

ACS2000-F004 FCC ID: JHP10858B R/C Car TX @ 49.86 MHz
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APPLICATION FOR CERTIFICATION

On Behalf of
Perfect Toys International Co., Ltd.
Toyhouse Cart

Model : 10859B

Prepared for : Perfect Toys International Co., Ltd.
2/F., Block 3, Wah Lai Industrial Centre,
10-14 Kwei Tei Street, Fo Tan,
Shatin New Territories, Hong Kong

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Report Number	•	ACS-20F073
Date of Test	•	Apr. 23~Jun. 02, 2000
Date of Report	•	Jun. 02, 2000

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	•	Toyhouse R/C Car Transmitter @ 49.86 MHz
Model Number	•	10859B
Applicant	•	Perfect Toys International Co., Ltd. 2/F., Block 3, Wah Lai Industrial Centre, 10-14 Kwei Tei Street, Fo Tan, Shatin, New Territories, Hong Kong
Manufacturer	•	Xian Hao Electric Appliances & Toys Co., Ltd. Tian Xin Management Zone, Huang Jiang, Dongguan, Guangdong, P. R. C.
Date of Test	•	Apr. 23~ Jun. 02, 2000
Remote Control Car TX @ 49.860 MHz / Part 15C, Section Part 15.235		

1.2. Test Facility

Site Description

3m Anechoic Chamber	:	certificated by FCC, USA Aug. 18, 1997
3m & 10m Open Site	:	certificated by FCC, USA Feb. 13, 1998
EMC Lab.		certificated by VCCI, Japan Oct. 29, 1998
		certificated by DATech, German Feb. 02, 1999
		certificated by NVLAP, USA until Mar. 03, 2001 NVLAP Code: 200372-0
Name of Firm	:	Audix Technology (Shenzhen) Co., Ltd.
Site Location	:	No. 6, Ke Feng Rd., 52 Block, Shenzhen Science & Industrial Park, Nantou, Shenzhen, Guangdong, China

1.3. Test Uncertainty

Conducted Emission Uncertainty	=	$\pm 2.66\text{dB}$
Radiated Emission Uncertainty	=	$\pm 4.26\text{dB}$

2. POWER LINE CONDUCTED MEASUREMENT

According to Paragraph (f) of FCC Part 15 Section 15.107, measurement to demonstrate compliance with the conducted emission limits are not required for devices which only employ battery power for operation and which do not operate from AC power lines or contain provisions for operation while connected to AC power lines.

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

3.1.1. For Anechoic Chamber

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	HP	85422E	3625A00181	Jun. 04, 00	1 Year
2.	Test Receiver	Rohde & Schwarz	ESVS20	830350/005	Jun. 04, 00	1 Year
3.	Amplifier	HP	8447D	2944A07794	Jun. 04, 00	1/2 Year
4.	Bilog Antenna	Chase	CBL6112A	2176	Sep. 26, 99	1 Year
5.	Computer	N/A	N/A	N/A	N/A	N/A
6.	Printer	NEC	P3800	568101448	N/A	N/A
7.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.1	Feb.10, 00	1/2 Year
8.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.2	Feb.10, 00	1/2 Year
9.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.3	Feb.10, 00	1/2 Year
10.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.4	Feb.10, 00	1/2 Year
11.	Coaxial Switch	Anritsu	MP59B	M74389	Jun. 04, 99	1/2 Year

3.2. Block Diagram of Test Setup

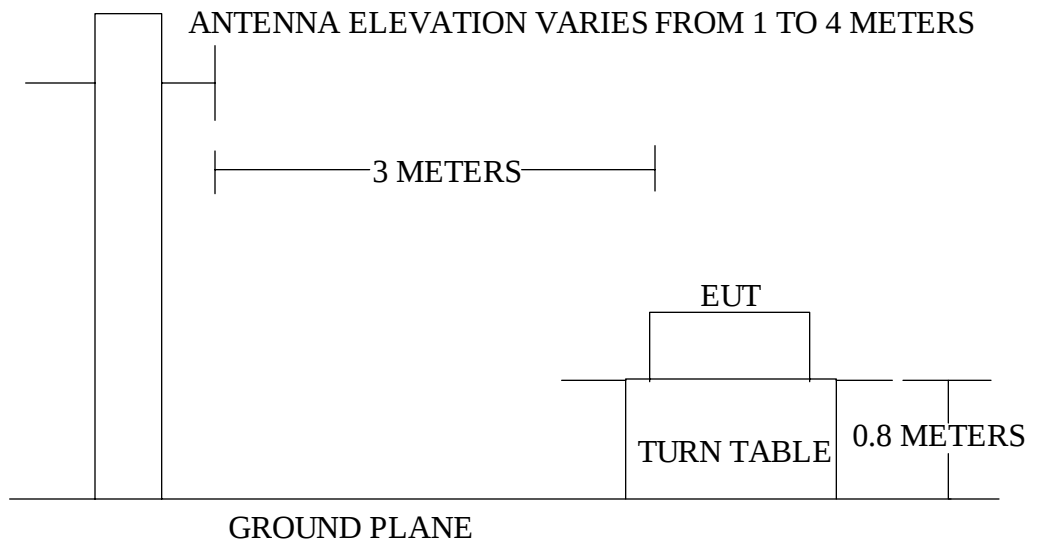
3.2.1. diagram of connection between the EUT and simulators



(EUT: Toyhouse Cart)

3.2.2. In Anechoic Chamber 3 Test Setup Diagram

ANTENNA TOWER



3.3. Radiated Emission Limit (Class B)

Remote Control Car TX @ 49.860 MHz / Part 15C, Section Part 15.235

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
49.860 MHz Fundamental Frequency	3	10×10^3	80.0
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

Remark • (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V}/\text{m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

3.4. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.4.1. Toyhouse Cart (EUT)

Model Number : 10859B
 Serial Number : 2000050402
 Receiver : 8*1.5 DC Batteries
 30cm length antenna built-in
 Manufacturer : Xian Hao Electric Appliances & Toys Co., Ltd.

3.4.2. Support Equipment : As Tested Supporting System Detail, in Section 1.2.

3.5. Operating Condition of EUT

1. Setup the EUT as shown in Section 3.2..
2. Let the EUT work in test modes (Lie on / Side on / Stand on) and measure it.

3.6. Test Procedure

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-1992 on radiated emission measurement.

The bandwidth of the EMI test receiver (R&S ESVS20) is set at 120KHz in the 30-1000MHz and 1MHz had been set in above 1000MHz Range.

The frequency range from 30MHz to 1000MHz is checked.

The test modes (Lie on/ Stand on/ Side on) are tested in Anechoic Chamber and all the scanning waveforms are attached in Appendix II.

3.7. Radiated Emission Noise Measurement Result

PASS.

The frequency range from 30MHz to 1000MHz is investigated.

Please see the following pages.

Date of Test :	Apr. 23, 2000	Temperature :	26•
EUT :	Toyhouse Cart	Humidity :	60•
Model No. :	10859B	Test Mode :	Lie
Test Engineer:	Philo Zhong		

Frequency	Antenna	Cable	Meter Reading	Emission Level	Average	Net	Over	Limits
MHz	Factor	Loss	Horizontal	Horizontal	Factor	Level	Limits	
	dB/m	dB	dBμV	dBμV/m	dB	dB	dB	dBμV/m
49.860	7.44	1.57	33.10	42.12	-7.04	35.08	-44.92	80.00

Remark: 1. All readings are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

Date of Test :	Apr. 23, 2000	Temperature :	26•
EUT :	Toyhouse Cart	Humidity :	60•
Model No. :	10859B	Test Mode :	Lie
Test Engineer:	Philo Zhong		

Frequency	Antenna	Cable	Meter Reading	Emission Level	Average	Net	Over	Limits
MHz	Factor	Loss	Vertical	Vertical	Factor	Level	Limits	
	dB/m	dB	dBμV	dBμV/m	dB	dB	dB	dBμV/m
49.860	13.58	1.57	29.30	44.46	-7.04	37.42	-42.58	80.00

Remark: 1. All readings are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

Reviewer : Martin Lin 6/6

Date of Test :	<u>Apr. 23, 2000</u>	Temperature :	<u>26•</u>
EUT :	<u>Toyhouse Cart</u>	Humidity :	<u>60•</u>
Model No. :	<u>10859B</u>	Test Mode :	<u>Stand</u>
Test Engineer:	<u>Philo Zhong</u>		

Frequency	Antenna Factor	Cable Loss	Meter Reading	Emission Level	Average	Net	Over	Limits
MHz	dB/m	dB	Horizontal dBμV	Horizontal dBμV/m	Factor dB	Level dB	Limits dB	dBμV/m
49.860	7.44	1.57	17.90	26.92	-7.04	19.88	-60.12	80.00

Remark: 1. All readings are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

Date of Test :	<u>Apr. 23, 2000</u>	Temperature :	<u>26•</u>
EUT :	<u>Toyhouse Cart</u>	Humidity :	<u>60•</u>
Model No. :	<u>10859B</u>	Test Mode :	<u>Stand</u>
Test Engineer:	<u>Philo Zhong</u>		

Frequency	Antenna Factor	Cable Loss	Meter Reading	Emission Level	Average	Net	Over	Limits
MHz	dB/m	dB	Vertical dBμV	Vertical dBμV/m	Factor dB	Level dB	Limits dB	dBμV/m
49.860	13.58	1.57	38.80	53.96	-7.04	46.92	-33.08	80.00

Remark: 1. All readings are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

Reviewer : Martin Lin 6/6

Date of Test :	Apr. 23, 2000	Temperature :	26•
EUT :	Toyhouse Cart	Humidity :	60•
Model No. :	10859B	Test Mode :	Side
Test Engineer:	Philo Zhong		

Frequency	Antenna	Cable	Meter Reading	Emission Level	Average	Net	Over	Limits
MHz	Factor	Loss	Horizontal	Horizontal	Factor	Level	Limits	
	dB/m	dB	dBμV	dBμV/m	dB	dB	dB	dBμV/m
49.860	7.44	1.57	35.60	44.62	-7.04	37.58	-42.42	80.00
199.450	13.63	3.67	18.90	36.20	0.00	0.00	-7.30	43.50

Remark: 1. All readings are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

Date of Test :	Apr. 23, 2000	Temperature :	26•
EUT :	Toyhouse Cart	Humidity :	60•
Model No. :	10859B	Test Mode :	Side
Test Engineer:	Philo Zhong		

Frequency	Antenna	Cable	Meter Reading	Emission Level	Average	Net	Over	Limits
MHz	Factor	Loss	Vertical	Vertical	Factor	Level	Limits	
	dB/m	dB	dBμV	dBμV/m	dB	dB	dB	dBμV/m
49.860	13.58	1.57	31.60	46.76	-7.04	39.72	-40.28	80.00

Remark: 1. All readings are Quasi-Peak values.

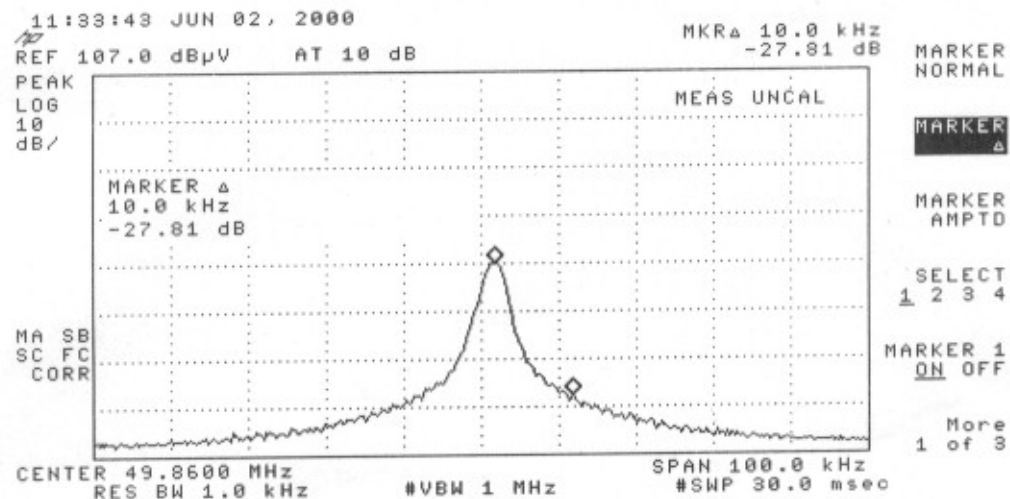
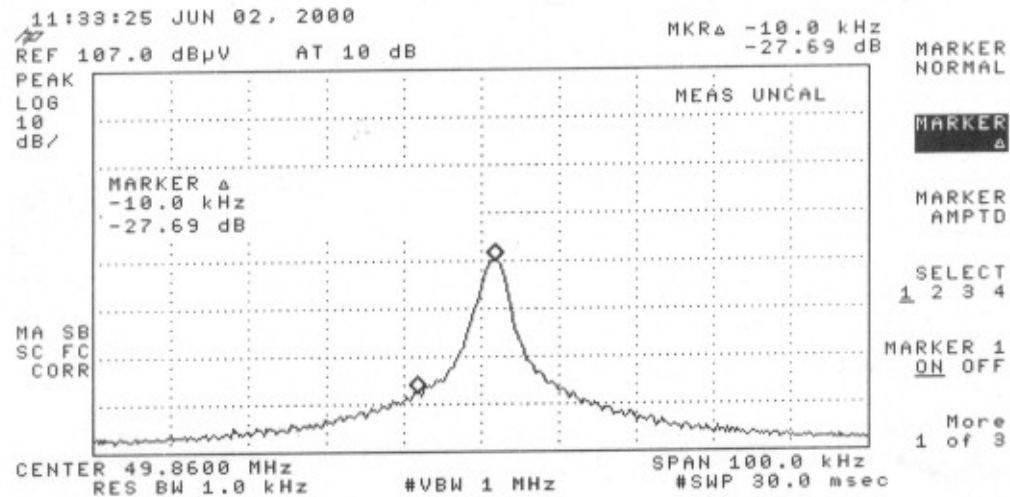
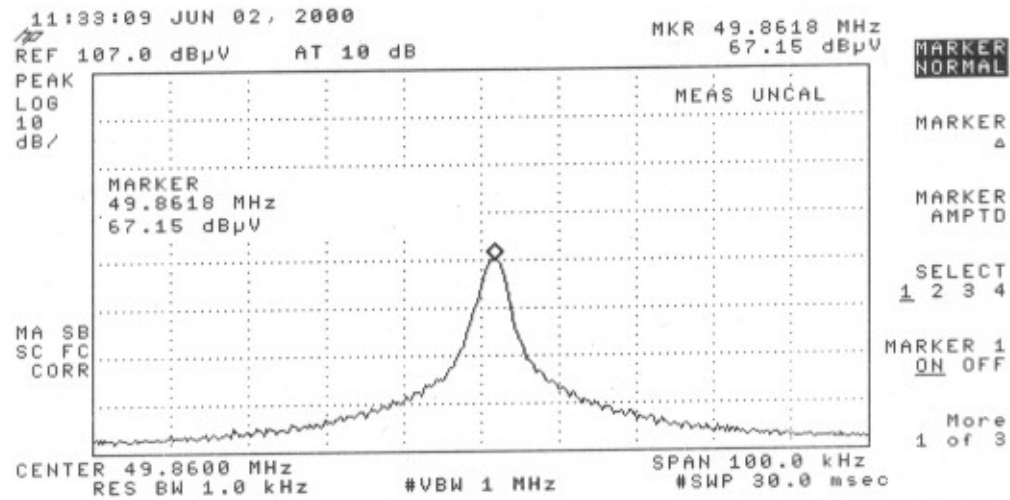
2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

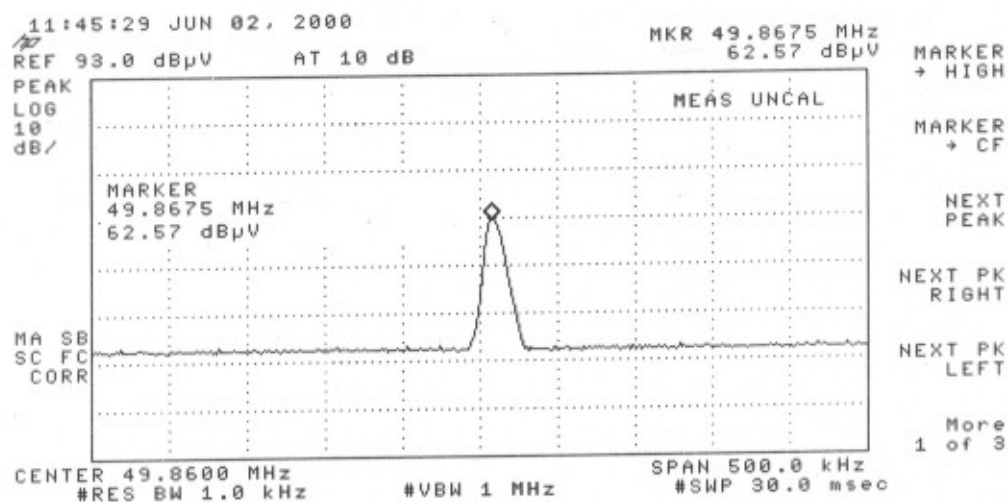
Reviewer : Martin Lin 6/6

4. TEST BANDWIDTH

The plot on the following page shows the fundamental frequency is 49.8618MHz when modulated. From the plot the emission is observed between the handedgs and up to 10KHz had attenuated at least 26dB. The unit meets the FCC bandwidth requirements.

Please see the attached waveform.





5. CALCULATION OF AVERAGE FACTOR

Averaging factor in dB = $20 \log (\text{duty cycle})$

The specification for output field strengths in accordance with of the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 4.2 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down).

A plot of the worst-case duty cycle as detected in this manner are included in the following pages.

The duty cycle is simply the on-time divided by the period:

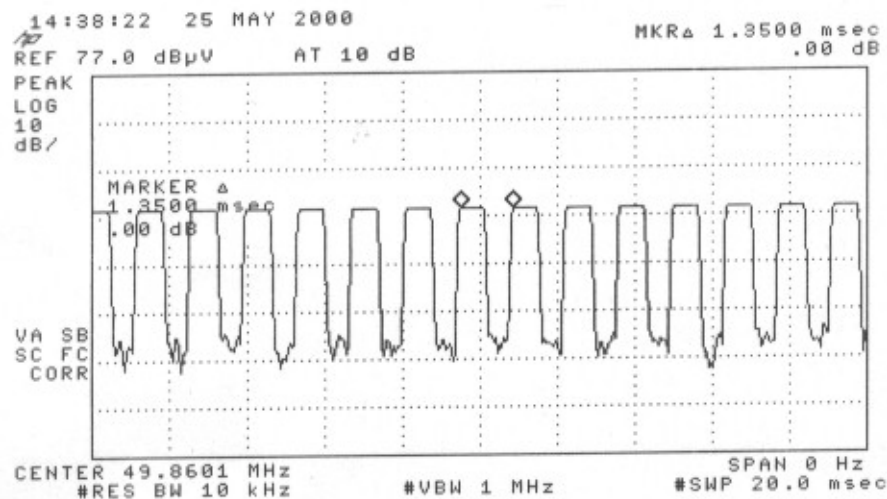
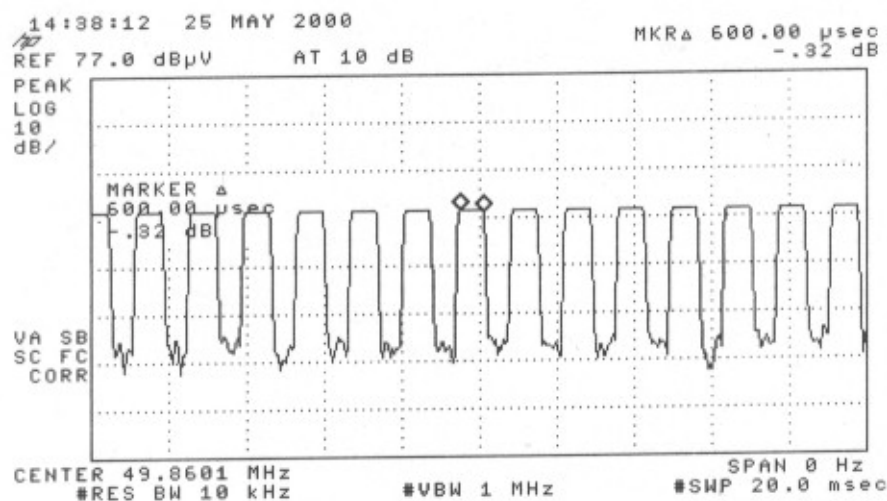
The duration of one cycle = 0.6 ms

Effective period of the cycle = 1.35 ms

DC=0.6ms/1.45ms = 0.44444

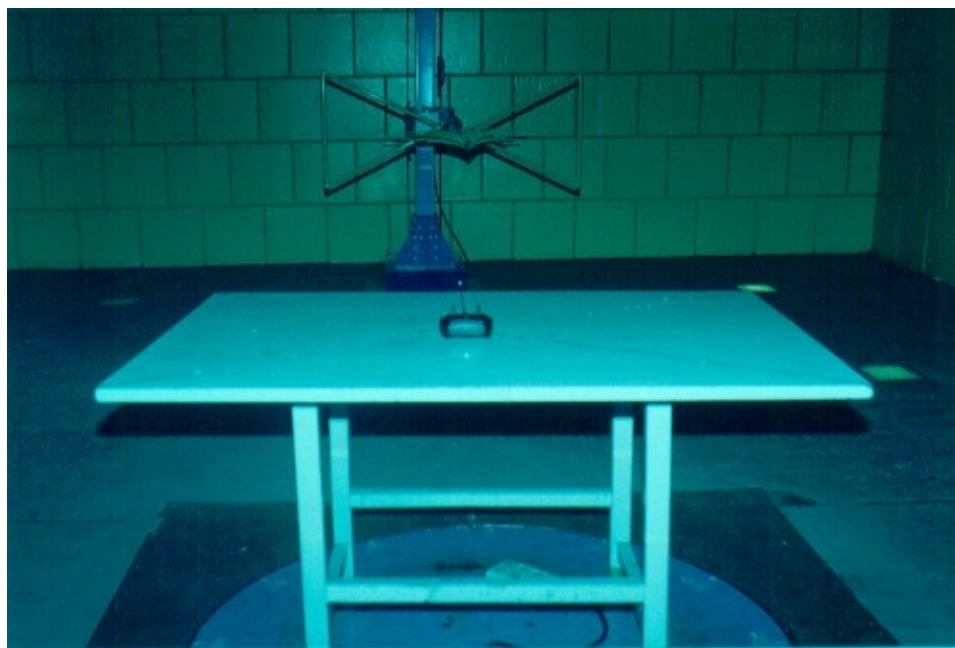
Therefore, the averaging factor is found by $20 \log_{10} 0.44444 = -7.0437 \text{ dB}$

Please see the attached waveform.



6. PHOTOGRAPH

6.1. Photos of Radiated Measurement



FRONT VIEW OF RADIATED MEASUREMENT

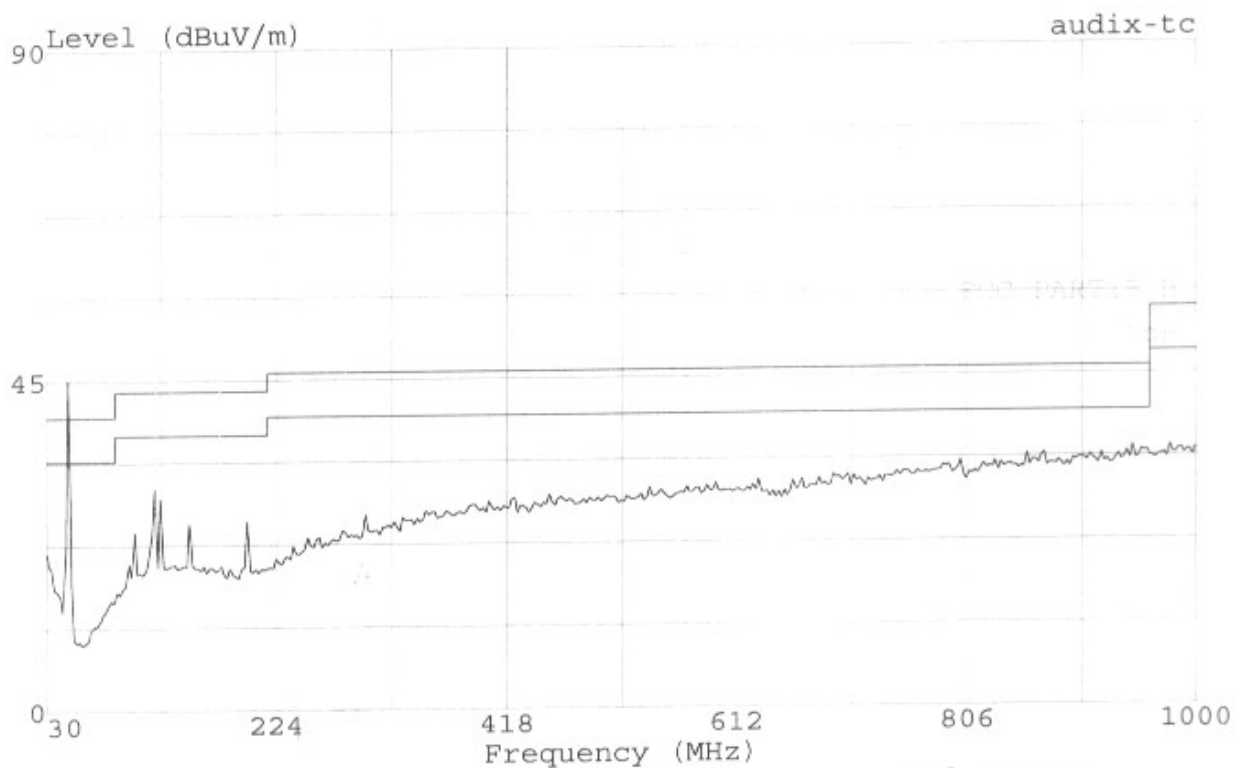
APPENDIX I



52 Block
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AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Data#: 41 File#: PERFECT.EMI Date: 2000-04-23 Time: 16:44:48



Trace:
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EUT: : TOYHOUSE CART
POWER: : DC 9V BATTERY
M/N: : 10859B
: TX
: LIE

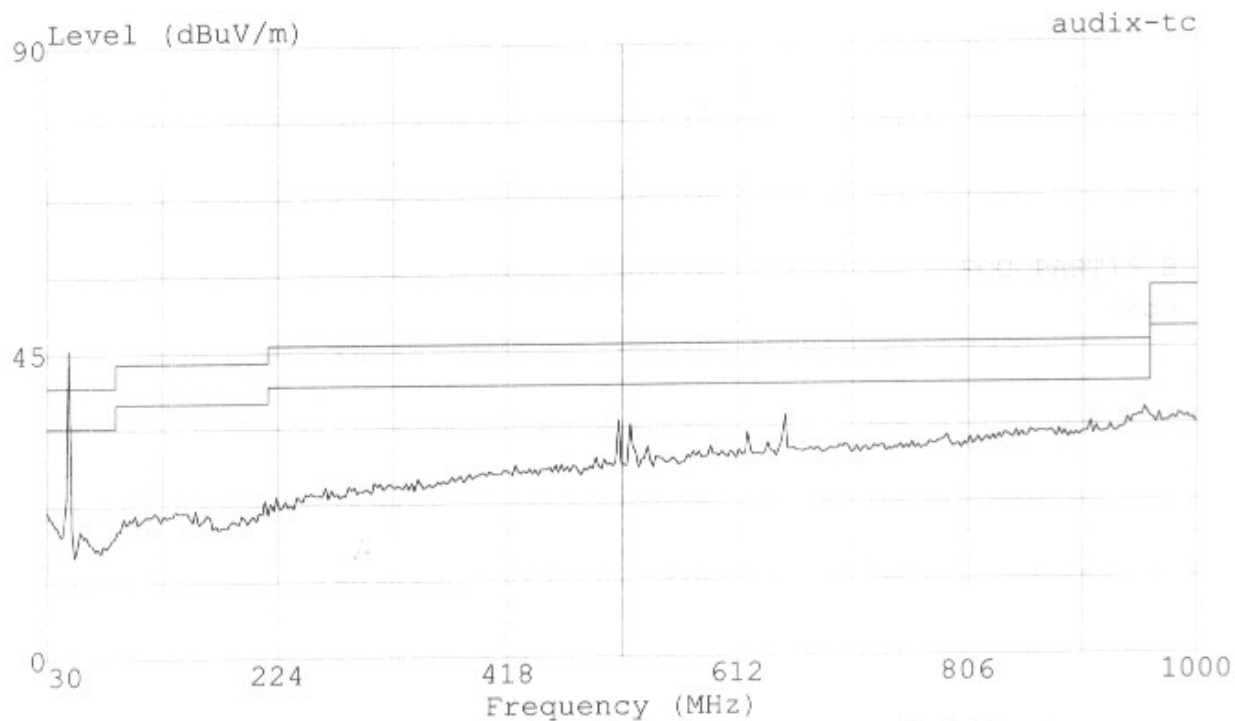
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AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Data#: 39 File#: PERFECT.EMI Date: 2000-04-23 Time: 16:42:37



Trace:
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EUT: : TOYHOUSE CART
POWER: : DC 9V BATTERY
M/N: : 10859B
: TX
: LIE

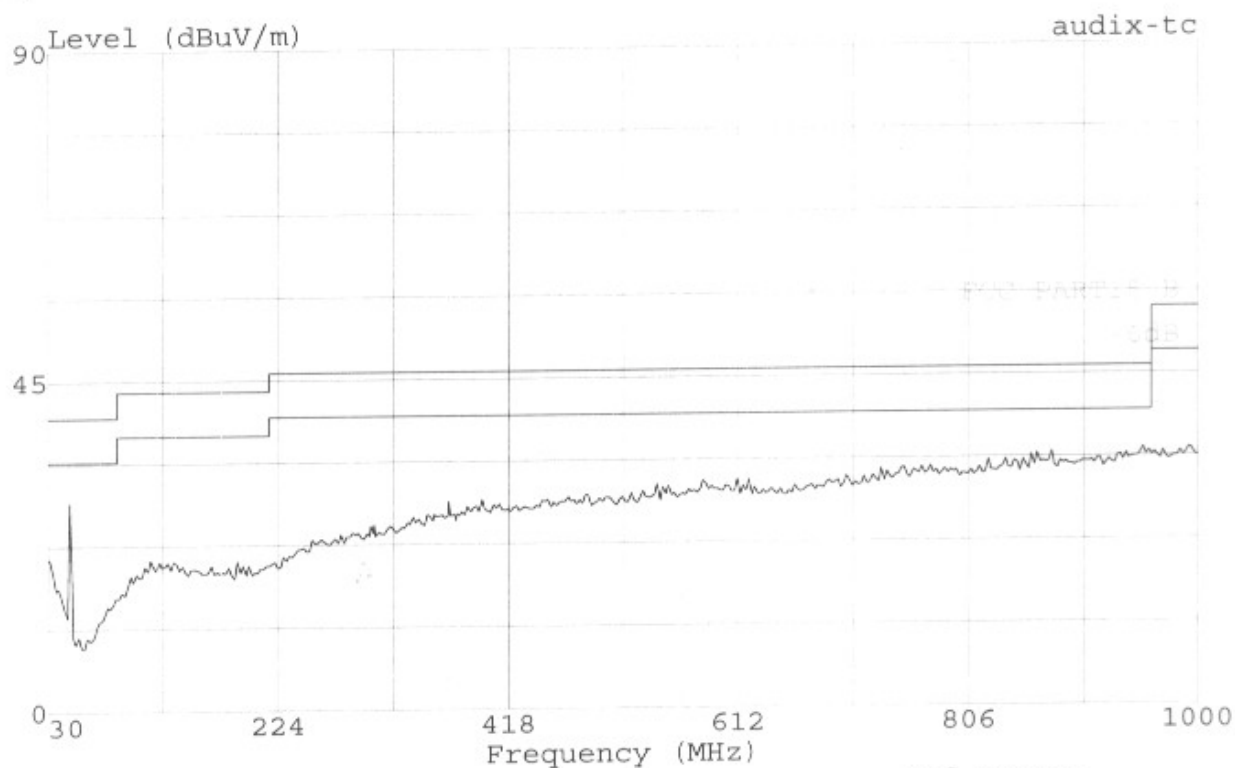
Ref Trace:



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AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Data#: 43 File#: PERFECT.EMI Date: 2000-04-23 Time: 16:52:37



Trace:
Condition: FCC PART15 B 3m 2176FACTOR HORIZONTAL
EUT: : TOYHOUSE CART
POWER: : DC 9V BATTERY
M/N: : 10859B
: TX
: STAND

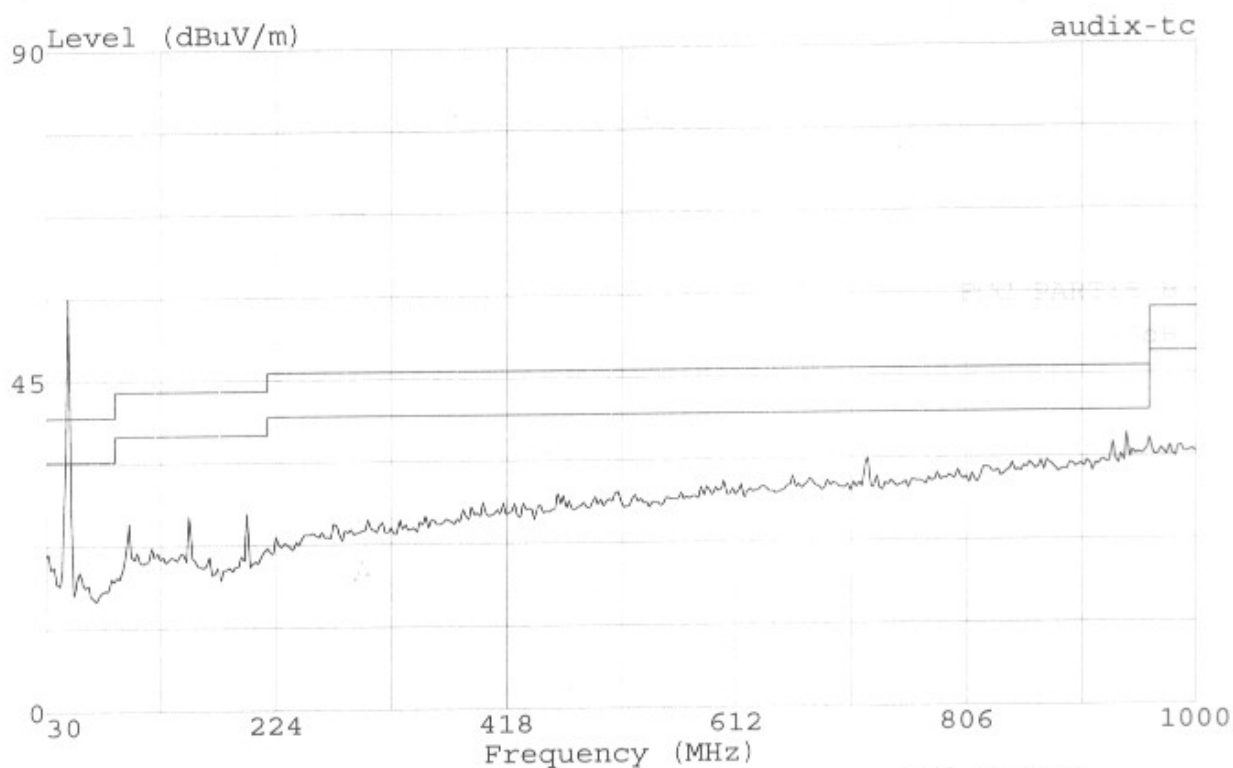
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AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Data#: 45 File#: PERFECT.EMI Date: 2000-04-23 Time: 16:56:52



Trace:
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EUT: : TOYHOUSE CART
POWER: : DC 9V BATTERY
M/N: : 10859B
: TX
: STAND

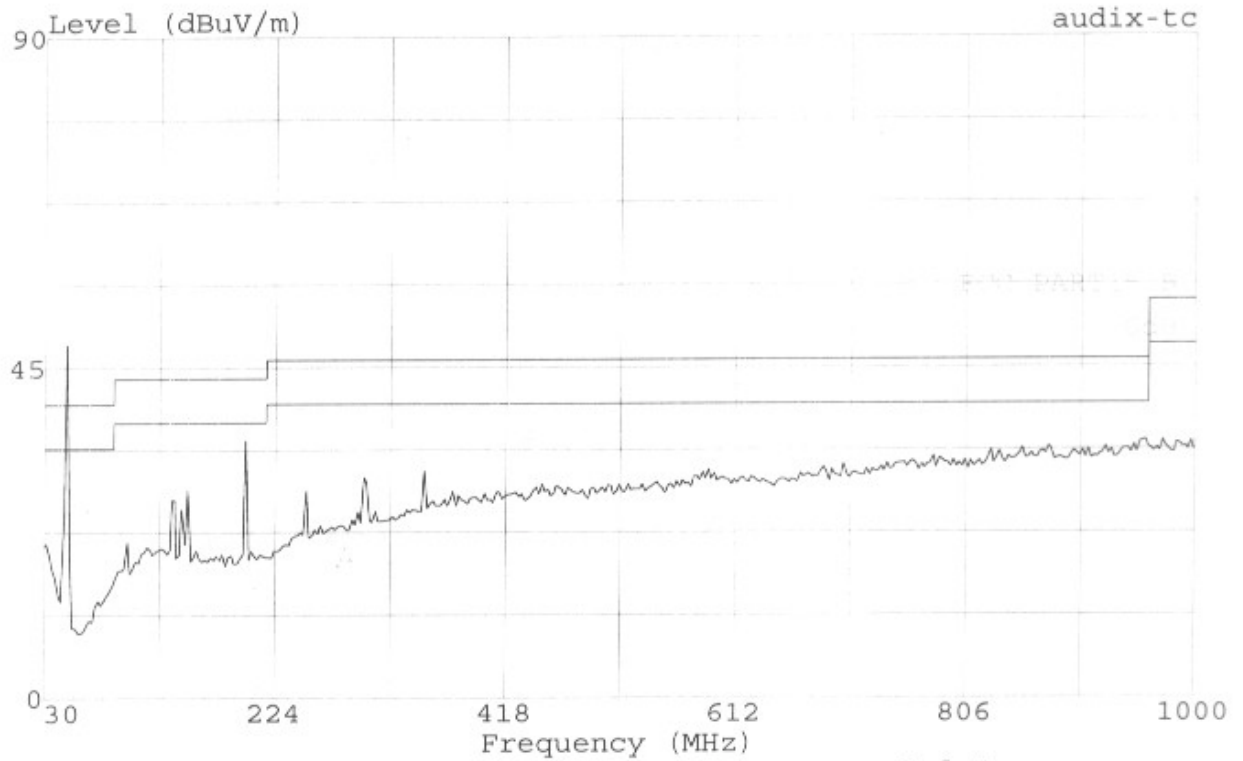
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Tel: 0755-6639495~7 Fax: 0755-6632877

Data#: 49 File#: PERFECT.EMI Date: 2000-04-23 Time: 17:01:12



Trace:

Condition: FCC PART15 B 3m 2176FACTOR HORIZONTAL

EUT: : TOYHOUSE CART

POWER: : DC 9V BATTERY

M/N: : 10859B

: TX

: SIDE

Ref Trace:



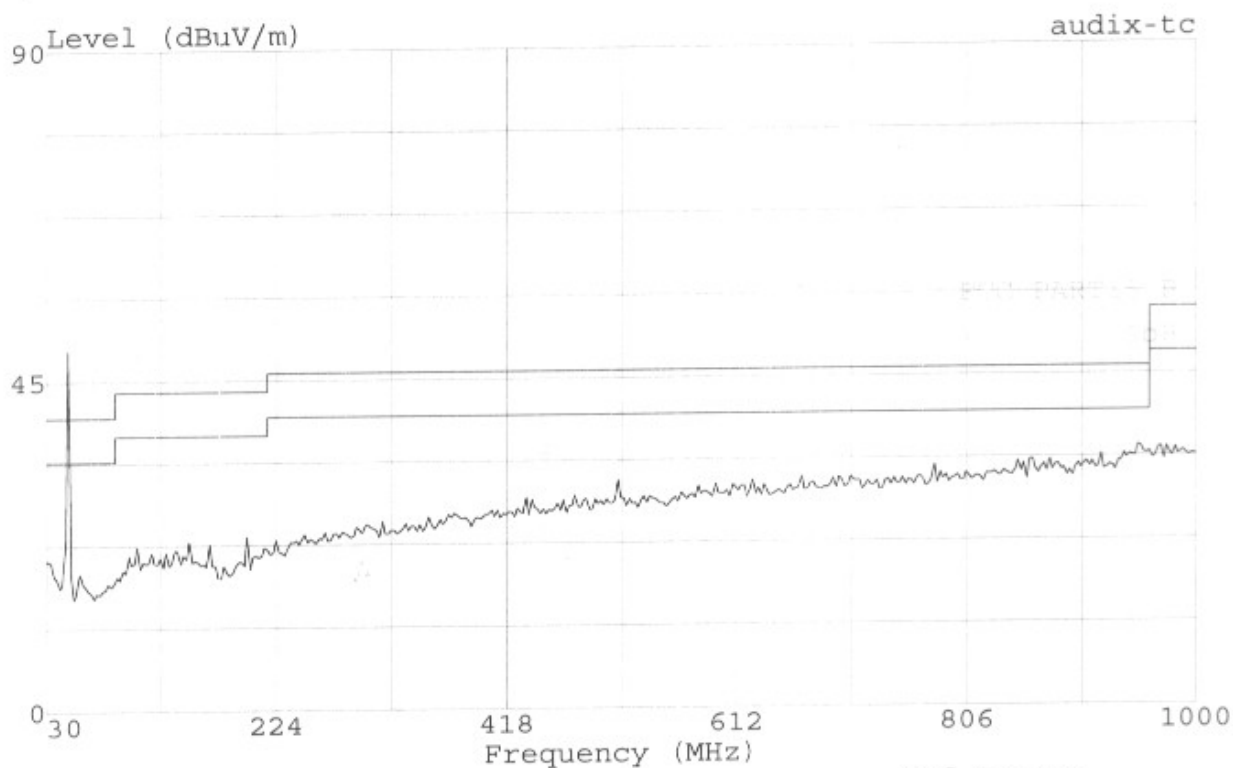
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Data#: 47

File#: PERFECT.EMI

Date: 2000-04-23 Time: 16:59:22



Trace:

Condition: FCC PART15 B 3m 2176FACTOR VERTICAL

EUT: : TOYHOUSE CART

POWER: : DC 9V BATTERY

M/N: : 10859B

: TX

: SIDE

Ref Trace: