



**FCC PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE**

FOR

433.92 MHz COMMERCIAL SENSOR

MODEL: 200.0101.R

FCC ID NO: NATTX433CS-3

REPORT NO: 04U2760-1

ISSUE DATE: JUNE 1, 2004

Prepared for

**SMARTIRE SYSTEMS INC.
#150 13151 VANIER PLACE
RICHMOND, BC
CANADA**

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 : SMARTIRE SYSTEMS INC.
#150, 13151 VANIER PLACE
RICHMOND BC, CANADA
EUT DESCRIPTION : 433.92 MHz COMMERCIAL SENSOR
MODEL NO : 200.0101.R
FCC ID : NATTX433CS-3
DATE TESTED : JUNE 1, 2004
REPORT NUMBER : 04U2760-1

TYPE OF EQUIPMENT	COMMERCIAL SENSOR
EQUIPMENT TYPE	433.92MHz 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	3V Battery
Transmitting Time	Interval: 3-5 minutes; Length: 500ms
Associated Receiver	NA
Manufacturer	Smartire Systems Inc.

3. CLASS II PERMISSIVE CHANGE DESCRIPTION

This is a Class II permissive change for FCC ID: NATTX433CS-3, originally granted on June 4, 2004.

The major change includes:

- Change #1 Adding Switch to circuit for protection of micro
- Change #2 Modified housing and changed matching components on the transmitter.

4. 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.

5. MEASUREMENT STANDARD

The site is constructed and calibrated in conformance with the requirements of ANSI C63.4/2001.

6. 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)

7. MEASUREMENT EQUIPMENT USED

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Site B Antenna, Bilog	Chase	CBL6112B	2586	3/6/2005
Quasi-Peak Adaptor	HP	85650A	2811A01155	8/22/2004
SA Display Section 2	HP	85662A	2816A16696	8/22/2004
Spectrum Analyzer, 26.5 GHz	HP	8593EM	3710A00205	10/1/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	9001-3245	2/4/2005
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/25/2005
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	US42070220	1/13/2005
Spectrum Analyzer	HP	8568B	2814A04337	2/22/2005
1.5GHz HPF	MicroTronic	HPM13194	1	CNR

8. POWERLINE RFI LIMIT

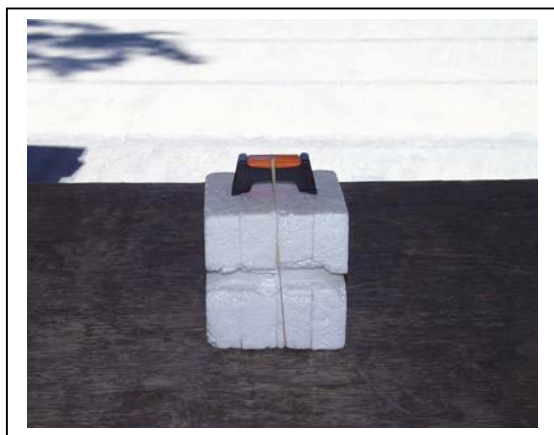
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 150 KHz TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NOT REQUIRED

9. 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(e)

10. SYSTEM TEST CONFIGURATION

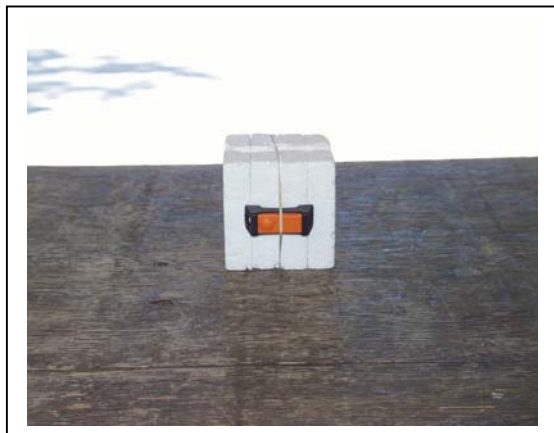
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



X-Axis



Y-Axis

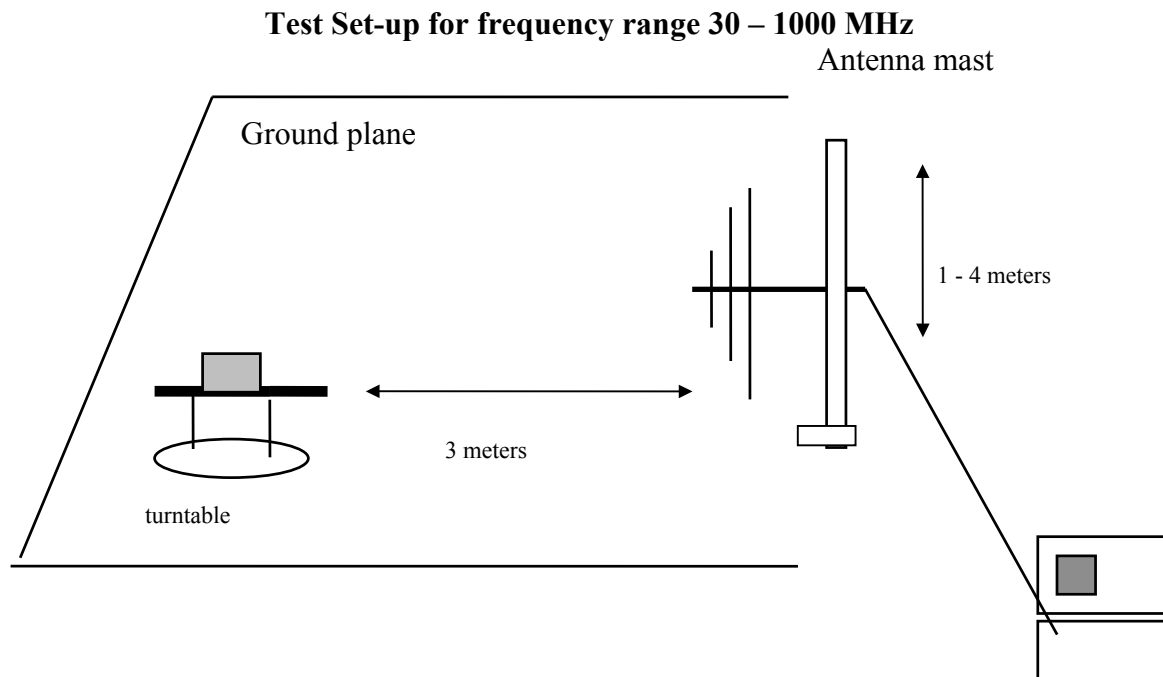


Z-Axis

Radiated Open Site Test Set-up

11. 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.

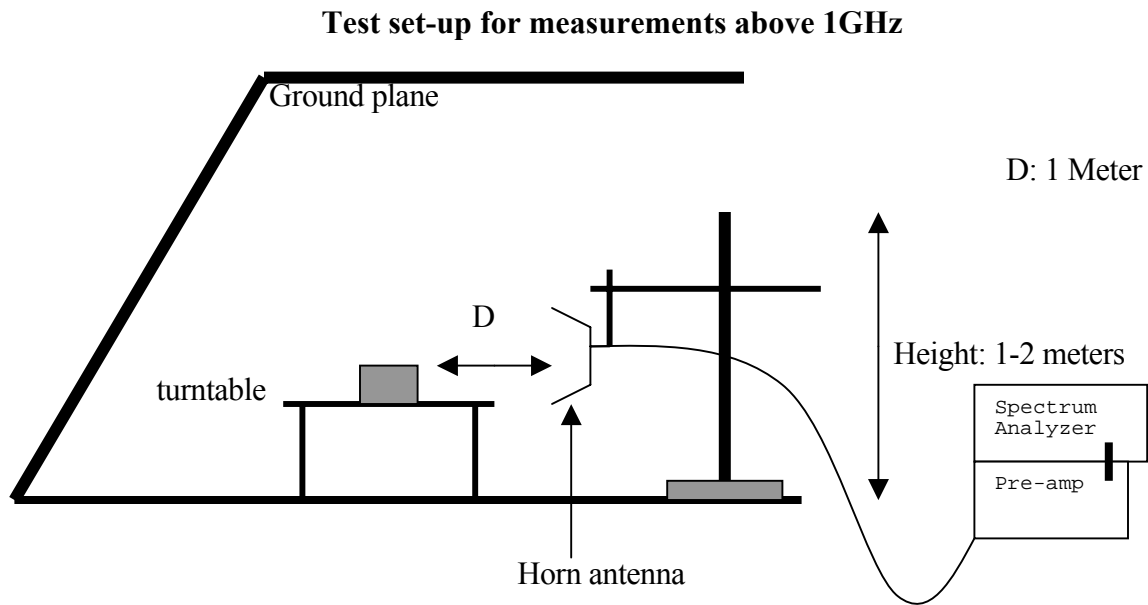


FIG. 2

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.

12. 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.

13. 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 (e)	X

13.1 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:

WHERE

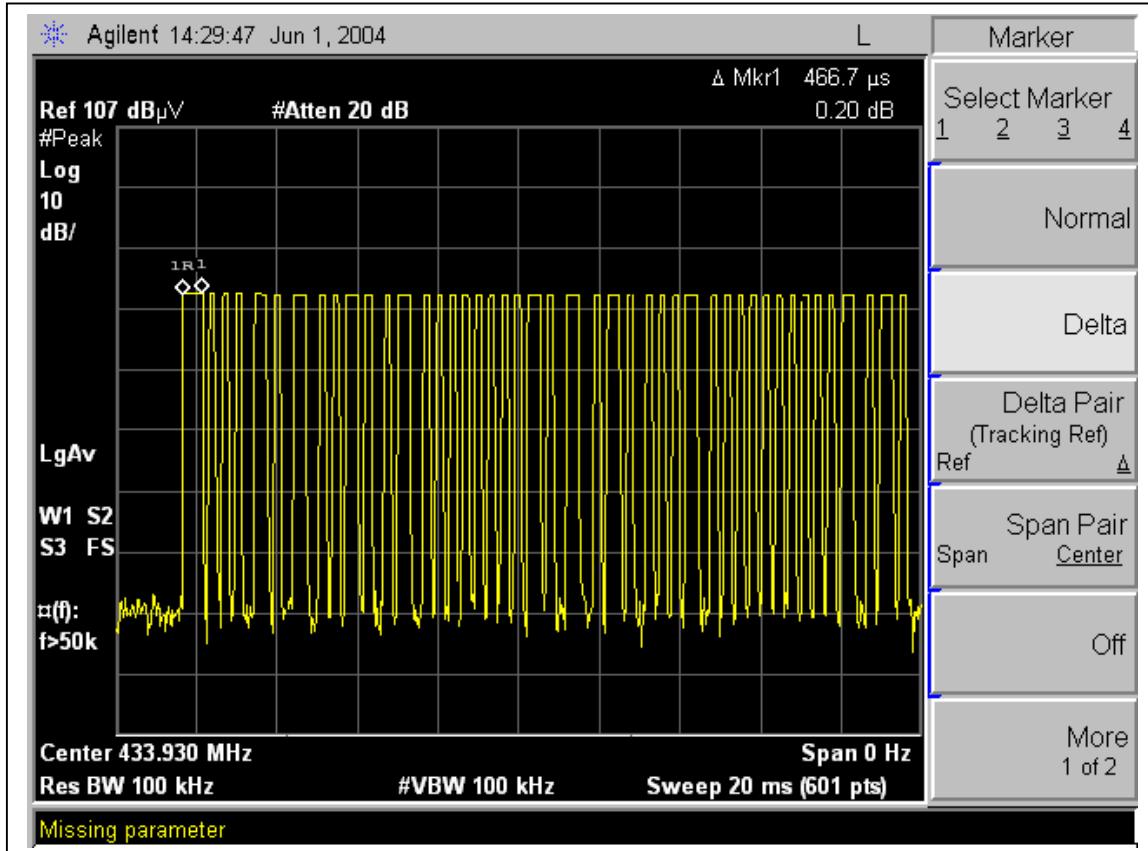
1 Period	= 67.33ms
Long pulse	= 0.4667 ms
Medium pulse	=0.2667ms
Short pulse	=0.1333 ms
No of Long pulse	= 1
No of Medium pulse	=10
No of Short pulse	= 34

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

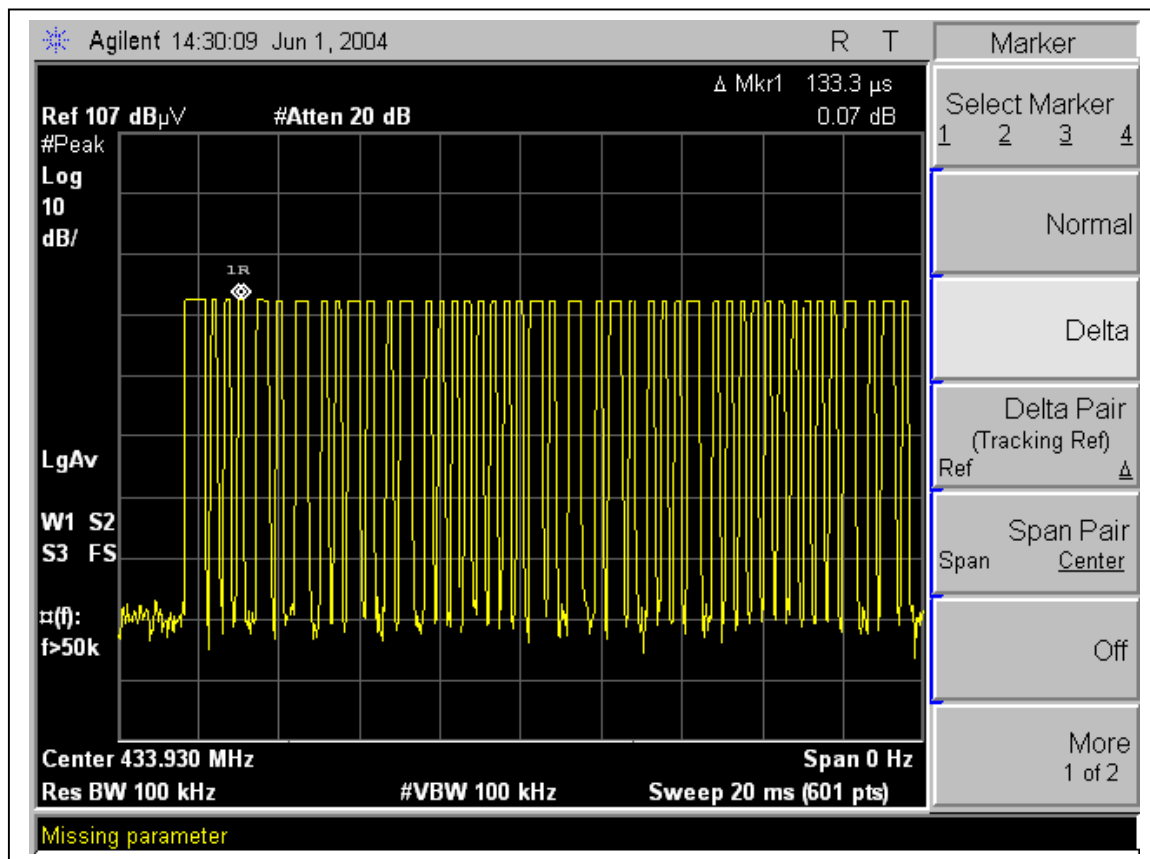
$$\text{Duty Cycle} = ((1 \times 0.4667) + (10 \times 0.2667)) + (34 \times 0.1333) / 66.83 = 0.1147 = 11.47\%$$

For duty cycle refer to plot #1, 2, 3,4, 5.

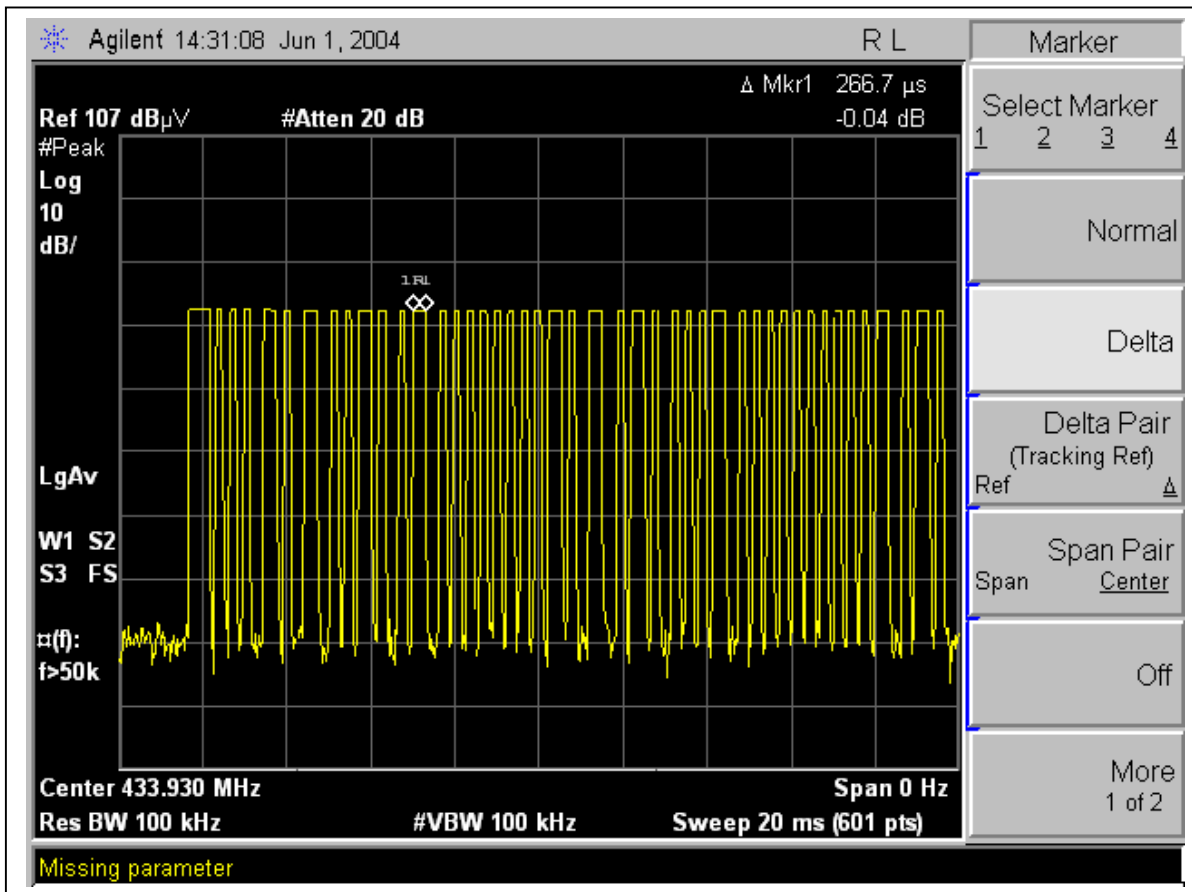
DUTY CYCLE PLOT 1



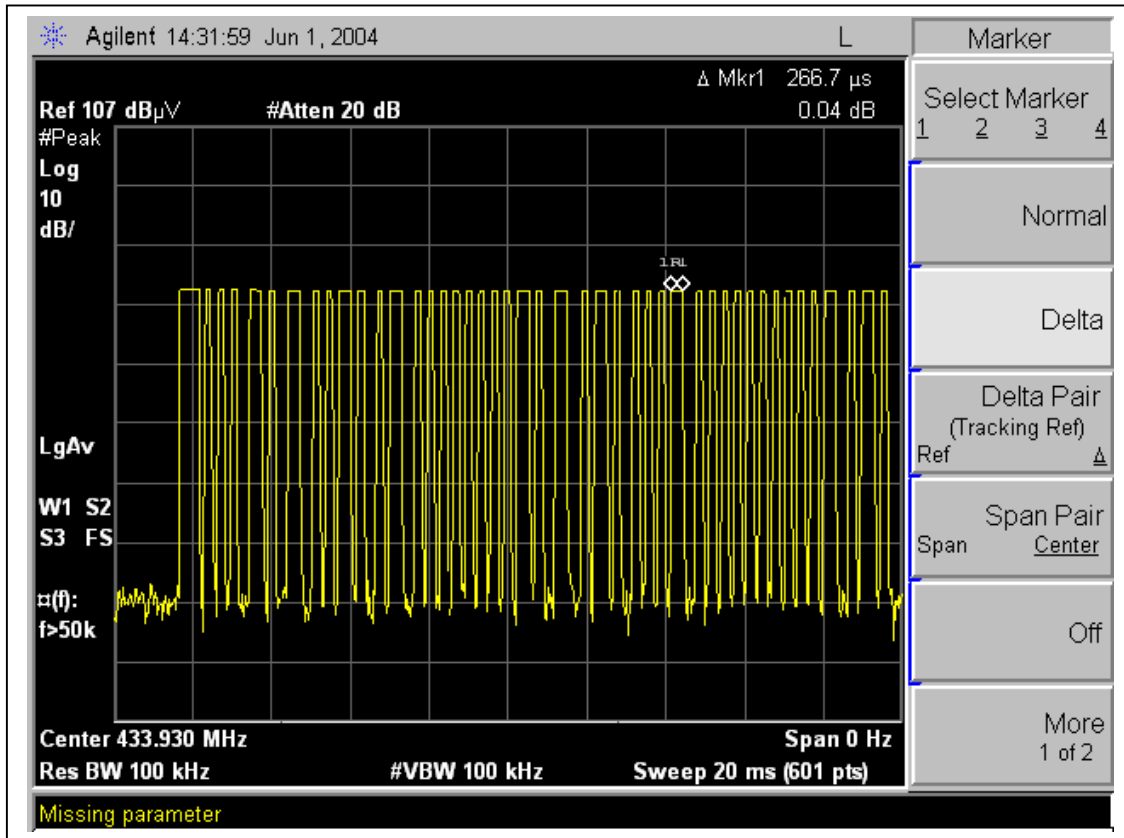
DUTY CYCLE PLOT 2



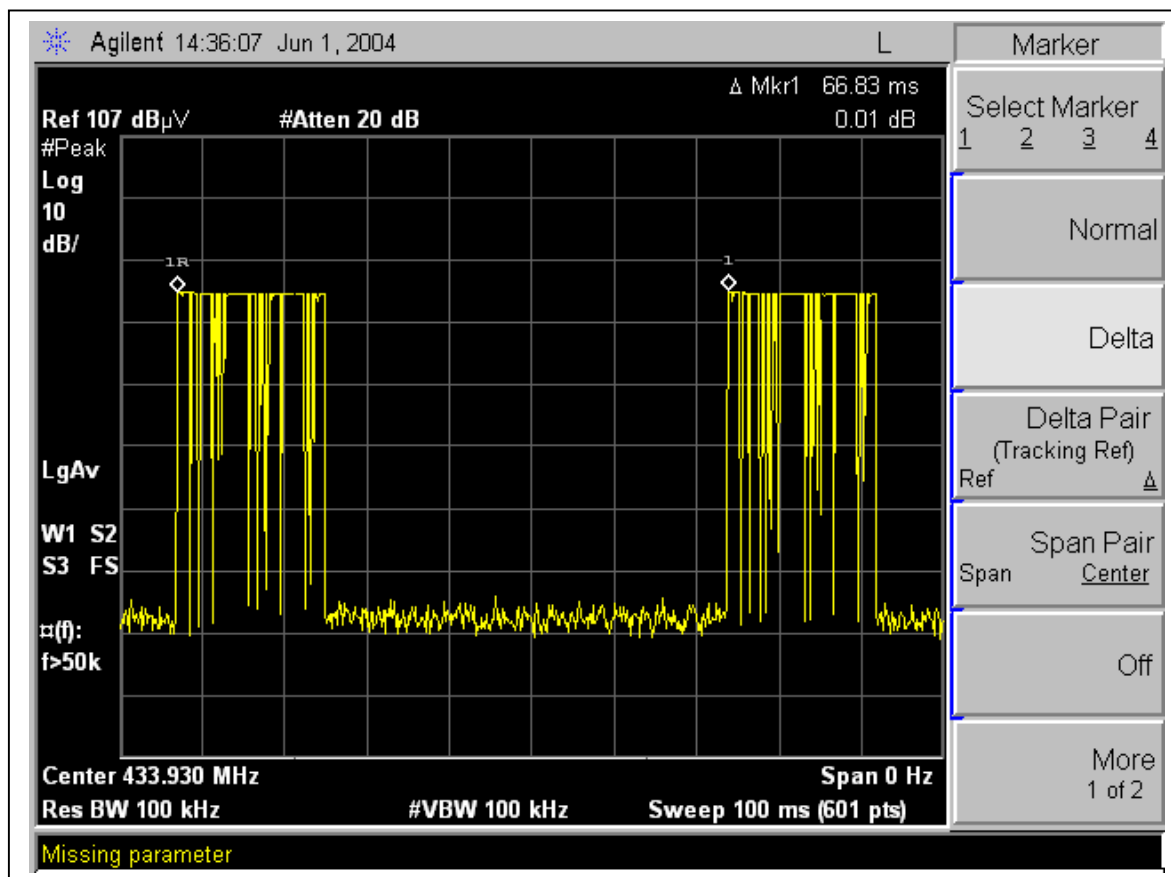
DUTY CYCLE PLOT 3



DUTY CYCLE PLOT 4



DUTY CYCLE PLOT 5

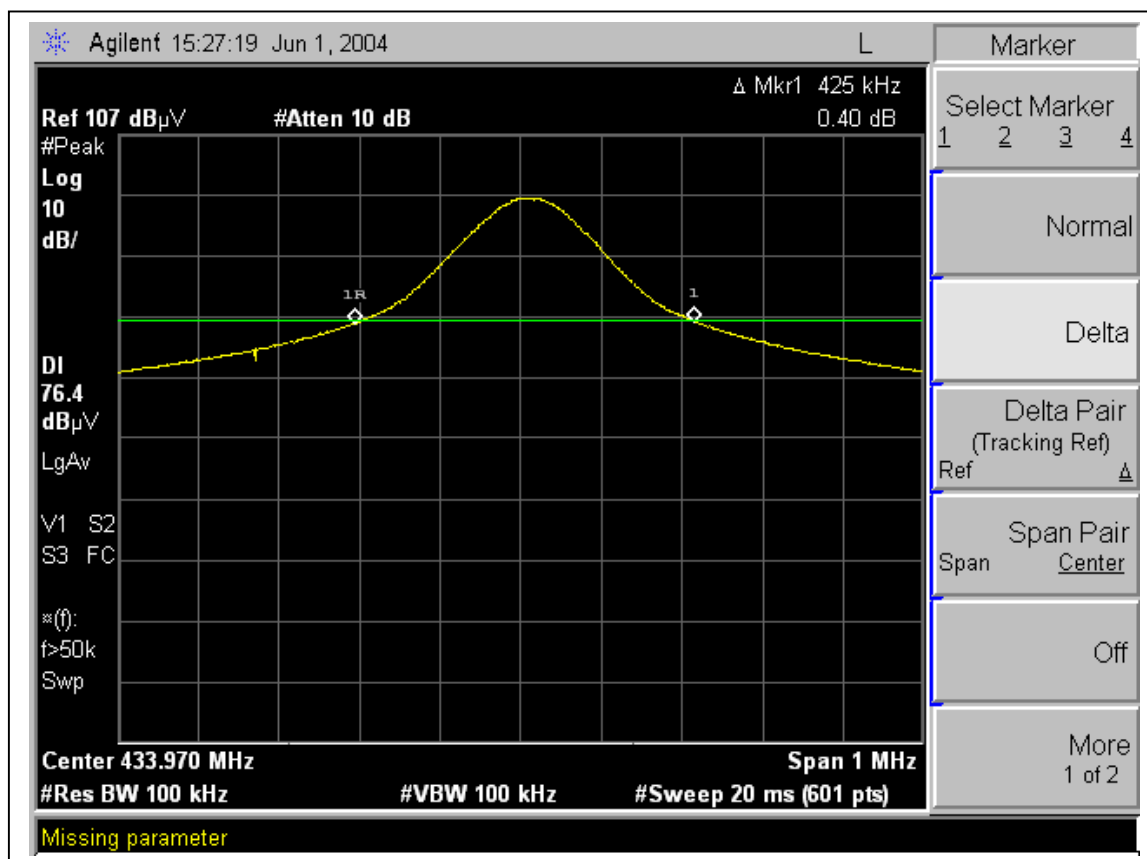


13.2 EMISSION BANDWIDTH


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

Center Frequency	Measured	Limits
433.92 MHz	425 KHz (refer to plot)	433.93 x 0.25%= 1.0848MHz

EMISSION BANDWIDTH



RADIATED DATA

		Project #: 04U2760-1 Report #: 040601B1 Date & Time: 6/01/2004 10:25AM 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: Smartire Systems Inc EUT Description: 433.92MHz Transmitter Test Configuration: EUT only Type of Test: FCC 15.231 Mode of Operation: Transmitting														
M% = ((t1+t2+t3+...)/T)*66.83% = 11.47%														
Av Reading = Pk Reading + 20*log(M%) 20*log(M%) = -18.80														
Freq. (MHz)	Pk Rdg (dBuV)	Av Rdg (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Pk Level (dBuV/m)	Av Level (dBuV/m)	Pk Limit FCC_B	Av Limit FCC_B	Pk Margin (dB)	Avg Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)
433.92Mhz Fundamental frequency														
X-Position (EUT Lay down)														
433.92	55.40	36.60	16.41	5.14	0.00	76.95	58.15	92.86	72.86	-15.91	-14.71	3mV	0.00	1.00
433.92	56.20	37.40	16.41	5.14	0.00	77.75	58.95	92.86	72.86	-15.11	-13.91	3mH	0.00	2.50
Y-Position (EUT Standup)														
433.92	58.50	39.70	16.41	5.14	0.00	80.05	61.25	92.86	72.86	-12.81	-11.61	3mV	0.00	1.00
433.92	52.60	33.80	16.41	5.14	0.00	74.15	55.35	92.86	72.86	-18.71	-17.51	3mH	0.00	2.00
Z-Position (EUT Sideway)														
433.92	51.60	32.80	16.41	5.14	0.00	73.15	54.35	92.86	72.86	-19.71	-18.51	3mV	0.00	1.00
433.92	57.80	39.00	16.41	5.14	0.00	79.35	60.55	92.86	72.86	-13.51	-12.31	3mH	0.00	2.00
The Data show Y-Position is the worst case														
867.86	42.60	23.80	20.36	7.38	0.00	70.34	51.54	72.86	52.86	-2.52	-1.32	3mV	0.00	1.00
867.86	35.00	16.20	20.36	7.38	0.00	62.74	43.94	72.86	52.86	-10.12	-8.92	3mH	0.00	1.50

RADIATED EMISSIONS (HARMONIC)

06/01/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:Chin Pang
 Project #:04U2760-1
 Company:Smartire System, Inc.
 EUT Descip.:433.93MHz OOK Commercial Transmitter
 EUT M/N:200.0101.R
 Test Target:FCc 15.231
 Mode Oper:TX

Test Equipment:

EMCO Horn 1-18GHz T59; S/N: 3245 @3m	Spectrum Analyzer Agilent 8564E Analyzer	Pre-amplifier 1-26GHz T63 Miteq 646456	Pre-amplifier 26-40GHz	Horn >18GHz
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Hi Frequency Cables
 (2 ft) (2~3 ft) (4~6 ft) (12 ft)

Peak Measurements:
 1 MHz Resolution Bandwidth
 1MHz Video Bandwidth

Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

Average Reading=Peak Reading-Duty Cycle

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	9.8	68.5	49.7	25.3	1.5	-36.4	0.0	0.0	58.7	39.9	74.0	54.0	-15.3	-14.1	V
1.736	9.8	65.2	46.4	27.2	1.6	-36.4	0.0	1.0	58.5	39.7	74.0	54.0	-15.5	-14.3	V
2.160	9.8	63.2	44.4	28.7	1.8	-36.3	0.0	1.0	58.4	39.6	74.0	54.0	-15.6	-14.4	V
2.607	9.8	62.7	43.9	29.8	2.0	-36.0	0.0	1.0	59.5	40.7	74.0	54.0	-14.5	-13.3	V
3.037	9.8	55.2	36.4	30.9	2.2	-35.7	0.0	1.0	53.5	34.7	74.0	54.0	-20.5	-19.3	V
3.471	9.8	52.4	33.6	31.6	2.3	-35.6	0.0	1.0	51.7	32.9	74.0	54.0	-22.3	-21.1	V
3.905	9.8	54.1	35.3	32.4	2.5	-35.5	0.0	1.0	54.5	35.7	74.0	54.0	-19.5	-18.3	V
4.339	9.8	58.9	40.1	32.8	2.7	-35.4	0.0	1.0	59.9	41.1	74.0	54.0	-14.1	-12.9	V
1.302	9.8	67.3	48.5	25.3	1.5	-36.4	0.0	0.0	57.5	38.7	74.0	54.0	-16.5	-15.3	H
1.736	9.8	59.8	41.0	27.2	1.6	-36.4	0.0	1.0	53.1	34.3	74.0	54.0	-20.9	-19.7	H
2.160	9.8	63.0	44.2	28.7	1.8	-36.3	0.0	1.0	58.2	39.4	74.0	54.0	-15.8	-14.6	H
2.607	9.8	62.7	43.9	29.8	2.0	-36.0	0.0	1.0	59.5	40.7	74.0	54.0	-14.5	-13.3	H
3.037	9.8	49.5	30.7	30.9	2.2	-35.7	0.0	1.0	47.8	29.0	74.0	54.0	-26.2	-25.0	H
3.471	9.8	49.1	30.3	31.6	2.3	-35.6	0.0	1.0	48.4	29.6	74.0	54.0	-25.6	-24.4	H
3.905	9.8	57.3	38.5	32.4	2.5	-35.5	0.0	1.0	57.7	38.9	74.0	54.0	-16.3	-15.1	H
4.339	9.8	57.1	38.3	32.8	2.7	-35.4	0.0	1.0	58.1	39.3	74.0	54.0	-15.9	-14.7	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		

END OF REPORT