

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

*for*

**INTENTIONAL RADIATOR**

**302 MHz CAR ALARM TRANSMITTER**

**MODEL NAME: PRO-OE3B3**

**TRADE NAME: NUTEK**

**FCC ID NO: ELVAT1E**

**REPORT NO: 01T0977-1**

**ISSUE DATE: SEPTEMBER 28, 2001**

*Prepared for*

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

*Prepared by*

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*d.b.a.*

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**1. VERIFICATION OF COMPLIANCE**

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

CONTACT PERSON: RUBY HSIEH  
 TELEPHONE NO.: 02-2918-9478  
 EUT DESCRIPTION: 302 MHz CAR ALARM TRANSMITTER  
 MODEL NAME/NUMBER: PRO-OE3B3  
 TRADE NAME: NUTЕК  
 FCC ID: ELVAT1E  
 DATE TESTED: SEPTEMBER 24, 2001  
 REPORT NUMBER: 01U0977-1

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	302 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:

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KERWIN CORPUZ  
 ASSOCIATE EMC ENGINEER  
 COMPLIANCE CERTIFICATION SERVICES

Approved & Released By:

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THU CHAN  
 SENIOR EMC ENGINEER  
 COMPLIANCE CERTIFICATION SERVICES

**2. PRODUCT DESCRIPTION**

Fundamental Frequency	<b>302 MHz</b>
Power Source	<b>12V Alkaline Battery Model 27A</b>
Transmitting Time	<b>Periodic <math>\leq</math> 5 seconds</b>
Associated Receiver	<b>FCC ID: ELVAR5C</b>

**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**

<b>TEST EQUIPMENTS LIST</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Due Date</b>
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

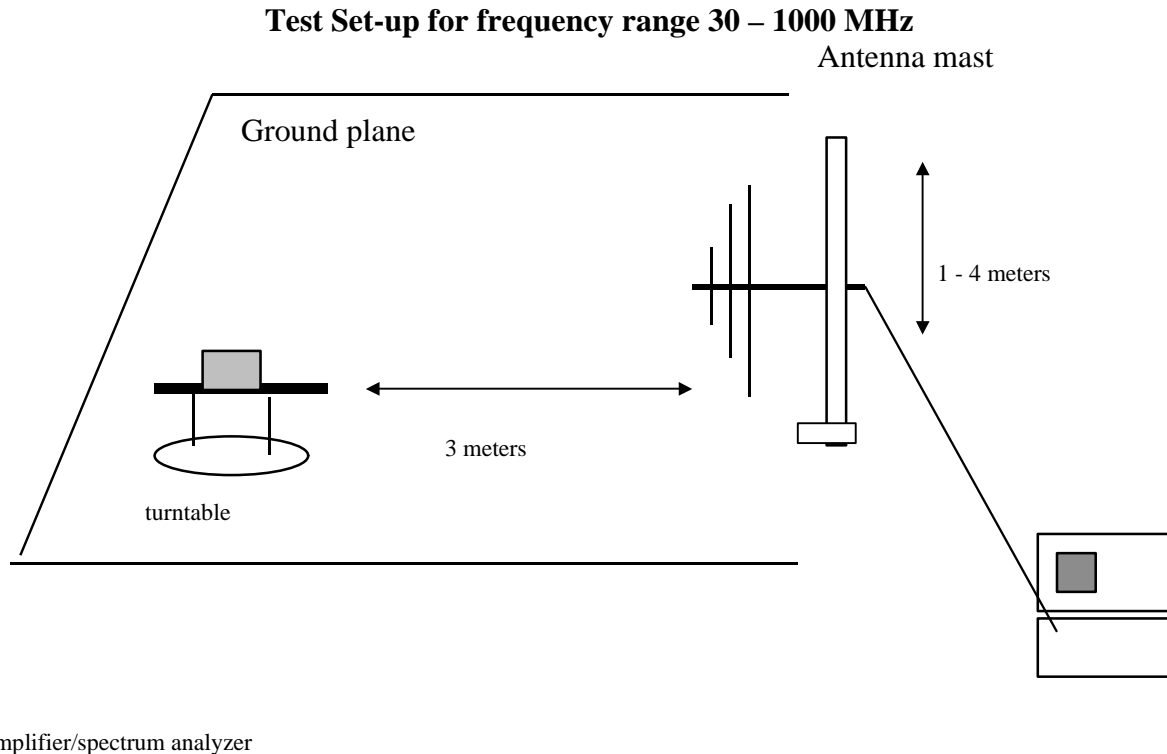
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

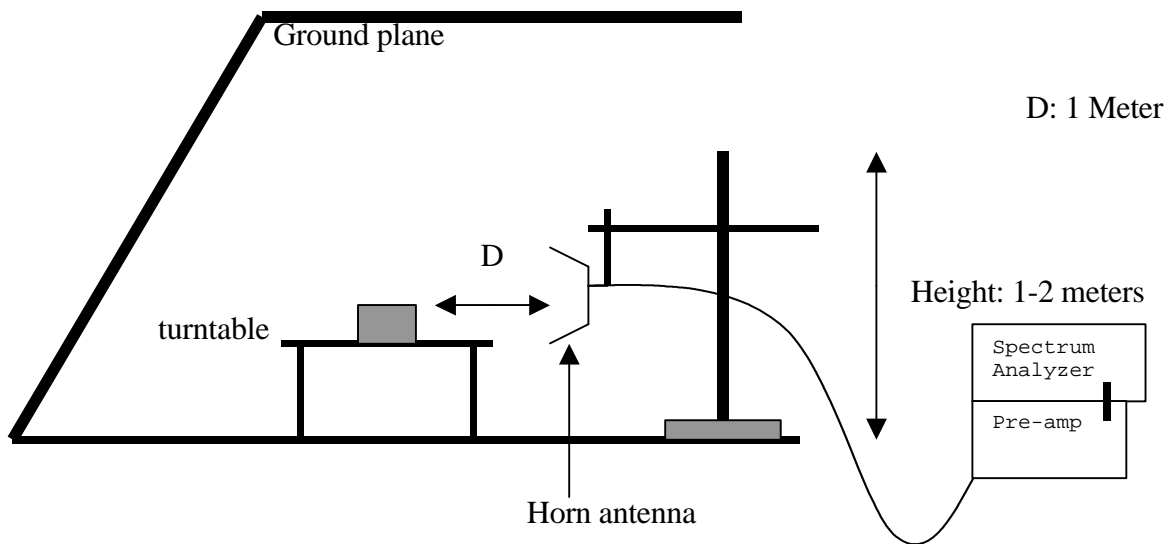
## 10. TEST PROCEDURE

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



**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**

<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	X
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                      = 70.5 mS  
                  Long pulse                      = 1 mS  
                  Short pulse                      = 0.5 mS  
                  No of Long pulse                  = 11  
                  No of Short pulse                  = 14

Duty Cycle = ( N1L1+N2L2+...+Nn-1Ln-1+NnLn)/70.5 or T

Duty Cycle = ( (11x1)+(14x0.50))/70.5=0.255=25.5%

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

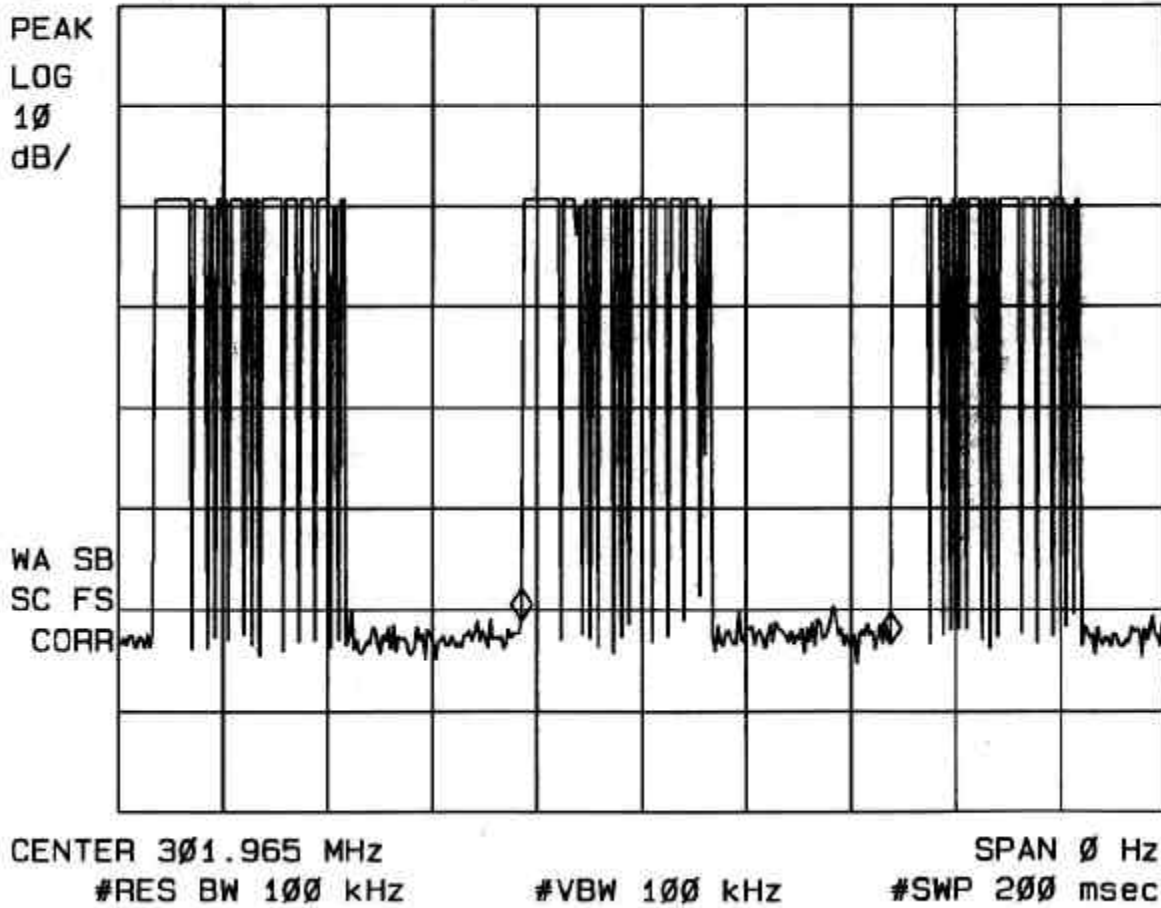
**12.2 EMISSION BANDWIDTH**

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

<b>Center Frequency</b>	<b>Measured</b>	<b>Limits</b>
302 MHz	<b>465 KHz</b> (refer to plot)	<b>302 x 0.25%=755 KHz</b>

11:19:47 SEP 24, 2001  
15.231 duty cycle: NUTEK  
REF 87.0 dBμV AT 10 dB

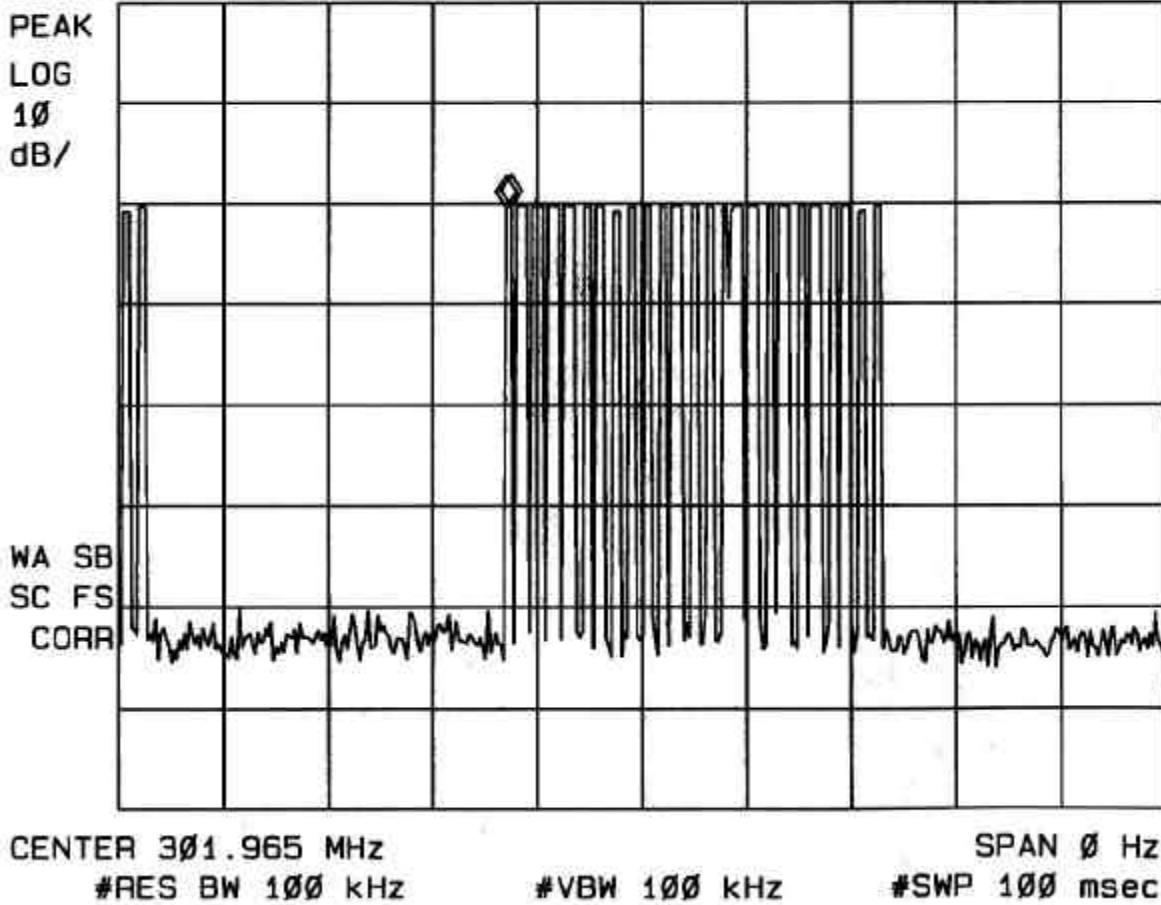
MKR 70.500 msec  
-2.35 dB



DUTY CYCLE 1

11: 25: 20 SEP 24, 2001  
15.231 duty cycle: NUTEK  
REF 87.0 dBμV AT 10 dB

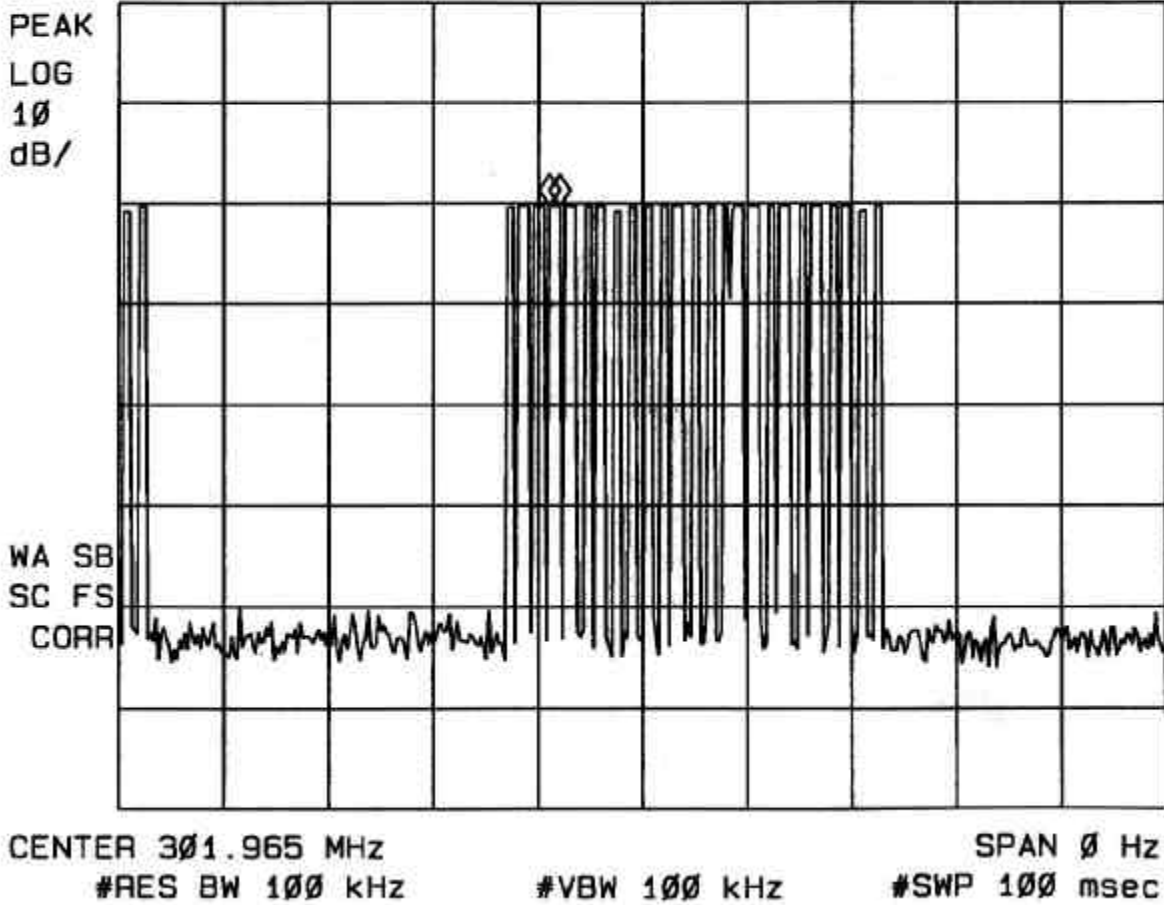
MKR 500.00 μsec  
.10 dB



DUTY CYCLE 2

11:26:07 SEP 24, 2001  
15.231 duty cycle: NUTEK  
REF 87.0 dBμV AT 10 dB

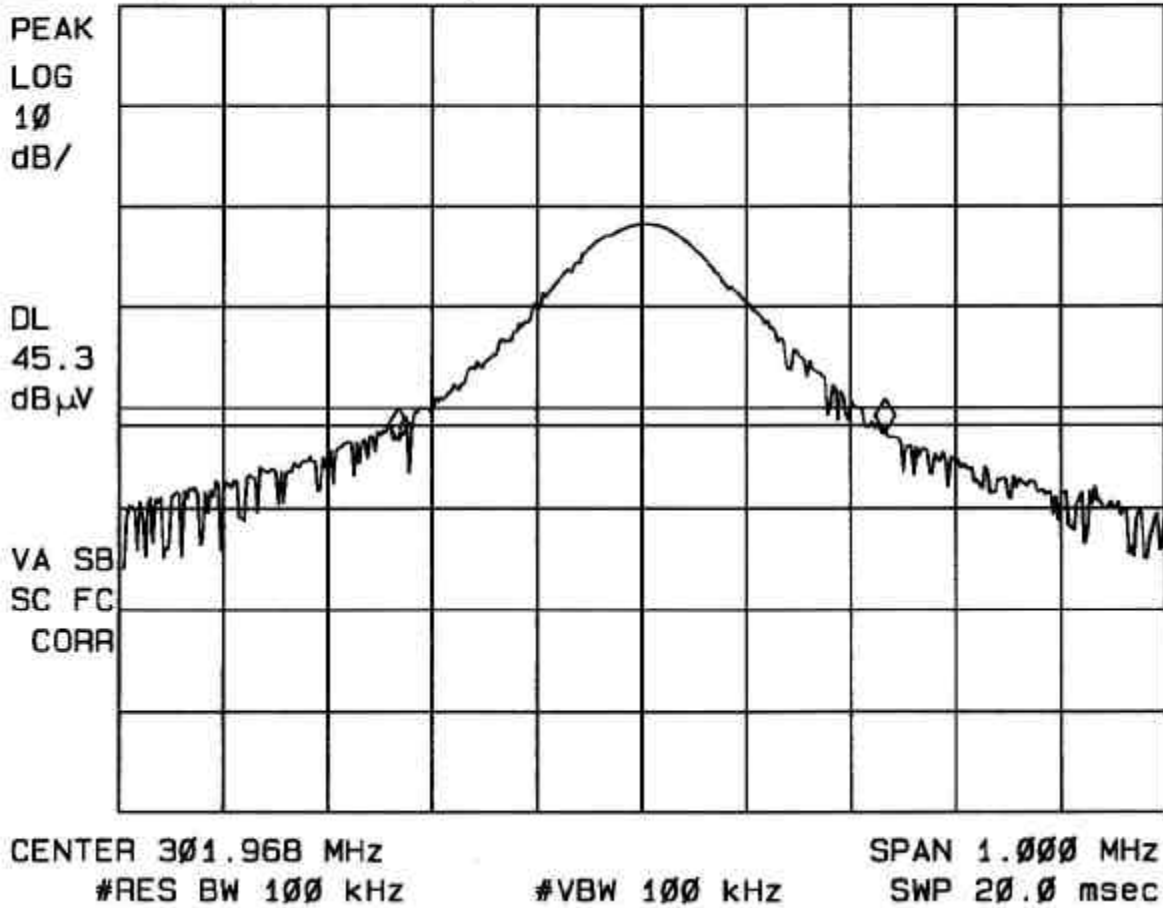
MKR 1.0000 msec  
-.02 dB



DUTY CYCLE 3

11: 15: 47 SEP 24, 2001  
15.231 (c): NUTEK ID: ELVAT1E  
REF 87.0 dBμV AT 10 dB

MKR 465 kHz  
.83 dB



EMISSION BANDWIDTH



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

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001  
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**Project #:** 01T0977-1  
**Report #:** 010924C1  
**Date & Time:** 09/24/01 4:45 PM  
**Test Engr:** KERWIN CORPUZ

**Company:** JTEK CORPORATION  
**EUT Description:** 2MHz CAR ALARM TX (M/N: PRO-OE3B3)  
**Test Configuration:** JT ONLY  
**Type of Test:** C PART 15.231(b)  
**Mode of Operation:**

A-Site   
  B-Site   
  C-Site   
  F-Site   
 6 Worst Data   
 Descending

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
X AXIS:											
OPTION button:											
302.01	59.21	15.09	2.59	26.65	50.23	74.80	-24.57	3mV	135.00	1.30	A
302.01	75.02	14.85	2.59	26.65	65.80	74.80	-9.00	3mH	135.00	1.00	A
LOCK button											
302.01	71.61	14.85	2.59	26.65	62.39	74.80	-12.41	3mH	270.00	1.00	A
302.01	55.91	15.09	2.59	26.65	46.93	74.80	-27.87	3mV	180.00	1.30	A
UNLOCK button											
302.01	55.41	15.09	2.59	26.65	46.43	74.80	-28.37	3mV	180.00	1.30	A
302.01	72.01	14.85	2.59	26.65	62.79	74.80	-12.01	3mH	0.00	1.00	A
Y AXIS:											
UNLOCK button											
302.01	63.21	14.85	2.59	26.65	53.99	74.80	-20.81	3mH	180.00	1.70	A
302.01	68.31	15.09	2.59	26.65	59.33	74.80	-15.47	3mV	270.00	1.60	A
LOCK button											
302.01	68.31	15.09	2.59	26.65	59.33	74.80	-15.47	3mV	270.00	1.60	A
302.01	62.61	14.85	2.59	26.65	53.39	74.80	-21.41	3mH	0.00	1.70	A
OPTION button											
302.01	63.31	14.85	2.59	26.65	54.09	74.80	-20.71	3mH	180.00	1.70	A
302.01	67.81	15.09	2.59	26.65	58.83	74.80	-15.97	3mV	315.00	1.60	A
Z AXIS:											
OPTION button											
302.01	67.91	15.09	2.59	26.65	58.93	74.80	-15.87	3mV	270.00	1.70	A
302.01	62.71	14.85	2.59	26.65	53.49	74.80	-21.31	3mH	0.00	1.70	A
LOCK button											
302.01	62.71	14.85	2.59	26.65	53.49	74.80	-21.31	3mH	180.00	1.70	A
302.01	68.01	15.09	2.59	26.65	59.03	74.80	-15.77	3mV	0.00	1.70	A
UNLOCK button											
302.01	67.31	15.09	2.59	26.65	58.33	74.80	-16.47	3mV	90.00	1.70	A
302.01	62.91	14.85	2.59	26.65	53.69	74.80	-21.11	3mH	0.00	1.70	A

for Harmonic: X axis, OPTION button with RX antenna at horiz											
Y axis, UNLOCK button with RX antenna at vertical polarizati											
604.05	37.21	18.51	3.87	28.12	31.47	54.80	-23.33	3mV	0.00	1.00	A
906.07	24.71	21.79	4.97	27.51	23.96	54.80	-30.84	3mV	90.00	1.00	A
604.05	38.61	19.21	3.87	28.12	33.57	54.80	-21.23	3mH	0.00	1.00	A
906.07	23.01	22.54	4.97	27.51	23.02	54.80	-31.78	3mH	0.00	1.00	A
NOTE: duty cycle (-11.88dB) was subtracted from SA reading.											
TO COMPLETE RADIATED EMISSION, NEED TO SCAN ABOVE 1 GHz UP TO 10th HARMONIC											
Total data #: 22											

V.2c

**COMPLIANCE CERTIFICATION SERVICES, INC.**

Radiated Emissions  
15.231(b)

09/27/01  
Kerwin Corpuz  
C-Site @ 1 meter

NUTEK CORPORATION  
302 MHz CAR ALARM TRANSMITTER (M/N: PRO-OE3B3)

f<sub>0</sub>= 302.01 MHz  
Worse case: X axis, OPTION button with RX antenna at Horizontal polarization  
and Y axis, UNLOCK button with RX antenna at Vertical polarization.

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
1208*	41.2	26.31	14.89	23.8	0.3	42.7	9.5	0	13.1	-1.79	74	54	-60.9	-55.79
1510*	42.4	27.51	14.89	25.9	0.34	42.5	9.5	0	16.64	1.75	74	54	-57.4	-52.25
1812*	43.1	28.21	14.89	27.3	0.4	42.4	9.5	1	19.9	5.01	74	54	-54.1	-48.99
2114*	43.1	28.21	14.89	28.3	0.42	42.3	9.5	1	21.02	6.13	74	54	-53	-47.87
2416*	43.2	28.31	14.89	30.1	0.44	42.1	9.5	1	23.14	8.25	74	54	-50.9	-45.75
2718*	43.4	28.51	14.89	31.6	0.48	41.9	9.5	1	25.08	10.19	74	54	-48.9	-43.81
3020*	43.1	28.21	14.89	32.4	0.56	41.8	9.5	1	25.76	10.87	74	54	-48.2	-43.13

\* 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, S/N: 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 EMISSION (HARMONIC)