



SANMINA-SCI

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Radiated Emissions Part 24 Test Report
Lab Project Number- 02NOR010
MPAM-CR (Wide-Range HCPA/MPPEM)

Revision: 01

Date: May 23, 2002

Prepared for: Nortel Networks Inc.

Author: Shankara Malwes
EMC Test Technologist

Approved by: Glen Moore
EMC Manager

Matthew P. Buxton
PI Laboratory Manager

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Summary

Sanmina-SCI Canada

Product Integrity Laboratory

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

Accreditation Numbers: FCC 101386

IC 46405-3978

Standards Council of Canada Accredited Laboratory No. 440

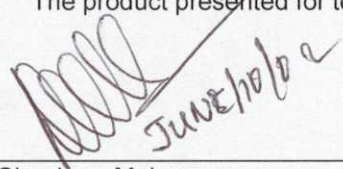
Performed For: Thomas Wong
Nortel Networks Inc.
5111-47th Street, N.E.
Calgary Alberta T3J 3R2
Phone (403) 769-2425

EUT Description: MPAM-CR (Wide-Range HCPA/MPEM)
Model: Wide-Range MPEM and HPCA, CRPA
Serial Number: Refer Table 2 of the project test plan in Appendix D

Appendix	Core Standard	Reference Standard	Sanmina Test Case	Description & Range	Deviation From Standard	Deviation From Test Plan	Pass / Fail
B	FCC Part24	ANSI C63.4:2001	RE02-10M-2002-021	Spurious Radiated Emissions 30MHz-1GHz	No	No	Pass
C	FCC Part24	ANSI C63.4:2001	RE03-10M-2002-007	Spurious Radiated Emissions 1GHz - 10 GHz	No	Yes	Pass

Note: Test Plan deviations are listed in Appendix A.

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

Tested By: 
Shankara Malwes
EMC Technologist

Checked By: 
Glen Moore
EMC Manager

Digitally signed by Glen Moore
DN: cn=Glen Moore, o=Sanmina-SCI, ou=Product Integrity, c=CA
Date: 2002.06.06 14:27:30 -0700

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REGISTER OF REVISIONS

Issue	Date	Description of Revisions
Rev.1	23 May 2002	Initial Release

1. INTRODUCTION

1.1 PURPOSE

The purpose of this report is to describe testing and results for Radiated Emissions on Nortel's MPAM-CR (Wide-Range MPEM and HPCA, CRPA) as performed in reference to FCC Part 24 Subpart E limits.

1.2 ABBREVIATIONS AND DEFINITIONS

None

1.3 REFERENCES

- ANSI C63.4-2001
- FCC CFR 47 Part 24
- Sanmina-SCI Radiated Emissions 30MHz-1GHz (Automated) Test Method E001R6
- Sanmina-SCI Radiated Emissions 1GHz – 18GHz (Manual) EMC Test Method E006R3
- Sanmina-SCI Radiated Emissions 30MHz – 20GHz Signal Substitution Method Revision:01

2. TEST LOG

Appendix	Test Case	Start	End
Date Received: 28 th Apr 2002			
B	Radiated Emissions 30MHz – 1GHz FCC Part 24	16 May 02	16 May 02
C	Radiated Emissions 30MHz – 20GHz FCC Part 24 Signal Substitution	16 May 02	17 May 02
Date Shipped: Not shipped			

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3. EUT

3.1 CONFIGURATION

The EUT was placed on the wooden palette located in the center of the turntable in the 10M chamber. Cabling was routed through a cable rack in an attempt to maximize the emissions. The EUT was configured with 3x1900MFRMs named MFRM#1, 2 and 3. All the MFRM Antenna ports connected to bulkhead in the center of the turntable and terminated with a 50-ohm attenuator load in the support room under the 10M chamber.

For more detailed EUT configuration and setup refer to Appendix F of the Project test plan in Section 3.4.1.2 and section 4.2 of the Project test plan draft document number xxxxxx, Stream 00, Issue 01, dated 21 Apr 2002.

Table 1 –Description of EUT

Name	MPAM-CR
Model Number	Wide-Range MPEM and HPCA, CRPA
Revision Number	Not provided
Serial Number	Refer to the Table 2
Physical Description	The MPAM-CR consists of three subassemblies mounted in an open, floor-standing frame, all gray in color. Each MFRM has green lights on the front panel and four ports on the back (Ant, Div Ant, RF In, & RF Out). The rack was placed on a 10cm high wooden pallet in the center of the 10M-chamber turntable.
Classification	Floor standing
Size	Not provided
Weight	Not provided
Power	-48V DC, 15 Amps in each feed. The 3MFRM powers were connected to the B-Hubble connector. For more details Refer Appendix E Table 11,of the Project test plan in Section 2.2
Functional Description	The cost reduced MPAM was tested as part of a Metrocell Multi carrier BTS.The cellular and PCS communication uses CDMA Technology and operates at 1900MHz. The basic system provides a complete, one carrier cell site that may be configured for indoor or outdoor applications. For more detailed description please Refer to the section 1.3 of the Project test plan draft document Number: xxxxxx, stream 00, issue 01 dated 21 Apr 2002.

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Table 2 – EUT Description List

The following equipment was provided by the customer and was verified by Sanmina-SCI.

Module	Module Description	PEC	Serial Number (Unique Identifier)	Verified
DPM	1900 DPM #4	NTGS53JA	NNTM7400000G	<input checked="" type="checkbox"/>
	1900 DPM #5	NTGS53KA	NNTM7400000C	<input checked="" type="checkbox"/>
	1900 DPM #6	NTGS53LA	NNTM7400000L	<input checked="" type="checkbox"/>
MTRM	1900 MTRM#4	NTGY10AA AD	NNTM537X6W0B	<input checked="" type="checkbox"/>
	1900 MTRM#5	NTGY10AA AD	NNTM535TGUM2	<input checked="" type="checkbox"/>
	1900 MTRM#6	NTGY10AA AD	NNTM535TGUU8	<input checked="" type="checkbox"/>
MPAM #4	MPAM#4	NPGY80AZ P1	NNTM537YT0X1	<input checked="" type="checkbox"/>
	MCPA	NTGY81AC N1	NNTM74PE080F	<input checked="" type="checkbox"/>
	MPEM	ACTT MPEM	ACTT00000049	<input checked="" type="checkbox"/>
	HPCA	ASTEC HPCA	ADPL0800000E	<input checked="" type="checkbox"/>
MPAM #5	MPAM #5	NPGY80AZ P1	NNTM537YT115	<input checked="" type="checkbox"/>
	MCPA	NTGY81AC N1	NNTM74PE080C	<input checked="" type="checkbox"/>
	MPEM	ACTT MPEM	NNTM533GQN48	<input checked="" type="checkbox"/>
	HPCA	ASTEC HPCA	ADPL0800000J	<input checked="" type="checkbox"/>
MPAM #6	MPAM #6	NPGY80AZ P1	NNTM537YT0Y2	<input checked="" type="checkbox"/>
	MCPA	NTGY81AC N1	NNTM74PE0809	<input checked="" type="checkbox"/>
	MPEM	ACTT MPEM	NNTM533GQN6A	<input checked="" type="checkbox"/>
	HPCA	NTGY82CA N5	ASENAE000046	<input checked="" type="checkbox"/>

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Module	Module Description	PEC	Serial Number (Unique Identifier)	Verified
FRAME	FRAME	NTGS65AA 06	DEVP01010848	<input checked="" type="checkbox"/>
FAN	FAN#4	NTGY60AA 02	SNMN5300K5F5	<input checked="" type="checkbox"/>
	FAN#5	NTGY60AE 01	NNTM532VW839	<input checked="" type="checkbox"/>
	FAN#6	NTGY60AE 01	NNTM532VW88E	<input checked="" type="checkbox"/>

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

3.1.1 CONFIGURATION DEVIATIONS

None

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3.2 Power

B – Hubble: 15 Amps each feed
 Line 1 -48V DC through LISN B1
 Line 2 +48V DC through LISN B2
 Line 3 -48V DC through LISN B3
 Line 4 +48V DC through LISN B4

3.2.1 POWER DEVIATIONS

None

3.3 CABLES

Table 3 – Cable List

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

No	Description	Routing From	Routing to	Length (m)	Connector Type	Shield Type	Back shell Material	Verified
1	50Ω RF Cable # 1	1900MFRM #4 Main Ant D6 port through #1 bulkhead connector	30dB, 150 watts, attenuator and to 50Ω term	~22	N-Type	Braid /Foil	Metal	☒
2	50Ω RF Cable # 2	1900MFRM #5 Main Ant D6 port through #2 bulkhead connector	150 watts, attenuator load term	~22	N Type	Braid /Foil	Metal	☒
3	50Ω RF Cable # 4	1900MFRM #6 Main Ant D6 port through #4 bulkhead connector	40dB, 500 watt, attenuator and to 50Ω term	~22	N-Type	Braid /Foil	Metal	☒
4	50Ω RF Cable # 5	1900MFRM #4 Div Ant port through #5 bulkhead connector	150 watts, attenuator load term	~22	N-Type	Braid /Foil	Metal	☒

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No	Description	Routing From	Routing to	Length (m)	Connector Type	Shield Type	Back shell Material	Verified
5	50Ω RF Cable # 7	1900MFRM #5 Div Ant port through #7 bulkhead connector	150 watts, attenuator and to 50Ω term	~22	N-Type	Braid /Foil	Metal	<input checked="" type="checkbox"/>
6	50Ω RF Cable # 8	1900MFRM #6 Div Ant port through #8 bulk head connector	150 watts, attenuator load term	~22	N-Type	Braid /Foil	Metal	<input checked="" type="checkbox"/>
7	2 Shielded Power Cable	Line 1 and Line 2 of B-Hubble connector	1900 MFRM# 4,5 Power I/P	~8.0	N-Type	Braid /Foil	Metal	<input type="checkbox"/>
8	1 Shielded Power Cable	Line 3 and Line 4 of B-Hubble connector	1900 MFRM# 6 Power I/P	~8.0	N-Type	Braid /Foil	Metal	<input type="checkbox"/>

Note: "☒" means verified and "☐" not verified

3.3.1 CABLE LIST DEVIATIONS

None

3.4 EUT FREQUENCIES

For a detailed list of frequencies refer to the Appendix. D, Table 2 and 3 of the project test plan draft document number: xxxxxx, Stream 00, Issue 01, dated 21 Apr 02. Also Refer to the section 7.2.1 in the test plan.

3.4.1 FREQUENCY LIST DEVIATIONS

Frequencies of the EUT were not verified by Sanmina-SCI.

3.5 MODE OF OPERATION

Refer to the Appendix. D in section 4.4 of the Project test plan draft document number xxxxxx, Stream 00, Issue 01, dated 21 Apr 2002.

3.5.1 MODE OF OPERATION DEVIATION

The customer operated the EUT and reported no operation deviations reported by the client.

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3.6 PASS / FAIL CRITERIA

The pass/fail criteria are defined as the limits specified in FCC CFR Part 24 Subpart E. The standard limits are described in each appendix of this report.

Pass Criteria:

The EUT is considered to pass the FCC Part 24 Spurious Emissions Test if the measured level is less than or equal to the applicable limit -13dBm .

Fail Criteria:

The EUT is considered to Fail the FCC Part 24 Spurious Emissions Test if the measured level is greater than or equal to the applicable limit -13dBm .

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4. SUPPORT EQUIPMENT

The following modules were used as support equipment and verified by Sanmina-SCI. The equipment was isolated from the EUT in the shielded enclosure below the test site and was used to excite the EUT and monitor the alarm status of the EUT.

Table 5 – Support Equipment

Module	Module Description	PEC	Serial Number (Unique Identifier)	Verified
Upper Shelf	CEM in Slot 1	NTGS60BA 80	NNTM5357YCHB	<input checked="" type="checkbox"/>
	CEM in Slot 2	NTGS60BA 78	NNTM5357H4BF	<input checked="" type="checkbox"/>
	CEM in Slot 3	NTGS60BA 73	NNTM533M1365	<input checked="" type="checkbox"/>
	CEM in Slot 7	NTGS60BA 76	NNTM53406QTY	<input checked="" type="checkbox"/>
	CEM in Slot 8	NTGS60BA 77	NNTM5340832L	<input checked="" type="checkbox"/>
	CEM in Slot 9	NTGS60BA 73	NNTM533MUMDQ	<input checked="" type="checkbox"/>
Bottom Shelf				<input checked="" type="checkbox"/>
	GPSTM slot2	NTBW50AA P4	NNTM74TW0010	<input checked="" type="checkbox"/>
	CM Slot4	NTGS40AA 97	NNTM5357CGFT	<input checked="" type="checkbox"/>
	CM slot5	NTGS40AA 34	NNTM533MPBB8	<input checked="" type="checkbox"/>
	CORE slot6	NTGS30AA 37	NNTM533MNG78	<input checked="" type="checkbox"/>
	CORE slot7	NTGS30AA 40	NNTM533MUF16	<input checked="" type="checkbox"/>
SHELF		NTGS20AA 09	SNMN53002T2K	<input checked="" type="checkbox"/>
FRAME		NTGS45BA 12	SNMN53002UGJ	<input checked="" type="checkbox"/>
BRAKER PANEL		NTGS47AB 05	SNMN53002PE8	<input checked="" type="checkbox"/>

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APPENDICES

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APPENDIX A: TEST DEVIATION LOG

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Deviation Number	Time & Date	Reference	Deviation from Standard (Y/N)	Description and Justification of Deviation	Core Standard Affected	Approval

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APPENDIX B: MTRM 1900MHZ RADIATED EMISSIONS 30MHZ – 1GHZ RESULTS

B.1. Test Basis

FCC CFR 47 Part 24
ANSI C63.4

B.2. Test Specifications

FCC Part 24 Subpart E		
Frequency	ERP Limit	Peak Limit @ 10 meters*
MHz	dBm	dBμV/m
30MHz – 1 GHz	-13	73.90

* Theoretical field strength based on a dipole

B.3. Test Procedure

Sanmina-SCI Radiated Emissions 30MHz-1GHz (Automated) Test Method E001R6
Radiated Emissions Signal Substitution Method 30MHz-20GHz Revision 1.0.
The EUT was scanned for emissions, field strength measurements were made on the EUT, and for any signals detected signal substitution was performed.

B.4. Measurement Uncertainty

The estimated uncertainty for the Radiated Emissions Signal substitution test from 30MHz – 1GHz is +2.15/-2.19 dB. The corresponding expanded uncertainty is +4.29/- 4.37 dB.

B.5. Deviations

From Standard

None.

From Method

Substitutions were referenced to automated compliance peak data.

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B.6. Test Results

FCC Part 24

Peak Scan 30MHz – 1GHz (Horizontal Polarization)

	Project Name: CR MPAM		Tester: Shankara Malwes							
	Model: MPAM 1900MHz Single Carrier		Test ID: RE02-10M-2002-021							
Comments: Horizontal Scan Compliance Data										
Standard		FCC Part 24		Measurement Distance		10 meters				
Antenna	Start Frequency	Stop Frequency	Frequency	AF	CL	Detector	Pk Measured Value	Corrected Value	Theoretical Limit	Theoretical Margin
	MHz	MHz	MHz	dB/m	dB		dBuV	dBuV/m	dBuV/m	dB
2261 RX BiCon Hpol	30	1000	40.45	13.30	-24.55	Peak	26.14	14.89	73.90	59.01
2261 RX BiCon Hpol	30	1000	120.00	11.75	-24.21	Peak	37.46	24.99	73.90	48.91
2261 RX BiCon Hpol	30	1000	135.00	11.71	-24.32	Peak	40.84	28.22	73.90	45.68
2261 RX BiCon Hpol	30	1000	471.86	17.16	-24.33	Peak	43.51	36.34	73.90	37.56
Corrected Value: Measured Value + AF + CL					AF: Antenna Factors & CL: Cable Loss					
Notes: Positive Margin indicates a pass										

Peak Scan 30MHz – 1GHz (Vertical Polarization)

	Project Name: CR MPAM		Tester: Shankara Malwes							
	Model: MPAM 1900MHz Single Carrier		Test ID: RE02-10M-2002-021							
Comments: Vertical Scan Compliance Data										
Standard		FCC Part 24		Measurement Distance		10 meters				
Antenna	Start Frequency	Stop Frequency	Frequency	AF	CL	Detector	Pk Measured Value	Corrected Value	Theoretical Limit	Theoretical Margin
	MHz	MHz	MHz	dB/m	dB		dBuV	dBuV/m	dBuV/m	dB
2261 RX BiCon Vpol	30	1000	176.95	9.99	-24.12	Peak	39.67	25.54	73.90	48.36
2261 RX BiCon Vpol	30	1000	383.38	15.64	-23.96	Peak	34.36	26.03	73.90	47.87
2261 RX BiCon Vpol	30	1000	471.85	17.74	-24.33	Peak	42.69	36.10	73.90	37.80
Corrected Value: Measured Value + AF + CL					AF: Antenna Factors & CL: Cable Loss					
Notes: Positive Margin indicates a pass										

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Substitution Data 30MHz – 1GHz



Project Name: CR MPAM
Model: MPAM 1900MHz Single Carrier
Comments: Substitution Data at 10M distance
Tester: Shankara Malwes
Test ID: RE02-10M-2002-021

Frequency (MHz)	Polarization (V/H)	Uncorrected Peak level dBuV/m	Uncorrected Substitution measure level dBuV/m	Signal Generator level (source) dBm	Cable factor dB	Antenna Gain dB	Effective Radiated Power (E.R.P.) dBm	E.R.P Limit dBm	Margin dB
40.45	H	26.14	26.60	-75.30	-0.79	1.10	-74.99	-13	61.99
120.00	H	37.46	37.73	-67.40	-1.34	1.80	-66.94	-13	53.94
135.00	H	40.84	40.87	-62.70	-1.43	2.00	-62.13	-13	49.13
471.86	H	43.51	43.69	-36.20	-2.67	3.10	-35.77	-13	22.77
176.95	V	39.65	39.69	-43.90	-1.63	1.20	-44.33	-13	31.33
383.38	V	34.21	34.17	-46.30	-2.41	1.20	-47.51	-13	34.51
471.85	V	42.59	42.37	-37.60	-2.67	2.30	-37.97	-13	24.97

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

Note: Positive Margin indicates a Pass.

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B.7. Measurement Equipment

Radiated Emissions 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 west range	Ferrite bead loaded cable	Suhner Succoflex	40500650	17 Apr 03	17 Apr 02
RF Cable from Bulkhead to LNA	Succoflex 103	Suhner Succoflex	35200/3	17 Apr 03	17 Apr 02
Adjustable Dipole Antenna Set	3121C	EMCO	9611-1233	04 Mar 2003	04 Mar 2002
CONTROL ROOM					
ESMI	1032.5510.23	Rohde & Schwarz	40500153/154	11 Jan 03	11 Jan 02
Amplifier	HP-8447F OPT H64	Hewlett Packard	40500228	17 Apr 03	17 Apr 02
Switch Matrix Controller	SMC-002	TDL	40500189	N/A	N/A

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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.8. Deviations from Normal Operating Mode

Client operated the EUT during the test and reported no deviations in its normal operating mode.

B.9. Test Setup Special Considerations

Refer to section 3.4.1.2 and 4.4 of the project test plan draft copy document number xxxxxx, issue 01 dated 21 Apr 02 for more detailed description of the setup configuration and details.

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B.10. Sample Calculation

Emission Level = Measured Level + Correction Factors

Margin = Limit – Emission Level

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

Example

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

ERP Limit

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

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

Example

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

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

Peak Limit

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

$$= 79.3 \text{ dBuV/m}$$

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B.11. Test Data and Pictures

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

B.12. Test Results

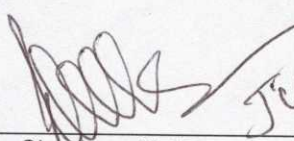
The EUT is in compliance with the limits as specified in the standard FCC Part 24 Subpart E.

B.13. Signature

Signature/Date:

Name:

Function:



Shankara Malwes
EMC Technologist

June 10/02

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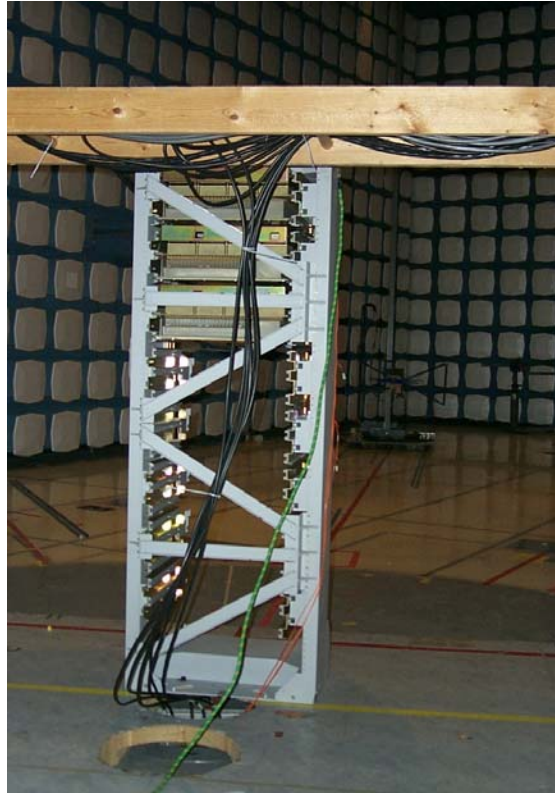
Picture 1: Front view of the EUT towards the Antenna



Picture 2: Left side of the EUT

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Picture 3: Back view of the EUT



Picture 4: Right side of the EUT

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APPENDIX C: MTRM 1900MHZ RADIATED EMISSIONS 1 – 20GHZ RESULTS

C.1. Test Basis

Standards

Core Standard: FCC CFR 47 Part 24, Subpart E.

Reference Standard: ANSI C63.4

C.2. Test Specifications

Applicable Limits:

FCC Part 24 Subpart E Radiated Electric Field @ 3m West Site

FCC Part 24		
Frequency	ERP Limit	Peak Limit @ 3 meters*
MHz	dBm	dBμV/m
1GHz – 20GHz	-13	84.3

* Theoretical field strength based on a dipole

C.3. Test Procedure

The EUT was scanned for emissions, field strength measurements were made on the EUT, and for any signals detected signal substitution was performed.

Sanmina-SCI Radiated Emissions 1GHz – 18GHz (Manual) Test Method E006R3.

Radiated Emissions Signal Substitution Method 30MHz-20GHz.

C.4. Measurement Uncertainty

The estimated uncertainty for the Radiated Emissions Signal substitution test from 1GHz – 20GHz is +/-2.74 dB. The corresponding expanded uncertainty is +/- 5.49 dB.

C.5. Deviations

From Standard

None

From Test Plan

None

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C.6. Test Results

FCC Part 24

Peak Scan 1GHz - 20GHz (Horizontal Polarization)

	Project Name: CR MPAM		Tester: Shankara Malwes							
	Model: MPAM 1900MHz Single Carrier		Test ID: RE03-10M-2002-007							
Comments: Horizontal Scan Compliance Data										
Standard FCC Part 24			3 meters							
Antenna	Start Frequency MHz	Stop Frequency MHz	Frequency MHz	AF dB/m	CL + LNA dB	Detector	Pk Measured Value dBuV	Corrected Value dBuV/m	Theoretical Limit dBuV/m	Theoretical Margin dB
3115 Hpol	1000	2700	2028.86	29.38	-61.67	Peak	94.32	61.82	84.35	22.53
3115 Hpol	2700	5950	3867.55	34.03	-58.44	Peak	94.33	69.92	84.35	14.43
3115 Hpol	2700	5950	3867.40	34.03	-58.44	Peak	93.75	69.34	84.35	15.01
3160-06	5950	8200	7815.06	30.00	-51.37	Peak	72.37	51.00	84.35	33.35
3160-07	8200	10000	9768.93	33.50	-48.84	Peak	70.80	55.46	84.35	28.89
3160-07	10000	12500	11887.95	33.60	-48.60	Peak	72.51	57.51	84.35	26.84
3160-08	13000	15000	13536.86	37.10	-48.10	Peak	73.37	62.37	84.35	21.98
3160-08	15000	18000	15629.91	37.20	-46.93	Peak	73.63	63.90	84.35	20.45
3160-08	15000	18000	17403.48	37.20	-46.23	Peak	74.72	65.69	84.35	18.66
3160-09	18000	20000	19537.51	40.30	-84.31	Peak	112.65	68.64	84.35	15.71

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

Note: The levels shown in the table are the noise floor of the measurement system.

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Peak Scan 1GHz – 20GHz (Vertical Polarization)

	Project Name: CR MPAM		Tester: Shankara Malwes							
	Model: MPAM 1900MHz Single Carrier		Test ID: RE03-10M-2002-007							
Comments: Vertical Scan Compliance Data										
Standard			FCC Part 24	3 meters						
Antenna	Start Frequency	Stop Frequency	Frequency	AF	CL + LNA	Detector	Pk Measured Value	Corrected Value	Theoretical Limit	Theoretical Margin
	MHz	MHz	MHz	dB/m	dB		dBuV	dBuV/m	dBuV/m	dB
3115 Vpol	1000	2700	1886.59	28.37	-62.24	Peak	102.75	68.88	84.35	15.47
3115 Vpol	2700	5950	2028.62	28.89	-61.88	Peak	103.05	70.07	84.35	14.28
3160-06	5950	8200	7735.15	30.00	-51.54	Peak	74.08	52.54	84.35	31.81
3160-07	8200	10000	9668.27	33.47	-48.94	Peak	71.08	55.61	84.35	28.74
3160-07	10000	12500	11722.06	33.59	-48.54	Peak	72.33	57.38	84.35	26.97
3160-08	13000	15000	13675.86	37.10	-47.96	Peak	73.27	62.41	84.35	21.94
3160-08	15000	18000	15849.76	37.20	-46.60	Peak	73.27	63.87	84.35	20.48
3160-08	15000	18000	17583.57	37.22	-46.39	Peak	74.04	64.87	84.35	19.48
3160-09	18000	20000	19537.99	40.30	-84.31	Peak	112.35	68.34	84.35	16.01

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

Note: The levels shown in the table are the noise floor of the measurement system

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Substitution Data 1GHz – 20GHz

	Project Name: CR MPAM	Tester: Shankara Malwes
	Model: MPAM 1900MHz Single Carrier	Test ID: RED3-10M-2002-007
Comments: Substitution Data at 3M distance		

Frequency (MHz)	Polarization (V/H)	Emission level dBuV/m	Corrected Substitution measure level dBuV/m	Signal Generator level (source) dBm	Cable factor dB	Antenna Gain dB	Effective Radiated Power (E.R.P.) dBm	E.R.P Limit dBm	Margin dB
2028.86	H	61.82	61.92	-36.20	-5.70	7.13	-34.77	-13	21.77
3867.55	H	69.92	69.62	-27.50	-8.09	7.95	-27.64	-13	14.64
3867.40	H	69.34	69.49	-27.60	-8.09	7.95	-27.74	-13	14.74
7815.06	H	51.00	51.12	-53.50	-11.79	10.10	-55.19	-13	42.19
9768.93	H	55.46	55.24	-50.30	-13.42	10.68	-53.05	-13	40.05
11887.95	H	57.51	56.89	-47.90	-15.11	10.07	-52.94	-13	39.94
13536.86	H	62.41	62.37	-37.10	-16.32	12.52	-40.90	-13	27.90
15629.91	H	63.90	63.96	-38.90	-17.25	11.96	-44.19	-13	31.19
17403.48	H	65.69	65.37	-36.30	-17.09	11.77	-41.62	-13	28.62
19537.51	H	68.64	68.36	-26.00	-19.71	12.90	-32.81	-13	19.81
1886.59	V	68.88	68.82	-29.70	-5.50	7.08	-28.12	-13	15.12
2028.62	V	70.07	69.18	-28.60	-5.70	7.14	-27.16	-13	14.16
7735.15	V	52.54	52.21	-46.00	-11.73	9.96	-47.76	-13	34.76
9668.27	V	55.61	55.59	-47.80	-13.49	10.47	-50.83	-13	37.83
11722.06	V	57.38	57.10	-47.40	-15.05	10.53	-51.91	-13	38.91
13675.86	V	62.37	62.44	-40.00	-16.34	12.61	-43.73	-13	30.73
15849.76	V	63.87	63.93	-40.00	-17.27	12.54	-44.73	-13	31.73
17583.57	V	64.87	64.60	-37.60	-17.47	11.17	-43.90	-13	30.90
19537.99	V	68.34	68.51	-26.00	-19.73	12.90	-32.84	-13	19.84

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

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C.7. Measurement Equipment

Description	Type/Model	Manufacturer	Serial #	Cal Due	Cal Date
10m ANECHOIC CHAMBER					
Standard Gain Horn Antenna 1GHz-2.7GHz (TX)	3115	EMCO	40500087	19 N0v 2002	19 N0v 2001
Standard Gain Horn 2.7GHz-5.95GHz	3115	EMCO	40500087	19 N0v 2002	19 N0v 2001
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
Standard Gain Horn 12.5GHz-18GHz	3160-08	EMCO	40500178	N/A	N/A
Standard Gain Horn 18GHz-20GHz	3160-09	EMCO	40500180	N/A	N/A
Standard Gain Horn 2.6GHz-3.95GHz (substitution test)	3160-04	EMCO	40500175	N/A	N/A
Standard Gain Horn 3.95GHz-5GHz (Substitution test)	3160-05	EMCO	40500174	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

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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					
Standard Gain Horn Antenna (TX)	3115	EMCO	40500090	19 N0v 2002	19 N0v 2001
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

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C.8. Deviations from Normal Operating Mode

The Customer operated the EUT during the test and reported no deviations in its normal operating mode.

C.9. Test Setup Special Considerations

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

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. Test Results


The EUT is in compliance with the limits as specified in the standard FCC Part 24 Subpart E.

C.13. Signature

Signature/Date:

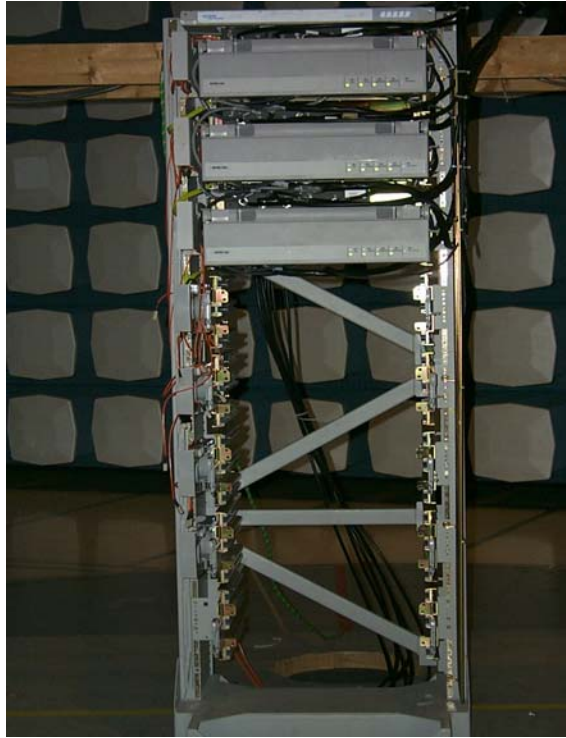
Name:

Function:

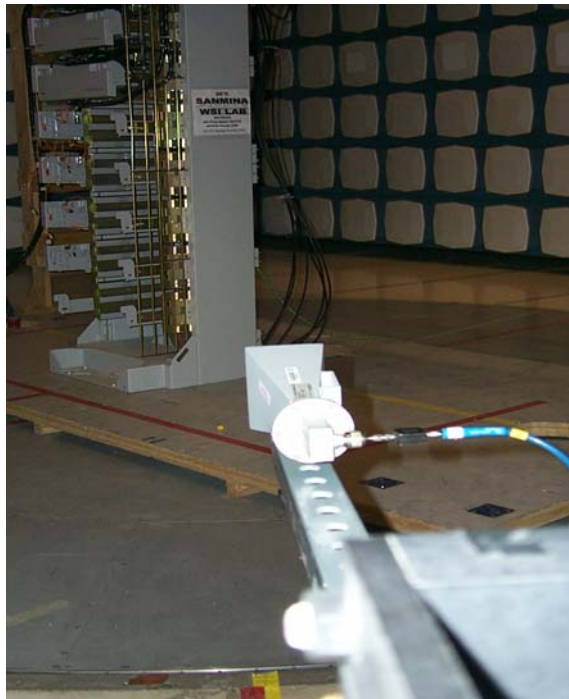

Shankara Malwes
EMC Technologist

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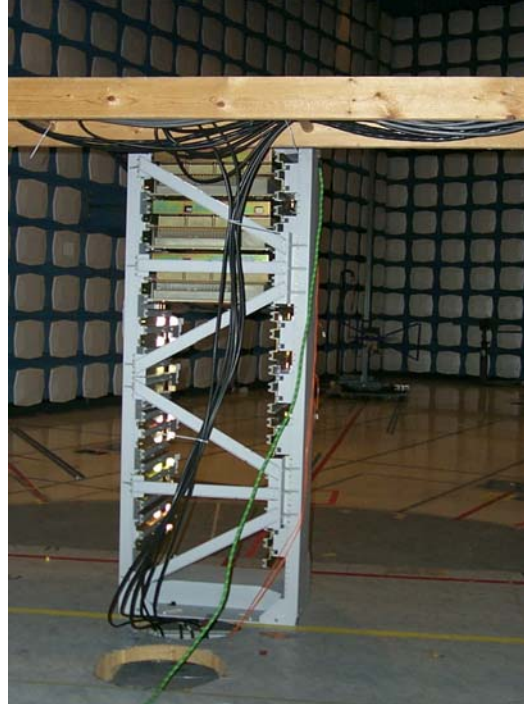
Picture 5: Front view of EUT setup



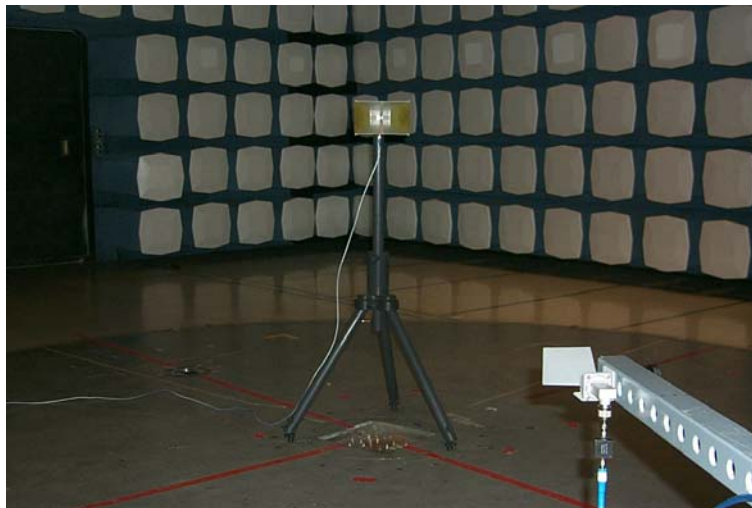
Picture 6: Right view of EUT setup

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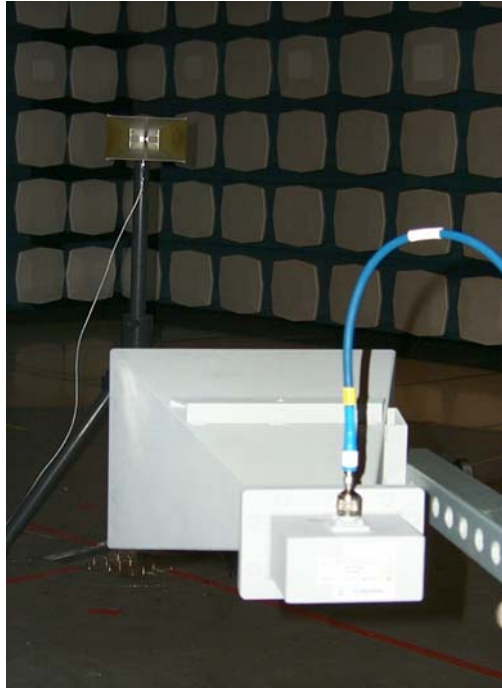
Picture 7: Back view of EUT



Picture 8: Signal Substitution measurement setup at 3M

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Picture 9: Signal Substitution measurement setup at 3M

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END OF DOCUMENT

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