

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

for

INTENTIONAL RADIATOR

432 MHz CAR ALARM TRANSMITTER

MODEL NO: TX-22-4

FCC ID NO: KFRTX-22-4

REPORT NO: 00E8933

ISSUE DATE: SEPTEMBER 19, 2000

Prepared for

**VISION AUTOMOBILE ELECTRONICS INDUSTRIAL CO., LTD.
NO. 17, ALLEY 92, LANE 189, SEC. 1,
AN CHUNG RD., TAINAN,
TAIWAN, R.O.C.**

Prepared by

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d.b.a.

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TEST DATA

- Maximum Modulation Percentage Plot
- Emission Bandwidth Plot
- Radiated Emission Worksheet for Peak Measurement
- Radiated Emission Worksheet for Average Measurement

1. VERIFICATION OF COMPLIANCE

COMPANY NAME: VISION AUTOMOBILE ELECTRONICS
INDUSTRIAL CO., LTD.
NO. 17, ALLEY 92, LANE 189, SEC. 1,
AN CHUNG RD., TAINAN,
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TELEPHONE NO.: 06-255-1269

EUT DESCRIPTION: 432 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: TX-22-4

FCC ID: KFRTX-22-4

DATE TESTED: SEPTEMBER 4, 2000 ~ SEPTEMBER 14, 2000

REPORT NUMBER: 00E8933

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	432 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 Certification Services 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 Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification will constitute fraud and shall nullify the document.



RICK YEO / EMC MANAGER
COMPLIANCE ENGINEERING SERVICES, INC.

PAGE NO: 1

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2. Product Description

Fundamental Frequency	432 MHz
Power Source	6V Battery
Transmitting Time	Periodic < 5 seconds
Associated Receiver	FCC ID: KFR-SAIC

3. Test Facility

The 3/10/30 meter open area test site and conducted measurement facility used to collect the radiated data is located at 561F Monterey Road, Morgan Hill, California, U.S.A. A detailed description of the test facility was submitted to the Commission on May 27, 1994.

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
H.P.	8566B	Spectrum Analyzer (100Hz – 22GHz)	12/00
H.P.	8595EM	Spectrum Analyzer (9KHz – 6.5GHz)	01/01
EMCO	3115	Antenna (1-18GHz)	09/01
EMCO	3142	Antenna (30-2000MHz)	06/01
T.E.C.	PA-102	Amplifier(30-2000MHz)	05/01
MITEQ	NSP2600-44	Amplifier(1-26GHz)	12/00

7. POWERLINE RFI LIMIT

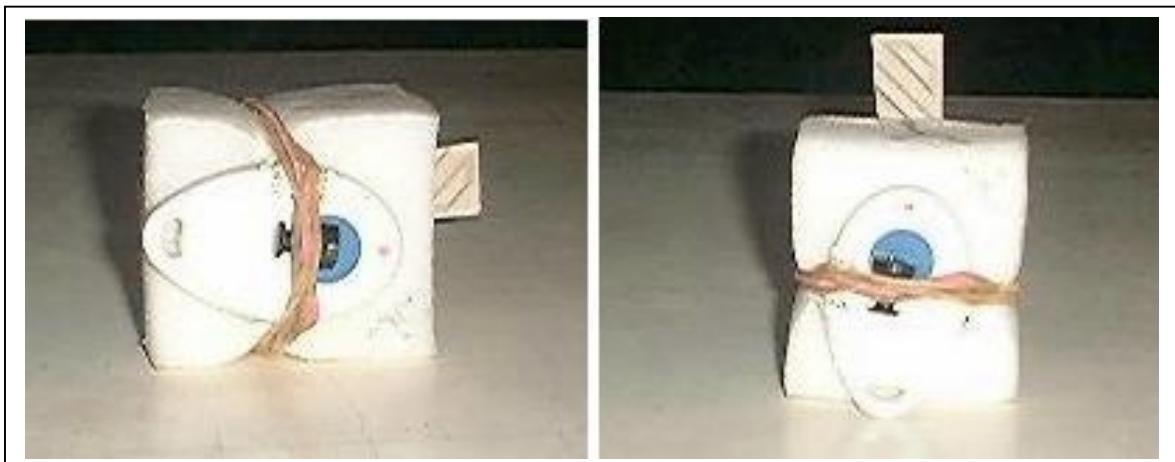
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 kHz TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NO REQUIRED.

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

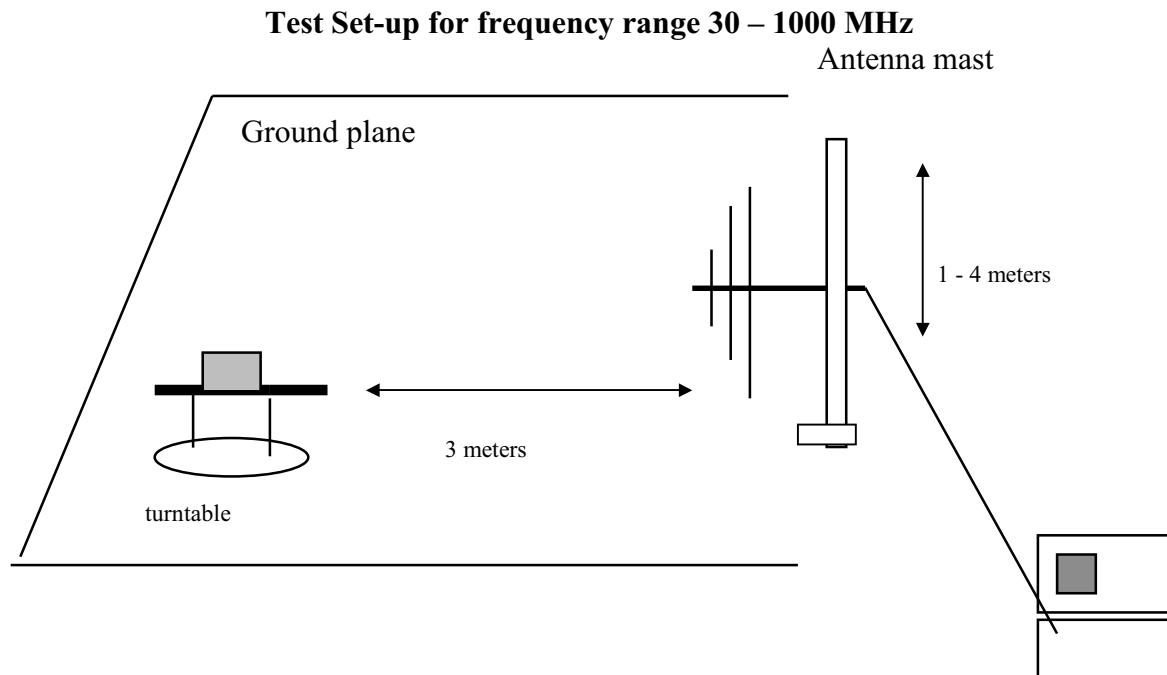
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



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.

Test set-up for measurements above 1GHz

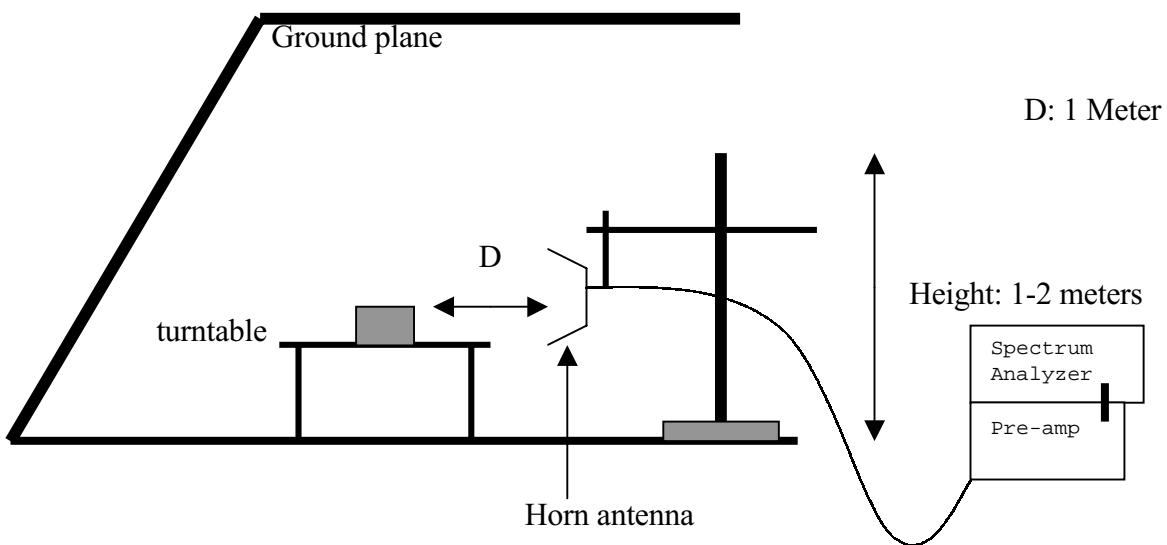


FIG. 2

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:

$$\text{Average Reading} = \text{Peak Reading (dBuV/m)} + 20\log(\text{Duty Cycle})$$

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

WHERE	1 Period	=98.000 mS.
	Long pulse	=0.600 mS
	Short pulse	=0.267 mS
	No of Long pulse	=47
	No of Short pulse	=31

$$\text{Duty Cycle} = (N_1L_1 + N_2L_2 + \dots + N_{n-1}L_{n-1} + N_nL_n)/100 \text{ or } T$$

$$\text{Duty Cycle} = ((47 \times 0.600) + (31 \times 0.267))/98 = 0.3722 = 37.22\% \text{ or } -8.58\text{dB}$$

12.2 The Emissions Bandwidth

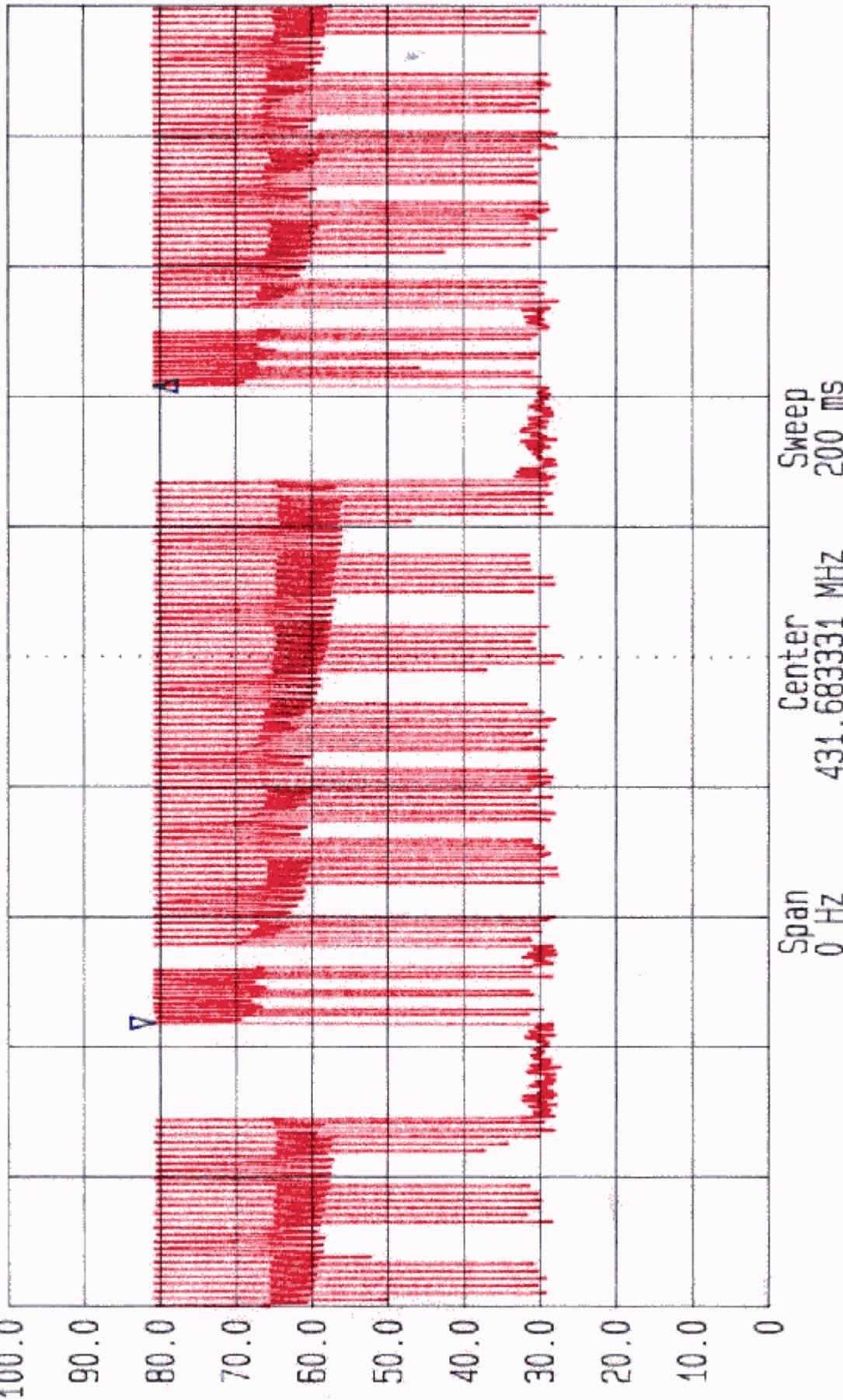
The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
432 MHz	726.6 kHz < (refer to plot)	432X0.25% = 1080 kHz



Date 06.Sep.'00 Time 11:06:05
TRG Ref. Lv1
Ref. Lv1 Delta 0.05 dB
100.00 dB μ V

Res. Bw 120 kHz [imp]
TG. Lv1 Off 10 dB
CF. Stp 12.000 kHz [dB μ V]
Unit





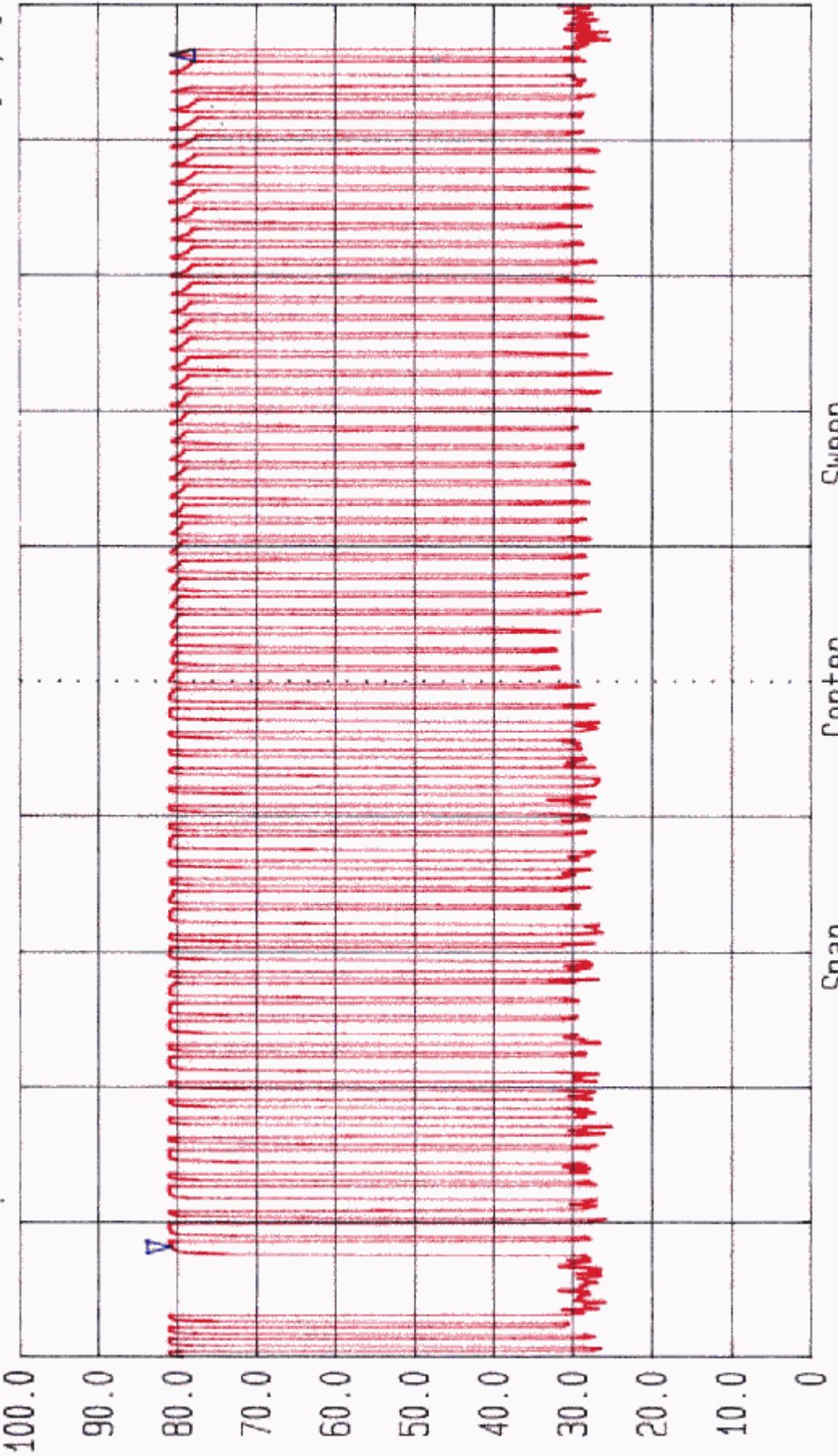
TR6

Date 06.Sep.'00 Time 14:13:43

Ref.Lv1 Delta 0.05 dB

100.00 dB μ V

Res.Bw 120 kHz [imp] Vid.Bw 300 kHz

T6.Lv1 Off 10 dB
CF.Stp 12.000 kHz RF Att [dB μ V]

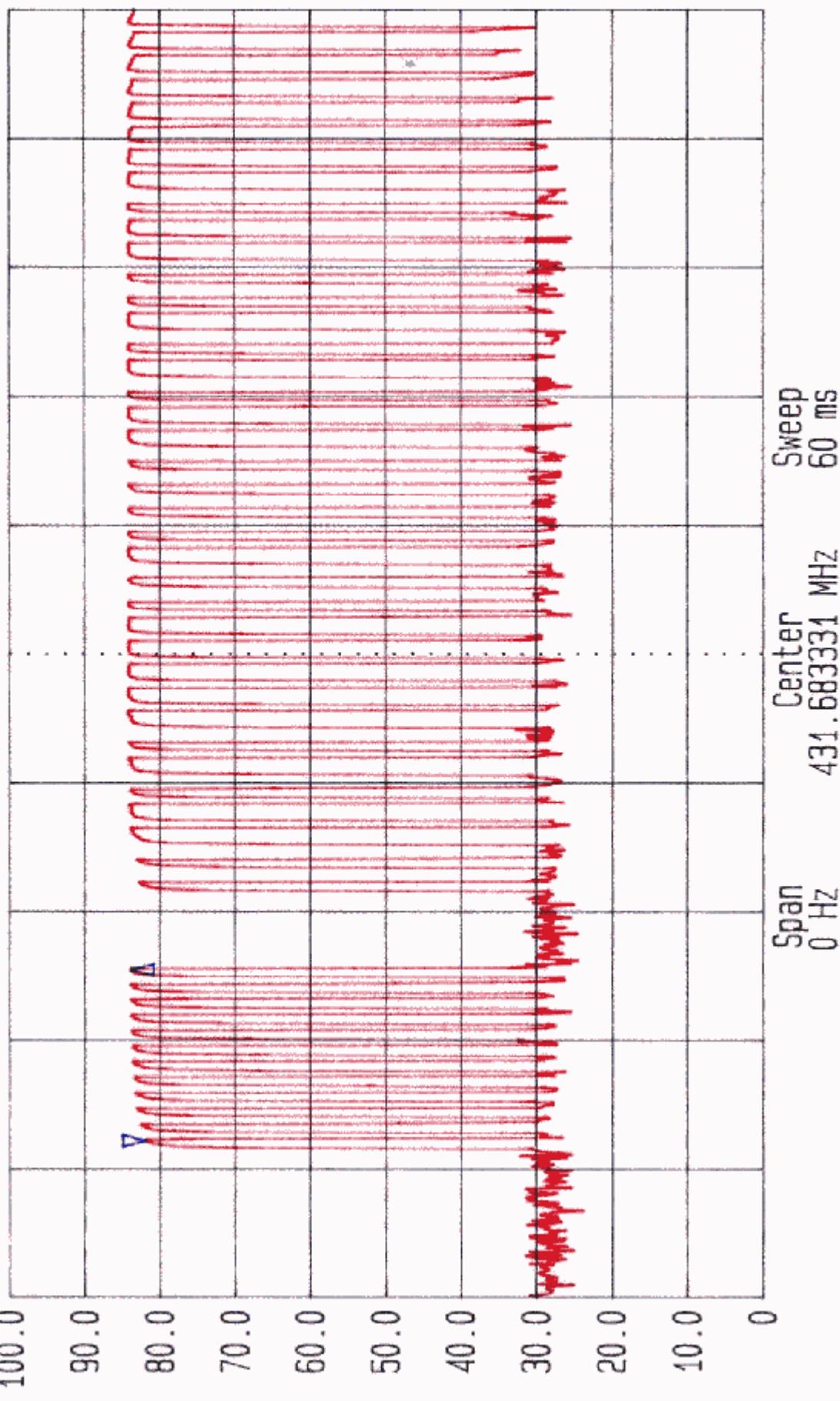
Center 431.683331 MHz

Sweep 80 ms



TRG
Date 06.Sep.'00 Time 14:23:23
Ref.Lv1 Delta 2.03 dB
100.00 dB μ V

Res.BW 120 kHz [imp] Vid.BW 300 kHz
TG.Lv1 off
CF.Stp 142.000 kHz RF.Att 10 dB
Unit [dB μ V]





Date 06.Sep.'00

TRG

Ref.Lv1

Time 11:34:57

Delta

-0.40 dB

CF.Stp

600.000 μ s

100.00 dB μ V

Res.BW

120 kHz[imp]

Vid.BW

300 kHz

TG.Lv1

off

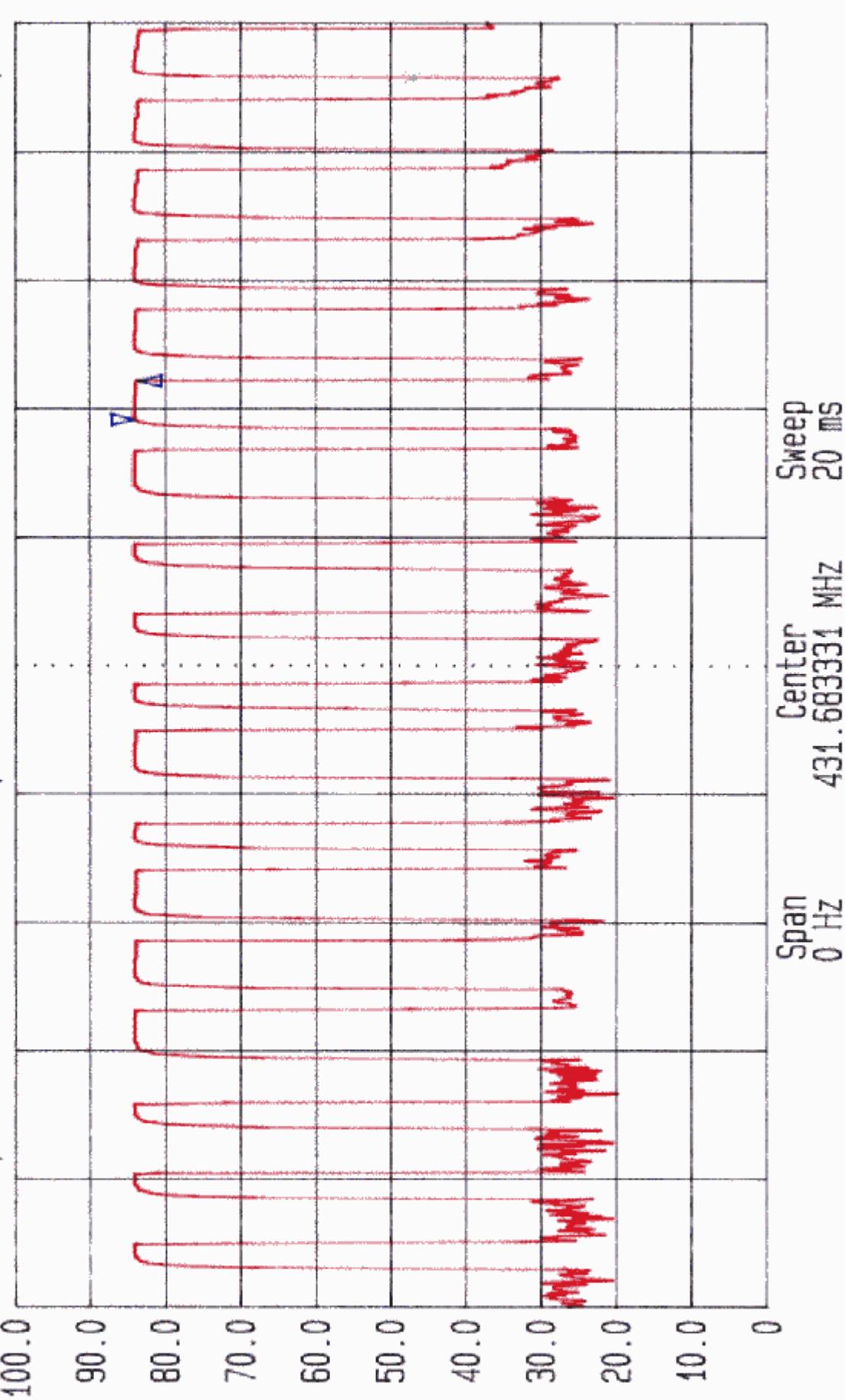
12.000 kHz

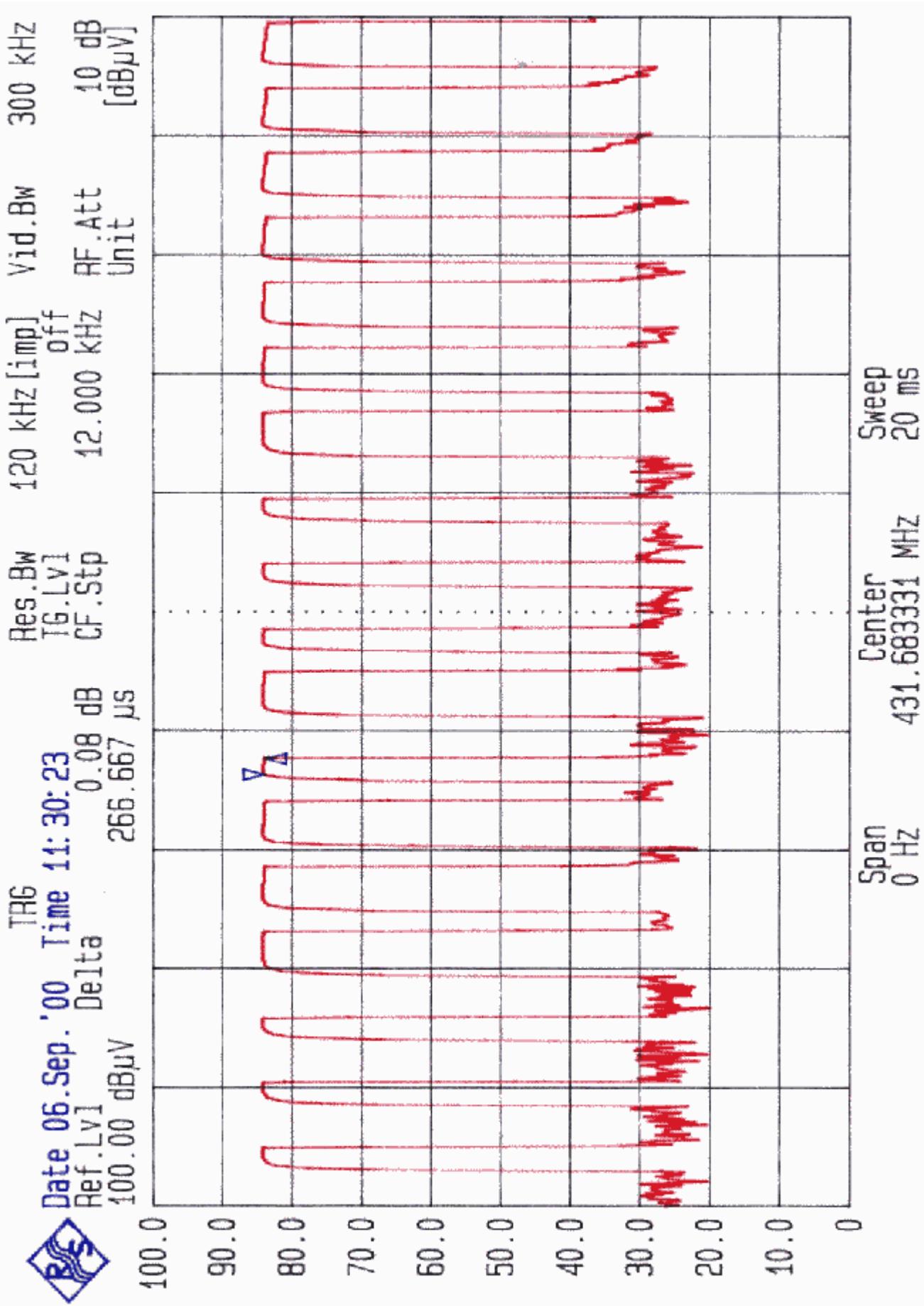
RF.Att

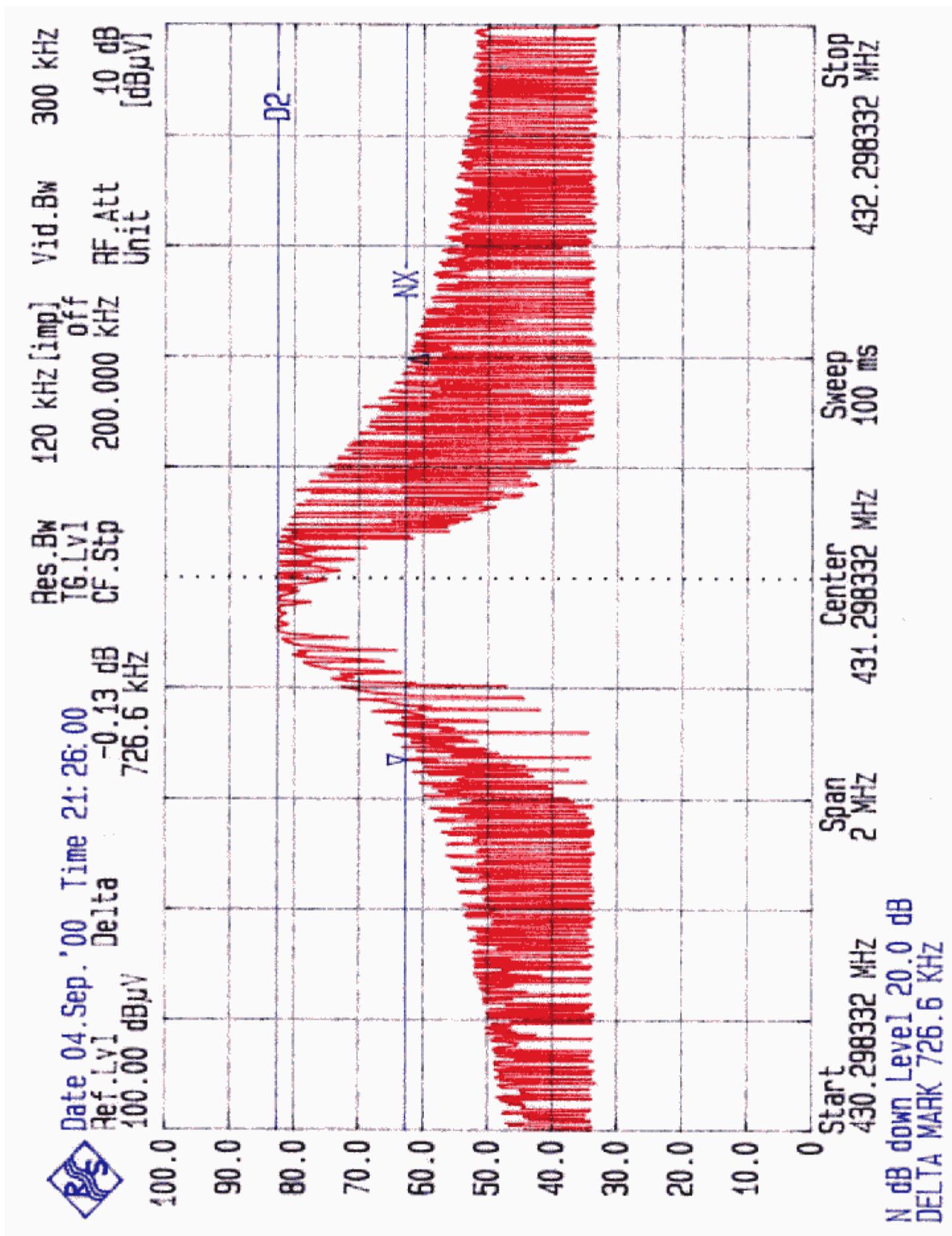
Unit

10 dB

[dB μ V]









COMPLIANCE

Certification Services

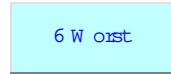
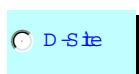
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

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Project #: 00E8933
Report #: 8933D1
Date & Time: 9/6/00 16:25
Test Engr: VINCE CHIANG

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<i>Company:</i>	VISION
<i>EUT Description:</i>	TX-22-4 (Alarm TX / 432MHz)
<i>Test Configuration :</i>	EUT ONLY
<i>Type of Test:</i>	FCC 15.231(b)
<i>Mode of Operation:</i>	NORMAL MODE



$$M\% = ((t_1+t_2+t_3+\dots)/T) * 100\% = 37.22\%$$

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

$$20^* \log(M\%) = -8.5845$$



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

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Project #: 00E8933
Report #: 8933D2
Date & Time: 9/14/00 21:42
Test Engr: Vince Chiang

Company: VISION
EUT Description: TX-22-4 (Alarm TX / 432MHz)
Test Configuration : EUT ONLY
Type of Test: FCC 15.231(b)
Mode of Operation: NORMAL MODE



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
1298	82.91	74.33	25.1	2.8	43.27	-9.5	49.50	60.8	-11.26	1mV	180	1.2	A
1731	74.27	65.69	26.1	3.3	43.04	-9.5	42.54	60.8	-18.22	1mV	180	1.2	A
2164	81.31	72.73	27.7	3.7	42.82	-9.5	51.83	60.8	-8.93	1mV	180	1.2	A
2597	71.84	63.26	29.2	3.9	42.59	-9.5	44.27	60.8	-16.49	1mV	180	1.2	A
3030	75.71	67.13	30.8	4.2	42.38	-9.5	50.25	60.8	-10.51	1mV	180	1.2	A
3462	69.85	61.27	32.8	4.6	42.22	-9.5	46.94	60.8	-13.82	1mV	180	1.2	A
1298	78.52	69.94	25.1	2.8	43.27	-9.5	45.11	60.8	-15.65	1mH	180	1.2	A
1730	74.93	66.35	26.1	3.3	43.04	-9.5	43.20	60.8	-17.56	1mH	180	1.2	A
2163	73.81	65.23	27.7	3.7	42.82	-9.5	44.33	60.8	-16.43	1mH	180	1.2	A
2597	63.33	54.75	29.2	3.9	42.59	-9.5	35.76	60.8	-25.00	1mH	180	1.2	A
3029	63.38	54.80	30.8	4.2	42.38	-9.5	37.92	60.8	-22.84	1mH	180	1.2	A
3462	58.39	49.81	32.8	4.6	42.22	-9.5	35.48	60.8	-25.28	1mH	180	1.2	A

No other emissions were found within 20dB under the limits upto 5GHz.

Total data #: 12
V.2d

Peak: RBW=VBW=1MHz
Average: Pk Reading - 8.5845dB(For FCC 15.231(b))

Distance = $20\log(1/3) = -9.5\text{dB}$