

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

for

INTENTIONAL RADIATOR

434 MHz CAR ALARM TRANSMITTER

MODEL NO: 136B1892

PRODUCT FAMILY: 136B1890; 136B1891; 136B2143

FCC ID NO: ELVAT1B

REPORT NO: 01E9870

ISSUE DATE: DECEMBER 7, 2001

Prepared for

**NUTEK CORPORATION
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HSING-TIEN CITY, 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 Average Measurement

1. VERIFICATION OF COMPLIANCE

COMPANY NAME: NUTEK 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.: (02) 2918-9478 # 120

EUT DESCRIPTION: 434 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: 136B1892

PRODUCT FAMILY: 136B1890; 136B1891; 136B2143

FCC ID: ELVAT1B

DATE TESTED: DECEMBER 4 & DECEMBER 5, 2001

REPORT NUMBER: 01E9870

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 / 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	434 MHz
Power Source	12V Battery
Transmitting Time	Periodic \leq 5 seconds
Associated Receiver	Model: 136D2107 (FCC-DoC)

Model Differences:

Difference	Model Number	Tested (Checked)
2BUTTONS IN FRONT 1BUTTON IN REAR	136B1890	<input type="checkbox"/>
3BUTTONS IN FRONT 1BUTTON IN REAR	136B1891	<input type="checkbox"/>
3BUTTONS IN FRONT 2BUTTONS IN REAR	136B1892	<input checked="" type="checkbox"/>
2BUTTONS IN FRONT 2BUTTONS IN REAR	136B2143	<input type="checkbox"/>

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/1005.4300.52	EMI Test RF Unit	10/2002
H.P.	8595EM	Spectrum Analyzer (9KHz – 6.5GHz)	01/2002
EMCO	3115	Antenna (1-18GHz)	02/2002
SCHWARZBECK	VULB 9160	Antenna (30-2000 MHz)	05/2002
H.P.	8447D	Amplifier	05/2002
MITEQ	NSP2600-44	Amplifier(1-26GHz)	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.



10. Test Procedure
Radiated Emissions, 15.231(4)(b)

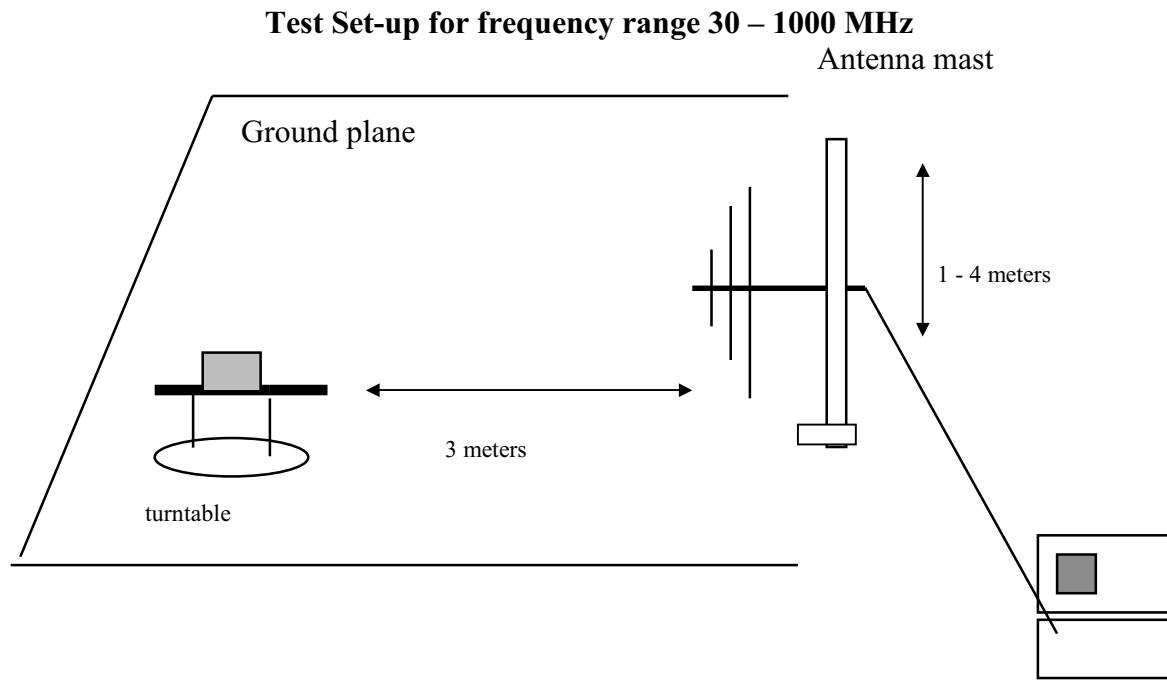


Fig. 1

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.

Test set-up for measurements above 1GHz

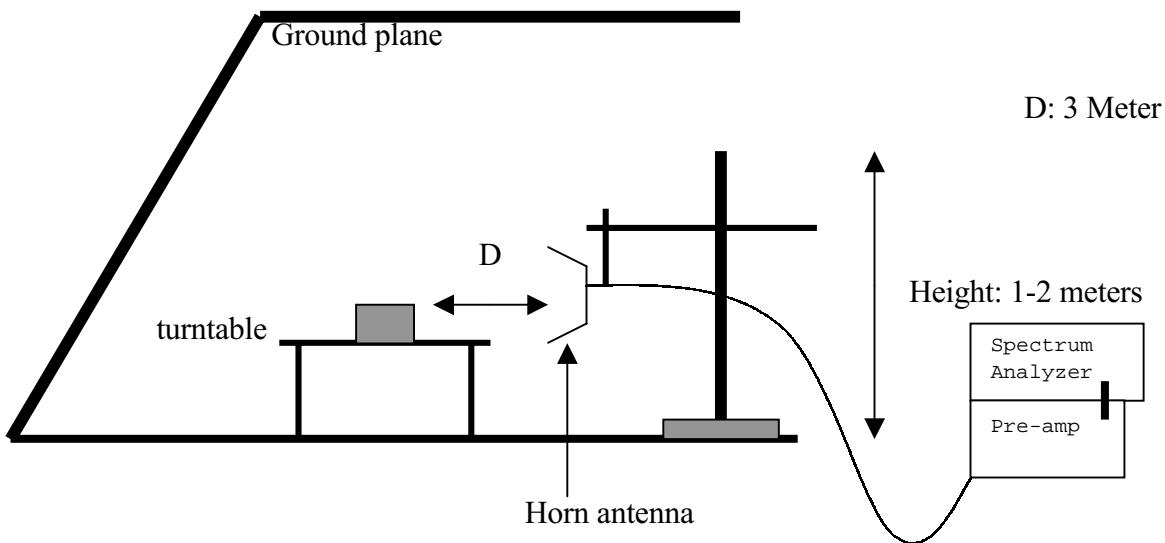


FIG. 2

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

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:

$$\text{Average Reading} = \text{Peak Reading (dBuV/m)} + 20\log(\text{Duty Cycle})$$

In order to determine possible Maximum Modulation percentage, alternations are made to the EUT. We measured:

WHERE	1 Period	= 106.50 mS >100 mS. use 100 mS for calculation
	Long pulse	= 0.600 mS
	Short pulse	= 0.263 mS
	No of Long pulse	= 35
	No of Short pulse	= 43

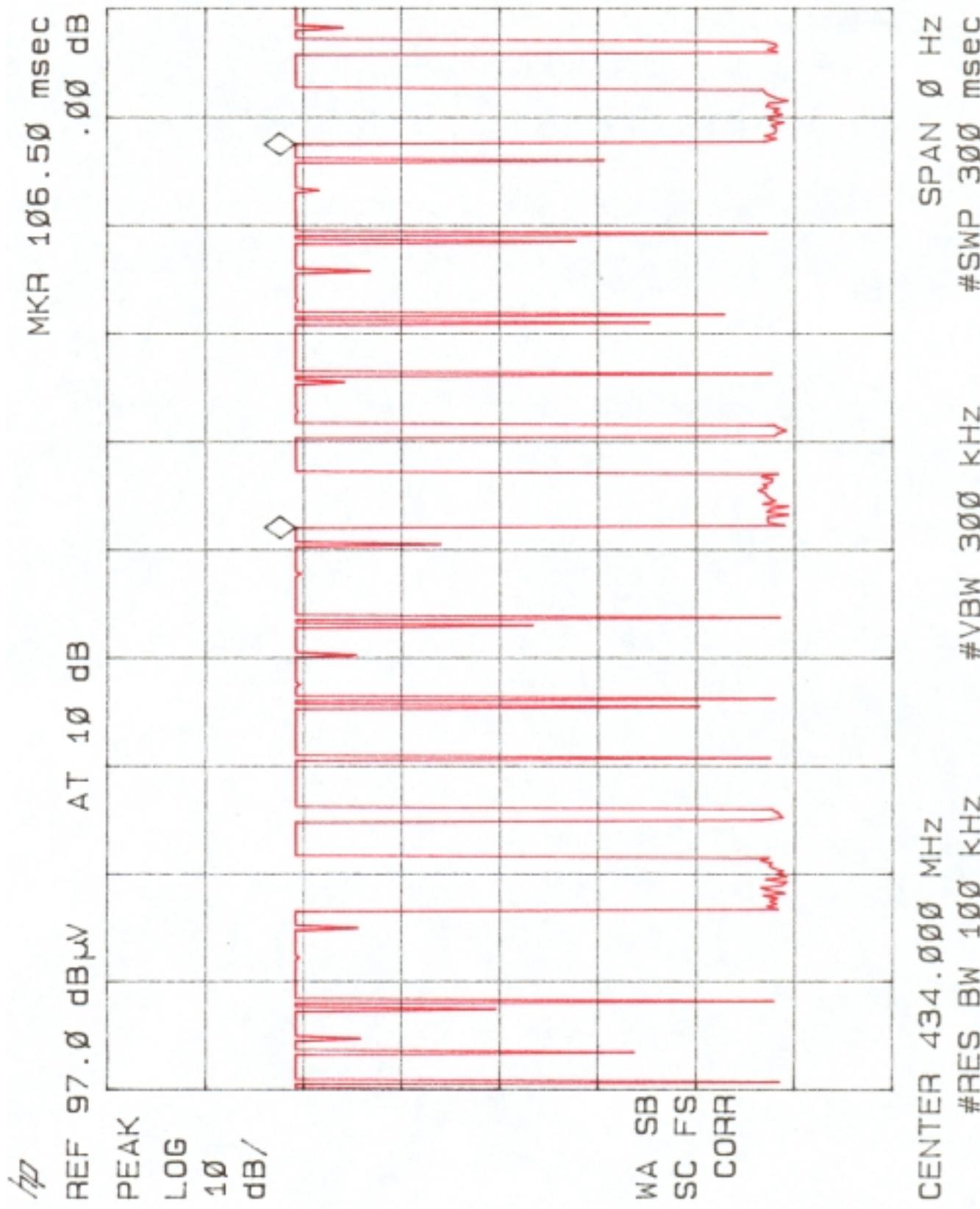
$$\text{Duty Cycle} = (N1L1+N2L2+\dots+Nn-1Ln-1+NnLn)/100 \text{ or } T$$

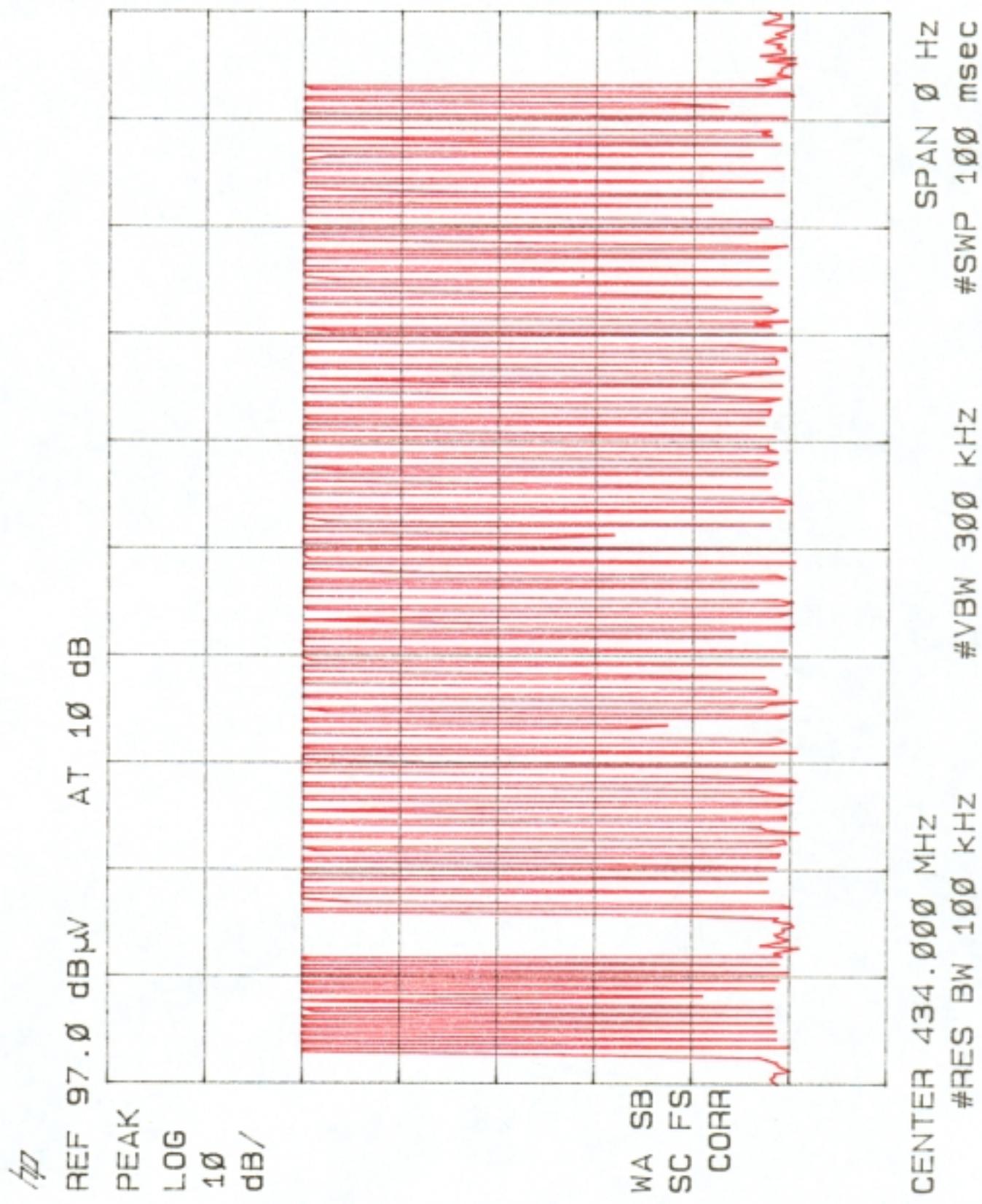
$$\text{Duty Cycle} = ((35 \times 0.600) + (43 \times 0.263))/100 = 0.3231 = 32.31\% \text{ or } -9.8133 \text{ dB}$$

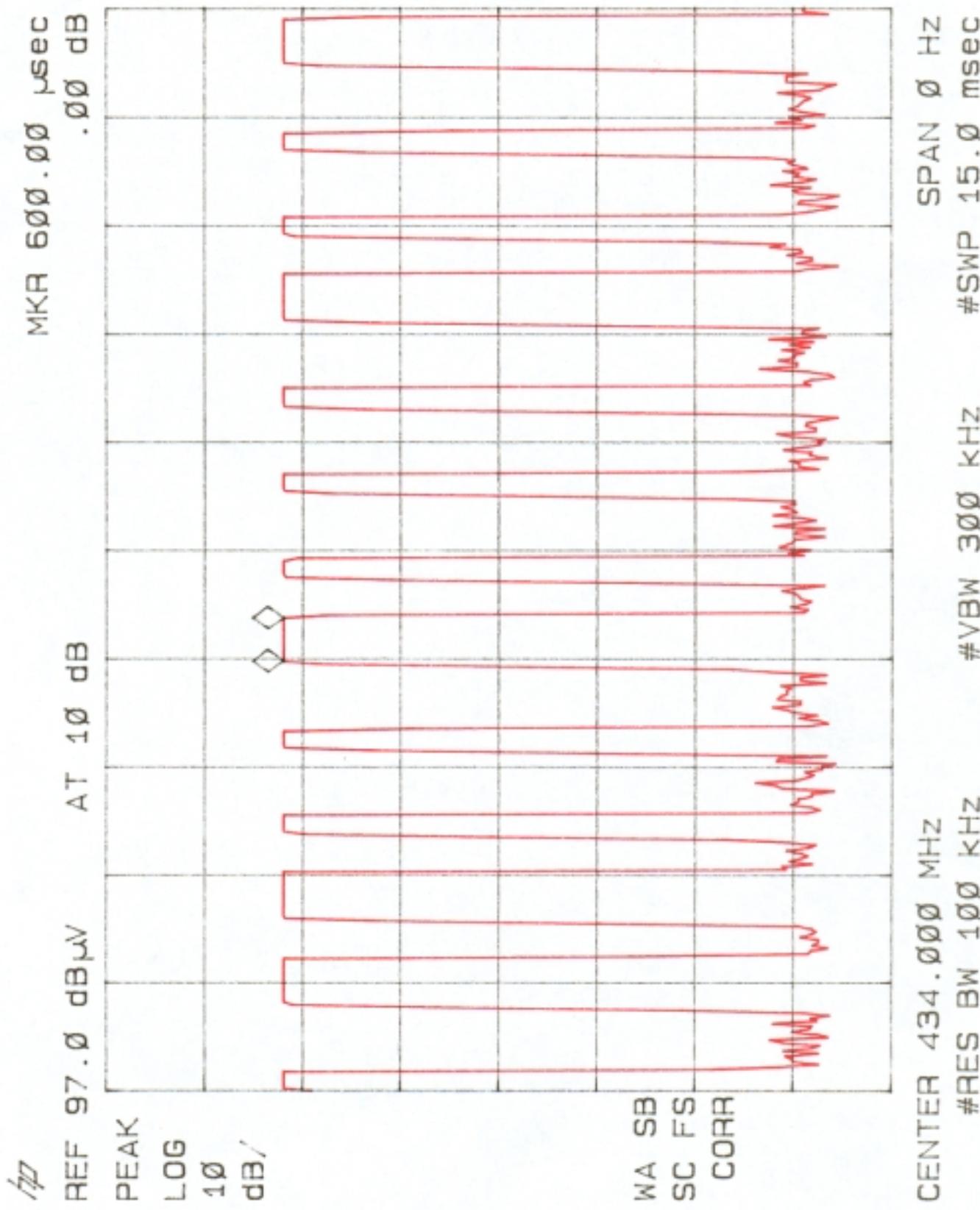
12.2 The Emissions Bandwidth

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

Center Frequency	Measured	Limits
434 MHz	409 kHz < (refer to plot)	434MHzX0.25% = 1085 kHz



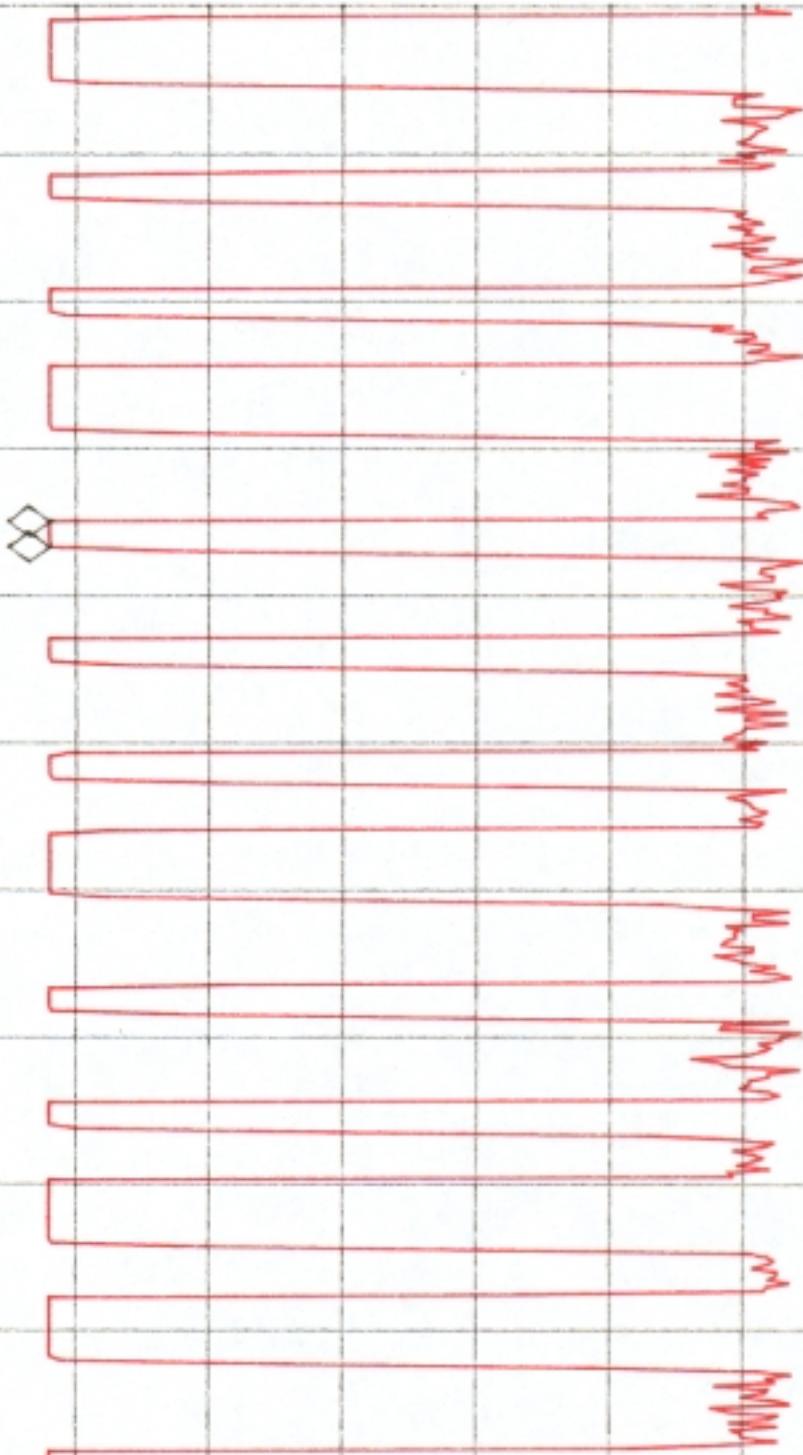




MKR 263.Ø Ø µsec
Ø 3 dB

REF 97.Ø dB µV AT 1Ø dB

PEAK LOG
1Ø dB/



WA SB
SC FS
CORR

CENTER 434.ØØØ MHz
#RES BW 1ØØ kHz
#VBW 3ØØ kHz
SPAN Ø Hz
#SWP 15.Ø msec

MAX. PEAK DOWN LEVEL 20dB, DELTA MKR 490 kHz
REF 97.0 dB μ V AT 10 dB

PEAK LOG
10 dB/

DL 61.1
dB μ V

MA SB
SC FC
CORR

SPAN 2.000 MHz
SWP 20.0 msec
CENTER 434.000 MHz
#RES BW 100 kHz
#VBW 300 kHz



FCC, VCCI, CISPR, CE, AUSTEL, NZUL, CSA, TUV, BSMI, DHHS, NVLAP

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PHONE: 02-2217-0894 FAX: 02-2217-1254

Project #: 01E9870
Report #: 9870D1
Date & Time: 2001/12/05
Test Engr.: VINCE CHIANG

<i>Company:</i>	NUTEK CORPORATION
<i>EUT Description:</i>	136B1892 (Alarm TX / 434 MHz)
<i>Test Configuration :</i>	EUT ONLY
<i>Type of Test:</i>	FCC 15.231(b)
<i>Mode of Operation:</i>	NORMAL MODE



$$M\% = ((t_1+t_2+t_3+\dots)/T) * 100\% = 32.31\%$$

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

$$20 * \log(M\%) = -9.8133$$



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PHONE: 02-2217-0894 FAX: 02-2217-1254

Project #: 01E9870
Report #: 9870D2
Date & Time: 2001/12/05
Test Engr.: VINCE CHIANG

<i>Company:</i>	NUTEK CORPORATION
<i>EUT Description:</i>	136B1892 (Alarm TX / 434 MHz)
<i>Test Configuration :</i>	EUT ONLY
<i>Type of Test:</i>	FCC 15.231(b)
<i>Mode of Operation:</i>	NORMAL MODE



$$M\% = ((t_1+t_2+t_3+\dots)/T) * 100\% = 32.31\%$$

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

$$20 * \log(M\%) = -9.8133$$



FCC, VCCI, CISPR, CE, AUSTEL, NCL, CSA, TUV, BSMI, DHHS, NVLAP

No. 199 Chung Sheng Road
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PHONE: 02-2217-0894 FAX: 02-2217-1254

Project #: 01E9870
Report #: 9870D3
Date & Time: 2001/12/05
Test Engr: VINCE CHIANG

<i>Company:</i>	NUTEK CORPORATION
<i>EUT Description:</i>	136B1892 (Alarm TX / 434 MHz)
<i>Test Configuration :</i>	EUT ONLY
<i>Type of Test:</i>	FCC 15.231(b)
<i>Mode of Operation:</i>	NORMAL MODE



$$M\% = ((t_1+t_2+t_3+\dots)/T) * 100\% = 32.31\%$$

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

$$20 \cdot \log(M\%) = -9.8133$$



COMPLIANCE

Certification Services

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 #:

01E9870

Report #:

9870D4

Date & Time:

2001/12/05

Test Engr:

Vince Chiang

Company:

NUTEK CORPORATION

EUT Description:

136B1892 (Alarm TX / 434 MHz)

Test Configuration :

EUT ONLY

Type of Test:

FCC 15.231(b)/FCC 15.209

Mode of Operation:

NORMAL MODE

D-Site

E-Site

6 Worst

Descending

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	40.29	30.48	24.9	3.5	39.82	19.08	54.0	-34.92	1mV	0	1.0	A
1302	37.16	27.35	24.9	3.5	39.82	15.97	54.0	-38.03	1mH	0	1.0	A

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

Total data #:2
V.2d

P(Peak): RBW=VBW=1MHz
A(Average): Pk Reading -9.8133dB