

FCC ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT CERTIFICATION TO FCC PART 15 REQUIREMENTS

for

INTENTIONAL RADIATOR

of

CAR ALARM TRANSCEIVER

FCC ID Number : ELVNTRCA

Trade Name : NUTEK CORPORATION

Model Number : AC17

Agency Series : N/A

Report Number : C30710402-RP

Date : January 13, 2004

Prepared for :

NUTEK CORPORATION

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

Prepared by :

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Lab. Code: 200617-0



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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. : (886-2) 2918-9478

EUT DESCRIPTION : CAR ALARM TRANSCEIVER

MODEL NAME/NUMBER : AC17

FCC ID : ELVNTRCA

DATE TESTED : July 07, 2003 & July 10, 2003

REPORT NUMBER : C30710402-RP

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 Compliance Certification 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 Certification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services Inc. will constitute fraud and shall nullify the document.

Vince Chiang

Vince Chiang / Supervisor
Compliance Certification Services Inc.

2. PRODUCT DESCRIPTION

Fundamental Frequency	433.92 MHz
Power Source	1.5V AAA Battery
Transmitting Time	Periodic \leq 5 seconds
Associated Receiver	Model: ELVNTRCB (FCC ID)

3. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at No. 165 & 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
R&S	ESVS30	MEASURE RECEIVER	09/13/03
ADVANTEST	R3132	SPECTRUM ANALYZER	09/11/03
SCHAFFNER	CBL 6112B	ANTENNA	11/11/03
BELDEN	9913	CABLE	10/13/03
SCHAFFNER	CPA9231A	PRE-AMPLIFIER	10/30/03
CCS	N/A	Site NSA	09/10/03
EMCO	3115	ANTENNA (1-18GHz)	02/24/04
HP	8449B	AMPLIFIER (1-26.5GHz)	02/20/04
JYEBAO	LL143	CABLE (1-18GHz)	02/20/04
JYEBAO	LL142	CABLE (1-18GHz)	02/20/04
HP	8566B	EMC ANALYZER (100Hz-22GHz)	06/25/04

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
RECEIVER MODE	SECTION 15.109

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

Radiated Open Site Test Set-Up (Receiver Mode)



10. TEST PROCEDURE

Radiated Emissions, 15.231(4)(b)

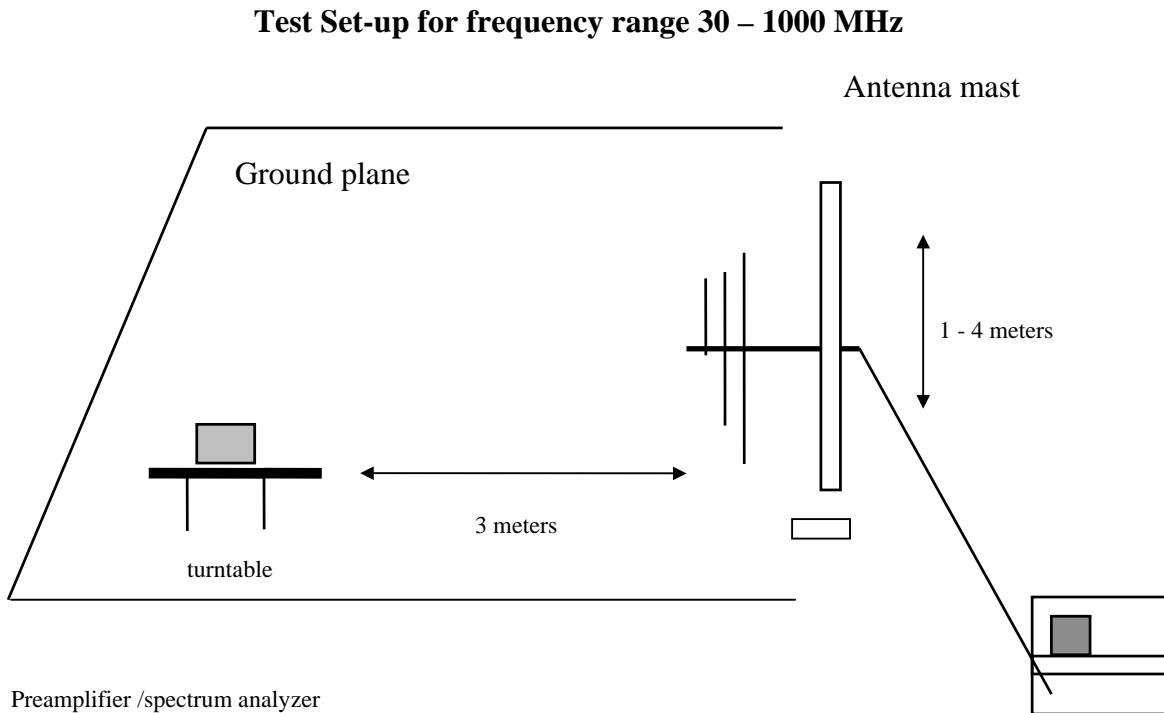


Fig. 1

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.

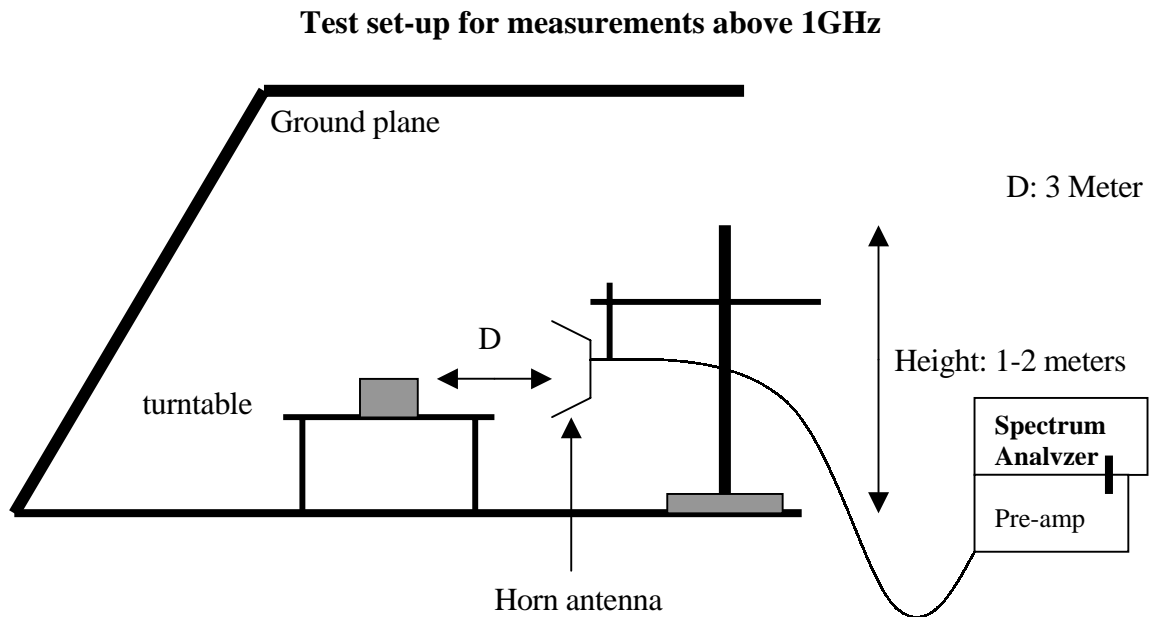


Fig. 2

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

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)	
		SECTION 15.109	X

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:

Button 1

WHERE 1 Period = 108.5 mS > 100 mS. use 100 mS for calculation
 Long pulse = 0.68 mS
 Short pulse = 0.27 mS
 No of Long pulse = 45
 No of Short pulse = 33

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

$$\text{Duty Cycle} = [(45 \times 0.68) + (33 \times 0.27)] / 100 = 0.3951 = 39.51 \% \text{ or } -8.0659 \text{dB}$$

Button 2

WHERE 1 Period = 108.3 mS > 100 mS. use 100 mS for calculation
 Long pulse = 0.67 mS
 Short pulse = 0.26 mS
 No of Long pulse = 39
 No of Short pulse = 37

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

$$\text{Duty Cycle} = [(39 \times 0.67) + (37 \times 0.26)] / 100 = 0.3575 = 35.75 \% \text{ or } -8.9345 \text{dB}$$



Button 3

WHERE 1 Period = 108.3 mS > 100 mS. use 100 mS for calculation
 Long pulse = 0.66 mS
 Short pulse = 0.27 mS
 No of Long pulse = 49
 No of Short pulse = 27

Duty Cycle = $(N1L1+N2L2+\dots+Nn-1Ln-1+NnLn)/100$ or T
 Duty Cycle = $[(49 \times 0.66) + (27 \times 0.27)] / 100 = 0.3963 = 39.63\%$ or -8.0395dB

Button 4

WHERE 1 Period = 108.4 mS > 100 mS. use 100 mS for calculation
 Long pulse = 0.67 mS
 Short pulse = 0.25 mS
 No of Long pulse = 45
 No of Short pulse = 33

Duty Cycle = $(N1L1+N2L2+\dots+Nn-1Ln-1+NnLn)/100$ or T
 Duty Cycle = $[(45 \times 0.67) + (33 \times 0.25)] / 100 = 0.3840 = 38.40\%$ or -8.3134dB

12.2 The Emissions Bandwidth

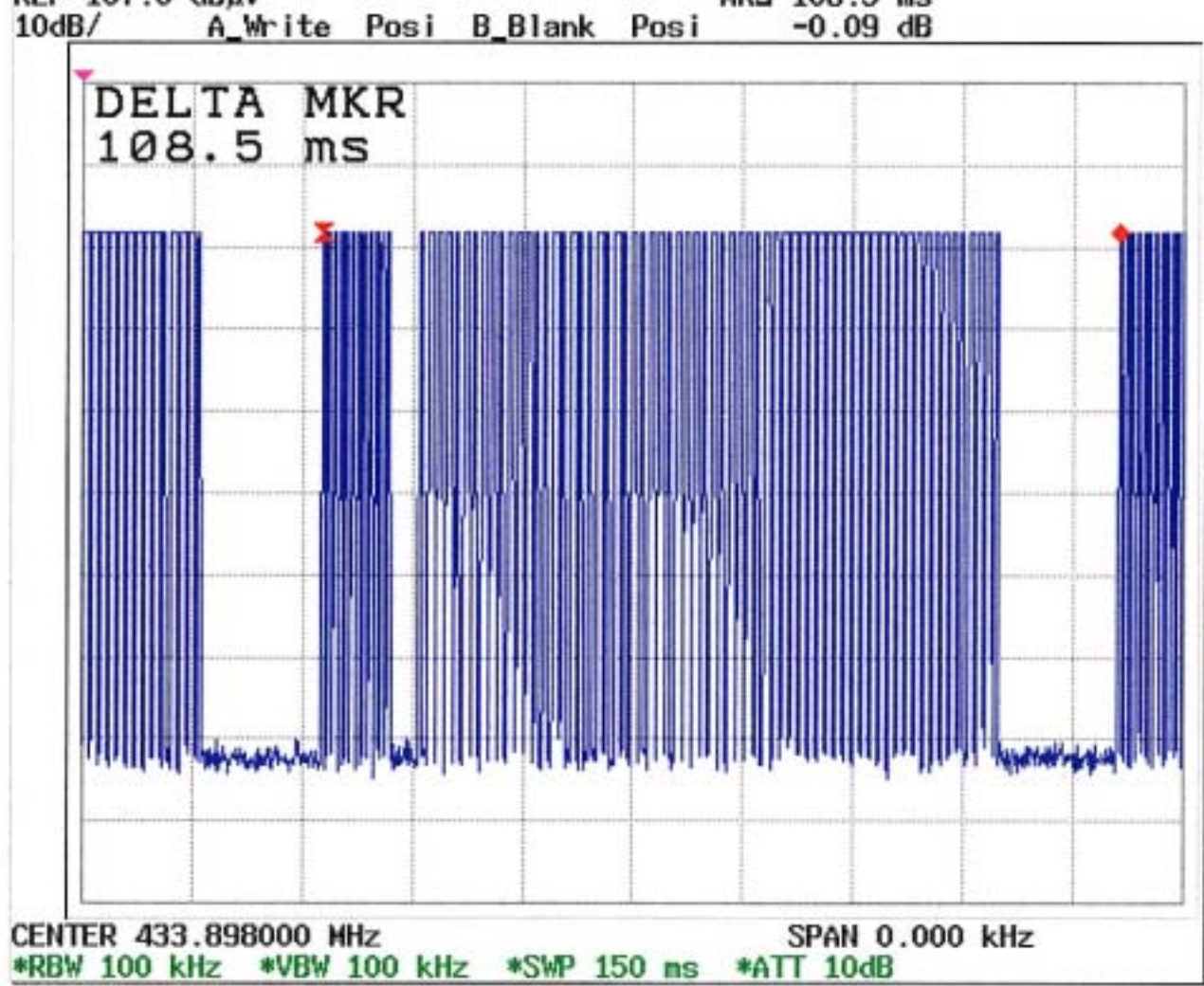
The bandwidth of the emissions were investigated per 15.231(c)

	Center Frequency	Measured	Limits
Button 1	433.92 MHz	470.0 kHz < (refer to plot)	433.92MHzX0.25%=1084.8 kHz
Button 2	433.92 MHz	473.0 kHz < (refer to plot)	433.92MHzX0.25%=1084.8 kHz
Button 3	433.92 MHz	475.0 kHz < (refer to plot)	433.92MHzX0.25%=1084.8 kHz
Button 4	433.92 MHz	449.0 kHz < (refer to plot)	433.92MHzX0.25%=1084.8 kHz

Mon 2003 Jul 7 12:56

REF 107.0 dB μ V
10dB/

MK Δ 108.5 ms
-0.09 dB



Mon 2003 Jul 7 14:04

REF 107.0 dB μ V

MK Δ 680.0 μ s

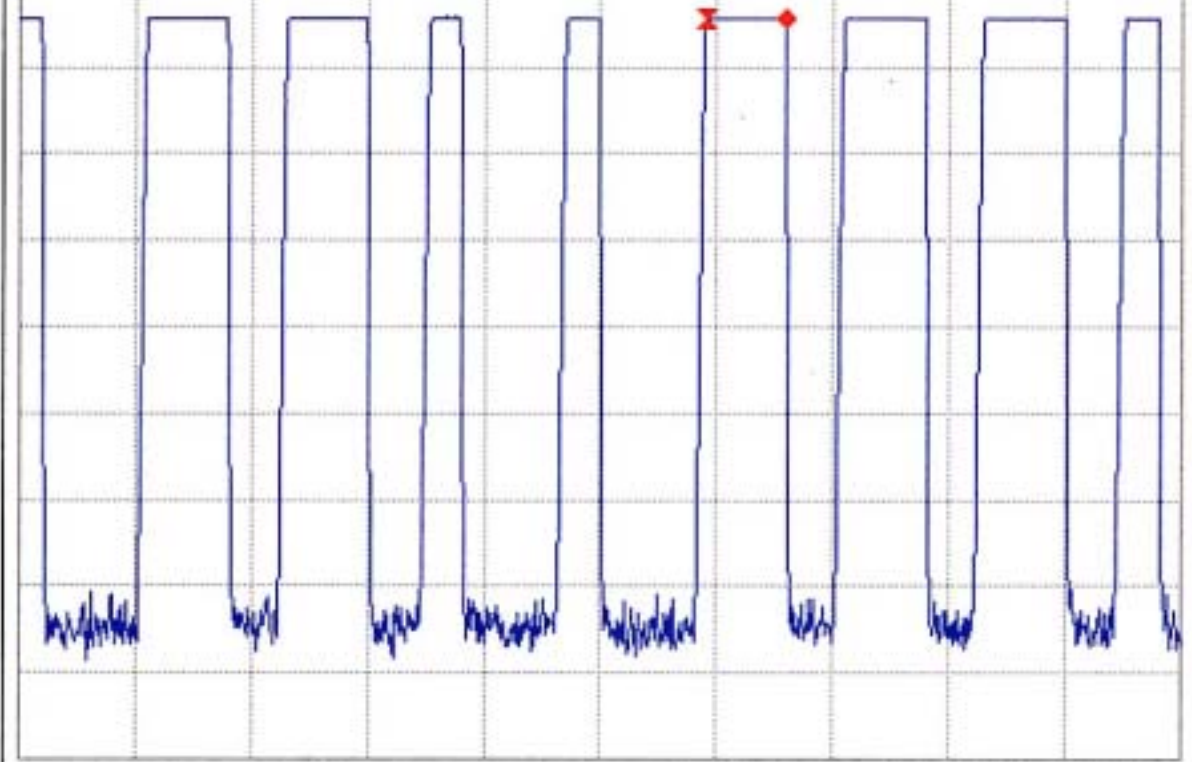
10dB/

A_Write Posi

B_Blank Posi

0.16 dB

DELTA MKR
680.0 μ s



CENTER 433.898000 MHz

SPAN 0.000 kHz

*RBW 100 kHz

*VBW 100 kHz

*SWP 10 ms

*ATT 10dB

Mon 2003 Jul 7 14:02

REF 107.0 dB μ V

MK Δ 270.0 μ s

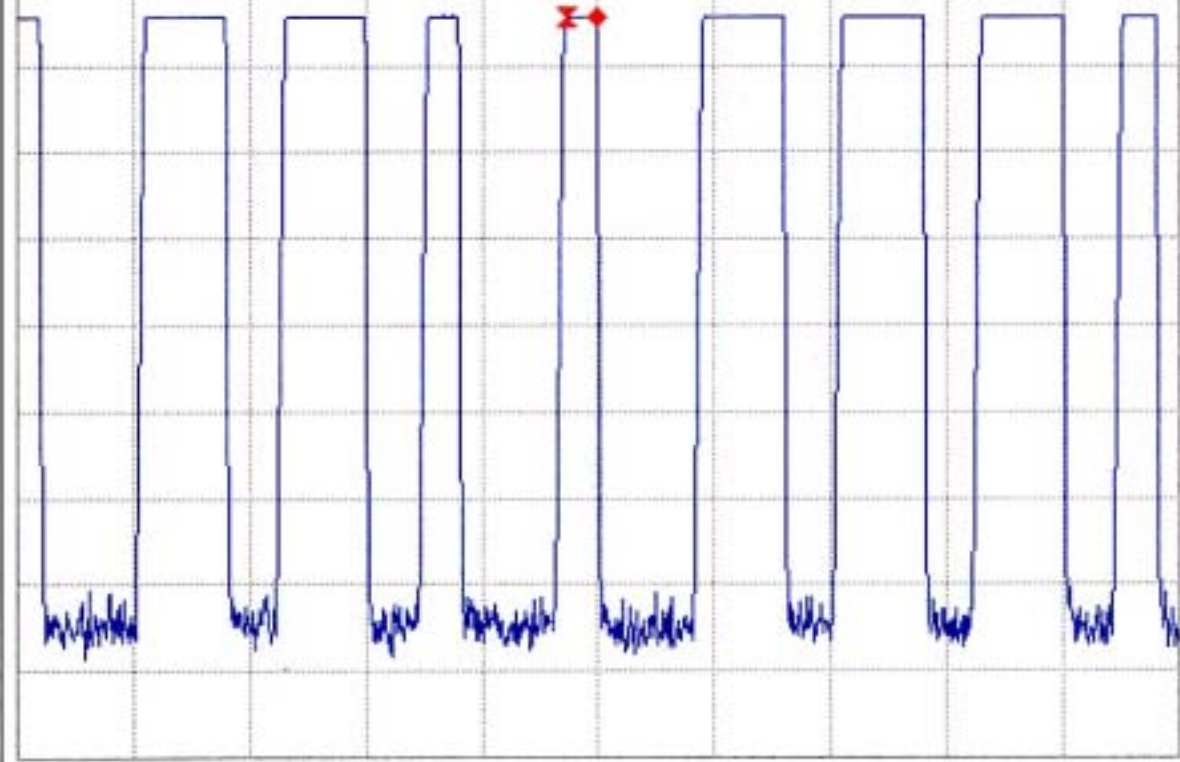
10dB/

A_Write Posi

B_Blank Posi

0.06 dB

DELTA MKR
270.0 μ s



CENTER 433.898000 MHz

SPAN 0.000 kHz

*RBW 100 kHz

*VBW 100 kHz

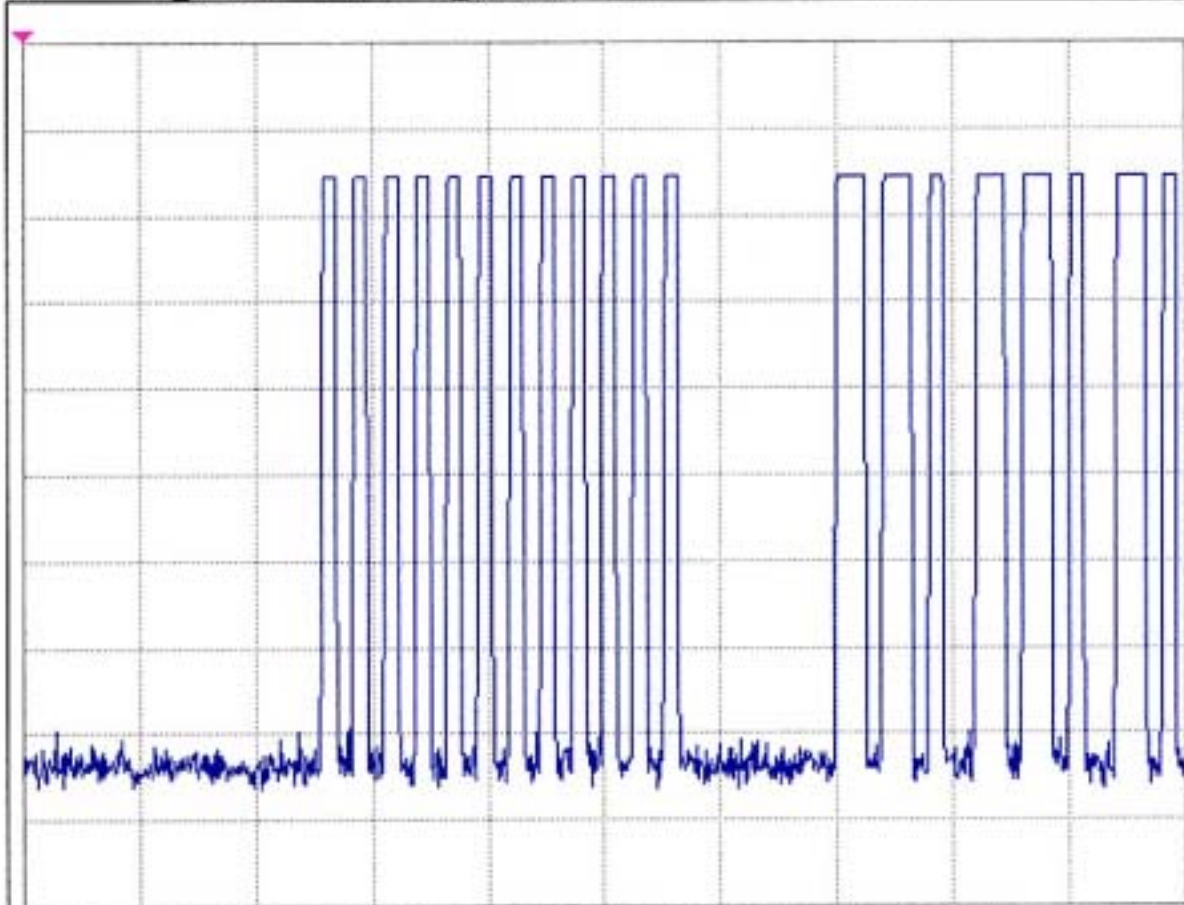
*SMP 10 ms

*ATT 10dB

Mon 2003 Jul 7 12:59

REF 107.0 dB μ V

10dB/ A_Write Posi B_Blank Posi



CENTER 433.898000 MHz

SPAN 0.000 kHz

*RBW 100 kHz

*VBW 100 kHz

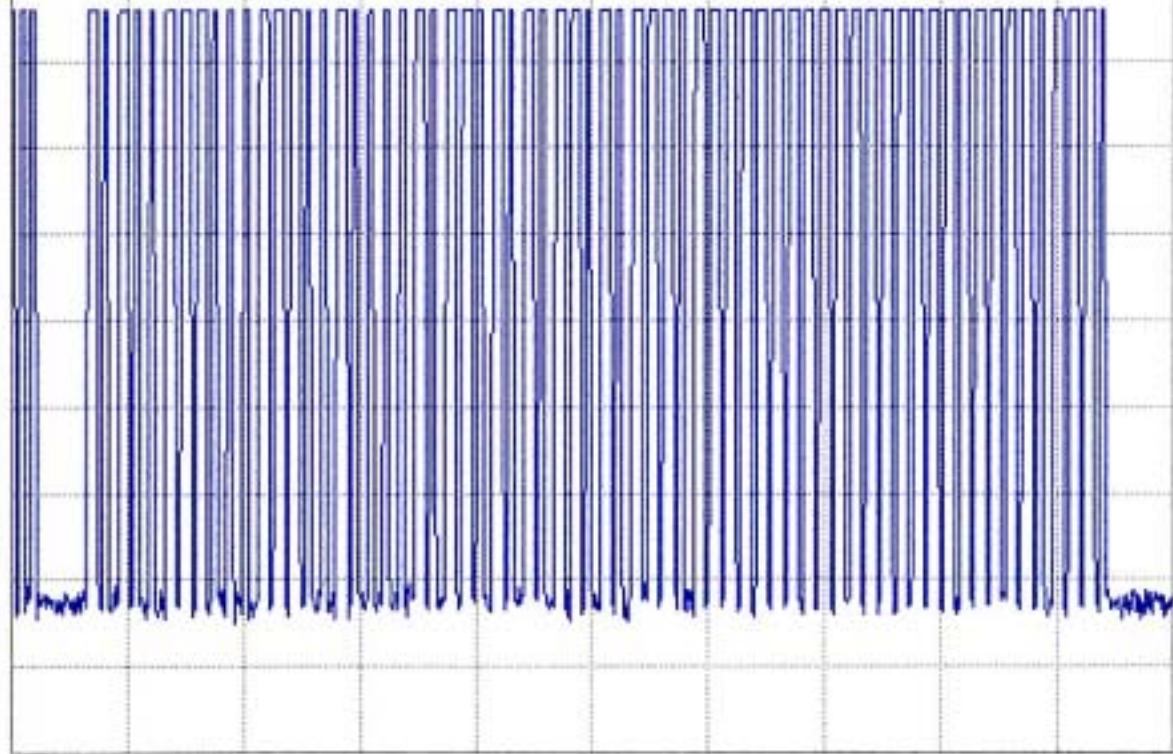
*SWP 30 ms

*ATT 10dB

Mon 2003 Jul 7 13:59

REF 107.0 dB μ V
10dB/ A_Write Posi B_Blank Posi

VBW
100 kHz

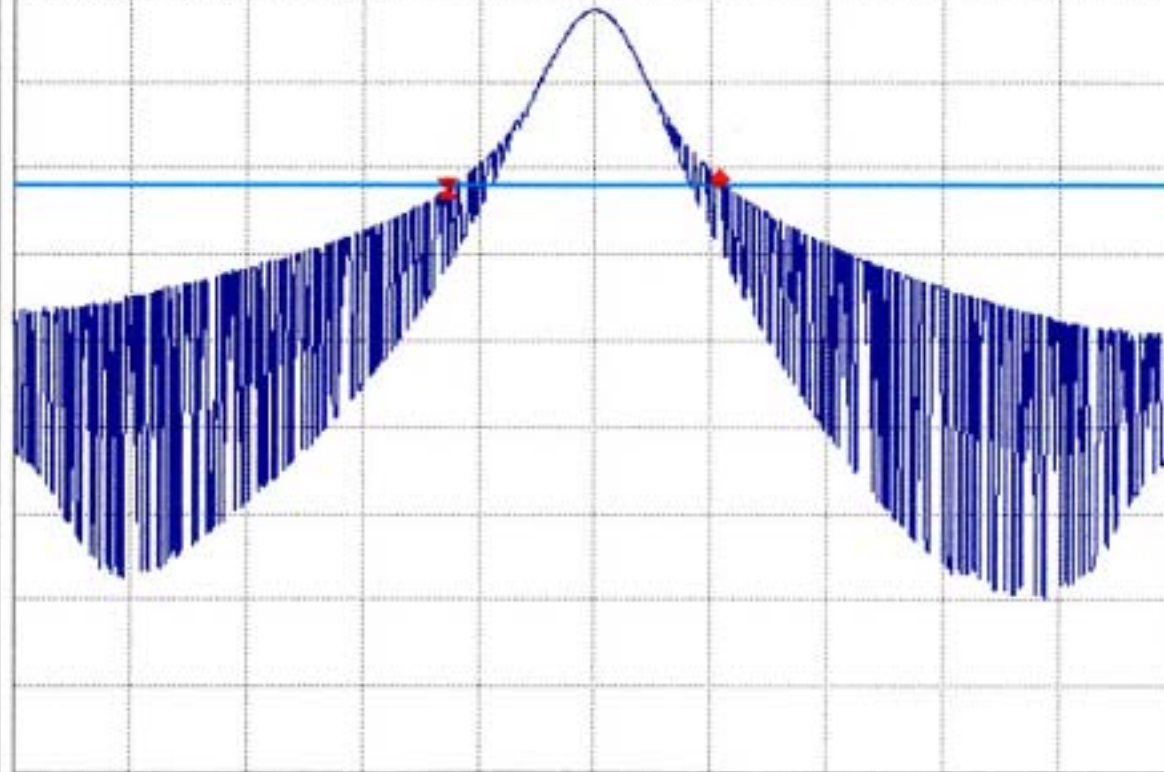


CENTER 433.898000 MHz SPAN 0.000 kHz
*RBW 100 kHz *VBW 100 kHz *SMP 90 ms *ATT 10dB

Mon 2003 Jul 7 12:53

REF 107.0 dB μ V DL 75.3 dB μ V MK Δ 470 kHz
10dB/ A_Max Posi B_Blank Posi 1.13 dB

DELTA MKR
470 kHz



CENTER 433.898 MHz SPAN 2.000 MHz
*RBW 100 kHz *VBW 100 kHz *SWP 20 ms *ATT 10dB



Compliance Certification
Services Inc.

FCC, VCCI, CISPR, CE, AUSTEL, NZ
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Project #: C30710402
Report #: C30710402-RP
Date: 2003/07/10
Test Engr: JIMMY CHEN

Company: NUTEK CORPORATION
EUT Description: AC17 (433.92 MHz / Car Alarm Transceiver)
Test Configuration : EUT ONLY
Type of Test: FCC 15.231(b)
Mode of Operation: Transmitter Mode

K Site

$$M\% = ((t1+t2+t3+\dots)/T) * 100\% = 39.51 \%$$

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

$$20 * \log(M\%) = -8.0659$$

	Freq. (MHz)	Pk Rdg (dBuV)	Av Rdg (dBuV)	AF/AT (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)
	Button #1:											
X	433.91	84.21	76.14	27.12	3.28	29.68	76.86	80.82	-3.96	3mV	270	1.20
	867.82	45.36	37.29	32.74	5.02	28.79	46.26	60.82	-14.56	3mV	90	1.00
Y	433.90	78.04	69.97	27.12	3.28	29.68	70.69	80.82	-10.13	3mV	90	1.30
	867.81	46.02	37.95	32.74	5.02	28.79	46.92	60.82	-13.90	3mV	180	1.50
Z	433.91	87.92	79.85	27.12	3.28	29.68	80.57	80.82	-0.25	3mV	0	1.00
	867.81	44.80	36.73	32.74	5.02	28.79	45.70	60.82	-15.12	3mV	180	1.10
X	433.91	79.43	71.36	27.12	3.28	29.68	72.08	80.82	-8.74	3mH	90	1.00
	867.81	41.18	33.11	32.74	5.02	28.79	42.08	60.82	-18.74	3mH	90	1.20
Y	433.91	86.43	78.36	27.12	3.28	29.68	79.08	80.82	-1.74	3mH	270	1.00
	867.82	43.32	35.25	32.74	5.02	28.79	44.22	60.82	-16.60	3mH	180	1.30
Z	433.91	80.15	72.08	27.12	3.28	29.68	72.80	80.82	-8.02	3mH	0	1.40
	867.81	45.86	37.79	32.74	5.02	28.79	46.76	60.82	-14.06	3mH	270	1.30

AF/AT=AF+10dB(ATTENUATOR)
Peak: RBW= 120KHz
VBW= 300KHz
A(Average): Pk Reading - 8.0659dB

Total Data #12

KEY 1

Thu 2004 Jan 15 17:47

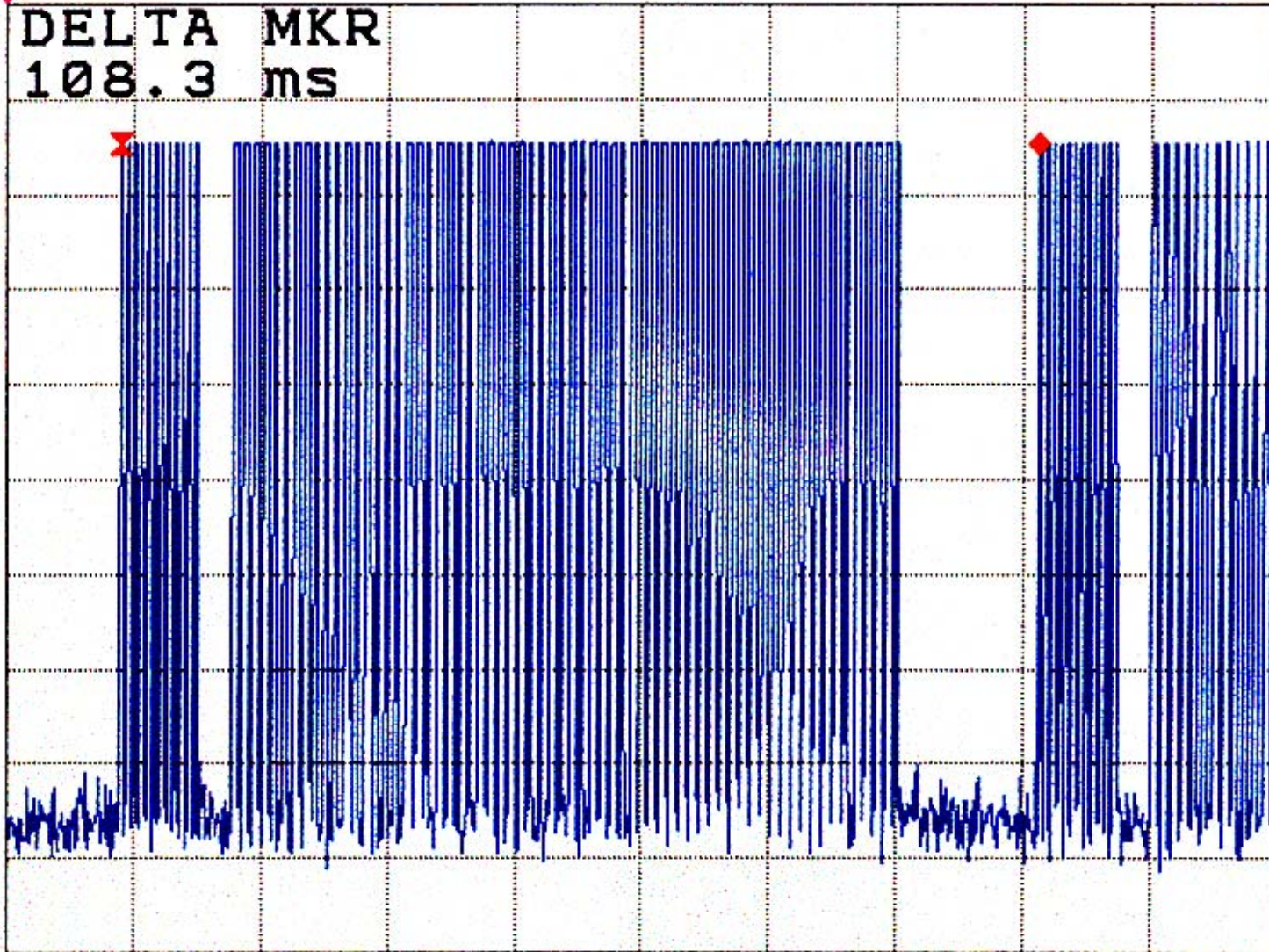
REF 107.0 dB μ V

MK Δ 108.3 ms

10dB/

A_Write Smpl B_Blank Posi

-0.10 dB



CENTER 433.919700 MHz

SPAN 0.000 kHz

*RBW 100 kHz *VBW 100 kHz *SWP 150 ms *ATT 10dB

KEY 1

Thu 2004 Jan 15 17:59

REF 107.0 dB μ V

MK Δ 670.0 μ s

10dB/

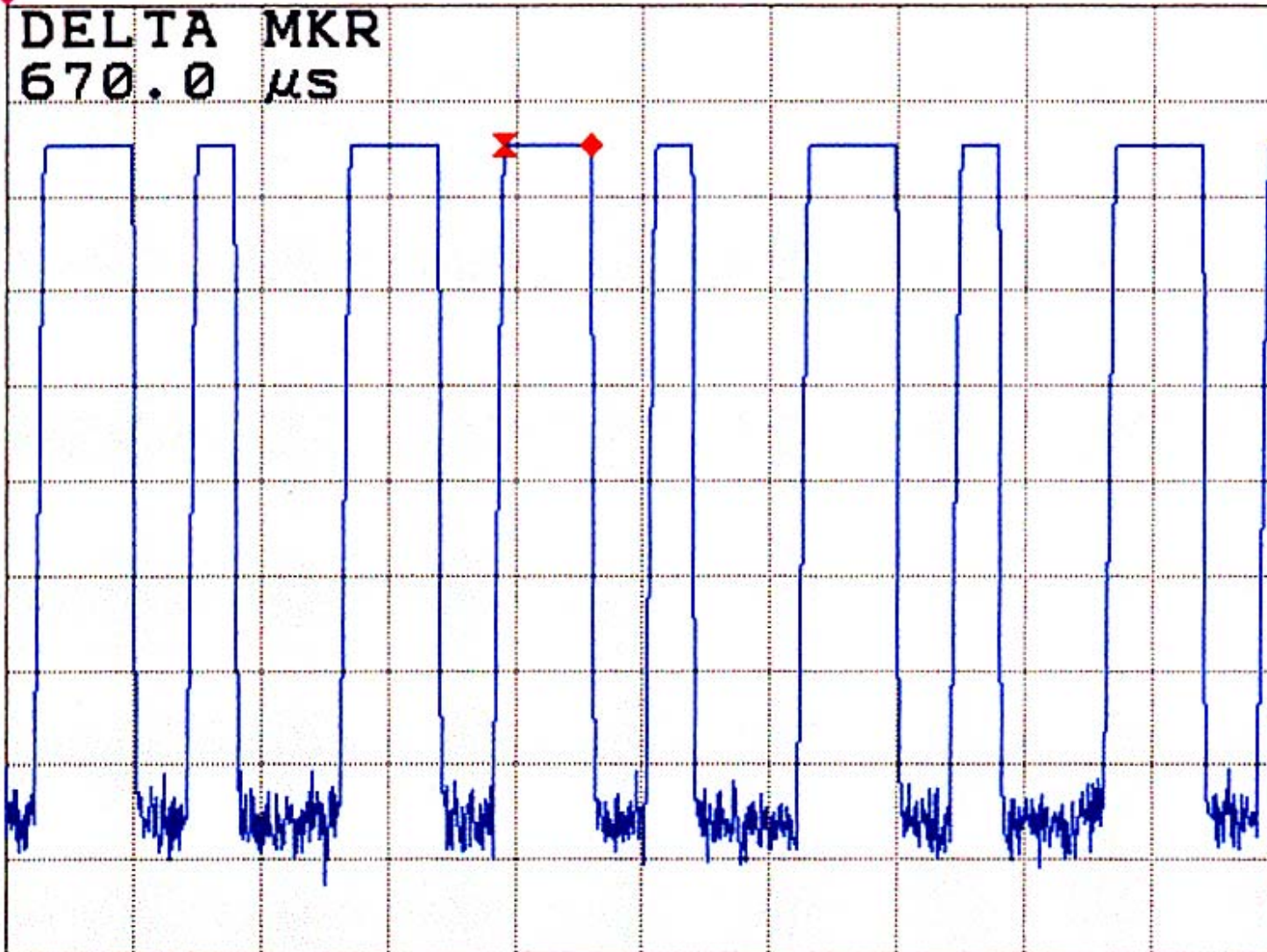
A_Write

Smpl

B_Blank

Posi

0.19 dB



CENTER 433.919700 MHz

SPAN 0.000 kHz

*RBW 100 kHz

*VBW 100 kHz

*SWP 10 ms

*ATT 10dB