



GSM 18000 INDOOR BTS 1900 MHz (US & Canada Market)
According to CFR 47
Part 15
Part 24
ICES 003 and RSS 133

N°15103-03-CC-1-A

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1 Reference and record of revisions of the test report:

Test report number :	Revision :	Number of pages	Modification reasons :
15103-03-CC-1-a	a	24	Creation
Redactor : F.NOURRY		Date of writing : June, 6th and 7th of 2005	
Technical control: O. ROY 		Quality Control: L. MONTIEL 	

2 Interpretation and remarks :

2.1 RESULTS :

This equipment complies with the rules of the FCC, Class B.

NOTA: .for conformity towards all requirements FCC standard the following items shall be fulfil:

2.2 USERS NOTICE SHALL CONTAINS (SECTION 15.105):

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

The United States Federal Communications Commission (in 47 CFR 15.105) has specified that the following notice be brought to the attention of users of this product:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference's by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

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The user may find the following booklet, prepared by the Federal Communications Commission, helpful: How to identify and Resolve Radio/TV Interference Problems. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4. Pursuant to Part 15.21 of the FCC Rules, any changes or modifications to this equipment not expressly approved by S.A. GROLLEAU FLEXTRONICS may cause, harmful interference and void the FCC authorization to operate this equipment.

2.3 EQUIPEMENT LABELING REQUIREMENTS (SECTION 15.19) :

“This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation”.

2.3.1 Product Regulatory Label Drawing :



(No FCC label on the equipment at present time)

2.3.2 Product Regulatory Label Placement :

The product regulatory label is affixed to equipment door.



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3 GENERAL INFORMATION :

3.1 APPLICANT:

S.A. GROLLEAU FLEXTRONICS
49310 MONTILLIERS
FRANCE

3.2 MANUFACTURER:

NORTEL NETWORKS
Parc d'activités de Magny Chateaufort
CHATEAUFORT 78928 Yvelines Cedex 9
France

3.3 APPLICANT REPRESENTATIVE:

Mr. Patrick Galopin

3.4 TEST DATE :

6th and 7th June 2005

3.5 TEST SITE :

GYL Technologies
Parc d'activités de Lanserre
21, rue de la Fuye
49610 Juigné sur Loire – France
FCC registration Number : 90469



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4 INTRODUCTION :

The following test report for GSM 18000 INDOOR cabinet is written in accordance with Part 15 of the Federal Communications Commissions. The Equipment Under Test (EUT) was GSM 18000 Indoor configured in 1900 MHz. The test results reported in this document relate only to the item that was tested

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions of 2001. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurements were performed manually at GYL TECHNOLOGIES. The radiated emissions measurements required by the rules were performed on the three to ten meters, open field, test site maintained by GYL Technologies Parc d'activités de Lanserre, 49610 Juigné sur Loire , France. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission.

The power line conducted emission measurements were performed in a shielded enclosure also located at the Parc d'activités de Lanserre, 49610 Juigné sur Loire, France facility

5 MEASUREMENT EQUIPMENT LIST:

PART TYPE	MANUFACTURER	MODEL	GYL TECHNOLOGIES NUMBER	CALIBRATION DATE
RECEIVERS				
Receiver	Rohde & Schwarz	ESI 7	M02020	Mar-05
Spectrum analyzer	Rohde & Schwarz	FSEM 30	M02021	Mar-05
Highpass filter 150 kHz	Rohde & Schwarz	EZ25	M02040	July-04
ARTIFICIAL MAINS NETWORKS				
LISN 100 A (three phases)	SCHWARZBECK	MNLK8121	M02036	July-04
ANTENNAS				
Bilog (30-2000MHz)	CHASE	CBL-6112	M02031	Aug-04
Bilog (30-2000MHz)	CHASE	CBL-6112	M02032	Aug-04
Horn (18to 26GHz)	ETS LINDGREN	M3160-09	M04002	Jan-04
Horn (1 to 18GHz)	EMCO	3115	M02045	July-04

6 TESTED SYSTEM DETAILS :

The equipment tested is a BTS considered as an Information Technology Equipment. The equipment, used in Residential, commercial and light industry.

The product is a personal communication service equipment



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7 EQUIPMENT DESCRIPTION:

7.1 PRODUCT TYPE:

This document applied to:

- Product : GSM 18000 Indoor BTS
- Manufacturer : Nortel Networks
- Frequencies : 1900 MHz
- RM equipped with **PSU ARTESYN** and **ASTEC**
- Configuration applies to : up to S666 (With base cabinet)
- Power Supply : -48Vdc
- Options : Alarm Protection module (ALPRO Indoor)
- **Serial number:** 362203
- **FCC ID :** AB6BTS18000IND
- **Operating frequency range :** 1930.2 MHz to 1989.8 MHz

Power supply :

Tested at 0 V -48 V DC

7.2 ANCILLARY EQUIPMENT :

Equipment	Quantity	Supplier	Model
Computer	2	Dell	
Fix attenuator 40 dB 50W	9	Radiall	R417020128
50 ohms terminators	9		

7.3 PRODUCT PICTURES :

Front View



Rear view





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7.4 TESTED SYSTEM DETAILS:

BASE CABINET				
Product : GSM/UMTS BTS 18000 Indoor				
Article delivered : GSM PCS BTS 18000 Indoor			Article code : NTN016AA 01	
Cabinet Serial Number : N° 362203				
MODULES DELIVERED IN THE CABINET				
ARTICLE	PEC code	Release	Serial number	Comment
PRECAB IND 48V	NTN016AA	01	NNTMGT0022C7	
IBP	NTQA0027AA	01	NNTMGR00G297	
IBP	NTQA0027AA	01	NNTMGR00H3NG	
DBP	NTN030AA	D2	NNTMGR00GTWM	
DBP	NTN030AA	D2	NNTMGR00G9G6	
IFM	NTN025AA	02	NNTMGR00GYJ4	
IFM	NTN025AA	02	NNTMGR00GYJ5	
ICM	NTN023AA	01	NNTMGR00H6H8	
ICM	NTN023AA	01	NNTMGR00H9KT	
ABM	NTN029AA	02	NNTMGR00GHE8	
ABM	NTN029AA	02	NNTMGR00GHW0	
RICO	NTN020CA	01	NNTMGT0024WS	
DDM H2 1900 W vswr	NTN063AA	02	FICT03000273	
DDM H2 1900 W vswr	NTN063AA	02	FICT030002EH	
DDM H2 1900 W vswr	NTN063AA	02	FICT0200029R	
Tx filter H2 1900	NTN064AA	02	FICT030000SZ	
Tx filter H2 1900 W vswr	NTN064AA	02	FICT0300024E	
Tx filter H2 1900 W vswr	NTN064AA	02	FICT02000206	
Radio Module 1900 (RM0)	NTN050PM	02	NNTM7504G35C	
Radio Module 1900 (RM1)	NTN050PM	02	NNTM7504GUIT	with PSU ASTEC NTN058 AA D4 /ADPL1602W1TX
Radio Module 1900 (RM2)	NTN050PM	02	NNTM7504GE6P	
Radio Module 1900 (RM3)	NTN050PM	02	NNTM7504GE3T	with PSU ASTEC NTN058 AA D4 /ADPL1602W1V3
Radio Module 1900 (RM4)	NTN050PM	02	NNTM7504GE6U	
Radio Module 1900 (RM5)	NTN050PM	02	NNTM7504GUIO	with PSU ARTESYN NTN058 AA 06 /ATSNTA003518

Modules software version	PI software tools :
V15b1e04 - CDI107405 ICM/ABM : V15B106 -CDI107359 RM : V15B107 -CDI107361	- WINTMI: v03d302 - TIL COAM: v15c304 - TIL Alarm: v01d104 - WINTOOL: v01b2e30



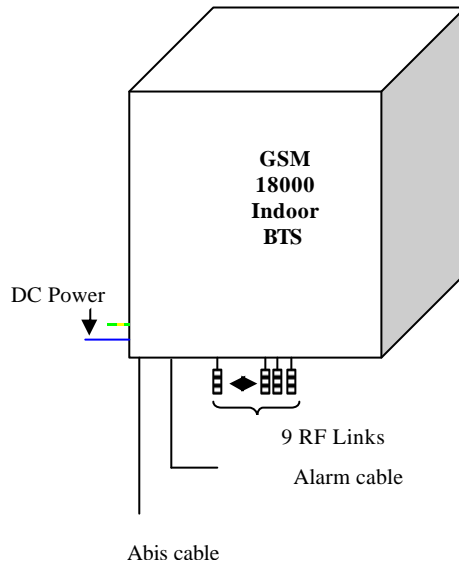
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SLOT	CHANNEL & FREQUENCY
RM0 TDMA0	Channel : 512 TX : 1930.2 MHz
RM0 TDMA1	Channel : 530 TX : 1933.8 MHz
RM0 TDMA2	Channel : 560 TX : 1939.8 MHz
RM1 TDMA0	Channel : 590 TX : 1945.8 MHz
RM1 TDMA1	Channel : 610 TX : 1949.8 MHz
RM1 TDMA2	Channel : 620 TX : 1951.8 MHz
RM2 TDMA0	Channel : 640 TX : 1955.8 MHz
RM2 TDMA1	Channel : 660 TX : 1959.8 MHz
RM2 TDMA2	Channel : 680 TX : 1963.8 MHz
RM3 TDMA0	Channel : 700 TX : 1967.8 MHz
RM3 TDMA1	Channel : 720 TX : 1971.8 MHz
RM3 TDMA2	Channel : 740 TX : 1975.8 MHz
RM4 TDMA0	Channel : 760 TX : 1979.8 MHz
RM4 TDMA1	Channel : 770 TX : 1981.8 MHz
RM4 TDMA2	Channel : 780 TX : 1983.8 MHz
RM5 TDMA0	Channel : 790 TX : 1985.8 MHz
RM5 TDMA1	Channel : 800 TX : 1987.8 MHz
RM5 TDMA2	Channel : 810 TX : 1989.8 MHz

7.5 CONFIGURATION OF TESTED SYSTEM :



See details on test plan in appendix.



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8 EXERCISING TEST CONDITIONS :

The BTS is configured with all transmitters active at their maximum output power on all RF links.
(30W output amplifier of Radio module 1900 MHz)
Measurements are done in transmitter BCCH mode. (See § 8 Frequency plan)

9 CONFORMANCE STATEMENT :

9.1 STANDARDS REFERENCED FOR THIS REPORT :

PART 15: 2004	Radio frequency devices
PART 22 : 2003	Public mobile service
PART 24 : 2003	Personal communications services
ANSI C63.4-2001	Standard format measurements/technical report personal computer and peripherals

9.2 JUSTIFICATION :

As mentioned in paragraph 5 of this report, the equipment is an information technology equipment (BTS) and as it may be installed in residential commercial or light industry areas the following sub clause of the standard mentioned above are

- Part 15.207 and 15.209 (subpart C) for respectively conducted and radiated emission for intentional radiator.
- Part 24.238 (subpart E) for broadband PCS emission limits

10 TEST ACCORDING TO CFR 47 Part 15 Class A and B :

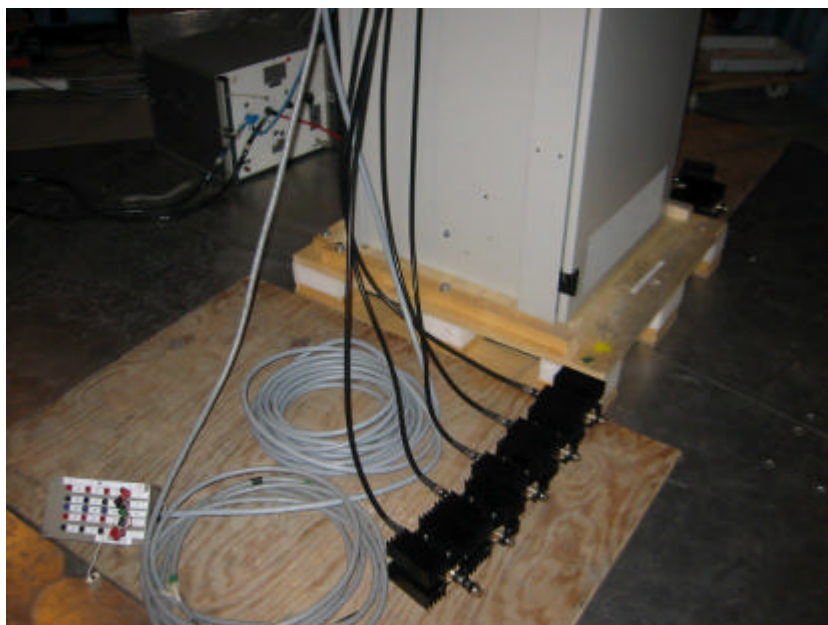
Tests performed by Daniel RAUD and Olivier MARET at GYL Technologies laboratories on June, 6th and 7th of 2005.

10.1 REFERENCE DOCUMENTATION :

FCC part 15 (Sub part B) §15.207 and 15.209 of 2002

10.2 CONDUCTED EMISSIONS MEASUREMENTS :

The power line conducted emission measurements were performed in a semi anechoic chamber manufactured by SIDT. The EUT was assembled on a non conductive 10 centimeters high wooden pallet. Power was fed to the EUT through a 50 ohm / 50 micro-Henry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Rohde and Schwartz 150 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 150 kHz. Conducted emission levels were measured on each current-carrying line with the receiver operating in the CISPR quasi-peak mode (or average mode if applicable)





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The conducted emissions initial measurement consists of a prescan (tester in receiver mode), in order to determine the maximum quasi peak and average values.

- If the conducted emissions have limits showing a margin lower than 15dB, data collection measurement is performed on the six (6) highest frequencies to determine the compliance of the EUT.
- If the conducted emissions have limits showing a margin greater than 15dB, data collection measurement is not performed and the curves are given as evidence of compliance.

The following tables lists worst-case conducted emission data. Specifically: emission frequency, measurement level (including cable loss and transducer factors) in quasi-peak and average mode and margin.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and LIVE SIDE, herein referred to as Neutral, and Live respectively.

ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	4KHz
Preamplifier	OFF
Preselector	ON
Resolution, Band With	9 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	1 sec minimum

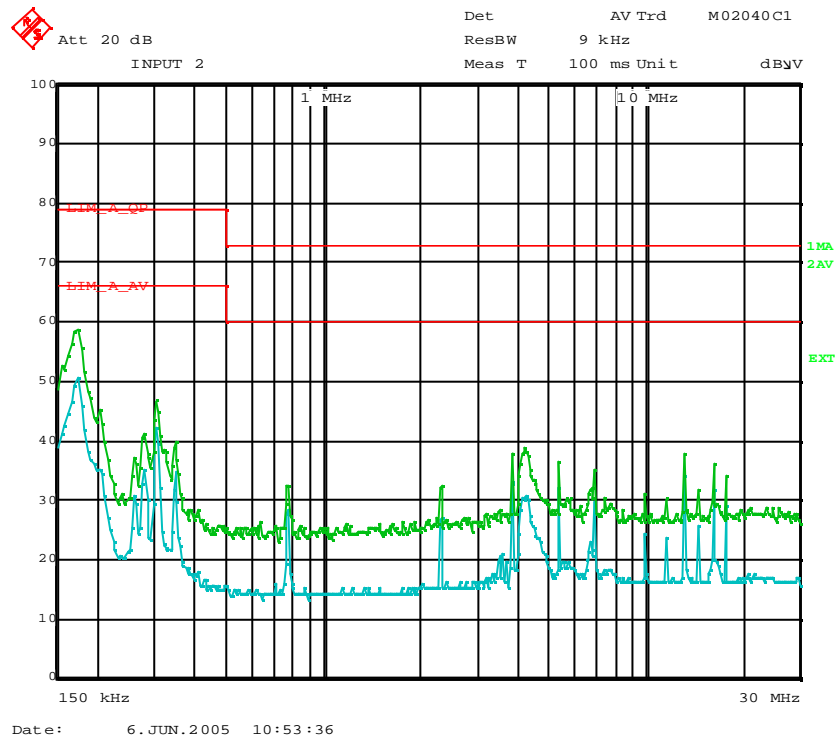
All readings are quasi-peak unless stated otherwise.

10.2.1 -48V wire with limit class A:

Frequency (MHz)	Quasi-peak (dBμV)	QP margin (dB)
0,174	54,5	-24,5

Frequency (MHz)	Average (dBμV)	Average margin (dB)
0,174	48,9	-17,1
0,302	42,5	-23,5
3,858	32,5	-27,5
13,126	34,0	-26,0

Legend: Blue curve represents average values
Green curve represents the peak values

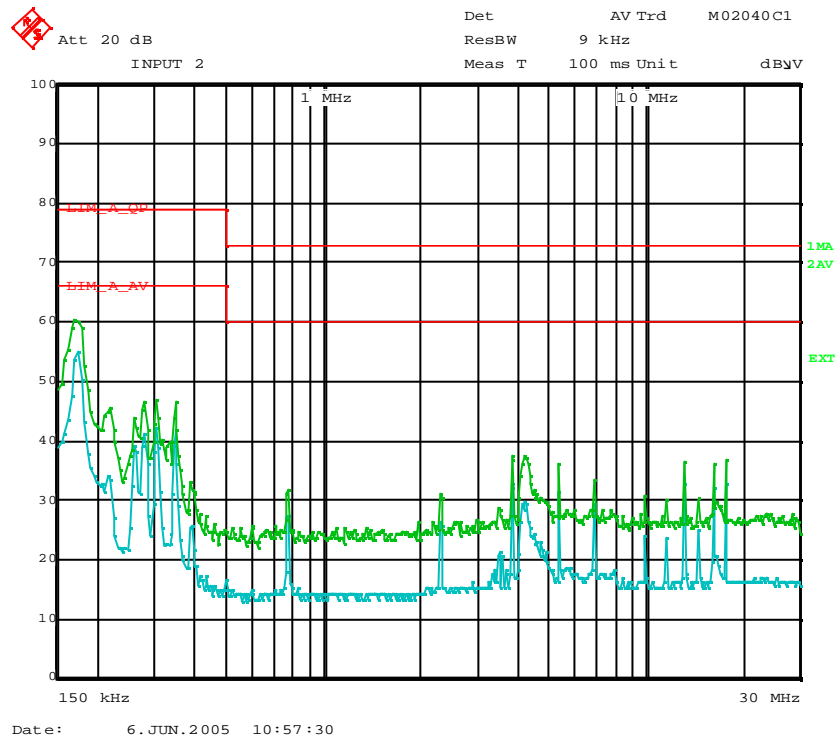


10.2.2 OV wire with limit class A:

Frequency (MHz)	Quasi-peak (dBµV)	QP margin (dB)
0,170	58,7	-20,3

Frequency (MHz)	Average (dBµV)	Average margin (dB)
0,174	54,9	-11,1
0,258	39,4	-26,6
0,278	41,1	-24,9
0,302	42,9	-23,1
0,346	42,1	-23,9
0,174	54,9	-11,1

Legend: Blue curve represents average values
Green curve represents the peak values

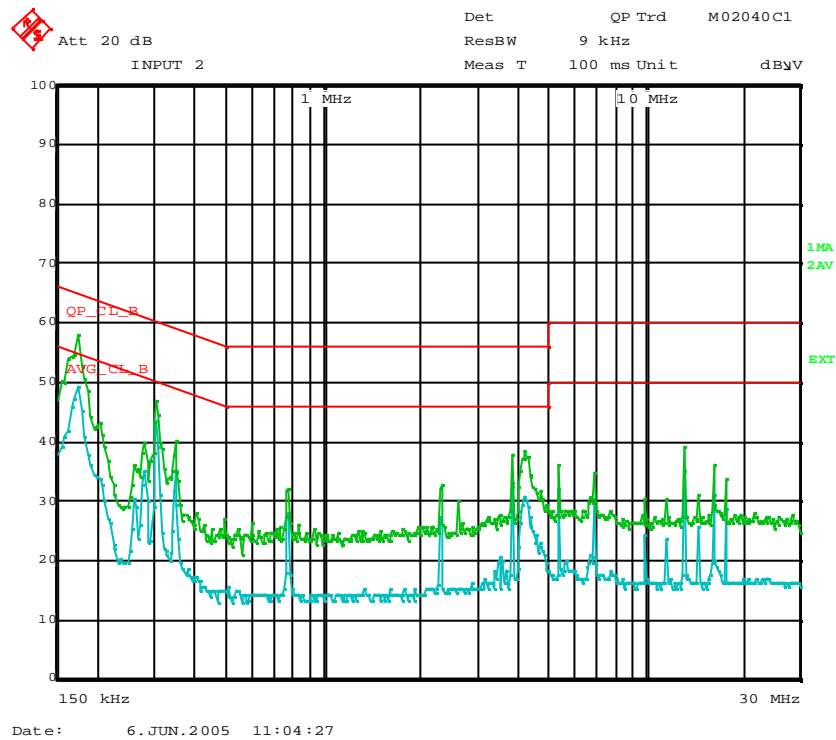


10.2.3 -48V wire with limit class B:

Frequency (MHz)	Quasi-peak (dBμV)	QP margin (dB)
0,174	53,9	-10,9

Frequency (MHz)	Average (dBμV)	Average margin (dB)
0,174	48,3	-6,5
0,302	42,6	-7,6

Legend: Blue curve represents average values
Green curve represents the peak values

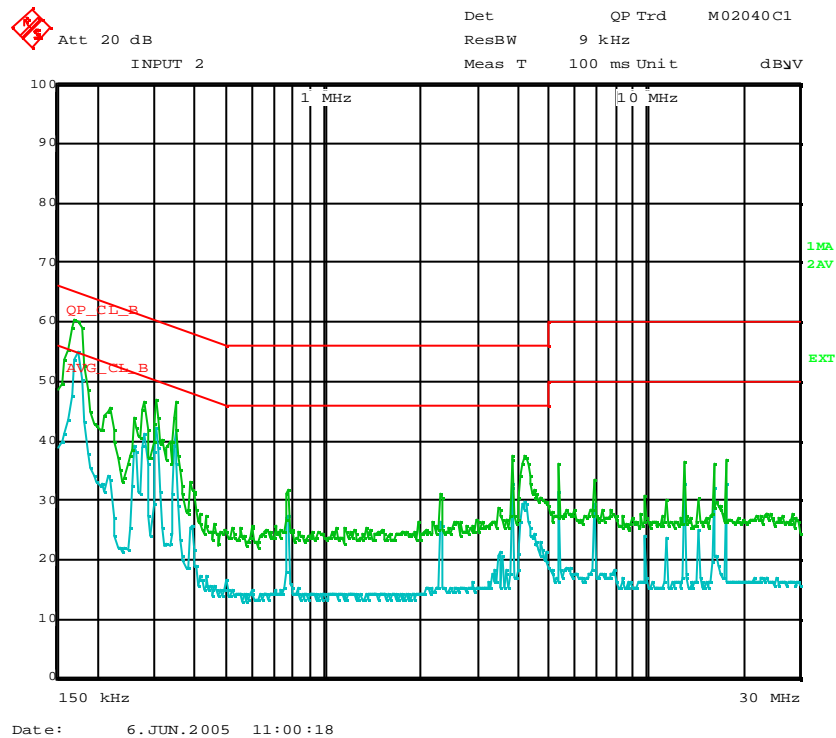


10.2.4 0V wire with limit class B:

Frequency (MHz)	Quasi-peak (dBµV)	QP margin (dB)
0,174	59,1	-5,7
0,346	45,4	-13,7

Frequency (MHz)	Average (dBµV)	Average margin (dB)
0,174	54,5	-0,3
0,258	39,2	-12,3
0,278	41,1	-9,8
0,302	42,7	-7,5
0,346	41,8	-7,3

Legend: Blue curve represents average values
Green curve represents the peak values



10.3 INTERPRETATION AND REMARKS:

The equipment complies with the §15.207 Class A and B requirements and IECS-003 Class A and B requirements.



10.4 RADIATED EMISSIONS MEASUREMENTS :

Before final measurements of radiated emissions were made on the open-field three/ten meter range; the EUT was pre-scanned in the semi anechoic at one meter distance. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a conductive turntable on isolated support, pallet, 0.1 meter above the ground plane. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Summary of settings

ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	40 KHz
Preamplifier	ON
Preselector	ON
Resolution, Band With	120 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	1 s minimum

All readings are quasi-peak unless stated otherwise.

10.4.1 Test Set up :



10.5 RESULTS (Class B):

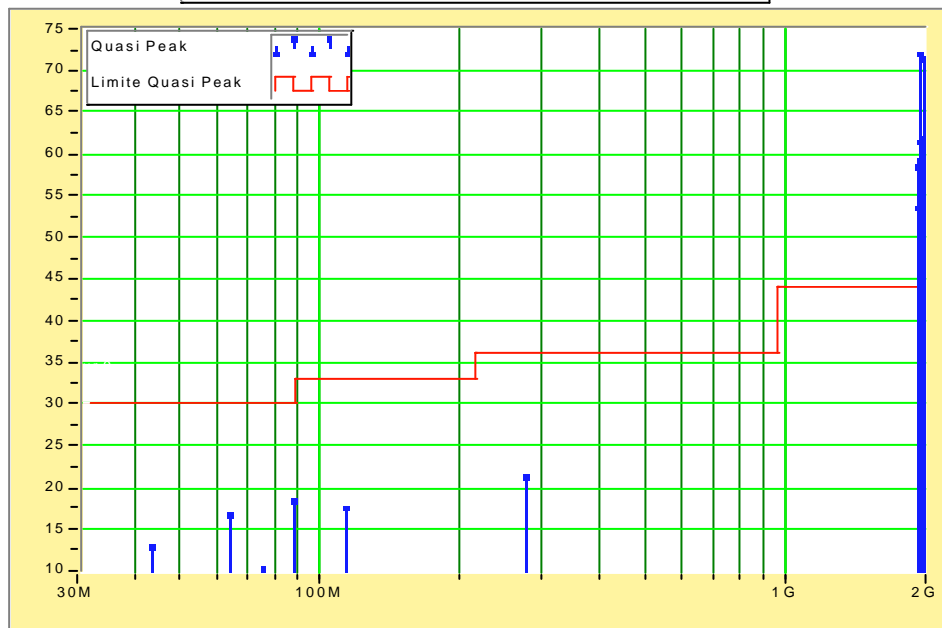
The following data table lists the most significant emission frequencies, measured level, correction factor (includes cable and antenna corrections), corrected reading and the limit. The highest peaks are measured in quasi-peak detection mode at 10 meters distance.



10.5.1 Configuration FCC part 15

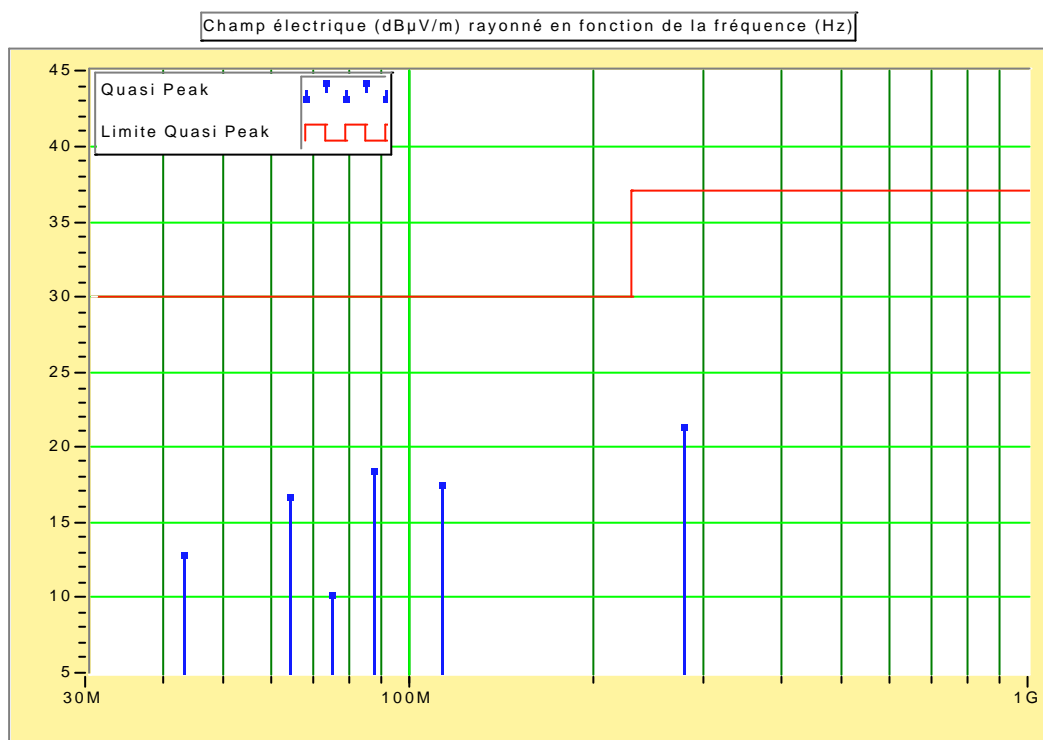
Frequency (MHz)	Peak (dBµV/m)	Quasi peak (dBµV/m)	Margin (dB)	Polar.	Height (cm)	Angle (°)	Factor Corr. (dB)	Comments
43.075	33.69	12.80	-17.20	V	100	0	11.46	
64.077	19.68	16.68	-13.32	V	220	12	6.00	
75.005	13.12	10.19	-19.81	V	200	5	7.00	
87.504	22.08	18.44	-11.56	V	125	281	9.50	
112.501	19.83	17.47	-15.53	V	127	164	11.63	
278.533	21.78	21.24	-14.76	V	127	229	14.79	
1930.268	53.12	53.54	9.54	H	121	359	33.42	transmitter
1933.871	57.21	58.42	14.42	H	121	349	33.40	transmitter
1939.883	59.97	61.34	17.34	H	121	349	33.36	transmitter
1945.877	52.01	52.18	8.18	H	121	336	33.32	transmitter
1949.867	54.92	55.86	11.86	H	121	336	33.30	transmitter
1951.877	70.17	71.91	27.91	H	121	336	33.29	transmitter
1955.874	57.82	59.00	15.00	H	121	336	33.26	transmitter
1959.872	60.40	61.78	17.78	H	155	347	33.24	transmitter
1963.871	58.66	60.00	16.00	H	155	336	33.22	transmitter
1967.868	60.08	61.54	17.54	H	155	336	33.19	transmitter
1971.858	42.90	40.92	-3.08	H	155	326	33.17	transmitter
1975.865	51.27	51.43	7.43	H	155	326	33.14	transmitter
1979.861	69.49	71.35	27.35	H	155	326	33.12	transmitter
1981.861	46.15	44.82	0.82	H	155	351	33.11	transmitter
1983.859	46.82	45.63	1.63	H	155	5	33.10	transmitter
1985.867	54.51	55.34	11.34	H	138	358	33.08	transmitter
1987.869	55.84	56.87	12.87	H	138	5	33.07	transmitter
1989.860	60.49	61.86	17.86	H	121	9	33.06	transmitter

Champ électrique (dBµV/m) rayonné en fonction de la fréquence (Hz)



10.5.2 Configuration ICES 003/CISPR22

Frequency (MHz)	Peak (dBμV/m)	Quasi peak (dBμV/m)	Margin (dB)	Polar.	Height (cm)	Angle (°)	Factor Corr. (dB)	Comments
43.075	33.69	12.80	-17.20	V	100	0	11.46	
64.077	19.68	16.68	-13.32	V	220	12	6.00	
75.005	13.12	10.19	-19.81	V	200	5	7.00	
87.504	22.08	18.44	-11.56	V	125	281	9.50	
112.501	19.83	17.47	-12.53	V	127	164	11.63	
278.533	21.78	21.24	-15.76	V	127	229	14.79	



10.6 INTERPRETATION AND REMARKS :

The equipment complies with the §15.209, ICES 003 and RSS 133 class B requirements.

11 Test according to CFR 47 Part 24

Tests performed by Daniel RAUD at GYL Technologies laboratories, in June, 6th of 2005.

11.1 REFERENCE DOCUMENTATION:

CFR 47 part 24, (2003)
ANSI C63.4 (2003).

11.2 RADIATED DISTURBANCE :

11.2.1 General measurement conditions.

Conforms to Section 8 of the ANSI C63.4 measurement standard.
Equipment under test:



11.2.2 Method of measurement.

Method of measurement and test installation according ANSI C63.4.

Measurement are done at 1m in a free area.

We try to obtain a maximum at all frequencies by moving the product orientation and antenna polarisation. The height of the antenna can vary from 1 m to 4 m.

Measurements done in transmitter mode (all transmitters at maximum power 30 W, in BCCH mode without frequency hopping) and in receiver mode.



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11.2.3 Test equipment used :

DESIGNATION	MANUFACTURER	REFERENCE	GYL NUMBER	Calibration Date
Spectrum analyzer	Rohde & Schwarz	FSEM30	M02021	MAR-05
10 m open area test site			M02093	AUG-04
Horn Antenna	EMCO	3115	M02045	JUL-04
Turn table controller, Open area	EMCO	1085	M01100	Without
Turn table controller	EMCO	1085	M01102	Without

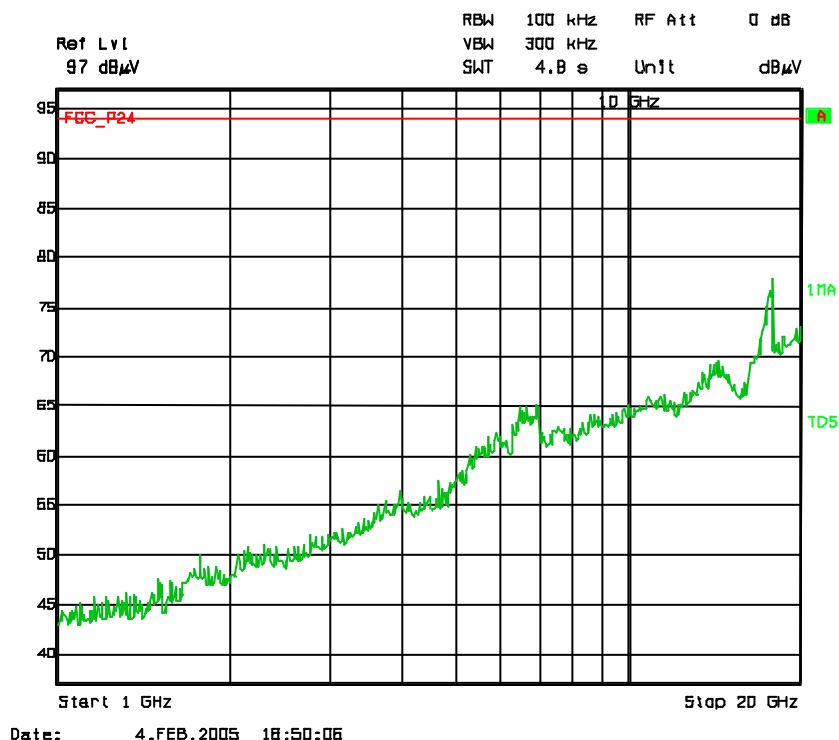
11.2.4 Results :

Spurious emissions measurement.

No spurious emission found which level upper to noise level in 100KHz bandwidth (harmonics from transmitters frequencies are under noise level).

Max level found at 5,79GHz : 62,7DbμV/m with horizontal polarisation front side.

Spectrum of noise level from 1GHz to 20GHz including loss cable and antenna factors



11.3 INTERPRETATION AND REMARKS:

The equipment complies with the FCC part 24 requirements.

**EMC TEST PLAN FOR QUALIFICATION OF GSM 18000
INDOOR BTS 1900 MHz (US & Canada Market)**

Reference: NORTEL/18K/IN/1900/EMC/TP/01

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1	12 April 2005	Creation	Patrick Galopin	Arnaud Lucy

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1. INTRODUCTION

The objective of this document is to present the test plan for EMC testing on the system GSM 18000 Indoor BTS configured in 1900 MHz.

The conformity with the test program presented below will be used to demonstrate the compliance of the GSM 18000 Indoor BTS with the Electromagnetic Compatibility applicable standard.

- ❖ For North America deployment the applicable standard for the EMC and Radio aspects are the CFR 47 part 15 subpart B for EMC conducted and radiated emissions and the CFR 47 part 24 subpart E for radio spurious emissions.
- ❖ For CANADA deployment the applicable standard for EMC are the ICES 003 and RSS 133 for conducted and radiated emissions.

This document applied to:

- Product : GSM 18000 Indoor BTS
- Manufacturer: Nortel Networks
- Frequencies: 1900 MHz
- RM equipped with **PSU ARTESYN** and **ASTEC**
- Configuration applies to : up to S666 (With base cabinet)
- Power Supply : -48Vdc
- Options : Alarm Protection module (ALPRO Indoor)

The tests will be performed on base cabinet only. During the first qualification (see test report [R2]), we have already validated the extension cabinet with interconnection cable. The extension cabinet and interconnection cable are the same as in previous qualification. For this reason, only the base cabinet will be tested

2. APPLICABLES DOCUMENTS

[A1]	47CFR Part 2 10/01/01	FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations - Frequency allocations and radio treaty matters; general rules and regulations.
[A2]	47 CFR Part 24 10/01/01	FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations - Personal communications services.
[A3]	47 CFR Part 15 08/20/02	FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations – Radio frequency devices.
[A4]	ICES-003 Issue 4 February 2004	Industry CANADA Digital Apparatus
[A5]	RSS 133 Issue 2 November 1999	2 GHz Personal Communications services

3. REFERENCES DOCUMENTS

[R1]	PE/BTS/DPL/014717	GSM BTS 18000 Project Qualification plan for 1900 MHz Indoor Cabinet and Additional Introduction on 1900 MHz Outdoor
[R2]	151017DK	EMC Test Report of Gyl Technologies

4. TEST PLAN SUMMARY

The following table lists the tests to be done, the severity level to apply, the configuration to test and comment when necessary.

	Test case	Application	Standard	Test requirement	Performance criteria	Comment	
US & CANADA MARKET	1	Radiated emissions	Enclosure of system	FCC Part 15 § 15.109	30MHz – 20 GHz	Class B	All transmitters in the EUT should be transmitting at full power.
	2	Radiated emissions	Enclosure of system	FCC Part 24 § 24.238 and RSS 133	30 MHz – 20GHz	See § 5	All transmitters in the EUT should be transmitting at full power.
	3	Conducted emissions	DC Power	CISPR 22 for IECS-003	150 kHz – 30 MHz	Class B	All transmitters in the EUT should be transmitting at full power.
	4	Radiated emissions for IECS-003	Enclosure of system	CISPR 22	30MHz – 1 GHz	Class B	All transmitters in the EUT should be transmitting at full power.

5. TEST DESCRIPTION OF THE RADIATED EMISSION.

Standard Coverage : FCC Part 15.109, FCC Part 24.238

Intend :

- (a) 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 harmonics and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of 2.989, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open filed measurements (e.g., a broadcast transmitter installed in a building) measurements will be acceptable of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. 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.
- (b) The measurements specified in paragraph (a) of this section shall be made for the following equipment :
 - (1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
 - (2) All equipment operating on frequencies higher than 25 MHz.
 - (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
 - (4) Other types of equipment as required, when deemed necessary by the Commission.

Test Procedure:

Radiated emission measurement procedures shall be performed as outlined in Section 8 of the ANSI C63.4 measurement standard. The BTS will be tested to the applicable limits of the FCC rules. For radiated emission measurements the measurement distance between the center of the measurement antenna and the equipment under test shall be 3 meters (or less for frequencies above 1 GHz). In order to maximize all emission levels from the equipment, the emissions will be searched with the receive antenna at varied height levels. The equipment shall also be rotated a full 360 degrees on the turntable with the receive antenna at varying height levels (1 to 4 meters). Tests shall be made with the antenna positioned in both the horizontal and vertical planes of polarization. The BTS shall be placed on the turntable as per ANSI C63.4 measurement procedures. Please see the Part 15 test plan as Part 24 radiated requirements will be tested in conjunction with the Part 15 testing. The spectrum shall be searched to identify emissions. A complete scan of the applicable spectrum shall be completed (up to 10th harmonic of fundamental). The transmitter shall then be turned off, with the rest of the equipment powered on. A complete scan of the spectrum shall be done and referred to as "ambient" without the transmitter keyed on. Emissions emanating from the transmitter shall be identified from comparing these two scans. The identified emissions (from the transmitter) shall be measured and the levels recorded with the transmitter keyed on at full rated power output.

EMC TEST PLAN FOR QUALIFICATION OF GSM 18000 INDOOR BTS 1900 MHz (US&CANADA Market)

Important remark :

Substitution measurements must be made on all detected emissions given that the limits for the FCC are given in power measurements. If no emissions are detected, measurements should be made at the noise floor levels for each of the transmitter harmonic frequencies and a statement should be placed in the test report indicating that no emissions were detected.

The equipment was configured as shown in the next figure.

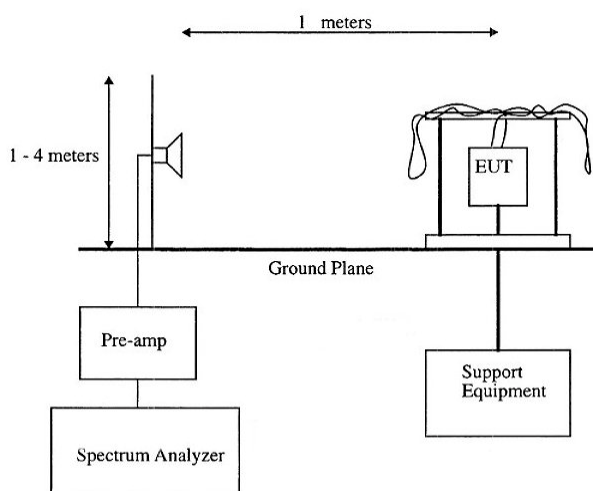


Figure 1 : Test configuration for Radiated Spurious emissions

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Measurements were made according to the procedures outline in ANSI C63.4
 The emissions were investigated up to the tenth harmonic of the fundamental emission (20 GHz).
 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:

$$E(V/m) = \frac{1}{R(m)} * \sqrt{30 * P_t * G}$$

Where,

- E = Field Strength in Volts/meter,
- R = Measurement distance in meters,
- P_t = Transmitter Rated Power in Watts (10 Watts), (40.0 dBm)
- G = Gain of ideal Dipole (linear)

Therefore :

$$E(V/m) = \sqrt{30 * 10 * 1.64}$$

E = 22.18 V/m = 146.9 dBμV/m
 The spurious emissions must be attenuated by at least:
 43 + 10*Log(10) = 53.0 dB.
 Therefore the field strength limit at 1 meters is:
 E = 146.9 dBμV/m – 53.0 dB = 93.9 dBμV/m

Spectrum Analyzer setting during measurements shall be as following:

Receiver Setting	Pre-Scan (to identify spurious emissions from EUT)	Final Measurements
Detector Type	Peak	Quasi-Peak (CISPR)
Mode	Max Hold	Not Applicable
Bandwidth	100 kHz or 1 MHz (for > 1GHz)	120 kHz
Amplitude Range	60 dB	20 dB
Measurement Time	Not Applicable	> 1s
Observation Time	Not Applicable	> 15s
Step size	Continuous sweep	Not Applicable
Sweep Time	Coupled	Not Applicable
Measuring Distance	3m for 30 MHz - 1GHz 1m for 1GHz - 20GHz	10m for 30 MHz - 1GHz 1m for 1GHz - 20GHz

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Pass / Fail criteria :

Frequency range MHz	Distance m	Electric fields	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30-88	3	100	40
88-216	3	150	43.5
216-960	3	200	46
>960	3	500	54

- For 1 GHz to 20 GHz :
 Measurement distance : 1 m
 Limit : 93.9 $\text{dB}\mu\text{V/m}$

6. TEST DESCRIPTION OF THE CONDUCTED EMISSION.

Test case name : Conducted emissions on DC port

Standard Coverage : CISPR 22 (0.15 MHz – 30 MHz)

Intend :

Measurement shall be made in the operational mode producing the largest emission in the frequency band being investigated consistent with normal applications.

Test procedure :

A measuring receiver shall be connected to each RSIL measurement port in turn and the conducted emission levels recorded. The RSIL measurement ports not being used for measurement shall be terminated with a 50 Ω (50μH) load.

Pass / Fail Criteria :

Limits for conducted emissions and CISPR 22 (0.15 MHz – 30 MHz)

Limits for conducted emissions (CISPR 22 class B)

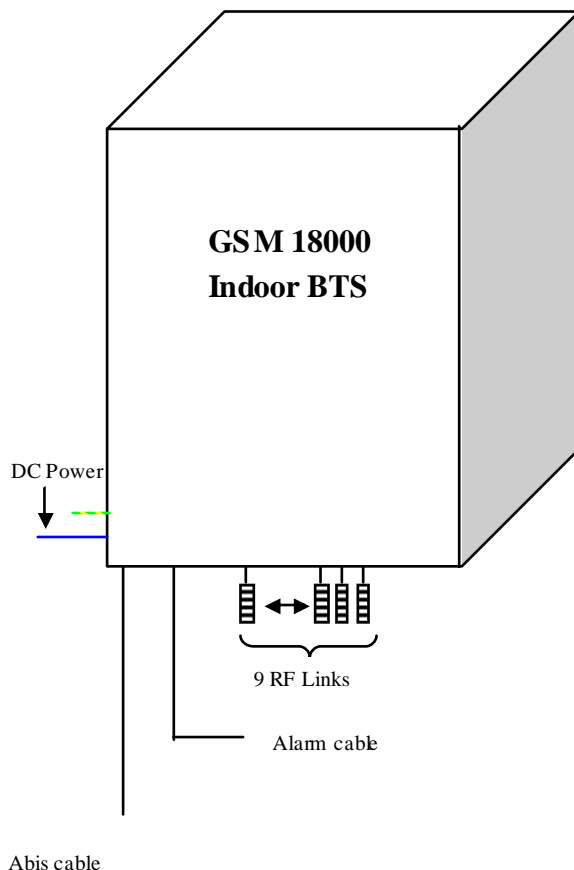
Frequency range	Quasi-peak	Average
> 0,15-0,5 MHz	66 - 56 dBμV	56 - 46 dBμV
> 0.5- 5 MHz	56 dBμV	46 dBμV
> 5-30 MHz	60 dBμV	50 dBμV
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

Configuration :

All transmitters in the EUT should be transmitting at full power. The transmitters' operating frequencies should be selected by setting the Absolute Radio Frequency Channel Numbers (ARFCN) equally distributed over the BSS operating band, subject to any restrictions of the configuration of the EUT.

7. INSTALLATION DIAGRAM

The drawing gives a representation of functional test bench.



8. DOCUMENTATION DELIVERABLES

The report needs to contain the minimum following information ordered in such manner:

- all the information contained in this document, in order to identify precisely the configuration under test,
- any deviation from the test methods defined in the relevant standards,
- for radiated and conducted tests, a table giving the maximum emission levels in absolute and with respect to the limit (margin).
- description of any modifications made to the EUT during testing which are required to acquire compliance,
- instrumentation and antennas calibration dates,
- photographs of the equipment under test (as many as different tests, showing open field test site...)

9. FREQUENCY PLAN

SLOT	BASE CABINET
RM0 TDMA0	Channel : 512 TX : 1930.2 MHz
RM0 TDMA1	Channel : 530 TX : 1933.8 MHz
RM0 TDMA2	Channel : 560 TX : 1939.8 MHz
RM1 TDMA0	Channel : 590 TX : 1945.8 MHz
RM1 TDMA1	Channel : 610 TX : 1949.8 MHz
RM1 TDMA2	Channel : 620 TX : 1951.8 MHz
RM2 TDMA0	Channel : 640 TX : 1955.8 MHz
RM2 TDMA1	Channel : 660 TX : 1959.8 MHz
RM2 TDMA2	Channel : 680 TX : 1963.8 MHz
RM3 TDMA0	Channel : 700 TX : 1967.8 MHz
RM3 TDMA1	Channel : 720 TX : 1971.8 MHz
RM3 TDMA2	Channel : 740 TX : 1975.8 MHz
RM4 TDMA0	Channel : 760 TX : 1979.8 MHz
RM4 TDMA1	Channel : 770 TX : 1981.8 MHz
RM4 TDMA2	Channel : 780 TX : 1983.8 MHz
RM5 TDMA0	Channel : 790 TX : 1985.8 MHz
RM5 TDMA1	Channel : 800 TX : 1987.8 MHz
RM5 TDMA2	Channel : 810 TX : 1989.8 MHz

10. ABBREVIATIONS

BTS:	Base Transceiver Station
EMC:	Electromagnetic Compatibility
EN:	European Norm
ETS:	ETSI Standard
EUT:	Equipment Under Test
GSM:	Global System Mobile
N/A:	Not Applicable
RF:	Radio Frequency
RSIL:	Line stabilization networks Impedance

EMC TEST PLAN FOR QUALIFICATION OF GSM 18000 INDOOR BTS 1900 MHz (US&CANADA Market)

“END OF DOCUMENT”