

KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

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KITA-KU, OSAKA, 530-0047 JAPAN



Corporate Juridical Person

IKOMA TESTING LABORATORY
12128, TAKAYAMA-CHO
IKOMA-CITY, NARA, 630-0101 JAPAN

TEST REPORT

Report No.A-024-03-A

Date: 14 July 2003

This test report is to certify that the tested device properly complies with the requirements of:

FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.

All the tests necessary to show compliance to the requirements were performed and these results met the specifications of requirement. The results of this report should not be construed to imply compliance of equipment other than that, which was tested. Unless the laboratory permission, this report should not be copied in part.

1. Applicant

Company Name : Welcat Inc.
Mailing Address : IWATA Bldg. 1-17-12, Shin-Yokohama, Kouhoku-ku, Yokohama,
Kanagawa-ken, 222-0033 Japan

2. Identification of Tested Device

Kind of Equipment Authorization : ☒: DoC ☐: Certification ☐: Verification
FCC ID : Not Applicable
Device Name : Wireless Hand-held Terminal
Trade Name : —
Model Number : CTR-800-11W
Serial Number : 17 ☐ : Prototype ☒ : Pre-production ☐ : Production
Date of Manufacture : June 2003

3. Test Items and Procedure

☐: AC Power Line Conducted Emission Measurement
☒: Radiated Emission Measurement

Above all tests were performed under: ANSI C63.4 – 1992

☒: without deviation, ☐: with deviation (details are found inside of this report)

4. Date of Test

Receipt of Test Sample : 30 June 2003
Condition of Test Sample : ☒: Damage is not found on the set.
☐: Damage is found on the set. (Details are described in this report)
Test Completed on : 30 June 2003



Seiichi Izumi
General Manager / Ikoma Testing Laboratory

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0. LABORATORY ACCREDITATION AND MEASUREMENT UNCERTAINTY

0.1. Laboratory Accreditation

KEC is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for the specific scope of accreditation under Lab Code: 200207-0.

When the test report concerns with the NVLAP accreditation test, the first page of the test report is signed by NVLAP Approved Signatory accompanied by the NVLAP logo.

The report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

0.2. Measurement Uncertainty

The result of a measurement is only an approximation or estimate of the value of a specific quantity. And thus the measurand is complete only when a statement of uncertainty is given.

KEC quotes Measurement Uncertainty (U) of +/- 4.9 dB for Radiated Emissions and
of +/- 2.2 dB for AC Power Line Conducted Emissions.

1. CERTIFICATION OF THE COMPLIANCE

1.1. Certification of the Compliance

This test report is to certify that the tested device properly complies with the requirements of FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.

KEC evaluation criteria for compliance:

The Product complies, if

the measured results are below the specification limit by a margin more than or equal

1/2 U (2.5 dB) for Radiated Emissions and

U (2.2 dB) for AC Power Line Conducted Emissions.

2. GENERAL INFORMATION

2.1. Product Description

Model No. CTR-800-11W (referred as EUT in this report) is a Wireless Hand-held Terminal.

(1) Technical Specifications

- Access type : DSSS
- Tx Frequency range : 2412 – 2462 MHz
- Rx Frequency range : 2412 – 2462 MHz
- Antenna : Built in antenna (Gain 2.14 dBi (typ.)),
Impedance 50Ω (Unballanced)

(2) Used Oscillating Frequency

- SS Base band processor : 44.0 MHz
- Micro computer clock : 11.0592 MHz
- Reel time clock : 32.768 kHz

(4) Rated Power Supply

: DC 3.7V, 500mA (with Li-ion battery)
(Li-ion battery Model No. HBC-51, trade name Welcat.)

2.2. Description for Equipment Authorization

(1) Category	: <input type="checkbox"/> Class A <input checked="" type="checkbox"/> Class B
(2) Reference Rule and Specification	: FCC Rule Part 15 <input checked="" type="checkbox"/> Section 15.107 (a), 15.109 (a) and (c) <input type="checkbox"/> Section 15.107 (b), 15.109 (b) and (c)
(3) Type of device	: <input type="checkbox"/> Personal Computer & Peripherals <input checked="" type="checkbox"/> Other Digital Device
(4) Kind of Equipment Authorization	: <input checked="" type="checkbox"/> DoC <input type="checkbox"/> Certification <input type="checkbox"/> Verification
(5) Highest Frequency used in the Device	: 2412 - 2462 MHz (receiving frequency)
(6) Upper Frequency of Radiated Emission Measurement Range	: <input type="checkbox"/> 1000 MHz <input type="checkbox"/> 2000 MHz <input type="checkbox"/> 5000 MHz <input checked="" type="checkbox"/> Tenth harmonics of the highest fundamental frequency

2.3. Test Facility

All tests described in this report were performed by:	
Name:	KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC) IKOMA TESTING LABORATORY
Open Area Test Site	<input type="checkbox"/> No.1 <input type="checkbox"/> No.3 <input type="checkbox"/> No.4
Anechoic Chamber	<input type="checkbox"/> No.1 <input checked="" type="checkbox"/> No.3
Shielded Room	<input type="checkbox"/> No.1 <input type="checkbox"/> No.2 <input type="checkbox"/> No.4 <input type="checkbox"/> No.5
Address:	12128, Takayama-cho Ikoma-city, Nara, 630-0101 Japan
<p>These test facilities have been filed with the FCC under the criteria of ANSI C63.4-1992. The KEC has been accredited by the NVLAP (Lab. Code: 200207-0) based on ISO/IEC17025.</p> <p>Also the laboratory has been authorized by TUV Product Service (GER) and TUV Rheinland (GER) based on their criteria for testing laboratory (ISO/IEC17025).</p>	

3. TESTED SYSTEM

3.1. TEST MODE

The compliance tests were performed test mode.

Op-mode 1 : Receiving (Tx standby)

3.2. Operation of EUT System

Receiving mode (Op-mode 1)

1. Turn on the EUT with key in “trigger key” (more than 5 times).
2. Displaying the menu and select “I:RF Technical Test”.
3. Choice the test mode
 - a. Tx / Rx mode : Receiving mode
 - b. Select frequency : ch.1 : 2412 MHz, ch.6 : 2437 MHz and ch.11 : 2462 MHz

Then, the EUT was set in the continuous receiving operation.

[Note]

The test program is prepared by manufacture.

3.3. Characterization and condition of EUT System

☒: normal, ☐: not normal (that is)

4. RADIATED EMISSION MEASUREMENT

4.1. Test Procedure

<p>(1)</p> <p>(2)</p> <p>(3)</p> <p>(4)</p> <p>(5)</p> <p>(6)</p> <p>(7)</p> <p>(8)</p>	<p>Configure the EUT System in accordance with ANSI C63.4-1992 section 8 and 13. <input checked="" type="checkbox"/>: without deviation, <input type="checkbox"/>: with deviation (details are found below) See also the block diagram and the photographs of EUT System configuration in this report.</p> <p>If the EUT system is connected to a public power network, all power cords for the EUT System are connected the receptacle on the turntable.</p> <p>Warm up the EUT System.</p> <p>Activate the EUT System and run the prepared software for the test, if necessary.</p> <p>To find out the emissions of the EUT System, preliminary radiated measurement are performed at a closer distance than that specified for final radiated measurement using the spectrum analyzer (*1) and the broad band antenna. In the frequency above 1 GHz, it is performed using the spectrum analyzer (*2) and the horn antenna.</p> <p>To find out an EUT System condition, which produces the maximum emission, the configuration of EUT System, the position of the cables, and the operation mode, are changed under normal usage of the EUT.</p> <p>The spectrums are scanned from 30 MHz to the upper frequency of measurement range, and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.</p> <p>In final compliance test, the six highest emissions minimum, recorded above, are measured at the specified distance using the broad band antenna or the tuned dipole antenna and the test receiver (*3). In the frequency above 1 GHz, the measurements are performed by the horn antenna and <input type="checkbox"/> the test receiver (*4). <input checked="" type="checkbox"/> the spectrum analyzer (*5) with pre-amplifier.</p>
<p>[Note]</p> <p>(*1)</p> <p>(*2)</p> <p>(*3)</p> <p>(*4)</p> <p>(*5)</p>	<p>Spectrum Analyzer Set Up Conditions Frequency range : 30 - 1000 MHz Resolution bandwidth : 100 kHz Detector function : Peak mode</p> <p>Spectrum Analyzer Set Up Conditions Frequency range : 1 GHz - Upper frequency of measurement range Resolution bandwidth : 1 MHz Video bandwidth : 1 MHz Attenuator : 10 dB Detector function : Peak mode</p> <p>Test Receiver Set Up Conditions Detector function : Quasi-Peak or Peak IF bandwidth : 120 kHz</p> <p>Test Receiver Set Up Conditions Detector function : Average IF bandwidth : 1 MHz</p> <p>Spectrum Analyzer Set Up Conditions Frequency range : 1 GHz - Upper frequency of measurement range Resolution bandwidth : 1 MHz Video bandwidth : 1 MHz (peak detector), 10Hz (Average detector) Attenuator : 10 dB Detector function : Peak mode</p>

4.2. Test Results

30 - 1000 MHz

Measurement Distance ☒: 3m ☐: 10m

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading		Maximum Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin for Limit (dB)
		Horizontal Polarization (dB μ V)	Vertical Polarization (dB μ V)			
352.00	18.6	5.4	1.0	24.0	46.0	22.0
381.54	19.1	3.0	0.8	22.1	46.0	23.9
702.29	24.8	4.0	1.0	28.8	46.0	17.2

Above 1 GHz

Measurement Distance ☒: 3m ☐: 10m

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit (Average)	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Peak Detector Measurement]						
(Fundamental)						
2412.00	-10.1	<40.0	<40.0	<29.9	54.0	>24.1
2437.00	-10.1	<40.0	<40.0	<29.9	54.0	>24.1
2462.00	-10.1	<40.0	<40.0	<29.9	54.0	>24.1
(2nd Harmonics)						
4824.00	-2.2	50.0	54.5	52.3	54.0	1.7
4874.00	-2.2	50.8	54.6	52.4	54.0	1.6
4924.00	-2.2	50.2	54.5	52.3	54.0	1.7
(3rd Harmonics)						
7236.00	-1.2	<43.0	<43.0	<41.8	54.0	>12.2
7311.00	-1.1	<43.0	<43.0	<41.9	54.0	>12.1
7386.00	-1.0	<43.0	<43.0	<42.0	54.0	>12.0
(4th Harmonics)						
9648.00	2.5	46.8	47.4	49.9	54.0	4.1
9748.00	2.6	46.8	47.4	50.0	54.0	4.0
9848.00	2.7	48.7	47.6	51.4	54.0	2.6
(5th Harmonics)						
12060.00	6.4	<42.0	<42.0	<48.4	54.0	>5.6
12185.00	6.6	<42.0	<42.0	<48.6	54.0	>5.4
12310.00	6.8	<42.0	<42.0	<48.8	54.0	>5.2
[Average Detector Measurement]						
(2nd Harmonics)						
4824.00	-2.2	47.4	52.5	50.3	54.0	3.7
4874.00	-2.2	48.3	53.4	51.2	54.0	2.8
4924.00	-2.2	48.0	53.1	50.9	54.0	3.1
(4th Harmonics)						
9648.00	2.5	40.1	41.5	44.0	54.0	10.0
9748.00	2.6	40.1	41.5	44.1	54.0	9.9
9848.00	2.7	40.2	41.8	44.5	54.0	9.5

[Note]

- (1) Antenna Factor includes the cable loss.
- (2) *: Measured data with the tuned dipole antenna.

[Calculation method]

Maximum Field Strength (dBuV/m)

= Meter Reading (at maximum level of Horizontal or Vertical) (dBuV) + Antenna Factor (dB/m)

[Environment]

Temperature : 23°C

Humidity : 70%

[Tested Date / Tester]

30 June 2003

Signature



Ikuya Minematsu

Test data in Graph (30 ~ 1000MHz)

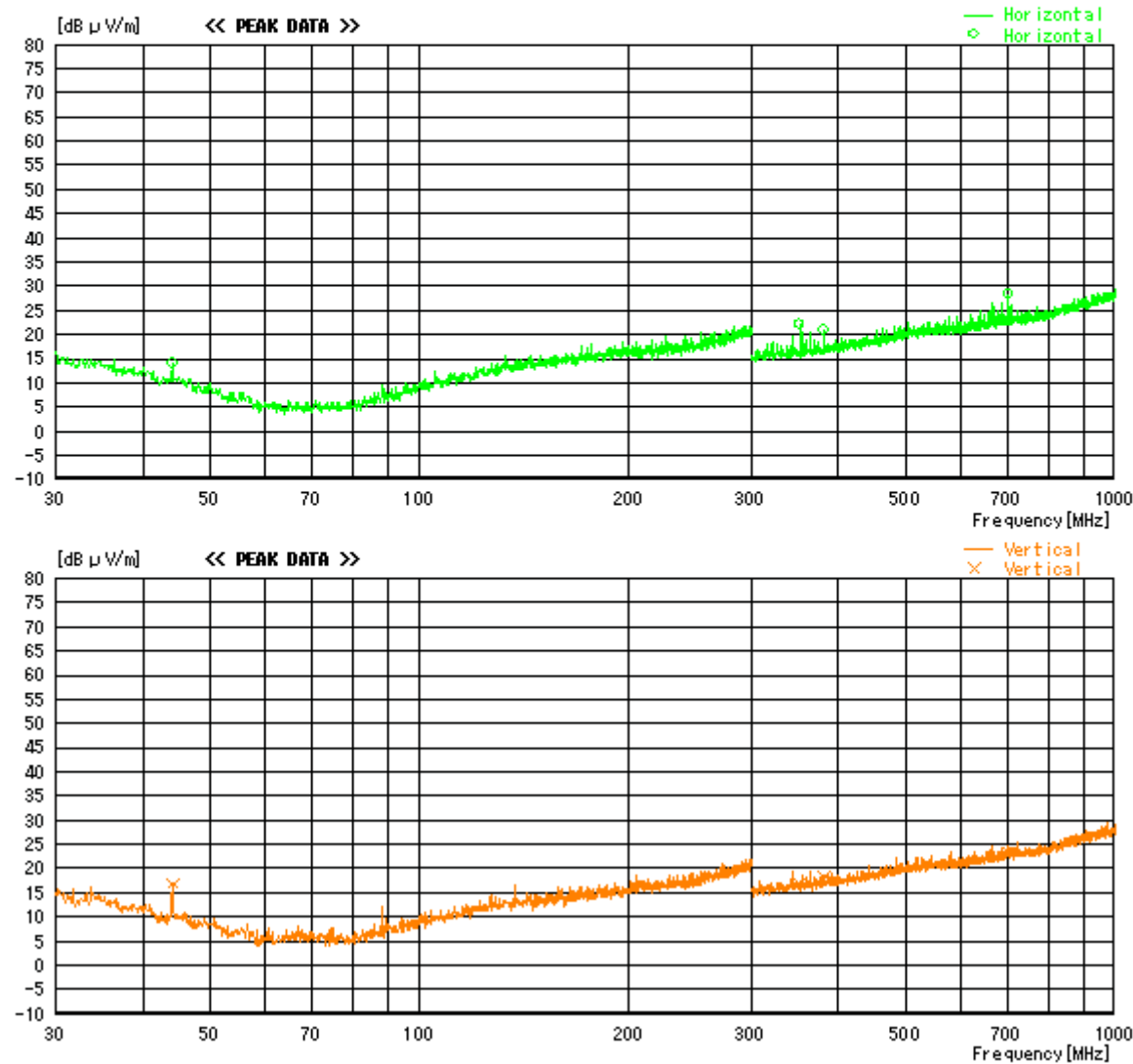
RADIATED EMISSION

KEC No. : A-006-03-C
Model No. : CTR-800-11W
Serial No. : 17
Test Condition : Continuous Tx

Memo :

LIMIT :

Reference No. : FCC Part15
Power Supply : DC 3.3V
Temp/Humi : 23°C, 69%
Operator : kuya Minematsu



4.3. Photographs of EUT System Configuration

Vertical Placed



- Continued -

Horizontal Placed



5. USED TEST EQUIPMENTS AND CALIBRATION STATUS

Equipment	Manufacturer	Model No.	Specifications	KEC Control No.	Test Item (*)	Last Cal.	Next Cal.
Test Receiver	Rohde & Schwarz	ESHS10	Frequency Range 9 kHz - 30 MHz	FS-83	N/A	2003/1	2004/1
		ESVS10	Frequency Range 20 MHz - 1 GHz	FS-66	2	2002/12	2003/12
Spectrum Analyzer	Anritsu	MS8608A	Frequency Range 9 kHz - 7.8 GHz	SA-46	2	2002/7	2003/7
	Agilent Technology	E4403B	Frequency Range 9 kHz - 3 GHz	SA-48	N/A	2003/4	2004/4
Biconical Antenna	Schwarzbeck	BBA9106	Frequency Range 30 MHz - 300 MHz	AN-180	2	2003/2	2004/2
Log-Periodic Antenna	Schwarzbeck	UHALP9108A	Frequency Range 300 MHz - 1 GHz	AN-215	2	2003/2	2004/2
Tuned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25 MHz - 500 MHz	AN-135	N/A	2003/2	2005/2
		KBA-611S	Frequency Range 500 MHz - 1 GHz	AN-137	N/A	2003/2	2005/2
Horn Antenna	Raven	91888-2	Frequency Range 1 GHz - 2 GHz	AN-211	3	2001/8	2003/8
		91889-2	Frequency Range 2 GHz - 5 GHz	AN-212	3	2001/8	2003/8
	Scientific Atlanta	12-3.9	Frequency Range 3.95 GHz - 5.85GHz	AN-142	3	2002/8	2004/8
		12-5.8	Frequency Range 5.85 GHz - 8.2GHz	AN-104	3	2002/8	2004/8
		12-8.2	Frequency Range 8.2 GHz - 12.4GHz	AN-210	3	2002/8	2004/8
Pre-Amplifier	Hewlett Packard	8449B	Frequency Range 1 GHz - 26.5 GHz	AM-52	3	2003/2	2004/2
LISN for EUT	Kyoritsu	KNW-407	Frequency Range 150 kHz - 30 MHz	FL-107	N/A	2003/5	2004/5
LISN for Peripherals	Kyoritsu	KNW-242	Frequency Range 9 kHz - 30 MHz	FL-110	N/A	2003/5	2004/5

[Note]

Test Item (*):

- 1: Conducted Emission Measurement
- 2: Radiated Emission Measurement (30 MHz - 1 GHz)
- 3: Radiated Emission Measurement (1 GHz <)
- N/A: Not Applicable

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurements made by KEC are traceable to national standards of measurement or equivalent abroad.