
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 T6TR VHF Transceiver

FCC ID: C8LB6550-S2

Report No OR613603/03 Issue 3

September 2005

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Report No OR613603/03 Issue 3

September 2005

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DATED

29th September 2005

DISTRIBUTION

Park Air Systems Limited

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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:


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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 T6TR VHF Transceiver



1.1 STATUS

EQUIPMENT UNDER TEST	Park Air Systems T6TR VHF Transceiver
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	T6TR
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 30 th November 2004
START OF TEST	23 rd September 2005
FINISH OF TEST	8 th July 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 verification of compliance of the Park Air Systems T6TR VHF Transceiver 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	15.109	Spurious Radiated Emissions	Pass	
2.2	15.207	Conducted Emissions on Power Lines	Pass	
2.3	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	Section 2.1046/Part 87.131	Output Power	Pass	
2.7	Section 2.1053.Part 87.139	Transmitter Unwanted Emissions	Pass	
2.8	Section 2.1055/Part 87.133	Frequency Stability	Pass	



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a T6TR VHF multi-mode air traffic control Transceiver. A full technical description can be found in the T6TR Transceiver 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: Receive Mode

The EUT operates between 118.00MHz – 136.975MHz, and for all testing was operated in Receive mode, the middle channel of 127.5MHz was set.

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 ac 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 T6TR VHF Transceiver



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

T6TR

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: Receive 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
173.40	Horizontal	165	117	30.2	32.4	43.5	150.0
175.10	Horizontal	159	117	30.5	33.5	43.5	150.0
177.40	Horizontal	165	112	34.5	53.1	43.5	150.0
179.20	Horizontal	165	112	38.3	82.8	43.5	150.0
181.00	Horizontal	165	112	34.4	52.5	43.5	150.0
181.90	Horizontal	165	112	29.4	29.5	43.5	150.0

The margin between the specification requirements and all other emissions was 14dB or more below the specification limit.

1GHz - 1.4GHz Range

No EUT emissions were detected



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

T6TR

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
0.1520	36.5	65.9	28.6	55.9
0.1602	26.1	65.5	20.7	55.5
0.1757	33.9	64.7	34.2	54.7
0.2125	36.1	63.1	33.2	53.1
0.2524	12.8	61.7	3.7	51.7

The margin between the specification requirements and all other emissions were 48dB or more below the specified Quasi-Peak limit and 44dB 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
0.1500	37.9	66.0	30.0	56.0
0.1753	39.5	64.7	38.7	54.7
0.2124	48.9	63.1	41.9	53.1
0.2501	19.2	61.7	16.9	51.7
0.3195	12.8	59.7	9.5	49.7

The margin between the specification requirements and all other emissions were 46dB or more below the specified Quasi-Peak limit and 40dB 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
0.1500	36.6	66.0	27.3	56.0
0.1589	28.7	65.6	25.0	55.6
0.1758	35.7	64.7	35.5	54.7
0.2125	47.5	63.1	41.0	53.1
1.2151	17.3	56.0	15.1	46.0

The margin between the specification requirements and all other emissions were 40dB or more below the specified Quasi-Peak limit and 49dB 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
0.1516	37.4	65.9	29.9	55.9
0.1756	38.7	64.7	38.3	54.7
0.2126	47.9	63.1	41.1	53.1
0.7284	10.4	56.0	9.7	46.0
1.2155	14.7	56.0	12.6	46.0

The margin between the specification requirements and all other emissions were 45dB or more below the specified Quasi-Peak limit and 36dB 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
0.1572	29.0	65.6	25.0	55.6
0.1762	36.3	64.7	34.4	54.7
0.2127	35.7	63.1	33.0	53.1
0.2528	17.6	61.7	13.4	51.7

The margin between the specification requirements and all other emissions were 44dB or more below the specified Quasi-Peak limit and 38dB or more below the Average limit.

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

Top Channel Tx: 136.975MHz

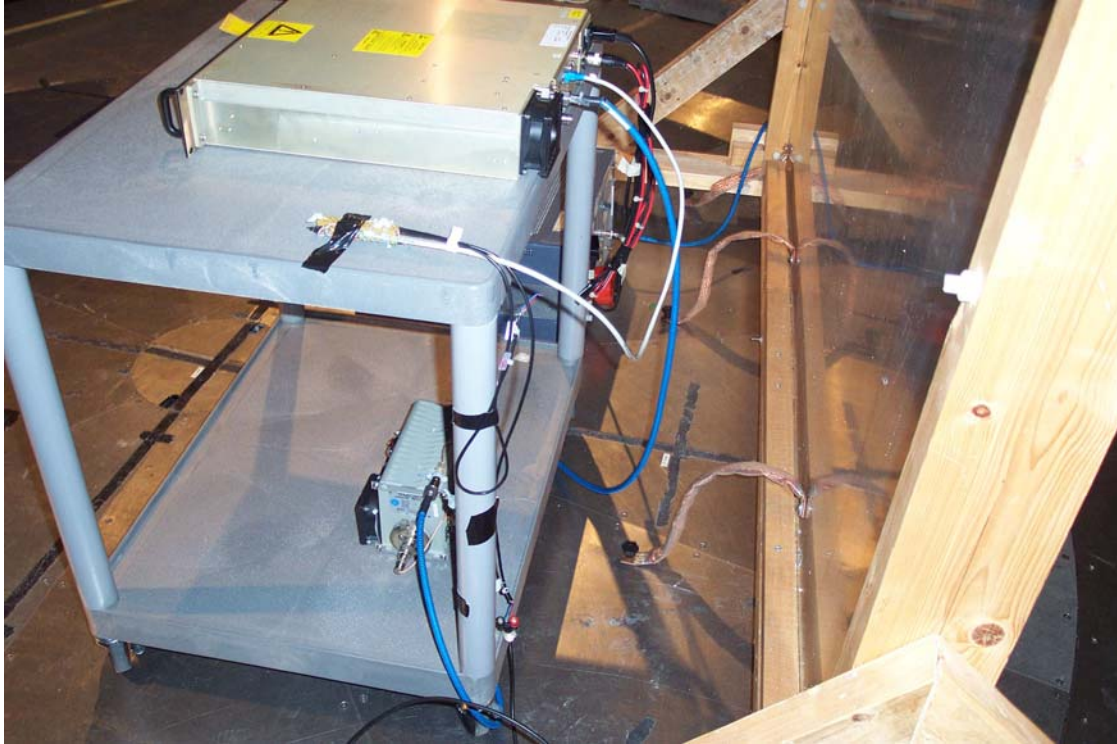
Emission Frequency MHz	Quasi-Peak Level dBμV	Quasi-Peak Limit dBμV	Average Level dBμV	Average Limit dBμV
0.1501	38.2	66.0	30.5	56.0
0.1567	29.6	65.6	25.5	55.6
0.1760	39.8	64.7	38.9	54.7
0.2125	49.0	63.1	41.9	53.1
0.2212	19.0	62.9	12.6	52.9

The margin between the specification requirements and all other emissions were 43dB or more below the specified Quasi-Peak limit and 40dB 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

T6TR

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
186.03	Vertical	100	240	-87.3	-65.1	-13.0
236.00	Vertical	100	199	-83.7	-60.8	-13.0
354.00	Horizontal	100	0	-65.6	-40.0	-13.0

Middle Channel Tx: 127.50MHz

Emission Frequency	Polarity	Height	Azimuth	Raw Peak	ERP Final	Specification Limit
MHz		cm	Degrees	dBm	dBm	dBm
179.21	Horizontal	100	115	-78.4	-58.6	-13.0
255.00	Vertical	100	180	-73.2	-47.8	-13.0
382.50	Horizontal	100	65	-72.1	-46.3	-13.0

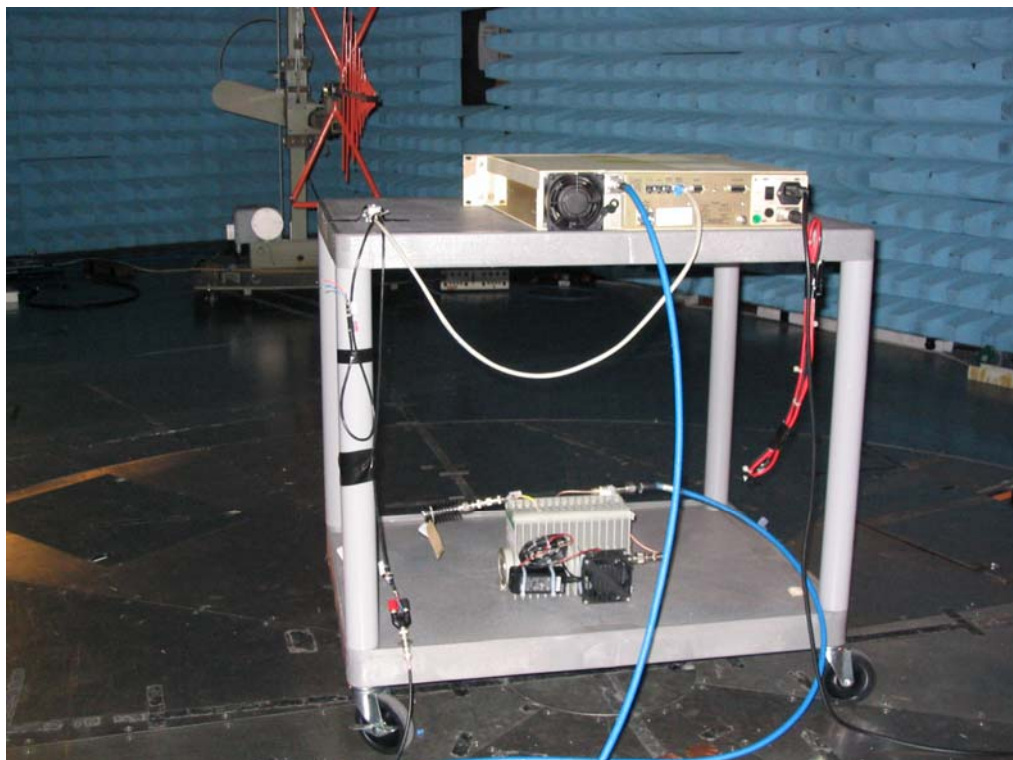
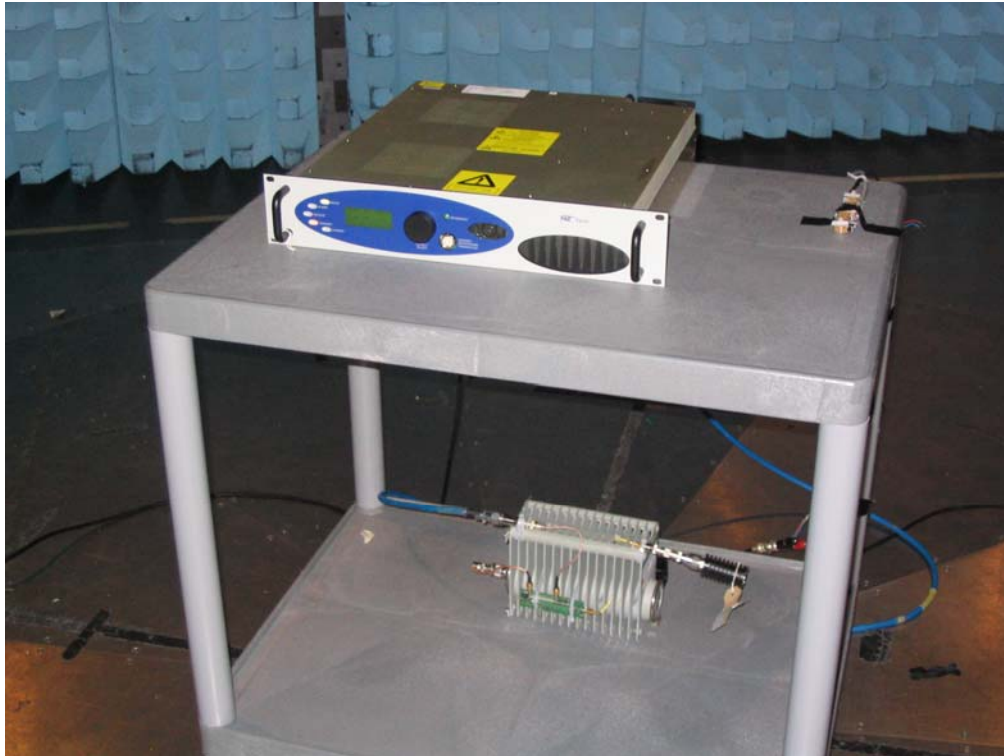
Top Channel Tx: 136.975MHz

Emission Frequency	Polarity	Height	Azimuth	Raw Peak	ERP Final	Specification Limit
MHz		cm	Degrees	dBm	dBm	dBm
179.21	Horizontal	100	115	-77.8	-57.9	-13.0
273.96	Vertical	100	150	-82.6	-59.2	-13.0
410.92	Horizontal	100	30	-58.6	-31.7	-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 T6TR VHF Transceiver

2.4.3 Date of Test

16th 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 analyser 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	25	2.0504	25
127.5 MHz	25	2.0485	25
136.975 MHz	25	2.0493	25

Limit	≤25kHz
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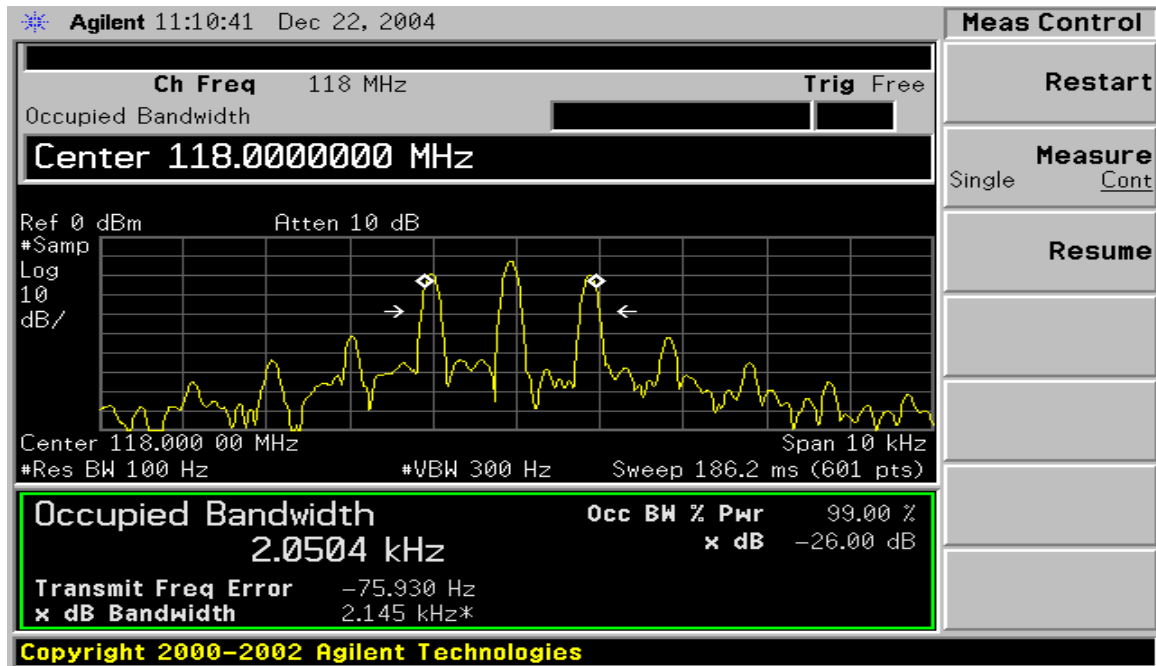
See Test results Plots overleaf.



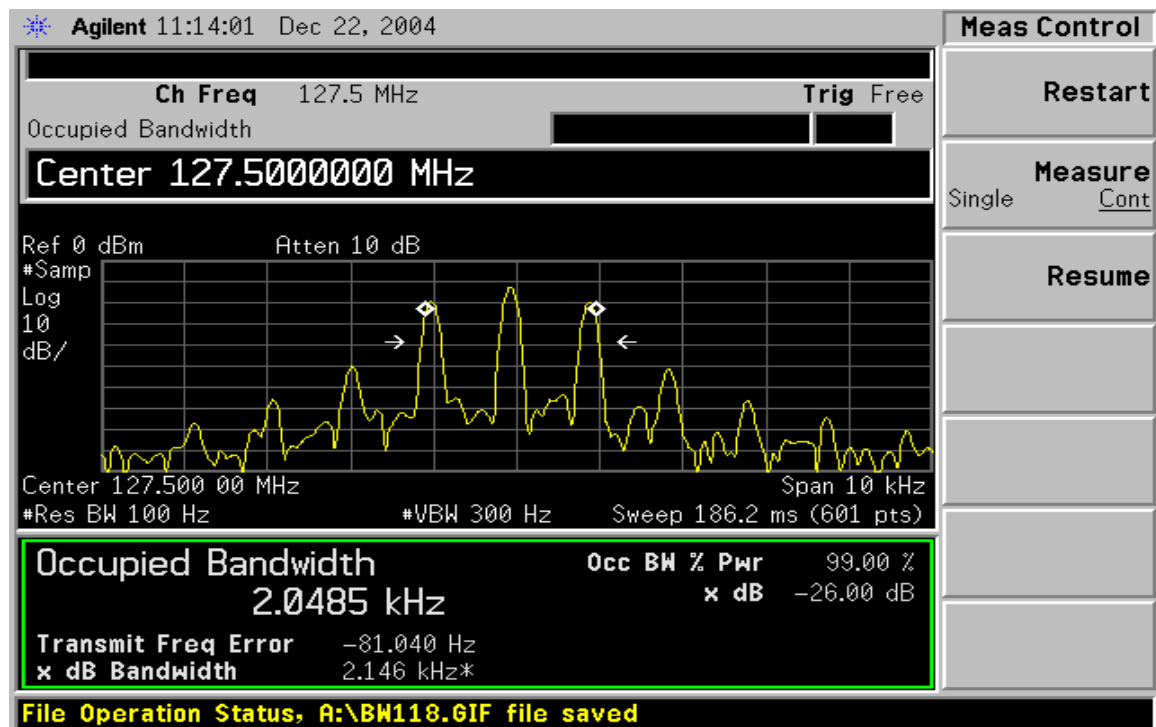
2.4 OCCUPIED BANDWIDTH

2.4.6 Test Results (Continued)

118MHz Maximum Power



127.5MHz Maximum Power

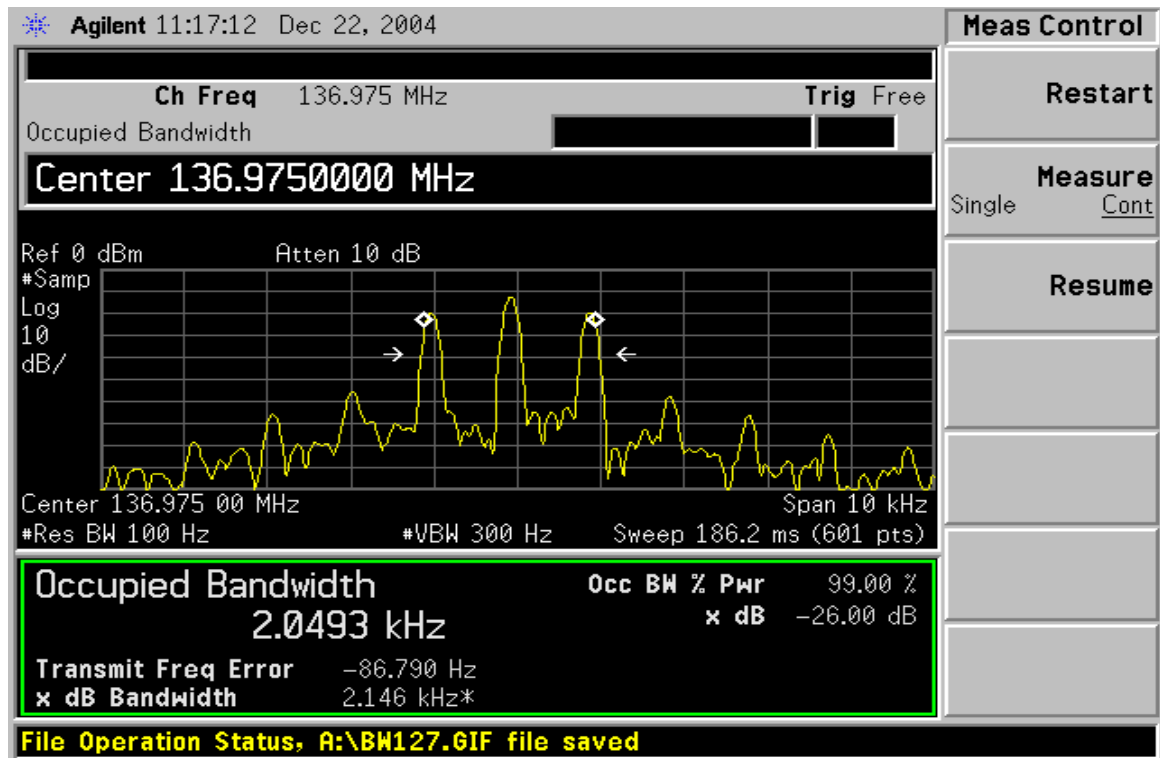




2.4 OCCUPIED BANDWIDTH

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 T6TR VHF Transmitter

2.5.3 Date of Test

16th December 2004

2.5.4 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.

2.5.5 Test Procedure

2.1047(a)

The EUT was connected to the modulation analyzer via a 40dB attenuator. The modulation analyser 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 - continued

2.5.6 Test Results

2.1047(a)

Modulating Frequency Hz	Demodulated Audio Voltage (V)
	Channel (Middle)
100	0.00352
200	1.92100
300	0.53500
400	0.62300
500	0.57100
1000	0.58200
1500	0.57400
2000	0.56900
2500	0.55600
3000	0.54100
3500	0.42400
4000	0.00347
4500	0.00347
5000	0.00349



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	56.1
95	81.6
100	85.8
105	88.4
110	88.5
115	88.6
125	89.0
150	89.3

600Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	51.7
95	57.0
100	77.0
105	82.9
110	84.2
115	84.4
125	84.3
150	84.8



2.5 MODULATION CHARACTERISTICS - continued

2.5.6 Test Results

2.1047(b)

1000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	53.0
95	77.0
100	81.0
105	84.9
110	85.9
115	86.2
125	86.3
150	86.7

2000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	51.7
95	75.3
100	79.2
105	82.8
110	82.9
115	83.2
125	83.3
150	83.7



2.5 MODULATION CHARACTERISTICS - continued

2.5.6 Test Results

2.1047(b)

3000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	49.0
95	71.4
100	75.1
105	78.8
110	78.9
115	79.1
125	79.3
150	79.6

4000Hz

Audio Input Voltage mV	Modulation Depth (%)
	Channel (Middle)
65	0.18
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	0.17
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 analyser 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 400Hz. The input level to the EUT was increased and the depth of modulation was monitored.

Test Frequency Hz	Maximum Modulation Depth (%)
400	91.5

Limit for Maximum Modulation Depth	<100%
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2.6 TRANSMITTER OUTPUT POWER

2.6.1 Specification Reference

Part 87.131

2.6.2 Equipment Under Test

Park Air Electronics T6TR VHF Transmitter

2.6.3 Date of Test

11th July 2005

2.6.4 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.

2.6.5 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.

2.6.6 Test Results

EUT complies with Part 87.131

Test Conditions		Transmitter Output Power (dBm)		
		118 MHz	127.5 MHz	136.975 MHz
T _{nom} (+20°C)	V _{nom} (120 V 60Hz)	47.22	47.20	47.28

Additional testing to cover extended Frequency Range

Test Conditions		Transmitter Output Power (dBm)	
		112.0MHz	155.975MHz
T _{nom} (+20°C)	V _{nom} (120 V 60Hz)	47.22	47.34

Limit	200 W or 53dBm
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2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.1 Specification Reference

FCC Part 87.139 (c) (3)

2.7.2 Equipment Under Test

Park Air Electronics T6TR VHF Transmitter

2.7.3 Date of Test

14th July 2005 and 23rd September 2005

2.7.4 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.

2.7.5 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.

2.7.6 Test Results

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

The plots recorded are shown on the following pages.

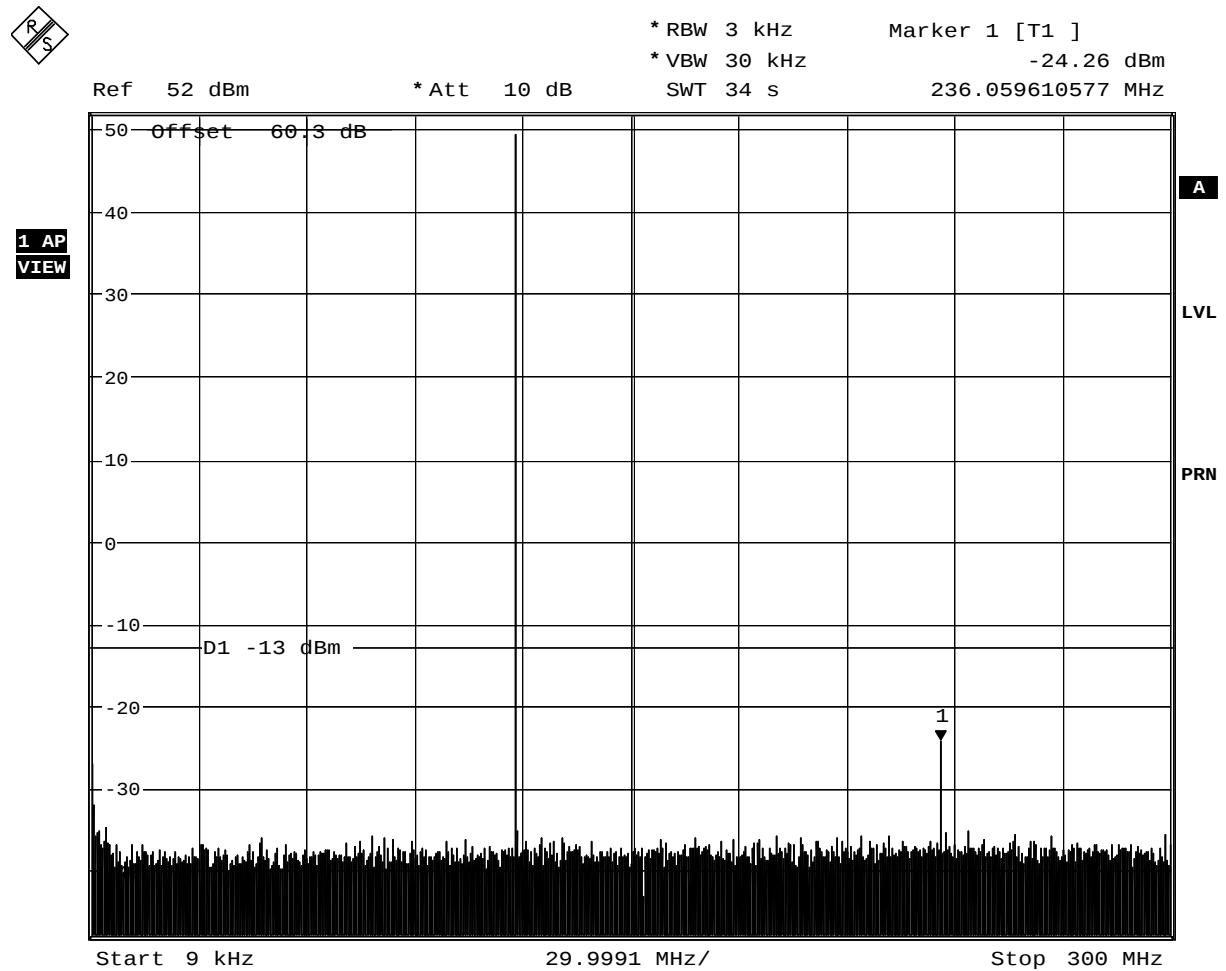


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)

Channel Frequency – 118 MHz



Date: 14.JUL.2005 15:10:37

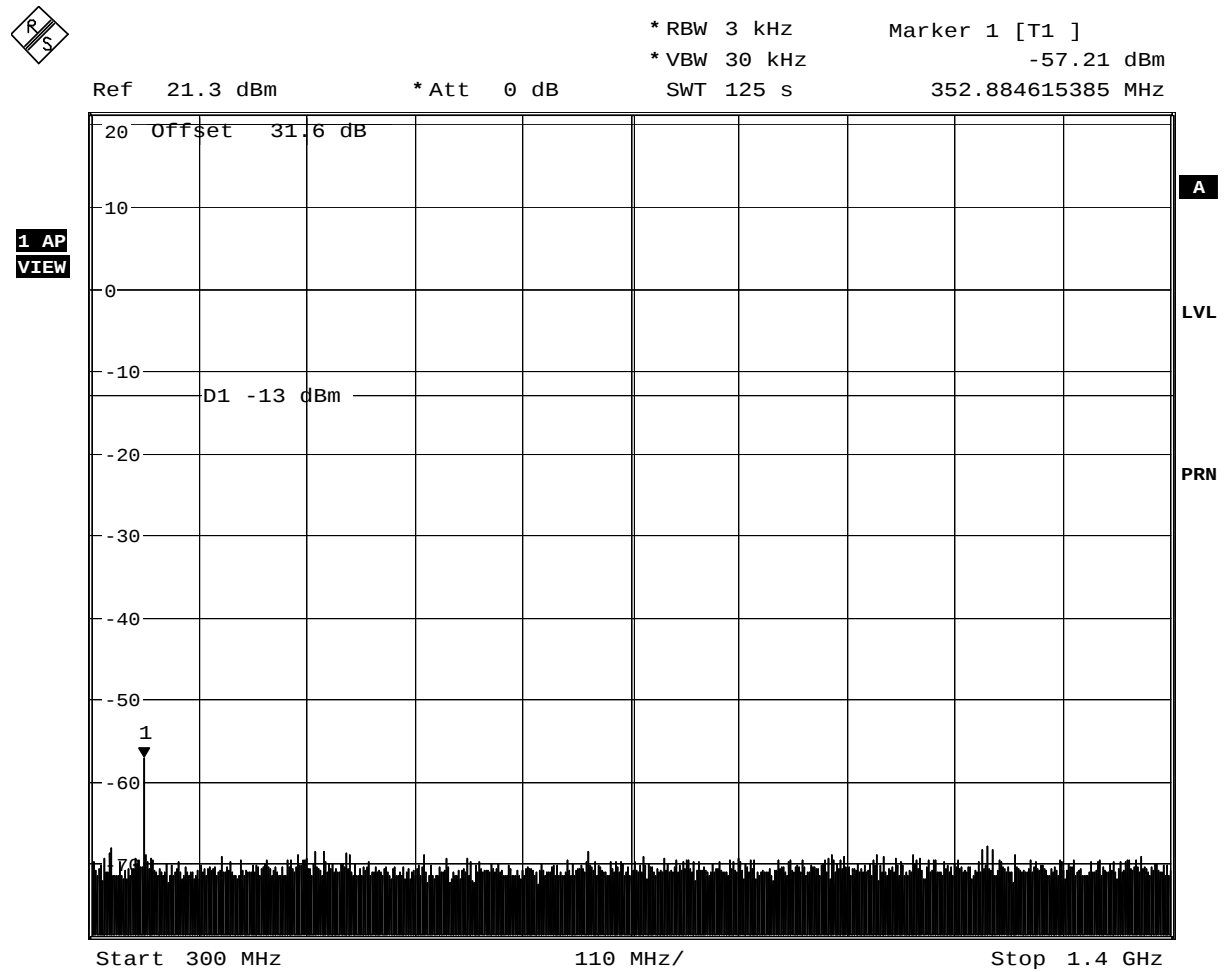


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)

Channel Frequency – 118 MHz



Date: 14.JUL.2005 17:39:50

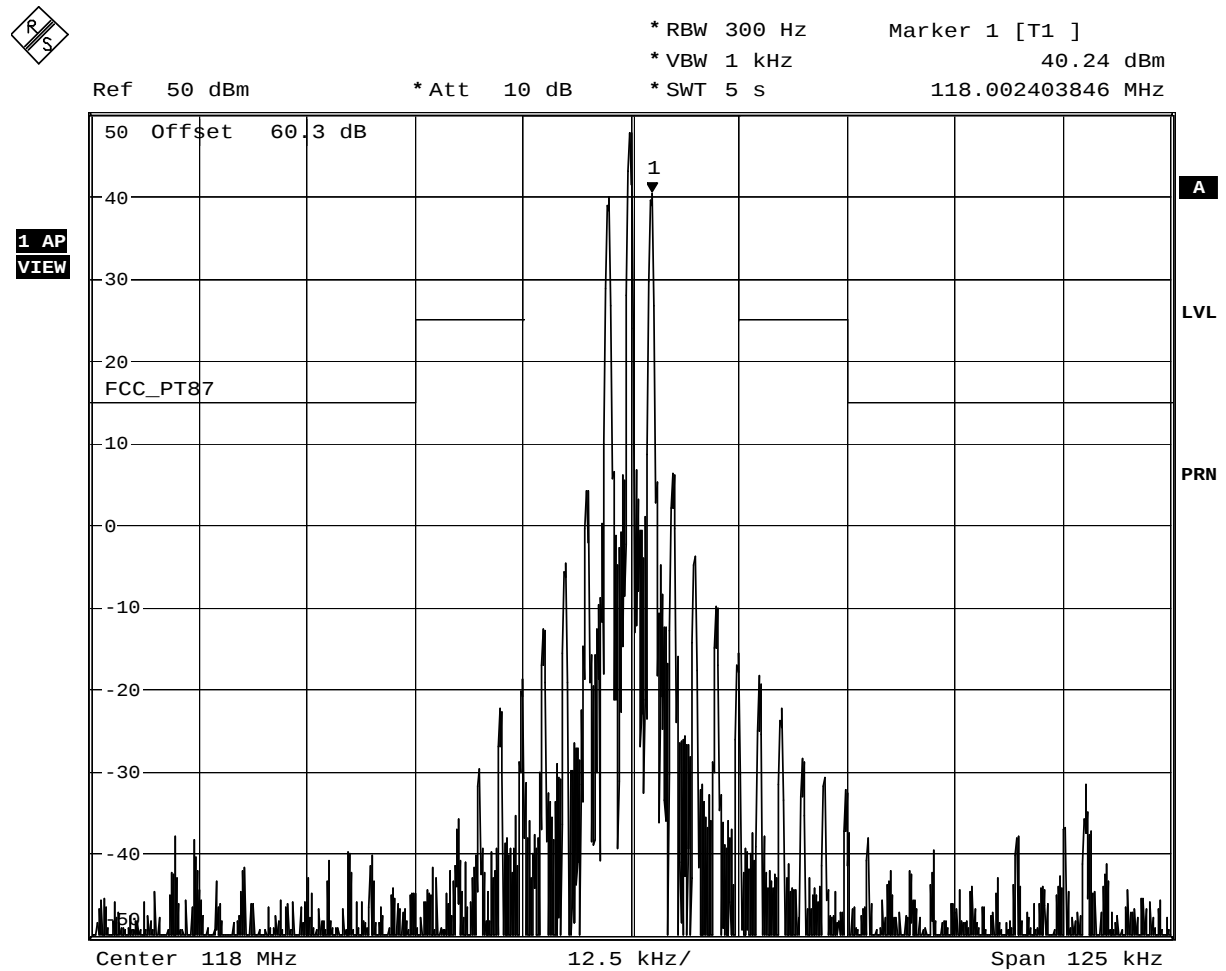


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)

Channel Frequency – 118 MHz



Date: 14.JUL.2005 16:41:46

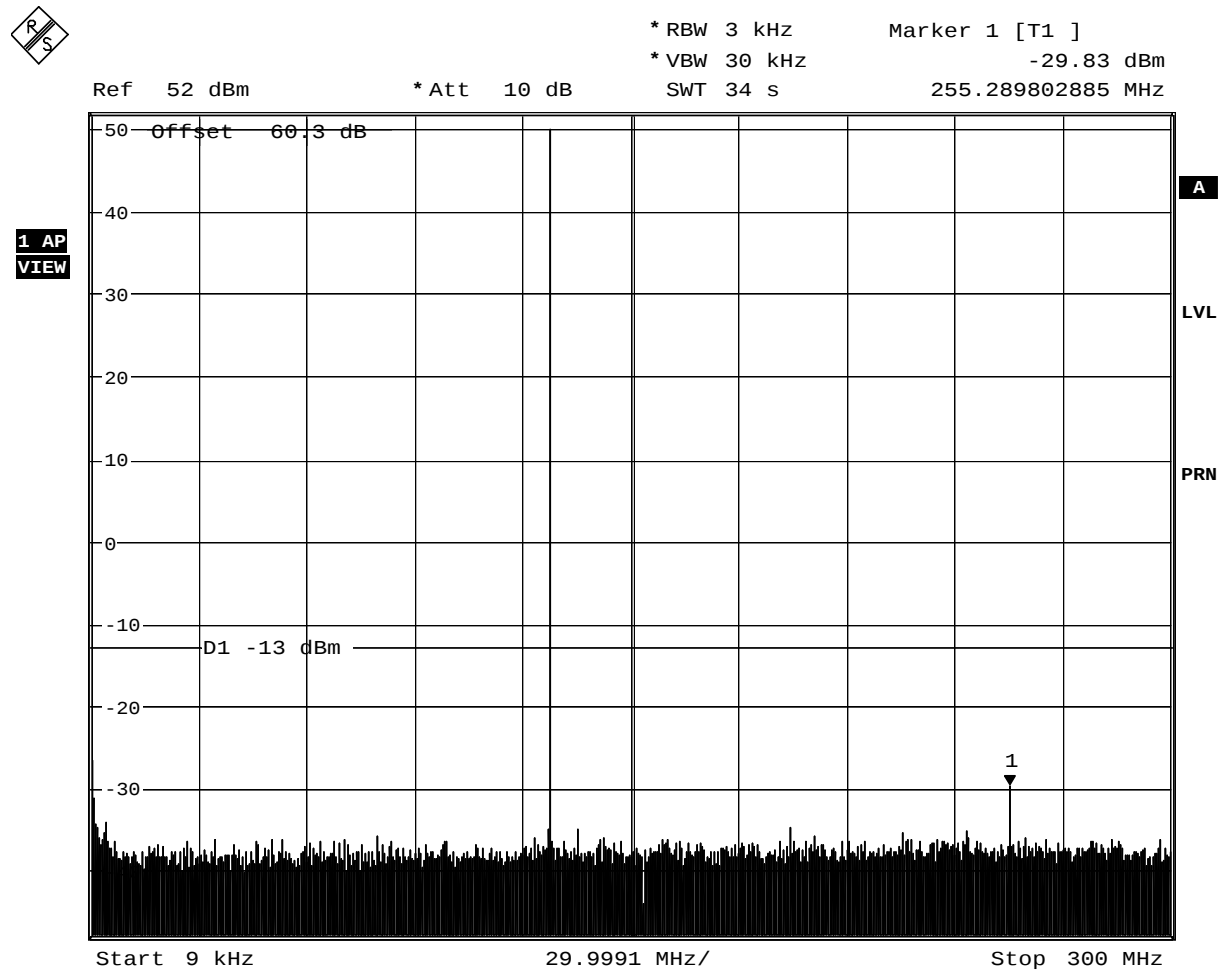


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)

Channel Frequency – 127.5 MHz



Date: 14.JUL.2005 15:17:58

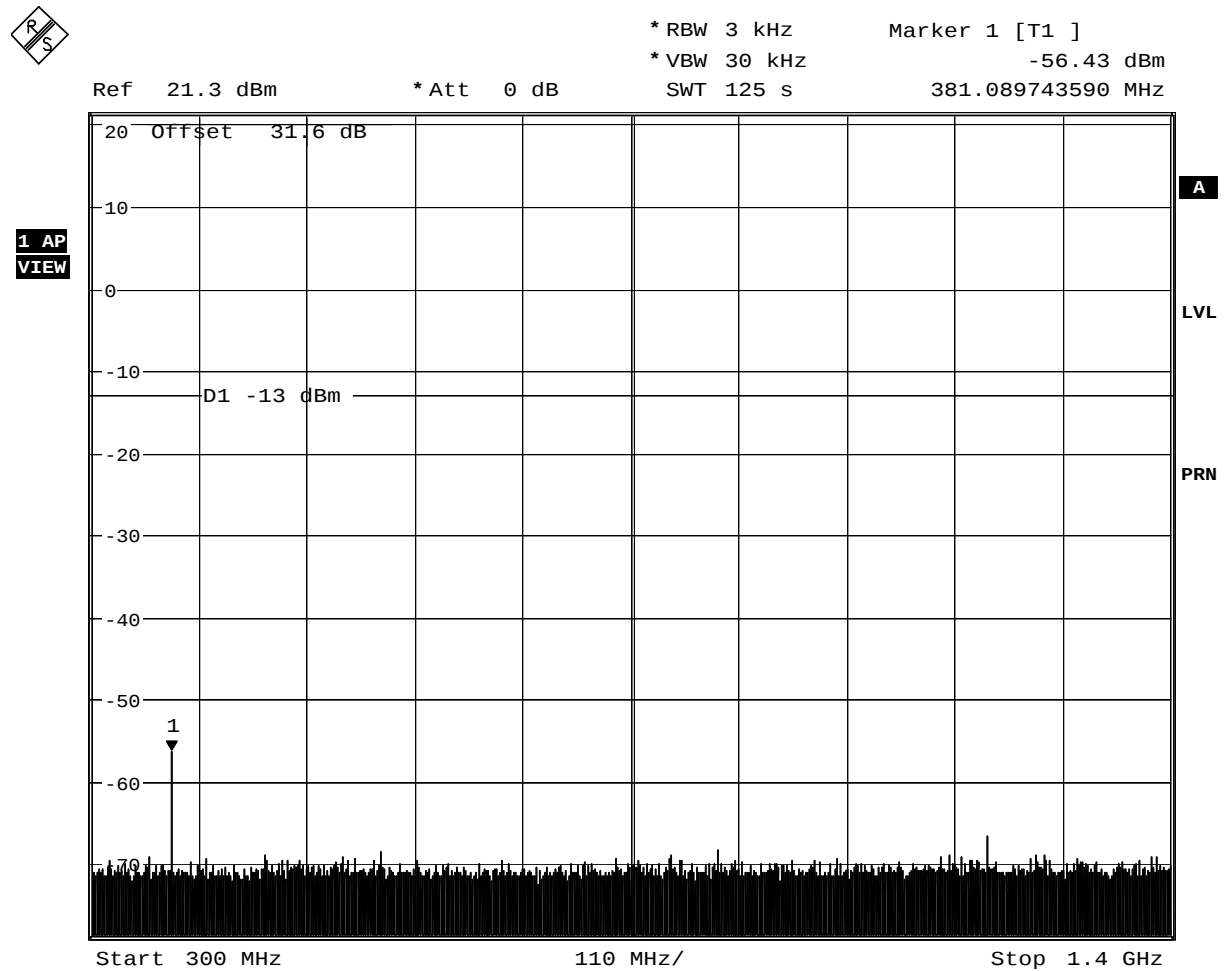


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)

Channel Frequency – 127.5 MHz



Date: 14.JUL.2005 17:42:46

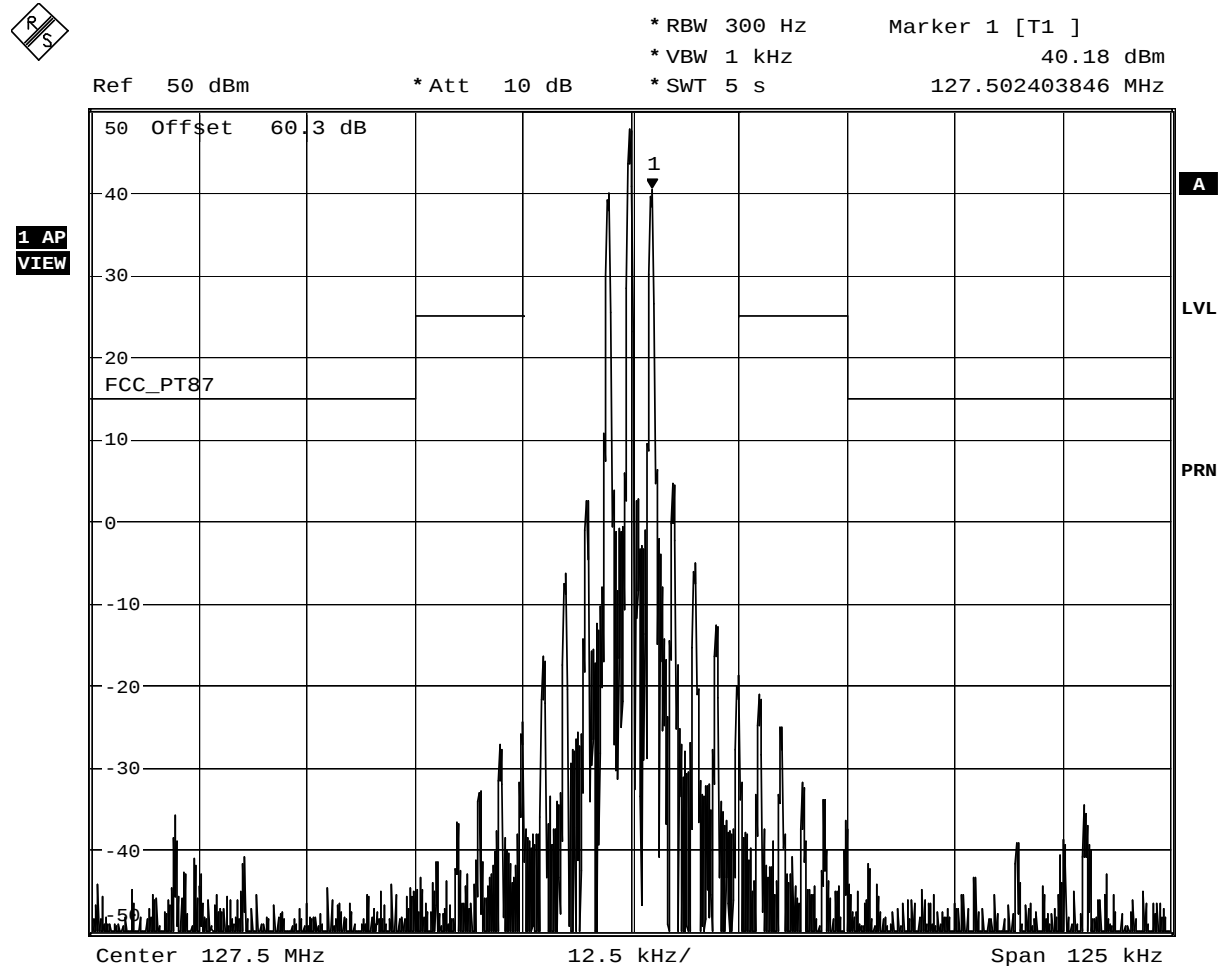


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)

Channel Frequency – 127.5 MHz



Date: 14.JUL.2005 16:43:45

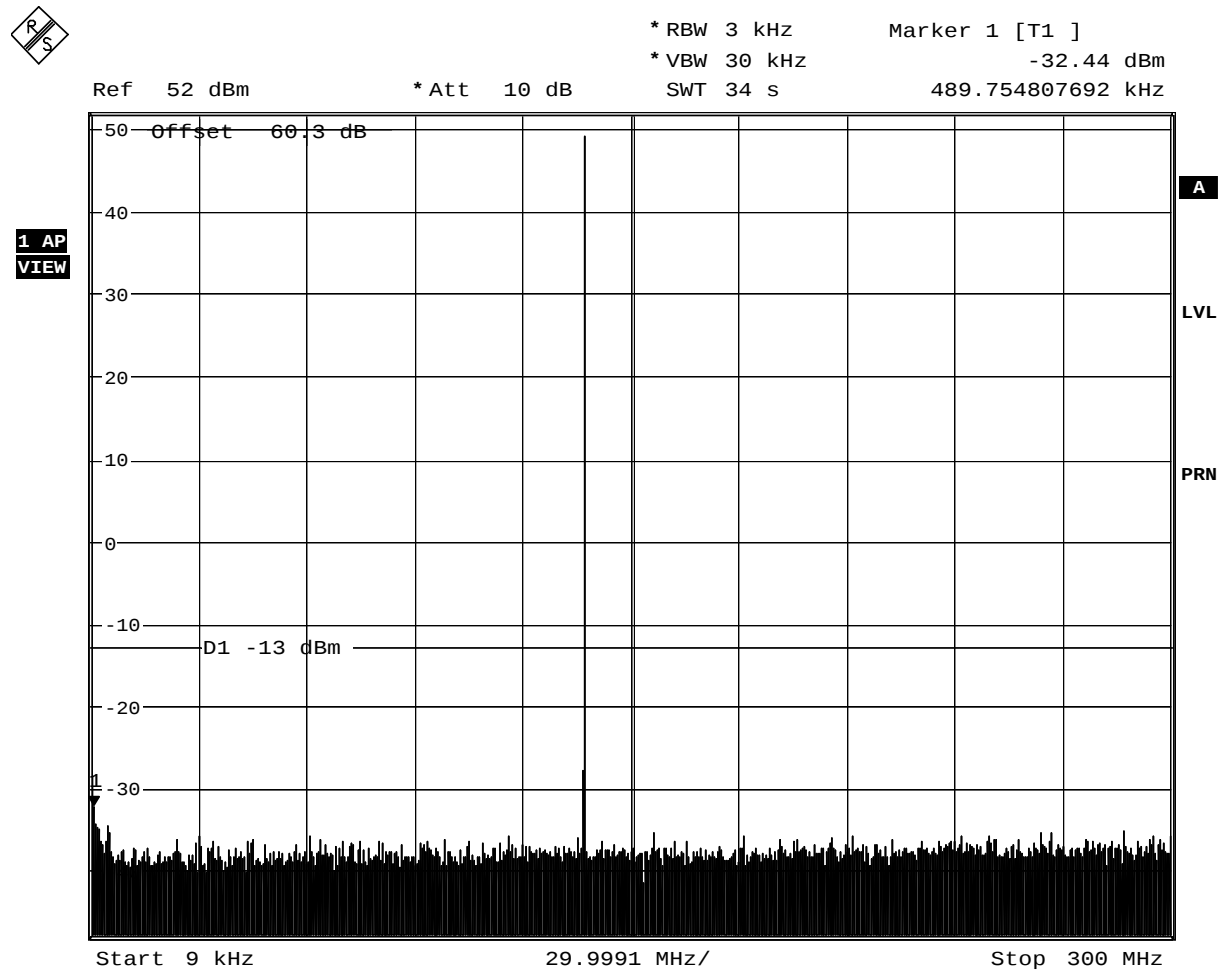


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)

Channel Frequency – 136.975 MHz



Date: 14.JUL.2005 15:20:42

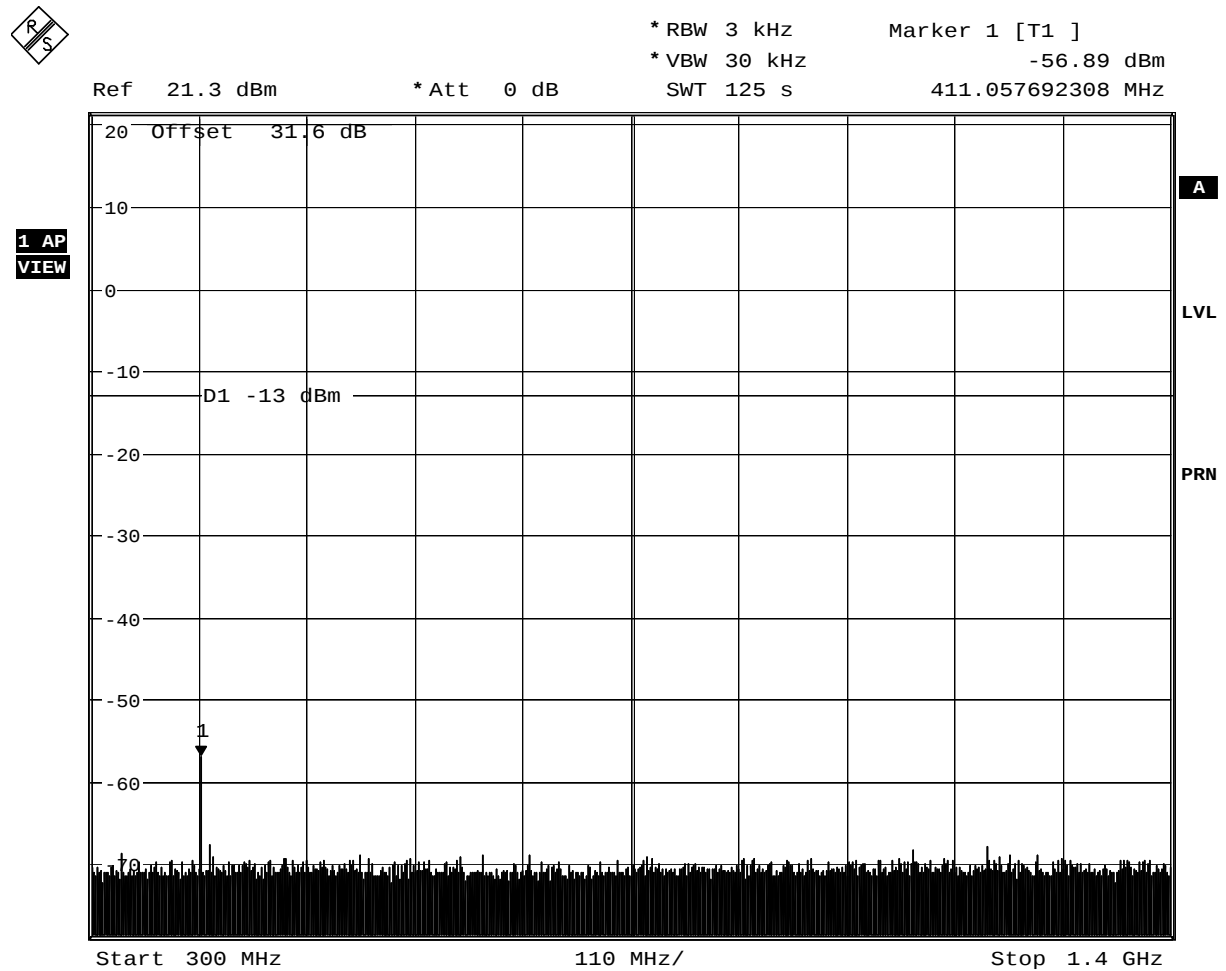


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)

Channel Frequency – 136.975 MHz



Date: 14.JUL.2005 17:45:54

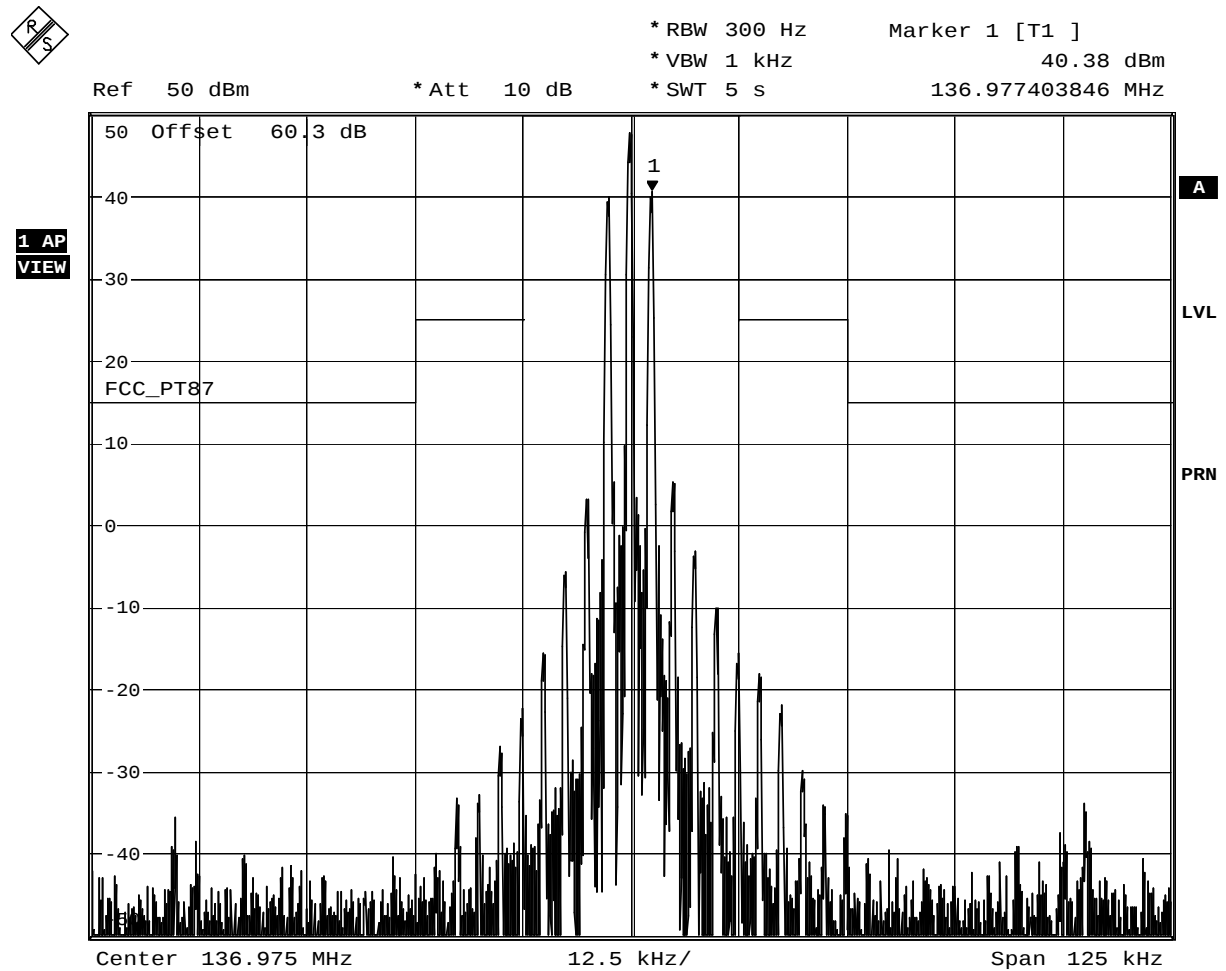


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)

Channel Frequency – 136.975 MHz



Date: 14.JUL.2005 16:46:45

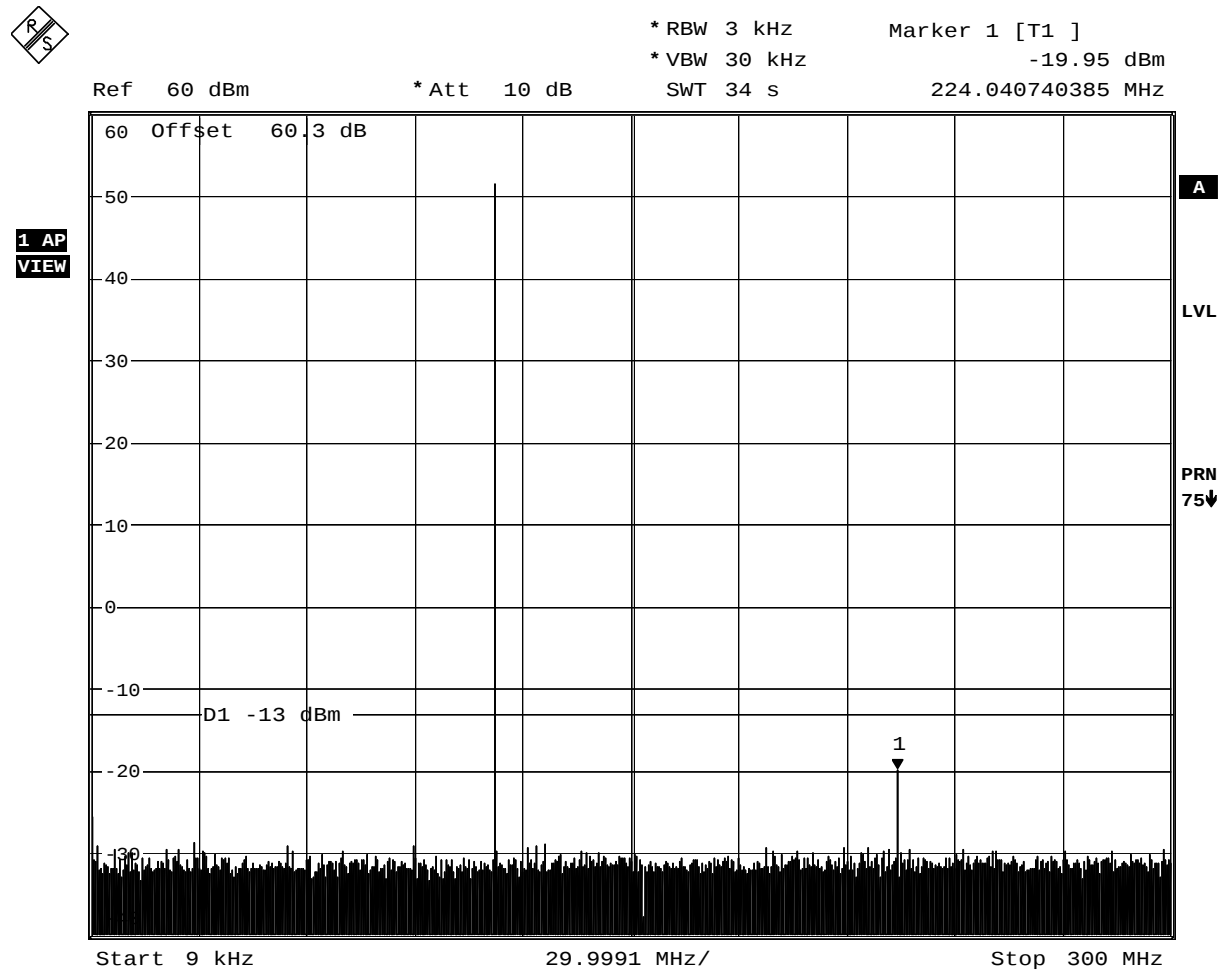


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)

Channel Frequency – 112 MHz



Date: 8. JUL. 2005 14:49:25

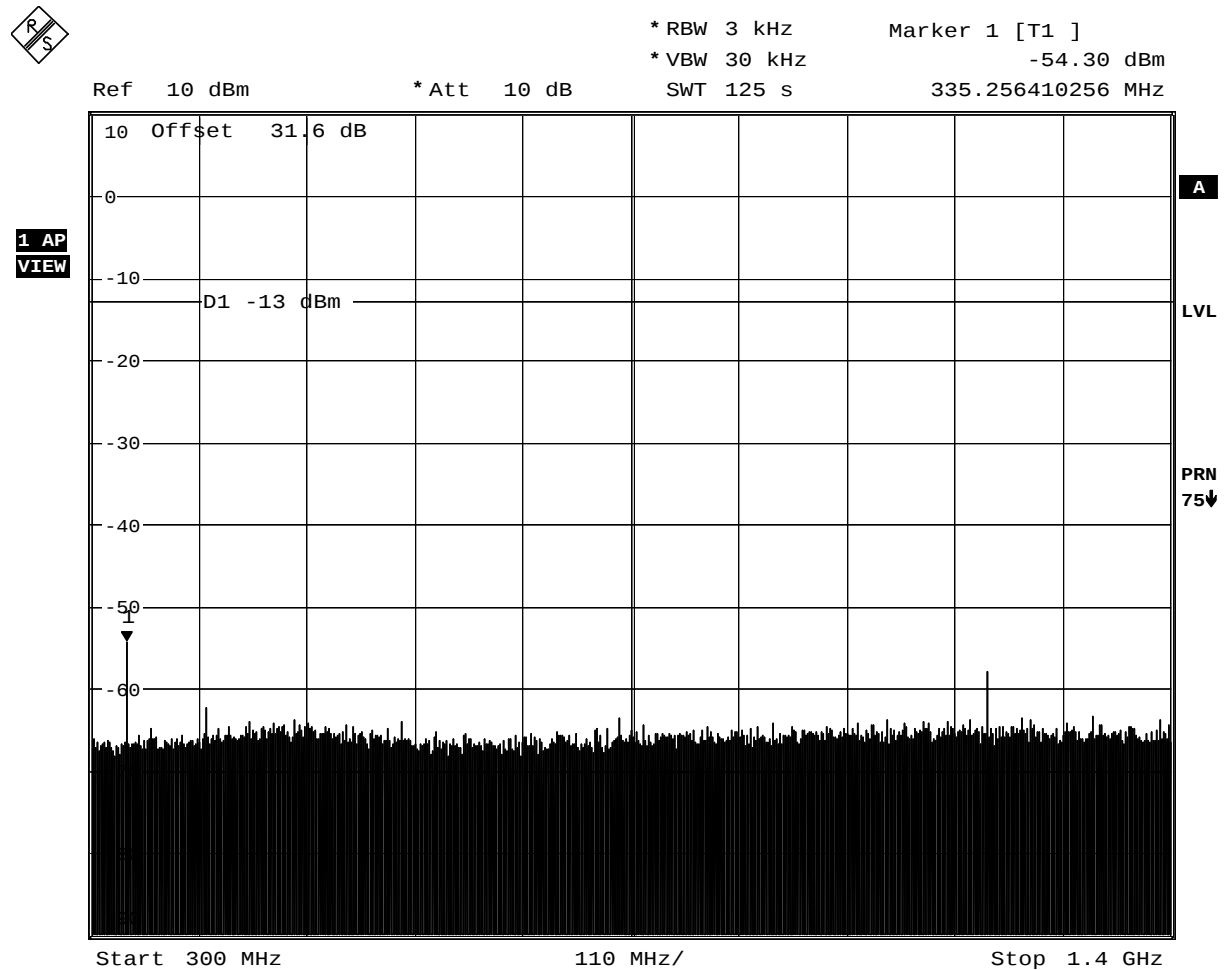


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (300 MHz – 1400 MHz)

Channel Frequency – 112 MHz



Date: 8. JUL. 2005 15:19:14

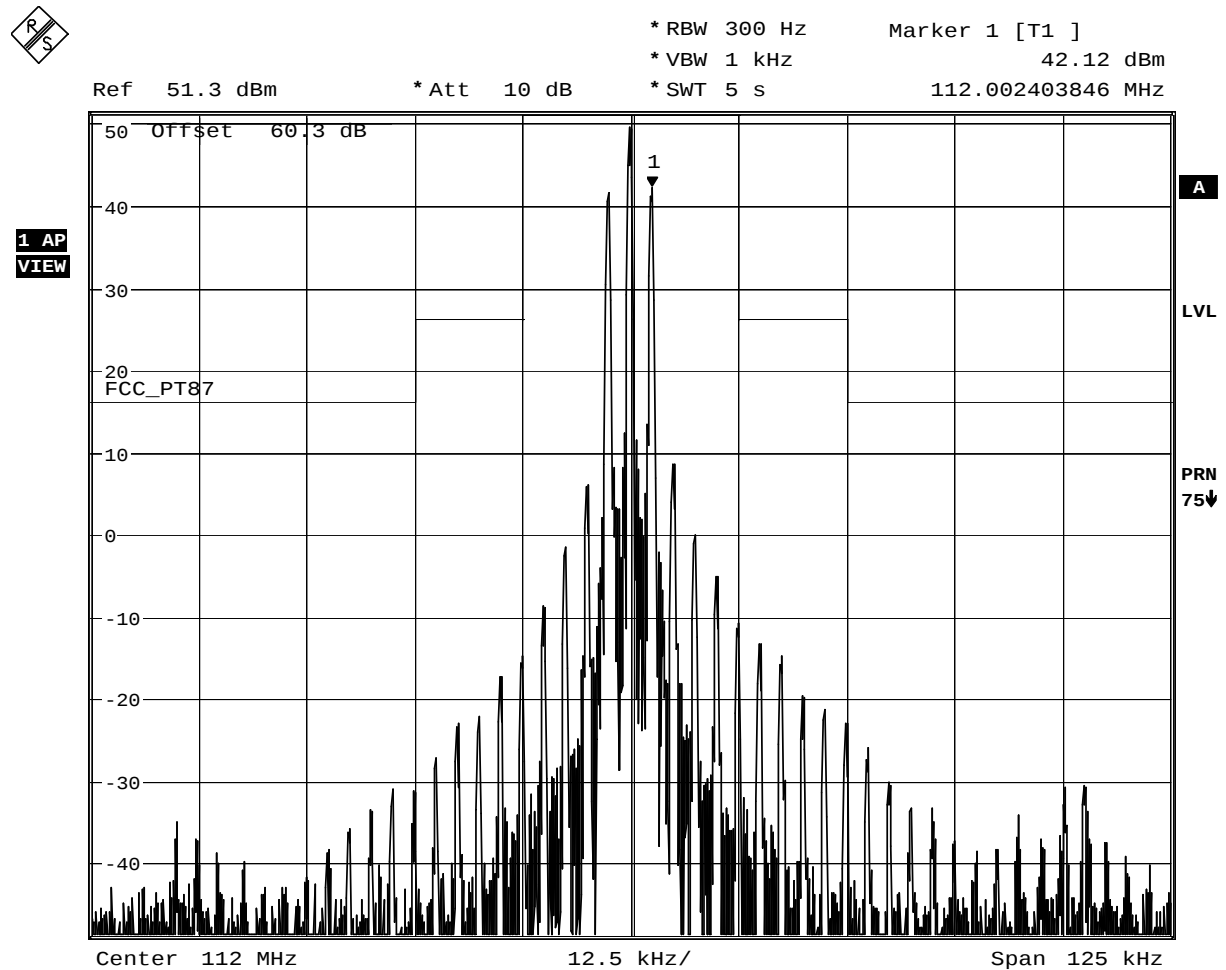


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)

Channel Frequency – 112 MHz



Date: 8. JUL. 2005 15:31:57

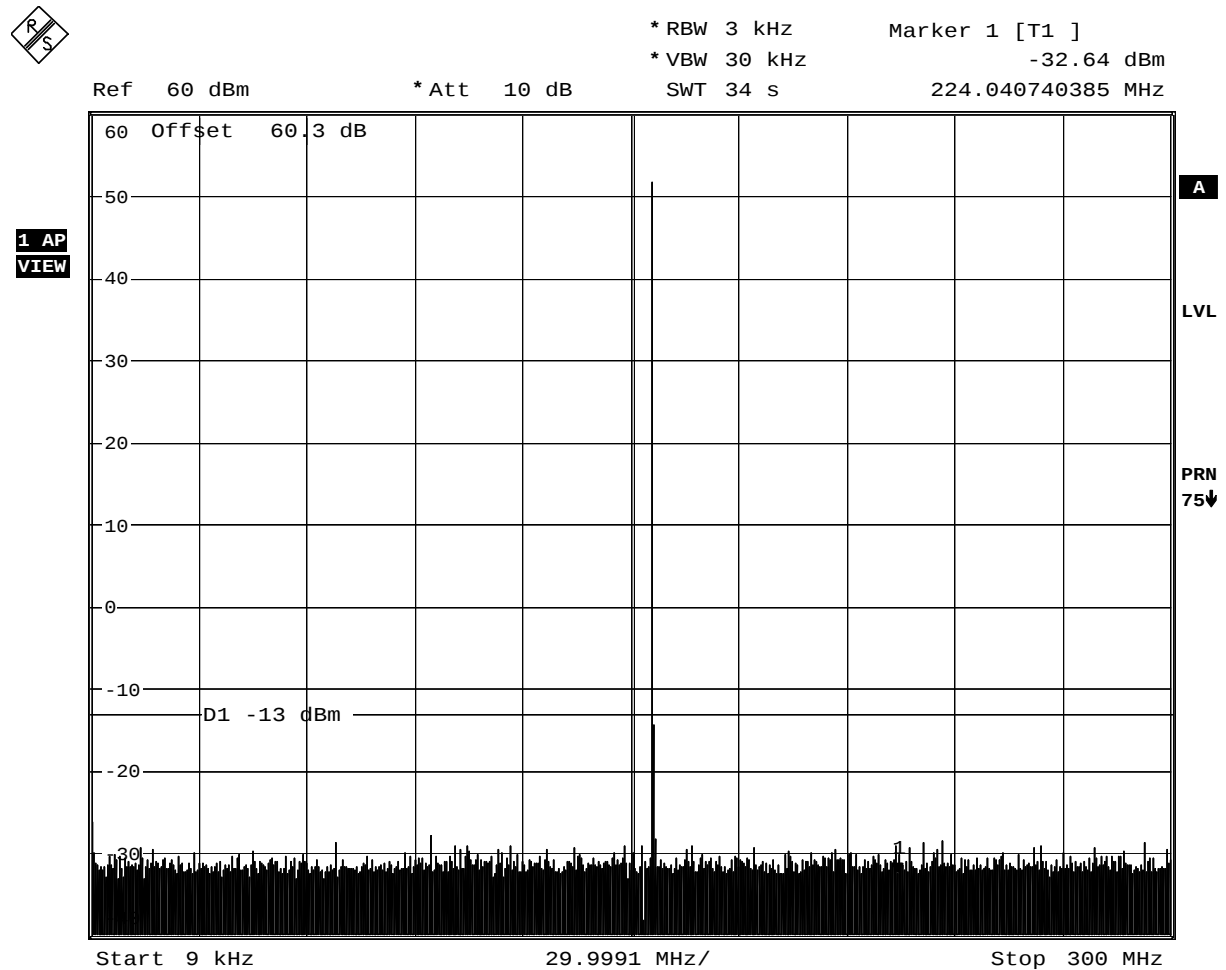


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (9kHz – 300 MHz)

Channel Frequency – 155.975 MHz



Date: 8. JUL. 2005 14:54:46

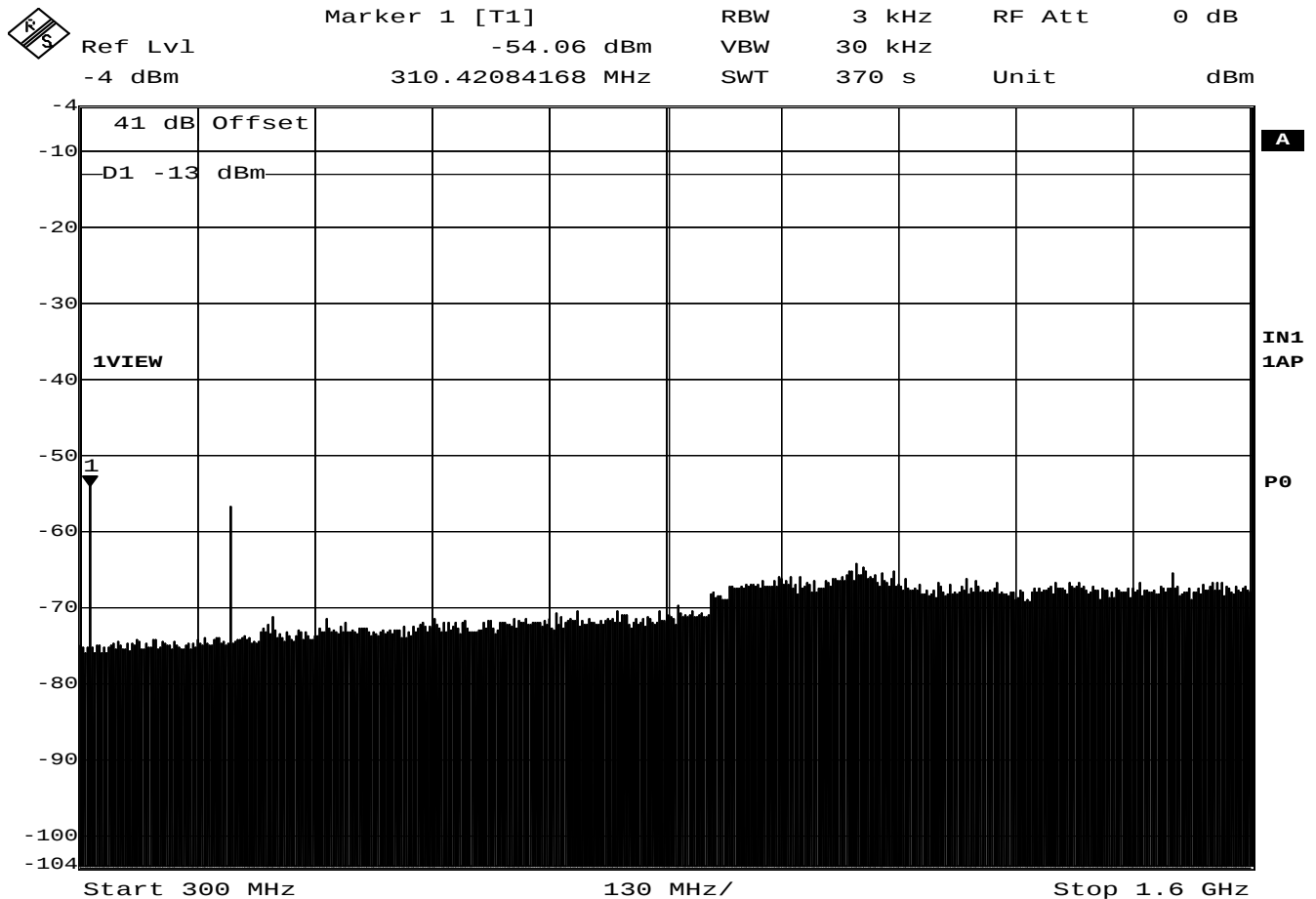


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (300 MHz – 1600 MHz)

Channel Frequency – 155.975 MHz



Date: 23.SEP.2005 10:12:22

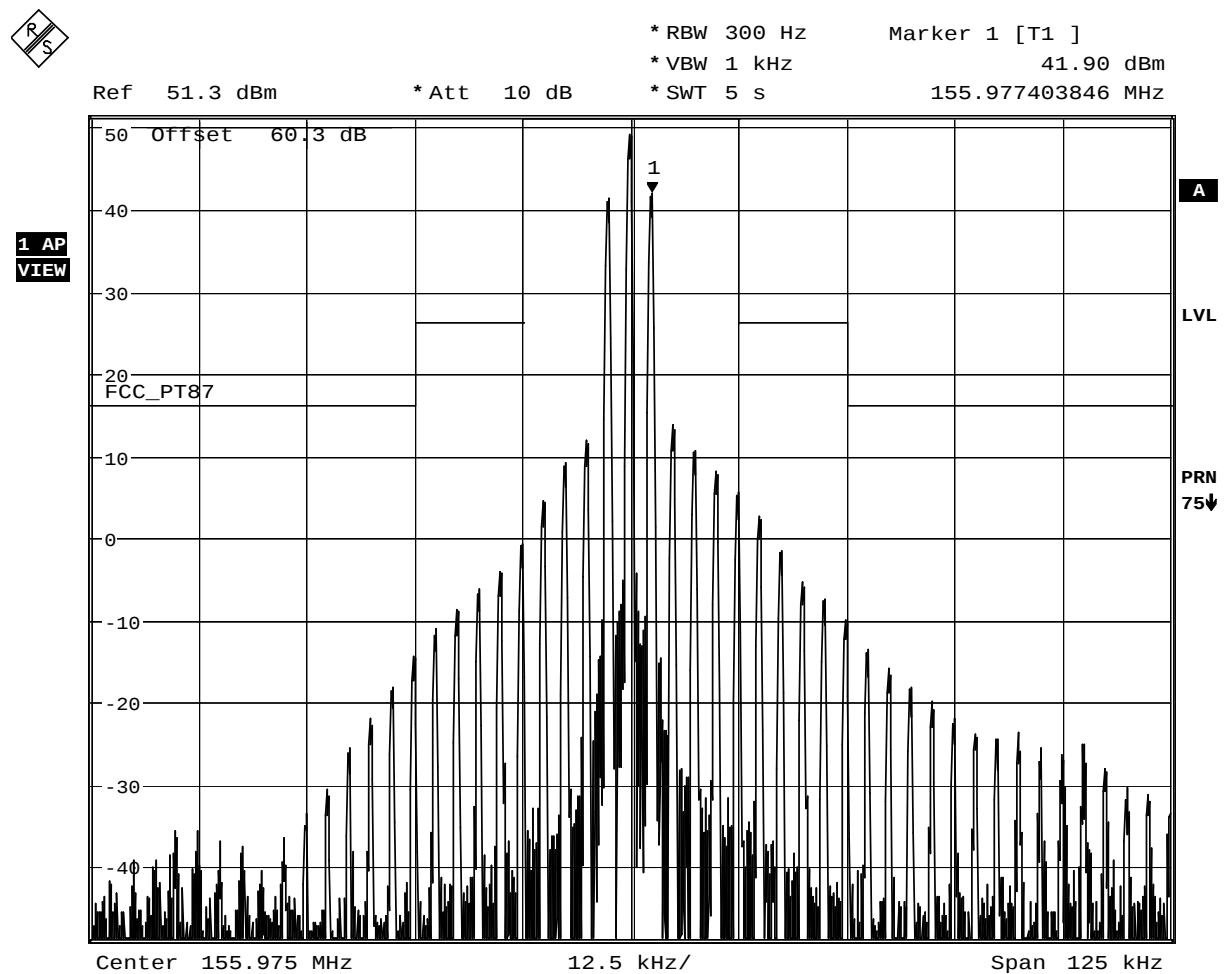


2.7 TRANSMITTER UNWANTED EMISSIONS

2.7.6 Test Results - Continued

Unwanted Emission (<250% Channel Bandwidth)

Channel Frequency – 155.975 MHz



Date: 8.JUL.2005 15:37:14



2.8 FREQUENCY STABILITY

2.8.1 Specification Reference

Part 87.133 (a) (5)

2.8.2 Equipment Under Test

Park Air Electronics T6TR VHF Transmitter

2.8.3 Date of Test

18th July 2005

2.8.4 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.

2.8.5 Test Procedure

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

2.8.6 Test Results

EUT complies with Part 87.133 (a)(5)

Test Conditions		Frequency Drift (Hz)		
Temperature	Voltage	118 MHz	127.5 MHz	136.975 MHz
50°C	28.0V DC	110	70	96
40°C	28.0V DC	107	82	52
30°C	28.0V DC	104	62	86
20°C	23.8V DC	103	89	100
20°C	28.0V DC	100	83	111
20°C	32.2V DC	99	84	102
10°C	28.0V DC	95	91	117
0°C	28.0V DC	89	104	115
-10°C	28.0V DC	99	102	113
-20°C	28.0V DC	72	107	117
-30°C	28.0V DC	71	123	124



2.8 FREQUENCY STABILITY

2.8.6 Test Results - Continued

Test Conditions		Frequency Drift (Hz)		
Temperature	Voltage	118 MHz	127.5 MHz	136.975 MHz
50°C	120.0V AC	107	66	112
40°C	120.0V AC	109	76	56
30°C	120.0V AC	98	55	83
20°C	102.0V AC	102	84	106
20°C	120.0V AC	101	89	109
20°C	138.0V AC	102	90	107
10°C	120.0V AC	90	89	119
0°C	120.0V AC	95	101	118
-10°C	120.0V AC	99	104	112
-20°C	120.0V AC	51	106	113
-30°C	120.0V AC	80	118	131

Limit	± 20 ppm or 2.36kHz
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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due
Section 2.1 & 2.3 (tested January 2005)				
Bilog Antenna	Chase	CBL 6143	2965	12/09/2005
EMI Test Receiver	Hewlett Packard	8542E	2286	08/05/2005
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	23/07/2005
50 Ohm Load	Diamond Antenna	DL-30N	3052	18/08/2005
High Pass Filter	Mini-Circuits	NHP-300	4986	10/08/2005
Bilog Antenna	Chase	CBL 6143	2861	TU
Signal Generator	Marconi	2031	2199	06/10/2005
Audio Analyser	Hewlett Packard	8903B	2232	29/09/2005
Section 2.2 (tested January 2005)				
Test Receiver	Rohde & Schwarz	ESH3	1020	24/09/2005
Spectrum Monitor	Rohde & Schwarz	EZM	1416	TU
LISN	Rohde & Schwarz	ESH2-Z5	1915	28/04/2005
Transient Limiter	Hewlett Packard	11947A	2271	19/08/2005
Section 2.4 & 2.5				
Hygrometer	Rotronic	1-1000	N/A	07/04/05
Power Supply Unit	Hewlett Packard	6267B	2333A08844	TU
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

Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due
Section 2.6 (tested July 2005)				
Attenuator 10dB	Bird	8343-100	1339	27/07/2005
Attenuator 20dB	Pasternic	PE7004-20	1973	11/11/2005
Attenuator 10dB	Bird	8343-100	1339	27/07/2005
Sensor	Hewlett Packard	11722A	Inv 1873	22/06/2005
Hygrometer	Rotronic	I-1000	3229	25/10/2005
Section 2.7 (tested 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
Section 2.7 (tested July 2005)				
Attenuator 10dB	Bird	8343-100	1339	27/07/2005
Attenuator 20dB	Pasternic	PE7004-20	1973	11/11/2005
Signal Generator	Marconi	2031	1768	01/09/2005
Modulation Analyser	Hewlett Packard	8901B	1986	10/01/2006
Attenuator 30dB	Bird	8321	1614	24/11/2005
High Pass Filter	Mini-Circuits	NHP-300	4986	10/08/2005
Spectrum Analyser	Rohde & Schwarz	FSU26	4989	16/12/2005
Hygrometer	Rotronic	I-1000	3229	25/10/2005
Sensor	Hewlett Packard	11722A	1873	22/06/2005
Section 2.8 (tested July 2005)				
DC Power Supply Unit	Hewlett Packard	6267B	963	-
AC Power Source	California Inst	200/RP-01	2790	-
Modulation Analyser	Hewlett Packard	8901B	1510	22/06/2006
Sensor	Hewlett Packard	11722A	1987	09/07/2006
Data Logging Thermometer	Digitron	2098T	Inv 4284	10/08/2005
Digital Temperature Indicator	Fluke	51	Inv 4223	21/09/2005
Chamber	Montford	2F3,BLD 8	Inv 3037	-
Multimeter	Fluke	70	Inv 3550	23/05/2006
Attenuator 30dB	Bird	8321	Inv 3807	15/10/2005



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
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	26MHz to 2.5GHz Test Amplitude	1.4dB†
Conducted Susceptibility	100kHz to 250MHz Amplitude	1.8dB†
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.8dB*
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—

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



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).

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APPENDIX A

TITCHFIELD FCC SITE COMPLIANCE LETTER



APPENDIX A TITCHFIELD FCC SITE ACCREDITATION 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