FCC Part 22&24 Radio Test Report for GSM850 & PCS1900 GSM6000 BTS (FCC ID AB6BTS6000D)

Document number: PE/BTS/DJD/022176
Document issue: V01.01/EN
Document status: Standard
Date: 10/05/2007

RF Tests concerning FCC are performed in Les Miroirs building – laboratory 007 – Nortel Networks, 38 Bd Paul Cézanne, 78280 Guyancourt –France

Authors: **A. CAILLE**
BTS RF HW GSM engineer

Approved by: **C. DOMEC**
BTS GSM HW Senior manager

Printed in France

PUBLICATION HISTORY

10/May /2006 **A. CAILLE**

Document creation -

Dual Band GSM850 & PCS1900 GSM 6000 BTS introduction

Issue V01.01 / EN

Standard

CONTENTS

1. INTRODUCTION

1.1. OBJECT

This document presents the measurement results of tests performed on this report presents the test data in accordance with FCC Part 24 Subpart E for the Nortel Networks GSM 6000 BTS in Dual Band GSM850 / PCS1900 band.

This report presents test data for GMSK modulation and 8PSK modulation (EDGE functionality).

1.2. SCOPE OF THIS DOCUMENT

This document applies to the Nortel Networks GSM 6000 BTS (FCC ID AB6BTS6000D).

GSM 6000 BTS can integrate a maximum of 2 Radio-Modules (RM).

This report presents the test data in accordance with FCC Part 24 Subpart E for the S6000 Outdoor Base-stations in PCS1900 band configured with:

- Radio module PCS1900 30W (GMSK / Edge),

This report presents also the test data in accordance with FCC Part 22, Subpart H, for the S6000 Outdoor Base-stations in GSM850 Band configured with:

- **New radio module HPRM 3T GSM850 (GMSK 60W / Edge 45W)**

These results can be applied for Dual Band GSM850 / PCS1900 GSM 6000 BTS configuration.

This report presents test data for GMSK modulation and 8PSK modulation (EDGE functionality).

1.3. AUDIENCE FOR THIS DOCUMENT

This document is to be used by any person needing a view on Nortel Networks GSM 6000 BTS.

2. RELATED DOCUMENTS

2.1. APPLICABLE DOCUMENTS

[A1]	47CFR Part 24	PERSONAL COMMUNICATIONS SERVICES January 2003
[A2]	CFR 47 - Part 22	PUBLIC MOBILE SERVICES
[A3]	47CFR Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS October 2003
[A4]	IC RSS-133	Spectrum Management and Telecommunication Policy – Radio Standards Specifications Issue 3– June 2005

2.2. REFERENCE DOCUMENTS

[R1] Radio Test Report for the qualification of GSM 1900Mhz BTS 6000 Cabinets (FCC ID AB6BTS6000)
PCS/BTS/DJD/020396 – v01.01/EN - 15/11/2006

[R2] Radio Test Report in extreme conditions for the qualification of GSM1900Mhz BTS 6000 Cabinets (FCC)
EXTERNAL LABORATORY LCIE – N° 60049617-550145-R-TR-FCC

[R3] GSM 18000 Outdoor BTS Radio Test Report according to FCC Part 24 & FCC Part 22 (FCC ID AB6BTS18OUT)
PE/BTS/DJD/021883 – V01.01/EN - 01/03/2007

[R4] Radio Test Report in extreme conditions for the introduction of RICAM and GSM 850MHz band in GSM 6000 BTS Outdoor AC version (FCC)
Laboratory LCIE: 60056545-557309-R-TR-6oac-FCC - May2007

3. TEST REPORT: RM PCS1900 &GSM 6000 BTS

3.1. INTRODUCTION

The following information is submitted for update of the type acceptance of a Broadband PCS Base Station for Northern Telecom, Inc., in accordance with FCC Part 24, Subpart E and Part 2, Subpart J of the FCC Rules and Regulations.

The measurement procedures were in accordance with the requirements of Part 2.

3.2. TX RF CHAIN CONFIGURATION UNDER TESTS

Tests are performed on Radio Module (RM) in first slot RM0.

Radio Module is equipped with three identical RF ways Tx0, Tx1 and Tx2.
Each RF path includes a 30W Power amplifier.
The different RF way can be coupled with a coupling module placed before antenna connector.

Two types of coupling device are tested:

- DDM Duplexer on ways Tx0, Tx1,Tx2
- DDM H2 on way Tx0

H2 combiner introduces additional 3dB losses

3.3. MEASUREMENT RESULTS

Measurement Results Summary:

FCC Measurement Specification	IC Limit Specification	Description	Result	Note
2.1046(a), 2.1033(c)(8) 24.232	6.2	RF Power Output	Complies	Results available on this document **[R1]**
2.1049		Occupied Bandwidth	Complies	
2.1051, 2.1057 24.238	6.3 6.4	Spurious Emissions at Antenna Terminals	Complies	
2.1055 24.235	7.0	Frequency Stability	Complies	**[R2]** External Laboratory Additional report

CONCLUSION:

GSM 6000 BTS (FCC ID AB6BTS6000D) is compliant with FCC Part24 requirement.

The following Power limitation is required to comply with Adjacent Band spurious which depends on coupling configuration:

Coupling configuration	System Power limitation GMSK modulation	System Power limitation 8 PSK modulation
DDM Duplexer & Tx Filter (without H2)	**Power Limitation :** Pmax – 2 dB = 42 dBm	**Power Limitation : Pmax – 2 dB = 42 dBm**
DDM H2 Tx Filter H2	**Pmax = 41 dBm**	**Pmax = 41 dBm**

3.4. NAME OF TEST: RF POWER OUTPUT

3.4.1 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.

3.4.2 TEST RESULTS

The Table shows the test results of RF Output Power for **GMSK modulation** with DDM Duplexer configuration:

Radio Channel	Frequency (MHz)	Tx0 DDM w/o H2 Power (dBm)	Tx1 DDM w/o H2 Power (dBm)	Tx2 TXF w/o H2 Power (dBm)	PA Output Power (dBm)	Limit (dBm)
512	1930,2	43.3	43.4	43.4	GMSK (30W) 44.8 dBm +/- 0.5 dB	50
661	1960	43.7	43.8	43.8		
810	1989,8	43.6	43.6	43.6		

The Table shows the test results of RF Output Power for **8PSK modulation** with DDM duplexer configurations:

Radio Channel	Frequency (MHz)	Tx0 DDM w/o H2 Power (dBm)	Tx1 DDM w/o H2 Power (dBm)	Tx2 TXF w/o H2 Power (dBm)	PA Output Power (dBm)	Limit (dBm)
512	1930,2	43.5	43.5	43.6	8PSK (30W) 44.8 dBm +/- 0.5 dB	50
661	1960	43.8	43.9	43.9		
810	1989,8	43.7	43.8	43.8		

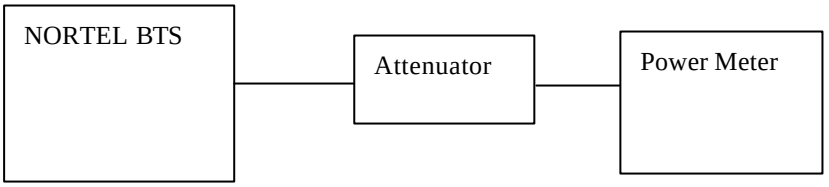
The Table shows the test results of RF Output Power with DDM H2 configuration:

Radio Channel	Frequency (MHz)	Tx0 DDM H2 Power (dBm) GMSK	Tx0 DDM H2 Power (dBm) 8PSK	PA Output Power (dBm)	Limit (dBm)
512	1930,2	40	40.2	GMSK / 8PSK (30W) 44.8 dBm +/- 0.5 dB	50
661	1960	40.4	40.5		
810	1989,8	40.2	40.4		

3.4.3 TEST PROCEDURE

The equipment was configured as shown in schematic 1.

Schematic: Test configuration for RF Output Power



The BTS was configured to transmit at maximum power (static level 0) :

- for GMSK modulation, in mode GMSK no synchro,
- for 8PSK modulation, in mode logical PDCH, Type GPRS, coding MCS5.

Measurements were made at frequencies which are the bottom, middle and top of each of the licensed blocks.

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

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

3.5. NAME OF TEST: OCCUPIED BANDWIDTH

3.5.1 FCC REQUIREMENTS

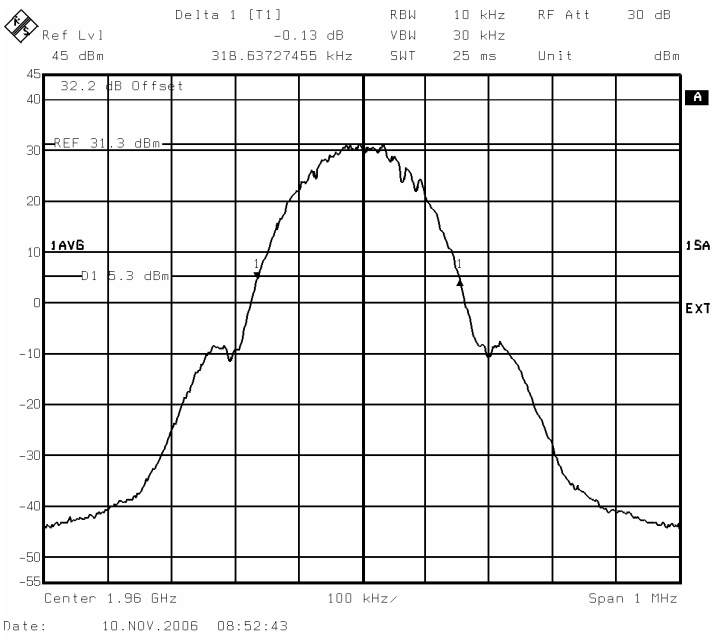
The occupied bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.5.2 TEST RESULTS WITH DDM DP CONFIGURATION

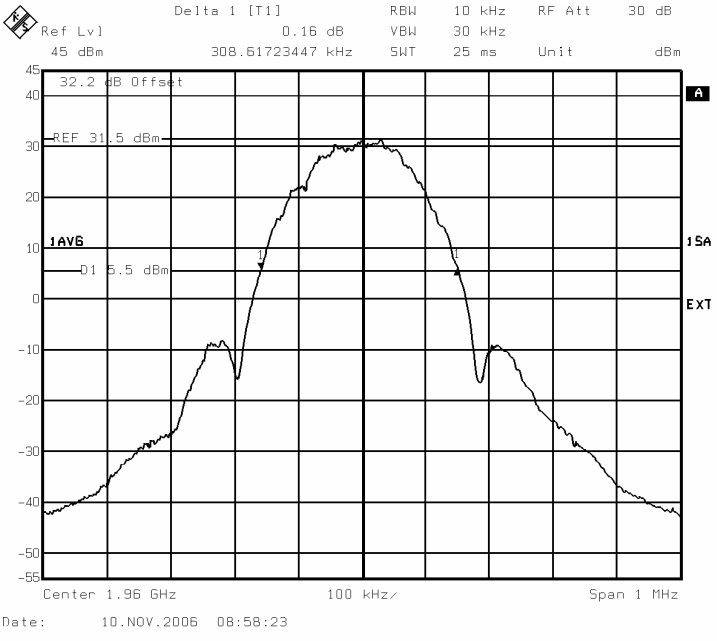
- **The maximum occupied bandwidth on Tx0** was found to be:
  318.6 kHz, measured on channel 661, f=1960 MHz in GMSK modulation,
  308.6 kHz, measured on channel 661, f=1960 MHz in 8PSK modulation.

Figure: Sample plot for occupied bandwidth for Tx0.

GMSK modulation



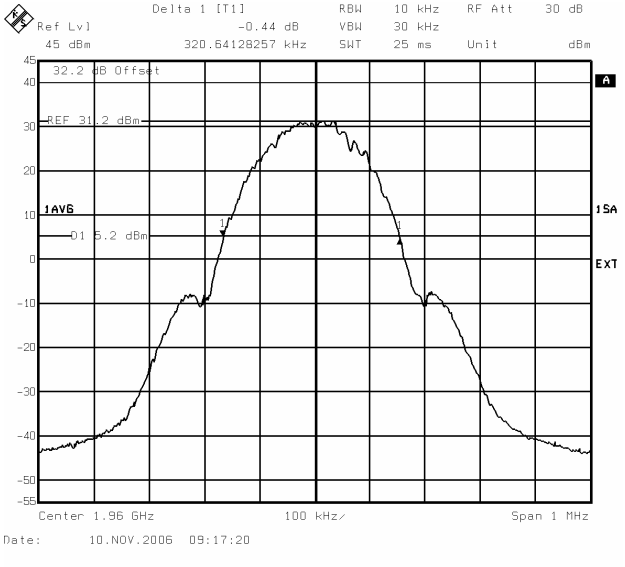
8PSK modulation



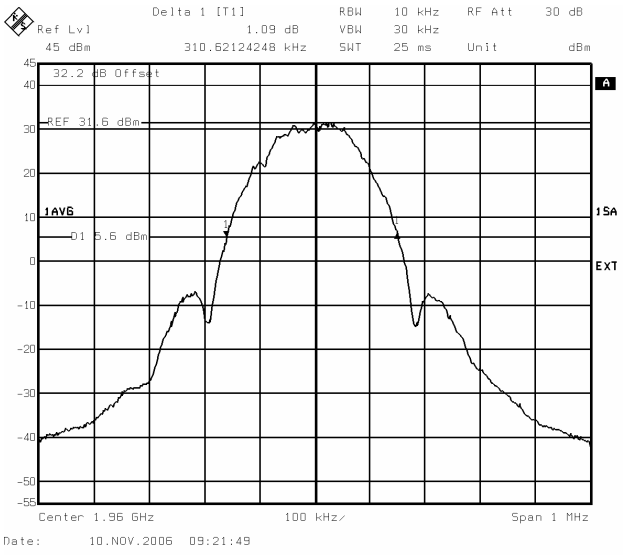
- **The maximum occupied bandwidth on Tx1** was found to be:
  320.6 kHz, measured on channel 661, f=1960 MHz in GMSK modulation,
  310.6 kHz, measured on channel 661, f=1960 MHz in 8PSK modulation.

Figure: Sample plot for occupied bandwidth in Tx1

GMSK modulation



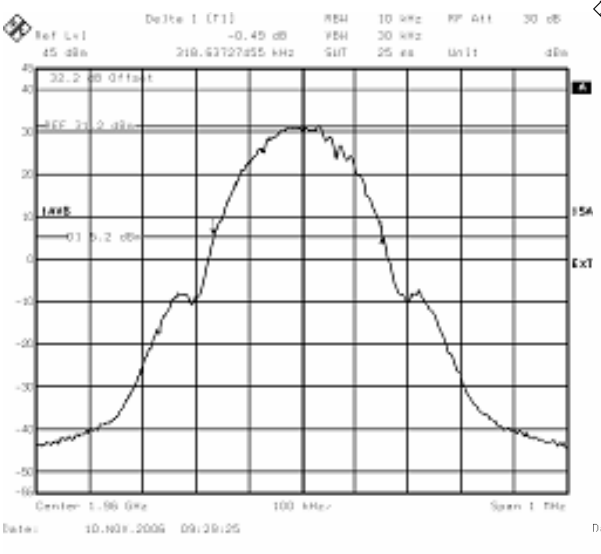
8PSK modulation



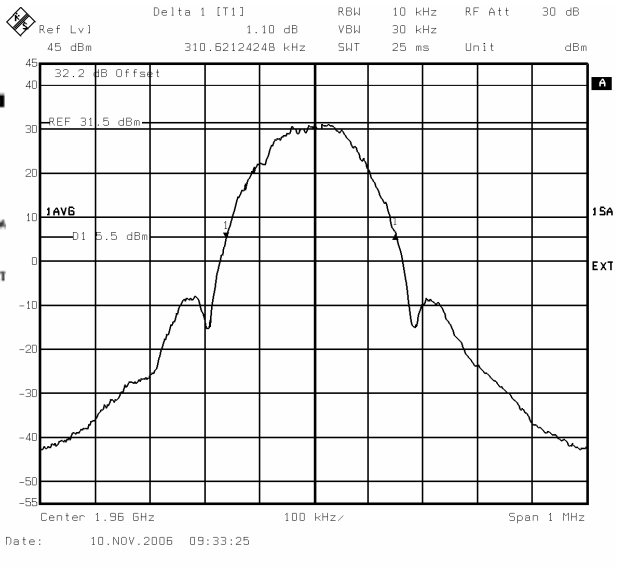
- **The maximum occupied bandwidth on Tx2** was found to be:
  318.6 kHz, measured on channel 661, f=1960 MHz in GMSK modulation,
  310.6 kHz, measured on channel 661, f=1960 MHz in 8PSK modulation.

Figure: Sample plot for occupied bandwidth in Tx2

GMSK modulation



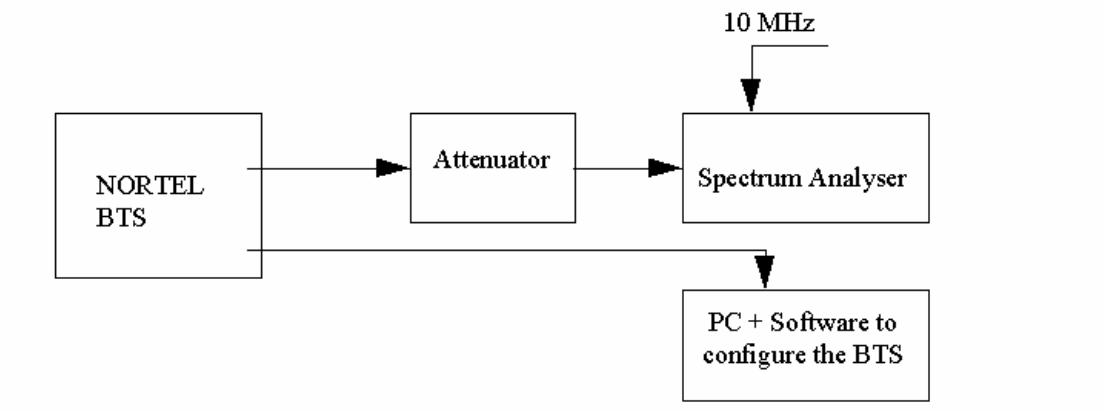
8PSK Modulation



3.5.3 TEST PROCEDURE

The equipment was configured as shown in schematic 2.

Schematic: Test configuration for occupied bandwidth



The BTS was configured to transmit at maximum power (static level 0):

- for GMSK modulation, in mode GMSK no synchro,
- for 8PSK modulation, in mode logical PDCH, Type GPRS, coding MCS5.

The occupied bandwidth was measured by determining the bandwidth out of which all emissions are attenuated at least 26 dB below the transmitter power.

The spectrum analyzer had the following settings:

Detector:	Sample
Trace:	Average
Resolution bandwidth:	10 kHz
Video bandwidth:	30 kHz
Span:	1 MHz
Reference Level Offset:	Corrected to account for cable(s) and attenuator losses
Level range:	100 dB
Sweep time:	25 ms

3.6. NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

3.6.1 FCC REQUIREMENTS LIMITS – FCC PART 24.238

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

3.6.2 TEST RESULTS WITH DDM DUPLEXER & TX FILTER (W/O H2) CONFIGURATION

The reference level for spurious emissions at the antenna terminals is taken from the measured output power (44.8 dBm = 30 Watts).

Therefore the spurious emissions must be attenuated by at least 43 + 10*Log (30) =57.8dB

The measured output power was 44.8 dBm therefore the limit is 44.8 – 57.8 = -13 dBm.

Spurious measurement is performed with the worst configuration with Duplexer coupling
The Nominal power at antenna connector: PD max =44.8 dBm.

The test compliance with DDM duplexer / TXF without H2 involves the compliance with DDM/ TxF H2 (two input coupler with 3dB loss coupling associated with TxF/duplexer).

- TX0 TEST WITH DDM DUPLEXER OR TX FILTER WITHOUT H2 CONFIGURATION

Tx 0 – Spurious emissions with the DDM Dp / TxF w/o H2 for GMSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax-2	-15.23	-13	2.23
810	Pmax-2	-14.88	-13	1.88

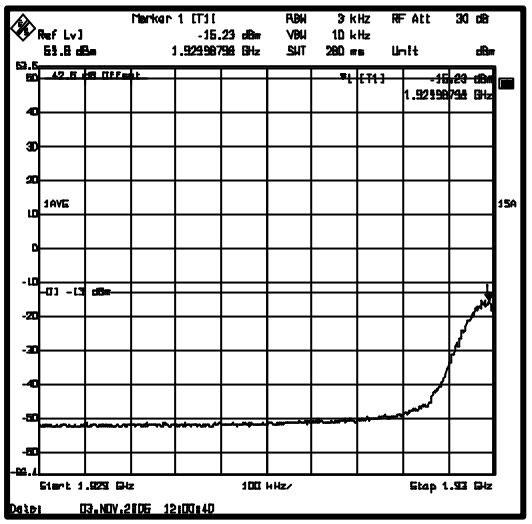
Tx 0 – Spurious emissions with the DDM Dp & TxF w/o H2 for 8PSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax-2	-15.25	-13	2.25
810	Pmax-2	-15.57	-13	2.57

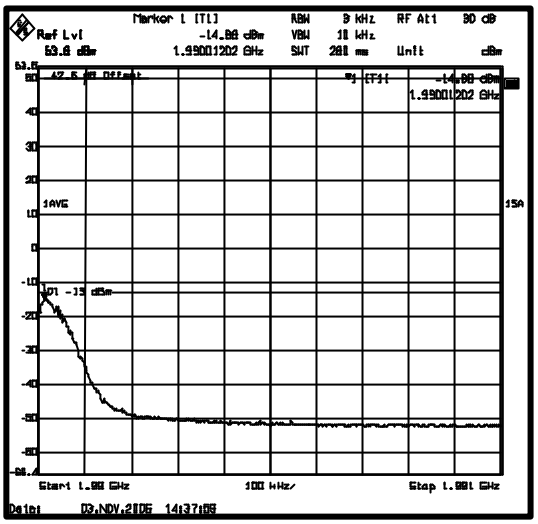
- **Graphs : Tx 0 – Spurious emissions with the DDM Dp & TXF w/o configuration**

GMSK modulation

-1 MHz adjacent band (Channel 512, Pmax-2dB)

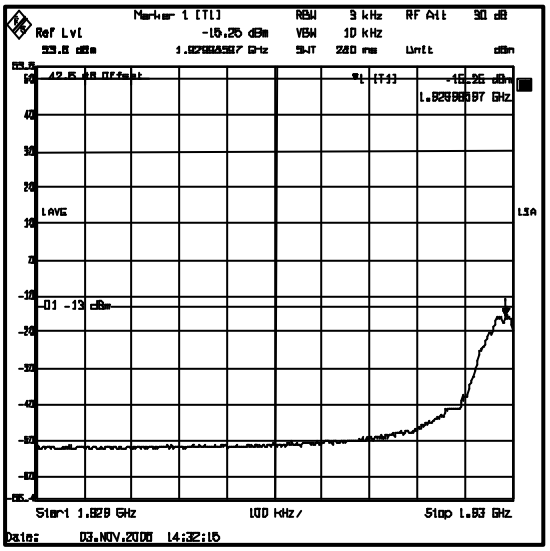


+1 MHz adjacent band (Channel 810, Pmax-2dB)

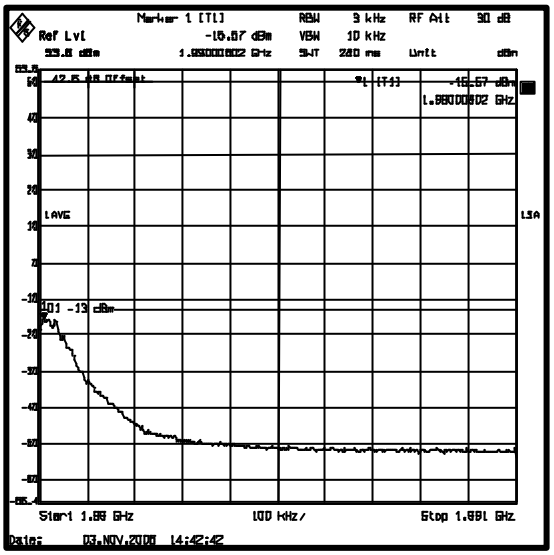


8PSK modulation

-1 MHz adjacent band (Channel 512, Pmax-2dB)



+1 MHz adjacent band (Channel 810, Pmax-2dB)



- TX1 TEST WITH DDM DUPLEXER OR TX FILTER WITHOUT H2 CONFIGURATION

Tx 1 – Spurious emissions with the Dp & TxF w/o H2 for GMSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax-2	-15.45	-13	2.45
810	Pmax-2	-14.42	-13	1.42

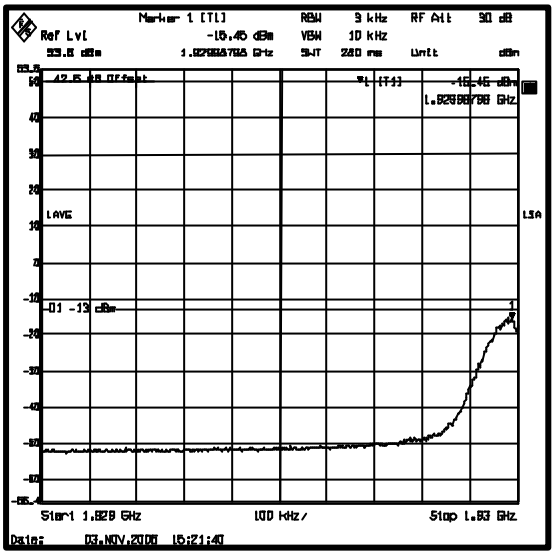
Tx 1 – Spurious emissions with the Dp & TxF w/o H2 for 8PSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax-2	-14.23	-13	1.23
810	Pmax-2	-14.29	-13	1.29

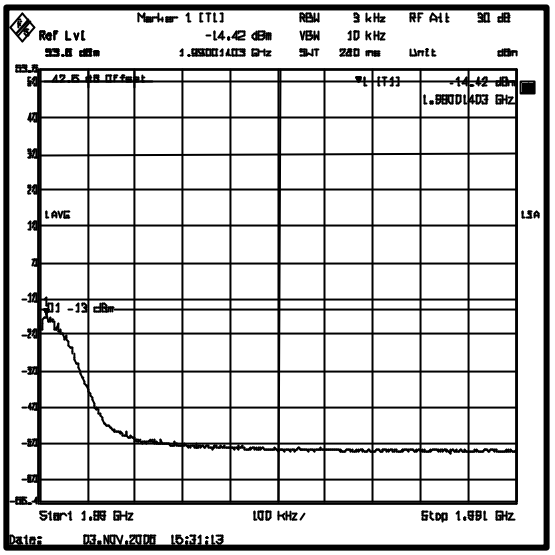
- **Graphs : Tx 1 – Spurious emissions with the Dp & TXF w/o configuration**

GMSK modulation

-1 MHz adjacent band (Channel 512, Pmax-2dB)

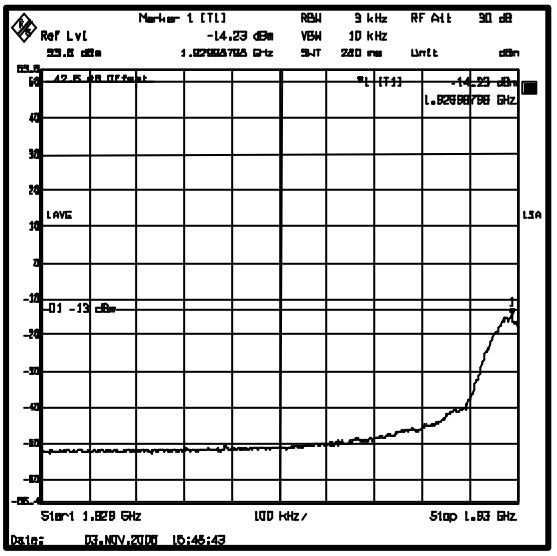


+1 MHz adjacent band (Channel 810, Pmax-2dB)

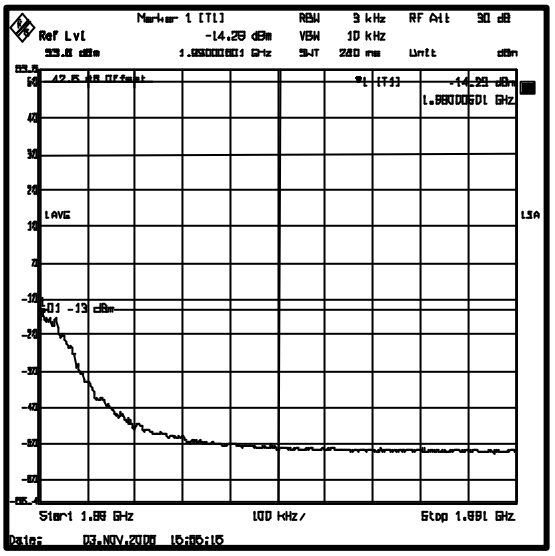


8PSK modulation

-1 MHz adjacent band (Channel 512, Pmax-2dB)



+1 MHz adjacent band (Channel 810, Pmax-2dB)



- TX2 TEST WITH DDM DUPLEXER OR TX FILTER WITHOUT H2 CONFIGURATION

Tx 2 – Spurious emissions with the DDM Dp & TxF w/o H2 for GMSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax-2	-15.83	-13	2.83
810	Pmax-2	-15.31	-13	2.31

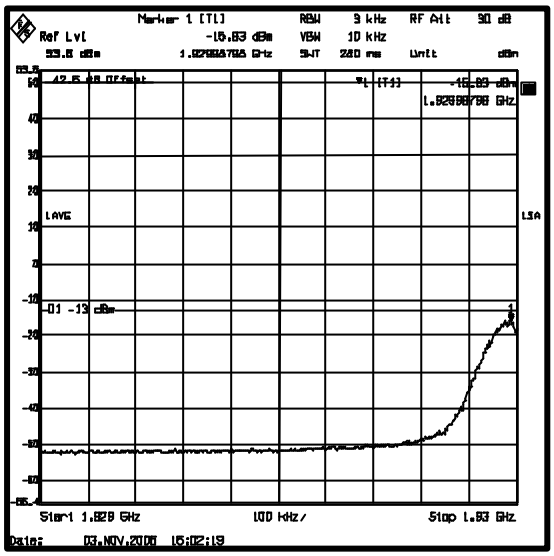
Tx 2 – Spurious emissions with the DDM Dp & TxF w/o H2 for 8PSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax-2	-15.05	-13	2.05
810	Pmax-2	-15.02	-13	2.02

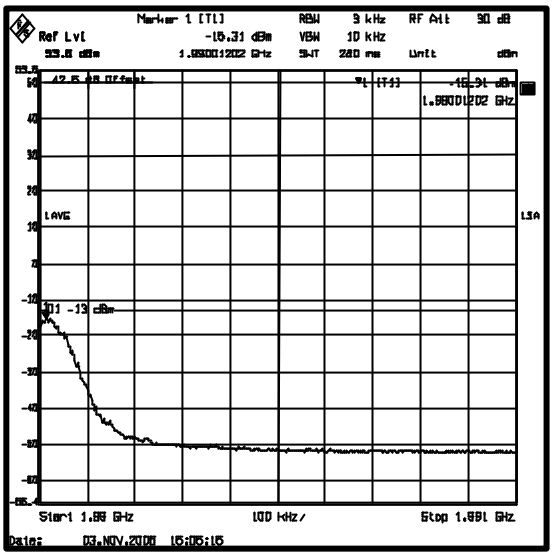
- **Graphs : Tx 2 – Spurious emissions with the DDM Dp & TXF w/o configuration**

GMSK modulation

-1 MHz adjacent band (Channel 512, Pmax-2dB)

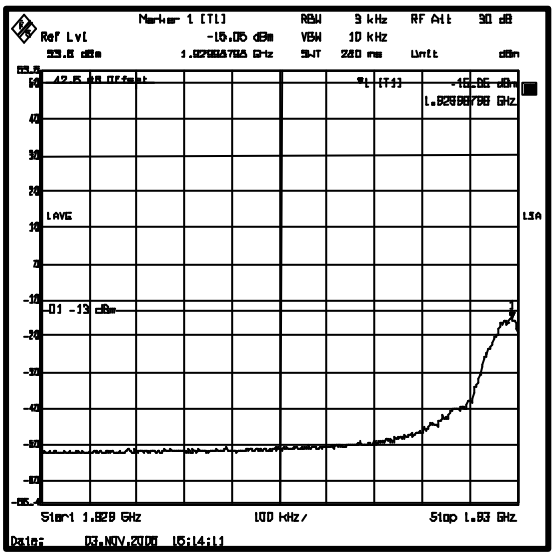


+1 MHz adjacent band (Channel 810, Pmax-2dB)

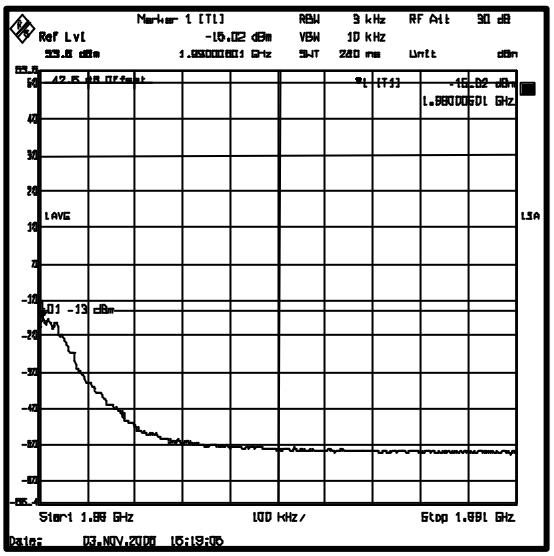


8PSK modulation

-1 MHz adjacent band (Channel 512, Pmax-2dB)



+1 MHz adjacent band (Channel 810, Pmax-2dB)



- OUT OF BLOCK EMISSION BAND – TX0 TEST WITH DDM DP & TX FILTER (W/O H2)

Test results for Tx0 DDM Dp & TxF w/0 H2, GMSK modulation

Frequency band	Level max. (dBm)	Spec. (dBm)	Margin (dB)
100 kHz – 50 MHz	-34.48	-13	21.48
50 – 500 MHz	-34.22	-13	21.52
500 – 1970.2MHz	-33.58	-13	20.58
1970.2 – 1974 MHz	-45.12	-13	35.12
1974 – 1975 MHz	-56.09	-13	43.09
1991 – 1994.8 MHz	-45.45	-13	32.45
1994.8 MHz – 3.5 GHz	-29.90	-13	16.9
3.5 – 8 GHz	-39.14	-13	26.14
8 – 12 GHz	-51.56	-13	38.56
12 – 20 GHz	-44.67	-13	31.67

Test results for Tx0 DDM Dp & TxF w/0 H2, 8PSK modulation

Frequency band	Level max. (dBm)	Spec. (dBm)	Margin (dB)
100 kHz – 50 MHz	-46.18	-13	33.18
50 – 500 MHz	-45.03	-13	32.03
500 – 1970.2MHz	-40.20	-13	27.20
1970.2 – 1974 MHz	-54.46	-13	41.46
1974 – 1975 MHz	-64.70	-13	51.70
1991 – 1994.8 MHz	-45.15	-13	32.15
1994.8 MHz – 4 GHz	-32.48	-13	19.48
4 – 8 GHz	-38.80	-13	25.80
8 – 12 GHz	-48.36	-13	35.36
12 – 20 GHz	-44.88	-13	31.88

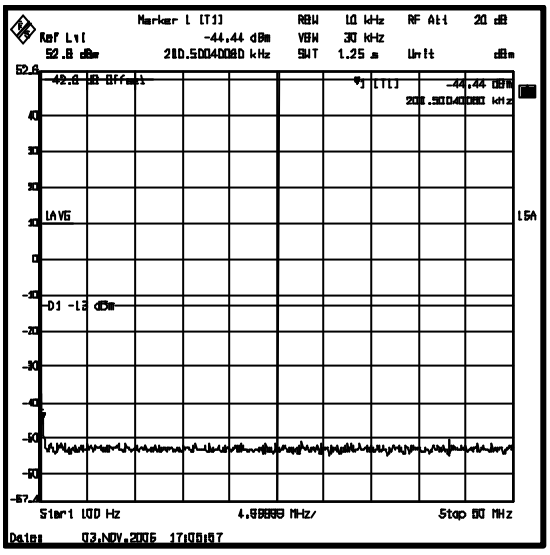
OUT OF BLOCK EMISSION BAND – GRAPHS

TX0 TEST WITH DDM DP & TX FILTER (W/O H2) - MODULATION GMSK

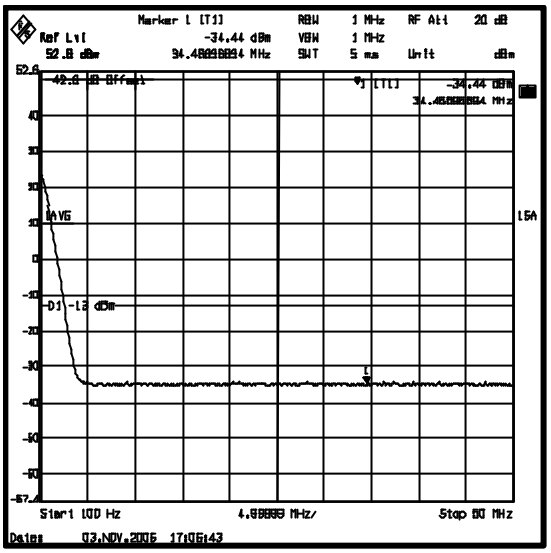
(Channel 810, Pmax), GMSK modulation.

100 Hz – 50 MHz

RBW=10 kHz

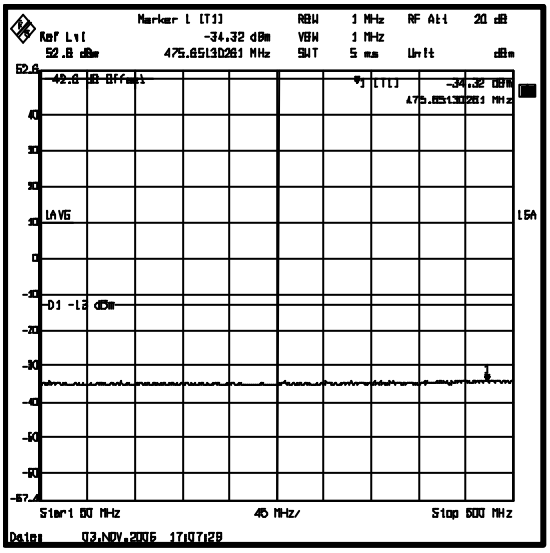


RBW=1 MHz (*)

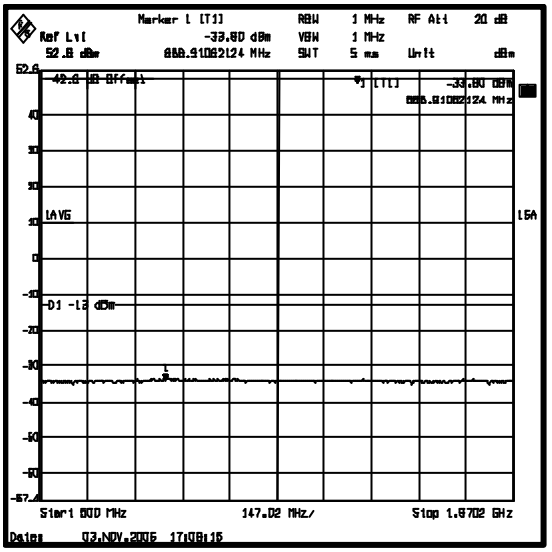


(*) *Note: spectrum line at 100 kHz is internal DC spectrum line of analyser*

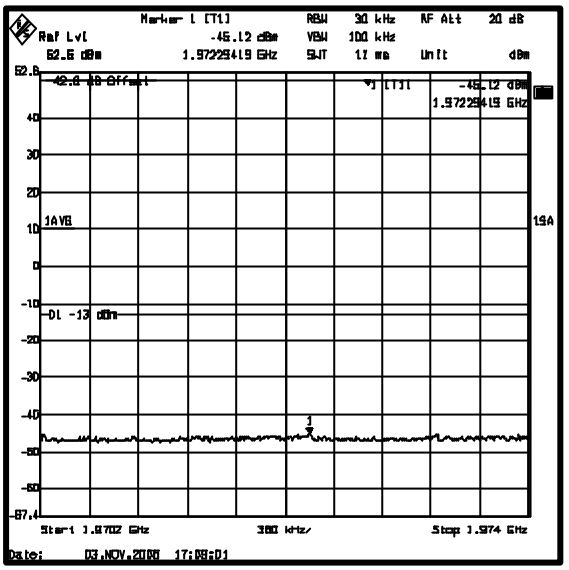
50 MHz – 500 MHz



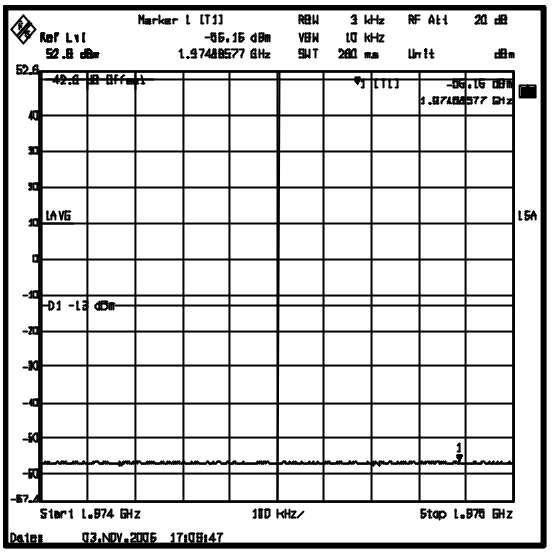
500 MHz – 1970.2 MHz



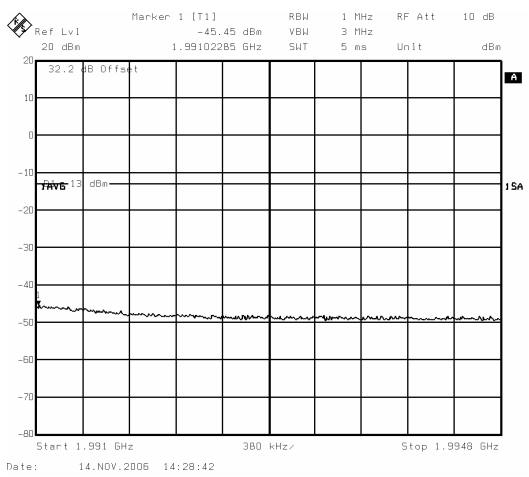
1970.2 – 1974 MHz



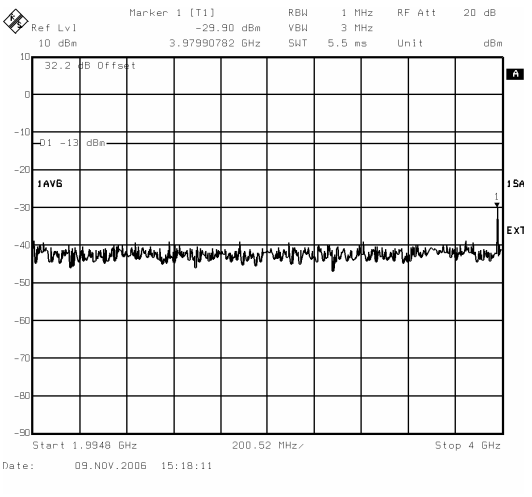
1974 – 1975 MHz



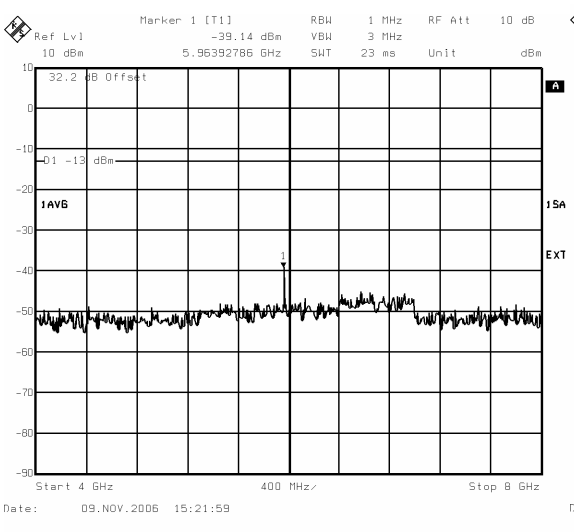
1991 – 1994.8 MHz



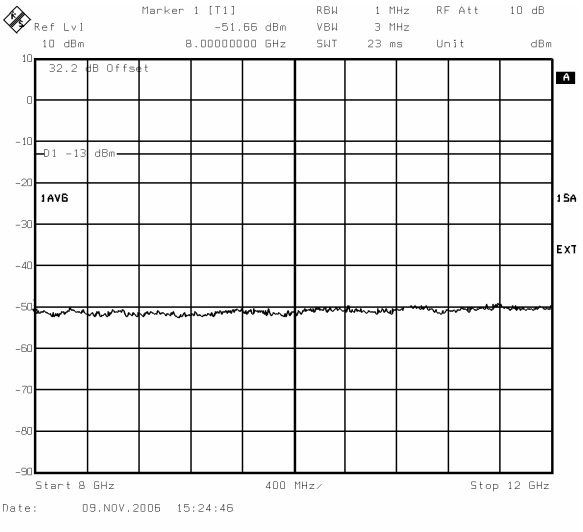
1994.8 MHz – 4 GHz



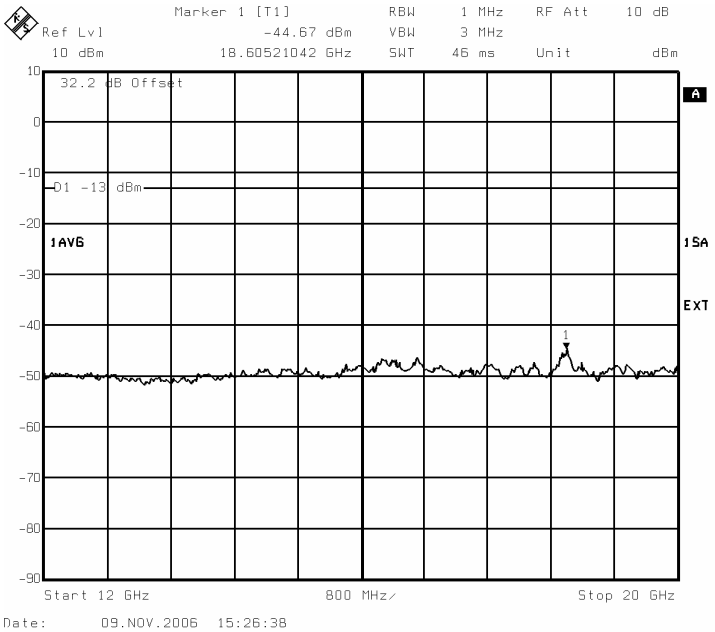
4 GHz – 8 GHz



8 GHz – 12 GHz



12 GHz – 20 GHz



3.6.3 TEST RESULTS WITH DDM H2 & TXF H2 CONFIGURATION

The reference level for spurious emissions at the antenna terminals is taken from the measured output power (41 dBm = 12.6 Watts).

Therefore the spurious emissions must be attenuated by at least 43 + 10*Log (12, 6) = 54 dB

The measured output power was 41 dBm therefore the limit is 41 – 54 = -13 dBm.

Spurious measurement is performed with the DDM H2 configuration.

The Nominal power at antenna connector: PD max =41 dBm.

Tx 0 – Spurious emissions with DDM H2 & TXF H2 for GMSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax	-17.19	-13	4.19
810	Pmax	-16.44	-13	3.44

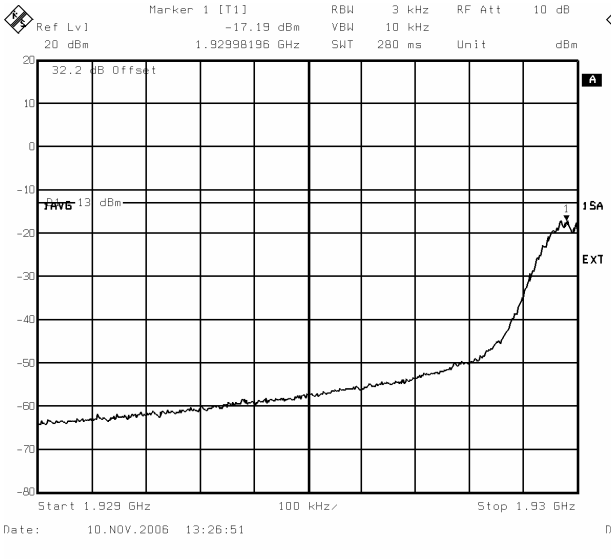
Tx 0 – Spurious emissions with the DDM H2 & TXF H2 for 8PSK modulation

Channel	Power emission level	Spurious emissions level (dBm)	Limit (dB)	Margin (dB)
512	Pmax	-17.36	-13	4.36
810	Pmax	-17.49	-13	4.49

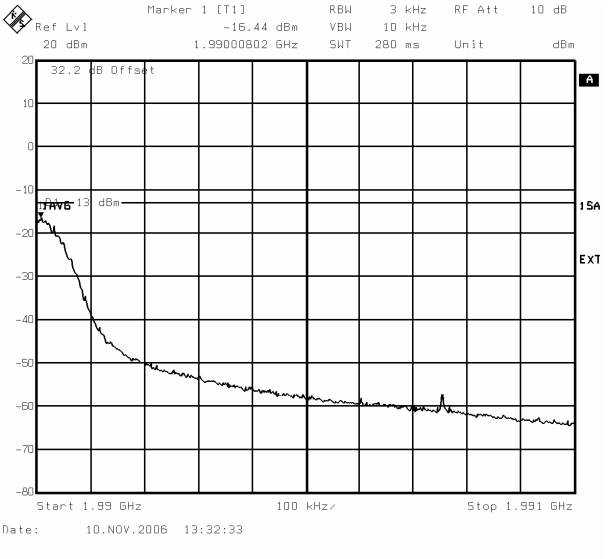
- **Tx 0 Spurious emissions with DDM H2 & TXF H2 configuration.**

GMSK modulation

-1 MHz adjacent band (Channel 512, Pmax),

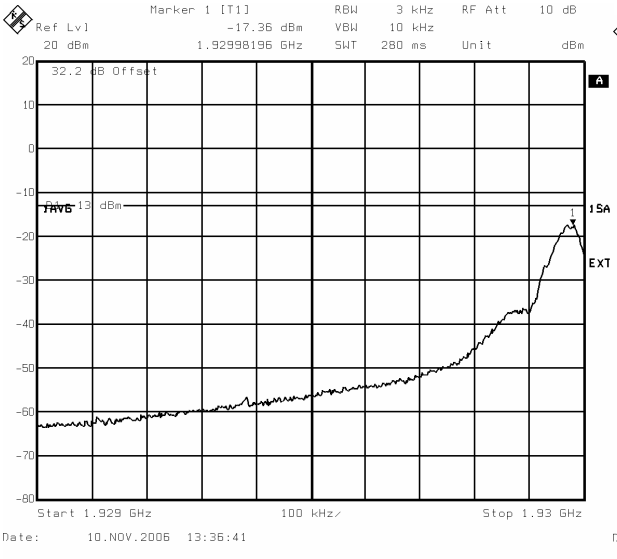


+1 MHz adjacent band (Channel 810, Pmax),

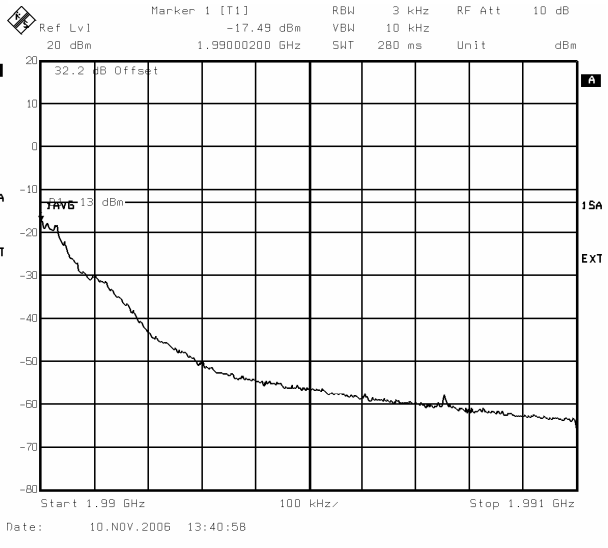


8PSK modulation

-1 MHz adjacent band (Channel 512, Pmax),



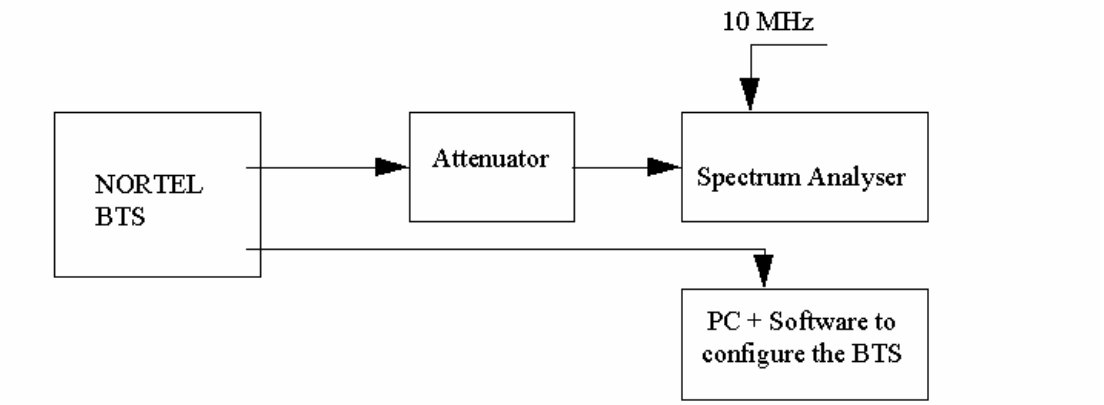
+1 MHz adjacent band (Channel 810, Pmax),



3.6.4 TEST PROCEDURE

The equipment was configured as shown in schematic 3.

Schematic: Test configuration for spurious emissions at antenna terminals



For adjacent channels emissions, the BTS nominal carrier frequency was adjusted to each block edge channel.

Channels 512 and 810 are those channels which are at the lower and upper edges of the PCS band respectively.

The BTS was configured to transmit at maximum power (static level 0) or a reduced power:

- for GMSK modulation, in mode GMSK no synchro
- for 8PSK modulation, in mode logical PDCH, Type GPRS, coding MCS5.

For these measurements, the resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth. In this case the emission bandwidth measured was closed to 300 kHz. Therefore, the resolution bandwidth was set to 3 kHz.

The spectrum analyzer had the following settings for adjacent band:

Resolution bandwidth:	3 kHz
Video bandwidth:	10 kHz
Span:	1 MHz
Reference Level Offset:	Corrected to account for cable(s), filter and attenuator losses
Level range:	100 dB
Sweep time:	Coupled
Detector :	Sample
Trace :	Average
Sweep count :	200

For all other measurements the BTS carrier frequency was adjusted to Channel 810.

The spectrum analyzer had the following settings for out of block emissions.

Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz

The emissions were investigated up to the tenth harmonic of the fundamental emission (20 GHz).

The measured level of the emissions was recorded and compared to the -13 dBm limit.

4. TEST REPORT – HPRM 60W GSM850 & BTS6000

4.1. INTRODUCTION

The following information is submitted for update of the type acceptance of a Broadband GSM Base Station for Nortel Networks, in accordance with FCC Part 22, Subpart H and Part 2, Subpart J of the FCC Rules and Regulations. The measurement procedures were in accordance with the requirements of Part 2.999.

4.2. TX RF CHAIN CONFIGURATION UNDER TESTS

Complete Tests have been already performed in GSM 18000 BTS configuration on Radio the Module HPRM 3T 850 (60W GMSK / 45W Edge) {[R3][R4]}.

The Radio Module is equipped with three identical RF ways Tx0, Tx1, Tx2.
Each RF path includes a 60W Power amplifier.

The different RF ways can be coupled with a coupling module placed before antenna connector.

Different types of coupling device are tested:

- Tx Filter without H2 combiner (TxF w/o H2)
- Tx Filter with H2 combiner (TxF H2)
- DDM Duplexer without H2 combiner (DDM w/o H2)
- DDM with H2 combiner (DDM H2)

Tx Filter / DDM Duplexer (without H2) are the worst case for spurious level.
H2 combiner introduces additional 3dB losses

As radio modules (HPRM 850 & DDM 850) and Tx & Rx radio paths are the same in GSM1800 BTS and GSM6000 BTS, Radio performances checking are performed on HPRM GSM850 -Tx0 (with DDM Duplexer without H2 configuration) at ambient temperature for following tests (RF Power Output , Modulation characteristics , Occupied Bandwidth , Spurious Emissions).

The GSM 6000 results have confirmed the same radio performances as those measured inGSM18000 BTS. So we can refer to GSM 18000 BTS radio performances, [R3].

A complete frequency stability test is performed in GSM6000 BTS for the worst BTS thermal case which is the BTS full equipped with HPRM850, [R4].

4.3. MEASUREMENTS RESULTS

Table 1 is a summary of the measurement results for this update.

Table : Measurement Results Summary

FCC Measurement Specification	IC Limit Specification RSS 128 Section	Description	Result
2.1046 22.913	7.1	RF Power Output	Complies **[R3]**
2.1047	7.2	Modulation characteristics	
2.1049		Occupied Bandwidth	
2.1051 22.917	7.4 , 7.5	Spurious Emissions at Antenna Terminals	
2.1055	8.1 , 8.2	Frequency Stability	**[R4]** External Laboratory Additional report

Radio Tests are performed for the Edge channel of sub-band A", A, B, A', B' in GMSK modulation and 8PSK modulation.

CONCLUSION:

Power limitation to comply with Adjacent Band spurious at antenna connector:

Coupling configuration	System Power limitation GMSK modulation	System Power limitation 8 PSK modulation
DDM Diplexer Tx Filter (w/oH2)	Power Limitation : Pmax – 6 dB = 41.3 dBm Except ARFCN 238 , 241 : Pmax	Power Limitation : Pmax – 4 dB = 42.4 dBm Except ARFCN 238, 241 : Pmax
DDM H2 TXF H2	Power Limitation : Pmax – 2 dB = 42 dBm Except ARFCN 238, 241 : Pmax	Pmax= 43 dBm

For Edge Channel ARFCN 128, 131, 133, 181, 183, 231, 233, 251, power has to be reduced by 6dB (GMSK) or 4dB (8PSK) in order to meet spurious emission requirement.

For Edge Channel ARFCN 238, 241, maximum power has allowed to meet spurious emission requirement.

4.4. RF POWER OUTPUT

4.4.1 FCC REQUIREMENTS

4.3.1.1. FCC PART 22.913L

(a) Base stations are limited to 1640 watts peak equivalent isotropicaly 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.

4.4.2 TEST RESULTS

The following tables show the test results of BTS RF Output Power for GMSK and 8PSK modulation

- **HPRM850 Tx0 + Tx Filter**

GMSK Modulation:

Radio Channel	Frequency (MHz)	RF Output Power (dBm) TxF (w/o H2)	RF Output Power (dBm) TxF (H2)	Maximum Rated Power (dBm)	Limit (dBm)
128	869.2	46.9	43.6	47,8 (60 W) GMSK	50
131	869.8	47	43.7		
133	870.2	47	43.7		
181	879.8	47.2	43.9		
183	880.2	47.2	43.9		
231	889.8	47.3	43.9		
233	890.2	47.3	43.9		
238	891.2	47.3	43.9		
241	891.8	47.3	43.9		
251	893.8	47.2	43.8		

8PSK Modulation:

Radio Channel	Frequency (MHz)	RF Output Power (dBm) TxF (w/o H2)	RF Output Power (dBm) TxF (H2)	Maximum Rated Power (dBm)	Limit (dBm)
128	869.2	46.1	42.8	46.5 dBm (45 W) 8 PSK	50
131	869.8	46.2	42.8		
133	870.2	46.2	42.8		
181	879.8	46.4	43.0		
183	880.2	46.4	43.1		
231	889.8	46.3	42.9		
233	890.2	46.3	42.9		
238	891.2	46.2	42.9		
241	891.8	46.2	42.8		
251	893.8	46.1	42.8		

- **HPRM850 TX1 + TX FILTER (w/o H2)**

GMSK Modulation:

Radio Channel	Frequency (MHz)	RF Output Power (dBm) TxF	Maximum Rated Power (dBm)	Limit (dBm)
128	869.2	47.0	47,8 (60 W) GMSK	50
189	881.4	47.3		
251	893.8	47.3		

8PSK Modulation:

Radio Channel	Frequency (MHz)	RF Output Power (dBm) TxF	Maximum Rated Power (dBm)	Limit (dBm)
128	869.2	46.1	46.5 (45 W) 8 PSK	50
189	881.4	46.4		
251	893.8	46.3		

- **HPRM850 TX2 + DDM Diplexer (w/o H2)**

GMSK Modulation:

Radio Channel	Frequency (MHz)	RF Output Power (dBm) DDM Dp	Maximum Rated Power (dBm)	Limit (dBm)
128	869.2	47.0	47,8 (60 W) GMSK	50
189	881.4	47.2		
251	893.8	47.0		

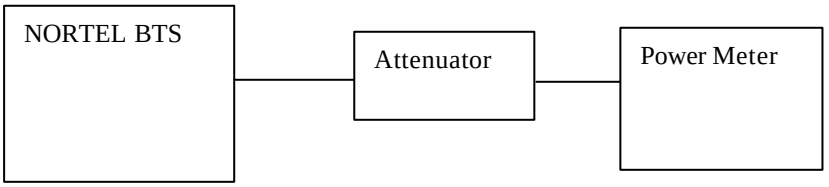
8PSK Modulation:

Radio Channel	Frequency (MHz)	RF Output Power (dBm) DDM Dp	Maximum Rated Power (dBm)	Limit (dBm)
128	869.2	45.9	46.5 (45 W) 8 PSK	50
189	881.4	46.2		
251	893.8	46.0		

4.4.3 TEST PROCEDURE

The equipment was configured as shown in schematic 1.

Schematic 1: Test configuration for RF Output Power



The BTS was configured to transmit at maximum power (static level 0):

- for GMSK modulation, in mode GMSK no synchro,
- for 8PSK modulation, in mode logical PDCH, Type GPRS, coding MCS5.

Measurements were made at frequencies which are the bottom and top of each of the licensed blocks.

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

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

4.5. OCCUPIED BANDWIDTH

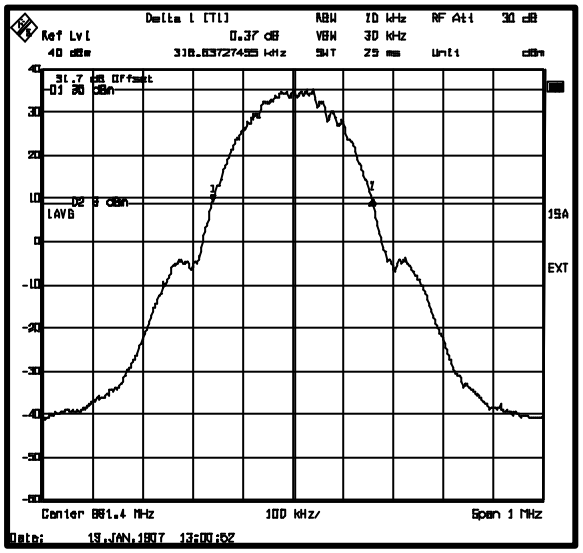
4.5.1 FCC REQUIREMENTS - FCC PART 2.1049

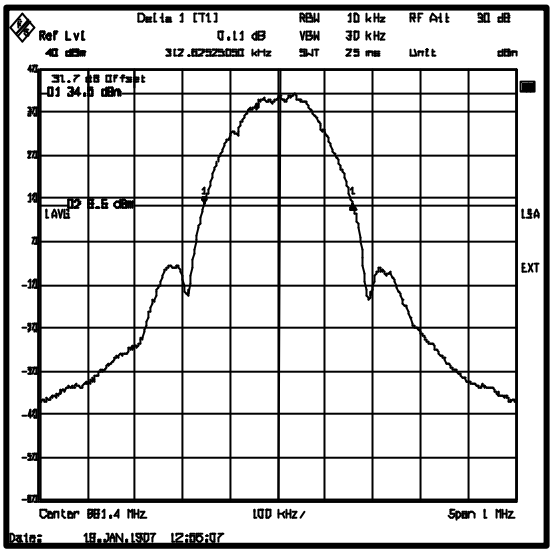
The occupied bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

4.5.2 TEST RESULTS

- **HPRM850 TX0 + TXF**

GMSK modulation **8PSK Modulation**

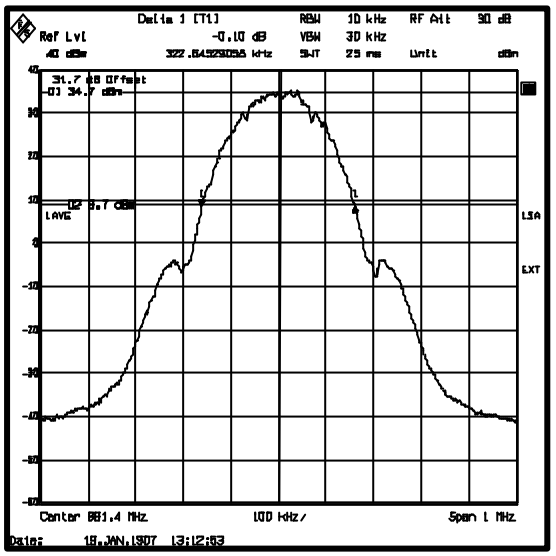




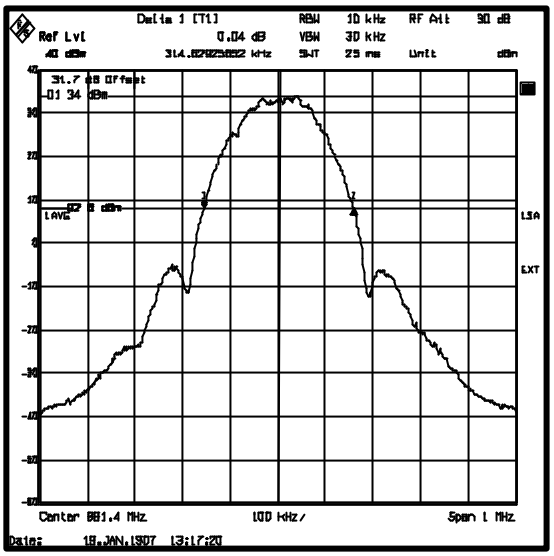
The maximum occupied bandwidth is 318 kHz for GMSK modulation
The maximum occupied bandwidth is 312 kHz for 8PSK modulation

- **HPRM850 TX1 + TxF**

GMSK MODULATION



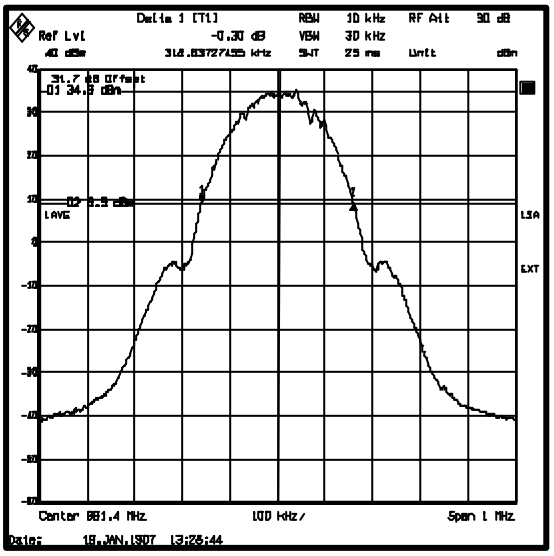
8PSK MODULATION



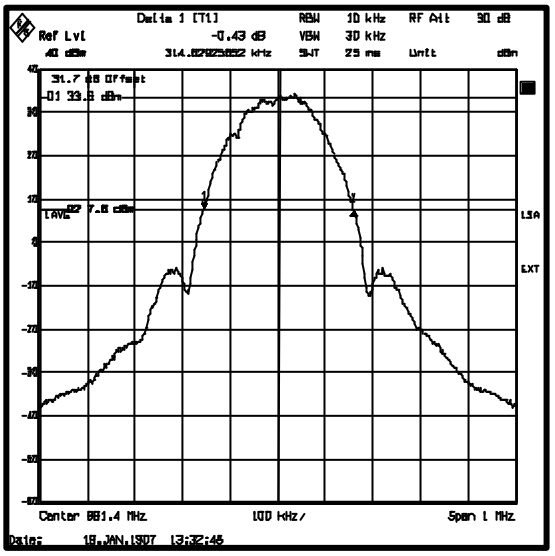
The maximum occupied bandwidth is 322 kHz for GMSK modulation
The maximum occupied bandwidth is 314 kHz for 8PSK modulation

- **HPRM850 TX2 + DDM Dp**

GMSK modulation



8PSK Modulation

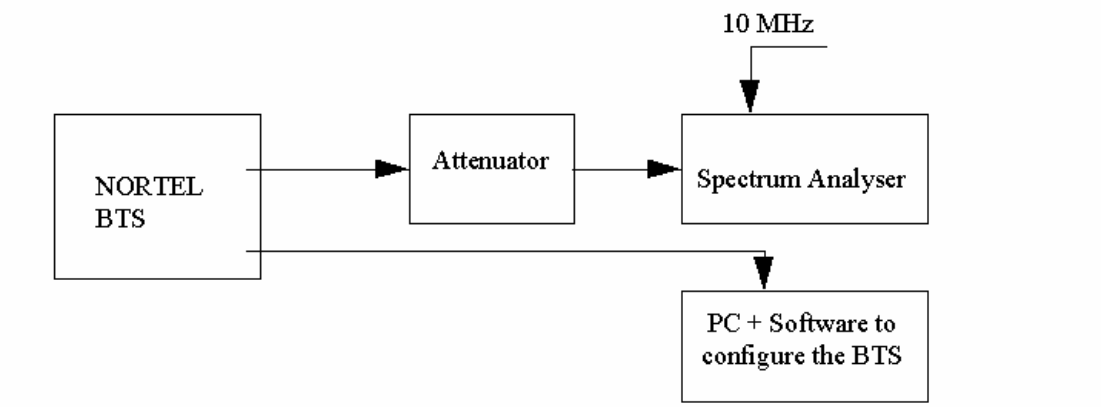


The maximum occupied bandwidth is 318 kHz for GMSK modulation
The maximum occupied bandwidth is 314 kHz for 8PSK modulation

4.5.3 TEST PROCEDURE

The equipment was configured as shown in schematic 2.

Schematic 2: Test configuration for occupied bandwidth



The BTS was configured to transmit at maximum power (Static Level 0). Measurements were made at frequencies which were at the bottom and top of the transmit band.

The occupied bandwidth was measured by determining the bandwidth out of which all emissions are attenuated at least 26 dB below the transmitter power.

The spectrum analyzer had the following settings:

Resolution bandwidth:	10 kHz
Video bandwidth:	30 kHz
Span:	1 MHz
Reference level:	40 dBm
Reference Level Offset:	Corrected to account for cable(s) and attenuator losses
Level range:	100 dB
Sweep time:	25 ms

4.6. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

4.6.1 FCC REQUIREMENTS

(c) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

(d) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(e) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(f) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

4.6.2 TEST RESULTS WITH DDM DUPLEXER & TXF (W/O H2) CONFIGURATION

The reference level for spurious emissions at the antenna terminals is taken from the measured output power (47.3dBm = 53.7 Watts).
Therefore the spurious emissions must be attenuated by at least 43 + 10*Log (53.7) = 60.3dB. The measured output power was 47.3dBm; therefore the limit is 47.3 – 60.3 = -13dBm.

Spurious measurement is performed in the following coupling configuration with 30W Power amplifier and with duplexer.

The nominal GMSK power at antenna connector: P_{GMSK} diplexer max = 47.3dBm
The nominal 8PSK power at antenna connector: P8duplexer max = 46.4dBm

4.6.2.1 Tx0 Test Results: HPRM Tx0 + TxF (w/o H2)

Tables show the results for Spurious Emissions at Antenna Terminals.

TABLE : TEST RESULTS FOR GMSK MODULATION

	Channel	Spurious Emissions Level (dBm)			Margin(dB)
		Power level (Pmax)	Power level (Pmax-4)	Power level (Pmax-6)	
A''	128		**-13.31**		0.31
	131		**-13.18**		0.18
A	133		**-13.82**		0.82
	181		**-13.06**	**14.96**	0.06
B	183		**-13.4**		0.4
	231		-12.92	**-14.65**	1.65
A'	233		**-13.55**		0.55
	238	**-28.12**			15.12
B'	241	**-28.89**			15.89
	251		-12.91	**-15.07**	2

Table: Test results for 8PSK Modulation

	Channel	Spurious Level (dBm) Pmax	Spurious Level (dBm) Pmax -4dB	Margin (dB)
A''	128		**-14.94**	1.94
	131		**-14.73**	1.73
A	133		**-14.28**	1.28
	181		**-15.73**	2.73
B	183		**-13.93**	0.93
	231		**-15.43**	2.43
A'	233		**-13.53**	0.53
	238	**-25.96**	**-25.96**	12.96
B'	241	**-27.71**	**-27.71**	14.71
	251		**-15.71**	2.71

Table : Test results for Out of block spurious emissions – Channel 189

Power (dB)	Frequency MHz	Spurious Emissions Level (dBm) GMSK Modulation
Pmax	100 kHz - 50 MHz	-35
	50 MHz – 500 MHz	-32
	500 MHz – 880.2 MHz	-29
	882.6 MHz –1970.2 MHz	-30
	1970.2 MHz – 1994.8 MHz	-32
	1994.8 MHz – 3 GHz	-33
	3 GHz - 10 GHz	-45
	10 GHz -20 GHz	-44
		Margin > 15dB

Power (dB)	Frequency MHz	Spurious Emissions Level (dBm) 8PSK Modulation
Pmax	100 kHz - 50 MHz	-35
	50 MHz – 500 MHz	-33
	500 MHz – 880.2 MHz	-28
	882.6 MHz –1970.2 MHz	-31
	1970.2 MHz – 1994.8 MHz	-33
	1994.8 MHz – 3 GHz	-32
	3 GHz - 10 GHz	-45
	10 GHz -20 GHz	-44
		Margin > 15dB

4.6.2.2 Tx1 Test Results: HPRM Tx1 + TxF (w/o H2)

Table : Test results for GMSK Modulation

	Channel	Spurious Emissions Level (dBm)			Margin (dB)
		Power level (Pmax)	Power level (Pmax-4)	Power level (Pmax-6)	
A''	128		**-13.38**		0.38
	131		-12.41	**-14.68**	1.68
B	183		-12.79	**-14.94**	1.94
	231		-12.6	**-14.92**	1.92
B'	241	**-28.04**			15.04
	251		-12.75	**-15.02**	2.02

Table: Test results for 8PSK Modulation

	Channel	Spurious Level (dBm) Pmax	Spurious Level (dBm) Pmax-2	Spurious Level (dBm) Pmax-4	Margin (dB)
A''	128			**-14.30**	1.30
	131		**-13.45**	**-15.45**	0.45
B	183			**-13.62**	0.62
	231		**-13.60**	**-15.60**	0.60
B'	241	**-27.15**			14.15
	251		**-13.25**		2.25

4.6.2.3 Tx2 Test Results: HPRM Tx2 + DDM Dp

Table : Test results for GMSK Modulation

	Channel	Spurious Emissions Level (dBm)			Margin (dB)
		Power level (Pmax)	Power level (Pmax-4)	Power level (Pmax-6)	
A''	128		**-14.3**		1.3
	131		**-13.75**		0.75
B	183		**-13.42**		0.42
	231		**-13.20**		0.2
B'	241	**-28.12**	**-28.12**		15.12
	251		-12.51	**-14.45**	1.45

TABLE : TEST RESULTS FOR 8PSK MODULATION

	Channel	Spurious Level (dBm) Pmax	Spurious Level (dBm) Pmax -2	Spurious Level (dBm) Pmax-4	Margin (dB)
A''	128			**-14.9**	1.9
	131		**-14.4**	-16.4	1.4
B	183			**-14.3**	1.3
	231		**-13.7**	-15.7	0.7
B'	241	**-27.14**			14
	251		**-13.72**	-15.72	0.7

Notes:

Figures show sample plots for the case when the transmitter TX0 was respectively tuned to edge channels in TX band for GMSK modulation and 8PSK modulation.

Figures show sample plots for frequency spans from 0 to 20 GHz with emission on channel 189 at Pmax with TxF (w/o H2) module for GMSK Modulation on the transmitter TX0.

Conclusion:

In GMSK modulation, the power has to be reduced by 6 dB (**Pmax - 6dB**) and in 8PSK modulation, the power has to be reduced by 4 dB (**Pmax - 4dB**), for Edge Channel ARFCN 128, 131, 133, 181, 183, 231, 233, 251 in order to meet spurious emission requirement.

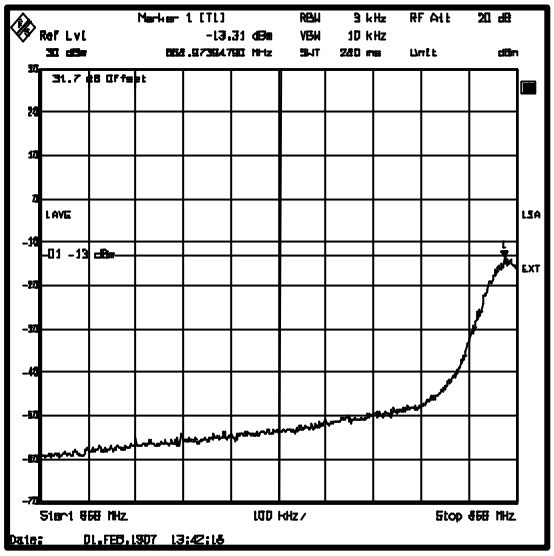
For Edge Channel ARFCN 238, 241, the maximum power (47dBm) is allowed to meet the spurious emission requirements.

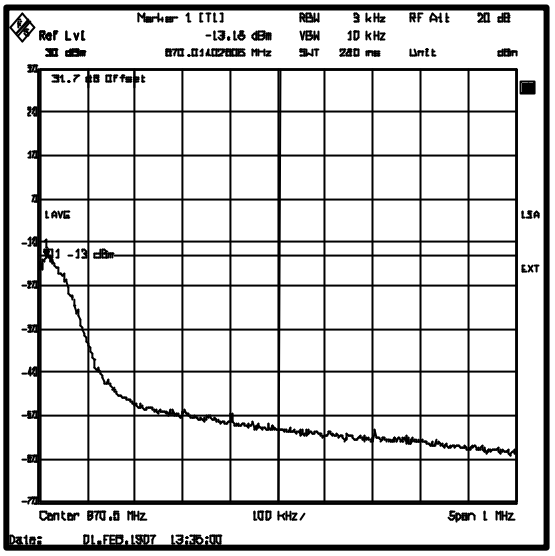
Figure : In Band – Edge block channel - 1 MHz adjacent band

GMSK MODULATION – TxF (w/o H2) configuration

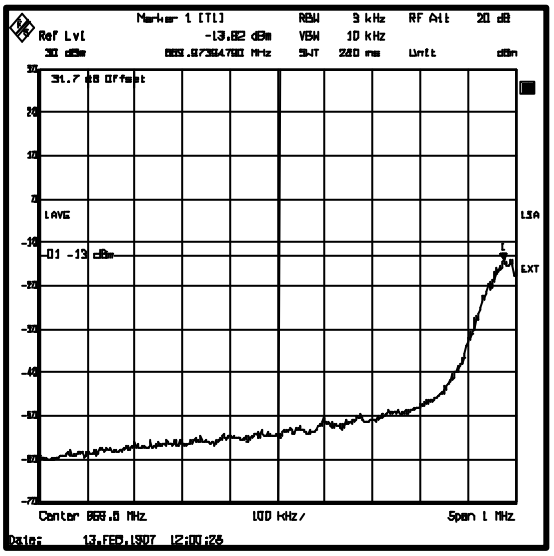
(-1 MHz adjacent band) **(+1 MHz adjacent band)**

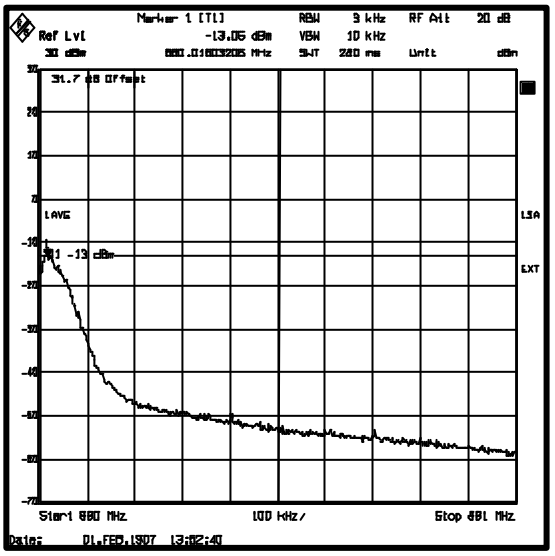
Channel 128 (Pmax – 4 dB) **Channel 131 (Pmax – 4 dB)**



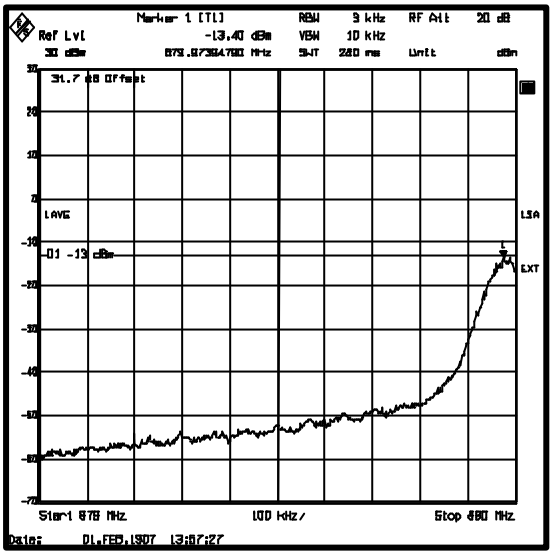


CHANNEL 133 (PMAX – 4 DB) **CHANNEL 181 (PMAX – 4 DB)**

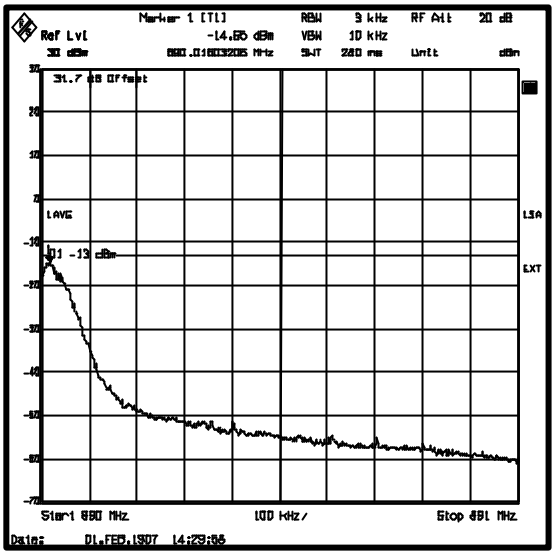




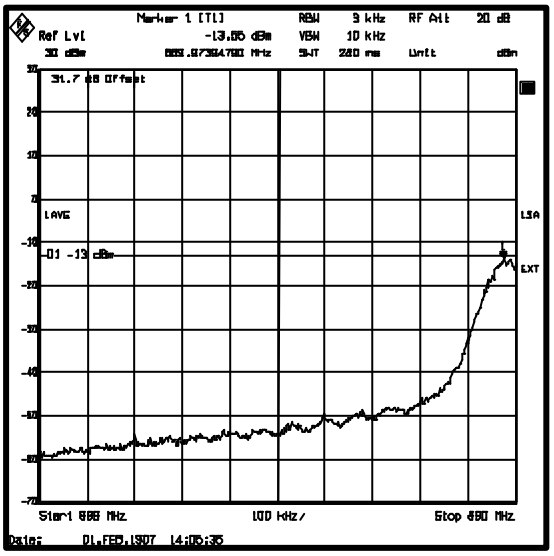
Channel 183 (Pmax – 4dB)



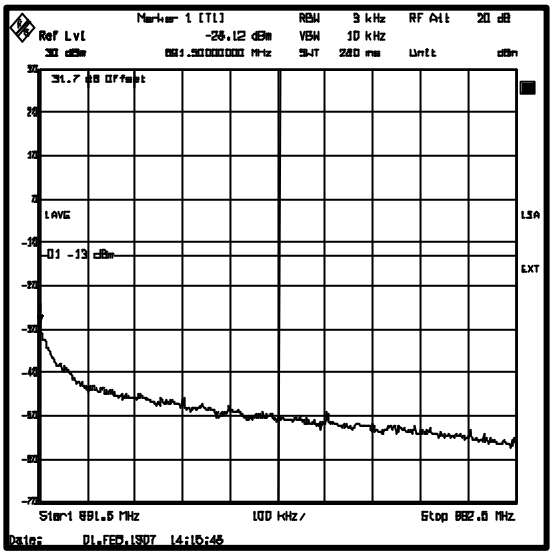
Channel 231 (Pmax – 6dB)



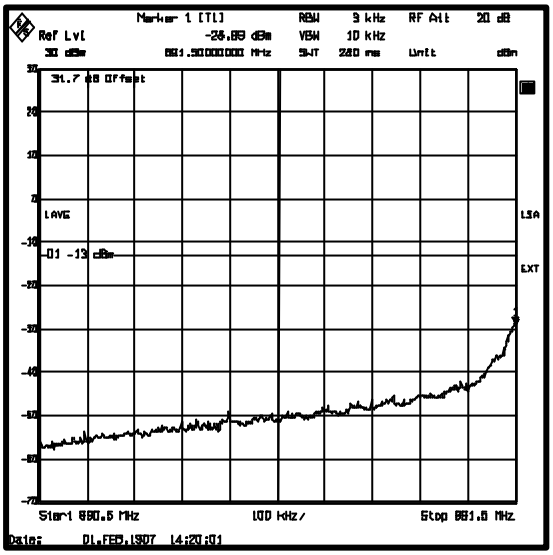
CHANNEL 233(PMAX – 4DB)



CHANNEL 238 (PMAX)



CHANNEL 241 (P MAX)



CHANNEL 251 (PMAX –6 DB)

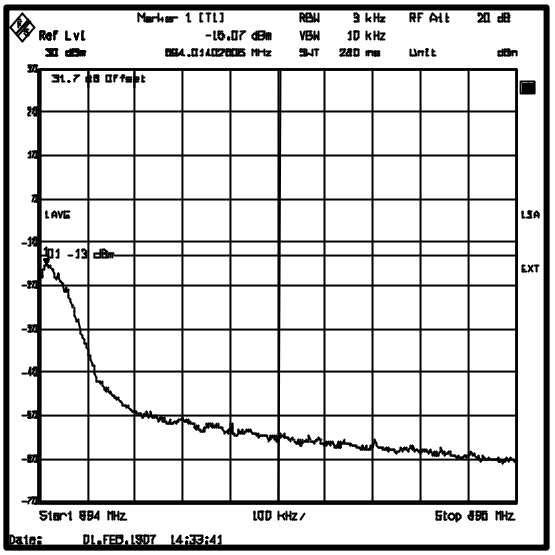


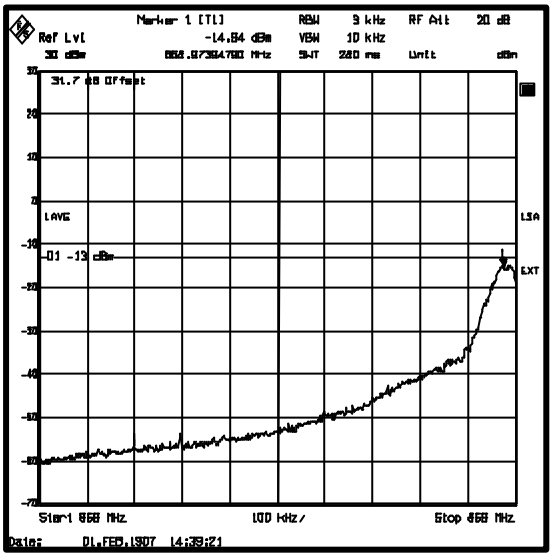
Figure: In Band – Edge block channel - 1 MHz adjacent band

8PSK MODULATION – TxF (w/o H2) configuration

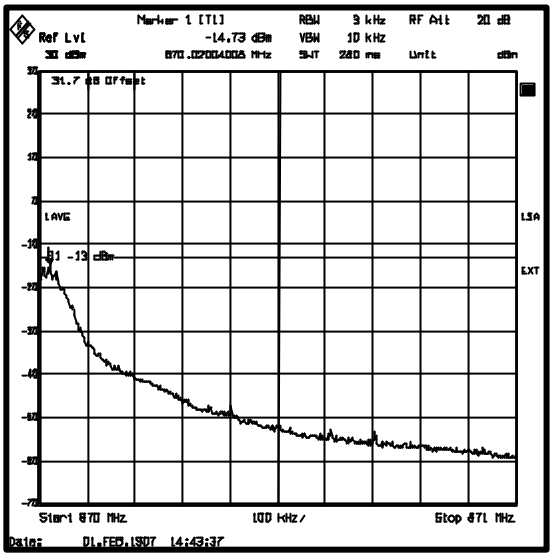
(8PSK Power emission = P_{8PSK}-max – 4 dB)

(-1 MHz adjacent band) (+1 MHz adjacent band)

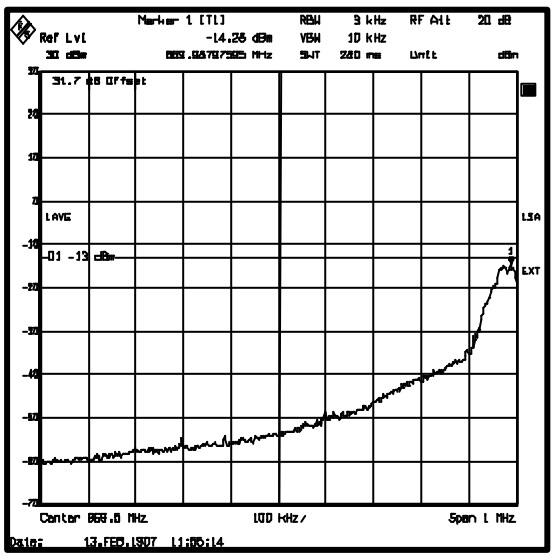
CHANNEL 128



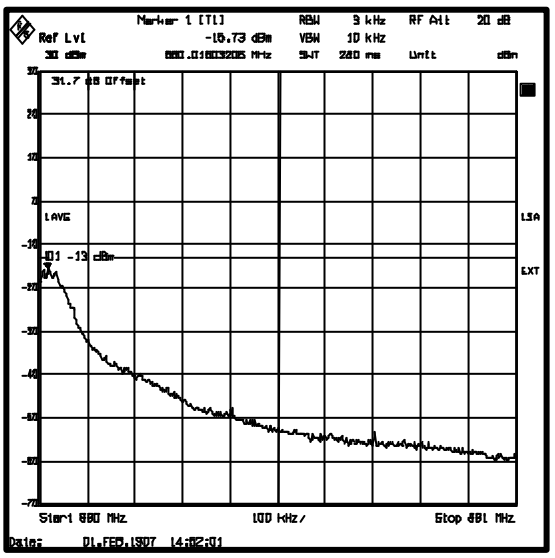
CHANNEL 131



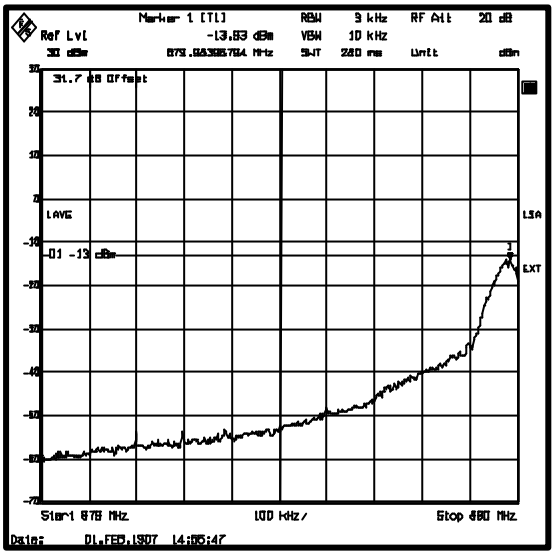
Channel 133



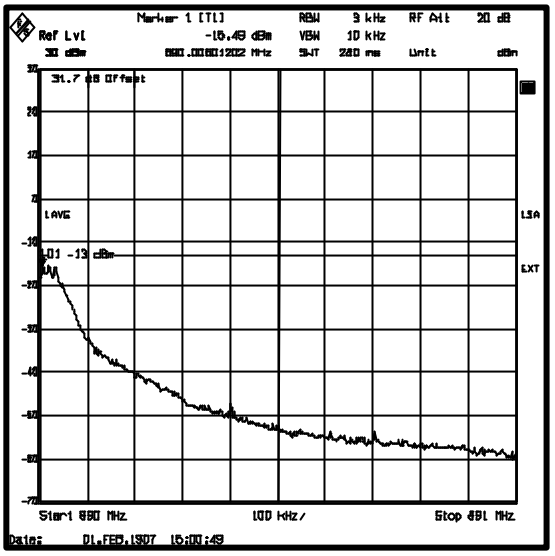
Channel 181



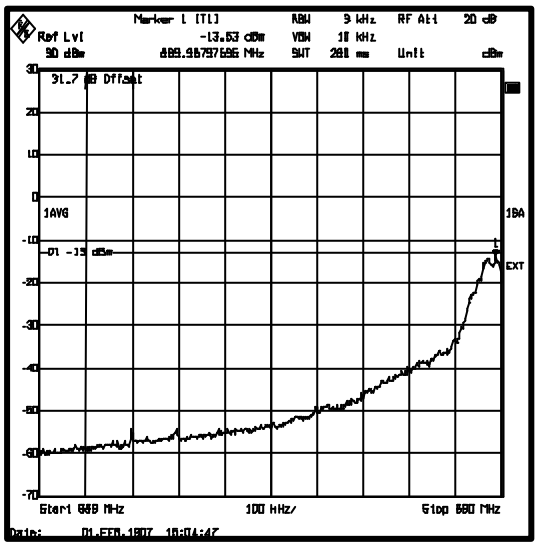
Channel 183



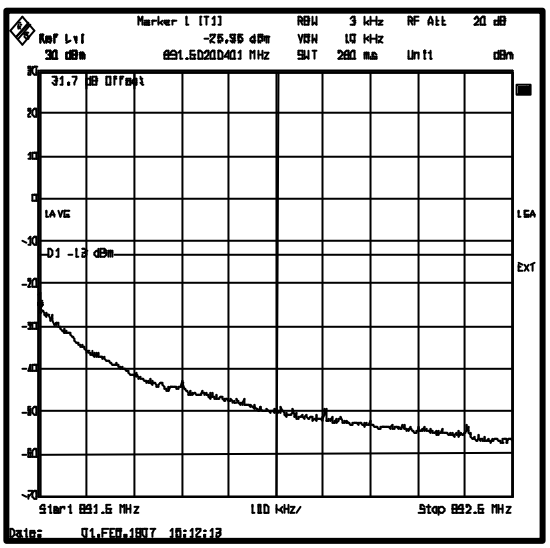
Channel 231



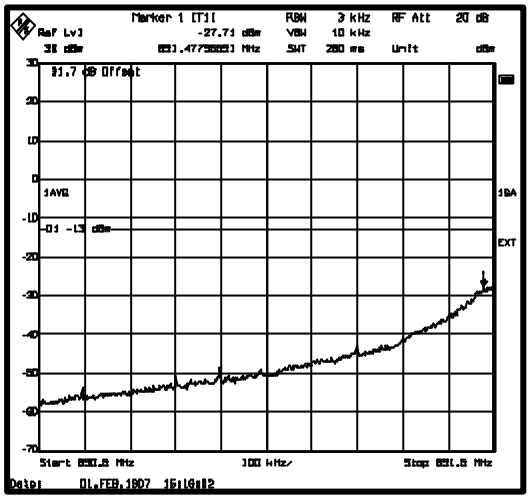
CHANNEL 233 :



CHANNEL 238 : PMAX



CHANNEL 241 : PMAX



CHANNEL 251 : PMAX –6DB

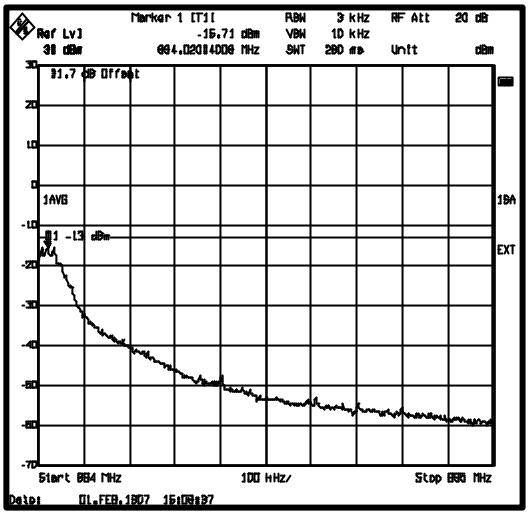
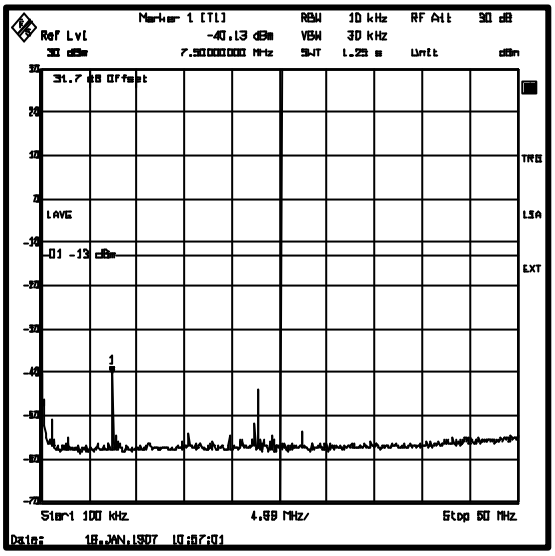
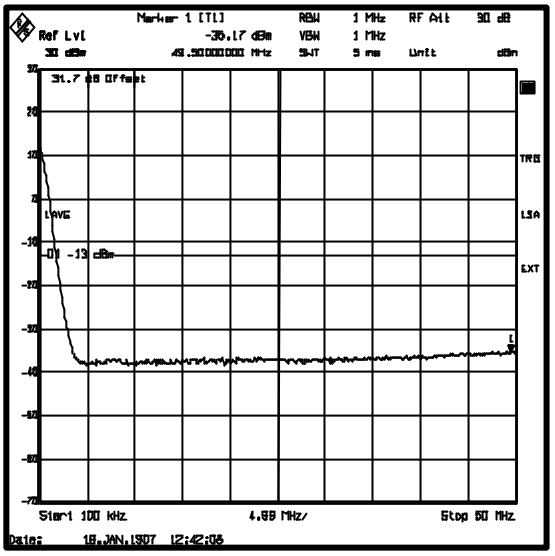


Figure : Out of block emissions (channel 189, Pmax) with TXF (w/o H2)

GMSK modulation

Band 100 KHz – 50 MHz



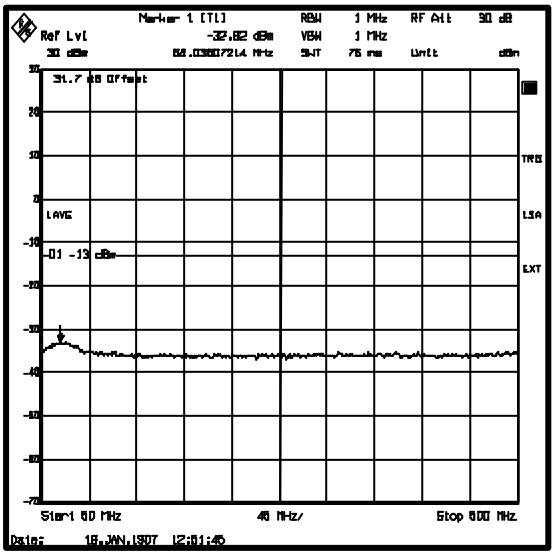


RBW = 10 kHz

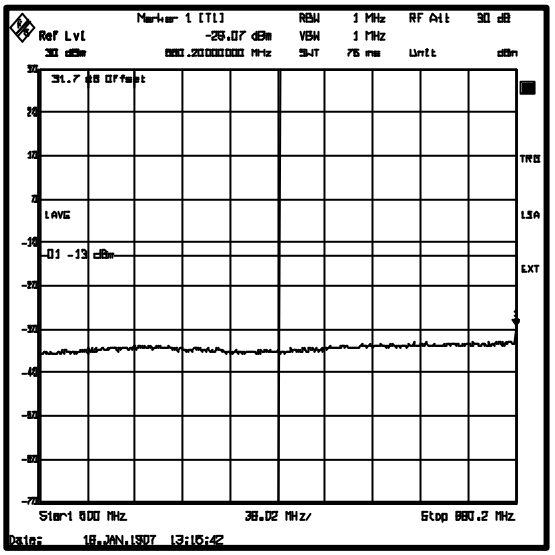
RBW = 1 MHz

Note: spectrum lines at 100 kHz are internal line of the DC spectrum Analyser

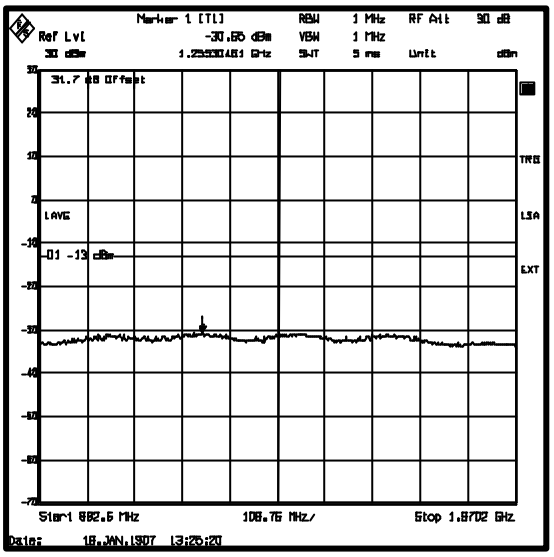
Band 50 Mhz – 500 MHz



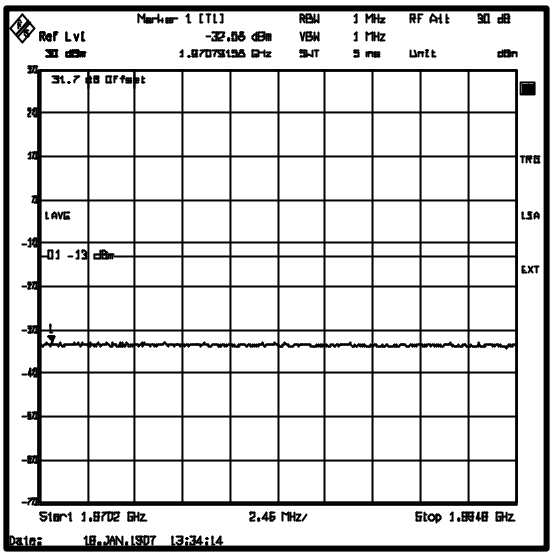
Band 500 Mhz – 880.2 MHz



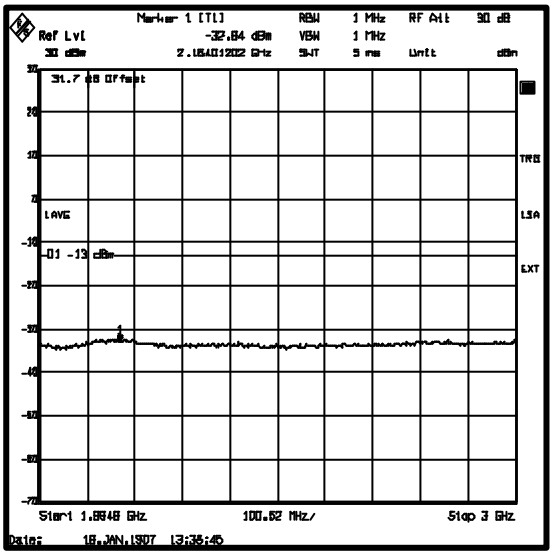
Band 882.6 Mhz – 1970.2 MHz



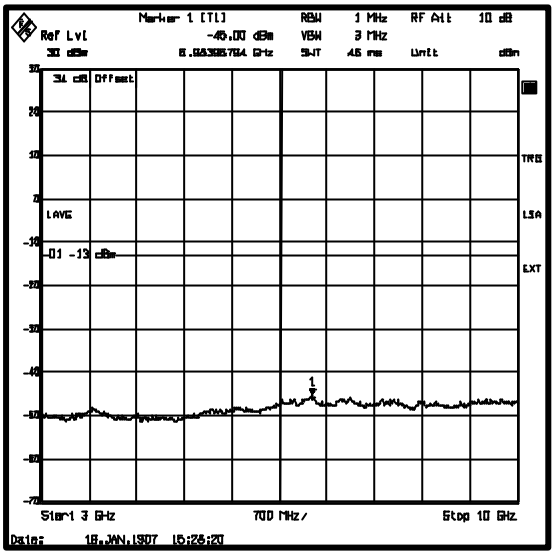
Band 1970.2 Mhz – 1994.8 MHz



Band 1994.8 Mhz – 3 GHz



Band 3 GHz – 10 GHz



Band 10 GHz – 20 GHz

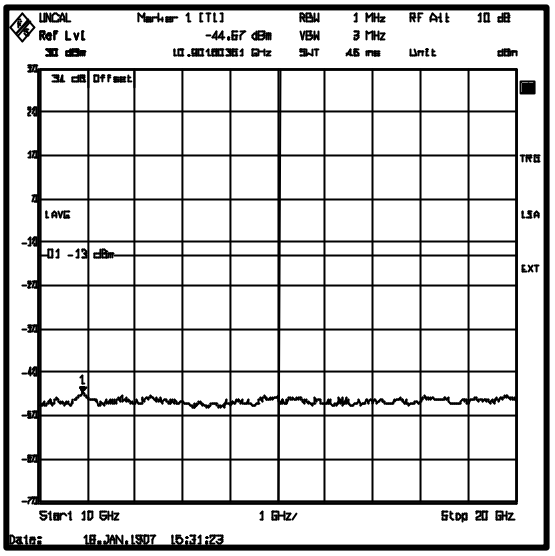
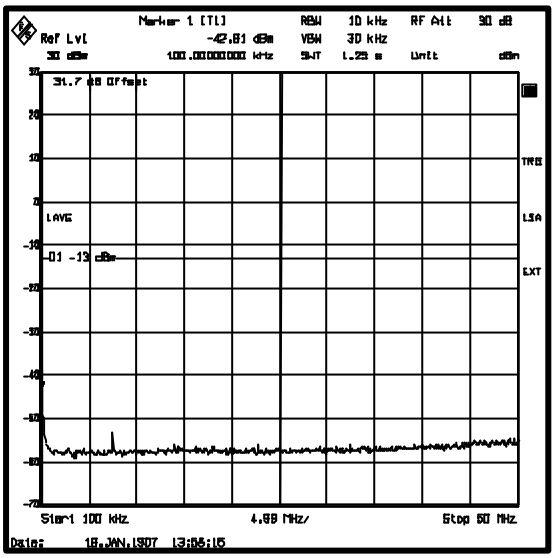
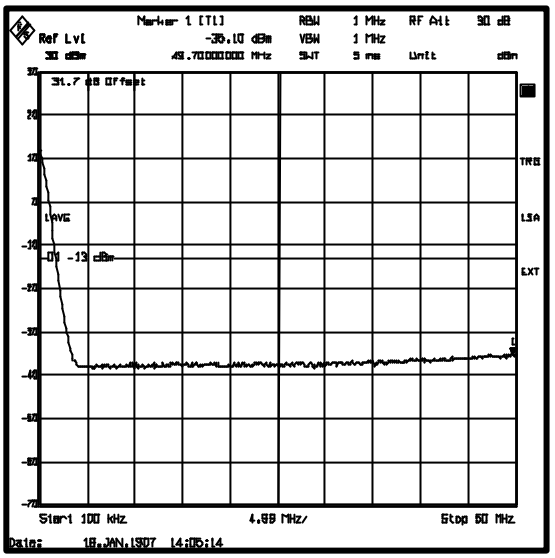


Figure : Out of block emissions (channel 189, Pmax) with TxF (w/o H2)

8PSK modulation

Band 100 KHz – 50 MHz



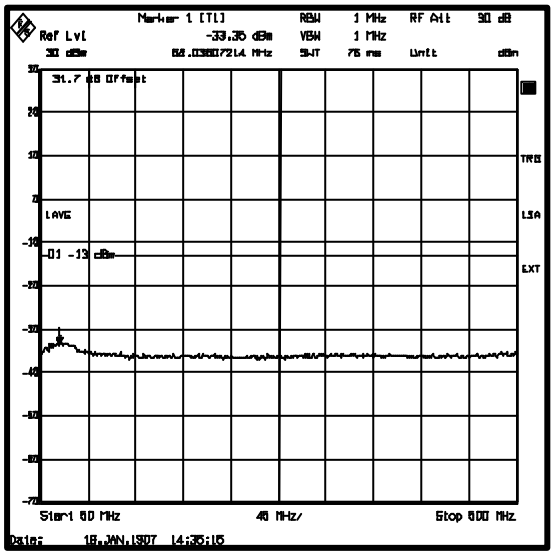


RBW = 10 kHz

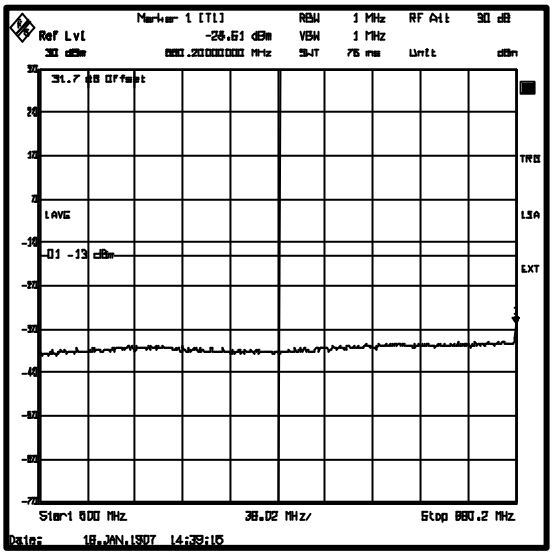
RBW = 1 MHz

Note: spectrum line s at 100 kHz are internal DC spectrum line of Analyser

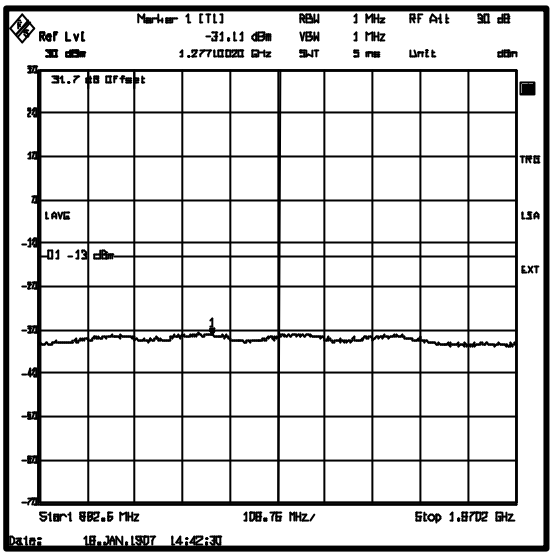
Band 50 Mhz – 500 MHz



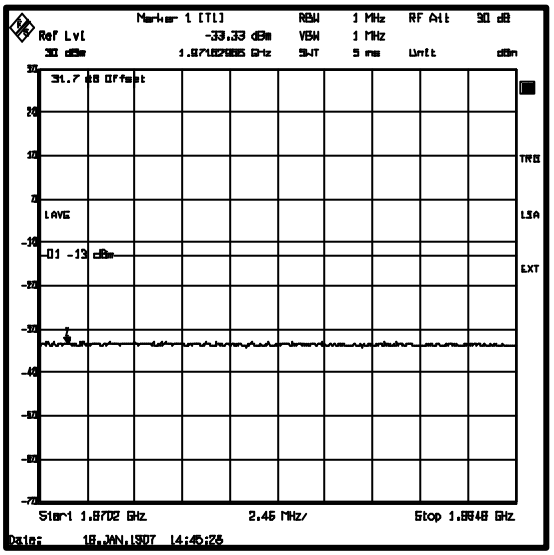
Band 500 Mhz – 880.2 MHz



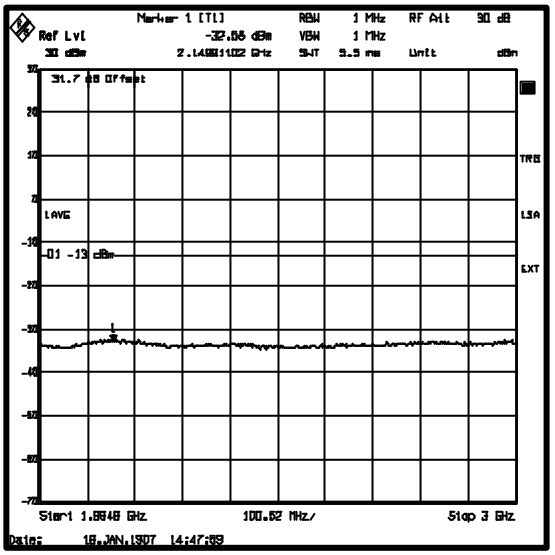
Band 882.6 Mhz – 1970.2 MHz



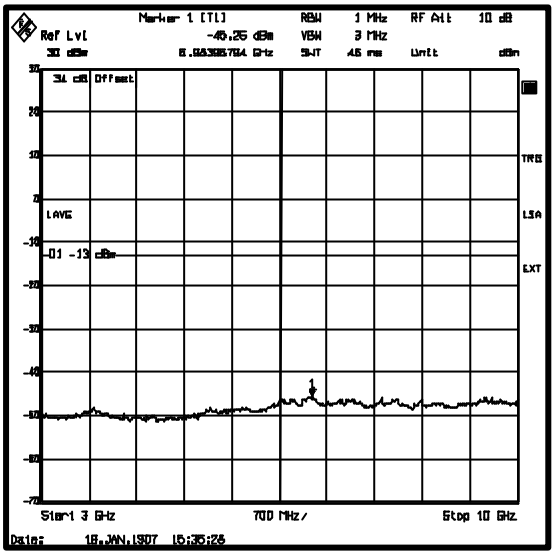
Band 1970.2 Mhz – 1994.8 MHz



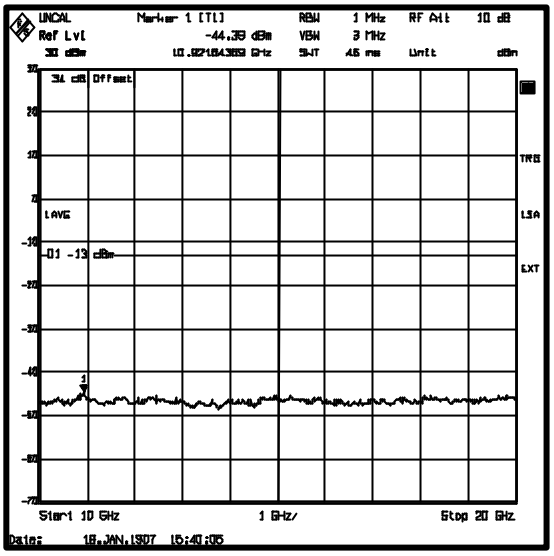
Band 1994.8 Mhz – 3 GHz



Band 3 GHz – 10 GHz



Band 10 GHz – 20 GHz



4.6.3 TEST RESULTS WITH DDM H2 & TXF H2 CONFIGURATION

Spurious measurement is performed in the TxF H2 combiner coupling configuration with HPRM 850 module.

The nominal GMSK power at antenna connector: P TxF H2 max = 44dBm.
The nominal 8PSK power at antenna connector: P TxF H2 max = 43dBm.

For TX0 + TxF H2 configuration, spurious has been measured for channels which have the worst results in Duplexer coupling.

4.6.3.1 Tx0 Test Results:

Tables show the results for Spurious Emissions for GMSK and 8PSK modulation at Antenna Terminals.

Table: Test results for GMSK Modulation TxF H2 combiner

	Channel	Power emission level	Spurious Emissions Level (dBm)	Limit (dBm)	Margin (dB)
A''	128	**Pmax - 2dB**	-15.74	-13	2.74
	131	**Pmax - 2 dB**	-14.62	-13	1.62
A	133	**Pmax - 2 dB**	-15.25	-13	2.25
	181	**Pmax - 2dB**	-14.69	-13	1.69
B	183	**Pmax - 2 dB**	-15.00	-13	2
	231	**Pmax - 2 dB**	-14.25	-13	1.25
B'	241	**(Pmax)**	-31.67	-13	18.67
	251	**Pmax - 2 dB**	-14.49	-13	1.49

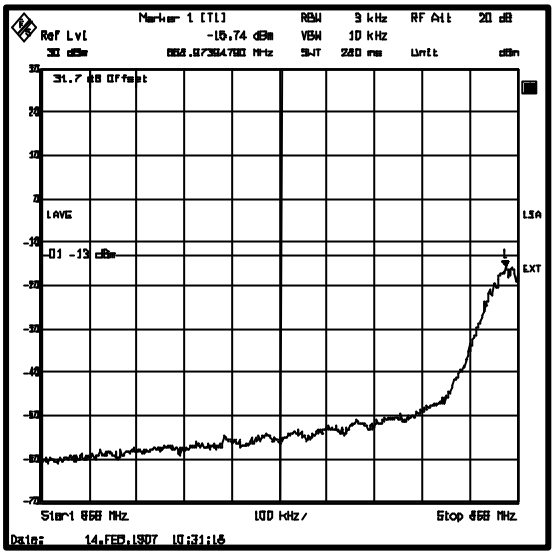
Table: Test results for 8PSK Modulation with TxF H2 combiner

	Channel	Power emission level	Spurious Emissions Level (dBm)	Limit (dBm)	Margin (dB)
A''	128	**Pmax**	-14.02	-13	1.02
	131	**Pmax**	-14.79	-13	1.79
A	133	**Pmax**	-14.29	-13	1.29
	181	**Pmax**	-14.90	-13	1.90
B	183	**Pmax**	-14.43	-13	1.43
	231	**Pmax**	-15.61	-13	2.61
B'	241	**Pmax**	-30.35	-13	17.35
	251	**Pmax**	-15.24	-13	2.24

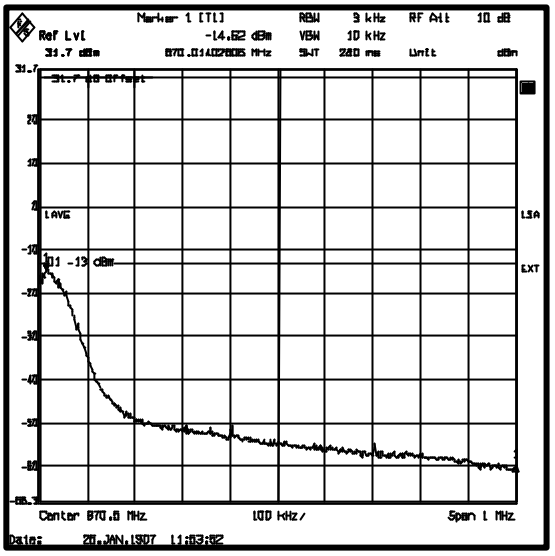
Notes:
Figures show sample plots for the case when the transmitter was respectively tuned to edge channels in Tx band for GMSK and 8PSK modulation.

Figure : 1 MHz adjacent band
GMSK MODULATION – Tx H2 configuration
Power limitation: Pmax –2 dB

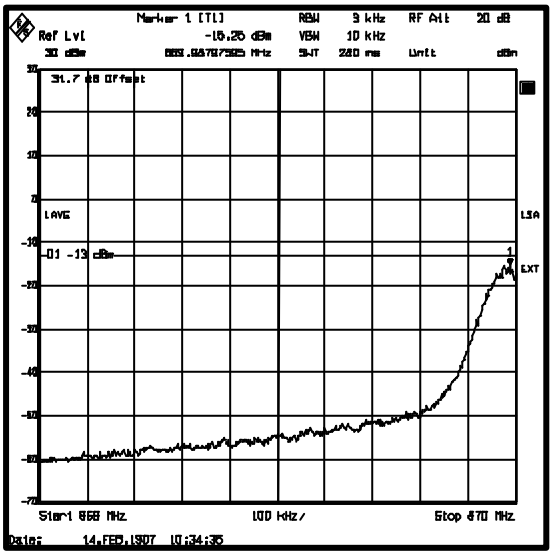
Channel 128



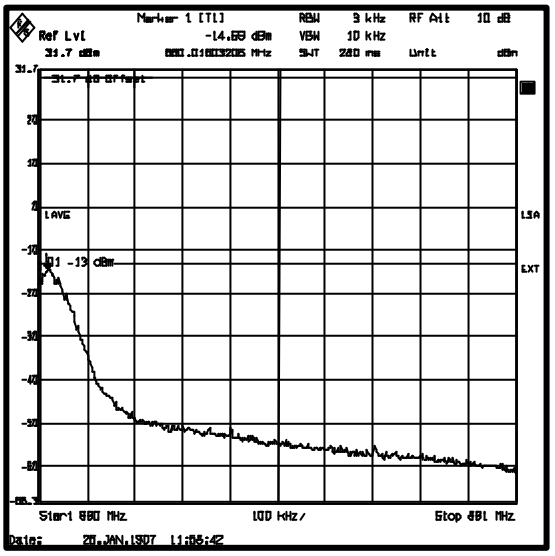
Channel 131



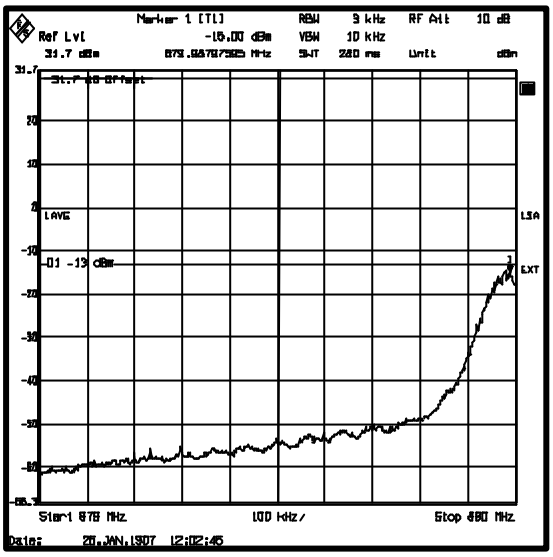
CHANNEL 133



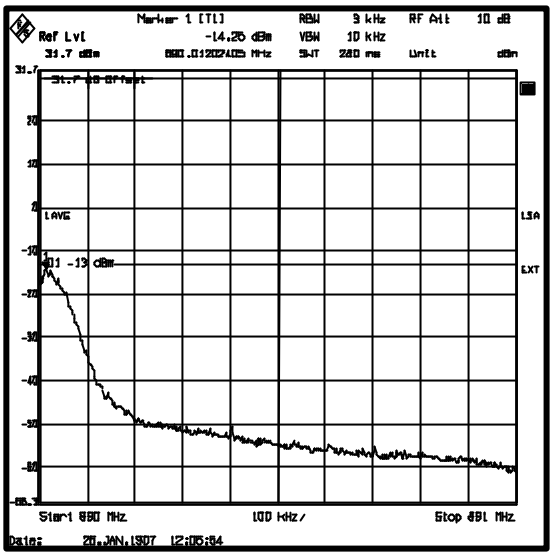
CHANNEL 181



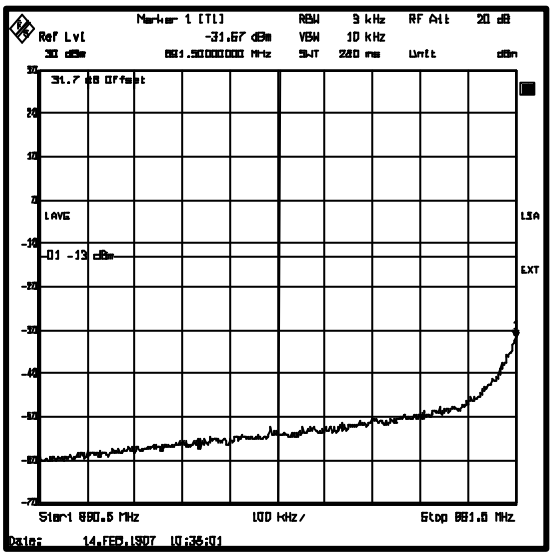
Channel 183



Channel 231



Channel 241 @ Pmax



Channel 251

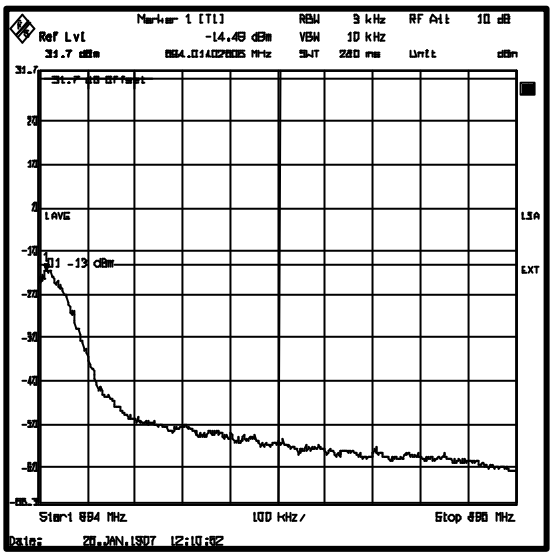
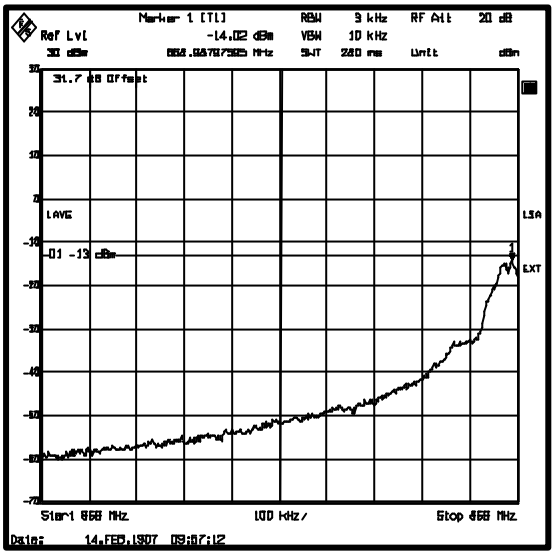


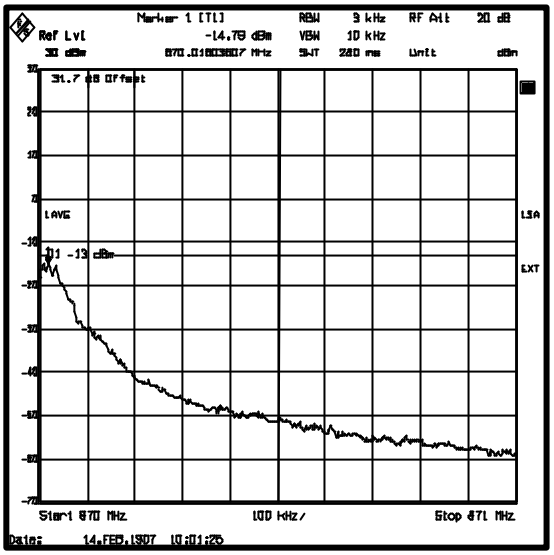
Figure 12: 1 MHz adjacent band

8PSK MODULATION – TxF H2 configuration
Power limitation: Pmax

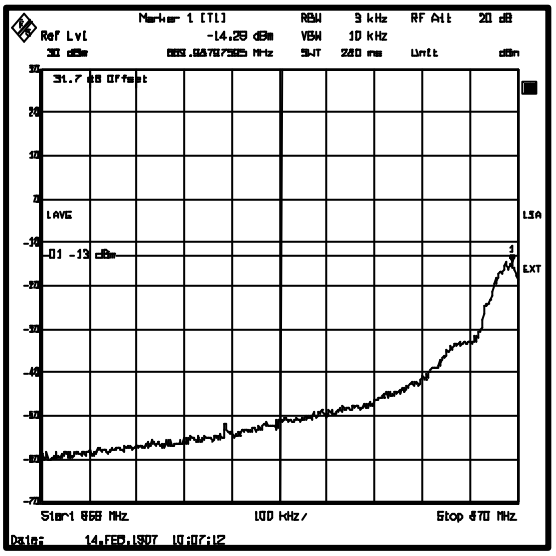
CHANNEL 128



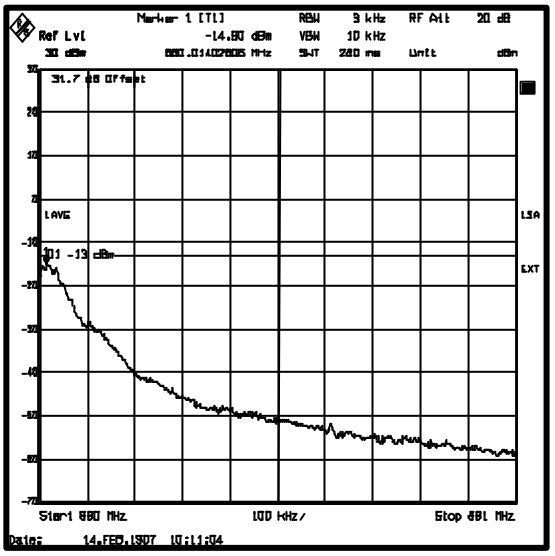
CHANNEL 131



CHANNEL 133

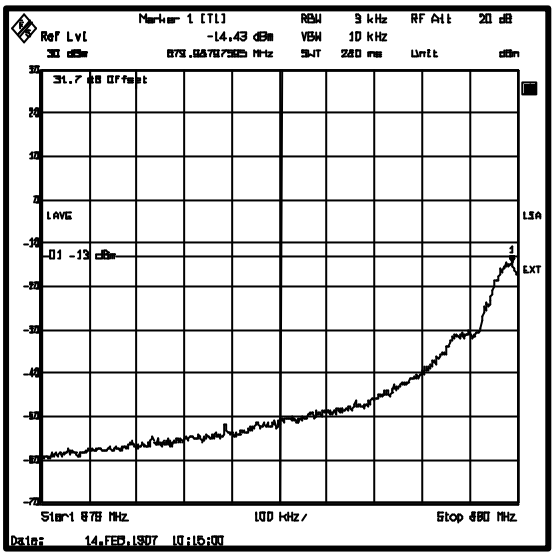


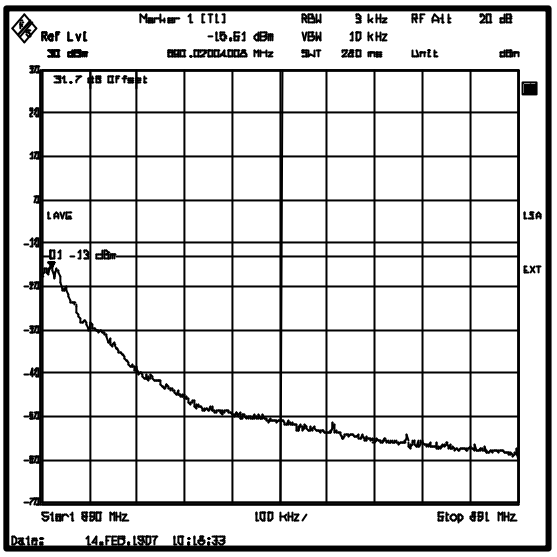
CHANNEL 181



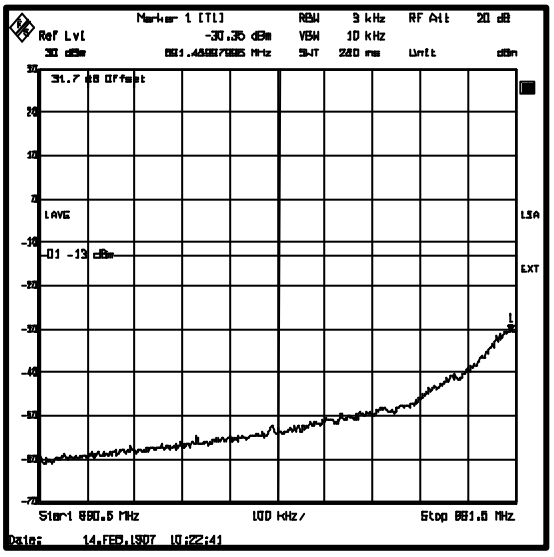
CHANNEL 183

CHANNEL 231

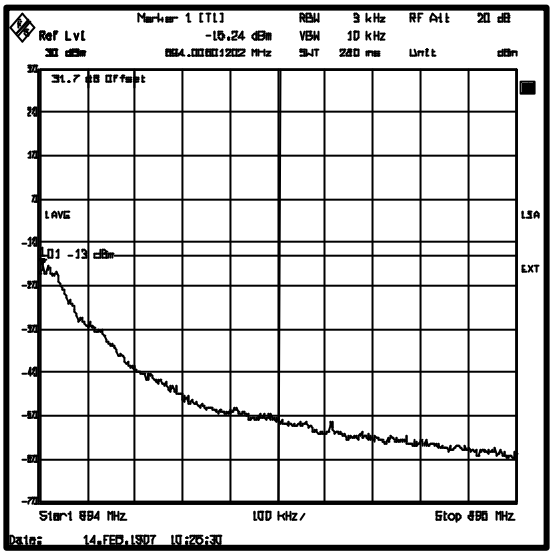




CHANNEL 241 @ PMAX



CHANNEL 251



Conclusion:

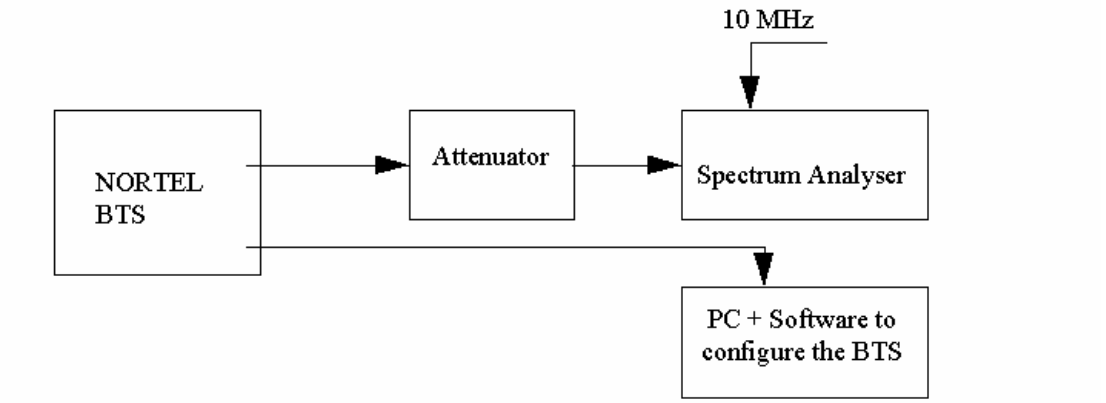
For Edge Channel ARFCN 128, 131, 133, 181, 183, 231, 233, 251, in order to meet spurious emission requirement, power has to be reduced by 2 dB in GMSK modulation and maximum power is allowed in 8PSK, with DDM H2 & TxF H2 configuration.

For Edge Channel ARFCN 238, 241, the maximum power (GMSK: 44dBm) has allowed to meet spurious emission requirement.

4.6.3.2 TEST PROCEDURE

The equipment was configured as shown in schematic3.

Schematic3: Test configuration for spurious emissions at antenna terminals



For adjacent channels emissions, the BTS nominal carrier frequency was adjusted to each block edge channel.

Channels 128 and 251 are those channels which are at the lower and upper edges of the eGSM 850 band respectively.

The BTS was configured to transmit at maximum power (static level 0) or a reduced power:

- For GMSK modulation, in mode GMSK no synchro
- For 8PSK modulation, in mode logical PDCH, Type GPRS, coding MCS5.

Initially the transmitter was set to operate to maximum power. Then in case of out of limits, the power has been decreased by 2 dB.

For these measurements, the resolution bandwidth was of the spectrum analyzer was set to at least 1% of the emission bandwidth. In this case the emission bandwidth measured was closed to 300 kHz. Therefore, the resolution bandwidth was set to 3 kHz.

The spectrum analyzer had the following settings for adjacent band:

Resolution bandwidth:	3 kHz
Video bandwidth:	10 kHz
Span:	1 MHz
Reference level:	30 dBm
Reference Level Offset:	Corrected to account for cable(s), filter and attenuator losses
Level range:	100 dB
Sweep time:	Coupled
Detector:	Sample
Trace:	Average
Sweep count:	200

The spectrum analyzer had the following settings for out of block emissions.

Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz

The emissions were investigated up to the twentieth harmonic of the fundamental emission (20 GHz).
The measured level of the emissions was recorded and compared to the -13 dBm limit.

5. ABBREVIATIONS AND DEFINITIONS

5.1. ABBREVIATIONS

RM	Radio Module
BCF	Base Common Function
BTS	Base Transceiving Station
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

5.2. 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

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

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

IF frequencies on Radio Board: For Tx path 299 MHz
For Rx path 211 MHz

Clock frequency on the Radio Board 13MHz created from 4.096MHz coming from the Digital board.

- **GSM 850 Frequency Band and Channels**

	B	M	T
GSM 850	C128	C189	C251
F Tx (MHz)	869.2	881.4	893.8
F Rx (MHz)	824.2	836.4	848.8

For 128 < n <251

$F_{Rx}(n) = 824.2 + 0.2*(n-128)$

$T_{Tx}(n) = F_{Rx}(n) + 45$

IF frequencies on Radio Board: For Tx path 133 MHz
For Rx path 71 MHz

Clock frequency on the Radio Board 13MHz created from 4.096MHz coming from the Digital board.

6. MEASUREMENT EQUIPMENT LIST

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

Equipment description	Manufacturer	Model	Serial No.	V/A date
Power Meter	Giga-tronics	8542C	393733	21/11/08
Spectrum Analyser	Rohde & Schwarz	FSEM30	64680	13/11/08
Synthesized Signal Generator, 0.1 – 3000Mhz	Hewlett Packard	8664A	375088	11/07/07
20 dB attenuator 100 W	Spinner		24400	
10 dB attenuator 100 W	Spinner		22476	

7. EQUIPMENT LIST UNDER TEST

Software Compatibility :	Load BTS v15f1e01 (CDI117235) ICM/ABM/RICAM: v15f101 (CDI117166) RM : v15e403 (CDI117006)			
PI software tools:	**TIL COAM**	v15e402	**Wintools**	v04b4e10

Designation	Hardware code PEC Code	comments
CABINET BTS6K	NTQ610FA	OUT AC ROHS VERS
UCPS RECTIFIER	NTN070BF	1400W ROHS VERS
UCPS RECTIFIER	NTN070BF	1400W ROHS VERS

- **Interconnect Digital board**

HARDWARE EQUIPEMENT UNDER TEST		
Description	**Hardware code**	**Comment**
Interconnect board		
Logical board		
IFM 0 - IFM 1	NTN025AA NTN025AF	
ICM 0 - ICM 1	NTN023AA NTN023AF	
ABM 0 – ABM 1	NTN029AA NTN029AA	
RICAM ICAM	NTN024AA NTN024BA	RICAM = (1 IFM+2 ICM+1 ABM) ICAM is depopulated RICAM board ICAM = 1 IFM + 1 ICM + 1ABM

- **GSM1900 Radio Modules used with 30W Power Amplifier configuration**

Radio modules PCS1900		
RM 30W PCS1900	NTN050PM	
PCS1900 Coupling module		
PCS1900 DDM H2	NTN063AA NTN063AM	DDM 1900 W/VSWR W/HYBRIDS DDM 1900 W/O VSWR W/HYBRIDS
PCS1900 DDM	NTN063BA NTN063BM	DDM 1900 W/VSWR W/O HYBRIDS DDM 1900 W/O VSWR W/O HYBRIDS
TXF H2	NTN064AA NTN064AM	TX FILTER 1900 W/VSWR W/HYB TX FILTER 1900 W/O VSWR W/HYB
TXF H2	NTN064BA NTN064BM	TX FILTER 1900 W/VSWR W/O HYB TX FILTER 1900 W/O VSWR W/OHYB

Power limitation to comply to Adjacent Band spurious at antenna connector

Coupling configuration	**System Power limitation** **GMSK modulation**	**System Power limitation** **8 PSK modulation**
DDM Duplexer Tx Filter **(without H2)**	**Power Limitation :** **Pmax – 2 dB** = 42 dBm	**Power Limitation :** **Pmax – 2 dB** = 42 dBm
DDM H2 Tx Filter H2	**Pmax** = 41 dBm	Pmax = 41 dBm

- **GSM850 Radio Modules used with 60W Power Amplifier configuration**

Description	Hardware code	Serial Number	Comment
Radio Modules GSM 850			
HPRM 3T 60W GSM 850	NTN050JA	CDN200651002	Radio Module 850Mhz (GMSK 60W / 8PSK 45W)
Full Band coupling (*Tx Band 869-894 MHz)*			
DDM 850 H2	NTN063HA	FICT02002064	With TOS meter
	NTN063HM	FICT02002064	With out TOS meter
DDM 850	NTN063JA	FICT02002064	With TOS meter
	NTN063JM	FICT02002064	With out TOS meter
Tx Filter 850 H2	NTN064HA	FICT02001XL4	With TOS meter
	NTN064HM	FICT02001XL4	Without TOS meter
Tx Filter 850	NTN064JA	FICT02001XL4	With TOS meter
	NTN064JM	FICT02001XL4	Without TOS meter

Power limitation to comply with Adjacent Band spurious at antenna connector:

Coupling configuration	**System Power limitation GMSK modulation**	**System Power limitation 8 PSK modulation**
Diplexer Tx Filter	Power Limitation : **Pmax – 6 dB = 41.3 dBm** Except ARFCN 238 , 241 : Pmax	Power Limitation : **Pmax – 4 dB = 42.4 dBm** Except ARFCN 238 , 241 : Pmax
DDM 850	Power Limitation : **Pmax – 2 dB = 42 dBm** Except **ARFCN 238, 241 : Pmax**	**Pmax= 43 dBm**

For Edge Channel ARFCN 128, 131, 133, 181, 183, 231, 233, 251, power has to be reduced by 6dB (GMSK) or 4dB (8PSK) in order to meet spurious emission requirement.

For Edge Channel ARFCN 238, 241, maximum power has allowed to meet spurious emission requirement.

END OF DOCUMENT