

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

for

INTENTIONAL RADIATOR

433 MHz CAR ALARM TRANSMITTER

MODEL NO: TX-23-4

FCC ID NO: KFRTX-23-4

REPORT NO: 00E8934

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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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: 433 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: TX-23-4

FCC ID: KFRTX-23-4

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

REPORT NUMBER: 00E8934

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	433 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

RICK YEO / EMC MANAGER
COMPLIANCE ENGINEERING SERVICES, INC.

PAGE NO: 1

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2. Product Description

Fundamental Frequency	433 MHz
Power Source	6V Battery
Transmitting Time	Periodic $\leq$ 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

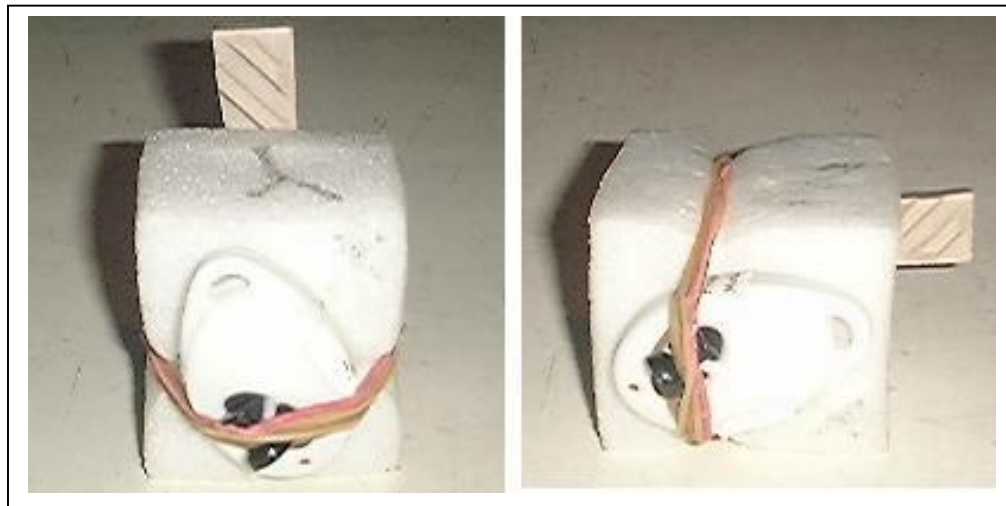
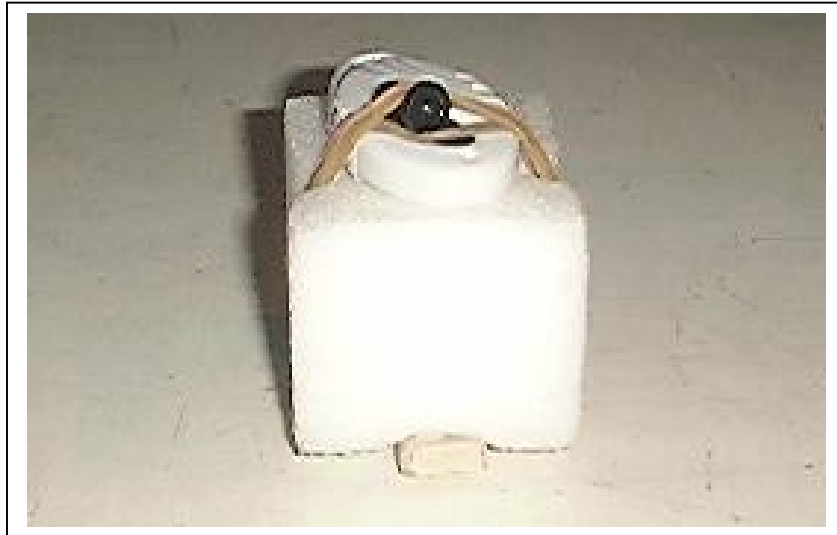
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHz TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NO REQUIRED.

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

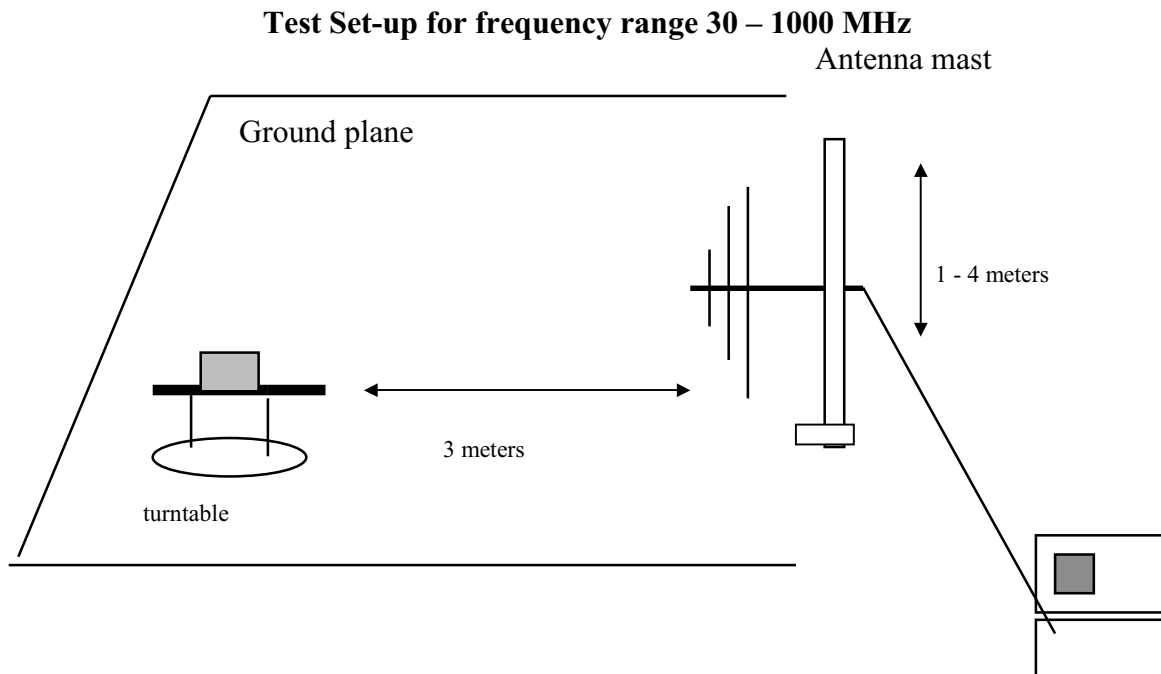
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

10. Test Procedure

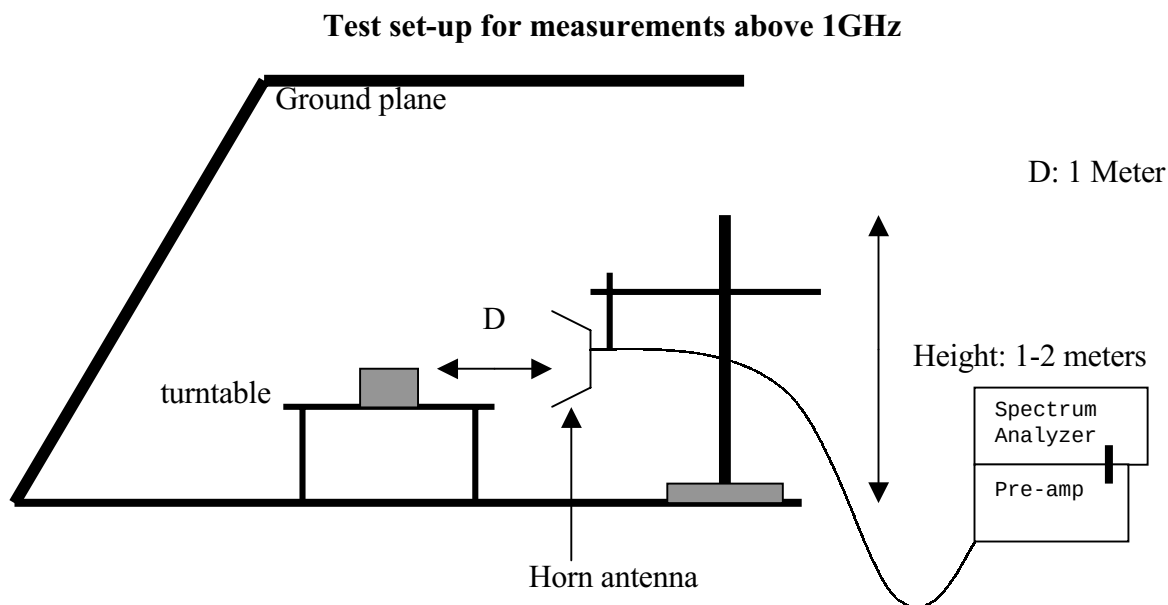
Radiated Emissions, 15.231(4)(b)



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.



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 = 99.200 mS
 Long pulse =0.644 mS
 Short pulse = 0.311 mS
 No of Long pulse = 47
 No of Short pulse =31

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

Duty Cycle = ((47X0.644)+(31X0.311))/99.2=0.4023=40.23% or -7.909dB

12.2 The Emissions Bandwidth

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

Center Frequency	Measured	Limits
433 MHz	786.6 kHz < (refer to plot)	433X0.25%=1082.5 kHz



TRG

Date 04.Sep.'00 Time 17:29:36

Ref.Lvl Delta

100.00 dBuV

-0.18 dB

99.200 ms

Res.Bw

TG.Lvl

CF.Stp

120 kHz [imp]

Off

12.000 kHz

Vid.Bw

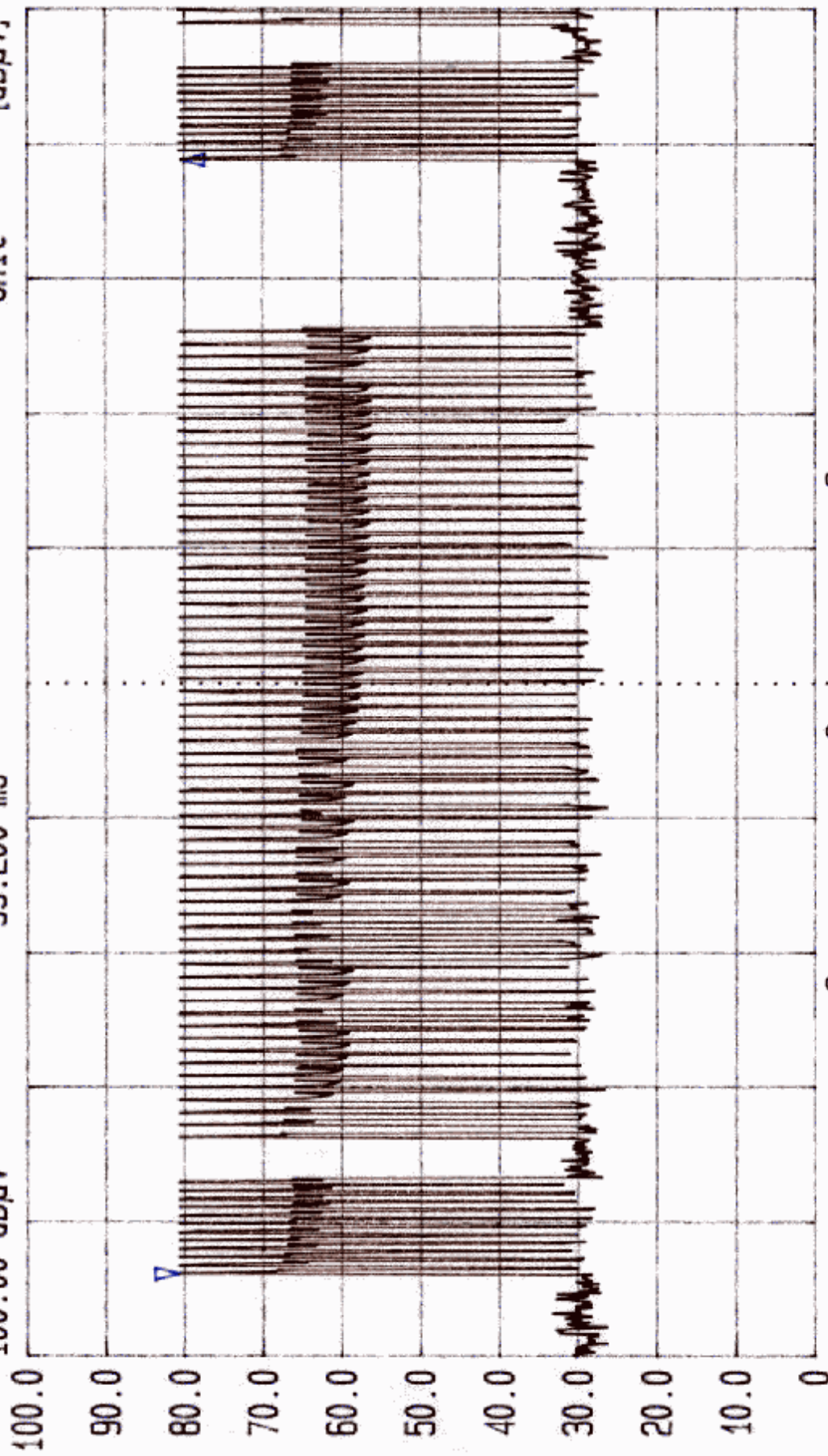
RF.Att

Unit

300 kHz

10 dB

[dBuV]



Span
0 Hz

Center
432.50444 MHz

Sweep
120 ms



TRG

Date 04.Sep.'00 Time 17:06:42

Ref.Lvl Delta

0.97 dB

100.00 dB μ V

71.644 ms

Res.Bw

TG.Lvl

CF.Stp

120 kHz [imp]

off

12.000 kHz

Vid.Bw

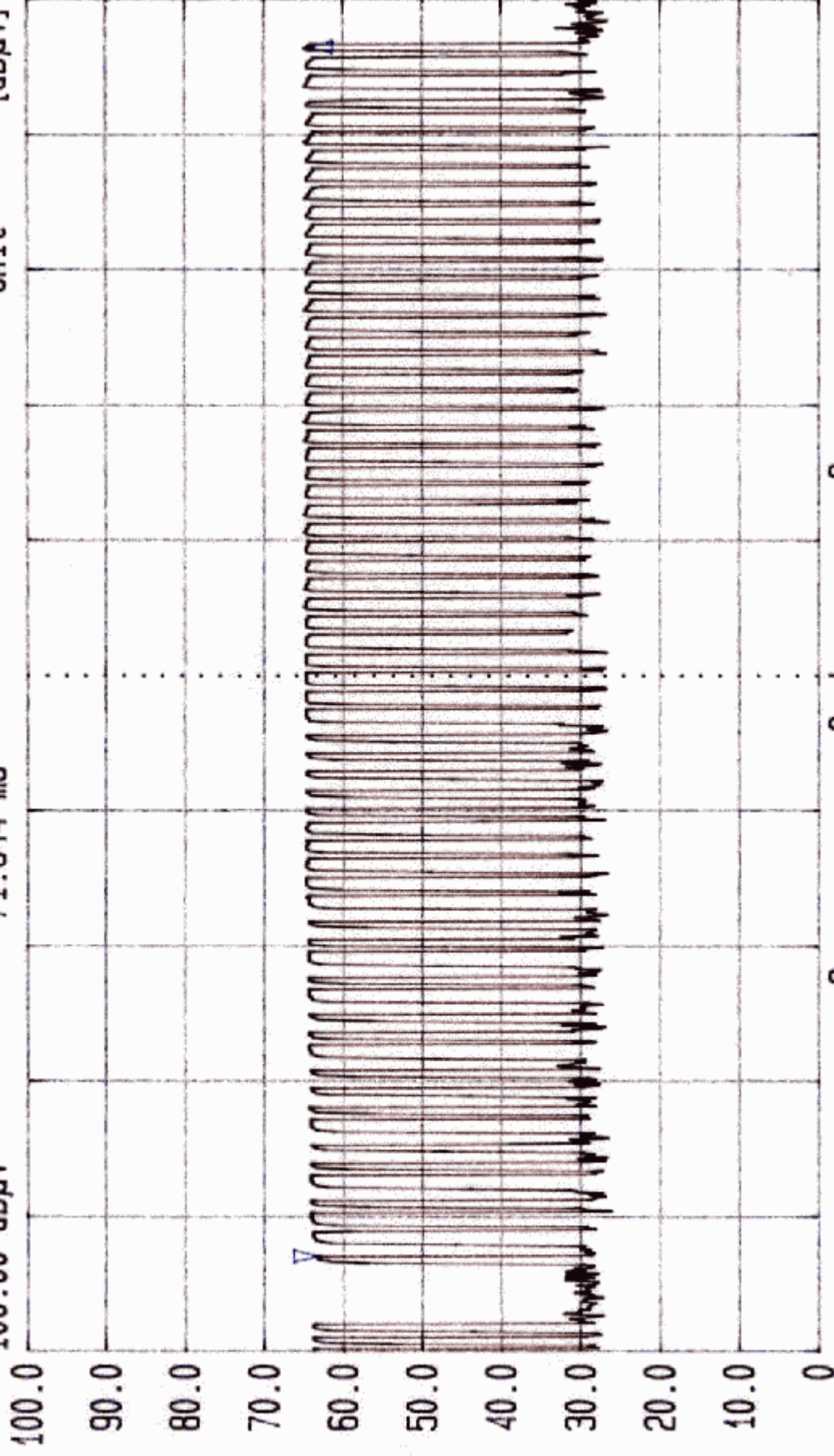
RF.Att

Unit

300 kHz

10 dB

[dB μ V]



Span
0 Hz

Center
432.50444 MHz

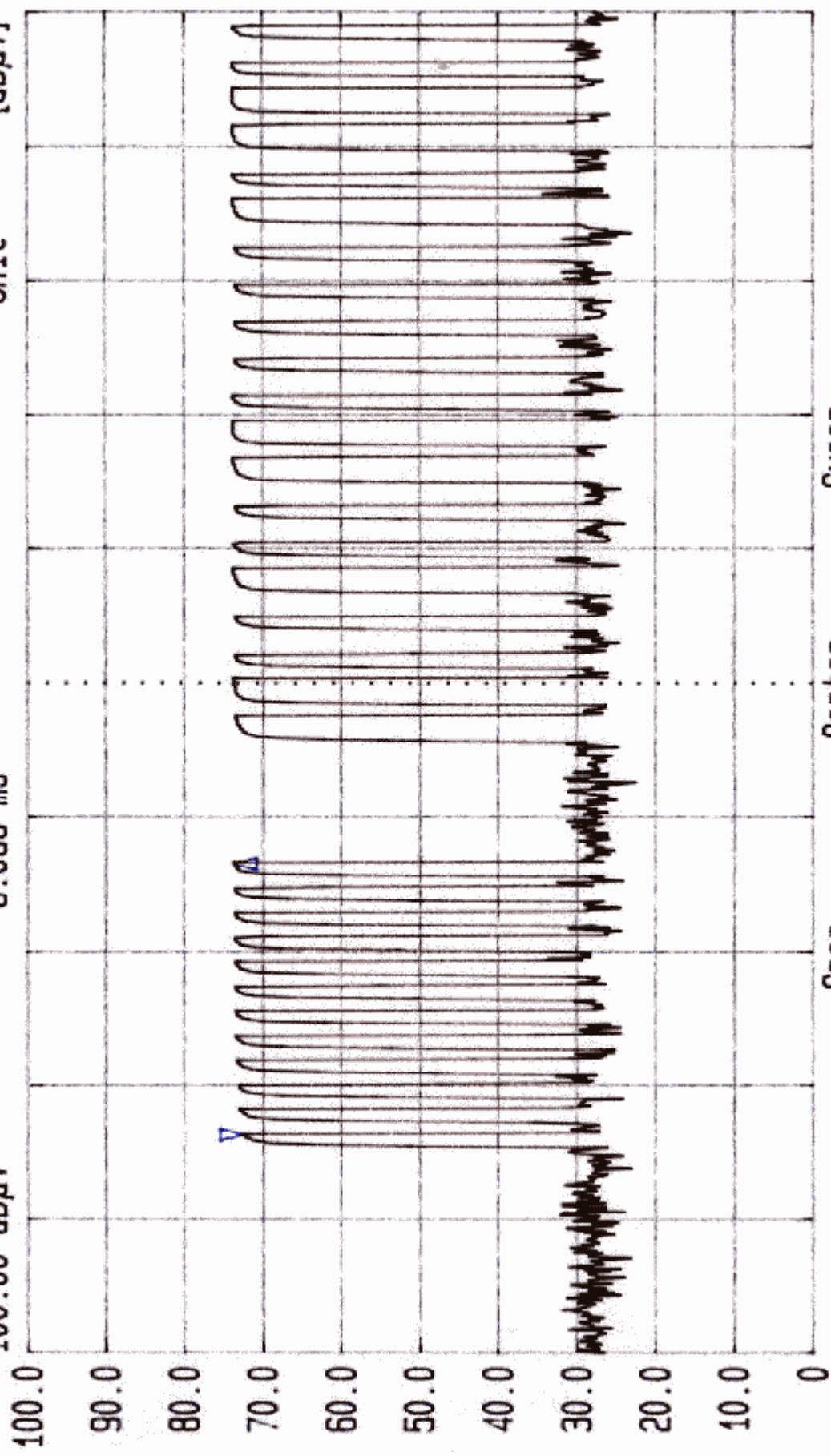
Sweep
80 ms



Date 04.Sep.'00 Time 17:13:30
Ref.Lvl Delta 1.22 dB
100.00 dBμV 8.088 ms

TRG

Res.Bw 120 kHz [imp]
TG.Lvl Off
CF.Stp 12.000 kHz
Vid.Bw 300 kHz
RF.Att 10 dB
Unit [dBμV]



Span 0 Hz
Center 432.50444 MHz
Sweep 40 ms



Date 04.Sep.'00 Time 17:23:51

Ref.Lvl Delta

100.00 dB μ V

-1.91 dB

644.444 μ s

TRG

Res.Bw

TG.Lvl

CF.Stp

120 kHz [imp]

off

12.000 kHz

Vid.Bw

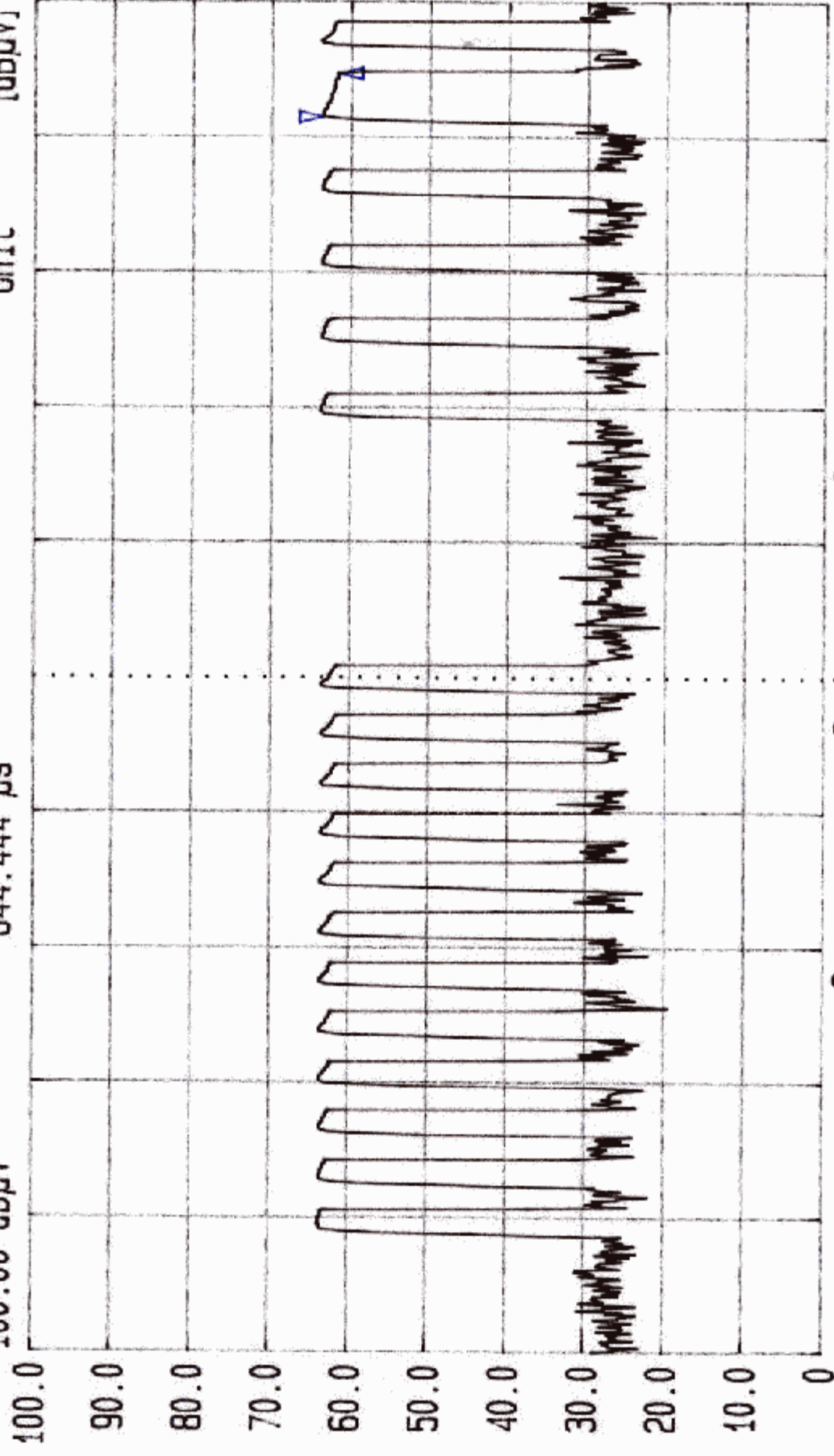
RF.Att

Unit

300 kHz

10 dB

[dB μ V]



Span
0 Hz

Center
432.504444 MHz

Sweep
20 ms



Date 04.Sep.'00 Time 17:19:12

Ref.Lvl Delta

100.00 dB μ V

-1.55 dB

311.111 μ s

TRG

Res.Bw

TG.Lvl

CF.Stp

120 kHz [imp]

off

12.000 kHz

Vid.Bw

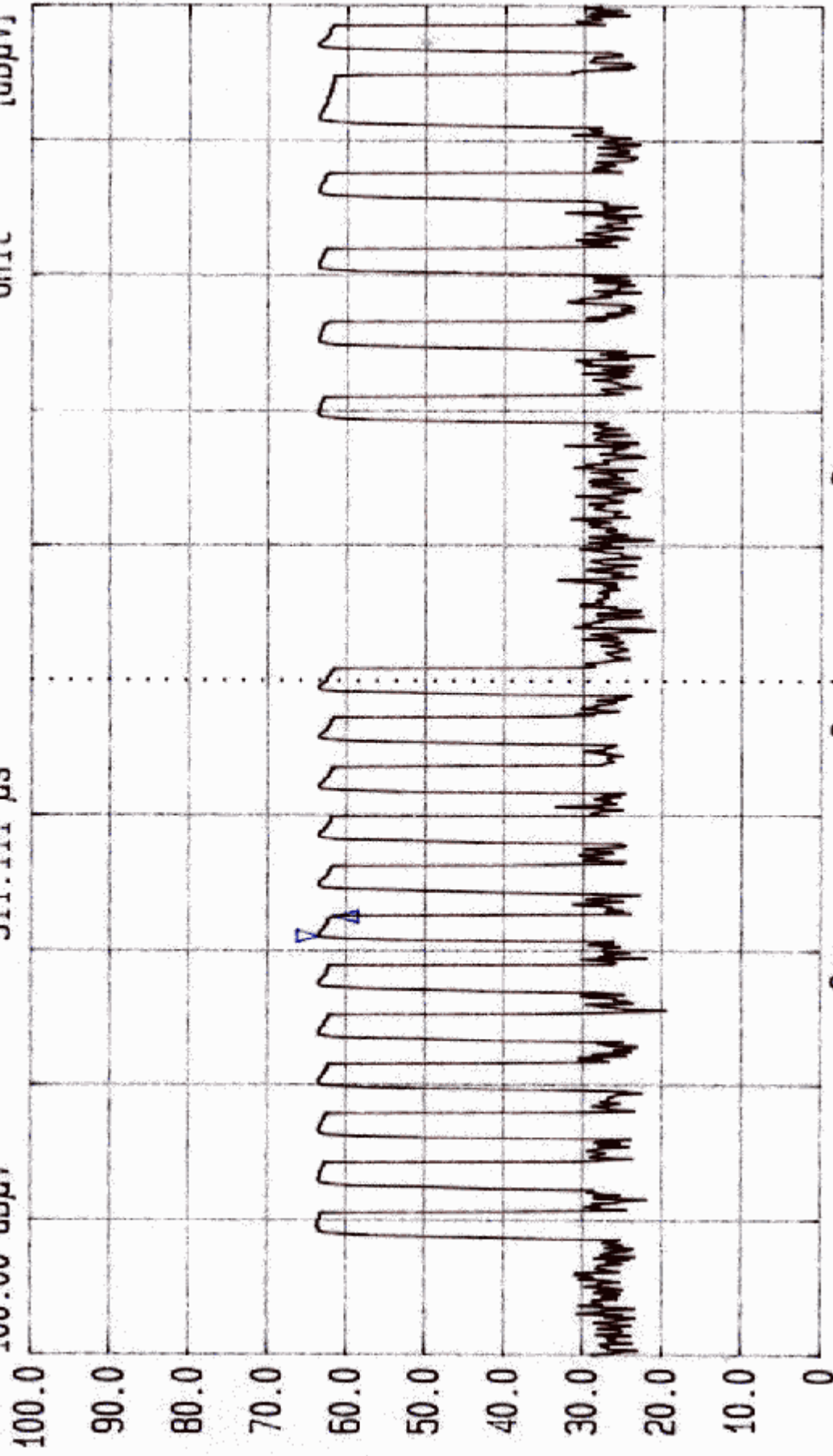
AF.Att

Unit

300 kHz

10 dB

[dB μ V]



Span
0 Hz

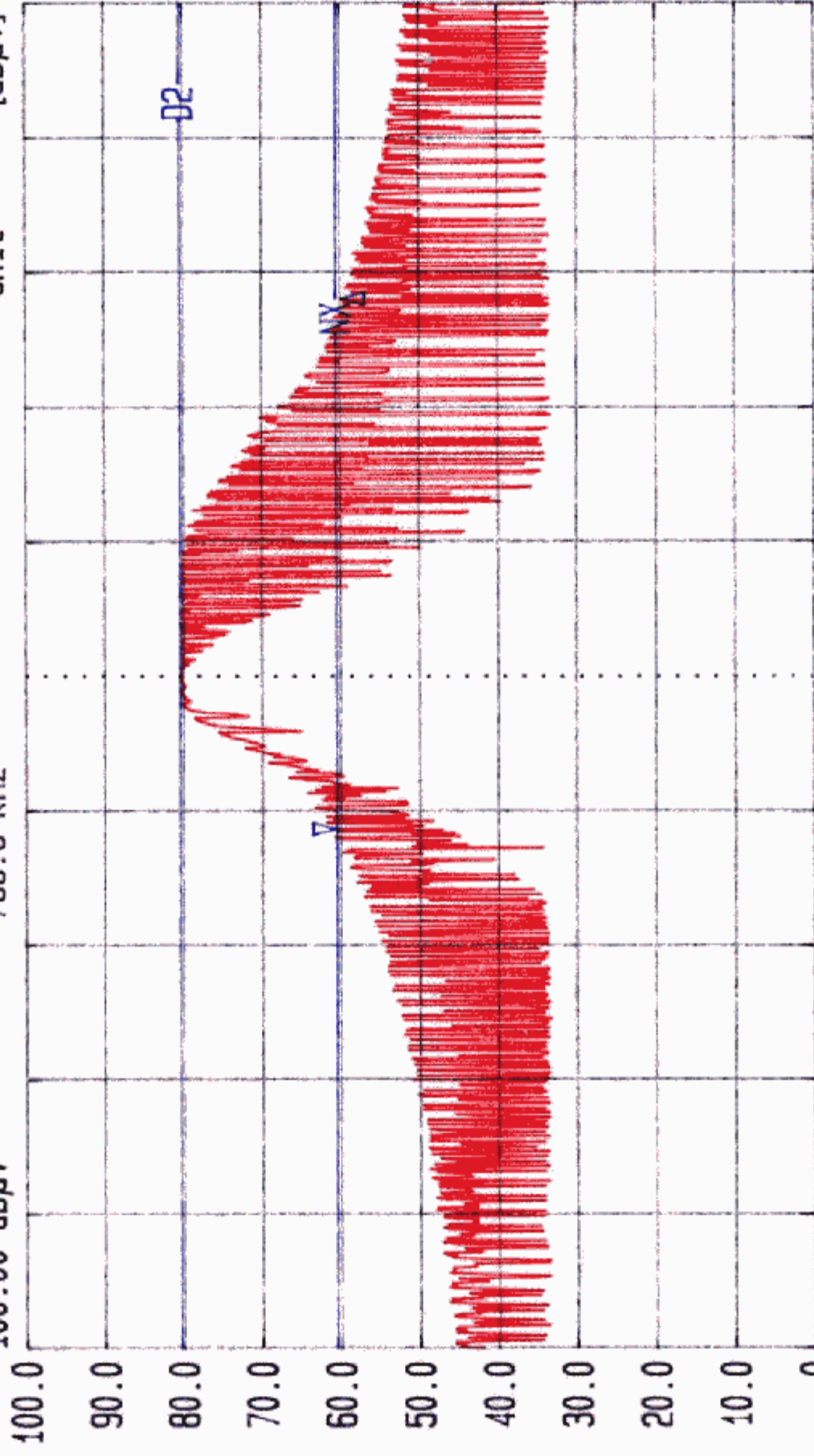
Center
432.50444 MHz

Sweep
20 ms



Date 04.Sep.'00 Time 17:44:27
Ref.Lvl Delta
100.00 dBμV -0.48 dB
786.6 kHz

Res.Bw 120 kHz [imp] 300 kHz
TG.Lvl off
CF.Stp 200.000 kHz
AF.Att 10 dB
Unit [dBμV]



Start 431.515555 MHz Span 2 MHz Center 432.515555 MHz Sweep 100 ms Stop 433.515555 MHz

N dB down Level 20.0 dB
DELTA MARK 786.6 KHz

[illegible]



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

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Project #: 00E8934
Report #: 8934D2
Date & Time: 9/14/00 21:37
Test Engr: Vince Chiang

Company:
EUT Description:
Test Configuration :
Type of Test:
Mode of Operation:

VISION
TX-23-4 (Alarm TX / 433MHz)
EUT ONLY
FCC 15.231(b)
NORMAL MODE

☐ D Site

☒ E Site

6 W orst

Descendin

Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Dist	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
1299	86.80	78.89	25.1	2.8	43.27	-9.5	54.06	60.8	-6.73	1mV	90	1.5	A
1731	81.74	73.83	26.1	3.3	43.04	-9.5	50.68	60.8	-10.11	1mV	90	1.5	A
2165	85.12	77.21	27.7	3.7	42.82	-9.5	56.31	60.8	-4.48	1mV	90	1.5	A
2597	78.15	70.24	29.2	3.9	42.59	-9.5	51.25	60.8	-9.54	1mV	90	1.5	A
3029	76.97	69.06	30.8	4.2	42.38	-9.5	52.18	60.8	-8.61	1mV	90	1.5	A
3465	76.78	68.87	32.8	4.6	42.22	-9.5	54.57	60.8	-6.22	1mV	90	1.5	A
1299	85.91	78.00	25.1	2.8	43.27	-9.5	53.17	60.8	-7.62	1mH	90	1.5	A
1731	82.11	74.20	26.1	3.3	43.04	-9.5	51.05	60.8	-9.74	1mH	90	1.5	A
2165	79.48	71.57	27.7	3.7	42.82	-9.5	50.67	60.8	-10.12	1mH	90	1.5	A
2595	78.02	70.11	29.2	3.9	42.59	-9.5	51.12	60.8	-9.67	1mH	90	1.5	A
3028	71.65	63.74	30.8	4.2	42.38	-9.5	46.86	60.8	-13.93	1mH	90	1.5	A
3463	73.72	65.81	32.8	4.6	42.22	-9.5	51.48	60.8	-9.31	1mH	90	1.5	A

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

Total data #: 12
V.2d

Peak: RBW=VBW=1MHz Distance = $20\log(1/3) = -9.5\text{dB}$
Average: Pk Reading - 7.909dB(For FCC 15.231(b))