

PCC/MELLOW

DEC 28 1998

EXHIBIT 4

Test Report

Test Report

TTEMC-F98184

APPLICATION FOR CERTIFICATION

On Behalf of
Can Technology Co., Ltd.
CAN Turbo Wheel

Model : PC-801

FCC ID : IZIPC-801

Prepared for : Can Technology Co., Ltd.
No. 10, NanYuan Rd., Chung Li City,
Taoyuan, Taiwan, R.O.C.

Prepared By : Taiwan Tokin EMC Eng. Corp.
No. 53-11, Tin-Fu Tsun, Lin-Kou,
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File Number : ATM-G98602
Report Number : TTEMC-F98184
Date of Test : Nov. 16 / Dec. 03, 1998
Date of Report : Dec. 17, 1998

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Tok98-F063

TEST REPORT CERTIFICATION

Applicant : Can Technology Co., Ltd.
Manufacturer : Can Technology Co., Ltd.
FCC ID : IZIPC-801
EUT Description : CAN Turbo Wheel
(A) MODEL NO. : PC-801
(B) SERIAL NO. : N/A
(C) POWER SUPPLY : + 5V DC (Via PC)

Measurement Procedure Used :

FCC RULES AND REGULATIONS PART 15 SUBPART B CLASS B OCTOBER 1997
AND FCC / ANSI C63.4-1992

The device described above was tested by TAIWAN TOKIN EMC ENG. CORP. to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15B Class B limits both radiated and conducted emissions.

The measurement results were contained in this test report and TAIWAN TOKIN EMC ENG. CORP. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report showed that the EUT to be technically compliance with the FCC official limits.

This report applied to above tested sample only. This report shall not be reproduced in part without written approval of Taiwan Tokin EMC Eng. corp.

Date of Test : Nov. 16 / Dec. 03, 1998

Prepared by : Cherry Wang 12/3/98
(CHERRY WANG)

Test Engineer : Allen Wang 12/17/98
(ALLEN WANG)

Approve & Authorized Signer : Jackie Deng 12/17/98
(JACKIE DENG)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	CAN Turbo Wheel (Including Wheel and Foot Pedal)
Model Number	:	PC-801
FCC ID	:	IZIPC-801
Applicant	:	Can Technology Co., Ltd. No. 10, Nanyuan Rd., Chung Li City, Taoyuan, Taiwan, R.O.C.
Manufacturer	:	Can Technology Co., Ltd, No. 10, Nanyuan Rd., Chung Li City, Taoyuan, Taiwan, R.O.C.
Signal Cable (15-Pin)	:	Non-Shielded, Undetachable, 2.4m
Expansion Adapter Cable (4-Pin male foot pedal connector, link to foot pedal cable)	:	Non-Shielded, Undetachable, 0.2m
Foot Pedal Cable (4-Pin)	:	Non-Shielded, Undetachable, 1.8m
Date of Receipt of Sample	:	Oct. 14, 1998
Date of Test	:	Nov. 16 / Dec. 03, 1998

1.2. Tested Supporting System Details

1.2.1. PERSONAL COMPUTER

Mother Board	:	Asus, M/N P2L97 FCC ID. By FCC DoC
CPU	:	Intel Pentium II 233MHz
S.P.S.	:	Englight, M/N EN-8257901
Floppy Driver 3.5"	:	Mitsumi, M/N D359T6
Hard Disk Driver	:	Seagate, M/N ST32122A
Case	:	Enlight, M/N EN-7230
Disk Ctrl Card	:	Within Mother Board
Serial/Parallel Card	:	Within Mother Board
VGA Card	:	Dataexpert Corp. M/N CP765V2 FCC ID LUT-CP765
Sound Card	:	Dataexpert Corp. M/N MED6617 FCC By DoC
Power Cord	:	Non-Shielded, Detachable, 1.8m

1.2.2. MONITOR

Model Number	:	CM752ET
Serial Number	:	T8D002313
FCC ID	:	By DoC
Manufacturer	:	Hitachi
Data Cable	:	Shielded, Detachable, 1.8m
Power Cord	:	Non-Shielded, Detachable, 1.5m

1.2.3. KEYBOARD

Model Number	:	5121
Serial Number	:	J83300820
FCC ID	:	E5XKBM104M10UC
Manufacturer	:	Behavior Tech Computer Corp.
Data Cable	:	Shielded, Undetachable, 1.0m

1.2.4. PRINTER

Model Number	:	2225C+
Serial Number	:	3007S68643
FCC ID	:	DSI6XU2225
Manufacturer	:	Hewlett Packard
Power Adapter	:	Hewlett Packard, M/N 82241A Non-Shielded, Undetachable, 2.0m
Data Cable	:	Shielded, Detachable, 1.2m

1.2.5. MODEM #1

Model Number	:	DM-1414
Serial Number	:	980034398
FCC ID	:	IFAXDM1414
Manufacturer	:	Aceex
Data Cable	:	Shielded, Detachable, 1.2m
Power Adapter	:	Amigo, Model AM-91000A Non-Shielded, Undetachable, 1.8m

1.2.6. MODEM #2

Model Number	:	DM-1414
Serial Number	:	980034397
FCC ID	:	IFAXDM1414
Manufacturer	:	Aceex
Data Cable	:	Shielded, Detachable, 1.2m
Power Adapter	:	Amigo, Model AM-91000A Non-Shielded, Undetachable, 1.8m

1.2.7. PS2 MOUSE

Model Number	:	M-S35
Serial Number	:	LZA82103130
FCC ID	:	DZL211029
Manufacturer	:	Logitech
Data Cable	:	Non-Shielded, Undetachable, 1.8m

1.2.8. USB MOUSE #1

Model Number	:	M-UB48
Serial Number	:	LZB81900216
FCC ID	:	DZL211137
Manufacturer	:	Logitech
Data Cable	:	Shielded, Undetachable, 1.8m

1.2.9. USB MOUSE #2

Model Number	:	M-UB48
Serial Number	:	LZB81900204
FCC ID	:	DZL211137
Manufacturer	:	Logitech
Data Cable	:	Shielded, Undetachable, 1.8m

1.2.10. SPEAKER

Model Number	:	J-008
Serial Number	:	97-C-009780-T
Manufacturer	:	(J-S) JAZZ HIPSTER
Data Cable	:	Non-Shielded, Undetachable, 1m

1.2.11. MICROPHONE W/EARPHONE

Model Number	:	MI-2
Manufacturer	:	Mylar Speaker
Data Cable	:	Non-Shielded, Undetachable, 1.8m

1.2.12. WALKMAN

Model Number	:	RQ-P35LT-K
Serial Number	:	HA08489
Manufacturer	:	Panasonic
Data Cable	:	Non-Shielded, Detachable, 1.8m

1.3. Description of Test Facility

Site Description (No. 2 Open Site)	:	Jul. 15, 1996 Re-file on Federal Communication Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046, U.S.A.
Name of Firm	:	Taiwan Tokin EMC Eng. Corp.
Site Location	:	No. 53-11, Tin-Fu Tsun, Lin-Kou, Taipei Hsien, Taiwan, R.O.C.
NVLAP lab. Code	:	200077-0

Tok48-f063

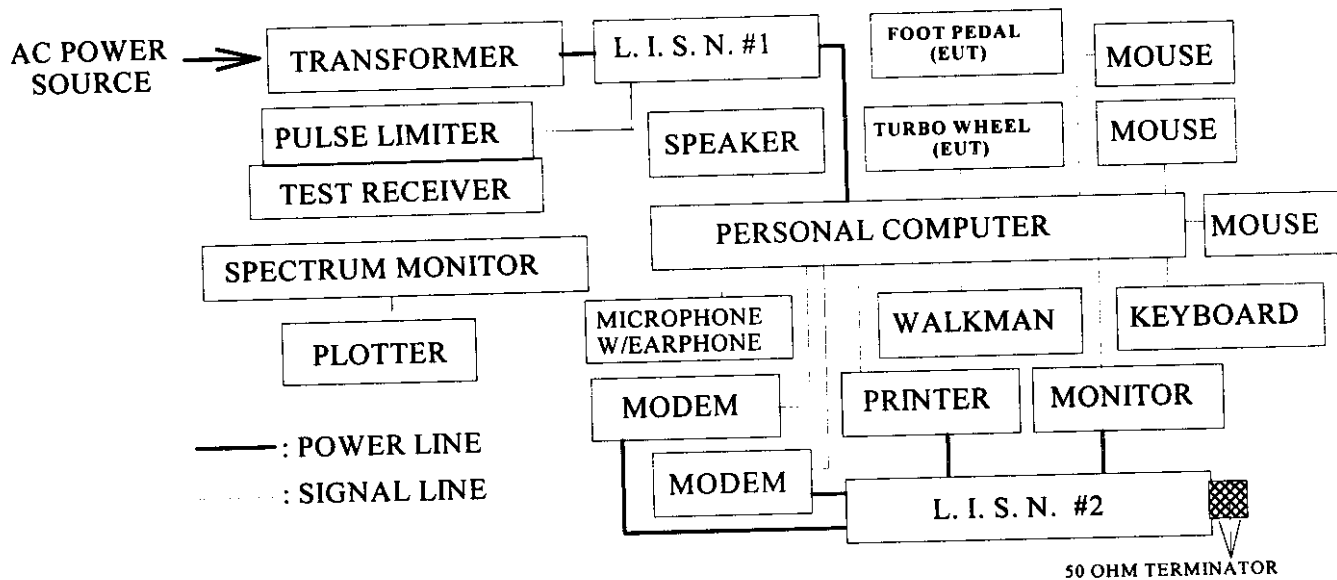
2. POWERLINE CONDUCTED TEST

2.1. Test Equipment

The following test equipments were used during the power line conducted tests :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
2.	Test Receiver	Rohde & Schwarz	ESH3	880647/035	Jun. 24, 98'	1 Year
3.	A.M.N.	Rohde & Schwarz	ESH3-Z5	861189/008	Jul. 30, 98'	1 Year

2.2. Block Diagram of Test Setup



2.3. Powerline Conducted Emission Limit (CLASS B)

Frequency	Maximum RF Line Voltage	
	uV	dBuV
0.45MHz ~ 30Mhz	250	48

REMARKS : RF LINE VOLTAGE (dBuV) = 20 log RF LINE VOLTAGE (uV)

2.4. EUT's Configuration during Compliance Measurement

The following equipments were installed on RF LINE VOLTAGE measurement to meet the Commission requirement and operating in a manner which tend to maximize its emission characteristics in a normal application.

2.4.1. CAN Turbo Wheel (EUT)

Model Number	:	PC-801
FCC ID	:	IZIPC-801
Manufacturer	:	Can Technology Co., Ltd.
Signal Cable (15-Pin)	:	Non-Shielded, Undetachable, 2.4m
Expansion Adapter Cable (4-Pin male foot pedal connector, link to foot pedal cable)	:	Non-Shielded, Undetachable, 0.2m
Foot Pedal Cable (4-Pin)	:	Shielded, Undetachable, 1.8m

2.4.2. Supporting System : As in Section 1.2

2.5. Operating Condition of EUT

2.5.1. Setup the EUT and simulator as shown on 2.2.

2.5.2. Turned on the power of all equipments.

2.5.3. Setup the personal computer to drive the EUT through the "JOYSTICK" software driver by Windows 95 .

2.5.4. Data was communicated between host personal computer and Turbo Wheel (EUT) through Sound Card and Signal Cable.

2.5.5. Personal computer displayed the test software and EUT's work function mode to monitor.

2.5.6. The other peripheral devices were drove and operated in turn during all testing.

2.6. Test Procedure

The EUT was connected to PC, then the PC power cord connected to the power mains through a line impedance stabilization network (L.I.S.N # 1.). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N. # 2). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to FCC ANSI C63.4-1992 on conducted measurement.

The bandwidth of the R&S Test Receiver ESH3 was set at 10KHz.

The frequency range from 450KHz to 30MHz was checked. All the test results are listed in section 2.8.

2.7. Test Results

PASSED. Please refer to the following pages.

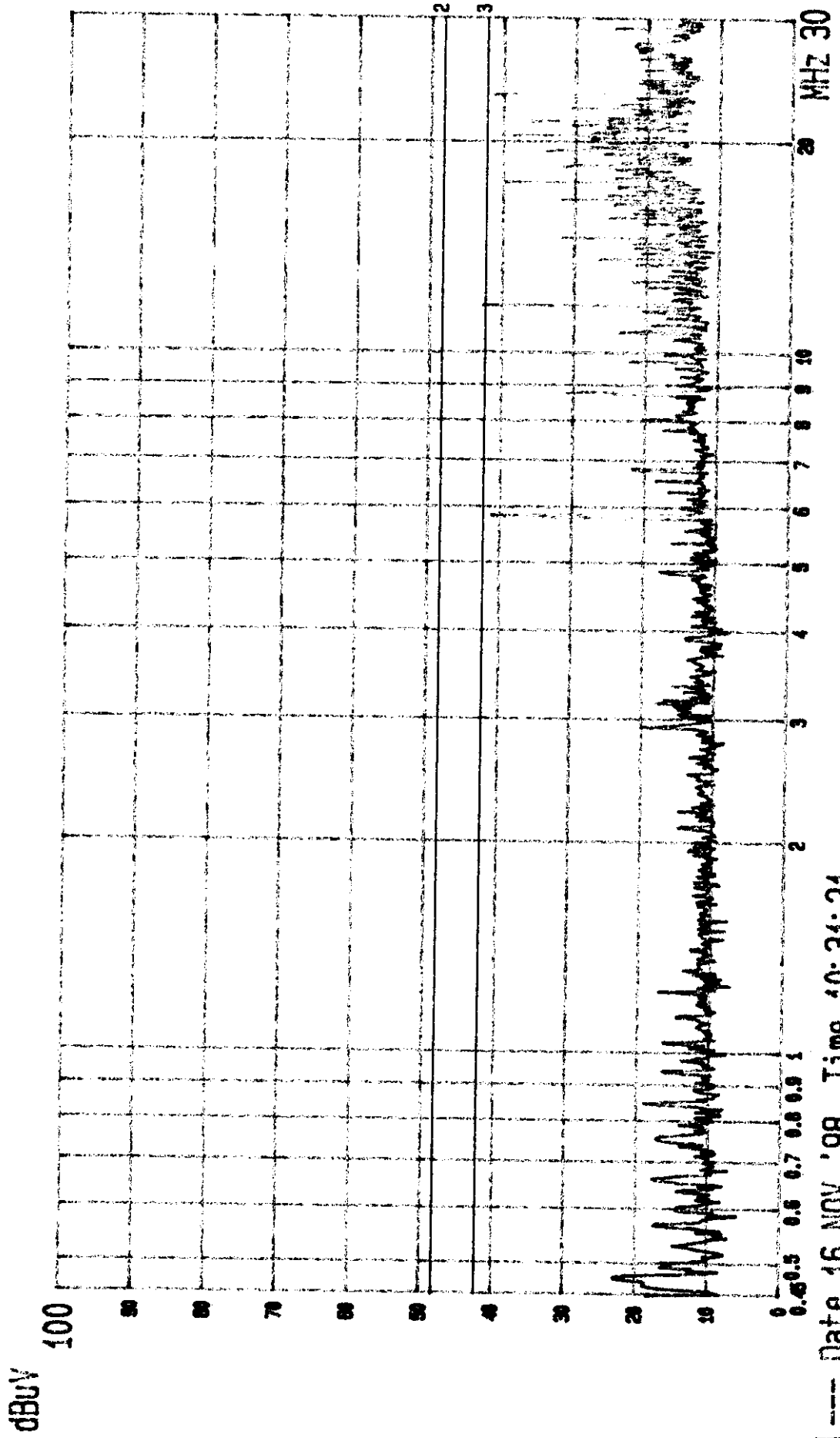
2.8. Line Conducted RF Voltage Measurement Results

The frequency range from 450KHz to 30 MHz was investigated.
All emissions not report below are too low against the prescribed limits.

Date of Test : Nov. 16, 1998 Temperature : 24 °C
EUT : CAN Turbo Wheel Humidity : 45 %

Frequency (MHz)	Factor dB	Measurement (dBuV)		Reading (dBuV)		Limits (dBuV)	Margin (dBuV)	
		VA	VB	VA	VB		VA	VB
0.4921	0.5	15.1	15.1	15.6	15.6	48.0	32.4	32.4
0.7512	0.5	*	11.8	*	12.3	48.0	*	35.7
0.7536	0.5	11.4	*	11.9	*	48.0	36.1	*
5.8559	0.8	*	41.5	*	42.3	48.0	*	5.7
5.8562	0.8	41.0	*	41.8	*	48.0	6.2	*
8.7839	0.8	30.2	30.6	31	31.4	48.0	17	16.6
11.7116	1.0	42.3	42.7	43.3	43.7	48.0	4.7	4.3
23.4234	1.1	41.6	41.9	42.7	43	48.0	5.3	5

Remark : 1. All readings are Quasi-Peak values.
2. Factor = Insertion Loss + Cable Loss
3. The worst emission was detected at 11.7116MHz with corrected signal level of 43.7dBuV (limit is 48dBuV) when the VB side of the EUT was connected to PC, PC's Power Connected to L.I.S.N.

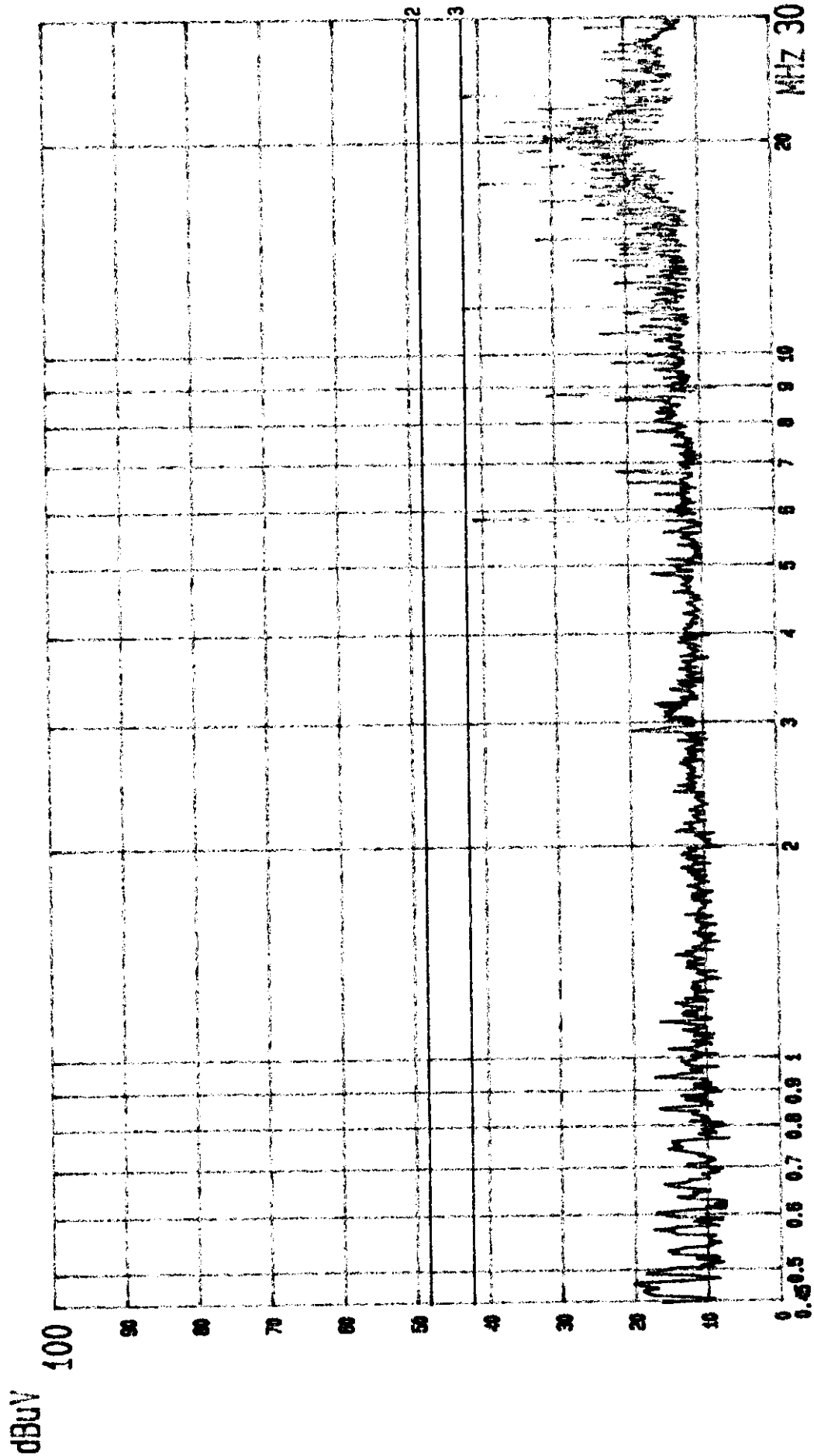


--- Date 16.NOV.'98 Time 10:31:21
CAN EUT: CAN TURBO WHELL
LINE: VA.

M/N: PC-801

(PEAK VALUE) TTEMC.

PAGE: 001.



PAGE: 002.
(PEAK VALUE) ITEM C.

M/N: PC-801

--- Date 16.NOV.'98 Time 10:32:58
CAN EUT: CAN TURBO WHELL
LINE: V8.

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3. RADIATED EMISSION TEST

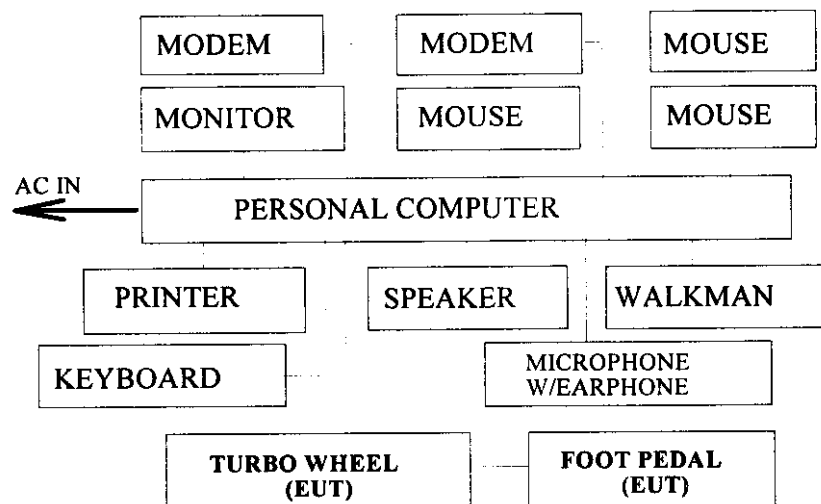
3.1. Test Equipment

The following test equipments are used during the radiated emission tests :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde&Schwarz	ESVP	893202/001	Jul.24, 98'	1 Year
2.	Broadband Antenna	Chase	VBA6106A	1240	Jul. 15, 98'	1 Year
3.	Broadband Antenna	Chase	UPA6109	1048	Jul. 15, 98'	1 Year

3.2. Block Diagram of Test Setup

3.2.1. Block Diagram of connection between EUT and simulators



3.2.2. Open Field Test Site Setup Diagram

ANTENNA TOWER

ANTENNA ELEVATION VARIES FROM 1 METER TO 4 METERS

3 METERS

EUT

0.8
METER

TURN TABLE

GROUND PLANE

3.3. Radiation Limit (CLASS B)

FREQUENCY	DISTANCE	FIELD STRENGTHS LIMITS	
		uV/M	dBuV/M
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0

Remark : (1) Emission level (dBuV/M) = 20 log Emission level (uV/M)
 (2) The tighter limit applies at the edge between two frequency bands.
 (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.

3.4. EUT's Configuration during Compliance Measurement

The configuration of EUT and its simulators were same as those used in conducted measurement. Please refer to 2.4.

3.5. Operating Condition of EUT

Same as conducted measurement which is listed in 2.5.

3.6. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above ground. The turn table rotate 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which were mounted on a antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated biconical and log periodical antenna) and dipole antenna were used as receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4-1992 on radiated measurement.

The bandwidth of the R&S Test Receiver ESVP was set at 120KHz.

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

All the test results are listed in section 3.8.

3.7. Test Results

PASSED. Please refer to the following pages.

3.8. Radiated Emission Measurement Results

The frequency spectrum from 30 MHz to 1000MHz was investigated. All the emissions not reported below were too low against the FCC CLASS B limit.

Date of Test : Dec. 03, 1998 Temperature : 19 °C
 EUT : CAN Turbo Wheel Humidity : 87 %

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading		Emission Level		Margin dBuV/m
			Horizontal dBuV		Horizontal dBuV/m	Limits dBuV/m	
35.917	21.50	1.89	- 6.00		17.39	40.00	22.61
83.999	14.79	3.13	- 3.10		14.82	40.00	25.18
120.139	19.19	3.83	2.00		25.02	43.50	18.48
131.852	20.14	4.03	- 1.70		22.47	43.50	21.03
156.271	21.11	4.41	- 5.70		19.82	43.50	23.68
179.993	21.24	4.74	- 4.90		21.08	43.50	22.42
216.041	21.70	5.28	- 3.30		23.68	43.50	19.82
251.994	23.07	5.74	3.80		32.61	46.00	13.39
263.964	23.24	5.88	- 1.70		27.42	46.00	18.58
288.055	24.29	6.21	- 1.40		29.10	46.00	16.90
312.059	13.83	6.48	1.30		21.61	46.00	24.39
336.064	15.04	6.75	6.80		28.59	46.00	17.41
372.281	15.55	7.21	2.50		25.26	46.00	20.74
408.077	16.56	7.63	9.50		33.69	46.00	12.31
432.082	16.67	7.84	4.40		28.91	46.00	17.09
480.091	17.02	8.37	6.00		31.39	46.00	14.61
*528.100	18.62	8.92	9.20		36.74	46.00	9.26
576.109	19.60	9.44	0.90		29.94	46.00	16.06
624.118	19.98	9.85	3.20		33.03	46.00	12.97

- Remark :
1. All readings are Quasi-Peak values.
 2. The worst emission was detected at 528.100MHz with corrected signal level of 36.74dBuV/m (limit is 46.0dBuV/m) when the antenna was at horizontal polarization and was at 1m high and the turn table was at 315° .
 3. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

Date of Test : Dec. 03, 1998 Temperature : 19 °C
 EUT : CAN Turbo Wheel Humidity : 87 %

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBuV	Emission Level Vertical dBuV/m	Limits dBuV/m	Margin dBuV/m
35.915	20.65	1.89	- 2.60	19.94	40.00	20.06
83.992	14.43	3.13	- 3.70	13.86	40.00	26.14
120.113	18.31	3.83	- 0.50	21.64	43.50	21.86
*131.843	18.77	4.03	6.90	29.70	43.50	13.80
156.249	20.12	4.41	- 5.20	19.33	43.50	24.17
179.996	19.04	4.74	- 2.50	21.28	43.50	22.22
216.042	22.99	5.28	- 5.60	22.67	43.50	20.83
251.964	22.30	5.74	1.00	29.04	46.00	16.96
263.928	21.65	5.88	- 4.50	23.03	46.00	22.97
288.054	24.00	6.21	- 3.00	27.21	46.00	18.79
312.061	14.03	6.48	- 1.70	18.81	46.00	27.19
336.064	16.10	6.75	4.20	27.05	46.00	18.95
372.175	14.62	7.21	- 1.30	20.53	46.00	25.47
408.078	16.08	7.63	2.50	26.21	46.00	19.79
456.086	17.40	8.13	- 0.40	25.13	46.00	20.87
480.090	18.36	8.37	- 2.00	24.73	46.00	21.27
504.096	18.62	8.66	0.60	27.88	46.00	18.12
552.103	19.36	9.16	- 2.40	26.12	46.00	19.88
576.110	19.18	9.44	0.40	29.02	46.00	16.98

- Remark :
1. All readings are Quasi-Peak values.
 2. The worst emission was detected at 131.843MHz with corrected signal level of 29.70dBuV/m (limit is 43.5dBuV/m) when the antenna was at vertical polarization and was at 1m high and the turn table was at 270° .
 3. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

4. MODIFICATIONS TO EUT

***FOR PART OF HNDLC ***

1. Added a ferrite bead between Pin 1 and VCC of RP2.
2. Added ferrite beads on Pin 34, Pin 35 and Pin 36 of U1.
3. Added a 8.2 μ H inductor on Pin 1 of J1.
4. Added a 8.2 μ H inductor on Pin 1 of J2.
5. Added a ferrite core on the cable of J5 with 1 turn.

***FOR PART OF HNDLB ***

6. Added a 22 μ H inductor and a 10000pF bypass capacitor on Pin 2 of J3.
7. Added a ferrite core on the cable of J1, J2 and J3 with 1 turn.
8. Added a ferrite core on the cable of J6 with 2 turns.
9. Added a ferrite core on the cable of J5 with 2 turns.
10. Added a metal plane under the circuit board of HNDLB.
11. Added a ground wire from metal plane to cable connector of J6.

5. DEVIATIONS TO TEST SPECIFICATIONS

[NONE]