

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

for

INTENTIONAL RADIATOR

434 MHz CAR ALARM TRANSMITTER

MODEL NO: 136B1889

FCC ID NO: ELVAT1A

REPORT NO: 01E9288

ISSUE DATE: March 7, 2001

Prepared for

**NUTEK CORPORATION
5F, NO. 3, ALLEY 6, LANE 45
PAO-HSING ROAD, HSIN TIEN, TAIPEI
TAIWAN, R. O. C.**

Prepared by

COMPLIANCE ENGINEERING SERVICES, INC.

d.b.a.

COMPLIANCE CERTIFICATION SERVICES

**1366 BORDEAUX DRIVE
SUNNYVALE, CA 94089, USA**

TEL: (408) 752-8166

FAX: (408) 752-8168



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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: NUTEK CORPORATION
5F, NO. 3, ALLEY 6, LANE 45, PAO-HSING ROAD
HSIN TIEN, TAIPEI, TAIWAN
R. O. C.

CONTACT PERSON: RUBY HSIEH/ MARKETING DEPT.

TELEPHONE NO.: 02-2918-9478

EUT DESCRIPTION: 434 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: 136B1889

FCC ID: ELVAT1A

DATE TESTED: March 1 & March 6, 2001

REPORT NUMBER: 01E9288

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 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

COMPLIANCE ENGINEERING SERVICES, INC.

1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089, USA

CCS DOCUMENT NO:CCSUP4020B

TEL:(408)752-8166 FAX:(408)752-8168

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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
H.P.	8566B	Spectrum Analyzer (100Hz – 22GHz)	12/2001
H.P.	8595EM	Spectrum Analyzer (9KHz – 6.5GHz)	01/2002
EMCO	3115	Antenna (1-18GHz)	09/2001
EMCO	3142	Antenna (30-2000MHz)	06/2001
T.E.C.	PA-102	Amplifier(30-2000MHz)	05/2001
MITEQ	NSP2600-44	Amplifier(1-26GHz)	12/2001

7. POWERLINE RFI LIMIT

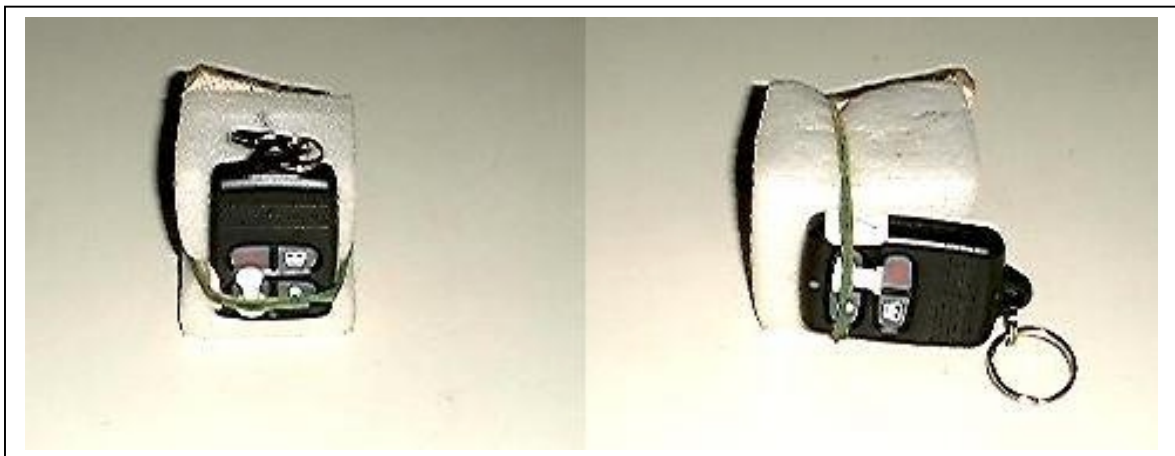
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHZ TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NO REQUIRED.

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

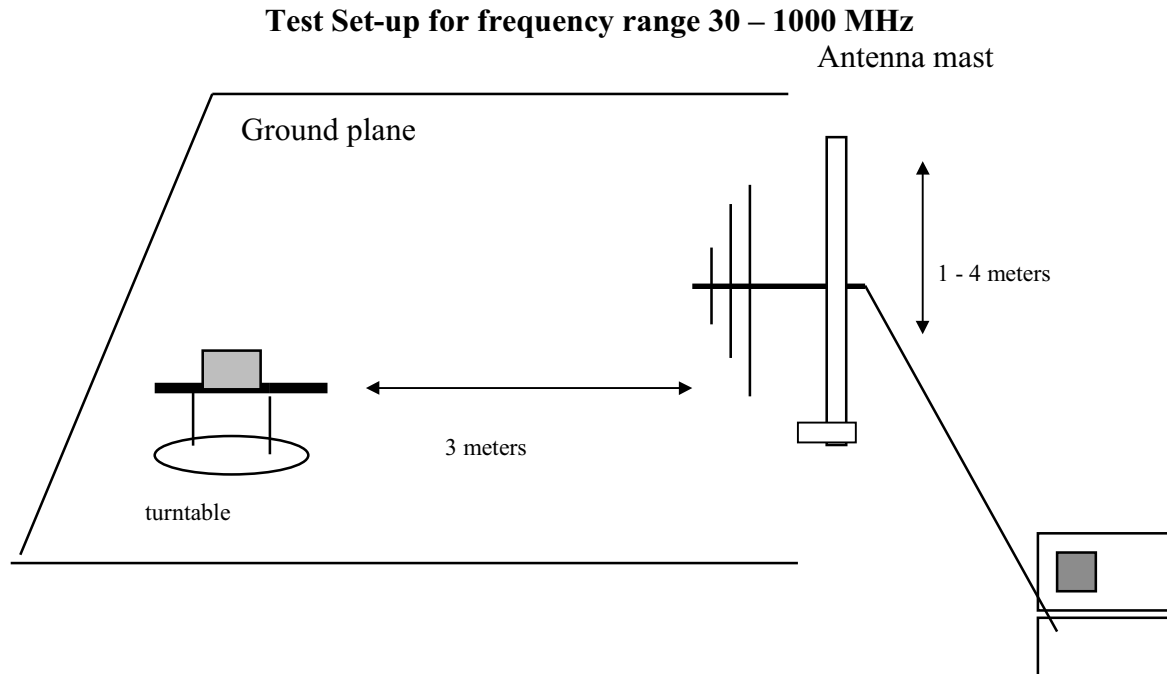
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

10. Test Procedure

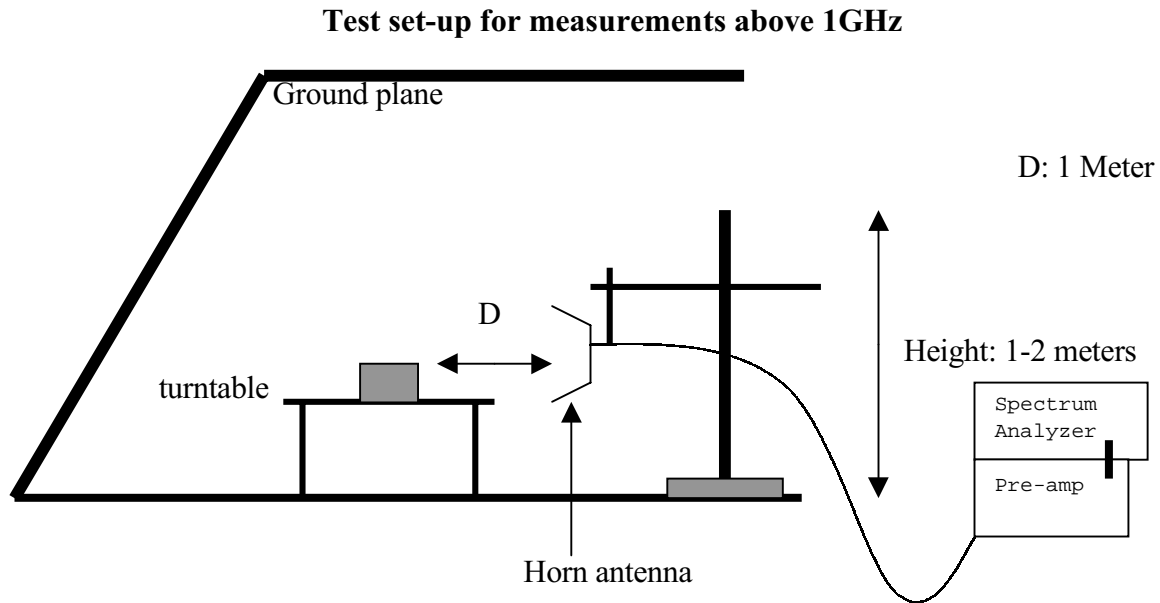
Radiated Emissions, 15.231(4)(b)



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 = 98.0 mS
 Long pulse = 0.667 mS
 Short pulse = 0.300 mS
 No of Long pulse = 37
 No of Short pulse = 41

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

Duty Cycle = ((37x0.667)+(41x0.300))/98=0.3773=37.73% or -8.47dB

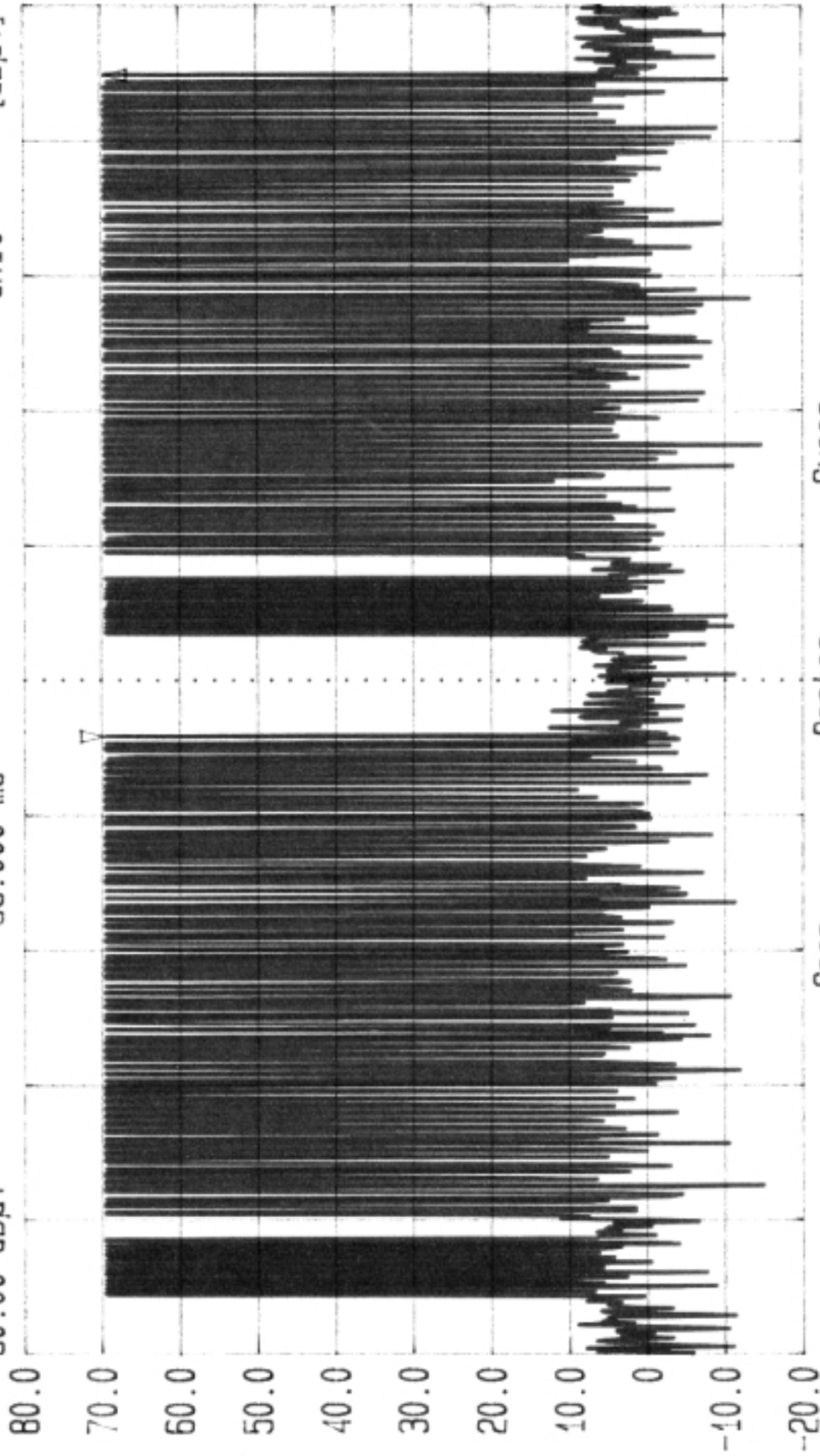
12.2 The Emissions Bandwidth

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

Center Frequency	Measured	Limits
434 MHz	380.0 kHz < (refer to plot)	434X0.25%=1085 kHz



Date 01.Mar.'01 Time 14:46:44 TRG
Ref.Lvl Delta 80.00 dB μ V
Res.BW 120 kHz [imp] TG.Lvl Off
Vid.Bw 300 kHz RF.Att 0 dB
Unit [dB μ V] CF.Stp



Span 0 Hz Center 433.861666 MHz Sweep 200 ms



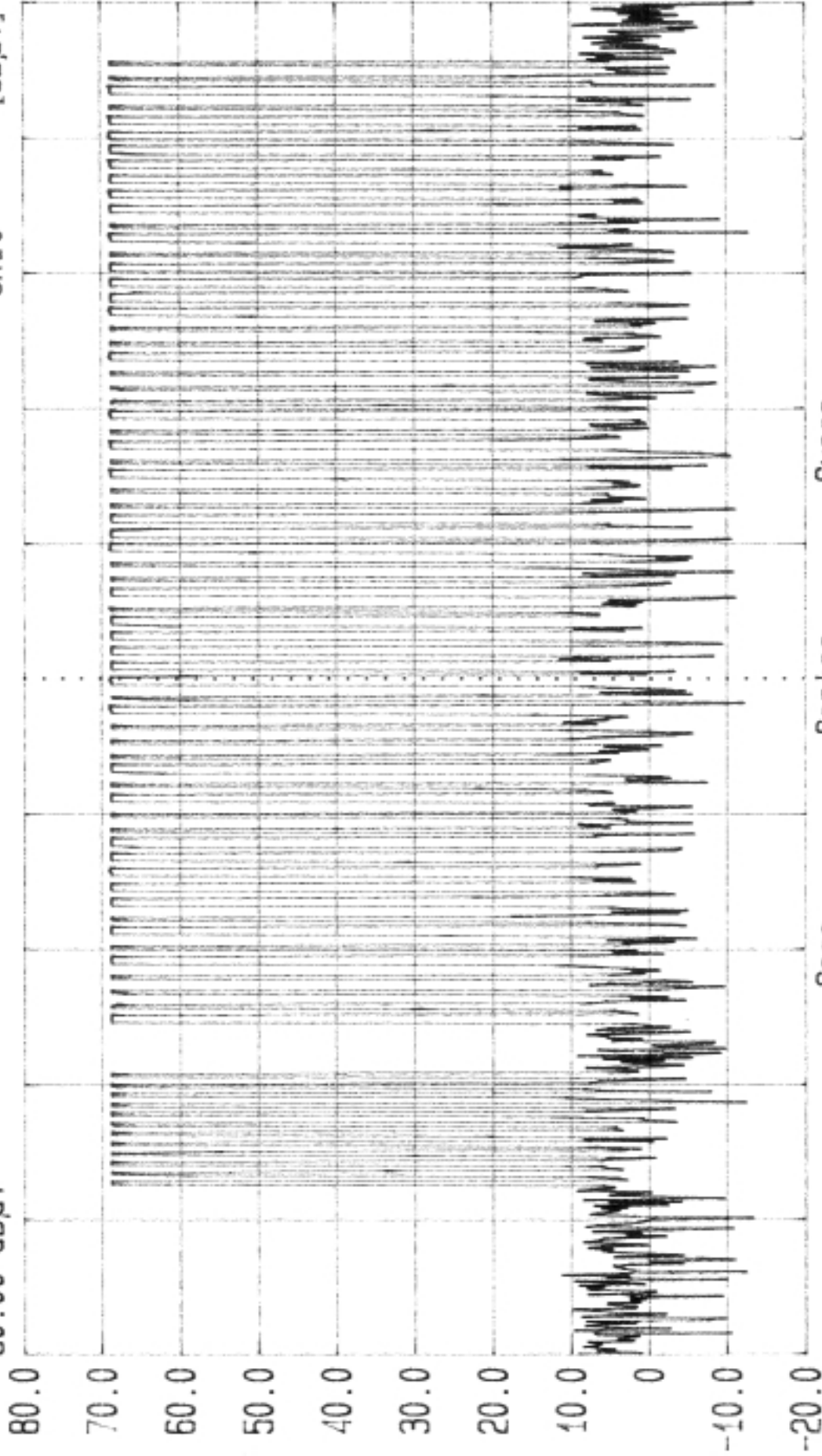
Date 01.Mar.'01 Time 14:54:05

Ref.Lvl
80.00 dB μ V

TRG

Res.Bw 120 kHz [imp]
T6.Lvl Off
CF.Stp 12.000 kHz

Vid.Bw 300 kHz
RF.Att 0 dB
Unit [dB μ V]



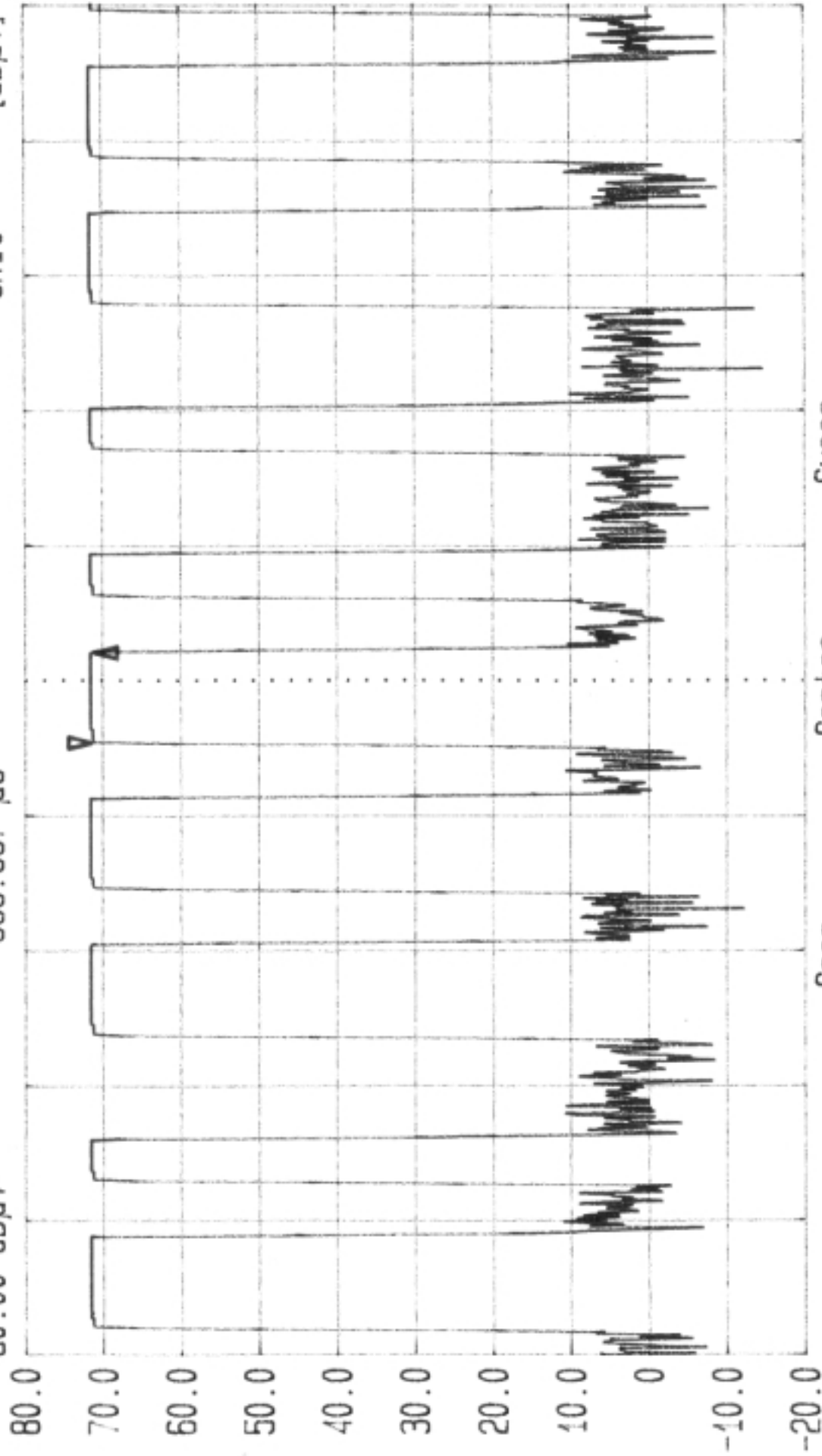
Span
0 Hz

Center
433.861666 MHz

Sweep
100 ms



Date 01.Mar.'01 Time 14:58:46
Ref.Lvl 80.00 dB μ V
Delta -0.43 dB
666.667 μ s
TRG
Res.Bw 120 kHz [imp]
TG.Lvl Off
CF.Stp 12.000 kHz
Vid.Bw 300 kHz
RF.Att 0 dB
Unit [dB μ V]



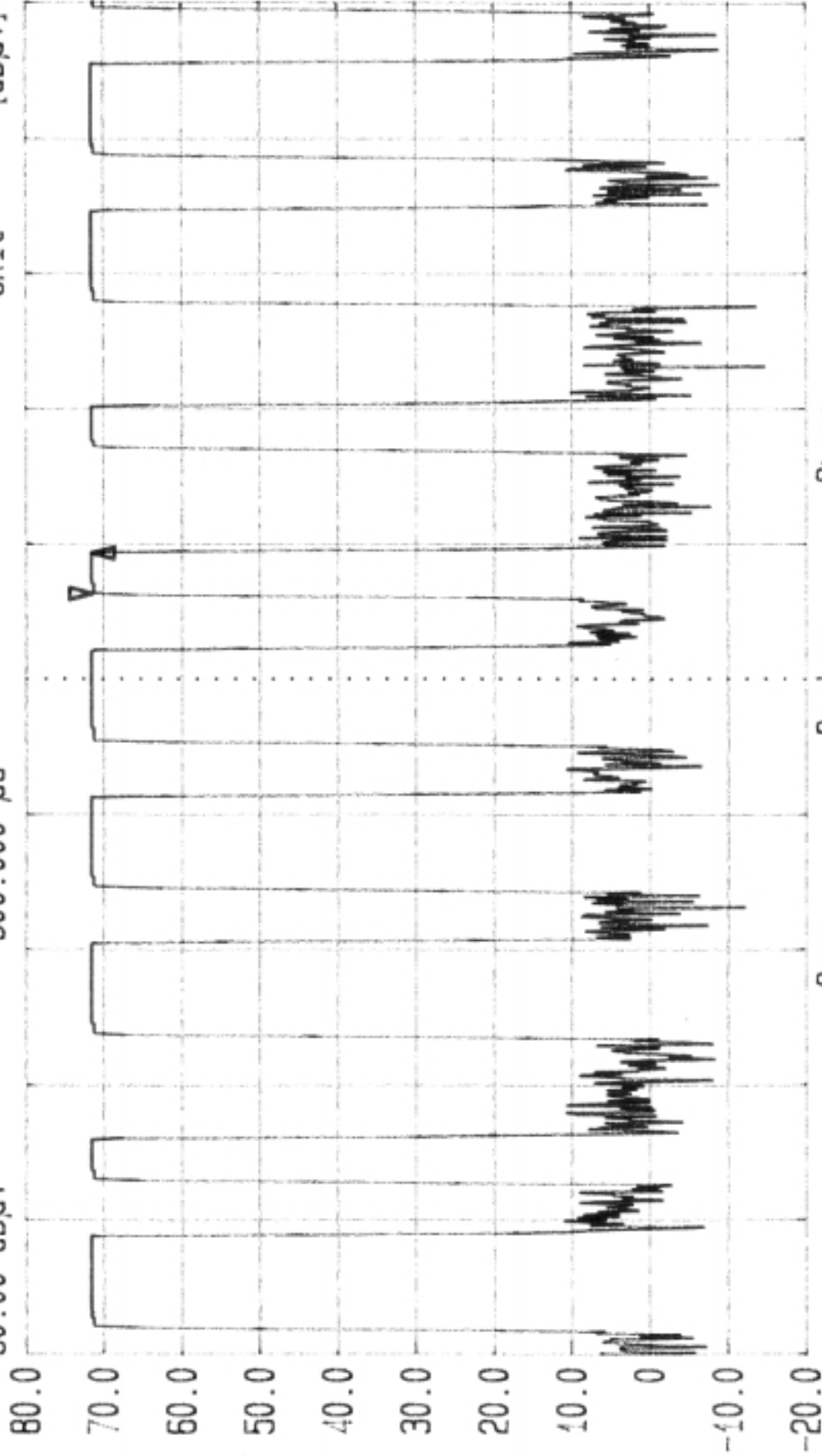
Span 0 Hz
Center 433.861666 MHz
Sweep 10 ms



Date 01.Mar.'01 Time 15:02:51
Ref.Lvl 80.00 dBuV
Delta 0.31 dB
300.000 μ s

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

Vid.Bw 300 kHz
RF.Att 0 dB
Unit [dBuV]

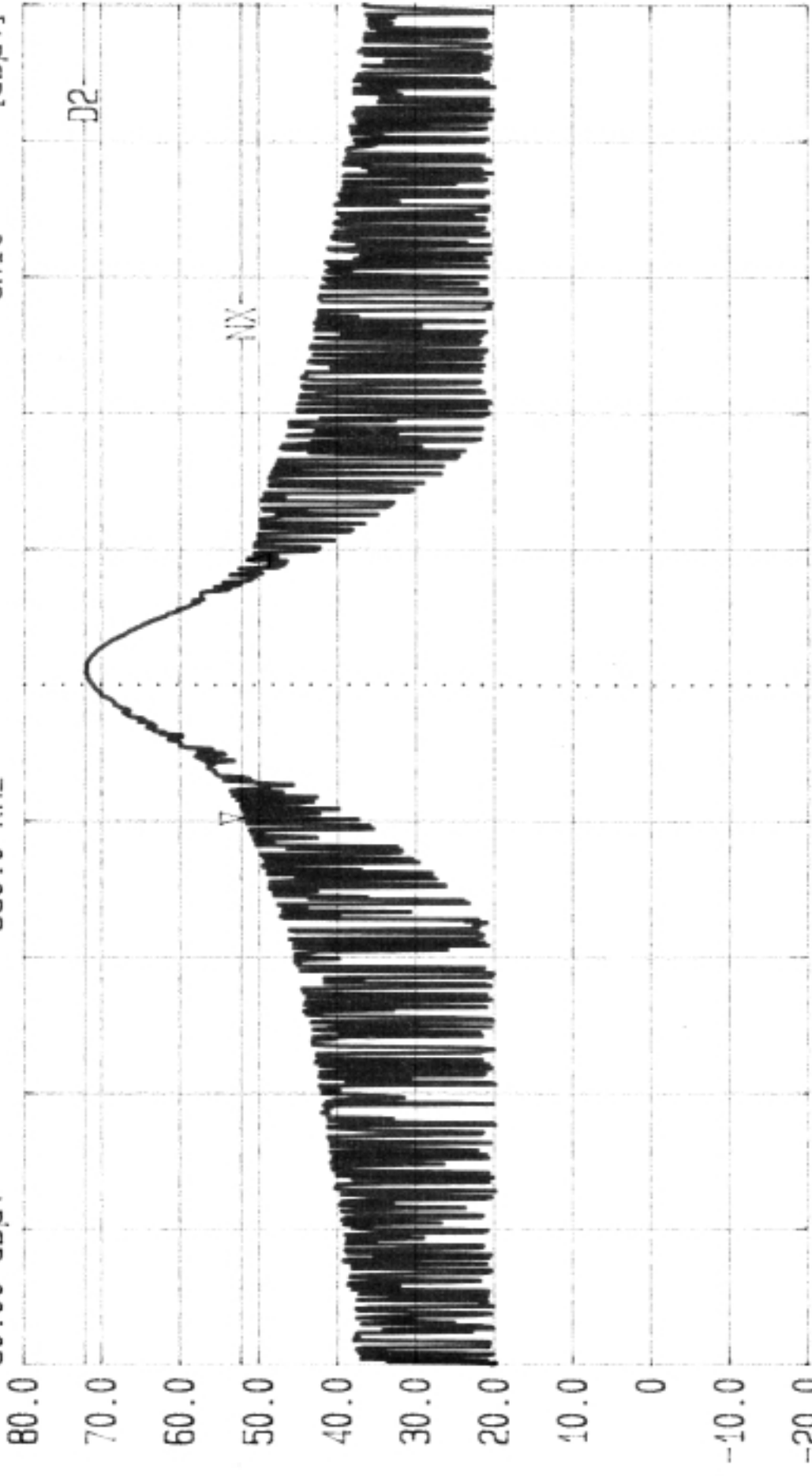


Span 0 Hz
Center 433.861666 MHz
Sweep 10 ms



Date 01.Mar.'01 Time 13:25:23
Ref.Lvl Delta -0.43 dB
80.00 dBuV 380.0 kHz

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



Start 432.844444 MHz Span 2 MHz Sweep 20 ms Stop 434.844444 MHz
Center 433.844444 MHz

N dB down Level 20.0 dB
DELTA MARK 380.0 KHZ



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 #: 01E9288
Report #: 9288D1
Date & Time: 3/01/2001
Test Engr: VINCE CHIANG

Company: NUTEK CORPORATION
EUT Description: 136B1889 (Alarm TX / 434MHz)
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% = **37.73 %**

Av Reading = Pk Reading + 20*log(M%)
20*log(M%) = **-8.4663**

	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	433.88	59.61	51.14	17.50	3.19	21.28	50.55	80.82	-30.27	3mV	0	1.10
	867.80	32.42	23.95	23.37	4.26	20.69	30.89	60.82	-29.93	3mV	0	1.20
Y	433.89	75.28	66.81	17.50	3.19	21.28	66.22	80.82	-14.60	3mV	90	1.10
	867.79	47.02	38.55	23.37	4.26	20.69	45.49	60.82	-15.33	3mV	90	1.20
Z	433.88	73.17	64.70	17.50	3.19	21.28	64.11	80.82	-16.71	3mV	0	1.25
	867.78	40.98	32.51	23.37	4.26	20.69	39.45	60.82	-21.37	3mV	0	1.30
X	433.91	69.72	61.25	17.50	3.19	21.28	60.66	80.82	-20.16	3mH	90	1.25
	867.81	42.93	34.46	23.37	4.26	20.69	41.40	60.82	-19.42	3mH	90	1.20
Y	433.91	69.16	60.69	17.50	3.19	21.28	60.10	80.82	-20.72	3mH	180	1.30
	867.83	43.41	34.94	23.37	4.26	20.69	41.88	60.82	-18.94	3mH	180	1.25
Z	433.91	67.08	58.61	17.50	3.19	21.28	58.02	80.82	-22.80	3mH	0	1.20
	867.79	42.93	34.46	23.37	4.26	20.69	41.40	60.82	-19.42	3mH	0	1.15
	Button #2:											
X	433.87	57.33	48.86	17.50	3.19	21.28	48.27	80.82	-32.55	3mV	90	1.30
	867.77	33.46	24.99	23.37	4.26	20.69	31.93	60.82	-28.89	3mV	90	1.20
Y	433.88	75.13	66.66	17.50	3.19	21.28	66.07	80.82	-14.75	3mV	0	1.15
	867.79	46.74	38.27	23.37	4.26	20.69	45.21	60.82	-15.61	3mV	0	1.10
Z	433.88	74.82	66.35	17.50	3.19	21.28	65.76	80.82	-15.06	3mV	180	1.20
	867.78	37.75	29.28	23.37	4.26	20.69	36.22	60.82	-24.60	3mV	180	1.20
X	433.92	69.57	61.10	17.50	3.19	21.28	60.51	80.82	-20.31	3mH	0	1.00
	867.81	43.54	35.07	23.37	4.26	20.69	42.01	60.82	-18.81	3mH	0	1.00
Y	433.91	69.24	60.77	17.50	3.19	21.28	60.18	80.82	-20.64	3mH	180	1.20
	867.81	44.17	35.70	23.37	4.26	20.69	42.64	60.82	-18.18	3mH	180	1.10
Z	433.91	65.89	57.42	17.50	3.19	21.28	56.83	80.82	-23.99	3mH	90	1.15
	867.82	42.37	33.90	23.37	4.26	20.69	40.84	60.82	-19.98	3mH	90	1.25
	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 #: 01E9288
Report #: 9288D2
Date & Time: 3/01/2001
Test Engr: VINCE CHIANG

Company: NUTEK CORPORATION
EUT Description: 136B1889 (Alarm TX / 434MHz)
Test Configuration : EUT ONLY
Type of Test: FCC 15.231(B)
Mode of Operation: NORMAL MODE

D-Ste

E-Ste

$M\% = ((t1+t2+t3+...)/T) * 100\% = 37.73 \%$

$Av \text{ Reading} = Pk \text{ Reading} + 20 * \log(M\%)$
 $20 * \log(M\%) = -8.4663$

	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 #3:											
X	433.88	58.13	49.66	17.50	3.19	21.28	49.07	80.82	-31.75	3mV	90	1.20
	867.80	41.81	33.34	23.37	4.26	20.69	40.28	60.82	-20.54	3mV	90	1.20
Y	433.89	75.03	66.56	17.50	3.19	21.28	65.97	80.82	-14.85	3mV	180	1.35
	867.80	49.20	40.73	23.37	4.26	20.69	47.67	60.82	-13.15	3mV	180	1.25
Z	433.88	72.49	64.02	17.50	3.19	21.28	63.43	80.82	-17.39	3mV	270	1.30
	867.79	41.51	33.04	23.37	4.26	20.69	39.98	60.82	-20.84	3mV	270	1.20
	Button #4:											
X	433.91	69.44	60.97	17.50	3.19	21.28	60.38	80.82	-20.44	3mH	90	1.25
	867.81	41.97	33.50	23.37	4.26	20.69	40.44	60.82	-20.38	3mH	90	1.25
Y	433.91	68.20	59.73	17.50	3.19	21.28	59.14	80.82	-21.68	3mH	90	1.10
	867.81	43.51	35.04	23.37	4.26	20.69	41.98	60.82	-18.84	3mH	90	1.00
Z	433.91	65.12	56.65	17.50	3.19	21.28	56.06	80.82	-24.76	3mH	180	1.00
	867.80	42.60	34.13	23.37	4.26	20.69	41.07	60.82	-19.75	3mH	180	1.50
X	433.85	55.47	47.00	17.50	3.19	21.28	46.41	80.82	-34.41	3mV	90	1.30
	867.79	28.41	19.94	23.37	4.26	20.69	26.88	60.82	-33.94	3mV	90	1.20
Y	433.89	75.41	66.94	17.50	3.19	21.28	66.35	80.82	-14.47	3mV	0	1.15
	867.79	49.53	41.06	23.37	4.26	20.69	48.00	60.82	-12.82	3mV	0	1.10
Z	433.89	72.49	64.02	17.50	3.19	21.28	63.43	80.82	-17.39	3mV	180	1.20
	867.79	47.02	38.55	23.37	4.26	20.69	45.49	60.82	-15.33	3mV	180	1.20
X	433.91	65.12	56.65	17.50	3.19	21.28	56.06	80.82	-24.76	3mH	0	1.00
	867.80	42.60	34.13	23.37	4.26	20.69	41.07	60.82	-19.75	3mH	0	1.00
Y	433.91	69.75	61.28	17.50	3.19	21.28	60.69	80.82	-20.13	3mH	180	1.20
	867.79	44.66	36.19	23.37	4.26	20.69	43.13	60.82	-17.69	3mH	180	1.10
Z	433.91	66.04	57.57	17.50	3.19	21.28	56.98	80.82	-23.84	3mH	90	1.15
	867.81	43.36	34.89	23.37	4.26	20.69	41.83	60.82	-18.99	3mH	90	1.25
	Total data #: 24											



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

1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089
PHONE: (408) 752-8166 FAX: (408) 752-8168

Project #: 01E9288
Report #: 9288D3
Date & Time: 3/06/2001
Test Engr: Vince Chiang

Company: NUTEK CORPORATION
EUT Description: 136B1889 (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	63.58	55.11	24.8	2.8	43.27	-9.5	29.95	54.0	-24.05	1mH	0	1.2	A
2170	55.49	47.02	27.8	3.7	42.82	-9.5	26.14	60.8	-34.69	1mH	0	1.2	A
2603	58.99	50.52	29.2	3.9	42.59	-9.5	31.56	60.8	-29.27	1mH	0	1.2	A
3037	54.44	45.97	30.9	4.2	42.37	-9.5	29.15	60.8	-31.65	1mH	0	1.2	A
1302	63.31	54.84	24.8	2.8	43.27	-9.5	29.68	54.0	-24.32	1mV	0	1.2	A
2170	55.24	46.77	27.8	3.7	42.82	-9.5	25.89	60.8	-34.91	1mV	0	1.2	A
2603	54.46	45.99	29.2	3.9	42.59	-9.5	27.03	60.8	-33.77	1mV	0	1.2	A
3037	47.42	38.95	30.9	4.2	42.37	-9.5	22.13	60.8	-38.67	1mV	0	1.2	A

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

Total data #:8
V.2d

P(Peak): RBW=VBW=1MHz

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

A(Average): Pk Reading - 8.4663dB(For FCC 15.231(b))