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MPBT Report No.: n01e2969 Rev: 1 Date: 21 March 2004

Report for Emissions Testing of Indoor Compact Metro Cell In accordance with FCC Part 2.1053

Test Personnel: David Raynes

Prepared for: Nortel Networks
Westwinds Innovation Centre
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David Raynes
Laboratory Supervisor
Electronics Test Centre (Airdrie)
Authorized Signatory

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1.0 INTRODUCTION

1.1 SCOPE

The purpose of this report is to present the findings and results of compliance testing performed in accordance with CFR Title 47 FCC Part 2.1053 and 2.1057.

1.2 APPLICANT

This test report has been prepared for Nortel Networks, located in Calgary, Alberta, Canada.

1.3 APPLICABILITY

All test procedures, limits, and results defined in this document apply to the Nortel Networks Indoor Compact Metro Cell unit, referred to herein as the Equipment Under Test (EUT).

The results contained in this report relate only to the items tested.

This report does not imply product endorsement by NVLAP or the Canadian or US governments.

1.4 TEST SAMPLE DESCRIPTION

The test sample provided for testing was a Indoor Compact Metro Cell:

Detailed information is provided by Nortel Networks in Appendix A.

1.5 GENERAL TEST CONDITIONS AND ASSUMPTIONS

The EUT was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. All inputs and outputs to and from other equipment associated with the EUT were adequately simulated.

Where relevant, the EUT was only tested using the monitoring methods and test criteria defined in this report.

Environmental conditions are recorded for each test.

1.6 SCOPE OF TESTING

Testing was performed in accordance with FCC Parts 2.1053 and 2.1057 (2000), and ANSI C63.4 (2000).

1.6.1 VARIATIONS IN TEST METHODS

There were no variations from the test procedures outlined above.

1.6.2 MARGINAL EMISSIONS MEASUREMENTS

There were no emissions measured to be closer to the specified limits than -6 dB.

1.6.3 TEST SAMPLE CONFIGURATION & MODIFICATIONS

The EUT met the requirements without modifications.

2.0 ABBREVIATIONS

AP -Average Peak
CE -Conducted Emissions
E -Field - Electric Field
H -Field - Magnetic Field
N/T -Not Tested
N/A -Not Applicable
PK -Peak
QP -Quasi Peak
RE -Radiated Emissions

3.0 MEASUREMENT UNCERTAINTY

For Radiated E-Field Emissions and Conducted Emissions, the uncertainties in the measurements were calculated using the methods outlined in the NAMAS document, NIS81: May 1984.

Frequency	= ± 1 kHz
Amplitude (RE)	= ± 4.01 dB
Amplitude (CE)	= ± 3.25 dB

4.0 TEST CONCLUSION

The EUT was subjected to the following tests. Compliance status is reported as **PASS** or **FAIL**. Test conditions that are not applicable to the EUT are marked **n/a**. If testing was not performed at this time, the appropriate field is marked **n/t**.

The following table summarizes the test results in terms of the specification and class or level applied, the unique test sample identification, the EUT modification state, and configuration as applicable.

TEST CASE	TEST TYPE	SPECIFICATION	TEST SAMPLE	MOD. STATE	CONFIGURATION	RESULT
§4.1	Radiated Emissions (Tx Mode)	FCC Part 2.1053 & 2.1057	Indoor Compact Metro Cell	nil	See Appendix A	**PASS**

STATEMENT OF COMPLIANCE

The client equipment referred to in this report was found to comply with the requirements as stated above.

4.1 Transmit Mode: Spurious Radiated Emissions

Test Lab: Electronics Test Centre. Airdrie Test Personnel: David Raynes Date: 2004/02/24 – 2004/03/20	Product: Indoor Compact Metro Cell
Test Result, Indoor Compact Metro Cell (measured from 30 MHz to 10 GHZ): **PASS**	
Specification: FCC Part 2.1053 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. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies... … Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas. Temperature: 19 ° C Relative Humidity: 35 %	Specification: FCC Part 2.1057 (a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below: (1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. (2) If the equipment operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower. (3) If the equipment operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower. (b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked. (c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported. (d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

Spurious Radiated Emissions Data: Substitution Method

The EUT was removed from the test chamber.

An EMCO 3147 log-periodic array antenna was set up at the turntable centre, at a height of 1.5 m. A low-loss cable was connected from this antenna to an RF signal generator in the Control Room.

This Tx antenna was driven at each of the frequencies and polarizations of interest with the RF source fixed at –20 dBm CW. The Rx antenna was scanned between 100 and 400 cm height to maximise the reception at each frequency. The resulting field strength was recorded.

The Tx cable was then connected directly to the measuring system to record the drive level reaching the Tx antenna after cable loss.

This drive level was corrected at each frequency and polarization to derive the power required to achieve the field strength produced by the EUT emissions.

Further correction was applied to calculate the drive level required for a dipole Tx antenna.

Radiated Spurious Emissions Data: 48 VDC Operation

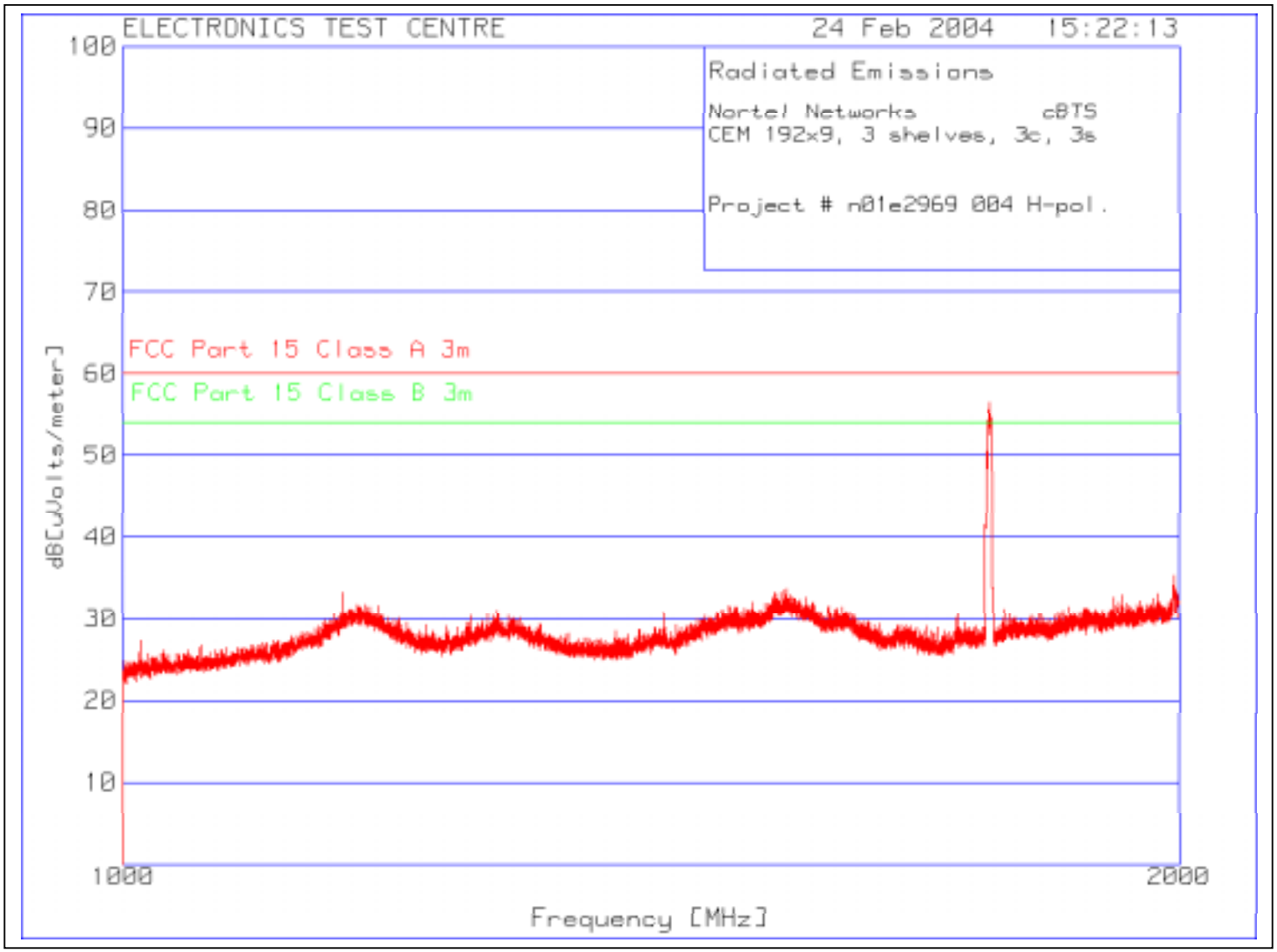
Carrier Harmonic #	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees) (EUT faces Rx Antenna at 120 degrees)	EUT Emission Field Strength (dBµV/m) Peak	Tx Field Strength with CW -20 dBm source (dBµV/m)	Tx Antenna drive corrected for cable loss (dBm)	Tx Antenna Drive (dBm) corrected to match EUT emission	Tx Antenna Gain over standard dipole (Gain dBi - 2.15)	ERP (dBm into Standard Dipole)	ERP Limit (dBm into Standard Dipole)	Δ (dB)
2	1766.51000	H	99	281	56.50	56.40	-32.25	-32.15	7.05	-25.10	-13	**-12.10**
2	1766.31000	V	99	340	55.00	57.46	-32.10	-34.56	6.75	-27.81	-13	**-14.81**
3	2644.43600	H	100	281	53.20	54.50	-34.45	-35.75	7.75	-28.00	-13	**-15.00**
3	2644.43600	V	250	320	50.50	54.68	-34.45	-38.63	7.75	-30.88	-13	**-17.88**
5	4417.88400	H	100	140	44.90	53.34	-39.30	-47.74	8.85	-38.89	-13	**-25.89**
5	4407.89300	V	100	61	43.00	50.12	-39.30	-46.42	8.45	-37.97	-13	**-24.97**
9+	8080.67900	V	250	261	50.80	58.10	-47.50	-54.8	9.55	-45.25	-13	**-32.25**

Radiated Spurious Emissions Data: 24 VDC Operation

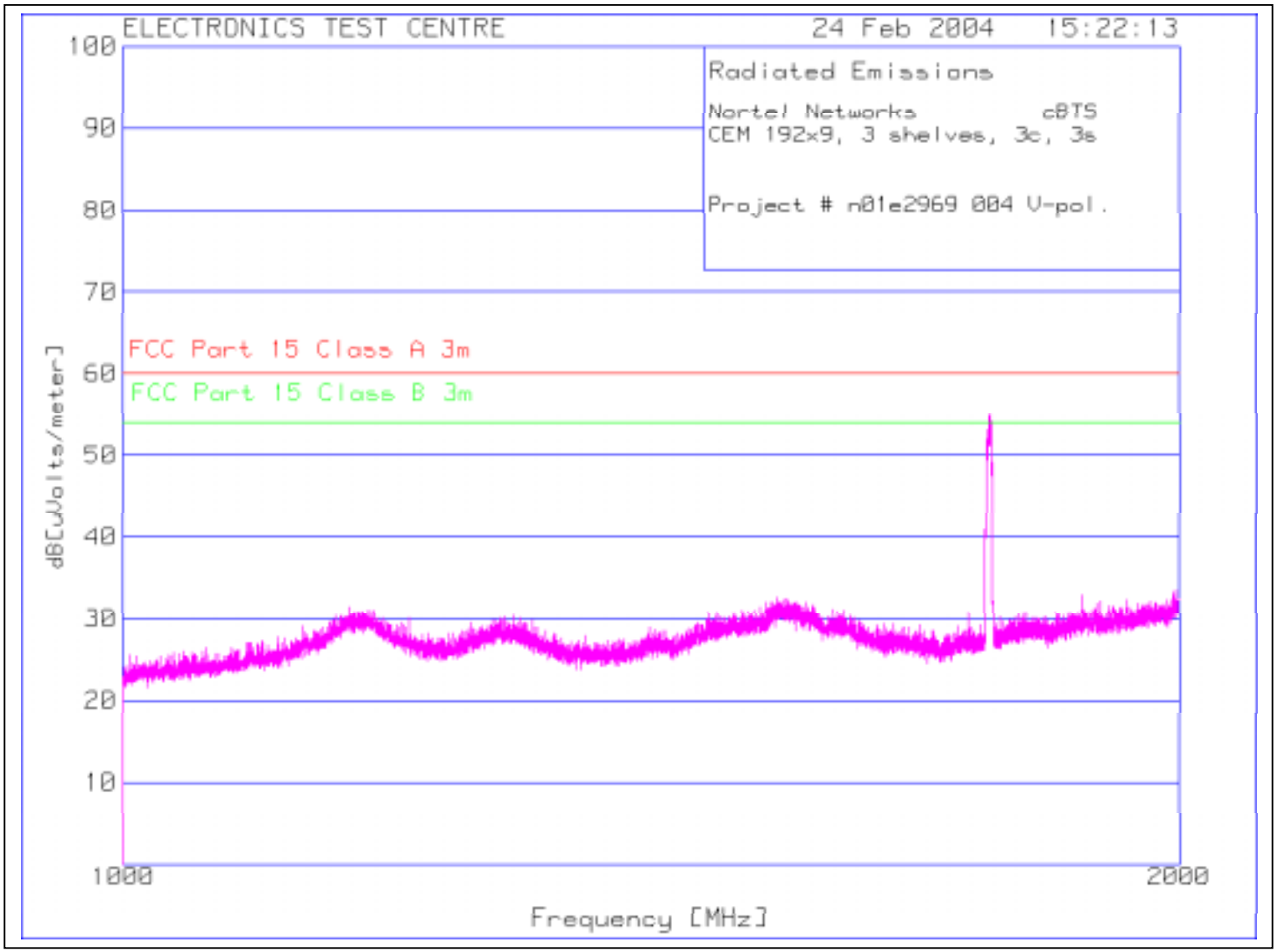
Carrier Harmonic #	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees) (EUT faces Rx Antenna at 120 degrees)	EUT Emission Field Strength (dBµV/m) Peak	Tx Field Strength with CW -20 dBm source (dBµV/m)	Tx Antenna drive corrected for cable loss (dBm)	Tx Antenna Drive (dBm) corrected to match EUT emission	Tx Antenna Gain over standard dipole (Gain dBi - 2.15)	ERP (dBm into Standard Dipole)	ERP Limit (dBm into Standard Dipole)	Δ (dB)
2	1766.91000	H	106	294	51.50	56.40	-32.25	-37.15	7.05	-30.1	-13	**-17.10**
2	1767.60900	V	112	330	52.90	57.45	-32.10	-36.65	6.75	-29.9	-13	**-16.90**
3	2646.43400	H	100	340	28.38	54.52	-34.45	-60.59	7.75	-52.84	-13	**-39.84**
3	2642.43800	V	250	341	23.39	54.65	-34.45	-65.71	7.75	-57.96	-13	**-44.96**

Note: All other emissions were below the measurement system noise floor. Peak system noise is at least 6 dB below the Part 2.1053 limit.

Plot of Radiated Emissions 48 Volt Operation:



Plot of Radiated Emissions 48 Volt Operation:



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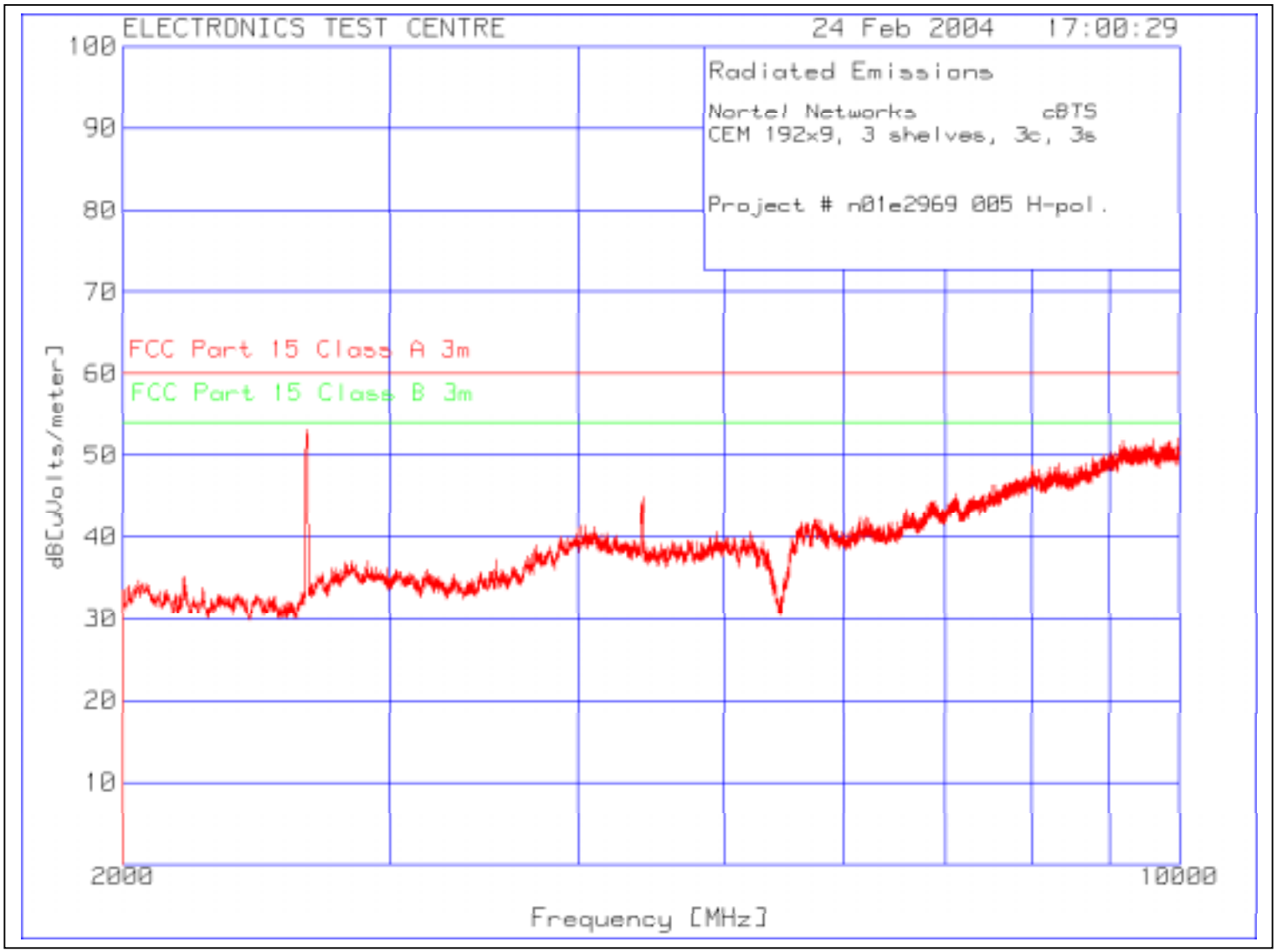

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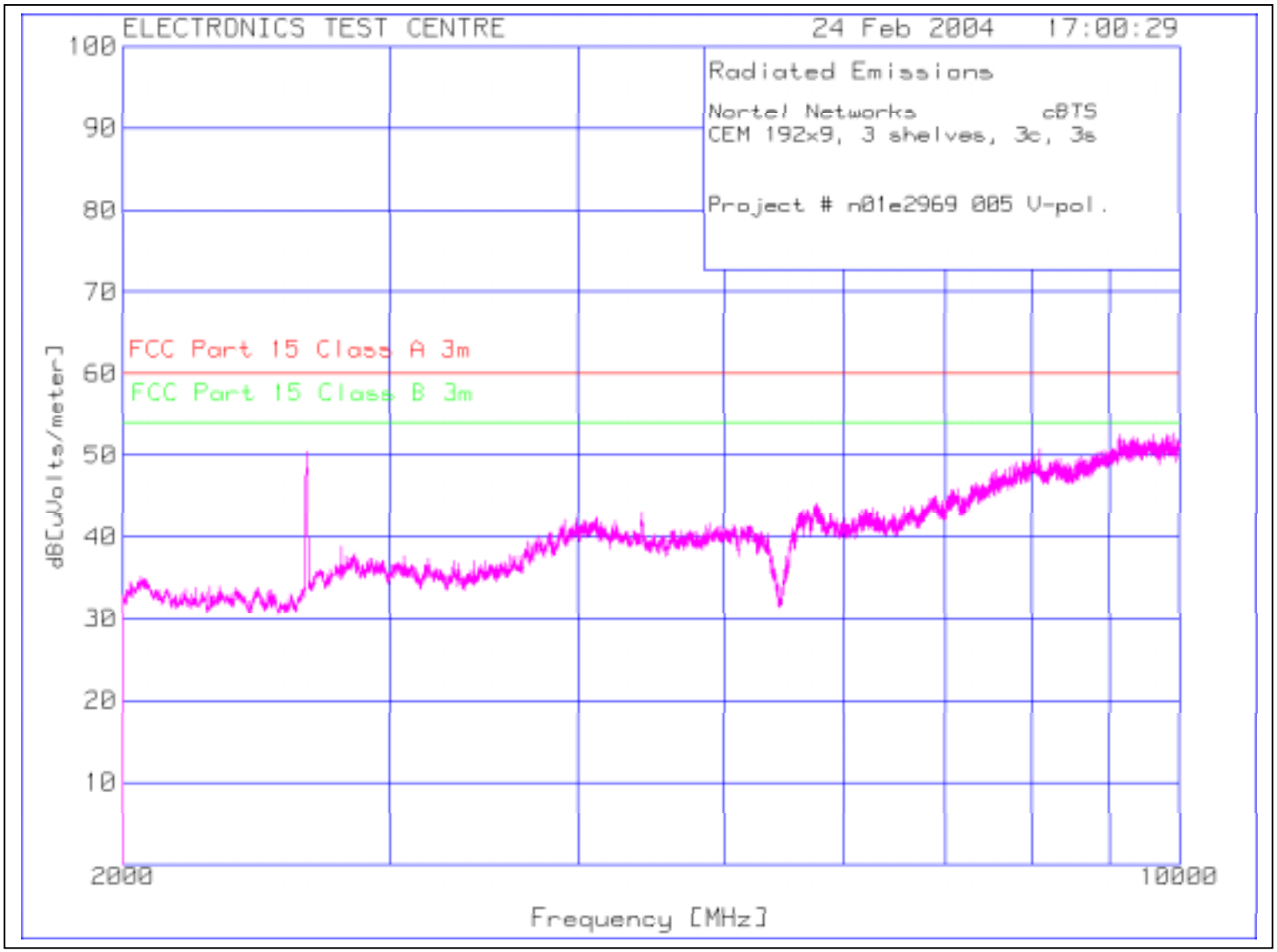
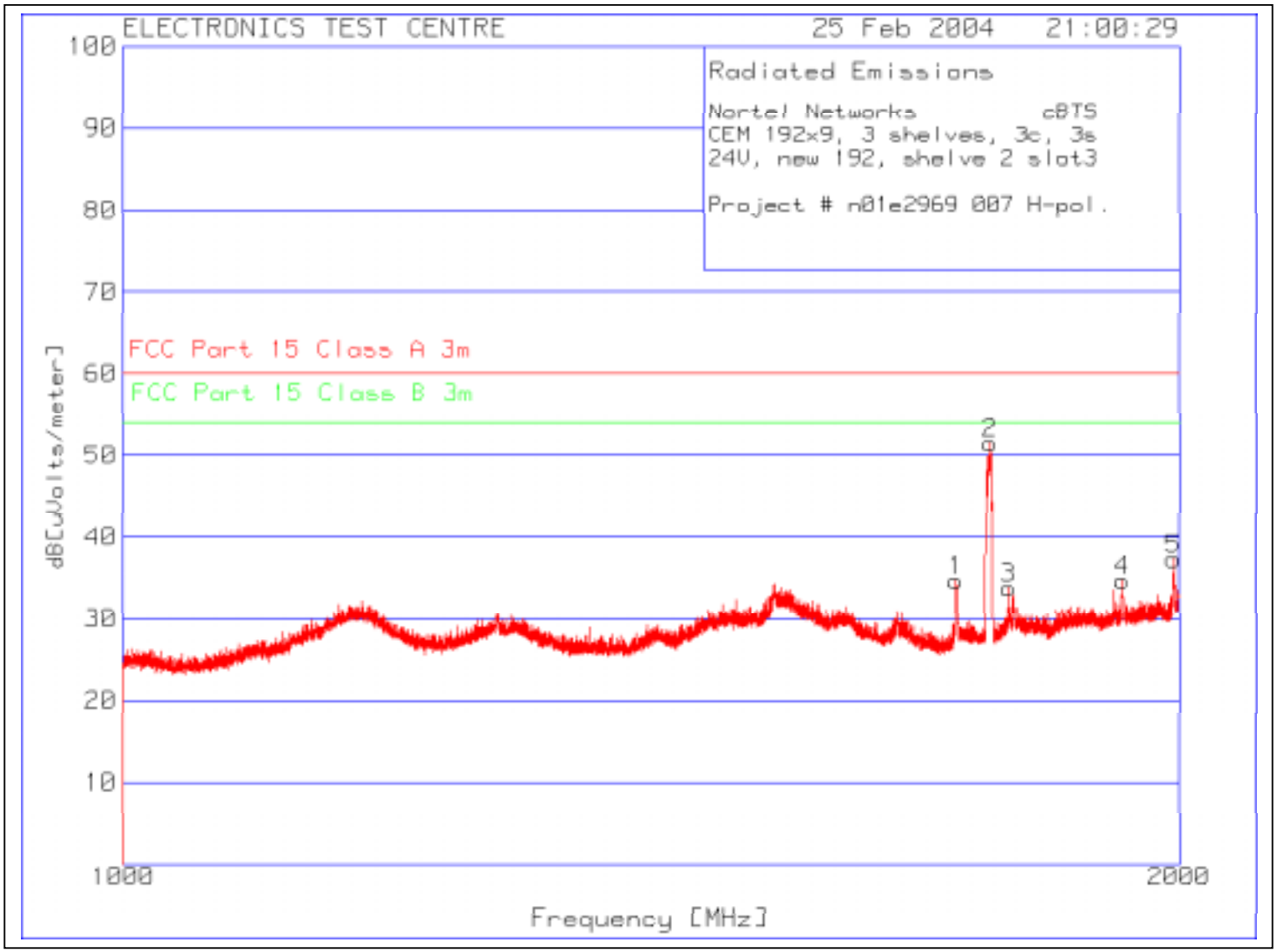
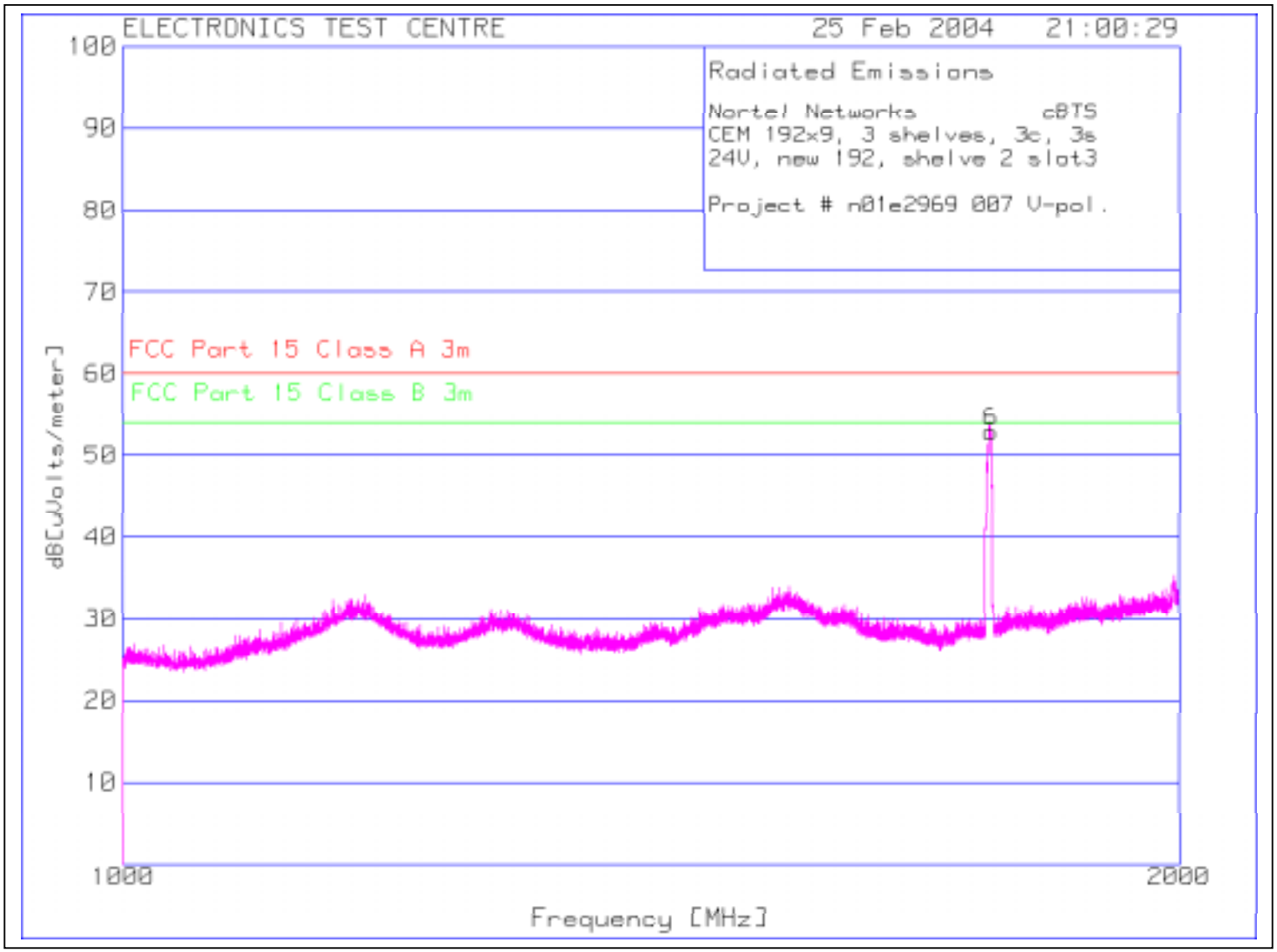


Plot of Radiated Emissions 24 Volt Operation:



Plot of Radiated Emissions 24 Volt Operation:



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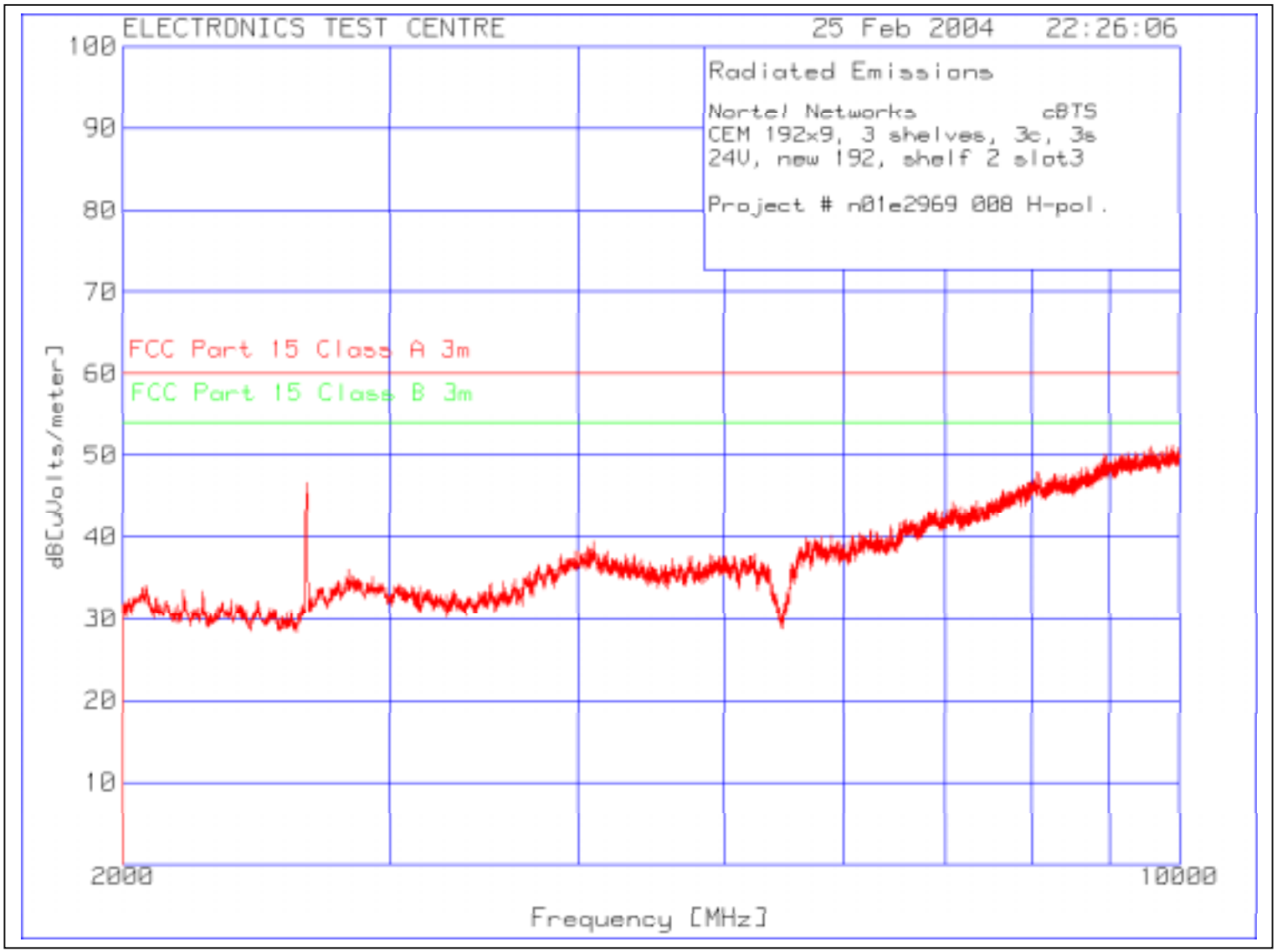
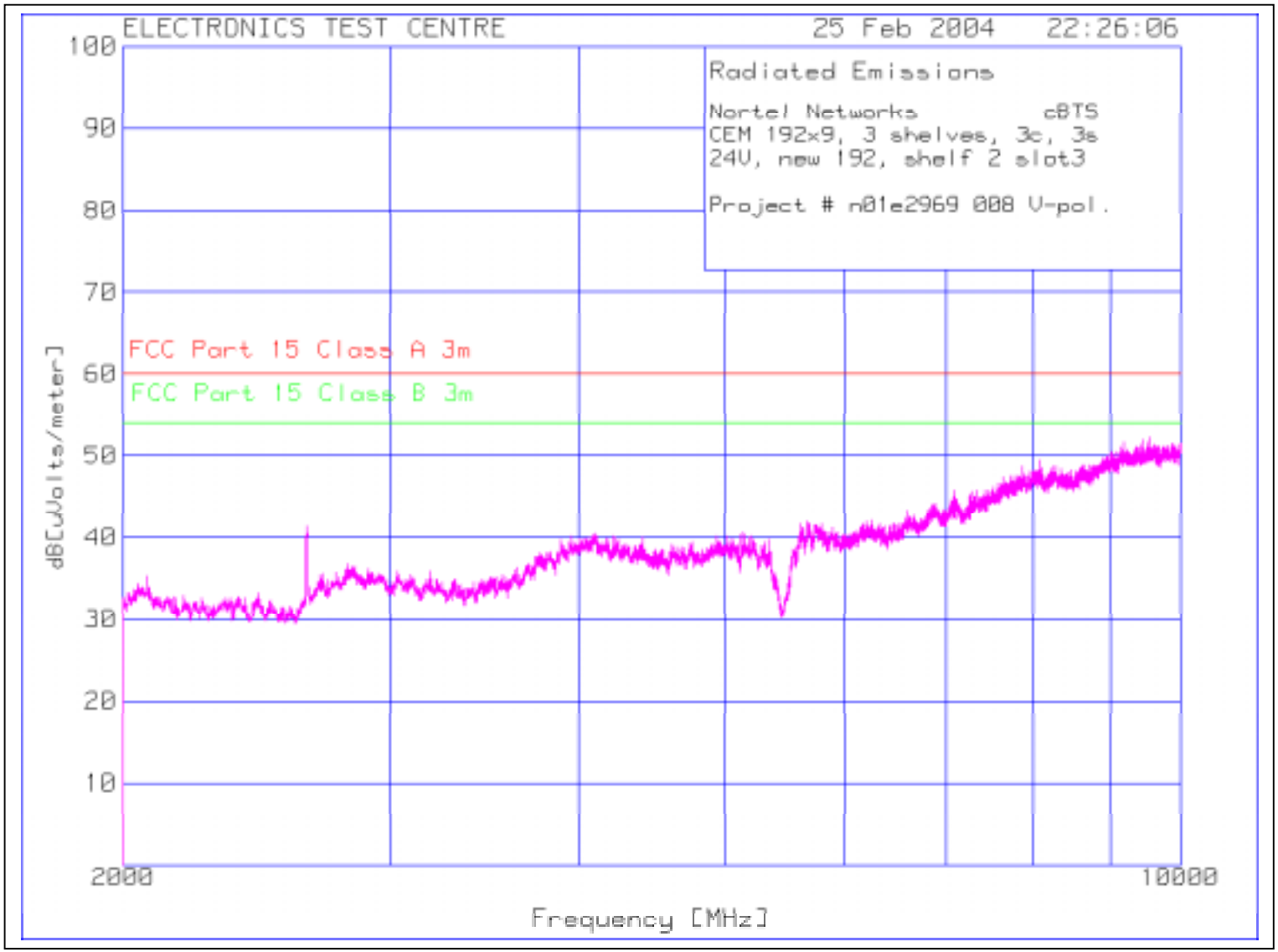
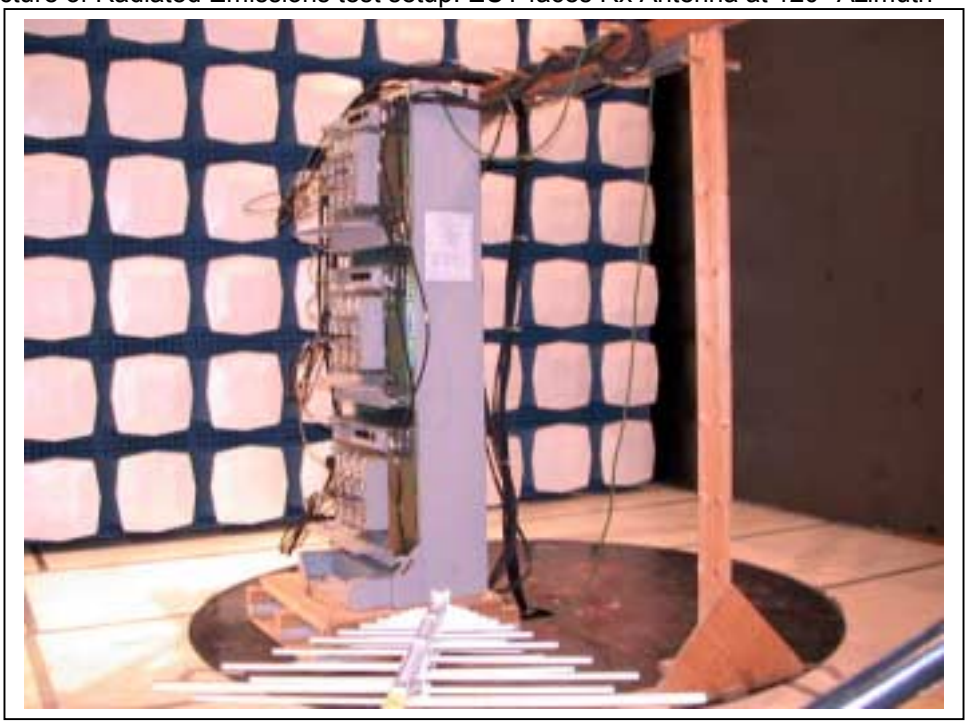


Plot of Radiated Emissions 24 Volt Operation:

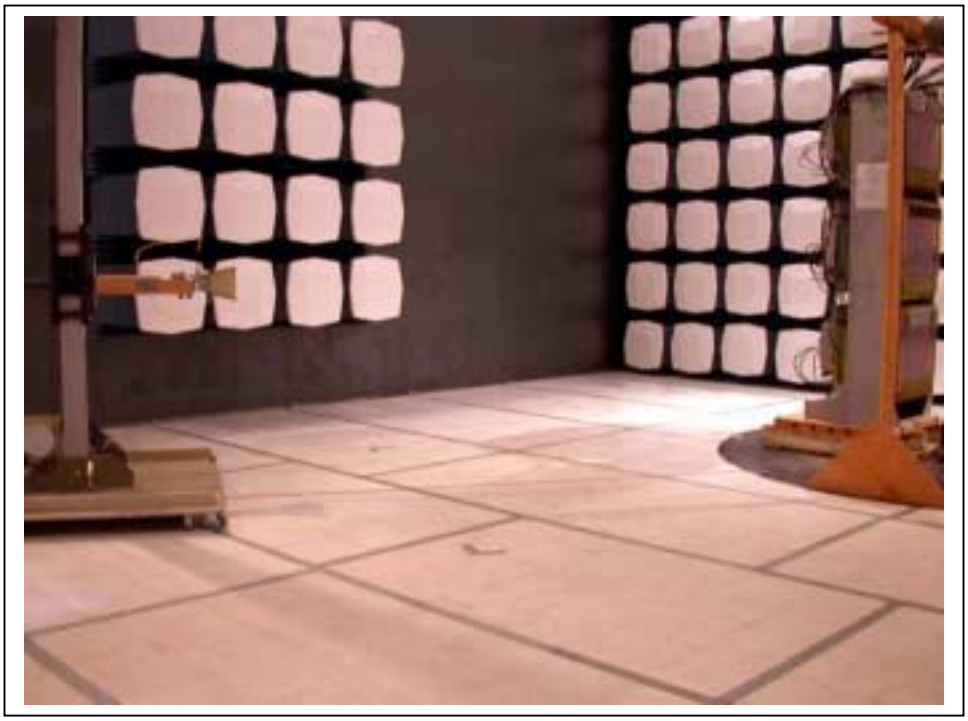


Picture of Radiated Emissions test setup: EUT faces Rx Antenna at 120° Azimuth

Picture of Radiated Emissions test setup: EUT faces Rx Antenna at 120° Azimuth



Picture of Radiated Emissions test setup: EUT faces Rx Antenna at 120° Azimuth



Picture of Radiated Emissions test setup: EUT faces Rx Antenna at 120° Azimuth

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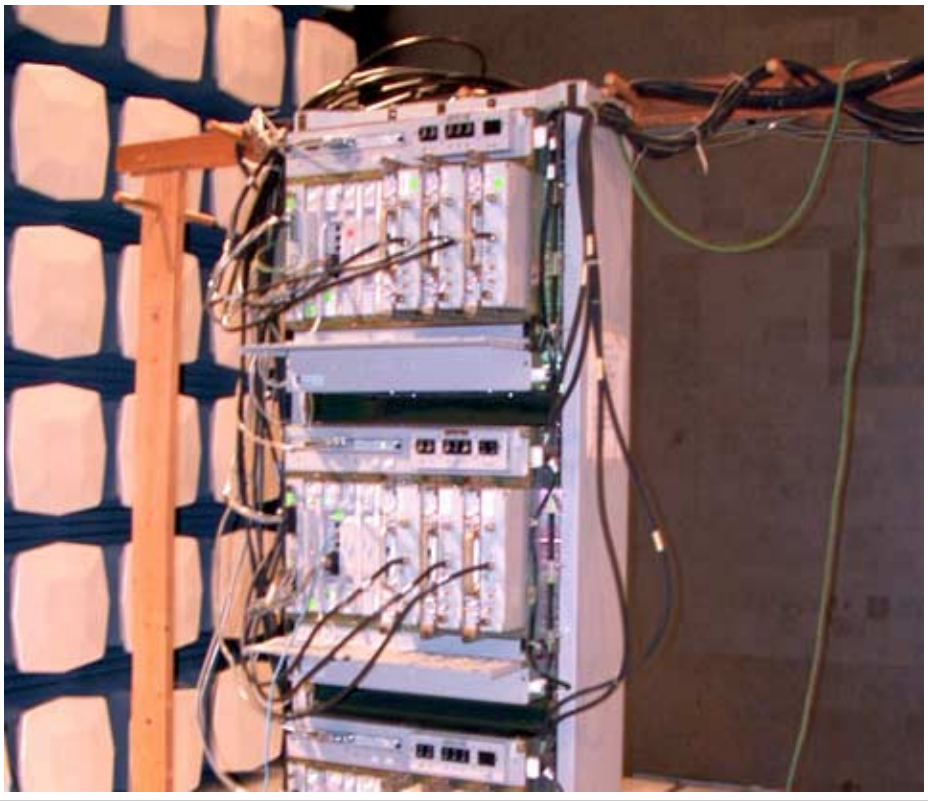

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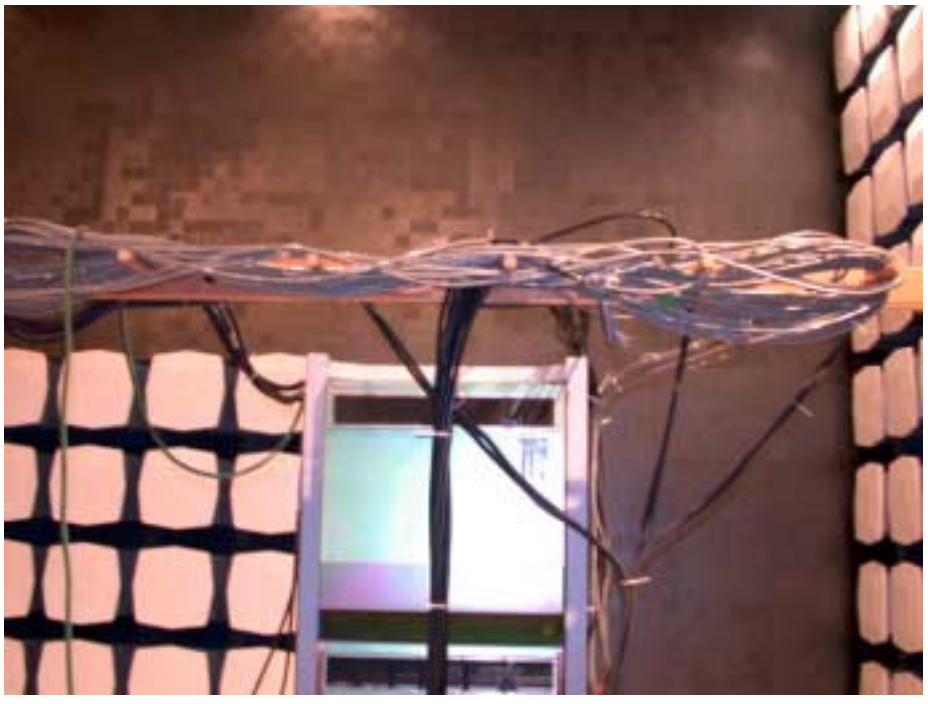


5.0 TEST FACILITY

5.1 LOCATION

The EUT was tested for Electromagnetic Compatibility at the Electronics Test Centre, located in Airdrie, Alberta, Canada.

The RF Anechoic Chamber (RFAC) is identified as Chamber 1, located in the main building complex at the Electronics Test Centre. The usable working space measures 10.6 m long x 7.3 m wide x 6.5 m high.

This test site is listed with the FCC under Registration Number 99541. Measurements taken at this site are accepted by Industry Canada per file number IC 2046-1.

The floor, walls and ceiling consist of annealed steel panels. The walls and ceiling are covered with ferrite tile, augmented by RF absorbant foam material on the end wall nearest the turntable, and on the adjacent walls and the ceiling. The chamber floor supports a 15 cm high internal floor, constructed of annealed steel panels, that forms the ground plane, and is bonded to the chamber walls.

The 3-m diameter turntable is flush-mounted with the floor. A sub-floor cable-way is provided to route cables between the turntable pit and EUT support equipment. Cables reach the EUT through an opening in the centre of the turntable.

Test instrumentation and EUT support equipment is located in two shielded vestibules located at the side of the main room. Cables are routed through bulkhead panels between the rooms as required. Power feeds are routed into the main room and vestibules through line filters providing at least 100 dB of attenuation between 10 kHz and 10 GHz.

5.2 GROUNDING PLAN

The EUT was located in a rack provided by Nortel Networks.

The EUT was grounded in accordance with Nortel Networks specifications.

5.3 POWER

DC power was supplied via Underwriter's Laboratories ULW100-69, 100 dB, 100 Ampere wall mounted filters. Bonding to ground is implemented at the chamber wall.

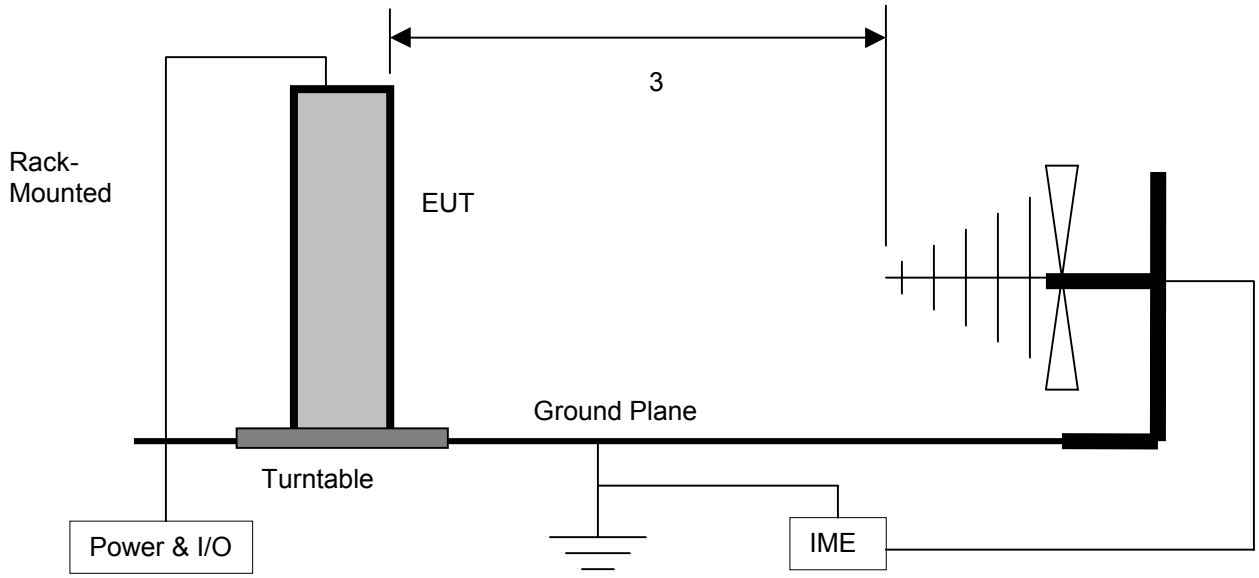
5.4 EMISSIONS PROFILE

Ambient conducted electromagnetic emission profiles were generated throughout the tests and are included in the test data.

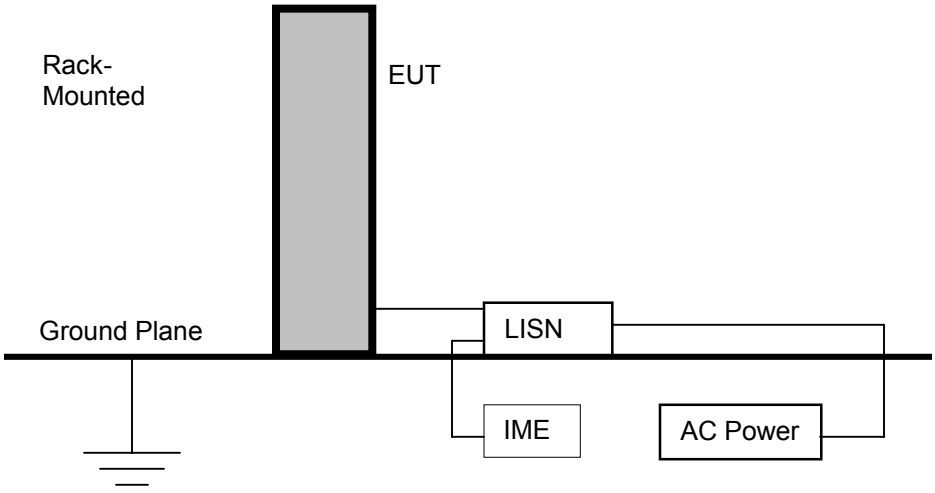
5.5 TEST CONFIGURATION

The following diagrams illustrate the configuration of the EUT test and measurement equipment for Radiated and Conducted Emissions Testing of rack mounted equipment.

Radiated Emission



Conducted Emissions



6.0 TEST EQUIPMENT

The following equipment was used for this procedure. All measurement devices are calibrated annually, traceable to NIST.

6.1 RADIATED EMISSIONS

a) Spectrum Analyzer with RF Preselector
b) CISPR Quasi-peak Adapter
c) Power Isolation Transformers
d) Biconilog antenna (20 MHz to 2 GHz)
e) DRG horn antenna (1 GHz to 18 GHz)
f) LNA preamplifier (500 MHz to 22 GHz)
g) Antenna mast positioner, and controller
h) Flush-mounted turntable, and controller
i) Personal Computer and EMC software

6.2 CONDUCTED EMISSIONS

a) Spectrum Analyzer with RF Preselector
b) Line Impedance Stabilization Network, 50 μH
c) CISPR Quasi-peak Adapter
d) Isolation Transformer
e) Personal Computer and EMC software

6.3 CALIBRATION

All measurement instrumentation conforms to ANSI C63.2. Calibration is maintained in accordance with manufacturer recommendations. Each measurement device is labeled with its ETC asset number and calibration due date.

6.3.1 CALIBRATION ACCURACY

Test equipment used to provide quantitative measurements are calibrated with standards traceable to the National Research Council, National Institute of Standards and Technology or other national standards. Instrumentation systems for emissions measurements have the following accuracies:

Frequency = ± 1 kHz
Amplitude (RE) = ± 4.01 dB
Amplitude (CE) = ± 3.25 dB

6.3.2 TEST EQUIPMENT DESCRIPTION

The equipment used in the tests was selected from the following list.

Instrument	Manufacturer	Model No.	Asset No.	Calibration Due
Spectrum Analyzer (100 Hz to 26.5 GHz)	Hewlett Packard	8566B	9565	18 July 2004
Spectrum Analyzer (100 Hz to 26.5 GHz)	Hewlett Packard	8566B	9168	19 August 2004
RF Preselector (100 Hz to 2 GHz)	Hewlett Packard	85685A	9728	19 August 2004
RF Preselector (100 Hz to 2 GHz)	Hewlett Packard	85685A	9563	18 July 2004
Quasi-Peak Adapter (100 Hz to 1 GHz)	Hewlett Packard	85650A	4411	19 August 2004
Quasi-Peak Adapter (100 Hz to 1 GHz)	Hewlett Packard	85650A	9243	18 July 2004
Measurement System Software	Underwriters Laboratories	Version 6.0	4443	n/a
Line Impedance Stabilization Network (30 Hz to 100 MHz)	EMCO	3825/2r	9331	2 November 2004
Line Impedance Stabilization Network (30 Hz to 100 MHz)	EMCO	3825/2r	9259	2 November 2004
Biconilog Antenna (20 MHz to 2 GHz)	ARA	Lpb-2520/A	4318	2 August 2004
Dual Ridged Guide Antenna (1 – 18 GHz)	EMCO	3115	9588	2 August 2004
Low Noise Amplifier (500 MHz to 22 GHz)	MITEQ	JS43-01001800-21-5P	4354	3 November 2004

Appendix A

Indoor Compact Metro Cell

Test Sample Description
(from data provided by Nortel Networks)

Quotation Number:	Project Number:: N01e2969
Company Name : Nortel Networks	Contact Name : Daryl Therens
Address : Wireless Innovation Centre, 5050 - 40th Street NE, Calgary, AB, T3J 4P8	Phone : 403-769-4103
	Fax : 403-769-4188
	E-mail : dtherens@nortelnetworks.com
Product Name: Indoor Compact Metro Cell (800 MHz, DC)	# of units to be tested : 3 Compact shelves in a 7-foot frame
Part/Model # : see attachment A	Serial # : see attachment A

Product Application	**Designated Marketplaces**			
Commercial √	Canada √		Other √	
Military ☐	United States of America √		_____ ☐	
	European Union √		_____ ☐	

GENERAL INFORMATION REQUIRED FOR ALL PRODUCTS

Dimensions (L x W x H) In the standard 7-foot frame: 2.13m high, 1.37m wide, 0.64m deep	Weight: ____ (lbs. kgs.) Fully assembled in the standard 7-foot frame with 3 shelves: not more than 450kg			
If compliance testing, to what standards?	FCC CFR 47 Part 2.1053 & Part 22.917e, Out of Band Spurious – Effective Radiated Power			
Regulatory Submission for?	none ☐ FCC √ Industry Canada ☐		ETC to do the submission?	YES ☐ NO √
Power Requirements: **AC** ☐	Voltage: _____VAC	# of AC phases: ___	current: ____ Amps	frequency: ____ Hz
DC √	Voltage: -48 and +24 VDC		current: (for 3 shelves) 120A @ 48V, 240A @ 24V	
Product Intended Application	Wireless CDMA Base-station supporting both IS-95 and IS-2000 air interfaces			
Product Deployment Environments	Indoor, floor standing when installed			
Operating Modes in the Field	During test, each shelf was operating 3-carrier/3-sector (typical maximum field configuration per shelf)			
Peripheral support and/or Monitoring Equipment to Monitor and Operate the Product (to be supplied by client):	PC with Windows 2000 and the Nortel Commissioning Tool Vortex Agilent Vector Signal Analyzer E4406A S/N US40060935, cal due Oct04 Agilent Vector Signal Analyzer E4406A S/N US41362937, cal due Nov04 Agilent Power Meter E4419A S/N 3513006398, cal due Dec05 Agilent Power Sensor 8481A, S/N US37292687, cal due Apr04 9 RF attenuators (30dB, 150 watt)			

		Cable 1	Cable 2	Cable 3	Cable 4
Description of interconnecting leads & cables (Attach separate sheet, if required	**Type:**	DC power feed, 2 AWG, 1 battery hot and 1 battery return per shelf. Also, 1 2 AWG safety ground for the frame	4 LMR-400 RF cables per shelf (1 GPS, 3 Tx/Rx)	1 25-pair T1/E1 cable per shelf (NTBW4032 release 01)	1 25-pair alarm cable per shelf (NTGS3518 R01C03)
	Connectors:	2 hole lugs, 1 end	Type N male each end	50-pin connector on 1 end, flying lead on the other	50-pin connector on 1 end, flying lead on the other
	Terminations :	Connected to the Compact shelf Breaker Module and to lab power. Connected to 7-foot frame and lab earth ground	Connected to Radio Module main antennas and RF attenuators	Connected to TIIM and looped-back (Tx to Rx pairs) other end	Connected to CCAM and looped-back (no alarm status) other end
	Shielding:	no	yes	yes	no
	Length:	7m	8m	16m	15m

List of internally generated frequencies: Crystal / Oscillator / Switcher / LO	See attachment B
Brief Functional description of Product including System Block Diagram (Attach a Separate sheet, if required)	See attachment C
Any additional information?	Compact software used during test was cBTS121bc

WIRELESS PRODUCT INFORMATION

Type of Radio Device (check all applicable Equipment Configurations)

Intentional transmitter √	Receiver √	Transceiver √

Type of Radio Operating License

Unlicensed Personal Communication ☐	Unlicensed National Information Infrastructure ☐	Ultra-Wideband Operation ☐	Licensed √

Type of Modulation of Radio Device

CDMA √	TDMA ☐	Other ☐
Spread Spectrum Technology ☐	Direct sequencer ☐	Frequency hopper ☐
Transmitter Power Output : 54 watts at main antenna port	Emission Designator**:**	

Information on Radio Frequencies

Transmitter Operating Frequency(s) & Bandwidth	869.000 MHz to 894.000 MHz
Transmitter Channel Frequencies & separations (If required, attach a separate sheet)	RF channels used during test were 384, 425, and 466
Receiver Operating Frequency(s) & Bandwidth	824.000 MHz to 849.000 MHz
Receiver Channel Frequencies & separations (If required, attach a separate sheet)	RF channels used during test were 384, 425, and 466

Information on Antenna(s)

Is the antenna removable? **YES** √ **NO** ☐	Antenna Connector Type **:** Type N female on Radio Module, and GPS antenna bracket	Number of Antennas : 1 GPS antenna per shelf, plus each Radio Module has a main and diversity antenna connection, X 3 RMs per Compact shelf = 7 antennas per shelf
Gain of Each Antenna (and tolerance)	Customer provided	
Activity and State of Digital Circuitry during ON Time		

Radio Transmission Type

Continuous √	Intermittent ☐	ON Time/ OFF Time **:**
Activity and State of Digital Circuitry during OFF Time		

Attachment A

Description	PEC / CPC (Part Number)	Release Number	Serial Number	Bottom Shelf	Middle Shelf	Top Shelf
Compact Dual Voltage Shelf with NTBW18AB release P4 fan tray	NTRZ60AA	Jia-Feng (prototype)[1]	No serial numbers	√	√	√
Compact Dual Voltage Shelf with NTBW18AB release P3 fan tray	NTRZ60AA	N7[2]	SNMN5300V4FJ	√		
Compact Dual Voltage Shelf with NTBW18AB release P3 fan tray	NTRZ60AA	N7	SNMN5300V4FC		√	
Compact Dual Voltage Shelf with NTBW18AB release P3 fan tray	NTRZ60AA	N7	SNMN5300V4F8			√
T1/E1 Indoor Interface Module (TIIM)	NTGS3188	01	NNTM74XL05VH	Slot 0		
T1/E1 Indoor Interface Module (TIIM)	NTGS3188	03	NNTM74XL0N3G		Slot 0	
T1/E1 Indoor Interface Module (TIIM)	NTGS3188	03	NNTM74XL0N37			Slot 0
GPSTM Dual Voltage (24/-48V)	NTBW50AA	07	NNTM74TC0E1X	Slot 1		
GPSTM Dual Voltage (24/-48V)	NTBW50AA	08	NNTM74TC0Q2E		Slot 1	
GPSTM Dual Voltage (24/-48V)	NTBW50AA	08	NNTM74TC0P62			Slot 1
Control Module 2 (CM-2) Dual Voltage (24/-48V)	NTBW40BA	T6P	NNTM84C027T1	Slot 2		
Control Module 2 (CM-2) Dual Voltage (24/-48V)	NTBW40BA	T6P	NNTM84C027TE		Slot 2	
Control Module 2 (CM-2) Dual Voltage (24/-48V)	NTBW40BA	T4	NNTM84C027T7			Slot 2
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N5	NNTM84C026X8	Slot 3		
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N5	NNTM84C026X5	Slot 4		
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N7	NNTM74X0L455	Slot 5		
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N5	NNTM84C026X7		Slot 3	
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N5	NNTM84C026XN		Slot 4	
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N7	NNTM74X0J74Y		Slot 5	
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N5	NNTM84C026XT			Slot 3
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N5	NNTM84C026Y3			Slot 4
XCEM 192 Dual Voltage (24/-48V)	NTRZ80BA	N5	NNTM84C026YD			Slot 5
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RPYY	Slot 3		
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RPYE	Slot 4		
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RPY8	Slot 5		
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RR00		Slot 3	

[1] Class B compliance scans were with these shelves.
[2] Class A compliance scans were with the release N7 shelves.

Description	PEC / CPC (Part Number)	Release Number	Serial Number	Bottom Shelf	Middle Shelf	Top Shelf
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RPYD		Slot 4	
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RPYG		Slot 5	
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RPYT			Slot 3
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RPYC			Slot 4
XCEM 64 Dual Voltage (24/-48V) PnP	NTRZ80AA	N2	NNTM74X0RR08			Slot 5
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	S5	NNTM536G0D17	Slot 6		
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	S5	NNTM536G0ECK	Slot 7		
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	S8	NNTM536G0CPV	Slot 8		
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	R5	NNTM536FYKY9		Slot 6	
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	R5	NNTM536FYKJV		Slot 7	
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	R5	NNTM533GTRDN		Slot 8	
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	S8	NNTM536G0C5A			Slot 6
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	S5	NNTM536FYV0K			Slot 7
Compact Radio Module 800 MHz High Power Dual Voltage	NTRZ71AA	S8	NNTM536G0CLR			Slot 8
Compact Customer Alarm Module (CCAM)	NTRZ64AA	P5	NNTM74XL1WC8	√		
Compact Customer Alarm Module (CCAM)	NTRZ64AA	P5	NNTM74XL1WC9		√	
Compact Customer Alarm Module (CCAM)	NTRZ64AA	P5	NNTM74XL1WC7			√

Attachment B

Frequency (MHz)	GPSTM	CM-2	CEM64-PnP	CEM 192	RM	CCAM	Cooling Unit[3]
0.040							X
0.15 to 0.75	X	X	X	X	X		
400 kbit/s		X	X	X	X		
1.2288		X	X				
1.544		X					
2.048		X					
3.3 Mbit/s		X					
3.6864	X						
4.096		X					
6.6		X					
8						X	
8.192		X					
9.8304	X	X	X	X	X		
10	X	X	X				
12							X
12.5	X						
16.5		X					
19.2					X		
19.44		X					
19.6608	X		X	X	X		
20	X		X				
24					X		
25		X		X			
33			X	X			
33.25				X			
37.5							
39.3216		X	X	X	X		
40							
44							
63.8976		X	X	X	X		
66							
66.666		X					
75							
78.6432					X		
100		X					
133			X	X			
166							
200		X	X				
400		X					
638.976		X	X	X	X		
867				X			
Tx frequency – 153.6					X		

[3] Fan speed is 1750-3500 revolutions per minute, 2 pulses per revolution.

Frequency (MHz)	GPSTM	CM-2	CEM64-PnP	CEM 192	RM	CCAM	Cooling Unit[3]
Rx frequency – 88.5					X		
Tx frequency + 9.8304					X		
Tx frequency + 57.6					X		

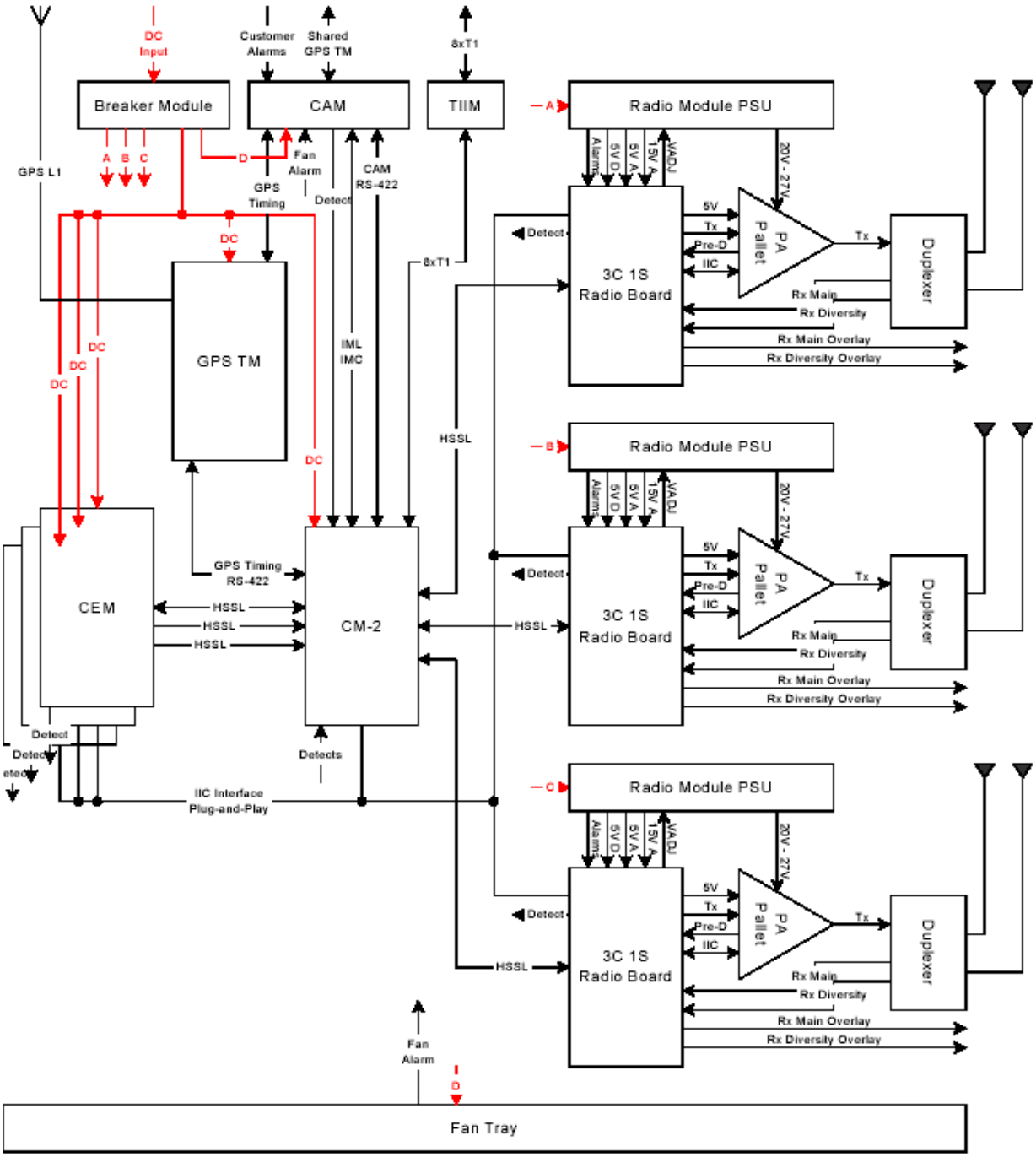
Attachment C

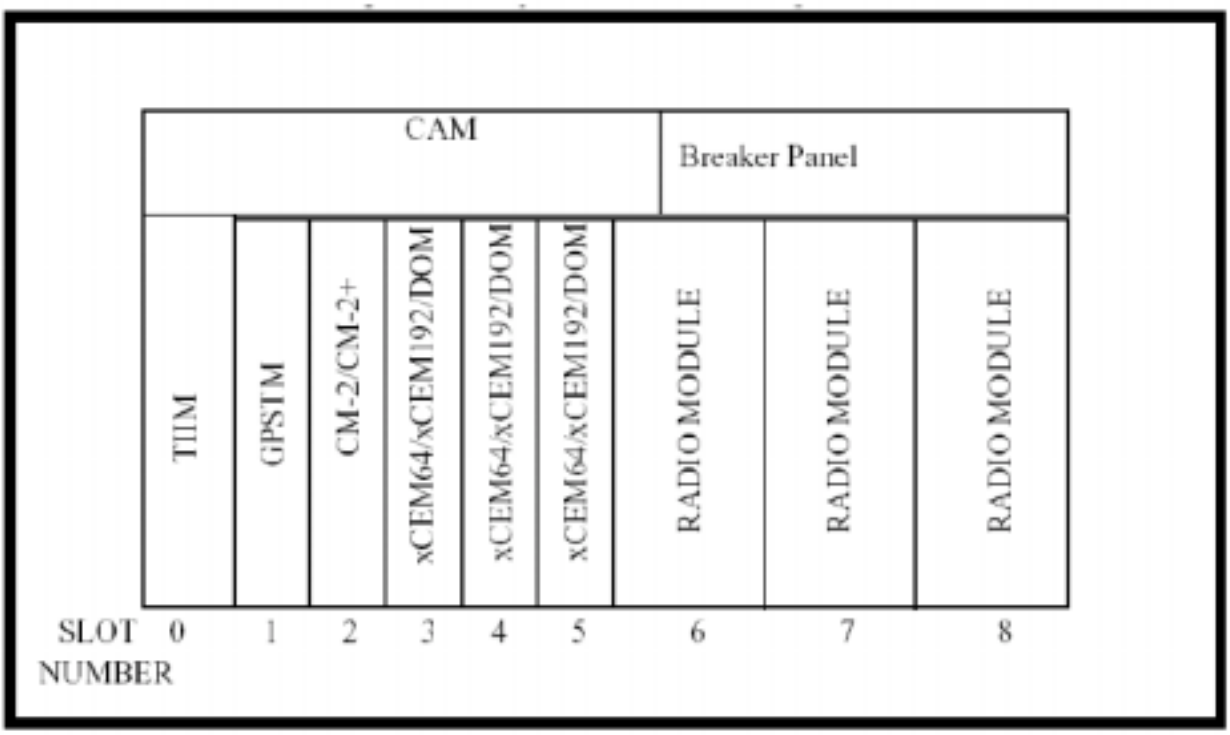
1 to 3 standalone Compact BTS shelves may be installed in the standard Nortel 7-foot CDMA Metro Cell frame.

Note that the lower Compact BTS shelf in the 7-foot frame is BTS 1, the middle shelf is BTS 2, and upper shelf is BTS 3.

Each Indoor Compact BTS for PI testing will comprise of the following major modules and assemblies:

- Compact Dual Voltage Shelf - comprises a common digital/radio shelf with back-plane, and houses the entire Compact BTS that consists of TIIM, GPSTM, CM-2, CEM, RM, CCAM, DC Breaker Module, and Cooling Unit. The back-plane provides the electrical interfaces that support the inter-module communication and DC power distribution to the modules housed within the BTS through a combination of D-sub connectors, 2mm high density connectors, combo D-sub connectors and high power contacts. The DC Breaker Module distributes DC power to the CCAM and fan tray via a 10A breaker, to the digital modules via a 20A breaker, and to each of the radio modules via a separate 40A breaker. The DC Breaker Module also allows for 2, 5A breakers for customer power.
- CM-2 - the CM-2 digital module provides the call-processing capability, overall data flow control, the T1/E1 back-haul interface, and OAM functionality plus the CDMA toolbox interface (DMI and Vortex).
- RM with duplexer - the RM provides the radio channel compensation and RF conversion. Once the RM is configured it becomes a data processing pipe with little activity that is not OAM related.
- GPSTM - the GPSTM provides the timing reference for the BTS.
- CEM, any permutation of CEM64-PnP, CEM192, DOM (2 DOM maximum) – there are 3 different CEM digital module variants that can be used in the Compact BTS. The CEM provides the cell site modem function, converting the encoded voice and data between the network and the air interface. The CEM64-PnP and CEM192 provide 1xRTT voice and data capability. The DOM is an OEM unit that provides 1xEV-DO capability, and also provides its own back-haul interface via T1/E1 or Ethernet.
- TIIM - the TIIM is designed for use as a secondary surge protection device on T1/E1 data lines and to provide T1/E1 routing to the CM-2 and DOM in the Compact BTS. The TIIM is installed in series between primary surge protection (customer supplied) and the CM-2 / DOM to be protected. A single unit can protect up to 8 T1/E1 lines, or eight paired circuits.
- CCAM – the CCAM supports 24 customer configurable alarms, a shared GPSTM, Cooling Unit alarm monitoring, and input DC voltage monitoring. Through an Inter-Shelf Alarm cable, the CCAM could also monitor the DC power and Cooling Unit alarm from an extension Compact BTS shelf.
- Cooling Unit – the Cooling Unit consists of a fan tray that has temperature controlled fan speed to reduce acoustic noise.


DC Input
Customer Alarms
Shared GPS TM
8xT1
Breaker Module
CAM
TIIM
Radio Module PSU
GPS L1
A B C
D
Fan Alarm
GPS Timing
Detect
CAM RS-422
DC
GPS TM
IML IMC
8xT1
HSSL
3C 1S Radio Board
PA Pallet
Duplexer
5V
Tx
Pre-D
IIC
Rx Main
Rx Diversity
Rx Main Overlay
Rx Diversity Overlay
Alarms
5V D
5V A
15V A
VADJ
20V - 27V
CEM
GPS Timing RS-422
HSSL
CM-2
Detect
Detects
IIC Interface Plug-and-Play
Fan Tray


CAM
Breaker Panel
TIIM
GPSTM
CM-2/CM-2+
xCEM64/xCEM192/DOM
xCEM64/xCEM192/DOM
xCEM64/xCEM192/DOM
RADIO MODULE
RADIO MODULE
RADIO MODULE
SLOT NUMBER 0 1 2 3 4 5 6 7 8