SANMINA-SCI

EMC analysis for UMTS Indoor 2 iBTS with rack 24V Rel.01 & i-modules

Reference:	**RPT-H-030505-6G1**
Version:	**A**
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Product Name:	**UMTS Indoor 2 iBTS (With rack rectifier Rel.01 + i-modules)**
Frequency:	**UMTS-1900**
Discipline:	**EMC**

Author:	**M.CANCOUËT**
Verified by:	**P.GALOPIN**
Approved by:	**C.CHANSARD**

PUBLICATION HISTORY

VERSION	DATE	AUTHOR	MODIFICATION
A	12/09/2003	M.CANCOUËT	Creation of the document

CONTENTS

1. INTRODUCTION

The purpose of this document is to present the EMC analysis of the introduction of the rack rectifier 24 V Rel.01 introduced on UMTS 1900 Indoor 2 iBTS with the i-modules used for the US Market. During the qualification phase of the UMTS 1900 Indoor 2 iBTS 24V, FCC part 15 & part 24 tests have been realized on alpha modules with rack rectifier Rel.01 and on i-modules with rack rectifier Rel.02.
The EMC analysis presented is used to demonstrate the compliance of the UMTS 1900 Indoor 2 iBTS 24V with the Electromagnetic Compatibility applicable standard.

For North America, applicable standard for EMC Base stations are the FCC part 15 Class B [Part 15.107 and 15.109 (subpart B)] and the FCC Part 24 [Part 24.238 (subpart E)].

This document applies to:

Product:	UMTS Indoor 2 iBTS with i-modules
Manufacturer:	NORTEL NETWORKS
Frequencies:	1930 - 1990 MHz
Configuration:	STSR 3
Option:	PCM lightening protection kit
	External alarm module
	Kit 24 V Rel.01

2. RELATED DOCUMENTS

2.1. APPLICABLE STANDARDS

[A1]	47CFR Part 2	FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations - Frequency allocations and radio treaty matters; general rules and regulations - dated 10/1/01
[A2]	47 CFR Part 15 08/20/02	FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations – Radio frequency devices – dated 08/20/02
[A3]	47 CFR Part 24	FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations - Personal communications services - dated 10/1/01

2.2. REFERENCE DOCUMENTS

[R1]	PLN-T-030350-6G1	UMTS 1900 Indoor 2 iBTS 48V: EMC test plan
[R2]	PLN-T-030351-6G1	UMTS 1900 Indoor 2 iBTS 24V: EMC test plan
[R3]	PLN-T-030390-6G1	EMC Test Plan for introduction of i-modules on UMTS 1900 MHz product
[R4]	149024DK	UMTS 1900 Indoor 2 iBTS 48V: EMC test repot
[R5]	149025DK	UMTS 1900 Indoor 2 iBTS 24V: EMC test repot
[R6]	149028DK	UMTS 1900 Indoor 2 iBTS with i-modules: EMC test report
[R7]		+24V/-55V converter system for indoor UMTS BTS – UMTS – Product Change Notice rev 1

3. RESUME OF RADIATED MEASUREMENTS

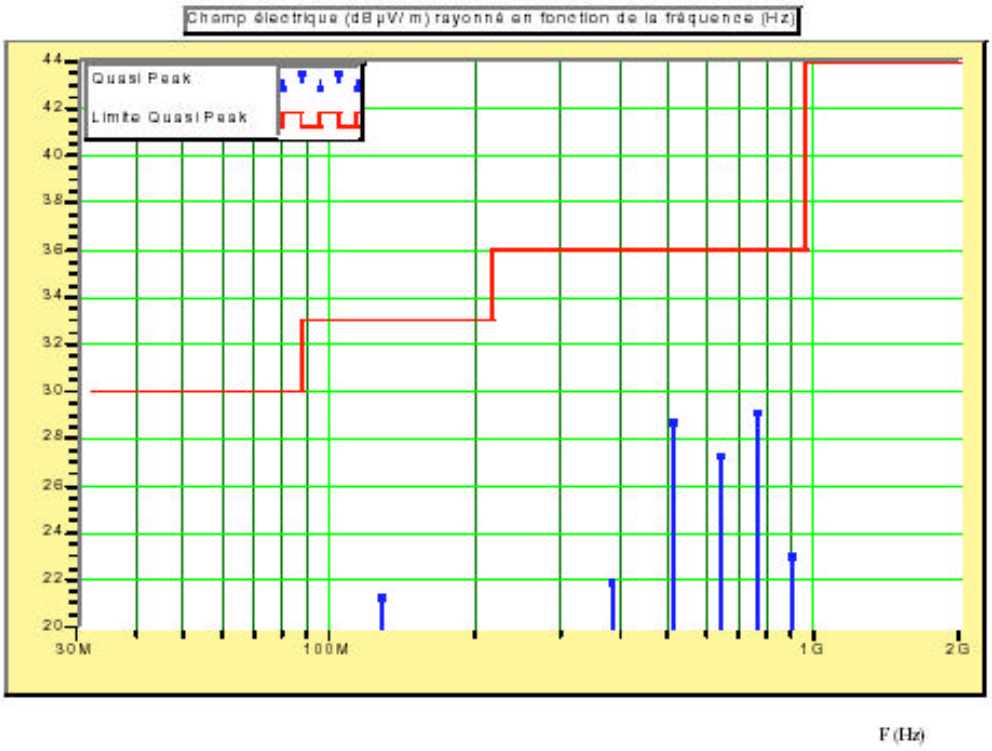
During the qualification phase of the UMTS 1900 Indoor 2 iBTS 24V, FCC part 15 & part 24 tests have been realized on alpha modules with rack rectifier Rel.01 and on i-modules with rack rectifier Rel.02.

3.1. UMTS 1900 INDOOR 2 WITH ALPHA MODULES

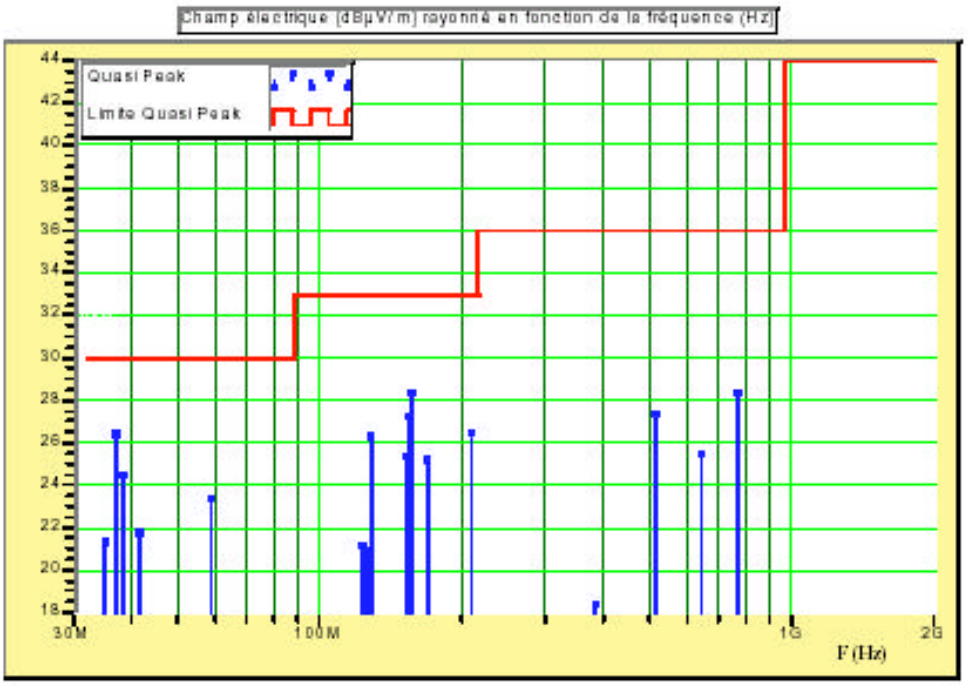
3.1.1 UMTS 1900 INDOOR 2 WITH ALPHA MODULES IN FCC PART 15

Radiated test have been realized in 2 configurations, iBTS has powered in –48 V or in +24 V (with +24V/-55V converter).
Comparison between this 2 configurations showed the radiated noise emissions product by the DC/DC converter Rel.01.

Indoor 2 modules alpha –48V



Indoor 2 modules alpha +24V



Comparison chart

Frequency range	Limit FCC part 15 Cl. B	Indoor 2 iBTS -48 V Modules alpha	Indoor 2 iBTS 24 V Modules alpha
30-88 MHz	30 dBµV/m	Margin > 10 dB	Margin 3.5 dB
88 –216 MHz	33.5 dBµV/m	Margin 12 dB	Margin 5.2 dB
216-960 MHz	36 dBµV/m	Margin 7 dB	Margin 7 dB
960-2000 MHz	43.9 dBµV/m	Margin > 24 dB	Margin > 24 dB

3.2. UMTS 1900 INDOOR 2 WITH ALPHA MODULES IN FCC PART 24

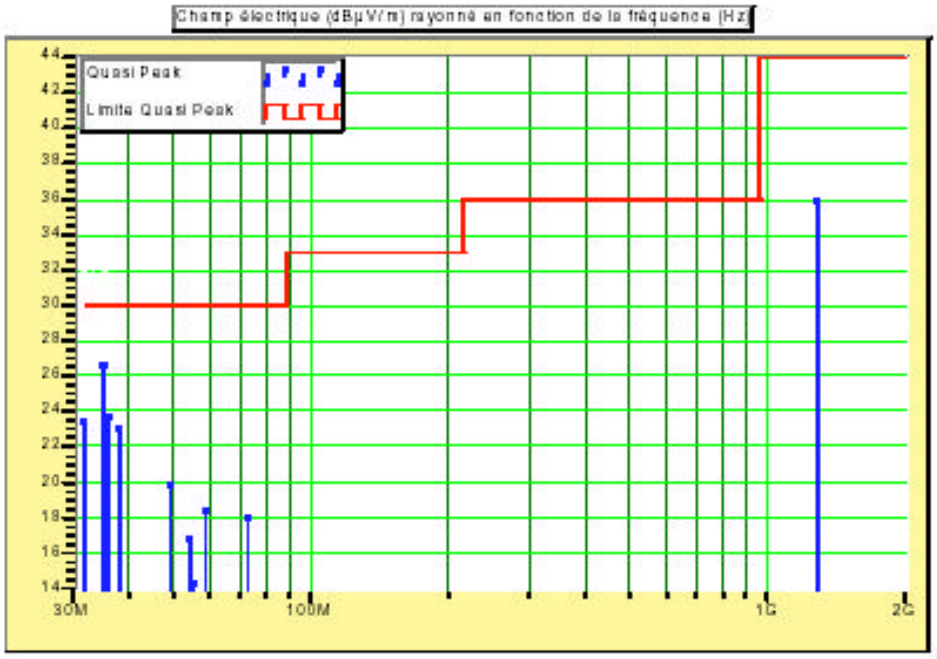
No spurious emission found which level upper to noise level in 1 MHz bandwidth (harmonics transmitters' frequencies under noise level)

3.3. UMTS 1900 INDOOR 2 WITH I-MODULES

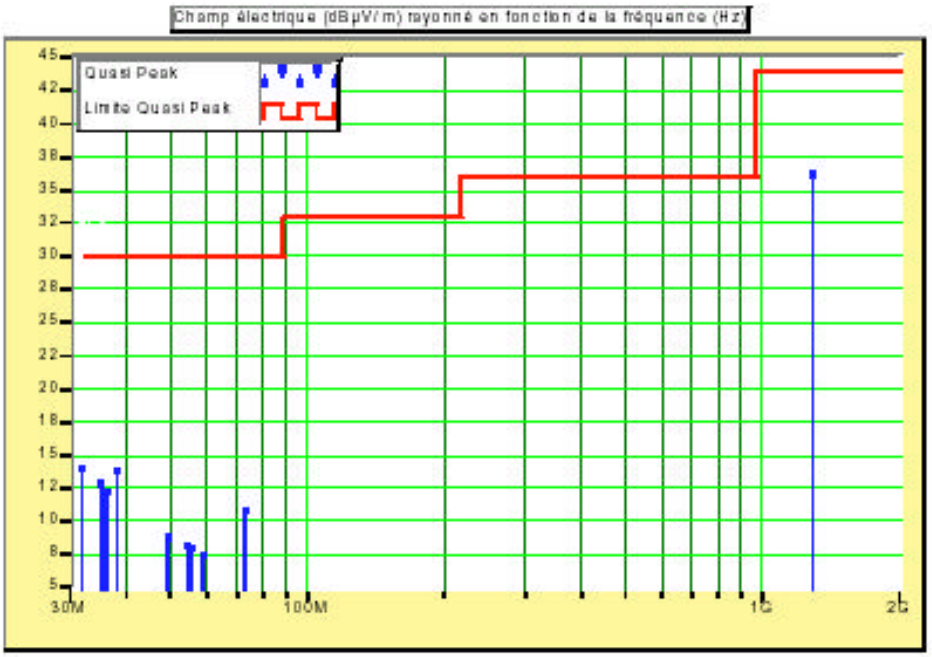
3.3.1 UMTS 1900 INDOOR 2 WITH I-MODULES IN PART 15

Radiated test have been realized in 2 configurations, iBTS has powered in –48 V or in +24 V (with +24V/-55V converter).
Comparison between this 2 configurations showed the radiated noise emissions product by the DC/DC converter Rel.02.

Indoor 2 i-modules 24V



Indoor 2 i-modules -48V



Comparison chart

Frequency range	Limit FCC part 15 Cl. B	Indoor 2 iBTS -48 V i-modules	Indoor 2 iBTS 24 V i-modules
30-88 MHz	30 dBµV/m	Margin 16 dB	Margin 3.5 dB
88 –216 MHz	33.5 dBµV/m	Margin > 30 dB	Margin > 30 dB
216-960 MHz	36 dBµV/m	Margin > 30 dB	Margin > 30 dB
960-2000 MHz	43.9 dBµV/m	Margin 8 dB	Margin 8 dB

3.3.2 UMTS 1900 INDOOR 2 WITH I-MODULES IN PART 24

Only one spurious emission in horizontal polarization found which level upper to noise level in 1 MHz bandwidth (harmonics transmitters' frequencies under noise level).
This spurious emission have 43.5 dB margin under the limit and it's identified with or without the DC/DC converter.

3.4. COMPARISON BETWEEN CONVERTER REL.01 & REL.02

While comparing the various tests carried out on Indoor 2 iBTS, we can notice that converter Rel. 01 has a spectrum of radiation more significant than the Rel.02. Nevertheless the margin minimum is identical between the 2 releases. That is 3.5 dB margin in the frequency band 30-88 MHz.

4. CONCLUSION

The introduction of converter Rel. 01 on the Indoor 2 iBTS with i-module does not affecte the compliance of FCC Part 15 Cl B & Part 24.

5. ABBREVIATIONS AND DEFINITIONS

5.1. ABBREVIATIONS

AC	Alternative Current (Power source)
AC/DC	Alternative Current to Direct Current converter
BER	Bit Error Rate
BTS	Base Station Transceiver Subsystem
CCM	CORE Controller Module
CEM	Channel Element Module
iDACS	Direct Ambient Cooling System
dBm	Decibel milliwatt
DC	Direct Current (Power source)
DDM	Dual Duplexer Module
E1	Standard European PCM link nickname
EFT	Electrical Fast Transient
EMC	Electro-Magnetic Compatibility
EMI	Electro-Magnetic Interference
EN	European Norm
ERM	Electromagnetic compatibility and Radio spectrum Matters
GPSAM	GPS/Alarm Module
HSSL	High Speed Serial Link
HSSPC	High Speed Serial Protocol Controller
I2C	Inter-Integrated Circuit
MCPA	Multi Carrier Power Amplifier
NCPS	New Compact Power System
PCM	Pulse Code Modulation
PE	Protective Earth
RFI	Radio Frequency Interference
UMTS	Universal Mobile Telecommunication System

5.2. DEFINITIONS

fc	Chip frequency in IS-95 standard. fc = 1.2288MHz
Node B	A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment.
Iub	Interface between a Node B and an RNC.

END OF DOCUMENT