

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
CERTIFICATION TO FCC PART 15 REQUIREMENTS**

for

INTENTIONAL RADIATOR

434 MHz CAR ALARM TRANSMITTER

MODEL NO: APS99BT3CF4

FCC ID NO: ELVAT1C

REPORT NO: 01E9571

ISSUE DATE: August 9, 2001

Prepared for

**NUTEK CORPORATION
5F, NO. 3, ALLEY 6, LANE 45, PAO-HSING RD.,
HSING-TIEN CITY, TAIPEI, TAIWAN**

Prepared by

**COMPLIANCE ENGINEERING SERVICES, INC.
NO. 199, CHUNG SHENG ROAD,
HSIN TIEN CITY, TAIPEI,
TAIWAN, R. O. C.**

d.b.a.

COMPLIANCE CERTIFICATION SERVICES



**FCC, VCCI, CISPR, CE
UL, CSA, TÜV, VDE**

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| <ul style="list-style-type: none">• Maximum Modulation Percentage Plot• Emission Bandwidth Plot• Radiated Emission Worksheet for Average Measurement | |

1. VERIFICATION OF COMPLIANCE

COMPANY NAME: NUTEK CORPORATION
5F, NO. 3, ALLEY 6, LANE 45, PAO-HSING RD.,
HSING-TIEN CITY, TAIPEI, TAIWAN

CONTACT PERSON: RUBY HSIEH/ MARKETING DEPT.

TELEPHONE NO.: 02-2918-9478

EUT DESCRIPTION: 434 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: APS99BT3CF4

FCC ID: ELVAT1C

DATE TESTED: July 4 ~ July 6, 2001

REPORT NUMBER: 01E9571

| | |
|-----------------------|---|
| TYPE OF EQUIPMENT | SECURITY EQUIPMENT (INTENTIONAL RADIATOR) |
| EQUIPMENT TYPE | 434 MHz CAR ALARM TRANSMITTER |
| MEASUREMENT PROCEDURE | ANSI C63.4 / 1992 |
| LIMIT TYPE | CERTIFICATION |
| FCC RULE | CFR 47, PART 15 |

The above equipment was tested by Compliance Engineering Services, Inc. for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. **Warning** : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Engineering Services, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Engineering Services, Inc. will constitute fraud and shall nullify the document.

Rick Yeo

RICK YEO / EMC MANAGER
COMPLIANCE ENGINEERING SERVICES, INC.

2. Product Description

| | |
|-----------------------|---|
| Fundamental Frequency | 434 MHz |
| Power Source | 12V Battery |
| Transmitting Time | Periodic \leq 5 seconds |
| Associated Receiver | FCC ID: ELVAR1A |

3. Test Facility

The open area test sites and conducted measurement facilities used to collect the radiated data are located at No. 199, Chung Sheng Road, Hsin Tien City, Taipei, Taiwan R.O.C. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

4. Measurement Standards

The site is constructed and calibrated in conformance with the requirements of ANSI C63.4/1992.

5. Test Methodology

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 KHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. (CFR 47 Section 15.33)

6. Measurement Equipment Used

| Manufacturer | Model Number | Description | Cal Due Date |
|--------------|--------------------------|-----------------------------------|--------------|
| R & S | DSAI-D 804.8932.52 | Spectrum Analyzer (20Hz – 5GHz) | 11/2001 |
| R & S | ESBI- RF/1005.4300.52 | Spectrum Analyzer (20Hz – 5GHz) | 11/2001 |
| H.P. | 8595EM | Spectrum Analyzer (9KHz – 6.5GHz) | 01/2002 |
| EMCO | 3115 | Antenna (1-18GHz) | 02/2002 |
| SCHWARZBECK | VULB 9160 | Antenna (30-2000 MHz) | 05/2002 |
| H.P. | 8447D | Amplifier | 05/2002 |
| MITEQ | NSP2600-44 | Amplifier(1-26GHz) | 02/2002 |

7. POWERLINE RFI LIMIT

| | |
|--|--|
| CONNECTED TO AC POWER LINE | SECTION 15.207 |
| CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 kHz TO 30 MHz | SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE. |
| BATTERY POWER | NO REQUIRED. |

8. RADIATED EMISSION LIMITS

| | |
|---|----------------|
| GENERAL REQUIREMENTS | SECTION 15.209 |
| RESTRICTED BANDS OF OPERATION | SECTION 15.205 |
| PERIODIC OPERATION IN THE BAND 40.66 -40.70 MHz AND ABOVE 70 MHz. | SECTION 15.231 |

9. SYSTEM TEST CONFIGURATION

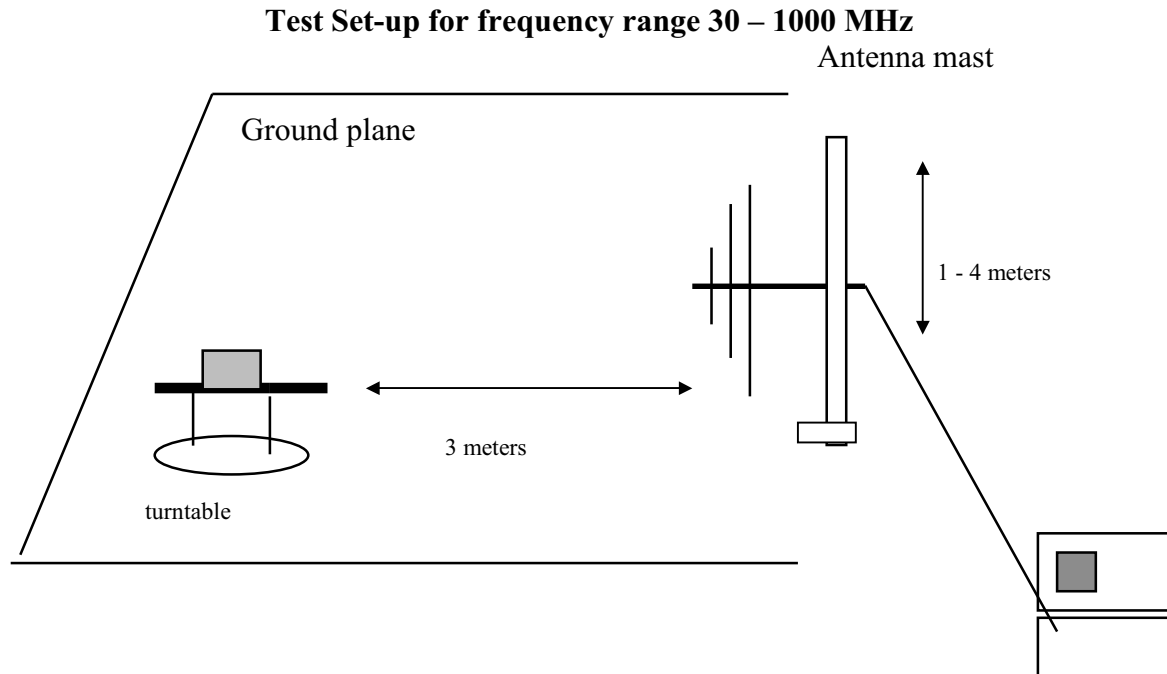
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

10. Test Procedure

Radiated Emissions, 15.231(4)(b)



preamplifier/spectrum analyzer

Fig. 1

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3-meters from the EUT.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

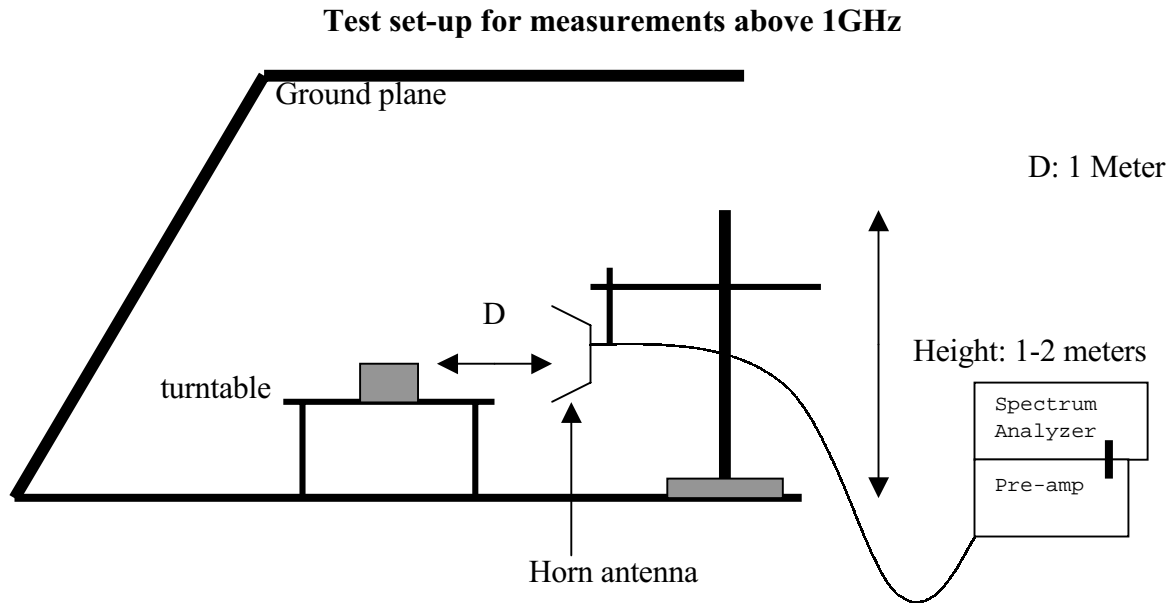


FIG. 2

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1-meters from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

11. Equipment Modifications

To achieve compliance to FCC Section 15.231 technical limits, the following change(s) were made during compliance testing:

NONE

12. TEST RESULT

| Powerline RFI Class B | Eut | Radiated Emission Limits | Eut |
|--|------------|---------------------------------|------------|
| SECTION 15.207 | | SECTION 15.209 | X |
| SECTION 15.205, 15.209, 15.221, 15.223, x 15.225 OR 15.227 | | SECTION 15.205 | |
| BATTERY POWER | X | SECTION 15.231 (b) | X |
| | | SECTION 15.231 (e) | |

12.1 Maximum Modulation Percentage (M%)

CALCULATION:

Average Reading = Peak Reading (dBuV/m)+ 20log (Duty Cycle)

In order to determine possible Maximum Modulation percentage, alternations are made to the EUT. We measured:

WHERE 1 Period = 112 mS >100 mS. use 100 mS for calculation
 Long pulse = 1.0125 mS
 Short pulse = 0.525 mS
 No of Long pulse = 20
 No of Short pulse = 17

Duty Cycle = (N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T

Duty Cycle = ((20x1.0125)+(17x0.525))/100=0.2918=29.18% or -10.698dB

12.2 The Emissions Bandwidth

The bandwidth of the emissions were investigated per 15.231(c)

| Center Frequency | Measured | Limits |
|-------------------------|---|---------------------------|
| 434 MHz | 453.3 kHz < (refer to plot) | 434X0.25%=1085 kHz |

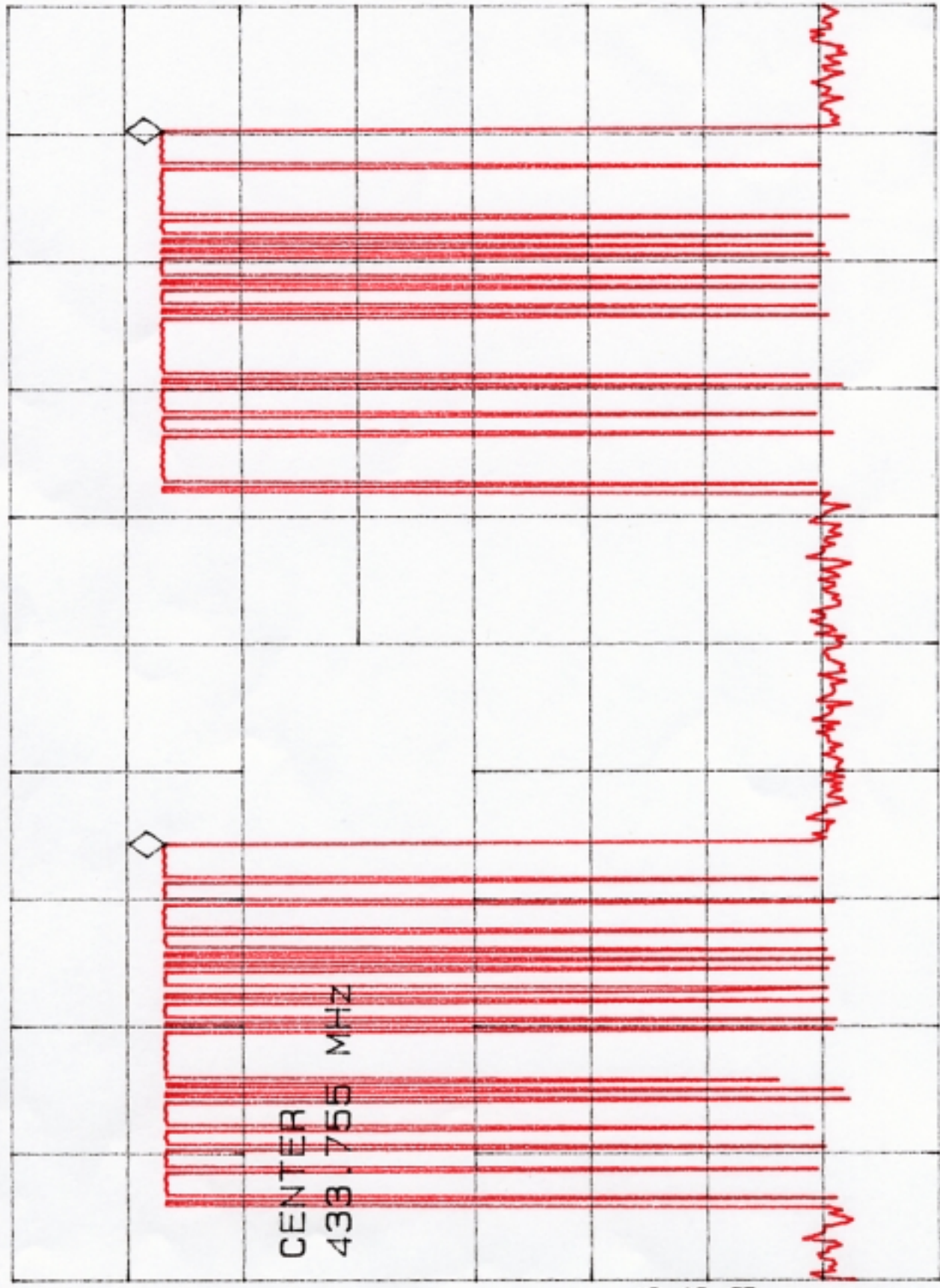
02:14:30 JUL 04, 2001

TP

MKR Δ 112.000008 msec
.04 dB

REF -10.0 dBm #ATTEN 10 dB

PEAK
LOG
10
dB/



WA SB
SC FS
CORR

CENTER 433.755 MHz

#RES BW 120 KHZ

VBW 300 KHZ

#SWP 200 msec

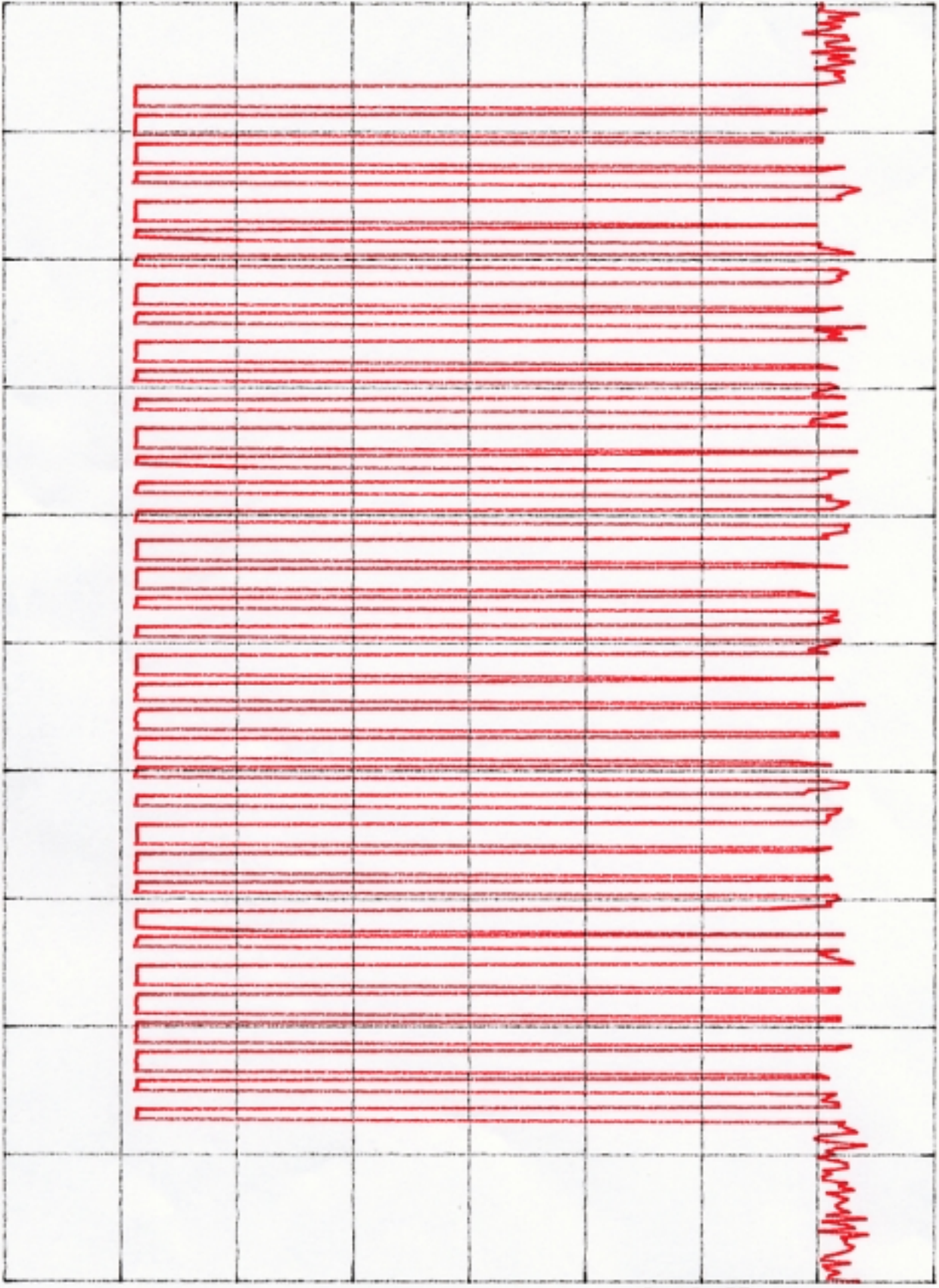
SPAN 0 HZ

02:19:34 JUL 04, 2001

TP

REF -10.0 dBm #ATTEN 10 dB

PEAK
LOG
10
dB/



WA SB
SC FS
CORR

CENTER 433.755 MHZ

#RES BW 120 KHZ

VBW 300 KHZ

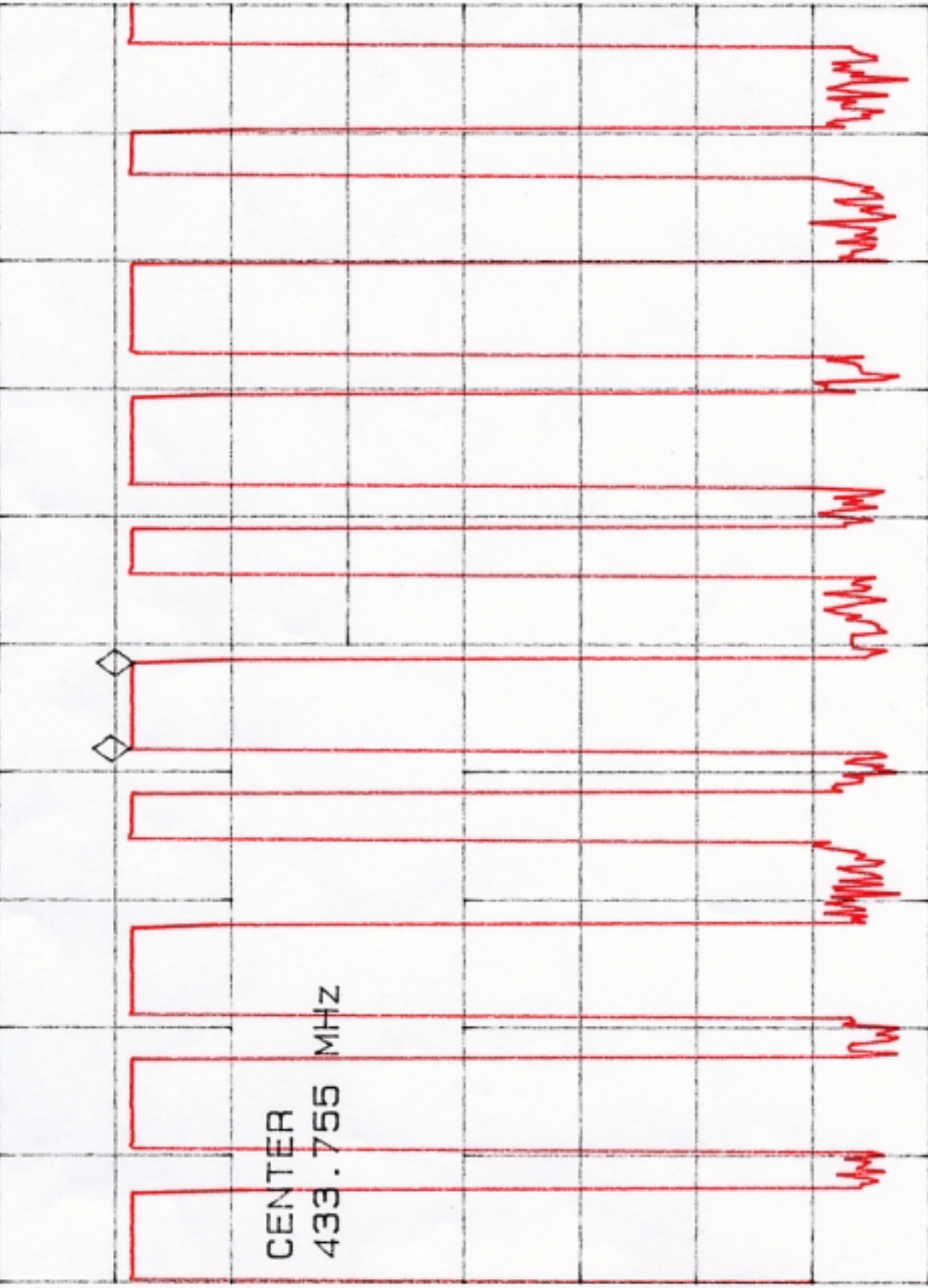
#SWP 70 msec

SPAN 0 HZ

02: 23: 06 JUL 04, 2001

MKR Δ 1.012500 msec
- .32 dB

REF -10.0 dBm #ATTEN 10 dB



PEAK
LOG
10
dB/

WA SB
SC FS
CORR

CENTER 433.755 MHZ

#RES BW 120 KHZ

VBW 300 KHZ

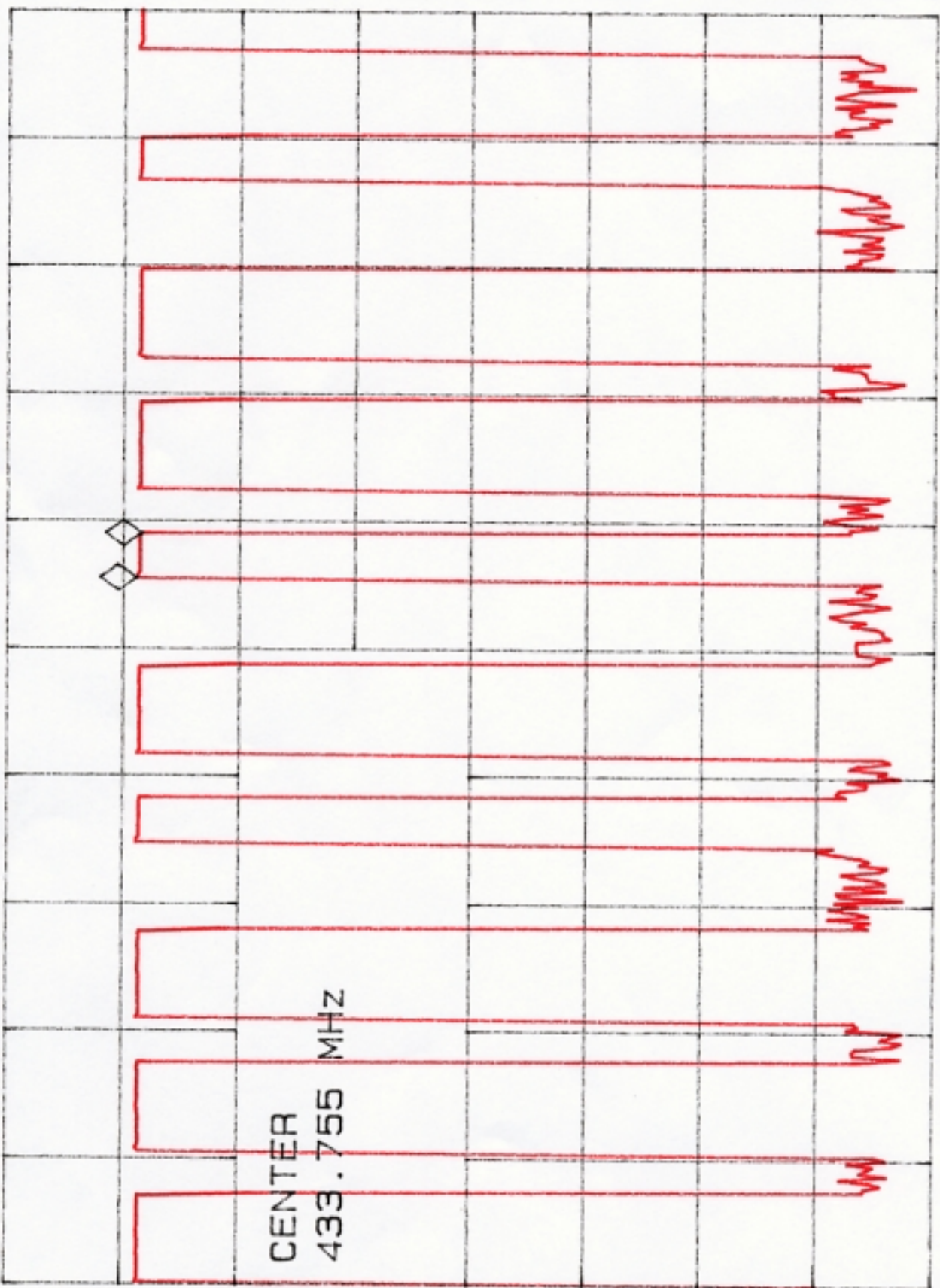
#SWP 15 msec

SPAN 0 HZ

02:25:59 JUL 04, 2001
77

MKR Δ 525.000 μ sec
- .44 dB

REF -10.0 dBm #ATTEN 10 dB



PEAK
LOG
10
dB/

WA SB
SC FS
CORR

CENTER 433.755 MHZ
#RES BW 120 KHZ
SPAN 0 HZ
#SWP 15 msec
VBW 300 KHZ

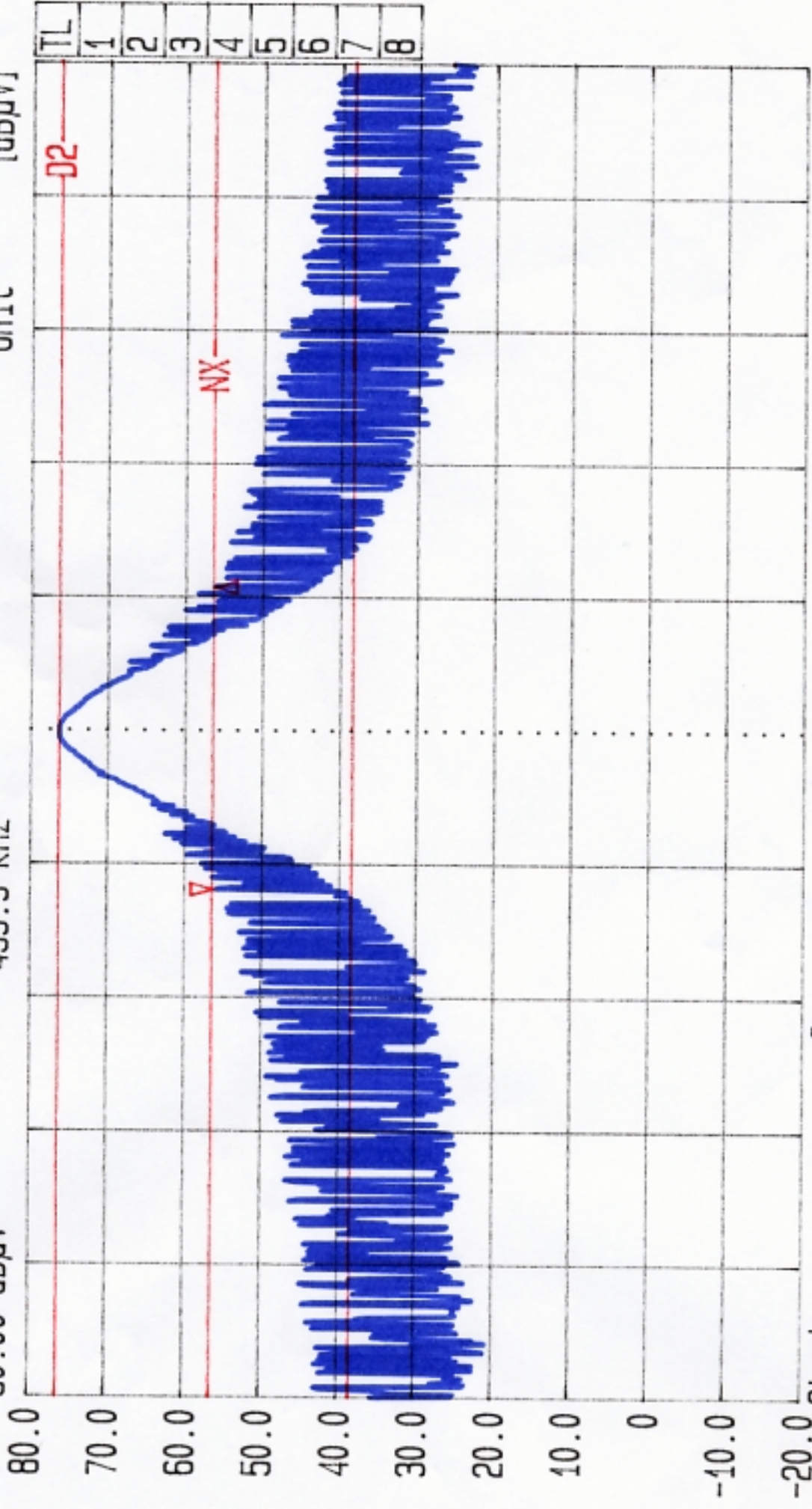


Date 04.Jul.'01 Time 18:00:03
 Ref.Lvl Delta
 80.00 dBuV

0.18 dB
 453.3 kHz

Res.Bw 120 kHz [imp]
 TG.Lvl off
 CF.Stp 200.000 kHz

Vid.Bw 300 kHz
 AF.Att 10 dB
 Unit [dBuV]



Start 432.617776 MHz Stop 434.617776 MHz
 Span 2 MHz Sweep 20 ms
 Center 433.617776 MHz

N dB down Level 20.0 dB
 DELTA MARK 453.3 Kz

- TL
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

No. 199 Chung Sheng Road
Hsin Tien City, Taipei, Taiwan, R.O.C.
PHONE: 02-2217-0894 FAX: 02-2217-1254

Project #: 01E9571
Report #: 9571D1
Date & Time: 7/5/2001
Test Engr: Bill Huang

Company: NUTEK CORPORATION
EUT Description: APS99BT3CF4 (Alarm TX / 434 MHz)
Test Configuration : EUT ONLY
Type of Test: FCC 15.231(b)
Mode of Operation: NORMAL MODE

D-Ste

E-Ste

$M\% = ((t1+t2+t3+...)/T) * 100\% = 29.18 \%$

$Av \text{ Reading} = Pk \text{ Reading} + 20 * \log(M\%)$
 $20 * \log(M\%) = -10.698$

| | Freq. (MHz) | Pk Rdg (dBuV) | Av Rdg (dBuV) | AF (dB) | Closs (dB) | Pre-amp (dB) | Level (dBuV/m) | Limit FCC_B | Margin (dB) | Pol (H/V) | Az (Deg) | Height (Meter) |
|---|------------------|------------------|------------------|------------|---------------|-----------------|-------------------|----------------|----------------|--------------|-------------|-------------------|
| | Button #1: | | | | | | | | | | | |
| X | 434.16 | 68.80 | 58.10 | 16.85 | 3.51 | 26.48 | 51.98 | 80.83 | -28.85 | 3mV | 180 | 1.20 |
| | 868.41 | 28.00 | 17.30 | 22.73 | 5.33 | 26.69 | 18.67 | 60.83 | -42.16 | 3mV | 180 | 1.30 |
| Y | 434.18 | 80.40 | 69.70 | 16.85 | 3.51 | 26.48 | 63.58 | 80.83 | -17.25 | 3mV | 90 | 1.10 |
| | 868.21 | 28.00 | 17.30 | 22.73 | 5.33 | 26.69 | 18.67 | 60.83 | -42.16 | 3mV | 90 | 1.50 |
| Z | 434.18 | 80.30 | 69.60 | 16.85 | 3.51 | 26.48 | 63.48 | 80.83 | -17.35 | 3mV | 270 | 1.10 |
| | 868.33 | 31.90 | 21.20 | 22.73 | 5.33 | 26.69 | 22.57 | 60.83 | -38.26 | 3mV | 270 | 1.70 |
| | Button #2: | | | | | | | | | | | |
| X | 434.18 | 77.10 | 66.40 | 16.85 | 3.51 | 26.48 | 60.28 | 80.83 | -20.55 | 3mH | 90 | 1.00 |
| | 868.22 | 30.90 | 20.20 | 22.73 | 5.33 | 26.69 | 21.57 | 60.83 | -39.26 | 3mH | 90 | 1.50 |
| Y | 434.11 | 77.20 | 66.50 | 16.85 | 3.51 | 26.48 | 60.38 | 80.83 | -20.45 | 3mH | 180 | 1.20 |
| | 868.16 | 29.40 | 18.70 | 22.73 | 5.33 | 26.69 | 20.07 | 60.83 | -40.76 | 3mH | 180 | 1.80 |
| Z | 434.07 | 76.80 | 66.10 | 16.85 | 3.51 | 26.48 | 59.98 | 80.83 | -20.85 | 3mH | 90 | 1.00 |
| | 868.08 | 28.20 | 17.50 | 22.73 | 5.33 | 26.69 | 18.87 | 60.83 | -41.96 | 3mH | 90 | 1.40 |
| X | 434.14 | 65.60 | 54.90 | 16.85 | 3.51 | 26.48 | 48.78 | 80.83 | -32.05 | 3mV | 180 | 1.10 |
| | 868.22 | 31.80 | 21.10 | 22.73 | 5.33 | 26.69 | 22.47 | 60.83 | -38.36 | 3mV | 180 | 1.80 |
| Y | 434.15 | 82.10 | 71.40 | 16.85 | 3.51 | 26.48 | 65.28 | 80.83 | -15.55 | 3mV | 90 | 1.00 |
| | 868.19 | 34.30 | 23.60 | 22.73 | 5.33 | 26.69 | 24.97 | 60.83 | -35.86 | 3mV | 90 | 1.50 |
| Z | 434.12 | 79.50 | 68.80 | 16.85 | 3.51 | 26.48 | 62.68 | 80.83 | -18.15 | 3mV | 0 | 1.20 |
| | 868.22 | 31.10 | 20.40 | 22.73 | 5.33 | 26.69 | 21.77 | 60.83 | -39.06 | 3mV | 0 | 1.70 |
| X | 434.10 | 76.60 | 65.90 | 16.85 | 3.51 | 26.48 | 59.78 | 80.83 | -21.05 | 3mH | 90 | 1.10 |
| | 868.32 | 30.80 | 20.10 | 22.73 | 5.33 | 26.69 | 21.47 | 60.83 | -39.36 | 3mH | 90 | 1.60 |
| Y | 434.05 | 77.00 | 66.30 | 16.85 | 3.51 | 26.48 | 60.18 | 80.83 | -20.65 | 3mH | 180 | 1.20 |
| | 868.11 | 28.08 | 17.38 | 22.73 | 5.33 | 26.69 | 18.75 | 60.83 | -42.08 | 3mH | 180 | 1.40 |
| Z | 434.09 | 75.40 | 64.70 | 16.85 | 3.51 | 26.48 | 58.58 | 80.83 | -22.25 | 3mH | 270 | 1.10 |
| | 868.08 | 25.50 | 14.80 | 22.73 | 5.33 | 26.69 | 16.17 | 60.83 | -44.66 | 3mH | 270 | 1.80 |
| | Total data #: 24 | | | | | | | | | | | |



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

No. 199 Chung Sheng Road
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PHONE: 02-2217-0894 FAX: 02-2217-1254

Project #: 01E9571
Report #: 9571D3
Date & Time: 7/6/2001
Test Engr: Michael Hung

Company: NUTEK CORPORATION
EUT Description: APS99BT3CF4 (Alarm Tx / 434MHz)
Test Configuration : EUT ONLY
Type of Test: FCC 15.231(b)/FCC 15.209
Mode of Operation: NORMAL MODE

D-Ste

E-Ste

6 W oist

Des

| Freq. (MHz) | Pk Rdg (dBuV) | Av Rdg (dBuV) | AF (dB) | Closs (dB) | Pre-amp (dB) | Dist dB | Level (dBuV/m) | Limit FCC_B | Margin (dB) | Pol (H/V) | Az (Deg) | Height (Meter) | Mark (P/Q/A) |
|----------------|------------------|------------------|------------|---------------|-----------------|------------|-------------------|----------------|----------------|--------------|-------------|-------------------|-----------------|
| 1302 | 50.14 | 39.44 | 25.1 | 2.8 | 38.00 | -9.5 | 19.89 | 54.0 | -34.11 | 1mV | 0 | 1.0 | A |
| 1736 | 48.25 | 37.55 | 26.7 | 3.3 | 37.95 | -9.5 | 20.07 | 60.8 | -40.75 | 1mV | 0 | 1.0 | A |
| 1302 | 67.70 | 57.00 | 25.1 | 2.8 | 38.00 | -9.5 | 37.45 | 54.0 | -16.55 | 1mH | 0 | 1.0 | A |
| 1736 | 55.76 | 45.06 | 26.7 | 3.3 | 37.95 | -9.5 | 27.58 | 60.8 | -33.22 | 1mH | 0 | 1.0 | A |

* No other emission were found within 20dB under the limits upto 4.5 GHz.

Total data #:04
V.2d

P(Peak): RBW=VBW=1MHz
A(Average): Pk Reading - 10.698dB

Distance = 20log(1/3) = -9.5dB