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EMI TEST REPORT

Model Name: HIGH AVAILABILITY UCM CONNECTOR

Model Number: HA100

Brand Name: Grandstream

Prepared for Grandstream Networks, Inc.

FCC ID: YZZHA100

Classification: Part 15 Class B Computing Device Peripheral(JBP)

According to FCC 47 CFR Part 15, Subpart B
Test Procedure: ANSI C63.4:2014

Test Report #: SHE-1705-11711-FCC

Prepared by: Nancy — *ECMG*
Nancy Han /Assistant — *Company Name*

Reviewed by: — *ECMG*
Jawen Yin/ Senior Engineer — *Company Name*

QC Manager: Swall Zhang — *ECMG*
Swall Zhang/QC Manager — *Company Name*

Test Report Released by : Swall Zhang — *June 6th, 2017*
Swall Zhang — *Date*

Verdict

Test Result :	Pass*

*:In the configuration, the EUT complied with the standard specified above.

Revision History

Rev.	Issue date	Revision	Revised by
01	6/6/2017	Initial review	Jawen Yin
/	/	/	/

Test Location

Tests performed in a Certified ANSI Semi-Anechoic Chamber and Shielded Room.

Test Site Location: *NTEK Testing Technology Co., Ltd.*

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Baoan District,Shenzhen Guangdong, china

Tel: *(86)-755- 61156588*

Fax: *(86)-755- 61156599*

Accreditation Bodies

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

FCC-Registration No.: 238937
NTEK EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 238937

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List Attached Files

Exhibit Type	File Description	File Name
Test Report	Test Report	YZZHA100 _Test Report.pdf
Operation Description	Technical Description	YZZHA100 _Operation description.pdf
External Photos	External Photos	YZZHA100 _External Photos
Internal Photos	Internal Photos	YZZHA100 _Internal Photos
Block Diagram	Block Diagram	YZZHA100 _Block Diagram.pdf
Schematics	Circuit Diagram	YZZHA100 _Schematics.pdf
ID Label/Location	Label and Location	YZZHA100 _Label & Location.pdf
User Manual	User Manual	YZZHA100 _User Manual.pdf
Test setup photos	Test set-up photos	YZZHA100 _Test Set-up Photos

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Opinions and Interpretations

This test report relates to the abovementioned equipment under test (EUT). Without the permission of ECMG Electronic Technical Testing Corp (Shenzhen) Test Lab this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. The manufacturer has sole responsibility of continued compliance of the device.

Statement of Measurement Uncertainty

The data and results referenced in the document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

Administrative Data

Test Sample	*: HIGH AVAILABILITY UCM CONNECTOR*
Model Numbers	*: HA100*
Model Tested	*: HA100*
Date of Receipt	*: May 25th, 2017*
Date Tested	*: May 27th, 2017*
Applicant	*: Grandstream Networks, Inc.*
Address	*126 Brookline Ave, 3rd Floor Boston, MA 02215, USA*
Telephone	*: (617)-566-9300*
Fax	*: (617)-249-1987*
Manufacturer	*: Grandstream Networks, Inc.*
Address	*126 Brookline Ave, 3rd Floor Boston, MA 02215, USA*
Telephone	*: (617)-566-9300*
Fax	*: (617)-249-1987*
Factory	*: Grandstream Networks, Inc.*
Address	*126 Brookline Ave, 3rd Floor Boston, MA 02215, USA*
Telephone	*: (617)-566-9300*
Fax	*: (617)-249-1987*

EUT Description

Grandstream Networks, Inc. Model Tested HA100 (referred to as the EUT in this report) is an HIGH AVAILABILITY UCM CONNECTOR.

Rating(s) of EUT: *DC 12V, 1.5A*
The EUT has two Manufacturer's Power Adapters which detailed information are as below:
Power Adapter 1:
Model: F18W8-120150SPAU
Input: 100~240V~ 50/60Hz
Output: DC12V 1.5A
Manufacturer: FRECOM
Power Adapter 2:
Model: H18US1200150B
Input: 100~240V~ 50/60Hz
Output: DC12V 1.5A
Manufacturer: SUNLIGHT

For other informations &features please refer to user's manual of EUT.

Frequency Range Of Radiated Measurements

(b) For unintentional radiators:

(1) Except as otherwise indicated in paragraphs (b)(2) or (b)(3) of this section, for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Note: *Since the highest frequency operated of the EUT is 48MHz, so upper frequency of radiated emission test is up to 1000MHz as per §15.33(b)(1).*

Test Summary

The Electromagnetic Compatibility requirements on model HA100 for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

Emission Tests				
Specifications	**Description**	**Test Results**	**Test Point**	**Remark**
FCC Part 15.107 ANSI C63.4 -2014	Conducted Emission	Passed	AC Input Port	Attachment 1
FCC Part 15.109 ANSI C63.4 -2014	Radiated Emission	Passed	Enclosure	Attachment 2

Test Mode Justification

Pre-Scan has been conducted to determine the worst-case from all possible combination between available operation mode .Following mode(s) was (were) selected for the final test as listed below:

Pre-Test Mode	
EMI Test Mode	**Mode 1:** Communication with Notebook PC and Phone + Power Adapter 1
	Mode 2: Communication with Notebook PC and Phone + Power Adapter 2
	/
Final Test Mode: Mode 1,2	

EUT Exercise Software

No Exercise software support this test.

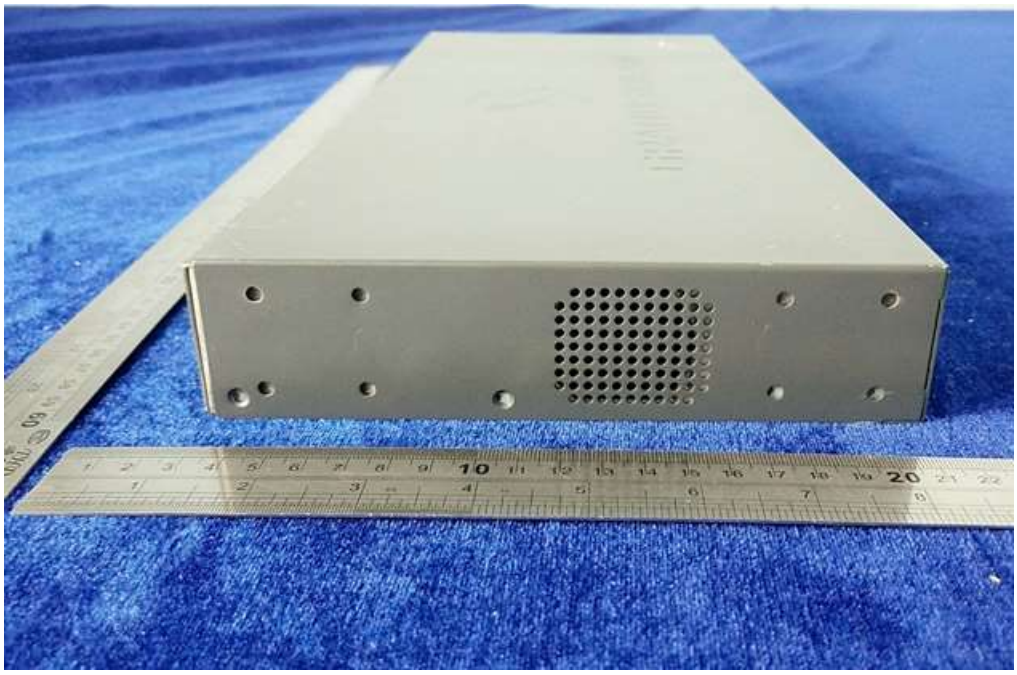
Equipment Modification

Any modifications installed previous to testing by Grandstream Networks, Inc. will be incorporated in each production model sold or leased in United States.

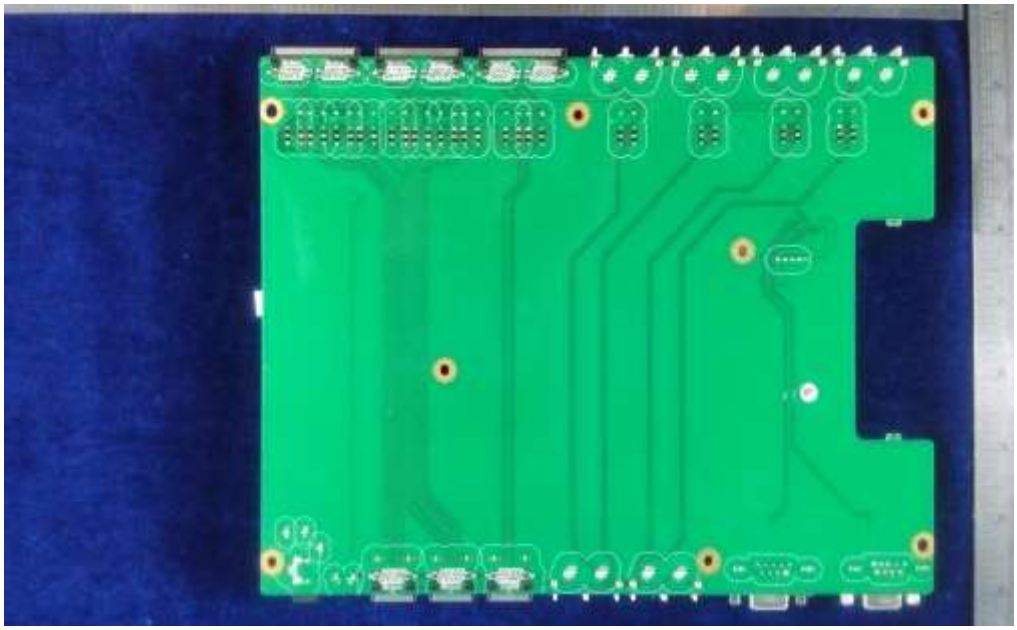
There were no modifications installed by ECMG Electronic Technical Testing Corp (Shenzhen).

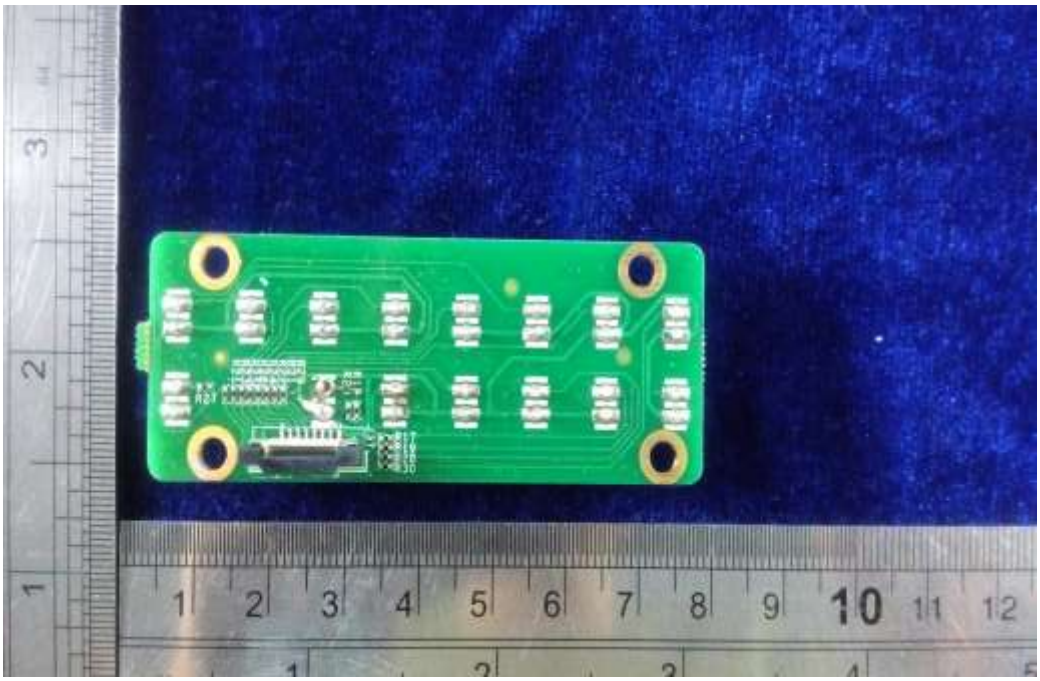
EUT Sample Photos

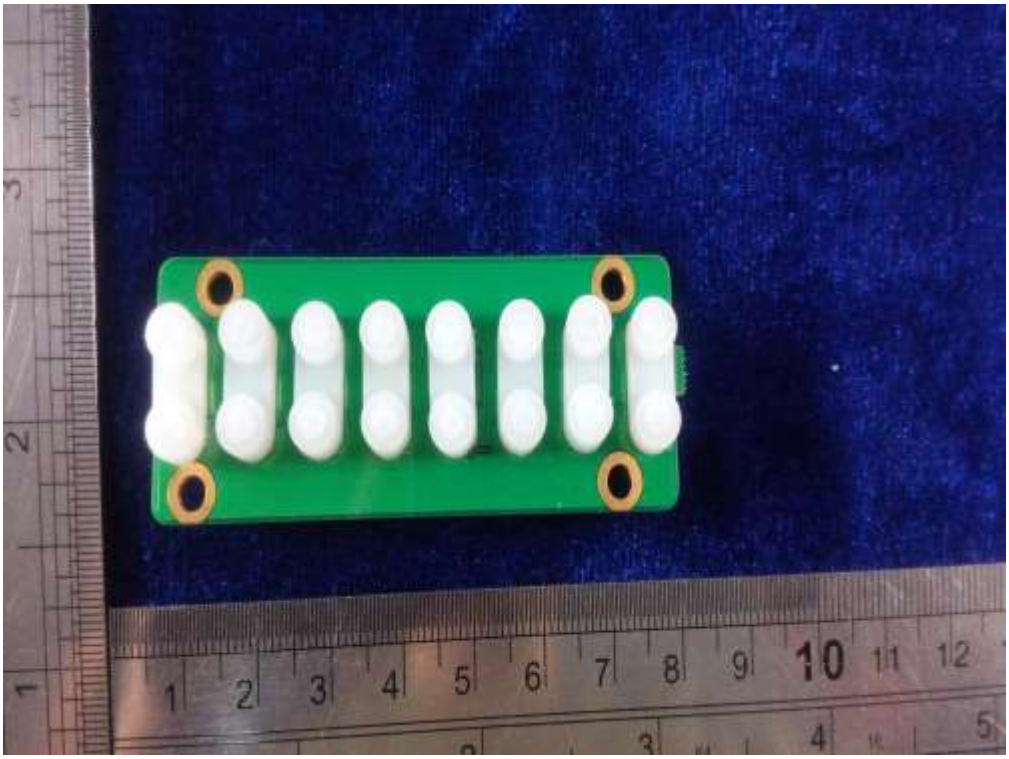
EUT Exterior View



EUT Internal View







Test System Details

EUT	
Model Number:	HA100
Description:	HIGH AVAILABILITY UCM CONNECTOR
Manufacturer:	Grandstream Networks, Inc.
Input Voltage:	DC12V

Support Equipment

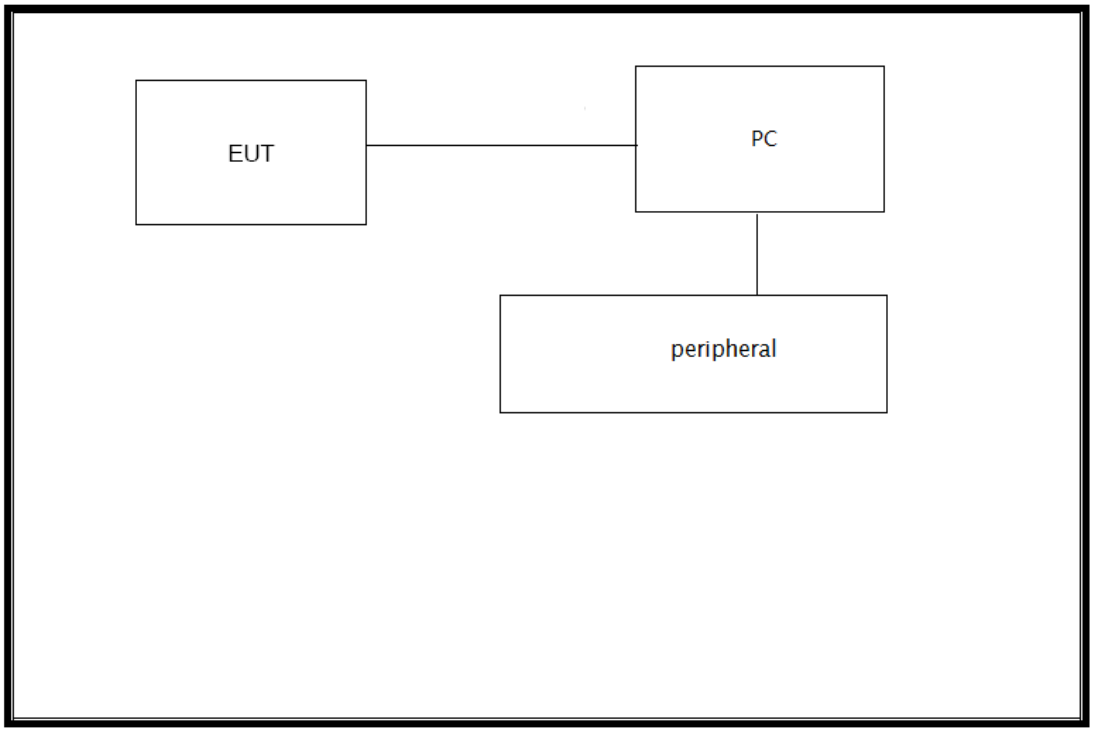
Description	Model Number	Serial Number	FCC Certificate	Manufacturer
Notebook PC	R720-15IKBN	PF0G38DB	DoC	Lenovo
IP Phone	GXV3275	/	YZZGXV3275	Grandstream
Phone	HCD757P	39824X41NPPTY 8N	VOC	TCL
Router	DIR-600NW	PK2V2B5007964	DOC	D-LINK
Printer	LBP2900	/	DoC	Canon
Mouse	N889	44AC107	DoC	DELL

Cable Description

Cable No.	Type of Cable	From	To	Length (Meters)	Shielded (Y/N)	Ferrite (Y/N)
1	Network Cable	EUT	Notebook PC	1.5	N	N
2	Power cable	EUT	Plug	1.8	N	N
3	Printer Cable	EUT	Printer	1.2	Y	Y
4	RJ 11 Cable	EUT	Phone	1.2	N	Y
5	Mouse Cable	Mouse	Notebook PC	1.2	N	Y

Note: The EUT has been tested as an independent unit together with other necessary accessories or support units.the above support units or accessories were used to form a representative test configuration during the test tests.

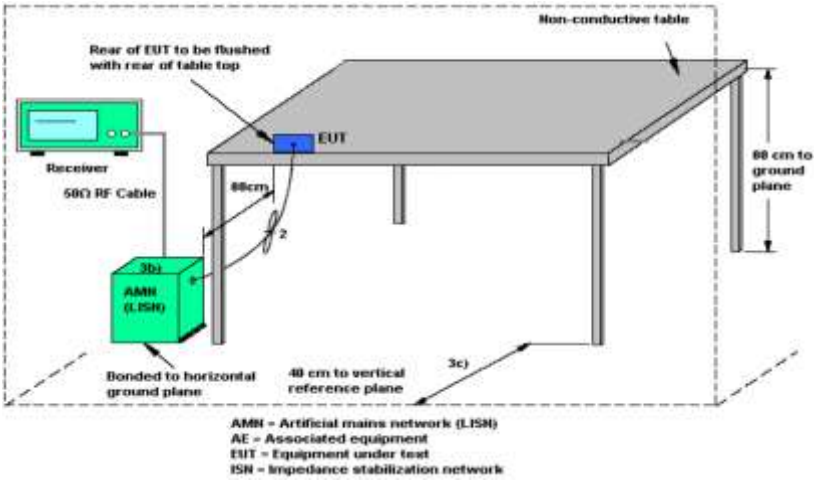
Configuration of Tested System



ATTACHMENT 1 - CONDUCTED EMISSION TEST RESULTS

CLIENT:	Grandstream Networks, Inc.	**TEST STANDERD:**	Section 15.107
MODEL NUMBERS:	HA100	**PRODUCT:**	HIGH AVAILABILITY UCM CONNECTOR
MODEL TESTED:	HA100	**EUT DESIGNATION:**	Home or Office
TEMPERATURE:	22°C	**HUMIDITY:**	48%
ATM PRESSURE:	103kPa	**GROUNDING:**	None
TESTED BY:	Alex Yu	**DATE OF TEST:**	May 27th, 2017
TEST REFERENCE:	ANSI C63.4- 2014		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4: 2014 for conducted emissions. The measurement was using a AMN on each line and an EMI receiver peak scan was made at the frequency measurement range. The six highest significant peaks were then marked, and these signals were then quasi-peaked and averaged. The frequency range investigated was from 150KHz to 30MHz. Corrected Amplitude & Over Limit Calculation. The basic equation as follow: VC = VR + AC + VDF; Herein, VC: corrected voltage amplitude VR: reading voltage amplitude AC: attenuation caused by cable loss VDF: voltage division factor of AMN or ISN. The “Over Limit” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a Over Limit of 7dB means the emission is 7dB below the maximum limit. The equation for Over Limit calculation is as follows: Over Limit = Limit - Corrected Amplitude.		
TEST MODE:	Mode 1,Model 2		
TESTED RANGE:	150kHz to 30MHz		
TEST VOLTAGE:	AC 120V/60Hz		
RESULTS:	The EUT meets the requirements of test reference for Conducted Emissions. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by ECMG Electronic Technical Testing Corp(Shenzhen) test personnel.		
M. UNCERTAINTY:	The maximum measurement uncertainty is evaluated as: 150KHz~30MHz: 3.2dB. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.		

Continue on to next page…

TEST SET UP:	

EMI Receiver Set-up:

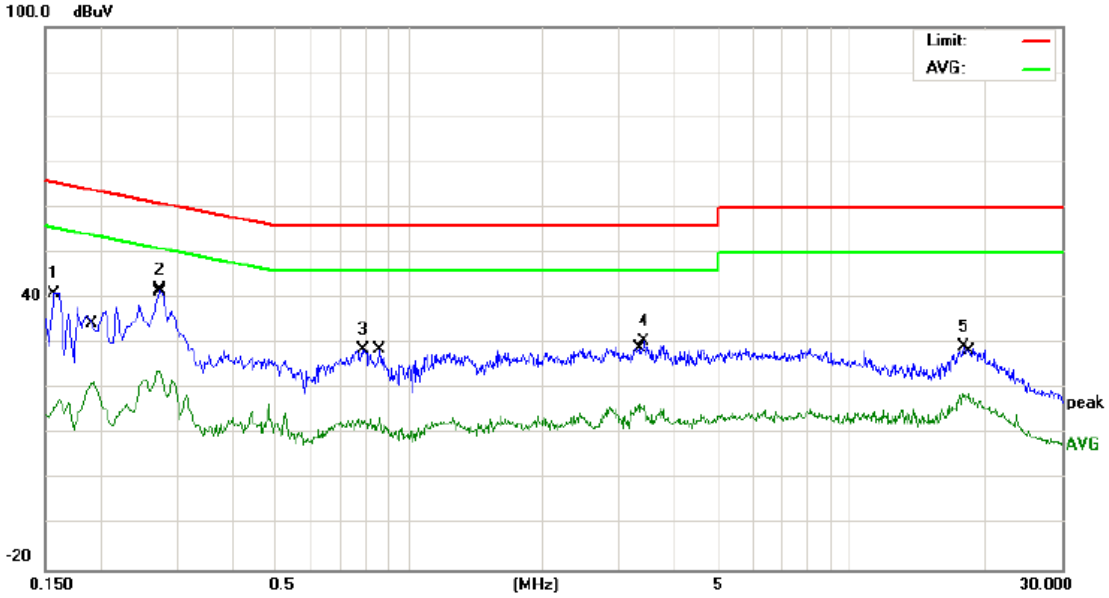
Frequency [MHz]	*IF B/W*
0.15 - 30	*9KHz*

Conducted Emission Limit:

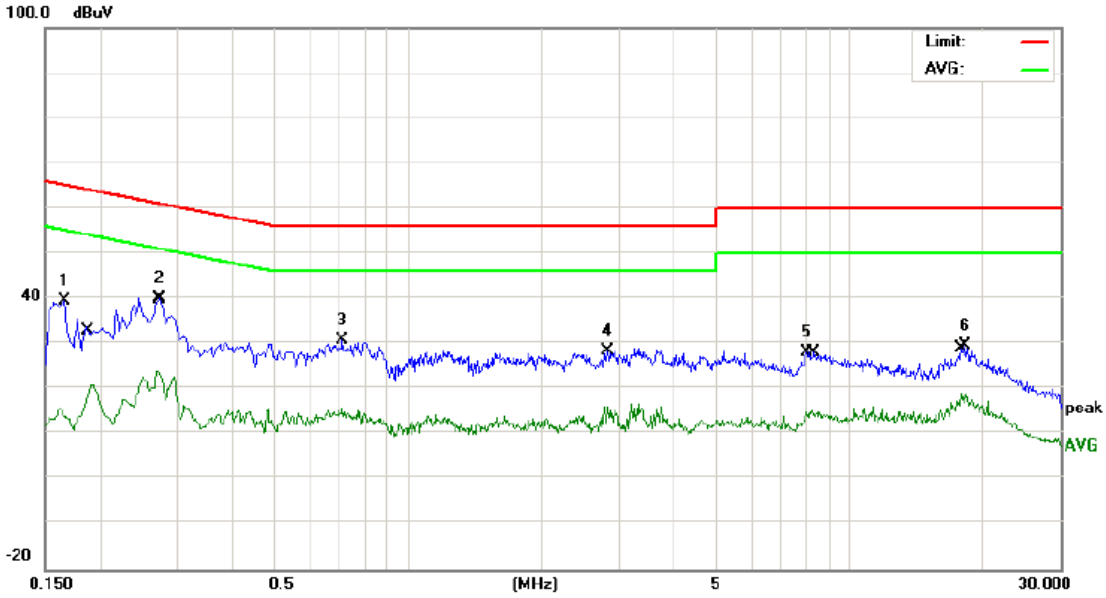
Frequency [MHz]	*Field strength [dBuV]*	
	Ouasi-peak	*Average*
0.15-0.5	*66 to 56**	*56 to 46**
0.5-5	*56*	*46*
5-30	*60*	*50*

**Decreases with the logatithm of the frequency.*

Mode 1:

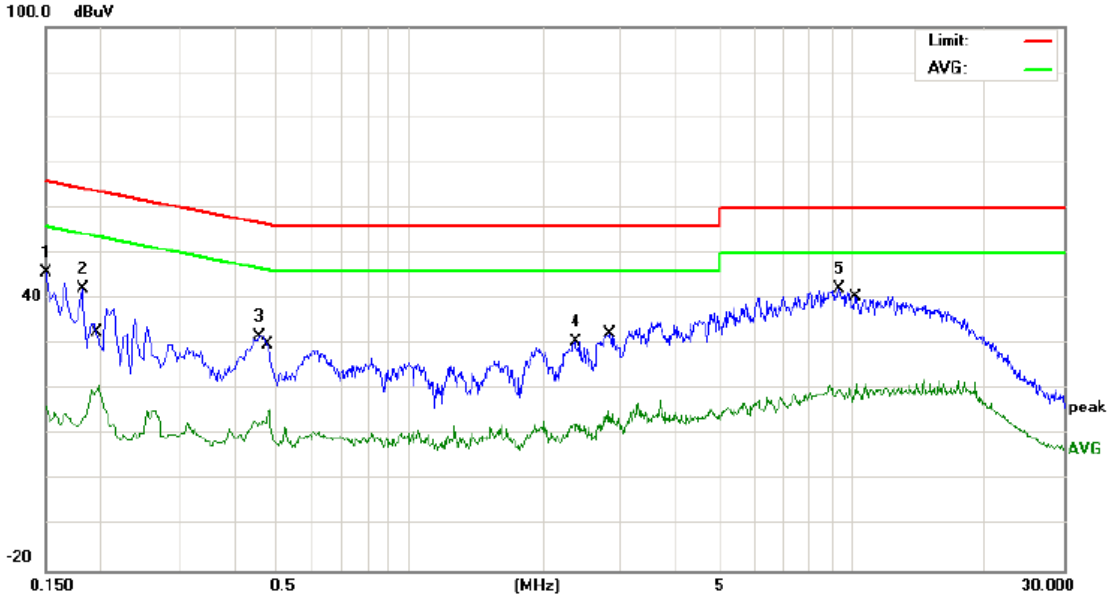


Line L Conducted Emission Graph

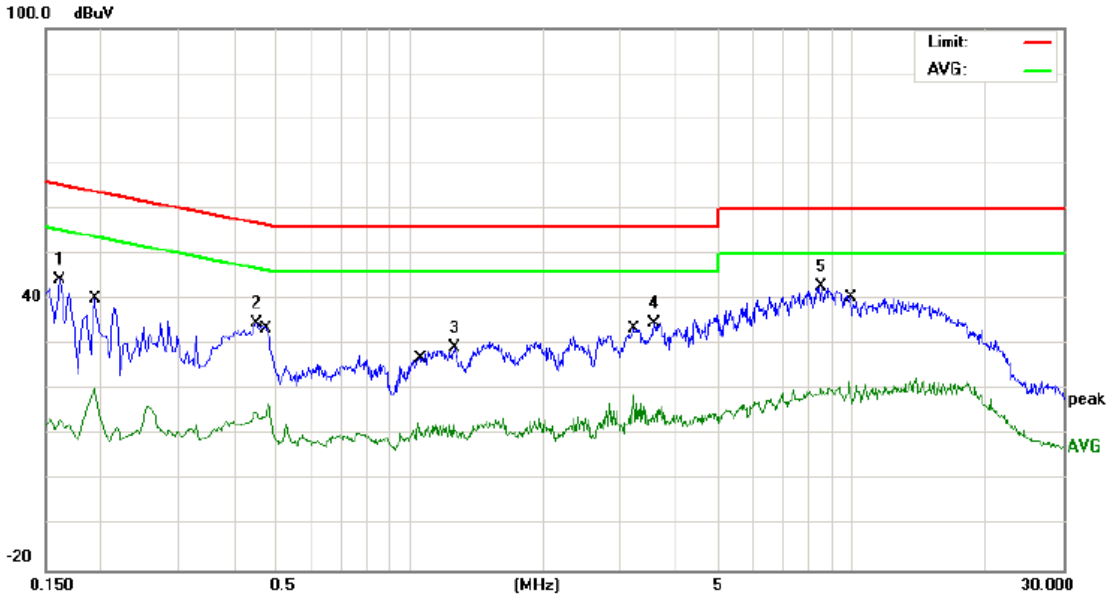


Line N Conducted Emission Graph

Mode 2:



Line L Conducted Emission Graph



Line N Conducted Emission Graph

Test Data
Mode 1:

Lines	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Over Limit QP (dB)	Frequency (MHz)	Corrected AVE Level (dBuV)	Limits AVE (dBuV)	Over Limit AVE (dB)
L	0.158	41.14	65.56	-24.42	0.194	21.50	53.86	-32.36
L	0.274	42.01	60.99	-18.98	0.270	23.95	51.12	-27.17
L	0.790	28.79	56.00	-27.21	0.858	13.81	46.00	-32.19
L	/	/	/	/	/	/	/	/
N	0.166	39.54	65.15	-15.61	0.190	20.88	54.03	-33.15
N	0.274	40.22	60.99	-20.77	0.270	23.94	51.12	-27.18
N	0.710	30.78	56.00	-25.22	0.710	15.83	46.00	-30.17
N	/	/	/	/	/	/	/	/

Note:
1) All readings are using a bandwidth of 9 kHz, with a 500 ms sweep time. A video filter was not used.
2) Other emission levels are too low against official limit that are not reported.

Mode 2:

Lines	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Over Limit QP (dB)	Frequency (MHz)	Corrected AVE Level (dBuV)	Limits AVE (dBuV)	Over Limit AVE (dB)
L	0.150	45.95	65.99	-20.04	0.198	20.92	53.69	-32.77
L	0.182	42.21	64.39	-22.08	0.482	15.46	46.30	-30.84
L	0.458	31.87	56.73	-24.86	2.822	15.18	46.00	-30.82
L	/	/	/	/	/	/	/	/
N	0.162	44.31	65.36	-21.05	0.194	20.32	53.86	-33.54
N	0.450	34.65	56.87	-22.22	0.478	16.96	46.37	-29.41
N	1.266	29.32	56.00	-26.68	1.046	12.73	46.00	-33.27
N	/	/	/	/	/	/	/	/

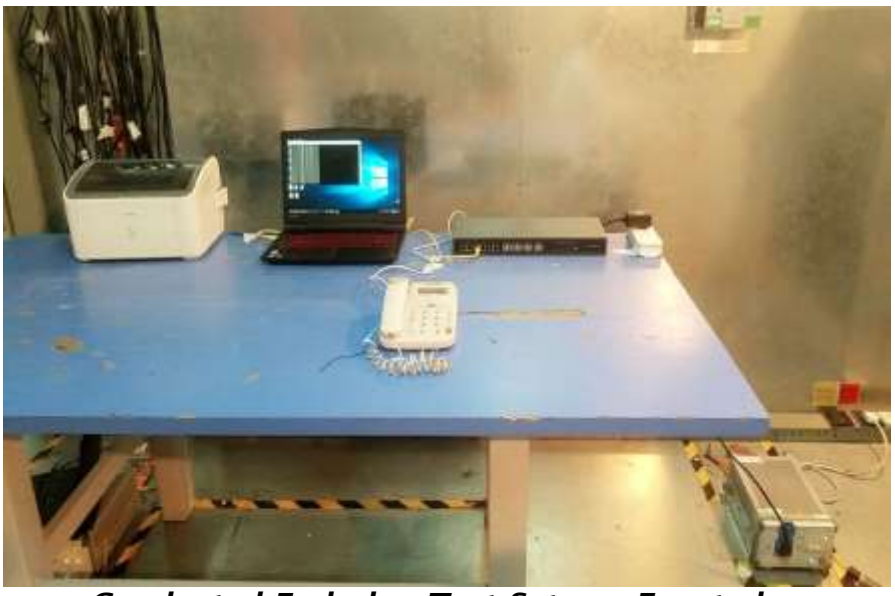
Note:
3) All readings are using a bandwidth of 9 kHz, with a 500 ms sweep time. A video filter was not used.
4) Other emission levels are too low against official limit that are not reported.

Test Equipment List:

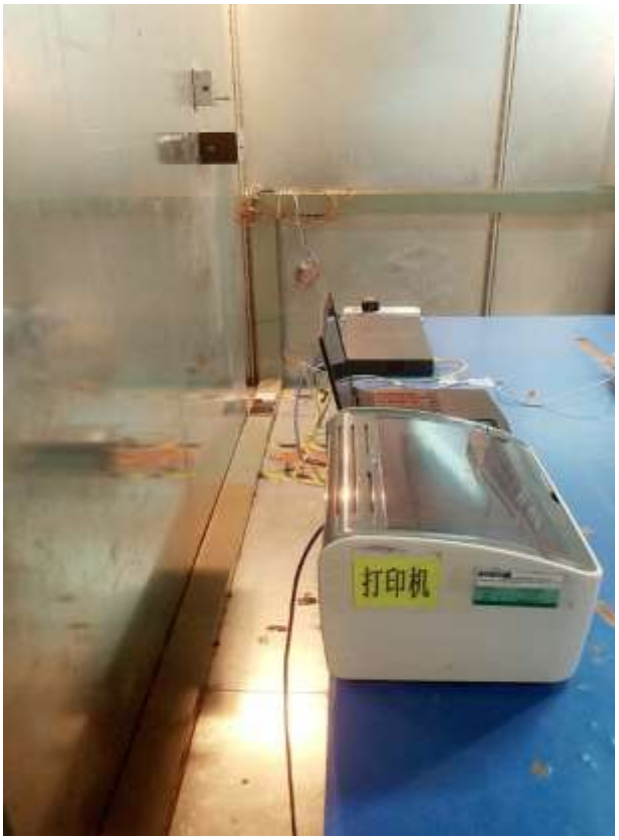
Test Equipment	*Model No.*	*Manufacturer*	*Serial No.*	*Last Cal.*	*Cal. Interval*
EMI Test Receiver	*ECSI*	*R&S*	*100920*	*2017.01.05*	*2018.01.04*
Line impedance stabilization network	*ENV216*	*R&S*	*101112*	*2017.01.05*	*2018.01.04*
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

TESTED BY: _____ ***REVIEWED BY:*** _____

ENGINEER ***SENIOR ENGINEER***



Conducted Emission Test Set-up –Front view



Conducted Emission Test Set-up –Back view

ATTACHMENT 2 – RADIATED EMISSION MEASUREMENT

CLIENT:	Grandstream Networks, Inc.	**TEST STANDERD:**	Section 15.109
MODEL NUMBERS:	HA100	**PRODUCT:**	HIGH AVAILABILITY UCM CONNECTOR
EUT MODEL:	HA100	**EUT DESIGNATION:**	Home or Office
TEMPERATURE:	22°C	**HUMIDITY:**	47%RH
ATM PRESSURE:	103.0kPa	**GROUNDING:**	None
TESTED BY:	Alex Yu	**DATE OF TEST:**	May 27th,2017
TEST REFERENCE:	ANSI C63.4: 2014		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4: 2014 for radiated emissions. An EMI receiver peak scan was made at the frequency measurement range (pre-scan) in an Anechoic chamber.signal discrimination was then performed and the significant peaks marked.these peaks were then average and peak in the frequency range of 9KHz to 30MHz at an anechoic chamber,quasi-peaked in the frequency range of 30 MHz to 1GHz and average and peak in the frequency range of 1GHz to 5GHz at an anechoic chamber. The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the Correction Factor are given as follows: FS= RA + AF + CF - AG Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain		
TEST MODE:	Mode 1,Mode 2		
TESTED RANGE:	30~1000MHz (Please see page 4)		
TEST VOLTAGE:	120VAC/60Hz		
RESULTS:	The EUT meet the requirements of test reference for radiated emissions.The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by ECMG Electronic Technical Testing Corp (Shenzhen). Test personnel.		
M. UNCERTAINTY:	The maximum measurement uncertainty is evaluated as : 30~1000MHz: 4.7dB;1~2GHz: 4.5dB. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.		

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EMI Receiver Set-up:

Frequency [MHz]	RBW	VBW	Detector
0.009-0.015	200Hz	1KHz	Quasi-peak
0.015-30	9KHz	30kHz	Quasi-peak
30-1000	120KHz	300KHz	Quasi-peak
Above 1GHz	1MHz	3MHz	Peak
	1MHz	10Hz	PK detector is for AV

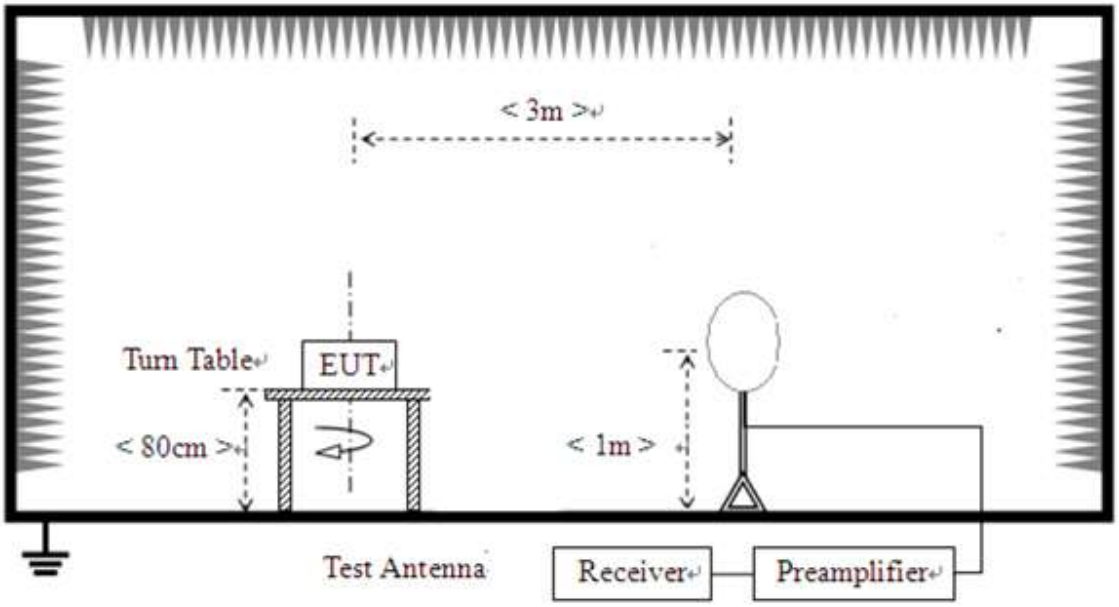
Note 1: In the emission table above, the tighter limit applies at the band edges.
Note 2: (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Radiated Emission Limit:

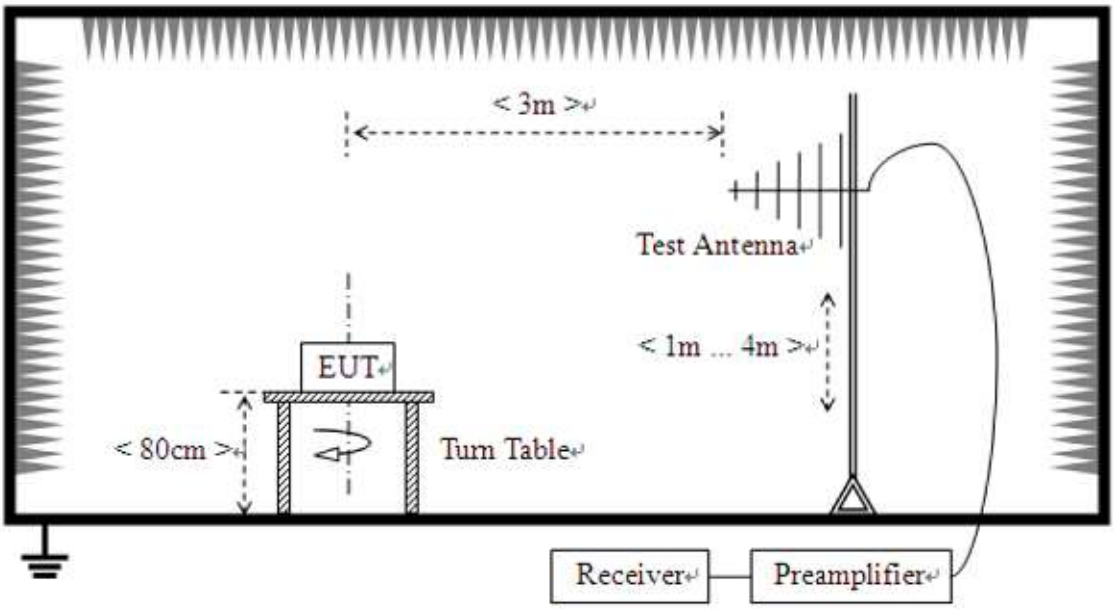
FCC Part 15 Subpart B&C Paragraph 15.109&15.209			
Frequency [MHz]	Field strength [uV/m]	Limit@3m (dBuV/m)	Distance [Meters]
0.009-0.490	2400/F(KHz)	128.5~93.8	300
0.490-1.705	24000/F(KHz)	73.8~63.0	30
1.705-30	30	69.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Note 1: The lower limit shall apply at the transition frequency.
Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
Note 3: E field strength (dBμV/m) = 20 log E field strength (uV/m)

Frequency measured at 9KHz to 30MHz:



Frequency measured at 30MHz to 1000MHz:



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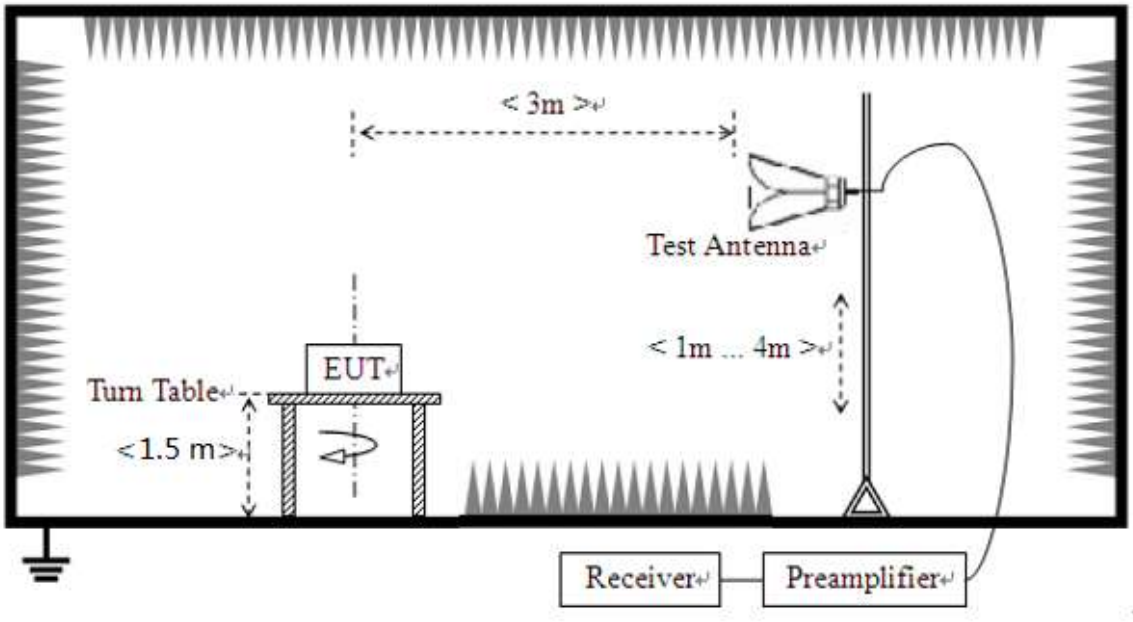
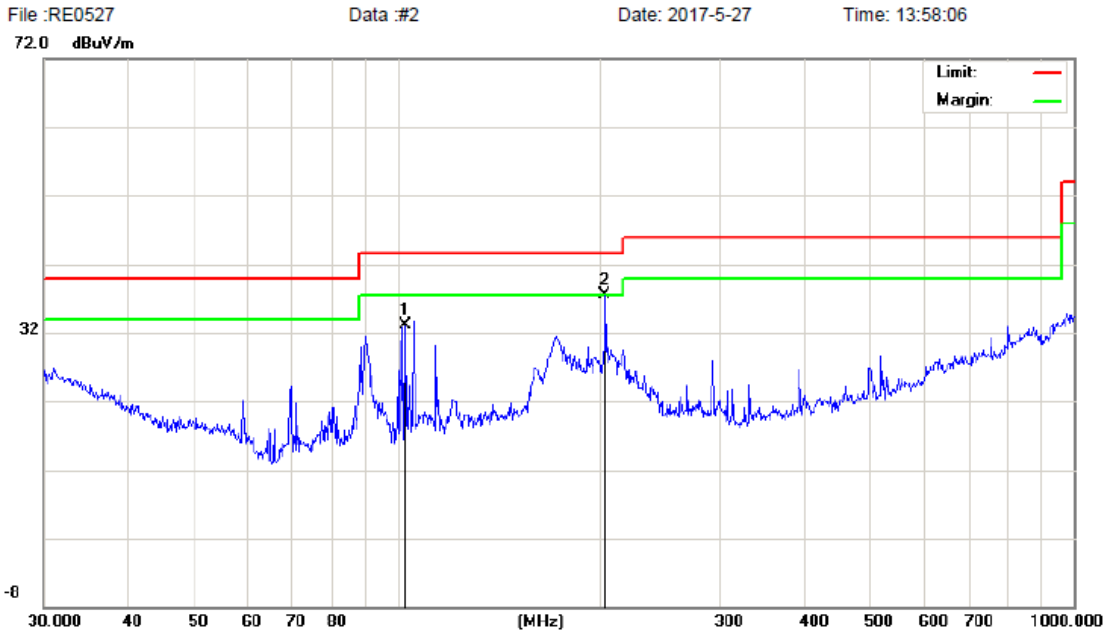
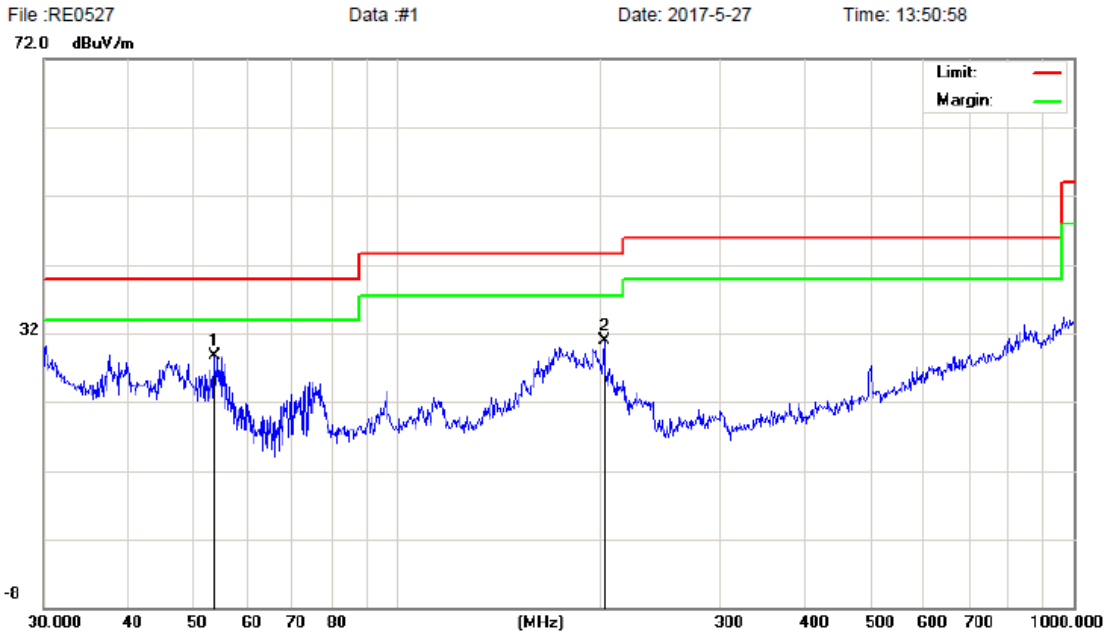
Frequency measured at Above 1GHz:



30-1000MHz:
Mode 1:

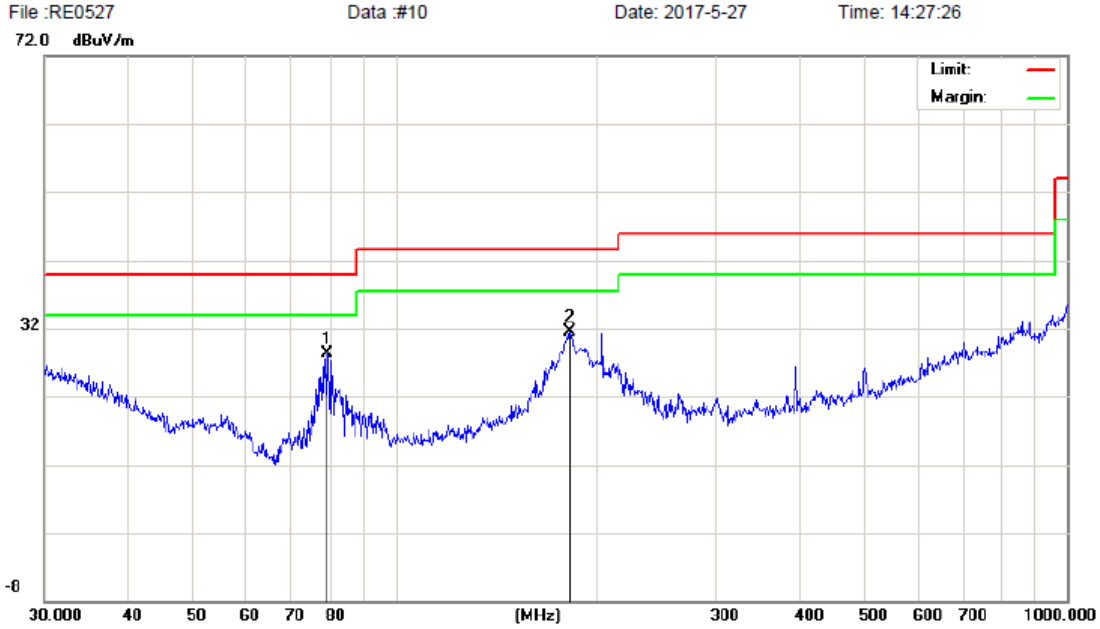


Horizontal: Radiated Emission Test Plot

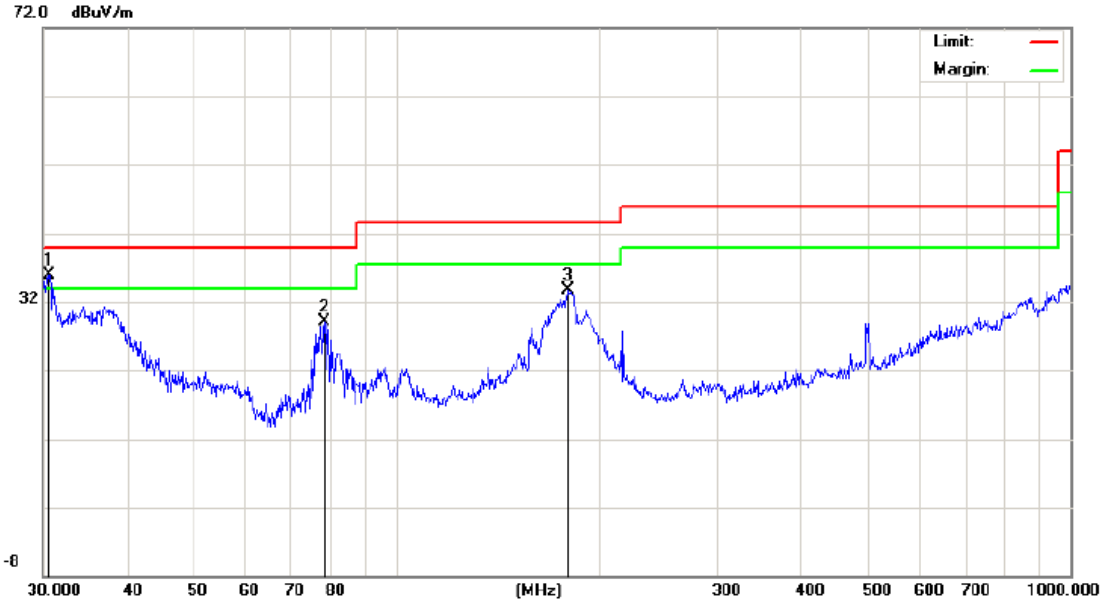


Vertical: Radiated Emission Test Plot

Mode 2:



Horizontal: Radiated Emission Test Plot



Vertical: Radiated Emission Test Plot

Radiated Emission Test Data(30-1000MHz):

Mode 1:

Frequency (MHz)	Polarization (H/V)	Factor (dB)	Reading Level QP (dBuV/m)	Emission Level QP (dBuV/m)	Limit (dBuV/m)	Over Limt (dB)
102.719	H	10.33	22.84	33.17	43.50	-10.33
202.810	H	13.84	23.60	37.44	43.50	-6.06
/	/	/	/	/	/	/
/	/	/	/	/	/	/
53.693	V	12.43	16.31	28.74	40.00	-11.26
202.101	V	13.81	17.03	30.84	43.50	-12.66
/	/	/	/	/	/	/
/	/	/	/	/	/	/

Mode 2

Frequency (MHz)	Polarization (H/V)	Factor (dB)	Reading Level QP (dBuV/m)	Emission Level QP (dBuV/m)	Limit (dBuV/m)	Over Limt (dB)
78.965	H	11.58	16.65	28.23	40.00	-11.77
181.920	H	12.73	18.83	31.56	43.50	-11.94
/	/	/	/	/	/	/
/	/	/	/	/	/	/
30.638	V	20.93	14.99	35.92	40.00	-4.08
78.413	V	11.56	17.46	29.02	40.00	-10.98
/	/	/	/	/	/	/
/	/	/	/	/	/	/

Note:

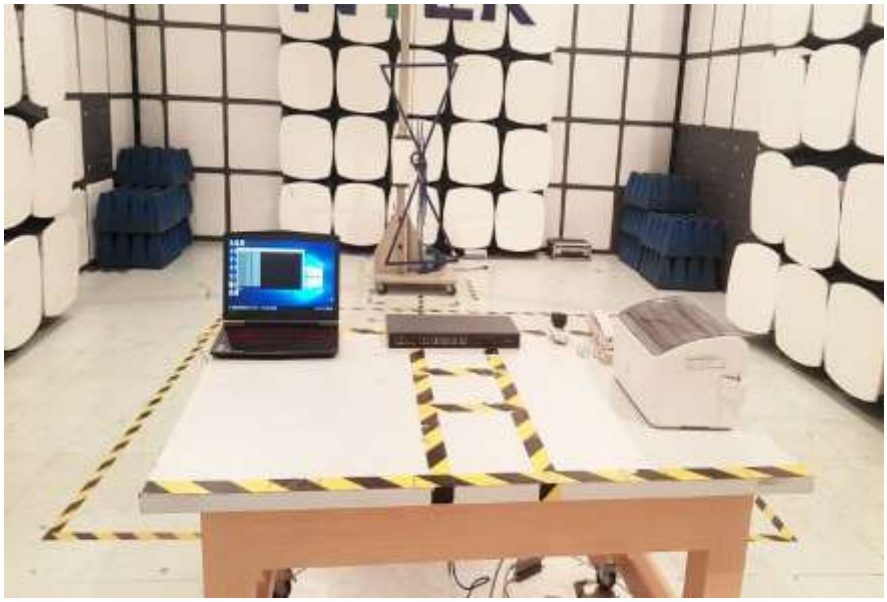
1. *All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 60 s sweep time. A video filter was not used.*
2. *The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Emission Level =Reading Level + Antenna Factor + Cable Loss –Preamplifier Factor.*
3. *The other emission levels are 20dB below the official limits that are not reported.*

Test Equipment List:

Test Equipment	Manufacturer	Model	Cal. Interval	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	1 year	100967	2018.01.04
Loop Antenna	Schwarzbeck	FMZB1519	1 year	1519-037	2018.01.04
Bilog Antenna	Schwarzbeck	CBL6141A	1 year	4180	2018.01.04
Horn Antenna	Schwarzbeck	BBHA 9120D	1 year	647	2018.01.04
Low Noise Pre-Amplifier	HP	8447D	1 year	1937A03050	2018.01.04

TESTED BY: _____ **REVIEWED BY:** _____

ENGINEER **SENIOR ENGINEER**



Radiated Emission Test Set-up(30-1000MHz)

Radiated Emission Test Set-up-Rear View

※※※ End Of Report ※※※