

## Exhibit 12

### Magic 9000

with a Research in Motion R902M-2-0 Transmitter

Mobitex Modem

(FCC ID:L6AR902M-2-0, Test Data)

**Schlumberger Technologies**

**FCC ID: NIQM9KMOBITEX**

**Test Data/Report  
For**

**2.1049 and 2.1047(2.987): Occupied  
Bandwidth/Bandwidth Limitations**

**2.1051(2.991): Spurious Emissions at Antenna Terminal**

**2.1055(2.995): Frequency Stability**

# **ELECTROMAGNETIC EMISSIONS TEST REPORT**

BY

***COM-SERVE CORPORATION***

***KITCHENER, ONTARIO***

***CANADA***

RADIATED and CONDUCTED EMI TEST REPORT

April 05, 1999

CLIENT:

Research In Motion  
295 Phillip Street  
Waterloo, Ontario  
N2L 3W8

TESTED MODEL:

Model Number: R902M-2-0  
Serial Number: RADIO # 6  
Description: 900 MHz RADIO MODEM DEVICE  
Date tested: March 08 & 09, 1999  
Tested with: Host computer, IBM ThinkPad 760 Type 9546, Serial # 78-ACFW2 97/02, FCC ID ANOGCF2704AT; Printer, Epson Model FX-80, Serial # 319837, FCC ID BKM9A8P80FA; AC/DC adapter power supply, Part No. WR91A2400CCP, 05 VDC @ 2.4A; Antenna Company 900 MHz "Cell" antenna, Model Eclipse II/9123; RIM Radio Monitor Board Model 02120001; Associated cables and cords.

IN ACCORDANCE WITH:

- FCC Part 2 and FCC Part 90 Transmitters; Type Acceptance.
- Test procedure(s) MP-4 and ANSI C63.4

TESTED BY:

Com-Serve Corporation  
17 Old Carriage Court  
Kitchener, Ontario  
N2P 1V3

  
Jim Sims  
Com-Serve Corporation

TECHNICIAN:

Jim Sims  
With: Mr. Adam Stevenson and Mr. Masud Attayi (Research in Motion)

FILE NUMBER: RIM 019



Author Data	Date	Document No.
Masud S. Attayi	April 8, 1999	01947-CERT-FCC-TEST-BW_MASK
Approved	Rev	File / Reference
		BW_MASK

### OCCUPIED BANDWIDTH/BANDWIDTH LIMITATIONS

#### TEST PROCEDURE:

The Research In Motion Limited R902M-2-O radio modem device was connected together with a radio monitor board 02120-001, host computer, external power supply, a 20 dB external attenuator, and a coaxial cable. The R902M-2-O antenna output terminal was connected to the input of a 50  $\Omega$  spectrum analyzer through a matched 20 dB attenuator and a coaxial cable. The R902M-2-O transmitter was operating at full and low output power with and without internal data modulation.

#### TEST RESULTS:

UNMODULATED CARRIER, High Power: **11.97 dBm** with a 20 dB external attenuator and a 1 m coaxial cable.

- a) Internal Modulation: Please refer to the attached spectrum analyzer plots. 100% of the in-band modulation is below the specified mask per 90.210(j)

UNMODULATED CARRIER, Low Power: **-2.53 dBm** with a 20 dB external attenuator and 1 m coaxial cable.

- b) Internal Modulation: Please refer to the attached spectrum analyzer plots. 100% of the in-band modulation is below the specified mask per 90.210(j)

Below is the **description of the mask** for band 896-901/935-940 MHz (Mobitex) : 2 Watts transmitter

<u>Frequency (MHz)</u>	<u>Formula</u>	<u>Upper Limit (dB)</u>	<u>Lower Limit (dB)</u>
-26500	$50 + 10 \log(P)$	-53	-175
-0.0115	$157 \log(f_d/5.3)$	-53	-175
-0.0095	$157 \log(f_d/5.3)$ or $103 \log(f_d/3.9)$	-39.8	-175
-0.0062	$103 \log(f_d/3.9)$ or $53 \log(f_d/2.5)$	-21.1	-175
-0.0025	$53 \log(f_d/2.5)$	0.0	-175
0.0025	$53 \log(f_d/2.5)$	0.0	-175
0.0062	$103 \log(f_d/3.9)$ or $53 \log(f_d/2.5)$	-21.1	-175

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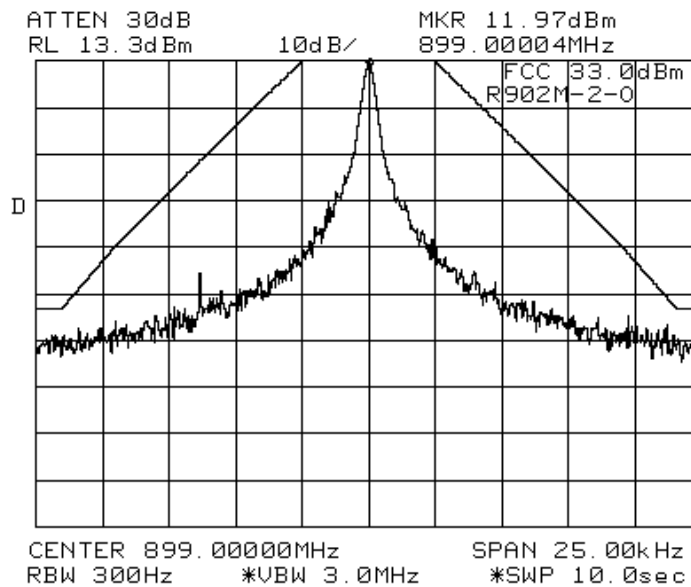
0.0095	$157 \log (f_d/5.3)$ or $103 \log (f_d/3.9)$	-39.8	-175
0.0115	$157 \log (f_d/5.3)$	-53	-175
26500	$50+10 \log (P)$	-53	-175

#### EQUIPMENT:

- H.P. 8563E Spectrum Analyzer 9.0 KHz - 26.5 GHz
- HP6632A DC POWER SUPPLY
- Mini Circuits 20 dB att. # NAT-20 0 Hz - 1.5 GHz

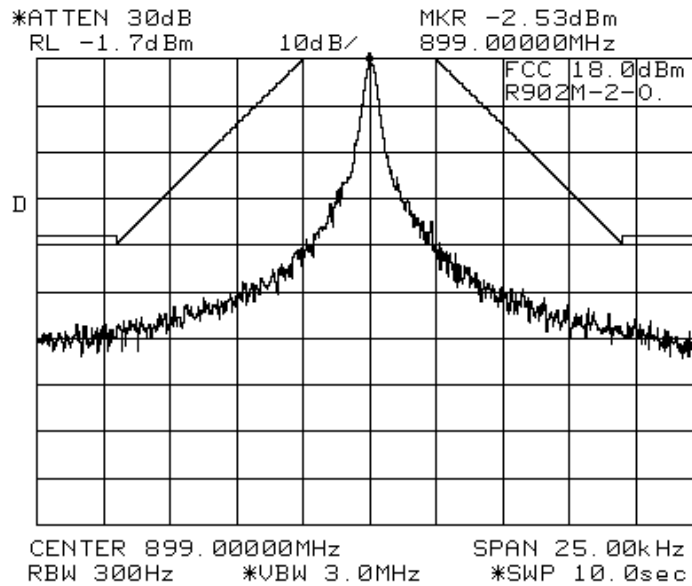
SETTING: RBW: 300 Hz; VBW: 3 MHz; SPAN: 25 KHz; SWP: 10 Sec

#### OCCUPIED BANDWIDTH/BANDWIDTH LIMITATIONS UNMODULATED CARRIER – HIGH POWER

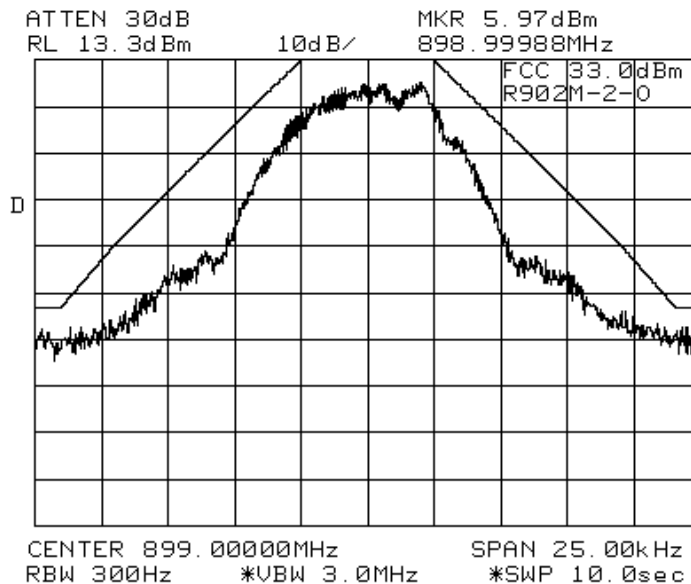


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# OCCUPIED BANDWIDTH/BANDWIDTH LIMITATIONS UNMODULATED CARRIER – LOW POWER



# OCCUPIED BANDWIDTH/BANDWIDTH LIMITATIONS MODULATED CARRIER – HIGH POWER





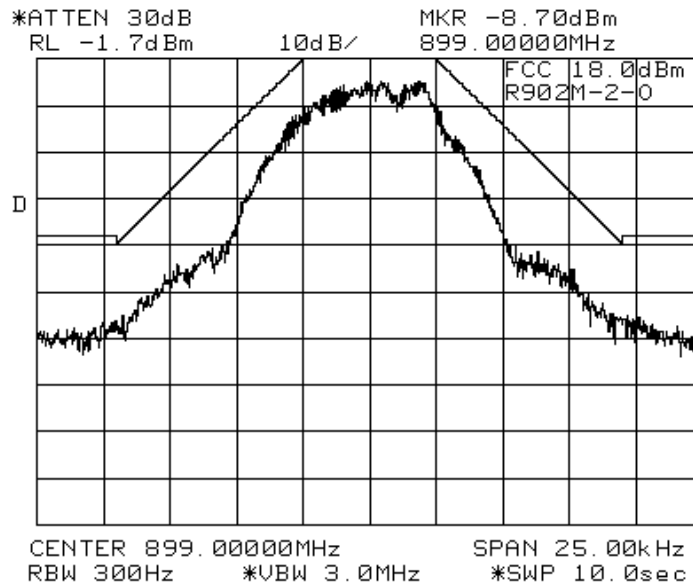
Date

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**OCCUPIED BANDWIDTH/BANDWIDTH LIMITATIONS  
MODULATED CARRIER – LOW POWER**



Author Data	Date	Document No.
Masud S. Attayi	April 8, 1999	01947-CERT-FCC-TEST-SPURIOUS
Approved	Rev	File / Reference
		Spurious

### **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

#### **TEST PROCEDURE:**

The Research In Motion Limited R902M-2-O radio modem device was connected together with a radio monitor board 02120-001, host computer, external power supply, a 20 dB external attenuator, and a coaxial cable. The R902M-2-O antenna output terminal was connected to the input of a 50  $\Omega$  spectrum analyzer through a matched 20 dB attenuator and a coaxial cable. The transmitter was operating at full output power with and without internal data modulation. The calculated limit below the unmodulated carrier at +12.1 dBm, including the 20 dB external attenuator and 1 dB cable loss, is +33.1 dBm. The actual limit is 53.1 dBc lower, or -20.0 dB.

#### **TEST RESULTS:**

**Ref 899****+33.1 (- 53.1)****-20.0**

<b>FREQUENCY MHz</b>	<b>LEVEL dBm</b>	<b>LIMIT dB</b>
899	33.1	
1,798	-37.0	-20.0
2,697	-39.3	-20.0
3,596	-62.9	-20.0
4,495	-55.1	-20.0
5,394	-39.8	-20.0
6,293	-41.7	-20.0
7,192	-73.1	-20.0
8,091	-57.2	-20.0
8,990	-66.5	-20.0

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#### **NOTE:**

The above limits take into account the unmodulated carrier level of 33.1 dBm inclusive of the 20 dB external attenuator and 1 dB coaxial cable loss. The modulation used was a worst case, random data pattern while still representing a normal modulation pattern.

#### **EQUIPMENT:**

- H.P. 8563E Spectrum Analyzer 9.0 KHz - 26.5 GHz
- HP6632A DC POWER SUPPLY
- Mini Circuits 20 dB att. # NAT-20 0 Hz - 1.5 GHz





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Masud S. Attayi	April 8, 1999	01947-CERT-FCC-TEST-013
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		013

## CFR 47 Chapter 1 - Federal Communication Commission Rules

## Part 2 Required Measurement

- 2.995 Frequency Stability - Procedures
- (a,b) Frequency Stability - Temperature Variation
  - (d) Frequency Stability - Voltage Variation

## Part 90 Subpart I : Technical Standards

- 90.213 Frequency Tolerance
- (a) Maintain the carrier frequency within 0.00015 % (1.5 ppm) of the assigned frequency.
  - (b) Maximum power output used for measurement

Frequency and power measurements were performed together with the same set up. Frequency and power data were both recorded across temperature and voltage. The set up used a cable assembly with a power splitter to allow concurrent measurements with the frequency counter, the power meter and the signal generator. The cable assembly was calibrated to allow compensation of the insertion loss between the transmitter and the power meter.

## Calibration for the Cable and Attenuator Loss:

Place: RF Lab in RIM.

Date: March 14, 1999

Time: 08:26:00.

## Instruments used:

Instrument	Serial Number	Calibrated on
Network Analyzer HP 8753D	3410A05905	08/08/98
Calibration Kit HP85033D	3423A00734	20/08/98

## Procedure:

Full Two port Calibration of 8753D using the 85033D was done.

An assembly of Cables, Attenuator, power splitter, and connectors was made for making RF power measurements.

Attenuator: 20dB, DC to 1500 MHz - Mini-Circuits model no: NAT-20

Power splitter: 4.93 dB - Mini-Circuits model no: 15542 ZN3PD 900W

The total loss of this cable assembly from the RF input to the RF output was measured to be 26.83 dB at 899.0 +/- 3 MHz.

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Power and frequency measurements of RIM Radio at different temperatures:

Place: RF Lab in RIM

Date: March 23 1999

Instruments used:

Instrument	Serial number	Calibrated on
DC Power supply HP 6632A	3524A14012	05/08/98
Universal Counter HP 53131A	3325A00988	04/08/98
Power Meter HP EPM-441A	GB37481300	29/04/98
Power Sensor HP ECP-E18A	US37181260	05/05/98
Signal Generator HP 8648A	3636A02799	25/11/98
RIM 2181 DSP board		

Temperature Chamber used:

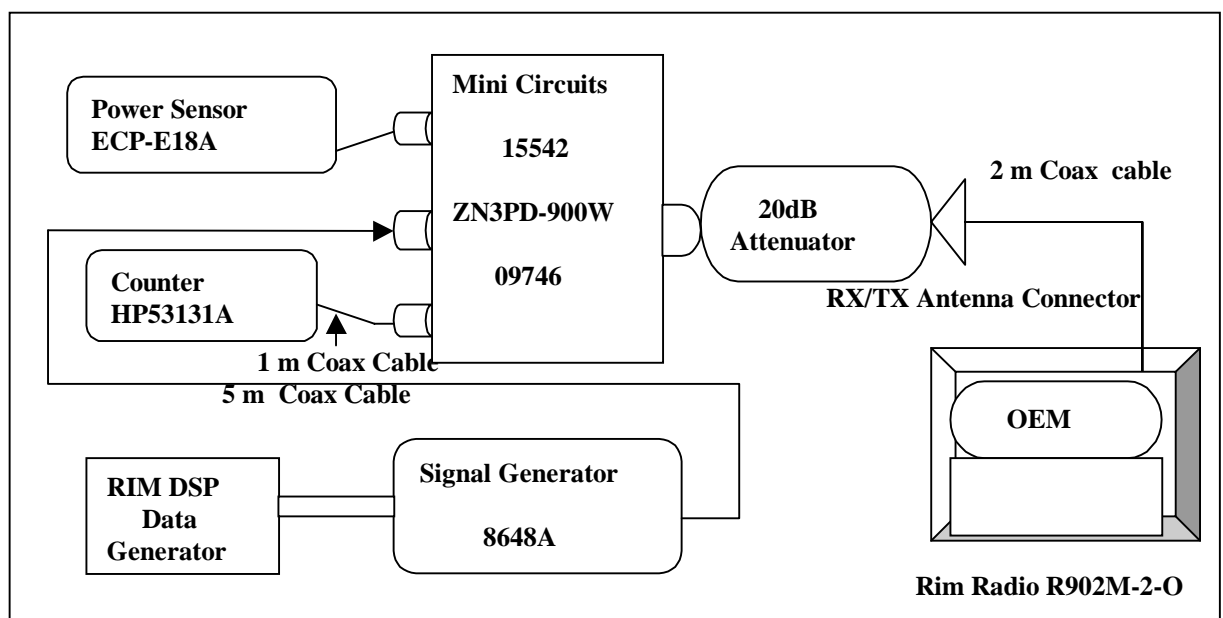
Manufacturer: Envirotronics

Model: SH8C

Serial No: 01984093-S-10860

Procedure:

The RIM Radio modem device R902M-2-O was placed in the Temperature chamber and connected to the instruments outside as shown in the figure below. Dry air was pumped inside the temperature chamber to maintain a back pressure during the test. The Radio was kept in the off condition at all times except when the measurements were to be made.



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The chamber was switched on and the temperature was set to -30°C. After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber. The Radio was switched on and frequency and power measurements were made as follows:

The RIM Radio automated test utility was controlled by computer. This application was given ward of activating all machines intrinsic to the temperature test. It controls the HP 53131A universal counter, HP 6623A power supply, HP EPM-441A power meter and HP 8648A signal generator by GPIB Bus. The Environmental Chamber was instructed through a RS-232 serial line. The RIM Radio dialogue was passed through a serial connection with a special Serial-to-Radio message converter. The Radio was put in repetitive alternating receive and transmit modes and the power and frequency levels were measured and recorded by the RIM automated test utility.

The RIM Radio Automated test utility produces data files in text format. All data from this test has been formatted from the initial files into a single Spreadsheet.

The RIM Radio output was characterized through its power and frequency across temperature (-30°C to 75°C), and transmit frequency (896 MHz to 901 MHz) at an output power of 33 dBm.

The Radio power and frequency were measured at voltages of 4.15, 4.45, AND 4.75 VDC. The transmit frequency was varied in 3 steps consisting of 896 MHz, 899 MHz and 901 MHz. This frequency generated by the RIM Radio has been recorded in MHz and also as deviation from nominal in Parts Per Million.

The output from the RIM Radio was accounted from -30°C to 75°C in +5 °C steps. The Radio was interrogated for data every 29 seconds for each measurement and 10 minutes for each voltage readings. From activity the Radio heats up and produces different signals. This heating led to much data which characterizes the Radio over most temperatures, not just at 5°C intervals.

Before the initial temperature one hour soak was allowed and for other temperature steps 1/2 hour soak was accomplished.

## PROCEDURE

This process was affected through automation.

1. Switch on the HP 6632B, power supply and set the Voltage to 4.15 V.
2. Set the initial Environmental Chamber temperature (-30 Degrees Celsius) and hold for initial soak.
3. Set the frequency to 896 MHz, and power to 33 dBm on RIM Radio.
4. Command the RIM Radio to receive mode and adjust its frequency to that of the HP 8648A signal generator and measure BERT.



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5. Activate Carrier on RIM Radio.
6. Take initial HP EPM-441A power meter measurement.
7. Take initial HP 53131A frequency counter measurement.
8. Measure temperature of product.
9. Measure power output.
10. Measure frequency output.
11. Repeat steps 8 - 10 for twenty measurements every 29 seconds for 10 minutes.
12. Repeat steps 3 - 11 for 899 MHz and 901 MHz.
13. Increase temperature by 5°C and soak for 1/2 hour.
14. Repeat steps 2-13 for temperatures –25 degrees to 75 degrees Celsius.

Procedure 3 to 12 was then repeated at 25°C with the power supply voltage set to 4.15, 4.45 and 4.75V.



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		014

## CFR 47 Chapter 1 - Federal Communication Commission Rules

## Part 2 Required Measurement

## 2.995 Frequency Stability - Procedures

## (a,b) Frequency Stability - Temperature Variation

## Part 90 - Subpart I : Technical Standards

## 90.213 Frequency Tolerance

(a) Maintain the carrier frequency within 0.00015 % (1.5 ppm) of the assigned frequency.

(b) Maximum power output used for measurement

Procedure: These results were obtained using the test procedure described in document 01947-CERT-FCC-TEST-013.

Results: 896 MHz nominal transmitter

Ambient Temperature (Degrees Celsius)	Minimum Device Temperature (Degrees Celsius)	Maximum Device Temperature (Degrees Celsius)	Initial Frequency Deviation [ppm]	Maximum Deviation [ppm]
-30.0	-24.60	-24.30	-0.1027	-0.1217
-25.0	-19.70	-19.30	-0.1194	-0.1250
-20.0	-15.40	-15.10	-0.1116	-0.1239
-15.0	-11.00	-10.60	-0.1016	-0.1161
-10.0	-6.10	-5.80	-0.1038	-0.1116
-5.0	-1.20	-0.80	-0.0848	-0.0971
0	3.70	4.00	-0.0781	-0.0882
5.0	8.30	8.50	-0.0692	-0.0781
10.0	13.20	13.40	-0.0681	-0.0681
15.0	18.10	18.40	-0.0536	-0.0558
20.0	23.30	23.50	-0.0424	-0.0502
25.0	28.30	28.60	-0.0223	-0.0435
30.0	33.60	33.80	--0.0547	-0.0547
35.0	38.20	38.50	-0.0558	-0.0558
40.0	43.20	43.40	-0.0513	-0.0513
45.0	48.30	48.50	-0.0759	-0.0960
50.0	53.10	53.40	-0.0971	-0.1038
55.0	58.20	58.40	-0.1027	-0.1094
60.0	63.20	63.40	-0.1049	-0.1205
65.0	67.90	68.20	-0.1183	-0.1239
70.0	72.60	72.90	-0.1083	-0.1250
75.0	77.30	77.70	-0.1150	-0.1373



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Results: 899 MHz nominal transmitter.

Ambient Temperature (Degrees Celsius)	Minimum Device Temperature (Degrees Celsius)	Maximum Device Temperature (Degrees Celsius)	Initial Frequency Deviation [ppm]	Maximum Deviation [ppm]
-30.0	-24.80	-24.40	-0.1034	-0.1135
-25.0	-19.70	-19.30	-0.1224	-0.1324
-20.0	-15.40	-15.10	-0.1201	-0.1324
-15.0	-11.10	-10.70	-0.1190	-0.1190
-10.0	-6.10	-5.80	-0.0879	-0.1068
-5.0	-1.10	-0.80	-0.0857	-0.0890
0	3.70	4.00	-0.0745	-0.0934
5.0	8.30	8.60	-0.0578	-0.0701
10.0	13.10	13.30	-0.0512	-0.0701
15.0	18.20	18.50	-0.0389	-0.0512
20.0	23.30	23.50	-0.0501	-0.0501
25.0	28.40	28.50	-0.0289	-0.0378
30.0	33.40	33.70	-0.0423	-0.0501
35.0	38.30	38.50	-0.0489	-0.0612
40.0	43.20	43.40	-0.0456	-0.0634
45.0	48.20	48.40	-0.0756	-0.0857
50.0	53.10	53.40	-0.1034	-0.1034
55.0	58.20	58.40	-0.0979	-0.1123
60.0	63.10	63.40	-0.1057	-0.1190
65.0	67.90	68.20	-0.1090	-0.1268
70.0	72.60	72.80	-0.0990	-0.1257
75.0	77.30	77.50	-0.1201	-0.1257



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Results: 901 MHz nominal transmitter.

Ambient Temperature (Degrees Celsius)	Minimum Device Temperature (Degrees Celsius)	Maximum Device Temperature (Degrees Celsius)	Initial Frequency Deviation [ppm]	Maximum Deviation [ppm]
-30.0	-24.40	-23.90	-0.1265	-0.1265
-25.0	-20.70	-19.00	-0.1210	-0.1443
-20.0	-14.80	-14.30	-0.1188	-0.1232
-15.0	-9.70	-9.30	-0.1021	-0.1154
-10.0	-4.90	-4.60	-0.0966	-0.1065
-5.0	-0.10	0.30	-0.0966	-0.0966
0	4.60	5.10	-0.0810	-0.0910
5.0	9.30	9.60	-0.0688	-0.0844
10.0	14.10	14.50	-0.0577	-0.0733
15.0	18.20	18.40	-0.0622	-0.0655
20.0	23.30	23.50	-0.0544	-0.0577
25.0	28.30	28.50	-0.0366	-0.0577
30.0	33.30	33.50	-0.0477	-0.0688
35.0	38.10	38.40	-0.0622	-0.0744
40.0	43.00	43.30	-0.0688	-0.0810
45.0	48.10	48.20	-0.0721	-0.0899
50.0	53.00	53.20	-0.0954	-0.1054
55.0	57.80	58.00	-0.0966	-0.1143
60.0	62.60	62.80	-0.1110	-0.1232
65.0	66.90	67.60	-0.1321	-0.1354
70.0	71.90	72.10	-0.1199	-0.1365
75.0	76.60	77.20	-0.1265	-0.1354

Author Data <b>Masud S. Attayi</b>	Date <b>April 8, 1999</b>	Document No. <b>01947-CERT-FCC-TEST-15</b>
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Part 2 Required Measurement

2.995 Frequency Stability - Procedures

(d) Frequency Stability - Voltage Variation

Part 90 Subpart I : Technical Standards

90.213 Frequency Tolerance

(a) Maintain the carrier frequency within 0.00015 % (1.5 ppm) of the assigned frequency.

(b) Maximum power output used for measurement

Procedure: These results were obtained using the test procedure described in document 01947-CERT-FCC-TEST-013.

Results: 896 MHz nominal transmitter.

Ambient Temperature [degrees Celsius]	Device Supply Voltage [Volts]	Initial Frequency Deviation [ppm]	Maximum Deviation [ppm]
25.0	4.15	-0.0826	-0.1038
25.0	4.45	-0.0223	-0.0435
25.0	4.75	-0.0257	-0.0491

Results: 899 MHz nominal transmitter.

Ambient Temperature [degrees Celsius]	Device Supply Voltage [Volts]	Initial Frequency Deviation [ppm]	Maximum Deviation [ppm]
25.0	4.15	-0.0634	-0.0634
25.0	4.45	-0.0289	-0.0378
25.0	4.75	-0.0289	-0.0467

Results: 901 MHz. nominal transmitter.

Ambient Temperature [degrees Celsius]	Device Supply Voltage [Volts]	Initial Frequency Deviation [ppm]	Maximum Deviation [ppm]
25.0	4.15	-0.0910	-0.1132
25.0	4.45	-0.0366	-0.0577
25.0	4.75	-0.0433	-0.0677