REPORT ON

Qualification Approval Testing of the Thales Avionics Limited
Satellite Data Unit (SDU)

COMMERCIAL-IN-CONFIDENCE

Report No EE615497/01 Issue 1 Draft A January 2007

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REPORT ON

Qualification Approval Testing of the Thales Avionics Limited Satellite Data Unit (SDU)

Report No EE615497/01 Issue 1

January 2007

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UKAS TESTING
0141
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SECTION 1

REPORT SUMMARY

EMC Qualification Approval Testing of the Thales Avionics Limited
Satellite Data Unit (SDU)

1.1 STATUS

EQUIPMENT UNDER TEST	Satellite Data Unit (SDU)
OBJECTIVE	To perform Electromagnetic Compatibility (EMC) Qualification Approval Testing to determine the Equipment Under Test's (EUT's) compliance with the specification, for the series of tests carried out.
NAME AND ADDRESS OF CLIENT	Thales Avionics Limited 88 Bushey Road London SW20 0JW
MODEL NUMBER	82155/D10D
SERIAL NUMBER	10007
TEST SPECIFICATION / ISSUE / DATE	RTCA/DO-160E
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial-In-Confidence
INCOMING RELEASE DATE	Not released 24 January 2007
DISPOSAL REFERENCE NUMBER DATE	Packing Note EE615497/01 25 January 2007
ORDER NUMBER DATE	SP000118 & email 19 January 2007 31 August 2006
START OF TEST	24 January 2007
FINISH OF TEST	25 January 2007
RELATED DOCUMENTS	Not applicable

1.2 INTRODUCTION

This test report details EMC testing carried out on a Thales Avionics Limited Satellite Data Unit (SDU).

Testing was carried out in accordance with RTCA/DO 160E Category M using extended Limits.

1.3 BRIEF SUMMARY OF RESULTS

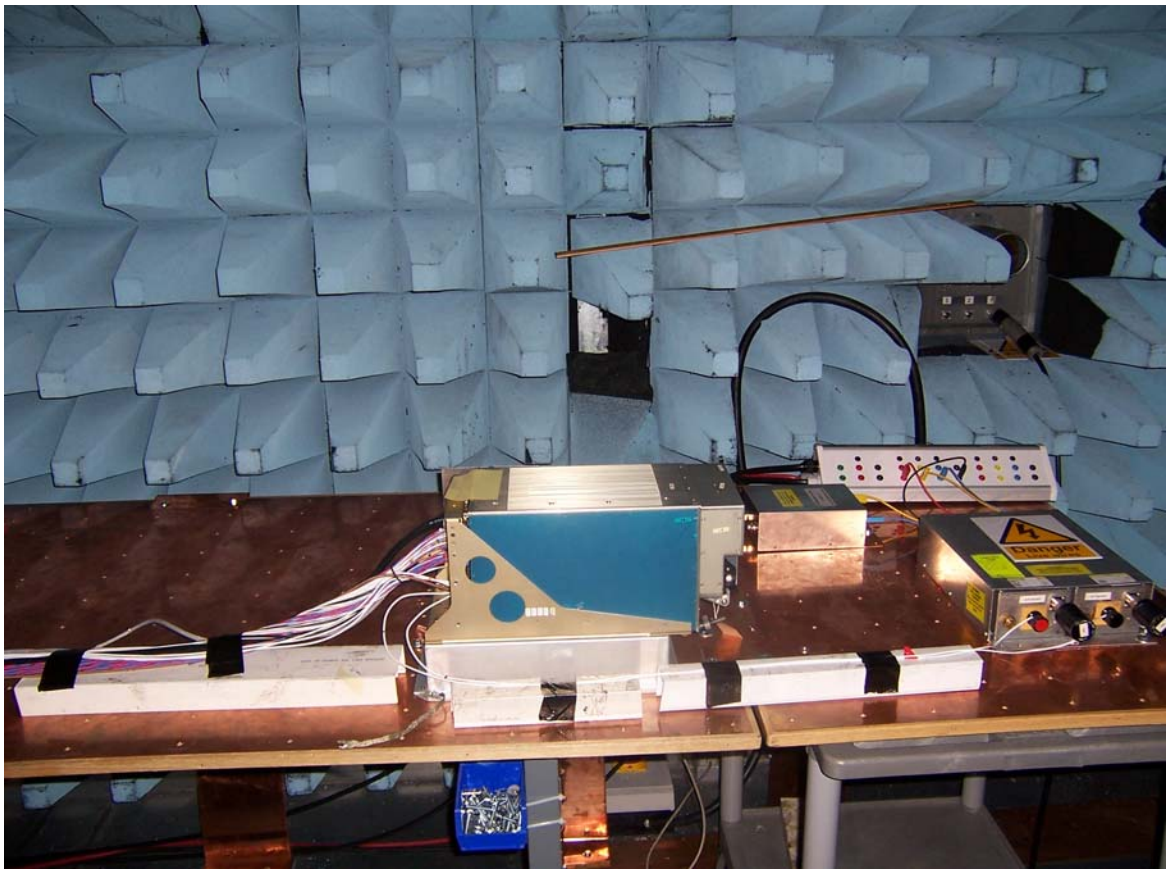
A brief summary of the tests carried out is shown below.

Test	Spec Clause	Test Description	Result	Levels/Comments
2.1	Section 21	Emission of Radio Frequency Energy (Radiated)	Pass	Category M extended limit

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Satellite Data Unit (SDU) as shown below.



Equipment Under Test

1.4.2 Modes of Operation

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

PRBS RT05Q, PRBS RT1Q, PRBS2Q and RT45Q.

1.4.3 Test Configuration

The EUT was set up on and bonded to a groundplane which was located in a screened room. The EUT was powered via LISNs from a 110V 400Hz supply.

1.4.4 Monitoring of performance

Not applicable, emissions testing only carried out.

1.4.5 Performance Criteria

Not applicable, emissions testing only carried out.

1.5 TEST CONDITIONS

All test conditions were maintained to the requirements of the Test Plan.

The EUT was placed within Shielded Enclosure 6 and mounted on and bonded to a groundplane. The bonding impedance was 2.9mΩ, when measured at a frequency of 1kHz.

The table below shows the information not shown on the plots.

Frequency Range	Receiver Bandwidth	Detector Function & Hold Time	Receiver Scan Rate	Attenuator Settings
6GHz – 18GHz	1MHz	20ms	2mins/oct	0dB
Frequency Range	Sensor or Probe			
6GHz – 18GHz	DRG			

1.6 DEVIATIONS FROM THE STANDARD

None.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing covered by this test report.

1.8 ALTERNATIVE TEST SITE

Not applicable.

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SECTION 2

TEST DETAILS

EMC Qualification Approval Testing of the Thales Avionics Limited
Satellite Data Unit (SDU)

2.1 EMISSION OF RADIO FREQUENCY ENERGY (RADIATED)

2.1.1 Specification Reference

RTCA/DO-160E, Section 21, Category M

2.1.2 Equipment Under Test

Satellite Data Unit (SDU), Serial No: 10007

2.1.3 Date of Test

25 January 2007

2.1.4 Test equipment used

The major items of test equipment used for the above tests are identified under Section 2.1 of the Table in Section 3.1.

2.1.5 Test Procedure

The EUT was configured as detailed in 1.4.3 and subjected to the test detailed in 2.1.1, over the frequency range 6GHz to 18GHz. The limit line shown on the following plots has been extrapolated in the 6GHz to 18GHz range by Thales Avionics.

The EUT was operated in 4 modes and 3 operating frequencies in turn. The frequencies utilised represented the Lowest (L), Middle (M) and Highest (H) EUT operating frequencies. The EUT was operated at the L, M and H frequencies to satisfy the basic requirements for FCC.

2.1.6 Test Results

The EUT met the requirements of the Test Plan as follows:

Mode	Frequency	Polarisation	Result	Figure
PRBS RT05Q (L)	1626.600MHz	Vertical	Pass	2.1.1
PRBS RT1Q (L)	1626.600MHz	Vertical	Pass	2.1.2
PRBS RT2Q (L)	1626.600MHz	Vertical	Pass	2.1.3
PRBS RT45Q (L)	1626.600MHz	Vertical	Pass	2.1.4
PRBS RT05Q (M)	1643.500MHz	Vertical	Pass	2.1.5
PRBS RT1Q (M)	1643.500MHz	Vertical	Pass	2.1.6
PRBS RT2Q (M)	1643.500MHz	Vertical	Pass	2.1.7
PRBS RT45Q (M)	1643.500MHz	Vertical	Pass	2.1.8
PRBS RT05Q (H)	1660.400MHz	Vertical	Pass	2.1.9
PRBS RT1Q (H)	1660.400MHz	Vertical	Pass	2.1.10
PRBS RT2Q (H)	1660.400MHz	Vertical	Pass	2.1.11
PRBS RT45Q (H)	1660.400MHz	Vertical	Pass	2.1.12

An Ambient Plot is shown at Figure 2.1.13.

Suffix L, M and H shown on the test result plots indicates Lowest, Middle or Highest EUT operating frequencies.

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2.1.6 Test Results - continued

Mode	*Frequency*	Polarisation	Result	Figure
PRBS RT05Q (L)	1626.600MHz	Horizontal	Pass	2.1.14
PRBS RT1Q (L)	1626.600MHz	Horizontal	Pass	2.1.15
PRBS RT2Q (L)	1626.600MHz	Horizontal	Pass	2.1.16
PRBS RT45Q (L)	1626.600MHz	Horizontal	Pass	2.1.17
PRBS RT05Q (M)	1643.500MHz	Horizontal	Pass	2.1.18
PRBS RT1Q (M)	1643.500MHz	Horizontal	Pass	2.1.19
PRBS RT2Q (M)	1643.500MHz	Horizontal	Pass	2.1.20
PRBS RT45Q (M)	1643.500MHz	Horizontal	Pass	2.1.21
PRBS RT05Q (H)	1660.400MHz	Horizontal	Pass	2.1.22
PRBS RT1Q (H)	1660.400MHz	Horizontal	Pass	2.1.23
PRBS RT2Q (H)	1660.400MHz	Horizontal	Pass	2.1.24
PRBS RT45Q (H)	1660.400MHz	Horizontal	Pass	2.1.25

An Ambient Plot is shown at Figure 2.1.26.

Suffix L, M and H shown on the test result plots indicates Lowest, Middle or Highest EUT operating frequencies.

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT05Q L;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

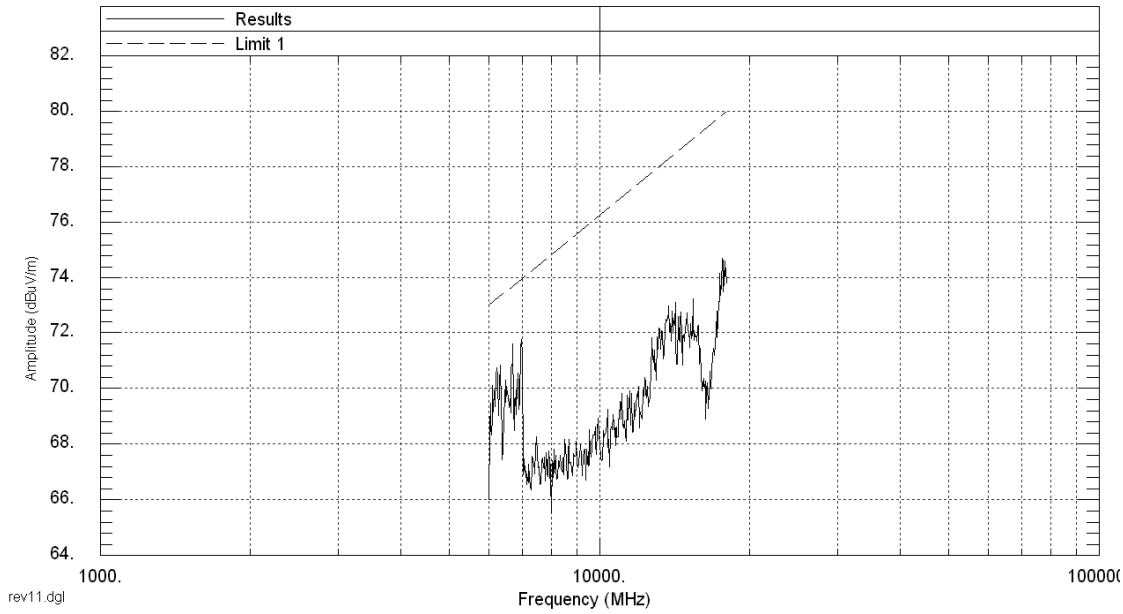

Figure 2.1.1

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT1Q L;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

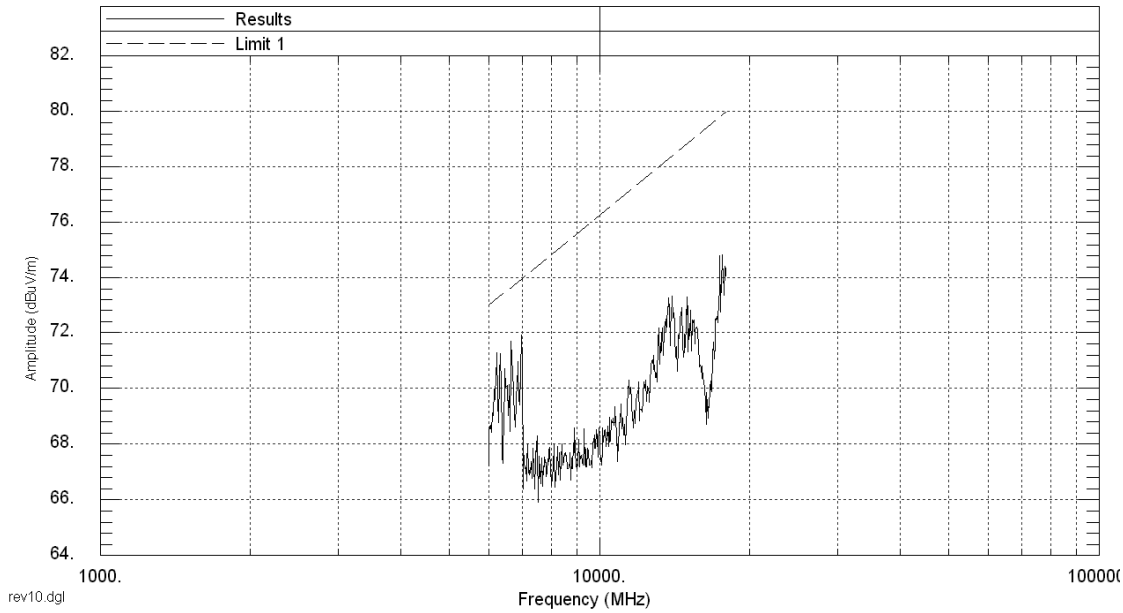

Figure 2.1.2

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT2Q L;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

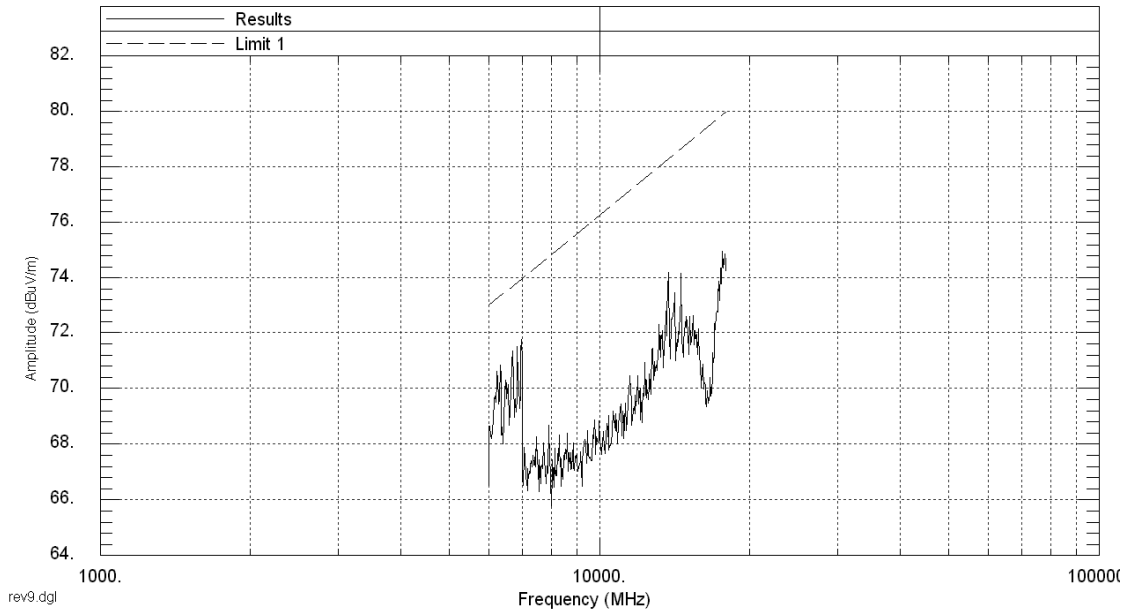

Figure 2.1.3

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q L;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

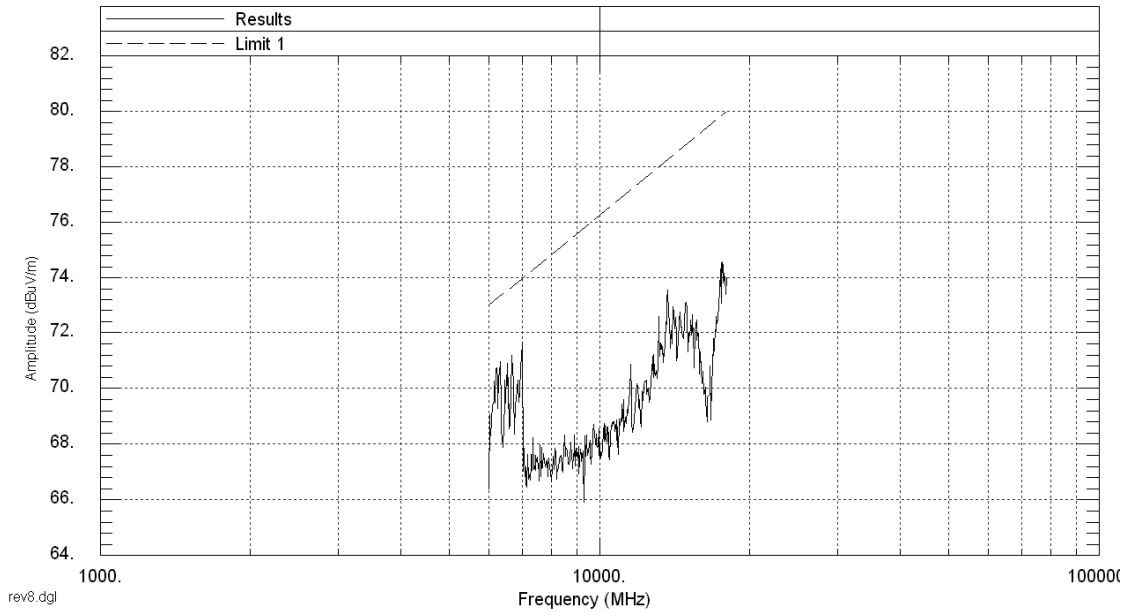

Figure 2.1.4

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT05Q M;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

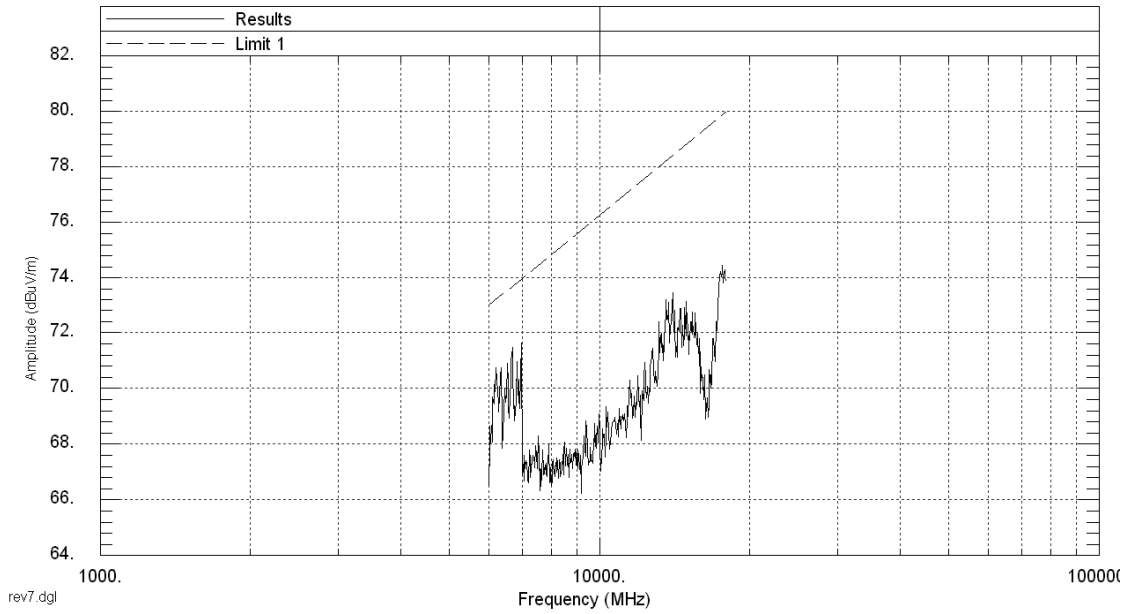

Figure 2.1.5

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT1Q M;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

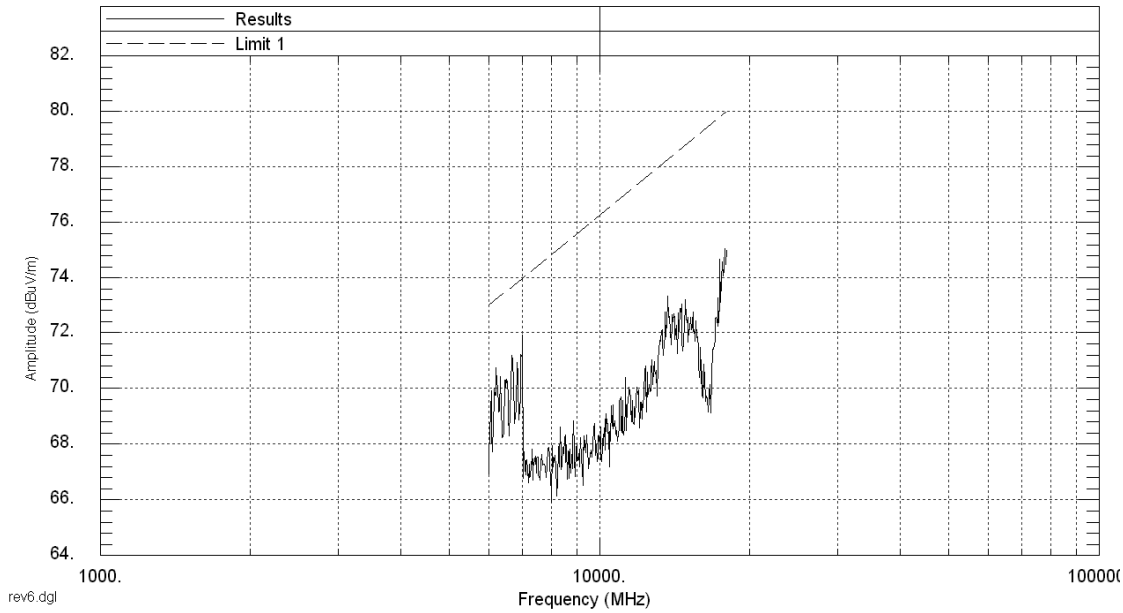

Figure 2.1.6

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT2Q M;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

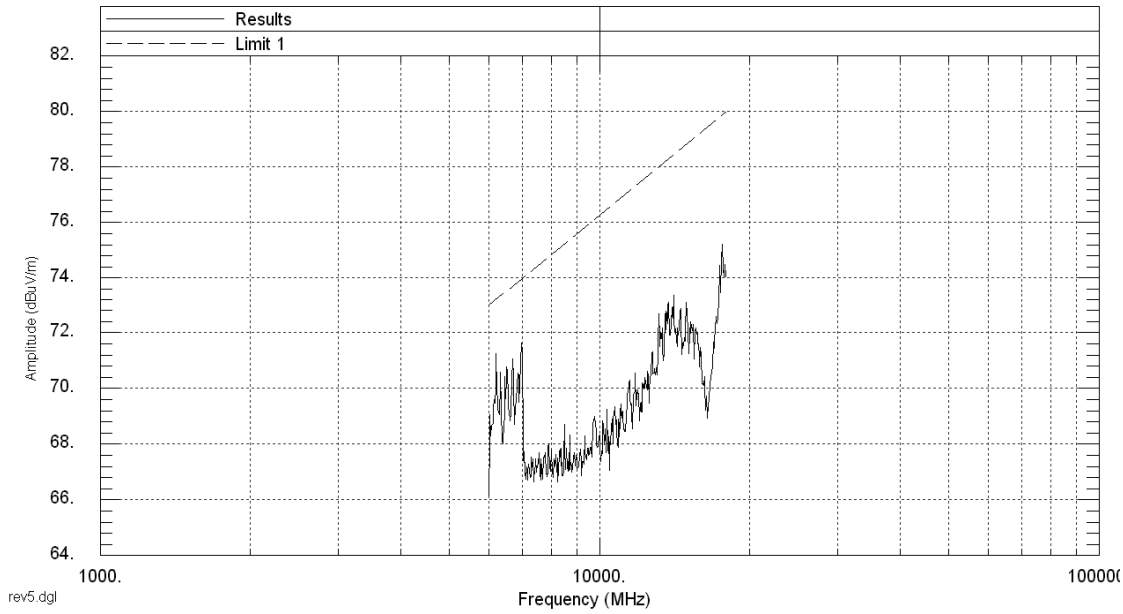

Figure 2.1.7

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q M;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

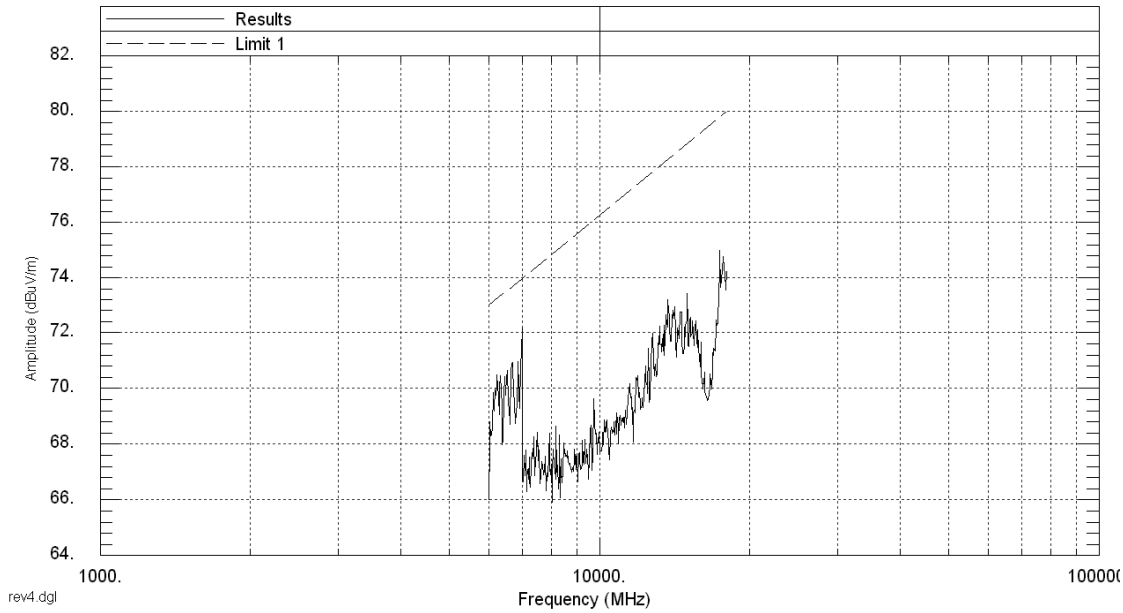

Figure 2.1.8

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT05Q H;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

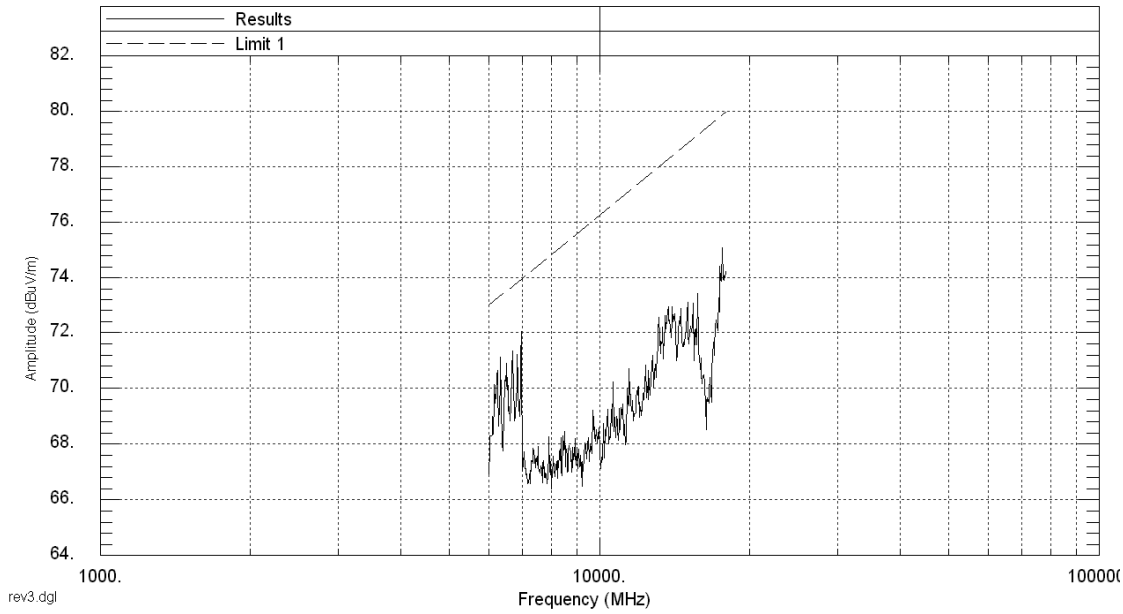

Figure 2.1.9

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT1Q H;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

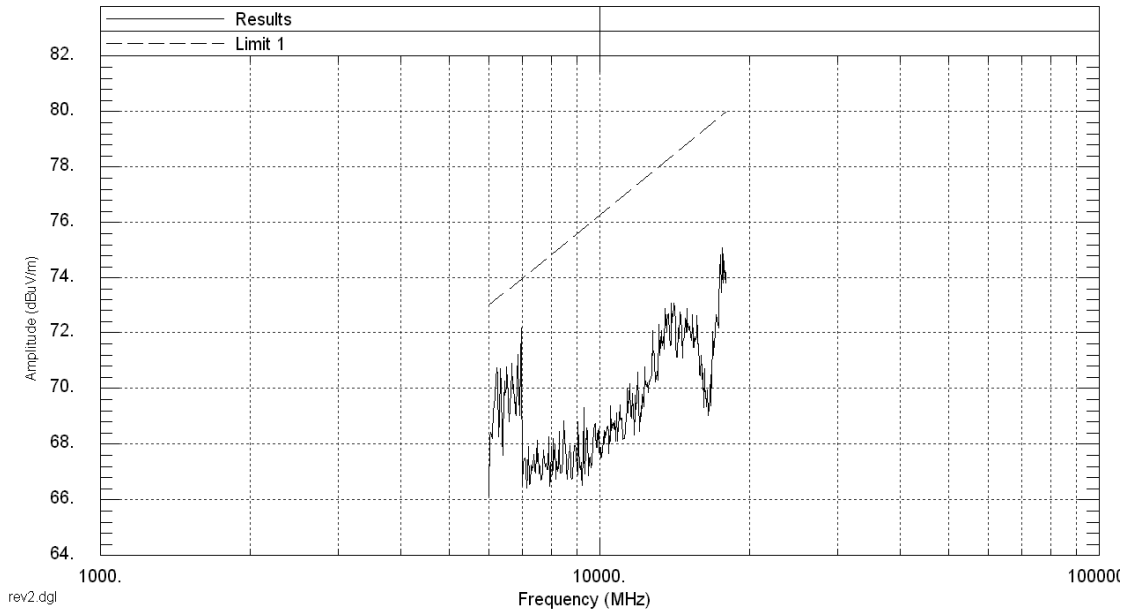

Figure 2.1.10

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT2Q H;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

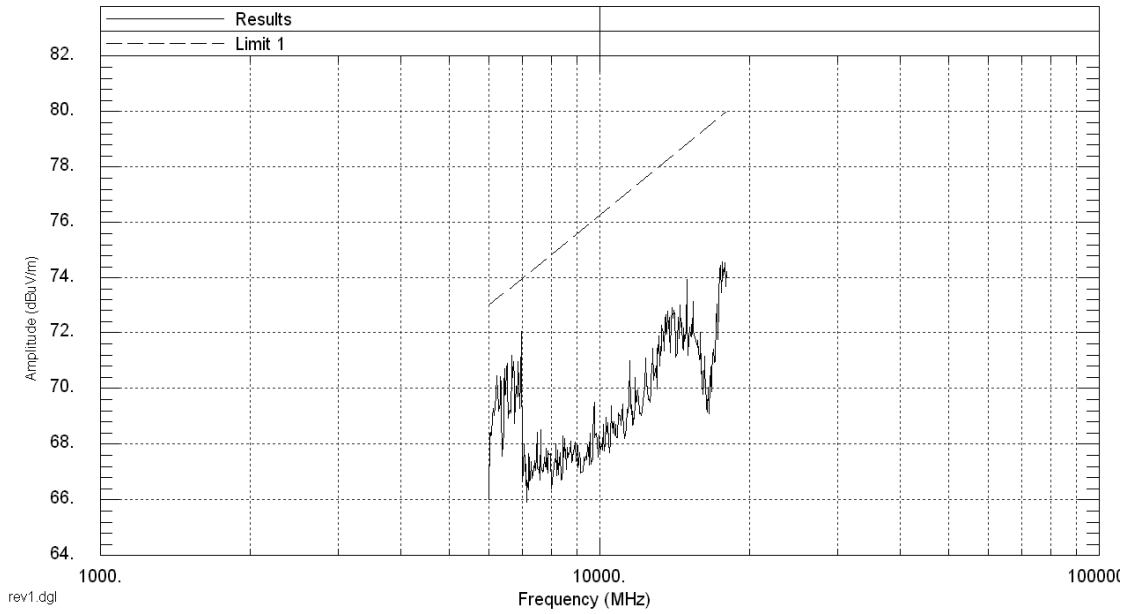

Figure 2.1.11

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q H;- Vertical Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

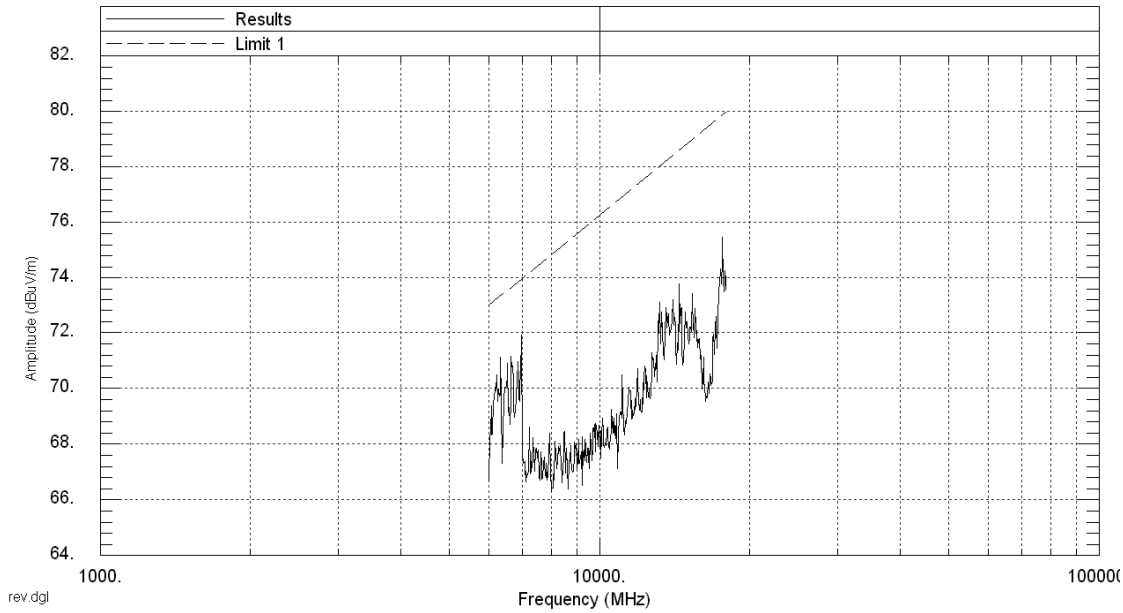

Figure 2.1.12

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q H;- Vertical Polarisation

Plot Description: Ambient;- 6GHz to 18GHz

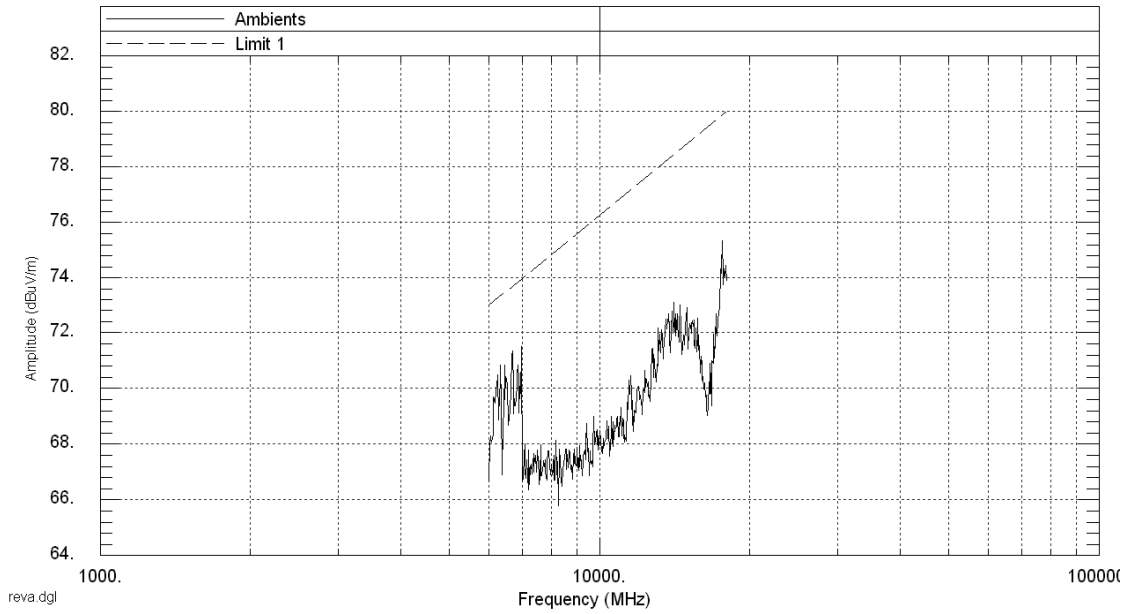

Figure 2.1.13

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT05Q L;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

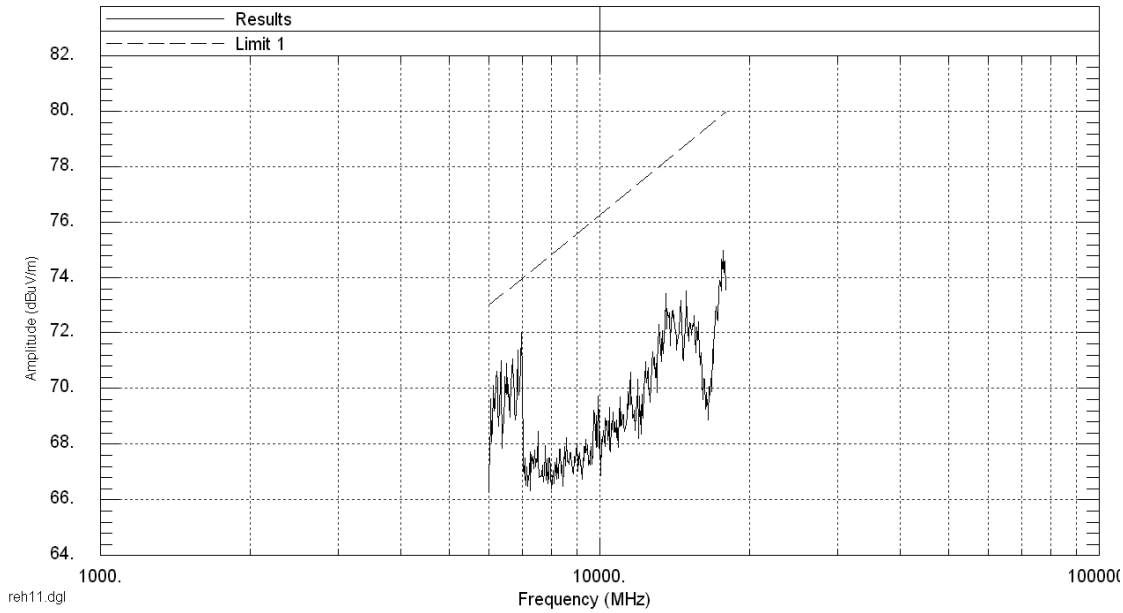

Figure 2.1.14

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT1Q L;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

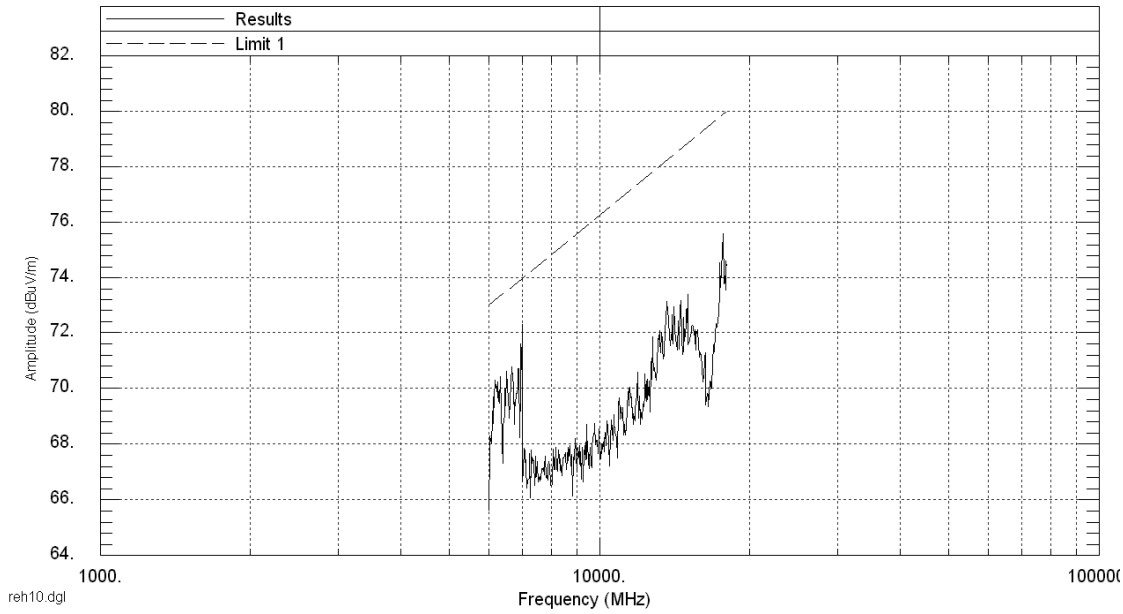

Figure 2.1.15

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT2Q L;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

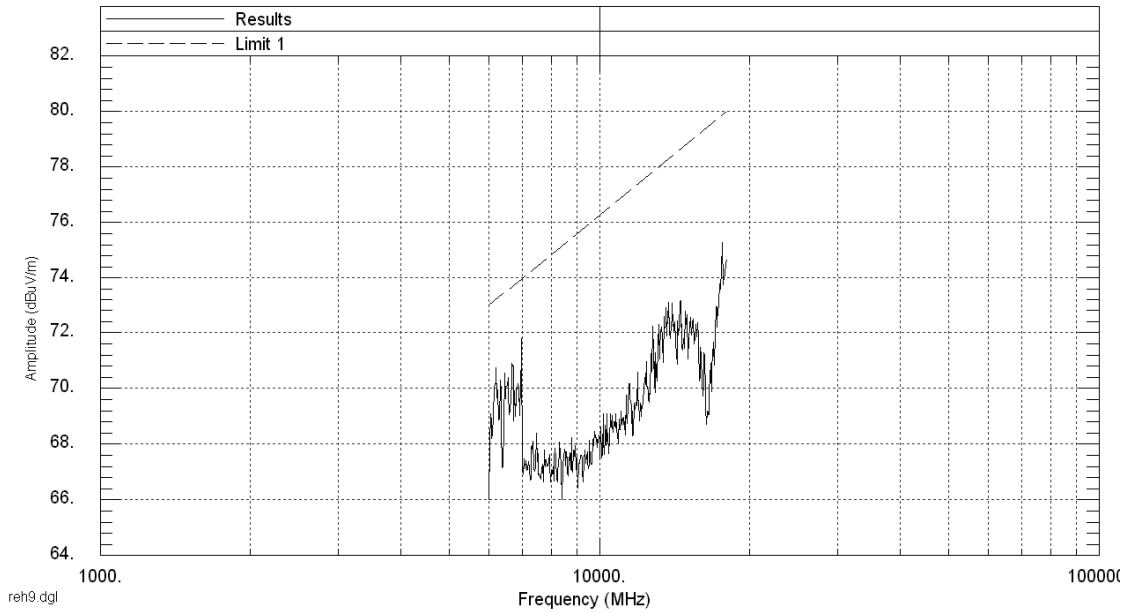

Figure 2.1.16

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q L;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

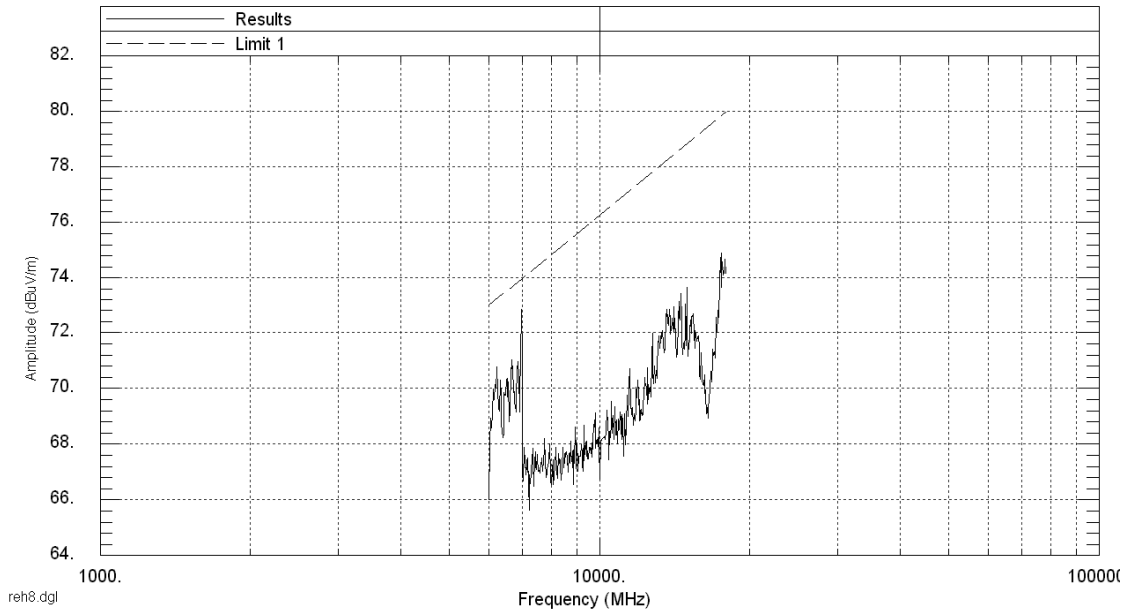

Figure 2.1.17

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT05Q M;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

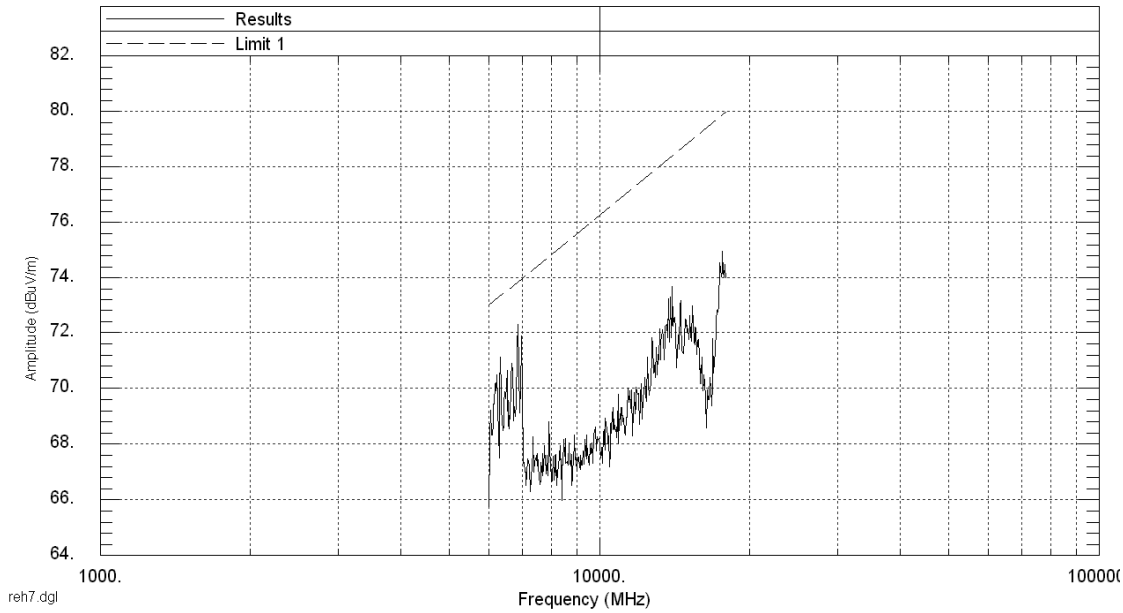

Figure 2.1.18

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT1Q M;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

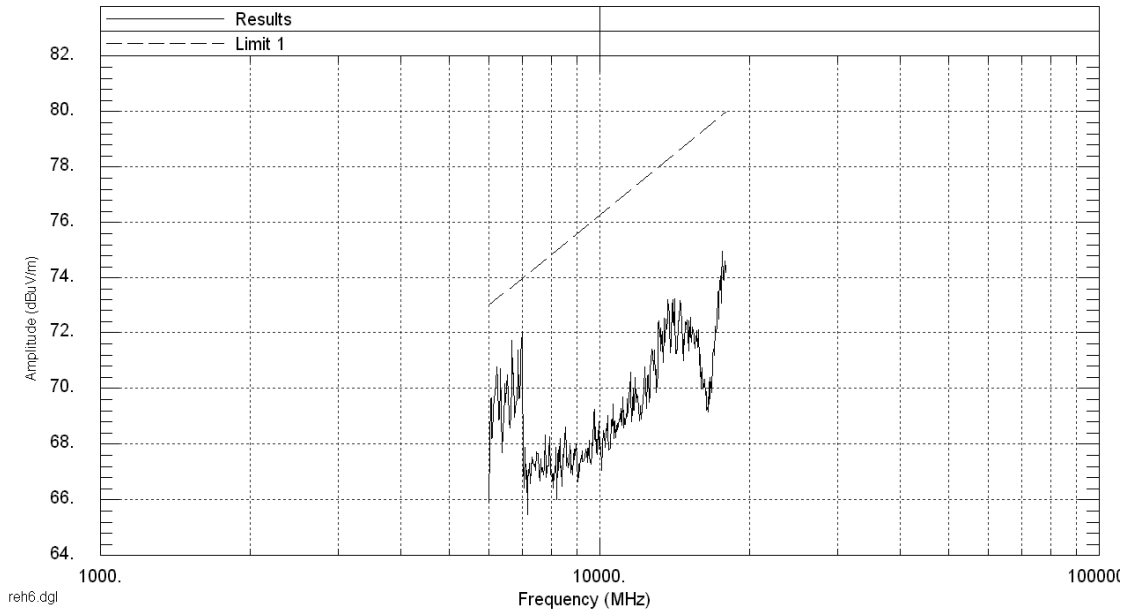

Figure 2.1.19

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT2Q M;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

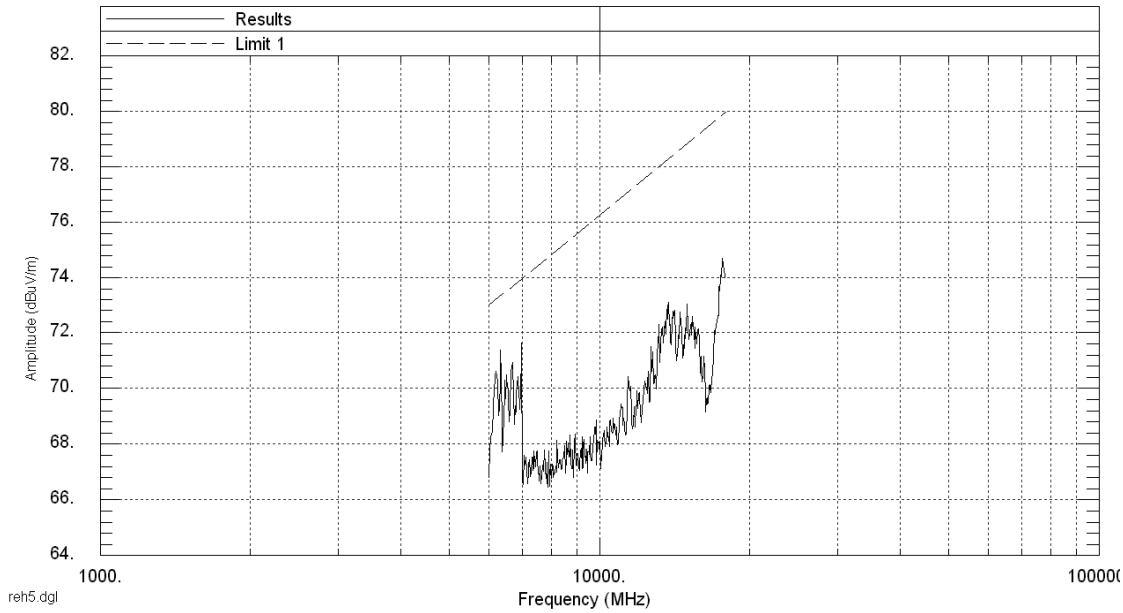

Figure 2.1.20

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q M;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

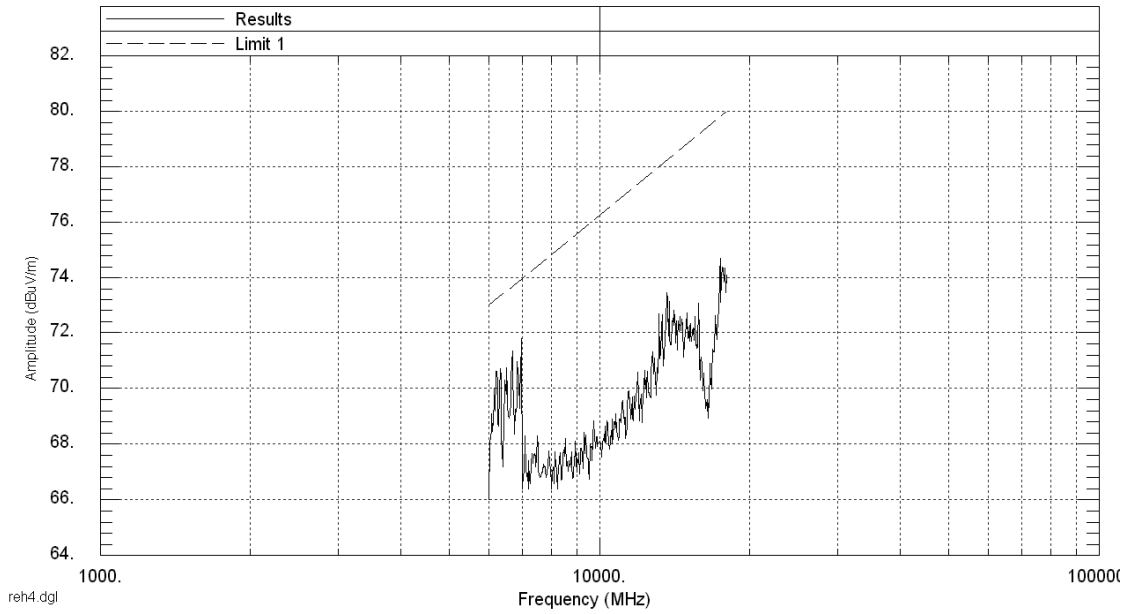

Figure 2.1.21

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT05Q H;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

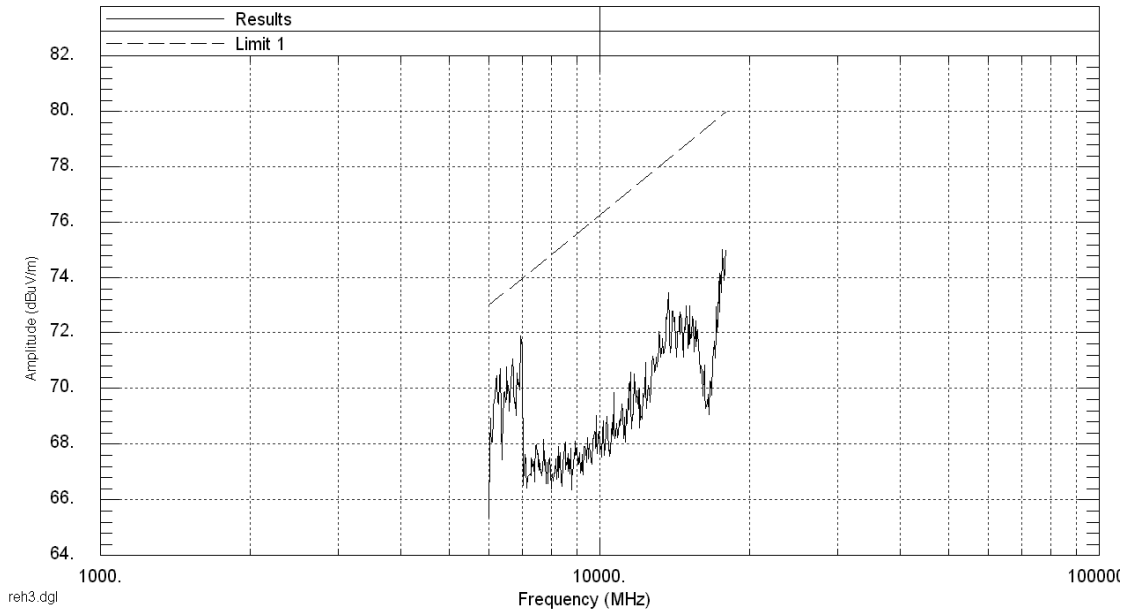

Figure 2.1.22

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT1Q H;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

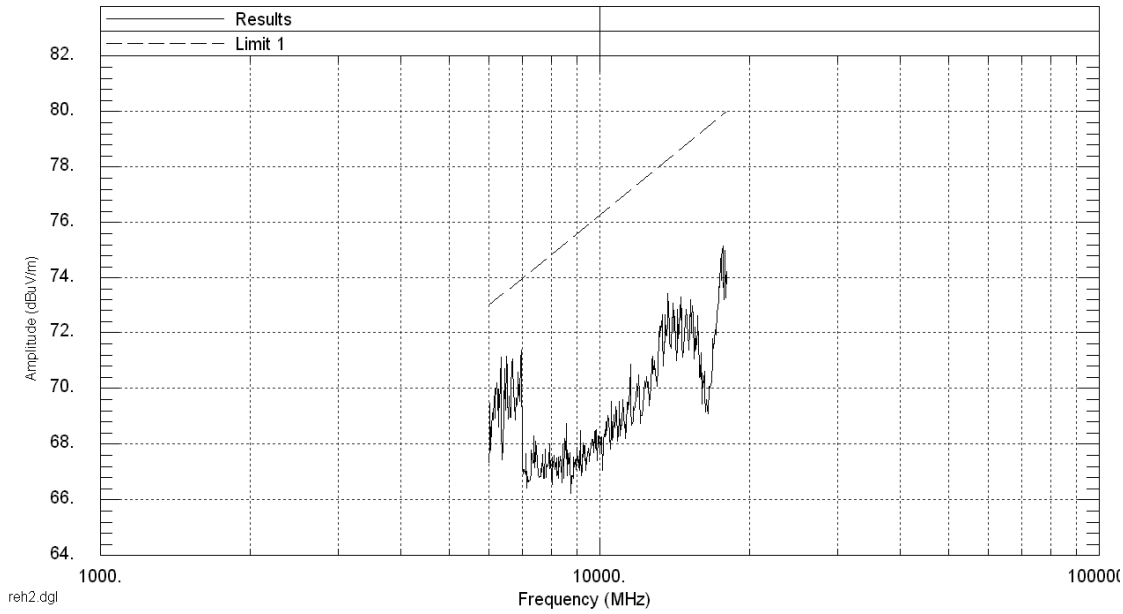

Figure 2.1.23

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT2Q H;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

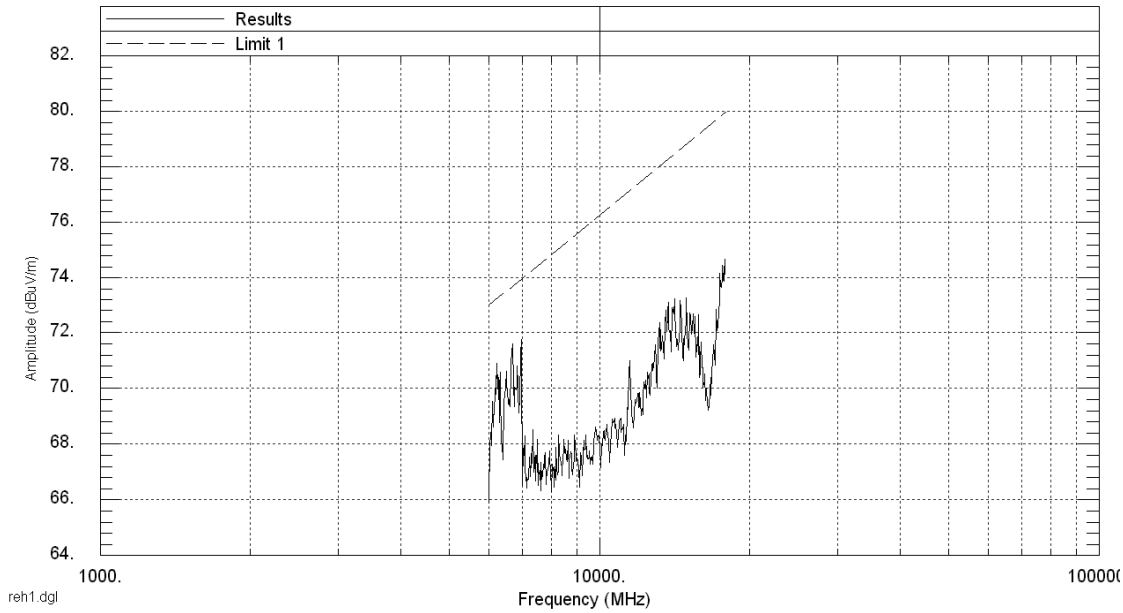

Figure 2.1.24

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q H;- Horizontal Polarisation

Plot Description: EUT On;- 6GHz to 18GHz

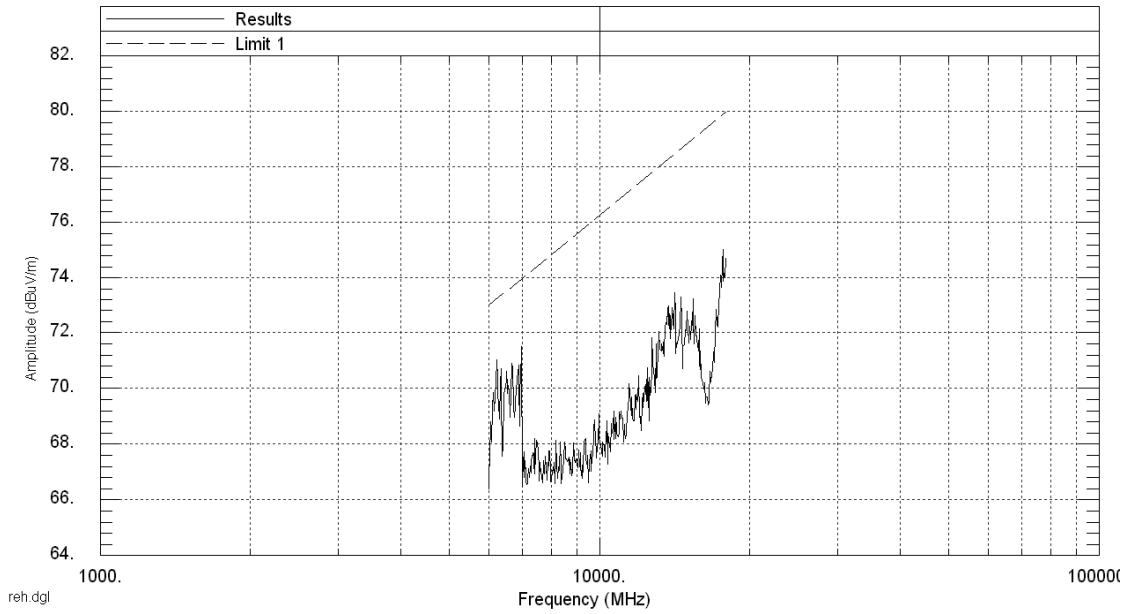

Figure 2.1.25

Job Number: EE615497 Test Applied: RE Date of Test: 25 January 2007

EUT: Topflight SDU RT45Q H;- Horizontal Polarisation

Plot Description: Ambient;- 6GHz to 18GHz

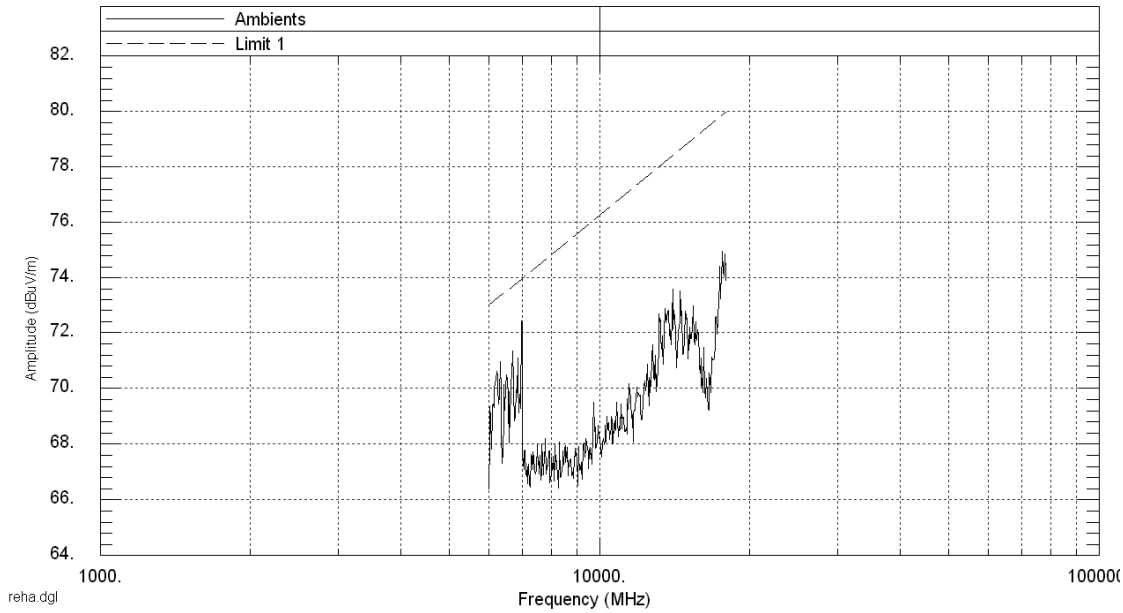

Figure 2.1.26

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.1				
Load (50Ω, 30W)	JFW	50T-054	349	05/06/2007
Load (50Ω, 30W)	Weinschel	50T-054	350	26/01/2007
LISN + Capacitor 10µF	TUV	59-41	1932	14/11/2007
LISN + Capacitor 10µF	TUV	59-41	1933	14/11/2007
DRG	EMCO	3115	793	03/08/2007
Test Receiver	Rohde & Schwarz	ESIB40	1006	07/04/2007

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Conducted Emissions Voltage	10Hz - 400MHz	4.00dB
Conducted Emissions Current	10Hz - 150MHz	4.20dB
Conducted Emissions Antenna Terminals	10Hz - 1GHz	2.90dB
Conducted Emissions Exported Transients	Voltage Amplitude	1.4%
Radiated Emissions Electric Field [Rod]	10kHz - 25MHz	3.20dB
Radiated Emissions Electric Field [Bicone]	25MHz - 200MHz	4.50dB
Radiated Emissions Electric Field [Logper]	200MHz - 1GHz	4.80dB
Radiated Emissions Electric Field [DRG]	200MHz - 1GHz	4.60dB
Radiated Emissions Electric Field [DRG]	1GHz - 18GHz	4.00dB
Radiated Emissions Electric Field [Horn]	18GHz - 26GHz	4.00dB
Radiated Emissions Electric Field [Horn]	26GHz - 40GHz	4.70dB
Radiated Emissions Magnetic Field [Loop]	20Hz - 1MHz	3.25dB
Radiated Emissions Installed Antenna	1MHz - 76MHz	3.00dB
Radiated Emissions Antenna Spurious	As for RE Electric Field	-
Conducted Susceptibility [Iso Tfmr]	20Hz – 250kHz	0.44%
Conducted Susceptibility [BCI]	10kHz – 400MHz	2.55dB
Conducted Susceptibility [Wire Wrap]	20Hz – 250kHz	0.44%
Conducted Susceptibility [Voltage Spikes]	Voltage Amplitude	0.91%
Conducted Susceptibility [Transients Aircraft]	Voltage Amplitude Current Amplitude	0.91% 11.0%
Conducted Susceptibility [Transients Land and Sea]	Current Amplitude	11.0%
Conducted Susceptibility [Long Transients Land]	Current Amplitude	11.0%
Conducted Susceptibility [External Transients Aircraft]	Voltage Amplitude Current Amplitude	0.91% 11.0%
Conducted Susceptibility [Lightning Aircraft]	Voltage Amplitude Current Amplitude	0.91% 11.0%
Conducted Susceptibility [Direct Voltage Injection]	50kHz – 400MHz	1.6dB
Compass Safe Distance	Azimuth Accuracy	0.01°
Radiated Susceptibility [Helmholtz]	Magnetic Field Value	0.45%
Radiated Susceptibility Electric Field, Field Probe Method	10kHz - 4GHz	1.30dB
Radiated Susceptibility Electric Field, 2 Antenna Method	4GHz - 40GHz	3.10dB
Radiated Susceptibility Magnetic Field, Loop Antenna Method	20Hz - 1MHz	2.10dB
Voltage Variations DO-160 Section 16	Frequency and Time Voltage Amplitude	12 ppm 0.16%
Conducted Susceptibility [Electrostatic Discharge]	ESD Simulator meets the requirements of the Basic Standard	

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

SECTION 4

INCIDENT REPORTS

4.1 INCIDENT REPORTS ISSUED

No Incident Reports were issued during testing covered by this test report.

SECTION 5

DISCLAIMERS AND COPYRIGHT

Group

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).