FCC TEST REPORT

REPORT NO.: RF960730A04A-1

MODEL NO.: 1132

RECEIVED: March 3, 2009

TESTED: March 5 ~9, 2009

ISSUED: March 27, 2009

APPLICANT: MICROSOFT CORPORATION

ADDRESS: ONE MICROSOFT WAY REDMOND, WA 98052-6399, U.S.A

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan

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1 CERTIFICATION

PRODUCT:	Microsoft® Wireless Keyboard 700 v2.0
BRAND NAME:	Microsoft®
MODEL NO.:	1132
APPLICANT:	MICROSOFT CORPORATION
TEST SAMPLE:	ENGINEERING SAMPLE
TESTED:	March 5 ~ 9, 2009
STANDARDS:	FCC Part 15, Subpart C (Section 15.227) ANSI C63.4-2003

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Jessica Cheng , **DATE:** March 27, 2009
(Jessica Cheng / Specialist)

TECHNICAL ACCEPTANCE : Jamison Chan , **DATE:** March 27, 2009
Responsible for RF
(Jamison Chan / Supervisor)

APPROVED BY : Ken Liu , **DATE:** March 27, 2009
(Ken Liu / Assistant Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD PARAGRAPH	**TEST TYPE**	**RESULT**	**REMARK**
15.207	Conducted Emission Test	N/A	Power supply is 3Vdc from batteries
15.227 15.209	Radiated Emission Test	PASS	Minimum passing margin is –11.15dB at 80.541MHz

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Frequency	Uncertainty
Radiated emissions	30MHz ~ 1GHz	3.72 dB
	1GHz ~ 40GHz	2.89 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Microsoft® Wireless Keyboard 700 v2.0
MODEL NO.	1132
FCC ID	C3K1132
POWER SUPPLY	3.0Vdc from batteries
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	27.195 MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Loop antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is a wireless keyboard which is a transmitter

2. This report is base on ADT report with Reference No.: RF960730A04-1. The original report was issued by Advance Data Technology Corp. (ADT Corp.) on Aug. 10, 2007 ADT Corp. is one of Bureau Veritas family and she has fully transferred all its test facilities, staffs & service system to Bureau Veritas Consumer Products Services (Hong Kong) Limited, Taoyuan Branch in 2008.

3. This report is prepared for FCC class II permissive change.

4. This report is a supplementary report to verify test result for some electronic and mechanical changes. The main changes are as the following item:
   ♦ Change PCB material that are change from FR4 to FR 1.

5. The EUT has 3 samples, which are defined as their serial no. as follows:

Model No.	Serial no.
1132	26
	29
	32

6. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

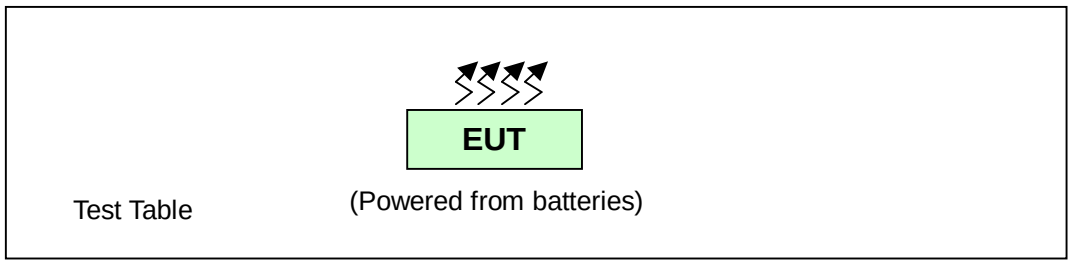
1 channel was provided to this EUT

Channel	Frequency (MHz)
1	27.195MHz

3 sets of identical samples are tested and presented in the report.

Keyboard Serial Number
26
29
32

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT configure mode	Applicable to		Description
	PLC	RE<1G	
-	Note	√	-

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz

Note: No need to concern of Conducted Emission due to the EUT is powered by battery.

RADIATED EMISSION TEST (BELOW 1 GHz):

☒Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	SERIAL NO.	MODULATION TYPE
1	1	26, 29, 32	FSK

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (Section 15.227)
ANSI C63.4 -2003

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

NOTE: The receiver part of this product (USB receiver) has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any necessary accessory or support unit.

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 15.227 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)	
26.96-27.28	Peak	Average
	100	80

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:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	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 DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	May 09, 2008	May 08, 2009
HP Preamplifier	8449B	3008A01924	Sep. 03, 2008	Sep. 02, 2009
HP Preamplifier	8449B	3008A01292	Aug. 06, 2008	Aug. 05, 2009
ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Dec. 04, 2008	Dec. 03, 2009
Schwarzbeck Antenna	VULB 9168	137	May 02, 2008	May 01, 2009
Schwarzbeck Antenna	VHBA 9123	480	Apr. 23, 2008	Apr. 22, 2009
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF104-26.5	CABLE-CH6-17m -01	Aug. 22, 2008	Aug. 21, 2009
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009
Loop Antenna R & S	HFH2-Z2	100070	Jan. 14, 2008	Jan. 13, 2010

NOTE: 1. The calibration interval of the above test instruments is 12 or 24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.

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 3 meter semi-anechoic chamber. 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 antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna 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.

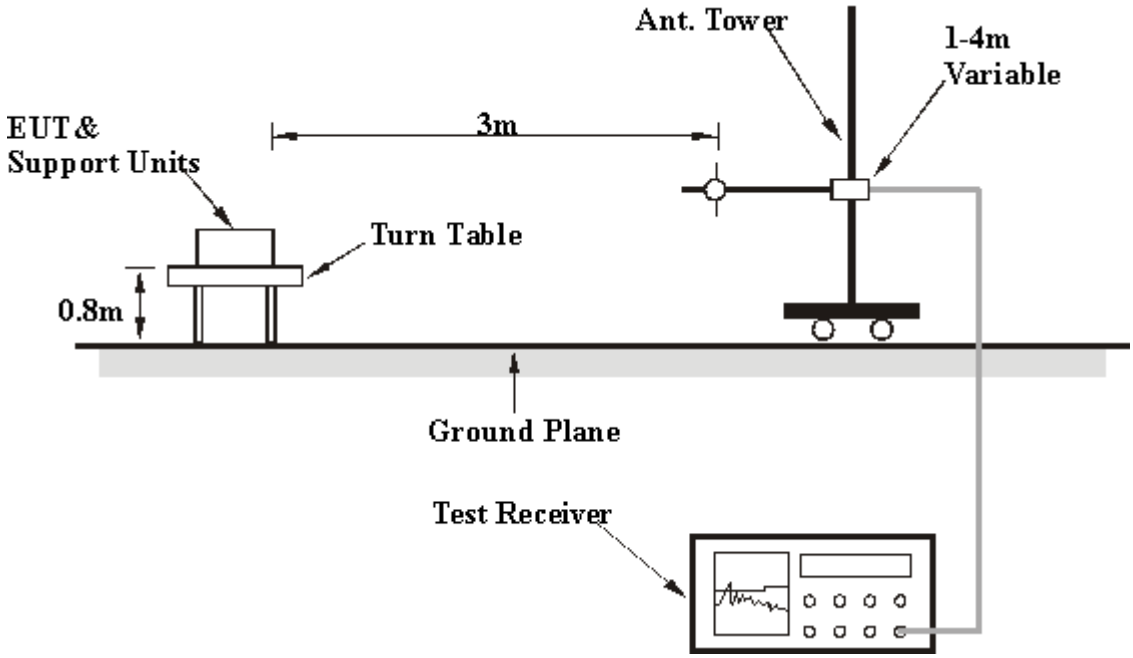
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz

f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak method or average method as specified and then reported in data sheet.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
3. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the interference-receiving antenna.

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

Set the EUT under transmission condition continuously at specific channel frequency.

4.2.6 TEST RESULT

INPUT POWER	3Vdc	**SERIAL NO.**	26
ENVIRONMENTAL CONDITIONS	20deg. C, 85% RH, 1009hPa	**FREQUENCY RANGE**	Below 1000MHz
TESTED BY	Chad Lee	**DETECTOR FUNCTION**	Peak / Average

TEST DISTANCE: 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*27.195	56.23 PK	100.00	-43.77	1.96	332	43.07	20.22
2	*27.195	46.11 AV	80.00	-33.89	1.96	332	32.95	20.22

REMARKS:

1 Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2 Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3 The other emission levels were very low against the limit.
4 Margin value = Emission level – Limit value.
5 ”*”= Fundamental frequency.
6 Loop antenna was used for all radiated emission below 30MHz.

INPUT POWER	3Vdc	**SERIAL NO.**	26
ENVIRONMENTAL CONDITIONS	19deg. C, 79% RH, 1018hPa	**FREQUENCY RANGE**	Below 1000MHz
TESTED BY	Chad Lee	**DETECTOR FUNCTION**	Quasi-Peak

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)	Correction Factor (dB/m)
1	31.944	24.71 QP	40.00	-15.29	1.12 H	334	10.98	13.73
2	80.541	28.80 QP	40.00	-11.20	1.68 H	175	18.70	10.10
3	119.419	17.17 QP	43.50	-26.33	1.52 H	340	3.95	13.22
4	152.465	17.43 QP	43.50	-26.07	1.10 H	22	2.91	14.52
5	243.828	20.63 QP	46.00	-25.37	1.14 H	346	5.86	14.77
6	319.639	18.43 QP	46.00	-27.57	1.84 H	343	1.91	16.52

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)	Correction Factor (dB/m)
1	92.204	29.44 QP	43.50	-14.06	1.12 V	7	19.14	10.30
2	119.419	27.28 QP	43.50	-16.22	1.68 V	106	14.06	13.22
3	136.914	23.22 QP	43.50	-20.28	1.54 V	343	9.15	14.07
4	150.521	22.83 QP	43.50	-20.67	1.42 V	262	8.24	14.59
5	164.128	21.60 QP	43.50	-21.90	1.13 V	241	7.67	13.93
6	201.062	21.86 QP	43.50	-21.64	1.08 V	10	10.13	11.73

REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

INPUT POWER	3Vdc	**SERIAL NO.**	29
ENVIRONMENTAL CONDITIONS	20deg. C, 85% RH, 1009hPa	**FREQUENCY RANGE**	Below 1000MHz
TESTED BY	Chad Lee	**DETECTOR FUNCTION**	Peak / Average

TEST DISTANCE: 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*27.195	55.09 PK	100.00	-44.91	2.00	26	41.93	20.22
2	*27.195	40.76 AV	80.00	-39.24	2.00	6	27.60	20.22

REMARKS:

1 Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2 Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3 The other emission levels were very low against the limit.
4 Margin value = Emission level – Limit value.
5 "*"= Fundamental frequency.
6 Loop antenna was used for all radiated emission below 30MHz.

INPUT POWER	3Vdc	**SERIAL NO.**	29
ENVIRONMENTAL CONDITIONS	19deg. C, 79% RH, 1018hPa	**FREQUENCY RANGE**	Below 1000MHz
TESTED BY	Chad Lee	**DETECTOR FUNCTION**	Quasi-Peak

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)	Correction Factor (dB/m)
1	**80.541**	**28.85 QP**	**40.00**	**-11.15**	**1.12 H**	**190**	**18.75**	**10.10**
2	117.475	17.94 QP	43.50	-25.56	1.03 H	136	4.91	13.03
3	152.465	18.41 QP	43.50	-25.09	1.24 H	208	3.89	14.52
4	243.828	20.41 QP	46.00	-25.59	1.06 H	31	5.64	14.77
5	298.257	18.36 QP	46.00	-27.64	1.07 H	10	2.41	15.95
6	319.639	16.95 QP	46.00	-29.05	1.35 H	319	0.43	16.52

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)	Correction Factor (dB/m)
1	35.832	27.61 QP	40.00	-12.39	1.02 V	10	12.76	14.85
2	72.766	23.97 QP	40.00	-16.03	1.12 V	223	12.10	11.87
3	88.317	24.12 QP	43.50	-19.38	1.08 V	238	14.09	10.03
4	117.475	22.81 QP	43.50	-20.69	1.53 V	127	9.78	13.03
5	140.802	23.30 QP	43.50	-20.20	1.00 V	16	9.06	14.24
6	187.455	20.60 QP	43.50	-22.90	1.00 V	118	8.44	12.16

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

INPUT POWER	3Vdc	**SERIAL NO.**	32
ENVIRONMENTAL CONDITIONS	20deg. C, 85% RH, 1009hPa	**FREQUENCY RANGE**	Below 1000MHz
TESTED BY	Chad Lee	**DETECTOR FUNCTION**	Peak / Average

TEST DISTANCE: 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*27.195	56.13 PK	100.00	-43.87	2.01	4	42.97	20.22
2	*27.195	43.55 AV	80.00	-36.45	2.01	4	30.39	20.22

REMARKS:

1 Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2 Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3 The other emission levels were very low against the limit.
4 Margin value = Emission level – Limit value.
5 "*"= Fundamental frequency.
6 Loop antenna was used for all radiated emission below 30MHz.

INPUT POWER	3Vdc	**SERIAL NO.**	32
ENVIRONMENTAL CONDITIONS	19deg. C, 79% RH, 1018hPa	**FREQUENCY RANGE**	Below 1000MHz
TESTED BY	Chad Lee	**DETECTOR FUNCTION**	Quasi-Peak

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)	Correction Factor (dB/m)
1	80.541	28.80 QP	40.00	-11.20	1.03 H	160	18.70	10.10
2	152.465	17.78 QP	43.50	-25.72	1.59 H	292	3.26	14.52
3	185.511	16.31 QP	43.50	-27.19	1.13 H	160	4.07	12.24
4	243.828	20.71 QP	46.00	-25.29	1.25 H	19	5.94	14.77
5	319.639	19.58 QP	46.00	-26.42	1.00 H	43	3.05	16.52
6	397.395	18.91 QP	46.00	-27.09	1.18 H	334	0.11	18.80

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)	Correction Factor (dB/m)
1	35.832	23.17 QP	40.00	-16.83	1.05 V	304	8.32	14.85
2	68.878	24.69 QP	40.00	-15.31	1.13 V	217	12.05	12.64
3	84.429	25.48 QP	40.00	-14.52	1.12 V	181	15.41	10.07
4	103.868	27.08 QP	43.50	-16.42	1.03 V	289	15.38	11.70
5	127.194	26.22 QP	43.50	-17.28	1.18 V	232	12.61	13.61
6	158.297	28.32 QP	43.50	-15.18	1.93 V	10	14.04	14.28

REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6 INFORMATION ON THE TESTING LABORATORIES

We, **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA, CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	GOST-ASIA (MOU)
Russia	CERTIS (MOU)

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:

Linko EMC/RF Lab:
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Hsin Chu EMC/RF Lab:
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Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

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