

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

for

**INTENTIONAL RADIATOR**

of

**CAR ALARM TRANSCEIVER**

**FCC ID Number** : ELVATRBA

**Trade Name** : NUTEK CORPORATION

**Model Number** : ATRBA

**Agency Series** : N/A

**Report Number** : 02E0428-D

**Date** : October 14, 2002

Prepared for :

**NUTEK CORPORATION**

**5F, NO. 3, ALLEY 6, LANE 45, PAO-HSING RD.,  
HSING-TIEN CITY, TAIPEI, TAIWAN, R. O. C.**

Prepared by :

**C&C LABORATORY CO., LTD.**

**#B1, 1<sup>st</sup> Fl., Universal Center,  
No. 183, Sec. 1, Tatung Rd., Hsi Chih,  
Taipei Hsien, Taiwan, R.O.C.**

TEL: (02)8642-2071~3

FAX: (02)8642-2256



**This report shall not be reproduced, except in full, without the written approval of  
C&C Laboratory Co., Ltd.**

## TABLE OF CONTENTS

<b>1. VERIFICATION OF COMPLIANCE.....</b>	<b>3</b>
<b>2. PRODUCT DESCRIPTION .....</b>	<b>4</b>
<b>3. TEST FACILITY.....</b>	<b>4</b>
<b>4. MEASUREMENT STANDARDS.....</b>	<b>4</b>
<b>5. TEST METHODOLOGY .....</b>	<b>4</b>
<b>6. MEASUREMENT EQUIPMENT USED .....</b>	<b>5</b>
<b>7. POWERLINE RFI LIMIT .....</b>	<b>5</b>
<b>8. RADIATED EMISSION LIMITS.....</b>	<b>6</b>
<b>9. SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
<b>10. TEST PROCEDURE .....</b>	<b>8</b>
<b>11. EQUIPMENT MODIFICATIONS .....</b>	<b>9</b>
<b>12. TEST RESULT.....</b>	<b>10</b>
<b>12.1. MAXIMUM MODULATION PERCENTAGE (M%) .....</b>	<b>10</b>
<b>12.2. THE EMISSIONS BANDWIDTH.....</b>	<b>10</b>
<b>APPENDIX 1 TEST CONFIGURATION PHOTOS .....</b>	<b>11</b>
<b>APPENDIX 2 PHOTOGRAPHS OF EUT .....</b>	<b>16</b>

## 1. VERIFICATION OF COMPLIANCE

COMPANY NAME : NUTЕК CORPORATION  
5F, NO. 3, ALLEY 6, LANE 45, PAO-HSING RD.,  
HSING-TIEN CITY, TAIPEI, TAIWAN, R. O. C.

CONTACT PERSON : RUBY HSIEH / MARKETING DEPT.

TELEPHONE NO. : (886-2) 2918-9478

EUT DESCRIPTION : CAR ALARM TRANSCEIVER

MODEL NAME/NUMBER : ATRBA

FCC ID : ELVATRBA

DATE TESTED : August 22, 2002 ~ September 4, 2002

REPORT NUMBER : 02E0428

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	433.92 MHz CAR ALARM TRANSCEIVER
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992
LIMIT TYPE	CERTIFICATION
FCC RULE	CFR 47, PART 15

The above equipment was tested by C&C Laboratory Co., Ltd. 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 C&C Laboratory Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by C&C Laboratory Co., Ltd. will constitute fraud and shall nullify the document.

*Vince Chiang For.*

James Chan / Manager  
C&C Laboratory Co., Ltd.

## 2. PRODUCT DESCRIPTION

Fundamental Frequency	<b>433.92 MHz</b>
Power Source	<b>DC 12V</b>
Transmitting Time	<b>Periodic <math>\leq</math> 5 seconds</b>
Associated Receiver	<b>Model: ELVATRBB</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
ROHDE & SCHWARZ	DSAI- D 804.8932.52	EMI Test Display	10/2002
ROHDE & SCHWARZ	ESBI-RF/1005.43 00.52	EMI Test RF Unit	10/2002
H.P.	8595EM	Spectrum Analyzer (9KHz – 6.5GHz)	02/2003
EMCO	3115	Antenna (1-18GHz)	02/2003
SCHWARZBECK	VULB 9160	Antenna (30-2000 MHz)	05/2003
H.P.	8447D	Amplifier	05/2003
H.P.	8449B	Amplifier (1-26.5GHz)	10/2002

**7. POWERLINE RFI LIMIT**

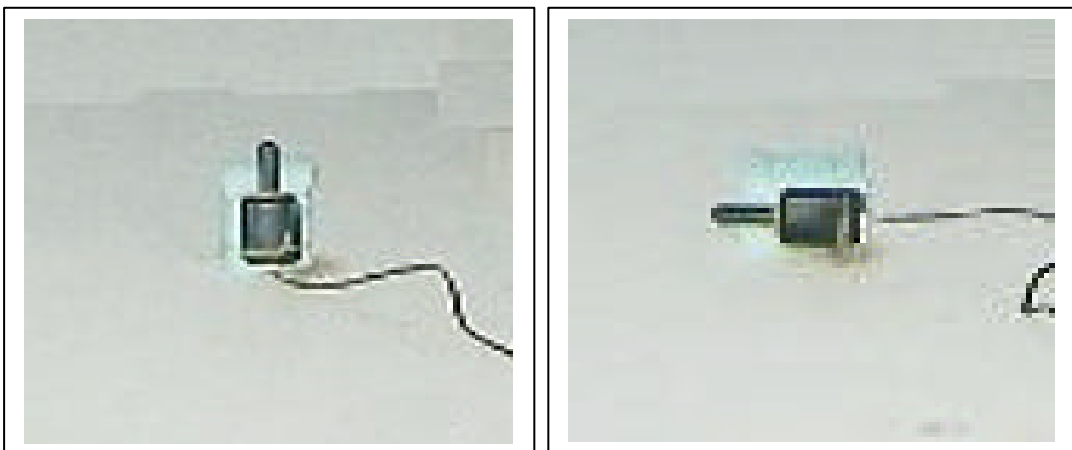
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHZ TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NO REQUIRED.

## 8. RADIATED EMISSION LIMITS

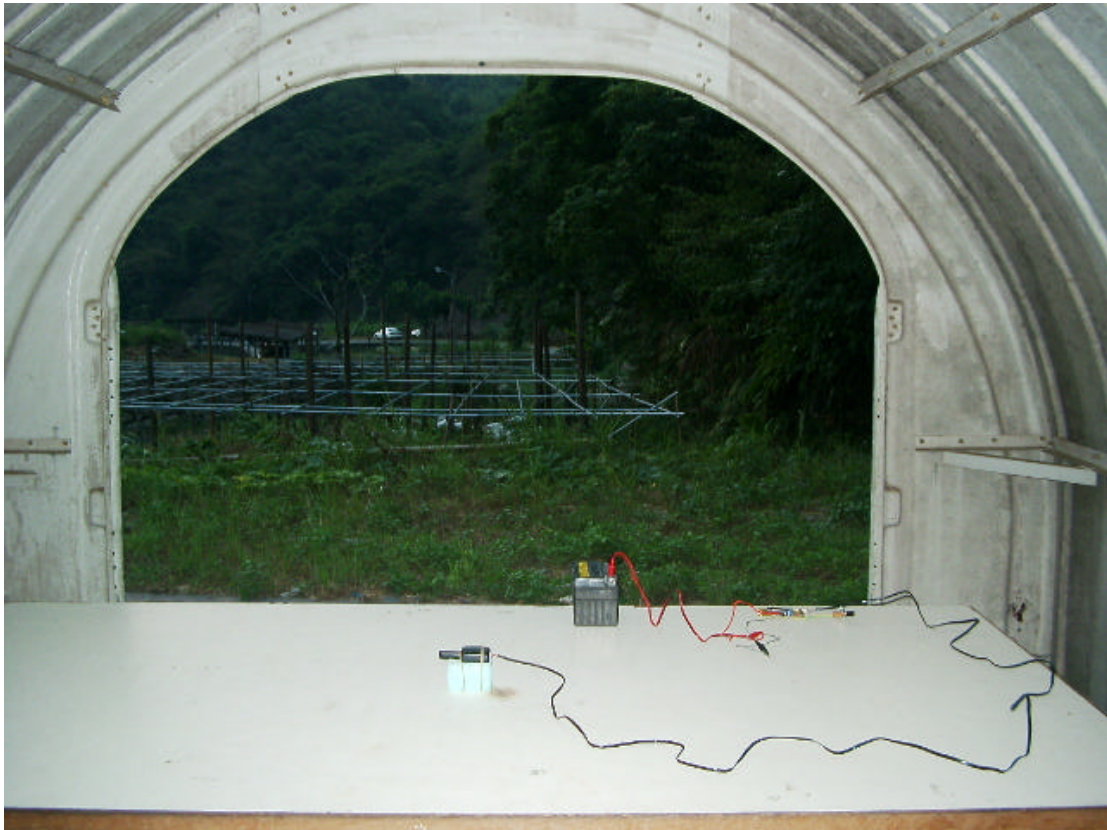
GENERAL REQUIREMENTS	SECTION 15.209
RESTRICTED BANDS OF OPERATION	SECTION 15.205
PERIODIC OPERATION IN THE BAND 40.66 -40.70 MHz AND ABOVE 70 MHz.	SECTION 15.231

## 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.



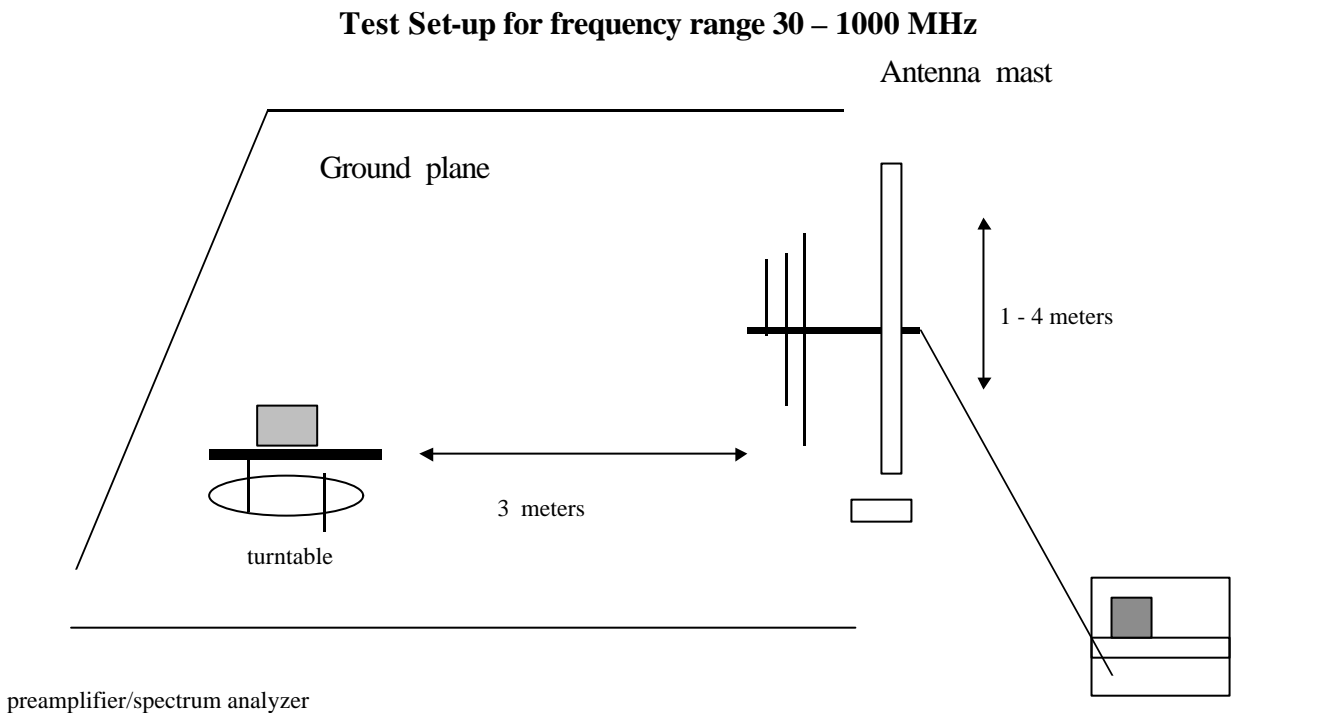
**Radiated Open Site Test Set-up (Transmitter Mode)**



**Radiated Open Site Test Set Up (Receiver Mode)**

## 10. TEST PROCEDURE

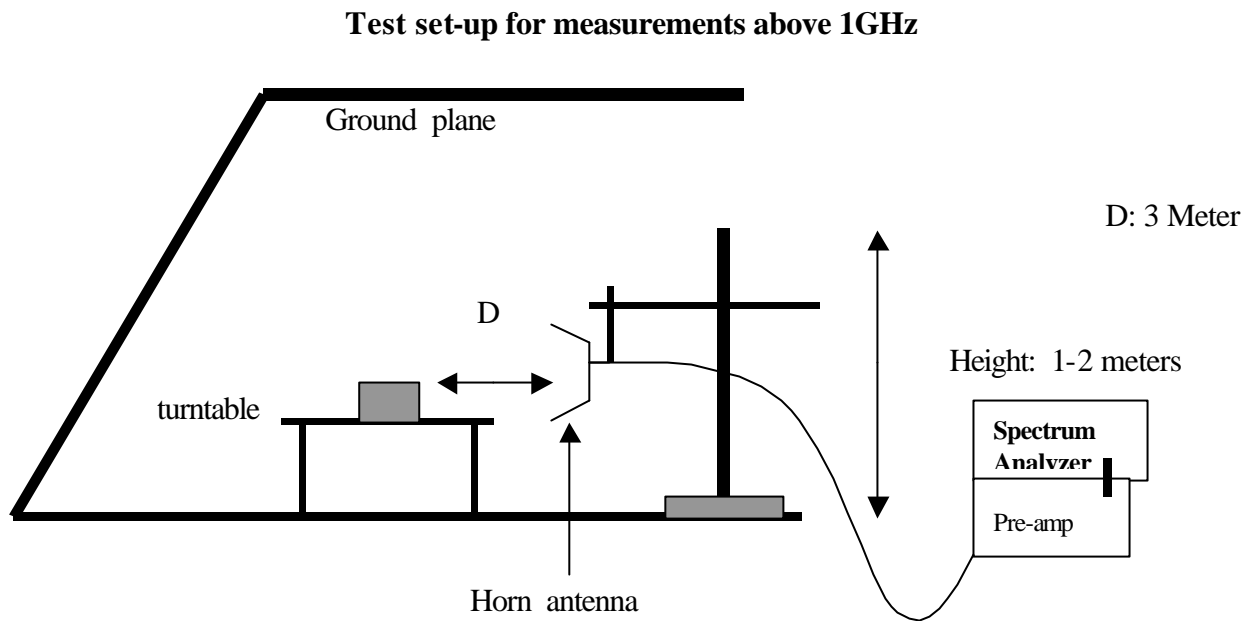
### Radiated Emissions, 15.231(4)(b)



**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)	
		SECTION 15.109	X

**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 = 96.333 mS
- Long pulse = 1 mS
- Middle pulse = 0.5778 mS
- Short pulse = 0.2778 mS
- No of Long pulse = 5
- No of Middle pulse = 5
- No of Short pulse = 47

Duty Cycle = ( N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T  
 Duty Cycle = ((5x1)+(50x0.5778)+(47x0.2778))/96.33=0.2174=21.74 % or- 13.3dB

**12.2 The Emissions Bandwidth**

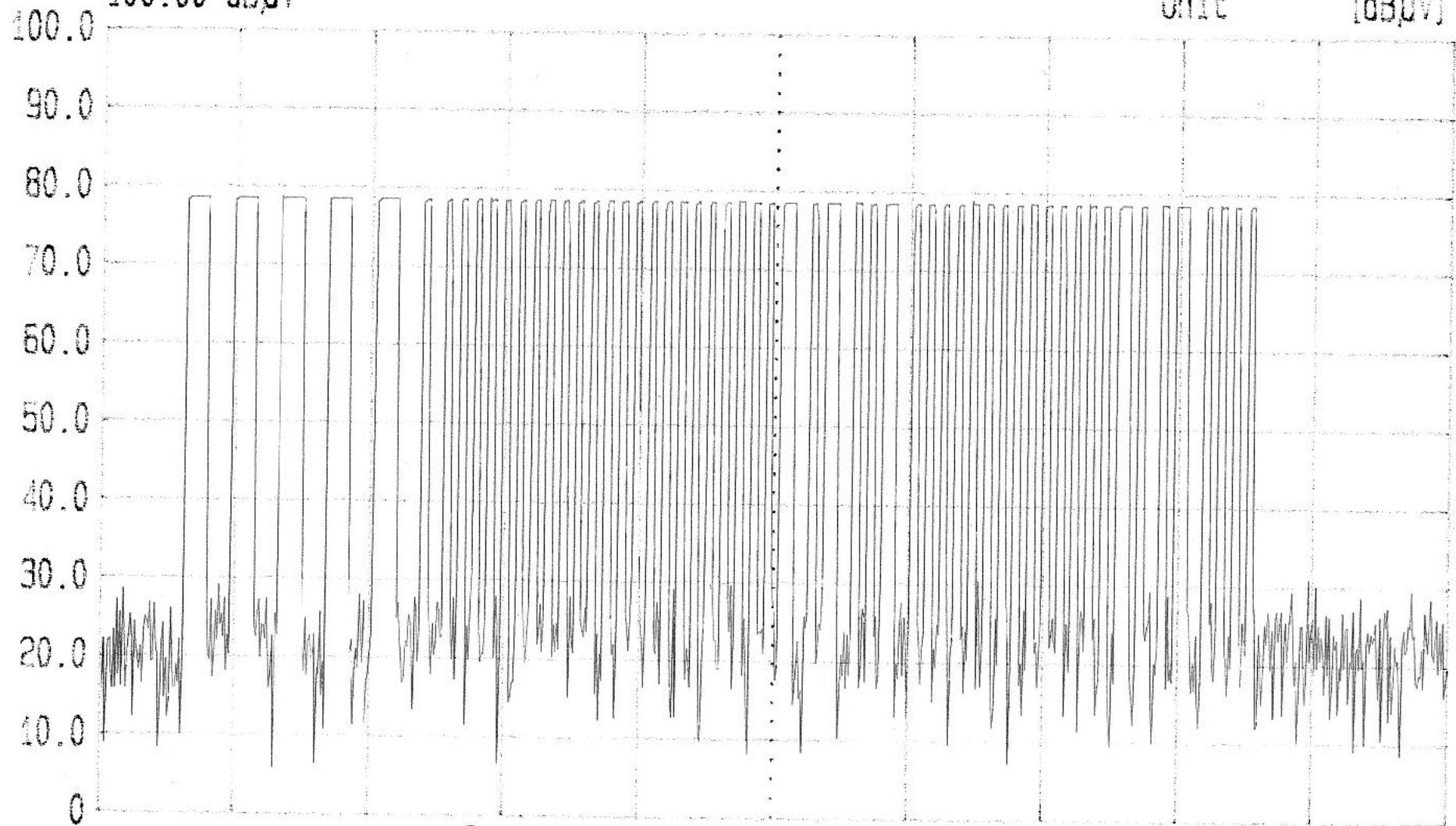
The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
<b>433.92 MHz</b>	<b>455.5 kHz &lt; (refer to plot)</b>	<b>433.92MHzX0.25%=1084.8 kHz</b>



Date 22.Aug.'02 TRG  
Time 21:20:38  
Ref.Lvl  
100.00 dB $\mu$ V

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]

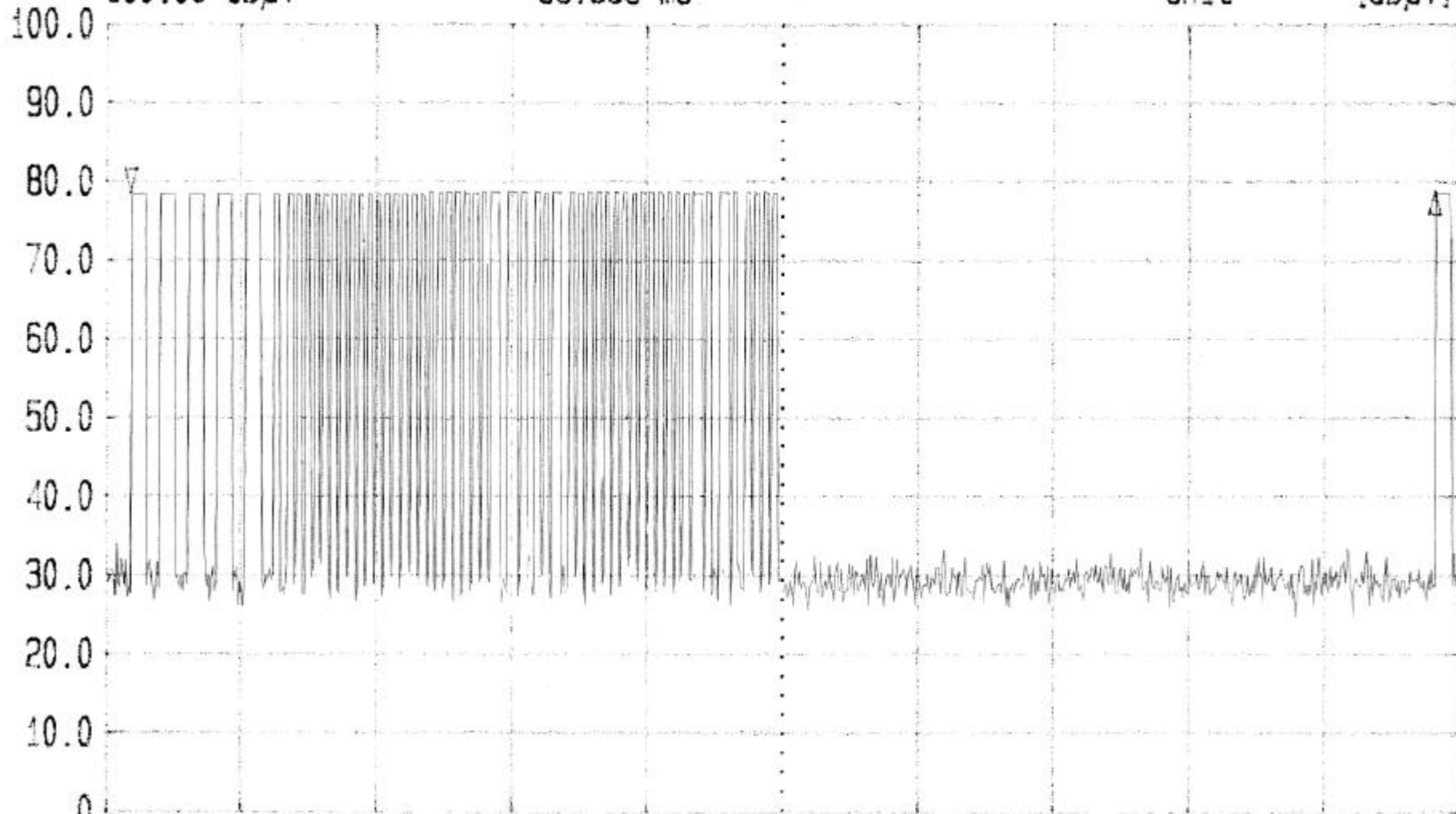


Span 0 Hz  
Center 434 MHz  
Sweep 60 ms



Date 22.Aug.'02 Time 20:53:37 TRG  
Ref.Lvl 100.00 dB $\mu$ V Delta 0.25 dB  
96.333 ms

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



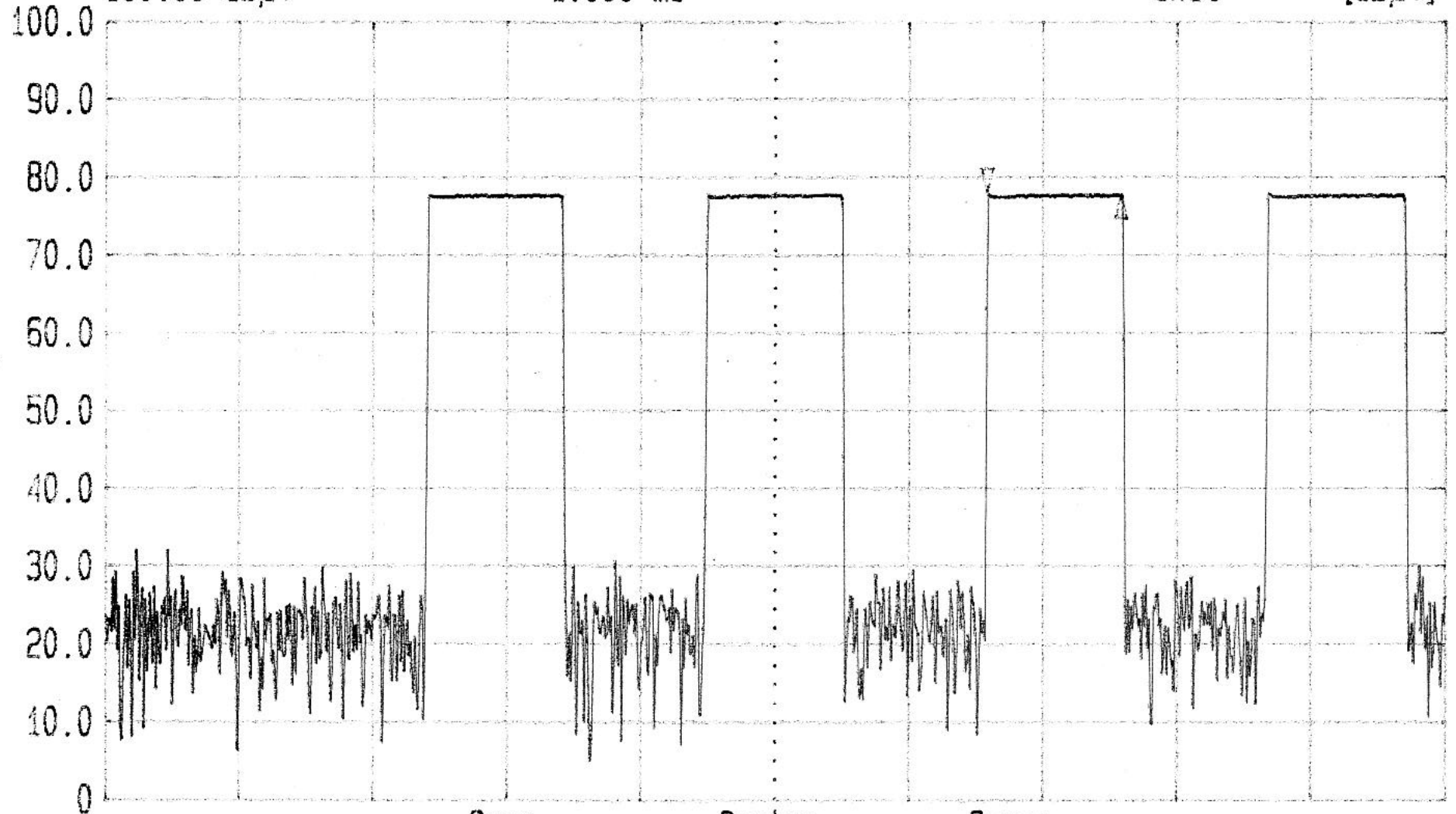
Span 0 Hz Center 434 MHz Sweep 100 ms



Date 22.Aug.'02 Time 20:59:22  
Ref.Lvl 100.00 dB $\mu$ V  
Delta -0.38 dB  
1.000 ms

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

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

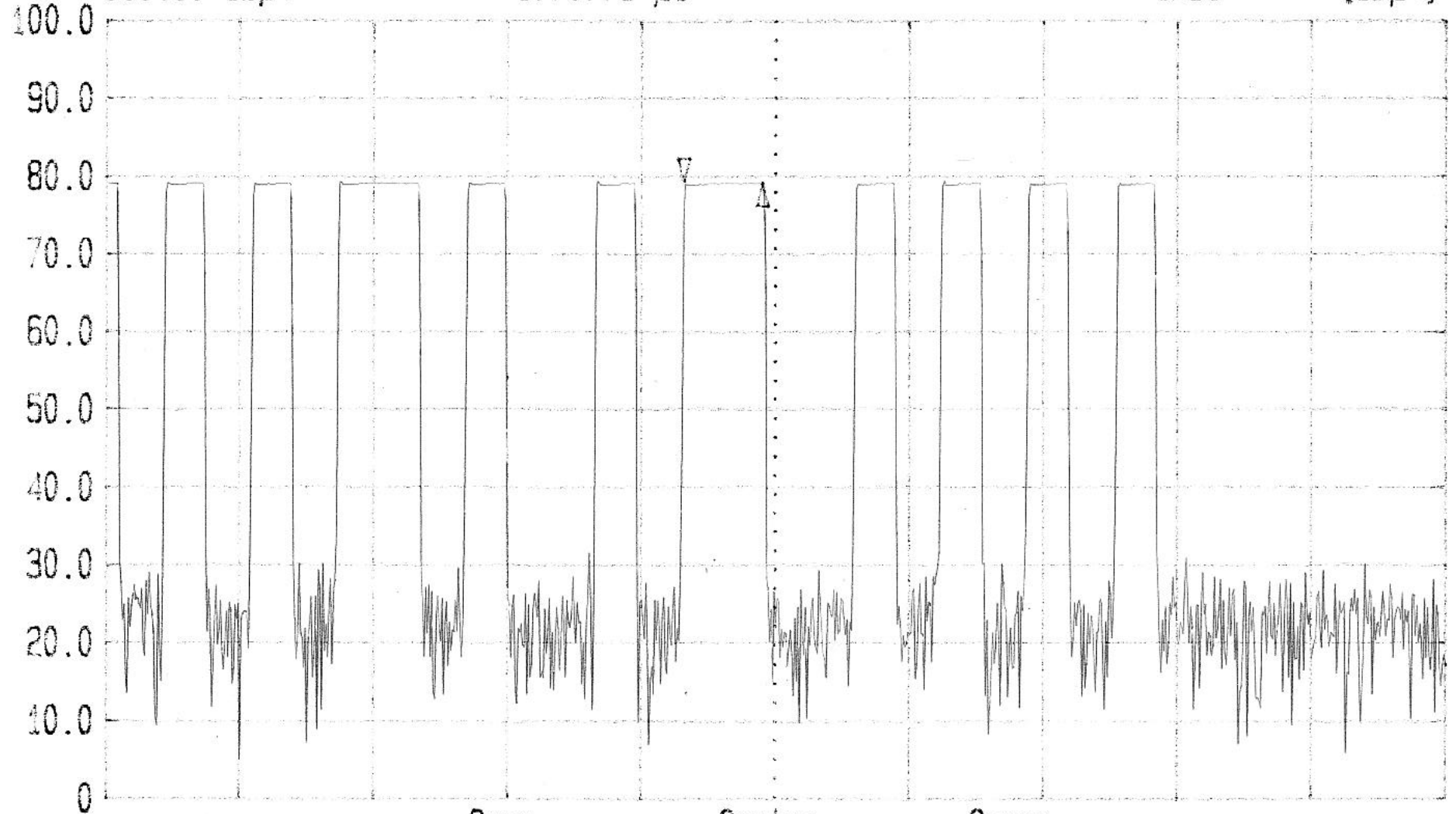


Span 0 Hz  
Center 434 MHz  
Sweep 10 ms



Date 22.Aug.'02 Time 21:15:54  
Ref.Lvl 100.00 dB $\mu$ V  
Delta -0.08 dB  
577.778  $\mu$ s

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]

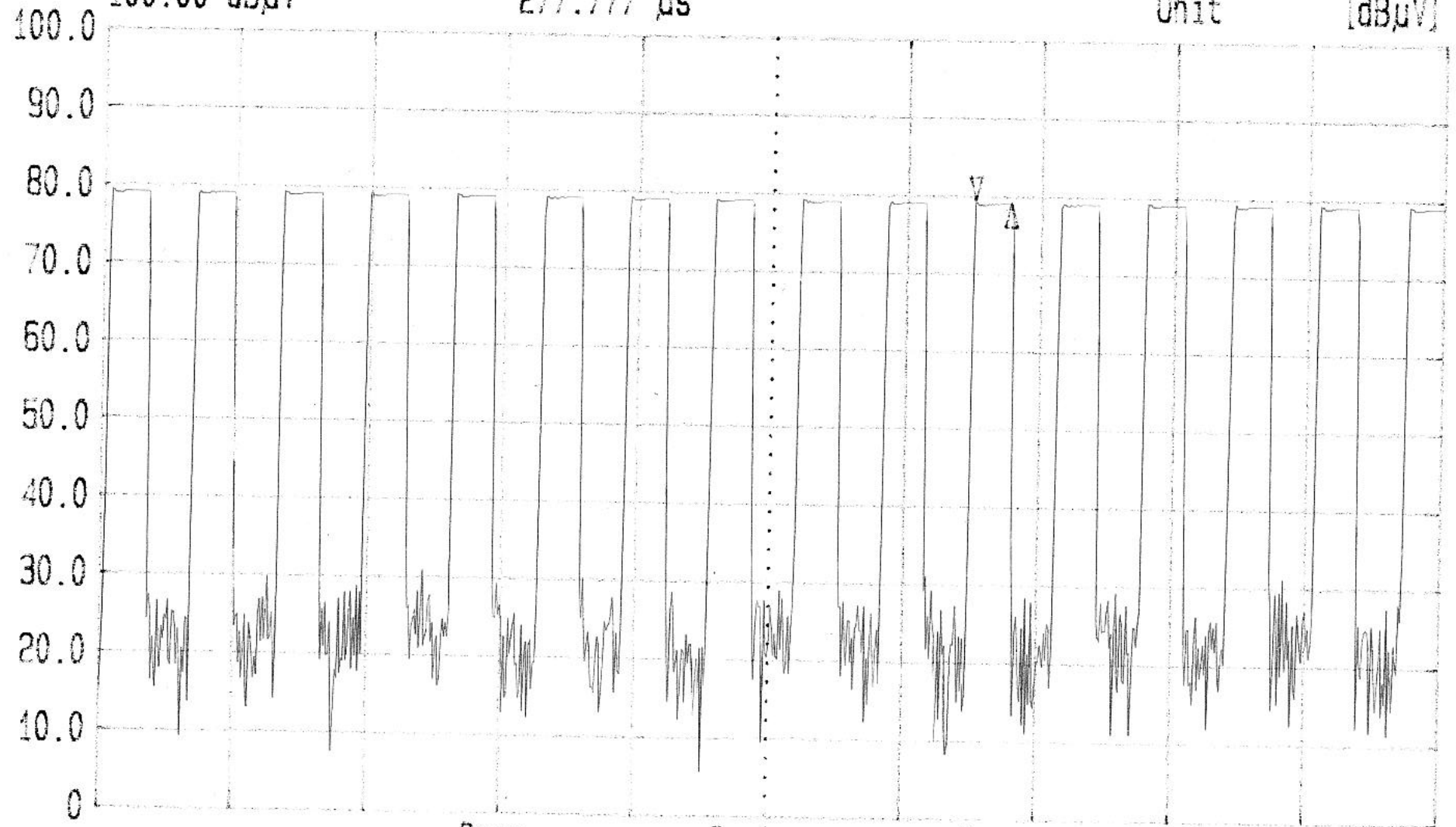


Span 0 Hz  
Center 434 MHz  
Sweep 10 ms



Date 22.Aug.'02 Time 21:05:11  
Ref.Lvl 100.00 dB $\mu$ V  
Delta -0.43 dB  
277.777  $\mu$ 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]

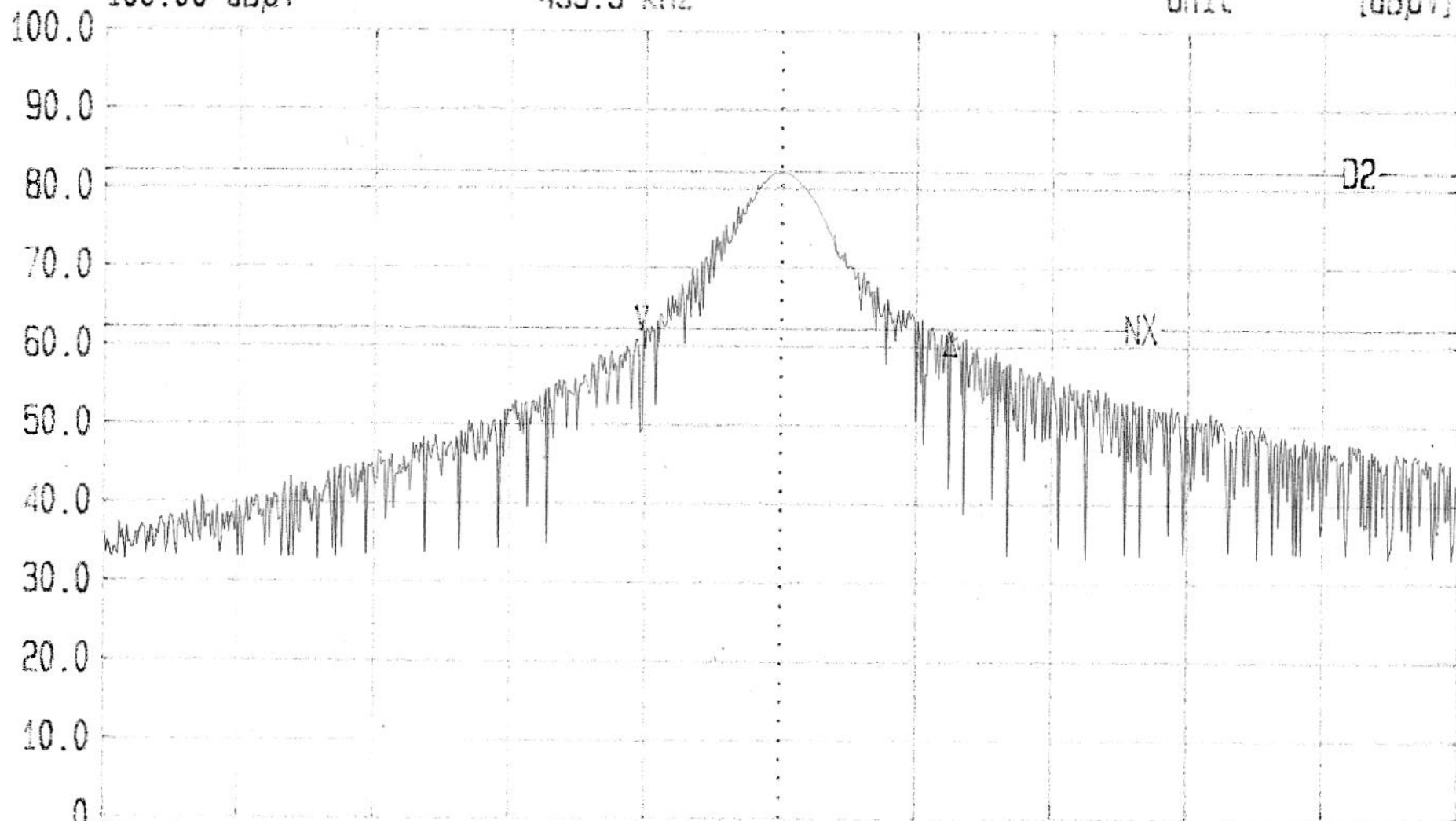


Span 0 Hz  
Center 434 MHz  
Sweep 10 ms



Date 22.Aug.'02 Time 21:33:07  
Ref.Lvl 100.00 dB $\mu$ V  
Delta -0.18 dB  
455.5 kHz

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



N dB down Level 20.0 dB  
DELTA MARK 455.5 kHz



# C&C Laboratory CO., LTD.

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 #:** 02E0428  
**Report #:** 0248D1  
**Date & Time:** 2002/08/23  
**Test Engr:** MICHAEL HUNG

**Company:** NUTEK CORPORATION  
**EUT Description:** ATRBA (433.92 MHz / TRANSCEIVER )  
**Test Configuration :** EUT / DC POWER  
**Type of Test:** FCC 15.231(b)  
**Mode of Operation:** TRANSMITTER MODE

D-Site

$$M\% = ((t1+t2+t3+...) / T) * 100\% = 21.74 \%$$

$$\begin{aligned} \text{Av Reading} &= \text{Pk Reading} + 20 * \log(M\%) \\ 20 * \log(M\%) &= -13.3 \end{aligned}$$

	Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height
	(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)
	Button #1:											
X	433.91	84.59	71.34	18.14	3.19	26.83	65.84	80.82	-14.99	3mV	270	1.00
	867.82	43.73	30.48	24.10	5.05	26.26	33.37	60.82	-27.45	3mV	270	1.20
Y	433.91	82.13	68.88	18.14	3.19	26.83	63.38	80.82	-17.45	3mV	0	1.00
	867.82	45.10	31.85	24.10	5.05	26.26	34.74	60.82	-26.08	3mV	0	1.30
Z	433.91	92.67	79.42	18.14	3.19	26.83	73.92	80.82	-6.91	3mV	90	1.00
	867.84	46.35	33.10	24.10	5.05	26.26	35.99	60.82	-24.83	3mV	90	1.40
X	433.90	95.43	82.18	18.14	3.19	26.83	76.68	80.82	-4.15	3mH	90	1.00
	867.89	50.97	37.72	22.88	5.05	26.26	39.39	60.82	-21.43	3mH	90	1.50
Y	433.91	97.08	83.83	18.14	3.19	26.83	78.33	80.82	-2.50	3mH	180	1.00
	867.82	44.66	31.41	24.10	5.05	26.26	34.30	60.82	-26.52	3mH	180	1.40
Z	433.91	94.00	80.75	18.14	3.19	26.83	75.25	80.82	-5.58	3mH	270	1.10
	867.82	49.34	36.09	24.10	5.05	26.26	38.98	60.82	-21.84	3mH	270	1.30

Peak: RBW= 120KHz  
VBW= 300KHz  
A(Average): PkReading - 13.3dB

Total Data #12

# C&C Laboratory CO., LTD.

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 #:** 02E0428  
**Report #:** 0428D2  
**Date & Time:** 2002/08/29  
**Test Engr:** DAVID HUNG

**Company:** NUTEK CORPORATION  
**EUT Description:** ATRBA (433.92 MHz / TRANSCEIVER )  
**Test Configuration :** EUT / DC POWER  
**Type of Test:** FCC 15.231(b) / FCC 15.209  
**Mode of Operation:** TRANSMITTER MODE

D-Site

E-Site

6 Worst Data

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)	Mark (P/Q/A)
1302	64.57	51.32	24.9	3.6	37.07	42.71	54.0	-11.30	1mV	0	1.0	A
1736	70.99	57.74	26.4	4.4	36.47	52.07	60.8	-8.76	1mV	0	1.0	A
2170	71.80	58.55	27.7	4.5	36.07	54.72	60.8	-6.11	1mV	60	1.0	A
2603	63.52	50.27	28.8	5.7	36.02	48.71	60.8	-12.12	1mV	60	1.0	A
3037	64.20	50.95	30.4	5.8	36.06	51.08	60.8	-9.75	1mV	90	1.0	A
3471	54.00	40.75	31.3	6.1	35.64	42.49	60.8	-18.34	1mV	150	1.0	A
3905	52.45	39.20	32.3	6.7	35.21	42.97	54.0	-11.04	1mV	240	1.0	A
4339	57.62	44.37	32.4	7.1	35.17	48.70	54.0	-5.31	1mV	150	1.0	A
1302	65.56	52.31	24.9	3.6	37.07	43.74	54.0	-10.27	1mH	0	1.0	A
1736	68.19	54.94	26.4	4.4	36.47	49.27	60.8	-11.56	1mH	0	1.0	A
2170	69.39	56.14	27.7	4.5	36.07	52.31	60.8	-8.52	1mH	60	1.0	A
2603	58.63	45.38	28.8	5.7	36.02	43.82	60.8	-17.01	1mH	60	1.0	A
3037	61.52	48.27	30.4	5.8	36.06	48.40	60.8	-12.43	1mH	90	1.0	A
3471	53.47	40.22	31.3	6.1	35.64	41.96	60.8	-18.87	1mH	150	1.0	A
3905	51.49	38.24	32.3	6.7	35.21	42.01	54.0	-12.00	1mH	240	1.0	A
4339	54.21	40.96	32.4	7.1	35.17	45.29	54.0	-8.72	1mH	150	1.0	A

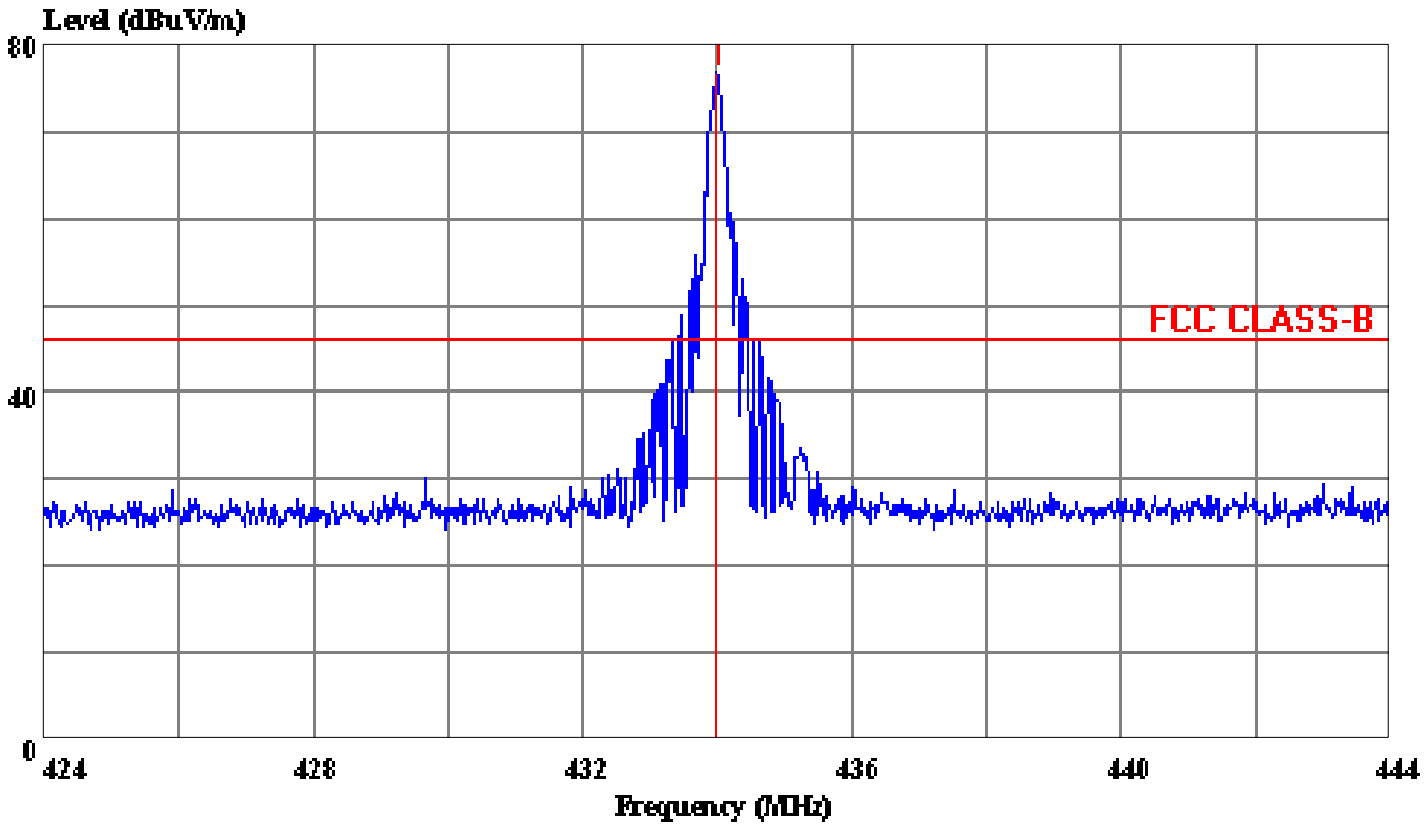
\* No other emission were found within 20dB under the limits upto 4.5 GHz.

Total data #16  
V.2d

P(Peak): RBW=VBW=1MHz  
A(Average): Pk Reading - 13.3dB (For FCC 15.231(b))

Data#: 210 File#: 0246d.EMI

Date: 2002-09-03 Time: 10:09:46



(D-Site)

Trace: 192

Ref Trace:

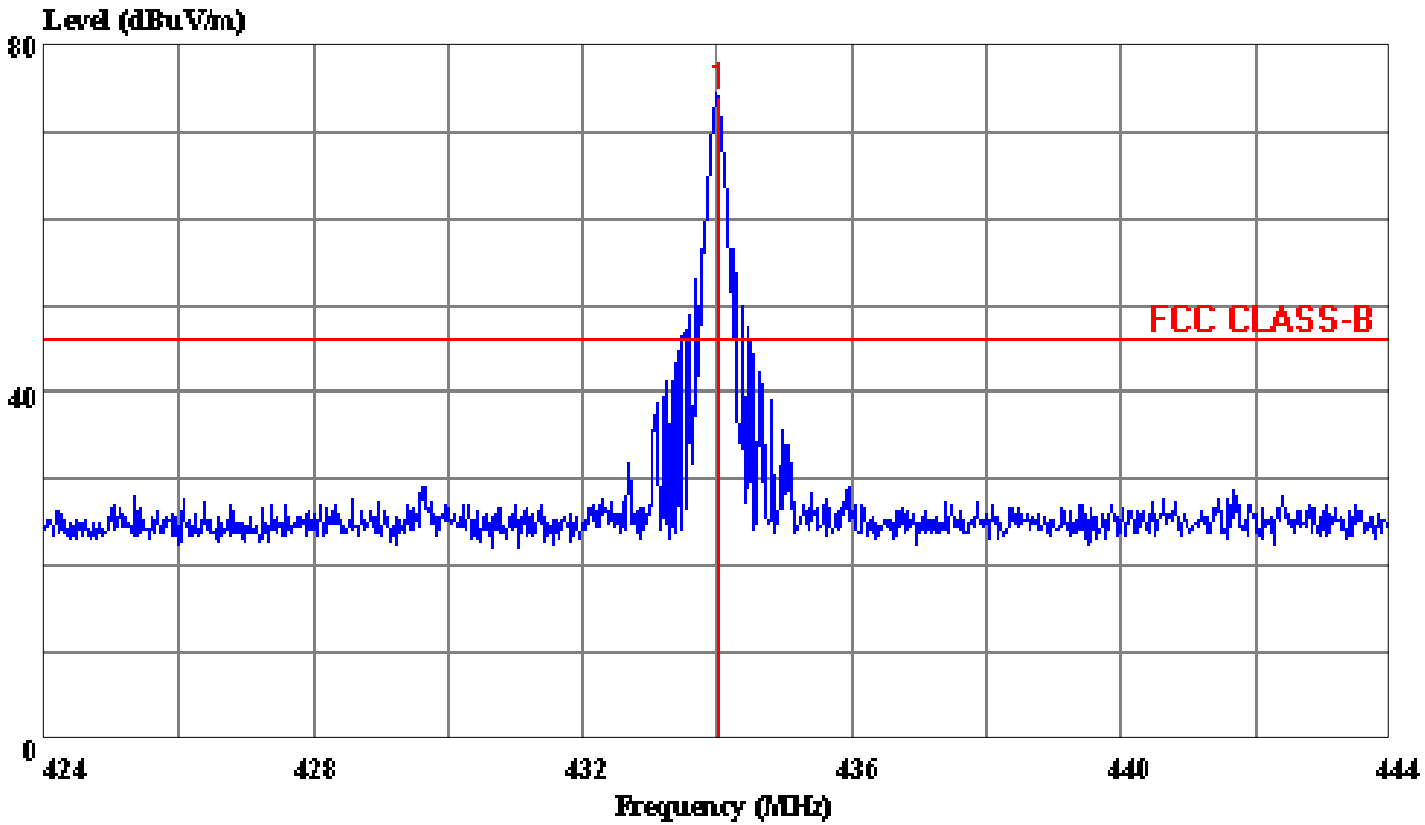
Condition: VERTICAL  
 Report No. : 02E0428  
 Test Engr. : DAVID HUNG  
 Company : NUTEK CORPORATION  
 EUT : ATRBA  
 Test Config : EUT / DC POWER / TX  
 Type of Test: FCC 15.109  
 Mode of Op. : RECEIVER MODE (Model No. ATRBB Transmit signal and trigger EUT to product signal)

Page: 1

	Read
Freq	Level
MHz	dBuV
1 * 434.000	82.35

Data#: 209 File#: 0246d.EMI

Date: 2002-09-03 Time: 10:13:34



(D-Site)

Trace: 193

Ref Trace:

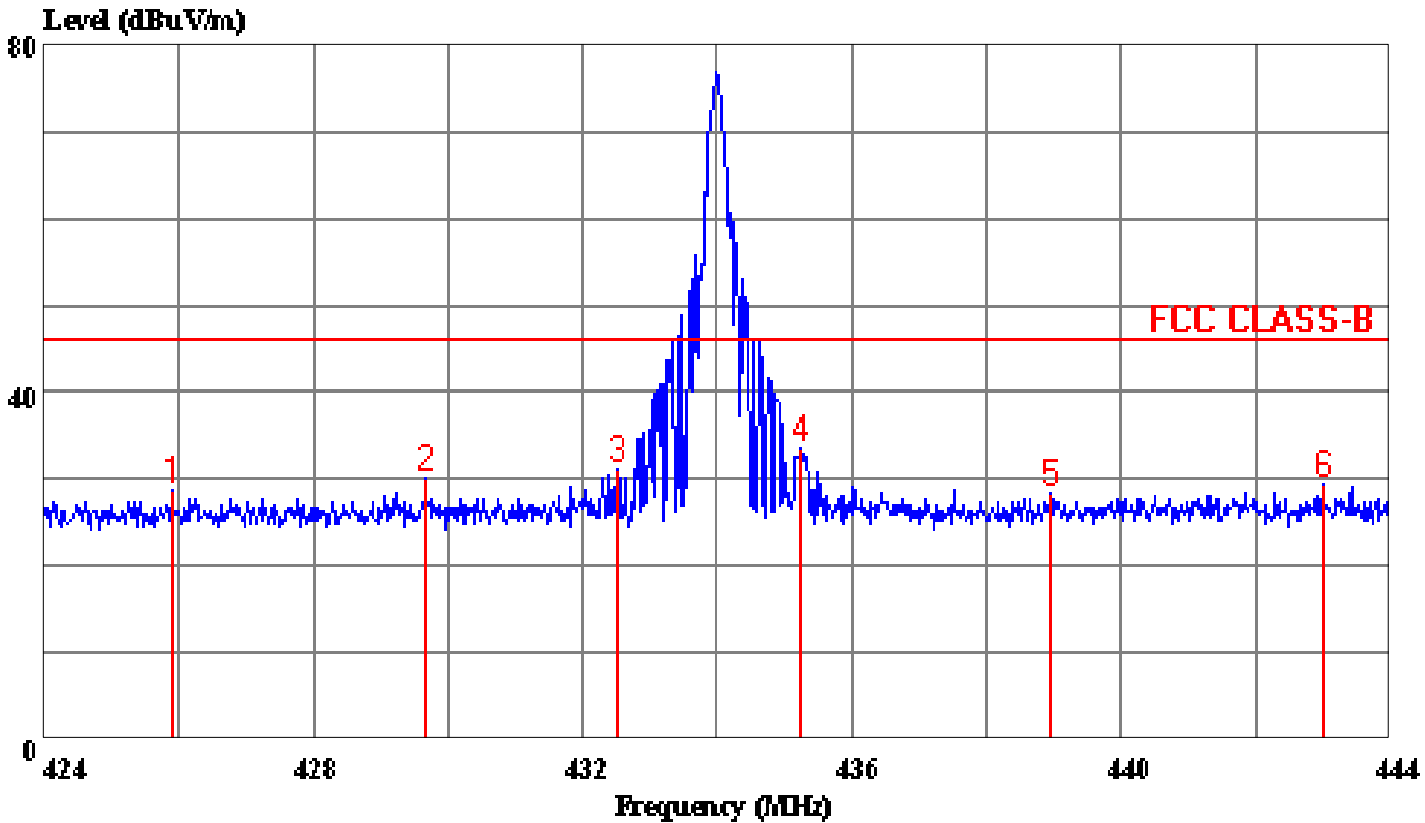
Condition: HORIZONTAL  
 Report No. : 02E0428  
 Test Engr. : DAVID HUNG  
 Company : NUTEK CORPORATION  
 EUT : ATRBA  
 Test Config : EUT / DC POWER / TX  
 Type of Test: FCC 15.109  
 Mode of Op. : RECEIVER MODE (Model No. ATRBB Transmit signal and trigger EUT to product signal)

Page: 1

	Read
Freq	Level
MHz	dBuV
1 * 434.020	79.58

Data#: 211 File#: 0246d.EMI

Date: 2002-09-04 Time: 18:29:06



(D-Site)

Trace: 192

Ref Trace:

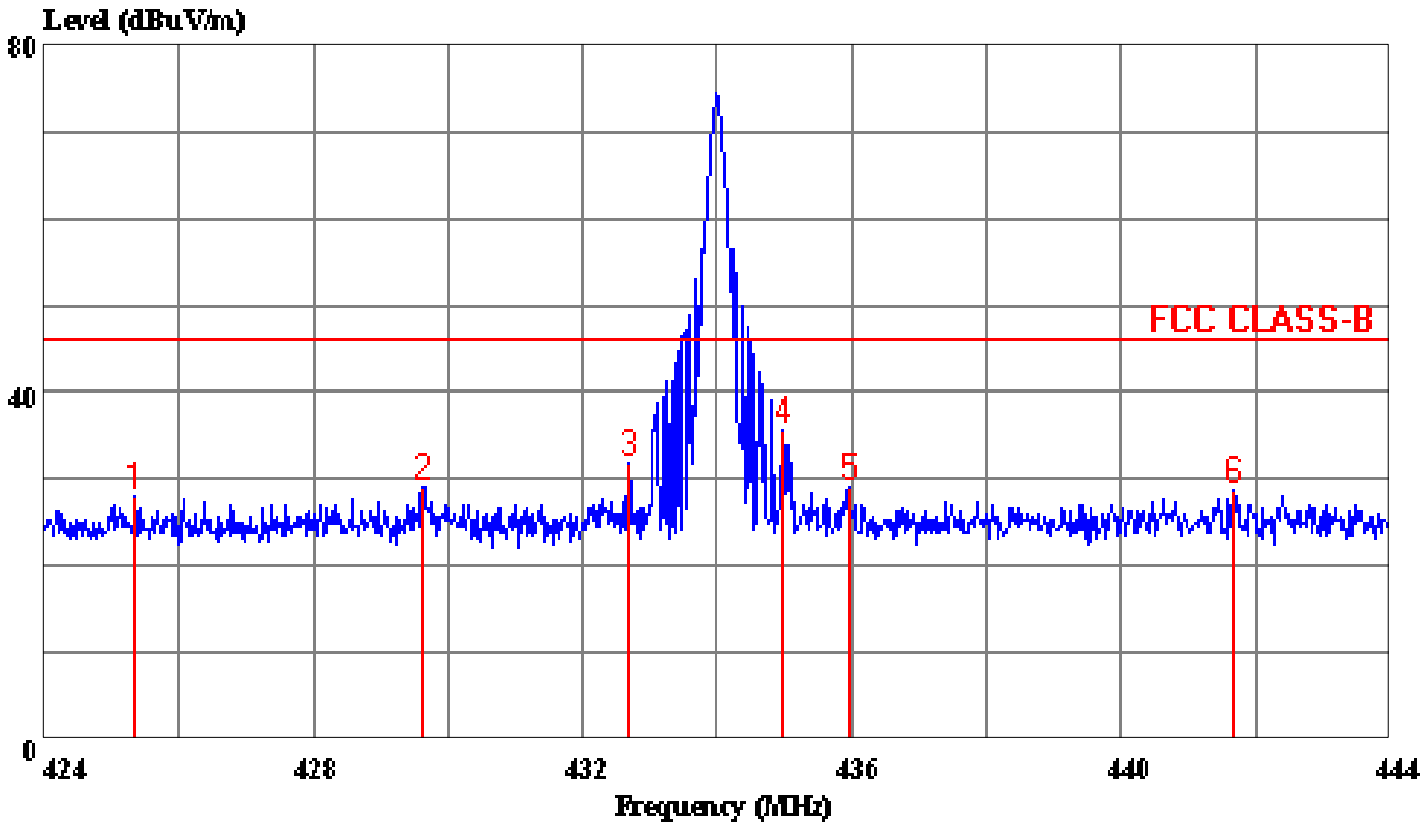
Condition: VERTICAL  
 Report No. : 02E0428  
 Test Engr. : DAVID HUNG  
 Company : NUTEK CORPORATION  
 EUT : ATRBA  
 Test Config : EUT / DC POWER / TX  
 Type of Test: FCC 15.109  
 Mode of Op. : RECEIVER MODE (Model No. ATRBB Transmit signal and trigger EUT to product signal)

Page: 1

	Read Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	425.880	34.38	-5.68	28.71	46.00	-17.29	Peak
2	429.660	35.55	-5.58	29.97	46.00	-16.03	Peak
3	432.520	36.82	-5.51	31.31	46.00	-14.69	Peak
4	435.240	39.16	-5.44	33.72	46.00	-12.28	Peak
5	438.960	33.65	-5.34	28.30	46.00	-17.70	Peak
6	443.000	34.69	-5.24	29.45	46.00	-16.55	Peak

Data#: 198 File#: 0246d.EMI

Date: 2002-09-04 Time: 18:30:58



(D-Site)

Trace: 193

Ref Trace:

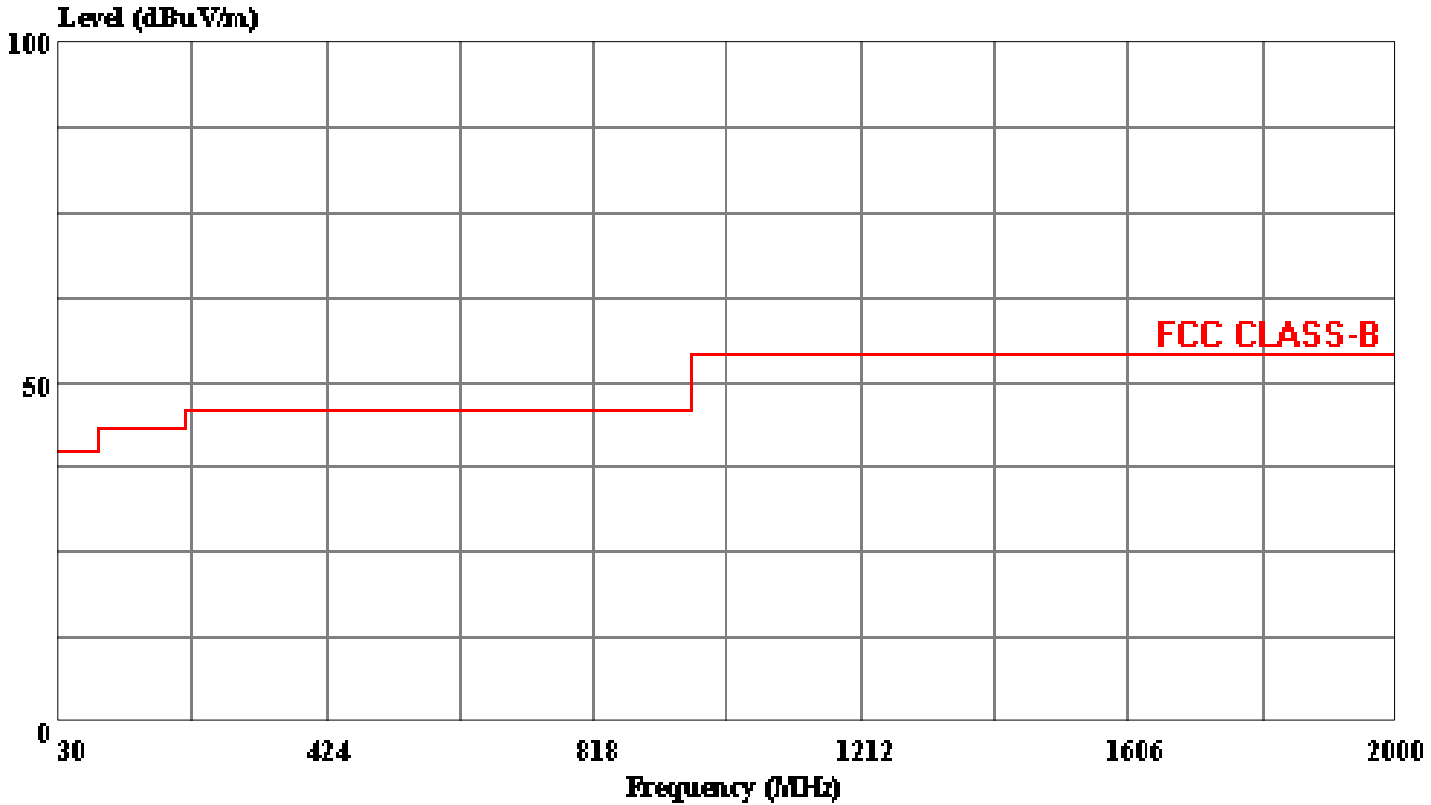
Condition: HORIZONTAL  
Report No. : 02E0428  
Test Engr. : DAVID HUNG  
Company : NUTEK CORPORATION  
EUT : ATRBA  
Test Config : EUT / DC POWER / TX  
Type of Test: FCC 15.109  
Mode of Op. : RECEIVER MODE (Model No. ATRBB Transmit signal and trigger EUT to product signal)

Page: 1

	Read Freq	Probe Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	425.360	33.82	17.95	3.16	26.80	28.13	46.00	-17.87	Peak
2	429.620	34.66	18.06	3.18	26.82	29.08	46.00	-16.92	Peak
3	432.700	37.23	18.13	3.19	26.83	31.72	46.00	-14.28	Peak
4	434.960	41.14	18.19	3.20	26.83	35.69	46.00	-10.31	Peak
5	435.960	34.38	18.21	3.20	26.84	28.96	46.00	-17.04	Peak
6	441.660	33.88	18.35	3.22	26.85	28.60	46.00	-17.40	Peak

Data#: 212 File#: 0246d.EMI

Date: 2002-09-04 Time: 18:54:15



(D-Site)

Trace:

Ref Trace:

Condition:

Report No. : 02E0428  
 Test Engr. : DAVID HUNG  
 Company : NUTEK CORPORATION  
 EUT : ATRBA  
 Test Config : EUT / DC POWER / TX  
 Type of Test: FCC 15.109  
 Mode of Op. : RECEIVER MODE  
 : NO OTHER EMISSION WERE FOUND WITHIN / 20 dB BELOW THE LIMITS FROM 30-2000MHZ