

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

*for*

**INTENTIONAL RADIATOR**

**434 MHz CAR ALARM TRANSMITTER**

**MODEL NO: APS2K4MS**

**FCC ID NO: ELVAT0H**

**REPORT NO: 01E9458**

**ISSUE DATE: May 11, 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.  
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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#### 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: APS2K4MS

FCC ID: ELVAT0H

DATE TESTED: May 8 ~ May 9, 2001

REPORT NUMBER: 01E9458

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.

PAGE NO: 1

COMPLIANCE ENGINEERING SERVICES, INC. TEL: (02)2217-0894 FAX: (02)2217-1254  
NO. 199, CHUNG SHENG ROAD, HSIN TIEN CITY, TAIPEI, TAIWAN, R. O. C.

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## 2. Product Description

Fundamental Frequency	<b>434 MHz</b>
Power Source	<b>12V Battery</b>
Transmitting Time	<b>Periodic <math>\leq</math> 5 seconds</b>
Associated Receiver	<b>FCC ID: ELVAR5F</b>

## 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)	02/2002
EMCO	3142	Antenna (30-2000MHz)	06/2001
T.E.C.	PA-102	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

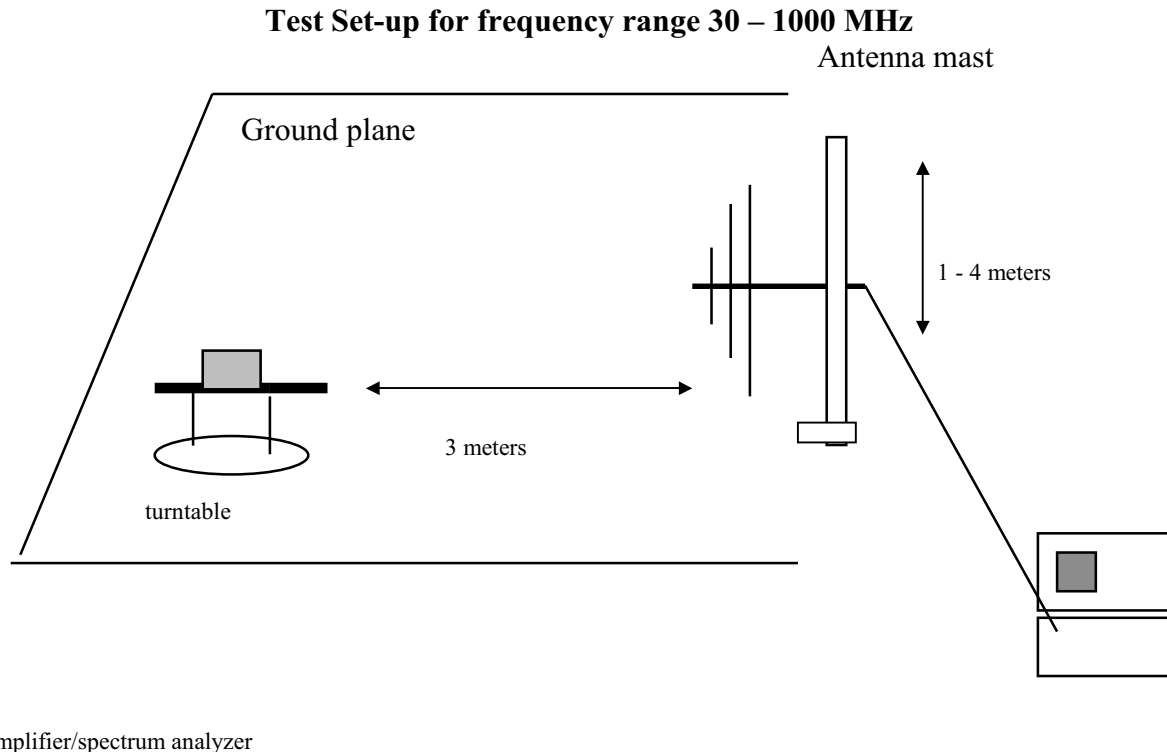
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

## 10. Test Procedure

### Radiated Emissions, 15.231(4)(b)



**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.

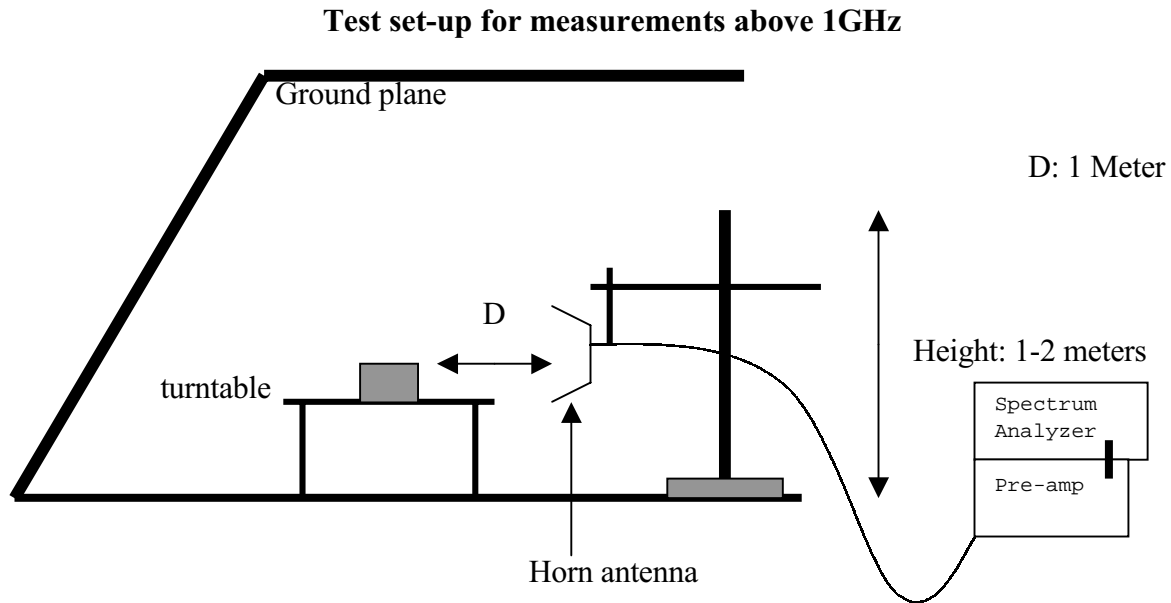


FIG. 2

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**

<b>Powerline RFI Class B</b>	<b>Eut</b>	<b>Radiated Emission Limits</b>	<b>Eut</b>
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                      = 96.777 mS  
                  Long pulse                      = 0.516 mS  
                  Short pulse                      = 0.178 mS  
                  No of Long pulse                  = 39  
                  No of Short pulse                  = 39

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

Duty Cycle = ((39x0.178)+(39x0.516))/96.777=0.2797=27.97% or -11.066dB

**12.2 The Emissions Bandwidth**

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

<b>Center Frequency</b>	<b>Measured</b>	<b>Limits</b>
<b>434 MHz</b>	<b>664.4 kHz &lt; (refer to plot)</b>	<b>434X0.25%=1085 kHz</b>



Date 08.May.'01 Time 10:51:08

Ref.Lvl Delta

80.00 dB $\mu$ V

TAG

0.07 dB  
96.777 ms

Res.Bw 121.6 kHz [3dB]

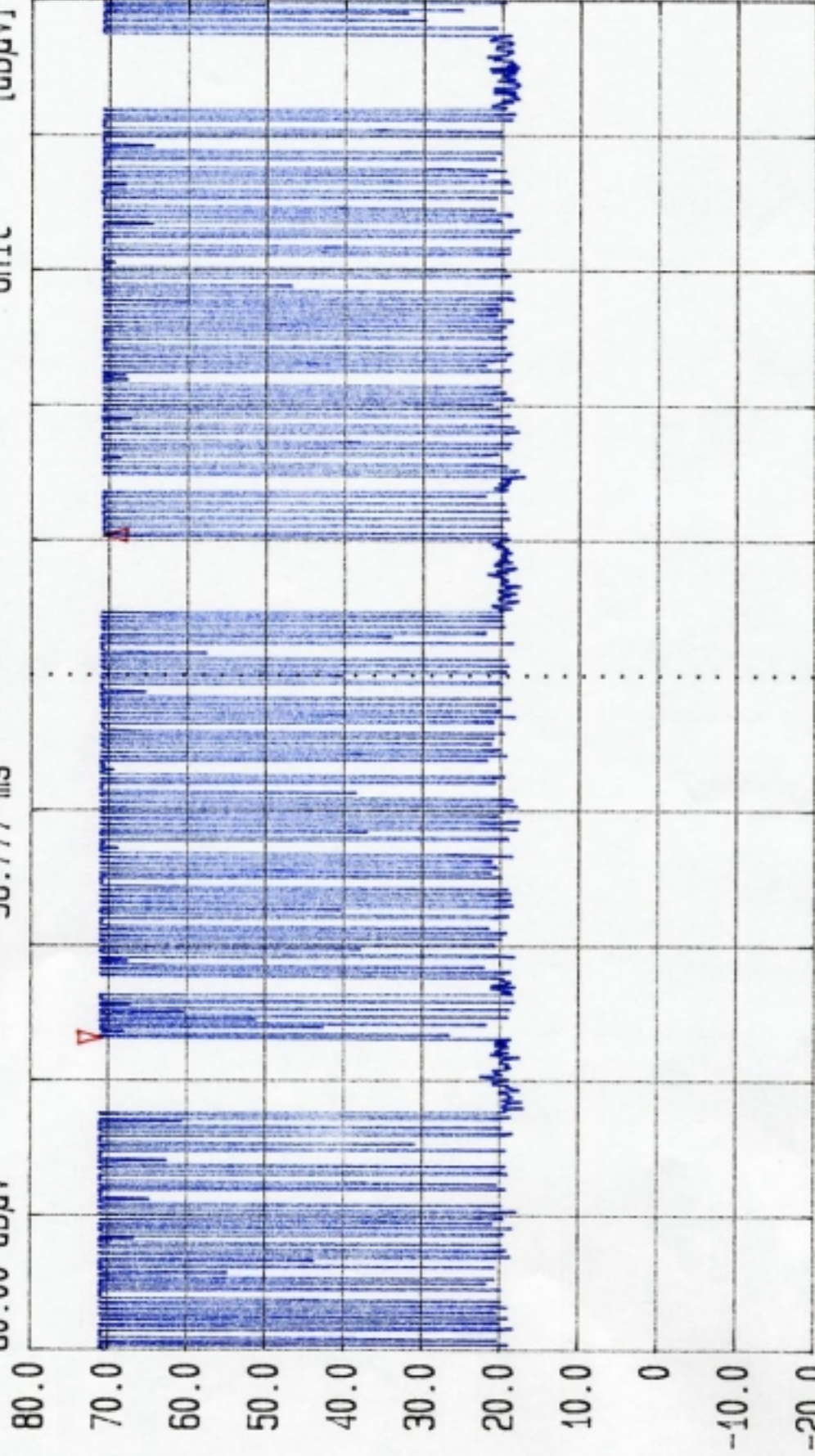
TG.Lvl Off

CF.Stp 12.165 kHz

Vid.Bw 300 kHz

RF.Att 10 dB

Unit [dB $\mu$ V]



Span 0 Hz Center 433.88444 MHz Sweep 250 ms



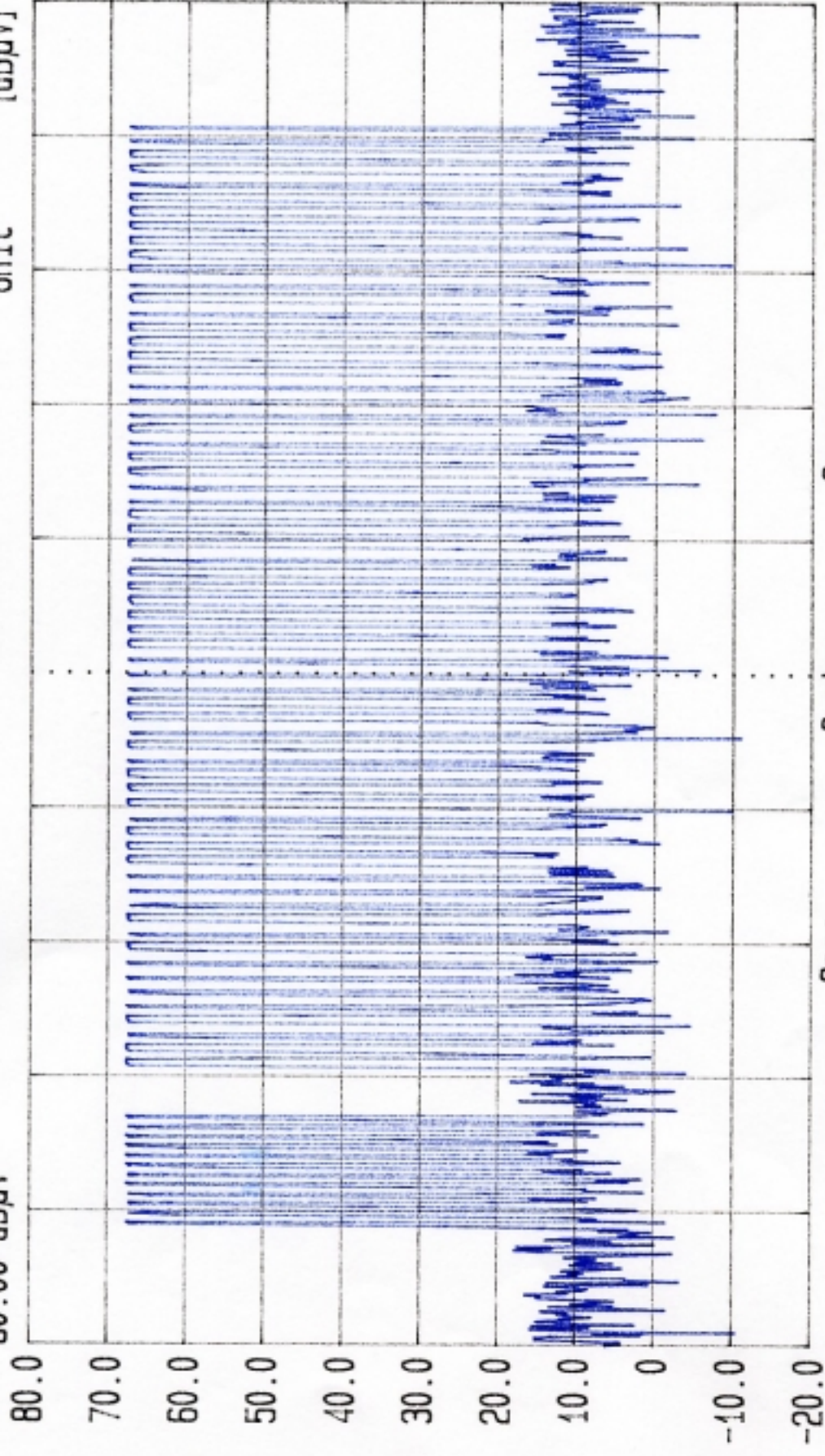
Date 08.May.'01 Time 10:58:57

Ref.Lvl  
80.00 dBuV

TRG

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

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

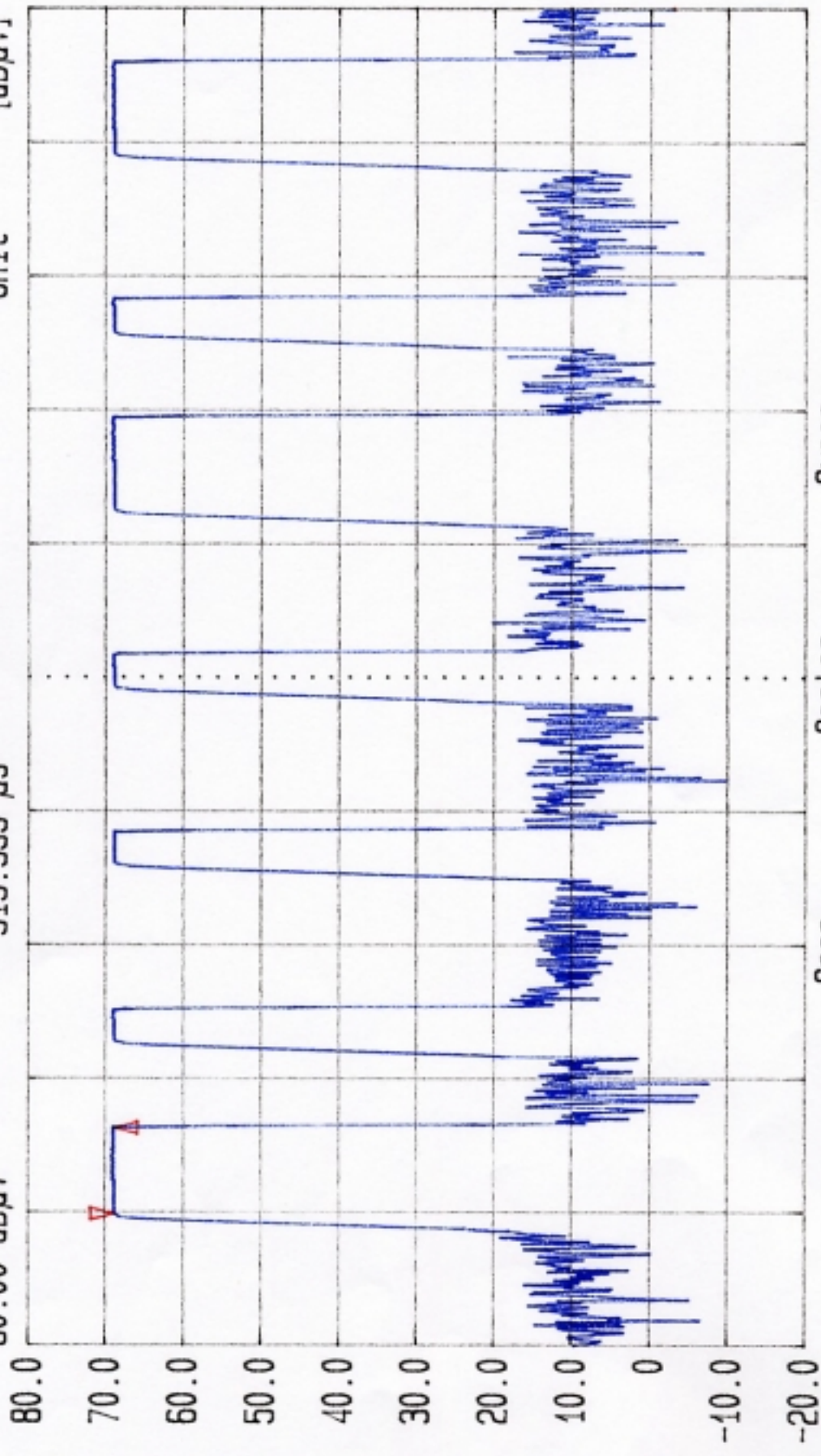


Span  
0 Hz  
Center  
433.853333 MHz  
Sweep  
100 ms



Date 08.May.'01 Time 11:03:31  
Ref.Lvl 80.00 dBuV  
Delta 0.08 dB  
515.555  $\mu$ s

TRG  
Res.Bw 120 kHz [imp]  
T6.Lvl Off  
CF.Stp 12.000 kHz  
Vid.Bw 300 kHz  
RF.Att 10 dB  
Unit [dBuV]



Span 0 Hz  
Center 433.853333 MHz  
Sweep 8 ms

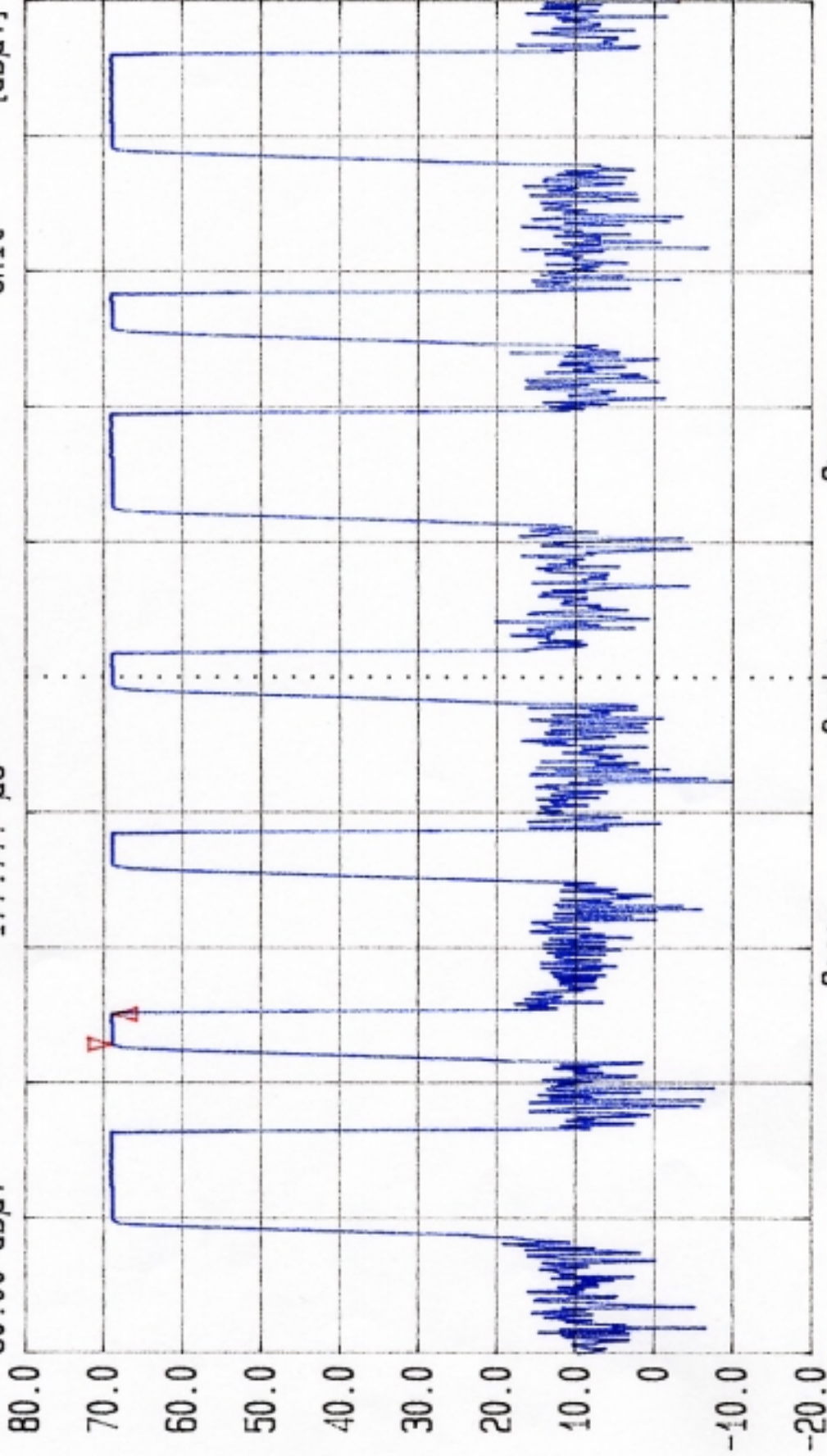


Date 08.May.'01 Time 11:07:45  
Ref.Lvl 80.00 dB $\mu$ V  
Delta 0.18 dB  
177.777  $\mu$ s

TRG

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

Vid.Bw 300 kHz  
RF.Att 10 dB  
Unit [dB $\mu$ V]



Span 0 Hz  
Center 433.853333 MHz  
Sweep 8 ms



Date 08.May.'01 Time 10:39:33

Ref.Lvl Delta

80.00 dBuV

-0.43 dB

664.4 kHz

Res.Bw 121.6 kHz [3dB]

TG.Lvl off

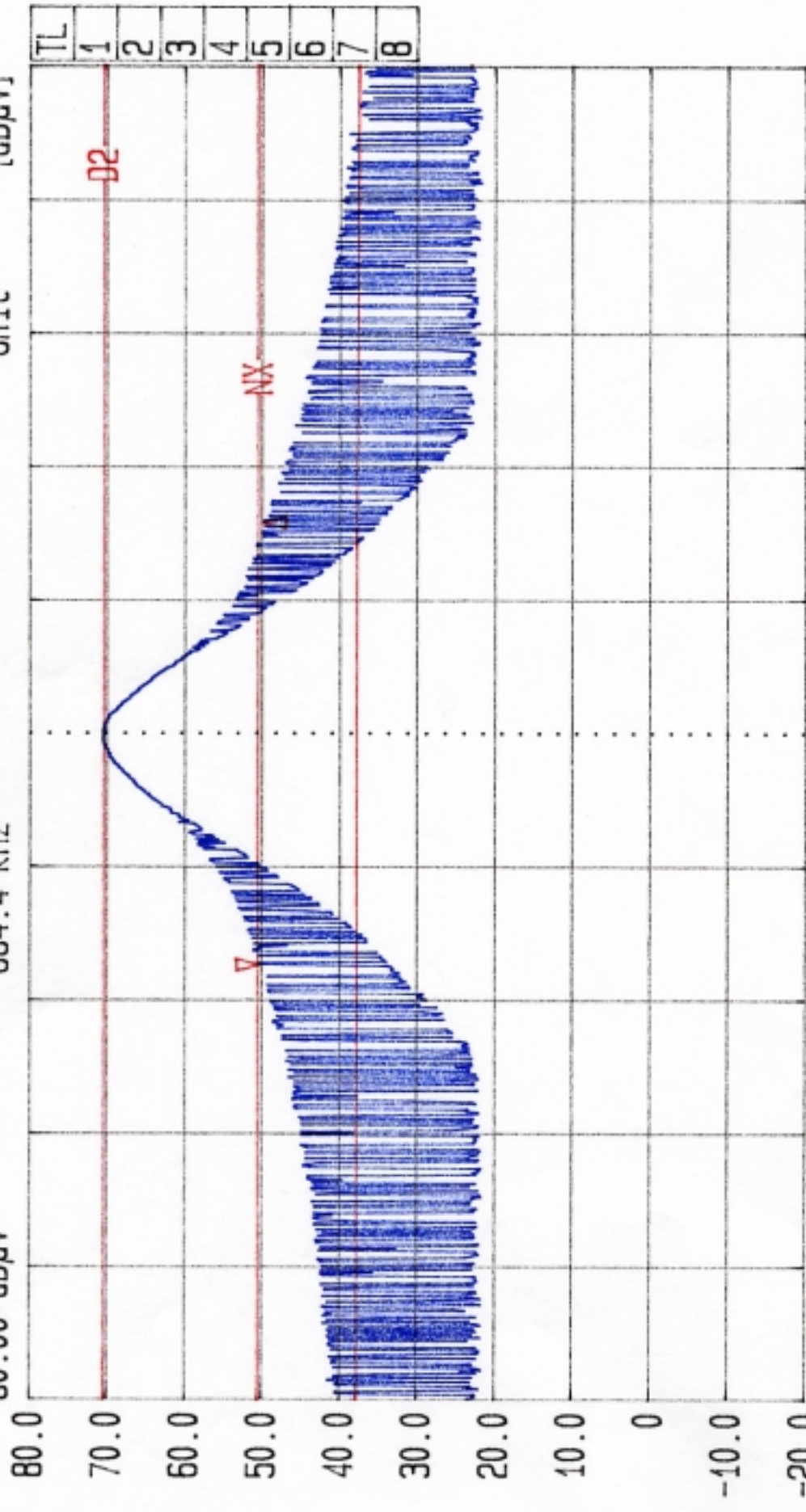
CF.Stp 200.000 kHz

Unit

Vid.Bw 300 kHz

RF.Att 10 dB

[dBuV]



Start

432.884444 MHz

Span

2 MHz

Center

433.884444 MHz

Sweep

20 ms

Stop

434.884444 MHz

N dB down Level 20.0 dB  
DELTA MARK 664.4 KHZ



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

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Hsin Tien City, Taipei, Taiwan, R.O.C.  
PHONE: 02-2217-0894 FAX: 02-2217-1254

**Project #:** 01E9458  
**Report #:** 9458D1  
**Date & Time:** 05/09/2001  
**Test Engr:** VINCE CHIANG

**Company:** NUTEK CORPORATION  
**EUT Description:** APS2K4MS (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% = **27.97 %**

Av Reading = Pk Reading + 20\*log(M%)  
20\*log(M%) = **-11.066**

	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	433.89	69.81	58.74	17.50	3.19	27.03	52.40	80.82	-28.42	3mV	90	1.10
	867.77	48.79	37.72	23.37	4.26	26.70	38.65	60.82	-22.17	3mV	90	1.20
Y	433.88	83.85	72.78	17.50	3.19	27.03	66.44	80.82	-14.38	3mV	180	1.00
	867.77	48.79	37.72	23.37	4.26	26.70	38.65	60.82	-22.17	3mV	180	1.30
Z	433.87	79.26	68.19	17.50	3.19	27.03	61.85	80.82	-18.97	3mV	0	1.25
	867.76	44.42	33.35	23.37	4.26	26.70	34.28	60.82	-26.54	3mV	270	1.30
	Button #2:											
X	433.92	78.98	67.91	17.50	3.19	27.03	61.57	80.82	-19.25	3mH	180	1.20
	867.78	40.79	29.72	23.37	4.26	26.70	30.65	60.82	-30.17	3mH	180	1.50
Y	433.89	74.99	63.92	17.50	3.19	27.03	57.58	80.82	-23.24	3mH	90	1.20
	867.76	44.34	33.27	23.37	4.26	26.70	34.20	60.82	-26.62	3mH	180	1.70
Z	433.89	79.99	68.92	17.50	3.19	27.03	62.58	80.82	-18.24	3mH	0	1.10
	867.74	40.25	29.18	23.37	4.26	26.70	30.11	60.82	-30.71	3mH	0	1.60
X	433.89	69.66	58.59	17.50	3.19	27.03	52.25	80.82	-28.57	3mV	180	1.10
	867.75	41.27	30.20	23.37	4.26	26.70	31.13	60.82	-29.69	3mV	180	1.30
Y	433.88	84.59	73.52	17.50	3.19	27.03	67.18	80.82	-13.64	3mV	0	1.20
	867.75	49.65	38.58	23.37	4.26	26.70	39.51	60.82	-21.31	3mV	0	1.20
Z	433.87	83.25	72.18	17.50	3.19	27.03	65.84	80.82	-14.98	3mV	90	1.10
	867.77	44.67	33.60	23.37	4.26	26.70	34.53	60.82	-26.29	3mV	90	1.40
X	433.89	80.68	69.61	17.50	3.19	27.03	63.27	80.82	-17.55	3mH	90	1.20
	867.78	42.69	31.62	23.37	4.26	26.70	32.55	60.82	-28.27	3mH	90	1.40
Y	433.91	76.52	65.45	17.50	3.19	27.03	59.11	80.82	-21.71	3mH	180	1.10
	867.81	41.29	30.22	23.37	4.26	26.70	31.15	60.82	-29.67	3mH	180	1.00
Z	433.89	78.98	67.91	17.50	3.19	27.03	61.57	80.82	-19.25	3mH	0	1.30
	867.78	42.62	31.55	23.37	4.26	26.70	32.48	60.82	-28.34	3mH	0	2.00
	Total data #: 24											



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

No. 199 Chung Sheng Road  
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**Project #:** 01E9458  
**Report #:** 9458D2  
**Date & Time:** 05/09/2001  
**Test Engr:** VINCE CHIANG

**Company:** NUTEK CORPORATION  
**EUT Description:** APS2K4MS (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% = **27.97 %**

Av Reading = Pk Reading + 20\*log(M%)  
20\*log(M%) = **-11.066**

	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	68.26	57.19	17.50	3.19	27.03	50.85	80.82	-29.97	3mV	180	1.10
	867.77	39.37	28.30	23.37	4.26	26.70	29.23	60.82	-31.59	3mV	180	1.20
Y	433.89	83.73	72.66	17.50	3.19	27.03	66.32	80.82	-14.50	3mV	90	1.00
	867.77	50.94	39.87	23.37	4.26	26.70	40.80	60.82	-20.02	3mV	90	1.30
Z	433.88	82.13	71.06	17.50	3.19	27.03	64.72	80.82	-16.10	3mV	0	1.25
	867.78	43.96	32.89	23.37	4.26	26.70	33.82	60.82	-27.00	3mV	270	1.30
	Button #4:											
X	433.88	78.70	67.63	17.50	3.19	27.03	61.29	80.82	-19.53	3mH	180	1.10
	867.78	41.50	30.43	23.37	4.26	26.70	31.36	60.82	-29.46	3mH	180	1.50
Y	433.89	81.32	70.25	17.50	3.19	27.03	63.91	80.82	-16.91	3mH	90	1.20
	867.71	40.89	29.82	23.37	4.26	26.70	30.75	60.82	-30.07	3mH	180	1.70
Z	433.89	71.56	60.49	17.50	3.19	27.03	54.15	80.82	-26.67	3mH	0	1.20
	867.72	38.63	27.56	23.37	4.26	26.70	28.49	60.82	-32.33	3mH	0	1.60
X	433.88	72.99	61.92	17.50	3.19	27.03	55.58	80.82	-25.24	3mV	180	1.10
	867.77	38.37	27.30	23.37	4.26	26.70	28.23	60.82	-32.59	3mV	180	1.30
Y	433.88	83.93	72.86	17.50	3.19	27.03	66.52	80.82	-14.30	3mV	0	1.20
	867.77	46.98	35.91	23.37	4.26	26.70	36.84	60.82	-23.98	3mV	0	1.30
Z	433.89	81.34	70.27	17.50	3.19	27.03	63.93	80.82	-16.89	3mV	90	1.10
	867.77	46.98	35.91	23.37	4.26	26.70	36.84	60.82	-23.98	3mV	90	1.40
X	433.89	80.78	69.71	17.50	3.19	27.03	63.37	80.82	-17.45	3mH	90	1.20
	867.73	43.30	32.23	23.37	4.26	26.70	33.16	60.82	-27.66	3mH	90	1.40
Y	433.85	78.29	67.22	17.50	3.19	27.03	60.88	80.82	-19.94	3mH	180	1.20
	867.77	42.97	31.90	23.37	4.26	26.70	32.83	60.82	-27.99	3mH	180	1.00
Z	433.88	75.88	64.81	17.50	3.19	27.03	58.47	80.82	-22.35	3mH	0	1.30
	867.77	41.50	30.43	23.37	4.26	26.70	31.36	60.82	-29.46	3mH	0	2.00
	Total data #: 24											





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

1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089  
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**Project #:** 01E9458  
**Report #:** 9458D3  
**Date & Time:** 5/08/2001  
**Test Engr:** Vince Chiang

**Company:** NUTEK CORPORATION  
**EUT Description:** APS2K4MS (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	54.58	43.514	25.1	2.8	38.00	-9.5	23.95	54.0	-30.05	1mV	0	1.1	A
1735	51.13	40.064	26.7	3.3	37.95	-9.5	22.57	60.8	-38.25	1mV	0	1.1	A
1302	56.13	45.064	25.1	2.8	38.00	-9.5	25.50	54.0	-28.50	1mH	0	1.1	A
1736	47.61	36.544	26.7	3.3	37.95	-9.5	19.05	60.8	-41.77	1mH	0	1.1	A

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

Total data #:4  
V.2d

P(Peak): RBW=VBW=1MHz  
A(Average): Pk Reading - 11.066dB

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