

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 attests to the accuracy of the measurement data contained in this document.



Stephen Cassidy
Radio Compliance Engineer
Nortel Technology

July 17/98

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	42.4	42.4	50
150	1937.50	42.4	42.4	50
275	1943.75	42.3	42.4	50
325	1946.25	42.1	42.4	50
350	1947.50	42.1	42.4	50
375	1948.75	42.2	42.4	50
425	1951.25	42.2	42.4	50
550	1957.50	42.2	42.4	50
675	1963.75	42.3	42.4	50
725	1966.25	42.3	42.4	50
750	1967.50	42.4	42.4	50
775	1968.75	42.4	42.4	50
825	1971.25	42.3	42.4	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

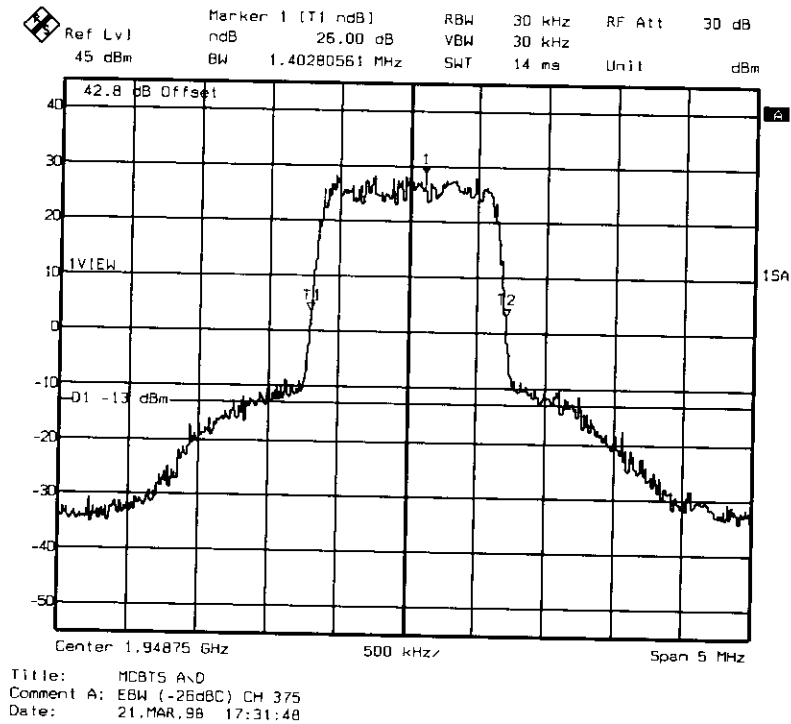
Channel #	Frequency (MHz)	Measured Occupied Bandwidth (KHz)
25	1931.25	1262.5
150	1937.50	1262.5
275	1943.75	1262.5
325	1946.25	1262.5
350	1947.50	1262.5
375	1948.75	1262.5
425	1951.25	1262.5
550	1957.50	1262.5
675	1963.75	1262.5
725	1966.25	1262.5
750	1967.50	1262.5
775	1968.75	1262.5
825	1971.25	1262.5
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 (42.4 dBm = 17.4 Watts). Therefore the spurious emissions must be attenuated by at least $43 + 10 \log (17.4) = 55.4$ dB. The measured output power was 42.4 dBm; therefore the limit is $42.4 - 55.4 = -13$ dBm.

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

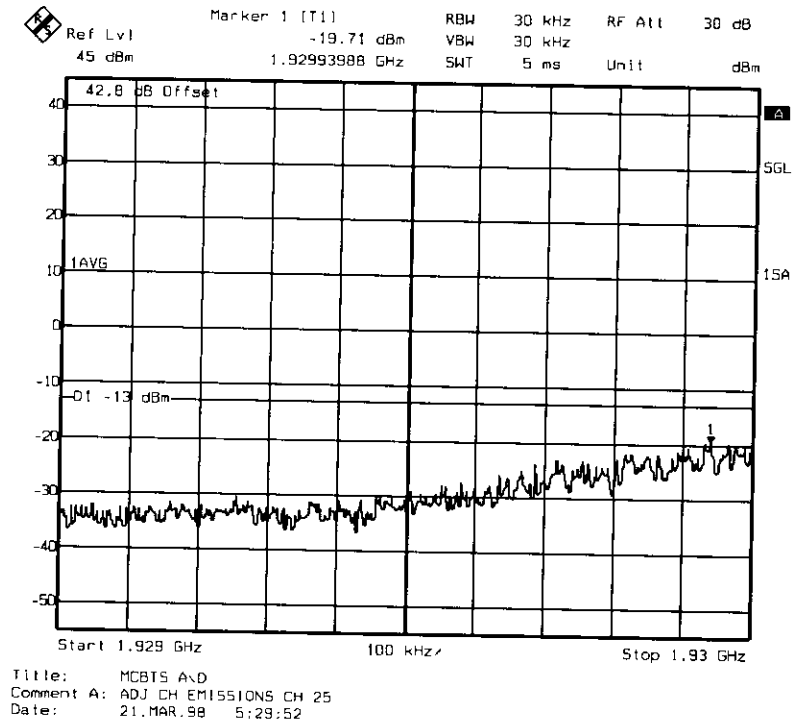


Figure 8: Sample Plot for Ch. 1175 (1st Adjacent MHz)

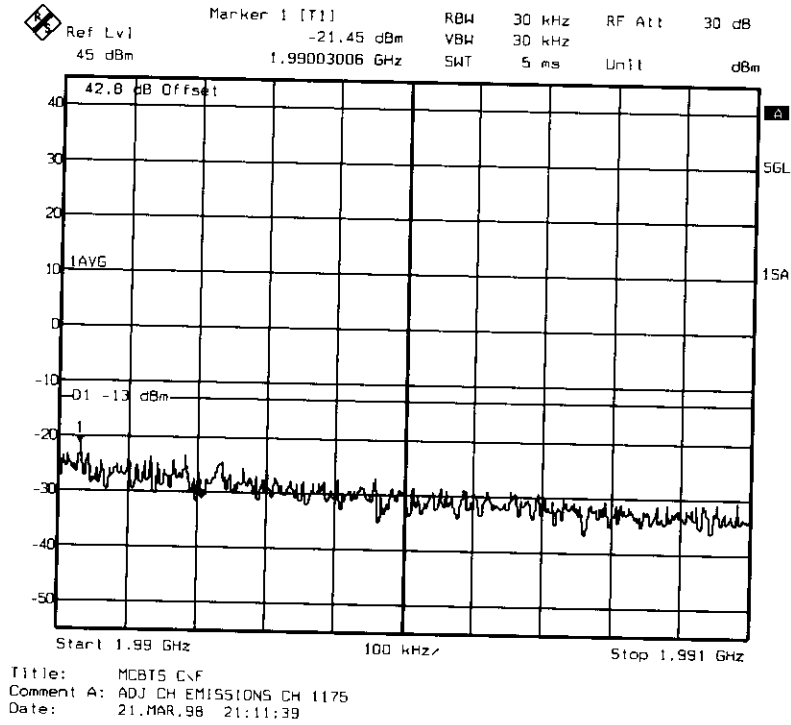


Figure 10: Sample Plot for Ch. 375 (5 MHz Span)

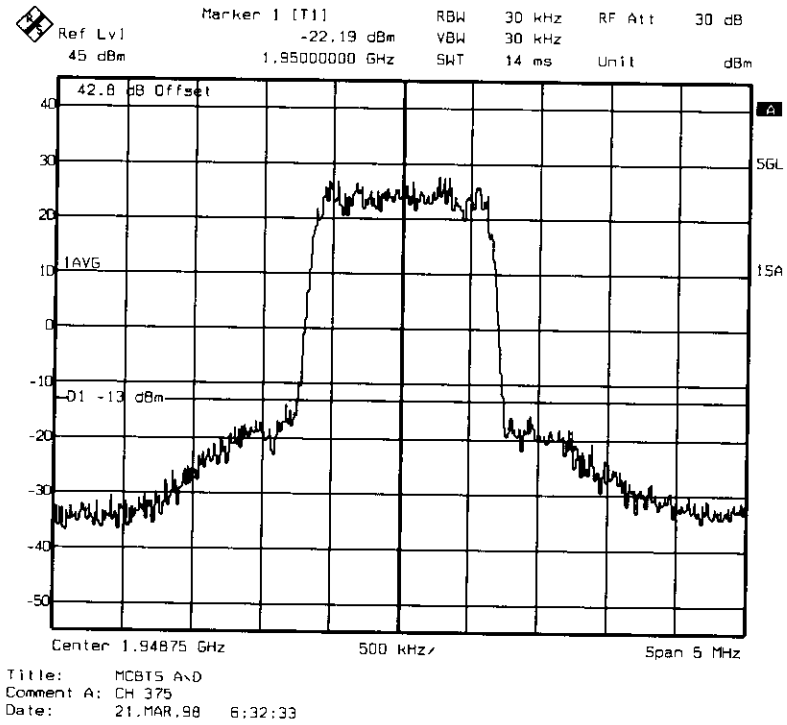


Figure 12: Sample Plot for 3 - 8 GHz Span

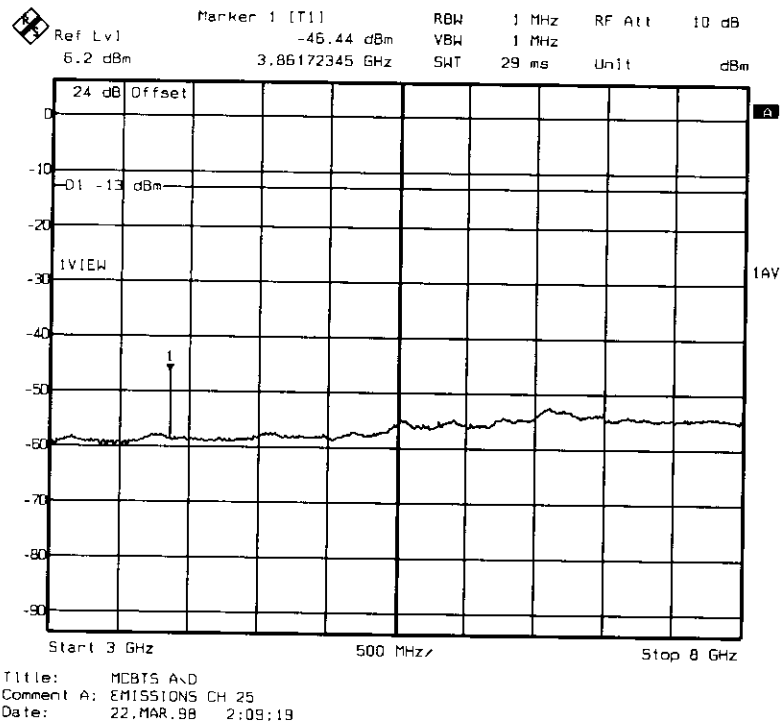
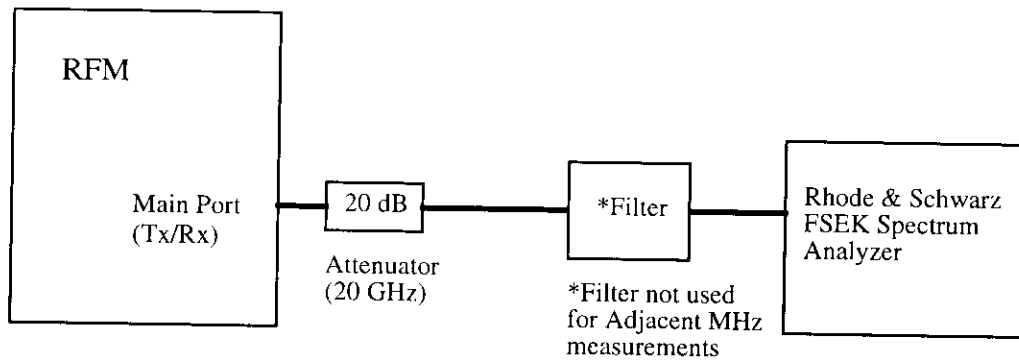


Figure 14: Test Configuration for Spurious Emissions at Antenna Terminals



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.

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:

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

Where,

E = Field Strength in Volts/meter,

R = Measurement distance in meters,

P_t = Transmitter Rated Power in Watts,

G = Gain of Ideal Dipole (linear)

Therefore:

isotropic for 24E

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

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~~ dBμV/m

82.2

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 -