FCC Test Report

Product Name ： M.2 SSD

Model No. ： M.2 T60 A200-M

Applicant ： Apacer Technology Inc

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

Date of Receipt ： 2014/04/28

Issued Date ： 2014/04/30

Report No. ： 1450027R-ITUSP03V00

Report Version ： V1.0

Testing Laboratory
0914

Test Report

Issued Date : 2014/04/30
Report No. : 1450027R-ITUSP03V00

Product Name	:	M.2 SSD
Applicant	:	Apacer Technology Inc
Address	:	1F., No.32, Zhongcheng Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C)
Manufacturer	:	Apacer Technology Inc.
Model No.	:	M.2 T60 A200-M
EUT Rated Voltage	:	Power by PC
EUT Test Voltage	:	AC 120 V / 60 Hz
Trade Name	:	Apacer
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart B: 2013, Class B CISPR 22: 2008, ANSI C63.4: 2009
Test Result	:	Complied
Performed Location	:	Quietek Corporation (Linkou Laboratory) No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C. TEL:+866-2-8601-3788 / FAX:+886-2-8601-3789

Documented By : Anny Chou
(Adm. Specialist / Anny Chou)

Reviewed By : Leo Lin
(Senior Engineer / Leo Lin)

Approved By :
(Director / Vincent Lin)

Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scopes:

Taiwan R.O.C.	**:**	**BSMI, NCC, TAF**
Norway	**:**	**DNV**
USA	**:**	**FCC**
Japan	**:**	**VCCI**

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : http://www.quietek.com/tw/ctg/cts/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/
If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : service@quietek.com

LinKou Testing Laboratory :
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TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

Suzhou (China) Testing Laboratory :
No. 99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., Suzhou,China.
TEL : +86-512-6251-5088 / FAX : +86-512-6251-5098 E-Mail : service@quietek.com

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1. General Information

1.1. EUT Description

Product Name	M.2 SSD
Trade Name	Apacer
Model No.	M.2 T60 A200-M

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Pre-Test Mode	
Mode 1: Normal Operation	
Final Test Mode	
Emission	Mode 1: Normal Operation

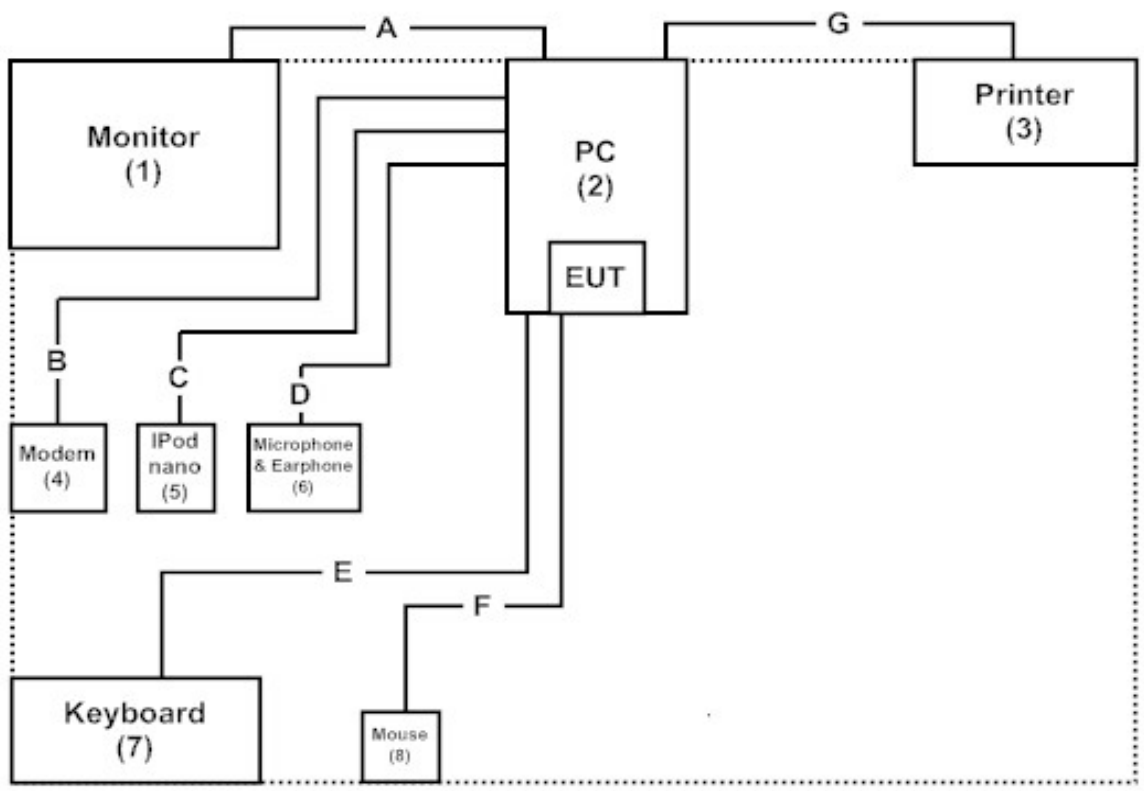
1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Monitor	DELL	U2410	CN-0J257M-728-01I-04NL	Non-Shielded, 1.8m
2	PC	DELL	Vostro230	1R7Z62S	Non-Shielded, 1.8m
3	Printer	EPSON	StyLus C63	FAPY094331	Non-Shielded, 1.8m
4	Modem	ACEEX	DM-1414	0102027554	Non-Shielded, 1.8m
5	IPod nano	Apple	A1236	YM823SUQY0P	N/A
6	Microphone & Earphone	Ergotech	ET-E201	N/A	N/A
7	Keyboard	Logitech	Y-SAL85	SY917UK	N/A
8	Mouse	Logitech	M-SBM96B	810-000440	N/A

1.4. Configuration of Tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	D-SUB Cable	Shielded, 1.8m, with two ferrite cores bonded.
B	RS-232 Cable	Shielded, 1.5m
C	Audio Cable	Non-Shielded, 1.6m
D	Microphone & Earphone Cable	Non-Shielded, 1.6m
E	Keyboard Cable	Shielded, 1.8m
F	Mouse Cable	Shielded, 1.8m
G	USB Cable	Shielded, 1.8m

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.4.
2	Turn on the power of all equipments.
3	All the features of the EUT operation normally.

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Emission			
Performed Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart B: 2013 Class B, ANSI C63.4: 2009	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart B: 2013 Class B, ANSI C63.4: 2009	Yes	No

2.2. List of Test Equipment

Conducted Emission / SR2

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
EMI Test Receiver	R&S	ESCI	100648	2013/11/22
LISN	R&S	ESH3-Z5	836679/020	2014/03/18
LISN	R&S	ENV216	100086	2014/04/10
Pulse Limiter	R&S	ESH3-Z2	100324	2014/03/28
Coaxial Cable	QTK(Arnist)	RG 400	LC017-RG	2013/06/26

Radiated Emission / Site2

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Bilog Antenna	Schaffner Chase	CBL6112B	2921	2013/05/06
EMI Test Receiver	R&S	ESCS 30	100123	2013/07/09
Coaxial Cable	QTK(Arnist)	RG 214	LC002-RG	2013/06/18
Coaxial Switch	Arnist	MP59B	6200436230	2013/06/18
Site2 NSA	QTK	N/A	N/A	2013/06/18

Radiated Emission / CB7

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
EMI Test Receiver	R&S	ESU26	100433	2013/07/29
Horn Antenna	ETS-Lindgren	3117	00135205	2014/03/26
Horn Antenna	SCHWARZBECK	9120D	576	2013/11/20
Pre-Amplifier	QuieTek	AP-180C	CHM/071920	2013/06/24
CB7 VSWR	QTK	N/A	N/A	2013/07/25

2.3. Measurement Uncertainty

Conducted Emission

The measurement uncertainty is evaluated as ± 2.26 dB.

Radiated Emission

The measurement uncertainty is evaluated as ± 3.19 dB.

2.4. Test Environment

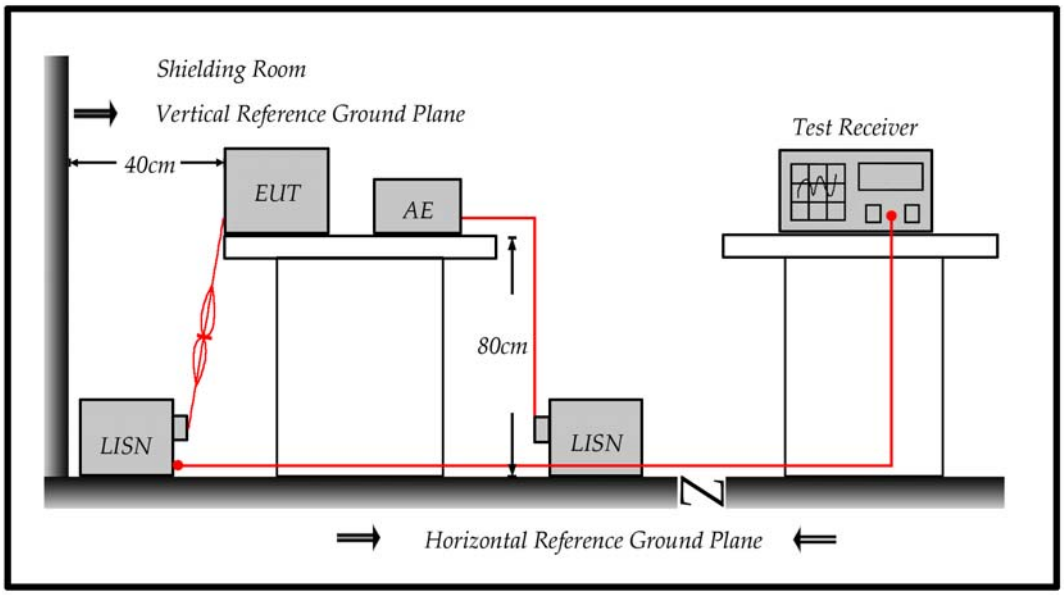
Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	15-35	23.9
	Humidity (%RH)	25-75	52
	Barometric pressure (mbar)	860-1060	950-1000
Radiated Emission	Temperature (°C)	15-35	24.9
	Humidity (%RH)	25-75	38
	Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

3.1. Test Specification

According to Standard : FCC Part 15 Subpart B, ANSI C63.4

3.2. Test Setup



3.3. Limit

Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50-5.0	56	46
5.0 - 30	60	50

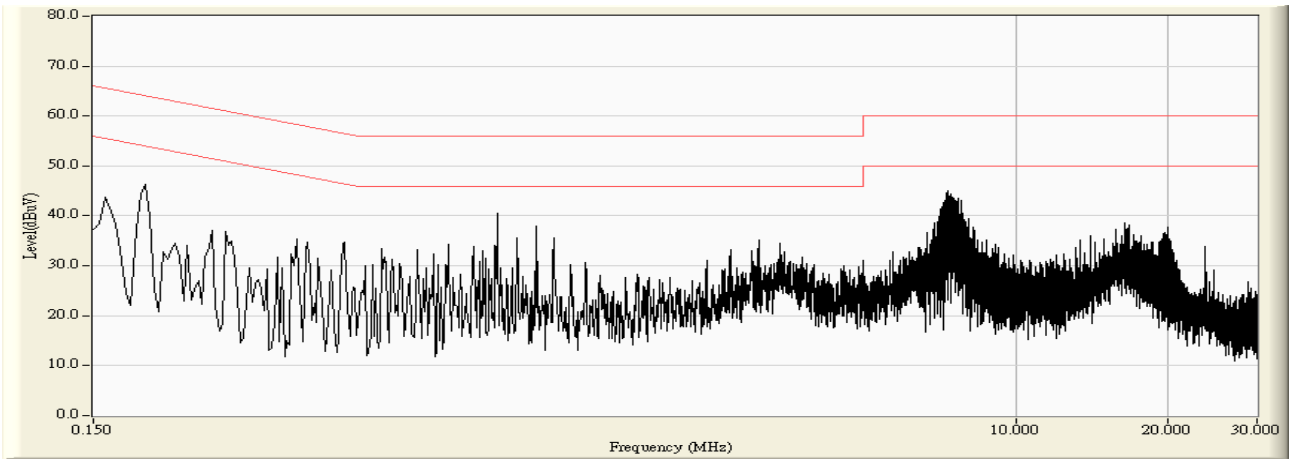
Remarks: In the above table, the tighter limit applies at the band edges.

3.4. Test Procedure

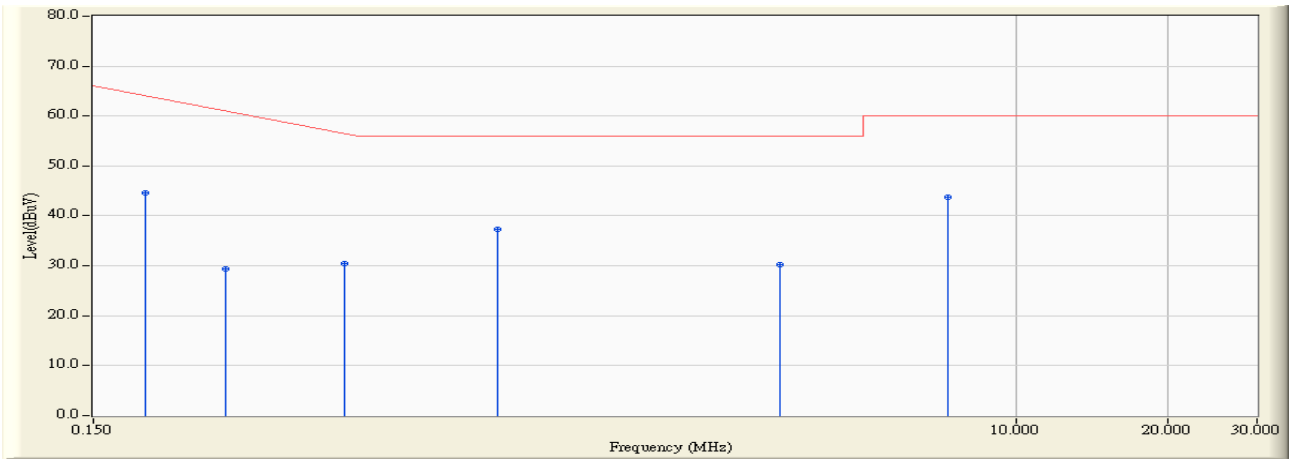
The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
(Please refers to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

3.5. Test Result

Site : SR2	**Time : 2014/04/29 - 09:56**
Limit : CISPR_B_00M_QP	**Margin : 10**
EUT : M.2 SSD	**Probe : ENV_216_L1 - Line1**
Power : AC 120V/60Hz	**Note : Mode 1**



Site : SR2	**Time : 2014/04/29 - 09:57**
Limit : CISPR_B_00M_QP	**Margin : 0**
EUT : M.2 SSD	**Probe : ENV_216_L1 - Line1**
Power : AC 120V/60Hz	**Note : Mode 1**

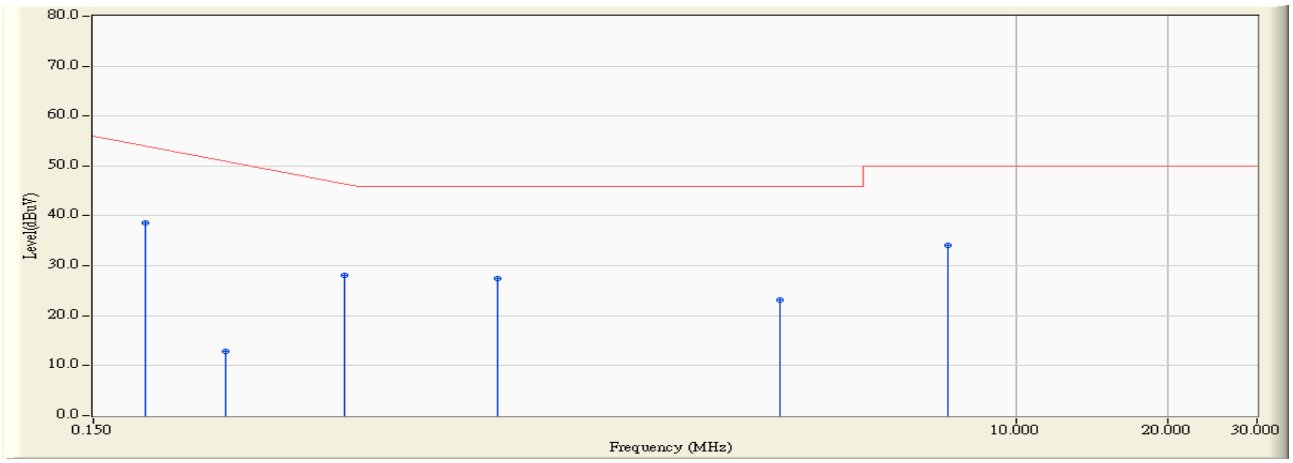


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.190	9.741	34.829	44.569	-20.288	64.857	QUASIPEAK
2		0.274	9.741	19.644	29.385	-33.072	62.457	QUASIPEAK
3		0.470	9.742	20.723	30.465	-26.392	56.857	QUASIPEAK
4		0.942	9.754	27.457	37.212	-18.788	56.000	QUASIPEAK
5		3.418	9.818	20.390	30.208	-25.792	56.000	QUASIPEAK
6	*	7.362	9.947	33.734	43.681	-16.319	60.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : SR2	**Time : 2014/04/29 - 09:57**
Limit : CISPR_B_00M_AV	**Margin : 0**
EUT : M.2 SSD	**Probe : ENV_216_L1 - Line1**
Power : AC 120V/60Hz	**Note : Mode 1**

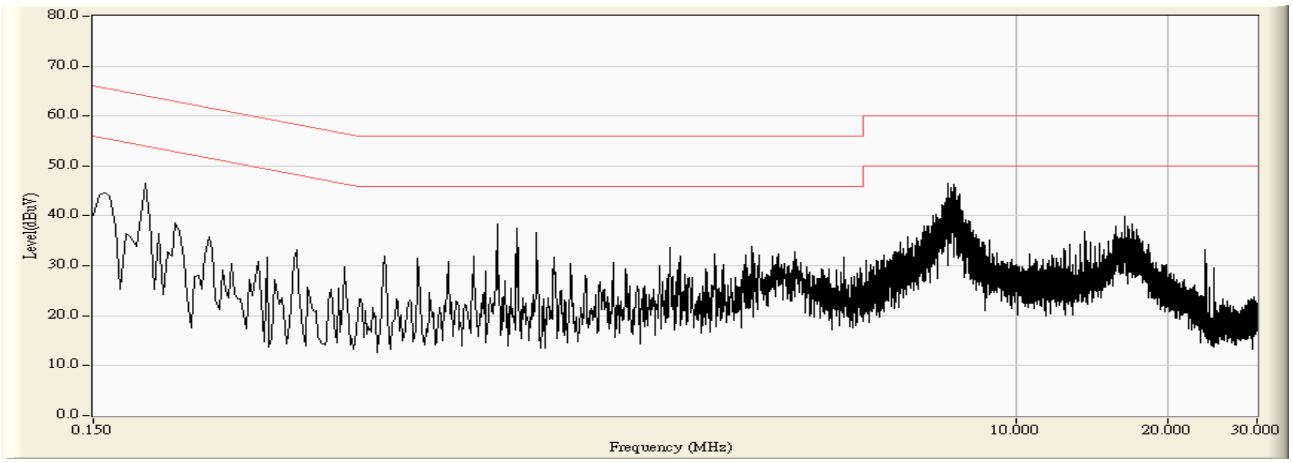


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.190	9.741	28.841	38.582	-16.275	54.857	AVERAGE
2		0.274	9.741	3.118	12.859	-39.598	52.457	AVERAGE
3		0.470	9.742	18.253	27.995	-18.862	46.857	AVERAGE
4		0.942	9.754	17.701	27.455	-18.545	46.000	AVERAGE
5		3.418	9.818	13.361	23.179	-22.821	46.000	AVERAGE
6	*	7.362	9.947	24.246	34.193	-15.807	50.000	AVERAGE

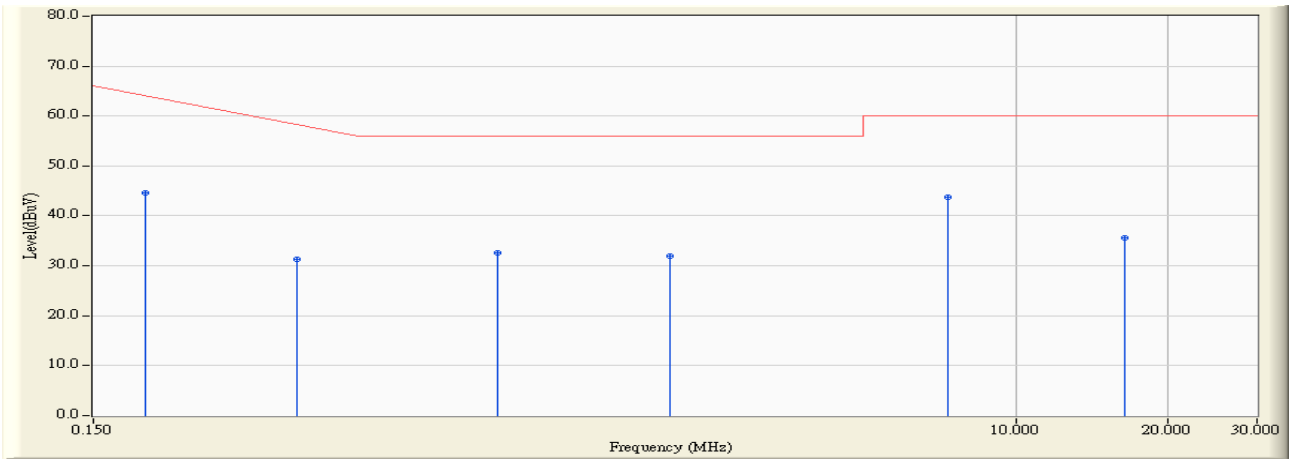
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : SR2	**Time : 2014/04/29 - 09:58**
Limit : CISPR_B_00M_QP	**Margin : 10**
EUT : M.2 SSD	**Probe : ENV_216_N - Line2**
Power : AC 120V/60Hz	**Note : Mode 1**



Site : SR2	**Time : 2014/04/29 - 09:59**
Limit : CISPR_B_00M_QP	**Margin : 0**
EUT : M.2 SSD	**Probe : ENV_216_N - Line2**
Power : AC 120V/60Hz	**Note : Mode 1**

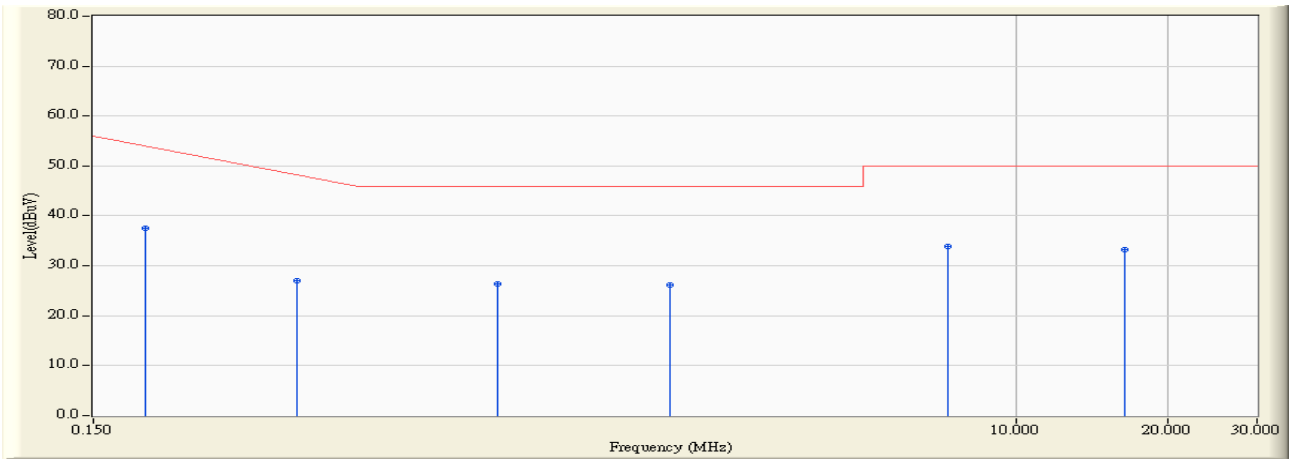


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.190	9.731	34.963	44.694	-20.163	64.857	QUASIPEAK
2		0.378	9.732	21.487	31.218	-28.268	59.486	QUASIPEAK
3		0.942	9.744	22.779	32.524	-23.476	56.000	QUASIPEAK
4		2.074	9.749	22.107	31.857	-24.143	56.000	QUASIPEAK
5	*	7.362	9.957	33.756	43.713	-16.287	60.000	QUASIPEAK
6		16.470	10.240	25.440	35.680	-24.320	60.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : SR2	**Time : 2014/04/29 - 09:59**
Limit : CISPR_B_00M_AV	**Margin : 0**
EUT : M.2 SSD	**Probe : ENV_216_N - Line2**
Power : AC 120V/60Hz	**Note : Mode 1**



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.190	9.731	27.871	37.602	-17.255	54.857	AVERAGE
2		0.378	9.732	17.238	26.970	-22.516	49.486	AVERAGE
3		0.942	9.744	16.539	26.283	-19.717	46.000	AVERAGE
4		2.074	9.749	16.365	26.115	-19.885	46.000	AVERAGE
5	*	7.362	9.957	23.826	33.783	-16.217	50.000	AVERAGE
6		16.470	10.240	22.997	33.237	-16.763	50.000	AVERAGE

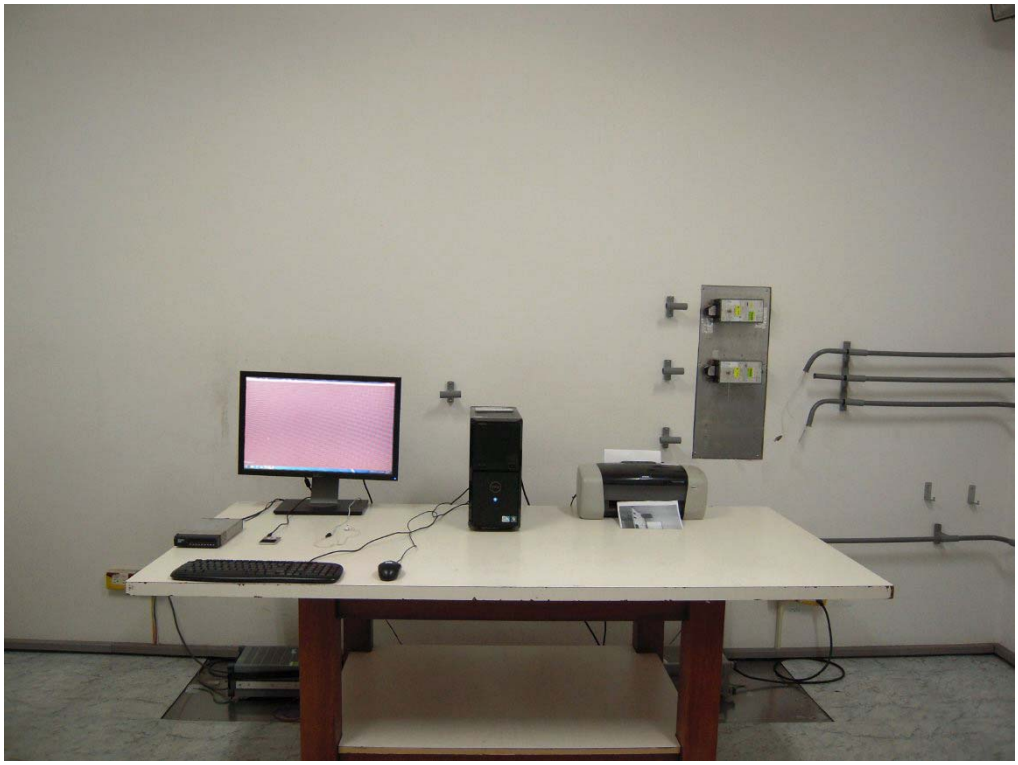
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3.6. Test Photograph

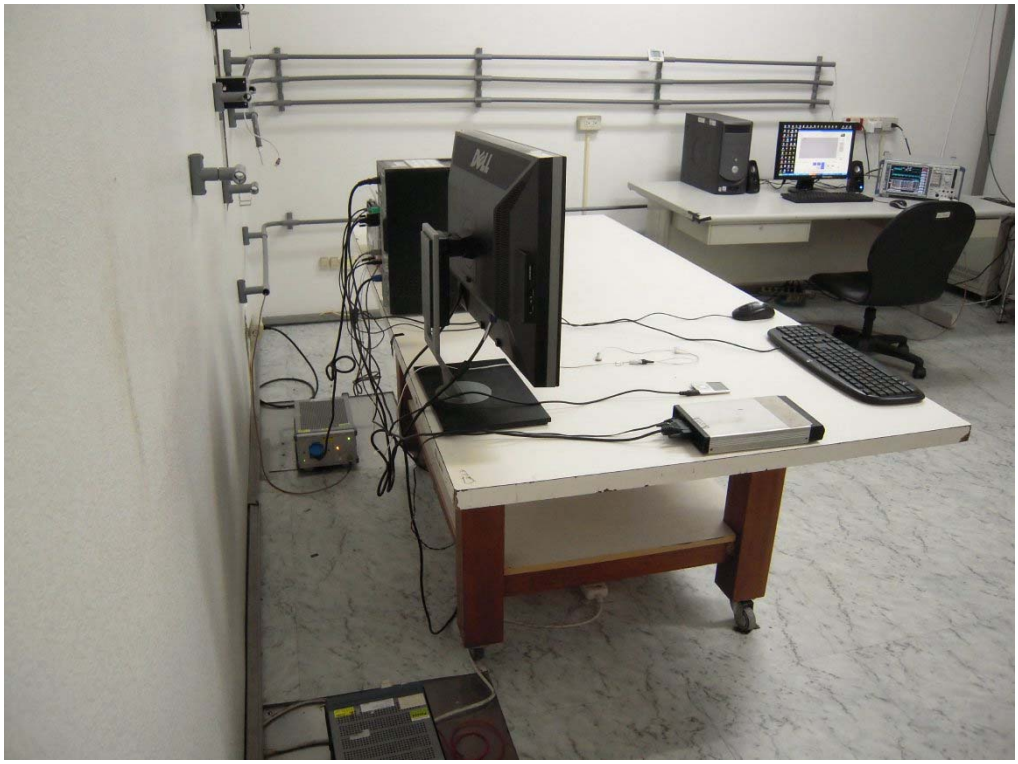
Test Mode : Mode 1: Normal Operation

Description : Front View of Conducted Test



Test Mode : Mode 1: Normal Operation

Description : Back View of Conducted Test



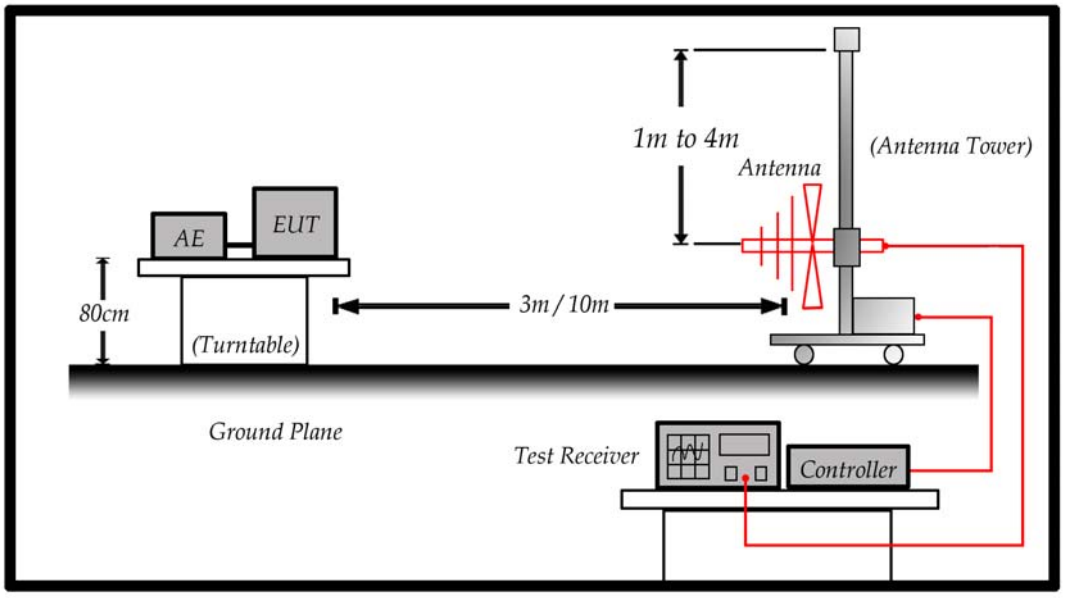
4. Radiated Emission

4.1. Test Specification

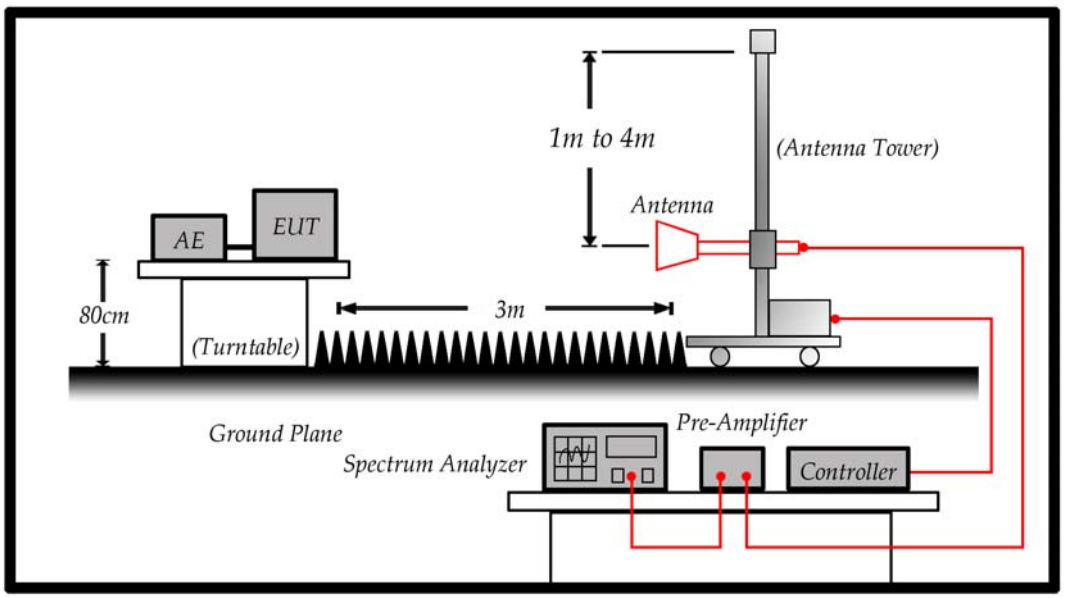
According to EMC Standard : FCC Part 15 Subpart B, ANSI C63.4

4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

Under 1GHz test shall not exceed the following value:

Limits		
Frequency (MHz)	Distance (m)	dBuV/m
30 – 230	10	30
230 – 1000	10	37

Remark:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Above 1GHz test shall not exceed the following value:

FCC Part 15 Subpart B Paragraph 15.109 Limits (dBuV/m)		
Frequency (MHz)	Distance (m)	dBuV/m
30-88	3	40
88-216	3	43.5
216-960	3	46
Above 960	3	54

Remark:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground.

The turn table can rotate 360 degrees to determine the position of the maximum emission level and the antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated on radiated measurement.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the folowing table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

On any frequency or frequencies below or equal to 1000 MHz, the radiated limits shown are based on measuring equipment employing a quasi-peak detector function and above 1000 MHz, the radiated limits shown are based measuring equipment employing an average detector function.

When average radiated emission measurement are included emission measurement Above 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

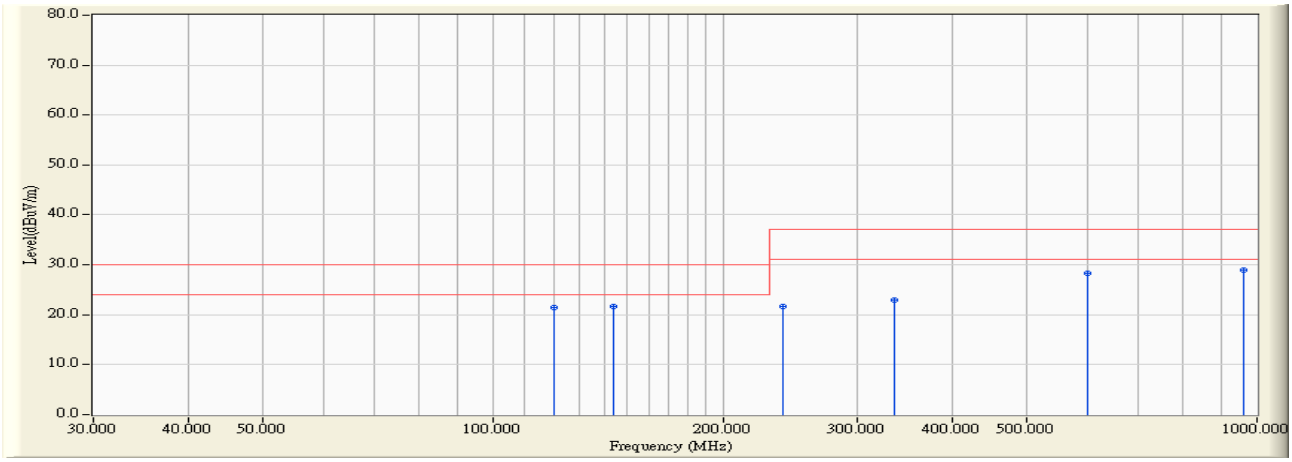
For class A, the measurement distance between the EUT and antenna is 10 meters for under 1GHz and above 1GHz.

For class B, the measurement distance between the EUT and antenna is 10 meters for under 1GHz and 3 meters for above 1GHz.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30) is 120 kHz and above 1GHz is 1MHz.

4.5. Test Result

Site : Site2	**Time : 2014/04/28 - 13:25**
Limit : CISPR_B_10M_QP	**Margin : 6**
EUT : M.2 SSD	**Probe : Site2_CBL6112_10M_2705 - HORIZONTAL**
Power : AC 120V/60 Hz	**Note : Mode 1**

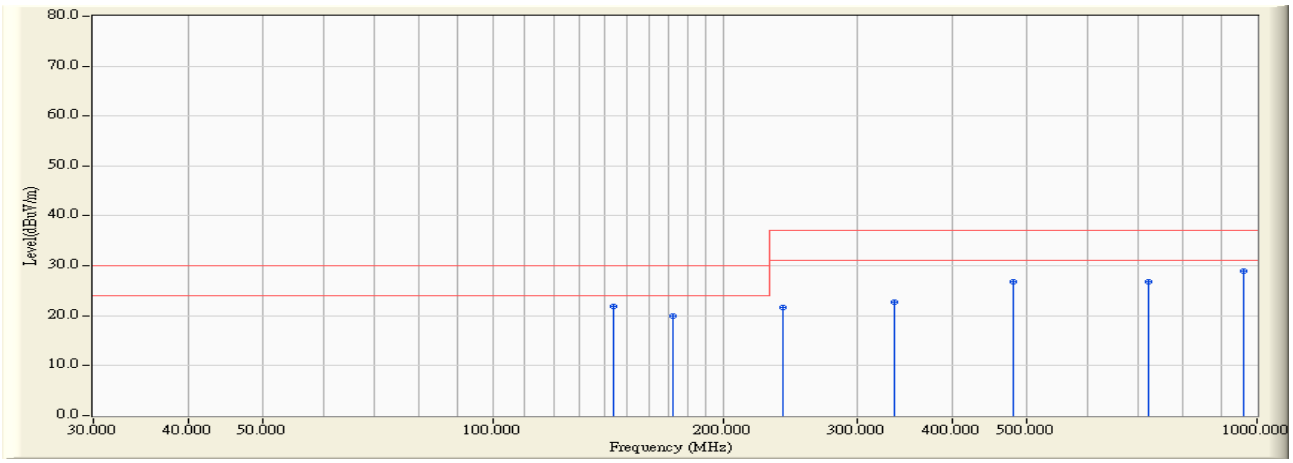


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		120.000	14.686	6.700	21.386	-8.614	30.000	QUASIPEAK
2		144.000	13.513	8.100	21.613	-8.387	30.000	QUASIPEAK
3		240.000	14.914	6.700	21.614	-15.386	37.000	QUASIPEAK
4		336.000	18.389	4.500	22.889	-14.111	37.000	QUASIPEAK
5		600.000	24.800	3.600	28.400	-8.600	37.000	QUASIPEAK
6	*	960.000	28.818	0.200	29.018	-7.982	37.000	QUASIPEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : Site2	**Time : 2014/04/28 - 13:43**
Limit : CISPR_B_10M_QP	**Margin : 6**
EUT : M.2 SSD	**Probe : Site2_CBL6112_10M_2705 - VERTICAL**
Power : AC 120V/60 Hz	**Note : Mode 1**

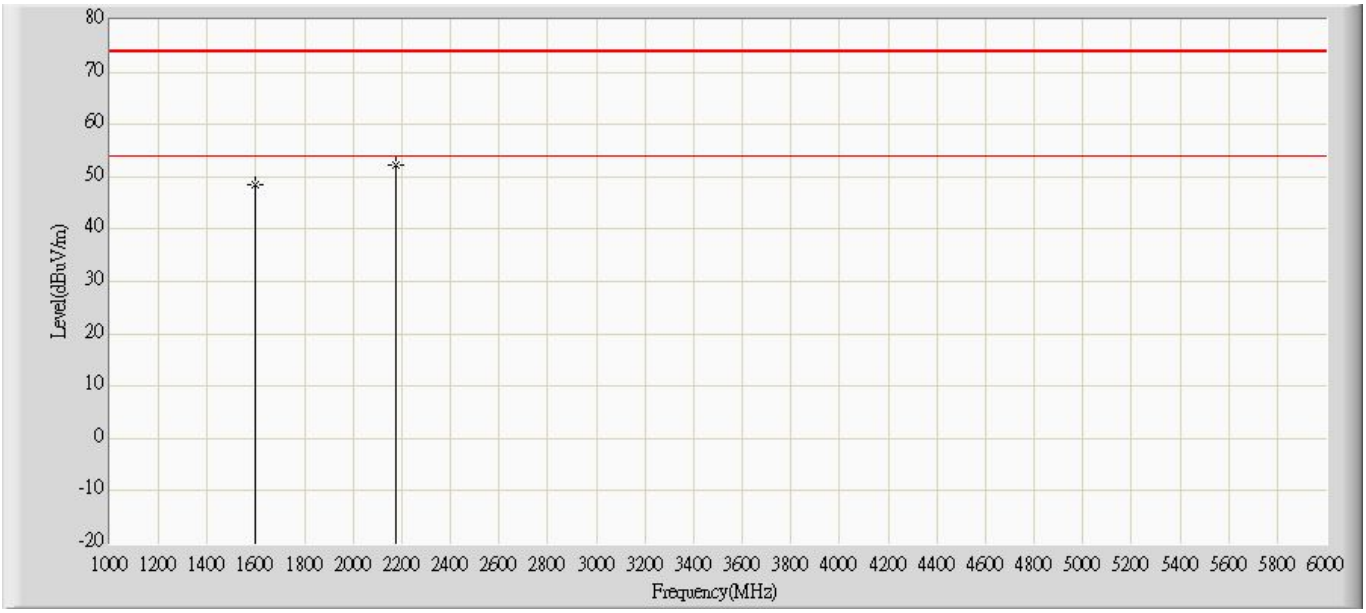


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		144.000	13.513	8.400	21.913	-8.087	30.000	QUASIPEAK
2		171.820	12.532	7.400	19.932	-10.068	30.000	QUASIPEAK
3		240.000	14.914	6.800	21.714	-15.286	37.000	QUASIPEAK
4		336.000	18.389	4.300	22.689	-14.311	37.000	QUASIPEAK
5		480.000	22.617	4.200	26.818	-10.182	37.000	QUASIPEAK
6		720.000	25.837	0.900	26.737	-10.263	37.000	QUASIPEAK
7	*	960.000	28.818	0.100	28.918	-8.082	37.000	QUASIPEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site: CB7	**Time: 2014/04/28 - 19:27**
Limit: FCC_B_(Above_1G)	**Margin: 0**
Probe: CB7_Horn_9120D_1311	**Polarity: Horizontal**
EUT : M.2 SSD	**Power: AC 120V/60Hz**
Note : Mode 1	

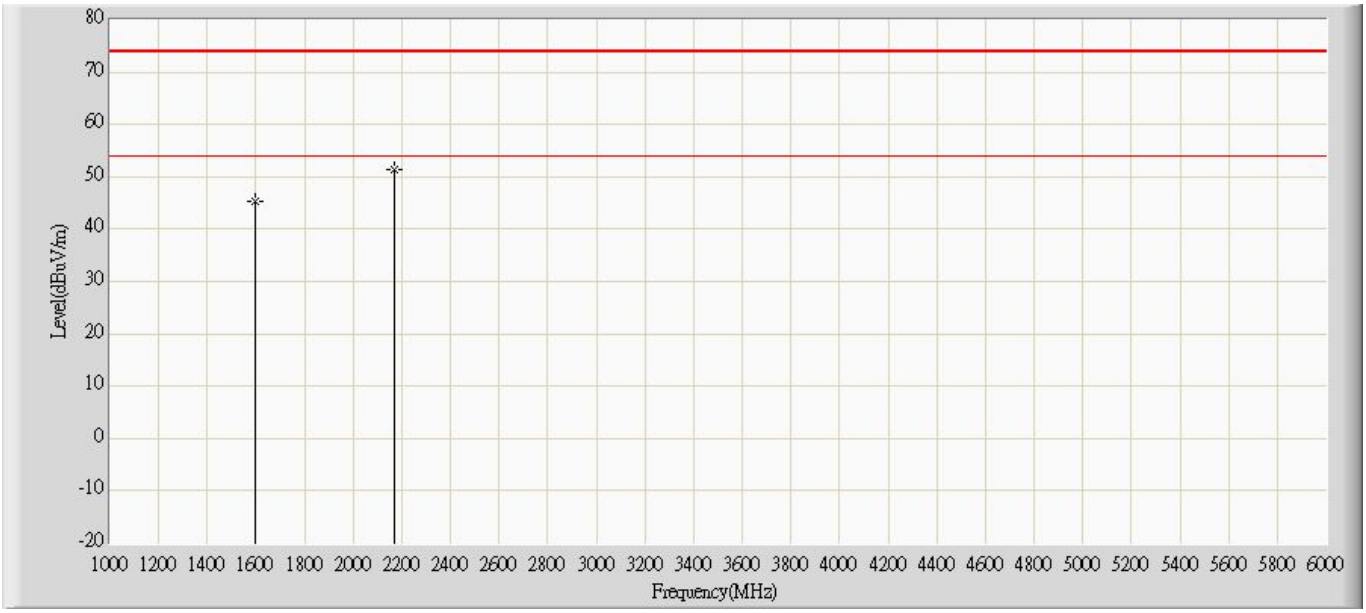


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			1594.000	48.578	51.220	-25.422	74.000	-2.642	PK
2		*	2173.000	52.170	52.240	-21.830	74.000	-0.070	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Site: CB7	**Time: 2014/04/28 - 19:28**
Limit: FCC_B_(Above_1G)	**Margin: 0**
Probe: CB7_Horn_9120D_1311	**Polarity: Vertical**
EUT : M.2 SSD	**Power: AC 120V/60Hz**
Note : Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			1600.000	45.225	47.860	-28.775	74.000	-2.635	PK
2		*	2170.000	51.379	51.460	-22.621	74.000	-0.081	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

4.6. Test Photograph

Test Mode : Mode 1: Normal Operation

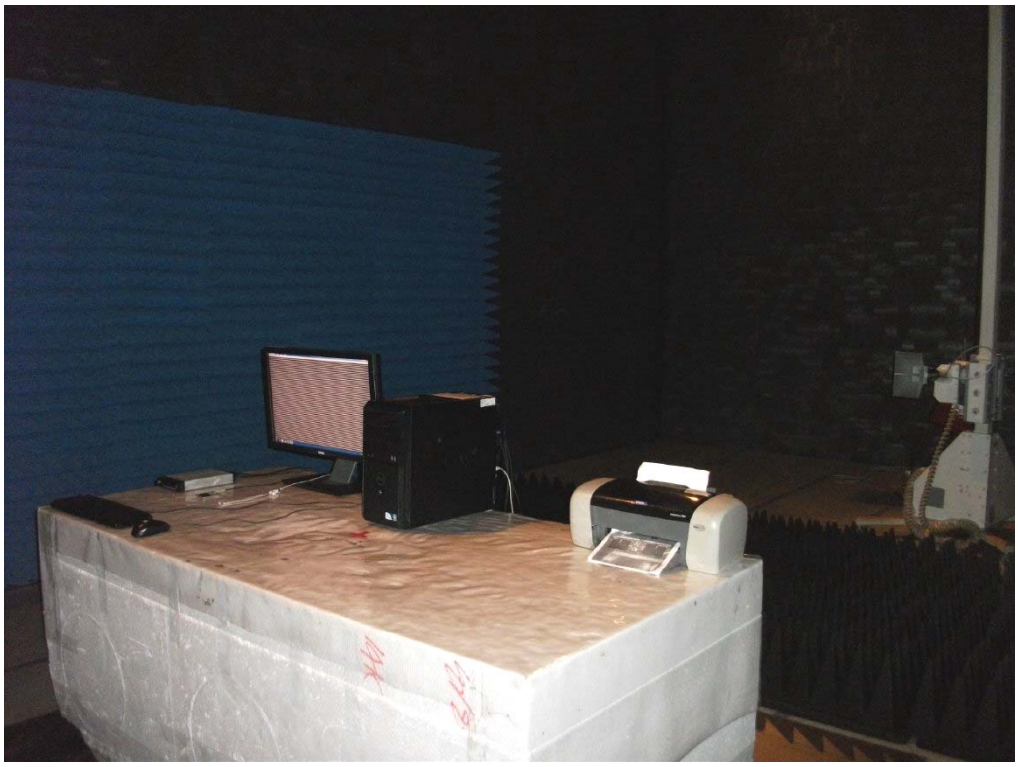
Description : Front View of Radiated Test

Test Mode : Mode 1: Normal Operation

Description : Back View of Radiated Test

Test Mode : Mode 1: Normal Operation

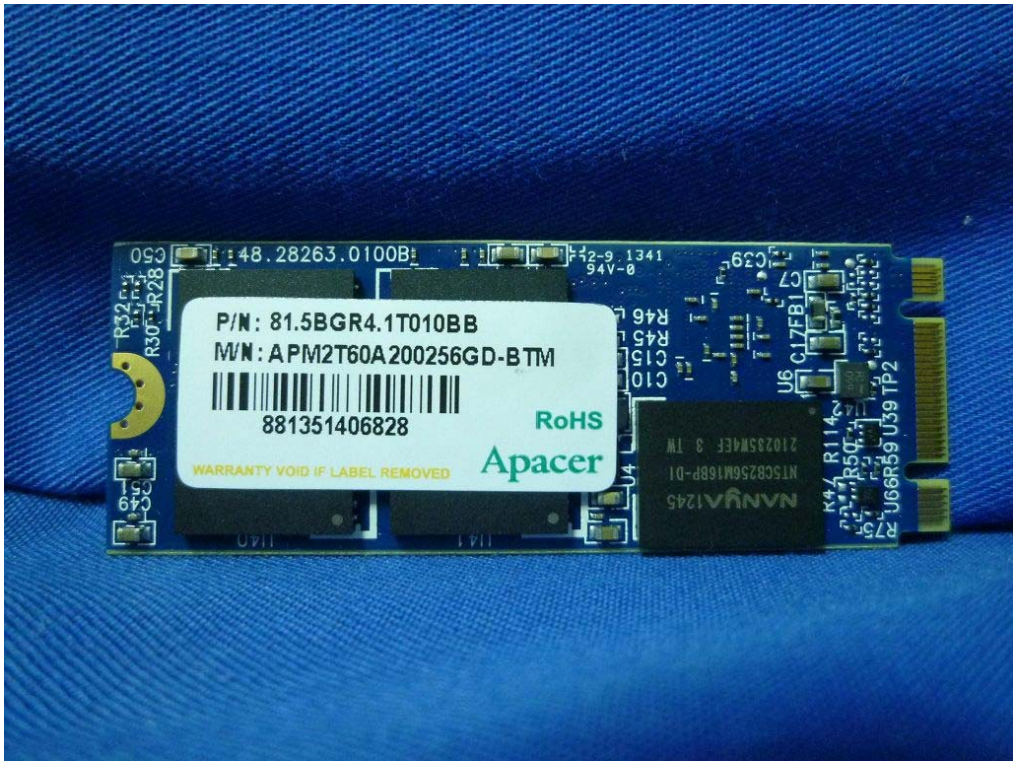
Description : Front View of High Frequency Radiated Test



5. Attachment

➢ EUT Photograph

(1) EUT Photo



(2) EUT Photo