



EMC TEST REPORT (Class B)

REGULATORY MODEL NUMBER: 25190

REGULATORY TYPE: N/A

REPORT NUMBER: TA13027F

ISSUED DATE: September 25, 2013

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, 33547 Tachi, Taoyuan, Taiwan

Receipt date of EUT: September 03, 2013

Date of testing: September 03, 2013 ~ September 11, 2013

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.

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1. PRODUCT INFORMATION

1.1. GENERAL DESCRIPTION

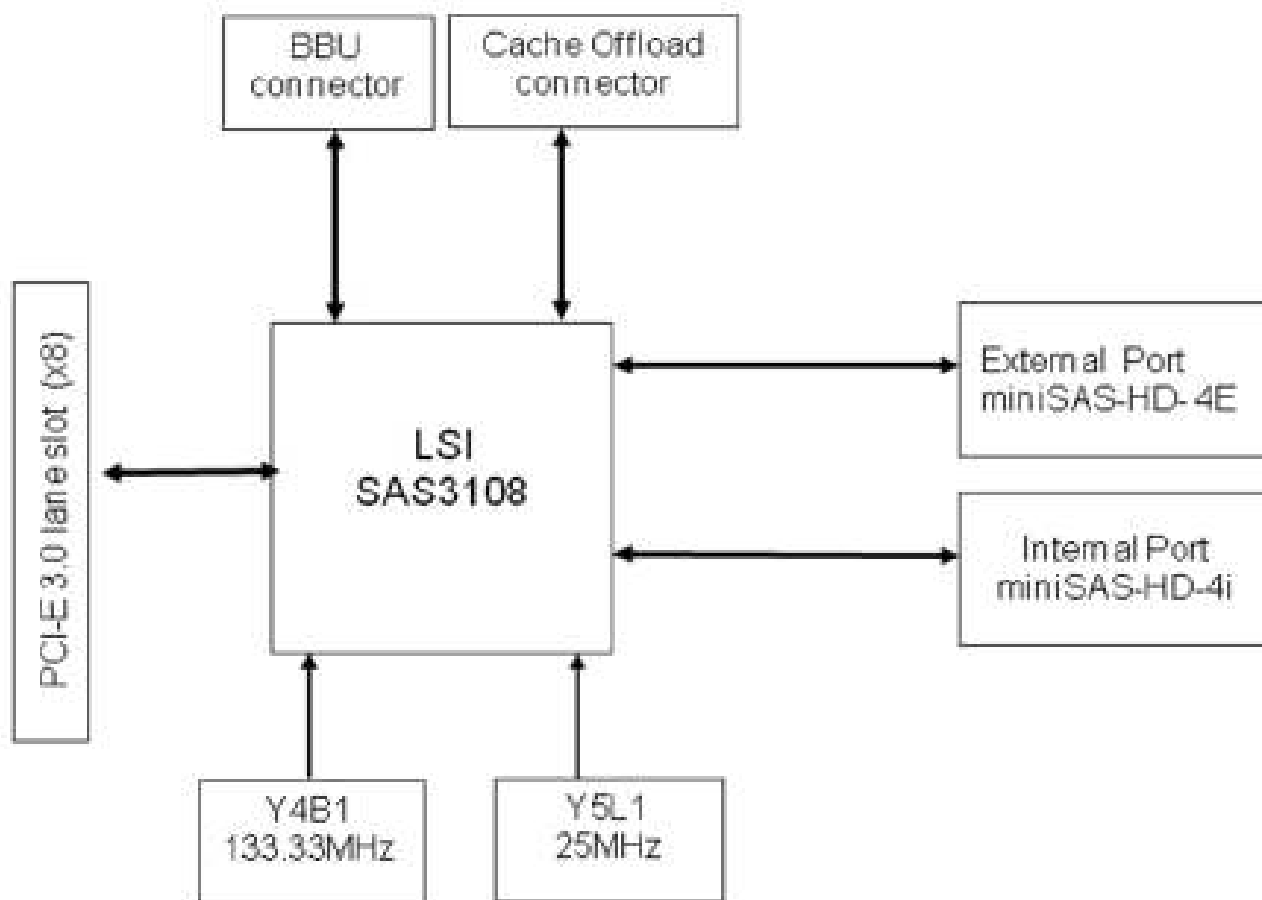
Product Type:	PCI-E SAS HBA Card (Host Bus Adaptor Card)
Regulatory Model:	25190
Regulatory Type:	N/A
Serial Number:	SR316P0026
Firmware Version:	24.0.1.0063
Host System:	ML350p Gen8 (Server)
Host Operating System:	Windows Server 2008 R2
Condition:	Engineering Sample
Brand:	LSI
Applicant:	LSI Corporation 3718 N. Rock Road Wichita, KS 67226 USA
Issued By:	Inventec Corporation (Taoyuan) EMC Lab
Standard:	FCC CFR 47 Part 15, Subpart B CISPR 22:2008 Canadian ICES-003:2012 Class B ANSI C63.4:2009

1.2. PRODUCT FEATURE

Feature Description
• LSI SAS3108 SAS Interface Controller • PCI Express 3.0 x8 lanes • One internal vertical mini SAS HD connector • One external mini SAS HD connector • On board DDR3 1866MHz Memory • Cache retention through "BBU Option" or "Cache Offload Option Using Supercaps" • Low profile and full height bracket

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	Manufacturer	Model / Part Number	Serial Number
PCI-E SAS HBA Card	LSI	25190	SR316P0026
Daughter Card (with Supercap support)	LSI	H2-25444-051	SR244P0024
iBBU09 Battery	LSI	BAT1S1P-A	SY25112736MA
Tecate Battery (Supercap)	TECATE	TPL 13.5V 6.4F	ST21301962
ML350p Gen8 Host System for conducted and radiated emission tests			
ML350p Gen8 Host System	HP	TPS-F003	SGH22689K1
Motherboard	HP	FXNESSN-002	PCUXA0BTM2O0AI
Memory (DDR3 4GB)	HP	RBYYU8DXR2V09C	647647-071
CPU	Intel	E5-2603	1.80GHz, 4 Core
HDD (2.5" SAS 300GB), for OS	HP	EG0300FBDBR	THH237I447
HDD (2.5" SAS 600GB)	HP	EG0600FBDSR	PHD219E117
			PHD219E1CZ
			PHD219E1CU
			PHD219E1BN
Power Supply (1200W)	HP (Delta)	HSTNS-PD30 (DPS-1200SB A)	5BXRC0B4D1L10V

Note: Tecate Battery (Supercap) must be attached on EUT through daughter card while iBBU09 battery links to EUT directly.

2. TEST INFORMATION

2.1. TEST MODE DESCRIPTION

The EUT (in Host: ML350p Gen8) has been pre-tested for conducted and radiated emission tests as the following configurations:

Component	Manufacturer	Type / Specification	SKU	
			1	2
PCI-E SAS HBA Card (EUT)	LSI	25190	*1	*1
Daughter Card (with Supercap support)	LSI	H2-25444-051	*1	-
iBBU09 Battery	LSI	BAT1S1P-A	-	*1
Tecate Battery (Supercap)	TECATE	TPL 13.5V 6.4F	*1	-
Components in ML350p Gen8 Host System for conducted and radiated emission tests				
Motherboard	HP	FXNESSN-002	*1	*1
Memory	HP	4GB, DDR3 DIMM	*1	*1
CPU	Intel	1.8GHz, 4 Core	*1	*1
HDD	HP	2.5" SAS HDD, 300GB	*1	*1
	HP	2.5" SAS HDD, 600GB	*4	*4
Power Supply	HP (Delta)	HSTNS-PD30 (1200W)	*1	*1

Note:

1. According to pre-test data, SKU 1 was the worst combination for both conducted emission test and radiated emission test.

2.2. EUT OPERATING CONDITIONS

Programs should be run on EUT during the test are listed below:

- Run the program "WinEMI" on host server in Windows OS. Access "H" pattern among the EUT, peripherals, and all the HDDs.
- Run the program "Smasher.exe" on host server. Access data between the EUT and all the HDDs.

2.3. SUPPORT TEST PERIPHERALS & CABLE CONFIGURATION

2.3.1. FOR CONDUCTED EMISSION TEST

Test Peripherals							Cables		
No.	Name	Brand	Model	Serial Number	FCC ID or DoC	I/O Port	Shielded	LTH	Qty
1	Monitor	HP	ZR24W	CNT04516KN	DoC	VGA	Yes	1.85m	1
2	USB Keyboard	HP	KU-0841	CD00904657	DoC	USB	Yes	1.8m	1
3	USB Mouse	HP	M-UAE96	FATSK0K5BZF35U	DoC	USB	Yes	1.8m	1
4	USB HDD	PQI	H566	PQ1011-0178024	DoC	USB	Yes	1.0m	1
5	USB HDD	PQI	H566	PQ1011-0178018	DoC	USB	Yes	1.0m	1
6	USB HDD	PQI	H566	PQ1011-0178021	DoC	USB	Yes	1.0m	1
7	USB HDD	PQI	H566	PQ1011-0178006	DoC	USB	Yes	1.0m	1
8	USB HDD	PQI	H566	PQ1011-0178003	DoC	USB	Yes	1.0m	1
9	USB HDD	PQI	H566	PQ1011-0178012	DoC	USB	Yes	1.0m	1
10	Modem	Hayes	3124US	A01031003415	BFJ9D9231AA	Series	Yes	1.8m	1
11	HUB	D-Link	DGS-1024D	DRC5BAC000184	DoC	RJ45	No	5.0m	5
12	Client (Server) for SAS port	HP	TPS-F003	SGH22689JY	DoC	SAS	Yes	10.0m	1
13	Power	-	-	-	-	Power	No	1.8m	1

Note: The item 12 is test peripheral of EUT and the others listed above are test peripherals of ML350p Gen8 Host System for conducted and radiated emission (above 1GHz) tests.

2.3.2. FOR RADIATED EMISSION (30MHz~1000MHz) TEST

Test Peripherals							Cables		
No.	Name	Brand	Model	Serial Number	FCC ID or DoC	I/O Port	Shielded	LTH	Qty
1	Monitor	HP	ZR24W	CNT04516KN	DoC	VGA	Yes	1.85m	1
2	USB Keyboard	HP	KU-0841	CD00904657	DoC	USB	Yes	1.8m	1
3	USB Mouse	HP	M-UAE96	FATSK0K5BZF35U	DoC	USB	Yes	1.8m	1
4	USB HDD	DELL	RD1000	85550124615	DoC	USB	Yes	1.8m	1
5	USB HDD	DELL	RD1000	85550124254	DoC	USB	Yes	1.8m	1
6	USB HDD	DELL	RD1000	85550124276	DoC	USB	Yes	1.8m	1
7	USB HDD	Seagate	9ZR8N1-500	NA0H1F3R	DoC	USB	Yes	1.0m	1
8	USB HDD	WD	WDBKXH5000ASL-03	WX41E72EH737	DoC	USB	Yes	1.0m	1
9	USB HDD	WD	WDBKXH5000ASL-03	WX81A23P5878	DoC	USB	Yes	1.0m	1
10	Modem	Hayes	3124US	A01031003415	BFJ9D9231AA	Series	Yes	1.8m	1
11	Client (Server) for RJ45 ports	HP	TPS-F003	SGH22689JY	DoC	RJ45	No	5.0m	5
12	Client (Server) for SAS port					SAS	Yes	10.0m	1
13	Power	-	-	-	-	Power	No	1.8m	1

Note: The item 12 is test peripheral of EUT and the others listed above are test peripherals of ML350p Gen8 Host System for radiated emission (30MHz~1000MHz) test.

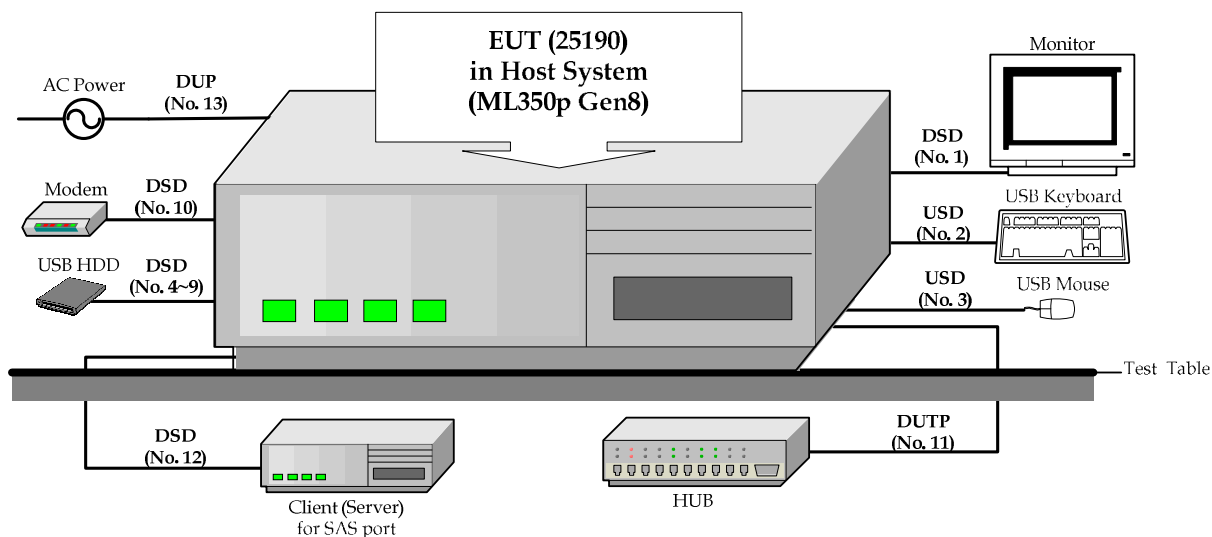
2.3.3. FOR RADIATED EMISSION (ABOVE 1GHz) TEST

Test Peripherals							Cables		
No.	Name	Brand	Model	Serial Number	FCC ID or DoC	I/O Port	Shielded	LTH	Qty
1	Monitor	HP	ZR24W	CNT04516KN	DoC	VGA	Yes	1.85m	1
2	USB Keyboard	HP	KU-0841	CD00904469	DoC	USB	Yes	1.8m	1
3	USB Mouse	HP	M-UAE96	FATSK0K5BZF33K	DoC	USB	Yes	1.8m	1
4	USB HDD	PQI	H566	PQ1011-0178024	DoC	USB	Yes	1.0m	1
5	USB HDD	PQI	H566	PQ1011-0178018	DoC	USB	Yes	1.0m	1
6	USB HDD	PQI	H566	PQ1011-0178021	DoC	USB	Yes	1.0m	1
7	USB HDD	PQI	H566	PQ1011-0178006	DoC	USB	Yes	1.0m	1
8	USB HDD	PQI	H566	PQ1011-0178003	DoC	USB	Yes	1.0m	1
9	USB HDD	PQI	H566	PQ1011-0178012	DoC	USB	Yes	1.0m	1
10	Modem	Hayes	3124US	A01031003415	BFJ9D9231AA	Series	Yes	1.8m	1
11	HUB	D-Link	DGS-1024D	DRC5BAC000184	DoC	RJ45	No	5.0m	5
12	Client (Server) for SAS port	HP	TPS-F003	SGH22689JY	DoC	SAS	Yes	10.0m	1
13	Power	-	-	-	-	Power	No	1.8m	1

Note: The item 12 is test peripheral of EUT and the others listed above are test peripherals of ML350p Gen8 Host System for conducted and radiated emission (above 1GHz) tests.

2.4. BLOCK DIAGRAM OF CONNECTIONS BETWEEN EUT AND TEST PERIPHERAL

2.4.1. FOR CONDUCTED EMISSION TEST



Legend:

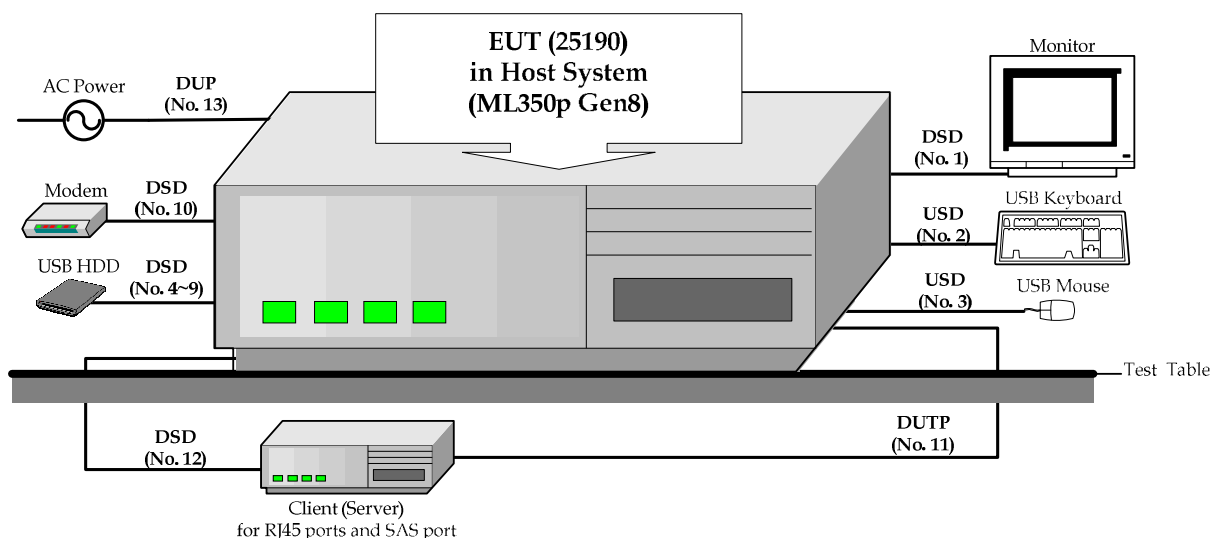
USD = Undetachable Shielded Data cable (No. refer to Sec. 2.3.1.)

DSD = Detachable Shielded Data cable (No. refer to Sec. 2.3.1.)

DUP = Detachable Unshielded Power cord (No. refer to Sec. 2.3.1.)

DUTP = Detachable Unshielded Twisted Pair cable (No. refer to Sec. 2.3.1.)

2.4.2. FOR RADIATED EMISSION (30MHz~1000MHz) TEST



Legend:

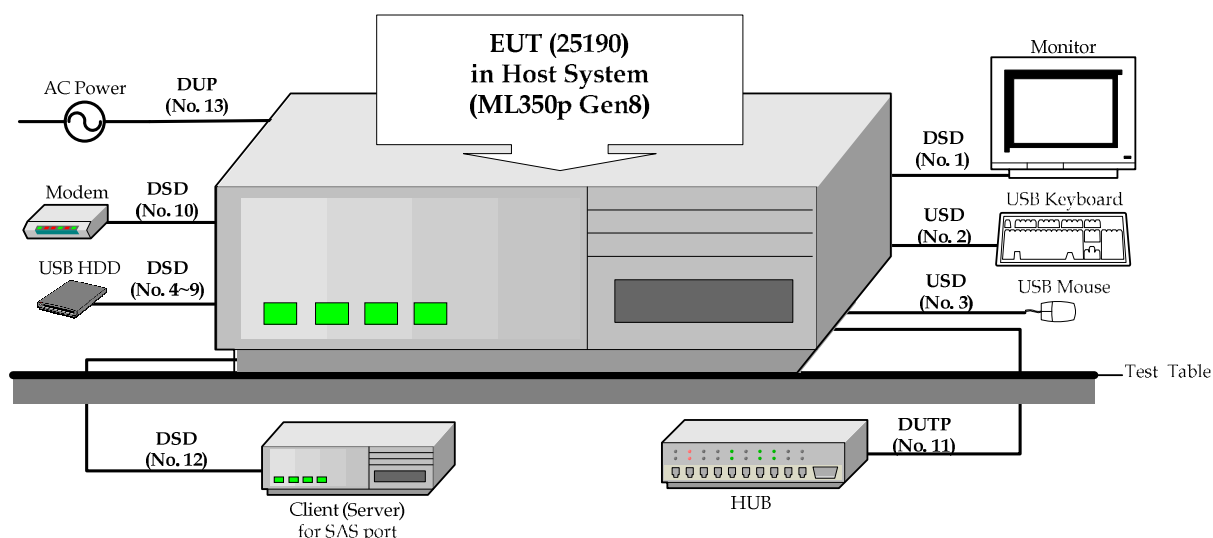
USD = Undetachable Shielded Data cable (No. refer to Sec. 2.3.2.)

DSD = Detachable Shielded Data cable (No. refer to Sec. 2.3.2.)

DUP = Detachable Unshielded Power cord (No. refer to Sec. 2.3.2.)

DUTP = Detachable Unshielded Twisted Pair cable (No. refer to Sec. 2.3.2.)

2.4.3. FOR RADIATED EMISSION (ABOVE 1GHz) TEST



Legend:

USD = Undetachable Shielded Data cable (No. refer to Sec. 2.3.3.)

DSD = Detachable Shielded Data cable (No. refer to Sec. 2.3.3.)

DUP = Detachable Unshielded Power cord (No. refer to Sec. 2.3.3.)

DUTP = Detachable Unshielded Twisted Pair cable (No. refer to Sec. 2.3.3.)

2.5. 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 CISPR 22:2008 Canadian ICES-003:2012 Class B	Conducted Emission for Mains Ports	PASS	Worst emission frequency is <u>9.799MHz</u> at <u>Line</u> And minimum passing margin is <u>-8.25dB</u> , <u>Average</u>	A-Kuan Yu <i>A-Kuan Yu</i>
	Radiated Emission (30MHz~1000MHz)	PASS	Worst emission frequency is <u>1000.0MHz</u> at <u>Vertical</u> And minimum passing margin is <u>-3.41dB</u> , <u>Quasi-Peak</u> Height of antenna is <u>1.28m</u> Angle of turntable is <u>190deg.</u>	A-Kuan Yu <i>A-Kuan Yu</i>
	Radiated Emission (Above 1GHz)	PASS	Worst emission frequency is <u>8999.73MHz</u> at <u>Vertical</u> And minimum passing margin is <u>-3.10dB</u> , <u>Average</u> Height of antenna is <u>1.67m</u> Angle of turntable is <u>352deg.</u>	A-Kuan Yu <i>A-Kuan Yu</i>

Note: The EUT's highest operating frequency is 6GHz. Radiated Emission need to be measured up to 30GHz.

2.6. 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.4	2.50dB
Radiated Emission	30MHz ~ 1000MHz	10m Chamber	4.54dB
	1GHz ~ 6GHz	3m Chamber No.2	5.11dB
	Above 6GHz	3m Chamber No.2	5.38dB

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

2.7. TEST FACILITY

The Inventec Corp. (Taoyuan) EMC lab located at:

No. 349, Section 2, Jen-Ho Road, 33547 Tachi, Taoyuan, Taiwan

The Lab has a turntable with a diameter at maximum 3 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, NEMKO, TAF (BSMI) and VCCI.

EMC Laboratory Accreditation:

NVLAP Lab Code: 200140-0

Nemko ELA No. 127

BSMI EMI Testing Lab: SL2-IN-E-0009

TAF Accreditation No. 1119

VCCI Registration No. C-3891, T-2011 (SR No.1)

C-3951, T-1043 (SR No.2)

C-4179, T-1210 (SR No.3)

C-4138, T-1172 (SR No.4)

C-4178, T-1209 (SR No.5)

R-3519, G-336 (10m Chamber)

R-3477, G-302 (3m Chamber No.1)

R-3540, G-346 (3m Chamber No.2)

R-3696, G-444 (3m Chamber No.3)

2.8. TEST SETUP

2.8.1. TEST METHODOLOGY

- A. Both conducted and radiated tests were performed according to the following methods and procedures:
- ANSI C63.4
Methods of Measurement of Radio-Noise Emissions for Low Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz.
 - CISPR 22
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

2.8.2. MODIFICATIONS IMPLEMENTED FOR COMPLIANCE

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

2.8.3. 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.

2.8.4. 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.

2.8.5. TEST CONDITION

2.8.5.1 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 3.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum conducted emissions.

2.8.5.2 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 4.3.

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:

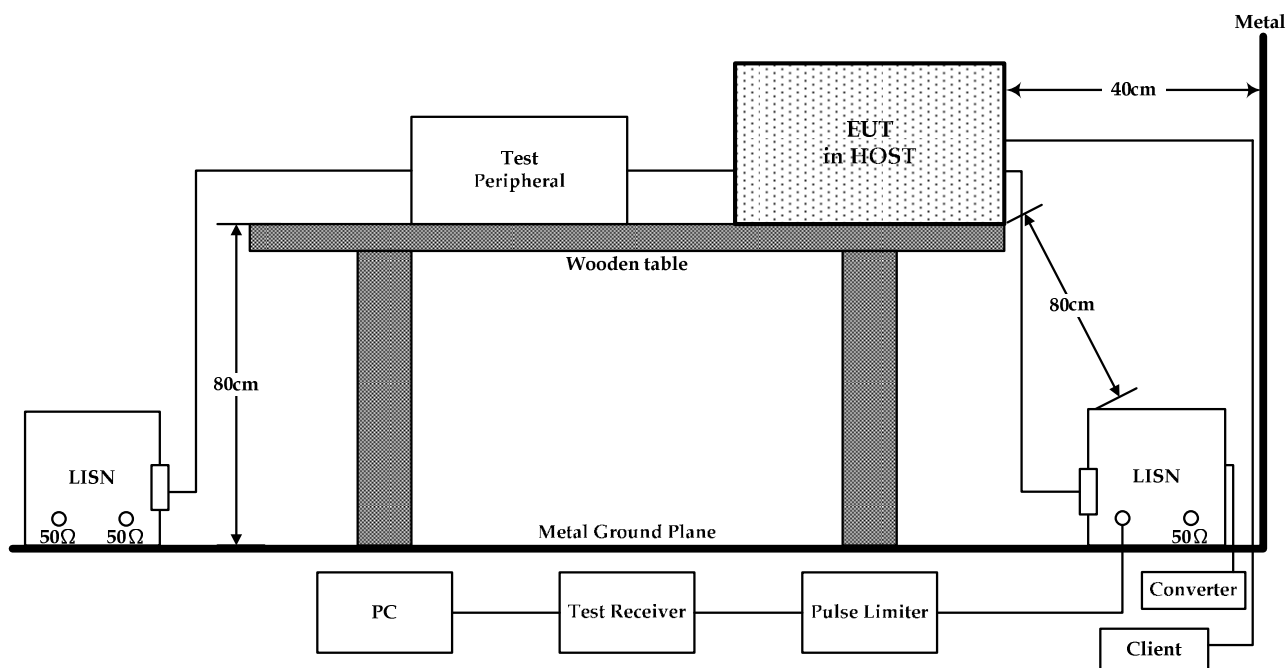
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 ~ 0.50MHz.

3.2. TEST INSTRUMENTS

Name	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	Rohde & Schwarz	ESCI 7	100766	01-Oct-2012	01-Oct-2013
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	101168	13-Jun-2013	13-Jun-2014
LISN	Rohde & Schwarz	ENV216	101062	12-Jun-2013	12-Jun-2014
LISN	Rohde & Schwarz	ENV216	101103	19-Dec-2012	19-Dec-2013
RF Cable	Harbour Industries	RG400	N/A	16-Nov-2012	16-Nov-2013
EMI Test Program	Audix	e3(Ver. 6)	N/A	N/A	N/A

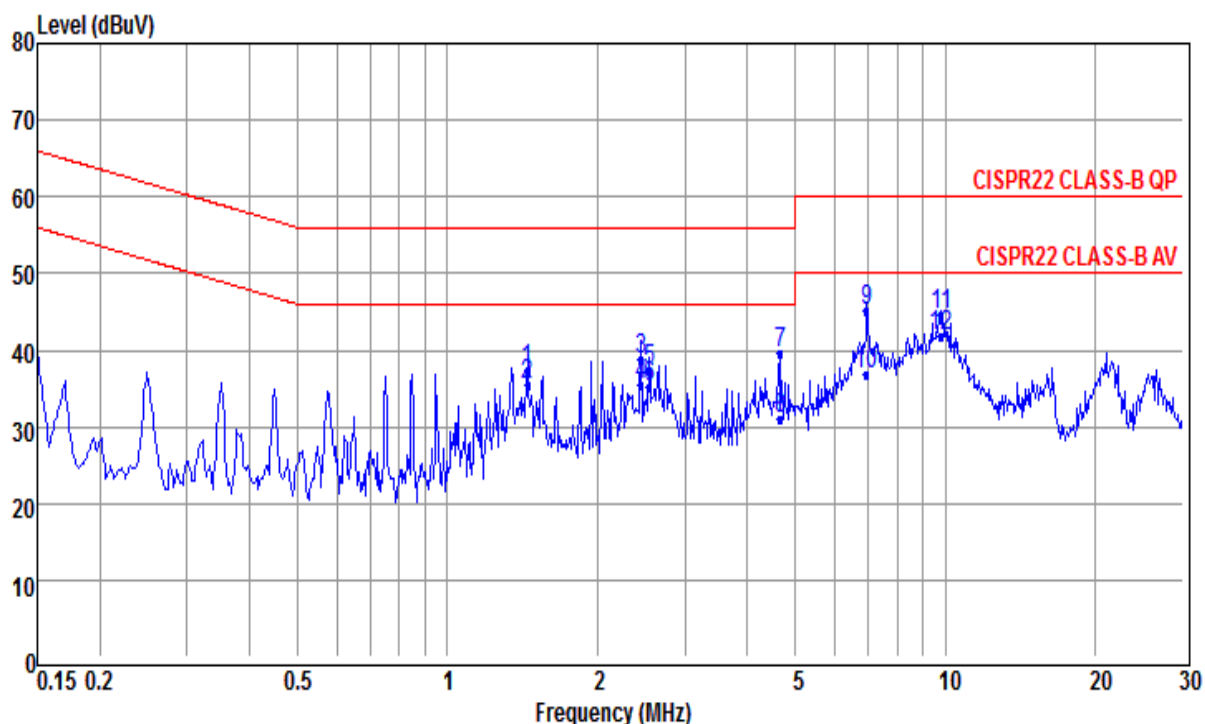
Note: The test equipments used are calibrated and can be traced to National ITRI and International Standards.

3.3. BLOCK DIAGRAM OF TEST SETUP



3.4. TEST DATA

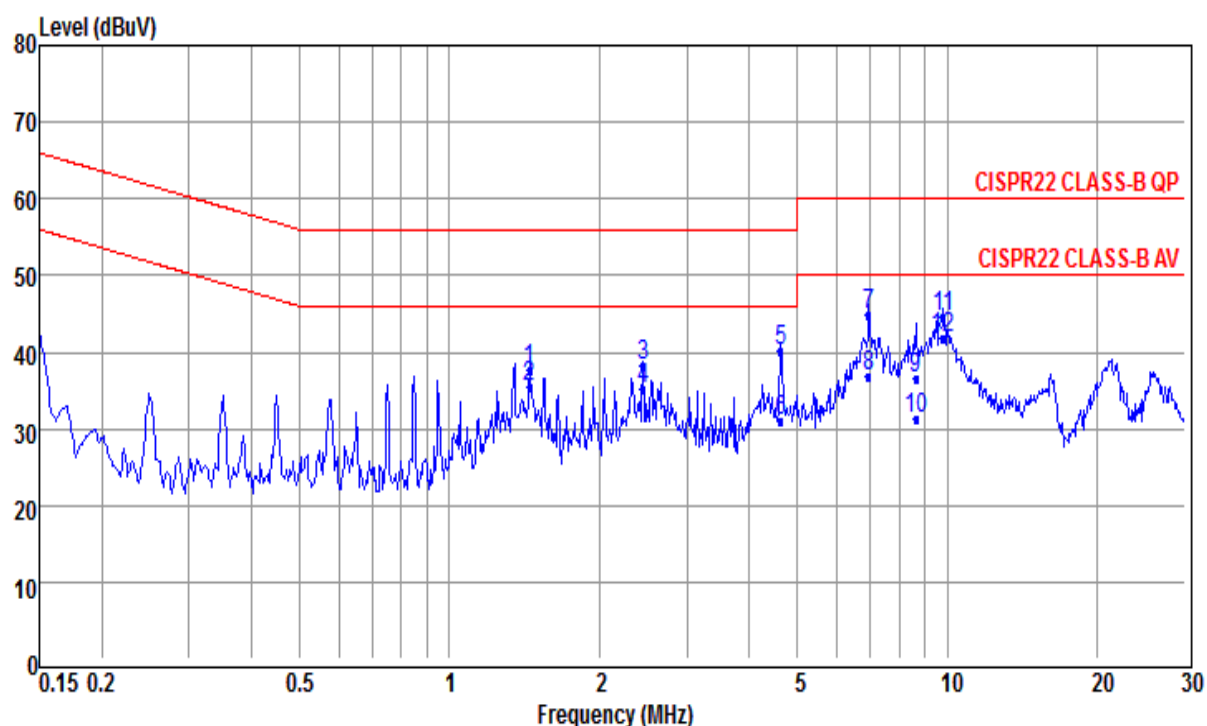
Data Log: 3413090706	Date of Test: Sep 07, 2013	Tested By: A-Kuan Yu
EUT: 25190	Main: 120V/60Hz	Test Mode: SKU 1
Temperature (°C): 24	Humidity (%): 61	Frequency Range: 0.15MHz~30MHz



Item (Mark)	Freq (MHz)	Read Level dBμV	Total Factor dB	Level dBμV	Limit Line dB(μV)	Over Limit dB	Detector	Phase
1	1.448	17.76	19.67	37.43	56.00	-18.57	QP	Line
2	1.448	15.69	19.67	35.36	46.00	-10.64	Average	Line
3	2.449	19.09	19.71	38.80	56.00	-17.20	QP	Line
4	2.449	15.80	19.71	35.51	46.00	-10.49	Average	Line
5	2.546	17.73	19.71	37.44	56.00	-18.56	QP	Line
6	2.546	15.34	19.71	35.05	46.00	-10.95	Average	Line
7	4.656	19.72	19.80	39.52	56.00	-16.48	QP	Line
8	4.656	11.26	19.80	31.06	46.00	-14.94	Average	Line
9	6.954	25.08	19.97	45.05	60.00	-14.95	QP	Line
10	6.954	16.94	19.97	36.91	50.00	-13.09	Average	Line
11	9.799	24.57	20.11	44.68	60.00	-15.32	QP	Line
12	9.799	21.64	20.11	41.75	50.00	-8.25	Average	Line

Remark:

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



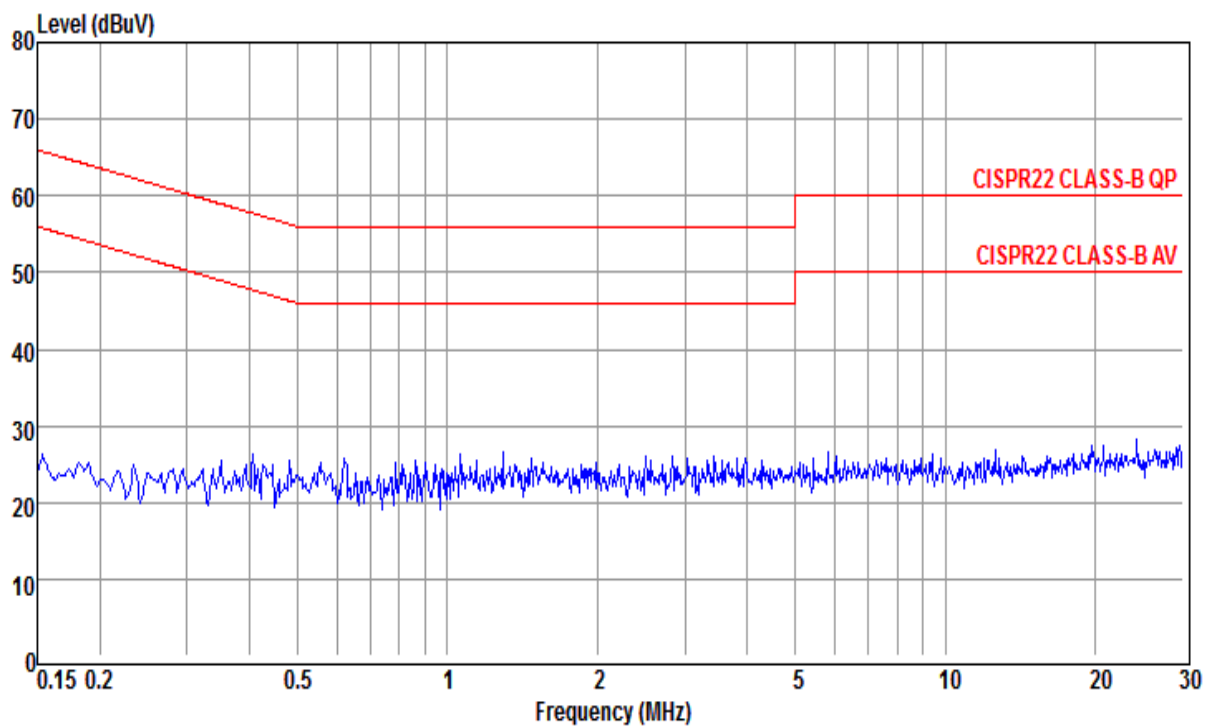
Item (Mark)	Freq (MHz)	Read Level dBμV	Total Factor dB	Level dBμV	Limit Line dB(μV)	Over Limit dB	Detector	Phase
1	1.448	17.87	19.66	37.53	56.00	-18.47	QP	Neutral
2	1.448	15.87	19.66	35.53	46.00	-10.47	Average	Neutral
3	2.449	18.63	19.70	38.33	56.00	-17.67	QP	Neutral
4	2.449	15.51	19.70	35.21	46.00	-10.79	Average	Neutral
5	4.625	20.35	19.79	40.14	56.00	-15.86	QP	Neutral
6	4.625	11.13	19.79	30.92	46.00	-15.08	Average	Neutral
7	6.953	24.99	19.96	44.95	60.00	-15.05	QP	Neutral
8	6.953	16.86	19.96	36.82	50.00	-13.18	Average	Neutral
9	8.637	16.39	20.06	36.45	60.00	-23.55	QP	Neutral
10	8.637	11.12	20.06	31.18	50.00	-18.82	Average	Neutral
11	9.799	24.57	20.11	44.68	60.00	-15.32	QP	Neutral
12	9.799	21.61	20.11	41.72	50.00	-8.28	Average	Neutral

Remark:

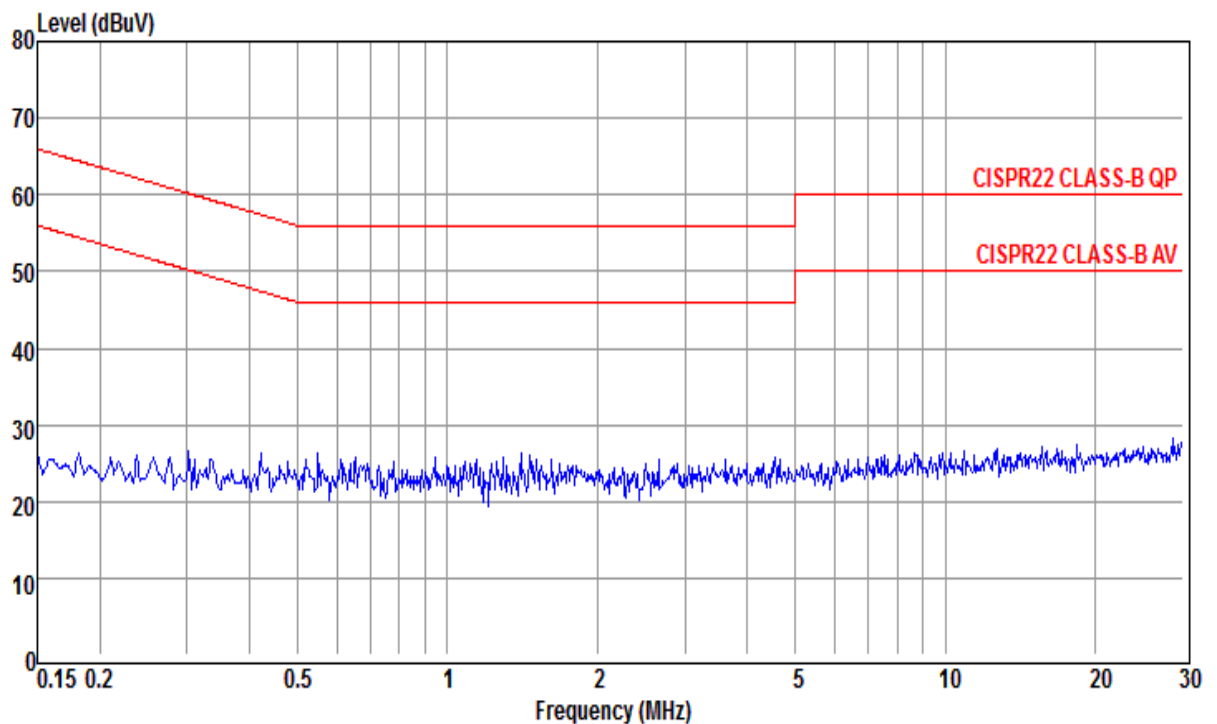
1. Negative number in the margin column indicates the amount (in dB) that the recorded emission is below the limit.

3.5. NOISE FLOOR MEASUREMENT

Line



Neutral



3.6. CALCULATION

1. Freq. (MHz), means Conducted Emission frequency.
2. Reading Level (dB μ V), means the reading of Analyzer or Test Receiver.
3. Total Factor (dB), means the value of LISN(or ISN) Loss + Cable Loss + Pulse Limiter.
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 22:2008, which was specified in FCC Part 15B 15.109(g). Also the limits of CISPR 22:2008 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: The lower limit shall apply at the transition frequency.

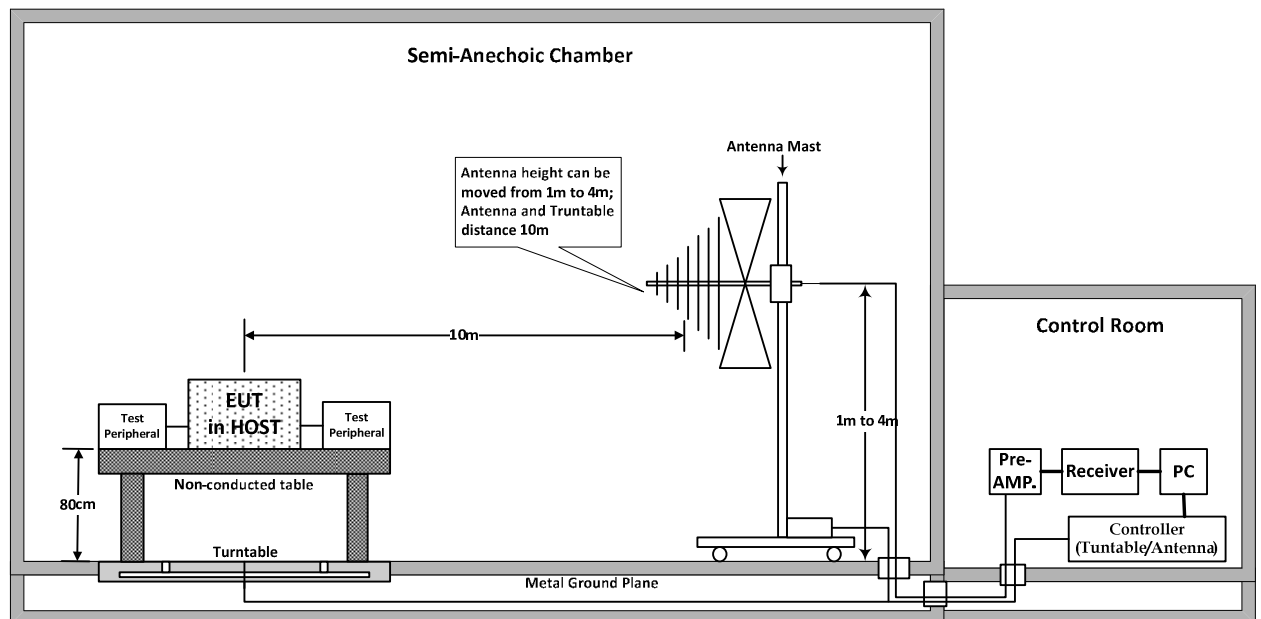
4.2. TEST INSTRUMENTS

Name	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	Rohde & Schwarz	ESU 8	100285	26-Jul-2013	26-Jul-2014
Receiver	Rohde & Schwarz	ESU 8	100365	01-Oct-2012	01-Oct-2013
Receiver	Rohde & Schwarz	ESU 40	100218	29-Jul-2013	29-Jul-2014
Antenna	TESEQ	CBL6111D	29797	19-Aug-2013	19-Aug-2014
Antenna	TESEQ	CBL6111D	29798	19-Aug-2013	19-Aug-2014
Antenna	ETS · LINDGREN	3117	00075934	26-Mar-2013	26-Mar-2014
Antenna	Com-Power	AH-840	101007	18-Apr-2013	18-Apr-2014
Pre-amp	Agilent	11909A	186996	13-Sep-2012	13-Sep-2013
Pre-amp	Agilent	11909A	186999	13-Sep-2012	13-Sep-2013
Pre-amp	EMC Instruments	EMC051845	980073	04-Jun-2013	04-Jun-2014
Pre-amp	Agilent	83051A	MY39500603	08-Aug-2013	08-Aug-2014
RF Cable	Huber+Suhner	S 07262 BD	N/A	07-Jan-2013	07-Jan-2014
RF Cable	Huber+Suhner	S 07262 BD	N/A	07-Jan-2013	07-Jan-2014
RF Cable	SUCOFLEX	104	N/A	07-Jan-2013	07-Jan-2014
RF Cable	SUCOFLEX	102	N/A	03-Apr-2013	03-Apr-2014
Test Program	Audix	e3(Ver. 6)	N/A	N/A	N/A

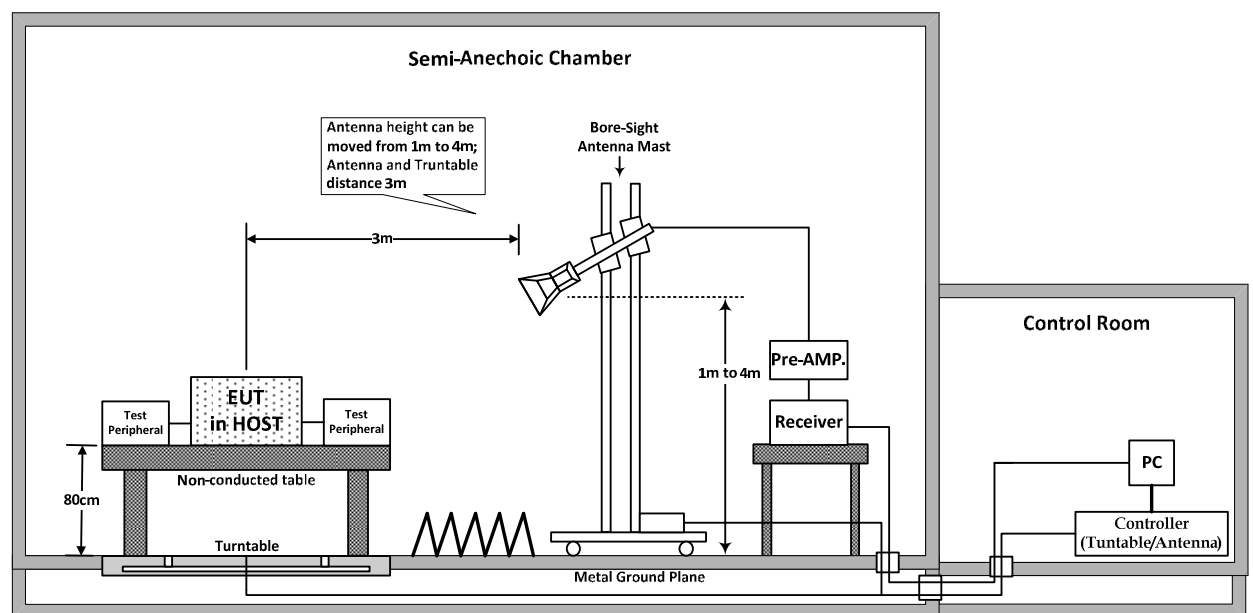
Note: The test equipments used are calibrated and can be traced to National ITRI and International Standards.

4.3. BLOCK DIAGRAM OF TEST SETUP

4.3.1. TEST SETUP FOR 30MHz~1000MHz



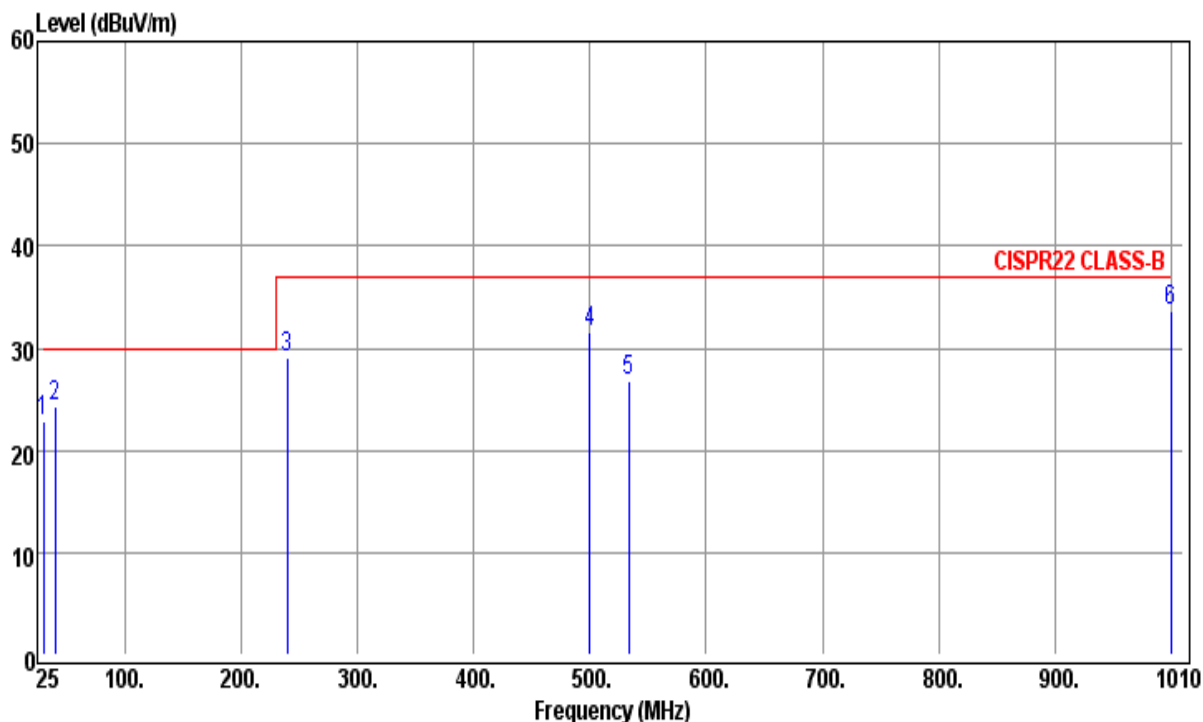
4.3.2. TEST SETUP FOR ABOVE 1GHz



4.4. TEST DATA

4.4.1. FREQUENCY RANGE (30MHz~1000MHz)

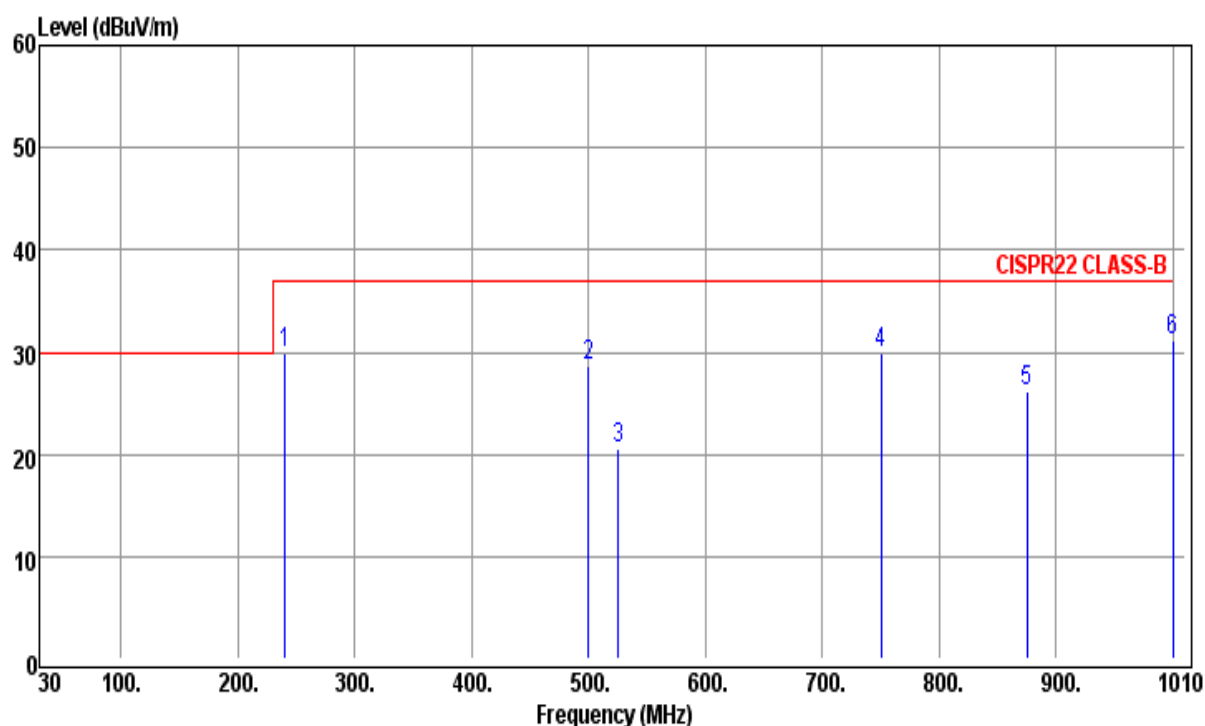
Data Log: 2013090606	Date of Test: Sep 06, 2013	Tested By: A-Kuan Yu
EUT: 25190	Main: 120V/60Hz	Test Mode: SKU 1
Temperature (°C): 21	Humidity (%): 59	Frequency Range: 30MHz~1000MHz



Item (Mark)	Freq (MHz)	Read Level (dBμV)	Total Factor (dB/m)	Level (dBμV/m)	Limit Line (dB(μV/m))	Over Limit (dB)	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	30.34	35.32	-12.45	22.87	30.00	-7.13	QP	100	197	Vertical
2	40.66	42.42	-18.22	24.20	30.00	-5.80	QP	154	315	Vertical
3	240.01	47.76	-18.60	29.16	37.00	-7.84	QP	100	205	Vertical
4	499.99	42.46	-10.94	31.52	37.00	-5.48	QP	100	240	Vertical
5	533.32	36.41	-9.68	26.73	37.00	-10.27	QP	100	353	Vertical
6	1000.00	34.60	-1.01	33.59	37.00	-3.41	QP	128	190	Vertical

Remark:

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



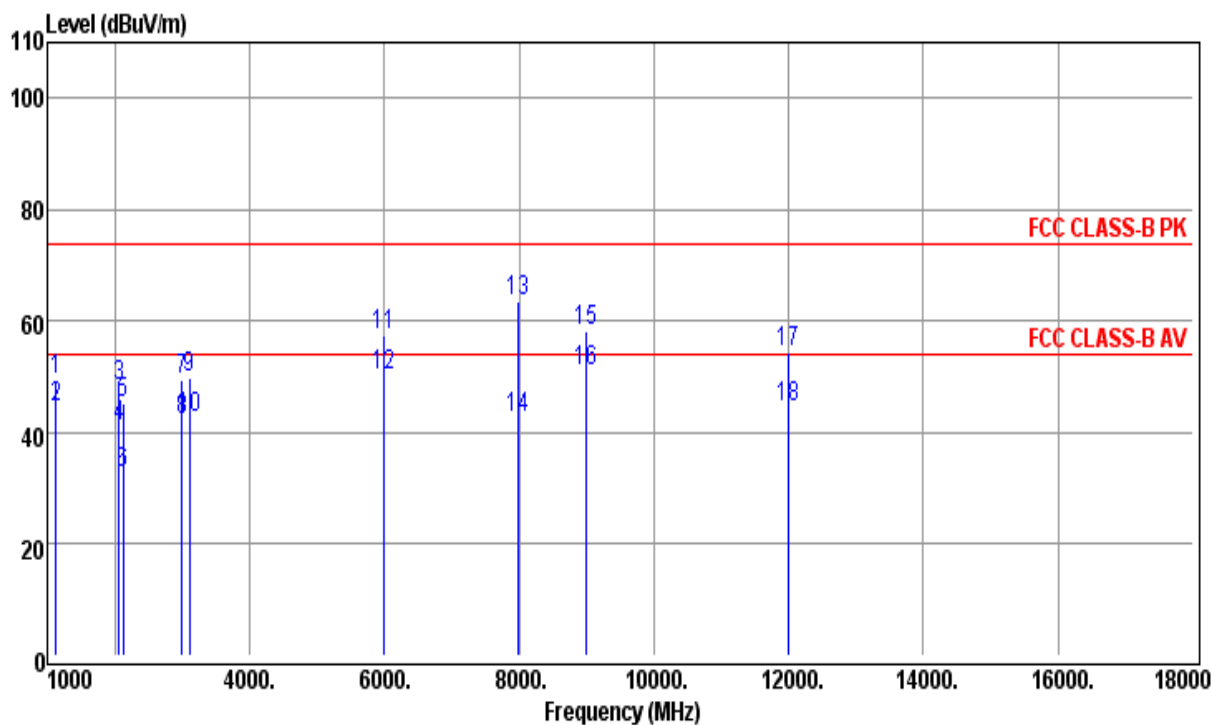
Item (Mark)	Freq (MHz)	Read Level dBμV	Total Factor dB/m	Level dBμV/m	Limit Line dB(μV/m)	Over Limit dB	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	240.02	48.92	-19.10	29.82	37.00	-7.18	QP	400	226	Horizontal
2	500.01	40.26	-11.64	28.62	37.00	-8.38	QP	400	266	Horizontal
3	525.05	31.48	-10.95	20.53	37.00	-16.47	QP	400	225	Horizontal
4	750.02	36.88	-7.06	29.82	37.00	-7.18	QP	375	214	Horizontal
5	875.01	31.37	-5.16	26.21	37.00	-10.79	QP	400	278	Horizontal
6	1000.00	33.76	-2.52	31.24	37.00	-5.76	QP	400	313	Horizontal

Remark:

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

4.4.2. FREQUENCY RANGE (ABOVE 1GHz)

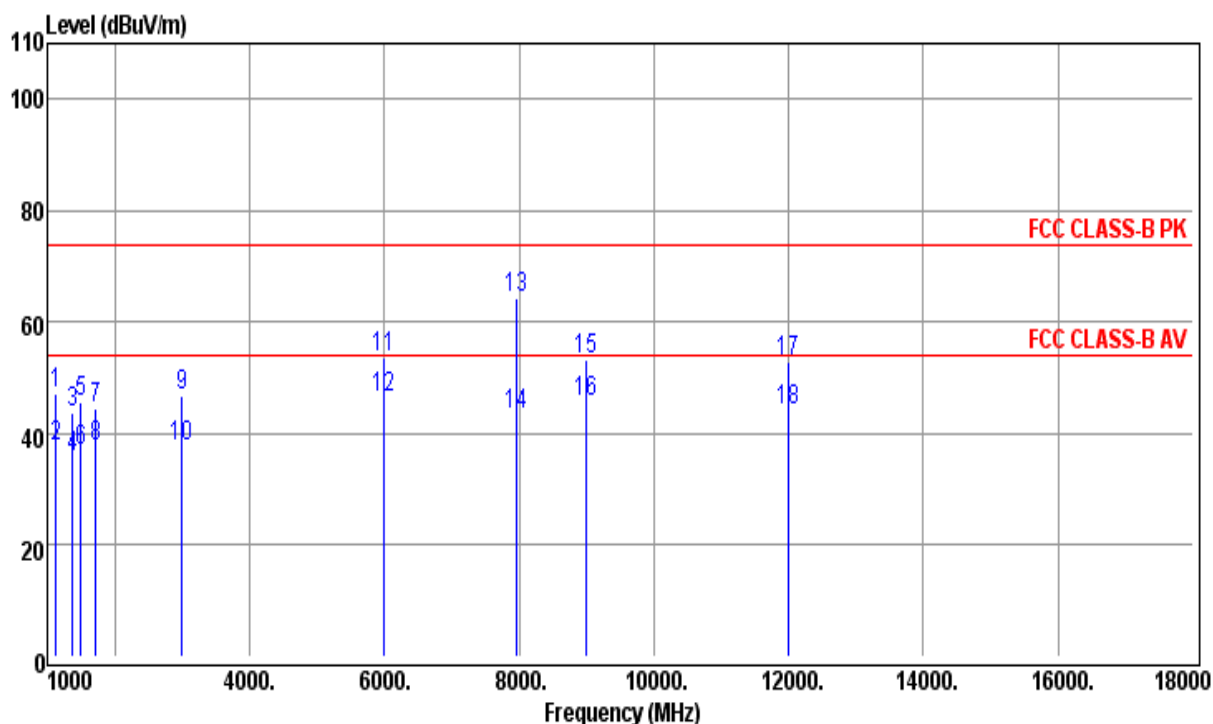
Data Log: 1213090306	Date of Test: Sep 03, 2013	Tested By: A-Kuan Yu
EUT: 25190	Main: 120V/60Hz	Test Mode: SKU 1
Temperature (°C): 21	Humidity (%): 53	Frequency Range: 1GHz~18GHz



Item (Mark)	Freq (MHz)	Read Level dBμV	Total Factor dB/m	Level dBμV/m	Limit Line dB(μV/m)	Over Limit dB	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	1124.97	72.29	-22.65	49.64	74.00	-24.36	Peak	109	173	Vertical
2	1124.97	67.29	-22.65	44.64	54.00	-9.36	Average	109	173	Vertical
3	2070.04	67.45	-19.21	48.24	74.00	-25.76	Peak	149	197	Vertical
4	2070.04	60.27	-19.21	41.06	54.00	-12.94	Average	149	197	Vertical
5	2125.07	64.45	-19.14	45.31	74.00	-28.69	Peak	117	185	Vertical
6	2125.07	52.03	-19.14	32.89	54.00	-21.11	Average	117	185	Vertical
7	3000.00	67.30	-17.64	49.66	74.00	-24.34	Peak	143	186	Vertical
8	3000.00	60.07	-17.64	42.43	54.00	-11.57	Average	143	186	Vertical
9	3104.91	67.15	-17.48	49.67	74.00	-24.33	Peak	126	9	Vertical
10	3104.91	60.20	-17.48	42.72	54.00	-11.28	Average	126	9	Vertical
11	6000.00	67.40	-9.94	57.46	74.00	-16.54	Peak	142	197	Vertical
12	6000.00	60.17	-9.94	50.23	54.00	-3.77	Average	142	197	Vertical
13	7989.20	74.63	-11.07	63.56	74.00	-10.44	Peak	100	194	Vertical
14	7989.20	53.63	-11.07	42.56	54.00	-11.44	Average	100	194	Vertical
15	8999.73	68.61	-10.55	58.06	74.00	-15.94	Peak	167	352	Vertical
16	8999.73	61.45	-10.55	50.90	54.00	-3.10	Average	167	352	Vertical
17	11999.67	61.18	-6.61	54.57	74.00	-19.43	Peak	167	235	Vertical
18	11999.67	51.03	-6.61	44.42	54.00	-9.58	Average	167	235	Vertical

Remark:

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

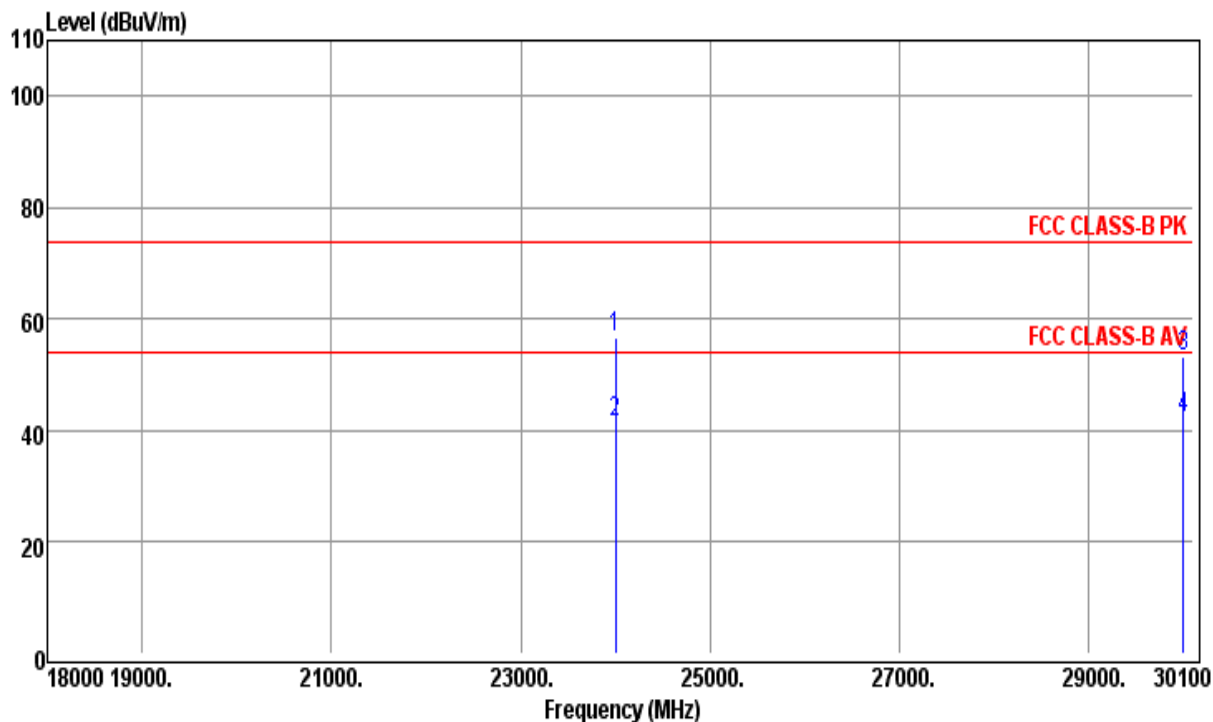


Item (Mark)	Freq (MHz)	Read Level dBμV	Total Factor dB/m	Level dBμV/m	Limit Line dB(μV/m)	Over Limit dB	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	1124.94	69.97	-22.65	47.32	74.00	-26.68	Peak	171	326	Horizontal
2	1124.94	60.17	-22.65	37.52	54.00	-16.48	Average	171	326	Horizontal
3	1375.02	66.87	-22.96	43.91	74.00	-30.09	Peak	184	75	Horizontal
4	1375.02	58.88	-22.96	35.92	54.00	-18.08	Average	184	75	Horizontal
5	1500.00	68.88	-23.11	45.77	74.00	-28.23	Peak	206	287	Horizontal
6	1500.00	60.08	-23.11	36.97	54.00	-17.03	Average	206	287	Horizontal
7	1724.97	65.96	-21.40	44.56	74.00	-29.44	Peak	212	237	Horizontal
8	1724.97	59.16	-21.40	37.76	54.00	-16.24	Average	212	237	Horizontal
9	3000.00	64.36	-17.64	46.72	74.00	-27.28	Peak	202	250	Horizontal
10	3000.00	55.14	-17.64	37.50	54.00	-16.50	Average	202	250	Horizontal
11	6000.00	63.74	-9.94	53.80	74.00	-20.20	Peak	192	232	Horizontal
12	6000.00	56.28	-9.94	46.34	54.00	-7.66	Average	192	232	Horizontal
13	7969.14	75.46	-11.06	64.40	74.00	-9.60	Peak	175	174	Horizontal
14	7969.14	54.37	-11.06	43.31	54.00	-10.69	Average	175	174	Horizontal
15	8999.73	64.00	-10.55	53.45	74.00	-20.55	Peak	175	243	Horizontal
16	8999.73	56.08	-10.55	45.53	54.00	-8.47	Average	175	243	Horizontal
17	11999.64	59.70	-6.61	53.09	74.00	-20.91	Peak	161	210	Horizontal
18	11999.64	50.92	-6.61	44.31	54.00	-9.69	Average	161	210	Horizontal

Remark:

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

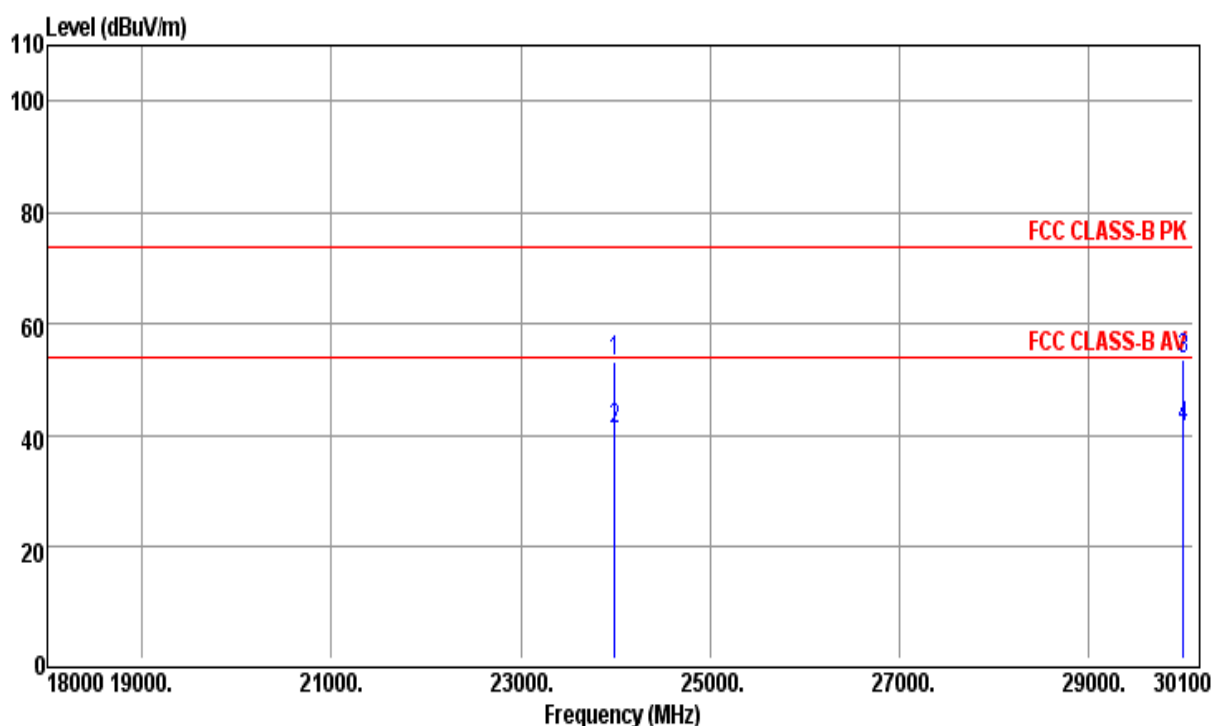
Data Log: 1213090309	Date of Test: Sep 03, 2013	Tested By: A-Kuan Yu
EUT: 25190	Main: 120V/60Hz	Test Mode: SKU 1
Temperature (°C): 21	Humidity (%): 53	Frequency Range: Above 18GHz



Item (Mark)	Freq (MHz)	Read Level dBμV	Total Factor dB/m	Level dBμV/m	Limit Line dB(μV/m)	Over Limit dB	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	23998.80	45.58	11.00	56.58	74.00	-17.42	Peak	150	165	Vertical
2	23998.80	30.39	11.00	41.39	54.00	-12.61	Average	150	165	Vertical
3	29995.98	44.14	9.23	53.37	74.00	-20.63	Peak	118	184	Vertical
4	29995.98	32.94	9.23	42.17	54.00	-11.83	Average	118	184	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 dBμV/m	Limit Line dB(μV/m)	Over Limit dB	Detector	Ant. Height (cm)	Table Ang. (deg)	Ant. Pol.
1	23993.76	42.36	11.00	53.36	74.00	-20.64	Peak	104	188	Horizontal
2	23993.76	30.23	11.00	41.23	54.00	-12.77	Average	104	188	Horizontal
3	29998.38	44.28	9.23	53.51	74.00	-20.49	Peak	100	179	Horizontal
4	29998.38	32.11	9.23	41.34	54.00	-12.66	Average	100	179	Horizontal

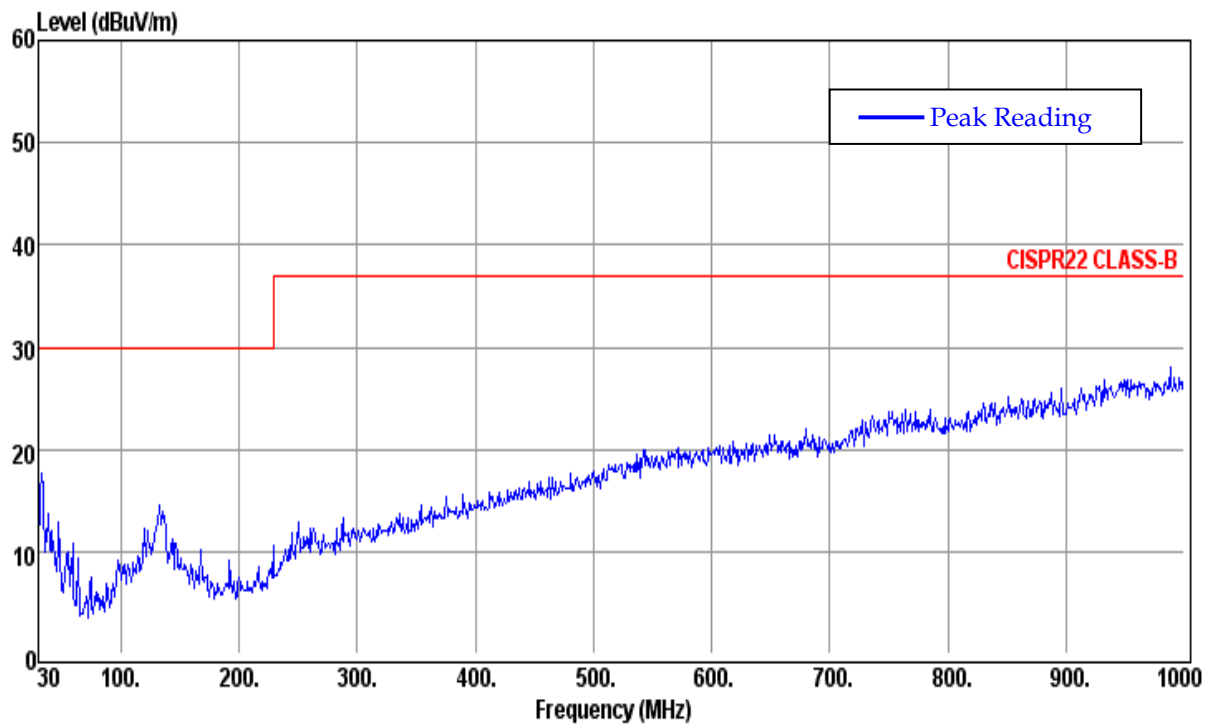
Remark:

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

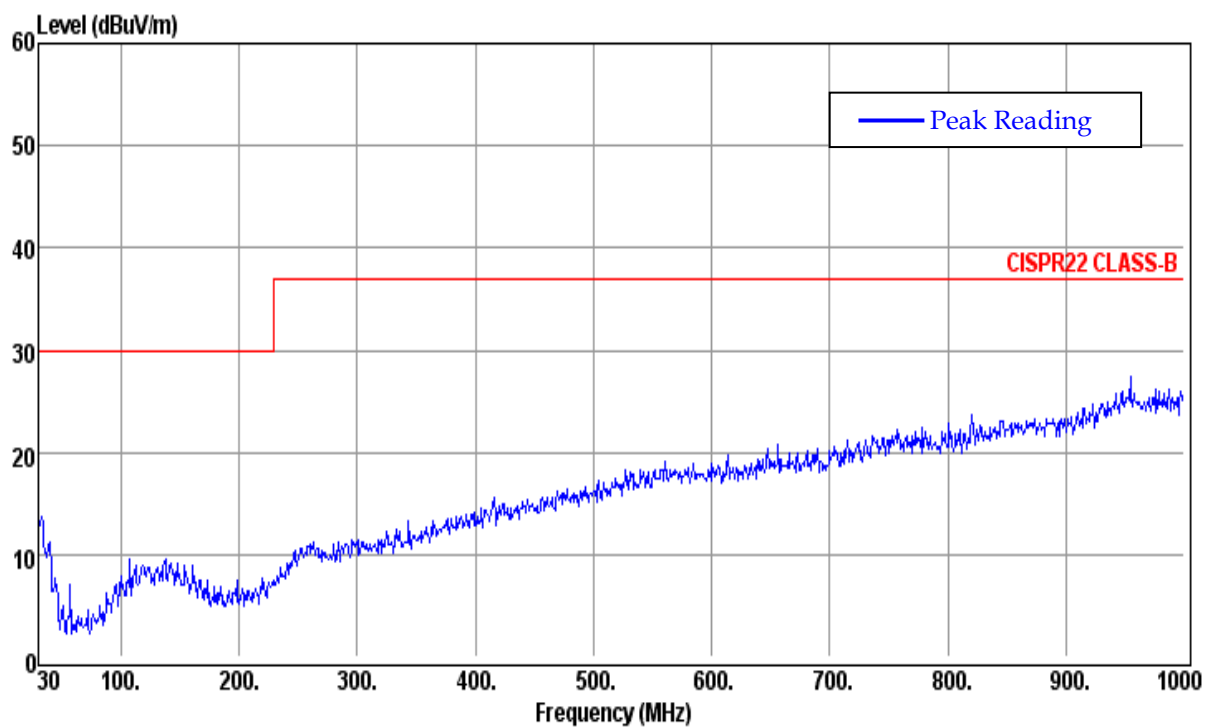
4.5. NOISE FLOOR MEASUREMENT

4.5.1. FREQUENCY RANGE (30MHz~1000MHz)

Vertical

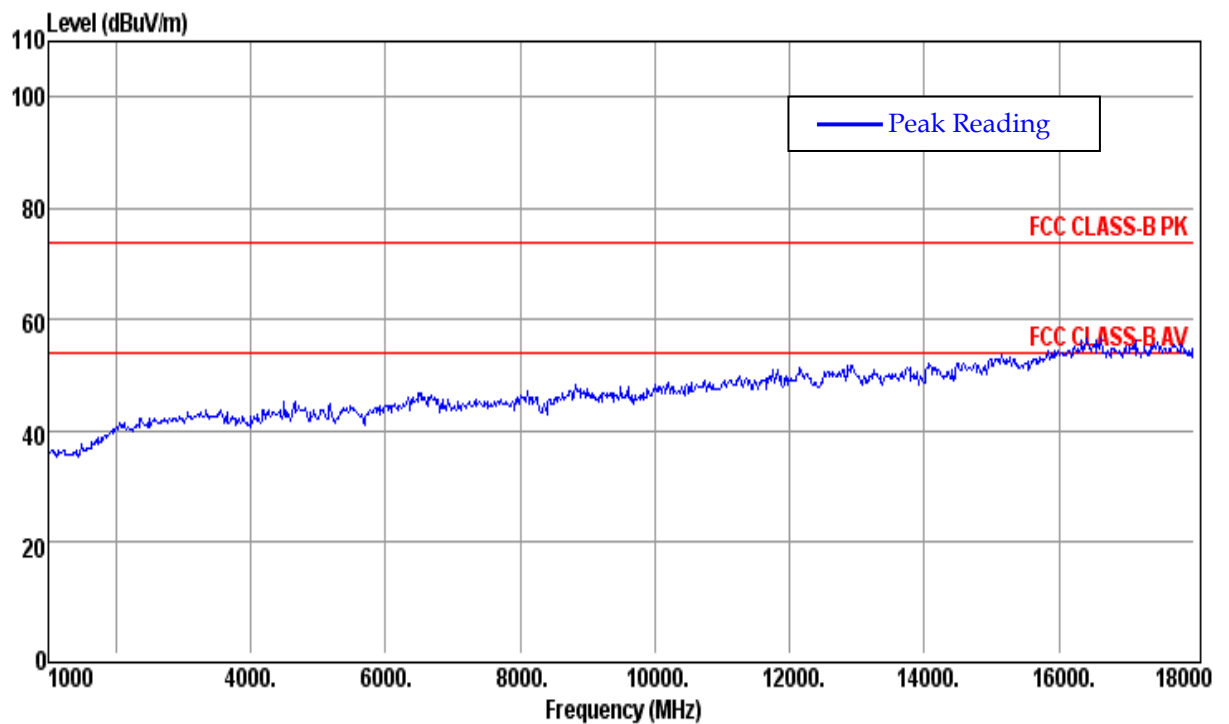


Horizontal

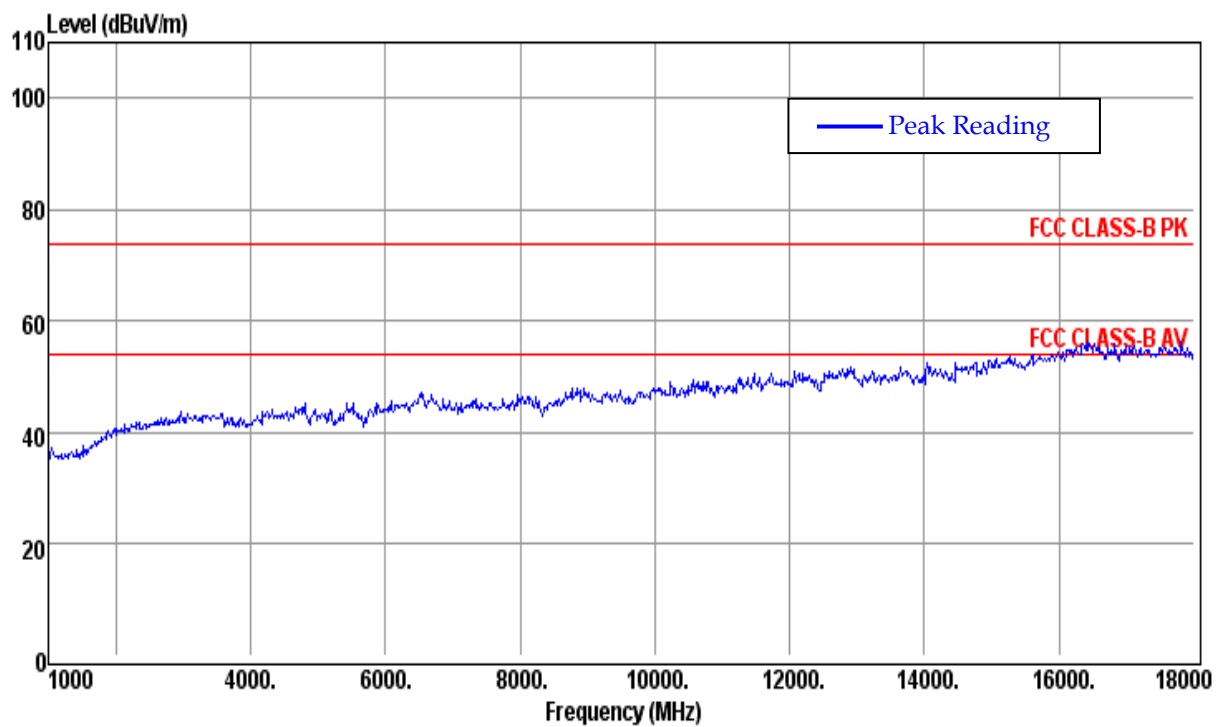


4.5.2. FREQUENCY RANGE (1GHz~18GHz)

Vertical

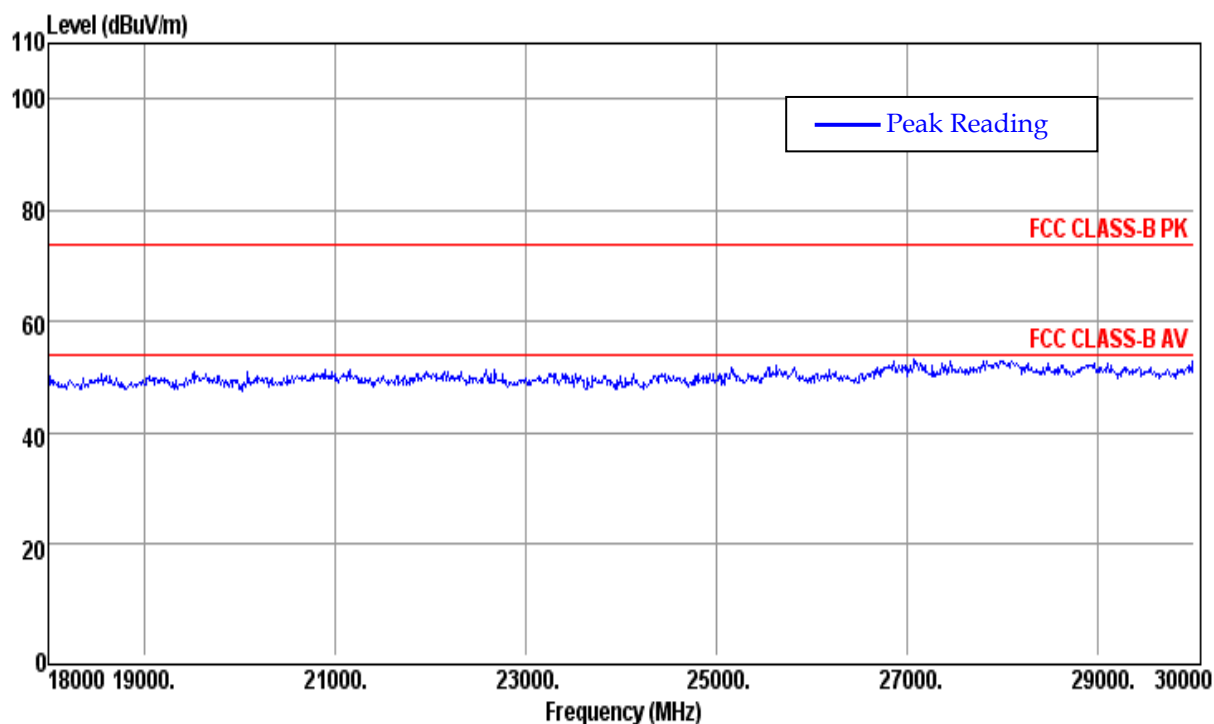


Horizontal

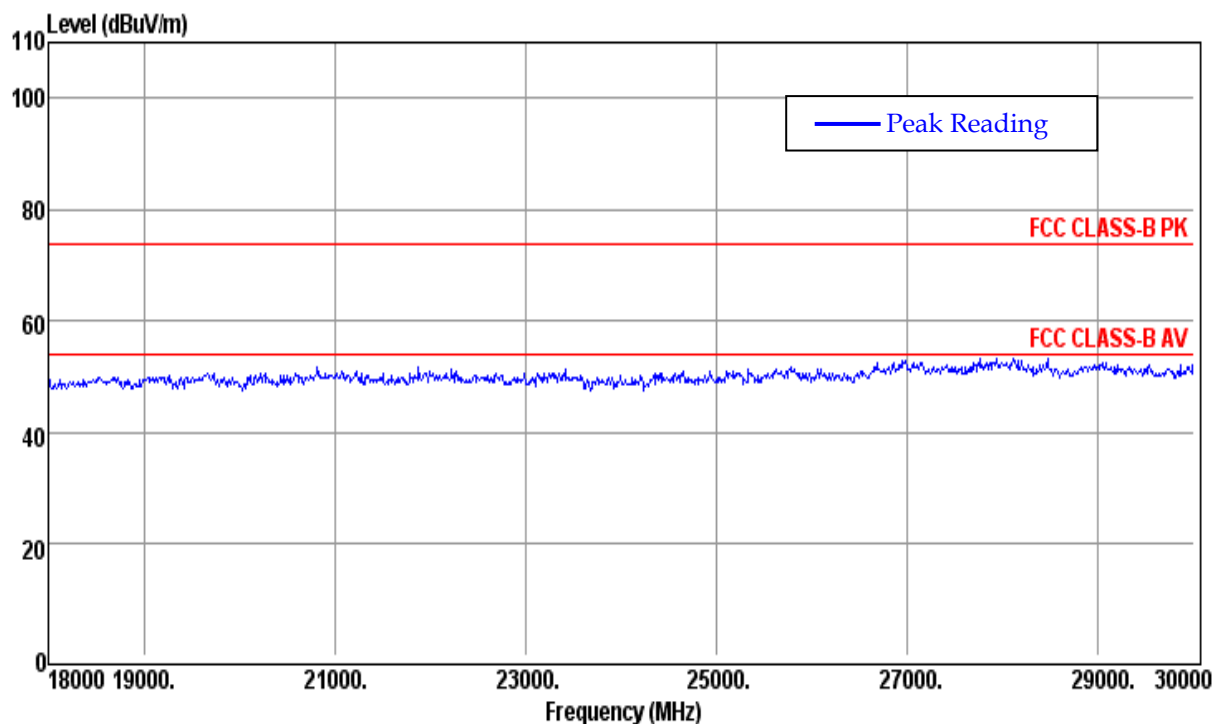


4.5.3. FREQUENCY RANGE (Above 18GHz)

Vertical



Horizontal



4.6. 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 $22 + 8.5 = 30.5\text{dB}\mu\text{V/m}$.

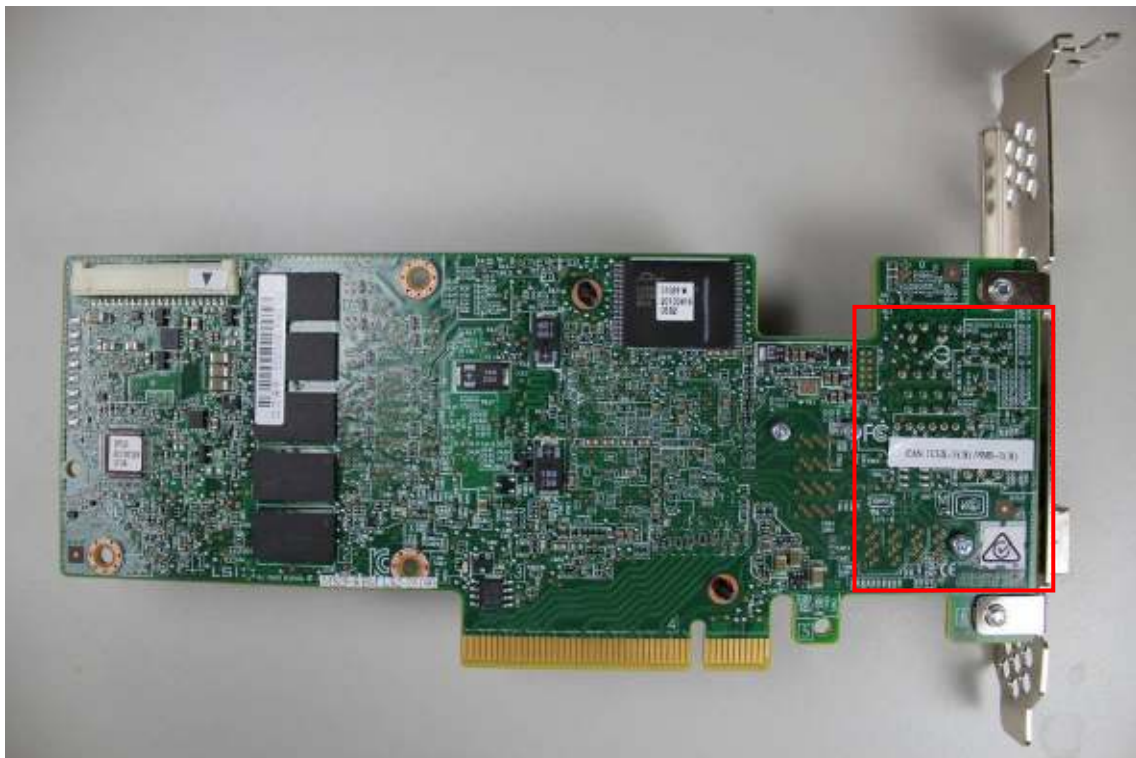
All values are listed as dB, either referenced to 1 μV or 1 $\mu\text{V/m}$.

5. PRODUCT LABELING

5.1. LOCATION OF THE LABEL ON EUT FRONT SIDE



5.2. LOCATION OF THE LABEL ON EUT REAR SIDE

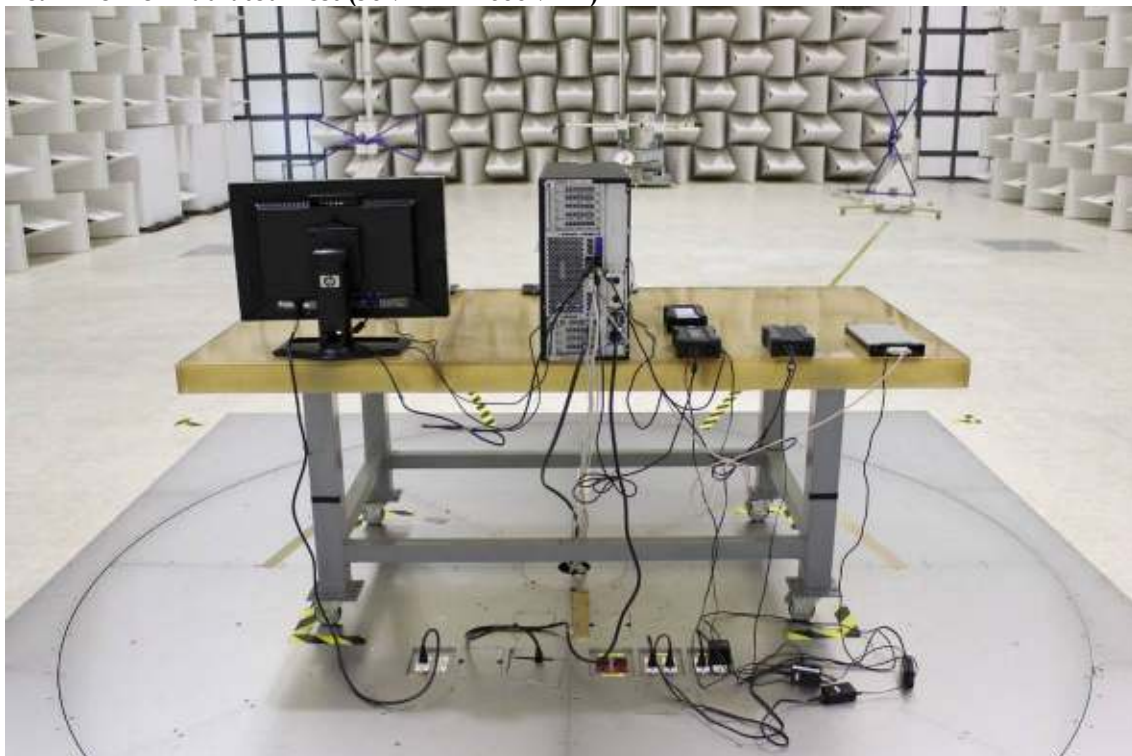


6. PHOTOGRAPHS

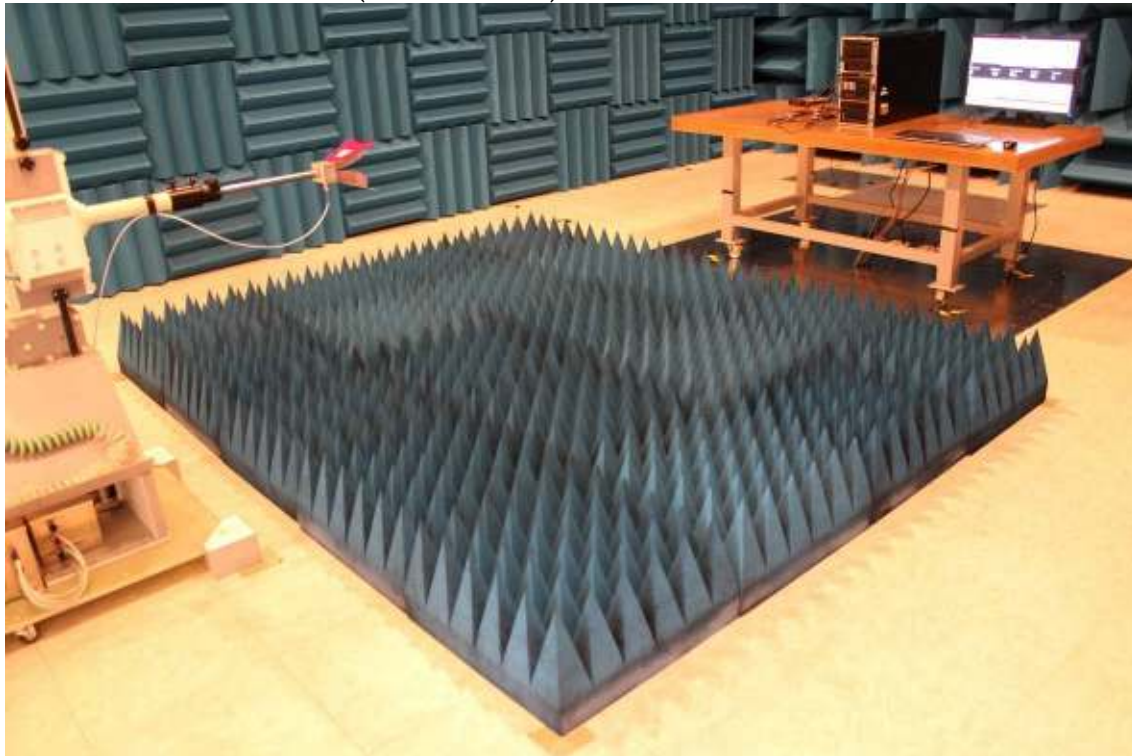
Front View of Radiated Test (30MHz ~ 1000MHz)



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



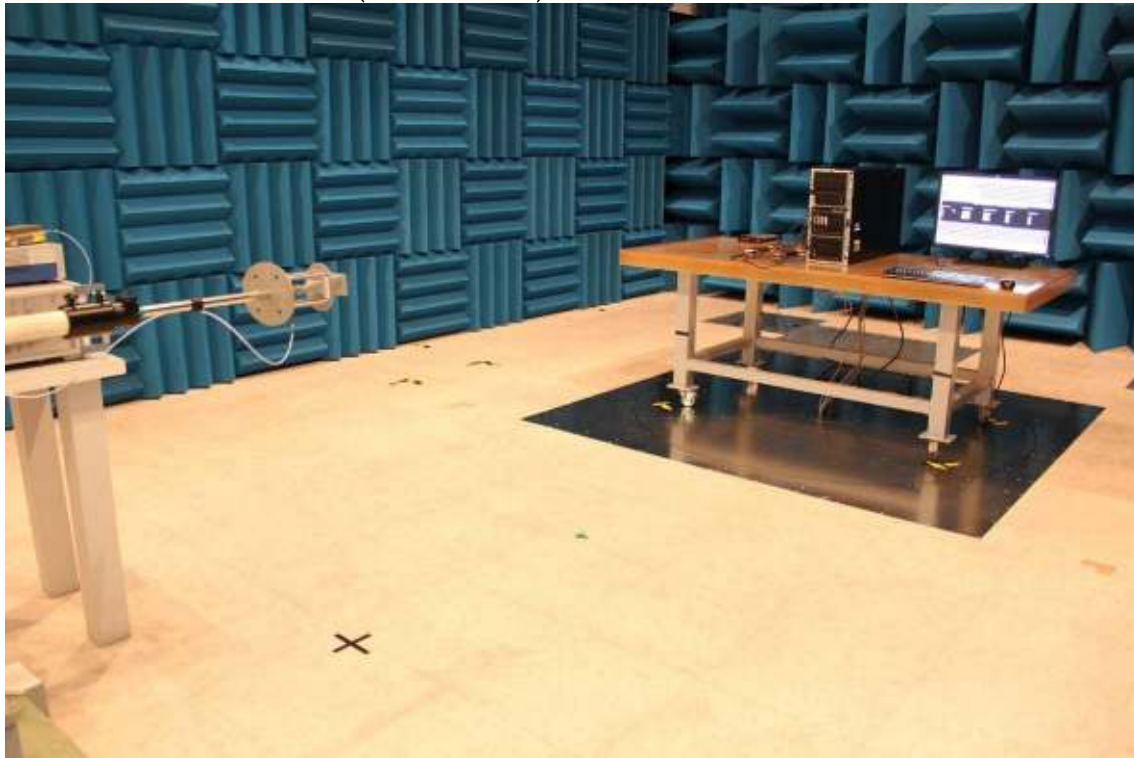
Front View of Radiated Test (1GHz ~ 18GHz)



Rear View of Radiated Test (1GHz ~ 18GHz)



Front View of Radiated Test (Above 18GHz)



Rear View of Radiated Test (Above 18GHz)



Front View of Conducted Test



Side View of Conducted Test



EUT, Antenna and Absorber



EUT in Host System



EUT Appearance (in SKU 1) 1



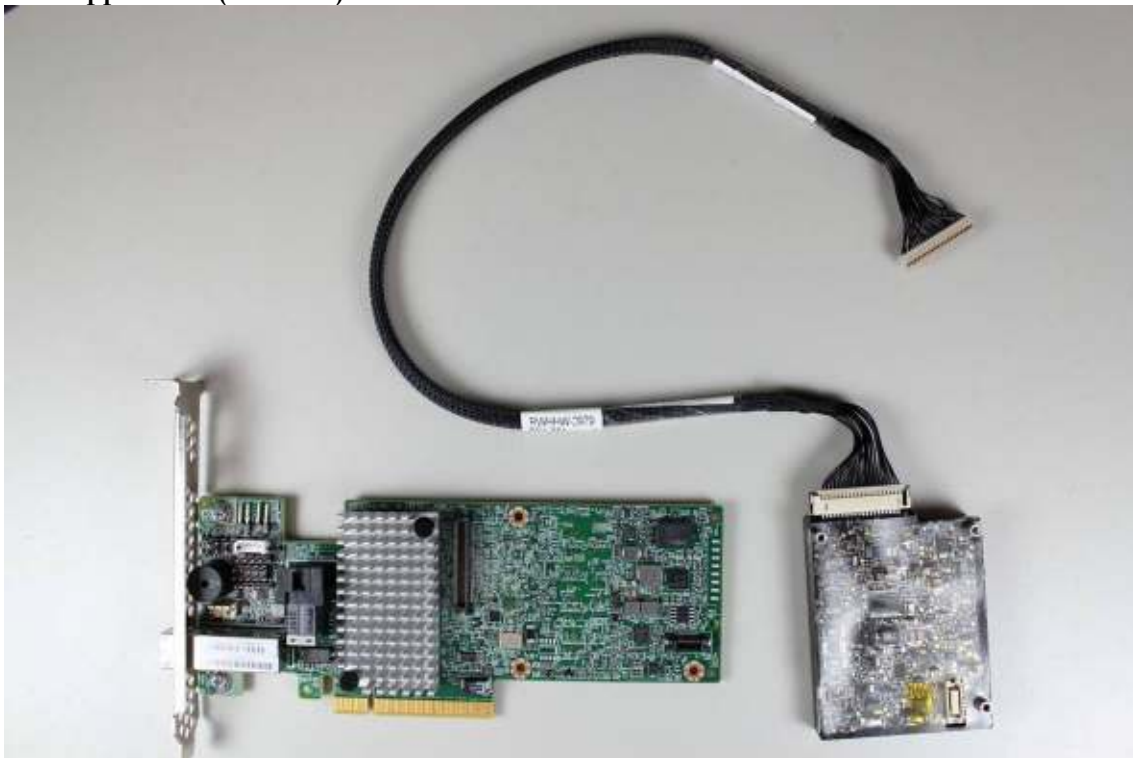
EUT Appearance (in SKU 1) 2



EUT Appearance (in SKU 2) 1



EUT Appearance (in SKU 2) 2



Front View of EUT



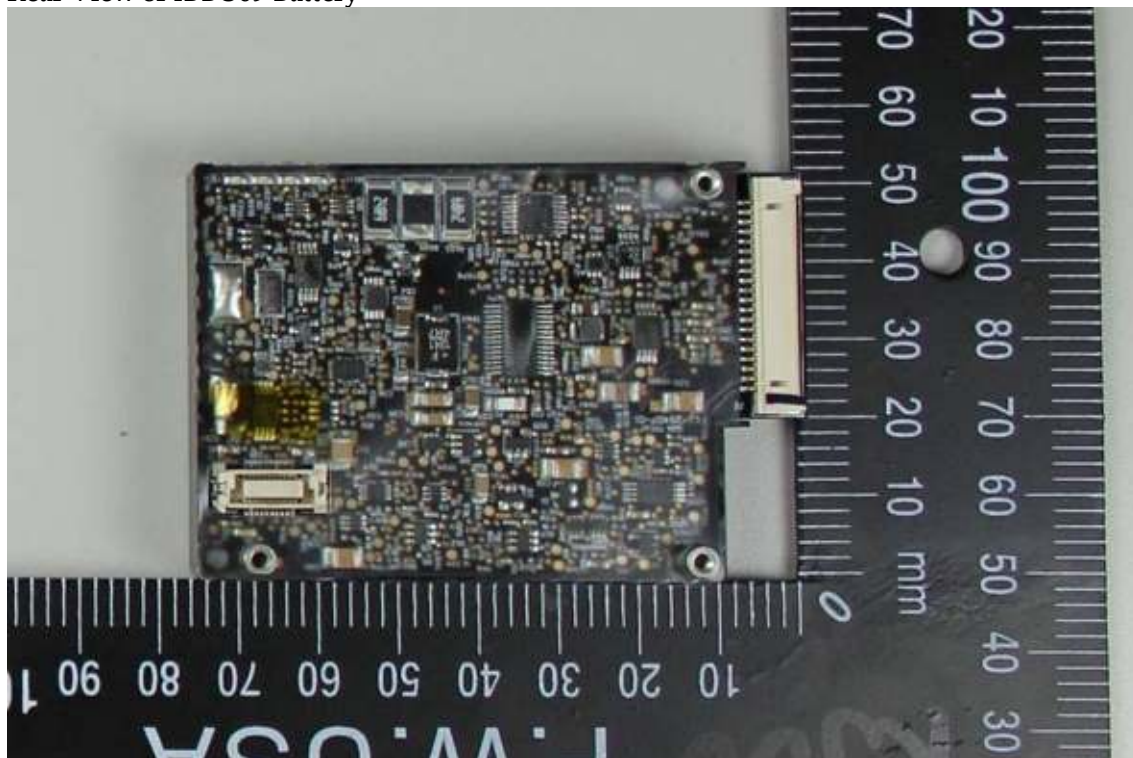
Rear View of EUT



Front View of iBBU09 Battery



Rear View of iBBU09 Battery



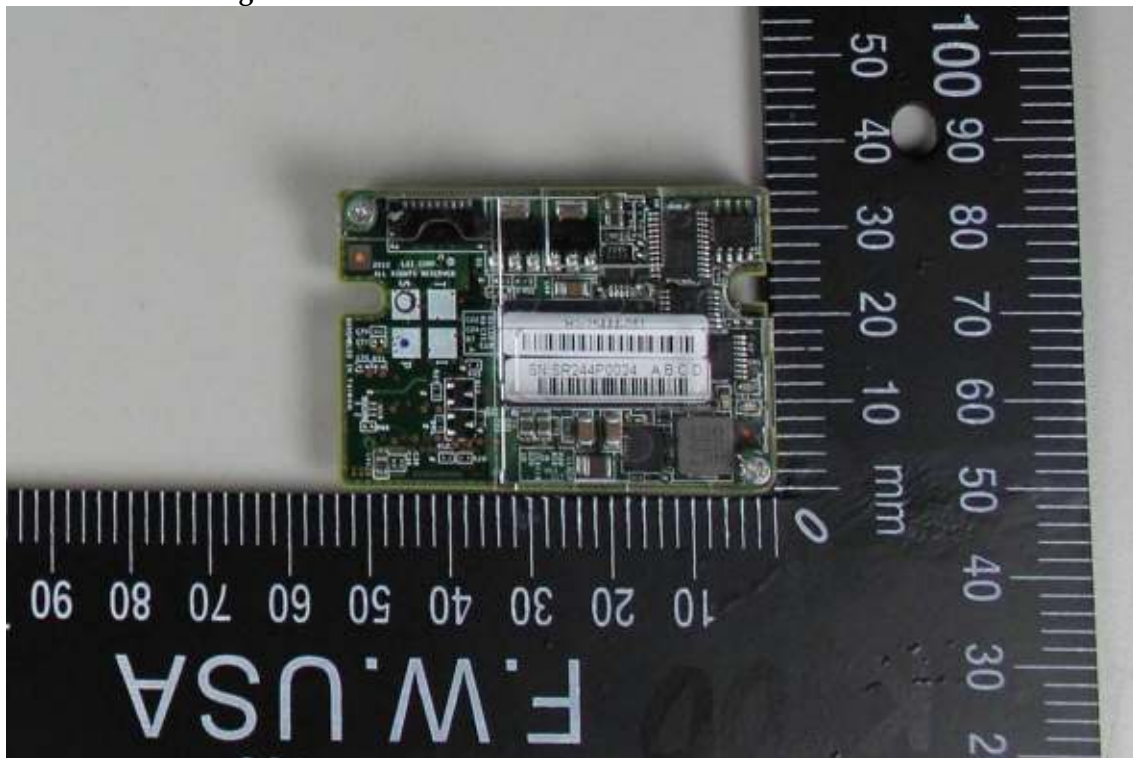
Front View of Tecate Battery



Rear View of Tecate Battery



Front View of Daughter Card



Rear View of Daughter Card

