



Flom Test Labs

EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268

fax: (480) 926-3598

<http://www.flomlabs.com>

info@flomlabs.com

Date: November 13, 2007

Applicant: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

Equipment: BDU
FCC ID: ROJBGAN-XTERMINAL
FCC Rules: Part 25

Gentlemen:

Enclosed please find your copy of the Engineering Test Report for which you are subject to the restrictions as listed on the attached summary.

As you know, the FCC, after a TCB issues a Grant, still has 30 days to review a submission and request added information. It is your decision whether or not to market the equipment subject to a possible recall before the end of the 30 days.

If your equipment is still retained by us, it will be returned to you 30 days after approval is achieved. Our invoice for services has been directed to your Accounts Payable Department.

Should you need any clarification, just fax or phone. Thank you again for this order - it has been a pleasure to be of service.

Sincerely yours,

Hoosamuddin S. Bandukwala, Lab Director

enclosure(s)
HSB/je



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Memo

Date: November 13, 2007

Applicant: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

Equipment: BDU
FCC ID: ROJBGAN-XTERMINAL

Please note that the enclosed Reports reflect the results of tests performed to the currently published Federal Communications Commissions Rules and Regulations.

Should the FCC's Examiners' interpretations request new and unpublished requirements, we will be pleased to provide them. We will invoice you accordingly, i.e. for the time spent on re-testing, providing the amended pages and/or Reports and for the time necessary to be spent on electronic filing. We will of course provide you with copies of any of the additions.

We regret any added expense to the Applicants, but of late the FCC continues to change their requirements without any prior written publication and/or notices.

As in the past, we will continue to provide all liaison with the FCC necessary for the successful conclusion of your project and the receipt of your Grant of Equipment Authorization.

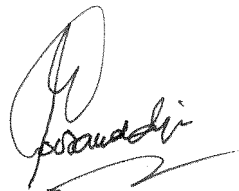
Sincerely yours,

Hoosamuddin S. Bandukwala, Lab Director

Summary of Restrictions

1. All submissions to the FCC are subject to **their** Examiner's interpretation.
2. Please allow from 60 to 90 days before hearing from the FCC with regard to any submission.
3. The FCC can set aside any action; modify or set aside any action, within 30 days. (FCC Rule 1.108, 1.113).
4. Under Rule 2.803, if device is not type accepted/certificated then it must **not** be sold, leased, offered for sale, imported, shipped or distributed or advertised for sale.
5. FCC can revoke its certificates at any time if the equipment does not meet or **continue** to meet their Rules. (Rule Parts 2.927, 2.939).
6. FCC can request a sample at any time (2.936).

M. Flom Associates, Inc.



Hoosamuddin S. Bandukwala, Lab Director



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Date: November 13, 2007

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Thrane & Thrane A/S
Equipment: BDU
FCC ID: ROJBGAN-XTERMINAL
FCC Rules: Part 25

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,

Hoosamuddin S. Bandukwala, Lab Director

enclosure(s)
cc: Applicant
HSB/je



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Transmitter Certification

of

Model: BDU

to

Federal Communications Commission

Rule Part(s) Part 25

Date of report: November 13, 2007

On the Behalf of the Applicant: Thrane & Thrane A/S

At the Request of: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

Attention of: Bror Malm, Director, Development, AERO Satcom Products
+45 39 55 88 24; FAX: +45 39 55 88 88
Email: bma@thrane.com
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Henrik Overgaard Christensen
+45 39 55 88 00; FAX: +45 39 55 88 88
Email: hoc@thrane.com

Supervised by:

Hoosamuddin S. Bandukwala, Lab Director

List of Exhibits

(FCC **Certification** (Transmitters) - Revised 9/28/98)

Applicant: Thrane & Thrane A/S

FCC ID: ROJBGAN-XTERMINAL

By Applicant:

1. Letter of Authorization
2. Confidentiality Request: 0.457 And 0.459
3. Identification Drawings, 2.1033(c)(11)
 - Label
 - Location of Label
 - Compliance Statement
 - Location of Compliance Statement
4. Photographs, 2.1033(c)(12)
5. Documentation: 2.1033(c)
 - (3) User Manual
 - (9) Tune Up Info
 - (10) Schematic Diagram
 - (10) Circuit Description
 - Block Diagram
 - Parts List
 - Active Devices
6. MPE Report

By F.T.L.:

- A. Testimonial & Statement of Certification

The Applicant has been cautioned as to the following:

15.21 Information to the User.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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25.204	Power limits	6
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Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: Flom Test Lab
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044-A) Chandler, AZ 85225

c) Report Number: d07b0007

d) Client: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

e) Identification: BDU

EUT Description: Below deck unit for mobile satellite radio

f) EUT Condition: Not required unless specified in individual tests.

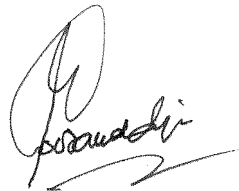
g) Report Date: November 13, 2007
EUT Received:

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with FTL internal quality manual.

m) Supervised by:



Hoosamuddin S. Bandukwala, Lab Director

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

Accessories used during testing:

Type	Quantity	Manufacturer	Model	Serial No.	FCC ID
------	----------	--------------	-------	------------	--------

Sub-part
2.1033(c)(14):

Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts: FCC Part 25 Satellite Communications

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with TIA 603-C-2004 and ANSI C63.4-2003, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.

A2LA

“A2LA has accredited Flom Test Labs, Inc. Chandler, AZ for technical competence in the field of Electrical Testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO 17025:2005 ‘General Requirements for the Competence of Testing and Calibration Laboratories’ and any additional program requirements in the identified field of testing.”

Please refer to www.a2la.org for current scope of accreditation.

Certificate Number: **2152.01**

Industry Canada OATS Number 2011A-1

List of General Information Required for Certification

In Accordance with FCC Rules and Regulations,
Volume II, Part 2 and to Part 25

Sub-part 2.1033

(c)(1):

Name and Address of Applicant: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

Manufacturer: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

(c)(2): **FCC ID:** ROJBGAN-XTERMINAL

Model Number: BDU

(c)(3): **Instruction Manual(s):** Please see attached exhibits

(c)(4): **Type of Emission:** PI/4 QPSK, 16-QAM

(c)(5): **Frequency Range, MHz:** 1626.6 to 1660.4

(c)(6): **Power Rating, Watts:** 18.6 mW
 _____ Switchable _____ Variable x N/A

FCC Grant Note:

(c)(7): **Maximum Power Rating, Watts:** N/A

DUT Results: Passes x Fails _____

Subpart 2.1033 (continued)

(c)(8): Voltages & currents in all elements in final RF stage, including final transistor or solid-state device:

Collector Current, A	=	0.11
Collector Voltage, Vdc	=	5.0
Supply Voltage, Vdc	=	10.5 - 32

(c)(9): **Tune-Up Procedure:**

Please see attached exhibits

(c)(10): **Circuit Diagram/Circuit Description:**

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please see attached exhibits

(c)(11): **Label Information:**

Please see attached exhibits

(c)(12): **Photographs:**

Please see attached exhibits

(c)(13): **Digital Modulation Description:**

Attached Exhibits
 N/A

(c)(14): **Test and Measurement Data:**

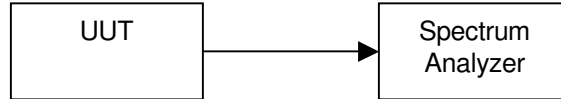
Follows

Name Of Test: Power Limits
Specification: 25.204
Test Equipment Utilized i00024, i00029

Test Procedure

The UUT was connected directly to a spectrum analyzer with the RBW and VBW set to 1MHz. The peak readings were taken and recorded in the following table.

Test Setup



Transmitter Peak Output Power

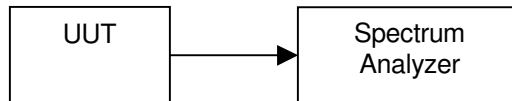
Tuned Frequency MHz	Recorded Measurement	Specification Limit	Result
1626.6	13.5 mW	No limit for Earth Stations	Pass
1643	18.6 mW	No limit for Earth Stations	Pass
1660.4	13.8 mW	No limit for Earth Stations	Pass

Name Of Test: Emissions Limitations for Mobile Earth Stations
Specification: 25.202(f)
Test Equipment Utilized i00024, i00029

Test Procedure

The UUT was connected directly to a spectrum analyzer and the conducted spurious emissions were measured to ensure that the UUT met the requirements specified. Only the worst-case emission was reported.

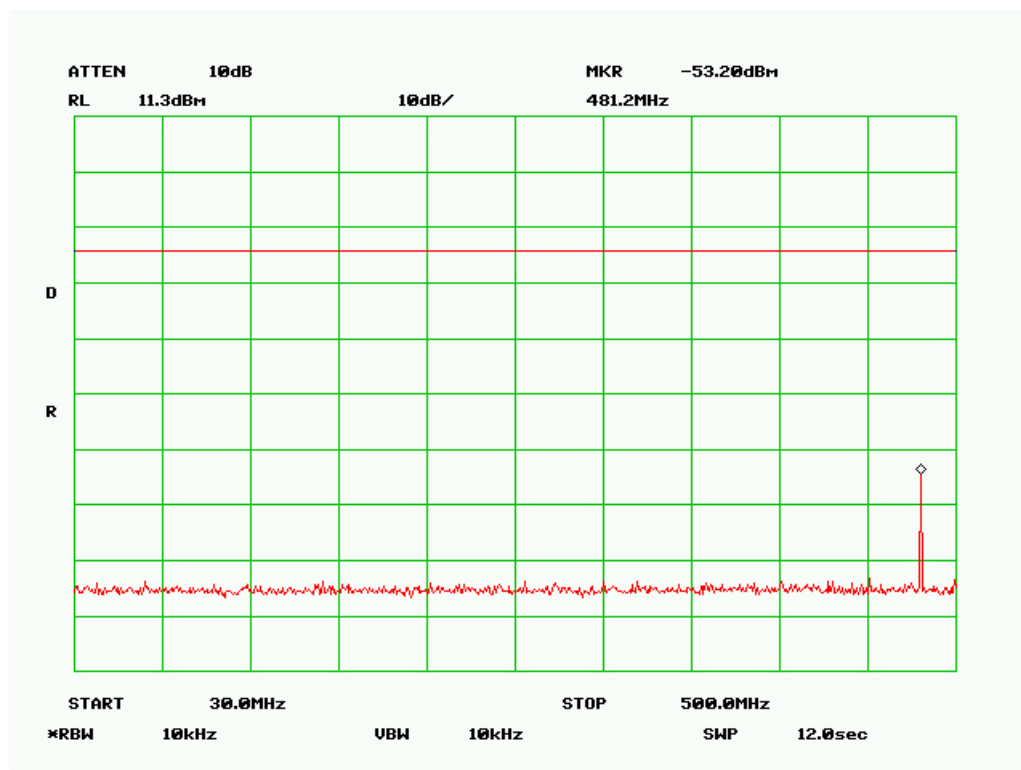
Test Setup

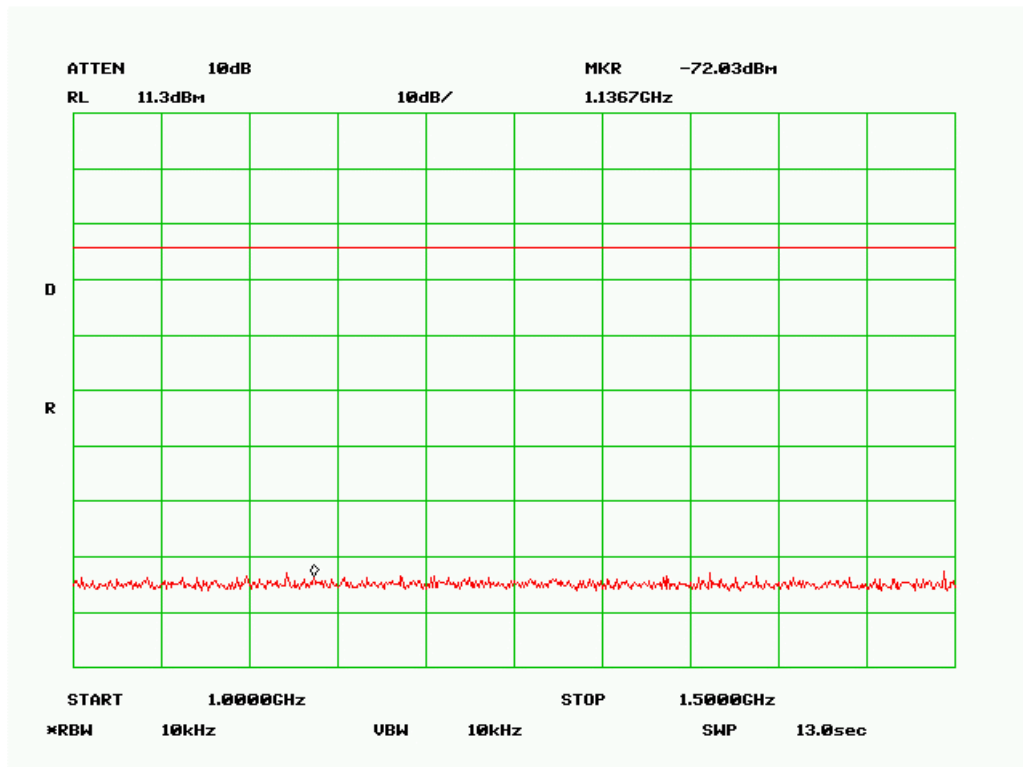
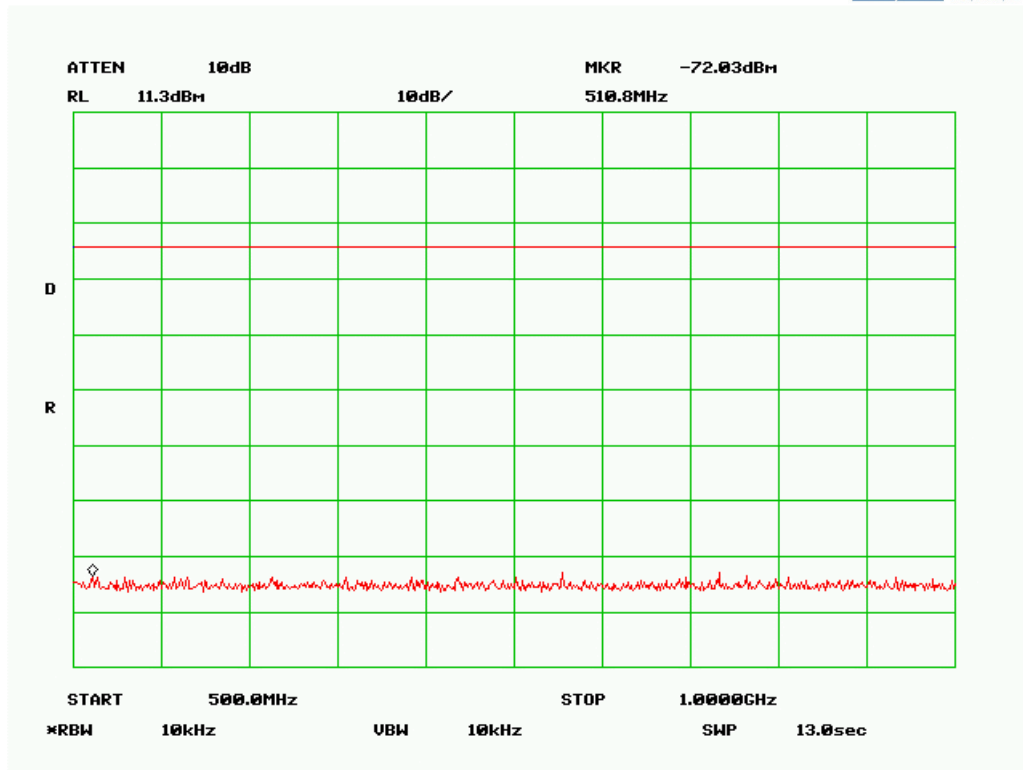


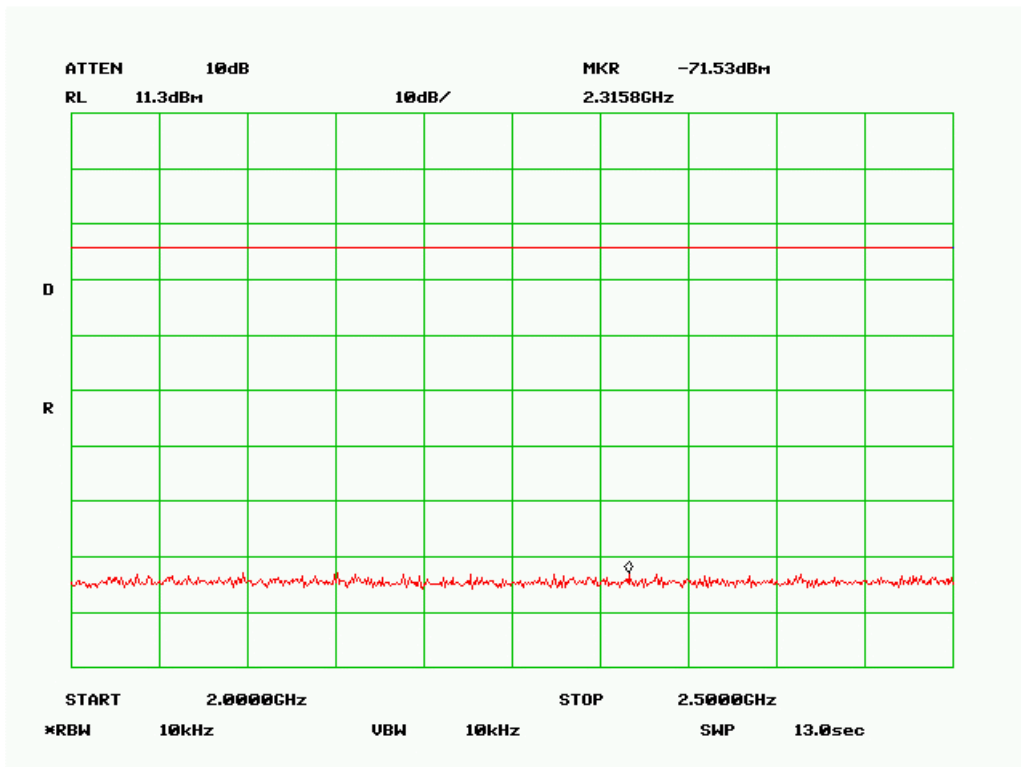
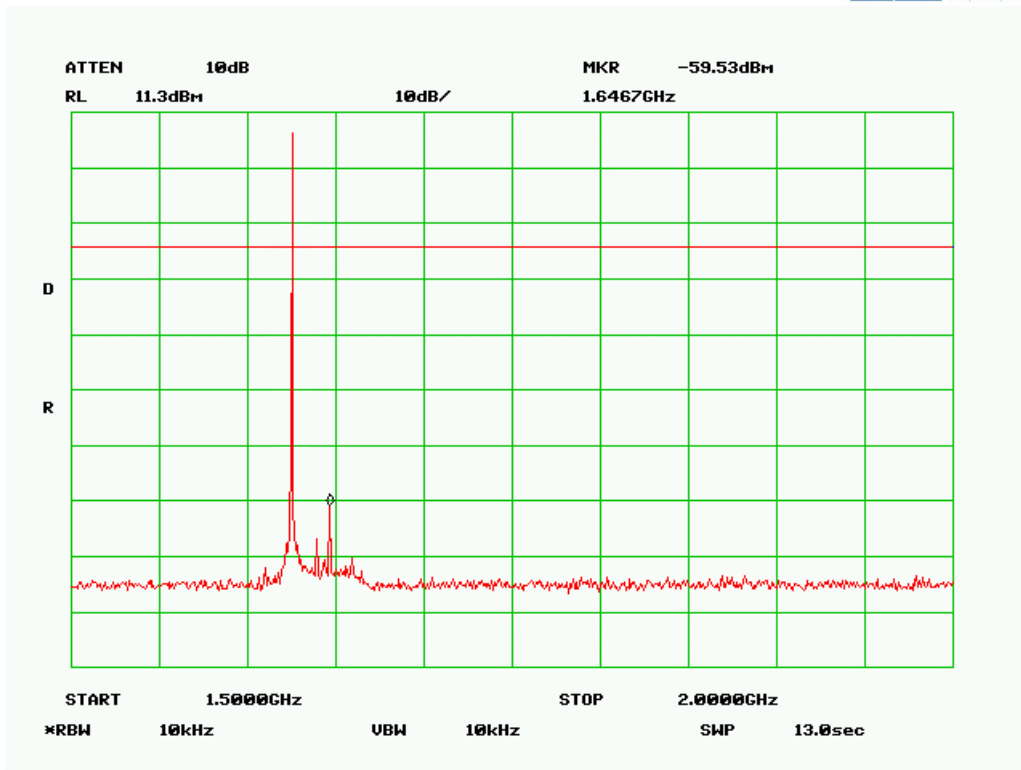
Transmitter Unwanted Emissions Results Table

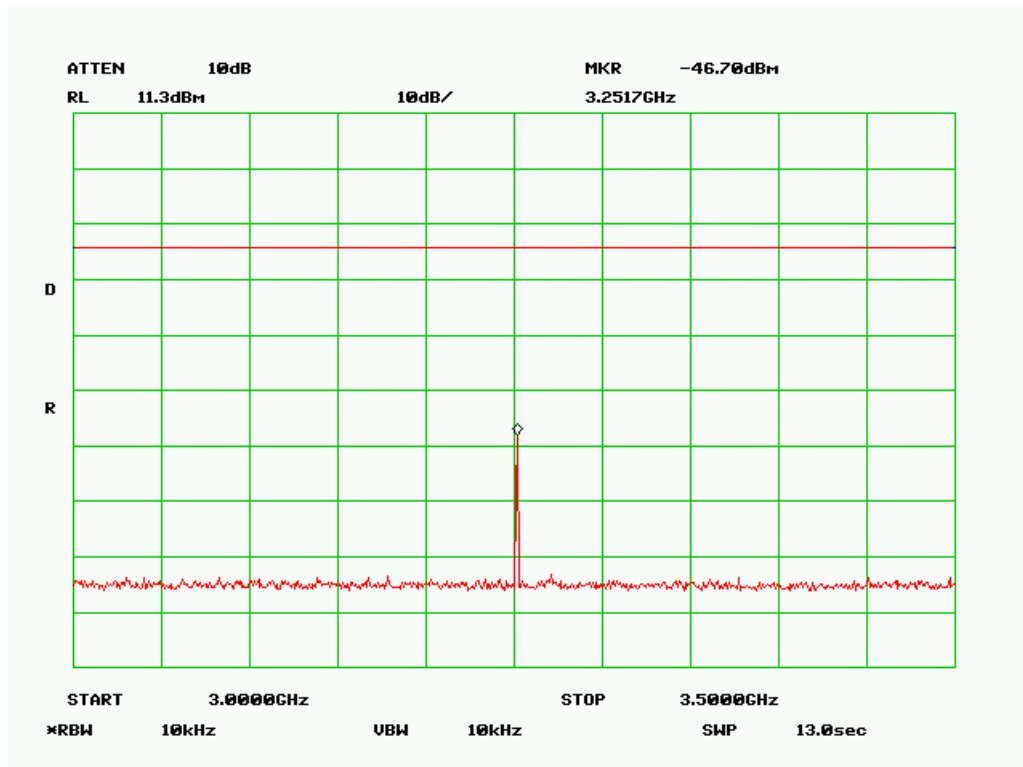
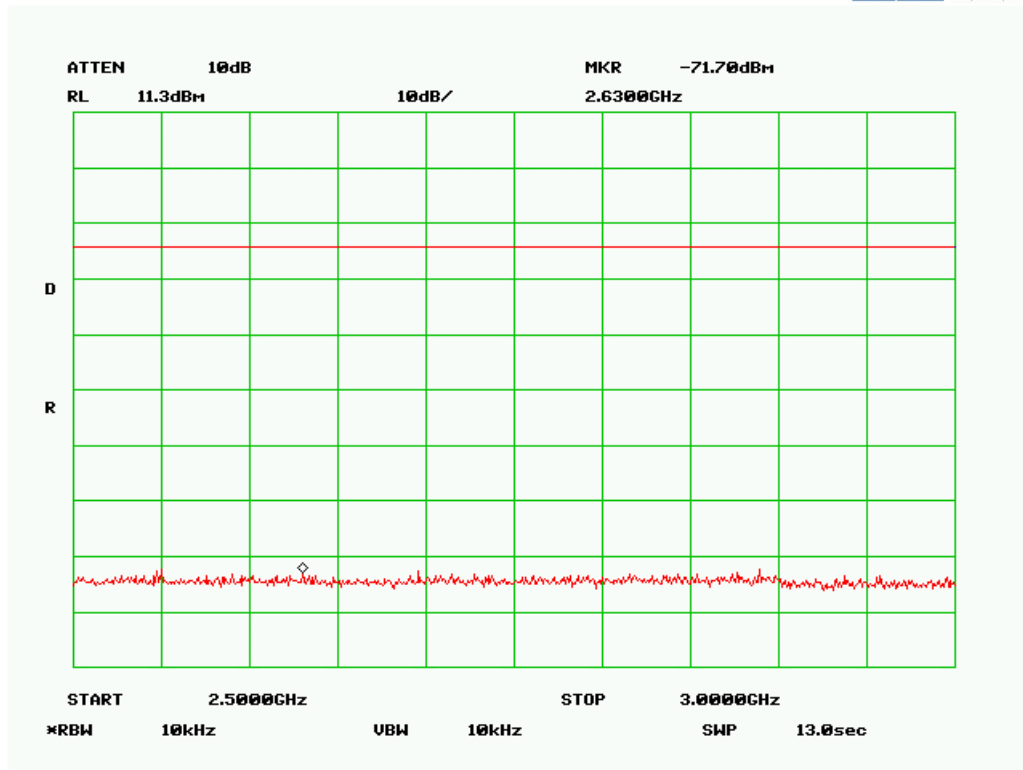
Emission Freq (MHz)	Monitored Level (dBm)	Limit (dBm)	Result
3251.7	-46.70	-13	Pass

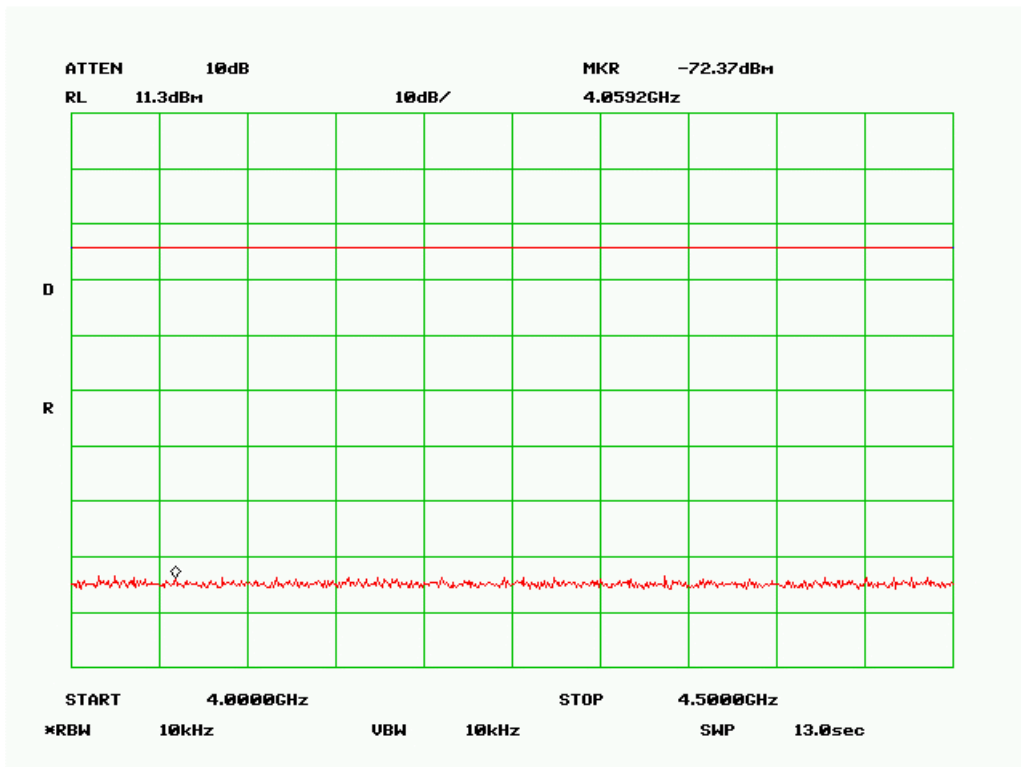
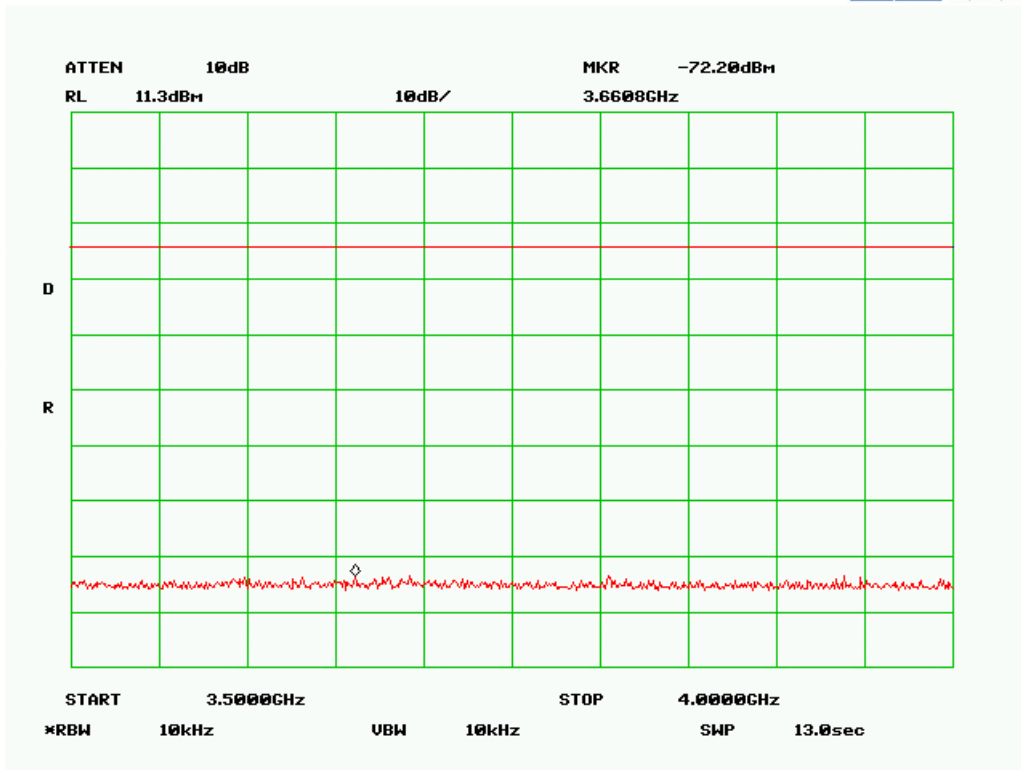
Transmitter Unwanted Emissions Test Plots

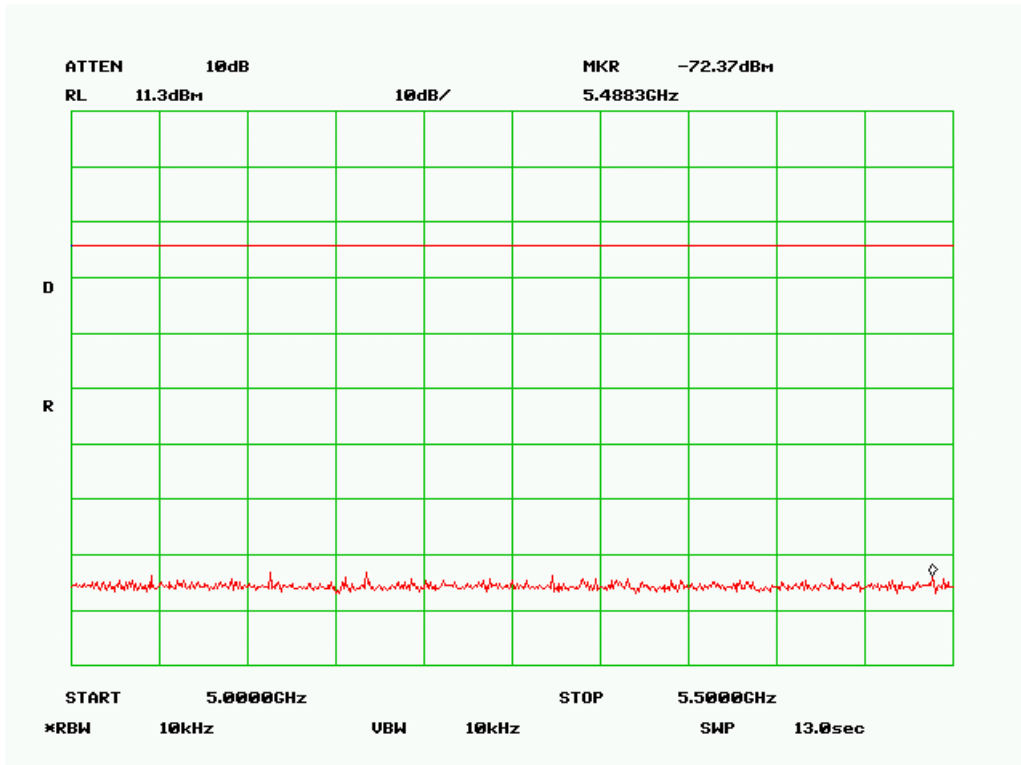
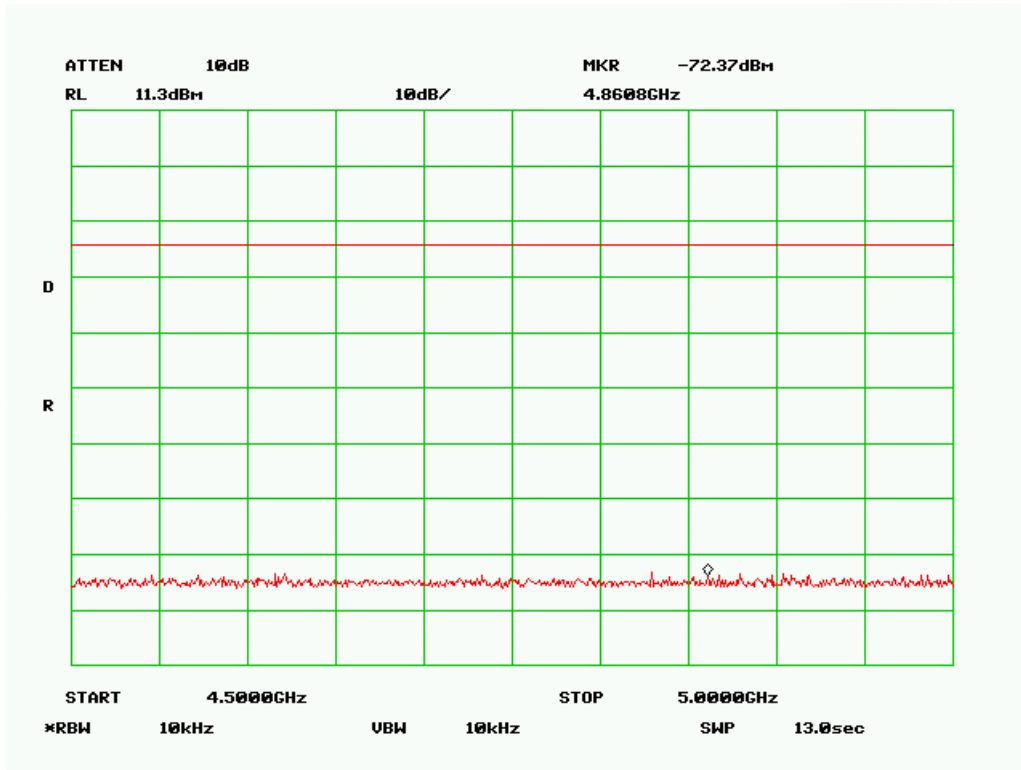


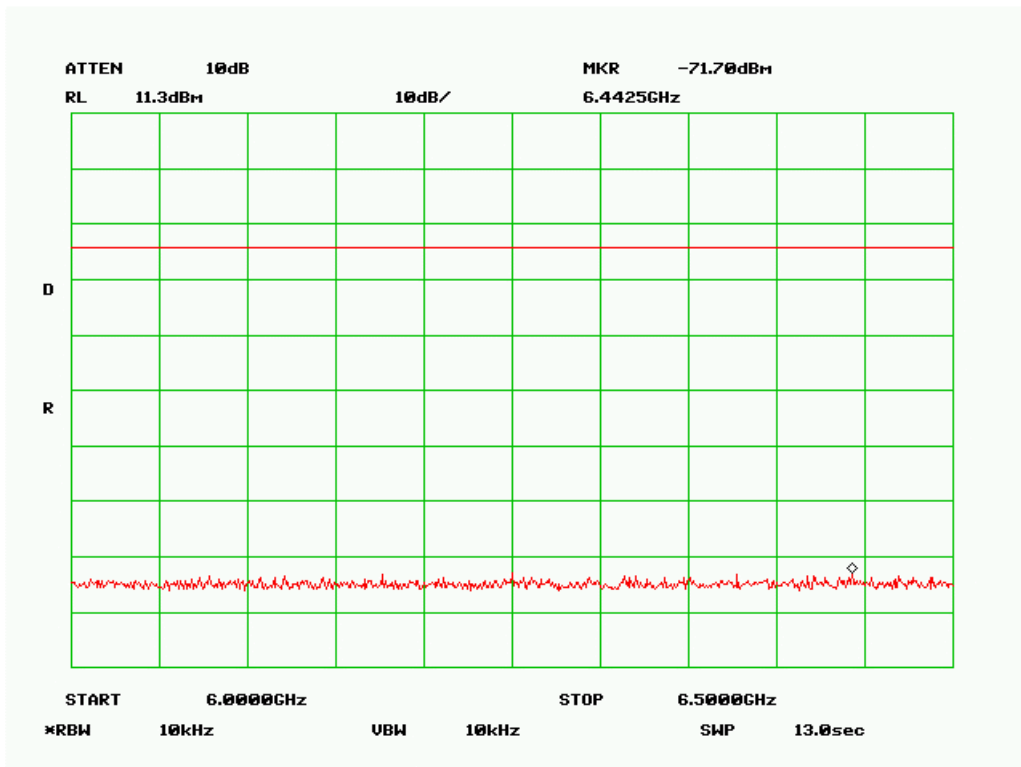
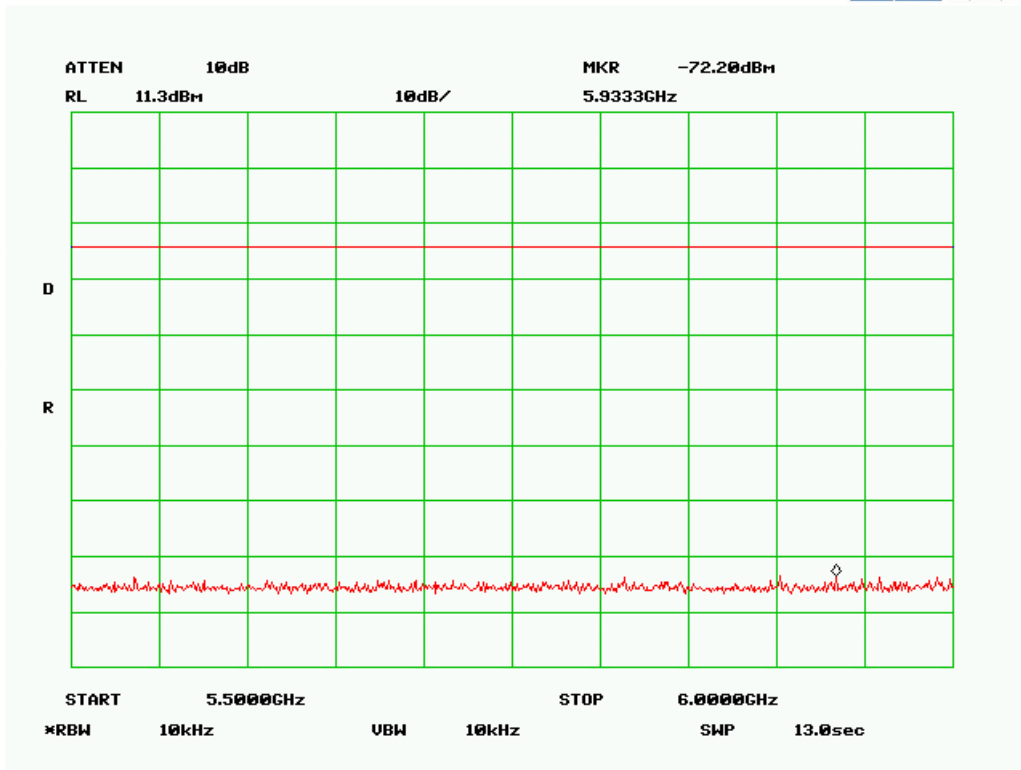


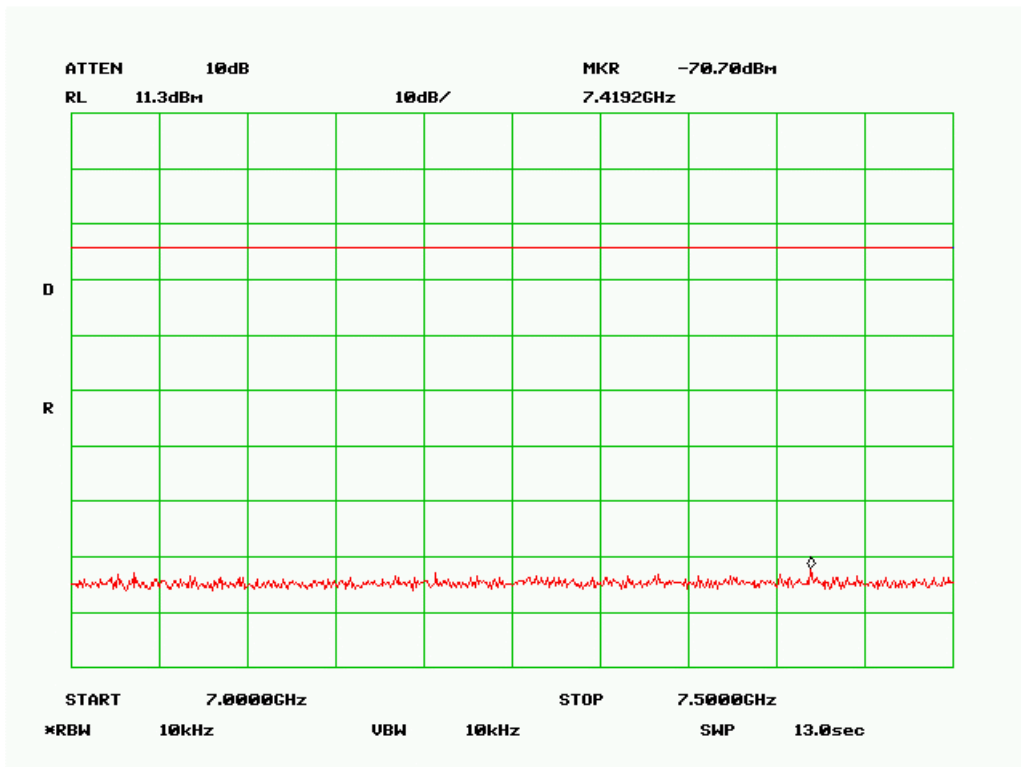
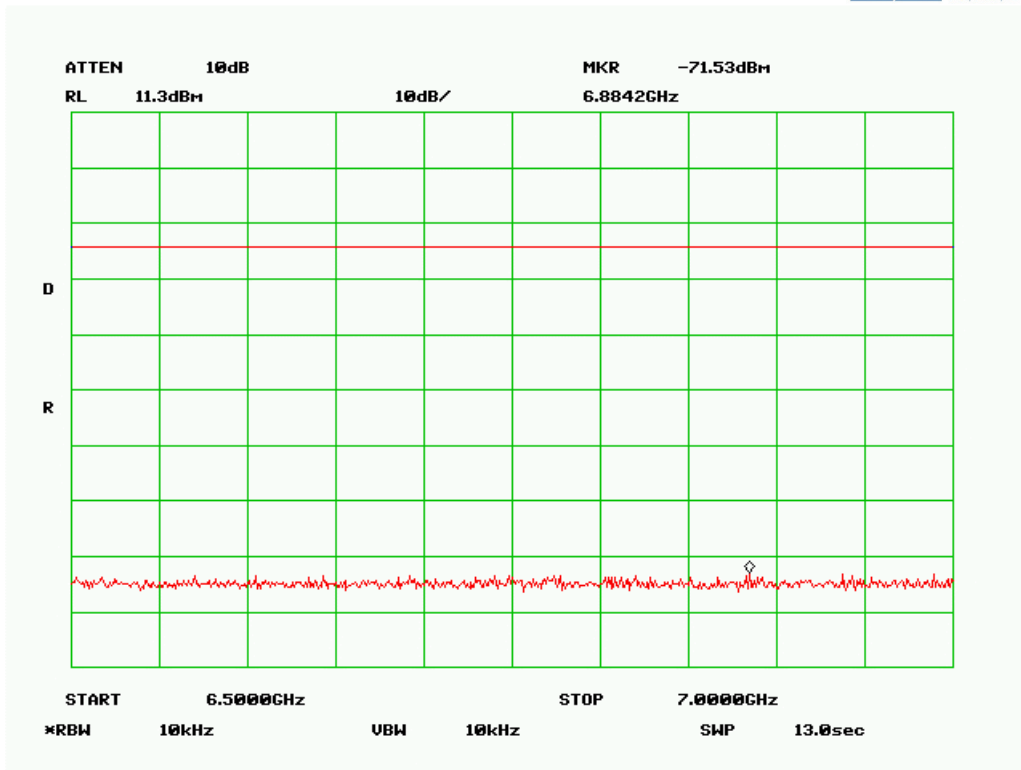


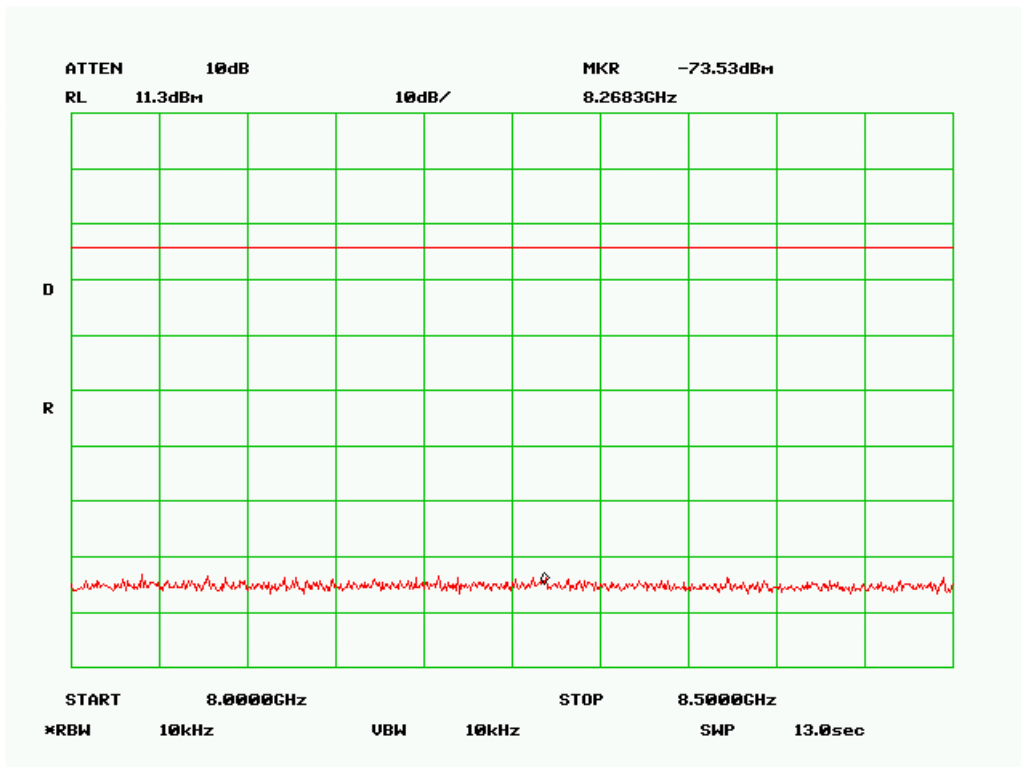
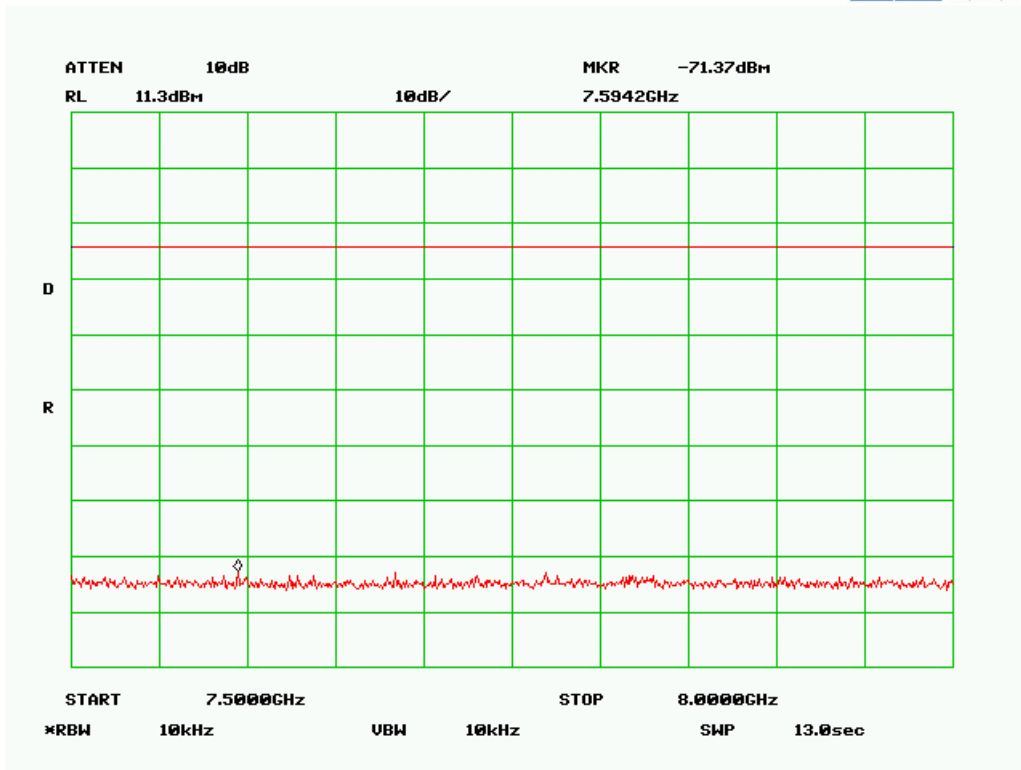


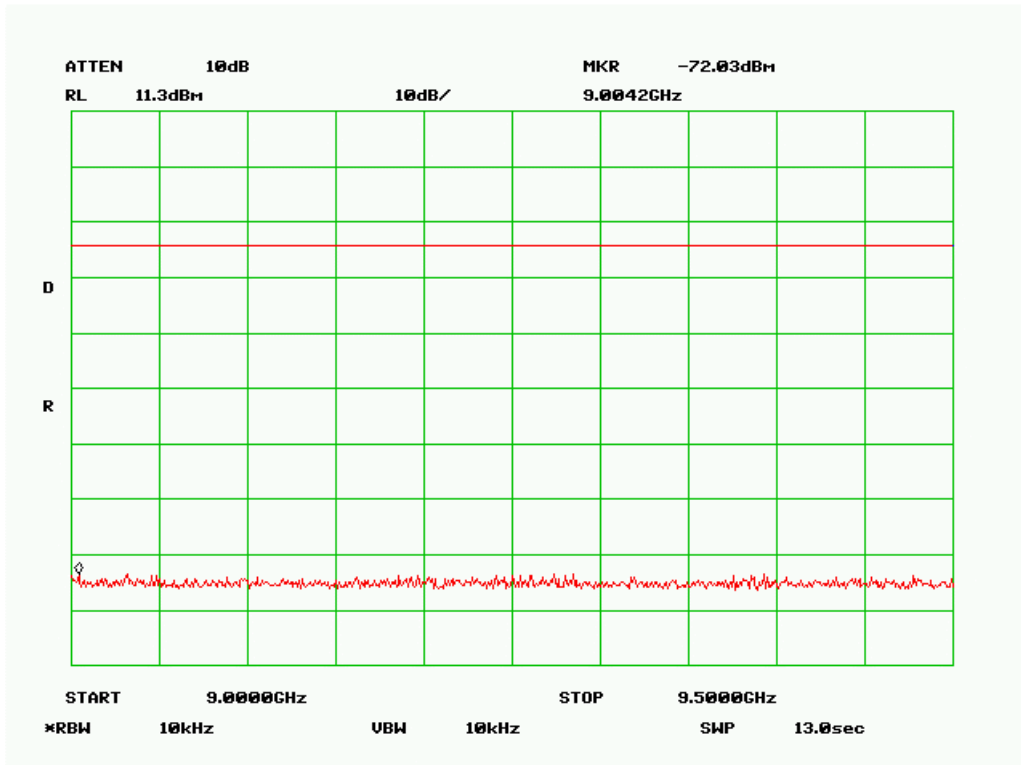
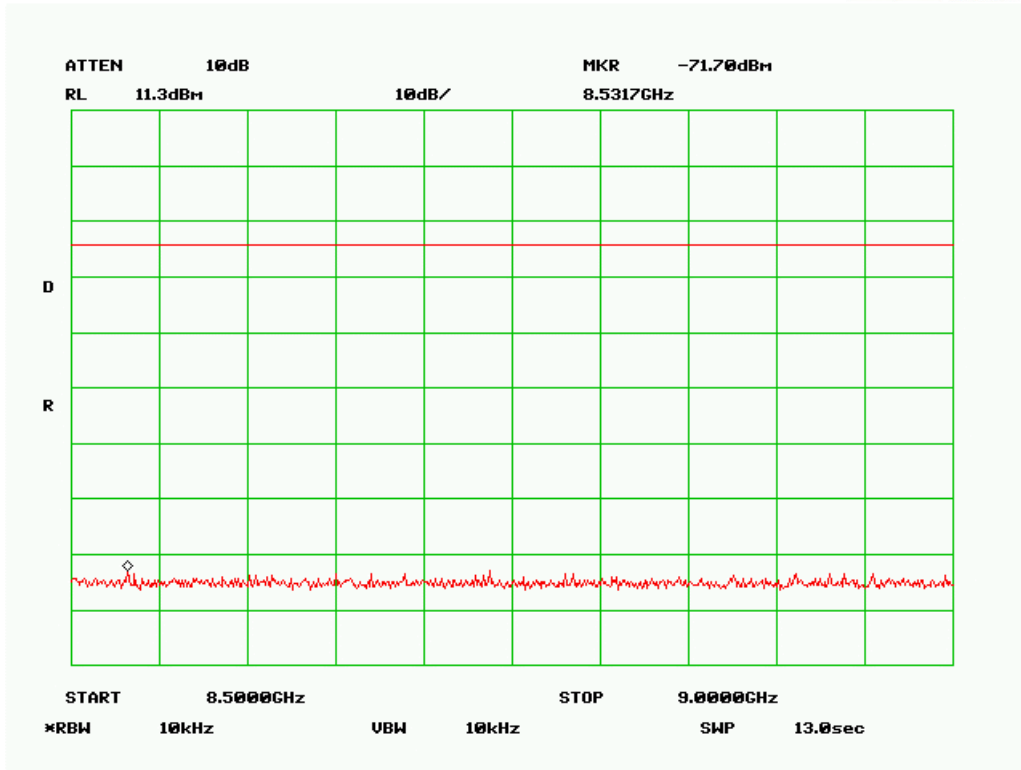


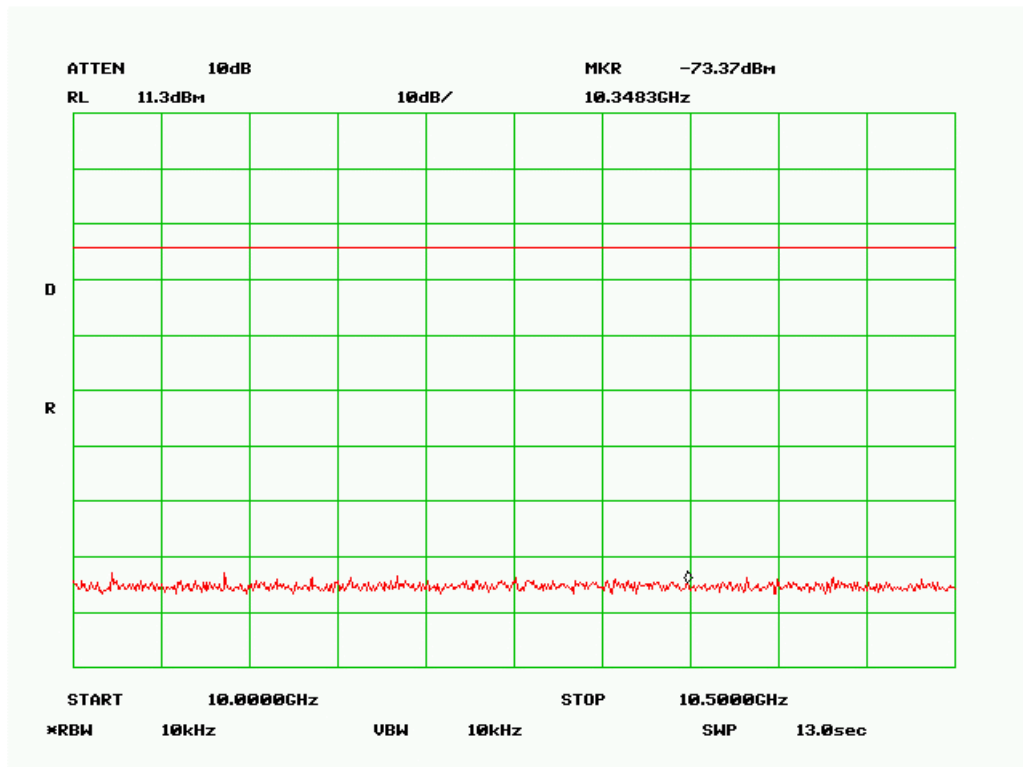
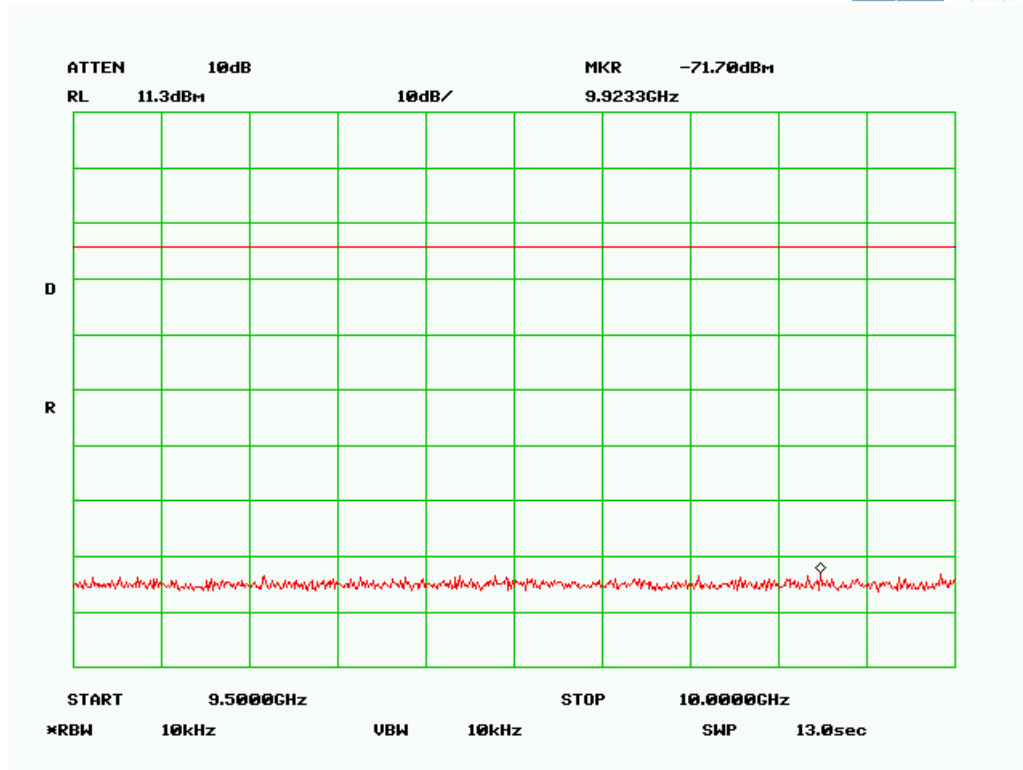


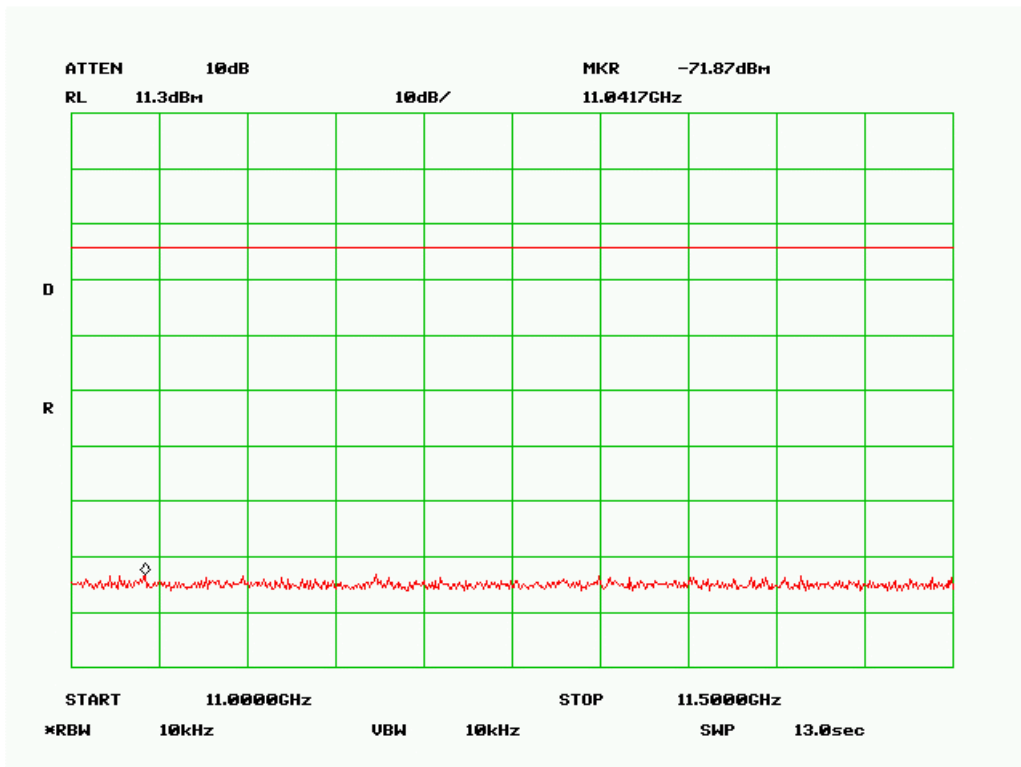
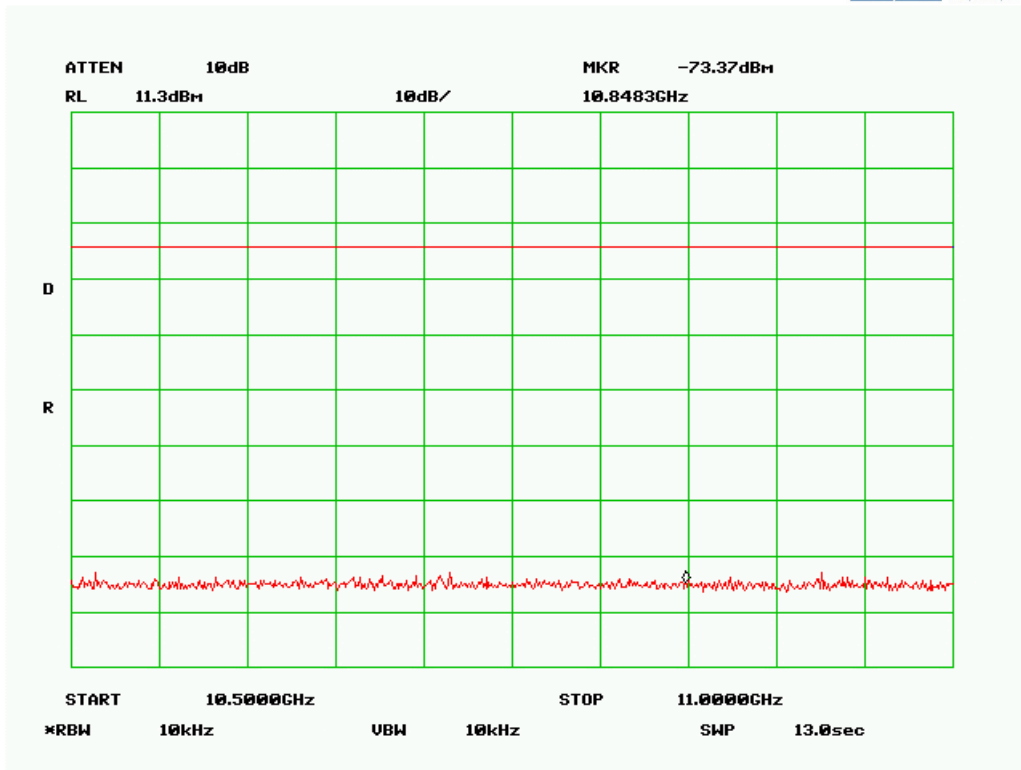


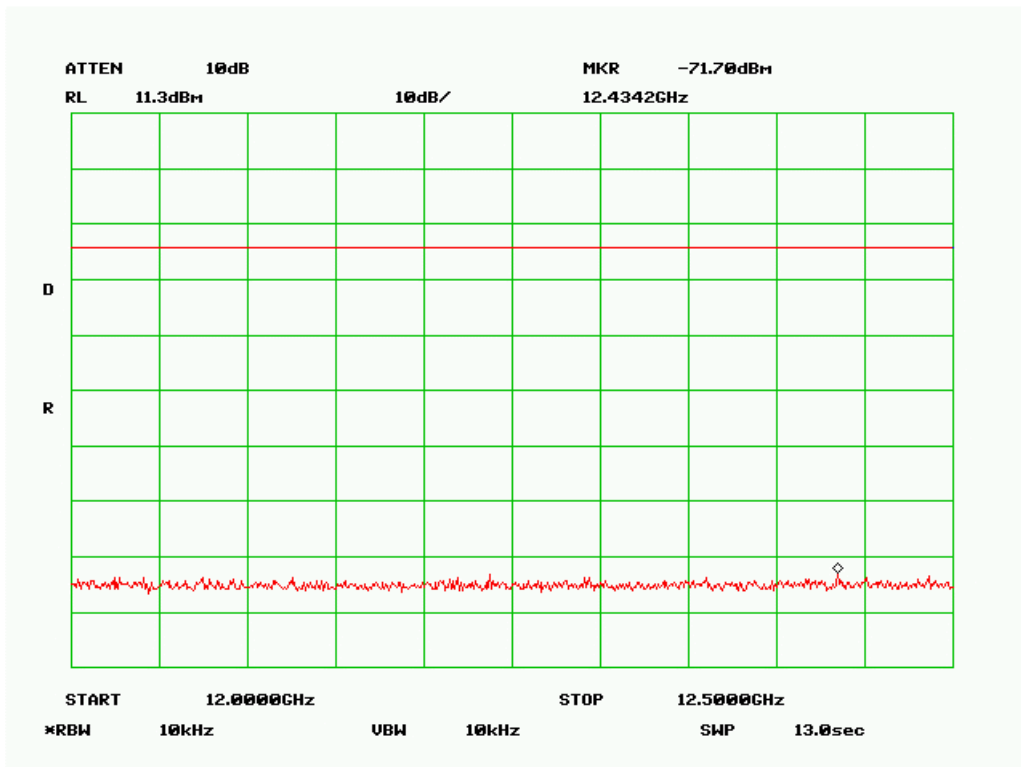
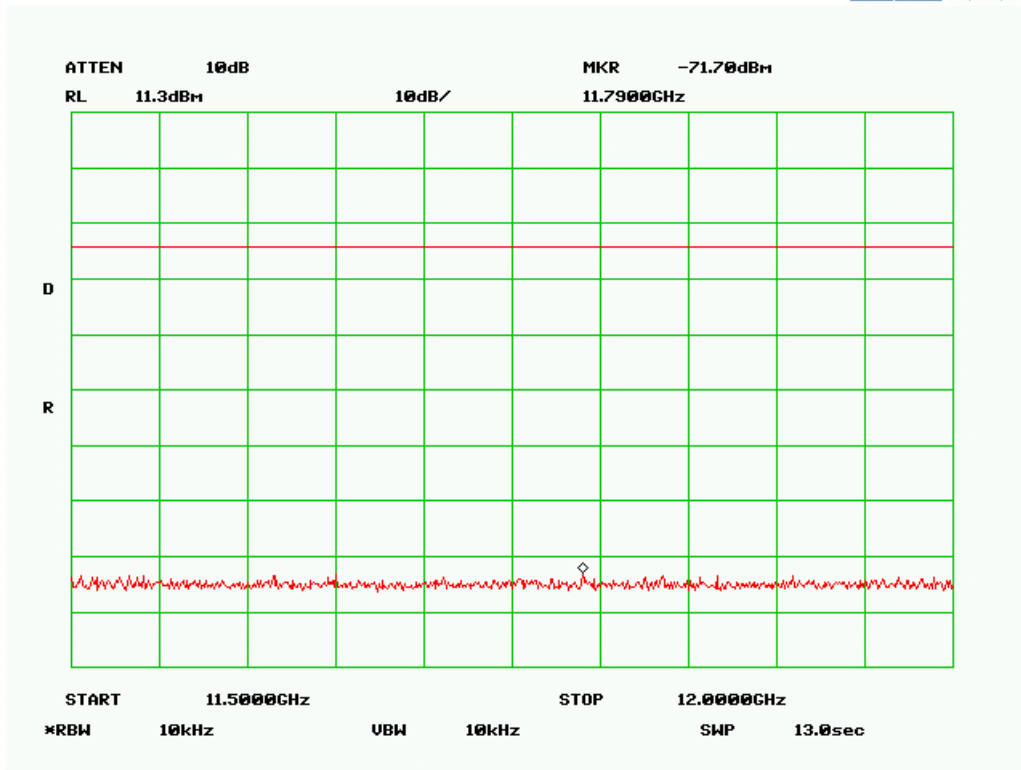


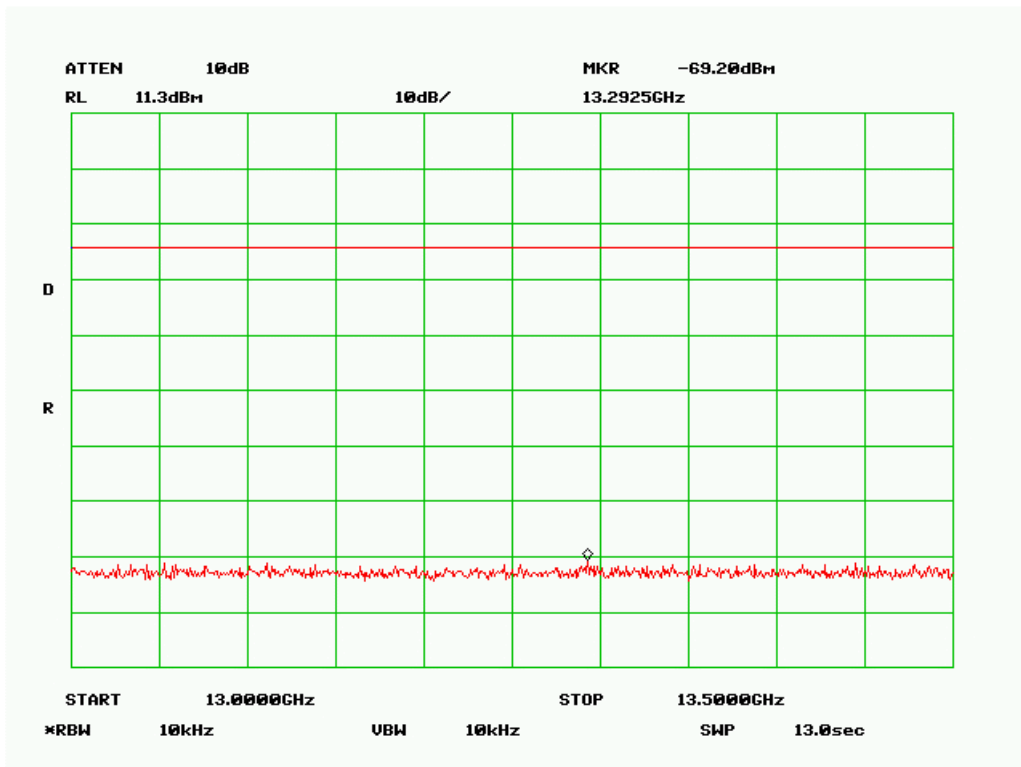
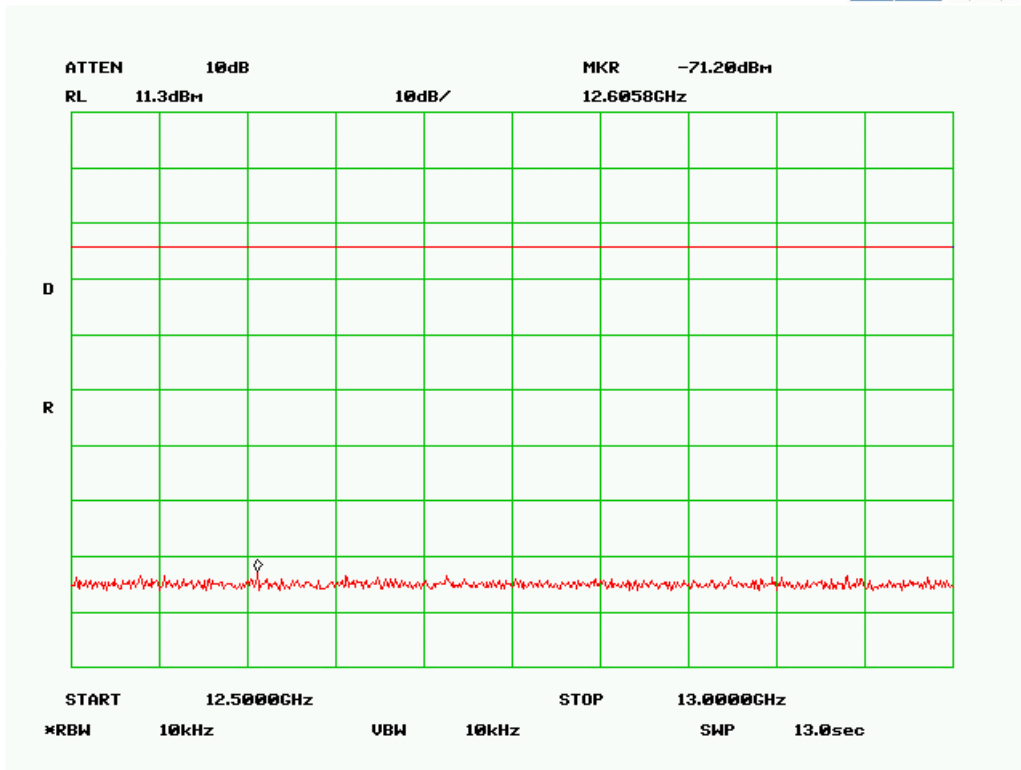


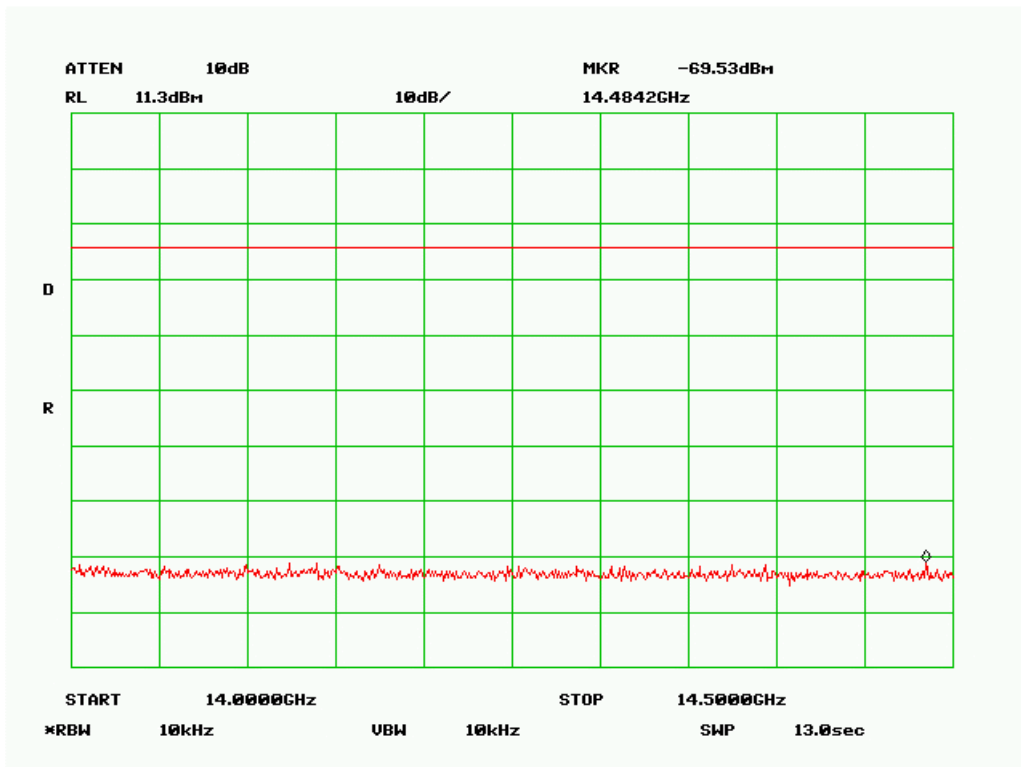
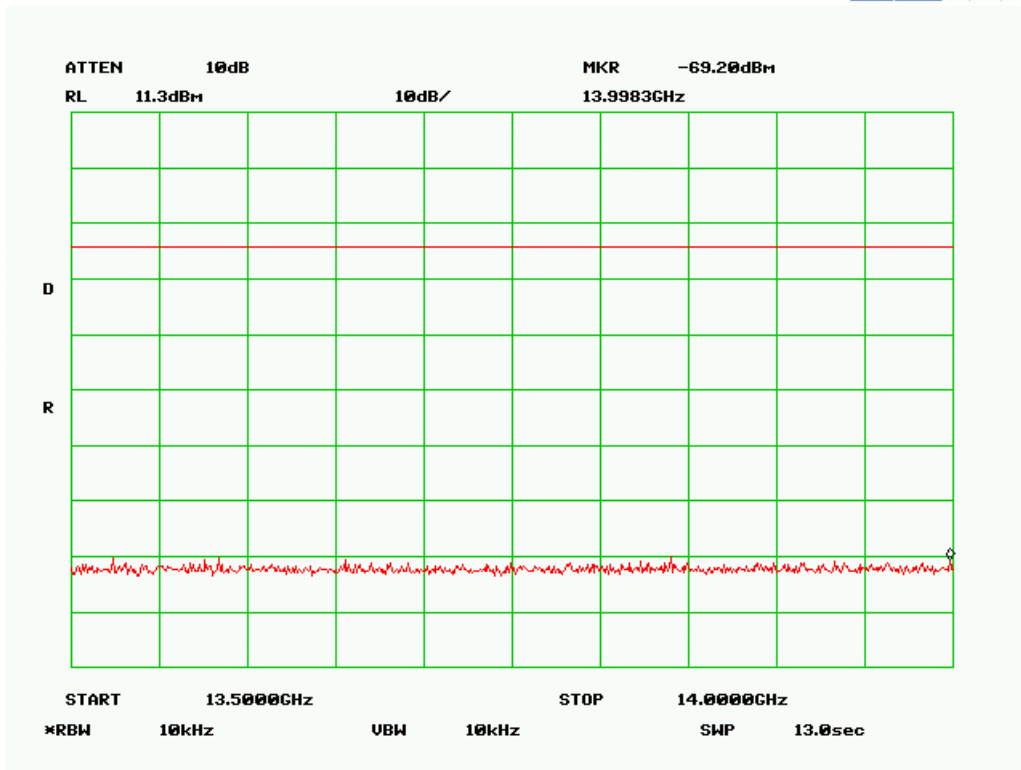


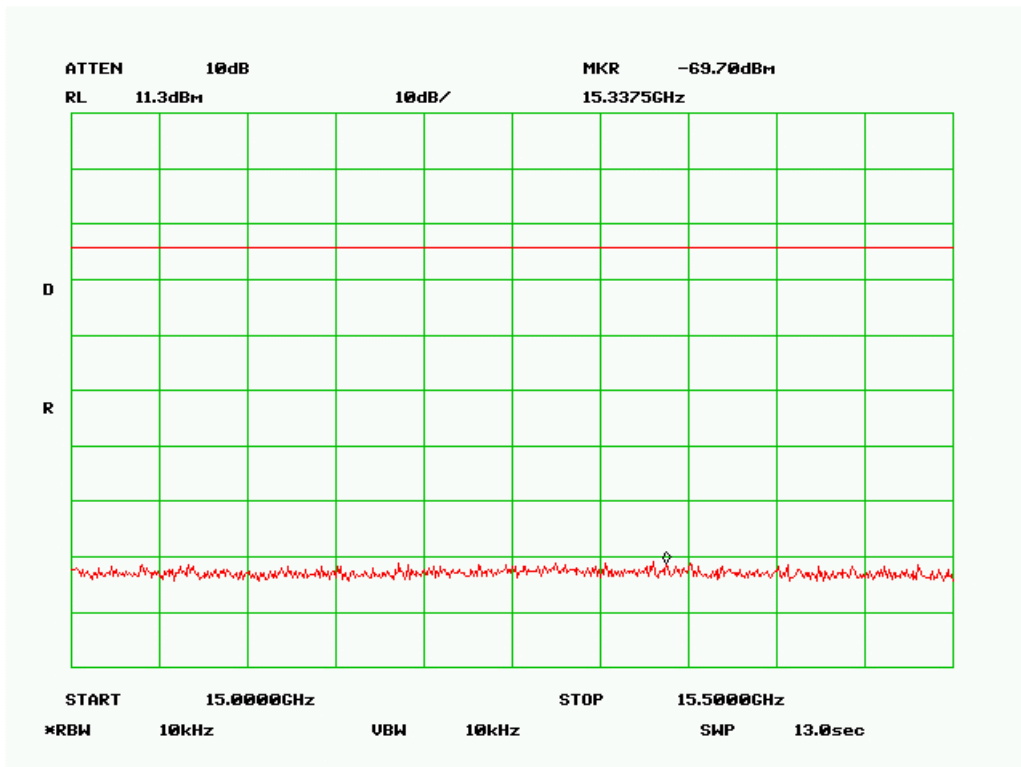
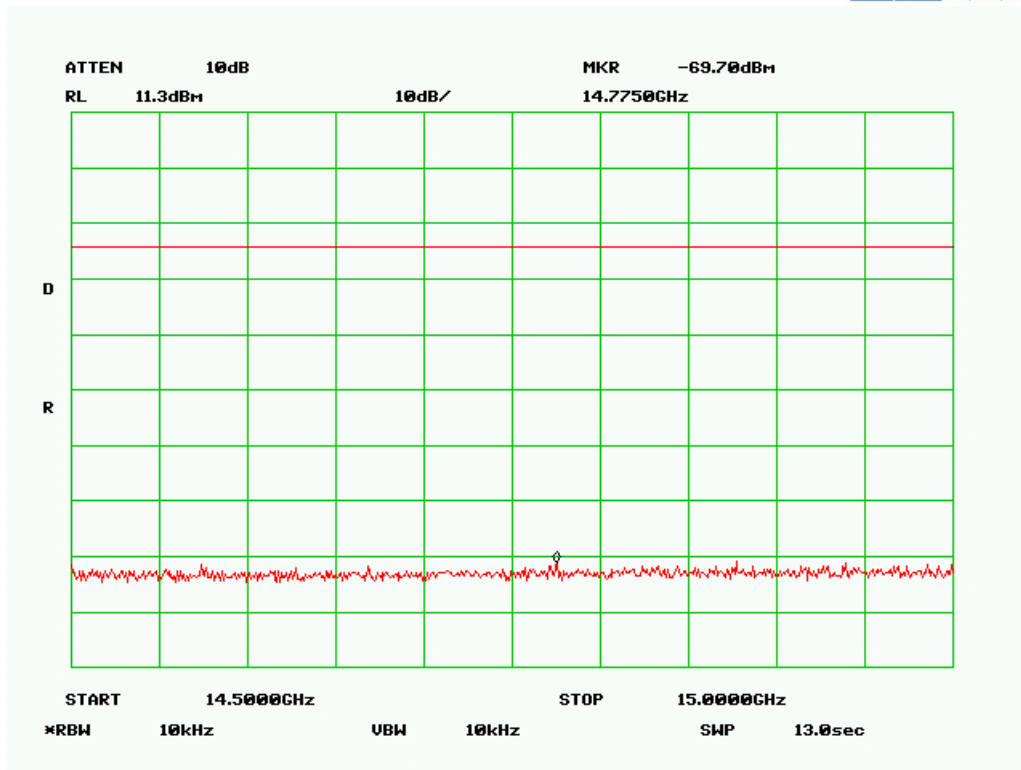


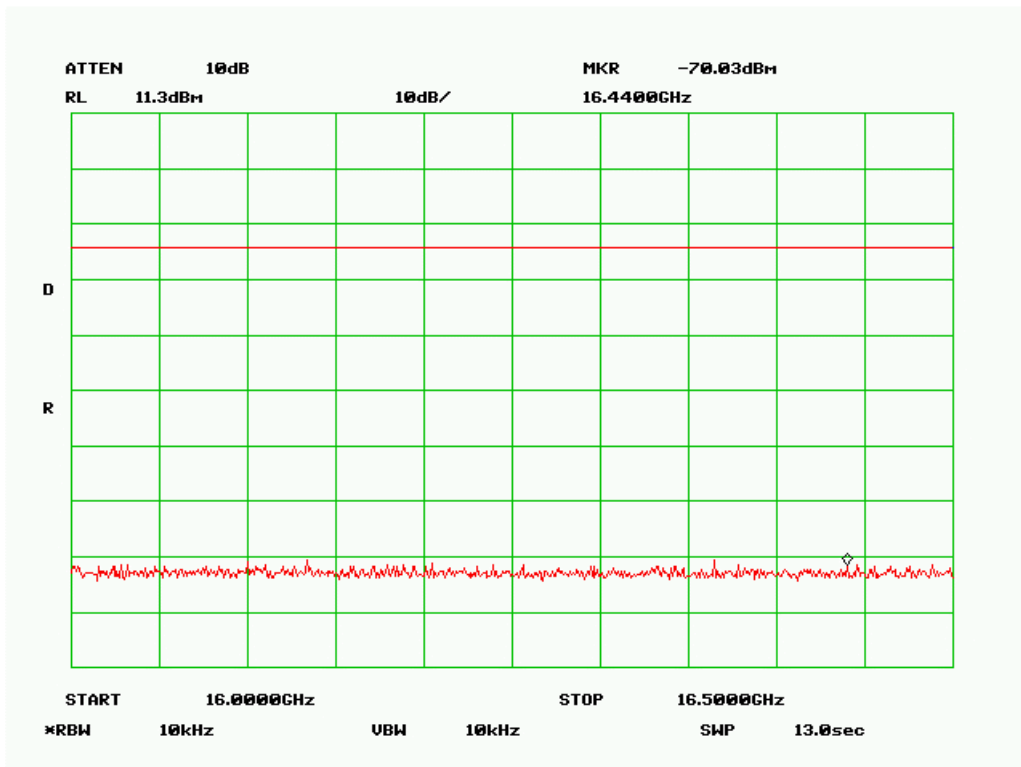
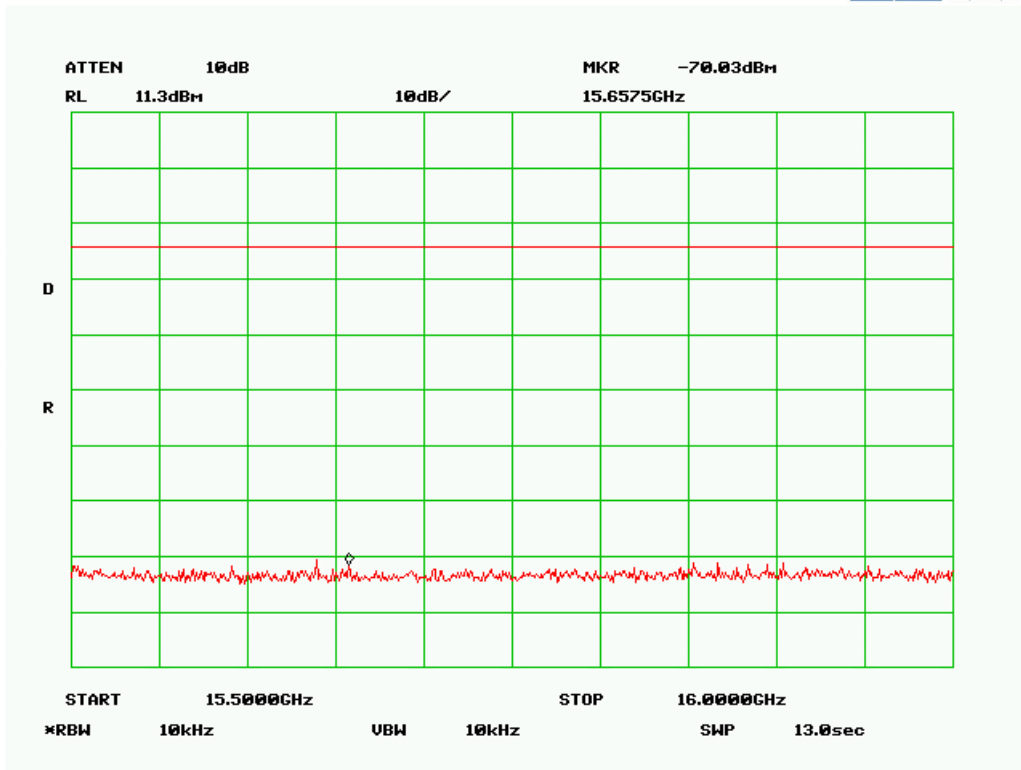










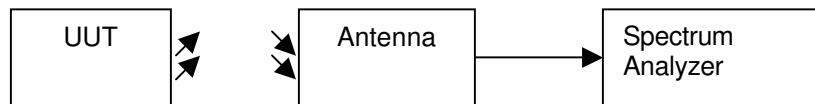


Name Of Test: Radiated Spurious Emissions
Specification: FCC Part 2.1053
Test Equipment: i00024, i00029, i00103

Test Procedure

The UUT was tested in a semi-anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the UUT met the requirements for Radiated Emissions. All emissions from to the 10th harmonic were examined. The antenna correction factor and cable loss were added and input into the spectrum analyzer as a reference level offset to ensure accurate measurements. The UUT was tested by rotating it 360° with the antennas in both the vertical and horizontal orientation and raised from 1 to 4 meters to ensure the TX signal levels were maximized.

Test Setup



Settings
 RBW = 1 MHz
 VBW = 1 MHz
 Detector – Average

Radiated Emissions

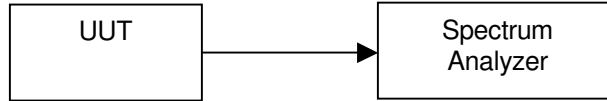
Tuned Freq Frequency (MHz)	Emission Frequency (MHz)	Measured Value (dBuV/m)
1626.6	3253.2	20.70

The UUT Tx output port was terminated into a 50Ω load. No emissions were detected. A noise floor measurement is provided.

Name Of Test: Occupied Bandwidth
Specification: FCC Part 2.1049
Test Equipment: i00024, i00029

Test Procedure

The UUT was connected directly to a spectrum analyzer. The occupied bandwidth of the modulated output was measured and plotted.

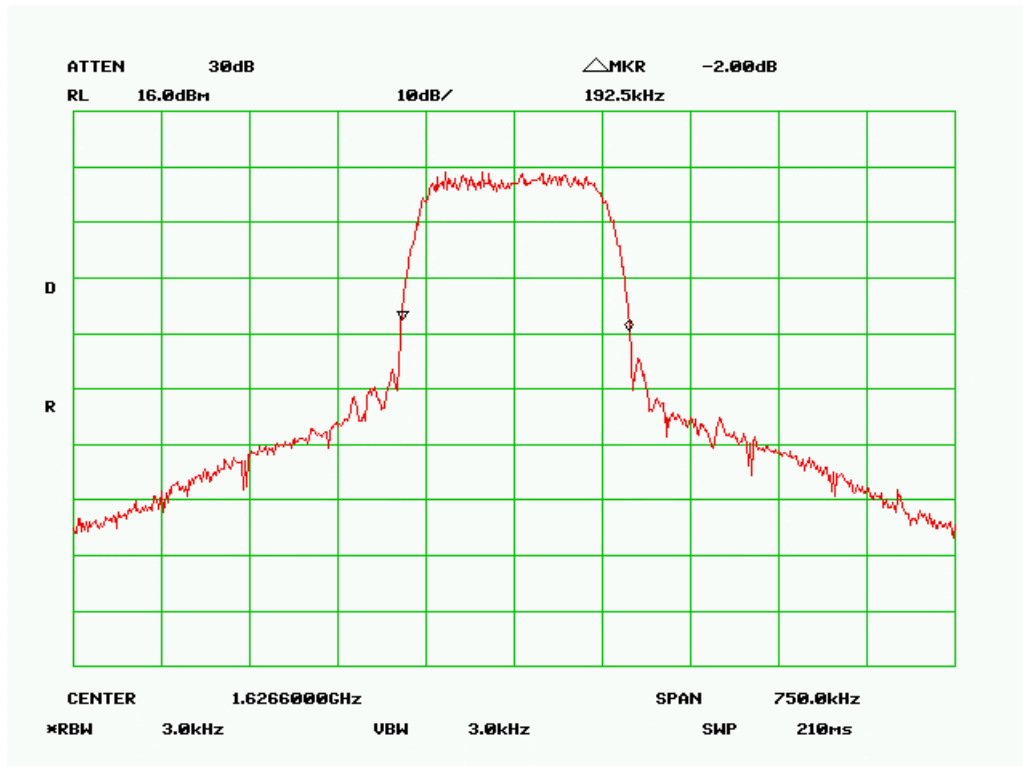


Occupied Bandwidth Results Table

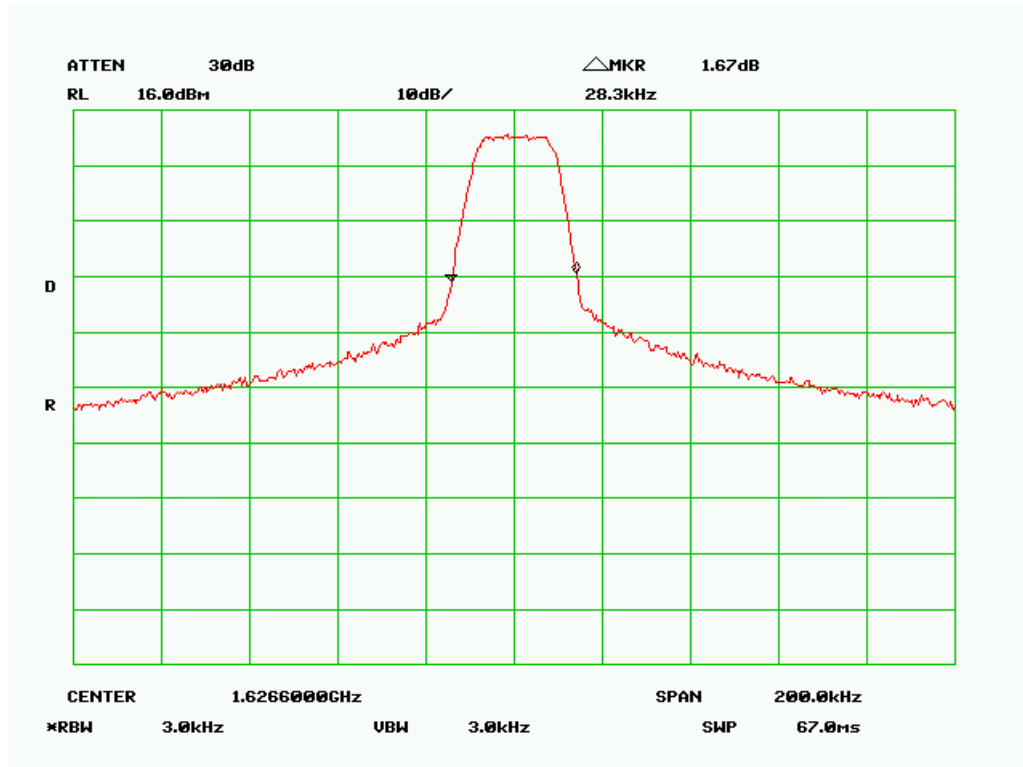
Modulation	Measured Bandwidth (kHz)
PI/4 QPSK Wideband	192.5
PI/4 QPSK Narrowband	28.3
16-QAM Wideband	193.0
16-QAM Narrowband	46.3

Occupied Bandwidth Plots

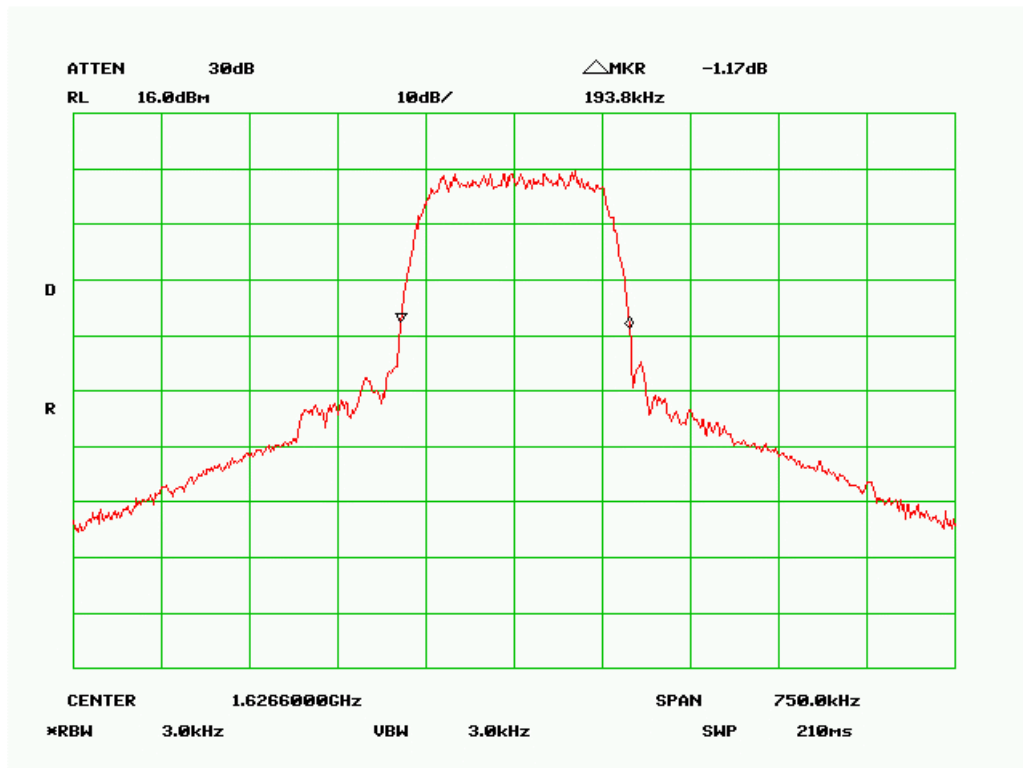
PI/4 QPSK Wideband



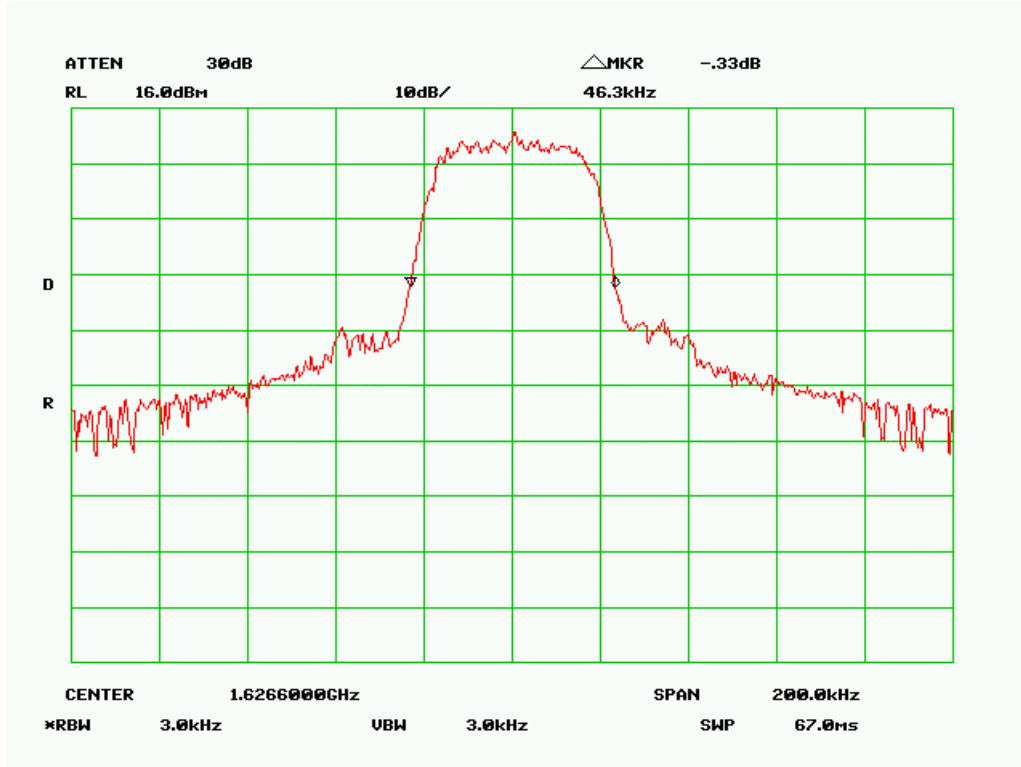
PI/4 QPSK Narrowband



16-QAM Wideband



16-QAM Narrowband

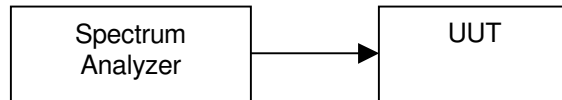


Name Of Test: Emission Masks
Specification: 25.202(f)
Test Equipment Utilized i00024, i00029

Test Procedure

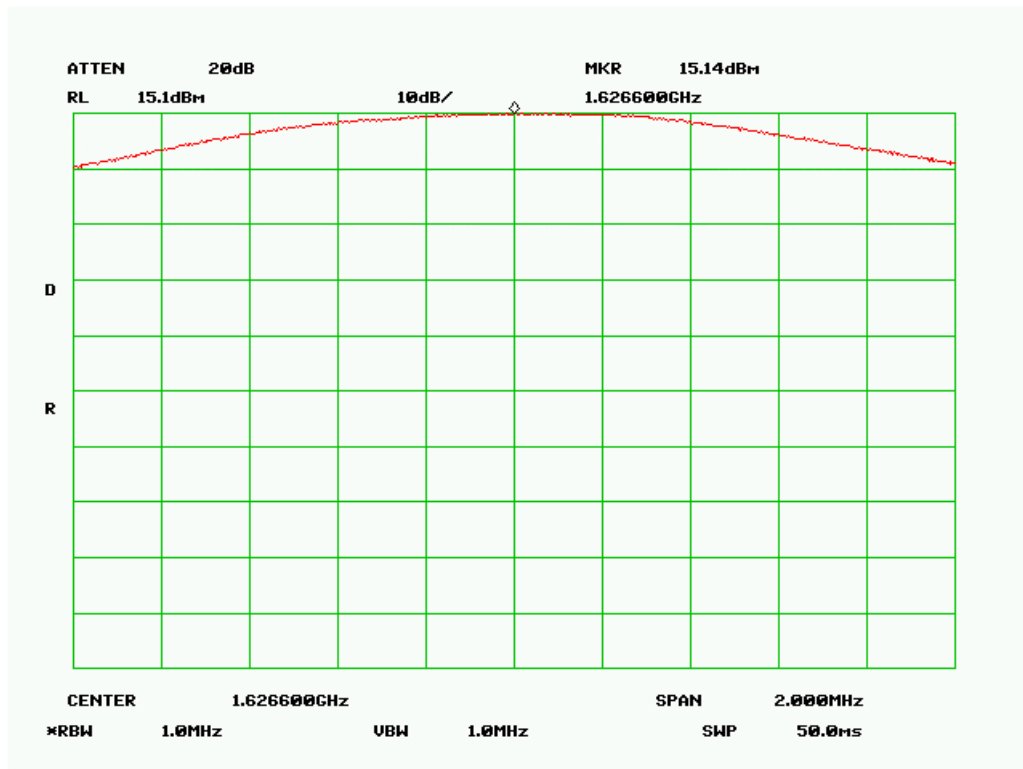
The UUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for emission mask. The reference level was set for the peak power output with the resolution bandwidth set for greater than 3 times the occupied bandwidth of a modulated signal. The emission masks of both modulation types and bandwidths were measured and plotted for all three operating frequencies.

Test Setup

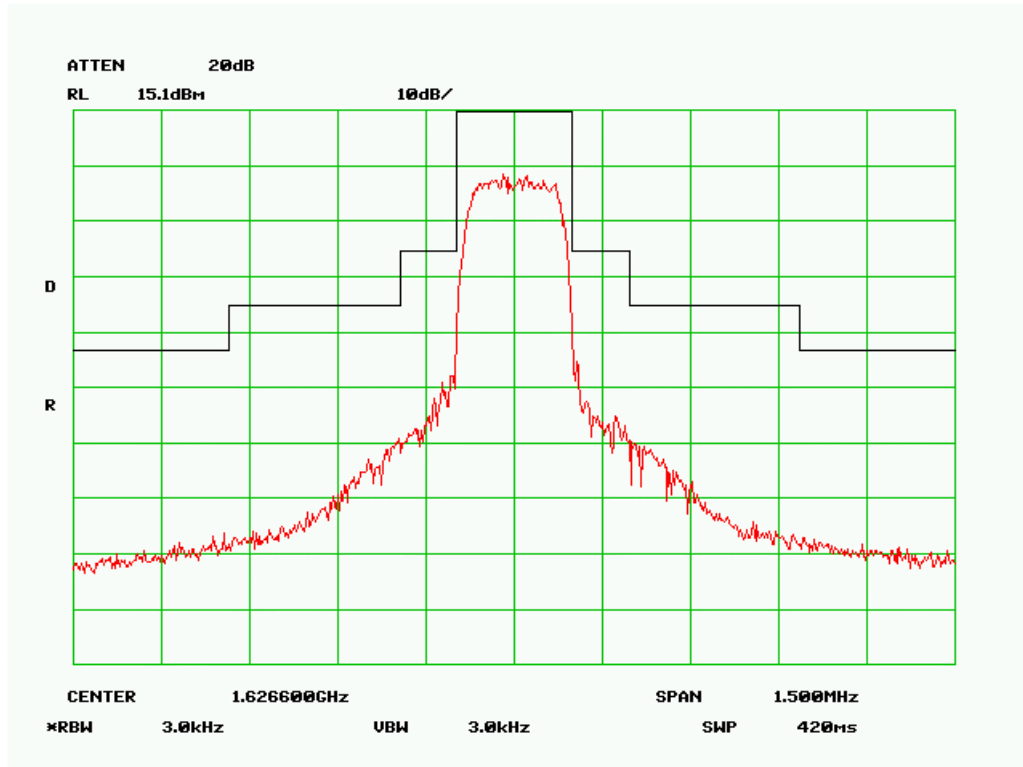


1626.6 MHz Emission Mask Plots

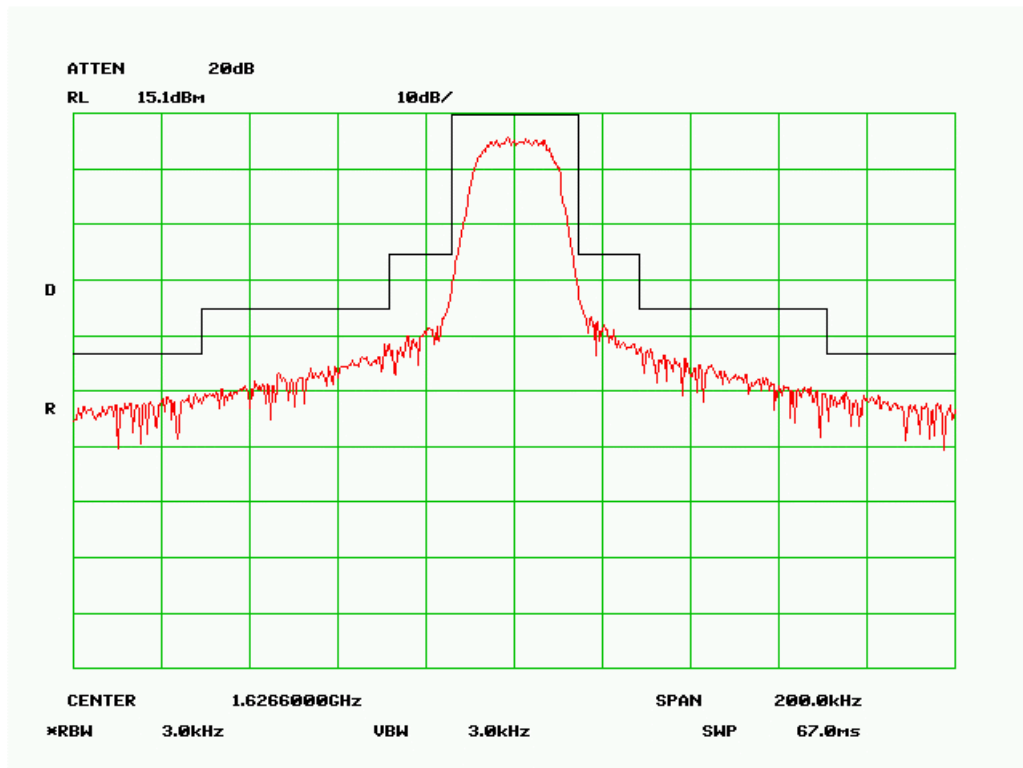
Power Reference



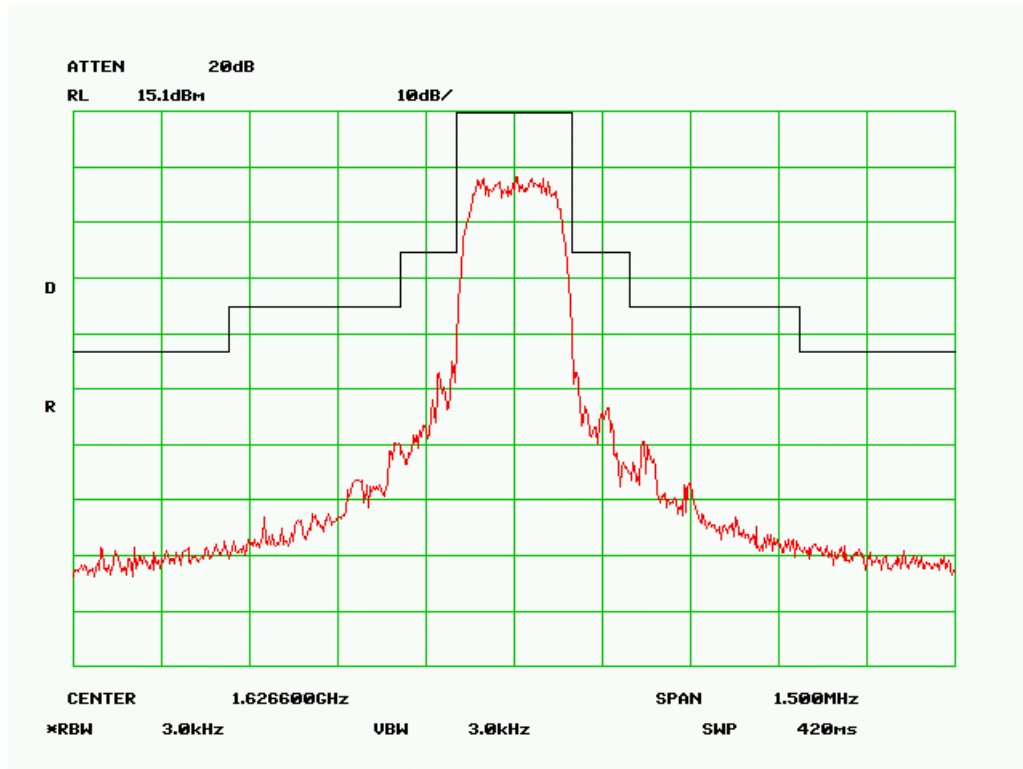
PI/4 QPSK Wideband



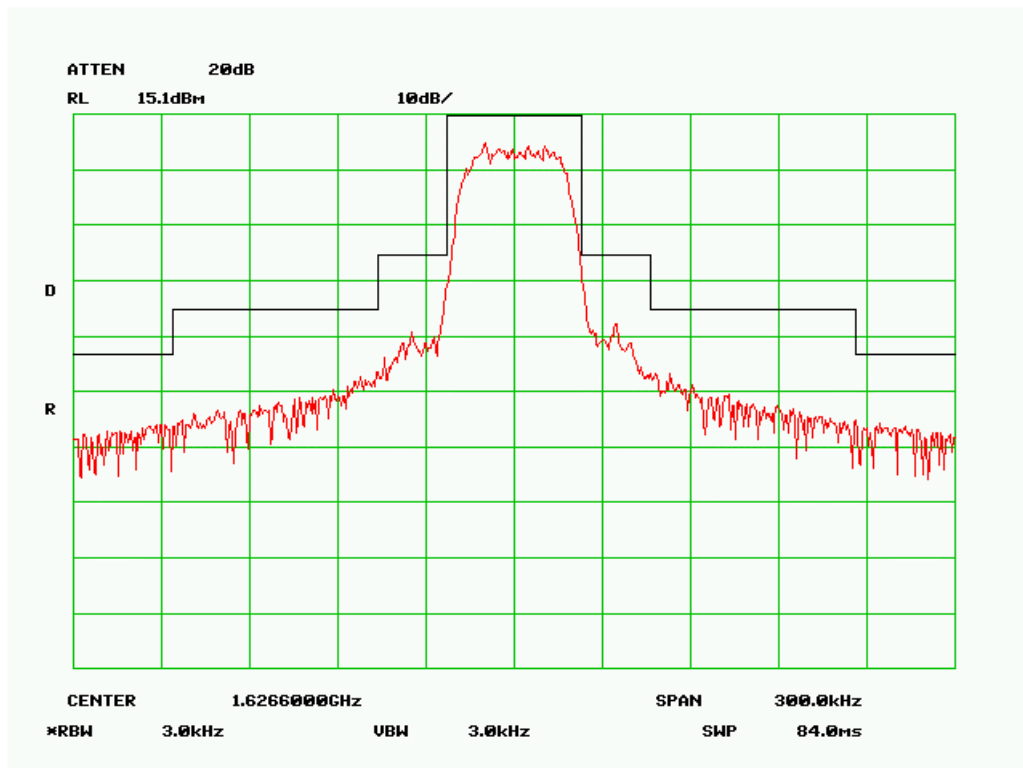
PI/4 QPSK Narrowband



16-QAM Wideband

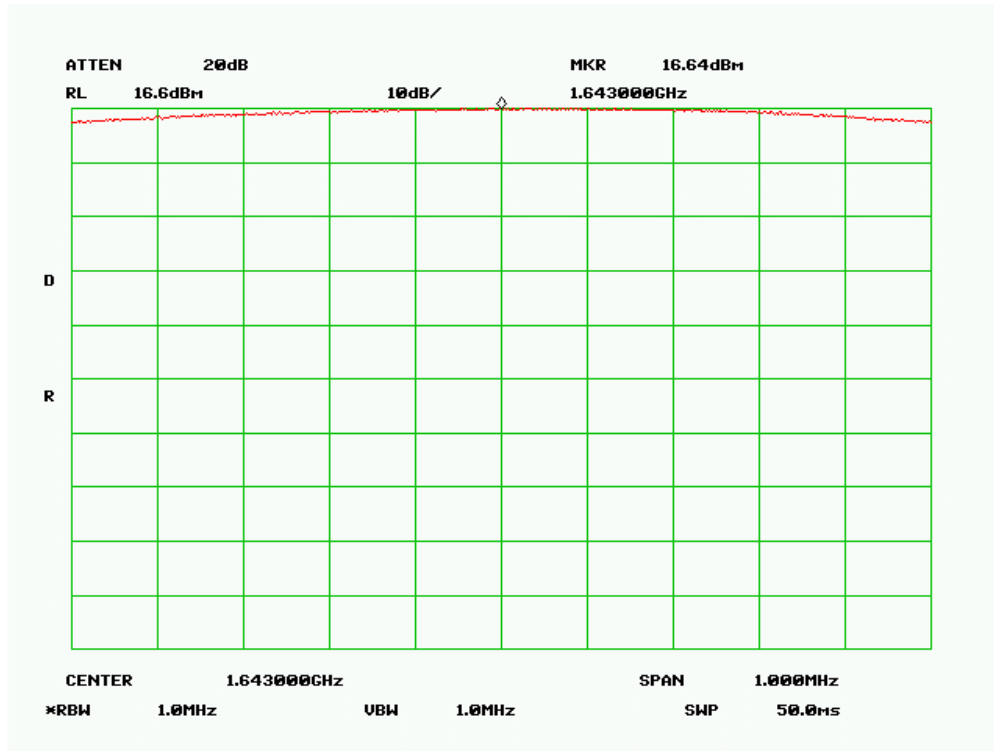


16-QAM Narrowband

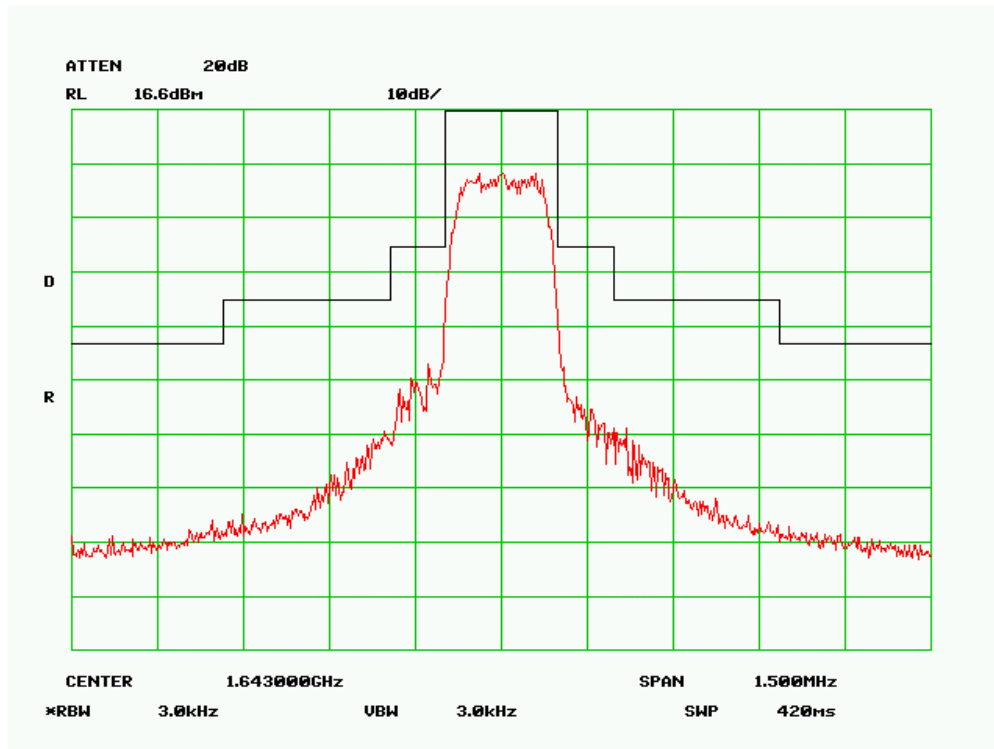


1643 MHz Emission Mask Plots

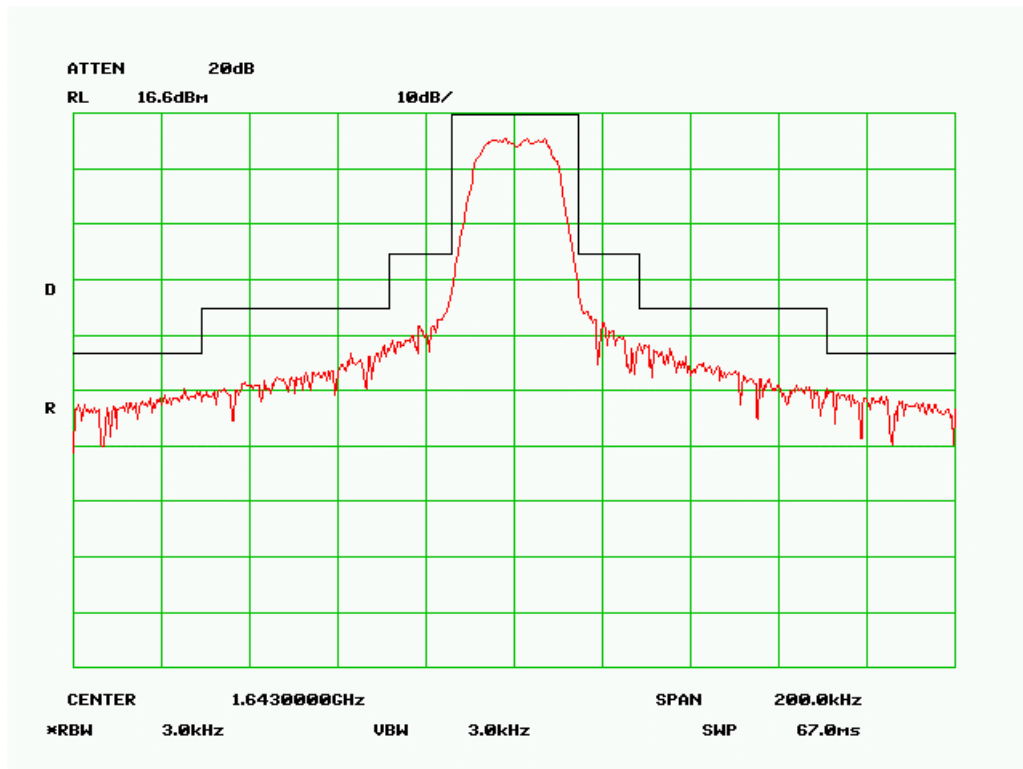
Power Reference



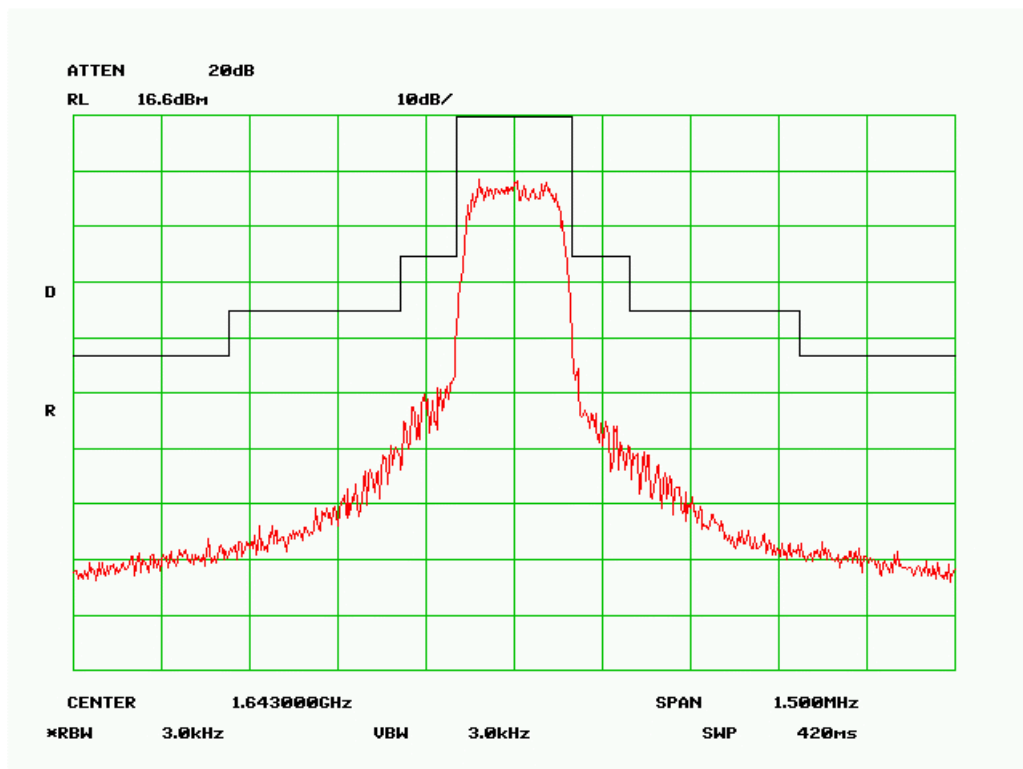
PI/4 QPSK Wideband



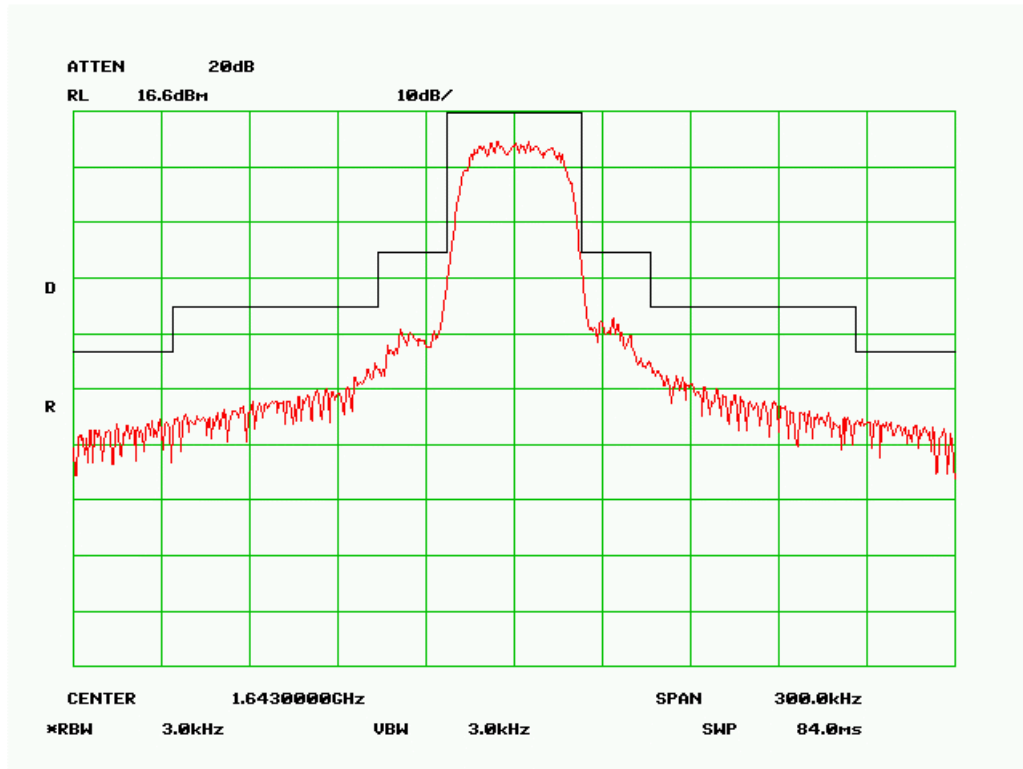
PI/4 QPSK Narrowband



16-QAM Wideband

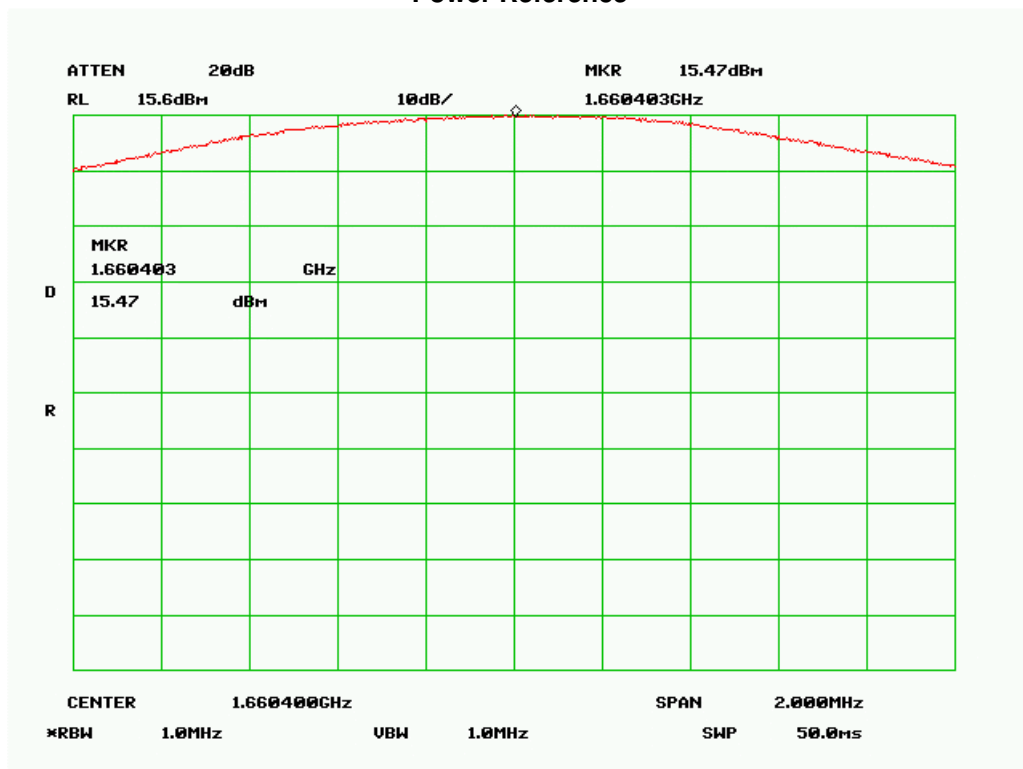


16-QAM Narrowband

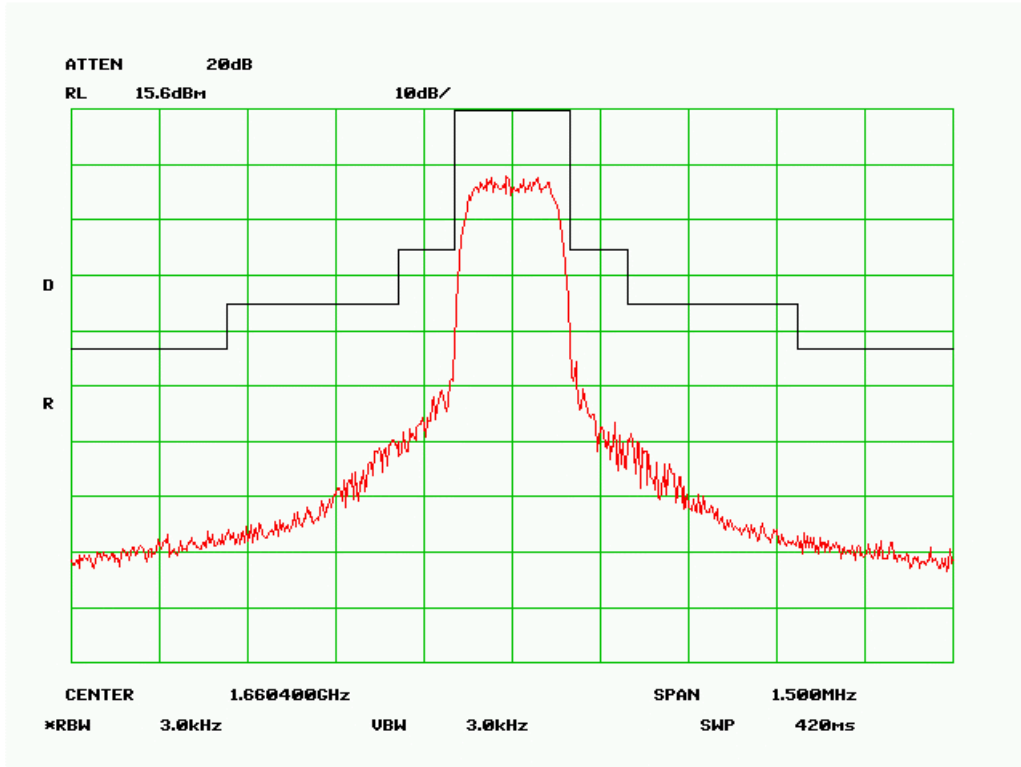


1660.4 MHz Emission Mask Plots

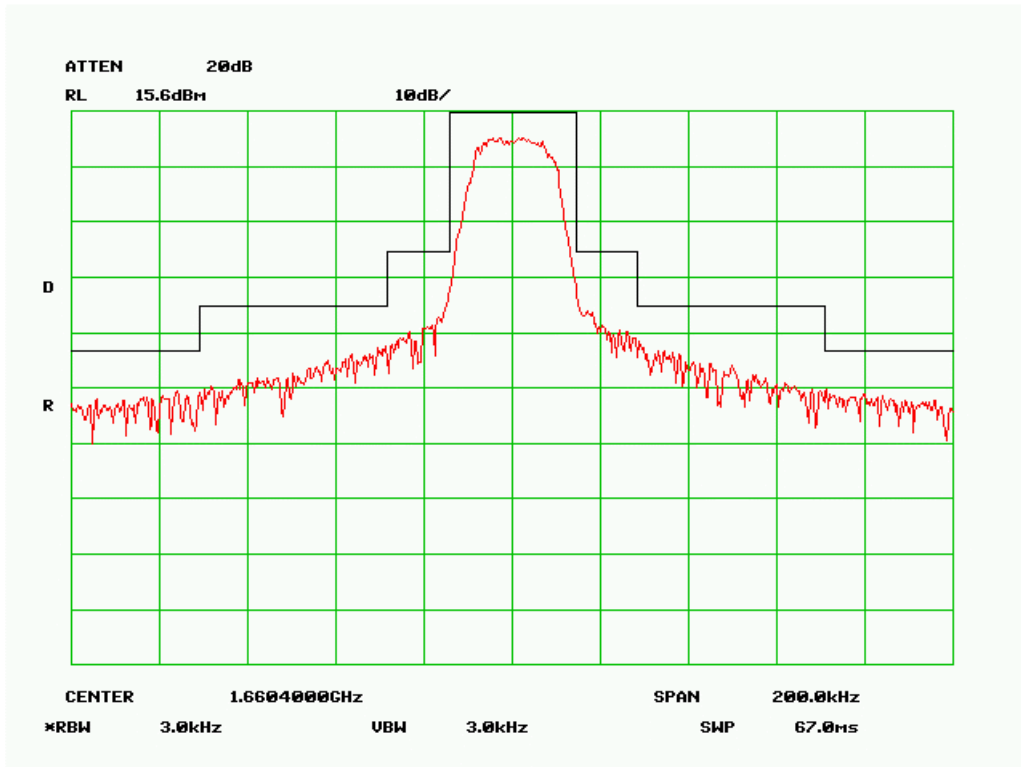
Power Reference



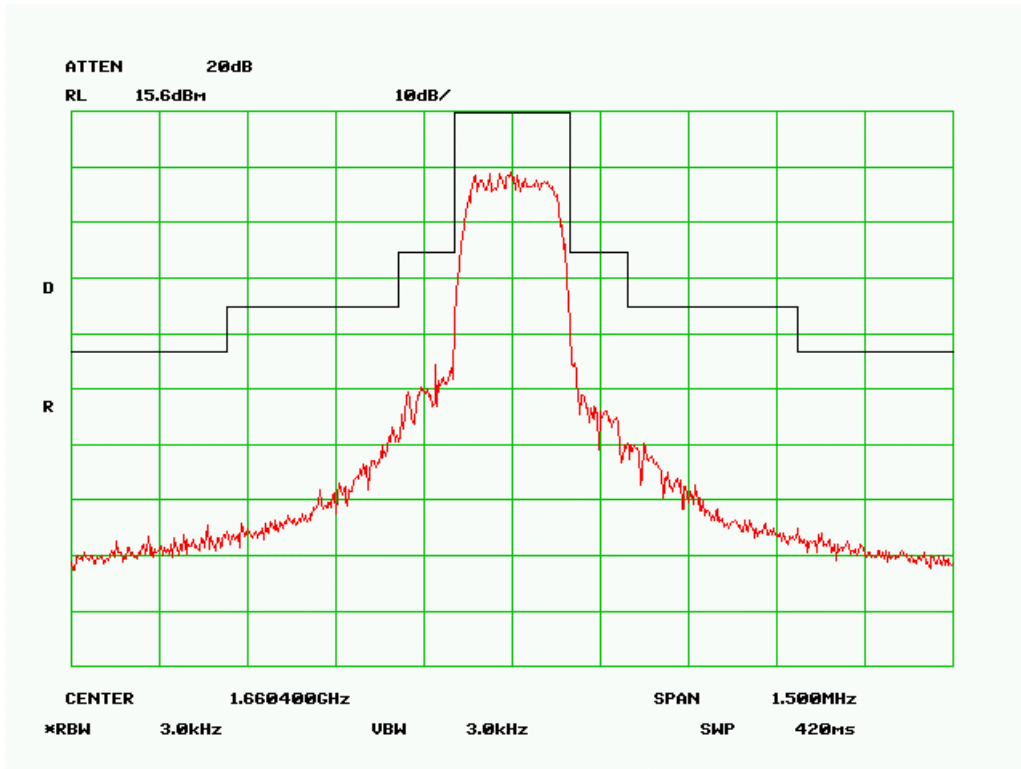
PI/4 QPSK Wideband



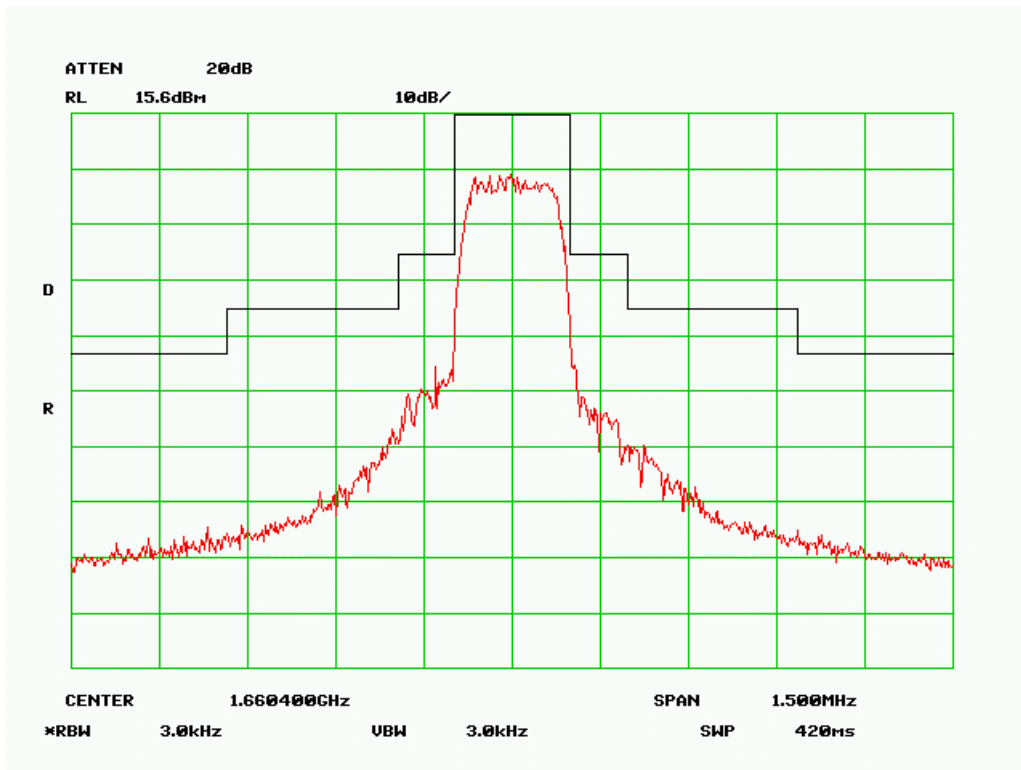
PI/4 QPSK Narrowband



16-QAM Wideband



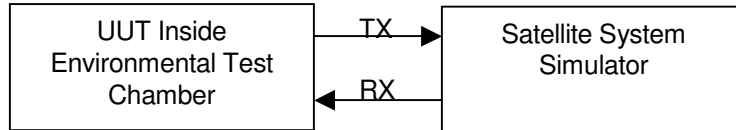
16-QAM Narrowband



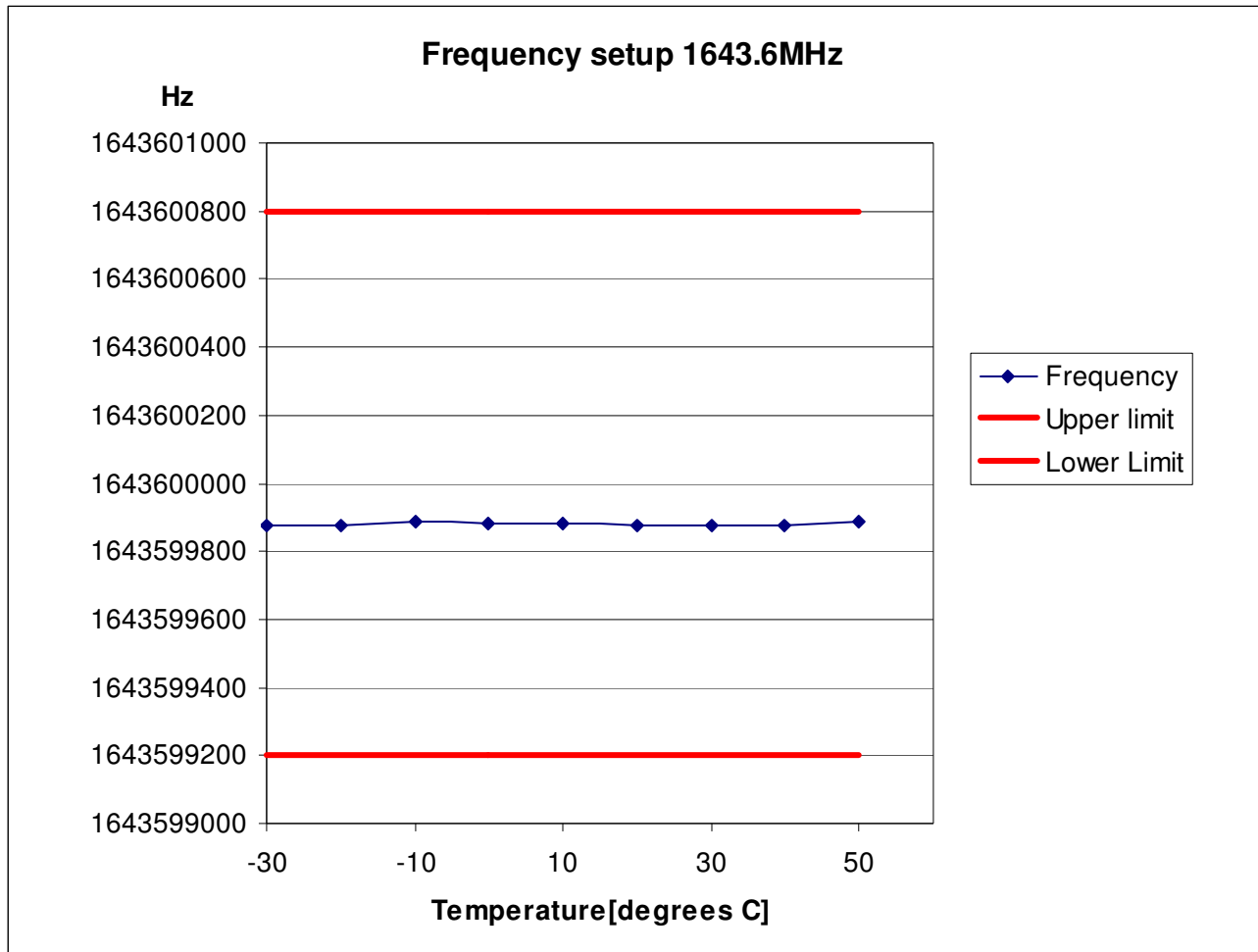
Name Of Test: Frequency Tolerance (Temperature Variation)
Specification: 25.202(d)
Limit: 0.001%
Test Equipment Utilized See attached list for test equipment utilized during off-site testing

Test Procedure

The UUT was placed in an environmental test chamber and the temperature was raised from -30°C to 50°C in 10°C increments. The UUT was connected a satellite system simulator where the output frequency was measured at each 10°C increment.



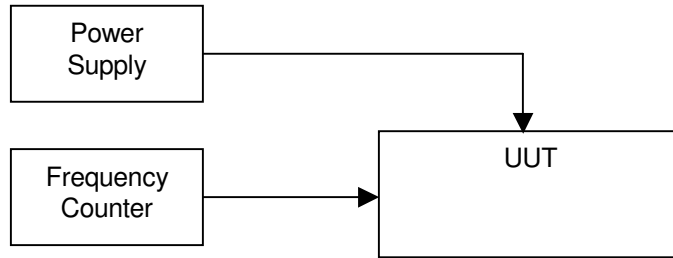
Test Plot



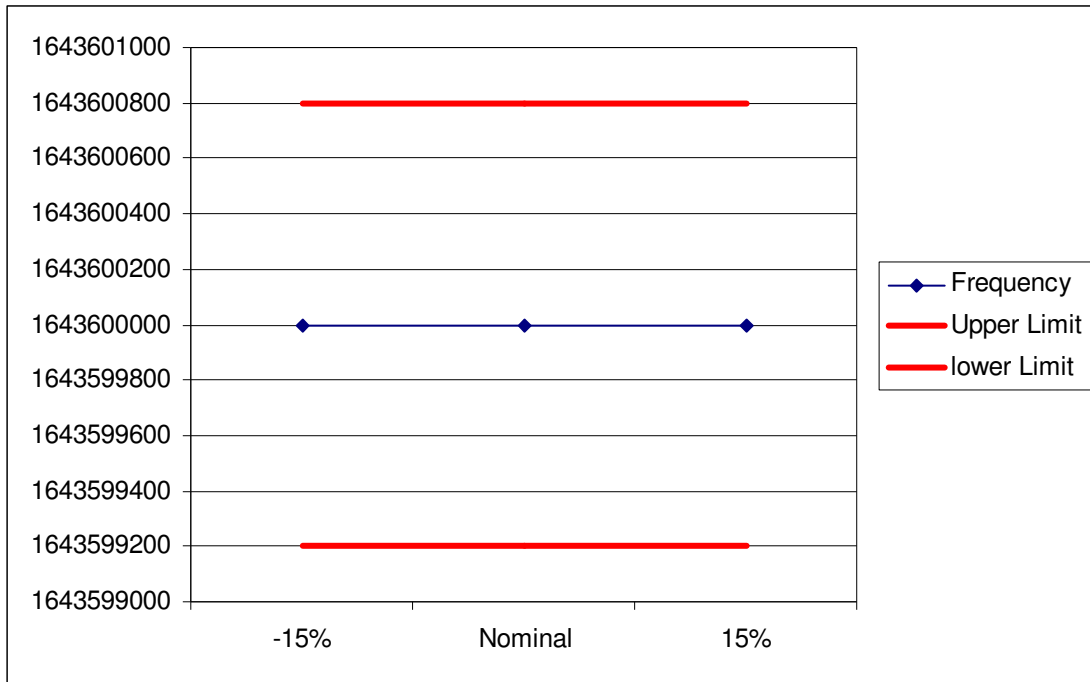
Name Of Test: Frequency Tolerance (Voltage Variation)
Specification: 25.202(d)
Limit: 0.001%
Test Equipment Utilized i00024, i00251

Test Procedure

The UUT was powered by a DC power supply. The UUT RF output was connected directly to a frequency counter. The UUT has the ability to operate from a 12 or 24 VDC supply. The UUT output frequency was measured at the nominal voltage and the +/- 15% voltage levels for the UUT. The -15% voltage calculated from the 12 VDC nominal is 10.2 VDC. The +15% calculated from the 24 VDC nominal is 28.75 VDC. The UUT was tested from 10.2 to 28.75 VDC with no observable change in output frequency.



Test Plot



Test Equipment Utilized

Asset#	Manufacturer	Model	Serial Number	Calibration Cycle	Calibration Due
i00024	HP	6012A	2213A-01034	NA	Verified
i00029	HP	8563E	3213A00104	12 mo.	3/9/2008
i00103	EMCO	3115	9028-3925	36 mo.	10/4/2009
i00251	HP	53152A	US39270237	12 mo.	5/3/2008

Test Equipment Utilized for Off-site Testing

Manufacturer	Model	Serial Number	Calibration Cycle	Calibration Due
Vötsch	VT7060	5956605140010	24 mo.	04-04-2008
Square Peg Communications	EM-907516C-01	004	12 mo.	17-12-2007
Square Peg Communications	EM907532C-04	PLTH_058	12 mo.	17-12-2007

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

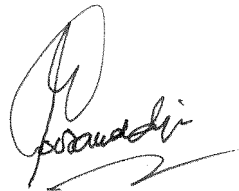
END OF TEST REPORT

**Testimonial
and
Statement of Certification**

This is to Certify:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

Certifying Engineer:



Hoosamuddin S. Bandukwala, Lab Director