

6 Randolph Way Hillsborough, NJ 08844 Tel: (908) 927 9288

Fax: (908) 927 0728

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

REMOTE CONTROL TRANSMITTER

MODEL: **TSA+**FCC ID: DWNTSA

December 06, 2012

This report concerns (check one): Original grant x Class II change  Equipment type: Low Power Intentional Radiator					
Company agrees to notify the Cor	If yes, defer until: (date)				
Transition Rules Request per 15.3 If no, assumed Part 15, Subpart B [10-1-90 Edition] provision.	37? yes nox for unintentional radiators - the new 47 CFR				
Report prepared for: Report prepared by: Report number:	SOMFY SYSTEMS Inc. Advanced Compliance Lab 0048-121205-01				



The test result in this report IS supported and covered by the NVLAP accreditation

# **Table of Contents**

Report Cover Page1
Table of Contents2
Figures3
1. GENERAL INFORMATION4
1.1 Verification of Compliance4
1.2 Equipment Modifications5
1.3 Product Information6
1.4 Test Methodology6
1.5 Test Facility6
1.6 Test Equipment6
1.7 Statement of the Document Use7
2. PRODUCT LABELING8
3. SYSTEM TEST CONFIGURATION9
3.1 Justification9
3.2 Special Accessories9
3.3 Configuration of Tested System9
4. SYSTEM SCHEMATICS
5. CONDUCTED EMISSION DATA14
5.1 Test Methods and Conditions14
5.2 Test Data14
6. RADIATED EMISSION DATA17
6.1 Field Strength Calculation17
6.2 Test Methods and Conditions17
6.2 Test Data17
6.4. Occupied Bandwidth19
7. PHOTOS OF TESTED EUT21

# **Figures**

Figure 2.1 FCC ID Label	8
Figure 2.2 Location of Label on Back of the EUT	8
Figure 3.1 Radiated Test Setup, Position 1	10
Figure 3.2 Radiated Test Setup, Position 2	10
Figure 3.3 Radiated Test Setup, Position 3	11
Figure 3.4 Conducted Test Setup, Front	12
Figure 3.5 Conducted Test Setup, Rear	12
Figure 4.1 EUT Schematics	13
Figure 5.1 Line Conducted	15
Figure 5.2 Neutral Conducted	16
Figure 6.1 Bandwidth Plot	19
Figure 6.2 Pulse Train Timing	20
Figure 7.1 Front View	22
Figure 7.2 Rear View	23
Figure 7.3 Insider View	24
Figure 7.4 Component Side	25
Figure 7.5 Foil Side	26

Model No: TSA+

Date: December 06, 2012 FCC ID: DWNTSA

#### 1. GENERAL INFORMATION

#### 1.1 Verification of Compliance

EUT: REMOTE CONTROL TRANSMITTER

Model: TSA+

Applicant: SOMFY SYSTEMS INC.

Test Type: FCC Part 15C CERTIFICATION (15.231(a))

Result: **PASS** 

Tested by: ADVANCED COMPLIANCE LABORATORY

Test Date: December 06, 2012

Report Number: 0048-121205-01

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC rules and regulations Part 15 subpart C. This said equipment in the configuration described in the report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty $u_c$	norm.	±2.36	±2.99	±1.83

Date: December 06, 2012

Wei Li

Lab Manager

Advanced Compliance Lab

EUT: REMOTE CONTROL TRANSMITTER Model No: TSA+ FCC ID: DWNTSA Report No. 0048-121205-01 Date: December 06, 2012

# **1.2 Equipment Modifications**

N/A

Report No. 0048-121205-01 Date: December 06, 2012

Model No: TSA+

#### 1.3 Product Information

#### **System Configuration**

ITEM	DESCRIPTION	FCC ID	CABLE
Product	REMOTE CONTROL	DWNTSA	
	TRANSMITTER (1)		
Housing	PLASTICS		
Power Supply	3V Battery		
Operation Freq.	433.4 MHz		
Device Type	Periodic Operation		
Receiver	Receiver	Verification	

<sup>(1)</sup> EUT submitted for grant.

#### 1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2003 at an antenna to EUT distance of 3 meters.

#### 1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted data are located at Hillsborough, New Jersey. This site has been accepted by FCC to perform measurements under Part 15 or 18 in a letter dated May 19, 1997 (Refer to: 31040/PRV 1300F2). The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

#### 1.6 Test Equipment

Manufacture	Model	Serial No.	Description	Cal Due
				dd/mm/yy
Hewlett-Packard	HP8546A	3448A00290	EMI Receiver	15/10/13
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	15/01/13
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/13
Fischer Custom	LISN-1	900-4-0008	Line Impedance Stabilization	18/03/13
			Networks	
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization	24/03/13
			Networks	
EMCO	3115	4945	Double Ridge Guide Horn Antenna	22/01/13
Agilent	E4440A	US40420700	PSA Spectrum Analyzer	25/08/13

All Test Equipment Used are Calibrated Traceable to NIST Standards.

EUT: REMOTE CONTROL TRANSMITTER Model No: TSA+ FCC ID: DWNTSA Report No. 0048-121205-01 Date: December 06, 2012

## 1.7 Statement for the Document Use

This report shall not be reproduced except in full, without the written approval of the laboratory. And this report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

Model No: TSA+ Date: December 06, 2012

#### 2. PRODUCT LABELING

#### FCC ID: DWNTSA

This device complies with part 15 of the FCC Rules. Operating is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Figure 2.1 FCC ID Label



Figure 2.2 FCC ID Label Location

Date: December 06, 2012 Report No. 0048-121205-01

Model No: TSA+

#### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). Its antenna is on PCB. The EUT is remote control transmitter and does not send data.

The transmission does stop when the button is released after the completion of the frame. This time is less than 5 seconds.

Testing was performed as EUT was operated continuously. Fresh batteries were used.

#### 3.2 Special Accessories

N/A

#### 3.3 Configuration of Tested System

Figure 3.1 to Figure 3.5 illustrate this system, which is tested standing along.



Figure 3.1 Radiated Test Setup, position 1-X



Figure 3.2 Radiated Test Setup, position 2-Y



Figure 3.3 Radiated Test Setup, position 3-Z

Model No: TSA+ Date: December 06, 2012

# N/A

**Figure 3.4 Conducted Setup- Front** 

## N/A

Figure 3.5 Conducted Setup- Rear

EUT: REMOTE CONTROL TRANSMITTER Model No: TSA+FCC ID: DWNTSA Report No. 0048-121205-01 Date: December 06, 2012

# 4. SYSTEM SCHEMATICS

See Attachment.

**Figure 4.1 System Schematics** 

Model No: TSA+ Date: December 06, 2012

5. CONDUCTED EMISSION DATA

#### **5.1 Test Methods and Conditions**

The EUT was under normal operational mode during the conducted emission test. EMI Receiver was scanned from 150KHz to 30MHz with maximum hold mode for maximum emission. Recorded data was sent to the plotter to generate output in linear format. At the input of the spectrum analyzer, a HP transient limiter is inserted for protective purpose. This limiter has a 10 dB attenuation in the range of 150KHZ to 30MHZ. That factor was automatically compensated by the receiver, so the readings are the corrected readings. The reference of the plot is the CISPR 22 Class B limit in Figure 5.1 through Figure 5.2.

	Conducted Emission Technical Requirements						
	Cla	ss A	Cla	ss B			
Frequency Range	Quasi-Peak	Average	Quasi-Peak	Average			
	dBuV dBuV		DBuV	dBuV			
150kHz -0.5MHz	79 (8912uV)	66 (1995uV)	66-56	56-46			
0.5MHz-30MHz	73 (4467uV)	60 (1000uV)					
0.5MHz- 5MHz			56	46 (250uV)			
5MHz-30MHz			60	50			

Emissions that have peak values close to the specification limit (if any) are also measured in the quasi-peak mode to determine compliance.

#### 5.2 Test Data

N/A

Figure 5.1-5.2 show the neutral a	and line conducted emissions	for the standard	operation.
-----------------------------------	------------------------------	------------------	------------

Test Personnel:	
Tester Signature:	Date:
Typed/Printed Name:	

<u>N/A</u>

Fig. 5.1 Conducted Emission-Line

## <u>N/A</u>

Fig. 5.2 Conducted Emission- Neutral

Model No: TSA+ Report No. 0048-121205-01 Date: December 06, 2012 FCC ID: DWNTSA

#### 6. RADIATED EMISSION DATA

#### **6.1 Field Strength Calculation**

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA + AF + CF + AG$$

where FS: Corrected Field Strength in dBµV/m

RA: Amplitude of EMI Receiver before correction in dBµV

AF: Antenna Factor in dB/m

CF: Cable Attenuation Factor in dB

AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

The pulse train timing plots are showed in Figure 6.2.

The pulse train timing plots as follows:

The total time for each pulse train is 139.62 ms, The short pulse is 0.640ms, The middle pulse is 2.5 ms, The long pulse is 4.8ms.

Coeff. =  $(55\times0.640+1\times4.8+5\times2.5)/100=0.525$ 

The maximum average field strength should be 0.525 of the peak field strength measured. So we use peak value minus 5.6dB as calculated maximum average field strength.

#### 6.2 Test Methods and Conditions

The initial step in collecting radiated data is a EMI Receiver scan of the measurement range below 30MHz using peak detector and 9KHz IF bandwidth / 30KHz video bandwidth. For the range under 1GHz, 120KHz IF bandwidth / 120KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. Up to 10<sup>th</sup> harmonics were investigated.

#### 6.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, the FCC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 6.1.

Date: December 06,2012

Test Personnel: I have

Typed/Printed Name: Edward Lee

Model No: TSA+ Date: December 06, 2012 Report No. 0048-121205-01

#### **Radiated Test Data**

866. 98         H, X         1.0         045         46. 4         40.8         60.80(4)         -20.0           1300. 47         H, X         1.1         090         47.3         41.7         54.0(2)         -12.3           1735. 60         H, X         1.1         090         55. 5         49.9         60.80         -10.9           433. 49         V, X         1.1         000         69.3         63.7         80.80         -17.1           866. 98         V, X         1.1         045         46.7         41.1         60.80         -19.7           1300. 47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735. 60         V, X         1.1         180         55.3         49.7         60.80         -11.1           433. 49         H, Y         1.0         180         75.5         69.9         80.80         -10.9           866. 98         H, Y         1.0         180         47.0         41.4         60.80         -11.6           1735. 60         H, Y         1.0         180         49.5         43.9         54.00         -11.6           433. 49         V, Y <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
(MHz)         Position (X,Y,Z)         (m)         (Degree)         (dBmV/m)         Reading (dBmV/m)         Reading (dBmV/m)         3m Limit (dBmV/m)         from limit (dB)           433.49         H, X(1)         1.0         090         83.4         77.8         80.80(3)         -3.0           866.98         H, X         1.0         045         46.4         40.8         60.80(4)         -20.0           1300.47         H, X         1.1         090         47.3         41.7         54.0(2)         -12.3           1735.60         H, X         1.1         090         55.5         49.9         60.80         -10.9           433.49         V, X         1.1         000         69.3         63.7         80.80         -17.1           866.98         V, X         1.1         045         46.7         41.1         60.80         -19.7           1300.47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735.60         V, X         1.1         180         75.5         69.9         80.80         -10.9           866.98         H, Y         1.0         180         47.0         41.4         60.80	Frequency	Polarity	Hei aht	Azimuth	Peak		FCC	Di fference
(MHz)         Position (X, Y, Z)         (m)         (Degree)         (dBmV/m)         (dBmV/m)         (dBmV/m)         (dBmV/m)         (dBmV/m)           433.49         H, X(1)         1.0         090         83.4         77.8         80.80(3)         -3.0           866.98         H, X         1.0         045         46.4         40.8         60.80(4)         -20.0           1300.47         H, X         1.1         090         47.3         41.7         54.0(2)         -12.3           1735.60         H, X         1.1         090         55.5         49.9         60.80         -10.9           433.49         V, X         1.1         000         69.3         63.7         80.80         -17.1           866.98         V, X         1.1         045         46.7         41.1         60.80         -19.7           1300.47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735.60         V, X         1.1         000         55.3         49.7         60.80         -11.6           433.49         H, Y         1.0         180         47.0         41.4         60.80         -19.4			, g					
(X, Y, Z)         33.49         H, X(1)         1.0         090         83.4         77.8         80.80(3)         -3.6           866. 98         H, X         1.0         045         46.4         40.8         60.80(4)         -20.0           1300. 47         H, X         1.1         090         47.3         41.7         54.0(2)         -12.3           1735. 60         H, X         1.1         090         55.5         49.9         60.80         -10.9           433. 49         V, X         1.1         000         69.3         63.7         80.80         -17.1           866. 98         V, X         1.1         045         46.7         41.1         60.80         -19.7           1300. 47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735. 60         V, X         1.1         100         55.3         49.7         60.80         -11.1           433. 49         H, Y         1.0         180         75.5         69.9         80.80         -10.9           866. 98         H, Y         1.0         180         47.0         41.4         60.80         -11.6           1735.	(MHz)		(m)	(Dearee)		(dBmV/m	(dBmV/m)	(dB)
866. 98         H, X         1.0         045         46. 4         40.8         60.80(4)         -20.0           1300. 47         H, X         1.1         090         47.3         41.7         54.0(2)         -12.3           1735. 60         H, X         1.1         090         55.5         49.9         60.80         -10.9           433. 49         V, X         1.1         000         69.3         63.7         80.80         -17.1           1300. 47         V, X         1.1         045         46.7         41.1         60.80         -19.7           1300. 47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735. 60         V, X         1.1         100         55.3         49.7         60.80         -11.1           433. 49         H, Y         1.0         180         75.5         69.9         80.80         -10.9           433. 49         H, Y         1.0         180         47.0         41.4         60.80         -11.6           433. 49         V, Y         1.1         090         81.6         76.0         80.80         -4.8           866. 98         V, Y								(* )
1300.47         H, X         1.1         090         47.3         41.7         54.0(2)         -12.3           1735.60         H, X         1.1         090         55.5         49.9         60.80         -10.9           433.49         V, X         1.1         000         69.3         63.7         80.80         -17.1           866.98         V, X         1.1         045         46.7         41.1         60.80         -19.7           1300.47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735.60         V, X         1.1         100         55.3         49.7         60.80         -11.1           433.49         H, Y         1.0         180         75.5         69.9         80.80         -10.9           866.98         H, Y         1.0         180         47.0         41.4         60.80         -11.6           433.49         H, Y         1.0         180         49.5         43.9         54.00         -11.6           433.49         V, Y         1.1         090         81.6         76.0         80.80         -22.2           1300.47         V, Y         1	433. 49	H, X(1)	1.0	090	83.4	77.8	80.80(3)	-3.0
1735. 60       H, X       1. 1       090       55. 5       49.9       60. 80       -10.9         433. 49       V, X       1. 1       000       69. 3       63.7       80. 80       -17.1         866. 98       V, X       1. 1       045       46. 7       41. 1       60. 80       -19.7         1300. 47       V, X       1. 1       180       50. 4       44. 8       54. 00       -9.2         1735. 60       V, X       1. 1       000       55. 3       49.7       60. 80       -11. 1         433. 49       H, Y       1. 0       180       75. 5       69.9       80. 80       -10.9         1300. 47       H, Y       1. 0       180       47. 0       41. 4       60. 80       -11.6         433. 49       V, Y       1. 1       090       81. 6       76. 0       80. 80       -4.8         866. 98       V, Y       1. 1       090       44. 2       38. 6       60. 80       -22.2         1300. 47       V, Y       1. 1       090       52. 1       46. 5       60. 80       -14. 3         433. 49       H, Z       1. 0       180       78. 1       72. 5       80. 80       -8. 3 <td>866. 98</td> <td>H, X</td> <td>1.0</td> <td>045</td> <td>46.4</td> <td>40.8</td> <td>60.80(4)</td> <td>-20.0</td>	866. 98	H, X	1.0	045	46.4	40.8	60.80(4)	-20.0
433.49         V, X         1.1         000         69.3         63.7         80.80         -17.1           866.98         V, X         1.1         045         46.7         41.1         60.80         -19.7           1300.47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735.60         V, X         1.1         000         55.3         49.7         60.80         -11.1           433.49         H, Y         1.0         180         75.5         69.9         80.80         -10.9           866.98         H, Y         1.0         180         47.0         41.4         60.80         -19.4           1300.47         H, Y         1.0         180         49.5         43.9         54.00         -10.1           1735.60         H, Y         1.0         180         49.5         43.9         54.00         -11.6           433.49         V, Y         1.1         090         81.6         76.0         80.80         -22.2           1300.47         V, Y         1.1         090         52.1         46.5         60.80         -14.3           433.49         H, Z         1.0	1300.47	H, X	1.1	090	47.3	41.7	54.0(2)	-12.3
866. 98         V, X         1.1         045         46. 7         41.1         60. 80         -19.7           1300. 47         V, X         1.1         180         50. 4         44.8         54. 00         -9.2           1735. 60         V, X         1.1         000         55. 3         49.7         60. 80         -11.1           433. 49         H, Y         1.0         180         75. 5         69.9         80. 80         -10.9           866. 98         H, Y         1.0         180         47. 0         41.4         60. 80         -19.4           1300. 47         H, Y         1.0         180         49. 5         43.9         54. 00         -10.1           1735. 60         H, Y         1.0         225         54. 8         49. 2         60. 80         -11.6           433. 49         V, Y         1.1         090         81. 6         76.0         80. 80         -22.2           1300. 47         V, Y         1.1         090         44. 2         38. 6         60. 80         -22.2           1300. 47         V, Y         1.1         090         52. 1         46. 5         60. 80         -14.3           433. 49	1735.60	H, X	1.1	090	55.5	49.9	60.80	-10.9
1300.47         V, X         1.1         180         50.4         44.8         54.00         -9.2           1735.60         V, X         1.1         000         55.3         49.7         60.80         -11.1           433.49         H, Y         1.0         180         75.5         69.9         80.80         -10.9           866.98         H, Y         1.0         180         47.0         41.4         60.80         -19.4           1300.47         H, Y         1.0         180         49.5         43.9         54.00         -10.1           1735.60         H, Y         1.0         225         54.8         49.2         60.80         -11.6           433.49         V, Y         1.1         090         81.6         76.0         80.80         -22.2           1300.47         V, Y         1.1         000         44.2         38.6         60.80         -22.2           1300.47         V, Y         1.1         000         47.8         42.2         54.00         -11.8           1735.60         V, Y         1.1         090         52.1         46.5         60.80         -21.3           866.98         H, Z         1	433. 49	V, X	1.1	000	69.3	63.7	80.80	-17.1
1735. 60       V, X       1.1       000       55. 3       49.7       60. 80       -11.1         433. 49       H, Y       1.0       180       75. 5       69.9       80. 80       -10.5         866. 98       H, Y       1.0       180       47. 0       41.4       60. 80       -19.4         1300. 47       H, Y       1.0       180       49.5       43.9       54.00       -10.1         1735. 60       H, Y       1.0       225       54. 8       49.2       60. 80       -11.6         433. 49       V, Y       1.1       090       81. 6       76.0       80. 80       -4.8         866. 98       V, Y       1.1       000       44. 2       38. 6       60. 80       -22.2         1300. 47       V, Y       1.1       270       47. 8       42.2       54. 00       -11.8         1735. 60       V, Y       1.1       090       52. 1       46.5       60. 80       -14.3         433. 49       H, Z       1.0       180       78. 1       72.5       80. 80       -8.3         866. 98       H, Z       1.0       045       45. 1       39.5       60. 80       -15.6	866. 98	V, X	1.1	045	46.7	41.1	60.80	-19.7
433.49       H, Y       1.0       180       75.5       69.9       80.80       -10.9         866.98       H, Y       1.0       180       47.0       41.4       60.80       -19.4         1300.47       H, Y       1.0       180       49.5       43.9       54.00       -10.1         1735.60       H, Y       1.0       225       54.8       49.2       60.80       -11.6         433.49       V, Y       1.1       090       81.6       76.0       80.80       -4.8         866.98       V, Y       1.1       000       44.2       38.6       60.80       -22.2         1300.47       V, Y       1.1       270       47.8       42.2       54.00       -11.8         1735.60       V, Y       1.1       090       52.1       46.5       60.80       -14.3         433.49       H, Z       1.0       180       78.1       72.5       80.80       -8.3         866.98       H, Z       1.1       090       40.0       34.4       54.00       -19.6         1735.60       H, Z       1.1       090       50.8       45.2       60.80       -15.6         433.49 <td< td=""><td>1300.47</td><td>V, X</td><td>1.1</td><td>180</td><td>50.4</td><td>44.8</td><td>54.00</td><td>-9.2</td></td<>	1300.47	V, X	1.1	180	50.4	44.8	54.00	-9.2
866. 98         H, Y         1.0         180         47.0         41.4         60.80         -19.4           1300. 47         H, Y         1.0         180         49.5         43.9         54.00         -10.1           1735. 60         H, Y         1.0         225         54.8         49.2         60.80         -11.6           433. 49         V, Y         1.1         090         81.6         76.0         80.80         -4.8           866. 98         V, Y         1.1         000         44.2         38.6         60.80         -22.2           1300. 47         V, Y         1.1         270         47.8         42.2         54.00         -11.8           1735. 60         V, Y         1.1         090         52.1         46.5         60.80         -14.3           433. 49         H, Z         1.0         180         78.1         72.5         80.80         -8.3           1735. 60         H, Z         1.1         090         40.0         34.4         54.00         -19.6           1735. 60         H, Z         1.1         090         50.8         45.2         60.80         -15.6           433. 49         V, Z	1735. 60	V, X	1.1	000	55.3	49.7	60.80	-11.1
1300. 47       H, Y       1.0       180       49.5       43.9       54.00       -10.1         1735. 60       H, Y       1.0       225       54.8       49.2       60.80       -11.6         433. 49       V, Y       1.1       090       81.6       76.0       80.80       -4.8         866. 98       V, Y       1.1       000       44.2       38.6       60.80       -22.2         1300. 47       V, Y       1.1       270       47.8       42.2       54.00       -11.8         1735. 60       V, Y       1.1       090       52.1       46.5       60.80       -14.3         433. 49       H, Z       1.0       180       78.1       72.5       80.80       -8.3         1300. 47       H, Z       1.1       090       40.0       34.4       54.00       -19.6         433. 49       V, Z       1.1       090       50.8       45.2       60.80       -15.6         433. 49       V, Z       1.1       270       83.2       77.6       80.80       -3.2         866. 98       V, Z       1.1       180       47.4       41.8       60.80       -19.0         1300. 47 <td>433. 49</td> <td>H, Y</td> <td>1.0</td> <td>180</td> <td>75.5</td> <td>69.9</td> <td>80.80</td> <td>-10.9</td>	433. 49	H, Y	1.0	180	75.5	69.9	80.80	-10.9
1735.60         H, Y         1.0         225         54.8         49.2         60.80         -11.6           433.49         V, Y         1.1         090         81.6         76.0         80.80         -4.8           866.98         V, Y         1.1         000         44.2         38.6         60.80         -22.2           1300.47         V, Y         1.1         270         47.8         42.2         54.00         -11.8           1735.60         V, Y         1.1         090         52.1         46.5         60.80         -14.3           433.49         H, Z         1.0         180         78.1         72.5         80.80         -8.3           1300.47         H, Z         1.0         045         45.1         39.5         60.80         -21.3           1735.60         H, Z         1.1         090         40.0         34.4         54.00         -19.6           433.49         V, Z         1.1         270         83.2         77.6         80.80         -3.2           866.98         V, Z         1.1         180         47.4         41.8         60.80         -19.0           1300.47         V, Z         1.1<	866. 98	H, Y	1.0	180	47.0	41.4	60.80	-19.4
433.49         V, Y         1.1         090         81.6         76.0         80.80         -4.8           866.98         V, Y         1.1         000         44.2         38.6         60.80         -22.2           1300.47         V, Y         1.1         270         47.8         42.2         54.00         -11.8           1735.60         V, Y         1.1         090         52.1         46.5         60.80         -14.3           433.49         H, Z         1.0         180         78.1         72.5         80.80         -8.3           866.98         H, Z         1.0         045         45.1         39.5         60.80         -21.3           1300.47         H, Z         1.1         090         40.0         34.4         54.00         -19.6           433.49         V, Z         1.1         270         83.2         77.6         80.80         -3.2           866.98         V, Z         1.1         180         47.4         41.8         60.80         -19.0           1300.47         V, Z         1.1         180         52.2         46.6         54.00         -7.4	1300.47	H, Y	1.0	180	49.5	43.9	54.00	-10.1
866. 98         V, Y         1.1         000         44. 2         38.6         60. 80         -22.2           1300. 47         V, Y         1.1         270         47. 8         42.2         54. 00         -11. 8           1735. 60         V, Y         1.1         090         52. 1         46.5         60. 80         -14. 3           433. 49         H, Z         1.0         180         78. 1         72. 5         80. 80         -8. 3           866. 98         H, Z         1.0         045         45. 1         39. 5         60. 80         -21. 3           1300. 47         H, Z         1.1         090         40. 0         34. 4         54. 00         -19. 6           433. 49         V, Z         1.1         270         83. 2         77. 6         80. 80         -3. 2           866. 98         V, Z         1.1         180         47. 4         41. 8         60. 80         -19. 0           1300. 47         V, Z         1.1         180         52. 2         46. 6         54. 00         -7. 4	1735. 60	H, Y	1.0	225	54.8	49.2	60.80	-11.6
1300. 47         V, Y         1.1         270         47. 8         42.2         54. 00         -11.8           1735. 60         V, Y         1.1         090         52. 1         46.5         60. 80         -14.3           433. 49         H, Z         1.0         180         78. 1         72.5         80. 80         -8.3           866. 98         H, Z         1.0         045         45. 1         39.5         60. 80         -21.3           1300. 47         H, Z         1.1         090         40. 0         34.4         54. 00         -19.6           1735. 60         H, Z         1.1         090         50. 8         45.2         60. 80         -15.6           433. 49         V, Z         1.1         270         83. 2         77.6         80. 80         -3.2           866. 98         V, Z         1.1         180         47. 4         41.8         60. 80         -19.0           1300. 47         V, Z         1.1         180         52. 2         46.6         54. 00         -7.4	433. 49	V, Y	1.1	090	81.6	76.0	80.80	-4.8
1735. 60         V, Y         1.1         090         52. 1         46.5         60. 80         -14.3           433. 49         H, Z         1.0         180         78. 1         72.5         80. 80         -8.3           866. 98         H, Z         1.0         045         45. 1         39.5         60. 80         -21.3           1300. 47         H, Z         1.1         090         40. 0         34.4         54. 00         -19.6           1735. 60         H, Z         1.1         090         50. 8         45.2         60. 80         -15.6           433. 49         V, Z         1.1         270         83. 2         77.6         80. 80         -3.2           866. 98         V, Z         1.1         180         47. 4         41.8         60. 80         -19.0           1300. 47         V, Z         1.1         180         52. 2         46.6         54. 00         -7.4	866. 98	V, Y	1.1	000	44. 2	38.6	60.80	-22.2
433. 49       H, Z       1.0       180       78. 1       72.5       80. 80       -8.3         866. 98       H, Z       1.0       045       45. 1       39.5       60. 80       -21.3         1300. 47       H, Z       1.1       090       40. 0       34.4       54. 00       -19.6         1735. 60       H, Z       1.1       090       50. 8       45.2       60. 80       -15.6         433. 49       V, Z       1.1       270       83. 2       77.6       80. 80       -3.2         866. 98       V, Z       1.1       180       47. 4       41.8       60. 80       -19.0         1300. 47       V, Z       1.1       180       52. 2       46.6       54. 00       -7.4	1300.47	V, Y	1.1	270	47.8	42.2	54.00	-11.8
866. 98       H, Z       1.0       045       45. 1       39.5       60. 80       -21.3         1300. 47       H, Z       1.1       090       40. 0       34.4       54. 00       -19.6         1735. 60       H, Z       1. 1       090       50. 8       45. 2       60. 80       -15.6         433. 49       V, Z       1. 1       270       83. 2       77.6       80. 80       -3.2         866. 98       V, Z       1. 1       180       47. 4       41.8       60. 80       -19.0         1300. 47       V, Z       1. 1       180       52. 2       46.6       54. 00       -7.4	1735. 60	V, Y	1.1	090	52.1	46.5	60.80	-14.3
1300. 47       H, Z       1. 1       090       40. 0       34.4       54. 00       -19.6         1735. 60       H, Z       1. 1       090       50. 8       45.2       60. 80       -15.6         433. 49       V, Z       1. 1       270       83. 2       77.6       80. 80       -3.2         866. 98       V, Z       1. 1       180       47. 4       41.8       60. 80       -19.0         1300. 47       V, Z       1. 1       180       52. 2       46.6       54. 00       -7.4	433. 49	H, Z	1.0	180	78. 1	72.5	80.80	-8.3
1735. 60       H, Z       1.1       090       50.8       45.2       60.80       -15.6         433. 49       V, Z       1.1       270       83.2       77.6       80.80       -3.2         866. 98       V, Z       1.1       180       47.4       41.8       60.80       -19.0         1300. 47       V, Z       1.1       180       52.2       46.6       54.00       -7.4	866. 98	H, Z	1.0	045	45.1	39.5	60.80	-21.3
433. 49     V, Z     1. 1     270     83. 2     77.6     80. 80     -3.2       866. 98     V, Z     1. 1     180     47. 4     41.8     60. 80     -19.0       1300. 47     V, Z     1. 1     180     52. 2     46.6     54. 00     -7.4	1300.47	H, Z	1.1	090	40.0	34.4	54.00	-19.6
866. 98     V, Z     1. 1     180     47. 4     41.8     60. 80     -19.0       1300. 47     V, Z     1. 1     180     52. 2     46.6     54. 00     -7.4	1735. 60	H, Z	1.1	090	50.8	45.2	60.80	-15.6
1300. 47 V, Z 1. 1 180 52. 2 46.6 54. 00 -7.4	433. 49	V, Z	1.1	270	83. 2	77.6	80.80	-3.2
	866. 98	V, Z	1.1	180	47.4	41.8	60.80	-19.0
1735. 60 V, Z 1. 1 090 59. 0 53.4 60. 80 -7.4	1300.47	V, Z	1.1	180	52.2	46.6	54.00	-7.4
	1735.60	V, Z	1.1	090	59.0	53.4	60.80	-7.4

<sup>(1)</sup> See Figure 3.1, 3.2 and 3.3 for definition of position X-1, Y-2, Z-3.

### 5.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, 1.0837MHz(433.49x0.25%). Bandwidth is determined at the points 20dB down from the modulated carrier. Figure 5.2 shows the occupied bandwidth plot.

<sup>(2)</sup> Restricted band.

<sup>(3)</sup> Fundamental limit is 1500-5000 microvolts/meter linear interpolations (average reading) for 260-470 MHz fundamental frequency range; 4390uV/m for 433.4MHz Fundamental. Per FCC 15.231(b).

<sup>(4)</sup> Spurious limit is 150-500 microvolts/meter linear interpolations (average reading). Per 15.231(b).

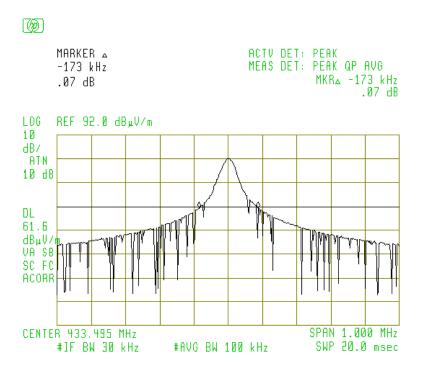
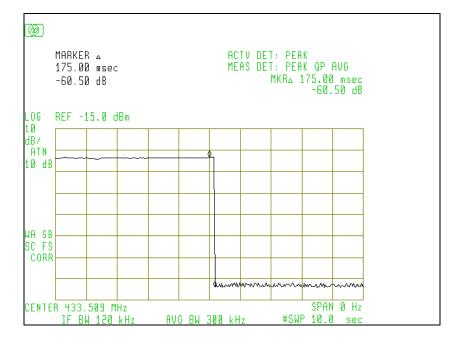


Figure 6.1 Occupied Bandwidth



Tx stopped within 5s after button released

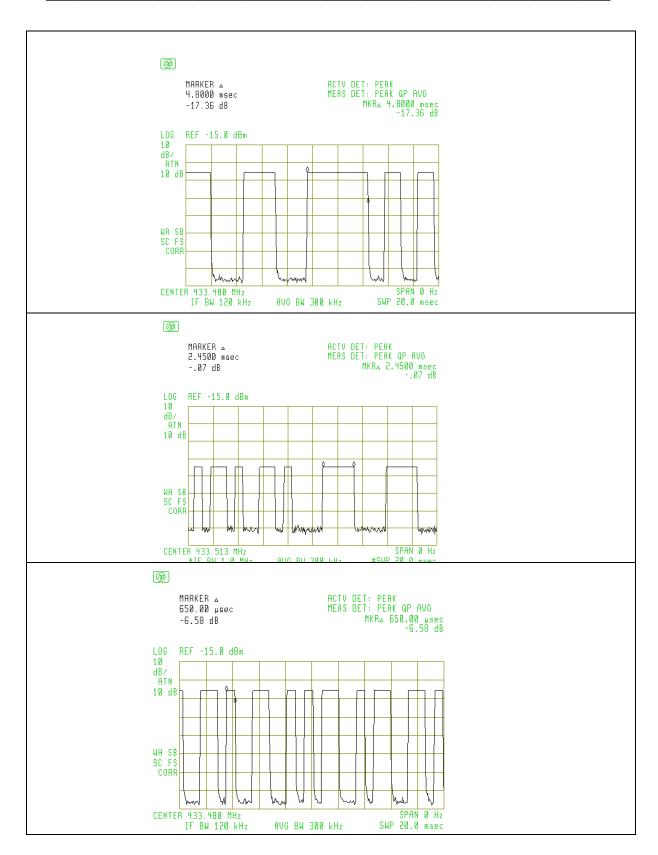


Figure 6.2 Pulse Train Timing