

# **EXHIBIT 2**

## **Test Report Summary**

**Applicant: Nortel Networks**

**For Original Equipment  
Certification on:**

**AB6NT800MFRM2-CG**



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## Test Report Summary for Original Equipment Authorization

**FCC ID : AB6NT800MFRM2-CG Multi-carrier Flexible Radio Module**

**Document:** TRS\_AB6NT800MFRM2-CG

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## 1. Introduction

This test report is submitted in accordance with the FCC Rules and Regulations, Part 2, Subpart J, Sections 2.1046 through 2.1057 for equipment authorization of Nortel Networks' CDMA 800 MHz Multi-carrier Flexible Radio Module 2 (MFRM2). The 800 MHz\_MFRM2 is intended for use in the Domestic Public Cellular Radio Telecommunications Service and is designed in accordance with the following standards:

- *CFR 47, Part 22, Subpart H, Subpart H, Cellular Radiotelephone Service[1]*
- *CFR 47, Part 2, Subpart J, Equipment Authorization Procedures - Equipment Authorization[2]*

## 2. Test Result Summary

Table 1 summarizes the measurement results for the CDMA 800 MHz MFRM2.

**Table 1: Test Results Summary**

FCC Measurement Specification	FCC Limit Specification	Description	Results	Test(s) Conducted by	Remarks
2.1033(c)(8)		Measurement of DC Power	Provided	Nortel Networks	
2.1046		RF Output Power	Provided	Nortel Networks	See Exhibit 2A
2.1047		Modulation Characteristics	Not Applicable		
2.1049		Occupied Bandwidth	Provided	Nortel Networks	See Exhibit 2A
2.1051, 2.1057	22.917	Spurious Emission at Antenna Terminals	Compliant	Nortel Networks	See Exhibit 2A
2.1053, 2.1057	22.917	Field Strength of Spurious Radiation	Compliant	Sanmina Canada ULC	See Exhibit 2B
2.1055	22.355	Frequency Stability	Compliant	Nortel Networks	See Exhibit 2A

## 2. Engineering Declaration

The CDMA 800 MHz MFRM2 (Multi-carrier Flexible Radio 2) has been tested in accordance with the requirements contained in the Federal Communication Rules and Regulations Part 2 and 22.

To the best of my knowledge, these tests were performed in accordance with good engineering practices using measurement procedures consistent with industry or commission standards or previous Commission correspondence or guidance and demonstrate that this equipment complies with the appropriate standards. All tests (including tests performed by Sanmina Canada ULC) were conducted on a representative sample of the equipment for which type acceptance/certification is sought.

Report Prepared by

  
Signature

Thomas Wong  
Regulatory Prime  
Nortel Networks  
Calgary, Alberta

Feb 11, 2004

### **3. Type Acceptance Application Requirements**

#### **3.1 Name of Applicant**

The applicant is Nortel Networks Inc.

#### **3.2 Identification of Equipment**

The equipment in this application for type acceptance is the Nortel's CDMA 800 MHz MFRM2 (Multi-carrier Flexible Radio Module 2). The 800MHz MFRM2 is marketed under the model NT800MFRM2. The FCC ID number sought is AB6NT800MFRM2-CG.

#### **3.3 Quantity Production**

The 800 MHz MFRM2 will be produced in quantity.

#### **3.4 Technical Description**

See Exhibit 3.

#### **3.5 Type of Emissions**

The 800MHz MFRM2 Assembly is designed to operate in digital mode. The emission type is F9W for IS95 and IS2000, and D9W for IS856. The emission designators for IS95 and IS2000 are 1M25D9W (1 Channel), 2M50D9W (2 Channels) and 3M73D9W (3 Channels). The emission designators for IS856 are 1M25D9W (1 Channel), 2M50D9W (2 Channels) and 3M73D9W (3 Channels). Testing was conducted in single channel, two channel, and 3 channel mode to determine compliance. The emission designators were calculated based on requirements of FCC Rule Part 2, Subpart C - Emissions, section 2.201 and Section 2.202.

#### **3.6 Frequency Range**

The 800 MHz MFRM2 operates in the 800 MHz cellular band where the operating frequency ranges are 824 – 849 MHz for the receiver and 869 - 894 MHz for the transmitter. The following table shows the CDMA channels within this band meeting FCC requirements based on single carrier mode. (for multi-carrier mode, the center frequency of the carrier closest to the band edge is used).

Band	CDMA Channel Number	Transmitter Center Frequency Assignment for Base Station (MHz)	Channel Meeting FCC Requirements
A'' + A	991-1014	869.040-869.730	Non-compliance
	1015-308	869.760-879.240	Compliance
	309-333	879.270-879.990	Non-compliance
B	334-357	880.020-880.710	Non-compliance
	358-642	880.740-889.260	Compliance
	631-666	889.290-889.980	Non-compliance
A'	667-691	890.010-890.730	Non-compliance
	692	890.760	Compliance
	693-716	890.790-891.480	Non-compliance
B'	717-741	891.510-892.230	Non-compliance
	742-775	892.260-893.250	Compliance
	776-799	893.280-893.970	Non-compliance

### 3.7 Range of Operating Power

The 800 MHz MFRM2 range of operating RF power is 0 dBm to 47.3 dBm . The maximum RF power output is 47.3 dBm..

### 3.8 Complete Circuit Diagrams

The Tx chain of the 800 MHz MFRM2 radio system for certification is made up of MFRM2 (consists of radio and PA portions) and DPM (an OEM equipment). Exhibit 8 contains the schematics of circuit cards inside the MFRM2 and Exhibit 9 contains the parts lists of the circuit cards inside MFRM2.

### 3.9 Tune-up Procedure

The tune-up tests will be performed as part of the factory testing on the MFRM2. This procedure includes power output levels, spurious emissions, and occupied bandwidth. There are no end-user adjustments that will have any effect on these settings. No tune-up testing is required in the field.

### 3.10 Circuit Description for Frequency Determining and Stabilizing

The Global Positioning Satellite Timing Module (GPSTM) is the primary clock source in the system. It consists of two outputs:

EVEN\_SEC Clock and,  
SYS\_CLK (at 8fc or 9.8304 MHz)

In addition, the GPSTM has a 10 MHz reference output that can be used to synchronize external measurement equipment during system testing.

The GPSTM distributes the primary clock signals directly to the Control Module (CM) and the CORE modules (see Exhibit 3) which in-turn distribute the clock signals to the digital modules and to the MFRM2 via the high speed optical link.

The GPSTM has a frequency stability of better than 1.0 part per billion.

### **3.11 Circuit Description for Suppression of Spurious Radiation**

The Tx band pass filter in the DPM provides out of band emission rejection and permits only signals in the Tx band to the antenna for emission. The close inband spurs are being taken care of by the BBPD (Band Band Pre-Distortion) circuitry in the MFRM2.

### **3.12 Circuit Description for Limiting Modulation**

This systems employs digital modulation techniques producing CDMA forward and reverse channel air interfaces which are compatible with IS 95A, IS2000, and IS856 technical standards.

## **4. Test Methods and Test Results**

### **4.1 Measurement of DC Power**

#### ***Section 2.1033(C)(8)***

*The DC voltages applied to and DC currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.*

#### **Response:**

Final Output Transistor: It has four final stage power transistors in parallel. The final state output power transistors each draw average about 3.85A @ 27Vdc.

### **4.2 Tests performed by Nortel Networks**

#### **RF Power Output for IS95, IS2000, and IS856**

The maximum measured RF output power was 47.34 dBm for single carrier.

The maximum measured RF output power was 47.31 dBm for two carriers.

The maximum measured RF output power was 47.35 dBm for three carriers.

#### **Occupied Bandwidth for IS95, IS2000, and IS856**

The maximum measured occupied bandwidth was 1258 KHz for single carrier.

The maximum measured occupied bandwidth was 2463 KHz for two carriers.

The maximum measured occupied bandwidth was 3671 KHz for three carriers (including mix modulation modes).

#### **Spurious Emissions at Antenna Terminals for IS95, IS2000, and IS856**

The minimum pass margin for one, two and three carrier(s) is:

1 MHz upper and lower band edge measurements was 10.62 dB

1 MHz to 10 GHz measurements was 8.16 dB.

#### **Frequency Stability**

The frequency stability over temperature –30 deg to 50 deg C and 85% to 115% of the nominal voltages is 0.0065 ppm.

Please refer to the Exhibit 2A for all test setups and results in details provided by Nortel Networks.

## **4.2 Tests performed by Sanmina Canada ULC**

The tests were performed with six MFRM2 800MHz in the chamber. The maximum number of radios that can be used in the Nortel CDMA basestation system is 12 due to radios being capable to be transmitted closer to the operator's band edge. For the worst case degradation of the margin from 6 to 12 radios should be 6 dB in theory. In practice, it should be about 3 dB. However, 6 dB is used to determine the margin with 12 radios in the system.

### **Radiated Emission Test Results from 30MHz to 1 GHz**

Since no pre-compliance peaks were found within 32 dB of the theoretical limit in the frequency range of 30 MHz – 1GHz, no signals were substituted.

### **Radiated Emission Test Results from 1GHz to 10 GHz**

The minimum pass margin after the substitution method for 6 radios:

31.31 dB for H-Pol
25.27 dB for V-Pol

The minimum pass margin after the substitution method for 12 radios (theoretical worst case):

25.31 dB for H-Pol
19.27 dB for V-Pol

Please refer to the Exhibit 2B for all test setups and results in details provided by Sanmina Canada ULC.