

Client: AeroComm, Inc.
FCC ID: KJA501540332
Model: 50124-03-32

Report No.: 9252-01-004
Issue Date: April 27, 2000

Certification Test Report

For a VHF Power Amplifier

Manufacturer:

AeroComm, Inc.
19516 Amaranth Drive
Germantown, MD 20874

Testing Facility:

F-Squared Laboratories
10880 Moxley Road
Damascus, MD 20872

The VHF Power Amplifier, Model 50124-03-32 has been tested and found to comply with the requirements of the Federal Communications Commission outlined in the Federal Register CFR 47 Part 2.1041 and Part 90 for Private Land Mobile Radio VHF Power Amplifier. The results found in this test report relate only to the items tested. The product was received on September 13, 1999 and the testing was completed on October 15, 1999.

Evaluation Conducted By:



Dale Royston
EMC Technical Manager

Report Reviewed By:



Robert Pellizze
General Manager



measuring how compliance

F-Squared Laboratories
9890A Main Street
Damascus, MD 20872
(301) 253 - 4500
Fax: (301) 253 - 5179

This report shall not be duplicated except in full without the written approval of F-Squared Laboratories

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Exhibit I

Engineering Statements

This report has been prepared on behalf of AeroComm, Inc. to certify a Private Land Mobile Radio Service VHF Power Amplifier. The test was performed for above said device under Parts 2.1033 (c) and Part 90 of the FCC Rules and Regulations. The test results found in this test report relate only to the items tested.

EQUIPMENT UNDER TEST:	VHF Power Amplifier Model: 50124-03-32 Power Supply General Requirements: 12 VDC, 0.3 Amps
FCC ID:	KJA501240332
APPLICABLE RULES:	CFR 47 Part 2.1033 (c); 2.1046, 90.209, 90.213, 2.1055/90.213
EQUIPMENT CATEGORY:	Power Amplifier, Licensed
MEASUREMENT LOCATION:	F-Squared Laboratories in Damascus, MD. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.
MEASUREMENT PROCEDURE:	All measurements were performed according to the 1992 version of ANSI C63.4. A list of the measurement equipment can be found in Exhibit II.

UNCERTAINTY BUDGET:

- Radiated Emission
Combined Uncertainty (+ or -) 2.24 dB
Expanded Uncertainty (+ or -) 4.48 dB
- Conducted Emission
Combined Uncertainty (+ or -) 1.13 dB
Expanded Uncertainty (+ or -) 2.26 dB

ENGINEERING STATEMENT#1:

I hereby state that: The measurements shown in this application were made in accordance with the procedures indicated and the energy emitted by this equipment was found to be within the limits. I assume full responsibility for the accuracy and completeness of these measurements.

I further state that: On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Parts 2.1033 (c); 2.1046, 90.209, 2.1055/90.213, and 90.219 of the FCC Rules under normal use and maintenance.

ENGINEERING STATEMENT#2:

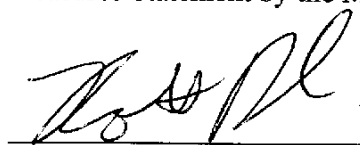
Radio Frequency Radiation Exposure Declaration

The FCC Rule as noted in Part 2.1091 is not applicable for this fixed station device.

ENGINEERING STATEMENT#3:

EMI Countermeasures Statement by the Manufacturer as shown on the next page.

Certified by:



Robert Pellizze, General Manager

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EMI Countermeasures Statement

Aero Comm, Inc.
a division of International FiberCom, Inc.

August 24, 1999

Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046
Attn: Chief Equipment Authorization Branch

Gentlemen:

This testimony is to assure that the EMI countermeasures will be included in the production process of this equipment in order to comply with the Class B Radio Emissions limitations as listed in this test report submitted by F-Squared Laboratories.

Sincerely,

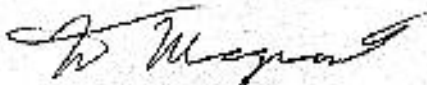

Michael Magnant
Chief of Operations

Exhibit II



August 24, 1999

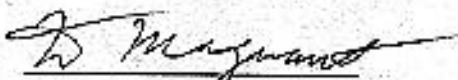
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046
Attn: Chief Equipment Authorization Branch

To Whom It May Concern:

F-Squared Laboratories is hereby authorized to act on our behalf before the Federal Communications Commission in matters concerning the obtainment of FCC Class B approval for our systems. Any and all acts carried out by the named party on our behalf shall have the same effects as acts on our own. This authorization is valid until further notice.

The applicant certifies that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a), or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits, that includes FCC benefits, pursuant to that section. For the definition of a "party" for these purposes, see 47 CFR 1.2002(b).

Dated this 24th day of August

By: 
Michael Magrant
Chief of Operations

Applicant: AeroComm, Inc.

Phone Number: (301) 540-0700

Client: AeroComm, Inc.
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Exhibit III

List of Measurement Instrumentation

Equipment Type	Manufacturer	Model #	Serial #	Cal. Due Date
Receiver Systems	Rohde & Schwarz	ESMI	DE23119	Feb. 2000
LISN #1	Solar	8012-50-R-24-BNC	910488	Jan. 2000
LISN #2	Solar	8012-50-R-24-BNC	933201	Jan. 2000
Biconical Antenna	Compliance Design Inc.	B100	383	Jan. 2000
Biconical Antenna	Compliance Design Inc.	B200	292	Jan. 2000
Biconical Antenna	Compliance Design Inc.	B300	318	Jan. 2000
Horn Antenna	Antenna Research Associates	DRG-118/A	1105	Feb. 2000
Antenna Mast	Compliance Design Inc.	M100	NA	NA
Turntable	F ² Laboratories	Site 1	NA	NA
Spectrum Analyzer	HP	8391A	3149A07546	Feb. 2000
Environmental Chamber	Enviotronics	N/A	N/A	N/A
Amplifier	HP	8447f	3113A04704	July 2000
Data Logger	Honeywell	DRS-4505	88137287001	Jan 2000

Note: All testing was conducted between September 13, 1999 and October 15, 1999.
At the time of the testing, all equipment was in calibration.

Exhibit IV

Labeling

The following are the label specifications for the FCC ID Label:

FCC ID to be on label	KJA501240332
Sample label (facsimile)	-On following page
Sketch of label placement	-On following page
Type of material	-As shown on following page
Size of type, FCC ID	-As shown on following page
Size of type, Statement	-As shown on following page
Label Dimensions	-As shown on sample
Method -permanently marking label	-Indelibly printed
Label attachment	-Permanently glued
FCC Statement	-As shown on following page

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Power Amplifier Label

Please see File label.pdf

Exhibit V

Equipment Under Test Information and Data

TEST ITEM CONDITION:

The equipment to be tested was received in good condition. Electrical and mechanical drawings are included in the Operation and Instruction manual as supplied in Exhibit XIII.

TESTING ALGORITHM:

The EUT was driven with the nominal signal level into a representative load

CONDUCTED EMISSION TESTING:

The EUT was placed on a 0.8 meter high, 1 X 1.5 meter non-conductive table. Power was provided to the EUT through a LISN bonded to a 3 X 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver and emissions in the range 450kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak values, and the resolution bandwidth during testing was 9kHz. All data for conducted emissions is found in Exhibit V.

RADIATED EMISSIONS: SPURIOUS EMISSIONS TESTING

The EUT was tested at a distance of 3 meters. The emissions were maximized by rotating the table and raising/lowering the antenna mounted on a 4 meter mast. Cable and peripheral positions were also varied to produce maximum emissions. Both horizontal and vertical field components were measured. The output of the antenna was connected to the input of the receiver and emissions were measured in the range 30MHz to 2 GHz. The measured values up to 1GHz with a resolution bandwidth of 120KHz are quasi-peak readings made at 3 meters. Emissions from 1 GHz to 2 GHz were measured with a resolution bandwidth of 1 MHz and placed in the average detector mode. All data for radiated spurious emissions is found in Exhibit VI.

RADIATED SPURIOUS EMISSION ANTENNA PORT TESTING:

The EUT was tested near the spectrum analyzer and source signal generators with the shortest available length cables to insure correct data collection. The output of the EUT was connected to the EMI receiver input port and the emissions were measured as shown in Exhibit VII.

EMISSIONS MASK TESTING:

The output of the EUT was connected to the receiver and the emissions were measured as shown in Exhibit VIII.

CALCULATION OF DATA #1:

RADIATED EMISSIONS - The antenna factors (including cable losses) of the biconical antennas were used along with the pre-amplifier gain, which were entered into the memory of the receiver. The receiver uses these values to correct the reading for amplitude automatically. The field strength reading was taken directly from the receiver and compared to the FCC limits in dBuV/m. The following equation is used to convert to uV/m:

$$E_{uV/m} = \text{antilog}(E_{dBuV/m}/20)$$

SAMPLE OF FIELD STRENGTH CALCULATION:

$$E_a = V_a + A_F + A_e + (-A_G)$$

Where E_a = Field Strength(dBuV/m)

V_a = $20 \times \log_{10}$ (Measure RF voltage, uV)

A_e = Cable Loss Factor, dB

A_G = Amplifier Gain, dB

A_F = Antenna Factor dB(m-1)

i.e. If the reading is 57.0 dBuV, the antenna factor 8.0 dB, cable loss factor 1.0 dB and Amplifier gain is 25.0 dB, so the field strength will be:

$$\begin{aligned} E_a(\text{dBuV/m}) &= 57 + 8 + 1 + (-25) \\ &= 41 \text{ dBuV/m} \end{aligned}$$

or

$$\begin{aligned} E_a(\text{uV/m}) &= 10^{(41/20)} \\ &= 112.20 \text{ uV/m} \end{aligned}$$

CALCULATION OF DATA#2:

Emission Mask Limits – All of the calculations were based on the output power level of the EUT and Emissions Mask B of section 90.210 (B). The EUT has an audio low-pass filter and the limits specified in sub sections 1 to 3 were applied. The mask was applied on the center frequency of 173.3375 MHz. An Excel spreadsheet was used with the various emission masks based on frequency to derive the limits. The limits are based on the following Mask (B) criteria's:

KHz offset from Center Frequency	DB of attenuation down from Center Frequency
0 - 12.5 KHz	0
12.5 – 25 KHz	25
25 KHz – 62.5 KHz	35
Beyond 62.5 KHz	43+Log (Output Power in Watts)

The required attenuation below and above the center frequency (CF) is shown to reveal the performance of the EUT. The spreadsheet on the next page reveals all of the limit data points used for the test as shown in Exhibit X. The emissions mask level was adjusted to the EUT unmodulated output level to provide a comparison between the modulated and unmodulated EUT output.

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EMISSION Mask dBmW Limit Levels

Public Safety and Industrial/Business Pool Emissions Mask	
FMHz	EUT Out (dBmW)
173.2	-3.89
173.27	-3.89
173.275	-3.89
173.275	2.76
173.3125	2.76
173.3125	12.76
173.325	12.76
173.325	37.76
173.3375	37.76
173.35	37.76
173.35	12.76
173.3625	12.76
173.3625	2.76
173.4	2.76
173.4	-3.89
173.4	-3.89
173.45	-3.89

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Exhibit VI

Power Amplifier Block diagram

Please see file block.pdf

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Exhibit VII

EUT Configuration and Cables

EUT:

Device	Manufacturer	Model #	FCC ID
VHF Power Amplifier	AeroComm Inc.	50124-03-32	KJA501240332

Peripherals:

None

Cables: All one meter or greater in length – bundled according to **ANSI C63.4 – 1992**

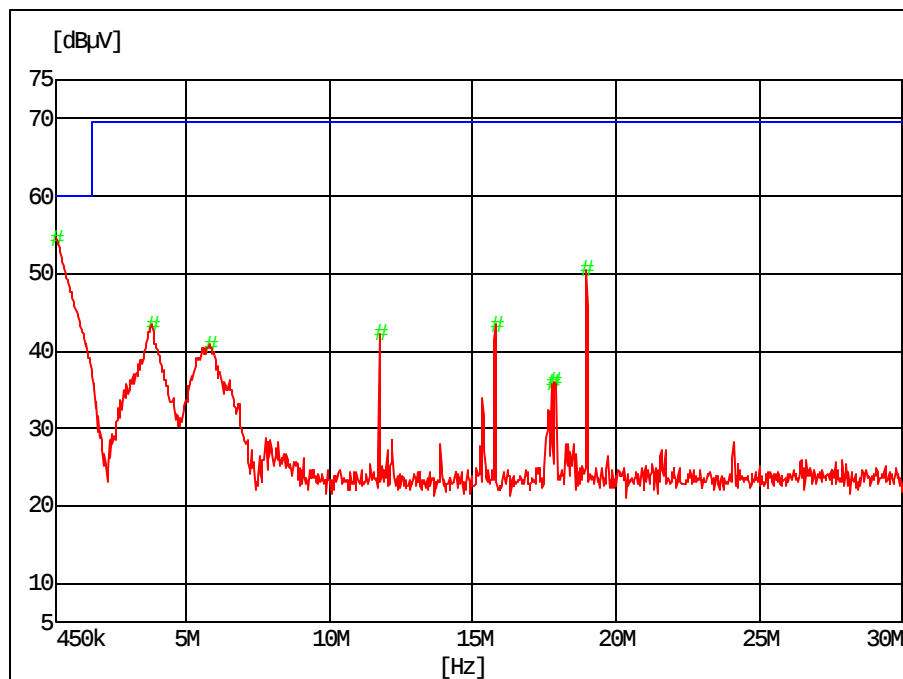
EUT Power - Unshielded

Internal Devices:

The EUT has no OEM internal circuits.

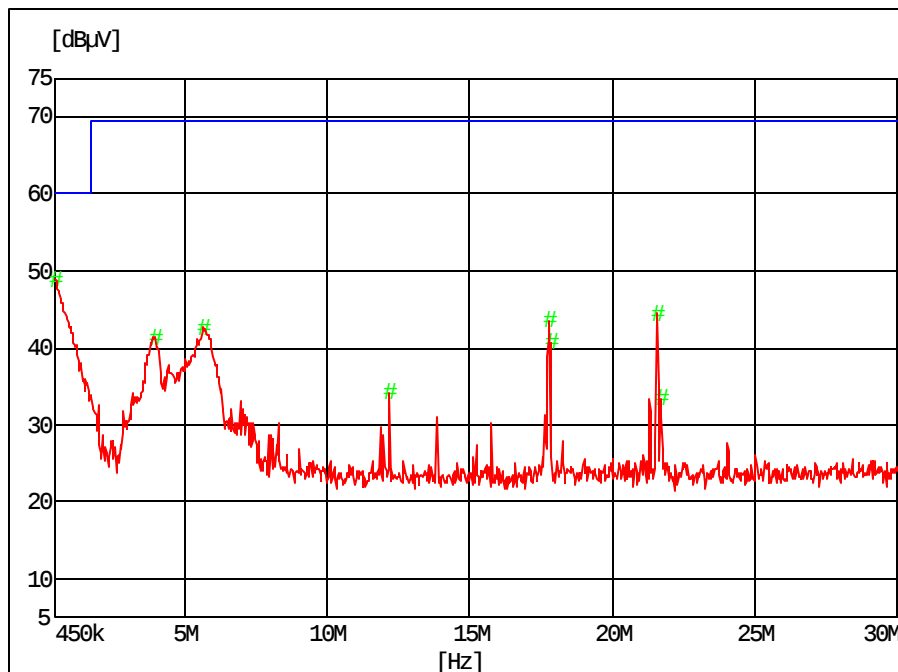
Exhibit VIII

Conducted Test Line: **Phase**



Frequency MHz	Level dBμV
0.450000	54.59
3.766167	43.35
5.801833	40.87
11.744667	42.24
15.783167	43.34
17.753167	35.87
17.851667	36.13
18.968000	50.52

Conducted Test Line: **Neutral**



Frequency MHz	Level dBμV
0.450000	48.90
3.963167	41.46
5.670500	42.62
12.171500	34.28
17.786000	43.62
17.851667	40.70
21.594667	44.40
21.693167	33.46

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See next page for equipment setup configuration.

Conducted Emissions Test Setup Configuration:

Conducted Emissions: Power Amplifier JCN 9252-01

Setup: Resolution Bandwidth: 9 KHz, Video Bandwidth: 30 kHz

Power Amplifier in transmitting mode

Please note: The above is AC Conducted Emissions. The unit was powered through a linear AC/DC supply.

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Exhibit IX

RADIATED DATA **(Per Section 2.1053 Field Strength of Spurious Enclosure Radiation)**

Frequency (MHz)	Reading (dBuV/m)		Emission(uV/m)		*FCC Limits @ 3 Meters	
	Horizontal	Vertical	Horizontal	Vertical	(dBuV/m)	(uV/m)
173.33	56.51	53.99	669.11	500.61	Fundamental .	Frequency
346.07	33.22	26.83	45.81	21.95	53.90	495.45
520.01	27.59	27.31	23.96	23.20	53.90	495.45
693.26	21.37	20.56	11.71	10.67	53.90	495.45
866.53	19.60	19.60	9.55	9.55	53.90	495.45

*Class A converted for a 3-meter site measurement

VCO frequency: 173.3375 MHz

Note : 173.32 is fundamental

Radiated Spurious Enclosure Emissions: VHF Power Amplifier

Setup: Resolution Bandwidth: 120 KHz, Video Bandwidth: 1 MHz – 30 MHz – 1000 MHz
1 MHz, Video Bandwidth: 3 MHz – 1000 – 2000 MHz

Power Amplifier Output: A 173.3375 Mhz Signal Generator @ +23.5 dBmW into the input and the output into a 50 ohm termination (Dummy Antenna)



PASS



FAIL

Client: AeroComm, Inc.
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Exhibit X

Data for CFR 47 Part 2.1041

Section 2.1046 –RF Power Output

Section 2.1047 –Modulation Characteristics

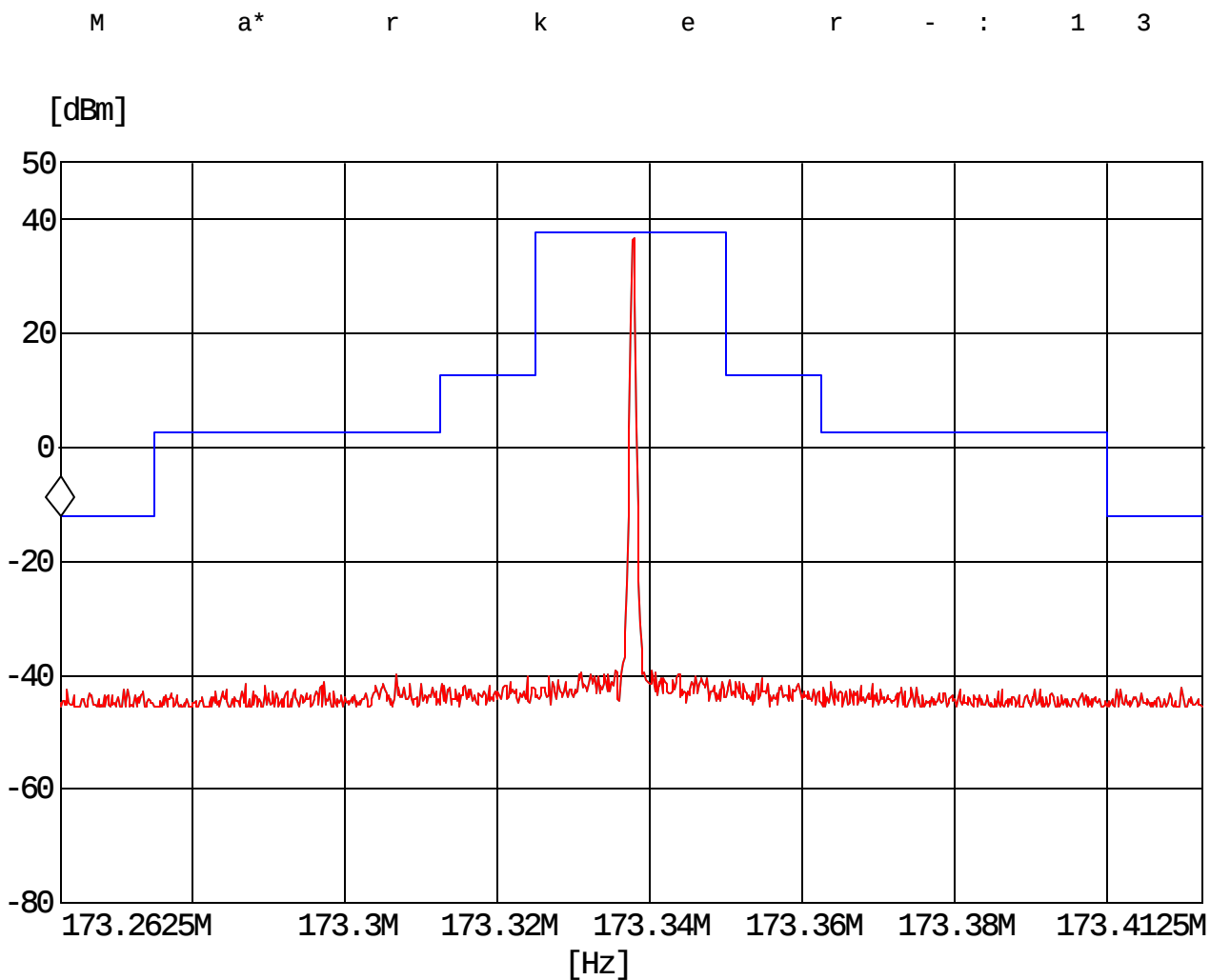
Sections 2.1049 (i) and 90.219 (b) - Emissions Mask

Section 2.1051 – Spurious Emissions at Antenna Terminal

Intermodulation Plot

Frequency Response Plot

Section 2.1046 (a) – RF power output

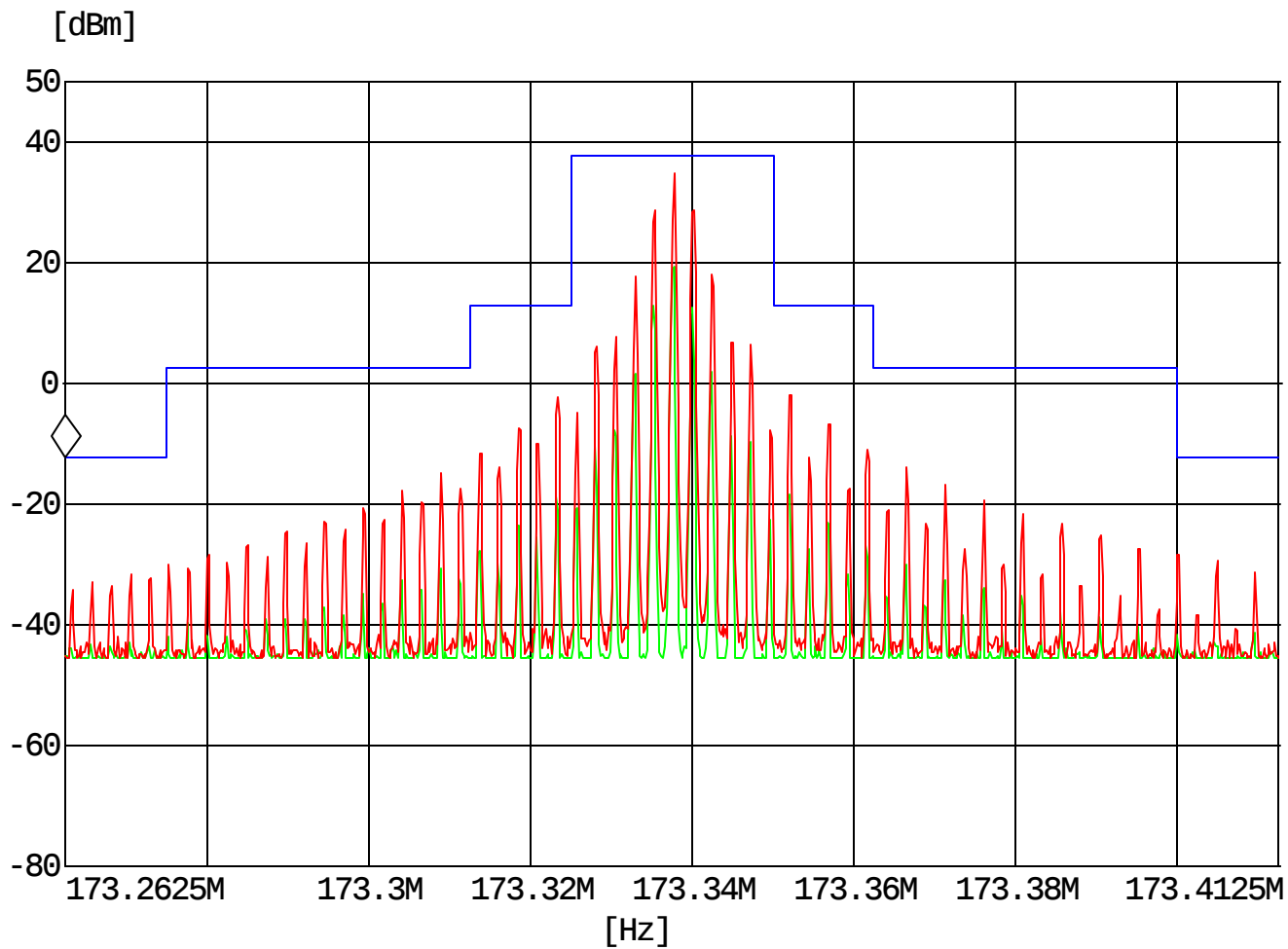


Test setup Configuration:

Aerocom 5 watt PA
Emission Mask B
Unmodulated carrier
TX Freq:173.3375
TX power output 37.76 dBm

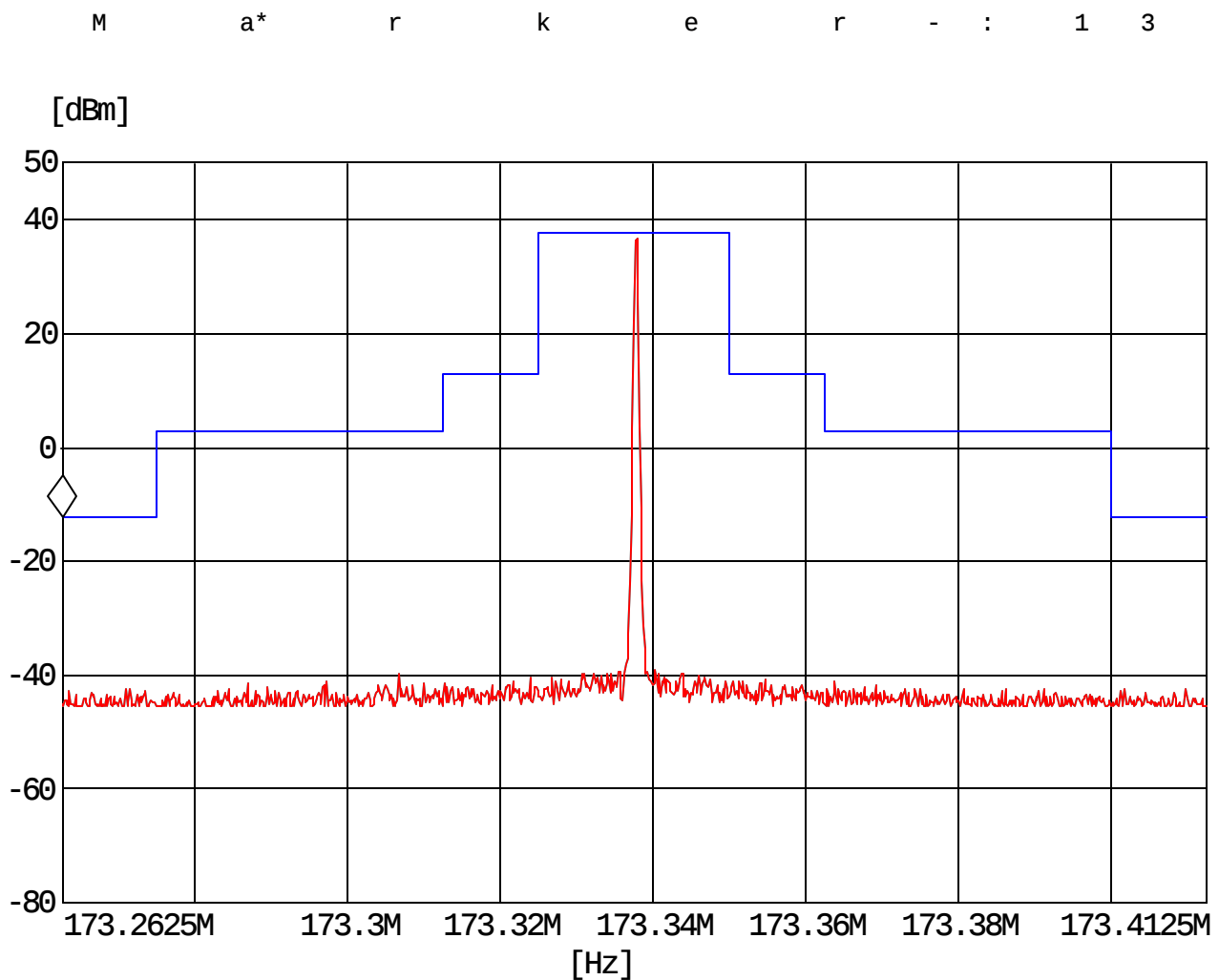
Section 2.1047 (a) – Modulation Characteristics

M a * r k e r - : 1 3 :



Aerocom PA modulation characteristic
Input to PA and output of PA

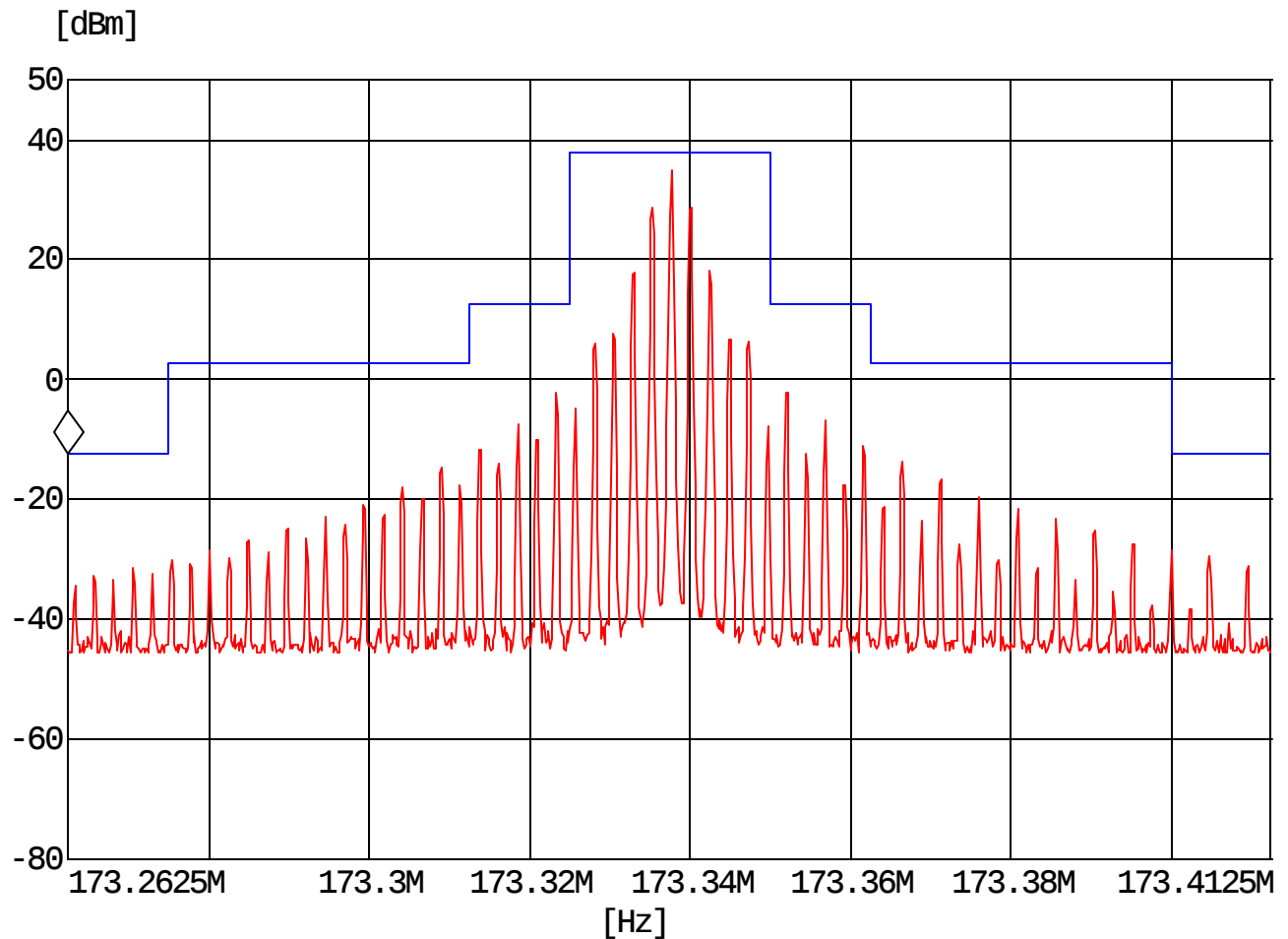
Section 2.1049 (i) and 90.219 (b) – Occupied Bandwidth/Emissions Mask



Test setup Configuration:

Aerocom 5 watt PA
Emission Mask B
Unmodulated carrier
TX Freq:173.3375
TX power output 37.76 dBm

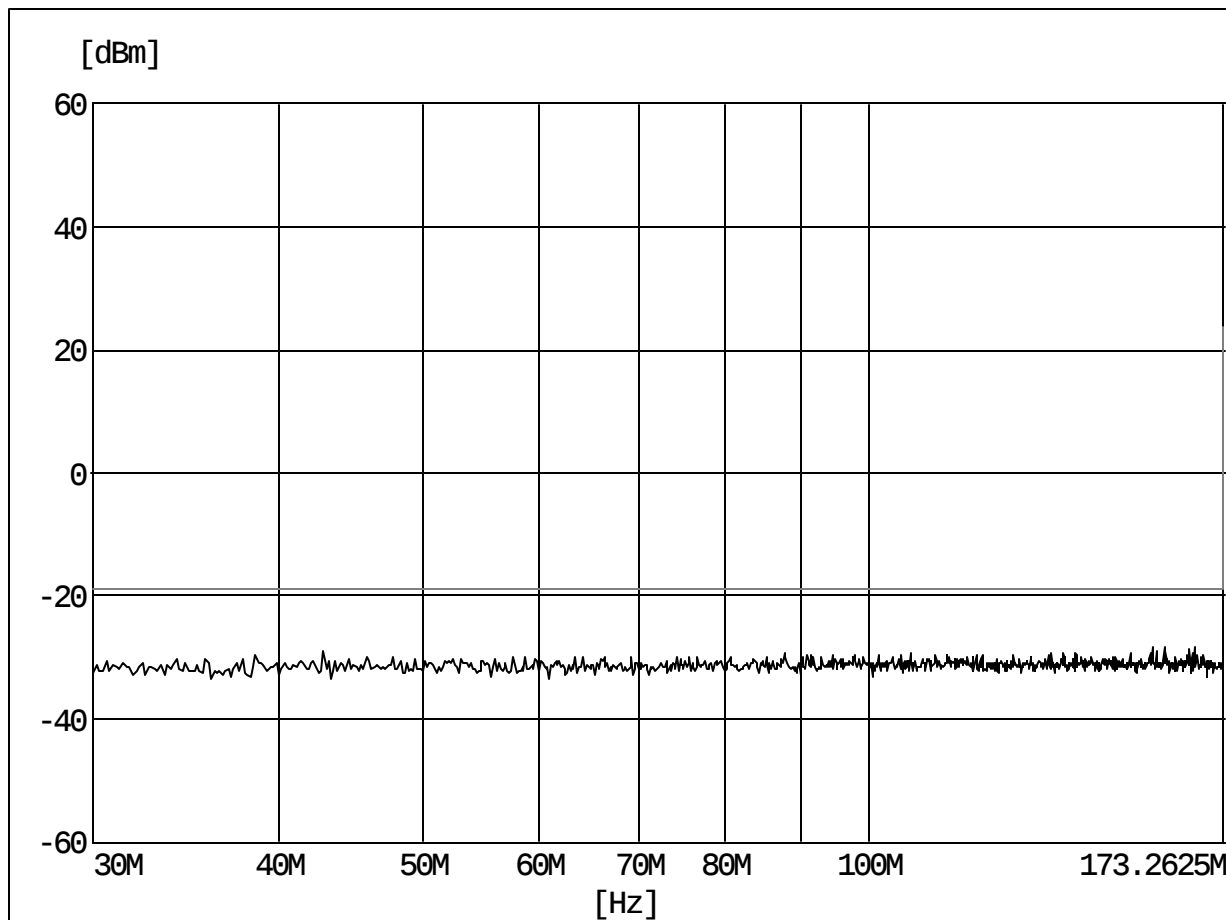
M a * r k e r - : 1 3 :



Test setup Configuration:

AeroComm, Inc.
5 watt PA
Modulated emissions mask
Emissions mask B
Modulation freq: 2.4 KHz
Modulation input amplitude 5.12 V peak
50% duty cycle

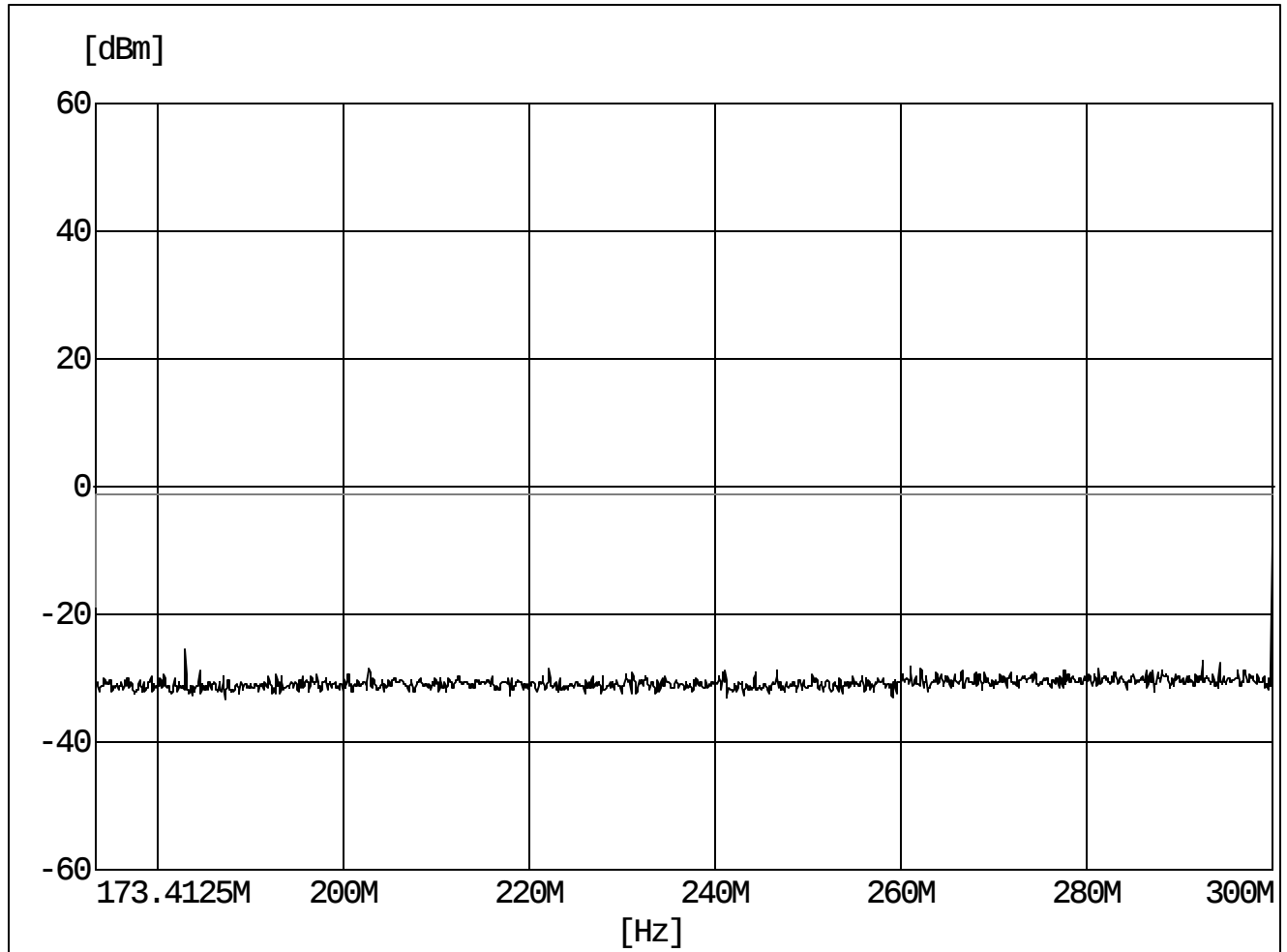
Section 2.1051 (a) – Spurious Emissions at Antenna Terminals



Spurious Emissions at Antenna Terminals (2.1051) Plot 1 of 4

Test setup Configuration:

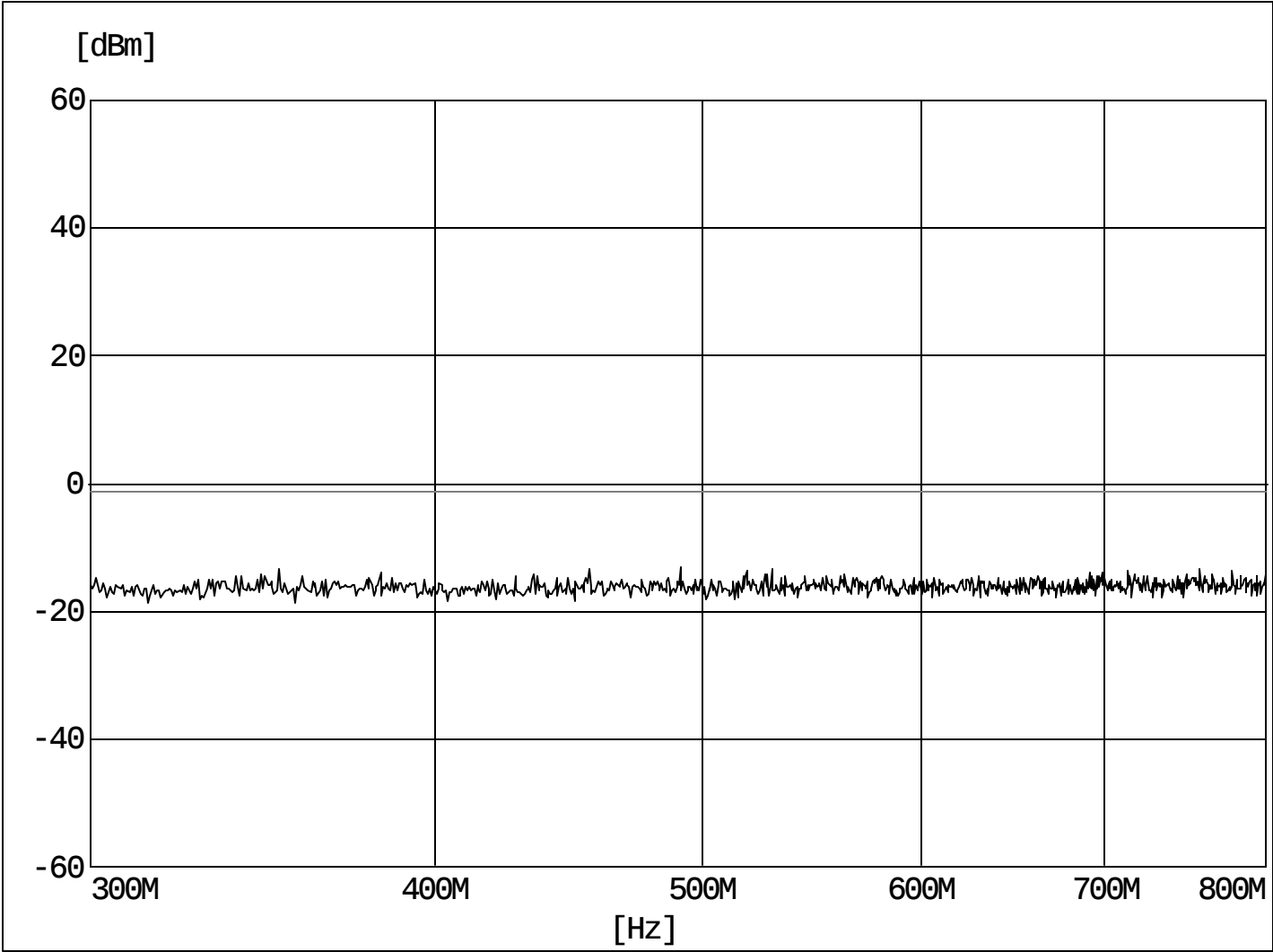
Aerocom spurious conducted emissions
30 Mhz to 173.2625Mhz
Modulated input



Spurious Emissions at Antenna Terminals (2.1051) Plot 2 of 4

Test setup Configuration:

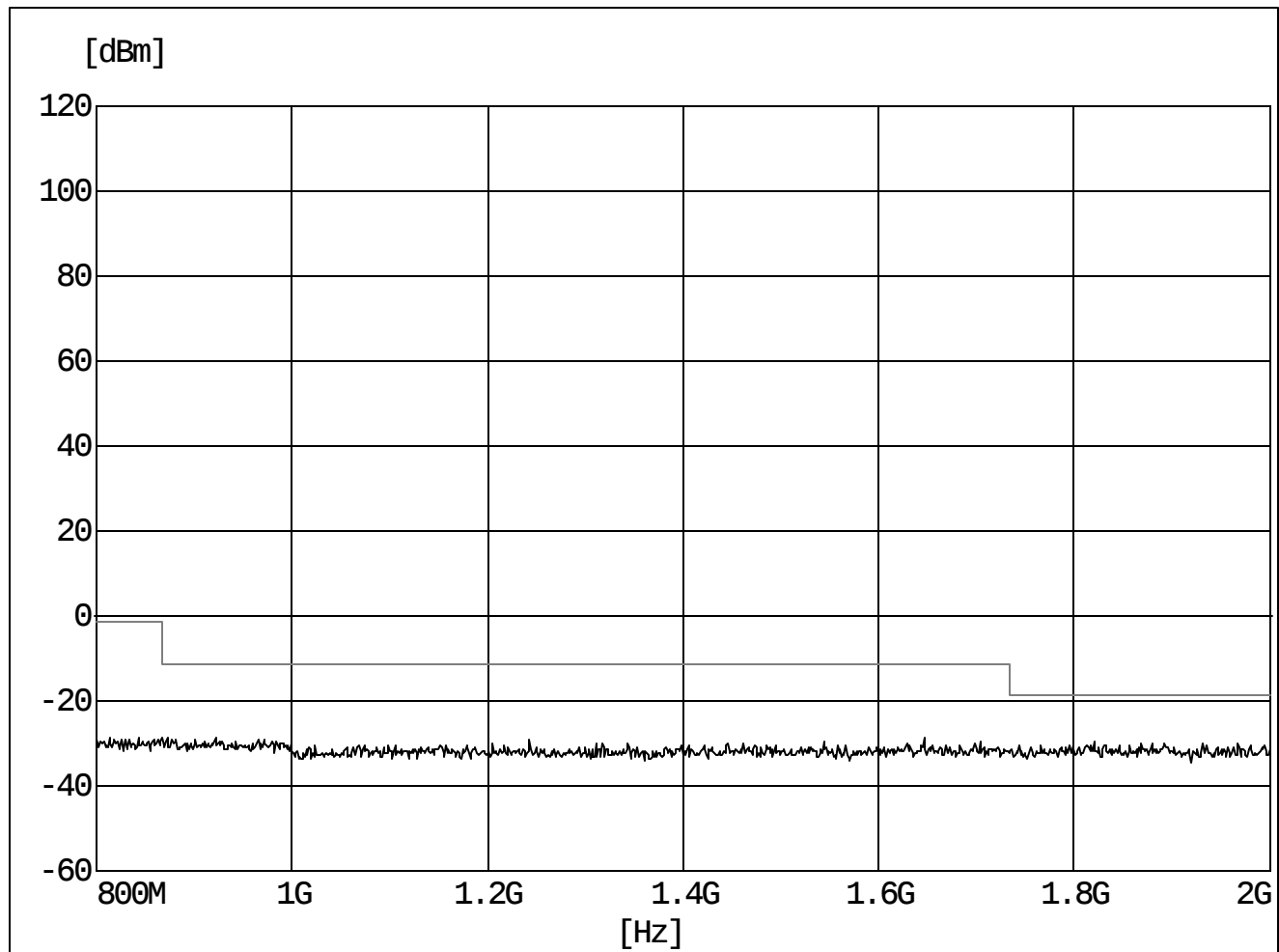
Aerocom spurious antenna emissions
173 to 300 Mhz
modulated input signal
Output of PA



Spurious Emissions at Antenna Terminals (2.1051) Plot 3 of 4

Test setup Configuration:

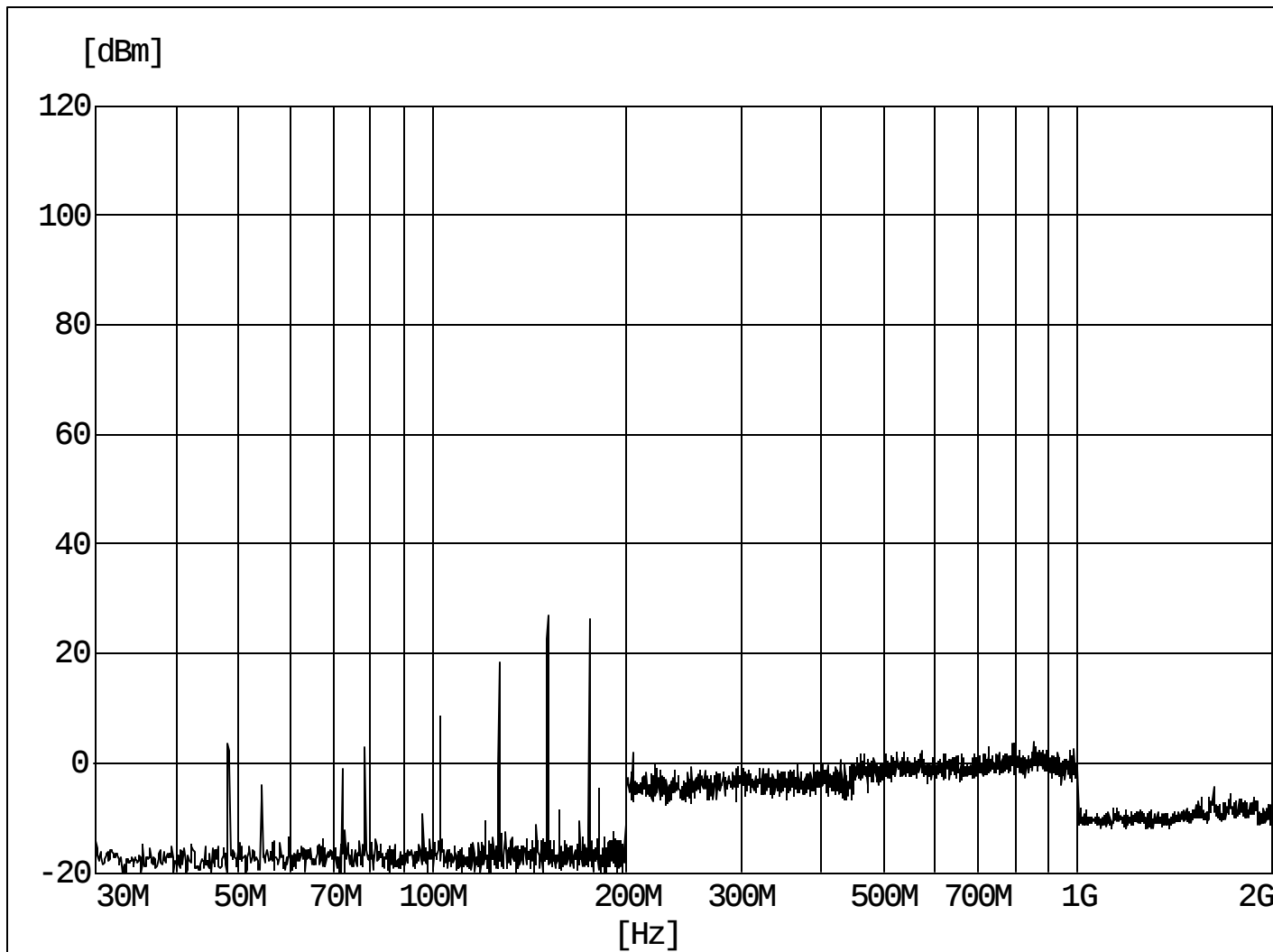
Aerocom spurious antenna emissions
300Mhz to 800 Mhz
Modualted input



Spurious Emissions at Antenna Terminals (2.1051) Plot 4 of 4

Test setup Configuration:

AeroComm, Inc. Spurious Emissions
800 Mhz to 2 Ghz
Modulated input



NOTE: This amplifier is not to be used for multiple channels at the same time. IT IS A SINGLE CHANNEL AMPLIFIER. THE ABOVE PLOT IS PROVIDED FOR INFORMATION ONLY AND IS NOT REQUIRED

AeroComm, Inc. Intermodulation Plot

Input Frequencies

F1= 150.000Mhz

F2 = 174.000 Mhz

The input amplitudes were adjusted for equal outputs from the amplifier.

(Please note that the Signal generators have a considerable amount of harmonic components)

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Equipment used

Signal generator - Marconi 2024 s/n 1121131019 cal due 7 April 2001

Signal Generator - HP E4420B ID# 902358 cal due 7 July 2000

Qty 2: UTE Isolators #CT-1059-ot s/n U6050 and U6049

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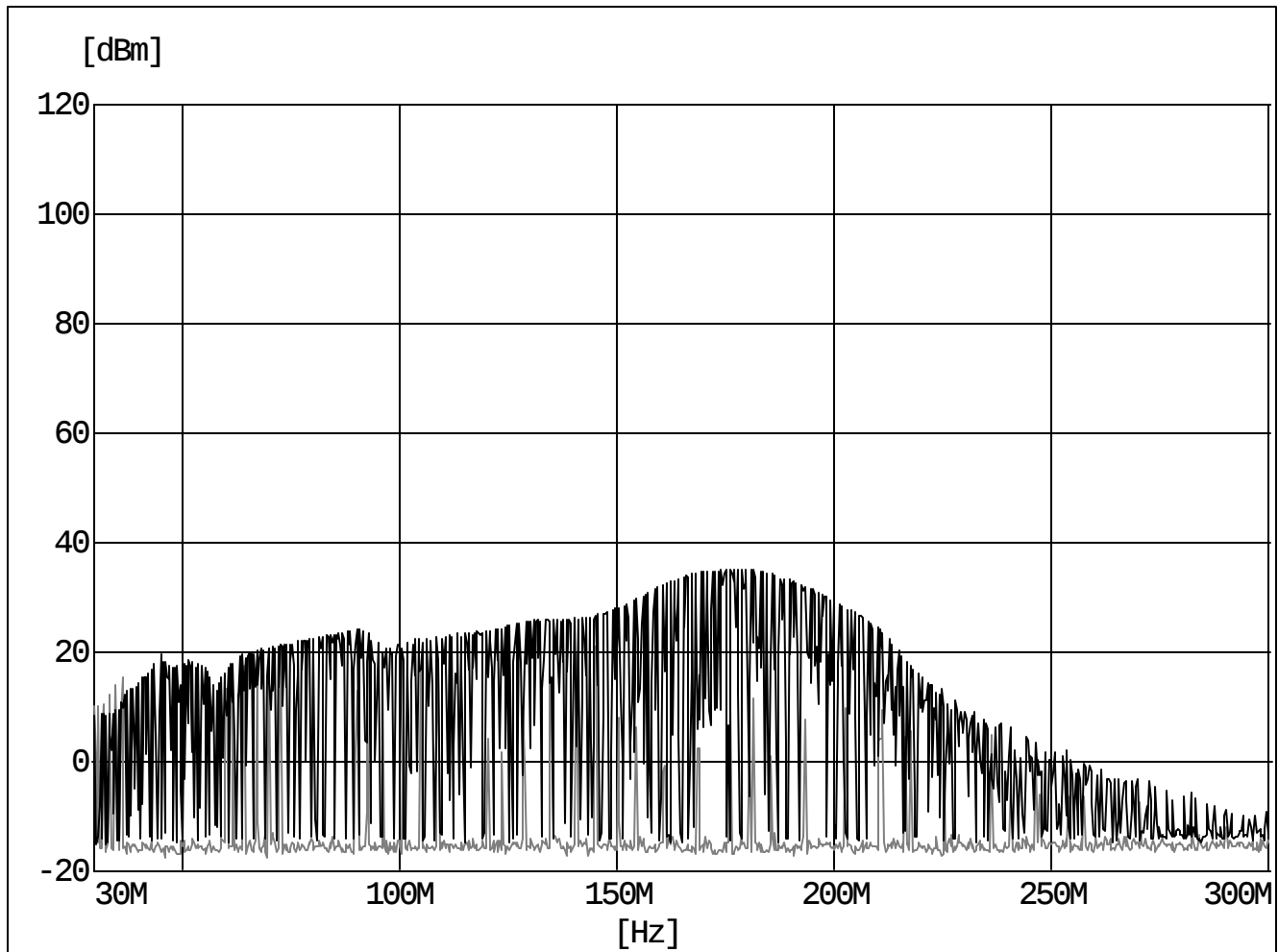
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Equipment used

1 Minicircuits mixer Zesc-2

1 Amplifier HP 8447F cal due 21 July 2000

Receiver R&H ESMI



AeroComm, Inc.
PA Frequency response
Unmodulated input @ +23dBm

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Exhibit XI



TEST SET-UP

&

EUT

PHOTOS

Client: AeroComm, Inc.
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TEST SET UP PHOTO
Please see test.pdf

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PHOTOGRAPH OF EUT
Please see extrn.pdf

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PHOTOGRAPH OF Overall Internal View
Please see intern.pdf

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Exhibit XII

Compliance Information

The following statement, or equivalent, is required to be in the user's manual:

FCC COMPLIANCE STATEMENT

The equipment described in this manual generates and uses radio frequency energy. If it is not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception.

This equipment has been tested and found to comply with the limits for a Private Land Mobile Radio Service VHF Power Amplifier pursuant to CFR 47 Part 2.1041 and Part 90 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference at the end use installation intended for this product. This device can only be operated with a station license issued by the FCC.

Warning to User:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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Exhibit XIII

Operation and Instruction Manual

The EUT does not have an operation/users manual. AeroComm, Inc. installs and maintains this equipment