Test Report:	6W74437
Applicant:	G-Wave Inc 38 Leuning Street South Hackensack, NJ 07606 USA
Apparatus:	BDA-ESMR-2/2W-80-AN89R
FCC ID:	Q8KESMR2W80AN89R
In Accordance With:	FCC Part 90, Boosters Private Land Mobile Radio Services
Tested By:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Authorized By:	Jin Xu, Wireless Specialist
Date:	November 13, 2006
Total Number of Pages:	36

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002 and TIA-102.CAAA-B. Radiated tests were conducted is accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	BDA-ESMR-2/2W-80-AN89R
Specification:	FCC Part 90 Private Land Mobile Radio Services
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Section 1: Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

BDA-ESMR-2/2W-80-AN89R Dual Band Bi-Directional Booster

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
4	BDA-ESMR89-2/2W-80-ANR	None

The first samples were received on: October 18, 2006

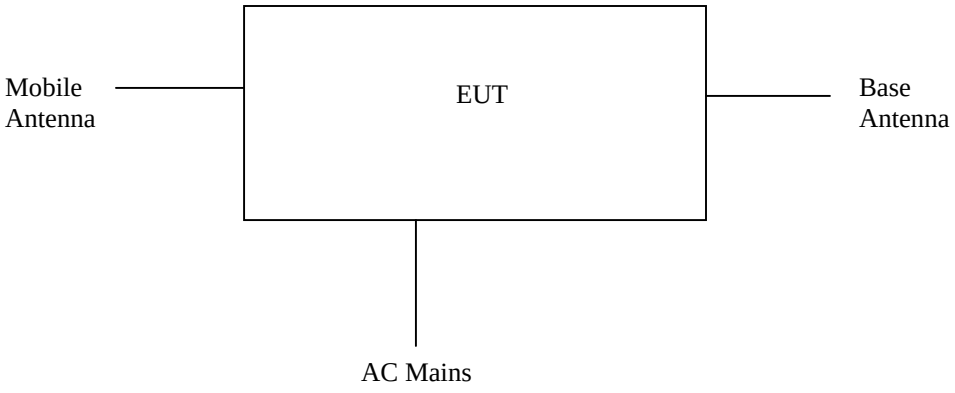
1.3 Theory of Operation

The EUT is a bi-directional booster. A signal received on the Mobile antenna is amplified and then transmitted out the Base antenna and any signal at the Base antenna is amplified and transmitted out the Mobile antenna.

1.4 Technical Specifications of the EUT

Manufacturer:	G-Wave Inc
Operating Frequency:	Uplink: 806-824MHz OR 817-824MHz, 896-902MHz Downlink: 851-869MHz OR 862-869MHz, 935-941MHz
Emission Designator:	D7W, F2D
Rated Power:	Uplink: 26dBm Downlink: 26dBm
Measured Power:	Uplink: 25.05dBm Downlink: 25.23dBm
Modulation:	2FSK, QAM
Power Source:	120VAC 60Hz

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 90 Private Land Mobile Radio Services
FCC 2-11-04/EAB/RF Amplifier, Booster, and Repeater Reminder Sheet

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 ^{o}C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSP40	FA001920	Mar 17/07
Power Meter	HP	E4418B	FA001413	May 15/07
Power Sensor	HP	8487A	FA001908	Apr 6/07
Signal Generator	Rohde & Schwarz	SMIQ03	FA001091	Jan 1/07
Signal Generator	Rohde & Schwarz	SMIQ06B	FA001878	June 28/07
Attenuator	Narda	776B-20	FA001153	COU
Attenuator	Narda	769-20	FA001394	COU
Combiner	Mini-circuits	ZA3PD-2	FA001155	COU
Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	May 16/07
Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	May 16/07
Horn Antenna #1	EMCO	3115	FA000649	Jan. 12/07
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	Aug. 02/07
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	Aug. 02/07
4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	Aug. 02/07
5.0 – 18.0 GHz Amplifier	NARDA	DWT-186N23U40	FA001409	COU
Biconical (1) Antenna	EMCO	3109	FA000805	May 03/07
Log Periodic Antenna #1	EMCO	LPA-25	FA000477	Sept. 12/07

COU – Calibrate on Use
NCR – No Calibration Required

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

The following technical judgement was made during this assessment:

3.2.1 Technical Judgement 1

The apparatus has a selector switch which is used for changing the Low frequency band duplexer. The different bands are 806-824MHz and 817-824MHz for the Uplink and 851-869MHz and 862-869MHz for the Downlink. It was judged that the two paths are not identical and that full testing would be required on each path.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 90 : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N	No : not applicable / not relevant.
Y	Yes : Mandatory i.e. the apparatus shall conform to these tests.
N/T	Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 90 : Test Results

Clause	Test Method	Test Description	Required	Result
90.205	2.1046	Output power	Y	PASS
90.210	2.1051	Conducted spurious emissions	Y	PASS
90.210	2.1053	Radiated spurious emissions	Y	PASS
90.213	2.1055	Frequency stability	N (1)	
90.214	—	Transient Behavior	N	
90.219	—	Use of boosters	Y	PASS
2-11-04/EAB/RF	2.1049	Occupied bandwidth	Y	PASS
2-11-04/EAB/RF	—	Out of band rejection	Y	PASS

Notes:

(1) The EUT has no frequency determining components.

Appendix A : Test Results

Clause 90.205 Output Power

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized for new stations authorized after August 16, 1995 is as follows in FCC Part 90.205(a) through (r).

Test Conditions:

Sample Number:	4	**Temperature (°C):**	23
Date:	October 20, 2006	**Humidity (%):**	29
Modification State:	0	**Tester:**	Jason Nixon
		Laboratory:	Wireless

Test Results:

Uplink

	806-824MHz Band	817-824MHz Band	896-902MHz Band
QAM	24.74	24.67	24.44
2FSK	25.05	24.96	24.78

Downlink

	851-869MHz Band	862-869MHz Band	935-941MHz Band
QAM	24.88	24.78	24.45
2FSK	25.23	25.07	24.65

Measurements were performed on a single Carrier set to the 1dB compression point.

Clause 90.210 Conducted Spurious Emissions

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

Test Conditions:

Sample Number:	4	**Temperature (°C):**	23
Date:	October 20, 2006	**Humidity (%):**	29
Modification State:	0	**Tester:**	Jason Nixon
		Laboratory:	Wireless

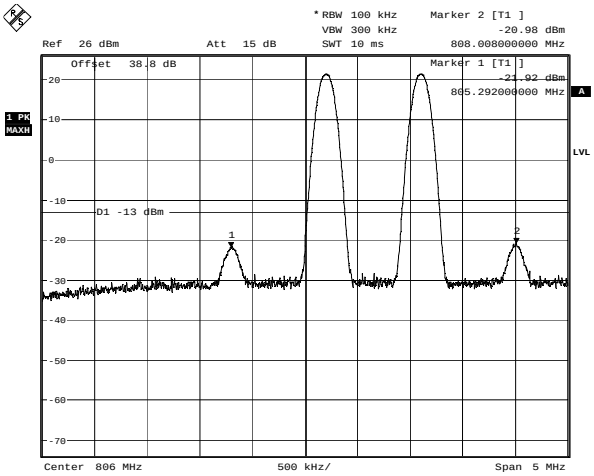
Test Results:

See Attached Plots.

Additional Observations:

Conducted emissions measurements were performed on three channels, low, mid and high, and with 2FSK and QAM modulation, but only the worst case have been included.

Uplink 3rd Order Intermodulation
806-824MHz Band



Uplink - 3rd Order Intermodulation - 2FSK - 806-824MHz

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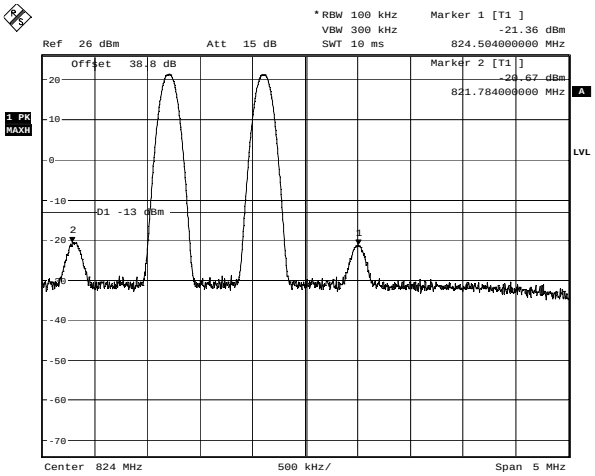

Uplink - 3rd Order Intermodulation - 2FSK - 806-824MHz

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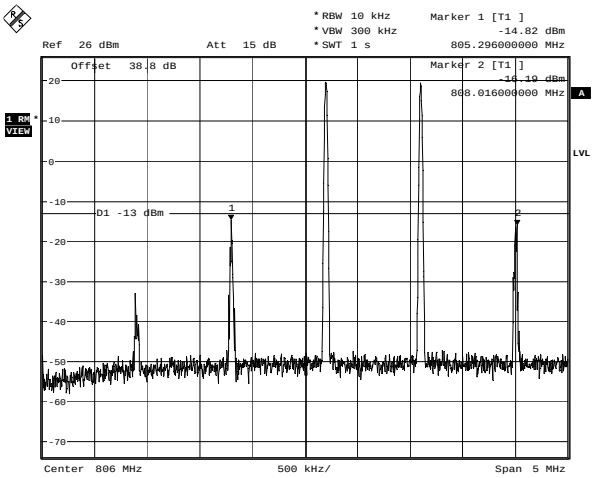

Uplink - 3rd Order Intermodulation - QAM - 806-824MHz

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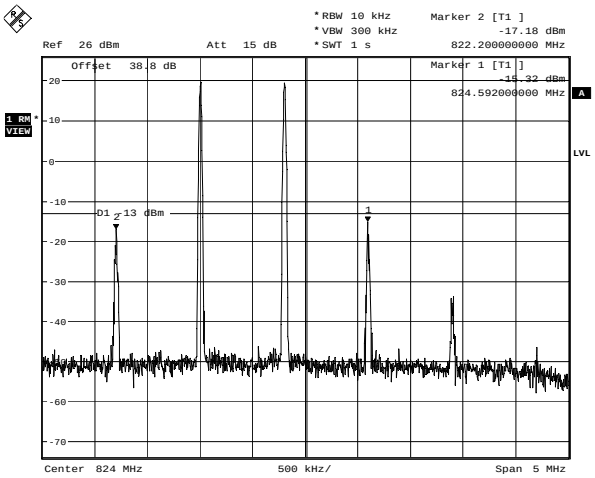
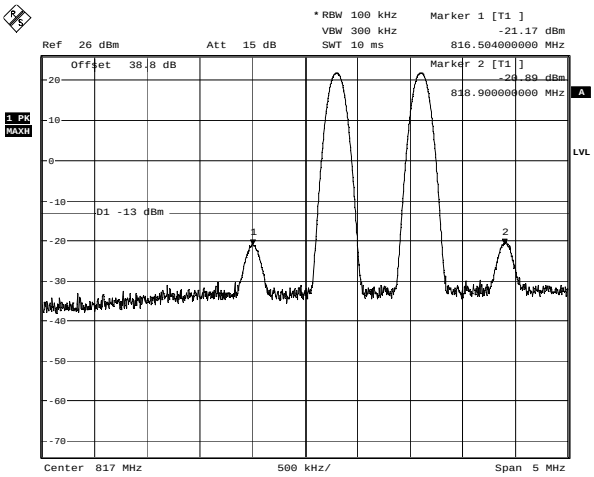


Uplink - 3rd Order Intermodulation - QAM - 806-824MHz

Date: 23.OCT.2006 11:00:21

817-824MHz Band



Uplink - 3rd Order Intermodulation - 2FSK - 817-824MHz

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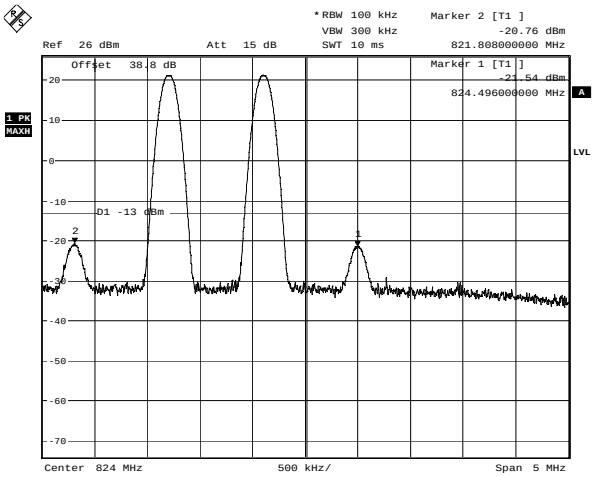

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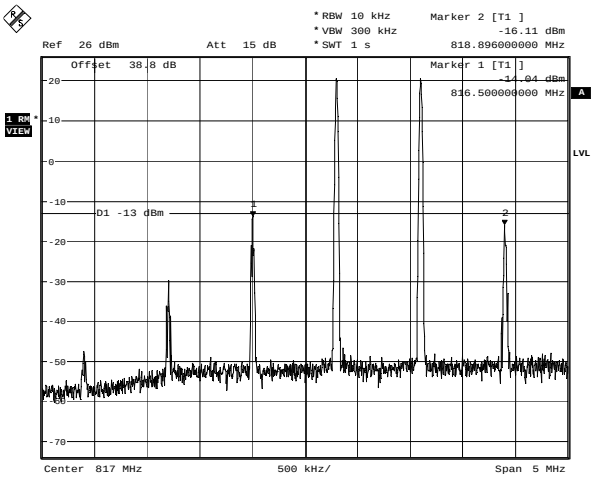

Uplink - 3rd Order Intermodulation - QAM - 817-824MHz

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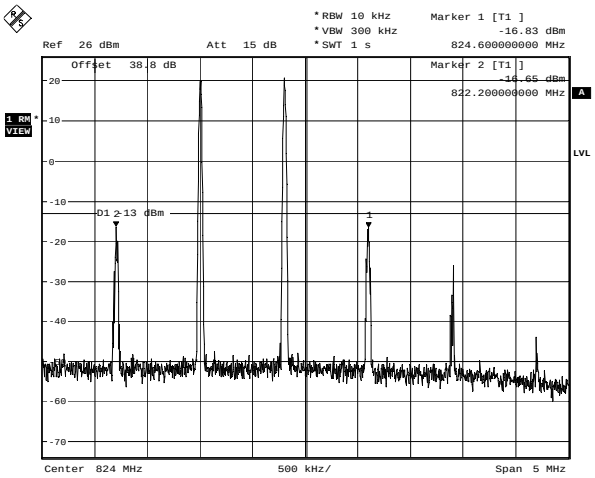
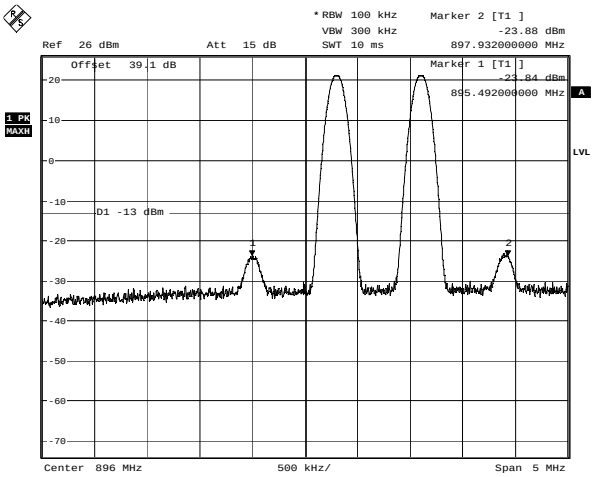


Uplink - 3rd Order Intermodulation - QAM - 817-824MHz

Date: 23.OCT.2006 10:58:29

896-902MHz Band



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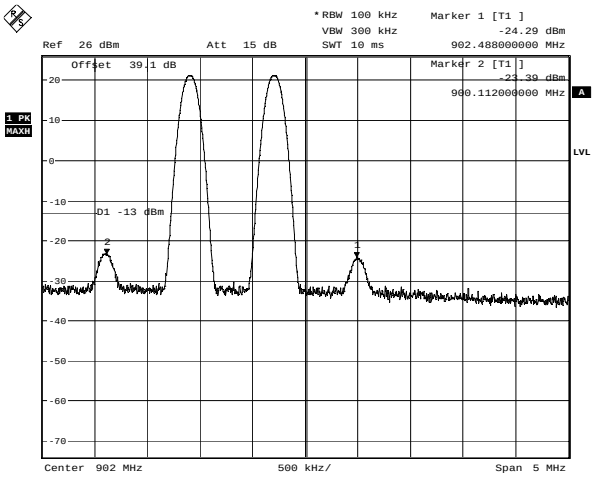

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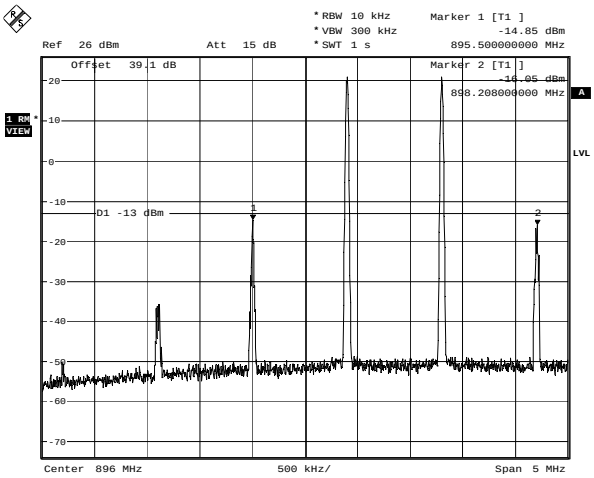

Uplink - 3rd Order Intermodulation - QAM - 896-902MHz

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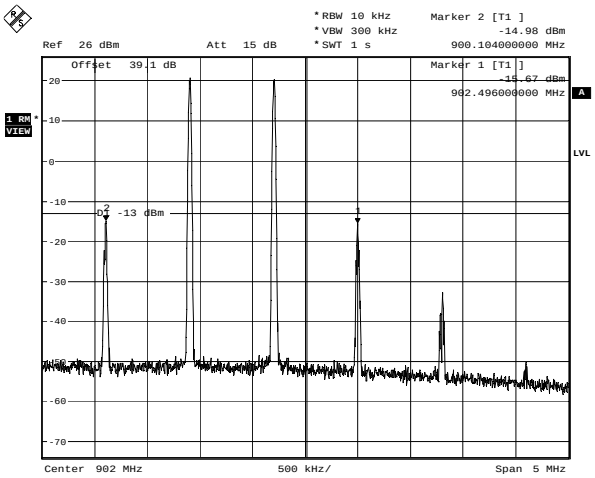
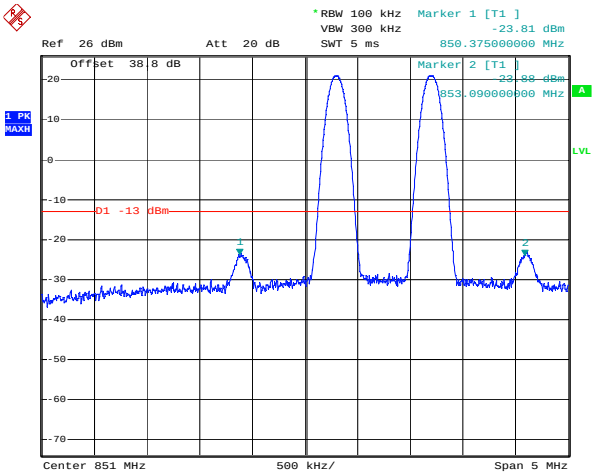


Uplink - 3rd Order Intermodulation - QAM - 896-902MHz

Date: 23.OCT.2006 12:36:39

Downlink 3rd Order Intermodulation 851-869MHz Band



Downlink - 3rd orderintermodulation - 2FSK - 851-869MHz

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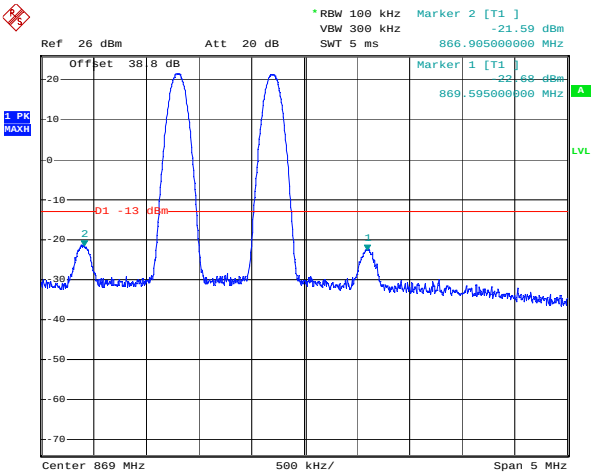

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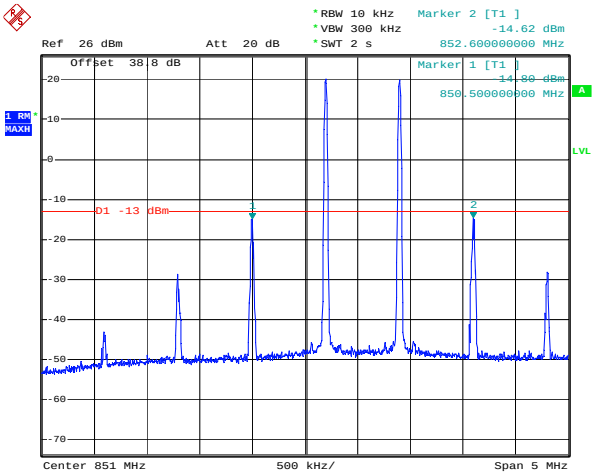

Downlink - 3rd orderintermodulation - QAM - 851-869MHz

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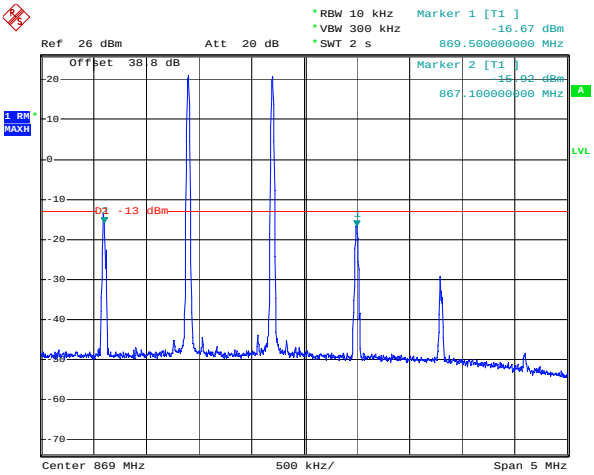

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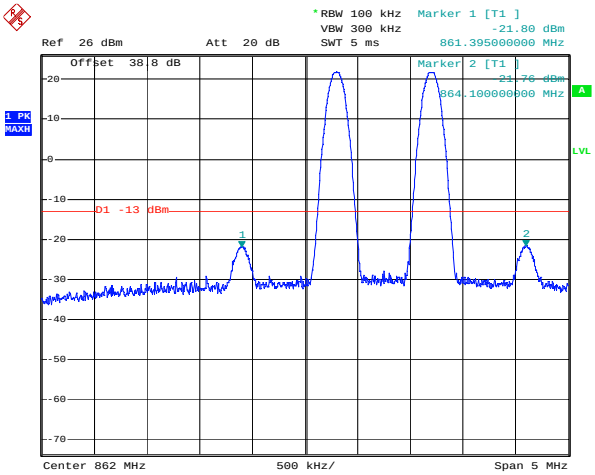
Date: 20.OCT.2006 21:05:05

862-869MHz Band



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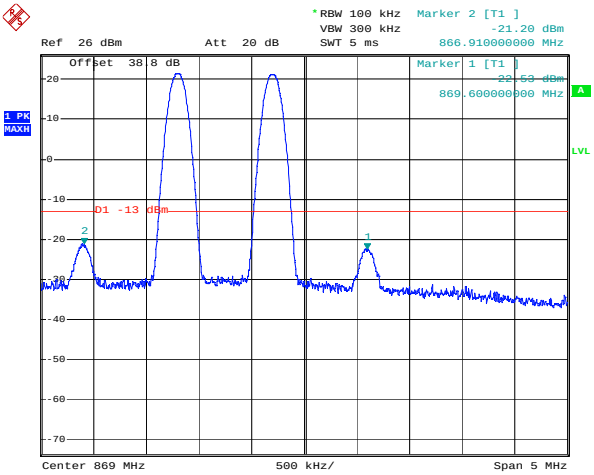

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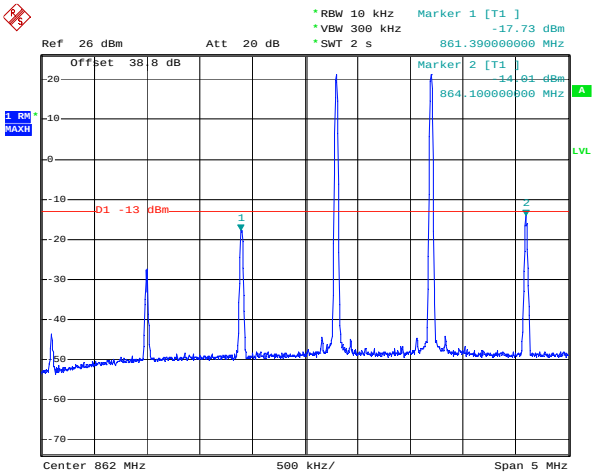

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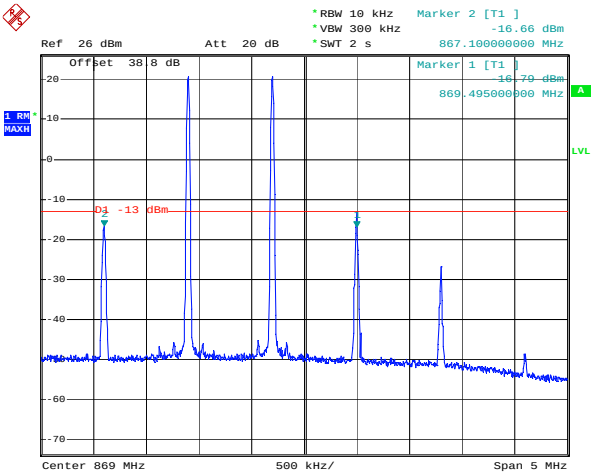
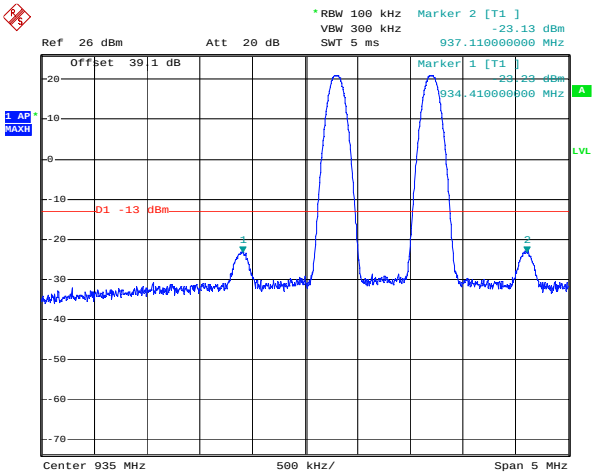
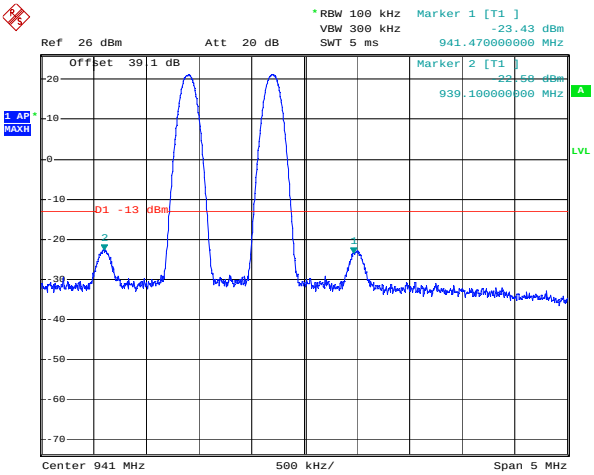


Downlink - 3rd orderintermodulation - QAM - 862-869MHz

Date: 20.OCT.2006 18:42:34

935-941MHz Band





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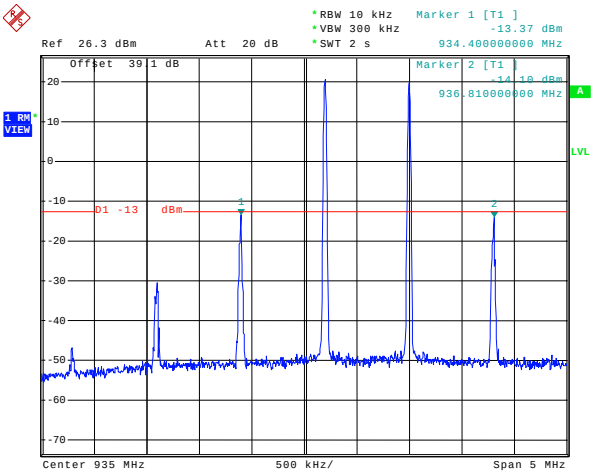

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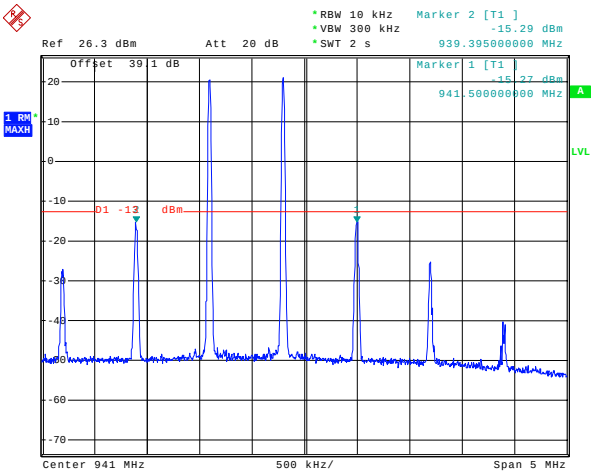
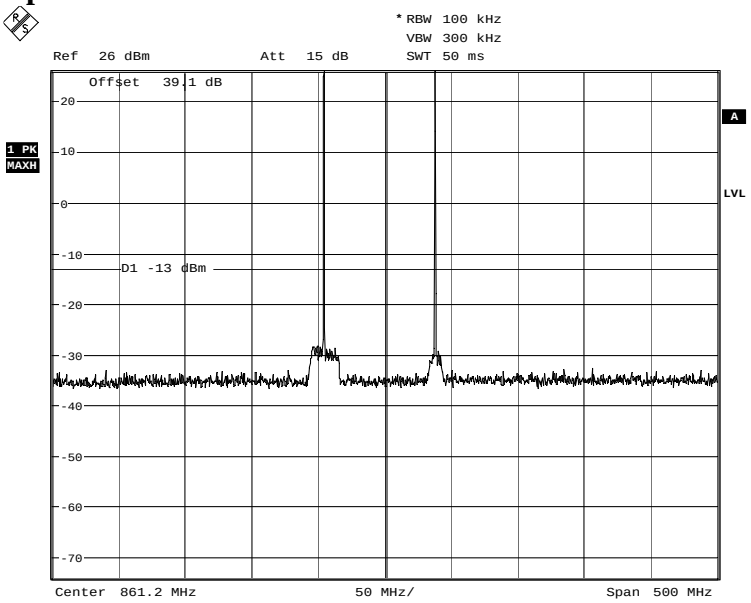


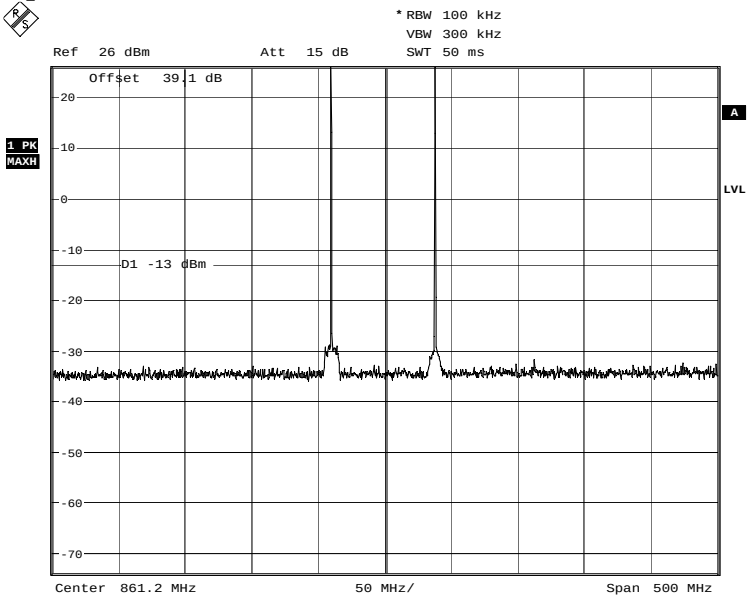
Uplink 806-824MHz and 896-902MHz



Uplink - Conducted Emissions - 806-824MHz and 896-902MHz

Date: 23.OCT.2006 13:55:59

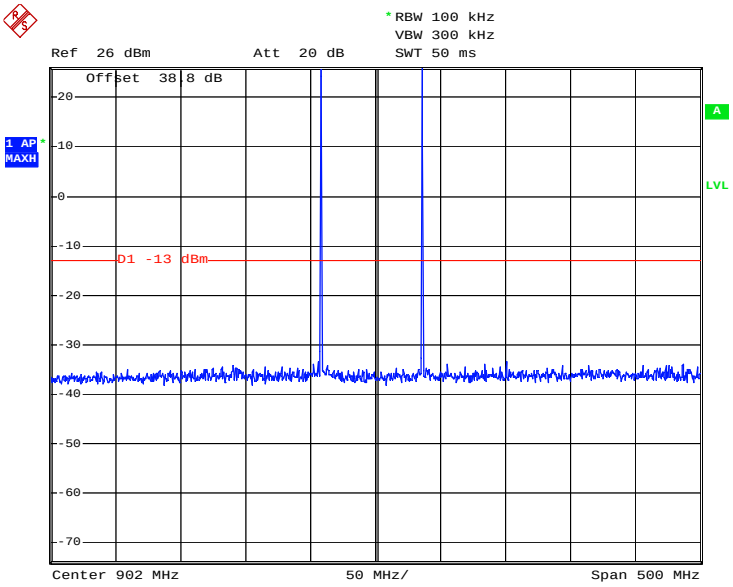
Uplink 817-824MHz and 896-902MHz



Uplink - Conducted Emissions - 817-824MHz and 896-902MHz

Date: 23.OCT.2006 13:55:17

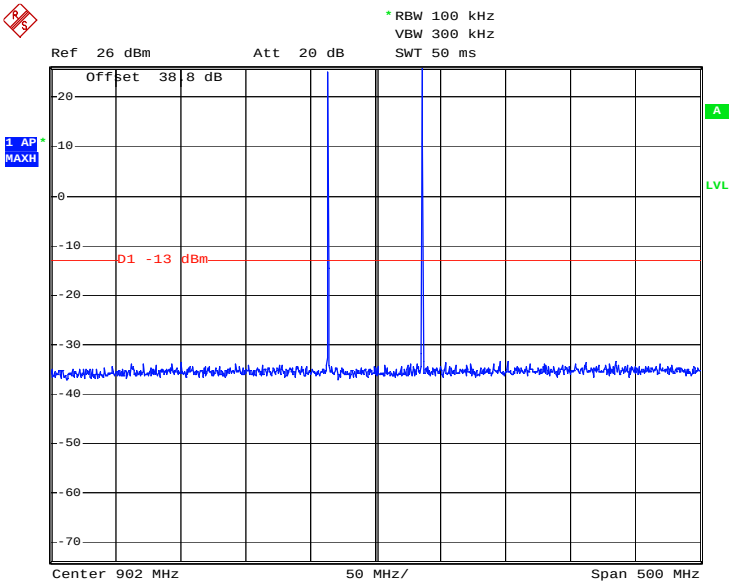
Downlink 851-869MHz and 935-941MHz



Downlink - 3rd Order Intermodulation

Date: 20.OCT.2006 22:20:54

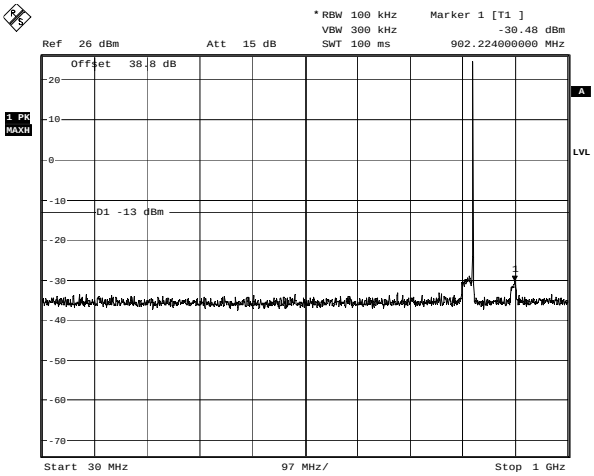
Downlink 862-869MHz and 935-941MHz



Downlink - 3rd Order Intermodulation

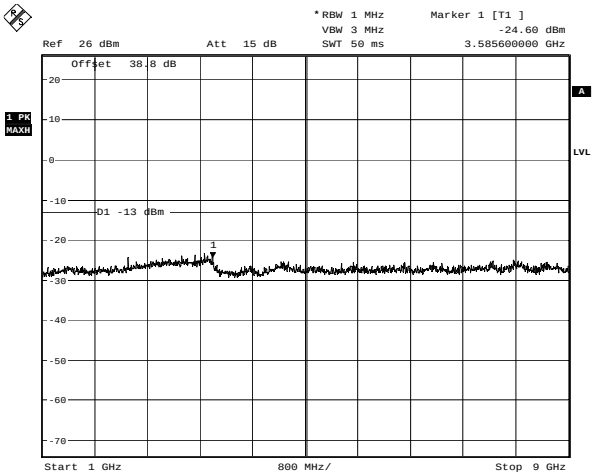
Date: 20.OCT.2006 22:20:22

Uplink Conducted Emissions
806-824MHz Band



Uplink - Conducted Emissions - 2FSK - 806-824MHz

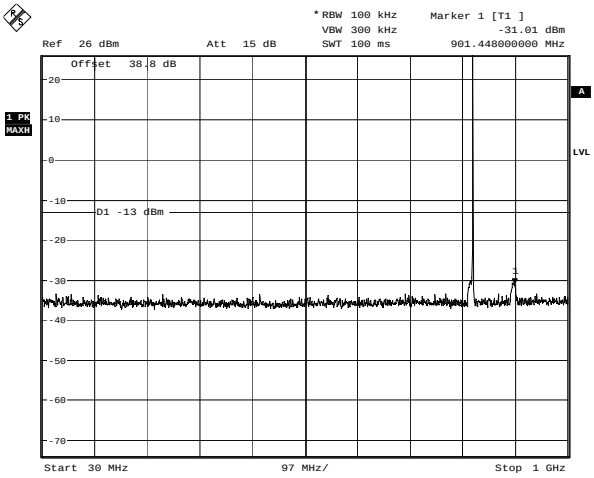
Date: 23.OCT.2006 13:10:22



Uplink - Conducted Emissions - 2FSK - 806-824MHz

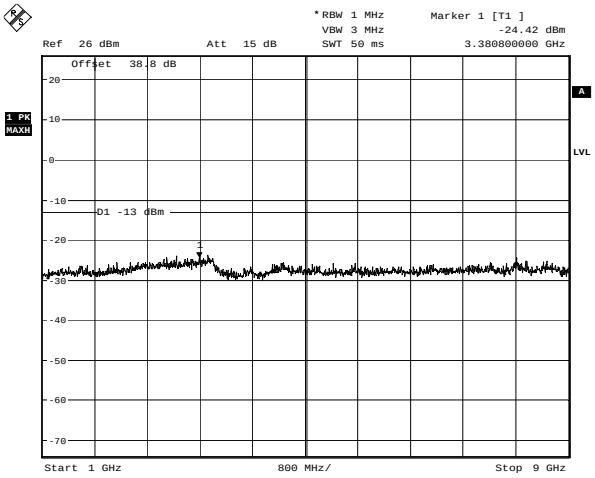
Date: 23.OCT.2006 13:09:44

817-824MHz Band



Uplink - Conducted Emissions - QAM - 817-824MHz

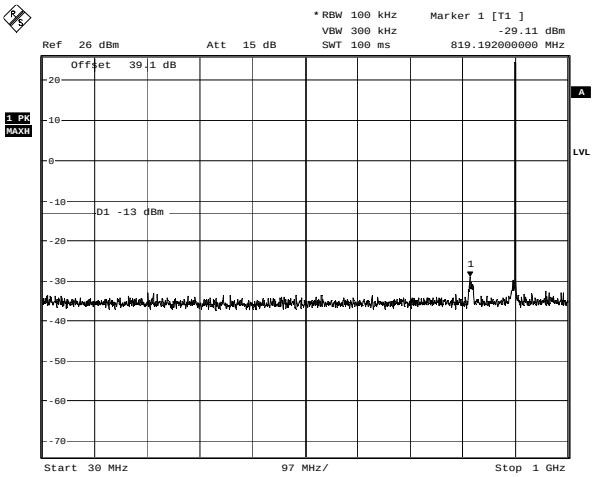
Date: 23.OCT.2006 13:24:40



Uplink - Conducted Emissions - QAM - 817-824MHz

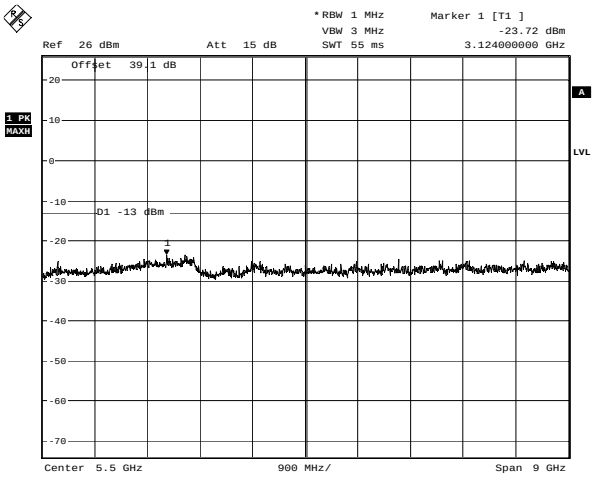
Date: 23.OCT.2006 13:25:15

896-902MHz Band



Uplink - Conducted Emissions - 2FSK - 896-902MHz

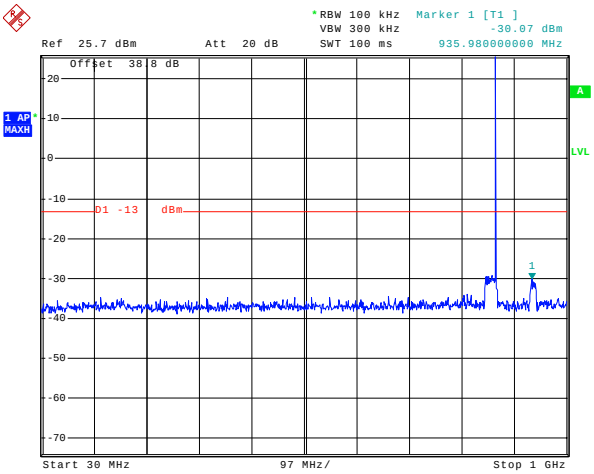
Date: 23.OCT.2006 13:41:36

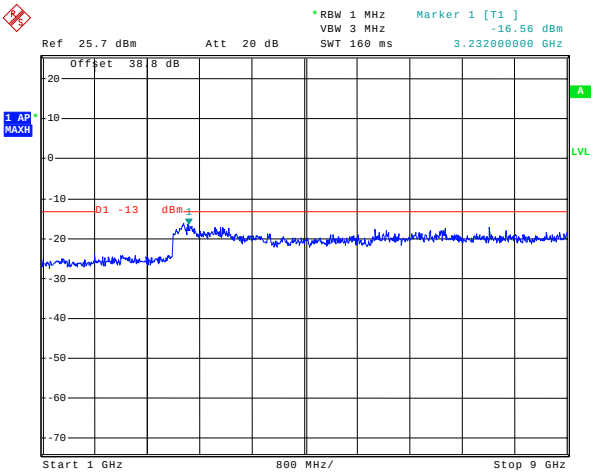


Uplink - Conducted Emissions - 2FSK - 896-902MHz

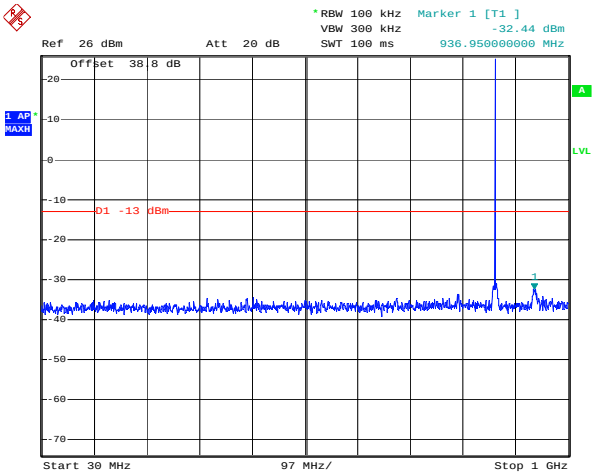
Date: 23.OCT.2006 13:38:46

Downlink Conducted Emissions
851-869MHz Band



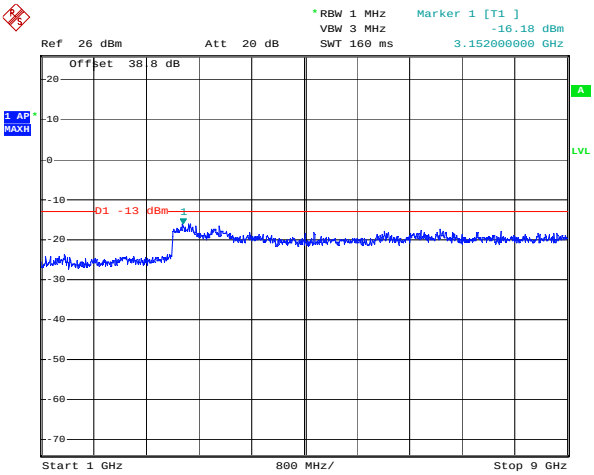


862-869MHz Band



Downlink - Conducted emissions - 2FSK - 862-869MHz

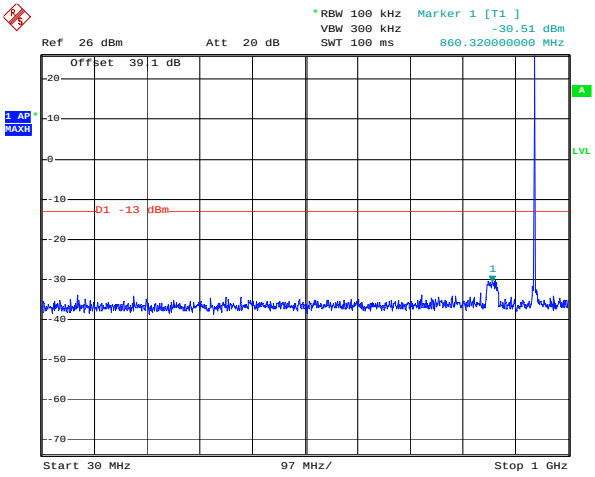
Date: 20.OCT.2006 22:00:03



Downlink - Conducted emissions - 2FSK - 862-869MHz

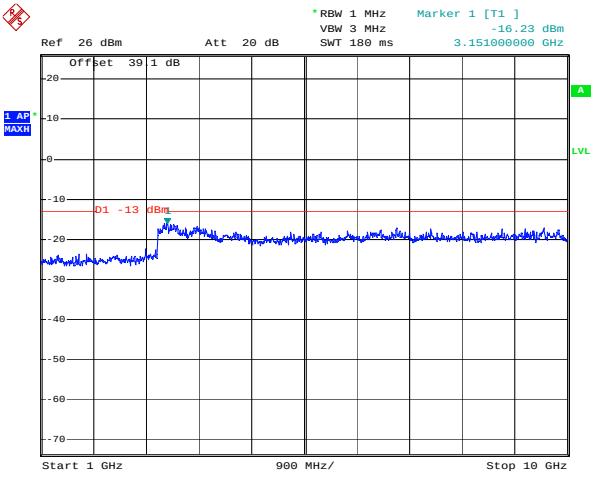
Date: 20.OCT.2006 22:01:24

935-941MHz Band



Downlink - Conducted emissions - QAM - 935-941MHz

Date: 20.OCT.2006 21:34:40



Downlink - Conducted emissions - QAM - 935-941MHz

Date: 20.OCT.2006 21:35:42

Clause 90.210 Radiated Spurious Emissions

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

Test Conditions:

Sample Number:	4	**Temperature (°C):**	12
Date:	October 23, 2006	**Humidity (%):**	56
Modification State:	0	**Tester:**	Jason Nixon
		Laboratory:	OATS

Test Results:

No Emissions were detected within 20dB below the limit.

Additional Observations:

The Spectrum was searched from 30MHz to 10GHz.

All measurements were performed using a Peak Detector with 100kHz RBW/VBW below 1GHz and a 1MHz RBW/VBW above 1GHz at a distance of 3 meters.

Clause 2-11-04/EAB/RF Occupied Bandwidth

Using an RBW of 300Hz or 1% of the emission bandwidth, The spectral shape of the output should look similar to the input for all modulations.

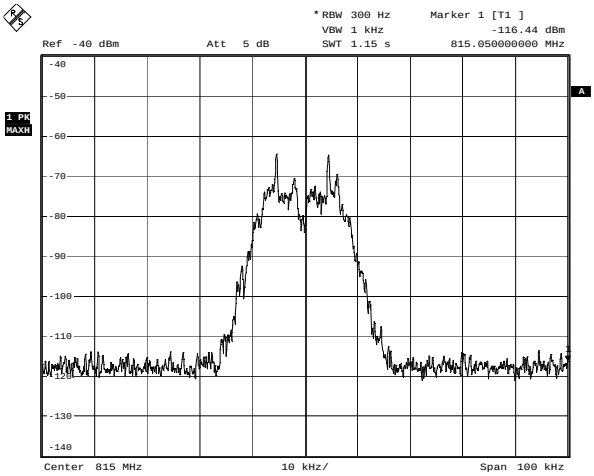
Test Conditions:

Sample Number:	4	**Temperature (°C):**	23
Date:	October 20, 2006	**Humidity (%):**	29
Modification State:	0	**Tester:**	Jason Nixon
		Laboratory:	Wireless

Test Results:

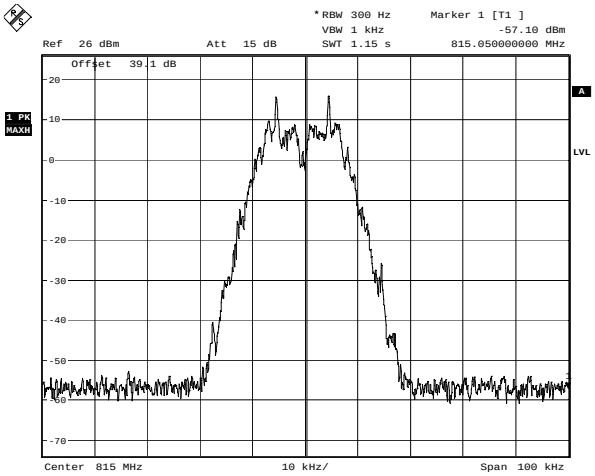
See Attached Plots.

Uplink
806-824MHz Band



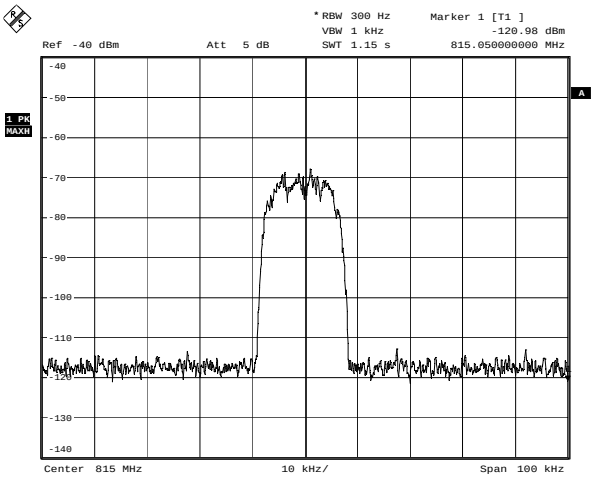
Uplink - Input - 2FSK - 806-824MHz

Date: 23.OCT.2006 09:45:42



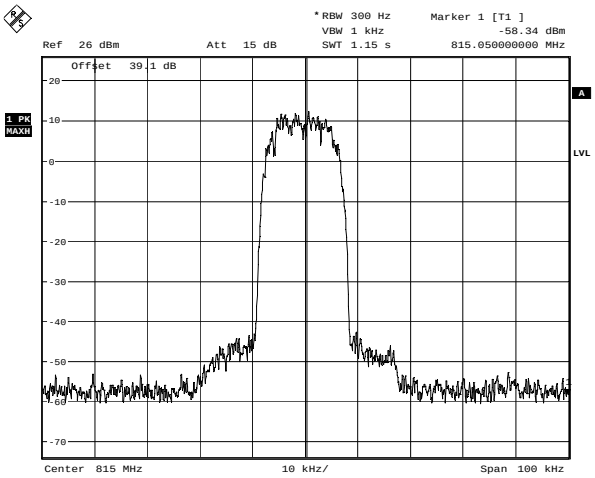
Uplink - Output - 2FSK - 806-824MHz

Date: 23.OCT.2006 09:42:58



Uplink - Input - QAM - 806-824MHz

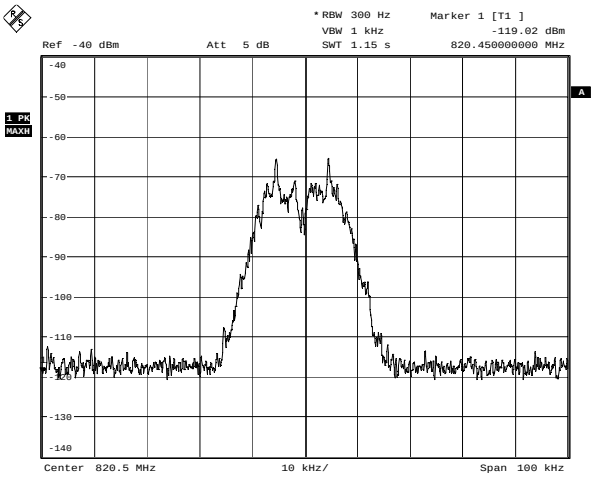
Date: 23.OCT.2006 09:44:57



Uplink - Output - QAM - 806-824MHz

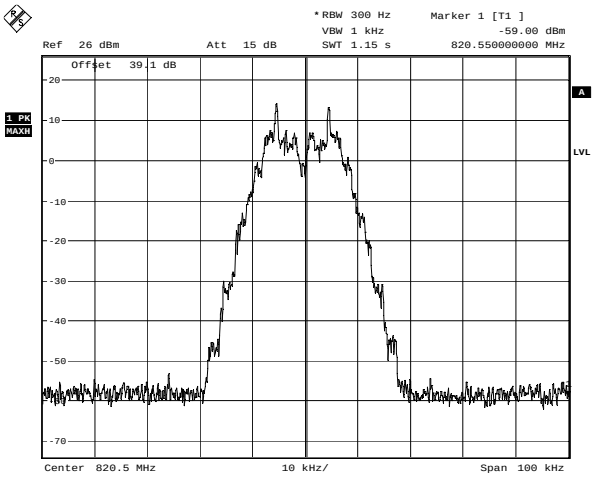
Date: 23.OCT.2006 09:43:37

817-824MHz Band



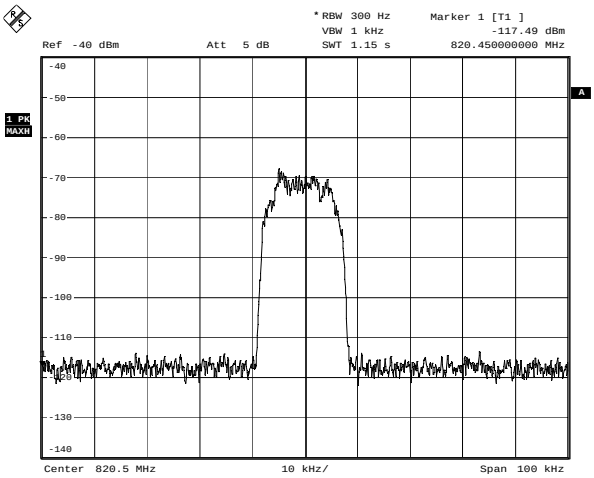
Uplink - Input - 2FSK - 817-824MHz

Date: 23.OCT.2006 09:46:41



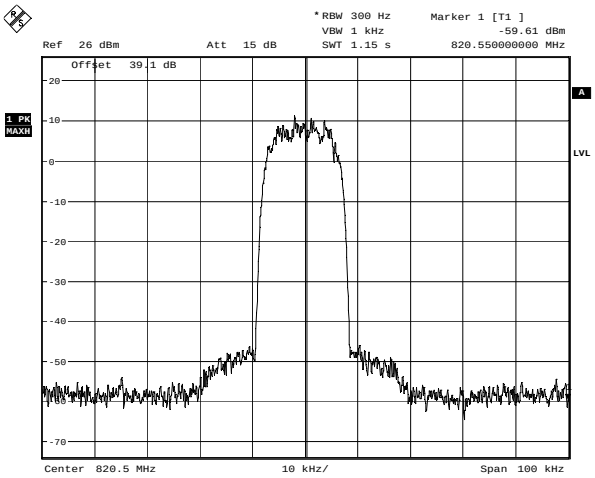
Uplink - Output - 2FSK - 817-824MHz

Date: 23.OCT.2006 09:42:15



Uplink - Input - QAM - 817-824MHz

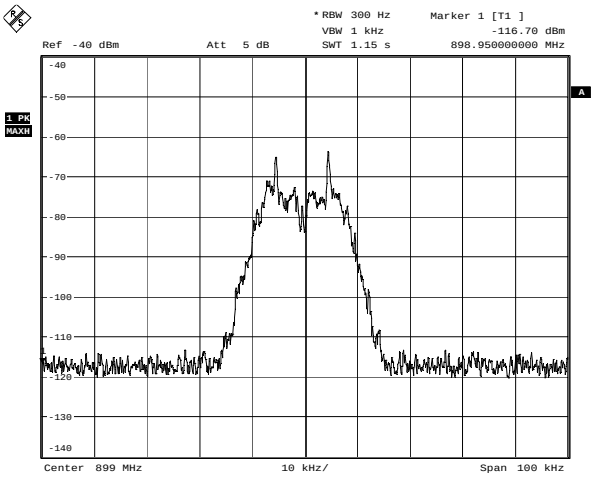
Date: 23.OCT.2006 09:47:19



Uplink - Output - QAM - 817-824MHz

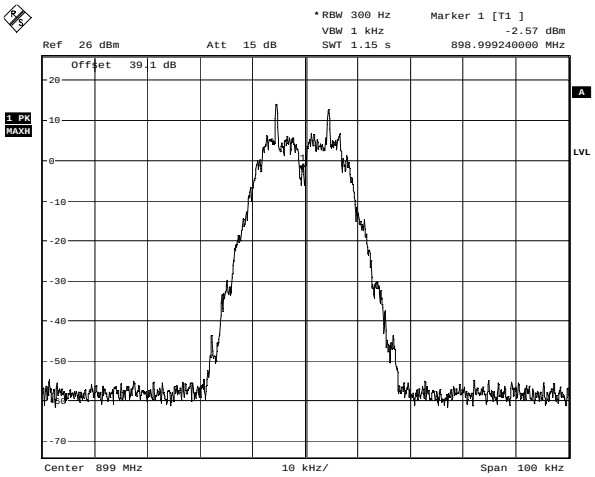
Date: 23.OCT.2006 09:41:37

896-902MHz Band



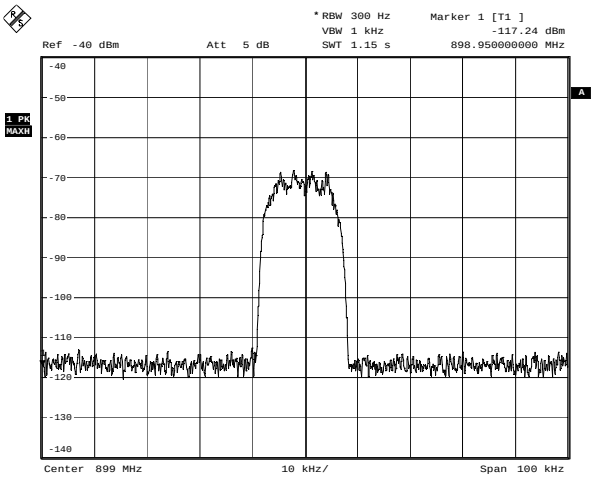
Uplink - Input - 2FSK - 896-902MHz

Date: 23.OCT.2006 09:48:37



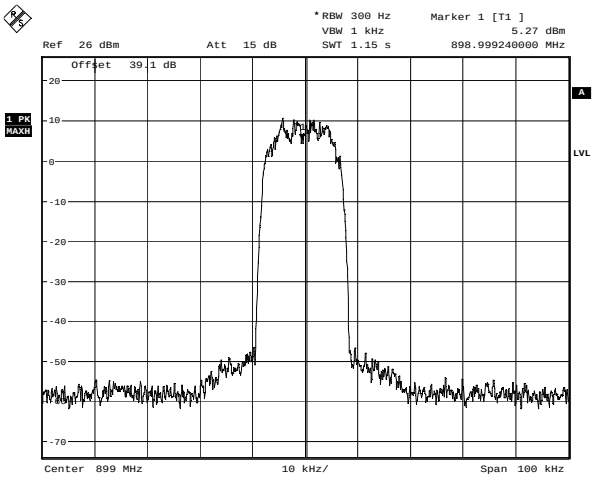
Uplink - Output - 2FSK - 896-902MHz

Date: 23.OCT.2006 09:39:31



Uplink - Input - QAM - 896-902MHz

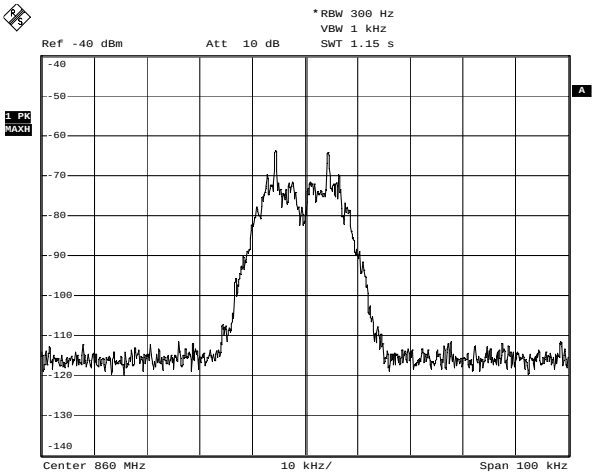
Date: 23.OCT.2006 09:48:02



Uplink - Output - QAM - 896-902MHz

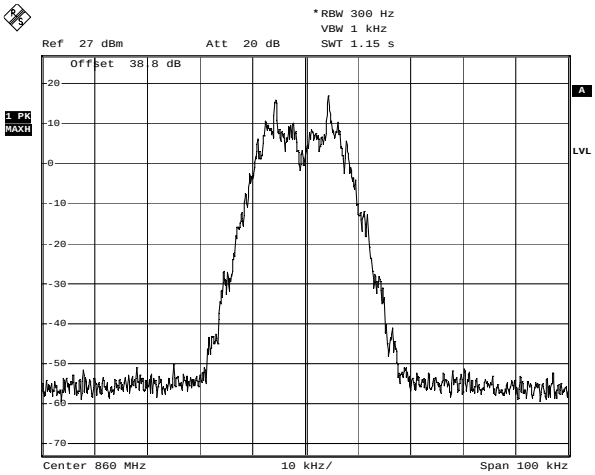
Date: 23.OCT.2006 09:40:18

Downlink
851-869MHz Band



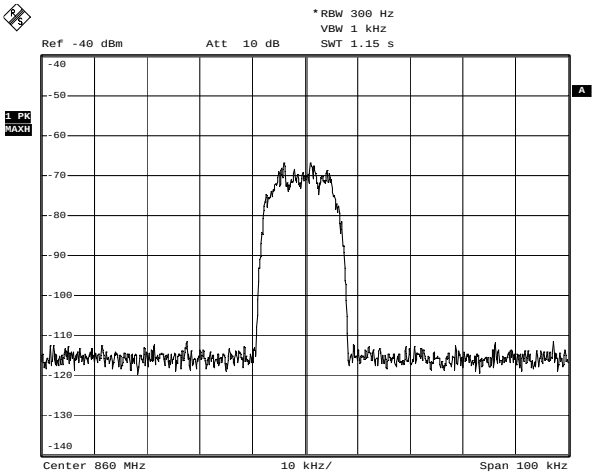
Downlink - 2FSK Input 851-869MHz

Date: 20.OCT.2006 17:02:13



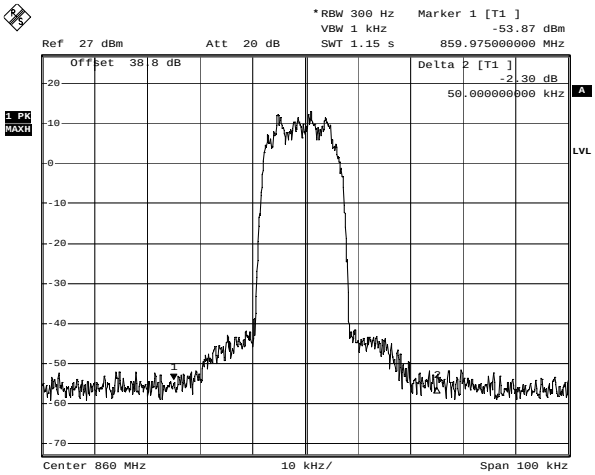
Downlink - 2FSK Output 851-869MHz

Date: 20.OCT.2006 17:01:07



Downlink - QAM Input 851-869MHz

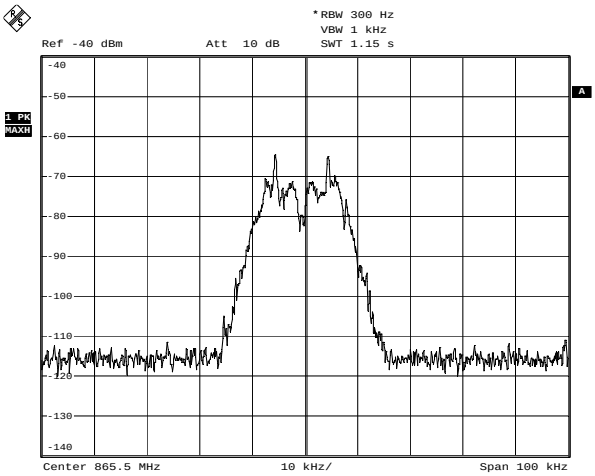
Date: 20.OCT.2006 17:02:53



Downlink - QAM Output 851-869MHz

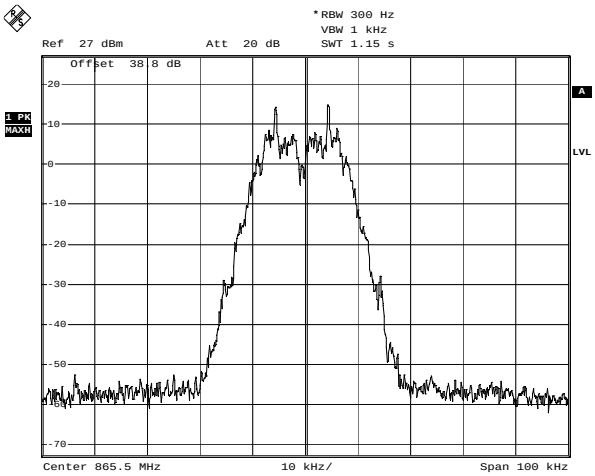
Date: 20.OCT.2006 17:00:06

862-869MHz Band



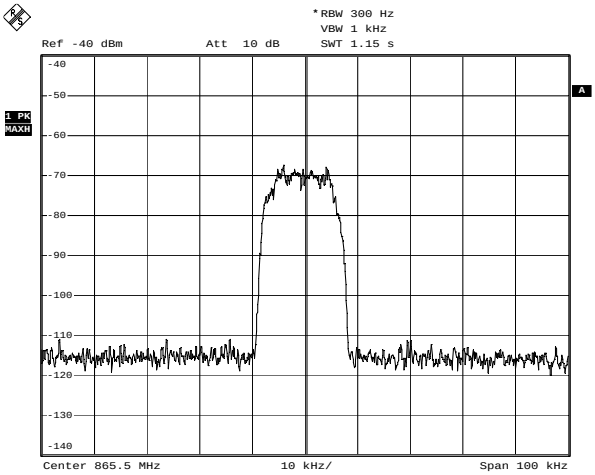
Downlink - 2FSK Input 862-869MHz

Date: 20.OCT.2006 17:04:36



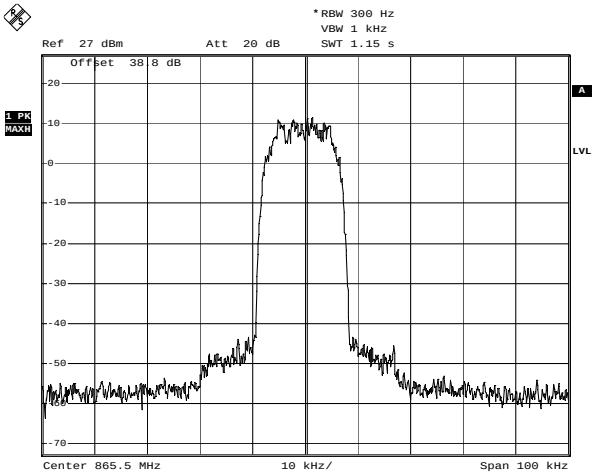
Downlink - 2FSK Output 862-869MHz

Date: 20.OCT.2006 17:05:41



Downlink - QAM Input 862-869MHz

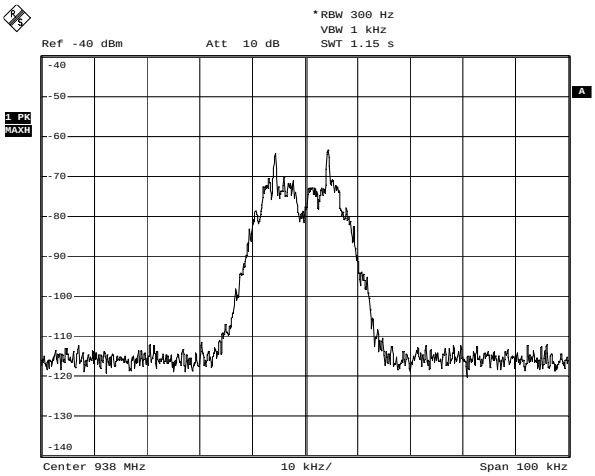
Date: 20.OCT.2006 17:04:01



Downlink - QAM Output 862-869MHz

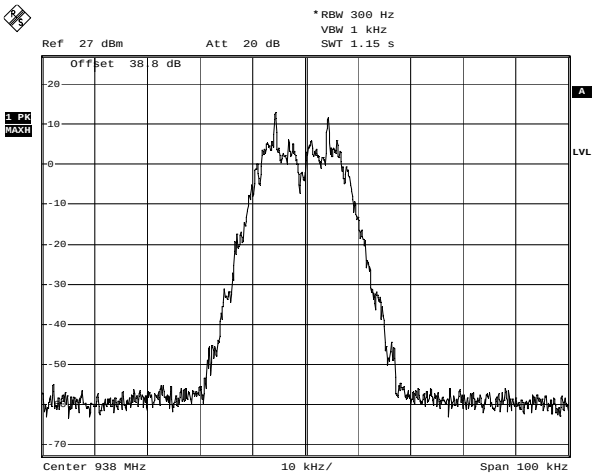
Date: 20.OCT.2006 17:06:17

935-941MHz Band



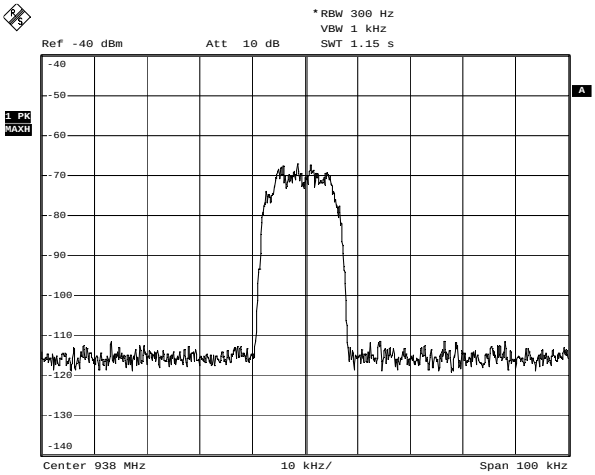
Downlink - 2FSK Input 935-941MHz

Date: 20.OCT.2006 17:08:46



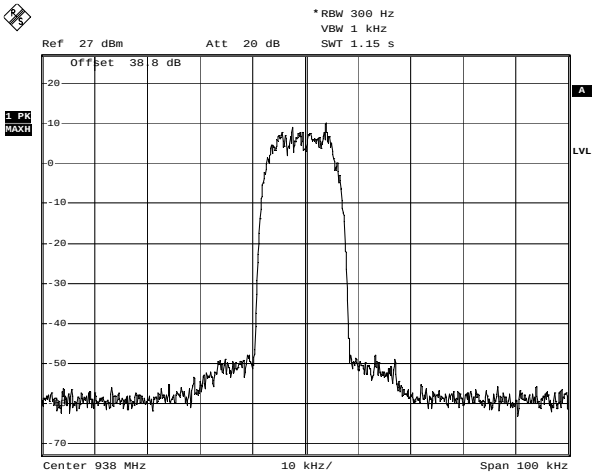
Downlink - 2FSK Output 935-941MHz

Date: 20.OCT.2006 17:07:45



Downlink - QAM Input 935-941MHz

Date: 20.OCT.2006 17:09:24



Downlink - QAM Output 935-941MHz

Date: 20.OCT.2006 17:07:12

Clause 2-11-04/EAB/RF Out of Band Rejection

Plots showing the filter frequency response.

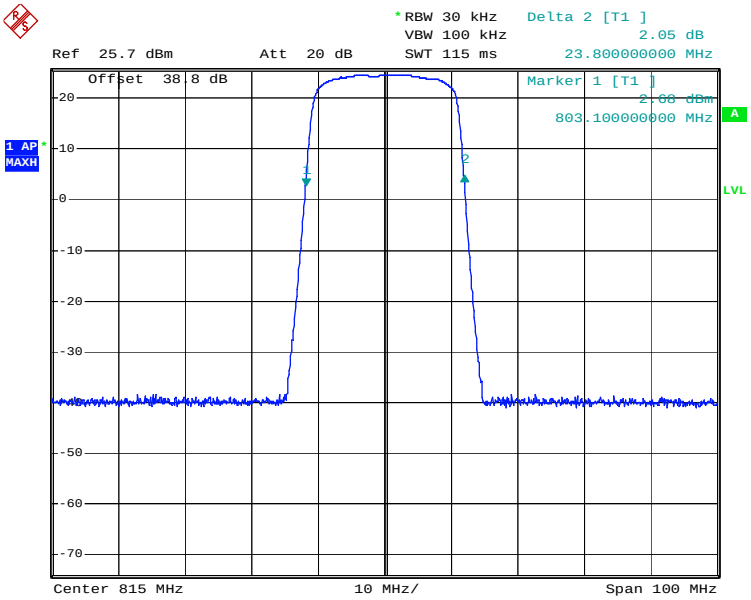
Test Conditions:

Sample Number:	4	**Temperature (°C):**	23
Date:	October 20, 2005	**Humidity (%):**	29
Modification State:	0	**Tester:**	Jason Nixon
		Laboratory:	Wireless

Test Results:

See Attached Plots.

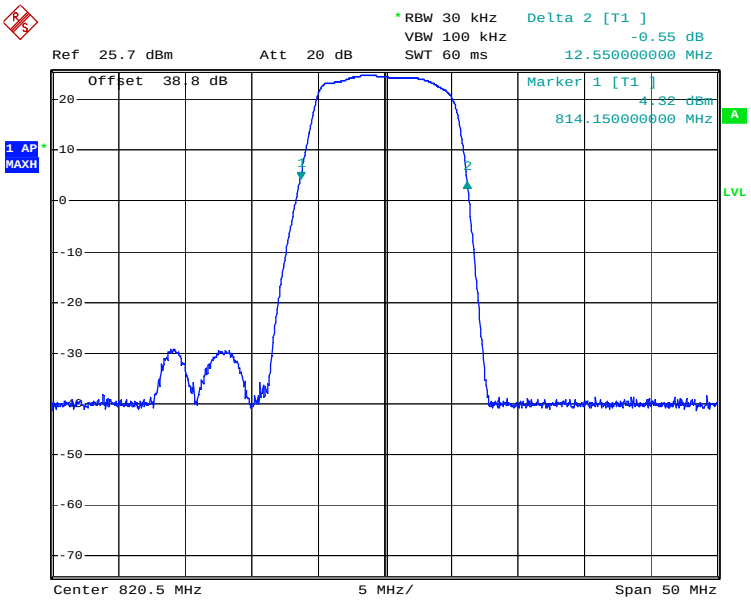
Uplink
806-824MHz Band



Uplink - Band Reject - 806-824MHz

Date: 20.OCT.2006 23:25:58

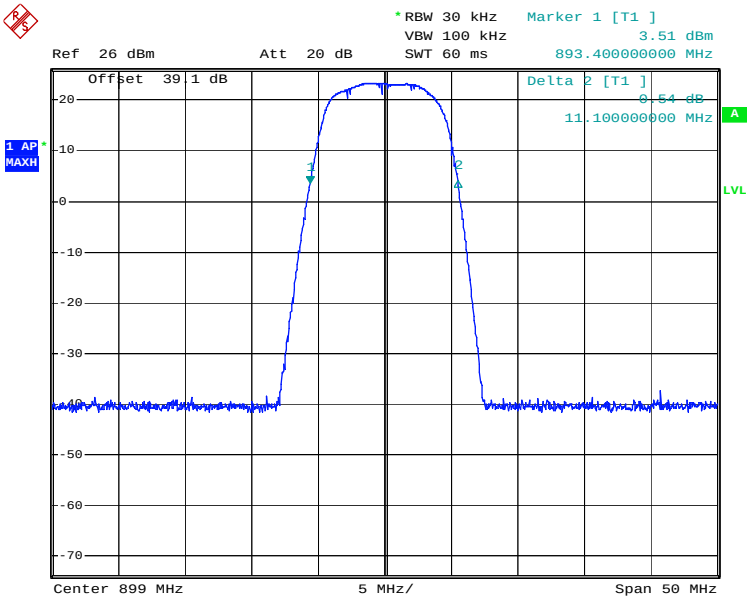
817-824MHz Band



Uplink - Band Reject - 817-824MHz

Date: 20.OCT.2006 23:13:45

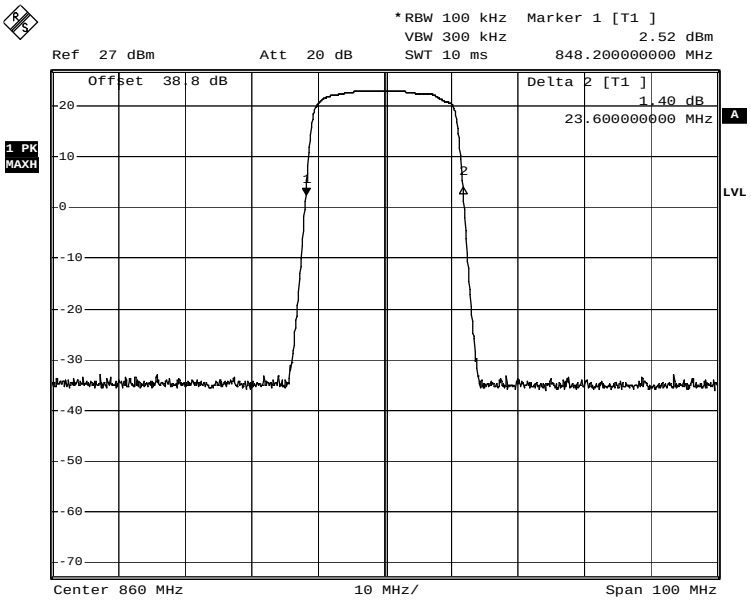
896-902MHz Band



Uplink - Band Reject - 896-902MHz

Date: 20.OCT.2006 23:04:10

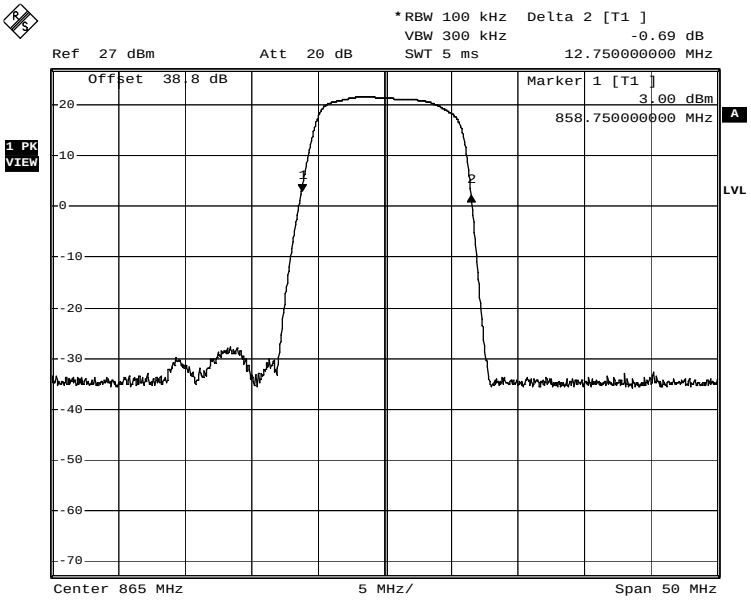
Downlink
851-869MHz Band



Downlink - Band Reject 851-869MHz

Date: 20.OCT.2006 16:56:39

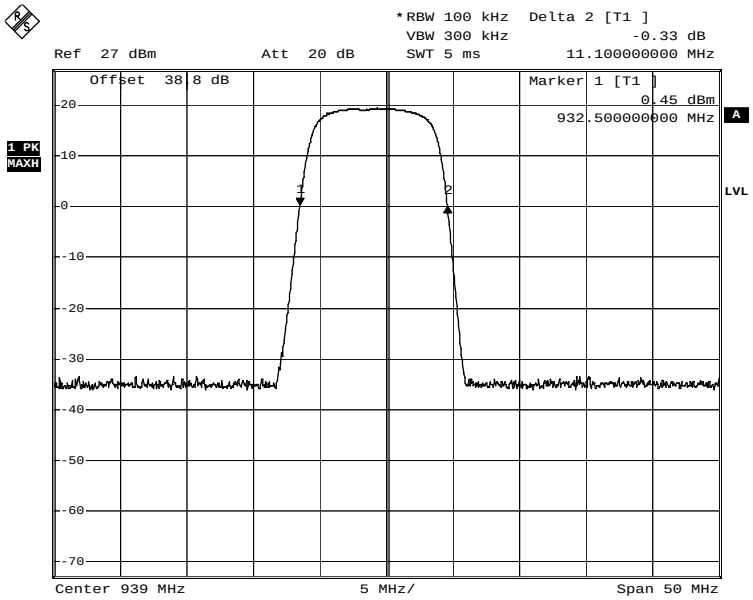
862-869MHz Band



Downlink - Band Reject 862-869MHz

Date: 20.OCT.2006 16:38:15

935-941MHz Band



Downlink - Band Reject 935-941MHz

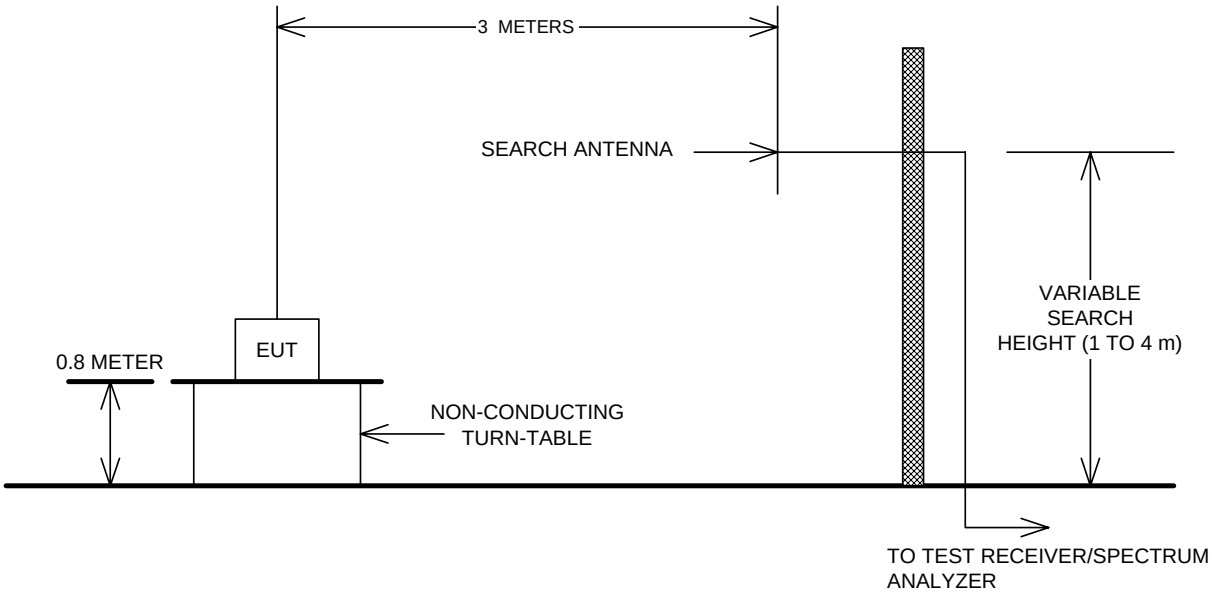
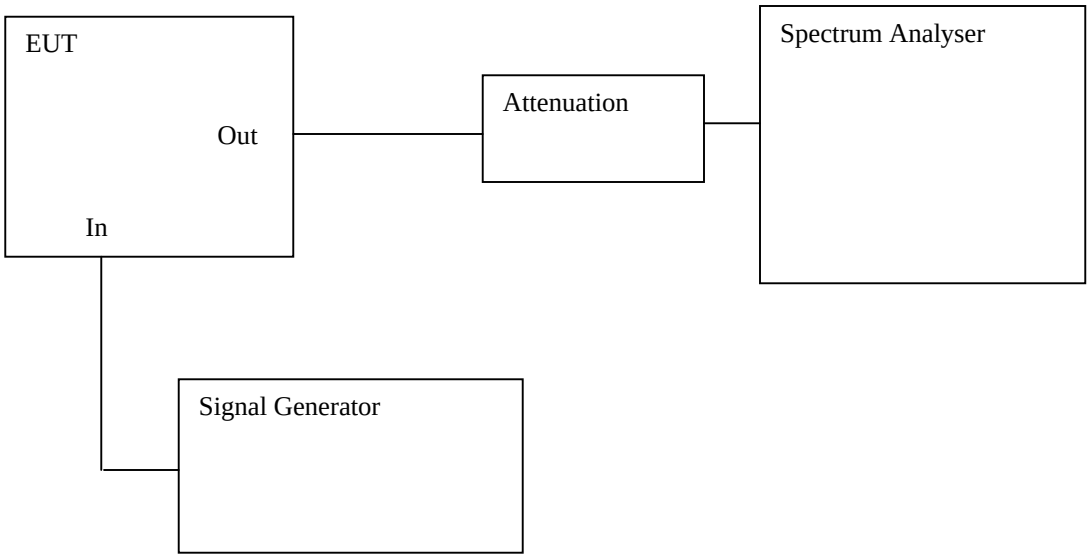
Date: 20.OCT.2006 16:46:18

Appendix B : Setup Photographs

Radiated Spurious Emissions Setup:

Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions, Output power, Occupied Bandwidth and Out of Band Rejection