TCT 通测检测 TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: 2ACN6SBT651

Product: BLUETOOTH SPEAKER

Model No.: SBT651

Additional Model: PBT651, PBT3003, SBT1003, PBT626X2, PBT626-2, SBT3003, BTH-001, BT-03, BT-04, BT-80, BT-80B, BT-20, BT-23, PBT592, MS6974, PBT3005, PBT3004, SBT1006, SBT1007

Trade Mark: POLAROID, SHARPER IMAGE, ART+SOUND

Report No.: TCT151104E903

Issued Date: Nov. 11, 2015

Issued for:

SHENZHENG YONGCHENGCHUANGXIN TECHNOLOGY CO., LTD.

7/F.Keji Block, Yongqixifa C district, yintian baoan, Shenzhen, China

Issued By:

Shenzhen Tongce Testing Lab.

1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

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Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

1. Test Certification

Product:	BLUETOOTH SPEAKER
Model No.:	SBT651
Additional Model:	PBT651, PBT3003, SBT1003, PBT626X2, PBT626-2, SBT3003, BTH-001, BT-03, BT-04, BT-80, BT-80B, BT-20, BT-23, PBT592, MS6974, PBT3005, PBT3004, SBT1006, SBT1007
Applicant:	SHENZHENG YONGCHENGCHUANGXIN TECHNOLOGY CO., LTD.
Address:	7/F.Keji Block, Yongqixifa C district, yintian baoan, Shenzhen, China
Manufacturer:	SHENZHENG YONGCHENGCHUANGXIN TECHNOLOGY CO., LTD.
Address:	7/F.Keji Block, Yongqixifa C district, yintian baoan, Shenzhen, China
Date of Test:	Nov. 04 – Nov. 05, 2015
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:	***SKY***	***Date:***	***Nov. 05, 2015***
Reviewed By:	***Joe Zhou***	***Date:***	***Nov. 11, 2015***
Approved By:	***Tomsin***	***Date:***	***Nov. 11, 2015***

SHENZHEN TONGCE TESTING LAB TCT

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2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203/§15.247 (c)	PASS
Conducted Peak Output Power	§15.247 (b)(1)	PASS
Radiated Emission	§15.205/§15.209	PASS
Band Edge	§15.247(d)	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

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3. EUT Description

Product Name:	BLUETOOTH SPEAKER
Model :	SBT651
Additional Model:	PBT651, PBT3003, SBT1003, PBT626X2, PBT626-2, SBT3003, BTH-001, BT-03, BT-04, BT-80, BT-80B, BT-20, BT-23, PBT592, MS6974,PBT3005, PBT3004, SBT1006, SBT1007
Trade Mark:	**POLAROID, SHARPER IMAGE, ART+SOUND**
Operation Frequency:	2402MHz~2480MHz
Transfer Rate:	1/2/3 Mbits/s
Number of Channel:	79
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK
Modulation Technology:	FHSS
Antenna Type:	Internal Antenna
Antenna Gain:	1dBi
Power Supply:	Rechargeable Li-ion Battery DC3.7V

Operation Frequency each of channel for GFSK, π/4-DQPSK, 8DPSK

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
…	…	…	…	…	…	…	…
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
…	…	…	…	…	…	…	…
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz	-	

Remark: Channel 0, 39 &78 have been tested for GFSK, π/4-DQPSK, 8DPSK modulation mode.

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4. Genera Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Notebook	G485	/	/	Lenovo

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

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5. Facilities and Accreditations

5.1. Facilities

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

- FCC - Registration No.: 572331

  Shenzhen Tongce Testing Lab

  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

- CNAS - Registration No.: CNAS L6165

  Shenzhen TCT Testing Technology Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6165.

5.2. Location

Shenzhen Tongce Testing Lab
Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China
Tel: 86-755-36638142

5.3. Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

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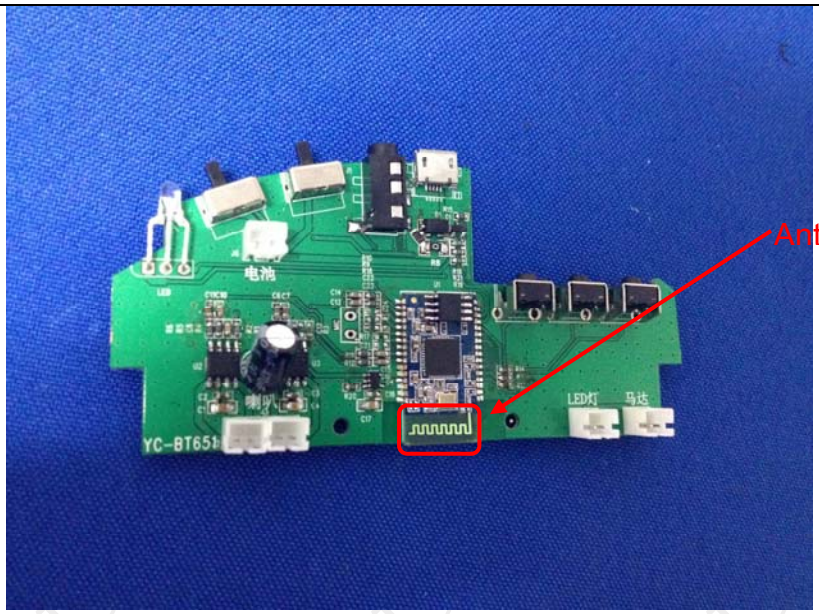
6. Test Results and Measurement Data

6.1. Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 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, 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. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
E.U.T Antenna:	
The Bluetooth antenna is an internal antenna which permanently attached, and the best case gain of the antenna is 1dBi.	



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6.2. Conducted Output Power

6.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2009 and DA00-705
Limit:	Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines. 2. Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold 3. Allow the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission.
Test Result:	PASS

6.2.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.2.3. Test Data

GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-3.553	21.00	PASS
Middle	-3.550	21.00	PASS
Highest	-3.771	21.00	PASS

Pi/4DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-3.369	21.00	PASS
Middle	-3.504	21.00	PASS
Highest	-3.753	21.00	PASS

8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-3.528	21.00	PASS
Middle	-3.716	21.00	PASS
Highest	-3.757	21.00	PASS

Test plots as follows:

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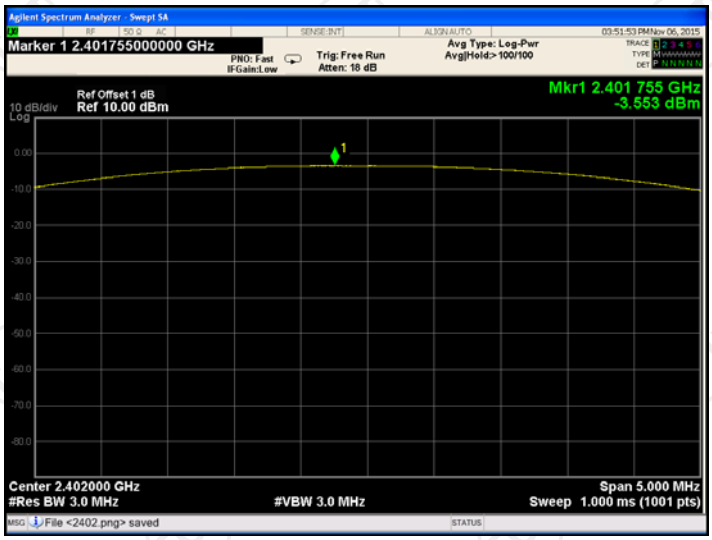
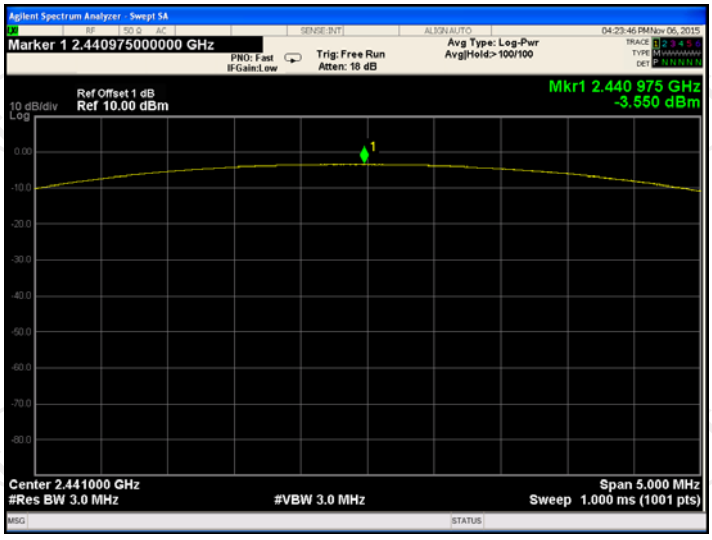
GFSK Modulation

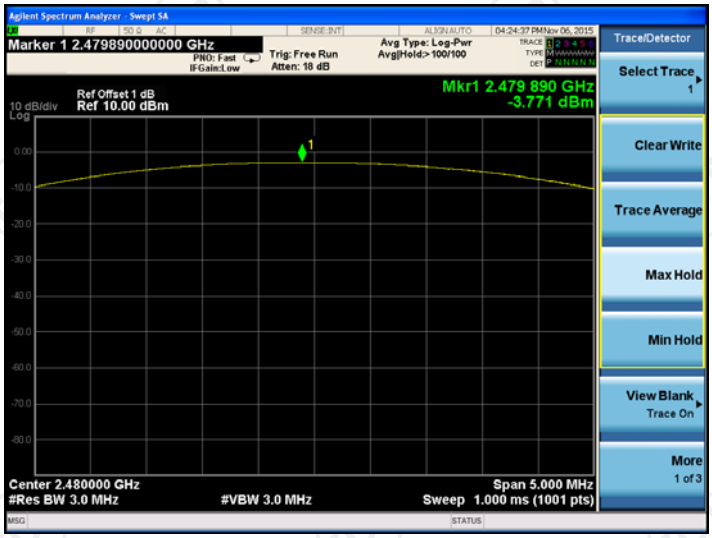
Lowest channel



Middle channel

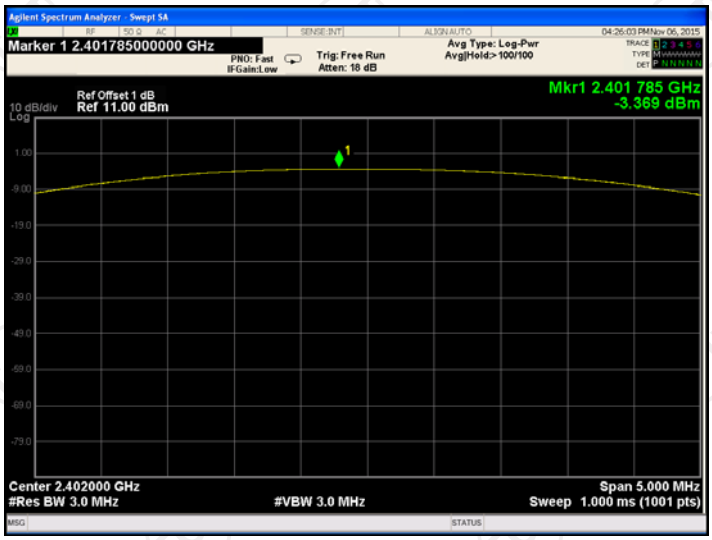


Highest channel

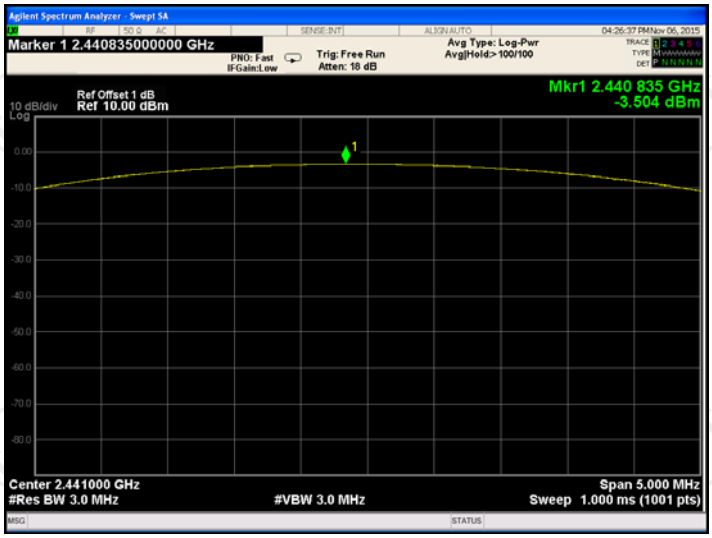


Pi/4DQPSK Modulation

Lowest channel



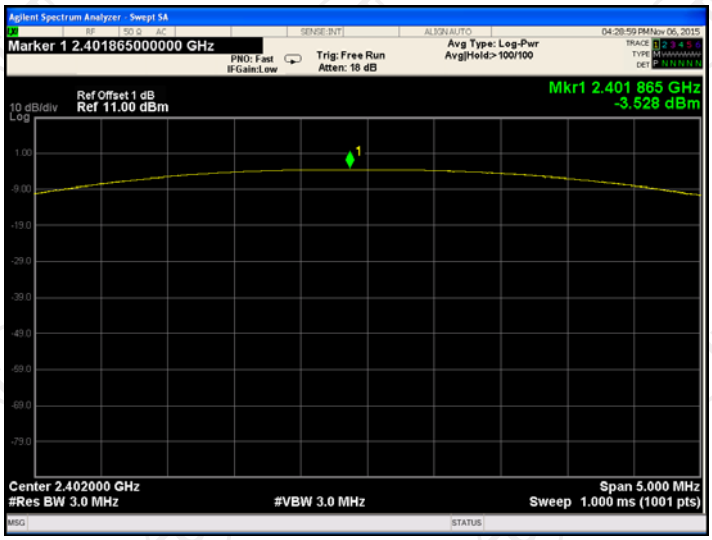
Middle channel



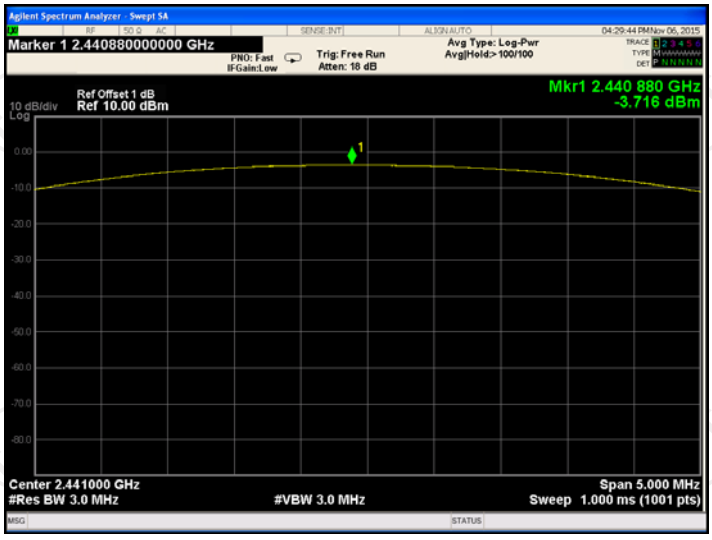
Highest channel

8DPSK Modulation

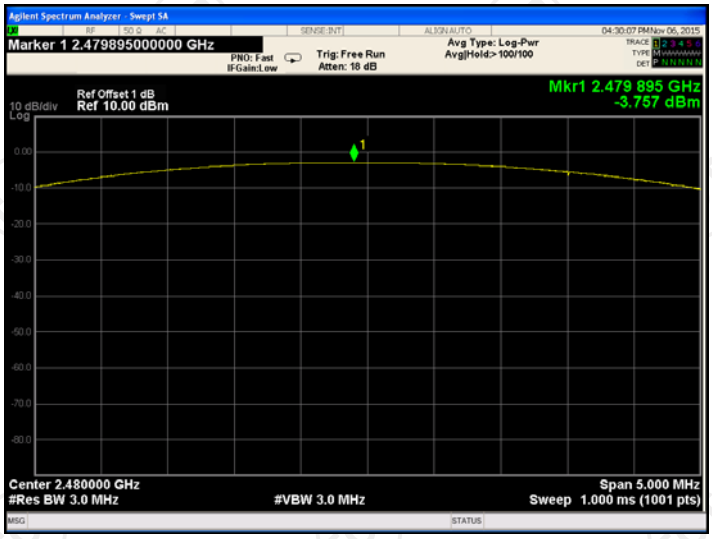
Lowest channel



Middle channel

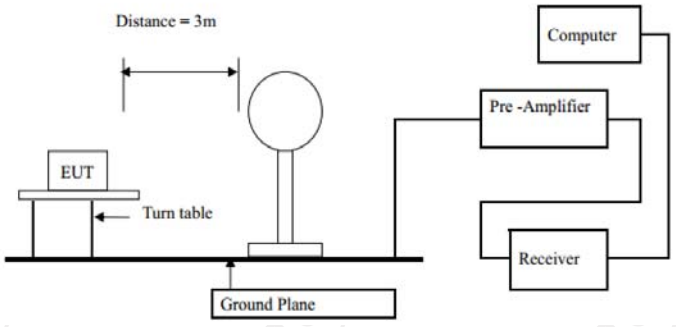


Highest channel

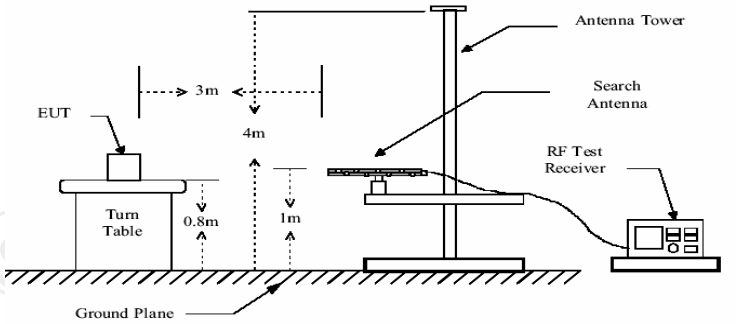


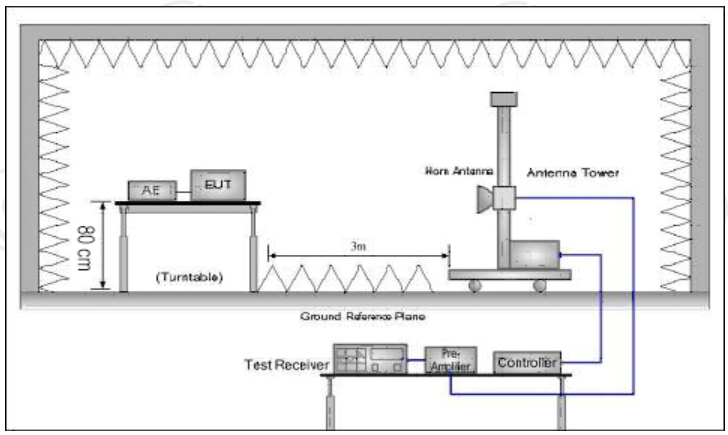
6.3. Radiated Spurious Emission Measurement

6.3.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2009 and ANSI C63.10: 2009</td></tr>
<tr><td>Frequency Range:</td><td>9 kHz to 25 GHz</td></tr>
<tr><td>Measurement Distance:</td><td>3 m</td></tr>
<tr><td>Antenna Polarization:</td><td>Horizontal & Vertical</td></tr>
<tr><td>Receiver Setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>9kHz- 150kHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Field Strength (microvolts/meter)</td><td>Measurement Distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(KHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(KHz)</td><td>30</td></tr>
<tr><td>1.705-30</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
<table>
<tr><td>Frequency</td><td>Field Strength (microvolts/meter)</td><td>Measurement Distance (meters)</td><td>Detector</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>500</td><td>3</td><td>Average</td></tr>
<tr><td>5000</td><td>3</td><td>Peak</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td>For radiated emissions below 30MHz
 

30MHz to 1GHz</td></tr>
</table>

<table>
<tr><td></td><td> 

Above 1GHz

</td></tr>
<tr><td>Test Mode:</td><td>Transmitting mode with modulation</td></tr>
<tr><td>Test Procedure:</td><td>1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. The EUT was placed on a turntable with 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings:
(1) Span shall wide enough to fully capture the emission being measured;
(2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW≥RBW;
Sweep = auto; Detector function = peak; Trace = max hold for peak</td></tr>
</table>

	(3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds On time =N1*L1+N2*L2+...+Nn-1*LNn-1+Nn*Ln Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log(Duty cycle) Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
Test results:	PASS

6.3.2. Test Instruments

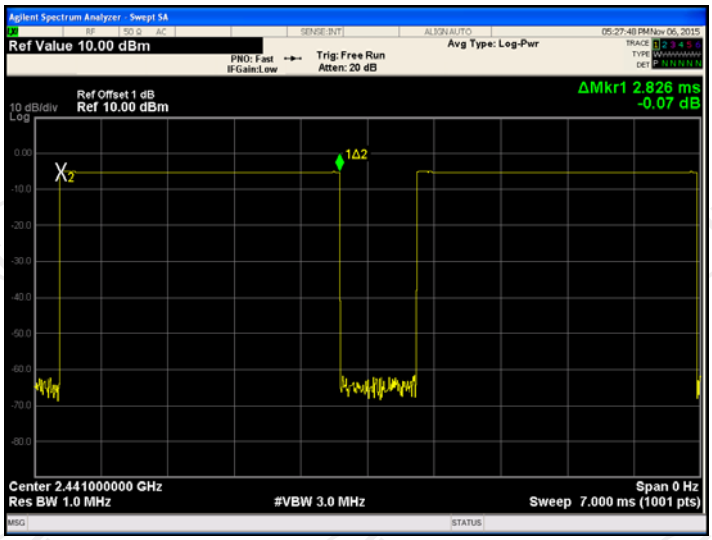
Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep. 11, 2016
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep. 11, 2016
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 11, 2016
Pre-amplifier	HP	8447D	2727A05017	Sep. 11, 2016
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 13, 2016
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9170	373	Sep. 13, 2016
Coax cable	TCT	RE-low-01	N/A	Sep. 11, 2016
Coax cable	TCT	RE-high-02	N/A	Sep. 11, 2016
Coax cable	TCT	RE-low-03	N/A	Sep. 11, 2016
Coax cable	TCT	RE-High-04	N/A	Sep. 11, 2016
Antenna Mast	CCS	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

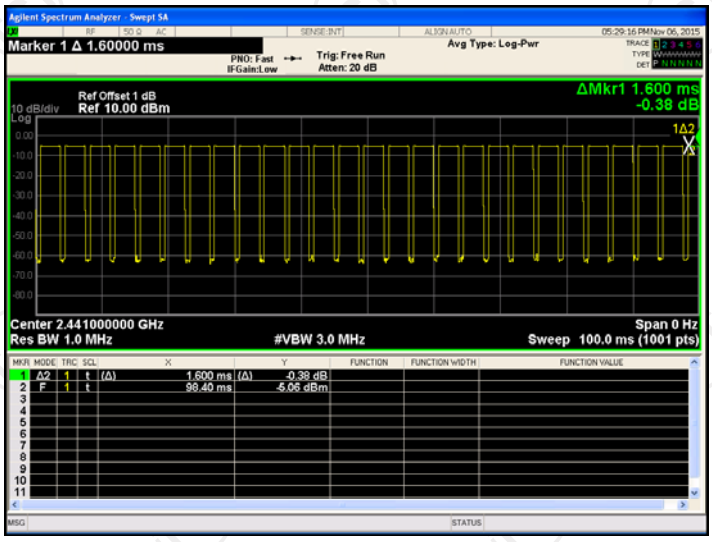
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.3.3. Test Data

Duty cycle correction factor for average measurement

DH5 on time Plot on Channel 01





Note:

*1. Worst case Duty cycle = on time/on time + off time = (2.826*26+1.600)/100 = 0.751*

*2. Worst case Duty cycle correction factor = 20*log (Duty cycle) = -2.49dB*

3. DH5 has the highest duty cycle worst case and is reported.

4. The average levels were calculated from the peak level corrected with duty cycle correction factor (-2.49dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: *1. Emission Level=Reading+ Cable loss + Antenna factor-Amp factor*

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

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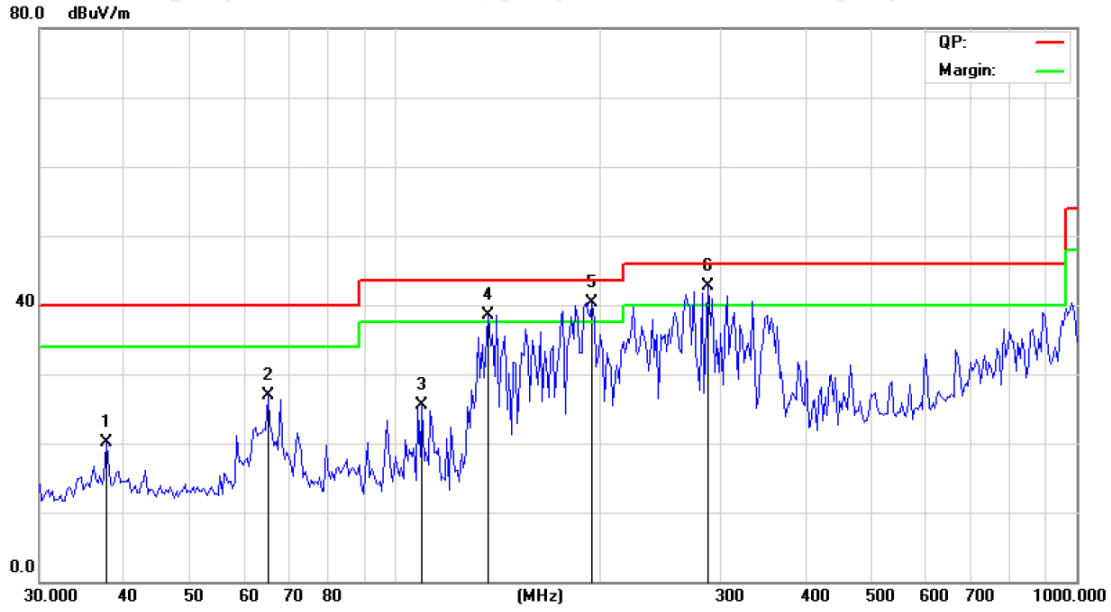
Frequency Range（30MHz～1GHz）

Horizontal:

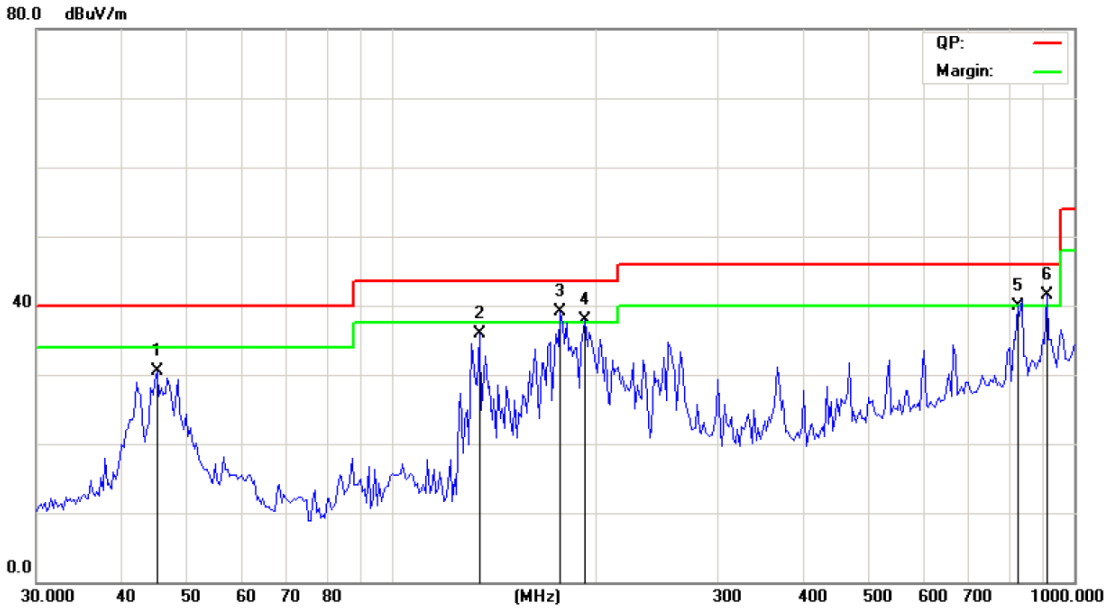


Site Chamber #2 Polarization: *Horizontal* Temperature: 25 (C)

Limit: FCC Part 15B Class B RE_3 m Power: AC 120V/60Hz Humidity: 56 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		37.5647	32.89	-12.78	20.11	40.00	-19.89	QP	
2		64.9869	41.56	-14.66	26.90	40.00	-13.10	QP	
3		109.3110	37.51	-11.96	25.55	43.50	-17.95	QP	
4	!	136.8745	53.85	-15.27	38.58	43.50	-4.92	QP	
5	!	194.4985	52.35	-12.06	40.29	43.50	-3.21	QP	
6	*	288.2839	51.45	-8.65	42.80	46.00	-3.20	QP	

Vertical:



Site Chamber #2 Polarization: *Vertical* Temperature: 25 (C)

Limit: FCC Part 15B Class B RE_3 m Power: AC 120V/60Hz Humidity: 56 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		45.0951	42.81	-12.25	30.56	40.00	-9.44	QP	
2		134.0192	51.15	-15.17	35.98	43.50	-7.52	QP	
3	*	176.2744	52.40	-13.33	39.07	43.50	-4.43	QP	
4	!	191.7839	50.05	-12.24	37.81	43.50	-5.69	QP	
5		827.1793	38.14	1.79	39.93	46.00	-6.07	QP	
6	!	912.6951	38.47	3.10	41.57	46.00	-4.43	QP	

Note: *Measurements were conducted in all three channels (high, middle, low), and the worst case Mode (GFSK, Highest channel) was submitted only.*

Above 1GHz

Modulation Type: GFSK									
Low channel: 2402 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Level Peak (dBμV/m)	Emission Level AV (dBμV/m)	Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
2390	H	53.52	---	-8.27	45.25	---	74	54	-8.75
4804	H	45.68	---	0.66	46.34	---	74	54	-7.66
7206	H	37.24	---	9.5	46.74	---	74	54	-7.26
---	H	---	---	---	---	---	---	---	---
2390	V	54.78	---	-8.27	46.51	---	74	54	-7.49
4804	V	46.32	---	0.66	46.98	---	74	54	-7.02
7206	V	37.45	---	9.5	46.95	---	74	54	-7.05
---	V	---	---	---	---	---	---	---	---

Middle channel: 2441 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level Peak (dBμV/m)	Emission Level AV (dBμV/m)	Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
4882	H	45.25	---	0.99	46.24	---	74	54	-7.76
7323	H	34.99	---	9.87	44.86	---	74	54	-9.14
---	H	---	---	---	---	---	---	---	---
4882	V	45.98	---	0.99	46.97	---	74	54	-7.03
7323	V	37.24	---	9.87	47.11	---	74	54	-6.89
---	V	---	---	---	---	----	---	---	---

High channel: 2480 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level Peak (dBμV/m)	Emission Level AV (dBμV/m)	Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
2483.5	H	54.58	---	-7.83	46.75	---	74	54	-7.25
4960	H	45.73	---	1.33	47.06	---	74	54	-6.94
7440	H	35.7	---	10.22	45.92	---	74	54	-8.08
---	H	---	---	---	---	----	---	---	---
2483.5	V	52.84	---	-7.83	45.01	---	74	54	-8.99
4960	V	45.83	---	1.33	47.16	---	74	54	-6.84
7440	V	34.06	---	10.22	44.28	---	74	54	-9.72
---	V	---	---	---	---	---	---	---	---

Note:

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency, The highest test frequency is 25GHz.*
5. *Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.*

********END OF REPORT********

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