



FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

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1. INTRODUCTION

This document presents the measurement results of tests performed on this report presents the test data in accordance with FCC Part 24 (PCS1900 band) and Part 22 (GSM850 Band), for the Nortel Networks GSM 18000 Indoor BTS.

This report presents test data for GMSK Modulation.

1.1 SCOPE OF THIS DOCUMENT

This document presents the radio qualification plan of following modules introduction:

- New NG2 GSM 18000 Indoor BTS mechanical frame & new dust filter on Indoor cabinets.
- New DCR Digital Modules RICAM 0D2(CIL17, Rel D2) & ABM2 (CIL9, Rel. D2).

Following RF performances tests will be performed to check FCC compliance and 3GPP TS11.21 compliance:

- At extreme temperature, Radio tests will be performed in NG2 GSM 18000 Indoor BTS.

Radio Tests will be performed in GMSK modulation.

1.2 AUDIENCE FOR THIS DOCUMENT

This document is to be used by any person needing a view on Nortel Networks GSM 18000 Indoor BTS.

2. RELATED DOCUMENTS

2.1 APPLICABLES DOCUMENTS

- [A1] 47 CFR Part 24 PERSONAL COMMUNICATION SERVICES , January2003
- [A2] 47 CFR Part22 PUBLIC MOBILE SERVICES
- [A3] 47 CFR Part2 FREQUENCY ALLOCATION AND RADIO TREATY MATTERS;
GENERAL RULES AND REGULATIONS , October 2003
- [A4] IC RSS-133 Spectrum Management and Telecommunication Policy – Radio
Standard Specifications, Issue 3- June 2005

2.2 REFERENCE DOCUMENTS

- [R1] PE/BTS/DPL/RICAM-ABM-NG2/S18K_RF-TP01
Radio Test Plan for the introduction of DCR RICAM/ABM in
NG2 GSM S18000 Indoor BTS

3. ABBREVIATIONS AND DEFINITIONS

3.1 ABBREVIATIONS

RM	Radio Module
BCF	Base Common Function
BTS	Base Transceiving Station
DDM	Dual Diplexer Module
GSM	Global System for Mobile Communications
GPRS	General Packet Radio Service
EDGE	Enhanced Data for GSM Evolution
PDTCH	Packet Data Logical Channel
PA	Power Amplifier
e-SCPA	EDGE Single Carrier PA
HePA	Edge High Power Amplifier
LNA	Low Noise Amplifier
OMC	Operation and Maintenance Center
TCU	Trans-Coding Unit
MSC	Mobile Switching Center
RF	Radio Frequency
Tx	Transmitter
TxF	Emission Filter

3.2 DEFINITIONS

NG2 GSM S18000 Indoor BTS: Nortel product line

GSM S18000 Indoor BTS: Nortel product line

B Bottom ARFCN. Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as follow:

GSM 850: $F_{B \text{ downlink}} = 869.2\text{MHz}$; $F_{B \text{ uplink}} = 824.2\text{ MHz}$
PCS1900: $F_{B \text{ downlink}} = 1930.2\text{ MHz}$; $F_{B \text{ uplink}} = 1850.2\text{ MHz}$

M Middle ARFCN. Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as follow:

GSM 850: $F_{M \text{ downlink}} = 881.4\text{ MHz}$; $F_{M \text{ uplink}} = 836.4\text{ MHz}$
PCS1900: $F_{M \text{ downlink}} = 1960.0\text{ MHz}$; $F_{M \text{ uplink}} = 1880.0\text{ MHz}$

T Top ARFCN. Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as follow:

GSM 850: $F_{T \text{ downlink}} = 893.8\text{ MHz}$; $F_{T \text{ uplink}} = 848.8\text{ MHz}$
PCS1900: $F_{T \text{ downlink}} = 1989.8\text{ MHz}$; $F_{T \text{ uplink}} = 1909.8\text{ MHz}$

4. TEST CONFIGURATION

4.1 BTS CONFIGURATION UNDER TESTS

DDM-0 850			DDM-1 850			DDM-2 850	
DDM-3 1900			DDM-4 1900			DDM-5 1900	
			RM-0 850 60/45W	RM-1 850 60/45W	RM-2 850 60/45W	RICAM2 ⁺	
			RM2-3 1900 50/30W	RM2-4 1900 50/30W	RM2-5 1900 50/30W	ABM2 ⁺	

Radio Modules is equipped with Tx0 for channel B.M.T

For the RM of PCS1900@ 50/30W, MPRM2 was configured in BTS.

For the RM of GSM850@60/45W, HPRM was configured in BTS.

One type of coupling device is tested:

- DDM H2 on way Tx0.

4.2 MODULE CONFIGURATION UNDER TEST

Designation	Hardware code PEC Code	Release	Serial number	comments
Cable Cabinet	NTN016AS	02	NNTM7880Z8G8	
RICAM	NTN024AA	D2	NNTMGWF306VD	RICAM
ABM	NTN029AF	D2	NNTMGWC50PYR	ABM2
SICS	NTN071GM	02	NNTMLA08N3E9	with new dust filter
DDM	NNT063AM	05	FICT06000E3K	PCS 1900
DDM	NNT063AM	05	FICT06000E2E	PCS 1900
DDM	NNT063AM	04	FICT06000L5Y	PCS 1900
DDM	NTN063HM	05	MANT01600021	GSM 850
DDM	NTN063HM	05	MANT01600025	GSM 850
DDM	NTN063HM	05	MANT01600051	GSM 850
RM2	NTN050PP	D2	NNTM7880Y9QN	PCS 1900
RM2	NTN050PP	D2	NNTM7880Y9QV	PCS 1900
RM2	NTN050CP	D1	NNTM7880Y9R3	PCS 1900
HPRM	NTN050JA	01	NNTM7880WT5G	GSM 850
HPRM	NTN050JA	02	NNTM78901TBX	GSM 850
HPRM	NTN050JA	02	NNTM78901UDS	GSM 850

4.3 TEST EQUIPMENT

Equipment	Model	S/N	Last Cal.	Cal. due
PSA series spectrum analyzer	E4443A	MY44300413	2008-04-22	2009-04-22

- PC, RF cables, attenuators

4.4 BTS SOFTWARE

HPRM 850 Load software version: V16_B4 E14

MPRM2 Load software version: V16_A4 E17

RICAM Load software version: V16_A4 E16

4.5 TEST SOFTWARE

TIL_alarm: V01f 205

TIL_COAM: V16e403

WINTOOL: V05A2_E19.0

5. TEST REPORT: RM2 50/30W PCS1900

5.1 INTRODUCTION

The following information is to introduce NG2 GSM 18000 indoor BTS for Nortel Network, in accordance with FCC Part 24 of the FCC Rules and Regulations.

5.2 MEASUREMENT RESULTS

Measurement Results Summary:

Test Case	Modulation	RESULT	Note
Mean RF Power	GMSK	Complies	Vmin (-40V) / Vmax (-57V)
Modulation accuracy-phase & freq	GMSK	Complies	From -5°C to +45°C by 10°C step

5.3 NAME OF TEST: MEAN RF POWER

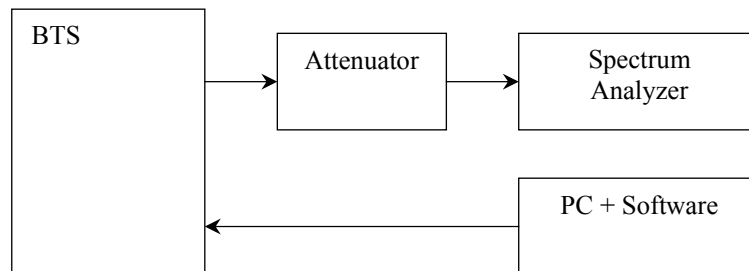
5.3.1 FCC REQUIREMENTS – FCC PART 24.232

Base stations are limited to 1640 watts peak equivalent isotropically radiated power (e.i.r.p.) with an antenna height up to 300 meters HAAT. See 24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power. In no case may the peak output power of a base station transmitter exceed 100 watts.

Specification for Radio Modulation Test:

Band	Modulation	Power	DDM Diplexer		DDM H2	
			Low Limit	Up Limit	Low Limit	Up Limit
PCS1900	GMSK	50w	44.7	47.2	40.7	44.0
	8PSK	30w	42.5	45.1	38.5	42.4

5.3.2 TEST PRINCIPLE



The BTS was configured to transmit at maximum power (static level 0 & Dynamic level 0):
 - for GMSK modulation, in mode GMSK no synchro,

Measurements were carried on frequencies which are C512 (B), C661 (M), C810 (T).

The output power was measured using the PSA which has the following settings:

- Mode: Average
- Reference Level Offset: Corrected to account for cable(s) and attenuator losses

5.3.3 TEST RESULTS

The Table shows the test results of RF Output Power for **GMSK** modulation with several coupling configurations:

5.3.3.1 OUTPUT POWER AT ANTENNA @ -5°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C512	42.48	Pass
	C661	42.98	Pass
	C810	43.05	Pass
-57VDC	C512	42.47	Pass
	C661	42.95	Pass
	C810	43.04	Pass

5.3.3.2 OUTPUT POWER AT ANTENNA @ +5°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C512	42.48	Pass
	C661	42.96	Pass
	C810	43.09	Pass
-57VDC	C512	42.51	Pass
	C661	43.01	Pass
	C810	43.03	Pass

5.3.3.3 OUTPUT POWER AT ANTENNA @ +15°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C512	42.44	Pass
	C661	42.92	Pass
	C810	42.98	Pass
-57VDC	C512	42.21	Pass
	C661	42.70	Pass
	C810	42.83	Pass

5.3.3.4 OUTPUT POWER AT ANTENNA @ +25°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C512	42.04	Pass
	C661	42.62	Pass
	C810	42.68	Pass
-57VDC	C512	42.13	Pass
	C661	42.60	Pass
	C810	42.65	Pass

5.3.3.5 OUTPUT POWER AT ANTENNA @ +35°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C512	42.30	Pass
	C661	42.81	Pass
	C810	42.97	Pass
-57VDC	C512	42.08	Pass
	C661	42.59	Pass
	C810	42.67	Pass

5.3.3.6 OUTPUT POWER AT ANTENNA @ +45°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C512	42.25	Pass
	C661	42.79	Pass
	C810	42.89	Pass
-57VDC	C512	42.11	Pass
	C661	42.71	Pass
	C810	42.77	Pass

Conclusion: The mean RF power test is compliant with the FCC part 24 specification.

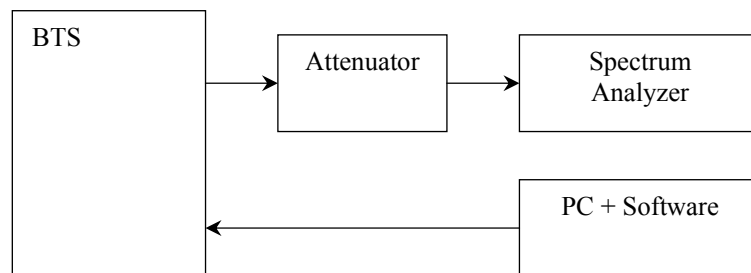
Note: Slight variations in power levels for GSM 1900 and GSM 850 can be observed in the Class II report when they are compared to their original reports; these slight variations are due to measurement uncertainty.

5.4 NAME OF TEST: MODULATION ACCURACY-PHASE & FREQ

5.4.1 FCC REQUIREMENTS

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

5.4.2 TEST PRINCIPLE



The BTS was configured to transmit at maximum power (static level 0) :
- for GMSK modulation, in mode GMSK synchro.

Measurements were carried on frequencies which are C512 (B), C661 (M), & C810 (T).

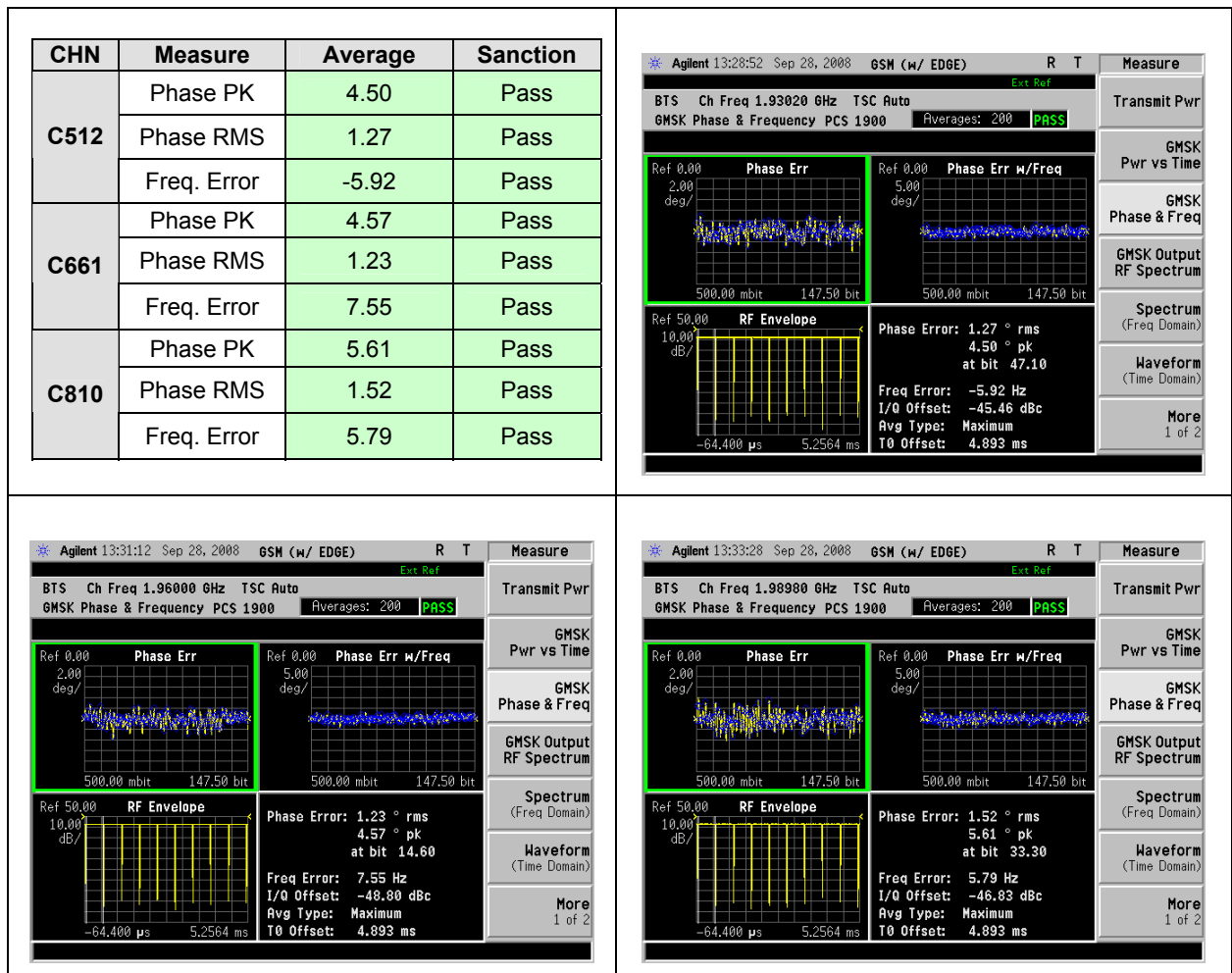
5.4.3 TEST RESULTS

The Table shows the test results of Phase and Mean Frequency for **GMSK** modulation with several coupling configurations:

5.4.3.1 TESTS AT TEMPERATURE -5 °C

5.4.3.1.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ H2D configuration:



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5.4.3.1.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C512	Phase PK	4.56	Pass
	Phase RMS	1.26	Pass
	Freq. Error	-6.57	Pass
C661	Phase PK	4.78	Pass
	Phase RMS	1.21	Pass
	Freq. Error	6.55	Pass
C810	Phase PK	5.65	Pass
	Phase RMS	1.50	Pass
	Freq. Error	-7.06	Pass

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5.4.3.2 TESTS AT TEMPERATURE +5 °C

5.4.3.2.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C512	Phase PK	4.32	Pass
	Phase RMS	1.26	Pass
	Freq. Error	-5.26	Pass
C661	Phase PK	4.69	Pass
	Phase RMS	1.20	Pass
	Freq. Error	4.63	Pass
C810	Phase PK	5.39	Pass
	Phase RMS	1.49	Pass
	Freq. Error	-5.79	Pass

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5.4.3.2.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C512	Phase PK	4.55	Pass
	Phase RMS	1.25	Pass
	Freq. Error	-4.34	Pass
C661	Phase PK	5.08	Pass
	Phase RMS	1.21	Pass
	Freq. Error	5.14	Pass
C810	Phase PK	5.49	Pass
	Phase RMS	1.49	Pass
	Freq. Error	-6.06	Pass

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5.4.3.3 TESTS AT TEMPERATURE +15 °C

5.4.3.3.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C512	Phase PK	4.64	Pass
	Phase RMS	1.23	Pass
	Freq. Error	-6.29	Pass
C661	Phase PK	4.39	Pass
	Phase RMS	1.21	Pass
	Freq. Error	-6.03	Pass
C810	Phase PK	5.57	Pass
	Phase RMS	1.48	Pass
	Freq. Error	-7.43	Pass

FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

5.4.3.3.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C512	Phase PK	4.29	Pass
	Phase RMS	1.21	Pass
	Freq. Error	-7.25	Pass
C661	Phase PK	4.79	Pass
	Phase RMS	1.21	Pass
	Freq. Error	-6.79	Pass
C810	Phase PK	5.46	Pass
	Phase RMS	1.50	Pass
	Freq. Error	-6.09	Pass

FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

5.4.3.4 TESTS AT TEMPERATURE +25 °C

5.4.3.4.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C512	Phase PK	4.43	Pass
	Phase RMS	1.23	Pass
	Freq. Error	-6.51	Pass
C661	Phase PK	4.57	Pass
	Phase RMS	1.16	Pass
	Freq. Error	-5.86	Pass
C810	Phase PK	5.34	Pass
	Phase RMS	1.48	Pass
	Freq. Error	9.32	Pass

FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

5.4.3.4.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C512	Phase PK	4.32	Pass
	Phase RMS	1.22	Pass
	Freq. Error	-6.20	Pass
C661	Phase PK	4.76	Pass
	Phase RMS	1.17	Pass
	Freq. Error	-7.09	Pass
C810	Phase PK	5.55	Pass
	Phase RMS	1.45	Pass
	Freq. Error	-8.49	Pass

FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

5.4.3.5 TESTS AT TEMPERATURE +35 °C

5.4.3.5.1 PHASE AND FRENQUENCY ERROR @ -40VDC

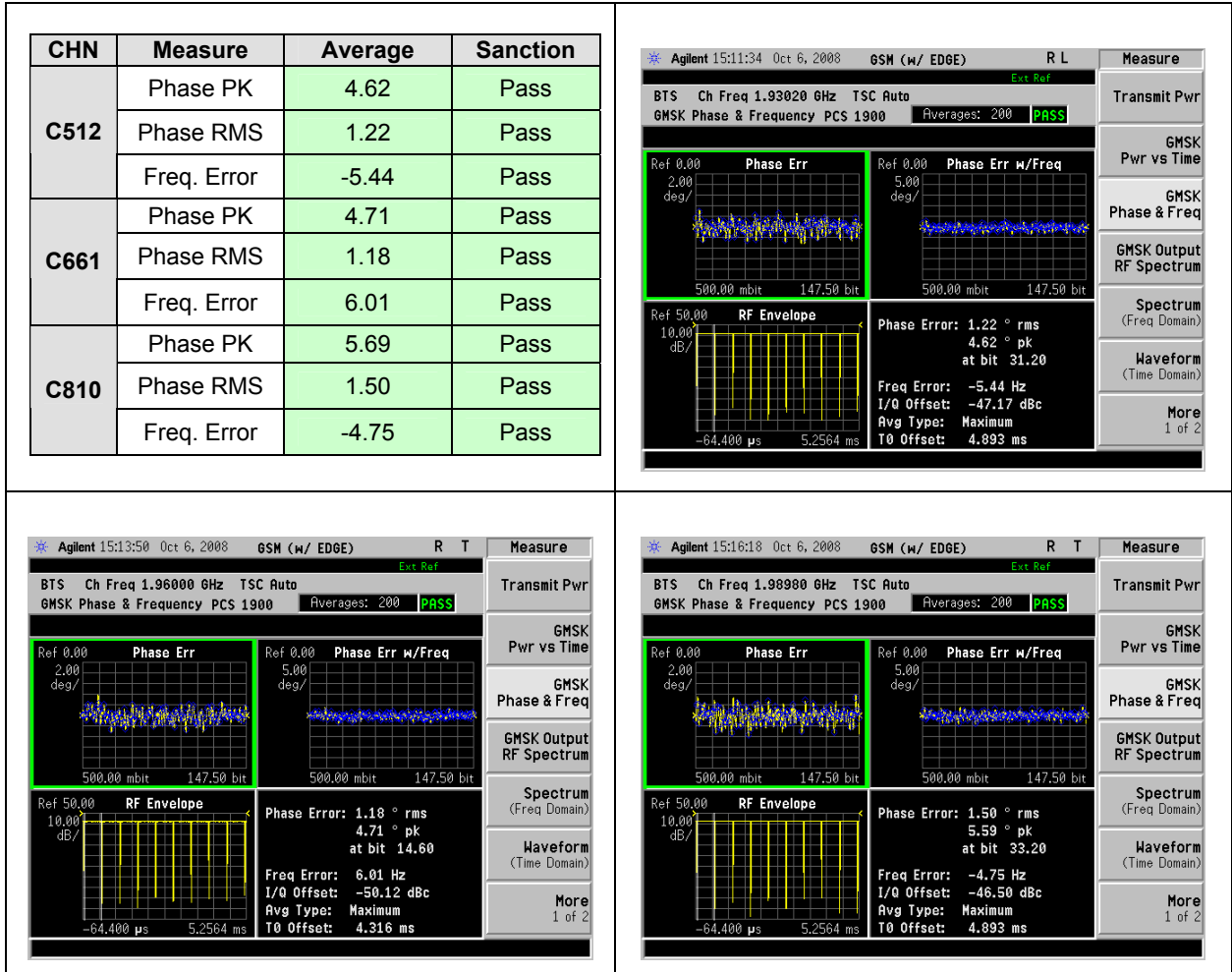
➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C512	Phase PK	4.38	Pass
	Phase RMS	1.23	Pass
	Freq. Error	5.94	Pass
C661	Phase PK	4.93	Pass
	Phase RMS	1.16	Pass
	Freq. Error	5.08	Pass
C810	Phase PK	5.53	Pass
	Phase RMS	1.48	Pass
	Freq. Error	-8.90	Pass

FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

5.4.3.5.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:



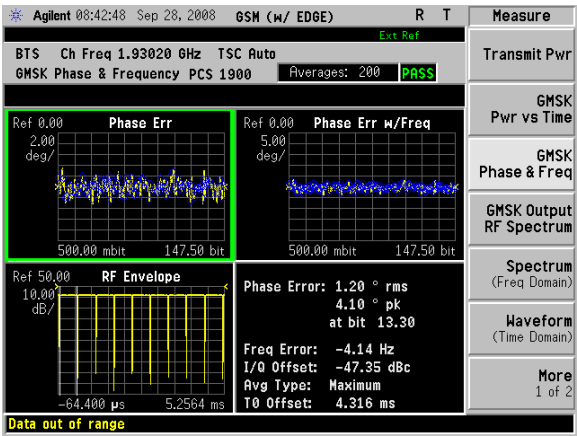
FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

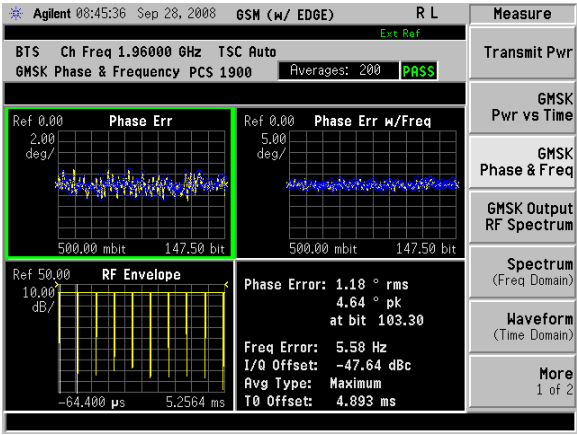
5.4.3.6 TESTS AT TEMPERATURE +45 °C

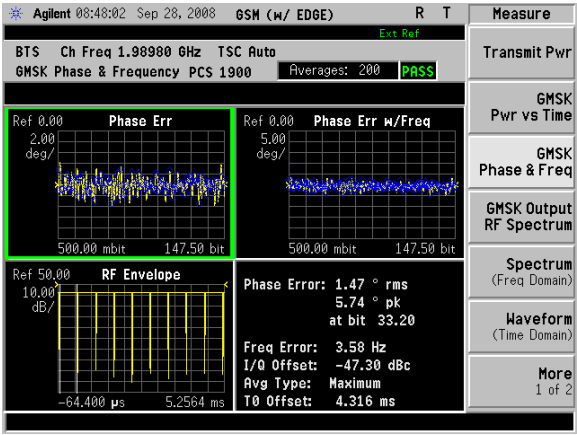
5.4.3.6.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C512	Phase PK	4.10	Pass
	Phase RMS	1.20	Pass
	Freq. Error	-4.14	Pass
C661	Phase PK	4.64	Pass
	Phase RMS	1.18	Pass
	Freq. Error	5.58	Pass
C810	Phase PK	5.74	Pass
	Phase RMS	1.47	Pass
	Freq. Error	3.58	Pass



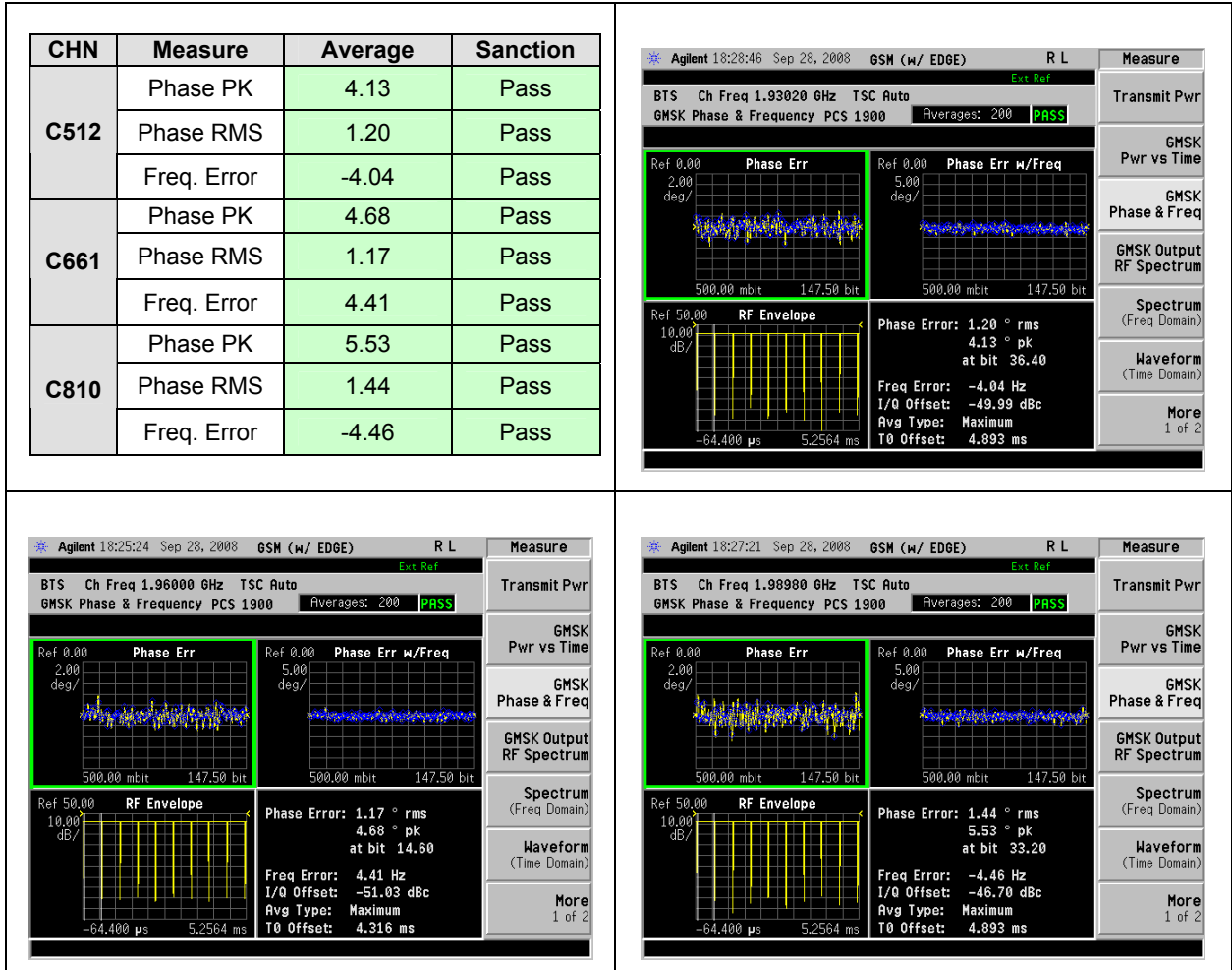




FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

5.4.3.6.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:



Conclusion: In GMSK modulation, the phase & frequency error test is compliant with the FCC part 24 specification.

6. TEST REPORT: HPRM GSM850

6.1 INTRODUCTION

The following information is to introduce GSM 18000 indoor BTS for Nortel Network, in accordance with FCC Part 22 of the FCC Rules and Regulations.

6.2 MEASUREMENT RESULTS

Measurement Results Summary:

Test Case	Modulation	RESULT	Note
Mean RF Power	GMSK	Complies	Vmin (-40V) / Vmax (-57V)
Modulation accuracy-phase & freq	GMSK	Complies	From -5°C to +45°C by 10°C step

6.3 NAME OF TEST: MEAN RF POWER

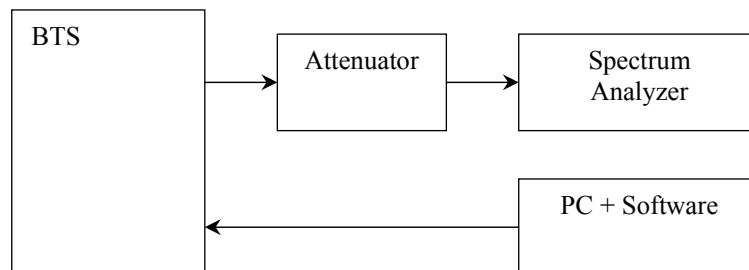
6.3.1 FCC REQUIREMENTS – FCC PART 22.913L

- (a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (e.i.r.p.) with an antenna height up to 300 meters HAAT. See 24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power. In no case may the peak output power of a base station transmitter exceed 500 watts.
- (b) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Specification for Radio Modulation Test:

Band	Modulation	Power	DDM Diplexer		DDM H2	
			Low Limit	Up Limit	Low Limit	Up Limit
GSM850	GMSK	60w	45.7	47.9	41.9	45.1
	8PSK	45w	44.4	46.6	40.6	43.8

6.3.2 TEST PRINCIPLE



The BTS was configured to transmit at maximum power (static level 0 & Dynamic level 0):
 - for GMSK modulation, in mode GMSK no synchro,

Measurements were carried on frequencies which are C128 (B), C190 (M), and C251 (T).

The output power was measured using the PSA which has the following settings:

Mode: Average
 Reference Level Offset: Corrected to account for cable(s) and attenuator losses

6.3.3 TEST RESULTS

The Table shows the test results of RF Output Power for **GMSK** modulation with several coupling configurations:

6.3.3.1 OUTPUT POWER AT ANTENNA @ -5°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C128	43.15	Pass
	C190	43.76	Pass
	C251	43.78	Pass
-57VDC	C128	43.24	Pass
	C190	43.71	Pass
	C251	43.75	Pass

6.3.3.2 OUTPUT POWER AT ANTENNA @ +5°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C128	43.08	Pass
	C190	43.60	Pass
	C251	43.64	Pass
-57VDC	C128	43.26	Pass
	C190	43.80	Pass
	C251	43.87	Pass

6.3.3.3 OUTPUT POWER AT ANTENNA @ +15°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C128	42.88	Pass
	C190	43.42	Pass
	C251	43.54	Pass
-57VDC	C128	43.08	Pass
	C190	43.63	Pass
	C251	43.62	Pass

6.3.3.4 OUTPUT POWER AT ANTENNA @ +25°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C128	43.01	Pass
	C190	43.50	Pass
	C251	43.51	Pass
-57VDC	C128	42.83	Pass
	C190	43.39	Pass
	C251	43.42	Pass

6.3.3.5 OUTPUT POWER AT ANTENNA @ +35°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C128	42.73	Pass
	C190	43.29	Pass
	C251	43.31	Pass
-57VDC	C128	42.78	Pass
	C190	43.36	Pass
	C251	43.32	Pass

6.3.3.6 OUTPUT POWER AT ANTENNA @ +45°C

➤ H2D configuration:

Power supply	ARFCN	Mean Power (dBm)	Sanction
-40VDC	C128	42.64	Pass
	C190	43.23	Pass
	C251	43.23	Pass
-57VDC	C128	42.60	Pass
	C190	43.13	Pass
	C251	43.14	Pass

Conclusion: The mean RF power test is compliant with the FCC part 22 specification.

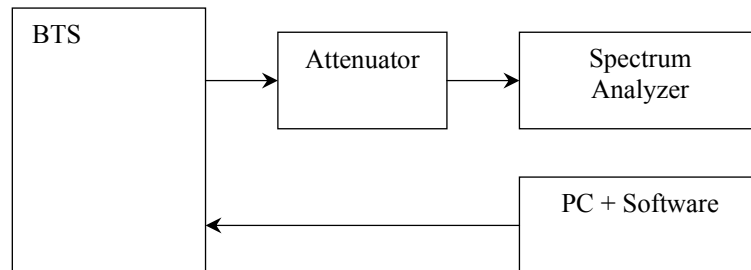
Note: Slight variations in power levels for GSM 1900 and GSM 850 can be observed in the Class II report when they are compared to their original reports; these slight variations are due to measurement uncertainty.

6.4 NAME OF TEST: MODULATION ACCURACY-PHASE & FREQ

6.4.1 FCC REQUIREMENTS

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

6.4.2 TEST PRINCIPLE



The BTS was configured to transmit at maximum power (static level 0) :
- for GMSK modulation, in mode GMSK synchro.

Measurements were carried on frequencies which are C128 (B), C190 (M), & C251 (T).

FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

6.4.3 TEST RESULTS

The Table shows the test results of Phase and Mean Frequency for **GMSK** modulation with several coupling configurations:

6.4.3.1 TESTS AT TEMPERATURE -5 °C

6.4.3.1.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C128	Phase PK	3.98	Pass
	Phase RMS	1.31	Pass
	Freq. Error	9.39	Pass
C190	Phase PK	4.26	Pass
	Phase RMS	1.26	Pass
	Freq. Error	7.79	Pass
C251	Phase PK	5.17	Pass
	Phase RMS	1.52	Pass
	Freq. Error	-7.63	Pass

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6.4.3.1.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C128	Phase PK	3.84	Pass
	Phase RMS	1.34	Pass
	Freq. Error	8.63	Pass
C190	Phase PK	4.44	Pass
	Phase RMS	1.35	Pass
	Freq. Error	10.82	Pass
C251	Phase PK	3.80	Pass
	Phase RMS	1.23	Pass
	Freq. Error	9.31	Pass

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6.4.3.2 TESTS AT TEMPERATURE +5 °C

6.4.3.2.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C128	Phase PK	5.56	Pass
	Phase RMS	1.50	Pass
	Freq. Error	8.73	Pass
C190	Phase PK	5.62	Pass
	Phase RMS	1.42	Pass
	Freq. Error	8.01	Pass
C251	Phase PK	6.16	Pass
	Phase RMS	1.55	Pass
	Freq. Error	9.76	Pass

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6.4.3.2.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C128	Phase PK	4.01	Pass
	Phase RMS	1.36	Pass
	Freq. Error	-8.08	Pass
C190	Phase PK	4.27	Pass
	Phase RMS	1.24	Pass
	Freq. Error	9.95	Pass
C251	Phase PK	3.86	Pass
	Phase RMS	1.28	Pass
	Freq. Error	9.85	Pass

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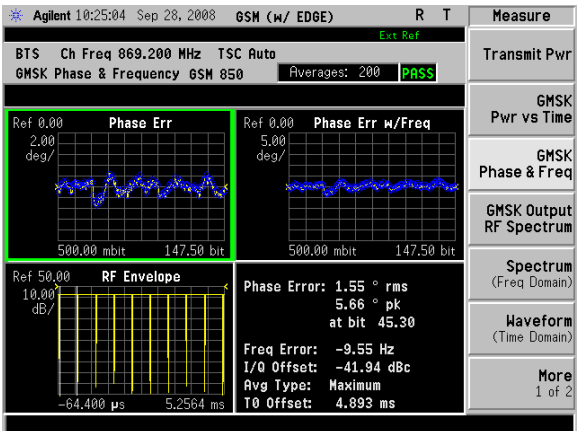
FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

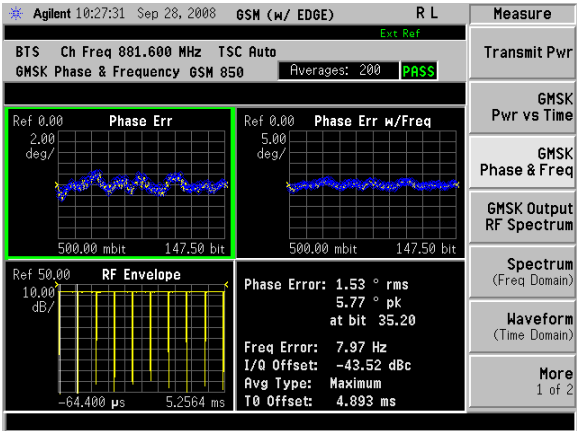
6.4.3.3 TESTS AT TEMPERATURE +15 °C

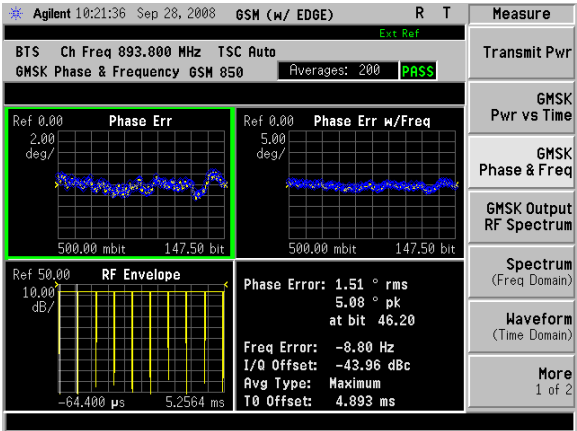
6.4.3.3.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C128	Phase PK	5.66	Pass
	Phase RMS	1.55	Pass
	Freq. Error	-9.55	Pass
C190	Phase PK	5.77	Pass
	Phase RMS	1.53	Pass
	Freq. Error	7.97	Pass
C251	Phase PK	5.08	Pass
	Phase RMS	1.51	Pass
	Freq. Error	-8.00	Pass







FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

6.4.3.3.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C128	Phase PK	6.99	Pass
	Phase RMS	1.73	Pass
	Freq. Error	-10.40	Pass
C190	Phase PK	5.68	Pass
	Phase RMS	1.47	Pass
	Freq. Error	10.60	Pass
C251	Phase PK	5.10	Pass
	Phase RMS	1.52	Pass
	Freq. Error	-10.22	Pass

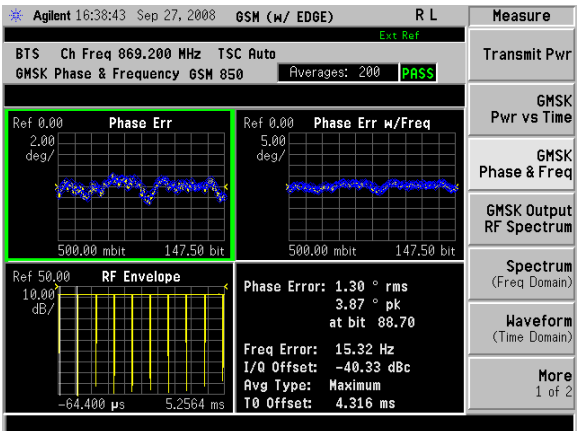
FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

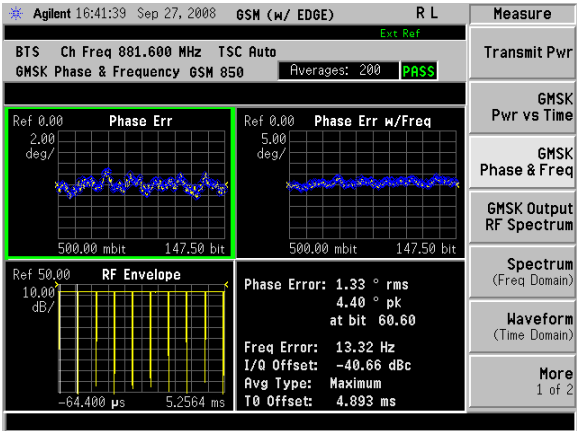
6.4.3.4 TESTS AT TEMPERATURE +25 °C

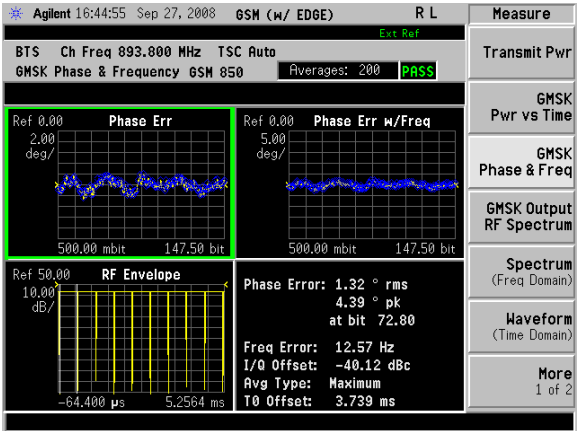
6.4.3.4.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C128	Phase PK	3.87	Pass
	Phase RMS	1.30	Pass
	Freq. Error	15.32	Pass
C190	Phase PK	4.40	Pass
	Phase RMS	1.33	Pass
	Freq. Error	13.32	Pass
C251	Phase PK	4.39	Pass
	Phase RMS	1.32	Pass
	Freq. Error	12.57	Pass







FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

6.4.3.4.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ H2D configuration:

CHN	Measure	Average	Sanction
C128	Phase PK	5.93	Pass
	Phase RMS	1.41	Pass
	Freq. Error	9.39	Pass
C190	Phase PK	5.47	Pass
	Phase RMS	1.49	Pass
	Freq. Error	9.88	Pass
C251	Phase PK	5.30	Pass
	Phase RMS	1.38	Pass
	Freq. Error	9.44	Pass

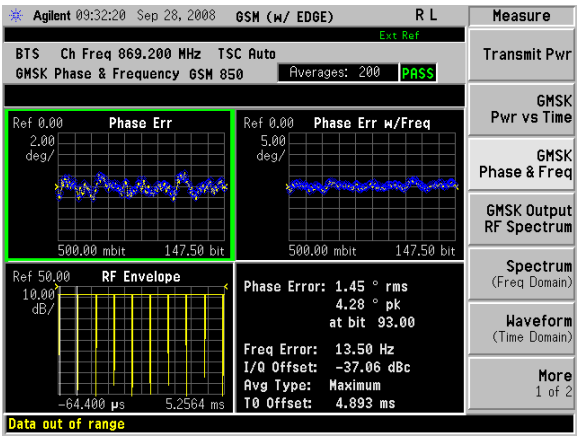
FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

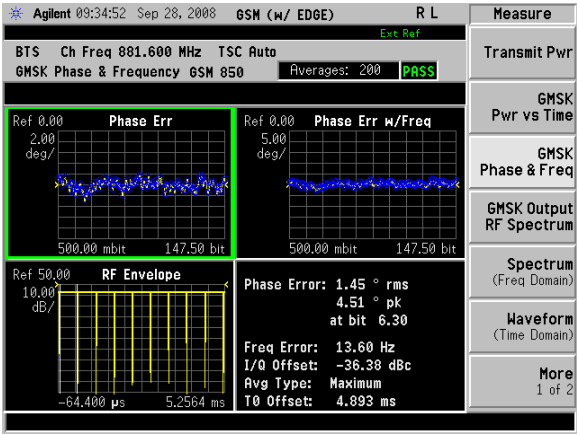
6.4.3.5 TESTS AT TEMPERATURE +35 °C

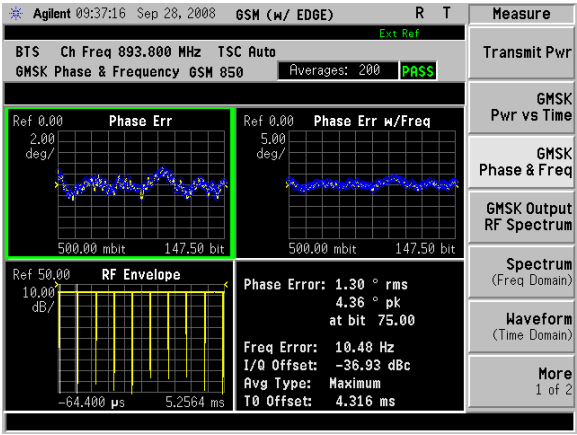
6.4.3.5.1 PHASE AND FRENQUENCY ERROR @ -40VDC

➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C128	Phase PK	4.28	Pass
	Phase RMS	1.45	Pass
	Freq. Error	13.59	Pass
C190	Phase PK	4.51	Pass
	Phase RMS	1.45	Pass
	Freq. Error	13.60	Pass
C251	Phase PK	4.36	Pass
	Phase RMS	1.30	Pass
	Freq. Error	10.48	Pass







FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

6.4.3.5.2 PHASE AND FRENQUENCY ERROR @ -57VDC

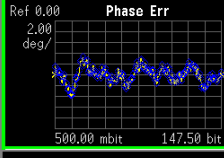
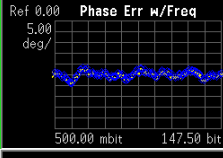
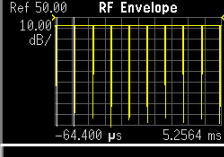
➤ H2D configuration:

CHN	Measure	Average	Sanction
C128	Phase PK	5.03	Pass
	Phase RMS	1.55	Pass
	Freq. Error	-11.32	Pass
C190	Phase PK	4.87	Pass
	Phase RMS	1.44	Pass
	Freq. Error	-11.72	Pass
C251	Phase PK	4.67	Pass
	Phase RMS	1.54	Pass
	Freq. Error	-10.09	Pass

Agilent 14:57:12 Oct 6, 2008 GSM (w/ EDGE) R L Measure

BTS Ch Freq 869.200 MHz TSC Auto Ext Ref

GMSK Phase & Frequency GSM 850 Averages: 200 PASS

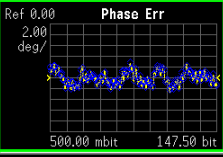
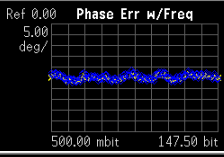
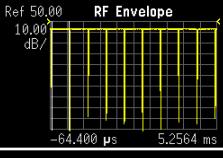
Phase Error: 1.55 ° rms
5.03 ° pk
at bit 16.30

Freq Error: -11.32 Hz
I/Q Offset: -35.75 dBc
Avg Type: Maximum
T0 Offset: 4.893 ms

Agilent 15:00:29 Oct 6, 2008 GSM (w/ EDGE) R L Measure

BTS Ch Freq 881.600 MHz TSC Auto Ext Ref

GMSK Phase & Frequency GSM 850 Averages: 200 PASS

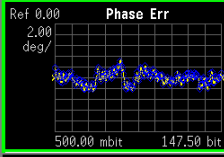
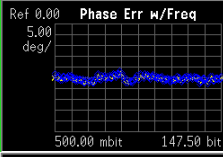
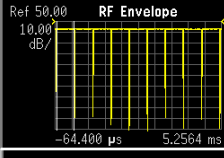
Phase Error: 1.44 ° rms
4.87 ° pk
at bit 15.00

Freq Error: -11.72 Hz
I/Q Offset: -36.56 dBc
Avg Type: Maximum
T0 Offset: 4.893 ms

Agilent 15:04:01 Oct 6, 2008 GSM (w/ EDGE) R L Measure

BTS Ch Freq 893.000 MHz TSC Auto Ext Ref

GMSK Phase & Frequency GSM 850 Averages: 200 PASS

Phase Error: 1.54 ° rms
4.67 ° pk
at bit 40.50

Freq Error: -10.09 Hz
I/Q Offset: -36.48 dBc
Avg Type: Maximum
T0 Offset: 3.739 ms

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6.4.3.6 TESTS AT TEMPERATURE +45 °C

6.4.3.6.1 PHASE AND FRENQUENCY ERROR @ -40VDC

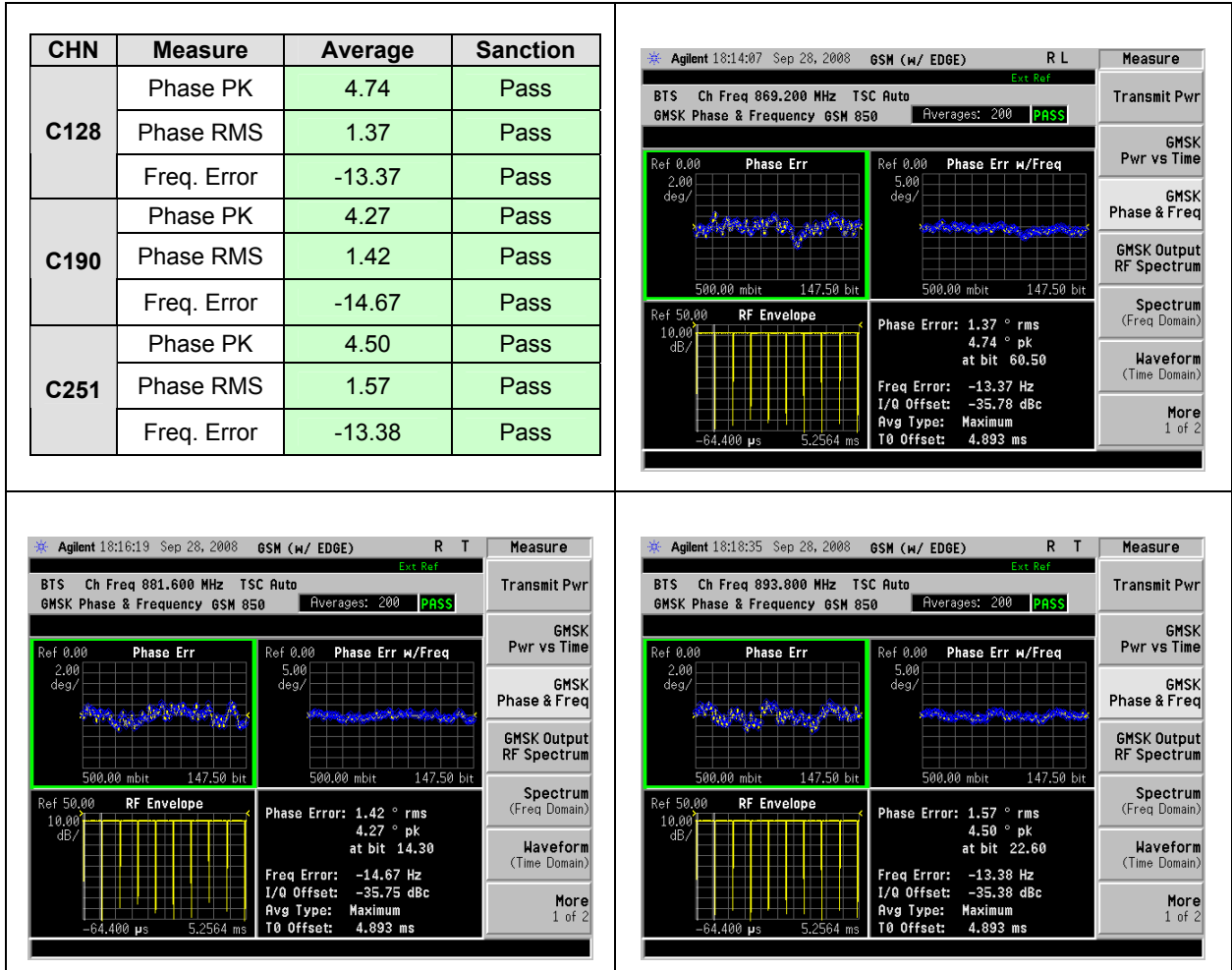
➤ **H2D configuration:**

CHN	Measure	Average	Sanction
C128	Phase PK	4.61	Pass
	Phase RMS	1.46	Pass
	Freq. Error	-9.19	Pass
C190	Phase PK	4.49	Pass
	Phase RMS	1.44	Pass
	Freq. Error	-8.06	Pass
C251	Phase PK	4.62	Pass
	Phase RMS	1.46	Pass
	Freq. Error	-9.60	Pass

FCC Radio Test Report for the qualification of RICAM 0D2 /ABM2 in NG2 GSM 18000 Indoor BTS in extreme conditions

6.4.3.6.2 PHASE AND FRENQUENCY ERROR @ -57VDC

➤ **H2D configuration:**



Conclusion: In GMSK modulation, the phase & frequency error test is compliant with the FCC part 22 specification.

7. CONCLUSION

Table below lists all tests item during the GSM 18000 Indoor BTS qualification:

Band	Test Item	Modulation	RESULT
PCS 1900	Mean RF Power	GMSK	Pass
	Modulation accuracy-phase & freq	GMSK	Pass
GSM 850	Mean RF Power	GMSK	Pass
	Modulation accuracy-phase & freq	GMSK	Pass