

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC141137 Page: 1 of 47

FCC Radio Test Report FCC ID: 2ACSPNST-BS1

Original Grant

Report No. : TB-FCC141137

Applicant: Beijing Natural Smart-Tech Co., Ltd.

Equipment Under Test (EUT)

EUT Name: Bluetooth Speaker

Model No. : NST-BS1

Series Model : N/A

No.

Brand Name : O'xon

Receipt Date : 2014-07-04

Test Date : 2014-07-05 to 2014-07-23

Issue Date : 2014-09-02

Standards : FCC Part 15, Subpart C (15.247:2012)

Test Method : ANSI C63.4:2003

Conclusions : PASS

In the configuration tested, the EUT complied with the standards specified above,

The EUT technically complies with the FCC requirements

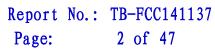
Test/Witness Engineer

3

Approved& Authorized

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

TB-RF-074-1.0





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1. General Information about EUT

1.1 Client Information

Applicant: Beijing Natural Smart-Tech Co., Ltd.

Address : Room 11C, Building B, No.28 Xinxi Road, Haidian District, Beijing,

China

Manufacturer: Beijing Natural Smart-Tech Co., Ltd.

Address : Room 11C, Building B, No.28 Xinxi Road, Haidian District, Beijing,

China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Bluetooth Speaker				
Models No.	:	NST-BS1	NST-BS1			
Model Difference	:	N/A.				
		Operation Frequency: 2402MHz~2480MHz				
Duaduat		Number of Channel:	Bluetooth 4.0 (BLE): 40 channels see note(3)			
Product Description	:	RF Output Power:	9.560 dBm Conducted Power			
Bescription		Antenna Gain:	0 dBi (PCB Antenna)			
		Modulation Type:	GFSK			
		Bit Rate of Transmitter:	1Mbps(GFSK)			
Power Supply	:	DC Voltage supplied from	n Host System by USB cable			
	DC power by Li-ion Battery		ery			
Power Rating	:	DC 5.0V by USB cable.				
		DC 3.7V 1000mAh Li-ion Battery				
Connecting I/O Port(S)	:	Please refer to the User's Manual				

Note:

- (1) This Test Report is FCC Part 15.247 for Bluetooth BLE, the test procedure follows the FCC KDB 558074 D01 DTS Meas Guidance v03r01.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (3) Antenna information provided by the applicant.
- (4) Channel List:

Channel	Frequency	Channel	Frequency	Channel	Frequency
	(MHz)		(MHz)		(MHz)

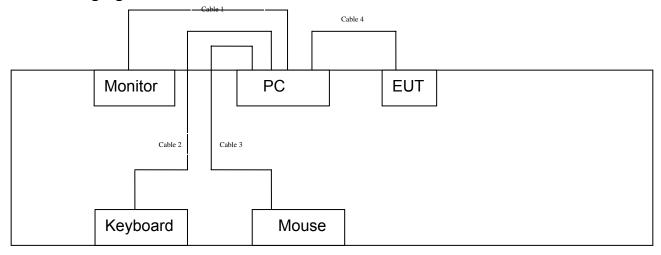


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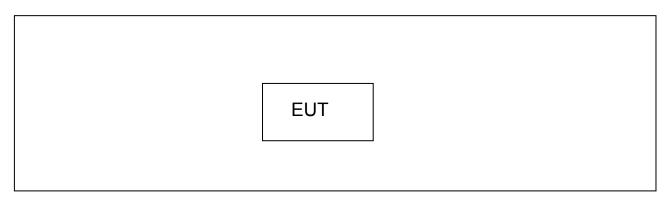
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

1.3 Block Diagram Showing the Configuration of System Tested

USB Charging Mode



TX Mode





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1.4 Description of Support Units

Equipment Information					
Name Model S/N Ma			Manufacturer	Used "√"	
LCD Monitor	E170Sc	DOC	DELL	√	
PC	OPTIPLEX380	DOC	DELL	V	
Keyboard	L100	DOC	DELL	V	
Mouse	M-UARDEL7	DOC	DELL	V	
		Cable Information			
Number	Shielded Type	Ferrite Core	Length	Note	
Cable 1	YES	YES(2)	1.8M		
Cable 2	YES	NO	1.5M		
Cable 3	YES	NO	1.5M		
Cable 4	YES	NO	0.4M	Accessories	

1.5 Description of Test Mode

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

For Conducted Test			
Final Test Mode	Description		
Mode 1	USB Charging Mode		

For Radiated Test				
Final Test Mode	Description			
Mode 2	USB Charging Mode			
Mode 3	TX Mode Channel 01/20/39			

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.4 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:



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Bluetooth BLE Mode: GFSK Modulation Transmitting mode.

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

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

Test Software Version	Test Program: BlueSuite 2.4.exe			
Channel	CH 01	CH 20	CH 39	
BLE Mode	DEF	DEF	DEF	



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1.7 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:

1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.



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2. Test Summary

FCC Part 15 Subpart C(15.247)/RSS-210: 2010					
Standar	rd Section	Test Item	Judgment	Domonis	
FCC	IC	rest item	Juagment	Remark	
15.203	1	Antenna Requirement	PASS	N/A	
15.207	RSS-GEN 7.2.4	Conducted Emission	PASS	N/A	
15.205	RSS-GEN 7.2.2	Restricted Bands	PASS	N/A	
15.247(a)(2)	RSS-210	6dB Bandwidth	PASS	N/A	
15.247 (a)(2)	A.8.2(a)	odb Bandwidth			
15.247(b)	RSS-210	Peak Output Power	PASS	N/A	
13.247(0)	A.8.4(4)	Feak Output Fower	FAGG	IN/A	
15.247(e)	RSS-210	Dower Chartral Danaity	PASS	N/A	
15.247 (e)	A.8.2(b)	Power Spectral Density	PASS	IN/A	
15 247(d)	RSS-210	Transmitter Radiated Spurious	PASS	N/A	
15.247(d)	Annex 8 (A8.5)	Emission	FASS	IN/A	
15.247(d)	RSS-210	Antenna Conducted	PASS	N/A	
15.247 (u)	Annex 8 (A8.5)	Spurious Emission			

Note: "/" for no requirement for this test item.

N/A is an abbreviation for Not Applicable.



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3. Conducted Emission Test

3.1 Test Standard and Limit

3.1.1Test Standard FCC Part 15.207

3.1.2 Test Limit

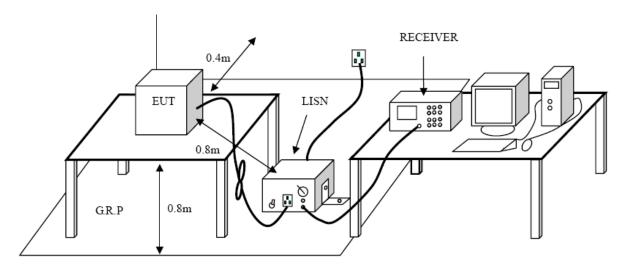
Conducted Emission Test Limit

Fraguanay	Maximum RF Line Voltage (dBμV)		
Frequency	Quasi-peak Level	Average Level	
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.2 Test Setup



3.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



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I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

3.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test	ROHDE&		400004	2013-08-10	2014-08-09
Receiver	SCHWARZ	ESCI	100321	2013-00-10	2014-08-09
50ΩCoaxial	Anritsu	MP59B	X10321	2013-08-10	2014-08-09
Switch	Aillisu	MESSE	X10321	2013-00-10	2014-00-09
L.I.S.N	Rohde & Schwarz	ENV216	101131	2013-08-10	2014-08-09
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	2013-08-10	2014-08-09

3.5 EUT Operating Mode

Please refer to the description of test mode.

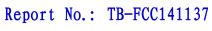
3.6 Test Data

Please see the next page.





EUT: Model: NST-BS1 Bluetooth Speaker **25** ℃ **Relative Humidity:** Temperature: 55% Test Voltage: AC 120V/60 Hz Terminal: Line **Test Mode:** USB Charging with TX Mode Remark: Only worse case is reported 100.0 dBuV QP: AVG: 0.0 (MHz) 30.000 0.150 0.5 Reading Correct Measure-Over Limit No. Mk. Freq. Level Factor ment MHz dBuV dΒ dBuV dBuV dΒ Detector Comment 0.5460 35.42 QΡ 1 10.04 45.46 56.00 -10.54 0.5460 46.00 -7.45 AVG 2 28.51 10.04 38.55 56.00 -15.22 3 0.8300 30.69 10.09 40.78 QΡ 4 0.8300 21.90 10.09 31.99 46.00 -14.01 AVG QP 5 1.4780 28.58 10.06 38.64 56.00 -17.36 1.4780 22.22 46.00 -13.72 6 10.06 32.28 AVG 2.0500 29.02 QP 7 10.06 39.08 56.00 -16.92 8 2.0500 23.16 10.06 33.22 46.00 -12.78 AVG QΡ 9 2.6860 27.04 10.04 37.08 56.00 -18.92 22.67 32.71 46.00 -13.29 AVG 10 2.6860 10.04 27.19 60.00 -22.85 QΡ 11 5.0140 9.96 37.15 12 5.0140 22.98 9.96 32.94 50.00 -17.06 AVG





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EUT:	Bluetooth Speaker	Model:	NST-BS1								
Temperature:	25 ℃	Relative Humidity:	55%								
Test Voltage:											
Terminal: Neutral											
Test Mode:	Test Mode: USB Charging with TX Mode										
Remark:	Remark: Only worse case is reported										
100.0 dBuV											
0.0	0.5 (M	M2) 5	QP:								
No. Mk. Fred	Reading Correct	Measure- ment Limit Over	r								
MHz	<u> </u>	dBuV dBuV dB	Detector Comment								
1 0.174	0 34.69 10.12	44.81 64.76 -19.95	QP QP								
2 0.174	0 33.99 10.12	44.11 54.76 -10.65	5 AVG								
3 0.554	0 35.96 10.02	45.98 56.00 -10.02	QP								
4 * 0.554	0 28.17 10.02	38.19 46.00 -7.81	AVG								
5 1.481	9 28.12 10.11	38.23 56.00 -17.77	' QP								
6 1.481	9 22.04 10.11	32.15 46.00 -13.85	5 AVG								
7 2.050	0 28.83 10.06	38.89 56.00 -17.11	QP								
8 2.050	0 22.91 10.06	32.97 46.00 -13.03	AVG								
9 2.758	0 25.37 10.06	35.43 56.00 -20.57	' QP								
10 2.758	0 20.99 10.06	31.05 46.00 -14.95	AVG								
11 5.006	0 25.81 10.06	35.87 60.00 -24.13	QP								
12 5.006	0 22.67 10.06	32.73 50.00 -17.27	' AVG								
Emission Level=	Read Level+ Correct Fa	actor									



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4. Radiated Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard FCC Part 15.209

4.1.2 Test Limit

Radiated Emission Limits (9kHz~1000MHz)

(0.000)						
Frequency (MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)				
0.009~0.490	2400/F(KHz)	300				
0.490~1.705	24000/F(KHz)	30				
1.705~30.0	30	30				
30~88	100	3				
88~216	150	3				
216~960	200	3				
Above 960	500	3				

Radiated Emission Limit (Above 1000MHz)

Frequency	Class A (dBuV	/m)(at 3 M)	Class B (dBuV/m)(at 3 M)		
(MHz)	Peak	Average	Peak	Average	
Above 1000	80	60	74	54	

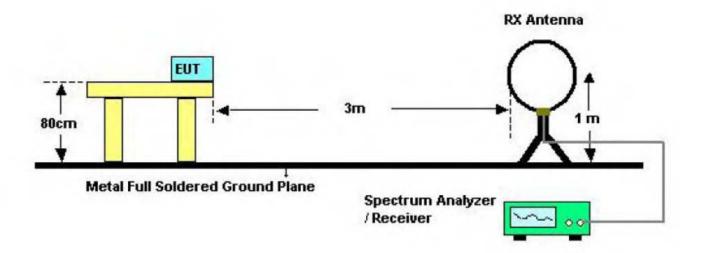
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

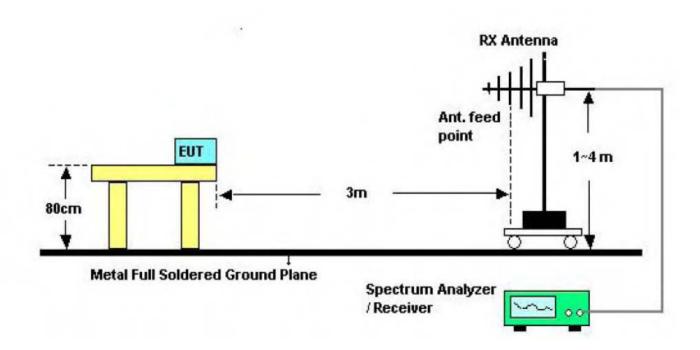


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4.2 Test Setup



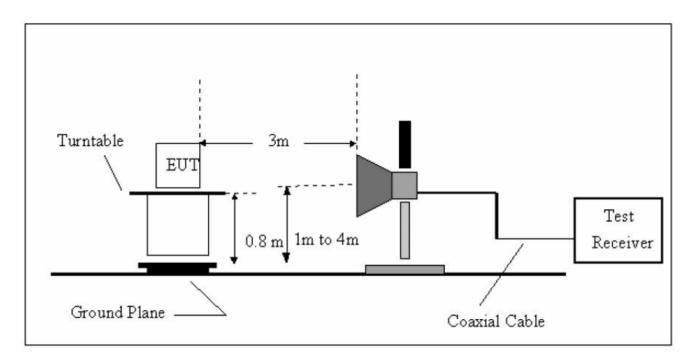
Below 30MHz Test Setup



Below 1000MHz Test Setup

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Above 1GHz Test Setup

4.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (5) For the actual test configuration, please see the test setup photo.

4.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

4.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015



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Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 10, 2013	Aug.09, 2014	
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 10, 2013	Aug.09, 2014	
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015	
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 07, 2014	Mar.06, 2015	
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015	
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 07, 2014	Mar.06, 2015	
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015	
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015	
Cable	HUBER+SUHNE R	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015	
Signal	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015	
Generator	Ttorido & Coriwarz	CIVILOU	11111002 004	1 00. 11, 2014	1 00.10, 2010	
Positioning	ETS-LINDGREN	2090	N/A	N/A	N/A	
Controller	210 ENABOREN	2000	1471	14// \	IN/A	

4.6 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Test data please refer the following pages.



TOBY

EUT:	Bluetooth Speake	er M o	odel:	NST-BS1				
Temperature:	25 °C Relative Humidity: 55%							
Test Voltage:	AC 120V/60 Hz							
Ant. Pol.	Horizontal							
Test Mode:	USB Charging with TX Mode							
Remark:	Only worse case	is reported						
80.0 dBuV/m								
-20	2 White man white the state of	Alphorner of the following of	5 3 X	FCC 15C 3M Radiation Margin -6 dB				
30.000 40 50	60 70 80	(MHz)	300 400	500 600 700 1000.000				
	Reading req. Level	Correct Factor	Measure- ment Limi					
	1Hz dBuV	dB/m	dBuV/m dBu\					
	40.68	-24.40	16.28 40.0	00 -23.72 peak				
2 98.4	4866 39.29	-21.95	17.34 43.	50 -26.16 peak				
3 240.	8304 50.52	-18.56	31.96 46.0	00 -14.04 peak				
4 259.	2338 52.44	-17.92	34.52 46.0	00 -11.48 peak				
5 * 360.	4476 54.01	-14.55	39.46 46.0	00 -6.54 peak				
6 419.	1081 48.81	-12.89	35.92 46.0	00 -10.08 peak				
Emission Level=	Read Level+ Corr	ect Factor						

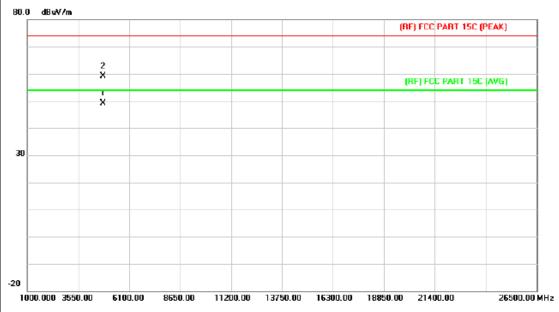


EUT: Bluetooth Speaker Model: NST-BS1 Temperature: 25 ℃ **Relative Humidity:** 55% **Test Voltage:** AC 120V/60 Hz Ant. Pol. Vertical **Test Mode:** USB Charging with TX Mode Remark: Only worse case is reported 80.0 dBuV/m (RF)FCC 15C 3M Radiation Margin -6 dB 30 -20 30.000 (MHz) 500 600 700 1000.000 60 70 80 400 50 Correct Reading Measure-Limit Over No. Mk. Freq. Factor Level ment dBuV dBuV/m MHz dBuV/m dΒ Detector dB/m 1 44.70 -24.41 20.29 -19.71 51.4807 40.00 peak 2 68.1514 40.25 -23.7816.47 40.00 -23.53 peak 3 148.4410 38.59 -21.30 17.29 43.50 -26.21 peak 4 27.57 253.8367 45.61 -18.04 46.00 -18.43 peak 5 361.7139 40.56 -14.54 26.02 46.00 -19.98 peak 6 -22.60 677.5798 30.88 -7.48 23.40 46.00 peak



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EUT:	Bluetooth Speaker	Model:	NST-BS1				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	BLE Mode TX 2402 MHz						
Remark:	No report for the emission	n which more than 10 c	B below the				
	prescribed limit.						
ma my							

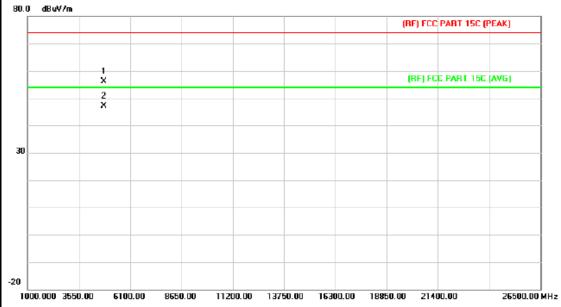


	No.	Mk.	Freq.	Reading Level	Correct Factor	Me asure- ment	Limit	Ov er	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	αÐ	Detector
1		*	4803.991	35.79	13.44	49.23	54.00	-4.77	AVG
2			4804.018	45.66	13.44	59.10	74.00	-14.90	peak



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EUT:	Bluetooth Speaker	Model:	NST-BS1				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Vertical	Vertical					
Test Mode:	BLE Mode TX 2402 MHz	BLE Mode TX 2402 MHz					
Remark:	No report for the emissio	n which more than 10 c	B below the				
	prescribed limit.						
80.0 dBuV/m							



No.	Mk	. Freq.	Reading Level		Measure- ment	Limit	Ov er	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	αÐ	Detector
1		4804.006	42.74	13.44	56.18	74.00	-17.82	peak
2	*	4804.006	33.79	13.44	47.23	54.00	-6.77	AVG



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EUT:	Bluetooth Speaker	Model:	NST-BS1				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	BLE Mode TX 2442 MHz						
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

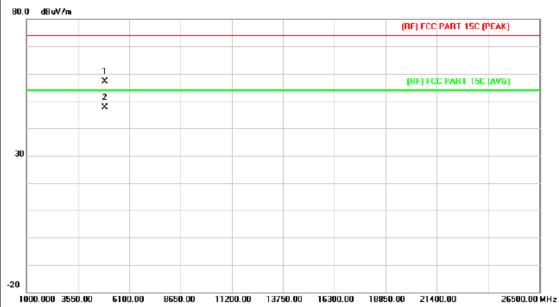


	No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Ov er	
_			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	αÐ	Detector
7	1	*	4883.988	35.72	13.92	49.64	54.00	-4.36	AVG
- 2	2		4884.078	44.63	13.92	58.55	74.00	-15.45	peak



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EUT:	Bluetooth Speaker	Model:	NST-BS1			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical					
Test Mode:	BLE Mode TX 2442 MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

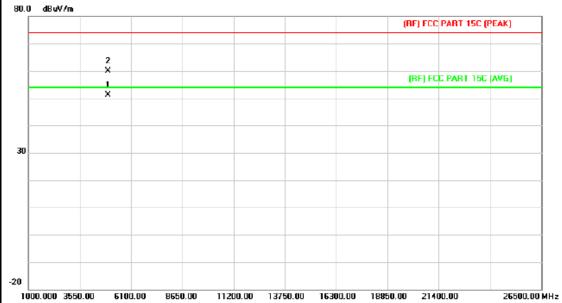


_	No.	Mk.	Freq.		Correct Factor	Measure- ment	Limit	Ov er	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	αÐ	Detector
	1		4883.883	43.10	13.92	57.02	74.00	-16.98	peak
	2	*	4883.931	33.62	13.92	47.54	54.00	-6.46	AVG



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Bluetooth Speaker	Model:	NST-BS1			
25 ℃	Relative Humidity:	55%			
DC 3.7V					
Horizontal					
BLE Mode TX 2480 MHz					
No report for the emission which more than 10 dB below the prescribed limit.					
	25 °C DC 3.7V Horizontal BLE Mode TX 2480 MHz No report for the emissio	25 °C Relative Humidity: DC 3.7V Horizontal BLE Mode TX 2480 MHz No report for the emission which more than 10 co			

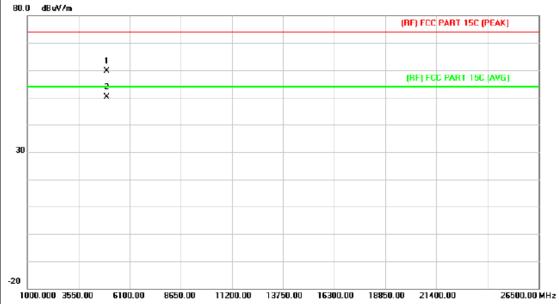


N	lo. N	Иk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Ov er	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	αÐ	Detector
1	*		4960.012	36.78	14.36	51.14	54.00	-2.86	AVG
2			4960.027	45.61	14.36	59.97	74.00	-14.03	peak



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EUT:	Bluetooth Speaker	Model:	NST-BS1			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical					
Test Mode:	BLE Mode TX 2480 MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					



No	. Mk.	Freq.	Reading Level		Measure- ment	Limit	Ov er	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	αÐ	Detector
1		4959.841	45.15	14.36	59.51	74.00	-14.49	peak
2	*	4959.913	35.81	14.36	50.17	54.00	-3.83	AVG



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5. Restricted Bands Requirement

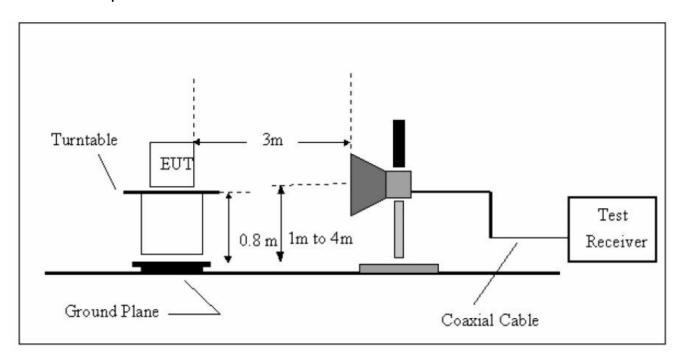
5.1 Test Standard and Limit

5.1.1 Test Standard FCC Part 15.209 FCC Part 15.205

5.1.2 Test Limit

Restricted Frequency	Class B (dBu	uV/m)(at 3 M)
Band (MHz)	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

5.2 Test Setup



5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit



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Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.

Peak Detection:

Set the center frequency of the emission to be measured (within 2 MHz of the authorized band edge), set span to 2 MHz, with RBW/VBW=100 kHz/300 kHz, detector mode is Peak, then use band power function to measure the Bandwidth of 1 MHz.

Average Detection (EUT transmitting continuously and duty cycle>=98 percent):

Set the center frequency of the emission to be measured (within 2 MHz of the authorized band edge), set span to 2 MHz, with RBW/VBW=100 kHz/300 kHz, detector mode is RMS or Average, then use band power function to measure the Bandwidth of 1 MHz.

(5) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 10, 2013	Aug.09, 2014
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 10, 2013	Aug.09, 2014
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

5.6 Test Data

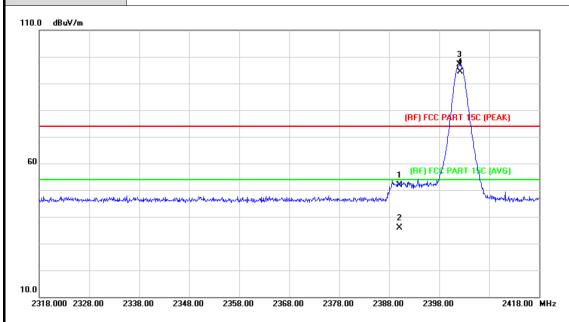
Please see the next page.



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(1) Radiation Test

EUT:	Bluetooth Speaker	Model:	NST-BS1					
Temperature:	25 ℃	25 °C Relative Humidity: 55%						
Test Voltage:	DC 3.7V							
Ant. Pol.	Horizontal							
Test Mode:	BLE Mode TX 2402 MHz							
Remark:	N/A							

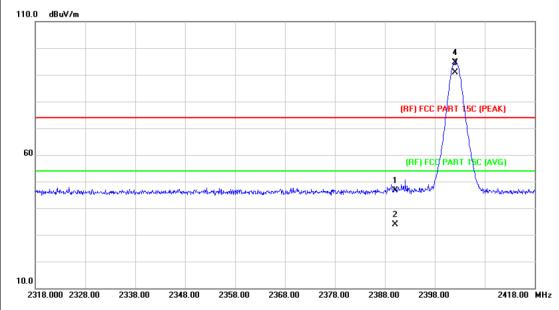


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	51.12	0.77	51.89	74.00	-22.11	peak
2		2390.000	35.14	0.77	35.91	54.00	-18.09	AVG
3	Χ	2402.100	96.21	0.82	97.03	74.00	23.03	peak
4	*	2402.200	93.62	0.82	94.44	54.00	40.44	AVG



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EUT:	Bluetooth Speaker	Model:	NST-BS1					
Temperature:	25 ℃	25 ℃ Relative Humidity: 55%						
Test Voltage:	DC 3.7V							
Ant. Pol.	Vertical							
Test Mode:	BLE Mode TX 2402 MHz							
Remark:	Remark: N/A							
110.0 dBuV/m								

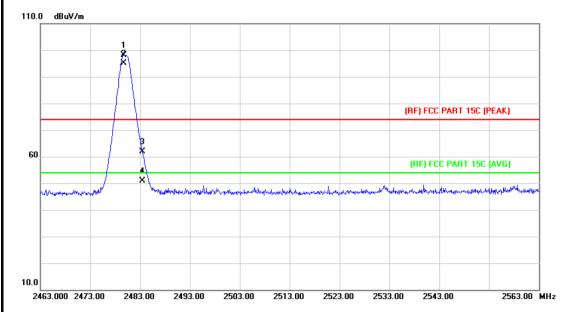


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	45.89	0.77	46.66	74.00	-27.34	peak
2		2390.000	32.99	0.77	33.76	54.00	-20.24	AVG
3	*	2402.000	90.12	0.82	90.94	54.00	36.94	AVG
4	Χ	2402.100	93.81	0.82	94.63	74.00	20.63	peak



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EUT:	Bluetooth Speaker	Model:	NST-BS1		
Temperature:	25 ℃	Relative Humidity:	55%		
Test Voltage:	DC 3.7V				
Ant. Pol.	Horizontal				
Test Mode:	BLE Mode TX 2480 MHz				
Remark:	N/A				

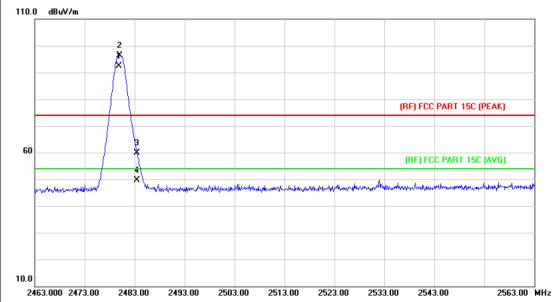


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ	2479.700	97.10	1.15	98.25	74.00	24.25	peak
2	*	2479.700	93.98	1.15	95.13	54.00	41.13	AVG
3		2483.500	60.65	1.17	61.82	74.00	-12.18	peak
4		2483.500	49.69	1.17	50.86	54.00	-3.14	AVG

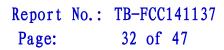


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EUT:	Bluetooth Speaker	Model:	NST-BS1	
Temperature:	25 ℃	Relative Humidity:	55%	
Test Voltage:	DC 3.7V			
Ant. Pol.	Vertical			
Test Mode:	BLE Mode TX 2480 MHz			
Remark:	N/A			



N	o. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.800	91.16	1.15	92.31	54.00	38.31	AVG
2	Х	2480.000	95.24	1.15	96.39	74.00	22.39	peak
3		2483.500	58.79	1.17	59.96	74.00	-14.04	peak
4		2483.500	48.54	1.17	49.71	54.00	-4.29	AVG





(2) Conducted Test

	Divate atta Con	alcan	Madali	NOT DO
:	Bluetooth Spe	aker	Model:	NST-BS1
perature:	25 ℃		Relative Humidity	y : 55%
Voltage:	DC 3.7V			
Mode:	BLE Mode TX	2402MHz /	BLE Mode TX 248	80MHz
nark:	The EUT is pr	ogramed in	continuously transi	mitting mode
* Agile	ent 15:02:34 Jul 16, 20	014		
Ref 20 d	IBm ##	Atten 30 dB		Mkr4 2.34975 GHz -46.46 dBm
1 dB DI -12.9 dBm	2.368 GHz V 100 kHz Trace Type (1) Freq (1) Freq (1) Freq (1) Freq (1) Freq	#VBW 3 X Axis 2.40200 GHz 2.39000 GHz 2.40000 GHz 2.34975 GHz	00 kHz Sweep Amplitude 7.052 dBm -48.73 dBm -39.15 dBm -46.46 dBm	Span 100 MHz 10.36 ms (401 pts)
Agile	enf 15:10:12 Jul 16, 20	014		
Ref 20 d		Atten 30 dB		Mkr2 2.48350 GHz -41.52 dBm
Peak Log 10 dB/ Offst 1 dB DI -11.1 dBm	Display Line -11.08 dBm -11.08 dBm 2.514 GHz V 100 kHz Trace Type (1) Freq	#VBW 3 X Axis 2.48025 GHz 2.48350 GHz 2.50000 GHz 2.48800 GHz	00 kHz Sweep Amplitude 8 928 dBm -41.52 dBm -49.76 dBm -49.15 dBm	Span 100 MHz 10.36 ms (401 pts)



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6. Bandwidth Test

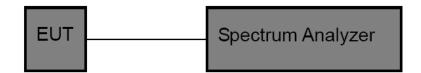
6.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247 (a)(2)

8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210				
Test Item	Limit	Frequency Range(MHz)		
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5		

6.2 Test Setup



6.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

6.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

6.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015



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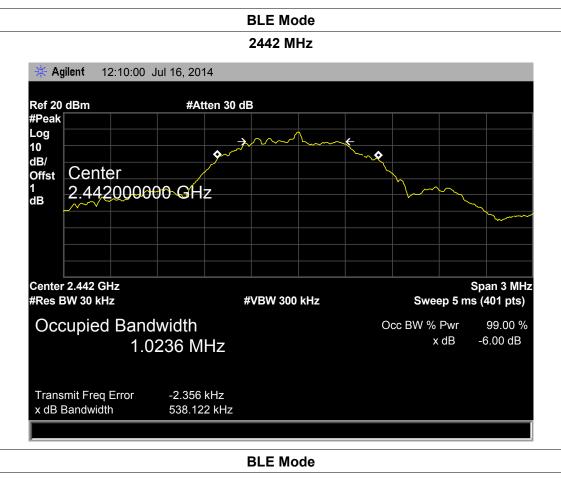
6.6 Test Data

EUT:	E	Bluetooth Speaker	Model:	NST-BS1	
Temperatu	erature: 25 °C		Relative Humidity:	55%	
Test Volta	ge: [DC 3.7V			
Test Mode): E	BLE TX Mode			
Channel f	requency	6dB Bandwidth	99% Bandwidth	Limit	
(MH	łz)	(kHz)	(kHz)	(kHz)	
240)2	543.166	1024.7		
24	42	538.122	1023.6	>=500	
248	30	537.829	1021.7		
		BLE	Mode		
		2402	? MHz		
* Agil	ent 12:10	:48 Jul 16, 2014			
Ref 20 d		#Atten 30 dB			
Ref 20 c #Peak Log 10					
Ref 20 c #Peak Log 10 dB/ Offst	_{IBm}	#Atten 30 dB			
Ref 20 c #Peak Log 10 dB/ Offst	_{IBm}	#Atten 30 dB			





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2480 MHz Agilent 12:11:51 Jul 16, 2014 Ref 20 dBm #Atten 30 dB #Peak Log 10 ø dB/ Center Offst 1 dB 2.480000000 GHz Center 2.48 GHz Span 3 MHz #Res BW 30 kHz **#VBW 300 kHz** Sweep 5 ms (401 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % -6.00 dB x dB 1.0217 MHz Transmit Freq Error -2.546 kHz x dB Bandwidth 537.829 kHz



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7. Peak Output Power Test

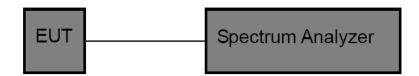
7.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247 (b)

9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210				
Test Item	Limit	Frequency Range(MHz)		
Peak Output Power	1 Watt or 30 dBm	2400~2483.5		

7.2 Test Setup



7.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above.

7.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

7.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015

7.6 Test Data



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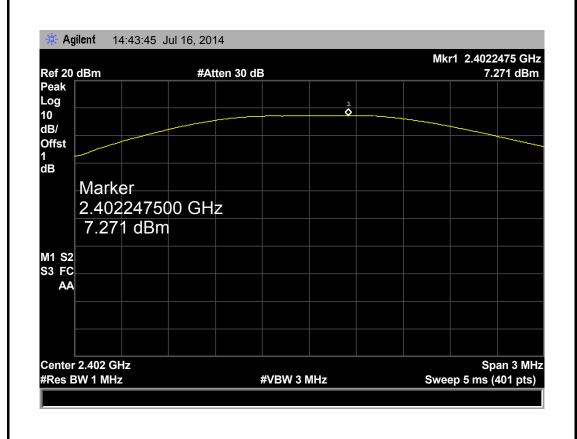
EUT:	Bluetooth Speaker	Model:	NST-BS1
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: **BLE TX Mode**

Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
2402	7.271	
2442	9.078	30
2480	9.560	

BLE Mode

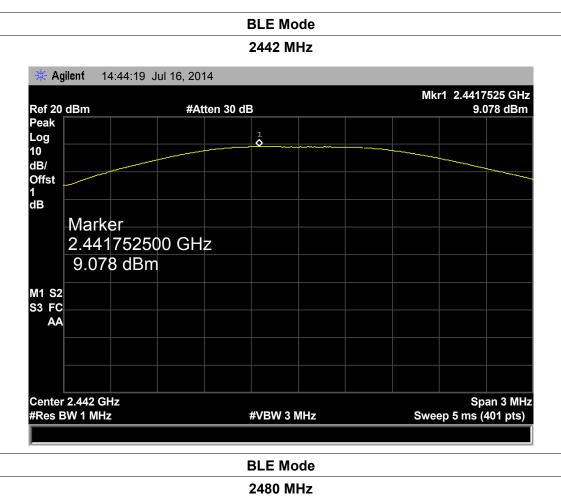
2402 MHz







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Agilent 14:45:53 Jul 16, 2014 Mkr1 2.4797900 GHz #Atten 30 dB 9.56 dBm Ref 20 dBm Peak Log $\stackrel{1}{\diamond}$ 10 dB/ Offst 1 dB Marker 2.479790000 GHz 9.56 dBm M1 S2 S3 FC AA Center 2.48 GHz Span 3 MHz #Res BW 1 MHz **#VBW 3 MHz** Sweep 5 ms (401 pts)



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8. Power Spectral Density Test

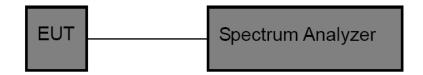
8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247 (e)

8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)					
Test Item	Limit	Frequency Range(MHz)			
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5			

8.2 Test Setup



8.3 Test Procedure

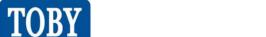
- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Measure the spectral power density the spectrum analyzer was set to Resolution Bandwidth=100 kHz, and Video Bandwidth≥300 kHz, Detector: Peak, Span to 5%~30% greater than EBW, Sweep time auto.
- (3) Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a BWCF=-15.2 dB.

8.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Midle and high channel for the test.

8.5 Test Equipment

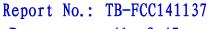
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015



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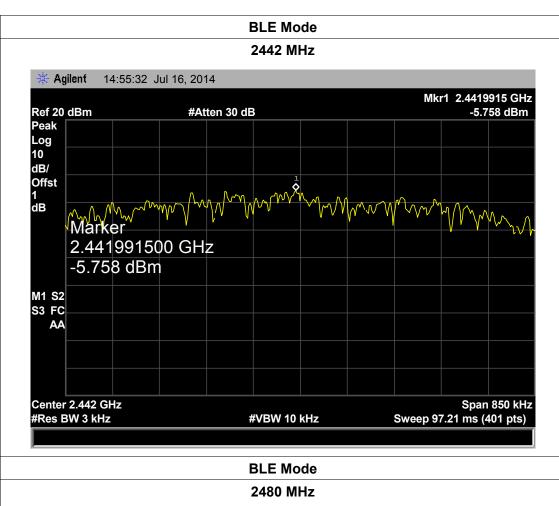
8.6 Test Data

JT:	Bluetooth Speaker		Model:		NST-BS1	
mperature:	-		Relative Hu	ımidity:	55%	
st Voltage:	DC 3.7V					
st Mode:	BLE TX M	ode				
Channel Frequ	uency	Power	Density		Limit (dBm)	
(MHz)		(3 kHz/dBm)				
2402		-7.954				
2442		-5	.758		8	
2480		-5	.233			
	1	BLE	Mode	· · ·		
		240	2 MHz			
Ref 20 dBm Peak Log	58:35 Jul 16, 2	2014 Atten 30 dB				
Ref 20 dBm Peak Log 10 dB/ Offst	#	Atten 30 dB			Mkr1 2.4019894 GH -7.954 dBm	
Ref 20 dBm Peak Log 10 dB/ Offst 1 dB	# ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Atten 30 dB	m ²	\~\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	-7.954 dBm	
Ref 20 dBm Peak Log 10 dB/ Offst 1 dB Markei 2.4019	# 289375 G	Atten 30 dB	m [‡] n~m	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	-7.954 dBm	
Ref 20 dBm Peak Log 10 dB/ Offst 1 dB	# 289375 G	Atten 30 dB	m ² n		-7.954 dBm	
Ref 20 dBm Peak Log 10 dB/ Offst 1 dB Markei 2.4019	# 289375 G	Atten 30 dB	W. N.		-7.954 dBm	
Ref 20 dBm Peak Log 10 dB/ Offst 1 dB Markei 2.4019 -7.954	# 289375 G	Atten 30 dB	m ² ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	-7.954 dBm	
Ref 20 dBm Peak Log 10 dB/ Offst 1 dB Markei 2.4019 -7.954	# 289375 G	Atten 30 dB	m ² n	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	-7.954 dBm	





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Agilent 14:54:50 Jul 16, 2014 Mkr1 2.4799894 GHz -5.233 dBm Ref 20 dBm #Atten 30 dB Peak Log 10 dB/ Offst 1 dB Marker Marker 2.479989375 GHz -5.233 dBm M1 S2 S3 FC AA Center 2.48 GHz Span 850 kHz #Res BW 3 kHz #VBW 10 kHz Sweep 97.21 ms (401 pts)



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9. Antenna Conducted Spurious Emission

9.1 Test Standard and Limit

10.1.1 Test Standard FCC Part 15.247 (d)

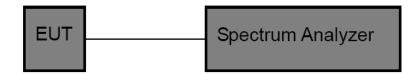
10.1.2 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)	
0.009~0.490	2400/F(KHz)	300	
0.490~1.705	24000/F(KHz)	30	
1.705~30.0	30	30	
30~88	100	3	
88~216	150	3	
216~960	200	3	
Above~960	500	3	

(2)If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

9.2 Test Setup



9.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.



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(2) Spectrum Setting:

RBW=100 KHz, VBW=300 KHz.

Frequency range: from 30MHz to 26.5 GHz.

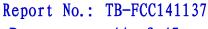
9.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

9.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015

9.6 Test Data

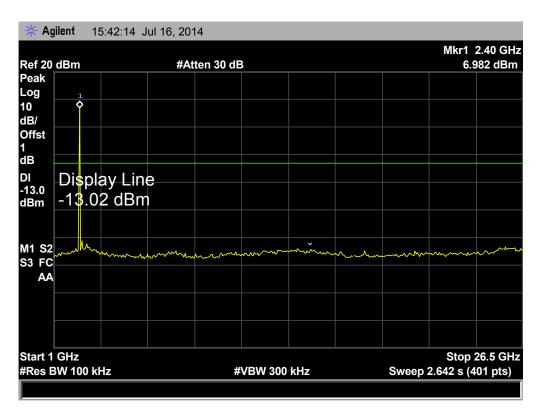




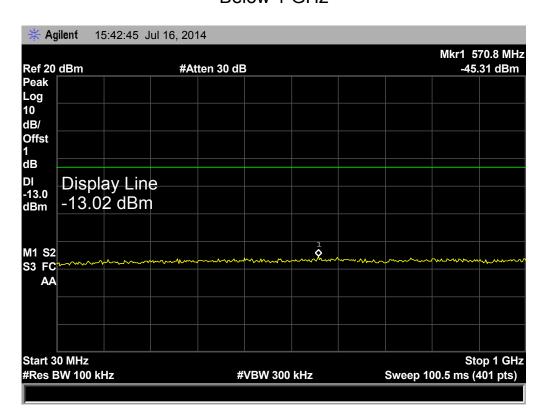
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BLE Mode TX CH 00 2402MHz

Above 1 GHz



Below 1 GHz



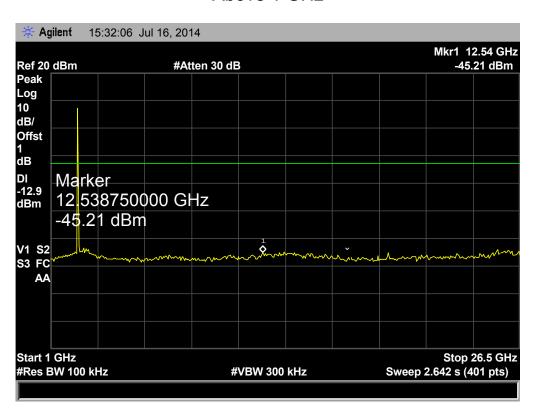




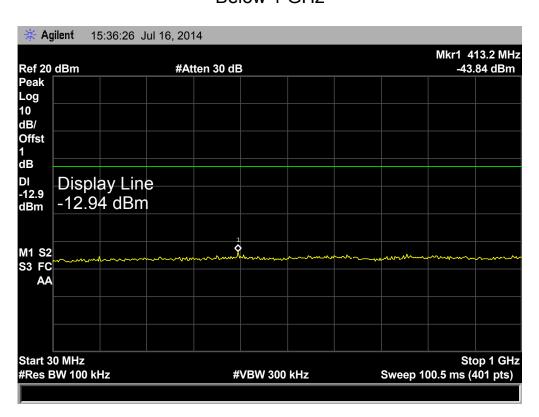
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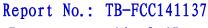
BLE Mode TX CH 20 2442MHz

Above 1 GHz



Below 1 GHz





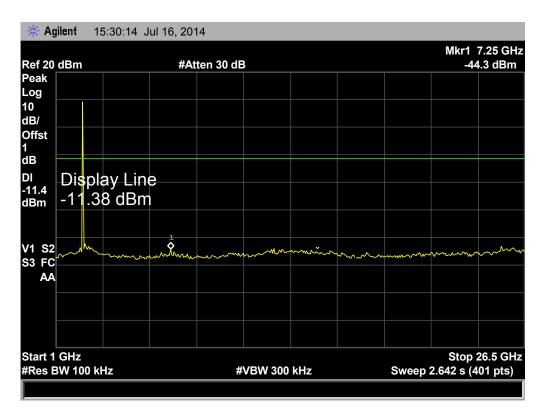


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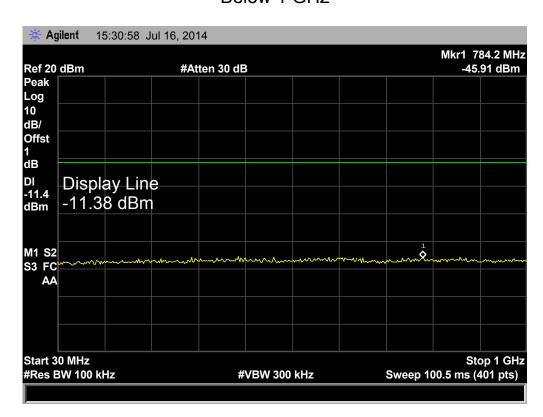
BLE Mode

TX CH 39 2480MHz

Above 1 GHz



Below 1 GHz





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10. Antenna Requirement

10.1 Standard Requirement

11.1.1 Standard

FCC Part 15.203

11.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0 dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

10.2 Result

The EUT antenna is a PCB Antenna. It complies with the standard requirement.