ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No.	**: E08DR-013**
AGR No.	**: A089A-137R1**
Applicant	**: Techsphere CO., LTD.**
Address	**: Wonil B/D 4F, 980-54, Bangbae-dong, Seocho-gu, Seoul, 137-060, Korea**
Manufacturer	**: Techsphere CO., LTD.**
Address	**: Wonil B/D 4F, 980-54, Bangbae-dong, Seocho-gu, Seoul, 137-060, Korea**
Type of Equipment	**: Hand Vascular Pattern Recognition System**
FCC ID	**: WYI-VP-IIX**
Model Name	**: VP-II X**
Serial number	**: N/A**
Total page of Report	**: 16 pages (including this page)**
Date of Incoming	**: November 10, 2008**
Date of Issuing	**: December 08, 2008**

SUMMARY

The equipment complies with the requirements of **FCC CFR 47 PART 15 SUBPART C, SECTION 15.225.**

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by:
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EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea.(TEL: 82-31-765-8289 FAX: 82-31-766-2904)

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1. VERIFICATION OF COMPLIANCE

-. APPLICANT : Techsphere CO., LTD.

-. ADDRESS : Wonil B/D 4F, 980-54, Bangbae-dong, Seocho-gu, Seoul, 137-060, Korea

-. CONTACT PERSON : Mr. Ho-Chun, Lee / Deputy Senior Engineer

-. TELEPHONE NO : +82-2-523-4715

-. FCC ID : WYI-VP-IIX

-. MODEL NO/NAME : VP-II X

-. SERIAL NUMBER : N/A

-. DATE : December 08, 2008

DEVICE TYPE	Intentional Radiator - Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Hand Vascular Pattern Recognition System
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2003
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C, Section 15.225
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	Yes
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. GENERAL INFORMATION

2.1 Product Description

The Techsphere CO., LTD., Model VP-II X (referred to as the EUT in this report) is a Hand Vascular Pattern Recognition System. The EUT transmits 13.559 7 MHz and has ports for LAN and RS232C, so this report covers for 13. 559 7 MHz function and another function for class B personal computer's peripheral will be issued by DoC test report. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Non-Metal
TX FREQUENCY	13.559 7 MHz
MODULATION	ASK
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	13.559 7 MHz, 25.95 MHz, 25 MHz, 24 MHz and 18.432 MHz
ANTENNA TYPE	Inserted into the main board (Pattern Antenna)
RATED SUPPLY VOLTAGE	DC 12 V, 1.5 A from an adaptor
USED AC/DC ADAPTOR	AULT KOREA / JPW118 Input: AC 100 V ~ 240 V, 50/60 Hz, 0.5 A, Output: DC 12 V, 1.5 A
NUMBER OF LAYERS	6 Layers: Main Board, DSP Board, 4 Layers :Key Board 2 Layers: IO Board, RF Board

2.2 Model Differences:

-. None

2.3 Related Submittal(s) / Grant(s)

-. Original

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 15.225.

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea. Description details of test facilities were submitted to the FCC (Registration No: 340658) and IC (Registration No: IC3736-2), accredited by KOLAS (Korea Laboratory Accreditation Scheme, No: 85) and approved by TUV, DNV and KCC (Korea Communications Commission) according to the requirement of ISO 17025.

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3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	Techsphere CO., LTD.	VPII-X_Main Ver1.1	N/A
Key Board	Techsphere CO., LTD.	VPII-X_Key Ver1.1	N/A
DSP Board	Techsphere CO., LTD.	DSP_Module V1.0	N/A
DSP LED Board	Techsphere CO., LTD.	DSP_Module_LED	N/A
IO Board	Techsphere CO., LTD.	VPII-X-10 Ver1.0	N/A
RF Board	Techsphere CO., LTD.	OEM50_Module	N/A

3.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	FCC ID	Description	Connected to
VP-II X	Techsphere CO., LTD.	WYI-VP-IIX	Hand Vascular Pattern Recognition System (EUT)	-
PP04X	Dell Computer	DoC	Notebook PC	EUT
M056UO	Dell Computer	DoC	Mouse	Notebook PC

3.3 Mode of operation during the test

-. To get a maximum radiated emission from the EUT, the EUT was continuously transmitted RF carrier and the card shall be used with the EUT was tested with together. And the ping and serial modes were performed at the same time during the test.

3.4 Cable Description for the EUT

Ports Name	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
DC In	N	Y (EUT END)	N	1.5	Adaptor
Serial	Y	Y (EUT END)	BOTH END	1.5	Notebook PC
LAN	N	Y (EUT END)	N	3.0	Notebook PC

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3.5 Equipment Modifications

For getting Class B Limit, following modifications were made by the applicant.

-. The ground of Y3 RTC Crystal bottom was reinforced. (Main Board)
-. The ground of J1(right side) was reinforced. (Main Board)
-. The R86 was deleted and connected to the ground. (Main Board)
-. The U34, U33 and U19 were connected to the line of LCD_CS. (Main Board)
-. The ground of SDRAM click was deleted. (Main Board)
-. The J7, J15 and J16 were connected to the ground. (Main Board)
-. The L69 and L70 were added. (Main Board)
-. The pin1 of U8 was connected to the ground. (Main Board)
-. The EC3 and C104 were added. (Main Board)
-. The D25, D26, D27 and C105 were added. (Main Board)
-. The ground of key board, DSP board and IO board were reinforced.

3.6 Configuration of Test System

Line Conducted Test: The EUT was connected to adaptor and the power line of adaptor was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2003 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

3.7 Antenna Requirement

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is an internal antenna in the EUT, so there is no consideration of replacement by the user.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode	-
TX mode	X

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode	-
TX mode	X

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5. FINAL RESULT OF MEASURMENT

5.1 Conducted Emission Test

Humidity Level : 45 %R.H. Temperature: 22 °C

Limits apply to : FCC CFR 47, PART 15 Section 15.207

Result : PASSED BY –11.68 dB at 2.76 MHz under average mode

EUT : Hand Vascular Pattern Recognition System Date: November 13, 2008

Operating Condition : Transmitting Mode

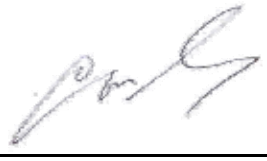
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)	Average (dBμV)		Margin (dB)
		Emission Level	Limits		Emission level	Limits	
0.20	H	43.82	63.61	-19.79	35.28	53.61	-18.33
2.55	H	42.80	56.00	-13.20	24.87	46.00	-21.13
2.69	N	40.80	56.00	-15.20	32.95	46.00	-13.05
2.76	N	42.21	56.00	-13.79	34.32	46.00	-11.68
2.82	H	43.62	56.00	-12.38	32.83	46.00	-13.17
2.89	H	43.33	56.00	-12.67	25.91	46.00	-20.09

Line Conducted Emission Tabulated Data

Remark : “H”: Hot Line, “N”: Neutral line.

See next page for an overview sweep performed with peak and average detector.



Tested by: In-Sub, Youn / Project Engineer

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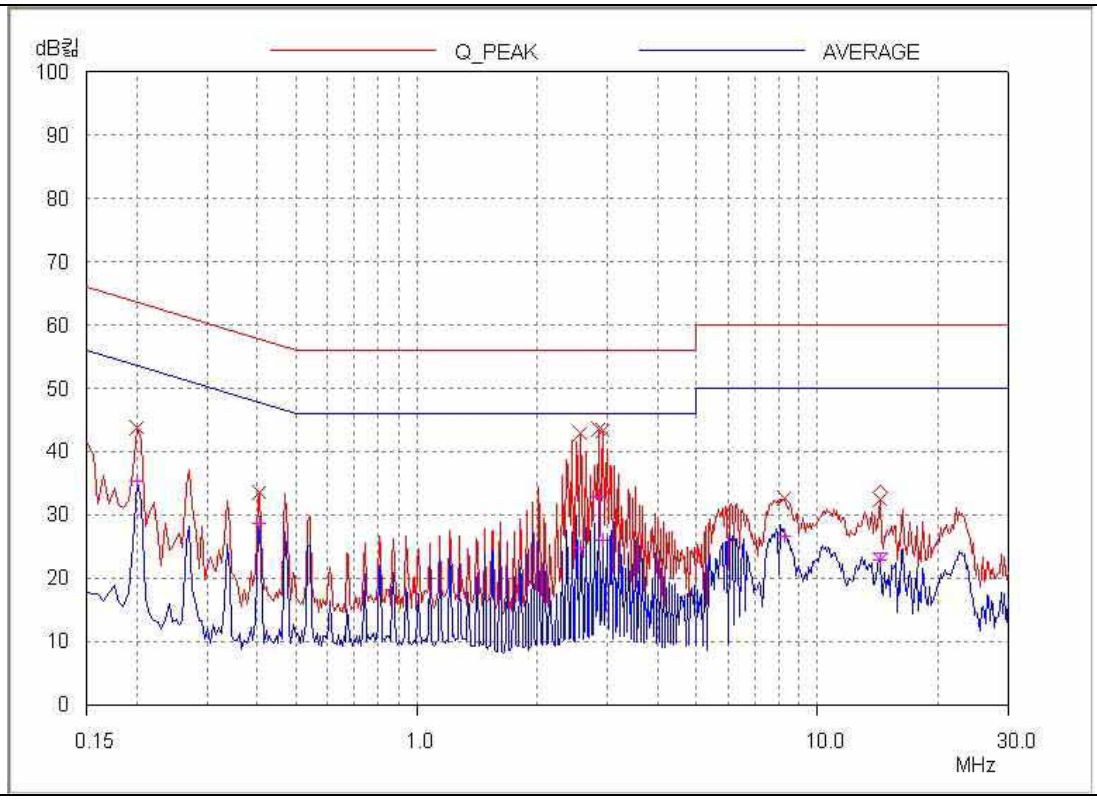
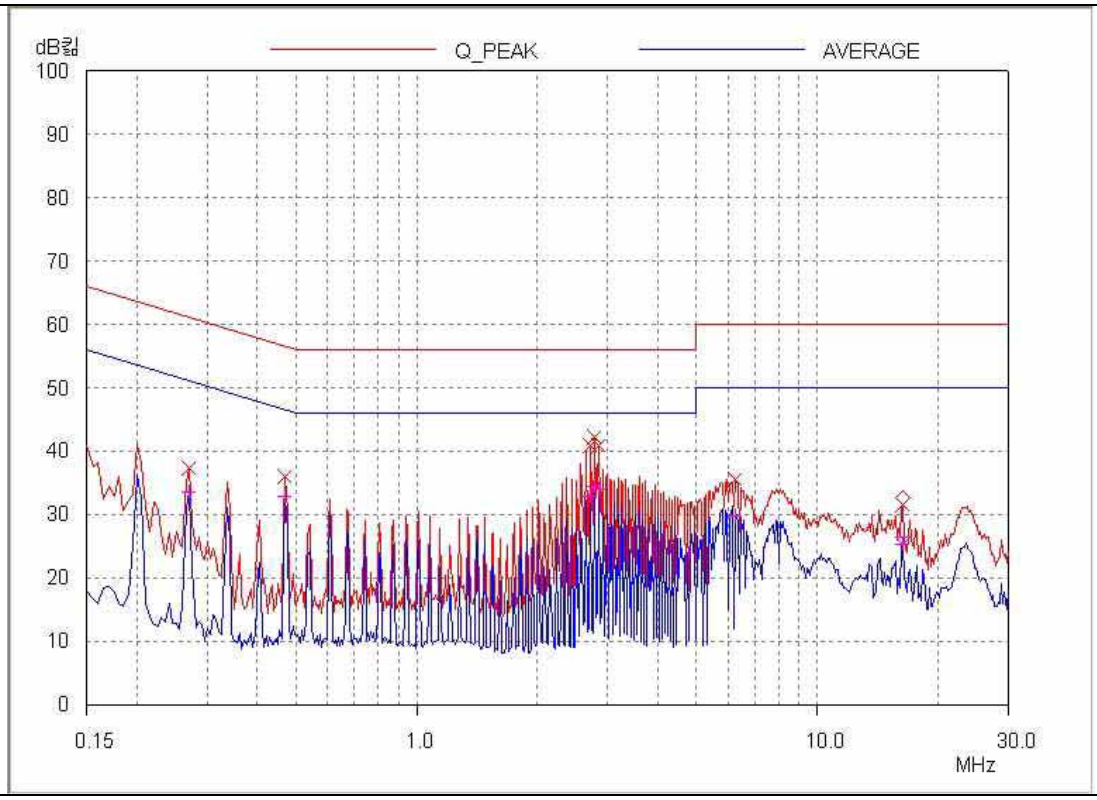


HOT LINE



NEUTRAL LINE

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5.2 Field Strength of the Carrier Test

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 37 %R.H. Temperature: 18 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED BY –58.51 dB at 13.559 7 MHz

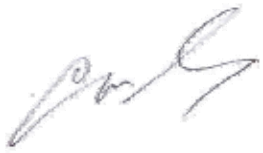
EUT : Hand Vascular Pattern Recognition System Date: November 18, 2008

Operating Condition : Transmitting Mode

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBµV)	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
13.559 7	46.80	V	18.69	0.00	65.49	124.00	-58.51
13.559 7	19.76	H	18.69	0.00	38.45	124.00	-85.55



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5.3 Spurious Emission Test

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 37 %R.H. Temperature: 18 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)

Type of Test : Low Power Communication Device Transmitter

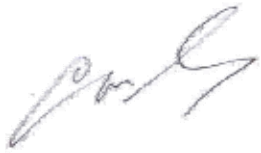
Result : PASSED BY –4.41 dB at 666.69 MHz

EUT : Hand Vascular Pattern Recognition System Date: November 18, 2008

Operating Condition : Transmitting Mode

Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBµV)	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
198.66	13.60	H	16.26	3.06	32.92	43.52	-10.60
250.02	15.70	H	17.47	3.40	36.57	46.02	-9.45
496.67	16.10	H	19.42	4.58	40.10	46.02	-5.92
595.94	15.50	V	19.33	5.30	40.13	46.02	-5.89
666.69	14.70	V	21.58	5.33	41.61	46.02	-4.41
769.56	14.20	V	20.78	6.00	40.98	46.02	-5.04



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6. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

6.1 Operating environment

Temperature : 21 °C

Relative humidity : 40 %R.H.

6.2 Test set-up

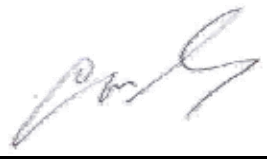
Turn EUT off and set chamber temperature to -20 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -20 °C to +50°C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.

6.3 Test data

-. Test Date : November 26, 2008

-. Result : PASSED BY -1 276.97 Hz at -20 ˚C

Temperature (˚C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 559 700	13 559 621	1 276.97	± 1 355.97
-10		13 559 637	1 292.97	
0		13 559 653	1 308.97	
10		13 559 676	1 331.97	
20		13 559 688	1 343.97	
30		13 559 694	1 349.97	
40		13 559 702	1 353.97	
50		13 559 734	1 321.97	



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7. FREQUENCY STABILITY WITH VOLTAGE VARIATION

7.1 Operating environment

Temperature : 21 °C

Relative humidity : 40 %R.H.

7.2 Test set-up

An external DC power supply was connected to the input of the EUT. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85 % of nominal voltage. The output frequency was recorded at each step.

7.3 Test data

-. Test Date : November 26, 2008

-. Result : PASSED BY -1 343.97 Hz at 100 %

Voltage (Vac)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
126.5 (115 %)	13 559 700	13 559 689	1 344.97	± 1 355.97
110 (100 %)		13 559 688	1 343.97	
93.5 (85 %)		13 559 689	1 344.97	

Tested by: In-Sub, Youn / Project Engineer

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8. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dBμV)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/meter)
=	Corrected Reading	(dBμV/meter)
-	Specification Limit	(dBμV/meter)
=	dB Relative to Spec	(+/- dB)

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9. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS10	827864/005	DEC/07	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/08	12MONTH	
3.	Spectrum analyzer	HP	8566B	2516A01677	JUN/08	12MONTH	■
4.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 202	APR/08	24MONTH	■
5.	Biconical antenna	EMCO	3110	9003-1121	JAN/08	12MONTH	
		Schwarzbeck	VHA9103	91031852	FEB/08		■
6.	Log Periodic antenna	Schwarzbeck	9108-A(494)	62281001	FEB/08	12MONTH	■
7.	LISN	EMCO	3825/2	9109-1867	JUN/08	12MONTH	
				9109-1869	JUN/08		
		Schwarzbeck	NSLK 8128	8128-216	JUN/08		■
8.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
9.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
10.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■
11.	RF Amplifier	HP	8447D	2727A04987	JUN/08	12MONTH	■
12.	Horn Antenna	Schwarzbeck	BBHA9120D	BBHA9120D294	JUL/06	36MONTH	
13.	Spectrum Analyzer	HP	8564E	3650A00756	JUN/08	12MONTH	■
14.	Frequency Converter	Digitek Power	VFS/DEFC	N/A	N/A	N/A	■
15.	Frequency Counter	HP	53152A	US39270295	DEC/08	12MONTH	■
16.	Slidacs (AC 0~300 V)	Dea Kwang	DH-60	N/A	SEP/08	12MONTH	■
17.	Chamber	Sam Kun	N/A	N/A	AUG/08	12MONTH	■

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