



FCC 47 CFR PART 15 SUBPART B

TEST REPORT

For

4U Rack Mounting chassis

Model: ARC-645M

Trade Name: AAEON

Issued for

AAEON Technology Inc.

**5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien City,
Taipei, Taiwan, R.O.C.**

Issued by

Compliance Certification Services Inc.

Hsintien Lab.

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1 TEST RESULT CERTIFICATION

Applicant: AAEON Technology Inc.
5F, No.135, Lane 235, Pao Chiao Rd., Hsin-Tien City,
Taipei, Taiwan, R.O.C.

Manufacturer: AAEON Technology Inc.
5F, No.135, Lane 235, Pao Chiao Rd., Hsin-Tien City,
Taipei, Taiwan, R.O.C.

Equipment Under Test: 4U Rack Mounting chassis

Trade Name: AAEON

Model: ARC-645M

Detailed EUT Description: See Item 2 of this report

Date of Test: October 22, 2004

Applicable Standard	Class / Limit	Test Result
FCC Part 15 Subpart B	Class A	No non-compliance noted
Deviation from Applicable Standard		
None		

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart B and the measurement procedures were according to ANSI C63.4. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

Approved by:

Reviewed by:

David Wang
 Manager of Hsintien Laboratory
 Compliance Certification Services Inc.

Vince Chiang
 Section Manager of Hsintien Laboratory
 Compliance Certification Services Inc.



2 EUT DESCRIPTION

Product	4U Rack Mounting chassis
Trade Name	AAEON
Model	ARC-645M
Housing Type	Metal case
EUT Power Rating	N/A
AC Power During Test	120VAC / 60 Hz to Host PC Power Supply
Power Supply Manufacturer	ETASIS
Power Supply Model Number	EFRP-2462
AC Power Cord Type	Unshielded, 1.8m (Detachable) to Host PC Power Supply
OSC/Clock Frequency	N/A

I/O PORT OF EUT

I/O PORT TYPE	Q'TY	TESTED WITH

Note: Client consigns only one model sample (Model Number is ARC-645M) to test.



3 TEST METHODOLOGY

3.1 EUT System Operation

1. Windows 2000 boots system.
2. Run Emctest.exe To activate All Peripherals And Display “H” Pattern On Monitor Screen.
3. Run Winemc.exe then choose “E:/ & F:/ & G:/ & H:/ & J:/” to test USB 2.0 HDD.
4. Press the start menu, select executive and type ping 192.168.0.1 -t (Server Notebook), ping 192.168.0.10 -t (EUT).

Note: Test program is self-repeating throughout the test.

3.2 DECISION OF FINAL TEST MODE

1. The following test mode were scanned during the preliminary test:

Conduction(s):

1.	POWER 1	1600X1200, VF=85Hz
2.		1600X1200, VF=85Hz
3.	POWER 2	1024X768, VF=75Hz
4.		800X600, VF=60Hz

Radiation(s):

1.	1600X1200, VF=85Hz
2.	1024X768, VF=75Hz
3.	800X600, VF=60Hz

2. After the preliminary scan, the following test mode was found to produce the highest emission level.

Conduction: Mode 3

Radiation: Mode 1

Then, the EUT configuration and cable configuration of the above highest emission mode was recorded for all final test items.



4 SETUP OF EQUIPMENT UNDER TEST

Setup Diagram

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

Support Equipment

Host PC Devices:

No	Equipment	Model #	Serial #	FCC ID/ BSMI ID	Trade Name
1	Motherboard	SF7505VB2	N/A	N/A	Intel
2	CPU (2.8GHz X2)	Xeon	N/A	N/A	Intel
3	HDD	ST340014A	N/A	N/A	Seagate
4	Floppy	JU-256A198PC	N/A	N/A	Panasonic
5	CD-ROM	652A-6N4	N/A	N/A	BenQ
6	RAM (512MB X2)	M312L6420ETS-CBO	N/A	N/A	KOREA
7	Power Supply	EFRP-2462	N/A	N/A	ETASIS

Peripherals Devices:

No	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade Name	Data Cable	Power Cord
1	USB 2.0 HDD	F12-U	N/A	BSMI ID: 4912A002	TeraSyS	Shielded, 1.8m	N/A
2	USB 2.0 HDD	F12-U	N/A	BSMI ID: 4912A002	TeraSyS	Shielded, 1.8m	N/A
3	USB 2.0 HDD	F12-U	N/A	BSMI ID: 4912A002	TeraSyS	Shielded, 1.8m	N/A
4	PS/2 Mouse	M-BE5	LZE20309352	BSMI ID: 3892A471	Logitech	Shielded, 1.8m	N/A
5	PS/2 Keyboard	6311-TW4C16	N/A	BSMI ID: 4862A064	ACER	Shielded, 1.8m	N/A
6	USB 2.0 HDD	F12-U	N/A	BSMI ID: 4912A002	TeraSyS	Shielded, 1.8m	N/A
7	USB 2.0 HDD	F12-UF	N/A	BSMI ID: 4912A002	TeraSyS	Shielded, 1.8m	N/A
8	Monitor	1100DF	N/A	DoC BSMI: R33475	SAMAUNG	Shielded, 1.8m with two cores	Unshielded, 1.8m
9	Modem	5JEG4033M KO	N/A	5RJTAI-35500-M5-E	TOP-SOLUTION	Shielded, 0.8m	Unshielded, 1.8m
10	Server Notebook	M285	RD49R-7YTJR-B3C4K-G2JQX-DD3CG	BSMI: R31259 DoC	LEO	Unshielded, 20m	Unshielded, 1.8m with a core

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

5 FACILITIES AND ACCREDITATIONS







5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at CCS Taiwan Hsintien Lab at No. 165, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan.

The measurement facilities are constructed in conformance with the requirements of CISPR 16-1, ANSI C63.4 and other equivalent standards.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

The test facilities used to perform Electromagnetic compatibility tests are registered or accredited by the organizations listed in the following table which includes the recognized scope specifically.

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	CFR 47, FCC Part 15/18 using ANSI 63.4; AS/NZS 3548; VCCI V3; CNS 13438; CNS 13439; CNS 13783; CNS 14115; CISPR 11/EN 55011; CISPR 14-1/EN 55014-1; CISPR 15/EN 55015; CISPR 22/EN 55022; EN 50081-1/EN 61000-6-3; EN 50082-1/EN 61000-6-4; IEC/EN 61000-4-2, IEC/EN 61000-4-3, IEC/EN 61000-4-4, IEC/EN 61000-4-5, IEC/EN 61000-4-6, IEC/EN 61000-4-8, IEC/EN 61000-4-11, IEC/EN 61000-3-2, IEC/EN 61000-3-3; CISPR 24/EN 55024; CISPR 14-2/EN 55014-2; EN 50081-2/EN 61000-6-1; EN 50082-2/EN 61000-6-2.	 824.01
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 250366
Japan	VCCI	3/10 meter Open Area Test Sites and Line Conducted Test Room to perform conducted/radiated measurements	 R-1434/1630~4 C-1511/1882
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2/3/4, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, Cispr 16-1/2/3/4	 ELA 103
Taiwan	CNLA	47 CFR FCC Part 15 Subpart B, EN 61000-3-2, EN 61000-3-3, CNS 13439, CNS 13783-1, CNS 13438, AS/NZS 3548, VCCI, CNS 13022-1/2/3, EN 55022, EN 55013, EN 55014-1, EN 61000-4-2/3/4/5/6/8/11, ENV 50204, ENV 50141, ENV 50142	 1108 ILAC MRA
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439	 SL2-IN-E-0005 SL2-A1-E-0005 SL2-R1-E-0005 SL2-R2-E-0005

Note: No part of this report may be used to claim or imply product endorsement by CNLA, A2LA or other government agency.



6 INSTRUMENT AND CALIBRATION

6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

6.2 test and MEASUREMENT equipment

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and other equivalent standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective manual.

Equipment Used for Emission Measurement

Open Area Test Site # I				
EQUIPMENT	MFR	MODEL	SERIAL NUMBER	CAL. DUE
SITE NSA	CCS	I Site	N/A	09/17/2005
MEASURE RECEIVER	SCHAFFNER	SCR3501	338	07/05/2005
SPECTRUM ANALYZER	ADVANTEST	R3132	120900008	No Calibration Required
ANTENNA	SCHAFFNER	CBL 6112B	2809	09/26/2005
AMPLIFIER	SCHAFFNER	CPA9231A	3626	10/08/2005
CABLE	BELDEN	9913	N-TYPE #I1	10/08/2005
ATTENUATOR	MCL	UNAT-6	AT06-3	10/08/2005
THERMO-HYGRO METER	TFA	N/A	NO.2	11/23/2004
Above 1GHz Used				
EMC ANALYZER (100Hz-22GHz)	HP	8566B	2937A06102	07/26/2005
ANTENNA (1-18GHz)	EMCO	3115	5761	02/02/2005
AMPLIFIER (1-26.5GHz)	HP	8449B	3008A01266	02/15/2005
CABLE (1-18GHz)	JYEBAO HUBER+SUHNER	LL142 SUCOFLEX 104	SMA-RS1&2 SMA-RS3	02/15/2005

Note: The measurement uncertainty is less than +/- 3.36dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



Conducted Emission Test Site # A				
EQUIPMENT	MFR	MODEL	SERIAL NUMBER	CAL. DUE
TEST RECEIVER	R&S	ESHS20	840455/006	03/07/2005
LISN (EUT)	SCHWARZBECK	NSLK 8127	8127382	01/05/2005
LISN	SOLAR	8012-50-R-24-BNC	8305114	02/10/2005
BNC CABLE	MIYAZAKI	5D-FB	BNC A1	01/30/2005
THERMO-HYGRO METER	TOP	HA-202	9303-1	03/24/2005

Note: The measurement uncertainty is less than +/- 2.83dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

7 LINE CONDUCTED & RADIATED EMISSION TEST

7.1 LIMIT

Maximum permissible level of Line Conducted Emission

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Note: The lower limit shall apply at the transition frequency.

Maximum permissible level of Radiated Emission measured at 10 meter

FREQUENCY (MHz)	Class A (dBuV/m)		Class B (dBuV/m)	
	Quasi-peak		Quasi-peak	
30 - 230	40		30	
230 - 1000	47		37	

Note: The lower limit shall apply at the transition frequency.

Maximum permissible level of Radiated Emission measured at 3 meter

FREQUENCY (MHz)	Class A (dBuV/m)		Class B (dBuV/m)	
	Average	Peak	Average	Peak
Above 1000	59.3	79.3	53.9	73.9

Note: The lower limit shall apply at the transition frequency.



7.2 TEST PROCEDURE OF LINE CONDUCTED EMISSION

Procedure of Preliminary Test

- The EUT was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per ANSI C63.4.
- All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- The test system with EUT received AC power, 120V/60Hz, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment received power from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a EMI Test Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to the Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Receiver.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 3.2 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 3.2 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission level were recorded for reference of the final test.



Procedure of Final Test

- EUT and support equipment were set up on the test bench as per step 10 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the AV. limit in Q.P. mode, then the emission signal was re-checked using an AV. detector.
- The test data of the worst-case condition(s) was recorded.

Data Sample:

Freq. MHz	Read Level dBuV	Factor dB	Level dBuV	Limit dBuV	Over Limit dB	Reading Type (P/Q/A)	Line (L1/L2)
x.xx	42.95	0.55	43.50	73	-29.50	Q	L1

- Freq. = Emission frequency in MHz
- Read Level = Uncorrected Analyzer/Receiver reading
- Factor = Insertion loss of LISN + Cable Loss
- Level = Read Level + Factor
- Limit = Limit stated in standard
- Over Limit = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading
- L1 = Hot side
- L2 = Neutral side

Calculation Formula

Over Limit (dB) = Level (dBuV) – Limit (dBuV)



7.3 TEST PROCEDURE OF RADIATED EMISSION

Procedure of Preliminary Test

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per ANSI C63.4.
- All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
- The EUT received AC power source, 120V/60Hz, from the outlet socket under the turntable. All support equipment received power from another socket under the turntable.
- The antenna was placed at 10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 3.2 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 3.2 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.



Procedure of Final Test

- EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- The test data of the worst case condition(s) was recorded.

Data Sample:

Freq. MHz	Amptd dBuV/m	Margin dB	Limit dBuV/m	Reading dBuV	Factor dB/m	Reading Type (P/Q/A)	Pol. (H/V)
x.xx	26.2	-13.8	40	14	12.2	Q	H

- Freq. = Emission frequency in MHz
- Reading = Uncorrected Analyzer/Receiver reading
- Factor = Antenna Factor + Cable Loss + Attenuator (3/6/10dB) – Amplifier Gain
- Amptd = Uncorrected Analyzer/Receiver reading + Factor
- Limit = Limit stated in standard
- Margin = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading
- H = Antenna Polarization: Horizontal
- V = Antenna Polarization: Vertical

Calculation Formula

$$\text{Margin (dB)} = \text{Amptd (dBuV/m)} - \text{Limit (dBuV/m)}$$



7.4 TEST RESULTS

Line Conducted Emission

Model: ARC-645M

Test Mode: Mode 3

Temperature: 20°C

Humidity: 50% RH

Test Results: Passed

Tested by: Matt Hsu

(The chart below shows the highest readings taken from the final data, see **Appendix II** for details.)

Six Highest Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Reading Type (P/Q/A)	Line (L1/L2)
2.144	39.43	0.17	39.60	73.00	-33.40	P	L1
2.884	44.63	0.21	44.84	73.00	-28.16	P	L1
3.901	43.39	0.27	43.66	73.00	-29.34	P	L1
0.516	39.23	0.12	39.35	73.00	-33.65	P	L2
2.884	43.59	0.21	43.80	73.00	-29.20	P	L2
3.840	42.95	0.27	43.22	73.00	-29.78	P	L2

NOTE: The emission level was or more than 2dB below the Average limit, so no re-check anymore.



Radiated Emission

Model: ARC-645M

Test Mode: Mode 1

Temperature: 24°C

Humidity: 40% RH

Test Results: Pass

Tested by: Jason Lee

(The chart below shows the highest readings taken from the final data, see **Appendix II** for details.)

Six Highest Radiated Emission Readings							
Frequency Range Investigated				30 MHz to 1000 MHz at 10m			
Freq (MHz)	Amptd (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Reading (dBuV)	Factor (dB/m)	Reading Type (P/Q/A)	Pol. (H/V)
149.4870	36.22	-3.78	40.00	46.81	-10.59	P	V
175.6800	33.80	-6.20	40.00	45.51	-11.71	P	V
438.3000	42.67	-4.33	47.00	45.22	-2.55	Q	V
150.1800	34.16	-5.84	40.00	44.78	-10.62	P	H
166.3700	32.83	-7.17	40.00	44.15	-11.32	P	H
438.1770	43.43	-3.57	47.00	45.98	-2.55	Q	H

NOTE: 30M to 1000M test is Applicable CISPR 22 / EN 55022 standard.



APPENDIX I - PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST





RADIATED EMISSION TEST





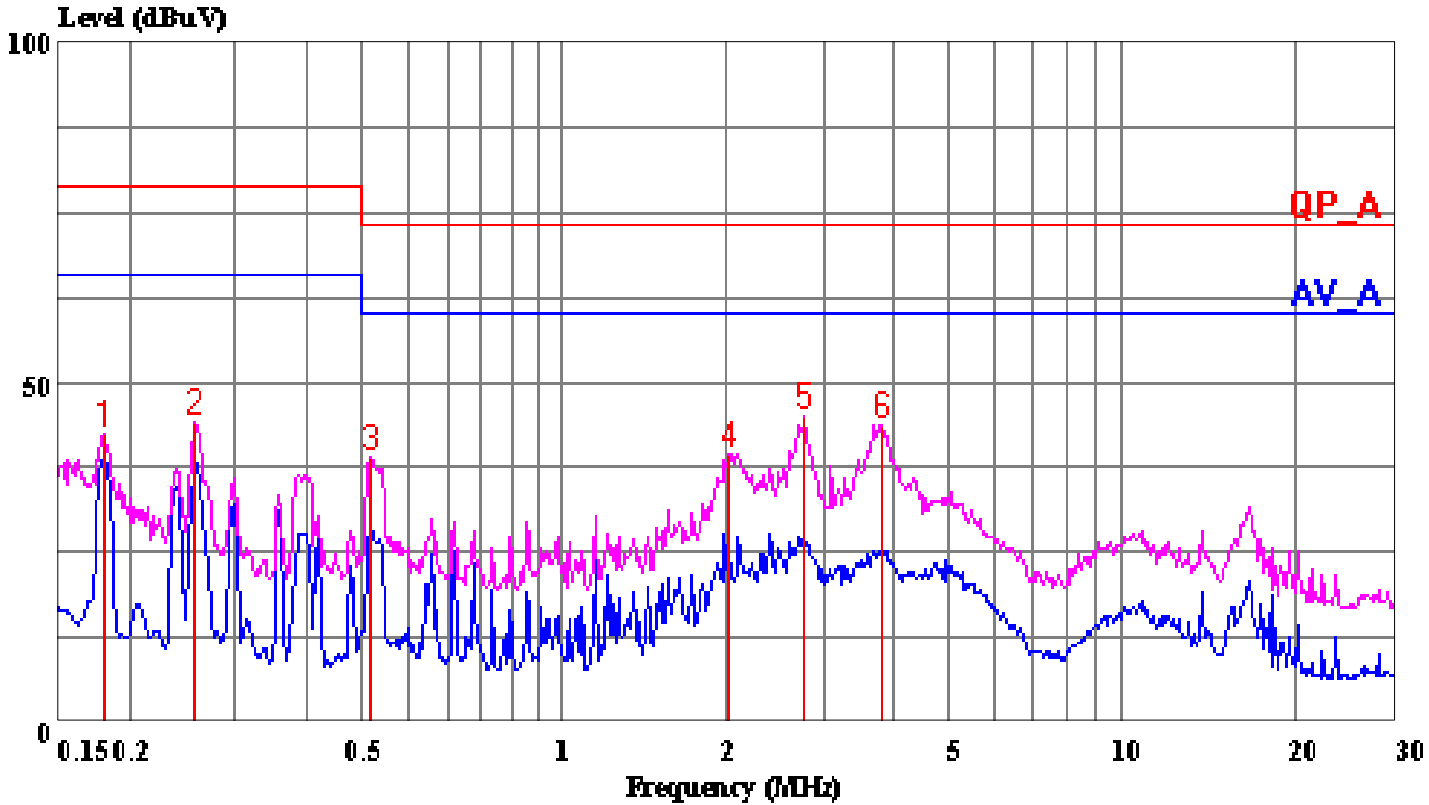
APPENDIX II - TEST RESULT OF FINAL DATAS

Conducted Emission Plot

Radiated Emission Data

Data#: 9 File#: 41021406CA.EMI

Date: 2004-10-22 Time: 15:01:18



(Conduction A)

Trace: 6 5

Ref Trace:

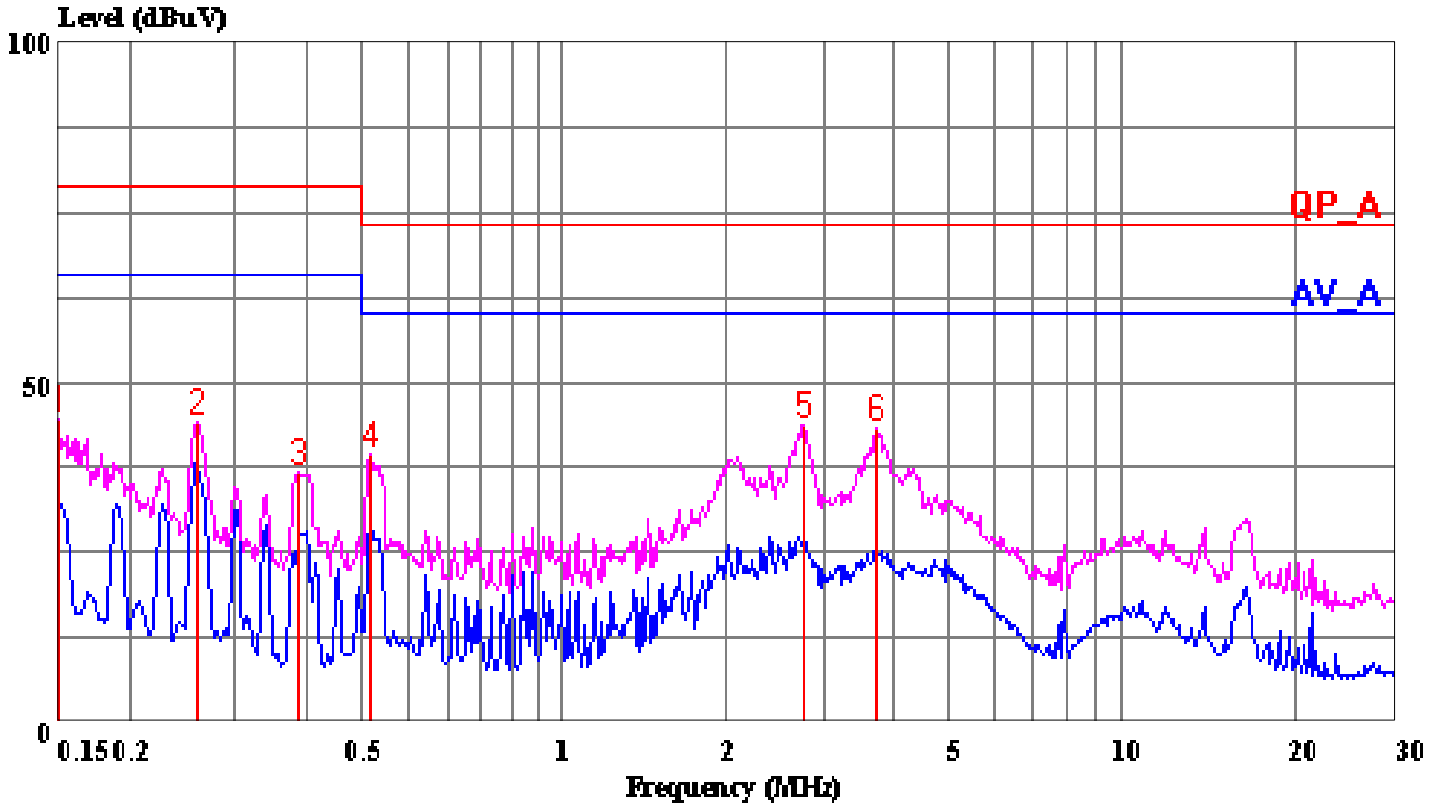
Condition: LINE
Report No. : 41021406
Test Engr. : MATT HSU
Company : AAION Technology Inc.
EUT : ARC-645M
Test Config : EUT / ALL PERIPHERALS
Type of Test: FCC CLASS A
Mode of Op. : POWER 2/1024X768, VF=75Hz(WORST)

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	Read Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.180	42.15	0.11	42.26	79.00	-36.74	Peak
2	0.258	44.19	0.12	44.31	79.00	-34.69	Peak
3	0.518	38.99	0.12	39.11	73.00	-33.89	Peak
4	2.144	39.43	0.17	39.60	73.00	-33.40	Peak
5	2.884	44.63	0.21	44.84	73.00	-28.16	Peak
6	3.901	43.39	0.27	43.66	73.00	-29.34	Peak

Data#: 12 File#: 41021406CA.EMI

Date: 2004-10-22 Time: 15:06:34



(Conduction A)

Trace: 11 10

Ref Trace:

Condition: NEUTRAL
Report No. : 41021406
Test Engr. : MATT HSU
Company : AAION Technology Inc.
EUT : ARC-645M
Test Config : EUT / ALL PERIPHERALS
Type of Test: FCC CLASS A
Mode of Op. : POWER 2/1024X768, VF=75Hz(WORST)

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	Read Freq	Level	Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	44.59	0.11	44.70	79.00	-34.30	Peak
2	0.260	43.89	0.12	44.01	79.00	-34.99	Peak
3	0.389	36.47	0.12	36.59	79.00	-42.41	Peak
4	0.516	39.23	0.12	39.35	73.00	-33.65	Peak
5	2.884	43.59	0.21	43.80	73.00	-29.20	Peak
6	3.840	42.95	0.27	43.22	73.00	-29.78	Peak

