

FCC TEST REPORT

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 RF931012L03B

 MODEL NO.:
 5187URF2+

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APPLICANT: BEHAVIOR TECH COMPUTER CORP.

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1 CERTIFICATION

PRODUCT:	Wireless Keyboard
BRAND NAME:	HP, COMPAQ
MODEL NO:	5187URF2+
TEST SAMPLE:	ENGINEERING SAMPLE
TESTED:	Aug. 31, 2005
APPLICANT:	BEHAVIOR TECH COMPUTER CORP.
STANDARDS:	FCC Part 15, Subpart C(Section 15.235) ANSI C63.4-2003

The above equipment has been tested by **Advance Data Technology Corporation**, 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 Gerg, DATE: Sep. 8, 2005 (Jessica Cheng)
TECHNICAL ACCEPTANCE Responsible for RF	: <u>Ken Līn</u> , DATE : Sep. 8, 2005 (Ken Liu)
APPROVED BY	:, DATE: Sep. 8, 2005 (Cody Chang / Deputy Manager)



2 SUMMARY OF TEST RESULTS

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
15.235, 15.209	Radiated Emission Test	PASS	Minimum passing margin is –11.52dB at 249.66MHz
15.235(b)	Band Edges Test	PASS	Meet the requirement of limit

The EUT has been tested according to the following specifications:

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:

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

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.65 dB
	1GHz ~ 18GHz	2.20 dB
	18GHz ~ 40GHz	1.88 dB



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Keyboard
MODEL NO.	5187URF2+
POWER SUPPLY	3.0Vdc from batteries
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	49.865MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Loop 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 two brand names for one model no. as follows:

Brand	Model	
HP	51871 IDE2+	
COMPAQ		

3. 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.



3.1 DESCRIPTION OF TEST MODES

One channel was provided to this EUT

Channel	Frequency (MHz)
1	49.865MHz

3.1.1 CONFIGURATION OF SYSTEM UNDER TEST





3.1.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT	Applicable to		Description
mode	PLC	RE<1G	Description
1	Note	V	NA

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.

EUT	AVAILABLE	TESTED	MODULATION
	CHANNEL	CHANNEL	TYPE
Wireless Keyboard	1	1	FSK

BANDEDGE MEASUREMENT:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.

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

EUT	AVAILABLE	TESTED	MODULATION
	CHANNEL	CHANNEL	TYPE
Wireless Keyboard	1	1	FSK



3.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C. (15.235) ANSI C63.4 -2003

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

3.3 DESCRIPTION OF SUPPORT UNITS

NA



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 15.235 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)			
49.82 - 49.90	Peak	Average		
	100	80		

According to 15.235 (b) the field strength of and emissions appearing between the band edges and up to 10kHz above and below the band edges shall be attenuated at least 26dB below the level of the unmodulated carrier or to the general limits in 15.209, whichever permits the higher emission levels.

The field strength of and emissions removed by more than 10kHz from the band edges shall not exceed the general radiated emission limits in 15.209. as following:

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

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	
Test Receiver	ESI7	838/06/016	lan 07 2006	
ROHDE & SCHWARZ	2317	030490/010	Jan. 07, 2000	
Spectrum Analyzer	ESP40	100041	Nov 29 2005	
ROHDE & SCHWARZ		1000+1	1101. 20, 2000	
BILOG Antenna	VIII B9168	9168-155	lan 22 2006	
SCHWARZBECK	VOLDS100	5100-100	Jan. 22, 2000	
HORN Antenna		91200-404	lan 05 2006	
SCHWARZBECK	00117 91200	91200-404	Jan. 05, 2000	
HORN Antenna	BBHA 0170	BBHA 0170242	lan 23 2006	
SCHWARZBECK	DDIASITO	DDIA 9170242	Jan. 23, 2000	
Preamplifier	8447D	2011010631	Nov 17 2005	
Agilent		2344710031	NOV. 17, 2003	
Preamplifier	8440B	3008401960	Nov 14 2005	
Agilent	07730	0000401000	1000. 14, 2000	
RF signal cable		210272/4	lan 26 2006	
HUBER+SUHNNER		21921214	Jan. 20, 2000	
RF signal cable	SUCOELEX 104	210275/4	lan 26 2006	
HUBER+SUHNNER		213213/4	Jan. 20, 2000	
Software	ADT_Radiated_V5.1	ΝΔ	ΝΔ	
ADT.	4	147.4		
Antenna Tower	MA 4000	010303	ΝΔ	
inn-co GmbH		010303	INA	
Antenna Tower Controller	CO2000	010303	ΝΔ	
inn-co GmbH	002000	019303		
Turn Table	TT100	TT03021704	NA	
ADT.		1133021704		
Turn Table Controller	SC100	SC93021704	ΝΔ	
ADT.	00100.	000021704		

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 3.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The IC Site Registration No. is IC4924-4.



4.2.3TEST 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 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 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 and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection (PK) 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

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



4.2.6 TEST RESULT

EUT	Wireless Keyboard	MEASUREMENT DETAIL		
INPUT POWER	3Vdc	MODEL	5187URF2+	
ENVIRONMENTAL CONDITIONS	25deg. C, 64% RH, 989hPa	FREQUENCY RANGE	Below 1000MHz	
TESTED BY	Brad Wu	DETECTOR FUNCTION	Peak / Quasi-Peak / Average	

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
	Freq	Emission	Limit	Margin	Antenna	Table	Raw	Correction
No.	/M⊔>)	Level	(dBu)//m)	(dP)	Height	Angle	Value	Factor
	(10172)	(dBuV/m)	(ubuv/iii)	(dB)	(m)	(Degree)	(dBuV)	(dB/m)
1	*49.865	59.74 PK	100.00	-40.26	1.25 H	262	45.05	14.69
2	*49.865	42.75 AV	80.00	-37.25	1.25 H	262	28.06	14.69
3	214.67	22.18 QP	43.50	-21.32	1.00 H	121	10.58	11.60
4	249.66	34.48 QP	46.00	-11.52	1.50 H	124	21.38	13.11
5	348.80	25.11 QP	46.00	-20.89	1.00 H	313	9.62	15.49
6	447.94	25.82 QP	46.00	-20.18	1.00 H	157	7.87	17.95
7	947.52	25.65 QP	46.00	-20.35	1.25 H	211	0.35	25.30

	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
	Freq	Emission	Limit	Margin	Antenna	Table	Raw	Correction
No.	/////→)	Level	(dBu)//m)	(dP)	Height	Angle	Value	Factor
	(10112)	(dBuV/m)	(ubuv/iii)	(dB)	(m)	(Degree)	(dBuV)	(dB/m)
1	*49.865	55.64 PK	100.00	-44.36	1.00 V	115	40.95	14.69
2	*49.865	38.56 AV	80.00	-41.44	1.00 V	115	23.87	14.69
3	99.98	21.71 QP	43.50	-21.79	1.25 V	40	10.80	10.91
4	249.66	29.30 QP	46.00	-16.70	1.00 V	10	16.19	13.11
5	825.05	22.85 QP	46.00	-23.15	1.00 V	346	-0.84	23.69
6	887.25	24.38 QP	46.00	-21.62	1.25 V	16	-0.20	24.58
7	945.57	25.21 QP	46.00	-20.79	1.00 V	79	-0.07	25.28

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. "*"= Fundamental frequency.



4.3 BAND EDGES MEASUREMENT

4.3.1 LIMITS OF BAND EDGES MEASUREMENT

The field strength of any emissions appearing between the band edges and up to 10kHz above and below the band edges shall be attenuated at least 26dB below the level of the unmidulated carrier or to the general limits in 15.209, whichever permits the higher emissions levels.

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Nov. 21, 2006

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

4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 1kHz with suitable frequency span including 10kHz bandwidth from band edge. The band edges was measured and recorded.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation



4.3.5 EUT OPERATING CONDITION

Same as Item 4.2.5

4.3.6 TEST RESULTS

The spectrum plots are attached on the following pages. D1 line indicates the highest level, D2 line indicates the 26dB offset below D1. It shows compliance with the requirement in part 15.235(C).



49.865MHz





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, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025

USA	FCC, NVLAP, UL , A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA, CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB, 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:

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