

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

TELIS 6 CHRONIS RTS US  
MODEL: TELIS 6 CHRONIS RTS US  
FCC ID: **DWNCHR06**

*February 02, 2012*

This report concerns (check one): Original grant <input checked="" type="checkbox"/> Class II change <input type="checkbox"/>	
Equipment type: <u>Low Power Intentional Radiator</u>	
Deferred grant requested per 47 CF 0.457(d)(1)(ii)?	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
If yes, defer until: _____ (date)	
Company agrees to notify the Commission by	_____ (date)
of the intended date of announcement of the product so that the grant can be issued on that date.	
Transition Rules Request per 15.37?	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision.	
Report prepared for:	SIMU U.S. Inc.
Report prepared by:	Advanced Compliance Lab
Report number:	0048-120202-01



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

# Table of Contents

Report Cover Page.....	1
Table of Contents.....	2
Figures.....	3
<b>1. GENERAL INFORMATION.....</b>	<b>4</b>
1.1 Verification of Compliance .....	4
1.2 Equipment Modifications .....	5
1.3 Product Information .....	6
1.4 Test Methodology .....	6
1.5 Test Facility .....	6
1.6 Test Equipment .....	6
1.7 Statement of the Document Use.....	7
<b>2. PRODUCT LABELING.....</b>	<b>8</b>
<b>3. SYSTEM TEST CONFIGURATION.....</b>	<b>9</b>
3.1 Justification .....	9
3.2 Special Accessories .....	9
3.3 Configuration of Tested System.....	9
<b>4. SYSTEM SCHEMATICS .....</b>	<b>13</b>
<b>5. CONDUCTED EMISSION DATA .....</b>	<b>14</b>
5.1 Test Methods and Conditions.....	14
5.2 Test Data.....	14
<b>6. RADIATED EMISSION DATA.....</b>	<b>17</b>
6.1 Field Strength Calculation .....	17
6.2 Test Methods and Conditions.....	17
6.2 Test Data.....	17
6.4. Occupied Bandwidth.....	19
<b>7. PHOTOS OF TESTED EUT.....</b>	<b>22</b>

## Figures

<b>Figure 2.1 FCC ID Label.....</b>	<b>8</b>
<b>Figure 2.2 Location of Label on Back of the EUT.....</b>	<b>8</b>
<b>Figure 3.1 Radiated Test Setup, Position 1.....</b>	<b>10</b>
<b>Figure 3.2 Radiated Test Setup, Position 2.....</b>	<b>10</b>
<b>Figure 3.3 Radiated Test Setup, Position 3.....</b>	<b>11</b>
<b>Figure 3.4 Conducted Test Setup, Front.....</b>	<b>12</b>
<b>Figure 3.5 Conducted Test Setup, Rear.....</b>	<b>12</b>
<b>Figure 4.1 EUT Schematics .....</b>	<b>13</b>
<b>Figure 5.1 Line Conducted.....</b>	<b>15</b>
<b>Figure 5.2 Neutral Conducted .....</b>	<b>16</b>
<b>Figure 6.1 Bandwidth Plot .....</b>	<b>19</b>
<b>Figure 6.2 Pulse Train Timing .....</b>	<b>20</b>
<b>Figure 7.1 Front View.....</b>	<b>22</b>
<b>Figure 7.2 Rear View .....</b>	<b>23</b>
<b>Figure 7.3 Cover Opened_ Inside View (1).....</b>	<b>24</b>
<b>Figure 7.4 Cover Opened_ Inside View (2).....</b>	<b>25</b>
<b>Figure 7.5 Component Side .....</b>	<b>26</b>
<b>Figure 7.6 Foil Side.....</b>	<b>27</b>

# 1. GENERAL INFORMATION

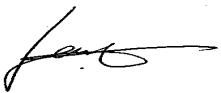
## 1.1 Verification of Compliance

EUT: TELIS 6 CHRONIS RTS US  
Model: TELIS 6 CHRONIS RTS US  
Applicant: SIMU U.S. INC.  
Test Type: FCC Part 15C CERTIFICATION (15.231: a)  
Result: PASS  
Tested by: ADVANCED COMPLIANCE LABORATORY  
Test Date: February 02, 2012  
Report Number: 0048-120202-01

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.	$\pm 2.36$	$\pm 2.99$	$\pm 1.83$

  
\_\_\_\_\_  
Wei Li  
Lab Manager  
Advanced Compliance Lab

Date: February 02, 2012

## **1.2 Equipment Modifications**

N/A

### 1.3 Product Information

#### System Configuration

ITEM	DESCRIPTION	FCC ID	CABLE
Product	TELIS 6 CHRONIS RTS US (1)	<b>DWNCRO6</b>	
Housing	PLASTICS		
Power Supply	3V Battery		
Operation Freq.	433.45 HMz		
Device Type	Periodic Operation		
Receiver	SENSOR Receiver	DoC	

(1) 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	15/10/12
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	5/01/13
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/13
Agilent	E4440A	US40420700	PSA Spectrum Analyzer	4/08/12
EMCO	3115	4945	Double Ridge Guide Horn Antenna	12/03/12

All Test Equipment Used are Calibrated Traceable to NIST Standards.

### **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.

## 2. PRODUCT LABELING

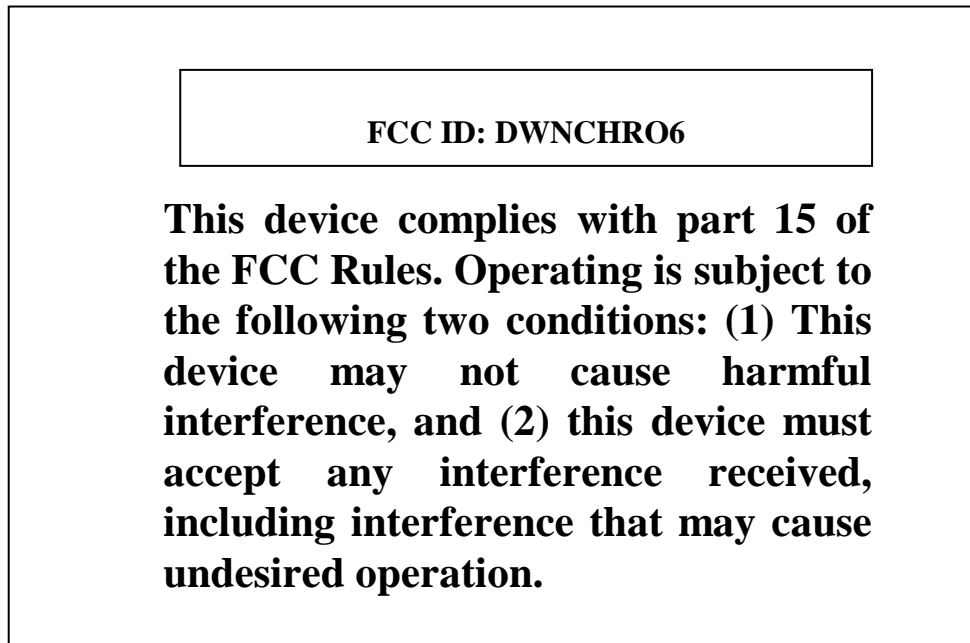


Figure 2.1 FCC ID Label

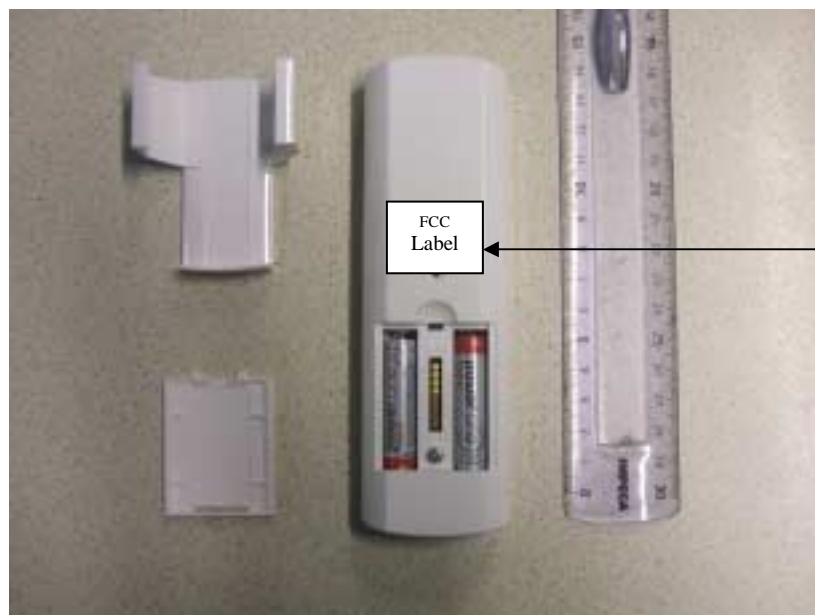


Figure 2.2 FCC ID Label Location



### **3. SYSTEM TEST CONFIGURATION**

#### **3.1 Justification**

The system was configured for testing in a typical fashion (as a customer would normally use it). And its antenna is on PCB.

The transmission does stop when the button or auto trigger is released after the completion of the frame. This time is less 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**

N/A

**Figure 3.4 Conducted Setup- Front**

N/A

**Figure 3.5 Conducted Setup- Rear**

## **4. SYSTEM SCHEMATICS**

See Attachment.

**Figure 4.1 System Schematics**

## 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				
Frequency Range	Class A		Class B	
	Quasi-Peak dBuV	Average dBuV	Quasi-Peak DBuV	Average 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

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

N/A

Test Personnel:

Tester Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Typed/Printed Name: \_\_\_\_\_

N/A

**Fig. 5.1 Conducted Emission-Line**

N/A

**Fig. 5.2 Conducted Emission- Neutral**



## 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 dB $\mu$ V/m

RA: Amplitude of EMI Receiver before correction in dB $\mu$ V

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. =  $(55 \times 0.640 + 1 \times 4.8 + 4 \times 2.5 + 5 \times 2.5) / 100 = 0.525$

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 30MHz - 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.

Test Personnel:



Typed/Printed Name: Edward Lee

Date: February 02, 2012

### Radiated Test Data

Frequency (MHz)	Polar ity [H or V], Posi ti on (X, Y, Z)	Hei ght (m)	Azi muth (Degree)	Peak Readi ng (dBmV/m)	Cal cul ated Average Readi ng (dBmV/m)	FCC 3m Limi t (dBmV/m)	Di fferen ce from Limi t (dB)
433.45	H, X(1)	1.1	000	79.1	73.5	80.8(3)	<b>-7.3</b>
866.90	H, X	1.1	045	48.9	43.3	60.8(4)	<b>-17.5</b>
1300.35	H, X	1.0	000	48.2	42.6	54.0(2)	<b>-11.4</b>
1733.80	H, X	1.0	000	49.5	43.9	60.80	<b>-16.9</b>
433.45	V, X	1.1	045	67.5	61.9	80.80	<b>-18.9</b>
866.90	V, X	1.1	000	46.8	41.2	60.80	<b>-19.6</b>
1300.35	V, X	1.0	090	53.9	48.3	54.00	<b>-5.7</b>
1733.80	V, X	1.0	090	50.1	44.5	60.80	<b>-16.3</b>
433.45	H, Y	1.1	000	81.4	75.8	80.80	<b>-5</b>
866.90	H, Y	1.1	180	47.6	42	60.80	<b>-18.8</b>
1300.35	H, Y	1.0	090	49.8	44.2	54.00	<b>-9.8</b>
1733.80	H, Y	1.0	090	48.0	42.4	60.80	<b>-18.4</b>
433.45	V, Y	1.1	090	70.9	65.3	80.80	<b>-15.5</b>
866.90	V, Y	1.1	000	49.0	43.4	60.80	<b>-17.4</b>
1300.35	V, Y	1.1	180	52.7	47.1	54.00	<b>-6.9</b>
1733.80	V, Y	1.1	180	50.6	45	60.80	<b>-15.8</b>
433.45	H, Z	1.2	000	68.2	62.6	80.80	<b>-18.2</b>
866.90	H, Z	1.2	045	46.8	41.2	60.80	<b>-19.6</b>
1300.35	H, Z	1.1	000	50.0	44.4	54.00	<b>-9.6</b>
1733.80	H, Z	1.1	000	49.8	44.2	60.80	<b>-16.6</b>
433.45	V, Z	1.2	090	79.5	73.9	80.80	<b>-6.9</b>
866.90	V, Z	1.2	180	47.9	42.3	60.80	<b>-18.5</b>
1300.35	V, Z	1.1	090	45.9	40.3	54.00	<b>-13.7</b>
1733.80	V, Z	1.1	090	49.0	43.4	60.80	<b>-17.4</b>

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

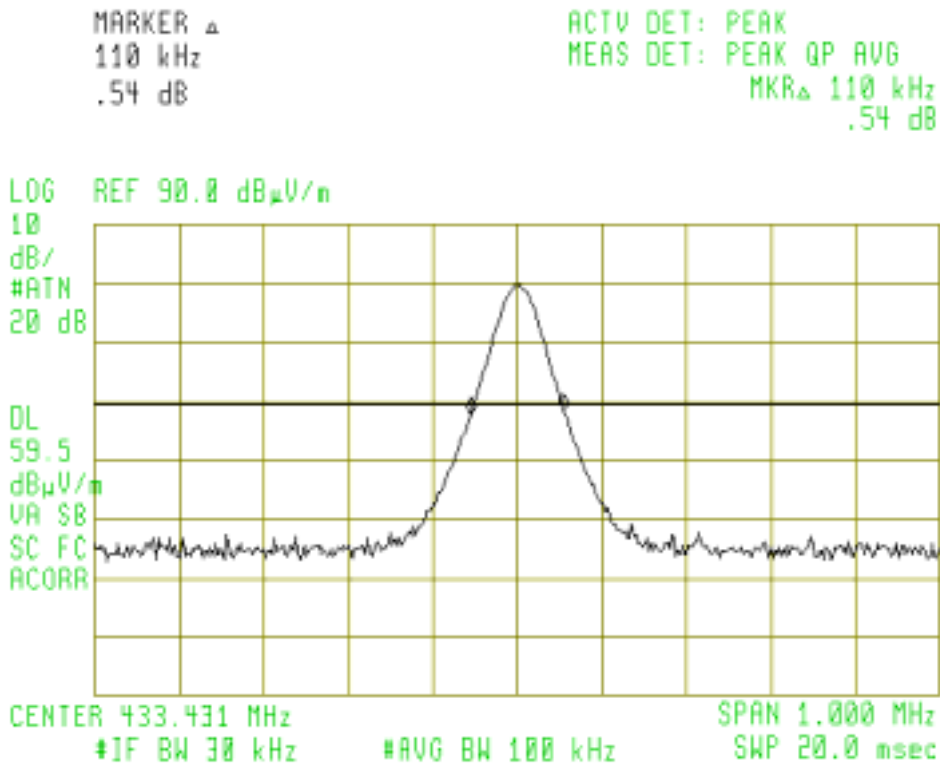
(2) Restricted band.

(3) Fundamental limit is 3750-12500 microvolts/meter linear interpolations (average reading). Per FCC 15.231(a).

(4) Spurious limit is 375-1250 microvolts/meter linear interpolations (average reading). Per 15.231(a).

### 5.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, 1.084MHz(433.5x0.25%). Bandwidth is determined at the points 20dB down from the modulated carrier. Figure 5.2 shows the occupied bandwidth plot.



**Figure 6.1 Occupied Bandwidth**

See operational description

**Figure 6.2 (a) Pulse Train Timing**

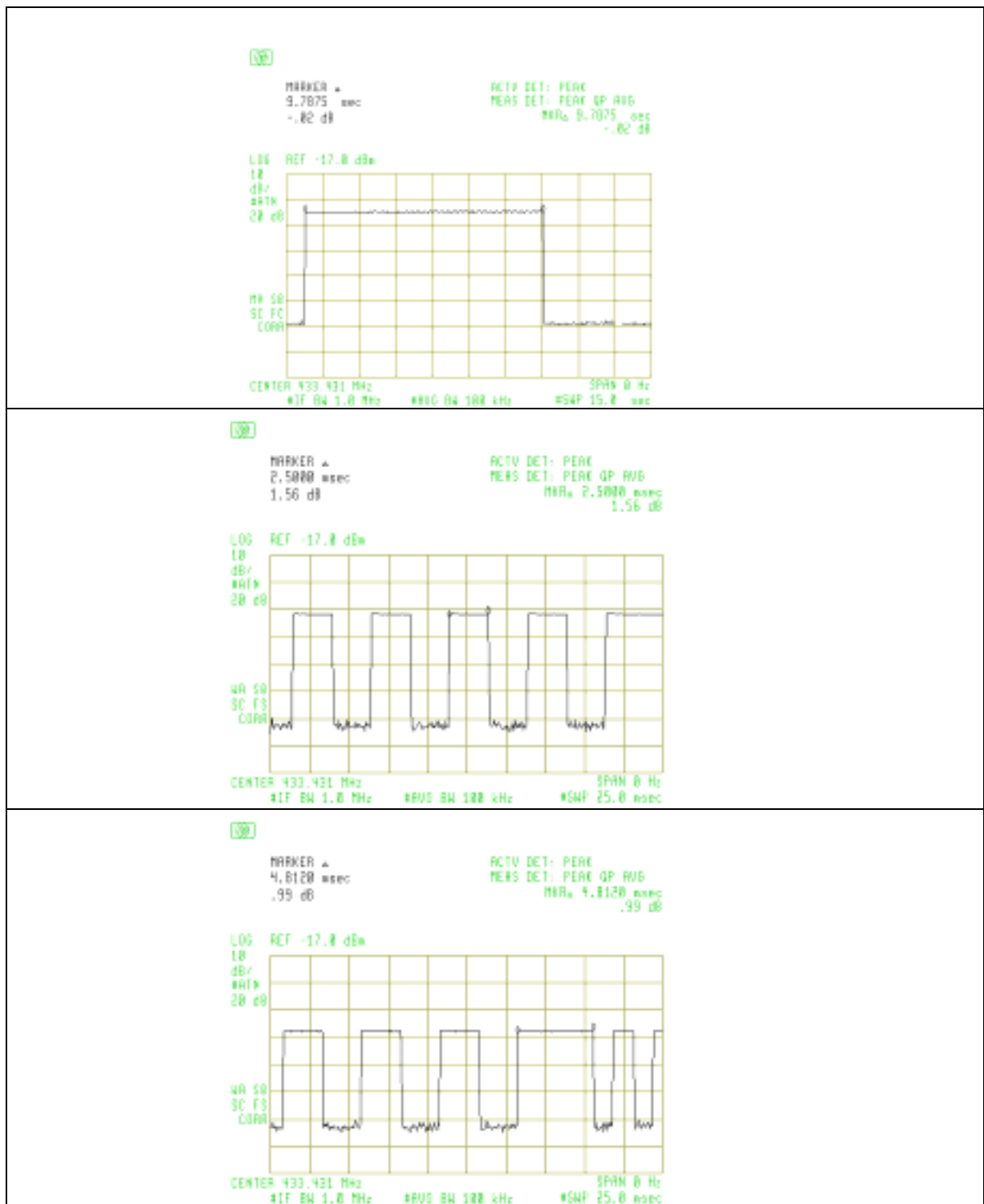


Figure 6.2 (b) Pulse Train Timing