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# FCC TEST REPORT

Under:
FCC Part 15, Class B

Prepared For:

## Grandstream Networks, Inc.

126 Brookline Ave, 3rd Floor Boston, MA 02215, USA

| |
|---|
| **FCC ID: YZZUCM6202** |
| **EUT: IP PBX** |
| **Model: UCM6204, UCM6202** |

| |
|---|
| May 31, 2016<br>**Issue Date:** |
| Original Report<br>**Report Type:** |
| Eric Guo<br>**Test Engineer:** Eric Guo |
| Apollo Liu<br>**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/ACLASS 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
Email: kmo@kmolab.com
Internet: www.kmolab.com

## 1. 3 Details of Applicant

**Name : Grandstream Networks, Inc.**
**Address : 126 Brookline Ave, 3rd Floor Boston, MA 02215, USA**

## 1. 4 Application Details

| | |
|---|---|
| Date of Receipt of Application | : March 24, 2016 |
| Date of Receipt of Test Item | : March 24, 2016 |
| Date of Test | : April 6~April 20, 2016 |

## 1. 5 Test Item

| | |
|---|---|
| Manufacturer | : Grandstream Networks, Inc. |
| Address | : 4th Floor, Rainbow Technology Building #16 New West Rd, Nanshan Science & Technology Park (North District),Shenzhen, China 518057 |
| Trade Name | : Grandstream |
| Model No.(Base) | : UCM6204 |
| Model No.(Extension) | : UCM6202 |
| Description | : IP PBX |

## Additional Information

| | |
|---|---|
| Product Type | : N/A |
| Radio Type | : N/A |
| Power Type | : DC 12V/1.5A(Adapter model:F18W8-120150SPAU)<br>POE DC 48V |
| Modulation | : N/A |
| Data Modulation | : N/A |
| Date Rate (Mbps) | : N/A |
| Frequency Range | : N/A |
| Channel Number | : N/A |
| Antenna | : N/A |

## 1. 6 Test Standards

| FCC Part 15, Class 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 |

## 2. 2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Uncertainty |
|---|---|---|
| Conducted emissions | 0.15MHz~30MHz | 1.72 |
| Radiated emissions | 30MHz ~ 300MHz | 3.88 |
| Radiated emissions | 300MHz ~1000MHz | 3.86 |
| Radiated emissions | 1000MHz ~18000MHz | 5.28 |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 22: 2006, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than $U_{CISPR}$ which is 3.6dB and 5.2dB respectively. KMO values (called $U_{Lab}$ in CISPR 16-4-2) is less than $U_{CISPR}$ as shown in the table above.
Therefore, MU need not be considered for compliance.

# 3. EUT Modifications

No modification by test lab.

# 4. Conducted Power Line Test

## 4. 1 Test Equipment

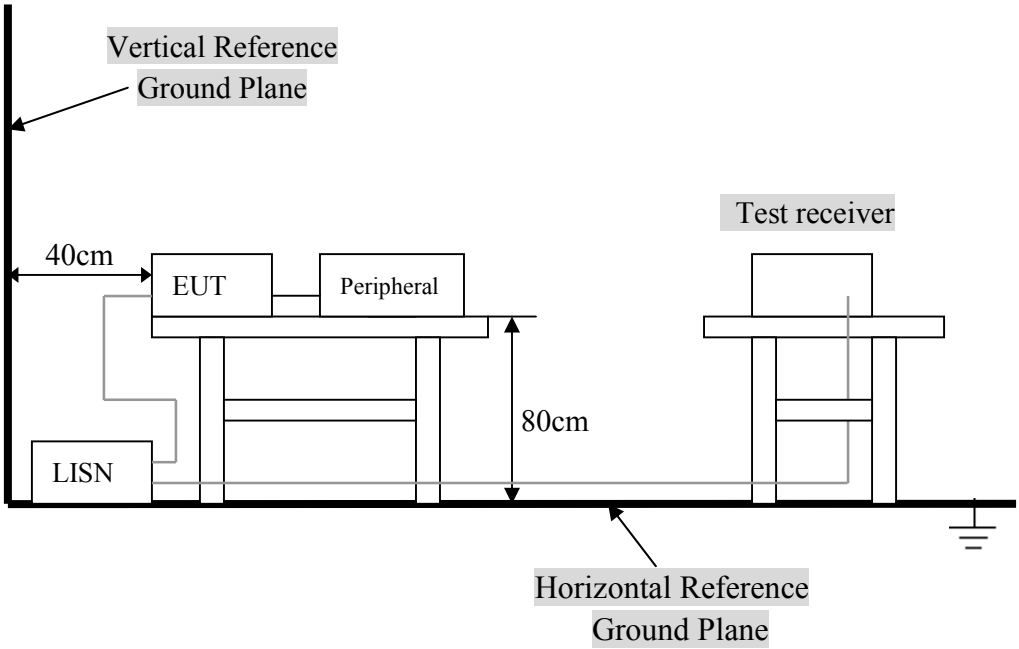
Please refer to Section 8 this report.

## 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 C63.4:2014 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 C63.4:2014. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

### A. EUT

| Device | Manufacturer | Model # | FCC ID |
|---|---|---|---|
| IP PBX | Grandstream Networks, Inc. | UCM6204 | YZZUCM6202 |

### B. Internal Devices

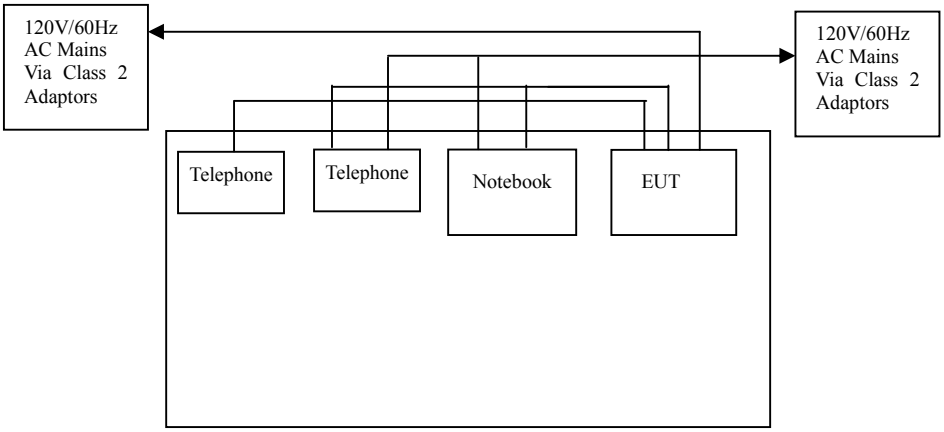
| Device | Manufacturer | Model # | FCCID / DoC |
|---|---|---|---|
| N/A | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

### C. Peripherals

| Device | Manufacturer | Model # Serial # | FCC ID/ DoC | Cable |
|---|---|---|---|---|
| Notebook | DELL | PP10L | DoC | 1.5m unshielded power cord |
| IP Phone | GRANDSTREAM | GXP1625 | YZZGXP16XX | N/A |
| Analog Phone | SINATEL | GCE6010 | DoC | N/A |

## 4. 5 EUT Operating Condition

Operating condition is according to ANSI C63.4:2014.
A. Setup the EUT and simulators as shown on follow.
B. Enable RF signal and confirm EUT active.
A. 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 PBX | Test Mode | : Normal Link / Auto |
| Test Item | : Conducted Emission Data | Temperature | : 25 ℃ |
| Test Voltage | : DC 12V | 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 ℃
- Humidity ： 53 % RH

Adapter model: F18W8-120150SPAU

| FCC 15 Class B | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Read Level (dBuV) | | Factor (dB) | Emission (dBuV) | | Line/ Neutral | Limit (dBuV) | | Margin | (dBuV) |
| | QP | AV | | QP | AV | | QP | AV | QP | AV |
| 0.158 | 34.06 | 22.96 | 10.30 | 44.36 | 33.26 | Line | 65.57 | 55.57 | -21.21 | -22.31 |
| 0.158 | 34.32 | 23.05 | 10.30 | 44.62 | 33.35 | Neutral | 65.57 | 55.57 | -20.95 | -22.22 |
| 0.214 | 34.57 | 27.51 | 10.30 | 44.87 | 37.81 | Line | 63.05 | 53.05 | -18.18 | -15.24 |
| 0.270 | 37.34 | 32.35 | 10.30 | 47.64 | 42.65 | Neutral | 61.12 | 51.12 | -13.48 | -8.47 |
| 0.270 | 36.61 | 31.59 | 10.30 | 46.91 | 41.89 | Line | 61.12 | 51.12 | -14.21 | -9.23 |
| 0.278 | 36.15 | 26.41 | 10.30 | 46.45 | 36.71 | Neutral | 60.88 | 50.88 | -14.43 | -14.17 |
| FCC 15 Class B | | | | | | | | | | |

**Note: NF = No Significant Peak was Found.**

**Note:**

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

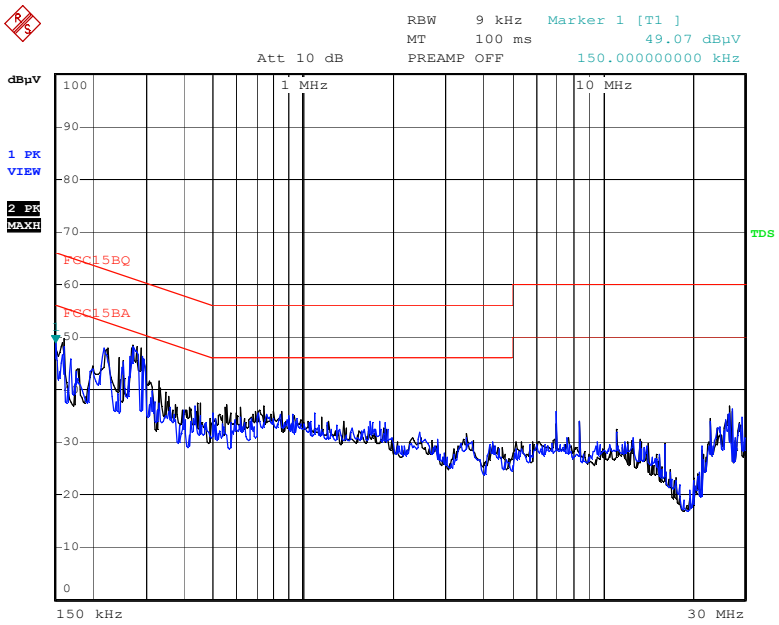
***Conducted Emission***

***FCC 15.107***

*Test Specification: LINE&NEUTRAL*

*Comment:*

*Adapter model: F18W8-120150SPAU*

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# 5. Radiated Emission Test

## 5. 1 Test Equipment

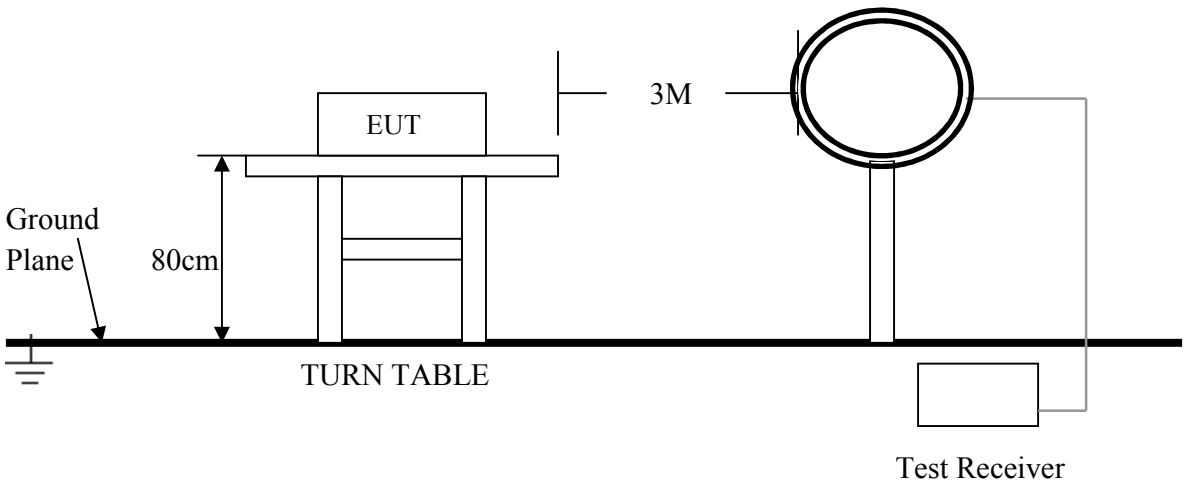
Please refer to Section 8 this report.

## 5. 2 Test Procedure

1. The EUT was tested according to ANSI C63.4:2014.
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 C63.4:2014 .
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 C63.4:2014

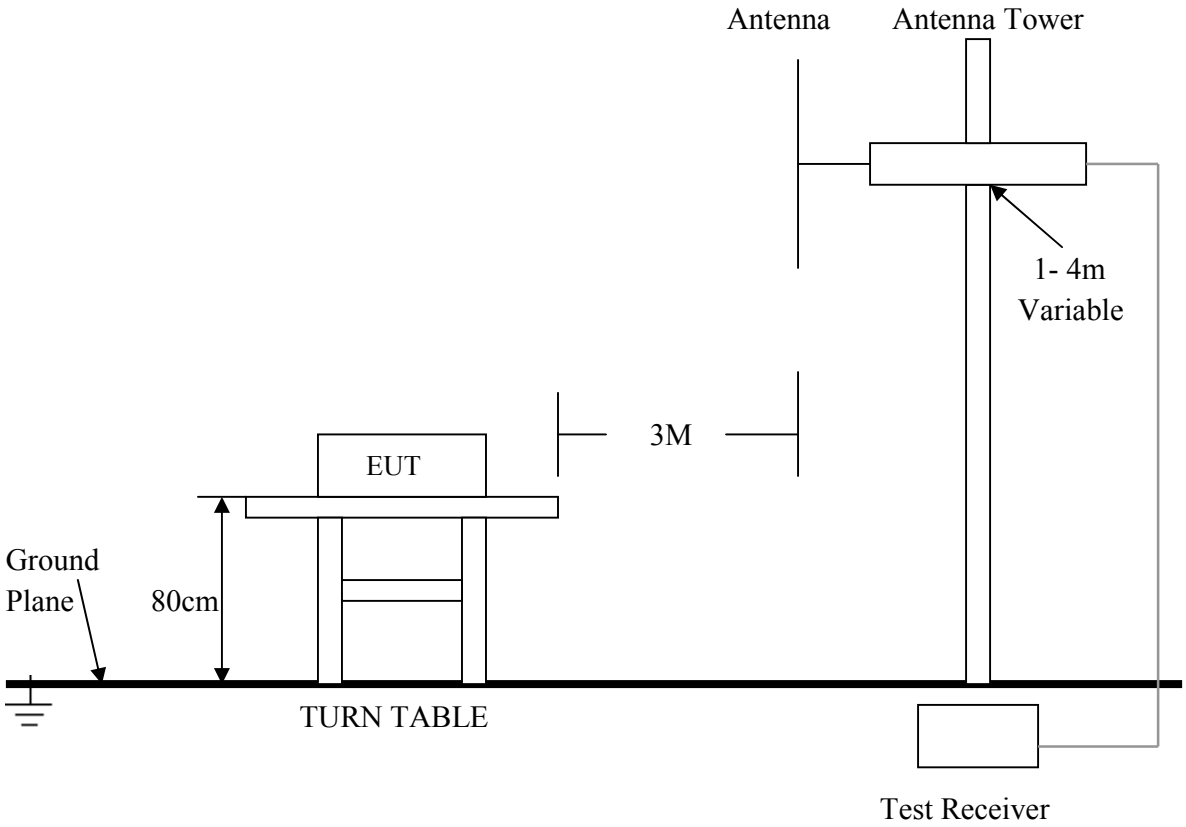
## 5. 3 Radiated Test Setup

**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 PBX | Test Mode | : Normal Link / Auto |
| Test Item | : Fundamental Radiated Emission Data | Temperature | : 25 ℃ |
| 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 | | | | |
| N/A | | | | |
| N/A | | | | |
| N/A | | | | |
| N/A | | | | |
| 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: F18W8-120150SPAU

| FCC 15 Class B | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Read Level (dBuV) | Factor (dB) | Emission (dBuV/m) | Horiz./ Vert. | Limit (dBuV/m) | Margin (dB) |
| 375.000 | 17.64 | 20.91 | 38.55 | Horiz./ | 46.0 | -7.45 |
| 32.600 | 19.05 | 12.06 | 31.11 | Vert. | 40.0 | -8.89 |
| 625.000 | 24.00 | 18.87 | 42.87 | Horiz./ | 46.0 | -3.13 |
| 375.000 | 18.34 | 20.91 | 39.25 | Vert. | 46.0 | -6.75 |
| 875.000 | 22.21 | 22.68 | 44.89 | Horiz./ | 46.0 | -1.11 |
| 625.000 | 23.78 | 18.87 | 42.65 | Vert. | 46.0 | -3.35 |
| FCC 15 Class B | | | | | | |

POE

| FCC 15 Class B | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Read Level (dBuV) | Factor (dB) | Emission (dBuV/m) | Horiz./ Vert. | Limit (dBuV/m) | Margin (dB) |
| 375 | 20.55 | 20.91 | 41.46 | Horiz./ | 46.0 | -4.54 |
| 125 | 18.79 | 13.83 | 32.62 | Vert. | 43.5 | -10.88 |
| 625 | 22.48 | 18.87 | 41.35 | Horiz./ | 46.0 | -4.65 |
| 625 | 21.67 | 18.87 | 40.54 | Vert. | 46.0 | -5.46 |
| 875 | 22.15 | 22.68 | 44.83 | Horiz./ | 46.0 | -1.17 |
| 875 | 19.37 | 22.68 | 42.05 | Vert. | 46.0 | -3.95 |
| FCC 15 Class B | | | | | | |

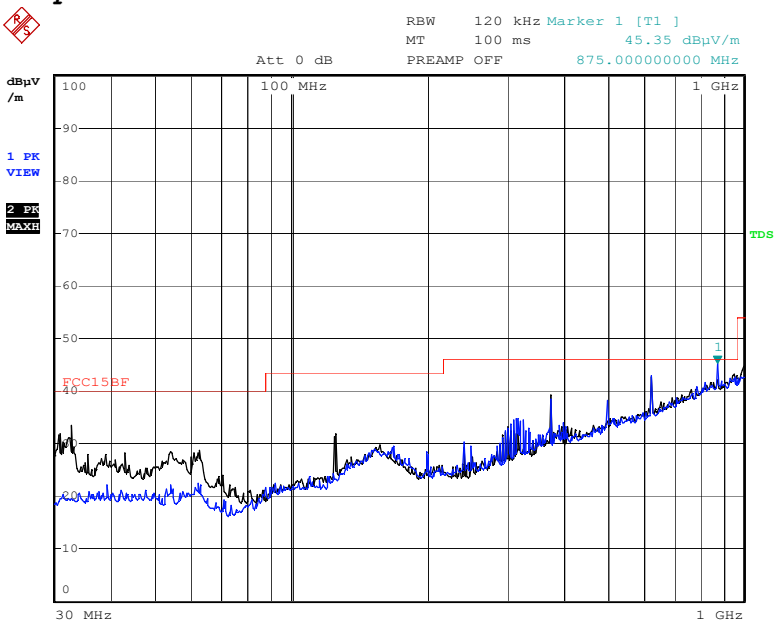
**Note:** (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
(2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.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

**Frequency above 1 GHz**

| FCC 15 Class B | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | Read Level(dBuV) | | Factor | Emission(dBuV/m) | | Horiz./ | Limit (dBuV/m) | | Margin(dB) | |
| (MHz) | PK | AV | (dB) | PK | AV | Vert. | PK | AV | PK | AV |
| 1596.800 | 27.43 | 6.94 | 20.91 | 48.34 | 27.85 | Horiz./ | 74.0 | 54.0 | -25.66 | -26.15 |
| 1763.600 | 31.39 | 13.68 | 13.83 | 45.22 | 27.51 | Vert. | 74.0 | 54.0 | -28.78 | -26.49 |
| 2432.400 | 36.76 | 15.36 | 18.87 | 55.63 | 34.23 | Horiz./ | 74.0 | 54.0 | -18.37 | -19.77 |
| 2430.000 | 40.94 | 16.35 | 18.87 | 59.81 | 35.22 | Vert. | 74.0 | 54.0 | -14.19 | -18.78 |
| 2948.800 | 26.19 | 12.23 | 22.68 | 48.87 | 34.91 | Horiz./ | 74.0 | 54.0 | -25.13 | -19.09 |
| 2906.400 | 26.66 | 12.17 | 22.68 | 49.34 | 34.85 | Vert. | 74.0 | 54.0 | -24.66 | -19.15 |
| FCC 15 Class B | | | | | | | | | | |

**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 15.109***
***For Frequency from 30MHz to 1GHz***
***Adapter model: F18W8-120150SPAU***

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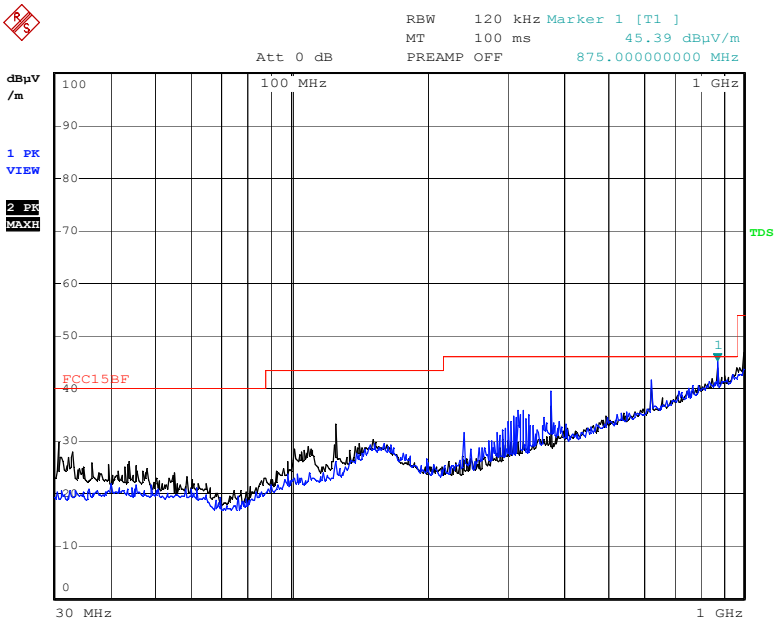
***POE***

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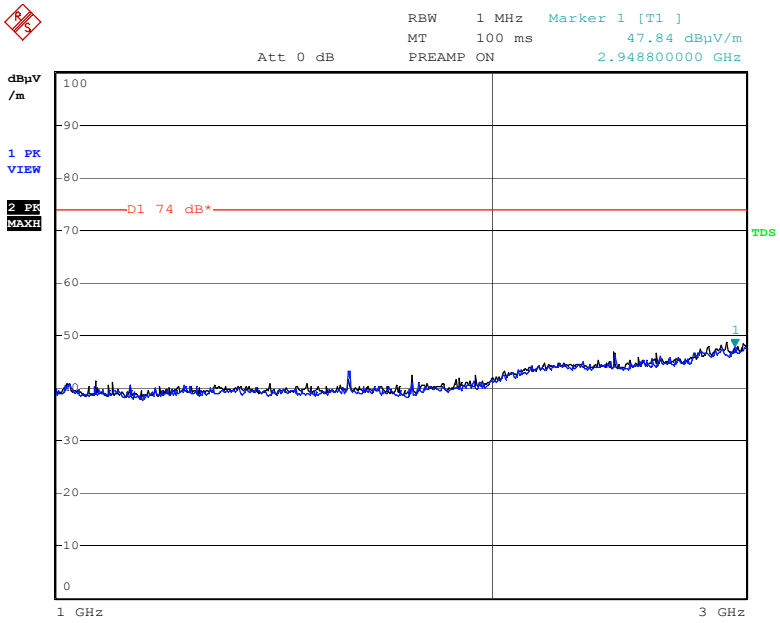
***For Frequency above 1GHz***

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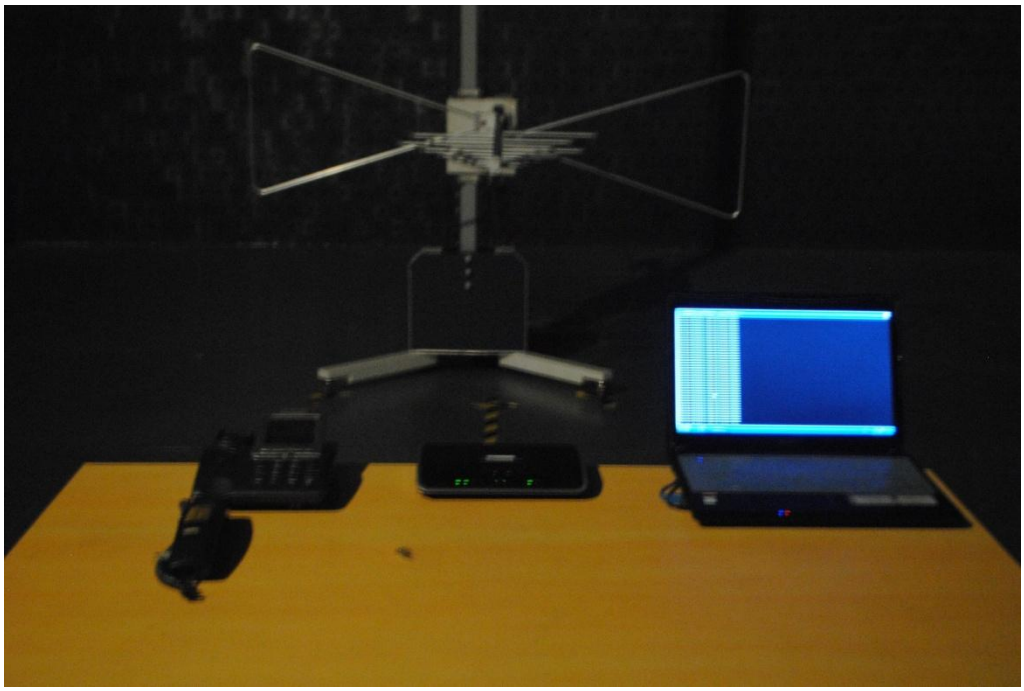
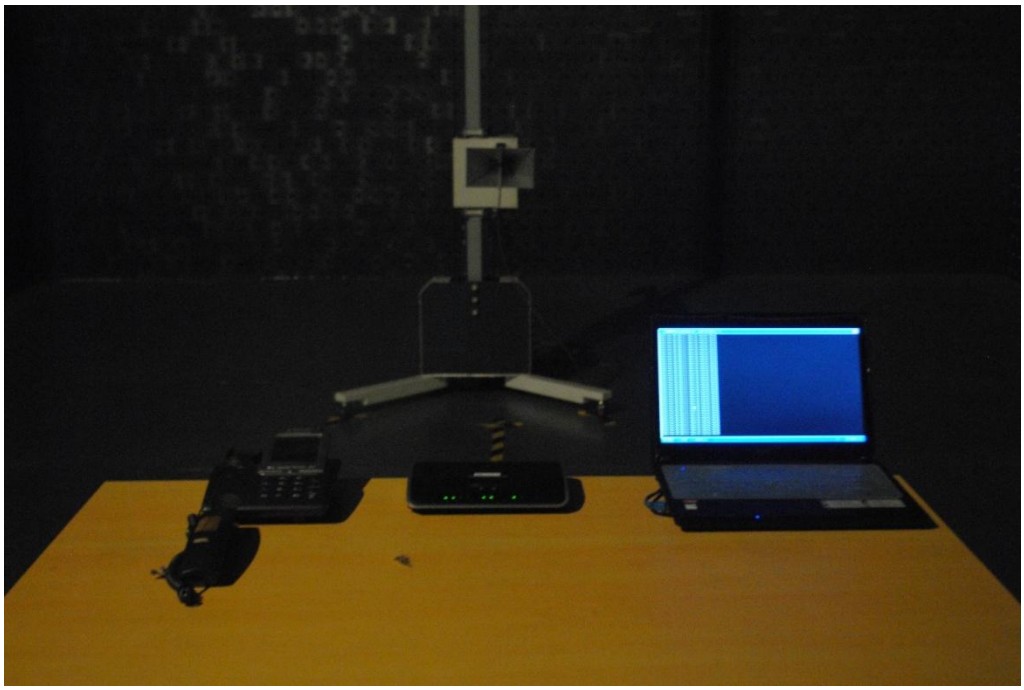
# 6. Photo of Testing

## 6.1 Emission test view

| EMI Test Setup View |
| --- |
| Conducted Emission test view |
| |

| Radiated Emission test view (From 30MHz to 1GHz) |
| --- |
|  |

| Radiated Emission test view (Above 1GHz) |
| --- |
|  |

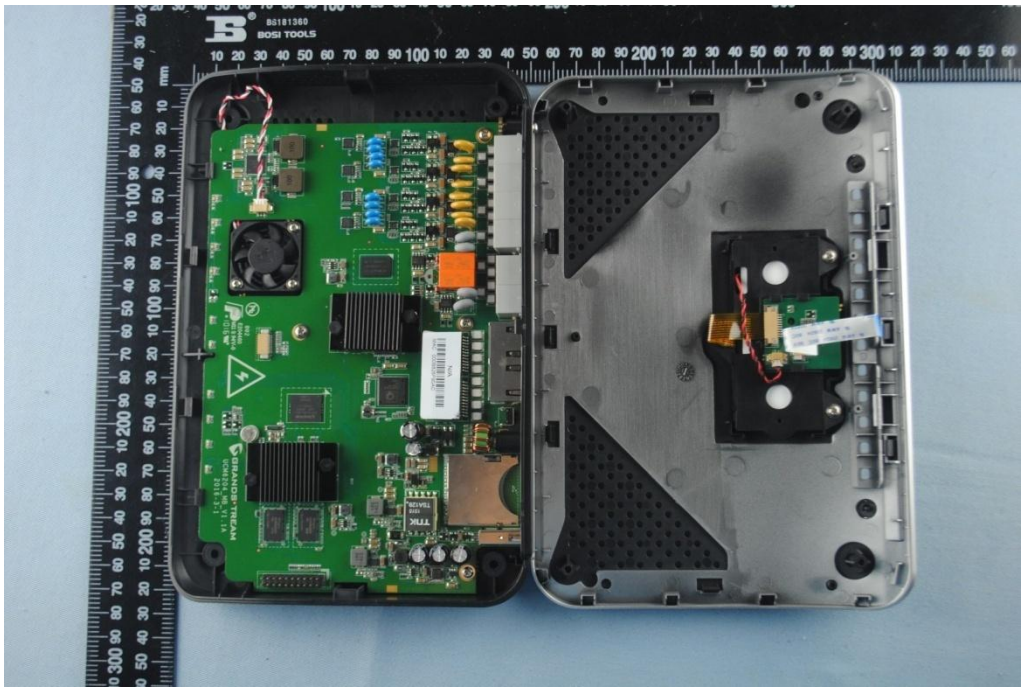
## 6.2 Photograph - EUT

| UCM6204 EUT top view |
| --- |
| |
| |

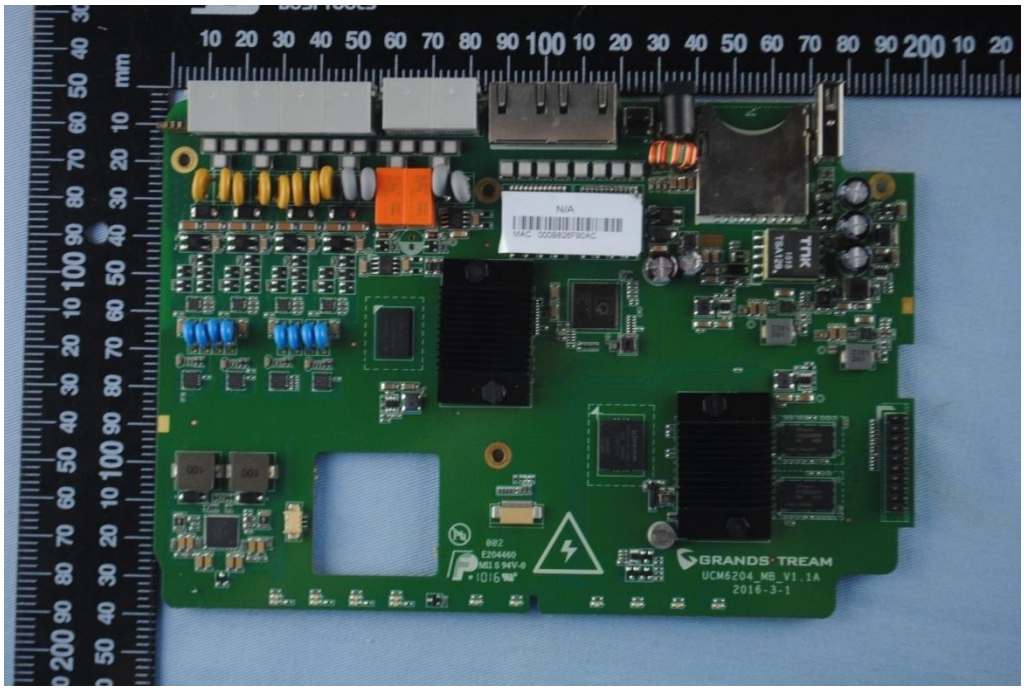
EUT bottom view

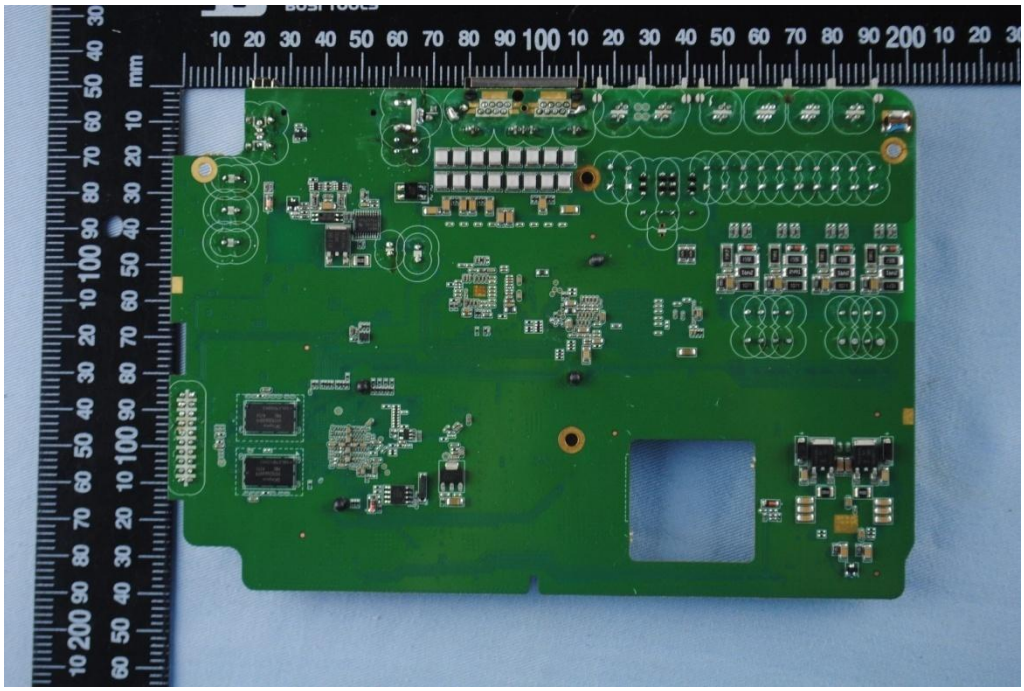
FXO4
FXO3
FXO2
FXO1
FXS2
FXS1
WAN
LAN
DC 12V
RESET
SD
USB

## EUT inside whole view



## Main board component side



| Main board solder side |
| --- |
|  |

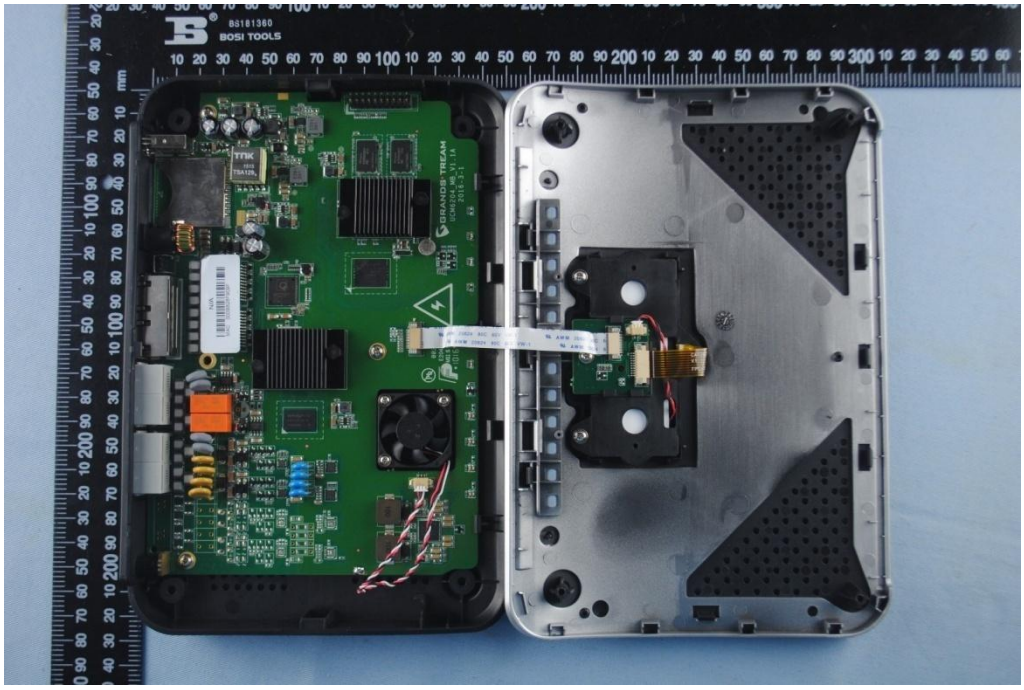
| UCM6202 EUT top view |
| --- |
| |

GRANDSTREAM
OK
LAN
WAN
USB
SD
Phone/Fax
Telco Line

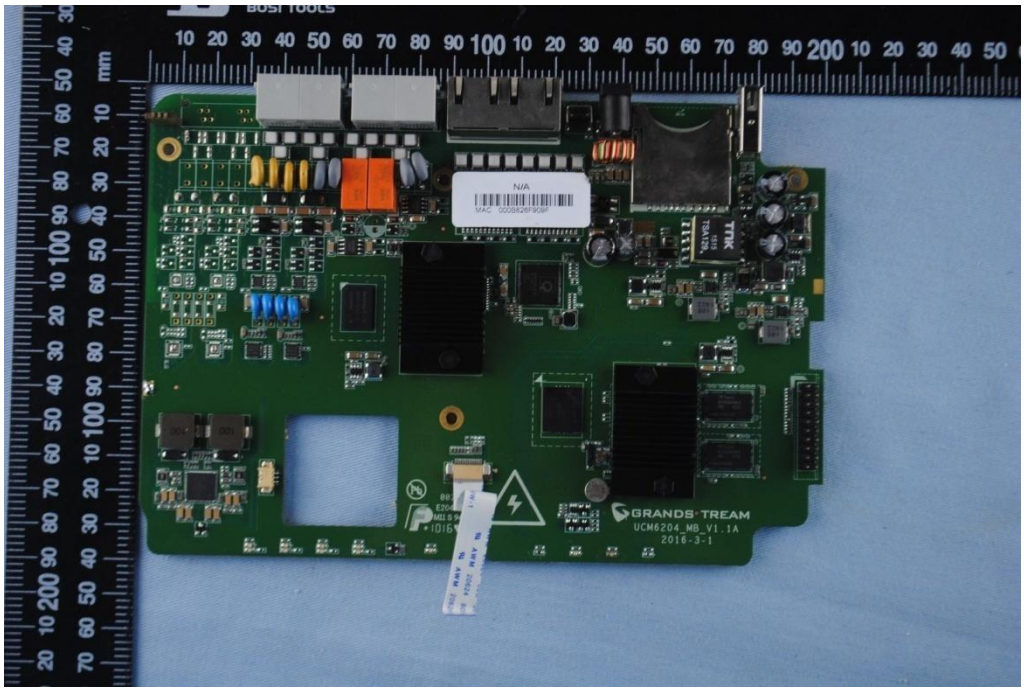
GRANDSTREAM

| EUT bottom view |
| --- |
| |
| |

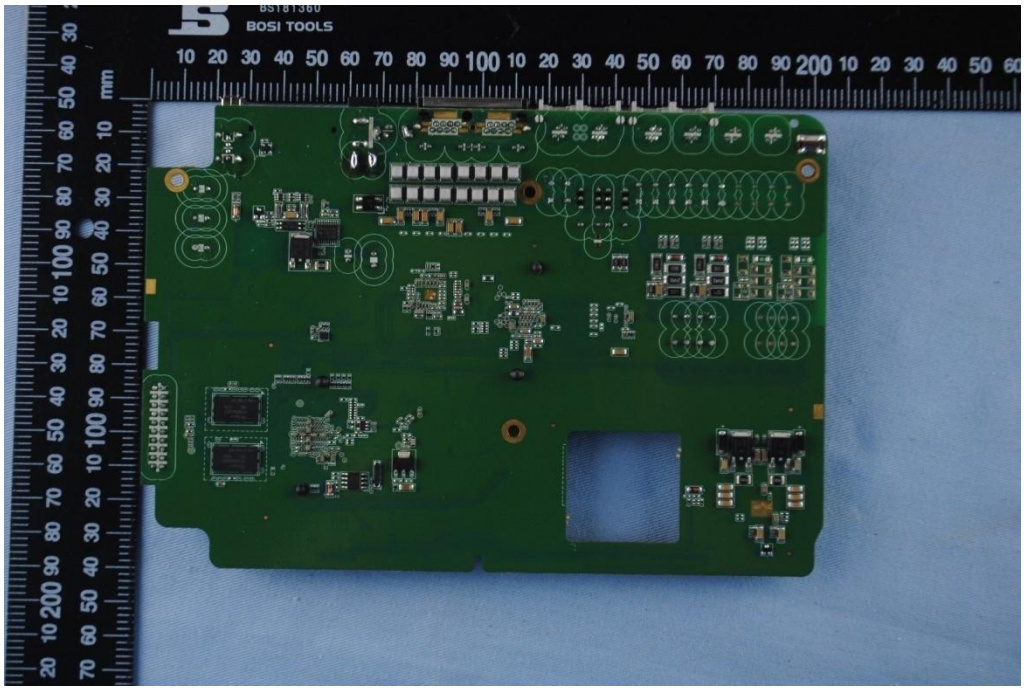
EUT inside whole view



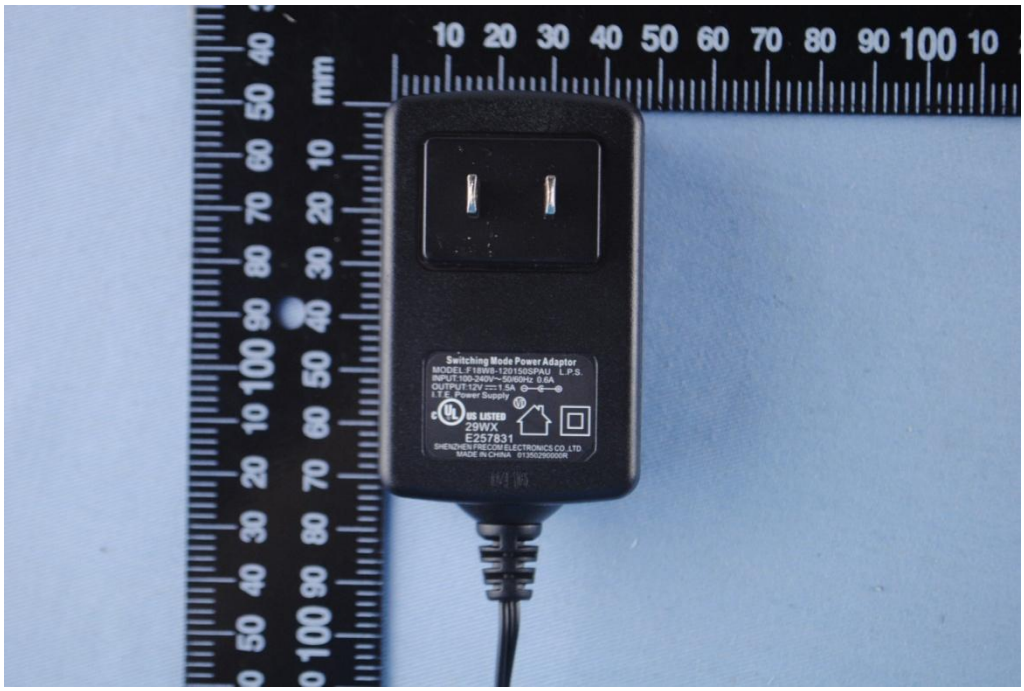
## Main board component side



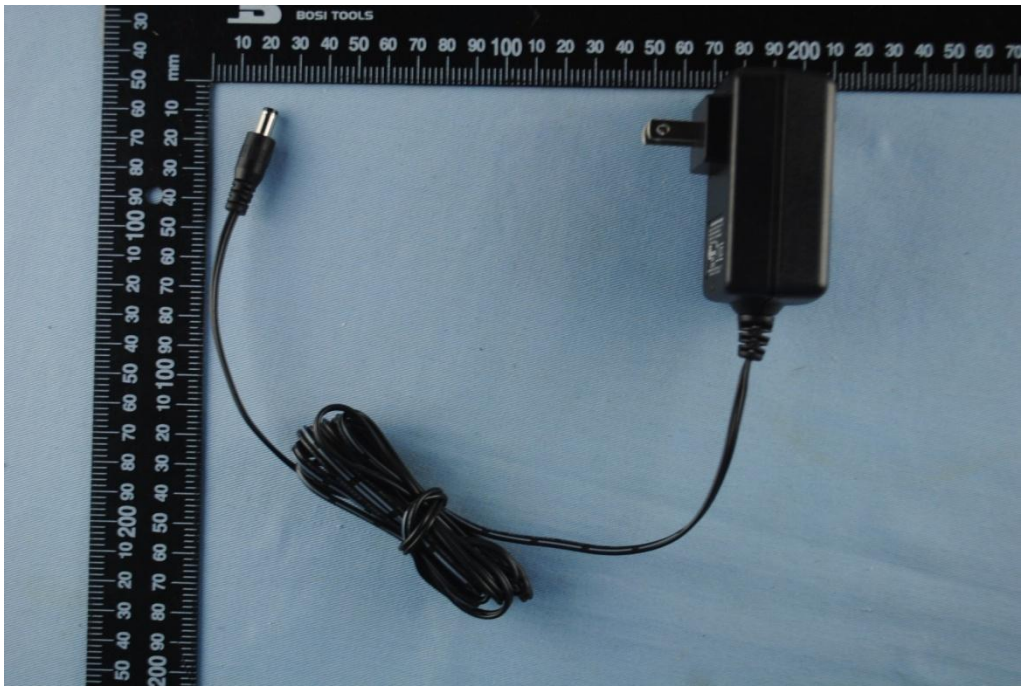

## Main board solder side



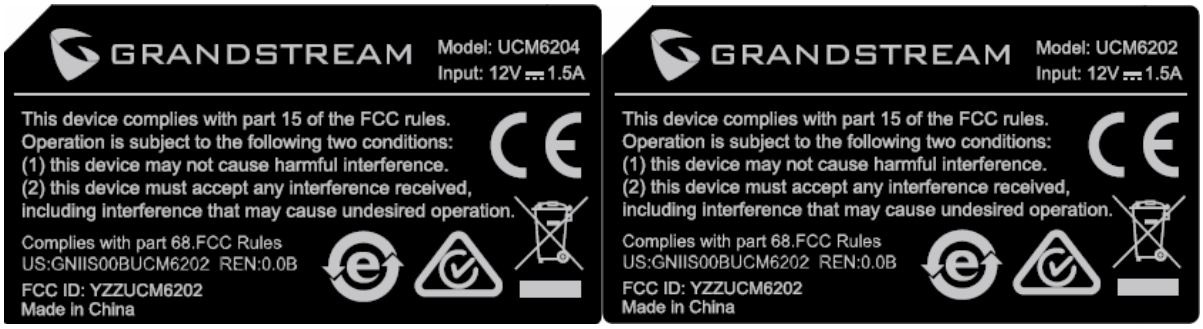
## FCC Adapter top view




## 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.

**Proposed Label Location on EUT**

# 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, 2016 |
| Pre-Amplifier | Com-Power | PAM-840 | KMO-SZ156 | Dec.6, 2016 |
| Horn Antenna | Com-Power | AH-840 | KMO-SZ157 | Dec.6, 2016 |
| 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, 2016 |
| 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, 2017 |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU200 | KMO-SZ170 | April 10, 2017 |
| Regulatory Test System 30 MHz to 40 GHz | Rohde & Schwarz | TS8997 | KMO-HK015 | Nov.6, 2016 |
| Program Control Telephone Exchanger | Excelltel | 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, 2017 |