



Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Withus Information & Telecommunication, CO. LTD.

2F. DongNam Bldg. 448-16
Shingil-5Dong, YongDungPo-Ku
Seoul Korea

Phone: +82-2-868-7013

Fax: +82-2-847-9992

Mr. David Oh

MODEL: WPE-1000

FCC ID: POQWPE-1000

June 6, 2001

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	§15.109: RADIATED EMISSIONS LIMITS
PART 24 (E): 1998	PERSONAL COMMUNICATIONS SERVICES – BROADBAND PCS
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA603- 1992	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA 603-1-1998	ADDENDUM TO ANSI/TIA/EIA 603-1992
RSS-118: Issue 2 Aug. 19, 1990, Supplement 1993-1 June 12, 1993, Amendment Issue 2 Aug. 24, 1996, Addendum Sept. 1, 1990	LAND AND SUBSCRIBER STATIONS: VOICE, DATA AND TONE MODULATED, ANGLE MODULATION RADIOTELEPHONE TRANSMITTERS AND RECEIVERS OPERATING IN THE CELLULAR MOBILE BANDS 824-849 MHz AND 869-894 MHz

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
24(E)	1850-1910 MHz	0.815 EIRP	5 ppm	1M6F9W
Industry Canada	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
24(E)	1850-1910 MHz	0.815 EIRP	5 ppm	1M6F9W

REPORT PREPARED BY:

EMI Technician: Daniel Baltzell
Administrative Writer: Melissa Fleming

Document Number: 2001118

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Phone: 703-689-0368; Fax: 703-689-2056; Metro: 703-471-6441



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1 GENERAL INFORMATION

The following Report of a Type Certification is prepared on behalf of ***Withus Information & Telecommunication, CO. LTD.*** in accordance with the Federal Communications Commissions and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the ***WPE-1000***. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application report.



1.3 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(\text{dBuV/m}) = SAR(\text{dBuV}) + SCF(\text{dB/m})$$

FI = Field Intensity

SAR = Spectrum Analyzer Reading

SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(\text{dB/m}) = -PG(\text{dB}) + AF(\text{dB/m}) + CL(\text{dB})$$

SCF = Site Correction Factor

PG = Pre-amplifier Gain

AF = Antenna Factor

CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\text{uV/m}) = 10^{FI(\text{dBuV/m})/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \text{ dBuV} - 11.5 \text{ dB/m} = 37.8 \text{ dBuV/m}$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$



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2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	§15.109: RADIATED EMISSIONS LIMITS
PART 24 (E): 1998	PERSONAL COMMUNICATIONS SERVICES – BROADBAND PCS
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Industry Canada	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
24(E)	1850-1910 MHz	0.815 EIRP	5 ppm	1M6F9W

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15.109 and FCC Part 24(E) Certification methodology.

Signature: 

Date: June 7, 2001

Typed/Printed Name: Bruno Clavier

Position: Vice President of Operations
(NVLAP Signatory)

Signature: 

Date: June 7, 2001

Typed/Printed Name: Daniel W. Baltzell

Position: Test Engineer

 Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



3 TESTED SYSTEM DETAILS

Listed below is the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

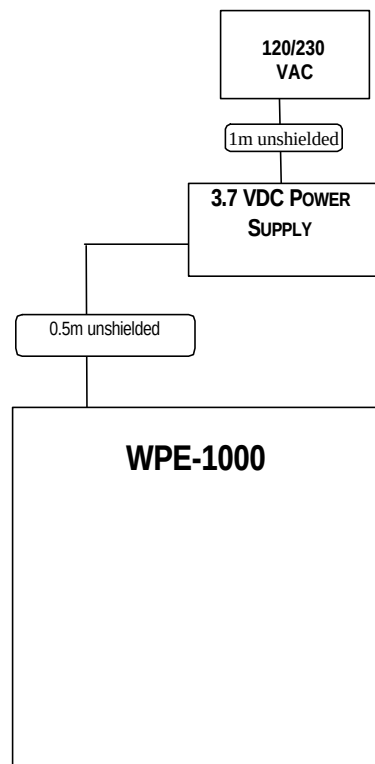
TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
PHONE	WITHUS INFORMATION & TELECOMMUNICATION, CO. LTD.	WPE-1000	N/A	POQWPR-1000	N/A	13291

TABLE 3-2: EXTERNAL COMPONENTS OF THE TEST CONFIGURATION

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
BATTERY	WITHUS INFORMATION & TELECOMMUNICATION, CO. LTD.	N/A	N/A	N/A	N/A	13283
BATTERY CHARGER	WITHUS INFORMATION & TELECOMMUNICATION, CO. LTD.	N/A	N/A	N/A	N/A	13298

FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM





4 PART 2.1046 (A) RF POWER OUTPUT: RADIATED – EIRP PART 24.232

4.1 TEST PROCEDURE

Substitution Method: ERP

The EUT was setup at an antenna to EUT distance of 3 meters on an open area test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

The physical arrangement of the EUT and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.

The worst-case, maximum radiated emission was recorded and used as reference for the ERP measurement.

The EUT was then replaced by an $\frac{1}{2}$ wave dipole antenna and polarized in accordance with the EUT's antenna polarization. The $\frac{1}{2}$ wave dipole antenna was connected to a RF signal generator with a coaxial cable.

The search antenna height, and search antenna polarity was set to levels that produced the maximum reading obtained in step 3. The signal generator was adjusted to a level that produced the radiated emission level obtained in step 3.

The signal generator level was recorded and corrected by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal $\frac{1}{2}$ wave dipole antenna. The signal generator corrected level is the ERP level



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4.2 TEST DATA

Settings:

- Peak 300mW delivered to antenna
- Antenna: built-in with a 2.0 dBi gain
- radiated power measurements performed at a 3 meter distance

TABLE 4-1: PART 2.1046 (A) RF POWER OUTPUT: RADIATED – EIRP PART 24.232

Frequency (MHz)	Emission Level* (dBuV)	Site Factor (dB/m)	Emission Level (dBuV/m)	Calculated ERP (mW)	Calculated EIRP (mW)
Channel 25					
1851.25	104.17	20.17	124.34	496.9	814.9
Channel 600					
1880.00	102.17	20.80	122.97	362.5	594.5
Channel 1042					
1902.1	101.67	20.23	121.9	281.6	464.7

*Measurement accuracy is +/- 1.5 dB

TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER


SIGNATURE

MAY 15, 2001
DATE OF TEST

TABLE 4-2: EQUIPMENT USED FOR TESTING

Radiated RF Output - EIRP					
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	03/27/02
900791	Schaffner - Chase	CBL6112	BiLog Antenna (25MHz – 2GHz)	2099	02/26/02



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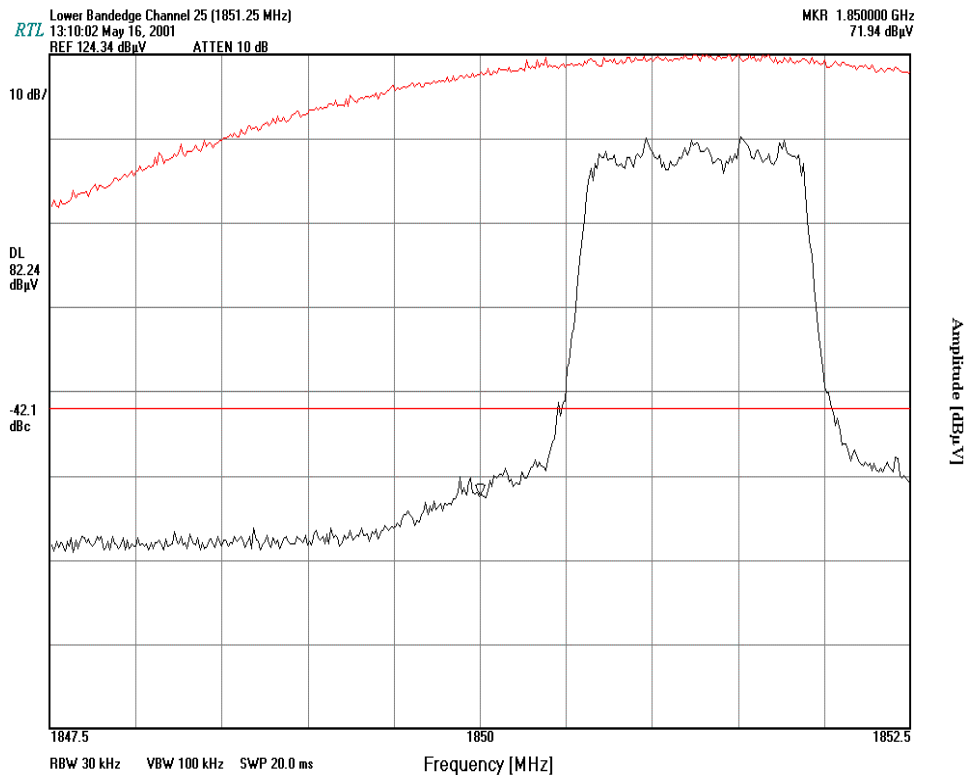
5 PART 24.229 AND PART 24.238 - BAND-EDGE COMPLIANCE

5.1 TEST DATA

The emission levels at the band edges are found to be below $43 + 10 \log P$ (EIRP).

TABLE 5-1: LOWER BANDEDGE CHANNEL 25 (1851.25 MHz)

$$43 + 10 \log 0.81493 = 42.1$$



TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER

SIGNATURE

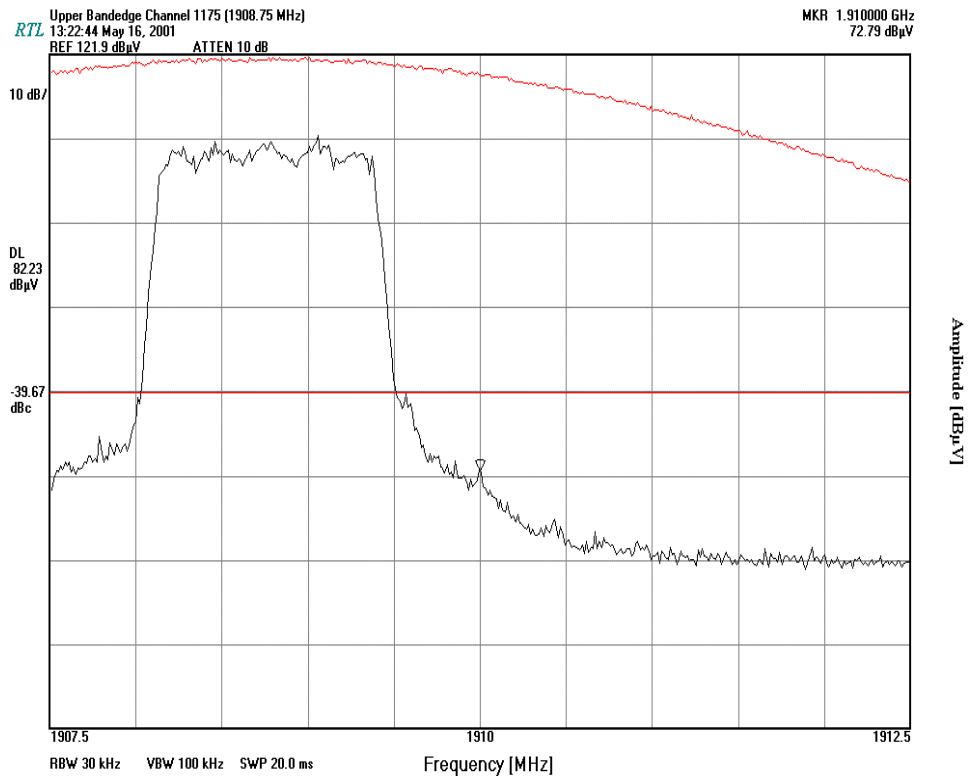
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TABLE 5-2: UPPER BAND EDGE = CHANNEL 1175 (1908.75 MHZ)

$$43 + 10 \log 0.4646 = 39.67$$



TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER

SIGNATURE

MAY 15, 2001
DATE OF TEST

TABLE 5-3: EQUIPMENT USED FOR TESTING

Radiated RF Output - EIRP					
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	03/27/02
900791	Schaffner - Chase	CBL6112	BiLog Antenna (25MHz – 2GHz)	2099	02/26/02



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6 FCC PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION – PART 24.238

6.1 TEST PROCEDURE

ANSI C63.4-1992

The transmitter is set in continuous transmitting mode and modulated with pseudo random data using the internal software.

Refer to section “Radiated Measurement” in this report for further information.

6.2 TEST DATA

The worst-case emissions test data are shown. The magnitude of emissions, attenuated more than 20 dB below the FCC limit, does not need to be recorded.

TABLE 6-1: FIELD STRENGTH (SPURIOUS RADIATION) CHANNEL 25; 1851.25 MHZ

Frequency (MHz)	Emission level* (dBuV)	Correction Factor (dB/m)	Corrected Level (-dBc)	Limit (-dBc)	Margin (dB)
3702.50*	46.52	13.97	-63.84	-42.1	-21.74
3702.50	34.91	13.97	-75.45	-42.1	-33.4
5553.75*	57.17	20.54	-46.62	-42.1	-4.52
5553.75	45.91	20.54	-57.88	-42.1	-15.8
7405.00	NF**				
9256.25	NF**				
11107.50	NF**				
12958.75	NF**				
14810.00	NF**				
16661.25	NF**				
18512.50	NF**				

* Peak detector per Part 24.238

**NF: Noise Floor

TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER


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TABLE 6-2: FIELD STRENGTH (SPURIOUS RADIATION) CHANNEL 600; 1880.00 MHZ

Frequency (MHz)	Emission level* (dBuV)	Correction Factor (dB/m)	Corrected Level (-dBc)	Limit (-dBc)	Margin (dB)
3760.00*	48.47	13.82	-62.04	-40.74	-21.30
3760.00	38.73	13.82	-71.78	-40.74	-31.04
5640.0*	59.26	19.82	-45.25	-40.74	-4.51
5640.0	42.57	19.82	-61.94	-40.74	-21.20
7520.0	NF**				
9400.0	NF**				
11280.0	NF**				
13160.0	NF**				
15040.0	NF**				
16920.0	NF**				
18800.0	NF**				

* Peak detector per Part 24.238

**NF: Noise Floor

TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER


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TABLE 6-3: FIELD STRENGTH (SPURIOUS RADIATION) CHANNEL 1042; 1902.10 MHZ

Frequency (MHz)	Emission level* (dBuV)	Correction Factor (dB/m)	Corrected Level (-dBc)	Limit (-dBc)	Margin (dB)
3804.20*	49.08	13.82	-61.43	-39.67	-21.76
3804.20	40.54	13.82	-69.97	-39.67	-30.30
5706.30*	59.00	19.55	-45.78	-39.67	-6.11
5706.30	44.14	19.55	-60.64	-39.67	-20.97
7608.40	NF**				
9510.50	NF**				
11412.60	NF**				
13314.70	NF**				
15216.80	NF**				
17118.90	NF**				
19021.00	NF**				

* Peak detector per Part 24.238

**NF: Noise Floor

TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER


SIGNATURE

MAY 15, 2001
DATE OF TEST

TABLE 6-4: EQUIPMENT USED FOR TESTING

Field Strength (Spurious Radiation)					
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Schaffner@Chase	CBL6112	Antenna (25MHz – 2GHz)	2099	02/26/02
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1-26.5 GHz)	3008A00505	09/15/01
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	03/06/02
900917	Hewlett Packard	8648C	Synthesized. Signal Generator (9 KHz to 3200 MHz)	3537A01741	04/10/02
900928	Hewlett Packard	83752A	Synthesized Sweeper, 0.01 to 20 GHz	3610A00866	03/28/02



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7 FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH – PART 24.238

OCCUPIED BANDWIDTH (99% POWER BANDWIDTH) - COMPLIANCE WITH THE EMISSION MASKS

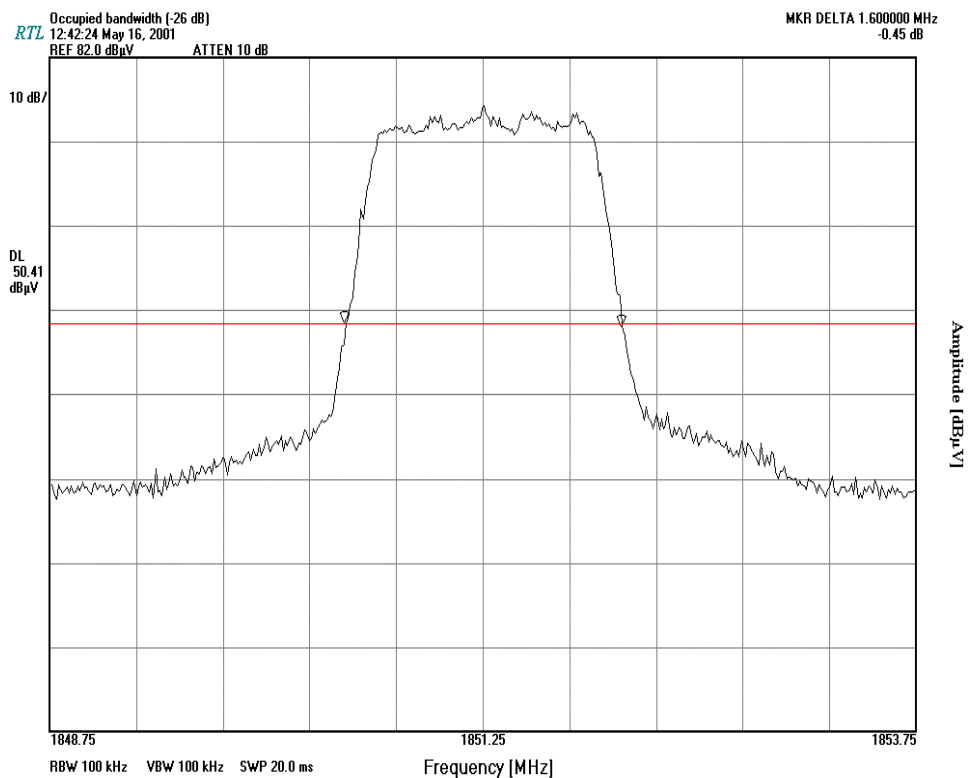
7.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.11

Device with digital modulation: operation to its maximum extent

7.2 TEST DATA

PLOT 7-1: CHANNEL 25: OCCUPIED BANDWIDTH = 1.6 MHZ



TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER

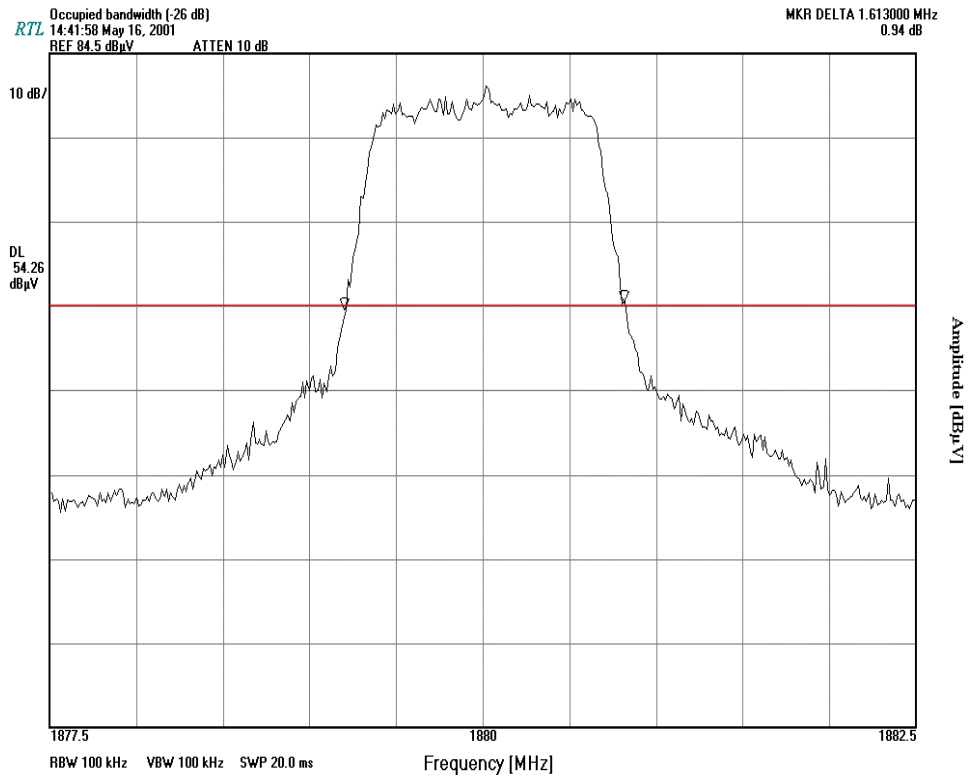
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PLOT 7-2: CHANNEL 600: OCCUPIED BANDWIDTH = 1.613 MHZ



TEST PERSONNEL:

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TEST TECHNICIAN/ENGINEER

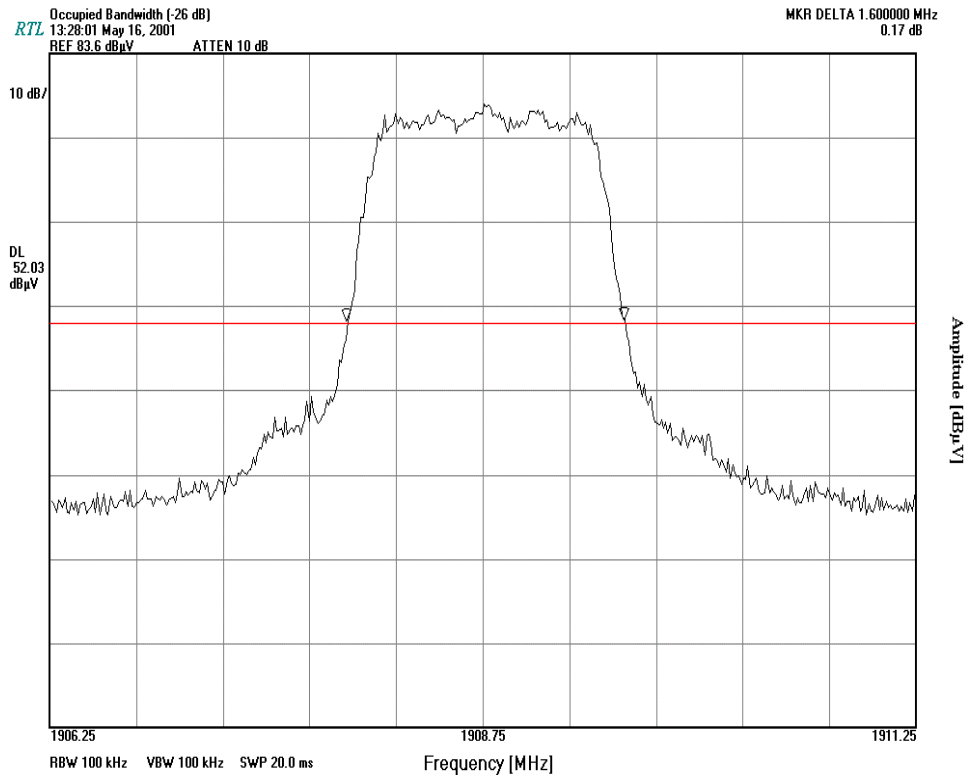

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PLOT 7-3: CHANNEL 1175: OCCUPIED BANDWIDTH = 1.6 MHz



TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER


SIGNATURE

MAY 15, 2001
DATE OF TEST

TABLE 7-1: EQUIPMENT USED FOR TESTING

Occupied Bandwidth					
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	03/06/02



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8 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY – PART 24.235

8.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +50°C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT.

The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. At an hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter.

Additionally, the power supply voltage of the EUT was varied from 85% to 115% of the nominal battery voltage.

The worst-case test data are shown.

9 FCC RULES AND REGULATIONS PART 2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Type of Emission: F9W

Necessary Bandwidth is 1.6 MHz

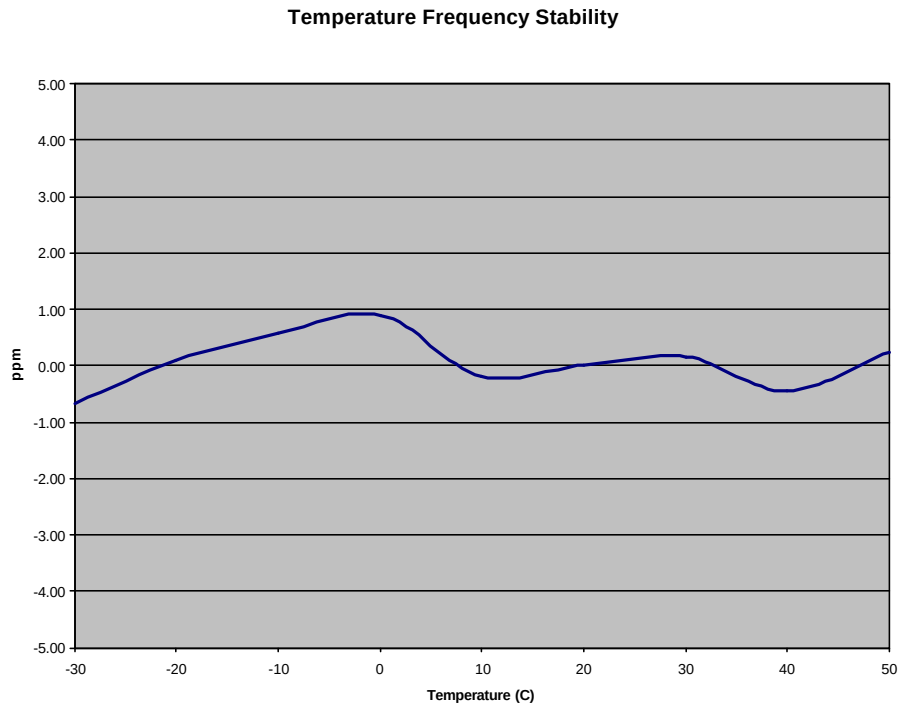
Emission designator: 1M6F9W



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9.1 TEST DATA

PLOT 9-1: FREQUENCY STABILITY/FREQUENCY VARIATION (0.9 PPM AT 0C WORST CASE)



TEST PERSONNEL:

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TEST TECHNICIAN/ENGINEER

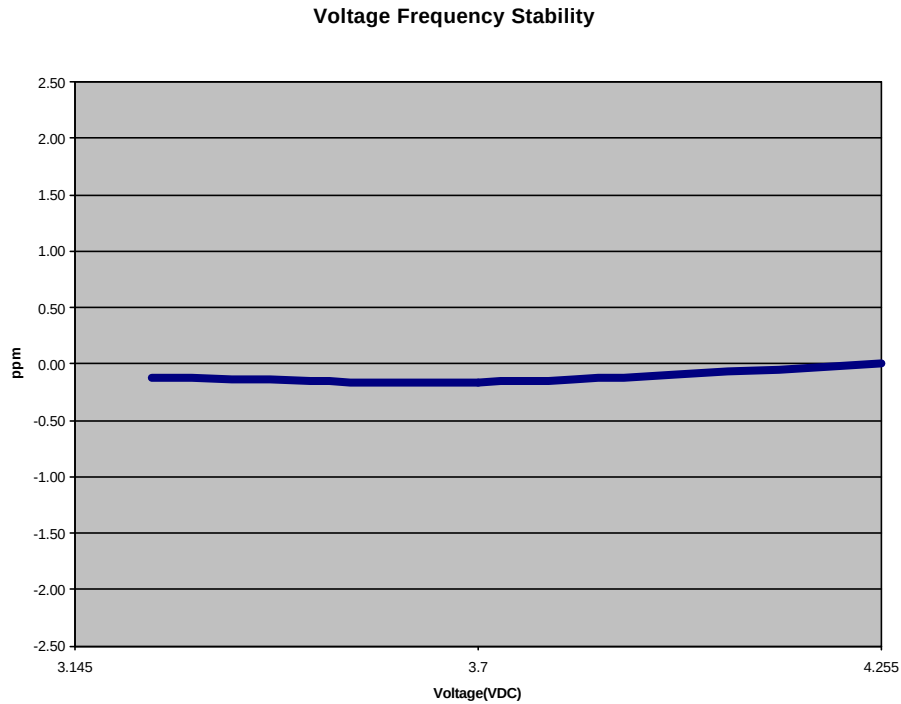

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PLOT 9-2: FREQUENCY STABILITY/VOLTAGE VARIATION (-0.16 PPM WORST CASE)



TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER


SIGNATURE

MAY 15, 2001
DATE OF TEST

TABLE 9-1: EQUIPMENT USED FOR TESTING

Frequency Stability/Voltage					
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	11/07/01
901055	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2545A04102	06/08/01