Exhibit B

Test Report

Introduction

The following information is submitted for Type Acceptance of a Broadband PCS Base Station for Northern Telecom, Inc., in accordance with Part 24, Subpart E and Part 2, subpart J of the FCC Rules and Regulations. The measurement procedures were in accordance with the requirements of Part 2.999.

Measurement Results Summary

Table 1 is a summary of the measurement results for the BTS.

Table 1: Measurement Results Summary

FCC Measurement Specification	FCC Limit Specification	Description	Result
2.985	24.232	RF Power Output	Passed
2.987		Modulation Characteristics	Not Applicable
2.989		Occupied Bandwidth	$OBW_{(max)}$= 1262.5 kHz
2.991, 2.997	24.238	Spurious Emissions at Antenna Terminals	Passed
2.993, 2.997	24.238	Field Strength of Spurious Radiation	Passed
2.995	24.235	Frequency Stability	Passed

Declaration of the Accuracy of Data

The undersigned attest to the accuracy of the measurement data contained in this document.

July 17/98

Stephen Cassidy
Radio Compliance Engineer
Nortel Technology

Name of Test:2.985 RF Power Output

1.0 FCC Requirements

1.1 FCC Part 24.232

(a) Base stations are limited to 1640 Watts peak equivalent isotropically radiated power (e.i.r.p.) with an antenna height up to 300 meters HAAT. See 24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power. In no case may the peak output power of a base station transmitter exceed 100 Watts.

(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. the measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

1.0 Test Results

Table 2 shows the test results for RF Output Power.

Table 2: Test Results for RF Output Power

Channel #	Frequency (MHz)	Measured RF Output Power (dBm)	Maximum Rated Power (dBm)	Limit (dBm)
25	1931.25	43.8	44.0	50
150	1937.50	43.7	44.0	50
275	1943.75	43.7	44.0	50
325	1946.25	43.6	44.0	50
350	1947.50	43.7	44.0	50
375	1948.75	43.8	44.0	50
425	1951.25	43.8	44.0	50
550	1957.50	43.7	44.0	50
675	1963.75	43.8	44.0	50
725	1966.25	43.9	44.0	50
750	1967.50	43.8	44.0	50
775	1968.75	43.9	44.0	50
825	1971.25	43.8	44.0	50

Name of Test:2.989 Occupied Bandwidth

1.0 FCC Requirements

1.1 FCC Part 2.989

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:...

1.0 Test Results

Table 3 shows the results for Occupied Bandwidth.

Table 3: Test Results for Occupied Bandwidth

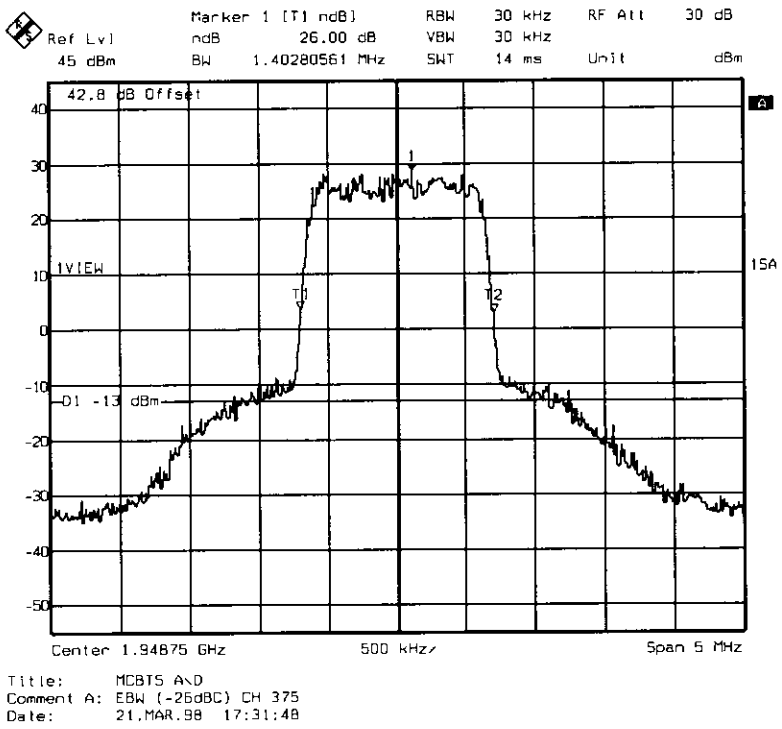
Channel #	Frequency (MHz)	Measured Occupied Bandwidth (KHz)
25	1931.25	1262.5
150	1937.50	1262.5
275	1943.75	1262.5
325	1946.25	1262.5
350	1947.50	1262.5
375	1948.75	1262.5
425	1951.25	1262.5
550	1957.50	1262.5
675	1963.75	1262.5
725	1966.25	1262.5
750	1967.50	1262.5
775	1968.75	1262.5
825	1971.25	1262.5
850	1972.50	1262.5
875	1973.75	1262.5
925	1976.25	1262.5
1050	1982.50	1262.5
1175	1988.75	1262.5

The BTS was configured to transmit at maximum power. Measurements were made at frequencies which were at the bottom and top of each of the licensed blocks.

The occupied bandwidth was measured using the channel power (99% power) feature of the spectrum analyzer which had the following settings:

Resolution Bandwidth:	30 KHz
Video Bandwidth:	30 KHz
Span:	5 MHz
Attenuation:	30 dB
Reference Level:	45 dBm
Ref. Level Offset:	42.8 dB
Level Range:	100 dB
Sweep Time:	14 ms

Figure 5: Sample Plot for Emission Bandwidth



The reference level for spurious emissions at the antenna terminals was taken from the measured output power (44.0 dBm = 25.1 Watts). Therefore the spurious emissions must be attenuated by at least 43 + 10 log (25.1) = 57.0 dB. The measured output power was 44.0 dBm; therefore the limit is 44.0 - 57.0 = -13 dBm.

Figure 6: Sample Plot for Ch. 25 (1st Adjacent MHz)

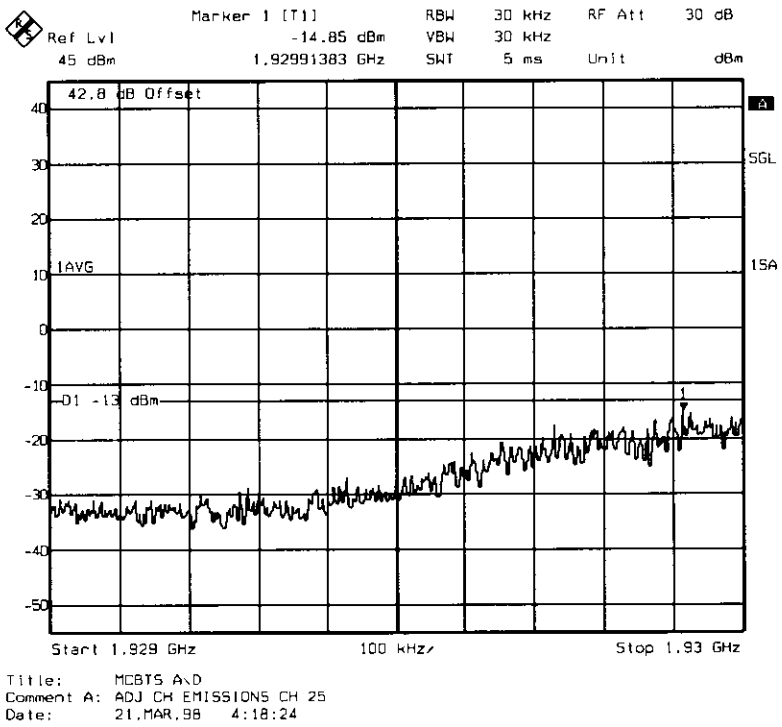


Figure 8: Sample Plot for Ch. 1175 (1st Adjacent MHz)

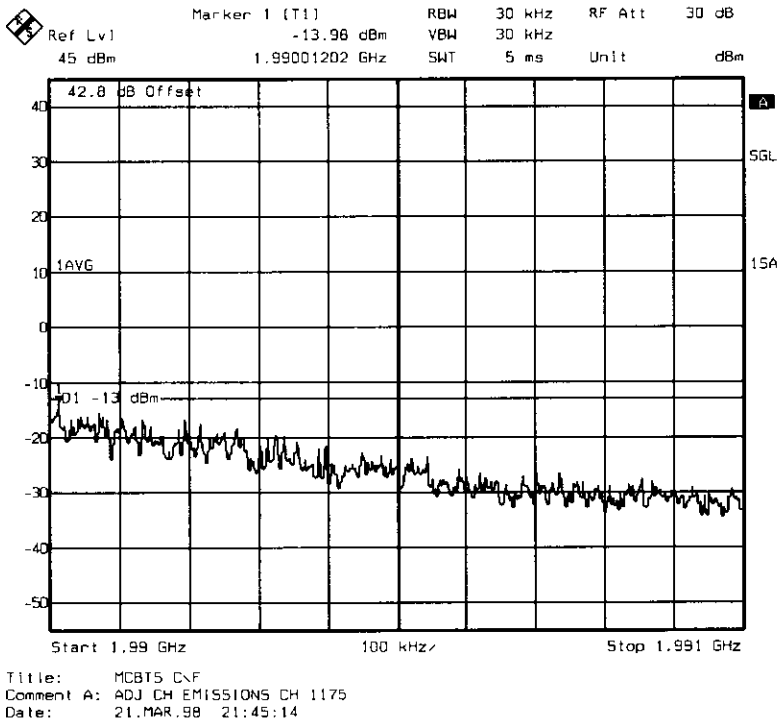


Figure 10: Sample Plot for Ch. 375 (5 MHz Span)

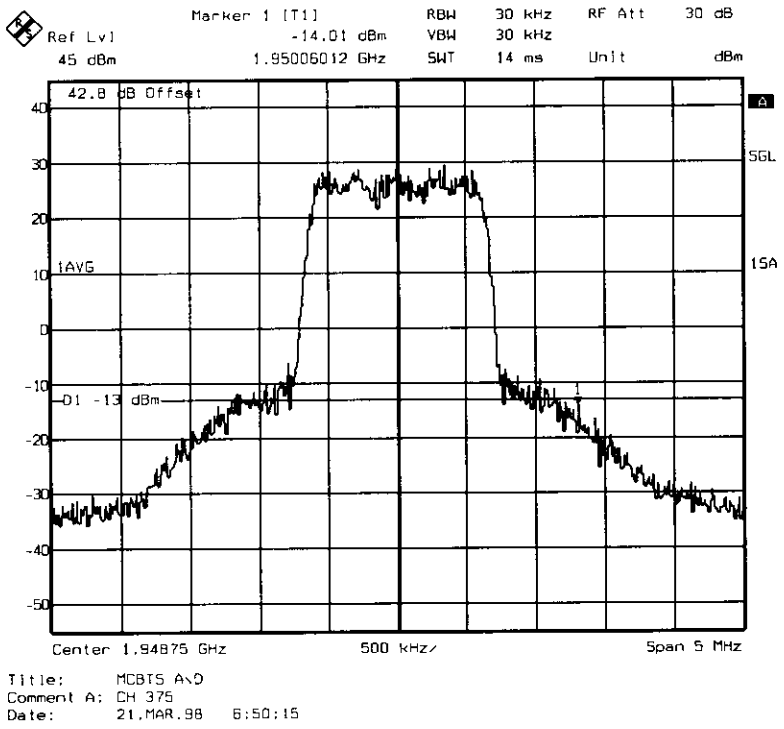


Figure 12: Sample Plot for 3 - 8 GHz Span

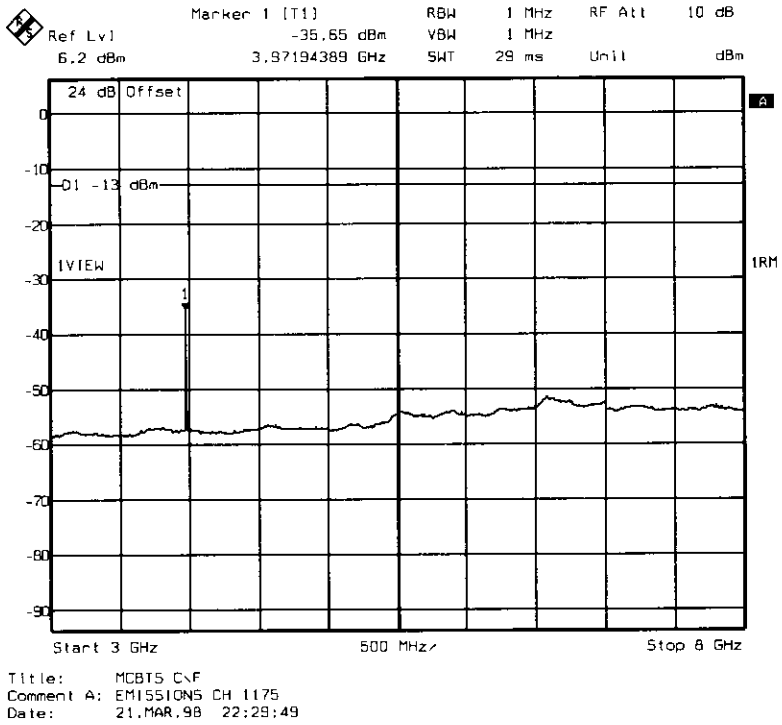
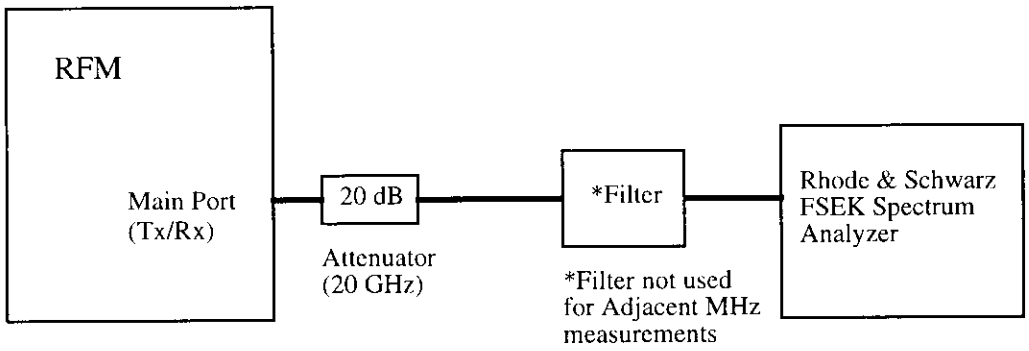


Figure 14: Test Configuration for Spurious Emissions at Antenna Terminals



Frequency Range (GHz)	**Filter**
0 - 3	K&L Tunable Tx Notch Filter, Model 5TNF-00002
3 - 20	FSY Microwave Highpass Filter, Model 2380-11XNXN

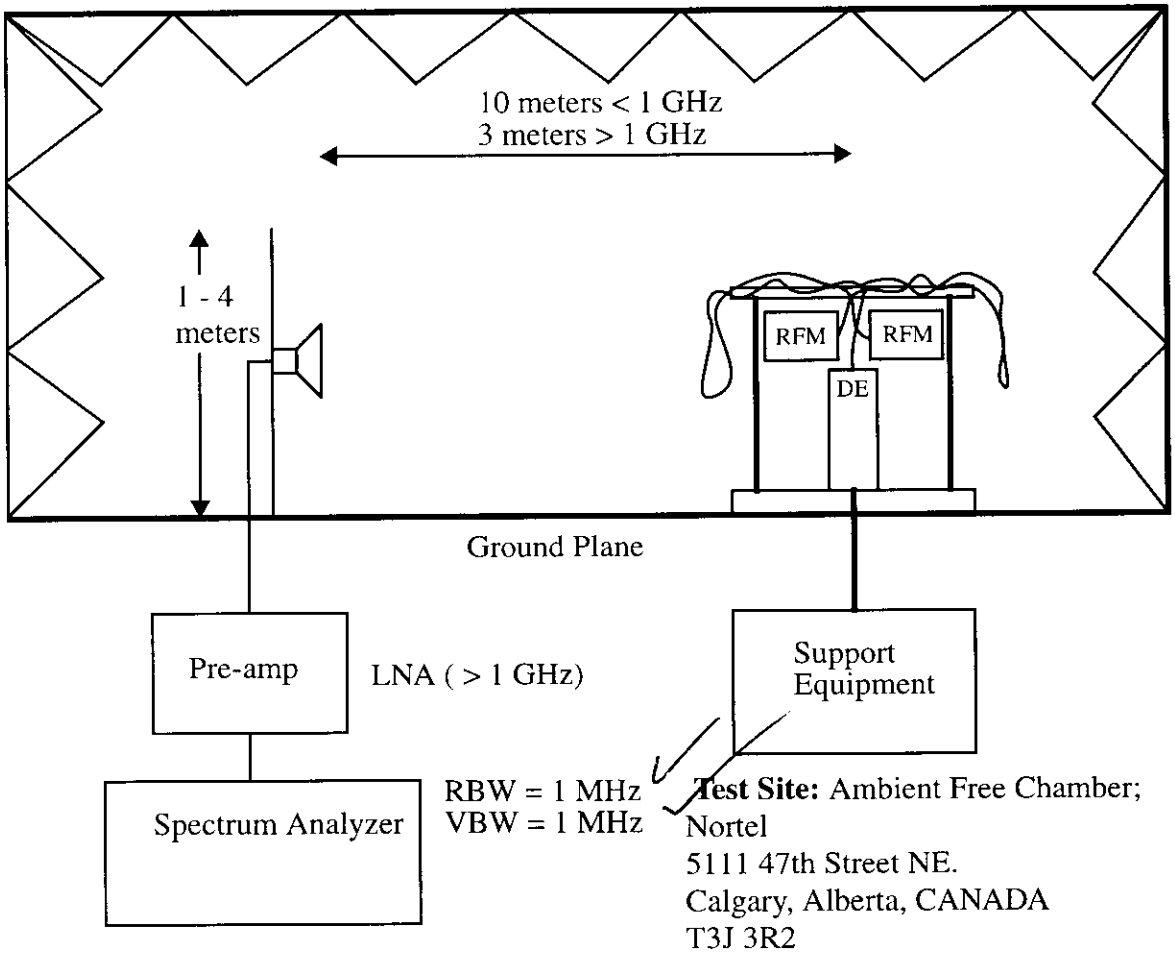
For adjacent channel emissions, the BTS nominal carrier frequency was adjusted to the high and low edge channels for each of the three DPM frequency samples (A&D, B&E and C&F blocks).

For these measurements, the resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth. In this case the emission bandwidth measured was 1402.8 KHz. Therefore the resolution bandwidth was set to 30 KHz. The spectrum analyzer had the following settings:

Resolution Bandwidth:	30 KHz
Video Bandwidth:	30 KHz
Span:	1 MHz
Attenuation:	30 dB
Reference Level:	45 dBm
Ref. Level Offset:	42.8 dB
Level Range:	100 dB
Sweep Time:	Coupled
Video Average:	Enabled (50 samples)

The emissions were investigated up to the tenth harmonic of the fundamental emission (20 GHz). The measured level of the emissions was recorded and compared to the -13 dBm limit.

Figure 15: Test Configuration for Radiated Spurious Emissions



The BTS was configured to transmit at maximum power. RFM #2 was set to channel 25 (1931.25 MHz), RFM #7 was set to channel 550 (1957.5 MHz)

Measurements were made according to the procedures outlined in ANSI C63.4.

The emissions were investigated up to the tenth harmonic of the fundamental emission (20 GHz). The measured level of the emissions was recorded and compared to the limit.

Name of Test:2.995 Frequency Stability

1.0 FCC Requirements

1.1 FCC Part 24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

1.0 Test Results

Table 6 shows the results for Frequency Stability versus Temperature Variation.

Table 6: Test Results for Frequency Stability versus Temperature

Temperature (°C)	Maximum Carrier Frequency Deviation (Hz)	10 MHz GPS Reference (MHz)
-30	10.2	10.000000
-20	16.4	10.000000
-10	10.9	10.000000
0	17.1	10.000000
10	10.2	10.000000
20	12.1	10.000000
30	-18.0	10.000000
40	7.9	10.000000
50	12.9	10.000000

Table 7 shows the results for Frequency Stability versus Power Supply Voltage.

Table 7: Test Results for Frequency Stability versus Power Supply Voltage

Power Supply Voltage	Maximum Carrier Frequency Deviation (Hz)	10 MHz GPS Reference (MHz)
-40.8 VDC	27.1	10.00000000
-48 VDC (Nominal)	23.2	10.00000001
-55.2 VDC	26.5	10.00000001

was recorded from the time the transmitter was keyed-on for a period of ten minutes using an HP CDMA Cell Site Test system. Also the frequency of the 10 MHz reference sourced from the GPS module was measured using a frequency counter with a rubidium clock reference.

EUT Identification List

Table 9 is a identification list of the equipment tested in this report.

Table 9: EUT Identification List

Equipment Description	Technical Status	Manufacturer	Serial No.
1) RFM #4	NTGS70AA P7	Nortel	NNTM535077J5
1.0) Power Amplifier (PA)	NTGS99AA P3	Spectrian	NNTM535077H4
1.1) TRM	NTGS78AA P5	Nortel	NNTM532AMUWR
1.2) EOM	NTGS74AA P4	Nortel	NNTM535076G2
1.3) DPM (A&D)	NTGS79OA P3	Celwave	M65
1.4) DPM (B&E)	NTGS79EA P3	Celwave	MP54
1.5) DPM (C&F)	NTGS79FA P1	Celwave	MP79
2) RFM #2	NTGS70AA P7	Nortel	NNTM535077BX
3) RFM #7	NTGS70AA P7	Nortel	NNTM535077CY

- End of Section -

Measurement Equipment List

Table 8 is a list of all of the measurement equipment used in this report.

Table 8: Measurement Equipment List

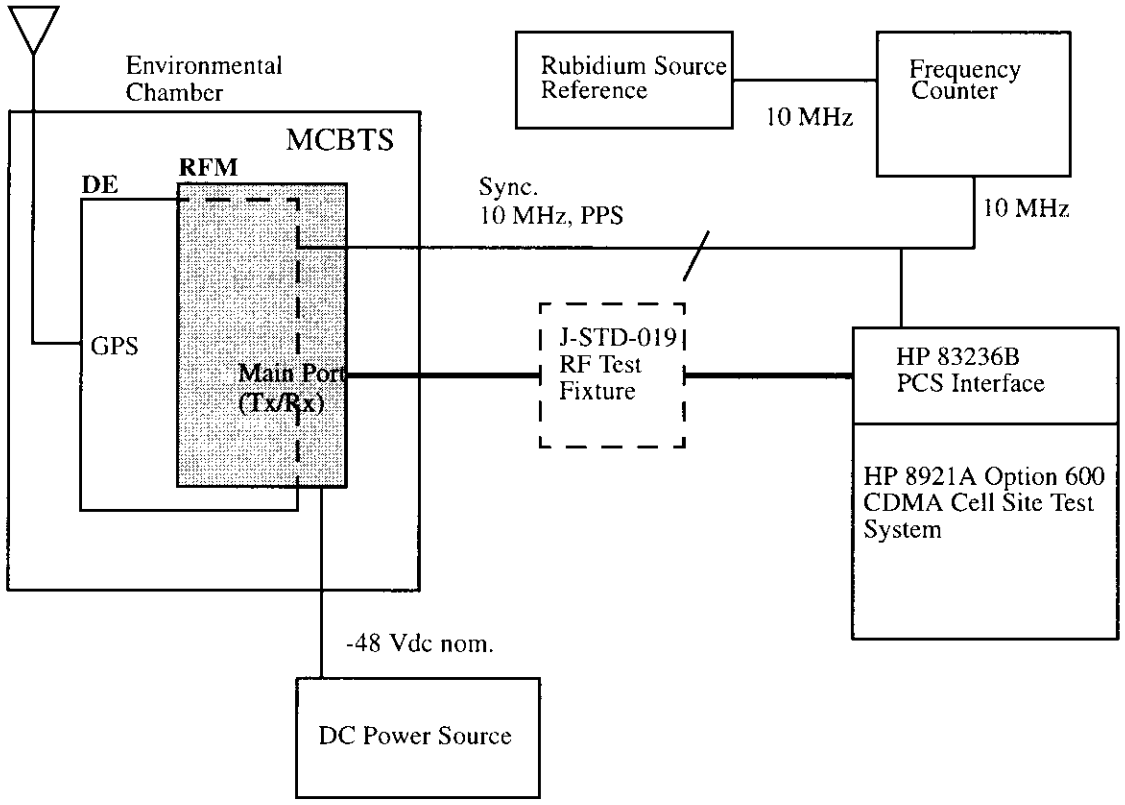
Equipment Description	Manufacturer	Model No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSEK	DE22471	98/11/28
Spectrum Analyzer	Hewlett Packard	8546A	3801A00422	98/11/28
Signal Generator	Wiltron	68369B	664005	99/09/22
Pre-amplifier	Miteq	1-20 GHz	513159	N/A
DC Power Source	Hewlett Packard	6010A	2846A0623	98/10/20
Power Meter	Hewlett Packard	438A	2634A03057	98/10/14
Power Sensor	Hewlett Packard	8481A	1550A07043	99/02/29
Rubidium Source	UTC	2008	A1014	98/11/26
Racal	Universal frequency counter	1996	L0542119	99/04/03
CDMA Cell Site Test Set	Hewlett Packard	8921A	3633A04337	99/01/14
PCS Interface	Hewlett Packard	83236A	3617J00121	99/01/14
Digital Multimeter	Fluke	87	57710270	98/07/11
Log Periodic Antenna	Rohde & Schwarz		355618/010	98/06/10
BILOG Antenna	EMCO	3143	9612-1348	99/06/16
Tunable Notch Reject Filter	K&L	5TNF-00002	23	N/A
Highpass Filter	FSY Microwave	2380-11XNXN	003	N/A
Attenuator (30 dB) 100W	Weinschel	66-30-34	BD8227	N/A
Attenuator (20 dB) 100W	Weinschel	6069	BE1306	N/A
Directional Coupler	Narda	3043B-10	06163	N/A
Environmental Chamber	Scientific Climate	DSW	97817	99/02/28

The maximum frequency deviation was found to be 27.1 Hz or (0.014 ppm). This deviation is more than sufficient to ensure that the fundamental emission stays within the authorized frequency block. Therefore the BTS complies with the requirement.

1.0 Test Procedure

The equipment was configured as shown in Figure 16.

Figure 16: Test Configuration for Frequency Stability



The BTS was configured to transmit at maximum power at channel 25 (1931.25 MHz).

At 20 centigrade ambient temperature, measurements were made with the primary supply voltage set to 85, 100 and 115 percent of the nominal value. The nominal primary supply voltage for the RFM was -48 VDC.

The BTS was subjected to ambient temperatures from -30 to +50 centigrade at intervals of 10 centigrade. A period of at least 3 hours was allowed prior to measurement to ensure that the all of the components of the oscillator circuit had stabilized at each temperature.

At each of the above specified ambient temperatures, the maximum carrier deviation

The reference level for spurious radiation was taken with reference to an ideal dipole antenna excited by the rated output power according to the following relationship:

$$E\left(\frac{V}{m}\right) = \frac{1}{R(m)} \bullet \sqrt{30 \bullet Pt \bullet G}$$

Where,

E = Field Strength in Volts/meter,
R = Measurement distance in meters,
Pt = Transmitter Rated Power in Watts,
G = Gain of Ideal ~~Dipole~~ (linear) isotropic for part 24 E

Therefore:

$$E\left(\frac{V}{m}\right) = \frac{1}{10} \bullet \sqrt{30 \bullet 31.6 \bullet \cancel{1.64}\ 1.0}$$

E = 3.94 V/m = 131.9 dBμV/m

The spurious emissions must be attenuated by at least 43 + 10 log (31.6) = 58 dB

Therefore the field strength limit at 10 meters is:

E = 131.9 dBμV/m - 58 dB = 73.9 dBμV/m

And at 3 meters is:

E = ~~84.4~~ 82.2 dBμV/m

Name of Test:2.993 Field Strength of Spurious Radiation

1.0 FCC Requirements

1.1 FCC Part 24.238

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

1.2 FCC Part 2.993

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

1.0 Test Results

Table 5 shows the results for radiated spurious emissions measurements.

Table 5: Test Results for Spurious Emissions

Frequency (MHz)	Antenna Polarization	Measured Level (dBµV)	Correction Factor (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m) @ 3m
18800.6072	Horizontal	21.5	52.1	73.6	~~84.4~~ 82.2
18800.60	Vertical	21.0	52.1	73.1	~~84.4~~ 82.2

EIRP not ERP

The field strength is calculated by adding the correction factor to the measured level to obtain the corrected level. A sample calculation is as follows:

$\text{Correction Factor}_{(dB)} = \text{Cable Losses}_{(dB)} + \text{Antenna Factor}_{(dB)} - \text{pre-amplifier gain}_{(dB)}$

$\text{Correction Factor}_{(dB)} = 29.7 \text{ dB} + 47.0 \text{ dB} - 24.6 \text{ dB} = 52.1 \text{ dB}$

$\text{Corrected Level}_{(dB\mu V/m)} = \text{Measured Level}_{(dB\mu V/m)} + \text{Correction Factor}_{(dB)}$

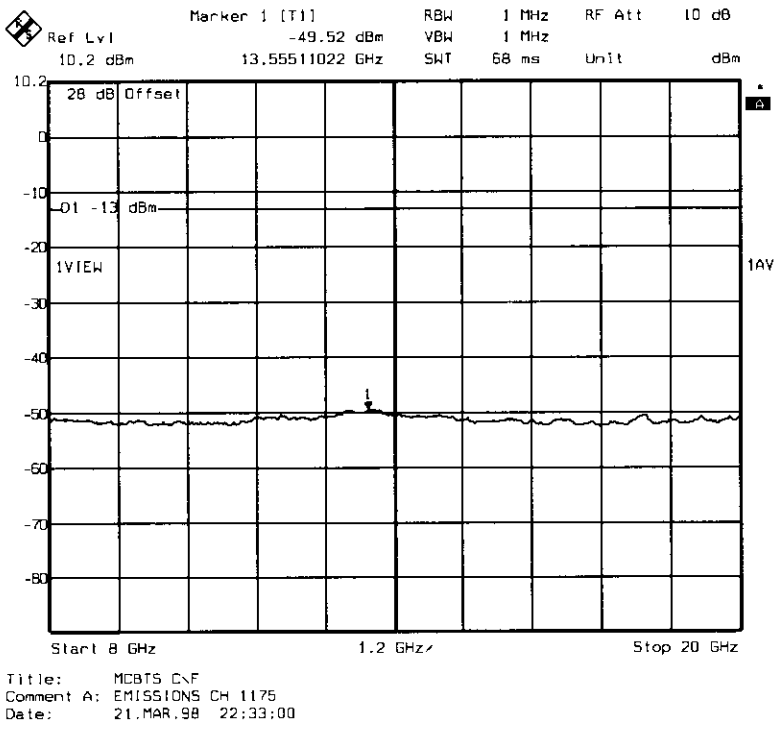
Corrected Level = 21.5 + 52.1 = 73.6 dBµV/m

All spurious emissions were below the limit by greater than 20 dB except for those recorded in Table 5. The BTS complies with the requirement.

1.0 Test Procedure

The equipment was configured as shown in Figure 15.

Figure 13: Sample Plot for 8 - 20 GHz Span



From the results shown in Table 4, the BTS complies with the requirement.

1.0 Test Procedure

The equipment was configured as shown in Figure 14.

Figure 11: Sample Plot for 0 - 3 GHz Span

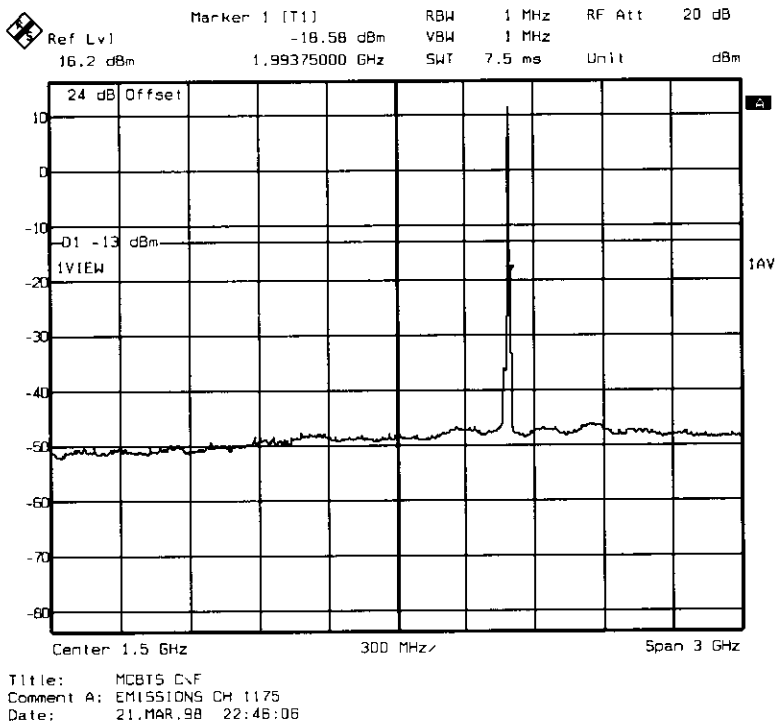


Figure 9: Sample Plot for Ch. 1175 (1991 - 1994 MHz)

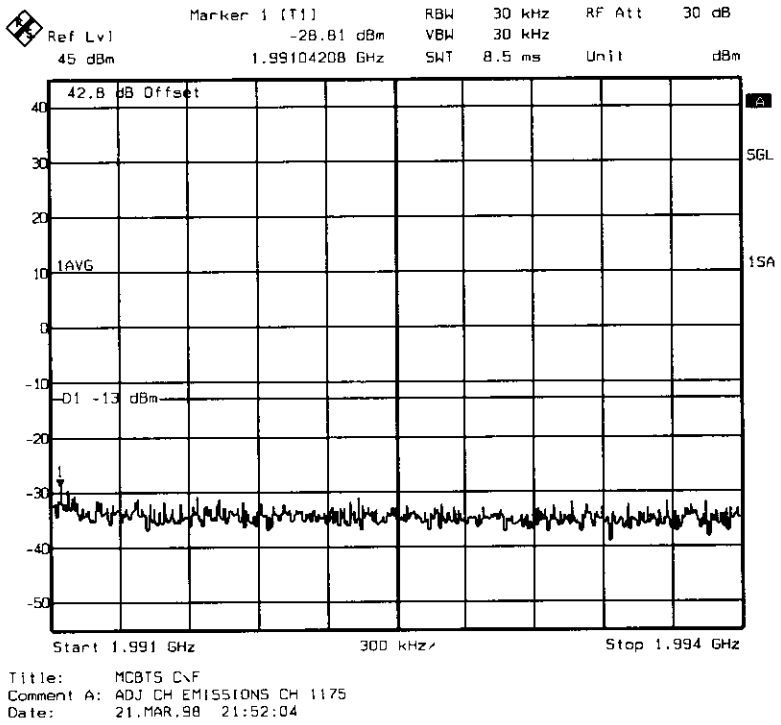


Figure 7: Sample Plot for Ch. 25 (1926 - 1929 MHz)

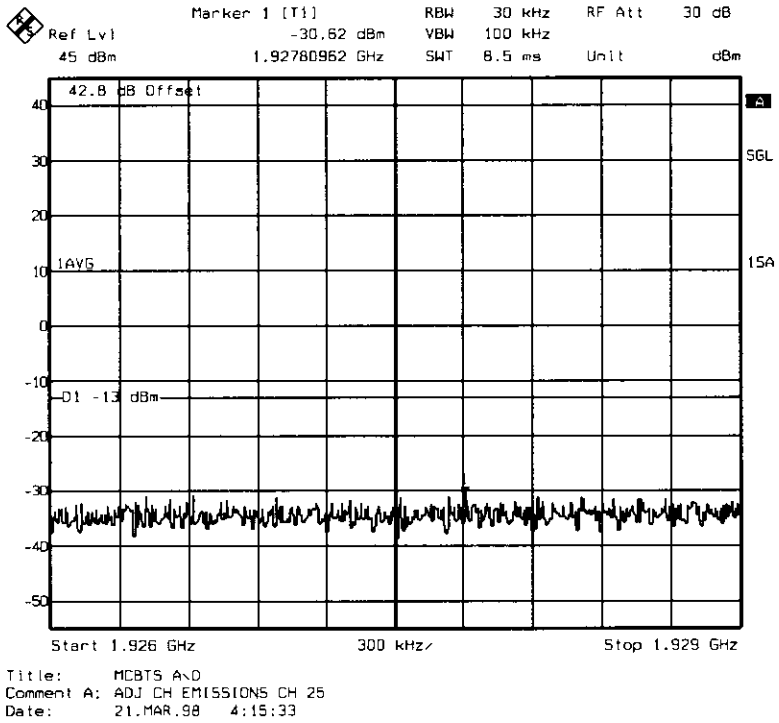


Table 4 shows the results for Spurious Emissions at Antenna Terminals.

Table 4: Test Results for Spurious Emissions at Antenna Terminals

Frequency (MHz)	Spurious Emissions Level (dBm)	Limit (dBm)	Margin (dB)
(@Ch. 25)	-14.8 (1st Adjacent MHz)	-13	1.8
(@Ch. 375)	-13.9 (1st Adjacent MHz)	-13	0.9
(@Ch. 425)	-14.7 (1st Adjacent MHz)	-13	1.7
(@Ch. 775)	-14.7 (1st Adjacent MHz)	-13	1.7
(@Ch. 825)	-14.5 (1st Adjacent MHz)	-13	1.5
(@Ch. 1175)	-14.0 (1st Adjacent MHz)	-13	1.0
0 - 3000	-28.0 @ 1983.78 MHz (Tx- 4.97 MHz)	-13	15.1
3000 - 8000	-35.6 @ 3.977 GHz (2Tx)	-13	33.4
8000 - 20000	-49.5 (noise floor)	-13	36.7

Notes:

Figure 6 and Figure 7 show sample plots for the case when the transmitter was tuned to Channel 25 (lowest channel in Tx band).

Figure 8 and Figure 9 show sample plots for the case when the transmitter was tuned to Channel 1175 (highest channel in Tx band).

Figure 10 shows a sample plot for the case when the transmitter was tuned to Channel 375 (highest channel in Blocks A&D).

Figure 11 to Figure 13 show sample plots for frequency spans from 0 to 20 GHz

Name of Test:2.991 Spurious Emissions at Antenna Terminals

1.0 FCC Requirements

1.1 FCC Part 24.238

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

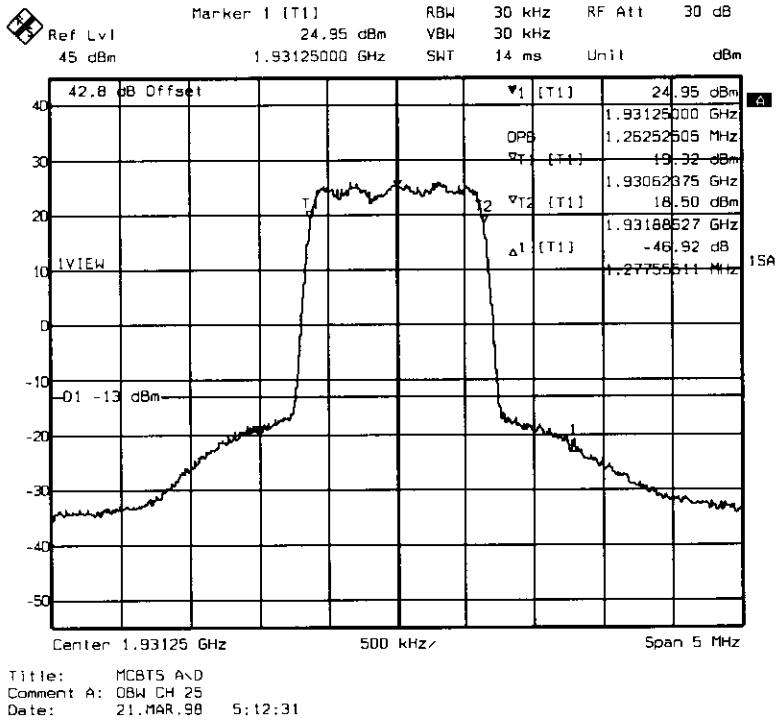
(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

1.0 Test Results

The emission bandwidth was found to be 1402.8 kHz. A sample plot for the emission bandwidth measurement is shown in Figure 5. This value was used to determine the resolution bandwidth required for measurements in the first adjacent MHz outside the licensee's frequency block.

Figure 3 shows a sample plot for case of the maximum measured occupied bandwidth. The maximum occupied bandwidth was found to be 1262.5 KHz.

Figure 3: Sample Plot for Occupied Bandwidth



1.0 Test Procedure

The equipment was configured as shown in Figure 4.

Figure 4: Test Configuration for Occupied Bandwidth

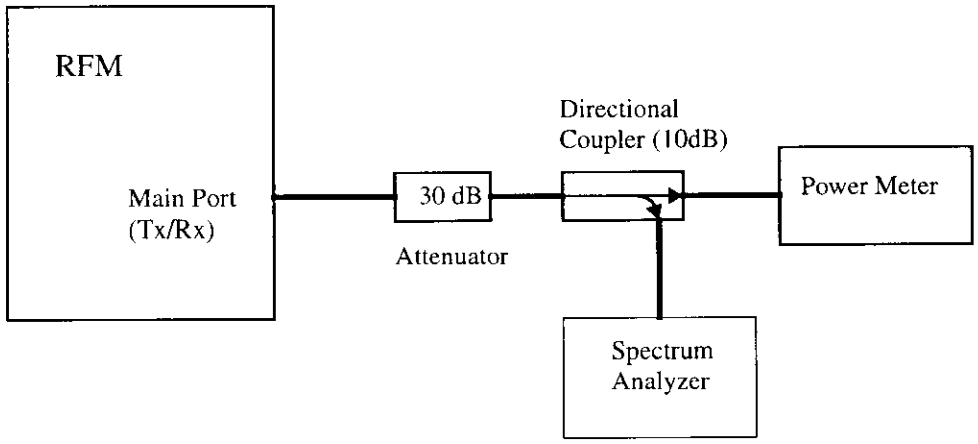


Table 2: Test Results for RF Output Power

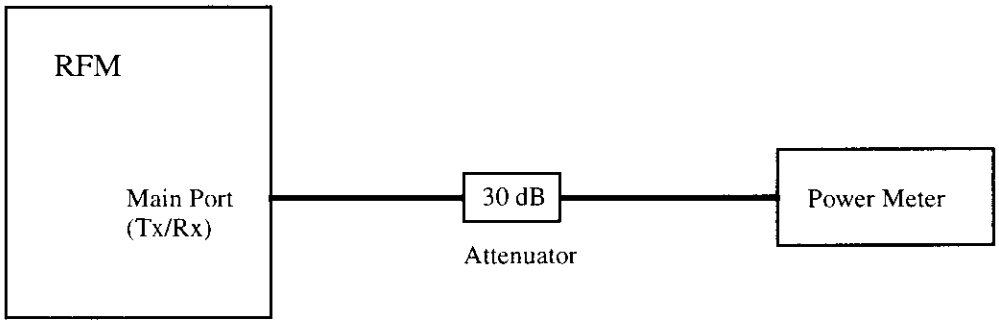
Channel #	Frequency (MHz)	Measured RF Output Power (dBm)	Maximum Rated Power (dBm)	Limit (dBm)
850	1972.50	43.9	44.0	50
875	1973.75	44.0	44.0	50
925	1976.25	44.0	44.0	50
1050	1982.50	44.0	44.0	50
1175	1988.75	43.9	44.0	50

From the results shown in Table 2, the BTS complies with the requirement.

1.0 Test Procedure

The equipment was configured as shown in Figure 2.

Figure 2: Test Configuration for RF Output Power



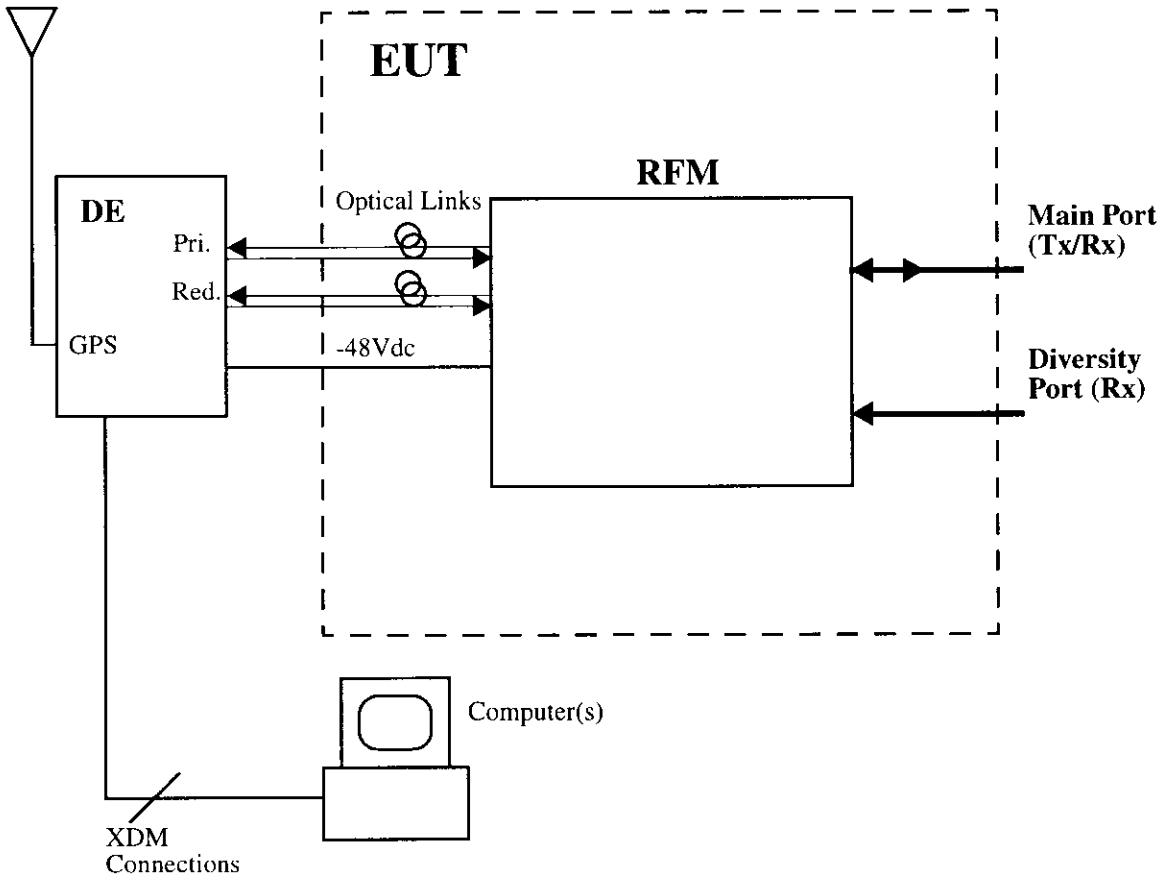
The BTS was configured to transmit at maximum power. Measurements were made at frequencies which were at the bottom, middle and top of each of the licensed blocks.

The output power was measured using a Hewlett Packard power meter Model 438A

General Test Setup

Figure 1 shows the general test setup used during testing of the BTS.

Figure 1: General Test Setup



The base station was configured as detailed in the Technical Description (Exhibit B). The base station forward channel was configured with multiple code channels active simultaneously as described in Table 6.5.2-1 (Base Station Test Model) of ANSI J-STD-019 Recommended Minimum Performance Requirements for Base Stations Supporting 1.8 to 2.0 GHz Code Division Multiple Access (CDMA) Personal Stations

Measurement Results

The following section contains the measurement results.