

# FCC REPORT

**Applicant:** Dongguan Hele Electronics Co., Ltd.

**Address of Applicant:** Dalingya Industrial Zone, Daojiao Town, Dongguan City, Guangdong China 523181

**Equipment Under Test (EUT)**

Product Name: Bluetooth headset

Model No.: Q25, Q11, Q12, Q27, Q18, Q19, Q30

**FCC ID:** RDR-Q25

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.249:2015

**Date of sample receipt:** November 03, 2016

**Date of Test:** November 04-10, 2016

**Date of report issued:** November 10, 2016

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



**Robinson Lo**

**Laboratory Manager**

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## 2 Version

Version No.	Date	Description
00	November 10, 2016	Original

Prepared By:

*Bill. Yuan*

Date:

November 10, 2016

**Project Engineer**

Check By:

*Andy. Wu*

Date:

November 10, 2016

**Reviewer**

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## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

*Pass: The EUT complies with the essential requirements in the standard.*

*Remark: Test according to ANSI C63.10: 2013 and ANSI C63.4: 2014.*

### 4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

## 5 General Information

### 5.1 Client Information

Applicant:	Dongguan Hele Electronics Co., Ltd.
Address of Applicant:	Dalingya Industrial Zone, Daojiao Town, Dongguan City, Guangdong China 523181
Manufacturer/Factory:	Dongguan Hele Electronics Co., Ltd.
Address of Manufacturer/Factory:	Dalingya Industrial Zone, Daojiao Town, Dongguan City, Guangdong China 523181

### 5.2 General Description of EUT

Product Name:	Bluetooth headset
Model No.:	Q25, Q11, Q12, Q27, Q18, Q19, Q30
Test Model:	Q25
Remark:	Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The only difference is the model name for commercial purpose.
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	40
Channel separation:	2MHz
Modulation type:	GFSK
Antenna Type:	Chip antenna
Antenna gain:	3.98dBi(declare by Applicant)
Power supply:	DC 3.7V Li-ion Battery Or DC 5V USB Charger

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

### 5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the duty cycle &gt;98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

#### Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	88.33	89.23	89.17

### 5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number
Emerson Network Power	USB Charger	A1299	N/A

### 5.5 Test Facility

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

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 22, 2016.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016

### 5.6 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

### 5.7 Other Information Requested by the Customer

None.

## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July 03 2015	July 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 29 2016	June 28 2017
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 29 2016	June 28 2017
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 29 2016	June 28 2017
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 29 2016	June 28 2017
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 29 2016	June 28 2017
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 29 2016	June 28 2017
10	Coaxial Cable	GTS	N/A	GTS211	June 29 2016	June 28 2017
11	Coaxial cable	GTS	N/A	GTS210	June 29 2016	June 28 2017
12	Coaxial Cable	GTS	N/A	GTS212	June 29 2016	June 28 2017
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 29 2016	June 28 2017
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 29 2016	June 28 2017
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 29 2016	June 28 2017
16	Band filter	Amindeon	82346	GTS219	June 29 2016	June 28 2017
17	Power Meter	Anritsu	ML2495A	GTS540	June 29 2016	June 28 2017
18	Power Sensor	Anritsu	MA2411B	GTS541	June 29 2016	June 28 2017

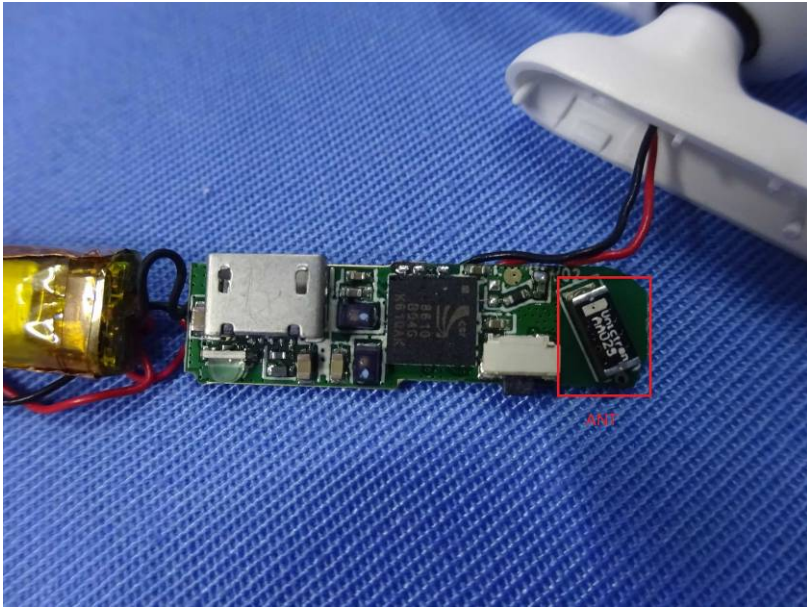
Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 29 2016	June. 28 2017
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 29 2016	June. 28 2017
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 29 2016	June. 28 2017
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 29 2016	June. 28 2017

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017



## 7 Test results and Measurement Data

### 7.1 Antenna requirement

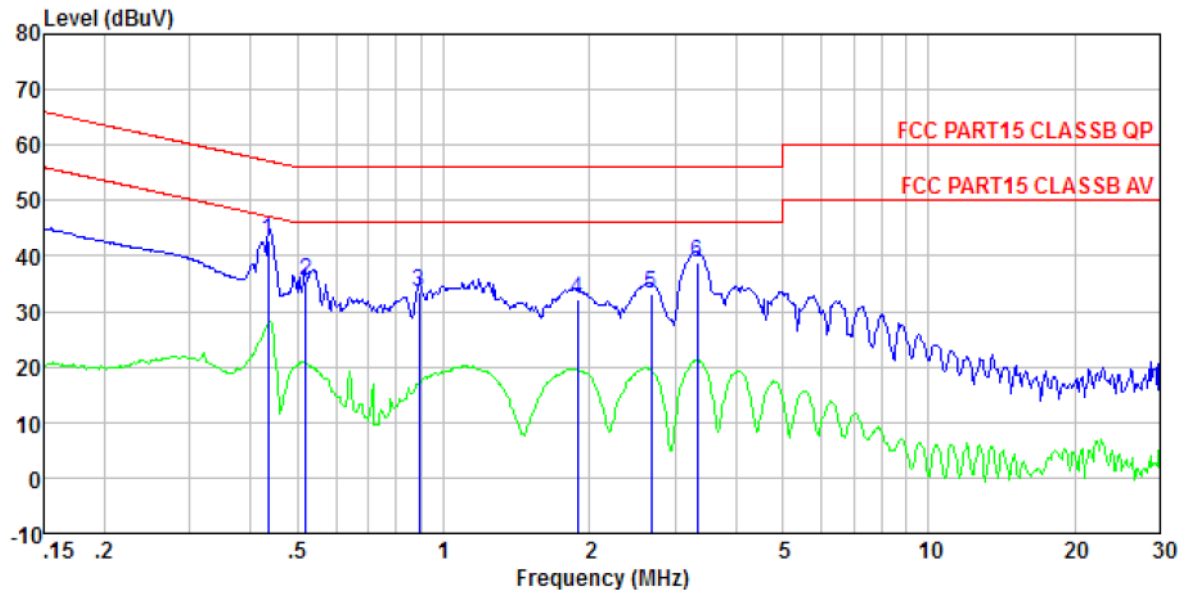
<b>Standard requirement:</b>	FCC Part15 C Section 15.203
<p><b>15.203 requirement:</b></p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna 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.</p>	
<p><b>EUT Antenna:</b></p>	
<p><i>The antenna is Chip antenna, the best case gain of the antenna is 3.98dBi</i></p> 	

## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Test Frequency Range:	150KHz to 30MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <p>* Decreases with the logarithm of the frequency.</p>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test setup:	<p><i>Remark</i>  E.U.T: Equipment Under Test  LISN: Line Impedance Stabilization Network  Test table height=0.8m</p>														
Test procedure:	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</li> </ol>														
Test Instruments:	Refer to section 6.0 for details														
Test mode:	Refer to section 5.3 for details														
Test results:	Pass														

### Measurement data:

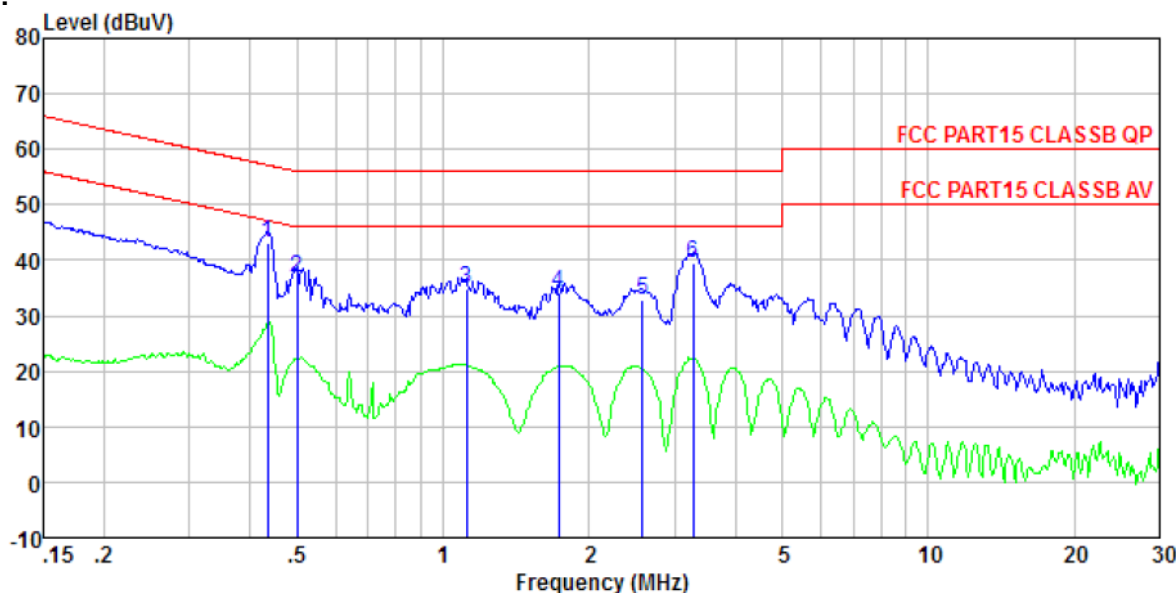
Line:



Site : Shielded room  
 Condition : FCC PART15 CLASSB QP LISN-2016 LINE  
 Job No. : 0030  
 Test mode : Bluetooth 4.0 mode  
 Test Engineer: Boy

	Read Freq	Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.435	42.42	0.40	0.11	42.93	57.15	-14.22	QP
2	0.521	34.99	0.37	0.11	35.47	56.00	-20.53	QP
3	0.890	33.28	0.26	0.13	33.67	56.00	-22.33	QP
4	1.888	31.90	0.20	0.14	32.24	56.00	-23.76	QP
5	2.678	32.74	0.20	0.15	33.09	56.00	-22.91	QP
6	3.328	38.46	0.21	0.15	38.82	56.00	-17.18	QP

**Neutral:**



Site : Shielded room  
 Condition : FCC PART15 CLASSB QP LISN-2016 NEUTRAL  
 Job No. : 0030  
 Test mode : Bluetooth 4.0 mode  
 Test Engineer: Boy

	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
Freq	dBuV	dB	dB	dBuV	dBuV	dB	
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.435	42.70	0.38	0.11	43.19	57.15	-13.96 QP
2	0.499	36.33	0.35	0.11	36.79	56.01	-19.22 QP
3	1.117	34.50	0.21	0.13	34.84	56.00	-21.16 QP
4	1.734	33.91	0.20	0.14	34.25	56.00	-21.75 QP
5	2.581	32.64	0.20	0.15	32.99	56.00	-23.01 QP
6	3.276	39.14	0.21	0.15	39.50	56.00	-16.50 QP

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

### 7.3 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	30MHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	2400MHz-2483.5MHz	94.00		Average Value	
Limit: (Spurious Emissions)	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.00		Quasi-peak Value	
	88MHz-216MHz	43.50		Quasi-peak Value	
	216MHz-960MHz	46.00		Quasi-peak Value	
	960MHz-1GHz	54.00		Quasi-peak Value	
	Above 1GHz	54.00		Average Value	
74.00		Peak Value			
Limit: (band edge)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				
Test setup:	Below 1GHz				
	<p>The diagram illustrates the test setup for frequencies below 1GHz. It shows an Equipment Under Test (EUT) placed on a turn table, which is positioned 80cm above the ground. A test antenna is located 3m away from the EUT and is oriented vertically, with its height adjustable between 1m and 4m. The antenna is connected to a receiver and a preamplifier. The entire setup is enclosed within a shielded chamber to prevent external interference.</p>				
	Above 1GHz				

	<p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a rotating table with a height of approximately 150 cm. The table is rotated 360 degrees. The EUT is positioned 3 meters away from a test antenna mounted on a variable-height antenna tower. The antenna height is varied from 1 meter to 4 meters above the ground. The test antenna is connected to a receiver and preamplifier system.</p>
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>
<p>Test results:</p>	<p>Pass</p>

**Measurement data:**

### 7.3.1 Field Strength of The Fundamental Signal

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402.00	85.48	27.58	5.39	30.18	88.27	114.00	-25.73	Vertical
2402.00	84.02	27.58	5.39	30.18	86.81	114.00	-27.19	Horizontal
2440.00	84.40	27.55	5.43	30.06	87.32	114.00	-26.68	Vertical
2440.00	83.17	27.55	5.43	30.06	86.09	114.00	-27.91	Horizontal
2480.00	86.17	27.52	5.47	29.93	89.23	114.00	-24.77	Vertical
2480.00	83.91	27.52	5.47	29.93	86.97	114.00	-27.03	Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402.00	76.16	27.58	5.39	30.18	78.95	94.00	-15.05	Vertical
2402.00	74.47	27.58	5.39	30.18	77.26	94.00	-16.74	Horizontal
2440.00	74.75	27.55	5.43	30.06	77.67	94.00	-16.33	Vertical
2440.00	72.09	27.55	5.43	30.06	75.01	94.00	-18.99	Horizontal
2480.00	76.77	27.52	5.47	29.93	79.83	94.00	-14.17	Vertical
2480.00	74.50	27.52	5.47	29.93	77.56	94.00	-16.44	Horizontal

Remark: RBW 3MHz VBW 3MHz Peak detector is for PK value RMS detector is for AV value

## 7.3.2 Spurious emissions

### ■ Below 1GHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
33.21	30.44	14.31	0.59	30.08	15.26	40.00	-24.74	Vertical
59.65	24.88	14.73	0.86	29.92	10.55	40.00	-29.45	Vertical
95.09	24.68	14.84	1.15	29.72	10.95	43.50	-32.55	Vertical
228.49	24.26	13.57	2.01	29.47	10.37	46.00	-35.63	Vertical
447.98	25.25	17.57	3.08	29.40	16.50	46.00	-29.50	Vertical
925.76	25.09	23.28	4.95	29.10	24.22	46.00	-21.78	Vertical
31.07	26.24	14.32	0.56	30.09	11.03	40.00	-28.97	Horizontal
49.19	24.81	15.31	0.76	30.00	10.88	40.00	-29.12	Horizontal
92.14	24.42	14.33	1.13	29.74	10.14	43.50	-33.36	Horizontal
254.73	25.32	14.06	2.15	29.68	11.85	46.00	-34.15	Horizontal
432.55	24.14	17.53	3.01	29.43	15.25	46.00	-30.75	Horizontal
687.15	25.29	20.76	4.05	29.21	20.89	46.00	-25.11	Horizontal



■ Above 1GHz

Test channel:	Lowest channel
---------------	----------------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	35.35	31.78	8.60	32.09	43.64	74.00	-30.36	Vertical
7206.00	30.53	36.15	11.65	32.00	46.33	74.00	-27.67	Vertical
9608.00	30.31	37.95	14.14	31.62	50.78	74.00	-23.22	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	39.24	31.78	8.60	32.09	47.53	74.00	-26.47	Horizontal
7206.00	32.12	36.15	11.65	32.00	47.92	74.00	-26.08	Horizontal
9608.00	29.55	37.95	14.14	31.62	50.02	74.00	-23.98	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	24.53	31.78	8.60	32.09	32.82	54.00	-21.18	Vertical
7206.00	19.44	36.15	11.65	32.00	35.24	54.00	-18.76	Vertical
9608.00	18.64	37.95	14.14	31.62	39.11	54.00	-14.89	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	28.55	31.78	8.60	32.09	36.84	54.00	-17.16	Horizontal
7206.00	21.49	36.15	11.65	32.00	37.29	54.00	-16.71	Horizontal
9608.00	18.21	37.95	14.14	31.62	38.68	54.00	-15.32	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. “\*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Middle
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	35.64	31.85	8.67	32.12	44.04	74.00	-29.96	Vertical
7320.00	30.73	36.37	11.72	31.89	46.93	74.00	-27.07	Vertical
9760.00	30.49	38.35	14.25	31.62	51.47	74.00	-22.53	Vertical
12200.00	*					74.00		Vertical
14640.00	*					74.00		Vertical
4880.00	39.59	31.85	8.67	32.12	47.99	74.00	-26.01	Horizontal
7320.00	32.34	36.37	11.72	31.89	48.54	74.00	-25.46	Horizontal
9760.00	29.75	38.35	14.25	31.62	50.73	74.00	-23.27	Horizontal
12200.00	*					74.00		Horizontal
14640.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	24.78	31.85	8.67	32.12	33.18	54.00	-20.82	Vertical
7320.00	19.61	36.37	11.72	31.89	35.81	54.00	-18.19	Vertical
9760.00	18.79	38.35	14.25	31.62	39.77	54.00	-14.23	Vertical
12200.00	*					54.00		Vertical
14640.00	*					54.00		Vertical
4880.00	28.82	31.85	8.67	32.12	37.22	54.00	-16.78	Horizontal
7320.00	21.67	36.37	11.72	31.89	37.87	54.00	-16.13	Horizontal
9760.00	18.38	38.35	14.25	31.62	39.36	54.00	-14.64	Horizontal
12200.00	*					54.00		Horizontal
14640.00	*					54.00		Horizontal

**Remark:**

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *“\*”*, means this data is the too weak instrument of signal is unable to test.

Test channel:	Highest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	35.74	31.93	8.73	32.16	44.24	74.00	-29.76	Vertical
7440.00	30.80	36.59	11.79	31.78	47.40	74.00	-26.60	Vertical
9920.00	30.55	38.81	14.38	31.88	51.86	74.00	-22.14	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	39.71	31.93	8.73	32.16	48.21	74.00	-25.79	Horizontal
7440.00	32.41	36.59	11.79	31.78	49.01	74.00	-24.99	Horizontal
9920.00	29.82	38.81	14.38	31.88	51.13	74.00	-22.87	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	24.89	31.93	8.73	32.16	33.39	54.00	-20.61	Vertical
7440.00	19.68	36.59	11.79	31.78	36.28	54.00	-17.72	Vertical
9920.00	18.86	38.81	14.38	31.88	40.17	54.00	-13.83	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	28.95	31.93	8.73	32.16	37.45	54.00	-16.55	Horizontal
7440.00	21.76	36.59	11.79	31.78	38.36	54.00	-15.64	Horizontal
9920.00	18.46	38.81	14.38	31.88	39.77	54.00	-14.23	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

*Remark:*

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *“\*”*, means this data is the too weak instrument of signal is unable to test.
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

### 7.3.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

Test channel:	Lowest channel
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	39.85	27.59	5.38	30.18	42.64	74.00	-31.36	Horizontal
2400.00	56.20	27.58	5.39	30.18	58.99	74.00	-15.01	Horizontal
2390.00	40.11	27.59	5.38	30.18	42.90	74.00	-31.10	Vertical
2400.00	57.92	27.58	5.39	30.18	60.71	74.00	-13.29	Vertical

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	31.08	27.59	5.38	30.18	33.87	54.00	-20.13	Horizontal
2400.00	42.14	27.58	5.39	30.18	44.93	54.00	-9.07	Horizontal
2390.00	30.81	27.59	5.38	30.18	33.60	54.00	-20.40	Vertical
2400.00	43.50	27.58	5.39	30.18	46.29	54.00	-7.71	Vertical

Test channel:	Highest channel
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	41.59	27.53	5.47	29.93	44.66	74.00	-29.34	Horizontal
2500.00	41.34	27.55	5.49	29.93	44.45	74.00	-29.55	Horizontal
2483.50	41.93	27.53	5.47	29.93	45.00	74.00	-29.00	Vertical
2500.00	42.05	27.55	5.49	29.93	45.16	74.00	-28.84	Vertical

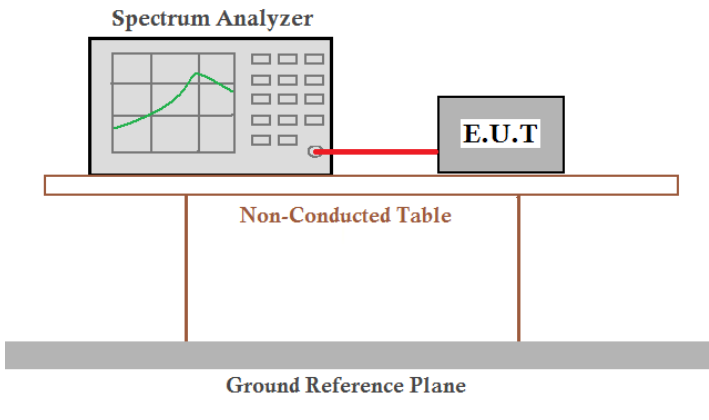
**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	33.88	27.53	5.47	29.93	36.95	54.00	-17.05	Horizontal
2500.00	32.31	27.55	5.49	29.93	35.42	54.00	-18.58	Horizontal
2483.50	34.83	27.53	5.47	29.93	37.90	54.00	-16.10	Vertical
2500.00	31.98	27.55	5.49	29.93	35.09	54.00	-18.91	Vertical

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor

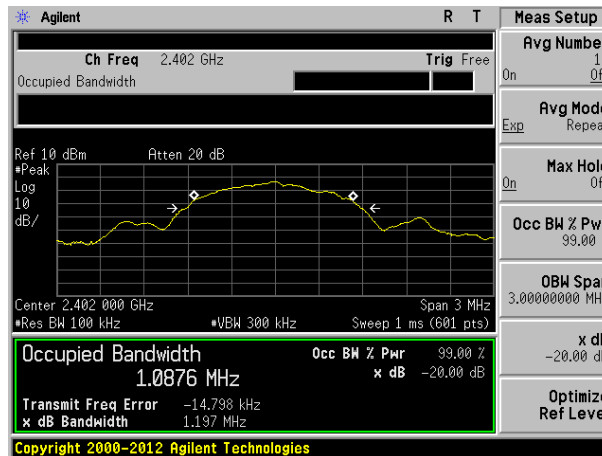
## 7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10:2013
Limit:	Operation Frequency range 2400MHz~2483.5MHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

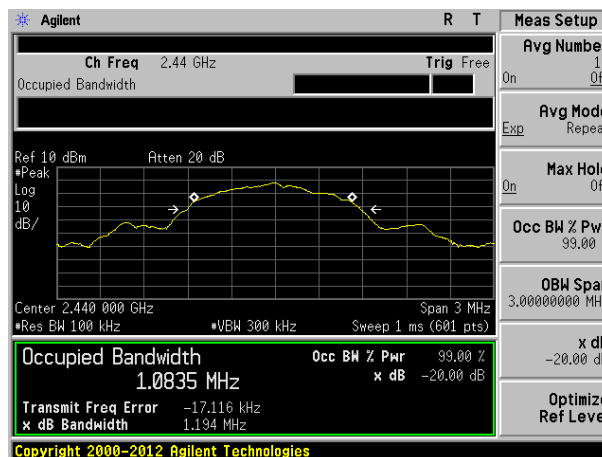
### Measurement Data

Test channel	20dB bandwidth(MHz)	Result
Lowest	1.197	Pass
Middle	1.194	Pass
Highest	1.201	Pass

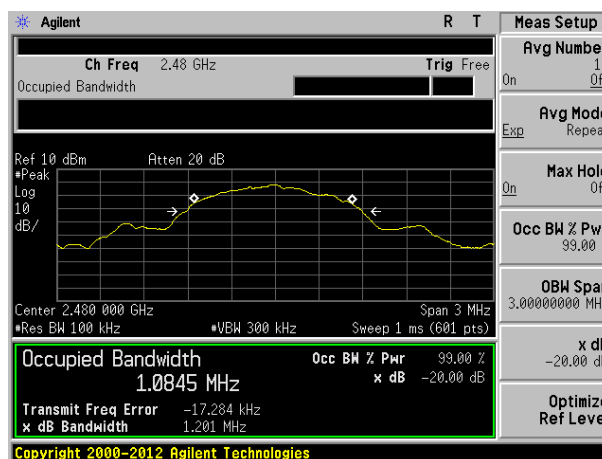
Test plot as follows:



Lowest channel



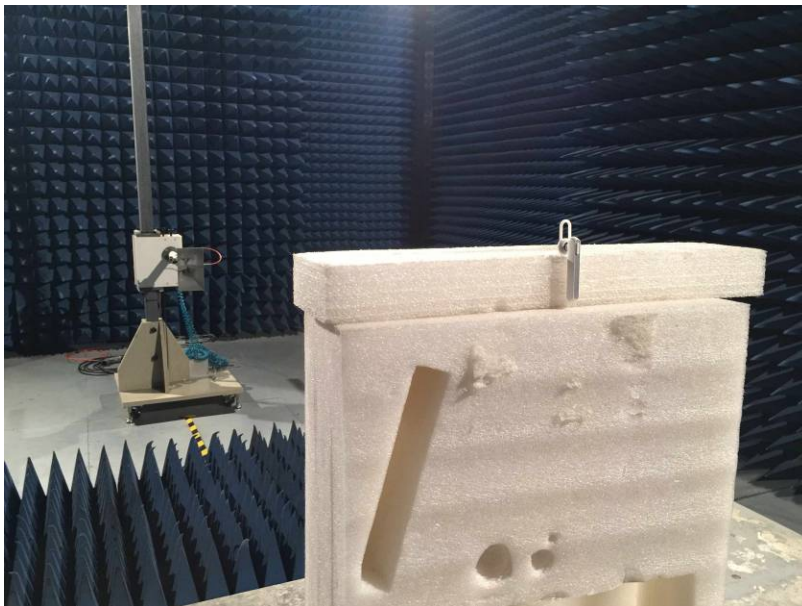
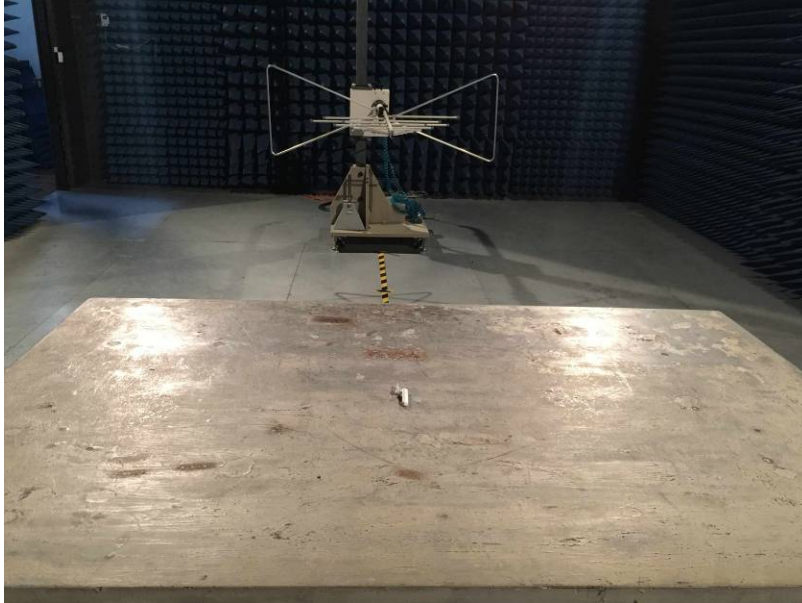
Middle channel



Highest channel

## 8 Test Setup Photo

Radiated Emission



Conducted Emission



## 9 EUT Constructional Details

Reference to the test report No. GTS201611000030E01

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