STC Test Report

Deutsche Akkreditierungsstelle D-PL-12121-01-01

Date: 2014-12-20

No.: DM117670

Applicant:	StudioFeed USA LLC 1608 Argyle Ave. Los Angeles, CA 90028
Manufacturer:	Season Technologies Limited Jun Da Lu, Dongkeng, Dongguan, Guangdong, China
Description of Sample(s):	Submitted sample(s) said to be Product: SubPac Brand Name: SubPac Model Number: S2 FCC ID: 2AEJU-SC2
Date Sample(s) Received:	2014-11-18
Date Tested:	2014-11-20 to 2014-12-08
Investigation Requested:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014. FCC KDB Publication 558074 D01 DTS Meas Guidance v02and ANSI C63.4:2009 for FCC Certification.
Conclusion(s):	The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.
Remark(s):	Bluetooth DTS (GFSK)

LONG Yun Jian, Along
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
STC (Dongguan) Company Limited

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

CONTENT:

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

1.0 General Details

1.1 Test Laboratory

STC (Dongguan) Company Limited
EMC Laboratory
68 Fumin Nan Road, Dalang, Dongguan, Guangdong, China

Telephone: (86 769) 81119888
Fax: (86 769) 81116222

1.2 Equipment Under Test [EUT]
Description of Sample(s)

Product:	SubPac
Manufacturer:	Season Technologies Limited
Brand Name:	SubPac
Model Number:	S2
Additional Model Number:	M1, M2
Rating:	Input: 100-240Va.c. 50/60Hz 0.75A, Output: 15.0Vd.c. 1600mA 24w.

The AC/DC adaptor was provided by the applicant with following details:-
Brand name: GPE; Model no.: GPE242-150160D

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Bluetooth audio device. The R.F. signal was modulated by IC; the type of modulation used was frequency hopping spread spectrum Modulation.

1.3 Date of Order
2014-11-18

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2014-11-20 to 2014-12-08

1.6 Country of Origin
China

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

1.7 RF Module Details

Module Model Number:	SubPac BT V_C
Module FCC ID:	N/A
Module Transmission Type:	Bluetooth 4.0
Modulation:	GFSK
Data Rates:	1Mbps
Frequency Range:	2400-2483.5MHz
Carrier Frequencies:	2402MHz – 2480MHz

Module Specification (specification provided by manufacturer)

1.8 Antenna Details

Antenna Type:	Meander line inverted F PCB antenna
Antenna Gain:	0dBi

1.9 Channel List

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

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 Regulations. FCC KDB Publication 558074 D01 DTS Meas Guidance v03r02 and ANSI C63.4:2009 for FCC Certification.
The device was realized by test software.
Duty cycle ≧98%

2.2 Test Standards and Results Summary Tables

EMISSION
Results Summary

Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Maximum Peak Output Power	FCC 47CFR 15.247(b)(3)	FCC KDB Publication 558074 D01 DTS Meas Guidance v03r02	N/A	☒	☐	☐
Radiated Spurious Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	☒	☐	☐
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.4:2009	N/A	☒	☐	☐
Power Spectral Density	FCC 47CFR 15.247(e)	FCC KDB Publication 558074 D01 DTS Meas Guidance v03r02	N/A	☒	☐	☐
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	FCC KDB Publication 558074 D01 DTS Meas Guidance v03r02	N/A	☒	☐	☐
Band Edge Emissions (Radiated)	FCC 47CFR 15.247(d)	FCC KDB Publication 558074 D01 DTS Meas Guidance v03r02	N/A	☒	☐	☐
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	☒	☐	☐
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	☒	☐	☐

Note: N/A - Not Applicable

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

3.0 Test Results

3.1 Emission

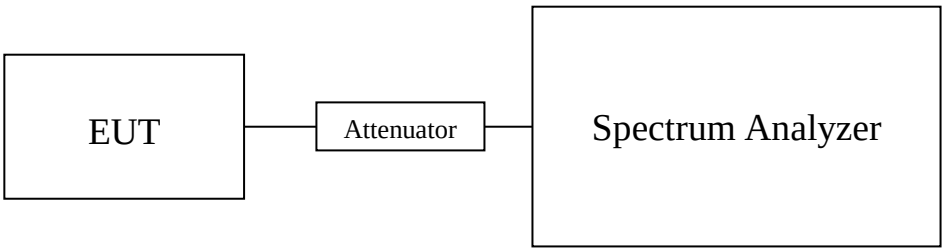
3.1.1 Maximum Peak Output Power

Test Requirement:	FCC 47CFR 15.247(b)(3)
Test Method:	FCC KDB Publication 558074 D01 DTS Meas Guidance v03r02
Test Date:	2014-11-20
Mode of Operation:	Bluetooth 4.0 Tx mode

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in mW.

Test Setup:



Note: a temporary antenna connector was soldered to the RF output.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt (30dBm)

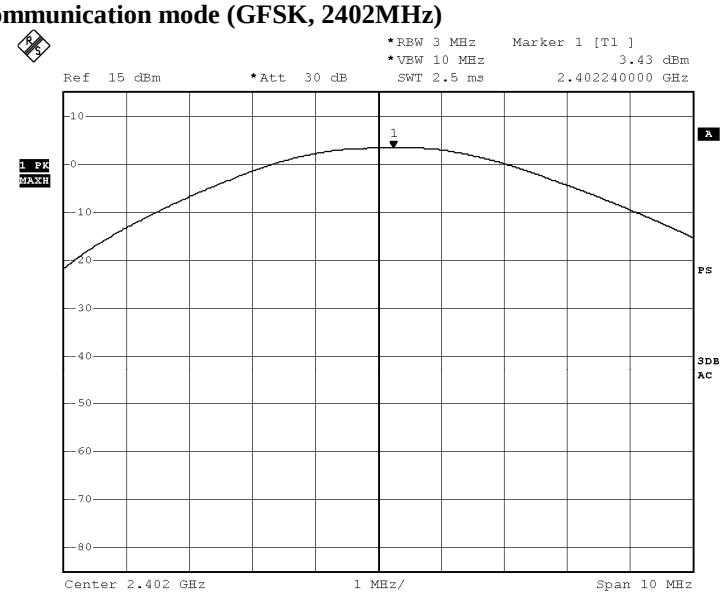
Results of BT4.0 Tx Mode, (2402MHz to 2480MHz) : Pass (TX Unit) (GFSK)
Maximum conducted output power

Channel	Frequency(MHz)	Output Power(Watt)
0	2402	0.002203
19	2442	0.002649
39	2480	0.002884

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB
1GHz to 26GHz 1.7dB

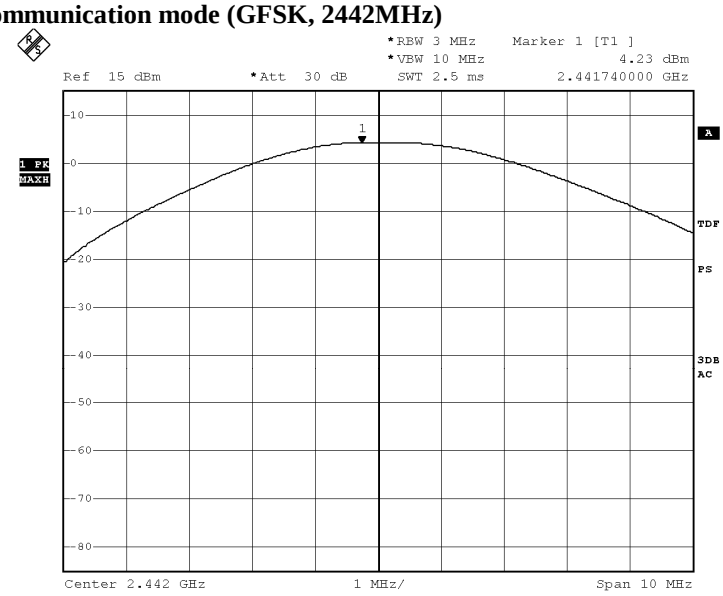
This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Test plot of Maximum Peak Conducted Output Power ：
Bluetooth Communication mode (GFSK, 2402MHz)



Date: 20.NOV.2014 15:12:09

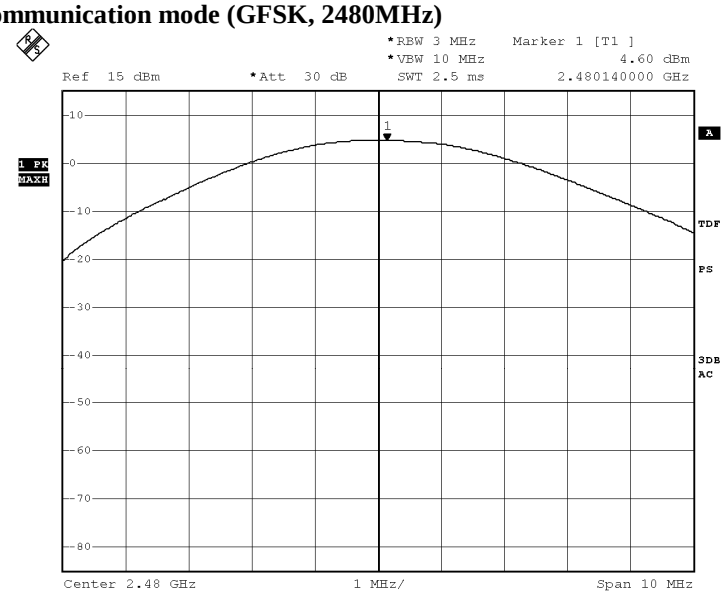
Bluetooth Communication mode (GFSK, 2442MHz)



Date: 20.NOV.2014 15:12:44

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Bluetooth Communication mode (GFSK, 2480MHz)



This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

3.1.2 Radiated Emissions

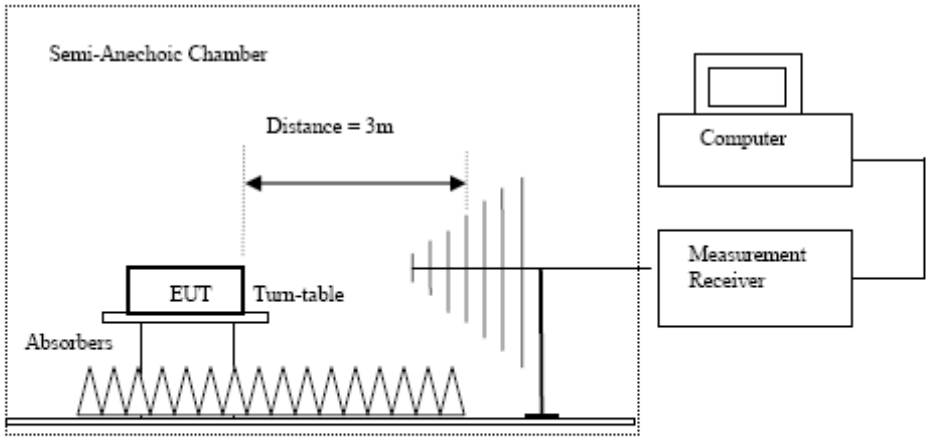
Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.4:2009
Test Date:	2014-12-05
Mode of Operation:	Bluetooth 4.0 Tx mode/ Bluetooth +Charging mode

Test Method:

The sample was placed 0.8m above the ground plane of semi-anechoic 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 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.

* Semi-anechoic chamber located on the G/F of "STC (Dongguan) Company Limited" with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

Test Setup:



Ground Plane

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limits for Radiated Emissions [FCC 47 CFR 15.247 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of TX mode (GFSK) (9kHz – 30MHz): Pass

The Low Frequency, which started from 9KHz to 30MHz, was Pre-scan and the result which was more than 20dB lower than the Limit line.

Result of Tx mode (2402.0 MHz) (GFSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m $dB\mu V$	Correction Factor dB/m	Field Strength $dB\mu V/m$	Limit @3m $dB\mu V/m$	Margin $dB\mu V/m$	E-Field Polarity
4804.0	14.6	41.5	56.1	74.0	17.9	Vertical
4804.0	13.1	42.4	55.5	74.0	18.5	Horizontal
7206.0	10.2	45.1	55.3	74.0	18.7	Vertical
7206.0	8.8	46.2	55.0	74.0	19.0	Horizontal
9608.0	7.0	48.0	55.0	74.0	19.0	Vertical
9608.0	6.6	48.8	55.4	74.0	18.6	Horizontal
12010.0	4.2	51.5	55.7	74.0	18.3	Vertical
12010.0	2.8	52.4	55.2	74.0	18.8	Horizontal

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
4804.0	0.3	41.5	41.8	54.0	12.2	Vertical
4804.0	-1.7	42.4	40.7	54.0	13.3	Horizontal
7206.0	-3.3	45.1	41.8	54.0	12.2	Vertical
7206.0	-5.5	46.2	40.7	54.0	13.3	Horizontal
9608.0	-7.4	48.0	40.6	54.0	13.4	Vertical
9608.0	-8.7	48.8	40.1	54.0	13.9	Horizontal
12010.0	-10.0	51.5	41.5	54.0	12.5	Vertical
12010.0	-10.8	52.4	41.6	54.0	12.4	Horizontal

Result of Tx mode (2442.0 MHz) (GFSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
4884.0	14.2	41.6	55.8	74.0	18.2	Vertical
4884.0	12.0	42.5	54.5	74.0	19.5	Horizontal
7326.0	10.2	45.2	55.4	74.0	18.6	Vertical
7326.0	9.0	46.3	55.3	74.0	18.7	Horizontal
9768.0	7.9	48.1	56.0	74.0	18.0	Vertical
9768.0	6.2	48.9	55.1	74.0	18.9	Horizontal
12210.0	3.6	51.6	55.2	74.0	18.8	Vertical
12210.0	4.0	52.5	56.5	74.0	17.5	Horizontal

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
4884.0	-0.1	41.6	41.5	54.0	12.5	Vertical
4884.0	-2.5	42.5	40.0	54.0	14.0	Horizontal
7326.0	-4.7	45.2	40.5	54.0	13.5	Vertical
7326.0	-6.2	46.3	40.1	54.0	13.9	Horizontal
9768.0	-6.6	48.1	41.5	54.0	12.5	Vertical
9768.0	-8.9	48.9	40.0	54.0	14.0	Horizontal
12210.0	-11.1	51.6	40.5	54.0	13.5	Vertical
12210.0	-10.5	52.5	42.0	54.0	12.0	Horizontal

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Result of Tx mode (2480.0 MHz) (GFSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
4960.0	14.5	41.4	55.9	74.0	18.1	Vertical
4960.0	13.3	42.7	56.0	74.0	18.0	Horizontal
7440.0	9.9	45.6	55.5	74.0	18.5	Vertical
7440.0	8.7	46.5	55.2	74.0	18.8	Horizontal
9920.0	7.3	48.6	55.9	74.0	18.1	Vertical
9920.0	6.6	49.7	56.3	74.0	17.7	Horizontal
12400.0	3.9	51.7	55.6	74.0	18.4	Vertical
12400.0	3.9	52.7	56.6	74.0	17.4	Horizontal

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
4960.0	-0.2	41.4	41.2	54.0	12.8	Vertical
4960.0	-1.2	42.7	41.5	54.0	12.5	Horizontal
7440.0	-4.9	45.6	40.7	54.0	13.3	Vertical
7440.0	-4.9	46.5	41.6	54.0	12.4	Horizontal
9920.0	-8.5	48.6	40.1	54.0	13.9	Vertical
9920.0	-9.2	49.7	40.5	54.0	13.5	Horizontal
12400.0	-10.0	51.7	41.7	54.0	12.3	Vertical
12400.0	-10.7	52.7	42.0	54.0	12.0	Horizontal

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

* Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty (9kHz-30MHz): 3.3dB
(30MHz -1GHz): 4.6dB
(1GHz -26GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

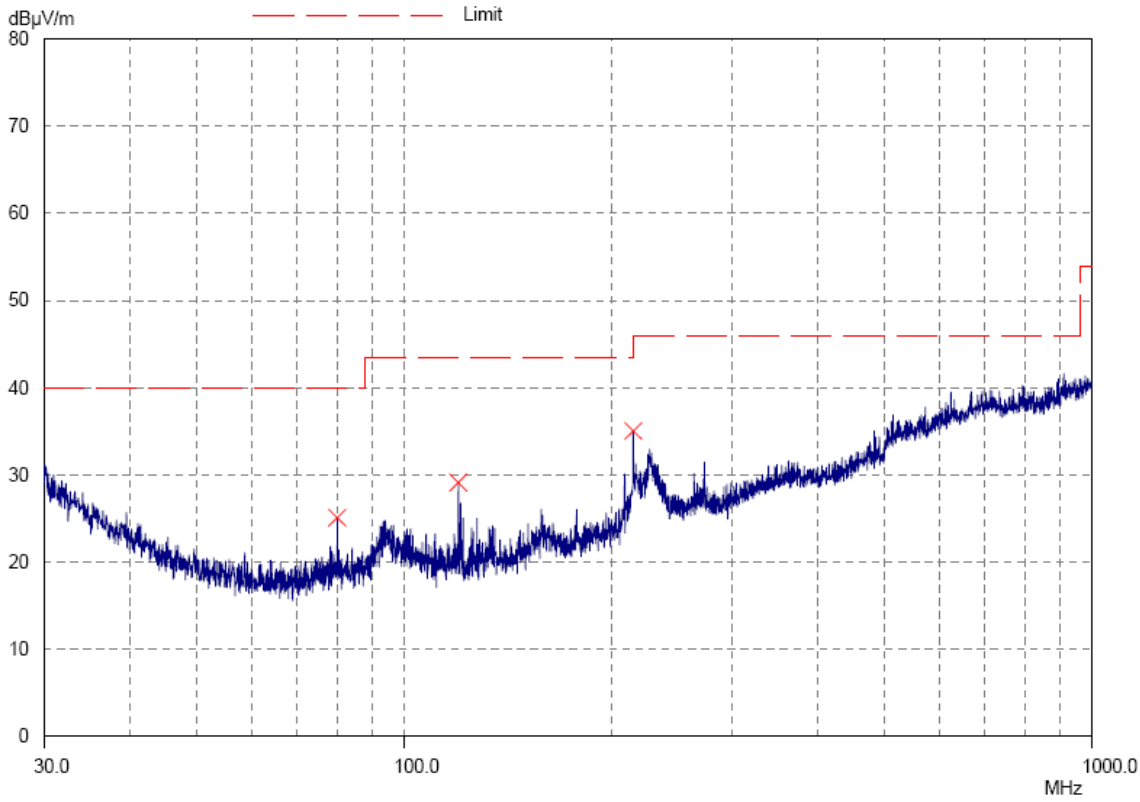
Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Bluetooth Communication+ Charging mode (30MHz – 1GHz): Pass
Please refer to the following table for result details

Horizontal



This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Result of Bluetooth Communication+ Charging mode (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBμV/m	Limit @3m dBμV/m	Level @3m μV/m	Limit @3m μV/m
80.0	Horizontal	25.1	40.0	18.0	100
119.9	Horizontal	29.1	43.5	28.5	150
215.4	Horizontal	35.1	43.5	56.9	150

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

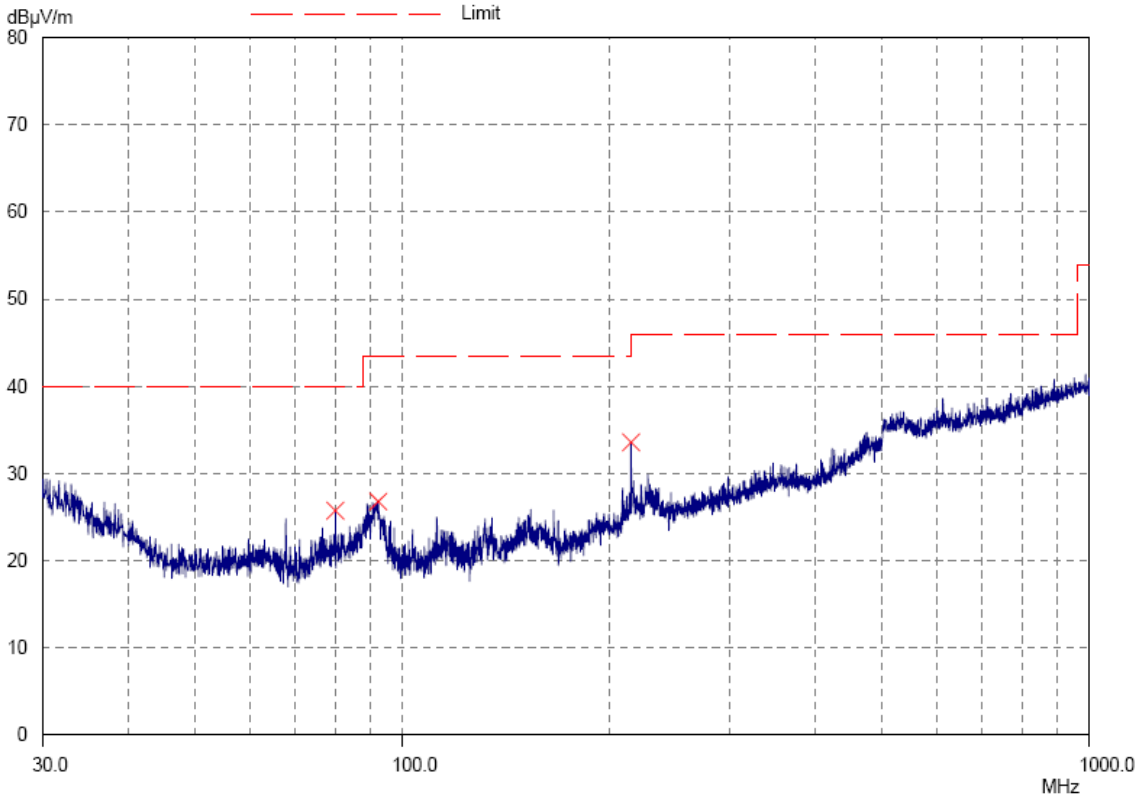
Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Bluetooth Communication+ Charging mode (30MHz – 1GHz): Pass

Please refer to the following table for result details

Vertical



This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Result of Bluetooth Communication+ Charging mode (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m µV/m	Limit @3m µV/m
80.0	Vertical	25.7	40.0	19.3	100
92.3	Vertical	26.8	43.5	21.9	150
215.4	Vertical	33.6	43.5	47.9	150

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

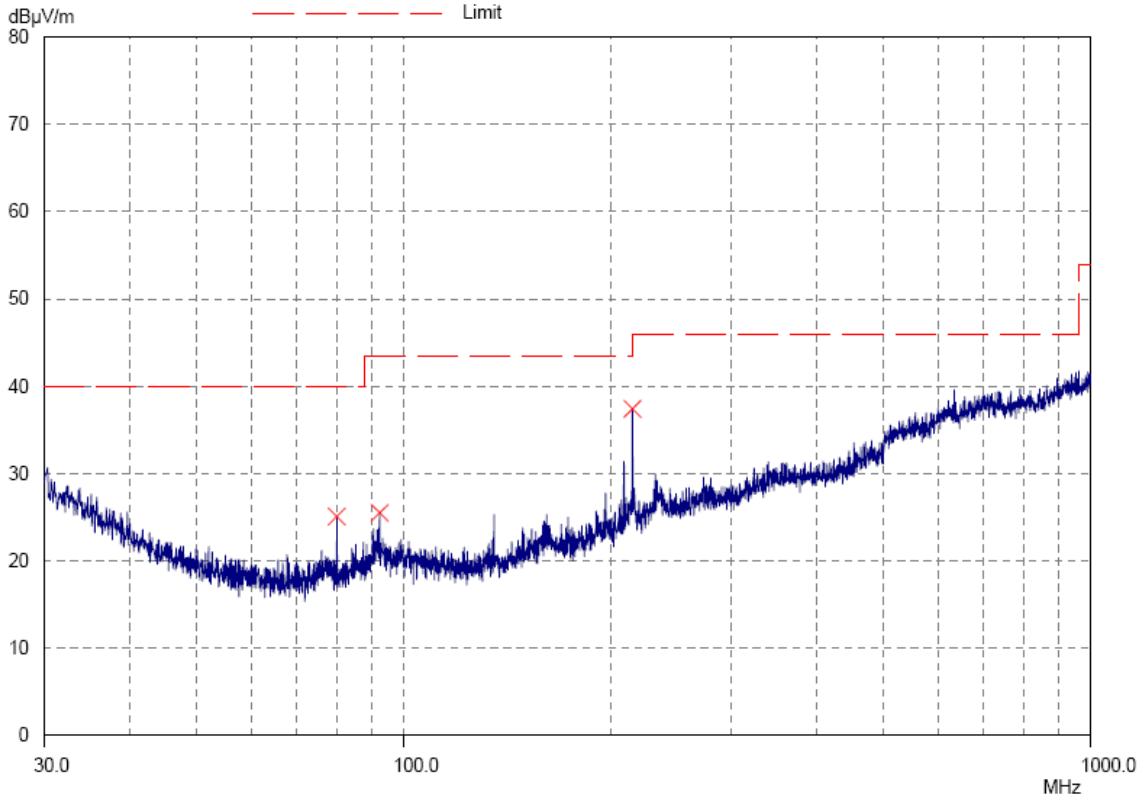
Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Bluetooth Communication mode (GFSK) (30MHz – 1GHz): Pass
Please refer to the following table for result details

Horizontal



This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Result of Bluetooth Communication mode (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m µV/m	Limit @3m µV/m
80.0	Horizontal	25.1	40.0	18.0	100
92.3	Horizontal	25.5	43.5	18.8	150
215.4	Horizontal	37.4	43.5	74.1	150

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

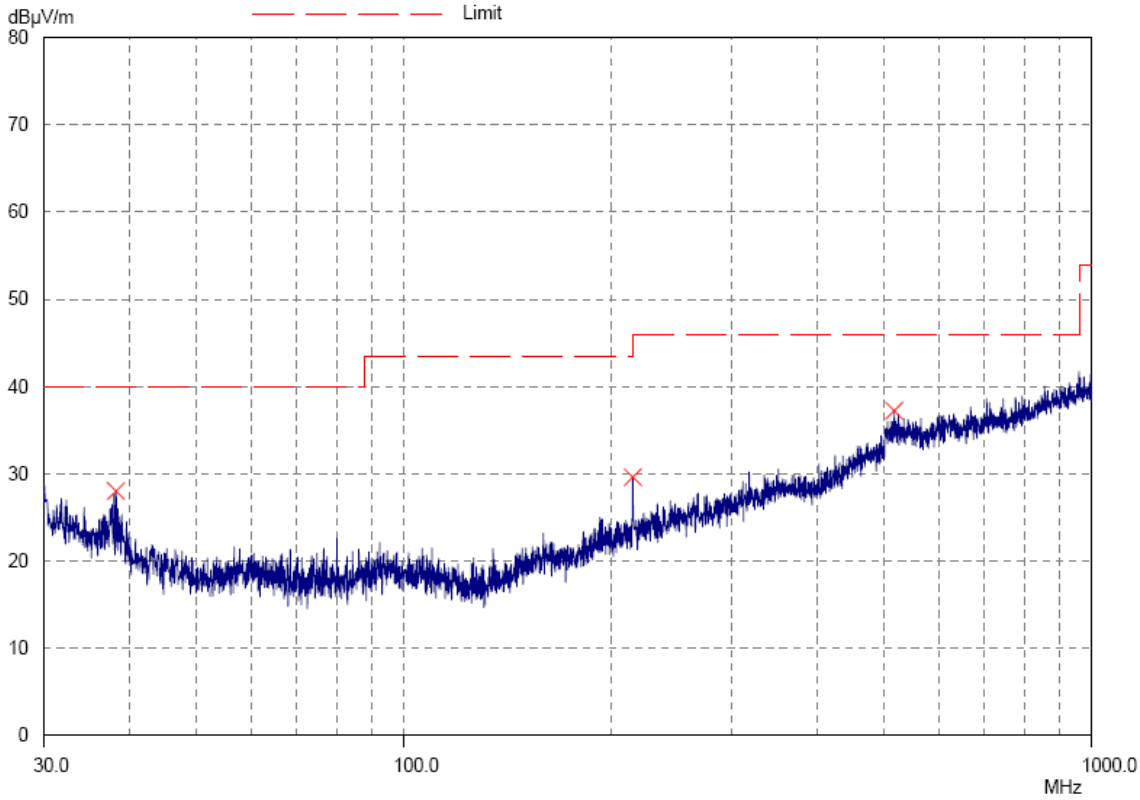
Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Bluetooth Communication mode (30MHz – 1GHz): Pass
Please refer to the following table for result details

Vertical



This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Result of Bluetooth Communication mode (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBμV/m	Limit @3m dBμV/m	Level @3m μV/m	Limit @3m μV/m
38.2	Vertical	28.0	40.0	25.1	100
215.4	Vertical	29.6	43.5	30.2	150
516.6	Vertical	37.2	46.0	72.4	200

Remarks:
Calculated measurement uncertainty (30MHz – 1GHz): 4.6dB
Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

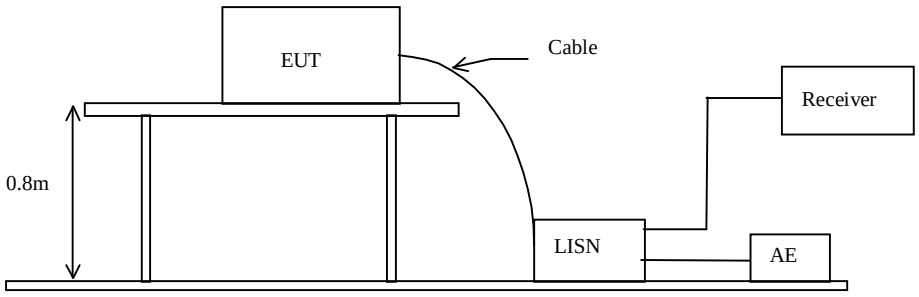
3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2009
Test Date:	2014-11-20
Mode of Operation:	Bluetooth + Charge mode
Test Voltage:	120Va.c. 60Hz

Test Method:

The test was performed in accordance with ANSI C63.4: 2009, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:



This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limit for Conducted Emissions (FCC 47 CFR 15.207):

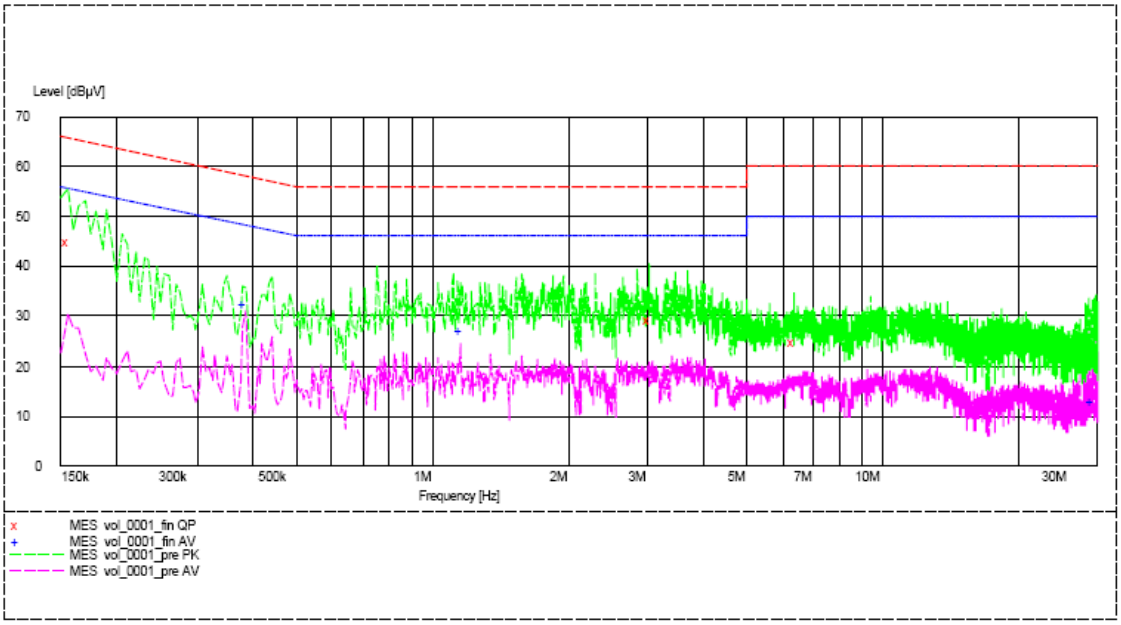
Frequency Range [MHz]	Quasi-Peak Limits [dBµV]	Average [dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Result of Bluetooth Communication+ Charging mode (L): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Average Level dBµV	Average Limit dBµV
Live	0.155	45.0	66.0	-*-	-*-
Live	3.035	29.2	56.0	-*-	-*-
Live	6.365	24.9	60.0	-*-	-*-
Live	0.385	-*-	-*-	32.4	46.0
Live	1.155	-*-	-*-	27.1	46.0
Live	29.045	-*-	-*-	12.9	50.0

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limit for Conducted Emissions (FCC 47 CFR 15.207):

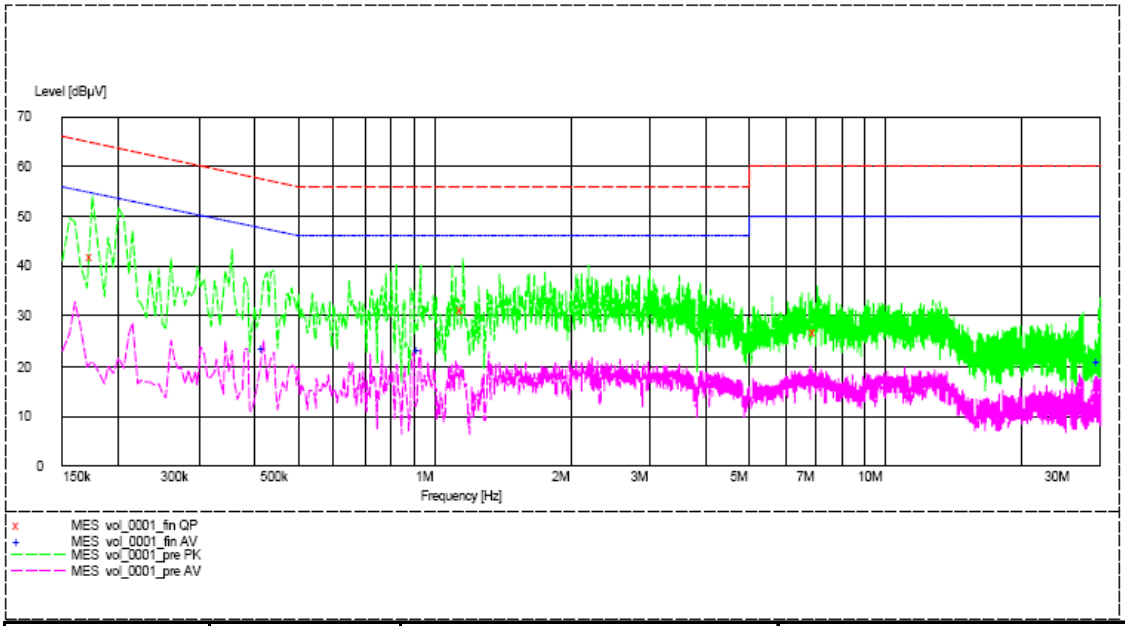
Frequency Range [MHz]	Quasi-Peak Limits [dBµV]	Average [dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Result of Bluetooth Communication+ Charging mode (N): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Average Level dBµV	Average Limit dBµV
Neutral	0.175	41.8	65.0	-*-	-*-
Neutral	1.160	31.5	56.0	-*-	-*-
Neutral	7.045	26.8	60.0	-*-	-*-
Neutral	0.420	-*-	-*-	23.8	47.0
Neutral	0.930	-*-	-*-	23.5	46.0
Neutral	29.810	-*-	-*-	0.8	50.0

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.2dB

-*- Emission(s) that is far below the corresponding limit line.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

3.1.3 Power Spectral Density

Test Requirement:	FCC 47CFR 15.247(e)
Test Method:	FCC KDB Publication 558074 D01 DTS Meas Guidance v02
Test Date:	2014-11-20
Mode of Operation:	Bluetooth 4.0 Tx mode

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz , VBW= 10KHz , Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple , Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

Test Limit:
The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

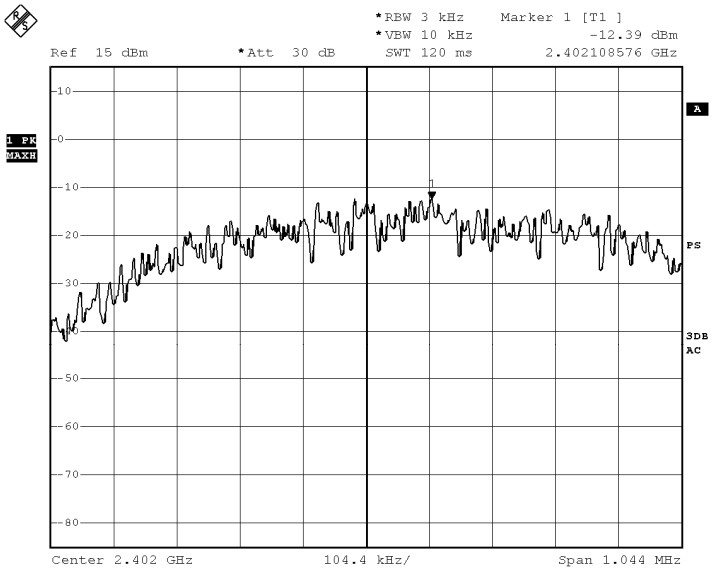
Results of BT 4.0 Mode (Tx:2402MHz to 2480MHz) : Pass (TX Unit)
Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2402.0	-12.39	**8dBm**
2442.0	-11.12	**8dBm**
2480.0	-10.93	**8dBm**

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

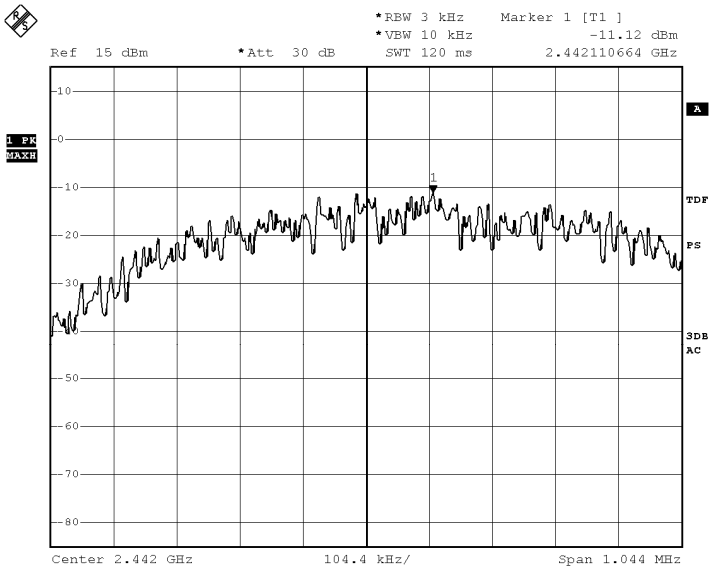
Bluetooth 4.0 mode (Tx: 2402MHz to 2480MHz)

2402.0 MHz



Date: 20.NOV.2014 15:16:39

2442.0 MHz

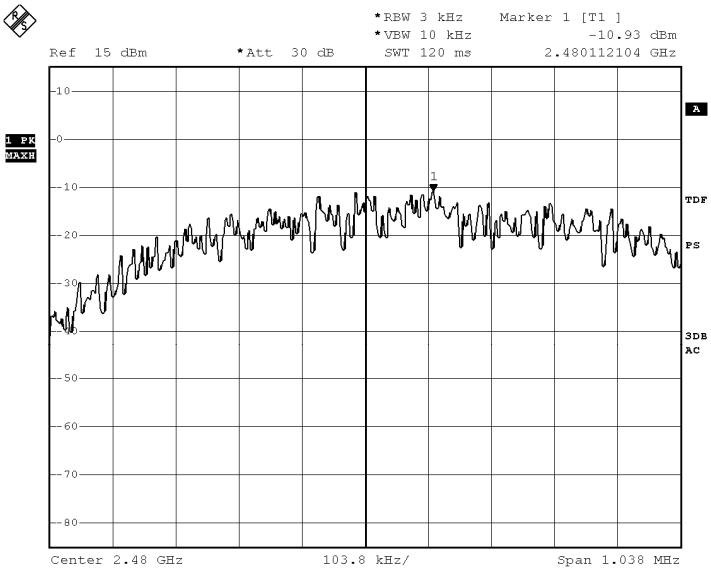


Date: 20.NOV.2014 15:16:14

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

2480.0 MHz



Date: 20.NOV.2014 15:15:33

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

3.1.4 6dB Bandwidth Measurement

Test Requirement:	FCC 47CFR 15.247(a)(2)
Test Method:	FCC KDB Publication 558074 D01 DTS Meas Guidance v02
Test Date:	2014-11-20
Mode of Operation:	Bluetooth 4.0 Tx mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. 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.

Test Setup:

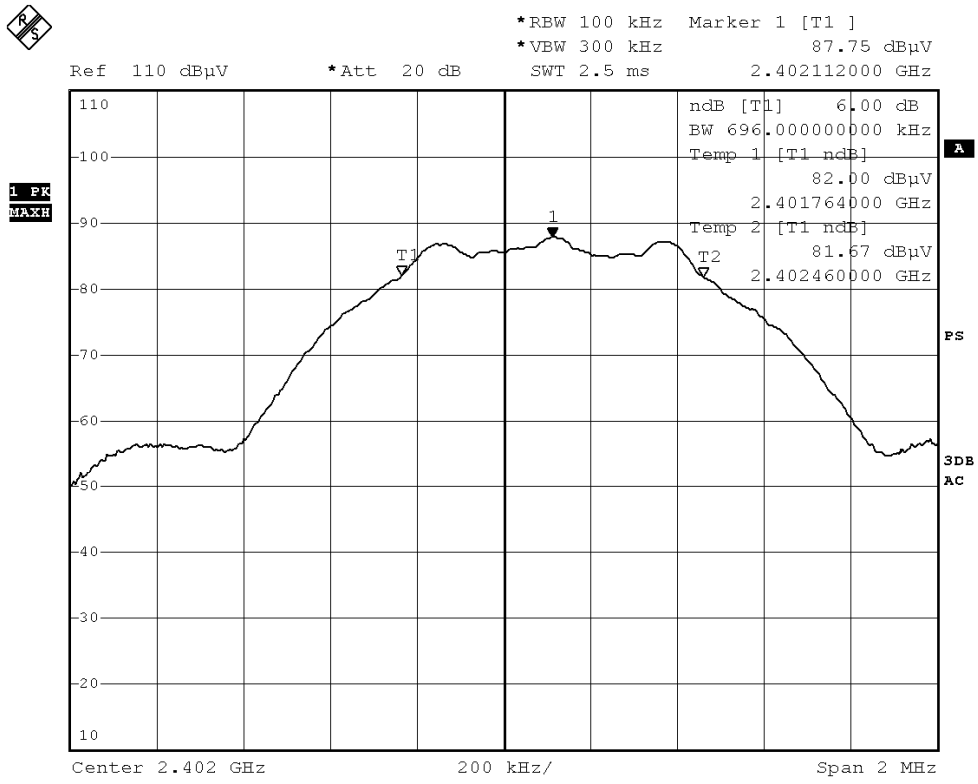
As Test Setup of clause 3.1.1 in this test report.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limits for 6dB Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2402.0	696.0	> 500

6 dB Bandwidth Plot on Configuration BT 4.0 (GFSK: 2402MHz)



Date: 20.NOV.2014 14:47:07

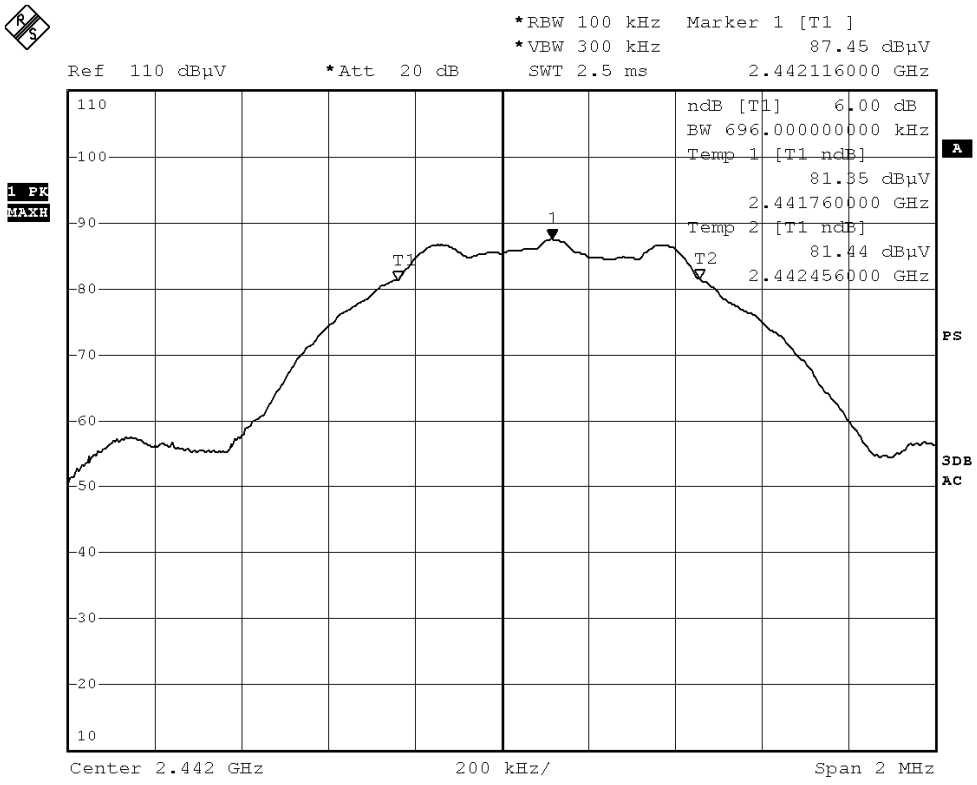
This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limits for 6dB Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2442.0	696.0	> 500

6 dB Bandwidth Plot on Configuration BT 4.0 (GFSK: 2442MHz)



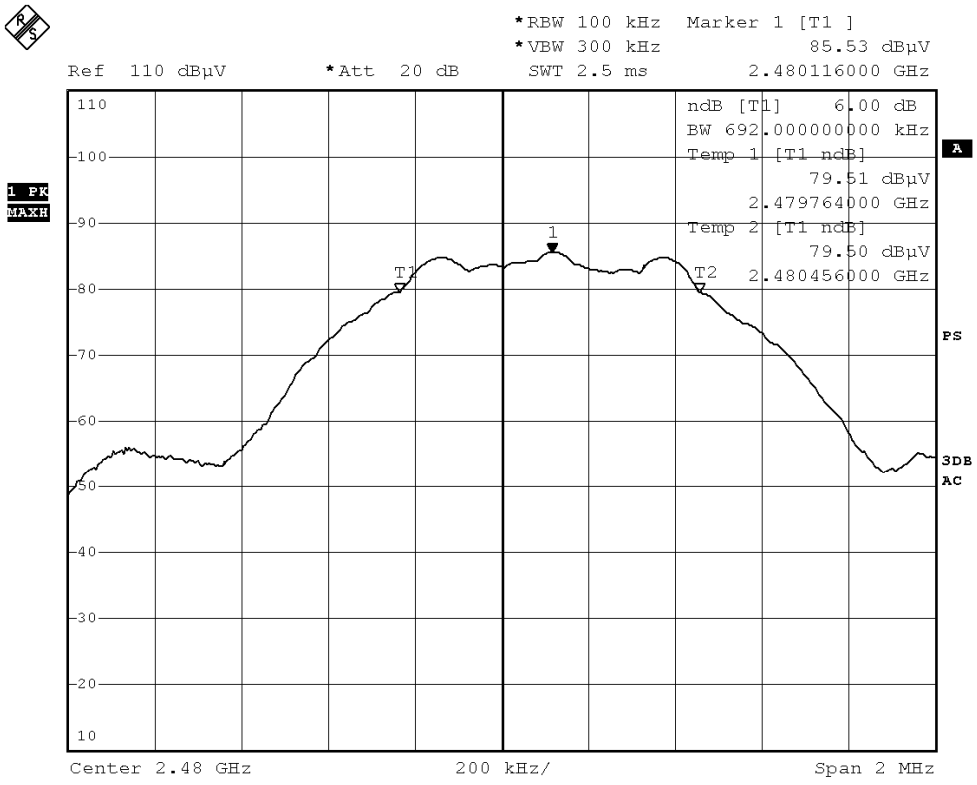
This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Limits for 6dB Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2480.0	692.0	> 500

6 dB Bandwidth Plot on Configuration BT 4.0 (GFSK: 2480MHz)



Date: 20.NOV.2014 14:46:08

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

3.1.5 Band Edges Measurement

Test Requirement:	FCC 47CFR 15.247
Test Method:	FCC KDB Publication 558074 D01 DTS Meas Guidance v02
Test Date:	2014-11-20
Mode of Operation:	Bluetooth 4.0 Tx mode

Test Method:

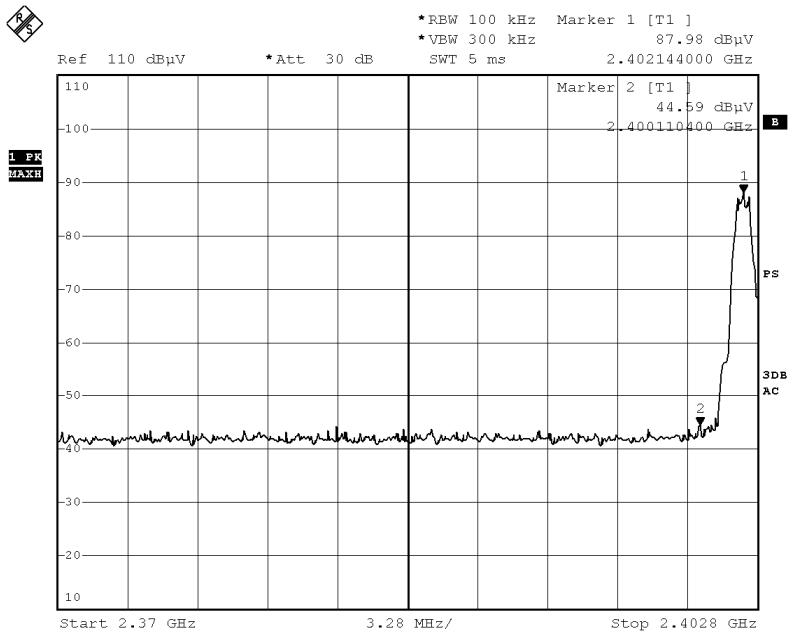
The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. The RBW and VBW are set to 100kHz for this measurement.

Test Setup:

As Test Setup of clause 3.1.2 in this test report.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Band-edge Compliance of RF Emissions – Lowest (GFSK: BT4.0 mode 2402MHz)



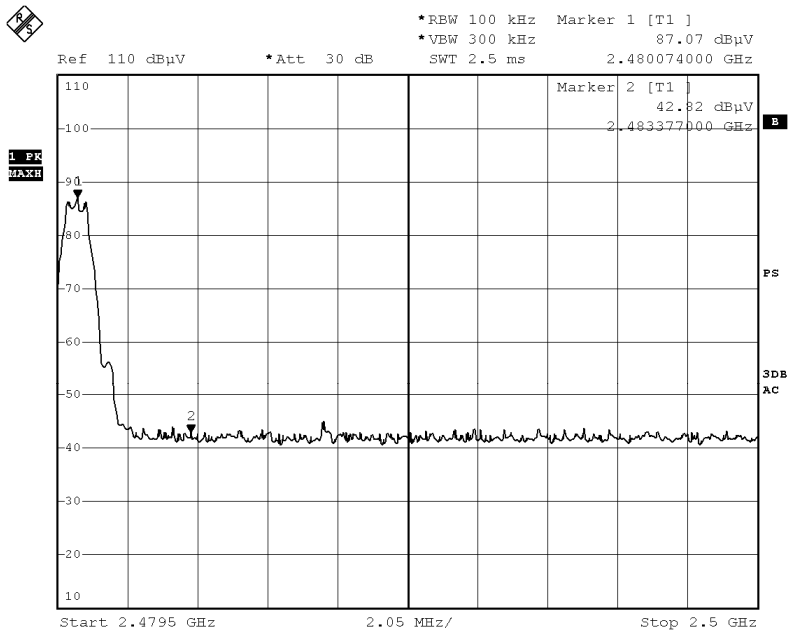
Date: 20.NOV.2014 14:37:16

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
2400.0	20.2	36.8	57.0	74.0	17.0	Vertical
Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
2400.0	3.7	36.8	40.5	54.0	13.5	Vertical

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Band-edge Compliance of RF Emissions – Highest (GFSK: BT4.0 mode 2480MHz)



Date: 20.NOV.2014 14:39:23

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
2483.5	19.9	36.4	56.3	74.0	17.7	Horizontal
Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
2483.5	3.8	36.4	40.2	54.0	13.8	Horizontal

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

3.1.6 Antenna Requirement

Test Requirements: § 15.203

Test Specification:

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.

Test Results:

This is Meander line antenna. There is no external antenna, the antenna gain = 0dBi.
All component install on inside of EUT. User unable to remove or changed the Antenna.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

3.1.7 RF Exposure

Test Requirement:	FCC 47CFR 15.247(i)
Test Date:	2014-12-08
Mode of Operation:	Tx mode

Test Method:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Test Results:

The EUT complied with the requirement(s) of this section.
EUT meets the requirements of these sections as proven through MPE calculation
The MPE calculation for EUT @ 20cm
Based on the highest P =2.88 mW

Pd = PG/ 4pi*R2 = (2.88 x1)/12.566* (20)2
= (2.88)/12.566x 400= 2.88 /5026.4
= 0.000573mW/cm2

where:
*Pd = power density in mW/cm2
* G = Antenna numeric gain (1); Log G = g/10 (g = 0dBi).
* P = Conducted RF power to antenna (2.88 mW).
* R = Minimum allowable distance.(20 cm)

*The power density Pd = 0.000573mW/cm2 is less than 1 mW/cm2 (listed MPE limit)
*The SAR evaluation is not needed (R> 20 cm)
* The EUT(antenna) must be 0.2 meters away from the General Population.

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Appendix A

List of Measurement Equipment

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD004	LISN	ROHDE & SCHWARZ	ESH3-Z5	100102	2014.03.21	2015.03.21
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100314	2014.03.21	2015.03.21
EMD035	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100441	2014.06.10	2015.06.10
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB 26	100388	2014.06.10	2015.06.10
EMD041	TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	100261	2014.03.21	2015.03.21
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2014.11.29	2016.11.29
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2014.11.15	2015.11.15
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo lnstrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD103	Intelligent Frequency	Ainuo lnstrument Co., Ltd	AN97005SS	79707455	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD106	Shielding Room #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A
EMD111	Power meter	ROHDE & SCHWARZ	NRVD	102051	2014.03.21	2015.03.21
	100V Insertion Unit	ROHDE & SCHWARZ	URV5-Z4	100464	2014.03.21	2015.03.21
EMD113	Pre-Amplifier	ROHDE & SCHWARZ	N/A	1129588	2014.03.21	2015.03.21
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2014.04.28	2016.04.28
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO lnc.	JXTXLB-42-15-C-KF	J2021100721001	2013.04.09	2015.04.09

Remarks:-

N/A Not Applicable or Not Available

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Appendix B

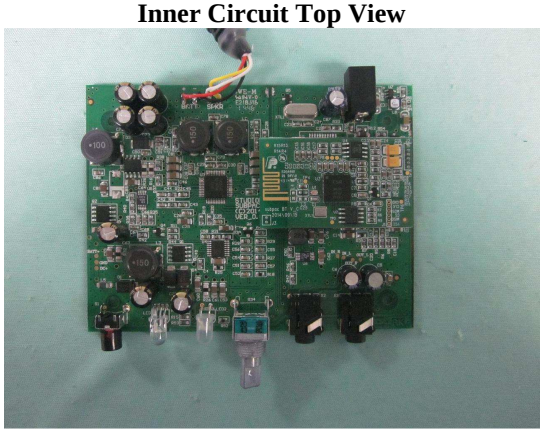
Photographs of EUT

Front View of the product

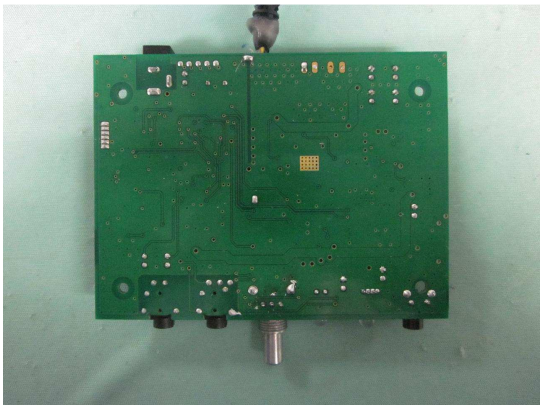
Rear View of the product

Inside View of the product

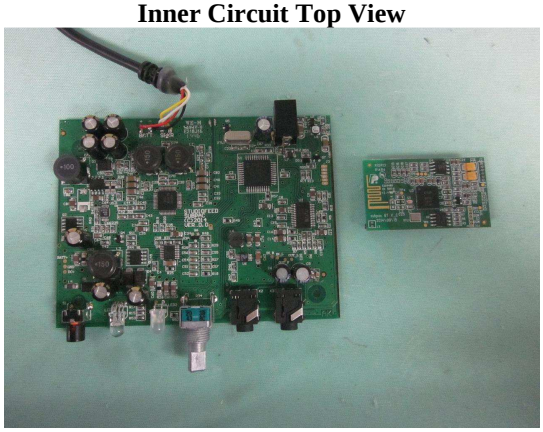
Inner Circuit Top View



Inner Circuit Bottom View



Inner Circuit Top View

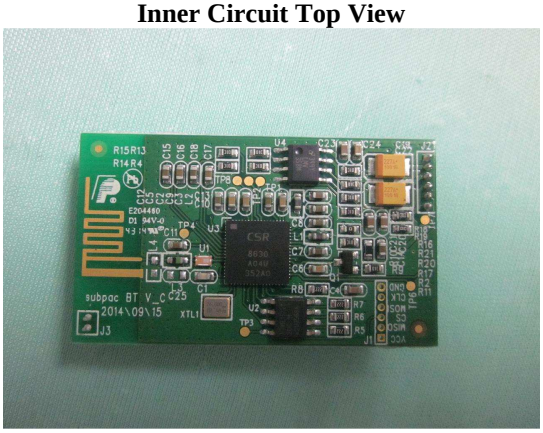


This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

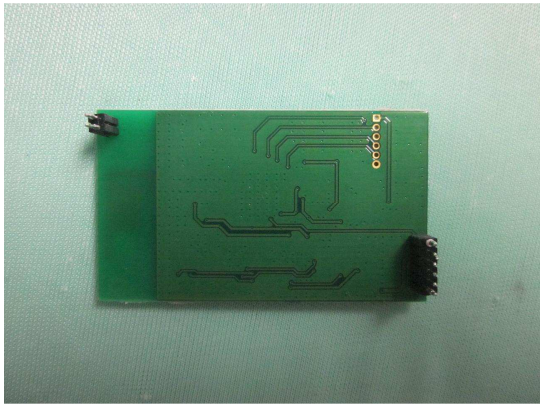
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Photographs of EUT

Inner Circuit Top View



Inner Circuit Bottom View

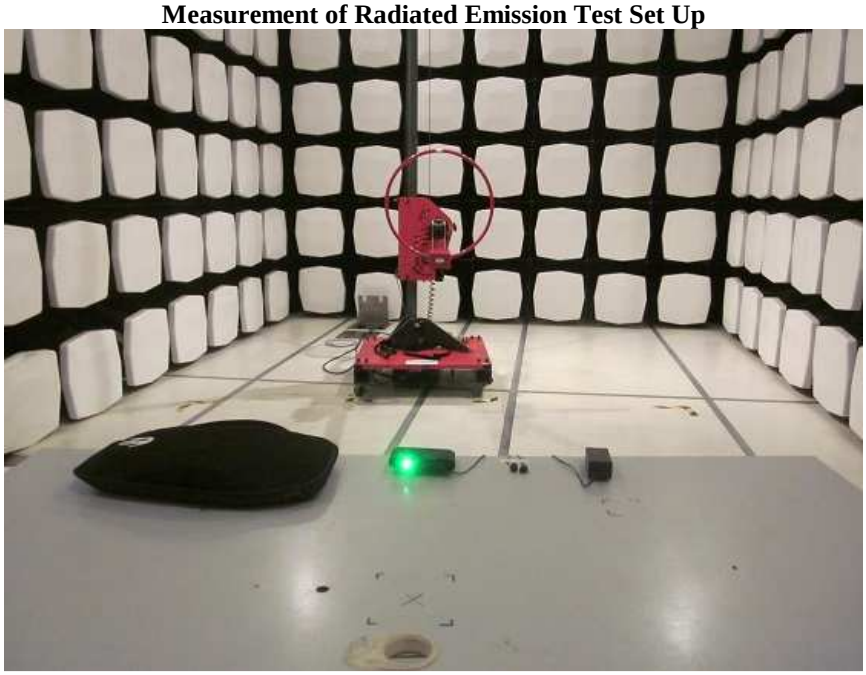


This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

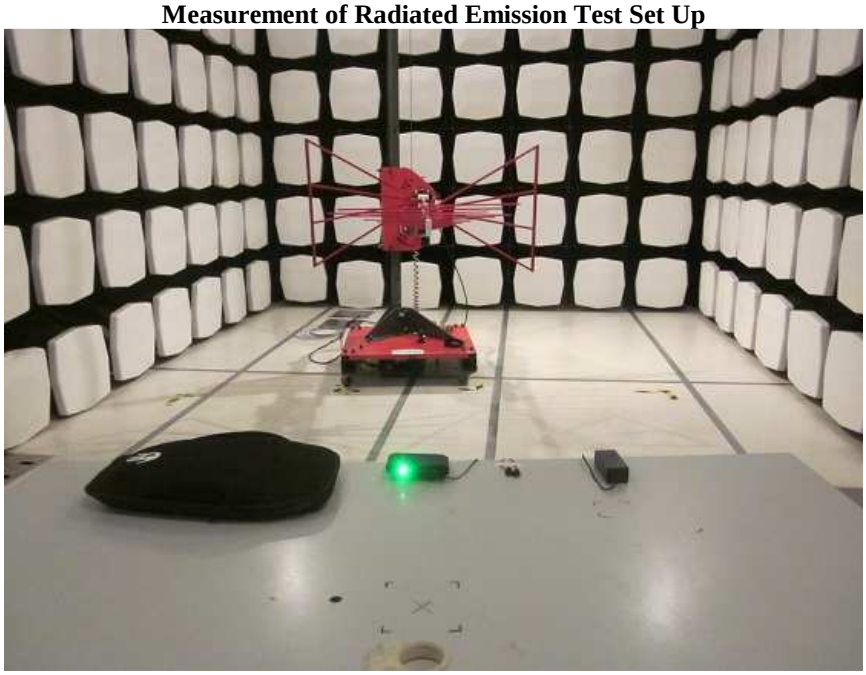
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up

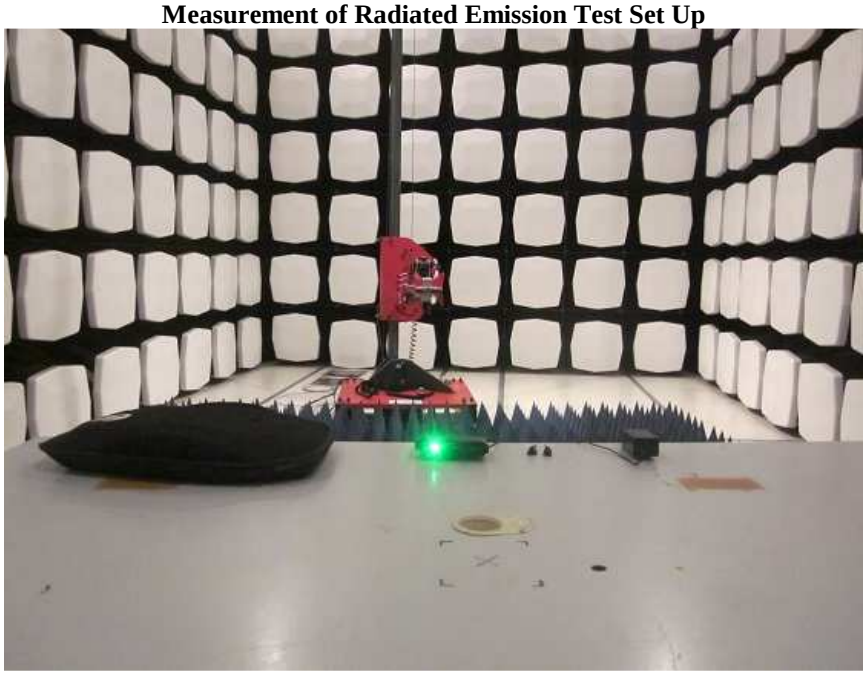


This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

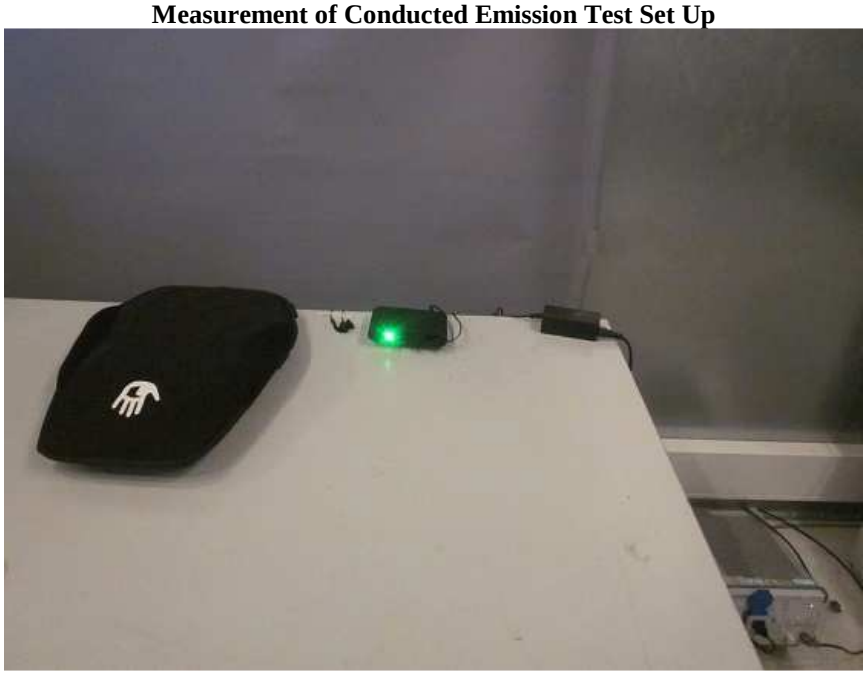
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.

Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



******* End of Test Report *******

This report shall not be reproduced unless with prior written approval from STC (Dongguan) Company Limited.

For Conditions of Issuance of this test report, please refer to the overleaf or Homepage.