

## **Test Report B**

**Applicant: Ericsson (China)**

**For Original Filing:**

**FCC: X3V1900MFRM3V2**

**IC: 287AJ-1900MFRM3V2**



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## Spurious Emissions Test Report for the M3 1900 NTGZ70BBE5

### FCC Part 24 and Industry Canada RSS-133

**FCC:** X3V1900MFRM3V2  
**IC:** 287AJ-1900MFRM3V2

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**Author:** Ramon Lao

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### Revision History

Stream/Issue	Revision Date	Status	Changes	Author/Editor
00/01	April 15, 2010	Draft	Initial test report	Ramon Lao
00/01	May 4, 2010	Standard		Ramon Lao

### Approval by

Name	Function	Date	Signature
Daniel Tan	PI Manager	May4,2010	

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## Applicable Standard

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- [A1] ANSI C63.4-2003 for FCC CFR 47 American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz, 15 September 2009.
- [A2] ANSI C63.2-1996, American National Standard for Electromagnetic Noise and Field Strength Instrumentation, 10 Hz to 40 GHz – Specifications, 01 January 1996.
- [A3] FCC CFR 47 Part 15, “FCC Rules for Radio Frequency devices, title 47 of the code of federal regulations – radio frequency devices”
- [A4] TIA-603-C, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards, August 2004.
- [A5] CISPR 22 (1997 / A2 2002), Title: Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.
- [A6] EN 55022, “Information technology equipment – Radio disturbance characteristics – limits and methods of measurement (1998)”
- [A7] ICES-003, Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard, Issue 4, February 2004
- [A8] 2GHz Personal Communications Services, Industry Canada, RSS-133, Issue 2, Revision 1, November 6, 1999.
- [A9] Industry Canada, RSS 212, Test Facilities and Test Methods for Radio Equipment, Issue 1 (Provisional), February 27, 1999.

## Reference Document

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- [R1] "CDMA Common Radio Module (MFRM-3) Systems Design Specification", Author: Mark Willetts, Approved, Stream 01, Issue 04, March 12, 2006.
- [R2] "Recommended Minimum Performance Standards for Spread Spectrum Base Stations" Release C (TIA-97-F), C.S0010-C, Version 1.0, Jan 14, 2005.
- [R3] E1003WT8888-0401-1, Lab report provided by CEPREI in Guangzhou, China.
- [R4] Interconnect General Specification for CDMA Metro Cell MFRM-3.  
Issue: January 11, 2008

## Acronyms and Abbreviations

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<u>Abbreviation</u>	<u>Explanation</u>
ASIC	Application Specific Integrated Circuit
BBW	Breathing, Blossoming and Wilting
BPF	Bandpass Filter
BTS	Base Station Transceiver Subsystem
BW	Bandwidth
CDMA	Code Division Multiple Access
dBFS	dB relative to Full Scale
dB	Decibel
dBm	decibel relative to 1 mW
DPM	Duplexer Preselector Module
EMI	Electro-Magnetic Interference
EMU	Equipment Under Test
EMC	Electromagnetic Compatibility
EC	Engineering Change
ERLCE	Excess Reverse Link Capacity Estimate
HSSPC	High-Speed Serial Protocol Controller
HW	Hardware
IF	Intermediate Frequency
ITE	International Electro technical Commission
IS	Interim Standard
IEC	International Electro technical Commission
LO	Local Oscillator
LPF	Low pass Filter
MCPA	Multi-Carrier Power Amplifier
MFRM	Multi-carrier Flexible Radio Module
MHz	Megahertz
N/A	Not Applicable
NA	not Available
OCNS	Orthogonal Channel Noise Source
OH	Over Head
PA	Power Amplifier
PC	Personal Computer
PI	Product Integrity
RE	Radiated Emissions
PSA	Product Specification Agreement
RBW	Resolution Band Width
RF	Radio Frequency
Rx	Receive
SA	Spectrum Analyzer
SFRW	Single Carrier Flexible Radio Module
SW	Software
TBD	To Be Determined
TM	Triplexer Module
TPTL	Transmit Power Tracking Loop
TRM	Transmitter Receiver Module
Tx	Transmit
uP	Microprocessor
XCVR	Transceiver

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## 1.0 Introduction

### 1.1 Purpose

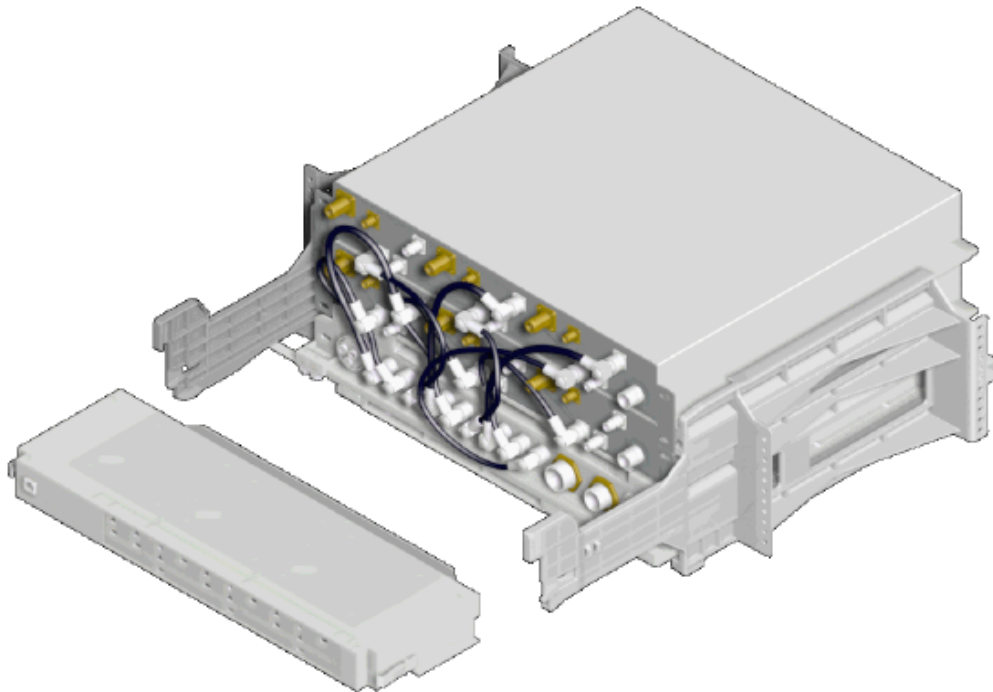
The purpose of this document is to describe the test results of FCC Part 24 and Industry Canada RSS-133 radiated emissions tests applied by China CEPREI Laboratory on MFRM3 1900MHz CR .

### 1.2 Product Overview

The MFRM3 CR product is focused on maximizing the product cost, therefore while reserving some important MFRM3 CR features, other expensive or rarely utilized original MFRM3 CR features are removed.

The MFRM3 CR is a 3-Carrier 3-Sector and dual voltage (24v/-48v) radio module deployed in both Outdoor and Indoor CDMA base stations.

The general view of MFRM3 CR product is shown below, note that the MFRM3 CR product share the same external view as original MFRM3 CR.



**Figure 1. MFRM-3 CR Product External View**



## 2.0 EUT Configuration

### 2.1 BTS Configuration Under Test

The following figure shows test configuration during test.

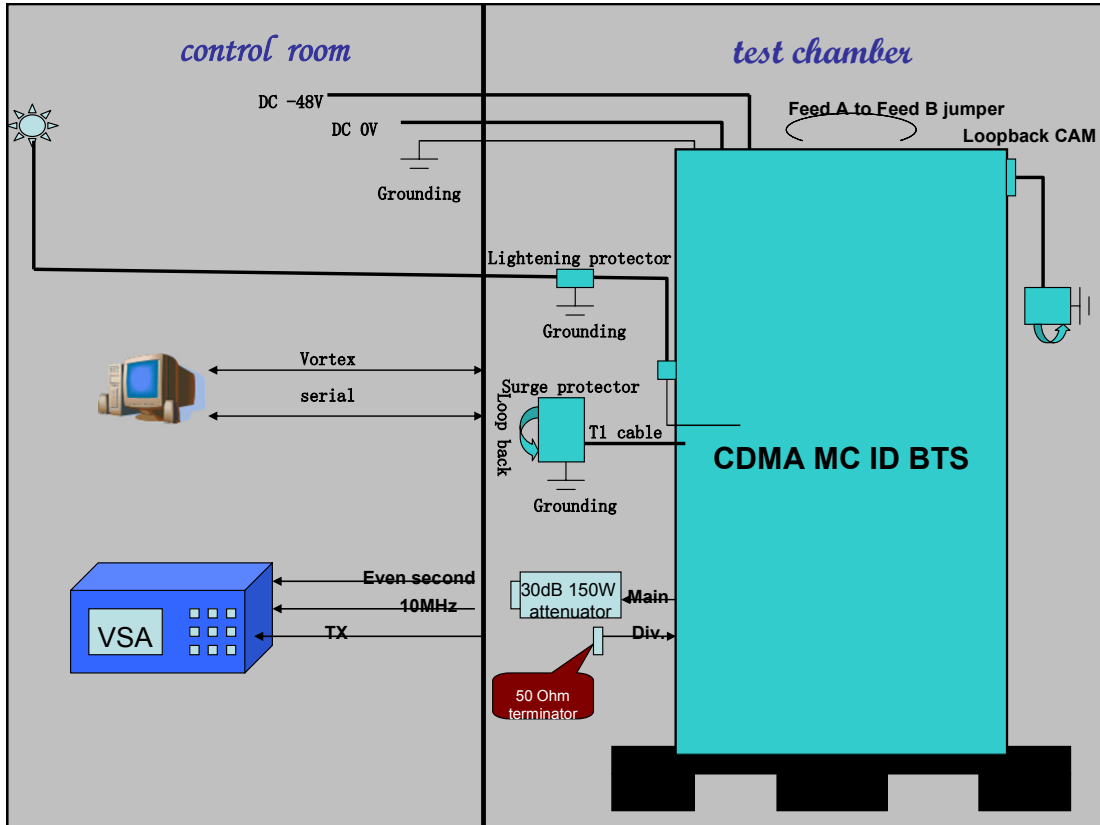


Figure 2. Chamber Environment Setup

## 2.2 BTS Configuration Description

Item	Description	Test cases
Configuration 1	A CDMA MetroCell indoor BTS have been configured for testing with 1 GPSTM, 1 eDCG, 3 XCEM192, 1 TDPM AD-band, 1 TDPM BE-band, 1 TDPM CFG-band, 3 MFRM3 1900MHz CR.	Radiated Emission Spurious

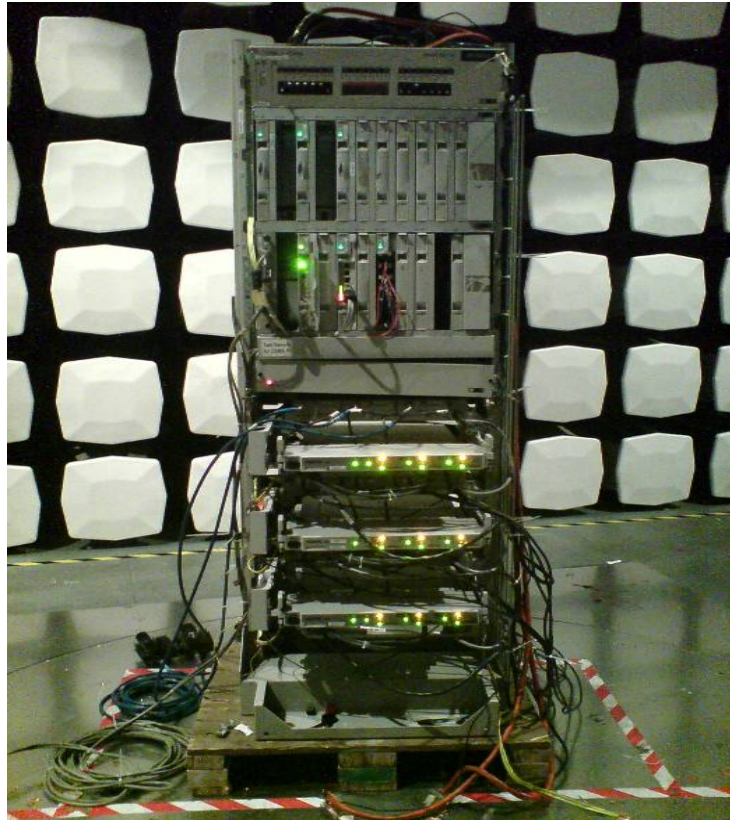


Figure 3. EUT Setup

### 2.3 EUT Identification List

CDMA DC Metrocell Indoor BTS			
Item	component	PEC code	SN
1	xCEM192	NTRZ80BA	NNTMPX000GXN
2	xCEM192	NTRZ80BA	NNTMPX000M2T
3	xCEM192	NTRZ80BA	NNTM7860EUFV
5	TIIM	NTGS3188E5	NNTM74XL7FLN
6	GPS TM	NTBW50AA	NNTM74TC1SD3
7	CM-2	NTBW40BAE5	NNTMDV01HFCK
8	CORE-2S	NTBW30DAE5	NNTMDV04TK7P
9	MFRM3 1900MHz CR	NTGZ70BBE5	NNTMEEK0100W
10	MFRM3 1900MHz CR	NTGZ70BBE5	NNTMEEK01011
11	MFRM3 1900MHz CR	NTGZ70BE5	NNTMEEK0100S
12	TDPM 1900MHz AD-band	NTGZ81AB	ACET020011J3
13	TDPM 1900MHz-BEband	NTGZ81BB	ACET0200198M
14	TDPM 1900MHz-CFGband	NTGZ81DB	ACET0200080G
15	FAM-3	NTGZ85AA	NNTM84G109M1
16	FAM-3	NTGZ85AA	NNTM84G10LJP
17	FAM-3	NTGZ85AA	NNTM84G10LJR
18	CAM	NTGS47FAE5	NNTM74XL7HLJ
19	IBIP BREAKER PANEL, ELEC SWITCH	NTGS47AEE5	NNTM74XL8655
20	FRAME	NTGS45DAE5	NNTMGYA02GCD
21	Digital rack	NTGS20BAE5	NNTMGY008KWW
22	Cooling unit	NTGS18ACE5	NNTM74XA2F23

### 3.0 Vortex configuration

Software	Version
Vortex	17.02_09WK40
Lip files	
CM-2(eDCG)	Cmedcg1702eh.lip
CM config file	Cmcfg1702eh.lip
XCEM-192	Xchcap1702eh.lip
XCEM	Xcemap1702eh.lip
SFRM	Rfmap1702eh.lip
MFRM	Mfrmap1702eh.lip
MFRM2	Mfrmtwoap1702eh.lip
MFRM3	Mfrmthree1702eh.lip

### 4.0 Test Procedure

Verifications of the test equipment and 10-meter Ambient Free Chamber were performed prior to the installation of the EUT in accordance with the quality assurance procedures documented in the EMC Test Procedures document. The test was performed as per the relevant test procedures in ANSI C63.4 and TIA-603-C :

- The EUT was placed on a turntable inside the 10-meter Ambient Free Chamber (configured as in normal operation). The system and its cables were separated from the ground plane. 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 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.
- 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 (where applicable) of the search antenna. The maximum level measured was recorded.
- 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.

## 5.0 Test Equipment

Item	Quantity	Description
Current Clamp Meter	1	Model:318 Cal. 2009-9-1 to 2010-9-1
Multi-Meter	1	Model:117 Cal. 2009-9-1 to 2010-9-1
VSA	1	Model:E4406A . VSA series transmitter tester (7MHZ-4.0GHZ). Cal. 2009-9-1 to 2010-9-1
PC	1	Window XP
Attenuator	12	30dB @ 150W
Attenuator	12	12dB @ 5W
Terminal	12	Huber + Suhner Load @ 50 Ohm
BNC Cable	12	2ea for 10, 5ea for 3m.
Ethernet Cable	2	About 10m, shielded
Note: EMC test equipments in lab are listed in lab report , E1003WT8888-0401-1		

## 6.0 Test Result Summary

Electromagnetic Emissions		
Test Item	Clause Standard	Result
Radiated emissions spurious	FCC PART 24 § 24.238 and RSS-133	PASS

## 7.0 EMC Lab Test Report Reference

Refer to report E1003WT8888-0401-1 [R3].

## 8.0 Conclusion

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 24 and Industry Canada RSS-133** requirements..

∞ END OF DOCUMENT ∞

## **APPENDIX EMC TEST REPORT of CEPREI CHINA**

No.	E1003WT8888-0401-1
Total page	14

# TEST REPORT

(No part of the report can be duplicated without permission)

Product Name : MFRM3 1900MHz CR

Type and Specification : CDMA DC Metrocell Indoor

Test Category : Entrusted Test

Manufacturer : Guangdong Nortel Telecommunications Equipment Co.,Ltd

Applicant: Guangdong Nortel Telecommunications Equipment Co.,Ltd



**China Electronic Product Reliability And  
Environmental Testing Research Institute**

**China CEPREI Laboratory**

## Items For Attention

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4. It would be invalid test report, if there is any scrawl in the test report without official authorization.
5. Any disputes about the report must be submitted for test institute within 15 days from the day when the report is received, otherwise that would be invalid out of expiry.
6. Generally, the responsible is only for the samples in entrusted test.

Remark: Possible test case verdicts:

Test item does meet the requirement.....P (Pass)

Test item does not meet the requirement.....F (Fail)

Test case does not apply to the test object.....N (N/A)

Address: No.110, Dongguanzhuang Road, Tianhe District,  
Guangzhou City, Guangdong Province, 510610, P.R. China

Tel: 0086-20-87237150, 87237006, 87237178,87237552

Fax: 0086-20-87236171, 87237609

E-mail: info@ceprei.biz, qic@ceprei.biz, market@ceprei.biz



## TEST REPORT

Product	MFRM3 1900MHz CR			Model / Type	CDMA DC Metrocell Indoor
Factory	Guangdong Nortel Telecommunications Equipment Co.,Ltd			Trade/Mark	Nortel
Address of Factory	Rongli Industrial Park ,Liheng Road ,Ronggui Shunde Foshan Guangdong 528306 P.R.China.				
Manufacturer	Guangdong Nortel Telecommunications Equipment Co.,Ltd				
Address of manufacturer	Rongli Industrial Park ,Liheng Road ,Ronggui Shunde Foshan Guangdong 528306 P.R.China.				
Applicant	Guangdong Nortel Telecommunications Equipment Co.,Ltd				
Address of Applicant	Rongli Industrial Park ,Liheng Road ,Ronggui Shunde Foshan Guangdong 528306 P.R.China.				
Sampling Method	Sampling by the factory			Production Date	/
Number of Specimen	1	Testing Duration	2010.03.02-2010.03.03	Ambient Condition	15~35℃, 45~75%RH, 86~106kPa
Test Standards: FCC PART 24 § 24.238 and RSS-133					
Test Instruments and Equipments: See Equipments List of This Report.					
Conclusion: EUT complied with the requirements of the test standards.					
Testing Technician: <u>刘鑫</u> (Liu xin)					
Responsible Engineer: <u>陈辉</u> (Chen Hui)					
Approver: <u>陈辉</u> Date: _____					
Remark:					



**EMC Standards Compliance List / Test Summary:**

The following standards have been applied to ensure the product conforms to Radiated Emissions Spurious requirements of the Reference: MFRM3 1900MHz CR General Test Plan.

EMC Test plan for MFRM3 1900MHz CR Introduction:

<b>Electromagnetic Emissions</b>		
<b>Test Item</b>	<b>Clause Standard</b>	<b>Result</b>
Radiated emissions spurious	FCC PART 24 § 24.238 and RSS-133	PASS

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## Section 1 General Information

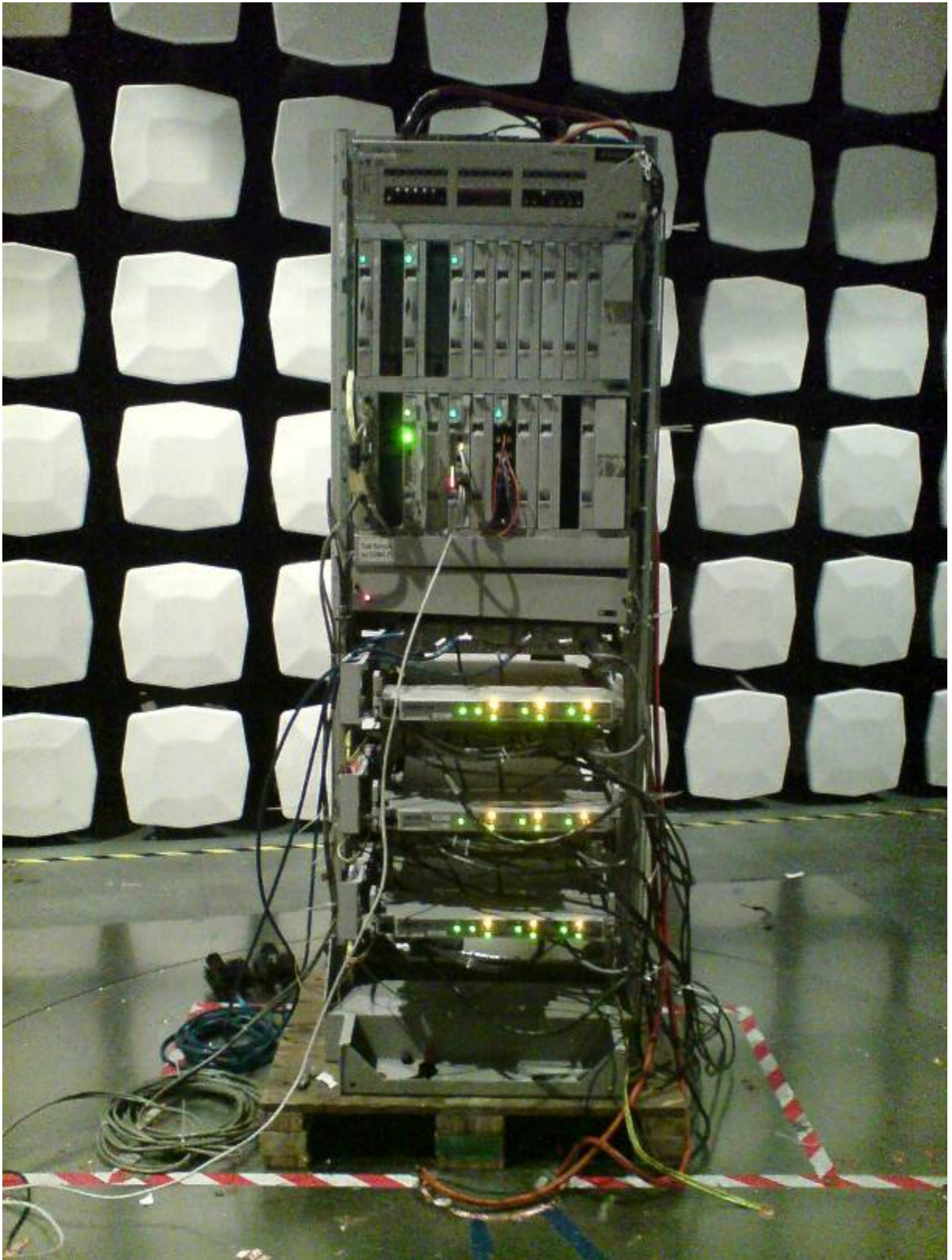
### 1.1 Introduction

This report document the Radiated Emissions Spurious test results for the MFRM3 1900MHz CR.

### 1.2 EUT General and Technical Descriptions

EUT Name:	MFRM3 1900MHz CR
EUT Model:	CDMA DC Metrocell Indoor
EUT Trademark:	Nortel
Input Voltage:	DC-48V
Power Cable Description:	DC cable: un-shielded.
Other Cables Description:	ABIS cable: shielded.
Function(s) Description:	CDMA base station.

### 1.3 EUT Photographs



## Section 2 Electromagnetic Emissions

### 2.1 Radiated Emission spurious (30MHz-18GHz)

#### 2.1.1 Radiated Emission Test Information

<b>Temperature:</b>	22 °C	<b>Humidity:</b>	63% RH
<b>ATM Pressure:</b>	101 k Pa	<b>Grounding:</b>	Grounding
<b>Test Voltage:</b>	-48VDC	<b>Tested Range:</b>	30MHz to 18GHz
<b>Tested by:</b>	Liu Xin	<b>Date of test:</b>	2010-03-03
<b>Test Reference:</b>	FCC PART 24 § 24.238 and RSS-133	<b>Test method:</b>	ANSI/TIA/EIA-603-B:2002
<b>Results:</b>	PASS		

#### 2.1.2 Measurement Equipments Used for Radiated emission

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	2009-06-08	2010-06-08
Horn Antenna	R & S	HF906	100095	2009-06-08	2010-06-08
0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	2009-06-08	2010-06-08
1-26.5GHz Pre-Amplifier	Agilent	8449B	3008A01649	2009-06-08	2010-06-08
10m Semi- Anechoic Chamber	ETS	N/A	N/A	2009-06-08	2010-06-08

#### 2.1.3 Limits for radiated emissions from FCC Part 24 § 24.238, and RSS133

Frequency range	Minimum requirement(e.r.p.)/ Reference Bandwidth
30MHz≤f≤18GHz	The spurious emission must be attenuated by at least 43+10log(P) P=Transmitter rated Power in watts

Measurements were made according to the procedures outline in ANSI/TIA-603-C-2004

The emissions were investigated up to the tenth harmonic of the fundamental emission(18GHz).

The measured level of the emissions was recorded and compared to the limit.

The reference level for spurious radiation was taken with reference to an ideal dipole antenna excited by the rated output power according to the following relationship:

$$ERP = \text{Signal generator Level} - \text{Cable losses} + \text{Antenna gain} - \text{Half wave dipole gain}$$

$$\text{Margin} = \text{Limit} - \text{ERP}$$

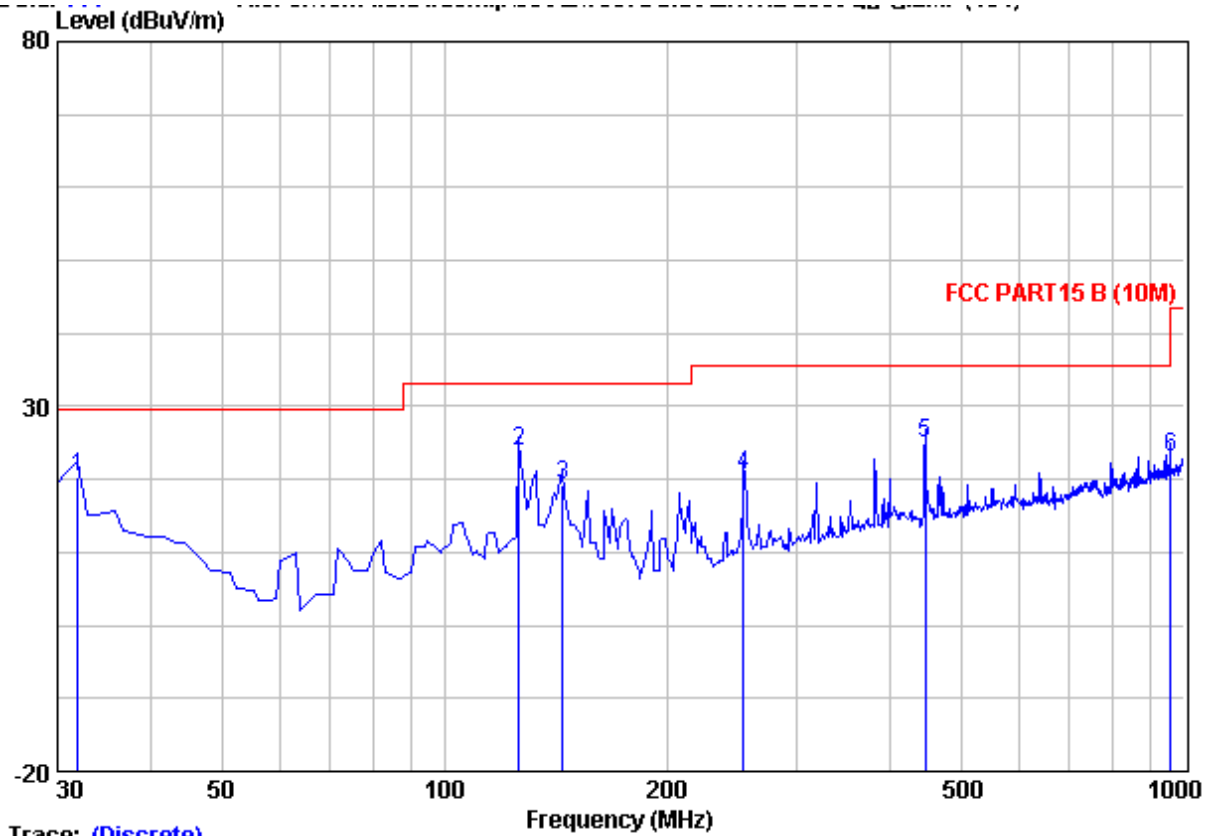
### 2.1.4 Test Data

Horizontal										
No.	Frequency	E-Field Emission Level	Substituted Measured Rx level	Signal Generator	Tx Antenna Gain	Theoretical Dipol gain	Tx Cable loss	E.R.P	E.R.P Limit	Margin (dB)
	MHz	dB $\mu$ V/m	dB $\mu$ V	dBm	dBi	dB	dB	dBm	dBm	dB
1	1947.0	67.17	71.09	-20.46	9.30	2.15	4.35	-17.66	-13.00	-4.66
2	3895.0	37.30	33.46	-50.14	8.80	2.15	4.66	-48.15	-13.00	-35.15
3	5843.0	38.64	31.52	-49.26	8.65	2.15	6.90	-49.66	-13.00	-36.66
4	7790.0	37.94	27.37	-42.77	7.38	2.15	12.80	-50.34	-13.00	-37.34
Vertical										
No.	Frequency (MHz)	E-Field Emission Level	Substituted Measured Rx level	Signal Generator	Tx Antenna Gain	Theoretical Dipol gain	Tx Cable loss	E.R.P	E.R.P Limit	Margin (dB)
	MHz	dB $\mu$ V/m	dB $\mu$ V	dBm	dBi	dB	dB	dBm	dBm	dB
1	1947.0	64.44	68.5	-26.60	9.30	2.15	4.35	-23.80	-13.00	-10.80
2	3895.0	36.92	33.08	-56.03	8.80	2.15	4.90	-51.12	-13.00	-38.12
3	5843.0	33.18	26.06	-54.76	8.65	2.15	6.70	-54.96	-13.00	-41.96
4	7790.0	36.74	26.17	-50.00	7.38	2.15	8.65	-51.20	-13.00	-38.20

Note: The Corrected QP Level included The Cable attenuation and The Antenna Factor.

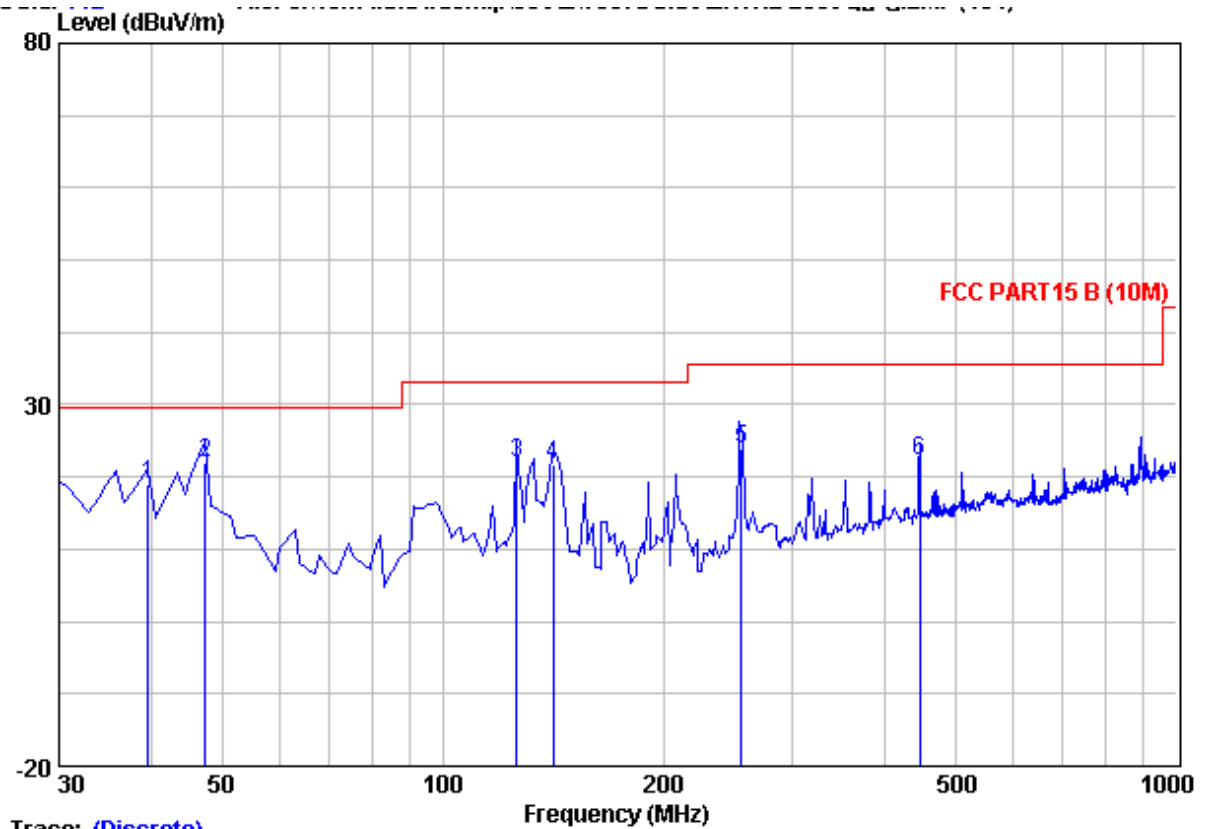
Test was performed at 10m semi-anechoic chamber.

### 2.1.4 Test Curves



Trace: (Discrete)

Horizontal Radiated Emission Plot (Peak, Max Hold Mode) 30-1000MHz

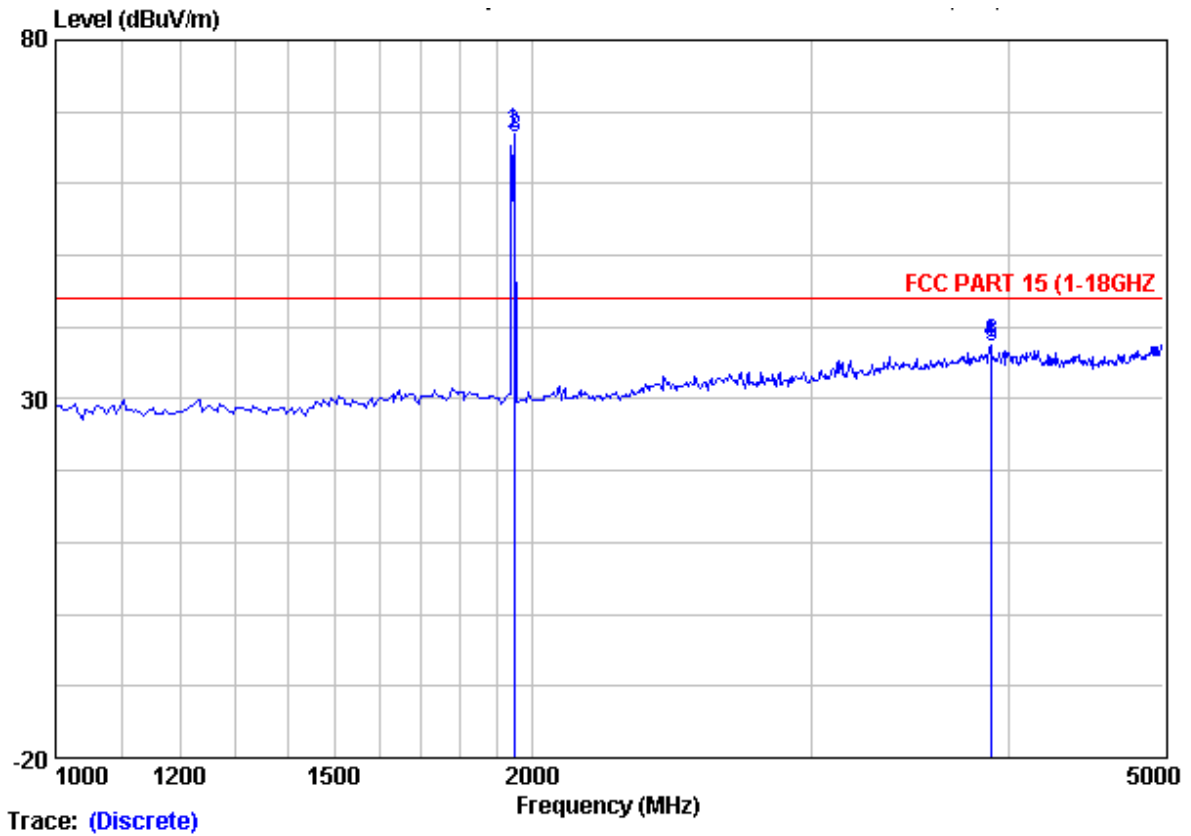


Trace: (Discrete)

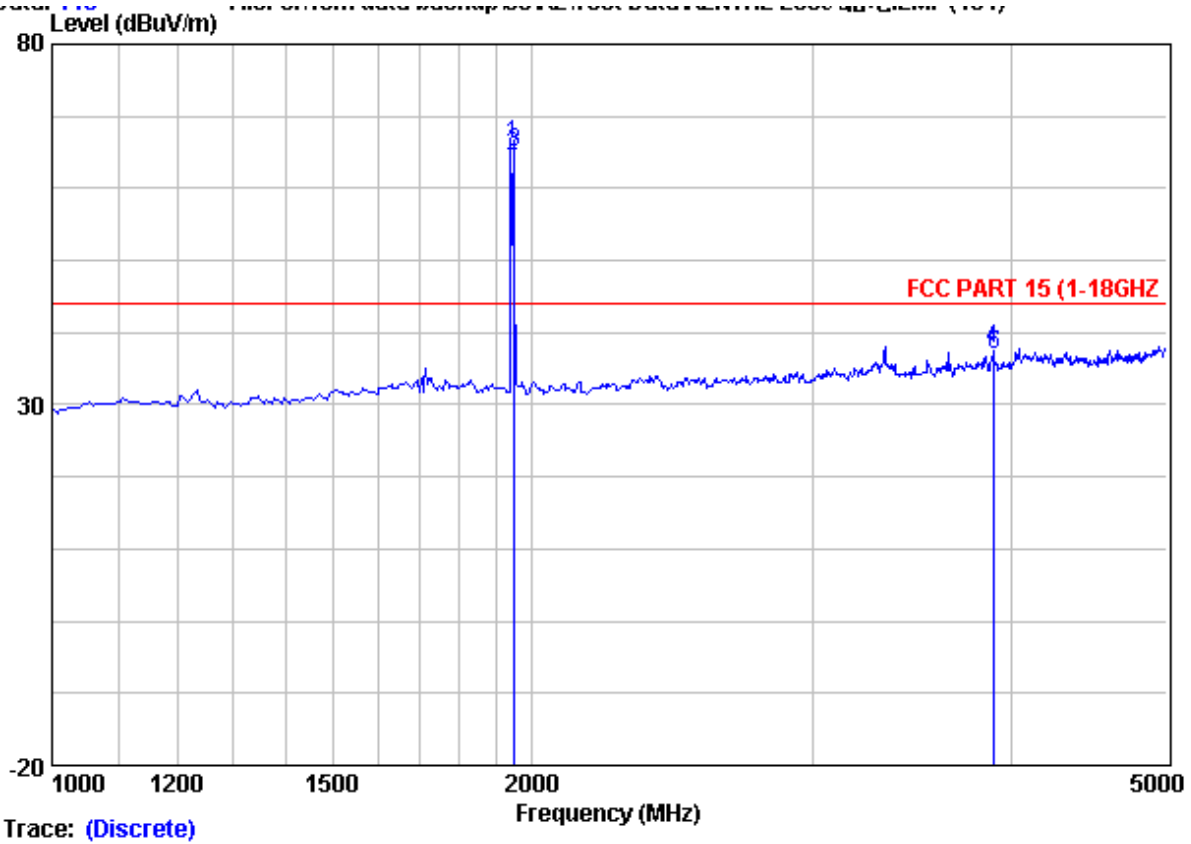
Vertical Radiated Emission Plot (Peak, Max Hold Mode) 30-1000MHz

Note: The Curves included The Cable attenuation and The Antenna Factor.  
CDMA frequencies were included.



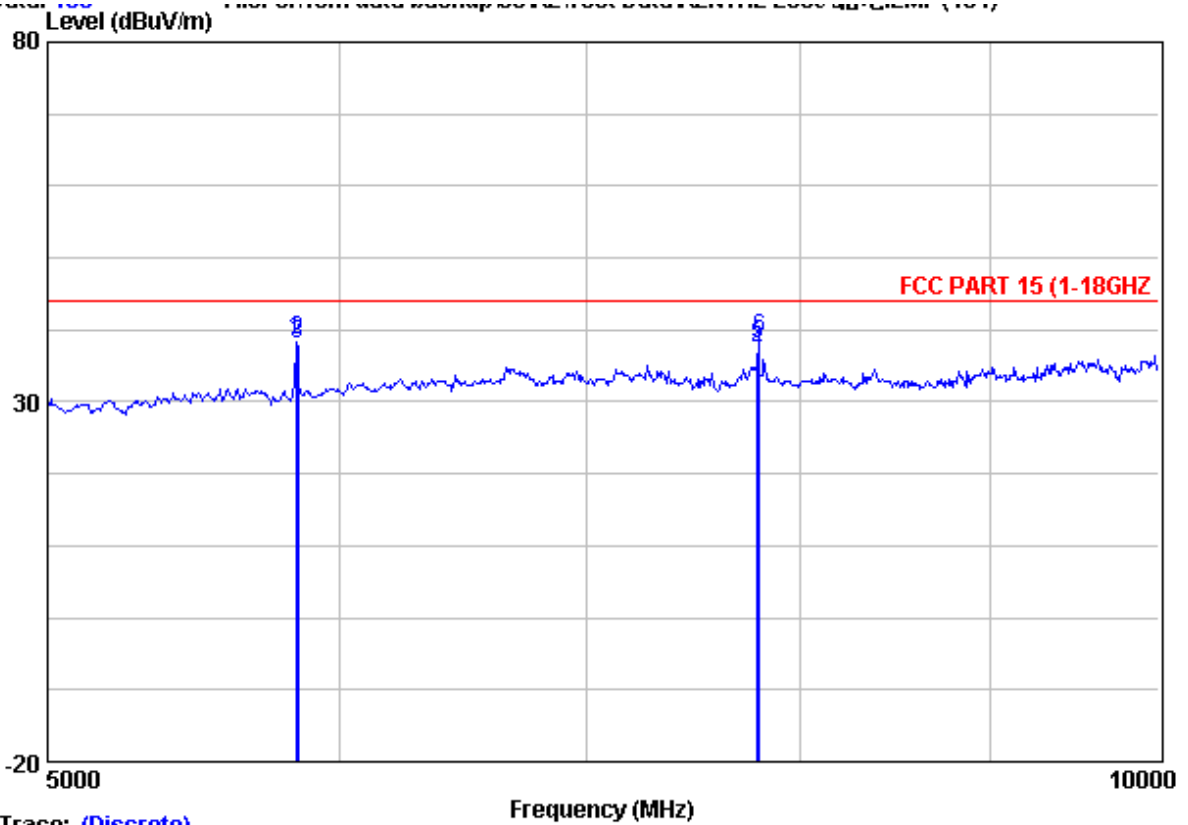


Horizontal Radiated Emission Plot (Peak, Max Hold Mode) 1-5GHz

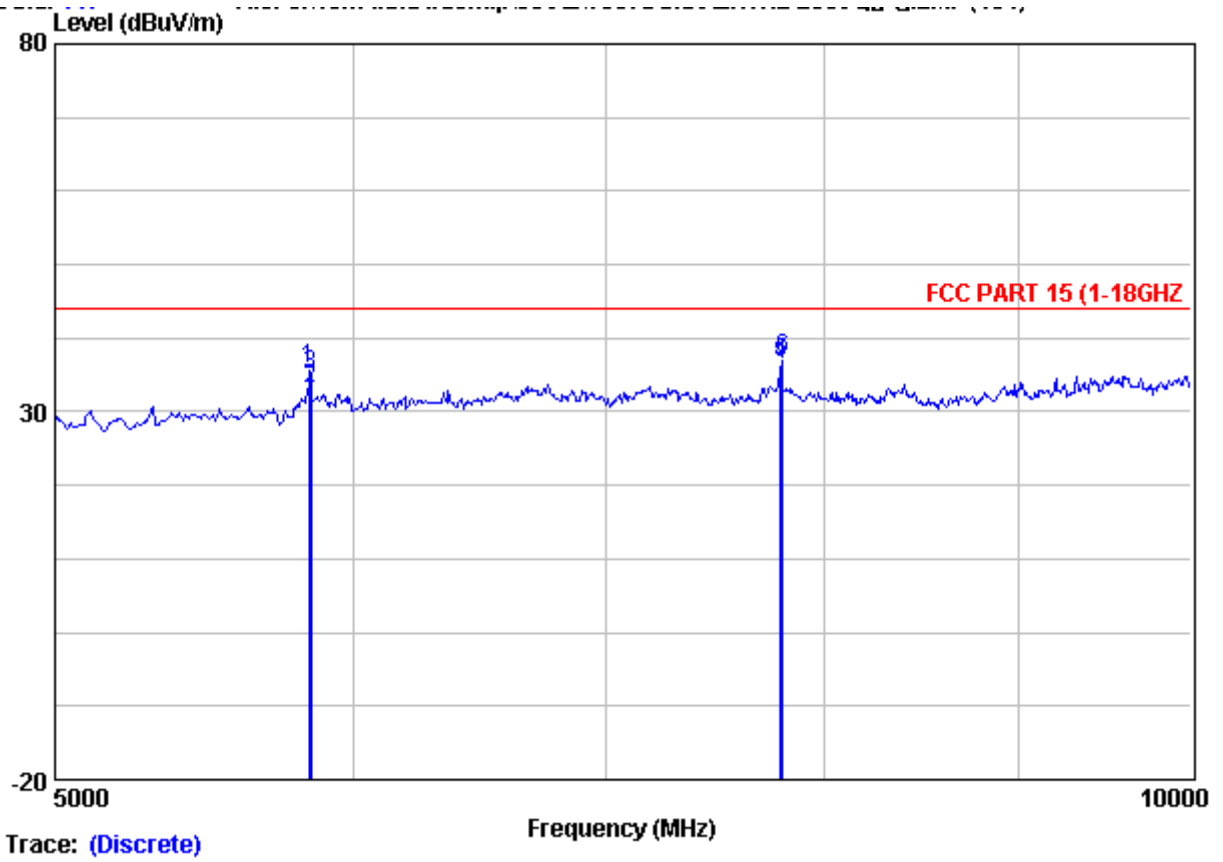


Vertical Radiated Emission Plot (Peak, Max Hold Mode) 1-5GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.  
CDMA frequencies were included.

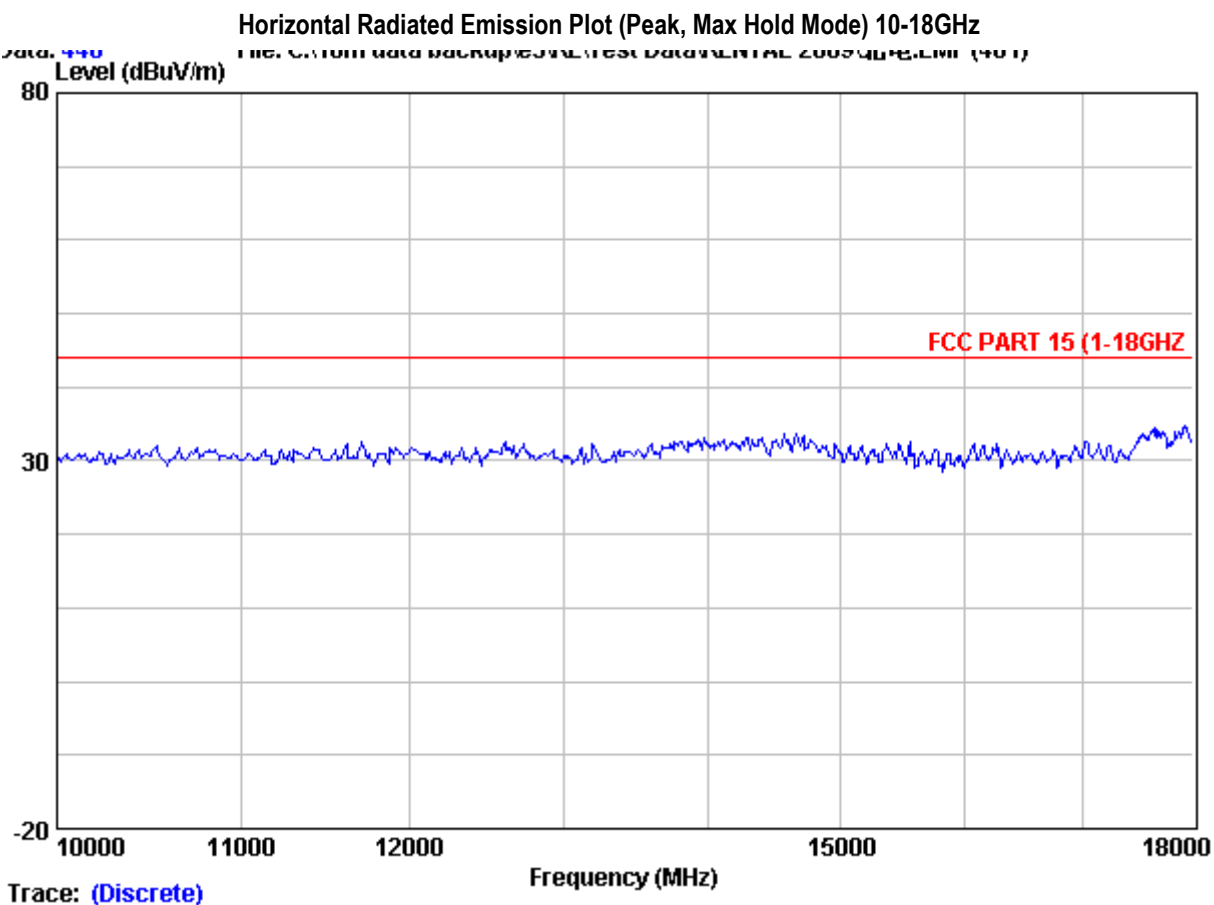
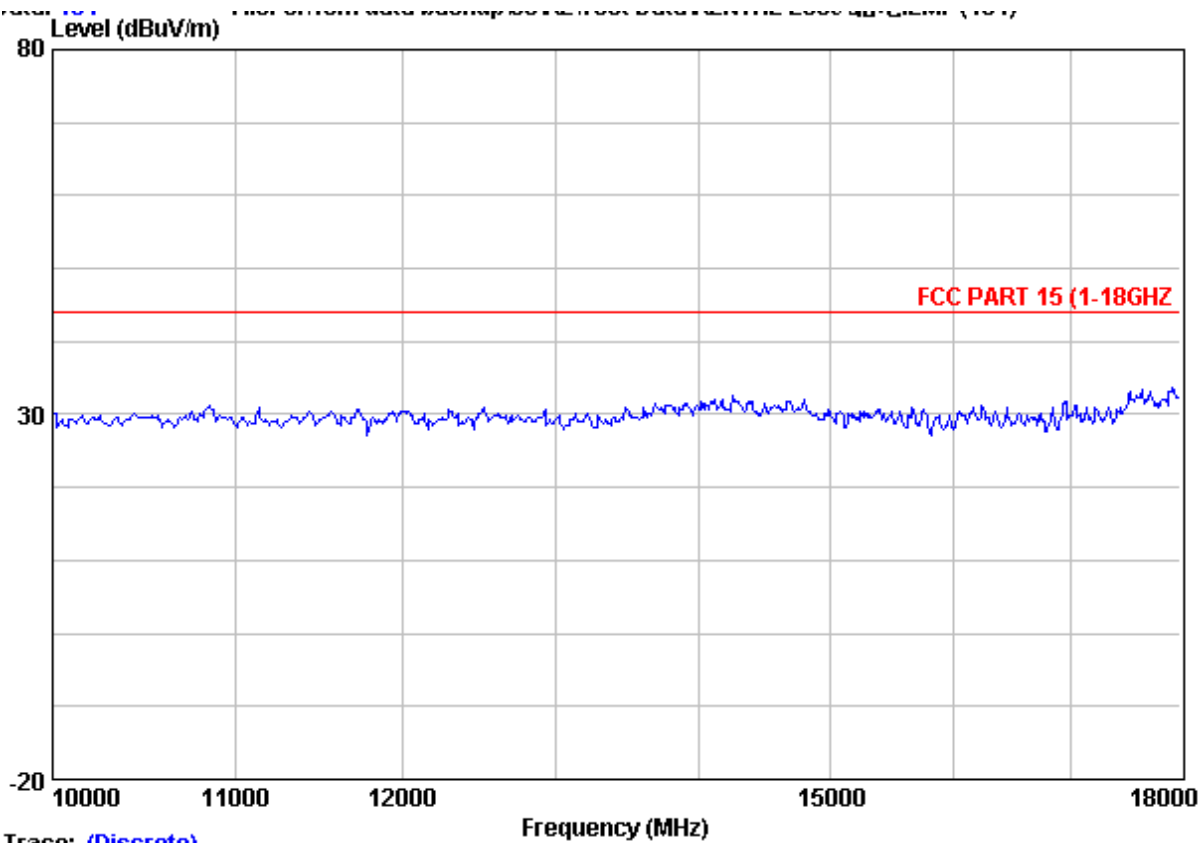


Horizontal Radiated Emission Plot (Peak, Max Hold Mode) 5-10GHz



Vertical Radiated Emission Plot (Peak, Max Hold Mode) 5-10GHz

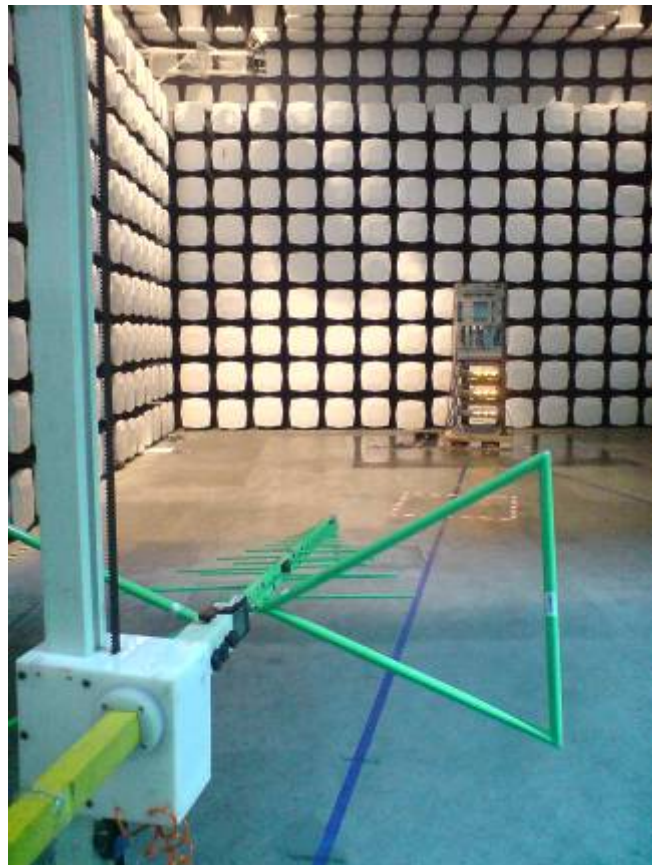
Note: The Curves included The Cable attenuation and The Antenna Factor.  
CDMA frequencies were included.



Vertical Radiated Emission Plot (Peak, Max Hold Mode) 10-18GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.  
CDMA frequencies were included.

## 2.1.5 Test Setup



**Radiated Emission Test Set-Up 30-1000MHz**



**Radiated Emission Test Set-Up 1-18GHz**

END OF THE TEST REPORT