



TEST REPORT

CFR 47 Part 15
CFR 47 Part 24
and
ICES 003, RSS 133

GSM 18000 MCPA BTS

N°151014DK

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EMC TEST REPORT
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Written by : D.RAUD

22 September 2004

Identification : 151014DK

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Référence : Nortel/18K/MCPA/1900/EMC/TP/01

Version : 1

Date de création : 16 June 2004

Page Number : 22

B :

PCS BTS18000 MCPA Hardware delivery notice (3 pages)

Document number: PE/BTS/DJD/0011841

Document issue: 02.01 / EN

Document status: Standard

Date: 13/AUG/2004



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Applicant:

S.A. GROLLEAU FLEXTRONICS
49310 MONTILLIERS
FRANCE

Product description**GSM 18000 MCPA BTS****Manufacturer :**

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

Responsible of the equipment:

Patrick GALOPIN

Product type:

GSM 18000 MCPA BTS in S999 configuration configured in 1900MHz

Reference

Item definition	Designation	Comments
Base :	NTT916AAD1	S/N: NNTMGRR0012XS
Manual:	none	
Power supply:	208V/60Hz	tested at 208 V 60 Hz. (L1, L 2 and Neutral)
FCC ID :	AB6BTS18000MCPA	
FCC Emission designator:	300KGXW	
Operating Frequency Range:	1930.2 to 1989.8 MHz	

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PRODUCT PICTURE:

Front view



Rear view





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PRODUCT COMPOSITION:

See Nortel document referenced PE/BTS/DJD/011841 Issue 02.01/EN of 13 August 2004 in appendix B.

UTILISATION:

Base Transceiver Station

General test conditions

AUXILIARY EQUIPMENT:

Attenuators and 50 ohms load

WORKING MODE FOR EMISSION TEST

Measurements are done in transmitter mode (all MCPA Radio modules at maximum power, -3 dBm output amplifier of MCPA Radiomodule, in BCCH mode without frequency hopping), and in receiver mode.

Channels configuration for the test:

MRM#	CHANNEL #	FREQUENCY (MHz)
1	512	1930.2
2	530	1933.8
3	550	1937.8
4	600	1947.8
5	650	1957.8
6	700	1967.8
7	750	1977.8
8	800	1987.8
9	810	1989.8



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Reference standards choice

The product is information technology equipment.

For North America deployment the applicable product standard for the EMC and Radio aspects are the CFR 47 part 15 subpart C for EMC conducted and radiated emissions and the CFR 47 part 24 subpart E for radio spurious emissions.

For CANADA deployment the applicable product standard for EMC are the ICES 003 and RSS 133 for conducted and radiated emissions.

Note : CFR47 part 15 and part 24 are in agreement with ICES 003 and RSS 133 for conducted and radiated emission.

Interpretation and remarks:

This equipment conforms to limits standards for EMC measurements.

IMPORTANT REMARK :

Substitution method was not performed as there was nor spurious emission neither emission within the limits detected in prescan as shown by page 16

The EUT Plot on pages 19 show measured noise floor levels detected while testing the GSM 18000 MCCA BTS.



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Test according to CFR 47 Part 15 Class B

Tests performed by Daniel RAUD at GYL Technologies laboratories, in September 6 of 2004.

REFERENCE DOCUMENTATION:

FCC CFR 47 part 15, (2004)
ANSI C63.4 (2001).

CONDUCTED DISTURBANCE AT INPUT POWER ACCESS :

General measurement conditions.

Conforms to ANSI C63.4.

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).

Limit :

Class B of FCC standard regulation CFR 47 part 15 subpart B for conducted emission limit (§15.107 class B device).

Method of measurement.

Method of measurement and test installation according to Section 7 of the ANSI C63.4 measurement standard.

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Test equipment used :

APPARATUS	MANUFACTURER	REFERENCE	SERIAL NUMBER	Date of verification
EMI test receiver	Rohde & Schwarz	ESI 7	M02020	Aug-04
LISN (50 μ H / 5/50ohms)	Rohde & Schwarz	ESH2-Z5	M02034	Nov-03

Results:

The following table lists worst-case conducted emission data. Specifically: Emission Frequency, Test Detector, Analyzer Reading, Site Correction Factor, corrected Emission Level, Quasi Peak Limit and Margin, and the Average Limit and Margin.

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode.

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 LIVES SIDE, herein referred to as Neutral, and Lives 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 s minimum

Split phase 208V 60Hz

For some measurements, since no peak emissions were detected above average or quasi-peak limits data collection measurement were not performed on the EUT.



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

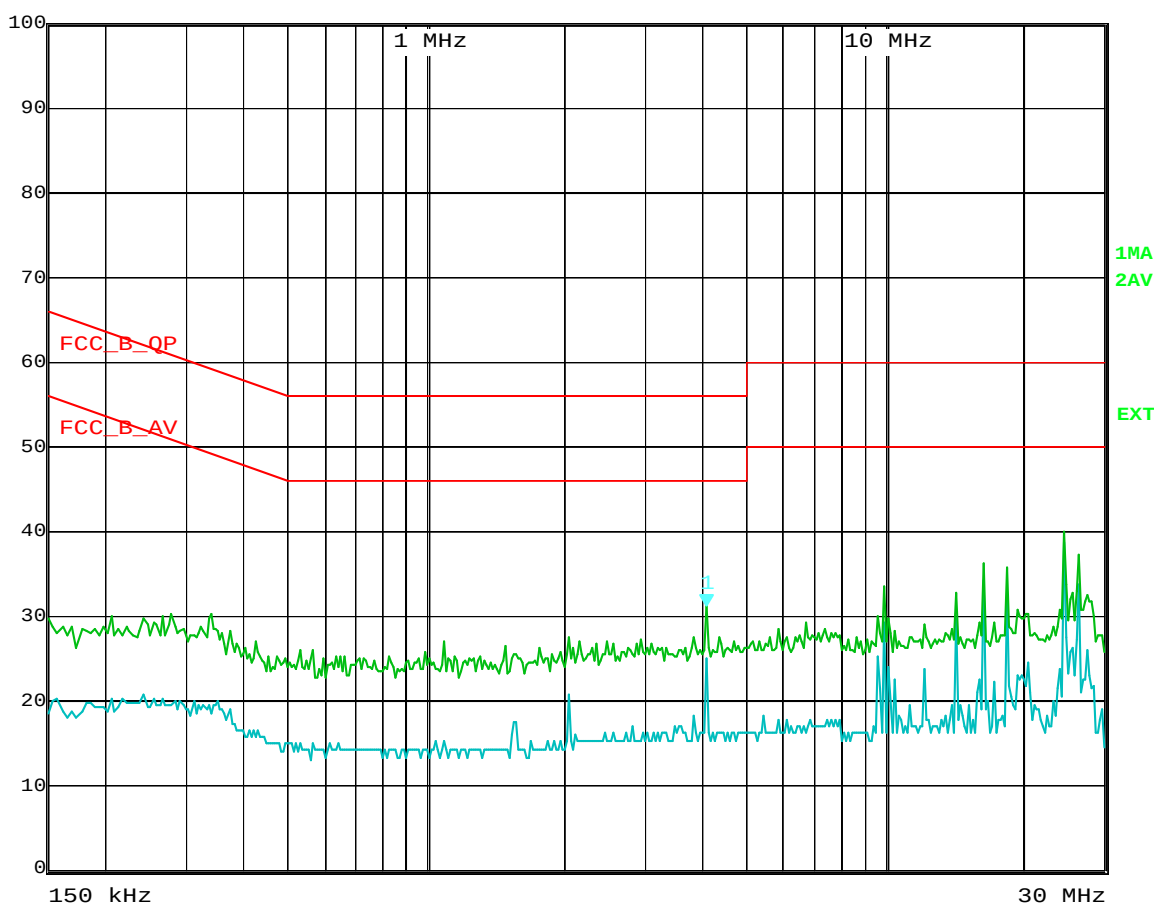
Neutral

Frequency (MHz)	Quasi-peak (dBμV)	QP margin (dB)	Frequency (MHz)	Average (dBμV)	Average margin (dB)
24,574	39,39	-20,61	4,094	28,54	-17,46
			9,998	25,04	-24,96
			14,338	30,32	-19,68
			16,382	32,25	-17,75
			18,434	34,33	-15,67
			24,574	36,12	-13,88
			26,626	32,41	-17,59



Att 20 dB
INPUT 2
Marker 1 [T1]
31.06 dBμV
4.09800000 MHz

Det
ResBW 9 kHz
Meas T
AV Trd
100 ms Unit
M02040C1
dBμV



Date: 6.SEP.2004 09:29:21



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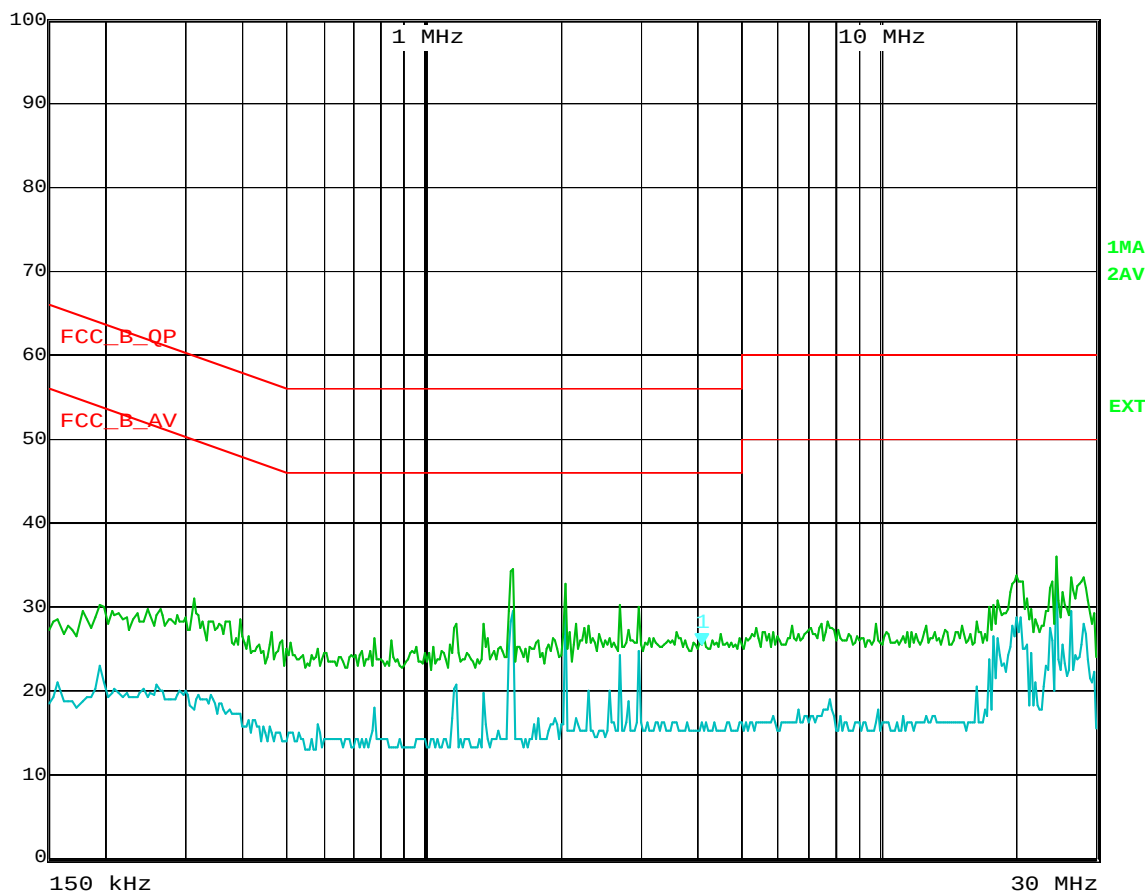
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Live 1

Frequency (MHz)	Average (dBμV)	Average margin (dB)
1,550	27,77	-18,23
1,566	29,31	-16,69
2,046	20,70	-25,30
2,050	21,79	-24,21
24,574	32,54	-17,46



Att 20 dB Marker 1 [T1] Det AV Trd M02040C1
 25.31 dBμV ResBW 9 kHz
INPUT 2 4.09800000 MHz Meas T 100 ms Unit dBμV



Date: 6.SEP.2004 09:22:14



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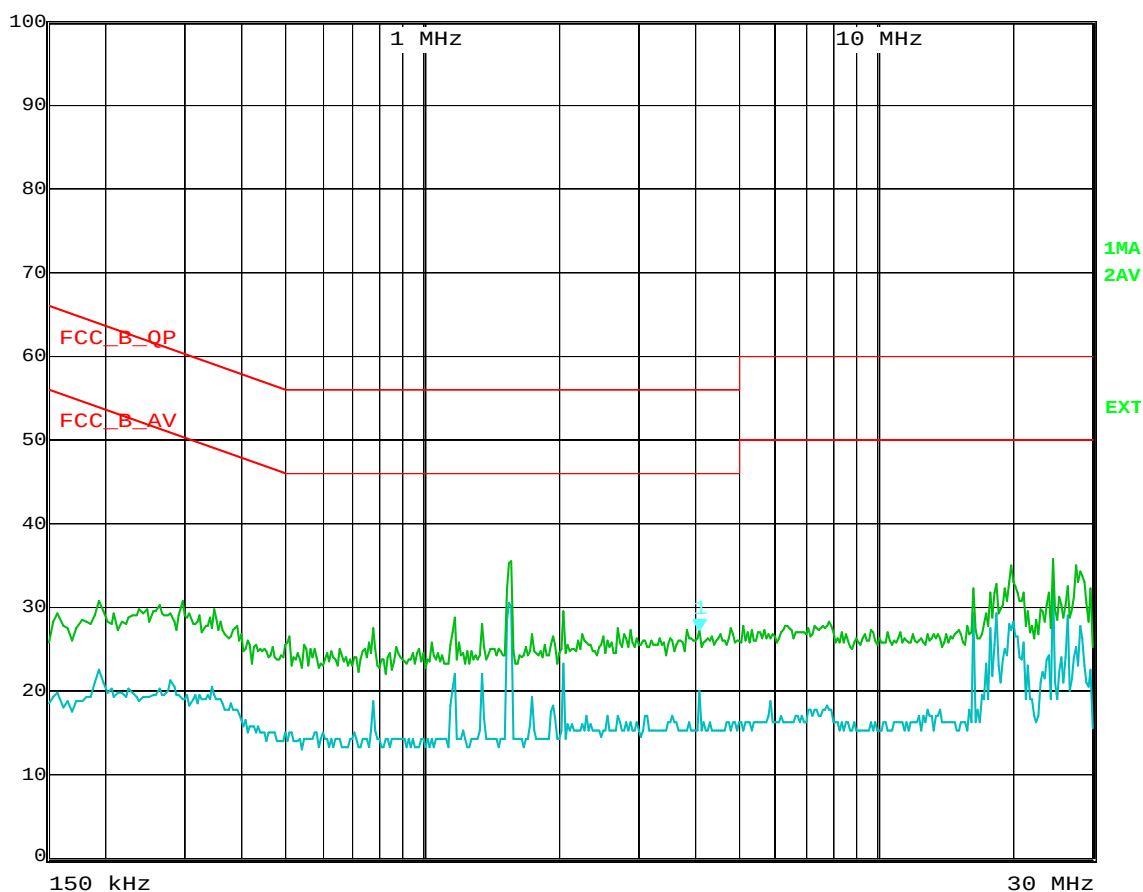
Live 2

Frequency (MHz)	Quasi-peak (dBμV)	QP margin (dB)	Frequency (MHz)	Average (dBμV)	Average margin (dB)
1,566	32,63	-23,37	1,550	28,63	-17,37
			1,562	28,16	-17,84
			16,382	28,75	-21,25
			18,430	28,96	-21,04
			20,130	24,22	-25,78
			24,574	32,66	-17,34
			26,626	28,62	-21,38



Att 20 dB
INPUT 2
Marker 1 [T1]
27.03 dBμV
4.09800000 MHz

Det
ResBW
Meas T
AV Trd
9 kHz
100 ms Unit
M02040C1
dBμV



Date: 6.SEP.2004 09:24:21

INTERPRETATION AND REMARKS:

Conform to the FCC part 15. class B requirements

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RADIATED DISTURBANCE :

Limit :

Class B of FCC standard regulation CFR 47 part 15 subpart B for radiated emission limit (§15.109 class B device) for unintentional radiator and subpart C (§15.209 class B device) for intentional radiator

General measurement conditions.

Conforms to ANSI C63.4.

Diagram in 0° position, angles are positives in the reverse clock wise.

Equipment under test.



Method of measurement.

Method of measurement and test installation according to Section 8 of the ANSI C63.4 measurement standard.

Measurement are done at 10m 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.

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Test equipment used :

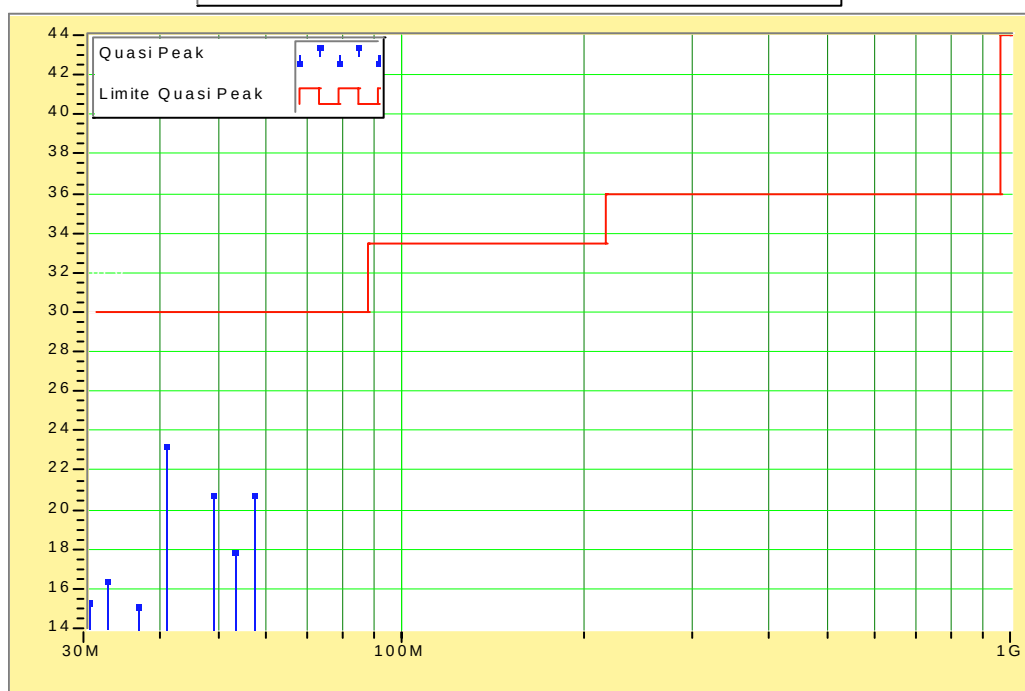
APPARATUS	MANUFACTURER	REFERENCE	SERIAL NUMBER	Date of verification
EMI test receiver	Rohde & Schwarz	ESI 7	M02020	March-04
10 m open area test site			M02093	AUG-04
semi-anechoic 11mx7mx5m	SIDT	SIDT	M02098	JUL-04
10 m measurement Cables kit			M02068	AUG-04
Horn Antenna 1 to 18 GHZ	EMCO	3115	M02045	JUL-04
Antenna Positioning Masts	EMCO	1050	M01101	without
Antenne Bilog	CHASE	6112A CBL	M02032	AUG-04
Turn table controler, Open area	EMCO	1085	M01100	without
Turn table controler	EMCO	1085	M01102	without

Results :

Highest lines table (spurious signals from 30MHz to 20GHz):

Frequency (MHz)	Quasi-peak (dBμV/m)	Std limit (dBμV/m)	Margin (dB)	Angle (Deg.)	Site (cm)	Polari-sation	Corr Fact.	Comment
30,719	20,98	15,26	-14,74	V	101	117	18,30	
32,776	21,23	16,34	-13,66	V	108	362	17,37	
36,846	23,25	15,07	-14,93	V	108	362	15,48	
40,946	27,10	23,25	-6,75	V	102	142	13,55	
49,150	32,72	20,80	-9,20	V	400	158	10,25	
53,250	21,97	17,90	-12,10	V	400	156	8,97	
57,333	23,31	20,76	-9,24	V	102	184	7,73	

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



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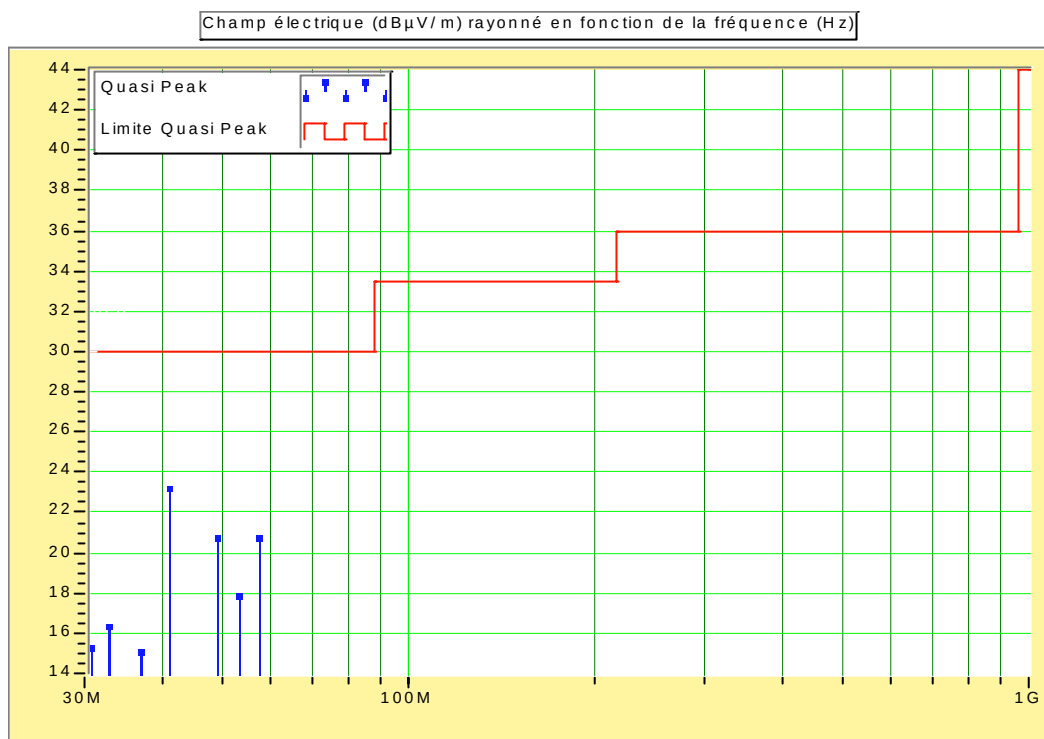
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ACCORDING TO Canada STANDARDS CISPR 22 CLASS B

Results for emissions measurements from 30MHz to 1GHz:

Frequency (MHz)	Peak (dBμV/m)	Quasi peak (dBμV/m)	Margin (dB)	Polar.	Height (cm)	Angle (°)	Facteur Corr. (dB)	Comments
30,719	20,98	15,26	-14,74	V	101	117	18,30	
32,776	21,23	16,34	-13,66	V	108	362	17,37	
36,846	23,25	15,07	-14,93	V	108	362	15,48	
40,946	27,10	23,25	-6,75	V	102	142	13,55	
49,150	32,72	20,80	-9,20	V	400	158	10,25	
53,250	21,97	17,90	-12,10	V	400	156	8,97	
57,333	23,31	20,76	-9,24	V	102	184	7,73	



INTERPRETATION AND REMARKS:

Conform to the FCC part 15. class B requirements

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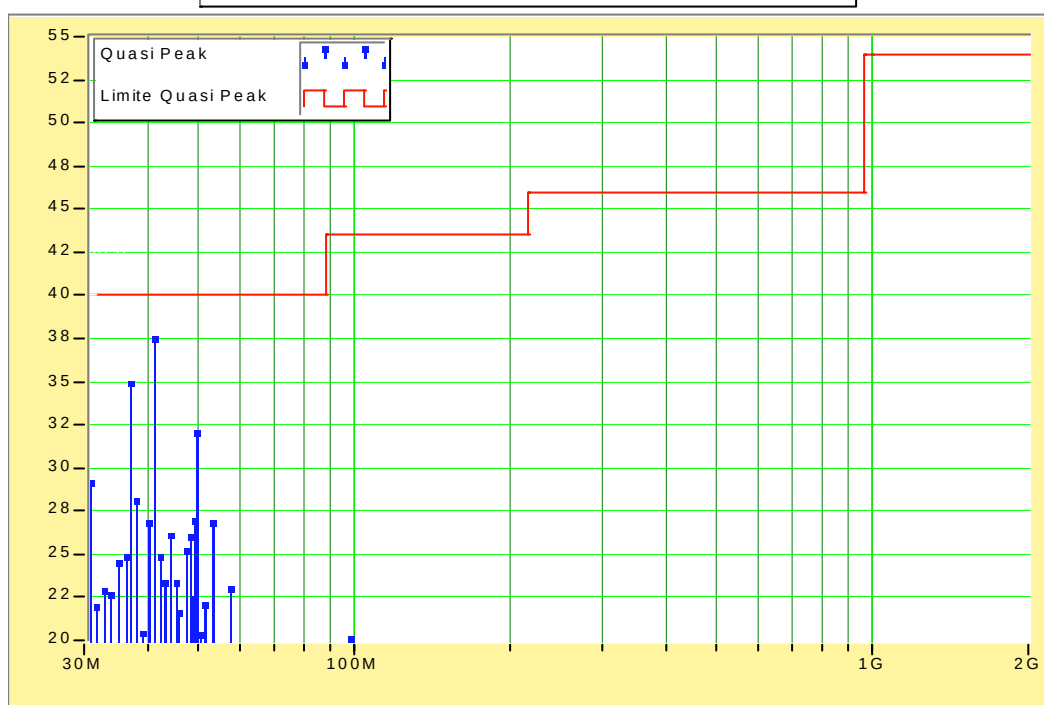
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Pre-Scan measurement in anechoic chamber to identify spurious emissions from EUT at D=3m:

Fréquence (MHz)	Peak (dBμV/m)	Ecart (dB)	Polar.	Hauteur (cm)	Angle (Degré)	Facteur Corr. (dB)	Comments
30,073	23,99	-16,01	V	100	90	18,59	
30,719	29,12	-10,88	V	100	90	18,3	
31,649	21,96	-18,04	V	100	0	17,88	
32,776	22,89	-17,11	V	100	90	17,37	
33,785	22,61	-17,39	V	100	90	16,92	
34,825	24,48	-15,52	V	100	90	16,45	
36,29	24,85	-15,15	V	100	90	15,75	
36,846	34,9	-5,1	V	100	0	15,48	
37,817	28,09	-11,91	V	100	90	15,02	
38,934	20,45	-19,55	V	100	90	14,48	
39,938	26,82	-13,18	V	100	90	14	
40,944	37,54	-2,46	V	100	0	13,55	
41,994	24,91	-15,09	V	100	0	13,08	
42,993	23,36	-16,64	V	100	0	12,63	
44,005	26,2	-13,8	V	100	90	12,18	
45,086	23,4	-16,6	V	100	90	11,7	
45,542	21,58	-18,42	H	100	90	11,54	
47,097	25,23	-14,77	V	100	90	10,99	
48,14	26,01	-13,99	H	100	0	10,61	
48,69	22,39	-17,61	H	100	90	10,42	
49,152	26,93	-13,07	H	100	0	10,25	
49,19	32	-8	H	100	0	10,24	
50,189	20,3	-19,7	H	100	0	9,89	
51,239	22,09	-17,91	H	100	0	9,58	
53,25	26,85	-13,15	V	100	0	8,97	
57,335	23	-17	H	100	0	7,73	
98,302	20,13	-19,87	H	100	0	11,92	

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



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Test according to CFR 47 Part 24

Tests performed by Daniel RAUD at GYL Technologies laboratories, in September 6 of 2004.

REFERENCE DOCUMENTATION:

CFR 47 part 24, (2003)
ANSI C63.4 (2001).

RADIATED DISTURBANCE :

General measurement conditions.

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



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 -3 dBm, in BCCH mode without frequency hopping) and in receiver mode.



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Test equipment used :

APPARATUS	MANUFACTURER	REFERENCE	SERIAL NUMBER	Date of verification
EMI test receiver	Rohde & Schwarz	ESI 7	M02020	March-04
Spectrum analyzer	Rohde & Schwarz	FSEM30	M02021	March-04
10 m open area test site			M02093	AUG-04
semi-anechoic 11mx7mx5m	SIDT	SIDT	M02098	AUG-04
10 m measurement Cables kit			M02068	AUG-04
Horn Antenna 1 to 18 GHz	EMCO	3115	M02045	JUL-04
Antenna Positioning Masts	EMCO	1050	M01101	Without
Bilog antenna	CHASE	6112A CBL	M02032	AUG-04
Turn table controller	EMCO	1085	M01100	Without

Spurious emissions measurement result from 1GHz to 20GHz:

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

Measurement at transmitters frequencies for indicative level transmitters output connected to resistive 50 ohms loads.

Due to the emitters low level of emission and as the tested equipment is not equipped with power amplifiers, (these one are located in another cabinet) no transmitter frequencies measurement were done because they are under the noise level (see test plan §9 and curve next page)

INTERPRETATION AND REMARKS:

Conform to the FCC part 24 requirements



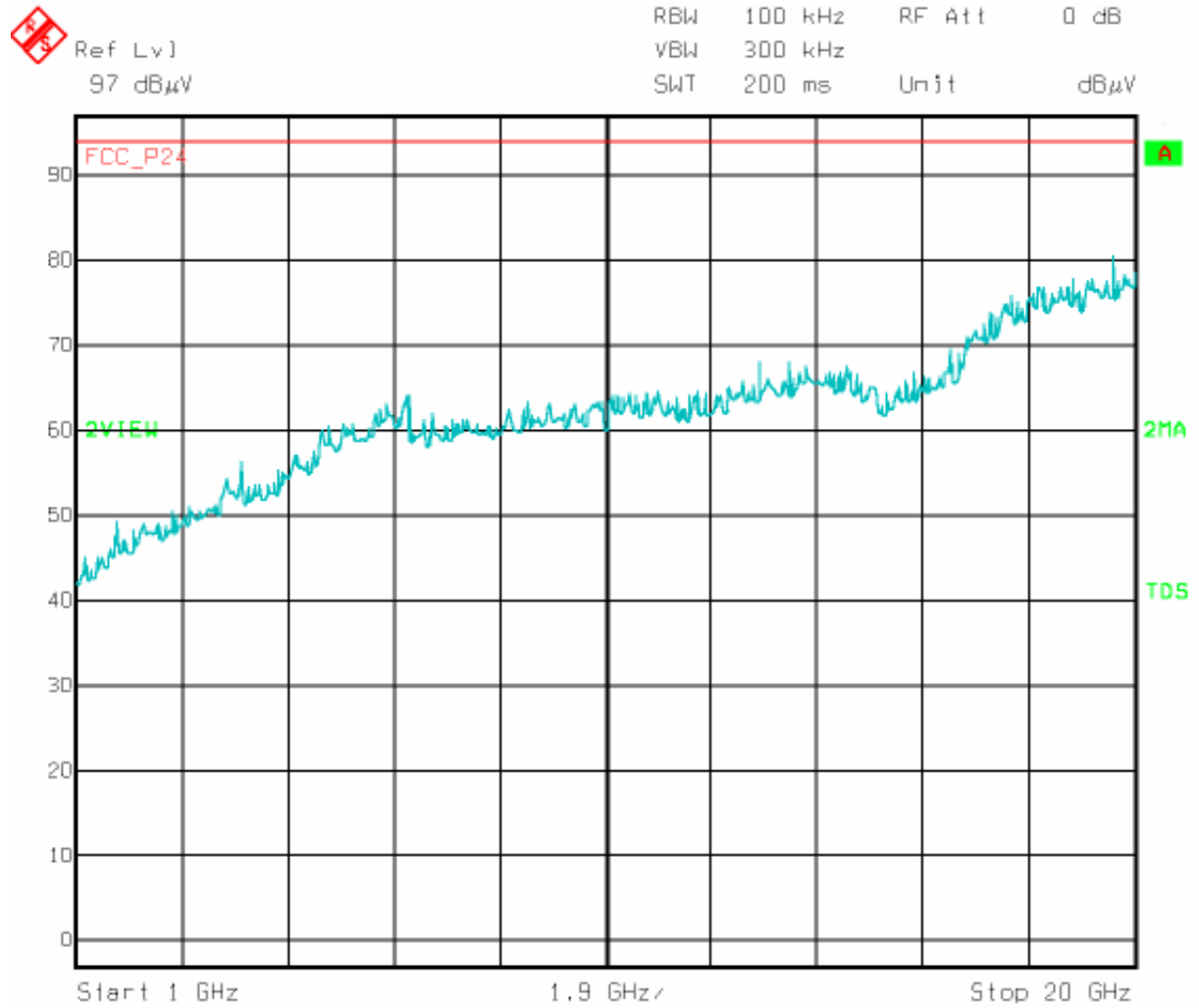
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Spectrum of noise level from 1GHz to 20GHz including loss cable and antenna factors



**EMC TEST PLAN FOR QUALIFICATION OF GSM 18000
MCPA BTS (US & CANADA MARKET)**

Référence : Nortel/18K/MCPA/1900/EMC/TP/01

Version : 1

Date de création : 16 June 2004

Page Number : 22

Ed	Date	Comments	Author	Verified by
1	16 June 2004	Creation	Arnaud Lucy Tests and qualification Engineer	Christophe Cordier

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1. INTRODUCTION

This objective of this document is to present the strategy of EMC test on the system GSM 18000 MCPA BTS configured in 1900 MHz.

The conformity with the test program presented below will be used to demonstrate the compliance of the GSM 18000 MCPA BTS Outdoor 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 MCPA BTS
- Manufacturer : Nortel Networks
- Frequency : 1900 MHz
- Configuration : Base cabinet S999 radio configuration (maximal RF configuration)
- Power Supply :
 - 120/240VAC, Split phase US, Three wires (Phase 1, Phase 2, Neutral) plus protective earth (208/250VAC -10%/+6%).
 - 120/240VAC, Split phase Europe, Three wires (Phase 1, Phase 2, Neutral) plus protective earth (208/250VAC -10%/+6%)
- Options : Alarm Protection module (ALPRO box) and AC plugs.

2. APPLICABLES DOCUMENTS

[A1]	47CFR Part 2 10/01/03	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 10/01/03	FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations - Personal communications services.
[A3]	47 CFR Part 15 04/29/04	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/9884	GSM 18000 MCPA BTS Outdoor Project Qualification Plan
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4. PRESENTATION OF SYSTEM

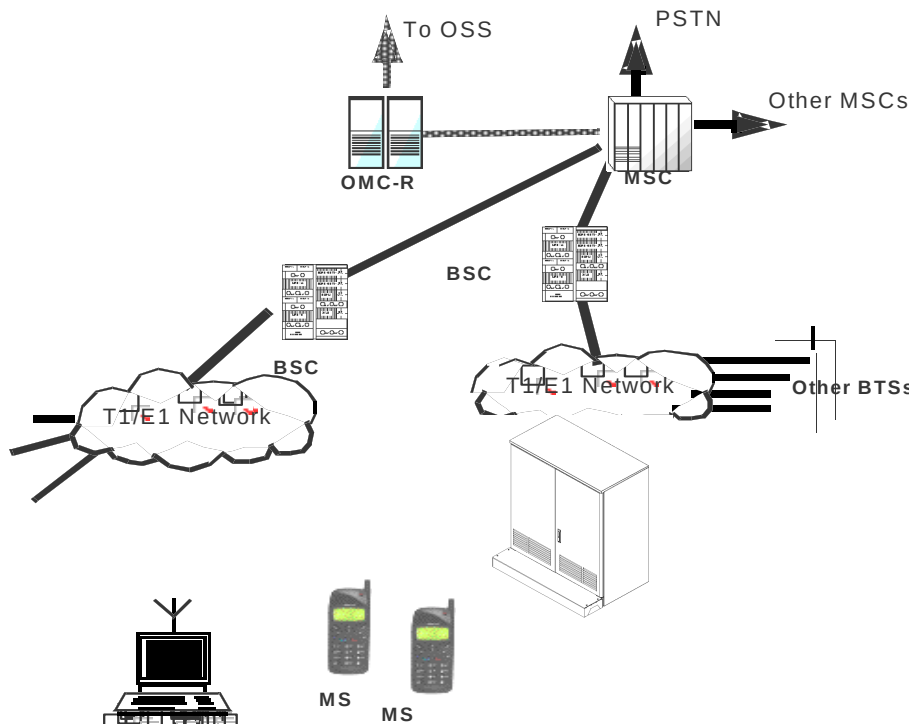
The GSM 18000 MCPA BTS provides the interface between the fixed network and the mobile stations which is a radio interface.

The radio interface carries signalling and speech / data channels using digitized and encoded signals modulated in GMSK or EDGE.

Communication with the fixed network are enabled across a wire interface called the ABIS interface. It connects the BTS to its Base Station Controller (BSC). The transmission of signalling, speech, and data channels is carried out on the PCM link (also called ABIS interface).

The BTS configures its equipment, establishes, maintains and clears calls to and from mobile stations as directed by the Base Station Controller (BSC). The BTS organizes and manages radio-electric resources, supervises its own equipment and conducts stand-alone defence actions as and when required.

The diagram below puts the BTS into the context of the network.



The GSM 18000 MCPA BTS is a Base Transceiver Station based on the GSM protocol for the radio coverage of GSM networks. It consists of a cabinet populated with a variable number of modules depending on the number of radio channels to be implemented.

The 18000 MCPA BTS is a BTS, with up to 27 GSM carriers radio capacity in base cabinet and with up to 54 GSM carriers radio capacity for the base and extension cabinet.



Figure 1- GSM 18000 MCPA BTS Cabinet fully equipped overview (Open doors)

The 18000 MCPA BTS system is subdivided into **six major areas** :

- **Interface Control Module (ICM) and Interface Module (IFM)** - This block is made of digital packs and provides management of the system as well as connection to the network.
- **MCPA RADIO MODULE (MRM)**: MRM module is a radio module dedicated to MCPA configuration. Sub units are:
 1. power supply,
 2. TX path : 3 low level transmit drivers, 3 TX boosters and 3:1 combiner that allow the RM to deliver a low power composite transmit signal..
 3. RX path: 2 * 1:3 RX splitter, 3 dual narrowband receiver chain.
 4. Digital control board
- **TX Combiner and RX Splitter** modules –
- **Alarm Collector and Bridge module ABM** – Interface Alarm Board
- **UCPS (Univerty Compact Power System)** - Provides energy to the system
- **Thermal Management System : Environmental Cooling Unit (ECU)**

4.1 Cabinet populations

Internal BTS configuration: maximum number of modules included in a cabinet:

Module identification	BASE cabinet	EXTENSION cabinet	
Outdoor enclosure	1	0 or 1	
UCPS (Univerty Compact Power System):			
ADU power input module	1	1	
Rectifiers	Up to 5	Up to 5	
Battery back up	1	1	
Back-planes and ICO :	1	1	power and signal distribution to the modules (telecom, signalling, radio PA and combiners)
Interface Back Panel (IBP)	up to 2	0	
Digital Back-plane (DBP)	3	3	
Radio ICO (RICO)	1	1	
DC breaker panel	1	1	
ECU (Environmental Cooling Unit)	1	1	
Interface Module (IFM)	up to 2	0	4 x ABIS T1 lines/IFM+ICM, 100 Ω - 1,544 Mbit/s
Interface Control Module (ICM)	up to 2	0	Data control board
Alarm collector and Bridge Module (ABM)	3	3	
MCPA Radio Module (MRM)	up to 9	up to 9	The number of modules is sectorisation dependant
Rx splitter	3	3	
Tx combiner	3	3	

4.2 Cabinet options

The cabinet variant:

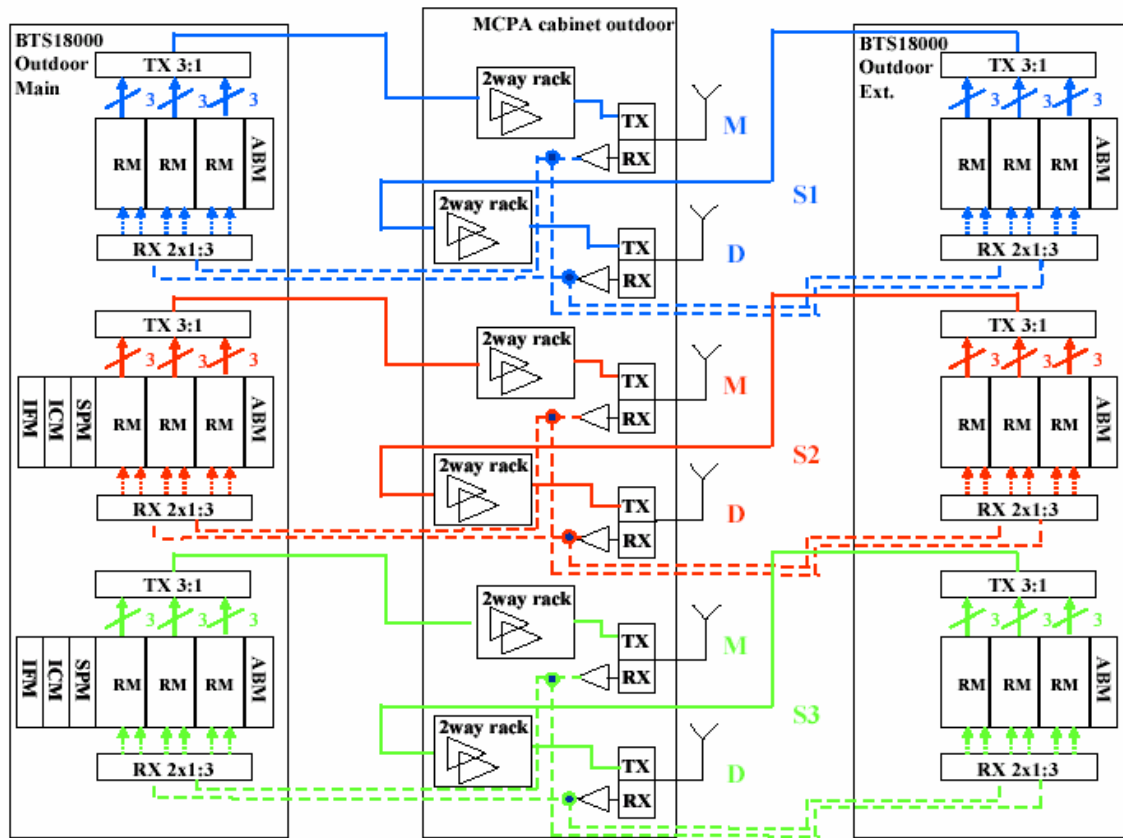
- BTS 18000 BASE cabinet for MCPA cabinet (see Figure 1), must be used with MCPA cabinet for full operation
- BTS 18000 EXTENSION cabinet: 1 extension cabinets may be used with one Base cabinet. An extension cabinet is designed as the BASE but is not equipped with IFM/ICM modules

4.3 External interfaces

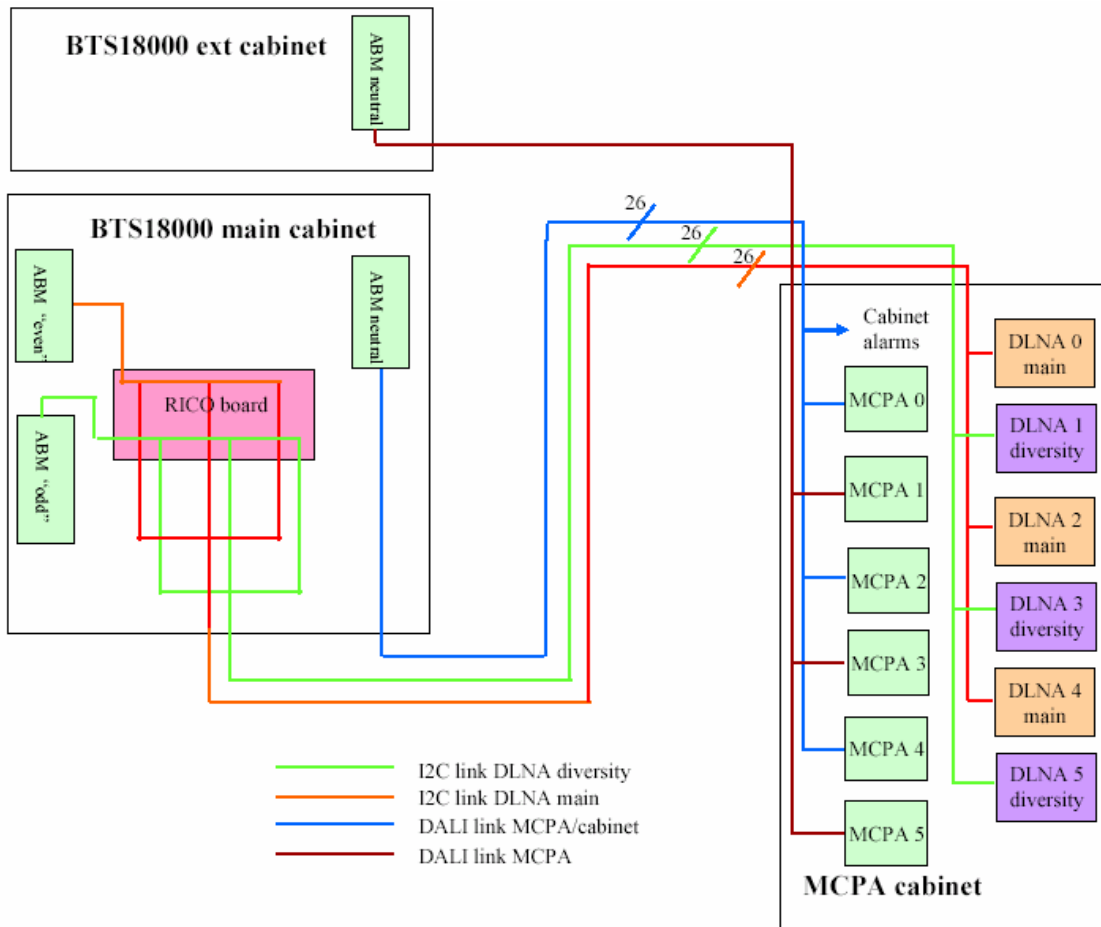
Three types of external interfaces are available :

- Radio interface (between BTS and Antenna or BTS and MCPA Cabinet)
- Abis interface (between BTS and BSC or other BTS)
- Alarms interface (between others cabinets or modules)

4.3.1 Radio Interfaces



4.3.2 Alarms Interfaces



The MCPA CABINET presents on a bulkhead the following connection in order to allow the alarm monitoring from the BTS 18000 cabinet.

- Two I2C connectors for DLNA monitoring,
- Up to two DALI connectors for MCPA racks and cabinet monitoring

On the main cabinet, the external alarms are available with or without the Alarm Protection module (ALPRO box).

4.3.3 ABIS Interfaces

Three interfaces ABIS are available :

- The first between the base and extension cabinet MCPA
- The second optional for connected at the BTS S12000 or S8000.
- The third between the BTS and BSC.

5. 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	AC Power	FCC Part 15 § 15.107 and/or CISPR 22 for IECS-003	150 kHz – 30 MHz	Class B	This EMC test is realized in Split phase AC Power 60 Hz. This test is realized on base cabinet and extension cabinet.
	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.

6. TEST DESCRIPTION OF THE RADIATED EMISSION.

Test Procedure :

Radiated emission measurement procedures shall be performed as outlined in Section 8 of the ANSI C63.4 measurement standard. 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. 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.

The equipment was configured as shown in the next figure.

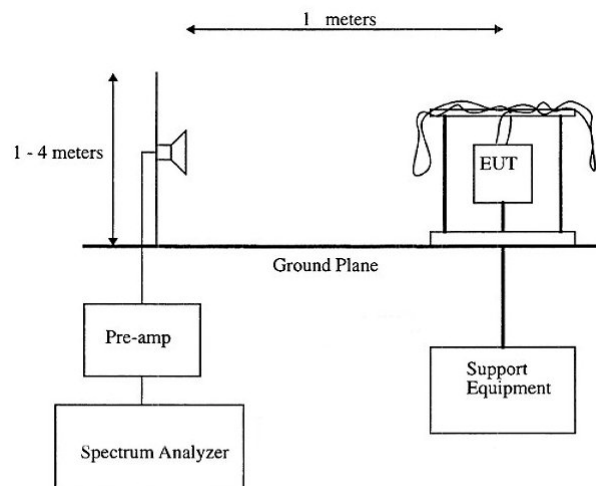


Figure 1 : Test configuration for Radiated Spurious emissions

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 (30.19 Watts), (44.8 dBm)
 G = Gain of ideal Dipole (linear)

Therefore :

$$E(V/m) = \sqrt{30 * 30.19 * 1.64}$$

E = 38.54 V/m = 151.69 dBμV/m

The spurious emissions must be attenuated by at least :
 $43 + 10 * \log(30.19) = 57.79$ dB.

Therefore the field strength limit at 1 meters is :

E = 151.69 dBμV/m – 57.79 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

Pass / Fail criteria :

Frequency range MHz	Distance m	Electrics 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 with RBW 1 MHz
Limit : 93.9 $\text{dB}\mu\text{V/m}$

7. TEST DESCRIPTION OF THE CONDUCTED EMISSION.

Test case name : Conducted emissions on AC port (60Hz)

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 (50 μ H) load.

Pass / Fail Criteria :

Limits for conducted emissions AC mode

Limits for conducted emissions (CISPR 22 class B)

Frequency range	Quasi-peak	Average
> 0,15-0,5 MHz	66 - 56 dB μ V	56 - 46 dB μ V
> 0.5- 5 MHz	56 dB μ V	46 dB μ V
> 5-30 MHz	60 dB μ V	50 dB μ V
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.

8. Strategy for EMC qualification

According to radio configuration, the system in the maximum RF configuration is composed of
- one base cabinet

- one extension cabinet
 - one MCPA cabinet
- For more detail see § 4.1.

During the phase of qualification, only the base cabinet will be tested with interconnections interfaces cables. The extension cabinet and MCPA cabinet will not be tested.

See below the list of interconnection cables of GSM 18000 MCPA BTS Base cabinet :

1. ABIS cable (Link between the base cabinet and BSC)
2. ABIS interconnection cable (Link between the base and extension cabinet S18000)
3. MIC Synchronisation cable (Link between the base S18000 cabinet and others BTS that S18000 family)
4. RF cables
5. Externals Alarms
6. Dali link (Link between the base cabinet S18000 and MCPA cabinet)
7. I2C Link (Link between the base cabinet S18000 and MCPA cabinet)
8. AC Power Input port

The cabinet MCPA is tested alone with these different interconnections cables. For US deployment the cabinet MCPA is conform at 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 cabinet MCPA is conform at the ICES 003 and RSS 133 for conducted and radiated emissions.

The radio certification delivered by FCC is labeled on the cabinet.

The cabinet extension may be used with one base cabinet. An extension cabinet is designed as the BASE but is not equipped with IFM/ICM modules.

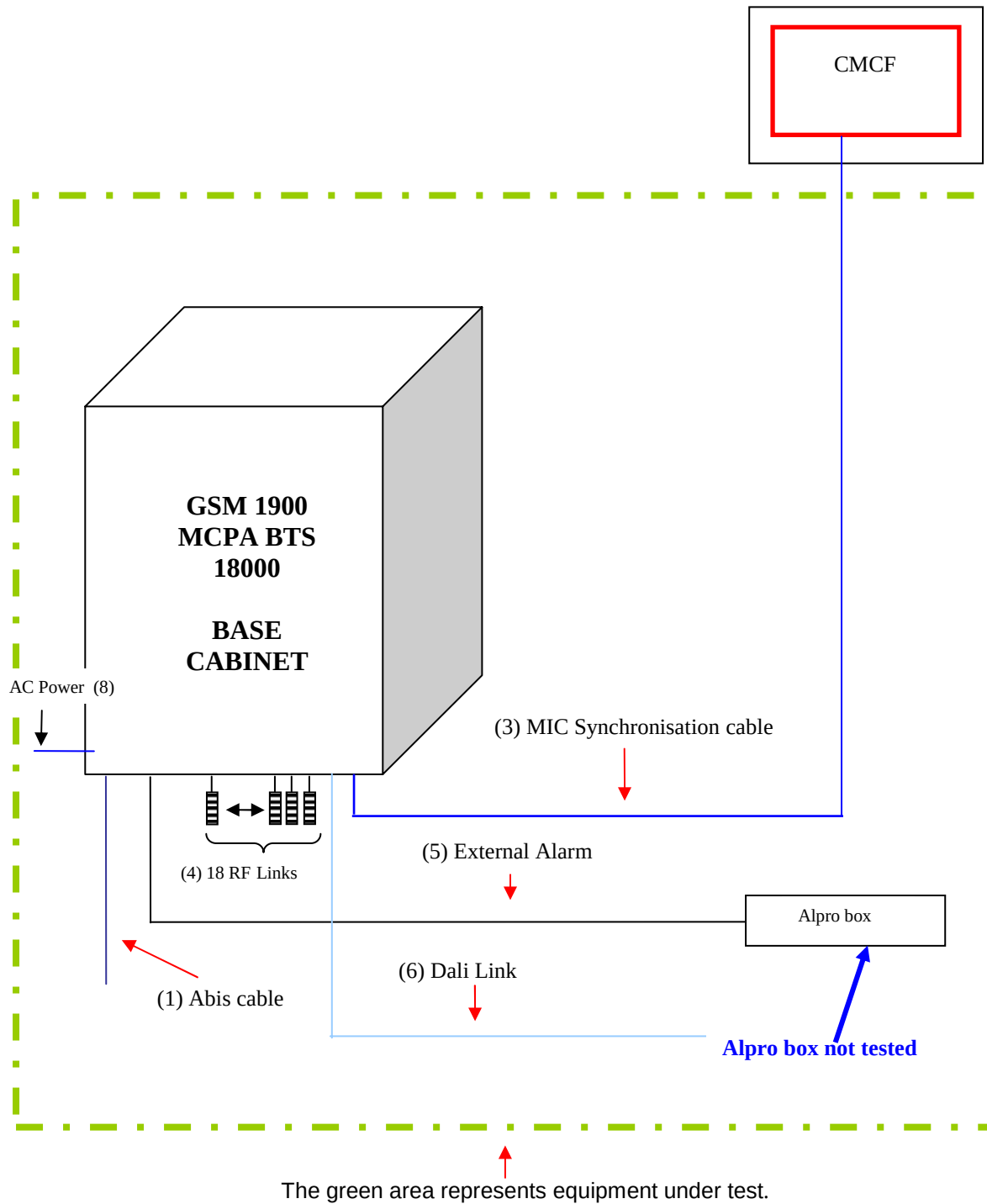
Remark for activation of interconnections cables :

1. ABIS cable : Activated link – TX loop on RX at the end of cable.
2. ABIS interconnection cable – Not tested (identical to ABIS cable)
3. MIC Synchronisation cable : Activated link with CMCF module
4. RF cables : Activated link
5. Externals Alarms : Activated link
6. Dali link : Activated link
7. I2C Link : Not activated link – not tested
8. AC Power Input port

The diagram of paragraph 9 showed the equipment under test and the input and output cables.

9. INSTALLATION DIAGRAM

The drawing gives a representation of functional equipment under test .



10. List of input and output ports

The following table presents the list of cable :

S18000 Outdoor Base Cabinet configured in S666
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Cables	Number (§8)	Length		Quantity
Radio cables	4	3 m	Shielded	18
Abis cable	1		Shielded	1
MIC Synchronisation cable	3	10 m	Shielded	1
Power cable AC	8	/	Not Shielded	1
External Alarm cables	5		Shielded	1
Dali link	6		Shielded	1
Abis interconnection	2		Shielded	1
Not tested				
I2C link	7		Shielded	1
Not tested				

11. 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...)

12. FREQUENCY PLAN

SLOT	BASE CABINET
1	Channel : 512 TX : 1930.2 MHz
2	Channel : 530 TX : 1933.8 MHz
3	Channel : 560 TX : 1939.8 MHz
4	Channel : 590 TX : 1945.8 MHz
5	Channel : 610 TX : 1949.8 MHz
6	Channel : 620 TX : 1951.8 MHz
7	Channel : 640 TX : 1955.8 MHz
8	Channel : 660 TX : 1959.8 MHz
9	Channel : 680 TX : 1963.8 MHz
10	Channel : 700 TX : 1967.8 MHz
11	Channel : 720 TX : 1971.8 MHz
12	Channel : 740 TX : 1975.8 MHz
13	Channel : 760 TX : 1979.8 MHz
14	Channel : 770 TX : 1981.8 MHz
15	Channel : 780 TX : 1983.8 MHz
16	Channel : 790 TX : 1985.8 MHz
17	Channel : 800 TX : 1987.8 MHz
18	Channel : 810 TX : 1989.8 MHz

13. ABBREVIATIONS

AC :	Alternative Current
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 :	Networks Impedance Stabilization

“END OF DOCUMENT”

AVLM Recipient: FLEXTRONICS	Date of delivery: 13/AUG/2004
Product: BTS18000 Outdoor MCPA	
Article delivered : GSM PCS BTS18000 MCPA	Article code: NTT916AA D1
Section transmitting: 8Z60	Designer name: CHENET / THERY
Cabinet Serial Number: NNTMGR0012XS	
Documents related to the Hardware Design Specifications	
Documents dealing with specifications: PE/BTS/DD/9268 V01.03/EN Technical Specification for MCPA cabinet	
Software compatibility: Modules software version : – Load MRM / V15A118 (CDI103265) – Load ICM / V15A123 (CDI103369) – Load ABM / V15A123 (CDI103369) PI software tools: – TIL COAM version: Vv03b108 – TIL Alarm version : V01d102 – WIN TMI version : V03d302 – WINSPU version : V04b201	

The delivery includes :

ARTICLE	PEC code	Release	Serial number	Comment
BARE CABINET & ECU	NTT91600	D2	NNTMGT001KIY	
ABM	NTN029AA	D2	NNTMGR0090LJ	IP 136.147.44.130 MAC : 00 60 38 14 2A 2E
ABM	NTN029AA	D2	NNTMGR0090LK	MIR 4 IP 136.147.44.129 MAC : 00 60 38 14 2A 2D
ABM	NTN029AA	D2	NNTMGR0090KK	MIR 4 IP 136.147.44.128 MAC : 00 60 38 B9 60 6D
ICM	NTN023AA	D1	NNTMGR008WJ3	MIR 03.1 IP 136.147.44.37 MAC : 00 60 38 B9 40 E0
ICM	NTN023AA	D1	NNTMGR008WHF	MIR 03.1 IP 136.147.44.53 MAC : 00 60 38 B9 41 11
IFM	NTN025AA	D1	NNTMGR009H6R	
IFM	NTN025AA	D1	NNTMGR009H65	
MRM	NTN050BA	D1	NNTM75047EZ0	IP : 136.147.44.126 MAC : 00 60 38 14 30 A4
MRM	NTN050BA	D1	NNTM75047EYU	IP : 136.147.44.66 MAC : 00 60 38 14 30 22
MRM	NTN050BA	D1	NNTM75047EYX	IP : 136.147.44.101 MAC : 00 60 38 14 31 5F
MRM	NTN050BA	D1	NNTM75047EYP	IP : 136.147.44.104 MAC : 00 60 38 14 2D 21
MRM	NTN050BA	D1	NNTM75047EZ3	IP : 136.147.44.124 MAC : 00 60 38 14 31 A6
MRM	NTN050BA	D1	NNTM75047EYW	IP : 136.147.44.123 MAC : 00 60 38 14 31 8A
MRM	NTN050BA	D1	NNTM75047EYV	IP : 136.147.44.103 MAC : 00 60 38 14 30 2C
MRM	NTN050BA	D1	NNTM75047EYQ	IP : 136.147.44.31 MAC : 00 60 38 14 30 A0
MRM	NTN050BA	D1	NNTM75047EZ4	IP : 136.147.44.127 MAC : 00 60 38 14 31 AC
TX Coupler	NTN055CA	01	R434.443.480 002	
TX Coupler	NTN055CA	01	R434.443.480 003	
TX Coupler	NTN055CA	01	R434.443.480 004	
RX Splitter	NTN055BA	01	R434.423.480 004	
RX Splitter	NTN055BA	01	R434.423.480 005	
RX Splitter	NTN055BA	01	R434.423.480 006	
DBP	NTN030AA	D1	NNTMGR008H73	
DBP	NTN030AA	D1	NNTMGR008H7M	

DBP	NTN030AA	D1	NNTMGR008H81	
IBP	NTN027AA	D1	NNTMGR00996J	
IBP	NTN027AA	D1	NNTMGR009975	
RICO	NTN020CA	D1	NNTMGR001GZZ	
ECU CONTROL CARD	NTT971CM	D2	NNTMGT001KJU	As a part of NTT91600
UCPS	NTW703AA	N2	ATSNZH000008	
DDU	NTN070DA	N2	ATSNZH000005	
CCU	NTW703CC	N3	ATSNZH000021	Firmware 2.06
Rectifier 1000W	NTW703BB	N3	ATSNZH000011	AC 04-06-044
Rectifier 1000W	NTW703BB	N3	ATSNZH000015	AC 04-06-044
Rectifier 1000W	NTW703BB	N3	ATSNZH000032	AC 04-06-044
Filler Rectifier	NTW70301	P2	ATSNZH000026	
Filler Rectifier	NTW70301	P2	ATSNZH000024	
ADU	NTT970AA	P1	ATSNTA000004	MIR 01
USER ICO	NTU737AM	D1	NNTMGT001KKK	

Additional delivery:

ARTICLE	PEC code	Release	Serial number	Comment
Filler ICM	NTN079CG		N/A	Qty : 1
External cable for alarm S18000/ALPRO 2	NTT997FA			Qty : 1
Cable : INTERCABINET TYPE N	NTQA4726			Qty : 9
Cable : DLNA MCPA L=10M	NTT995LD			Qty : 1
Cable : EXTERNAL D-LINK L=10M	NTT995ED			Qty : 4
Cable : EXTERNAL ABIS T1	NTT995ER			Qty : 1 Updated with an Abis box
Cable : EXTERNAL SYNCHRO S180 L=10M	NTT995EK			Qty : 1

Documents related to the Hardware Test Specifications

Reference of the test specifications documents:

PE/BTS/DJD/011215 V01/EN Hardware integration test specification for BTS18000 MCPA

Documents related to the Hardware Test Report

PE/BTS/DJD/011769 V01/FR Dossier des tests d'intégration de la BTS18000 MCPA PCS

❧ END OF DOCUMENT ❧