REPORT ON

FCC CFR 47: Part 15 (Subparts B & C) and Part 87 Testing in support of an Application for Grant of Equipment Authorisation of a Park Air Systems T6T VHF Transmitter

FCC ID: C8LB6350-S2

Report No OR613603/02 Issue 3 September 2005

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September 2005

PREPARED FOR

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DATED 29th September 2005

DISTRIBUTION

Park Air Systems Limited	Copy 1
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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: Parts 87 & 15 Subparts B & C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

S Hartley B Airs G Lawler

UKAS TESTING 0141 Group

CONTENTS

SECTION 1

REPORT SUMMARY

FCC CFR 47: Parts 15 Subparts B & C and Part 87 Testing in support of an Application for Grant of Equipment Authorisation of a Park Air Systems T6T VHF Transmitter

1.1 STATUS

EQUIPMENT UNDER TEST	Park Air Systems T6T VHF Transmitter
OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
NAME AND ADDRESS OF CLIENT	Park Air Systems Limited Northfields Ind Estate Market Deeping Peterborough PE6 8UE United Kingdom
TYPE / MODEL NUMBER	T6T
SERIAL NUMBER	2J0001
TEST SPECIFICATION / ISSUE / DATE	FCC CFR 47; Part 15, Subparts B & C: 2003 FCC CFR 47; Part 87: 2004
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE DATE	Not formally released
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER DATE	90324 30th November 2004
START OF TEST	14th October 2003
FINISH OF TEST	23rd Spetember 2005
RELATED DOCUMENTS	ANSI C63.4: 2001. Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. FCC Part 2.1053: 2003

1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Park Air Systems T6T VHF Transmitter to the requirements of FCC Specification Parts 15 (Subparts B & C) and Part 87.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of Park Air Systems.

Full testing was carried out on the frequency range 118.0MHz to 136.975MHz.

Limited testing was then performed on the EUT to cover an extended frequency range of 112.0 MHz to 155.975 MHz.

1.3 BRIEF SUMMARY OF RESULTS

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

Test	Spec Clause	Test Description	Result	Comments
2.1	Part 15.109	Spurious Radiated Emissions	Pass	
2.2	Part 15.207	Conducted Emissions on Power Lines	Pass	
2.3	Part 87.139	Spurious Radiated Emissions	Pass	
2.4	Section 2.1049 / Parts 87.135 & 87.137	Occupied Bandwidth	Pass	
2.5	Section 2.1047/ Part 87.141	Modulation Characteristics	Pass	
2.6	Part 87.133	Frequency Stability	Pass	
2.7	Part 87.131	Transmitter Output Power	Pass	
2.8	Part 87.139 (c) (3)	Transmitter Unwanted Emissions	Pass	

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a T6T VHF multi-mode air traffic control Transmitter. A full technical description can be found in the T6T Transmitter User Guide.

1.4.2 Modes of Operation

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

Mode 1: Transmit Mode

The EUT operates between 112.00MHz – 155.975MHz, and for all testing was set to continuous Transmit mode, on the bottom, middle and top channels in turn.

Bottom Channel:	118.00MHz
Middle Channel:	127.50MHz
Top Channel:	136.975MHz

The EUT was modulated by a 2.5kHz, 135mV source from a HP 8903B Audio Analyser. (Audio Analyser placed outside of the test area)

Additional testing was performed on frequencies 112.0MHz and 155.975MHz to cover extended frequency range.

Mode 2: Idle Mode

The EUT operates between 118.00MHz – 136.975MHz, and for all testing was operated in an idle state, the middle channel of 127.5MHz was set, but was not transmitting.

A 50ohm Termination was connected to the EUT's Antenna Port.

1.5 TEST CONDITIONS

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site identified in Appendix A and tested in accordance with the applicable specification.

The EUT was operated powered by a 120V, 60Hz mains supply.

The EUT's alternative DC input supply cable was connected but was left un-terminated.

The EUT's Antenna Port was connected to a dummy load during Transmit Mode.

1.6 DEVIATIONS FROM THE STANDARD

Not Applicable

1.7 MODIFICATION RECORD

Not Applicable

1.8 ALTERNATIVE TEST SITE

No alternative Test Site was utilised.

SECTION 2

TEST DETAILS

FCC CFR 47: Parts 15 Subparts B & C and Part 87 Testing in support of an Application for Grant of Equipment Authorisation of a Park Air Systems T6T VHF Transmitter

2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109

2.1.2 Equipment Under Test

Park Air Electronics T6T VHF Transmitter

2.1.3 Date of Test

12th January 2005

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.1” within the Test Equipment Used table shown in Section 3.1.

2.1.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector (120kHz Detector Bandwidth).

Emissions identified within the range 1GHz – 1.4GHz were then formally measured using a Peak detector, to measure the Peak and Average values.

The Peak measurement was made with the Measuring system’s Resolution and Video Bandwidth both set to 1MHz.

The Average measurement was made with the Measuring system’s Resolution Bandwidth set to 1MHz and the Video Bandwidth set to 10Hz.

The measurements were performed at a 3m distance unless otherwise stated.

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 for Spurious Radiated Emissions (30MHz – 1.4GHz).

Measurements were made with the EUT in Mode 2: Idle Mode.

30MHz - 1GHz Range

The levels of the six highest emissions measured in accordance with the specification are presented below:

Emission Frequency	Polarity	Height	Azimuth	Field Strength at 3m		Specification Limit	
MHz		cm	degrees	dBµV/m	µV/m	dBµV/m	µV/m
30.50*	Horizontal	100	0	22.8	13.8	40.0	100
193.10	Horizontal	169	107	19.2	9.1	43.5	150
300.00*	Horizontal	100	0	23.7	15.3	46.0	200
580.60	Vertical	100	0	28.4	26.3	46.0	200
653.20	Vertical	100	357	27.0	22.4	46.0	200
800.00*	Horizontal	100	0	29.2	28.8	46.0	200

Note: The emissions marked * were System Noise Floor measurements, provided due to lack of EUT emissions.

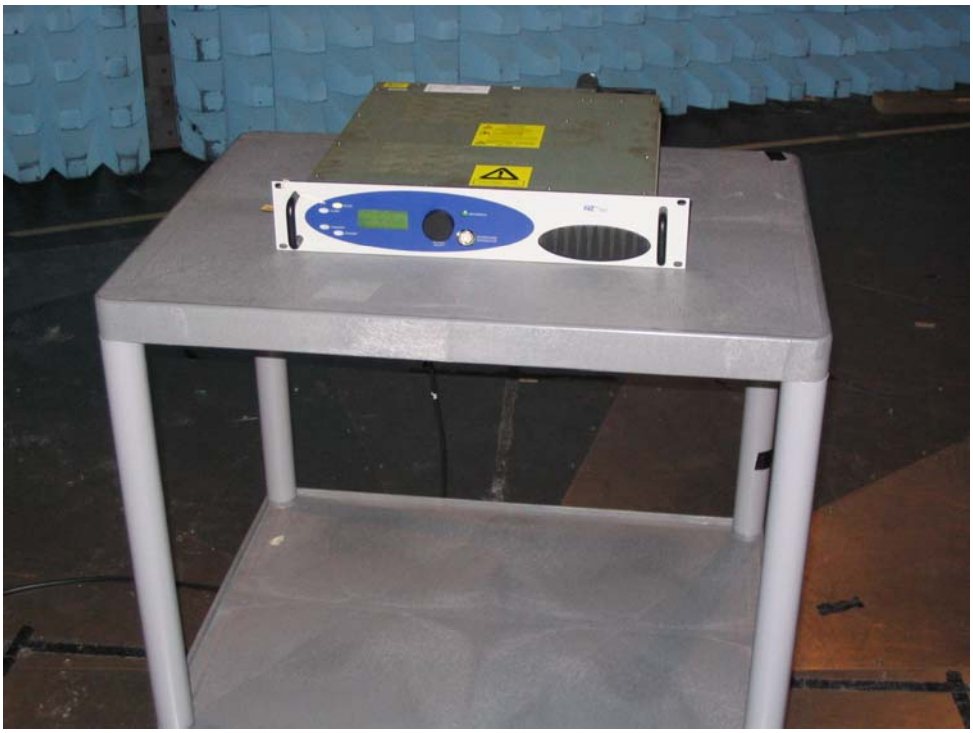
1GHz - 1.4GHz Range

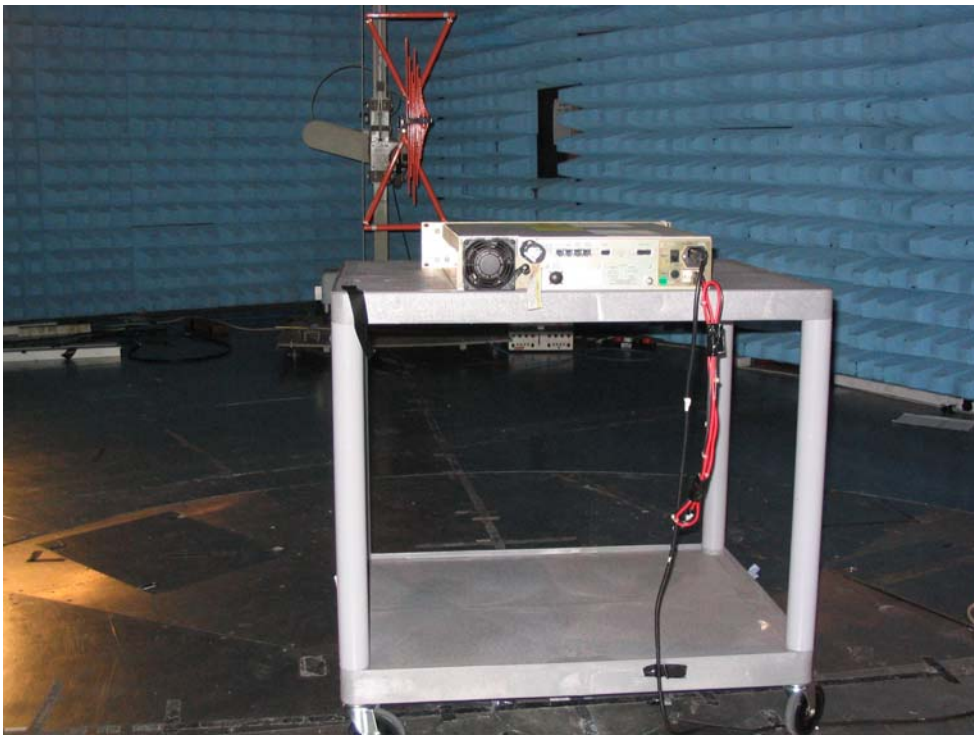
The level of the only emission detected, measured in accordance with the specification is presented below:

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
1.336	V	100	136	40.9	74.0	32.0	54.0
1.336	H	112	129	42.6	74.0	36.2	54.0

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.7 Test Setup Photographs





2.2 CONDUCTED EMISSIONS ON POWER LINES

2.2.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.207

2.2.2 Equipment Under Test

Park Air Electronics T6T VHF Transmitter

2.2.3 Date of Test

11th January 2005

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.2” within the Test Equipment Used table shown in Section 3.1.

2.2.5 Test Procedure

Test performed in accordance with ANSI C63.4.

Conducted Emission Measurements were undertaken within the semi-anechoic chamber. Emissions were measured on the Live and Neutral Lines in turn.

Emissions were formally measured using a Quasi-Peak and Average Detectors, which meet the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in the tables in Section 2.2.6.

The EUT was supplied from a 120V, 60Hz supply.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

Live Line Measurements were made with the EUT in Mode 1.

Bottom Channel Tx: 118.00MHz

Emission Frequency MHz	Quasi-Peak Level dBµV	Quasi-Peak Limit dBµV	Average Level dBµV	Average Limit dBµV
0.1598	36.2	65.5	29.3	55.5
0.1876	38.0	64.1	37.9	54.1
0.2105	52.2	63.2	45.9	53.2
0.2412	23.3	62.1	22.0	52.1
0.3154	23.8	59.8	21.0	49.8

The margin between the specification requirements and all other emissions were 38dB or more below the specified Quasi-Peak limit and 30dB or more below the Average limit.

Neutral Line Measurements were made with the EUT in Mode 1.

Bottom Channel Tx: 118.00MHz

Emission Frequency MHz	Quasi-Peak Level dBµV	Quasi-Peak Limit dBµV	Average Level dBµV	Average Limit dBµV
0.1602	36.9	65.5	29.7	55.5
0.1870	39.7	64.1	39.4	54.1
0.2104	52.6	63.2	46.3	53.2
0.2408	20.6	62.1	18.3	52.1
0.3153	24.3	59.8	21.7	49.8

The margin between the specification requirements and all other emissions were 41dB or more below the specified Quasi-Peak limit and 33dB or more below the Average limit.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

Live Line Measurements were made with the EUT in Mode 1.

Middle Channel Tx: 127.50MHz

Emission Frequency MHz	Quasi-Peak Level dBµV	Quasi-Peak Limit dBµV	Average Level dBµV	Average Limit dBµV
0.1613	37.0	65.4	29.9	55.4
0.1885	39.5	64.1	38.9	54.1
0.2108	52.3	63.2	46.1	53.2
0.2442	19.2	62.0	16.7	52.0
0.3157	24.3	59.8	21.6	49.8

The margin between the specification requirements and all other emissions were 43dB or more below the specified Quasi-Peak limit and 35dB or more below the Average limit.

Neutral Line Measurements were made with the EUT in Mode 1.

Middle Channel Tx: 127.50MHz

Emission Frequency MHz	Quasi-Peak Level dBµV	Quasi-Peak Limit dBµV	Average Level dBµV	Average Limit dBµV
0.1500	23.8	66.0	18.6	56.0
0.1616	36.8	65.4	29.5	55.4
0.1880	39.2	64.1	39.1	54.1
0.2107	52.3	63.2	46.2	53.2
0.2420	14.8	62.1	9.7	52.1
0.3157	13.5	59.8	11.0	49.8

The margin between the specification requirements and all other emissions were 47dB or more below the specified Quasi-Peak limit and 42dB or more below the Average limit.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

Live Line Measurements were made with the EUT in Mode 1.

Top Channel Tx: 136.975MHz

Emission Frequency MHz	Quasi-Peak Level dBµV	Quasi-Peak Limit dBµV	Average Level dBµV	Average Limit dBµV
0.1610	36.4	65.4	29.6	55.4
0.1887	38.4	64.1	38.1	54.1
0.2107	52.7	63.2	46.1	53.2
0.2435	23.1	62.0	22.1	52.0
0.3158	24.3	59.8	21.5	49.8

The margin between the specification requirements and all other emissions were 38dB or more below the specified Quasi-Peak limit and 36dB or more below the Average limit.

Neutral Line Measurements were made with the EUT in Mode 1.

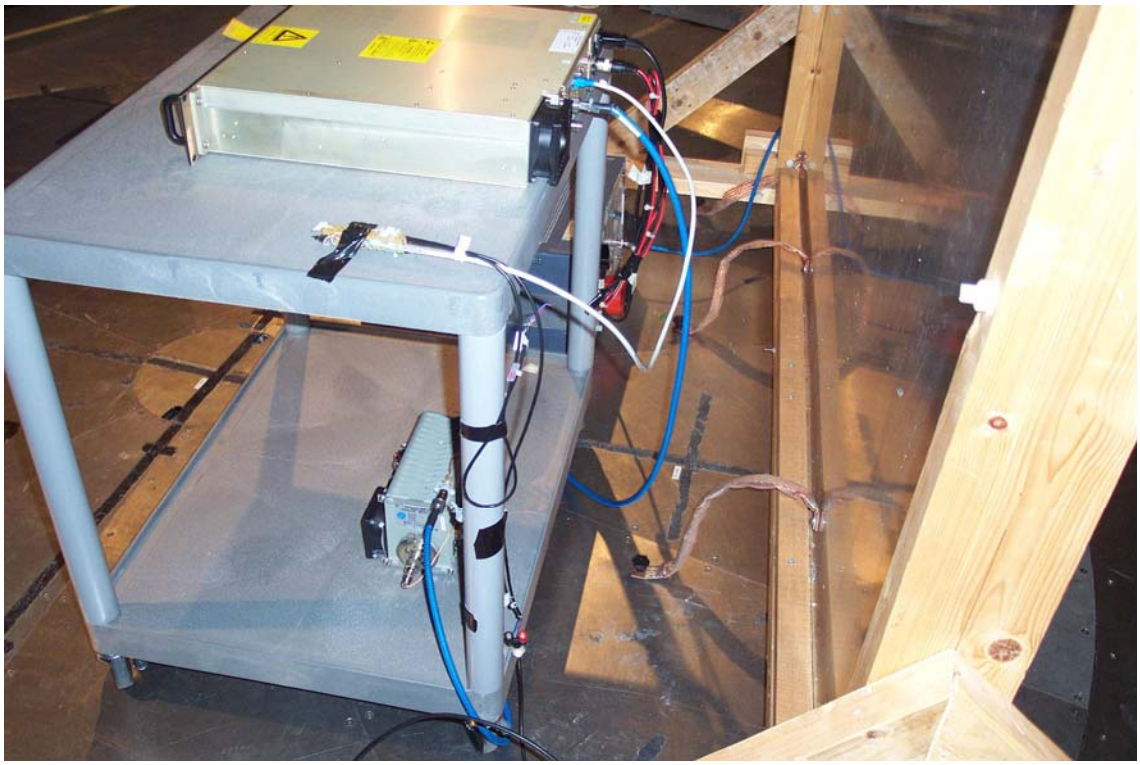
Top Channel Tx: 136.975MHz

Emission Frequency MHz	Quasi-Peak Level dBµV	Quasi-Peak Limit dBµV	Average Level dBµV	Average Limit dBµV
0.1613	37.3	65.4	30.4	55.4
0.1885	39.7	64.1	39.3	54.1
0.2110	53.0	63.2	46.6	53.2
0.2439	19.7	62.0	17.6	52.0
0.3156	25.1	59.8	22.3	49.8

The margin between the specification requirements and all other emissions were 42dB or more below the specified Quasi-Peak limit and 34dB or more below the Average limit.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.7 **Setup Photograph –** continued



Conducted Emissions Setup Photograph

2.3 SPURIOUS RADIATED EMISSIONS

2.3.1 Specification Reference

FCC CFR 47: Part 87.139

2.3.2 Equipment Under Test

Park Air Electronics T6T VHF Transmitter

2.3.3 Date of Test

10th January 2005

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.3” within the Test Equipment Used table shown in Section 3.1.

2.3.5 Test Procedure

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1.4GHz were then formally measured using a Peak detector (120kHz Detector Bandwidth).

The emissions were then substituted and the ERP result compared against an ERP limit of -13dBm.

The measurements and all substitutions were performed at a 3m distance. The height of the substitution antenna was fixed at 150cm.

Note: in the range 300MHz - 1.4GHz, a 300MHz High Pass Filter was placed into the Measurement System.

2.3 SPURIOUS RADIATED EMISSIONS - continued

2.3.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 87.139 for Spurious Radiated Emissions (30MHz – 1.4GHz).

Measurements with the EUT in Mode 1.

The levels of the highest emissions measured in accordance with the specification are presented below:

Bottom Channel Tx: 118.00MHz

Emission Frequency	Polarity	Height	Azimuth	Raw Peak	ERP Final	Specification Limit
MHz		cm	Degrees	dBm	dBm	dBm
236.00	V	100	333	-81.6	-45.9	-13.0
354.00	H	100	0	-71.4	-45.8	-13.0

Middle Channel Tx: 127.50MHz

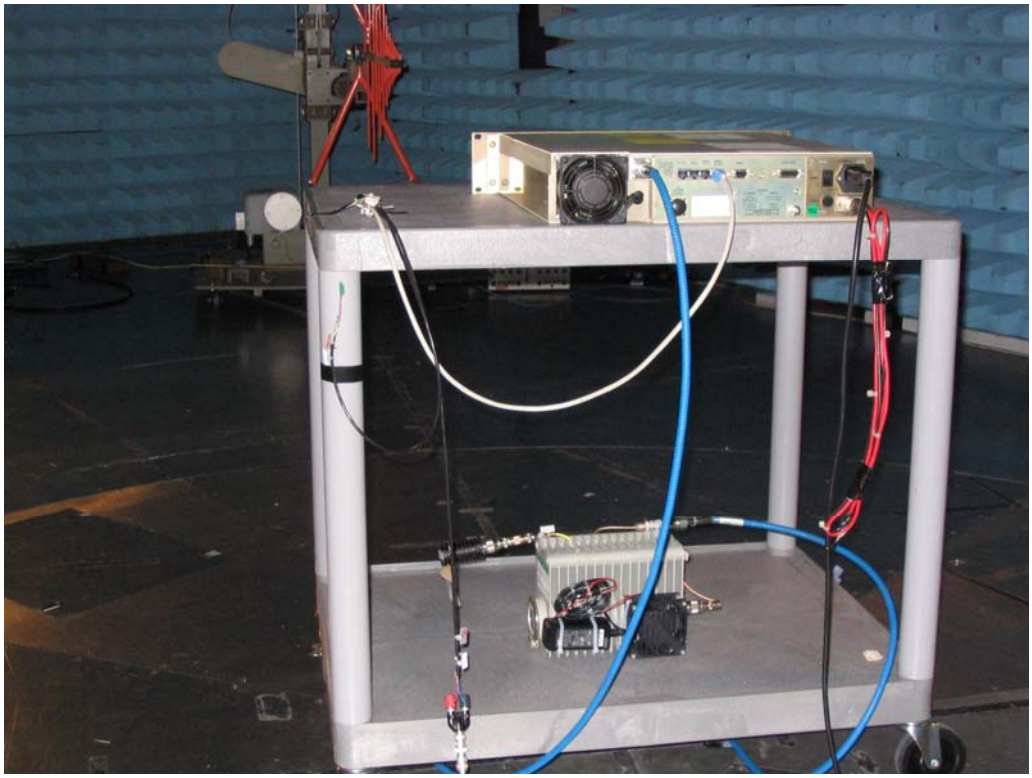
Emission Frequency	Polarity	Height	Azimuth	Raw Peak	ERP Final	Specification Limit
MHz		cm	Degrees	dBm	dBm	dBm
143.75	V	100	45	-79.4	-51.8	-13.0
255.00	H	137	126	-79.8	-57.5	-13.0
382.50	V	100	0	-74.1	-47.7	-13.0

Top Channel Tx: 136.975MHz

Emission Frequency	Polarity	Height	Azimuth	Raw Peak	ERP Final	Specification Limit
MHz		cm	Degrees	dBm	dBm	dBm
143.73	V	100	88	-79.2	-51.9	-13.0
273.96	H	100	247	-82.9	-60.4	-13.0
410.93	V	100	220	-77.7	-49.8	-13.0

2.3 SPURIOUS RADIATED EMISSIONS - continued

2.3.7 Test Setup Photographs



2.4 OCCUPIED BANDWIDTH

2.4.1 Specification Reference

Section 2.1049(c)(1)/ FCC Part 87.135 / Part 87.137

2.4.2 Equipment Under Test

Park Air Electronics T6T VHF transmitter

2.4.3 Date of Test

22nd December 2004

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.4” within the Test Equipment Used table shown in Section 3.1.

2.4.5 Test Procedure

The EUT is declared as having a class of emission A3E, which dictates an emission designator of 6K00A3E, which from 87.137(a) equates to an authorised bandwidth of 25kHz.

Initially, the EUT was connected via a 40dB attenuator to a modulation analyser, which was set to measure modulation depth. The EUT was set to transmit and the audio input frequency to the EUT was varied between 300Hz and 5kHz. The modulation depth was monitored and the frequency, which yielded the highest level of modulation, was 980Hz. Thus, the audio analyzer was set to supply the EUT with an audio tone of 980Hz at an amplitude which produced a modulation depth of 50%. The level was then increased on the audio analyser by 16dB.

The modulation analyser was then replaced with a spectrum analyser and the 99% bandwidth was measured. The measurements were performed on the bottom, middle and top channels.

2.4.6 Test Results

Channel Number/ Frequency	Power Level W	Result kHz	Authorized Bandwidth kHz
118 MHz	50	2.1146	25
127.5 MHz	50	2.1112	25
136.975 MHz	50	2.0690	25

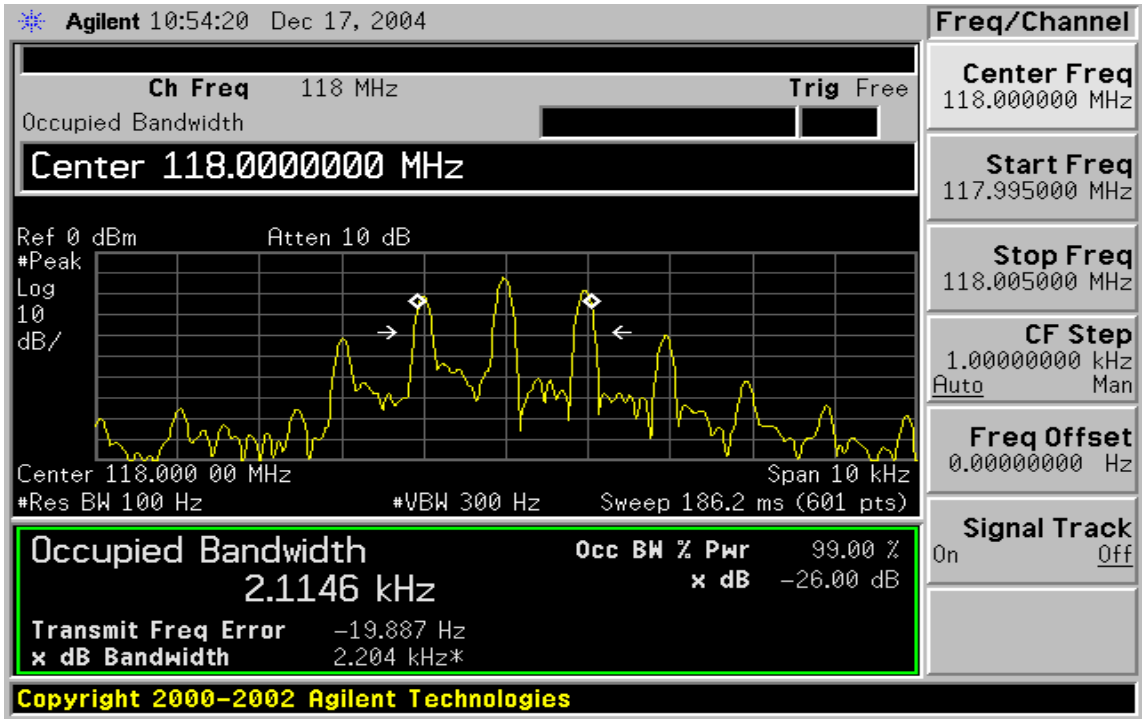
Limit	≤25kHz

See Test results Plots overleaf.

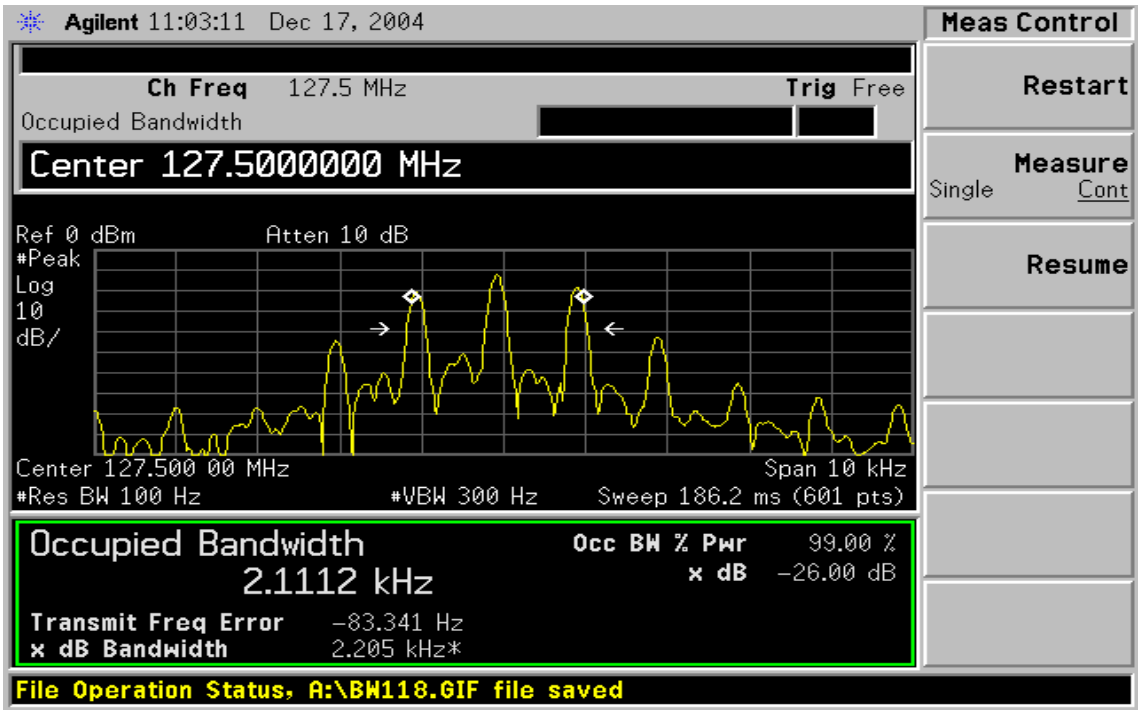
2.4 OCCUPIED BANDWIDTH

2.4.6 Test Results (Continued)

118MHz Maximum Power



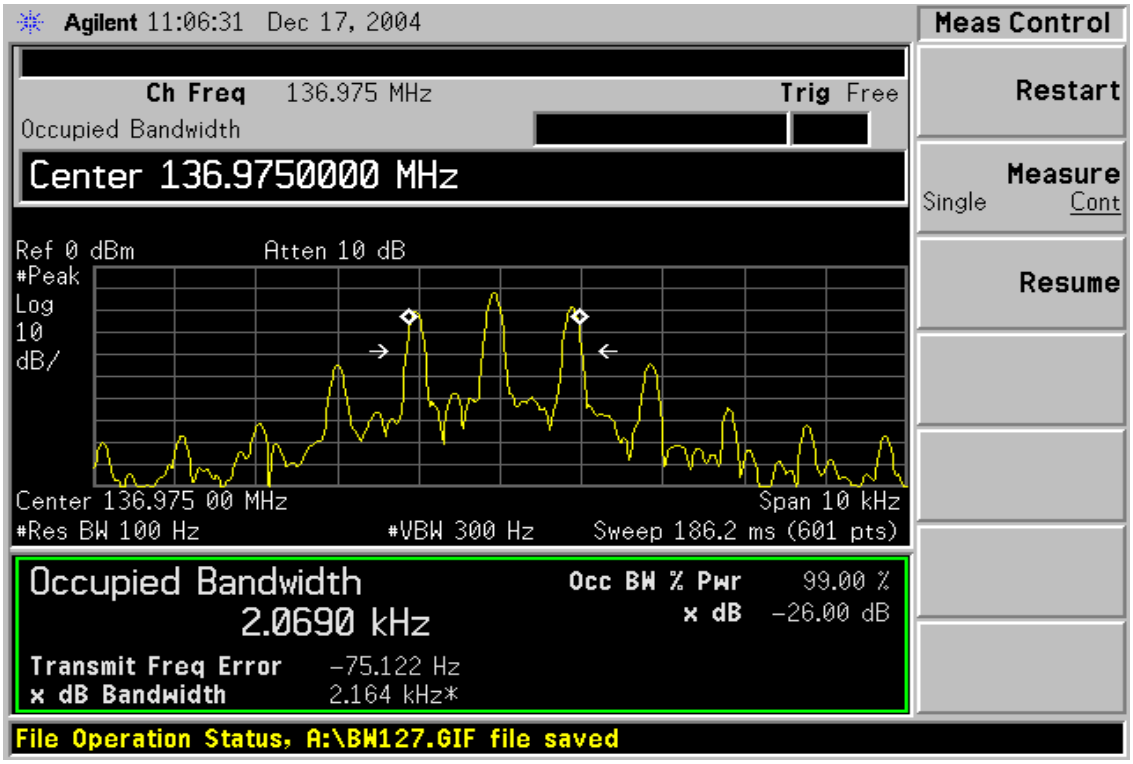
127.5MHz Maximum Power



2.4 OCCUPIED BANDWIDTH

2.4.6 Test Results (Continued)

136.975MHz Maximum Power



2.5 MODULATION CHARACTERISTICS

2.5.1 Specification Reference

Section 2.1047/ Part 87.141

2.5.2 Equipment Under Test

Park Air Electronics T6T VHF Transmitter

2.5.3 Date of Test

22nd December 2004

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.5” within the Test Equipment Used table shown in Section 3.1.

2.5.5 Test Procedure

2.1047(a)

The EUT was connected to the modulation analyser via a 40dB attenuator. The modulation analyzer was set to measure AM. Using an audio analyser, an audio tone of 2500Hz was input into the EUT and the amplitude was adjusted to give a modulation depth of 80%. The demodulated audio from the modulation analyzer was fed back into the measuring section of the audio analyser, which was adjusted to measure rms voltage. The audio analyser output frequency was then adjusted between 100Hz and 5000Hz and the demodulated audio from the modulation analyser was measured and recorded. The results are shown in the table below. The test was performed on the centre channel at the maximum power output level.

2.5 MODULATION CHARACTERISTICS

2.5.6 Test Results

2.1047(a)

Modulating Frequency Hz	Demodulated Audio Voltage (V)
	Channel (Middle)
100	0.00361
200	0.00360
300	0.49900
400	0.61400
500	0.55800
1000	0.58200
1500	0.56900
2000	0.56700
2500	0.55700
3000	0.53800
3500	0.42200
4000	0.00358
4500	0.00358
5000	0.00358

2.5 MODULATION CHARACTERISTICS - continued

2.5.6 Test Results

2.1047(b)

The EUT was connected to the modulation analyser via a 40dB attenuator. The modulation analyser was set to measure AM. The demodulated audio input from the modulation analyser was connected to the audio analyser input. A range of test voltages was established to show the limiting characteristics of the EUT's modulating circuitry. With the voltage range determined, the modulating frequency to the EUT from the audio analyser was varied over the range 300Hz to 5kHz. The EUT was tested on the centre channel at its maximum output power level. The test results are shown below.

350Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	53.7
95	78.3
100	82.4
105	86.3
110	86.9
115	87.1
125	87.1
150	87.5

600Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	57.2
95	74.6
100	78.4
105	82.3
110	82.8
115	82.8
125	83.1
150	83.6

2.5 MODULATION CHARACTERISTICS - continued

2.5.6 Test Results

2.1047(b)

1000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	53.1
95	77.3
100	81.3
105	84.5
110	84.6
115	84.7
125	84.9
150	85.3

2000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	52.0
95	75.6
100	79.5
105	81.6
110	81.4
115	81.7
125	81.8
150	82.1

2.5 MODULATION CHARACTERISTICS - continued

2.5.6 Test Results

2.1047(b)

3000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	49.4
95	71.7
100	75.4
105	77.4
110	77.4
115	77.7
125	77.8
150	78.1

4000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	0.16
95	0.16
100	0.16
105	0.16
110	0.16
115	0.16
125	0.16
150	0.16

2.5 MODULATION CHARACTERISTICS - continued

2.5.6 Test Results

2.1047(b)

5000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	0.16
95	0.16
100	0.16
105	0.16
110	0.16
115	0.16
125	0.16
150	0.16

87.141(a)

The EUT was connected to the modulation analyzer via a 40dB attenuator. The modulation analyzer was set to measure AM. The frequency for which a constant given input yielded the highest depth of modulation as determined in 2.1049(c). This frequency was 980Hz. The input level to the EUT was increased and the depth of modulation was monitored.

Test Frequency Hz	Maximum Modulation Depth (%)
980	87.8

Limit for Maximum Modulation Depth	<100%

2.6 FREQUENCY STABILITY

2.6.1 Specification Reference

Part 87.133 (a) (5)

2.6.2 Equipment Under Test

Park Air Electronics T6T VHF Transmitter

2.6.3 Date of Test

14th October 2003

2.6.4 Test equipment used

The major items of test equipment used for the above tests are identified as “Section 2.6” within the Test Equipment Used table shown in Section 3.1.

2.6.5 Test Procedure

The EUT was transmitted without modulation and the frequency error was measured using a frequency counter. The measurement was repeated at minimum and maximum voltage extremes and at minimum and maximum temperature extremes.

2.6.6 Test Results

EUT complies with Part 87.133 (a) (5)

Test Conditions		Frequency Drift (Hz)		
		118 MHz	127.5 MHz	136.975 MHz
T_{nom} (+20ºC)	V_{nom} (120 V ac)	+33	+42	+35
	V_{min} (102 V ac)	+32	+49	+35
	V_{max} (138 V ac)	+33	+39	+34
T_{min} (-20ºC)	V_{nom} (120 V ac)	-102	-111	-121
T_{max} (+55ºC)	V_{nom} (120 V ac)	+31	+28	+29

Limit	± 20 ppm or 2.36kHz

2.7 TRANSMITTER OUTPUT POWER

2.7.1 Specification Reference

Part 87.131

2.7.2 Equipment Under Test

Park Air Electronics T6T VHF Transmitter

2.7.3 Date of Test

15th October 2003 and 1st July 2005

2.7.4 Test equipment used

The major items of test equipment used for the above tests are identified as “Section 2.7” within the Test Equipment Used table shown in Section 3.1.

2.7.5 Test Procedure

The EUT was connected to a spectrum analyser via 30 dB of attenuation. The EUT was set to transmit on maximum power with an un-modulated carrier. A modulation analyser was used to measure the mean output power as defined in 87.131.

2.7.6 Test Results

EUT complies with Part 87.131

Test Conditions		Transmitter Output Power (dBm)		
		118 MHz	127.5 MHz	136.975 MHz
T_{nom} (+20ºC)	V_{nom} (120 V 60Hz)	48.98	48.76	49.24

Additional testing to cover extended Frequency Range

Test Conditions		Transmitter Output Power (dBm)	
		112.0MHz	155.975MHz
T_{nom} (+20ºC)	V_{nom} (120 V 60Hz)	47.13	47.04

Limit	200 W or 53dBm

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.1 Specification Reference

FCC Part 87.139 (c) (3)

2.8.2 Equipment Under Test

Park Air Electronics T6T VHF Transmitter

2.8.3 Date of Test

14th July 2005 and 23rd September 2005

2.8.4 Test equipment used

The major items of test equipment used for the above tests are identified as “Section 2.8” within the Test Equipment Used table shown in Section 3.1.

2.8.5 Test Procedure

The transmitter output power was reduced using an attenuator and the frequency spectrum investigated from 9 kHz to 1.4 GHz. The EUT was set to transmit on full power. The audio frequency which gave the maximum modulation depth was established. At this frequency, the audio input signal level was adjusted to produce 50% modulation. The input signal to provide 50% modulation was then increased by 16dB for the whole test. The resolution and video bandwidths were set to 300Hz for inband measurements. This was the minimum possible bandwidth that could be set as close to 1% of the emission bandwidth of 7kHz. All other out of band measurements were made with a 3kHz resolution bandwidth. The video bandwidth was set to at least 3 times the resolution bandwidth for all measurements. The spectrum analyser detector was set to average.

The maximum path loss across each measurement band was used as the reference level offset to ensure worst case.

2.8.6 Test Results

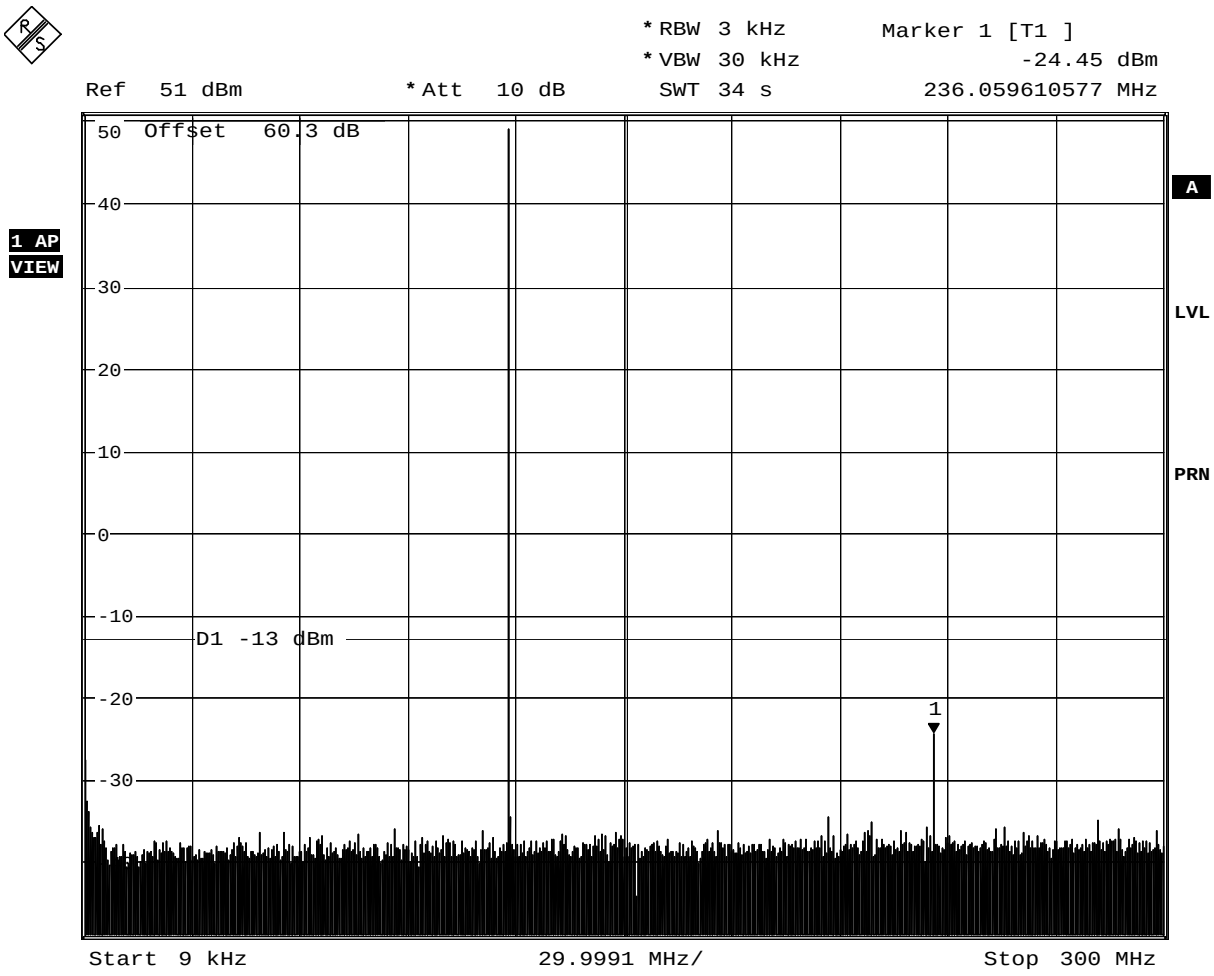
EUT complies with FCC Part 87.139 (c) (3).

The plots recorded are shown on the following pages.

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)
Channel Frequency – 118 MHz

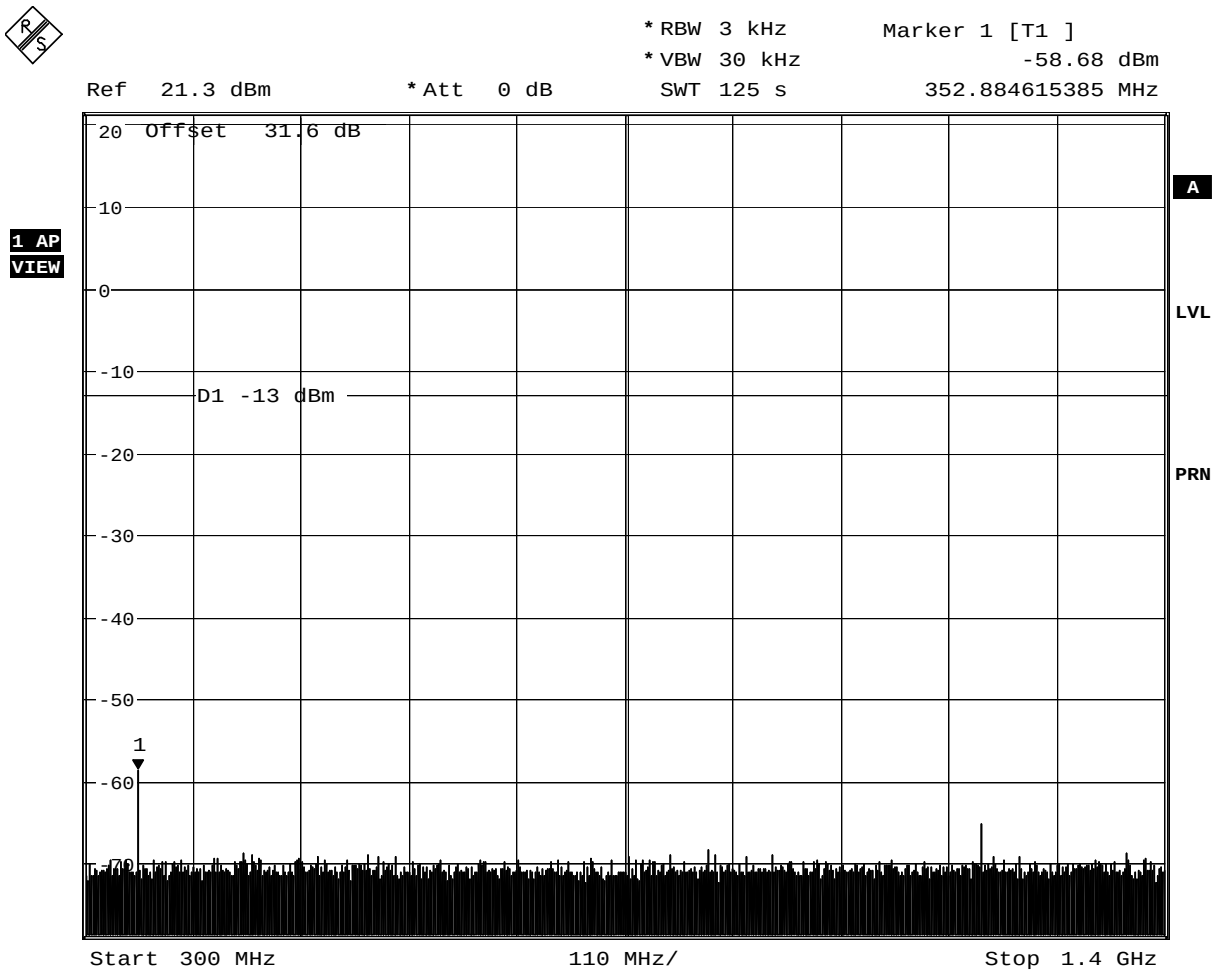


Date: 14.JUL.2005 14:24:03

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)
Channel Frequency – 118 MHz

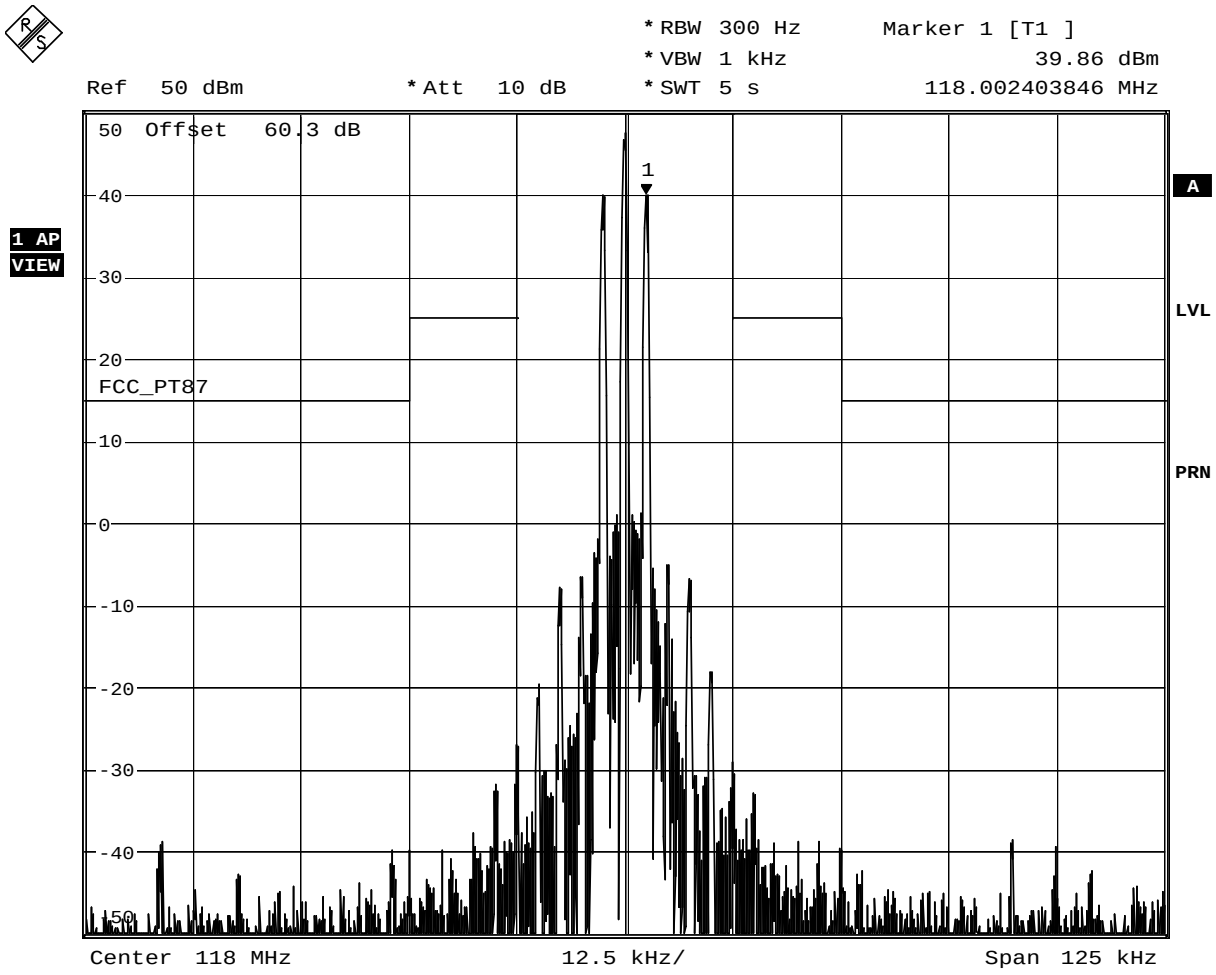


Date: 14.JUL.2005 17:29:19

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)
Channel Frequency – 118 MHz

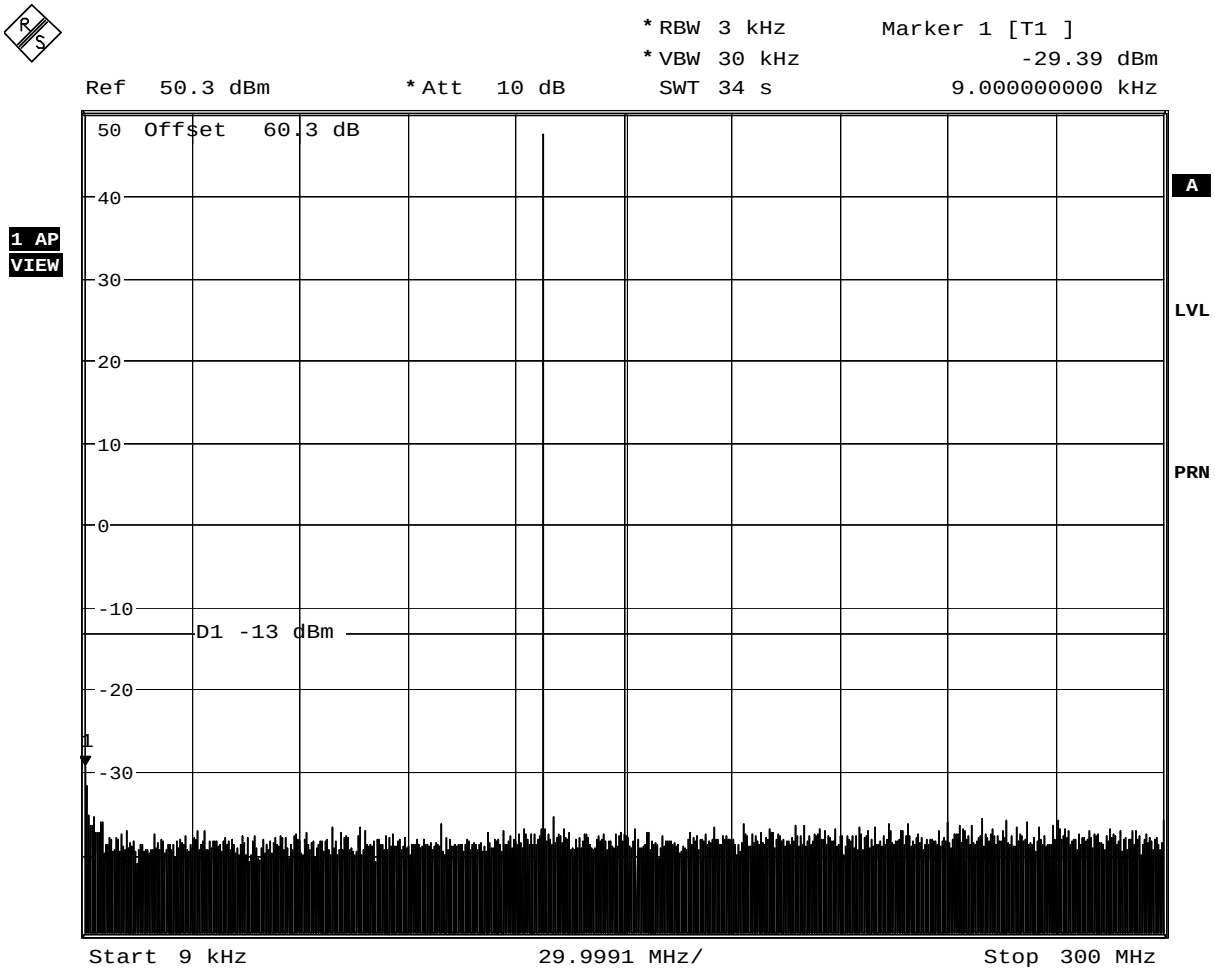


Date: 14.JUL.2005 16:53:36

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)
Channel Frequency – 127.5 MHz

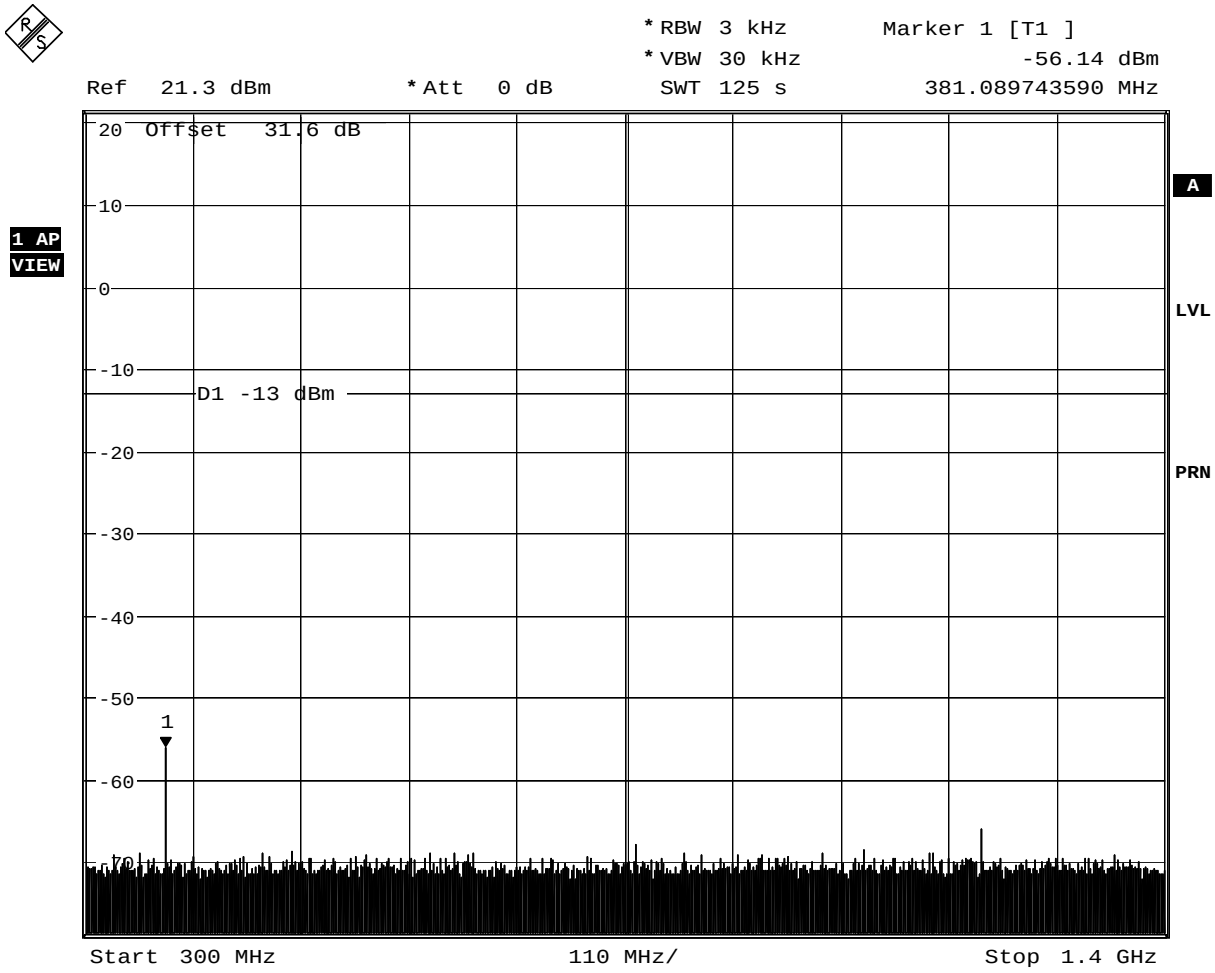


Date: 14.JUL.2005 14:19:18

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)
Channel Frequency – 127.5 MHz

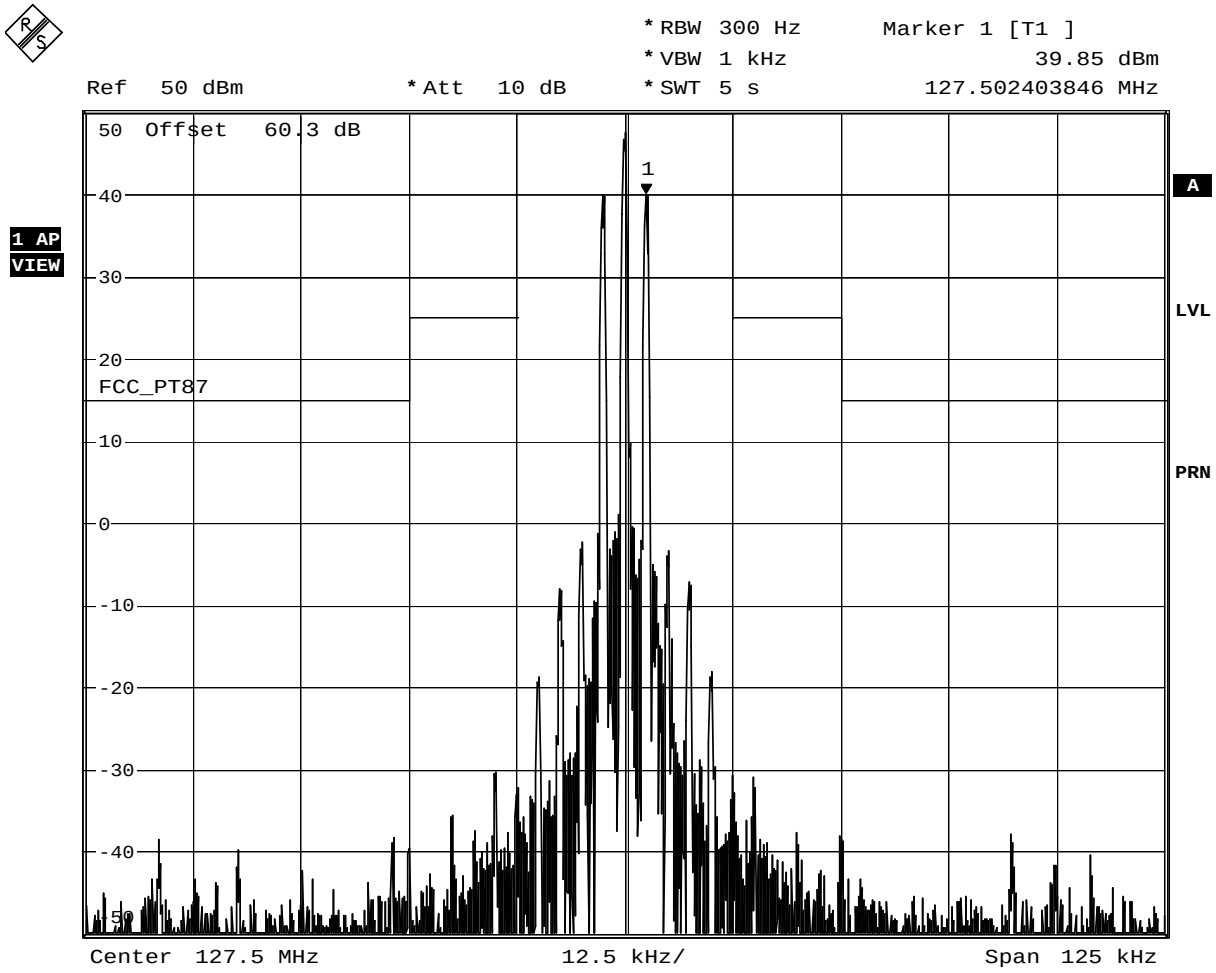


Date: 14.JUL.2005 17:32:04

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)
Channel Frequency – 127.5 MHz

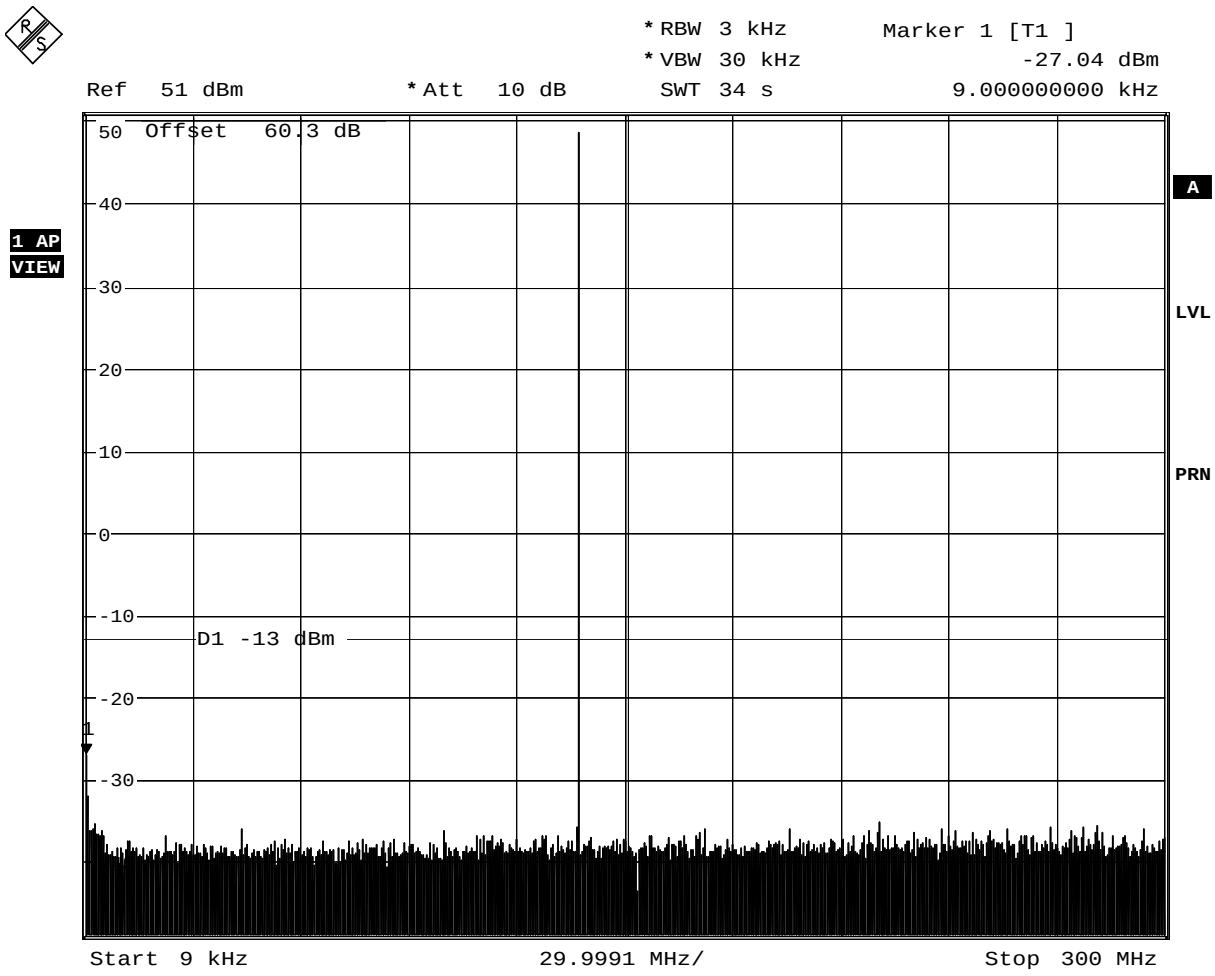


Date: 14.JUL.2005 16:54:45

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)
Channel Frequency – 136.975 MHz

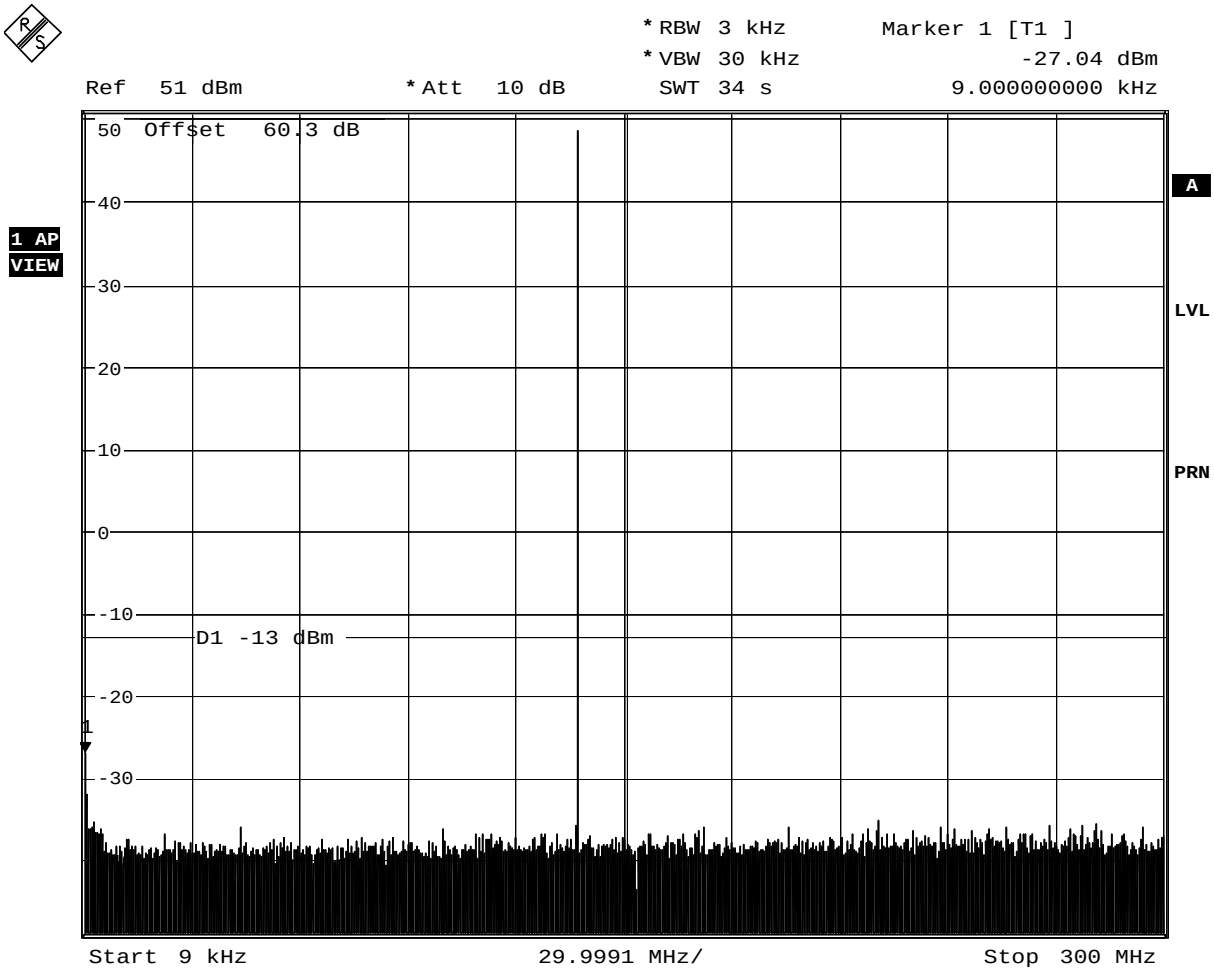


Date: 14.JUL.2005 14:28:52

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)
Channel Frequency – 136.975 MHz

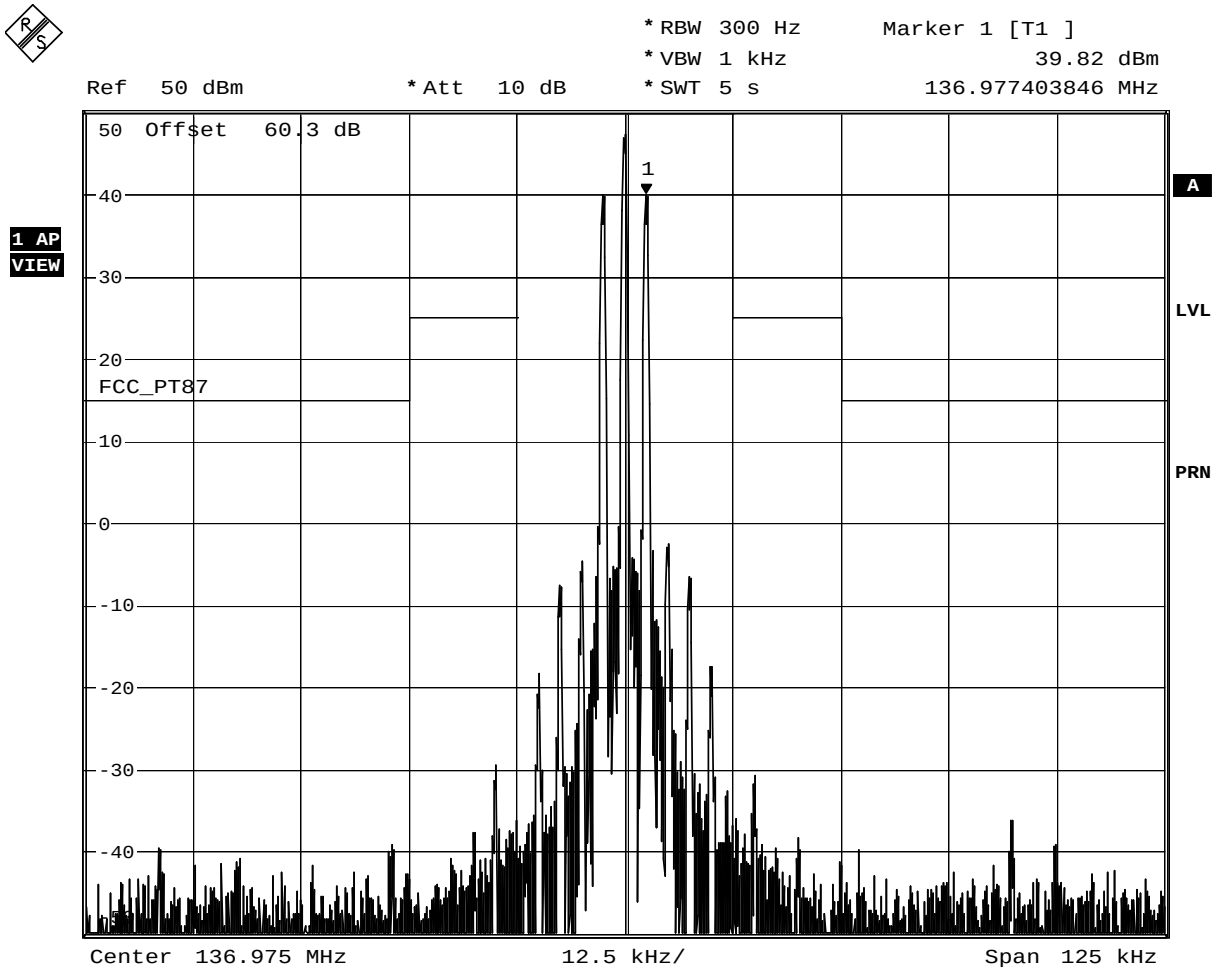


Date: 14.JUL.2005 14:28:52

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)
Channel Frequency – 136.975 MHz

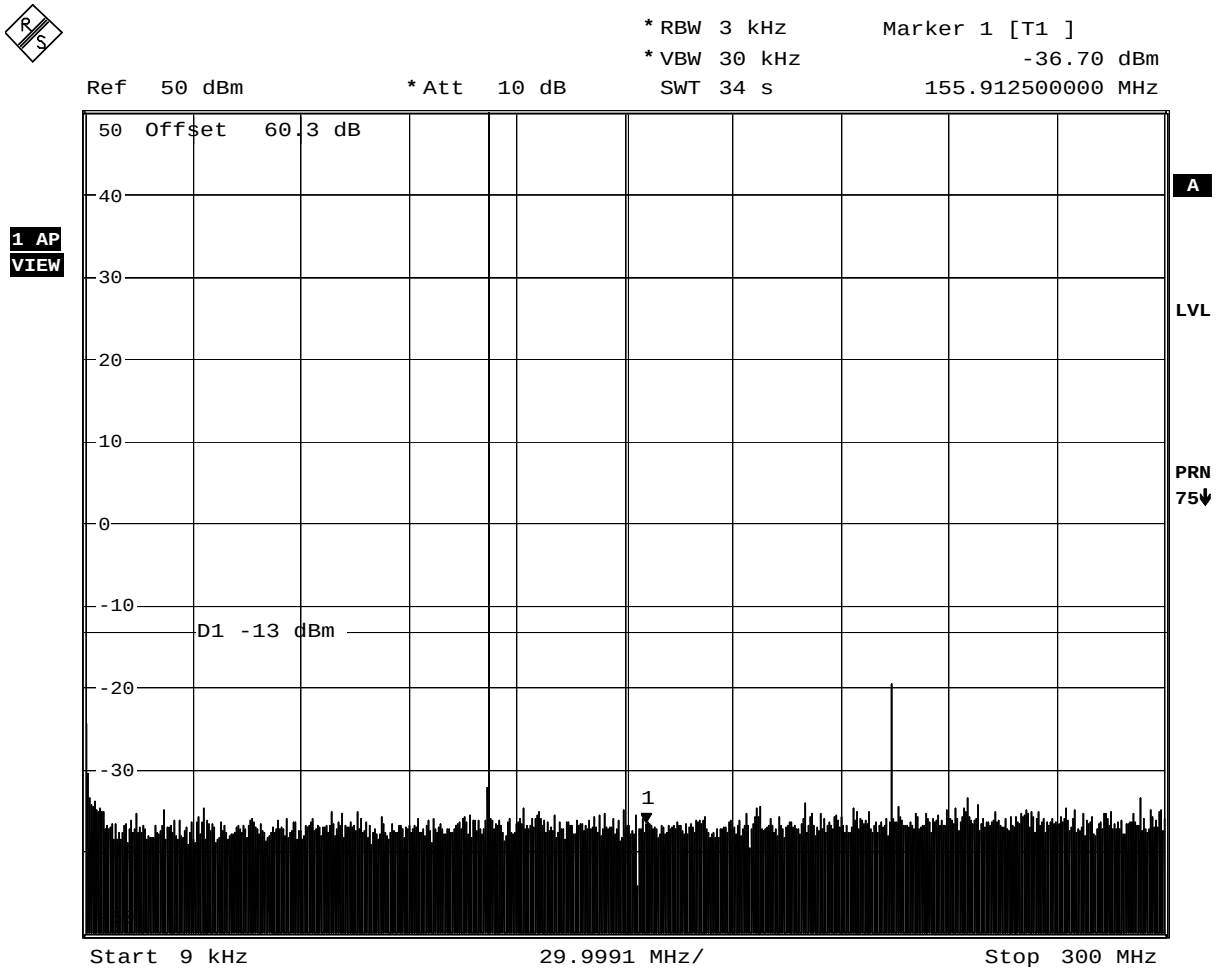


Date: 14.JUL.2005 16:56:21

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)
Channel Frequency – 112 MHz

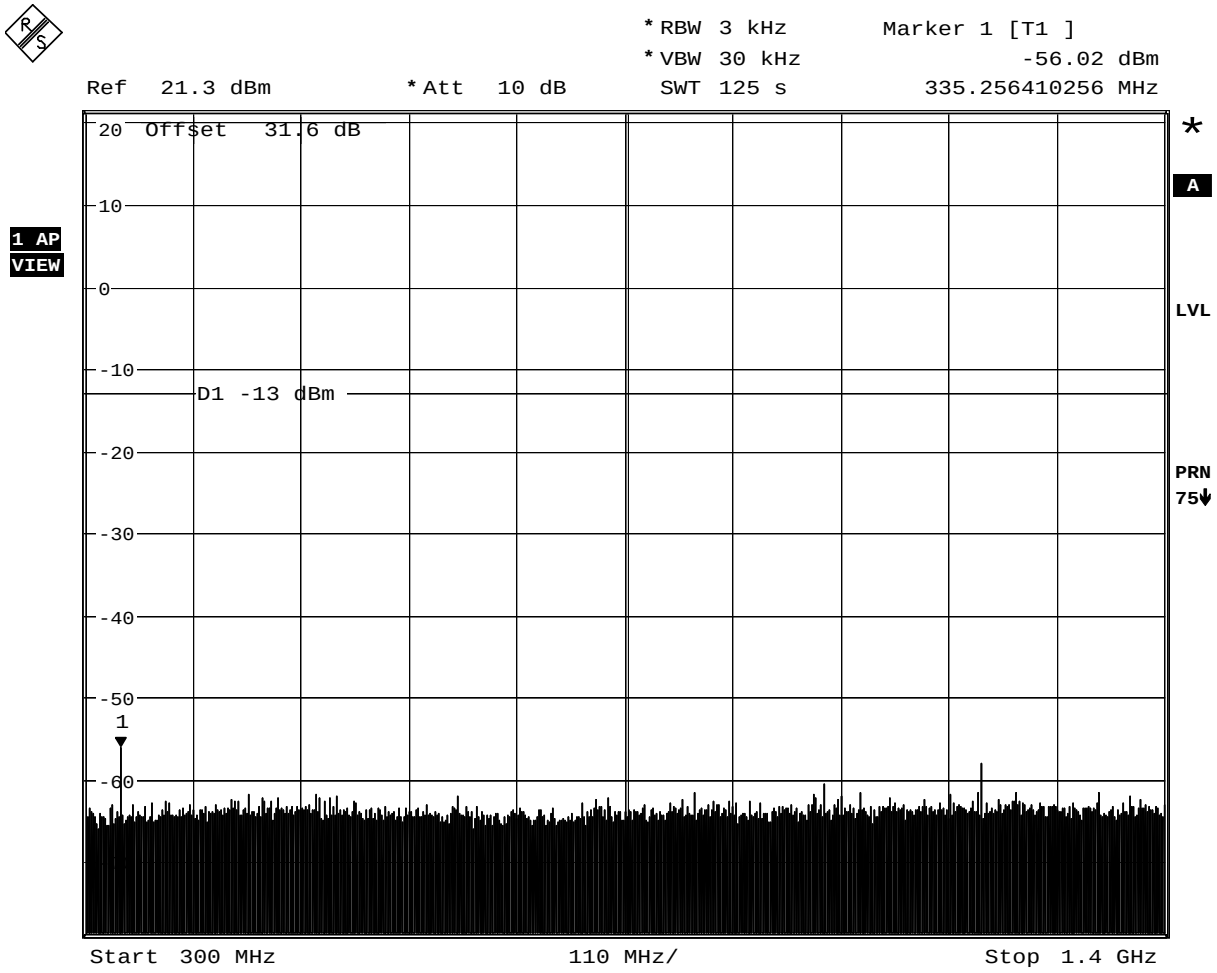


Date: 11.JUL.2005 11:07:05

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)
Channel Frequency – 112 MHz

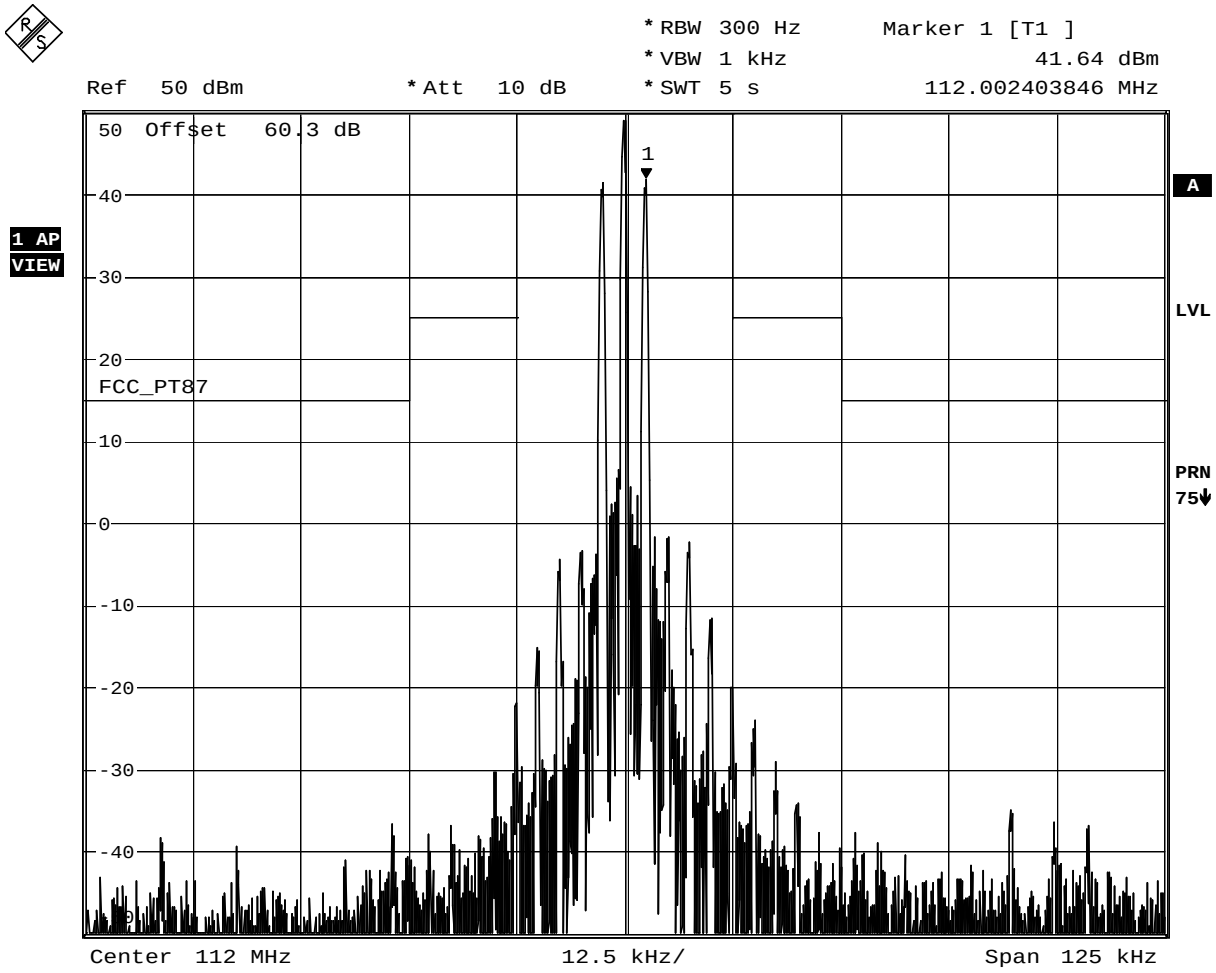


Date: 11.JUL.2005 11:24:00

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)
Channel Frequency – 112 MHz

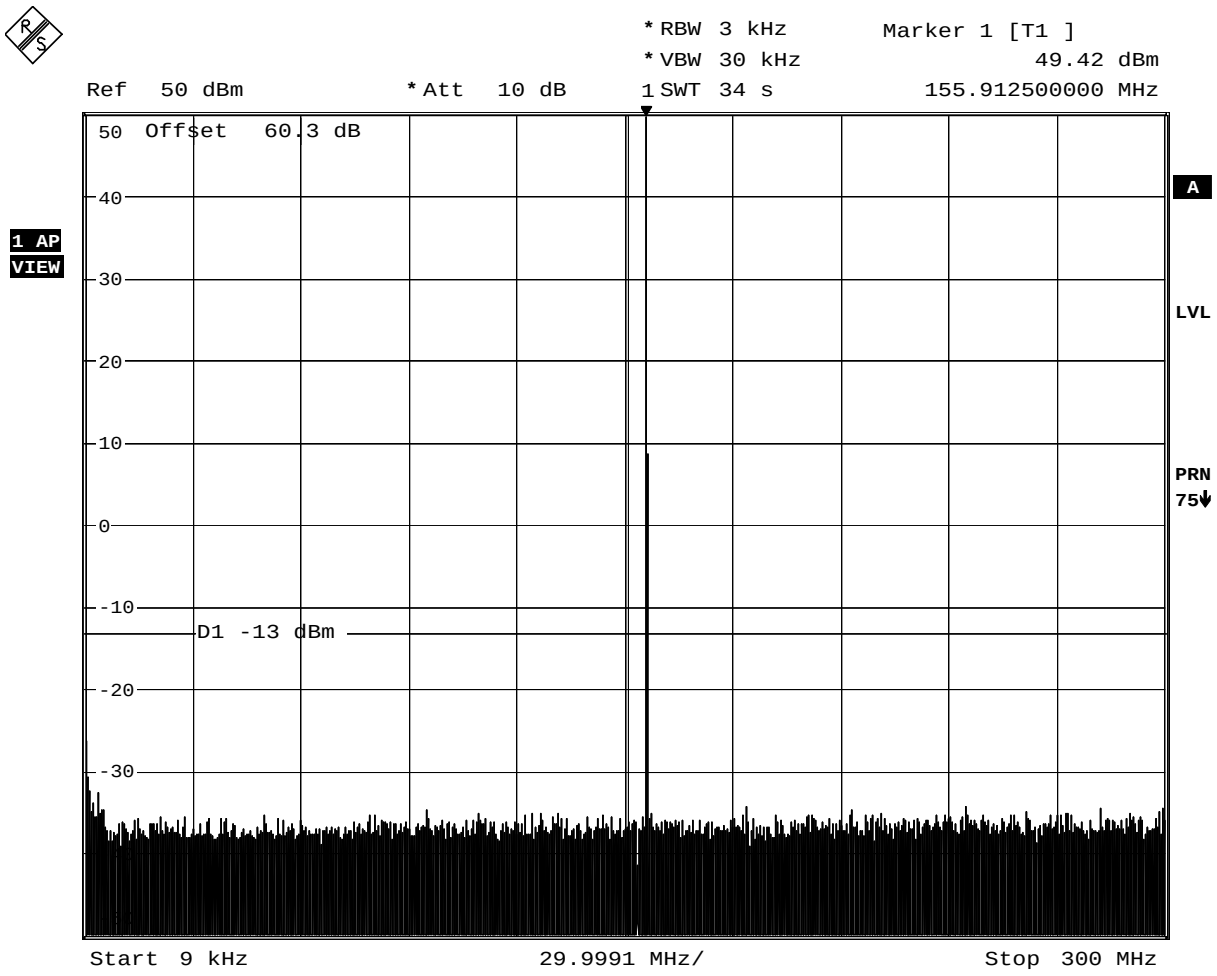


Date: 11.JUL.2005 10:45:12

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)
Channel Frequency – 155.975 MHz

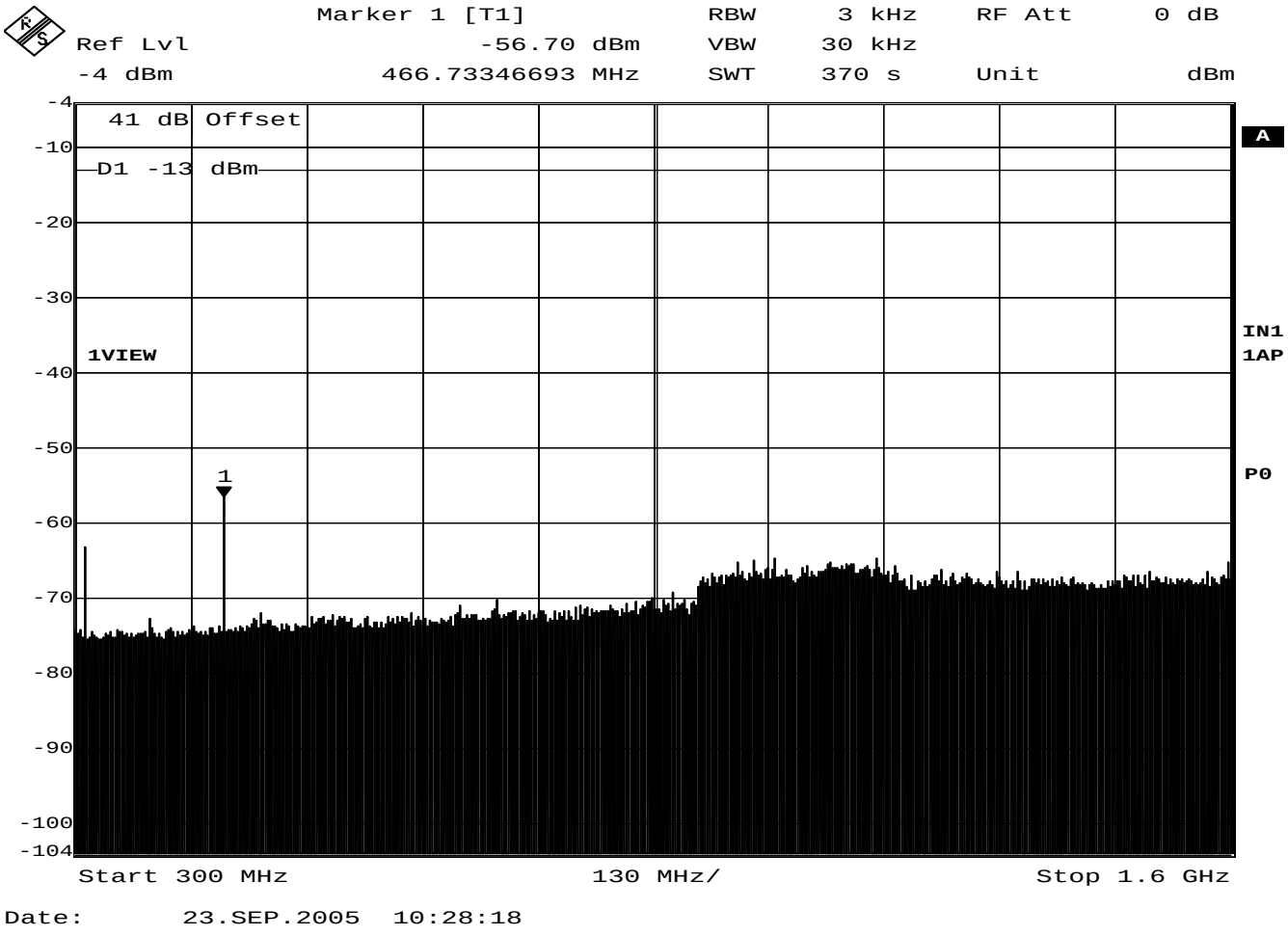


Date: 11.JUL.2005 11:09:04

2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

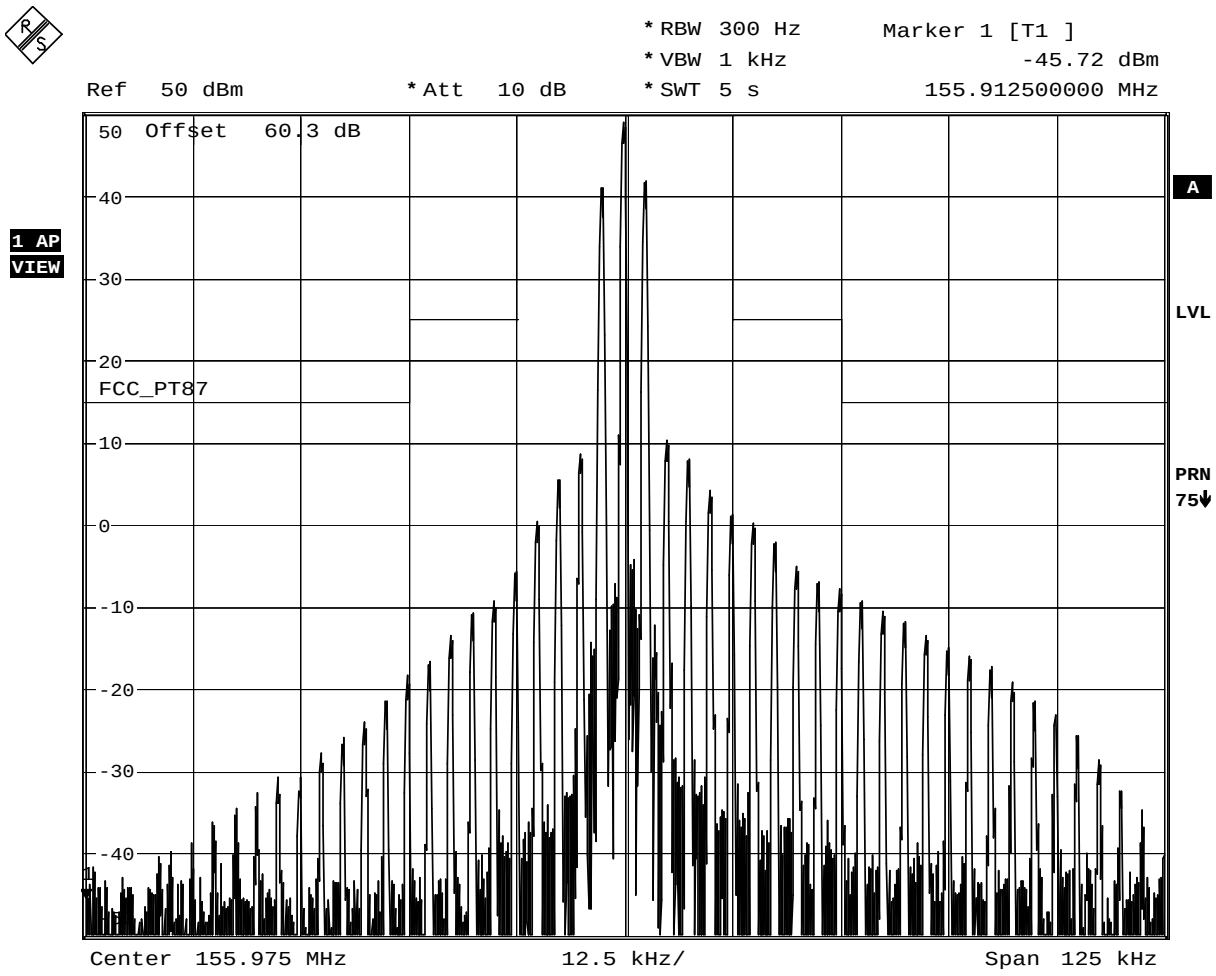
Unwanted Emission (300 MHz – 1600 MHz)
Channel Frequency – 155.975 MHz



2.8 TRANSMITTER UNWANTED EMISSIONS

2.8.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)
Channel Frequency – 155.975 MHz



Date: 11.JUL.2005 10:49:59

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due
Sections 2.1 & 2.3				
Bilog Antenna	Chase	CBL 6143	2965	12/09/05
EMI Test Receiver	Hewlett Packard	8542E	2286	08/05/05
Turntable & Controller	HD Gmbh	HD 050	2528	TU
Antenna Mast	EMCO	1051	2182	TU
Antenna Mast Controller	EMCO	2090	-	TU
Screened Enclosure	Siemens	EAC 54300	2533	TU
50 Ohm Load	Diamond Antenna	DL-30N	2805	23/07/05
50 Ohm Load	Diamond Antenna	DL-30N	3052	18/08/05
High Pass Filter	Mini-Circuits	NHP-300	4986	10/08/05
Bilog Antenna	Chase	CBL 6143	2861	TU
Signal Generator	Marconi	2031	2199	06/10/05
Audio Analyser	Hewlett Packard	8903B	2232	29/09/05
Section 2.2				
Test Receiver	Rohde & Schwarz	ESH3	1020	24/09/05
Spectrum Monitor	Rohde & Schwarz	EZM	1416	TU
LISN	Rohde & Schwarz	ESH2-Z5	1915	28/04/05
Transient Limiter	Hewlett Packard	11947A	2271	19/08/05
Sections 2.4 & 2.5				
Hygrometer	Rotronic	1-1000	N/A	07/04/05
Power Supply Unit	Hewlett Packard	6267B	2333A08844	T/U
Digital Multi Meter	Fluke	77	65540345	12/01/05
Attenuator	Weinschel	45-20-43	MM 919	26/01/05
Attenuator	Weinschel	1	AX8326	15/10/05
Modulation Analyser Sensor	Hewlett Packard	11722A	3111A04314	29/05/05
Modulation Analyser	Hewlett Packard	8901B	3005A02539	02/06/05
Audio Analyser	Hewlett Packard	8903B	2922A06961	29/01/05
Spectrum Analyser	Agilent	E4445A	MY41000154	22/12/04

3.1 TEST EQUIPMENT USED

(Continued)

Instrument/Ancillary	Manufacturer	Type	Serial No.	Cal Due
Sections 2.6, 2.7 (tests performed October 2003)				
Attenuator	Bird	8308-200	NS	21/08/04
Attenuator	Weinschel	47-10-34	AT 4937	08/05/04
Attenuator	Pasternic	PE7004-20	NS	28/07/04
Counter	Hewlett Packard	53181A	KR9120300	-
Hygrometer	Rotronic	I-1000	-	07/04/04
Power Supply	Various	1001TC	7159-7119A	-
Meter	Fluke	87	67990817	28/04/04
Analyser	Hewlett Packard	8903B	2922A06961	28/01/04
Counter	Hewlett Packard	53181A	KR9120300	04/07/03
Signal Generator	Rohde & Schwarz	SMX	883747-69	14/01/04
Sensor	Hewlett Packard	11722A	3111A04314	07/05/04
Chamber	Montford	2F3,BLD 8	-	21/08/03
Temperature Equipment	Fluke	51	73860011	10/12/03
Section 2.8 (tests performed July 2005)				
Audio Analyser	Hewlett Packard	8903B	3011A08238	02/08/2006
Modulation Analyser	Hewlett Packard	8901B	3226A04514	10/01/2006
Power Attenuator 30dB	Rohde & Schwarz	RBU	860950-007	15/10/2005
High Pass Filter	Mini-Circuits	NHP-300	15542	12/08/2006
Spectrum Analyser	Rohde & Schwarz	FSU26	100109	16/12/2005
Sensor	Hewlett Packard	11722A	2716A02675	09/07/2006
Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due
Section 2.8 (test performed September 2005)				
Audio Analyser	Hewlett Packard	8903B	1512	02/08/2006
Modulation Analyser	Hewlett Packard	8901B	1986	10/01/2006
Power Attenuator 30dB	Rohde & Schwarz	RBU	Inv 2506	15/10/2005
High Pass Filter	Mini-Circuits	NHP-300	Inv 4986	12/08/2006
Spectrum Analyser	Rohde & Schwarz	FSU26	Inv 4989	16/12/2005
Sensor	Hewlett Packard	11722A	Inv 1873	09/07/2006

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 2GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Frequency Stability	Frequency	±46.28Hz
Transmitter Output Power	Amplitude	±0.47dB
Transmitter Unwanted Emission	Amplitude	±1.94dB

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

* In accordance with CISPR 16-4

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 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).

APPENDIX A

TITCHFIELD FCC SITE COMPLIANCE LETTER

ANNEX A TITCHFIELD FCC SITE COMPLIANCE LETTER

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

October 18, 2002

Registration Number: 90987

TUV Product Service Ltd
Segensworth Road
Titchfield
Fareham, Hampshire, PO15 5RH
United Kingdom
Attention: Kevan Adsetts

Re: Measurement facility located at Titchfield
Anechoic chamber (3 meters) and 3 & 10 meter OATS
Date of Listing: October 18, 2002

Gentlemen:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Thomas W Phillips
Electronics Engineer