

FCC ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT CERTIFICATION TO FCC PART 15 REQUIREMENTS

for

INTENTIONAL RADIATOR

of

Car Alarm Transmitter

FCC ID Number : GOH-PAN05

Trade Name : CODE SYSTEMS, INC.

Model Number : TX-CA

Agency Series : N/A

Report Number : C30804401-RP

Date : August 21, 2003

Prepared for :

CODE SYSTEMS, INC.

525 MINNESOTA

TROY MI 48083, USA

Prepared by :

C&C LABORATORY CO., LTD.

No. 165, Chung Sheng Road, Hsin Tien City,

Taipei, Taiwan, R. O. C.

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1. VERIFICATION OF COMPLIANCE

COMPANY NAME : CODE SYSTEMS, INC.
525 MINNESOTA
TROY MI 48083, USA

CONTACT PERSON : MR. SHANE WILSON / RETAIL PROGRAM MANAGER

TELEPHONE NO. : 1-248-583-9620

EUT DESCRIPTION : Car Alarm Transmitter

MODEL NAME/NUMBER : TX-CA

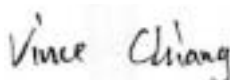
FCC ID : GOH-PAN05

DATE TESTED : August 19, 2003

REPORT NUMBER : C30804401-RP

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	433.92 MHz Car Alarm Transmitter
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992
LIMIT TYPE	CERTIFICATION
FCC RULE	CFR 47, PART 15

The above equipment was tested by C&C Laboratory Co., Ltd. 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 Engineering Services, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by C&C Laboratory Co., Ltd. will constitute fraud and shall nullify the document.



Vince Chiang / Supervisor
C&C Laboratory Co., Ltd.

2. PRODUCT DESCRIPTION

Fundamental Frequency	433.92 MHz
Power Source	12V Battery
Transmitting Time	Periodic $\leq$ 5 seconds
Associated Receiver	FCC ID:BGA104R

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	DSAI-D 804.8932.52	EMI TEST DISPLAY	12/18/03
R&S	ESBI-RF/1005.4300.52	EMI TEST RF UNIT	12/18/03
SCHWARZBECK	VULB 9160	ANTENNA	05/09/04
BELDEN	9913	CABLE	04/06/04
H.P.	8447D B	PRE-AMPLIFIER	05/03/04
EMCO	3115	ANTENNA (1-18GHz)	02/24/04
HP	8449B	AMPLIFIER (1-26.5GHz)	02/20/04
HUBER+SUHNER	SUCOFLEX 104	CABLE (1-18GHz)	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

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)

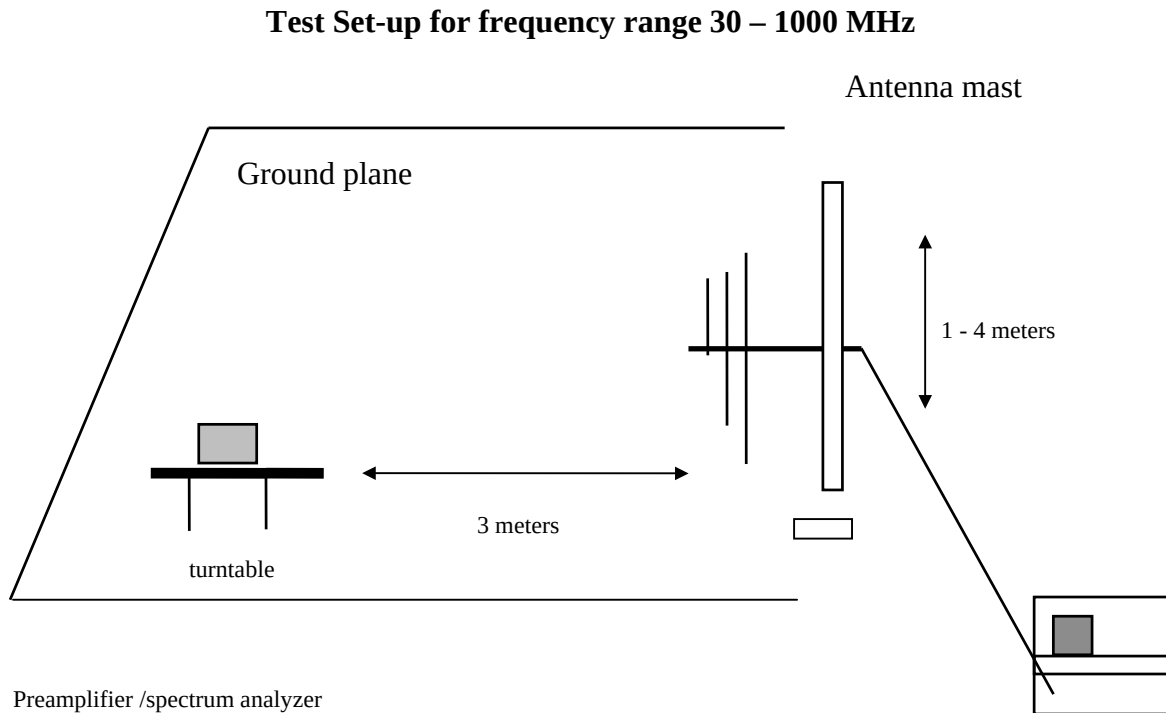


Fig. 1

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.

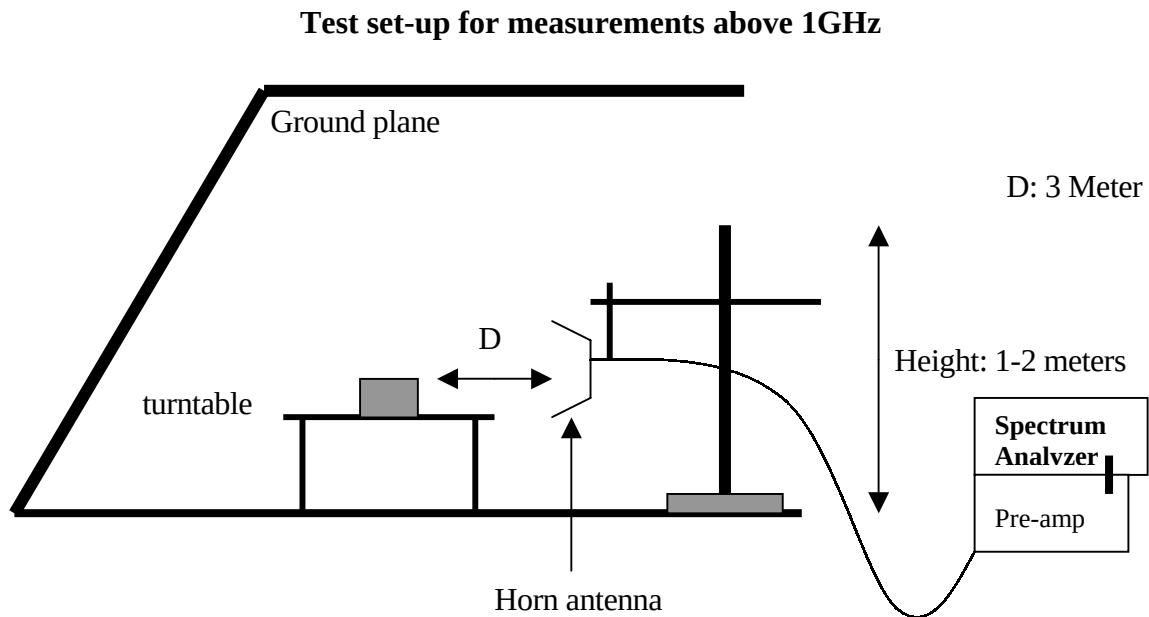


Fig. 2

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	
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 = 45.54 mS
Long pulse = 0.76 mS
Short pulse = 0.34 mS
No of Long pulse = 12
No of Short pulse = 13

Duty Cycle = (N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T
Duty Cycle = [(12x0.76)+(13x0.34)]/45.54 = 0.2973 = 27.73 % or -10.536dB

12.2 The Emissions Bandwidth

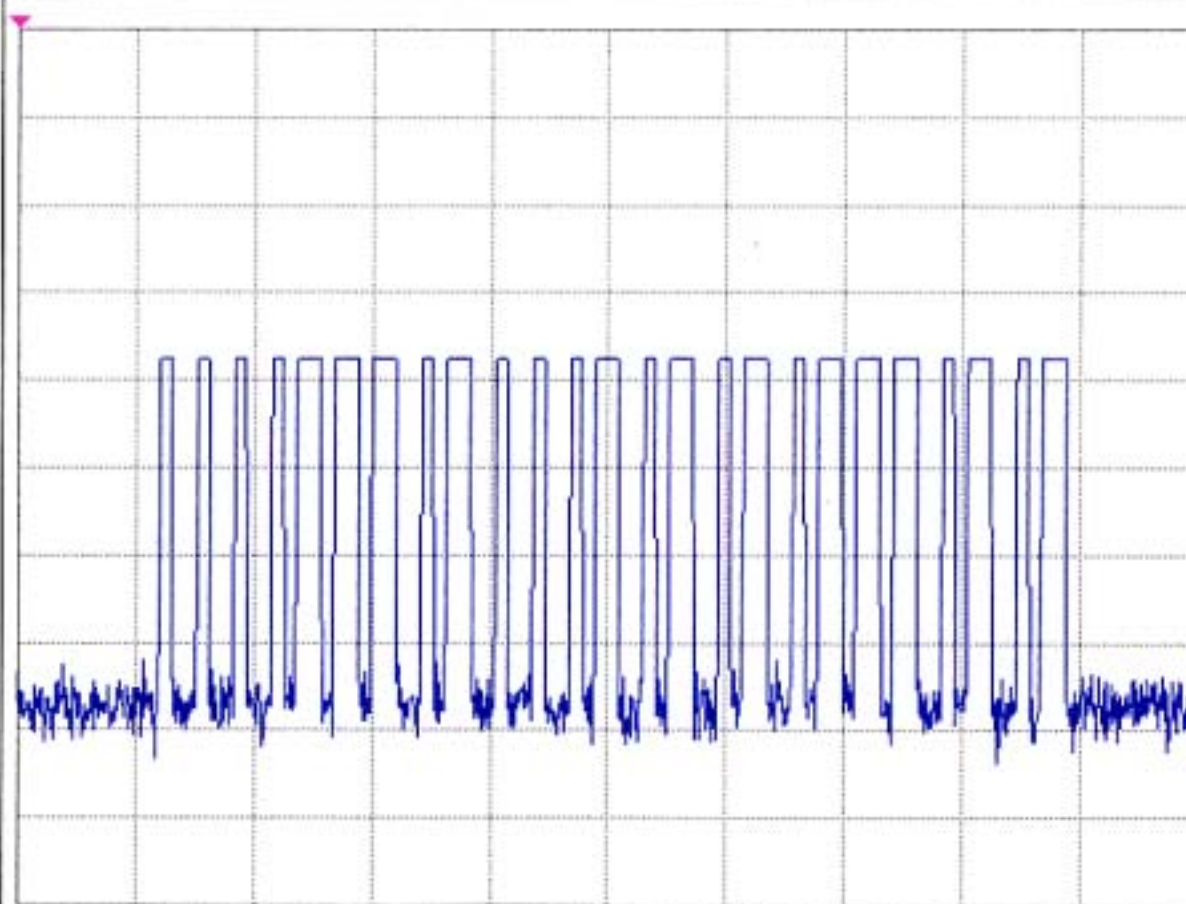
The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
433.92 MHz	406.0 kHz < (refer to plot)	433.92 MHzX0.25%=1084.8 kHz

Tue 2003 Aug 19 10:51

REF 97.0 dB μ V

10dB/ A_Write Posi B_Blank Posi



CENTER 433.954000 MHz

SPAN 0.000 kHz

*RBW 100 kHz

*VBW 100 kHz

*SWP 40 ms

*ATT 10dB

Tue 2003 Aug 19 10:47

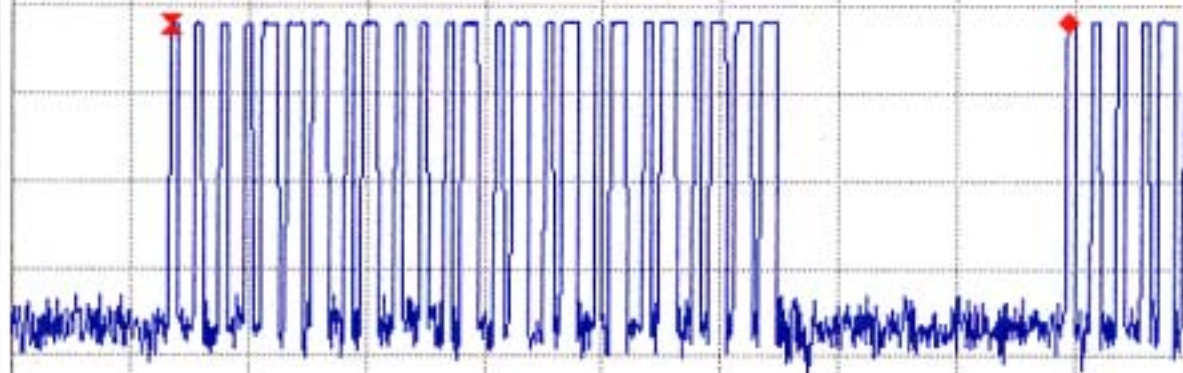
REF 97.0 dB μ V

MK Δ 45.54 ns

10dB/ A_Write Posi B_Blank Posi

0.35 dB

DELTA MKR
45.54 ms



CENTER 433.954000 MHz

SPAN 0.000 kHz

*RBW 100 kHz *VBW 100 kHz *SWP 60 ms *ATT 10dB

Tue 2003 Aug 19 11:03

REF 97.0 dB μ V

MK Δ 760.0 μ s

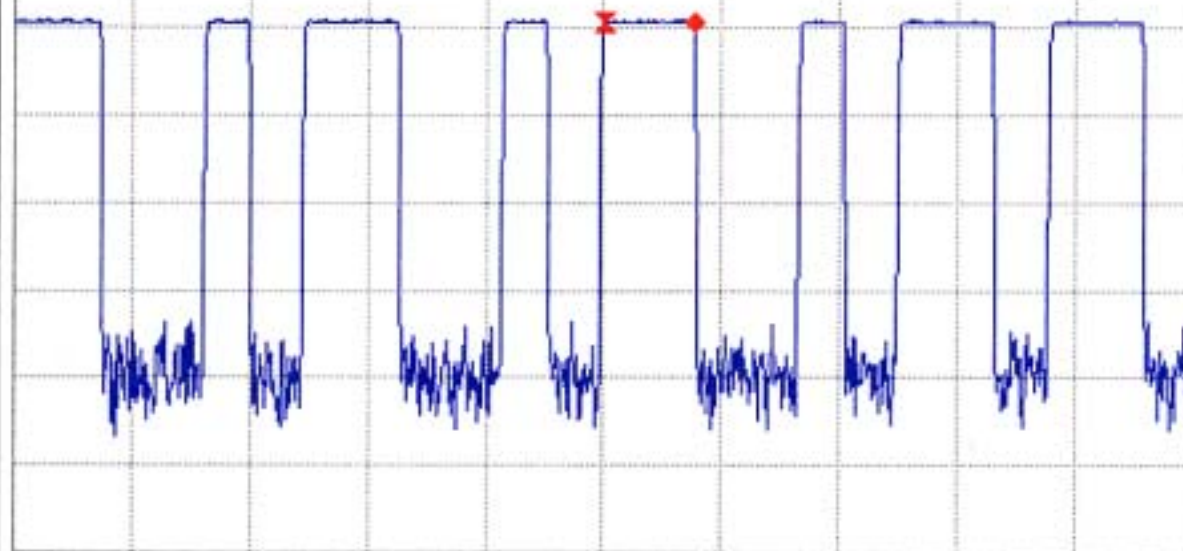
10dB/

A_Write Posi

B_Blank Posi

0.10 dB

DELTA MKR
760.0 μ s



CENTER 433.954000 MHz

SPAN 0.000 kHz

*RBW 100 kHz

*VBW 100 kHz

*SWP 10 ms

*ATT 10dB

Tue 2003 Aug 19 10:55

REF 97.0 dB μ V

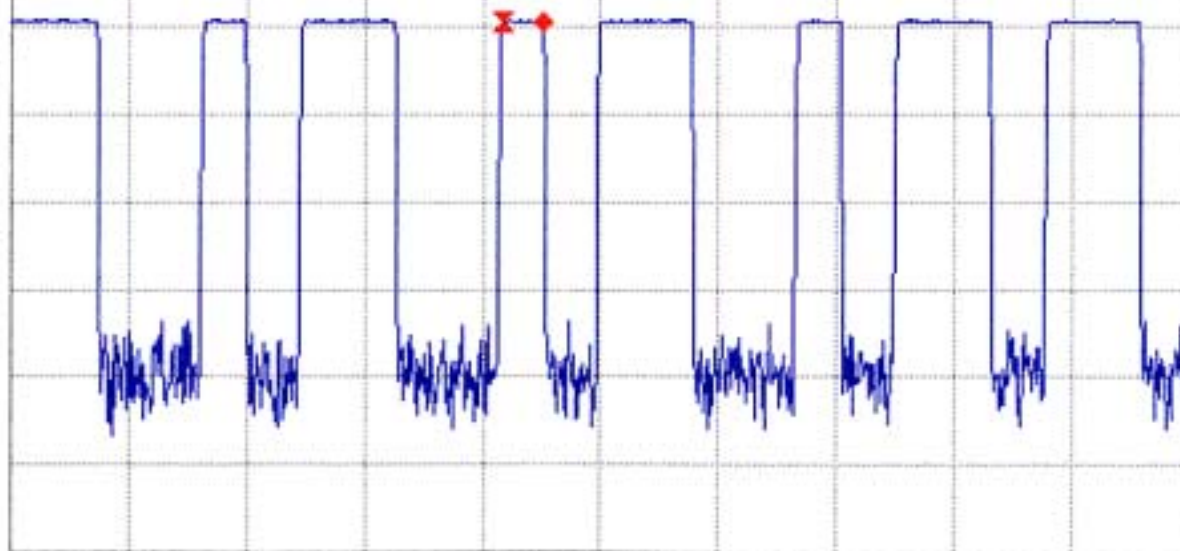
MK Δ 340.0 μ s

10dB/

A_Write Posi B_Blank Posi

0.03 dB

DELTA MKR
340.0 μ s



CENTER 433.954000 MHz

SPAN 0.000 kHz

*RBW 100 kHz

*VBW 100 kHz

*SWP 10 ms

*ATT 10dB

Tue 2003 Aug 19 10:36

REF 97.0 dB μ V

DL 36.3 dB μ V

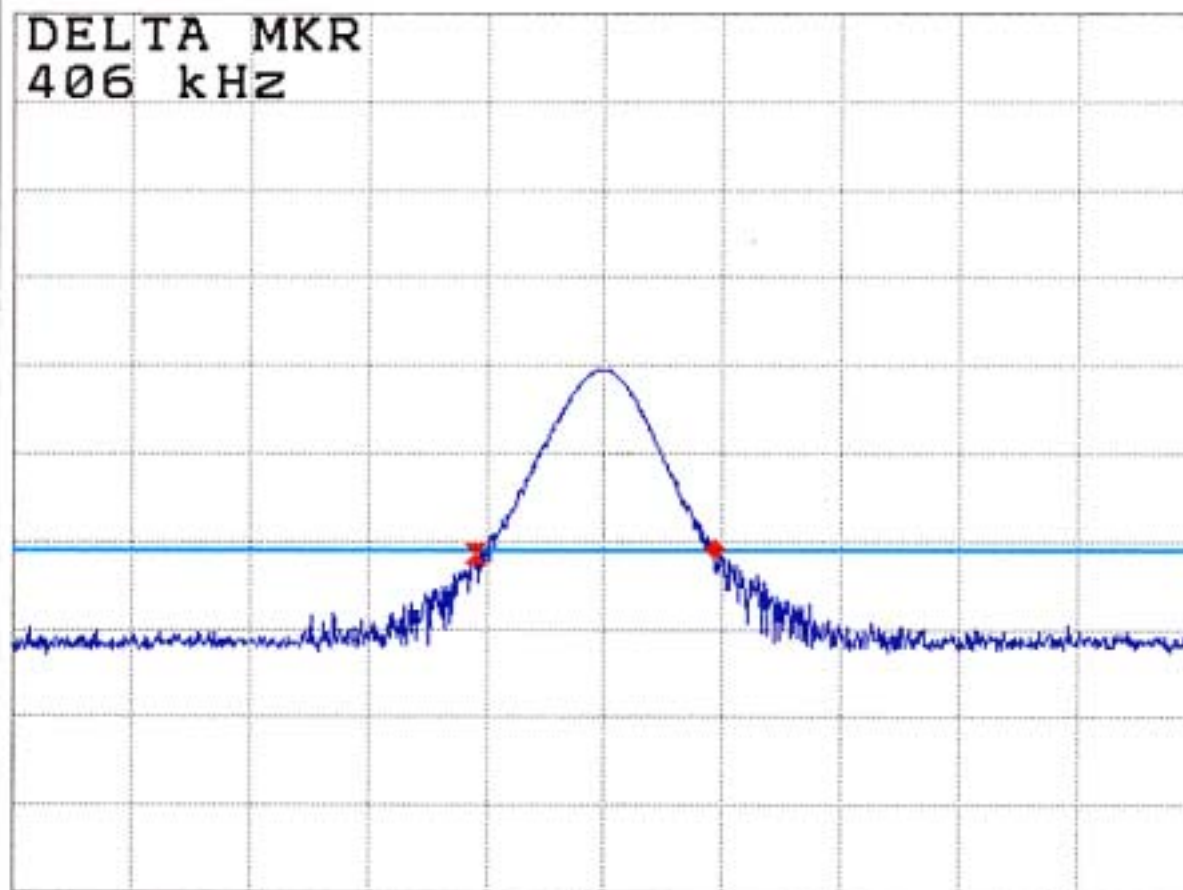
MK Δ 406 kHz

10dB/ A_Max

Posi B_Blank Posi

0.52 dB

DELTA MKR
406 kHz



CENTER 433.954 MHz

SPAN 2.000 MHz

*RBW 100 kHz

*VBW 100 kHz

*SWP 10 ms

*ATT 10dB

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UL, CSA, TUV, BSMI, DHHS, NVLAP

No. 165, Chung Sheng Road,
Hsin Tien City, Taipei, Taiwan, R.O.C.
PHONE: 02-2217-0894 FAX: 02-2217-1029

Project #: C30804401
Report #: C30804401-RP
Date & Time: 2003/08/19
Test Engr: ALEX PAN

Company: CODE SYSTEMS, INC.
EUT Description: TX-CA (433.92 MHz / Car Alarm Transmitter)
Test Configuration : EUT ONLY
Type of Test: FCC 15.231(b)
Mode of Operation: Normal Mode

D-Site

M% = ((t1+t2+t3+...)/T) * 100% = **29.73 %**

Av Reading = Pk Reading + 20*log(M%)
20*log(M%) = **-10.536**

	Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height
	(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)
X	Button #1:											
	433.93	47.04	36.50	17.15	2.62	27.00	29.27	80.83	-51.55	3mV	0	1.60
Y	867.99	37.04	26.50	24.01	3.95	26.74	27.72	60.83	-33.11	3mV	90	1.00
	433.93	60.55	50.01	17.15	2.62	27.00	42.78	80.83	-38.05	3mV	180	1.20
Z	867.88	40.90	30.36	24.01	3.95	26.74	31.58	60.83	-29.25	3mV	270	1.80
	433.93	60.73	50.19	17.15	2.62	27.00	42.96	80.83	-37.87	3mV	90	1.00
	867.88	41.81	31.27	24.01	3.95	26.74	32.49	60.83	-28.34	3mV	180	1.50
X	433.96	53.77	43.23	17.15	2.62	27.00	36.00	80.83	-44.83	3mH	270	1.20
	867.90	39.17	28.63	24.01	3.95	26.74	29.85	60.83	-30.98	3mH	0	1.00
Y	433.93	59.13	48.59	17.15	2.62	27.00	41.36	80.83	-39.47	3mH	180	1.20
	867.91	38.46	27.92	24.01	3.95	26.74	29.14	60.83	-31.69	3mH	90	1.80
Z	433.95	53.22	42.68	17.15	2.62	27.00	35.45	80.83	-45.38	3mH	180	1.00
	867.90	36.23	25.69	24.01	3.95	26.74	26.91	60.83	-33.92	3mH	90	1.60

Peak: RBW= 100KHz
VBW= 300KHz
A(Average): Pk Reading - 10.536dB

Total Data #12

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

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D-Site

M% = ((t1+t2+t3+...)/T) * 100% = **29.73 %**

Av Reading = Pk Reading + 20*log(M%)

20*log(M%) = **-10.536**

	Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height
	(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)
X	Button #2:											
	433.92	54.92	44.38	17.15	2.62	27.00	37.15	80.83	-43.67	3mV	90	1.20
Y	867.88	34.73	24.19	24.01	3.95	26.74	25.41	60.83	-35.42	3mV	0	1.00
	433.93	60.71	50.17	17.15	2.62	27.00	42.94	80.83	-37.89	3mV	180	1.00
Z	867.89	39.20	28.66	24.01	3.95	26.74	29.88	60.83	-30.95	3mV	180	1.80
	433.93	60.68	50.14	17.15	2.62	27.00	42.91	80.83	-37.92	3mV	90	1.60
	867.89	41.03	30.49	24.01	3.95	26.74	31.71	60.83	-29.12	3mV	270	1.50
X	433.97	56.90	46.36	17.15	2.62	27.00	39.13	80.83	-41.70	3mH	270	1.00
	867.90	35.64	25.10	24.01	3.95	26.74	26.32	60.83	-34.51	3mH	0	1.80
Y	433.94	47.27	36.73	17.15	2.62	27.00	29.50	80.83	-51.33	3mH	180	1.20
	867.89	36.10	25.56	24.01	3.95	26.74	26.78	60.83	-34.05	3mH	90	1.60
Z	433.95	51.26	40.72	17.15	2.62	27.00	33.49	80.83	-47.34	3mH	270	1.00
	867.92	37.32	26.78	24.01	3.95	26.74	28.00	60.83	-32.83	3mH	90	1.50

Peak: RBW= 100KHz
VBW= 300KHz
A(Average): Pk Reading - 10.536dB

Total Data #12

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

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Test Configuration : EUT ONLY
Type of Test: FCC 15.231(b)
Mode of Operation: Normal Mode

D-Site

M% = ((t1+t2+t3+...)/T) * 100% = **29.73 %**

Av Reading = Pk Reading + 20*log(M%)

20*log(M%) = **-10.536**

	Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height
	(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)
X	Button #3:											
	433.93	55.12	44.58	17.15	2.62	27.00	37.35	80.83	-43.47	3mV	0	1.00
	837.88	39.98	29.44	24.01	3.95	26.74	30.66	60.83	-30.17	3mV	90	1.30
Y	433.93	54.13	43.59	17.15	2.62	27.00	36.36	80.83	-44.47	3mV	180	1.20
	867.88	38.69	28.15	24.01	3.95	26.74	29.37	60.83	-31.46	3mV	270	1.80
Z	433.93	60.78	50.24	17.15	2.62	27.00	43.01	80.83	-37.82	3mV	90	1.20
	867.88	42.35	31.81	24.01	3.95	26.74	33.03	60.83	-27.80	3mV	180	1.00
X	433.95	56.31	45.77	17.15	2.62	27.00	38.54	80.83	-42.29	3mH	0	1.00
	867.91	35.08	24.54	24.01	3.95	26.74	25.76	60.83	-35.07	3mH	180	1.50
	433.94	50.27	39.73	17.15	2.62	27.00	32.50	80.83	-48.33	3mH	270	1.10
Y	867.91	39.22	28.68	24.01	3.95	26.74	29.90	60.83	-30.93	3mH	90	1.80
	433.94	52.40	41.86	17.15	2.62	27.00	34.63	80.83	-46.20	3mH	180	1.20
Z	867.91	36.30	25.76	24.01	3.95	26.74	26.98	60.83	-33.85	3mH	270	1.80

Peak: RBW= 100KHz
VBW= 300KHz
A(Average): Pk Reading - 10.536dB

Total Data #12

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D-Site

M% = ((t1+t2+t3+...)/T) * 100% = **29.73 %**

Av Reading = Pk Reading + 20*log(M%)
20*log(M%) = **-10.536**

	Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height
	(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)
X	Button #4:											
	433.93	59.11	48.57	17.15	2.62	27.00	41.34	80.83	-39.48	3mV	0	1.10
Y	867.87	32.39	21.85	24.01	3.95	26.74	23.07	60.83	-37.76	3mV	90	1.40
	433.93	54.89	44.35	17.15	2.62	27.00	37.12	80.83	-43.71	3mV	270	1.80
Z	867.87	38.05	27.51	24.01	3.95	26.74	28.73	60.83	-32.10	3mV	90	1.00
	433.93	60.27	49.73	17.15	2.62	27.00	42.50	80.83	-38.33	3mV	90	1.20
	867.88	40.49	29.95	24.01	3.95	26.74	31.17	60.83	-29.66	3mV	0	1.50
X	433.96	53.67	43.13	17.15	2.62	27.00	35.90	80.83	-44.93	3mH	90	1.10
	867.91	32.52	21.98	24.01	3.95	26.74	23.20	60.83	-37.63	3mH	0	1.50
Y	433.95	53.52	42.98	17.15	2.62	27.00	35.75	80.83	-45.08	3mH	180	1.00
	867.91	34.83	24.29	24.01	3.95	26.74	25.51	60.83	-35.32	3mH	0	1.40
Z	433.95	53.57	43.03	17.15	2.62	27.00	35.80	80.83	-45.03	3mH	180	1.20
	867.90	37.22	26.68	24.01	3.95	26.74	27.90	60.83	-32.93	3mH	90	1.60

Peak: RBW= 100KHz
VBW= 300KHz
A(Average): Pk Reading - 10.536dB

Total Data #12

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Test Engr: ALEX PAN

Company:
EUT Description:
Test Configuration :
Type of Test:
Mode of Operation:

CODE SYSTEMS, INC.
TX-CA (433.92 MHz / Car Alarm Transmitter)
EUT ONLY
FCC 15.231(b)/FCC 15.209
Normal Mode

☒ D-Site

Freq.	Pk Rdg	Av Rdg	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
1302	45.60	38.06	25.19	4.75	32.04	35.96	54.00	-18.04	3mV	180	1.1	A
1736	44.60	37.06	26.43	5.58	32.76	36.31	60.83	-24.52	3mV	90	1.5	A
2170	45.60	38.06	27.76	6.25	33.15	38.92	60.83	-21.91	3mV	180	1.0	A
1302	49.70	42.16	25.19	4.75	32.04	40.06	54.00	-13.94	3mH	270	1.1	A
1736	51.80	44.26	26.43	5.58	32.76	43.51	60.83	-17.32	3mH	180	1.6	A
2170	47.00	39.46	27.76	6.25	33.15	40.32	60.83	-20.51	3mH	270	1.2	A

* No other emission were found within 20dB under the limits upto 4.5 GHz.

Total data #6
V.2d

P(Peak): RBW=VBW=1MHz
A(Average): Pk Reading -10.536dB