

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

for

INTENTIONAL RADIATOR

433.92 MHz CAR ALARM TRANSMITTER

MODEL NAME: TX220

TRADE NAME: ADVANCE

FCC ID NO: H50T17

REPORT NO: 02T1157-1

ISSUE DATE: FEBRUARY 20, 2002

Prepared for

**ADVANCE SECURITY INC.
3F, 48 TA AN STREET
HIS-CHIH, TAIPEI HSIEN
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Prepared by

**COMPLIANCE ENGINEERING SERVICES, INC.
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1. VERIFICATION OF COMPLIANCE

COMPANY NAME: ADVANCE SECURITY INC.
 3F, 48 TA AN STREET
 HIS-CHIH, TAIPEI HSIEN, TAIWAN
 R. O. C.

CONTACT PERSON: MICHAEL CHEN/PRESIDENT
 TELEPHONE NO.: 02-8648-1688
 EUT DESCRIPTION: 433.92 MHz CAR ALARM TRANSMITTER
 MODEL NAME/NUMBER: TX220
 TRADE NAME: ADVANCE
 FCC ID: H5OT17
 DATE TESTED: 2/14/2002, 2/15/2002

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	433.92 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:



CHIN PANG
 EMC TECHNICIAN
 COMPLIANCE CERTIFICATION SERVICES

Approved & Released By:



THU CHAN
 SENIOR EMC ENGINEER
 COMPLIANCE CERTIFICATION SERVICES

2. PRODUCT DESCRIPTION

Fundamental Frequency	433.92 MHz
Power Source	12V Battery
Transmitting Time	Periodic \leq 5 seconds
Associated Receiver	Advance Security FCC ID: H5OR36

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	HP 0.1K - 1.5GHz	8568B	2732A03661	5/10/02
Spectrum Display	HP	85662A	2816A16696	5/4/02
Quasi Peak Adapter	HP9K - 1GHz	85650A	2811A01155	5/4/02
Pre-Amplifier, 25 dB	HP0.1 - 1300MHz	8447D (P5)	2944A06550	9/19/01
Antenna, LP	EMCO200 - 2000MHz	3146	9107-3163	8/10/01
Horn Antenna(1 - 18GHz)	EMCO	3115	9001-3245	6/20/02
Quasi-Peak Detector	HP9K - 1GHz	85650A	3145A01654	6/28/02
Spectrum Display	HP	85662A	3026A19146	6/28/02
Spectrum Analyzer	HP100Hz - 22GHz	8566B	3014A06685	6/28/02
Pre-Amplifier	MITEQ1-26GHz	NSP2600-44	646456	4/12/02

7. POWERLINE RFI LIMIT

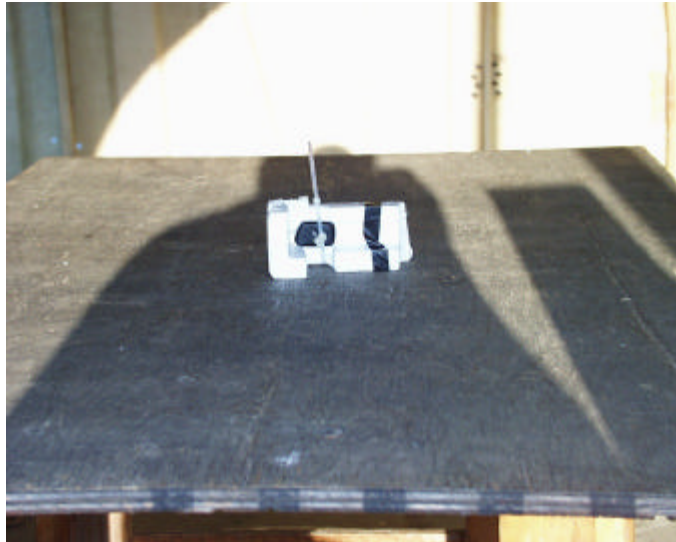
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHz TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NOT REQUIRED

8. RADIATED EMISSION LIMITS

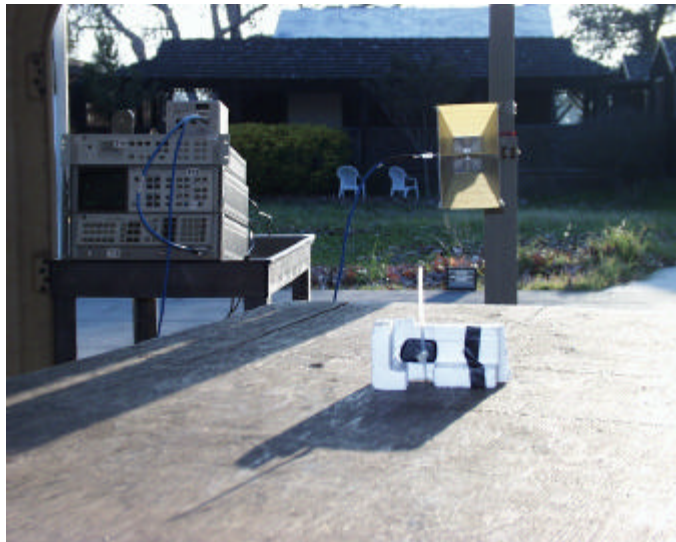
GENERAL REQUIREMENTS	SECTION 15.209
RESTRICTED BANDS OF OPERATION	SECTION 15.205
PERIODIC OPERATION IN THE BAND 40.66 - 40.70 MHz AND ABOVE 70 MHz.	SECTION 15.231

9. SYSTEM TEST CONFIGURATION

Use a block of foam and combined it with EUT wrapping cable tie 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.



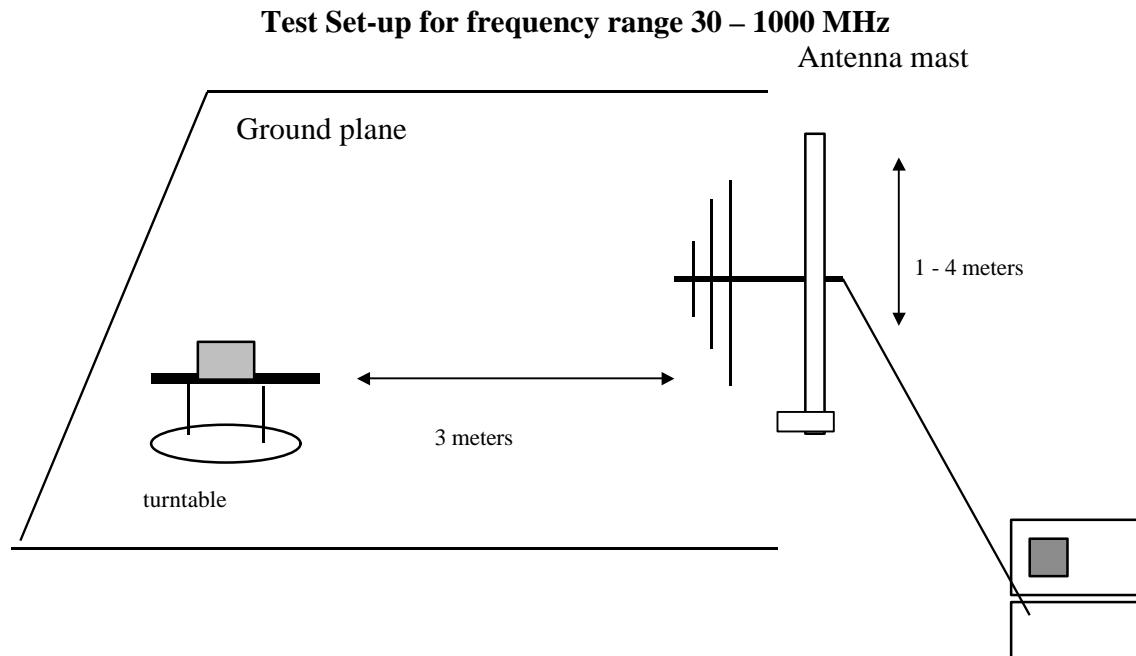
Radiated Open Site Test Set-up



High Frequency Test Set-up

10. TEST PROCEDURE

Radiated Emissions, 15.231(4)(b)



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.

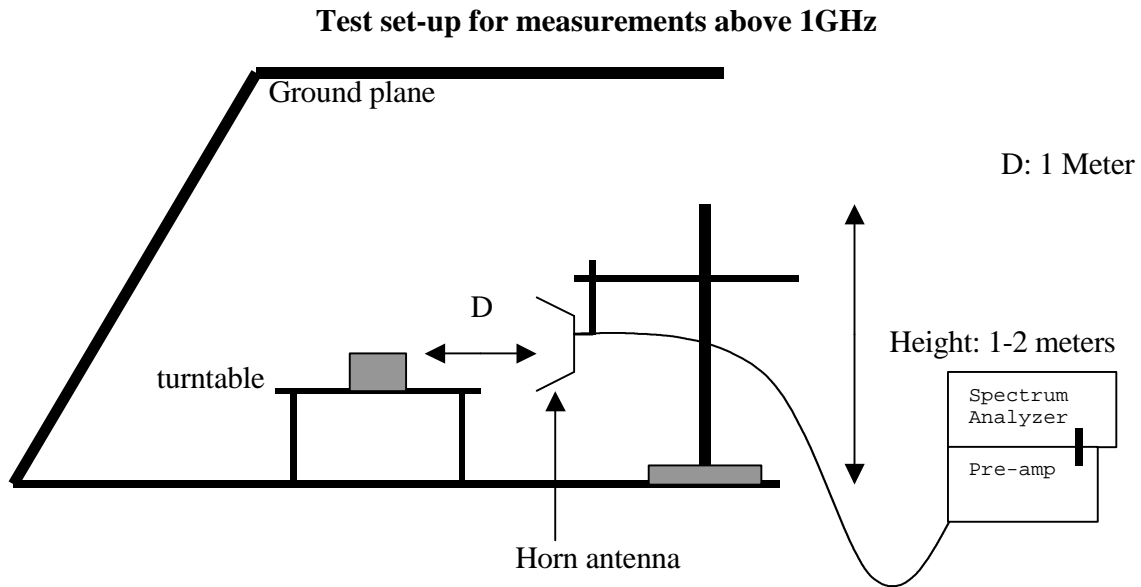


FIG. 2

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:

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 = 81.3 mS
 Long pulse = 1.78 mS
 Short pulse = 0.5 mS
 No of Long pulse = 10
 No of Short pulse = 15

Duty Cycle = (N1L1+N2L2+...+Nn-1Ln-1+NnLn)/81.3 or T

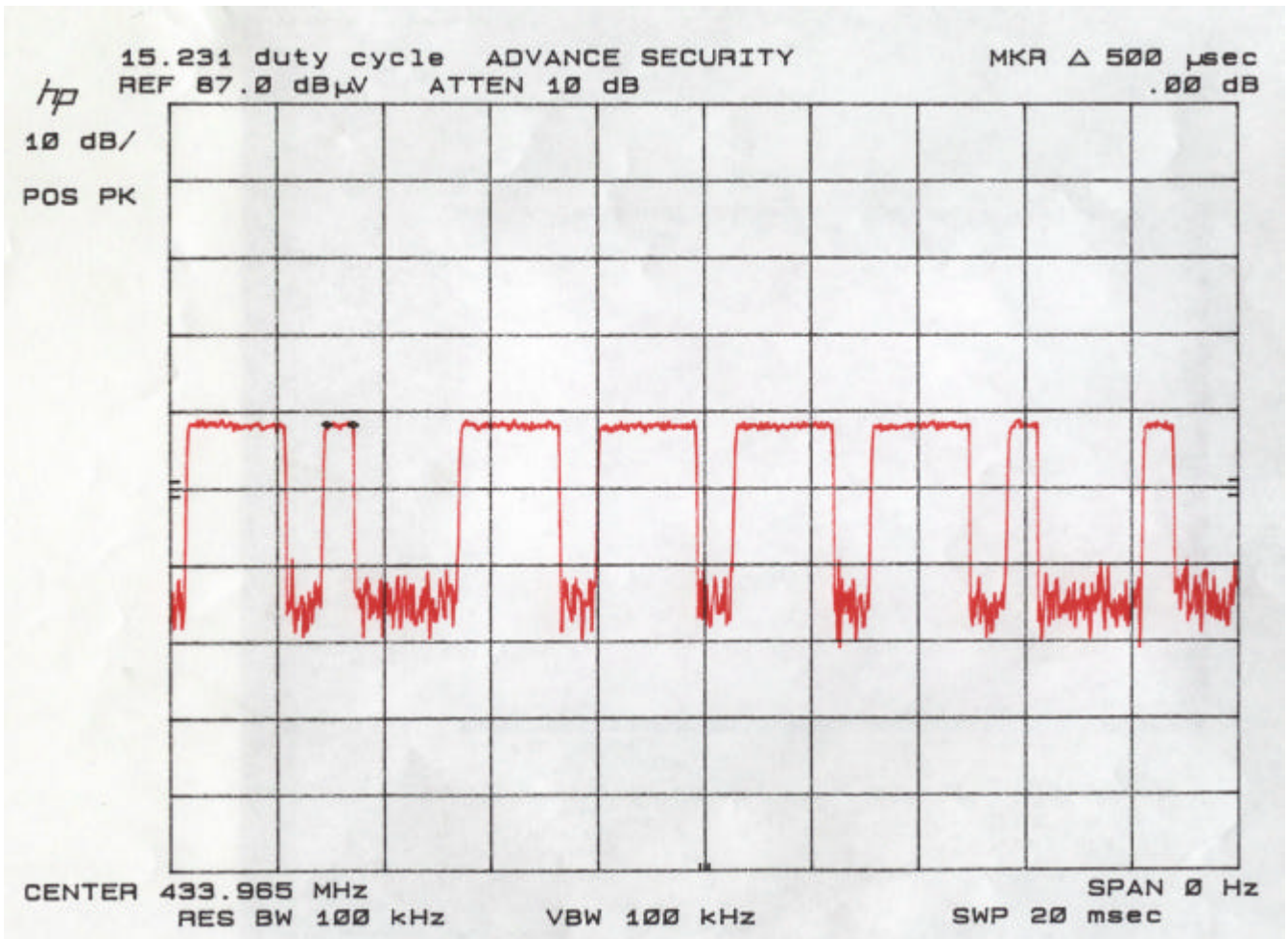
Duty Cycle = ((10x1.78)+(15x0.50))/81.3=0.3112=31.12%

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

12.2 EMISSION BANDWIDTH

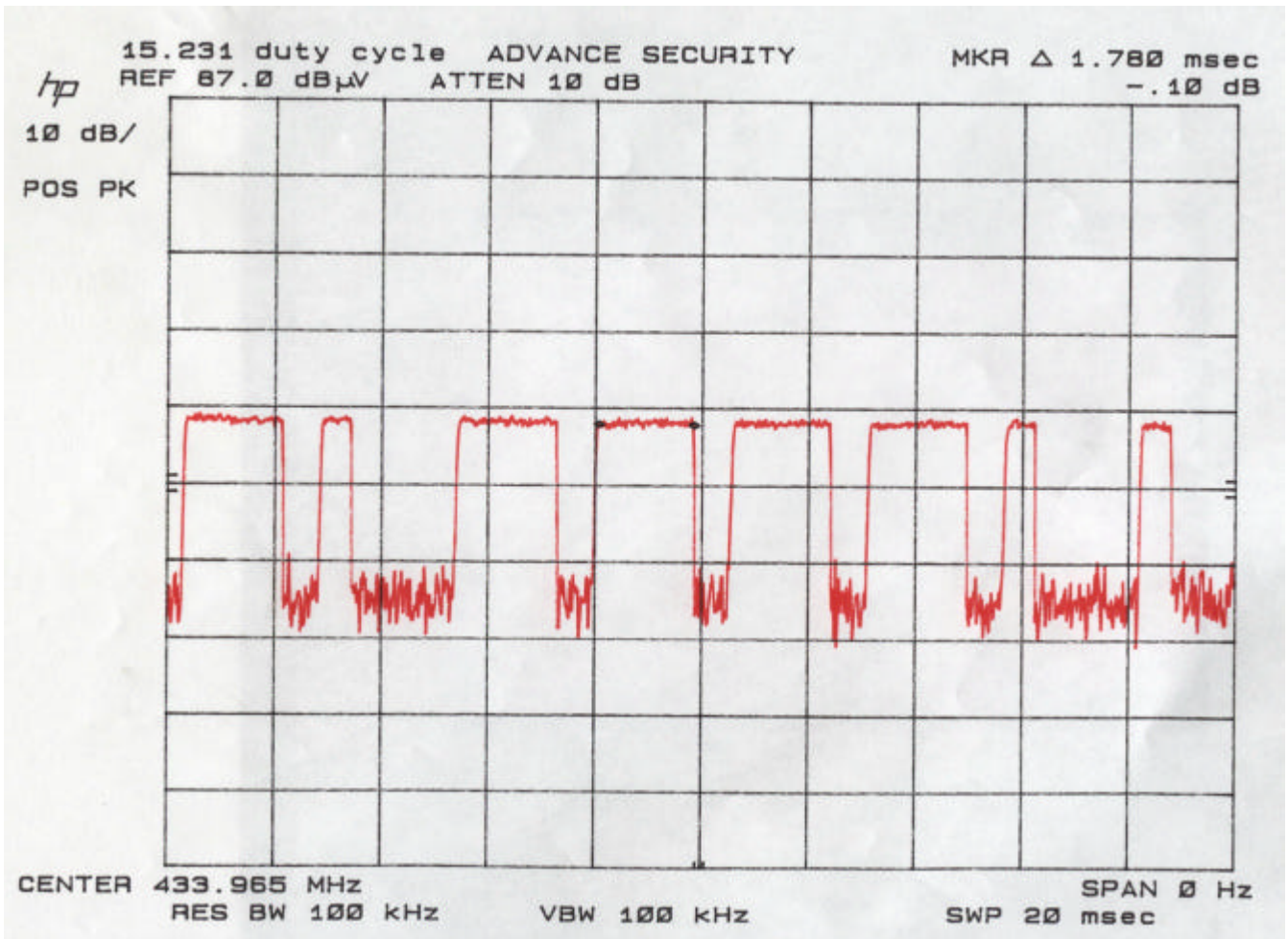
The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
434.061 MHz	433 KHz (refer to plot)	434.061 x 0.25%= 1.085 MHz



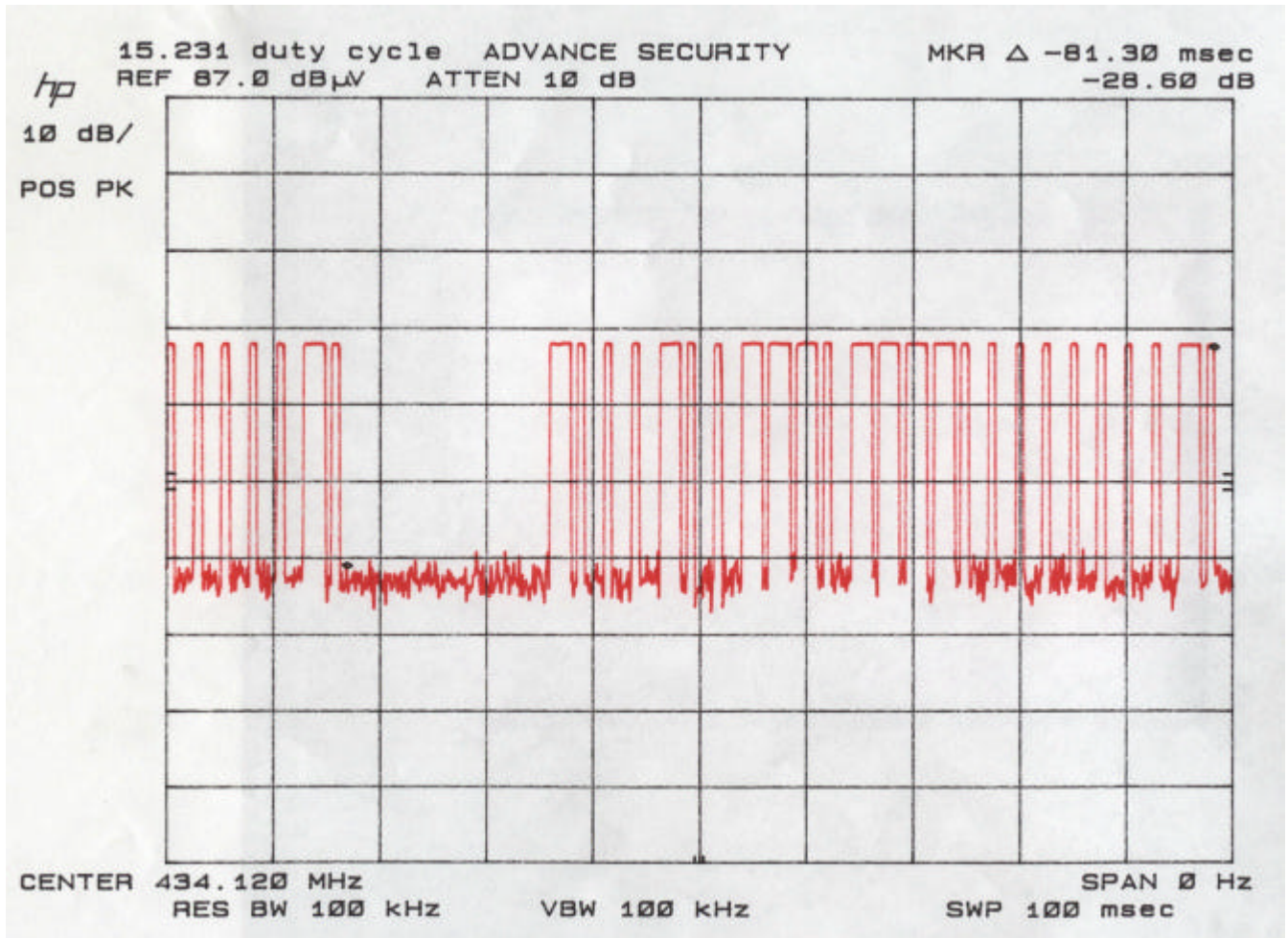
SHORT PULSE

PLOT 1



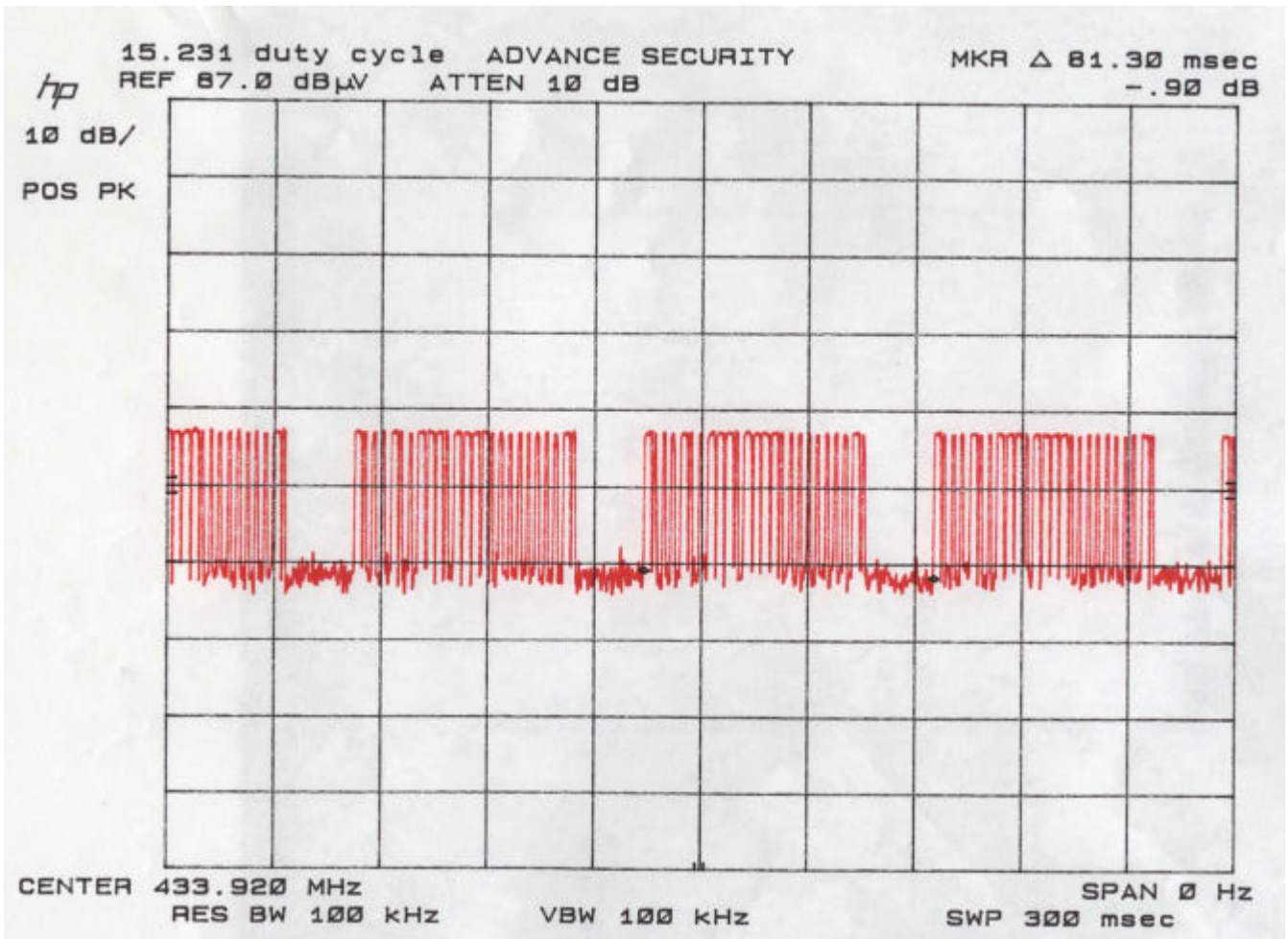
LONG PULSE

PLOT 2



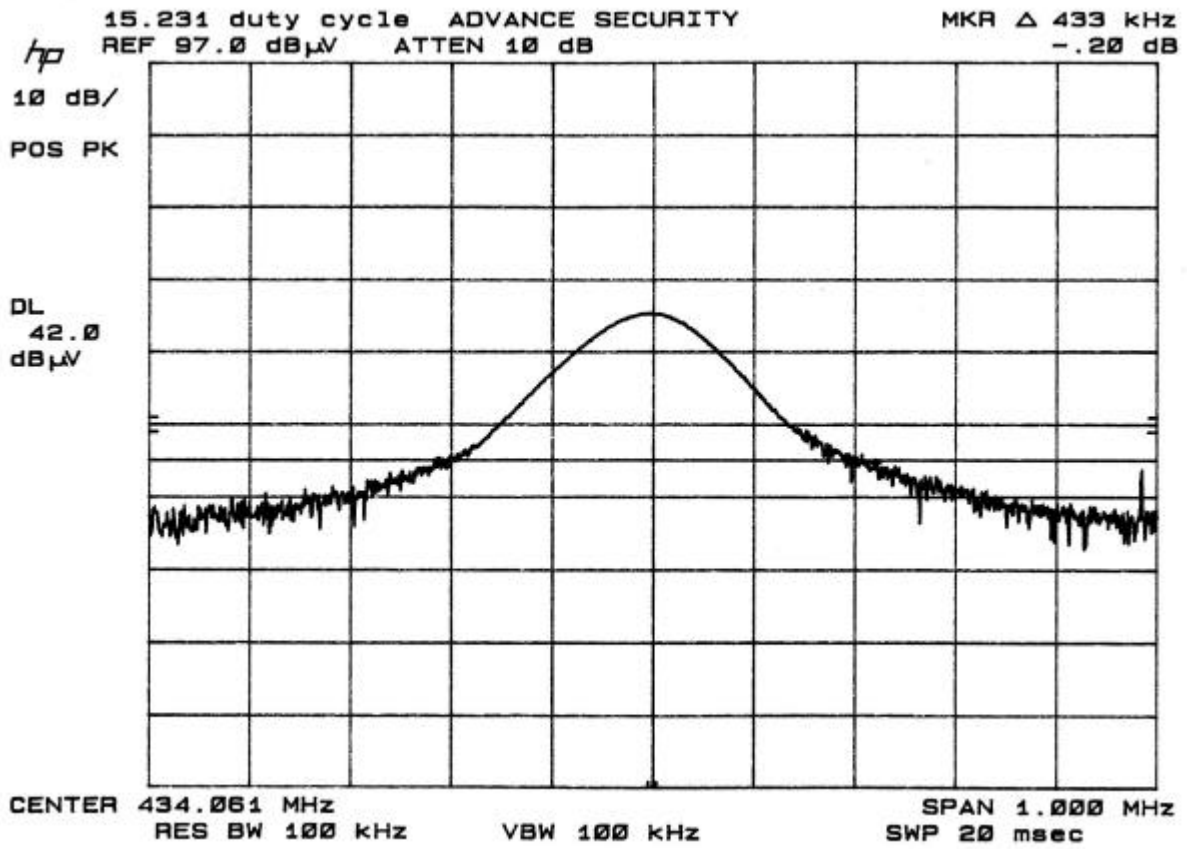
ONE PERIOD AT 100ms

PLOT 3



REFERENCE FOR MORE DUTY CYCLES AT 300msec

PLOT 4



EMISSION BANDWIDTH



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

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Project #: J2T1175-1
Report #: J20214C1
Date & Time: 02/14/02 5:46 PM
Test Engr: Chin Pang

Company: Advance Security Inc
EUT Description: 433.92MHz Car Alarm Transmitter
Test Configuration: EUT only
Type of Test: FCC 15.231
Mode of Operation: Transmitting

[<< Main Sheet](#)

$M\% = ((t1+t2+t3+\dots)/T)*81.3\% = 31.12\%$

$Av \text{ Reading} = Pk \text{ Reading} + 20*\log(M\%)$
$20*\log(M\%) = -10.14$

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)
433.92Mhz Fundamental frequency												
X-Position (stand Up)												
433.92	61.90	51.76	16.61	3.15	27.56	43.97	80.80	-36.83	3mV	0.00	1.00	P
433.92	53.90	43.76	16.53	3.15	27.56	35.88	80.80	-44.92	3mH	0.00	1.00	P
Y-Position (Side Lay Down)												
433.92	62.30	52.16	16.61	3.15	27.56	44.37	80.80	-36.43	3mV	0.00	1.00	P
433.92	56.20	46.06	16.53	3.15	27.56	38.18	80.80	-42.62	3mH	0.00	1.00	P
Z-Position (Lay Down)												
433.92	51.60	41.46	16.61	3.15	27.56	33.67	80.80	-47.13	3mV	0.00	1.00	P
433.92	61.30	51.16	16.53	3.15	27.56	43.28	80.80	-37.52	3mH	0.00	1.00	P
The Data show Y-Position is the worst case												
868.60	63.10	52.96	21.33	4.83	27.63	51.49	60.80	-9.31	3mV	0.00	1.00	P
868.60	67.00	56.86	22.08	4.83	27.63	56.15	60.80	-4.65	3mH	0.00	2.00	P

Note: See other sheets for Hi-Frequency data above 1 GHz.

RADIATED DATA

02/14/02 FCC Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Equipment for 1-22 GHz
 HP8566B Analyzer
 Miteq NSP2600-44 Preamp
 EMCO 3115 Antenna
 Cable: 16.0 feet
 FCC Measurement

Equipment for 22 - 58 GHz
 HP8566B Analyzer
 HP 11975A Amplifier (LO)
 HP11970K External mixer/antenna
 Cable: IF Only (321 MHz)

Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

Peak Measurements:
 1MHz Resolution Bandwidth
 1MHz Video Bandwidth

EUT: 433.92Mhz Car Alarm Transmitter

$M\% = ((t1+t2+t3+...)/T)*81.3\% = 31.12\%$

$Av\ Reading = Pk\ Reading + 20*\log(M\%)$
$20*\log(M\%) = -10.14$

f	Dist	Read Peak	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Peak Lim	Avg Lim	Peak Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
1.301	6.6	50.5	40.4	23.9	2.9	-42.4	-3.5	0.0	31.5	21.4	74.0	54.0	-42.5	-32.6	V
1.735	6.6	62.5	52.4	25.8	3.5	-42.4	-3.5	0.0	45.9	35.8	74.0	54.0	-28.1	-18.2	V
2.169	6.6	51.4	41.3	27.5	3.9	-42.4	-3.5	0.0	36.9	26.8	74.0	54.0	-37.1	-27.2	V
2.603	6.6	50.3	40.2	28.4	4.2	-42.3	-3.5	0.0	37.2	27.1	74.0	54.0	-36.8	-26.9	V
3.037	6.6	49.6	39.5	30.2	4.5	-42.2	-3.5	0.0	38.7	28.6	74.0	54.0	-35.3	-25.4	V
3.471	6.6	49.2	39.1	31.5	4.9	-42.1	-3.5	0.0	40.1	30.0	74.0	54.0	-33.9	-24.0	V
3.905	6.6	49.5	39.4	32.7	5.3	-42.0	-3.5	0.0	42.1	32.0	74.0	54.0	-31.9	-22.0	V
4.339	6.6	54.5	44.4	32.7	5.7	-41.9	-3.5	0.0	47.5	37.4	74.0	54.0	-26.5	-16.6	V

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

RADIATED EMISSIONS (HARMONIC)

02/14/02 FCC Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Equipment for 1-22 GHz
 HP8566B Analyzer
 Miteq NSP2600-44 Preamp
 EMCO 3115 Antenna
 Cable: 16.0 feet
 FCC Measurement

Equipment for 22 - 58 GHz
 HP8566B Analyzer
 HP 11975A Amplifier (LO)
 HP11970K External mixer/antenna
 Cable: IF Only (321 MHz)

Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

Peak Measurements:
 1MHz Resolution Bandwidth
 1MHz Video Bandwidth

EUT: 433.92Mhz Car Alarm Transmitter

$M\% = ((t1+t2+t3+\dots)/T)*81.3\% = 31.12\%$

$Av\ Reading = Pk\ Reading + 20*\log(M\%)$
$20*\log(M\%) = -10.14$

f	Dist	Read Peak	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Peak Lim	Avg Lim	Peak Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
1.301	6.6	50.9	40.8	23.9	2.9	-42.4	-3.5	0.0	31.9	21.8	74.0	54.0	-42.1	-32.2	H
1.735	6.6	56.4	46.3	25.8	3.5	-42.4	-3.5	0.0	39.8	29.7	74.0	54.0	-34.2	-24.3	H
2.169	6.6	51.5	41.4	27.5	3.9	-42.4	-3.5	0.0	37.0	26.9	74.0	54.0	-37.0	-27.1	H
2.603	6.6	49.6	39.5	28.4	4.2	-42.3	-3.5	0.0	36.5	26.4	74.0	54.0	-37.5	-27.6	H
3.037	6.6	49.7	39.6	30.2	4.5	-42.2	-3.5	0.0	38.8	28.7	74.0	54.0	-35.2	-25.3	H
3.471	6.6	50.7	40.6	31.5	4.9	-42.1	-3.5	0.0	41.6	31.5	74.0	54.0	-32.4	-22.5	H
3.905	6.6	49.5	39.4	32.7	5.3	-42.0	-3.5	0.0	42.1	32.0	74.0	54.0	-31.9	-22.0	H
4.339	6.6	50.9	40.8	32.7	5.7	-41.9	-3.5	0.0	43.9	33.8	74.0	54.0	-30.1	-20.2	H

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

RADIATED EMISSIONS (HARMONIC)