

FCC TEST REPORT**47 CFR FCC Part 15 Subpart B****Report Reference No.**.....: **A1310086032-2****FCC ID**.....: **2ABAB-MC600**

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Date of issue.....: Nov 07, 2013

Representative Laboratory Name : **Shenzhen Tian Hai Test Technology Co.,Ltd**

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Testing Laboratory Name: DTT Services Co.,Ltd

Address: 1F,2 Block, Jiaquan Building, Guanlan High-tech Park, Bao'an District, Shenzhen, Guangdong, China. 518110

Applicant's name.....: **Sumavision Technologies Co., Ltd.**

Address: Sumavision Plaza, No.15, KaiTuo Road, Shangdi Information and Industry Base, Haidian District, Beijing 100085, China

Test specification:Standard: **47 CFR FCC Part 15 Subpart B - Unintentional Radiators**
ANSI C63.4: 2009

TRF Originator.....: Shenzhen Tian Hai Test Technology Co.,Ltd

Master TRF.....: Dated 2012-06

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Test item description: Network set-top box

Trade Mark: sumavision

Model/Type reference.....: MC600

Manufacturer.....: **Shenzhen Zowee Technologies Co., Ltd.**

Rating: DC 5.00V Adapter from AC 120V/60Hz

Result.....: **Positive**

TEST REPORT

Test Report No. :	A1310086032-2	Nov 07, 2013
		Date of issue

Equipment under Test : Network set-top box

Model /Type : MC600

Applicant : **Sumavision Technologies Co., Ltd.**

Address : Sumavision Plaza, No.15, KaiTuo Road, Shangdi
Information and Industry Base, Haidian District, Beijing
100085, China

Manufacturer Shenzhen Zowee Technologies Co., Ltd.

Address : Zowee Factory, Tongfuyu Industrial Zone, Songgang,
Baoan District, Shenzhen, Guangdong, China 518105

Test Result	Positive
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

[47 CFR FCC Part 15 Subpart B](#) - Unintentional Radiators

[ANSI C63.4: 2009](#) – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Oct 22, 2013
Testing commenced on	:	Oct 22, 2013
Testing concluded on	:	Nov 07, 2013

2.2. Product Description

The **Sumavision Technologies Co., Ltd.**'s Model: MC600 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Network set-top box
Model Number	MC600
FCC ID	2ABAB- MC600
WLAN Modulation Type	IEEE 802.11 b:DSSS(CCK,DQPSK,DBPSK) IEEE 802.11 g:OFDM(64QAM,16QAM,QPSK,BPSK) IEEE 802.11 n HT20: OFDM(64QAM,16QAM,QPSK,BPSK) IEEE 802.11 n HT40: OFDM(64QAM,16QAM,QPSK,BPSK)
Antenna Type	Internal
WLAN FCC Operation Frequency	IEEE 802.11 b:2412-2462MHz IEEE 802.11 g: 2412-2462MHz IEEE 802.11 n HT20: 2412-2462MHz IEEE 802.11 n HT40: 2422-2452MHz
WLAN	Supported 802.11b/g/n
Bluetooth	Not Supported

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

DC 5.00V Adapter from AC 120V/60Hz

2.4. Short description of the Equipment under Test (EUT)

2.4GHz (Network set-top box (M/N: MC600))

For more details, refer to the user's manual of the EUT.

2.5. EUT operation mode

The EUT has been tested under typical operating condition.

2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2ABAB-MC600** filing to comply with the FCC Part 15, Subpart B Rules.

2.7. Internal Identification of AE used during the test

AE ID*	Description
AE2	Charger

AE2:

Model: F12W3-050200SPAU

Manufacturer: Shenzhen Frecom Electronics Co.,Ltd.

Input: 100-240V~50/60Hz 0.3A

Output: OUTPUT: 5.0V DC 2A

Power Cable Length: 150cm

☐ Shielded ☒ Unshielded

*AE ID: is used to identify the test sample in the lab internally.

2.8. Modifications

No modifications were implemented to meet testing criteria.

2.9. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

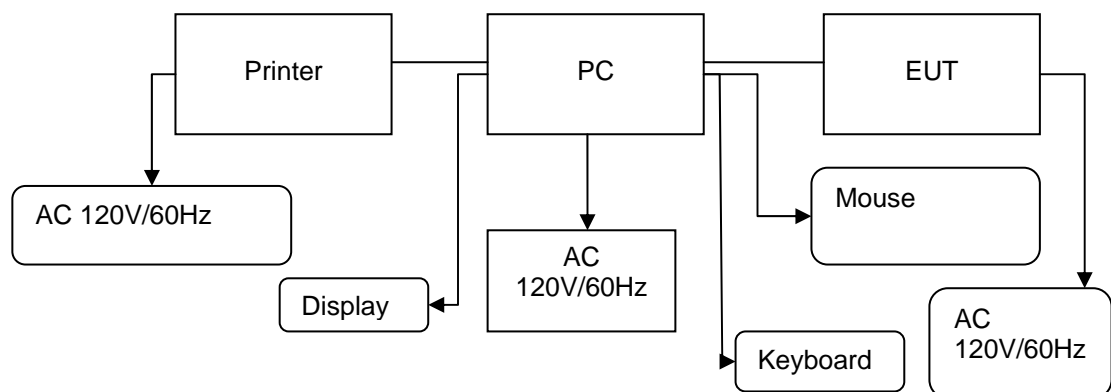
☒ - supplied by the manufacturer

☐ - supplied by the lab

<input type="radio"/>	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
<input type="radio"/>	Multimeter	Manufacturer :	/
		Model No. :	/

2.10. Configuration of Tested System

Configuration of Tested System



Equipment Used in Tested System

No.	Equipment	Manufacturer	Model No.	Serial No.	Notes
1	PC	DELL	PP26L	CNG8390Q6X	DOC
2	Printer	HP	Laserjet 6L C3990	Laserjet 6L C3990A	DOC
3	Mouse	DELL	OPTICAL MOUSE	/	DOC

4	Keyboard	DELL	KB212-B	/	DOC
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Printer USB Cable*1	Shield :	Shielded
	Detachable :	Detachable
	Length (m) :	1.8m
Network Cable*1	Shield :	Unshielded
	Detachable :	Detachable
	Length (m) :	2.0m
Main Cable for PC Adaptor Line*1	Shield :	Shielded
	Detachable :	Detachable
	Length (m) :	1.0m
Adaptor Cable from PC*1	Shield :	Unshielded
	Detachable :	Detachable
	Length (m) :	1.5m
Main Cable for Printer*1	Shield :	Unshielded
	Detachable :	Detachable
	Length (m) :	1.5m
HDMI Cable	Shield :	Shielded
	Detachable :	Detachable
	Length (m) :	1.5m
AV Cable	Shield :	Shielded
	Detachable :	Detachable
	Length (m) :	1.5m

2.11. NOTE

1. The EUT is a Network set-top box with WLAN fuction, The functions of the EUT listed as below:

	Test Standards	Reference Report
WLAN	FCC Part 15 C 15.247	A1310086032-1
USB Port	FCC Part 15 B	A1310086032-2
MPE	FCC Part 2 §2.1091	A1310086032-3

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

DTT Services Co.,Ltd
1F,2 Block, Jiaquan Building, Guanlan High-tech Park, Bao'an District, Shenzhen, Guangdong, China.
518110

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

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

IC Registration No.: 9783A

The 3m alternate test site of DTT Services Co.,Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Aug, 2011.

FCC-Registration No.: 214666

DTT Services Co.,Ltd 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 214666, Sep 19, 2011

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the DTT Services Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for DTT Services Co.,Ltd is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24 dB	(1)
Radiated Emission	1~18GHz	5.16 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.39 dB	(1)

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

3.5. Equipments Used during the Test

AC Power Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2013/4/23
2	EMI Test Receiver	Rohde&Schwarz	ESCI	100106	2013/4/23
3	Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2013/4/23
4	EMI Test Software	Audix	E3	N/A	N/A

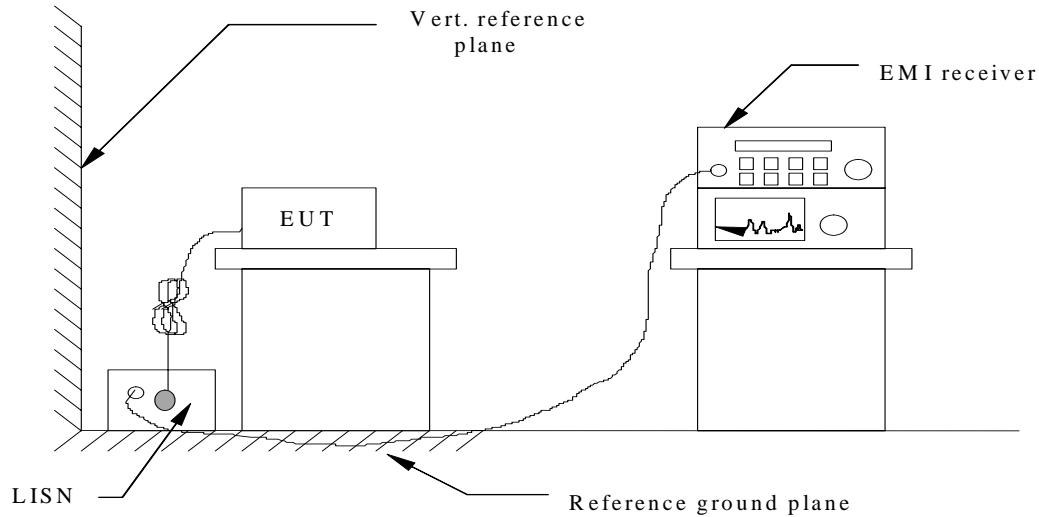
Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2013/4/23
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2013/4/23
3	EMI TEST Software	Audix	E3	N/A	2013/4/23
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
7	HORN ANTENNA	ShwarzBeck	9120D	1011	2013/4/23
8	Amplifer	Sonoma	310N	E009-13	2013/4/23
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2013/4/23
10	High pass filter	Compliance Direction systems	BSU-6	34202	2013/4/23
11	HORN ANTENNA	ShwarzBeck	9120D	1012	2013/4/23
12	Amplifer	Compliance Direction systems	PAP1-4060	120	2013/4/23
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2013/4/23
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2013/4/23
17	HORN ANTENNA	Rohde&Schwarz	HF906	100039	2013/4/23
18	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2013/4/23
19	EMI Test Software	Audix	E3	N/A	N/A

The calibration interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST CONFIGURATION



TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4-2009.
2. Support equipment, if needed, was placed as per ANSI C63.4-2009.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2009.
4. The EUT received DC 5.0 from USB powered from AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

CONDUCTED POWER LINE EMISSION LIMIT

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

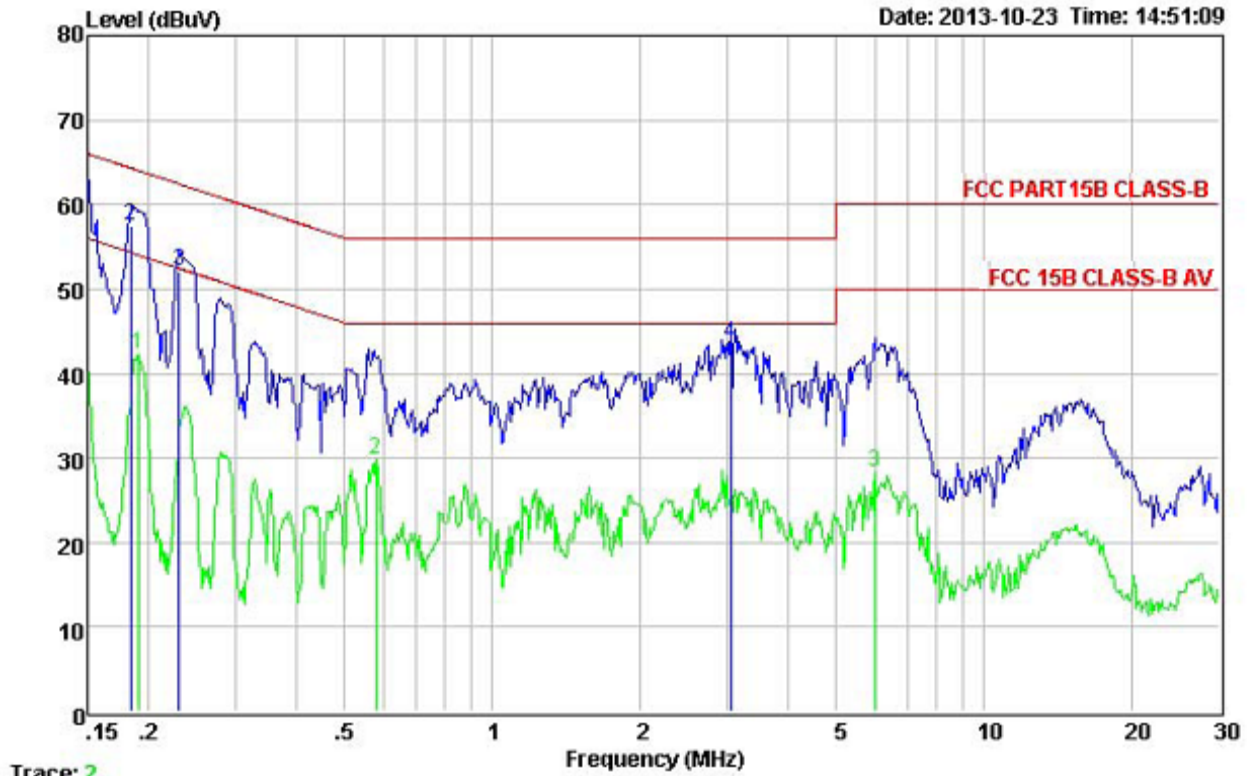
TEST RESULTS

Line

Data: 1

File: E:\Test Data\G\GS\2013.10.23.EM6 (4)

Date: 2013-10-23 Time: 14:51:09



	Read Freq	Level	Factor	Level	Limit Line	Over Limit	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.15	51.96	9.94	61.90	66.00	-4.10	9.86	0.08	QP
2	0.18	47.64	9.90	57.54	64.33	-6.79	9.85	0.05	QP
3	0.23	42.16	9.88	52.04	62.44	-10.40	9.84	0.04	QP
4	3.04	32.99	10.50	43.49	56.00	-12.51	9.85	0.65	QP

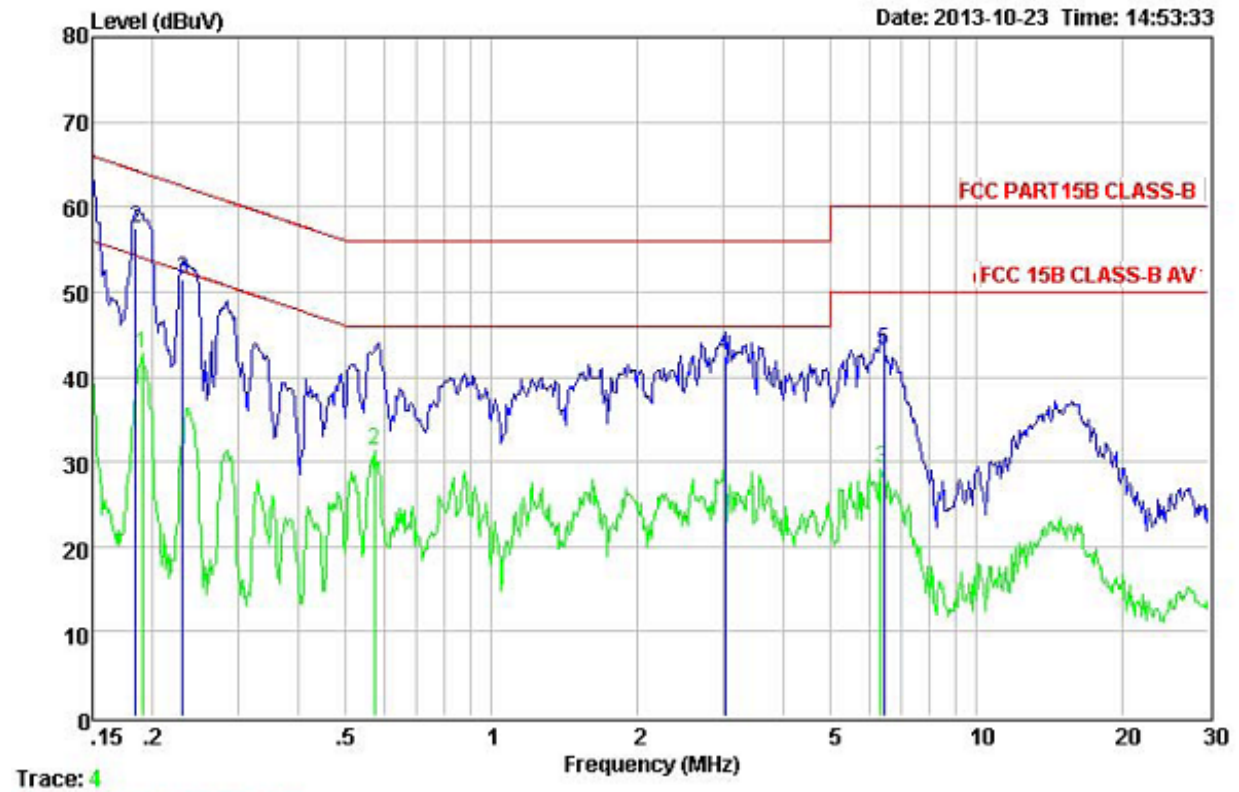
	Read Freq	Level	Factor	Level	Limit Line	Over Limit	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.19	32.37	9.89	42.26	54.02	-11.76	9.84	0.05	Average
2	0.58	19.80	9.93	29.73	46.00	-16.27	9.81	0.12	Average
3	5.99	17.68	10.58	28.26	50.00	-21.74	9.88	0.70	Average

Neutral

Data: 3

File: E:\Test Data\G\GS\2013.10.23.EM6 (4)

Date: 2013-10-23 Time: 14:53:33



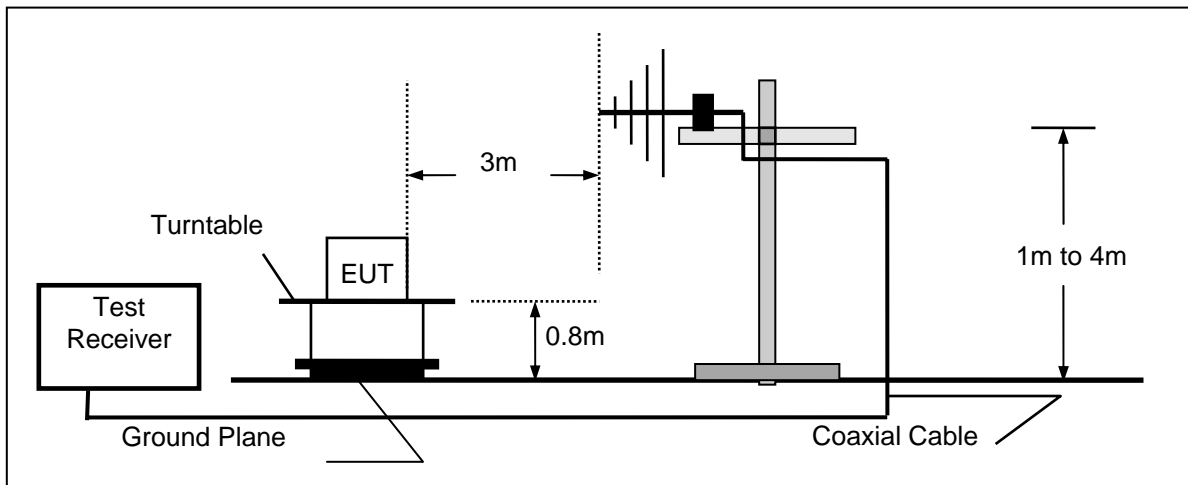
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.15	51.65	9.86	61.51	66.00	-4.49	9.78	0.08	QP
2	0.18	47.64	9.84	57.48	64.28	-6.80	9.79	0.05	QP
3	0.23	41.68	9.84	51.52	62.44	-10.92	9.80	0.04	QP
4	3.03	31.96	10.50	42.46	56.00	-13.54	9.85	0.65	QP
5	6.42	32.54	10.59	43.13	60.00	-16.87	9.88	0.71	QP

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.19	32.73	9.85	42.58	54.02	-11.44	9.80	0.05	Average
2	0.57	21.30	9.95	31.25	46.00	-14.75	9.83	0.12	Average
3	6.35	18.54	10.59	29.13	50.00	-20.87	9.88	0.71	Average

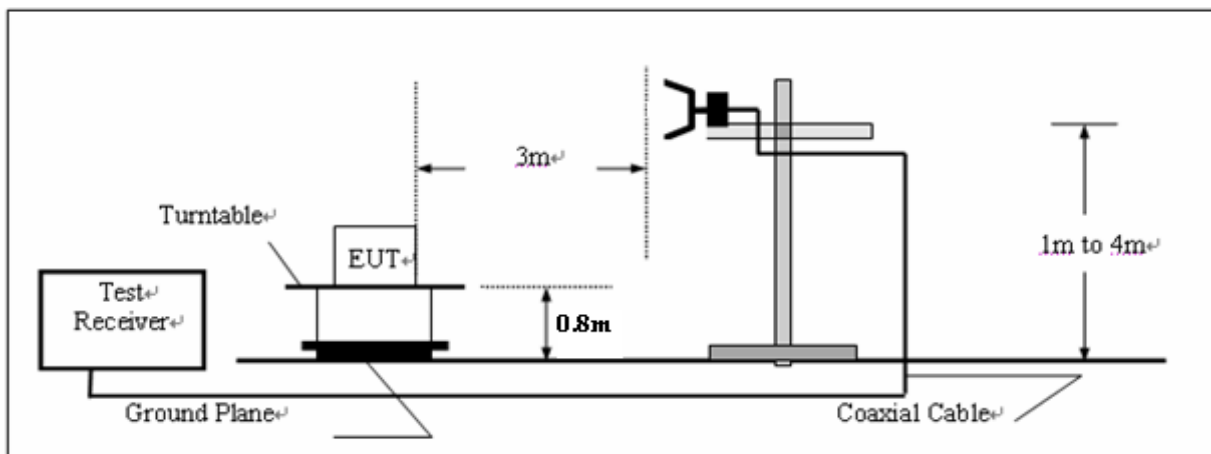
4.2. Radiated Emission Test

TEST CONFIGURATION

a) Radiated Emission Test Set-Up, Frequency below 1000MHz



b) Radiated Emission Test Set-Up, Frequency above 1000MHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The maximum operation frequency was 512MHz, the radiated emission test frequency from 30MHz to 6GHz.

FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

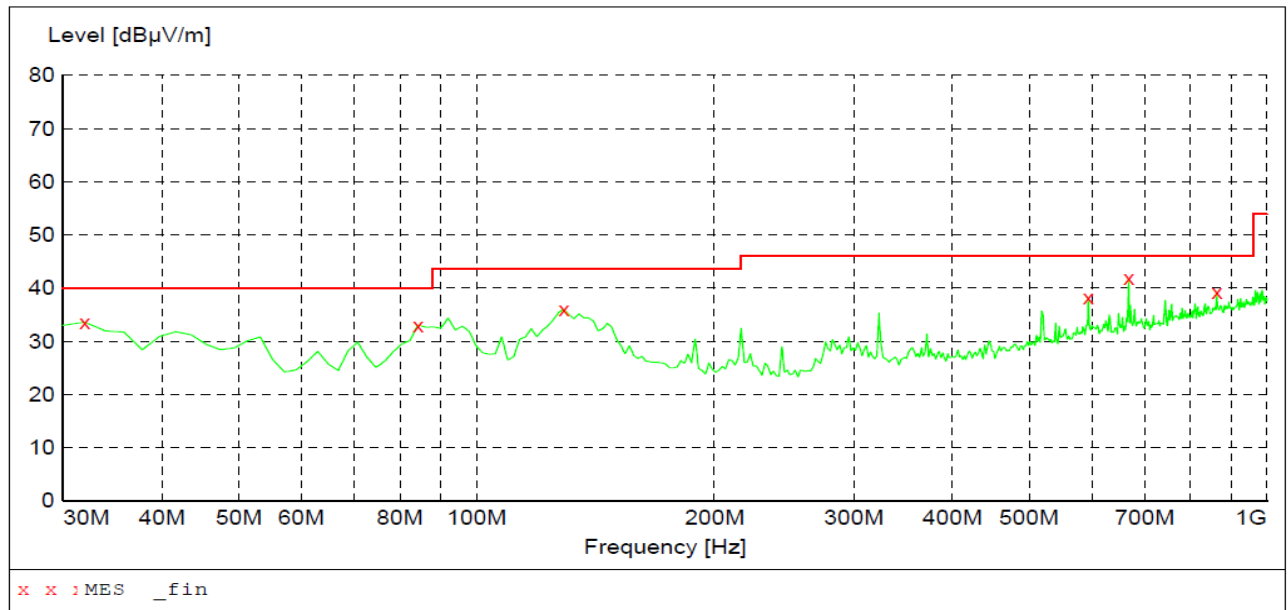
$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

RADIATION LIMIT

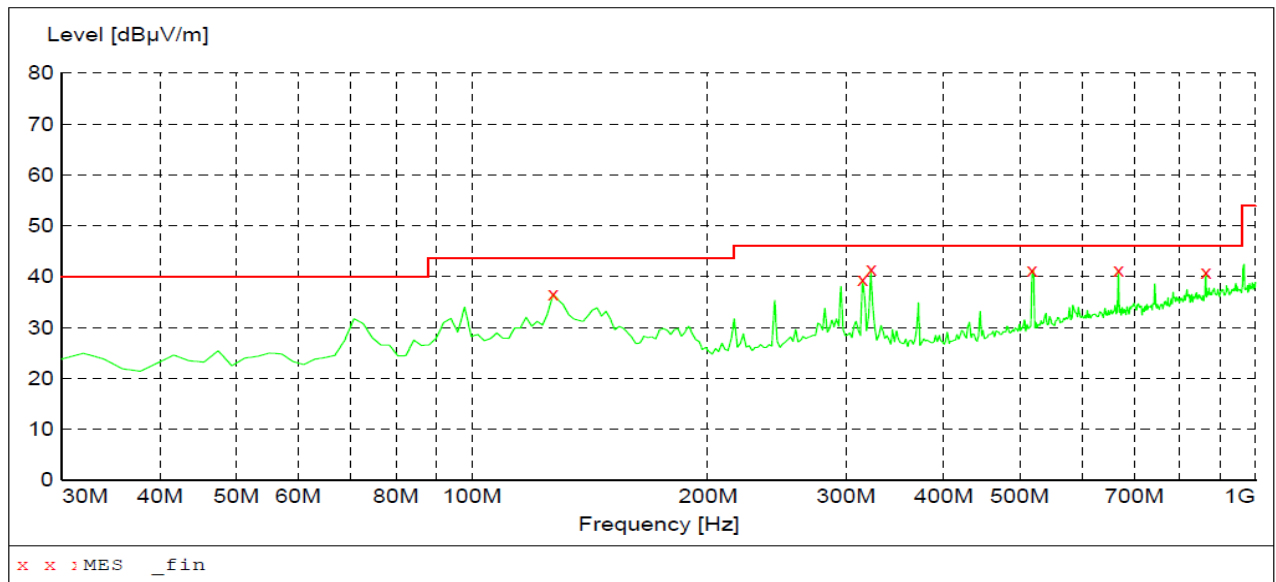
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

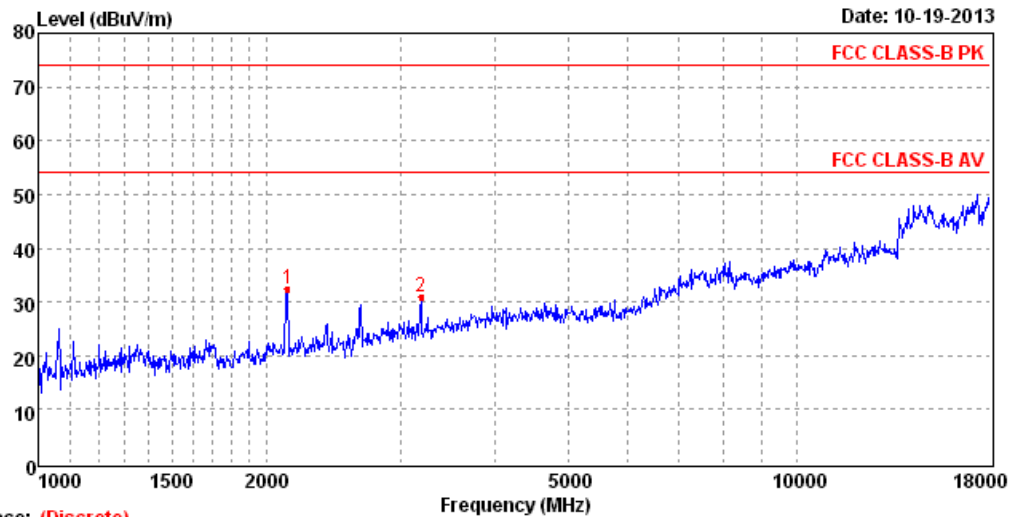
Vertical**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	33.60	14.4	40.0	6.4	QP	100.0	15.00	VERTICAL
84.320000	33.00	14.1	40.0	7.0	QP	100.0	124.00	VERTICAL
128.940000	36.00	13.9	43.5	7.5	QP	100.0	60.00	VERTICAL
594.540000	38.20	26.3	46.0	7.8	QP	100.0	238.00	VERTICAL
668.260000	41.80	27.2	46.0	4.2	QP	100.0	325.00	VERTICAL
864.200000	39.30	30.6	46.0	6.7	QP	100.0	75.00	VERTICAL

Horizontal**MEASUREMENT RESULT:**

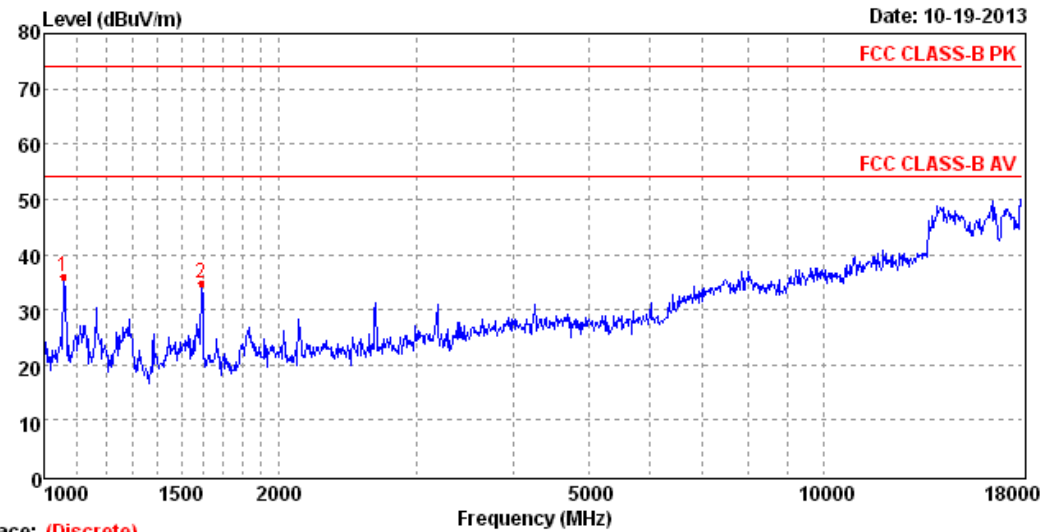
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
127.000000	36.60	14.1	43.5	6.9	QP	300.0	25.00	HORIZONTAL
315.180000	39.40	19.1	46.0	6.6	QP	100.0	30.00	HORIZONTAL
322.940000	41.50	19.3	46.0	4.5	QP	100.0	125.00	HORIZONTAL
518.880000	41.30	24.4	46.0	4.7	QP	100.0	350.00	HORIZONTAL
668.260000	41.20	27.2	46.0	4.8	QP	100.0	272.00	HORIZONTAL
864.200000	40.80	30.6	46.0	5.2	QP	100.0	105.00	HORIZONTAL

Data: 236



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2132.46	32.45	-5.58	38.03	74.00	41.55	HORIZONTAL	Peak
2	3196.09	31.03	-2.80	33.83	74.00	42.97	HORIZONTAL	Peak

Data: 240



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	1059.51	36.02	-9.83	45.85	74.00	37.98	VERTICAL	Peak
2	1592.57	34.86	-8.38	43.24	74.00	39.14	VERTICAL	Peak

5. Test Setup Photos of the EUT

Conducted Emission (AC Mains)



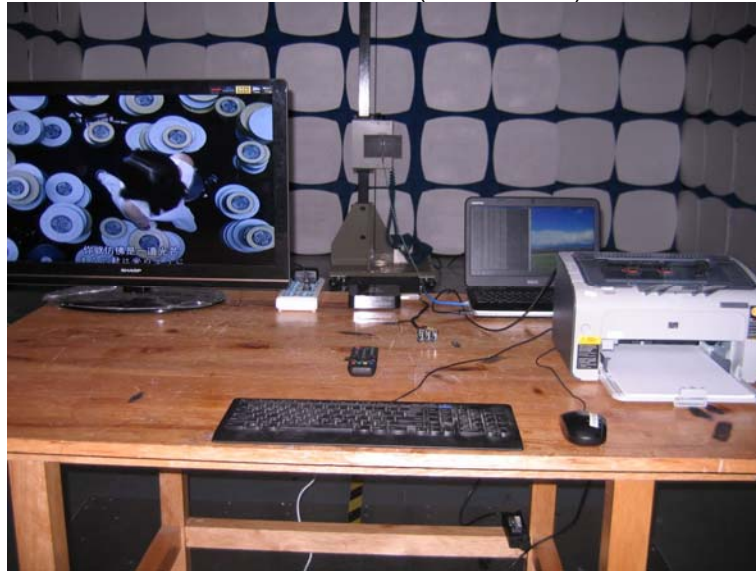
Radiated Emission (30MHz-1GHz)



Radiated Emission (30MHz-1GHz)

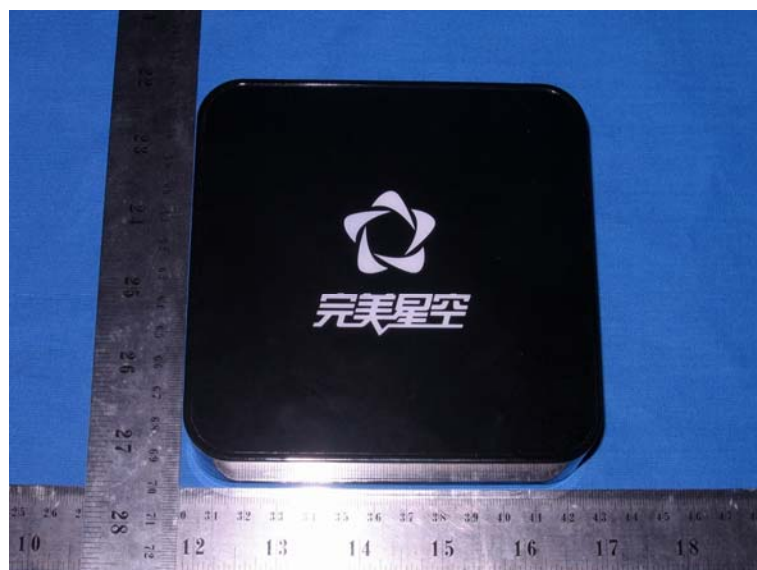


Radiated Emission (above 1GHz)



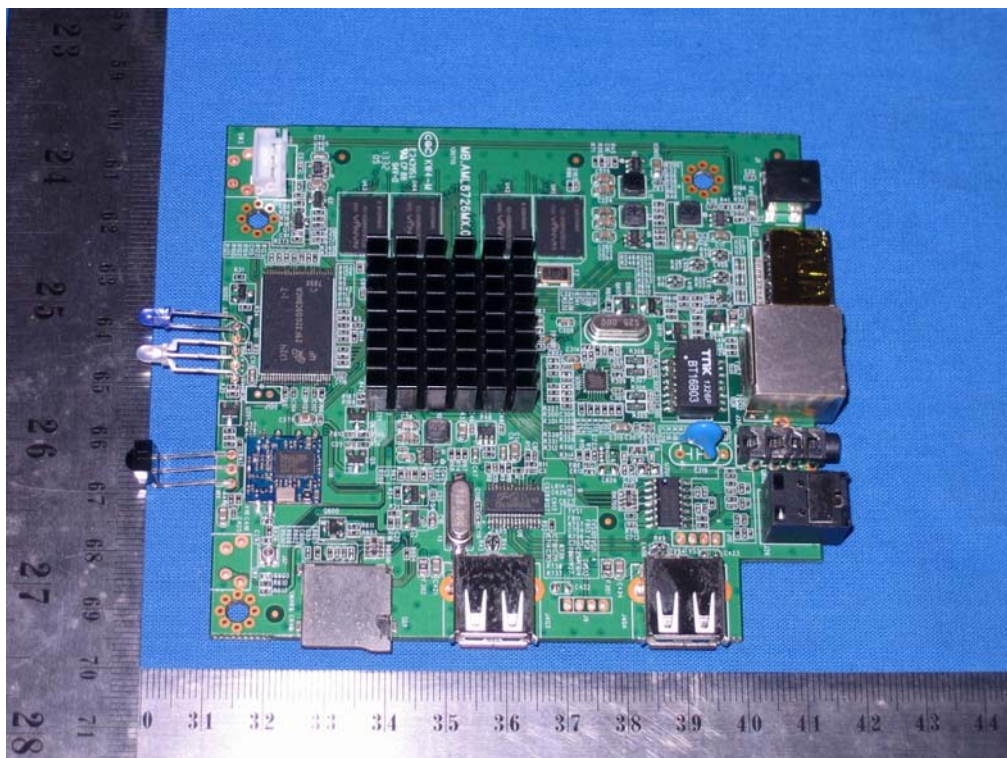
6. External and Internal Photos of the EUT

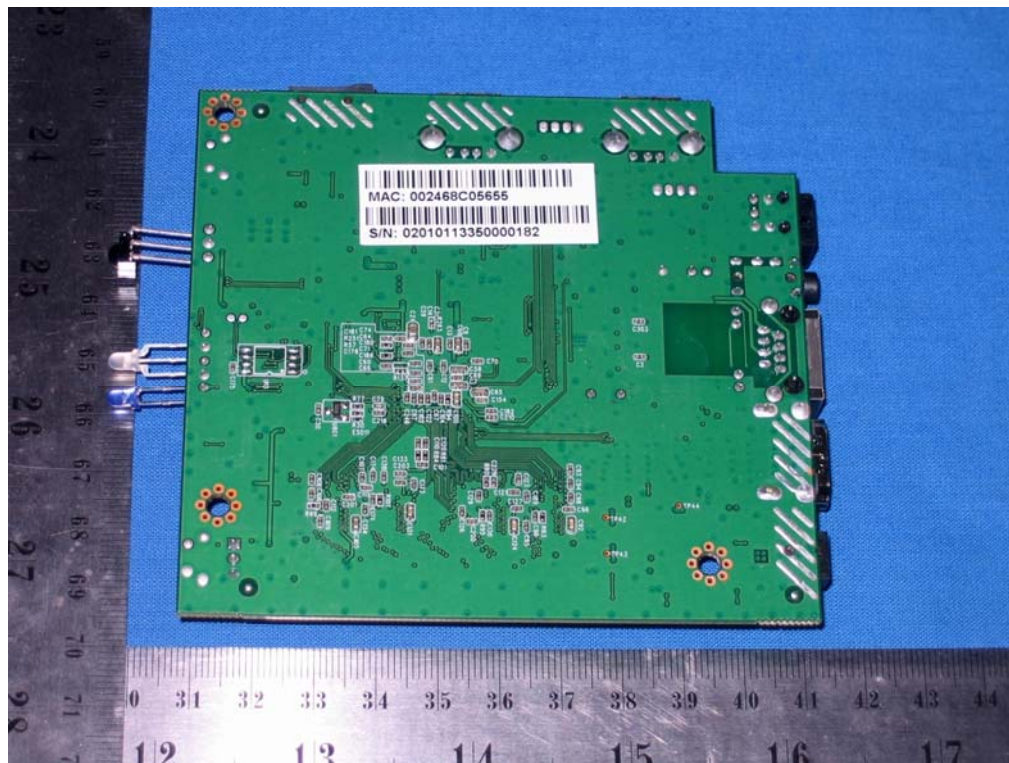
External photos of the EUT







Internal photos of the EUT



.....End of Report.....