



**RADIO TEST REPORT**  
**FOR**  
**FCC REGULATORY IN EXTREME CONDITIONS**  
**OF GSM 18000 MCPA BTS**

**N°151014FB**

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|                                                                                                                 |                                                                                                                                                       |                                                                                                                     |
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## 1. INTRODUCTION

This objective of this document is to present the test report for Radio qualification in extreme conditions on the system GSM 18000 MCPA BTS configured in 1900 MHz with the GSMK modulation.

The tests in extreme conditions have been realized in accordance with FCC Part 24.235 and Part 2.1055 of FCC Rules and Regulation.

These tests are performed on 14 & 15 October 2004 in LNE laboratory.

### Product description:

- GSM 18000 MCPA BTS

### Manufactured:

- NORTEL NETWORKS  
Parc d'Activité de Magny Chateaufort  
Chateaufort  
78928 Yvelines Cedex 9  
FRANCE

### Product type:

- GSM 18000 MCPA BTS in S999 configuration configured in 1900 MHz

| Item definition            | Designation                                          | Comments                 |
|----------------------------|------------------------------------------------------|--------------------------|
| Base :                     | NTT916AAD1                                           | NNTMGRR0012XS            |
| Manual:                    | none                                                 |                          |
| Power supply:              | 230V/60Hz,                                           | tested at 195, 230, 265V |
| FCC ID :                   | AB6BTS18000MCPA                                      |                          |
| FCC Emission designator:   | 300KGXW                                              |                          |
| Operating Frequency Range: | Tx :1930.2 to1989.8 MHz<br>Rx : 1850.2 to 1909.8 MHz |                          |



## 2. APPLICABLES DOCUMENTS

|      |                          |                                                                                                                                                                     |
|------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [A1] | 47CFR Part 2<br>(2003)   | 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<br>(2003) | FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations - Personal communications services.                                              |

## 3. REFERENCES DOCUMENTS

|      |                   |                                                                            |
|------|-------------------|----------------------------------------------------------------------------|
| [R1] | PCS/BTS/DPL/12219 | GSM 1900 BTS MRM 18000 Outdoor & BTS MCPA PWW : RF Qualification test plan |
| [R2] | 151014FB          | Radio Test Report for External Laboratory                                  |



## 4. HARDWARE AND SOFTWARE CONFIGURATION

See Nortel document below:

| ARTICLE            | PEC code | Release | Serial number    | Comment                                                 |
|--------------------|----------|---------|------------------|---------------------------------------------------------|
| BARE CABINET & ECU | NTT91600 | D2      | NNTMGT001KIY     |                                                         |
| ABM                | NTN029AA | D2      | NNTMGR0090LJ     | IP 136.147.44.130<br>MAC : 00 60 38 14 2A 2E            |
| ABM                | NTN029AA | D2      | NNTMGR0090LK     | MIR 4<br>IP 136.147.44.129<br>MAC : 00 60 38 14 2A 2D   |
| ABM                | NTN029AA | D2      | NNTMGR0090KK     | MIR 4<br>IP 136.147.44.128<br>MAC : 00 60 38 B9 60 6D   |
| ICM                | NTN023AA | D1      | NNTMGR008WJ3     | MIR 03.1<br>IP 136.147.44.37<br>MAC : 00 60 38 B9 40 E0 |
| ICM                | NTN023AA | D1      | NNTMGR008WHF     | MIR 03.1<br>IP 136.147.44.53<br>MAC : 00 60 38 B9 41 11 |
| IFM                | NTN025AA | D1      | NNTMGR009H6R     |                                                         |
| IFM                | NTN025AA | D1      | NNTMGR009H65     |                                                         |
| MRM 0              | NTN050BA | D1      | NNTM75047EZ0     | IP : 136.147.44.126<br>MAC : 00 60 38 14 30 A4          |
| MRM 1              | NTN050BA | D1      | NNTM75047EYU     | IP : 136.147.44.66<br>MAC : 00 60 38 14 30 22           |
| MRM 2              | NTN050BA | D1      | NNTM75047EYX     | IP : 136.147.44.101<br>MAC : 00 60 38 14 31 5F          |
| MRM 3              | NTN050BA | D1      | NNTM75047EYP     | IP : 136.147.44.104<br>MAC : 00 60 38 14 2D 21          |
| MRM 4              | NTN050BA | D1      | NNTM75047EZ3     | IP : 136.147.44.124<br>MAC : 00 60 38 14 31 A6          |
| MRM 5              | NTN050BA | D1      | NNTM75047EYW     | IP : 136.147.44.123<br>MAC : 00 60 38 14 31 8A          |
| MRM 6              | NTN050BA | D1      | NNTM75047EYV     | IP : 136.147.44.103<br>MAC : 00 60 38 14 30 2C          |
| MRM 7              | NTN050BA | D1      | NNTM75047EYQ     | IP : 136.147.44.31<br>MAC : 00 60 38 14 30 A0           |
| MRM 8              | NTN050BA | D1      | NNTM75047EZ4     | IP : 136.147.44.127<br>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     |                                                         |



| ARTICLE          | PEC code | Release | Serial number | Comment               |
|------------------|----------|---------|---------------|-----------------------|
| 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  |                       |

## 5. TEST EQUIPMENT LIST

List of all of the measurement equipment used in this report.

| Equipment description    | Manufacturer | Model                | Serial No.  | V/A date   |
|--------------------------|--------------|----------------------|-------------|------------|
| Spectrum Analyzer        | R&S          | FSEA                 | 842655/0027 | 23/04/2004 |
| Advanced Networks System | W&G          | ANT20                | P41591      | 09/12/2003 |
| HF Signal Generator      | HP           | 8657B                | X278975     | 28/07/2004 |
| AC/AC Power System       | Elgar        |                      | 57220215    | 29/04/2003 |
| Voltmetre                | Agilent      | 34970A               |             |            |
| LNE Climatic room        | Sapratin     | ECK 6 m <sup>3</sup> | CT101088/4  | 22/04/2004 |



## 6. MEASUREMENT PRINCIPLE AND CONFIGURATION FOR FREQUENCY STABILITY TEST

**Standard Coverage:** FCC Part 2.1055, FCC Part 24.235

**Objective:** This measurement evaluates frequency and phases errors during the active part of the timeslot.

**Intend:**

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30 deg. to +50 deg. centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(2) From -20 deg. to +50 deg. centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radio beacons (EPIRBs), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, and equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter.

(3) From 0 deg. to +50 deg. centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10 deg. centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.

(1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0 deg. centigrade and +30 deg. centigrade with no primary power applied.

(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to raise more than 10 deg. centigrade above the respective beginning ambient temperature level.

(3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished to the user.

(4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c), and (d) of this section. (For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

**Specification:**

The phase error shall not exceed:

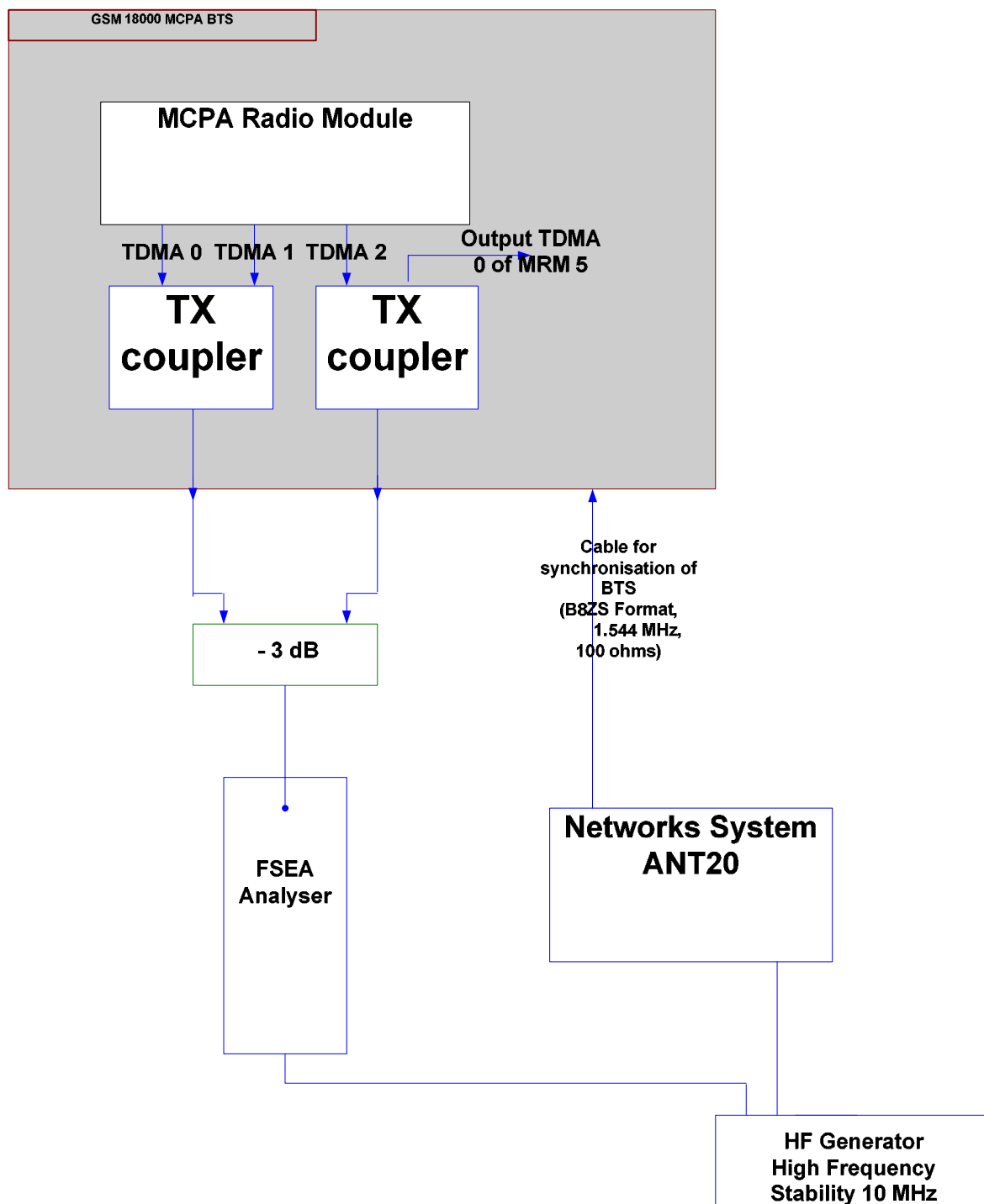
- **5 degrees rms**
- **20 degrees peak**

The mean frequency error across the burst shall not exceed **0.05 ppm or 90 Hz.**

Number of bursts: 200



**Measurement principle:**



**Test configuration:**

Frequency stability test is performed under following extreme conditions:

- Temperature from  $-40^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of 10 degrees.
- With AC power supply variations: 195 VAC, 230 VAC, 265 VAC.

All MRM Modules run with nominal power regulation at maximum power in GMSK modulation. The MRM were configured to transmit at maximum power (Static level 0).

GSM 18000 MCPA BTS is equipped with MRM in slots 0, 1, 2, 3, 4, 5, 6, 7 and 8 with following emission configuration:

|       |        |      |                      |
|-------|--------|------|----------------------|
| MRM 0 | TDMA 0 | TCH  | (B) 512 @ 1930.2 MHz |
|       | TDMA 1 | BCCH | 540 @ 1935.8 MHz     |
|       | TDMA 2 | BCCH | 545 @ 1936.8 MHz     |
| MRM 1 | TDMA 0 | BCCH | 550 @ 1937.8 MHz     |
|       | TDMA 1 | BCCH | 560 @ 1939.8 MHz     |
|       | TDMA 2 | BCCH | 575 @ 1942.8 MHz     |
| MRM 2 | TDMA 0 | BCCH | 590 @ 1945.8 MHz     |
|       | TDMA 1 | BCCH | 600 @ 1947.8 MHz     |
|       | TDMA 2 | BCCH | 611 @ 1950.0 MHz     |
| MRM 3 | TDMA 0 | BCCH | 612 @ 1950.2 MHz     |
|       | TDMA 1 | BCCH | 625 @ 1952.8 MHz     |
|       | TDMA 2 | BCCH | 640 @ 1955.8 MHz     |
| MRM 4 | TDMA 0 | BCCH | 645 @ 1956.8MHz      |
|       | TDMA 1 | TCH  | (M) 661 @ 1960.0 MHz |
|       | TDMA 2 | BCCH | 680 @ 1963.8 MHz     |
| MRM 5 | TDMA 0 | BCCH | 690 @ 1975.8 MHz     |
|       | TDMA 1 | BCCH | 700 @ 1967.8 MHz     |
|       | TDMA 2 | BCCH | 711 @ 1970.0 MHz     |
| MRM 6 | TDMA 0 | BCCH | 712 @ 1970.8 MHz     |
|       | TDMA 1 | BCCH | 725 @ 1972.8 MHz     |
|       | TDMA 2 | BCCH | 740 @ 1975.8 MHz     |
| MRM 7 | TDMA 0 | BCCH | 750 @ 1977.8 MHz     |
|       | TDMA 1 | BCCH | 760 @ 1979.8 MHz     |
|       | TDMA 2 | BCCH | 775 @ 1982.8 MHz     |
| MRM 8 | TDMA 0 | BCCH | 780 @ 1983.8 MHz     |
|       | TDMA 1 | BCCH | 790 @ 1985.8 MHz     |
|       | TDMA 2 | TCH  | (T) 810 @ 1989.8 MHz |

Frequency deviation is measured in MRM 0 (TDMA0), MRM 4(TDMA1) and MRM 8 (TDMA2) on channel C512, C 661 and C 810.



## 7. TESTS RESULTS

Remark: All measurements have been realized without slow frequency hopping and after thermal stabilization.

### @ - 40°C

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | -16.72                   | 7.13                     | 2.20                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 14.21                    | 7.50                     | 2.48                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | 19.69                    | 7.66                     | 2.38                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | -14.59                   | 7.07                     | 2.28                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | -13.75                   | 7.87                     | 2.29                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | -14.66                   | 7.21                     | 2.40                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 18.53                    | 8.56                     | 2.67                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 22.54                    | 8.28                     | 2.58                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 24.86                    | 9.40                     | 2.76                    | PASS   |

### @ - 30°C

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | -18.02                   | 7.20                     | 2.41                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 16.79                    | 7.67                     | 2.55                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | -17.69                   | 7.52                     | 2.44                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | -14.01                   | 7.12                     | 2.38                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 16.72                    | 7.33                     | 2.47                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 18.98                    | 7.26                     | 2.34                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 23.44                    | 8.20                     | 2.61                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 19.44                    | 7.68                     | 2.58                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 24.09                    | 8.00                     | 2.47                    | PASS   |

### @ - 20°C

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | -19.18                   | 7.12                     | 2.25                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 19.82                    | 7.67                     | 2.27                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | 16.85                    | 7.23                     | 2.31                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 19.95                    | 8.17                     | 2.69                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 17.69                    | 8.41                     | 2.44                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 19.31                    | 7.22                     | 2.44                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 17.43                    | 8.62                     | 2.57                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 20.92                    | 7.83                     | 2.48                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 18.47                    | 8.40                     | 2.57                    | PASS   |



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**@ - 10°C**

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | 18.98                    | 7.67                     | 2.34                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 14.85                    | 7.70                     | 2.60                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | -15.30                   | 7.40                     | 2.40                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 19.44                    | 7.06                     | 2.27                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 12.98                    | 7.10                     | 2.26                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 15.63                    | 8.01                     | 2.44                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 25.76                    | 8.76                     | 2.68                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 23.50                    | 7.59                     | 2.54                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 24.34                    | 7.93                     | 2.44                    | PASS   |

**@ 0°C**

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | 15.69                    | 7.15                     | 2.37                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 17.11                    | 7.28                     | 2.51                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | -14.33                   | 7.90                     | 2.39                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 16.11                    | 8.07                     | 2.29                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 21.70                    | 8.39                     | 2.56                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 19.37                    | 8.44                     | 2.37                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 24.15                    | 9.72                     | 2.66                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 24.92                    | 8.31                     | 2.56                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 23.89                    | 8.29                     | 2.53                    | PASS   |

**@ + 10°C**

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | 26.09                    | 7.27                     | 2.34                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | -16.79                   | 7.61                     | 2.63                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | -20.86                   | 7.45                     | 2.37                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 20.99                    | 8.17                     | 2.49                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 19.95                    | 8.50                     | 2.85                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 23.37                    | 8.93                     | 2.51                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 20.08                    | 7.33                     | 2.57                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 20.73                    | 9.00                     | 2.64                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 24.02                    | 8.32                     | 2.58                    | PASS   |



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**@ + 20°C**

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | 15.37                    | 7.79                     | 2.28                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 18.02                    | 8.50                     | 2.33                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | 18.14                    | 7.88                     | 2.45                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 19.31                    | 8.34                     | 2.60                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 20.28                    | 7.71                     | 2.42                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 22.08                    | 7.90                     | 2.70                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 21.44                    | 9.28                     | 2.68                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 19.76                    | 9.31                     | 2.81                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 23.18                    | 8.10                     | 2.71                    | PASS   |

**@ + 30°C**

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | -19.69                   | 7.64                     | 2.35                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 18.73                    | 8.49                     | 2.47                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | -20.02                   | 8.48                     | 2.54                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 19.76                    | 8.10                     | 2.43                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 24.73                    | 7.52                     | 2.55                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 14.33                    | 7.80                     | 2.35                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 24.60                    | 9.95                     | 2.74                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 22.41                    | 9.79                     | 2.71                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 24.86                    | 9.25                     | 2.92                    | PASS   |

**@ + 40°C**

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | -16.47                   | 7.76                     | 2.33                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | 14.66                    | 7.50                     | 2.37                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | 17.43                    | 8.91                     | 2.49                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 16.47                    | 9.81                     | 2.57                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 13.95                    | 8.44                     | 2.37                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 17.11                    | 8.47                     | 2.80                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 24.41                    | 9.25                     | 2.85                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 21.18                    | 8.43                     | 2.78                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | -22.99                   | 8.69                     | 2.63                    | PASS   |

**@ + 50°C**

| MRM tested | TX tested | Voltage  | Channel | Max frequency error (Hz) | Max peak phase error (°) | Max rms phase error (°) | Result |
|------------|-----------|----------|---------|--------------------------|--------------------------|-------------------------|--------|
| MRM0       | TDMA0     | 195 V AC | 512 (B) | 17.43                    | 8.95                     | 2.57                    | PASS   |
|            | TDMA0     | 230 V AC | 512 (B) | -17.63                   | 7.58                     | 1.85                    | PASS   |
|            | TDMA0     | 265 V AC | 512 (B) | -18.40                   | 7.83                     | 2.67                    | PASS   |
| MRM4       | TDMA1     | 195 V AC | 661 (M) | 13.95                    | 7.42                     | 2.41                    | PASS   |
|            | TDMA1     | 230 V AC | 661 (M) | 22.15                    | 8.83                     | 2.53                    | PASS   |
|            | TDMA1     | 265 V AC | 661 (M) | 12.33                    | 7.87                     | 2.35                    | PASS   |
| MRM8       | TDMA2     | 195 V AC | 810 (T) | 23.25                    | 10.12                    | 2.80                    | PASS   |
|            | TDMA2     | 230 V AC | 810 (T) | 25.25                    | 9.45                     | 3.04                    | PASS   |
|            | TDMA2     | 265 V AC | 810 (T) | 23.96                    | 10.91                    | 2.95                    | PASS   |

## 8. CONCLUSION

The phase error and mean frequency in extreme conditions is fully compliant with the specification of FCC requirements.

The maximum deviation measured **26.09 Hz** is sufficient to ensure that the fundamental emission stays within the authorized frequency block.

The GSM 18000 MCPA BTS configured in 1900 MHz complies with the requirements FCC Part 24.235 and Part 2.1055 of FCC Rules and Regulation.



## 9. ABBREVIATIONS & DEFINITIONS

### 9.1 ABBREVIATIONS

|        |                                                    |
|--------|----------------------------------------------------|
| ARFCN  | Absolute Radio Frequency Channel Number            |
| BCCH   | Broadcast Control Channel                          |
| BER    | Bit Error Rate                                     |
| BIST   | Built In Self Test                                 |
| BTS    | Base Transceiver System                            |
| C/I    | Carrier to Interferer ratio                        |
| dBm    | Ratio in decibel with respect to 1 milliwatt       |
| dBc    | Ratio in decibel with respect to the carrier level |
| FER    | Frame Erasure Rate                                 |
| FP     | Frame Processor                                    |
| FH bus | Transmission bus between FP and TX                 |
| IF     | Intermediate Frequency                             |
| IP3    | 3rd order interception point                       |
| LNA    | Low Noise Amplifier                                |
| NER    | Nominal Error Rate                                 |
| NFH    | NO Frequency Hopping                               |
| OL     | Local Oscillator                                   |
| PA     | TX Power Amplifier                                 |
| PCM    | Pulse Coded Modulation                             |
| RF     | Radio Frequency Channel                            |
| RX     | Receiver                                           |
| SFH    | Slow Frequency Hopping                             |
| TCH    | Traffic Residual Bit Error Rate                    |
| TDMA   | Time Division Multiple Access                      |
| TS     | Time Slot                                          |
| TX     | Transmitter                                        |
| TRX    | Transmitter - Receiver                             |



## 9.2 DEFINITIONS

### PCS1900 Frequency Band and Channels

| PCS 1900    | C512   | C661 | C810   |
|-------------|--------|------|--------|
| F Tx ( MHz) | 1930.2 | 1960 | 1989.8 |
| F Rx ( MHz) | 1850.2 | 1880 | 1909.8 |

For  $512 < n < 810$

$$F_{Rx}(n) = 1850.2 + 0.2 \cdot (n - 512)$$

$$F_{Tx}(n) = F_{Rx}(n) + 80$$

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