



EXHIBIT 2B

**Test Report Provided by
Sanmina-SCI**

Applicant: Nortel Networks

**For Class II Permissive Change
Certification on:**

AB6NT800MFRM



SANMINA-SCI

Product Integrity Laboratory

5151-47th Street, NE
Calgary, Alberta
T3J 3R2
Tel: (403) 295 5134
Fax: (403) 295 4091

Emissions Report Lab Project Number- 80169

-48V MTRM- 800MHz Part 22

Revision: 2

Date: 15 Nov 2002

Prepared for: Nortel Networks Inc.

Author: Shankara Malwes
EMC Test Technologist

Approved by: Glen Moore
EMC Manager

Confidentially Statement: The information contained in this document is the property of Sanmina-SCI Corporation. Except as specifically authorized in writing by the Director of Sanmina-SCI Corporation, the holder of this document shall keep all information contained herein confidential and shall protect the same, in whole or in part, from disclosure and dissemination to all third parties.

**Summary****Sanmina-SCI Canada**

Product Integrity Laboratory

5151-47th Street, N.E. Calgary Alberta T3J 3R2

Accreditation Numbers: FCC 101386

IC 46405-3978; File # IC 3978-2

Standards Council of Canada Accredited Laboratory No. 440

Performed For: Thomas Wong
 Nortel Networks Inc.
 5111-47th Street, N.E.
 Calgary Alberta T3J 3R2
 Phone (403) 769-2425

EUT Description: CDMA MCBTS -48V MTRM – 800MHz
 Model: NTGY10DA

Serial Number: NNTM535XDDGG; NNTM535XCH7A; NNTM535XCH58

Appendix	Standards		Description & Range	Deviations		Pass / Fail	Criteria
	Base	Test Basis		From Standard	From Test Plan		
B	ANSI C63.4-2001	FCC Part 22	Radiated Emissions Signal Substitution 30MHz-1GHz	No	Yes	PASS	None
C	ANSI C63.4-2001	FCC Part 22	Radiated Emissions Signal Substitution 1GHz-10GHz	No	Yes	PASS	None

Note: Test Plan deviations are listed in Appendix A.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



SANMINA-SCI

80169

Emissions Test Report

-48V MTRM – 800MHz

Test Result: The product presented for testing complied with test requirements shown above.

Tested By:



Digitally signed by
Shankara Malwes
DN: cn=Shankara
Malwes,
o=Sanmina-SCI, ou=CA
Date: 2002.11.15
18:05:28 -0700

Shankara Malwes
EMC Technologist

Checked By:

Duane
Friesen

Signature
Not Verified

Digitally signed by
Duane Friesen
DN: cn=Duane Friesen,
o=Sanmina-SCI, ou=PI
Laboratory, ou=CA
Date: 2002.11.15
18:30:01 -0700
Reason: I have
reviewed this document

Duane Friesen C.E.T.
EMC Technical Advisor

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

Confidential

Page 3 of 33

Nov 15, 2002



Table of Contents

SUMMARY	2
REGISTER OF REVISIONS.....	5
Description of Revisions	5
1. INTRODUCTION.....	5
1.1 Purpose	5
1.2 Abbreviations and Definitions.....	5
1.3 References	5
2. TEST LOG.....	6
3. EUT	7
3.1 Configuration	7
3.1.1 TEST PLAN CONFIGURATION DEVIATIONS.....	9
3.2 Power	10
3.2.1 TEST PLAN POWER DEVIATIONS.....	10
3.3 Cables	10
3.3.1 TEST PLAN CABLE LIST DEVIATIONS.....	11
3.4 EUT Frequencies	11
3.4.1 TEST PLAN FREQUENCY LIST DEVIATIONS	12
3.5 Mode of Operation.....	13
3.5.1 TEST PLAN MODE OF OPERATION DEVIATION	13
3.6 Pass / Fail Criteria	13
4. SUPPORT EQUIPMENT	14
APPENDICES.....	15
APPENDIX A: TEST PLAN DEVIATION LOG.....	16
APPENDIX B: MTRM 800MHZ RADIATED EMISSIONS 30MHZ – 1GHZ PART 22	18
APPENDIX C: MTRM 800MHZ RADIATED EMISSIONS 1 – 10GHZ PART 22.....	25
END OF DOCUMENT	33

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



REGISTER OF REVISIONS

Revision	Date	Description of Revisions
Rev.0	09 Oct, 2002	Initial Release
Rev.1	05 No, 2002	Revised front page date and revision number, page 2 Appendix G Criteria, Page 5 in register of revisions added row 2, page 10 added row in Table 3 to the cable list, page 32 section C.5 updated 1 st row, page 43 and 51 updated cable factors and ERP columns in substitution results table, page 63 deleted row 4 in section G.5 and in all pages updated the date to Nov 05 2002
Rev.2	15 Nov, 2002	Revised front page date and revision number, deleted 4 rows in Summary table in page 2, page 5 in register of revisions added row 3, in page 6 deleted 4 rows in test log, deleted FCC part 15 references, deleted pages from 18 to 37(FCC Part 15) and 53 to 65 as per customer request.

1. INTRODUCTION

1.1 PURPOSE

The purpose of this report is to describe testing and results for Radiated Emissions in reference to FCC Part 22 on the Nortel Network's CDMA MCBTS -48V MTRM 800MHz system.

The CDMA -48V MTRM 800MHz Radiated Emissions testing was executed with an MCBTS Indoor system using three 800 MHz MFRM's.

The test outlined may not be inclusive of all testing required by the Core Standards or fulfill the applicable regulatory requirements in their entirety.

1.2 ABBREVIATIONS AND DEFINITIONS

EUT	Equipment under test
RE	Radiated Emissions
CE	Conducted emissions
LISN	Line Impedance stabilization network
BIP	Breaker Interface Panel
CAM	Customer Alarm Module
ECM	Enhanced Control Module
DR	Digital Rack
GPS	Global Positioning System

1.3 REFERENCES

ANSI C63.4-2001

FCC Part 22

Sanmina-SCI EMC Test Method 11.0 Radiated Emissions Signal Substitution Method 30MHz – 20GHz
Project test plan draft document number: N/A, Stream: 00, Issue: 01, dated Sept 23, 2002.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

**2. TEST LOG**

Appendix	Test Case	Start	End
Date Received: 08 th Sept 2002			
B	Radiated Emissions 30MHz-1GHz FCC Part 22	Sept 25, 02	Sept 25, 02
C	Radiated Emissions 1GHz-10GHz FCC Part 22	Sept 25, 02	Sept 25, 02
Date Shipped: 27 Sept, 2002			

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



3. EUT

3.1 CONFIGURATION

The Radio rack was placed on the wooden palette 10cm above the ground plane, located at the center of the turntable in the 10M chamber. Customer alarm cable and power cables were routed through the cable rack in an attempt to maximize the emissions.

Vortex: Configure the MCBTS for Split operation using the specified channels with 6 OCNS channels, TPTL set to -6, and the modules in the specified slots.

Physical Configuration:

The radio rack was contained the following modules.

Three -48V MFRMs were used as EUT in the radio rack and powered from the A-side Hubble with one pair of cables.

Three dummy loads of 100watts were used to terminate the Antenna port of the radios under the 10M chamber and were not part of the EUT.

Three dummy loads of 100watts were used to terminate the Antenna port of the radios under the 10M chamber and were not part of the EUT.

For more detailed EUT configuration and setup refer to the Figure 1, Section 3.1.1.2, 3.1.2 and section 4.0 of the Project test plan draft document number: stream:00, issue: 01 dated 23 Sept 2002.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

**Table 1 –Description of EUT**

Name	MTRM 800MHZ
Model Number	NTGY10DA
Revision Number	P4
Serial Number	NNTM535XDDGG; NNTM535XCH7A; NNTM535XCH58
Physical Description	The MTRM Consists of a Printed Circuit Pack with two metal shields on both of its sides. It was located between the DPM and the FRM in the Radio rack. This consists of 8 connector ports in the front of the MTRM underneath the FAM. These 8 connectors named as T1-T8 (T1-PWR/Data in, T2- XDM Test, T3- RX Main In, T4-PWR/Data out, T5 – RX Div In, T6 & T7– RX Main out, T8 – TX Out).
Classification	ITE- Floor standing
Size (meters)	N/A
Weight	N/A
Power	-48Vdc
Functional Description	<p>The MFRM consists of a Multi-carrier Transmit Receive Module (MTRM), a Multi-carrier Power Amplifier Module (MPAM), a Duplexer-preselector Module (DPM) and a Fan Alarm Module (FAM). The MFRM can support 3 carriers on a single sector.</p> <p>Forward Link: - Uses different RF carrier frequencies to transmit the CDMA signals generated by the CEM's.</p> <p>Reverse Link: - Amplifies, filters and down converts signals received from CDMA mobiles so that the CEM's can convert those signals into received data</p>

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

**Table 2 – EUT Description List**

The following equipment was provided by the customer and referenced to the test plan draft document number: N/A, Stream: 00, Issue: 01, dated Sept 23, 2002.

Module Description		Quantity	PEC Code	Serial Number	Verified
MTRM modules	MTRM	3			<input type="checkbox"/>
MTRM 1	-48V		NPGY10DA P4	NNTM535XDDGG	<input type="checkbox"/>
MTRM 2	-48V		NPGY10DA P4	NNTM535XCH7A	<input type="checkbox"/>
MTRM 3	-48V		NPGY10DA P4	NNTM535XCH58	<input type="checkbox"/>
MPAM modules	MPAM	3			<input type="checkbox"/>
MPAM 1 (IOL)	HPCA -48V		NTGY70AB 20	NNTM5381N5HQ	<input type="checkbox"/>
MPAM 2 (IOL)	HPCA -48V		NTGY70AB 20	NNTM5330PC09	<input type="checkbox"/>
MPAM 3 (IOL)	HPCA -48V		NTGY70AB 20	NNTM536MH3DY	<input type="checkbox"/>
DPM modules	DPM	3			<input type="checkbox"/>
DPM 1			NTGS89DB 04	CLWVMM1005Y4	<input type="checkbox"/>
DPM 2			NTGS89DB 04	CLVWPP200BA5	<input type="checkbox"/>
DPM 3			NTGS89DB 04	CLWVCC100DM8	<input type="checkbox"/>
Fan Assembly Modules	FAM	3			<input type="checkbox"/>
FAM 1			NTGS5651 01	NNTM53586PYC	<input type="checkbox"/>
FAM 2			NTGS5651 01	NNTM53586PR6	<input type="checkbox"/>
FAM 3			NTGY60AE 01	NNTM532VW84A	<input type="checkbox"/>
Radio Rack	RR	1	NTGS65AA 06	DEVP01010848	<input type="checkbox"/>

Note: "☒" means Verified by Sanmina-SCI and "☐" means not verified by Sanmina-SCI.

Note: Special considerations for each test case are noted in the appropriate appendices.

3.1.1 TEST PLAN CONFIGURATION DEVIATIONS

All Test plan configuration deviations are noted in Appendix A, deviation number 1 and 2.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

**3.2 POWER**

A – Hubble: ~45 Amps in total
Line 1 -48V DC through LISN B1
Line 2 -48V DC Return through LISN B2

Also refer to the section 2.2 of the Project test plan draft document number: stream:00, issue: 01 dated 23 Sept 2002.

3.2.1 TEST PLAN POWER DEVIATIONS

None

3.3 CABLES**Table 3 – Cable List**

The customer provided the following list of cables and only checked ones were verified by Sanmina-SCI.

Equipment Description	Quantity	PEC Code	Test Setup Used In	Cable Length	Verified
RS-232 Communication Cable	1	N/A	All	N/A	<input type="checkbox"/>
Ground cables	2	NTGS7094	All	3m	<input type="checkbox"/>
System DC power cables	6	Supplied by Lab	All	N/A	<input type="checkbox"/>
Cable from Hubble to LISNs	8	Supplied by Lab	All	1m	<input checked="" type="checkbox"/>
MFRM DC power cables	6	NTGS8082	All	7m	<input type="checkbox"/>
Ethernet cable (PC) (rolled)	1	N/A	All	N/A	<input type="checkbox"/>
RF load cables	6	N/A	All	N/A	<input type="checkbox"/>
T1/E1 backhaul cable	1	NTGS3517	All	15m	<input type="checkbox"/>
Customer Alarm Cables	2	NTGS3518	All	30m	<input type="checkbox"/>

Note: "☒" means Verified by Sanmina-SCI and "☐" means not verified by Sanmina-SCI.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

3.3.1 TEST PLAN CABLE LIST DEVIATIONS

None

3.4 EUT FREQUENCIES**Table 4 – Modules Frequency List**

Signal	Frequency	Units
CORE (1Fc)	1.2288	MHz
CORE (8Fc)	9.8304	MHz
CORE (32Fc)	39.3216	MHz
CORE (52Fc)	63.9876	KHz
CORE (520 Fc)	638.9760	MHz
CORE (Oscillator)	20	MHz
GPSTM (8Fc)	9.8304	MHz
GPSTM	10	MHz
GPSTM (Even Second)	31.9488	50ns neg pulse 2 sec
GPSTM (GPS L1 Carrier)	15.7542 +/- 1.023	
52Fc	63.9876	MHz
64Fc	78.6432	MHz
520Fc	638.9760	MHz
CM (IML)	3.5	MHz
CM (IMC)	20	MHz
CM (TDM I/F)	39.3216	MHz
CEM/XCEM 8Fc	9.8304	MHz
CEM/XCEM 8Fc	9.8304	MHz
CEM/XCEM 32Fc	39.3216	MHz
CEM/XCEM 52Fc	63.8976	MHz
CEM/XCEM 520Fc	638.9760	MHz
CEM CPU clock	40	MHz
XCEM CPU clock	33, 133 & 200	MHz

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

**Table 5 – 800 MHz MFRM Frequency List**

Signal	800MHz Frequency	Units
Transmit Band	869 – 894	MHz
Receive Band	824 – 849	MHz
RF LO Range	750 - 776	MHz
RF LO Resolution	30	KHz
Carrier Spacing	1.26	MHz
TX IF LO	108.7488	MHz
Rx IF (Center)	73.5792	MHz
TX IF (Center)	118.5792	MHz
26Fc	31.9488	MHz
32Fc	39.3216	MHz
52Fc	63.8976	MHz
64Fc	78.6432	MHz
520Fc	638.9760	MHz

Fc = CDMA single channel spreading rate = 1.2288 MHz

For a detailed list of frequencies Refer to the Tables 3 and 4 of the Project test plan draft document number: stream:00, issue: 01 dated 23 Sept 2002.

3.4.1 TEST PLAN FREQUENCY LIST DEVIATIONS

None.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



3.5 MODE OF OPERATION

As defined by Nortel Networks:

The MCBTS Metro cell was tested in a configuration that duplicates field conditions, as closely as possible; following the installation methods as specified by Nortel Networks Installation Methods (see reference section).

Split

Maximum Output Power = 47.25dBm +/- 0.5dB (800 MHz)

Maximum Output Power = 47.25dBm +/- 0.5dB (1900 MHz)

OCNS Channels = 6

TPTL = -6.

Refer to the section 4.4 of the Project test plan draft document number: stream:00, issue: 01 dated 23 Sept 2002.

3.5.1 TEST PLAN MODE OF OPERATION DEVIATION

No operation deviations reported by the client.

3.6 PASS / FAIL CRITERIA

The pass/fail criteria is defined as the Radiated Emissions limits specified in FCC Part 22. The standard limits are described in each appendices of this report.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



4. SUPPORT EQUIPMENT

The following equipment were used to support the EUT and not verified by Sanmina-SCI. The support equipment (Digital Rack) was isolated from the Radio rack in the shielded enclosure below the test site and dummy loads were used to terminate the DPM Main ANT Port D6 and Diversity ANT Port.

Table 7 – Support Equipment used during Radiated Emissions testing

Module Description		Quantity	PEC Code	Serial Number	Verified
GPST M Slot 2 Bottom Shelf	GPS	1	NTGS50AA P4	NNTM74TW0010	<input type="checkbox"/>
Control Module Slot 4	CM	2	NTGS40AA 97	NNTM5357CGFT	<input type="checkbox"/>
Control Module Slot 5			NTGS40AA 34	NNTM533MPBB8	<input type="checkbox"/>
CORE Slot 6			NTGS40AA 37	NNTM533MNG78	<input type="checkbox"/>
CORE Slot 7			NTGS40AA 40	NNTM533MUF16	<input type="checkbox"/>
Channel Element Module (Upper Shelf)	CEM	6			<input type="checkbox"/>
CEM Slot 1			NTGS60BA 80	NNTM5357YCHB	<input type="checkbox"/>
CEM Slot 2			NTGS60BA 78	NNTM5357H4BF	<input type="checkbox"/>
CEM Slot 3			NTGS60BA 73	NNTM533M1365	<input type="checkbox"/>
CEM Slot 4			NTGS60BA 76	NNTM53406QTY	<input type="checkbox"/>
CEM Slot 5			NTGS60BA 77	NNTM5340832L	<input type="checkbox"/>
CEM Slot 6			NTGS60BA 73	NNTM533MUMDQ	<input type="checkbox"/>
Shelf			NTGS20AA 09	SNMN53002T2K	<input type="checkbox"/>
Frame			NTGS54BA 12	SNMN53002UGJ	<input type="checkbox"/>
Breaker Panel			NTGS47AB 05	SNMN53002PE8	<input type="checkbox"/>
RF Dummy Loads (150 W)		6	N/A	N/A	<input type="checkbox"/>

Note: "☒" Means verified by Sanmina-SCI and "☐" means not verified by Sanmina-SCI

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



APPENDICES

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



APPENDIX A: TEST PLAN DEVIATION LOG

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



Deviation Number	Time & Date	Reference to Test Plan	Deviation from Standard	Description and Justification of Deviation	Core Standard Affected	Approval
1	12 Sept, 02	Section 3.0 Project Test plan draft document stream:00 Issue:01, Dated 23 Sept, 2002	No	Three unpowered 24V MFRM's remained in the configuration during testing as requested by the client.	FCC Part 22	As per Customer request during the test
2	24 Sept, 02	Section 3.1.1.2 of the Project Test plan draft document stream:00 Issue:01, Dated 23 Sept, 2002	No	Three sets of unpowered 800MHz TRM, DPM, and PAMs remained in the radio rack during testing as opposed to the six powered sets defined in the test plan. The above EUT configurations as requested to test by the client.	FC Part 22	As per Customer request during the test

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091

Confidential

Page 17 of 33

Nov 15, 2002



APPENDIX B: MTRM 800MHZ RADIATED EMISSIONS 30MHZ – 1GHZ PART 22

B.1. Reference Standard & Test Basis

Reference Standard	ANSI C 63.4: ITE Radio Disturbance Characteristics.
Test Basis	FCC CFR 47 Part 22:ITE Radio Disturbance Characteristics. Limits and Methods of Measurement
Test Method	Sanmina-SCI Radiated Emissions Signal Substitution Method 30MHz-20GHz Revision 1.0.

B.2. Test Specifications

FCC Part 22		
Frequency	ERP Limit	Theoretical Peak Limit @ 10 meters*
MHz	dBm	dBσV/m
30MHz – 1 GHz	-13	73.90

* Theoretical field strength based on a dipole

B.3. Measurement Uncertainty

Radiated Emissions 30MHz – 1GHz	Measurement Uncertainty	Expanded Uncertainty (K=2)
(dB)	+2.15/-2.19	+4.29/-4.37
Radiated Emissions Signal Substitution 30MHz – 1GHz	Measurement Uncertainty	Expanded Uncertainty (K=2)
	+/-2.74	+/-5.49

B.4. Deviations

From Standard

None.

From Method

None.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



B.5. Measurement Equipment

Radiated Emissions Signal Substitution 30MHz – 1GHz

Description	Type/Model	Manufacturer	Serial #	Cal Due	Cal Date
10m ANECHOIC CHAMBER					
Bilog Antenna	CBL 6111B	Chase	40500566	12 Mar 03	12 Mar 02
Mast Controller	2090	EMCO	40500188	N/A	N/A
Multi Device Controller TT1 (Turntable)	2090	EMCO	40500197	N/A	N/A
RF Cable East range	Ferrite bead loaded cable	Suhner Succoflex	40500650	04 Sept 03	04 Sept 02
RF Cable from Bulkhead to LNA	Succoflex 103	Suhner Succoflex	35200/3	04 Sept 03	04 Sept 02
Adjustable Dipole Antenna Set	3121C	EMCO	9611-1233	04 Mar 03	04 Mar 02
CONTROL ROOM					
ESMI	1032.5510.23	Rohde & Schwarz	40500153/154	11 Jan 03	11 Jan 02
Amplifier	HP-8447F OPT H64	Hewlett Packard	40500228	04 Sept 03	04 Sept 02
Switch Matrix Controller	SMC-002	TDL	40500189	N/A	N/A

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



VERIFICATION EQUIPMENT					
RefRad	4630B	EMCO	40500257	25 Apr 03	25 Apr 02
RefRad (Kit)	Balun A	NA	NA	N/A	N/A
RefRad (Kit)	40cm Dipole	NA	NA	N/A	N/A
RefRad Fixture	NA	Sanmina	RefRad Fixture #1	N/A	N/A
Signal Generator 10MHz – 40GHz	SMP04	Rohde & Schwarz	40500125	27 Mar 03	27 Mar 02
Cable from RX antenna to 3M center bulk head in 10M Chamber	104	Succoflex	116558/4	18 Apr 03	18 Apr 02
Cable from 3M center bulk head to Control room	104	Succoflex	40500627	18 Apr 03	18 Apr 02
Cable from Control room bulk head TO Signal Generator	104	Succoflex	40500626	18 Apr 03	18 Apr 02

B.6. Test Setup Special Considerations

None

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.


Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



B.7. Test Results Summary

FCC Part 22

Peak Scan 30MHz – 1GHz (Horizontal and Vertical Polarization)

		Project Name: MTRM CR P2 Model: Indoor Metrocel Comments:			Tester: Carlos Celarie Test ID: RE02-10M-2002-040			
Standard		FCC Part 22		Measurement Distance		10		Meters
Antenna	Frequency	AF	CF	Detector	Measured Value	Corrected Value	Theoretical Limit	Theoretical Margin
	MHz	dB/m	dB		dBuV	dBuV/m	dBuV/m	dB
2261 RX BiCon Hpol	63.9961	6.00	-26.25	Peak	46.73	26.48	73.90	47.42
2261 RX BiCon Hpol	147.9959	10.99	-25.51	Peak	44.14	29.62	73.90	44.28
2261 RX BiCon Hpol	157.2907	10.38	-25.43	Peak	40.76	25.71	73.90	48.19
2261 RX BiCon Hpol	186.5779	8.78	-25.15	Peak	41.98	25.61	73.90	48.29
2261 RX BiCon Hpol	202.5935	8.90	-24.99	Peak	41.11	25.02	73.90	48.88
2261 RX BiCon Vpol	64.3956	6.40	-26.25	Peak	46.93	27.08	73.90	46.82
2261 RX BiCon Vpol	67.5801	7.00	-26.22	Peak	46.6	27.38	73.90	46.52
2261 RX BiCon Vpol	151.1838	10.50	-25.48	Peak	42.61	27.63	73.90	46.27
2261 RX BiCon Vpol	157.2695	10.60	-25.43	Peak	40.58	25.75	73.90	48.15
2261 RX BiCon Vpol	211.2061	10.38	-24.92	Peak	43.45	26.91	73.90	44.99

Corrected Value: Measured Value + AF + CF AF: Antenna Factors & CF: Correction Factors (LNA Gain + Cable Loss)


Notes:
Positive Margin indicates a pass

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



Substitution Data 30MHz – 1GHz

	Project Name: MTRM-CR Phase 2 Model: MTRM-CR Phase 2 Comments: Substitution Measurements	Tester: Jacky Wong Test ID:							
Frequency (MHz)		FCC Part 22		10M Distance					
	Polarization (V/H)	Uncorrected Substitution	Uncorrected Peak Measure level	Signal Generator	Cable factor	Antenna Gain	Effective Radiated Power (E.R.P.)	E.R.P Limit	Margin
		dBuV	dBuV	dBm	dB	dB	dBm	dBm	dB
63.9961	H	46.73	46.90	-65.10	-0.98	1.24	-64.85	-13	51.85
147.9959	H	44.14	41.34	-69.00	-1.50	1.80	-68.70	-13	55.70
157.2907	H	40.76	40.35	-70.20	-1.53	1.73	-70.01	-13	57.01
186.5779	H	41.98	41.70	-71.30	-1.67	1.80	-71.17	-13	58.17
202.5935	H	41.11	40.83	-73.50	-1.74	1.80	-73.44	-13	60.44
64.40	V	46.93	46.62	-68.90	-0.99	1.14	-68.75	-13	55.75
67.58	V	46.60	46.42	-67.10	-1.01	1.15	-66.96	-13	53.96
151.18	V	42.61	42.74	-65.10	-1.51	1.81	-64.80	-13	51.80
157.27	V	40.58	40.53	-69.20	-1.53	1.32	-69.42	-13	56.42
211.21	V	43.45	43.63	-64.50	-1.78	1.21	-65.07	-13	52.07

Effective Radiate Power (E.R.P) = Signal Generator + Cable Factor + Antenna Gain

Note: Positive Margin indicates a Pass.

B.8. Observations

None.

B.9. Deviations from Normal Operating Mode

None

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



B.10. Sample Calculation

Emission Level = Measured Level + Correction Factors

Margin = Limit – Emission Level

$$\text{ERP Limit} = P_{\text{dBm}} - (43 + 10\log(P))$$

Example

$$P = 20\text{w}$$

ERP Limit

$$= 43\text{dBm} - (43 + 10\log(20)) = -13\text{dBm}$$

$$\text{Peak Limit} = 120 + 20\log(\text{SQRT}(49.2 * P) / D)$$

Example

$$P = -13\text{dBm} = 0.00005\text{w}$$

$$D = 10\text{m}$$

Peak Limit

$$= 120 + 20\log(\text{SQRT}(49.2 * 0.00005)) / 10$$

$$= 73.9 \text{ dBuV/m}$$

$$\text{Peak Limit} = 120 + 20\log(\text{SQRT}(49.2 * P) / D)$$

Example

$$P = -13\text{dBm} = 0.00005\text{w}$$

$$D = 3\text{m}$$

Peak Limit

$$= 120 + 20\log((\text{SQRT}(49.2 * 0.00005)) / 3)$$

$$= 84.3$$

B.11. Test Data and Pictures

Test data and pictures for Radiated Emissions appear following this page.

B.12. Signature

Signature/Date:

Name:

Function:

 Digitally signed by
Shankara Malwes
DN: cn=Shankara
Malwes,
o=Sanmina-sci,
c=CA
Date: 2002.11.15
18:09:22 -0700

Shankara Malwes
EMC Technologist

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



Picture 1: Front view of the EUT towards the Antenna



Picture 2: Side of the EUT

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



APPENDIX C: MTRM 800MHZ RADIATED EMISSIONS 1 – 10GHZ PART 22

C.1. Reference Standard & Test Basis

Reference Standard	ANSI C 63.4: ITE Radio Disturbance Characteristics.
Test Basis	FCC CFR 47 Part 22:ITE Radio Disturbance Characteristics. Limits and Methods of Measurement
Test Method	Radiated Emissions Manual Method 1GHz-18GHz. EMC Test Method E006R4 Radiated Emissions Signal Substitution Method 30MHz-20GHz. (EMC Test Method 11.0)

C.2. Test Specifications

FCC Part 22 Radiated Electric Field @ 3m West Site

FCC Part 22		
Frequency	ERP Limit	Theoretical Peak Limit @ 3 meters*
MHz	dBm	dB μ V/m
1GHz – 10GHz	-13	84.3

* Theoretical field strength based on a dipole

C.3. Measurement Uncertainty

Radiated Emissions 1GHz-18GHz	Measurement Uncertainty	Expanded Uncertainty (K=2)
(dB)	+3.48/-3.51	+6.96/-7.02
Radiated Emissions 1GHz-20GHz Signal Substitution	Measurement Uncertainty	Expanded Uncertainty (K=2)
(dB)	+/-2.74	+/-5.49

C.4. Deviations

From Standard

None

From Test Plan

All Test Plan deviations are noted in Appendix A, deviation number 1.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



C.5. Measurement Equipment

Description	Type/Model	Manufacturer	Serial #	Cal Due	Cal Date
10m ANECHOIC CHAMBER					
Horn Antenna 1GHz-10GHz (TX)	3115	EMCO	40500087	19 Nov 02	19 Nov 01
Horn Antenna 1GHz-5.95GHz (Rx)	3115	EMCO	40500090	21 Jun 03	21 Jun 02
Standard Gain Horn 5.95GHz-8.2GHz	3160-06	EMCO	40500176	N/A	N/A
Standard Gain Horn 8.2GHz-12.5GHz	3160-07	EMCO	40500177	N/A	N/A
High pass filter	11SH10-3860	K&L	1/19900-010	N/A	N/A
Spectrum Analyzer 9KHz –40GHz	FSEK	Rohde & Schwarz	40500210	12 Mar 03	12 Mar 02
Step Attenuator/Switch	HP11713A	HP	40500014/ 40500276	N/A	N/A
DC Power Supply for LNA	LXO 30-2	Xantrex	40500211	N/A	N/A
Miteq LNA	JSD000121	Miteq	830620 in box	24 Apr 03	24 Apr 02
HPIB Extender	HP37204	HP	40500195	N/A	N/A
Cable from Antenna to LNA	101PEA	Succoflex	1713/1PEA	18 Apr 03	18 Apr 02

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



CONTROL ROOM					
Win 2000 PC with FSEK Manual control software loaded	N/A	N/A	N/A	N/A	N/A
Signal Generator 10MHz – 40GHz	SMP04	Rohde & Schwarz	40500125	27 Mar 03	27 Mar 02
HPIB Extender	HP37204	HP	40500193	N/A	N/A
Mast Controller	2090	EMCO	40500184	N/A	N/A
Multi Device Controller TT1 (Turntable)	2090	EMCO	40500197	N/A	N/A
VERIFICATION EQUIPMENT					
Horn Antenna (TX) 1GHz-18GHz	3115	EMCO	40500088	N/A	N/A
Signal Generator 10MHz – 40GHz	SMP04	Rohde & Schwarz	40500125	27 Mar 03	27 Mar 02
Cable from RX antenna to 3M center bulk head in 10M Chamber	104	Succoflex	116558/4	18 Apr 03	18 Apr 02
Cable from 3M center bulk head to Control room	104	Succoflex	40500627	18 Apr 03	18 Apr 02
Cable from Control room bulk head TO Signal Generator	104	Succoflex	40500626	18 Apr 03	18 Apr 02

C.6. Test Setup Special Considerations

Test was conducted at the 3m-distance west range and System was operational as per customer instructions

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.


Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



C.7. Test Results Summary

FCC Part 22

Peak Scan 1GHz - 10GHz (Horizontal Polarization)



Project Name:

MTRM-CR Phase 2

Model:

MTRM-CR Phase 2

Comments:

Tester:

Shankara Malves

Test ID:

RE03-10M-2002-011

Horizontal Polarization

Standard		FCC Part22		3 meters						
Antenna	Start Frequency	Stop Frequency	Frequency	AF	CL + LNA	Detector	Peak Measured Value	Corrected Value	Theoretical Limit	Theoretical Margin
	MHz	MHz	MHz	dB/m	dB		dBuV	dBuV/m	dBuV/m	dB
3115 Hpol	1000	2700	1752.41	28.21	-62.51	PK	88.53	55.23	84.30	29.07
3115 Hpol	2700	5950	2635.72	30.90	-60.50	PK	90.83	61.23	84.30	23.07
3115 Hpol	2700	5950	4042.03	34.32	-58.19	PK	74.87	51.00	84.30	33.30
3160-06	5950	8200	7906.26	30.00	-51.18	PK	71.76	50.58	84.30	33.72
3160-07	8200	10000	8784.25	33.40	-50.14	PK	71.86	55.12	84.30	29.18
3160-07	8200	10000	9731.34	33.49	-48.78	PK	70.54	55.25	84.30	29.05

Corrected Value: Measured Value + AF + CL + LNA

AF: Antenna Factors & CL: Cable Loss & LNA: Amplifier

Notes:

(1) Positive Margin indicates a pass


(2) Corrected Value was measured by FSEK Virtual Instrument with all factors loaded

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



Peak Scan 1GHz – 10GHz (Vertical Polarization)


	Project Name: MTRM-CR Phase 2		Tester: Shankara Malves							
	Model: MTRM-CR Phase 2		Test ID: RE03-10M-2002-011							
Comments:										
Vertical Polarization										
Standard	FCC Part22		3 meters							
Antenna	Start Frequency	Stop Frequency	Frequency	AF	CL + LNA	Detector	Peak Measured Value	Corrected Value	Theoretical Limit	Theoretical Margin
	MHz	MHz	MHz	dB/m	dB		dBuV	dBuV/m	dBuV/m	dB
3115 Vpol	1000	2700	1756.51	27.87	-62.53	PK	97.24	62.99	84.30	21.71
3115 Vpol	1000	2700	2635.57	30.70	-60.50	PK	100.90	71.10	84.30	13.20
3115 Vpol	2700	5950	5263.99	35.52	-56.26	PK	74.24	53.50	84.30	30.80
3160-06	5950	8200	8062.67	30.00	-50.98	PK	72.05	51.07	84.30	33.23
3160-07	8200	10000	8783.08	33.40	-50.14	PK	70.81	54.07	84.30	30.23
3160-07	8200	10000	9410.62	33.40	-49.25	PK	70.96	55.11	84.30	29.19
Corrected Value: Measured Value + AF + CL + LNA					AF: Antenna Factors & CL: Cable Loss & LNA: Amplifier					
Notes:										
(1) Positive Margin indicates a pass										
(2) Corrected Value was measured by FSEK Virtual Instrument with all factors loaded										

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



Substitution Data 1GHz – 10GHz



Project Name: MTRM-CR Phase 2
Model: MTRM-CR Phase 2
Comments: Substitution Measurement Data

Tester: Jacky Wong
Test ID:

Frequency (MHz)	Polarization (V/H)	Emission level	Corrected Substitution measure level	Signal Generator	Cable factor	Antenna Gain	Effective Radiated Power (E.R.P.)	E.R.P Limit	Margin
		dBuV/m	dBuV/m	dBm	dB	dB	dBm	dBm	dB
1752.41	H	55.23	55.54	-53.60	-5.31	6.95	-51.96	-13	38.96
2635.72	H	61.23	61.42	-48.30	-6.57	7.96	-46.91	-13	33.91
4042.03	H	51.00	51.39	-61.30	-8.27	8.04	-61.53	-13	48.53
7906.26	H	50.58	50.86	-56.50	-11.86	10.60	-57.76	-13	44.76
8784.25	H	55.12	55.13	-51.80	-12.63	10.47	-53.96	-13	40.96
9731.34	H	55.25	55.50	-53.60	-13.50	10.71	-56.39	-13	43.39
1756.51	V	62.59	62.42	-43.70	-5.32	6.95	-42.07	-13	29.07
2635.57	V	71.10	71.39	-36.30	-6.57	7.92	-34.95	-13	21.95
5263.99	V	53.50	53.57	-58.40	-9.52	9.24	-58.68	-13	45.68
8062.67	V	51.07	51.52	-59.90	-12.02	10.63	-61.30	-13	48.30
8783.08	V	54.07	54.60	-53.60	-12.62	8.43	-57.79	-13	44.79
9410.62	V	55.11	55.44	-52.50	-13.24	10.41	-55.32	-13	42.32

Effective Radiate Power (E.R.P) = Signal Generator + Cable Factor + Antenna Gain

Note: Positive Margin indicates a Pass.

The EUT is in compliance with the limits as specified in the standard FCC Part 22.

C.8. Observations.

None

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



C.9. Deviations from Normal Operating Mode

None

C.10. Sample Calculation

Emission Level = Measured Level + Correction Factors

Margin = Limit – Emission Level

Effective Radiated Power (ERP) = signal generator + cable factor + Antenna Gain

C.11. Test Data and Pictures

Test data and pictures for Radiated Emission appear following this page.

C.12. Signature

Signature/Date:

Name:

Function:

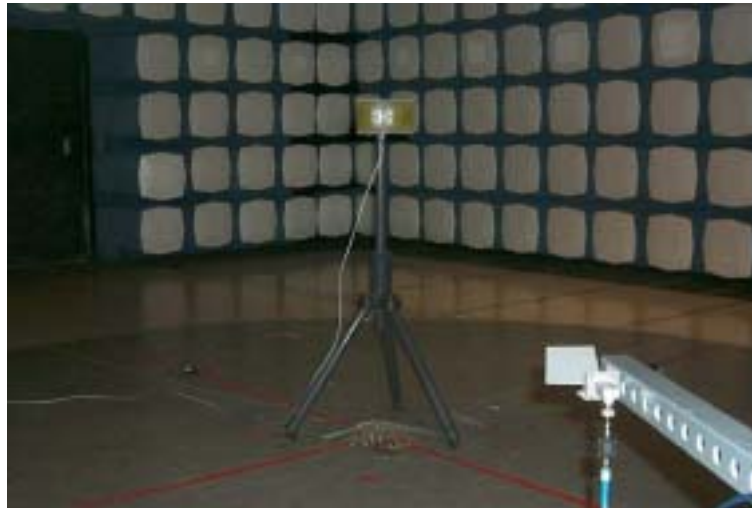


Digitally signed by
Shankara Malwes
DN: cn=Shankara
Malwes,
o=Sanmina-sci,
c=CA
Date: 2002.11.15
18:09:44 -0700

Shankara Malwes
EMC Technologist

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



Picture 3: Signal Substitution measurement setup at 3M

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091



END OF DOCUMENT

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in part without permission of the testing body.

Sanmina-SCI Canada Product Integrity, 5151-47th Street N.E. Tel: 403-295-5134, Fax: 403-295-4091