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EMC TEST REPORT

Report No. : EME-00697

Model No. : PTA-8012

Issued Date: Feb. 1, 2001

Applicant: Further Tech. Co., Ltd.

No 25, Chung-Shing South Road, 24115 San-Chung,

Taipei, Taiwan, R.O.C.

Test By : Intertek Testing Services Taiwan Ltd.

No. 11, Ko-Tze-Nan Chia-Tung Li, Shiang-Shan District,

Hsinchu, Taiwan, R.O.C.

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Test Engineer

Approved By

NAGER (EMC LABORATORY)

ETL SEMKO DIVISION

Elton Chen

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1. General Information

1.1 Identification of the EUT

Manufacturer : Further Tech Co., Ltd.

Product : PC to TV Add R Converter

Trade Name : Wireless Show

Model No. : PTA-8012

FCC ID. : L7APTA8012

Frequency Range : 2414MHz to 2468MHz

Channel Number : 4 channels

Frequency of Each Channel: 2414MHz, 2432MHz, 2450MHz, 2468MHz

Type of Modulation : FM

Power Supply : 120Vac, 60Hz to 9Vdc adapter

Power Cord : Unshielded fixed cable length 1.8m

Sample Received : Dec. 28, 2000

Test Date(s) : Jan. 3, 2001 to Jan. 30, 2001

1.2 Test Standard

The equipment under test (EUT) is a PC to TV Add RF Converter. The transmitter portion is subject to the FCC Part 15 Subpart C Section 15.249 evaluation. Test date is included in this report. The receiver part was tested in report "EME-00698 subjected to Part 15 paragraph 15.5.

For more detail features, please refer to user's Manual.

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1.3 Support equipment

1. Computer

Product No. : P79T

Serial No. : H0905483 Manufacturer : Twinhead

2. Monitor

Product No. : DCT-17CP Serial No. : 00020092

Manufacturer : Acula Technology Corporation

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2.1 Test Standard

2. Test Condition

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section 15.249.

The AC power conducted emissions was invested over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz.

Radiated emissions were invested over the frequency range from 30MHz to 1000MHz using a receiver bandwidth of 120kHz and the frequency range from 1GHz to 24GHz using a receiver bandwidth of 1MHz.

Radiated emission testing was performed at a 3-meter open field test site.

The EUT setup configuration please refer to the photo of test configuration in item.

2.2 Modifications Required for Compliance

No modification were installed during test performance to bring the product into compliance (Please note that this list does not include changes made specifically by Further Tech Co., Ltd. Prior to compliance testing.)

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2.3 Test Equipment

Conducted Emission

Equipment	Brand	Model No.	Series No.
EMI Receiver	Rohde & Schwarz	ESCS 30	825788/014
EMI Receiver	Rohde & Schwarz	ESMI	825428/005
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	848.766/052
Shield Room	N/A	N/A	N/A

Note:

1. The calibration interval of the above instruments is 12 months.

Radiated Emission

Equipment	Brand	Model No.	Series No.
EMI Receiver	Rohde & Schwarz	ESCS 30	825788/014
EMI Spectrum	Rohde & Schwarz	ESMI	825428/005
Pre-Amplifier	Advantest	BB525C	83120047
Horn Antenna	EMCO	3115	9906-5822
Turn Table	Electro-Metrics	EM4710	350101
Bilog Antenna	Electro-Metrics	EM-6917-1	N/A
Antenna Tower	Electro-Metrics	EM-4720	410109

Note:

1. The calibration interval of the above instruments is 12 months.

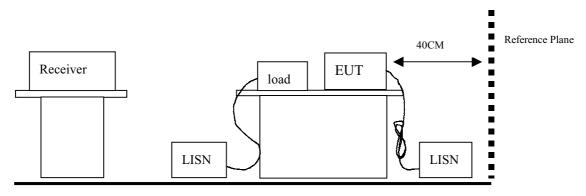
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3. Conducted emission test (15.207)

3.1 Operating Environment

Temperature: 23 $^{\circ}$ C Relative Humidity: 65 $^{\circ}$

3.2 Test Setup & procedure



Ground Plane

The EUT are connected to the main power through a line impedance stabilization network (LISN). 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 (Line and Neutral) of AC 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 according to ANSI C63.4/1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

3.3 Emission Limit

FCC Part 15 Paragraph 15.207			
Freq. (MHz)	Maximum RF Line Voltage		
rieq. (Wiliz)	uV	dBuV	
0.45 - 30	250	48.0	

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3.4 Conducted Emission Data

(1) Line

EUT : PTA-8012 Test Mode : Channel 1

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
0.45	35.8	48	-12.20
0.48	35.3	48	-12.70
10.738	36.3	48	-11.70
17.898	37.6	48	-10.40
25.058	37.9	48	-10.10
28.634	37.4	48	-10.60

- 1. The reading value including cable loss and LISN factor.
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within ±2dB
- 3. The average measurement was not performed when the peak measured data under the limit of average detection.



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(2) Neutral

EUT: PTA-8012
Test Mode: Channel 1

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
0.45	31.7	48	-16.30
0.698	31	48	-17.00
10.738	32.7	48	-15.30
12.29	25.7	48	-22.30
15.362	29.7	48	-18.30
22.602	24.1	48	-23.90

- 1. 1. The reading value included cable loss and LISN factor.
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within ±2dB
- 3. The average measurement was not performed when the peak measured data under the limit of average detection.



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(3) Line

EUT: PTA-8012 Test Mode: Channel 3

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
0.45	36	48	-12.00
0.994	31.1	48	-16.90
10.738	33.4	48	-14.60
15.362	33.9	48	-14.10
22.186	27.9	48	-20.10
25.058	33.1	48	-14.90

- 1. 1. The reading value included cable loss and LISN factor.
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within ±2dB
- 3. The average measurement was not performed when the peak measured data under the limit of average detection.



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(4) Neutral

EUT: PTA-8012
Test Mode: Channel 3

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
0.45	31.6	48	-16.40
0.714	31	48	-17.00
9.546	32.9	48	-15.10
10.738	32.7	48	-15.30
15.362	31.7	48	-16.30
25.058	27.9	48	-20.10

- 1. 1. The reading value included cable loss and LISN factor.
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within ±2dB
- 3. The average measurement was not performed when the peak measured data under the limit of average detection.



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(5) Line

EUT: PTA-8012
Test Mode: Channel 4

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
0.45	36.5	48	-11.50
0.954	31.6	48	-16.40
4.882	27.5	48	-20.50
10.738	32.3	48	-15.70
15.362	33.4	48	-14.60
25.058	32.3	48	-15.70

- 1. 1. The reading value included cable loss and LISN factor.
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within ±2dB
- 3. The average measurement was not performed when the peak measured data under the limit of average detection.



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(6) Neutral

EUT : PTA-8012 Test Mode : Channel 4

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
0.45	30.1	48	-17.90
0.674	30.5	48	-17.50
4.794	26.8	48	-21.20
10.738	32.5	48	-15.50
15.362	30.5	48	-17.50
25.058	28.4	48	-19.60

- 1. 1. The reading value included cable loss and LISN factor.
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within ±2dB
- 3. The average measurement was not performed when the peak measured data under the limit of average detection.

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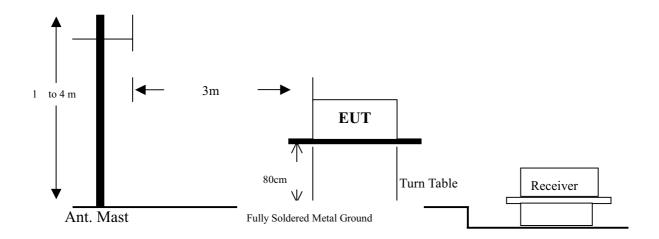
4. Radiated Emission Test (15.209)

4.1 Operating Environment

Temperature: 21 °C Relative Humidity: 63 %

4.2 Test Setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



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. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4/1992 on radiated measurement.

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

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4.3 Radiated Emission Limit

4.3.1 Fundamental and Harmonics Emission Limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
1	(mV/m@3m)	(dBuV/m@3m)	(mV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94(Average)	500	54(Average)
		114 (Peak)		74(Peak)

4.3.2 General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency	50dB below of the	15.209 Limits	General Radiated
MHz	fundamental	$(dB \mu V/m@3m)$	Limits
	$(dB \mu V/m @3m)$		(dB \(\mu \) V/m@3m)
30-88	40	40	40
88-216	43.5	43.5	43.5
216-960	44	46	46
Above 960	44	54	54

- 1. RF Line Voltage (dB μ V) = 20 log RF Line Voltage(μ V)
- 2. In the above table, the tighter limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

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4.4 Radiated Emission Test Data

4.4.1 General Radiated Emission Data (worst case)

(1) Polarity : Vertical EUT : PTA-8012 Testing Mode : Transmitter

Freq.	- Facior I	Cable	Reading	N	et	Limit	Margin	
(MHz)	(dB)	Loss (dB)		$dB \mu V/m$	μ V/m	$(\mu \text{ V/m})$	$(\mu \text{ V/m})$	
71.6	8.69	1.95	13.16	23.80	15.488	100	-84.51	
137.345	7.27	2.83	16.20	26.30	20.654	150	-129.35	
337.0	14.48	4.33	18.99	37.80	77.625	200	-122.38	
393.686	15.78	4.33	22.99	43.10	142.889	200	-57.11	
472.6	16.97	4.75	15.48	37.20	72.444	200	-127.56	
551.23	17.69	5.48	13.43	36.60	67.608	200	-132.39	
708.9	19.49	5.93	14.98	40.40	104.713	200	-95.29	

- 1. Emission Level = Reading Level + Antenna Factor + Cable Loss
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the General Radiated Emission Test, the uncertainty is within ±4dB
- 3. All Readings below 1GHz are Quasi-Peak, above are average value

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(2) Polarity : Horizontal EUT : PTA-8012 Testing Mode : Transmitter

Freq.	Antenna Factor	Cable Loss	Reading	ading Net			Margin	
(MHz)	(dB)	(dB)		$dB \mu V/m$	$\mu\mathrm{V/m}$	$(\mu \text{ V/m})$	$(\mu V/m)$	
71.6	8.69	1.95	14.96	25.60	19.055	100	-80.95	
85.9	6.14	2.3	14.46	22.90	13.964	100	-86.04	
135.2	7.27	2.83	8.00	18.10	8.035	150	-141.97	
336.9445	14.48	4.33	9.59	28.40	26.303	200	-173.70	
393.7	15.78	4.33	20.69	40.80	109.648	200	-90.35	
478.825	16.91	4.75	12.84	34.50	53.088	200	-146.91	
551.2	17.69	5.48	17.63	40.80	109.648	200	-90.35	

- 1. Emission Level = Reading Level + Antenna Factor + Cable Loss
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the General Radiated Emission Test, the uncertainty is within ±4dB
- 3. All Readings below 1GHz are Quasi-Peak, above are average value

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4.4.2 Fundamental Radiated Emission Data

(1) Polarity : Vertical EUT : PTA-8012 Testing Mode : Normal

Average

Channel #	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading Level dB μ V	Measurement dB μ V/m	Margin dB	Limit dB μ V/m
Channel 1	2413.01	29.2	1.4	36.57	67.17	-26.83	94
Channel 3	2446.4	29.2	1.4	28.48	59.08	-34.92	94
Channel 4	2468.97	29.2	1.4	41.22	71.82	-22,18	94

(2) Polarity : Horizontal EUT : PTA-8012 Testing Mode : Normal

Average

11, 61 mg c							
Channel #	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading Level dB μ V	Measurement dB μ V/m	Margin dB	Limit dB μ V/m
Channel 1	2413.01	29.2	1.4	41.82	72.42	-21.58	94
Channel 3	2446.4	29.2	1.4	41.92	73.52	-20.48	94
Channel 4	2468.97	29.2	1.4	40.33	70.93	-23.07	94

- 1. Emission Level = Reading Level + Antenna Factor + Cable Loss
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the General Radiated Emission Test, the uncertainty is within ±4dB
- 3. All Readings below 1GHz are Quasi-Peak, above are average value

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4.4.3 Harmonic Radiated Emission Data

(1) Polarity : Vertical EUT : PTA-8012 Testing Mode : Normal

Channel 1

E	Reading	Reading	Antenna	Cable	Calculation	Limit	Margin
Frequency	(Peak)	(Ave)	Factor	Loss	(Ave)	(Ave)	(Ave)
(MHz)	$dB \mu V$	$dB \mu V$	dB	dB	$dB \mu V$	$\mathrm{dB}\mu\mathrm{V}$	dB
4824.88	19.58	8.39	34.1	2.05	44.54	54	-9.46
7237.61	13.84	0.44	37.4	2.6	40.44	54	-13.56
9650.02	12.44	-0.47	38.7	3.08	41.31	54	-12.69

(2) Polarity : Horizontal EUT : PTA-8012 Testing Mode : Normal

Channel 1

Eroguanav	Reading	Reading	Antenna	Cable	Calculation	Limit	Margin
Frequency (MHz)	(Peak)	(Ave)	Factor	Loss	(Ave)	(Ave)	(Ave)
(MITZ)	$dB \mu V$	$dB \mu V$	dB	dB	$dB \mu V$	$\mathrm{dB}\mu\mathrm{V}$	dB
4824.99	18.05	8.34	34.1	2.05	44.49	54	-9.51
7237.44	9.41	-1.72	37.4	2.6	38.28	54	-15.72

- 1. Emission Level = Reading Level + Antenna Factor + Cable Loss
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the General Radiated Emission Test, the uncertainty is within ±4dB
- 3. All Readings below 1GHz are Quasi-Peak, above are average value



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(3) Polarity : Vertical EUT : PTA-8012 Testing Mode : Normal

Channel 3

Emagnamary	Reading	Reading	Antenna	Cable	Calculation	Limit	Margin
Frequency	(Peak)	(Ave)	Factor	Loss	(Ave)	(Ave)	(Ave)
(MHz)	$dB \mu V$	$dB \mu V$	dB	dB	$dB \mu V$	$\mathrm{dB}\mu\mathrm{V}$	dB
4897.33	21.22	8.97	34.1	2.05	45.12	54	-8.88
7345.46	11.41	-0.78	37.4	2.6	39.22	54	-14.78

(4) Polarity : Horizontal EUT : PTA-8012 Testing Mode : Normal

Channel 3

Frequency (MHz)	Reading (Peak) dB μ V	Reading (Ave) dB μ V	Antenna Factor dB	Cable Loss dB	Calculation (Ave) dB μ V	Limit (Ave) dB μ V	Margin (Ave) dB
4897.08	20.78	9.41	34.1	2.05	45.56	54	-8.44
7345.62	7	-1.56	37.4	2.6	38.44	54	-15.56
9794.33	9.56	-1.41	38.6	3.08	40.27	54	-13.73
12243.17	10.57	-0.78	39.7	3.71	42.63	54	-11.37

- 1. Emission Level = Reading Level + Antenna Factor + Cable Loss
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the General Radiated Emission Test, the uncertainty is within ±4dB
- 3. All Readings below 1GHz are Quasi-Peak, above are average value



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(5) Polarity : Vertical EUT : PTA-8012 Testing Mode : Normal

Channel 4

Engayonav	Reading	Reading	Antenna	Cable	Calculation	Limit	Margin
Frequency (MHz)	(Peak)	(Ave)	Factor	Loss	(Ave)	(Ave)	(Ave)
(МПZ)	$dB \mu V$	$dB \mu V$	dB	dB	$dB \mu V$	$dB \mu V$	dB
4934.64	19.72	8.36	34.1	2.05	44.51	54	-9.49
7401.97	11.49	-0.96	37.4	2.6	39.04	54	-14.96
9869.99	8.43	-1.95	38.6	3.08	39.73	54	-14.27

(6) Polarity : Horizontal EUT : PTA-8012 Testing Mode : Normal

Channel 4

Frequency (MHz)	Reading (Peak)	Reading (Ave)	Antenna Factor	Cable Loss	Calculation (Ave)	Limit (Ave)	Margin (Ave)
	$dB \mu V$	$dB \mu V$	dB	dB	$dB \mu V$	$\mathrm{dB}\mu\mathrm{V}$	dB
4934.33	19.89	8.59	34.1	2.05	44.74	54	-9.26
7402.06	9.09	-2.1	37.4	2.6	37.9	54	-16.1
9869.77	9.66	-1.74	38.6	3.08	39.94	54	-14.06

- 1. Emission Level = Reading Level + Antenna Factor + Cable Loss
- 2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the General Radiated Emission Test, the uncertainty is within ±4dB
- 3. All Readings below 1GHz are Quasi-Peak, above are average value