



EMC TEST REPORT (Class B)

REGULATORY MODEL NUMBER: 25413

REGULATORY TYPE: N/A

REPORT NUMBER: TA11008F

ISSUED DATE: June 20, 2011

Applicant: LSI Corporation

3718 N. Rock Road Wichita, KS 67226 USA

Manufacturer: LSI Corporation

3718 N. Rock Road Wichita, KS 67226 USA

Issued By: Inventec Corporation (Taoyuan) EMC Lab

No. 349, Section 2, Jen-Ho Road, Tachi Town,
Taoyuan, Taiwan, Republic of China

Receipt date of EUT: May 27, 2011

Date of testing: May 27, 2011 ~ June 08, 2011

Approved By

Jane Lin / EMC Lab Manager
Inventec Corp. (Taoyuan) EMC Lab



NVLAP LAB CODE 200140-0

The test results in this report only apply to the tested sample.

This report should not be reproduced, except in full, without the written approval of Inventec Corporation.

Table of Contents	Page
1. PRODUCT INFORMATION	3
1.1. PRODUCT DESCRIPTION	3
1.2. PRODUCT FEATURE	3
1.3. PRODUCT BLOCK DIAGRAM	4
1.4. PRODUCT COMPONENTS	5
2. TEST INFORMATION	6
2.1. TEST MODE DESCRIPTION	6
2.2. EUT OPERATING CONDITIONS	8
2.3. SUMMARY OF TEST RESULTS	9
2.4. MEASUREMENT UNCERTAINTY	9
2.5. TEST FACILITY	9
2.6. TEST SETUP	10
3. CONDUCTION EMISSION MEASUREMENT	12
3.1. TEST LIMIT	12
3.2. TEST INSTRUMENTS	12
3.3. SUPPORT TEST PERIPHERALS & CABLING CONFIGURATION	12
3.4. BLOCK DIAGRAM OF CONNECTION BETWEEN EUT AND TEST PERIPHERAL	13
3.5. BLOCK DIAGRAM OF TEST SETUP	13
3.6. TEST DATA	14
3.7. NOISE FLOOR MEASUREMENT	16
3.8. CALCULATION	17
4. RADIATION EMISSION MEASUREMENT	18
4.1. TEST LIMIT	18
4.2. TEST INSTRUMENTS	18
4.3. SUPPORT TEST PERIPHERALS & CABLING CONFIGURATION	19
4.4. BLOCK DIAGRAM OF RADIATED BETWEEN EUT AND TEST PERIPHERAL	19
4.5. BLOCK DIAGRAM OF TEST SETUP	20
4.6. TEST DATA	21
4.7. NOISE FLOOR MEASUREMENT	25
4.8. CALCULATION	27
5. PRODUCT LABELING	28
6. PHOTOGRAPHS	29

1. PRODUCT INFORMATION

1.1. PRODUCT DESCRIPTION

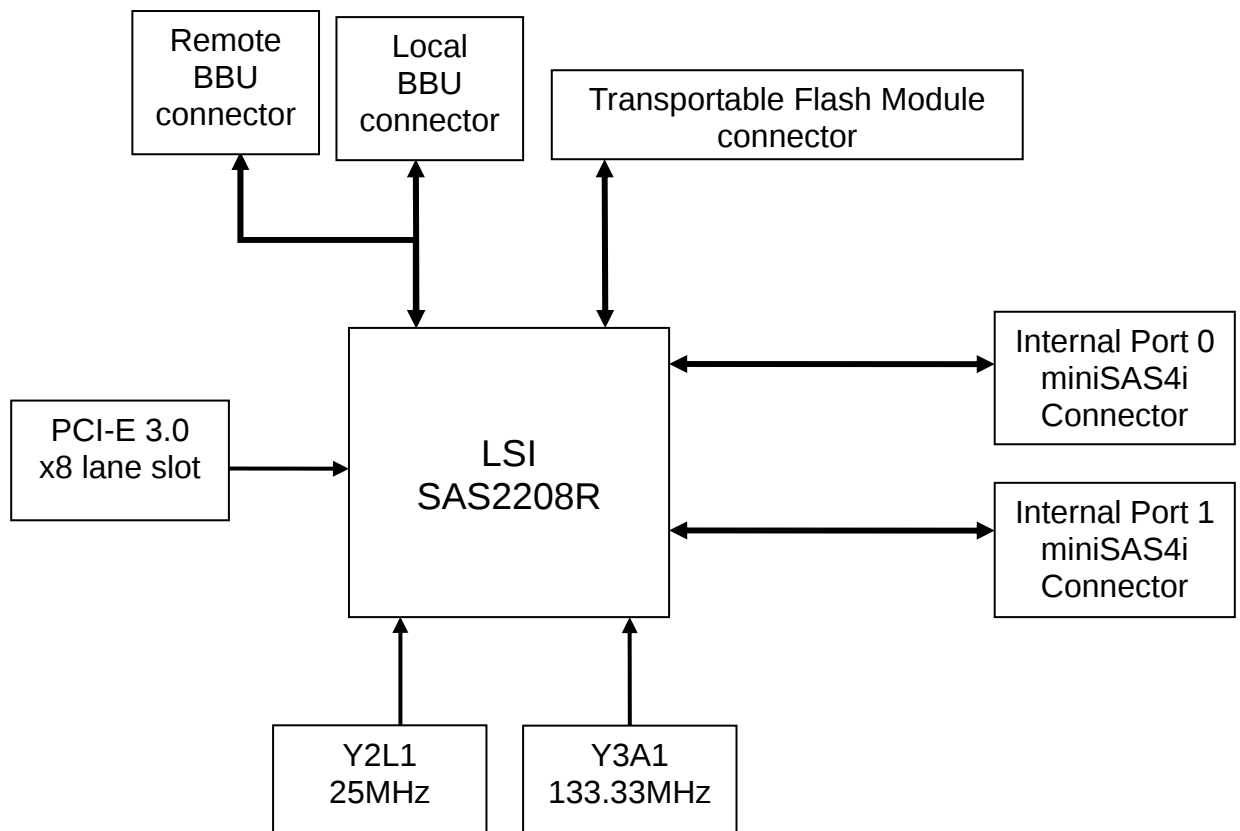
Product Type:	PCI-E SAS HBA Card (Host Bus Adaptor Card)
Regulatory Model:	25413
Regulatory Type:	N/A
Serial Number:	SR12200761(with DDR3 512MB Memory Module) SR12000578 (with DDR3 1GB Memory Module)
Firmware Version:	3.140.05-1201-TEST-SNANDURI-09A6-PL-Ver-5.0.28.0_CFGI-Ver-5.0.0.2
Host System:	HSTNS-2123 (Server)
Host Operating System:	Windows Server 2008 R2
Condition:	Engineering Sample
Brand:	LSI
Applicant:	LSI Corporation 3718 N. Rock Road Wichita, KS 67226 USA
Issued By:	Inventec Corporation (Taoyuan) EMC Lab No. 349, Section 2, Jen-Ho Road, Tachi Town, Taoyuan, Taiwan, Republic of China
Standard:	FCC CFR 47 Part 15, Subpart B CISPR 22: 2005 + A1: 2005 + A2: 2006 Canadian ICES-003: 2004 ANSI C63.4: 2009

1.2. PRODUCT FEATURE

Feature Description
• LSI SAS 2208R SAS Interface Controller • PCI Express 3.0 x8 lane slot • Two internal horizontal mini SAS4i connectors • Attached Transportable Flash Module and remote connection to super cap • Local/Remote connection to an iBBU

Note: The above EUT information was declared by manufacturer, and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

1.3. PRODUCT BLOCK DIAGRAM



1.4. PRODUCT COMPONENTS

Component	Manufacture	Model / Part Number	Serial Number
PCI-E SAS HBA Card (with DDR3 512MB Memory Module)	LSI	25413	SR12200761
PCI-E SAS HBA Card (with DDR3 1GB Memory Module)	LSI	25413	SR12000578
Flash Module	LSI	L2-25419-011	SR11900314
Host System (Server)	HP	HSTNS-2123	CN7035000D
Motherboard	HP	1395T2161703	Y707MP2359
CPU	Intel	E5520	2.27GHz/1066MHz
Memory (DDR3 2GB)	HYNIX	HMT125R7BFR8C-H9 TB AB-C	1022-6HC
			1022-5DC
HDD (3.5" SATA 1TB), for OS	Seagate	ST31000524NS	9WK017T5
HDD (2.5" SAS 146GB)	HP	DG0146FAMWL	3SD1DW33
			3SD1DKDZ
			3SD1DXKB
			3SD1E7VB
			3SD1DXGC
			3SD1EDJX
			3SD1ECT4
			3SD1DYF1
HDD (2.5" SATA 60GB)	FUJITSU	MHW2060BK G2	K30HT88254PC
			K30HT88254M6
			K30HT88254LT
			K30HT88254KN
			K30HT88254KP
			K30HT88254LW
			K30HT88254KU
			K30HT88254KS
Power Supply (1200W)	HP (LITE-ON)	HSTNS-PL11	0833000496

2. TEST INFORMATION

2.1. TEST MODE DESCRIPTION

2.1.1. TEST MODE OF CONDUCTION

The EUT has been pre-tested as following modes:

Mode	Processor	Storage	PCI-E SAS HBA Card	Power	Voltage
Mode 1	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SATA HDD 60GB *8	With DDR3 1GB Memory Module	HSTNS-PL11 *1	110V/60Hz
Mode 2	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SATA HDD 60GB *8	With DDR3 1GB Memory Module and Flash Module	HSTNS-PL11 *1	110V/60Hz
Mode 3	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SATA HDD 60GB *8	With DDR3 512MB Memory Module	HSTNS-PL11 *1	110V/60Hz
Mode 4	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SAS HDD 146GB *8	With DDR3 512MB Memory Module	HSTNS-PL11 *1	110V/60Hz

According to pre-tested data, Mode 4 was the worst combination for final test and description as following:

Component	Manufacture	Model / Part Number	Type / Specification
PCI-E SAS HBA Card	LSI	25413	With DDR3 512MB Memory Module
Board	HP	1395T2161703	Motherboard
CPU	Intel	E5520	2.27GHz/1066MHz *1
Memory	HYNIX	HMT125R7BFR8C-H9 TB AB-C	DDR3 DIMM (2GB) *2
HDD (for OS)	Seagate	ST31000524NS	3.5" SATA (1TB) *1
HDD	HP	DG0146FAMWL	2.5" SAS (146GB) *8
Power Supply	HP (LITE-ON)	HSTNS-PL11	1200W 10A/7.8A, 50/60Hz, 100V-120V, 200V-240V AC

2.1.2. TEST MODE OF RADIATION (30MHz~1000MHz)

The EUT has been pre-tested as following modes:

Mode	Processor	Storage	PCI-E SAS HBA Card	Power	Voltage
Mode 1	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SAS HDD 146GB *8	With DDR3 1GB Memory Module	HSTNS-PL11 *1	110V/60Hz
Mode 2	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SAS HDD 146GB *8	With DDR3 512MB Memory Module	HSTNS-PL11 *1	110V/60Hz
Mode 3	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SAS HDD 146GB *8	With DDR3 1GB Memory Module and Flash Module	HSTNS-PL11 *1	110V/60Hz
Mode 4	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SATA HDD 60GB *8	With DDR3 1GB Memory Module	HSTNS-PL11 *1	110V/60Hz

According to pre-tested data, Mode 1 was the worst combination for final test and description as following:

Component	Manufacture	Model / Part Number	Type / Specification
PCI-E SAS HBA Card	LSI	25413	With DDR3 1GB Memory Module
Board	HP	1395T2161703	Motherboard
CPU	Intel	E5520	2.27GHz/1066MHz *1
Memory	HYNIX	HMT125R7BFR8C-H9 TB AB-C	DDR3 DIMM (2GB) *2
HDD (for OS)	Seagate	ST31000524NS	3.5" SATA (1TB) *1
HDD	HP	DG0146FAMWL	2.5" SAS (146GB) *8
Power Supply	HP (LITE-ON)	HSTNS-PL11	1200W 10A/7.8A, 50/60Hz, 100V-120V, 200V-240V AC

2.1.3. TEST MODE OF RADIATION (ABOVE 1GHz)

The EUT has been pre-tested as following modes:

Mode	Processor	Storage	PCI-E SAS HBA Card	Power	Voltage
Mode 1	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SAS HDD 146GB *8	With DDR3 1GB Memory Module	HSTNS-PL11 *1	110V/60Hz
Mode 2	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SAS HDD 146GB *8	With DDR3 512MB Memory Module	HSTNS-PL11 *1	110V/60Hz
Mode 3	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SAS HDD 146GB *8	With DDR3 1GB Memory Module and Flash Module	HSTNS-PL11 *1	110V/60Hz
Mode 4	Intel E5520 Processor *1 2.27GHz/1066MHz	2.5" SATA HDD 60GB *8	With DDR3 1GB Memory Module	HSTNS-PL11 *1	110V/60Hz

According to pre-tested data, Mode 4 was the worst combination for final test and description as following:

Component	Manufacture	Model / Part Number	Type / Specification
PCI-E SAS HBA Card	LSI	25413	With DDR3 1GB Memory Module
Board	HP	1395T2161703	Motherboard
CPU	Intel	E5520	2.27GHz/1066MHz *1
Memory	HYNIX	HMT125R7BFR8C-H9 TB AB-C	DDR3 DIMM (2GB) *2
HDD (for OS)	Seagate	ST31000524NS	3.5" SATA (1TB) *1
HDD	FUJITSU	MHW2060BK G2	2.5" SATA (60GB) *8
Power Supply	HP (LITE-ON)	HSTNS-PL11	1200W 10A/7.8A, 50/60Hz, 100V-120V, 200V-240V AC

2.2. EUT OPERATING CONDITIONS

The EUT should run the programs listed below during the test.

- Run the program "WinHpattern.exe" on host server with full screen display, and let EUT to read and write data to all the HDDs.
- Run the "Smasher.exe" on host server, and let EUT to read and write data to all the HDDs.

2.3. SUMMARY OF TEST RESULTS

The worst data was found as following:

Standard	Test Item	Test Result	Remarks	Tester
FCC CFR 47 Part 15, Subpart B CISPR22 Canadian ICES-003 Class B	Conducted Emission for Mains Ports	PASS	Worst emission frequency is <u>0.57</u> MHz at <u>Neutral</u> And minimum passing margin is <u>-6.58</u> dB, <u>Average</u>	GF Sheu <i>GF Sheu</i>
	Conducted Emission for Telecommunication Ports	N/A	Not applicable	N/A
	Radiated Emission (30MHz~1000MHz)	PASS	Worst emission frequency is <u>800.00</u> MHz at <u>Horizontal</u> And minimum passing margin is <u>-4.74</u> dB, <u>Quasi-Peak</u> Height of antenna is <u>1.18</u> m Angle of turntable is <u>186</u> deg.	GF Sheu <i>GF Sheu</i>
	Radiated Emission (Above 1GHz)	PASS	Worst emission frequency is <u>8999.98</u> MHz at <u>Horizontal</u> And minimum passing margin is <u>-5.99</u> dB, <u>Average</u> Height of antenna is <u>1.01</u> m Angle of turntable is <u>205</u> deg.	GF Sheu <i>GF Sheu</i>

Note:

1. The EUT has no telecommunication ports, so there's no need to test for Conducted Emission for Telecommunication Ports.
2. The EUT's highest operating frequency is 3GHz. Radiated Emission need to be measured up to 15GHz.

2.4. 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	Test Site	Uncertainty
Conducted Emission	150kHz ~ 30MHz (Mains ports)	SR No.1	3.47dB
Radiated Emission	30MHz ~ 1000MHz	10m Chamber	4.40dB
	Above 1GHz	3m Chamber No.2	4.94dB

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

2.5. TEST FACILITY

The Inventec Corp. (Taoyuan) EMC lab located at:
 No. 349, Section 2, Jen-Ho Road 33547, Tachi Town, Taoyuan, Taiwan, Republic of China.
 The Lab has a turntable with a diameter at maximum 2 meters and can measure ITE products
 at the 3 and 10 meters of antenna distance.

A site description and calibration report to ANSI C63.4 is available upon request.
 It is authorized for testing ITE devices by NVLAP.

EMC Laboratory Accreditation: NVLAP Lab Code: 200140-0

2.6. TEST SETUP

2.6.1. TEST METHODOLOGY

A. Both conducted and radiated tests were performed according to the following methods and procedures:

- ANSI C63.4: 2009
Methods of Measurement of Radio-Noise Emissions for Low Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz.
- CISPR 22: 2005 + A1: 2005 + A2: 2006
Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.
- FCC CFR 47 Part 15
Federal Communications Commission Radio Frequency Devices.
- Canadian ICES-003
Implementation and Interpretation off the Interference-Causing Equipment Standard for Digital Apparatus

B. Description of departing from standard test method & any other specific: NONE

2.6.2. MODIFICATIONS IMPLEMENTED FOR COMPLIANCE

No modifications were made to the equipment under test by Test Laboratory.

2.6.3. TECHNICAL BASIC FOR COMPLIANCE

It was examined to the following sections of the standards FCC CFR 47 Part 15, Canadian ICES-003 and CISPR 22 underlying the basic requirements of the EMC directive 2004/108/EC.

2.6.4. RELATED SUBMITTAL(S) NOTES

- A. The results relate only to the items tested.
- B. The report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
- C. There are no related submittals to this file.

2.6.5. TEST CONDITION

2.6.5.1 Test of Conducted Emission

Conducted emissions were measured from 0.15MHz to 30MHz with a resolution bandwidth of 9kHz and return leads of the EUT according to the methods defines in ANSI C63.4: 2009.

The EUT was placed on a nonmetallic stand in a shielded room, 0.8 meter above the ground plane, as shown in section 3.5. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum conducted emissions.

2.6.5.2 Test of Radiation Emission

The measurement range of radiation emission, which is from 30MHz to 5th harmonic of the highest frequency or 40GHz, whichever is lower was investigated.

The readings of frequency 30MHz to 1000MHz are measured with a resolution bandwidth of 120kHz according to the methods defines in ANSI C63.4: 2009 and above 1000MHz shall be performed using a minimum resolution bandwidth of 1MHz defines in FCC 15.35(b). The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 4.5.

The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

Frequency range of radiated measurement:

Highest frequency generated or used within the EUT or on which the EUT operates or tunes (MHz)	Upper frequency of measurement range (GHz)
Below 108	1
108 ~ 500	2
500 ~ 1000	5
Above 1000	5 th harmonic of the highest frequency or 40GHz, whichever is lower

3. CONDUCTION EMISSION MEASUREMENT

3.1. TEST LIMIT

Test Standard: FCC CFR 47 Part 15 Subpart B, CISPR 22 (Class B), ICES-003 (Class B), for mains ports		
Frequency (MHz)	Limit [dB(μV)]	
	Quasi-Peak	Average
0.15 ~ 0.50	66 ~ 56	56 ~ 46
0.50 ~ 5	56	46
5 ~ 30	60	50

Note:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 ~ 0.50MHz.

3.2. TEST INSTRUMENTS

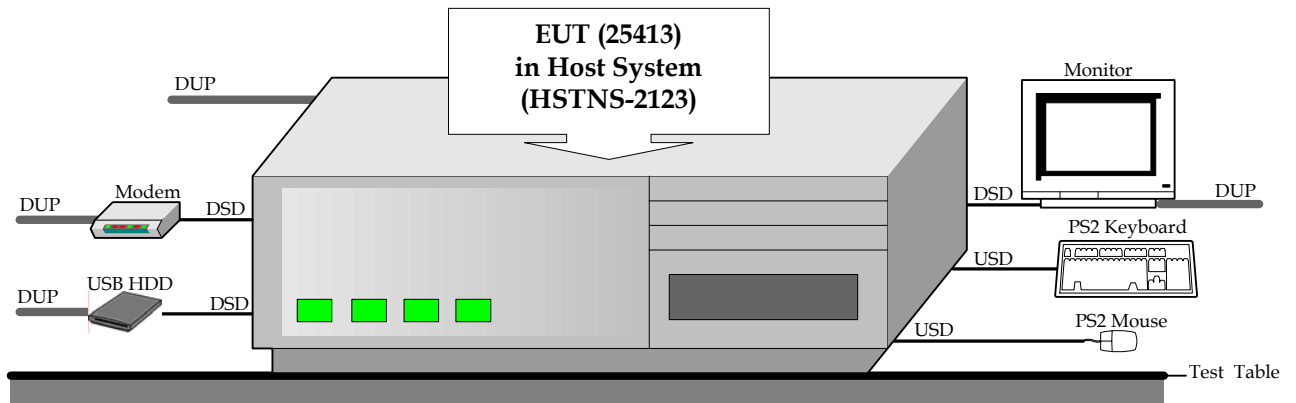
Name	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	Rohde & Schwarz	ESCI 7	100766	27-Jan-2011	22-Jun-2011
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	101167	27-Jan-2011	22-Jun-2011
LISN	EMCO	3825/2	9405-2196	12-Nov-2010	30-Oct-2011
LISN	Rohde & Schwarz	ENV4200	100100	28-Apr-2011	28-Apr-2012
RF Cable	Harbour Industries	RG400	N/A	09-Mar-2011	05-Feb-2012
EMI Test Program	Audix	e3(Ver. 6)	N/A	N/A	N/A

Note: The test instruments above have been calibrated and are traceable to NML/ROC and NIST/USA.

3.3. SUPPORT TEST PERIPHERALS & CABLING CONFIGURATION

Name	Brand	Model	Serial Number	FCC ID or DoC	Type	Shielded	LTH	Qty
Monitor	DELL	U2410f	CN-082WXD-72872-11B-173L	DoC	VGA	Yes	1.75m	1
PS2 Keyboard	HP	KB-0136	BAUEL0KVBZH0O3	DoC	PS2	Yes	1.80m	1
PS2 Mouse	HP	M-SBF96	FATSQ0C8F28QRR	DoC	PS2	Yes	1.80m	1
Modem	Hayes	3124US	A09531003675	BFJ9D9231AA	RS-232	Yes	1.80m	1
USB HDD	HP	md1000h	WCAV5E909832	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E816342	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E805048	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E885069	DoC	USB	Yes	1.25m	1

3.4. BLOCK DIAGRAM OF CONNECTION BETWEEN EUT AND TEST PERIPHERAL



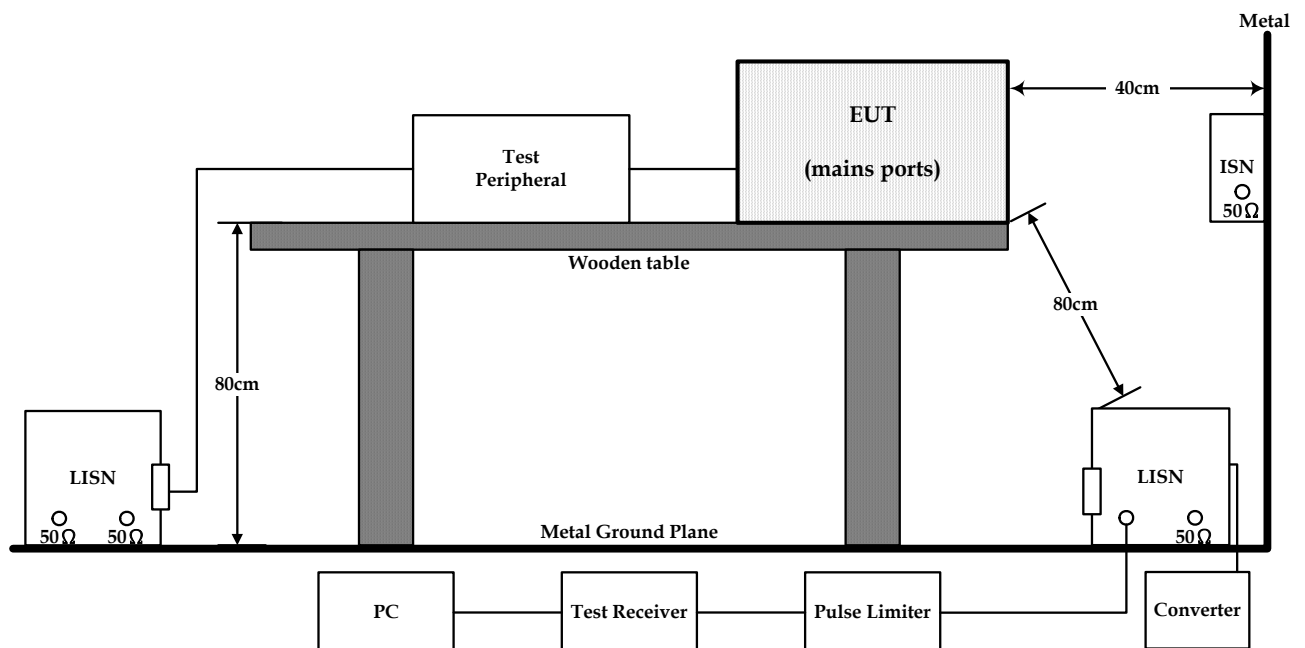
Legend:

USD = Undetachable Shielded Data cable

DSD = Detachable Shielded Data cable

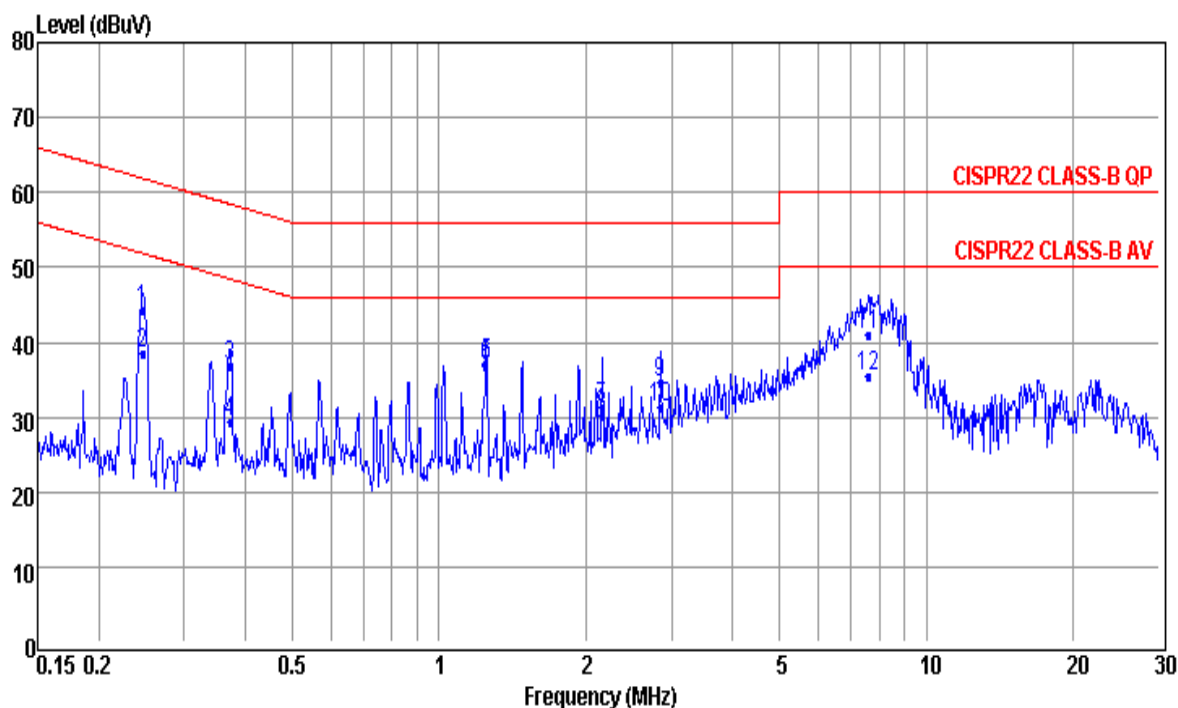
DUP = Detachable Unshielded Power cord

3.5. BLOCK DIAGRAM OF TEST SETUP



3.6. TEST DATA

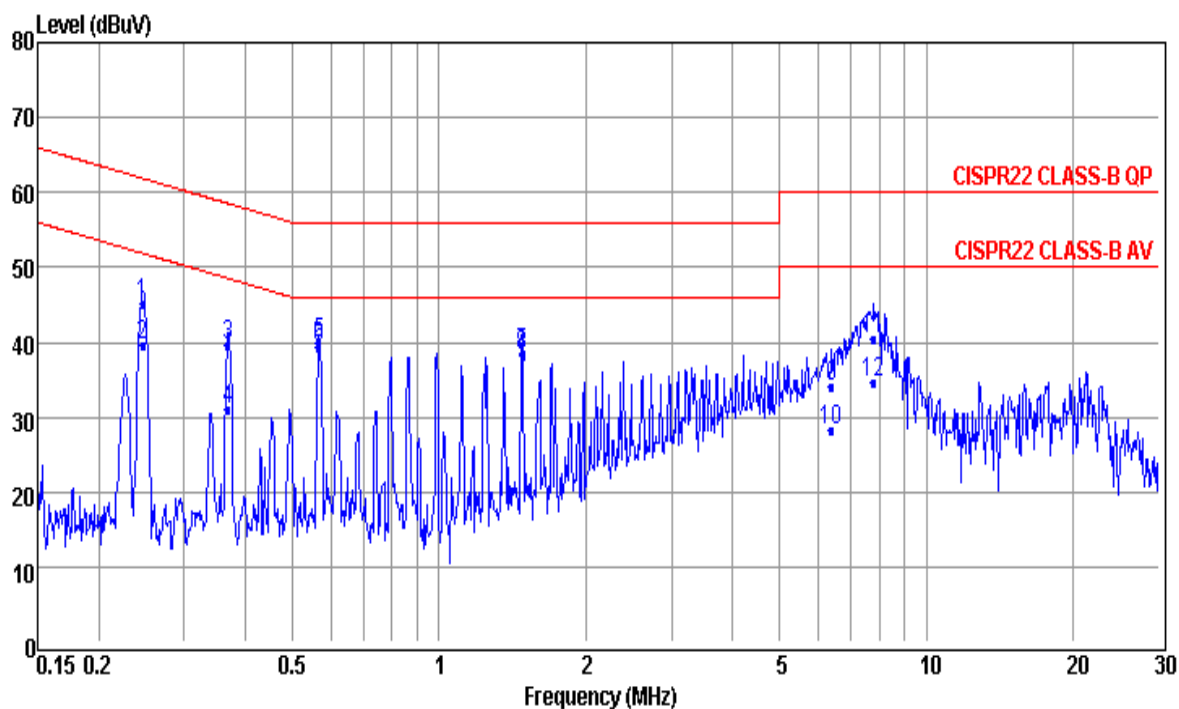
Data Log: 3111060106	Date of Test: Jun 01, 2011	Tested By: GF Sheu
EUT: 25413	Main: 120V/60Hz	Test Mode: Mode 4
Temperature (°C): 25.0	Humidity (%): 56.8	Frequency Range: 0.15MHz~30MHz



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Total Factor (dB)	Level (dBμV)	Limit Line (dBμV)	Over Limit (dBμV)	Detector	Phase
1	0.25	24.09	20.29	44.38	61.86	-17.48	QP	Line
2	0.25	18.10	20.29	38.39	51.86	-13.47	Average	Line
3	0.37	16.80	20.15	36.95	58.43	-21.48	QP	Line
4	0.37	9.15	20.15	29.30	48.43	-19.13	Average	Line
5	1.25	16.84	20.37	37.21	56.00	-18.79	QP	Line
6	1.25	16.51	20.37	36.88	46.00	-9.12	Average	Line
7	2.16	10.89	20.39	31.28	56.00	-24.72	QP	Line
8	2.16	9.78	20.39	30.17	46.00	-15.83	Average	Line
9	2.84	14.20	20.38	34.58	56.00	-21.42	QP	Line
10	2.84	10.98	20.38	31.36	46.00	-14.64	Average	Line
11	7.61	20.40	20.44	40.84	60.00	-19.16	QP	Line
12	7.61	14.92	20.44	35.36	50.00	-14.64	Average	Line

Remark:

1. Negative number in the margin column indicates the amount (in dB) that the recorded emission is below the limit.



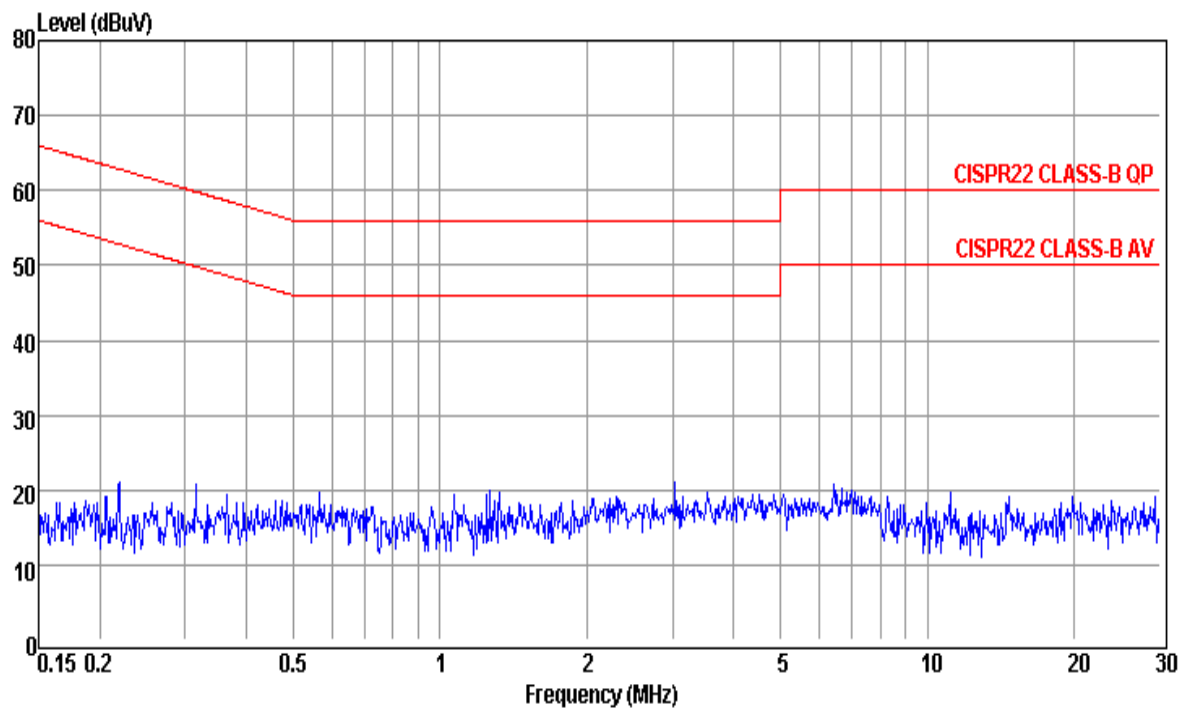
Item (Mark)	Freq (MHz)	Read Level (dBμV)	Total Factor (dB)	Level (dBμV)	Limit Line (dBμV)	Over Limit (dBμV)	Detector	Phase
1	0.25	24.75	20.28	45.03	61.86	-16.83	QP	Neutral
2	0.25	19.20	20.28	39.48	51.86	-12.38	Average	Neutral
3	0.37	19.35	20.14	39.49	58.52	-19.03	QP	Neutral
4	0.37	10.80	20.14	30.94	48.52	-17.58	Average	Neutral
5	0.57	19.66	20.18	39.84	56.00	-16.16	QP	Neutral
6	0.57	19.24	20.18	39.42	46.00	-6.58	Average	Neutral
7	1.48	18.20	20.36	38.56	56.00	-17.44	QP	Neutral
8	1.48	17.76	20.36	38.12	46.00	-7.88	Average	Neutral
9	6.39	13.56	20.42	33.98	60.00	-26.02	QP	Neutral
10	6.39	7.68	20.42	28.10	50.00	-21.90	Average	Neutral
11	7.81	19.87	20.43	40.30	60.00	-19.70	QP	Neutral
12	7.81	14.30	20.43	34.73	50.00	-15.27	Average	Neutral

Remark:

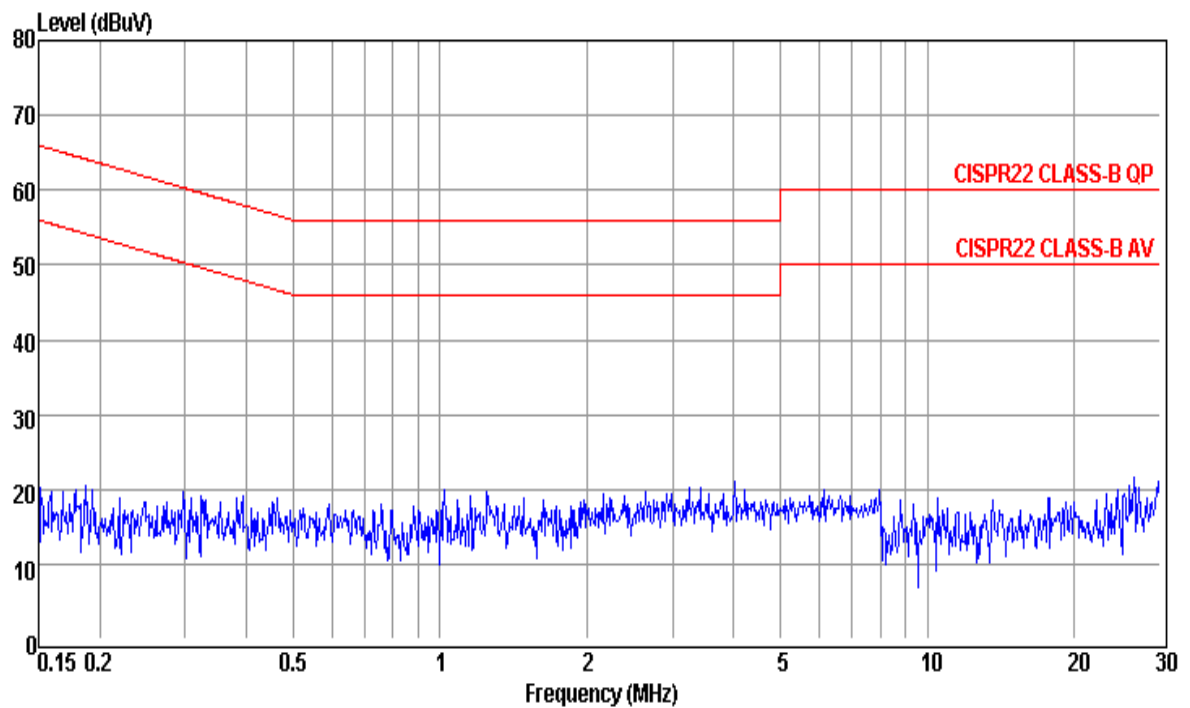
1. Negative number in the margin column indicates the amount (in dB) that the recorded emission is below the limit.

3.7. NOISE FLOOR MEASUREMENT

Line



Neutral



3.8. CALCULATION

1. Freq. (MHz), means Conducted Emission frequency.
2. Reading Level (dB μ V), means the reading of Analyzer or Test Receiver.
3. Correction Factor (dB), means the value of LISN Loss add Cable Loss.
4. Conducted Emission (dB μ V), means the values of Reading Level add CF added.
 $CE=RL+CF$
5. Ave. Limit (dB μ V), means Limit stated in Standard.
6. Ave. Delta (dB), Reading in reference to Limit.
 $AD=CE - AL$

4. RADIATION EMISSION MEASUREMENT

4.1. TEST LIMIT

Test Standard: FCC CFR 47 Part 15 Subpart B, CISPR 22 (Class B), ICES-003 (Class B)		
Frequency range (MHz)	Distance (Meter)	Quasi-peak limits dB(μV/m)
30 ~ 230	10	30
230 ~ 1000	10	37

Note: 1. The lower limit shall apply at the transition frequency.
 2. Additional provisions may be required for cases where interference occurs.
 3. The limit for radiated test was performed according to CISPR 22: 2005+A1: 2005+A2: 2006, which was specified in FCC Part 15B 15.109(g). Also the limits of CISPR 22: 2005+A1: 2005+A2: 2006 is same.

Test Standard: FCC CFR 47 Part 15 Subpart B, ICES-003 (Class B)		
Frequency (MHz)	Distance (Meter)	Field Strength dB(μV/m)
Above 1000	3	54

Note: 1. The lower limit shall apply at the transition frequency.
 2. Additional provisions may be required for cases where interference occurs.

4.2. TEST INSTRUMENTS

4.2.1. TEST INSTRUMENTS FOR 30MHz~1000MHz

Name	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	Rohde & Schwarz	ESU 40	100218	27-Jan-2011	30-Jun-2011
Receiver	Rohde & Schwarz	ESU 8	100285	27-Jan-2011	01-Jul-2011
Antenna	TESEQ	CBL6111D	29796	28-Jan-2011	23-Aug-2011
Antenna	TESEQ	CBL6111D	29799	28-Jan-2011	23-Aug-2011
Pre-amplifier	Agilent	11909A	186998	25-Nov-2010	09-Sep-2011
Pre-amplifier	Agilent	11909A	186997	25-Nov-2010	09-Sep-2011
RF Cable	Huber+Suhner	S 07262 BD	N/A	09-Mar-2011	05-Feb-2012
RF Cable	Huber+Suhner	S 07262 BD	N/A	09-Mar-2011	06-Feb-2012
Test Program	Audix	e3(Ver. 6)	N/A	N/A	N/A

Note: The test instruments above have been calibrated and are traceable to NML/ROC and NIST/USA.

4.2.2. TEST INSTRUMENTS FOR ABOVE 1GHz

Name	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	Rohde & Schwarz	ESU 40	100218	27-Jan-2011	30-Jun-2011
Antenna	EMCO	3117	00075934	30-May-2011	29-May-2012
Pre-amplifier	EMC Instruments	EMC051845	980073	22-Apr-2011	22-Apr-2012
RF Cable	Huber+Suhner	SUCOFLEX 104	N/A	09-Mar-2011	05-Feb-2012
Test Program	Audix	e3(Ver. 6)	N/A	N/A	N/A

Note: The test instruments above have been calibrated and are traceable to NML/ROC and NIST/USA.

4.3. SUPPORT TEST PERIPHERALS & CABLING CONFIGURATION

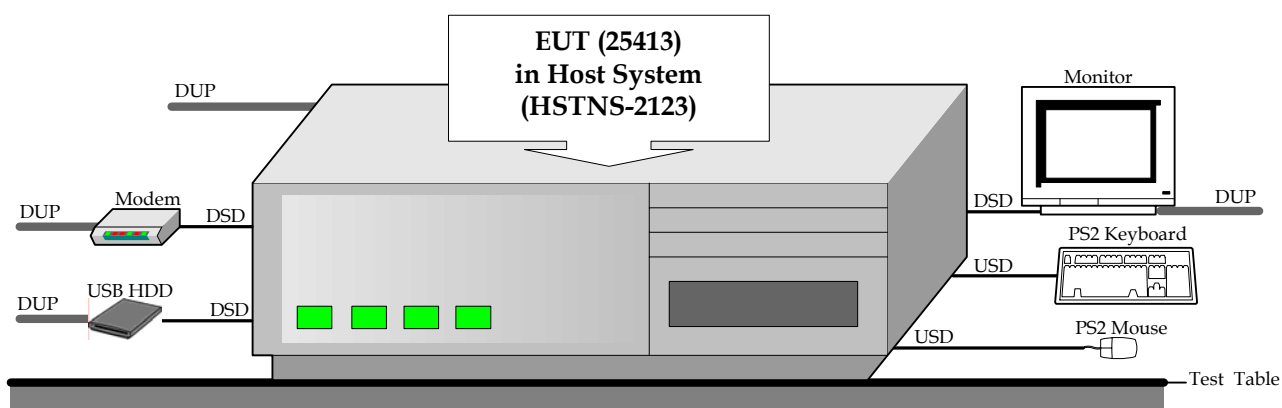
4.3.1. SUPPORT TEST PERIPHERALS & CABLING CONFIGURATION FOR 30MHz~1000MHz

Name	Brand	Model	Serial Number	FCC ID or DoC	Type	Shielded	LTH	Qty
Monitor	DELL	U2410f	CN-082WXD-72872-11B-173L	DoC	VGA	Yes	1.75m	1
PS2 Keyboard	Logitech	Y-S0002	SY041UK	DoC	PS2	Yes	1.50m	1
PS2 Mouse	HP	M-S34	F66C80F5B0B01S2	DZL211029	PS2	Yes	1.78m	1
Modem	Hayes	3124US	A09531003675	BFJ9D9231AA	RS-232	Yes	1.80m	1
USB HDD	HP	md1000h	WCAV5E909832	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E816342	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E805048	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E885069	DoC	USB	Yes	1.25m	1

4.3.2. SUPPORT TEST PERIPHERALS & CABLING CONFIGURATION FOR ABOVE 1GHz

Name	Brand	Model	Serial Number	FCC ID or DoC	Type	Shielded	LTH	Qty
Monitor	DELL	U2410f	CN-082WXD-72872-11B-173L	DoC	VGA	Yes	1.75m	1
PS2 Keyboard	HP	KB-0136	BAUEL0KVBZH0O3	DoC	PS2	Yes	1.80m	1
PS2 Mouse	HP	M-SBF96	FATSQ0C8F28QRR	DoC	PS2	Yes	1.80m	1
Modem	Hayes	3124US	A09531003675	BFJ9D9231AA	RS-232	Yes	1.80m	1
USB HDD	HP	md1000h	WCAV5E909832	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E816342	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E805048	DoC	USB	Yes	1.25m	1
USB HDD	HP	md1000h	WCAV5E885069	DoC	USB	Yes	1.25m	1

4.4. BLOCK DIAGRAM OF RADIATED BETWEEN EUT AND TEST PERIPHERAL



Legend:

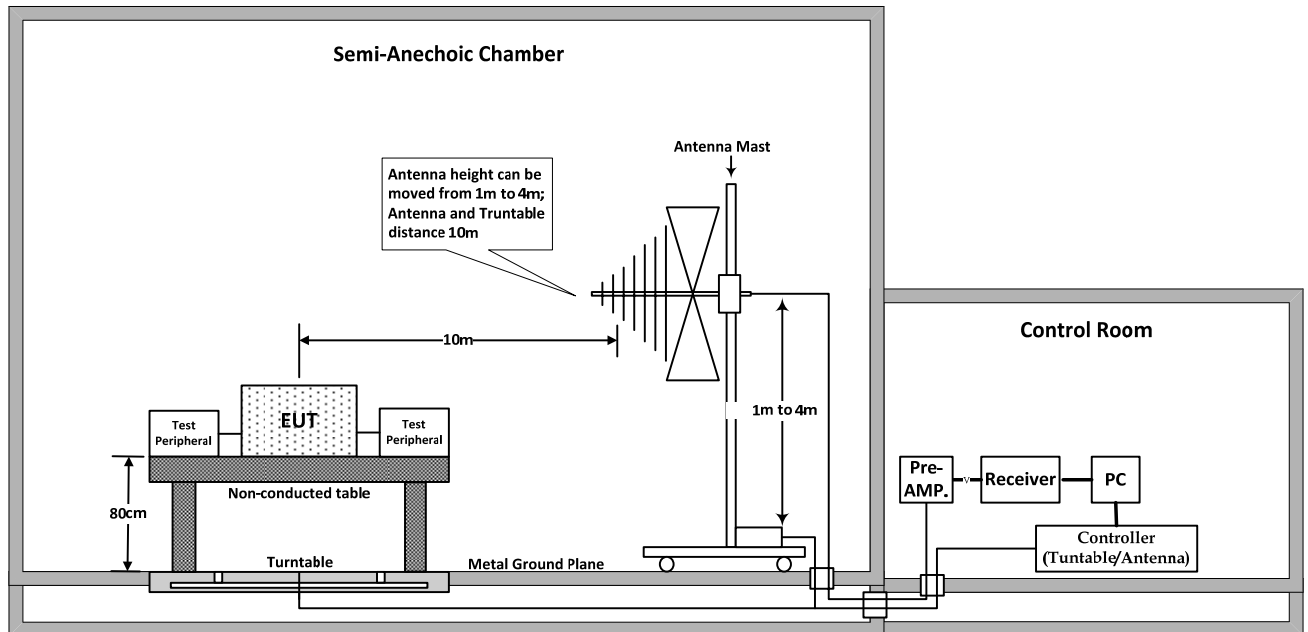
USD = Undetachable Shielded Data cable

DSD = Detachable Shielded Data cable

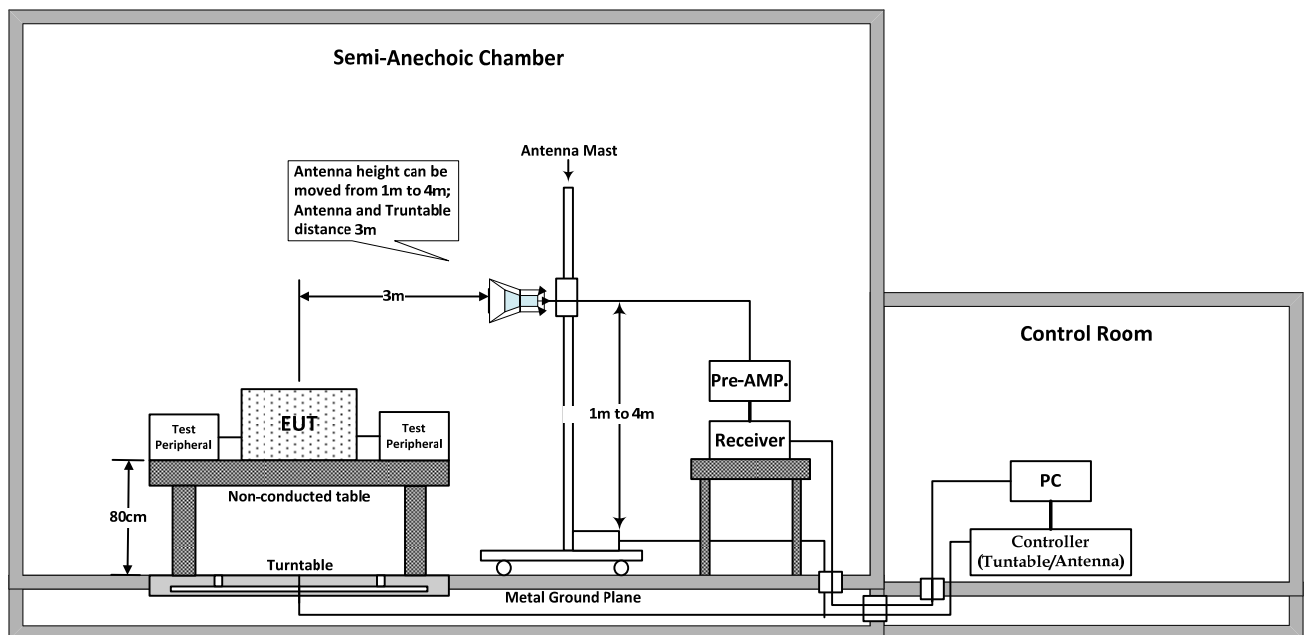
DUP = Detachable Unshielded Power cord

4.5. BLOCK DIAGRAM OF TEST SETUP

4.5.1. TEST SETUP FOR 30MHz~1000MHz



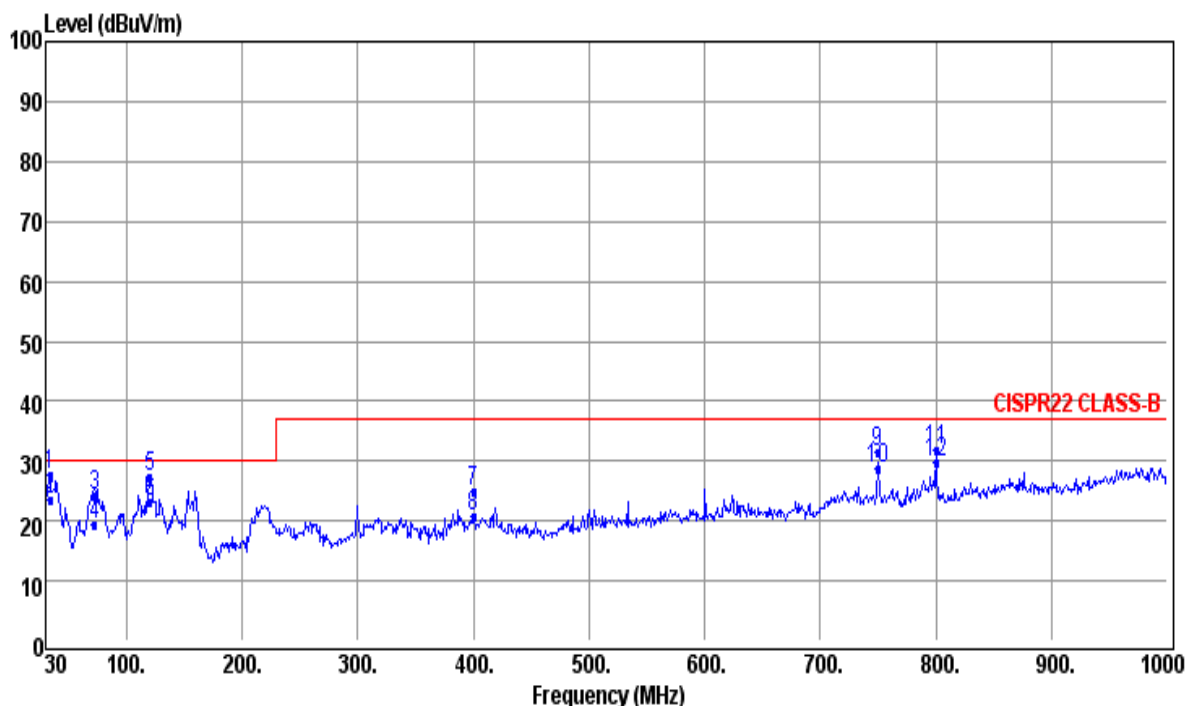
4.5.2. TEST SETUP FOR ABOVE 1GHz



4.6. TEST DATA

4.6.1. FREQUENCY RANGE (30MHz~1000MHz)

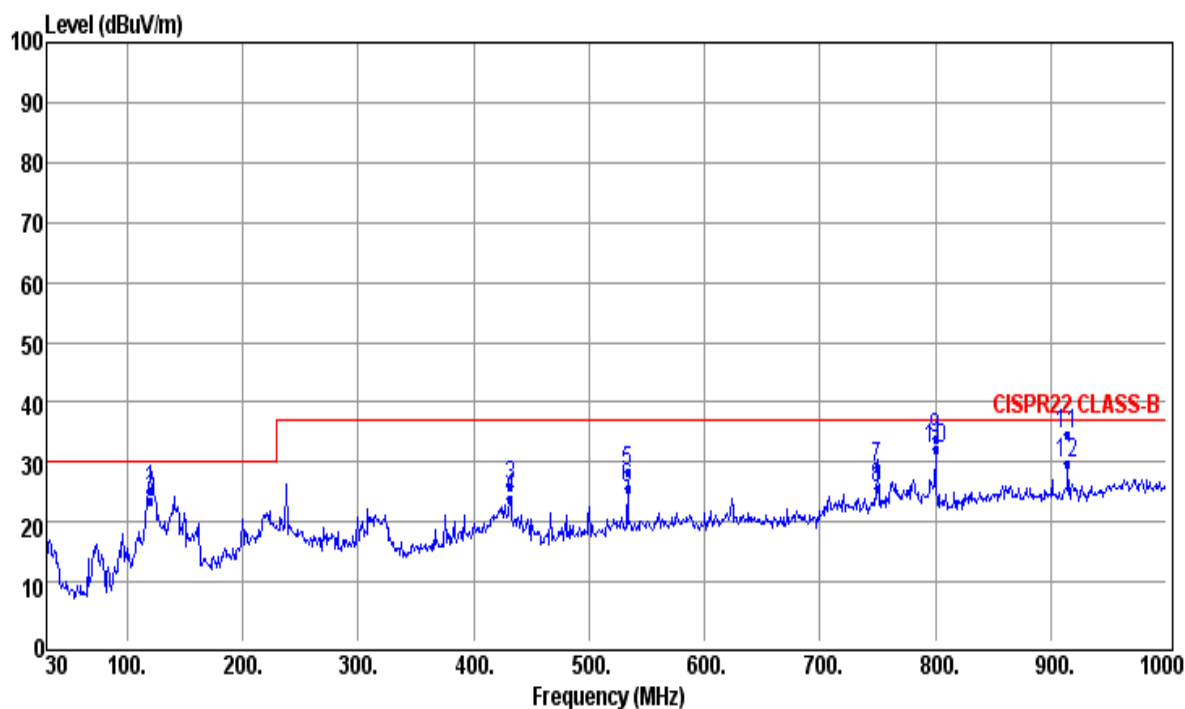
Data Log: 2011053002	Date of Test: May 30, 2011	Tested By: GF Sheu
EUT: 25413	Main: 120V/60Hz	Test Mode: Mode 1
Temperature (°C): 23.1	Humidity (%): 67.3	Frequency Range: 30MHz~1000MHz



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Total Factor (dB/m)	Level (μV/m)	Limit Line (μV/m)	Over Limit (dB)	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	34.17	42.05	-14.39	27.66	30	-2.34	Peak	100	360	Vertical
2	34.17	37.94	-14.39	23.55	30	-6.45	QP	100	360	Vertical
3	72.52	48.14	-23.96	24.18	30	-5.82	Peak	142	292	Vertical
4	72.52	43.42	-23.96	19.46	30	-10.54	QP	142	292	Vertical
5	120.12	46.28	-18.97	27.31	30	-2.69	Peak	100	2	Vertical
6	120.12	42.17	-18.97	23.2	30	-6.8	QP	100	2	Vertical
7	400	37.26	-12.51	24.75	37	-12.25	Peak	100	304	Vertical
8	400	33.13	-12.51	20.62	37	-16.38	QP	100	304	Vertical
9	750	37.42	-6	31.42	37	-5.58	Peak	209	317	Vertical
10	750	34.67	-6	28.67	37	-8.33	QP	209	317	Vertical
11	800.01	37.4	-5.43	31.97	37	-5.03	Peak	234	198	Vertical
12	800.01	35.17	-5.43	29.74	37	-7.26	QP	234	198	Vertical

Remark:

1. Negative number in the margin column indicates the amount (in dB) that the recorded emission is below the limit.



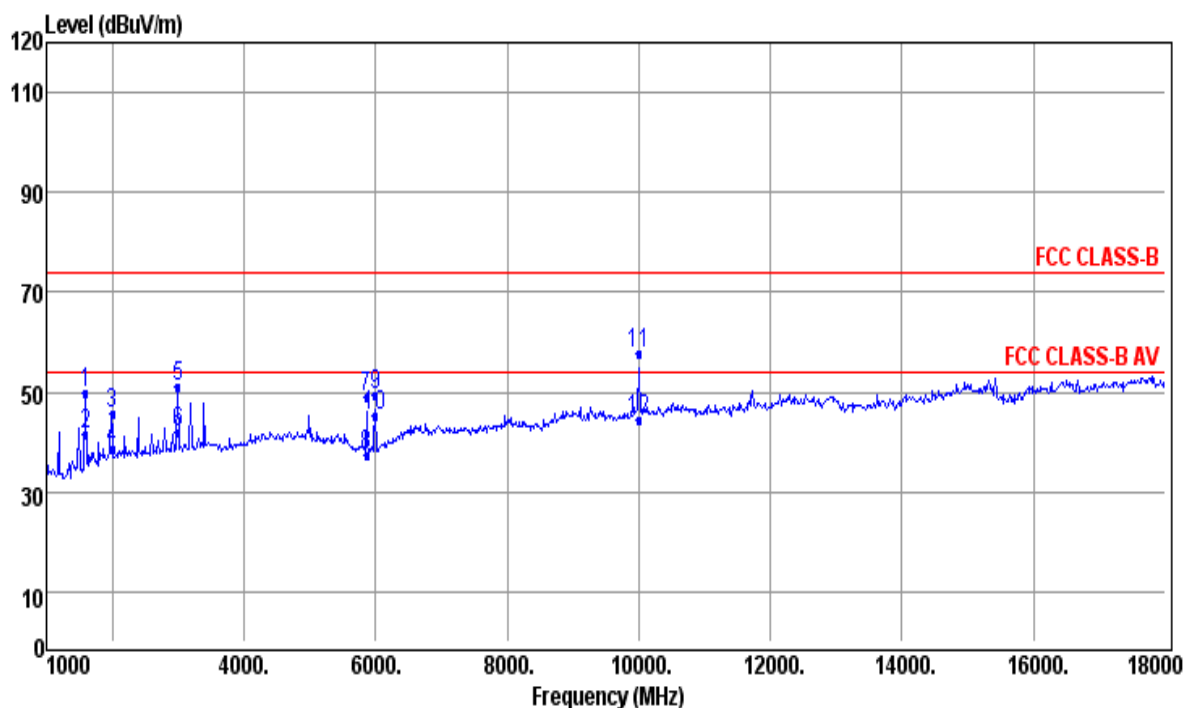
Item (Mark)	Freq (MHz)	Read Level (dBμV)	Total Factor (dB/m)	Level (μV/m)	Limit Line (μV/m)	Over Limit (dB)	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	120.48	44.96	-19.54	25.42	30	-4.58	Peak	265	360	Horizontal
2	120.48	42.92	-19.54	23.38	30	-6.62	QP	265	360	Horizontal
3	431.99	38.58	-12.61	25.97	37	-11.03	Peak	197	203	Horizontal
4	431.99	36.34	-12.61	23.73	37	-13.27	QP	197	203	Horizontal
5	533.3	39.43	-10.97	28.46	37	-8.54	Peak	167	215	Horizontal
6	533.3	36.55	-10.97	25.58	37	-11.42	QP	167	215	Horizontal
7	749.99	35.68	-6.61	29.07	37	-7.93	Peak	100	185	Horizontal
8	749.99	32.06	-6.61	25.45	37	-11.55	QP	100	185	Horizontal
9	800	40.7	-6.9	33.8	37	-3.2	Peak	118	186	Horizontal
10	800	39.16	-6.9	32.26	37	-4.74	QP	118	186	Horizontal
11	914.24	39.53	-5.08	34.45	37	-2.55	Peak	100	205	Horizontal
12	914.24	34.77	-5.08	29.69	37	-7.31	QP	100	205	Horizontal

Remark:

1. Negative number in the margin column indicates the amount (in dB) that the recorded emission is below the limit.

4.6.2. FREQUENCY RANGE (ABOVE 1GHz)

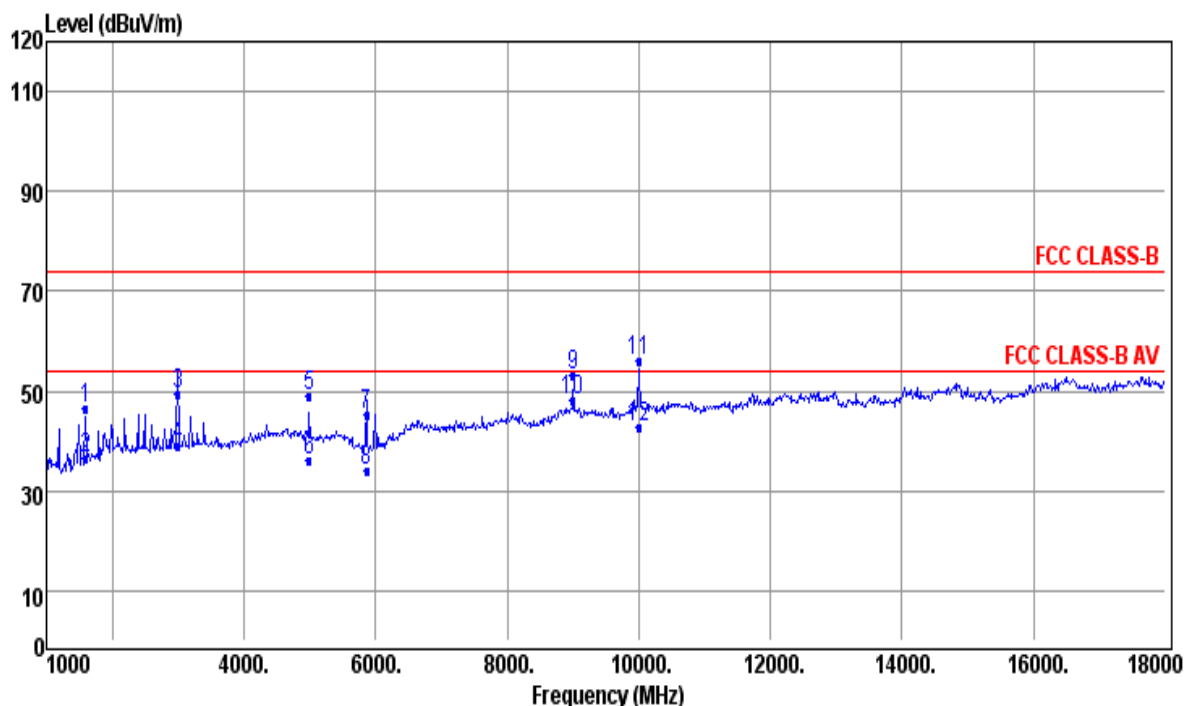
Data Log: 1211053107	Date of Test: May 31, 2011	Tested By: GF Sheu
EUT: 25413	Main: 120V/60Hz	Test Mode: Mode 4
Temperature (°C): 24.6	Humidity (%): 69.8	Frequency Range: Above 1GHz



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Total Factor (dB/m)	Level (μV/m)	Limit Line (μV/m)	Over Limit (dB)	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	1600	72.25	-22.6	49.65	74	-24.35	Peak	111	205	Vertical
2	1600	64.31	-22.6	41.71	54	-12.29	Average	111	205	Vertical
3	2000.15	65.42	-19.9	45.52	74	-28.48	Peak	175	209	Vertical
4	2000.15	58.4	-19.9	38.5	54	-15.5	Average	175	209	Vertical
5	3000	69.62	-18.48	51.14	74	-22.86	Peak	117	37	Vertical
6	3000.06	60.42	-18.48	41.94	54	-12.06	Average	117	37	Vertical
7	5863.7	63.24	-14.43	48.81	74	-25.19	Peak	105	12	Vertical
8	5863.7	51.68	-14.43	37.25	54	-16.75	Average	105	12	Vertical
9	6000	64.05	-14.75	49.3	74	-24.7	Peak	105	20	Vertical
10	6000.09	59.84	-14.75	45.09	54	-8.91	Average	105	20	Vertical
11	9998.8	67.76	-9.93	57.83	74	-16.17	Peak	103	208	Vertical
12	9998.8	54.32	-9.93	44.39	54	-9.61	Average	103	208	Vertical

Remark:

1. Negative number in the margin column indicates the amount (in dB) that the recorded emission is below the limit.



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Total Factor (dB/m)	Level (μV/m)	Limit Line (μV/m)	Over Limit (dB)	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	1600.07	68.93	-22.6	46.33	74	-27.67	Peak	174	161	Horizontal
2	1600.07	59.29	-22.6	36.69	54	-17.31	Average	174	161	Horizontal
3	3000	67.83	-18.48	49.35	74	-24.65	Peak	131	207	Horizontal
4	3000	57.47	-18.48	38.99	54	-15.01	Average	131	207	Horizontal
5	4997.41	62.6	-13.48	49.12	74	-24.88	Peak	100	181	Horizontal
6	4997.41	49.79	-13.48	36.31	54	-17.69	Average	100	181	Horizontal
7	5863.56	59.69	-14.43	45.26	74	-28.74	Peak	106	173	Horizontal
8	5863.56	48.61	-14.43	34.18	54	-19.82	Average	106	173	Horizontal
9	8999.98	63.07	-10.09	52.98	74	-21.02	Peak	101	205	Horizontal
10	8999.98	58.1	-10.09	48.01	54	-5.99	Average	101	205	Horizontal
11	9995.02	65.95	-9.94	56.01	74	-17.99	Peak	103	171	Horizontal
12	9995.02	52.69	-9.94	42.75	54	-11.25	Average	103	171	Horizontal

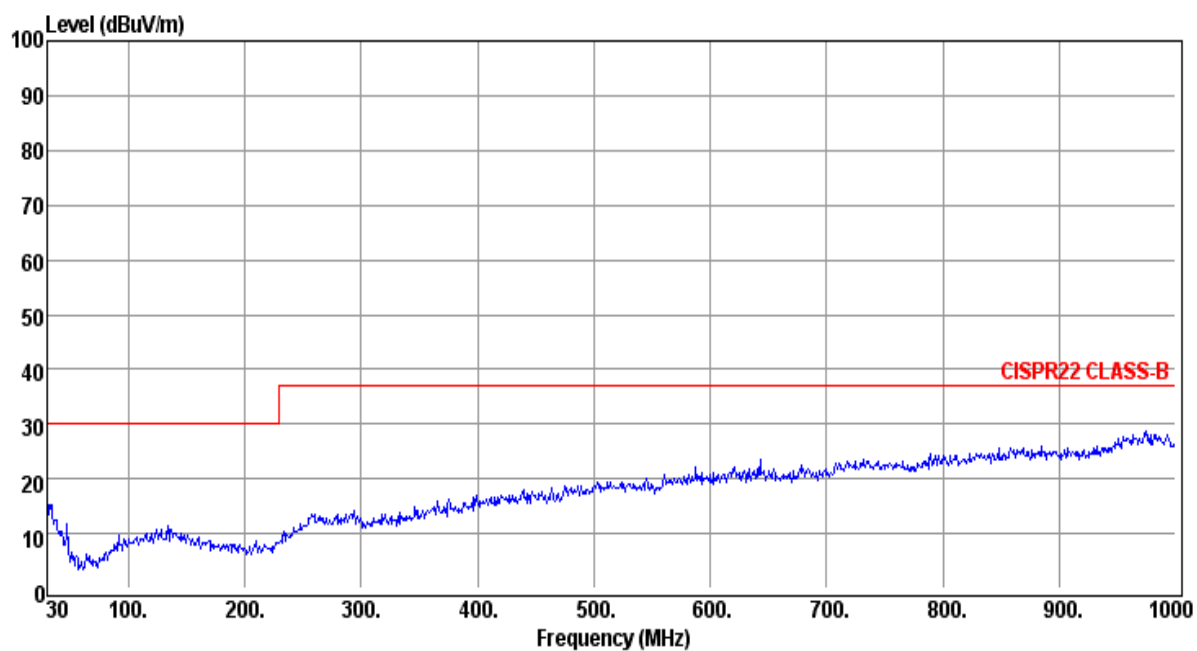
Remark:

1. Negative number in the margin column indicates the amount (in dB) that the recorded emission is below the limit.

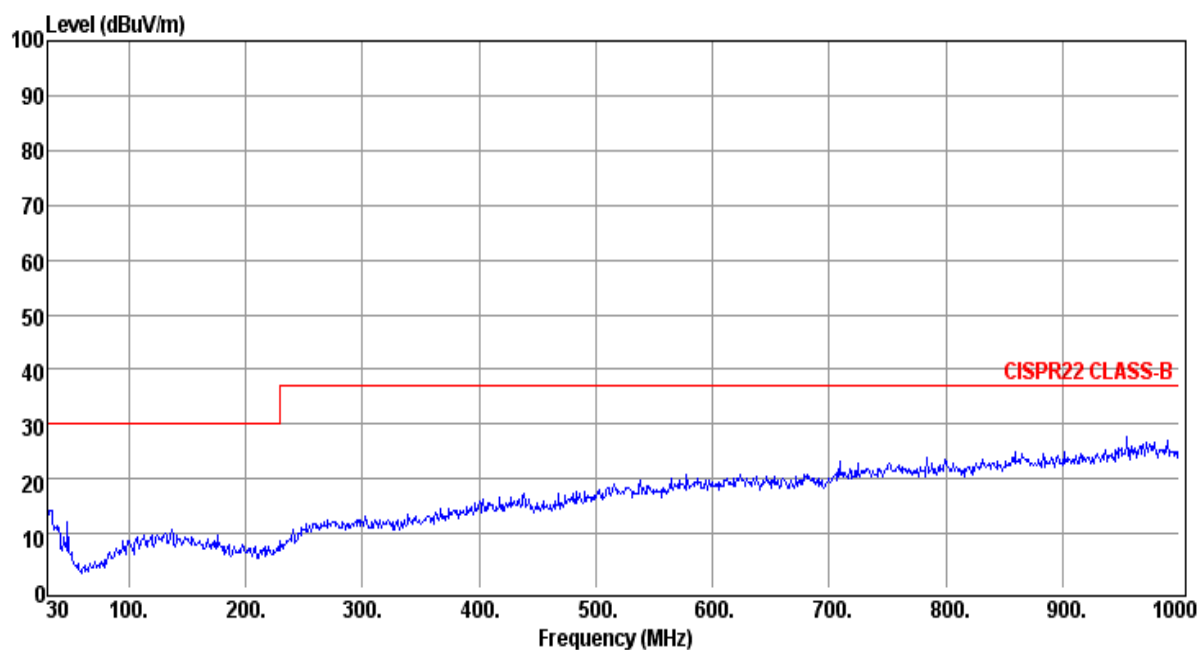
4.7. NOISE FLOOR MEASUREMENT

4.7.1. FREQUENCY RANGE (30MHz~1000MHz)

Vertical

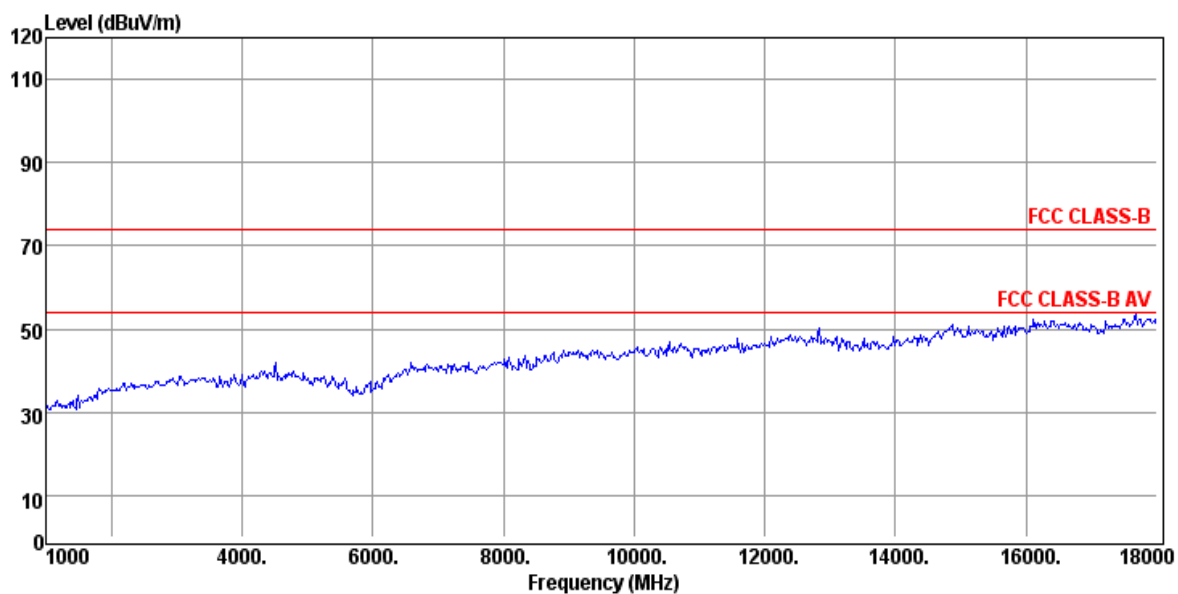


Horizontal

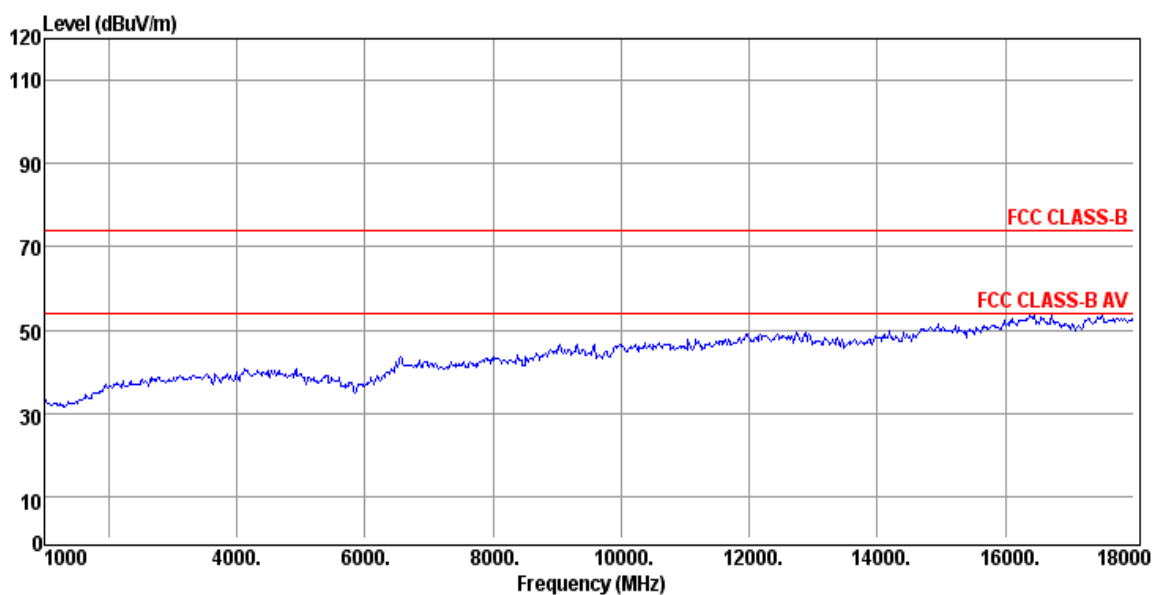


4.7.2. FREQUENCY RANGE (ABOVE 1GHz)

Vertical



Horizontal



4.8. CALCULATION

The field strength is calculated by adding the Total Factor to the receiver or analyzer reading to determine the resultant field strength.

The Total Factor is determined by adding the antenna factor and the loss of the cables connection the antenna to the receiver.

Front-end amplifier gain – if any – is accounted for in the receiver reading.

The basic equation with a sample calculation is as follows:

$$FS \text{ (dB}\mu\text{V/m)} = RA \text{ (dB}\mu\text{V)} + TF \text{ (dB/m)}$$

The sum of Total Factor is measured mean Antenna Factor, Cable Loss Factor and Amplifier Gain

$$TF = AF + CL - AG$$

FS = Field Strength

AF = Antenna Factor

CL = Cable Loss Factor

RA = Receiver Amplitude

AG = Amplifier Gain

The difference between Field Strength and Test Limit, Delta (dB) = FS - Limit [dB($\mu\text{V/m}$)]

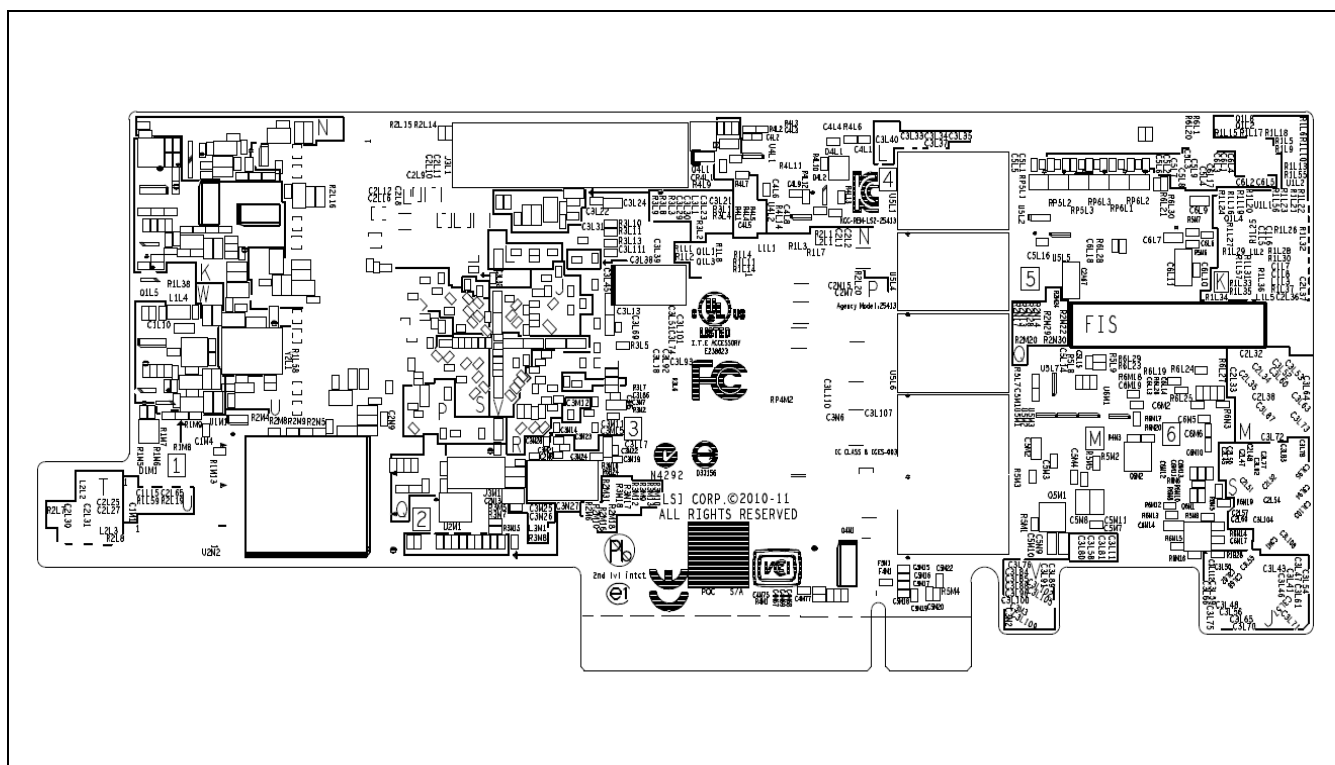
Assume a receiver reading of 22dB μV is obtained.

The Antenna factor of 7.4dB and a cable loss factor of 1.1dB are added to yield 8.5dB Total Factor.

The Calculated Field Strength is the sum of $22 + 8.5 = 30.5\text{dB}\mu\text{V/m}$.

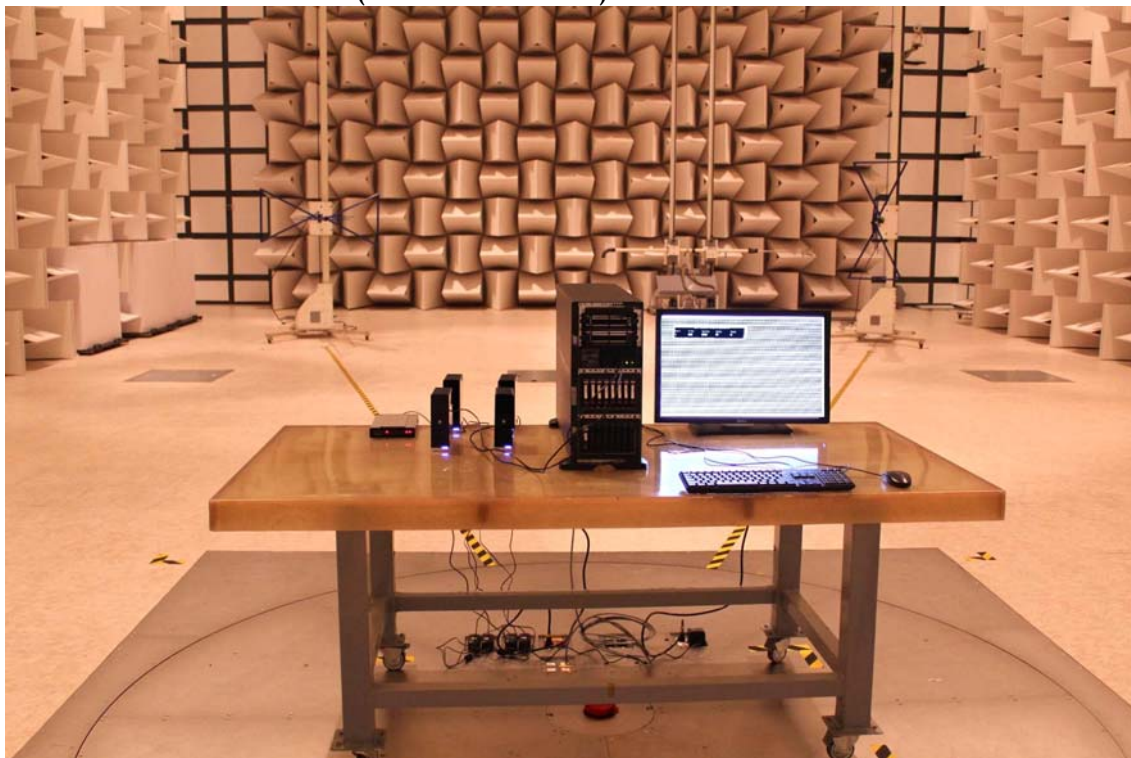
All values are listed as dB, either referenced to 1 μV or 1 $\mu\text{V/m}$.

5. PRODUCT LABELING

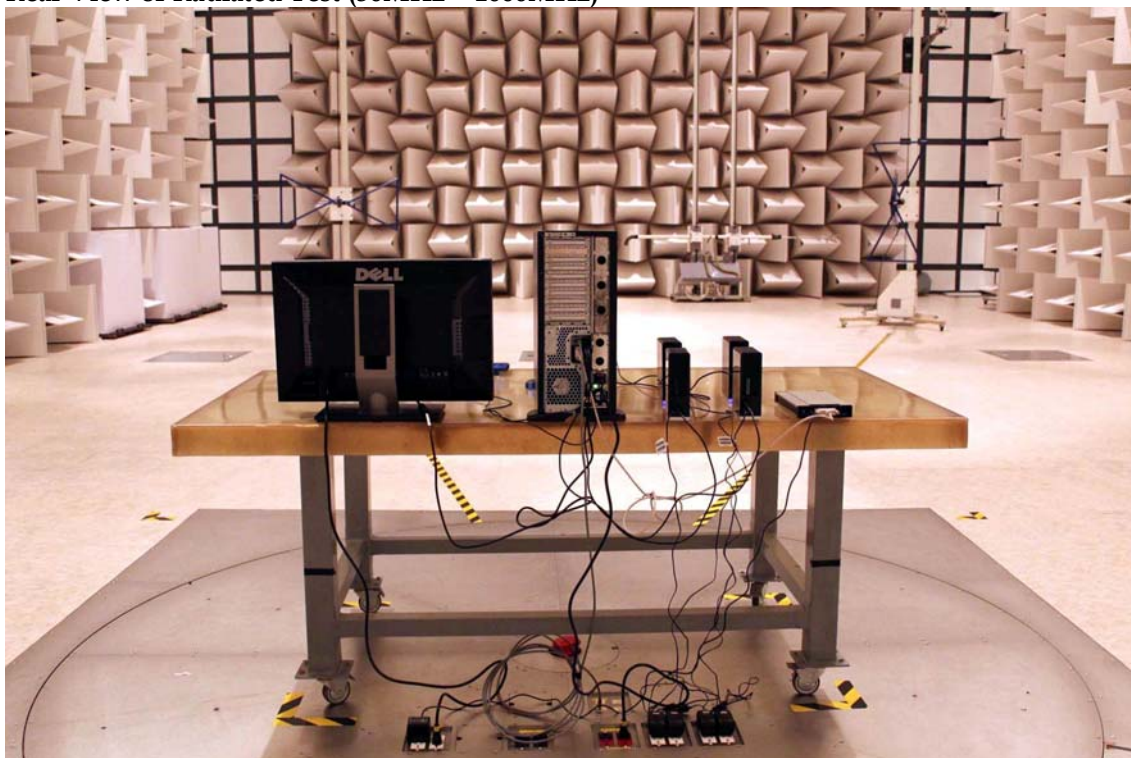


6. PHOTOGRAPHS

Front View of Radiated Test (30MHz ~ 1000MHz)



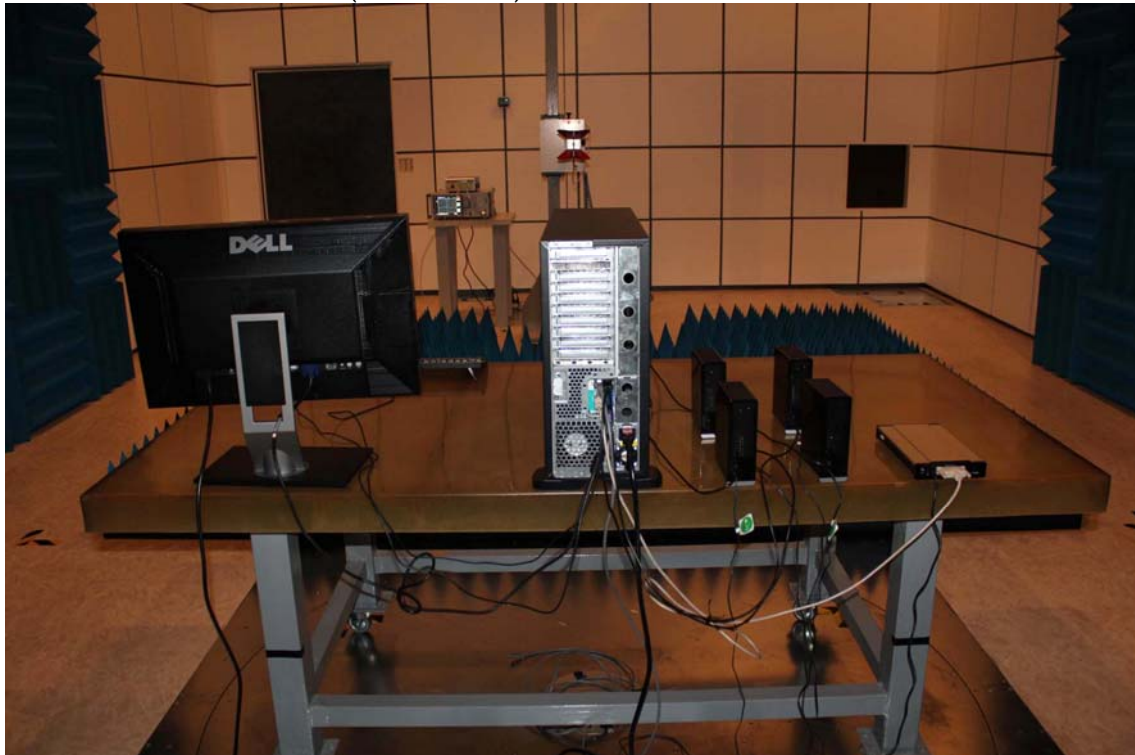
Rear View of Radiated Test (30MHz ~ 1000MHz)



Front View of Radiated Test (Above 1GHz)



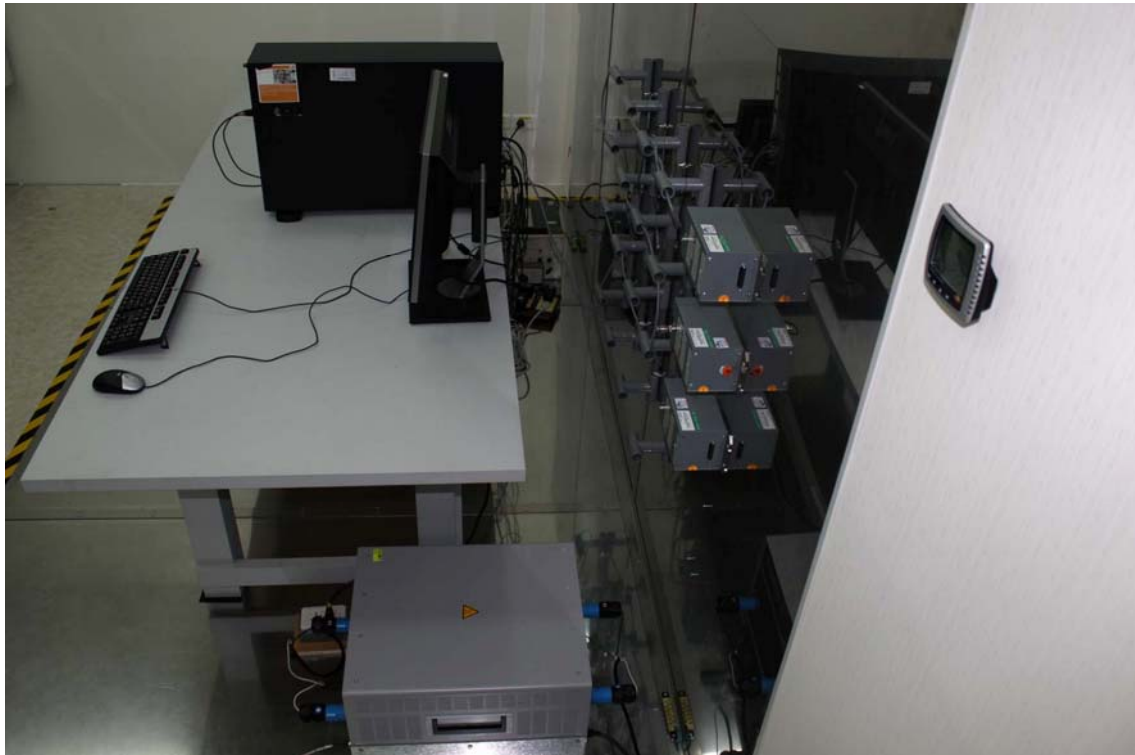
Rear View of Radiated Test (Above 1GHz)



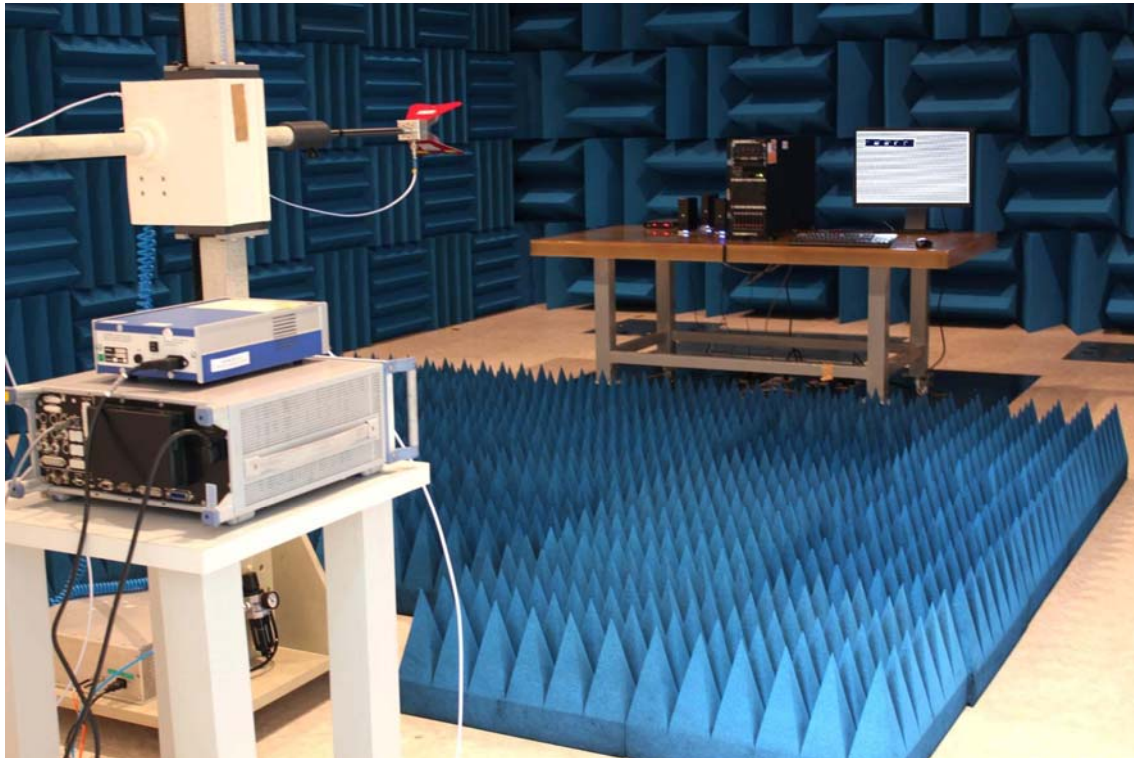
Front View of Conducted Test



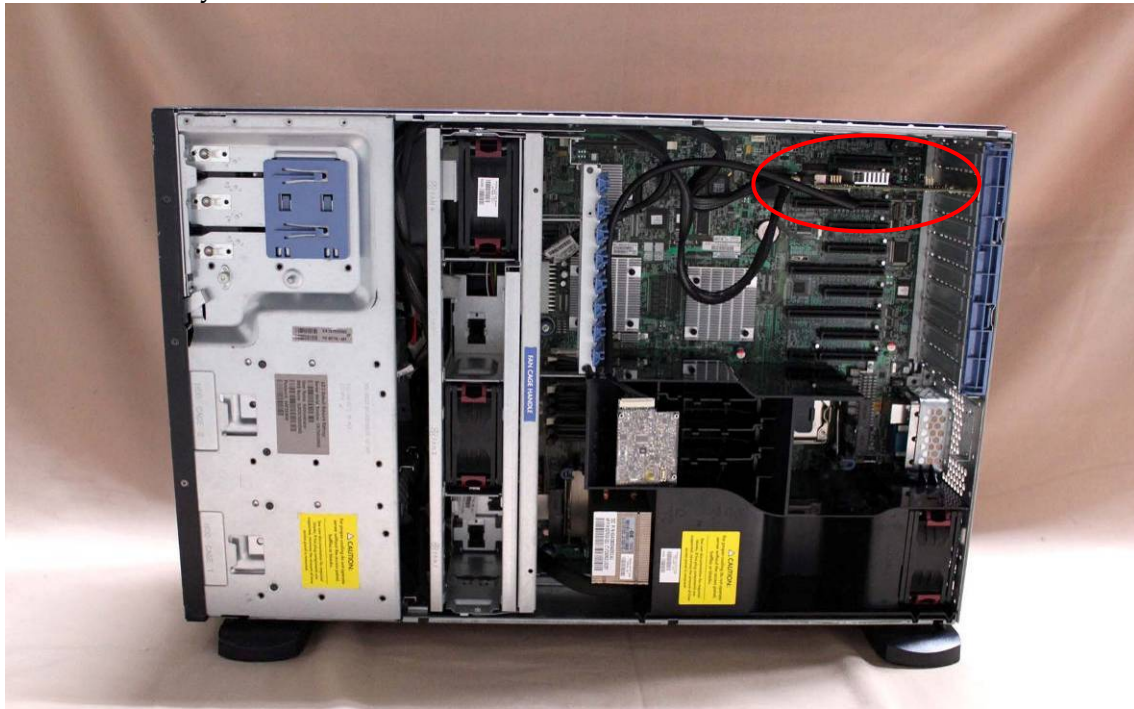
Side View of Conducted Test



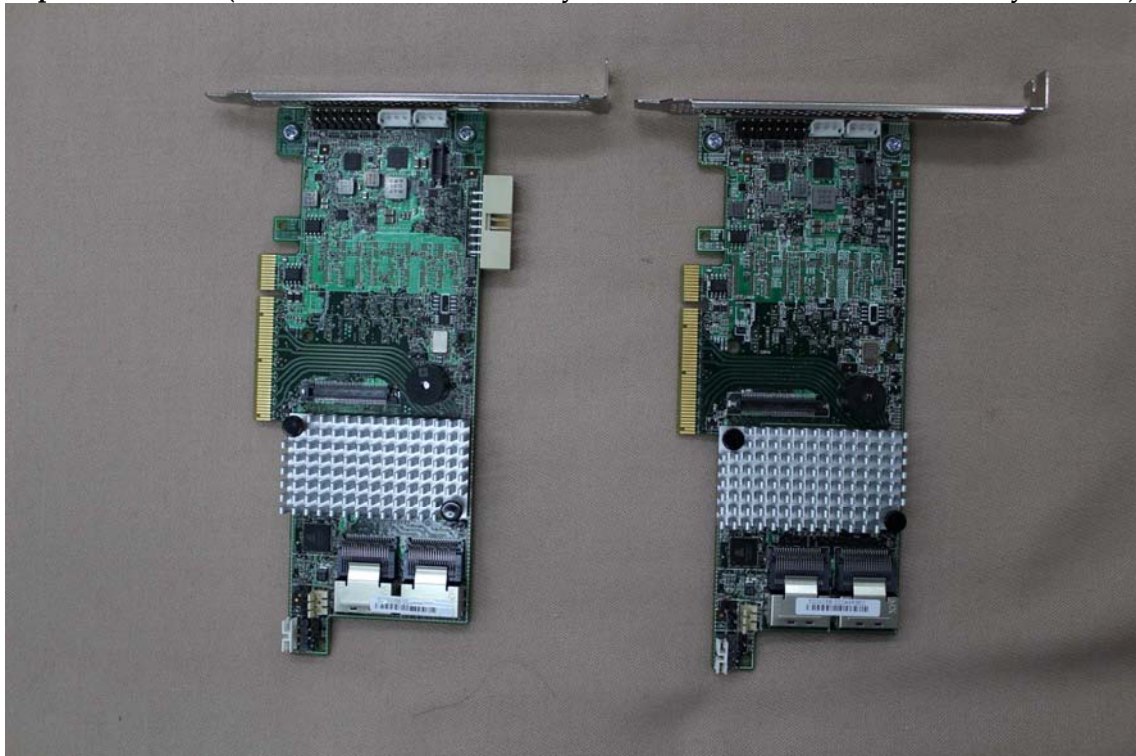
EUT, Antenna and Absorber



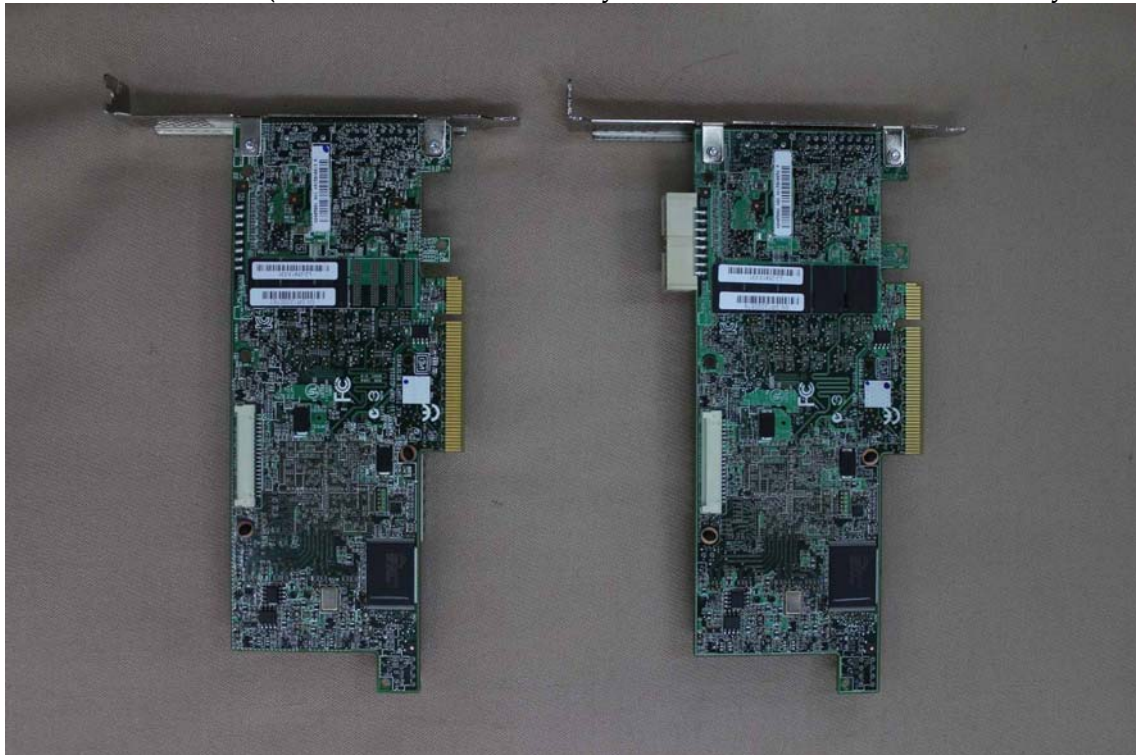
EUT in HOST System



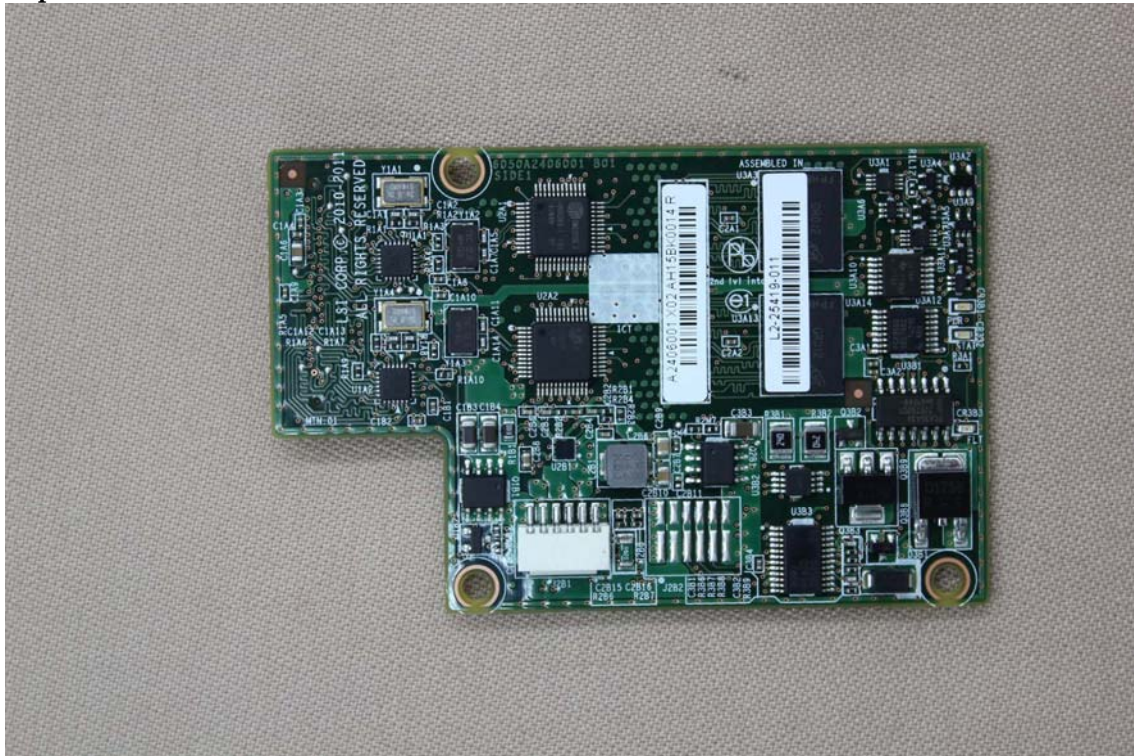
Top View of EUT (with DDR3 512MB Memory Module & with DDR3 1GB Memory Module)



Bottom View of EUT (with DDR3 512MB Memory Module & with DDR3 1GB Memory Module)



Top View of Flash Module



Bottom View of Flash Module



