

APPLICANT: ACROWAVE SYSTEMS CO., LTD.

FCC ID: PE6AAP-1100E

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TEST EQUIPMENT LIST

1. ☒ Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/ preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02, S/N 3008A00372.
2. ☒ Biconnical Antenna: Eaton Model 94455-1, S/N 1057.
3. ☐ Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171.
4. ☒ Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632.
5. ☐ Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 40.
6. ☒ Double-Ridged Horn Antenna: Electro-Metrics Model LPA-30, S/N 409 1-18 GHz, S/N 2319.
7. ☐ 18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20
8. ☐ Horn 40-60GHz: ATM Part #19-443-6R
9. ☐ Line Impedance Stabilization Network: Electro-Metrics Model ANS-25/2, S/N 2604.
10. ☐ Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
11. ☐ Frequency Counter: HP Model 5385A, S/N 3242A07460
12. ☐ Peak Power Meter: HP Model 8900C, S/N 2131A00545.
13. ☒ Open Area Test Site #1-3meters.
14. ☐ Signal Generator: HP 8640B, S/N 2308A21464 .
15. ☐ Signal Generator: HP 8614A, S/N 2015A07428
16. ☐ Passive Loop Antenna: EMC0 Model 6512, 9KHz to 30MHz, S/N 9706-1211.
17. ☐ Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153
18. ☐ AC Voltmeter: HP Model 400FL, S/N 2213A14499.
19. ☐ Digital Multimeter: Fluke Model 8012A, S/N 4810047.
20. ☐ Digital Multimeter: Fluke Model 77, S/N 43850817.
21. ☐ Oscilloscope: Tektronix Model 2230, S/N 300572.3

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC. Shielded interface cables were used in all cases except for cables connecting to the telephone line and the power cords. A test program was run which simulated a normal data transmission on a network.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 80°F with a humidity of 53%.

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TEST PROCEDURES CONTINUED

BANDWIDTH 6.0dB: The measurements were made with the spectrum analyzer's resolution bandwidth(RBW)=1.0MHz and the video bandwidth(VBW)=3.0MHz and the span set as shown on Page 7A-7C.

POWER OUTPUT: The RF power output was measured at the antenna feed point using a peak power meter.

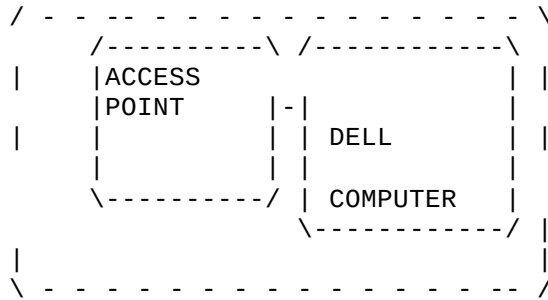
ANTENNA CONDUCTED EMISSIONS: The RBW=100KHz, VBW=300KHz and the span set to 10.0MHz and the spectrum was scanned from 30MHz to the 10th Harmonic of the fundamental. Above 1.0GHz the resolution bandwidth was 1.0MHz and the VBW = 3.0MHz and the span to 50MHz.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth(RBW) of the spectrum analyzer was 100kHz up to 1GHz and 1.0MHz above 1GHz with an appropriate sweep speed. The VBW above 1.0GHz was = 3.0MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 80°F with a humidity of 40%.

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PRODUCT DESCRIPTION:

This device is a wireless LAN adapter card that provides wireless connection between computers.



FREQUENCY RANGE: 2.4-2.4835 GHz

SUPPORT BIT RATES: 11 Mbps CCK, 5.5 Mbps CCK, 2 Mbps DQPSK,
1 mPBS dbps

SPREADING: DSSS (Direct Sequence Spread Spectrum)

CHIP RATE: 11 Mcps

ANTENNA: External 2 dBi Antenna with reverse SMA connector

MEDIA ACCESS
PROTOCOL: CSMA/CA (Collision Avoidance) with ACK

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APPLICANT: ACROWAVE SYSTEMS CO., LTD.
FCC ID: PE6AAP-1100E
NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE
RULES PART NUMBER: 15.107(a)
REQUIREMENTS: .45 - 30 MHz 250 uV OR 47.96 dBuV
TEST PROCEDURE: ANSI STANDARD C63.4-1992. The spectrum
was scanned from .45 to 30 MHz.

TEST DATA:

THE HIGHEST EMISSION READ FOR LINE 1 WAS 68.308 uV @ 6.06 MHz.

THE HIGHEST EMISSION READ FOR LINE 2 WAS 81.184 uv @ 5.65 MHz.

THE GRAPHS IN THE NEXT TWO PAGES REPRESENT THE EMISSIONS TAKEN FOR
THIS DEVICE.

TEST RESULTS: Both lines were observed. The measurements indicate
that the unit DOES appear to meet the FCC requirements for this class
of equipment.

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hp

REF 7.070 mV

ATTEN 0 dB + 20 dB

MKR 6.06 MHz

68.308 μ V

10 dB/

ACROWAVE SYSTEMS CO LTD

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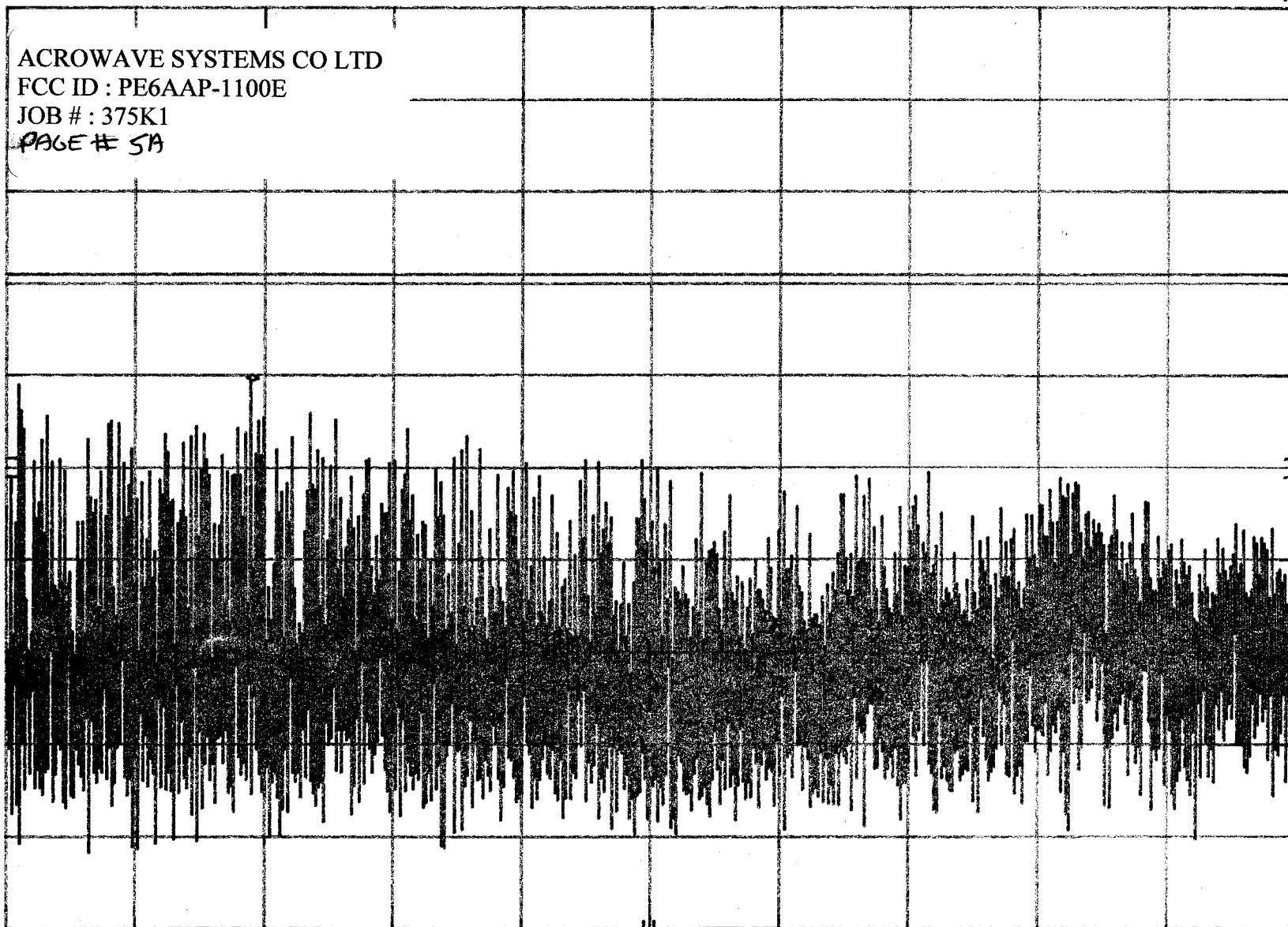
JOB # : 375K1

PAGE # 5A

DL

250.8

μ V



START 450 KHz

RES BW 10 KHz

VBW 10 KHz

STOP 30.00 MHz

SWP 750 msec

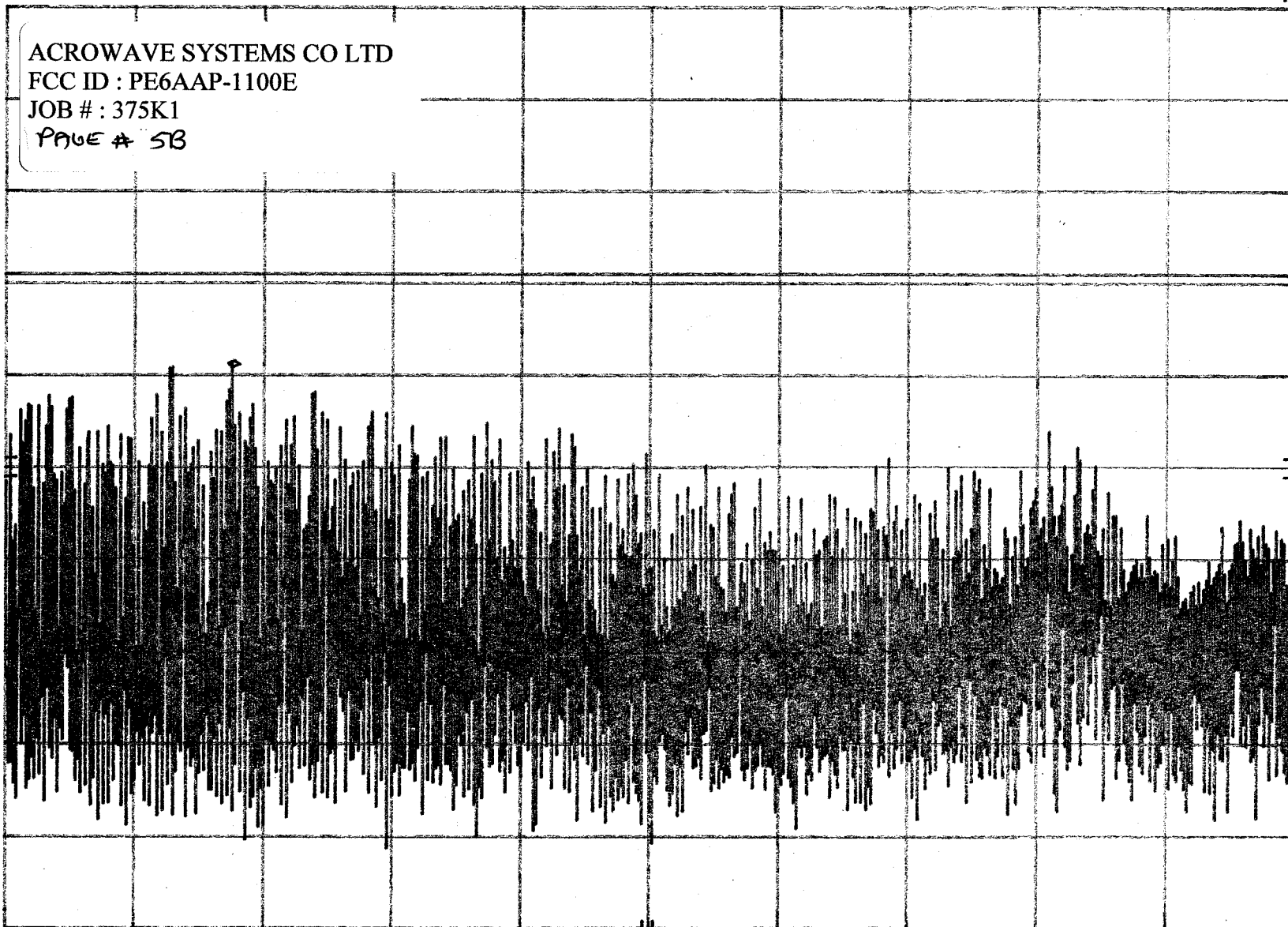
hp REF 7.070 mV ATTEN 0 dB + 20 dB

MKR 5.65 MHz
81.184 μ V

10 dB/

ACROWAVE SYSTEMS CO LTD
FCC ID : PE6AAP-1100E
JOB # : 375K1
PAGE # 5B

DL
250.8
 μ V



START 450 KHz

RES BW 10 KHz

VBW 10 KHz

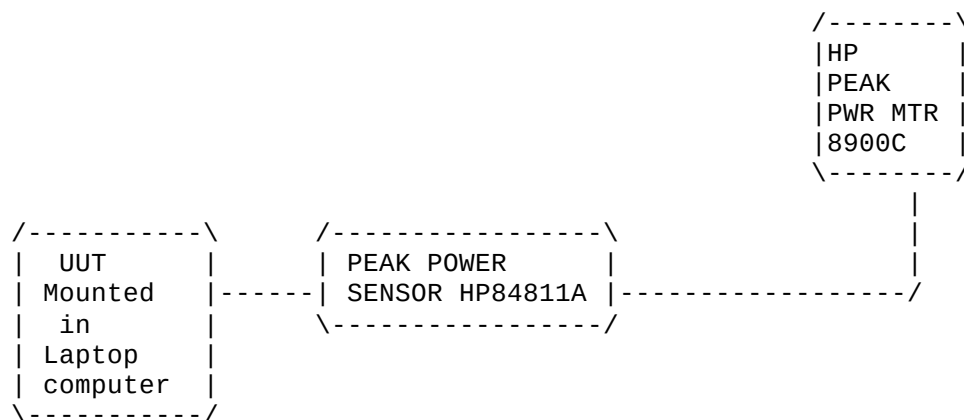
STOP 30.00 MHz
SWP 750 msec

APPLICANT: ACROWAVE SYSTEMS CO., LTD.
 FCC ID: PE6AAP-1100E
 NAME OF TEST: 6.0dB BANDWIDTH
 RULES PART NUMBER: 15.247(a)(2)
 REQUIREMENTS: The 6.0dB bandwidth must be greater than 500KHz.
 MEASUREMENT: The 6.0dB bandwidth measured @ 2442.00MHz was 10.50MHz.
 MEASUREMENT DATA: See plots on the next 3 pages.

NAME OF TEST: POWER OUTPUT
 RULES PART NUMBER: 15.247(b) 1.0Watt or +30dBm

MEASUREMENT: 17 mWATTS @ 2417.00 MHz
 20 mWATTS @ 2442.00 MHz
 20 mWATTS @ 2462.00 MHz

15.247(c) Method of Measuring RF Power output:
 The Peak power Sensor was connected
 in place of the antenna.



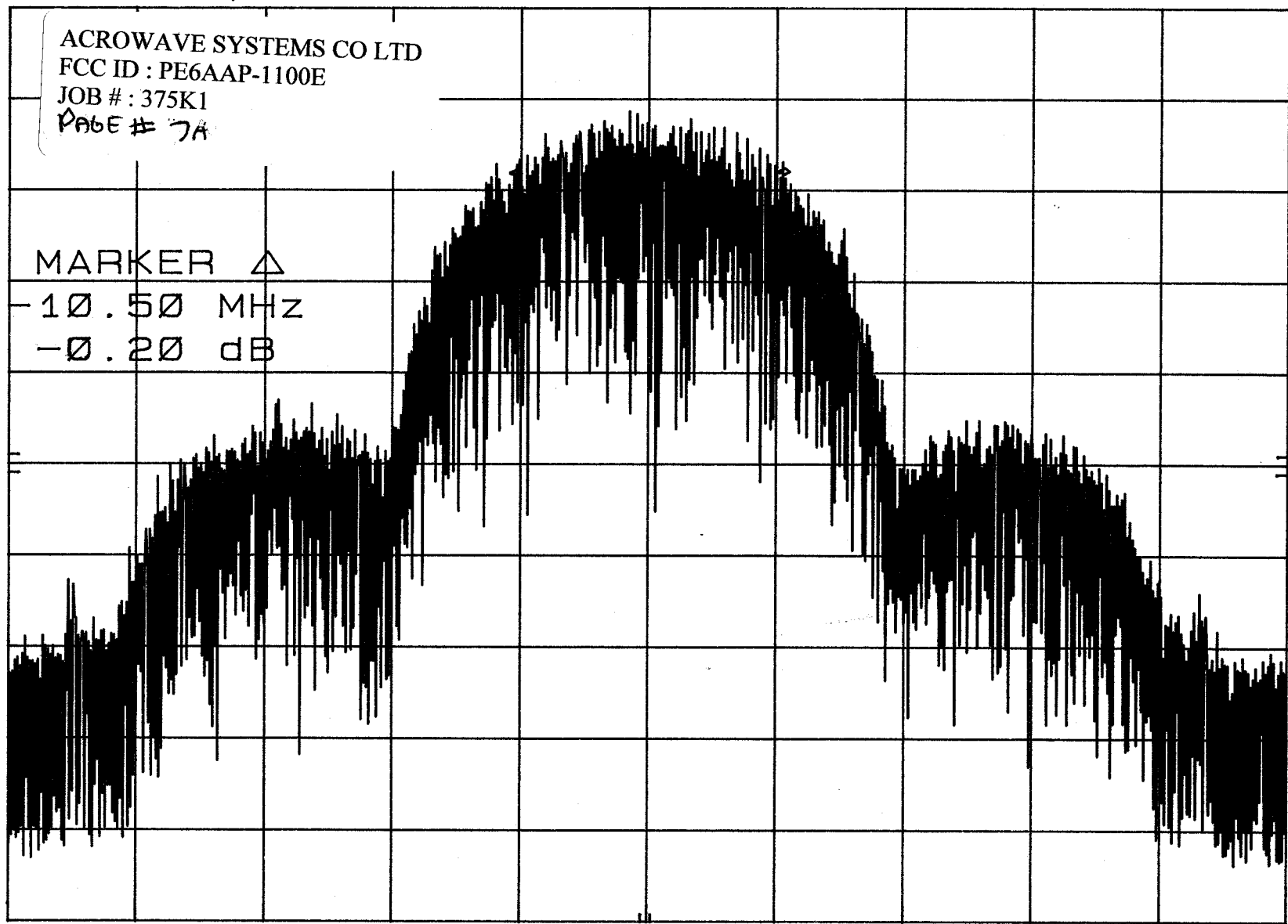
hp REF 97.0 dBμV ATTN 0 dB + 20 dB

MKR Δ-10.50 MHz
-0.20 dB

10 dB/

ACROWAVE SYSTEMS CO LTD
FCC ID: PE6AAP-1100E
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MARKER Δ
-10.50 MHz
-0.20 dB



CENTER 2.442 4 GHz

RES BW 100 kHz (i) VBW 300 kHz

SPAN 50.0 MHz
SWP 37.5 msec

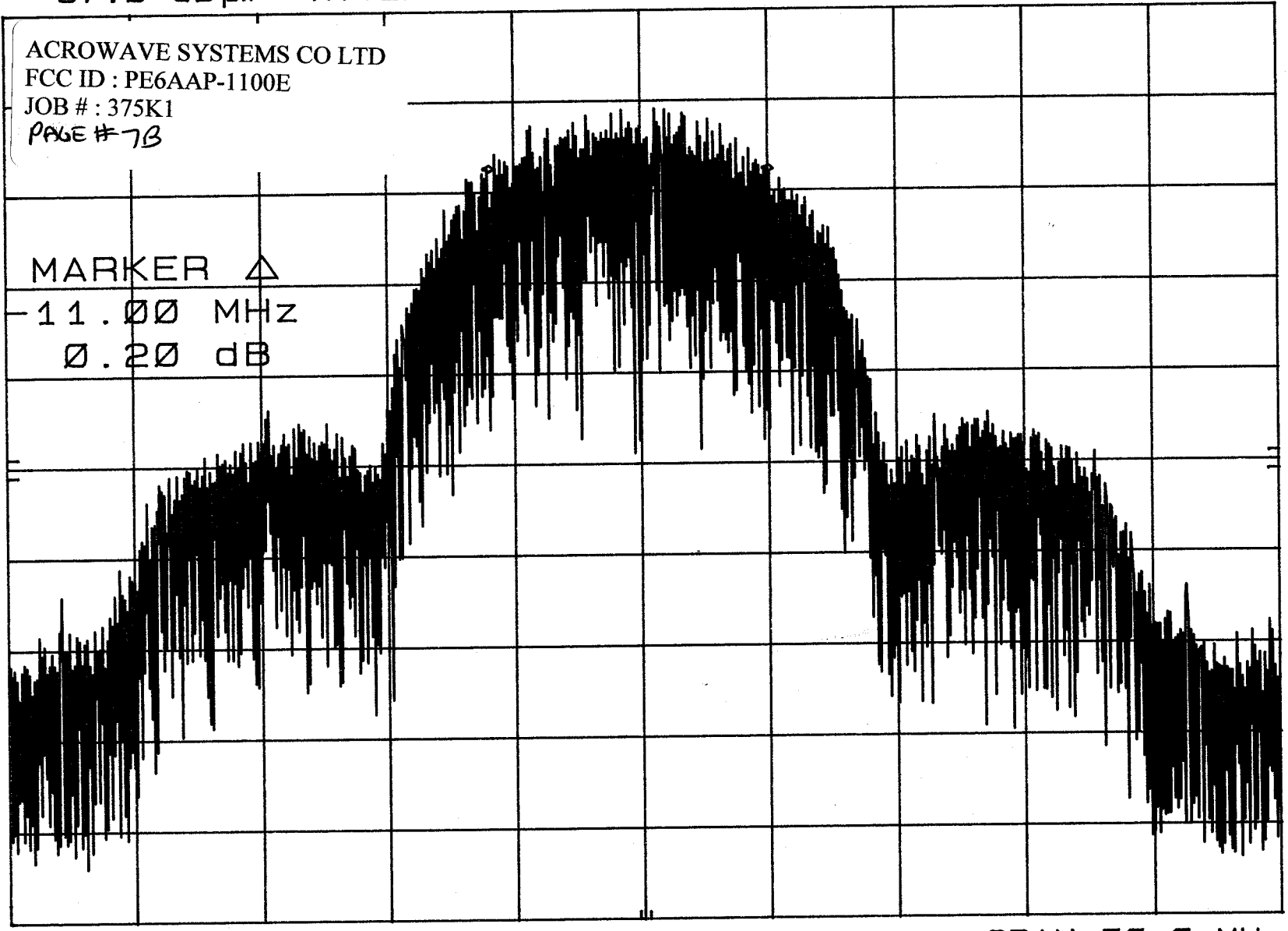
hp
10 dB/

REF 97.0 dBμV ATTN 0 dB + 20 dB

MKR Δ-11.00 MHz
0.20 dB

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MARKER Δ
-11.00 MHz
0.20 dB



CENTER 2.417 7 GHz SPAN 50.0 MHz
RES BW 100 kHz (i) VBW 300 kHz SWP 37.5 msec

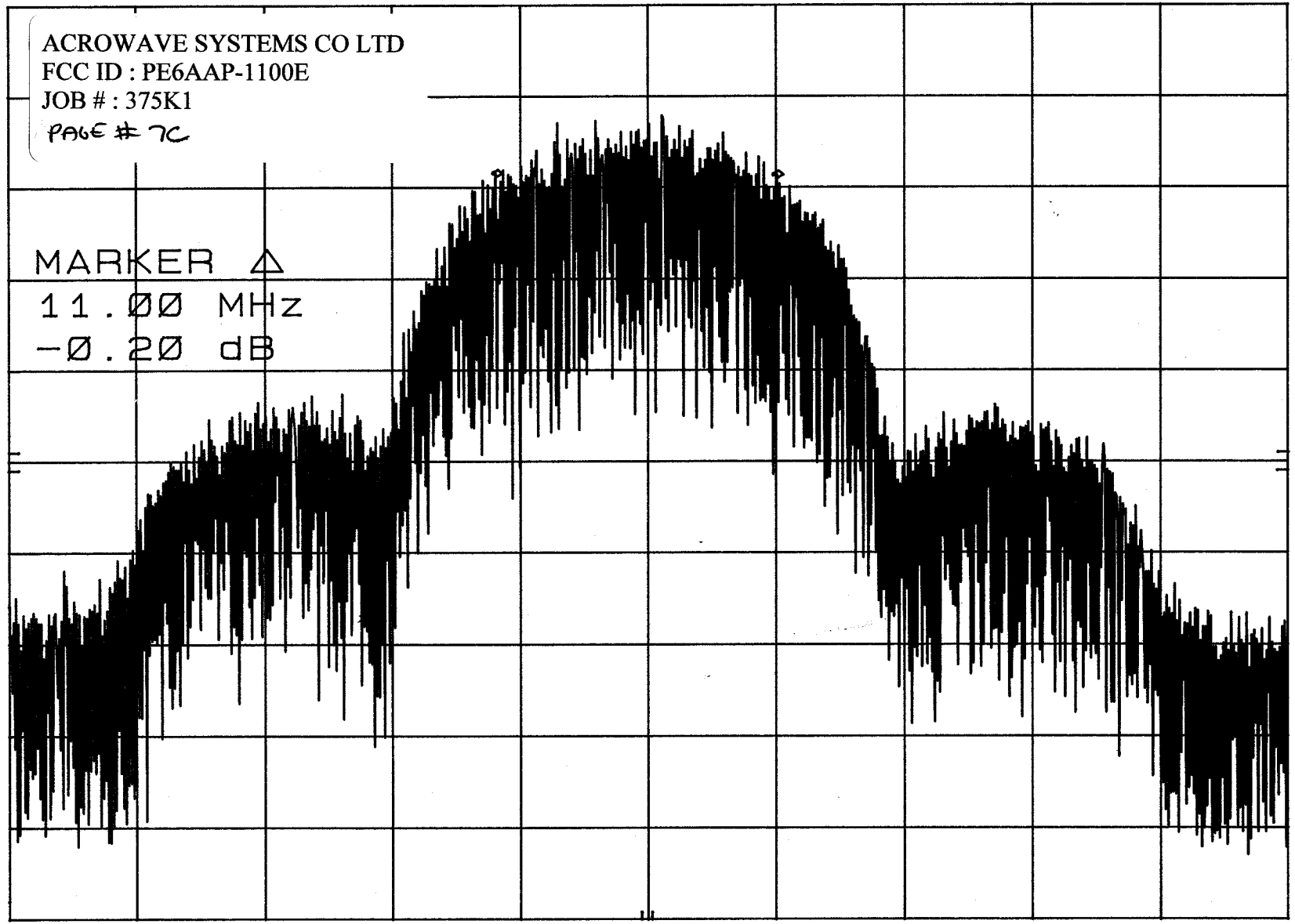
hp REF 97.0 dBμV ATTN 0 dB + 20 dB

MKR Δ 11.00 MHz
-0.20 dB

10 dB/

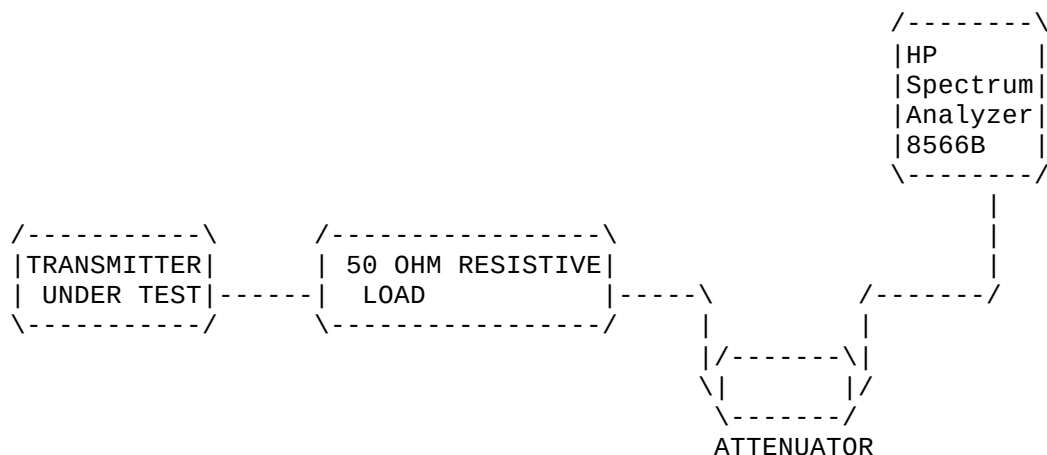
ACROWAVE SYSTEMS CO LTD
FCC ID : PE6AAP-1100E
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MARKER Δ
11.00 MHz
-0.20 dB



CENTER 2.462 5 GHz SPAN 50.0 MHz
RES BW 100 kHz (i) VBW 300 kHz SWP 37.5 msec

15.247(c) Method of Measuring RF Conducted Spurious Emissions



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 1 MHz RBW.

EMISSION FREQUENCY MHz	dB BELOW CARRIER
2417.0	00.0
4834.0	93.0
7251.0	74.3
9668.0	95.7
2442.0	00.0
4884.0	82.7
7326.0	75.1
9768.0	98.8
2462.0	00.0
4924.0	75.0
7486.0	68.3
9848.0	102.0
19696.0	102.3

NOTE: THE SPECTRUM WAS SCANNED TO THE TENTH HARMONIC.

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15.247(c), 15.205 & 15.209(b) Field strength of spurious emissions:

REQUIREMENTS:

FIELD STRENGTH of Fundamental: 902-928MHz 2.4-2.4835GHz 127.38dBuV/m @3m	FIELD STRENGTH of Harmonics	S15.209 30 - 88 MHz 40 dBuV/m @3M 88 -216 MHz 43.5 216 -960 MHz 46 ABOVE 960 MHz 54dBuV/m
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REQUIREMENTS: Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

TEST DATA:

EMISSION FREQUENCY MHz	METER READING @ 3m dBuV	COAX LOSS dB	ACF dB	FIELD STRENGTH dBuV/m	FCC. LIMIT dB	MARGIN dB	ANT.
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Intentional Radiator Emissions

2412.00	67.50	1.09	29.03	97.62	127.38	29.76	V
4824.00R	4.30	1.45	33.93	39.68	54.00	14.32	V
7236.00R	0.50	1.82	36.64	38.96	54.00	15.04	V
9648.00	1.90	2.11	38.59	42.61	54.00	11.39	V
2442.00	66.50	1.10	29.10	96.70	127.38	30.68	V
4884.00R	5.80	1.46	33.99	41.26	54.00	12.74	V
9768.00	8.50	2.12	38.67	49.30	54.00	4.70	V
2467.00	67.00	1.10	29.17	97.27	127.38	30.11	V
4934.00R	4.00	1.47	34.05	39.52	54.00	14.48	V
9868.00	1.30	2.13	38.74	42.17	54.00	11.83	V

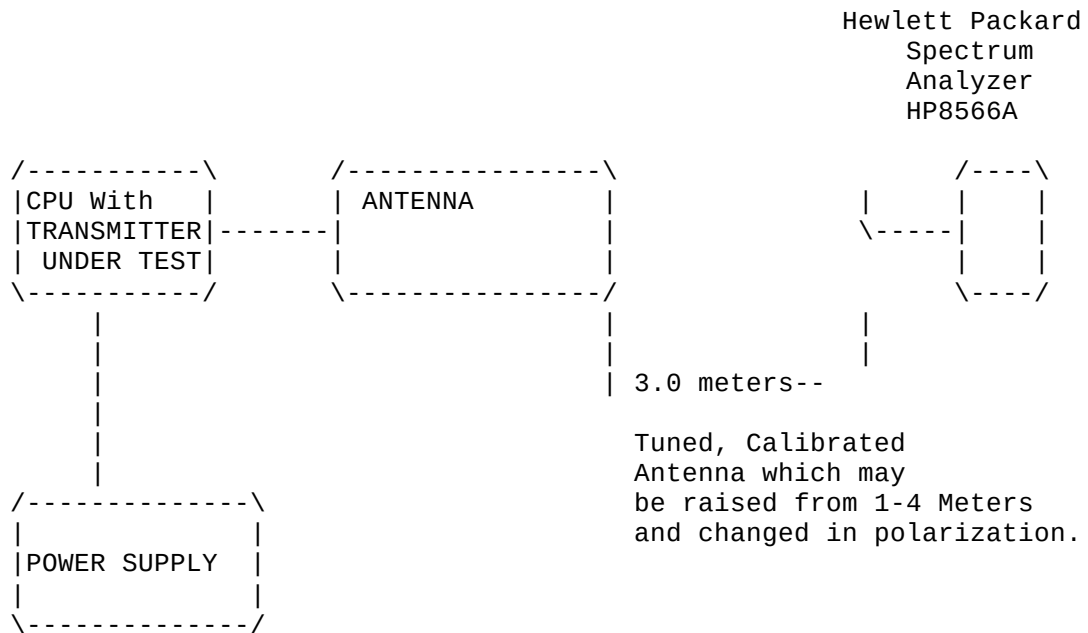
METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-1992 & the Guidance on Measurements for Direct Sequence Spread Spectrum Systems. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road, Newberry, FL 32669.

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2.993(a)(b)

2.993(a)(b) Continued Field strength of spurious emissions:

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotatable platform.

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NAME OF TEST: RADIATED SPURIOUS EMISSIONS INTO ADJACENT
RESTRICTED BAND

REQUIREMENTS: Emissions that fall in the restricted bands
(15.205). These emissions must be less than
or equal to 500 uV/m (54 dBuV/m).

TEST PROCEDURE: An in band field strength measurement of the
fundamental emissions using the RBW and
detector function required by C63.4-2000 and
FCC rules. The procedure was repeated with
an average detector and a plot made. The
calculated field strength in the adjacent
restricted band is presented below.

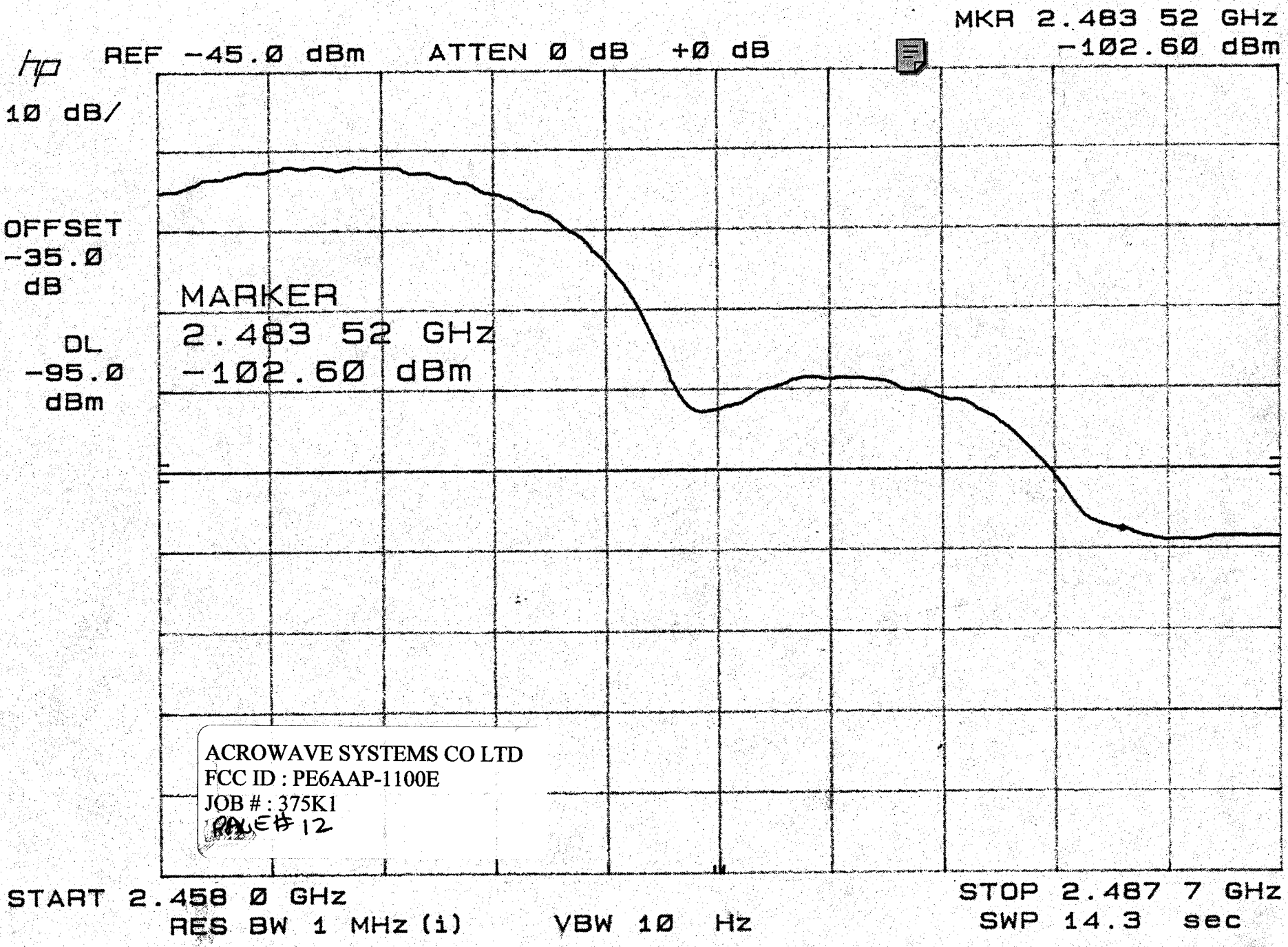
-102.60 dBm - from plot
+ 29.21 dB - ACF
+ 1.1 dB - Coax Loss
- 72.99 dBm
+107.00
34.71 dBuV

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NAME OF TEST: POWER SPECTRAL DENSITY
RULES PART NUMBER: 15.247(d)
REQUIREMENTS: The peak level measured must be no greater than +8.0dBm.
DATA: THE PLOTS ARE ON THE NEXT 3 PAGES.

The level at 2413.182MHz was -24.10dBm.

2417.70 MHz	2443.19 MHz	2462.26 MHz	
31.2 dBuV	36.2 dBuV	28.9 dBuV	from plots
+ 20.0 dB	+20.0 dB	+20.0 dB	Attenuation used
+ 35.0	+35.0	+35.0	Correction Factor
<u>86.2 dBm</u>	<u>91.2</u>	<u>83.9</u>	dBuV
-107.0	-107.0	-107.0	dBuV to dBm
- 20.8 dBm	- 15.8 dBm	- 23.1 dBm	Spectral Density

NAME OF TEST: PROCESSING GAIN

RULES PART NUMBER: 15.247(e)

REQUIREMENTS:

DATA: The processing gain information supplied by the manufacturer is 10.0dB.

See Exhibit 8 for processing gain test methods and data.

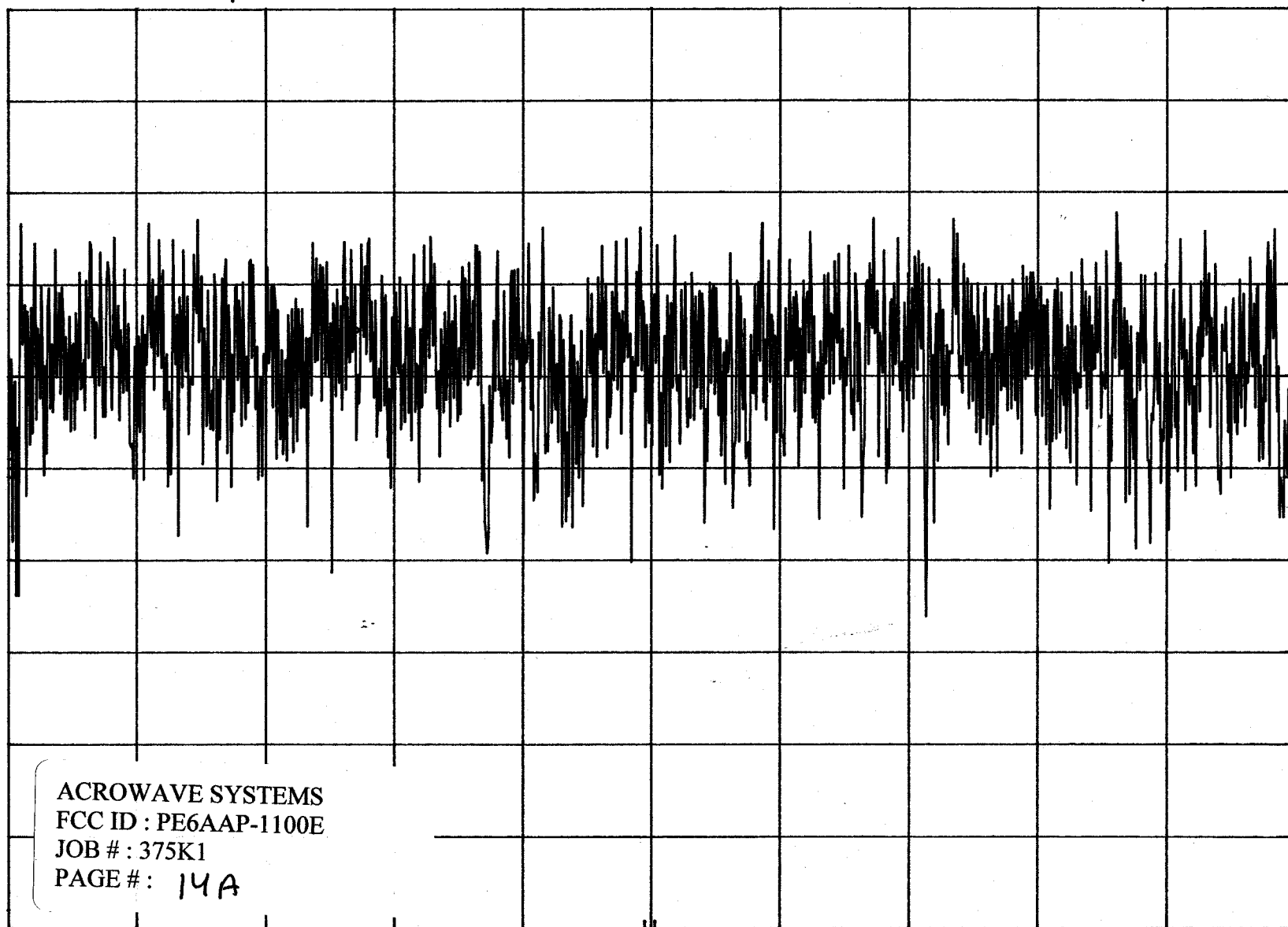
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hp REF 97.0 dB μ V ATTEN 0 dB + 20 dB

MKR 2.417 238 GHz
31.20 dB μ V (1Hz)

10 dB/

SAMPLE



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CENTER 2.417 70 GHz

RES BW 3 kHz (i)

VBW 10 kHz

SPAN 2.000 MHz

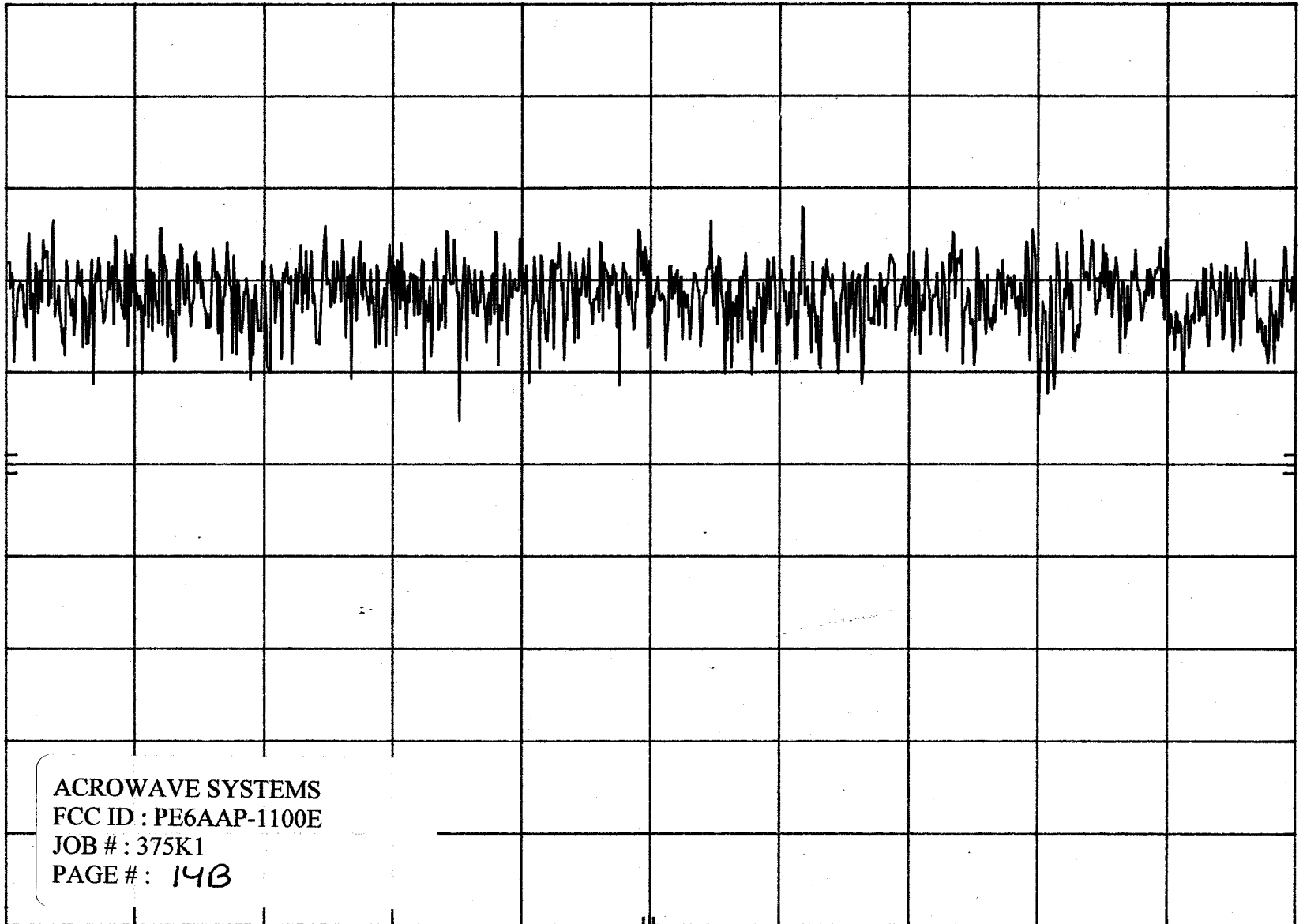
SWP 500 sec

hp REF 97.0 dB μ V ATTEN 0 dB + 20 dB

MKR 2.443 888 GHz
36.20 dB μ V (1Hz)

10 dB/

SAMPLE



CENTER 2.443 19 GHz

RES BW 3 KHz (1)

VBW 10 KHz

SPAN 2.00 MHz

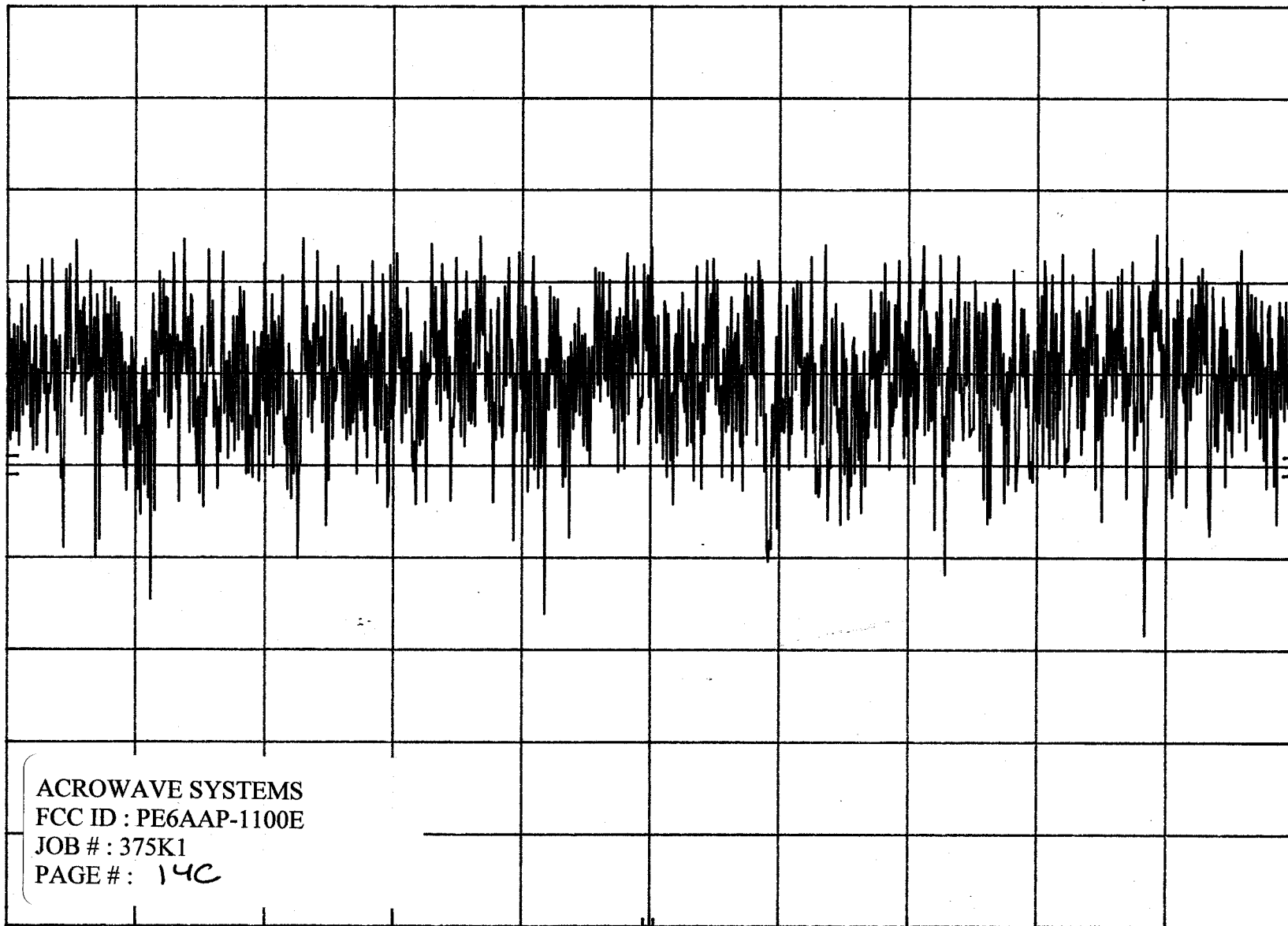
SWP 500 sec

hp REF 97.0 dB μ V ATTEN 0 dB + 20 dB

MKR 2.462 206 GHz
28.90 dB μ V (1Hz)

10 dB/

SAMPLE



CENTER 2.462 26 GHz
RES BW 3 kHz (i)

VBW 10 kHz

SPAN 2.00 MHz
SWP 500 sec