Report On

FCC Testing of the
Thales Aerospace Division
Top Flight Satcom SDU 82155

COMMERCIAL-IN-CONFIDENCE

FCC ID: KV6TFS-SDU-82155A1

Document 75903387 Report 01 Issue 6 August 2008

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REPORT ON

FCC Testing of the
Thales Aerospace Division
Top Flight Satcom SDU 82155

Document 75903387 Report 01 Issue 6

August 2008

PREPARED FOR

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DATED 14 August 2008

This report has been up-issued to Issue 6 to correct typographical errors.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Part 15 B, Part 15C and Part 87. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

G Lawler S Bennett P Harrison

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
Thales Aerospace Division
Top Flight Satcom SDU 82155

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Thales Aerospace Division Top Flight Satcom SDU 82155 to the requirements of FCC CFR 47 Part 15B: 2006, FCC CFR 47 Part 15C: 2006 and FCC CFR 47 Part 87: 2006.

Objective	To perform Electromagnetic Compatibility (EMC) Qualification Approval Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification/Test Plan, for the series of tests carried out.
Manufacturer	Thales Avionics Ltd
Type Number(s)	82155A30E
Serial Number(s)	10018
Software Version	Test
Hardware Version	A30E
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B: 2006 FCC CFR 47 Part 15C: 2006 and FCC CFR 47 Part 87: 2006
Test Plan/Issue/Date	Thales Document: T-145 Issue B 18 Feb 2008
Incoming Release Date	Declaration of Build Status 01 April 2008
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	RWH000081 Rev. No. 1 10 April 2008
Start of Test	12 May 2008
Finish of Test	21 May 2008
Name of Engineer(s)	G Lawler P Harrison S Bennett

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 15B: 2006, is shown below.

Configuration 1 - As supplied						
Section	Spec Clause	Test Plan Clause	Test Description	Mode	Mod State	Result
2.1	15.109	-	Radiated Emissions (Enclosure Port)	2	0	Pass

A brief summary of results in accordance with FCC CFR 47 Part 15C: 2006, is shown below.

Configuration 1 - As supplied						
Section	Spec Clause	Test Plan Clause	Test Description	Mode	Mod State	Result
2.2	15.209, 15.247(d), 15.205	8.2	Radiated Emissions (Enclosure Port)	1	0	Pass

A brief summary of results in accordance with FCC CFR 47 Part 87: 2006, is shown below.

Configuration 1 - As supplied						
Section	Spec Clause	Test Plan Clause	Test Description	Mode	Mod State	Result
2.3	87.131	8.2	RF Power Output	1	0	Pass – See Note $_1$
2.4	87.133	8.2	Frequency Stability Test	1	0	Pass – See Note $_1$
2.5	87.135	8.2	Occupied Bandwidth	1	0	Pass – See Note $_1$
2.6	87.139	8.2	Conducted Spurious Emissions	1	0	Pass – See Note $_1$

Note $_1$ Verdict based on 25K0G1W Modulation.

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	Top Flight Satcom SDU 82155		
MANUFACTURER	Thales Avionics Ltd		
TYPE	82155A30E		
PART NUMBER	N/A		
SERIAL NUMBER	10018		
HARDWARE VERSION	A30E		
SOFTWARE VERSION	Test		
TRANSMITTER OPERATING RANGE	1626.5 to 1662.5 MHz		
RECEIVER OPERATING RANGE	1525 to 1559 MHz		
COUNTRY OF ORIGIN	United Kingdom		
INTERMEDIATE FREQUENCIES	110 MHz		
ITU DESIGNATION OF EMISSION	G1D		
HIGHEST INTERNALLY GENERATED FREQUENCY	3325 MHz		
OUTPUT POWER (W or dBm)	30W		
FCC ID	KV6TFS-SDU-82155A1		
INDUSTRY CANADA ID	Non assigned		
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Airborne voice and data communication using Inmarsat BGAN-X satellite communication services		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	N/A- not battery powered		
MANUFACTURER			
TYPE			
PART NUMBER			
VOLTAGE			
COUNTRY OF ORIGIN			
MODULES (Not Applicable)			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	DLNA		
MANUFACTURER	Com Dev Ltd		
TYPE	Type A		
PART NUMBER	TBA		
SERIAL NUMBER	TBA		
COUNTRY OF ORIGIN	Canada		

Signature: Colin Appleyard (completed electronically)

Date: 1 April 2008
Declaration of Build Status Serial Number: 75903387

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Thales Aerospace Division Top Flight Satcom SDU 82155 as shown in the photograph below. A full technical description can be found in the Manufacturers documentation.

Equipment Under Test

Product Service

1.4.2 Test Configuration

Configuration 1: EUT as supplied

The EUT was configured in accordance with FCC CFR 47 Part 15B: 2006, FCC CFR 47 Part 15C: 2006 and FCC CFR 47 Part 87: 2006.

1.4.3 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 - TX

Mode 2 - RX

Information on the specific test modes utilised are detailed in the test procedure for each individual test.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate.

The EUT was powered from a 115V/400Hz AC Mains (single phase) supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

Testing has been performed on all modulation schemes supported by the EUT however not all of these modulation schemes are covered by the test specification.

Supported Modulation Schemes

Modulation	Declared Emission Designator	Declared Authorised Bandwidth
QPSK 16.8 ks/s	25K0G1W	25 kHz
QPSK 151.2 ks/s	200KG1W	200 kHz
QAM 33.6 ks/s	50K0D1W	50 kHz
QAM 151.2 ks/s	200KD1W	200 kHz

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Thales Aerospace Division
Top Flight Satcom SDU 82155

Product Service

2.1 RADIATED EMISSIONS (ENCLOSURE PORT)

2.1.1 Specification Reference

FCC CFR 47 Part 15B: 2006, Clause 15.109
Thales Document: T-145 Issue B 18 Feb 2008

2.1.2 Equipment Under Test

Top Flight Satcom SDU 82155, S/N: 10018

2.1.3 Date of Test and Modification State

19 May 2008 - Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.1.6 Environmental Conditions

	19 May 2008
Ambient Temperature	17°C
Relative Humidity	35%
Atmospheric Pressure	1013mbar

Product Service

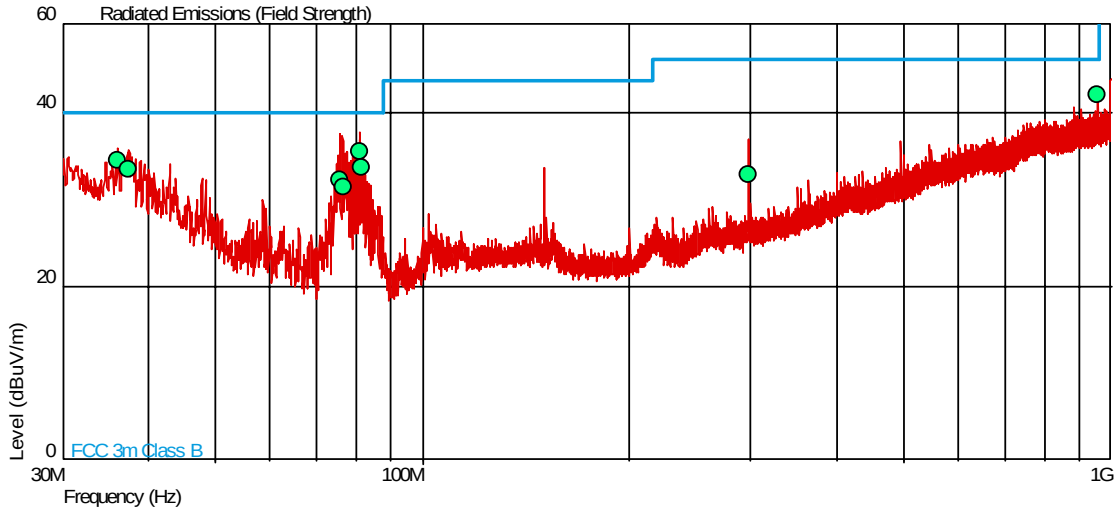
2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15B: 2006 for Radiated Emissions (Enclosure Port).

The test results are shown below.

Configuration 1 - Mode 2

30MHz – 1 GHz



Frequency (MHz)	QP Level		QP Limit		QP Margin		Angle (Deg)	Height (m)	Polarity
	(dBuV/m)	(dBm)	(dBuV/m)	(dBm)	(dBuV/m)	(dBm)			
36.156	34.4	52.5	40.0	100.0	-5.6	47.5	356	1.02	Vertical
37.387	33.5	47.3	40.0	100.0	-6.5	52.7	0	1.19	Vertical
75.920	32.2	40.7	40.0	100.0	-7.8	59.3	199	1.00	Vertical
76.617	31.4	37.2	40.0	100.0	-8.6	62.8	118	1.00	Vertical
81.245	35.5	59.6	40.0	100.0	-4.5	40.4	132	1.00	Vertical
81.588	33.7	48.4	40.0	100.0	-6.3	51.6	115	1.00	Vertical
297.022	32.7	43.2	46.0	200.0	-13.3	156.8	343	1.00	Vertical
957.997	41.9	124.5	46.0	200.0	-4.1	75.5	12	1.00	Vertical

1GHz to 18GHz

Frequency MHz	RES BW kHz	Vid BW kHz	Antenna Polarisation	Antenna Height cm	EUT Arc degrees	Result Peak		Limit		Margin	
						dBuV/m	dBm	dBuV/m	dBm	dBuV/m	dBm
1000.001	1000	0.01	Vertical	119	007	40.5	106.0	54.0	500.0	13.5	394.0
2399.871	1000	0.01	Horizontal	100	002	34.1	50.7	54.0	500.0	19.9	449.3

2.2 RADIATED EMISSIONS (ENCLOSURE PORT)

2.2.1 Specification Reference

FCC CFR 47 Part 15C: 2006, Clause 15.209, 15.247(d), 15.205
Thales Document: T-145 Issue B 18 Feb 2008, 8.2

2.2.2 Equipment Under Test

Top Flight Satcom SDU 82155, S/N: 10018

2.2.3 Date of Test and Modification State

19 May 2008 & 21 May 2008 - Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of Part 15: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.2.6 Environmental Conditions

	19 May 2008	21 May 2008
Ambient Temperature	17°C	17.4°C
Relative Humidity	35%	34%
Atmospheric Pressure	1013mbar	1011mbar

Product Service

2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15C: 2006 for Radiated Emissions (Enclosure Port).

The test results are shown below.

Configuration 1 - Mode 1

Bottom Channel (1626.6MHz) QAM 151.2kbps

No emissions were detected within 20dB of the specification limit over the range 30MHz to 1GHz.

Middle Channel (1643.5MHz) QAM 33.6kbps

No emissions were detected within 20dB of the specification limit over the range 30MHz to 1GHz.

Top Channel (1660.4MHz) QAM 151.2kbps

No emissions were detected within 20dB of the specification limit over the range 30MHz to 1GHz.

Bottom Channel (1626.6MHz) QPSK 151.2kbps

No emissions were detected within 20dB of the specification limit over the range 30MHz to 1GHz.

Product Service

2.3 RF POWER OUTPUT

2.3.1 Specification Reference

FCC CFR 47 Part 87: 2006, Clause 87.131
Thales Document: T-145 Issue B 18 Feb 2008, 8.2

2.3.2 Equipment Under Test

Top Flight Satcom SDU 82155, S/N: 10018

2.3.3 Date of Test and Modification State

12 May 2008 - Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of Part 87: 2006.

The path loss between the Peak Power Analyser and the EUT was measured. This was entered into the Power Meter as an offset. The peak and average powers were measured on the bottom, middle and top channels. Testing on these channels was also carried out for both supported modulation types at the highest and lowest data rates.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.3.6 Environmental Conditions

	12 May 2008
Ambient Temperature	18°C
Relative Humidity	41%

Product Service

2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 87: 2006 for RF Power Output.

The test results are shown below.

Configuration 1 - Mode 1

QAM 33.2 ks/s

Frequency (MHz)	Power (dBm)	Power (W)
1626.6	Av: 43.19	Av: 20.84
1643.5	Av: 41.98	Av: 15.78
1660.4	Av: 40.97	Av: 12.50

QAM 151.2 ks/s

Frequency (MHz)	Power (dBm)	Power (W)
1626.6	Av: 42.90	Av: 19.50
1643.5	Av: 41.84	Av: 15.28
1660.4	Av: 41.29	Av: 13.45

QPSK 16.8 ks/s

Frequency (MHz)	Power (dBm)	Power (W)
1626.6	Av: 42.92	Av: 19.59
1643.5	Av: 41.94	Av: 15.63
1660.4	Av: 41.26	Av: 13.37

QPSK 151.2 ks/s

Frequency (MHz)	Power (dBm)	Power (W)
1626.6	Av: 43.03	Av: 20.09
1643.5	Av: 41.96	Av: 15.70
1660.4	Av: 41.19	Av: 13.15

Limit

Frequency (MHz)	47.78 (dBm) or 60 (W)

Product Service

2.4 FREQUENCY STABILITY TEST

2.4.1 Specification Reference

FCC CFR 47 Part 87: 2006, Clause 87.133
Thales Document: T-145 Issue B 18 Feb 2008, 8.2

2.4.2 Equipment Under Test

Top Flight Satcom SDU 82155, S/N: 10018

2.4.3 Date of Test and Modification State

15 May 2008 - Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of Part 87: 2006.

The EUT was connected to a Frequency Counter via a 30dB attenuator. The Frequency Counter was also connected to a calibrated 10MHz frequency standard. The EUT was switched on and set to transmit an unmodulated carrier. Measurements were made between -20°C and +50°C in 10°C increments. At +20°C the voltage was varied by 15% in accordance with 2.1055(d)(i).

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.4.6 Environmental Conditions

	15 May 2008
Ambient Temperature	18°C
Relative Humidity	41%

Product Service

2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 87: 2006 for Frequency Stability.

The test results are shown below.

Configuration 1 - Mode 1

Test Conditions		Frequency Drift (Hz)		
Temperature Interval(ºC)	Supply Voltage	1626.6 MHz	1643.5 MHz	1660.4 MHz
- 20	V_{nom} (115 V AC)	-96	-111	-88
- 10	V_{nom} (115 V AC)	-100	-115	-91
0	V_{nom} (115 V AC)	-102	-117	-94
+ 10	V_{nom} (115 V AC)	-106	-121	-97
T_{nom} (+ 20)	V_{min} (97 V AC)	-110	-125	-102
	V_{nom} (115 V AC)	-110	-125	-102
	V_{max} (133 V AC)	-110	-125	-102
+ 30	V_{nom} (115 V AC)	-114	-129	-106
+ 40	V_{nom} (115 V AC)	-116	-131	-107
+ 50	V_{nom} (115 V AC)	-119	-135	-111

Limit	±160 Hz

2.5 OCCUPIED BANDWIDTH

2.5.1 Specification Reference

FCC CFR 47 Part 87: 2006, Clause 87.135
Thales Document: T-145 Issue B 18 Feb 2008, 8.2

2.5.2 Equipment Under Test

Top Flight Satcom SDU 82155, S/N: 10018

2.5.3 Date of Test and Modification State

12 May 2008 - Modification State 0

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of Part 87: 2006.

The EUT was connected to a Spectrum Analyser via a 40 dB attenuator. Using the measurement function the 99% Occupied Bandwidth was measured on bottom, middle and top channels. This included QPSK and QAM modulation at the highest and lowest data rates.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.5.6 Environmental Conditions

	12 May 2008
Ambient Temperature	18°C
Relative Humidity	41%

Product Service

2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 87: 2006 for Frequency Stability.

The test results are shown below.

Configuration 1 - Mode 1

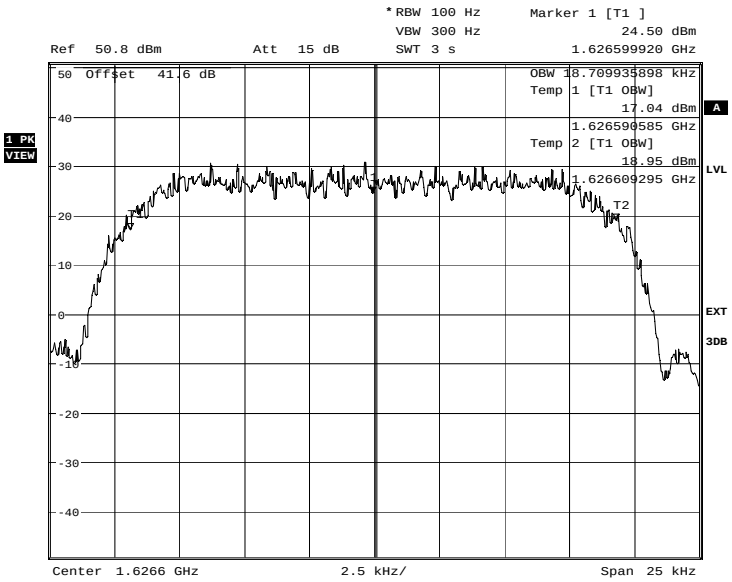
Frequency (MHz)	25K0G1W	50K0D1W	200KD1W	200KG1W
1626.6	18.7099 kHz	37.3397 kHz	167.6282 kHz	167.3076 kHz
1643.5	18.6699 kHz	37.2596 kHz	167.3077 kHz	167.3077 kHz
1660.4	18.5096 kHz	37.2596 kHz	167.6282 kHz	166.9872 kHz
Modulation	QPSK 16.8 ks/s	QAM 33.6 ks/s	QAM 151.2 ks/s	QPSK 151.2 ks/s

Limits	21 kHz	42 kHz	200 kHz	200 kHz

Note: Although the results for these mod schemes are within spec limits, no pass or fail statement can be made as these particular mod schemes are not included within Part 87.

25K0G1W

1626.6MHz



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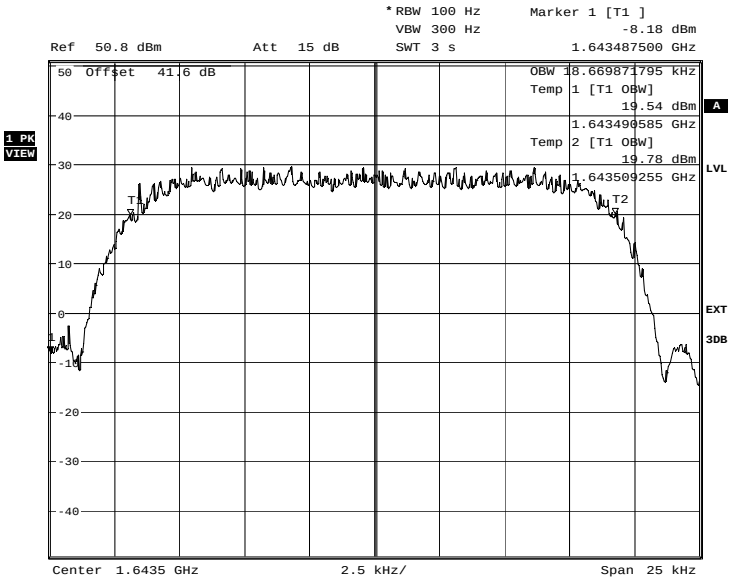
1643.5MHz



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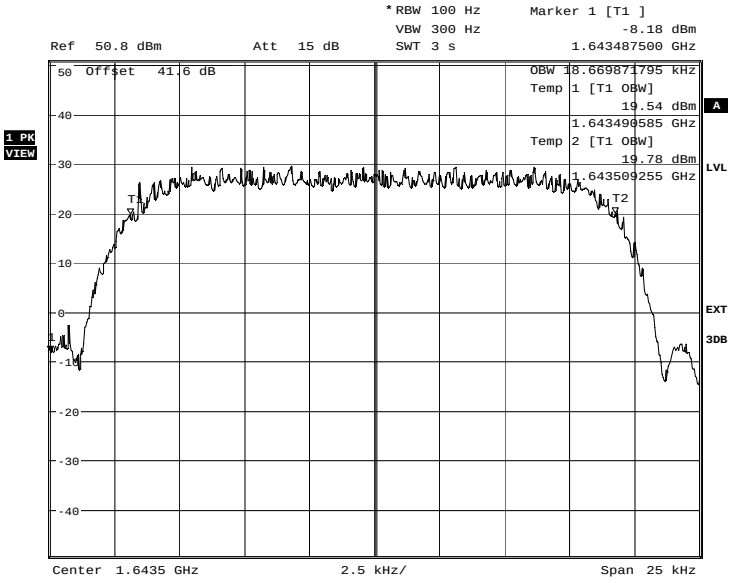
1660.4MHz



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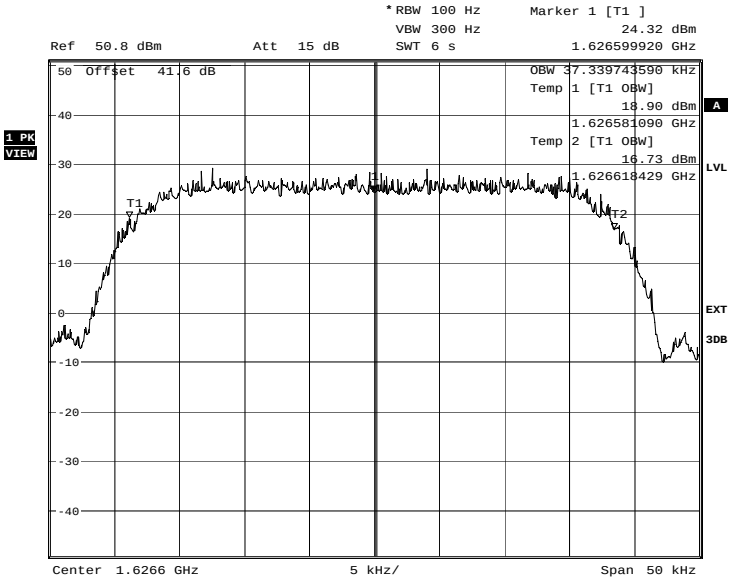
50K0D1W

1626.6MHz



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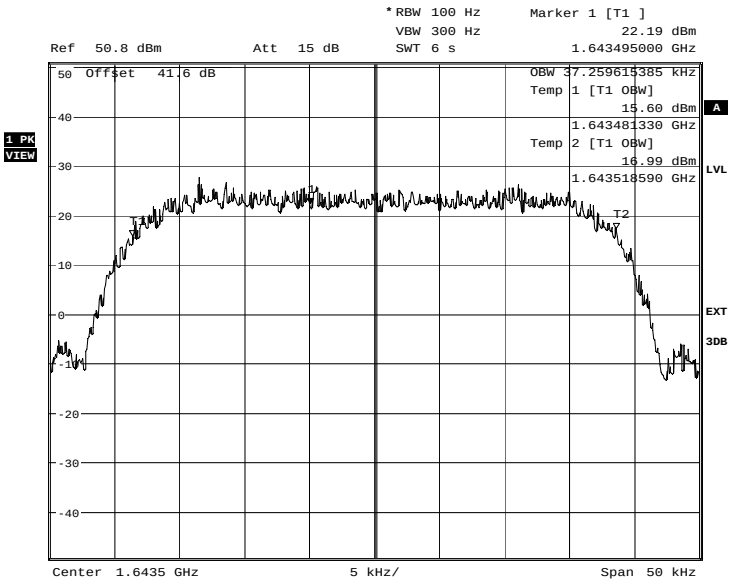
1643.5MHz



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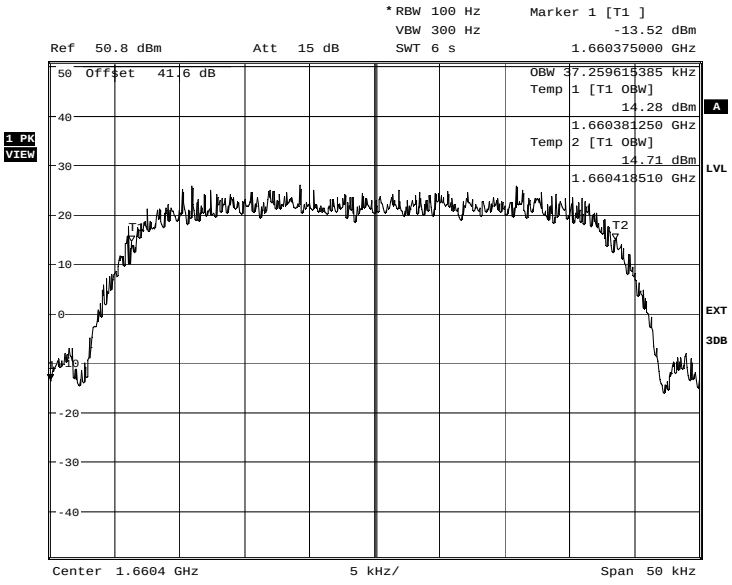
1660.4MHz



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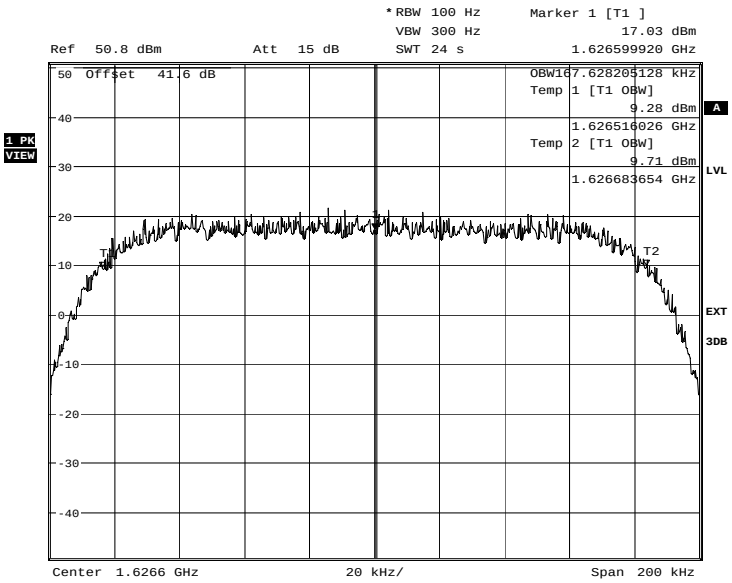
Product Service

200KD1W

1626.6MHz



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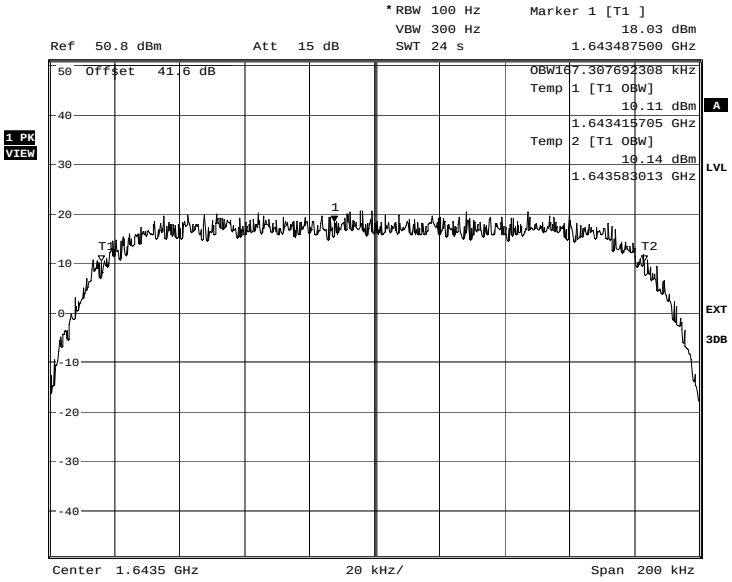
1643.5MHz



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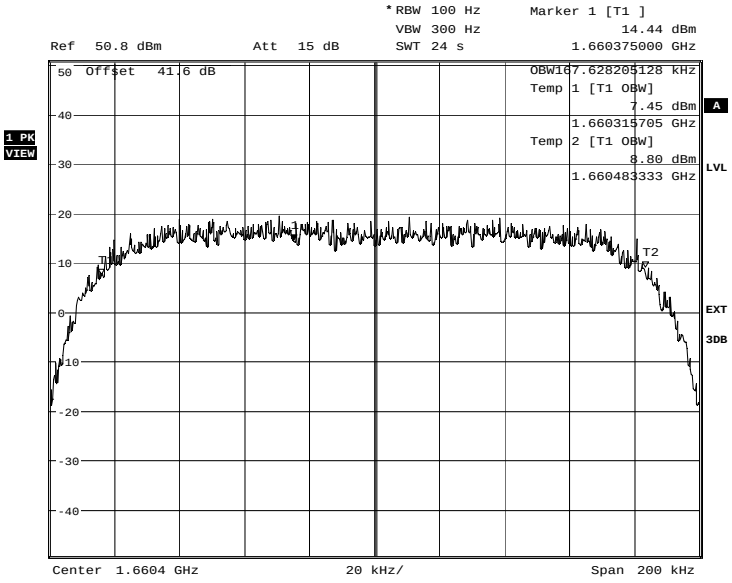
1660.4MHz



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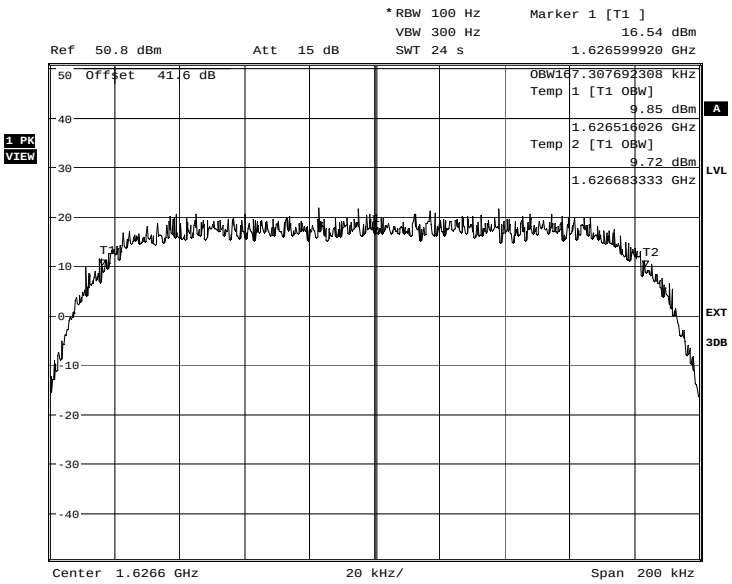
200KG1W

1626.6MHz



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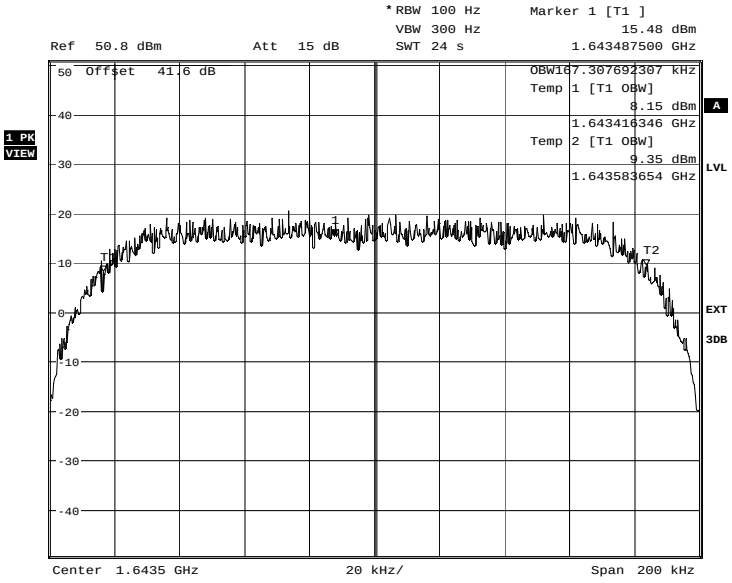
Product Service

1643.5MHz



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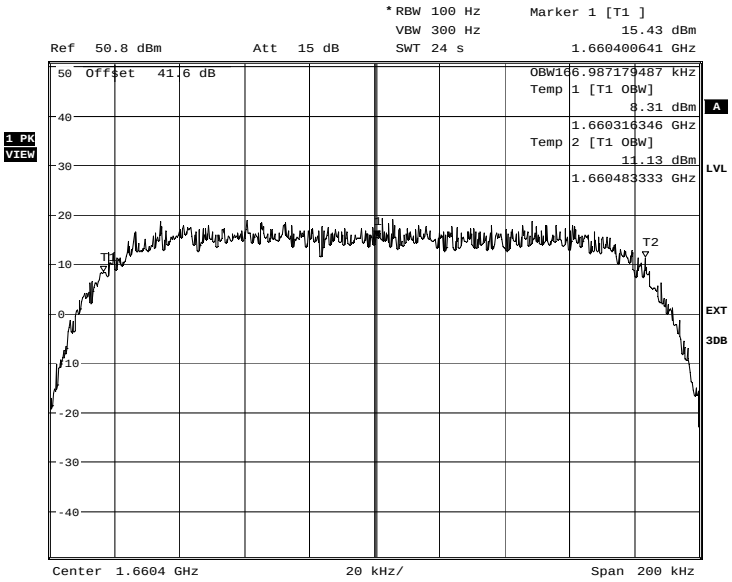
1660.4MHz



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2.6 CONDUCTED SPURIOUS EMISSIONS (EMISSION MASK)

2.6.1 Specification Reference

FCC CFR 47 Part 87: 2006, Clause 87.139(a)(1)(2)
Thales Document: T-145 Issue B 18 Feb 2008, 8.2

2.6.2 Equipment Under Test

Top Flight Satcom SDU 82155, S/N: 10018

2.6.3 Date of Test and Modification State

14 May 2008 - Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of Part 87: 2006.

The EUT was connected to a Spectrum Analyser vis a 40 dB attenuator. The path loss was measured and entered as a Reference Level Offset. Measurements were performed on the bottom, middle and top channels. Testing was also carried out on the two supported modulation schemes at the highest and lowest data rates. The emission mask was programmed into the Spectrum Analyser and the RBW set to 1kHz, the peak detector was used and the trace set to Max Hold. The plots were receorded and are included on the following pages.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.6.6 Environmental Conditions

	14 May 2008
Ambient Temperature	22°C
Relative Humidity	40%

Product Service

2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 87: 2006 for Conducted Emissions (Emission Mask).

The customer declared emission designators are as follows:

Modulation	Declared Emissions Designator	Declared Authorised Bandwidth	FCC Authorised Bandwidth
QPSK 16.8ks/s	25K0G1W	25kHz	25kHz
QPSK 151.2ks/s	200KG1W	200kHz	N/A
QAM 33.6ks/s	50K0D1W	50kHz	N/A
QAM 151.2ks/s	200KD1W	200kHz	N/A

The test results are shown below.

Configuration 1 - Mode 1

Bottom Channel (1626.6MHz)

Modulation	Frequency (GHz)	Result (dBm)	DLNA Loss	Corrected Result (dBm)
QPSK 16.8ks/s	3.25	-15.23	50	-65.23
	4.86	-18.77	50	-68.77
QPSK 151.2ks/s	3.25	-15.17	50	-65.17
	4.86	-17.21	50	-67.21
QAM 33.6ks/s	3.25	-12.35	50	-62.35
	4.88	-12.74	50	-62.74
QAM 151.2ks/s	3.25	-12.61	50	-62.61
	4.86	-13.87	50	-63.87

Middle Channel (1643.5MHz)

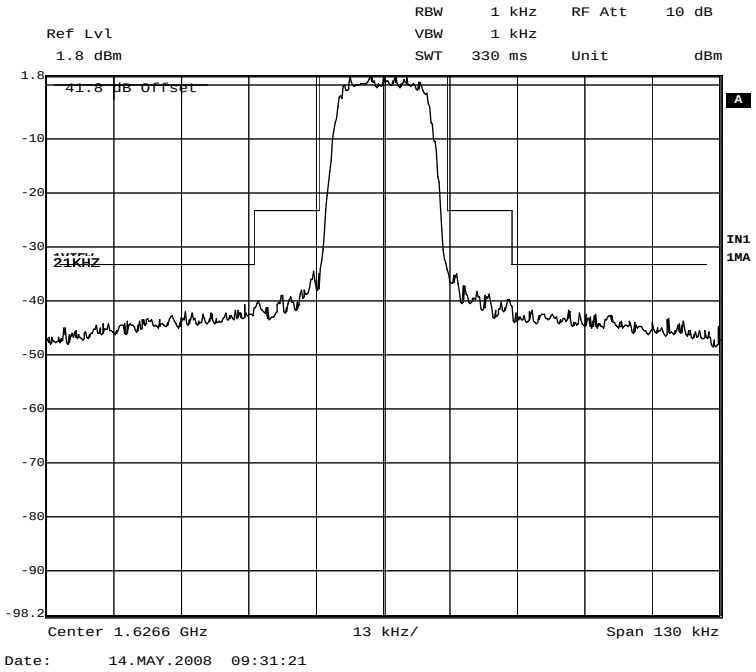
Modulation	Frequency (GHz)	Result (dBm)	DLNA Loss	Corrected Result (dBm)
QPSK 16.8ks/s	3.28	-15.40	50	-65.40
	4.91	-19.41	50	-69.41
QPSK 151.2ks/s	3.29	-14.94	50	-64.94
	4.91	-17.89	50	-67.89
QAM 33.6ks/s	3.28	-13.44	50	-63.44
	4.91	-14.51	50	-64.51
QAM 151.2ks/s	3.28	-13.10	50	-63.10
	4.91	-14.12	50	-64.12

Top Channel (1660.4MHz)

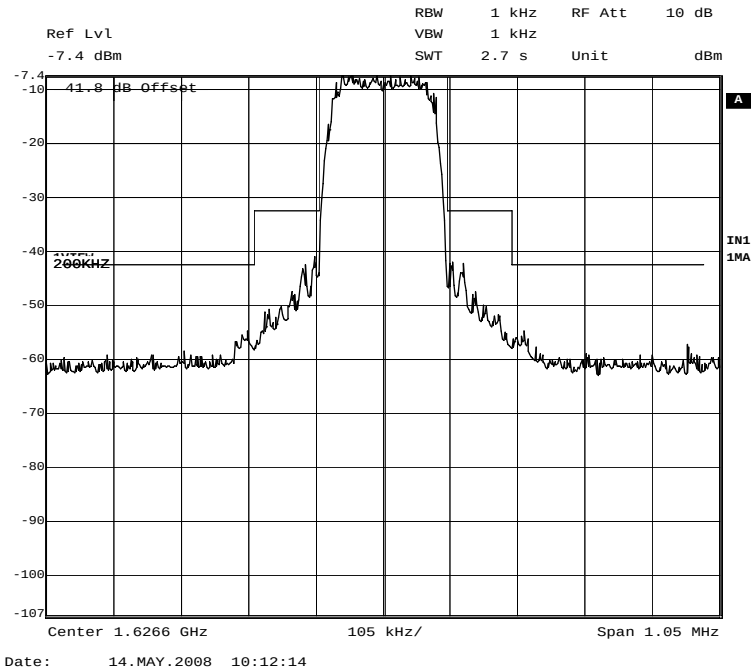
Modulation	Frequency (GHz)	Result (dBm)	DLNA Loss	Corrected Result (dBm)
QPSK 16.8ks/s	3.32	-21.44	50	-71.44
	4.99	-18.43	50	-68.43
QPSK 151.2ks/s	3.32	-20.03	50	-70.03
	4.99	-18.12	50	-68.12
QAM 33.6ks/s	3.32	-18.54	50	-68.54
	4.99	-13.34	50	-63.34
QAM 151.2ks/s	3.32	-18.53	50	-68.53
	4.97	-11.08	50	-61.08

Bottom Channel (1626.6MHz)

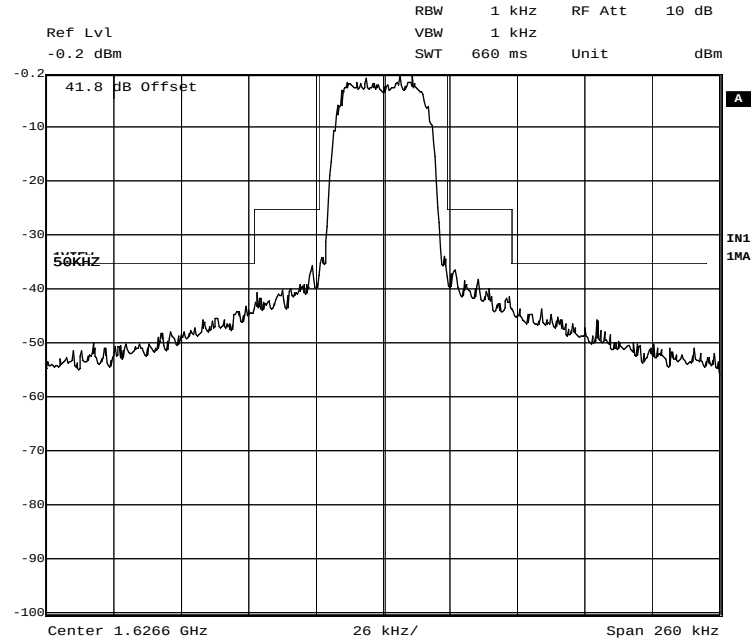
25kHz QPSK 16.8ks/s



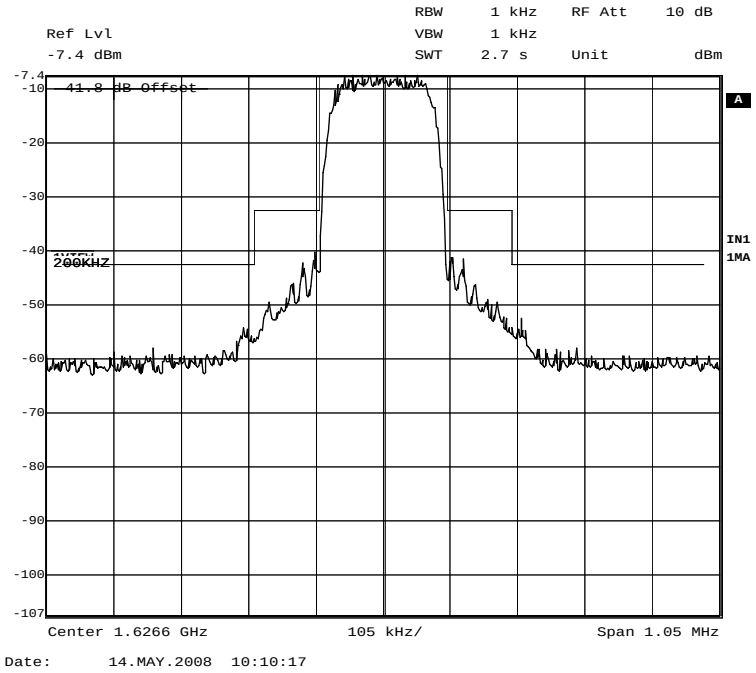
200kHz QPSK 151.2ks/s



50kHz QAM 33.6ks/s

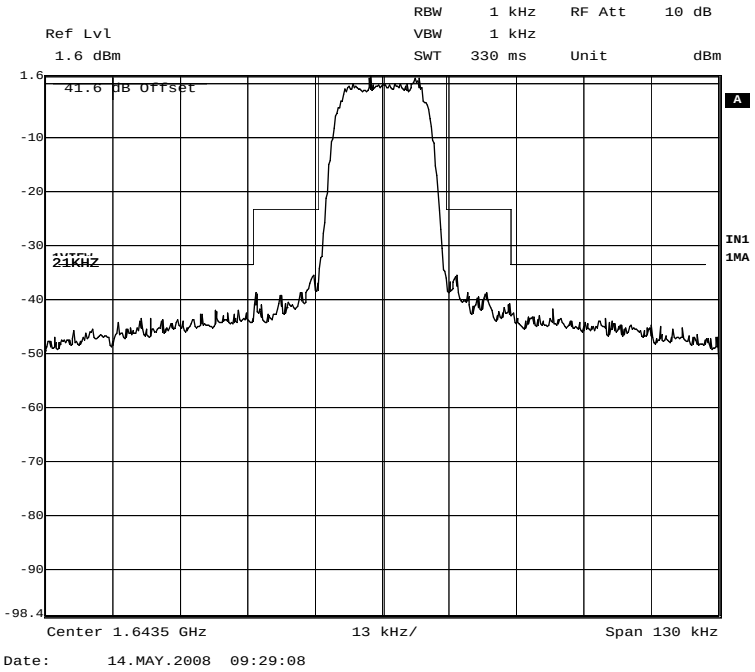


200kHz QPSK 151.2ks/s

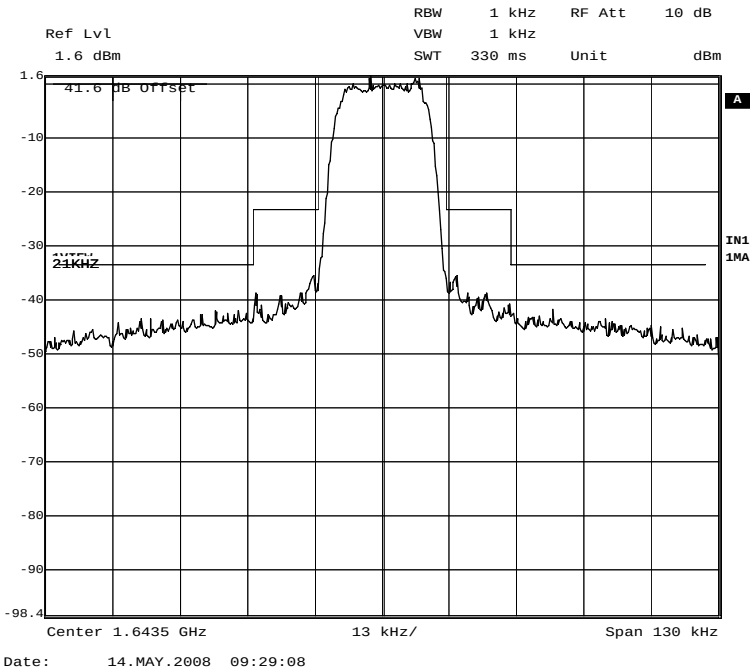


Middle Channel (1643.5MHz)

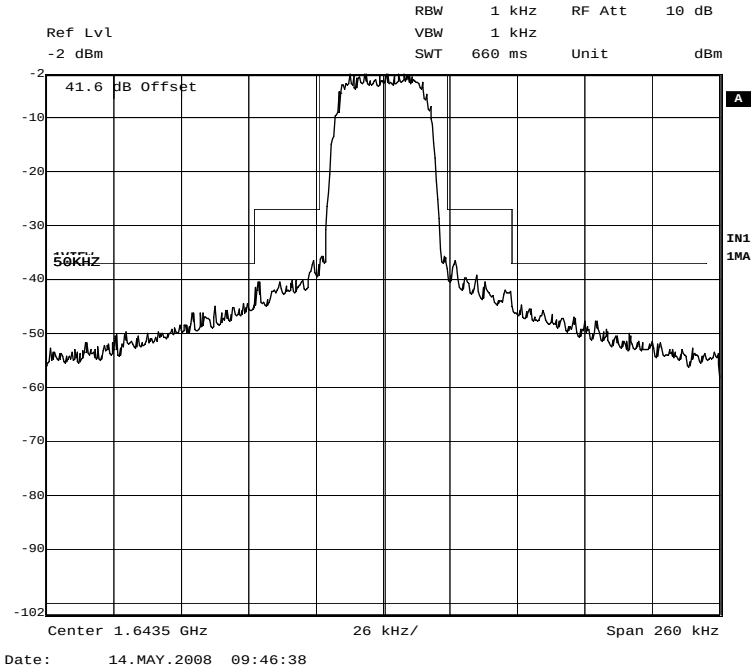
25kHz QPSK 16.8ks/s



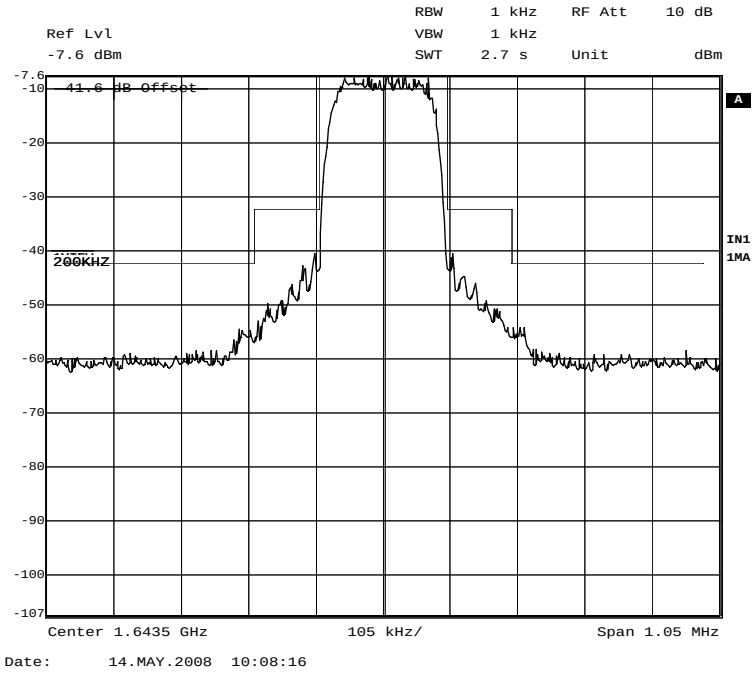
200kHz QPSK 151.2ks/s



50kHz QAM 33.6ks/s

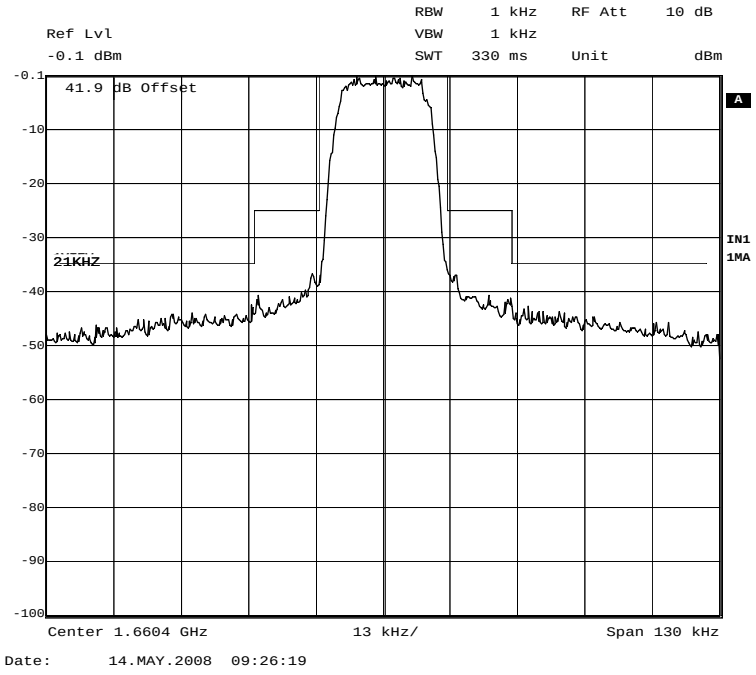


200kHz QPSK 151.2ks/s

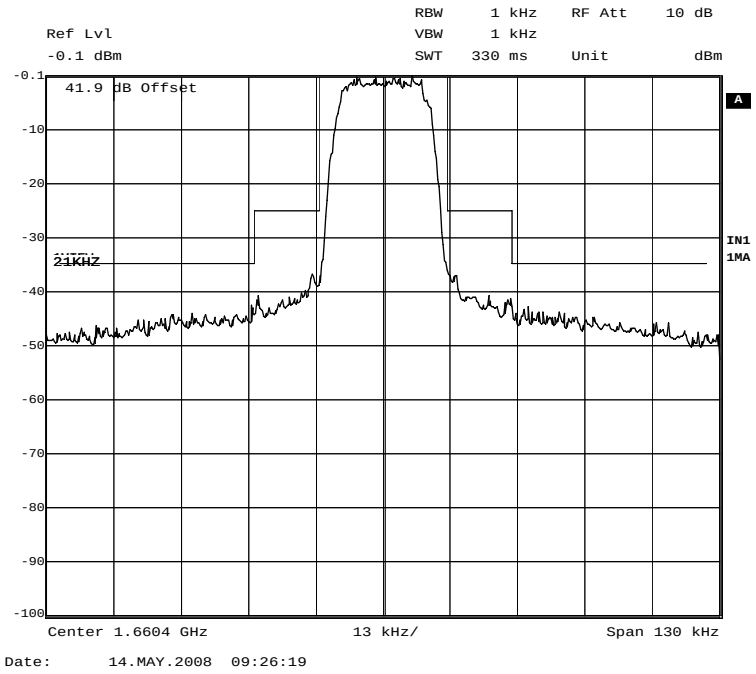


Top Channel (1660.4MHz)

25kHz QPSK 16.8ks/s

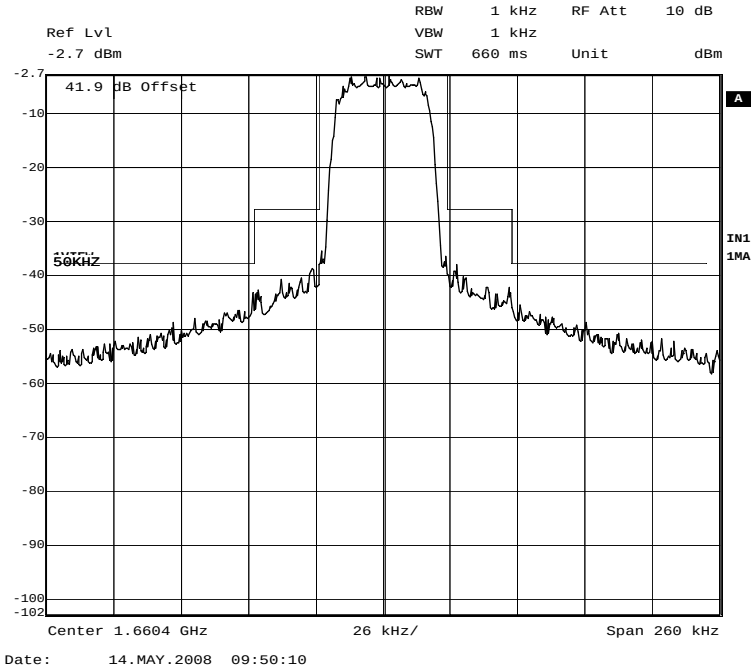


200kHz QPSK 151.2ks/s

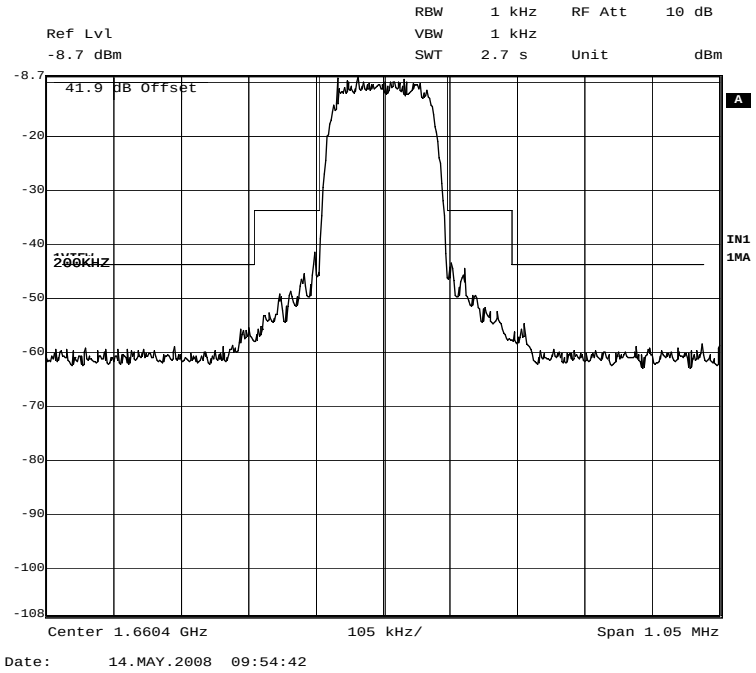


Product Service

50kHz QAM 33.6ks/s



200kHz QPSK 151.2ks/s



Product Service

2.7 CONDUCTED SPURIOUS EMISSIONS (OUT OF BAND EMISSIONS)

2.7.1 Specification Reference

FCC CFR 47 Part 87: 2006, Clause 87.139(a)(3)
Thales Document: T-145 Issue B 18 Feb 2008, 8.2

2.7.2 Equipment Under Test

Top Flight Satcom SDU 82155, S/N: 10018

2.7.3 Date of Test and Modification State

13 May 2008 - Modification State 0

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of Part 87: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.7.6 Environmental Conditions

	13 May 2008
Ambient Temperature	20°C
Relative Humidity	44%

Product Service

2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 87: 2006 for Conducted Spurious Emissions (Out of Band Emissions).

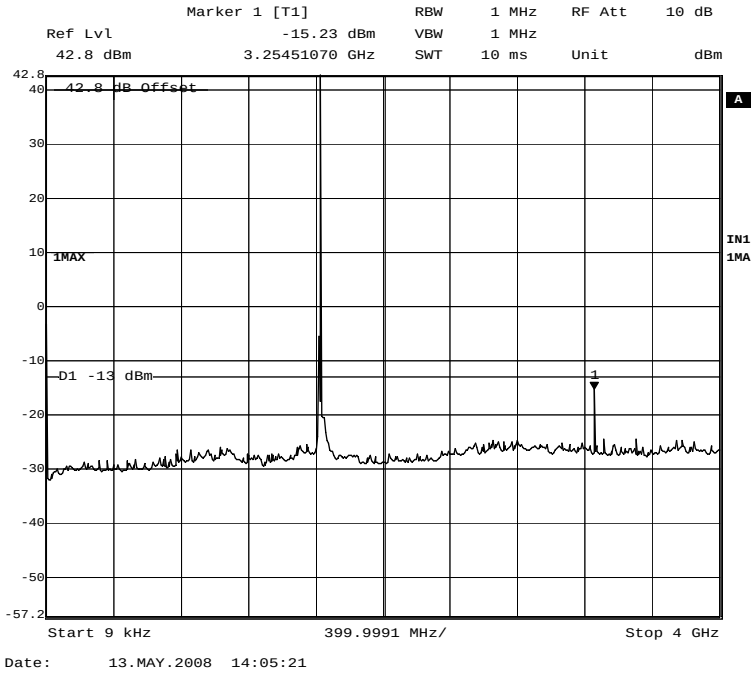
The test results are shown below.

Configuration 1 - Mode 1

Bottom Channel (1626.6MHz)

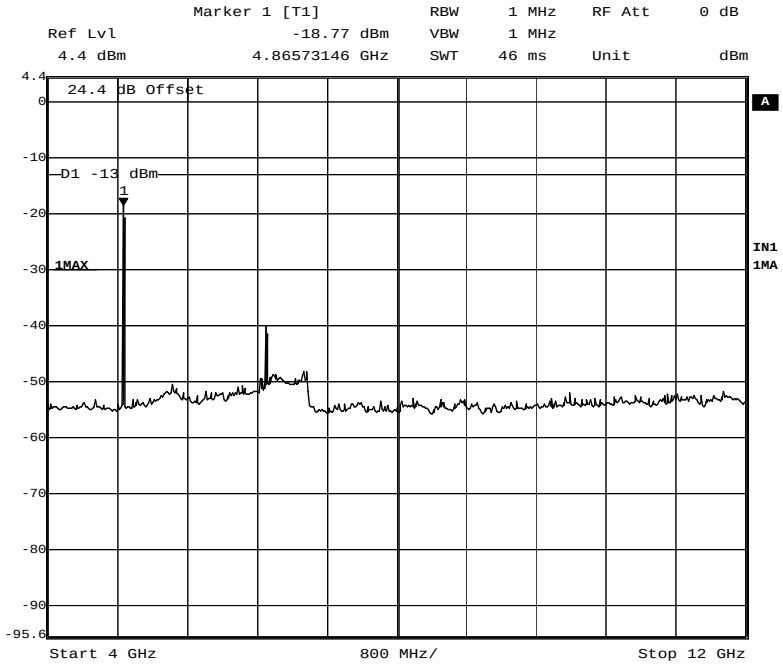
QPSK 16.8ks/s

9kHz – 4GHz

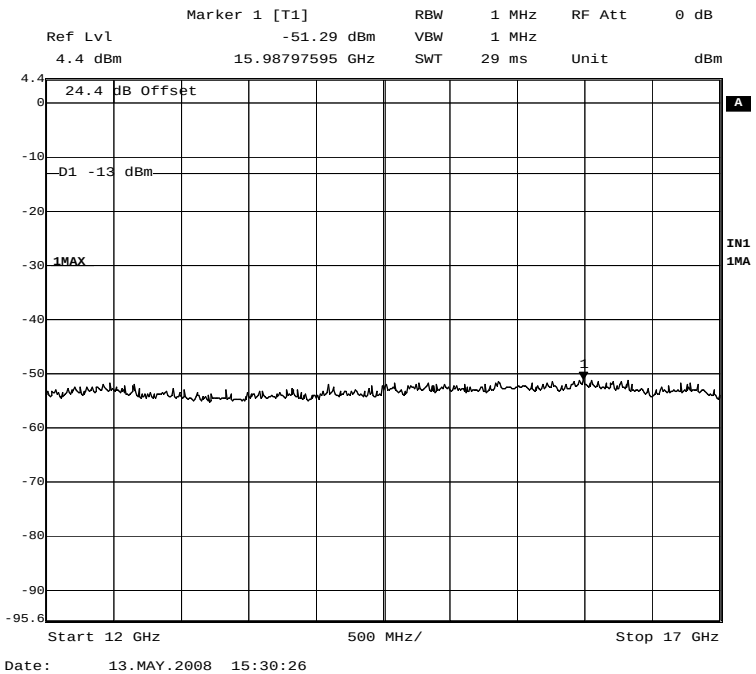


Product Service

4GHz – 12GHz



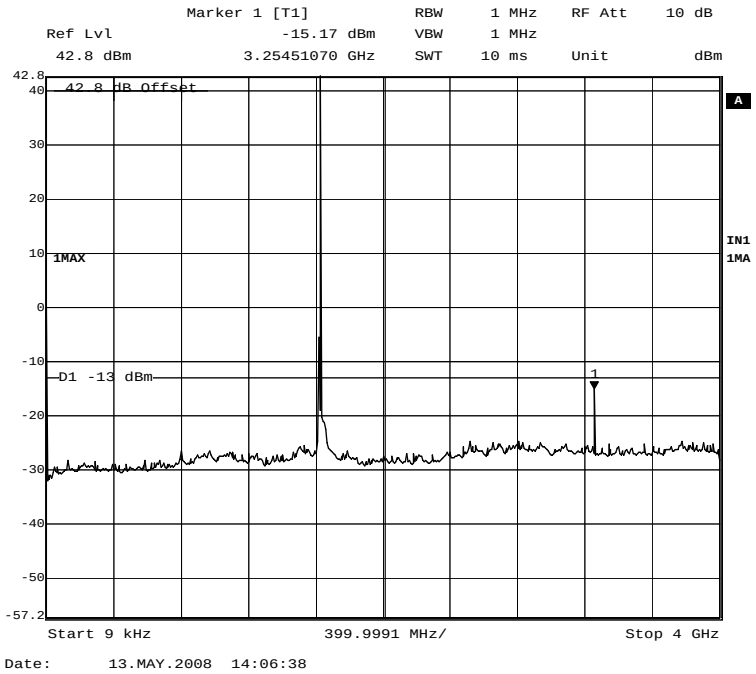
12GHz – 17GHz



Bottom Channel (1626.6MHz)

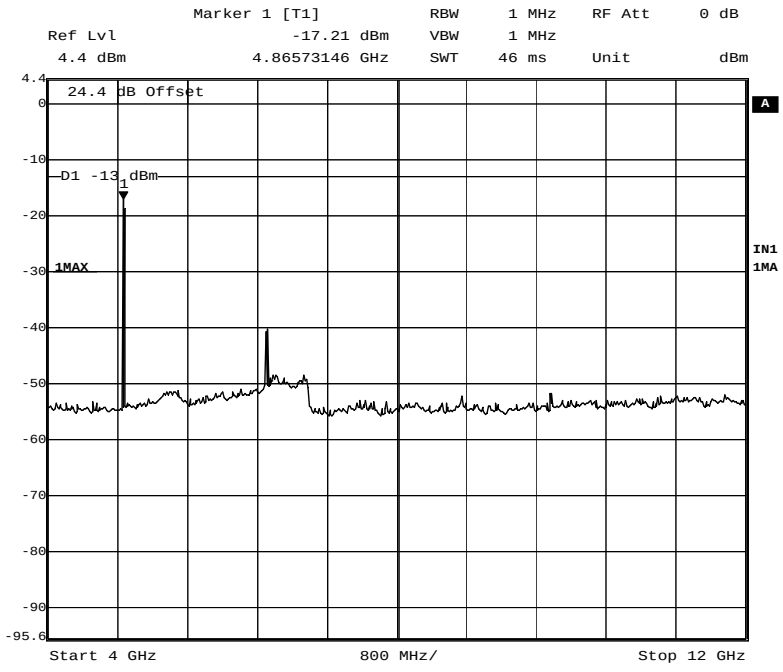
QPSK 151.2ks/s

9kHz – 4GHz



Date: 13.MAY.2008 14:06:38

4GHz – 12GHz



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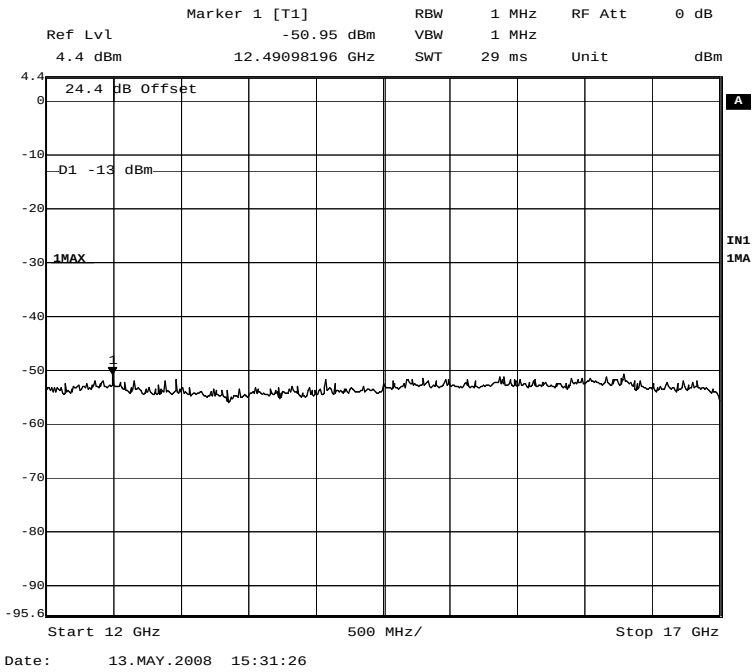
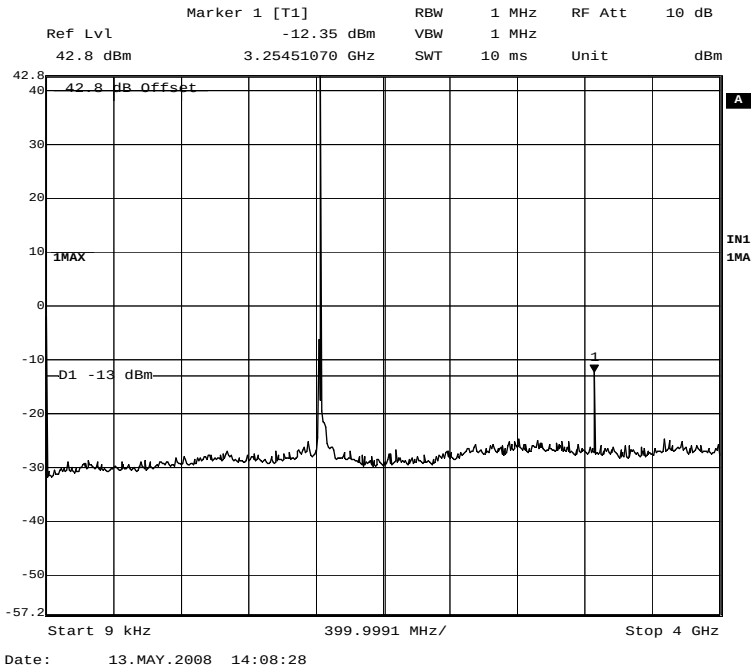
12GHz – 17GHz



Bottom Channel (1626.6MHz)

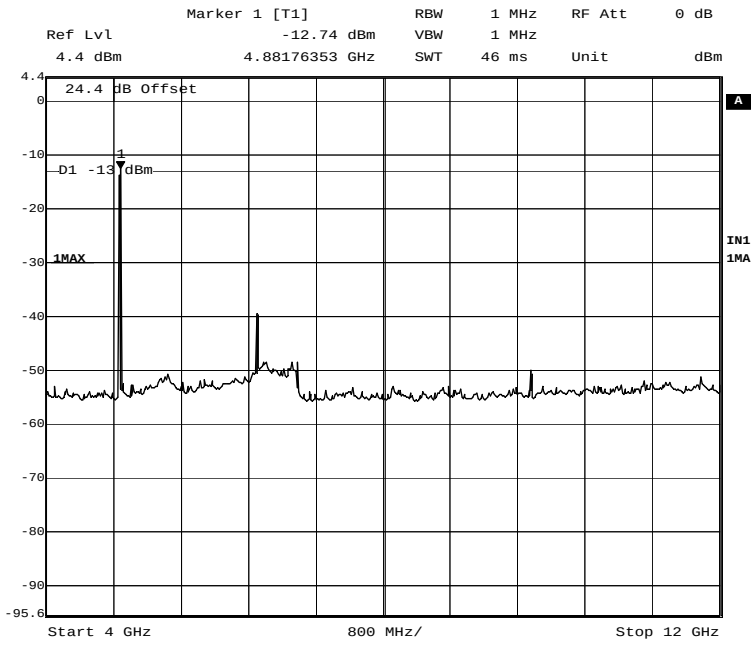
QAM 33.6ks/s

9kHz – 4GHz

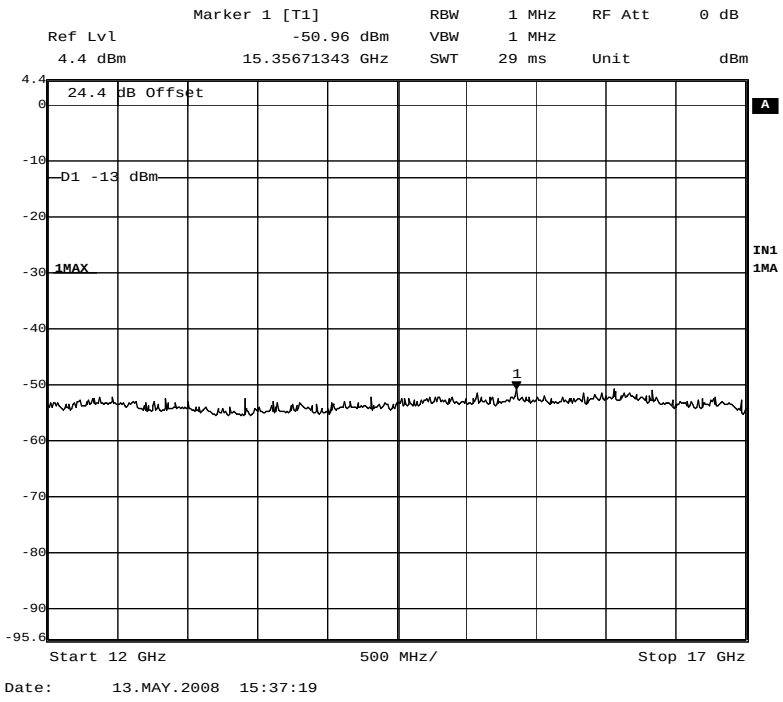


Product Service

4GHz – 12GHz



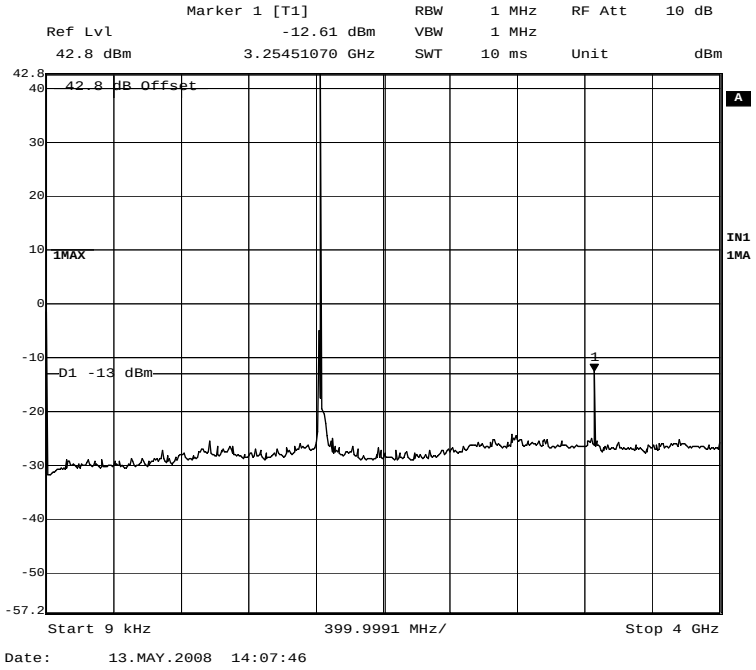
12GHz – 17GHz



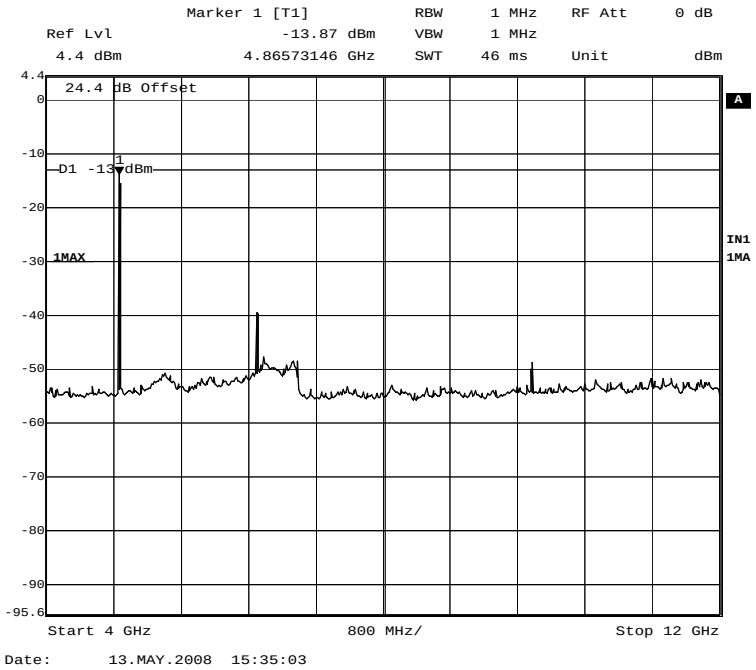
Bottom Channel (1626.6MHz)

QAM 151.2ks/s

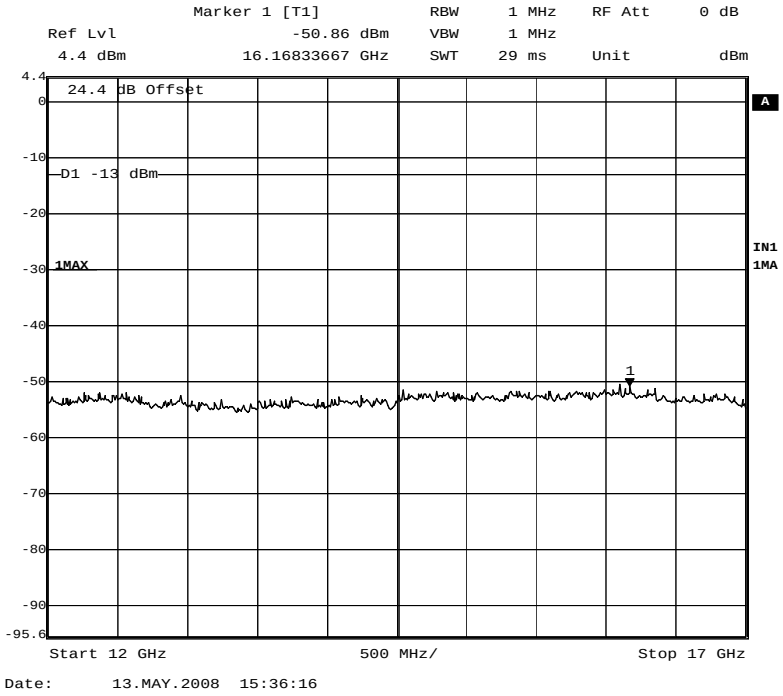
9kHz – 4GHz



4GHz – 12GHz



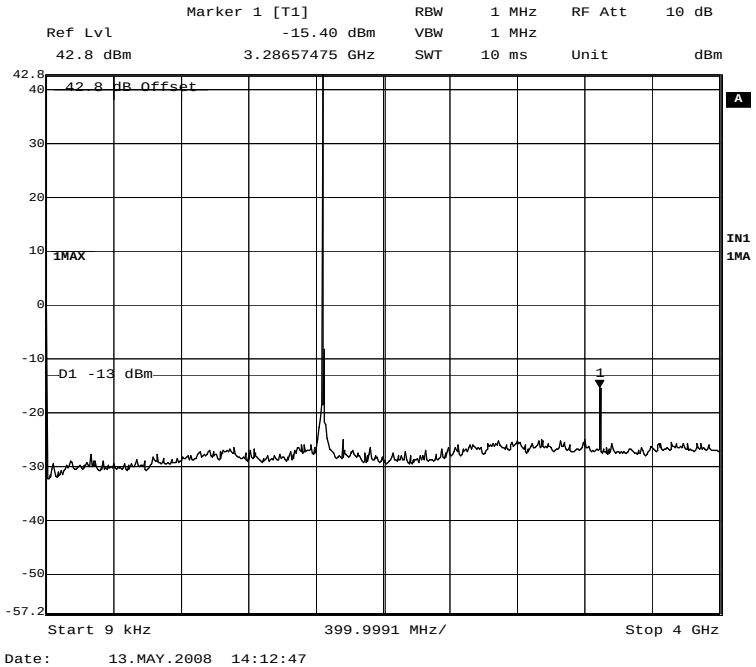
12GHz – 17GHz



Middle Channel (1643.5MHz)

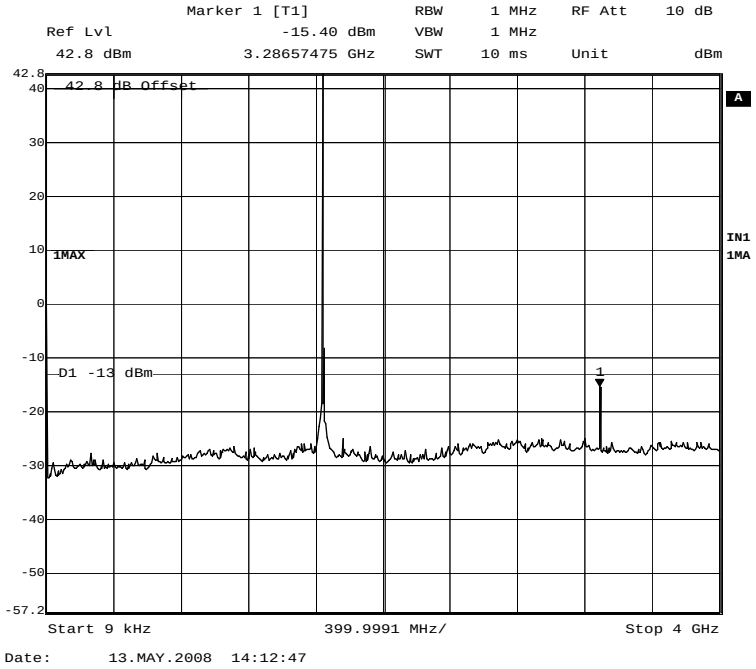
QPSK 16.8ks/s

9kHz – 4GHz

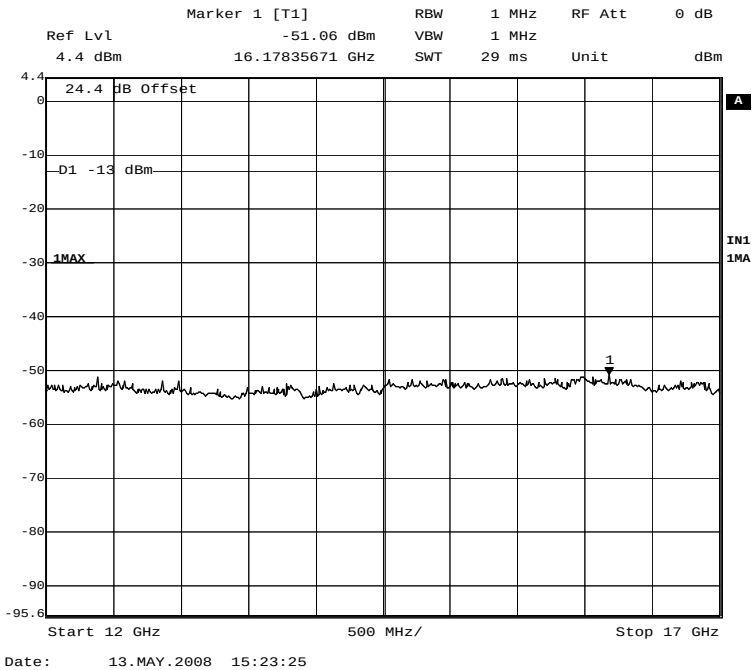


Product Service

4GHz – 12GHz



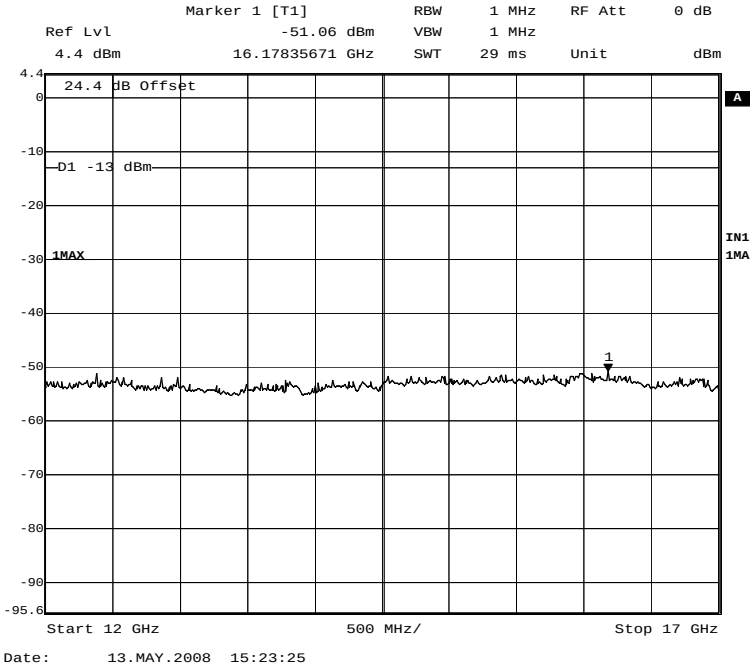
12GHz – 17GHz



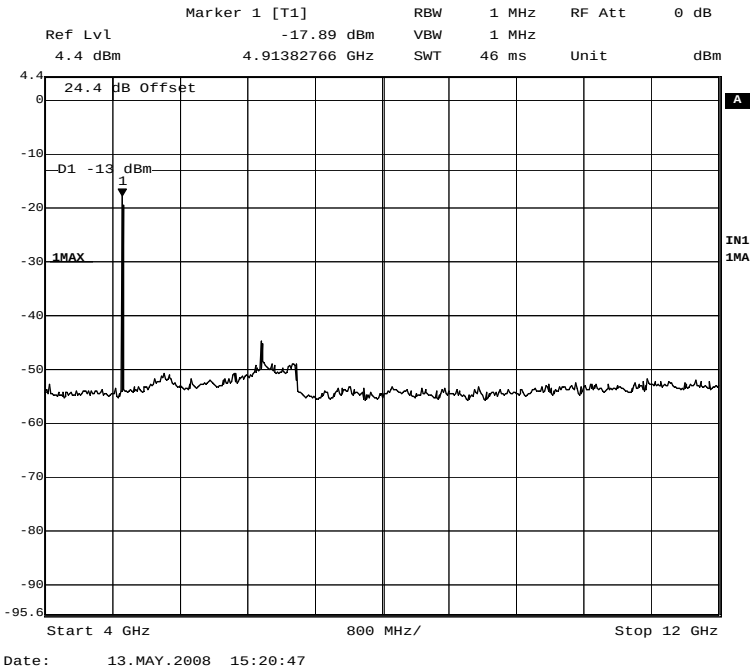
Middle Channel (1643.5MHz)

QPSK 151.2ks/s

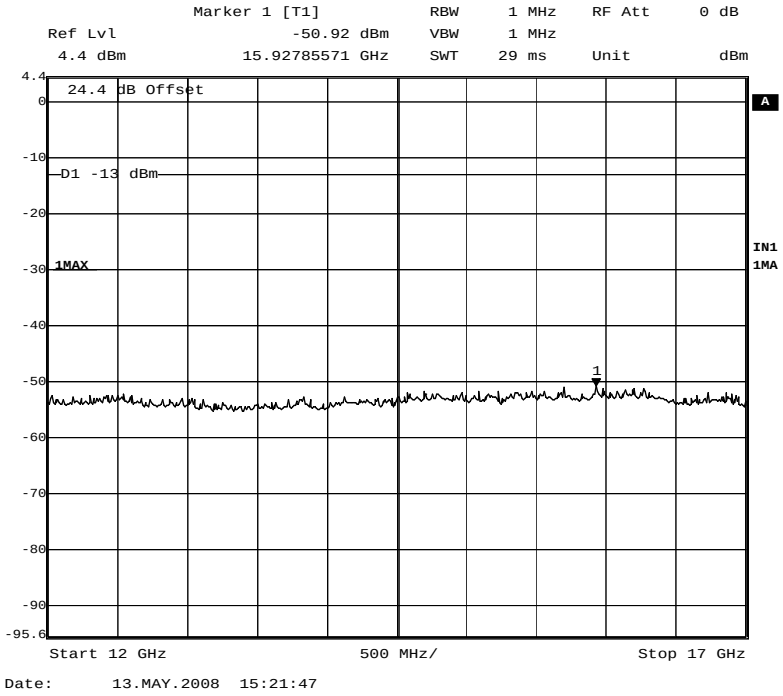
9kHz – 4GHz



4GHz – 12GHz



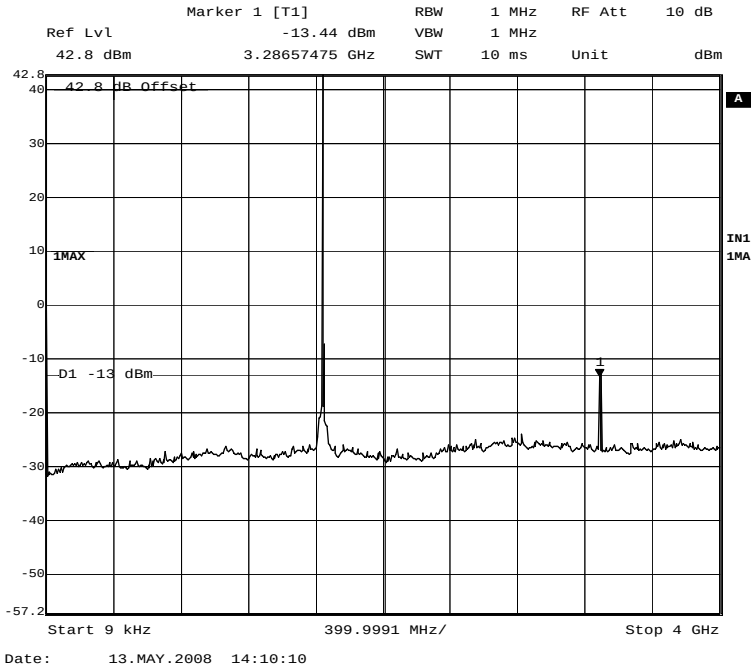
12GHz – 17GHz



Middle Channel (1643.5MHz)

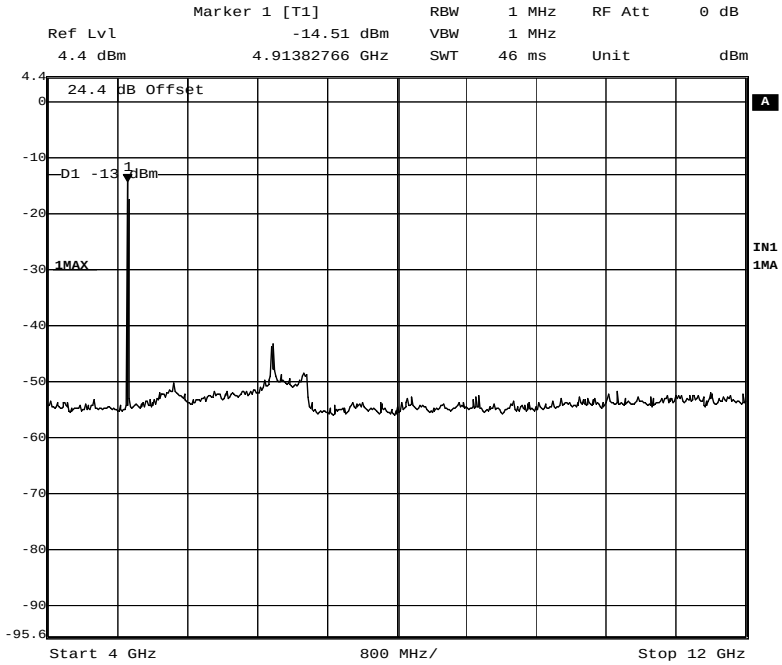
QAM 33.6ks/s

9kHz – 4GHz

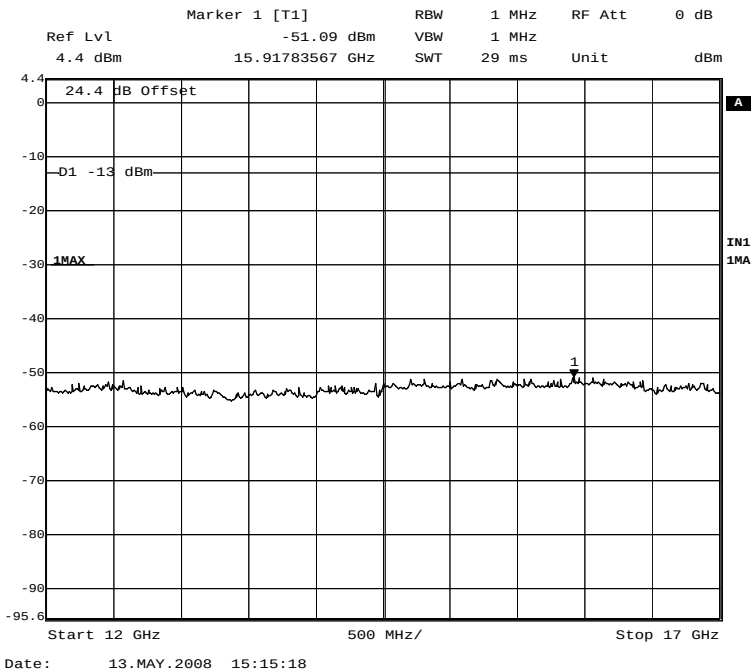


Product Service

4GHz – 12GHz



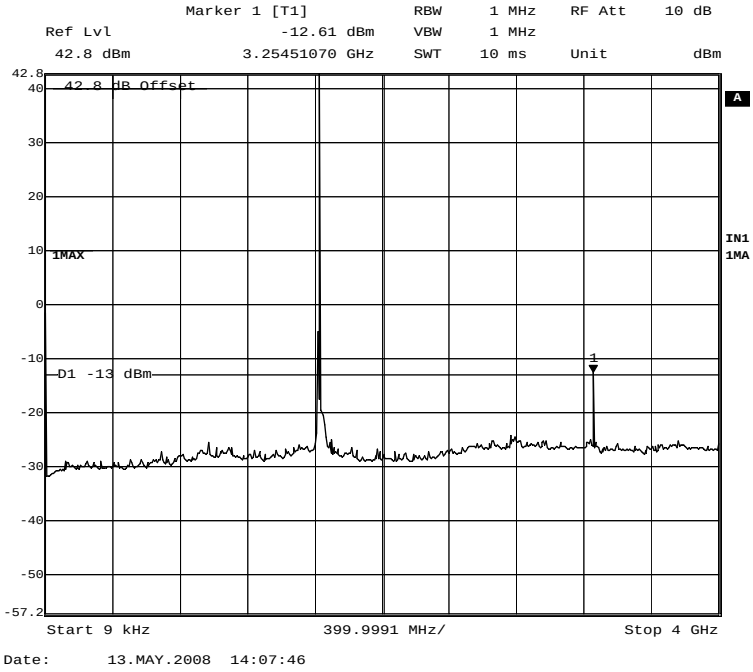
12GHz – 17GHz



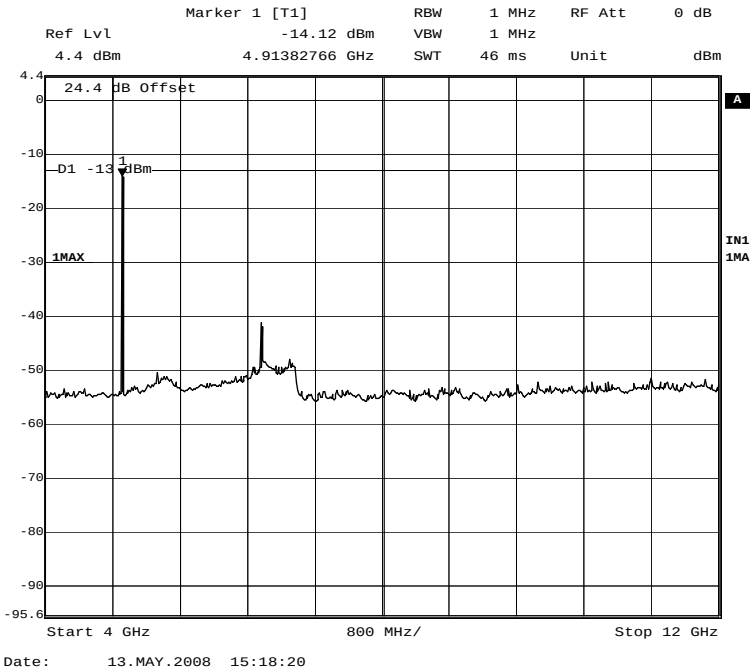
Middle Channel (1643.5MHz)

QAM 151.2ks/s

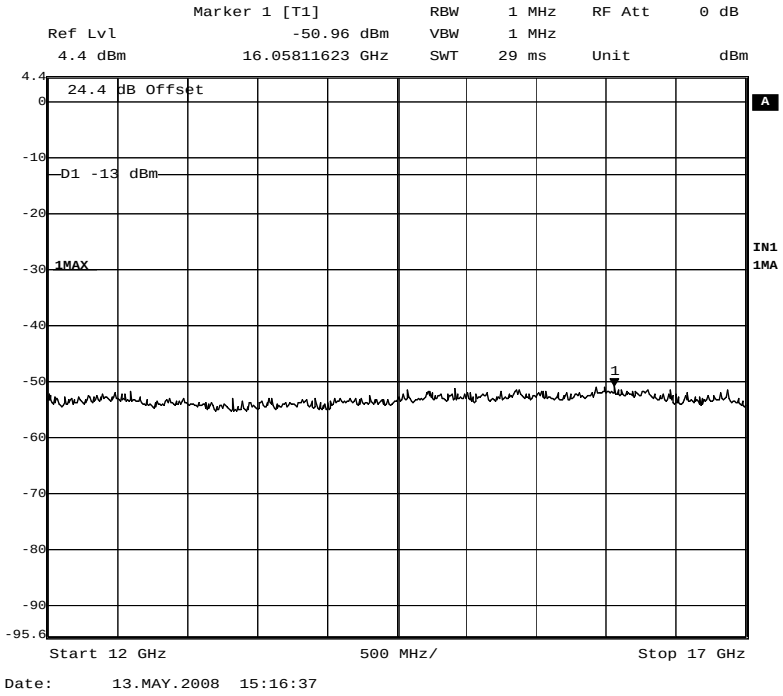
9kHz – 4GHz



4GHz – 12GHz



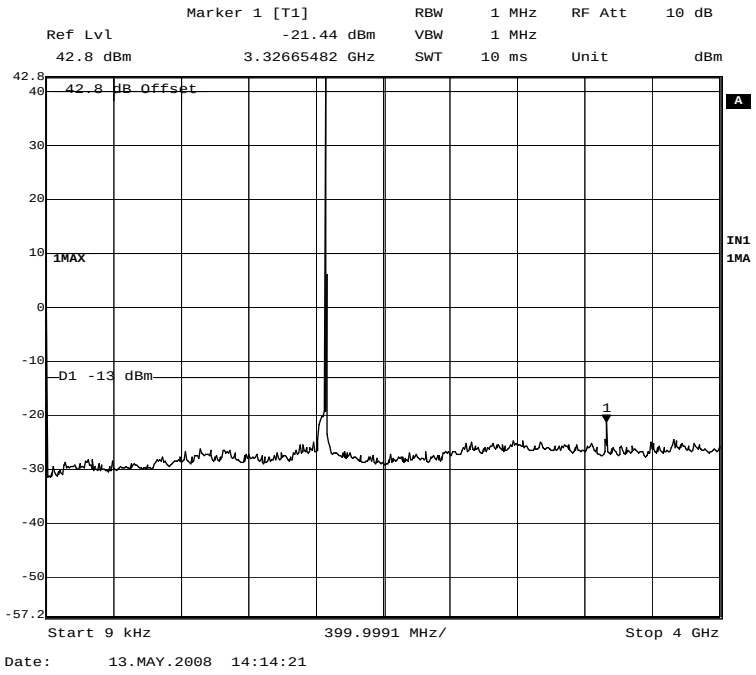
12GHz – 17GHz



Top Channel (1660.4MHz)

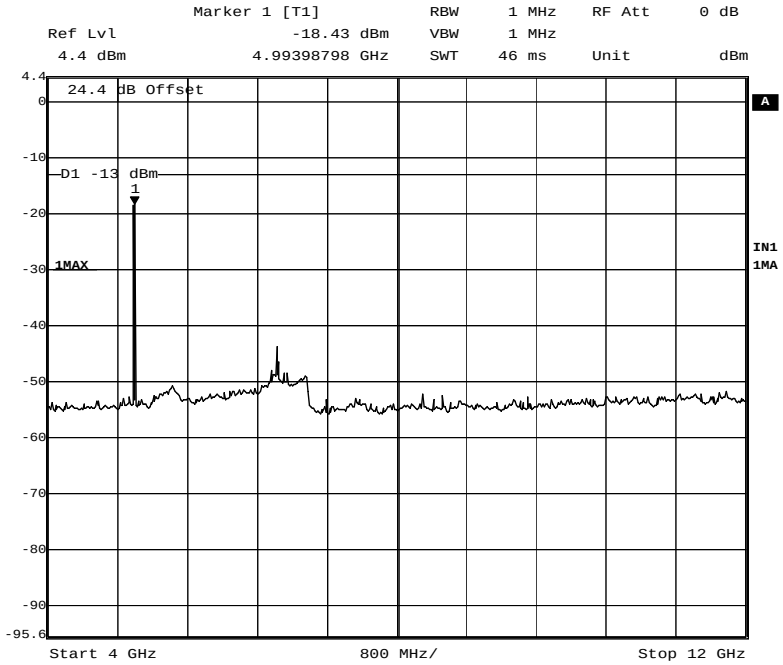
QPSK 16.8ks/s

9kHz – 4GHz

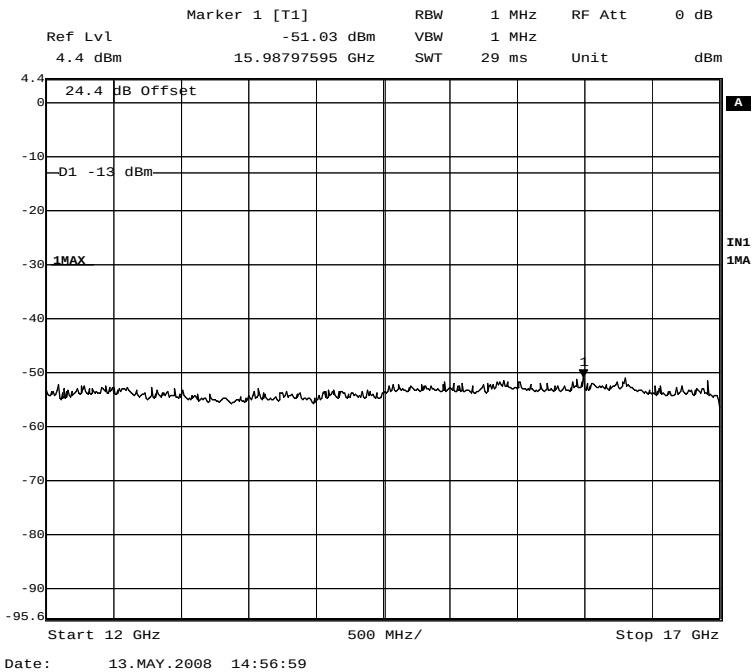


Product Service

4GHz – 12GHz



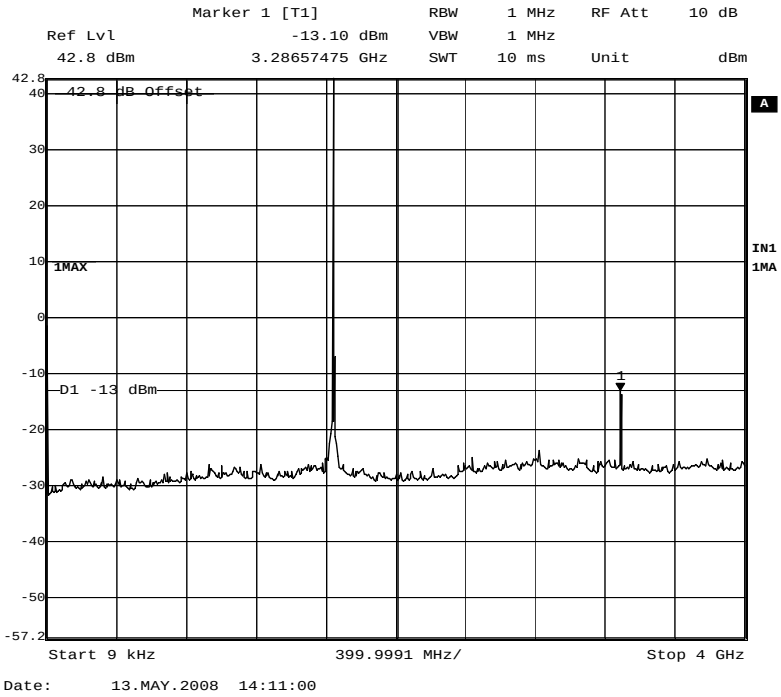
12GHz – 17GHz



Top Channel (1660.4MHz)

QPSK 151.2ks/s

9kHz – 4GHz



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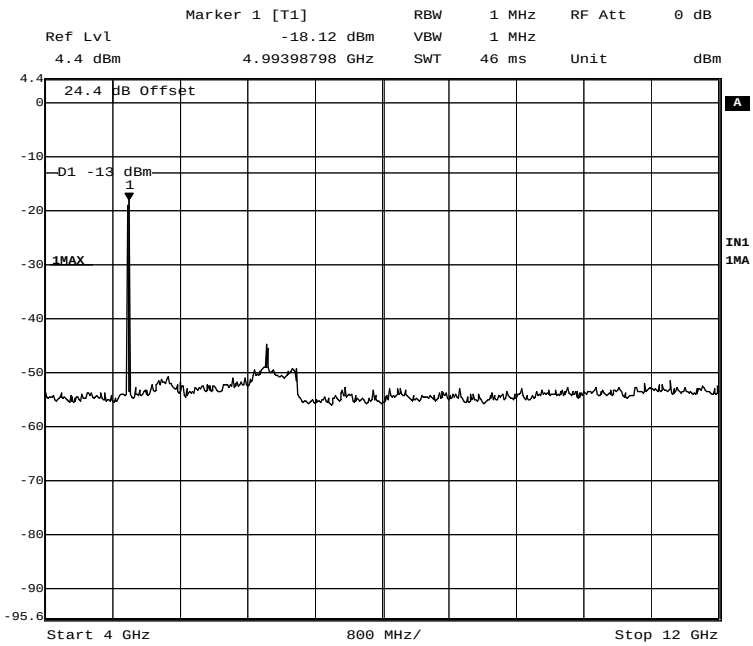
4GHz – 12GHz



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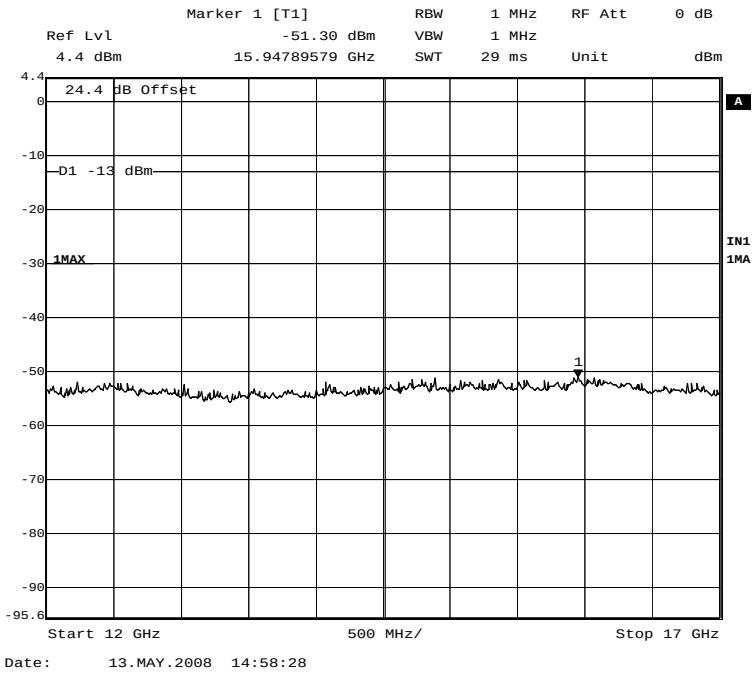
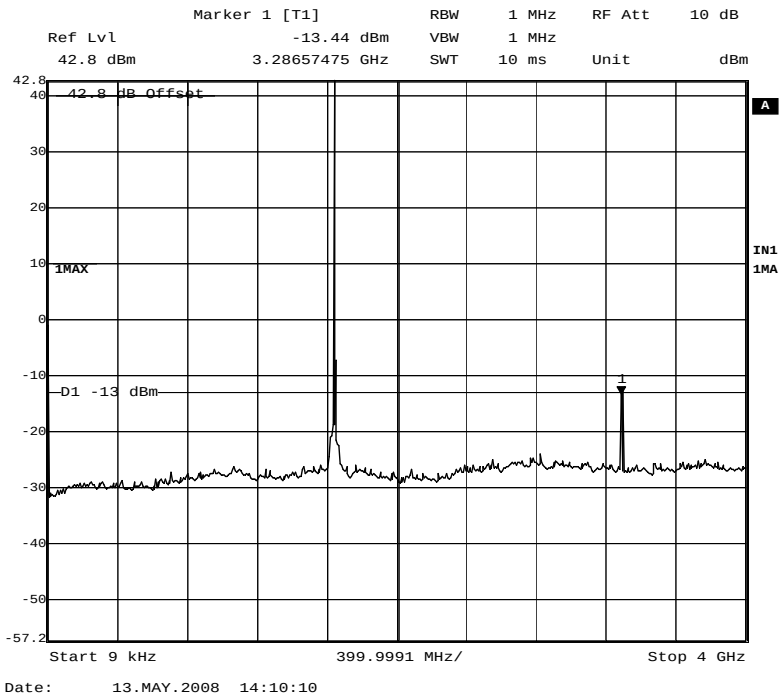
12GHz – 17GHz



Top Channel (1660.4MHz)

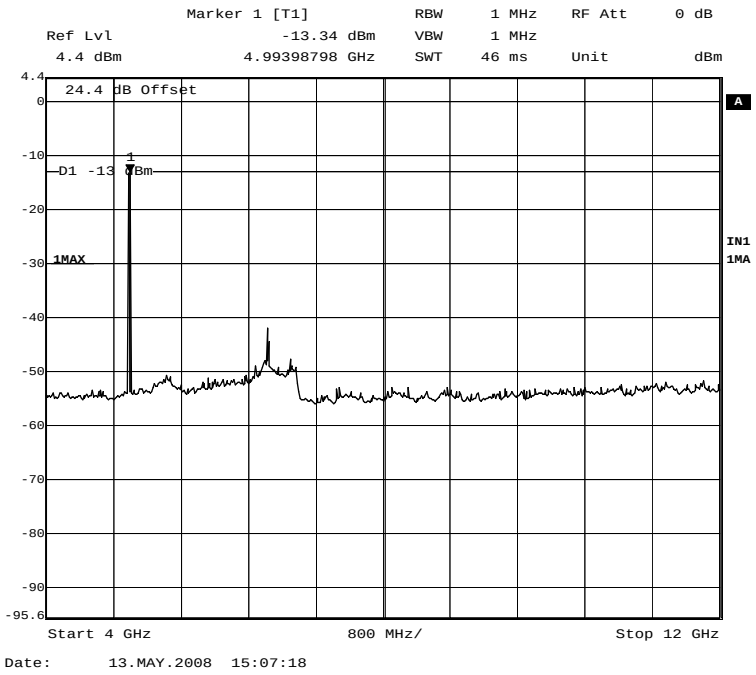
QAM 33.6ks/s

9kHz – 4GHz

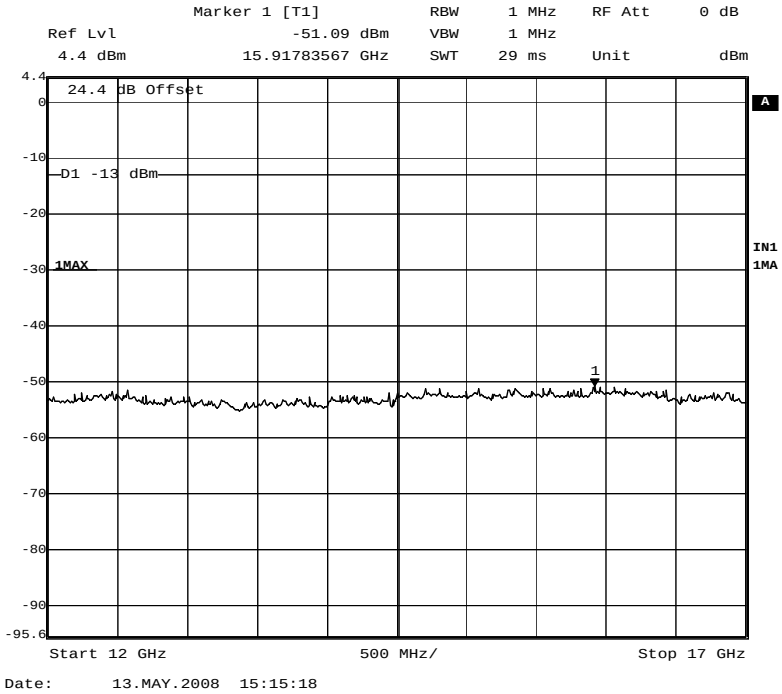


Product Service

4GHz – 12GHz



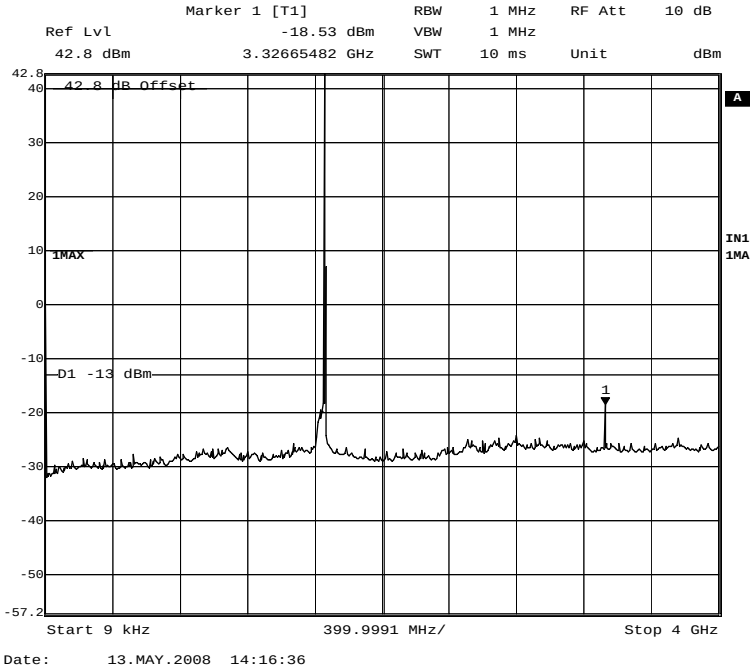
12GHz – 17GHz



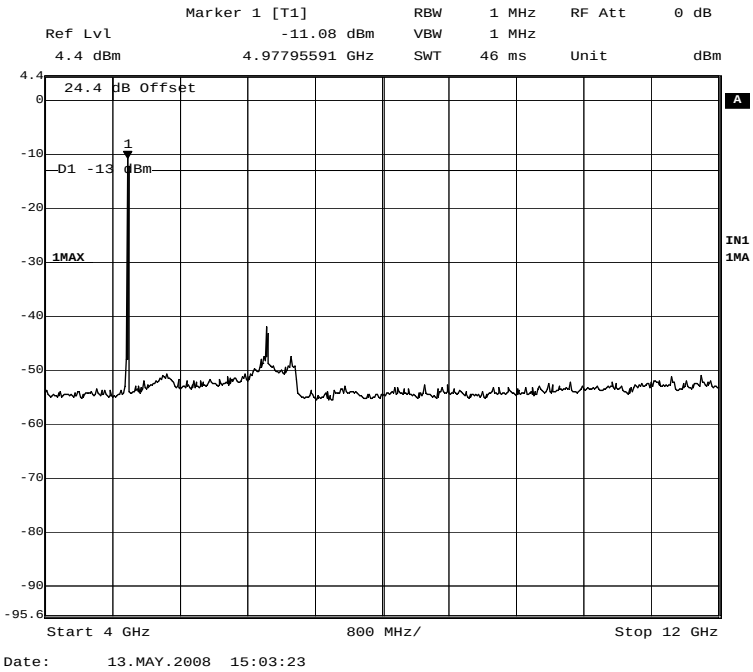
Top Channel (1660.4MHz)

QAM 151.2ks/s

9kHz – 4GHz

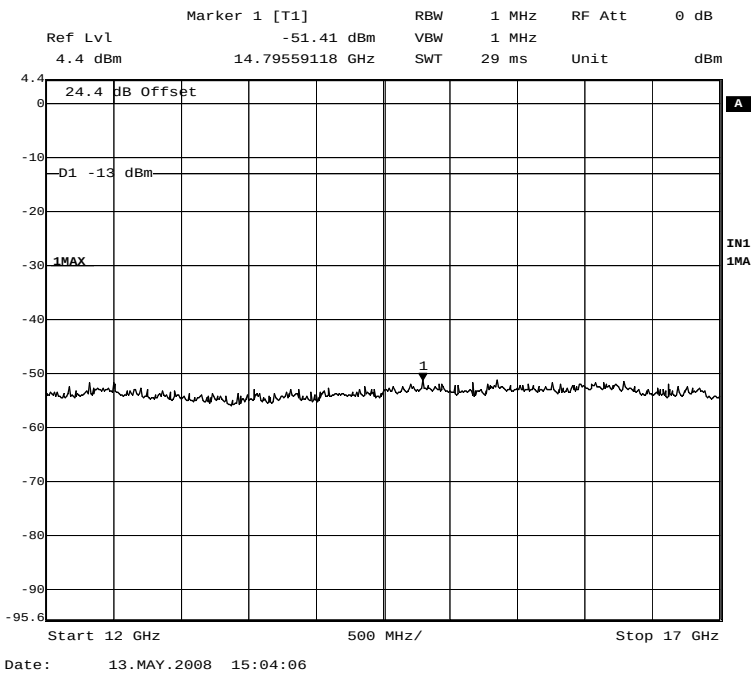


4GHz – 12GHz



Product Service

12GHz – 17GHz



Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Sections 2.1 and 2.2 EMC - Radiated Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	29-Jun-2008
Pre-Amplifier	Phase One	PS04-0085	1532	-	TU
Pre-Amplifier	Phase One	PS04-0086	1533	-	TU
Screened Room (5)	Rainford	Rainford	1545	36	11-Feb-2011
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1607	-	TU
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	28-Nov-2009
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	11-Jul-2008
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	15-Mar-2009
Section 2.7 Radio (Tx) - Conducted Spurious Emissions					
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	12	25-Jun-2008
Cable (1m, sma(m) - sma(m)	Reynolds	262-0248-1000	2406	12	TU
Multimeter	Iso-tech	Iso Tech IDM101	2424	12	13-Aug-2008
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	21-May-2008
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	29-May-2008
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	29-May-2008
Hygrometer	Rotronic	I-1000	3220	12	9-Apr-2009
Cable (2m, SMA Type)	Reynolds	262-0248-2000	3222	12	17-Sep-2008
Attenuator (30dB, 150W)	Narda	769-30	3369	12	9-May-2009
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	16-Apr-2009

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.6 Radio (Tx) - Emission Mask					
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	12	25-Jun-2008
Cable (1m, sma(m) - sma(m)	Reynolds	262-0248-1000	2406	12	TU
Multimeter	Iso-tech	Iso Tech IDM101	2424	12	13-Aug-2008
Hygrometer	Rotronic	I-1000	3220	12	9-Apr-2009
Cable (2m, SMA Type)	Reynolds	262-0248-2000	3222	12	17-Sep-2008
Attenuator (10dB, 150W)	Narda	769-10	3368	12	9-May-2009
Attenuator (30dB, 150W)	Narda	769-30	3369	12	9-May-2009
Section 2.4 Radio (Tx) - Frequency Characteristics					
Counter	Hewlett Packard	53181A	159	12	TU
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Montford F43	Montford	4FT CUBED	2126	12	23-Apr-2009
Data Logger	Pico Technology Ltd	TC-08	2226	12	11-Dec-2008
Multimeter	Iso-tech	Iso Tech IDM101	2424	12	13-Aug-2008
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	18-Sep-2008
Thermocouple	Unknown	Type T	3415	24	8-Feb-2009
Rubidium Frequency Standard	Symmetricom	8040C	3490	12	21-Feb-2009
Section 2.5 Radio (Tx) - Occupied Bandwidth					
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Cable (1m, sma(m) - sma(m)	Reynolds	262-0248-1000	2406	12	TU
Multimeter	Iso-tech	Iso Tech IDM101	2424	12	13-Aug-2008
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	18-Sep-2008
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	29-May-2008
Hygrometer	Rotronic	I-1000	3220	12	9-Apr-2009
Cable (2m, SMA Type)	Reynolds	262-0248-2000	3222	12	17-Sep-2008
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	20-Mar-2009

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Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.3 Radio (Tx) - Power Characteristics					
Peak Power Analyser	Hewlett Packard	8990A	107	12	24-Jan-2009
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	12	25-Jun-2008
Cable (1m, sma(m) - sma(m)	Reynolds	262-0248-1000	2406	12	TU
Multimeter	Iso-tech	Iso Tech IDM101	2424	12	13-Aug-2008
Power Sensor	Hewlett Packard	84812A	2743	12	24-Jan-2009
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	18-Sep-2008
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	29-May-2008
Hygrometer	Rotronic	I-1000	3220	12	9-Apr-2009
Cable (2m, SMA Type)	Reynolds	262-0248-2000	3222	12	17-Sep-2008

TU – Traceability Unscheduled

Product Service

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

* In accordance with CISPR 16-4
† In accordance with UKAS Lab 34

Product Service

SECTION 4

PHOTOGRAPHS

Product Service

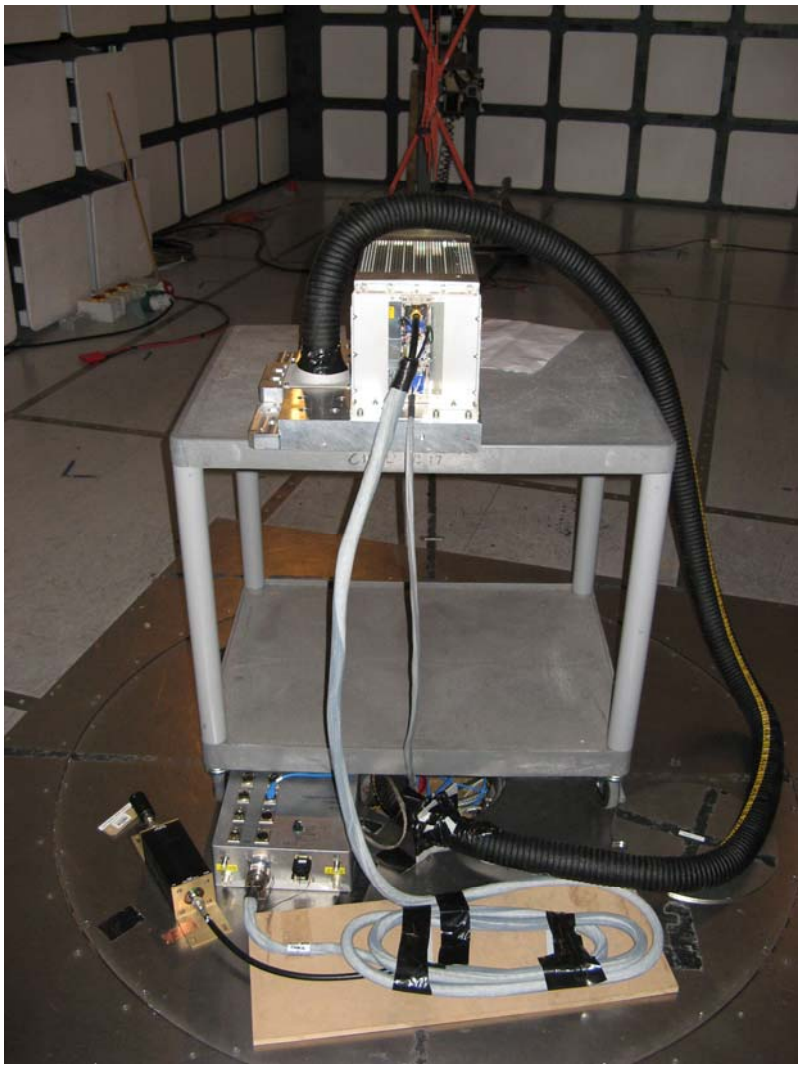
4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Front of EUT

Rear of EUT

Product Service

4.2 PHOTOGRAPHS OF TEST SETUP



Radiated Emissions Test Setup

Product Service

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Product Service

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).