



STC Test Report



Deutsche
Akkreditierungsstelle
D-PL-12121-01-00

Date: 2016-05-13

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No.: DM123485

Applicant: GP Electronics (HK) Ltd.
9/F, Building 12W, 12 Science Park West Avenue, Hong
Kong Science Park, Pak Shek Kok, New Territories, Hong
Kong

Manufacturer: GP Electronics (HuiZhou) Co., Ltd.
No. 76, HuiFeng Si Road, Zhong Kai Hi-Tech Industrial
Development Zone, Huizhou, Guangdong, PRC

Description of Sample(s): Submitted sample(s) said to be
Product: Bluetooth Speaker
Brand Name: KEF
Model Number: GRAVITY ONE
FCC ID: UXD16002

Date Sample(s) Received: 2016-05-05

Date Tested: 2016-05-06 to 2016-05-12

Investigation Requested: Perform ElectroMagnetic Interference measurement in
accordance with FCC 47CFR [Codes of Federal Regulations]
Part 15: 2015 and ANSI C63.10: 2013 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

STC (Dongguan) Company Limited

68 Fumin Nan Road, Dalang, Dongguan, China. (Zip Code : 523 770)

Tel : (86 769) 8111 9888 Fax : (86 769) 8111 6222 E-mail : dgstc@dgstc.org Homepage : www.dgstc.org

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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: Bluetooth Speaker
Manufacturer: GP Electronics (HuiZhou) Co., Ltd.
No. 76, HuiFeng Si Road, Zhong Kai Hi-Tech Industrial
Development Zone, Huizhou, Guangdong, PRC
Brand Name: KEF
Model Number: GRAVITY ONE
Rating: Adapter: Input: 100-240Va.c. 50/60Hz 0.45A;
Output: 5.0Vd.c. 2.0A.
Battery: 7.5Vd.c. 2900mAh

The AC/DC adaptor was provided by the applicant with following details:
Brand name: DYS; Model no.: APP521-050200U

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Bluetooth Speaker, modulation by IC; and type of modulation used is frequency hopping speed spectrum Modulation.

1.3 Date of Order

2016-05-05

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2016-05-06 to 2016-05-12

1.6 Country of Origin

China

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1.7 RF Module Details

Module Model Number: N/A
Module FCC ID: N/A
Module Transmission Type: Bluetooth 4.2 BLE
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: PIFA Antenna
Antenna Gain: -1.6dBi

1.9 Channel List

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

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 Regulations and ANSI C63.10:2013 for FCC Certification.

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)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Spurious Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Spectral Density	FCC 47CFR 15.247(e)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Band Edge Emissions (Radiated)	FCC 47CFR 15.247(d)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

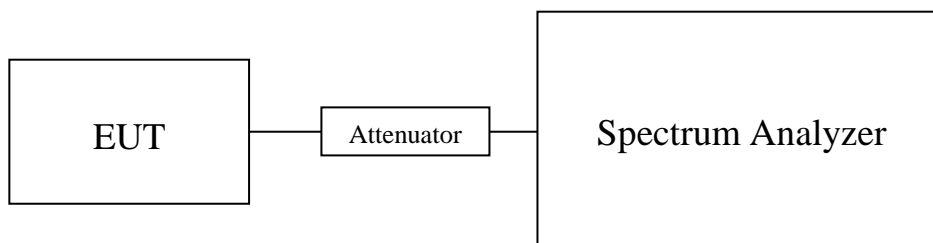
3.1.1 Maximum Peak Output Power

Test Requirement:	FCC 47CFR 15.247(b)(3)
Test Method:	ANSI C63.10: 2013
Test Date:	2016-05-06
Mode of Operation:	Bluetooth DTS 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.

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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 BT DTS Tx Mode (2402MHz to 2480MHz) : Pass (TX Unit) (GFSK) Maximum conducted output power		
Channel	Frequency(MHz)	Output Power(Watt)
0	2402	0.001799
19	2440	0.001999
39	2480	0.002188

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

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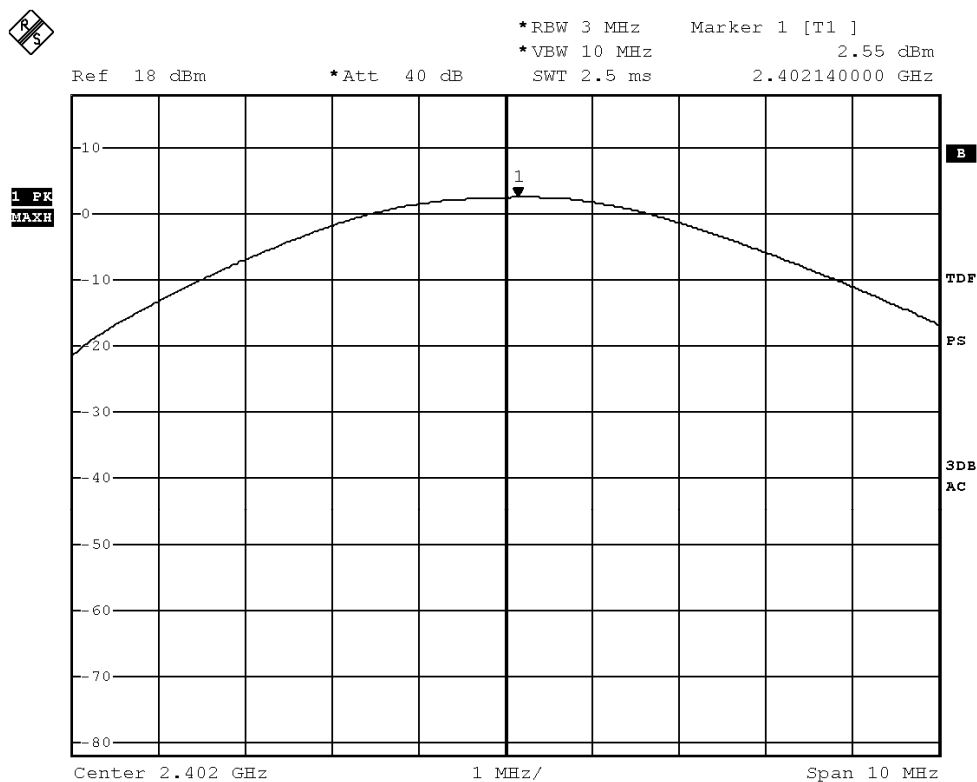
Date: 2016-05-13

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Test plot of Maximum Peak Conducted Output Power :

Bluetooth Communication mode (BT DTS-GFSK, 2402MHz)



BMP

Date: 6.MAY.2016 13:09:05

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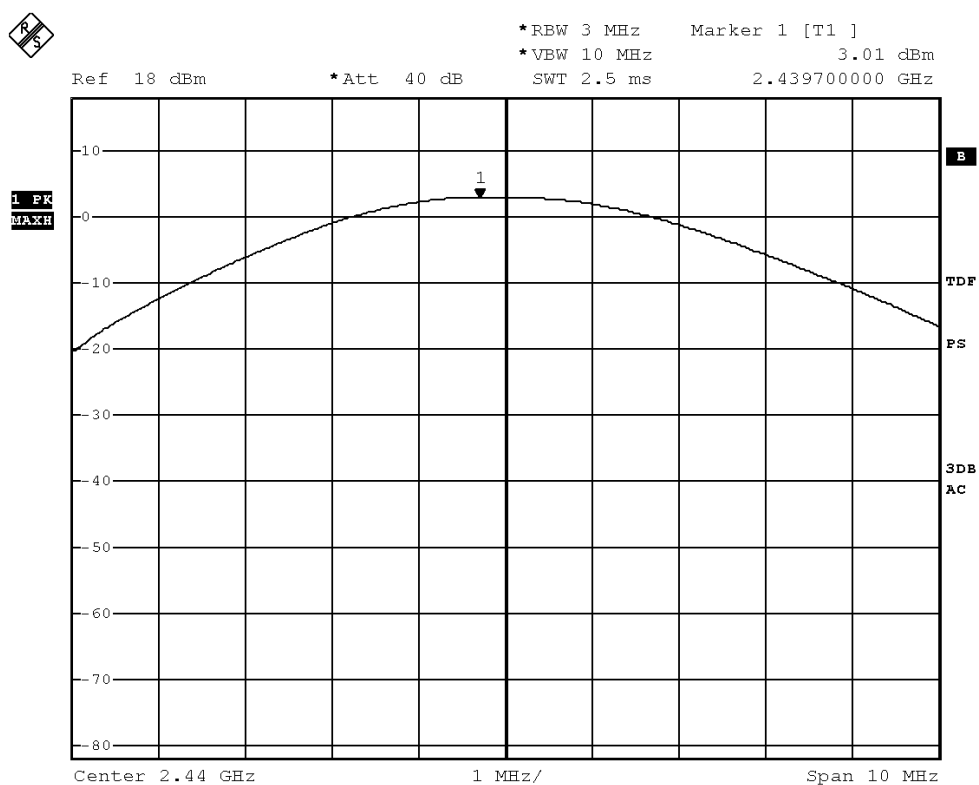
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Bluetooth Communication mode (BT DTS-GFSK, 2440MHz)



BMP

Date: 6.MAY.2016 13:08:50

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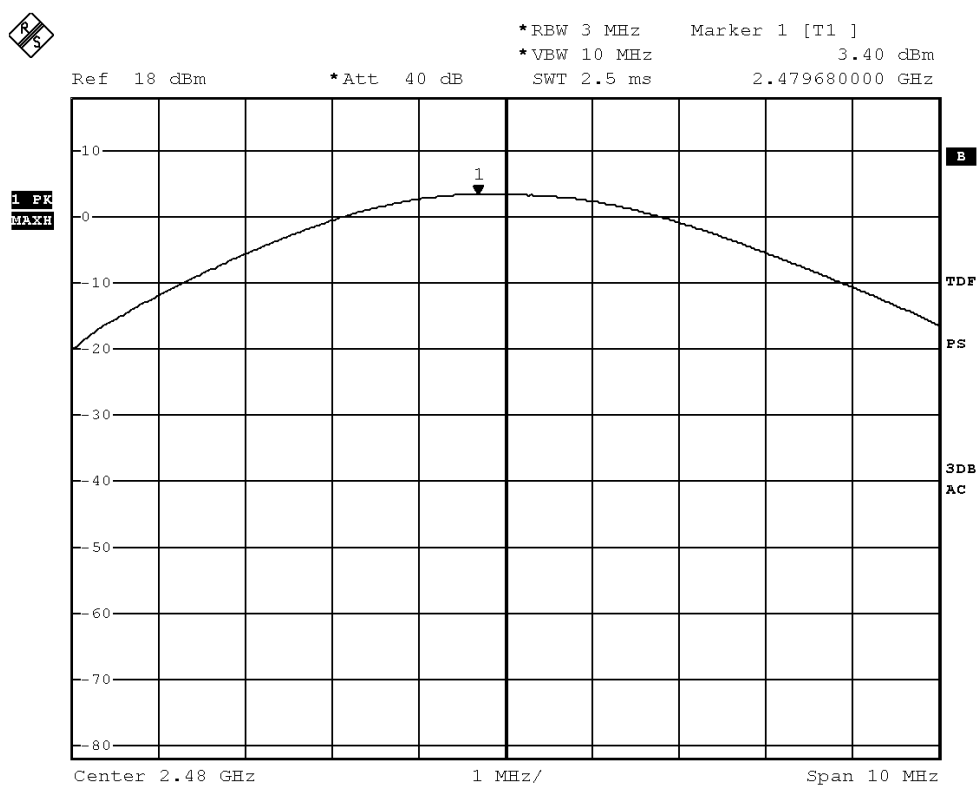
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Bluetooth Communication mode (BT DTS-GFSK, 2480MHz)



BMP

Date: 6.MAY.2016 13:08:33

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3.1.2 Radiated Emissions

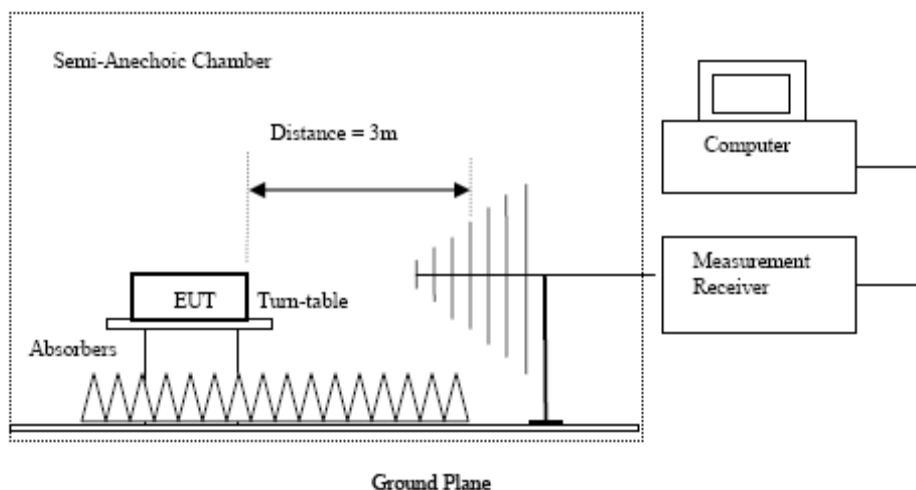
Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.10:2013
Test Date:	2016-05-06 to 2016-05-11
Mode of Operation:	Tx mode / Bluetooth Communication mode (GFSK)

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m 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 STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

Test Setup:



- 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.

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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
Above 960	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 (2402.0 MHz) (GFSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 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
4804.0	17.1	41.5	58.6	74.0	15.4	Vertical
4804.0	15.4	42.4	57.8	74.0	16.2	Horizontal
7206.0	12.2	45.1	57.3	74.0	16.7	Vertical
7206.0	9.9	46.2	56.1	74.0	17.9	Horizontal
9608.0	7.1	48.0	55.1	74.0	18.9	Vertical
9608.0	6.1	48.8	54.9	74.0	19.1	Horizontal
12010.0	3.7	51.8	55.5	74.0	18.5	Vertical
12010.0	3.6	52.4	56.0	74.0	18.0	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4804.0	2.8	41.5	44.3	54.0	9.7	Vertical
4804.0	0.1	42.4	42.5	54.0	11.5	Horizontal
7206.0	-2.8	45.1	42.3	54.0	11.7	Vertical
7206.0	-4.3	46.2	41.9	54.0	12.1	Horizontal
9608.0	-8.8	48.0	39.2	54.0	14.8	Vertical
9608.0	-10.4	48.8	38.4	54.0	15.6	Horizontal
12010.0	-12.5	51.8	39.3	54.0	14.7	Vertical
12010.0	-13.2	52.4	39.2	54.0	14.8	Horizontal

Result of Tx mode (2440.0 MHz) (GFSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2440.0 MHz) (GFSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4880.0	16.6	41.6	58.2	74.0	15.8	Vertical
4880.0	15.1	42.5	57.6	74.0	16.4	Horizontal
7320.0	4.3	53.2	57.5	74.0	16.5	Vertical
7320.0	10.7	46.3	57.0	74.0	17.0	Horizontal
9760.0	7.1	48.1	55.2	74.0	18.8	Vertical
9760.0	6.3	48.9	55.2	74.0	18.8	Horizontal
12200.0	4.5	51.6	56.1	74.0	17.9	Vertical
12200.0	3.5	52.5	56.0	74.0	18.0	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4880.0	2.2	41.6	43.8	54.0	10.2	Vertical
4880.0	0.8	42.5	43.3	54.0	10.7	Horizontal
7320.0	-2.3	45.2	42.9	54.0	11.1	Vertical
7320.0	-4.6	46.3	41.7	54.0	12.3	Horizontal
9760.0	-9.1	48.1	39.0	54.0	15.0	Vertical
9760.0	-9.7	48.9	39.2	54.0	14.8	Horizontal
12200.0	-12.2	51.6	39.4	54.0	14.6	Vertical
12200.0	-12.8	52.5	39.7	54.0	14.3	Horizontal

Result of Tx mode (2480.0 MHz) (GFSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

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

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4960.0	17.4	41.4	58.8	74.0	15.2	Vertical
4960.0	15.0	42.7	57.7	74.0	16.3	Horizontal
7440.0	11.9	45.6	57.5	74.0	16.5	Vertical
7440.0	10.9	46.5	57.4	74.0	16.6	Horizontal
9920.0	6.8	48.6	55.4	74.0	18.6	Vertical
9920.0	5.5	49.7	55.2	74.0	18.8	Horizontal
12400.0	4.4	51.7	56.1	74.0	17.9	Vertical
12400.0	3.4	52.7	56.1	74.0	17.9	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4960.0	2.6	41.4	44.0	54.0	10.0	Vertical
4960.0	-0.2	42.7	42.5	54.0	11.5	Horizontal
7440.0	-3.0	45.6	42.6	54.0	11.4	Vertical
7440.0	-4.0	46.5	42.5	54.0	11.5	Horizontal
9920.0	-9.6	48.6	39.0	54.0	15.0	Vertical
9920.0	-10.8	49.7	38.9	54.0	15.1	Horizontal
12400.0	-12.6	51.7	39.1	54.0	14.9	Vertical
12400.0	-13.4	52.7	39.3	54.0	14.7	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.

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

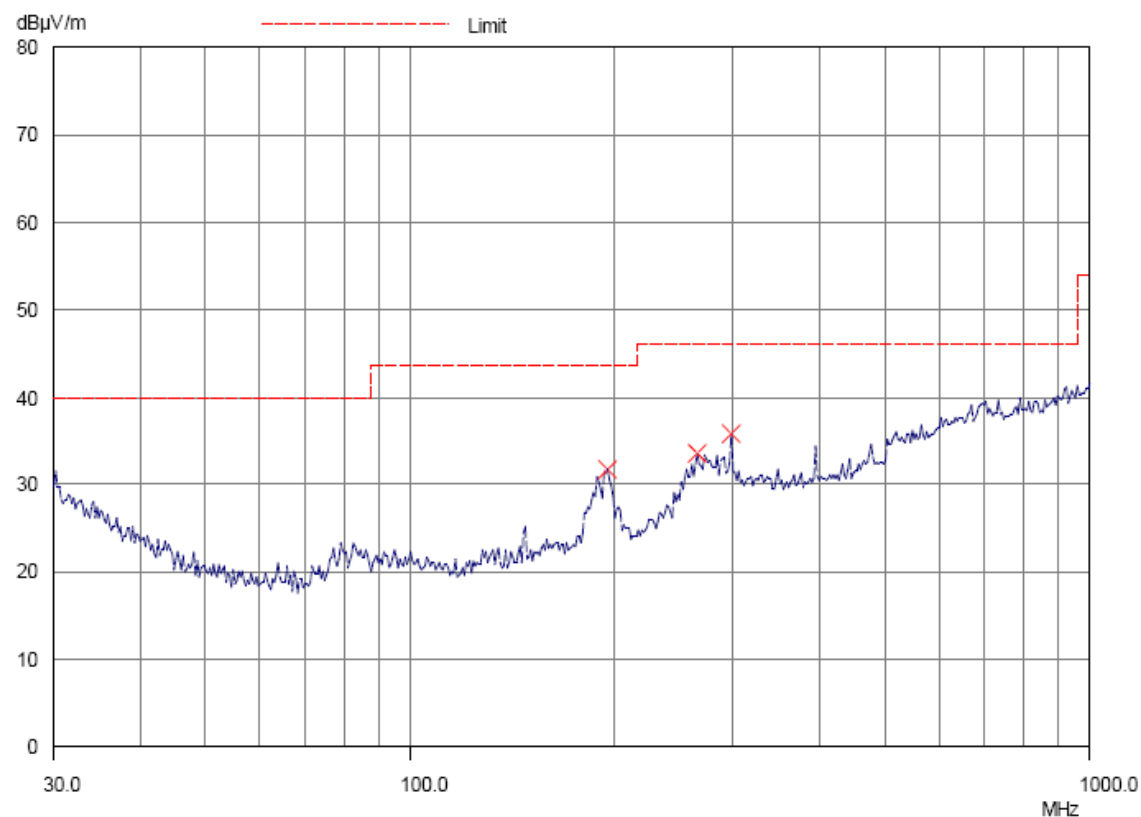
Frequency Range	Quasi-Peak Limits
[MHz]	[$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

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 (2402.0 MHz) (30MHz – 1GHz): Pass

Please refer to the following table for result details

Horizontal



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Result of Bluetooth Communication mode (2402.0 MHz) (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
194.9	Horizontal	31.8	43.5	38.9	150
264.0	Horizontal	33.6	46.0	47.9	200
294.9	Horizontal	35.7	46.0	61.0	200

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

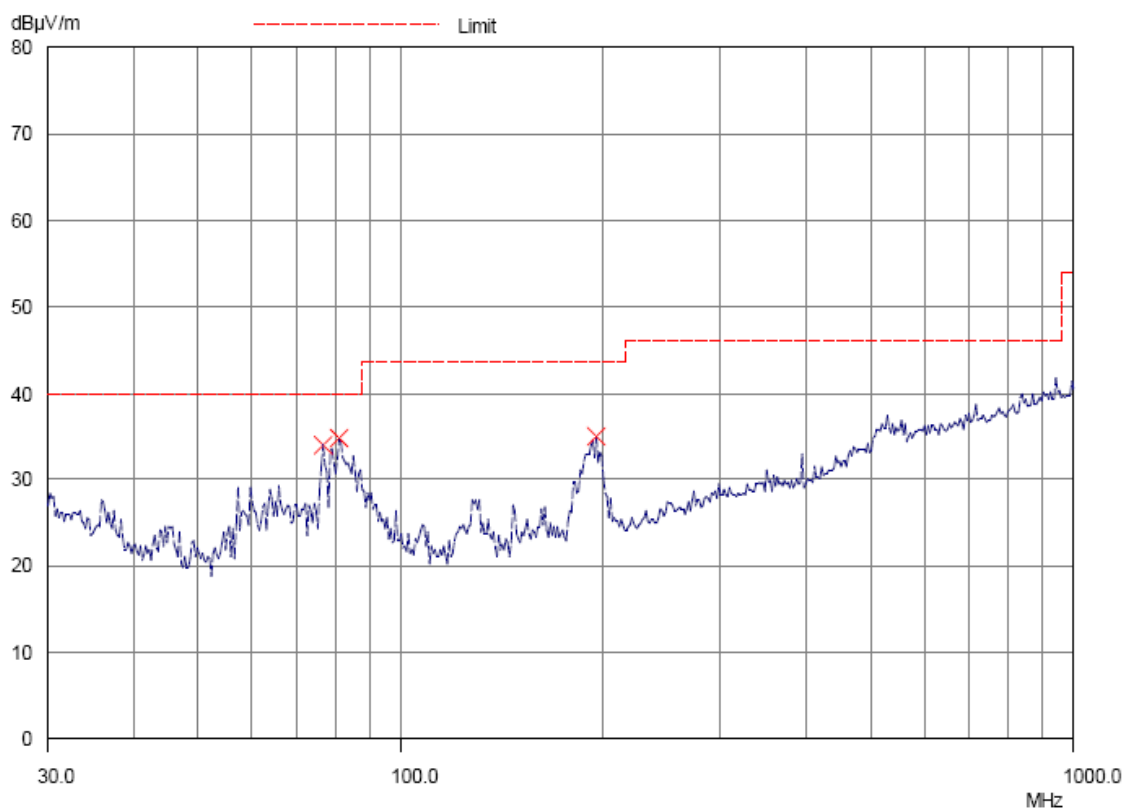
Frequency Range	Quasi-Peak Limits
[MHz]	[$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

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 (2402.0 MHz) (30MHz – 1GHz): Pass

Please refer to the following table for result details

Vertical



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Result of Bluetooth Communication mode (2402.0 MHz) (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
76.9	Vertical	34.1	40.0	50.7	100
81.1	Vertical	34.8	40.0	55.0	100
194.9	Vertical	35.1	43.5	56.9	150

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.

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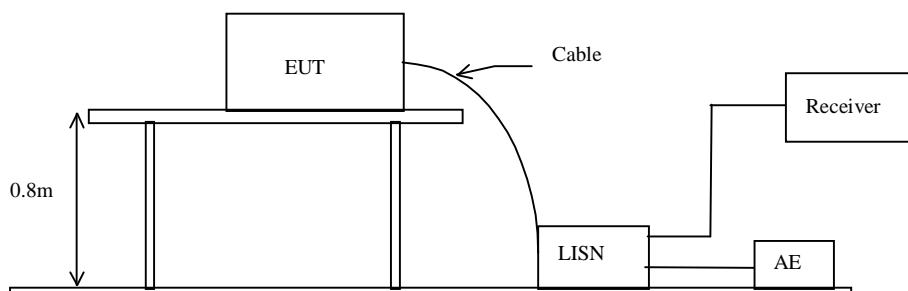
3.1.3 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10: 2013
Test Date:	2016-05-06
Mode of Operation:	Bluetooth Communication mode
Test Voltage:	120Va.c. 60Hz

Test Method:

The test was performed in accordance with ANSI C63.10: 2013, 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:



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Limit for Conducted Emissions (FCC 47 CFR 15.207):

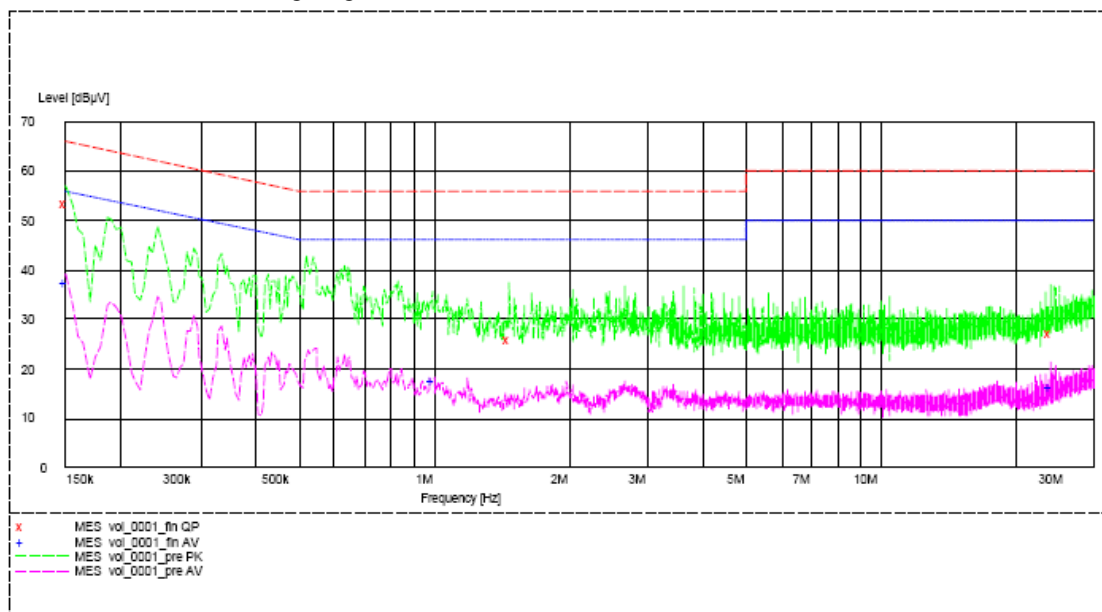
Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* 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 mode (L): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dBμV	Limit dBμV	Level dBμV	Limit dBμV
Live	0.150	53.4	66.0	-*-	-*-
Live	1.475	26.0	56.0	-*-	-*-
Live	23.980	27.3	60.0	-*-	-*-
Live	0.150	-*-	-*-	37.5	46.0
Live	1.000	-*-	-*-	17.6	46.0
Live	23.980	-*-	-*-	16.3	50.0

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Limit for Conducted Emissions (FCC 47 CFR 15.207):

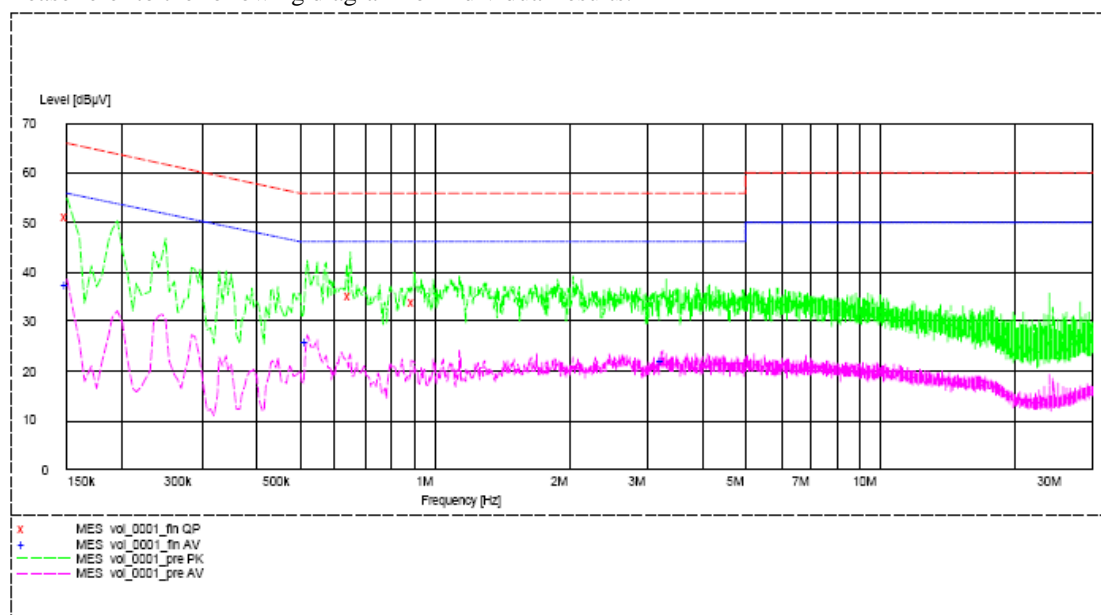
Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* 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 mode (N): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dBμV	Limit dBμV	Level dBμV	Limit dBμV
Neutral	0.150	51.2	66.0	-*-	-*-
Neutral	0.650	35.2	56.0	-*-	-*-
Neutral	0.905	34.0	56.0	-*-	-*-
Neutral	0.150	-*-	-*-	37.2	56.0
Neutral	0.520	-*-	-*-	25.9	46.0
Neutral	3.245	-*-	-*-	21.8	46.0

Remarks:

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

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

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3.1.4 Power Spectral Density

Test Requirement: FCC 47CFR 15.247(e)
Test Method: ANSI C63.10: 2013
Test Date: 2016-05-06
Mode of Operation: Bluetooth DTS 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 Bluetooth DTS 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	-13.29	8dBm
2440.0	-12.76	8dBm
2480.0	-12.49	8dBm

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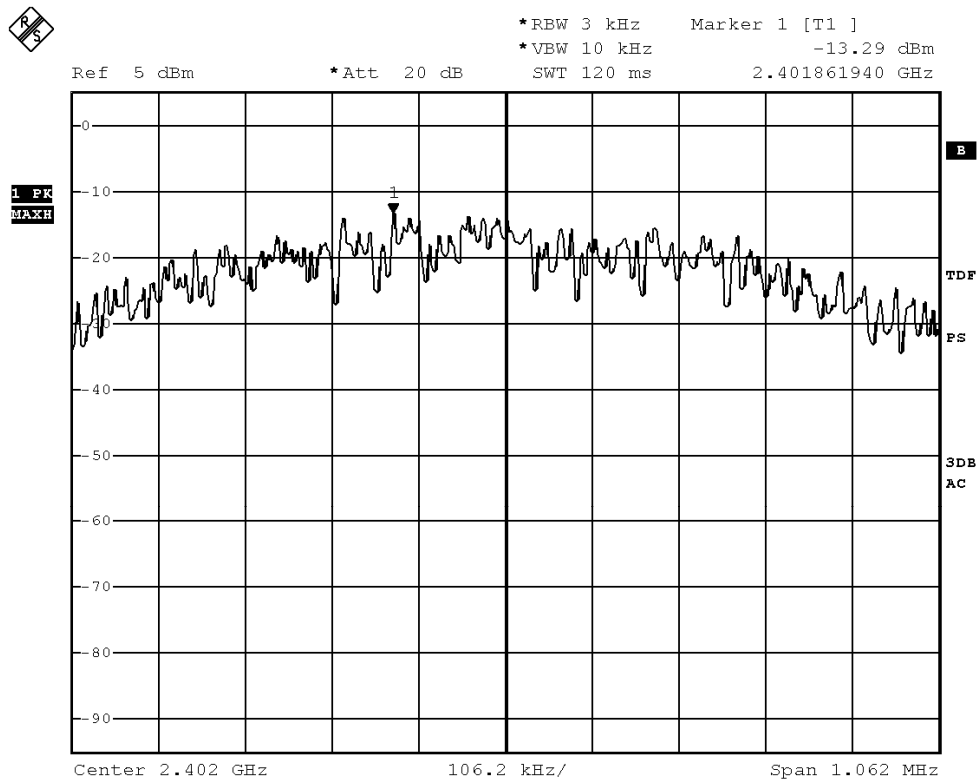
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Bluetooth DTS mode (Tx: 2402MHz to 2480MHz) 2402.0 MHz



BMP

Date: 6.MAY.2016 13:09:48

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2440.0 MHz



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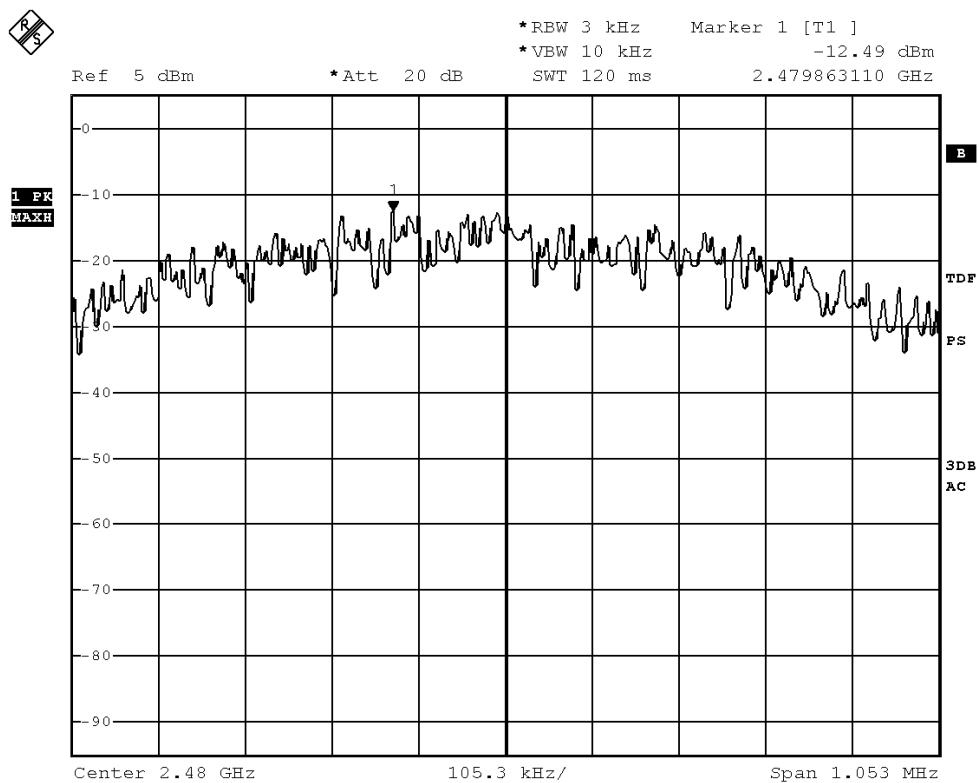
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2480.0 MHz



BMP

Date: 6.MAY.2016 13:10:54

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3.1.5 6dB Bandwidth Measurement

Test Requirement:	FCC 47CFR 15.247(a)(2)
Test Method:	ANSI C63.10: 2013
Test Date:	2016-05-06
Mode of Operation:	Bluetooth DTS 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.

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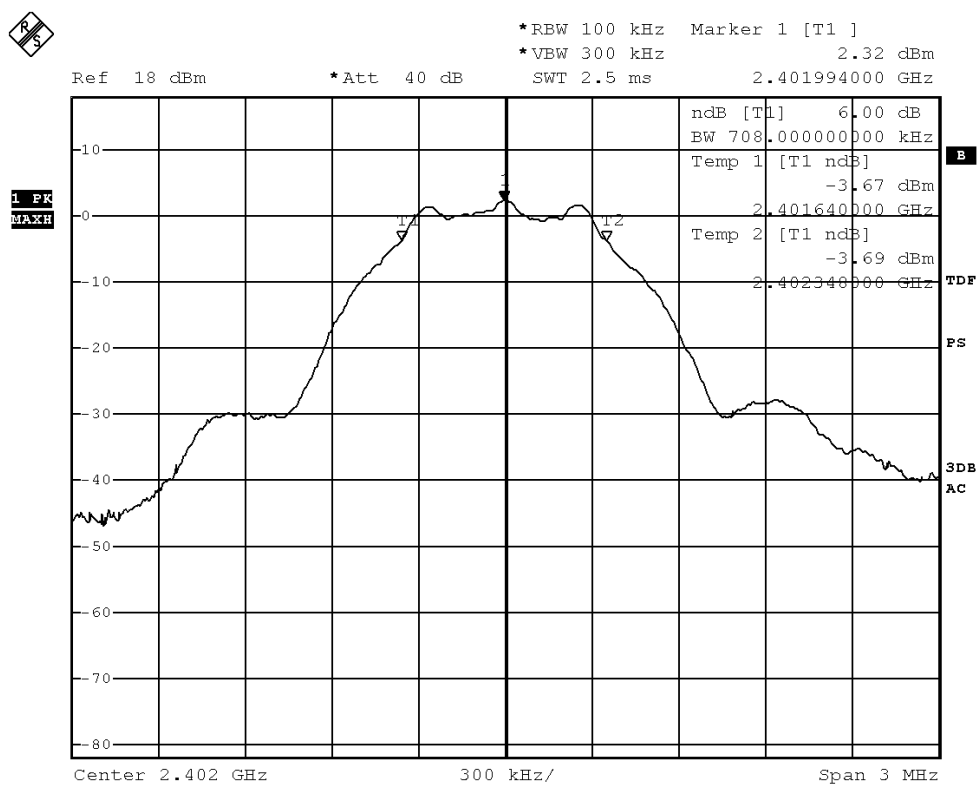
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Limits for 6dB Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2402.0	708.0	> 500

6 dB Bandwidth Plot on Configuration Bluetooth DTS (GFSK: 2402MHz)



BMP

Date: 6.MAY.2016 13:06:53

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Date: 2016-05-13

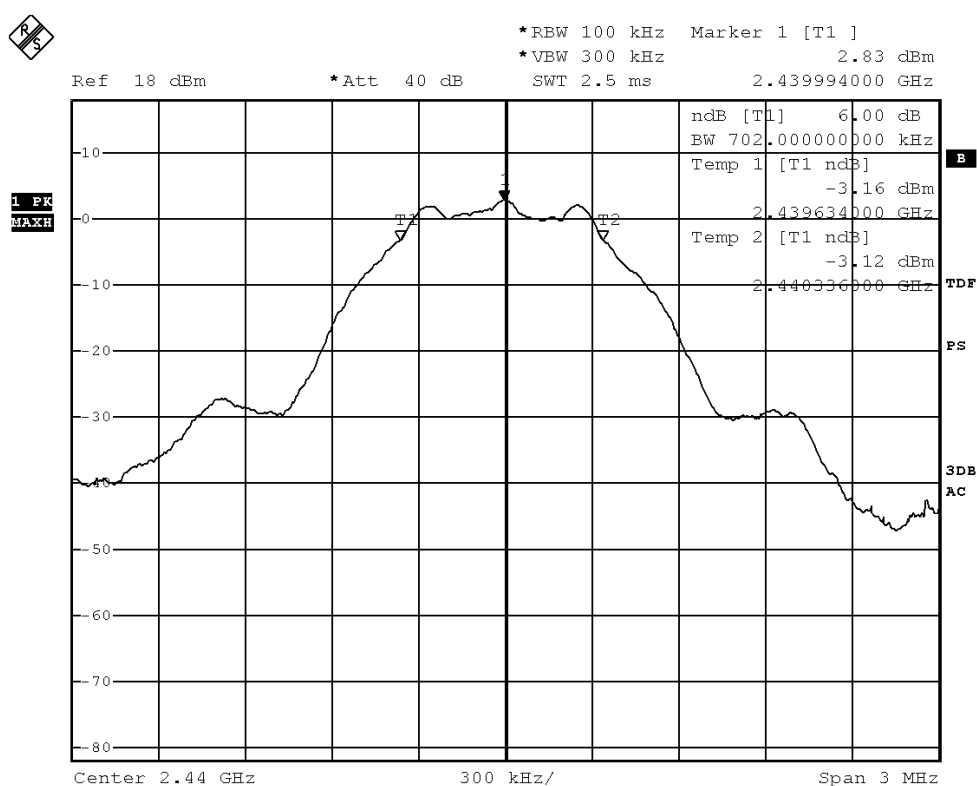
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No.: DM123485

Limits for 6dB Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2440.0	702.0	> 500

6 dB Bandwidth Plot on Configuration Bluetooth DTS (GFSK: 2440MHz)



BMP

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Date: 2016-05-13

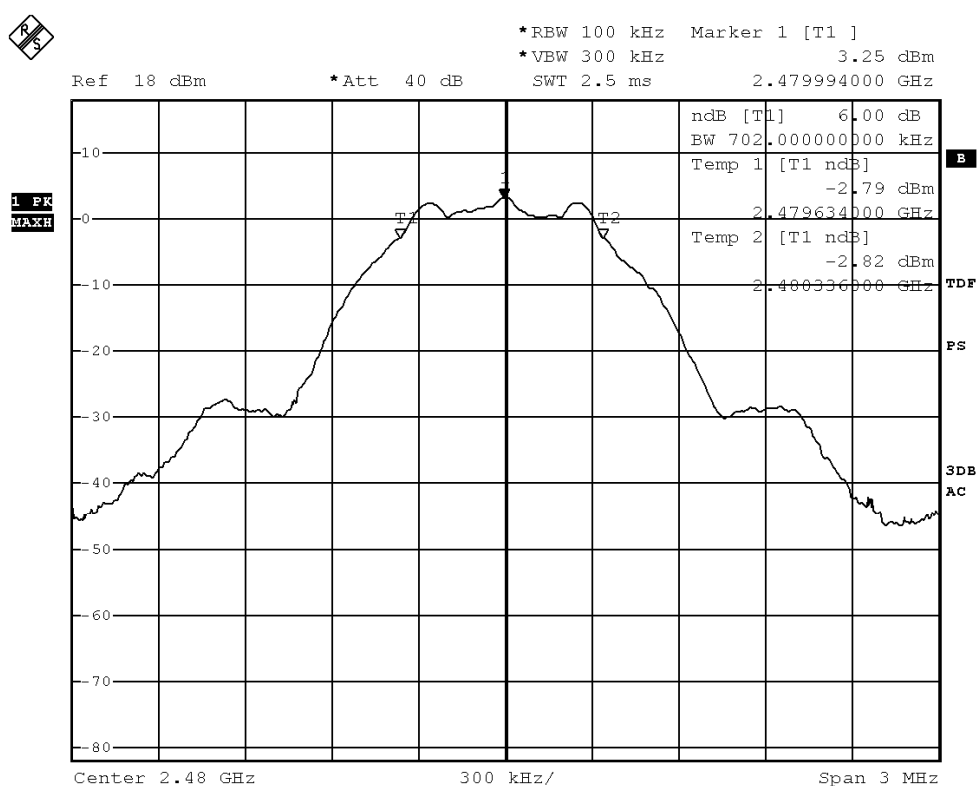
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Limits for 6dB Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2480.0	702.0	> 500

6 dB Bandwidth Plot on Configuration Bluetooth DTS (GFSK: 2480MHz)



BMP

Date: 6.MAY.2016 13:08:06

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3.1.6 Band Edges Measurement

Test Requirement:	FCC 47CFR 15.247
Test Method:	ANSI C63.10: 2013
Test Date:	2016-05-06
Mode of Operation:	Bluetooth DTS 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 are set to 100kHz and VBW are set to 300kHz for this measurement.

Test Setup:

As Test Setup of clause 3.1.2 in this test report.

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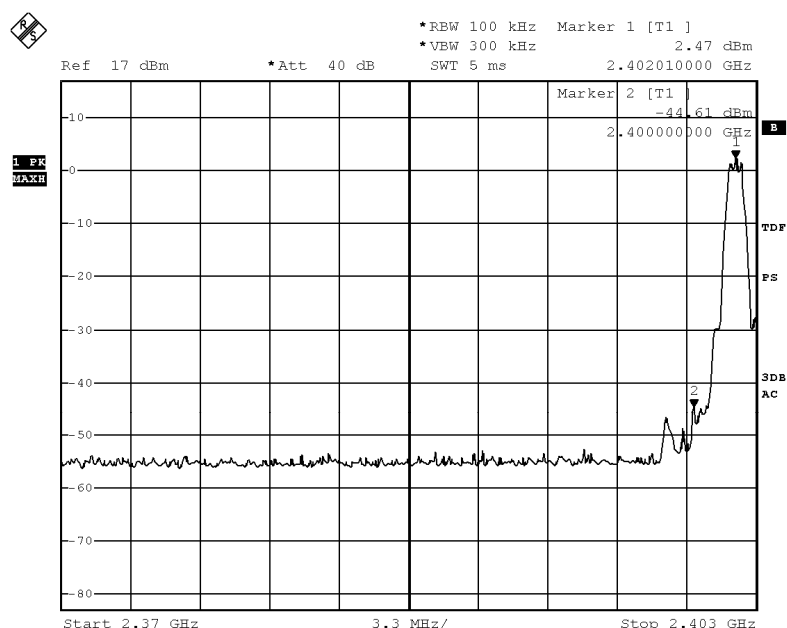
Band-edge Compliance of RF Conducted Emissions Measurement:

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, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Frequency Range	Radiated Emission Attenuated below the Fundamental
[MHz]	[dB]
2400 – Lowest Fundamental (2402)	47.08

Band-edge Compliance of RF Conducted Emissions – Lowest (GFSK: Bluetooth DTS mode 2402MHz)



BMP

Date: 6.MAY.2016 13:13:26

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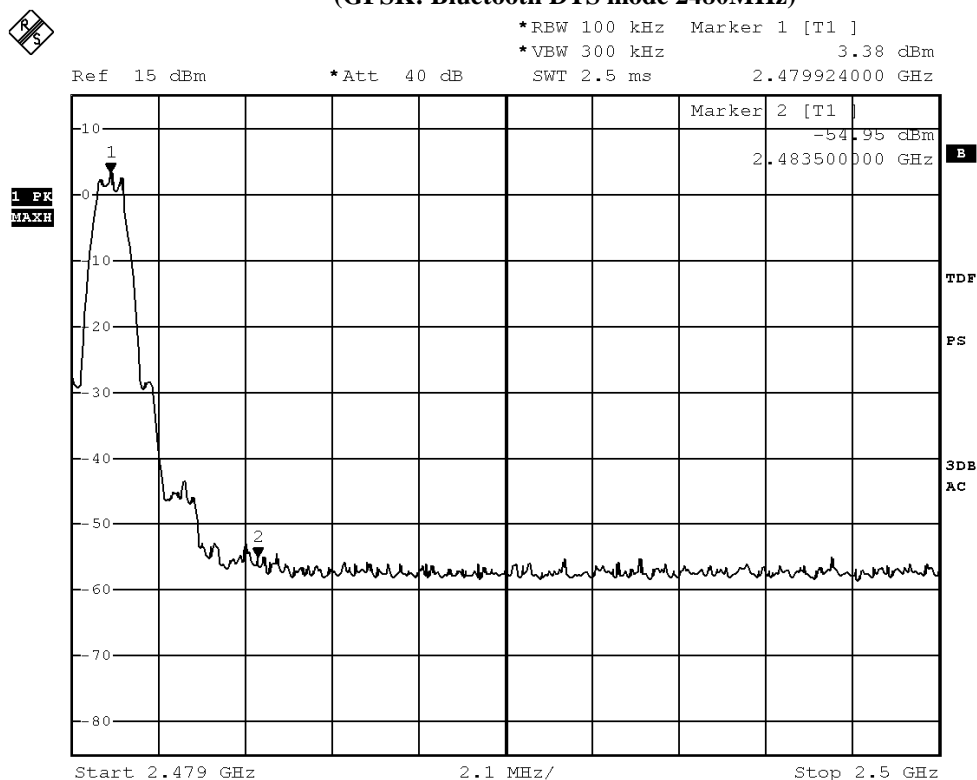
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Radiated Emission Attenuated below the Fundamental
[MHz]	[dB]
2483.5 - Highest Fundamental (2480)	58.33

Band-edge Compliance of RF Conducted Emissions – Highest (GFSK: Bluetooth DTS mode 2480MHz)



BMP

Date: 6.MAY.2016 13:11:50

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Band-edge Compliance of RF Radiated Emissions Measurement:

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, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

Result: Band-edge Compliance of RF Radiated Emissions (Lowest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2390.0	12.2	36.8	49.0	74.0	25.0	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2390.0	1.8	36.8	38.6	54.0	15.4	Vertical

Result: Band-edge Compliance of RF Radiated Emissions (Highest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2483.5	27.6	36.8	64.4	74.0	9.6	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2483.5	6.7	36.8	43.5	54.0	10.5	Vertical

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3.1.7 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 Monopole 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.

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3.1.8 RF Exposure

Test Requirement:	FCC 47CFR 15.247(i)
Test Date:	2016-05-12
Mode of Operation:	Tx mode

Test Method:

In 15.247(i), an equipment shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the limits in §§ 1.1310 and 2.1093 of this chapter.

Applications to the Commission for construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities must contain a statement confirming compliance with the limits unless the facility, operation, or transmitter is categorically excluded, as discussed below. Technical information showing the basis for this statement must be submitted to the Commission upon request.

According to KDB447498 D01 General RF Exposure Guidance v06, unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition.

Test Results:

RF Exposure Evaluation

The Maximum conducted output power = 2.188 mW (at frequency = 2.480 GHz)

It's Conducted source-based time-averaging output power = 2.188 mW (at frequency = 2.480 GHz)

Since the SAR test exclusion thresholds for 2450MHz at test separation distances ≤ 5 mm = 10mW and the Conducted source-based time-averaging output power is less than 10mW.

Therefore, the SAR evaluation can be exempted.

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Tel : (86 769) 8111 9888 Fax : (86 769) 8111 6222 E-mail : dgstc@dgstc.org Homepage : www.dgstc.org

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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	2016.3.29	2017.3.29
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100314	2016.3.29	2017.3.29
EMD035	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100441	2016.3.29	2017.3.29
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB 26	100388	2016.3.29	2017.3.29
EMD041	TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	100261	2016.3.29	2017.3.29
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	2016.11.15
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 Instrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD103	Intelligent Frequency	Ainuo Instrument 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	2016.3.29	2017.3.29
	100V Insertion Unit	ROHDE & SCHWARZ	URV5-Z4	100464	2016.3.29	2017.3.29
EMD113	Pre-Amplifier	ROHDE & SCHWARZ	N/A	1129588	2016.3.29	2017.3.29
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2014.04.28	2016.04.28
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO Inc.	JXTXLB-42-15-C-KF	J2021100721001	2015.04.09	2017.04.09
RE01	RF cable	N/A	N/A	N/A	2014-9-28	2016-9-27
RE02	RF cable	N/A	N/A	N/A	2014-9-28	2016-9-27

Remarks:-

N/A Not Applicable or Not Available

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Appendix B

Photographs of EUT

Front View of the product



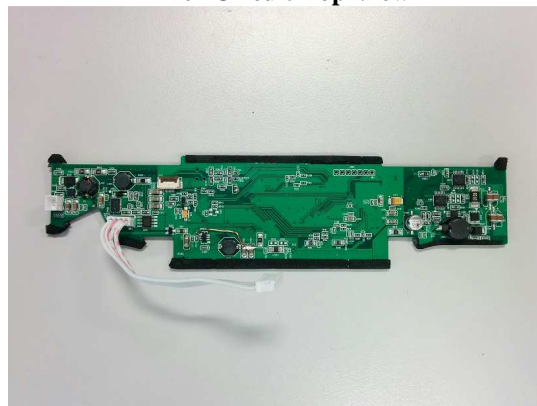
Rear View of the product



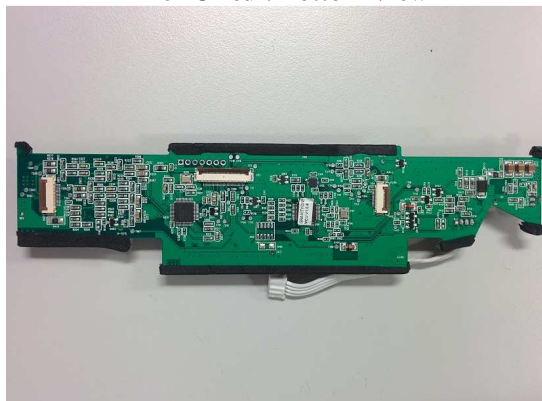
Inside View of the product



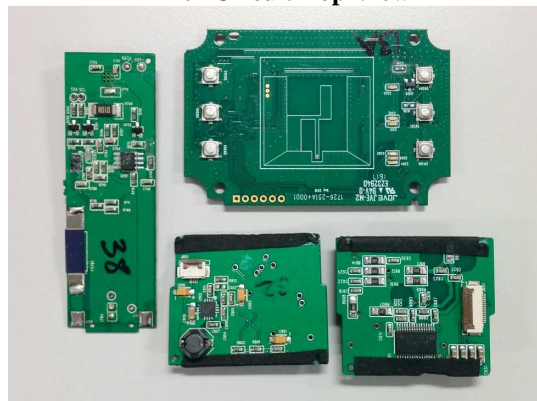
Inner Circuit Top View



Inner Circuit Bottom View



Inner Circuit Top View



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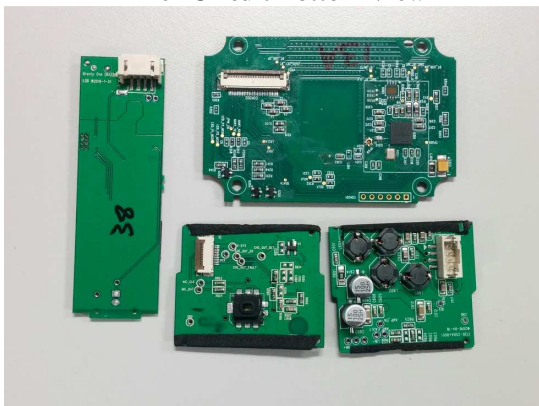
Date: 2016-05-13

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Photographs of EUT

Inner Circuit Bottom View



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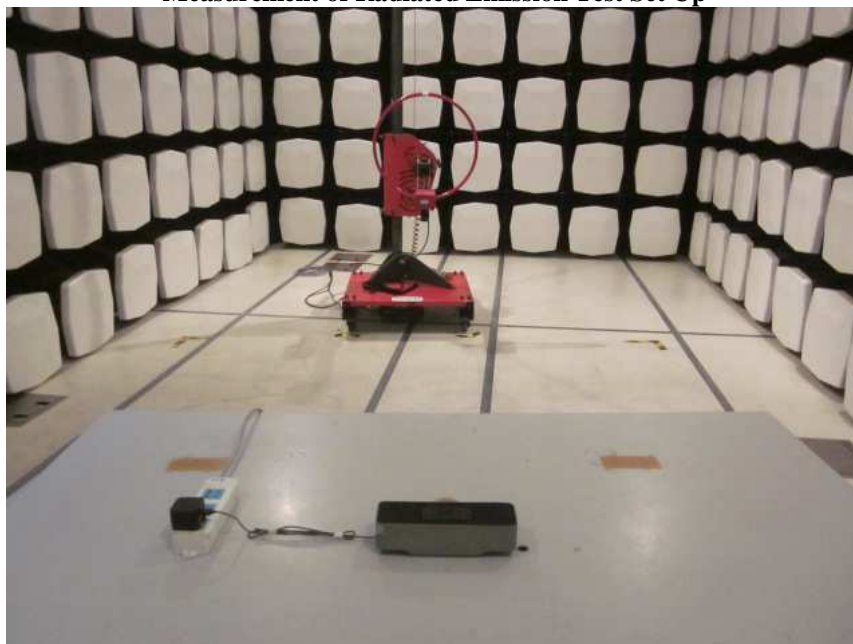
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



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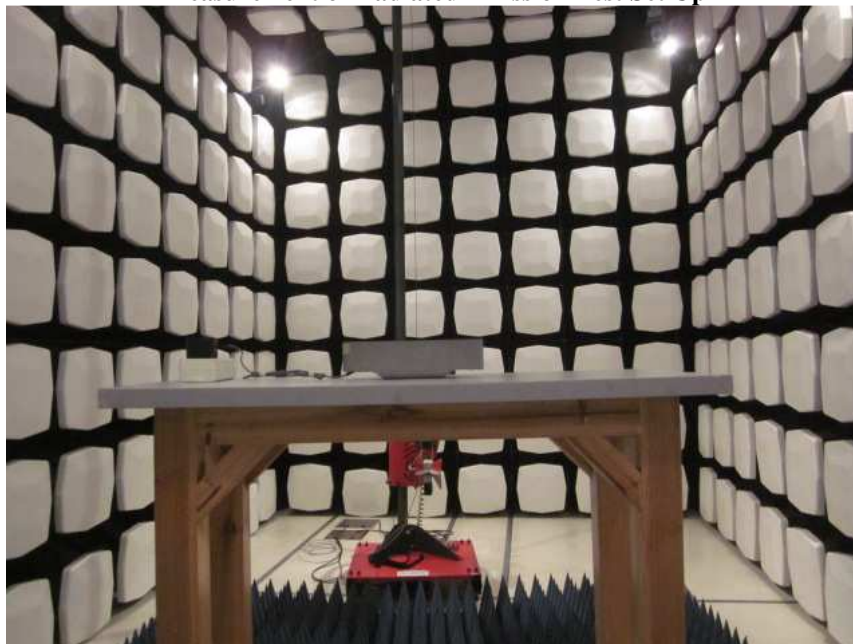
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



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

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