

**FCC PART 15 SUBPART C
CERTIFICATION REPORT**

FOR

433.92 MHz CAR ALARM RECEIVER

MODEL: TX540/TX221

FCC ID NO: GOH-PAN04

REPORT NO: 02T1706-1

ISSUE DATE: JAN. 17, 2003

Prepared for

**CODE SYSTEMS, INC.
525 MINNESOTA
TROY MI 48083
USA**

Prepared by

**COMPLIANCE ENGINEERING SERVICES, INC.
*d.b.a.***

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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 : CODE SYSTEMS, INC.
525 MINNESOTA
TROY MI 48083 USA
CONTACT PERSON : SHANE WILSON
EUT DESCRIPTION : 433.92 MHz CAR ALARM RECEIVER
MODEL NO : TX540/TX221
FCC ID : GOH-PAN04
DATE TESTED : 1-9-2003
REPORT NUMBER : 02T1706-1

TYPE OF EQUIPMENT	HANDS FREE CAR KIT
EQUIPMENT TYPE	433.92MHz, CAR Alarm Transmitter
MEASUREMENT PROCEDURE	ANSI C63.4 / 2001
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
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

2. PRODUCT DESCRIPTION

Fundamental Frequency	433.92 MHz
Power Source	12V Battery
Transmitting Time	Periodic $\leq$ 5 seconds
Associated Receiver	NA
Manufacturer	Advance Security, Inc.

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 C63.4/2001.

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
Pre-amplifier,35.5 dB (1 - 26.5GHz)	HP	8449B	3008A00369	7/15/03
Pre-Amplifier, 25 dB	HP 0.1 - 1300MHz	8447D (P_1M)	2944A06833	8/22/03
Quasi-Peak Detector	HP9K - 1GHz	85650A	3145A01654	6/1/03
Spectrum Display	HP	85662A	2152A03066	6/1/03
Spectrum Analyzer	HP100Hz - 22GHz	8566B	3014A06685	6/1/03
Antenna, LP	EMCO200 - 2000MHz	3146	2120	3/30/03
Horn	EMCO	3115	6717	1/30/03

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

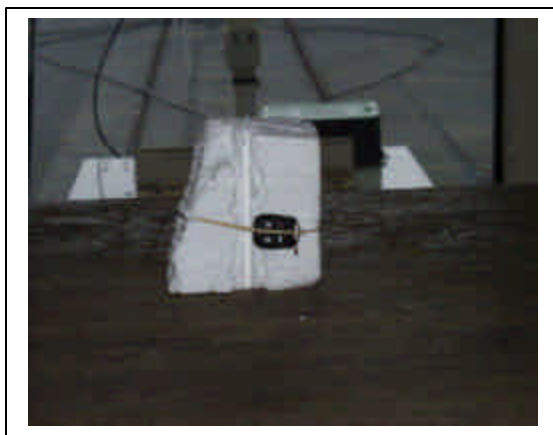
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X,Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



X-Axis



Y-Axis



Z-Axis

Radiated Open Site Test Set-up

10. TEST PROCEDURE

Radiated Emissions, 15.231(4)(b)

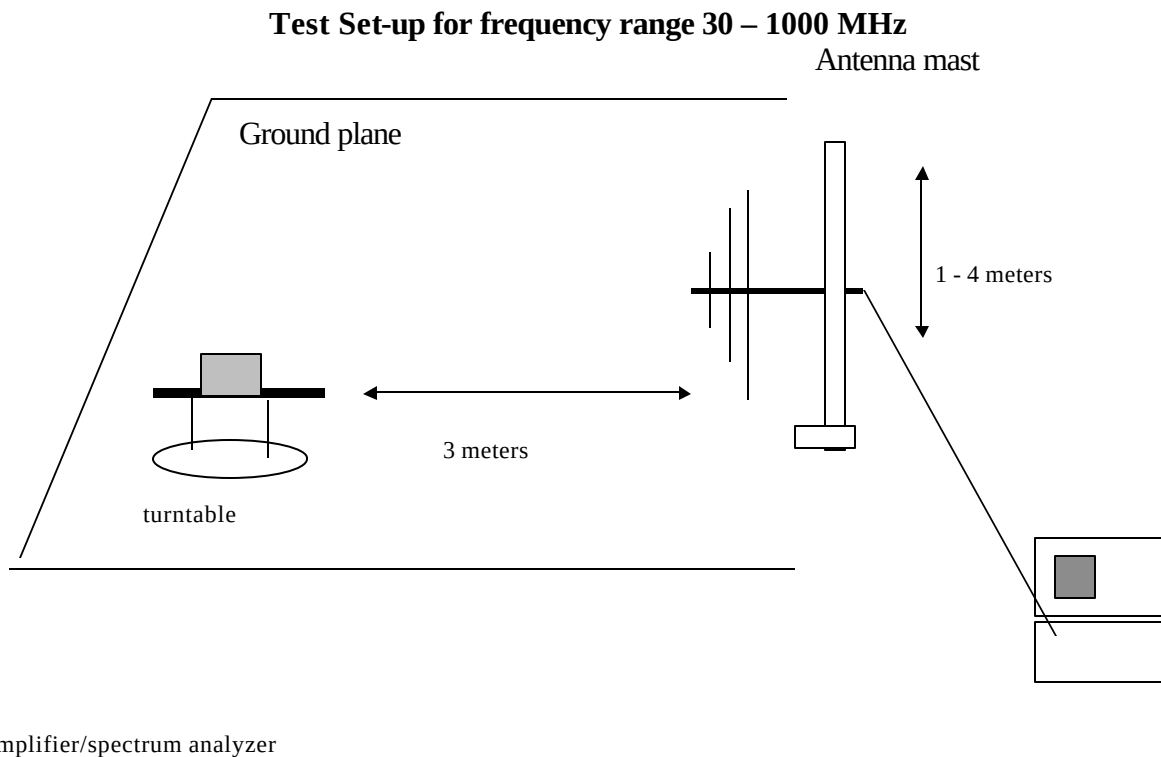
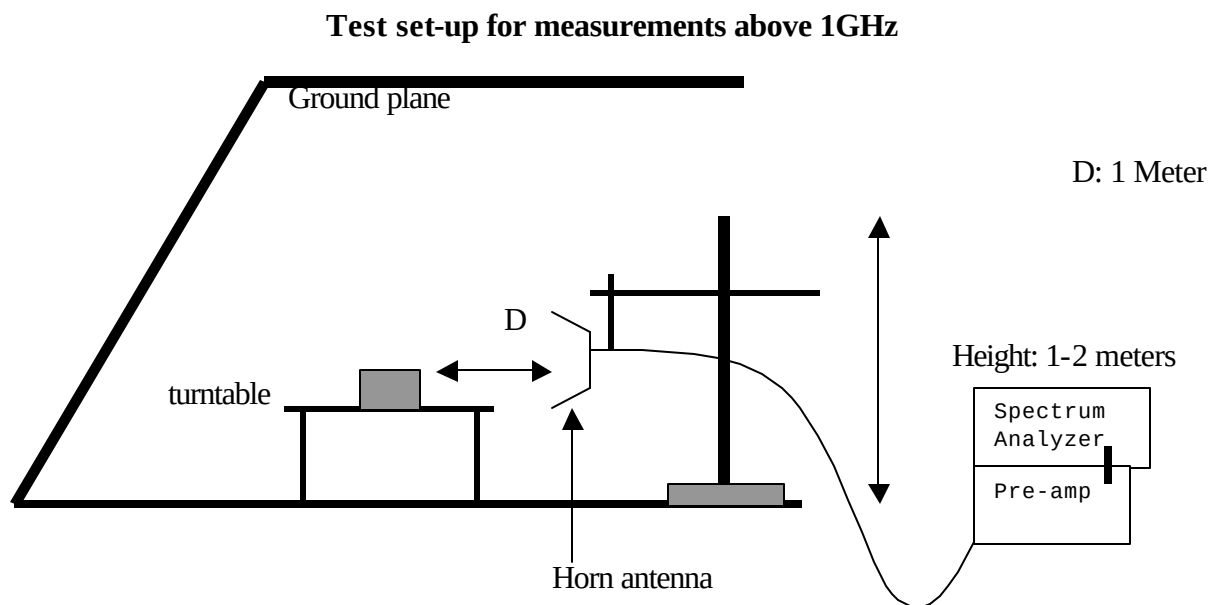


Fig. 1

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.



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 = 45.90 ms
 Long pulse = 0.6 ms
 Short pulse = 0.22 ms
 No of Long pulse = 15
 No of Short pulse = 10

Duty Cycle = (N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T

Duty Cycle = ((10x0.22)+(15x0.6))/45.90=0.244=24.4%

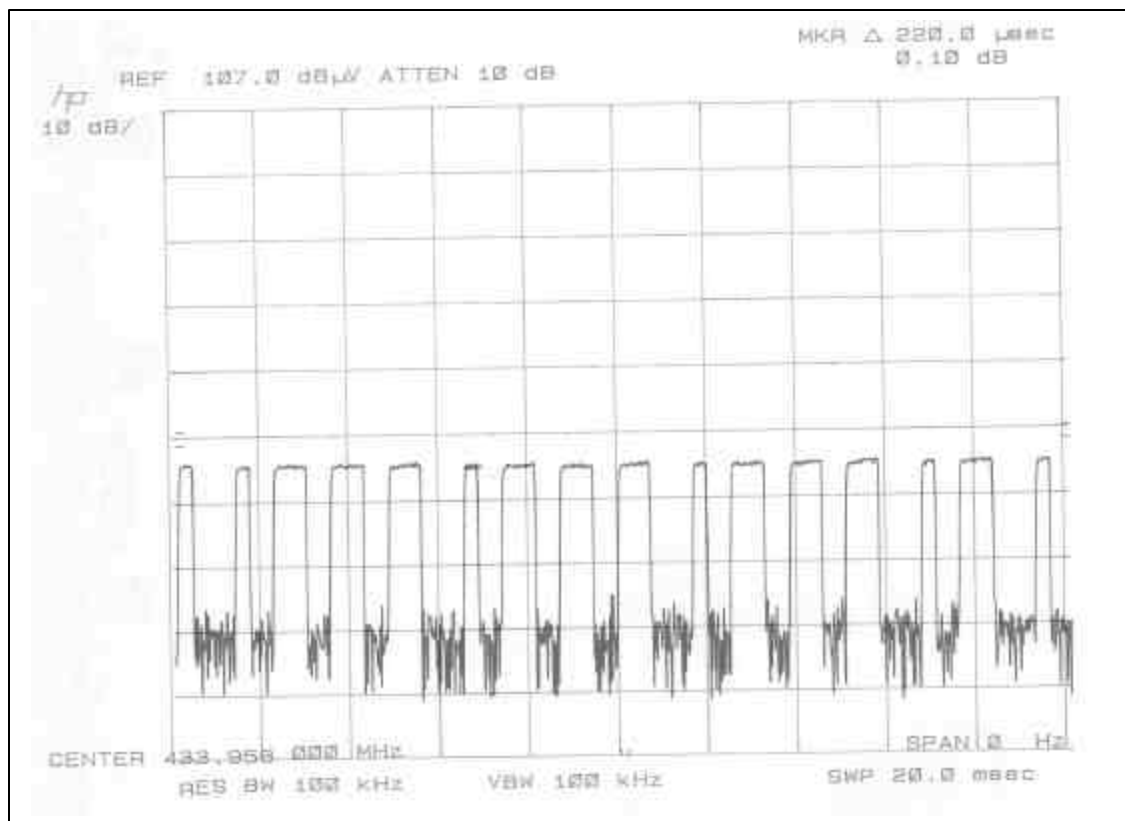
For duty cycle refer to plot #1, 2, 3,4.

12.2 EMISSION BANDWIDTH

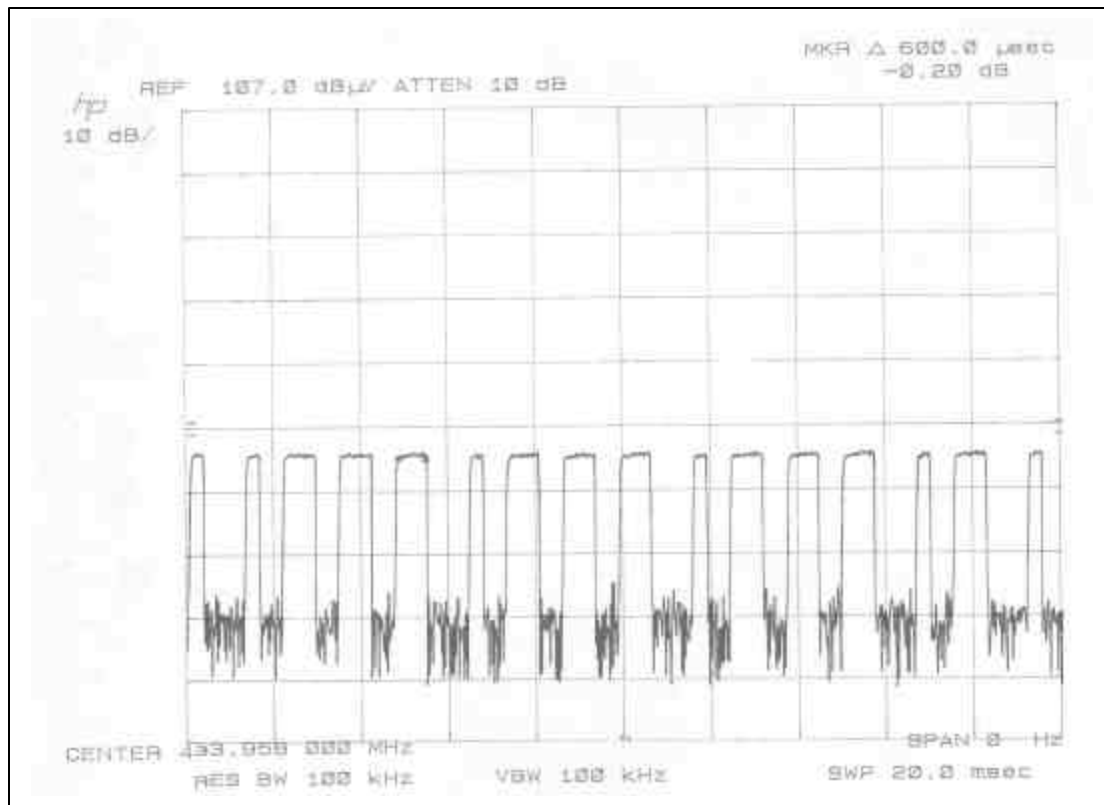
The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
433.92 MHz	271 KHz (refer to plot)	433.96 x 0.25 % = 1.0849MHz

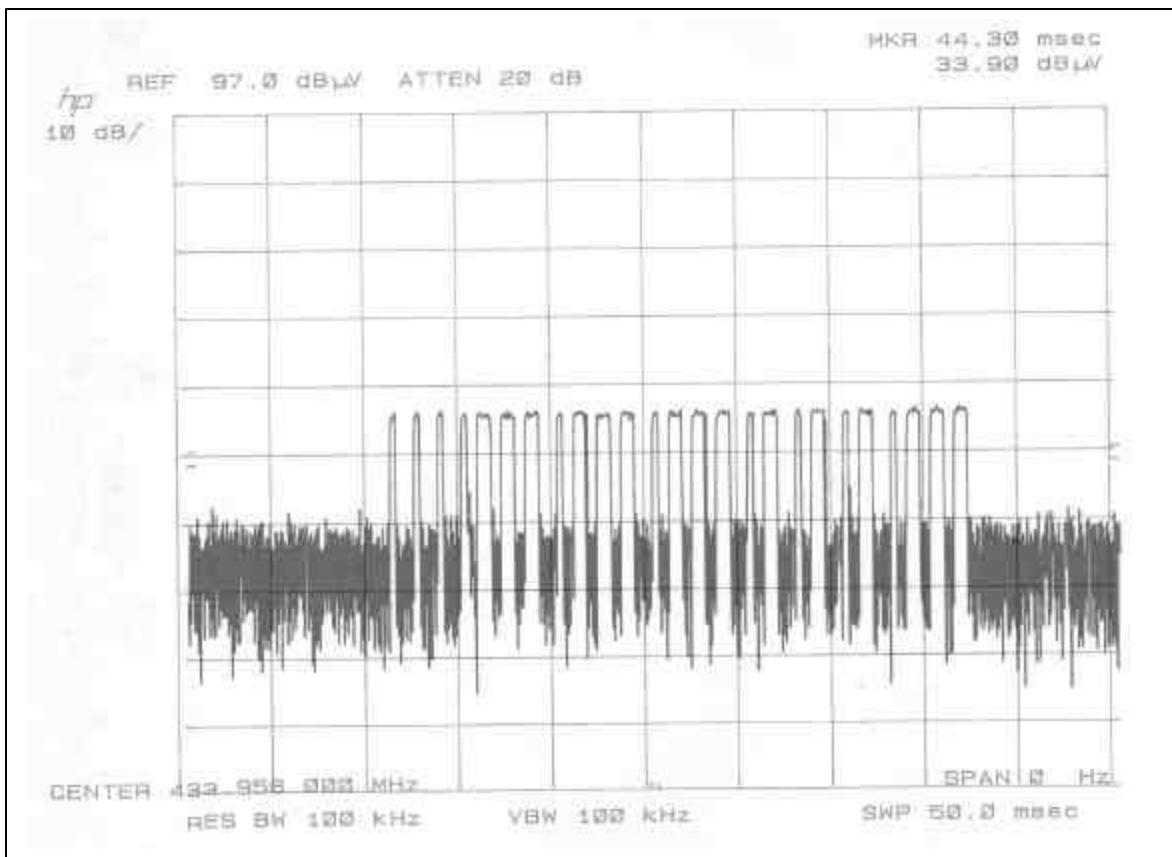
DUTY CYCLE 1



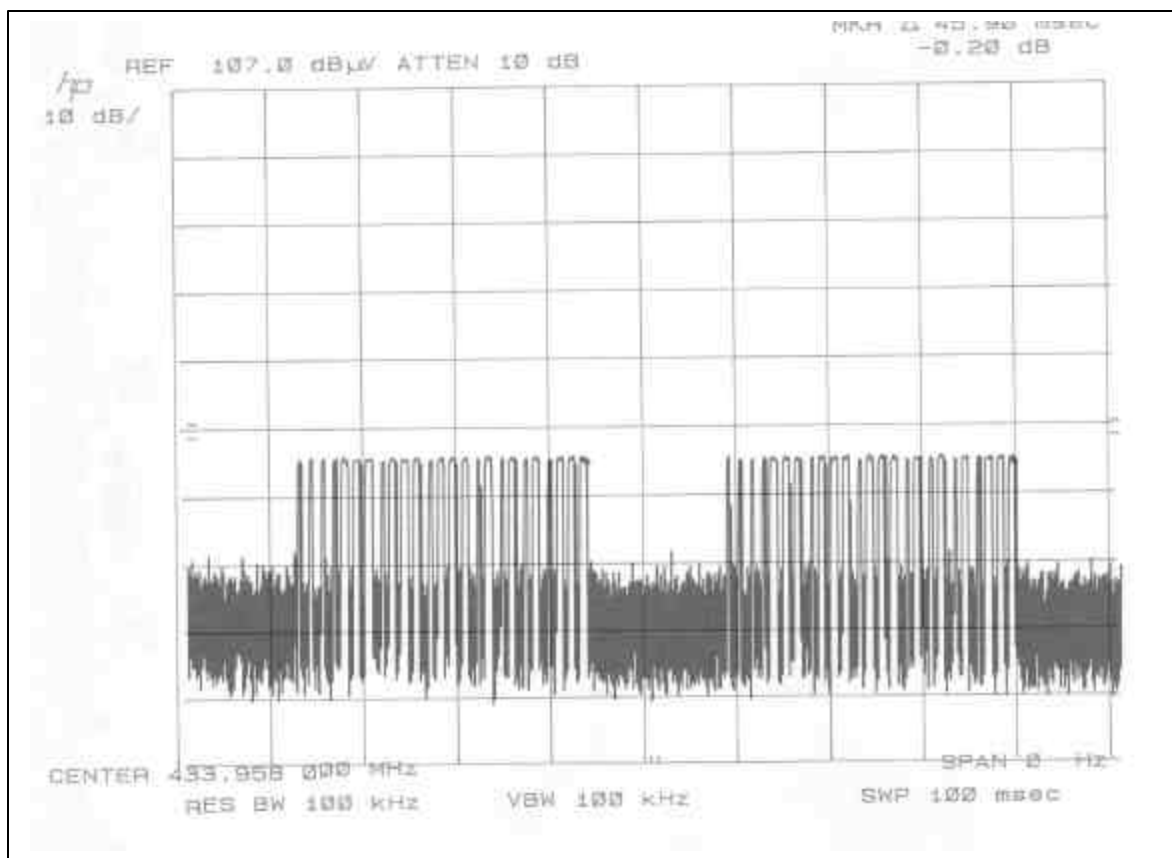
DUTY CYCLE 2



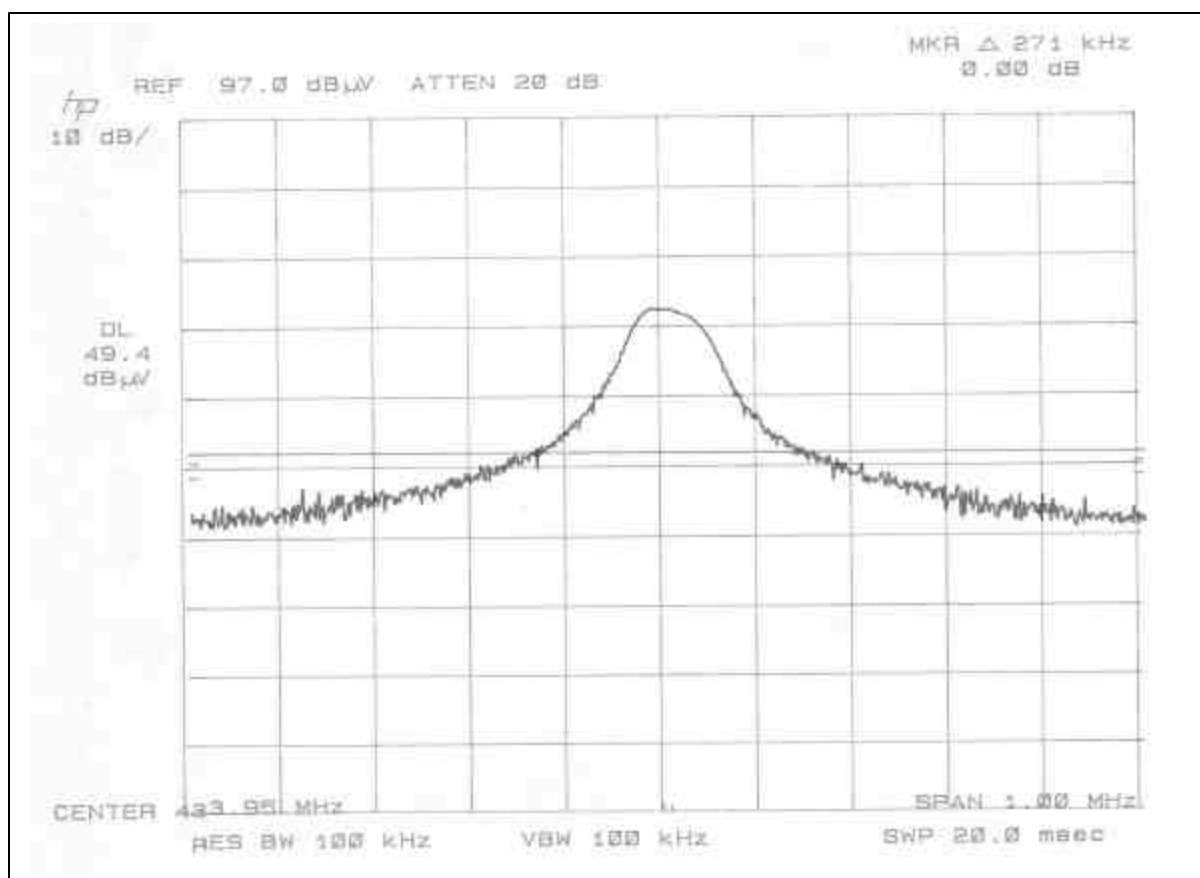
DUTY CYCLE 3



DUTY CYCLE 4



EMISSION BANDWIDTH



RADIATED DATA

		Project #: 02T1706-1 Report #: 03D109A1 Date & Time: 01/09/03 Test Engr: Chin Pang
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		
Company: EUT Description: Test Configuration: Type of Test: Mode of Operation:	Advance Security Inc. Car Alarm Transmitter EUT only (TX540 & TX221) FCC 15.231 Transmitting	

$M\% = ((t1+t2+t3+...)/T)*45.9\% = 24.46\%$

$Av\ Reading = Pk\ Reading + 20*\log(M\%)$
 $20*\log(M\%) = -12.23$

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												
Y-Position (stand Up)												
433.90	61.20	48.97	16.61	3.15	27.56	41.18	80.80	-39.62	3mV	0.00	1.00	P
433.90	54.10	41.87	16.53	3.15	27.56	33.99	80.80	-46.81	3mH	0.00	1.00	P
X-Position (Lay Down)												
433.90	48.40	36.17	16.61	3.15	27.56	28.38	80.80	-52.42	3mV	0.00	1.00	P
433.90	60.40	48.17	16.53	3.15	27.56	40.29	80.80	-40.51	3mH	0.00	1.00	P
Z-Position (EUT Placed Side Way))												
433.90	57.80	45.57	16.61	3.15	27.56	37.78	80.80	-43.02	3mV	0.00	1.00	P
433.90	55.90	43.67	16.53	3.15	27.56	35.79	80.80	-45.01	3mH	0.00	1.00	P
The Data show Y-Position is the worst case												
867.90	45.80	33.57	21.33	4.83	27.63	32.10	60.80	-28.70	3mV	0.00	1.00	P
867.90	43.80	31.57	22.08	4.83	27.63	30.86	60.80	-29.94	3mH	0.00	1.00	P

RADIATED EMISSIONS (HARMONIC)

01/09/03 High Frequency Measurement																				
Compliance Certification Services, Morgan Hill Open Field Site																				
Test Engr: Chin Pang																				
Project #: 02T1706-1																				
Company: Advance Security Inc.																				
EUT Descrip.: Car Alarm Transmitter																				
EUT M/N: TX540 & TX221																				
Test Target: FCC 15.231																				
Mode Oper: Continuous Transmitting																				
Test Equipment:																				
Cable (feet)	EMCO Horn 1-18GHz					Pre-amplifier 1-26GHz					Spectrum Analyzer					Horn > 18GHz				
15	T72; S/N: 6739					HP 8449B					8593EM Analyzer									
Peak Measurements: 1 MHz Resolution Bandwidth 1MHz Video Bandwidth								Average Measurements: 1 MHz Resolution Bandwidth 10Hz Video Bandwidth												
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes					
1.302	3.3	59.2	47.0	25.2	2.8	-37.5	-9.5	0.0	40.2	28.0	74.0	54.0	-33.8	-26.0	V					
1.735	3.3	46.4	34.2	26.7	3.3	-36.7	-9.5	0.0	30.2	18.0	74.0	54.0	-43.8	-36.0	V					
2.170	3.3	47.5	35.3	28.3	3.7	-36.1	-9.5	0.0	33.9	21.7	74.0	54.0	-40.1	-32.3	V					
1.302	3.3	51.3	39.1	25.2	2.8	-37.5	-9.5	0.0	32.4	20.1	74.0	54.0	-41.6	-33.9	H					
1.735	3.3	45.6	33.4	26.7	3.3	-36.7	-9.5	0.0	29.4	17.2	74.0	54.0	-44.6	-36.8	H					
2.170	3.3	47.2	34.9	28.3	3.7	-36.1	-9.5	0.0	33.6	21.4	74.0	54.0	-40.4	-32.6	H					
Note: EUT tested up to 10th Harmonic. No emissions found after 4th Harmonic																				
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															

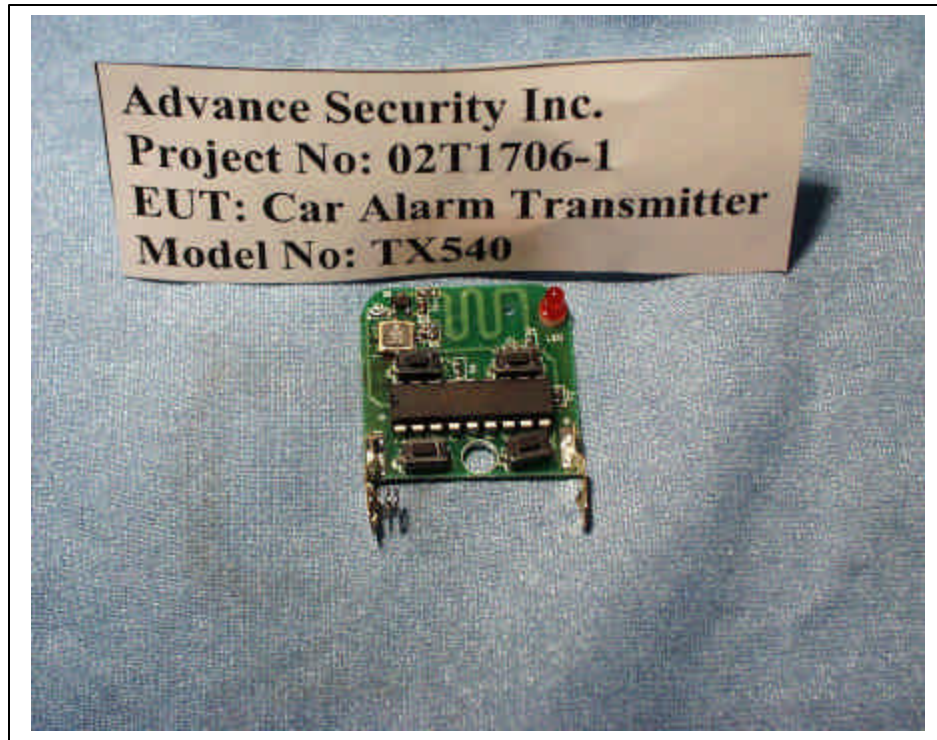
ATTACHMENT

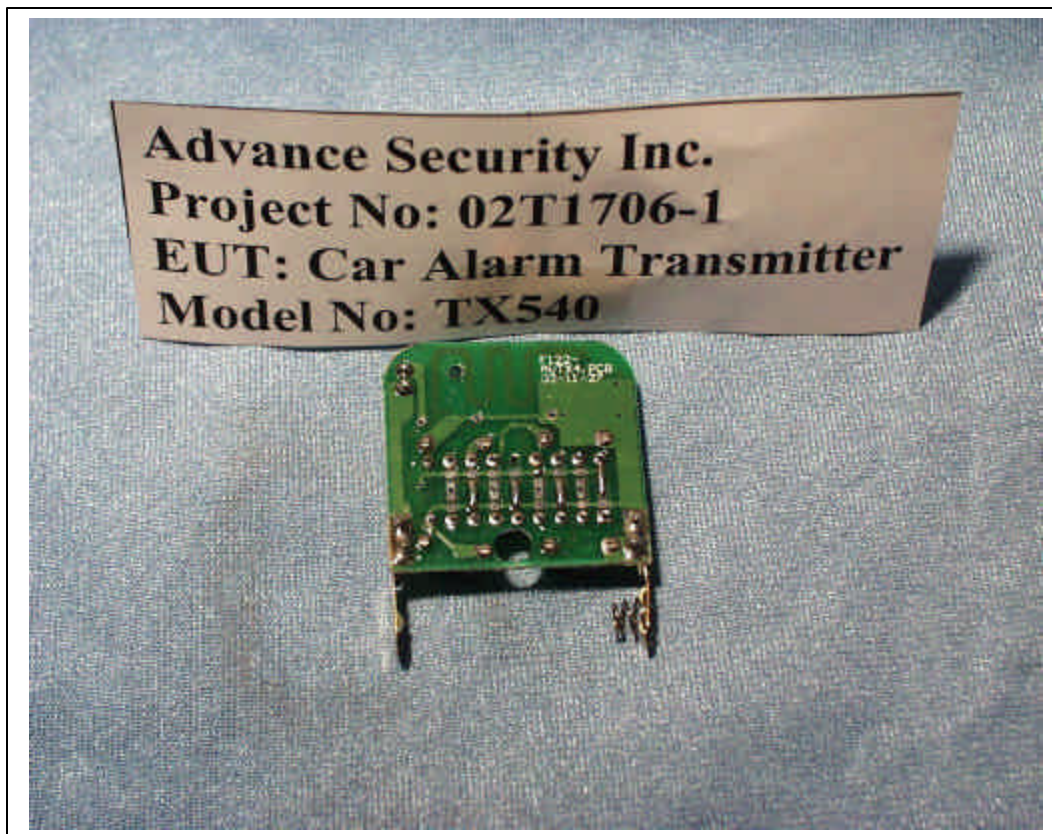
EUT PHOTOGRAPHS











END OF REPORT