FCC TEST REPORT

of

CFR 47 Part 15 Subpart B Class B

Application Type: Declaration of Conformity

Product : **1.8" SATA SSD**

Model(s): **SFD18H/-M**

Brand: **Apacer**

Applicant: **Apacer Technology Inc.**

Address: **1F., No.32, Zhongcheng Rd., Tucheng Dist., New Taipei City 236, Taiwan, R.O.C.**

Test Performed by:

International Standards Laboratory
<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; SL2-R1/R2-E-0013; TAF: 0997
FCC: TW1036; IC: IC4067B-1; NEMKO: ELA 113B
VCCI: <Conduction 02>C-1440, T-1676, <Conduction 03>C-2845, T-1464, <Chamber 02>R-1435, G-17, <Chamber 12>R-2598,G-16, <Chamber 14>G-211,
*Address:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
*Tel: 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-14LE379FB**

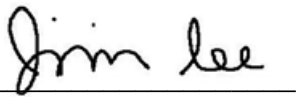
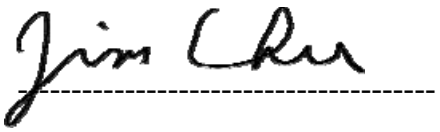
Issue Date : **September 11, 2014**

This report totally contains 26 pages including this cover page and contents page.

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	FCC CFR Title 47 Part 15 Subpart B: 2012- Section 15.107 and 15.109 ANSI C63.4-2009 Industry Canada Interference-Causing Equipment Standard ICES-003 Issue 5: 2012
Equipment Tested:	1.8" SATA SSD
Model:	SFD18H/-M
Brand:	Apacer
Applicant:	Apacer Technology Inc.
Sample received Date:	August 4, 2014
Final test Date:	refer to the date of test data
Test Site:	International Standards Laboratory Chamber 02; Chamber 14; Conduction 02
Test Distance:	10M; 3M (above1GHz)
Temperature:	refer to each site test data
Humidity:	refer to each site test data
Input power:	Conduction input power: AC 120 V / 60 Hz Radiation input power: AC 120 V / 60 Hz
Test Result:	**PASS**
Report Engineer:	Elly Duan
Test Engineer:	 Jiin Lee
Approved By:	 Jim Chu / Director

1.2 Description of EUT

EUT

Description: 1.8" SATA SSD
Condition: Pre-Production
Model: SFD18H/-M
Memory Capacity: 1GB~512GB
Serial Number: N/A
Control IC: SRP39CB0; SRP39EB0
PCBA Number: FSB0CG140DL2-MN
Highest working frequency: 6GHz
The radiation test should be tested till 30GHz

The memory capacities listed below are chosen by the applicant to be the representative configuration for testing in this report.

For EMI&EMS test configurations:

Configuration	Control IC	Memory Capacity
1	SRP39CB0	512GB

Model Difference:

Model	Memory Capacity	Control IC	Market
SFD18H/-M	1GB~512GB	SRP39CB0; SRP39EB0	For different customer

EMI Noise Source:

Refer to the photo	Crystal	Point
EUT-9	In Control IC	U1

EMI Noise Source:
N/A

1.3 Description of Support Equipment

No	Unit	Model / Serial No.	Brand	Power Cord	FCC ID
1	Personal Computer	WLIH77G12B7 S/N: N/A	LEMEL	Non-shielded	FCC DOC
2	PS/2 Keyboard	SK-8110 S/N: N/A	DELL	N/A	FCC DOC
3	USB Mouse	MO56U0 S/N: NA	DELL	Non-shielded	FCC DOC
4	HP Printer	C930 S/N: N/A	HP	Non-shielded	FCC DOC
5	Aceex Modem	DM1414 S/N: N/A	Aceex	Non-shielded	FCC DOC
6	24” LCD Monitor	ST2420L S/N:N/A	DELL	Non-shielded	FCC DOC

1.4 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

1. PC running Winthrax to read and write the EUT.
2. Send signal to the Printer through PC Parallel Port.
3. Send signal to the Modem through PC Serial Port.
4. Send H pattern to the 24" LCD Monitor through PC D-SUB Port.
5. Repeat the above steps.

	Filename	Issued Date
EUT	Winthrax	06/04/2005
Printer	IntelEMC.exe	04/11/2007
Modem	IntelEMC.exe	04/11/2007
Monitor	IntelEMC.exe	04/11/2007

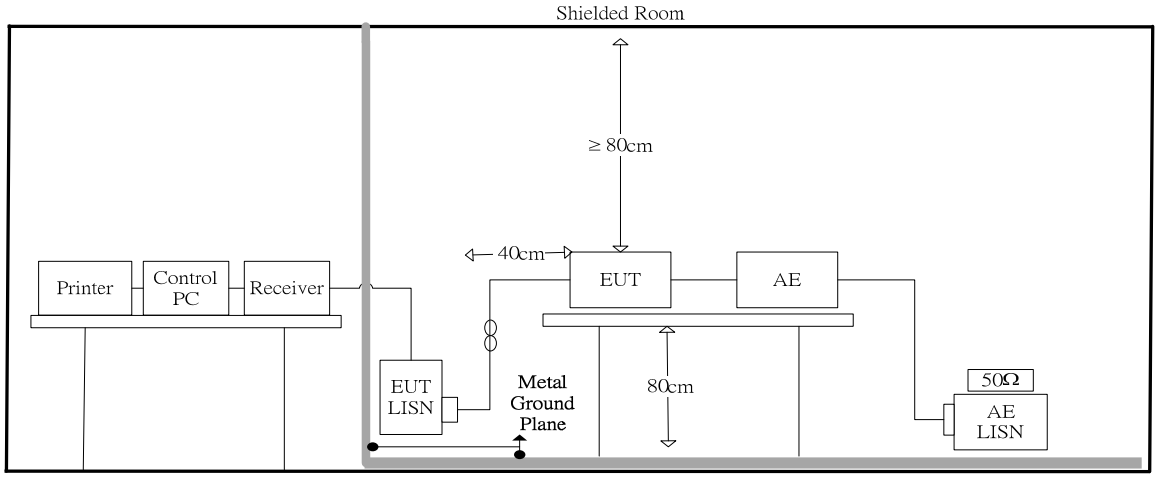
1.5 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type
AC Power Cable	100V (~240V) to PC SPS	1.8m	Non-shielded
PS/2 Keyboard Data Cable	PS/2 Keyboard to PC PS/2 Keyboard Port	1.8m	Shielded
USB Mouse Data Cable	USB Mouse to PC USB 2.0 Port	1.8m	Shielded
Printer Data Cable	Printer to PC Parallel Port	1.8m	Shielded
Modem Data Cable	Modem to PC Serial Port	1.8m	Shielded
Monitor Data Cable	Monitor D-SUB Port to PC D-SUB Port	1.8m	Shielded (with core)

2. Powerline Conducted Emissions

2.1 Test Setup and Procedure

2.1.1 Test Setup



2.1.2 Test Procedure

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured. All of the interface cables were manipulated according to ANSI C63.4 requirements.

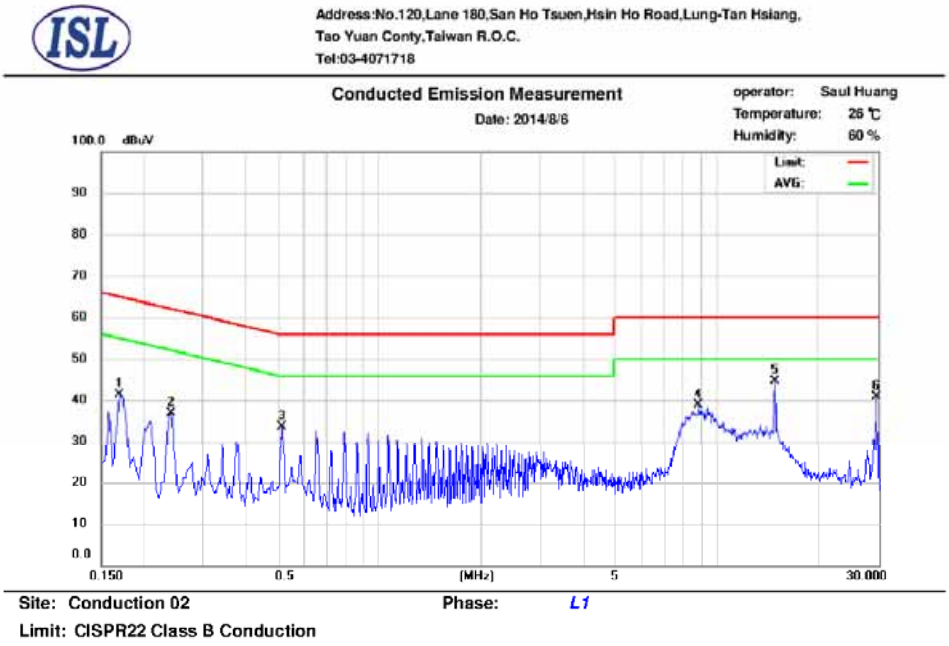
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

2.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150KHz~30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9KHz

2.2 Conduction Test Data: Configuration 1

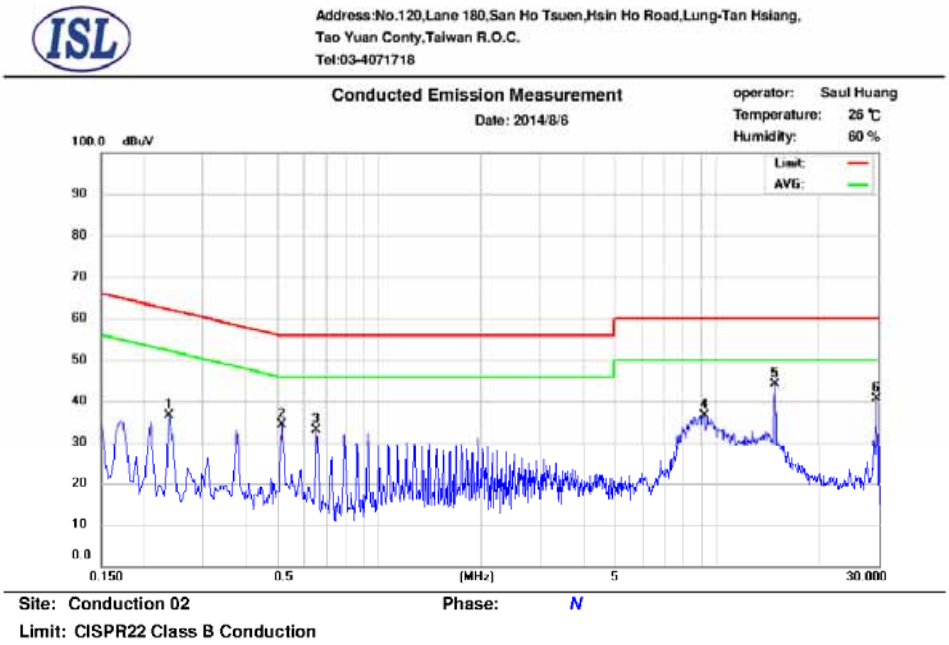
Table 2.2.1 Power Line Conducted Emissions (Line)



No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.170	9.66	41.02	64.96	-23.94	36.26	54.96	-18.70	
2	0.242	9.66	36.06	62.03	-25.97	32.02	52.03	-20.01	
3	0.514	9.67	32.34	56.00	-23.66	31.52	46.00	-14.48	
4	8.838	9.86	32.88	60.00	-27.12	24.96	50.00	-25.04	
5	14.850	9.96	43.37	60.00	-16.63	41.19	50.00	-8.81	
6	29.702	9.92	38.91	60.00	-21.09	36.09	50.00	-13.91	

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.
The CISPR 22 limits would be applied to all FCC Part 15 devices.

Table 2.2.2 Power Line Conducted Emissions (Neutral)



No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.238	9.65	36.44	62.17	-25.73	30.02	52.17	-22.15	
2	0.514	9.67	32.91	56.00	-23.09	32.04	46.00	-13.96	
3	0.650	9.67	32.17	56.00	-23.83	31.72	46.00	-14.28	
4	9.202	9.88	32.39	60.00	-27.61	24.73	50.00	-25.27	
5	14.850	9.85	42.98	60.00	-17.02	40.70	50.00	-9.30	
6	29.698	9.95	38.78	60.00	-21.22	35.99	50.00	-14.01	

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = Receiver Reading + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.
The CISPR 22 limits would be applied to all FCC Part 15 devices.

2.3 Test Setup Photo

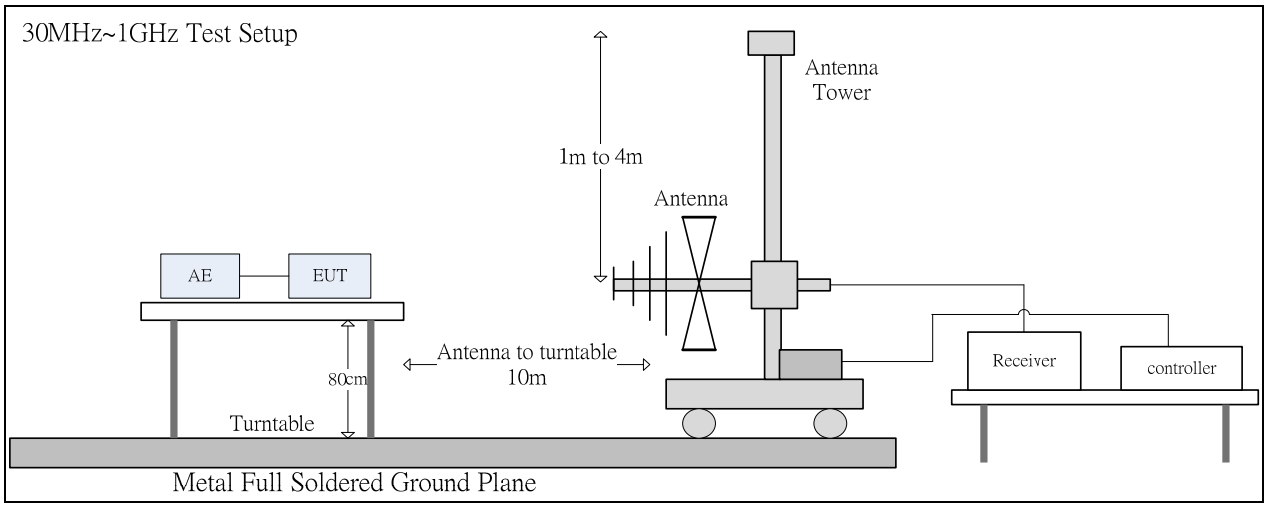
Front View

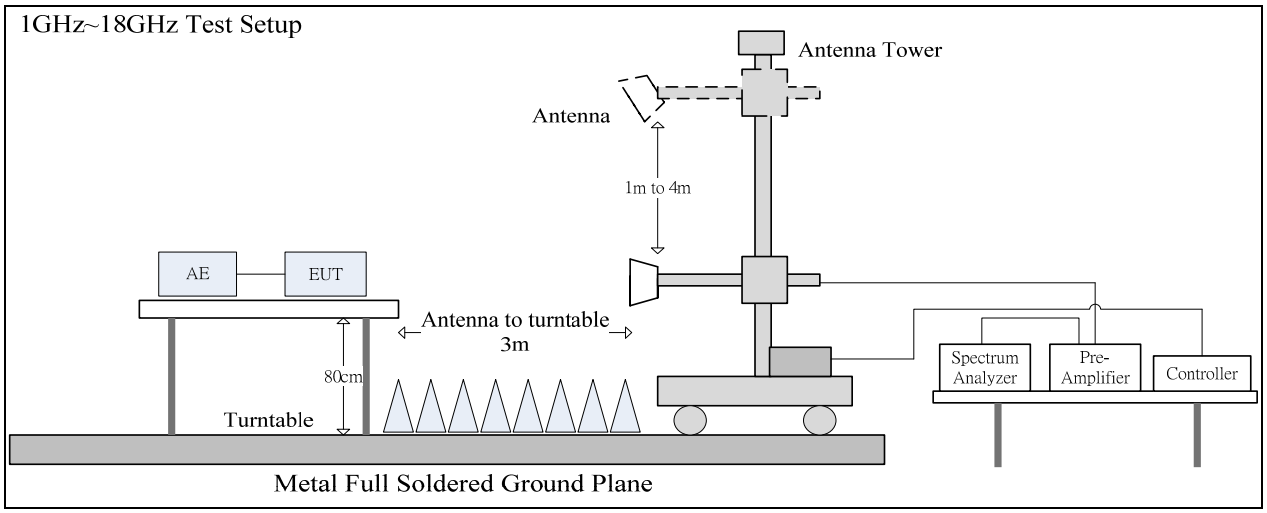
Back View

3. Radiated Emissions

3.1 Test Setup and Procedure

3.1.1 Test Setup





3.1.2 Test Procedure

The radiated emissions test will then be repeated on the open site or chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of 10 meter open field sites or 10 meter chamber. Desktop EUT are set up on a wooden stand 0.8 meter above the ground or floor-standing arrangement shall be placed on the horizontal ground reference plane. The test volume for a height of up to 30 cm may be obstructed by absorber placed on the ground plane.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. The highest emissions between 1 GHz to 40 GHz were analyzed in details by operating the spectrum analyzer in peak and average mode to determine the precise amplitude of the emissions.

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna in the cone of radiation from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response. At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings. All of the interface cables were manipulated according to ANSI C63.4 requirements.

The highest internal source of the EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 40 GHz, whichever is less.

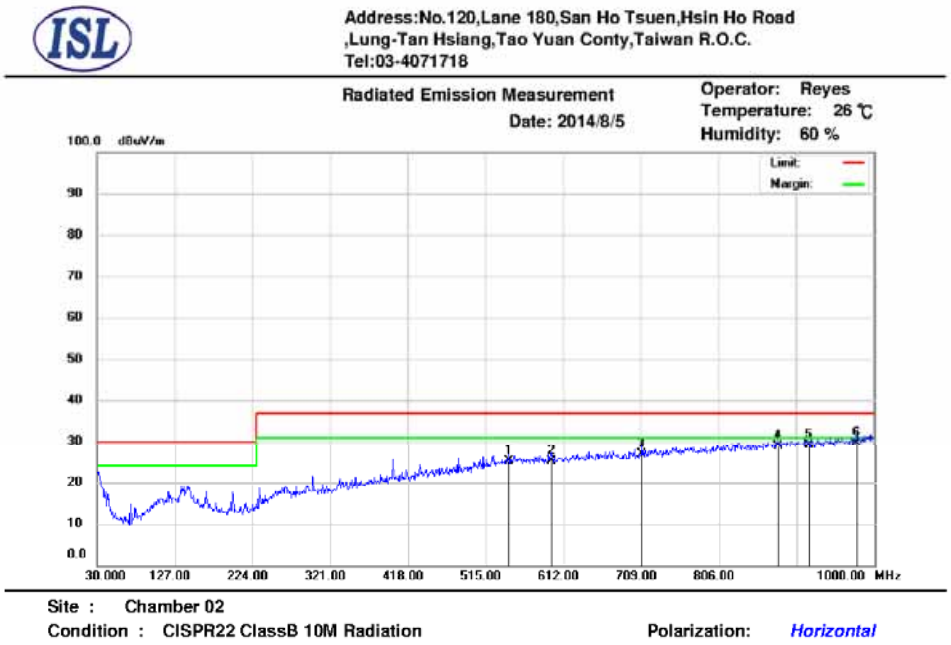
3.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	30MHz--1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120KHz

Frequency Range:	Above 1000MHz
Detector Function:	Peak/Average Mode
Resolution Bandwidth:	1MHz

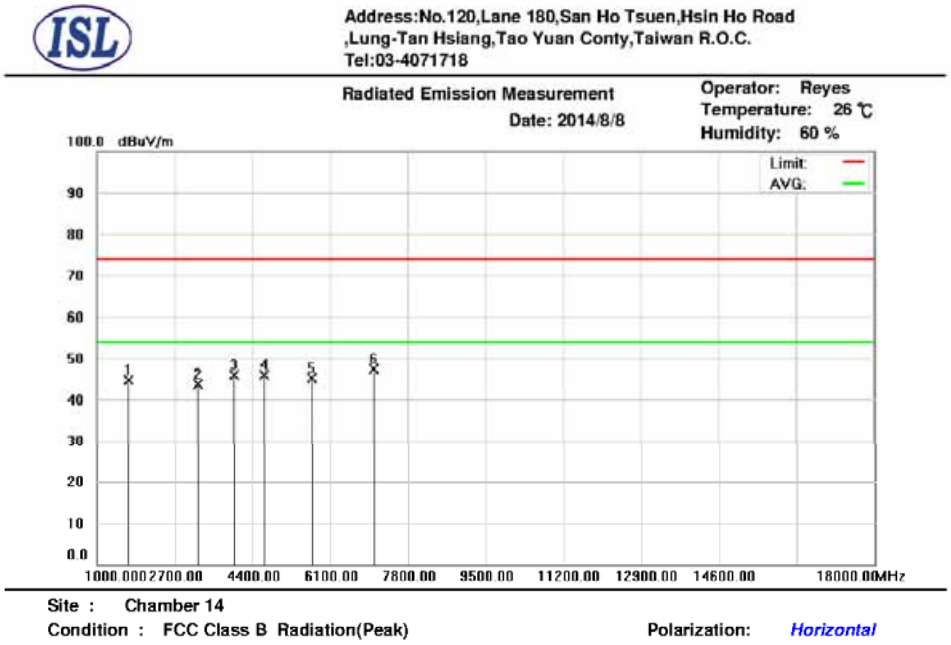
3.2 Radiation Test Data: Configuration 1

Table 3.2.1 Radiated Emissions (Horizontal)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	544.10	1.84	23.20	25.04	37.00	-11.96	145	218	QP
2	597.45	2.01	23.19	25.20	37.00	-11.80	100	89	QP
3	709.97	2.60	24.20	26.80	37.00	-10.20	142	167	QP
4	880.69	2.14	26.74	28.88	37.00	-8.12	100	210	QP
5	918.52	1.95	27.18	29.13	37.00	-7.87	100	36	QP
6	978.66	1.65	27.96	29.61	37.00	-7.39	100	196	QP

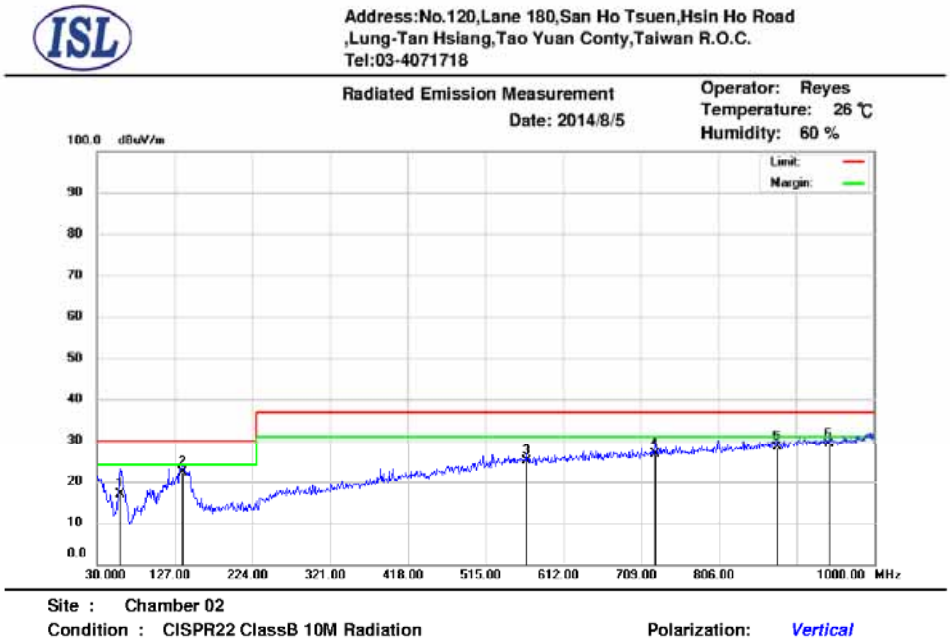
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meters
The CISPR 22 limits would be applied to all FCC Part 15 devices.
Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1680.00	59.53	-14.90	44.63	74.00	-29.37	357	101	peak
2	3210.00	53.91	-10.30	43.61	74.00	-30.39	212	233	peak
3	3992.00	55.42	-9.58	45.84	74.00	-28.16	318	69	peak
4	4655.00	55.31	-9.35	45.96	74.00	-28.04	285	318	peak
5	5709.00	53.17	-8.15	45.02	74.00	-28.98	397	150	peak
6	7052.00	53.68	-6.21	47.47	74.00	-26.53	172	116	peak

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Horn Antenna Distance: 3 meters
The CISPR 22 limits would be applied to all FCC Part 15 devices.
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.
No signal can be detected from 18GHz to 30GHz, so the graphs are omitted above 18GHz.

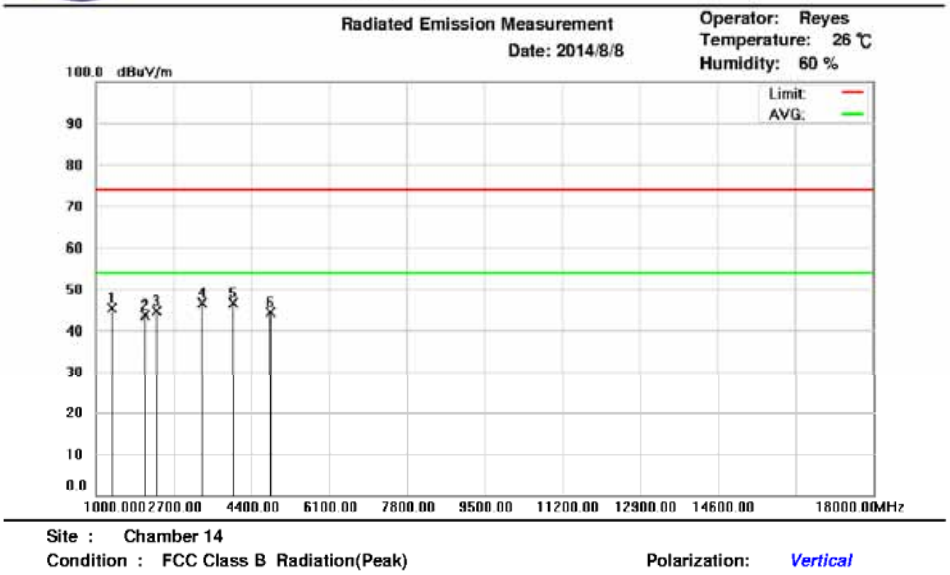
Table 3.2.2 Radiated Emissions (Vertical)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	59.10	8.65	8.27	16.92	30.00	-13.08	100	353	QP
2	136.70	8.54	13.51	22.05	30.00	-7.95	100	245	QP
3	565.44	1.65	23.33	24.98	37.00	-12.02	145	16	QP
4	726.46	2.11	24.60	26.71	37.00	-10.29	178	37	QP
5	878.75	1.67	26.71	28.38	37.00	-8.62	198	66	QP
6	943.74	1.54	27.47	29.01	37.00	-7.99	188	37	QP

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meters
The CISPR 22 limits would be applied to all FCC Part 15 devices.
Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.

Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road
,Lung-Tan Hsiang,Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718

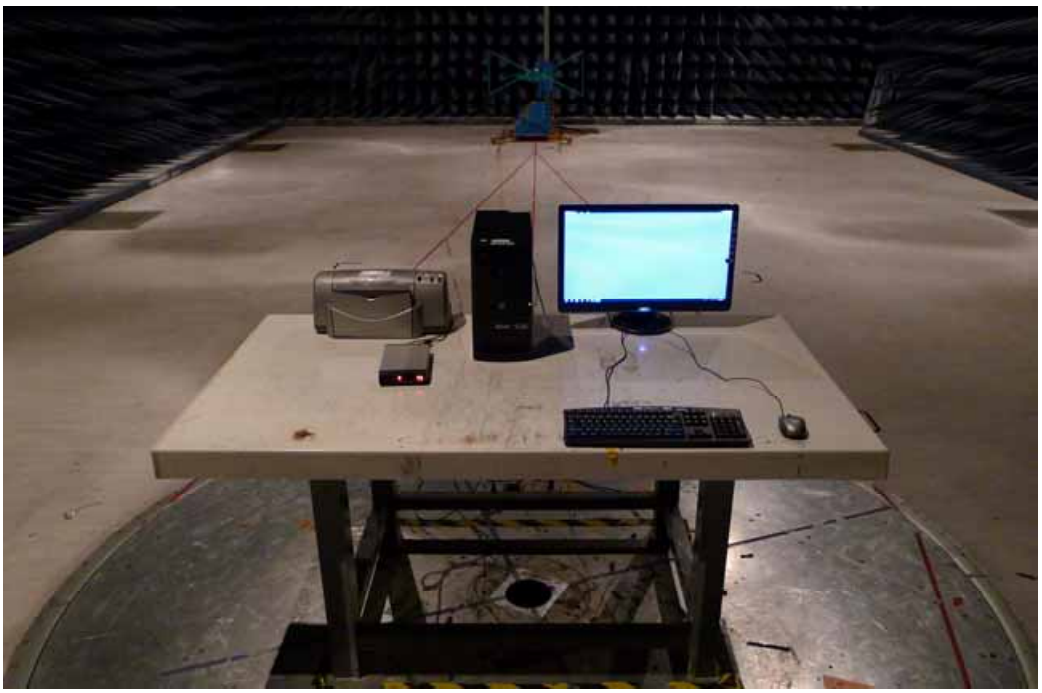


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1340.00	61.74	-16.40	45.34	74.00	-28.66	149	279	peak
2	2071.00	55.88	-12.30	43.58	74.00	-30.42	274	110	peak
3	2326.00	56.56	-11.81	44.75	74.00	-29.25	155	16	peak
4	3329.00	57.03	-10.29	46.74	74.00	-27.26	268	163	peak
5	3992.00	56.16	-9.58	46.58	74.00	-27.42	380	156	peak
6	4808.00	53.59	-9.29	44.30	74.00	-29.70	100	233	peak

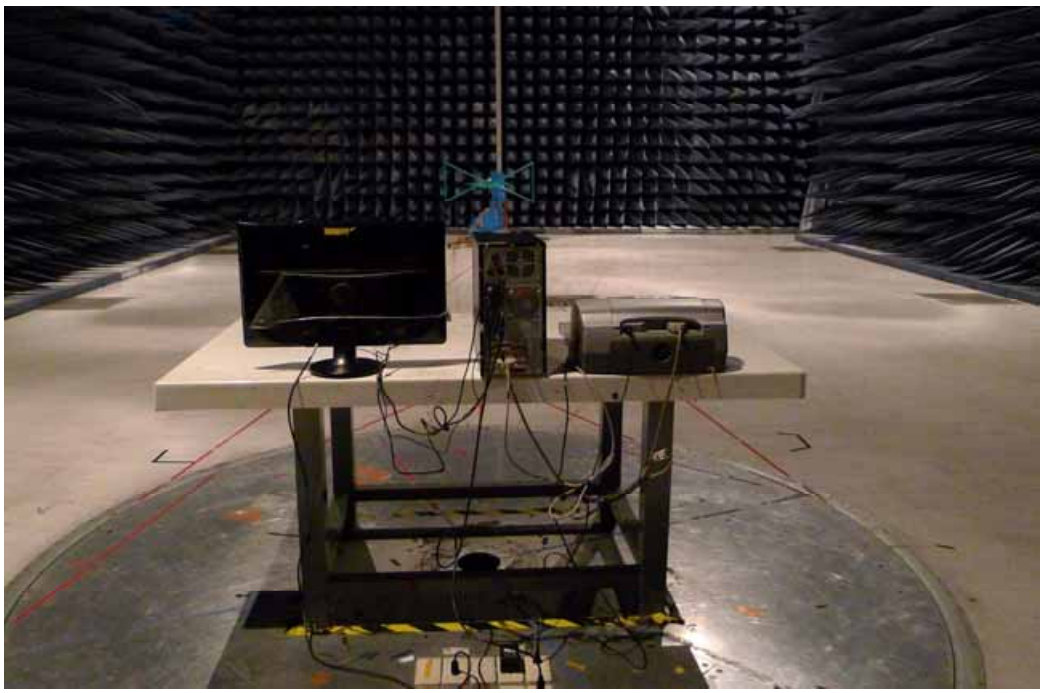
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Horn Antenna Distance: 3 meters
The CISPR 22 limits would be applied to all FCC Part 15 devices.
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.
No signal can be detected from 18GHz to 30GHz, so the graphs are omitted above 18GHz.

3.3 Test Setup Photo

Front View (below 1GHz)



Back View (below 1GHz)



Front View (above 1GHz)

Back View (above 1GHz)

4. Appendix

4.1 Appendix A: Warning Labels

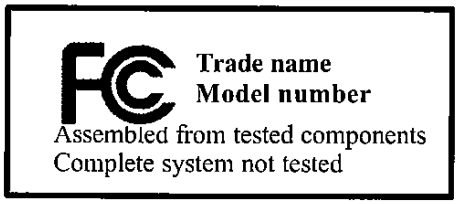
Label Requirements

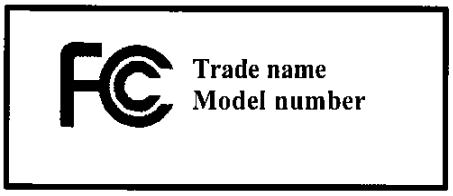
A Class B digital device subject to Declaration of Conformity of FCC shall carry a label which includes the following statement:

*** * * W A R N I N G * * ***

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The sample label shown shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.





4.2 Appendix B: Warning Statement

Statement Requirements

The operators' manual for a Class B digital device shall contain the following statements or their equivalent:

*** * * W A R N I N G * * ***

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice: The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equivalent.

*** * * * * * * * * ***

If the EUT was tested with special shielded cables the operators manual for such product shall also contain the following statements or their equivalent:

Shielded interface cables and/or AC power cord, if any, must be used in order to comply with the emission limits.

4.3 Appendix C: Test Equipment

4.3.1 Test Equipment List

Location Con02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 02	LISN 15	R&S	ENV216	101335	10/08/2013	10/08/2014
Conduction 02	LISN 06	ROHDE&SCHWARZ	ESH3/Z5	828874/009	02/25/2014	02/25/2015
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02-1	07/10/2014	07/10/2015
Conduction 02	EMI Receiver 14	ROHDE& SCHWARZ	ESCI	101034	04/24/2014	04/24/2015

Location Chamber02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber02)	BILOG Antenna 15	Teseq GmbH	CBL6112D	27622	01/23/2014	01/23/2015
Radiation (Chamber02)	Coaxial Cable Chmb 02-10M-02	MIYAZAK	8D-FB	Chmb 02-10M-02	10/14/2013	10/14/2014
Radiation (Chamber02)	EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	07/29/2014	07/29/2015

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1GHz	Spectrum Analyzer 24 (1G~26.5GHz)	Agilent	N9010A	MY49060537	07/29/2014	07/29/2015
Rad. Above 1GHz	Horn Antenna 06 (1G~18G)	ETS	3117	00066665	11/04/2013	11/04/2014
Rad. Above 1GHz	Preamplifier 13	MITEQ	JS44-00101800-25-10P-44	1329256	07/30/2014	07/30/2015
Rad. Above 1GHz	Microwave Cable 22 (1G~18G)	HUBER SUHNER	SUCOFLEX 106	501360/6 and 501361/6	02/17/2014	02/17/2015

4.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

Site	Filename	Version	Issue Date
Conduction/Radiation	EZ EMC	ISL-03A2	3/6/2013

4.4 Appendix D: Uncertainty of Measurement

The measurement uncertainty refers to CISPR 16-4-2:2011. The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 02>
AMN: ±3.27dB
ISN T2: ±3.86dB
ISN T4: ±3.86dB
ISN T8: ±3.86dB

<Chamber 02 (10M)>
Horizontal
30MHz~200MHz: ±4.05dB
200MHz~1000MHz: ±4.25dB
Vertical
30MHz~200MHz: ±4.77dB
200MHz~1000MHz: ±4.15dB

<Chamber 14 (3M)>
1GHz~6GHz: ±4.71dB
1GHz~18GHz: ±4.76dB
18GHz~26.5GHz: ±4.34dB
26.5GHz~40GHz: ±4.38dB

4.5 Appendix E: Photographs of EUT

Please refer to the File of **ISL-*14LE379P***