

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

for

INTENTIONAL RADIATOR

434 MHz CAR ALARM TRANSMITTER

MODEL NAME: PRO-OE3B4

TRADE NAME: NUTEK

FCC ID NO: ELVAT1F

REPORT NO: 01T0978-1

ISSUE DATE: SEPTEMBER 28, 2001

Prepared for
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5F, NO. 3, ALLEY 6, LANE 45
PAO-HSING ROAD, HSIN TIEN, TAIPEI
TAIWAN
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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

ATTACHMENT

- EUT Photographs
- Proposed FCC ID Label
- Schematics & Block Diagram
- User Manual

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
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EUT DESCRIPTION: 434 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: PRO-OE3B4

TRADE NAME: NUTEK

FCC ID: ELVAT1F

DATE TESTED: SEPTEMBER 21, 2001

REPORT NUMBER: 01U0978-1

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.

Tested By:

KERWIN CORPUZ
 ASSOCIATE EMC ENGINEER
 COMPLIANCE CERTIFICATION SERVICES

Approved & Released By:

THU CHAN
 SENIOR EMC ENGINEER
 COMPLIANCE CERTIFICATION SERVICES

2. PRODUCT DESCRIPTION

Fundamental Frequency	434 MHz
Power Source	12V Alkaline Battery Model 27A
Transmitting Time	Periodic \leq 5 seconds
Associated Receiver	FCC ID: ELVAR5F

3. TEST FACILITY

The 3/10/30 meter open area test site and conducted measurement facility used to collect the radiated data is located at 561F Monterey Road, Morgan Hill, California, U.S.A. A detailed description of the test facility was submitted to the Commission on May 27, 1994.

4. MEASUREMENT STANDARD

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

TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer	HP100Hz-1.5GHz	8568B	2732A03661	5/4/02
Spectrum Display	HP	85662A	2816A16696	5/4/02
Quasi-Peak Detector	HP9K - 1GHz	85650A	2811A01155	5/4/02
Pre-Amplifier, 25 dB	HP 0.1 - 1300MHz	8447D (P5)	2944A096550	8/10/02
Antenna, Bicon	Eaton 30-200MHz	94455-1	1214	8/2/02
Antenna, LP	EMCO 200-200MHz	3146	9107-3163	8/2/02
EMC Receiver, 9k-26.5GHz	HP	8593EM	3710A00205	6/20/02
Horn Antenna(1 - 18GHz)	EMCO	3115	9001-3245	6/20/02
Pre-Amplifier	MITEQ 1-26GHz	NSP2600-44	646456	4/12/02

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	NOT 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.



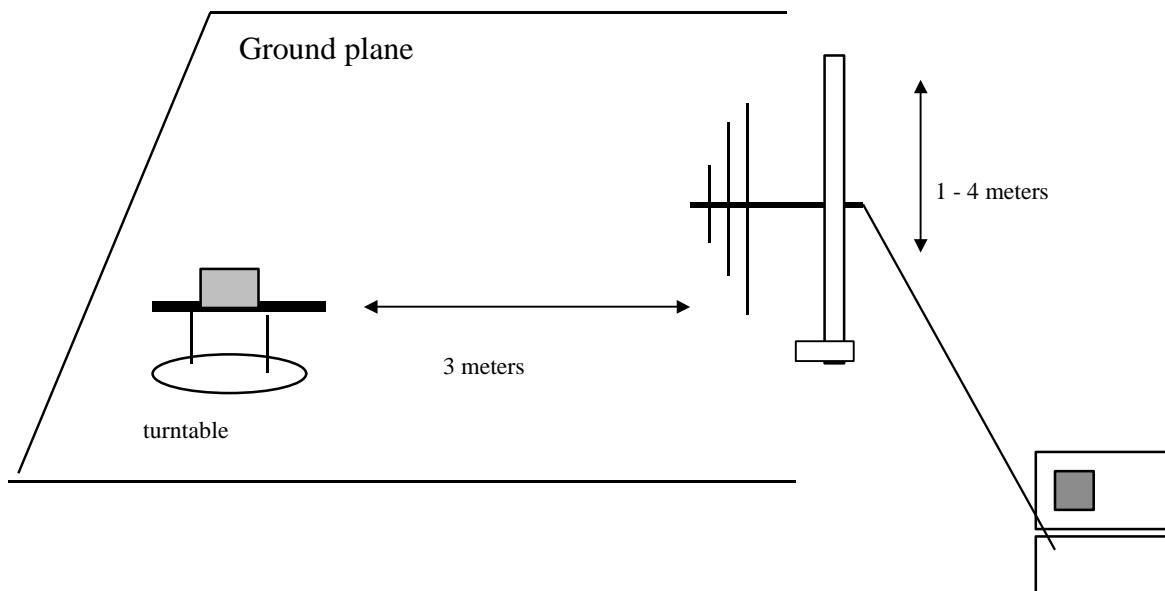
Radiated Open Site Test Set-up

10. TEST PROCEDURE

Radiated Emissions, 15.231(4)(b)

Test Set-up for frequency range 30 – 1000 MHz

Antenna mast



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.

Test set-up for measurements above 1GHz

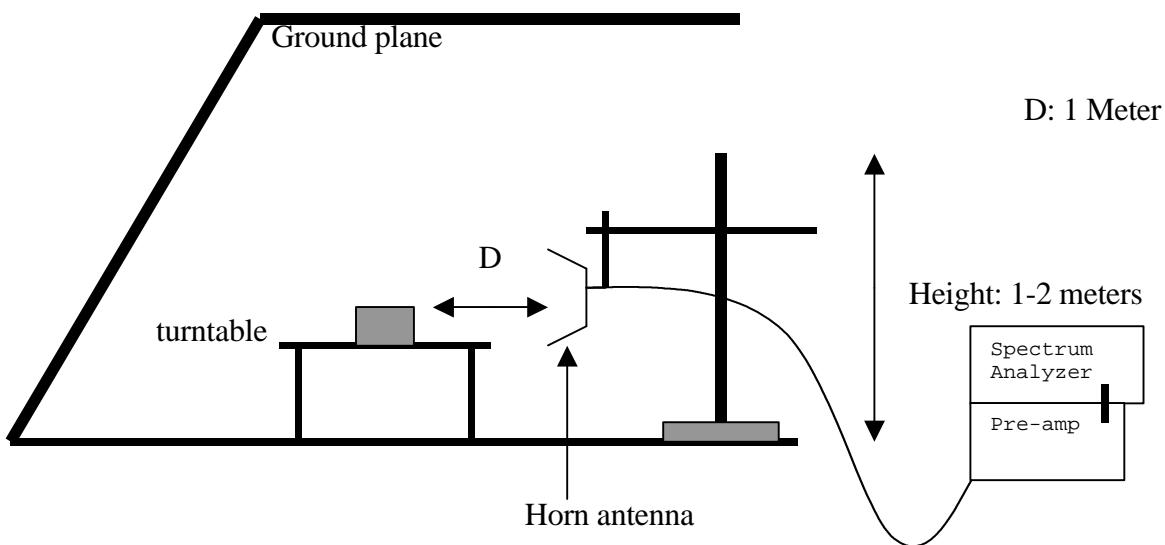


FIG. 2

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:

No changes were required in order to achieve compliance to Section 15.231 levels.

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	X
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	= 100 mS
	Long pulse	= 1 mS
	Short pulse	= 0.5 mS
	No of Long pulse	= 17
	No of Short pulse	= 20

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

$$\text{Duty Cycle} = ((17 \times 1) + (20 \times 0.50))/100 = 0.27 = 27\%$$

For duty cycle refer to plot #1, 2, 3,4.

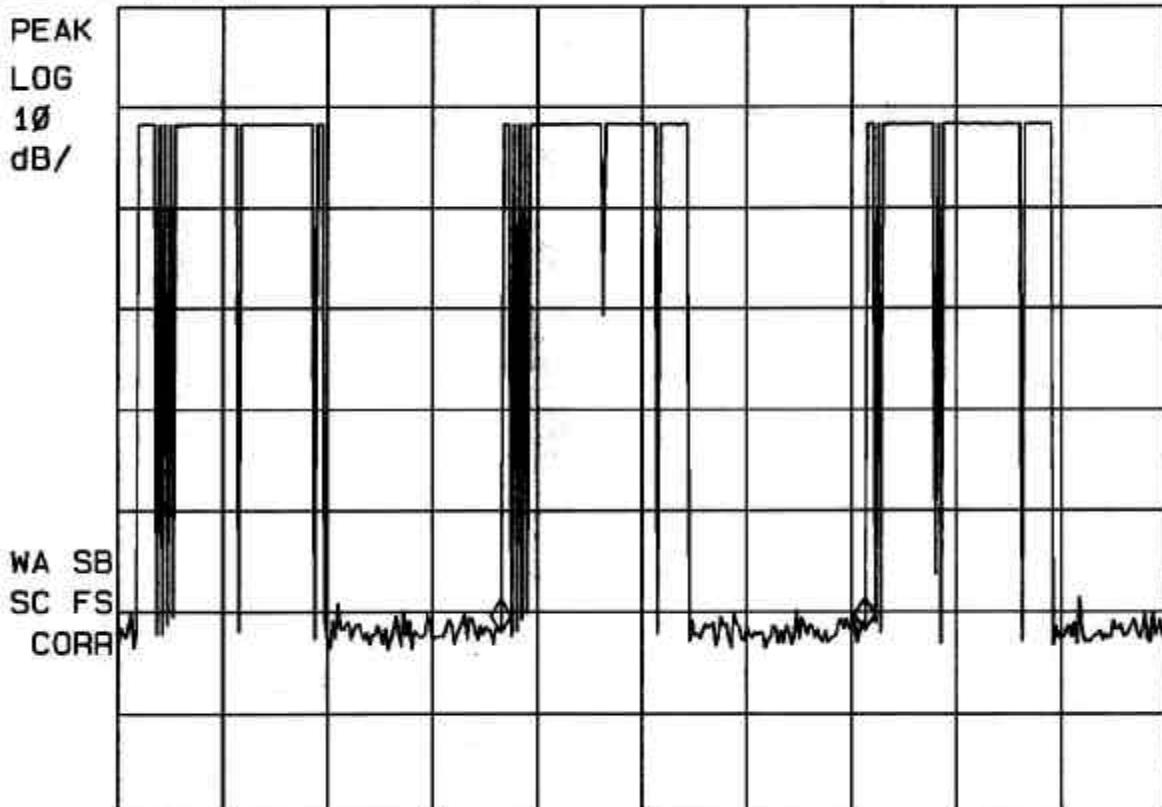
12.2 EMISSION BANDWIDTH

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

Center Frequency	Measured	Limits
434 MHz	475 KHz (refer to plot)	434 x 0.25% = 1.085 MHz

15: 24: 13 SEP 21, 2001
15.231 duty cycle: NUTEK
REF 87.0 dB μ V AT 10 dB

MKR 104.25 msec
.14 dB



DUTY CYCLE 1

14: 59: 21 SEP 21, 2001
15.231 duty cycle: NUTEK
REF 87.0 dB μ V AT 10 dB

MKA 95.500 msec
23.94 dB μ V

PEAK
LOG
10
dB/

WA SB
SC FS
CORR

CENTER 433.670 MHz
#RES BW 100 kHz

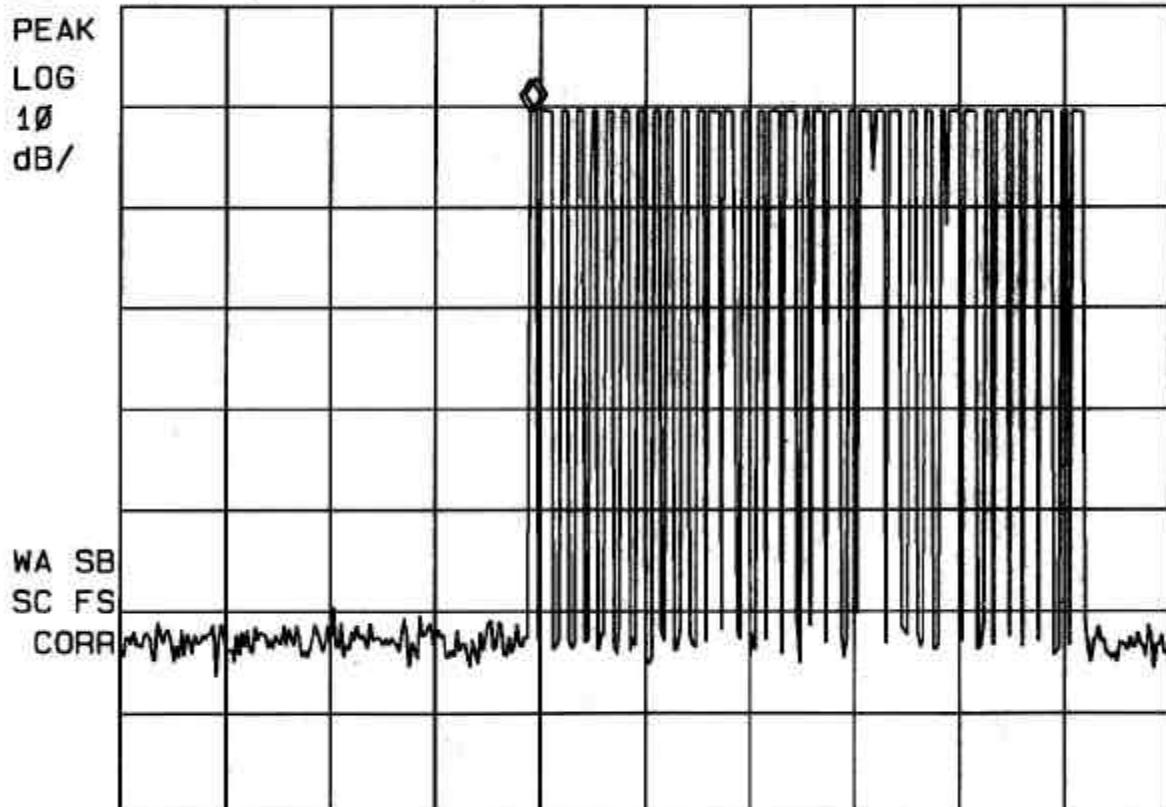
#VBW 100 kHz

SPAN 0 Hz
#SWP 100 msec

DUTY CYCLE 2

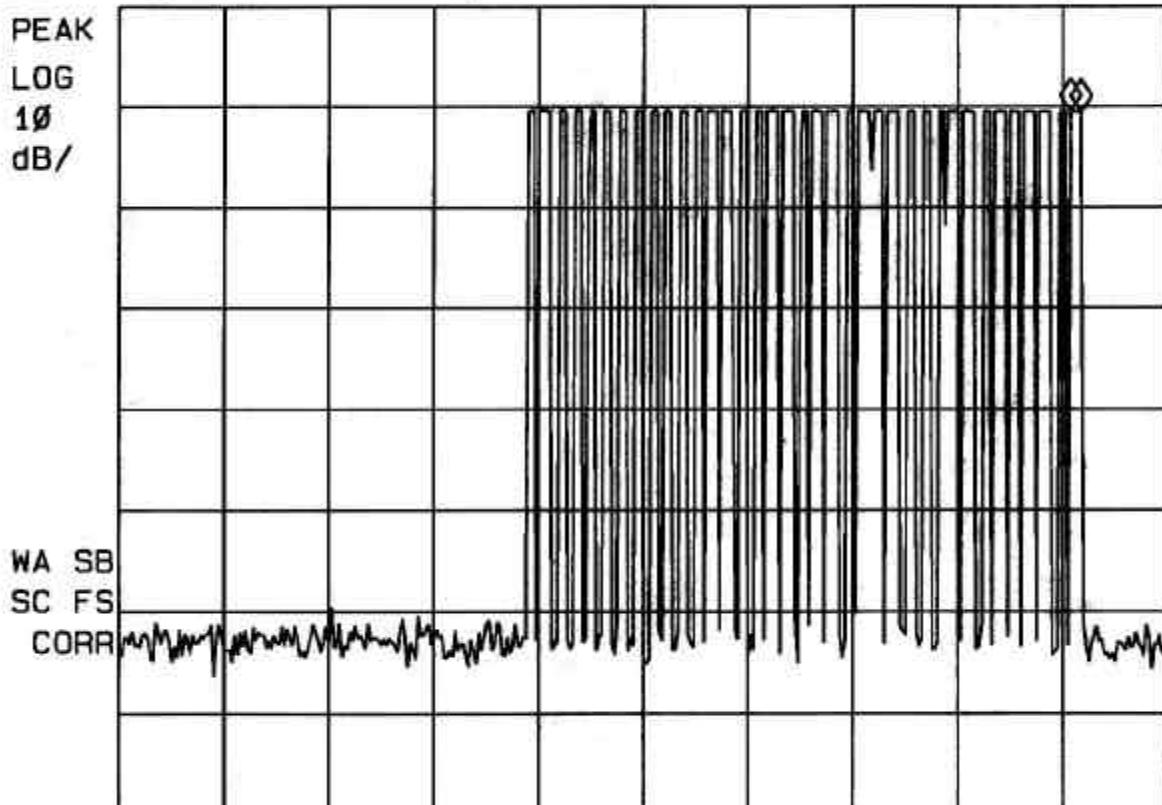
15: 01: 15 SEP 21, 2001
15.231 duty cycle: NUTEK
REF 87.0 dB μ V AT 10 dB

MKA 500.00 μ sec
.14 dB



15:05:20 SEP 21, 2001
15.231 duty cycle: NUTEK
REF 87.0 dB μ V AT 10 dB

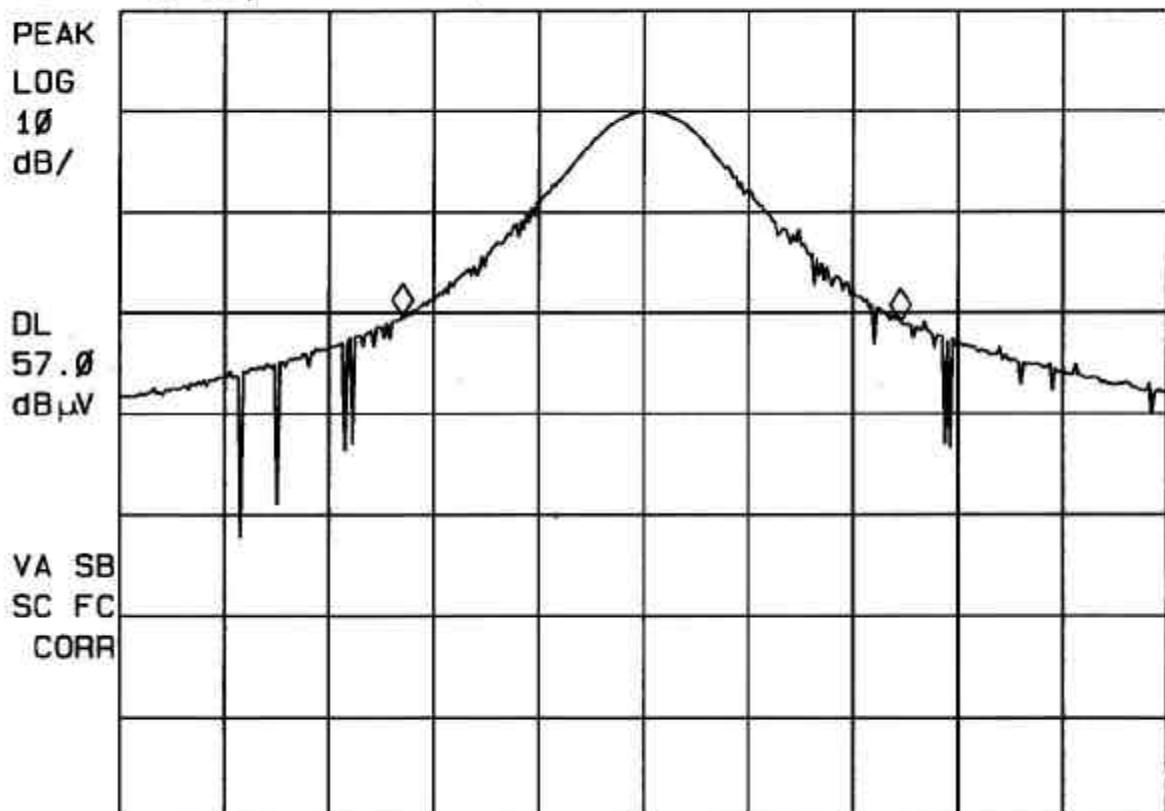
MKR 1.0000 msec
-.09 dB



DUTY CYCLE 4

14: 42: 07 SEP 21, 2001
15.231 (c): NUTEK, ID: ELVAT1F
REF 87.0 dB μ V AT 10 dB

MKR 475 kHz
-.54 dB



CENTER 433.710 MHz
#RES BW 100 kHz

#VBW 100 kHz

SPAN 1.000 MHz
SWP 20.0 msec

EMISSION BANDWIDTH

 COMPLIANCE Certification Services											
FCC, VCCI, CISPR, CE, AUSTEL, NZ, UL, CSA, TUV, BSMI, DHHS, NVLAP 561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888											
Project #: 01T0978-1 Report #: 010927C1 Date & Time: 09/27/01 9:33 AM Test Engr: KERWIN CORPUZ											
Company: NUTEK CORPORATION EUT Description: 434MHz CAR ALARM TX (M/N: PRO-OE3B4) Test Configuration : EUT ONLY Type of Test: 15.231(b) Mode of Operation: TX											
<input type="radio"/> A-Site		<input type="radio"/> B-Site		<input checked="" type="radio"/> C-Site		<input type="radio"/> D-Site		<input type="radio"/> E-Site		<input type="radio"/> F-Site	
<input type="radio"/> 6 Worst Data <input type="radio"/> All Data <input type="radio"/> Specific Data											
 09/27/01											
Freq. (MHz)	Reading (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)
X AXIS: 433.85 62.90 16.61 3.15 27.56 55.10 80.80 -25.70 3mV 135.00 1.70 A 433.85 75.20 16.53 3.15 27.56 67.32 80.80 -13.48 3mH 135.00 1.70 A											
Y AXIS: 433.85 70.60 16.53 3.15 27.56 62.72 80.80 -18.08 3mH 180.00 1.00 A 433.85 77.40 16.61 3.15 27.56 69.60 80.80 -11.20 3mV 270.00 1.30 A											
Z AXIS: 433.85 77.80 16.61 3.15 27.56 70.00 80.80 -10.80 3mV 270.00 1.30 A 433.85 71.50 16.53 3.15 27.56 63.62 80.80 -17.18 3mH 0.00 1.00 A											
WORSE CASE FOR VERTICAL POLARIZATION IS Z AXIS OF EUT AND HORIZONTAL POLARIZATION IS X AXIS OF EUT.											
867.63 32.80 22.07 4.83 27.63 32.07 60.80 -28.73 3mH 90.00 1.00 A 867.63 34.40 21.32 4.83 27.63 32.92 60.80 -27.88 3mV 180.00 1.00 A											
NOTE: duty cycle (-11.37dB) was subtracted from Spectrum Analyzer reading. TO COMPLETED RADIATED EMISSION, NEED TO SCAN ABOVE 1GHz UP TO 10th HARMONIC											
Total data #: 8 V.2c											

RADIATED DATA

COMPLIANCE CERTIFICATION SERVICES, INC.

Radiated Emissions

15.231(b)

09/27/01

Kerwin Corpuz
C-Site @ 1 meter

NUTEK CORPORATION

434 MHz CAR ALARM TRANSMITTER (M/N: PRO-OE3B4)

f_o= 433.85 MHz

Worse case: X axis with RX antenna at Horizontal and Z axis with RX antenna at Vertical

F(MHz)	READING (dBuV)		DC (dB)	AF (dB)	CL (dB)	AMP (dB)	DIST (dB)	HPF (dB)	TOTAL (dBuV/m)		LIMIT (dBuV/m)		MARGIN (dB)	
	Pk	Avg							Pk	Avg	Pk	Avg	Pk	Avg
1301V	61.7	50.33	11.37	23.8	0.3	42.7	9.5	0	33.6	22.23	74	54	-40.4	-31.77
1301H	54.3	42.93	11.37	23.8	0.3	42.7	9.5	0	26.2	14.83	74	54	-47.8	-39.17
1735V	55.6	44.23	11.37	25.9	0.34	42.5	9.5	1	30.84	19.47	74	54	-43.2	-34.53
1735H	56.7	45.33	11.37	25.9	0.34	42.5	9.5	1	31.94	20.57	74	54	-42.1	-33.43
2169V	61.6	50.23	11.37	27.3	0.4	42.4	9.5	1	38.4	27.03	74	54	-35.6	-26.97
2169H	59.8	48.43	11.37	27.3	0.4	42.4	9.5	1	36.6	25.23	74	54	-37.4	-28.77
2602V	50.9	39.53	11.37	28.3	0.42	42.3	9.5	1	28.82	17.45	74	54	-45.2	-36.55
2602H	49.7	38.33	11.37	28.3	0.42	42.3	9.5	1	27.62	16.25	74	54	-46.4	-37.75
3036V	50.8	39.43	11.37	30.1	0.44	42.1	9.5	1	30.74	19.37	74	54	-43.3	-34.63
3036H	47.4	36.03	11.37	30.1	0.44	42.1	9.5	1	27.34	15.97	74	54	-46.7	-38.03
3470*	43.6	32.23	11.37	31.6	0.48	41.9	9.5	1	25.28	13.91	74	54	-48.7	-40.09
3904*	42.5	31.13	11.37	32.4	0.56	41.8	9.5	1	25.16	13.79	74	54	-48.8	-40.21
4338*	43	31.63	11.37	32.3	0.6	41.7	9.5	1	25.7	14.33	74	54	-48.3	-39.67

* Measured noise floor (worse case vertical)

NOTE: MEASURED HORIZONTAL (H) AND VERTICAL (V)

DC: duty cycle

DIST: Extrapolate reading from 3meter to 1 meter distance: 9.5dB

SPECTRUM ANALYZER: HP 8593EM

AF: EMCO 3115, SN: 9001-3245

AMP: MITEQ NSP2600-44

CL: FLEXCO SMA cable loss (2ft)

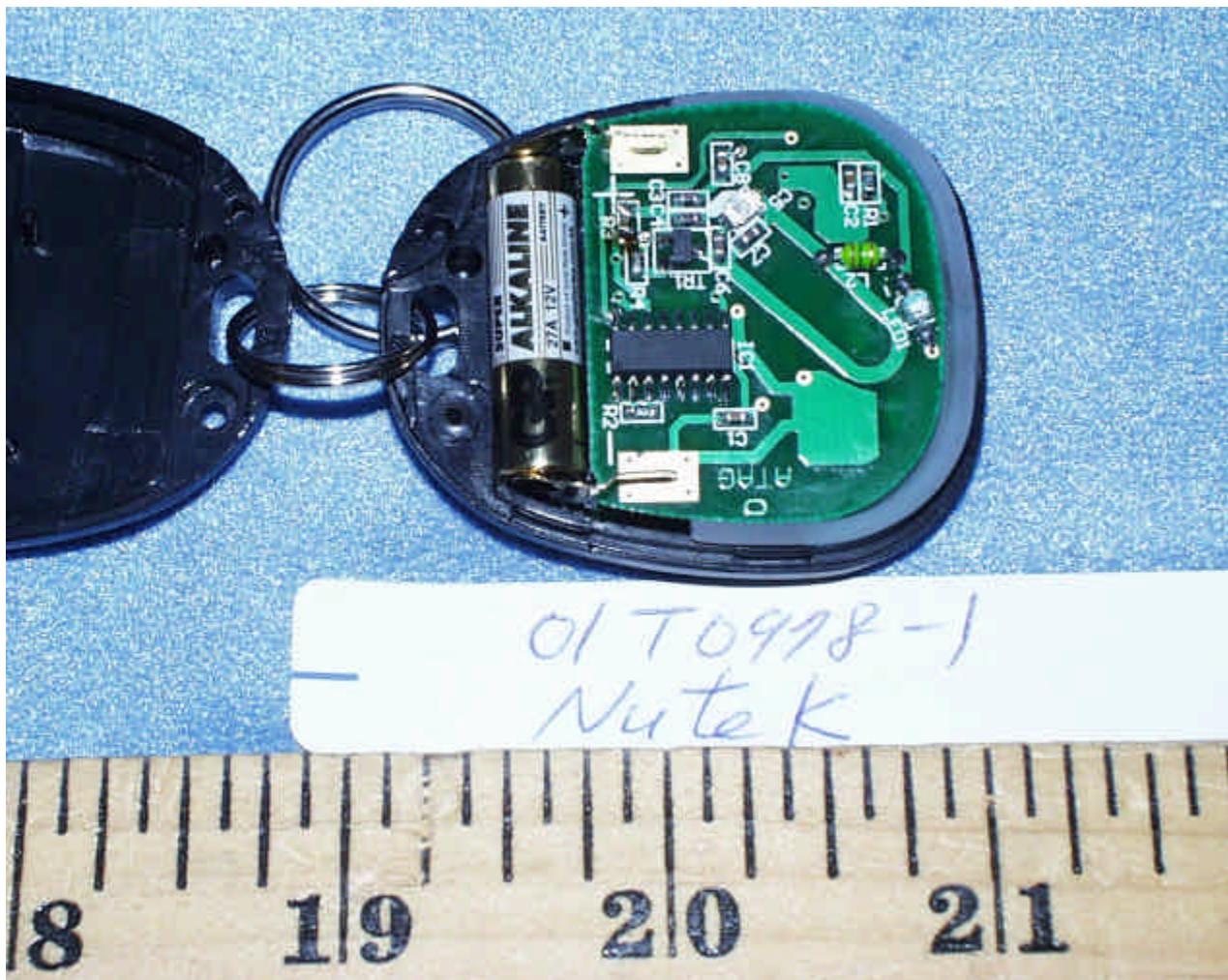
HPF: High pass filter insertion loss (FYS 1.8GHz, S/N: 577)

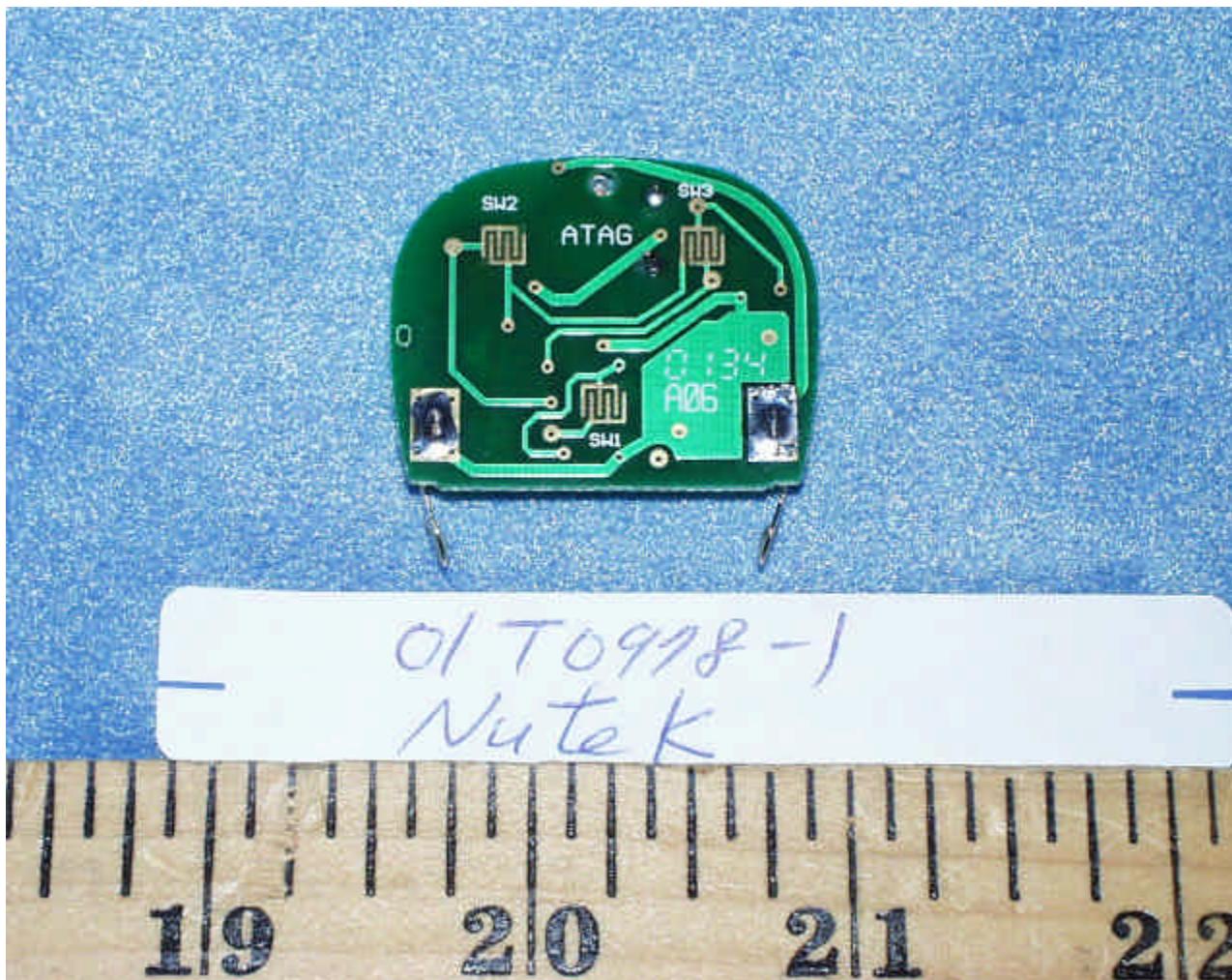
RADIATED EMISSIONS (HARMONIC)

ATTACHMENT

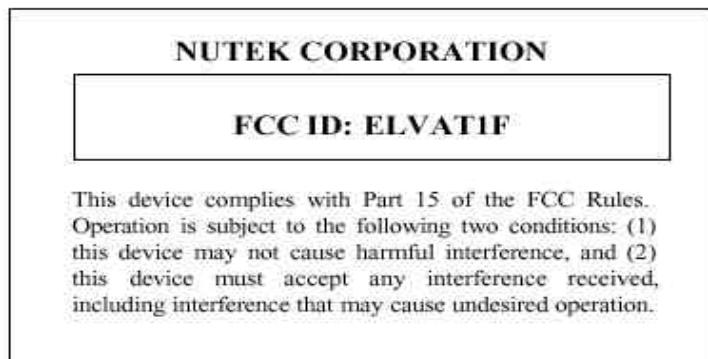
EUT PHOTOGRAPHS









PROPOSED FCC ID LABEL AND LOCATION

SCHEMATICS & BLOCK DIAGRAM

USER MANUAL

OPERATIONAL DESCRIPTION