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FCC TEST REPORT

Under:
FCC Part 15, Class B

Prepared For:

Grandstream Networks, Inc.

4th Floor, Rainbow Technology Building #16 New West Rd, Nanshan Science & Technology Park
(North District), Shenzhen, China 518057

FCC ID: YZZGXP2170

EUT: IP Phone

Model: GXP2170

November 20, 2015

Issue Date:

Original Report

Report Type:

Eric Guo

Test Engineer: Eric Guo

Apollo Liu

Review By: Apollo Liu / Manager

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1. General Information

1. 1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

1. 2 Testing Laboratory

Ke Mei Ou Laboratory Co., Ltd.

ANSI-ASQ National Accreditation Board/ACCLASS ISO/IEC 17025 Accredited Lab for telecommunication standards. The Registration Number is AT-1532. The testing quality system meets with ISO/IEC-17025 requirements, This approval results is accepted by MRA of ILAC.

FCC Test Site Registration Number: 962205

IC Test Site Registration Number: 4986A-2

Internet: www.kmolab.com

1. 3 Details of Applicant

Name : Grandstream Networks, Inc.

Address : 4th Floor, Rainbow Technology Building #16 New West Rd, Nanshan Science & Technology Park
(North District), Shenzhen, China 518057

1. 4 Application Details

Date of Receipt of Application : October 27, 2015

Date of Receipt of Test Item : October 27, 2015

Date of Test : November 3~November 20, 2015

1. 5 Test Item

Manufacturer : Same as applicant
Address : Same as applicant

Trade Name : Grandstream

Model No.(Base) : GXP2170

Model No.(Extension) : N/A

Description : IP Phone

Additional Information

Product Type : Bluetooth (1TX, 1RX)

Radio Type : Intentional Transceiver

Power Type : DC 12V/1.0A(Adapter model:F12US1200100A)

DC 12V/1.0A(Adapter model:PEA-120100VA)

POE DC 48V

Modulation : see the below tables

Data Modulation : Bluetooth: GFSK (1Mbps); $\pi/4$ -DQPSK (2Mbps) ; 8DPSK (3Mbps)

Date Rate (Mbps) : see the below table

Frequency Range : 2402~2480MHz

Channel Number : 79

Antenna : Internal

Bluetooth

| Type of Modulation | Data Rate |
|--------------------|-----------|
| GFSK | 1Mbps |
| $\pi/4$ -DQPSK | 2Mbps |
| 8DPSK | 3Mbps |

1. 6 Test Standards

FCC 15 Subpart B

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2. Technical Test

2. 1 Summary of Test Results

The EUT has been tested according to the following specifications:

| Standard | Test Type | Result | Notes |
|-------------------------------|----------------|-------------|----------|
| FCC Part 15, Paragraph 15.107 | Conducted Test | PASS | Complies |
| FCC Part 15, Paragraph 15.109 | Radiated Test | PASS | Complies |

3. EUT Modifications

No modification by test lab.

4. Conducted Power Line Test

4. 1 Test Equipment

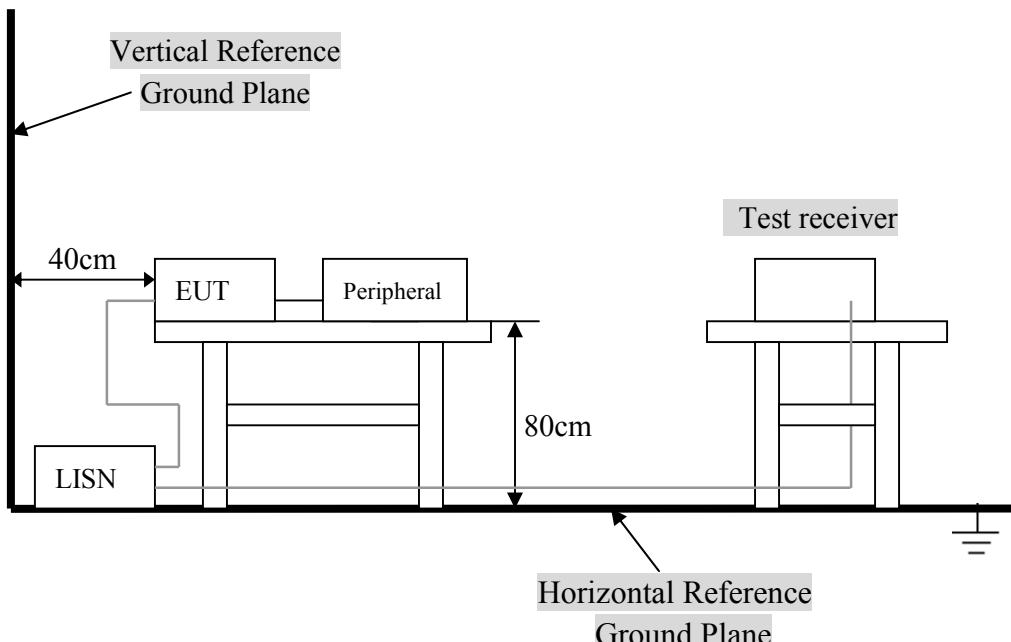
Please refer to Section 8 this report.

4. 2 Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

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. Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

4. 3 Test Setup



For the actual test configuration, Please refer to the related items – Photos of Testing.

4.4 Configuration of the EUT

The EUT was configured according to ANSI C63.10:2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

| Device | Manufacturer | Model # | FCC ID |
|----------|-------------------|---------|------------|
| IP Phone | Same as applicant | GXP2170 | YZZGXP2170 |

B. Internal Devices

| Device | Manufacturer | Model # | FCC ID |
|--------|--------------|---------|--------|
| N/A | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

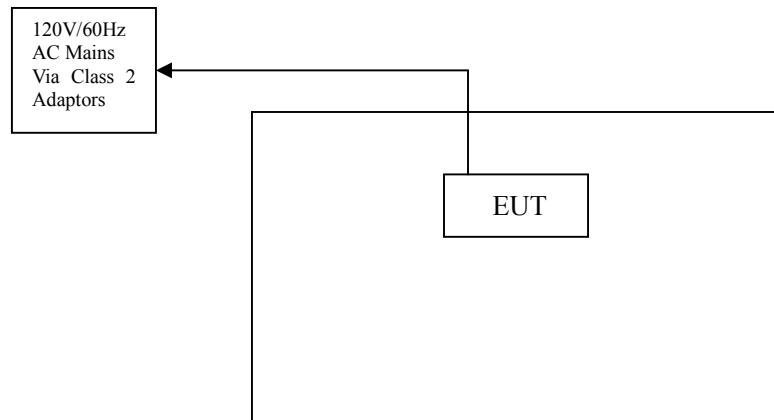
C. Peripherals

| Device | Manufacturer | Model # Serial # | FCC ID/ DoC | Cable |
|----------|--------------|---------------------|----------------|---|
| Printer | HP | HP930C | DoC | 1.5m unshielded power cord 1.2m unshielded data cable. |
| Modem | GVC | N/A | DoC | 1.5m unshielded power cord 1.2m unshielded data cable. |
| Notebook | DELL | PP10L | DoC | 1.5m unshielded power cord |
| PC | Dell | 2400n | DoC | 1.5m unshielded power cord |
| EXT | GRANDSTREAM | GXP2200EXT | DoC | 0.22m unshielded power & data cable |

4.5 EUT Operating Condition

Operating condition is according to ANSI C63.10:2013.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



4.6 Conducted Power Line Emission Limits

| Frequency Range (MHz) | Class A QP/AV (dBuV) | Class B QP/AV (dBuV) |
|-----------------------|----------------------|----------------------|
| 0.15 – 0.5 | 79/66 | 66 – 56/56 – 46 |
| 0.5 – 5.0 | 73/60 | 56/46 |
| 5.0 – 30 | 73/60 | 60/50 |

Note: In the above table, the tighter limit applies at the band edges.

4. 7 Conducted Power Line Test Result

| | | | |
|--------------|---------------------------|---------------|----------------------|
| Product | : IP Phone | Test Mode | : Normal Link / Auto |
| Test Item | : Conducted Emission Data | Temperature | : 25 °C |
| Test Voltage | : DC 12V/POE | Humidity | : 56%RH |
| Test Result | : PASS | Adapter Model | : |

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All readings are quasi -peak values with a resolution bandwidth of 9 KHz.

- Temperature : 26 °C
- Humidity : 53 % RH

Adapter model: F12US1200100A

| FCC Part 15 Paragraph 15.107 | | | | | | |
|------------------------------|-----------------|-------|---------------|--------------|-------|-------------|
| Frequency (MHz) | Emission (dBuV) | | LINE/ NEUTRAL | Limit (dBuV) | | Margin (dB) |
| | QP | AV | | QP | AV | QP |
| 0.154 | 51.01 | 37.45 | Line | 65.78 | 55.78 | -14.77 |
| 0.158 | 50.74 | 38.12 | Neutral | 65.57 | 55.57 | -14.83 |
| 0.182 | 47.45 | 34.78 | Line | 64.39 | 54.39 | -16.94 |
| 0.174 | 47.56 | 35.14 | Neutral | 64.77 | 54.77 | -17.21 |
| 0.518 | 48.13 | 39.42 | Line | 56.00 | 46.00 | -7.87 |
| 0.514 | 47.63 | 36.67 | Neutral | 56.00 | 46.00 | -8.37 |

Note: NF = No Significant Peak was Found.

Adapter model: PEA-120100VA

| FCC Part 15 Paragraph 15.107 | | | | | | |
|------------------------------|-----------------|-------|---------------|--------------|-------|-------------|
| Frequency (MHz) | Emission (dBuV) | | LINE/ NEUTRAL | Limit (dBuV) | | Margin (dB) |
| | QP | AV | | QP | AV | QP |
| 0.154 | 50.89 | 38.11 | Line | 65.78 | 55.78 | -14.89 |
| 0.150 | 49.91 | 37.42 | Neutral | 66.00 | 56.00 | -16.09 |
| 0.170 | 47.73 | 35.14 | Line | 64.96 | 54.96 | -17.23 |
| 0.178 | 46.84 | 35.22 | Neutral | 64.58 | 54.58 | -17.74 |
| 0.194 | 45.06 | 33.63 | Line | 63.86 | 53.86 | -18.80 |
| 0.486 | 43.98 | 39.74 | Neutral | 56.24 | 46.24 | -12.26 |

Note: NF = No Significant Peak was Found.

POE

| FCC Part 15 Paragraph 15.107 | | | | | | |
|------------------------------|-----------------|-------|---------------|--------------|-------|-------------|
| Frequency (MHz) | Emission (dBuV) | | LINE/ NEUTRAL | Limit (dBuV) | | Margin (dB) |
| | QP | AV | | QP | AV | QP |
| 0.162 | 55.98 | 44.11 | Line | 65.36 | 55.36 | -9.38 |
| 0.162 | 55.57 | 48.45 | Neutral | 65.36 | 55.36 | -9.79 |
| 0.206 | 49.77 | 38.85 | Line | 63.37 | 53.37 | -13.60 |
| 0.202 | 49.41 | 38.29 | Neutral | 63.53 | 53.53 | -14.12 |
| 11.098 | 49.58 | 45.95 | Line | 60.00 | 50.00 | -10.42 |
| 10.534 | 51.51 | 46.58 | Neutral | 60.00 | 50.00 | -8.49 |

Note: NF = No Significant Peak was Found.

Note:

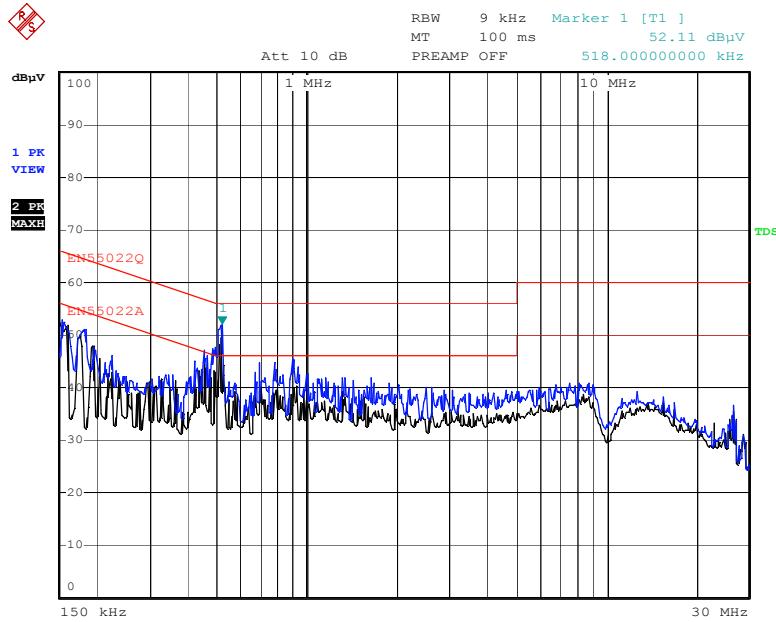
- Uncertainty in conducted emission measured is $<+/-2$ dB.
- The emission levels of other frequencies were very low against the limit.
- All Reading Levels are Quasi-Peak and Average value.
- Emission = Meter Reading + Factor; Factor = Insertion Loss + Cable Loss.
- Margin Value = Emission Level - Limit Value.

Conducted Emission**FCC 15.107**

Test Specification: LINE&NEUTRAL

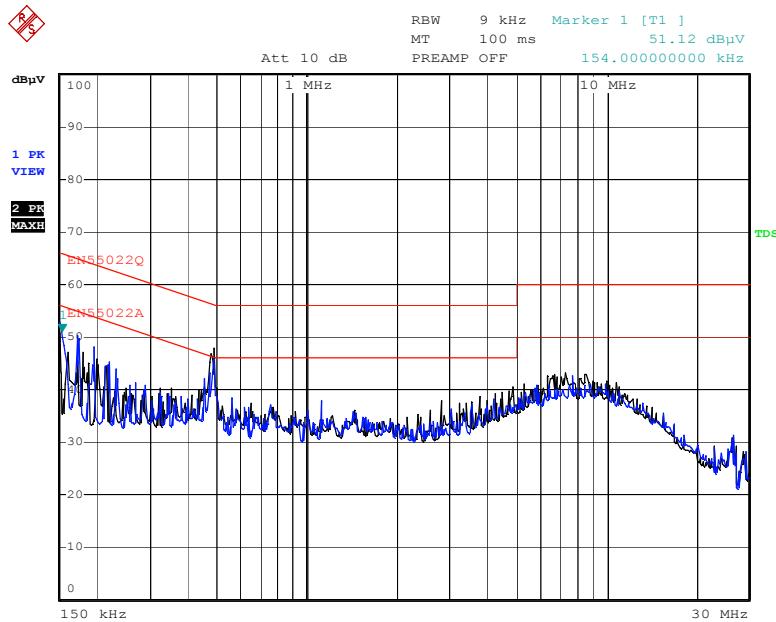
Comment:

Adapter model: F12US1200100A



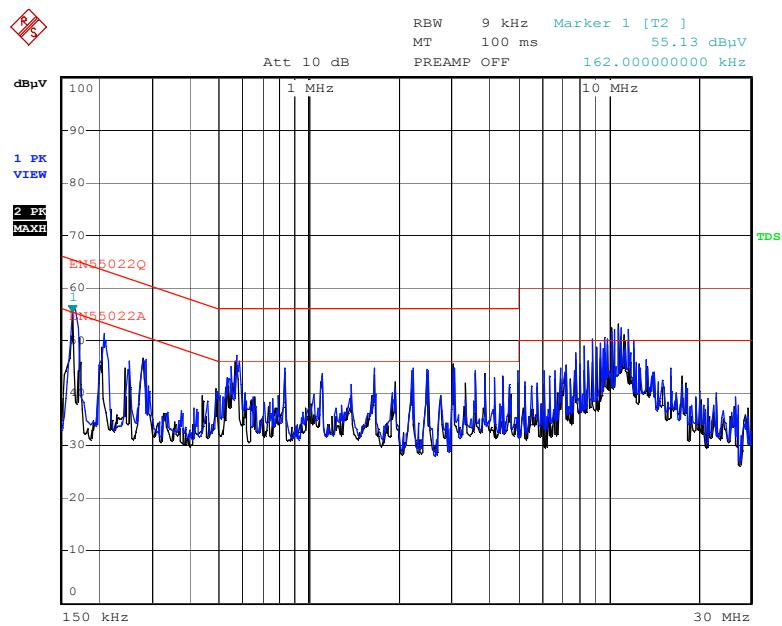
Date: 10.NOV.2015 10:52:53

Adapter model: PEA-120100VA



Date: 10.NOV.2015 13:09:40

POE



Date: 10.NOV.2015 13:21:39

5. Radiated Emission Test

5. 1 Test Equipment

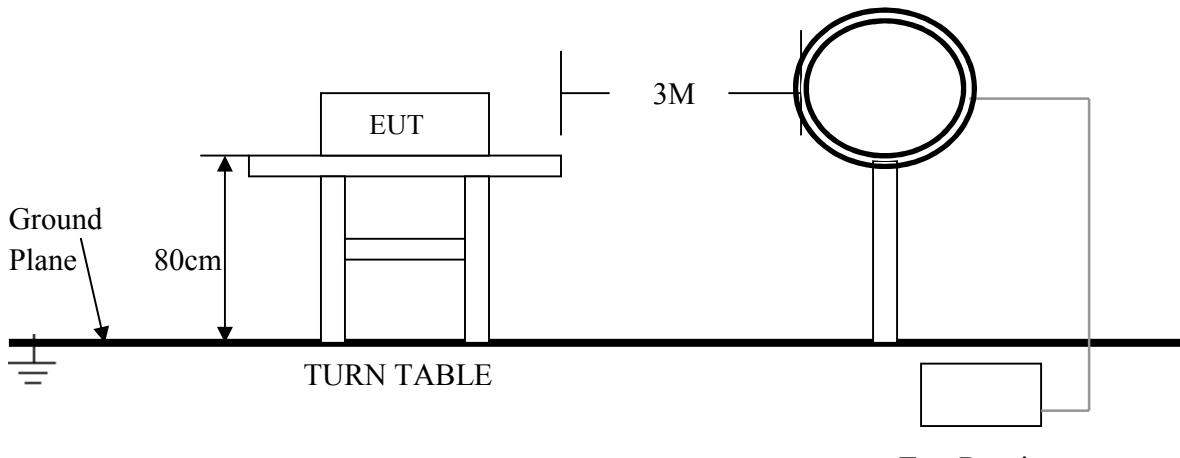
Please refer to Section 8 this report.

5. 2 Test Procedure

1. The EUT was tested according to ANSI C63.10:2013.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m, and which is 1.5 m high for above 1 GHz. All set up is according to ANSI C63.10:2013 .
3. The frequency spectrum from 9 kHz to 25 GHz was investigated. All readings from 9 kHz to 150 kHz are quasi-peak values with a resolution bandwidth of 200 Hz. All readings from 150 kHz to 30 MHz are quasi-peak values with a resolution bandwidth of 9 KHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. The Receiving antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency. Emissions below 30MHz were measured with a loop antenna while emission above 30MHz were measured using a broadband E-field antenna.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.10:2013

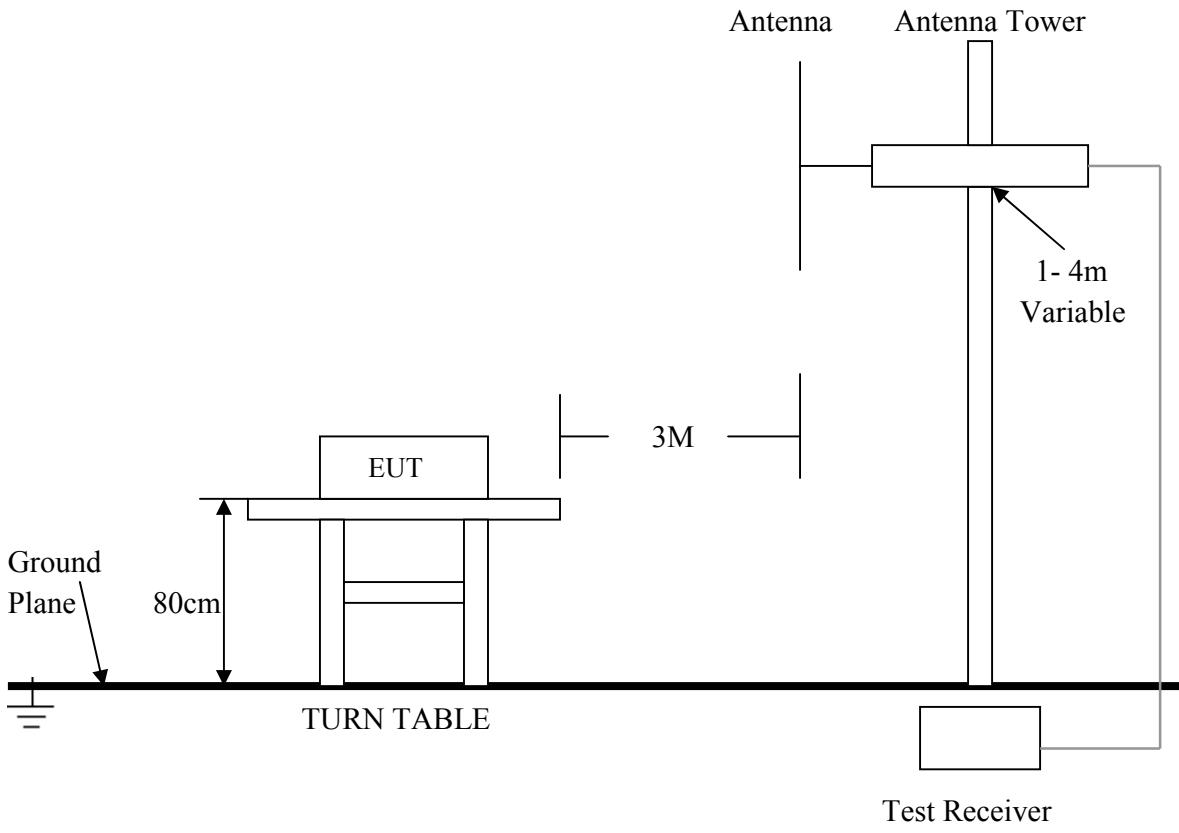
5. 3 Radiated Test Setup

For Frequencies below 30 MHz



For the actual test configuration , please refer to the related items – Photos of Testing

For Frequencies above 30 MHz



For the actual test configuration , please refer to the related items – Photos of Testing

5.4 Configuration of The EUT

Same as section 4.4 of this report

5.5 EUT Operating Condition

Same as section 4.5 of this report

5.6 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.109.

| Frequency (MHz) | Distance (m) | Field Strength (dBuV/m) |
|-----------------|--------------|-------------------------|
| 30 - 88 | 3 | 40.0 |
| 88 - 216 | 3 | 43.5 |
| 216 - 960 | 3 | 46.0 |
| Above 960 | 3 | 54.0 |

Note:

1. In the emission tables above, the tighter limit applies at the band edges.
2. Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.
3. The lower limit shall apply at the transition frequencies.

5.7 Radiated Emission Test Result

| | | | |
|--------------|--------------------------------------|-------------|----------------------|
| Product | : IP Phone | Test Mode | : Normal Link / Auto |
| Test Item | : Fundamental Radiated Emission Data | Temperature | : 25 °C |
| Test Voltage | : DC 12V/POE | Humidity | : 56%RH |
| Test Result | : PASS | Model | : |

For Frequency below 30MHz

| Freq. (MHz) | Emission (dBuV/m) QP Detector | HORIZ / VERT | Limits (dBuV/m) | Margin (dB) |
|----------------|----------------------------------|-----------------|--------------------|----------------|
| N/A | | | | |

Note:

- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
- (2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- (3) Emission Level = Reading Level + Probe Factor + Cable Loss.

For Frequency from 30MHz to 1GHz

Adapter model: F12US1200100A

| Freq. (MHz) | Emission (dBuV/m) QP Detector | HORIZ / VERT | Limits (dBuV/m) | Margin (dB) |
|----------------|----------------------------------|-----------------|--------------------|----------------|
| 71.760 | 32.71 | HORZ | 40.0 | -7.29 |
| 32.000 | 29.43 | VERT | 40.0 | -10.57 |
| 175.040 | 34.41 | HORZ | 43.5 | -9.09 |
| 175.000 | 37.89 | VERT | 43.5 | -5.61 |
| 233.240 | 39.03 | HORZ | 46.0 | -6.97 |
| 181.560 | 38.51 | VERT | 43.5 | -4.99 |

Adapter model: PEA-120100VA

| Freq. (MHz) | Emission (dBuV/m) QP Detector | HORIZ / VERT | Limits (dBuV/m) | Margin (dB) |
|----------------|----------------------------------|-----------------|--------------------|----------------|
| 375.040 | 30.57 | HORZ | 46.0 | -15.43 |
| 101.880 | 38.67 | VERT | 43.5 | -4.83 |
| 417.920 | 32.91 | HORZ | 46.0 | -13.09 |
| 164.400 | 36.45 | VERT | 43.5 | -7.05 |
| 459.320 | 33.18 | HORZ | 46.0 | -12.82 |
| 210.880 | 34.16 | VERT | 43.5 | -9.34 |

POE

| Freq. (MHz) | Emission (dBuV/m) QP Detector | HORIZ / VERT | Limits (dBuV/m) | Margin (dB) |
|----------------|----------------------------------|-----------------|--------------------|----------------|
| 192.840 | 38.57 | HORZ | 43.5 | -4.93 |
| 32.600 | 36.31 | VERT | 40.0 | -3.69 |
| 375.000 | 36.73 | HORZ | 46.0 | -9.27 |
| 118.080 | 33.12 | VERT | 43.5 | -10.38 |
| 877.880 | 36.16 | HORZ | 46.0 | -9.84 |
| 205.600 | 35.03 | VERT | 43.5 | -8.47 |

Note:

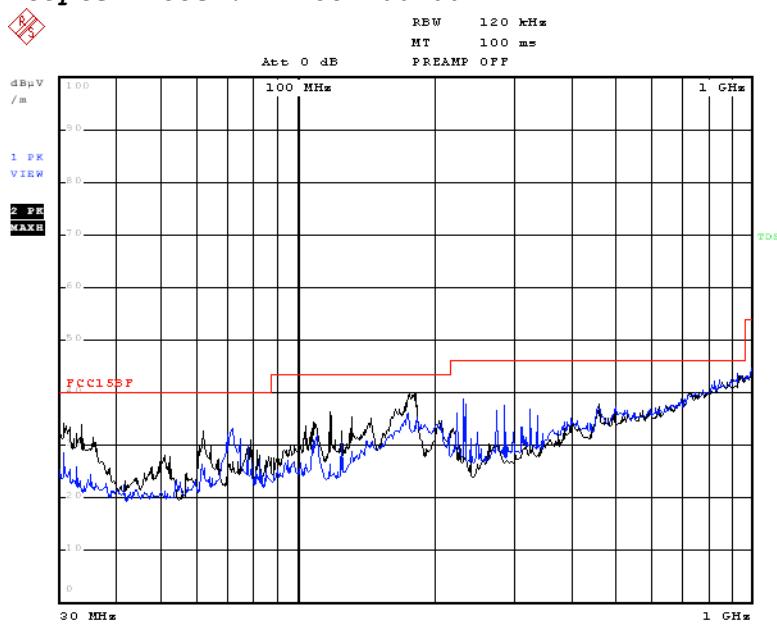
- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
- (2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- (3) Emission Level = Reading Level + Probe Factor + Cable Loss.

Frequency above 1 GHz

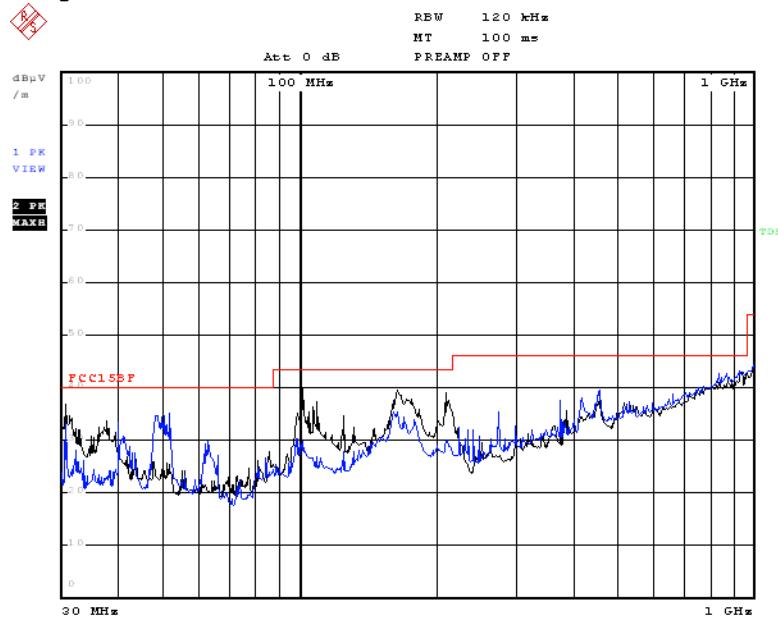
| Freq. (MHz) | Emission (dBuV/m) | | HORIZ / VERT | Limits (dBuV/m) | | Margin(dB) | |
|----------------|-------------------|-------|-----------------|--------------------|----|------------|--------|
| | PK | AV | | 74 | 54 | PK | AV |
| 2137.600 | 50.11 | 34.95 | HORZ | 74 | 54 | -23.89 | -19.05 |
| 2136.800 | 49.03 | 34.84 | VERT | 74 | 54 | -24.97 | -19.16 |
| 2328.000 | 54.43 | 35.81 | HORZ | 74 | 54 | -19.57 | -18.19 |
| 2322.000 | 49.87 | 33.95 | VERT | 74 | 54 | -24.13 | -20.05 |
| 2938.400 | 48.95 | 35.03 | HORZ | 74 | 54 | -25.05 | -18.97 |
| 2330.000 | 53.22 | 34.55 | VERT | 74 | 54 | -20.78 | -19.45 |

Note:

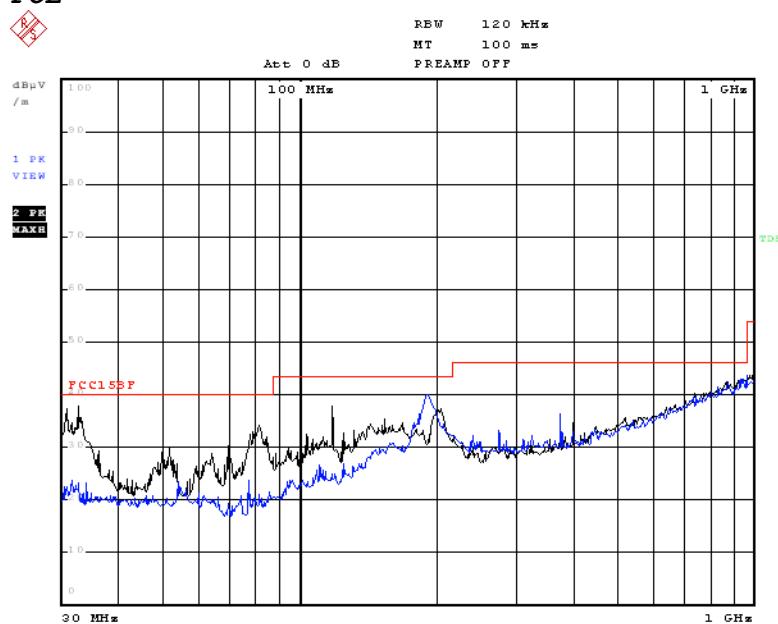
- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
- (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

Radiated Emission**FCC 15.209****For Frequency from 30MHz to 1GHz****Adapter model: F12US1200100A**

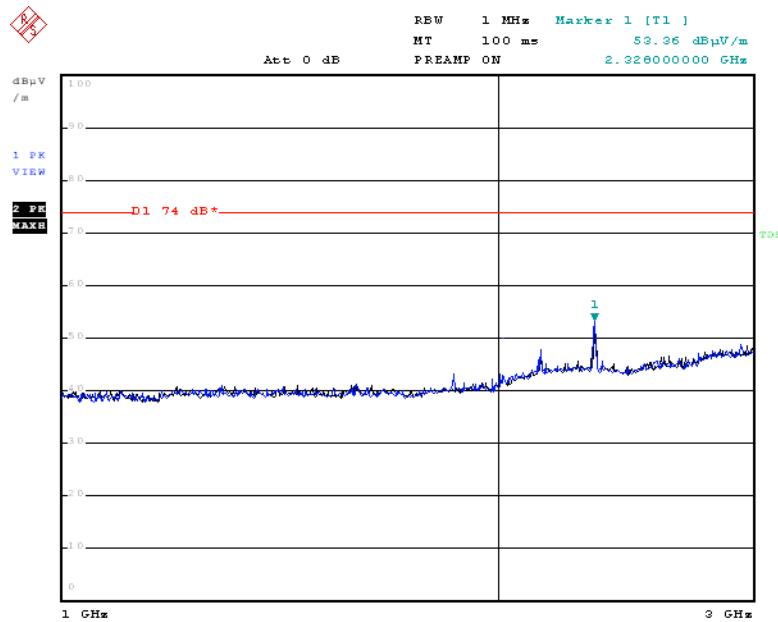
Date: 3.NOV.2015 09:55:12

Adapter model: PEA-120100VA

Date: 10.NOV.2015 09:40:09

POE

Date: 0.NOV.2015 10:26:01

For Frequency above 1GHz

Date: 10.NOV.2015 09:54:01

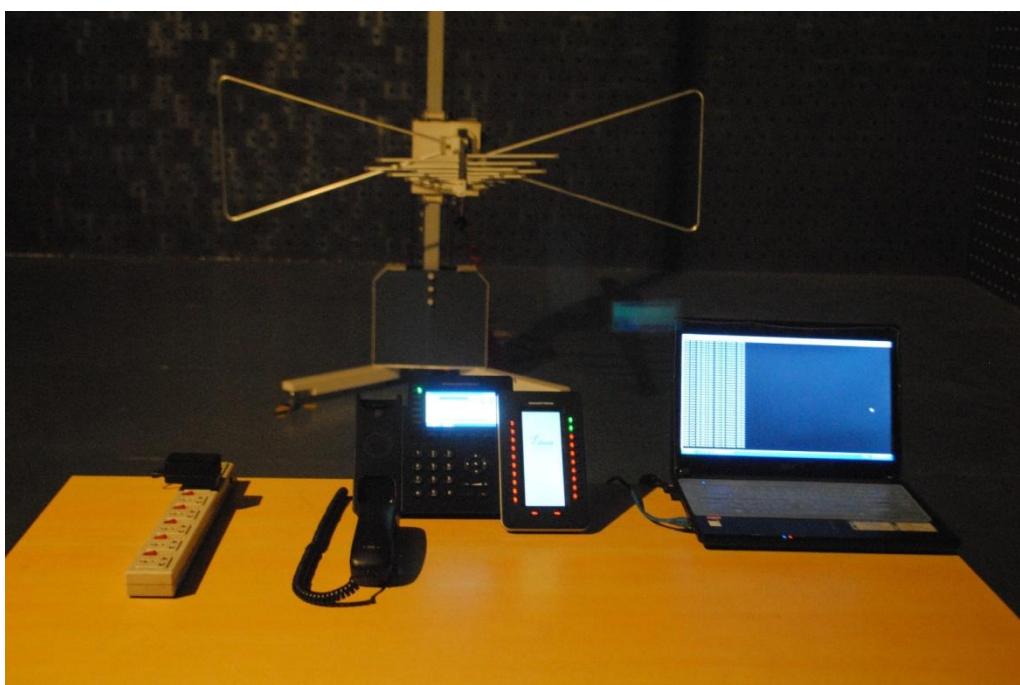
6. Photo of Testing

6.1 Emission test view

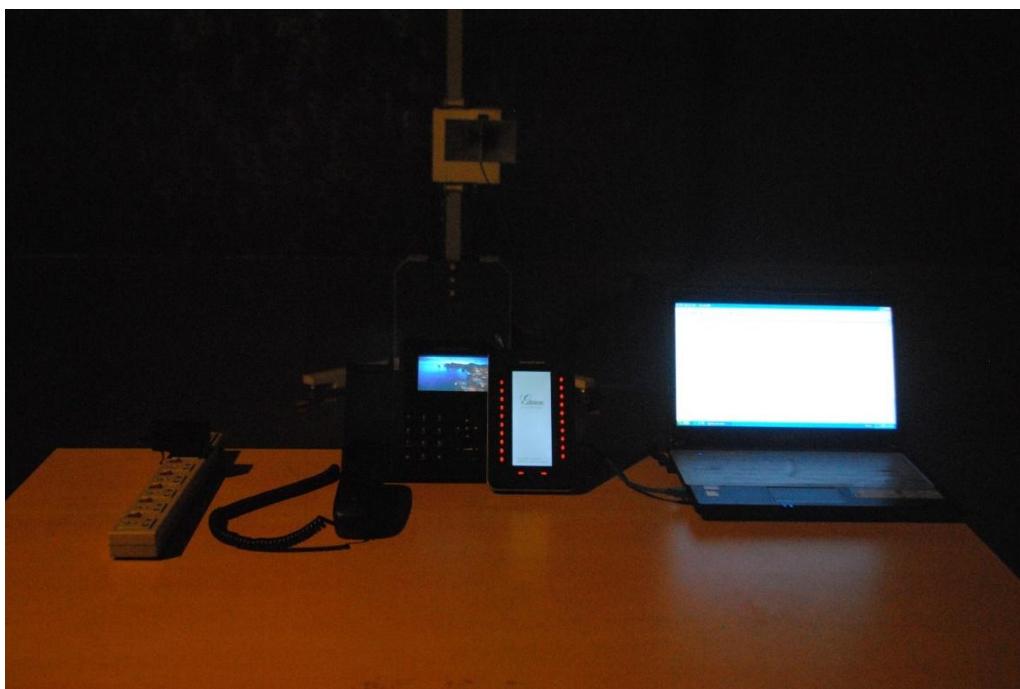
Conducted Emission test view



Radiated Emission test view (Frequency from 30MHz to 1GHz)



Radiated Emission test view (Frequency above 1GHz)



6.2 Photograph - EUT

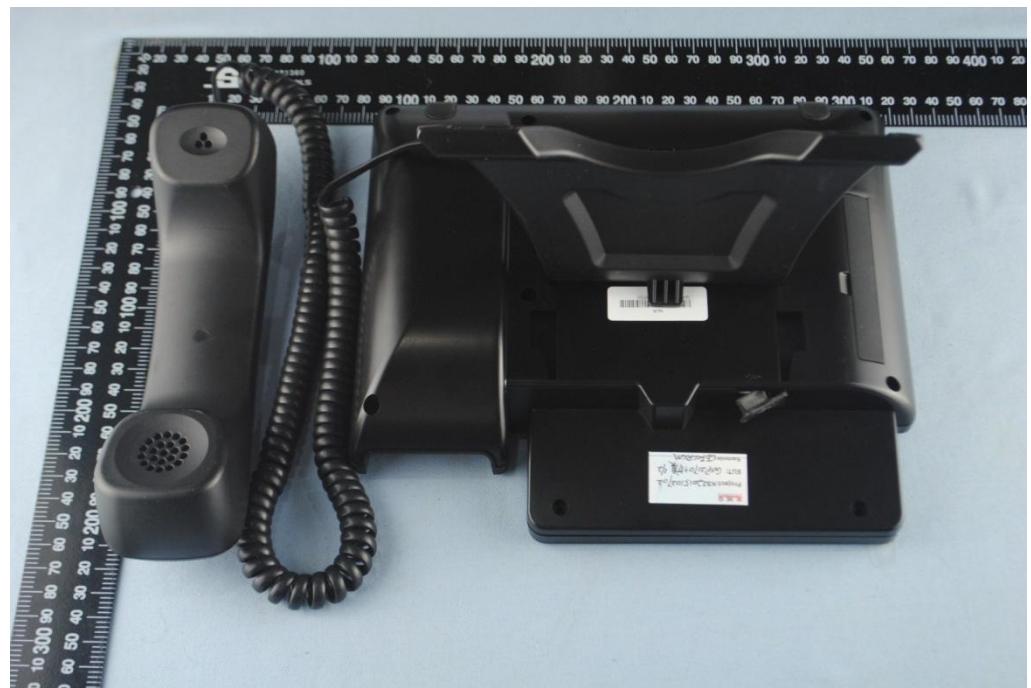
EUT top view



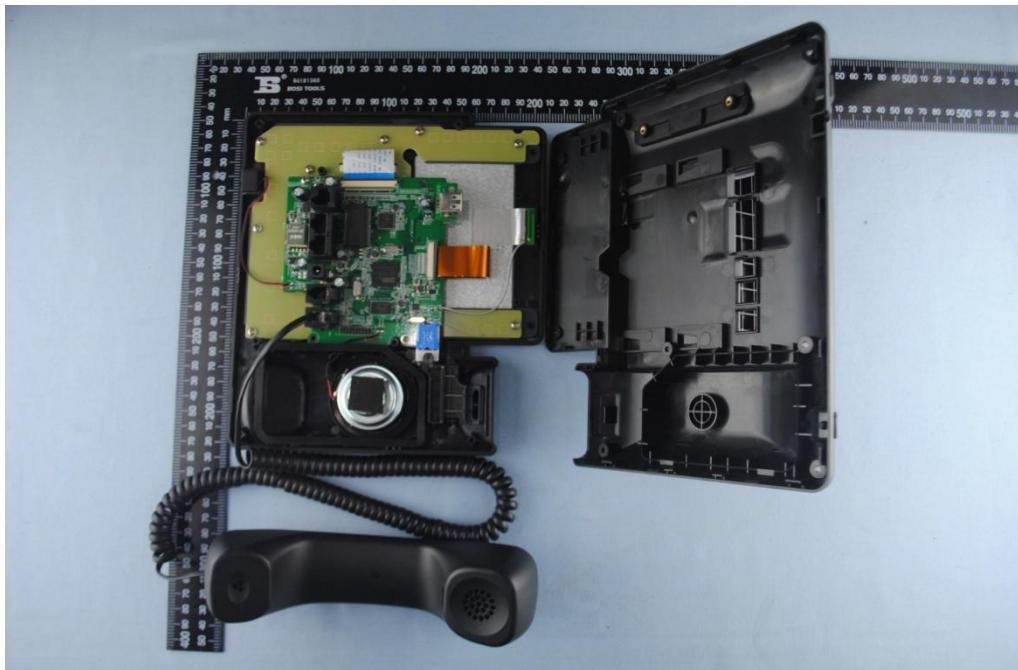


EUT bottom view

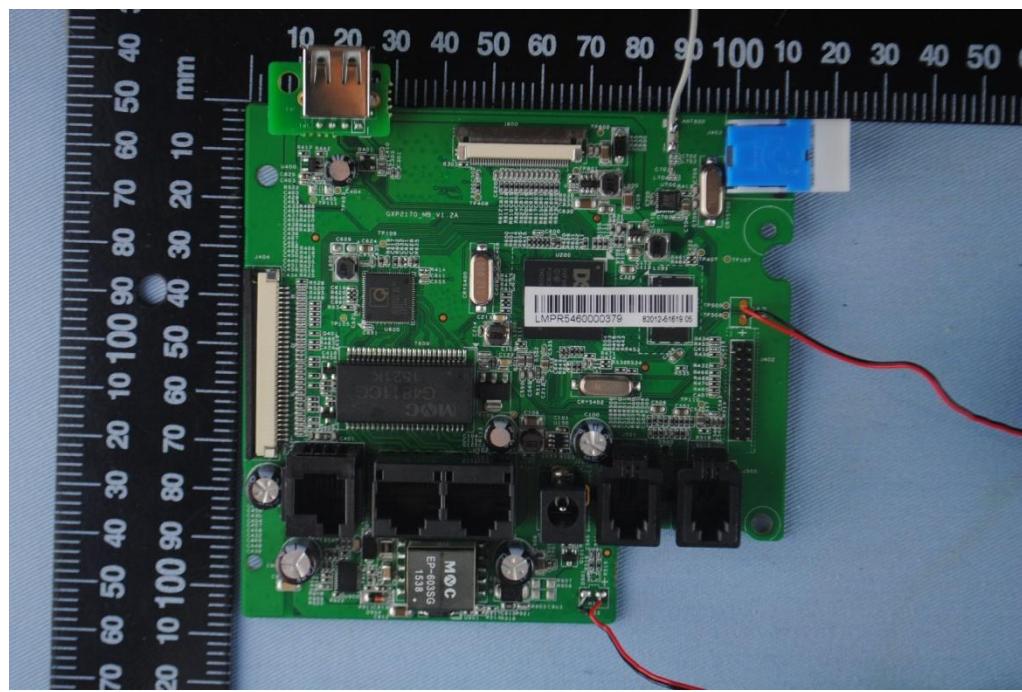




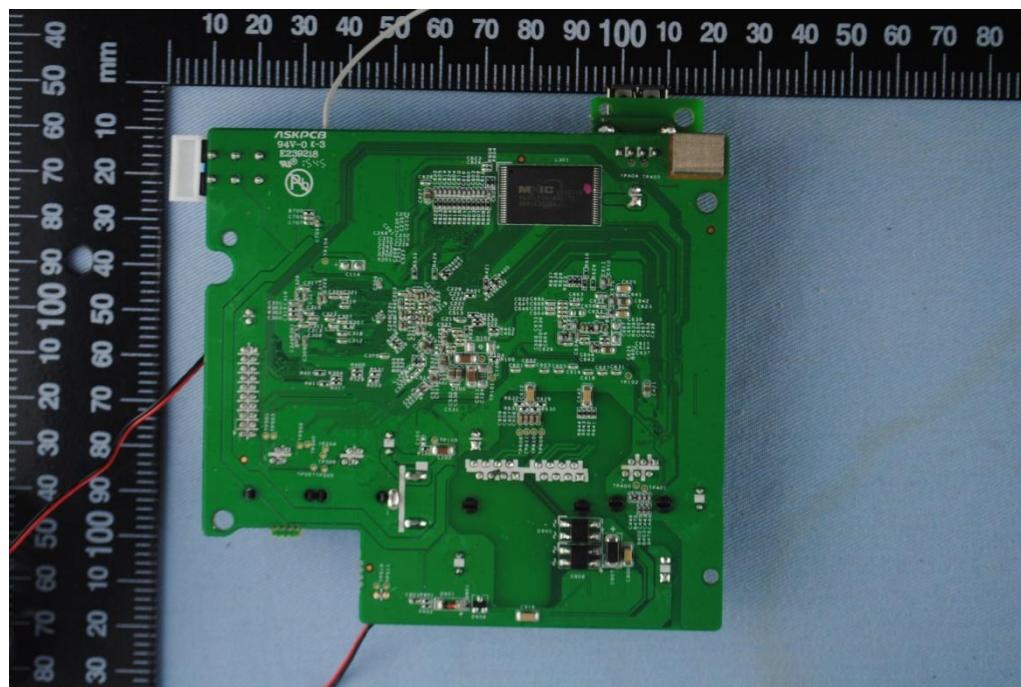
EUT inside whole view



Main board component side



Main board solder side



FCC Adapter top view SUNLIGHT



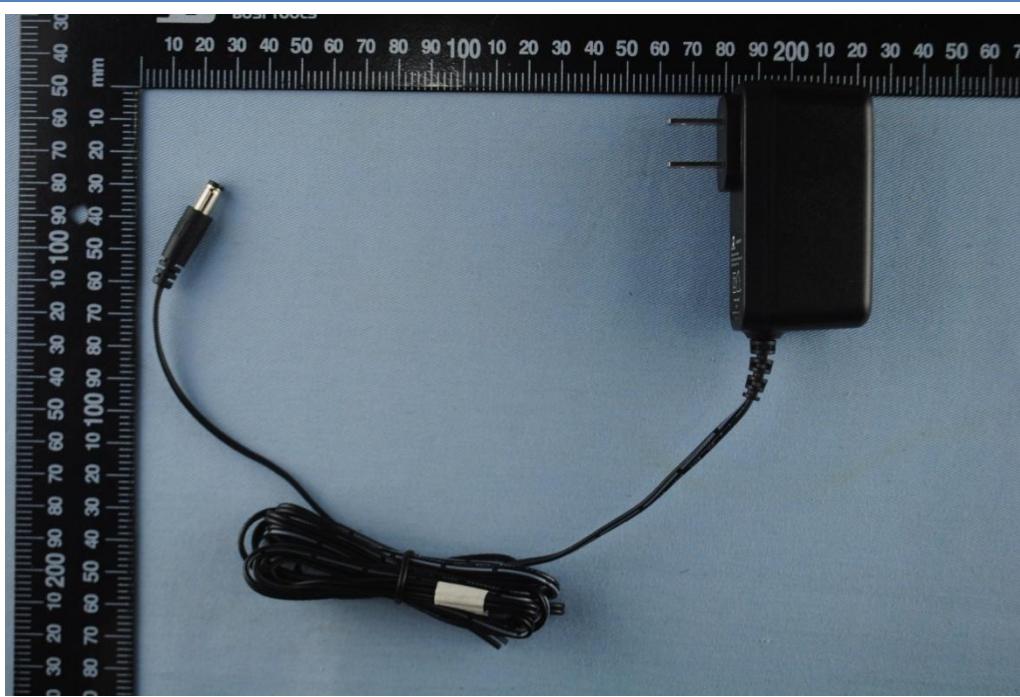
Adapter side view



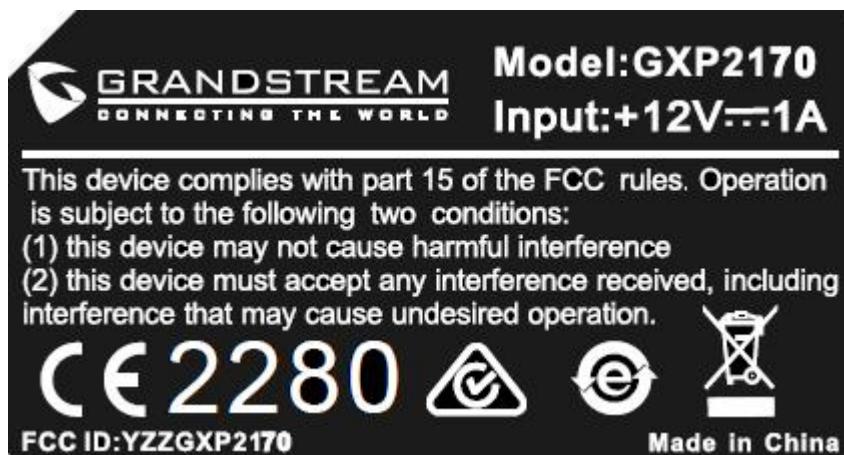
FCC Adapter top view MASS



Adapter side view



7. FCC ID Label



The following note shall be conspicuously placed in the users manual: "Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device."

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.



8. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

| Equipment/ Facilities | Manufacturer | Model # | Serial No. | Due Date |
|--|--------------------|----------------|------------|-----------------|
| Turntable | Innco systems GmbH | CT-0801 | KMO-SZ114 | NCR |
| Antenna Tower | Innco systems GmbH | MM4000-PP | KMO-SZ115 | NCR |
| Controller | Innco systems GmbH | CO2000 | KMO-SZ116 | NCR |
| Pre-Amplifier | Agilent | 87405C | KMO-SZ155 | Dec.6, 2015 |
| Pre-Amplifier | Com-Power | PAM-840 | KMO-SZ156 | Dec.6, 2015 |
| Horn Antenna | Com-Power | AH-840 | KMO-SZ157 | Dec.6, 2015 |
| EMI Test Receiver | Rohde & Schwarz | ESPI7 | KMO-SZ002 | June 27, 2016 |
| Spectrum Analyzer | Rohde & Schwarz | FSP40 | KMO-SZ003 | June 27, 2016 |
| Signal Generator | FLUKE | PM5418+Y/C | KMO-SZ020 | May 27, 2016 |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | KMO-SZ004 | August 19, 2018 |
| Trilog-Super Broadband Antenna | SCHWARZBECK | VULB9161 | KMO-SZ005 | August 27, 2018 |
| Trilog-Super Broadband Antenna | SCHWARZBECK | VULB9161 | KMO-SZ006 | August 19, 2018 |
| Broad-Band Horn Antenna | SCHWARZBECK | BBHA 9120D | KMO-SZ007 | August 19, 2018 |
| Broad-Band Horn Antenna | SCHWARZBECK | BBHA 9120D | KMO-SZ008 | August 19, 2018 |
| AMN | Rohde & Schwarz | ESH3-Z5 | KMO-SZ009 | June 27, 2016 |
| Pulse Limiter | SCHWARZBECK | VTSD 9561-F | KMO-SZ077 | Nov.29, 2015 |
| ISN | SCHWARZBECK | NTFM 8158 CAT3 | KMO-SZ070 | Nov.19, 2016 |
| ISN | SCHWARZBECK | NTFM 8158 CAT5 | KMO-SZ071 | Nov.19, 2016 |
| ISN | SCHWARZBECK | NTFM 8158 CAT6 | KMO-SZ072 | Nov.19, 2016 |
| KMO Shielded Room | KMO | KMO-001 | KMO-SZ036 | NCR |
| Coaxial Cable with N-Connectors | SCHWARZBECK | AK9515H | KMO-SZ037 | Sep.18, 2016 |
| AC Power Source / Analyzer | Agilent | 6813B | KMO-SZ166 | July 22, 2016 |
| Power Meter | Rohde & Schwarz | OSP-B157 | KMO-HK015 | Nov.6, 2016 |
| Digital Radio Communication Tester | Rohde & Schwarz | CMD60 | KMO-SZ169 | April 10, 2016 |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU200 | KMO-SZ170 | April 10, 2016 |
| Regulatory Test System 30 MHz to 40 GHz | Rohde & Schwarz | TS8997 | KMO-HK015 | Nov.6, 2016 |
| Program Control Telephone Exchanger | Exceltel | CDX8000-M | KMO-SZ221 | NCR |
| 3m Anechoic Chamber | KMO | KMO-3AC | KMO-3AC-1 | Nov.12, 2016 |
| Temperature Chamber | TABAI | PSL-4GTW | N/A | Feb.10, 2016 |