FCC TEST REPORT

REPORT NO.: RF900807R01
MODEL NO.: K8225
RECEIVED: August 7, 2001
TESTED: August 18, 2001

APPLICANT: SUNREX TECHNOLOGY CORP.

ADDRESS: No. 188-1, Chung Cheng Road, Ta Ya Shiang, Taichung Hsien, Taiwan, R.O.C.

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chia Pau Tsuen, Linkou Hsiang, Taipei, Taiwan, R.O.C.

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0528

Lab Code: 200102-0

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1 CERTIFICATION

PRODUCT :	Wireless Keyboard (Transmitter Part)
BRAND NAME :	Sunrex
OEM BRAND NAME :	CLEVO, DSI, Inpace, Young, Pictel, Philips, Rodman, OPTI, ARFA, Techprint, Sysgration, CONRAD, Telecruz, LG, Panasonic, Flicks, Faurecia, ASC
MODEL NO :	K8225
APPLICANT :	SUNREX TECHNOLOGY CORP.
STANDARDS :	47 CFR Part 15, Subpart C(15.249) ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the desigK8225, K3225tion has been tested in our facility on August 18, 2001. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

TESTED BY: Gary Chang , **DATE:** Aug. 21, 2001
Gary Chang

CHECKED BY: Demi Chen , **DATE:** August 21, 2001
Demi Chen

APPROVED BY: Alan Lane , **DATE:** Aug 21, 2001
Dr. Alan Lane
Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
STANDARD PARAGRAPH	**TEST TYPE**	**RESULT**	**REMARK**
15.107	Conducted Emission Test	N/A	Power supply is 6VDC from batteries
15.249	Radiated Emission Test	PASS	Minimum passing margin is –6.40dBuV at 9779.10MHz

NOTE: The receiver part to communicate with the EUT has been verified to comply with FCC Part 15, Subpart B, Class B (DoC). The test report can be provided upon request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Keyboard (Transmitter Part)
MODEL NO.	K8225, K3225
POWER SUPPLY	6VDC from battery
MODULATION TYPE	FSK
FREQUENCY RANGE	K8225
CARRIER FREQUENCY OF EACH CHANNEL	2405MHz ~ 2480MHz, 5MHz/step
BANDWIDTH OF EACH CHANNEL	NA
NUMBER OF CHANNEL	16
ANTENNA TYPE	Printed dipole antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is the transmitter part of a Wireless Keyboard.
2. The EUT has eighteen OEM Brand Name as following

OEM BRAND NAME					
1	CLEVO	7	Rodman	13	Telecruz
2	DSI	8	OPTI	14	LG
3	Inpace	9	ARFA	15	Panasonic
4	Young	10	Techprint	16	Flicks
5	Pictel	11	Sysgration	17	Faurecia
6	Philips	12	CONRAD	18	ASC

3. For more detailed features description of the EUT, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF TEST MODES

Sixteen channels are provided in this EUT.

Channel	Frequency	Channel	Frequency
1	2405 MHz	9	2445 MHz
2	2410 MHz	10	2450 MHz
3	2415 MHz	11	2455 MHz
4	2420 MHz	12	2460 MHz
5	2425 MHz	13	2465 MHz
6	2430 MHz	14	2470 MHz
7	2435 MHz	15	2475 MHz
8	2440 MHz	16	2480 MHz

NOTE:

1. Below 1 GHz, the channel 1, 9, and 16 were pre-tested in chamber. The channel 16, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 1, 9, and 16 were tested individually.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is the transmitter part of a Wireless Keyboard. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR 47 Part 15, Subpart C (15.249)

ANSI C63.4-1992

All tests have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Personal Computer	IBM	2187-12W	1S218714ABNA 000V	FCC DoC APPROVED
2	19" COLOR MONITOR	HP	D2842A	KR93473168	BEJCB910
3	PRINTER	HP	2225C+	3123S97230	DSI6XU2225
4	MODEM	ACEEX	1414	980020510	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core.
3	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.

NOTE: All power cords of the above support units are non shielded (1.8m).

4 TEST PROCEDURE AND RESULT

4.1 CONDUCTED EMISSION MEASUREMENT

NA

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.249 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
2400 ~ 2483.5	114	94

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Other Frequencies (MHz)	Field Strength of Fundamental	
	uV/meter	dBuV/meter
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
* HP Spectrum Analyzer	8590L	3544A01176	May 7, 2002
* HP Preamplifier	8447D	2944A08485	Nov. 3, 2001
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* HP Preamplifier	8449B	3008A01292	Aug. 21, 2001
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 25, 2002
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2001
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 2, 2002
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 6, 2002
* EMCO Horn Antenna	3115	9312-4192	April 15, 2002
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	AS61D4	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Aug. 2, 2002
* TIMES RF cable	LMR-600	CABLE-ST5-01	Aug. 2, 2002
* Antenna (Horn)	BBHA9120-D	D130	July 10, 2002
Open Field Test Site	Site 5	ADT-R05	July 28, 2002
VCCI Site Registration No.	Site 5	R-1039	NA
Site Registration No.	FCC: 90422 Canada IC: IC 3789 VCCI : R-1039		

NOTE: 1. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per the NAMAS document NIS81.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

3. "*" = These equipment are used for the final measurement.

4.2.3 TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antennaK3225, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

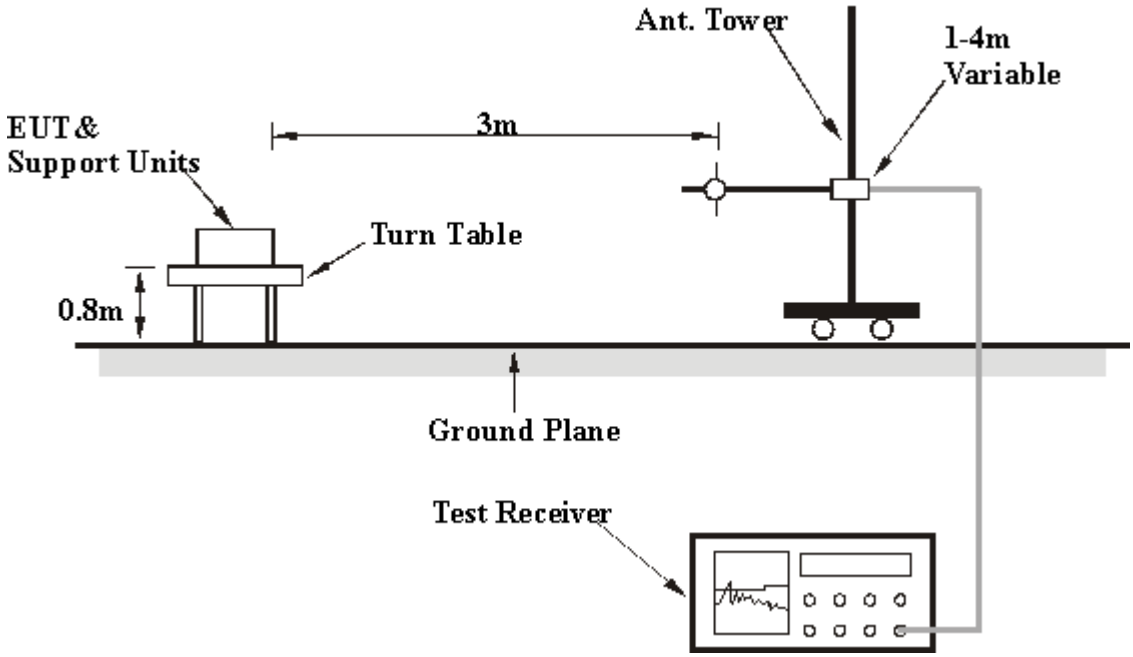
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.

4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item in this test report - Photographs of the Test Configuration.

4.2.5 EUT OPERATING CONDITION

a. Connected the EUT with a computer system on the testing table.
b. Set the wireless keyboard and receiver at the same channel.
c. The wireless keyboard sent “H” messages to receiver.
d. The receiver in a continuously receiving status form keyboard.
e. The computer system sent “H” messages to Color Monitor and Monitor displayed “H” patterns on its screen.
f. The computer system sent “H” messages to modem.
g. The computer system sent "H" messages to printer, and the printer prints them on paper.

4.2.6 TEST RESULT

EUT	Wireless Keyboard (Transmitter Part)	**MODEL**	K8225
MODE	Channel 16	**FREQUENCY RANGE**	30-1000 MHz
INPUT POWER	6VDC	**DETECTOR FUNCTION**	Peak / Quasi-Peak
ENVIRONMENTAL CONDITIONS	30 deg. C, 60 % RH, 1050 hPa	**TESTED BY**: Gary Chang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	120.00	28.1 QP	43.50	-15.40	1.50H	250	15.40	11.65	1.08	0.00	-12.73
2	220.47	28.0 QP	46.00	-18.00	1.39H	177	16.20	10.26	1.52	0.00	-11.79
3	251.93	28.8 QP	46.00	-17.20	1.28H	136	14.80	12.29	1.67	0.00	-13.96
4	384.13	30.9 QP	46.00	-15.10	1.38H	182	13.20	15.50	2.18	0.00	-17.67
5	480.41	31.9 QP	46.00	-14.10	1.45H	296	12.50	16.92	2.47	0.00	-19.38
6	512.47	33.1 QP	46.00	-12.90	1.45H	306	13.10	17.42	2.55	0.00	-19.97

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	120.47	27.3 QP	43.50	-16.20	1.29V	241	14.60	11.65	1.08	0.00	-12.73
2	211.88	26.1 QP	43.50	-17.40	1.37V	182	14.90	9.69	1.48	0.00	-11.16
3	220.18	28.0 QP	46.00	-18.00	1.32V	176	16.40	10.12	1.51	0.00	-11.63
4	252.47	29.7 QP	46.00	-16.30	1.24V	254	15.70	12.29	1.67	0.00	-13.96
5	454.94	32.7 QP	46.00	-13.30	1.19V	311	13.80	16.45	2.42	0.00	-18.86
6	508.47	32.6 QP	46.00	-13.40	1.12V	239	12.70	17.36	2.53	0.00	-19.88

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
   (Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.

EUT	Wireless Keyboard (Transmitter Part)	MODEL	K8225
MODE	Channel 1	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER	6VDC	DETECTOR FUNCTION	Peak / Average
ENVIRONMENTAL CONDITIONS	30 deg. C, 60 % RH, 1050 hPa	TESTED BY: Gary Chang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2405.1	67.4 PK	114.00	-46.60	1.14H	179	36.77	27.08	3.60	0.00	-30.67
2	*2405.1	57.8 AV	94.00	-36.20	1.14H	179	27.10	27.08	3.60	0.00	-30.68
3	4810.1	48.7 PK	74.00	-25.30	1.21H	129	12.13	31.40	5.19	0.00	-36.59
4	7215.1	44.5 AV	54.00	-9.50	1.32H	185	2.10	36.02	6.36	0.00	-42.39
5	7215.1	54.1 PK	74.00	19.90	1.32H	185	11.73	36.02	6.36	0.00	-42.38

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2405.0	60.2 PK	114.00	-53.80	1.07V	104	29.56	27.08	3.60	0.00	-30.67
2	*2405.0	52.0 AV	94.00	-42.00	1.07V	104	21.30	27.08	3.60	0.00	-30.67
3	4810.4	49.1 PK	74.00	-24.90	1.00V	151	12.46	31.40	5.19	0.00	-36.59
4	7215.1	51.5 PK	74.00	-22.50	1.10V	111	9.08	36.02	6.36	0.00	-42.39
5	9619.0	59.5 PK	74.00	-14.50	1.06V	84	14.20	38.07	7.19	0.00	-45.26.
6	9619.0	47.4 AV	54.00	-6.60	1.06V	84	2.10	38.07	7.19	0.00	-45.27

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
   (Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.
5. "*":Fundamental frequency

EUT	Wireless Keyboard (Transmitter Part)	**MODEL**	K8225
MODE	Channel 9	**FREQUENCY RANGE**	Above 1000 MHz
INPUT POWER	6VDC	**DETECTOR FUNCTION**	Peak / Average
ENVIRONMENTAL CONDITIONS	30 deg. C, 60 % RH, 1050 hPa	**TESTED BY**: Gary Chang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2445.0	66.3 PK	114.00	-47.70	1.31H	215	35.32	27.30	3.64	0.00	-30.94
2	*2445.0	56.9 AV	94.00	-37.10	1.31H	215	25.93	27.30	3.64	0.00	-30.94
3	4890.1	49.6 PK	74.00	-24.40	1.16H	293	12.87	31.49	5.26	0.00	-36.76
4	7334.1	44.1 AV	54.00	-9.90	1.08H	322	1.30	36.29	6.47	0.00	-42.77
5	7334.1	55.3 PK	74.00	-18.70	1.08H	322	12.49	36.29	6.47	0.00	-42.77
6	9779.1	46.7 AV	54.00	-7.30	1.26H	196	1.20	38.17	7.34	0.00	-45.51
7	9779.1	55.3 PK	74.00	-18.70	1.26H	196	9.77	38.17	7.34	0.00	-45.50.

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2445.0	65.9 PK	114.00	-48.10	1.28V	166	35.00	27.30	3.64	0.00	-30.94
2	*2445.0	58.4 AV	94.00	-35.60	1.28V	166	27.50	27.30	3.64	0.00	-30.94
3	4890.5	51.1 PK	74.00	-22.90	1.16V	231	14.34	31.49	5.26	0.00	-36.76
4	7334.6	44.4 AV	54.00	-9.60	1.41V	257	1.60	36.29	6.47	0.00	-42.77
5	7334.6	57.3 PK	74.00	-16.70	1.41V	257	14.49	36.29	6.47	0.00	-42.77
6	9779.1	58.4 PK	74.00	-15.60	1.36V	218	12.87	38.17	7.34	0.00	-45.51
7	9779.1	47.6 AV	54.00	-6.40	1.36V	218	2.10	38.17	7.34	0.00	-45.51

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
   (Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.
5. "*":Fundamental frequency

EUT	Wireless Keyboard (Transmitter Part)	MODEL	K8225
MODE	Channel 16	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER	6VDC	DETECTOR FUNCTION	Peak / Average
ENVIRONMENTAL CONDITIONS	30 deg. C, 60 % RH, 1050 hPa	TESTED BY: Gary Chang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2480.1	66.9 PK	114.00	-47.10	1.26H	138	35.65	27.52	3.68	0.00	-31.20
2	*2480.1	55.9 AV	94.00	-38.10	1.26H	138	24.73	27.52	3.68	0.00	-31.20
3	4960.1	50.0 PK	74.00	-24.00	1.37H	177	13.17	31.56	5.32	0.00	-36.88
4	7440.1	56.8 PK	74.00	-17.20	1.34H	220	13.76	36.47	6.55	0.00	-43.02.
5	7440.1	45.4 AV	54.00	-8.60	1.34H	220	2.40	36.47	6.55	0.00	-43.03
6	9919.8	60.0 PK	74.00	-14.00	1.26H	254	14.24	38.25	7.47	0.00	-45.72
7	9919.8	47.2 AV	54.00	-6.80	1.26H	254	1.50	38.25	7.47	0.00	-45.73

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2480.2	65.2 PK	114.00	-48.80	1.00V	311	34.00	27.52	3.68	0.00	-31.20
2	*2480.2	55.2 AV	94.00	-38.80	1.00V	311	24.00	27.52	3.68	0.00	-31.20
3	4960.0	50.9 PK	74.00	-23.10	1.08V	330	14.06	31.56	5.32	0.00	-36.88
4	7440.5	57.4 PK	74.00	-16.60	1.31V	258	14.37	36.47	6.55	0.00	-43.02.
5	7440.5	45.4 AV	54.00	-8.60	1.31V	258	2.40	36.47	6.55	0.00	-43.03
6	9919.8	59.6 PK	74.00	-14.40	1.19V	227	13.86	38.25	7.47	0.00	-45.73
7	9919.8	47.5 AV	54.00	-6.50	1.19V	227	1.80	38.25	7.47	0.00	-45.73

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
   (Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.
5. "*":Fundamental frequency

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST

6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
New Zealand	MoC
Norway	NEMKO
R.O.C.	BSMI, DGT, CNLA

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.
If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.