SANMINA-SCI

Radio Tests Report in Extreme Environment for 1900 MHz UMTS Outdoor iBTS with Alpha modules

Reference:	**RPT-T-030443-6G1**
Version:	**A**
Status:	**Approved**
Date:	**29/07/03**

Product Name:	**UMTS Outdoor iBTS**
Frequency:	**UMTS 1900**
Discipline:	**RF in extreme environment**

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PUBLICATION HISTORY

VERSION	DATE	AUTHOR	MODIFICATION
A	28/07/2003	J. PALARD	Creation of the document

CONTENTS

1. INTRODUCTION

This document presents the measurements results of Radio tests performed on the 1900 MHz UMTS Outdoor iBTS equipped with Alpha UMTS 1900 MHz modules, in extreme environment according to 3GPP TS 25.141 and 47CFR Part 24 and Nortel requests.

The measurements reported in this document have been performed in Sanmina-SCI climatic chamber. The tests definitions, methods and requirements follow the applicable version of the 3GPP TS 25.141 and 47CFR Part 24 as defined in the PLN-T-030089-6G1 Test Plan.

The tests results in this report relate to the equipment under test only described below and in the Nortel Networks AVL ref: UMT/BTS/DJD/7228 Ver 01.01/EN:

Product:	UMTS Outdoor iBTS
Manufacturer:	Nortel Networks
Type:	UMTS 1900
Configuration:	STSR3D
Power supply:	208-240 Vac
Power supply range:	187 Vac to 264 Vac
Extreme temperature range:	-40°C to +50°C

This document is addressed to Nortel Networks and Sanmina-SCI R&D department involved in the development of the UMTS Outdoor iBTS and Alpha UMTS 1900 MHz modules.

2. RELATED DOCUMENTS

2.1. APPLICABLES DOCUMENTS

[A1]	3GPP TS 25.141	3rd generation partnership project: Technical Specification Group Radio Access Networks; Base Station (BS) conformance testing (FDD) Release 1999; Version 3.12.0
[A2]	47 CFR Part 24	Personal Communications Services

2.2. REFERENCE DOCUMENTS

[R1]	UMT/BTS/DPL/07135	1900 MHz UMTS Project Qualification Plan
[R2]	UMT/BTS/DD/0058	Mechanical & Environmental Requirement Specification for a MK2 Outdoor Cabinet
[R3]	PLN-V-030355-6G1	1900 Mhz UMTS PI Qualification Plan
[R4]	UMT/BTS/DJD/7228	Hardware Delivery form for 1900 MHz UMTS Outdoor iBTS

3. IDENTIFICATION OF TESTED TECHNICAL VARIANT AND OF THE MODULES CONSTITUTING THE TESTED EQUIPMENT

Tests were performed on all the following variants:

TECHNICAL VARIANTS		
Identification	**Comments**	**Configuration code**
UMTS Outdoor iBTS	STSR3D 30W	A
UMTS Outdoor iBTS	STSR3D 45W	B

Software compatibility :
Modules software version : V03E2.1E05.6_2

PI bench : V03D0304
Visual TRM : V03D0305
Visual BBS for CEM : V03D3.0_E02

ARTICLE	PEC code	Release	Serial number	Comment
TRM 1900	NTUM10EA	P1	NNTM7502DFME	136.147.43.103
TRM 1900	NTUM10EA	P1	TRM1900010	136.147.43.122
TRM 1900	NTUM10EA	P1	NNTM7502DNTF	136.147.43.126
CCM	NTGY25AA	14	NNTM5330LJ0C	136.147.33.43
CEM	NTUM00AA	E8	NNTM7503CBPB	136.147.39.233
CEM	NTUM00AA	G5	NNTM7503ERKX	136.147.32.107
CEM	NTUM00AA	E8	NNTM7503CBOY	136.147.43.35
CEM	NTUM00AA	E6	NNTM7503C38V	136.147.43.36
CEM	NTUM00AA	E8	NNTM7503CBP2	136.147.43.37
CEM	NTUM00AA	E8	NNTM7503D5Z8	136.147.33.45
GPSAM	NTUM24AA	D7	NNTM7503QSRS	
MCPA 1900	NTUM30PA	D2	PWWT03D97J8N	Firmware 1.12
MCPA 1900	NTUM30PA	D2	PWWT03DC0NC6	Firmware 1.12
MCPA 1900	NTUM30PA	D2	PWWT03DC0NF7	Firmware 1.12
MCPA 1900	NTUM30PA	D2	PWWT03D9L76D	Firmware 1.12
MCPA 1900	NTUM30PA	D2	PWWT03D9RGYN	Firmware 1.12
MCPA 1900	NTUM30PA	D2	PWWT03D9L777	Firmware 1.12
DDM 1900	NTUM42AA	D1	FORM01428019	
DDM 1900	NTUM42AA	D1	FORM01428022	
DDM 1900	NTUM42AA	D1	FORM01428021	
IDACS	NTUM80AA	D3	HIRSA211W3E9	
INTERCO	NTUM60AA	D1	FCIN25000404	
DIGITAL SHELF	NTUM20AA	D2	SNMN7500B3O6	
User ICO	NTUM37AA	D2	SNMN7500B1X8	
LPPCM	NTUM98BA	D2	SNMN75005IZ1	
External alarm kit	NTUM98AA	D2	SNMN75005IDG	
MCA	NTUM7200	D1	SNMN7500B0CS	
RECTIFIER SHELF	NTUM87AA			
SPCM	NTUM85AA	D3	PITS01U31646	
Rectifier	NTUM86AA	D1	PITS01H35618	
Rectifier	NTUM86AA	D1	PITS01032287	
Rectifier	NTUM86AA	D1	PITS01032290	
Rectifier	NTUM86AA	D1	PITS01H35590	
Rectifier	NTUM86AA	D1	PITS01H35463	
Rectifier	NTUM86AA	D1	PITS01H35873	
Rectifier	NTUM86AA	D2	PITS01030219	
AC main	NTUM39AA	D2	SNMN7500BD8V	
Filtering box split phase	NTUM90BA	D1	SNMN7500BGLG	
100Ω PCM installation cable	NTQG41HA			
Antenna RF cable for TMA				

4. SYNTHESIS OF TESTS RESULTS FOR ALL VARIANTS

For 3GPP TS 25.141:

Identification	Description	Configuration Code	
		A	B
	UMTS Outdoor iBTS, STSR3D 30W	X	
	UMTS Outdoor iBTS, STSR3D 45W		X
Clause number	Description	Test Status (note)	
6.2.1	Base station maximum output power	P	P
6.3	Frequency error	NT	P
7.2	Reference sensitivity level	NT	P

For 47 CFR Part 24:

Identification	Description	Configuration Code
		A
	UMTS Outdoor iBTS, STSR3D 45W	X
Clause number	Description	Test Status (note)
24.235	Frequency error	P

Note : P = Pass, F = Fail, NT = Not Tested, N/A = Not Applicable

5. TESTS DATES AND OPERATORS FOR EACH VARIANT

Configuration: A and B

Start of Test: 16 July 2003
Finish of Test: 24 July 2003

Location of Tests: SANMINA-SCI laboratory et Plaisir (78-France)

Tests Engineer: J. PALARD

6. TESTS APPARATUS USED FOR TESTS

ID	Instrument/Ancillary	Type	Manufacturer	Serial number
ESG	ESG-D	E4433B	Agilent	523076
VSA	VSA	E4406A	Agilent	525148
CO	Counter	RACAL 1992	RACAL - DANA	57220008
SG1	High stability signal generator	8657B	HP	57220052
PCM	PCM analyser	ANT 20	W&G	517804
PM	Power meter	8542C	Gigatronics	57220024

7. TESTS RESULTS OF 3GPP TS 25.141 STANDARD

7.1. BASE STATION MAXIMUM OUTPUT POWER AT 30W (CL. 6.2.1)

Ambient Temperature (°C)	Relative humidity (%)	Operator
-40°C	25	J. PALARD
+50°C	55	J. PALARD

Configuration code: A
Site configuration type : STSR3D 30W at –40°C STSR3D 30W at +50°C
Activation mode : Single carrier
Output power : 44.7dBm at power amplifier output
Test model: 1

Tests results:

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	BS max output power(dBm)
B	-40	187	43,6
B	-40	230	43,6
B	-40	264	43,6
M	-40	187	44,3
M	-40	230	44,3
M	-40	264	44,3
T	-40	187	44,2
T	-40	230	44,2
T	-40	264	44,2

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	BS max output power(dBm)
B	50	187	43,4
B	50	230	43,4
B	50	264	43,4
M	50	187	43,8
M	50	230	43,8
M	50	264	43,8
T	50	187	43,5
T	50	230	43,5
T	50	264	43,5

Requirements of the clause 6.2.1:

Maximum Output Power	
Normal Conditions	43.3 dBm ± 2.7
Extreme conditions	43.3 dBm ± 3.2

Result
The equipment passed the requirement of this clause.

7.2. BASE STATION MAXIMUM OUTPUT POWER AT 45W (CL. 6.2.1)

Ambient Temperature (°C)	Relative humidity (%)	Operator
-40°C	25	J. PALARD
+50°C	55	J. PALARD

Configuration code: B
Site configuration type : STSR3D 45W at –40°C STSR3D 45W at +50°C
Activation mode : Single carrier
Output power : 46.5 dBm at power amplifier output
Test model: 1

Tests results:

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	BS max output power(dBm)
B	-40	187	45,1
B	-40	230	45,1
B	-40	264	45,1
M	-40	187	45,8
M	-40	230	45,8
M	-40	264	45,8
T	-40	187	45,9
T	-40	230	45,9
T	-40	264	45,9

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	BS max output power(dBm)
B	50	187	45,4
B	50	230	45,4
B	50	264	45,4
M	50	187	45,6
M	50	230	45,6
M	50	264	45,6
T	50	187	45,1
T	50	230	45,1
T	50	264	45,1

Requirements of the clause 6.2.1:

Maximum Output Power	
Normal Conditions	45.1 dBm ± 2.7
Extreme conditions	45.1 dBm ± 3.2

Result
The equipment passed the requirement of this clause.

7.3. FREQUENCY ERROR AT PMAX-3DB (CL. 6.3)

Ambient Temperature (°C)	Relative humidity (%)	Operator
-40°C	25	J. PALARD
+50°C	55	J. PALARD

Configuration code: B
Site configuration type : STSR3D 45W at –40°C STSR3D 45W at +50°C
Activation mode : Single carrier
Output power : 43.5 dBm at power amplifier output
Test model: 4

Tests results:

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	-40	187	3,4
B	-40	230	-10
B	-40	264	-3,5
M	-40	187	-9,2
M	-40	230	14,7
M	-40	264	0,9
T	-40	187	3,1
T	-40	230	2,6
T	-40	264	-11,1

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	50	187	-5,6
B	50	230	3,6
B	50	264	-12,7
M	50	187	-9,4
M	50	230	3,5
M	50	264	4,3
T	50	187	-7,3
T	50	230	6,6
T	50	264	5,4

Requirements of the Clause 6.3:

Frequency error	
Normal Conditions	± (0.05ppm + 12Hz)
Extreme conditions	± (0.05ppm + 12Hz)

Result
The equipment passed the requirement of this clause.

7.4. FREQUENCY ERROR AT PMAX-18DB (CL. 6.3)

Ambient Temperature (°C)	Relative humidity (%)	Operator
-40°C	25	J. PALARD
+50°C	55	J. PALARD

Configuration code: B
Site configuration type : STSR3D 45W at –40°C STSR3D 45W at +50°C
Activation mode : Single carrier
Output power : 28.5 dBm at power amplifier output
Test model: 4

Tests results:

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	-40	187	0,5
B	-40	230	-3,3
B	-40	264	-4,24
M	-40	187	-12,9
M	-40	230	-12,3
M	-40	264	12,5
T	-40	187	15,4
T	-40	230	2,9
T	-40	264	8,5

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	50	187	-9,9
B	50	230	3,2
B	50	264	-3,3
M	50	187	10,5
M	50	230	2,9
M	50	264	-0,9
T	50	187	-1,1
T	50	230	4,5
T	50	264	11,9

Requirements of the Clause 6.3:

Frequency error	
Normal Conditions	± (0.05ppm + 12Hz)
Extreme conditions	± (0.05ppm + 12Hz)

Result
The equipment passed the requirement of this clause.

7.5. REFERENCE SENSITIVIT Y LEVEL (CL. 7.2)

Ambient Temperature (°C)	Relative humidity (%)	Operator
-40°C	25	J. PALARD
+50°C	55	J. PALARD

Configuration code: B
Site configuration type : STSR3D 45W at –40°C STSR3D 45W at +50°C
Activation mode : Single carrier
Wanted Signal Level: -121dBm

Tests results:

Tests Conditions		BIT ERROR RATIO (BER en %)		
		Channel B 1932.4 MHz	Channel M 1960 MHz	Channel T 1987.6MHz
Tmin (-40°C)	Vmin (187 Vac)	0	0	0
	Vnom (230 Vac)	0	0	0
	Vmax (264 Vac)	0	0	0
Tmax (50°C)	Vmin (187 Vac)	0	0	0
	Vnom (230 Vac)	0	0	0
	Vmax (264 Vac)	0	0	0

Requirements clause 7.2:

BER	< 0.1%

Result
The equipment passed the requirement of this clause.

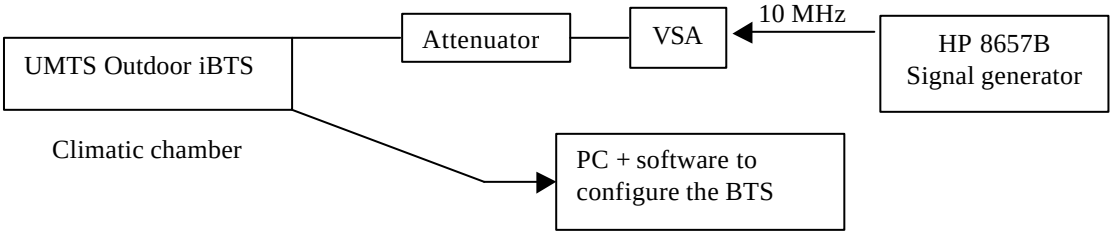
8. TESTS RESULTS OF 47 CFR PART 24

Test performed: clause 24.235 of the 47CFR Part 24 standard

Configuration code: B
Site configuration type : STSR3D 45W at –40°C, -30°C, -20°C, -10°C, 0°C, +10°C, +20°C, +30°C, +40°C and +50°C
Activation mode : Single carrier
Output Power: 46.5 dBm at power amplifier output
Test model: 1
Operator: J. PALARD

Test Procedure:

To realize these tests, the equipment was placed in the climatic chamber during sufficient time to obtain good temperature stabilization at several temperatures. The PA were configured at maximum RF output power (46.5dBm, test model: 1) and this value was controlled during all tests.
The measurements were performed with a VSA, as described on the figure below:



A period of at least one hour was allowed prior to measurement to ensure that all the components of the oscillator circuit were stabilized at each temperature.

Tests results:

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	50	187	-7,4
B	50	230	-17,8
B	50	264	10,3

M	50	187	-5,2
M	50	230	-4,2
M	50	264	-17,9

T	50	187	17,8
T	50	230	-15,1
T	50	264	3,1

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	40	187	-9,6
B	40	230	7,5
B	40	264	6,7

M	40	187	-0,2
M	40	230	10,5
M	40	264	-3,8

T	40	187	-11,5
T	40	230	2,6
T	40	264	4,1

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	30	187	-7,9
B	30	230	3,8
B	30	264	14,9

M	30	187	11,9
M	30	230	8
M	30	264	1,8

T	30	187	1,3
T	30	230	-15,3
T	30	264	-11,1

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	20	187	1,3
B	20	230	-12
B	20	264	8,8

M	20	187	-19,1
M	20	230	6,3
M	20	264	3,1

T	20	187	8,5
T	20	230	1,1
T	20	264	-12,3

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	10	187	11,1
B	10	230	10,3
B	10	264	-12,2

M	10	187	0,4
M	10	230	2,7
M	10	264	7,1

T	10	187	-1,9
T	10	230	-7,3
T	10	264	7,8

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	0	187	-0,4
B	0	230	6,5
B	0	264	-3,0

M	0	187	-2,5
M	0	230	-8,7
M	0	264	-8,4

T	0	187	0,3
T	0	230	-2,8
T	0	264	-4,6

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	-10	187	10,1
B	-10	230	7,5
B	-10	264	-16,3

M	-10	187	-13,4
M	-10	230	2,5
M	-10	264	8,1

T	-10	187	-2,1
T	-10	230	19,4
T	-10	264	5,8

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	-20	187	-2,7
B	-20	230	-10,5
B	-20	264	9,5

M	-20	187	-9,0
M	-20	230	-4,2
M	-20	264	14,7

T	-20	187	-9,5
T	-20	230	-9,4
T	-20	264	13,7

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	-30	187	-3,2
B	-30	230	2,1
B	-30	264	8,6

M	-30	187	5,1
M	-30	230	3,6
M	-30	264	-13,2

T	-30	187	8,9
T	-30	230	-5,1
T	-30	264	2,9

Emission frequency	Ambient temperature (°C)	Input voltage (Vac)	Frequency error (Hz)
B	-40	187	8,4
B	-40	230	-1,1
B	-40	264	-7,8

M	-40	187	11,7
M	-40	230	-0,6
M	-40	264	4,9

T	-40	187	1,7
T	-40	230	-3,3
T	-40	264	-6,5

9. CONCLUSION

The 1900 MHz UMTS Outdoor iBTS with Alpha modules, respects the RF requirements of the TS 25.141 V3.12.0 standard for measurements in extreme environment and the clause 24.235 of the 47 CFR Part 24 standard.

10. ABBREVIATIONS & DEFINITIONS

10.1. ABBREVIATIONS

ETS : European Telecommunication Standard

BTS : Base Transceiver Station

UMTS : Universal Mobile Telecommunication System

PA : Power Amplifier

CEM : Channel element module

CCM : Core Control Module

TRM : Transmitter receiver module

TMA: Tower Mounted Amplifier

GPSAM : Global position system alarm module

MCA : Manufacturing Commissioning Alarm Module

DC : Direct Current

TBC : To Be Confirmed

EUT : Equipment Under Test

BS : Base Station

UARFCN : Ultra ARFCN

ARFCN : Absolute Radio Frequency Channel Number

ESG : E Signal Generator

VSA : Vector Signal Analyzer

3GPP : Generation Partnership Project

Tx : Transmit

Rx : Receive

B : Bottom UARFCN Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as follows : $F_{B\ Downlink}$ = 1932.4 MHz ; $F_{B\ uplink}$ = 1852.4 MHz.

M : Middle UARFCN Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as follows : $F_{M\ Downlink}$ = 1960 MHz ; $F_{M\ uplink}$ = 1880 MHz.

T : Top UARFCN Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as follows : $F_{T\ Downlink}$ = 1987.6 MHz ; $F_{T\ uplink}$ = 1907.6 MHz.

10.2. DEFINITIONS

N/A

END OF DOCUMENT