FCC PART 15 CLASS B

MEASUREMENT AND TEST REPORT

For

UTStarcom Inc.

1732 N，First Street，Suit 220，San Jose，CA

FCC ID: 2ACKN-MSG2000

Model Number: MSG2000

This Report Concerns:	Equipment Type:
Original Report	Multi-Service Gateway

Test Engineer:	Wei Fan
Report Number:	RSC140729001
Report Date:	2014-09-03
Reviewed By:	Harry Wu EMC Leader
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **UTStarcom Inc.**'s product, model number: **MSG2000 (FCC ID: 2ACKN-MSG2000**) or the "EUT" as referred to in this report was the **Multi-Service Gateway,** which has the plastic enclosure. The highest operating frequency was 1000 MHz.

EUT – mainboard:
Manufacturer: Continuous Computing
Model Number: ATCA-PP50
P/N: CJD-26021

EUT – Power Supply:
Manufacturer: EMERSON
Model Number: AA26070L
P/N: 0106875F02A

Mechanical Description of EUT

The EUT was measured approximately 483mm L x 415mm W x 131mm H.

Rated input voltage: AC120V/60Hz.

** All measurement and test data in this report were gathered from final production sample, serial number: 4062014070300001 (Assigned by the applicant), It may have deviation from other sample. The EUT supplied by the applicant was received on 2014-07-24, and the EUT was complied with test requirement.*

Objective

The following Class B report was prepared on behalf of **UTStarcom Inc.**, in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC Part 15 Class B limits.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report are conducted with ANSI C63.4-2003, 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 40 GHz. All radiated and conducted emissions measurement is performed at BACL. The radiated testing is performed at an antenna-to-EUT distance of 3 Meters.

Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on July 31, 2009. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system is configured for testing in a typical fashion (as a normally used by a typical user).

EUT Exercise Software

Wind River Linux PNE
• RMI Operating System (Native C-based OS for fast path)
• Network and routing protocols including fast path and slow path functions
- Includes IPv4/6 forwarding, IPSEC, Tunneling, GRE, etc.

Special Accessories

No special accessories were supplied by BACL.

Equipment Modifications

No modification to the EUT was made by BACL to make sure the EUT comply with applicable limits.

Equipment under Test (EUT) General Description

Applicant	Description	Model Number	Serial Number
UTStarcom Inc.	Multi-Service Gateway	MSG2000	4062014070300001

Local Support Equipment List and Details

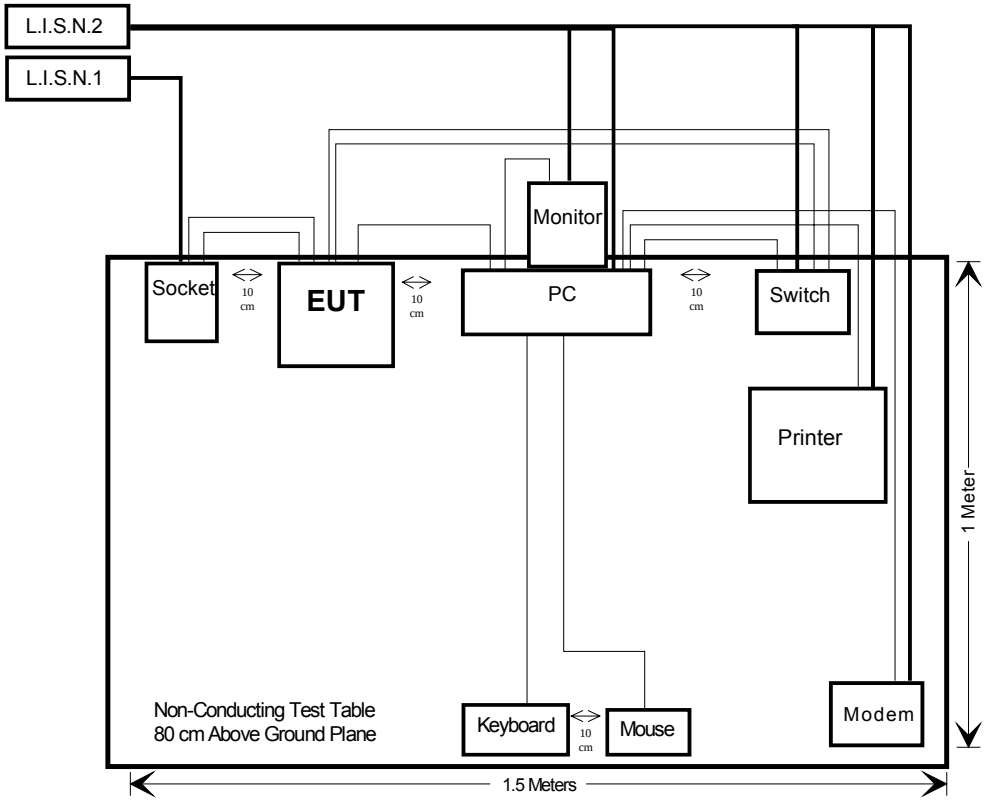
Manufacturer	Description	Model Number	Serial Number	Grants
DELL	PC	0T7570	45585329139	DOC
DELL	Monitor	E157FPb	CN-OWH339-74261-894-3LOU	DOC
ANTEK	Modem	EGW-802	05083500	DOC
Genius	Keyboard	KM-110X	XBK133000993	DOC
Genius	Mouse	Netscroll 120	33C83137305720	DOC
ESPON	Printer	STYLUS PHOTO 700	A2U0002196	DOC
TP-LINK	Switch	TL-SE1024D	12825402459	DOC

External I/O Cable

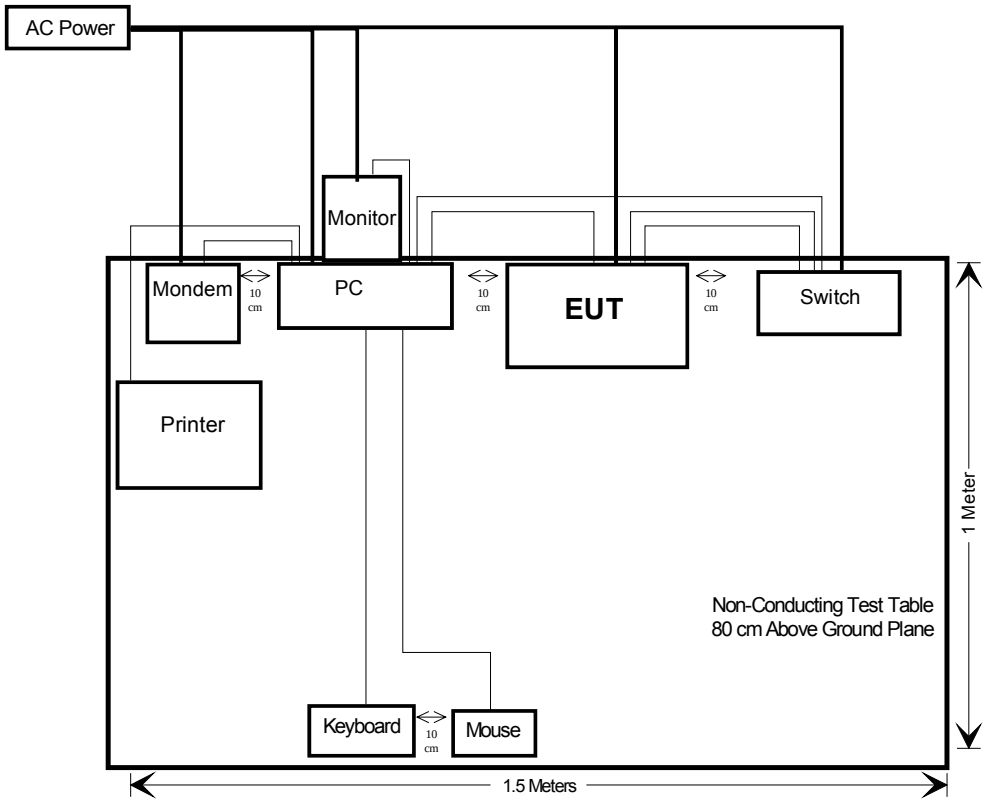
Cable Description	Length (m)	From	To
VGA Cable	1.5	PC/VGA Port	Monitor/VGA Port
USB Cable	1.5	PC / USB Port	Keyboard
USB Cable	1.5	PC/ USB Port	Mouse
RS232 Cable	1.5	PC/ RS232 Port	Modem/ RS232 Port
Parallel Cable	1.5	PC/ Parallel Port	Printer/ Parallel Port
RS232 Cable	3.75	PC RS232 Port	EUT/ USB Port
RJ45 Cable	1	PC/ RJ45 Port	Switch/ RJ45 Port
RJ45 Cable*2	1	EUT/ RJ45 Port	Switch/ RJ45 Port

Block Diagram of Test Setup

Conducted emission:



Radiated emission:



SUMMARY OF TEST RESULTS

Standard	Description	Result
FCC §15.107	Conducted Emission	Compliance
FCC §15.109	Radiated Emission	Compliance

FCC §15.107 CONDUCTED EMISSION TEST

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. The factors contributing to uncertainties are EMI Test Receiver, cable loss, and L.I.S.N.

Based on CISPR 16-4-2, the Treatment of Uncertainty in EMI Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Chengdu) is ±3.17 dB.

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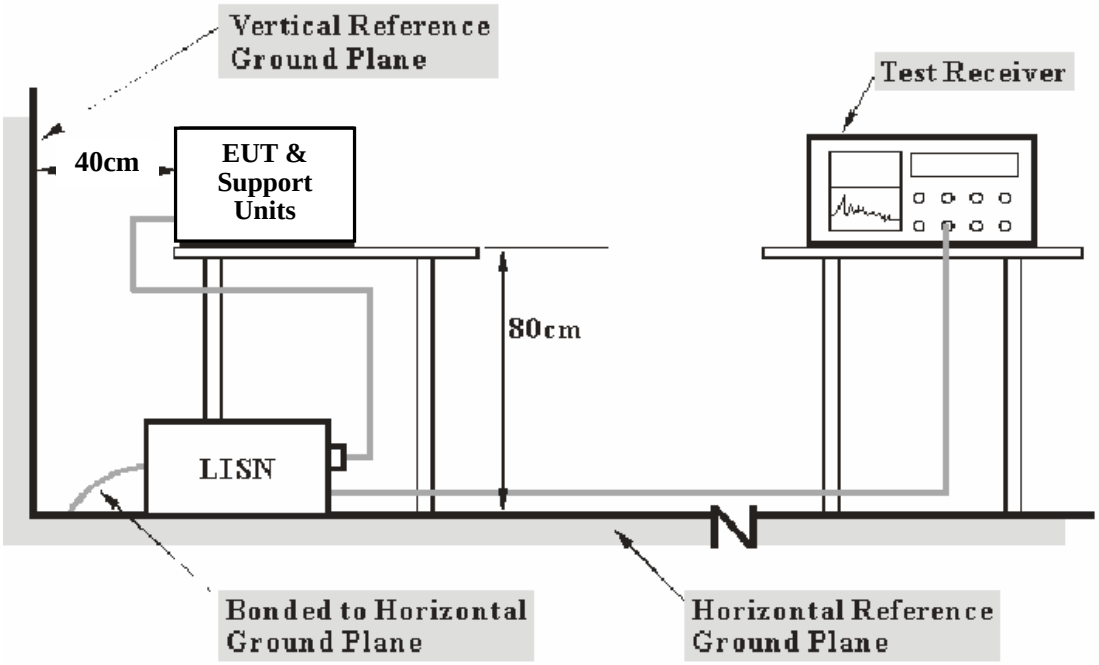
EUT Setup

The setup of EUT was in accordance with ANSI C63.4-2003 measurement procedure. The specification used was the FCC Part 15 Class B limits.



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The power cables and excess cables shall be folded at the cable center into a bundle no longer than 40 cm.

The spacing between the peripherals unit & EUT was 10 cm.

AC 120V/60Hz power source was provided to EUT.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	***IF B/W***
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data are recorded in the Quasi-peak and Average detection mode. Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with an "**AV**".

The EUT is in the normal operating mode during the final qualification test to represent the worst cases results.

Test Equipment List and Details

Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
EMI Test Receiver	Rohde & Schwarz	ESCS 30	836858/0016	2014-06-23	2015-06-22
L.I.S.N.	Rohde & Schwarz	ENV216	3560.6550.06	2014-06-23	2015-06-22
AMN	Rohde & Schwarz	ENV216	3560.6550.12	2014-02-08	2015-02-07

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Environment Conditions

Temperature:	21°C
Relative Humidity:	55%
ATM Pressure:	101.1 kPa

The testing was performed by Wei Fan on 2014-08-18

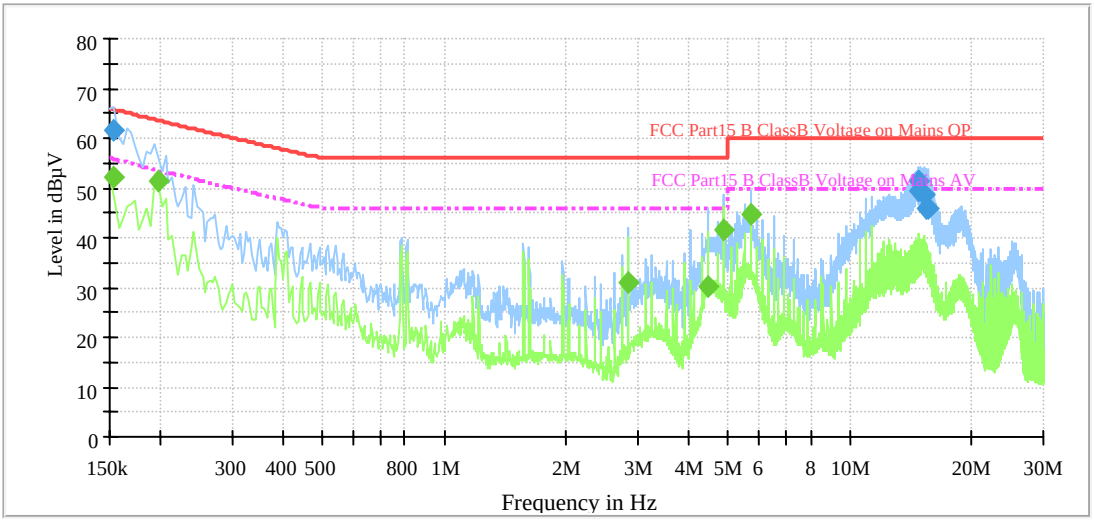
Summary of Test Results

According to the data in the following, the EUT complied with the FCC Part 15 for a Class B device, with the *worst* margin reading of:

2.2 dB at **0.197000 MHz** in the **L1** conductor mode

Conducted Emission Test Data and Plots

AC 120V/60Hz .L1

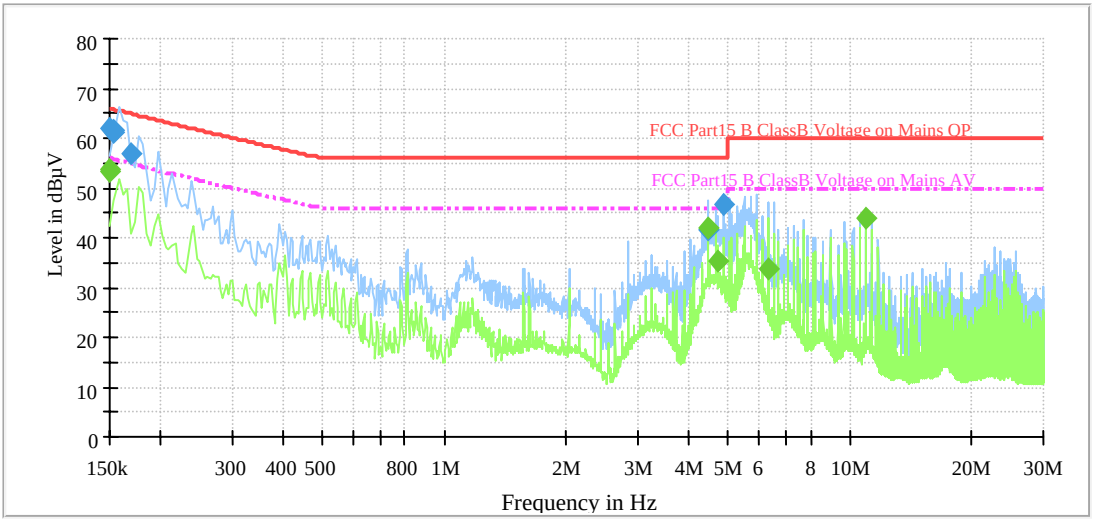


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	61.7	9.000	Off	L1	9.7	4.1	65.8
14.789000	51.2	9.000	Off	L1	10.5	8.8	60.0
14.849000	49.2	9.000	Off	L1	10.5	10.8	60.0
15.245000	48.6	9.000	Off	L1	10.5	11.4	60.0
15.447000	46.0	9.000	Off	L1	10.5	14.0	60.0
15.649000	45.8	9.000	Off	L1	10.5	14.2	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	52.0	9.000	Off	L1	9.7	3.8	55.8
0.197000	51.4	9.000	Off	L1	9.8	*2.2	53.6
2.845000	31.0	9.000	Off	L1	10.4	15.0	46.0
4.465000	30.3	9.000	Off	L1	10.4	15.7	46.0
4.877000	41.5	9.000	Off	L1	10.4	4.5	46.0
5.689000	44.6	9.000	Off	L1	10.4	5.4	50.0

* Within Measurement Uncertainty

120 V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	62.0	9.000	Off	N	9.7	4.0	66.0
0.153000	61.6	9.000	Off	N	9.7	4.2	65.8
0.154000	61.1	9.000	Off	N	9.7	4.7	65.8
0.169000	56.8	9.000	Off	N	9.7	8.1	64.9
4.465000	41.7	9.000	Off	N	10.4	14.3	56.0
4.877000	46.8	9.000	Off	N	10.4	9.2	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV
0.150000	53.5	9.000	Off	N	9.7	*2.5	56.0
0.153000	53.4	9.000	Off	N	9.7	*2.4	55.8
4.465000	41.8	9.000	Off	N	10.4	4.2	46.0
4.709000	35.2	9.000	Off	N	10.4	10.8	46.0
6.285000	33.7	9.000	Off	N	10.3	16.3	50.0
10.997000	44.0	9.000	Off	N	10.3	6.0	50.0

* Within Measurement Uncertainty

FCC §15.109 RADIATED EMISSION TEST

Measurement Uncertainty

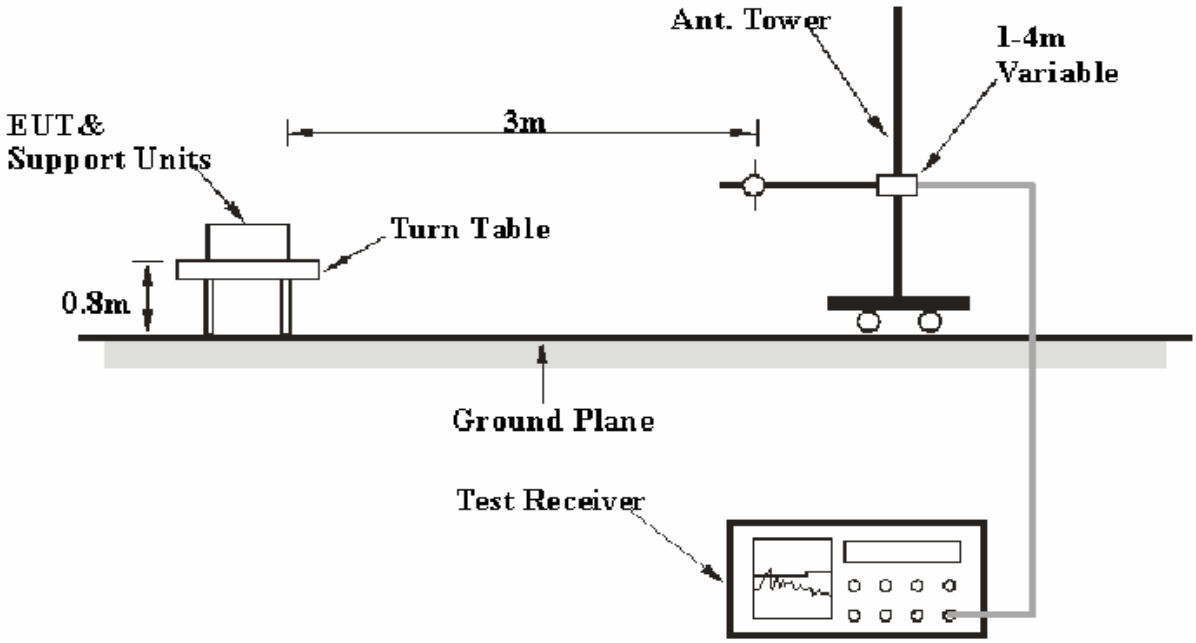
All measurements involve certain levels of uncertainties, especially in the field of EMI. The factors contributing to uncertainties are EMI Test Receiver, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2, the Treatment of Uncertainty in EMI Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is 30M~200MHz: ±4.7 dB ; 200M~1GHz: ±6.0 dB ; 1G-6GHz: ±5.13dB.

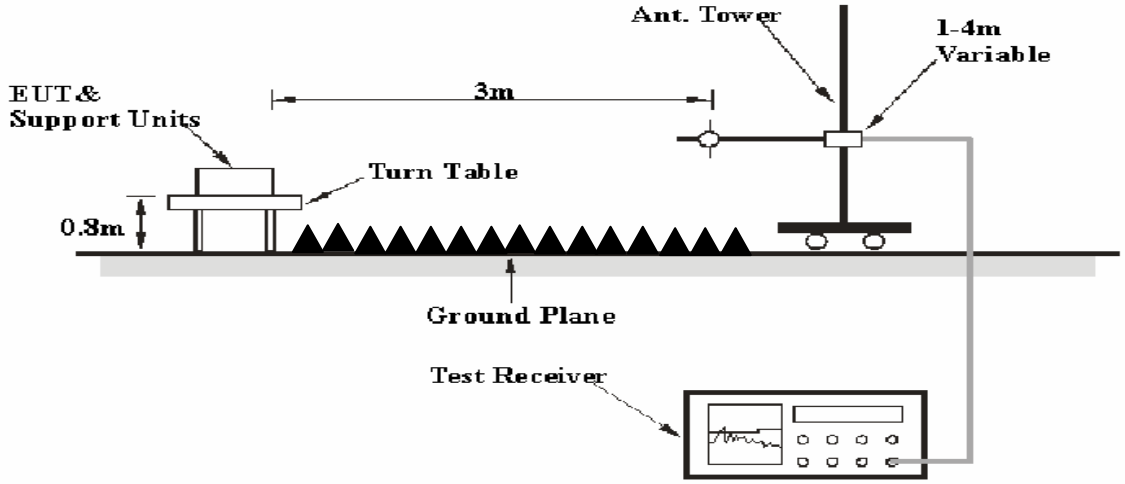
EUT Setup

The radiated emission tests were performed in the 3 meter Semi Anechoic Chamber, using the setup in accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 Class B limits.

Below 1GHz:



Above 1GHz:



The excess cables shall be folded at the cable center into a bundle no longer than 40 cm.

The spacing between the peripherals unit & EUT was 10 cm.

AC 120V/60Hz power source was provided to EUT.

EMI Test Receiver Setup

According to FCC Rules, the highest frequency in the device is 1000 MHz, so the frequency range to be tested from 30 MHz to 5000 MHz.

During the radiated emission test, the EMI test receiver is set with the following configurations:

Frequency	***RB/W***	***VB/W***	***IF B/W***	***Detector***
30 MHz-1 GHz	120 kHz	300 kHz	120 kHz	Quasi-peak
Above 1 GHz	1 MHz	3 MHz		Peak
	1 MHz	10 Hz		Average

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data were recorded in the quasi-peak detection mode.

The EUT was in the normal operating mode during the final qualification test to represent the worst case results.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7 dBμV/m below the maximum limit for FCC Part 15 Class B. The equation for margin calculation is as follows:

Margin = FCC Part 15 Class B Limit – Corr. Ampl.

Test Equipment List and Details

Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
Amplifier	Agilent	8447D	2944A10442	2014-06-23	2015-06-22
EMI Test Receiver	Rohde & Schwarz	ESCI	100028	2014-06-23	2015-06-22
Broadband Antenna	Sunol Sciences	JB3	A101808	2013-04-10	2015-04-09
Semi-Anechoic Chamber	EMCT	966	N/A	2013-03-13	2016-03-12
Spectrum Analyzer	Rohde & Schwarz	FSL18	100180	2014-06-23	2015-06-22
Horn Antenna	EM TEST	3115	003-6076	2013-04-09	2015-04-08
Amplifier	HP	8449B	3008A00277	2014-06-23	2015-06-22

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Software

Description	Manufacturer	Version
EMC32	R&S	V 8.52.0

Summary of Test Results

According to the data in the following, the EUT complied with the FCC Part 15 Class B standards, and had the worst margin of:

4.2 dB at **43.417500 MHz** in the **Vertical** polarization for Normal Operating Mode, 30 MHz to 1000 MHz, 3 meters

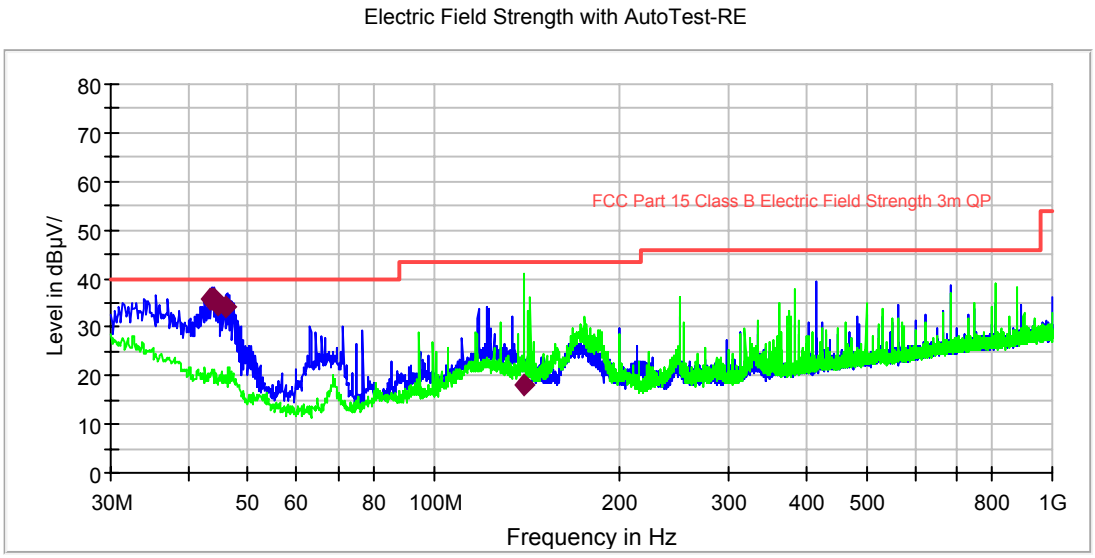
Radiated Emission Test Data

Test Environment Conditions

Temperature:	22°C
Relative Humidity:	55%
ATM Pressure:	101.1 kPa

The testing was performed by Wei Fan on 2014-08-18.

Below 1 GHz:

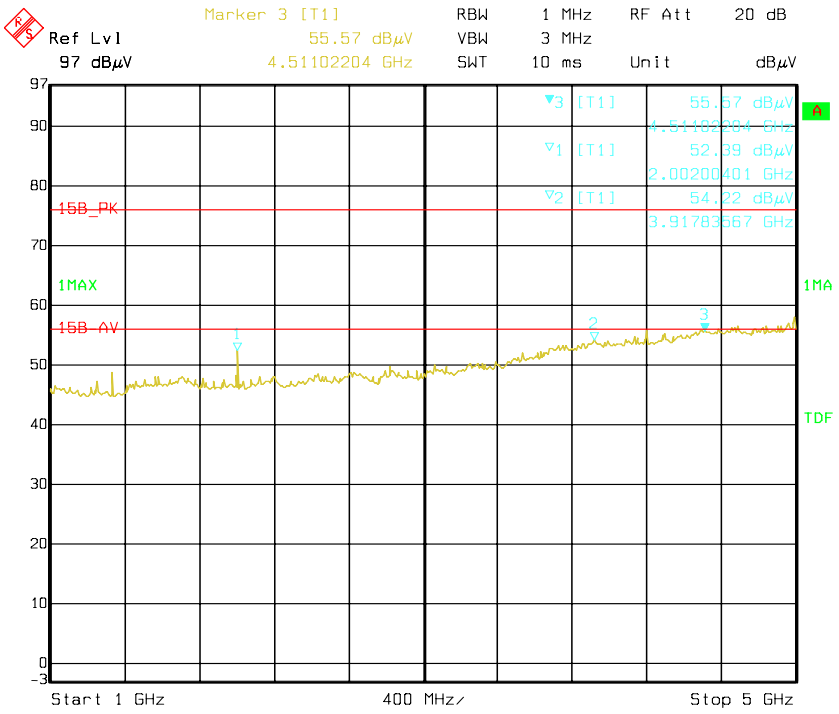


Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
43.417500	35.8	200.0	120.000	100.0	V	-14.4	4.2*	40.0
43.822500	35.8	200.0	120.000	125.0	V	-14.7	4.2*	40.0
44.186250	35.6	200.0	120.000	100.0	V	-15.0	4.4*	40.0
44.590000	34.7	200.0	120.000	100.0	V	-15.2	5.3	40.0
46.207500	34.1	200.0	120.000	125.0	V	-16.3	5.9	40.0
139.488750	18.0	200.0	120.000	175.0	H	-13.8	25.5	43.5

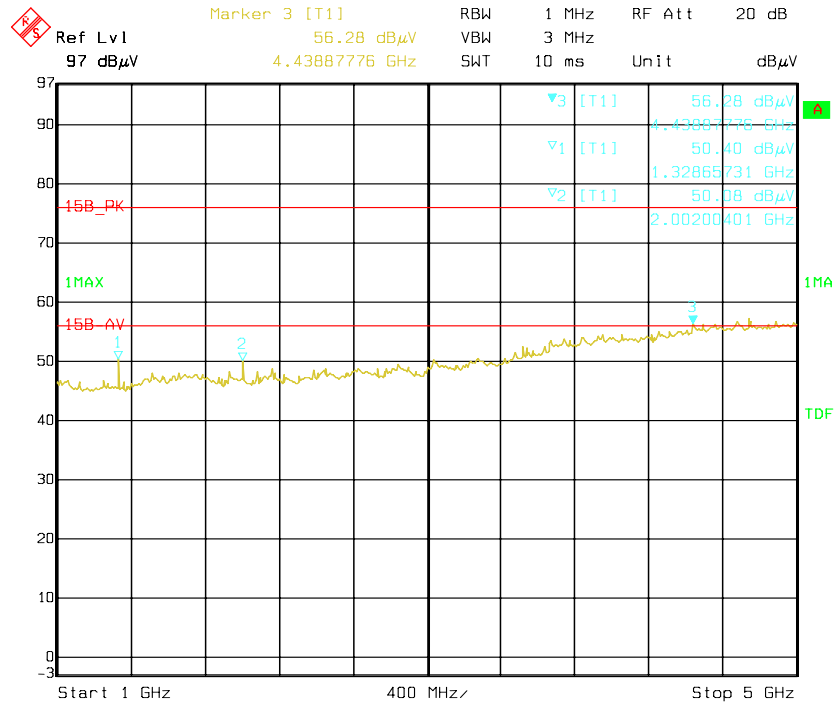
***** *Within Measurement Uncertainty*

Above 1 GHz:

Horizontal



Vertical



Frequency	Polarity	Detector	Corrected factor	Result	Limit	Margin
MHz	V/H	QP/pk/AV	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2002.004	H	PK	3.62	52.39	76	23.61
2002.004	H	AV	3.62	40.04	56	15.96
3917.835	H	PK	10.29	54.22	76	21.78
3917.835	H	AV	10.29	39.68	56	16.32
4511.022	H	PK	8.61	55.57	76	20.43
4511.022	H	AV	8.61	41.78	56	14.22
1328.657	V	PK	2.34	50.40	76	25.60
1328.657	V	AV	2.34	34.33	56	21.67
2002.004	V	PK	3.62	50.08	76	25.92
2002.004	V	AV	3.62	32.45	56	23.55
4438.877	V	PK	8.42	56.28	76	19.72
4438.877	V	AV	8.42	41.33	56	14.67

Test Result: Pass

*******END OF REPORT*******