FCC 47 CFR PART 15 SUBPART B & IC ICES-003

TEST REPORT

For

Keyboard

Model: 5105U

Trade Name: EMPREX

Issued to

BEHAVIOR TECH COMPUTER CORP.
20F, 98, Sec. 1, Hsin Tai Wu Rd., Hsichih,
Taipei Hsien 221, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,
Taoyuan Hsien, (338) Taiwan, R.O.C.
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ACCREDITED
No. 0824-01

TAF
Testing Laboratory
0363

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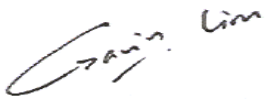
1 TEST RESULT CERTIFICATION

Applicant:	BEHAVIOR TECH COMPUTER CORP. 20F, 98, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien 221, Taiwan, R.O.C.
Manufacturer:	BEHAVIOR TECH COMPUTER CORP. 20F, 98, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien 221, Taiwan, R.O.C.
Equipment Under Test:	Keyboard
Trade Name:	EMPREX
Model:	5105U
Detailed EUT Description:	See Item 2 of this report
Date of Test:	January 30 ~ February 12, 2007

Applicable Standard	Class / Limit	Test Result
FCC Part 15 Subpart B, IC ICES-003	Class B	No non-compliance noted
Deviation from Applicable Standard		
None		

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in the FCC Part 15, Subpart B, and Industry Canada ICES-003. The measurement procedures were according to ANSI C63.4: 2003. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

Approved by:



Gavin Lim
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Amanda Wu
Section Manager
Compliance Certification Services Inc.

2 EUT DESCRIPTION

Product	Keyboard
Trade Name	EMPREX
Model Number	5105U
Model Discrepancy	N/A
Housing Type	Plastic
Power Supply	Powered from host device via USB cable
USB Cable	Shielded 1.6m (Non-detachable)

3 TEST METHODOLOGY

3.1 EUT SYSTEM OPERATION

Software Used During the Test	
Operating System	Windows XP
Program Sequence	1. EMI test program (file name: EMCTEST) was loaded and executed in "Windows XP" mode. 2. The detect signal was sent to EUT. 3. Data was sent to the monitor, filling the screen with upper case of "H" patterns. 4. Test program sequentially all related I/O's of Host PC include EUT and sent "H" patterns to all applicable output ports of Host PC. 5. Repeat 2 to 4.

3.2 DECISION OF FINAL TEST MODE

The EUT (model: 5105U) had been tested under operating condition.

1. The following test mode was scanned during the preliminary test:

   Mode 1
   Operating

2. After the preliminary scan, the following test mode was found to produce the highest emission level.

   Mode 1

   Then, the EUT configuration and cable configuration of the above highest emission mode was chosen for all final test items.

4 INSTRUMENT AND CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

4.2 TEST AND MEASUREMENT EQUIPMENT

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and other equivalent standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective manual.

Equipment Used for Emission Measurement

Open Area Test Site # 2				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	ADVANTEST	R3261A	N/A	N.C.R
Spectrum Analyzer	R&S	FSP 30	100112	10/10/2007
EMI Test Receiver	R&S	ESVS10	834468/006	04/06/2007
Pre-Amplifier	HP	8447D	2944A08780	07/16/2007
Bilog Antenna	Sunol Sciences	JB1	A031605	04/14/2007
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R
RF Switch	ANRITSU	MP59B	M76890	N.C.R
Site NSA	CCS	N/A	N/A	08/11/2007
Test S/W	LabVIEW 6.1 (CCS OATS EMI SW V2.6)			

Remark: *The measurement uncertainty is less than +/- 4.5143dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

Conducted Emission Test Site # 3				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESCS30	845552/030	03/21/2007
Pulse Limiter	R&S	ESH3-Z2	100299	11/09/2007
LISN	FCC	FCC-LISN-50/250-16-2-07	06012	10/08/2007
LISN	R&S	ESH2-Z5	843285/010	01/08/2008
ISN	FCC	FCC-TLISN-T4	20065	05/07/2007
Current Probe	FCC	F-35	506	05/07/2007
Voltage Probe	FCC	F-CVP-1	91	05/07/2007
Test S/W	LabVIEW 6.1 (CCS Conduction Test SW Version_01)			

Remark: *The measurement uncertainty is less than +/- 3.4509dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☒ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The measurement facilities are constructed in conformance with the requirements of CISPR 16-1, ANSI C63.4 and other equivalent standards.

5.2 TABLE OF ACCREDITATIONS AND LISTINGS

The test facilities used to perform Electromagnetic compatibility tests are registered or accredited by the organizations listed in the following table which includes the recognized scope specifically.

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	EN 55011, EN 55014-1/2, CISPR 11, CISPR 14-1/2, EN 55022, EN 55015, CISPR 22, CISPR 15, AS/NZS 3548, VCCI V3 (2001), CFR 47, FCC Part 15/18, CNS 13783-1, CNS 13439, CNS 13438, CNS 13803, CNS 14115, EN 55024, IEC 801-2, IEC 801-3, IEC 801-4, IEC/EN 61000-3-2, IEC/EN 61000-3-3, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 50081-1/ EN 61000-6-3, EN 50081-2/EN 61000-6-4, EN 50081-2/EN 61000-6-1: 2001	ACCREDITED 0824-01
USA	FCC	3/10 meter Open Area Test Sites (93105, 90471) / 3M Semi Anechoic Chamber (965860) to perform FCC Part 15/18 measurements	93105, 90471 965860
Japan	VCCI	3/10 meter Open Area Test Sites to perform conducted/radiated measurements	R-393/1066/725/879 C-402/747/912
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, EN 60601-1-2, EN 300 328, EN 300 422-2, EN 301 419-1, EN 301 489-01/03/07/08/09/17, EN 301 419-2/3, EN 300 454-2, EN 301 357-2	ELA 124a ELA 124b ELA 124c
Taiwan	TAF	EN 300 328, EN 300 220-1, EN 300 220-2, EN 300 220-3, 47 CFR FCC Part 15 Subpart C, EN 61000-3-2, EN 61000-3-3, CNS 13439, CNS 13783-1, CNS 14115, CNS 13438, AS/NZS CISPR 22, CNS 13022-1, IEC 61000-4-2/3/4/5/6/8/11, CNS 13022-2/3	Testing Laboratory 0363
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	SL2-IS-E-0014 SL2-IN-E-0014 SL2-A1-E-0014 SL2-R1-E-0014 SL2-R2-E-0014 SL2-L1-E-0014
Canada	Industry Canada	3/10 meter Open Area Test Sites (IC 3991-3, IC 3991-4) / 3M Semi Anechoic Chamber (IC 6106) to perform RSS 212 Issue 1	IC 3991-3 IC 3991-4 IC 6106

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

6 SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP DIAGRAM

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Serial No.	FCC ID	Data Cable	Power Cord
1	PC	HP	PL926AV	SGH528048P	FCC DoC	N/A	Unshielded, 1.8m
2	CRT Monitor	Samsung	959NF	AQ19H2RT706139P	FCC DoC	Shielded, 1.8m with two cores	Unshielded, 1.8m
3.	LCD Monitor	DELL	2405FPW	CN-0M6754-46633-56R-03NS	FCC DoC	Shielded, 1.8m with two cores	Unshielded, 1.8m
4.	USB Mouse	Logitech	MO19UCA	020440940	FCC DoC	Shielded, 1.8m	N/A
5.	Printer	EPSON	B241A	FAPY150357	FCC DoC	Shielded, 1.8m	Unshielded, 1.8m
6.	Modem	ACEEX	DM-1414	304012269	IFAXDM1414	Shielded, 1.8m	Unshielded, 1.8m

Remark: *All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.*

Grounding: *Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.*

7 LINE CONDUCTED & RADIATED EMISSION TEST

7.1 LIMIT

Maximum permissible level of Line Conducted Emission

Frequency (MHZ)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Remark: *The lower limit shall apply at the transition frequency.*

Maximum permissible level of Radiated Emission measured at 10 meter

Frequency (MHZ)	Class A (dBuV/m) Quasi-peak	Class B (dBuV/m) Quasi-peak
30 – 230	40	30
230 - 1000	47	37

Maximum permissible level of Radiated Emission measured at 3 meter

Frequency (MHZ)	Class A (dBuV/m)		Class B (dBuV/m)	
	Average	Peak	Average	Peak
Above 1000	59.3	79.3	53.9	73.9

Remark: *The lower limit shall apply at the transition frequency.*

Maximum permissible level of Radiated Emission measured at 3 meter

Frequency (MHz)	Field Strength (μV/m at 3-meter) Average	Field Strength (dBμV/m at 3-meter) Average
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remark: *The lower limit shall apply at the transition frequency.*

7.2 TEST PROCEDURE OF LINE CONDUCTED EMISSION

Procedure of Preliminary Test

- The EUT was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per ANSI C63.4.
- All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- The test equipment EUT installed received AC power, 120VAC/60Hz, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment received power from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a EMI Test Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to the Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Receiver.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 3.2 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 3.2 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission level were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per step 10 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

7.3 TEST PROCEDURE OF RADIATED EMISSION

Procedure of Preliminary Test

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per ANSI C63.4.
- All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
- The EUT received AC power source, 120VAC/60Hz, from the outlet socket under the turntable. All support equipment received power from another socket under the turntable.
- The antenna was placed at 10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 40GHz maximum, if any. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 3.2 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 3.2 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

- EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 40GHz maximum, if any. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- The test data of the worst case condition(s) was recorded.

7.4 TEST RESULTS

Powerline Conducted Emission

Operation Mode:	Mode 1	**Test Date:**	February 12, 2007
Temperature:	25°C	**Tested by:**	Eric Cheng
Humidity:	55% RH		

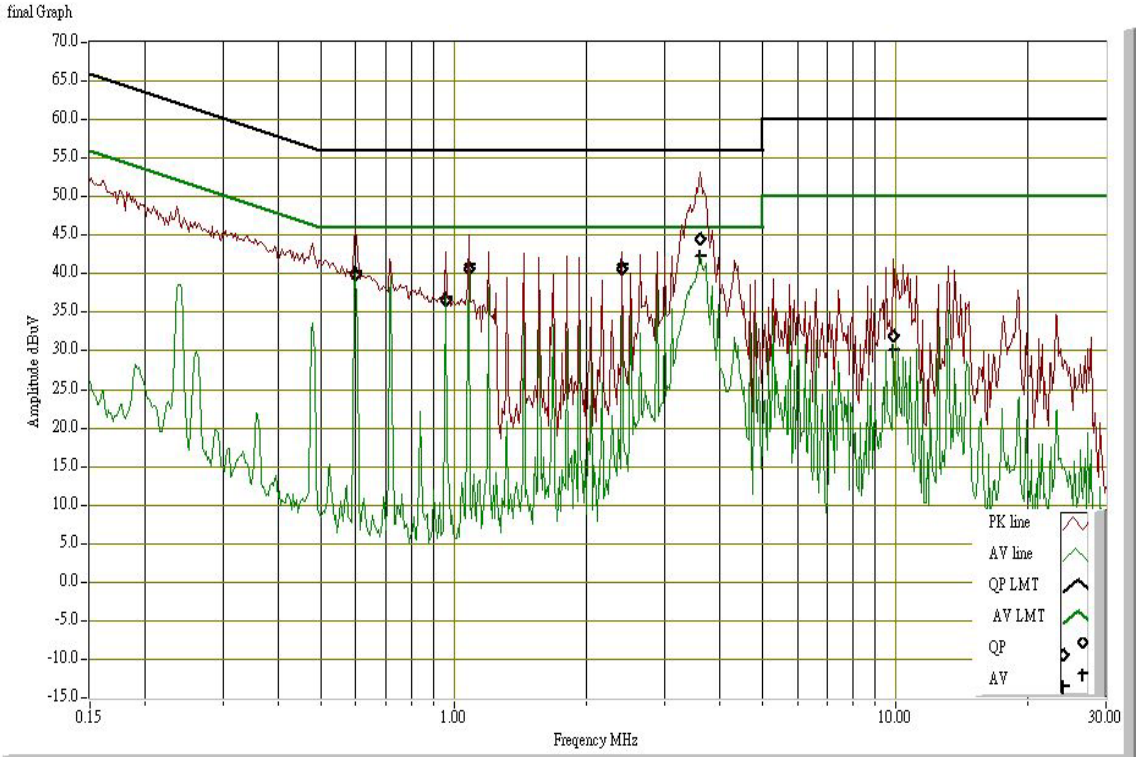
Frequency (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.600	39.810	39.290	0.100	39.910	39.390	56.000	46.000	-16.090	-6.610	L1
0.960	36.520	36.000	0.100	36.620	36.100	56.000	46.000	-19.380	-9.900	L1
1.082	40.560	40.100	0.100	40.660	40.200	56.000	46.000	-15.340	-5.800	L1
2.401	40.660	40.180	0.100	40.760	40.280	56.000	46.000	-15.240	-5.720	L1
3.604	44.420	42.230	0.100	44.520	42.330	56.000	46.000	-11.480	-3.670	L1
9.916	31.960	30.050	0.692	32.652	30.742	60.000	50.000	-27.348	-19.258	L1
0.595	36.370	35.510	0.100	36.470	35.610	56.000	46.000	-19.530	-10.390	L2
0.721	39.490	39.010	0.100	39.590	39.110	56.000	46.000	-16.410	-6.890	L2
1.082	40.090	39.670	0.100	40.190	39.770	56.000	46.000	-15.810	-6.230	L2
3.633	43.550	41.320	0.100	43.650	41.420	56.000	46.000	-12.350	-4.580	L2
4.329	38.600	37.810	0.133	38.733	37.943	56.000	46.000	-17.267	-8.057	L2
10.156	32.460	30.250	0.703	33.163	30.953	60.000	50.000	-26.837	-19.047	L2

Remark:

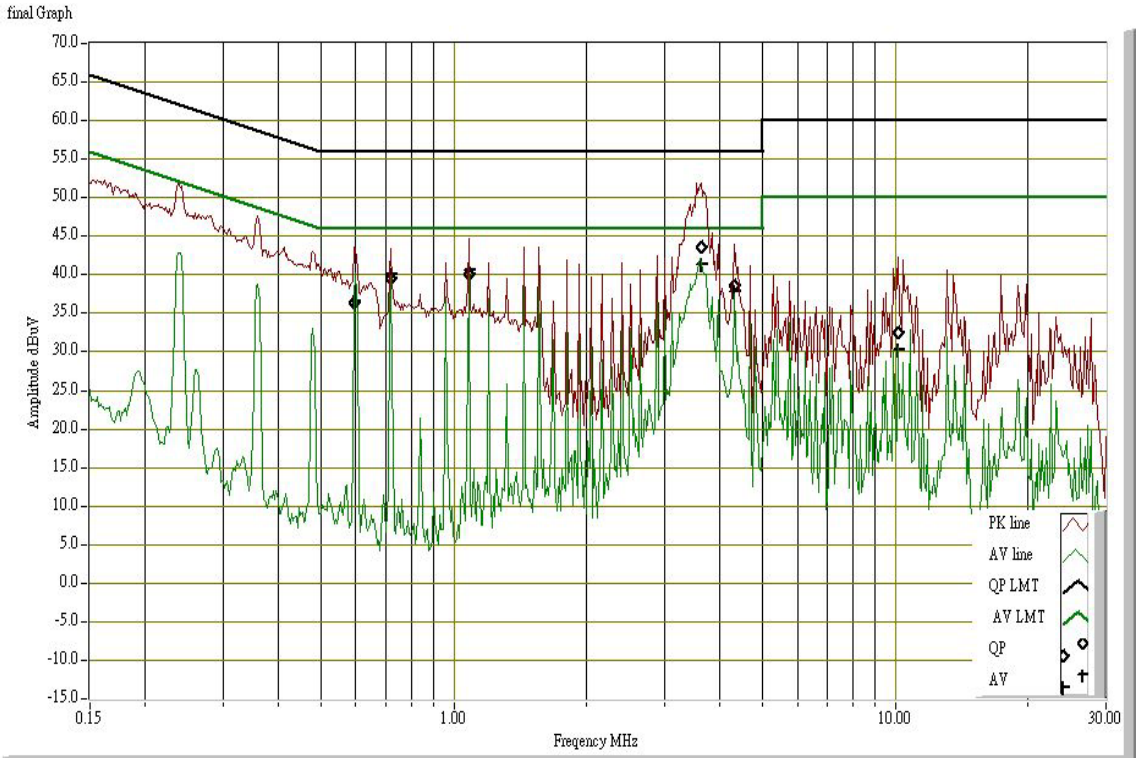
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)

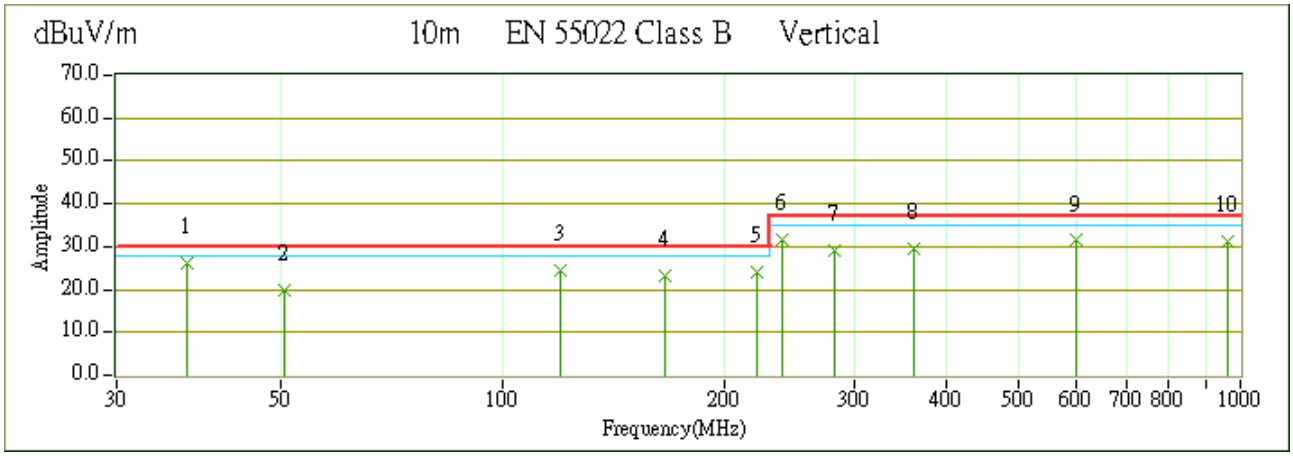


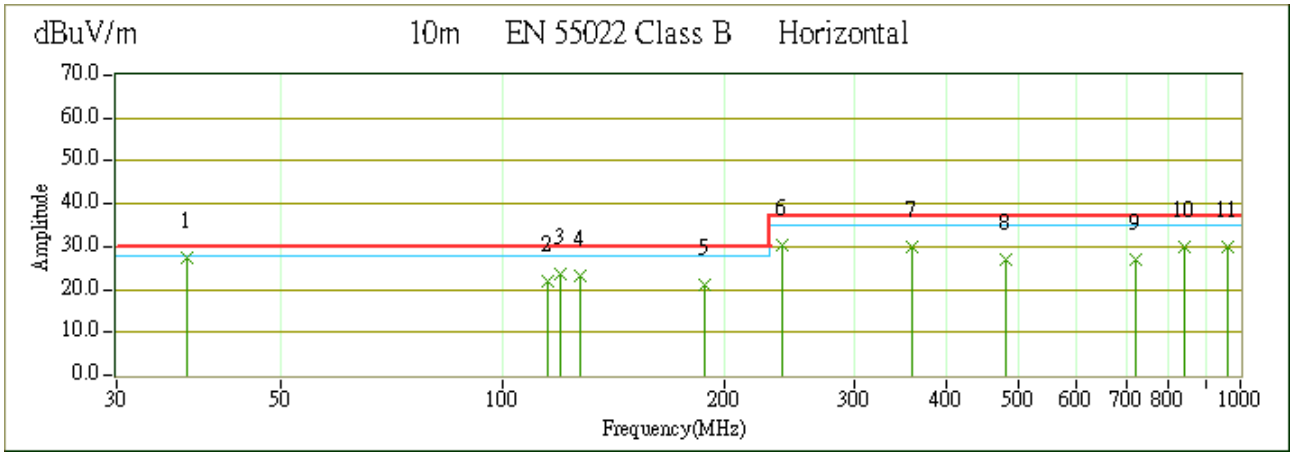
Radiated Emission

Operation Mode: Mode 1 **Test Date:** January 30, 2007

Temperature: 26°C **Tested by:** Alex Tsai

Humidity: 55 % RH **Polarity:** Ver. / Hor.





Frequency (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/QP)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit 10m (dBuV/m)	Margin (dB)
37.29	V	QP	9.00	17.29	26.29	30.00	-3.71
120.01	V	Peak	8.00	16.30	24.30	30.00	-5.70
221.59	V	Peak	9.38	14.62	24.00	30.00	-6.00
239.98	V	Peak	16.58	15.24	31.82	37.00	-5.18
600.20	V	Peak	5.92	25.50	31.42	37.00	-5.58
960.09	V	Peak	-0.43	31.78	31.35	37.00	-5.65
37.30	H	QP	10.00	17.28	27.28	30.00	-2.72
119.68	H	Peak	7.38	16.24	23.62	30.00	-6.38
127.56	H	Peak	6.88	16.22	23.10	30.00	-6.90
239.99	H	Peak	15.33	15.24	30.57	37.00	-6.43
359.87	H	Peak	10.40	19.60	30.00	37.00	-7.00
960.55	H	Peak	-1.78	31.80	30.02	37.00	-6.98

Remark:

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.*