420 N Dorothy Drive, Richardson, TX 75081 Ph: (972) 238-5591 Fax: (972) 238-1860

S&A Systems, Inc.

Application
For
Certification
(FCC ID: J4CGPT-3)

Fleetwatch GPT-3

LIST OF EXHIBITS

420 N Dorothy Drive, Richardson, TX 75081 Ph: (972) 238-5591 Fax: (972) 238-1860

MEASUREMENT/TECHNICAL REPORT

S&A System, Inc. - MODEL: Fleetwatch GPT-3
FCC ID: J4CGPT-3

August 11, 2003

This report concerns (check one:) Original Grant X Class II Change _____

Equipment Type: Low Power Transceiver (example: computer, printer, modem, etc.)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ___ No X

If yes, defer until: _____ date

Company Name 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 ___ No X

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-1-96 Edition] provision.

Report prepared by:

Sudesh Kamble
Intertek Testing Services
420 N Dorothy Drive
Richardson, TX
USA
Phone: 972-238-5591
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Exhibit type	File Description	Filename
Test Report	Test Report	report.doc
Operation Description	Technical Description	desc.pdf
Test Setup Photo	Radiated Emission	Rconfig photos.doc
Test Report	Bandwidth Plot	bw.gif
External Photo	External Photo	Intrnal_external.doc
Internal Photo	Internal Photo	Intrnal_external.doc
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Timing Diagram	Timing Diagram	timing.gif

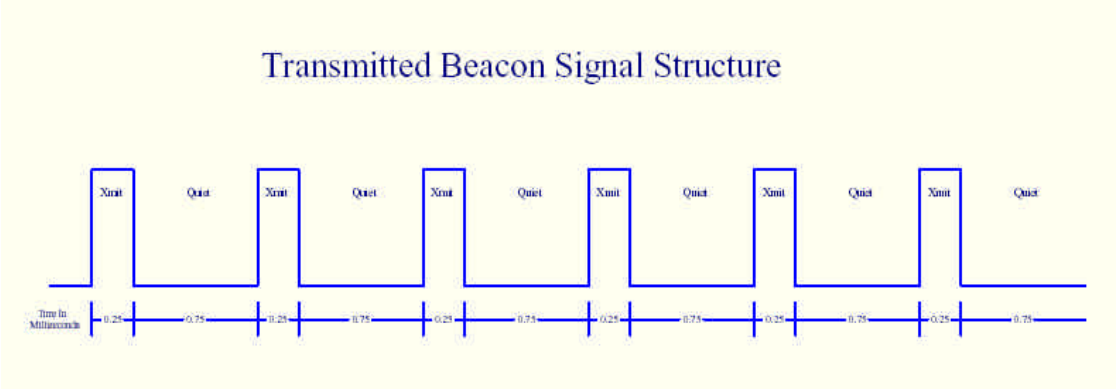
EXHIBIT 1

GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The GPT-3 is controlled by a Microchip PIC16F876-04I/SO RISC microcontroller. When instructed by serial command, the unit emits a beacon signal designed to trigger a Fleetwatch Electronic Trip Recorder. This beacon signal is a 4.25 second burst consisting of a 770 Hz stream of pulses with a 25% duty cycle over the 303.875 MHz transmitter (Refer to diagram "*Data Transmit Modulation Scheme*"). At the end of the beacon signal, the T/R Switch connects the receiver to the antenna and the unit looks for data on the same 303.875 MHz band. A small delay (approximately 1 second) occurs between the end of the beacon signal and the beginning of the data chain coming back to the TRM. This delay is required for backwards compatibility with previous readers, which required time for the Automatic Gain Control (AGC) circuitry to readjust to read the low-power signals returned by the RF devices, as well as for the transmitter circuitry in the device being read to power up. This delay is not required by the TRM. The microcontroller waits and examines the received data line from the receiver. A serial message is sent (over the RS-232 channel) indicating whether data was received or not, and passes either the data or a code indicating why the data could not be decoded.



Data Transmit Modulation Scheme

The transmit interval depends on the frequency of commands sent to the unit to do a search. It does not poll constantly; it requires an external trigger of some sort (usually a human hitting a GO button). At most it can trigger every 5 seconds.

ANTENNA: The antenna is a PCB trace. It cannot be modified by the user or replaced.

The Product is only battery operated. Only radiated emission (with new 9V battery) measurements were performed, as conducted emission test is not applicable to the product.

For electronic filing, the brief circuit description is saved with filename: desc.pdf.

1.2 Related Submittal(s) Grants

This is a single application for certification of a transmitter.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in 3meters FCC approved semi-anechoic Chamber. The site attenuation of the chamber is performed as per the procedure detailed in ANSI C63.4-1992-Alternate Test Site and is within the specified tolerance. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The Anechoic Chamber and conducted measurement facility used to collect the emission data is located at 420 N Dorothy Drive, Richardson, TX - 75081. This test facility and site measurement data have been fully placed on file with the FCC.

Test facility FCC Registration No. 101578 issued September 10, 2001.

EXHIBIT 2

SYSTEM TEST CONFIGURATION

2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (1992).

The EUT was powered from 9Vfully charged battery and the adapter.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step-by-step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

For simplicity of testing, the unit was wired to transmit continuously.

2.2 EUT Exercising Software

The EUT triggers from the test software installed on a computer. Once EUT gets the signal from computer via interface cable, the unit transmits the typical signal. For simplicity of testing, the unit was wired to transmit continuously.
The test software used is the “Mobile Receiver Interface Software v2.0.0 Beta 1”

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.
1m long RJ45 to DB9 serial cable used for connection with the computer.

2.4 Equipment Modification

Any modifications installed previous to testing by S&A Systems, Inc. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

2.5 Support Equipment List and Description

This product was tested in a standalone configuration.

All the items listed under section 2.0 of this report are

Confirmed by:

Sudesh Kamble
EMC Team Leader
Intertek Testing Services, Richardson Tx.
Agent for S&A Systems, Inc.

Signature
August 11, 2003

EXHIBIT 3

EMISSION RESULTS

3.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength indicated in the test results are inclusive of the antenna factors and the cable losses used during the measurement.

EMI receiver incorporating Quasi- peak and average filters was used for radiated emission measurements. The cable losses and the antenna factors were added in the EMI receiver and the corrected values are indicated in the table and graphs.

3.2 Emission Configuration Photograph

Worst Case Radiated Emission
at
303.80 MHz

For electronic filing, the worst-case radiated emission configuration photograph is saved with filename: Rconfig photos.doc

3.3 Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by > 25.00 dB

3.4 Test Equipments used

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
Agilent Technologies, E7405A, HP EMC System	US40240235	11/02	11/03	X
Schaffner, CBL6112B, Log Periodic Antenna	2726	5/03	5/04	X

TEST PERSONNEL:

Signature

Sudesh Kamble, EMC Team Leader
Typed/Printed Name

August 11, 2003
Date

Radiated Emissions

Date: August 8, 2003
Company: S&A Systems, Inc.
O Box 1928,
Rockwall, TX 75087-2028
Equipment: Fleetwatch, Model GPT-3
Test Engineer: Sudesh Kamble
Test Standard: CFR 47:1999, §15.209 and §15.231(b)
Note : The table shows the worst case radiated emissions. All the measurements were performed at test distance of 3m.

Table # 1: Radiated Emission

Antenna Polarity	Antenna Hts(m)/Azimuth	Frequency MHz	QP Reading dBuV/m	Limit dBuV/m	Margin	Comment
H	1.0/111 deg	303.80	46.74	73.67	-26.93	Pass
V	1.0/180 deg	303.80	35.16	73.67	-42.51	Pass

No spurious emissions were detected at frequencies other than fundamental frequency above the noise floor. Please refer to Graph 1 and 2.

Table # 2: Radiated Emission in Restricted Bands

Antenna Polarity	Antenna Hts(m)/Azimuth	Frequency MHz	QP/Ave. Reading dBuV/m	Limit dBuV/m	Margin	Comment
H/V	1.0/0	607.60	27.99*	46	--	Pass
H/V	1.0/0	911.40	31.14*	46	--	Pass
H/V	1.0/0	1064.00	26.41*	46	--	Pass
H/V	1.0/0	1519.00	30.40*	54	--	Pass
H/V	1.0/0	1822.80	33.26*	54	--	Pass

* Indicates the Noise floor with Antenna factors incorporated during measurements. QP measurements were performed below 1GHz and Average measurements were performed above 1GHz.

Notes:

1. QP measurements were performed for frequencies below 1GHz and Average measurements were performed for frequencies above 1 GHz.

2. Peak Detector Data unless otherwise stated.

3. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

4. Negative value in the margin column shows emission below limit.

5. Horn antenna and average detector are used for the emission over 1000MHz.

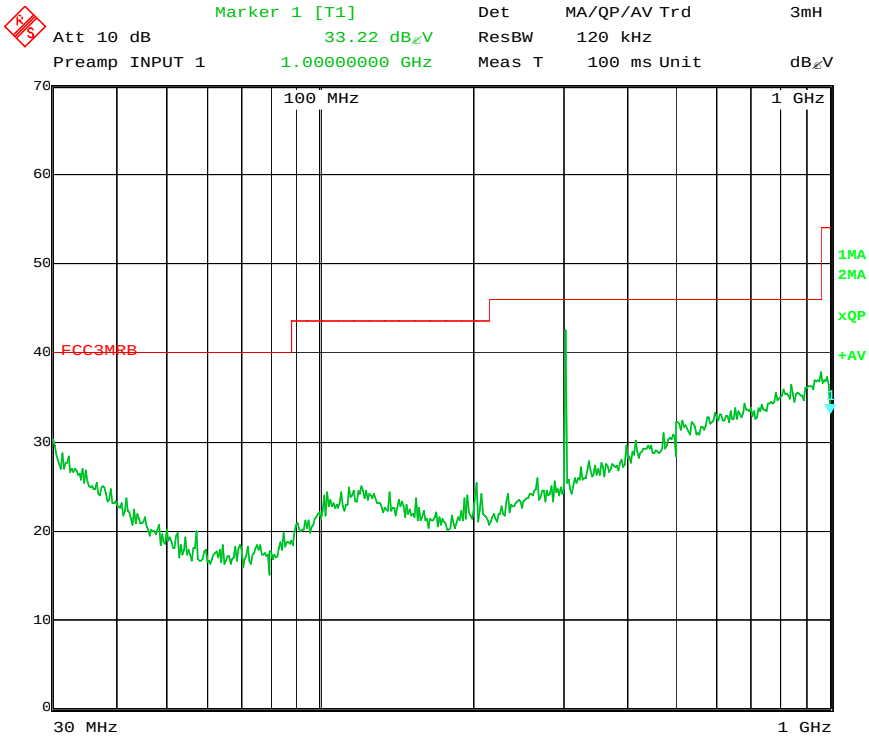
6. Emission within the restricted band meets the requirement of Section 6.3. The corresponding limit as Section 6.2.1 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Sudesh Kamble

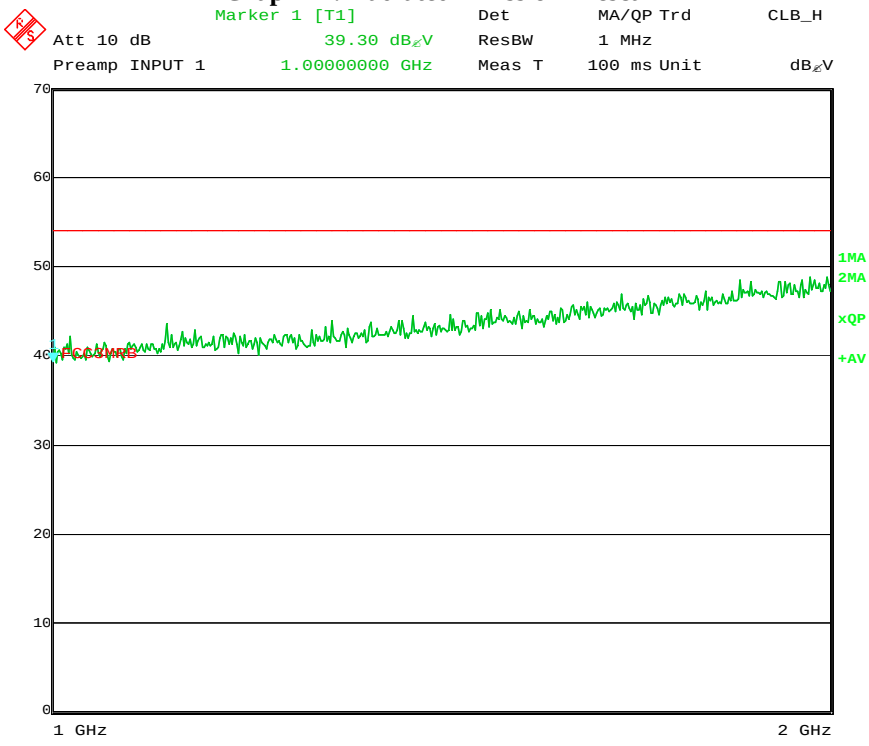
Conducted Emissions

Not performed, as product is battery operated and not connected to mains supply.

Graph #1 : Radiated Emission Prescan



Graph #2: Radiated Emission Prescan



Graph #3 : 20 dB Bandwidth Measurement

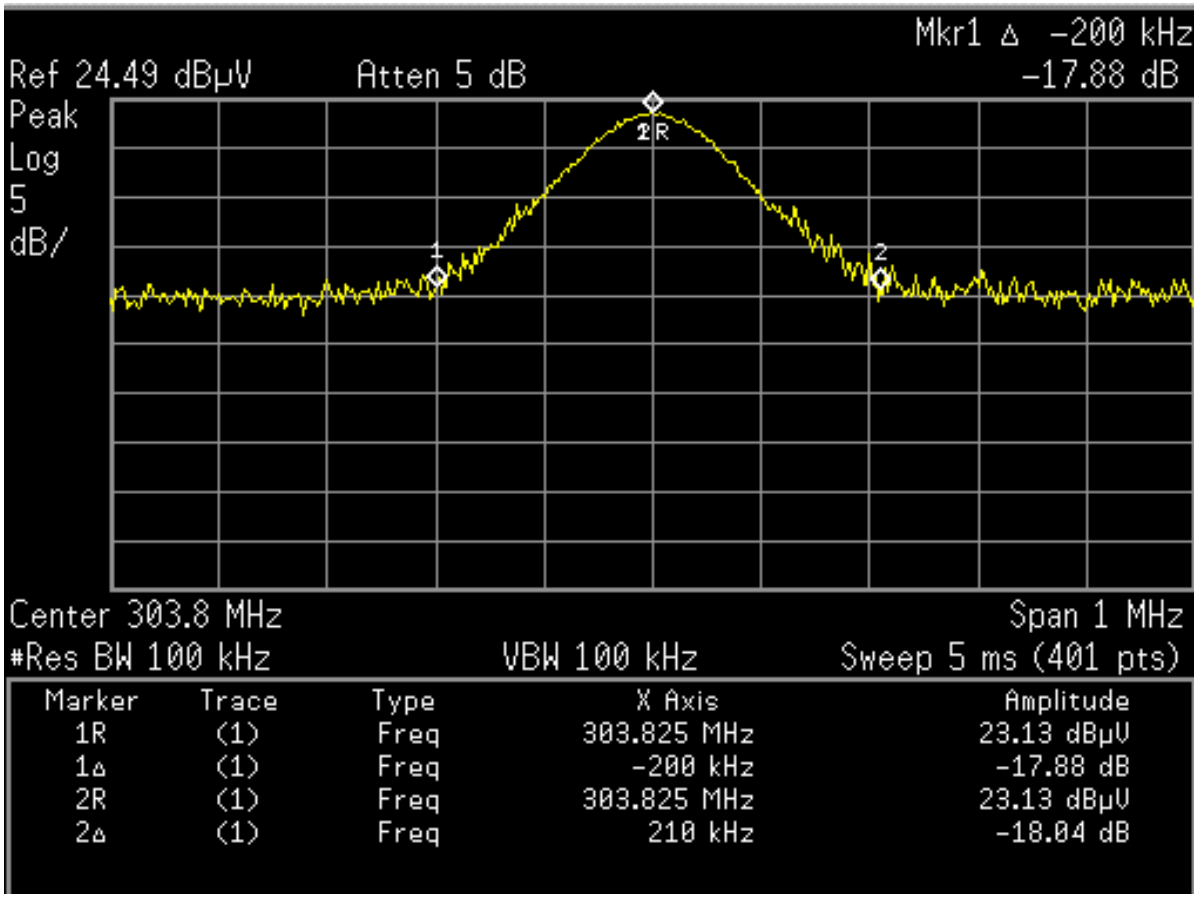


EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.doc & internal photos.doc

EXHIBIT 5

PRODUCT LABELLING

5.0 Product Labelling

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf

EXHIBIT 6

TECHNICAL SPECIFICATIONS

6.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

EXHIBIT 7

INSTRUCTION MANUAL

7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

This manual will be provided to the end-user with each unit sold/leased in the United States.

EXHIBIT 8

MISCELLANEOUS INFORMATION

8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factors such as pulse desensitization and averaging factor.

8.1 Measured Bandwidth

For electronic filing, the plot shows the fundamental emission when modulated is saved with filename: bw.gif.

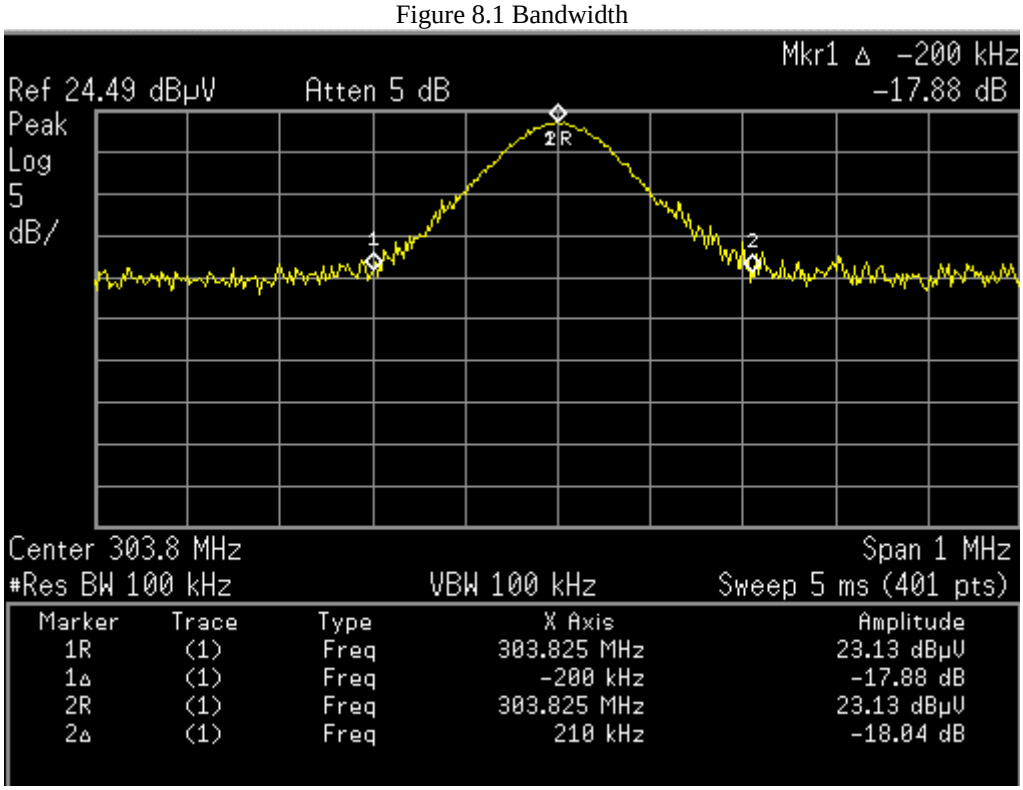
Bandwidth Measurement§15.231(c):

Fundamental Freq. 303.825 MHz
Lower Freq.(-20dB of peak at fundamental Freq.) = 303.625 MHz
Higher Freq.(-20dB of peak at fundamental Freq.) = 304.035 MHz
20db BW = 0.410 MHz which is 0.135% of fundamental (max. allowed is 0.25% of fundamental freq.)

Therefore, the unit meets the requirement of section 15.231(c).

**: BW measurements were performed in Frontal orientation with antenna height 1 m.

Figure 8.1 Bandwidth



8.2 Discussion of Pulse Desensitization

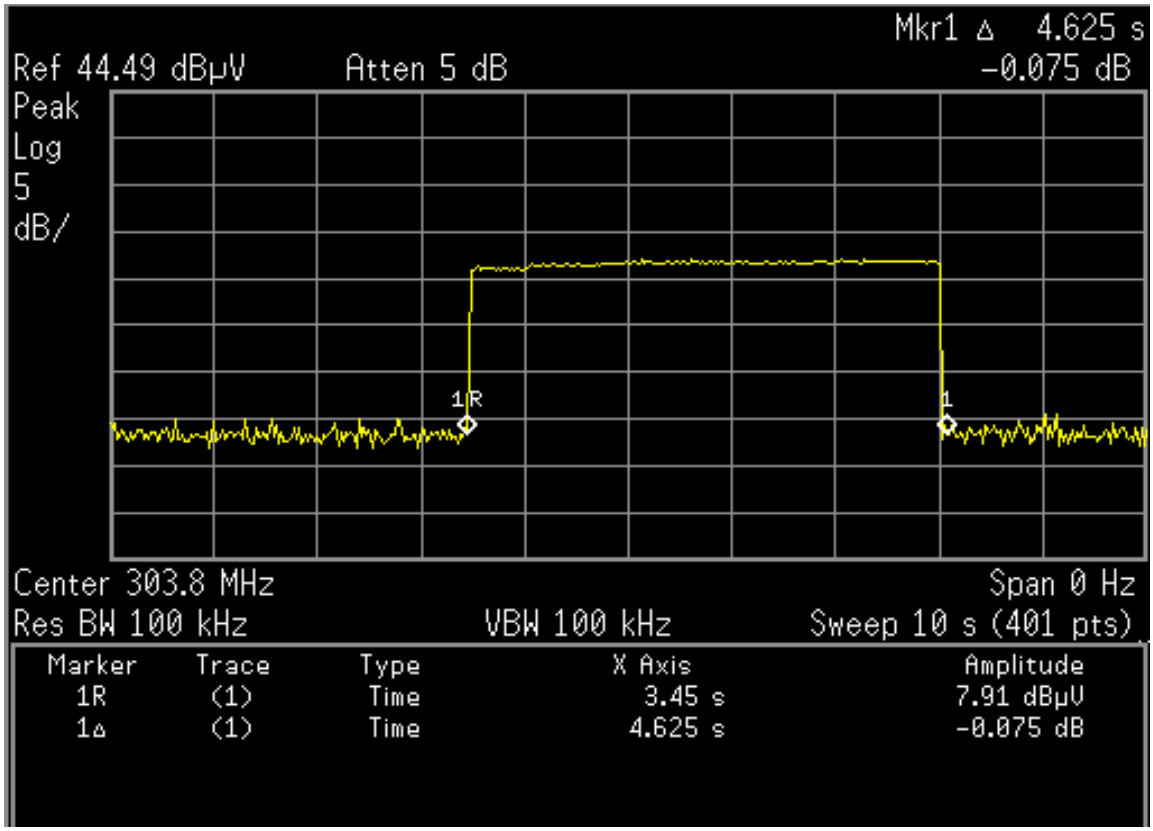
Pulse desensitivity was not applicable for this device.

8.3 Calculation of deactivation time

The EMI receiver was incorporated to meausre the deactivation time of the transmitted signal to cease within 5 seconds of activation to meet the requirements of FCC section 15.231(a)(1). The measure time is 4.625 seconds.

For electronic filing, the plot shows the transmission timing is saved with filename: timing.gif.

Fig. 8.3 Timing



8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 1992.

The transmitting equipment under test (EUT) is placed on a wooden turntable, which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in Quasi-peak mode. The frequency range scanned is from the lowest radio frequency signal generated in the device, which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 1992.

The IF bandwidth used for measurement of radiated signal strength was 120kHz when frequency is below 1000 MHz. Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.