



Measurement of RF Interference from an AFrame Watch Transceiver

For : Twishink, LLC
: 130 Central Avenue, Suite 400
: Holland, MI

P.O. No. : 175
Date Tested : September 25, 2008 through October 21, 2008
Test Personnel : Mark E. Longinotti
Specification : FCC "Code of Federal Regulations" Title 47, Part 15,
Subpart B, for receivers and Subpart C, Section 15.247 for
Digital Modulation Intentional Radiators Operating within
the band 2400-2483.5MHz
Industry Canada RSS-210
Industry Canada RSS-GEN

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WRITTEN APPROVAL OF ELITE ELECTRONIC ENGINEERING INCORPORATED.**

REVISION HISTORY

Revision	Date	Description
—	October 22, 2008	<p>Initial release</p>
A	October 27, 2008	<p>The AFrame Transmitter was replaced with AFrame Transceiver on pages 1, 4, and 13</p> <p>The following test specification was added to the title page: FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, for receivers</p> <p>Paragraph 1.1: "The test item is a digital modulation transmitter. The transmitter was designed to transmit in the 2400-2483.5 MHz band using an internal antenna" was replaced with:</p> <p>"The transceiver used digital modulation and was designed to transmit and receive in the 2400-2483.5MHz band using an internal antenna."</p> <p>Section 1.2: FCC "Code of Federal Regulations" Title 47, Part 15 Subpart C, Sections 15.207 and 15.247 for Intentional Radiators and Industry Canada RSS-GEN Table 2 and RSS-210, Annex 8. was replaced with:</p> <p>FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Part 15.107 and 15.109 for receivers and Subpart C, Sections 15.207 and 15.247 for Intentional Radiators and Industry Canada RSS-GEN Table 2 and RSS-210, Annex 8.</p> <p>Section 5 Test Procedures was reformatted into two sections, Section 5.1 Transmitter and Section 5.2 Receiver</p> <p>A section was added for Radiofrequency Radiation Exposure Evaluation</p>

Revision	Date	Description
B	November 11, 2008	<p>Section 2: the reference to the Federal Communications Commission "Code of Federal Regulations", Title 47, was modified to reference Part1, and Part 15, Subpart C in addition to Part 2, and Part15, Subparts B.</p> <p>Section 5.1.8.1 was modified from "The test item is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use based on its application and power level."</p> <p>TO:</p> <p>"Per the FCC "Code of Federal Regulations" Title 47, Part 1, Subpart I, Section 1.1307(b)(1) and 1.1307(b)(2) and Part 2, Subpart J, Section 2.1093, the test item is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use based on its application and power level (maximum EIRP measured from the transmitter was 4.4dBm or 2.75mW at 2445MHz)."</p> <p>The following sentence was added to section 5.2:</p> <p>The FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 101(b) states that receivers which operate above 960MHz are exempt from complying with the technical provisions of subpart B.</p> <p>The following sentences were added to section 6:</p> <p>The maximum EIRP measured from the transmitter was 4.4dBm</p> <p>The FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 101(b) states that receivers which operate above 960MHz are exempt from complying with the technical provisions of subpart B. Therefore, the Twishink, LLC AFrame Watch Transceiver, Serial No. None Assigned, was exempt from the conducted and radiated emissions requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 15.107 and 15.109.</p>



Measurement of RF Emissions from an AFrame Watch Transceiver

1 INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on an AFrame Watch, Circuit Board Part No. XF0296 Rev. 2, Serial No. None Assigned, transceiver (hereinafter referred to as the test item). The transceiver used digital modulation and was designed to transmit and receive in the 2400-2483.5MHz band using an internal antenna. The test item was manufactured and submitted for testing by Twishink, LLC located in Holland, MI.

1.2 Purpose

The test series was performed to determine if the test item meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Part 15.107 and 15.109 for receivers and Subpart C, Sections 15.207 and 15.247 for Intentional Radiators and the Industry Canada RSS-GEN Table 2 and RSS-210, Annex 8. Testing was performed in accordance with ANSI C63.4-2003.

1.3 Deviations, Additions and Exclusions

There were no deviations, additions to, or exclusions from the test specification during this test series

1.4 EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

1.5 Laboratory Conditions

The temperature at the time of the test was 22C and the relative humidity was 41%.

2 APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part1, Part 2, and Part15, Subparts B and C, dated 1 October 2007
- ANSI C63.4-2003, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- Industry Canada RSS-210, Issue 7, June 2007, "Spectrum Management and Telecommunications Radio Standards Specification, Low-power License-exempt radio communication devices (All Frequency Bands): Category I Equipment"

- Industry Canada RSS-GEN, Issue 2, June 2007, "Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment"

3 TEST ITEM SET-UP AND OPERATION

3.1 General Description

The test item is an AFrame Watch. A block diagram of the test item set-up is shown as Figure 1.

3.1.1 Power Input

The test item was powered with 4.2VDC via an internal battery.

3.1.2 Peripheral Equipment

In order to get the test item to operate in the worst case duty cycle mode, the test item was tested with the following peripheral equipment:

- Digi Connect Port x4, P/N: (1P)50001513-06B
- Antenna
- AC Adapter, P/N: 76000734

The Digi Connect Port x4 was powered with 12VDC from the output of the AC adapter. The AC adapter was connected to the Digi Connect x4 via a 1.5meter long 2 wire power cord. The AC adapter was powered with 115V, 60Hz via a 3 wire 2.2 meter long power cord. The RF output port of the Digi Connect Port x4 was terminated with an antenna. The antenna was connected to the Digi Connect Port x4 via a 1 meter long coaxial cable.

For all other tests, no peripheral equipment was required.

3.1.3 Interconnect Cables

The test item was submitted for testing with no peripheral equipment.

3.1.4 Grounding

The test item was ungrounded during testing.

3.2 Operational Mode

For all tests, the test item and all peripheral equipment were placed on an 80cm high non-conductive stand. The test item and all peripheral equipment were energized. The test item could be programmed to operate in one of the following modes: transmit at 2405MHz, transmit at 2445MHz, or transmit at 2475MHz.

In addition, to determine worst case duty cycle factor, the test item was set up to communicate with a Digi Connect Port x4. First the test item was placed at least 15 feet away from the Digi Connect Port x4. Then the Digi Connect Port x4 was powered up with the antenna connected to the RF output port. Next, communications between the test item and the Digi Connect Port x4 was established. To achieve the worst case duty cycle, the



antenna was removed from the RF output port of the Digi Connect Port x4 and the test item was forced to try and reestablish communications with the Digi Connect Port x4.

3.3 Test Item Modifications

No modifications were required for compliance to the FCC "Code of Federal Regulations" Title 47, Part 15 requirements or the Industry Canada RSS-GEN Table 2 and RSS-210, Annex 8 requirements.

4 TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

4.2 Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

Conducted emission tests were performed with a spectrum analyzer in conjunction with a quasi-peak adapter. Radiated emissions were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths specified by the FCC and with the quasi-peak detector function.

4.3 Calibration Traceability

Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.4 Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

The measurement uncertainty for these tests is presented below:

Conducted Emission Measurements		
Combined Standard Uncertainty	1.07	-1.07
Expanded Uncertainty (95% confidence)	2.1	-2.1

Radiated Emission Measurements		
Combined Standard Uncertainty	2.26	-2.18
Expanded Uncertainty (95% confidence)	4.5	-4.4



5 TEST PROCEDURES

5.1 Transmitter

5.1.1 Powerline Conducted Emissions

5.1.1.1 Requirements

Since the test item was powered by internal batteries, no conducted emissions tests are required.

5.1.2 Duty Cycle Factor Measurements

5.1.2.1 Requirements

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

5.1.2.2 Procedures

With the transmitter set up to transmit at its maximum value as described in section 3.2, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero span. The on-time and off-time are then measured. The duty cycle is then computed as the (On-time/ word period) where the word period = (On-time + Off-time).

5.1.2.3 Results

The plots of the duty cycle are shown on data pages 17 through 20. As can be seen from the plots, the maximum pulse density contains pulses of 3 different widths – narrow, medium, and wide. The width (on-time) of the narrow, medium, and wide pulses was measured. Then the number of each type of pulse in 100msec was counted. Then the total on-time was calculated as follows:

- Narrow pulse width = 567usec = 0.567 msec
 - Medium pulse width = 1.5 msec
 - Wide pulse width = 3 msec
-
- Number of narrow pulses = 2
 - Number of medium pulses = 4
 - Number of wide pulses = 8

Total On time = (Number of narrow pulses)x(Narrow pulse width) + (Number of medium pulses)x(Medium pulse width) + (Number of wide pulses)x(Wide pulse width)

$$\text{Total On time} = 2 \times 0.567 + 4 \times 1.5 + 8 \times 3$$

$$\text{Total On time} = 1.134 + 6 + 24 = 31.134 \text{ msec}$$

Therefore the duty cycle correction factor = $20 \times \log_{10}(\text{on time}/100\text{msec}) = 20 \times \log_{10}(31.134/100) = -10.1 \text{ dB}$

5.1.3 Radiated Measurements

5.1.3.1 Requirements

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Paragraph 15.209(a) has the following radiated emission limits:

Frequency MHz	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

5.1.3.2 Procedures

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the test item. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the test item. The entire frequency range from 30MHz to 25GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

1) For all harmonics not in the restricted bands, the following procedure was used:

- a) The field strength of the fundamental was measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
- b) The field strength of all of the harmonics not in the restricted band was then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
- c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
 - i) The test item was rotated so that all of its sides were exposed to the receiving antenna.
 - ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
 - iv) For hand-held or body-worn devices, the test item was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.
- d) All harmonics not in the restricted bands must be at least 20dB below level measured at the fundamental.

However, attenuation below the general limits specified in §15.209(a) is not required.

- 2) For all emissions in the restricted bands, the following procedure was used:
 - a) The field strength of all emissions below 1GHz was measured using a bi-log antenna. The bi-log antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
 - b) The field strength of all emissions above 1GHz was measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 1MHz was used on the spectrum analyzer.
 - c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:
 - i) The test item was rotated so that all of its sides were exposed to the receiving antenna.
 - ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
 - iv) For hand-held or body-worn devices, the test item was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.
 - d) For all radiated emissions measurements below 1GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.
 - e) For all radiated emissions measurements above 1GHz, the peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1GHz must be no greater than 20 dB above the limits specified in 15.209(a).
 - f) For all radiated emissions measurements above 1GHz, an average reading was taken by reducing the video bandwidth to 10Hz . This reading was further adjusted by the duty cycle correction factor. These readings must comply with the limits specified in 15.209(a).

5.1.3.3 Results

Preliminary radiated emissions plots with the test item transmitting at 2405MHz, 2445MHz, and 2475MHz are shown on pages 21 through 32. Final radiated emissions data are presented on data pages 33 through 38. As can be seen from the data, all emissions measured from the test item were within the specification limits. The emissions level closest to the limit (worst case) occurred at 4810MHz. The emissions level at this frequency was 1.4dB within the limit. See data pages 33 through 38 for details. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figure 2.

5.1.4 6dB Bandwidth

5.1.4.1 Requirements

The minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.

5.1.4.2 Procedures

The test item was set up inside the chamber. The test item was allowed to transmit continuously with modulation on. The transmit frequency was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to > to 1% of the 20 dB BW.

The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.



5.1.4.3 Results

The plots on pages 39 through 41 show that the minimum 6 dB bandwidth was 1MHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 2.76MHz.

5.1.5 Peak Output Power

5.1.5.1 Requirements

For systems using digital modulation the maximum peak output conducted power shall not be greater than 1.0W (30dBm). Per section 15.247(b)(4), this limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm).

5.1.5.2 Procedures

The test item was placed on the non-conductive stand and set to transmit. A double ridged waveguide antenna was placed at a test distance of 3 meters from the test item. The test item was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle and high hopping frequencies.

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a double ridged waveguide antenna was then set in place of the test item and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss and antenna gain for all measurements above 1GHz as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.1.5.3 Results

The results are presented on page 42. The maximum EIRP measured from the transmitter was 4.4dBm or 2.75mW at 2445MHz which is below the 4 Watt limit.

5.1.6 Band Edge Compliance

5.1.6.1 Requirements

The emissions at the band-edges must be at least 20dB below the highest level measured within the band but attenuation below the general limits is not required.

In addition, the radiated emissions which fall in the restricted band beginning at 2483.5 MHz must meet the general limits.

5.1.6.2 Procedures

A. Band Edge at 2400MHz

- 1) The test item was set up inside the test chamber on a non-conductive stand.
- 2) A broadband measuring antenna was placed at a test distance of 3 meters from the test item.
- 3) The test item was set to transmit continuously at the channel closest to the low band-edge with modulation enabled.

- 4) The test item was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
- 5) To determine the band edge compliance, the following spectrum analyzer settings were used:
 - a) Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
 - b) Resolution bandwidth (RBW) = 100kHz
 - c) The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
 - d) The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the frequency line (F1) must be below the display line.)
 - e) The analyzer's display was plotted using a 'screen dump' utility.

B. Band Edge at 2483.5MHz

- 1) The test item was set to transmit continuously at the channel closest to the high band edge with modulation enabled.
- 2) The test item was maximized for worst case emissions at the measuring antenna at the band edge (2483.5MHz).
- 3) To determine the bandage compliance, the following spectrum analyzer settings were used:
 - a) Resolution bandwidth (RBW) = 1MHz.
 - b) Detector = peak
- 4) The peak reading was converted to an average reading by adding the duty cycle correction factor to the readings. These readings must comply with the limits specified in 15.209(a).

5.1.6.3 Results

Pages 43 and 44 show the radiated emissions band-edge compliance results. As can be seen from these plots, the emissions at the low band edge (2400MHz) met the 20 dB down limits and the emissions at the high band edge (2483.5MHz) meet the general radiated emissions requirements of 15.209(a).

5.1.7 Spectral Density

5.1.7.1 Requirements

The peak power spectral density from the intentional radiator shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.1.7.2 Procedures

- 1) The test item was placed on the non-conductive stand and set to transmit at 2405MHz with modulation on.
- 2) A double ridged waveguide antenna was placed at a test distance of 3 meters from the test item.
- 3) Trace 1 was selected on the analyzer. The analyzer was tuned to the transmit frequency and was placed in "max hold" mode with a 10MHz bandwidth. "View Trace" was then selected for "Trace A"
- 4) Trace 2 was turned on and a 3kHz bandwidth was selected. Trace 2 was placed in a "Max Hold" mode with a sweep time of 500 seconds.
- 5) The peak reading taken with a 10MHz bandwidth corresponds to the EIRP reading of the test item. The



8dBm power spectral density limit is calculated by subtracting 8dBm from the EIRP reading (EIRP – 8.0dBm). The display line represents the 8dBm power spectral density limit.

- 6) All readings taken with the 3kHz bandwidth (Trace 2) must be below the display line.
- 7) Steps 2 through 6 were repeated with the test item set to transmit at 2445MHz with modulation on.
- 8) Steps 2 through 6 were repeated with the test item set to transmit at 2475MHz with modulation on.

5.1.7.3 Results

Pages 45 through 47 show the power spectral density results. As can be seen from the plots, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

5.1.8 Radiofrequency Radiation Exposure Evaluation

5.1.8.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 1, Subpart I, Section 1.1307(b)(1) and 1.1307(b)(2) and Part 2, Subpart J, Section 2.1093, the test item is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use based on its application and power level (maximum EIRP measured from the transmitter was 4.4dBm or 2.75mW at 2445MHz).

5.2 Receiver

The FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 101(b) states that receivers which operate above 960MHz are exempt from complying with the technical provisions of subpart B. Since the test item's receiver portion operates above 960MHz, it is exempt from complying with the technical requirement for receivers. Therefore, no testing was required for the receiver portion of the test item.

6 CONCLUSIONS

It was determined that the Twishink, LLC AFrame Watch Transceiver, Serial No. None Assigned, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators and Industry Canada RSS-GEN Table 2 and RSS-210, Annex 8, when tested per ANSI C63.4-2003. The maximum EIRP measured from the transmitter was 4.4dBm

The FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 101(b) states that receivers which operate above 960MHz are exempt from complying with the technical provisions of subpart B. Therefore, the Twishink, LLC AFrame Watch Transceiver, Serial No. None Assigned, was exempt from the conducted and radiated emissions requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 15.107 and 15.109.

7 CERTIFICATION

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the test item at the test date. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

8 ENDORSEMENT DISCLAIMER

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.



9 EQUIPMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	11/30/2007	11/30/2008
APW2	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10	PL2925	1GHZ-20GHZ	11/30/2007	11/30/2008
GRE0	SIGNAL GENERATOR	AGILENT TECHNOLOGIES	E4438C	MY42083127	250KHZ-6GHZ	1/7/2008	1/7/2009
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	10/13/2007	11/13/2008
NWI0	RIDGED WAVE GUIDE	AEL	H1498	153	2-18GHZ	10/13/2007	11/13/2008
NWI1	RIDGED WAVE GUIDE	AEL	H1498	154	2-18GHZ	10/13/2007	11/13/2008
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ.	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	11/5/2007	11/5/2008
RBD1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU40	100009	20Hz-40GHz	9/10/2008	9/10/2009
SBA1	DC POWER SUPPLY	APLAB	ZS3205	99071032	0-32VDC;0-5A	NOTE 1	
SRA4	DC POWER SUPPLY	TEKPOWER	HY3005D	23472		NOTE 1	
XOB2	ADAPTER	HEWLETT PACKARD	K281C,012	09407	18-26.5GHZ	NOTE 1	
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	7/30/2008	7/30/2009

I/O: Initial Only N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

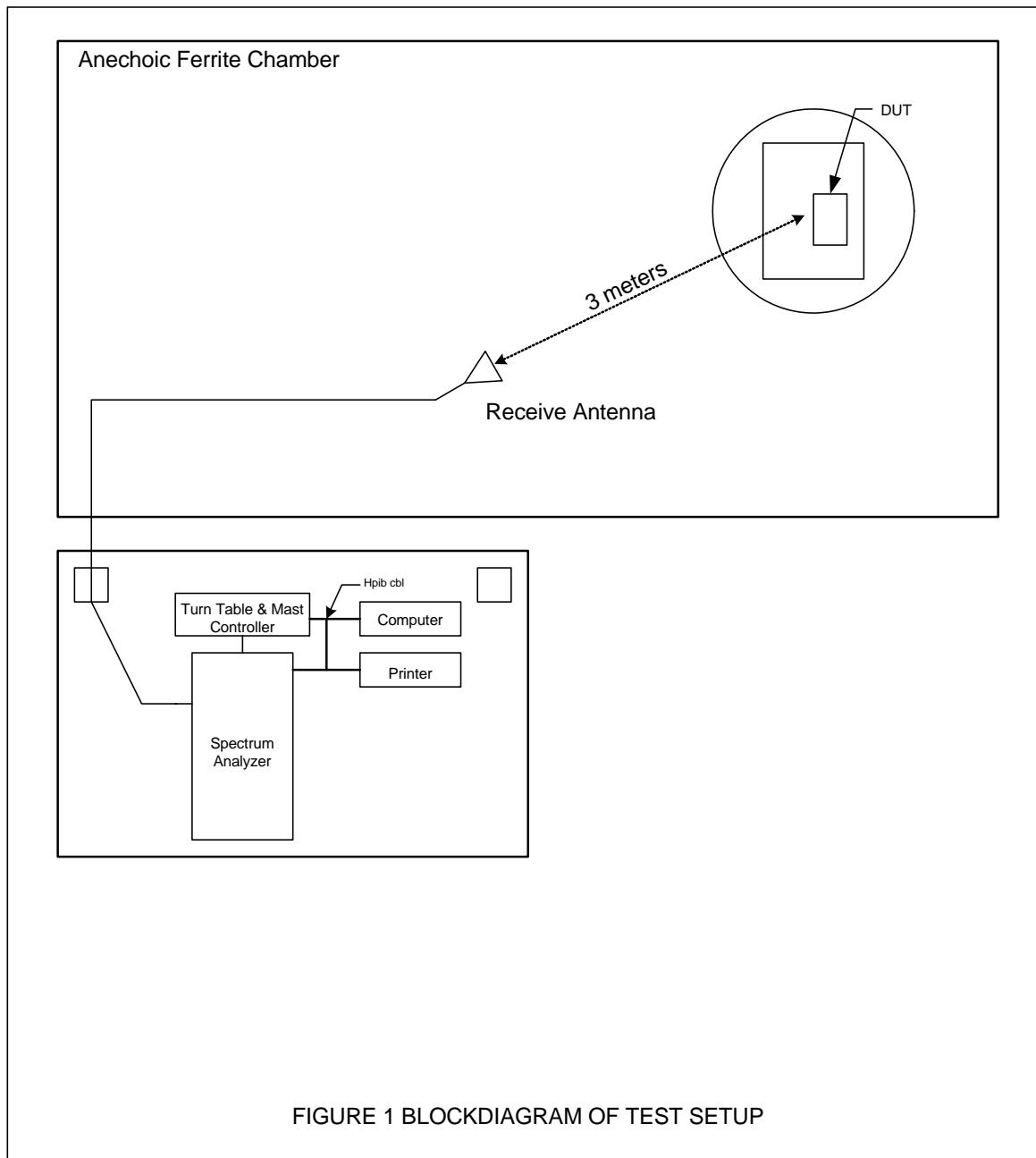


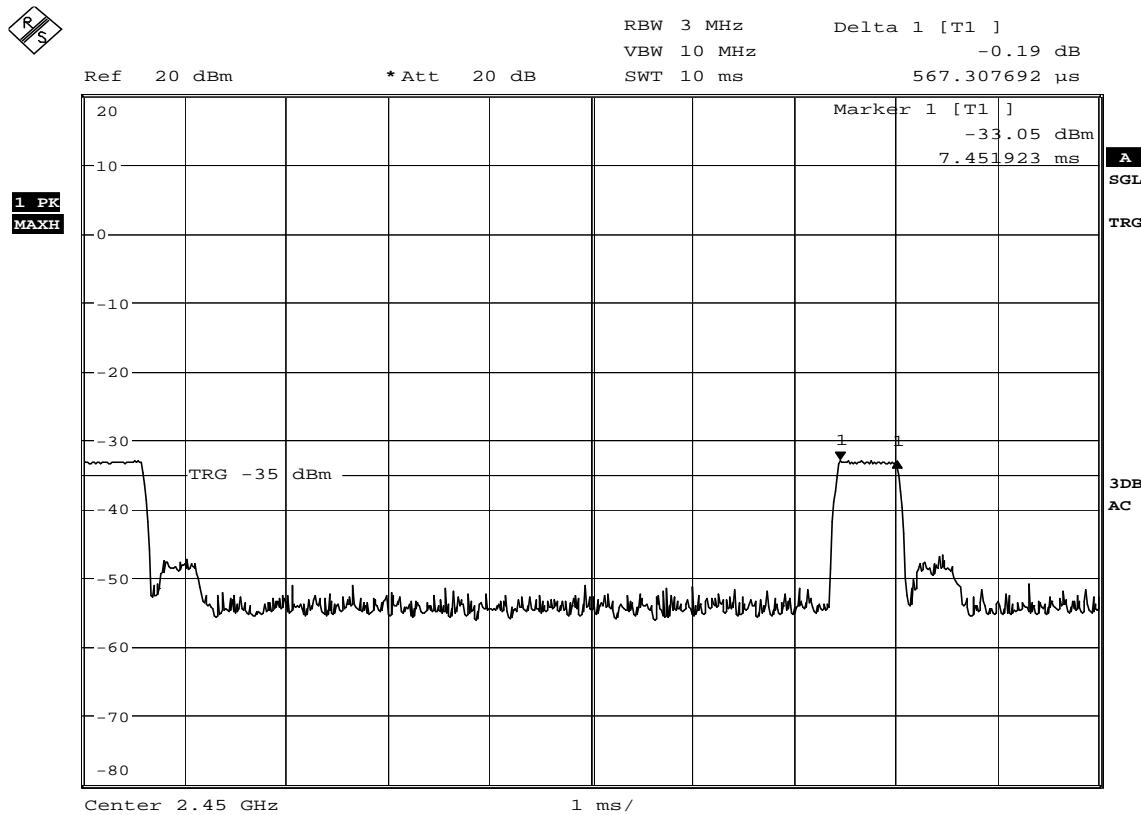
Figure 2



Test Set-up for Radiated Emissions – 2GHz to 18GHz, Horizontal Polarization



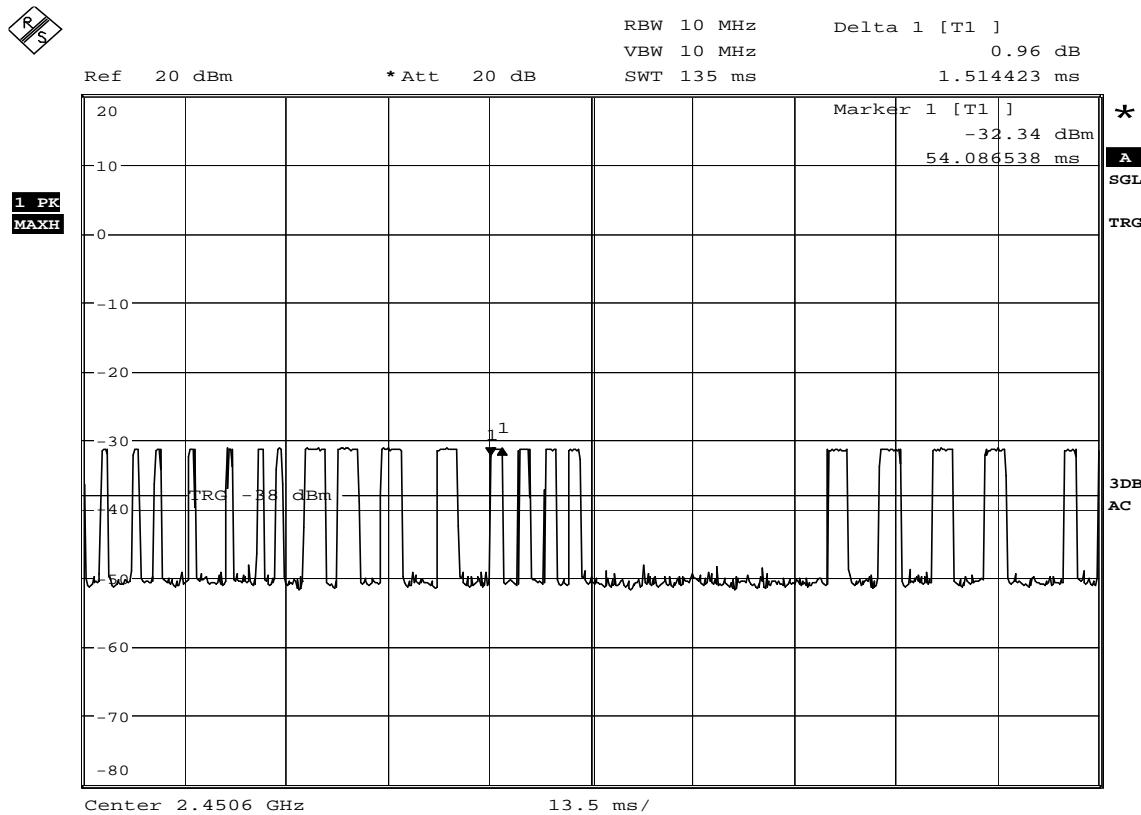
Test Set-up for Radiated Emissions – 2GHz to 18GHz, Vertical Polarization



Date: 15.OCT.2008 16:19:50

FCC 15.35(c), Duty Cycle Correction Factor

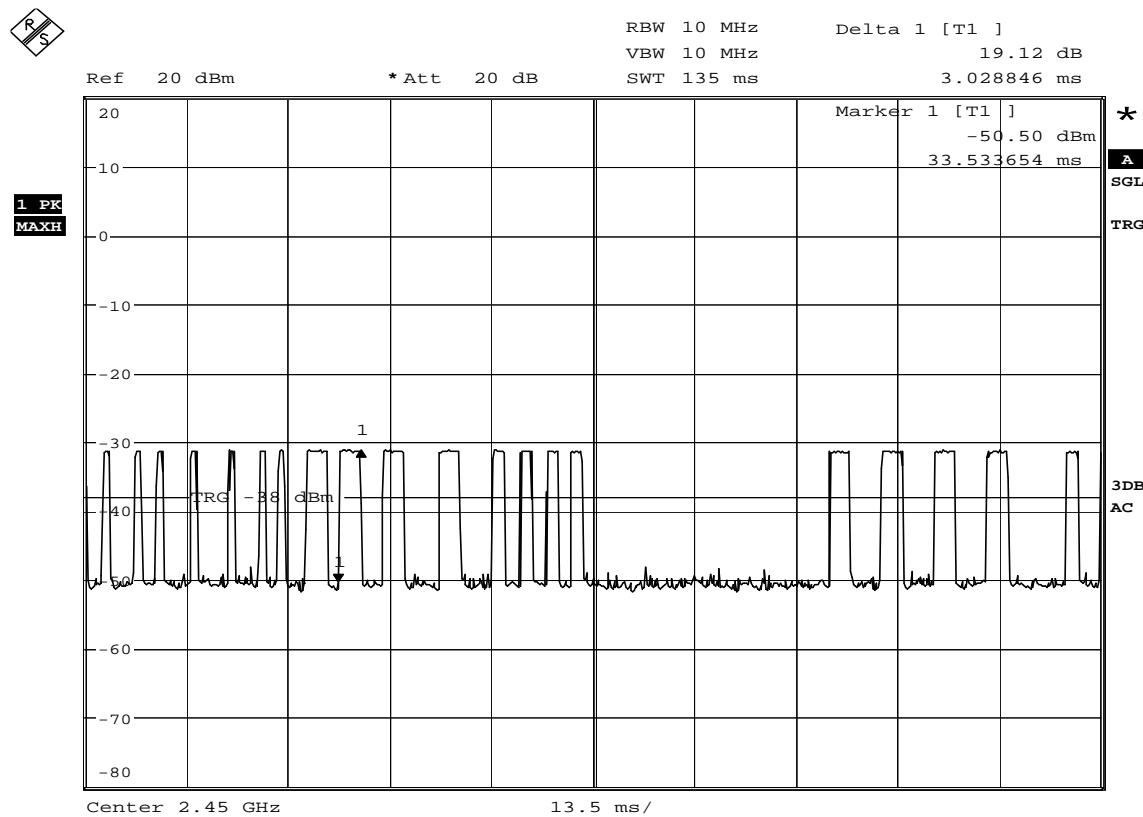
MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.450GHz
TEST PARAMETERS	: Duty Cycle Correction Factor
NOTES	: Pulse width of "narrow" pulses = 567usec
EQUIPMENT USED	: RBD1, NWH0



Date: 15.OCT.2008 16:43:37

FCC 15.35(c), Duty Cycle Correction Factor

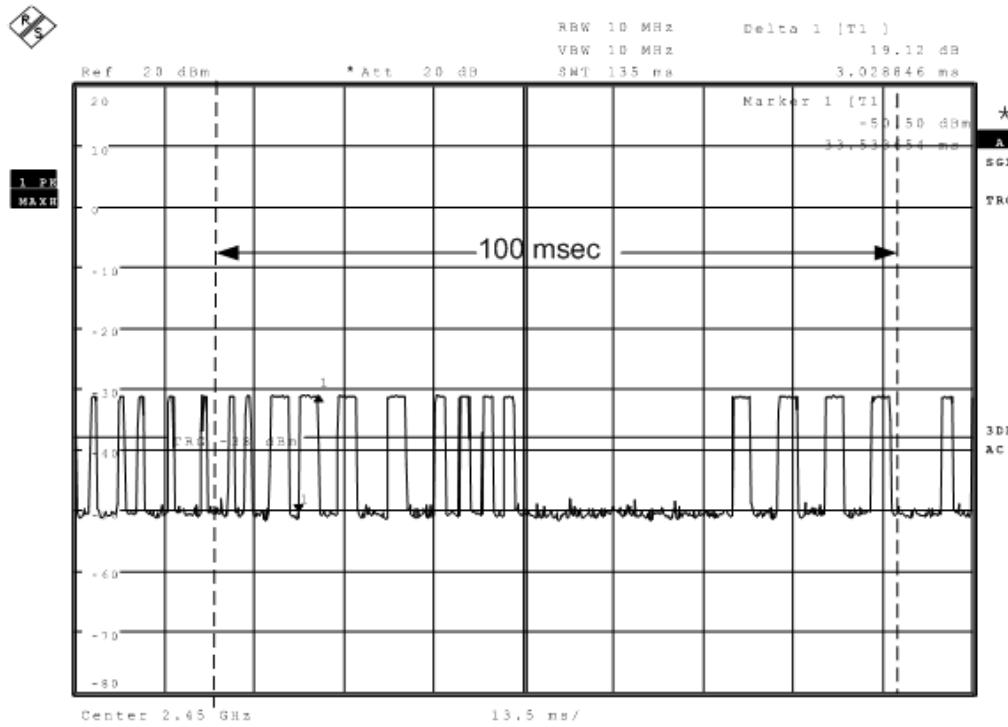
MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.450GHz
TEST PARAMETERS	: Duty Cycle Correction Factor
NOTES	: Pulse width of "medium" pulses = 1.5msec
EQUIPMENT USED	: RBD1, NWH0



Date: 15.OCT.2008 16:37:21

FCC 15.35(c), Duty Cycle Correction Factor

MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.450GHz
TEST PARAMETERS	: Duty Cycle Correction Factor
NOTES	: Pulse width of "wide" pulses = 3.0msec
EQUIPMENT USED	: RBD1, NWH0



Date: 15.OCT.2008 16:37:21

FCC 15.35(c), Duty Cycle Correction Factor

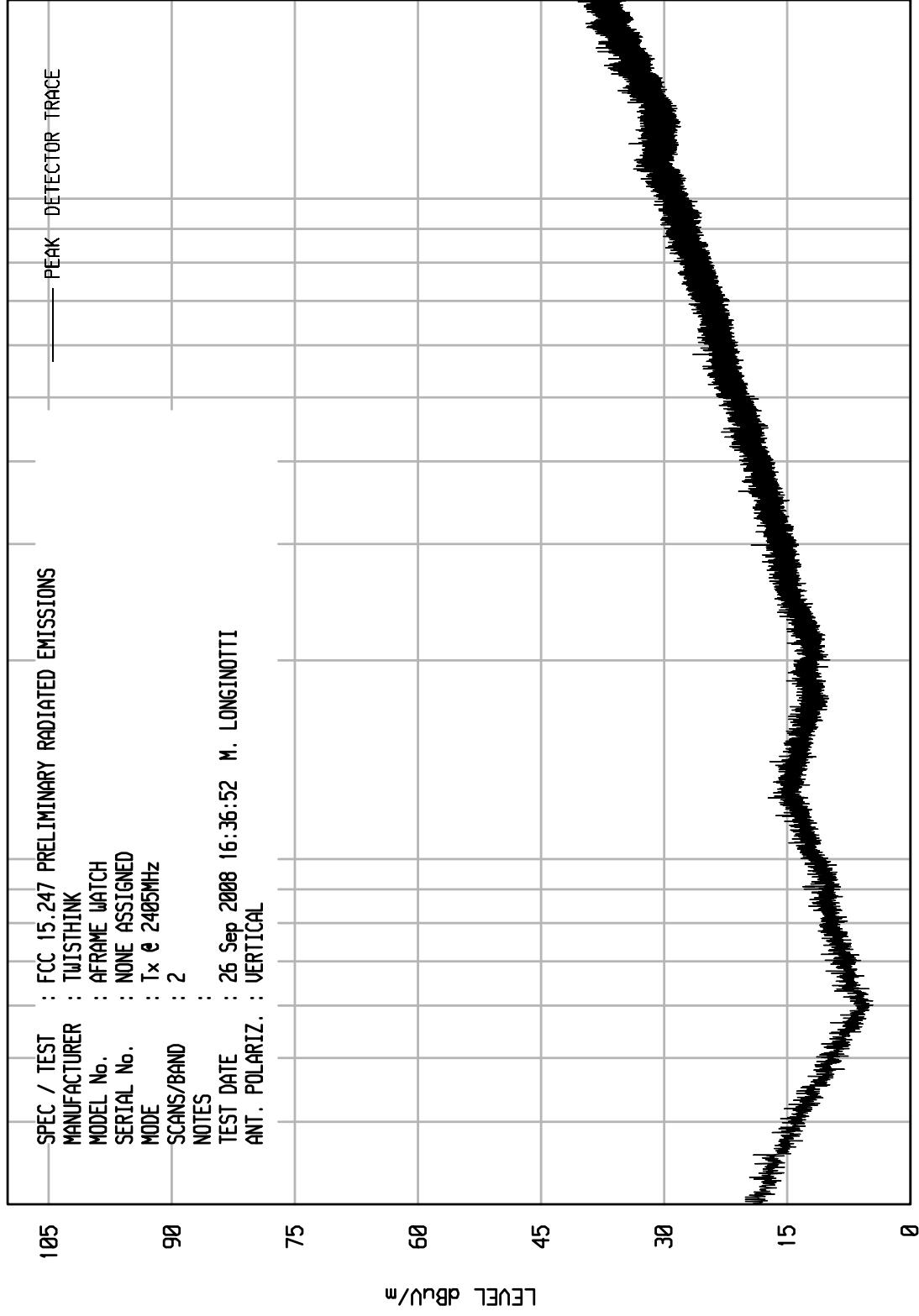
MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.450GHz
TEST PARAMETERS	: Duty Cycle Correction Factor
NOTES	: Worst case duty cycle in 100 msec is 8 wide pulses, : 4 medium pulses, and 2 narrow pulses. : On time=8 x 3.0msec + 4 x 1.5msec + 2x0.567msec : On time = 24msec + 6msec + 1.134msec : On time = 31.134msec
DUTY CYCLE CORR.	: 20*long (31.34msec/100msec) : = -10.1
EQUIPMENT USED	: RBD1, NWH0

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

WKA1 01/10/08

UNIT RCU EMI RUN 12

SPEC / TEST	FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER	TWISTTHINK
MODEL No.	AFRAME WATCH
SERIAL No.	NONE ASSIGNED
MODE	Tx & 2405MHz
SCANS/BAND	2
NOTES	
TEST DATE	26 Sep 2008 16:36:52
ANT. POLARIZ.	VERTICAL





ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

WKA1 01/10/08

UNIV RCU EMI RUN 2

105	SPEC / TEST	FCC 15.247 PRELIMINARY RADIATED EMISSIONS
	MANUFACTURER	TWISTTHINK
	MODEL No.	AFRAME WATCH
	SERIAL No.	NONE ASSIGNED
	MODE	Tx & 2405MHz
90	SCANS/BAND	1
	NOTES	
	TEST DATE	26 Sep 2008 15:25:59
	ANT. POLARIZ.	VERTICAL

75
60
45

LEVEL dB_{U/I}

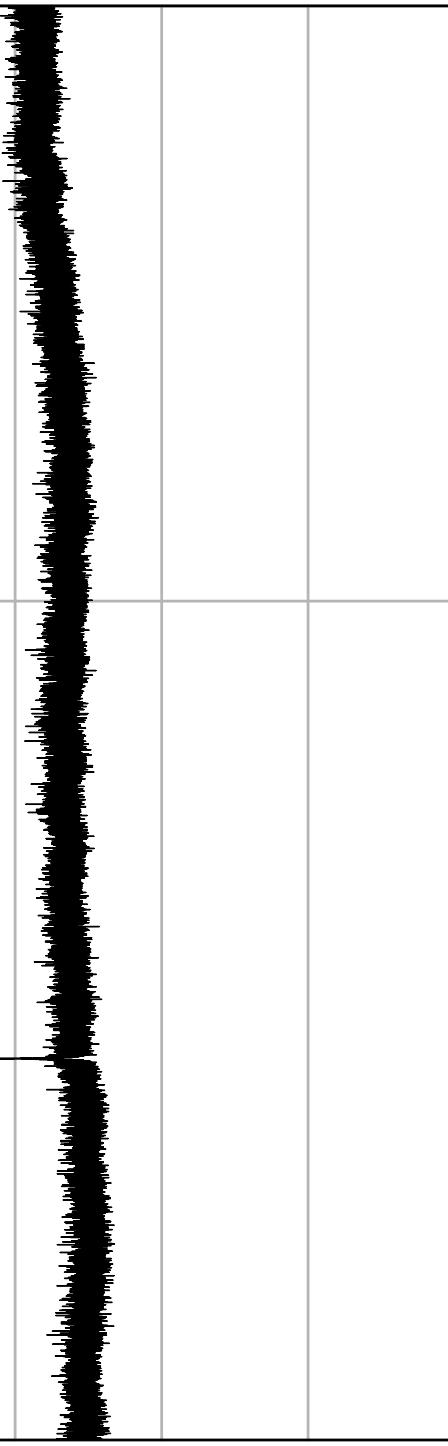
30
15
0

START = 2000

FREQUENCY MHz

STOP = 4000

PEAK DETECTOR TRACE

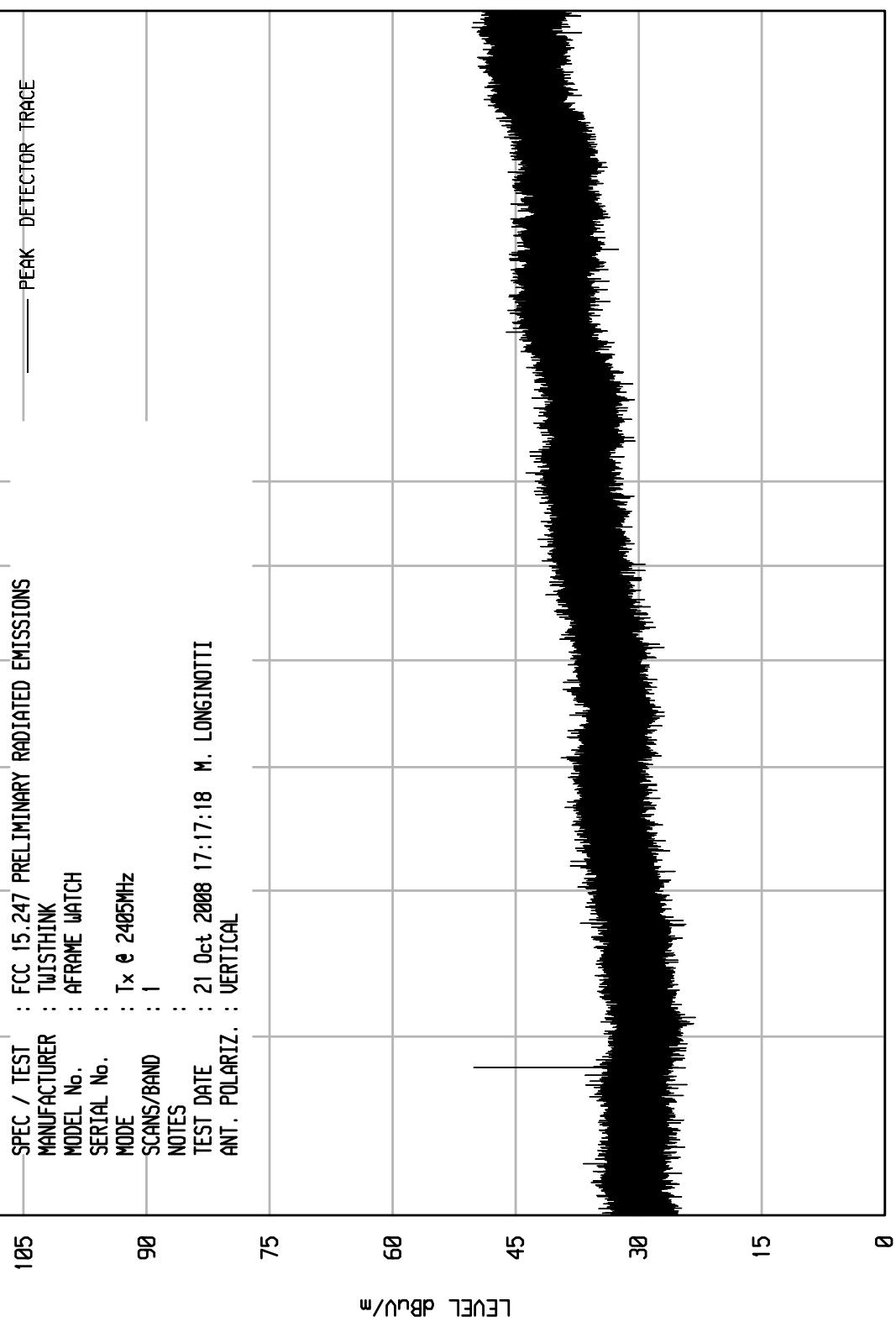


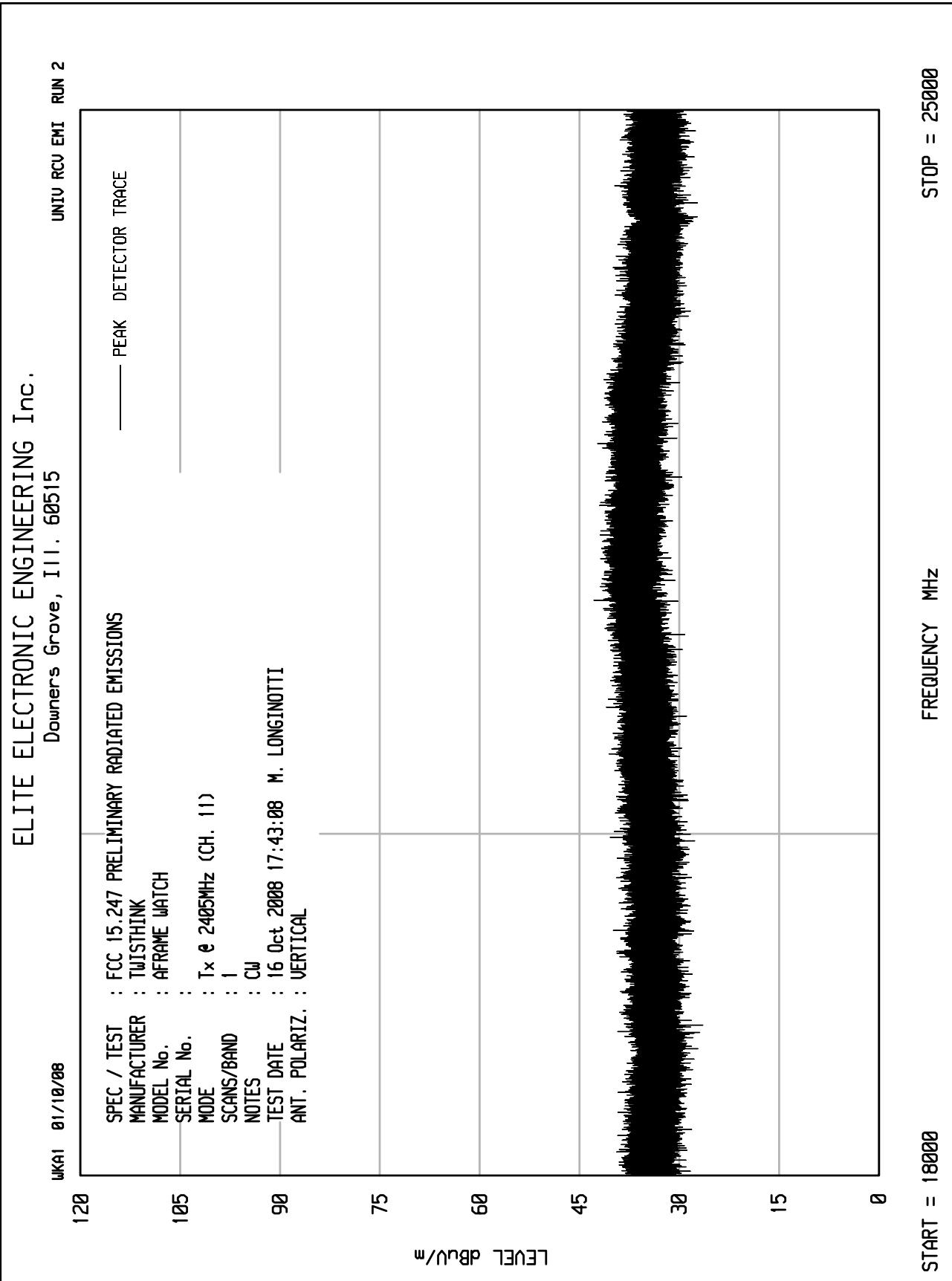
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

WKA1 01/10/08

UNIT RCU EMI RUN 2

105	SPEC / TEST	: FCC 15.247 PRELIMINARY RADIATED EMISSIONS
	MANUFACTURER	: TWISTTHINK
	MODEL No.	: AFRAME WATCH
	SERIAL No.	
	MODE	: Tx & 2405MHz
90	SCANS/BAND	: 1
	NOTES	
	TEST DATE	: 21 Oct 2008 17:17:18
	ANT. POLARIZ.	: VERTICAL



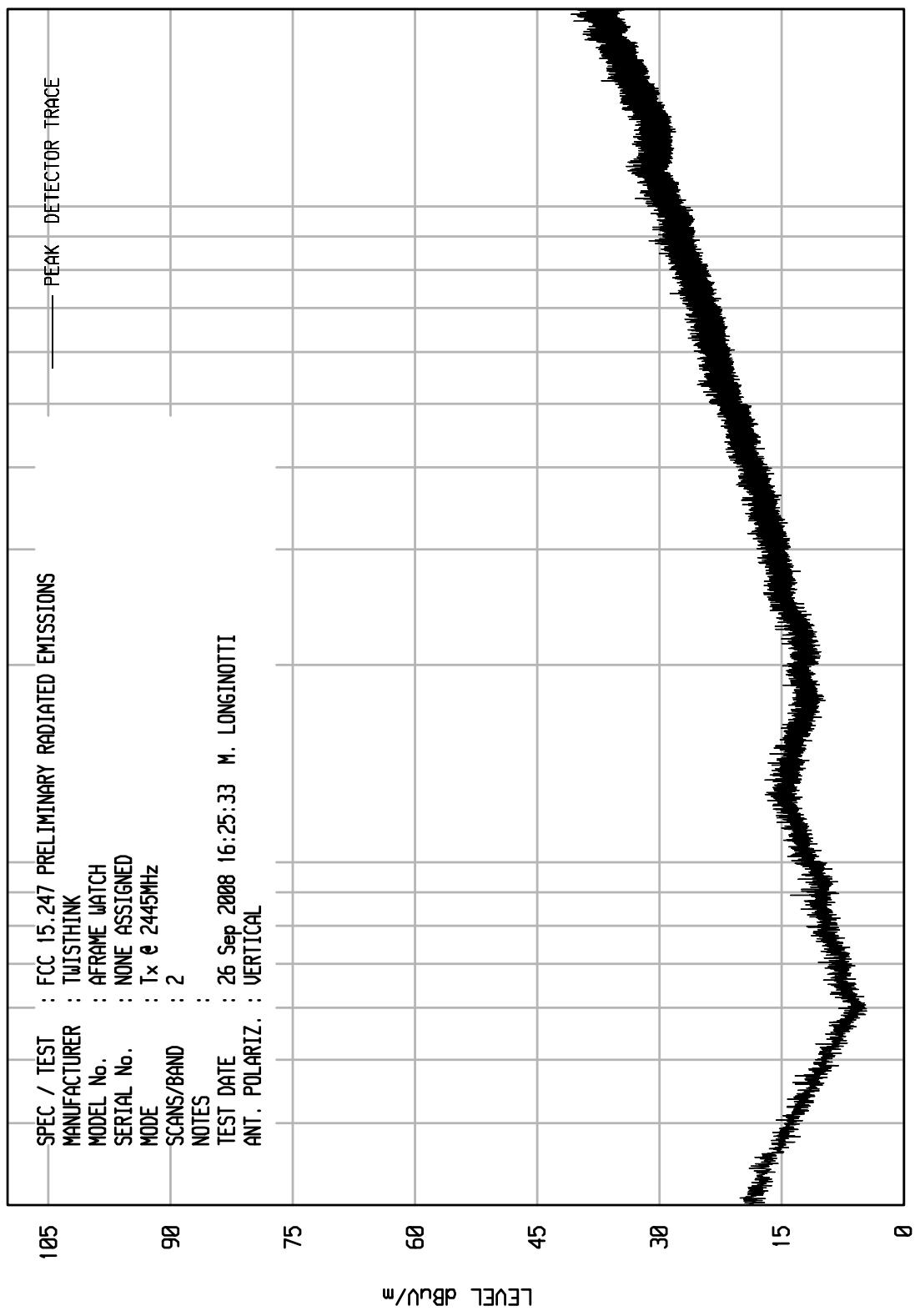


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WKA1 01/10/08

UNIT RCU EMI RUN 9

SPEC / TEST	FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER	TWISTTHINK
MODEL No.	AFRAME WATCH
SERIAL No.	NONE ASSIGNED
MODE	Tx & 245MHz
SCANS/BAND	2
NOTES	
TEST DATE	26 Sep 2008 16:25:33
ANT. POLARIZ.	VERTICAL



START = 30

100

FREQUENCY MHz

1000

STOP = 2000

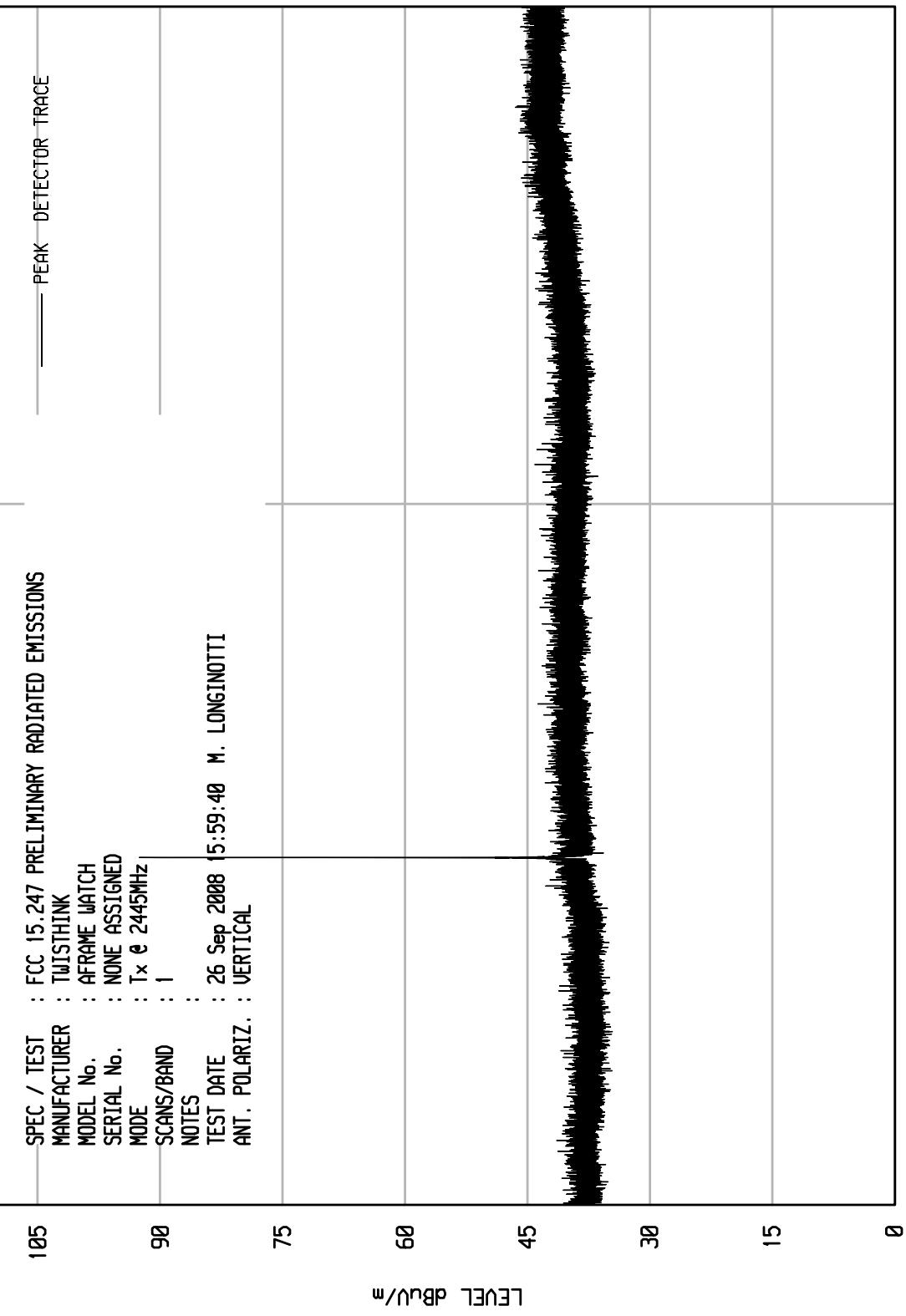


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

WKA1 01/10/08

UNIT RCU EMI RUN 3

SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : TWISTTHINK
MODEL No. : AFRAME WATCH
SERIAL No. : NONE ASSIGNED
MODE : Tx & 245MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Sep 2008 15:59:40 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL

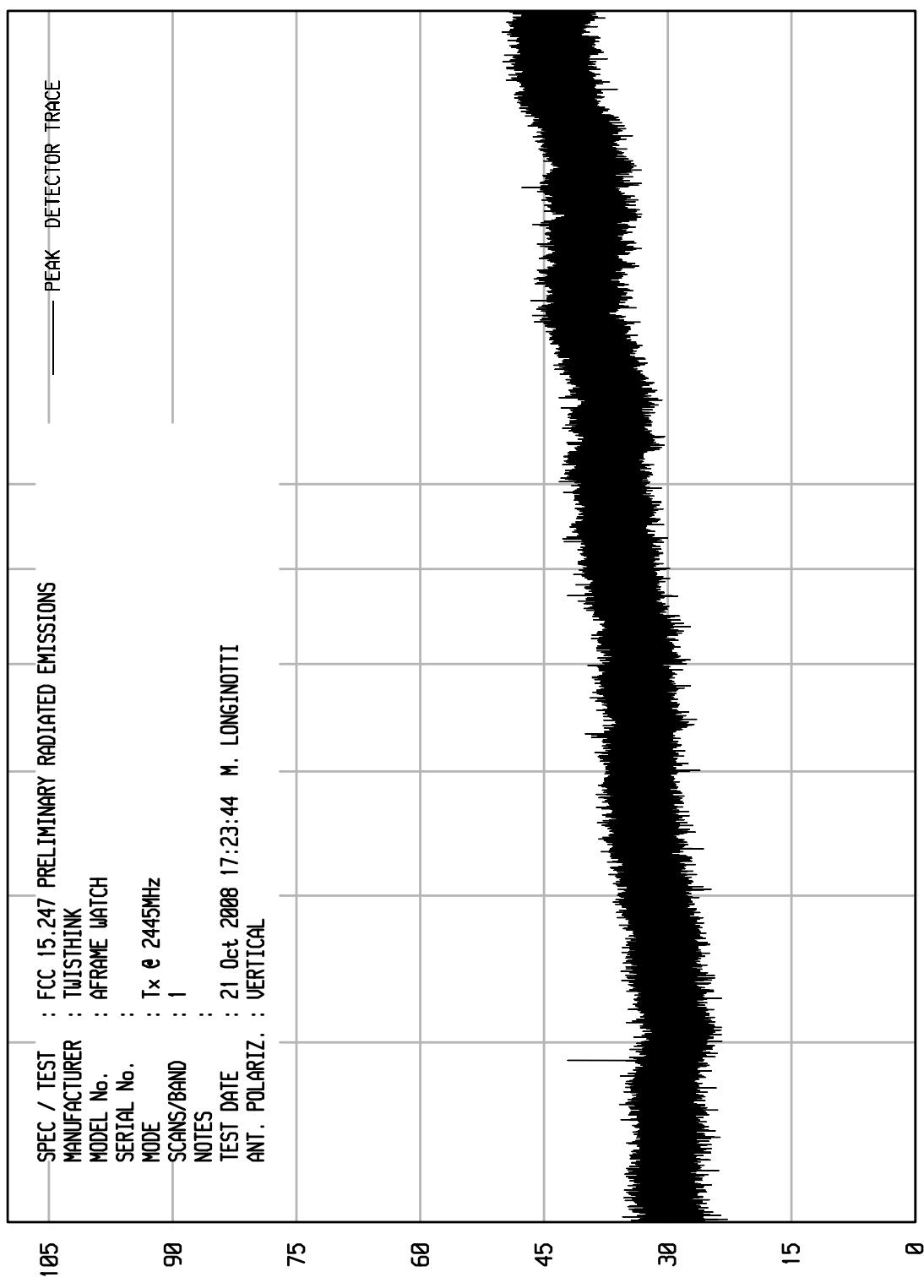


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WKA1 01/10/08

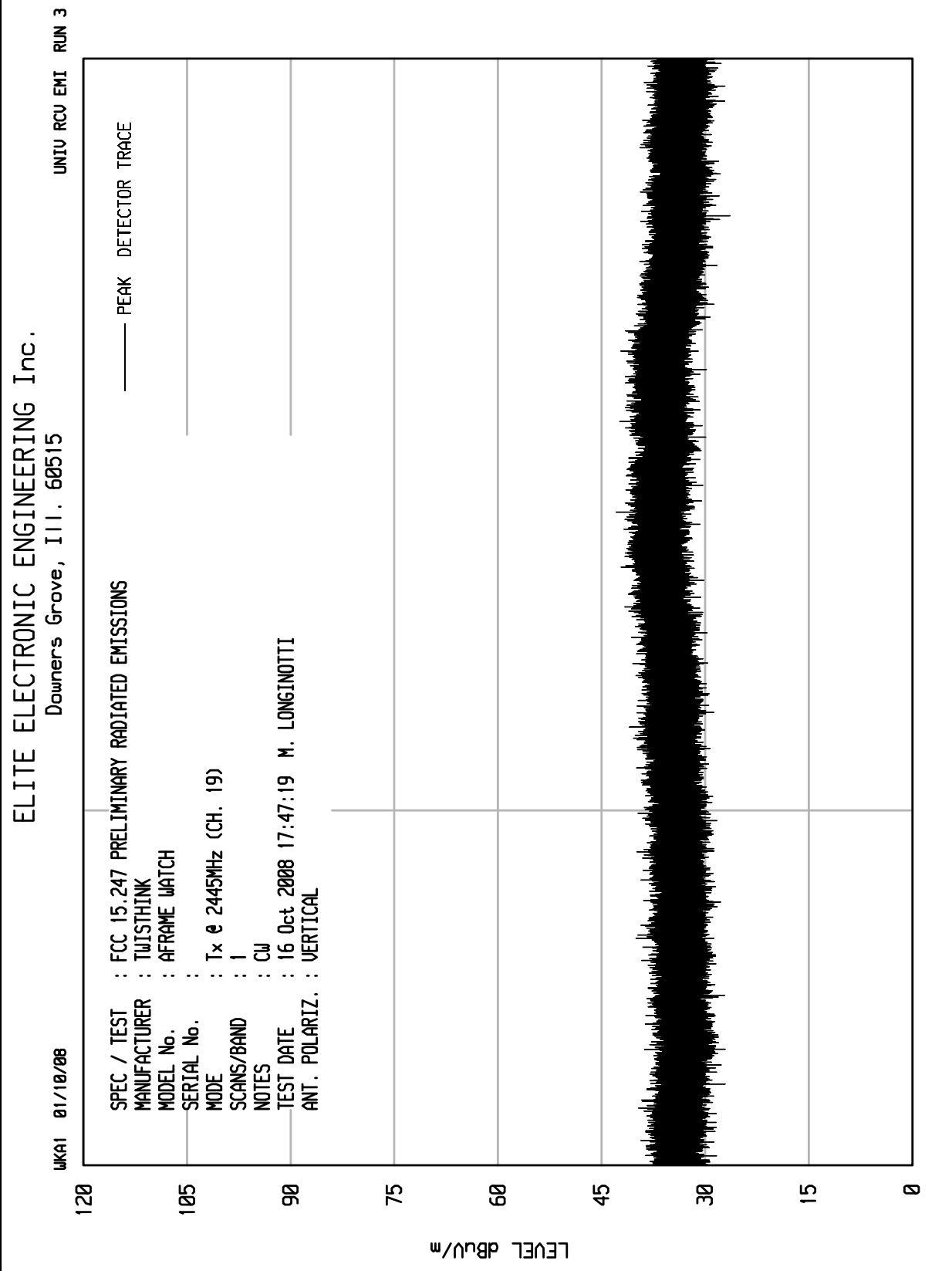
UNIT RCU EMI RUN 3

105	SPEC / TEST	: FCC 15.247 PRELIMINARY RADIATED EMISSIONS
	MANUFACTURER	: TWISTTHINK
	MODEL No.	: AFRAME WATCH
	SERIAL No.	
90	MODE	: Tx & 245MHz
	SCANS/BAND	: 1
	NOTES	
	TEST DATE	: 21 Oct 2008 17:23:44
	ANT. POLARIZ.	: VERTICAL

LEVEL dBu/ μ 

START = 4000

STOP = 18000

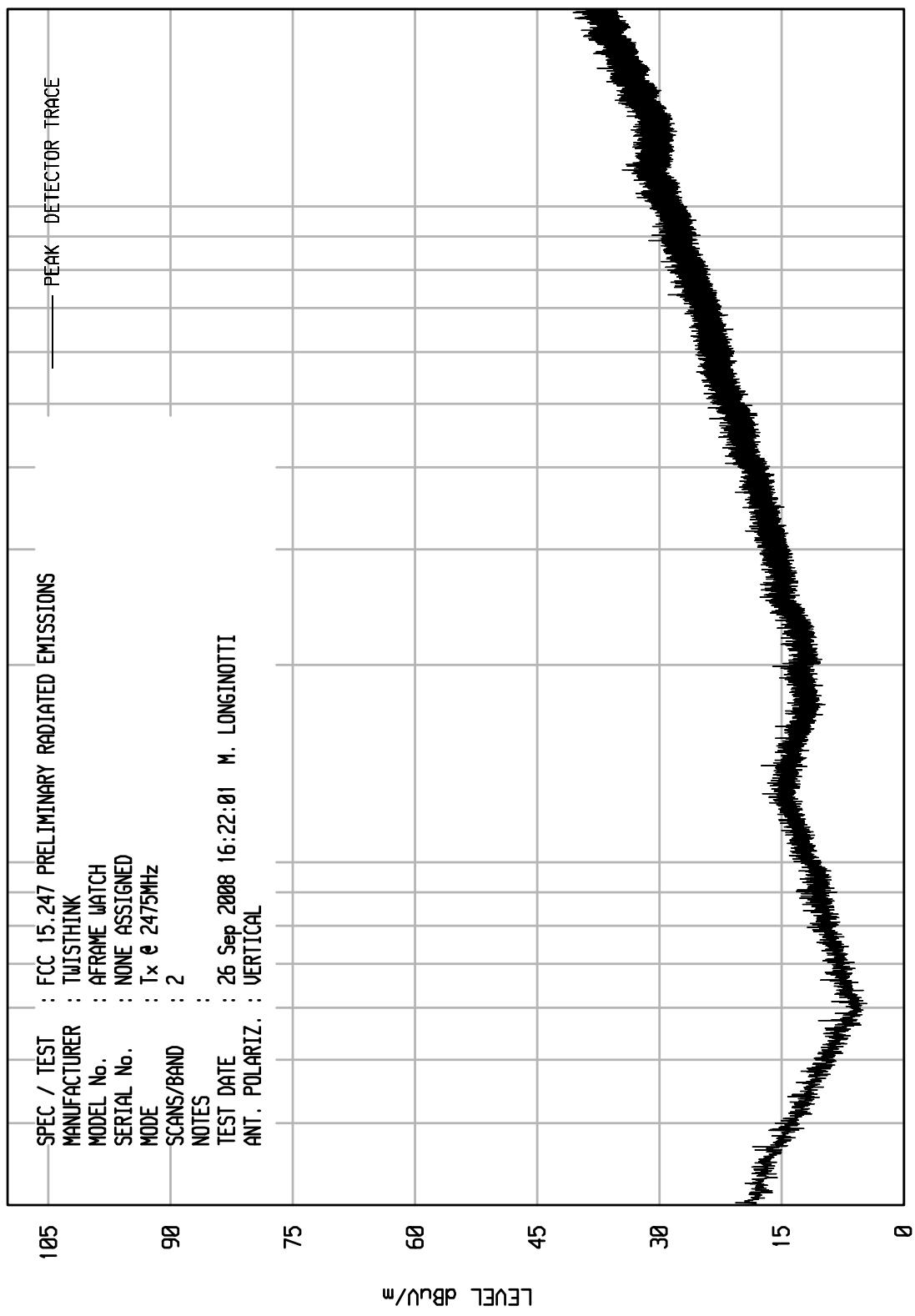


ELITE ELECTRONIC ENGINEERING Inc.
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WKA1 01/10/08

UNIV RCU EMI RUN 8

SPEC / TEST	FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER	TWISTTHINK
MODEL No.	AFRAME WATCH
SERIAL No.	NONE ASSIGNED
MODE	Tx & 2475MHz
SCANS/BAND	2
NOTES	
TEST DATE	26 Sep 2008 16:22:01
ANT. POLARIZ.	VERTICAL



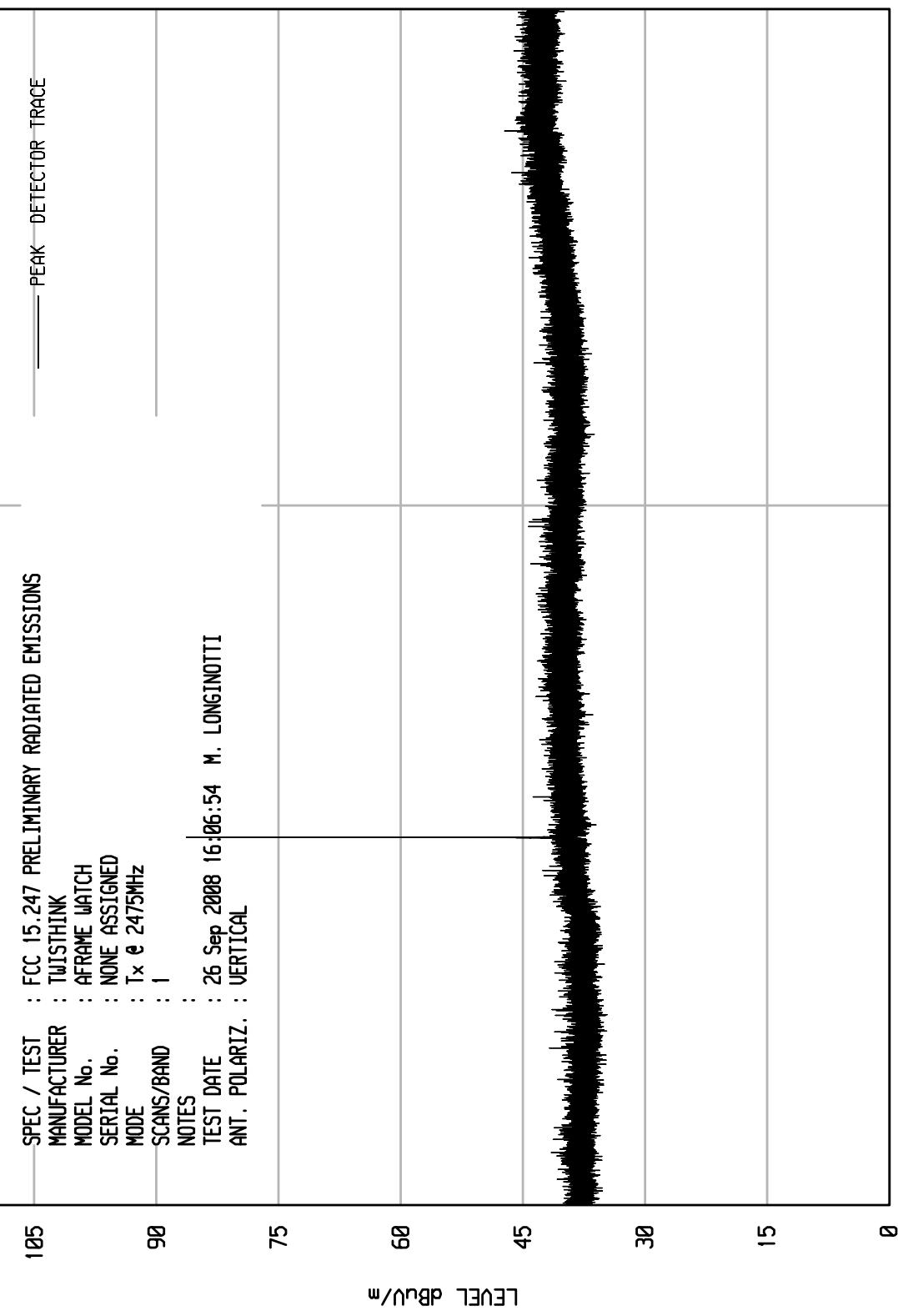


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

WKA1 01/10/08

UNIV RCU EMI RUN 6

105 SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : TWISTTHINK
MODEL No. : AFRAME WATCH
SERIAL No. : NONE ASSIGNED
MODE : Tx & 2475MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Sep 2008 16:06:54 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL

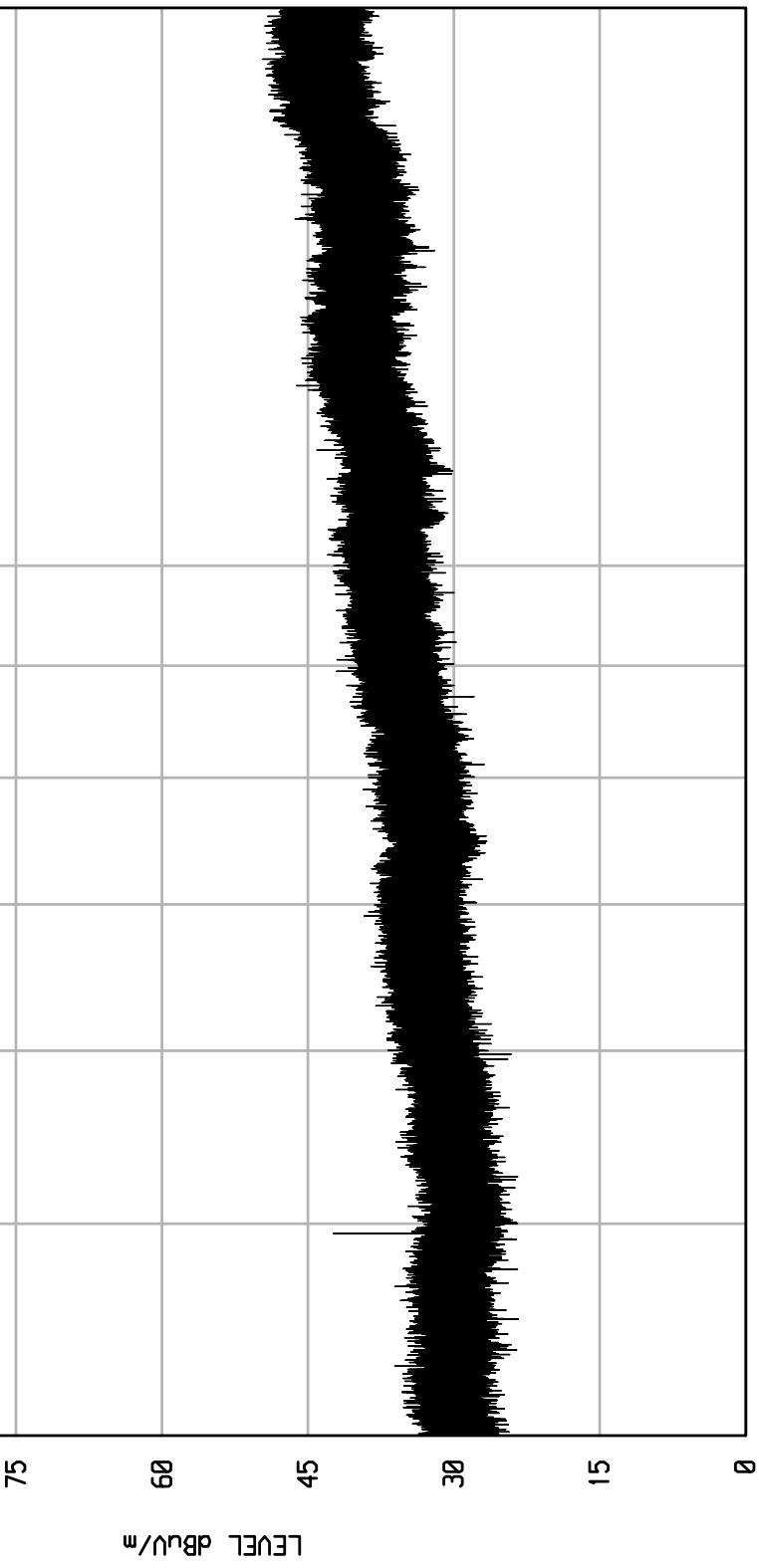


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

WKA1 01/10/08

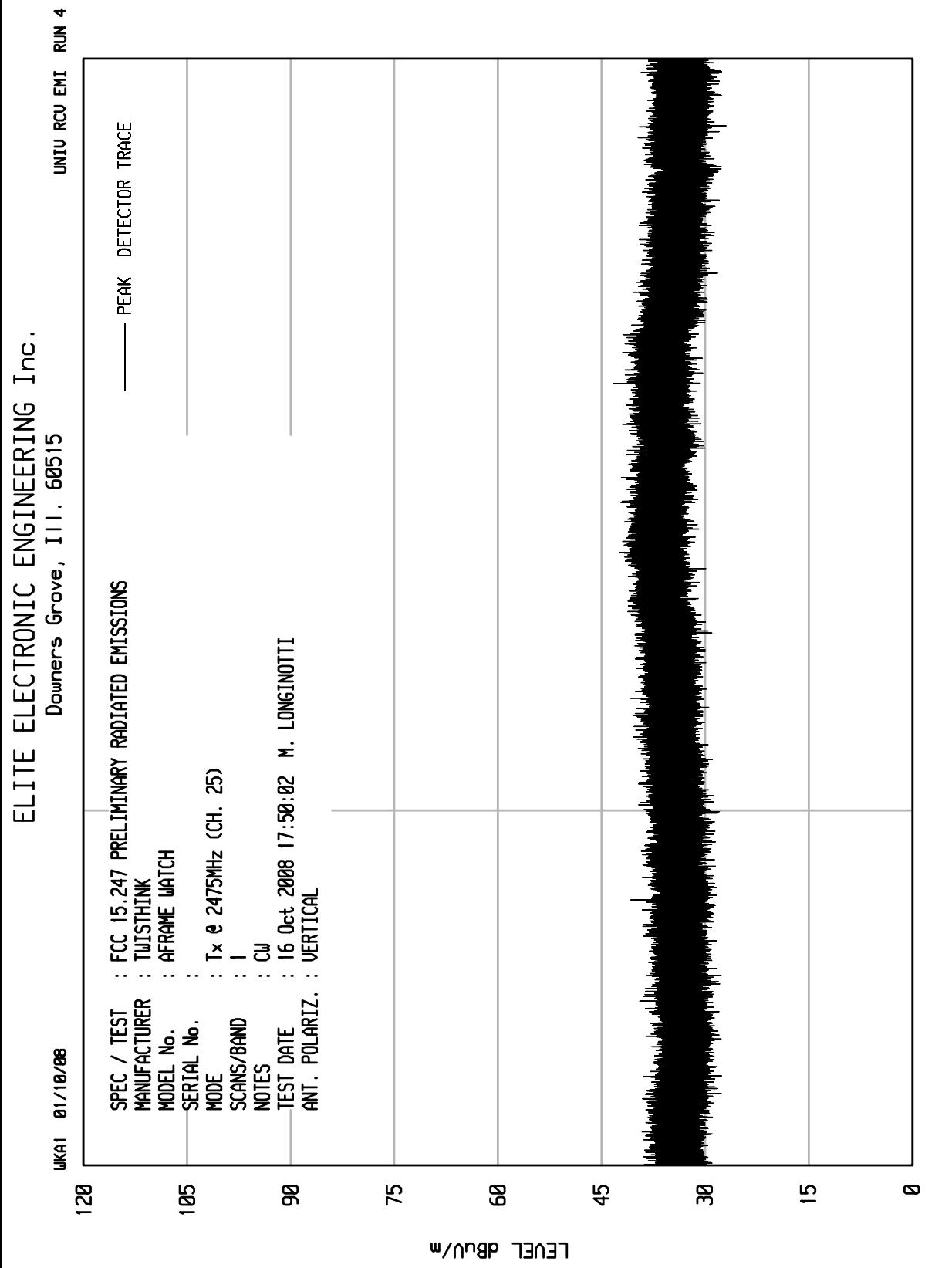
UNIT RCU EMI RUN 4

105	SPEC / TEST	: FCC 15.247 PRELIMINARY RADIATED EMISSIONS
	MANUFACTURER	: TWISTTHINK
	MODEL No.	: AFRAME WATCH
	SERIAL No.	
	MODE	: Tx & 2475MHz
90	SCANS/BAND	: 1
	NOTES	
	TEST DATE	: 21 Oct 2008 17:29:27
	ANT. POLARIZ.	: VERTICAL



START = 4000

STOP = 18000





Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 26, 2008 and October 16, 2008
Mode : Transmit @ 2405MHz, Channel 11
Test Distance : 3 meters
Notes : Peak Readings

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Distance Correction Factor dB	Total dBuV/m	Total uV/m	Limit uV/m
2405.0	H	64.4		3.8	31.4	0.0	0.0	99.6	95087.1	
2405.0	V	60.4		3.8	31.4	0.0	0.0	95.6	59995.9	
4810.0	H	61.4		5.7	34.5	-35.9	0.0	65.7	1928.7	5000.0
4810.0	V	57.8		5.7	34.5	-35.9	0.0	62.1	1274.3	5000.0
7215.0	H	38.4		7.6	38.0	-35.5	0.0	48.6	267.8	9508.7
7215.0	V	41.2		7.6	38.0	-35.5	0.0	51.4	369.6	9508.7
9620.0	H	34.5	Ambient	8.6	39.8	-35.1	0.0	47.8	245.1	9508.7
9620.0	V	34.7	Ambient	8.6	39.8	-35.1	0.0	48.0	250.8	9508.7
12025.0	H	45.5	Ambient	9.8	41.4	-34.4	0.0	62.3	1301.1	5000.0
12025.0	V	45.4	Ambient	9.8	41.4	-34.4	0.0	62.2	1286.2	5000.0
14430.0	H	35.2	Ambient	10.9	43.7	-33.9	0.0	55.9	626.7	9508.7
14430.0	V	35.1	Ambient	10.9	43.7	-33.9	0.0	55.8	619.5	9508.7
16835.0	H	35.0	Ambient	11.6	44.6	-33.9	0.0	57.4	738.6	9508.7
16835.0	V	35.4	Ambient	11.6	44.6	-33.9	0.0	57.8	773.4	9508.7
19240.0	H	34.5	Ambient	2.2	40.4	-27.5	0.0	49.6	302.9	5000.0
19240.0	V	34.5	Ambient	2.2	40.4	-27.5	0.0	49.6	302.9	5000.0
21645.0	H	25.8	Ambient	2.2	40.6	-26.2	0.0	42.4	131.5	9508.7
21645.0	V	26.3	Ambient	2.2	40.6	-26.2	0.0	42.9	139.3	9508.7
24050.0	H	24.3	Ambient	2.2	40.6	-27.4	0.0	39.7	97.2	9508.7
24050.0	V	24.4	Ambient	2.2	40.6	-27.4	0.0	39.8	98.3	9508.7

Gray rows indicate restricted bands which must meet the general limits

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Distance Correction Factor

Checked By: MARK E. LONGINOTTI



Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 26, 2008 and October 16, 2008
Mode : Transmit @ 2405MHz, Channel 11
Test Distance : 3 meters
Notes : Average Readings

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Duty Cycle Factor dB	Total dBuV/m	Total uV/m	Limit uV/m
4810.0	H	58.4		5.7	34.5	-35.9	-10.1	52.6	426.8	500.0
4810.0	V	54.8		5.7	34.5	-35.9	-10.1	49.0	282.0	500.0
12025.0	H	33.4	Ambient	9.8	41.4	-34.4	-10.1	40.1	101.0	500.0
12025.0	V	33.4	Ambient	9.8	41.4	-34.4	-10.1	40.1	101.0	500.0
19240.0	H	22.5	Ambient	2.2	40.4	-27.5	-10.1	27.5	23.8	500.0
19240.0	V	22.2	Ambient	2.2	40.4	-27.5	-10.1	27.2	23.0	500.0

Gray rows indicate restricted bands which must meet the general limits

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

MARK E. LONGINOTTI
Checked By: _____



Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 26, 2008 and October 16, 2008
Mode : Transmit @ 2445MHz, Channel 19
Test Distance : 3 meters
Notes : Peak Readings

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Distance Correction Factor dB	Total dBuV/m	Total uV/m	Limit uV/m
2445.0	H	67.5		3.8	31.4	0.0	0.0	102.7	136488	
2445.0	V	63.0		3.8	31.4	0.0	0.0	98.2	81301	
4890.0	H	54.1		5.8	34.5	-37.3	0.0	57.1	716.1	5000.0
4890.0	V	55.7		5.8	34.5	-37.3	0.0	58.7	861.0	5000.0
7335.0	H	42.7		7.7	38.1	-35.9	0.0	52.5	423.9	5000.0
7335.0	V	44.8		7.7	38.1	-35.9	0.0	54.6	539.9	5000.0
9780.0	H	35.5	Ambient	8.6	39.9	-35.5	0.0	48.5	265.3	13648.9
9780.0	V	35.9	Ambient	8.6	39.9	-35.5	0.0	48.9	277.8	13648.9
12225.0	H	45.8	Ambient	9.9	41.4	-35.0	0.0	62.0	1256.4	5000.0
12225.0	V	45.8	Ambient	9.9	41.4	-35.0	0.0	62.0	1256.4	5000.0
14670.0	H	35.8	Ambient	11.0	44.1	-34.4	0.0	56.6	677.0	13648.9
14670.0	V	35.4	Ambient	11.0	44.1	-34.4	0.0	56.2	646.5	13648.9
17115.0	H	35.6	Ambient	11.8	44.5	-33.9	0.0	57.9	786.9	13648.9
17115.0	V	35.4	Ambient	11.8	44.5	-33.9	0.0	57.7	769.0	13648.9
19560.0	H	33.8	Ambient	2.2	40.4	-27.1	0.0	49.3	290.5	5000.0
19560.0	V	33.7	Ambient	2.2	40.4	-27.1	0.0	49.2	287.1	5000.0
22005.0	H	26.7	Ambient	2.2	40.6	-27.0	0.0	42.5	133.0	13648.9
22005.0	V	26.2	Ambient	2.2	40.6	-27.0	0.0	42.0	125.6	13648.9
24450.0	H	24.7	Ambient	2.2	40.6	-27.5	0.0	40.0	100.1	13648.9
24450.0	V	24.2	Ambient	2.2	40.6	-27.5	0.0	39.5	94.5	13648.9

Gray rows indicate restricted bands which must meet the general limits

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Distance Correction Factor

MARK E. LONGINOTTI
Checked By: _____



Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 26, 2008 and October 16, 2008
Mode : Transmit @ 2445MHz, Channel 19
Test Distance : 3 meters
Notes : Average Readings

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Duty Cycle Factor dB	Total dBuV/m	Total uV/m	Limit uV/m
4890.0	H	53.1		5.8	34.5	-37.3	-10.1	46.0	199.5	500.0
4890.0	V	52.7		5.8	34.5	-37.3	-10.1	45.6	190.5	500.0
7335.0	H	39.7		7.7	38.1	-35.9	-10.1	39.4	93.8	500.0
7335.0	V	41.8		7.7	38.1	-35.9	-10.1	41.5	119.5	500.0
12225.0	H	33.8	Ambient	9.9	41.4	-35.0	-10.1	39.9	98.7	500.0
12225.0	V	33.8	Ambient	9.9	41.4	-35.0	-10.1	39.9	98.7	500.0
19560.0	H	21.8	Ambient	2.2	40.4	-27.1	-10.1	27.2	22.8	500.0
19560.0	V	21.7	Ambient	2.2	40.4	-27.1	-10.1	27.1	22.5	500.0

Gray rows indicate restricted bands which must meet the general limits

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Checked By: MARK E. LONGINOTTI



Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 26, 2008 and October 16, 2008
Mode : Transmit @ 2475MHz, Channel 25
Test Distance : 3 meters
Notes : Peak Readings

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Distance Correction Factor dB	Total dBuV/m	Total uV/m	Limit uV/m
2475.0	H	65.7		3.8	31.4	0.0	0.0	100.9	111316.0	
2475.0	V	61.5		3.8	31.4	0.0	0.0	96.7	68636.9	
4950.0	H	56.1		5.8	34.5	-37.3	0.0	59.1	904.8	5000.0
4950.0	V	57.1		5.8	34.5	-37.3	0.0	60.1	1015.3	5000.0
7425.0	H	48.0	Ambient	7.7	38.1	-35.9	0.0	57.9	785.7	5000.0
7425.0	V	52.1	Ambient	7.7	38.1	-35.9	0.0	62.0	1259.6	5000.0
9900.0	H	35.7	Ambient	8.5	40.0	-35.5	0.0	48.8	274.5	11131.6
9900.0	V	35.3	Ambient	8.5	40.0	-35.5	0.0	48.4	262.1	11131.6
12375.0	H	46.0	Ambient	9.9	41.3	-35.0	0.0	62.2	1293.1	5000.0
12375.0	V	46.0	Ambient	9.9	41.3	-35.0	0.0	62.2	1293.1	5000.0
14850.0	H	34.5	Ambient	11.1	44.5	-34.4	0.0	55.7	612.4	11131.6
14850.0	V	34.0	Ambient	11.1	44.5	-34.4	0.0	55.2	578.1	11131.6
17325.0	H	34.9	Ambient	11.9	44.4	-34.0	0.0	57.2	724.2	11131.6
17325.0	V	35.4	Ambient	11.9	44.4	-34.0	0.0	57.7	767.1	11131.6
19800.0	H	33.3	Ambient	2.2	40.4	-26.9	0.0	49.0	282.1	5000.0
19800.0	V	33.3	Ambient	2.2	40.4	-26.9	0.0	49.0	282.1	5000.0
22275.0	H	34.4	Ambient	2.2	40.6	-27.1	0.0	50.1	321.6	5000.0
22275.0	V	34.3	Ambient	2.2	40.6	-27.1	0.0	50.0	317.9	5000.0
24750.0	H	23.4	Ambient	2.2	40.6	-27.2	0.0	38.9	88.5	11131.6
24750.0	V	24.0	Ambient	2.2	40.6	-27.2	0.0	39.5	94.9	11131.6

Gray rows indicate restricted bands which must meet the general limits

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Distance Correction Factor

MARK E. LONGINOTTI
Checked By: _____



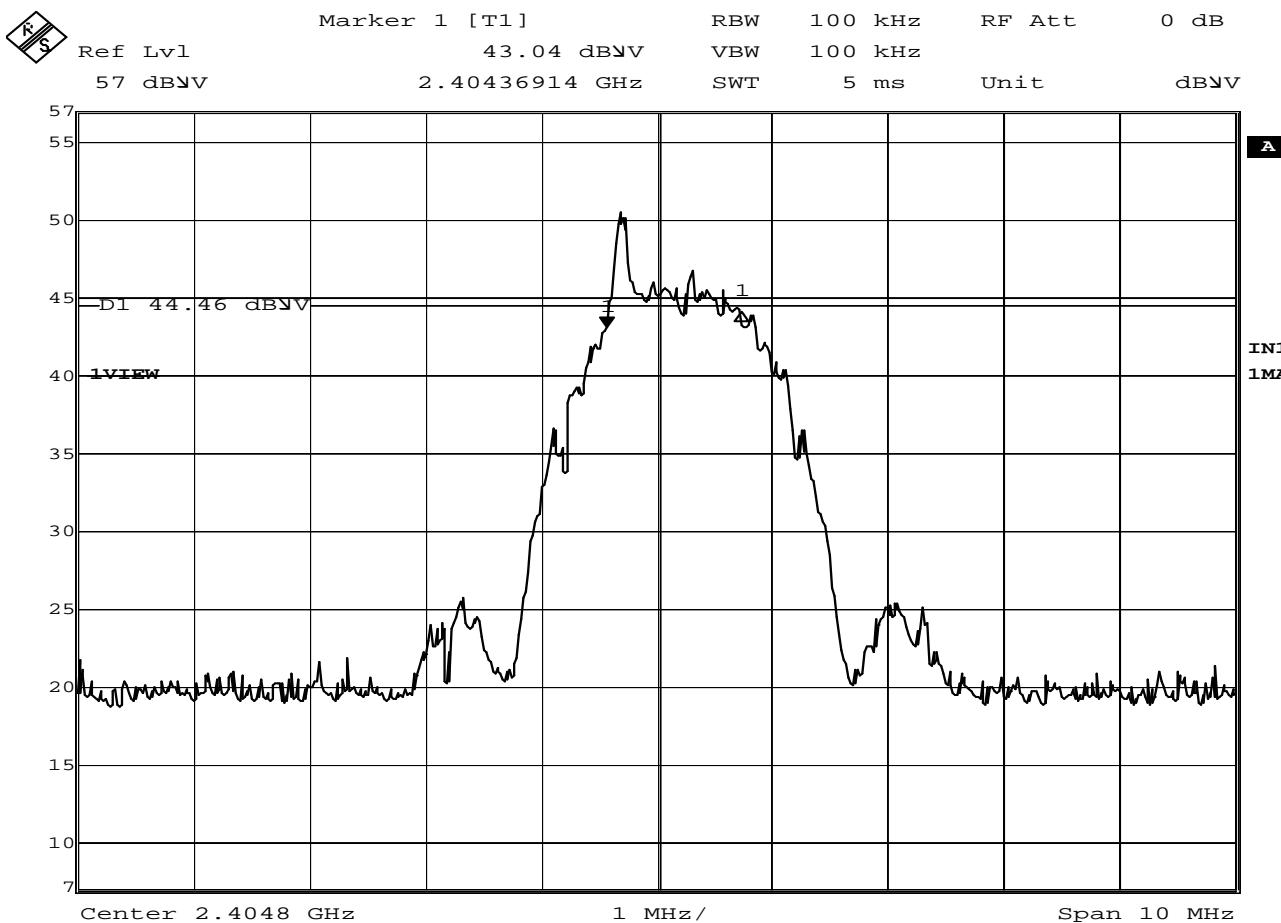
Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 26, 2008 and October 16, 2008
Mode : Transmit @ 2475MHz, Channel 25
Test Distance : 3 meters
Notes : Average Readings

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Duty Cycle Factor dB	Total dBuV/m	Total uV/m	Limit uV/m
4950.0	H	53.1		5.8	34.5	-37.3	-10.1	46.0	200.3	500.0
4950.0	V	54.1		5.8	34.5	-37.3	-10.1	47.0	224.7	500.0
7425.0	H	36.0	Ambient	7.7	38.1	-35.9	-10.1	35.8	61.7	500.0
7425.0	V	40.1	Ambient	7.7	38.1	-35.9	-10.1	39.9	98.9	500.0
12375.0	H	34.0	Ambient	9.9	41.3	-35.0	-10.1	40.1	101.5	500.0
12375.0	V	34.0	Ambient	9.9	41.3	-35.0	-10.1	40.1	101.5	500.0
19800.0	H	21.3	Ambient	2.2	40.4	-26.9	-10.1	26.9	22.2	500.0
19800.0	V	21.3	Ambient	2.2	40.4	-26.9	-10.1	26.9	22.2	500.0
22275.0	H	22.4	Ambient	2.2	40.6	-27.1	-10.1	28.0	25.3	500.0
22275.0	V	22.3	Ambient	2.2	40.6	-27.1	-10.1	27.9	25.0	500.0

Gray rows indicate restricted bands which must meet the general limits

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

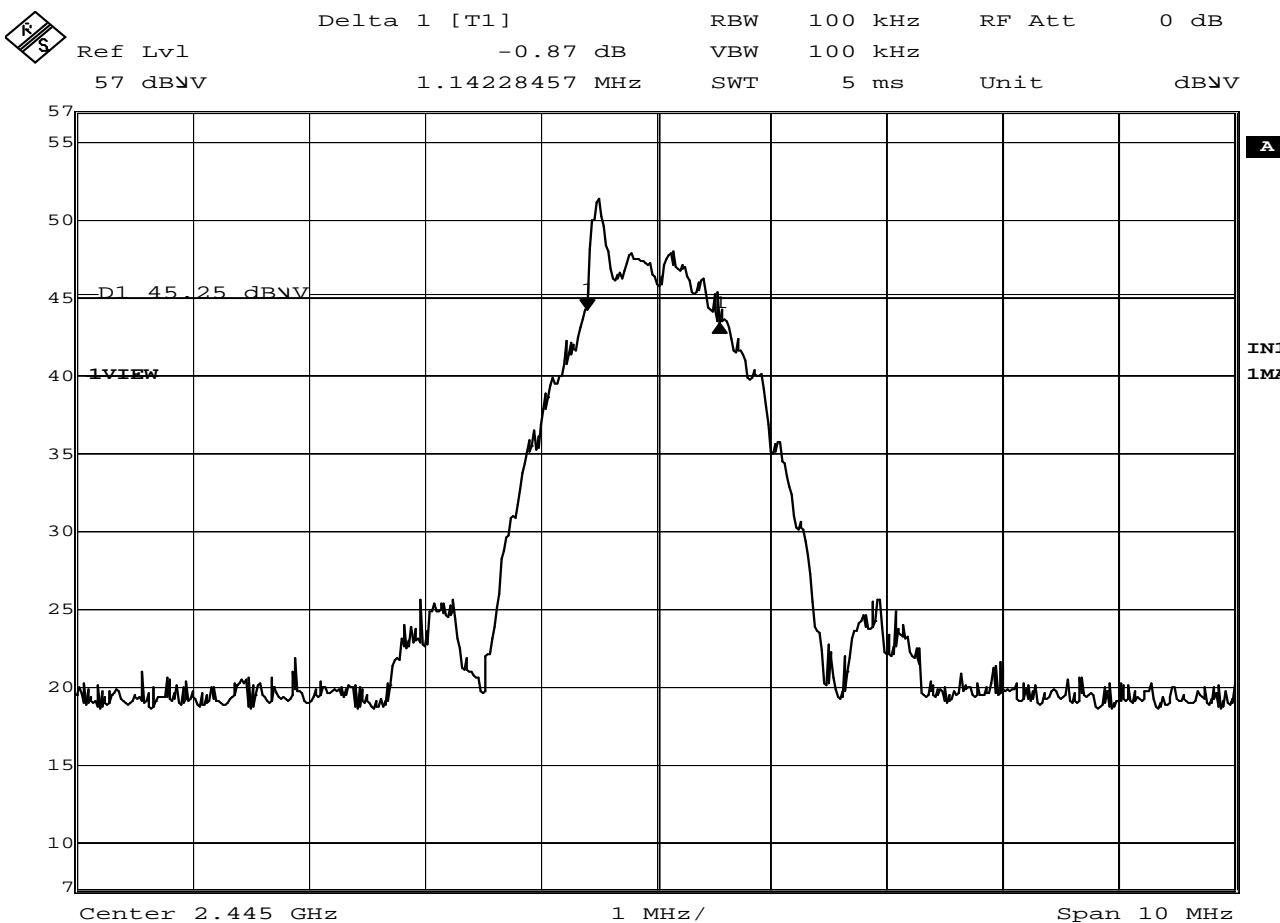
MARK E. LONGINOTTI
Checked By: _____



Date: 25.SEP.2008 19:46:51

FCC 15.247(a)(2)

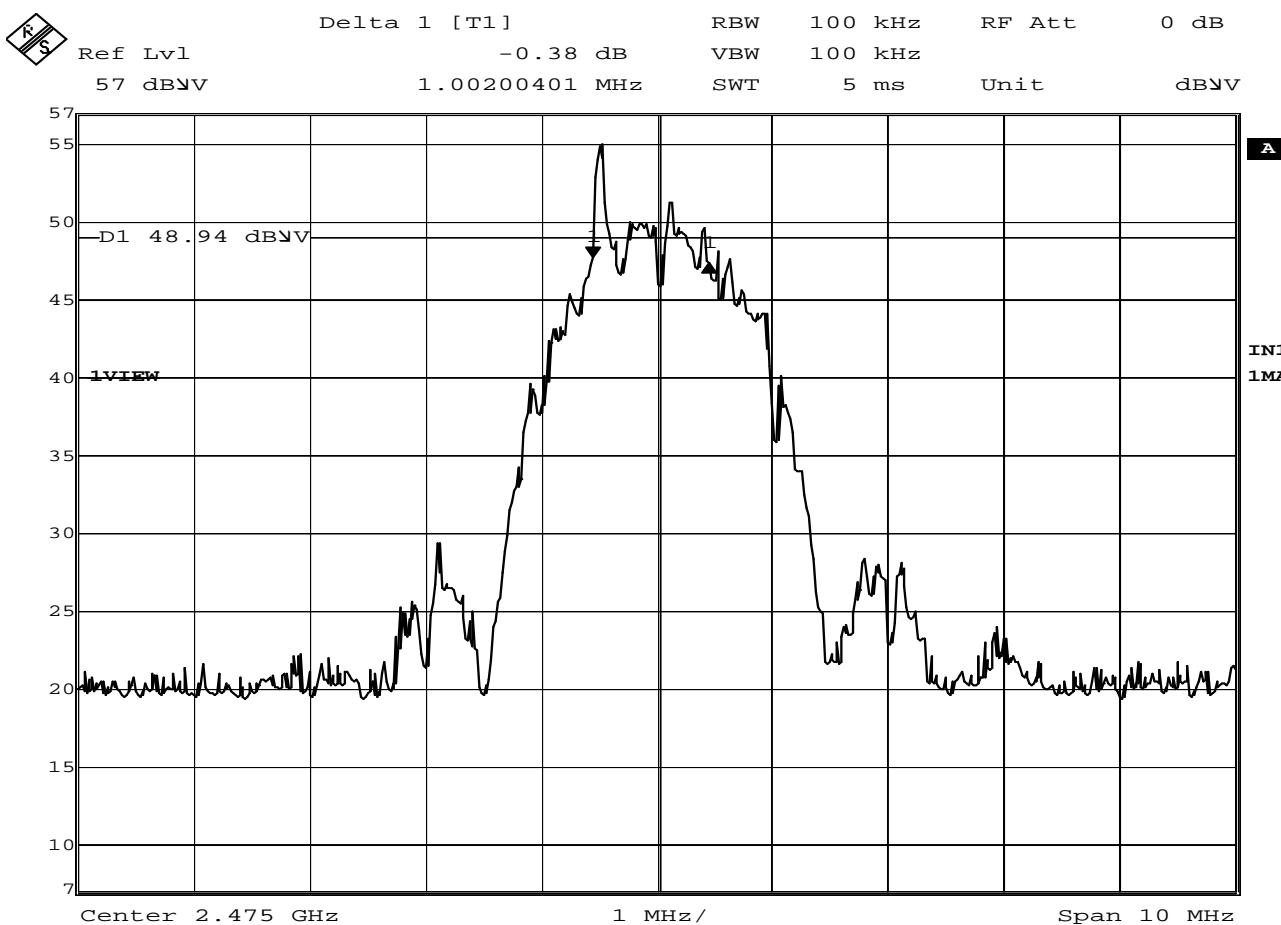
MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.405GHz (Ch. 11)
TEST PARAMETERS	: 6dB Bandwidth
NOTES	: Minimum 6dB Bandwidth must be greater than 500kHz
EQUIPMENT USED	: RBB0, NWI1



Date: 25.SEP.2008 20:00:03

FCC 15.247(a)(2)

MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.445GHz (Ch. 19)
TEST PARAMETERS	: 6dB Bandwidth
NOTES	: Minimum 6dB Bandwidth must be greater than 500kHz
EQUIPMENT USED	: RBB0, NWI1



Date: 29.SEP.2008 15:48:02

FCC 15.247(a)(2)

MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.475GHz (Ch. 25)
TEST PARAMETERS	: 6dB Bandwidth
NOTES	: Minimum 6dB Bandwidth must be greater than 500kHz
EQUIPMENT USED	: RBB0, NWI1

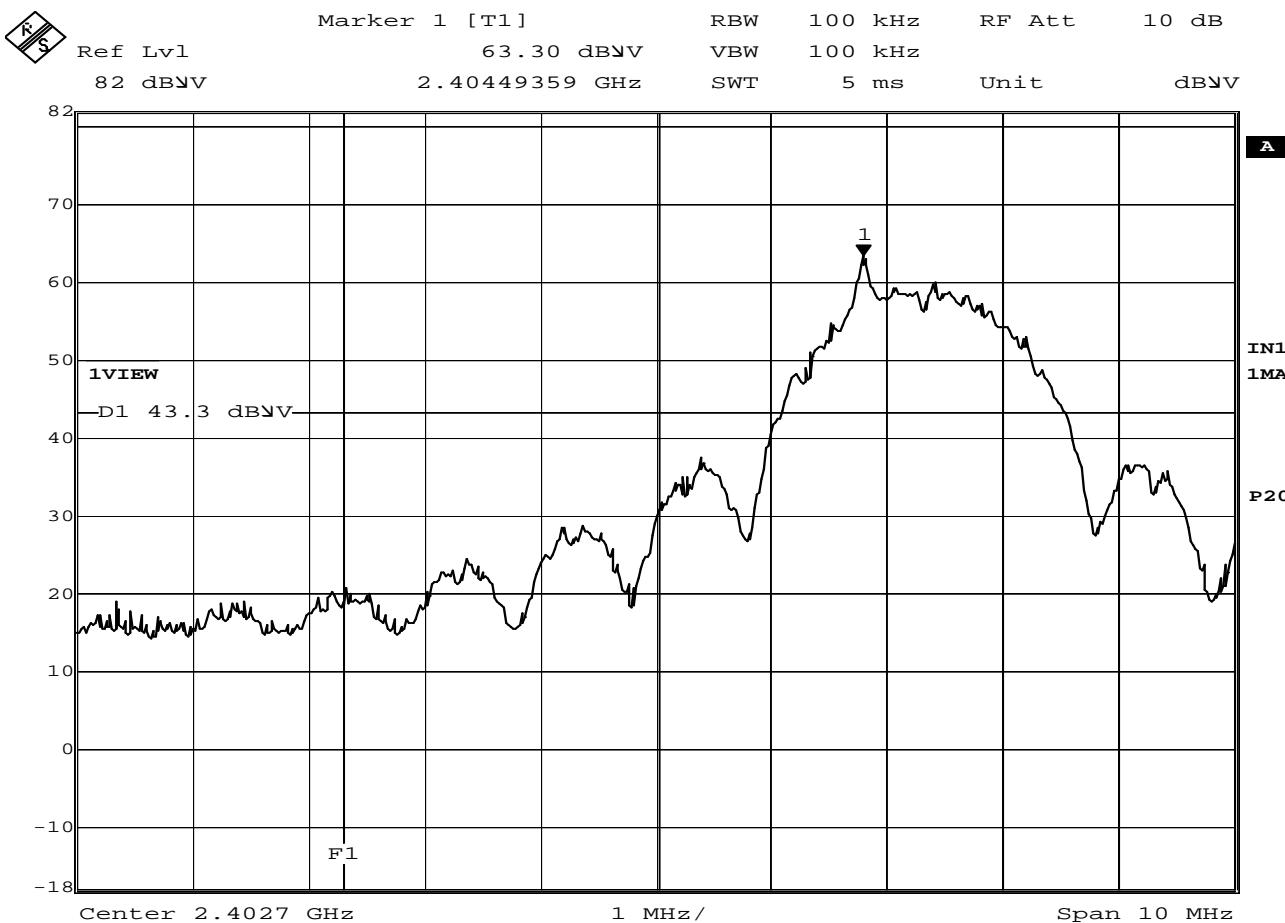


Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, EIRP
Date : September 26, 2008
Mode : Transmit @ 2405MHz, Channel 11
Test Distance : 3 meters
Notes : Peak Readings

Frequency MHz	Antenna Polarity	Meter Readin g dBuV		Matched Signal Generator Reading dBm	Antenna Gain dB	Cable Loss dBm	EIRP dBm	Limit dBm
2405.0	H	64.8		-3.1	6.5	3.0	0.4	36
2405.0	V	60.3		-7.0	6.5	3.0	-3.5	36
2445.0	H	67.6		0.7	6.7	3.0	4.4	36
2445.0	V	63.3		-3.3	6.7	3.0	0.4	36
2475.0	H	65.7		-0.6	6.7	3.1	3.0	36
2475.0	V	61.3		-5.9	6.7	3.1	-2.3	36

EIRP = Matched Signal Generator Reading + Antenna Gain – Cable Loss

MARK E. LONGINOTTI
Checked By:



Date: 26.SEP.2008 15:45:12
 FCC 15.247(d)

MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.405GHz (Ch. 11)
TEST PARAMETERS	: Band edge
NOTES	: Display line D1 represents the 20dB down point, Frequency line : F1 represents the band edge (2.40GHz)
EQUIPMENT USED	: RBB0, NWI1

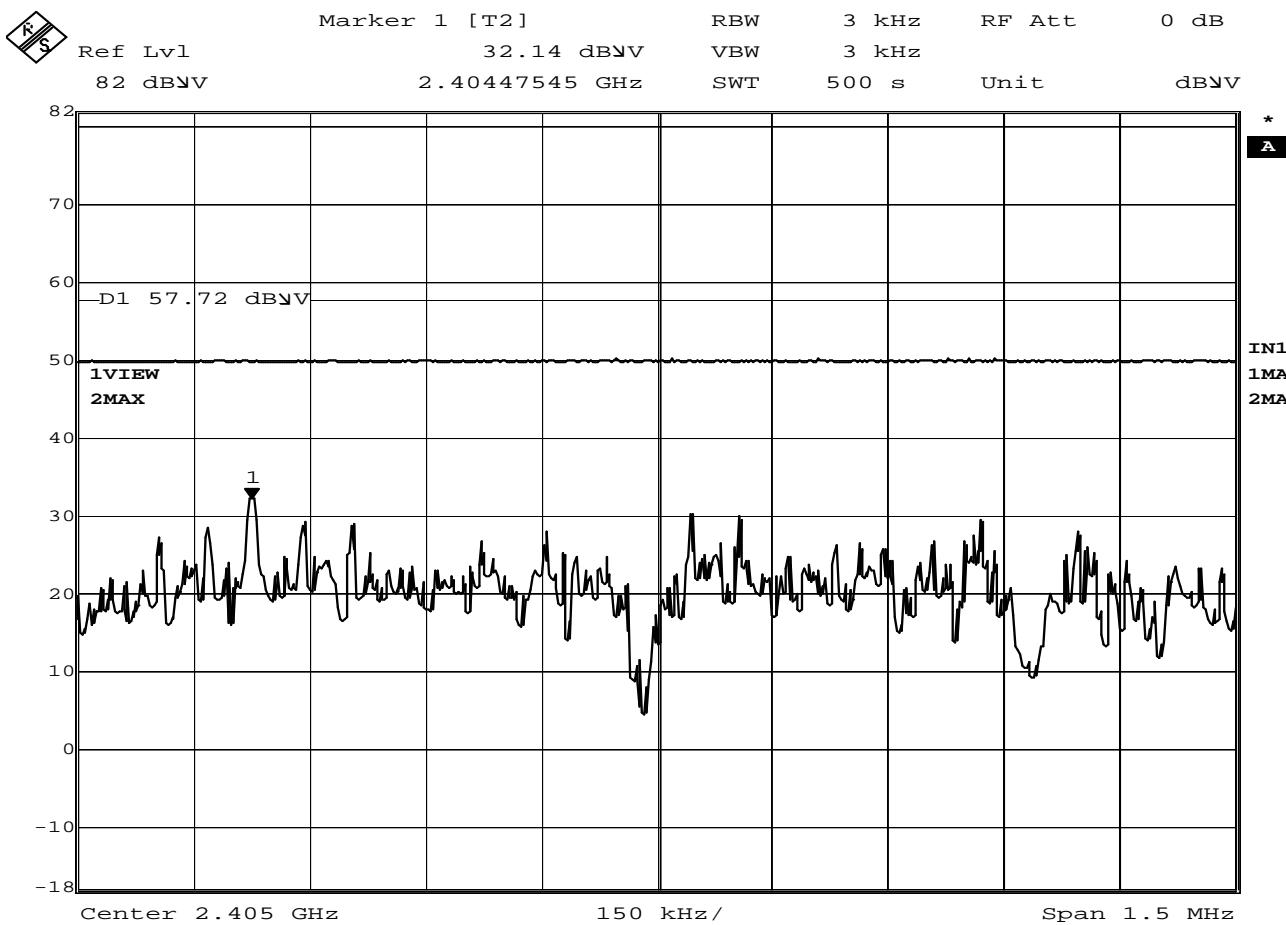


Manufacturer : Twistthink
Model No. : AFrame Watch
Serial No. : None Assigned
Test Specification : FCC Part 15, Subpart C, Section 15.247, Band Edge Compliance
Date : September 26, 2008
Mode : Transmit @ 2475MHz, Channel 25
Test Distance : 3 meters
Notes : Average Readings

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Duty Cycle Factor dB	Total dBuV/m	Total uV/m	Limit uV/m
2483.5	H	21.1		3.8	31.4	0.0	-10.1	46.2	205.1	500.0
2483.5	V	19.7		3.8	31.4	0.0	-10.1	44.8	174.6	500.0

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

MARK E. LONGINOTTI
Checked By: _____



Date: 29.SEP.2008 16:52:59

FCC 15.247(d)

MANUFACTURER

: Twistthink

MODEL NUMBER

: AFrame Watch

SERIAL NUMBER

: None Assigned

TEST MODE

: Transmit at 2.405GHz (Ch. 11)

TEST PARAMETERS

: Power Spectral Density

NOTES

: Top Trace (50.12dB_VV) represents the EIRP of the test item.

: This corresponds to an EIRP of 0.4dBm. The Power Spectral

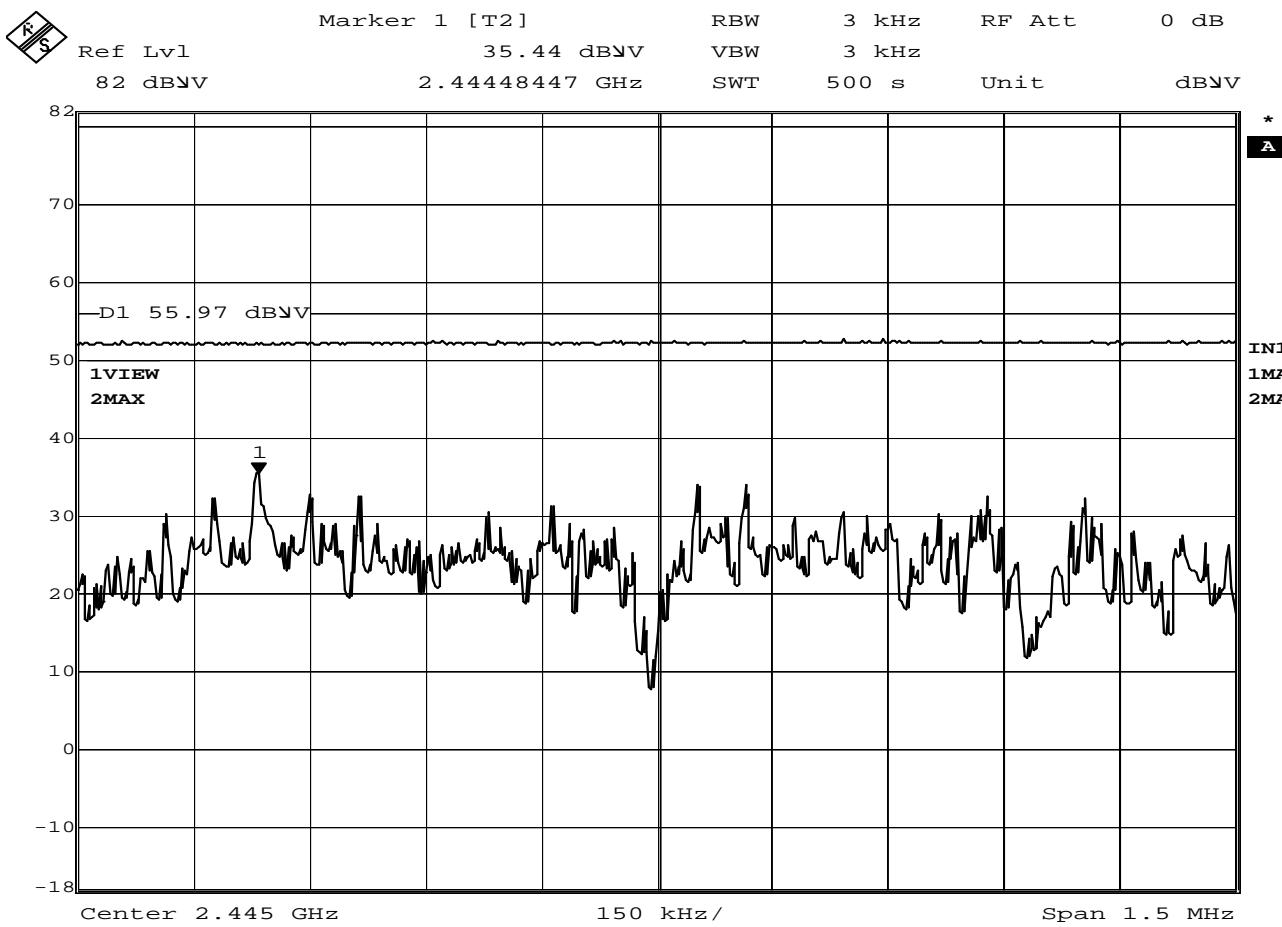
: Density must be no more than 8dBm. Display Line (D1)

: corresponds to the 8dBm level

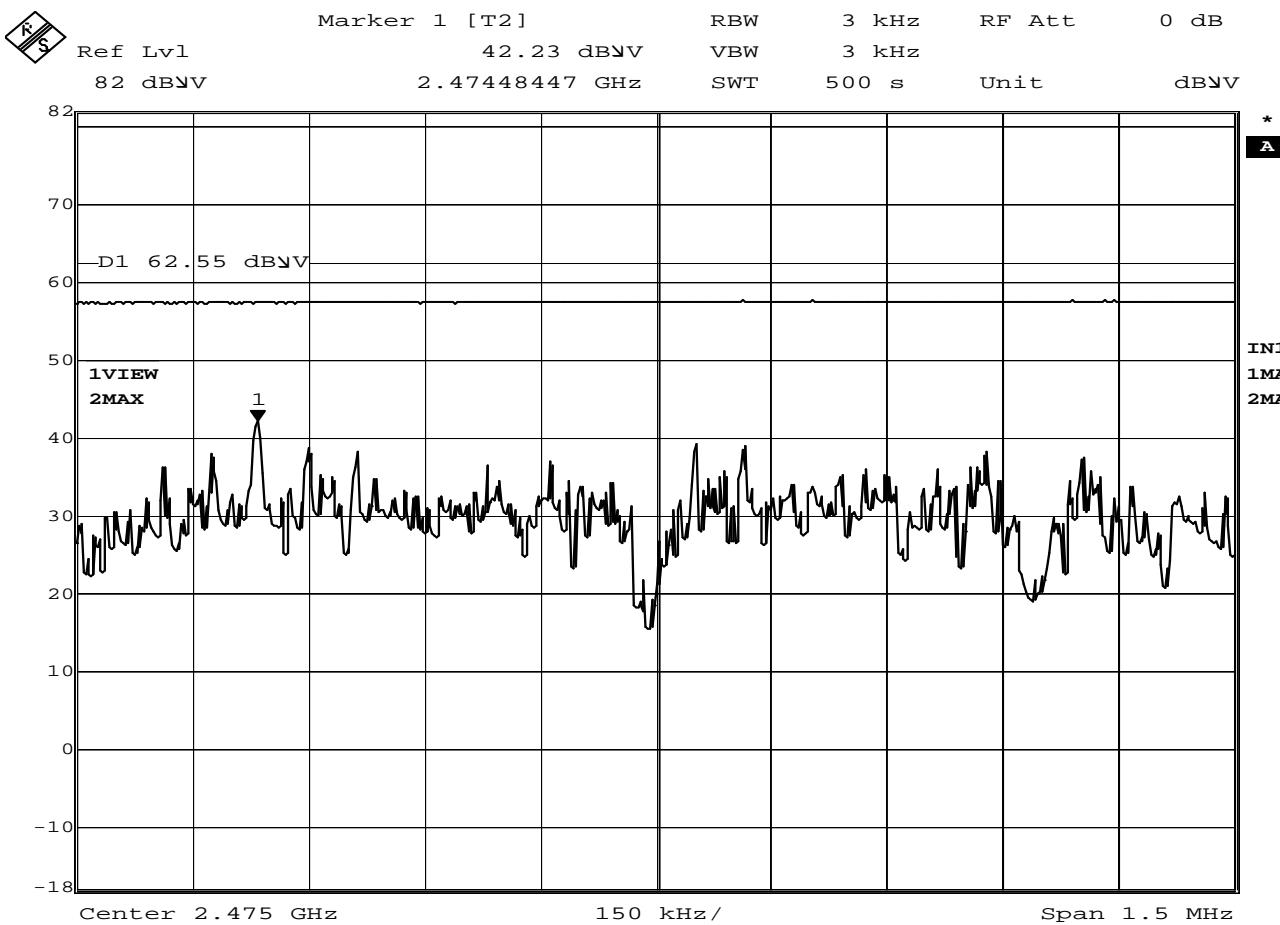
: $(50.12 - (0.4\text{dBm} - 8\text{dBm})) = 57.72\text{dBuV}$

EQUIPMENT USED

: RBB0, NWI1



MANUFACTURER : Twistthink
MODEL NUMBER : AFrame Watch
SERIAL NUMBER : None Assigned
TEST MODE : Transmit at 2.445GHz (Ch. 19)
TEST PARAMETERS : Power Spectral Density
NOTES : Top Trace (52.37dB_uV) represents the EIRP of the test item.
: This corresponds to an EIRP of 4.4dBm. The Power Spectral
: Density must be no more than 8dBm. Display Line (D1)
: corresponds to the 8dBm level
: (52.37 – (4.4dBm -8dBm)) = 55.97dB_VV
EQUIPMENT USED : RBB0, NWI1



Date: 29.SEP.2008 16:24:23

FCC 15.247(d)

MANUFACTURER	: Twistthink
MODEL NUMBER	: AFrame Watch
SERIAL NUMBER	: None Assigned
TEST MODE	: Transmit at 2.475GHz (Ch. 25)
TEST PARAMETERS	: Power Spectral Density
NOTES	: Top Trace (57.55dB _V V) represents the EIRP of the test item. : This corresponds to an EIRP of 3.0dBm. The Power Spectral : Density must be no more than 8dBm. Display Line (D1) : corresponds to the 8dBm level : (57.55 – (3.0dBm -8dBm) = 62.55dB _V V
EQUIPMENT USED	: RBB0, NWI1