



TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test of UMTS Compact iBTS

To FCC Part 24.235 & 3GPP TS 25.141
(Requested Parts Only)

Test Report Serial No.: RFI/MPTB5/RP45610JD01A

Supersedes Test Report Serial No.: RFI/MPTB4/RP45610JD01A,

Remarks:

Equipment complied with the specification	[*]
Equipment did not comply with the specification	[]
Results were within measurement uncertainties	[]

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	Checked By: 
Tested By: 	Release Version No: PDF 01
Issue Date: 12 December 2003	Test Dates: 05 November 2003 to 14 November 2003

It should be noted that 3GPP TS 25.141 is not listed on RFI's current UKAS accreditation schedule and is therefore "not UKAS accredited". However, the test methods used to determine RF frequency and output power are covered by RFI's UKAS accreditation.

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This report may be copied in full. The results in this report apply only to the sample(s) tested.

Test Of: Nortel Networks UMTS Compact iBTS

**To: FCC Part 24.235, 3GPP TS 25.141 V3.13.0 Release 1999 (2003-03)
3GPP TS 25.141 V5.6.0 Release 5 (2003-03)**

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Test Of: Nortel Networks UMTS Compact iBTS
To: FCC Part 24.235, 3GPP TS 25.141 V3.13.0 Release 1999 (2003-03)
3GPP TS 25.141 V5.6.0 Release 5 (2003-03)

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Section 1. Client Information

Company Name:	Nortel Networks
Address:	Nortel Networks Parc d'activité de Magny-Chateaufort CHATEAUFORT 78928 Yvelines Cedex 9 - France
Contact Name:	Luc Moulin

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Section 2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Nortel Networks
Model Name or Number:	UMTS Compact iBTS
Unique Type Identification:	UMTS Compact iBTS
FCC ID Number:	AB6UMTS1900COMP
Country of Manufacture:	Not Stated by Client
Date of Receipt:	05 November 2003

Description:	Tower Mounted Amplifier (TMA)
Brand Name:	Not Stated
Model Name or Number:	1850-1990MHz
Unique Type Identification:	FORM01429980
Serial Number:	NTUM35AA-D1
Country of Manufacture:	Not Stated
Date of Receipt:	05 November 2003

2.2. Accessories Supplied with Equipment Under Test (EUT)

Description:	Duplexer
Brand Name:	Not Stated
Model Name or Number:	Not Stated
Unique Type Identification:	1850-1910MHz
Serial Number:	MTEC0219A076
Country of Manufacture:	Not Stated
Date of Receipt:	05 November 2003

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2.3. Modules supplied with Nortel Networks UMTS Compact iBTS

ARTICLE	PEC code	Release	Serial Number
iTRM 1900	NTUM17BA	D1-DER AC 03 06 046	CDN200326005
iCCM shelf	NTUM26AA	D1	CDN200247010
iCCM board	NTUM25BA	D2	SLR200247010
iCEM 128	NTUM00DA	D2	CDN200316007
iCEM 128	NTUM00DA	D2	CDN200316032
cGPSAM	NTA520AA	02	NNTM7503OECE
MCPA 1900	NTUM30PA	D2	PWWT03DC11NY
MCPA 1900	NTUM30PA	D2	PWWT03D9RGYN
MCPA 1900	NTUM30PA	D2	PWWT03D9L777
DDM 1900	NTUM42AA	D1	FORM01428020
DDM 1900	NTUM42AA	D1	FORM01426048
DDM 1900	NTUM42AA	D1	FORM01426047
DIGITAL SHELF	NTA535EA	01	SNMN7500C84D
INTERCO	NTA525AA	01	SNMN7500C5XV
CICU	NTA535AA	No label with hardware release and serial number	
MCA	NTA536EA	No label with hardware release and serial number	
Pallet	CELESTICA P/N: CNN00194		
Cabinet Support	CELESTICA P/N: CNN00195		

2.4. Description Of EUT

The equipment under test is a Nortel Networks UMTS Compact iBTS.

2.5. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Number and Unique Type Identification stated above.

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2.6. Additional Information Related To Testing

Power Supply Requirement: (Supply via AC/DC converter unit)	-48V DC	
Intended Operating Environment:	Within the GSM/3GPP Networks	
Equipment Category:	UMTS Base Station	
Type of Unit:	Transceiver	
Highest Fundamental Frequency	1987.6 MHz	
Transmit Frequency Range	1930 MHz to 1990 MHz	
Transmit Channels Tested	Channel ID	Channel Frequency (MHz)
	Bottom	1932.4
	Middle	1960
	Top	1987.6
Receive Frequency Range	1850 MHz to 1910 MHz	
Receive Channels Tested	Channel ID	Channel Frequency (MHz)
	Bottom	1852.4
	Middle	1880.0
	Top	1907.6
Maximum Power Output	45.1dBm	

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3GPP TS 25.141 V5.6.0 Release 5 (2003-03)****2.7. Support Equipment**

The following support equipment was used to exercise the EUT during testing:

Manufacturer	Model No/Name	Serial No	Test Equipment ID
Hewlett Packard	6031A (0-20V/0-120A/1000W)	US 35430161	e1
Hewlett Packard	6031A (0-20V/0-120A/1000W)	US 35430198	e2
Hewlett Packard	6031A (0-20V/0-120A/1000W)	US 35430229	e3
Agilent	53131A/225MHz Universal Counter	MY40002203	e4
Hewlett Packard	37718B/Omni BER/718	GB00000266	e5
Hewlett Packard	E4433B 250kHz-4.0Ghz ESG-D Series Signal Generator	US3840769 opt 100/101/1E5/H97/H99/UN8/UND	e6
Agilent	E4406A 7MHz-4.0GHz VSA Series Transmitter Tester	US41152712 opt 202/BAF	e7
3Com	3C16985B Superstack 3/10 Base-T/100 Base-Tx	0100/7MAV4CBC4D8	e8
Duplexer	(1850-1910)MHz - MTEC0219A076		e9
TMA cable	TMA feeder cable	supplied by customer	e10
TIMES MICROWAVE RF CABLES	LMR 400 (68999) RF CABLES	3 off	e11
WEINSCHEL In-line-attenuator	model no. 24-40-34 /40dB In-line-attenuator	3-off	e12

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Section 3. Test Specification, Methods And Procedures

3.1. Test Specifications

Reference:	FCC Part 24.235 Subpart E: 2002 (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

Reference:	3GPP TS 25.141 Version 3.13.0 Release 1999 ETSI TS 125 141 V3.13.0 (2003-03) Clause 6.2, 6.3 and 7.2 (It should be noted that this standard is not listed on RFI 's current UKAS accreditation and is therefore "not UKAS accredited". The test methods used to determine RF frequency and output power are covered by RFI's UKAS accreditation.)
Title:	Universal Mobile Telecommunications System (UMTS)
Comments:	Base Station Conformance Testing (FDD)
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

Reference:	3GPP TS 25.141 Version 5.6.0 Release 5 ETSI TS 125 141 V5.6.0 (2003-03) Clause 6.2, 6.3 and 7.2 (It should be noted that this standard is not listed on RFI 's current UKAS accreditation and is therefore "not UKAS accredited". The test methods used to determine RF frequency and output power are covered by RFI's UKAS accreditation.)
Title:	Universal Mobile Telecommunications System (UMTS)
Comments:	Base Station Conformance Testing (FDD)
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

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3.2. Methods And Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2002

Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

3.3. Definition Of Measurement Equipment

The specialist measurement equipment used was supplied by the client and validated against RFI reference equipment for frequency accuracy and output power only. Appendix 1 contains a list of the test equipment used.

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Section 4. Deviations From The Test Specification

Testing was also performed to an earlier version of the 3GPP standard to cover Pmax-3 dB requirements at the client's request.

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Section 5. Operation Of The EUT During Testing

5.1. Operating Conditions

During testing, the EUT was powered by 3 x Hewlett Packard 6031A (0-20V/0-120A/1000W) DC Power Supplies. The Base Station was controlled using a customer's PC with PI Bench Tool. This utilises the Ethernet and GPIB buses to activate the iBTS digital modules and test equipment like ESG and VSA. Tests were performed in a normal laboratory environment and within an environmentally controlled chamber.

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5.2. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

STSR2 45W no TMA

Max Output Power	TS 25.141 V5.6 (Release 5) (2003-03)
Test model 1	Pmax measured on B PA1, M PA2, T PA3
Frequency Error	TS 25.141 V5.6 (Release 5) (2003-03)/FCC 24.235
Test model 1	Pmax measured on B PA1, M PA2, T PA3
Frequency Error	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 4	Pmax-3dB measured on B PA1, M PA2, T PA3
Frequency Error (2003-03)	TS 25.141 V5.6 (Release 5) (2003-03)/ TS 25.141 V3.13 Release 1999)
Test model 4	Pmax-18dB (1 PA operating) measured on B PA1, M PA2, T PA3
Reference Sensitivity	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 2	All PA running, measures on DDM1 Main (PA1 antenna), uplink frequencies B 1852.4MHz M 1880MHz T 1907.6MHz (with TX on) All PA's were transmitting Pmax on paired downlink

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Operating Modes (Continued)**STSR2 45W with TMA**

Max Output Power	TS 25.141 V5.6 (Release 5) (2003-03)
Test model 1	Pmax measured on B PA1, M PA1, T PA1
Frequency Error	TS 25.141 V5.6 (Release 5) (2003-03)
Test model 1	Pmax measured on B PA1, M PA1, T PA1
Frequency Error	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 4	Pmax-3dB measured on B PA1, M PA1, T PA1
Frequency Error (2003-03)	TS 25.141 V5.6 (Release 5) (2003-03)/ TS 25.141 V3.13 Release 1999)
Test model 4	Pmax-18dB (1 PA operating) measured on B PA1, M PA1, T PA1
Reference Sensitivity	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 2	All PA running, measures on DDM1 Main (PA1 antenna), uplink frequencies B 1852.4MHz M 1880MHz T 1907.6MHz (with TX on) All PA's were transmitting Pmax on paired downlink

OTOR 30W no TMA

Max Output Power	TS 25.141 V5.6 (Release 5) (2003-03)
Test model 1	Pmax (1 carrier) measured on B PA1, M PA1, T PA1
Frequency Error	TS 25.141 V5.6 (Release 5) (2003-03)
Test model 1	Pmax measured on B PA1, M PA1, T PA1
Frequency Error	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 4	Pmax-3dB measured on B PA1, M PA1, T PA1
Frequency Error (1999)(2003-03)	TS 25.141 V5.6 (Release 5) (2003-03)/ TS 25.141 V3.13 (Release 1999)
Test model 4	Pmax-18dB (1 PA operating) measured on B PA1, M PA1, T PA1
Reference Sensitivity	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 2	One PA running, measures on DDM1 Main (PA1 antenna), uplink frequencies B 1852.4MHz M 1880MHz T 1907.6MHz (with TX on) All PA's were transmitting Pmax on paired downlink

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Operating Modes (Continued)**OTOR 30W with TMA**

Max Output Power	TS 25.141 V5.6 (Release 5) (2003-03)
Test model 1	Pmax (1 carrier) measured on B PA1, M PA1, T PA1
Frequency Error	TS 25.141 V5.6 (Release 5) (2003-03)
Test model 1	Pmax measured on B PA1, M PA1, T PA1
Frequency Error	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 4	Pmax-3dB measured on B PA1, M PA1, T PA1
Frequency Error	TS 25.141 V5.6 (Release 5) (2003-03)/ TS 25.141 V3.13 (Release 1999)(2003-03)
Test model 4	Pmax-18dB measured on B PA1, M PA1, T PA1
Reference Sensitivity	TS 25.141 V3.13 (Release 1999) (2003-03)
Test model 2	One PA running, measures on DDM1 Main (PA1 antenna), uplink frequencies B 1852.4MHz M 1880MHz T 1907.6MHz (with TX on) All PA's were transmitting Pmax on paired downlink

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Please refer to Appendix A for Configuration Diagrams

These configurations were chosen at the clients request.

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Section 6. Summary Of Test Results

FCC Part 24

Range Of Measurements	Specification Reference	Port Type	Compliance Status
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 24: 2002 Section 24.235	Antenna Port	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 24: 2002 Section 24.235	Antenna Port	Complied

3GPP TS 25.141 V 5.6.0 Release 5 & V 3.13.0 Release 1999 (2003-03)

Range Of Measurements	Specification Reference	Port Type	Compliance Status
Base Station Output Power	TS 25.141 V5.6 (Release 5) (2003-03)	Antenna Port	Complied
Frequency Error	TS 25.141 V5.6 (Release 5) (2003-03) & TS 25.141 V3.13 (Release 1999) (2003-03)	Antenna Port	Complied
Reference Sensitivity Level	TS 25.141 V3.13 (Release 1999) (2003-03)	Antenna Port	Complied

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

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Section 7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 7 for details of measurement uncertainties.

Partial testing was performed against the applicable standards at the request of the client. Two versions of the TS 25.141 were tested against to show compliance an earlier version for output power levels of Pmax-3 dB and Pmax-18dB.

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7.2. Test Results – FCC Part 24.235

7.2.1. FCC Part 24.235 Transmitter Frequency Stability (Temperature and Voltage Variation)

Procedure

7.2.1.1. The client has stated that the EUT has an operating temperature range of -5°C to +45°C, and thus requested testing be performed over the temperature range -5°C to +45°C, rather than the -30°C to +50°C stated in the FCC Part 2.1055 standard.

7.2.1.2. The client requested that the clock reference for the VSA, and ESG-D be supplied from the Base Station's CCM 10MHz out clock signal. The accuracy of this signal was verified using RFI's EIP Microwave counter (M154) for each set up and was found to be accurate to 10MHz $\pm$ 1Hz.

7.2.1.3. The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an access port.

7.2.1.4. Measurements were performed with the EUT operating under extremes of temperature over the range -5°C to 45°C in 10 degree increments.

7.2.1.5. Measurements were also performed at voltage extremes between the declared nominal supply voltage by varying the primary supply voltage from 85% to 115% of the nominal value.

7.2.1.6. Measurements were made on the top, middle and bottom channels.

7.2.1.7. The EUT was switched off for a minimum of 60 minutes between each stage of testing while the environmental chamber, and EUT stabilised at the next temperature within the stated temperature range.

7.2.1.8. Once the environmental chamber had reached thermal equilibrium, the nominal frequency of the EUT was measured and recorded. The recorded frequency was compared to the applicants declared operating frequency band edges.

7.2.1.9. In order to show compliance, the measured frequency must remain within the declared frequency band.

7.2.1.10. This uncertainty value of this test is $\pm$ 24.14 Hz.

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(Continued)

Configuration A was as follows. - Please refer to Appendix A for configuration diagrams.
Configuration A was deemed worse case by the client.

STSR2 45W no TMA
PA1 used for Bottom Channel
PA2 used for Middle Channel
PA3 used for Top Channel

Results Bottom Channel (1932.4MHz)

Temp (°C)	Voltage (DC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
45	-40.8	23	1932.400023	1930	2.400023	Complied
45	-48.0	17	1932.400017	1930	2.400017	Complied
45	-55.2	26	1932.400026	1930	2.400026	Complied
35	-40.8	21	1932.400021	1930	2.400021	Complied
35	-48.0	21	1932.400021	1930	2.400021	Complied
35	-55.2	20	1932.400020	1930	2.400020	Complied
25	-40.8	16	1932.400016	1930	2.400016	Complied
25	-48.0	-20	1932.399980	1930	2.399980	Complied
25	-55.2	19	1932.400019	1930	2.400019	Complied
15	-40.8	30	1932.400030	1930	2.400030	Complied
15	-48.0	19	1932.400019	1930	2.400019	Complied
15	-55.2	23	1932.400023	1930	2.400023	Complied
5	-40.8	-15	1932.399985	1930	2.399985	Complied
5	-48.0	-12	1932.399988	1930	2.399988	Complied
5	-55.2	-25	1932.399975	1930	2.399975	Complied
-5	-40.8	27	1932.400027	1930	2.400027	Complied
-5	-48.0	28	1932.400028	1930	2.400028	Complied
-5	-55.2	-16	1932.399984	1930	2.399984	Complied

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(Continued)**Results Middle Channel (1960 MHz)**

Temp (°C)	Voltage	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Upper Band Edge Limit (MHz)	Worst Case Margin (MHz)	Result
45	-40.8	-30	1959.999970	1930	1990	30.000030	Complied
45	-48.0	-31	1959.999969	1930	1990	30.000031	Complied
45	-55.2	-18	1959.999982	1930	1990	30.000018	Complied
35	-40.8	45	1960.000045	1930	1990	30.000045	Complied
35	-48.0	32	1960.000032	1930	1990	30.000032	Complied
35	-55.2	17	1960.000017	1930	1990	30.000017	Complied
25	-40.8	19	1960.000019	1930	1990	30.000019	Complied
25	-48.0	28	1960.000028	1930	1990	30.000028	Complied
25	-55.2	14	1960.000014	1930	1990	30.000014	Complied
15	-40.8	24	1960.000024	1930	1990	30.000024	Complied
15	-48.0	-18	1959.999982	1930	1990	30.000018	Complied
15	-55.2	28	1960.000028	1930	1990	30.000028	Complied
5	-40.8	-21	1959.999979	1930	1990	30.000021	Complied
5	-48.0	-20	1959.999980	1930	1990	30.000020	Complied
5	-55.2	-20	1959.999980	1930	1990	30.000020	Complied
-5	-40.8	26	1960.000026	1930	1990	30.000026	Complied
-5	-48.0	25	1960.000025	1930	1990	30.000025	Complied
-5	-55.2	18	1960.000018	1930	1990	30.000018	Complied

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(Continued)**Results Top Channel (1987.6MHz)**

Temp (°C)	Voltage	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
45	-40.8	30	1987.600030	1990	2.399970	Complied
45	-48.0	-17	1987.599983	1990	2.400017	Complied
45	-55.2	-27	1987.599973	1990	2.400027	Complied
35	-40.8	42	1987.600042	1990	2.399958	Complied
35	-48.0	38	1987.600038	1990	2.399962	Complied
35	-55.2	41	1987.600041	1990	2.399959	Complied
25	-40.8	-30	1987.599970	1990	2.400030	Complied
25	-48.0	33	1987.600033	1990	2.399967	Complied
25	-55.2	23	1987.600023	1990	2.399977	Complied
15	-40.8	56	1987.600056	1990	2.399942	Complied
15	-48.0	21	1987.600021	1990	2.399979	Complied
15	-55.2	21	1987.600021	1990	2.399979	Complied
5	-40.8	-29	1987.599971	1990	2.400029	Complied
5	-48.0	-35	1987.599965	1990	2.400035	Complied
5	-55.2	41	1987.600041	1990	2.399959	Complied
-5	-40.8	28	1987.600028	1990	2.399972	Complied
-5	-48.0	25	1987.600025	1990	2.399975	Complied
-5	-55.2	-16	1987.599984	1990	2.400016	Complied

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7.3. 3GPP Base Station Output Power

Procedure

7.3.1. The Base Station was placed in the environmental chamber. The Chamber was set manually to the desired temperature and sufficient time allowed for the unit to stabilize. The Base Station was configured using the customer's PC and installed software and power was measured from the appropriate antenna port.

7.3.2. The EUT was switched off for a minimum of 60 minutes between each stage of testing while the environmental chamber and EUT stabilised at the next temperature within the stated temperature range.

7.3.3. The total loss of the cables, attenuators and combiner were measured and was noted as reference offset to correct for the losses.

7.3.4. Final measurements were obtained using a wide band power meter and derived by adding the relevant offsets for the losses that was measured.

7.3.5. For tests where the TMA was connected, the output power is declared at the base station output connector with 3.1dB cable loss and 0.3 db declared TMA loss being deducted. The final output power was measured at the TMA antenna output port.

TMA and Feeder Cable losses

Frequency (MHz)	Feeder Cable (dB)	TMA declared loss (dB)
B (1932.4)	3.1	0.3
B (1960)	3.1	0.3
B (1987.6)	3.2	0.3
B (1852.4)	3.1	0.3
B (1880)	3.1	0.3
B (1907.6)	3.1	0.3

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3GPP TS 25.141 V5.6.0 Release 5 (2003-03)**
3GPP Base Station Output Power (Continued)
Configuration A was as follows. - Please refer to Appendix A for configuration diagrams

45W mode, no TMA, Pmax - All PA's running and tested using:
PA1 for Bottom Channel
PA2 for Middle Channel
PA3 for Top Channel

Manufacturers' declared maximum output power			
45W mode no TMA	45W mode with TMA	30W mode no TMA	30W mode with TMA
45.1dBm	41.7dBm	43.5dBm	40.1dBm

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
45	-57.0	STSR2 45W no TMA	1932.4	44.3	Pass
45	-40.5	STSR2 45W no TMA	1932.4	44.3	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
45	-57.0	STSR2 45W no TMA	1960	45.1	Pass
45	-40.5	STSR2 45W no TMA	1960	45.1	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
45	-57.0	STSR2 45W no TMA	1987.6	45.3	Pass
45	-40.5	STSR2 45W no TMA	1987.6	45.3	Pass

LIMITS
CLAUSE 6.2.1.5

Extreme Conditions	no TMA	Nortel Limit	45.1dBm ±2.0dB
		3GPP Limit	45.1dBm ±3.2dB
Uncertainty	± 0.46 dB		

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3GPP Base Station Output Power (Continued)

Configuration B was as follows:- Please refer to Appendix A for configuration diagrams

45W mode, with TMA, Pmax – All PA's running and tested using:

PA1 for Bottom Channel

PA1 for Middle Channel

PA1 for Top Channel

Manufacturers' declared maximum output power			
45W mode no TMA	45W mode with TMA	30W mode no TMA	30W mode with TMA
45.1dBm	41.7dBm	43.5dBm	40.1dBm

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
45	-57.0	STSR2 45W with TMA	1932.4	41.0	Pass
45	-40.5	STSR2 45W with TMA	1932.4	41.0	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
45	-57.0	STSR2 45W with TMA	1960	41.7	Pass
45	-40.5	STSR2 45W with TMA	1960	41.7	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
45	-57.0	STSR2 45W with TMA	1987.6	41.5	Pass
45	-40.5	STSR2 45W with TMA	1987.6	41.5	Pass

LIMITS

CLAUSE 6.2.1.5

Extreme Conditions	With TMA	Nortel Limit	41.7dBm $\pm$ 2.0dB
		3GPP Limit	41.7dBm $\pm$ 3.2dB
Uncertainty	$\pm$ 0.46 dB		

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3GPP Base Station Output Power (Continued)

Configuration C was as follows:- Please refer to Appendix A for configuration diagrams

30W mode, no TMA, Pmax - Only one PA running and tested using:

PA1 for Bottom Channel
PA1 for Middle Channel
PA1 for Top Channel

Manufacturers' declared maximum output power			
45W mode no TMA	45W mode with TMA	30W mode no TMA	30W mode with TMA
45.1dBm	41.7dBm	43.5dBm	40.1dBm

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
-5	-57.0	OTOR1 30W no TMA	1932.4	43.1	Pass
-5	-40.5	OTOR1 30W no TMA	1932.4	43.1	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
-5	-57.0	OTOR1 30W no TMA	1960	43.6	Pass
-5	-40.5	OTOR1 30W no TMA	1960	43.6	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
-5	-57.0	OTOR1 30W no TMA	1987.6	43.8	Pass
-5	-40.5	OTOR1 30W no TMA	1987.6	43.7	Pass

LIMITS

CLAUSE 6.2.1.5

Extreme Conditions	no TMA	Nortel Limit	43.5dBm ±2.0dB
		3GPP Limit	43.5dBm ±3.2dB
Uncertainty	± 0.46 dB		

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3GPP Base Station Output Power (Continued)

Configuration D was as follows:- Please refer to Appendix A for configuration diagrams

30W mode, with TMA, Pmax - Only one PA running and tested using:

PA1 for Bottom Channel

PA1 for Middle Channel

PA1 for Top Channel

Manufacturers' declared maximum output power			
45W mode no TMA	45W mode with TMA	30W mode no TMA	30W mode with TMA
45.1dBm	41.7dBm	43.5dBm	40.1dBm

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
-5	-57.0	OTOR1 30W with TMA	1932.4	40.0	Pass
-5	-40.5	OTOR1 30W with TMA	1932.4	40.0	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
-5	-57.0	OTOR1 30W with TMA	1960	40.7	Pass
-5	-40.5	OTOR1 30W with TMA	1960	40.7	Pass

Temperature (°C)	Voltage	Configuration	Frequency (MHz)	Power (dBm)	Limit Pass/Fail
-5	-57.0	OTOR1 30W with TMA	1987.6	40.6	Pass
-5	-40.5	OTOR1 30W with TMA	1987.6	40.6	Pass

LIMITS

CLAUSE 6.2.1.5

Extreme Conditions	With TMA	Nortel Limit	40.1dBm $\pm$ 2.0dB
		3GPP Limit	40.1dBm $\pm$ 3.2dB
Uncertainty	$\pm$ 0.46 dB		

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7.4. 3GPP Frequency Error clause 6.3

Procedure

7.4.1. The Base Station was placed in the environmental chamber. The Chamber was set manually to the desired temperature and sufficient time allowed for the unit to stabilize. The unit was configured using the customer's PC and installed software. Measurements were made using the Agilent E4406A 7MHz-4.0GHz VSA. The frequency accuracy of the VSA's reference oscillator was verified using RFI calibrated frequency counter (M154).

7.4.2. The EUT was switched off for a minimum of 60 minutes between each stage of testing while the environmental chamber, and EUT, stabilised at the next temperature within the stated temperature range.

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3GPP Frequency Error clause (Continued)

Configuration A was as follows:- Please refer to Appendix A for configuration diagrams

45W mode, no TMA, Pmax - All PA's running and tested using:

PA1 for Bottom Channel
PA2 for Middle Channel
PA3 for Top Channel

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	45	-57.0	33
B PA1	45	-40.5	41
M PA2	45	-57.0	-19
M PA2	45	-40.5	18
T PA3	45	-57.0	20
T PA3	45	-40.5	-30

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3GPP Frequency Error (Continued)

Configuration A. Please refer to Appendix A for configuration diagrams

45W mode, no TMA, Pmax-3dB - All PA's running and tested using:

PA1 for Bottom Channel
PA2 for Middle Channel
PA3 for Top Channel

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	45	-57.0	29
B PA1	45	-40.5	-28
M PA2	45	-57.0	-40
M PA2	45	-40.5	29
T PA3	45	-57.0	-19
T PA3	45	-40.5	-22

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3GPP Frequency Error (Continued)**Configuration A.** Please refer to Appendix A for configuration diagrams**45W mode, no TMA, Pmax-18dB - All PA's running and tested using:****PA1 for Bottom Channel****PA2 for Middle Channel****PA3 for Top Channel**

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	45	-57.0	-23
B PA1	45	-40.5	-16
M PA2	45	-57.0	-30
M PA2	45	-40.5	23
T PA3	45	-57.0	34
T PA3	45	-40.5	-29

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3GPP Frequency Error (Continued)

Configuration B. Please refer to Appendix A for configuration diagrams

45W mode, with TMA, Pmax - All PA's running and tested using:

PA1 for Bottom Channel
PA1 for Middle Channel
PA1 for Top Channel

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	45	-40.5	-35
M PA1	45	-40.5	27
T PA1	45	-40.5	30

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3GPP Frequency Error (Continued)**Configuration B.** Please refer to Appendix A for configuration diagrams**45W mode, with TMA, Pmax-3dB - All PA's running and tested using:****PA1 for Bottom Channel****PA1 for Middle Channel****PA1 for Top Channel**

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	45	-40.5	44
M PA1	45	-40.5	-27
T PA1	45	-40.5	-24

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3GPP Frequency Error (Continued)

Configuration B. Please refer to Appendix A for configuration diagrams

45W mode, with TMA, Pmax-18dB - All PA's running and tested using:

PA1 for Bottom Channel
PA1 for Middle Channel
PA1 for Top Channel

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	45	-40.5	-26
M PA1	45	-40.5	34
T PA1	45	-40.5	16

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3GPP Frequency Error (Continued)**Configuration C.** Please refer to Appendix A for configuration diagrams**30W mode, no TMA, Pmax - Only 1 PA running and tested using:****PA1 for Bottom Channel****PA1 for Middle Channel****PA1 for Top Channel**

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	-5	-57.0	26
B PA1	-5	-40.5	28
M PA1	-5	-57.0	-18
M PA1	-5	-40.5	-36
T PA1	-5	-57.0	17
T PA1	-5	-40.5	-29

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3GPP Frequency Error (Continued)

Configuration C. Please refer to Appendix A for configuration diagrams

30W mode, no TMA, Pmax-3dB - Only 1 PA running and tested using:

PA1 for Bottom Channel
PA1 for Middle Channel
PA1 for Top Channel

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	-5	-57.0	-19
B PA1	-5	-40.5	-33
M PA1	-5	-57.0	-32
M PA1	-5	-40.5	-27
T PA1	-5	-57.0	-13
T PA1	-5	-40.5	19

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3GPP Frequency Error (Continued)**Configuration C.** Please refer to Appendix A for configuration diagrams**30W mode, no TMA, Pmax-18dB - Only 1 PA running and tested using:****PA1 for Bottom Channel****PA1 for Middle Channel****PA1 for Top Channel**

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	-5	-57.0	33
B PA1	-5	-40.5	25
M PA1	-5	-57.0	42
M PA1	-5	-40.5	25
T PA1	-5	-57.0	26
T PA1	-5	-40.5	20

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3GPP Frequency Error (Continued)

Configuration D. Please refer to Appendix A for configuration diagrams

30W mode, with TMA, Pmax - Only 1 PA running and tested using:

PA1 for Bottom Channel
PA1 for Middle Channel
PA1 for Top Channel

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	-5	-57.0	-16
B PA1	-5	-40.5	-24
M PA1	-5	-57.0	-21
M PA1	-5	-40.5	22
T PA1	-5	-57.0	16
T PA1	-5	-40.5	34

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3GPP TS 25.141 V5.6.0 Release 5 (2003-03)**

3GPP Frequency Error (Continued)**Configuration D.** Please refer to Appendix A for configuration diagrams**30W mode, with TMA, Pmax-3dB - Only 1 PA running and tested using:****PA1 for Bottom Channel****PA1 for Middle Channel****PA1 for Top Channel**

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	-5	-57.0	-26
B PA1	-5	-40.5	-25
M PA1	-5	-57.0	38
M PA1	-5	-40.5	22
T PA1	-5	-57.0	-25
T PA1	-5	-40.5	-30

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3GPP Frequency Error (Continued)

Configuration D. Please refer to Appendix A for configuration diagrams

30W mode, with TMA, Pmax-18dB - Only 1 PA running and tested using:

PA1 for Bottom Channel
PA1 for Middle Channel
PA1 for Top Channel

Emission Frequency	Ambient Temperature (°C)	Input Voltage (V DC)	Frequency Error (Hz)
B PA1	-5	-57.0	30
B PA1	-5	-40.5	44
M PA1	-5	-57.0	20
M PA1	-5	-40.5	22
T PA1	-5	-57.0	22
T PA1	-5	-40.5	-29

LIMITS**CLAUSE 6.3**

Frequency error minimum requirement.

Accuracy	(-0.05ppm – 12Hz) (+0.05ppm + 12Hz)
Client Limit	± 90 Hz
Uncertainty	± 24.14 Hz

TEST EQUIPMENT USED (Listed under RFI serial numbers):
Please refer to Section 7 for test equipment used

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7.5. Reference Sensitivity Level

Procedure

7.5.1. The Base Station was placed in the environmental chamber. The Chamber was set manually to the desired temperature and sufficient time allowed for the unit to stabilise. The unit was configured using the customer's PC and installed software.

7.5.2. Due to the low signal level required, a signal source of 0dBm was used and attenuated to the required amount to attain -122dBm. In-line-attenuators were calibrated and used for this task, in addition to the duplexer, TMA, and cables. The level accuracy of the ESG's RF level was verified using RFI calibrated power meter (M1122, M1123).

N.B. The customer requested to test to limit of -122dBm, with Tx On. The standard stated limit is -121dBm.

Table shows total calculated attenuation between signal generator and tested antenna port.

Channel	Total loss (dB)
Bottom	122.6dB
Middle	122.4dB
Top	122.3dB

TMA and Feeder Cable losses

Frequency (MHz)	Feeder Cable (dB)	TMA declared loss (dB)
B (1932.4)	3.1	0.3
B (1960)	3.1	0.3
B (1987.6)	3.2	0.3
B (1852.4)	3.1	0.3
B (1880)	3.1	0.3
B (1907.6)	3.1	0.3

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Reference Sensitivity Level (Continued)

Configuration A. Please refer to Appendix A for configuration diagrams

Test model 2 Pmax. All PA's running and PA mode 45W. Measures on DDM1 Main (PA1 antenna) uplink frequencies B (1852.4MHz), M (1880MHz), T (1907.6MHz) **with no TMA**

Test Conditions		BER – (using sensitivity level of –122dBm)		
		Channel B	Channel M	Channel T
Tmax (+45°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax (-57V DC)	0	0	0
Tmax (+45°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax (-57V DC)	0	0	0

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Reference Sensitivity Level (Continued)**Configuration B.** Please refer to Appendix A for configuration diagrams

Test model 2 Pmax. All PA 's running and PA mode 45W. Measures on DDM1 Main (PA1 antenna) uplink frequencies B (1852.4MHz), M (1880MHz), T (1907.6MHz) **with TMA**

Test Conditions		BER (using sensitivity level of -122dBm)		
		Channel B	Channel M	Channel T
Tmax (+45°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax (-57V DC)	0	0	0
Tmax (+45°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax (-57V DC)	0	0	0

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Reference Sensitivity Level (Continued)

Configuration C. Please refer to Appendix A for configuration diagrams

Test model 2 Pmax. Only 1 PA running and PA mode 30W. Measures on DDM1 Main (PA1 antenna) uplink frequencies B (1852.4MHz), M (1880MHz), T (1907.6MHz) **with no TMA**

Test Conditions		BER (using sensitivity level of -122dBm)		
		Channel B	Channel M	Channel T
Tmin (-5°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax (-57V DC)	0	0	0
Tmin (-5°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax(-57V DC)	0	0	0

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3GPP TS 25.141 V5.6.0 Release 5 (2003-03)Reference Sensitivity Level (Continued)Configuration D. Please refer to Appendix A for configuration diagramsTest model 2 Pmax. Only 1 PA running and PA mode 30W. Measures on DDM1 Main (PA1 antenna) uplink frequencies B (1852.4MHz), M (1880MHz), T (1907.6MHz) **with TMA**

Test Conditions		BER (using sensitivity level of -122dBm)		
		Channel B	Channel M	Channel T
Tmin (-5°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax (-57V DC)	0	0	0
Tmin (-5°C)	Vmin (-40.5V DC)	0	0	0
	Vnom (-48V DC)	0	0	0
	Vmax (-57V DC)	0	0	0

LIMITS**CLAUSE 7.2**

Table 7.1: BS reference sensitivity levels

Reference measurement channel data rate	BS reference sensitivity level (dBm)	BER
12,2kbps	-121.0	BER shall not exceed 0,001
Uncertainty	± 0.91 dB	

The BER shall not exceed 0,001 for the parameters specified in table 7.2.

The normative reference for this requirement is in TS 25.104 [1] subclause 7.2

N.B. The customer requested to test to limit of -122dBm, with Tx On. The standard stated limit is -121dBm.

TEST EQUIPMENT USED (Listed under RFI serial numbers):

Please refer to Section 7 for test equipment used

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Section 8.Test Equipment Used

RFI Test Equipment List

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A030	Step Attenuator	Narda	745-69	01544
A163	Step Attenuator 2W	Narda	743-80	01344
A246	30 dB Attenuator	Schaffner	6830-17-B	None
A248	60 dB Variable Attenuator	Narda	743-60	01411
C1000	Cable	Rosenberger	FA210A1020M3 0309	002
C1001	Cable	Rosenberger	FA210A1020M3 0309	003
E007	Environmental Chamber	Prolan	PV427H75F 30HV	None
E009	Environmental Chamber	Thermotron Corporation	S-8-E Mini Max	25-2407-0
E011	Environmental Chamber	Design Environmental	WIR3-40	11-96-A2103
G011	SMGU Signal Generator	Rohde & Schwarz	SMGU	894 054/004
M1068	Thermometer Digital	Iso-Tech	RS55	93102884
M1123	Boonton	Boonton	4531	138201
M122	Fluke 77 DVM	Fluke	77	64910017
M124	Temperature/Humidity Meter	RS Components	212-124	None
M128	Fluke 76 DVM	Fluke	76	65340273
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075
M212	Digital Thermometer	RS Components	RS 206-3738	70319456
M281	Power Meter	Hewlett Packard	E4418A (EPM441A)	GB37170210-01
M283	Power Sensor	Hewlett Packard	8487A	3318A03241

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Section 9. Abbreviations

Abbreviation	Terminology
iTRM	Transmit/Receive module
iCCM	Core Control module
iCEM	Channel Element module
cGPSAM	Global Position System Alarm Module
MCPA	Multi Channel Power Amplifier
DDM	Dual Duplexer Module
CICU	Cooling Unit
MCA	Manufacturing Commissioning Alarm
OTOR	Omni Transmit Omni Receive
STSR	Sector Transmit Sector Receive
TMA	Tower Mounted Amplifier (Low Noise Amplifier)
PA	Power Amplifier

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Appendix 1. Test Configuration Drawings

This appendix contains the following drawings:

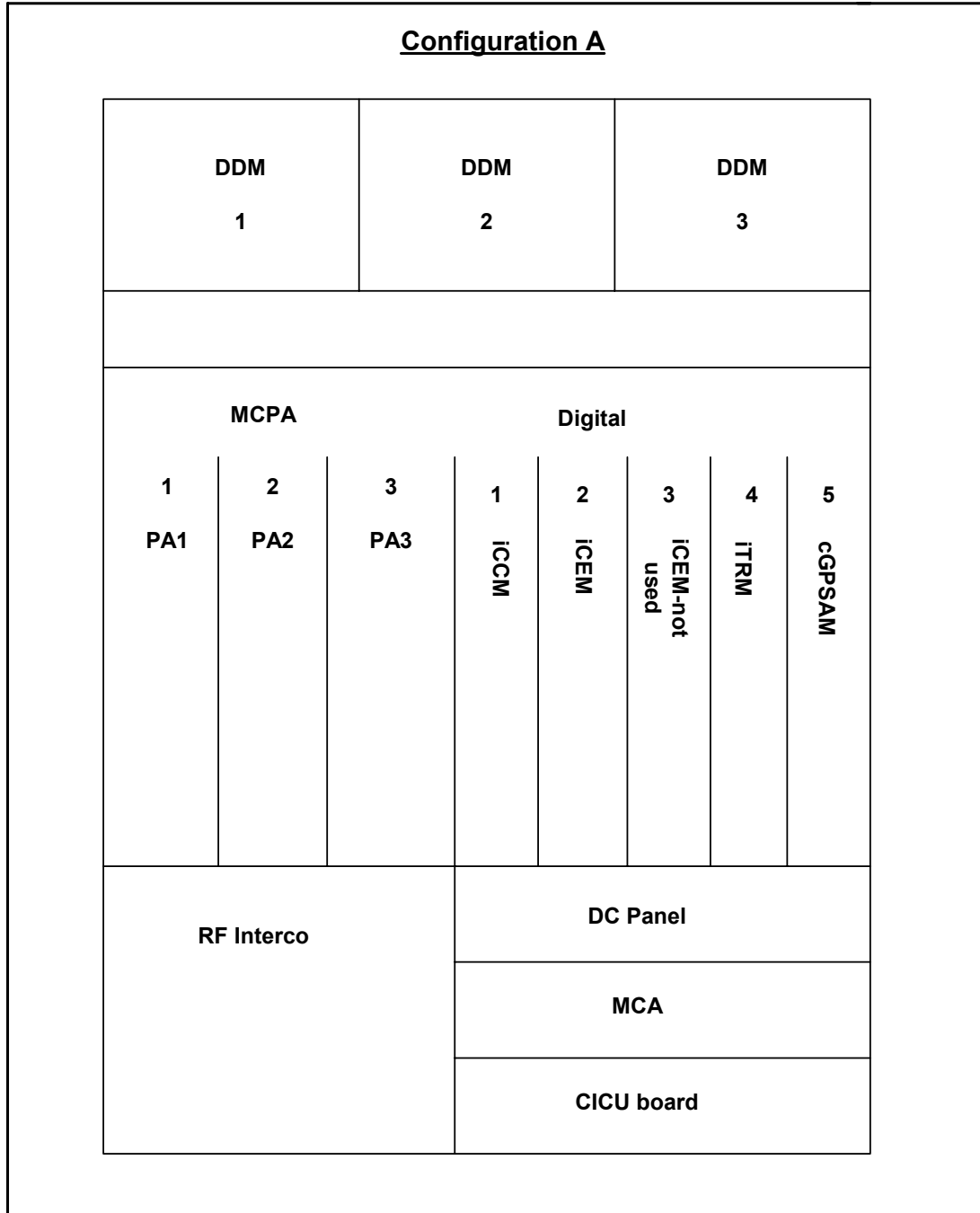
Drawing Reference Number	Title
DRG\45610JD01\001	Configuration A
DRG\45610JD01\002	Configuration B with TMA
DRG\45610JD01\003	Configuration C
DRG\45610JD01\004	Configuration D with TMA
DRG\45610JD01\005	Reference Sensitivity Set-up
DRG\45610JD01\006	Customer Set-up

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3GPP TS 25.141 V5.6.0 Release 5 (2003-03)**

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DRG\45610JD01\001 - Configuration A

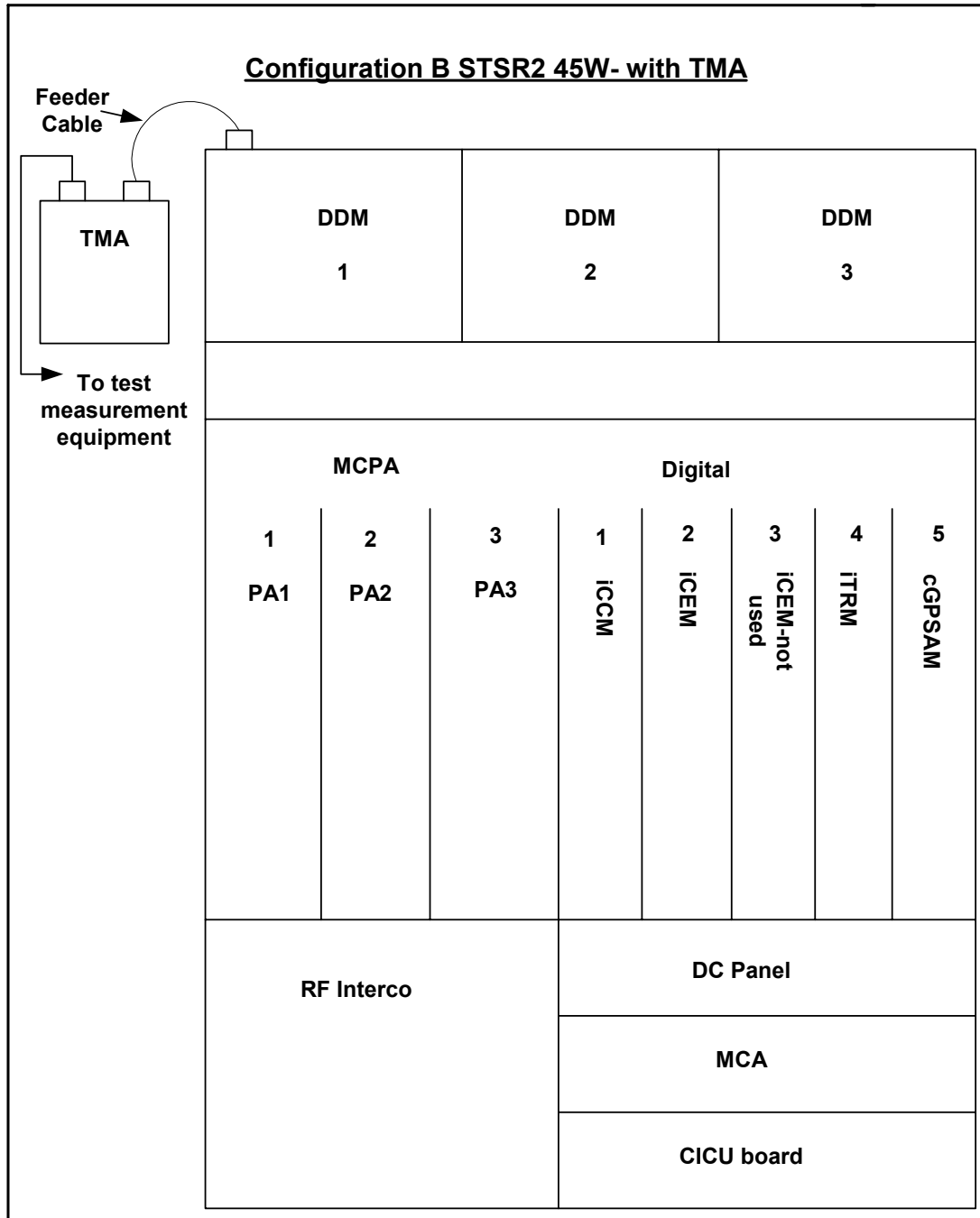


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DRG\45610JD01\002 - Configuration B with TMA



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DRG\45610JD01\003 - Configuration C**Configuration C**

DDM 1			FILLER 2			FILLER 3		
MCPA			Digital					
1 PA1	2 FILLER	3 FILLER	1 iCCM	2 iCEM	3 FILLER	4 iTRM	5 cGPSAM	
RF Interco			DC Panel					
			MCA					
			CICU board					

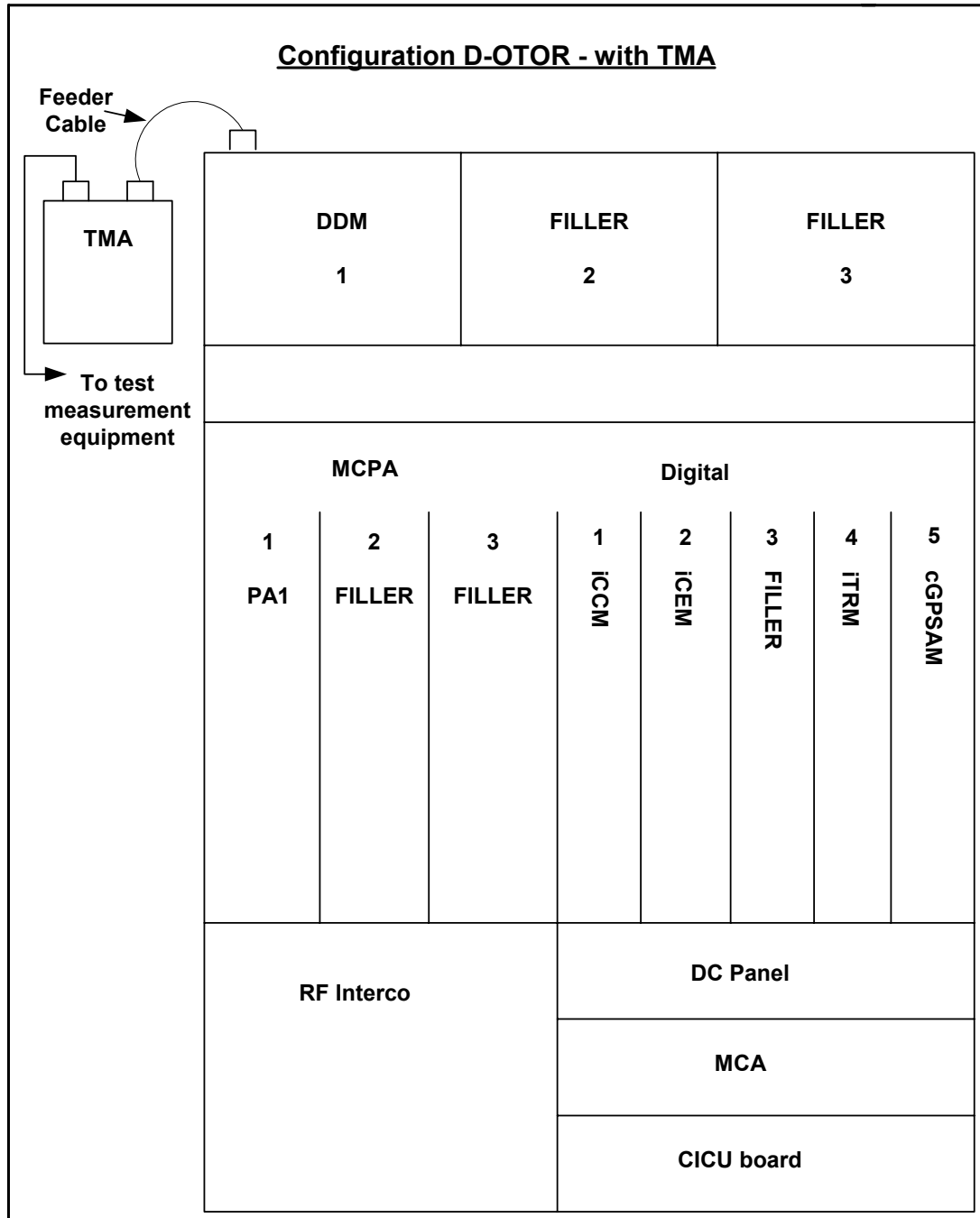
Conformance Testing Department

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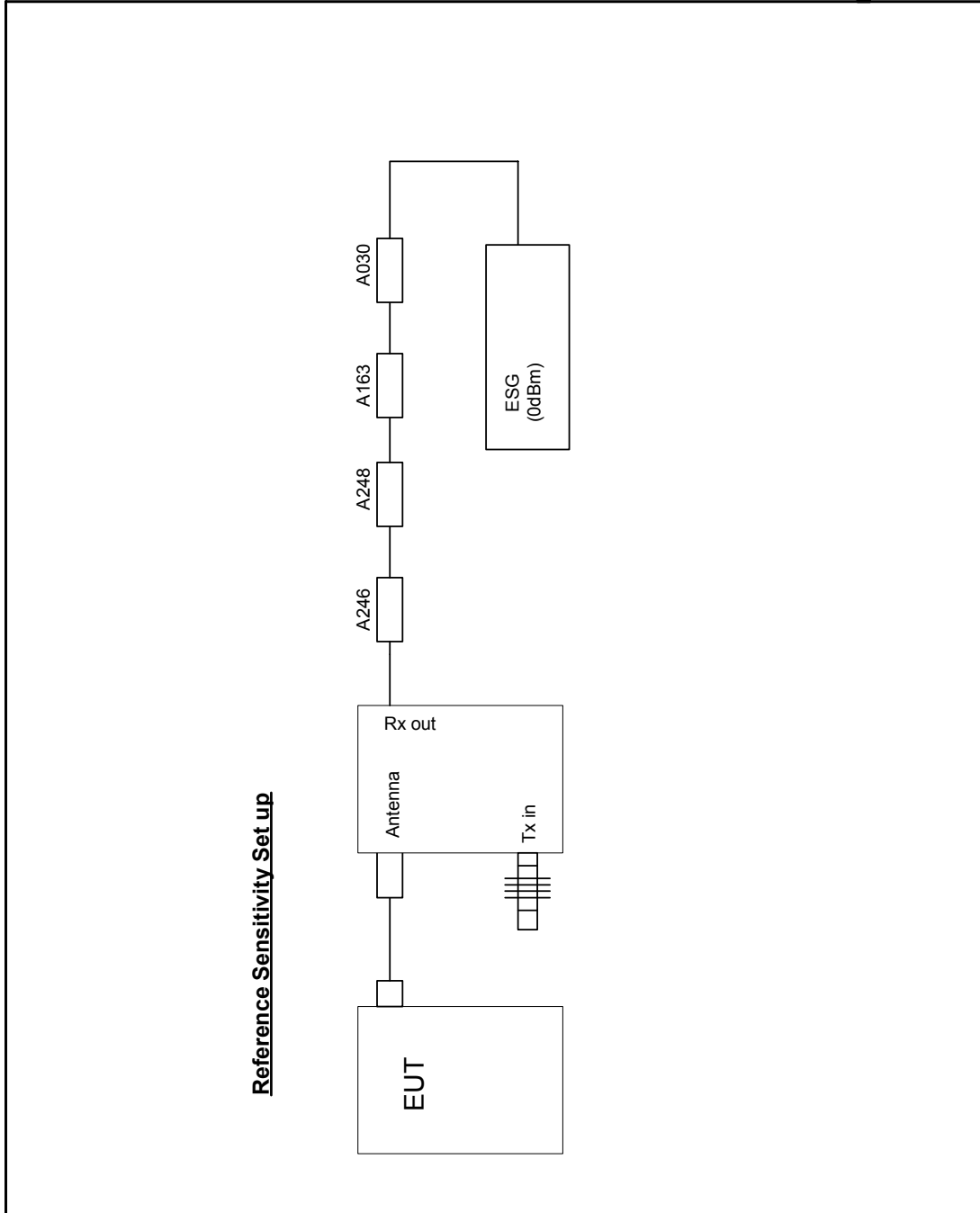
3GPP TS 25.141 V5.6.0 Release 5 (2003-03)

DRG\45610JD01\004 - Configuration D with TMA



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To: FCC Part 24.235, 3GPP TS 25.141 V3.13.0 Release 1999 (2003-03)
3GPP TS 25.141 V5.6.0 Release 5 (2003-03)

DRG\45610JD01\005 - Reference Sensitivity Set-up



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3GPP TS 25.141 V5.6.0 Release 5 (2003-03)

DRG\45610JD01\006 – Customer Set-up

