3500 CARLING AVENUE
OTTAWA ONTARIO CANADA
K2H 8E9

NORTEL 4G HW Infrastructure

EXHIBIT 2C

Radiated Spurious Emissions (RSE) Test Report

Applicant : NORTEL

For original Equipment Application on :

FCC : AB6NT2G1LTEFRM3

IC : 332AF-2G1LTEFRM3

Issue date: April 3, 2008
Document Prime: Yan Papernov

Radiated Spurious Emissions Compliance Report for the LTE MFRM3 1.7 / 2.1 GHz FCC Part 27

Document Number: **K0001449-TR-RAD-01-02**
Release Date: **March 27, 2008**

Prepared for: **Nortel Networks**
3500 Carling Avenue
Ottawa, Ontario
Canada, K2H 8E9

Author: **Denis Lalonde**
Radio Compliance Discipline Leader

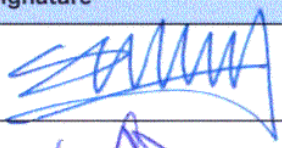
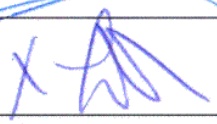
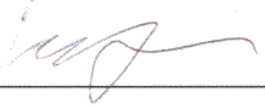
Solectron EMS Canada Inc.
Design & Engineering Kanata (SDE)
21 Richardson Side Road
Kanata, Ontario, K2K 2C1
http://www.solectron.com/services/prod.htm

Release Control Record

This document is based on CEI document template KG000347-TR-EMC-03.

Release no.	Reason for change	Date released
01	Original version	March 19, 2008
02	Added corrections suggested by the customer	March 27, 2008

Approvals

Function	Name	Job title	Signature	Date
Document Release Approval	Steve Tippet	Manager, Product Engineering and Verification		26 Mar 2008
Author	Denis Lalonde	Radio Compliance Discipline Leader		March 27, 2008
Technical Reviewer	Jacques Rollin	EMC Advisor		March 27, 2008

Accreditations

Solectron EMS Canada Inc.'s (SDE) test facilities are accredited by the Standards Council of Canada (SCC) to ISO/IEC 17025 in accordance with the scope of accreditation outlined at the following web site http://palcan.scc.ca/specs/pdf/95_e.pdf [2]. The SCC is a signatory of the APLAC [15] and ILAC [16] Mutual Recognition Arrangements.

FCC Part 27 is not currently on SDE's SCC scope of accreditation. SDE laboratory discipline specialists have ensured our laboratory has the required documentation, test equipment, and technical expertise to test to this standard.

Solectron EMS Canada Inc.'s (SDE) quality management system is registered to ISO 9001: 2000 [17] and its processes are documented in the SDE Quality Manual [4] and Lab Operations Manual [5].

Table of Contents

List of Figures

List of Tables

1 Executive Summary

At the request of Nortel Networks, Solectron EMS Canada Inc. has evaluated the system's radiated spurious emissions. This report describes the test results of the FCC Part 27 radiated emissions tests performed on the LTE MFRM3 1.7 / 2.1 GHz system.

On the basis of measurements performed on March 11 and 12, 2008, the LTE MFRM3 1.7 / 2.1 GHz is verified to be compliant with the radiated spurious emissions requirements of FCC Part 27. The test data included in this report apply to the product titled above manufactured by Nortel Networks.

2 Scope and Purpose

At the request of Nortel Networks, Solectron EMS Canada Inc. has evaluated the system's radiated spurious emissions. This report describes the test results of the FCC Part 27 radiated emissions tests performed on the LTE MFRM3 1.7 / 2.1 GHz system.

3 Compliance Summary

This section summarizes all the measurements performed on LTE MFRM3 1.7 / 2.1 GHz and its compliance to FCC Part 27.

Table 3-1: Compliance Results Summary

Product Summary			
Product Name:	LTE MFRM3 1.7 / 2.1 GHz	Project Leader:	Denis Lalonde
Product Code:	Refer to Customer Information and System Components and Inventory on pages 11 and 18.	EMC Engineer:	Denis Lalonde
Product Release:		Tester:	C. Maidens and D. Lalonde
Product Status:	Not Available	Date:	March 11-12, 2008

Test Cases [1]					
Completed	**Description**	**Specification**	**Test Results**		**Notes**
			Pass	Fail	
■	Radiated Spurious Emissions (E-field)	FCC Part 27	■	□	

1. All the emissions measurements were performed at Solectron EMS Canada Inc. Kanata, Ontario.

4 Equipment Under Test (EUT)

4.1 Product Functional Description

The LTE MFRM3 1.7/2.1GHz hardware is the same as AWS MFRM3 1.7/2.1GHz (NTGZ70CAE5) except for the protocol FPGA, that's been upgraded to the larger device and carry the LTE specific load.

The MFRM-3 is an evolution of the FRM (SFRM/MFRM/MFRM-2) CDMA MetroCell product, bringing a 3-sector 3-carrier system into a single radio module. It is an environmentally sealed module to allow installation into both outdoor and indoor systems. The MFRM-3 electronic assemblies are enclosed within EMI shield, thus providing maximum protection for RE/RI EMC. Fiber connectivity is used for data transfer with the digital equipment and allows the optional remote installation of the radio module. The MFRM-3 has a new Tri-Duplexor Preselector Module (TDPM), which will essentially provide the functionality of three separate MFRM/MFRM-2 duplexers. Images of an MFRM-3 are shown in the following three figures.

Figure 4-1: MFRM-3 radio module

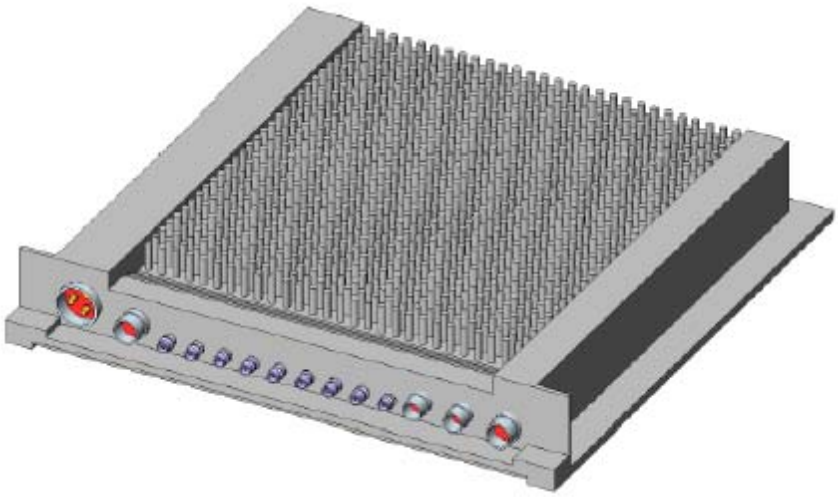


Figure 4-2: Fully assembled MFRM-3

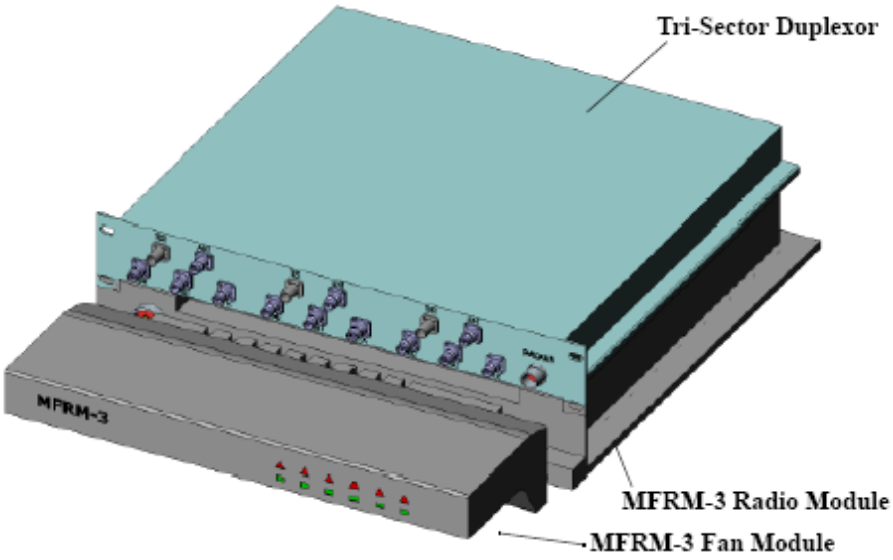
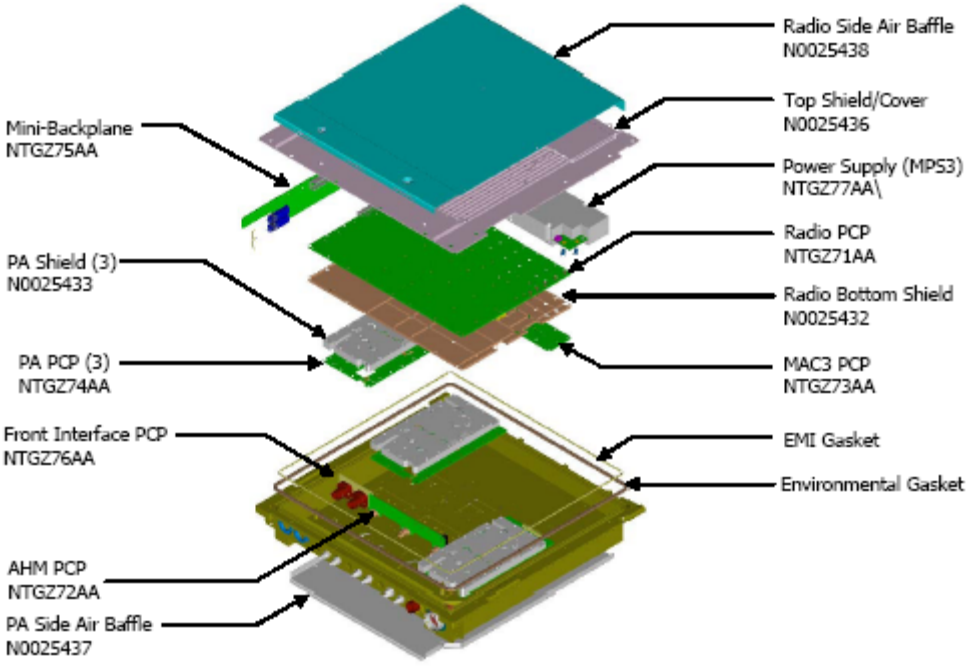


Figure 4-3: Exploded view of an MFRM-3 radio module



The configurations of the 1.7/2.1GHz AWS MFRM-3 that were tested are shown in the Section System Set-up and Test Configurations on page 16.

4.2 System Modifications

No modifications to the EUT were made during testing.

4.3 Customer Information

Company Name	Nortel Networks
Mailing Address	3500 Carling Avenue, Ottawa, Ontario, Canada, K2H 8E9
Product Name	LTE MFRM3 1.7 / 2.1 GHz
Model Number	1.7/2.1GHz Tri- Duplexor Preselector Module (TDPM) (PEC code: NTGZ83AAE6) 1.7/2.1 GHz AWS MFRM-3 Radio Module (PEC code: NTGZ70CBE5) Fan Assembly Module-3 (FAM-3) (PEC code: NTGZ85AA)
Primary Contact	Yan Papernnov
Title	4G Regulatory/PI
Phone	613-763-8819
E-mail	yanp@nortel.com

4.4 Power Requirements

The power requirements for the LTE MFRM3 1.7 / 2.1 GHz are in the following tables.

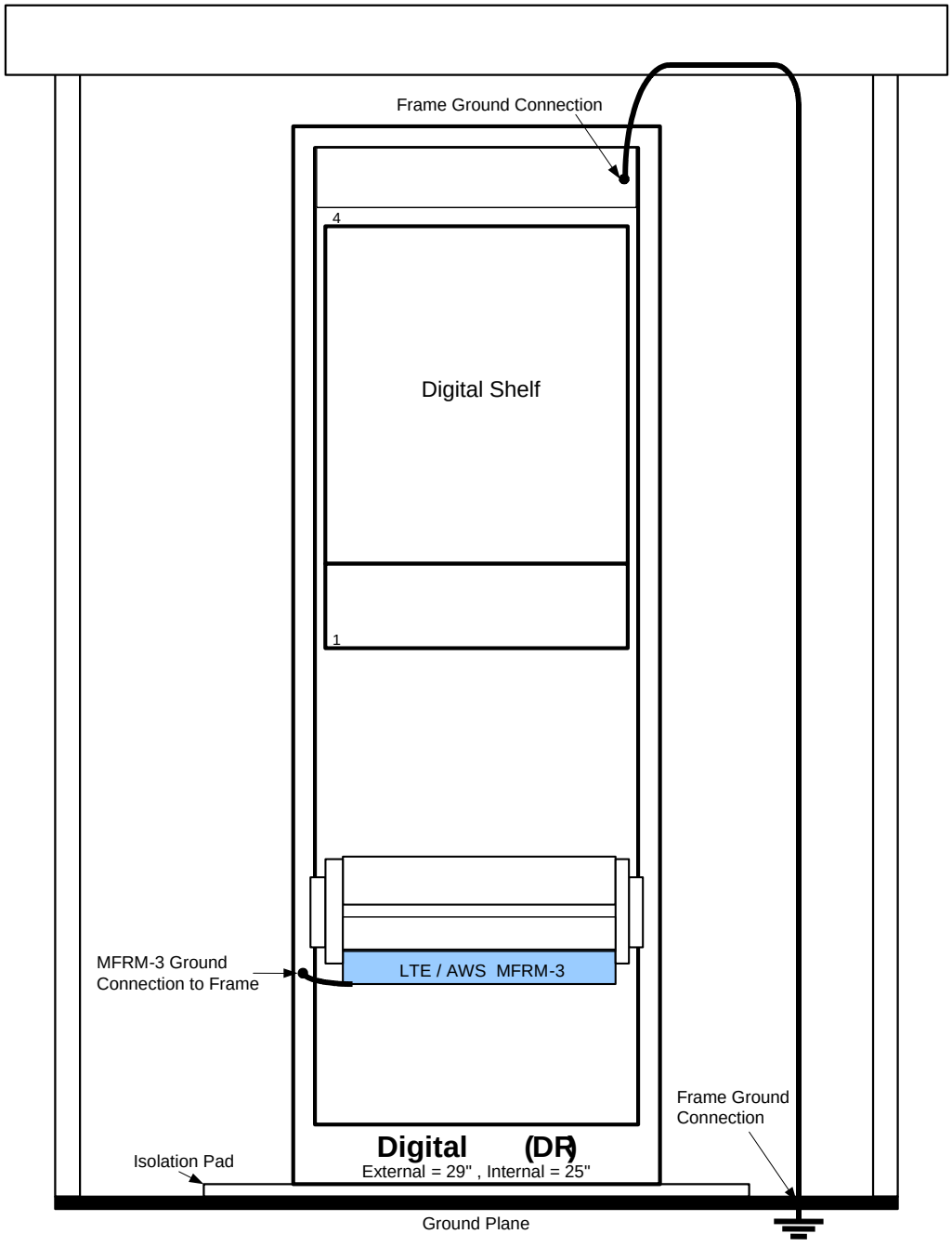
Table 4-1: -48VDC power requirement

Feed	Voltage	Current Rating	Current drawn during testing
A	-55 V DC	30 A max	14.4 A

4.5 Grounding Requirements

For EMC testing, the system was grounded in the same manner as its typical installation as shown in Figure 4-4.

Figure 4-4: System grounding



4.6 Clocks / Oscillators / Switching Power Supply Frequencies

The maximum clock frequency used to determine radiated emissions (RE) for FCC Part 15 is 2.15 GHz.

Table 4-2 lists all the clock sources (for example, discrete crystals, VCXOs, and DC/DC converter switching frequencies) used in the EUT.

Table 4-2: EUT clock frequencies per circuit pack

Circuit pack	Part number	Fundamental frequencies (MHz)
1.7/2.1 GHz AWS MFRM-3 Radio Module	NTGZ70CA	0.1536, 2.5, 7.3728, 19.2, 25, 31.9488, 33, 39.3216, 63.8976, 66, 78.6432, 96, 100, 638.976 excluding all Transmission Carriers' Frequencies in Table 4-3
1.7/2.1GHz TDPM	NTGZ70CAE5	None
FAM-3	NTGZ85AA	None

The LTE PoC (flxCEM) trial is limited to single carrier (10MHz wide) per each Indoor Digital Metrocell (LTE/AWS MFRM3).

Table 4-3: Transmission Carriers' Channels and Frequencies

Radio	Band	Channel	Frequency (MHz)
MFRM3	AWS	800	2150

4.7 EUT Interfaces and Cables

Table 4-4 identifies all possible cables that can be used with the system.

Table 4-4: System cables

Cable ref.	Cable designation	Permanently connected (Yes/No)	Interface description	Connection point	Length (m)	Quantity	Termination during testing
1	-48V DC power cable	Yes	DC power cable	Main DC Power Connector	5	1	Turntable -48 VDC connector
2	Ground cable	Yes	AWG 2 electrical cable	Frame ground	5	1	Earth ground on the turntable
3	Ethernet	Yes	Shielded Cat5	FlxCEM	10	1	LTE PoC PC
4	Ethernet	No	Shielded Cat5	CM2	30	2	Vortex PCs
5	Optical Fiber	Yes	Optical Fiber	Core2	6	1	MFRM3
6	GPS Cable	Yes	50 ohm Coaxial	GPS Module	20	1	GPS antenna
7	Antenna cable (Note 1)	Yes	50 ohm Coaxial	Duplexer	10	2	Load RF attenuators set
8	MFRM3 RF Tx	Yes	50 ohm Coaxial	MFRM3	0.5	2	TDPM
9	MFRM3 RF Rx	Yes	50 ohm Coaxial	MFRM3	0.4	2	TDPM
10	MFRM3-TDPM Data/Power	Yes	NTGZ8000	MFRM3	0.5	1	TDPM
11	FAM3-MFRM3 Data/Power	Yes	NTGZ86AA	MFRM3	0.4	1	FAM

Note 1: All antenna RF cables were calibrated prior to test to ensure correct RF power reading at the time of EUT setup.

4.8 Support Equipment

The following tables indicate the support equipment used during testing.

Table 4-5: Test support equipment for radiated emissions test cases, provided by Nortel

Description	Make	Model number	Serial number	Calibr. due
Personal computer (Vortex port 0)	Dell	OPTILEX GX520	2MK7391	Not required
Personal computer (Vortex port 1)	Dell	OPTILEX GX520	5MK7391	Not required
Laptop (flxCEM)	HP Compaq	6910p	CND7291H9C	Not required

4.9 System Set-up and Test Configurations

The MFRM-3 total RF power was 40 W for 2-antenna ports (α and β) as per MIMO antenna configuration:

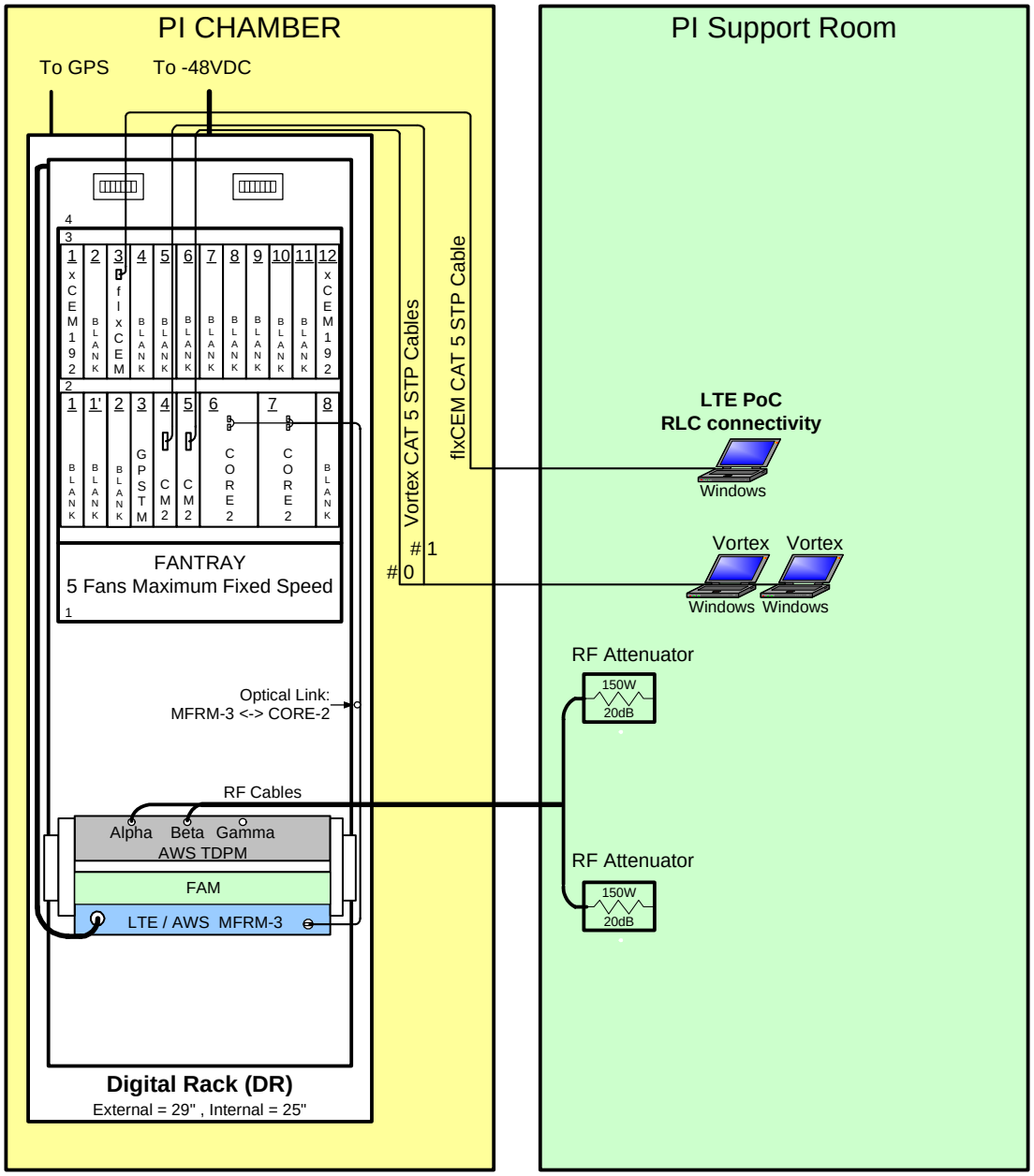
- α : RF Power = 43 dBm = 20 W
- β : RF Power = 43 dBm = 20 W

The transmitter was setup to transmit a 64 QAM modulated signal.

4.9.1 Configuration 1

Configuration 1 is presented in Figure 4-5. This configuration was used for Radiated Emissions testing because it maximized emissions. The MFRM-3 was linked by a fiber optic cable to a CORE-2 module in the digital shelf (BTS).

Figure 4-5: Setup for Radiated Emissions LTE PoC(flxCEM)



4.10 EUT Operations and Software

The system booted from an off state to a fully enabled state only requiring input to start test routines. DMI access was not required for the tests. The software requirement for the PC and the MFRM-3 Beta System are shown in Table 4-6.

Table 4-6: BTS Software Requirements for 1.7/2.1 GHz AWS Beta MFRM-3 System

Functionality	Release
Vortex 15.01 Lab	151_08wk05
CM-2 (eDCG)	cmedcg150lttaa.lip
CM Config File	cmcfg150gp.lip
flxCEM	flxcemappbr.lip
xCEM192	xchcap150gp.lip
CCEM	cemap150nt.lip
XCEM	xcemap150nt.lip
MFRM3	mfrmthree150alwlx60.lip

4.11 System Components and Inventory

The components and inventories of the EUT are provided in the following tables.

Table 4-7: 1.7/2.1GHz AWS MFRM-3 System Components

Component	Code	Quantity	Serial Number
LTE MFRM3 1.7/2.1GHz	NTGZ70CBE5	1	NNTMEEW01026
TDM / TDPM LTE-AWS	NTGZ83AAE6	1	FING01OFYQ11
FAM	NTGZ85AA	1	NNTM84G100TC

Table 4-8: 1.7/2.1 GHz AWS MFRM-3 Inventory List for Radiated Emissions Test Cases

Reference	Component	Nortel PEC Code	Release Number	Serial Number
	METRO CELL INDOOR FRAME (-48 V DC)	NTGS45AC	09	NNTM7860CMFH
	METROCELL INDOOR -48V BREAKER INTERFACE PANEL	NTGS47AD	09	NNTM74XL24XK
	DIGITAL SHELF / COOLING TRAY	NTGS20BA	07	NNTM7860CLKK
	MCBTS INDOOR FANTRAY (5x Fans Fantray Fixed Speed)	NTGS18AB	03	EBMIUSF00BSA
3_1	XCEM 192 DUAL VOLTAGE PNP MODULE	NTRZ80BA	02	NNTM74X0VC72
3_2	Blank (Air Buffle + Blank Faceplate)			
3_3	LTE TRIAL PNP CHANNEL ELEMENT MODULE (flxCEM)	NTGZ92AA	B1	NNTM536G3DGR
3_4	Blank (Air Buffle + Blank Faceplate)			
3_5	Blank (Air Buffle + Blank Faceplate)			
3_6	Blank (Air Buffle + Blank Faceplate)			
3_7	Blank (Air Buffle + Blank Faceplate)			
3_8	Blank (Air Buffle + Blank Faceplate)			

Reference	Component	Nortel PEC Code	Release Number	Serial Number
3_9	Blank (Air Buffle + Blank Faceplate)			
3_10	Blank (Air Buffle + Blank Faceplate)			
3_11	Blank (Air Buffle + Blank Faceplate)			
3_12	XCEM 192 DUAL VOLTAGE PNP MODULE	NTRZ80BA	02	NNTM74X0VC73
2_1	Blank (Air Buffle + Blank Faceplate)			
2_2	GPS, TIMING MODULE - METROCELL GPS/TIMING MODULE A	NTGS50AA	05	NNTM74TM29FH
2_3	Blank (Air Buffle + Blank Faceplate)			
2_4	CM2.0 MODULE DUAL VOLTAGE 24/-48V	NTBW40BA	04	NNTM74X0VWWVX
2_5	CM2.0 MODULE DUAL VOLTAGE 24/-48V	NTBW40BA	04	NNTM84C0228LY
2_6	CORE2.0 MODULE DUAL VOLTAGE 24/-48V	NTBW30BA	05	NNTM74X12FW4
2_7	CORE2.0 MODULE DUAL VOLTAGE 24/-48V	NTBW30BA	12	NNTM74X17KE7
2_8	Blank (Air Buffle + Blank Faceplate)			
	Blank (Air Buffle + Blank Faceplate)			
EUT_4.1	LTE MFRM3 1.7/2.1GHZ	NTGZ70CBE5	A1	NNTMEEW01026
EUT_4.2	TRI-SECTOR DUPLEXER PRESELECTOR 1.7/2.1 GHZ	NTGZ83AAE6	N1	FING01OFYQ11
EUT_4.3	MFRM-3 FAN MODULE (FAM3)	NTGZ85AA	01	NNTM84G100TC

5 General Test Conditions

5.1 Test Facility

Radiated emissions testing were performed in a 10-meter Ambient Free Chamber (AFC). The AFC consists of a shielded room lined with ferrite tiles and anechoic material. It is located in the Solectron EMS Canada Inc facilities on 21 Richardson Side Road, Kanata, Ontario, Canada.

Facility accreditation information is located in the Accreditation Section on page 2 of this test report.

5.2 Measurement Instrumentation

The measurement instrumentation conforms to ANSI C63.2 [7] and CISPR 16 [8]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

6 E-field Radiated Emissions

E-field Radiated Emissions tests are performed to assure that that the product does not produce excess amounts of radiated emissions that could interfere with licensed radiators.

6.1 Test Specification

The system was tested to the following requirements, listed in Table 6-1:

Table 6-1: E-field Radiated Emissions Requirements

Requirement	Country of Application
FCC Part 2.1053, 2.1057 FCC Part 27.53 (g)	USA

6.1.1 Limits

6.1.1.1 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 emissions. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of FCC 2.1049 [19], as appropriate.
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 half wave dipole antennas.

6.1.1.2 FCC Part 2.1057

The spectrum should be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Particular attention should be paid to harmonics and sub harmonics 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. The amplitude of spurious emissions, which are attenuated more than 20 dB below the permissible value, need not be reported.

6.1.1.3 FCC Part 27.53 (g)

For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

6.1.2 Test Facility Information

Location: SDE 10-meter AFC

Date tested: Recorded in the pre-scan plots included in Section 8.3.

Tested by: Recorded in the pre-scan plots included in Section 8.3.

6.1.3 Test Configurations

For radiated emissions test cases, the EUT hardware configuration/software load used are described in Section 0 and Section 4.10 on page 17 respectively.

6.1.4 Test Procedure

Verifications of the test equipment and AFC were performed prior to the installation of the EUT in accordance with the quality assurance procedures documented in the Solectron EMC Test Procedures document [10]. The test was performed as per the relevant test procedures in ANSI C63.4 [6] and TIA-603-C [9]:

- The EUT was placed on a turntable inside the AFC (configured as in normal operation). The system and its cables were separated from the ground plane by an insulating support 10 mm in height. The system was grounded in accordance with its installation specifications. No additional grounding connections were connected.
- For tests between **30 MHz and 10 GHz** the receive antenna (bi-log/horn) was placed at a 10 m distance from the EUT. An initial scan was performed to find emissions (frequencies) requiring detail measurement. The pre-scan was performed by rotating the system 360 degrees while recording all emissions (frequency and amplitude). This procedure was repeated for antenna heights of 1 to 4 meters, and for horizontal and vertical polarizations of the receiving antenna. The horn antenna was moved to a 3 m distance for measurements between 10 and 18 GHz. The measuring distance was further reduces to 1 m for measurements between 18 GHz and 20 GHz.
- Between 30 MHz and 1 GHz measurements at discrete frequencies, the detector mode was quasi-peak (QP) unless otherwise noted. Above 1 GHz measurements were made with an average detector mode (AVG) unless otherwise noted. Above 1 GHz the corresponding peak level can be no more than 20 dB above this limit.
- For **all the above frequency ranges** optimization was performed based on the pre-scan data. For each identified frequency, the EUT was rotated in azimuth over 360 degrees and the direction of maximum emission was noted. Antenna height was then varied from 1 to 4 meters at this azimuth to obtain maximum emissions. The procedure was repeated for both horizontal and vertical polarizations (were applicable) of the search antenna. The maximum level measured was recorded.
- A 2.1 GHz notch filter was used while measuring emissions between 1 GHz and 4 GHz. A 2.5 GHz high pass filter was used while measuring emissions between 4 and 10 GHz. The losses of each filter were previously evaluated with a calibrated Network Analyzer (HP 8753C, asset number: SSG012382, calibration due date: February 20th, 2009) and a calibrated Signal Generator (Anritsu 69369A, asset number: SSG012138, calibration due date: July 11th, 2009). The test results were adjusted to reflect filter losses accordingly.

- The highest emissions were re-evaluated using the substitution method. This is accomplished by replacing the EUT by a calibrated antenna, cable and signal generator. This equipment is used to transmit a signal that will generate a RF meter reading level identical to the one recorded when the EUT was present.

6.1.5 Test Results: E-field Radiated Emissions

This section presents the E-field radiated emissions results. Optimized emissions are presented in the table(s) below, while pre-scan plots of all measurements including marked peaks appear in Appendix C: Radiated Emissions Plots on page 31.

Positive margin values in the "RE Test Results" table(s) below indicate a **PASS** while negative margin values indicate a **FAILURE** to meet the requirement.

Pre-scan results between 30 MHz to 1000 MHz and 10 GHz to 26.5 GHz show no emissions present that require optimization.

Table 6-2: RE Test Results @ 10m (1-10 GHz)

Parameter	Unit	Emission 1	Emission 2	Emission 3
Frequency	MHz	4299.715	6449.852	8599.345
Azimuth	deg	126	331	321
Height	cm	201	214	209
Polarization		Vert	Vert	Vert
Meter Reading	dBμV	32.24	36.34	29.67
Detector	PK, QP, AV	av	av	av
Gain / Loss Factor	dB	-32.7	-28.8	-28.5
Transducer Factor	dB	32.1	34.4	37.8
Level	dBμV/m	31.6	41.9	39.0

Note: Emissions 1, 2, and 3 were the highest second, third, and fourth harmonic of the broadcast frequency of the 2100 MHz MFRM-3.

Substitution measurements were performed in the 1 to 10 GHz band. The highest signals from Configuration 1 were used. Test results can be found in Table 6-3.

No significant signals associated with the transmitter were observed in the 30 MHz to 1 GHz and 10 GHz to 26.5 GHz bands.

Pre-scan plots of the radiated E-field emissions measured are included in Appendix C: Radiated Emissions Plots on page 31.

Table 6-3: Substitution Measurement Test Results

Freq. (MHz)	Signal generator level (dBm)	Cable loss (dB)	Pol	Antenna gain (dB)	Prescan meter reading (dBuV)	Substitution meter reading (dBuV)	ERP (dBm)	Limit (dBm)	Margin (dB)
4299.715	-65.2	2.5	V	10.6	32.2	32.2	-59.3	-13	46.3
6449.852	-56.7	3	V	11.7	36.3	36.3	-50.2	-13	37.2
8599.345	-58.1	3.7	V	11.4	29.7	29.7	-52.6	-13	39.6

6.2 Prescan Measurement Uncertainties

Uncertainty evaluation has been calculated according to the method described in CISPR 16 [8].

The expanded measurement instrumentation uncertainty (with a 95 % level of confidence) on E-field RE is ± 4.5 dB between 30 MHz and 1 GHz, ± 5.9 dB between 1 GHz and 10 GHz, ± 5.8 dB between 10 GHz and 18 GHz, and ± 5.5 dB between 18 GHz and 26.5 GHz.

6.3 Calculation of the Compliance Margin

The following illustrates the manner in which the compliance margin is calculated:

ERP = Signal generator level – Cable losses + Antenna gain – Half wave dipole gain

Margin = Limit - ERP

6.4 Test Conclusion

The worst-case margin is 37.2 dB at 6449.852 MHz to FCC Part 27 spurious emissions requirements. This worst-case margin was calculated using a substitution measurement.

Since all measured emissions indicate positive margins, it can be declared that the EUT has passed the radiated Spurious Emission tests with respect to FCC Part 27 requirements.

6.5 Test Equipment List

Table 6-4: Test Equipment Used for E-field Radiated Emissions

Description	Make	Model number	Asset number	Calibr. due
Bilog Antenna	Antenna Research Associates	LPB 2520A	SSG012299	12/26/2008
Spectrum Analyzer	Hewlett Packard	8564E	SSG012069	3/19/2008
Spectrum Analyzer	Hewlett Packard	8566B	SSG012521	2/4/2009
Spec. A, RF PreSelector	Hewlett Packard	85685A	SSG012010	2/4/2009
Double Ridged Horn	Emco	3115	SSG012298	2/5/2009
Power Supply	Hewlett Packard	6216A	SSG013063	not required
Pre-Amplifier	BNR	LNA	SSG012594	4/13/2008
Quasi-Peak Adapter	Hewlett Packard	85650A	SSG012098	2/4/2009

Description	Make	Model number	Asset number	Calibr. due
RF Amplifier	Hewlett Packard	8447D	SSG013045	9/20/2008
Horn Antenna (18-26.5 GHz)	Emco	3160-09	SSG012292	12/26/2008
Coaxial Cable	Huber & Suhner	104PEA, Sucoflex	SSG012131	9/20/2008
Coaxial Cable # 14	Huber & Suhner	104PEA, Sucoflex	SSG012041	9/20/2008
Coaxial Cable # 2	Huber & Suhner	106A, Sucoflex	SSG012453	2/5/2009
Coaxial Cable # 1	Huber & Suhner	106A, Sucoflex	SSG012454	2/5/2009
Coaxial Cable # 7	Huber & Suhner	104, Sucoflex	SSG011801	4/18/2008
Coaxial Cable	Micro-Coax	UFA 210B-1-1500-504504, Utiflex	SSG012376	12/27/2008
Spectrum Analyzer Display	Hewlett Packard	85662A	SSG012433	2/4/2009
Sucoflex Cable	Huber & Suhner	102A	SSG013084	12/27/2008

The measurement instrumentation conforms to ANSI C63.2 [7] and CISPR 16 [8]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

7 References

7.1 Applicable documents

1. Solectron EMS Canada Inc. EMC Compliance Test Plan for LTE Metrocell 1.7/2.1 GHz, K0001449-TP-EMC-01-01, March 11, 2008.

7.2 Reference documents

2. Standards Council of Canada, Scope of Accreditation for Solectron EMS Canada Inc. outlined at the following web site http://palcan.scc.ca/specs/pdf/95_e.pdf
3. Industry Canada, RSS 212, Test Facilities and Test Methods for Radio Equipment, Issue 1 (Provisional), February 27, 1999.
4. Solectron EMS Canada Inc. Quality Manual, K0000608-QD-QM-01-09, July 4 2006.
5. Solectron EMS Canada Inc. Lab Operations Manual KG000347-QD-LAB-01-08, July 4 2006.
6. ANSI C63.4-2003 for FCC CFR 47 and ANSI C63.4-2001 for Telcordia, Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz, 06 June 2001.
7. ANSI C63.2-1996, American National Standard for Electromagnetic Noise and Field Strength Instrumentation, 10 Hz to 40 GHz – Specifications.
8. CISPR 16 Publications (2003), Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Part 1: Radio Disturbance and Immunity Measuring Apparatus.
9. TIA-603-C, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards, August 2004
10. Solectron EMS Canada Inc., EMC General Lab Test Procedure, KP000270-LP-EMC-01-08, July 6, 2006.
11. CISPR 22 (1997 / A2 2002), Title: Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.
12. FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations, Part 15, U.S. Federal Communications Commission, 2005.
13. ICES-003 Issue 4 (2004), “Spectrum Management: Interference-causing equipment standard (Digital Apparatus)”
14. Lab34 Edition 1, “The Expression of Uncertainty in EMC Testing”, UKAS, August 2002.
15. APLAC, Asia Pacific Laboratory Accreditation Cooperation, Website (http://www.aplac.org)
16. ILAC, International Laboratory Accreditation Cooperation, Website (http://www.ilac.org/)
17. ISO 9001:2000, Quality Management Systems – Requirements, third edition, 2000/12/15.

18. Code of Federal Regulations (Washington, DC: Federal Communications Commission), Title 47, Chapter 1, Part 27.
19. Code of Federal Regulations (Washington, DC: Federal Communications Commission), Title 47, Chapter 1, Part 2.
20. 2 GHz Personal Communications Services, Industry Canada, RSS-133, Issue 2, Revision 1, November 6, 1999
21. NAMAS Publication NIS 81: “The Treatment of Uncertainty in EMC Measurements”, Edition 1, May 1994.
22. Industry Canada, RSS 212, Test Facilities and Test Methods for Radio Equipment, Issue 1 (Provisional), February 27, 1999.

8 Appendices

8.1 Appendix A: Glossary

Included below are definitions and abbreviations of terms used in this document.

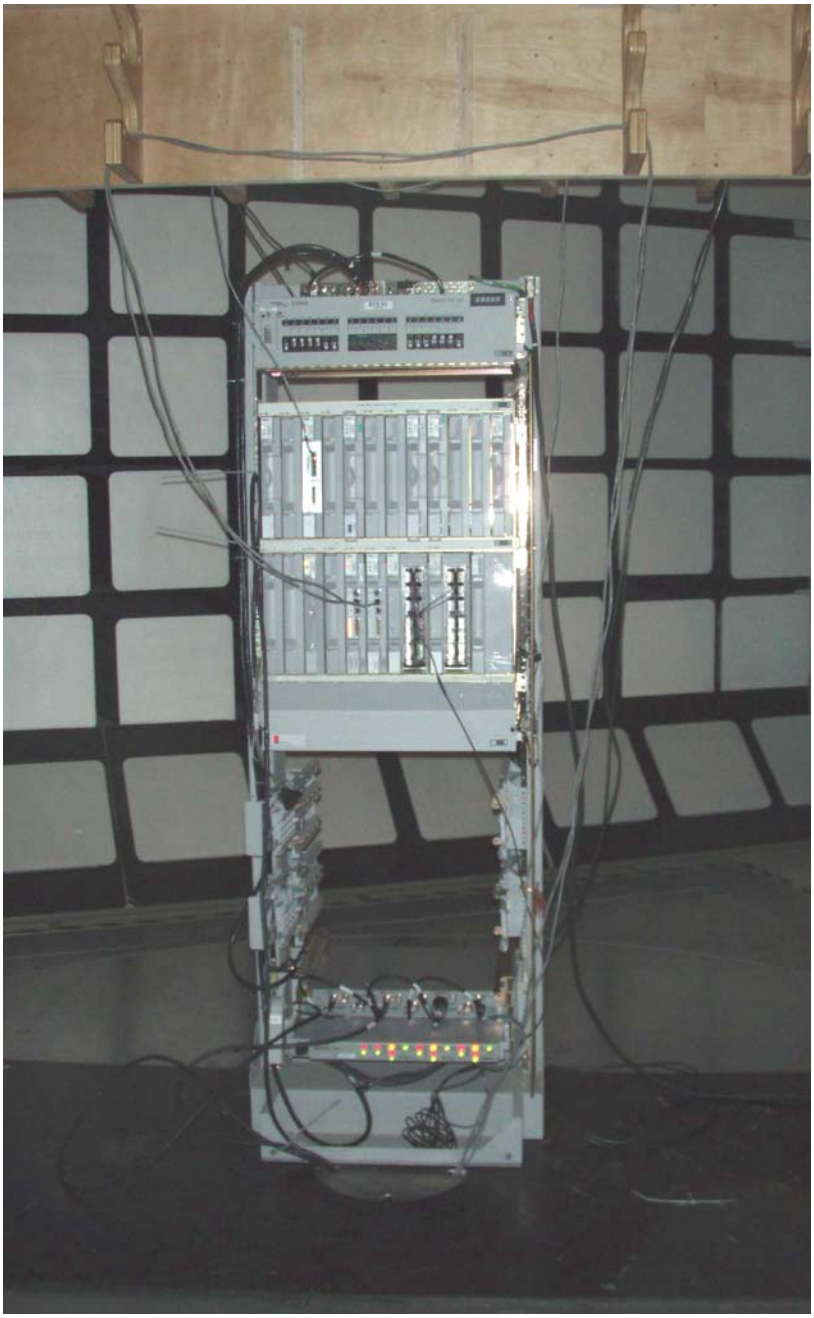
Term	Definition
1xRTT	IS-2000 Spreading Rate 1, i.e., using the same channel bandwidth as IS-95 (1.25 MHz), or one times the current RTT
AD	Average Detector
AE	Auxiliary Equipment
AFC	Ambient Free Chamber
AM	Amplitude modulation
ANSI	American National Standards Institute
AWS Band	1700/2100 MHz
BTS	Base-station Transceiver System
BTS	Base Station Transceiver Subsystem
CDMA	Code Division Multiple Access
CEM	Channel Element Module
CEM192	1xRTT CEM with six CSM5000 supporting 192 voice calls
CEM64	1xRTT CEM with two CSM5000 supporting 64 voice calls
CSA	Canadian Standards Association
dB	Decibel
DC	Direct Current
DR	Digital Rack
EMC	Electromagnetic Compatibility
ERP	Effective Radiated Power
EUT	Equipment Under Test
FCC	Federal Communications Commission, USA
FL	Forward Link
FOM	Fiber Optic Microcell
FRM	Flexible Radio Module
GND	Ground
IC	Industry Canada
LISN	Line Impedance Stabilization Network
MCBTS	Multi-Carrier Base Station Transceiver Subsystem
MFRM	Multi-carrier Flexible Radio Module
MU	Measurement Uncertainty

Term	Definition
NA	Not Applicable
NAMAS	National Measurement Accreditation Service
NBS/ NIST	National Bureau of Standards / National Institute of Standards and Technology
PA	Broadband Power Amplifier
PK	Peak Detector
PSU	Power Supply Unit
RBW	Resolution Bandwidth
RE	Radiated Emissions
RF	Radio-Frequency
RMS	Root-mean-square
RSS	Radio Standards Specification
SA	Spectrum Analyzer, the ANSI C63.2 Compliant EMI meter
SCC	Standards Council of Canada
T	50 Ω Coaxial Termination (conducted emissions / immunity)
TDM	Tri-Sector Duplexer Module
TDPM	Tri- Duplexor Preselector Module
UL	Underwriters Laboratories, Inc.
UUT	Unit Under Test
VBW	Video Bandwidth
WR HCPA	Wide voltage Range High Power Converter Assembly
WR MPEM	Wide voltage Range Power Entry Module

8.2 Appendix B: Test Set-up Photographs

This appendix presents all the set-ups used to cover all the tests presented in this Test Report.

Figure 8-1: LTE MFRM3 1.7 / 2.1 GHz Radiated Emission Set-up (Front View)



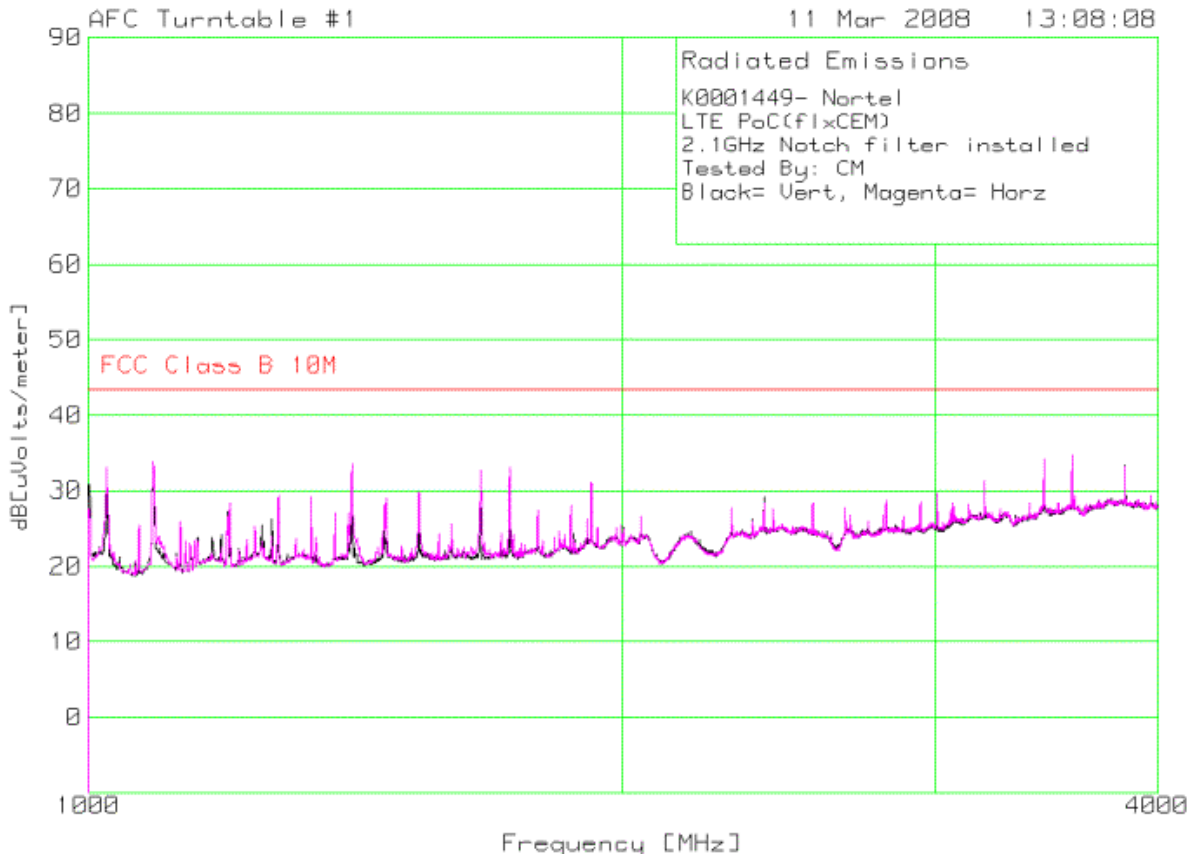
8.3 Appendix C: Radiated Emissions Plots

This appendix presents all radiated emissions plots for the test cases measured.

Radiated emissions were measured between the frequency ranges of 30 MHz to 26.5 GHz. No significant signals associated with the transmitter were observed in the 30 MHz to 1 GHz and the 10 GHz to 26.5 GHz ranges.

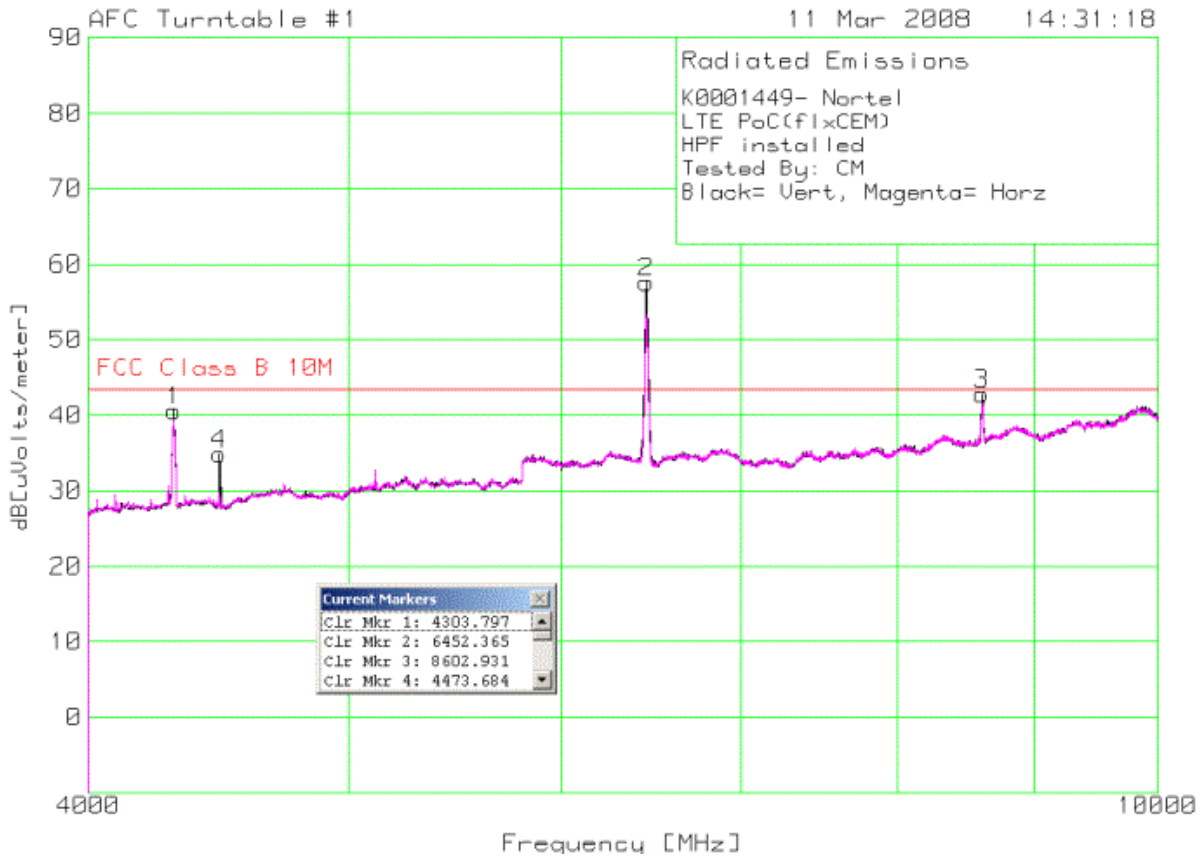
8.3.1 Configuration 1: 1.7/2.1 GHz AWS LTE MFRM-3

Figure 8-2: RE 1 – 4 GHz



Note: A 2100 MHz notch filter was placed between the horn antenna and pre-amplifier during this Radiated Emissions plot.

Figure 8-3: RE 4 – 10 GHz



Note: A 2.5 GHz high pass filter was placed between the horn antenna and pre-amplifier during this Radiated Emissions plot.

8.4 Appendix D: RF Characterization of the Filters Used in the Radiated Emissions Testing.

This appendix presents the RF characterization of the notch filter and the high pass filter. The notch filter (Nortel item, made by Microwave Circuits Inc., model number: N0321401, serial number: 4217-01) was used in the range of 1000 to 4000 MHz radiated emissions measurements. The high pass filter (Solectron item, made by FSY Microwave, model number: HR 2380-11XNXN, serial number: 002) was used in the range of 4000 to 18000 MHz radiated emissions measurements.

Figure 8-4: Characteristic of the Microwave Circuit Inc. Notch Filter in the range of 1640 to 2640 MHz

Figure 8-5: Characteristic of the Microwave Circuit Inc. Notch Filter in the range of 3 to 4000 MHz

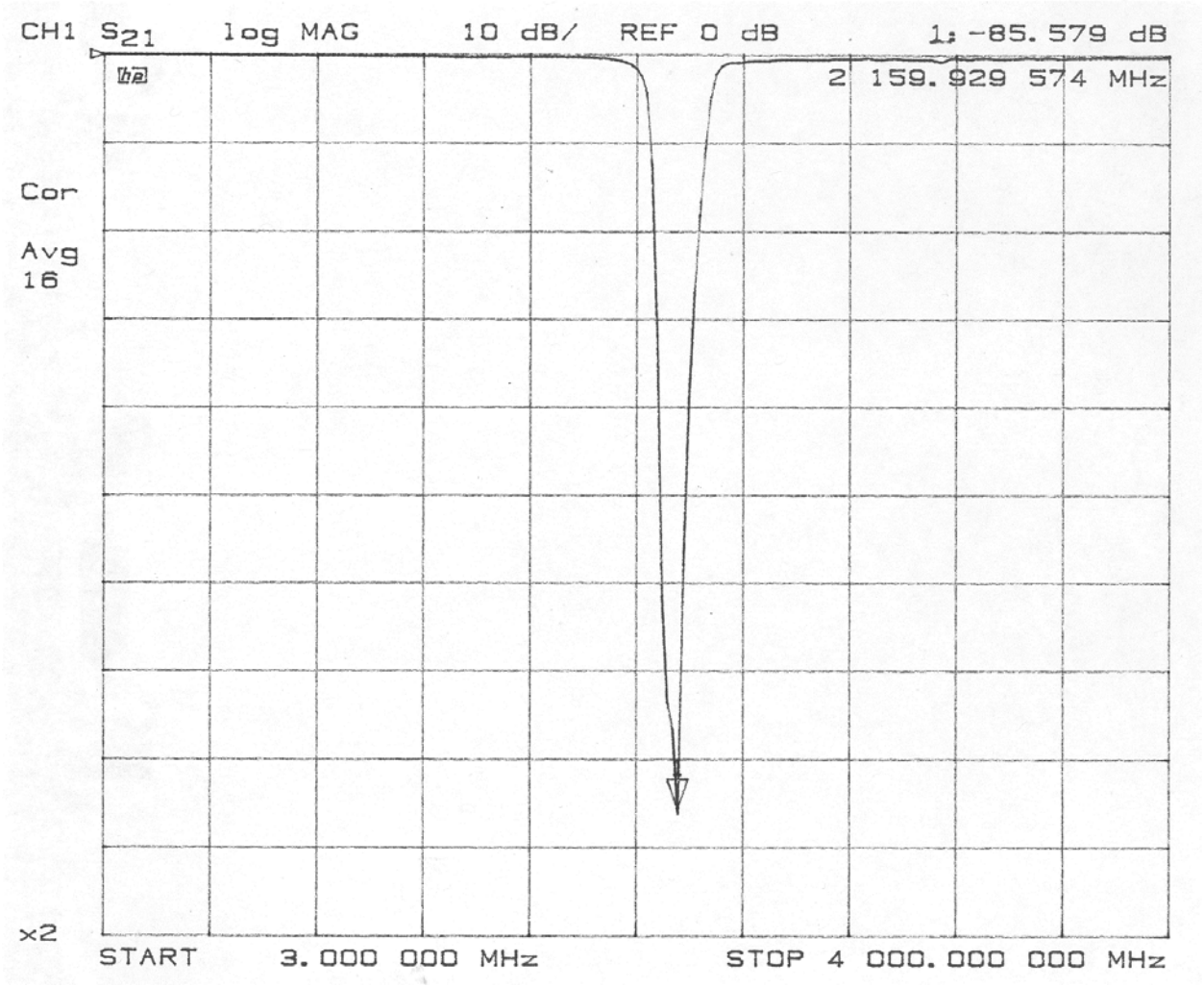
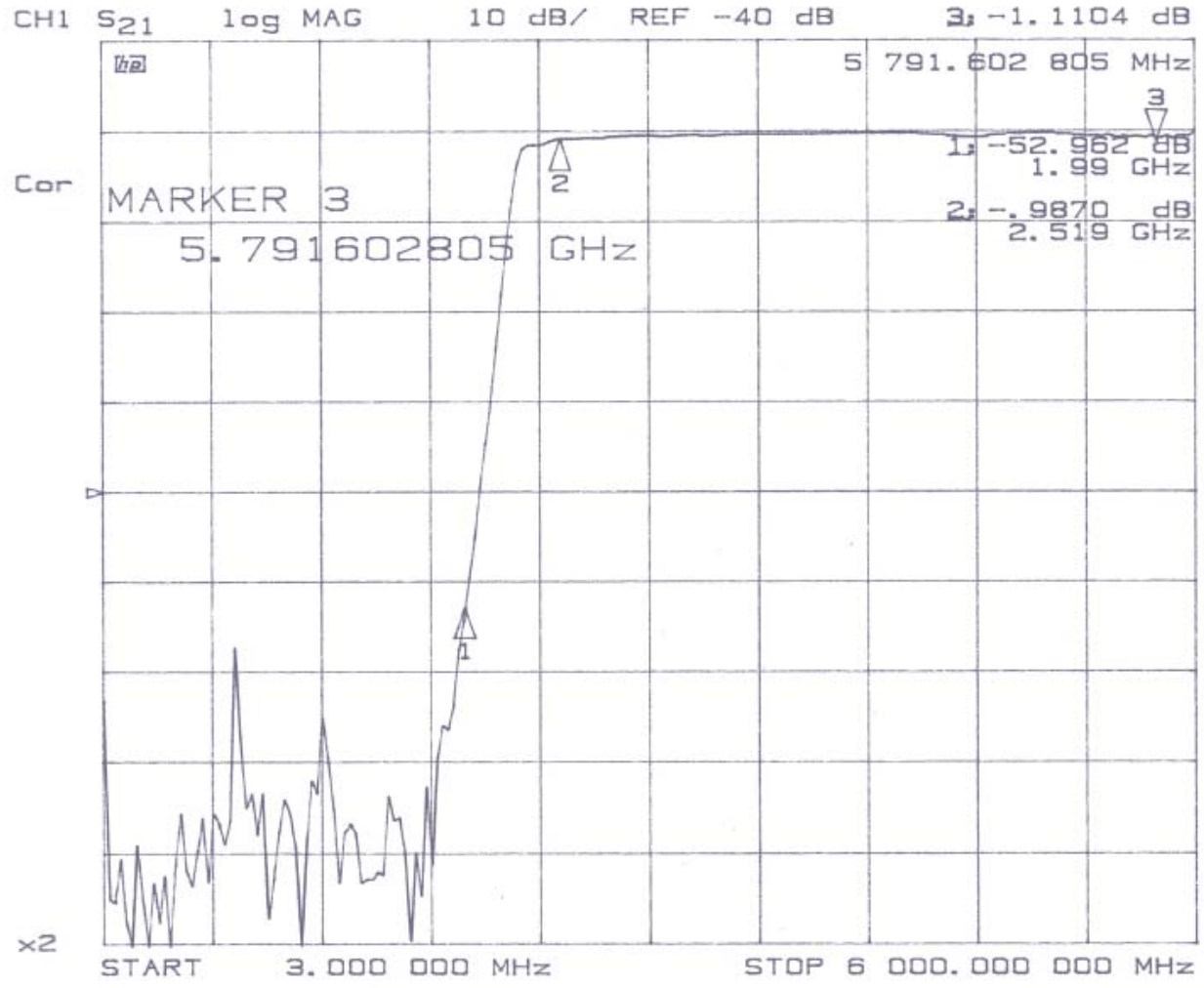


Figure 8-6: Characteristic of the FSY Microwave High Pass Filter in the range of 3 to 6000 MHz



Note: The high pass filter was also evaluated between 6 and 21 GHz. Less than 1dB of insertion loss was observed in that range.

Solectron EMS Canada Inc.
Design and Engineering

Spurious Emissions Compliance Report for the LTE Metrocell 1.7 / 2.1 GHz
FCC Part 27

End of Document