

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

for

315MHz CAR ALARM TRANSMITTER

MODEL NO: TX-22

FCC ID NO: KFR OUT-NC

REPORT NO: 01E9434

ISSUE DATE: July 16, 2001

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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**FCC, VCCI, CISPR, CE
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TEST DATA

- Maximum Modulation Percentage Plot
- Emission Bandwidth Plot
- 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,
TAIWAN, R.O.C.

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TELEPHONE NO.: 06-255-1269

EUT DESCRIPTION: 315MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: TX-22

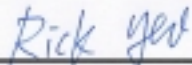
FCC ID: KFR OUT-NC

DATE TESTED: MAY 03, 2001 & MAY 08, 2001

REPORT NUMBER: 01E9434

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	315MHz 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 / EMC MANAGER
COMPLIANCE ENGINEERING SERVICES, INC.

2. Product Description

Fundamental Frequency	315 MHz
Power Source	6V Battery
Transmitting Time	Periodic $\leq$ 5 seconds
Associated Receiver	Brand Name: NorcomNetworks / Model Name: CEREM-NC / (DoC)

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
HP	8595EM	Spectrum Analyzer (9KHz – 6.5GHz)	01/2002
R & S	ESBI-RF/1005.4300.52	EMI Test Receiver (20Hz-5GHz)	11/2001
EMCO	3115	Antenna (1-18GHz)	02/2002
EMCO	3142	Antenna (30-2000MHz)	06/2001
T.E.C.	PA-102	Amplifier(30-2000MHz)	05/2001
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

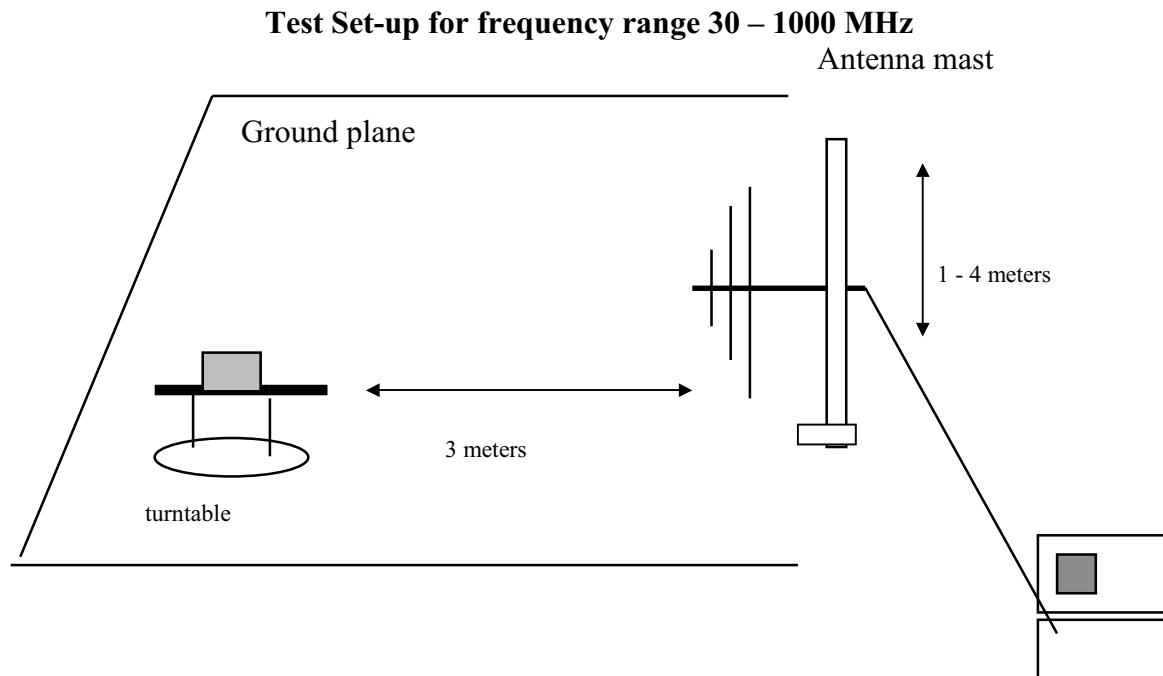
9. SYSTEM TEST CONFIGURATION

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.



10. Test Procedure

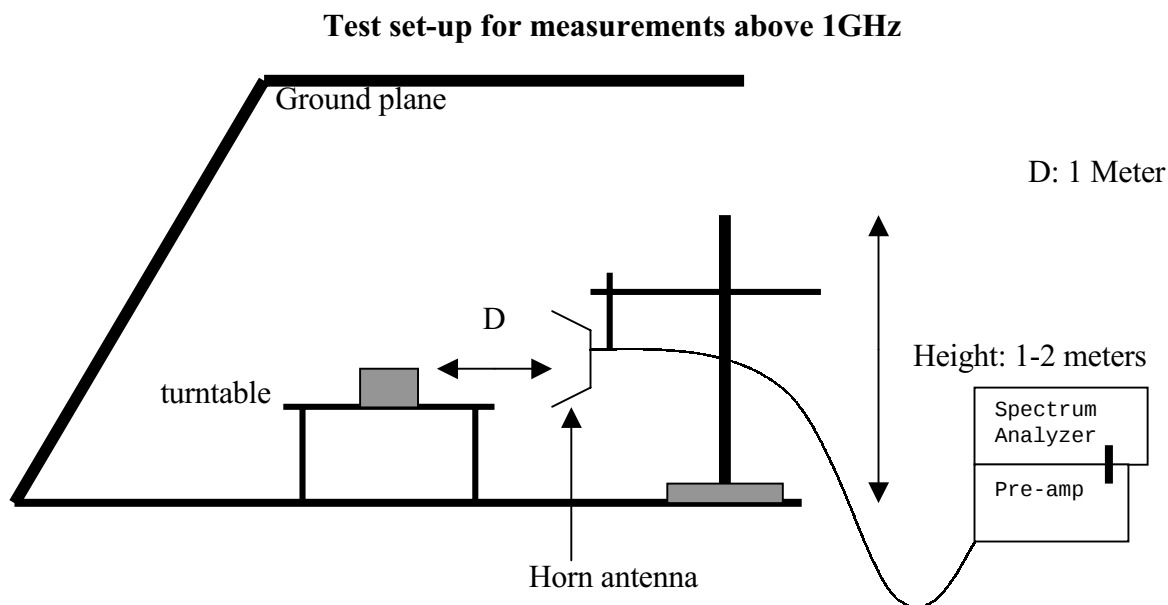
Radiated Emissions, 15.231(4)(b)



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:

Mod. #1 Replaced C1 From 1P to 5P.

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 =98.022 mS.
 Long pulse =0.633 mS
 Short pulse =0.289 mS
 No of Long pulse =44
 No of Short pulse =34

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

Duty Cycle = (44X0.633)+(34X0.2889)/98.022=0.3844=38.44% or -8.3043 dB

12.2 The Emissions Bandwidth

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

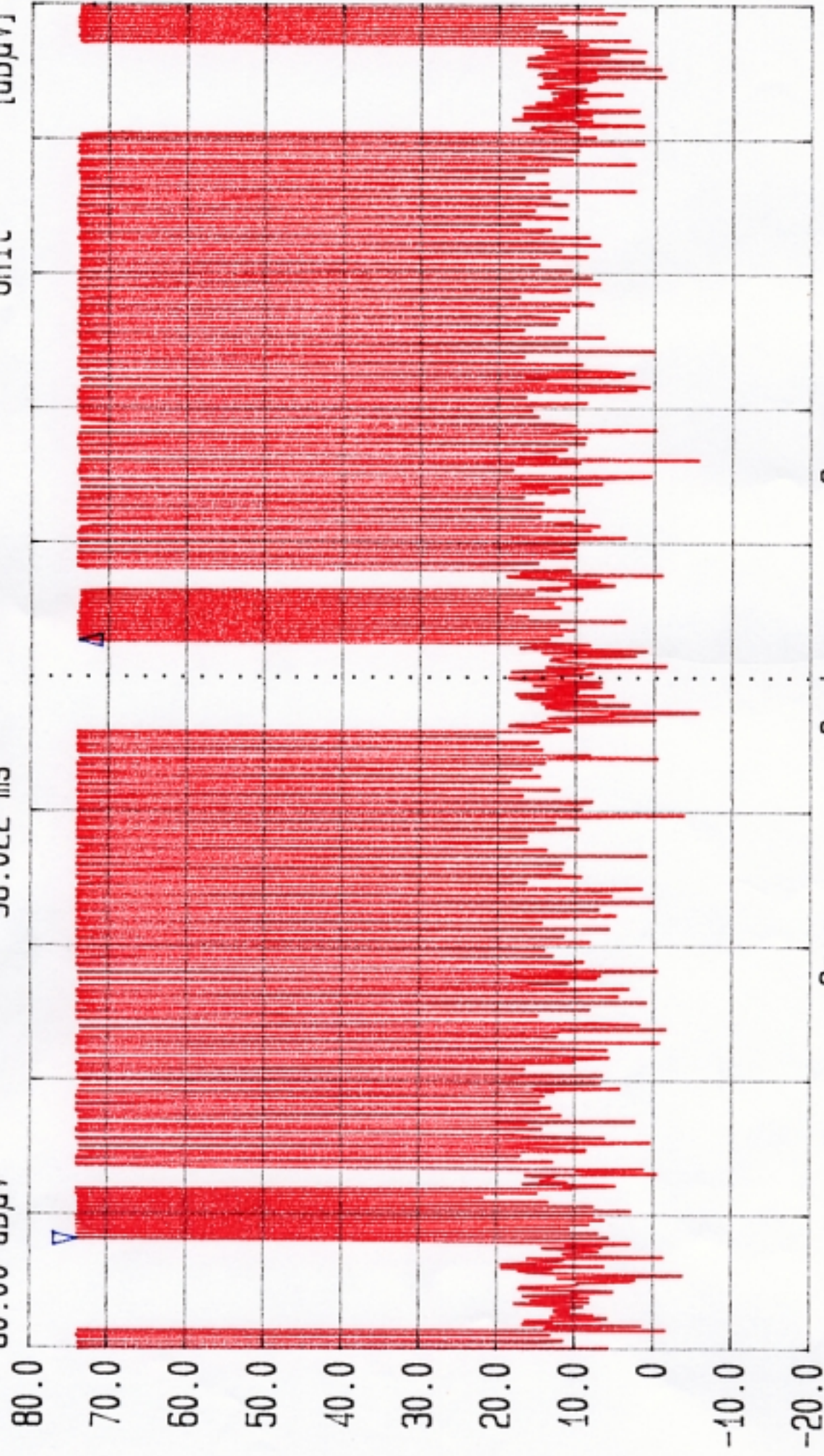
Center Frequency	Measured	Limits
315 MHz	293.3 kHz < (refer to plot)	315X0.25%=787.5 kHz



Date 03.May.'01 Time 09:27:29
Ref.Lvl Delta 0 dB
80.00 dBuV 98.022 ms

TRG
Res.Bw 120 kHz [imp]
TG.Lvl Off
CF.Stp 12.000 kHz

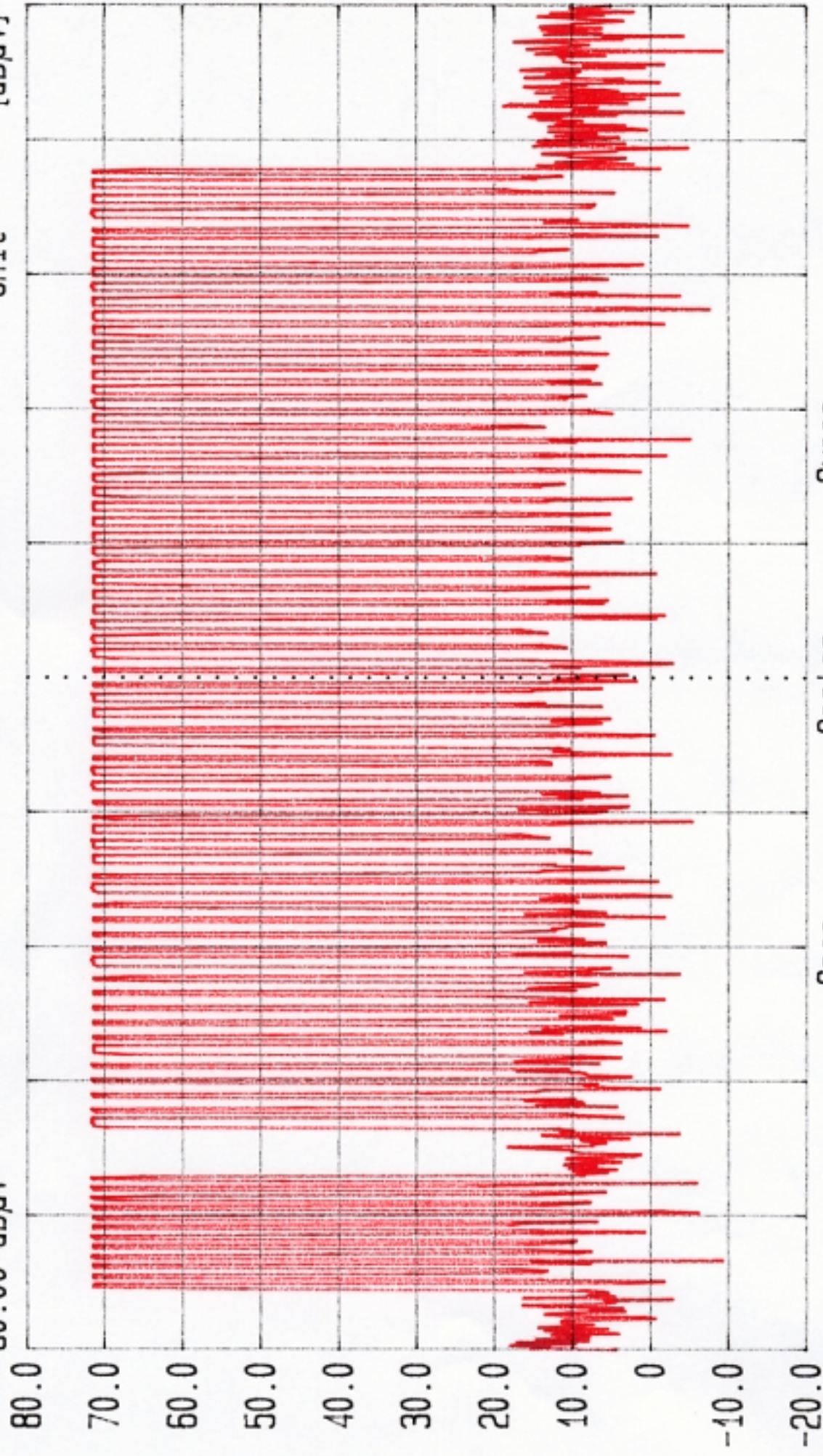
Vid.Bw 300 kHz
RF.Att 10 dB
Unit [dBuV]





Date 03.May.'01 TRG
Time 09:33:40
Ref.Lvl
80.00 dBuV

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





Date 03.May.'01 Time 09:38:11

Ref.Lvl 80.00 dB μ V

Delta 0.23 dB
633.333 μ s

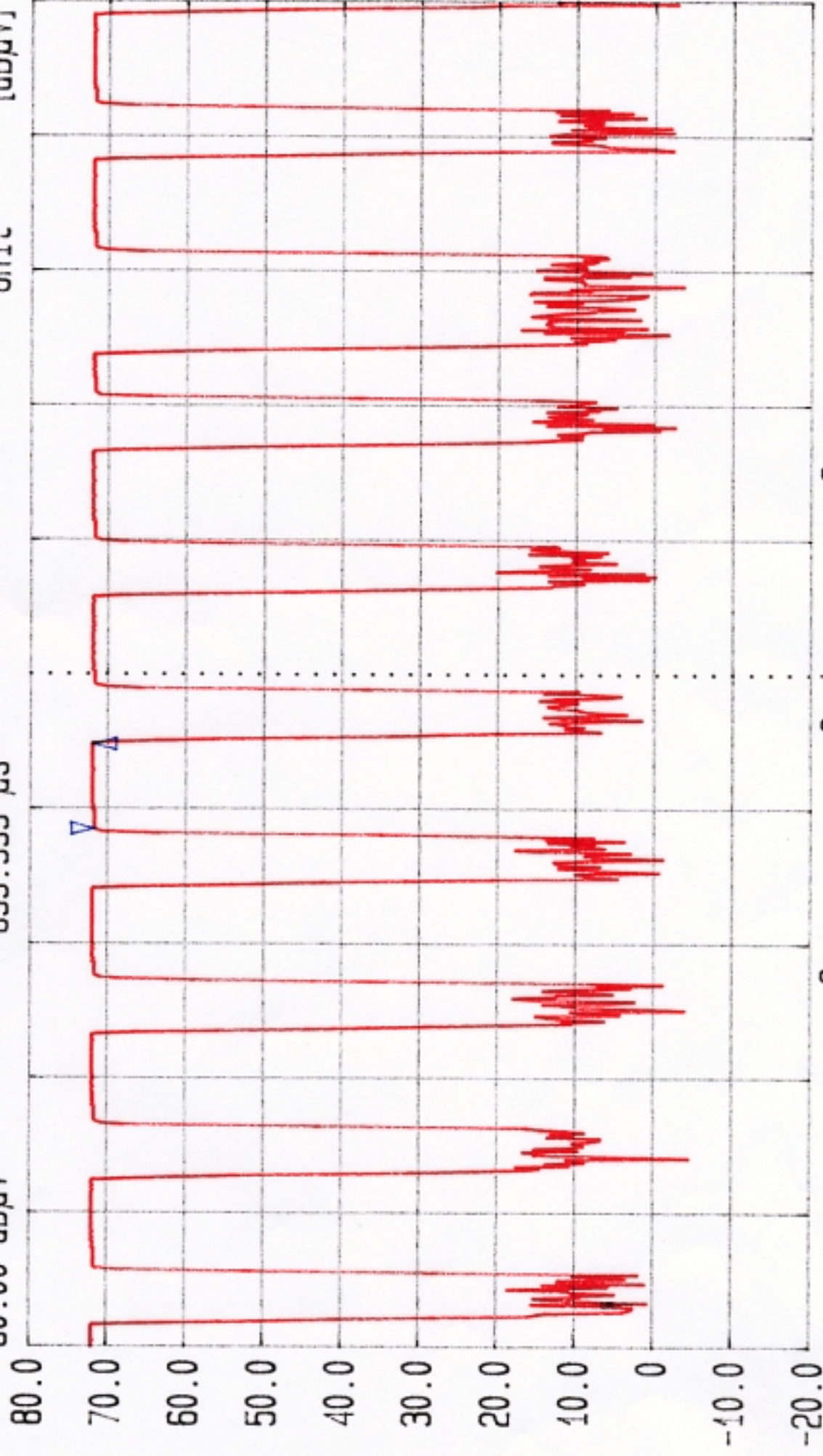
TRG

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
315.06222 MHz

Sweep
10 ms



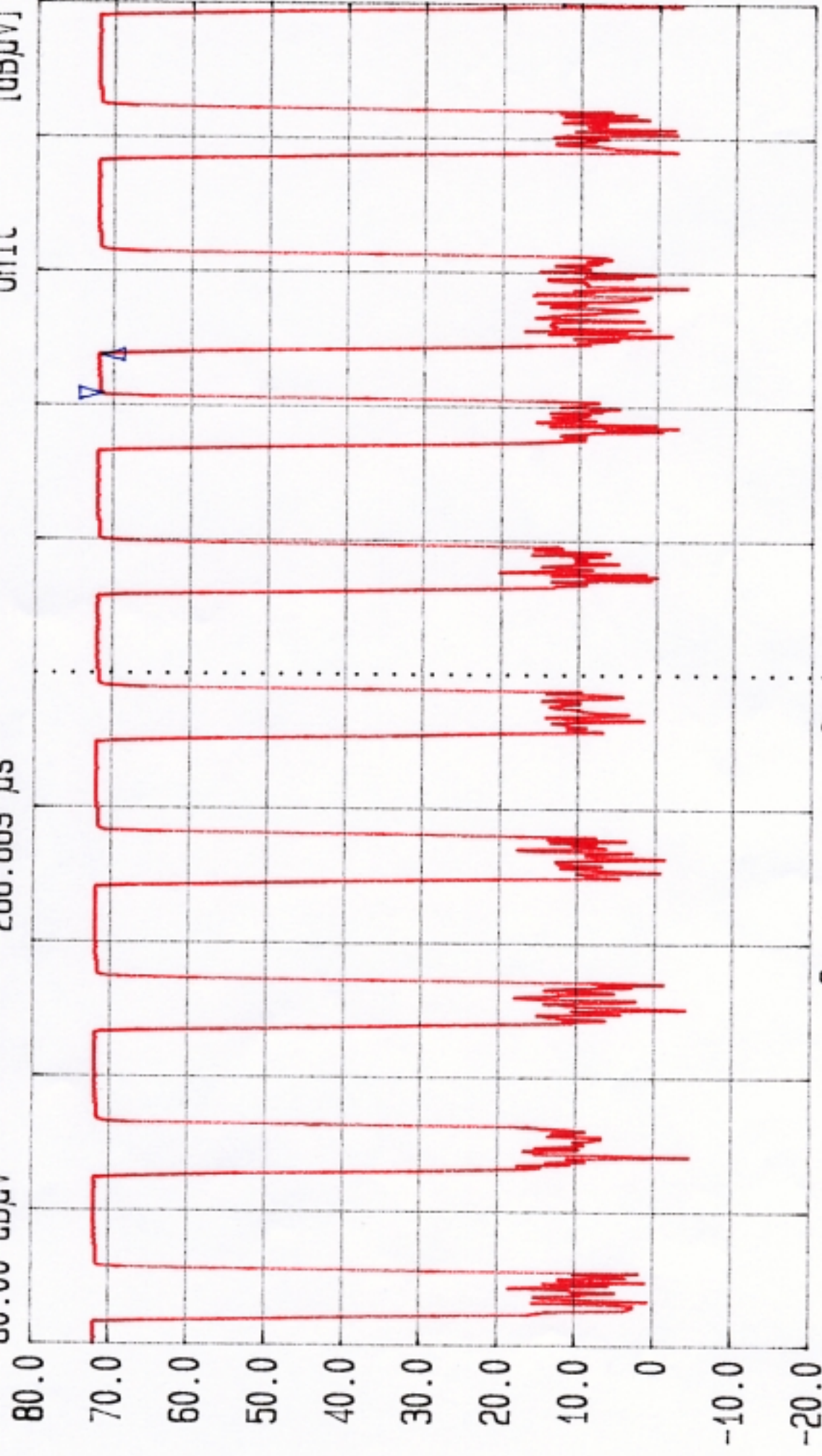
TRG

Date 03.May.'01 Time 09:42:14

Ref.Lvl Delta

80.00 dB μ V

0.23 dB

288.889 μ sRes.Bw
TG.Lvl
CF.Stp120 kHz [imp]
Off
12.000 kHzVid.Bw
RF.Att
Unit300 kHz
10 dB
[dB μ V]Span
0 HzCenter
315.06222 MHzSweep
10 ms



Date 03.May.'01 Time 09:51:23

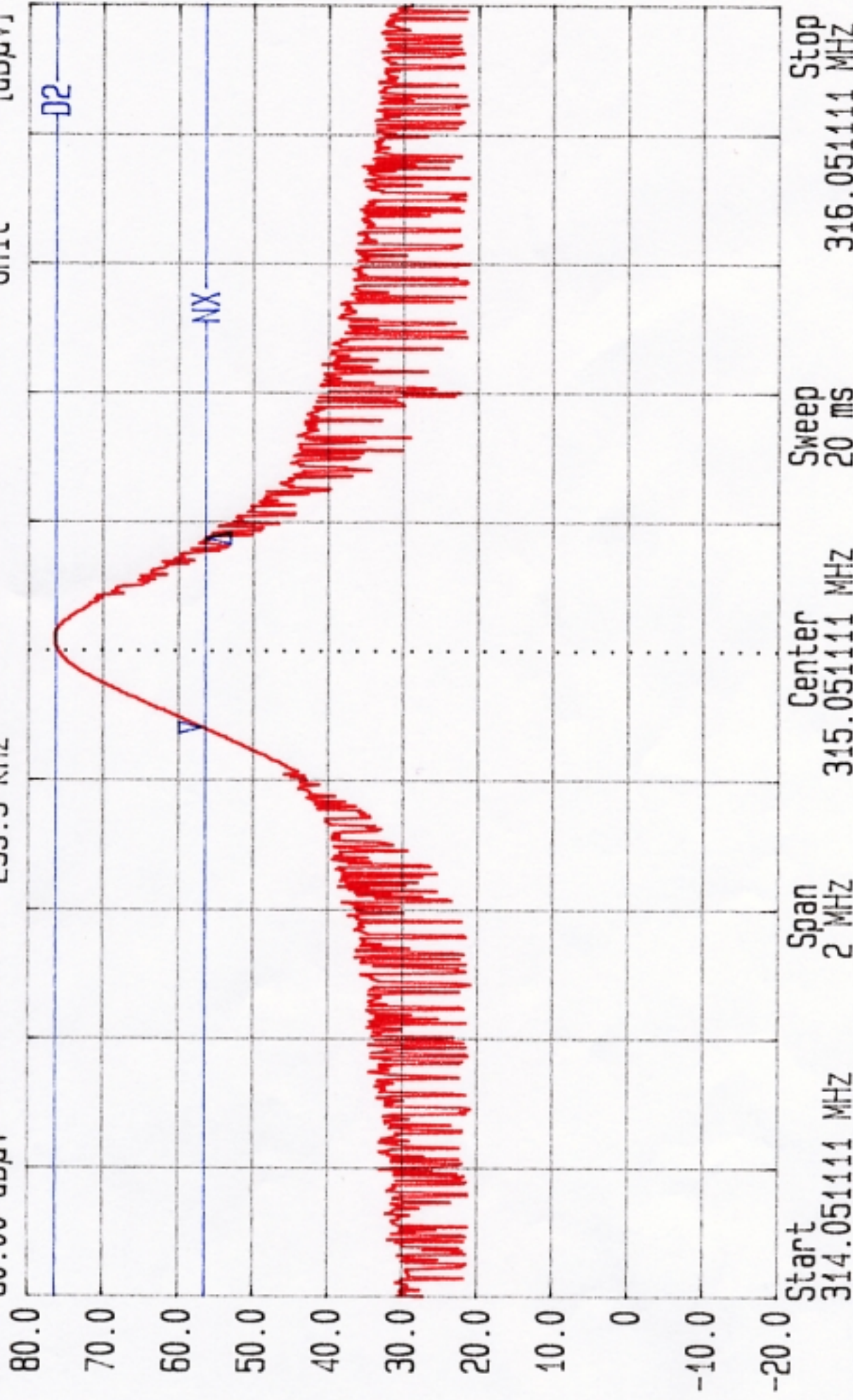
Ref.Lvl Delta

80.00 dBuV

--0.81 dB

293.3 kHz

Res.Bw 120 kHz [imp]
TG.Lvl off
CF.Stp 200.000 kHz
Vid.Bw 300 kHz
RF.Att 10 dB
Unit [dBuV]



N dB down Level 20.0 dB
DELTA MARK 293.3 KHz



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

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Project #: 01E9434
Report #: 9434D2
Date & Time: 5/08/2001
Test Engr: Vince Chiang

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

VISION AUTOMOBILE ELECTRONICS INDUSTRIAL CO., LTD.
TX-22 (TX / 315MHz)
EUT ONLY
FCC 15.231(b)/FCC 15.209
NORMAL MODE

☒ D Site

☐ E Site

6 W orst

Descending

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)
1260	64.03	55.72	25.0	2.8	38.00	-9.5	36.00	54.0	-18.00	1mV	0	1.1	A
1575	67.79	59.48	26.0	3.1	37.98	-9.5	41.13	54.0	-12.87	1mV	0	1.1	A
1890	67.77	59.46	27.3	3.5	37.92	-9.5	42.78	55.6	-12.85	1mV	0	1.1	A
2205	62.47	54.16	28.2	3.8	37.82	-9.5	38.77	55.6	-16.86	1mV	0	1.1	A
2520	54.66	46.35	28.9	4.0	37.65	-9.5	32.15	55.6	-23.45	1mV	0	1.1	A
2835	57.64	49.33	30.2	4.3	37.09	-9.5	37.23	54.0	-16.77	1mV	0	1.1	A
1260	71.36	63.05	25.0	2.8	38.00	-9.5	43.33	54.0	-10.67	1mH	0	1.1	A
1575	65.11	56.80	26.0	3.1	37.98	-9.5	38.45	54.0	-15.55	1mH	0	1.1	A
1890	70.86	52.55	27.3	3.5	37.92	-9.5	35.87	55.6	-19.76	1mH	0	1.1	A
2205	63.40	55.09	28.2	3.8	37.82	-9.5	39.70	55.6	-15.93	1mH	0	1.1	A
2520	55.73	47.42	28.9	4.0	37.65	-9.5	33.22	55.6	-22.38	1mH	0	1.1	A
2835	63.32	55.01	30.2	4.3	37.09	-9.5	42.91	54.0	-11.09	1mH	0	1.1	A

* No other emission were found within 20dB under the limits upto 3.2 GHz.

Total data #:12
V.2d

P(Peak): RBW=VBW=1MHz
A(Average): PK Reading - 8.304dB

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