

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

MID Model No.: PC789BXC,Trio Stealth G4 7.85

FCC ID: PWK-PC789BXC

Prepared for	:	HONG KONG NATURAL SOUND ELECTRONICS LIMITED
Address	:	FLAT/RM M 4/F CONTINENTAL MANSION 300 KING'S ROAD HONG KONG
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Report Number	:	ATE20140462
Date of Test	:	Apr 01-10,2014
Date of Report	:	Apr 11,2014



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Test Report Certification

Applicant	: HONG KONG NATURAL SOUND ELECTRONICS LIMITED
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Manufacturer : Natural Sound Electronics (Shenzhen) Co., Ltd.

EUT Description : MID

- (A) MODEL NO.: PC789BXC, Trio Stealth G4 7.85
- (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 :

Prepared by :

Apr 01-10,2014

hend

(Engineer)

Approved & Authorized Signer :

(Sean Liu, Manager)



1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT Model Number	:	MID PC789BXC,Trio Stealth G4 7.85 Note: These samples are same except for the model number is difference. So we prepare the PC789BXC 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, 1.5m
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,
Date of sample received	:	Bao'an District, Shenzhen, China Apr 01, 2014
Date of Test	:	Apr 01-10,2014



Channel	Frequceny (MHz)	Channel	Frequceny (MHz)	Channel	Frequceny (MHz)	Channe 1	Frequceny (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

1.2.Carrier Frequency of Channels

1.3. Special Accessory and Auxiliary Equipment

N/A



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 Site Location	:	ACCURATE TECHNOLOGY CO. LTD 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 (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2



2. MEASURING DEVICE AND TEST EQUIPMENT

				1	
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

Table 1: List of Test and Measurement Equipment



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 S	Setup: Transm	nitting mode	



4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	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.



5.5.Test Procedure

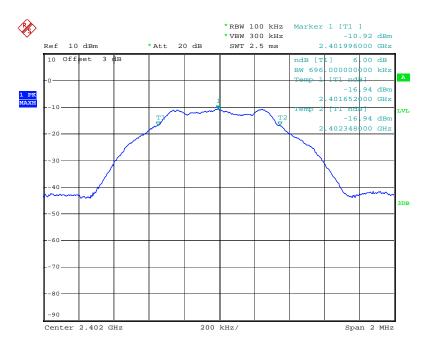
- 5.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 5.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to300 kHz.
- 5.5.3.The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

5.6.Test Result

Channel	Frequency (MHz)	6 dB Bandwith (MHz)	Minimum Limit(MHz)	PASS/FAIL
0	2402	0.696	0.5	PASS
19	2440	0. 676	0.5	PASS
39	2480	0. 704	0.5	PASS

The spectrum analyzer plots are attached as below.

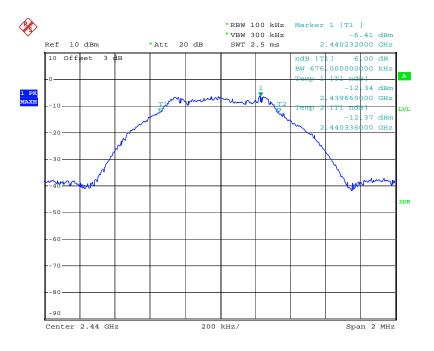
channel 0



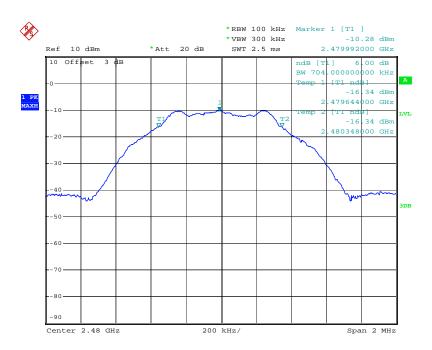
Date: 10.APR.2014 15:34:56



channel 19



Date: 10.APR.2014 15:32:52



channel 39

Date: 10.APR.2014 15:32:03



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.



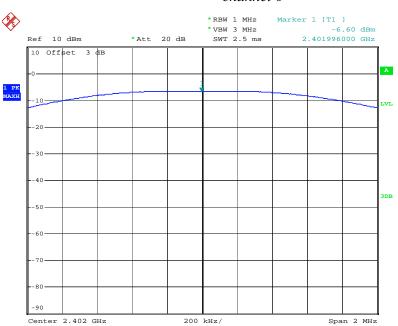
6.5.Test Procedure

- 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.

Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
0	2402	-6.60	30	PASS
19	2440	-5.67	30	PASS
39	2480	-5.26	30	PASS

6.6.Test Result

The spectrum analyzer plots are attached as below.



channel 0

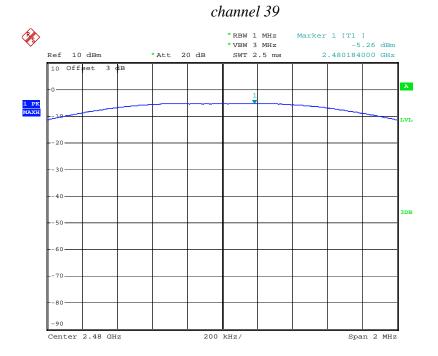
Date: 10.APR.2014 15:28:09



channel 19

X	Ref 10 dBm	*Att 20 dB	*VBW 3 MHz	Marker 1 [T1] -5.67 dBm 2.440068000 GHz
	10 Offset 3 dB			
	-0		1	
1 PK MAXH	-10			LVL
	20			
	30			
	-40			
	50			3DB
	60			
	70			
	80			
	-90			
	Center 2.44 GHz	200	kHz/	Span 2 MHz

Date: 10.APR.2014 15:29:04

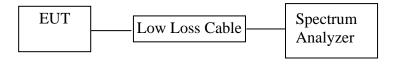


Date: 10.APR.2014 15:29:52



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.



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

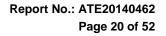
CHANNEL NUMBER	FREQUENCY (MHz)	PSD (dBm/3KHz)	LIMIT (dBm/3KHz)	PASS/FAIL
0	2402	-22.11	8	PASS
19	2440	-21.23	8	PASS
39	2480	-19.90	8	PASS

The spectrum analyzer plots are attached as below.

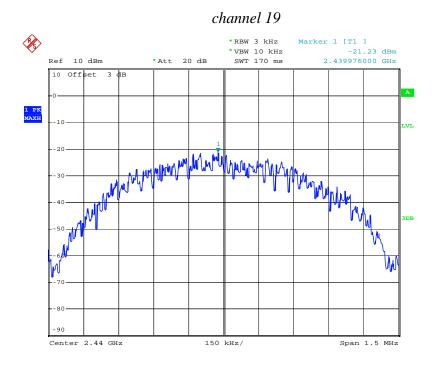
*RBW 3 kHz Marker 1 [T1] *VBW 10 kHz SWT 170 ms -22.11 dBm 2.401976000 GHz 10 dBm Ref * Att 20 dB 10 Offset A 1 PK MAXH LVL 20 away pro all a the Maria My Maria thous hours M DB h 90 Center 2.402 GHz 150 kHz/ Span 1.5 MHz

channel 0

Date: 10.APR.2014 15:36:46

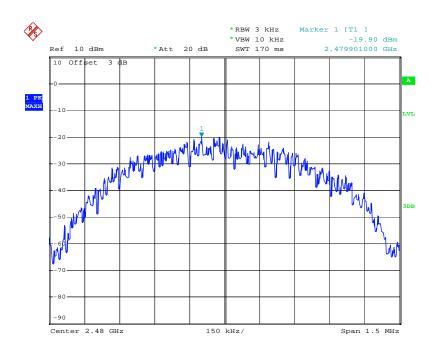






Date: 10.APR.2014 15:37:21



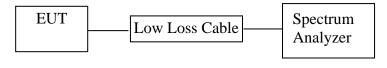


Date: 10.APR.2014 15:38:39



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 15.209(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.



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 cable.
- 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:

RBW=1MHz, VBW=1MHz

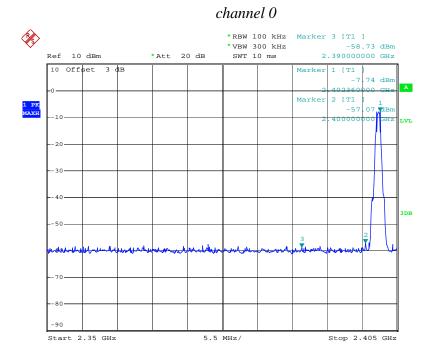
8.5.7.The band edges was measured and recorded.

8.6.Test Result

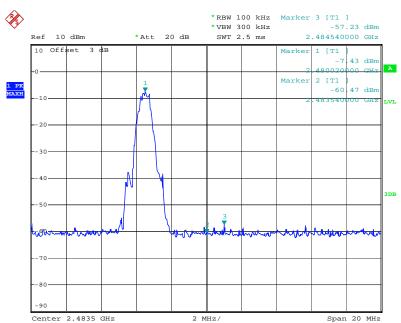
Pass

Channel	Frequency	Delta peak to band emission	Limit(dBc)
0	2390.0MHz	50.99	20
39	2484.5MHz	49.80	20





Date: 10.APR.2014 15:42:40



channel 39

Date: 10.APR.2014 15:40:53

Radiated Band Edge Result

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.

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and the	A MEL A PROPERTY OF	Sci	ence & Ind	dustry Park,	Nanshan Sh	enzhen,	P.R.Chi	na	Fax	:+86-0/55-2650338
Job No	b.: RICKY #64	47				F	olarizati	ion: \	/ertical	
Standa	rd: FCC PK Power Source: AC 120V/60Hz									
Fest it	em: Radiatio	n Test		Date: 14/04/07/						
Temp.	(C)/Hum.(%) 23 C/4	9 %			Т	ime: 10/	22/32		
EUT:	MID					E	Ingineer	Signat	ure: R	icky
Mode:	TX 2402M	Hz					Distance:	-		
Model:	PC789BX	c								
	acturer: Natur									
Note:			62							
vole.	Report No .:.	A1E201404	02							
108).0 dBuV/m									
									limit	
98								202000000	A limit2	2:
00									N = 1	
88									11	
78									1	
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68										
58										
48								1		
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28										
18										
8.0	2310.000									2420.0 MHz
	1			ř doba do	1					
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
	2393.970	48.78	-7.50	41.28	74.00	-32.72	peak			
	2393.970	43.54	-7.50	36.04	54.00	-17.96	AVG			
		00.00	-7.46	61.53	74.00	-12.47	peak			
3	2400.000	68.99	-7.40	01.55	74.00	-12.47	peak			



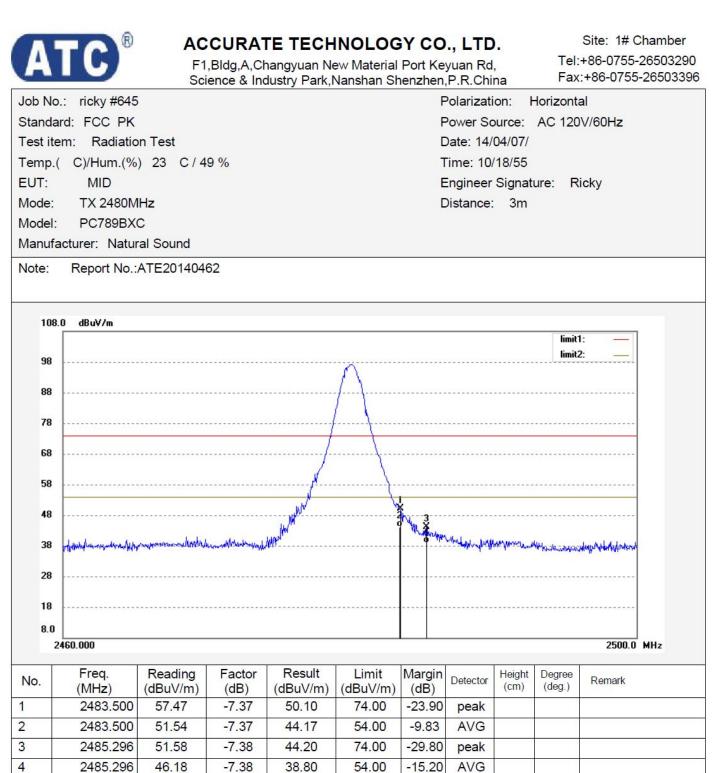


F1,Bldg,A,Changyuan New Material Port Keyuan Rd, Science & Industry Park,Nanshan Shenzhen,P.R.China Site: 1# Chamber Tel:+86-0755-26503290 Fax:+86-0755-26503396

andard: FCC PK Power Source: AC 120V/60Hz stitem: Radiation Test Date: 14/04/07/ Time: 10/24/24 JT: MID Engineer Signature: Ricky del: TX 2402MHz Distance: 3m del: PC789BXC anufacturer: Natural Sound the: Report No.:ATE20140462 108.0 dBwV/m 98 98 98 98 98 98 98 99 99 99	In Comp Street Street	Science & Inc	dustry Park,	Vanshan Sh	enzhen,P	R.Chin	a	Fax	:+86-0/55	-265033
st item: Radiation Test Date: 14/04/07/ mp.(C)/Hum.(%) 23 C / 49 % Time: 10/24/24 JT: MID Engineer Signature: Ricky Distance: 3m Jobel: TX 2402MHz Distance: 3m 108.0 dBuV/m 108.0 dBuV/m 108.	ob No.: RICKY #648				Po	larizatio	on: Ho	orizont	al	
mp. (C)/Hum.(%) 23 C/49 % Time: 10/24/24 JT: MID Engineer Signature: Ricky bde: TX 2402MHz Distance: 3m bdel: PC789BXC anufacturer: Natural Sound the: Report No.:ATE20140462 108.0 dBwV/m International Internation International International International International Interna	tandard: FCC PK				Po	wer Sou	urce: A	AC 120	V/60Hz	
DT: MID Engineer Signature: Ricky Distance: 3m bdel: PC789BXC anufacturer: Natural Sound the: Report No.:ATE20140462 108.0 dBuV/m 98 98 98 98 99 99 99 99 99 99	est item: Radiation 1	est			Da	ate: 14/0	4/07/			
bde: TX 2402MHz Distance: 3m bdel: PC789BXC anufacturer: Natural Sound tte: Report No.:ATE20140462 108.0 dBuV/m 108.0 dBu	emp.(C)/Hum.(%)	23 C / 49 %			Tir	ne: 10/2	24/24			
bille: PC789BXC anufacturer: Natural Sound te: Report No.:ATE20140462	UT: MID				En	gineer s	Signatu	re: R	icky	
anufacturer: Natural Sound ite: Report No.:ATE20140462 108.0 dBuV/m 109.0 dBuV/m 100.000 dBuV/m 100.000 2420.0 100.000 2420.0	lode: TX 2402MHz				Dis	stance:	3m			
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Freq. Reading Factor Result Limit Margin Detector Height Degree Remark	A STATE AND A STAT								2420.0	MH ₂
	2010.000								2420.0	.4112
					Margin (dB)	Detector			Remark	

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark	
1	2396.203	49.24	-7.49	41.75	74.00	-32.25	peak				
2	2396.203	44.33	-7.49	36.84	54.00	-17.16	AVG				
3	2400.000	70.24	-7.46	62.78	74.00	-11.22	peak				
4	2400.000	60.12	-7.46	52.66	54.00	-1.34	AVG				







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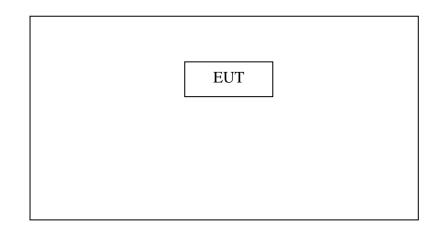
Job No.: ri	cky #646				turionan or		Polarizati		/ertical		
Standard:				Power Source: AC 120V/60Hz							
	item: Radiation Test						Date: 14/04/07/				
	emp.(C)/Hum.(%) 23 C / 49 %							20/46			
	MID) 23 0/4	5 70				Engineer			icky	
	X 2480M	1U-					Distance:	-	ure. IN	ICKY	
	C789BX						Jistance.	SIII			
Manufacture											
Note: Re	port No.:	ATE201404	62								
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2460.00	DO									2500.0	MHz
	req. //Hz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark	
1 2	483.500	55.42	-7.37	48.05	74.00	-25.95	peak				
2 2	483.500	50.11	-7.37	42.74	54.00	-11.26	AVG				
3 2	486.461	50.74	-7.39	43.35	74.00	-30.65	peak				
4 2	486.461	45.22	-7.39	37.83	54.00	-16.17	AVG		2		



9. RADIATED SPURIOUS EMISSION TEST

9.1.Block Diagram of Test Setup

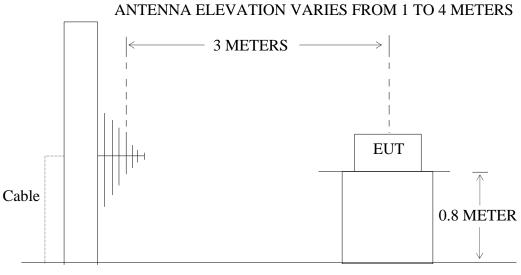
9.1.1.Block diagram of connection between the EUT and peripherals



Setup: Transmitting mode

(EUT: MID)

9.1.2.Semi-Anechoic Chamber Test Setup Diagram



GROUND PLANE



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:

I ·	inter in any of the freque	ney builds 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	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			

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

2 Above 38.6

(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.



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

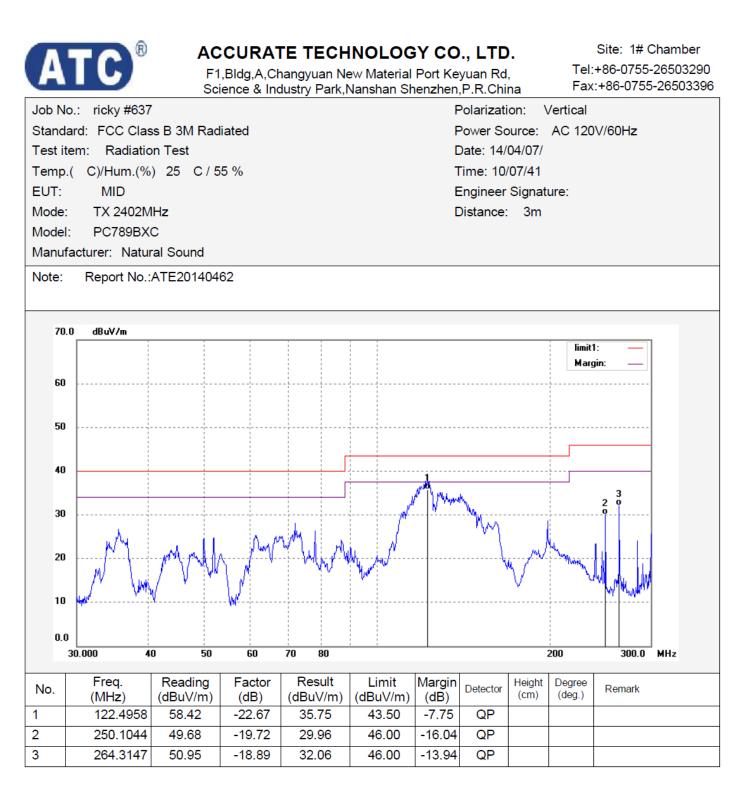
Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.

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.

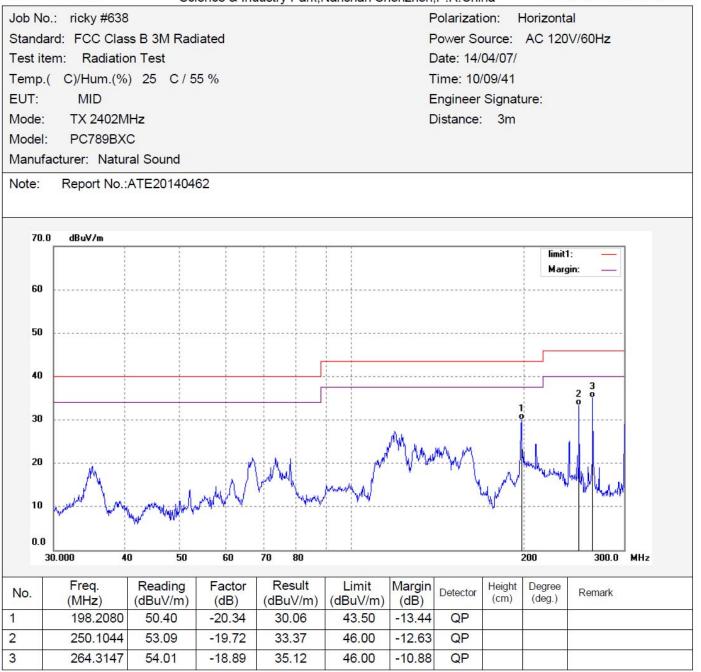
4. The average measurement was not performed when peak measured data under the limit of average detection.







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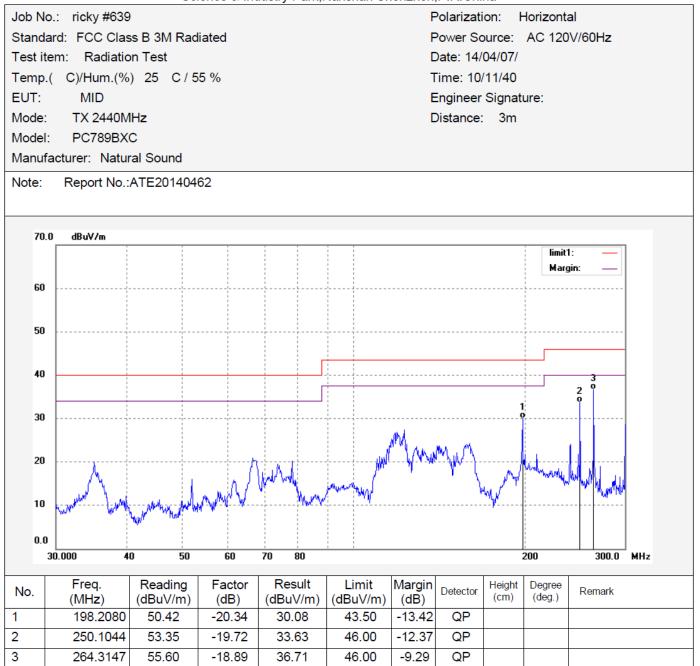
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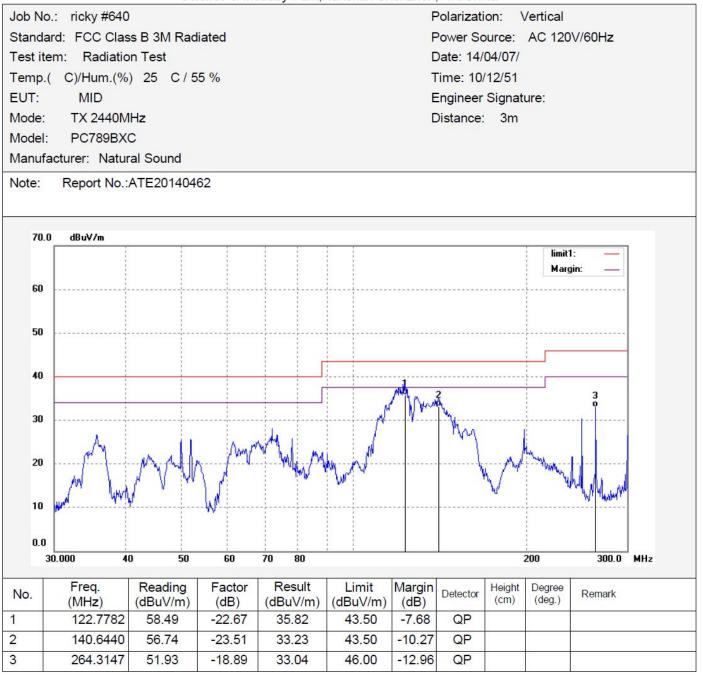




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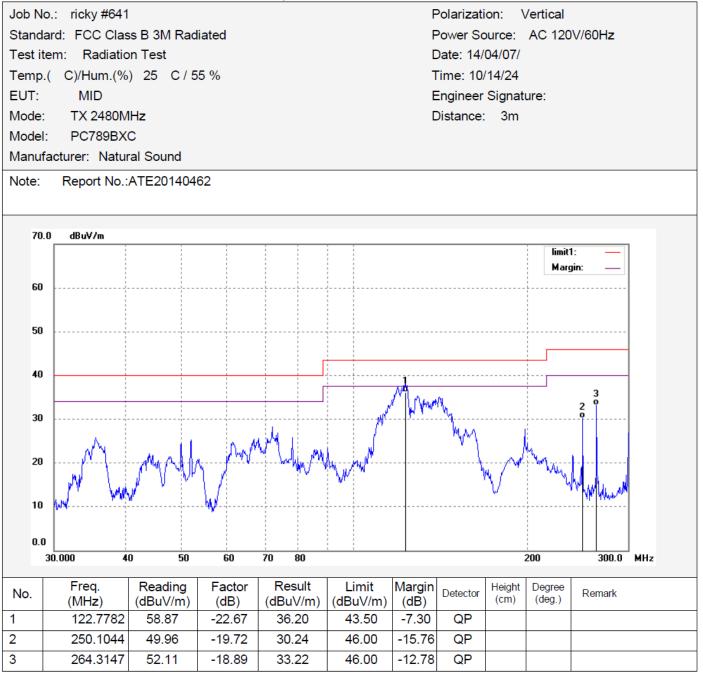




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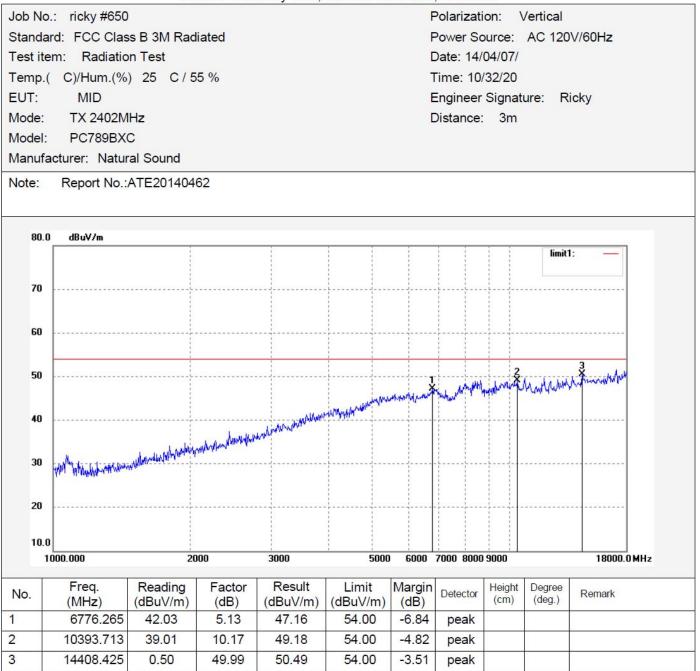
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Job No.: ricky #64		inte d				Polarizati				
Standard: FCC Cl		lated				Power So		AC 120	V/OUHZ	
Test item: Radiat					-	Date: 14/				
Temp.(C)/Hum.(%) 25 C/5	5 %				Time: 10/30/33 Engineer Signature: Ricky				
EUT: MID						-	-	ure: Ri	icky	
Mode: TX 2402					l	Distance:	3m			
Model: PC789B										
Manufacturer: Nat	ural Sound									
Note: Report No	.:ATE201404	62								
80.0 dBu∀/m										
								limit1	l: —	
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1000.000	20	000	3000	5000	6000	7000 8000	9000		18000.0 MHz	
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1 6841.81		5.30	48.22	54.00	-5.78	peak				
2 9657.13		10.64	51.13	54.00	-2.87	peak				
3 18000.00	0 1.19	51.60	52.79	54.00	-1.21	peak				



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Lala NLa								\			
	o.: ricky #651						Polarization: Vertical Power Source: AC 120V/60Hz				
	ard: FCC Clas		lated						AC 120)V/60Hz	
	em: Radiatio						Date: 14/				
	.(C)/Hum.(%)) 25 C/5	5 %				Time: 10/33/54				
EUT:	MID						Engineer	-	ure: R	licky	
Mode:						[Distance	3m			
Model:	: PC789BX	C									
Manufa	acturer: Natur	al Sound									
Note:	Report No.:	ATE201404	62								
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50 40 30 20 10.1 1	0 Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	3000 Result (dBuV/m)	5000 Limit (dBuV/m)	6000 Margin (dB)	7000 8000	9000 Height	Degree		



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Job No	o.: ricky #652			addiry Fart,			Polarizati		Horizonta	al	
	ard: FCC Clas		liated			F	Power So	ource:	AC 120	V/60Hz	
Test ite	em: Radiatio	n Test				[Date: 14/	04/07/			
Temp.	(C)/Hum.(%) 25 C/5	5 %			7	Time: 10/37/16				
EUT:	MID	,				E	Engineer Signature: Ricky				
Mode:	TX 2440M	Hz					Distance: 3m				
Model:	PC789BX	С									
Manufa	acturer: Natur	al Sound									
Note:	Report No.:	ATE201404	62								
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1	1000.000	20	000	3000	5000	6000	7000 8000	9000		18000.0 MHz	
No.	Freq.	Reading	Factor	Result	Limit	Margin	Detector	Height (cm)	Degree (deg.)	Remark	
1	(MHz) 4218.186	(dBuV/m) 44.43	(dB) -1.27	(dBuV/m) 43.16	(dBuV/m) 54.00	(dB) -10.84	peak	(cm)	(uey.)		
·											
>	6001 626	42 77	3 50	46.97	54 00	-/ /2	neak				
2	6001.626 8638.400	42.77 40.41	3.50 8.69	46.27 49.10	54.00 54.00	-7.73 -4.90	peak peak				



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50 40 30 20 10.0 1	000.000 Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	3000 Result (dBuV/m)	5000 Limit (dBuV/m)	6000 Margin (dB)	7000 8000	99000 Height	Degree	18000.0 MHz	



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Report No.: ATE20140462

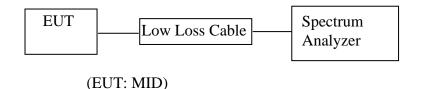
Page 42 of 52

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50 40 30 20 10.0 11	000.000 Freq. (MHz)	20 Reading (dBuV/m)	Factor (dB)	3000 Result (dBuV/m)	5000 Limit (dBuV/m)	6000 Margin (dB)	7000 8000 Detector	9000 Height	Degree	 18000.0 MHz	



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.



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.

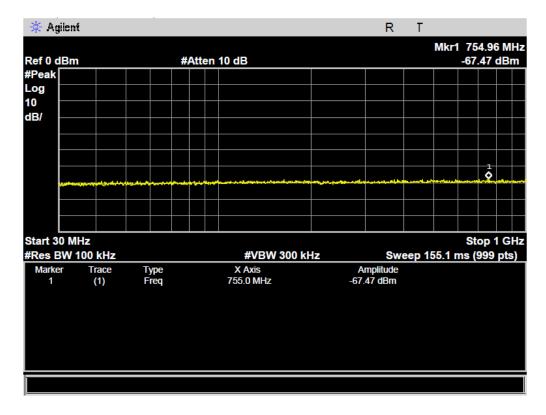
10.6.Test Result

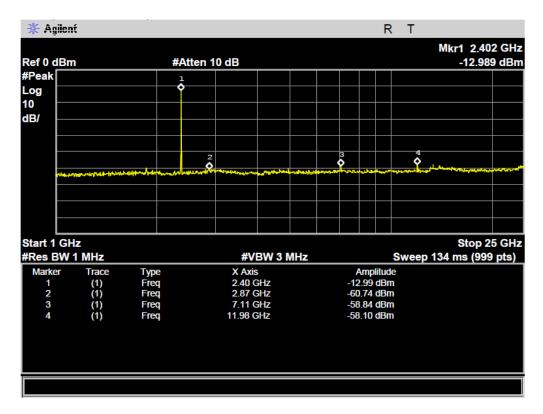
Pass.

The spectrum analyzer plots are attached as below.



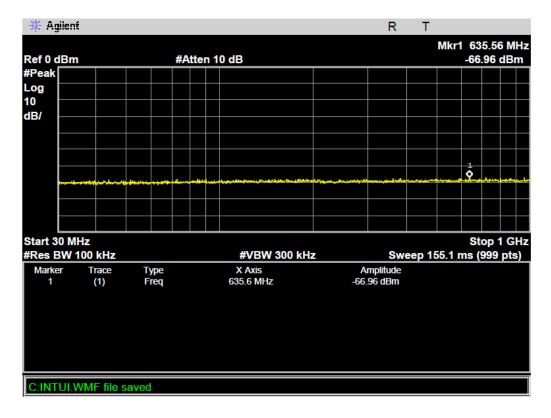
BLE Channel Low 2402MHz

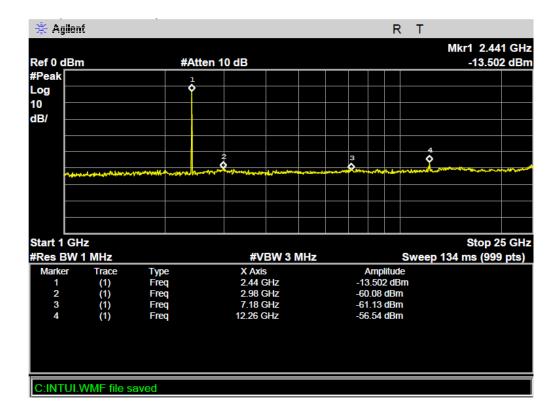






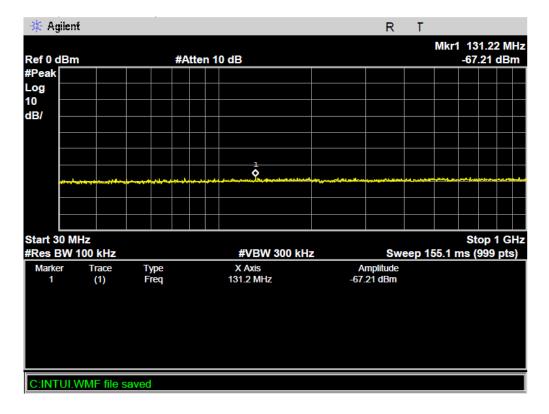
BLE Channel Middle 2440MHz







BLE Channel High 2480MHz

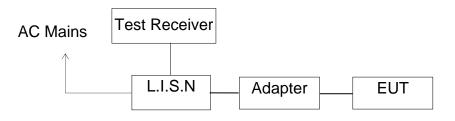


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11.POWER LINE CONDUCTED MEASUREMENT

11.1.Block Diagram of Test Setup



(EUT: MID)

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				
	all apply at the transition fre es linearly with the logarithm 0 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.



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 50ohm 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.

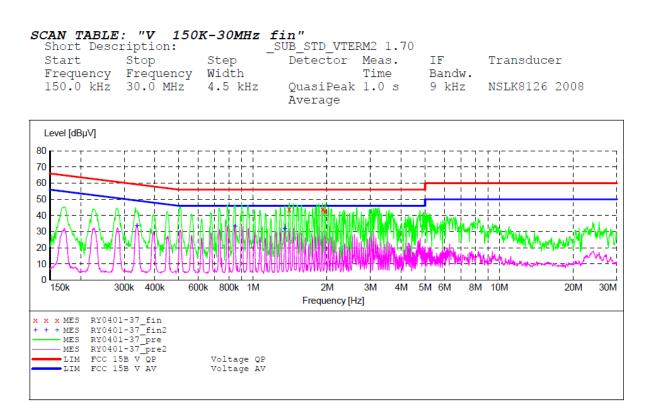
Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.



CONDUCTED EMISSION STANDARD FCC PART 15 B

EUT: MID M/N:PC789BXC(bluetooth) Manufacturer: Natural Sound Operating Condition: Operation Test Site: 1#Shielding Room Operator: Ricky Test Specification: L 120V/60Hz Comment: Report No.:ATE20140462



MEASUREMENT RESULT: "RY0401-37 fin"

4/1/2014 3:06PM

Frequency MHz		Transd dB			Detector	Line	PE
1.402718 1.915138 1.961563	43.90	11.0	56	12.1	ÕР	L1 L1 L1	GND GND GND

MEASUREMENT RESULT: "RY0401-37 fin2"

4/1/2014 3:06PM

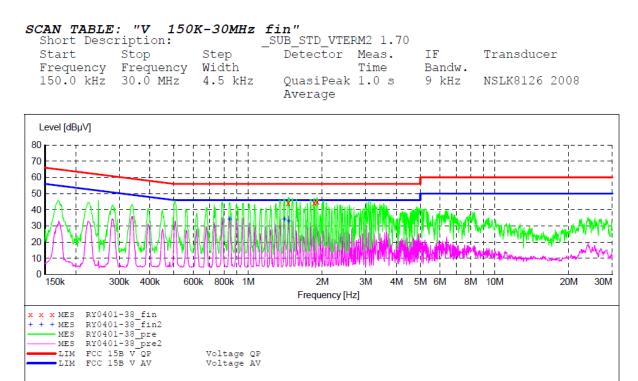
Frequency MHz		Transd dB			Detector	Line	PE
0.338664	33.80	10.6	49	15.4	AV	L1	GND
0.844868	33.40	10.8	46	12.6	AV	L1	GND
1.347824	31.70	10.9	46	14.3	AV	L1	GND



CONDUCTED EMISSION STANDARD FCC PART 15 B

EUT: MID M/N:PC789BXC(bluetooth) Manufacturer: Natural Sound Operating Condition: Operation Test Site: 1#Shielding Room Operator: Ricky Test Specification: N 120V/60Hz Comment:

Report No.:ATE20140462



MEASUREMENT RESULT: "RY0401-38 fin"

4/1/2014 3:09PM

Frequency MHz	Level dBµV		Limit dBµV	Margin dB	Detector	Line	PE
1.454032 1.854942 1.907508	44.30	10.9 11.0 11.0	56	11.9 11.7 10.9	ΏΡ	N N N	GND GND GND

MEASUREMENT RESULT: "RY0401-38 fin2"

4/1/2014 3:09PM

Frequency MHz		Transd dB		-	Detector	Line	PE
0.841502	33.90	10.8	46	12.1	AV	Ν	GND
1.402718	34.00	10.9	46	12.0	AV	Ν	GND
1.459848	32.90	10.9	46	13.1	AV	Ν	GND



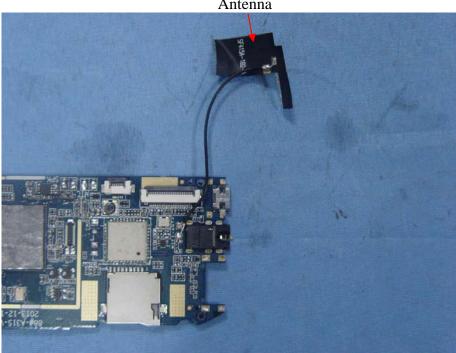
12.ANTENNA REQUIREMENT

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

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.



Antenna