Intertek Testing Services
ETL SEMKO

FCC Parts 22 Test Report

Test performed on the
CDPD Wireless Modem
Model: WipClipV131C
FCC ID: NZ6V8131C

for
Tellus Technology Inc

Date of Test: January15-18 & 30, 2001
Job #: J20022674

Total Nos. of Pages Contained in this Report: 15 + data pages

NVLAP Laboratory Code: 200201-0

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Review Date: _____

FCC Part 22, Certification, Ver 01/01

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1.0 Introduction

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* Test Not Applicable as EUT has no audio circuits
** Test Not Applicable as EUT is battery Operated

Tested By: _____ 01/3 01
Suresh Kondapalli — Date

Approved By: David Chernomordik _____
David Chernomordik — Date

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.2 Product Description

The Tellus Technology WipClip0800C is CDPD Wireless modem.

For more information, please refer to the attached product description.

Use of Product	Wireless Modem for PDA (Personnel Digital Assistant)
Whether quantity (>1) production is planned	[X] Yes, [ ] No
Cellular Phone standards	CDPD
Type(s) of Emission	40K0F1D, 30K0G7D
Allowed Deviation	12 kHz
RF Output Power	26.0 dBm
Frequency Range	824 - 849 MHz
Antenna(e) & Gain	0 dBi
Detachable antenna ?	[ ]Yes [X] No
Receiver L.O. frequency	
External input	[ ] Audio [x] Digital Data

.3 Related Submittal(s) Grants

[X] None

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2.0 Radiated Power
FCC 22.913

The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

2. Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz (for frequencies below 1 GHz) and 1 MHz (for frequencies above 1 GHz).

Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading was recorded and the field strength (E_1 in dBuV/m) was calculated.

ERP was measured using a substitution method. The EUT was replaced by half-wave dipole connected to a signal generator. The output power, applied to the antenna, was measured by peak power meter. The spectrum analyzer reading was recorded and the field strength (E_2 in dBuV/m) was calculated.

ERP was calculated as follows:

$$ERP = E_1 - E_2 + P_g,$$

where E_1 & E_2 are field strength in dBuV/m when measured from EUT & generator accordingly; P_g is the generator output in dBm

2.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
EMCO 3148 Log Periodic Antenna
CDI Robert's Antenna
Rohde & Schwarz SMH 44 signal generator
Hewlett Packard 8900D Peak Power Meter

2.3 Test Results

Passes	Refer to the attached data sheets.

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Field Strength of fundamental

Frequency MHz	**Antenna Polarity**	Detector	**SA Reading dB(μV)**	**Antenna Factor dB(1/m)**	**Cable Loss dB**	**Field Strength dB(μV/m)**
CDPD mode						
824.04	V	Peak	100.0	21.9	4.1	126.0
836.55	V	Peak	98.1	22.2	4.1	124.4
848.97	V	Peak	96.8	22.0	4.1	122.9

Radiated Power (Substitution Method)

Frequency MHz	Antenna Polariz.	Field Strength (EUT) dBμV/m	Field Strength (Sig. Gen. +Tuned Dipole) dBμV/m	Signal Generator Output dBm	ERP dBm
CDPD Mode					
824.04	V	126.0	110.1	10.0	25.9
836.55	V	124.4	110.0	10.0	24.4
848.97	V	122.9	110.0	10.0	22.9

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Range of Output Power
FCC 22.913

3. Test Procedure

The transmitter was placed in TEM Cell. One end of TEM Cell was terminated in 50 ohms load, the other end of TEM Cell was connected to a spectrum analyzer. Transmitter position inside the TEM cell was adjusted to obtain maximum reading. Transmitter power was setup to different power levels and the spectrum analyzer readings in dBm was plotted.

Tests were performed at three frequencies (low, middle, and high channels) and on all power levels which can be setup on the transmitters.

3.2 Test Equipment

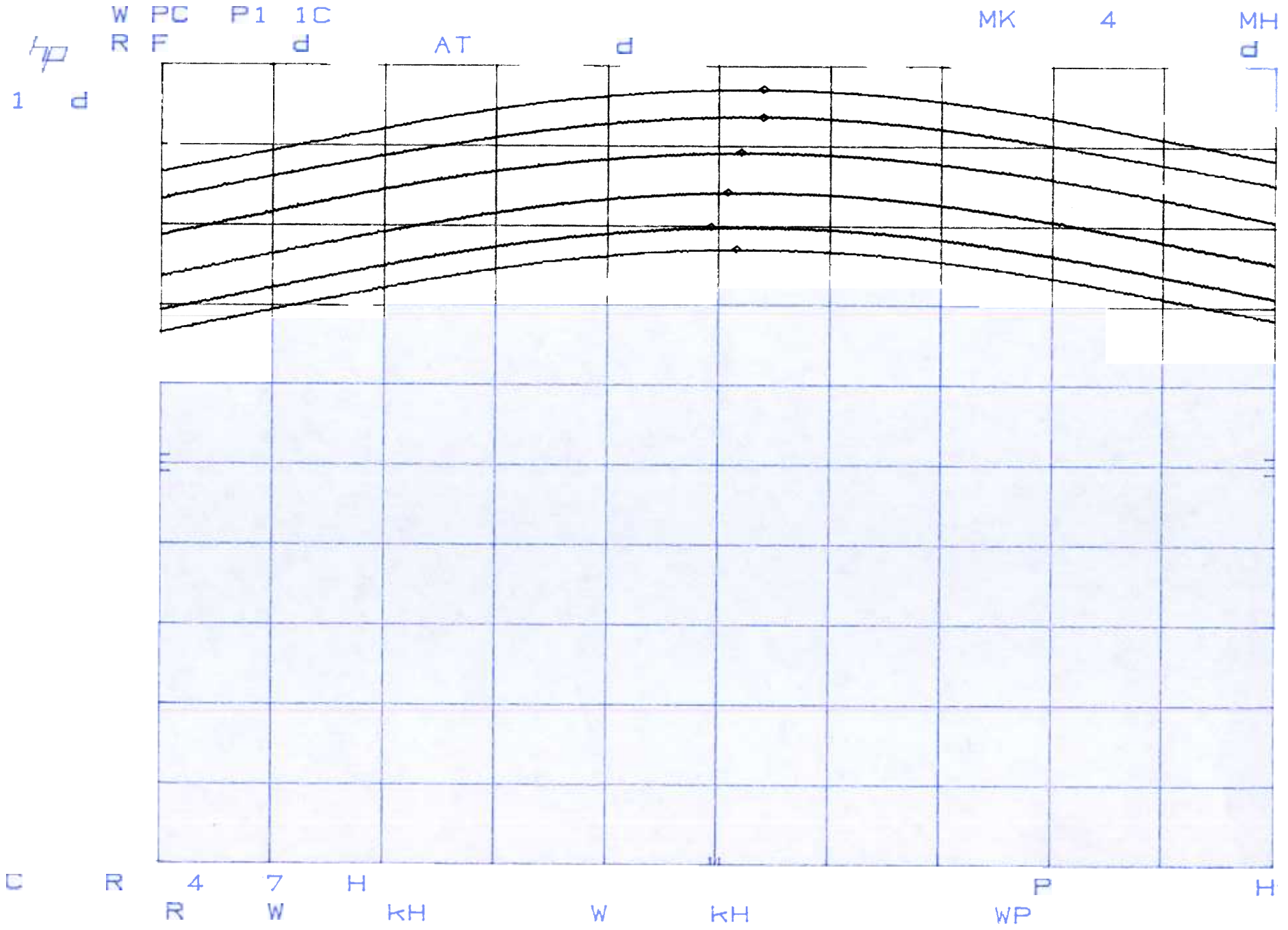
Hewlett Packard HP8566B Spectrum Analyzer
Tektronix 2784 Spectrum Analyzer
TEM Cell

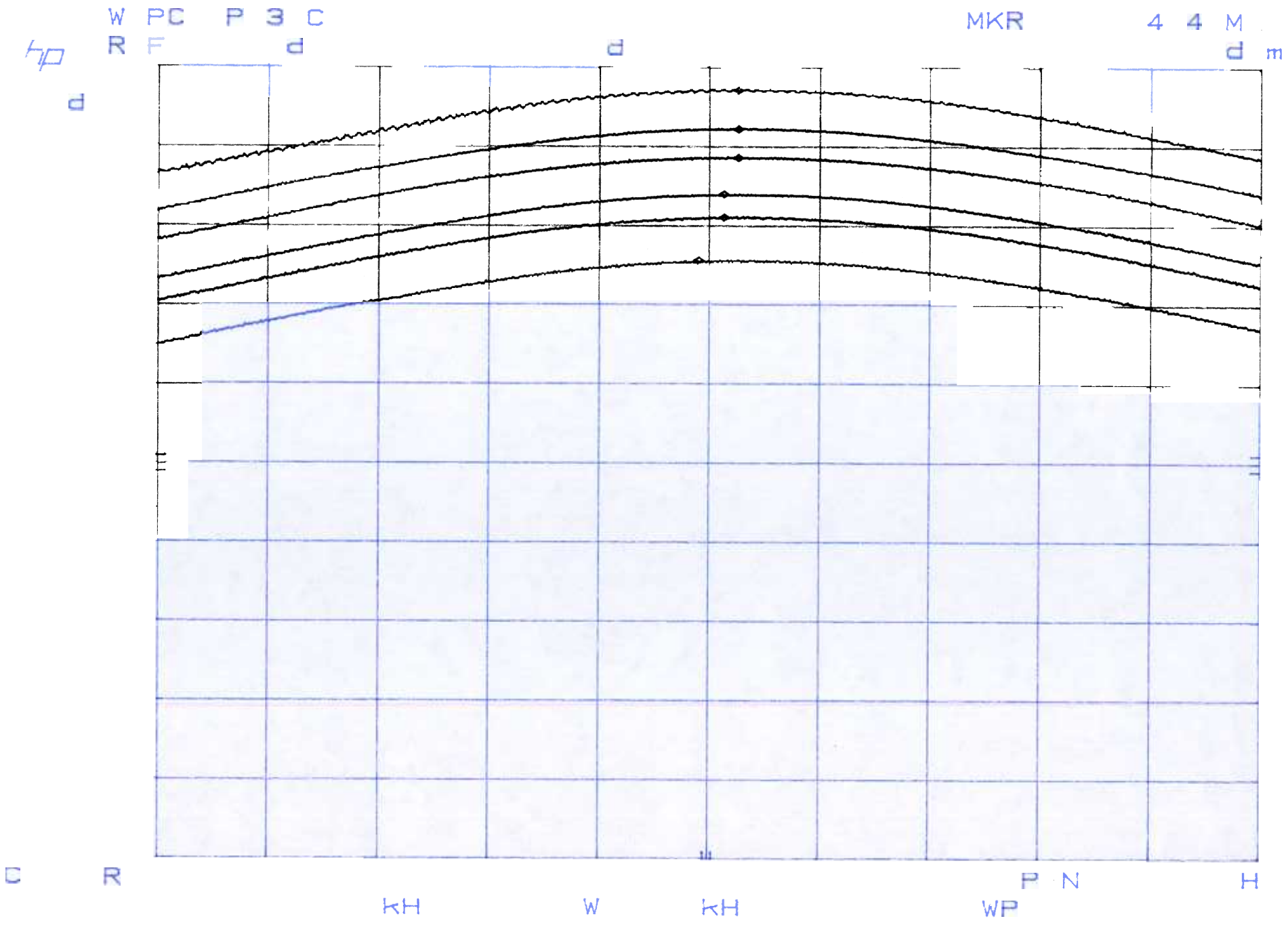
Test Results

For more details refer to the attached plots

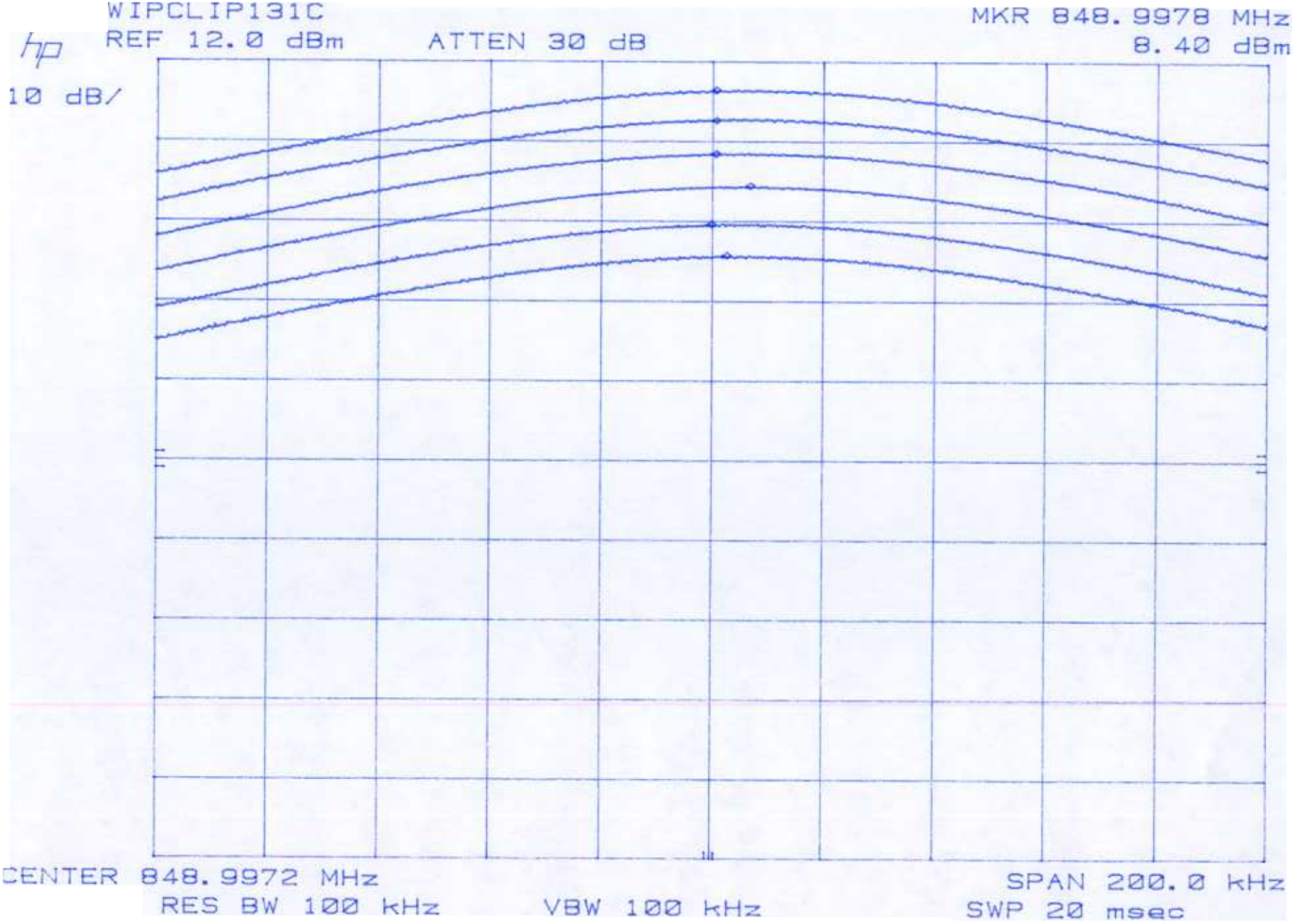
Plot Number	Description
2.3.a	Low Channel
2.3.b	Middle Channel
2.3.c	High Channel

plot #




W PC P 3 C
R F d
d
MKR
4 4 M
d m
C R
P N H
kH W kH WP

plot # 2.3.c


WIPCLIP131C
REF 12.0 dBm
ATTEN 30 dB
MKR 848.9978 MHz
8.40 dBm
10 dB/
CENTER 848.9972 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 200.0 kHz
SWP 20 msec

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4.0 Modulation Deviation Limiting
FCC 2.1047, 22.915(b)(c)

4. Test Procedure

The RF output of the transceiver was connected to the input of an FM deviation meter through sufficient attenuation so as not to overload the meter or distort the readings. An audio signal generator with a variable attenuator on the output was coupled into the external microphone jack of the transceiver, or alternatively, the microphone element was removed and the generator output was connected to the microphone wires by clip leads.

At three different modulating frequencies, the output level of the audio generator was varied and the FM deviation level was recorded (Table 4.1a).

In addition, the audio signal was adjusted to obtain 8 kHz deviation at 1 kHz modulation frequency. Then the input signal was increased in 1 step by 20 dB and the peak deviation and steady state deviation were recorded. This test was performed at modulation frequencies from 300 Hz to 3 kHz.

4.2 Test Equipment

Marconi 2955A Radio Communication Test Set
Leader LFG-1300S Function Generator
LMV-182 AC Millivoltmeter

4.3 Test Results

Test is not applicable as there is no audio input in EUT

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5.0 Audio Filter Characteristics
FCC 22.915(d)

For mobile stations, these signals must be attenuated, relative to the level at 1 kHz, as follows:

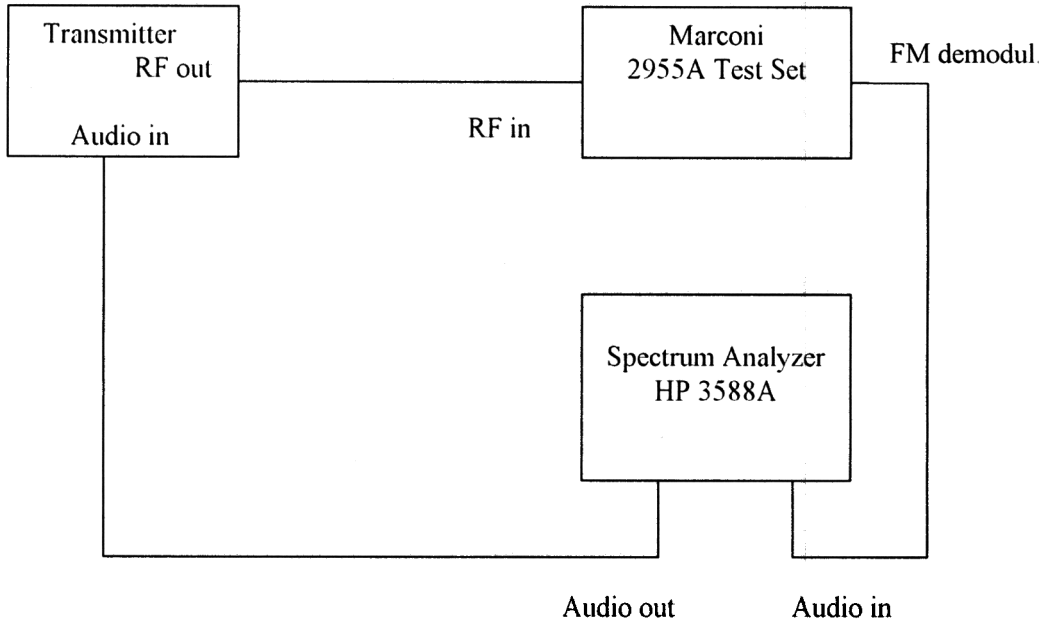
(i) In the frequency ranges of 3.0 to 5.9 kHz and 6.1 to 15.0 kHz, signals must be attenuated by at least 40 log (f/3) dB, where f is the frequency of the signal in kHz.

(ii) In the frequency range of 5.9 to 6.1 kHz, signals must be attenuated at least 35 dB.

(iii) In the frequency range above 15 kHz, signals must be attenuated at least 28 dB.

5 Test Procedure

The test was performed according to the block diagram shown below



On that block diagram, the HP 3885A spectrum analyzer having the tracing generator, and the Marconi 2955A Radio Communication Test Set having an output of a FM demodulator, are used. After the calibration was made (the -20 dBm reading of the spectrum analyzer corresponds to the 9 kHz deviation) the spectrum analyzer was set to scan the frequency from 300 Hz to 30 kHz, with the same audio input level as described above, and with compressor OFF and expander OFF.

The audio filter response was plotted directly from the spectrum analyzer (Refer to Plots # 5. .a, 5.1.b).

Using the level measured at kHz as a reference (0 dB), the audio filter response was calculated (See Table 5.1).

5.2 Test Equipment

Marconi Instruments 2955A Radio Communications Test Set
HP 3588A Spectrum Analyzer
HP 7470A Plotter

5.3 Test Results

Test is not applicable

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6.0 Emission Limitations, Occupied Bandwidth
FCC 2.1049, 22.917(b)(d)

For F3E/F3D emission mask uses with audio filter, the mean power of emissions must be attenuated below the mean power of the unmodulated carrier wave (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB;

(2) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency: at least 60 dB or (43 + 10 log P) dB, whichever is the lesser attenuation.

For F1D emission mask, the mean power of emissions must be attenuated below the mean power of the unmodualted carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but no more than 45 kHz: at least 26 dB;

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz: at least 45 dB;

(2) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency: at least 60 dB or (43 +10 log P) dB, whichever is the lesser attenuation.

6. Test Procedure

The EUT was setup in the TEM Cell as described in section 3. The resolution bandwidth of the spectrum analyzer was set to 100 kHz and the spectrum was recorded.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band 50 kHz and 100 kHz from the carrier frequency.

6.2 Test Equipment

HP 8566B Spectrum Analyzer
TEM Cell
HP 7470A Plotter

6.3 Test Results

Passes	Refer to the attached plots.

Plot Number	Description
6.3.a	Carrier only, scan 100KHz
6.3.b	CDPD, scan 100 kHz
6.3.c	Carrier only, scan 200 kHz
6.3.d	CDPD, scan 200 kHz