Measurement of RF Interference from a Model ST-RF 1000G UHF RFID Reader/Writer Frequency Hoping Spread Spectrum Transceiver

For : Strong M
1210 Old Henderson Road
Columbus, OH 43220

P.O. No. : 01-041907001a
Date Tested : May 21, 2007 through May 31, 2007
Test Personnel : Mark E. Longinotti, Daniel E. Crowder
Specification : FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B and Subpart C, Section 15.247 for Frequency Hopping Spread Spectrum Intentional Radiators Operating within the band 902-928MHz
: Industry Canada RSS-210
: Industry Canada RSS-GEN

Test Report By : MARK E. LONGINOTTI
Mark E. Longinotti

Approved By : Raymond J Klouda
Raymond J. Klouda
Registered Professional
Engineer of Illinois - 44894

Elite Electronic Engineering Inc.
1516 Centre Circle
Downers Grove, IL 60515
Tel : (630) 495-9770
Fax: (630) 495-9785
www.elitetest.com

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REVISION HISTORY

Revision	Date	Description
—	15 June 2007	Initial release

Measurement of RF Emissions from a Model ST-RF 1000G UHF RFID Reader/Writer Frequency Hopping Spread Spectrum Transceiver

1 INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on a Strong M, Model No. ST-RF 1000G (hereinafter referred to as the test item). Serial No.378833 was assigned to the transceiver board. (Serial Number 1 was assigned to the entire enclosure.) The test item was designed to transmit and receive in the 902.2MHz to 927.8MHz band using frequency hopping spread spectrum techniques. The test item was submitted for testing with two (2) each external antennas, a PATCH-A0025 external antenna and a Cushcraft Communications Antenna (S9028PC). The test item was manufactured and submitted for testing by Strong M located in Columbus, OH.

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, Sections 15.107 and 15.109 and Subpart C, Section 15.247 for Intentional Radiators. 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 23°C and the relative humidity was 35%.

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, Part 15, Subpart C, dated 1 October 2005
- FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000
- 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 6, September 2005, “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 1, September 2005, “Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment”

3 TEST ITEM SETUP AND OPERATION

3.1 General Description

The test item is a Strong M, UHF RFID Reader/Writer, Part No. ST-RF 1000G. A block diagram of the test item setup is shown as Figure 1.

3.1.1 Power Input

The test item obtained 9VDC power through 2 each 1.85 meter long leads from a Phihong AC Adapter, Model PSA15R-090P. The AC Adapter was powered with 115V, 60Hz power. The test item also received 5VDC power via a 1.75 meter long USB cable. The USB cable was connected to a Sony laptop computer, Model No. PCG-GR300K. The laptop computer obtained 16VDC power through 2 each, 2 meter long leads from a Sony AC Adapter, Model PCGA-AC16V. The AC Adapter was powered with 115V, 60Hz power via a 70cm long, 2 wire power cord.

For conducted emissions tests on the Phihong AC Adapter, each lead of the Phihong AC Adapter was connected through a line impedance stabilization network (LISN) which was located on the copper ground plane. The network complies with the requirements of Paragraph 4.1.2 of ANSI C63.4-2003.

For conducted emissions tests on the Sony laptop computer, each lead of the Sony AC Adapter was connected through a line impedance stabilization network (LISN) which was located on the copper ground plane. The network complies with the requirements of Paragraph 4.1.2 of ANSI C63.4-2003.

3.1.2 Grounding

The test item was ungrounded during the tests.

3.1.3 Support Equipment

The following support equipment was submitted with the test item:

Item	Description
AC Adapter	Phihong, Model PSA15R-090P, used to provide 9VDC power to the test item via a 1.85 meter long, 2 wire power cord
Laptop Computer	Sony, Model PCG-GR300K, used to program the test item and to provide 5VDC power via a 1.75 meter long USB Cable
AC Adapter	Sony, Model PCGA-AC16V, used to provide 16VDC power to the laptop computer via a 2 meter long 2 wire power cord

3.1.4 Interconnect Cables

The following interconnect cables were submitted with the test item:

Item	Description
USB Cable	1.75 meter long USB cable used to connect the test item to the laptop computer

3.2 Operational Mode

The test item and all support equipment were placed on an 80cm high non-conductive stand. The test item and all support equipment were energized. The test item was programmed to operate in one of the following modes:

- Transmit at 902.2MHz, frequency hopping disabled
- Transmit at 912.4MHz, frequency hopping disabled
- Transmit at 914MHz, frequency hopping disabled
- Transmit at 927.8MHz, frequency hopping disabled
- Transmit, frequency hopping enabled
- Receive at 902.2MHz, frequency hopping disabled
- Receive at 912.4MHz, frequency hopping disabled

- Receive at 927.8MHz, frequency hopping disabled

3.3 Test Item Modifications

No modifications were required for compliance to the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 and Subpart C, Section 15.247 for Intentional Radiators. Testing was performed in accordance with ANSI C63.4-2003.

4 TEST EQUIPMENT

4.1 Test Equipment List

A list of the test equipment used can be found on Table 8-1. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

4.2 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).

4.3 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 REQUIREMENTS, PROCEDURES AND RESULTS

5.1 Powerline Conducted Emissions

5.1.1 Receiver

5.1.1.1 Requirements

All radio frequency voltages on the power lines of a Class B device shall be below the values shown below when using a quasi-peak detector:

CONDUCTED LIMITS FOR RECEIVERS

Frequency MHz	RFI Voltage dBuV(QP)	RFI Voltage dBuV(Average)

0.15-0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency to 46
0.5-5	56	46
5-30	60	50

Note 1: The lower limit shall apply at the transition frequencies.
Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the test item is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.1.1.2 Procedures

The interference on each power lead was measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. The meter terminal of the LISN not under test was terminated with 50 ohm. Measurements were first made over the entire frequency range from 150 kHz through 30 MHz with a peak detector and the results were automatically plotted. The data thus obtained was then searched by the computer for the highest levels. Quasi-peak measurements were automatically performed at the frequencies selected from the highest peak measurements, and the results printed.

5.1.1.3 Results

The plots of the peak preliminary conducted voltage levels, with the test item set to Receive at 912.4MHz, on each power line of the Phihong AC Adapter are presented on pages 23 and 24. The conducted limits for Class B devices are shown as a reference. The final quasi-peak results are presented on pages 25 and 26.

As can be seen from the data, all conducted emission levels met the requirements for Class B devices. The emissions level closest to the limit (worst case) occurred at 191kHz. The emissions level at this frequency was 3.9dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

The plots of the peak preliminary conducted voltage levels, with the test item set to Receive at 912.4MHz, on each power line of the Sony AC Adapter (used to provide power to the Sony laptop computer which was in turn used to provide 5VDC power to the test item via a USB cable) are presented on pages 27 and 28 . The conducted limits for Class B devices are shown as a reference. The final quasi-peak results are presented on pages 29 and 30.

As can be seen from the data, all conducted emission levels met the requirements for Class B devices. The emissions level closest to the limit (worst case) occurred at 190kHz. The emissions level at this frequency was 3.3dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

5.1.2 Transmitter

5.1.2.1 Requirements

All radio frequency voltages on the power lines of an intentional radiator shall be below the values shown below when using a quasi-peak detector:

CONDUCTED LIMITS FOR AN INTENTIONAL RADIATOR

Frequency MHz	RFI Voltage dBuV(QP)	RFI Voltage dBuV(Average)
0.15-0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency to 46

0.5 – 5.0	56	46
5.0 – 30.0	60	50

Note 1: The lower limit shall apply at the transition frequencies.
Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the test item is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.1.2.2 Procedures

The interference on each power lead was measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. The meter terminal of the LISN not under test was terminated with 50 ohm. Measurements were first made over the entire frequency range from 150 kHz through 30 MHz with a peak detector and the results were automatically plotted. The data thus obtained was then searched by the computer for the highest levels. Quasi-peak measurements were automatically performed at the frequencies selected from the highest peak measurements, and the results printed.

5.1.2.3 Results

The plots of the peak preliminary conducted voltage levels, with the test item set to Transmit at 912.4MHz, on each power line of the Phihong AC Adapter are presented on pages 31 and 32 and. The conducted limits for Class B devices are shown as a reference. The final quasi-peak results are presented on pages 33 and 34.

As can be seen from the data, all conducted emission levels met the requirements for Class B devices. The emissions level closest to the limit (worst case) occurred at 190kHz. The emissions level at this frequency was 4.3dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

The plots of the peak preliminary conducted voltage levels, with the test item set to Transmit at 912.4MHz, on each power line of the Sony AC Adapter (used to provide power to the Sony laptop computer which was in turn used to provide 5VDC power to the test item via a USB cable) are presented on pages 35 and 36 . The conducted limits for Class B devices are shown as a reference. The final quasi-peak results are presented on pages 37 and 38.

As can be seen from the data, all conducted emission levels met the requirements for Class B devices. The emissions level closest to the limit (worst case) occurred at 188kHz. The emissions level at this frequency was 5.0dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

5.2 20dB Bandwidth

5.2.1 Requirement

Per section 15.247(a)(1)(i), for frequency hopping systems operating in the 902-928MHz band, the 20dB bandwidth shall be measured for determination of the carrier frequency separation limits and must not exceed 500 kHz. If the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping channels. If the 20dB bandwidth of the hopping channel is 250kHz or greater (but not greater than 500kHz), the system shall use at least 25 hopping channels.

5.2.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer through 50 dB of attenuation. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to $\geq$ 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.

5.2.3 Results

The plots on pages 39 through 41 show that the maximum 20dB bandwidth was 154.1kHz. Therefore, since the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping channels. The 99% bandwidth was measured to be 364.7kHz.

5.3 Carrier Frequency Separation:

5.3.1 Requirements

Per section 15.247 (a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

5.3.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer through 50dB of attenuation. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to $\geq$ to 1% of the span. The peak detector and 'Max-Hold' function were engaged. The span was set wide enough to capture the peaks of at least two adjacent channels. When the trace had stabilized after multiple scans, the marker-delta function was used to determine the separation between the peaks of the adjacent channels. The analyzer's display was plotted using a 'screen dump' utility.

5.3.3 Results

The plot on page 42 shows the carrier frequency separation. As can be seen from this plot, the separation is 200.4kHz which is greater than the 20dB bandwidth (154.1kHz).

5.4 Number of Hopping Frequencies

5.4.1 Requirements

Per section 15.247(a)(1)(i), for frequency hopping systems operating in the 902-928MHz band: if the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies.

5.4.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer through 50dB of attenuation. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to $\geq$ to 1% of the span. The peak detector and 'Max-Hold' function was engaged. The span was set wide enough to capture the entire frequency band of operation.

The test item’s signal was allowed to stabilize after multiple scans. The number of hopping frequencies was counted. The analyzer's display was plotted using a 'screen dump' utility.

5.4.3 Results

The plots on pages 48 through 50 show the number of hopping frequencies. As can be seen from this plot, the number of hopping frequencies is 129 which is greater than the minimum number of hoping frequencies of 75.

5.5 Time of Occupancy

5.5.1 Requirement

Per section 15.247(a)(1)(i), for frequency hopping systems operating in the 902-928MHz band, the average time of occupancy shall not be greater than 0.4 seconds within a 20 second period if the 20dB bandwidth is less than

250kHz.

5.5.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer through 50dB of attenuation. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to 1 MHz. The peak detector and 'Max-Hold' function were engaged. With the span set to 0Hz, the sweep time was adjusted to capture a single event in order to measure the dwell time per hop. The analyzer's display was plotted using a 'screen dump' utility. Then, the sweep time was expanded to 20 seconds to capture the number of hops in the appropriate sweep time. A single sweep was made. The analyzer's display was plotted using a 'screen dump' utility.

The dwell time in the specified time period was then calculated from dwell time per hop multiplied by the number of hops in the specified time period.

5.5.3 Results

The plots on pages 51 and 52 show the plots for the time of occupancy (dwell time). As can be seen from the plots, the time of occupancy can be determined by a 6.57msec pulse occurring 12 times in a 20 second period. This calculated value is 6.57msec X 12 = 78.84msec. Thus in a 20 second interval, the time of occupancy is 0.079 sec which is less than the 0.4 seconds allowed.

5.6 Peak Output Power

5.6.1 Antenna Conducted Measurement

5.6.1.1 Requirement

Per section 15.247(b)(2), for frequency hopping systems operating in the 902-928MHz band, the peak output power shall not be greater than (30dBm) 1 watt for systems employing at least 50 hopping channels.

5.6.1.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer through 50 dB of attenuation. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to $\geq$ the 20 dB BW. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter peak power was defined. The analyzer's display was plotted using a 'screen dump' utility.

5.6.1.3 Results

The results are presented on pages 53 through 55. The maximum antenna conducted output power measured from the transmitter was 26 dBm which meets the 30dBm limit.

5.6.2 Radiated Measurement

5.6.2.1 Requirement

Per section 15.247(b)(2), for frequency hopping systems operating in the 902-928MHz band and employing at least 50 hopping channels, the maximum peak output conducted power shall not be greater than 1W (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).

5.6.2.2 Procedures

The test item was placed on the non-conductive stand and set to transmit. A dipole 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 second dipole 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, as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.6.2.3 Results

The results are presented on pages 56 and 57. The maximum EIRP measured from the transmitter was 33.0 dBm or 2.0 W which is below the 36dBm (4 Watt) limit.

5.7 Band Edge Compliance

5.7.1 Requirement

Per section 15.247(c), the emissions at the band edges must be at least 20dB below the highest level measured within the band.

5.7.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer through 50 dB of attenuation.

a) With the hopping function disabled, the test item was set to transmit continuously at the channel closest to the low band edge with the hopping function disabled.

b) The span was set wide enough to capture the peak level of the emissions and the resolution bandwidth was set to ≥ 1% of the span.

c) The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter peak power was defined.

d) The analyzer's display was plotted using a 'screen dump' utility.

e) Steps b) through d) were repeated with the frequency hopping function enabled.

f) With the hopping function disabled, the test item was set to transmit continuously at the channel closest to the high band edge with the hopping function disabled.

g) Steps b) through e) were repeated.

5.7.3 Results

The results are presented on pages 58 through 61. The vertical red display line represents the band edge frequency and the horizontal red display line represents the 20dB down point. As can be seen from these plots, the emissions at the band-edge are within the 20dB down limits.

5.8 Duty Cycle Factor Measurements

5.8.1 Procedures

The duty cycle factor is used to convert peak detected readings to average readings. This factor is computed from the time domain trace of the pulse modulation signal.

With the transmitter set up to transmit for maximum pulse density, 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 width with 1msec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4th division from the bottom of the display. The markers are set at the beginning and end of a word period. If the word

period exceeds 100 msec the word period is set to 100 msec. The on-time and off-time are then measured. The on-time is total time signal level exceeds the 4th division. Off-time is time under for the word period. The duty cycle is then computed as the (On-time/ word period) where the word period = (On-time + Off-time).

5.8.2 Results

The plot of the duty cycle is shown on data page 62. The test item transmits a 6.57msec pulse 12 times every 20 seconds. Since a word is greater than 100 msec long, the duty cycle factor was computed over a 100msec interval. The duty cycle correction factor was calculated to be -23.6dB (-23.6dB = 20*log(6.57msec/100msec).

5.9 Spurious Emissions

5.9.1 Receiver

5.9.1.1 Antenna Conducted Emissions

5.9.1.1.1 Requirements

This test is performed to determine the test item configuration during the radiated RF emissions tests. The power at the antenna terminal over the frequency range 30MHz to 5.0GHz may be measured. If the emissions at the antenna terminal exceed 2 nanowatts, it is necessary to perform the radiated RF emissions tests with the antenna port terminated with an equivalent antenna. If the test item does meet the 2 nanowatt requirement, the radiated emissions tests can be performed with the antenna port terminated with a shielded load.

5.9.1.1.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer. With the hopping function disabled, the test item was allowed to receive continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The emissions in the frequency range from 30MHz to 5.0GHz were measured. The peak detector and 'Max-Hold' function was engaged.

5.9.1.1.3 Results

The results of the antenna conducted measurements are presented on pages 63 through 68. The reference line shown on the data pages represents the 2 nanowatt requirement. As can be seen from the data pages, all emissions from the test item were below the 2 nanowatt requirement. Since the emissions were below the 2 nanowatt limit, the antenna port was terminated with a shielded load for radiated emissions measurements.

5.9.1.2 Spurious Radiated Emissions

5.9.1.2.1 Requirements

All emanations from a receiver shall be below the levels shown on the following table:

RADIATION LIMITS FOR RECIEVERS

Frequency MHz	Distance between Test Item And Antenna in Meters	Field Strength uV/m
30-88	3	100
88-216	3	150
216-960	3	200
Above 960	3	500

Note: The tighter limit shall apply at the edge between the two frequency bands.

5.9.1.2.2 Procedures

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls

and ceiling of the shielded chamber are lined with ferrite tiles. 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.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All power lines and signal lines entering the enclosure pass through filters on the enclosure wall. The power line filters prevent extraneous signals from entering the enclosure on these leads.

Since a quasi-peak detector requires long integration times, it is not practical to automatically sweep through the quasi-peak levels. Therefore, radiated emissions from the test item were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak detector.

The broadband measuring antenna was positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 5.0GHz was investigated using a peak detector function with a bilog and waveguide antenna. The maximum levels were plotted.

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the preliminary sweeps using the following methods:

For all frequencies 1GHz and below, measurements were made using a broadband bi-log antenna.

For all frequencies above 1GHz, measurements were made using a waveguide antenna.

To ensure that the maximum, or worst case, emission levels were measured, the following steps were taken:

a) The test item was rotated so that all of its sides were exposed to the receiving antenna.

b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.

c) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.

5.9.1.2.3 Results

The preliminary plots are presented on pages 69 through 74. These plots are presented for a reference only, and are not used to determine compliance.

The final radiated levels are presented on pages 75 through 77. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration which yielded the highest or worst case radiated emission levels are shown on Figure 3.

5.9.2 Transmitter

5.9.2.1 Antenna Conducted Emissions

5.9.2.1.1 Requirement

Per section 15.247(c), the spurious emissions in any 100 kHz BW outside the frequency band must be at least 20dB below the highest 100 kHz BW level measured within the band.

5.9.2.1.2 Procedures

The test item was setup inside the chamber. The output of the test item was connected to the spectrum analyzer through 50 dB of attenuation. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The emissions in the frequency range from 30MHz to 10.0GHz were measured. The peak detector and 'Max-Hold' function were engaged. The analyzer's display was plotted using a 'screen dump' utility.

5.9.2.1.3 Results

The results of the antenna conducted measurements are presented on pages 78 through 86. The reference line

shown on the data pages represents the 20 dB down point from the highest 100 kHz BW level measured within the band. As can be seen from the data pages, all emissions from the test item were at least 20dB below the level of the fundamental.

5.9.2.2 Radiated Spurious Emissions

5.9.2.2.1 Requirement

Per section 15.247(d), 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 Strenght (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

5.9.2.2.2 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.

For all emissions in the restricted bands, the following procedure was used:

a) The field strength of all emissions below 1GHz were 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 were 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.

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, the peak readings were converted to average levels using a duty cycle factor which was computed from the pulse train. All average levels must comply with the limits specified in 15.209(a).

5.9.2.2.3 Results

The preliminary radiated emissions plots with the Patch A0025 Antenna are presented on pages 87 through 92. These plots are presented for a reference only, and are not used to determine compliance.

The final radiated emissions levels are presented on pages 93 through 98. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration which yielded the highest or worst case radiated emission levels are shown on Figure 4.

The preliminary radiated emissions plots with the S9028PC Antenna are presented on pages 99 through 104. These plots are presented for a reference only, and are not used to determine compliance.

The final radiated emissions levels are presented on pages 105 through 110. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration which yielded the highest or worst case radiated emission levels are shown on Figure 5.

6 CONCLUSIONS

It was determined that the Strong M UHF RFID Reader/Writer, Part No. ST-RF 1000G, Serial No. 278833 (Serial No. 1 was assigned to the entire enclosure), did fully meet the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 and Subpart C, Section 15.247 for Intentional Radiators when tested with a PATCH-A0025 external antenna and a Cushcraft Communications external antenna (S9028PC). Testing was performed in accordance with ANSI C63.4-2003.

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.

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

8 EQUIPMENT LIST

Table 8-1 Equipment List

ELITE ELECTRONIC ENG. INC. Page: 1

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
Equipment Type: ACCESSORIES, MISCELLANEOUS								
XDY0	HIGH POWER DIRECTIONAL COU	WERLATONE	C6934	14801	.1-1000MHZ	03/15/07	12	03/15/08
XLQ4	5W,50 OHM TERMINATION	JFW INDUSTRIES	50T-052	39	DC-2GHZ	10/02/06	12	10/02/07
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T	4	1.8GHZ-10GHZ		12	
XZG4	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2223A01683	---		N/A	
Equipment Type: AMPLIFIERS								
ADB0	BROADBAND POWER AMPLIFIER	AMPLIFIER RESEA	100W1000M1	24561	80-1000MHZ		NOTE 1	
APK4	PREAMPLIFIER OPT H02	HEWLETT PACKARD	8449B	3008A00329	1-26.5GHZ	03/12/07	12	03/12/08
APW3	PREAMPLIFIER	PLANAR ELECTRON	PE2-35-120-5	PL2924	1GHZ-20GHZ	11/27/06	12	11/27/07
Equipment Type: ANTENNAS								
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	03/28/07	12	03/28/08
NDS0	TUNED DIPOLE ANTENNA	STODDART	AT255	1	400-1000MHZ		NOTE 1	
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2057	0.03-2GHZ	08/21/06	12	08/21/07
NWF0	RIDGED WAVE GUIDE	EMCO	3105	2035	1-12.4GHZ	10/09/06	12	10/09/07
Equipment Type: ATTENUATORS								
T1E1	10DB, 25W ATTENUATOR	WEINSCHEL	46-10-43	AU1883	DC-18GHZ	12/08/06	12	12/08/07
T1EA	10DB, 25W ATTENUATOR	WEINSCHEL	46-10-34	BN2316	DC-18GHZ	03/22/07	12	03/22/08
T2DN	25W 20DB ATTENUATOR	WEINSCHEL	46-20-34	BS2147	DC-18GHZ	10/04/06	12	10/04/07
T2S5	20DB 25W ATTENUATOR	WEINSCHEL CORP	46-20-34	BV1338	DC-18GHZ	03/22/07	12	03/22/08
Equipment Type: CONTROLLERS								
CDS2	COMPUTER	GATEWAY	MFATXPNT NMZ	0028483108	1.8GHZ		N/A	
Equipment Type: METERS								
MPC2	DUAL POWER METER	HEWLETT PACKARD	EPM-442A	US37480150	0.1MHZ-50GHZ	11/22/06	12	11/22/07
MPCC	POWER SENSOR	HEWLETT PACKARD	8482A	2652A13499	0.1-4200MHZ	04/27/07	12	04/27/08
Equipment Type: PROBES; CLAMP-ON & LISNS								
PLL9	50UH LISN 462D	ELITE	462D/70A	010	0.01-400MHZ	03/08/07	12	03/08/08
PLLA	50UH LISN 462D	ELITE	462D/70A	011	0.01-400MHZ	03/08/07	12	03/08/08
Equipment Type: PRINTERS AND PLOTTERS								
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---		N/A	
Equipment Type: RECEIVERS								
RACA	RF PRESELECTOR	HEWLETT PACKARD	85685A	2926A00980	20HZ-2GHZ	02/16/07	12	02/16/08
RAEC	SPECTRUM ANALYZER	HEWLETT PACKARD	8566B	3014A06690	100HZ-22GHZ	02/16/07	12	02/16/08
RAF5	QUASIPEAK ADAPTOR W/ RECEI	HEWLETT PACKARD	85650A	2043A00151	0.01-1000MHZ	02/16/07	12	02/16/08
RBB0	EMI TEST RECEIVER 20HZ TO	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	09/29/06	12	09/29/07
Equipment Type: SIGNAL GENERATORS								
GBN5	SIGNAL GENERATOR	ROHDE & SCHWARZ	SMY 02	DE13542	0.009-2008MHZ	08/11/06	12	08/11/07

Cal. Interval: Listed in Months 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.

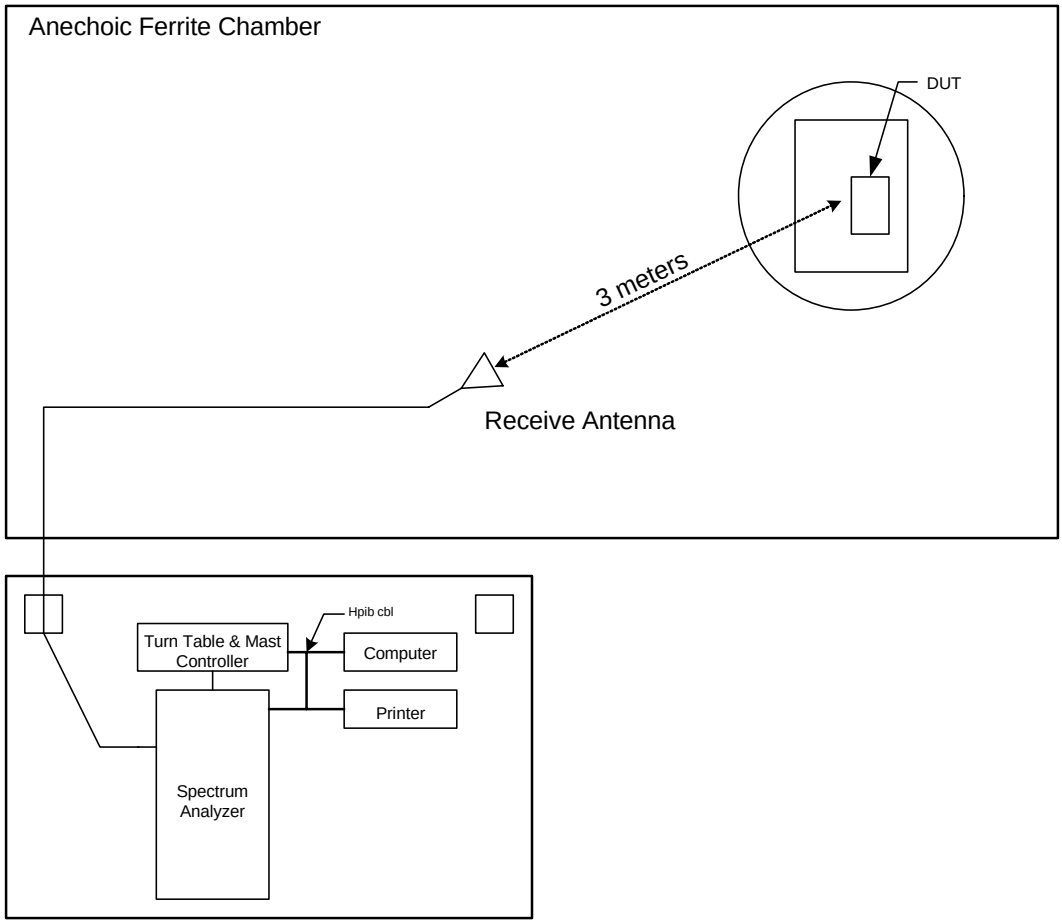
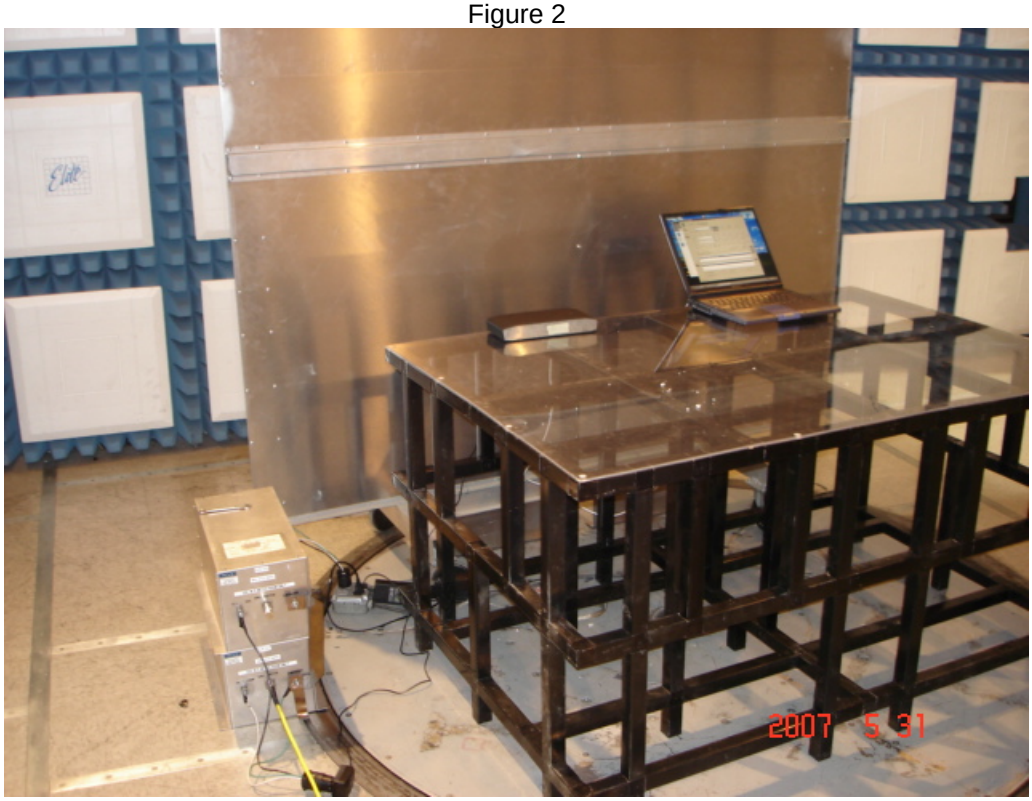


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

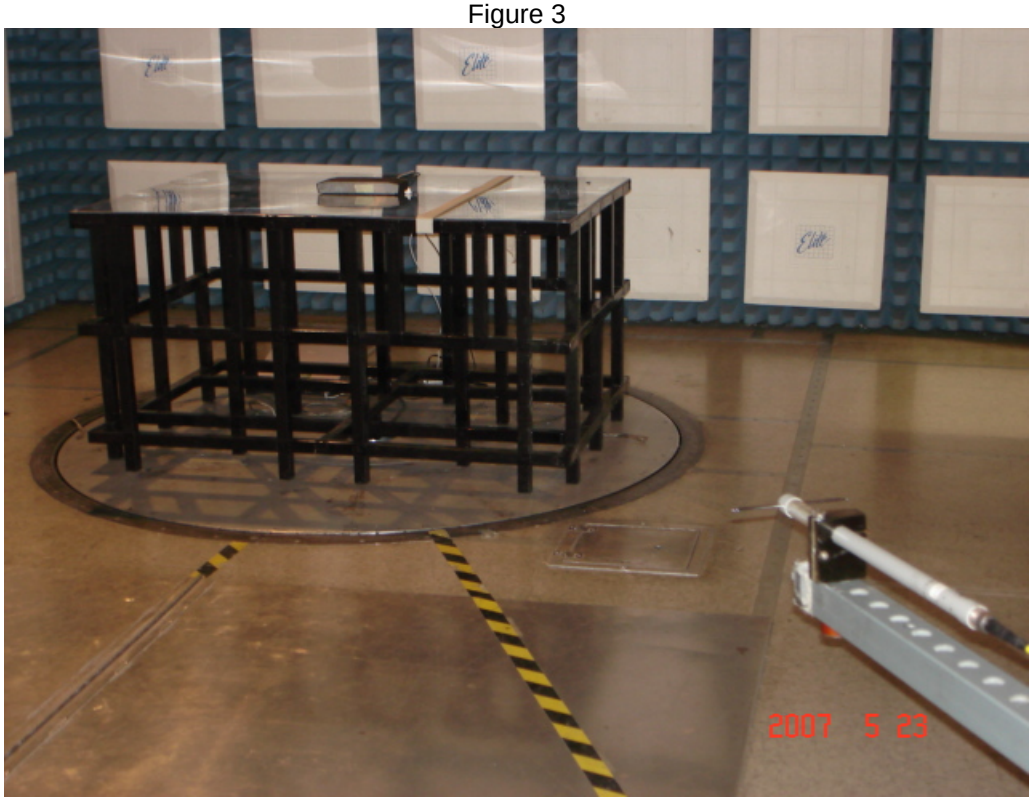
Figure 2



Test Setup for Conducted Emissions - Receiver

Test Setup for Conducted Emissions - Transmitter

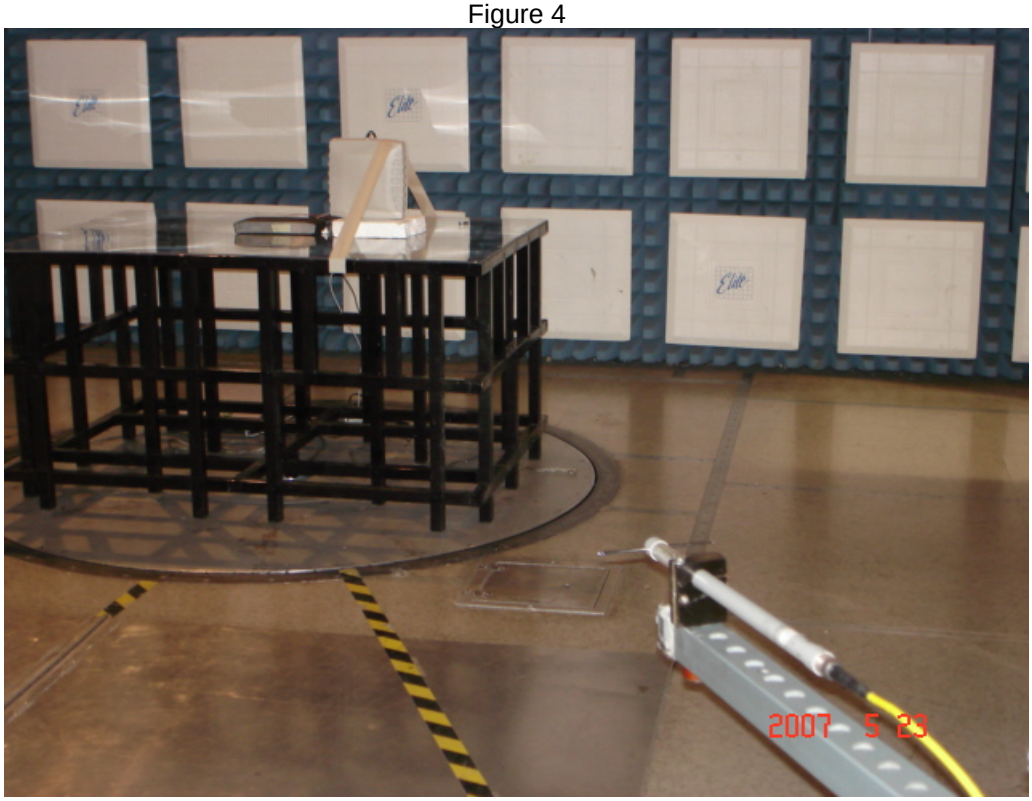
Figure 3



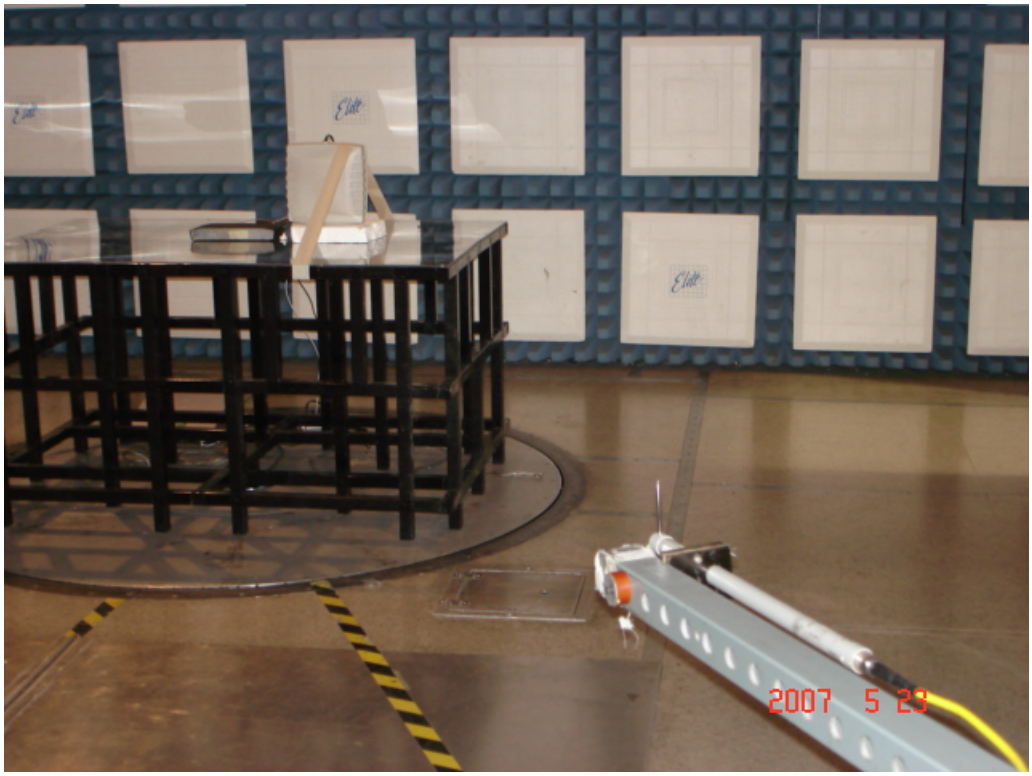
Test Setup for Radiated Emissions, Receiver – Horizontal Polarization

Test Setup for Radiated Emissions, Receiver – Vertical Polarization

Figure 4

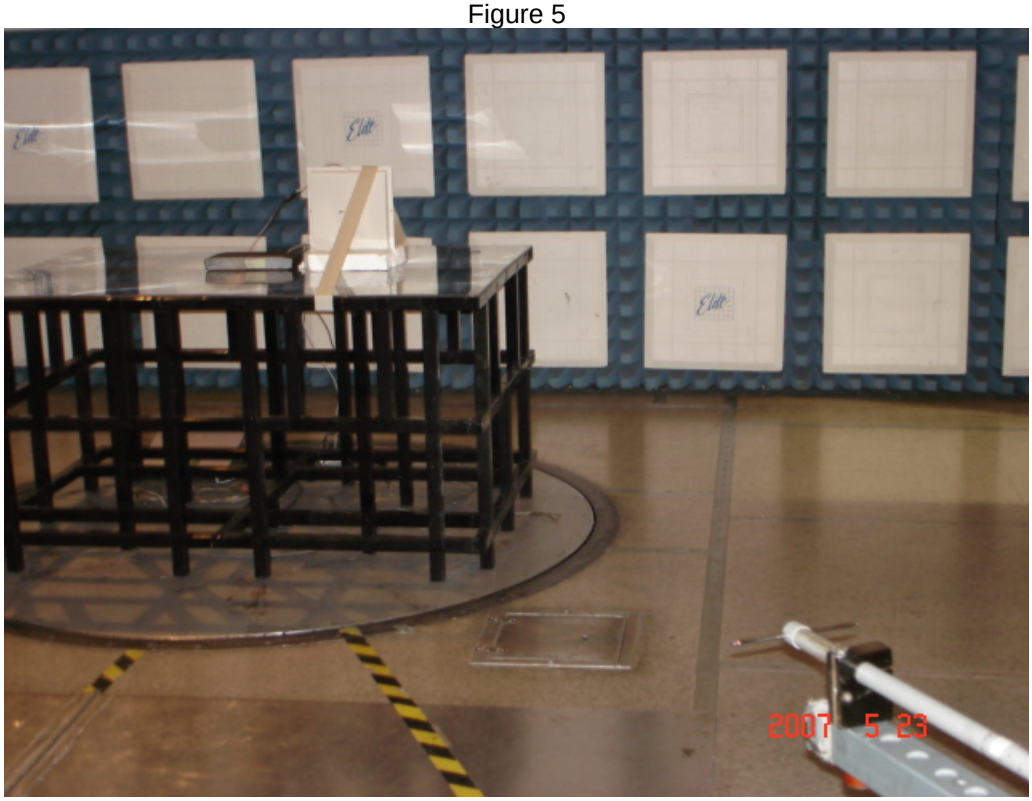


Test Setup for Radiated Emissions, Transmitter with Patch Antenna – Horizontal Polarization

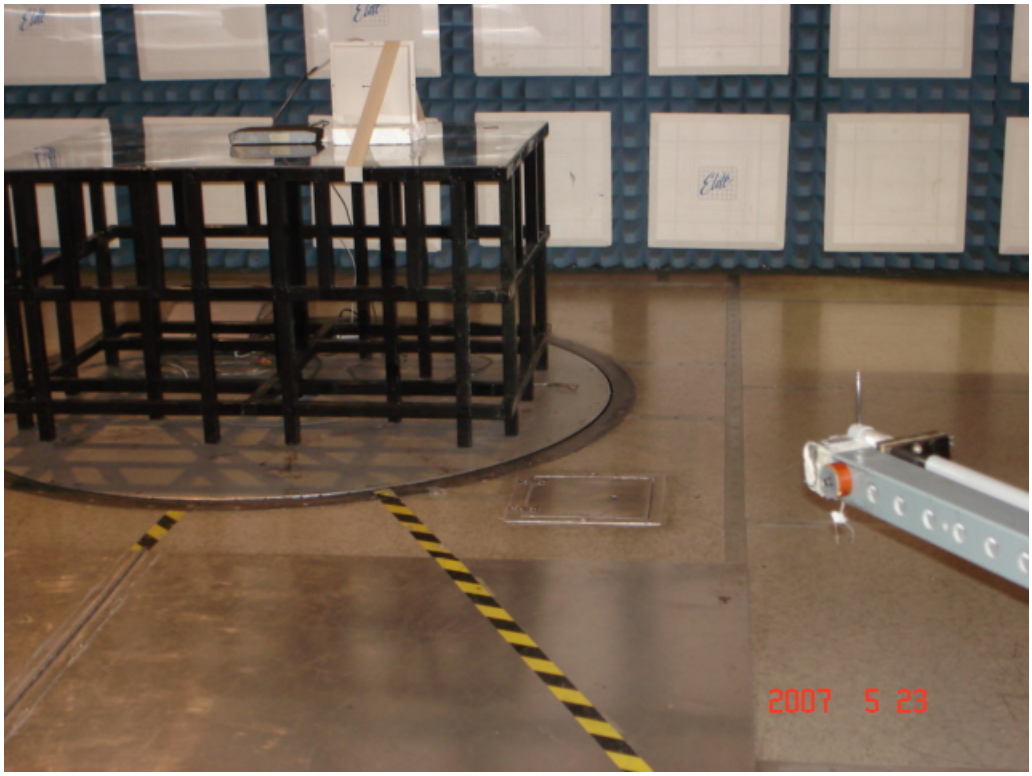


Test Setup for Radiated Emissions, Transmitter with Patch Antenna – Vertical Polarization

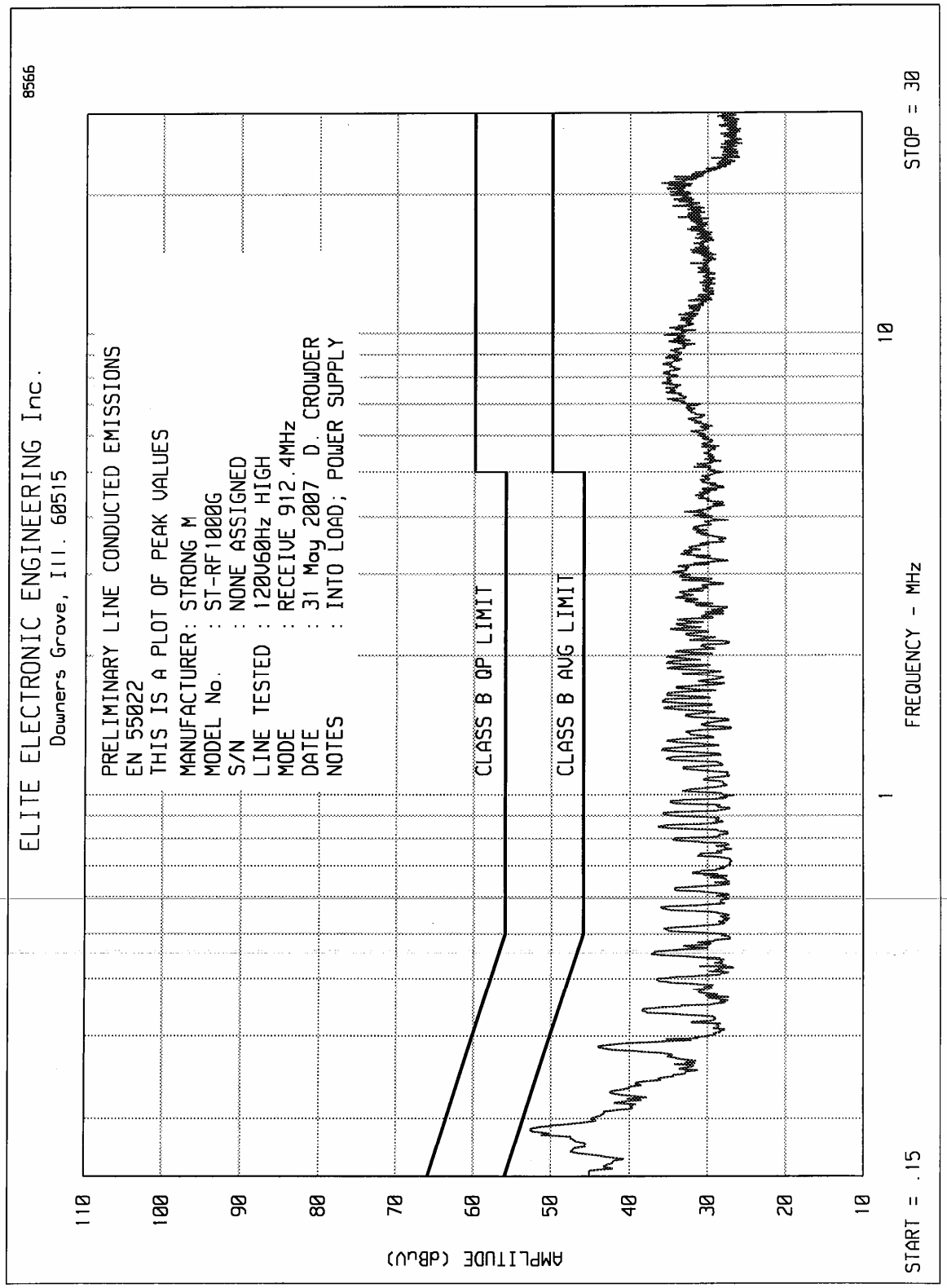
Figure 5

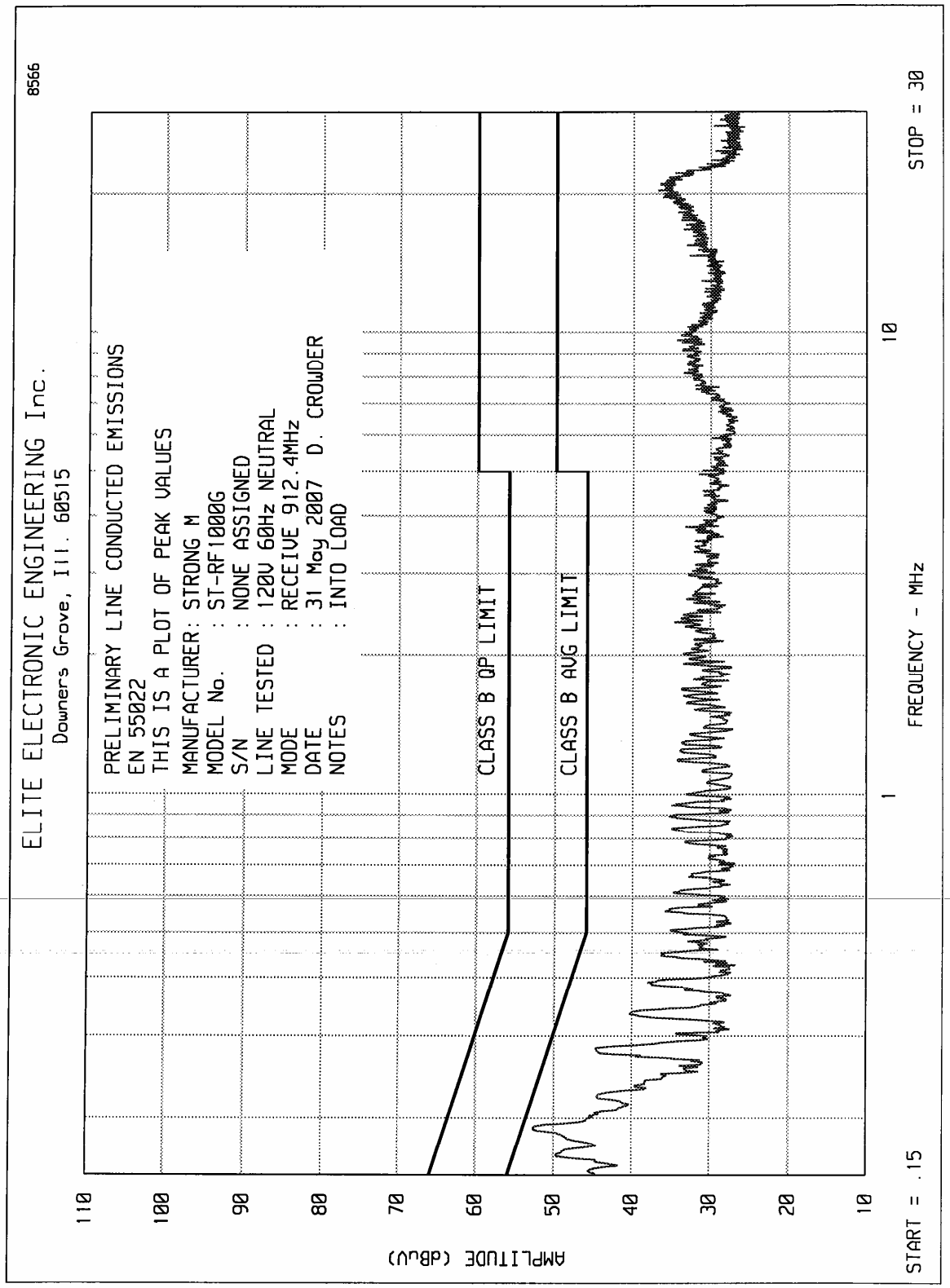


Test Setup for Radiated Emissions, Transmitter with Cushcraft Antenna – Horizontal Polarization



Test Setup for Radiated Emissions, Transmitter with Cushcraft Antenna – Vertical Polarization


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8566
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V60Hz HIGH
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : INTO LOAD; POWER SUPPLY
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz NEUTRAL
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : INTO LOAD
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V60Hz HIGH
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007
NOTES : INTO LOAD; POWER SUPPLY
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.172	44.3	64.9		54.9	
.191	50.0	64.0		54.0	
.286	40.7	60.7		50.7	
.342	35.8	59.1		49.1	
.400	33.7	57.9		47.9	
.458	34.8	56.7		46.7	
.800	32.2	56.0		46.0	
.856	34.0	56.0		46.0	
1.198	33.2	56.0		46.0	
1.254	33.9	56.0		46.0	
1.937	32.8	56.0		46.0	
2.670	29.5	56.0		46.0	
3.023	31.0	56.0		46.0	
4.106	28.0	56.0		46.0	
4.801	27.1	56.0		46.0	
7.781	31.2	60.0		50.0	
9.925	29.8	60.0		50.0	
11.748	26.8	60.0		50.0	
15.102	26.9	60.0		50.0	
19.601	28.4	60.0		50.0	
21.097	29.0	60.0		50.0	
23.865	23.6	60.0		50.0	
27.998	26.0	60.0		50.0	

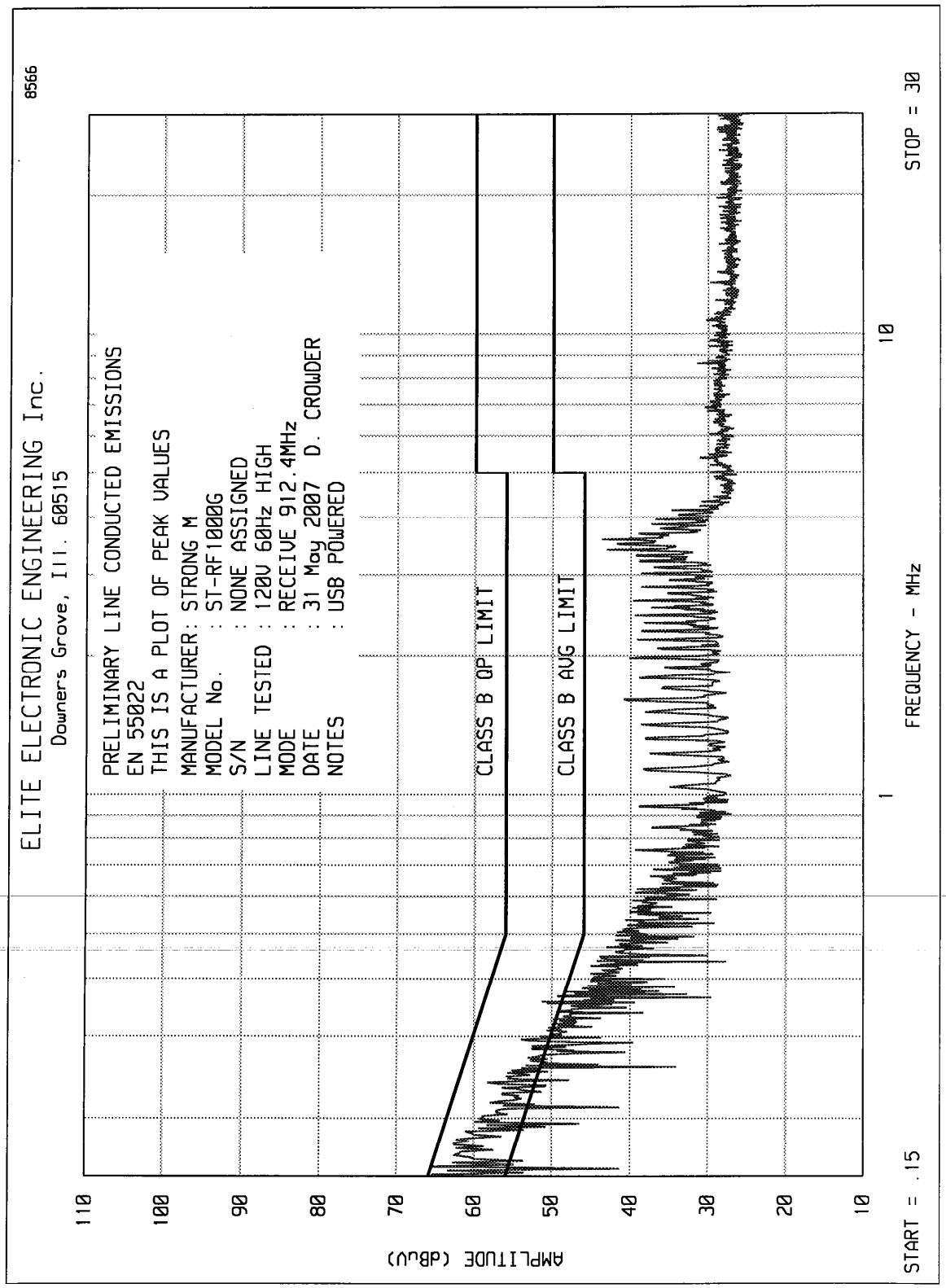
CHECKED BY: _____
D. CROWDER

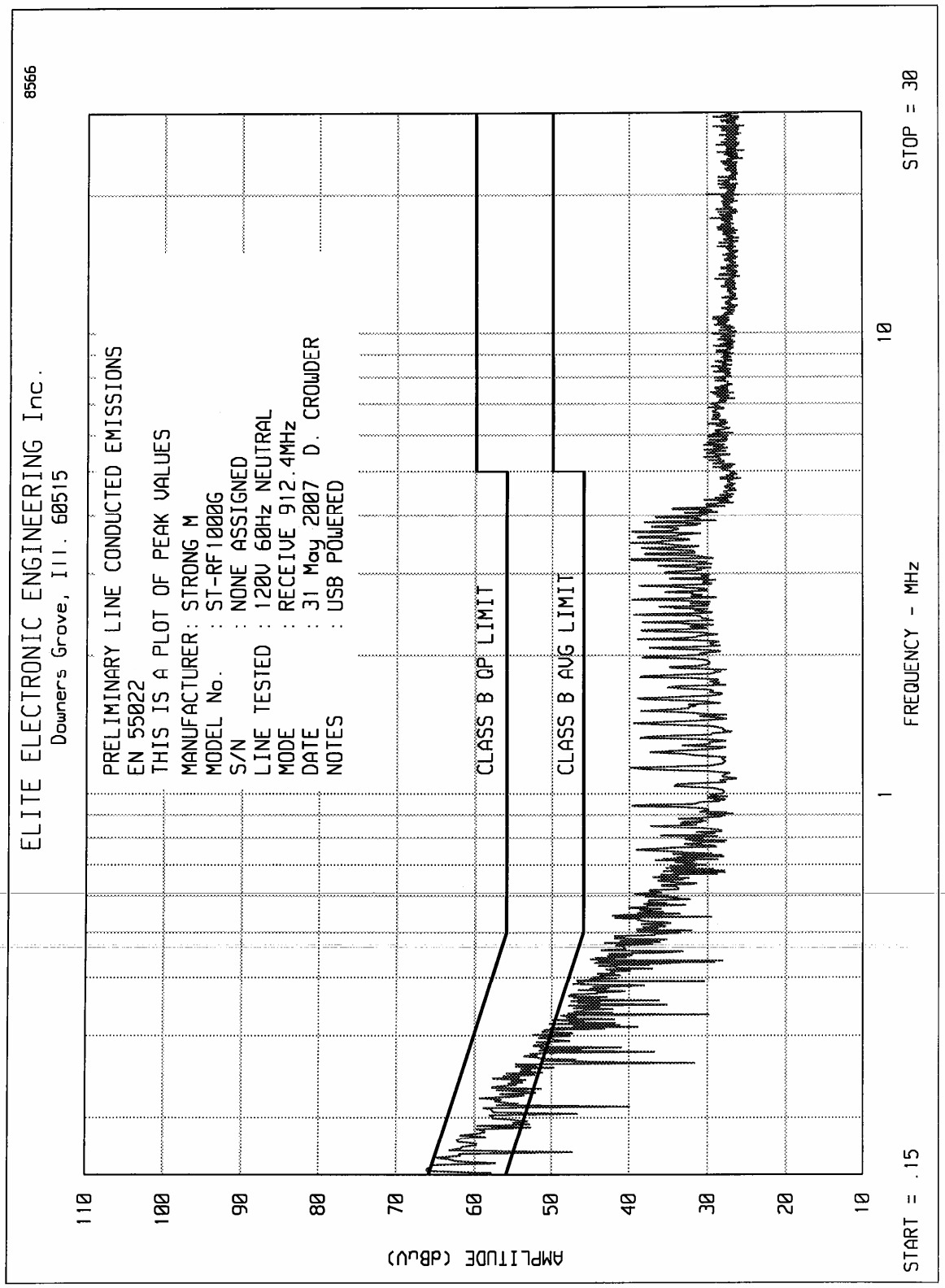
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007
NOTES : INTO LOAD
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.190	50.1	64.0		54.0	
.284	42.0	60.7		50.7	
.341	37.5	59.2		49.2	
.397	34.1	57.9		47.9	
.455	34.5	56.8		46.8	
.567	33.3	56.0		46.0	
.795	31.1	56.0		46.0	
.903	32.1	56.0		46.0	
1.188	30.9	56.0		46.0	
1.688	28.2	56.0		46.0	
2.360	27.4	56.0		46.0	
3.396	28.8	56.0		46.0	
3.736	28.0	56.0		46.0	
4.891	25.8	56.0		46.0	
7.862	28.5	60.0		50.0	
9.617	29.3	60.0		50.0	
12.956	25.4	60.0		50.0	
15.409	27.1	60.0		50.0	
19.621	30.3	60.0		50.0	
21.240	30.5	60.0		50.0	
23.601	24.1	60.0		50.0	
28.000	26.4	60.0		50.0	

CHECKED BY: D. CROWDER


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8566
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz HIGH
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : USB POWERED
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz NEUTRAL
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : USB POWERED
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz HIGH
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007
NOTES : USB POWERED
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.163	50.3	65.3		55.3	
.190	50.6	64.0		54.0	
.250	40.3	61.7		51.7	
.320	35.3	59.7		49.7	
.347	33.8	59.0		49.0	
.472	32.0	56.5		46.5	
.568	32.8	56.0		46.0	
.755	34.6	56.0		46.0	
.944	35.3	56.0		46.0	
1.604	36.5	56.0		46.0	
1.791	36.5	56.0		46.0	
1.979	36.4	56.0		46.0	
2.450	35.9	56.0		46.0	
2.638	36.3	56.0		46.0	
3.297	36.2	56.0		46.0	
3.583	36.5	56.0		46.0	
4.144	31.1	56.0		46.0	
7.942	24.5	60.0		50.0	
8.700	24.1	60.0		50.0	
12.868	23.3	60.0		50.0	
15.600	23.3	60.0		50.0	
18.482	23.4	60.0		50.0	
21.226	23.3	60.0		50.0	
24.947	23.1	60.0		50.0	
27.671	23.3	60.0		50.0	

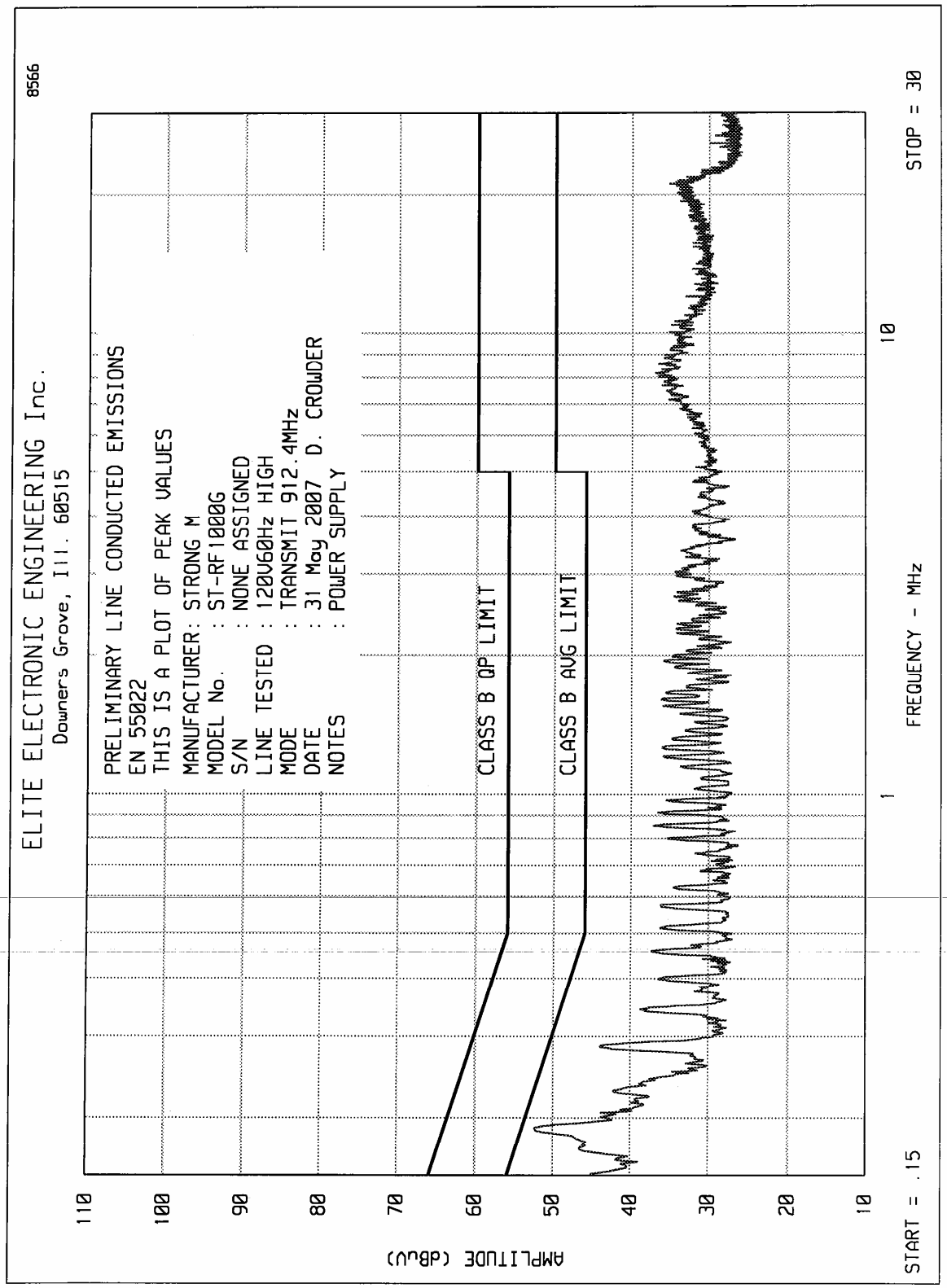
CHECKED BY: _____
D. CROWDER

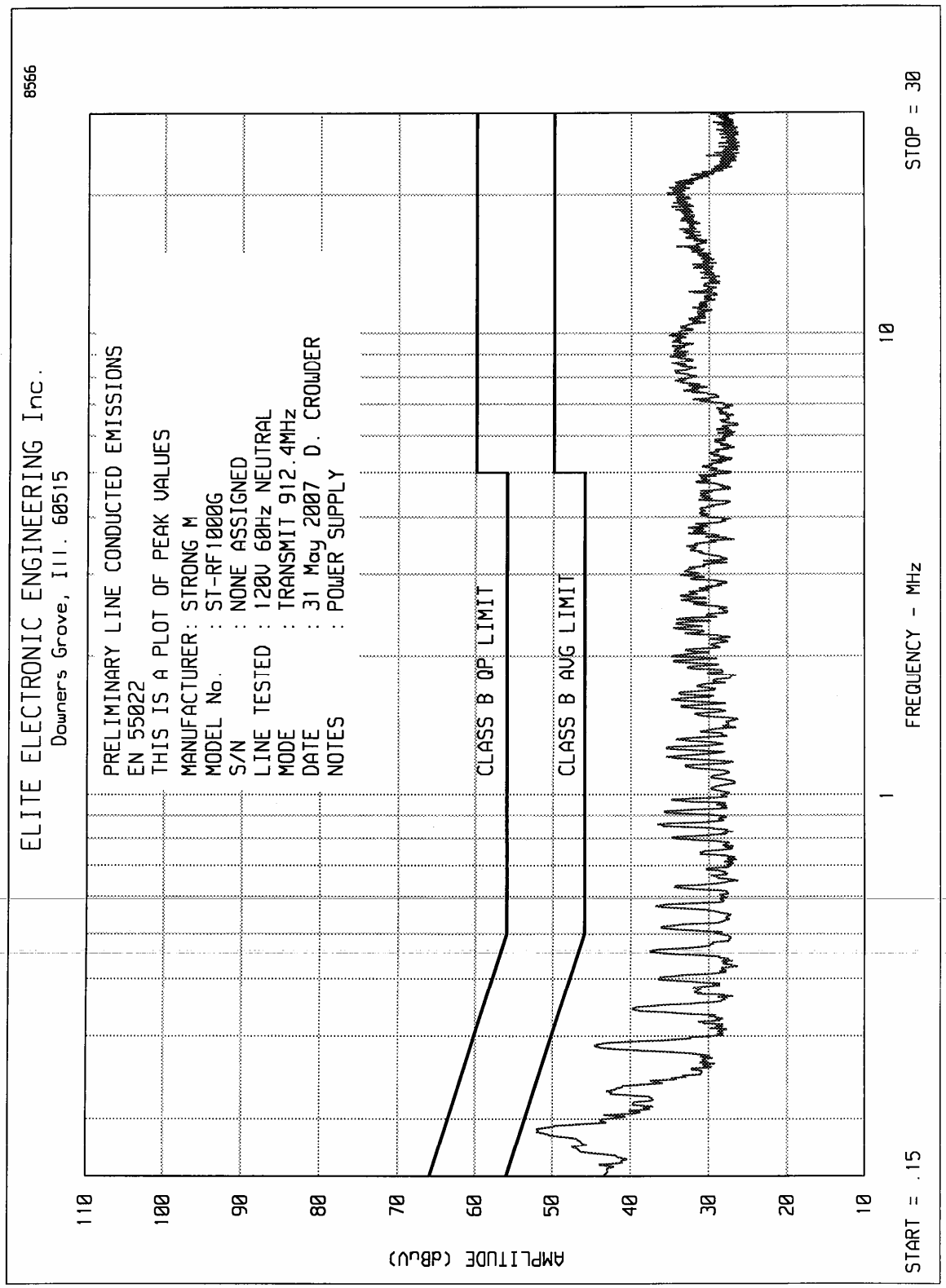
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : RECEIVE 912.4MHz
DATE : 31 May 2007
NOTES : USB POWERED
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.150	49.8	66.0		56.0	
.190	48.3	64.0		54.0	
.248	40.3	61.8		51.8	
.356	32.2	58.8		48.8	
.414	29.8	57.6		47.6	
.464	28.8	56.6		46.6	
.570	31.1	56.0		46.0	
.756	34.8	56.0		46.0	
.944	35.2	56.0		46.0	
1.132	34.7	56.0		46.0	
1.791	36.2	56.0		46.0	
2.169	35.3	56.0		46.0	
2.639	36.1	56.0		46.0	
3.393	33.3	56.0		46.0	
3.486	35.1	56.0		46.0	
4.146	31.3	56.0		46.0	
6.308	24.5	60.0		50.0	
8.091	24.1	60.0		50.0	
10.825	24.0	60.0		50.0	
14.713	23.3	60.0		50.0	
17.794	23.6	60.0		50.0	
20.630	23.4	60.0		50.0	
24.598	23.1	60.0		50.0	
27.998	26.3	60.0		50.0	

CHECKED BY: _____
D. CROWDER


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8566
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V60Hz HIGH
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : POWER SUPPLY
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz NEUTRAL
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : POWER SUPPLY
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V60Hz HIGH
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007
NOTES : POWER SUPPLY
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.190	49.7	64.0		54.0	
.287	40.5	60.6		50.6	
.402	33.6	57.8		47.8	
.459	34.9	56.7		46.7	
.802	32.4	56.0		46.0	
.859	34.1	56.0		46.0	
1.259	34.1	56.0		46.0	
1.602	33.8	56.0		46.0	
1.945	32.9	56.0		46.0	
2.690	30.9	56.0		46.0	
3.032	31.1	56.0		46.0	
4.802	27.4	56.0		46.0	
7.870	31.8	60.0		50.0	
8.186	31.9	60.0		50.0	
9.196	30.6	60.0		50.0	
11.958	26.5	60.0		50.0	
15.378	26.9	60.0		50.0	
19.244	27.9	60.0		50.0	
21.084	28.4	60.0		50.0	
23.468	23.6	60.0		50.0	
26.747	23.3	60.0		50.0	

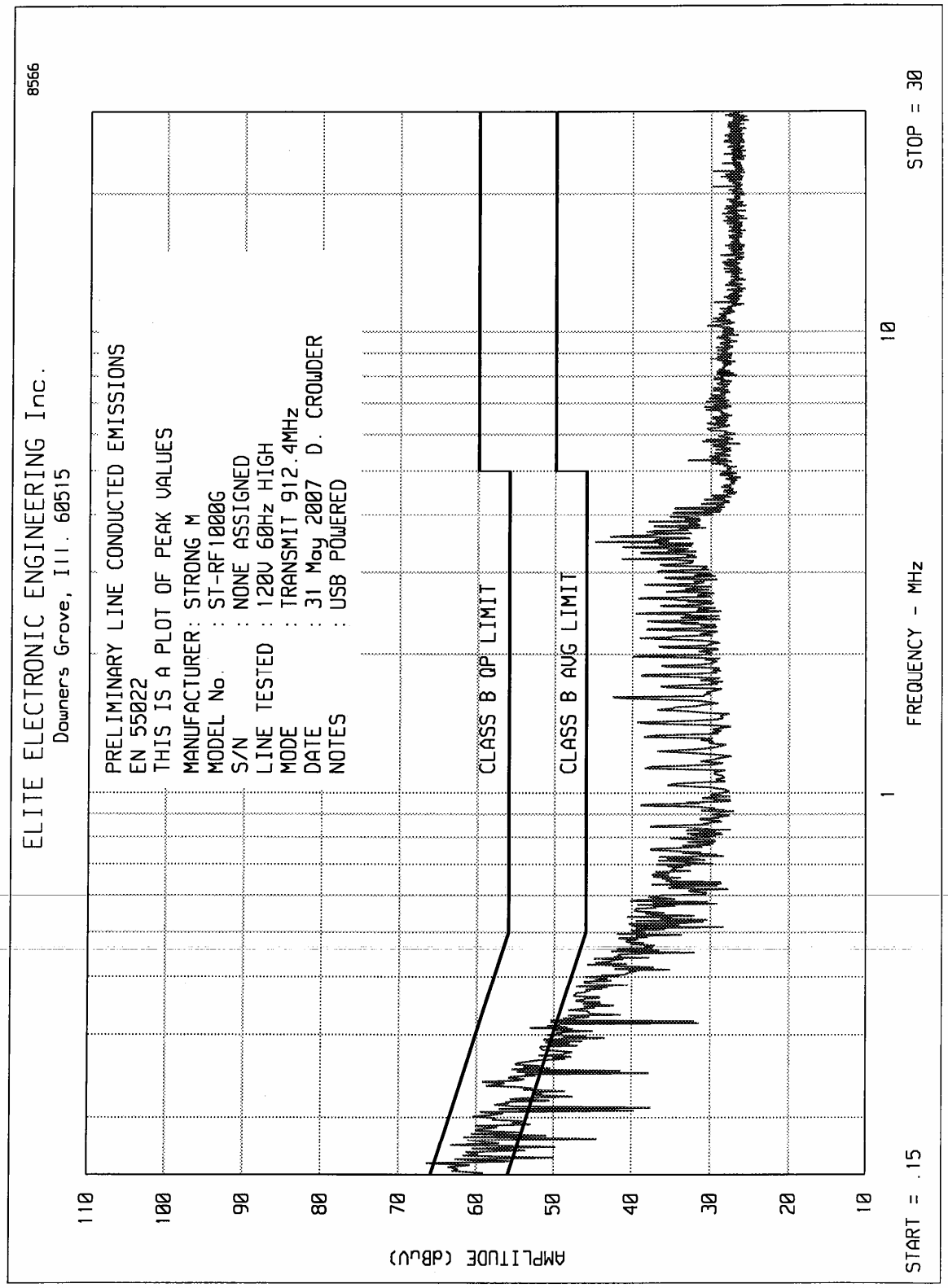
CHECKED BY: 
D. CROWDER

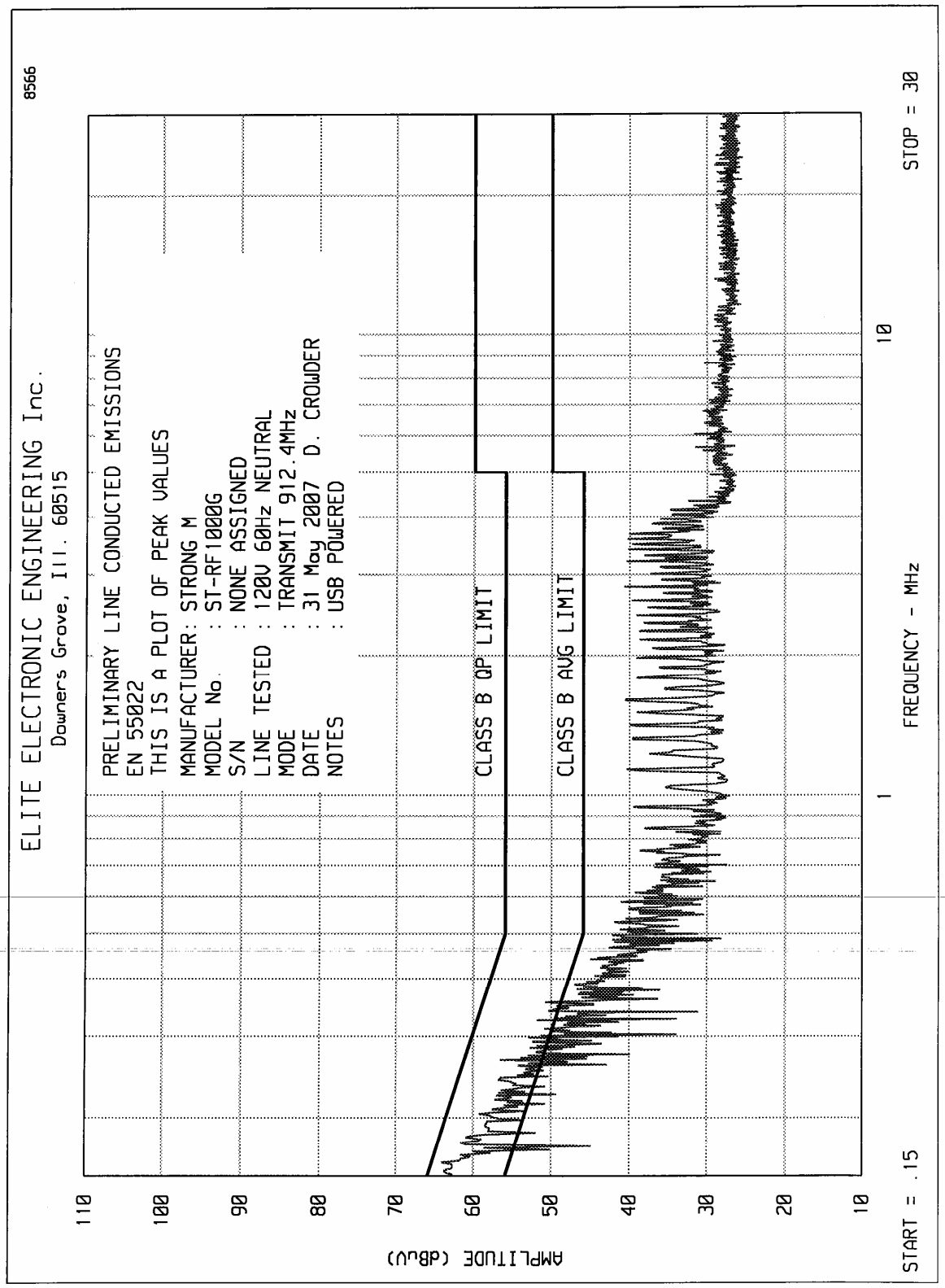
ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007
NOTES : POWER SUPPLY
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.190	49.1	64.0		54.0	
.287	41.6	60.6		50.6	
.345	37.6	59.1		49.1	
.402	33.8	57.8		47.8	
.460	35.2	56.7		46.7	
.804	32.1	56.0		46.0	
.861	33.9	56.0		46.0	
.918	33.2	56.0		46.0	
1.205	32.4	56.0		46.0	
2.003	31.1	56.0		46.0	
2.349	31.0	56.0		46.0	
3.039	29.4	56.0		46.0	
4.801	26.8	56.0		46.0	
7.858	29.6	60.0		50.0	
9.915	30.0	60.0		50.0	
12.335	26.0	60.0		50.0	
15.405	27.7	60.0		50.0	
19.803	29.6	60.0		50.0	
20.100	29.6	60.0		50.0	
24.137	23.4	60.0		50.0	
27.503	23.6	60.0		50.0	

CHECKED BY: _____
D. CROWDER


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz HIGH
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : USB POWERED
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


8566
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
EN 55022
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: STRONG M
MODEL No. : ST-RF1000G
S/N : NONE ASSIGNED
LINE TESTED : 120V 60Hz NEUTRAL
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007 D. CROWDER
NOTES : USB POWERED
CLASS B QP LIMIT
CLASS B AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz HIGH
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007
NOTES : USB POWERED
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.163	48.8	65.3		55.3	
.188	49.1	64.1		54.1	
.247	41.4	61.9		51.9	
.373	31.9	58.4		48.4	
.377	32.3	58.4		48.4	
.454	28.5	56.8		46.8	
.755	34.8	56.0		46.0	
.849	33.2	56.0		46.0	
.943	35.2	56.0		46.0	
1.602	36.6	56.0		46.0	
1.979	36.3	56.0		46.0	
2.450	36.0	56.0		46.0	
3.487	37.1	56.0		46.0	
3.674	35.4	56.0		46.0	
4.052	30.6	56.0		46.0	
5.275	25.6	60.0		50.0	
7.461	24.8	60.0		50.0	
9.278	24.6	60.0		50.0	
11.868	23.3	60.0		50.0	
15.382	23.3	60.0		50.0	
18.483	23.4	60.0		50.0	
21.812	23.3	60.0		50.0	
24.249	23.1	60.0		50.0	
27.738	23.1	60.0		50.0	

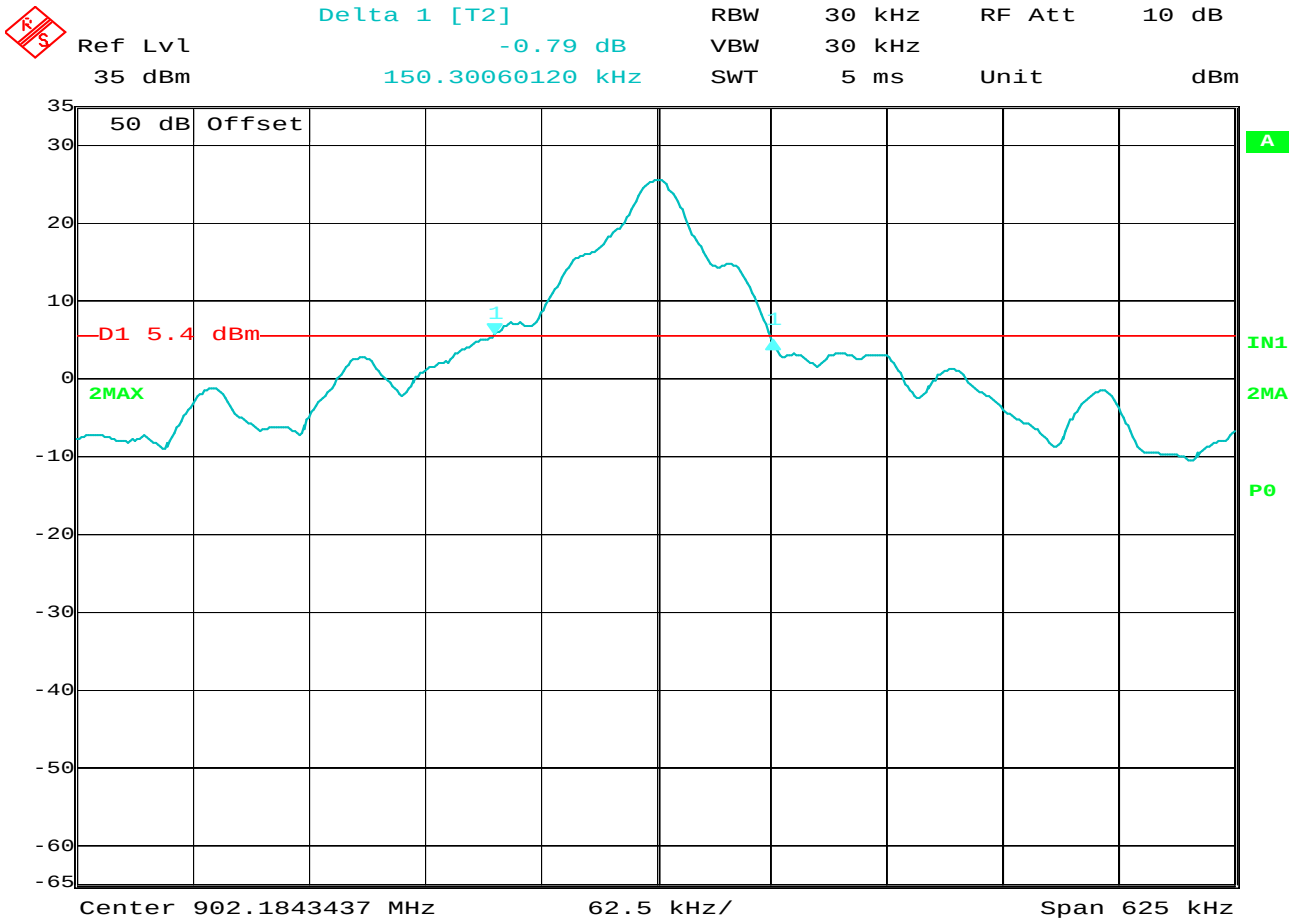
CHECKED BY: D. CROWDER

ETR No.
ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : STRONG M
MODEL : ST-RF1000G
S/N : NONE ASSIGNED
SPECIFICATION : EN 55022, CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : 120V 60Hz NEUTRAL
MODE : TRANSMIT 912.4MHz
DATE : 31 May 2007
NOTES : USB POWERED
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.150	48.8	66.0		56.0	
.267	39.3	61.2		51.2	
.350	33.5	59.0		49.0	
.472	32.4	56.5		46.5	
.566	33.4	56.0		46.0	
.755	34.8	56.0		46.0	
.943	35.4	56.0		46.0	
1.602	36.3	56.0		46.0	
1.790	36.4	56.0		46.0	
1.979	36.2	56.0		46.0	
2.449	35.5	56.0		46.0	
2.825	34.8	56.0		46.0	
3.203	33.6	56.0		46.0	
3.582	34.2	56.0		46.0	
4.143	31.1	56.0		46.0	
5.648	25.7	60.0		50.0	
6.308	24.5	60.0		50.0	
9.799	24.3	60.0		50.0	
13.102	23.8	60.0		50.0	
15.816	23.4	60.0		50.0	
17.869	23.6	60.0		50.0	
21.038	23.3	60.0		50.0	
24.907	23.3	60.0		50.0	
26.760	23.3	60.0		50.0	

CHECKED BY: _____
D. CROWDER

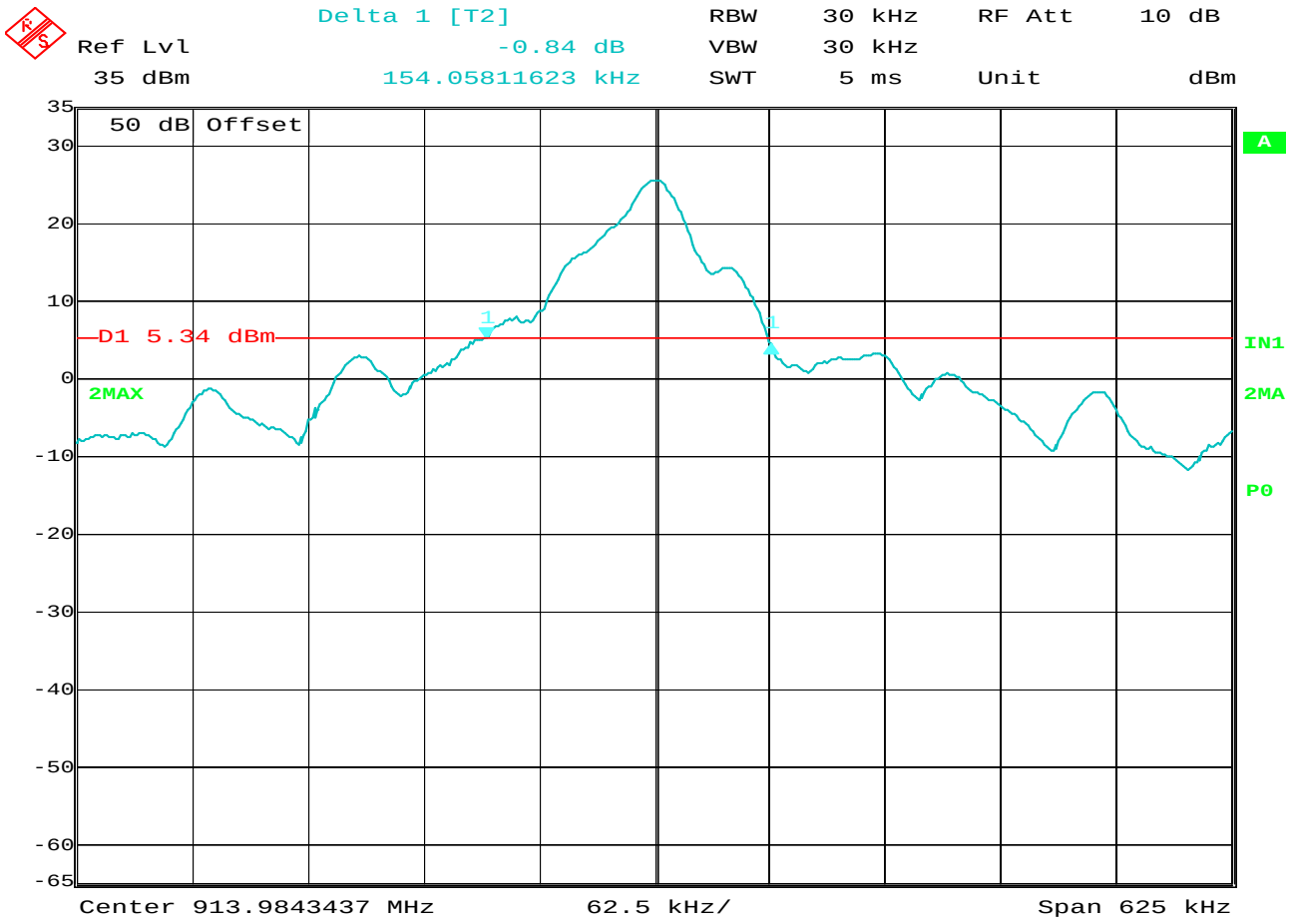


Date: 13.JUN.2007 22:41:13

FCC 15.247 20 dB bandwidth

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 902.2MHz
TEST PARAMETERS : 20dB bandwidth
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

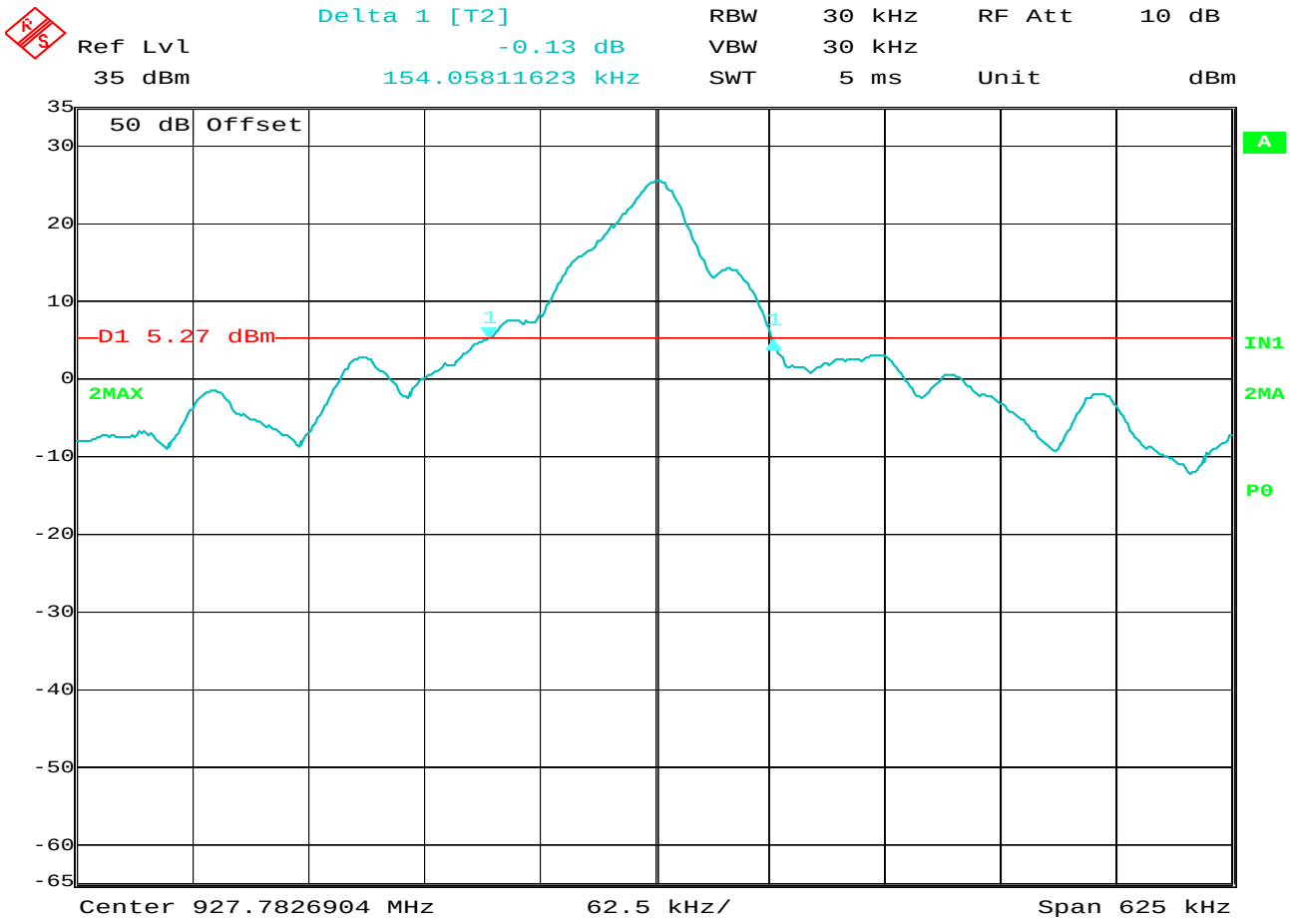


Date: 13.JUN.2007 22:45:54

FCC 15.247 20 dB bandwidth

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Transmit @ 914MHz
TEST PARAMETERS	: 20dB bandwidth
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

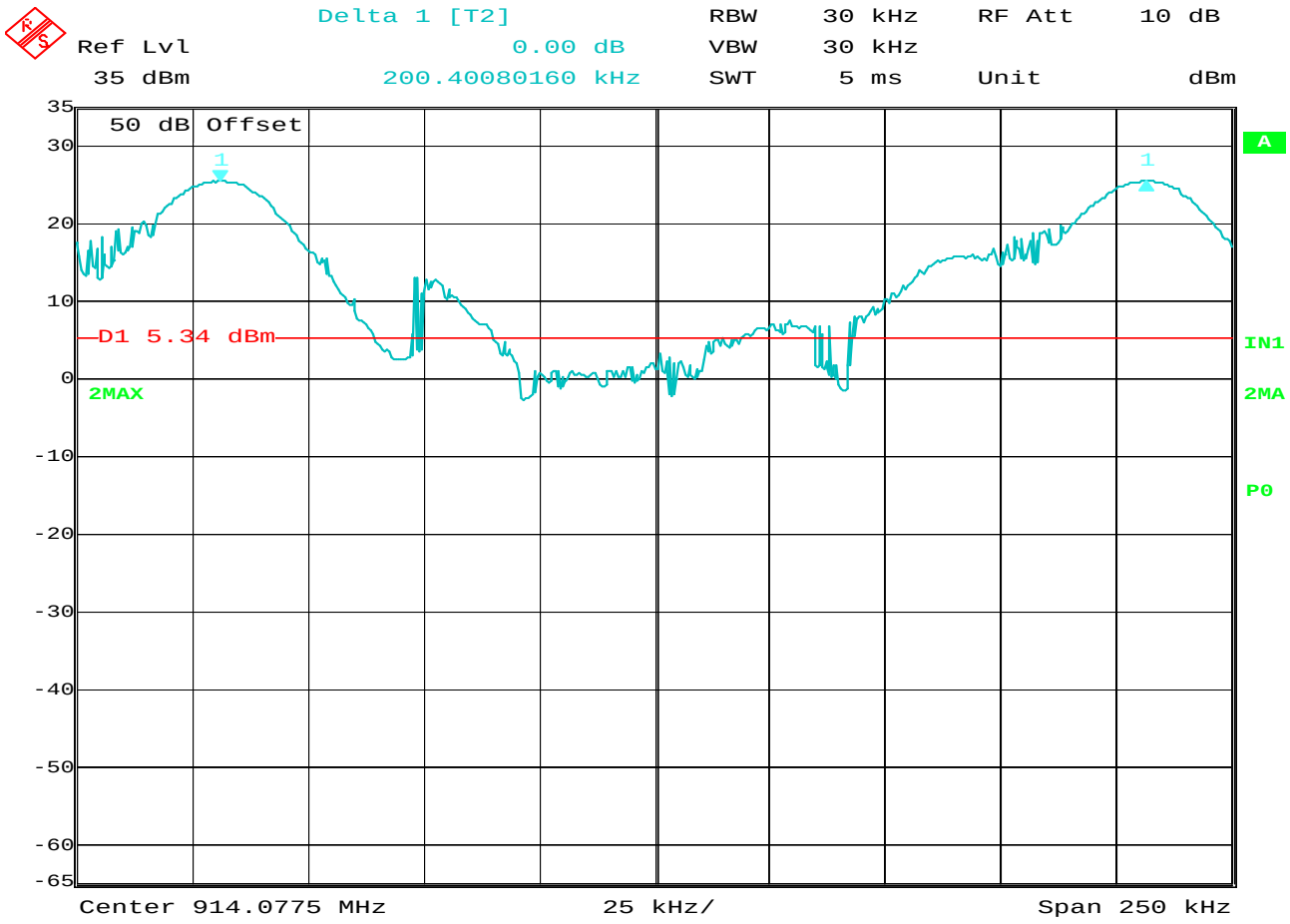


Date: 13.JUN.2007 22:26:33

FCC 15.247 20 dB bandwidth

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 927.8MHz
TEST PARAMETERS : 20dB bandwidth
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

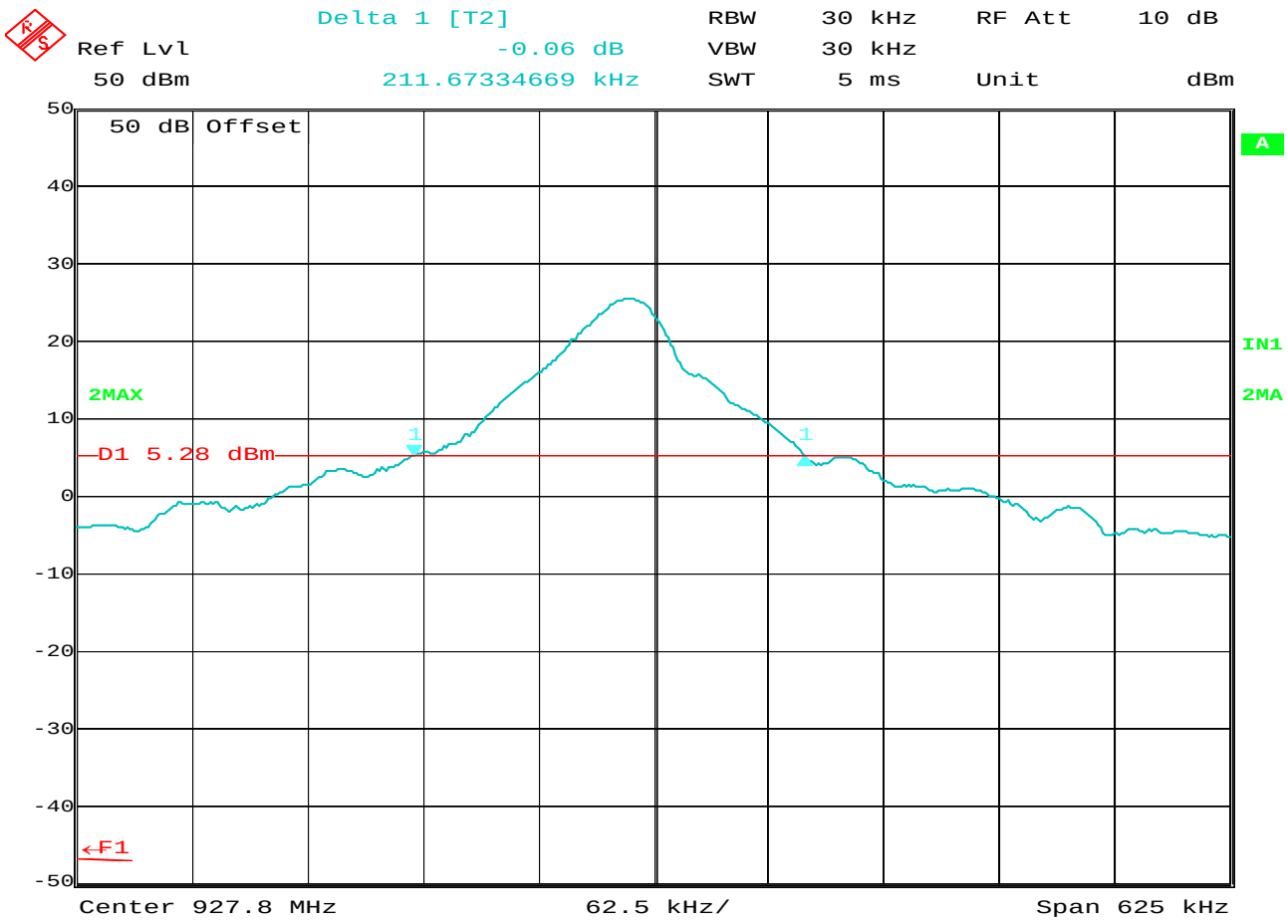


Date: 13.JUN.2007 22:54:40

FCC 15.247 Carrier Frequency Separation

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : Carrier Frequency Separation = 200.4kHz
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

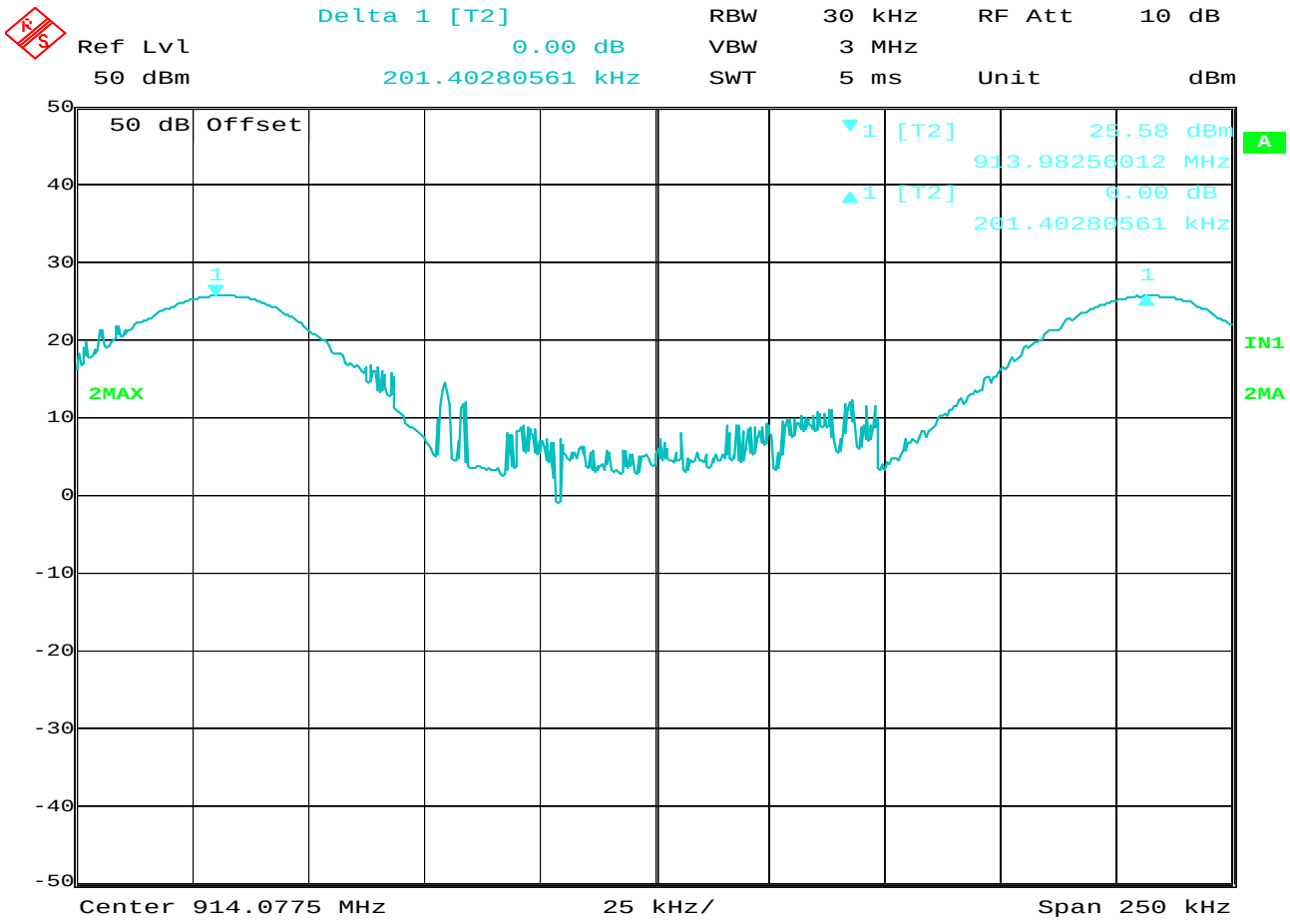


Date: 21.MAY.2007 20:54:38

FCC 15.247 20 dB bandwidth

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 927.8MHz
TEST PARAMETERS : 20dB bandwidth
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

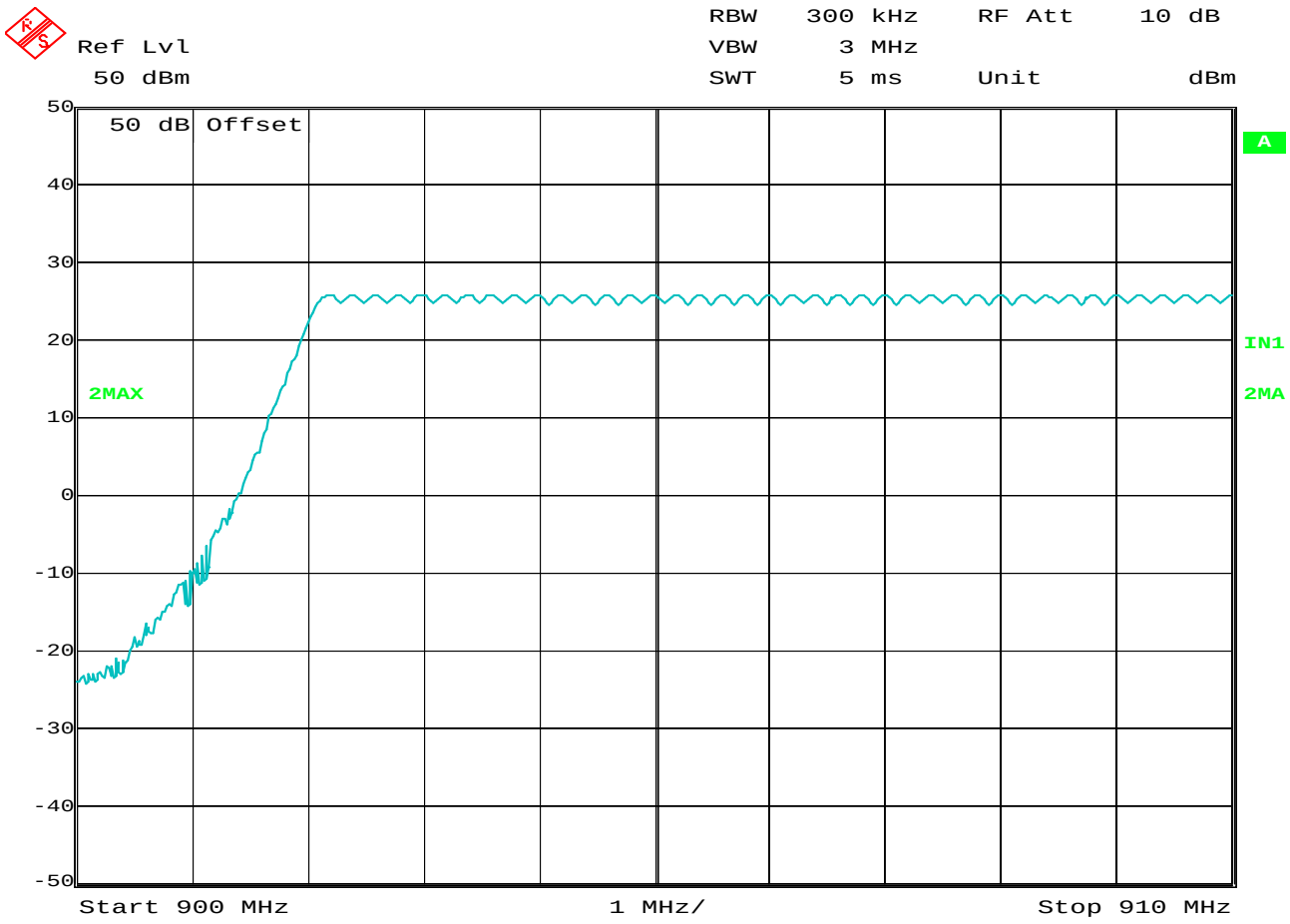


Date: 21.MAY.2007 22:44:12

FCC 15.247 Carrier Frequency Separation

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : Carrier Frequency Separation = 201.4kHz
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

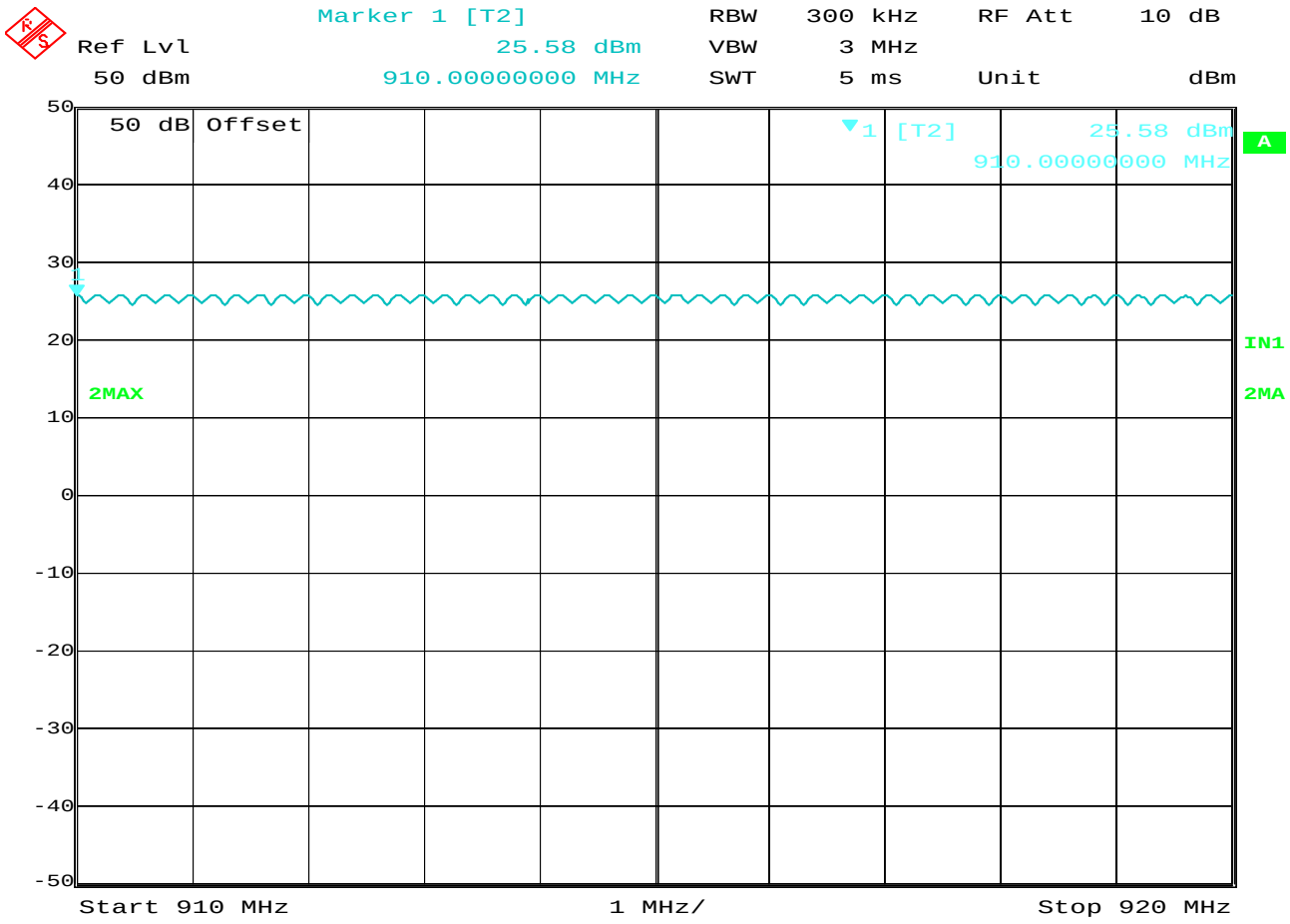


Date: 21.MAY.2007 22:26:25

FCC 15.247 Number of Hopping Frequencies

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : # channels = 40 from 902.2MHz to 910MHz
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

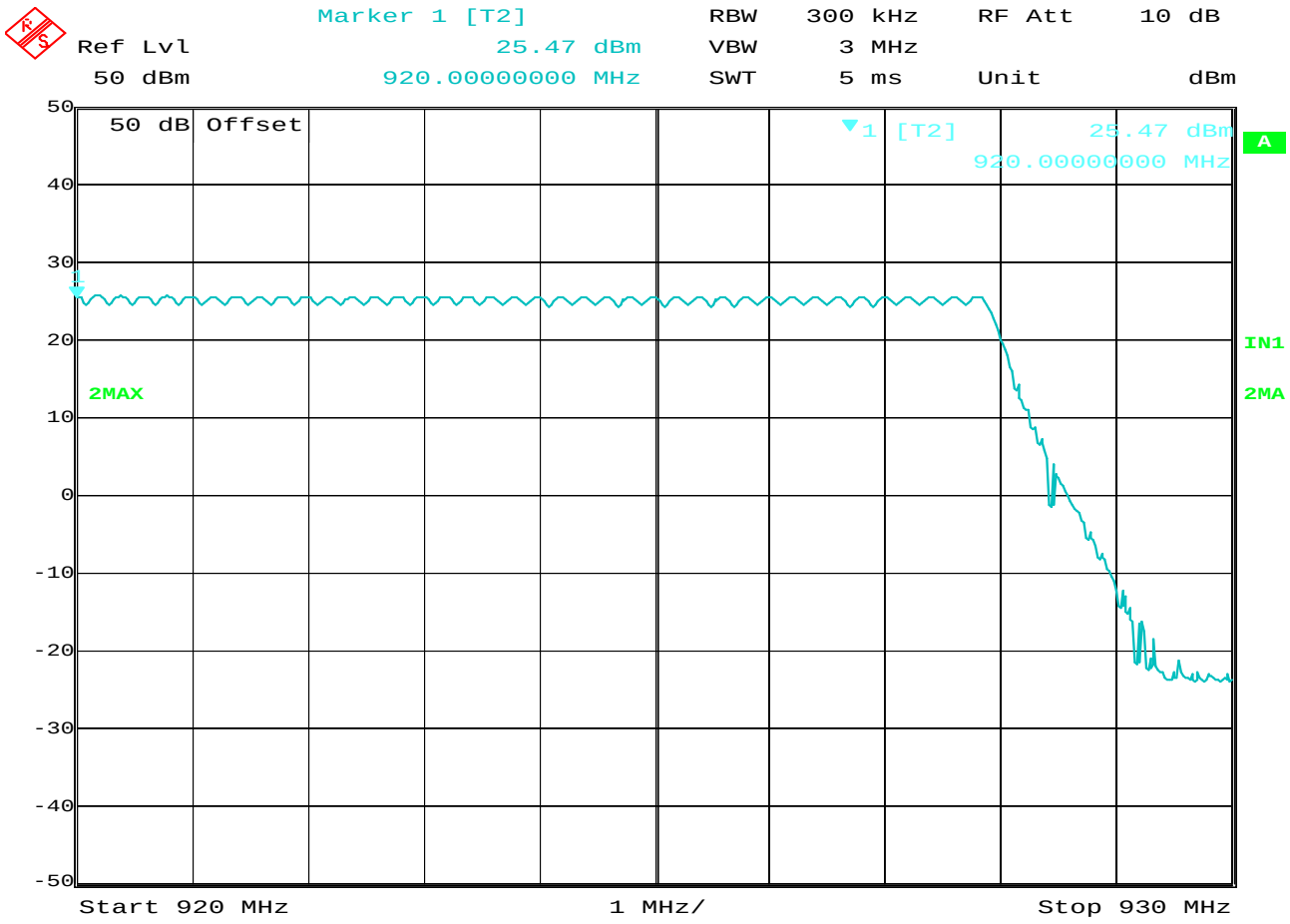


Date: 21.MAY.2007 22:33:37

FCC 15.247 Number of Hopping Frequencies

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : # channels = 50 from 910MHz to 920MHz
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

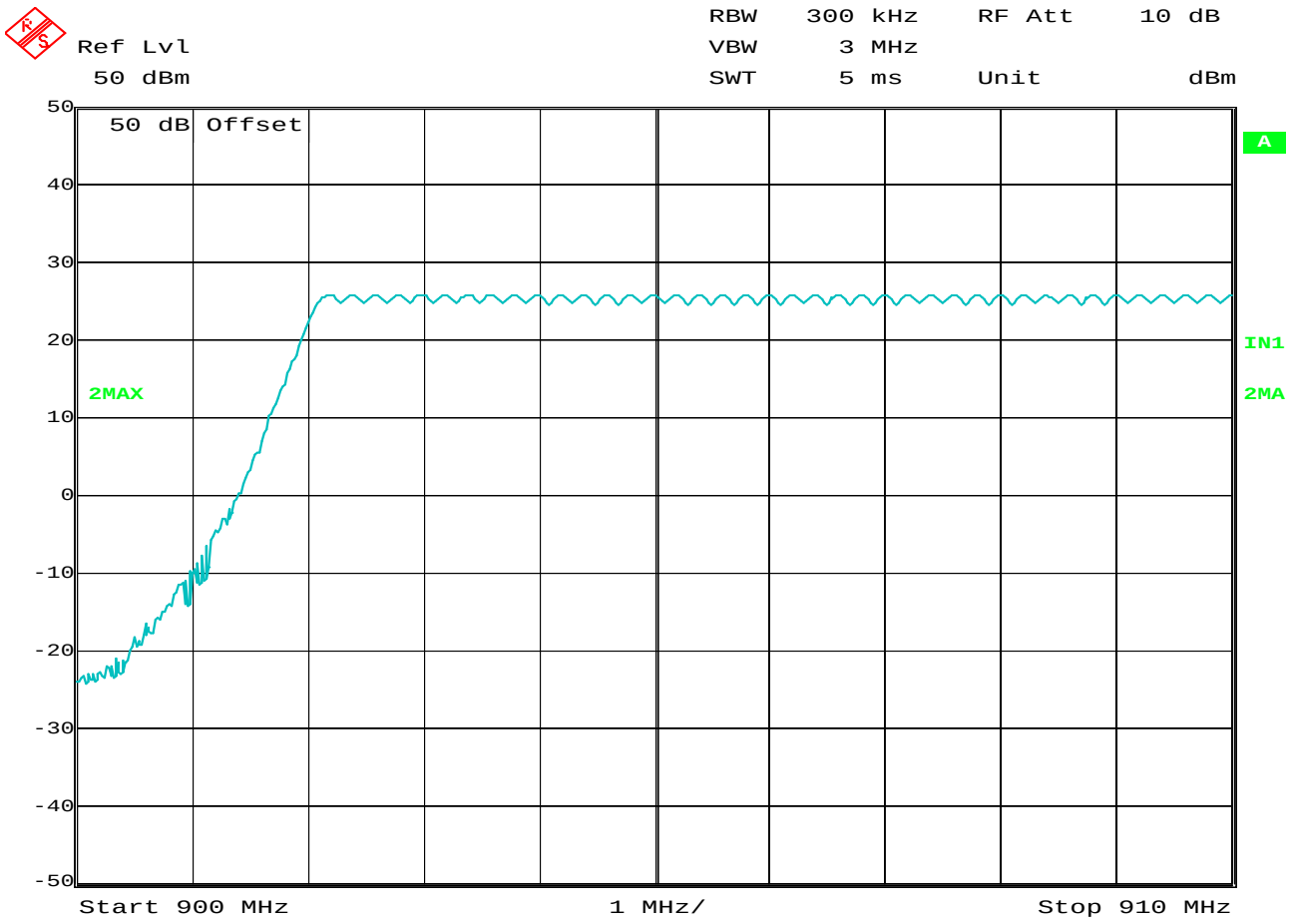


Date: 21.MAY.2007 22:36:10

FCC 15.247 Number of Hopping Frequencies

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : # channels = 39 from 920MHz to 927.8MHz
: Total # channels = 40 + 50 + 39 = 129
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

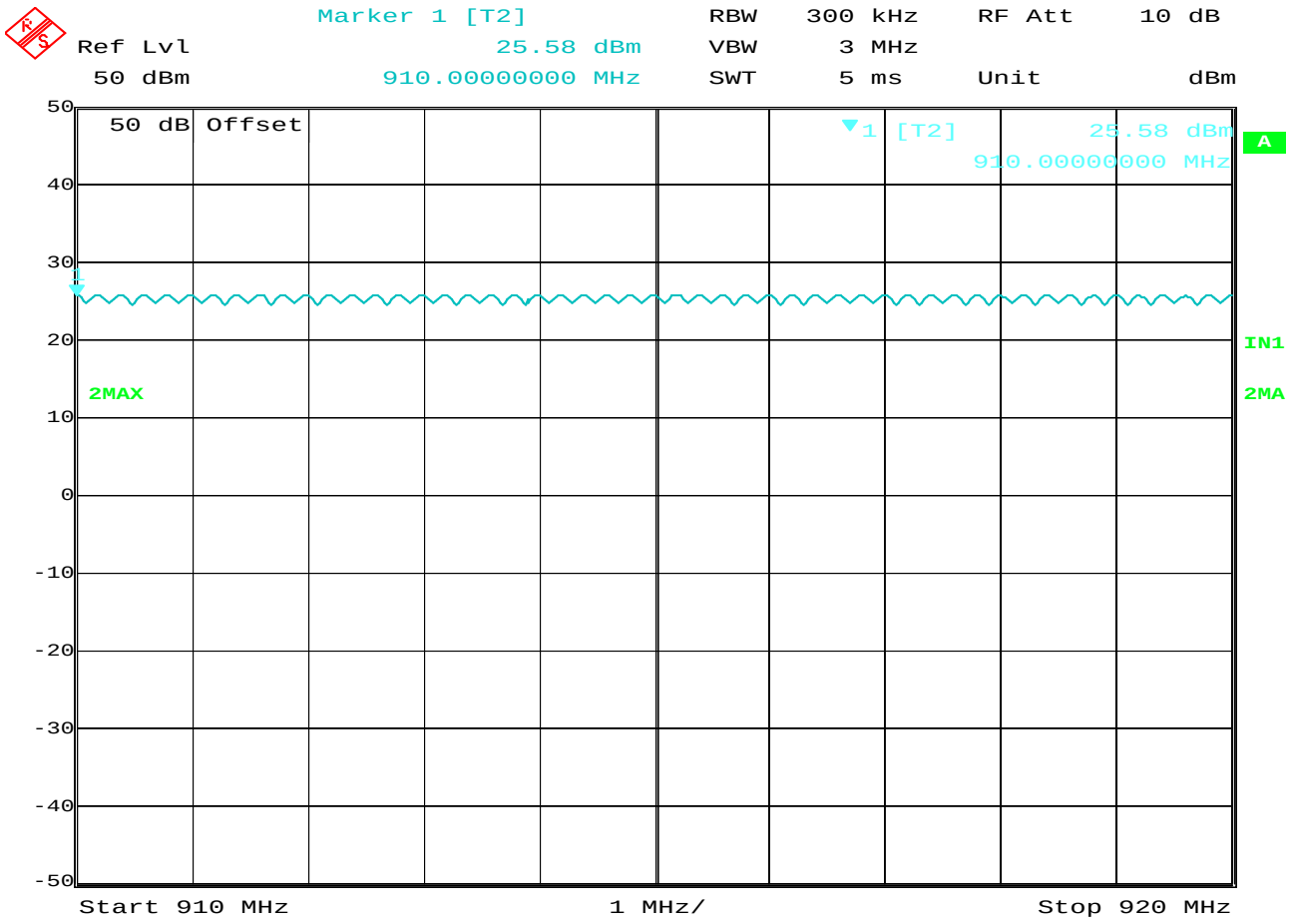


Date: 21.MAY.2007 22:26:25

FCC 15.247 Number of Hopping Frequencies

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Frequency Hopping Enabled
TEST PARAMETERS	: # channels = 40 from 902.2MHz to 910MHz
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

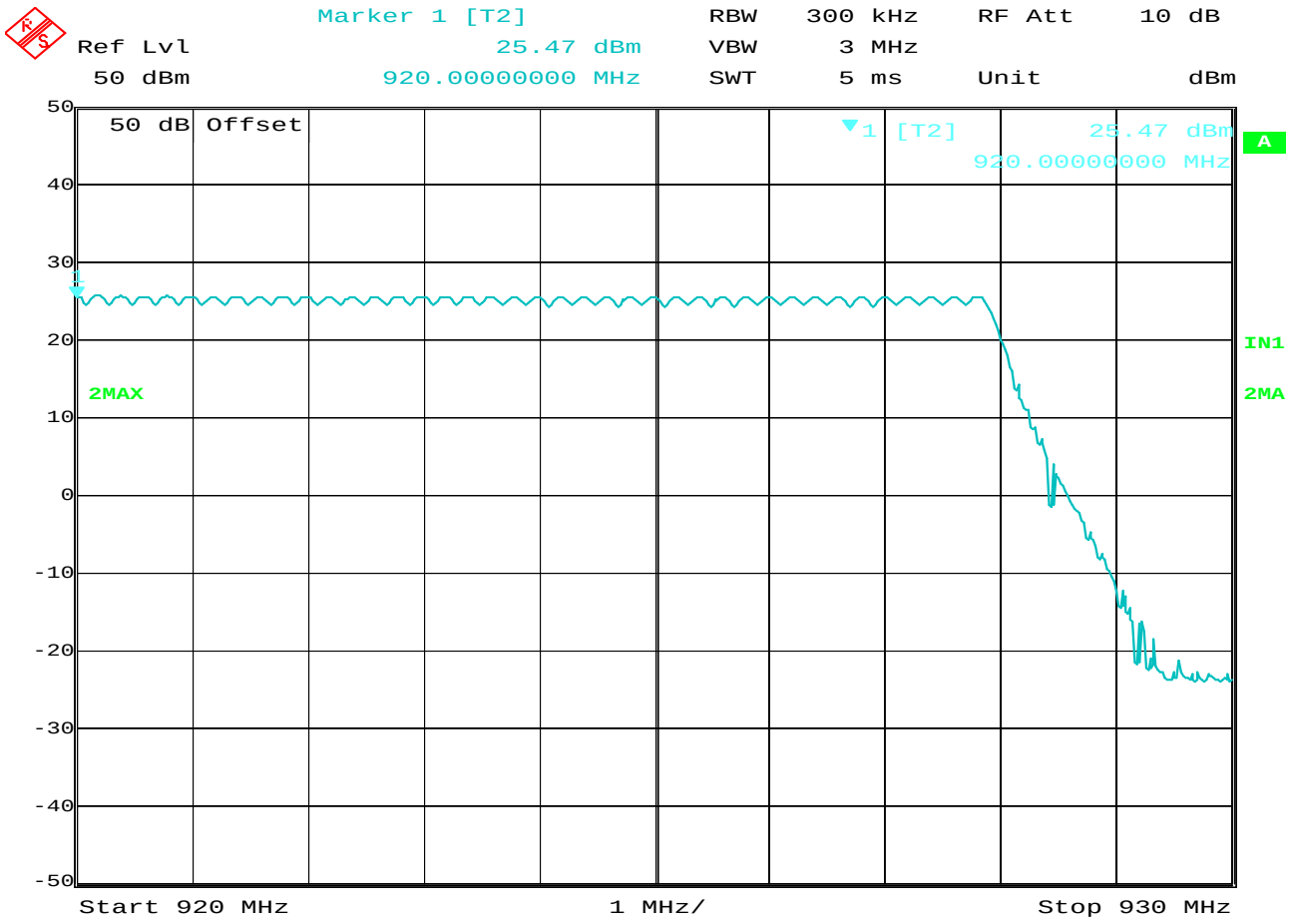


Date: 21.MAY.2007 22:33:37

FCC 15.247 Number of Hopping Frequencies

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : # channels = 50 from 910MHz to 920MHz
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

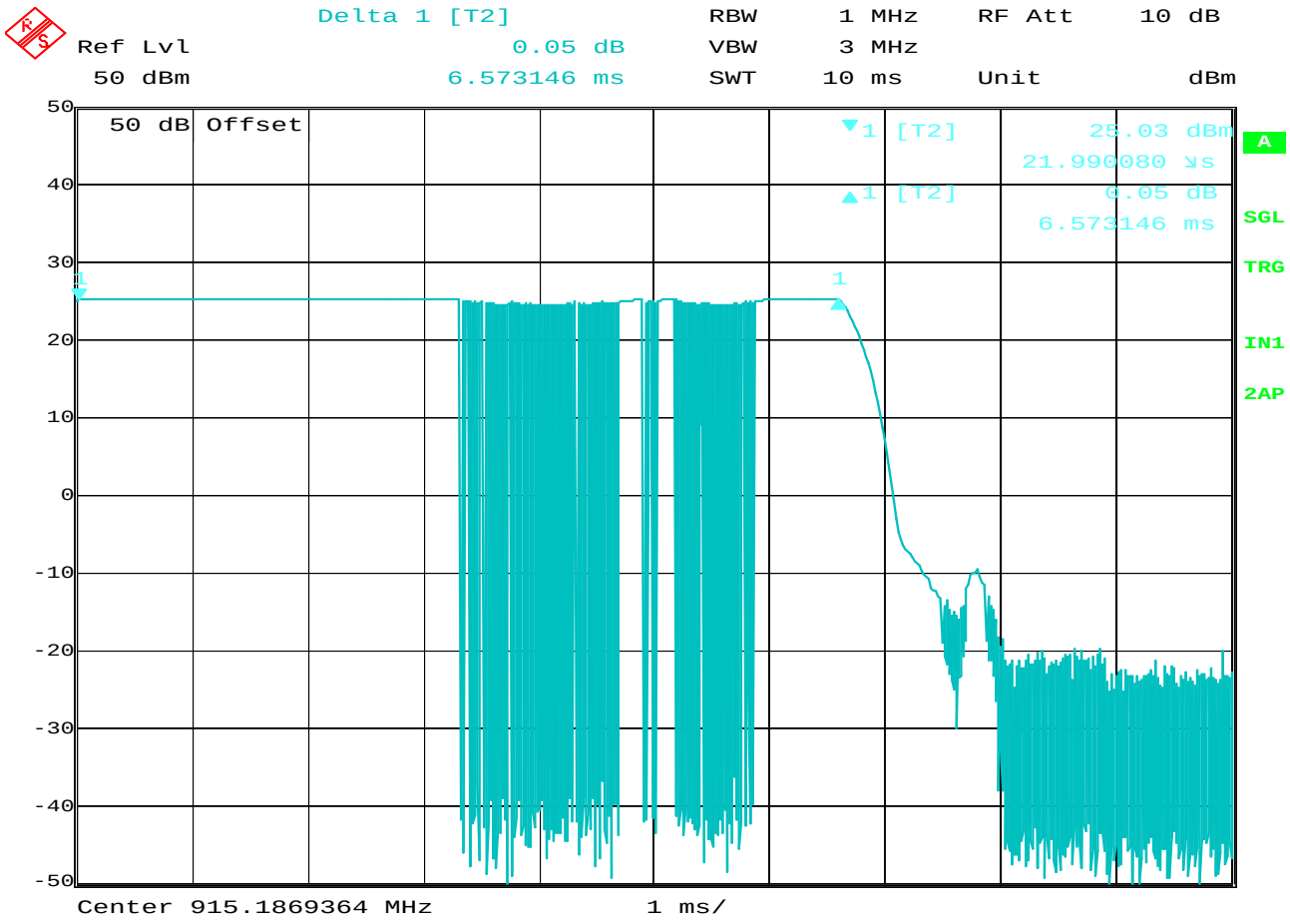


Date: 21.MAY.2007 22:36:10

FCC 15.247 Number of Hopping Frequencies

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : # channels = 39 from 920MHz to 927.8MHz
: Total # channels = 40 + 50 + 39 = 129
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

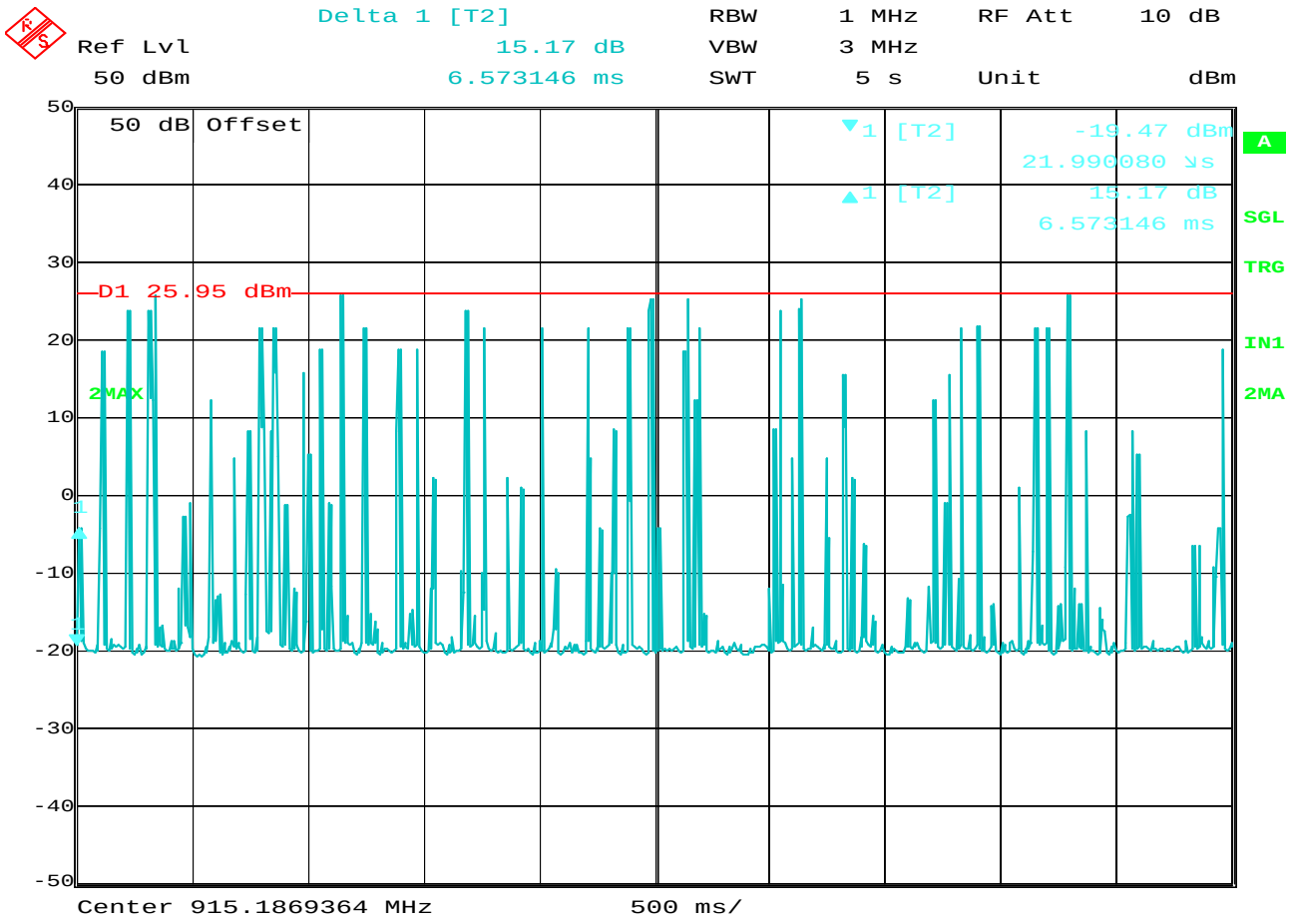


Date: 22.MAY.2007 14:27:24

FCC 15.247 Time of Occupancy

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : Pulse Width = 6.57msec
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

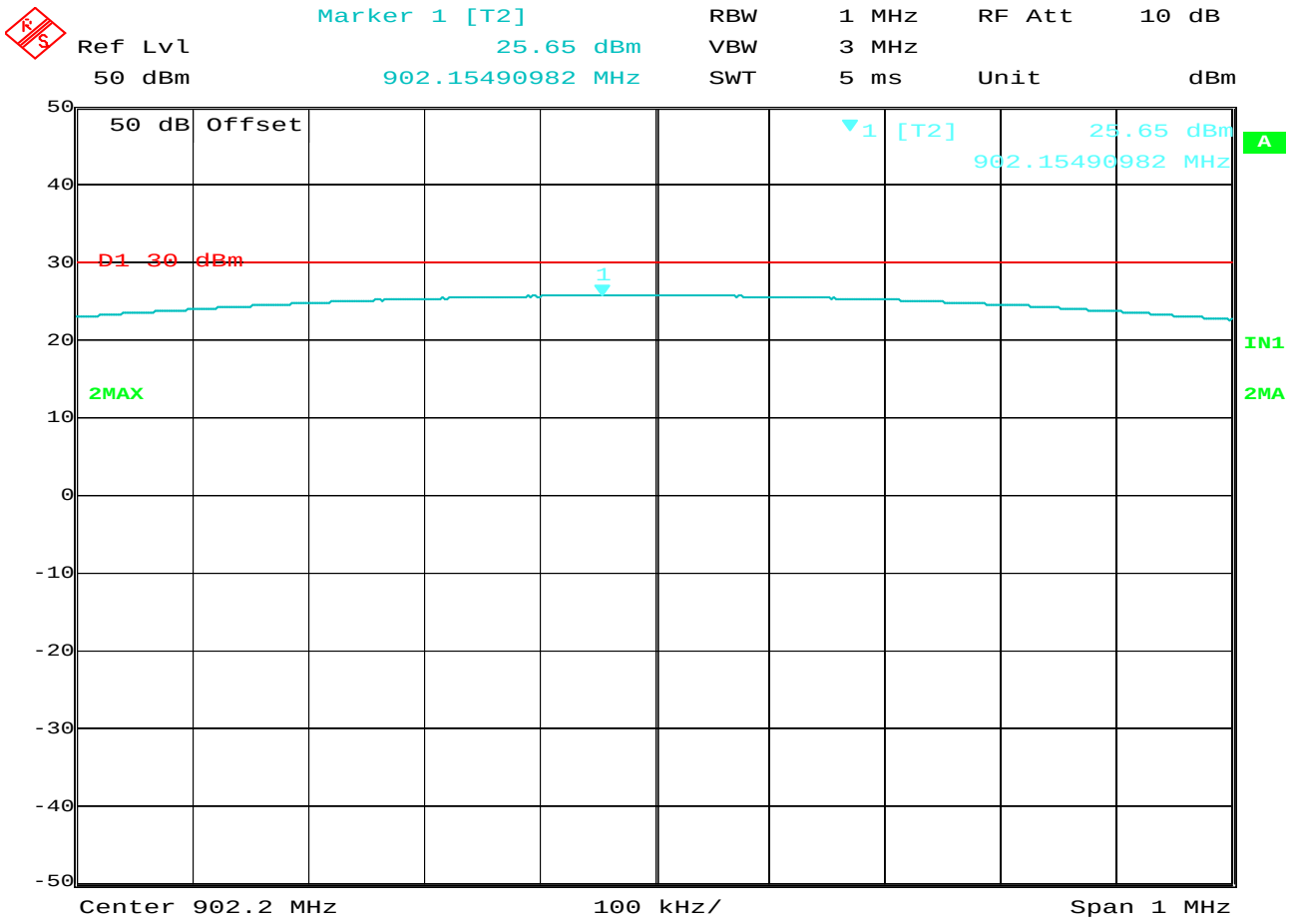


Date: 22.MAY.2007 14:31:10

FCC 15.247 Time of Occupancy

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : Number of Pulses in 5 seconds = 3
: Therefore Number of Pulses in 20 seconds = 12
: Time of Occupancy = #pulses * pulse width
: 12 * 6.57msec = 78.84 msec
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

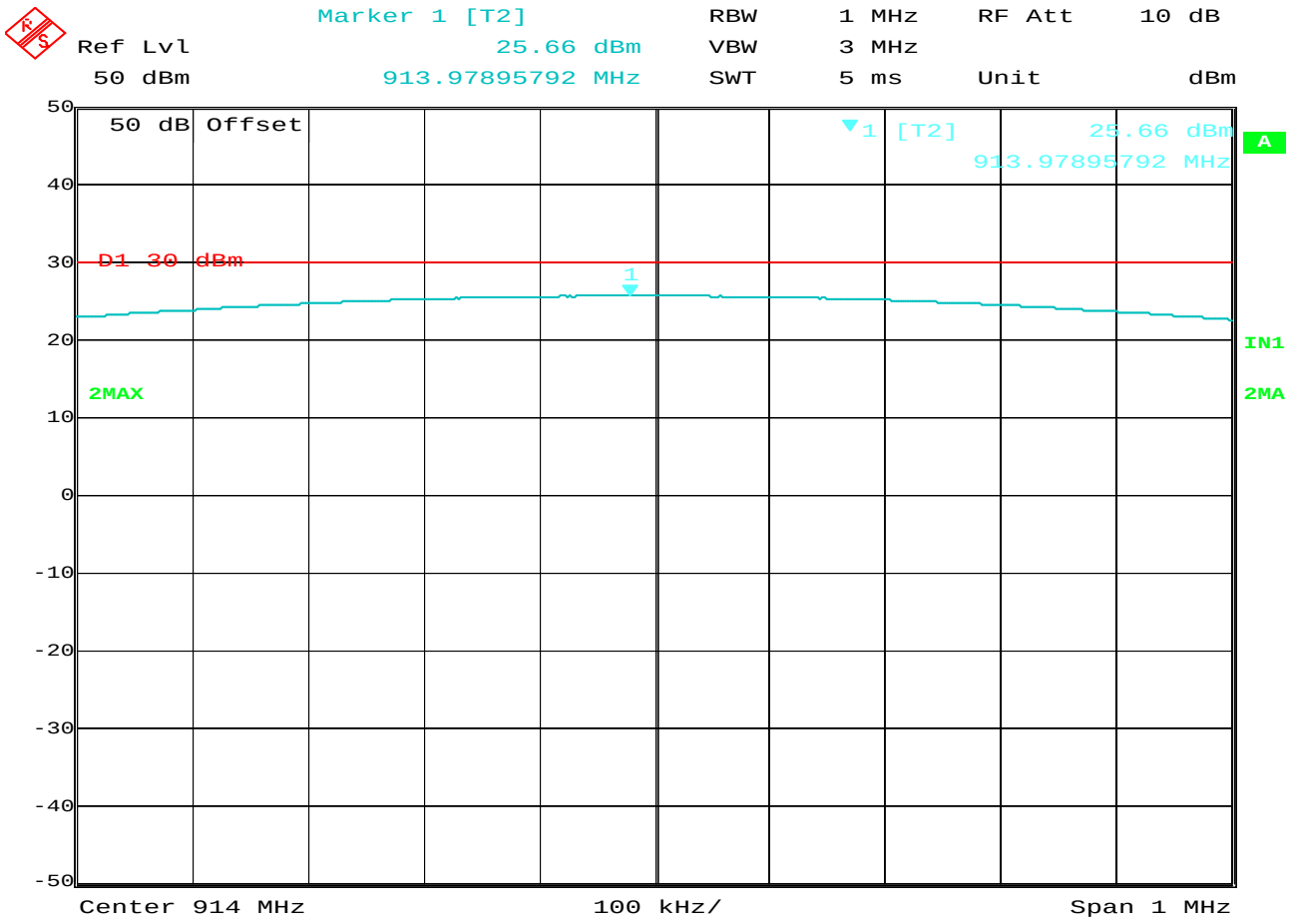


Date: 21.MAY.2007 21:37:44

FCC 15.247 Peak Output Power

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 902.2MHz
TEST PARAMETERS : peak output power (30dBm limit)
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

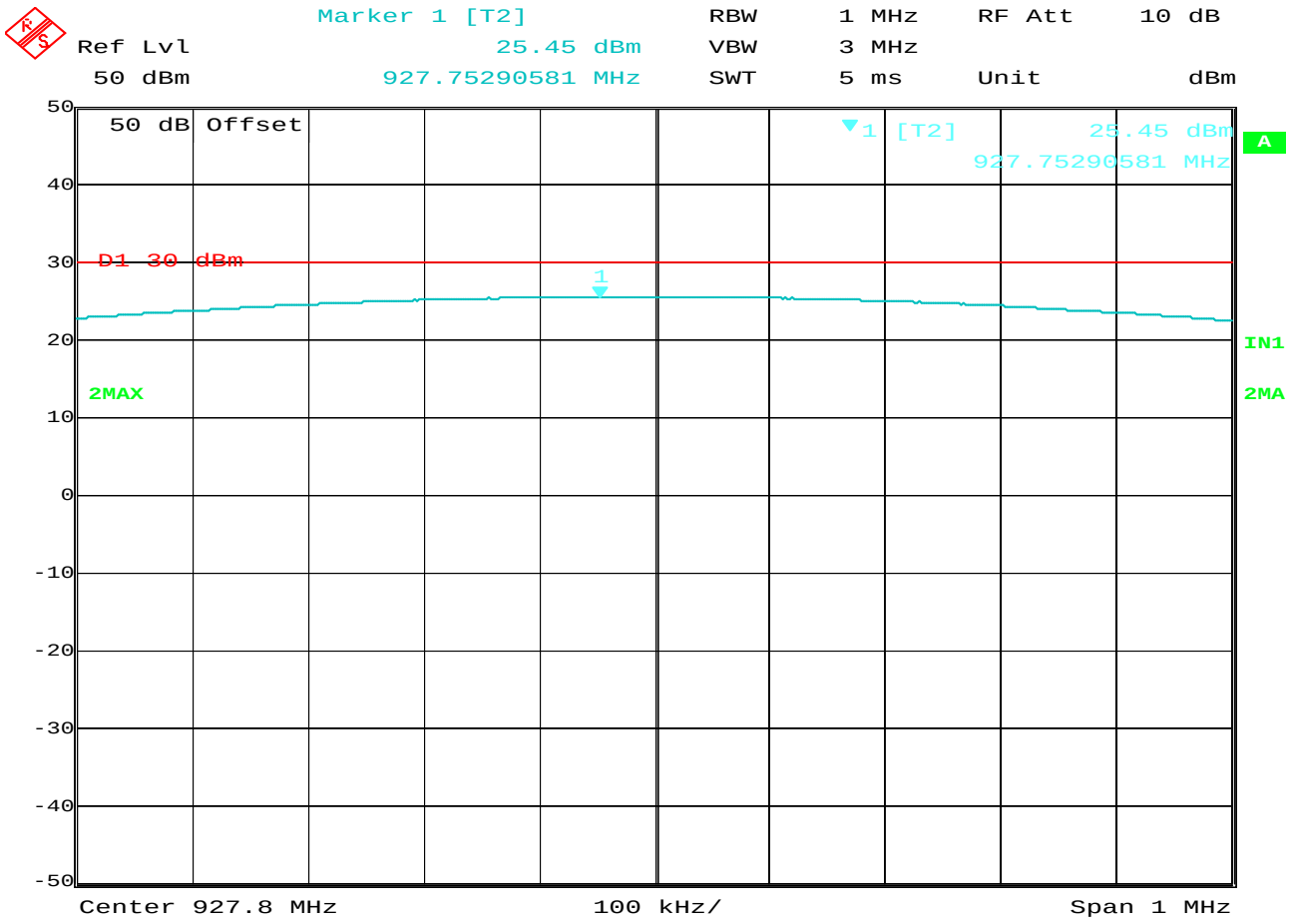


Date: 21.MAY.2007 21:59:15

FCC 15.247 Peak Output Power

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 914MHz
TEST PARAMETERS : peak output power (30dBm limit)
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES



Date: 21.MAY.2007 22:04:16

FCC 15.247 Peak Output Power

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 927.8MHz
TEST PARAMETERS : peak output power (30dBm limit)
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : See Below
TEST PARAMETERS : EIRP
NOTES : Tested with Patch A0025 Antenna
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T2S5, NDQ1, GBN5, ADB0, XDY0, MPCC, MPC2, XLQ4, NDS0

Transmit Frequency MHz	Antenna Polarity	Meter Reading dBuV	Matched Sig Gen Rading dBm	Antenna Gain dB	Cable Loss dB	EIRP dBm	Limit dBm
902.2	H	98.2	31	2.2	1.6	31.6	36
902.2	V	96.3	28.2	2.2	1.6	28.8	36
912.40	H	99.4	31.5	2.2	1.6	32.1	36
912.40	V	95.9	27.7	2.2	1.6	28.3	36
927.80	H	98.7	30.8	2.2	1.6	31.4	36
927.80	V	96.7	28.2	2.2	1.6	28.8	36

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

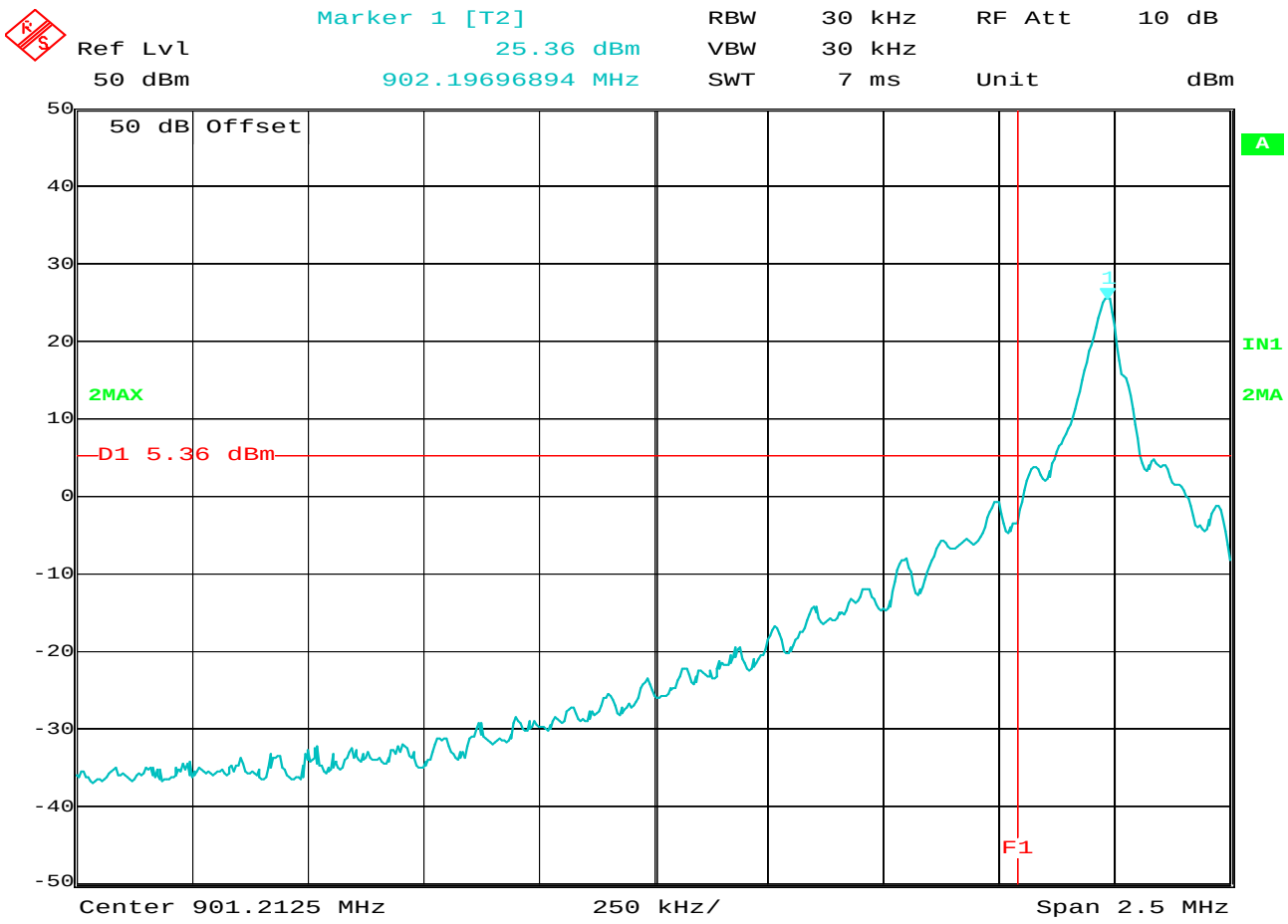
Checked By: MARK E. LONGINOTTI

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : See Below
TEST PARAMETERS : EIRP
NOTES : Tested with S9028PC Antenna
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T2S5, NDQ1, GBN5, ADB0, XDY0, MPCC, MPC2, XLQ4, NDS0

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Matched Sig Gen Rading dBm	Antenna Gain dB	Cable Loss dB	EIRP dBm	Limit dBm
902.2	H	99.3	32.1	2.2	1.6	32.7	36
902.2	V	94.1	26	2.2	1.6	26.6	36
912.40	H	100.3	32.4	2.2	1.6	33.0	36
912.40	V	93.6	25.5	2.2	1.6	26.1	36
927.80	H	99.2	31.3	2.2	1.6	31.9	36
927.80	V	95.3	26.8	2.2	1.6	27.4	36

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

Checked By: MARK E. LONGINOTTI

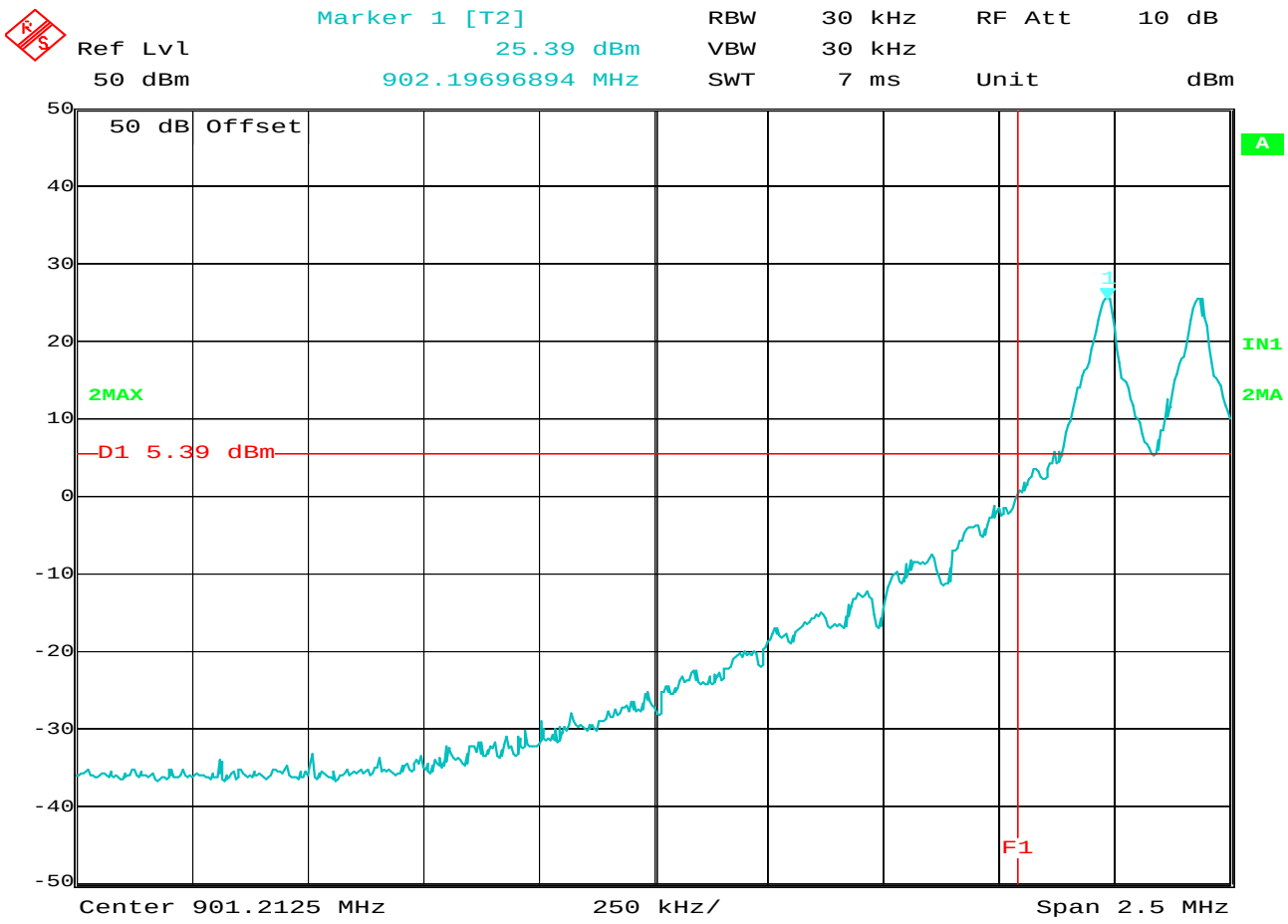


Date: 21.MAY.2007 20:13:13

FCC 15.247 Band edge compliance

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Transmit @ 902.2MHz
TEST PARAMETERS	: Band edge compliance
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

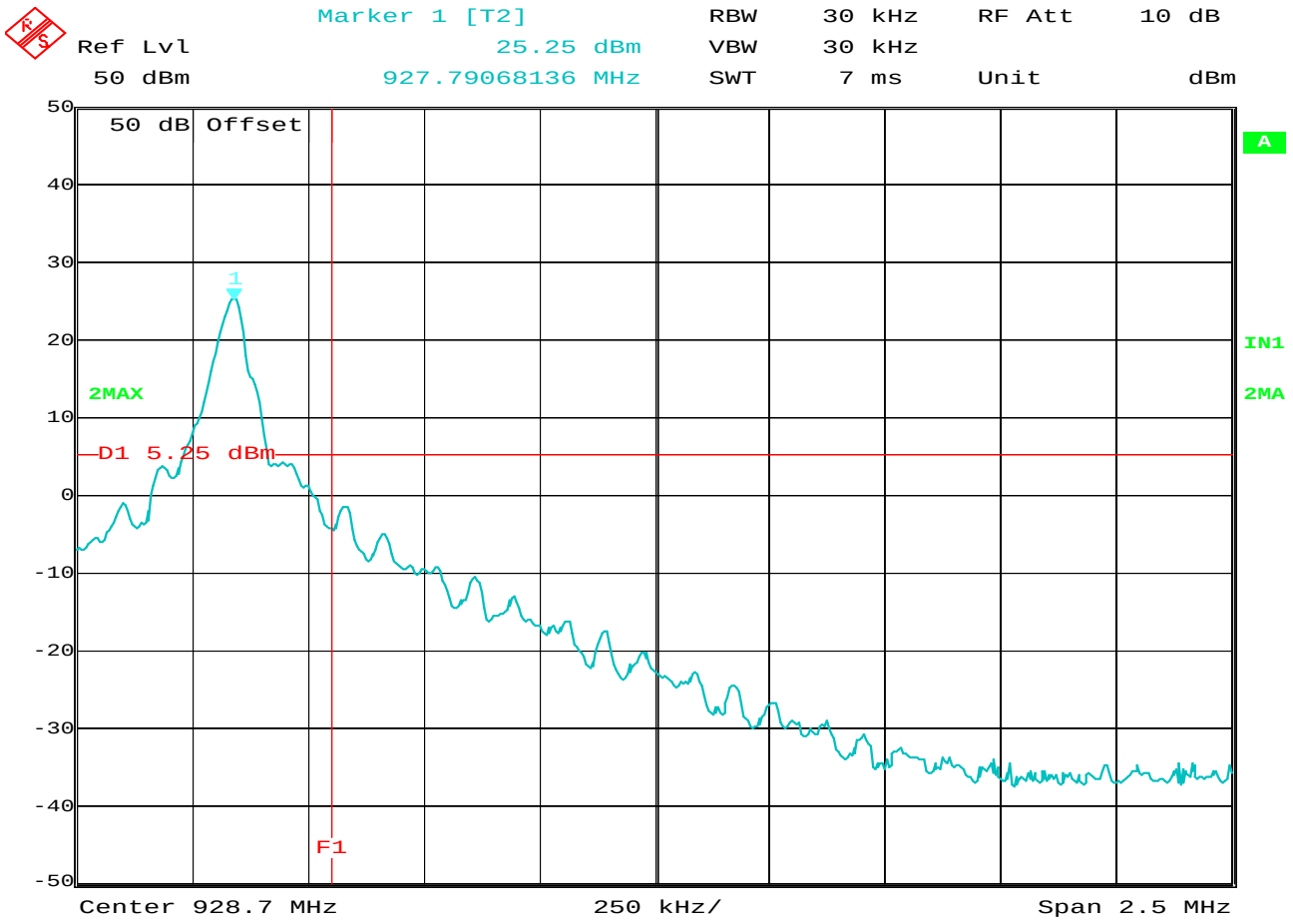


Date: 21.MAY.2007 20:46:37

FCC 15.247 Band edge compliance

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Hopping Enabled
TEST PARAMETERS	: Band edge compliance
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

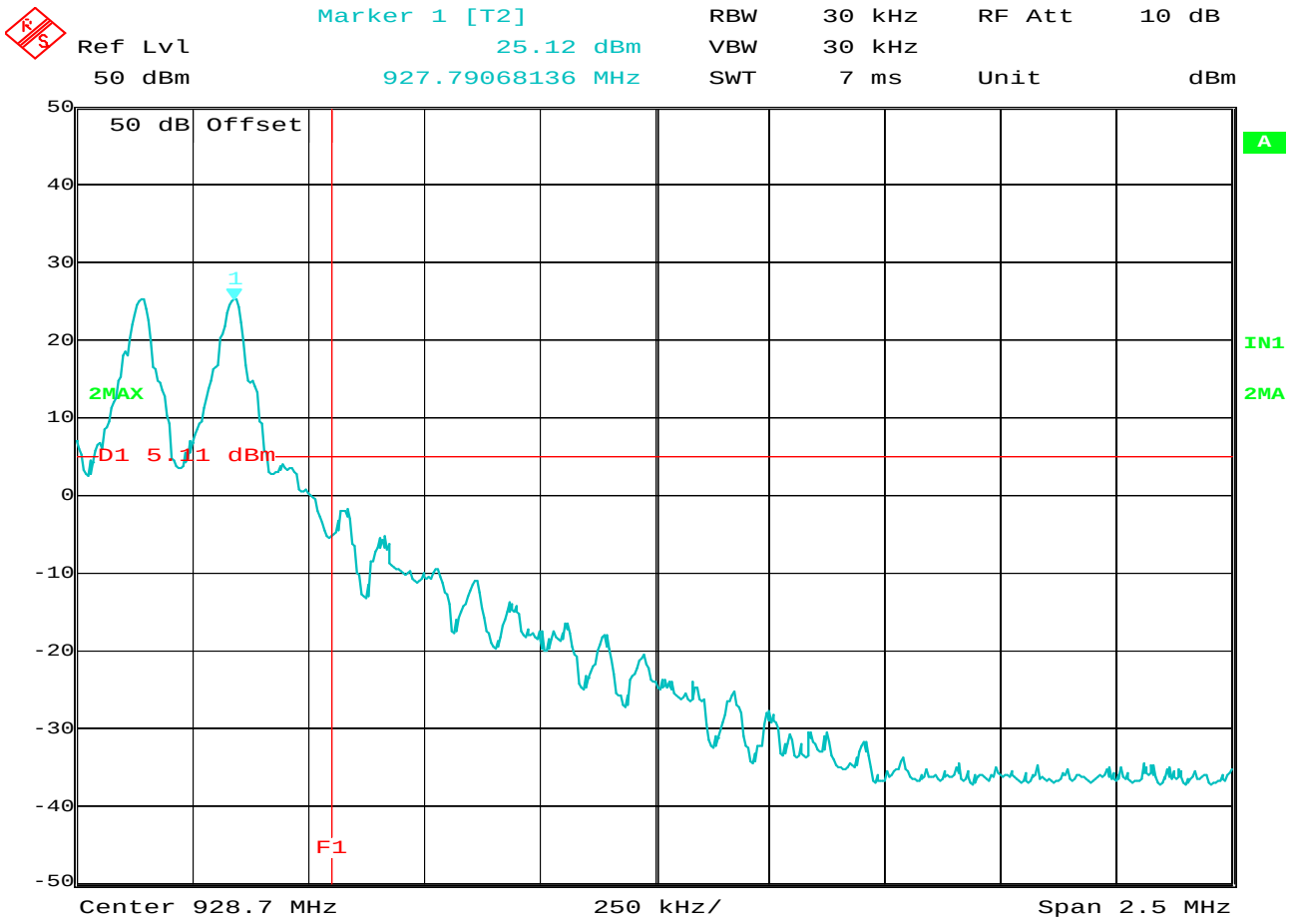


Date: 21.MAY.2007 21:14:45

FCC 15.247 Band edge compliance

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Transmit @ 927.8MHz
TEST PARAMETERS	: band edge compliance
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

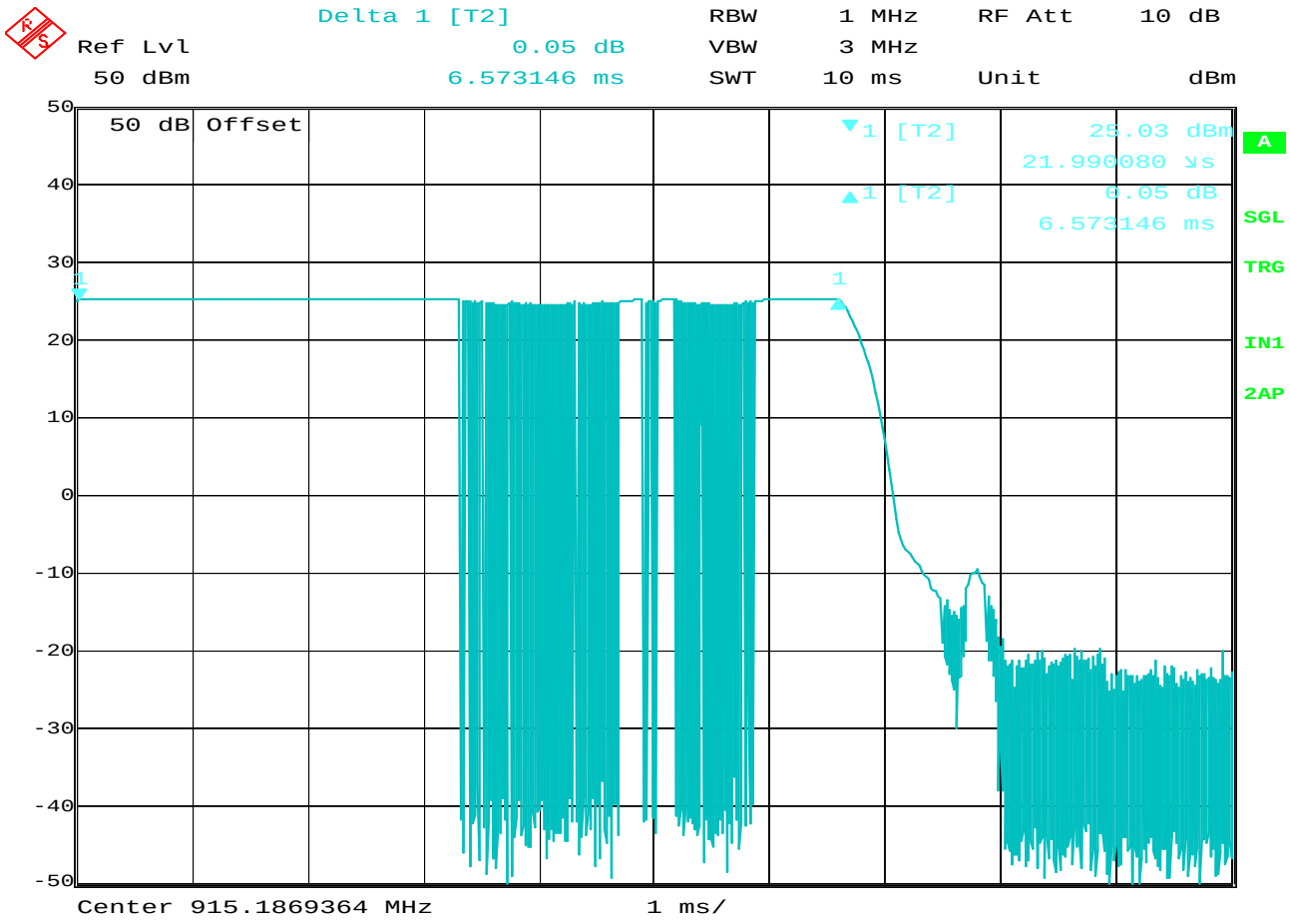


Date: 21.MAY.2007 21:08:01

FCC 15.247 Band edge compliance

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Frequency hopping enabled
TEST PARAMETERS	: band edge compliance
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

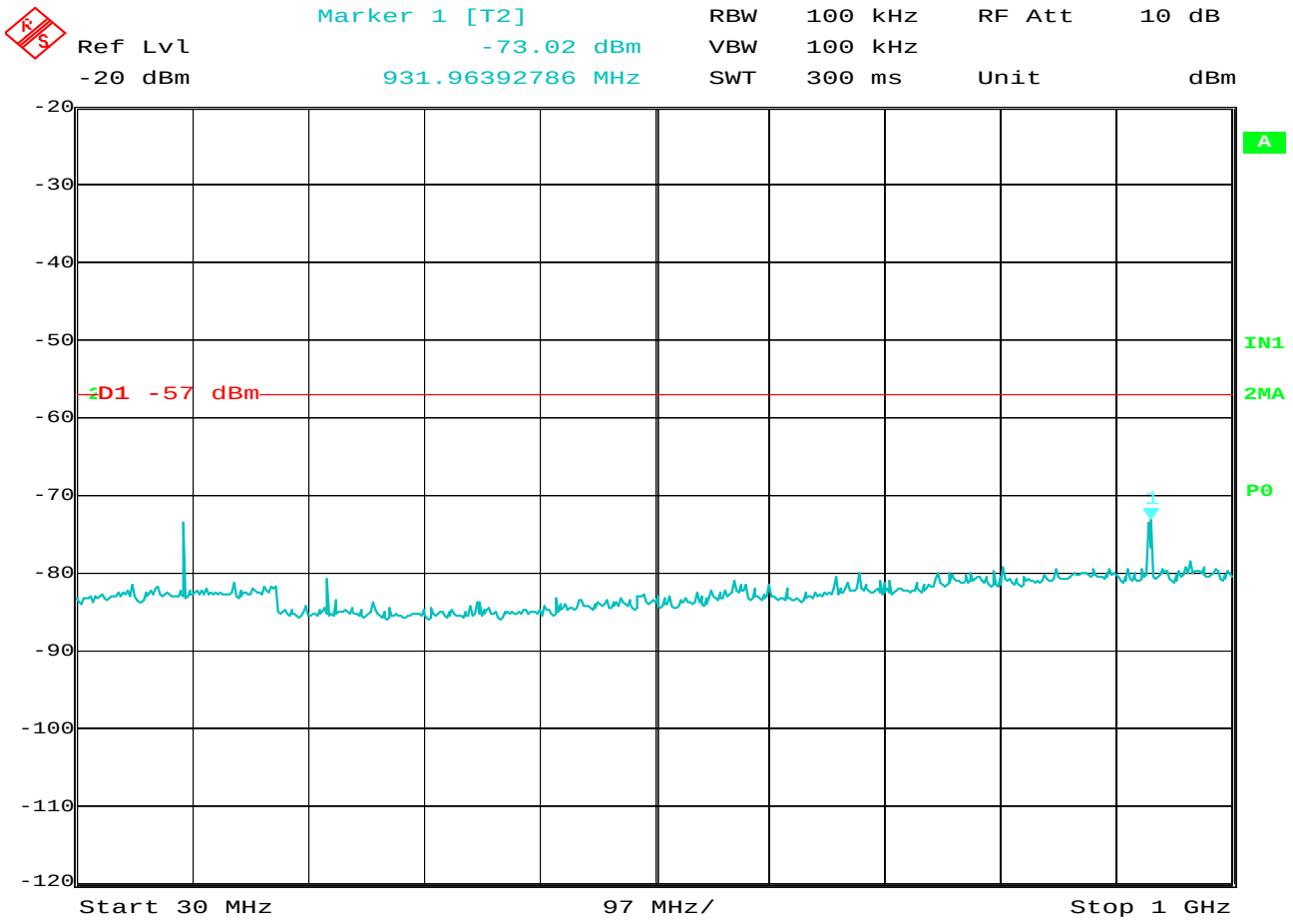


Date: 22.MAY.2007 14:27:24

Duty Cycle Factor

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Frequency Hopping Enabled
TEST PARAMETERS : Pulse Width = 6.57msec
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

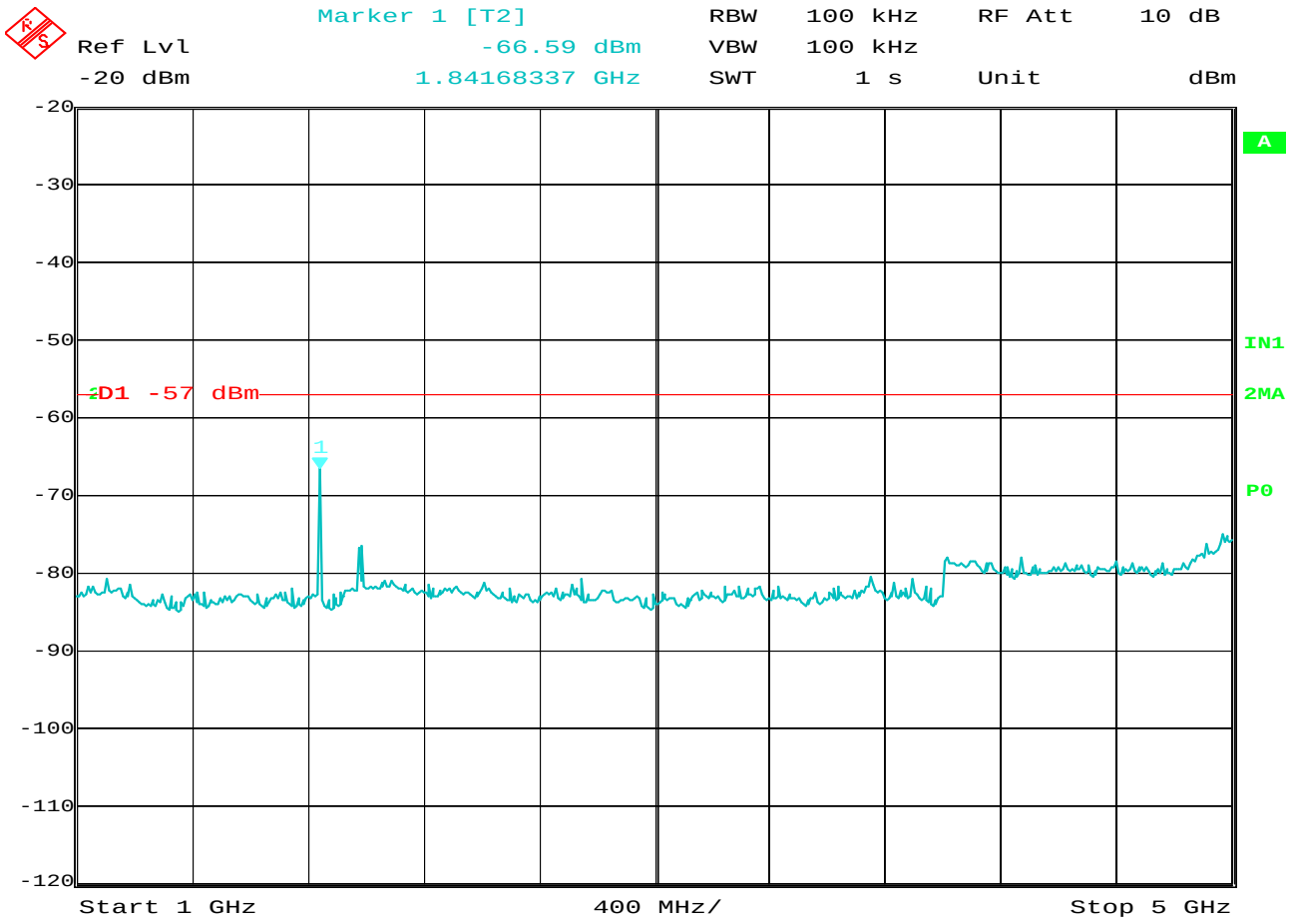


Date: 22.MAY.2007 19:09:35

FCC 15.111 Antenna Power Conducted Limits for Receivers

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V2
SERIAL NUMBER : 1
TEST MODE : Rx @ 902.2MHz
TEST PARAMETERS :
NOTES : -57dBm = 2nW limit
EQUIPMENT USED : RBB0

NOTES

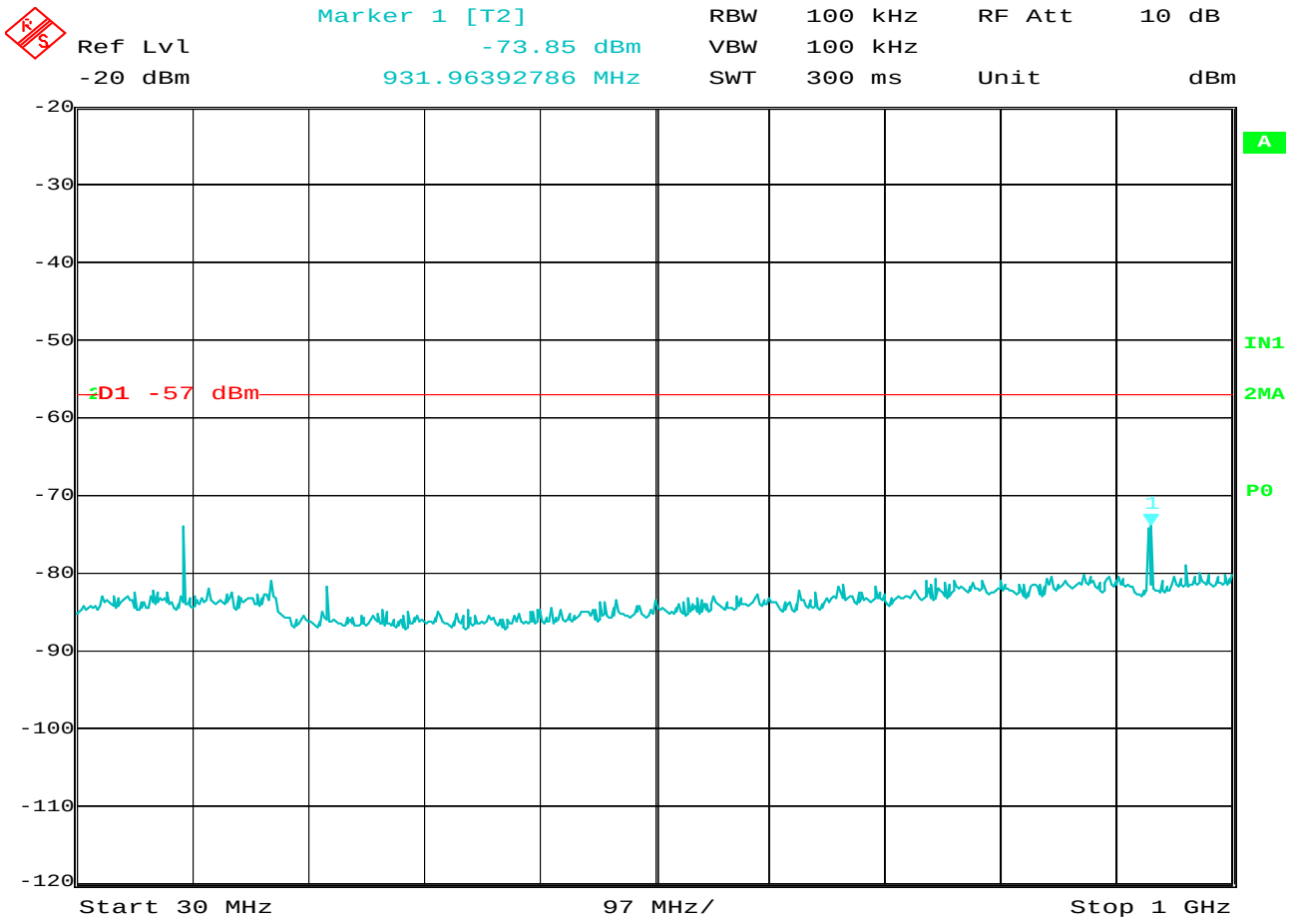


Date: 22.MAY.2007 19:13:07

FCC 15.111 Antenna Power Conducted Limits for Receivers

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V2
SERIAL NUMBER : 1
TEST MODE : Rx @ 902.2MHz
TEST PARAMETERS :
NOTES : -57dBm = 2nW limit
EQUIPMENT USED : RBB0

NOTES

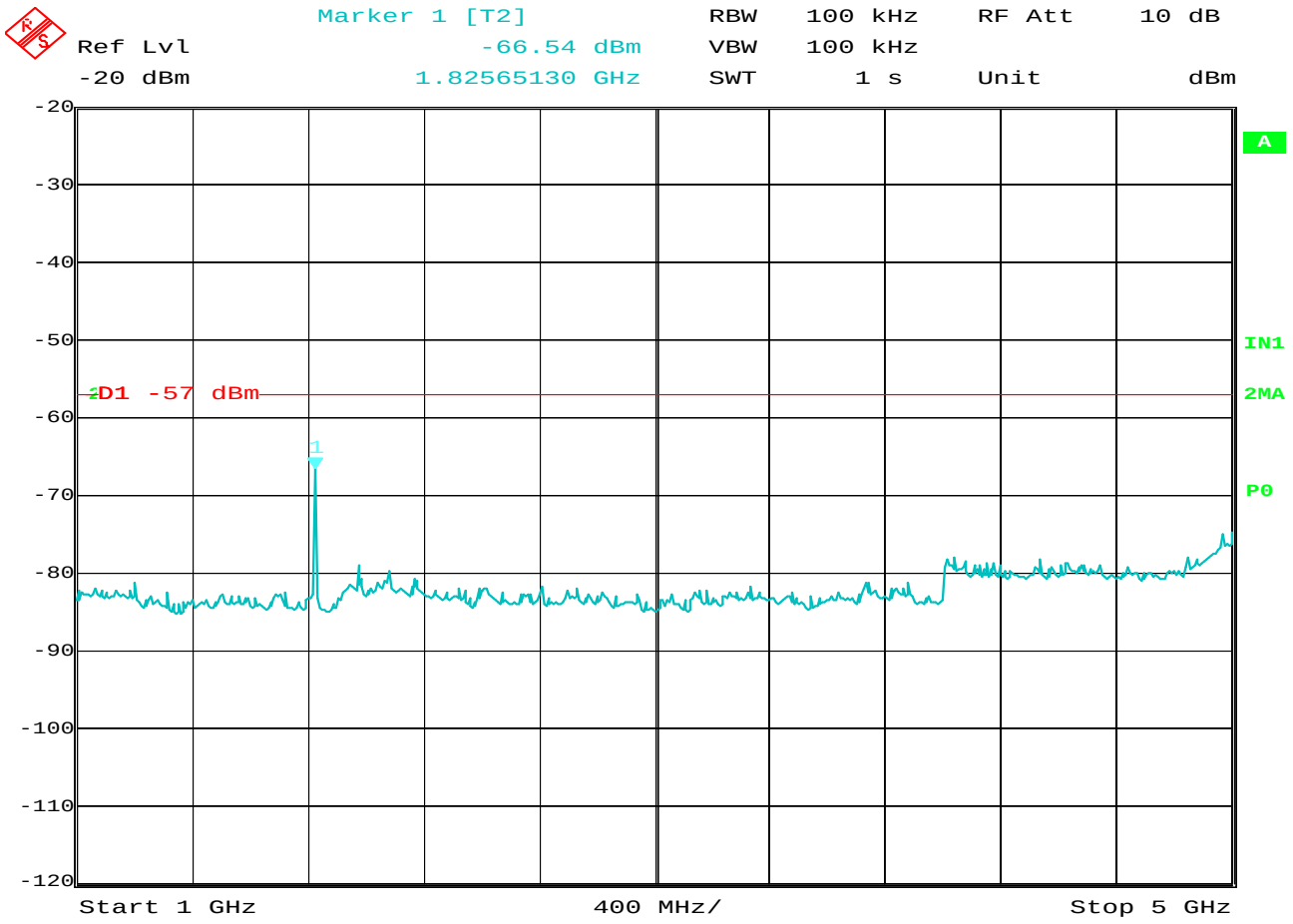


Date: 22.MAY.2007 19:22:27

FCC 15.111 Antenna Power Conducted Limits for Receivers

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V2
SERIAL NUMBER : 1
TEST MODE : Rx @ 912.4MHz
TEST PARAMETERS :
NOTES : -57dBm = 2nW limit
EQUIPMENT USED : RBB0

NOTES

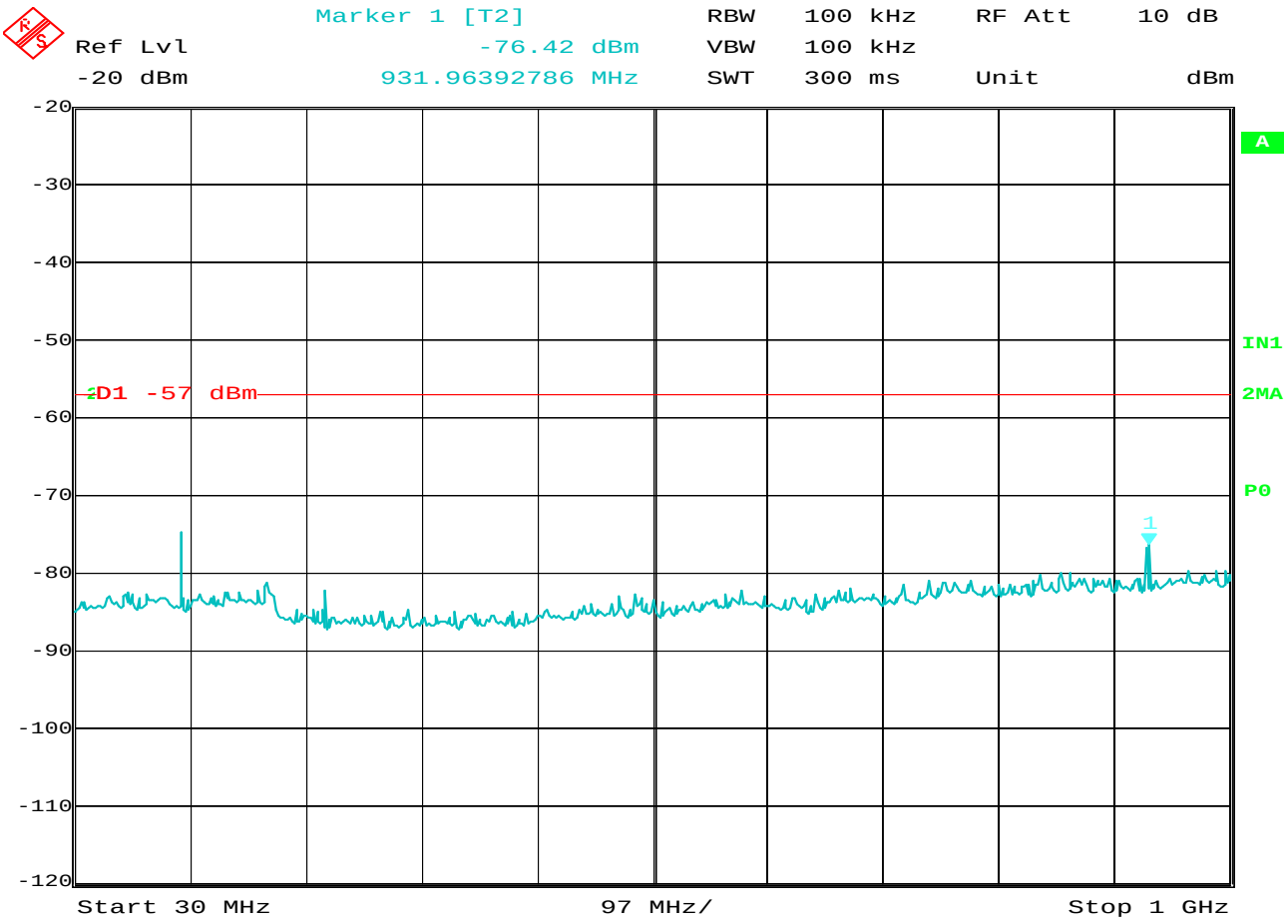


Date: 22.MAY.2007 19:24:00

FCC 15.111 Antenna Power Conducted Limits for Receivers

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V2
SERIAL NUMBER : 1
TEST MODE : Rx @ 912.4MHz
TEST PARAMETERS :
NOTES : -57dBm = 2nW limit
EQUIPMENT USED : RBB0

NOTES

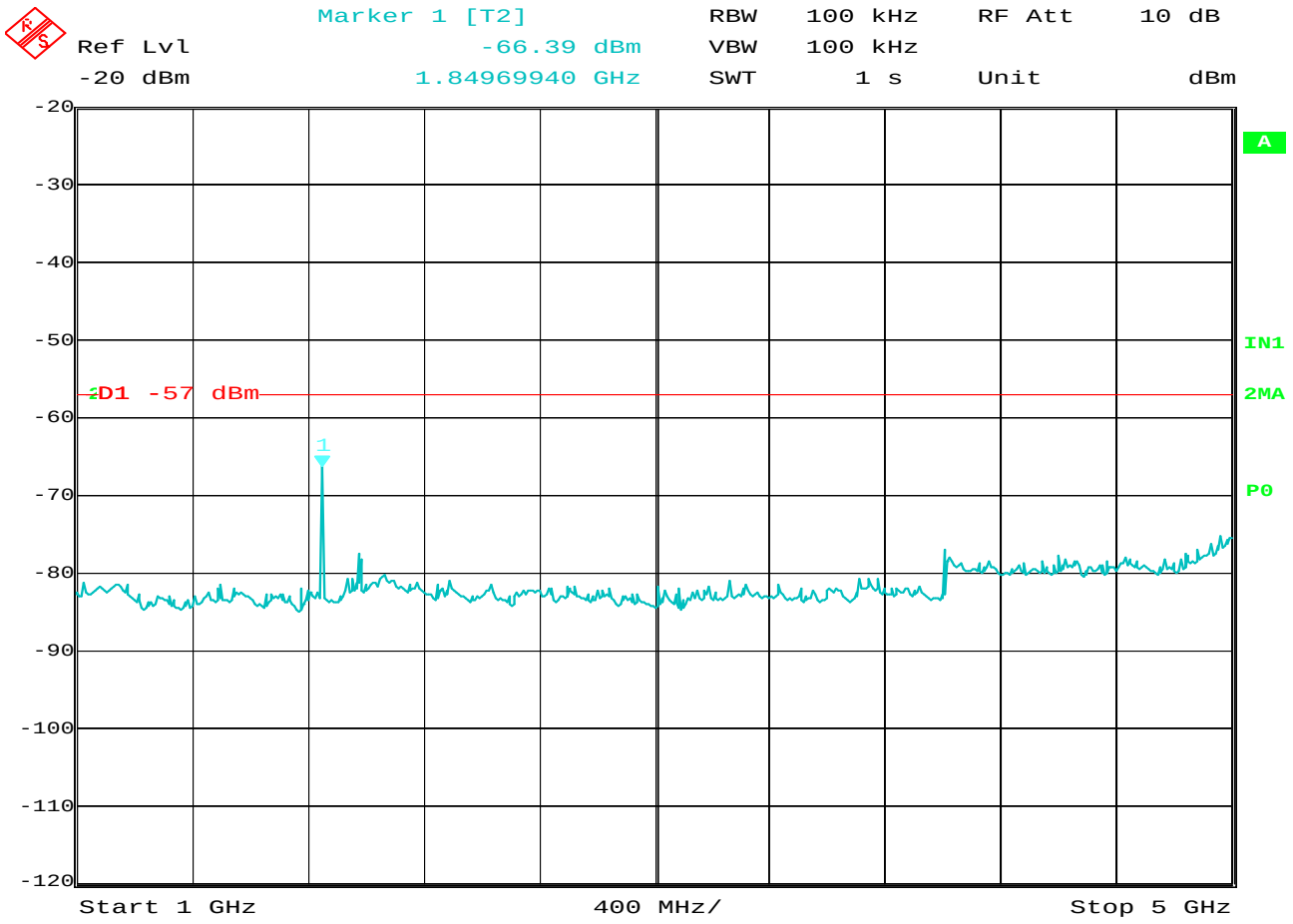


Date: 22.MAY.2007 19:29:43

FCC 15.111 Antenna Power Conducted Limits for Receivers

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V2
SERIAL NUMBER : 1
TEST MODE : Rx @ 927.8MHz
TEST PARAMETERS :
NOTES : -57dBm = 2nW limit
EQUIPMENT USED : RBB0

NOTES

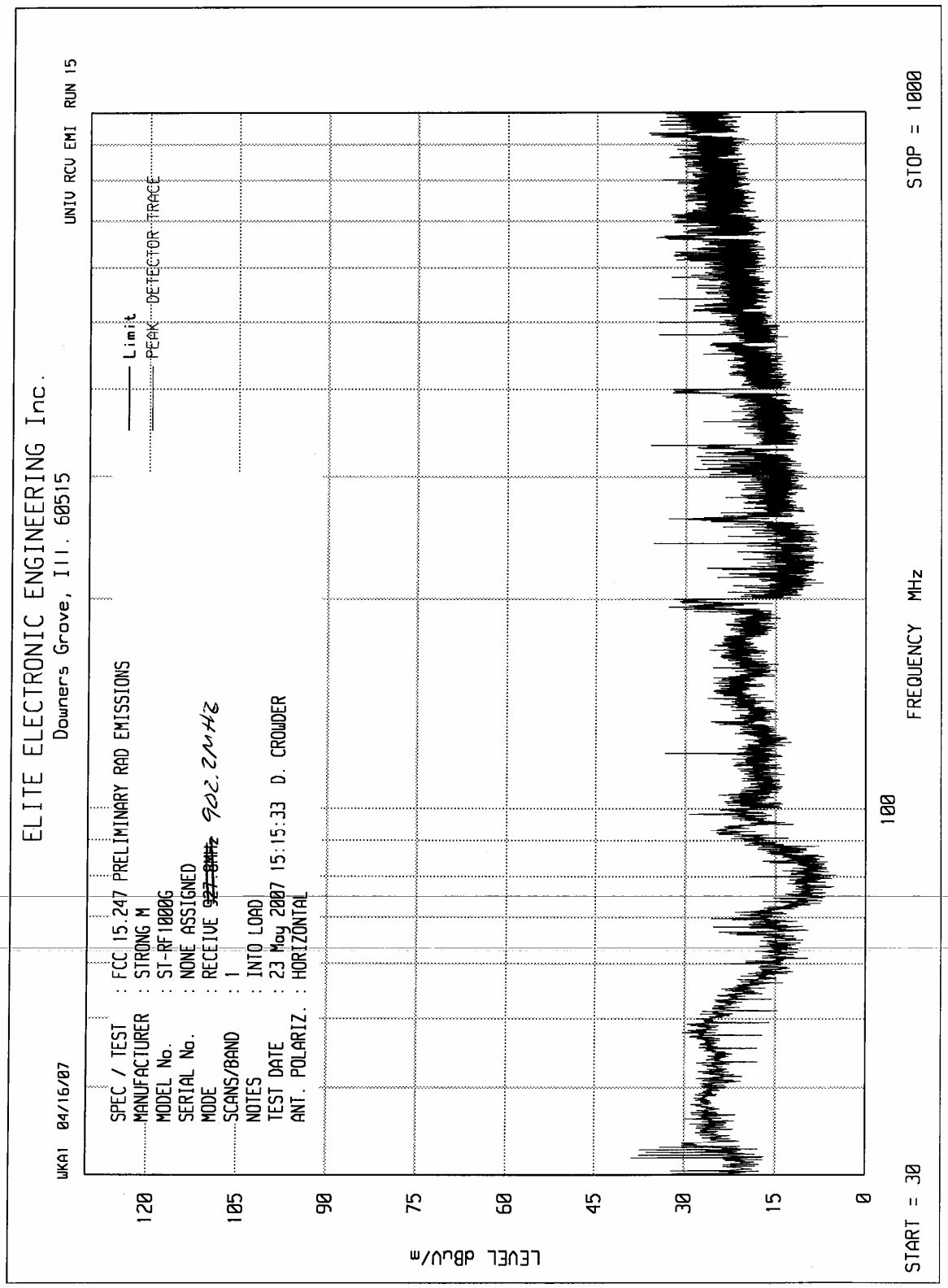


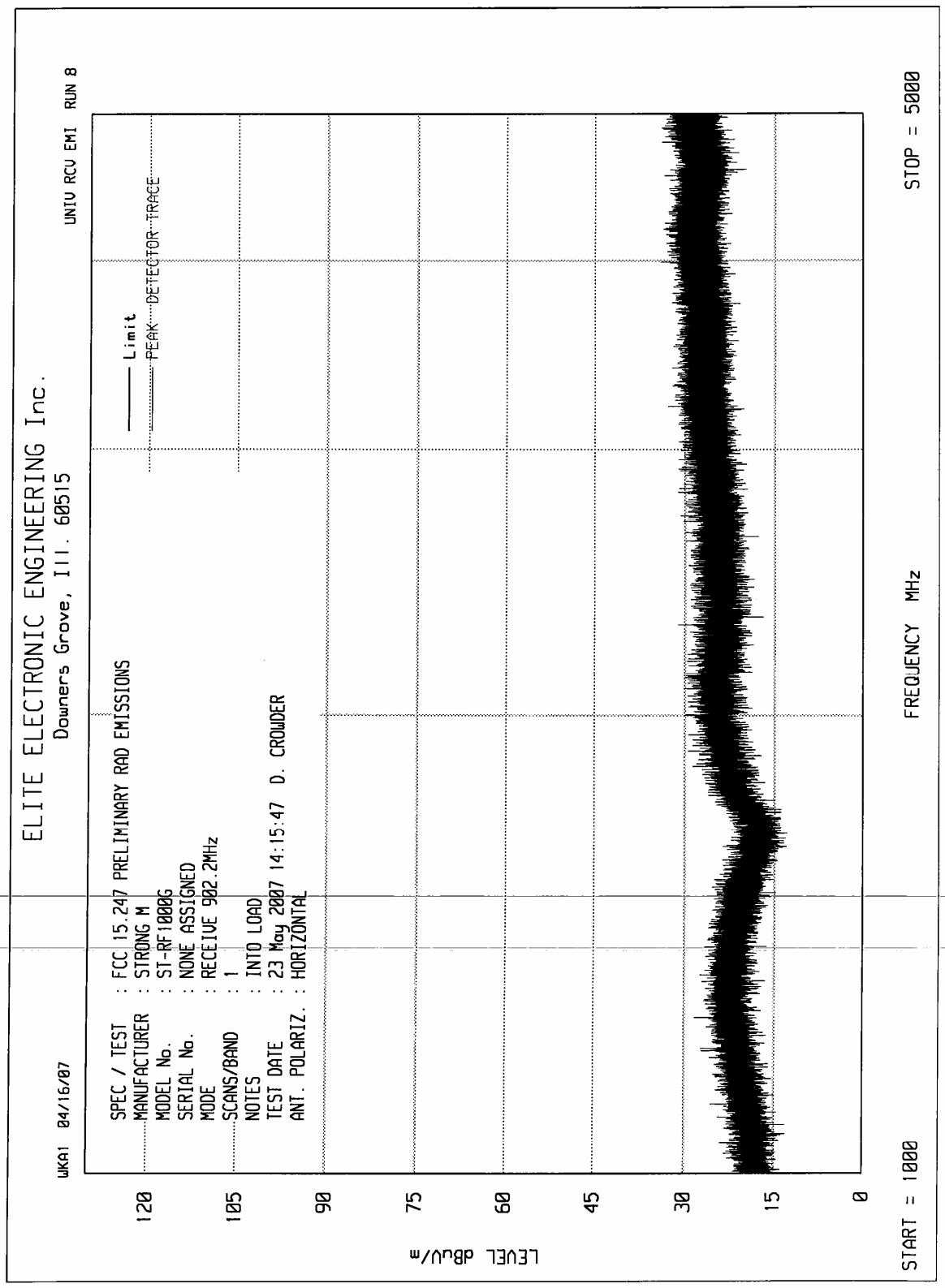
Date: 22.MAY.2007 19:31:12

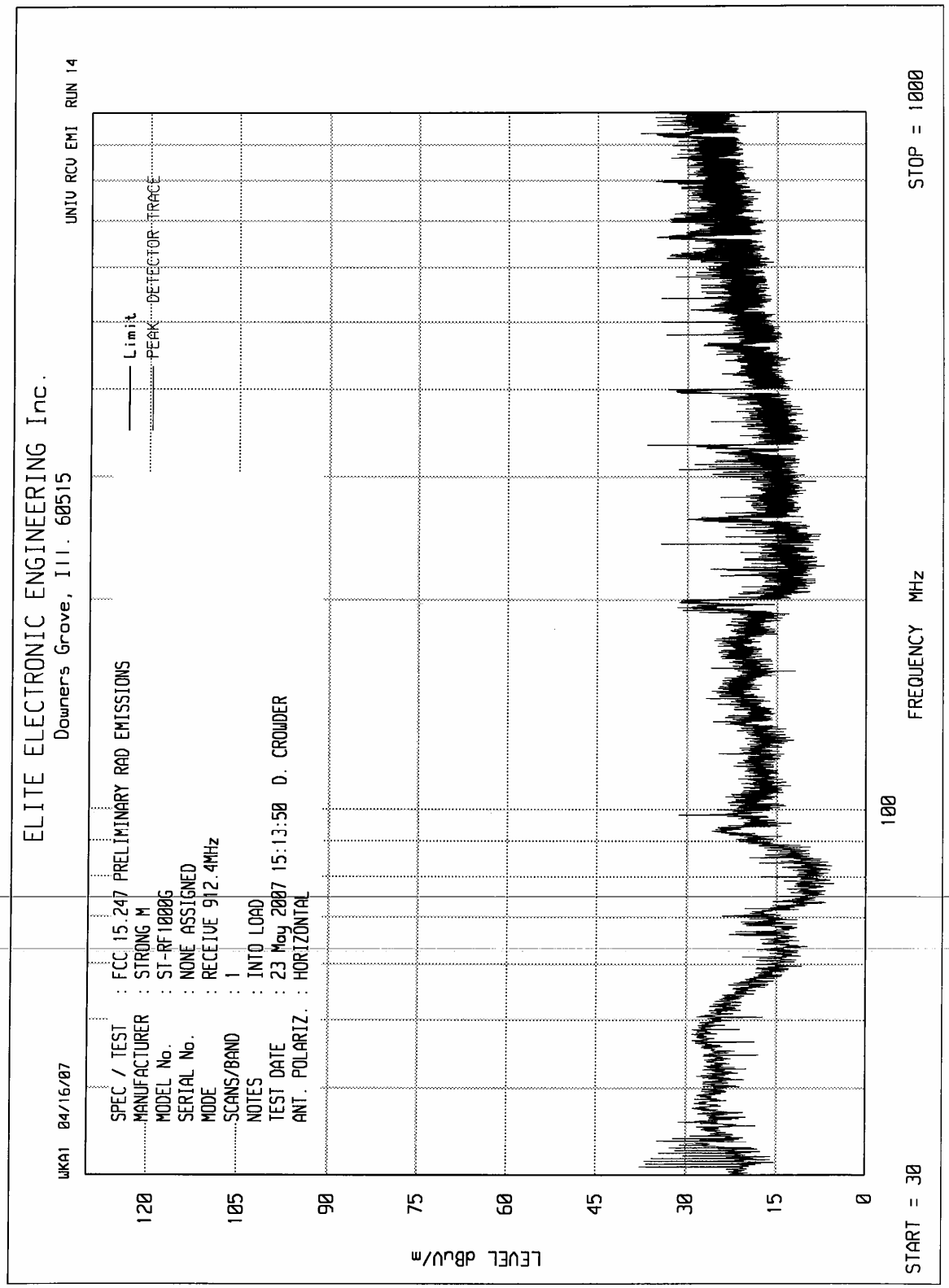
FCC 15.111 Antenna Power Conducted Limits for Receivers

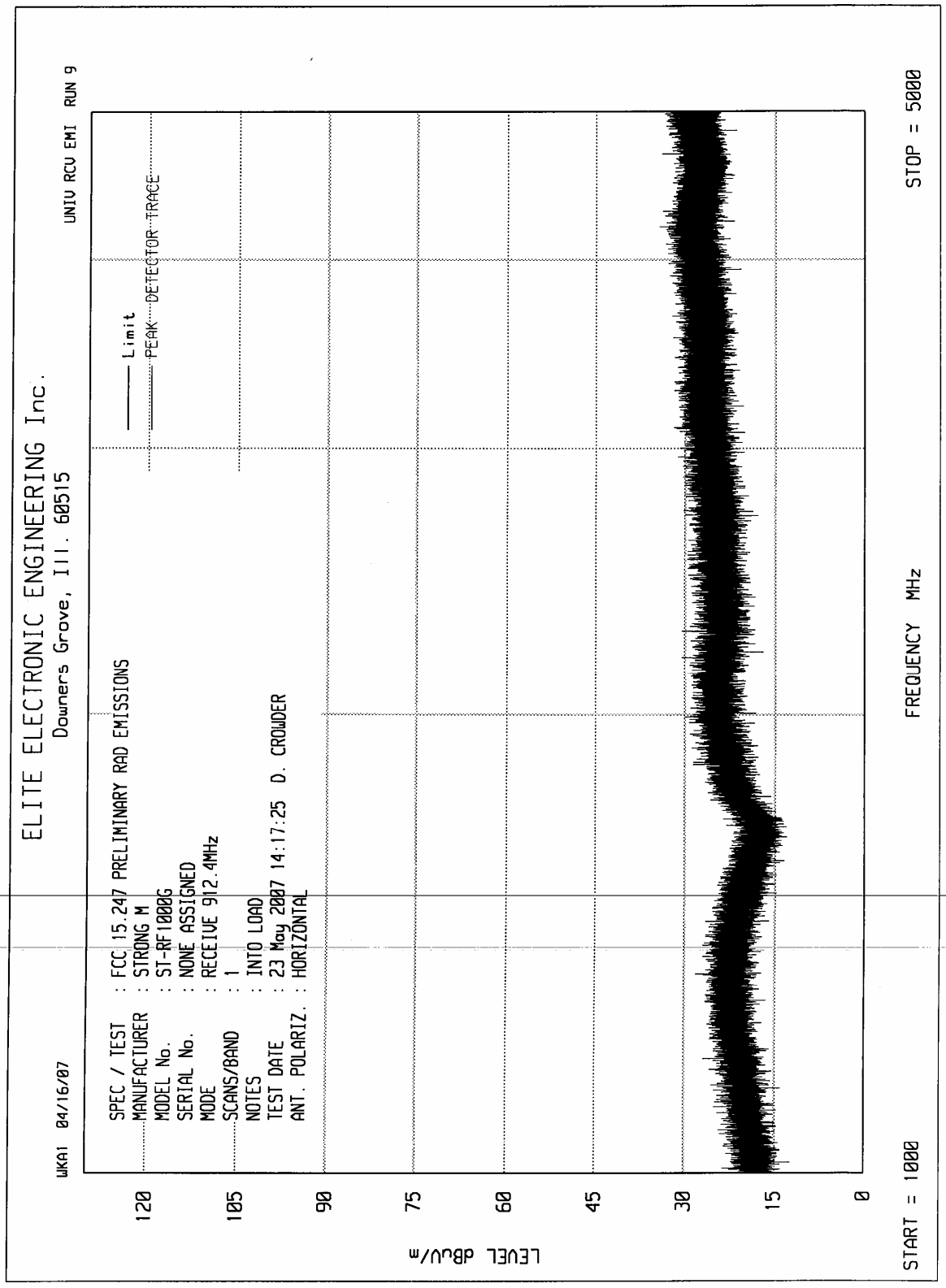
MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V2
SERIAL NUMBER : 1
TEST MODE : Rx @ 927.8MHz
TEST PARAMETERS :
NOTES : -57dBm = 2nW limit
EQUIPMENT USED : RBB0

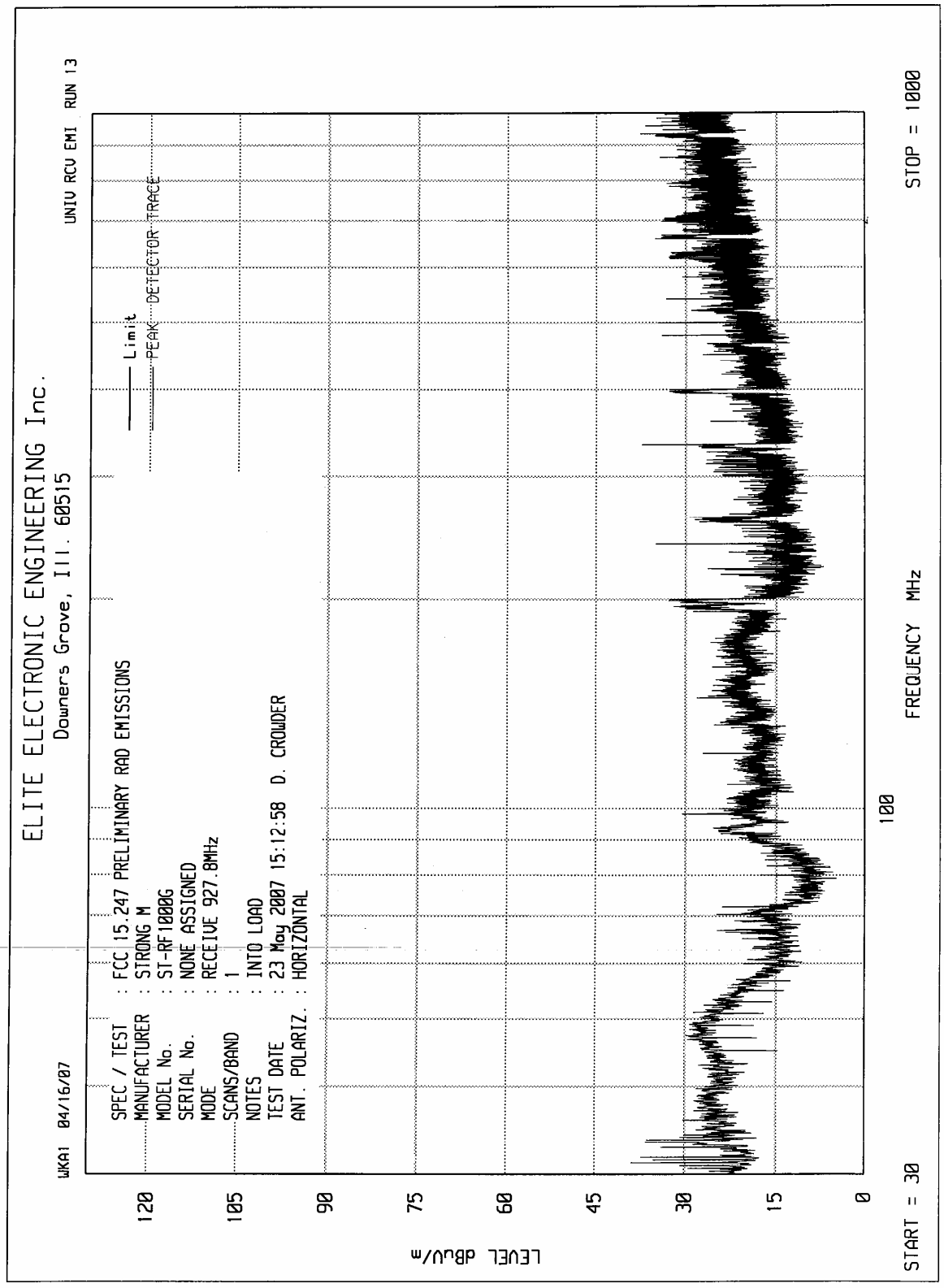
NOTES

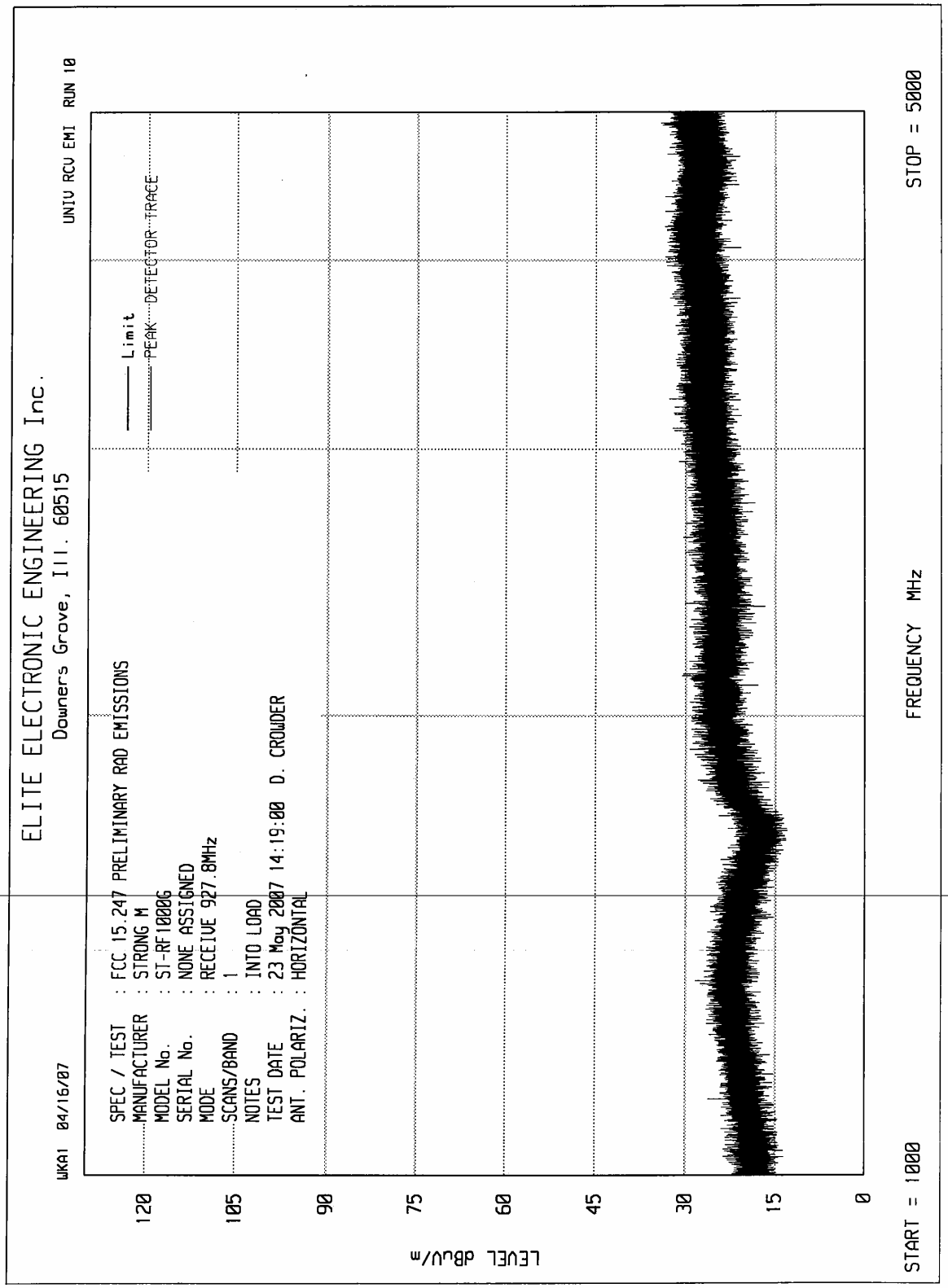

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 15
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF10006
SERIAL No. : NONE ASSIGNED
MODE : RECEIVE 902.2MHz
SCANS/BAND : 1
NOTES : INTO LOAD
TEST DATE : 23 May 2007 15:15:33 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 8
UKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : RECEIVE 902.2MHz
SCANS/BAND : 1
NOTES : INTO LOAD
TEST DATE : 23 May 2007 14:15:47 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 5000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 14
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : RECEIVE 912.4MHz
SCANS/BAND : 1
NOTES : INTO LOAD
TEST DATE : 23 May 2007 15:13:50 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 9
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : RECEIVE 912.4MHz
SCANS/BAND : 1
NOTES : INTO LOAD
TEST DATE : 23 May 2007 14:17:25 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 5000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 13
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : RECEIVE 927.8MHz
SCANS/BAND : 1
NOTES : INTO LOAD
TEST DATE : 23 May 2007 15:12:58 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF10006
SERIAL No. : NONE ASSIGNED
MODE : RECEIVE 927.8MHz
SCANS/BAND : 1
NOTES : INTO LOAD
TEST DATE : 23 May 2007 14:19:00 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 5000

MANUFACTURER : Strong M
MODEL : ST-RF 1000G
SERIAL NO. : 378833
SPECIFICATION : FCC-15B Spurious Radiated Emissions
DATE : May 23, 2007
NOTES : Receive @ 902.2MHz
: Peak Readings, Test Distance is 3 meters

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Pre-Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
902.20	H	10.7	Ambient	1.9	27.7	0.0	40.4	104.4	200.0
902.20	V	12.1	Ambient	1.9	27.7	0.0	41.8	122.6	200.0
1804.40	H	48.4	Ambient	2.9	28.0	-40.6	38.6	85.3	500.0
1804.40	V	48.5	Ambient	2.9	28.0	-40.6	38.7	86.3	500.0
2706.60	H	49.0	Ambient	3.7	31.4	-40.3	43.8	154.1	500.0
2706.60	V	48.3	Ambient	3.7	31.4	-40.3	43.1	142.2	500.0
3608.80	H	48.8	Ambient	4.4	32.5	-40.1	45.5	188.8	500.0
3608.80	V	48.5	Ambient	4.4	32.5	-40.1	45.2	182.4	500.0
4511.00	H	50.0	Ambient	4.8	32.8	-40.0	47.7	242.2	500.0
4511.00	V	50.0	Ambient	4.8	32.8	-40.0	47.7	242.2	500.0

V - Vertical

H - Horizontal

Total = Meter Reading + Cable Factor + Antenna Factor + Pre-Amp Gain

Checked By: MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL : ST-RF 1000G
SERIAL NO. : 378833
SPECIFICATION : FCC-15B Spurious Radiated Emissions
DATE : May 23, 2007
NOTES : Receive @ 912.4MHz
: Peak Readings, Test Distance is 3 meters

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Pre-Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
912.40	H	10.7	Ambient	1.9	27.7	0.0	0.0	40.4	104.4
912.40	V	12.1	Ambient	1.9	27.7	0.0	0.0	41.8	122.6
1824.80	H	48.4	Ambient	2.9	28.0	-40.6	0.0	38.6	85.3
1824.80	V	48.5	Ambient	2.9	28.0	-40.6	0.0	38.7	86.3
2737.20	H	49.0	Ambient	3.7	31.4	-40.3	0.0	43.8	154.1
2737.20	V	48.3	Ambient	3.7	31.4	-40.3	0.0	43.1	142.2
3649.60	H	48.8	Ambient	4.4	32.5	-40.1	0.0	45.5	188.8
3649.60	V	48.5	Ambient	4.4	32.5	-40.1	0.0	45.2	182.4
4562.00	H	50.0	Ambient	4.8	32.8	-40.0	0.0	47.7	242.2
4562.00	V	50.0	Ambient	4.8	32.8	-40.0	0.0	47.7	242.2

V - Vertical

H - Horizontal

Total = Meter Reading + Cable Factor + Antenna Factor + Pre-Amp Gain

Checked By: MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL : ST-RF 1000G
SERIAL NO. : 378833
SPECIFICATION : FCC-15B Spurious Radiated Emissions
DATE : May 23, 2007
NOTES : Receive @ 927.8MHz
: Peak Readings, Test Distance is 3 meters

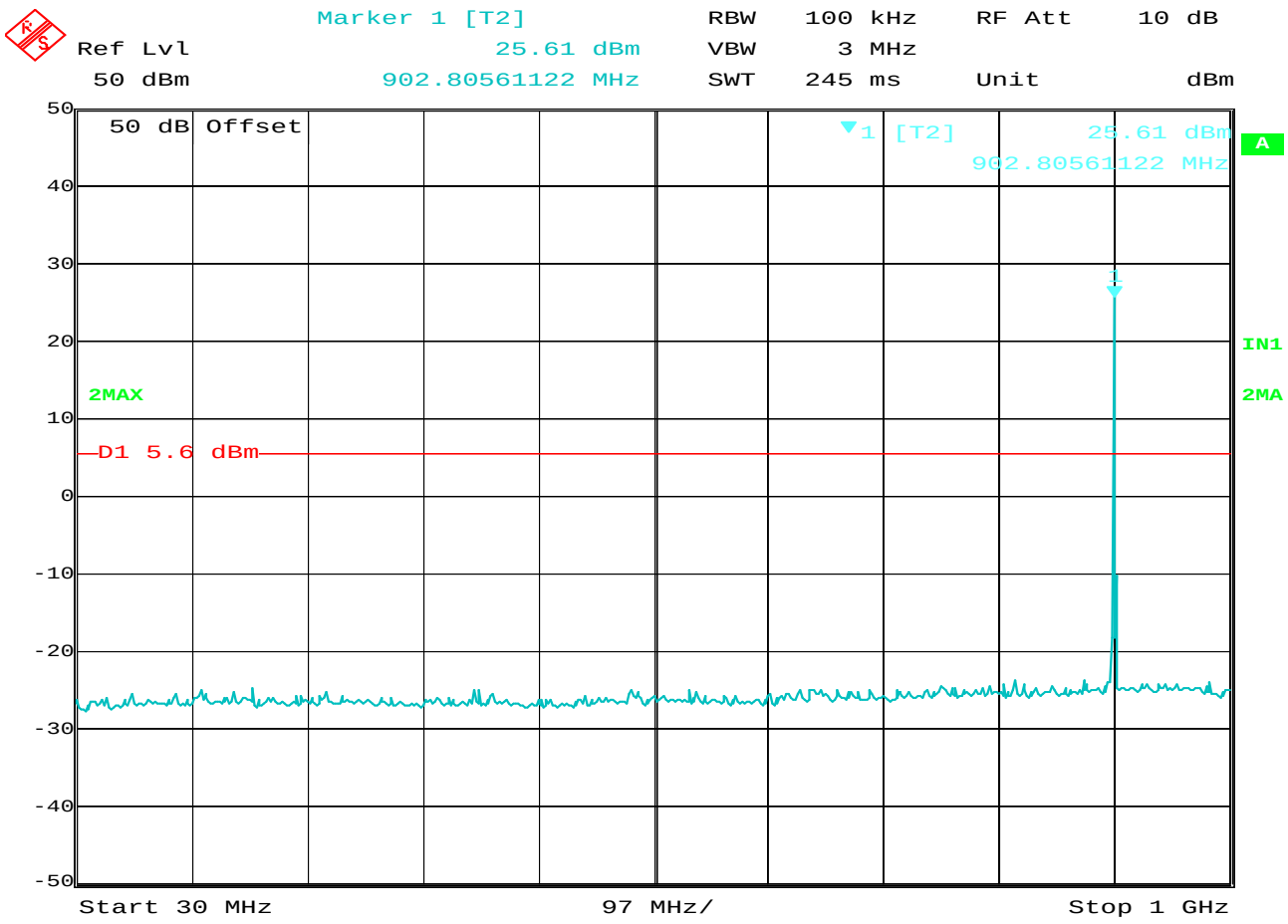
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Pre-Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
927.80	H	10.7	Ambient	1.9	27.7	0.0	0.0	40.4	104.4
927.80	V	12.1	Ambient	1.9	27.7	0.0	0.0	41.8	122.6
1855.60	H	48.4	Ambient	2.9	28.0	-40.6	0.0	38.6	85.3
1855.60	V	48.5	Ambient	2.9	28.0	-40.6	0.0	38.7	86.3
2783.40	H	49.0	Ambient	3.7	31.4	-40.3	0.0	43.8	154.1
2783.40	V	48.3	Ambient	3.7	31.4	-40.3	0.0	43.1	142.2
3711.20	H	48.8	Ambient	4.4	32.5	-40.1	0.0	45.5	188.8
3711.20	V	48.5	Ambient	4.4	32.5	-40.1	0.0	45.2	182.4
4639.00	H	50.0	Ambient	4.8	32.8	-40.0	0.0	47.7	242.2
4639.00	V	50.0	Ambient	4.8	32.8	-40.0	0.0	47.7	242.2

V - Vertical

H - Horizontal

Total = Meter Reading + Cable Factor + Antenna Factor + Pre-Amp Gain

Checked By: MARK E. LONGINOTTI

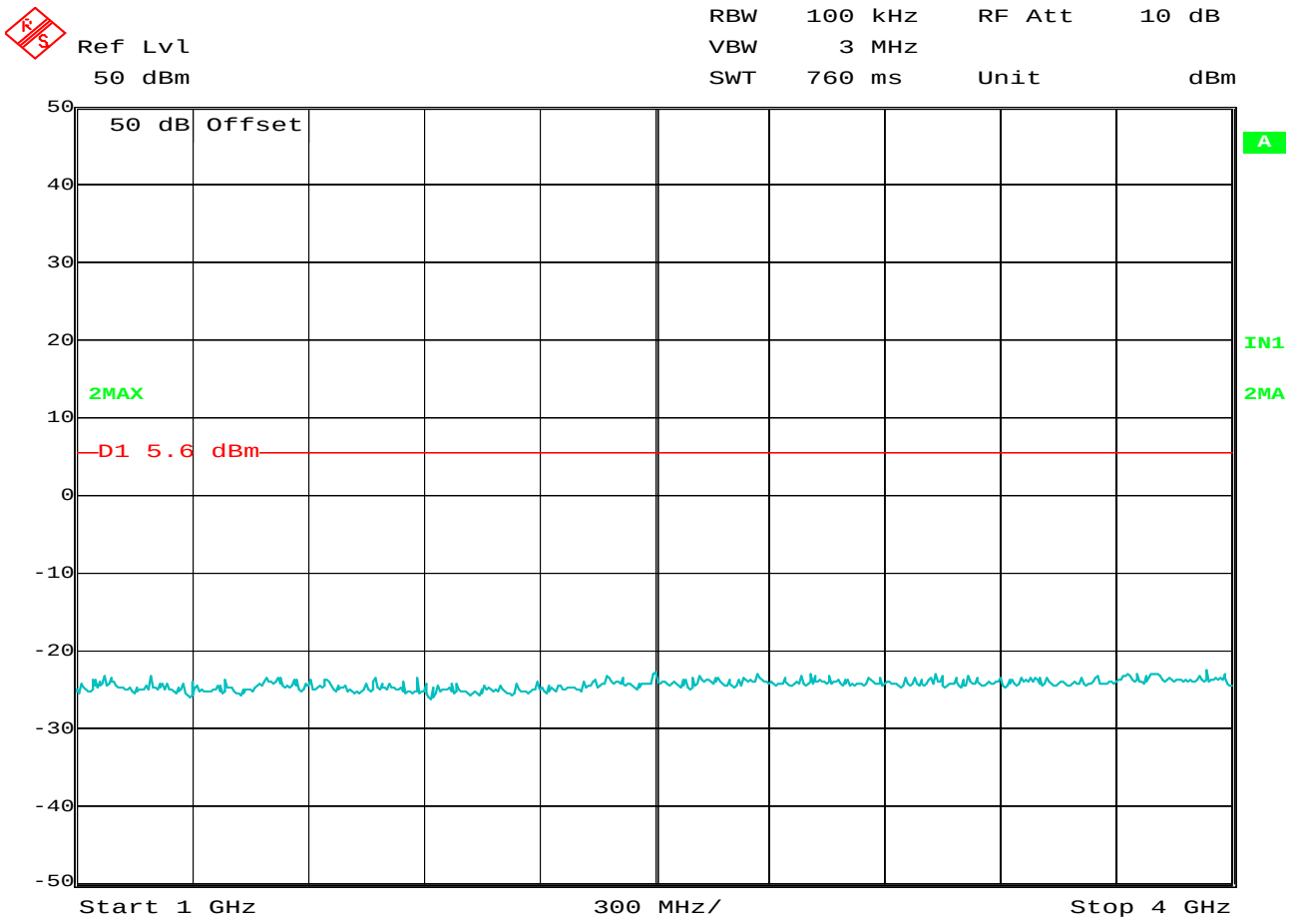


Date: 21.MAY.2007 21:42:28

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 902.2MHz
TEST PARAMETERS : Spurious RF Conducted Emissions
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

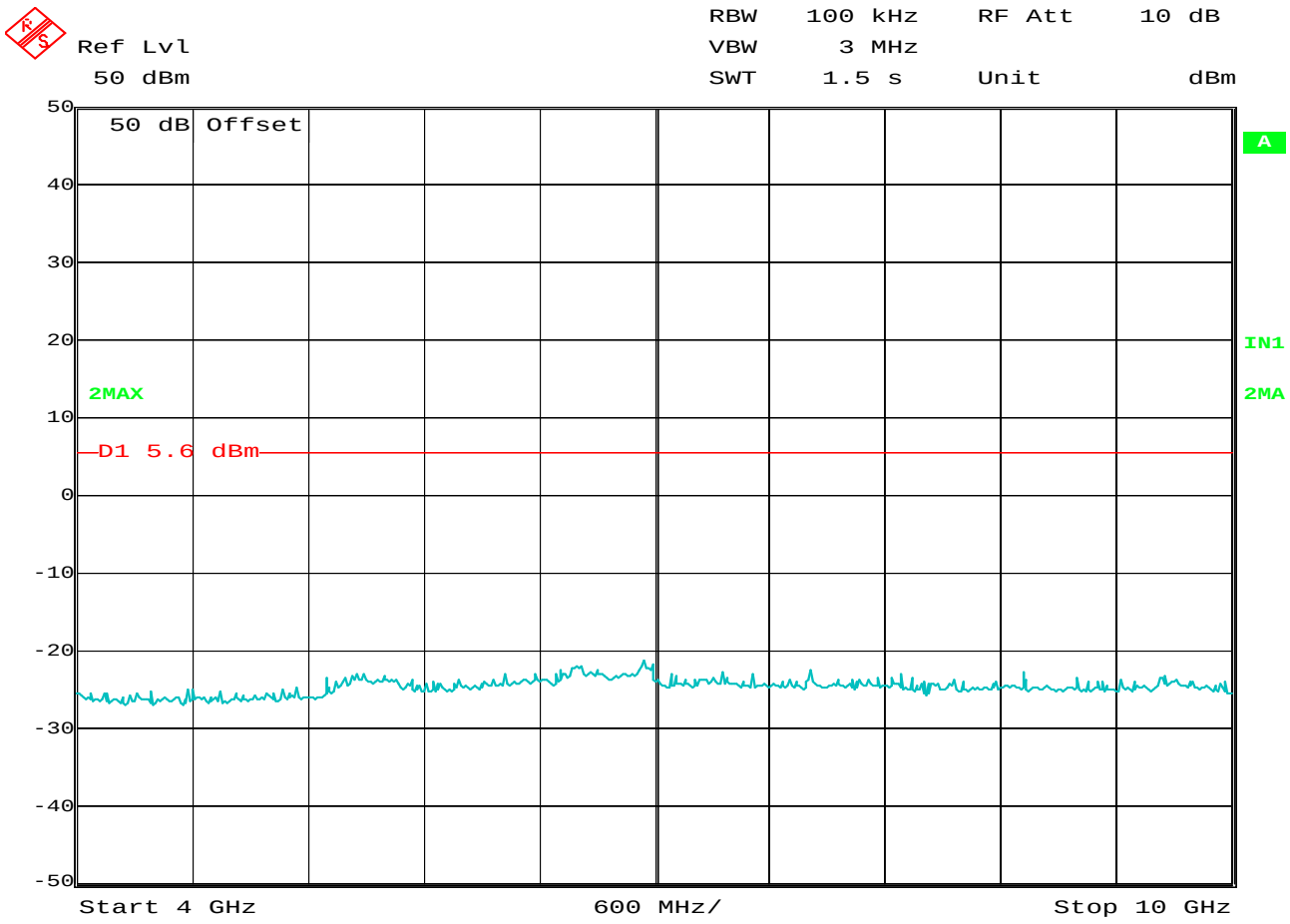


Date: 21.MAY.2007 21:48:01

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 902.2MHz
TEST PARAMETERS : Spurious RF Conducted Emissions
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

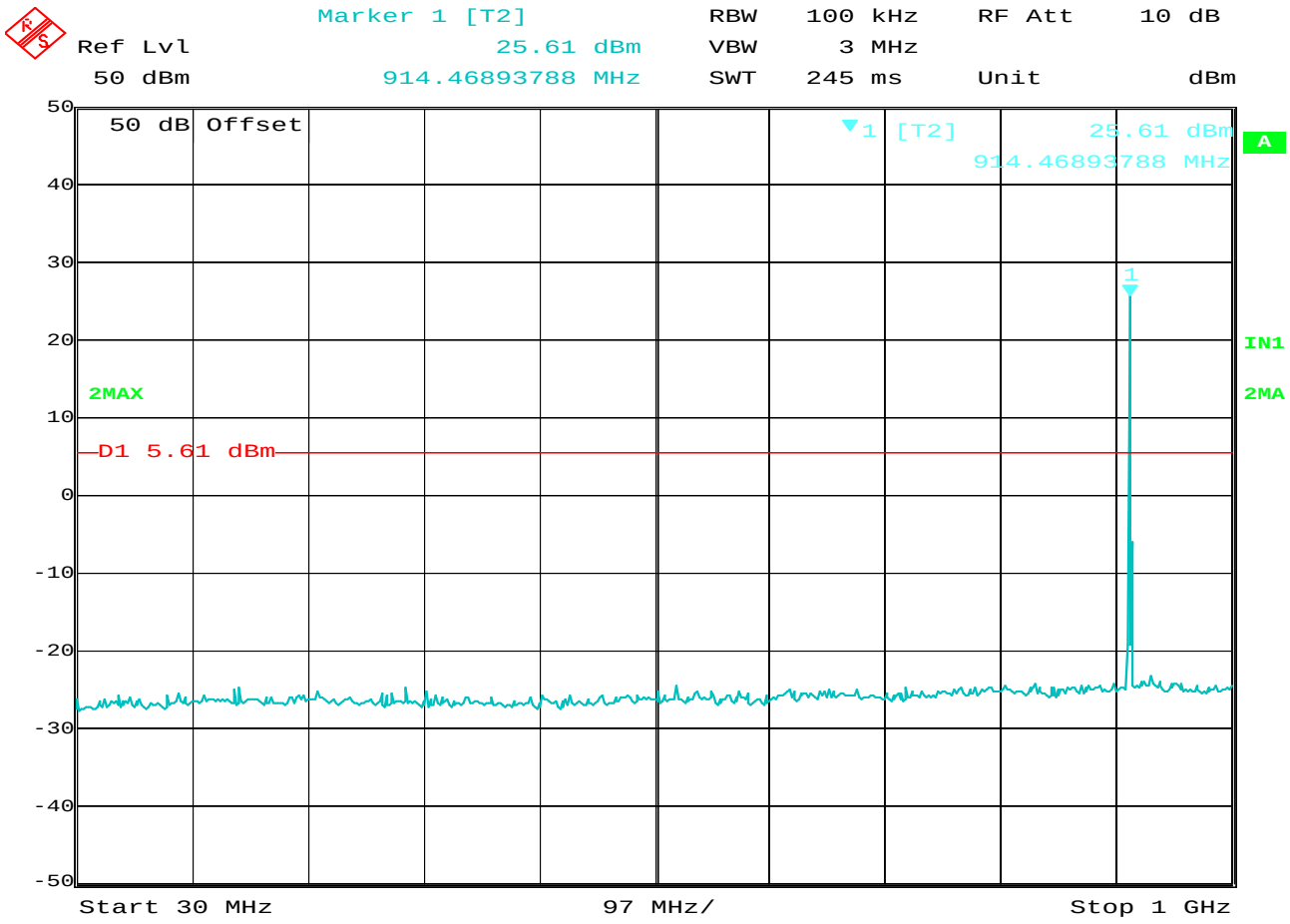


Date: 21.MAY.2007 21:49:28

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 902.2MHz
TEST PARAMETERS : Spurious RF Conducted Emissions
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

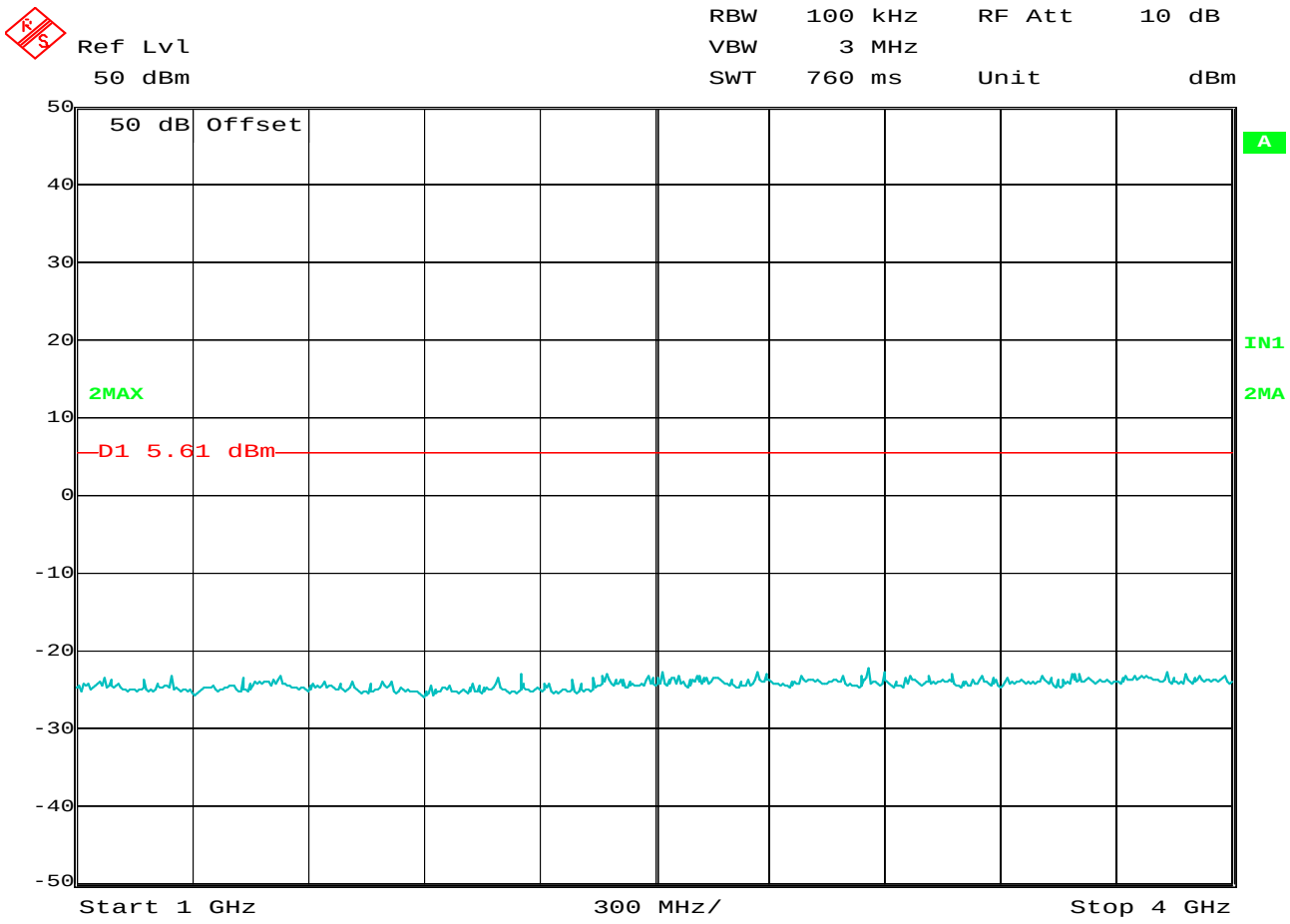


Date: 21.MAY.2007 21:53:18

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 914MHz
TEST PARAMETERS : Spurious RF Conducted Emissions
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

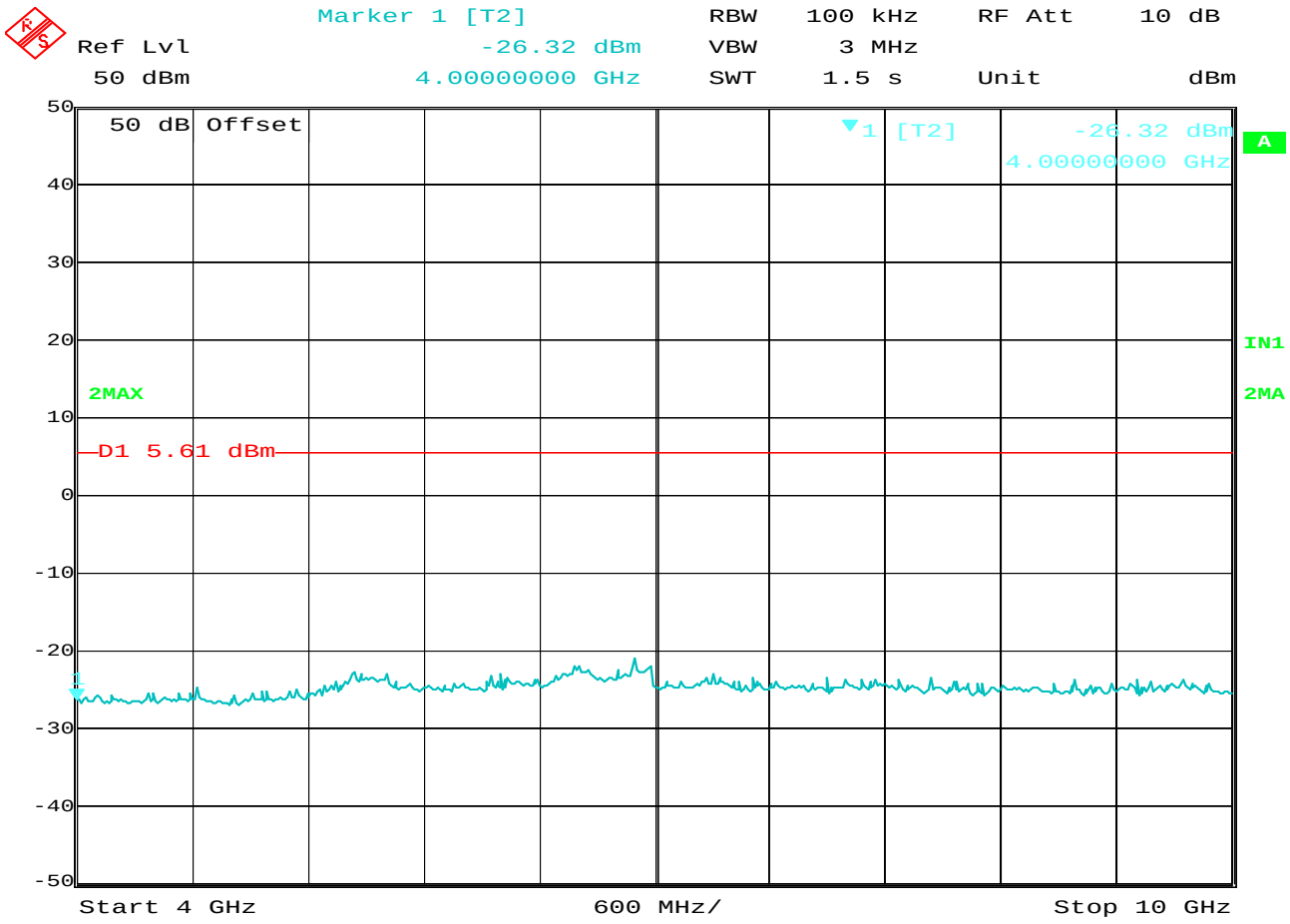


Date: 21.MAY.2007 21:55:21

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 914MHz
TEST PARAMETERS : Spurious RF Conducted Emissions
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

NOTES

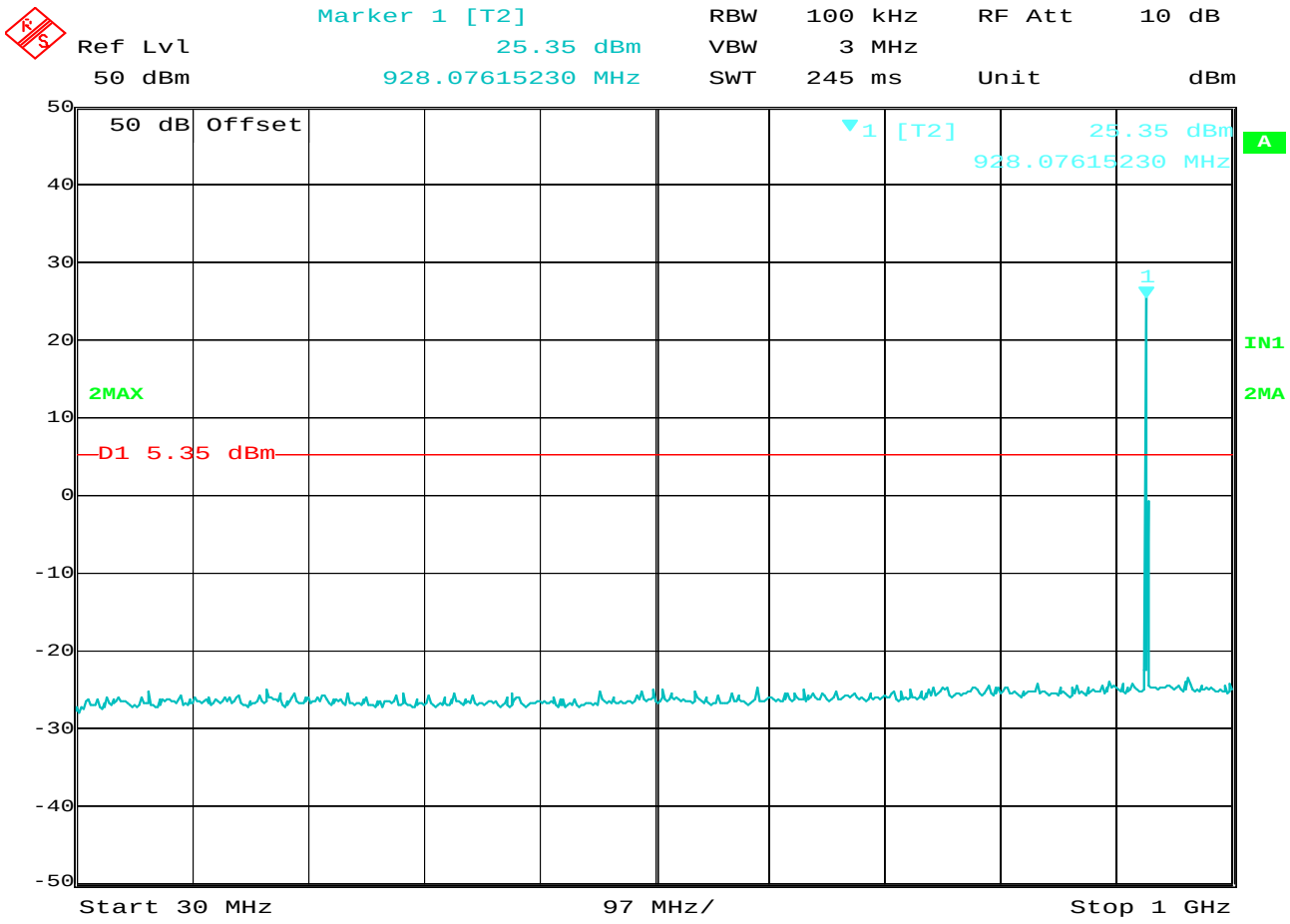


Date: 21.MAY.2007 21:56:34

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Transmit @ 914MHz
TEST PARAMETERS	: Spurious RF Conducted Emissions
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

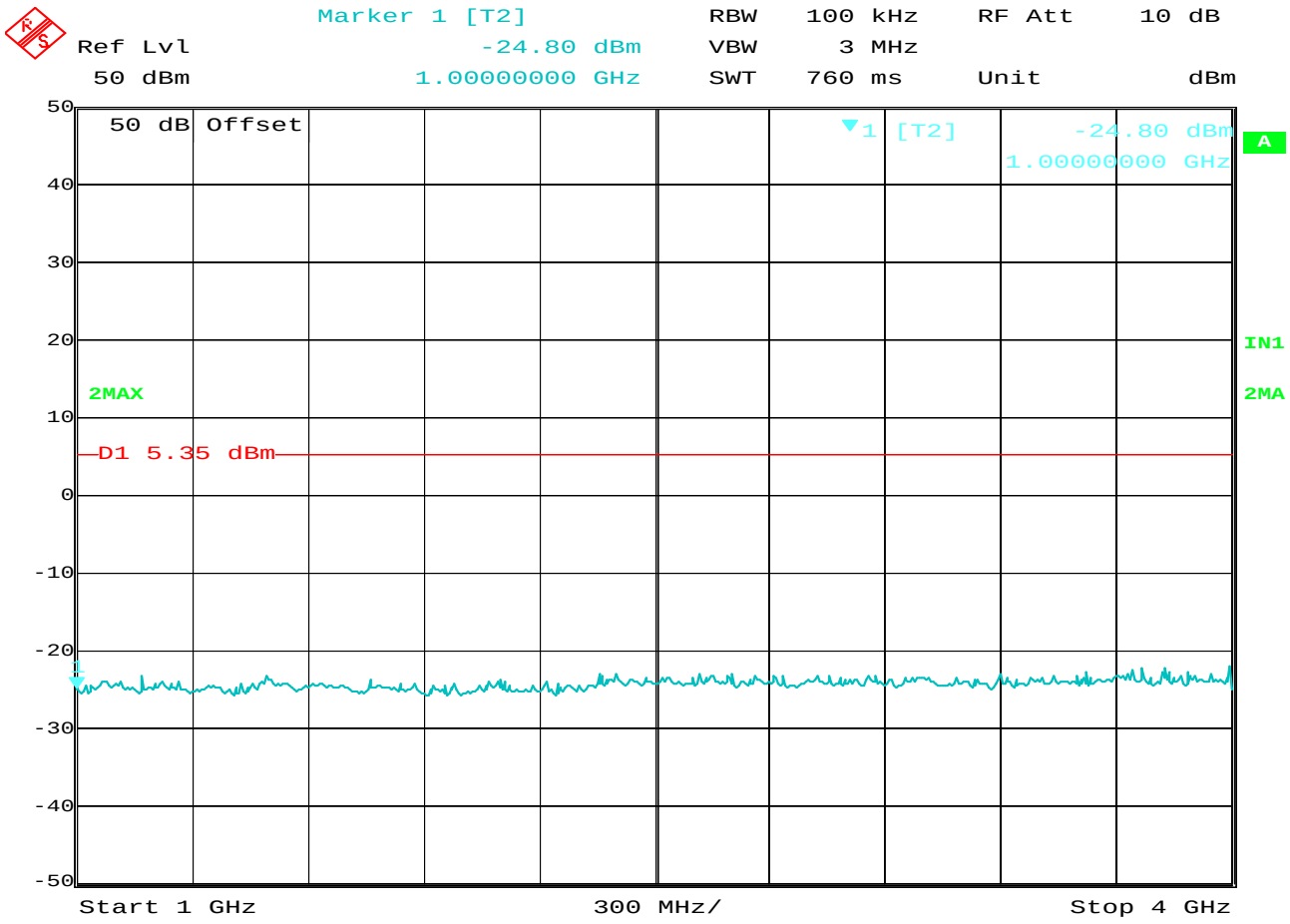


Date: 21.MAY.2007 22:09:01

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Transmit @ 927.8MHz
TEST PARAMETERS	: Spurious RF Conducted Emissions
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

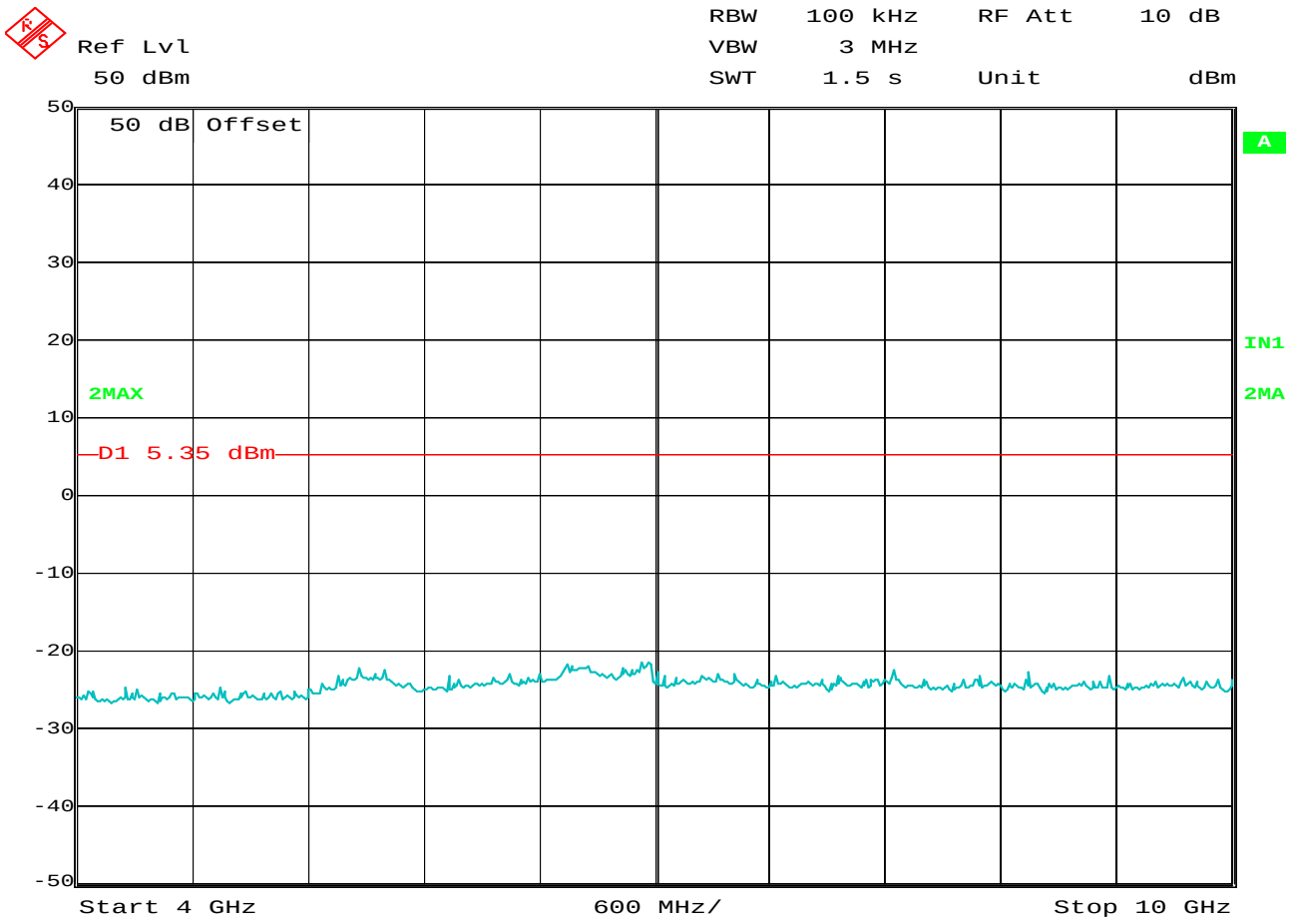


Date: 21.MAY.2007 22:11:32

FCC 15.247 Spurious RF Conducted Emissions

MANUFACTURER	: Strong M
PRODUCT NAME	: UHF RFID Reader/Writer
MODEL NUMBER	: ST-RF 1000G V3
SERIAL NUMBER	: 1
TEST MODE	: Transmit @ 927.8MHz
TEST PARAMETERS	: Spurious RF Conducted Emissions
NOTES	: 27dBm power setting
EQUIPMENT USED	: RBB0, T1E1, T2DN, T2S5

NOTES

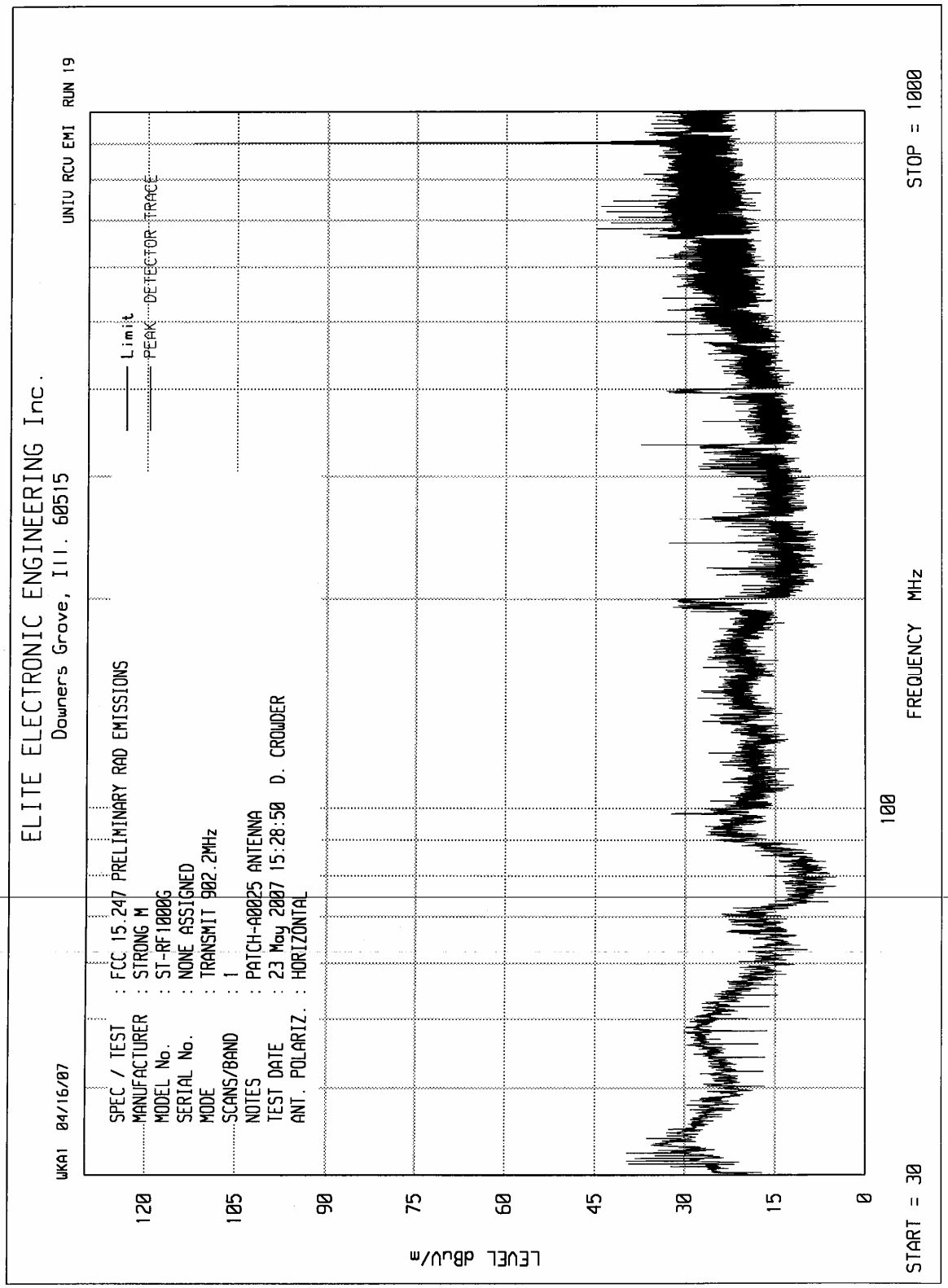


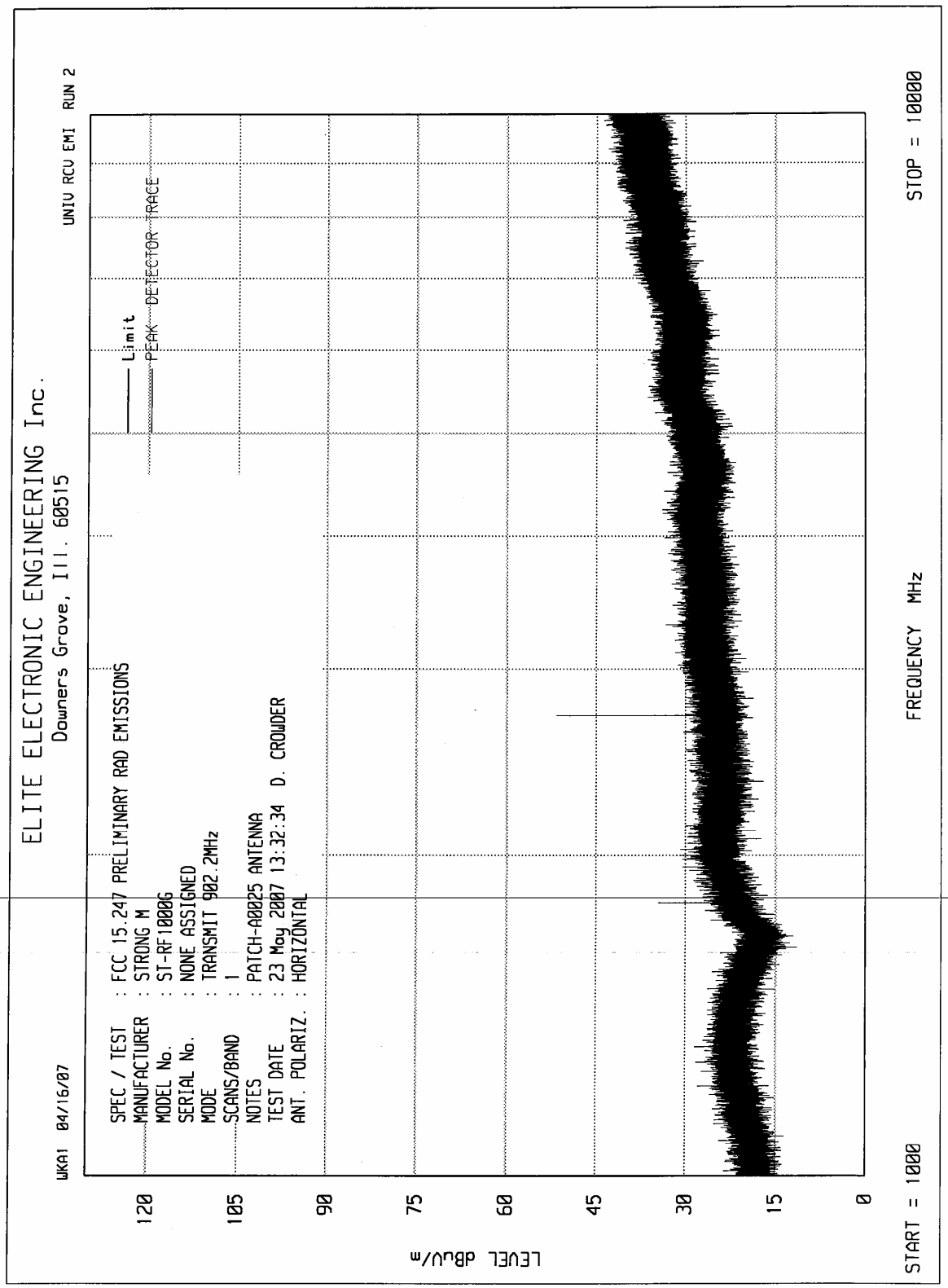
Date: 21.MAY.2007 22:14:35

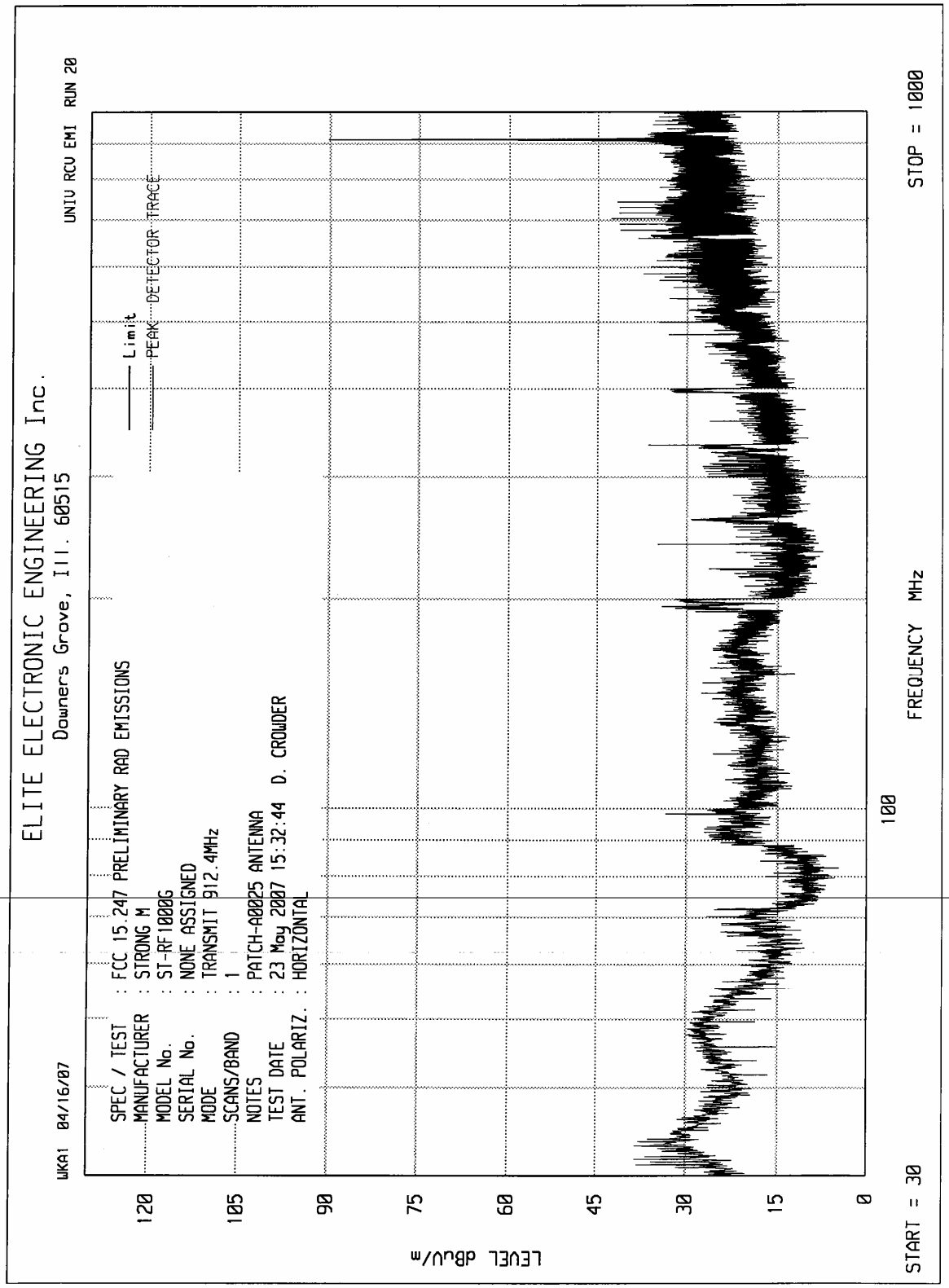
FCC 15.247 Spurious RF Conducted Emissions

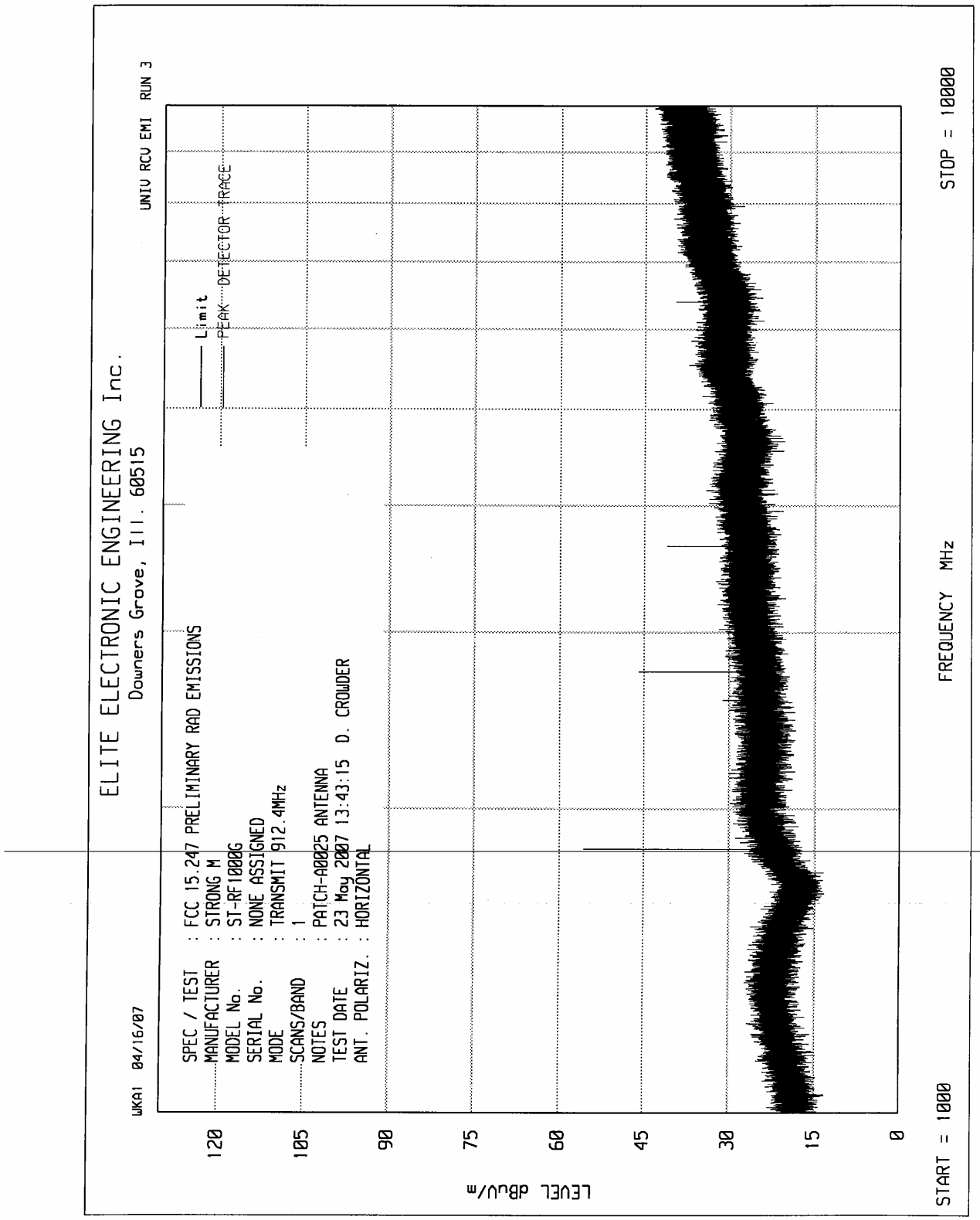
MANUFACTURER : Strong M
PRODUCT NAME : UHF RFID Reader/Writer
MODEL NUMBER : ST-RF 1000G V3
SERIAL NUMBER : 1
TEST MODE : Transmit @ 927.8MHz
TEST PARAMETERS : Spurious RF Conducted Emissions
NOTES : 27dBm power setting
EQUIPMENT USED : RBB0, T1E1, T2DN, T2S5

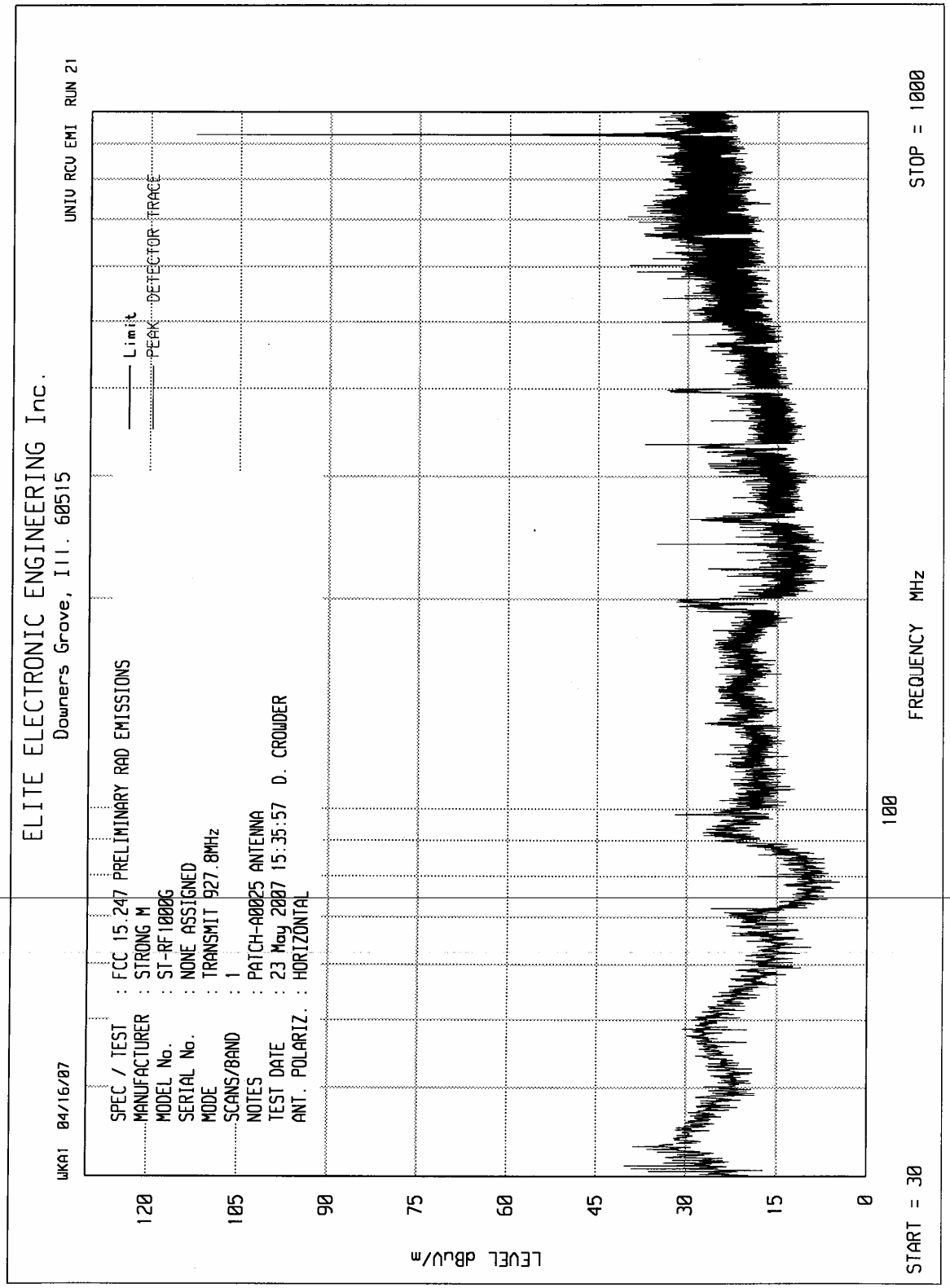
NOTES

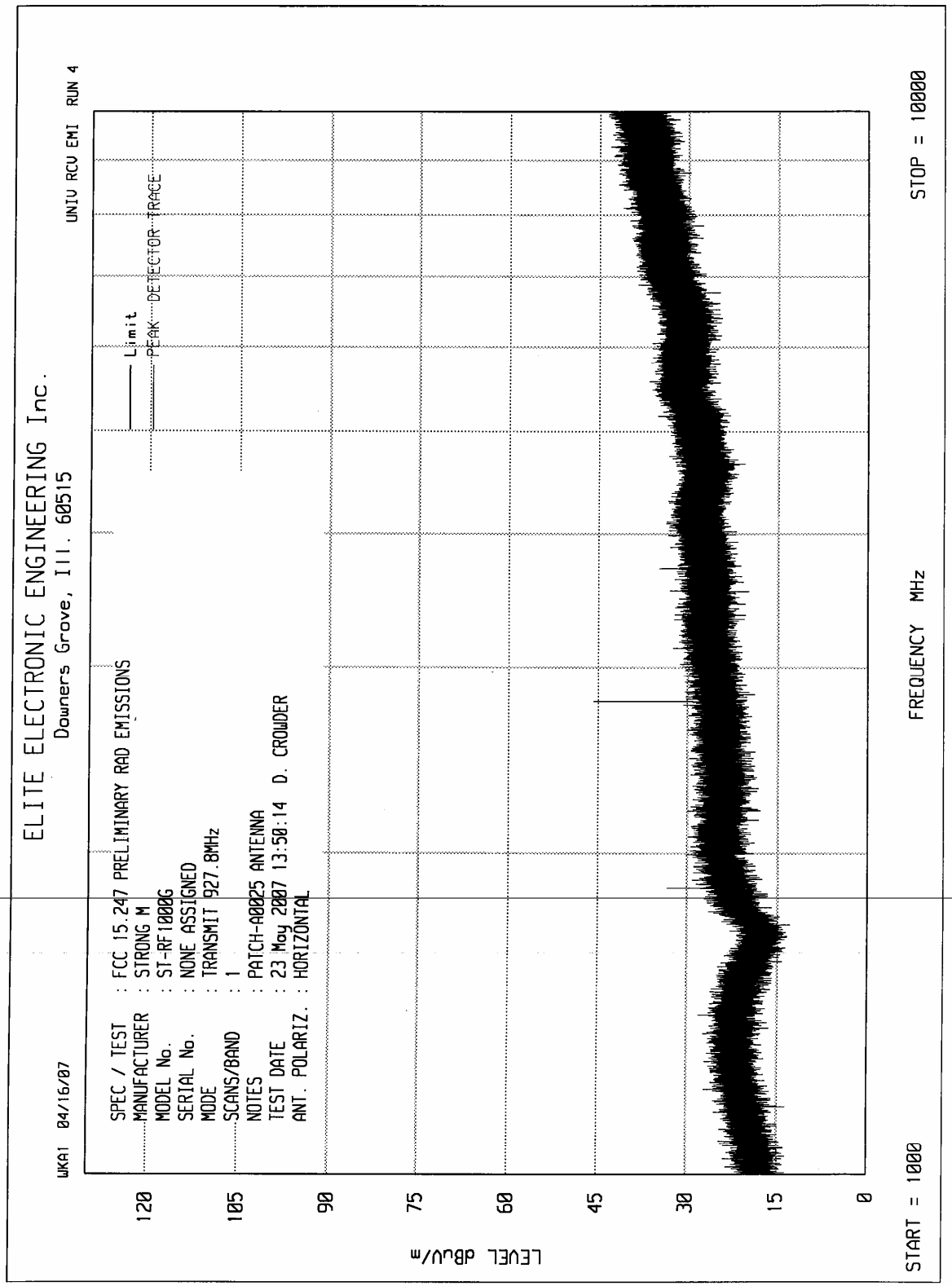

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 19
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 902.2MHz
SCANS/BAND : 1
NOTES : PATCH-A0025 ANTENNA
TEST DATE : 23 May 2007 15:28:50 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF10006
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 902.2MHz
SCANS/BAND : 1
NOTES : PATCH-A0025 ANTENNA
TEST DATE : 23 May 2007 13:32:34 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 20
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 912.4MHz
SCANS/BAND : 1
NOTES : PATCH-A0025 ANTENNA
TEST DATE : 23 May 2007 15:32:44 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 912.4MHz
SCANS/BAND : 1
NOTES : PATCH-A0025 ANTENNA
TEST DATE : 23 May 2007 13:43:15 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 21
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 927.8MHz
SCANS/BAND : 1
NOTES : PATCH-A0025 ANTENNA
TEST DATE : 23 May 2007 15:35:57 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF10006
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 927.8MHz
SCANS/BAND : 1
NOTES : PATCH-A0025 ANTENNA
TEST DATE : 23 May 2007 13:50:14 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 902.2MHz with Patch-A0025 Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Peak Total dBuV/m	Peak Total uV/m	Peak Limit uV/m
2706.60	H	67.8		3.7	31.4	-40.3	62.6	1342.2	5000.0
2706.60	V	64.4		3.7	31.4	-40.3	59.2	907.4	5000.0
3608.80	H	51.0	Ambient	4.4	32.5	-40.1	47.7	243.3	5000.0
3608.80	V	49.9	Ambient	4.4	32.5	-40.1	46.6	214.3	5000.0
4511.00	H	50.5	Ambient	4.8	32.8	-40.0	48.2	256.5	5000.0
4511.00	V	49.5	Ambient	4.8	32.8	-40.0	47.2	228.6	5000.0
5413.20	H	53.0	Ambient	5.2	35.2	-40.1	53.4	465.8	5000.0
5413.20	V	52.7	Ambient	5.2	35.2	-40.1	53.1	450.0	5000.0
8119.80	H	51.4	Ambient	7.1	37.6	-39.6	56.5	668.4	5000.0
8119.80	V	51.0	Ambient	7.1	37.6	-39.6	56.1	638.4	5000.0
9022.00	H	50.8	Ambient	7.5	37.9	-39.1	57.1	720.1	5000.0
9022.00	V	50.6	Ambient	7.5	37.9	-39.1	56.9	703.7	5000.0

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 902.2MHz with Patch-A0025 Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Total uV/m	Average Limit uV/m
2706.60	H	67.8		3.7	31.4	-40.3	-23.6	39.0	88.7	500.0
2706.60	V	64.4		3.7	31.4	-40.3	-23.6	35.6	60.0	500.0
3608.80	H	51.0		4.4	32.5	-40.1	-23.6	24.1	16.1	500.0
3608.80	V	49.9	Ambient	4.4	32.5	-40.1	-23.6	23.0	14.2	500.0
4511.00	H	50.5	Ambient	4.8	32.8	-40.0	-23.6	24.6	16.9	500.0
4511.00	V	49.5	Ambient	4.8	32.8	-40.0	-23.6	23.6	15.1	500.0
5413.20	H	53.0	Ambient	5.2	35.2	-40.1	-23.6	29.8	30.8	500.0
5413.20	V	52.7	Ambient	5.2	35.2	-40.1	-23.6	29.5	29.7	500.0
8119.80	H	51.4	Ambient	7.1	37.6	-39.6	-23.6	32.9	44.2	500.0
8119.80	V	51.0	Ambient	7.1	37.6	-39.6	-23.6	32.5	42.2	500.0
9022.00	H	50.8	Ambient	7.5	37.9	-39.1	-23.6	33.5	47.6	500.0
9022.00	V	50.6	Ambient	7.5	37.9	-39.1	-23.6	33.3	46.5	500.0

V – Vertical

H – Horizontal

Average Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain + Duty Cycle Correction Factor

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 912.4MHz with Patch-A0025 Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Peak Total dBuV/m	Peak Total uV/m	Peak Limit uV/m
2737.20	H	68.3		3.7	31.4	-40.3	63.1	1421.7	5000.0
2737.20	V	66.1		3.7	31.4	-40.3	60.9	1103.6	5000.0
3649.60	H	53.0	Ambient	4.4	32.5	-40.1	49.7	306.2	5000.0
3649.60	V	52.3	Ambient	4.4	32.5	-40.1	49.0	282.5	5000.0
4562.00	H	48.0	Ambient	4.8	32.8	-40.0	45.7	192.4	5000.0
4562.00	V	48.8	Ambient	4.8	32.8	-40.0	46.5	210.9	5000.0
7299.20	H	54.6	Ambient	6.6	37.5	-39.8	59.0	890.6	5000.0
7299.20	V	54.1	Ambient	6.6	37.5	-39.8	58.5	840.8	5000.0
8211.60	H	55.4	Ambient	7.1	37.6	-39.6	60.5	1059.4	5000.0
8211.60	V	54.5	Ambient	7.1	37.6	-39.6	59.6	955.1	5000.0
9124.00	H	54.2	Ambient	7.5	37.9	-39.1	60.5	1065.1	5000.0
9124.00	V	54.0	Ambient	7.5	37.9	-39.1	60.3	1040.9	5000.0

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 912.4MHz with Patch-A0025 Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Total uV/m	Average Limit uV/m
2737.20	H	68.3		3.7	31.4	-40.3	-23.6	39.5	93.9	500.0
2737.20	V	66.1		3.7	31.4	-40.3	-23.6	37.3	72.9	500.0
3649.60	H	53.0	Ambient	4.4	32.5	-40.1	-23.6	26.1	20.2	500.0
3649.60	V	52.3	Ambient	4.4	32.5	-40.1	-23.6	25.4	18.7	500.0
4562.00	H	48.0	Ambient	4.8	32.8	-40.0	-23.6	22.1	12.7	500.0
4562.00	V	48.8	Ambient	4.8	32.8	-40.0	-23.6	22.9	13.9	500.0
7299.20	H	54.6	Ambient	6.6	37.5	-39.8	-23.6	35.4	58.8	500.0
7299.20	V	54.1	Ambient	6.6	37.5	-39.8	-23.6	34.9	55.6	500.0
8211.60	H	55.4	Ambient	7.1	37.6	-39.6	-23.6	36.9	70.0	500.0
8211.60	V	54.5	Ambient	7.1	37.6	-39.6	-23.6	36.0	63.1	500.0
9124.00	H	54.2	Ambient	7.5	37.9	-39.1	-23.6	36.9	70.4	500.0
9124.00	V	54.0	Ambient	7.5	37.9	-39.1	-23.6	36.7	68.8	500.0

V – Vertical

H – Horizontal

Average Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain + Duty Cycle Correction Factor

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 927.8MHz with Patch-A0025 Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Peak Total dBuV/m	Peak Total uV/m	Peak Limit uV/m
2783.40	H	63.1		3.7	31.4	-40.3	57.9	781.3	5000.0
2783.40	V	61.9		3.7	31.4	-40.3	56.7	680.5	5000.0
3711.20	H	53.7	Ambient	4.4	32.5	-40.1	50.4	331.9	5000.0
3711.20	V	53.1	Ambient	4.4	32.5	-40.1	49.8	309.8	5000.0
4639.00	H	48.8	Ambient	4.8	32.8	-40.0	46.5	210.9	5000.0
4639.00	V	48.7	Ambient	4.8	32.8	-40.0	46.4	208.5	5000.0
7422.40	H	51.4	Ambient	6.6	37.5	-39.8	55.8	616.1	5000.0
7422.40	V	52.7	Ambient	6.6	37.5	-39.8	57.1	715.6	5000.0
8350.20	H	50.5	Ambient	7.1	37.6	-39.6	55.6	602.6	5000.0
8350.20	V	51.2	Ambient	7.1	37.6	-39.6	56.3	653.2	5000.0

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 927.8MHz with Patch-A0025 Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

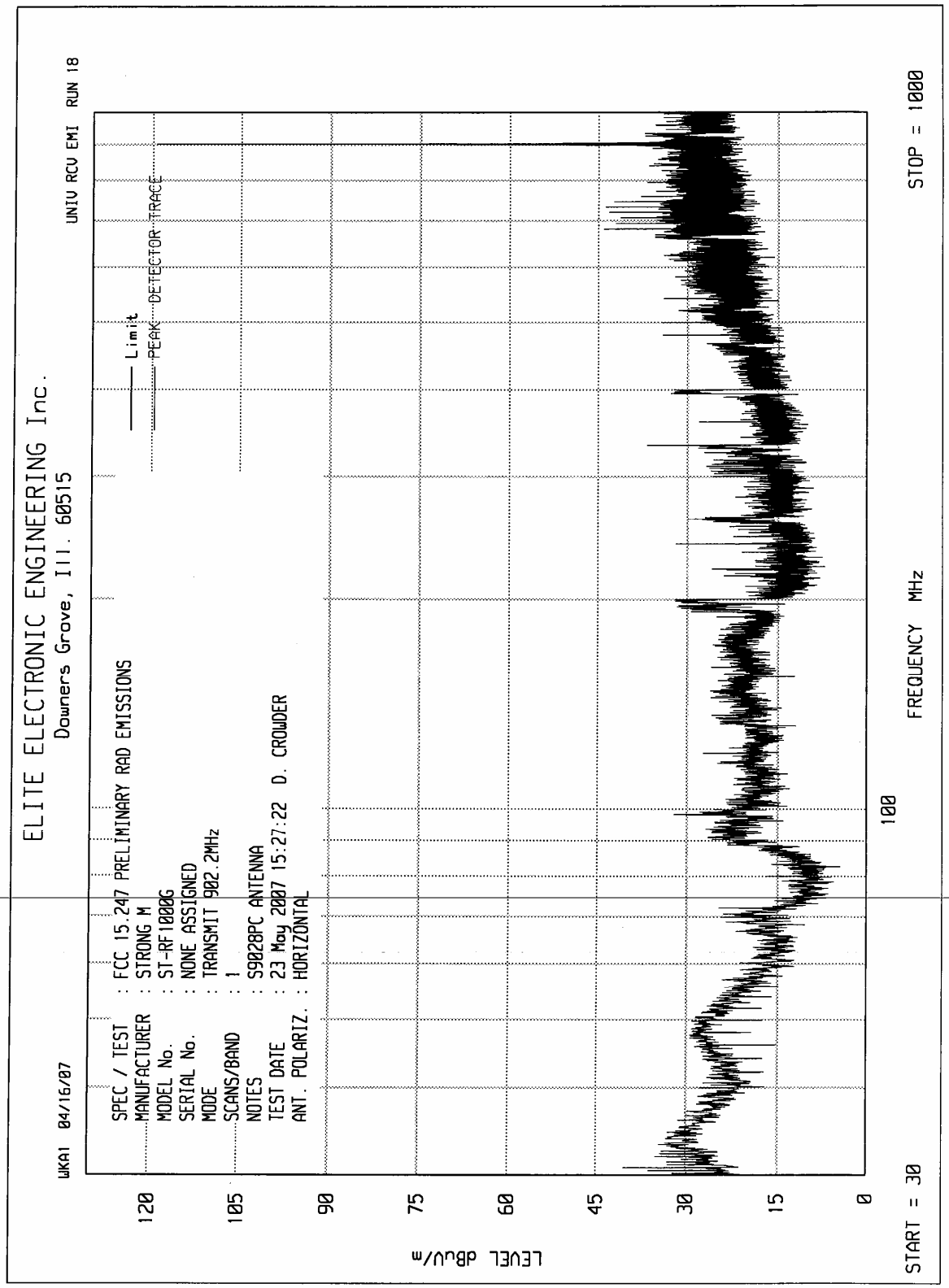
Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Total uV/m	Average Limit uV/m
2783.40	H	63.1		3.7	31.4	-40.3	-23.6	34.3	51.6	500.0
2783.40	V	61.9		3.7	31.4	-40.3	-23.6	33.1	45.0	500.0
3711.20	H	53.7		4.4	32.5	-40.1	-23.6	26.8	21.9	500.0
3711.20	V	53.1		4.4	32.5	-40.1	-23.6	26.2	20.5	500.0
4639.00	H	48.8	Ambient	4.8	32.8	-40.0	-23.6	22.9	13.9	500.0
4639.00	V	48.7	Ambient	4.8	32.8	-40.0	-23.6	22.8	13.8	500.0
7422.40	H	51.4	Ambient	6.6	37.5	-39.8	-23.6	32.2	40.7	500.0
7422.40	V	52.7	Ambient	6.6	37.5	-39.8	-23.6	33.5	47.3	500.0
8350.20	H	50.5	Ambient	7.1	37.6	-39.6	-23.6	32.0	39.8	500.0
8350.20	V	51.2	Ambient	7.1	37.6	-39.6	-23.6	32.7	43.2	500.0

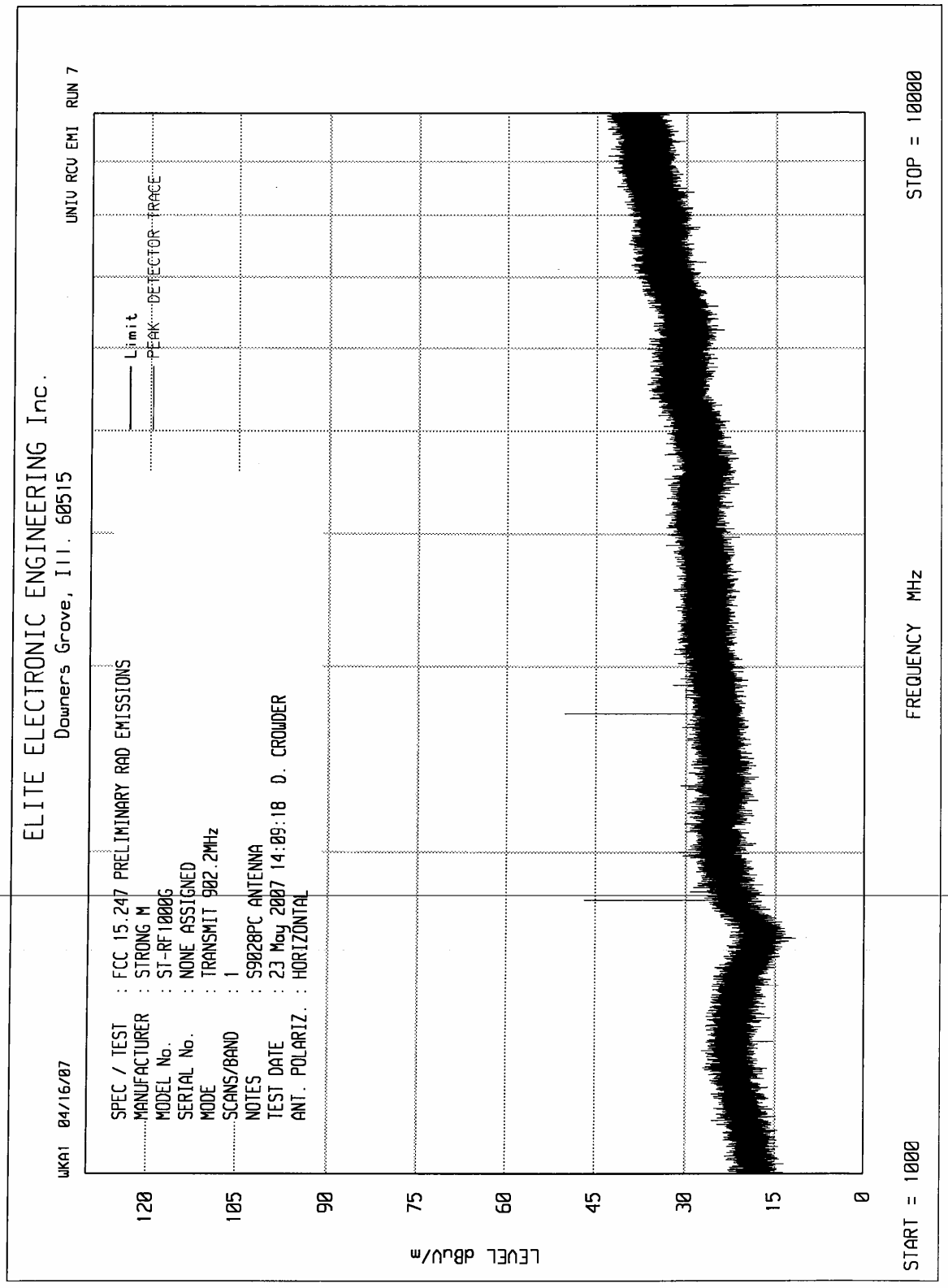
V – Vertical

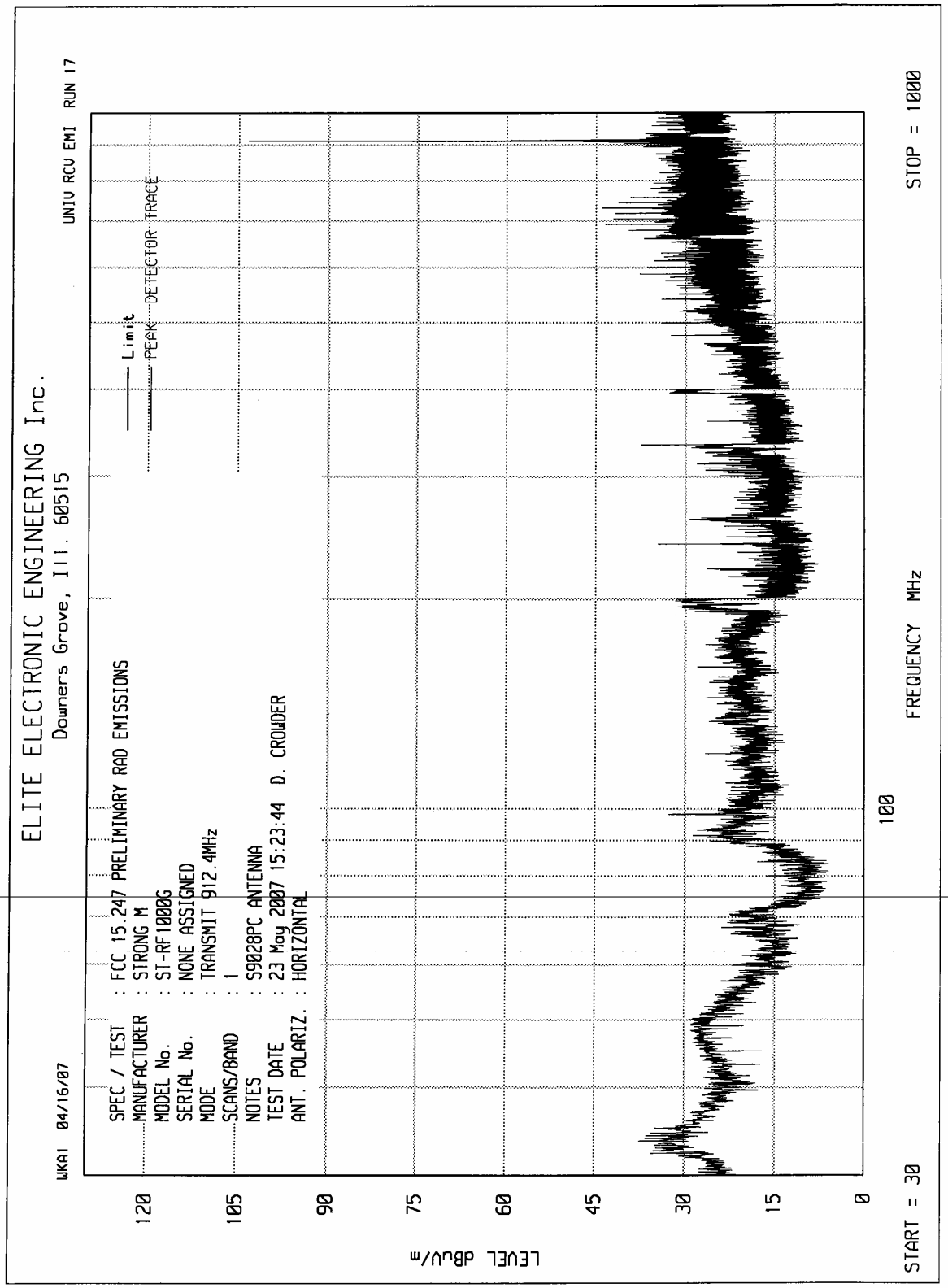
H – Horizontal

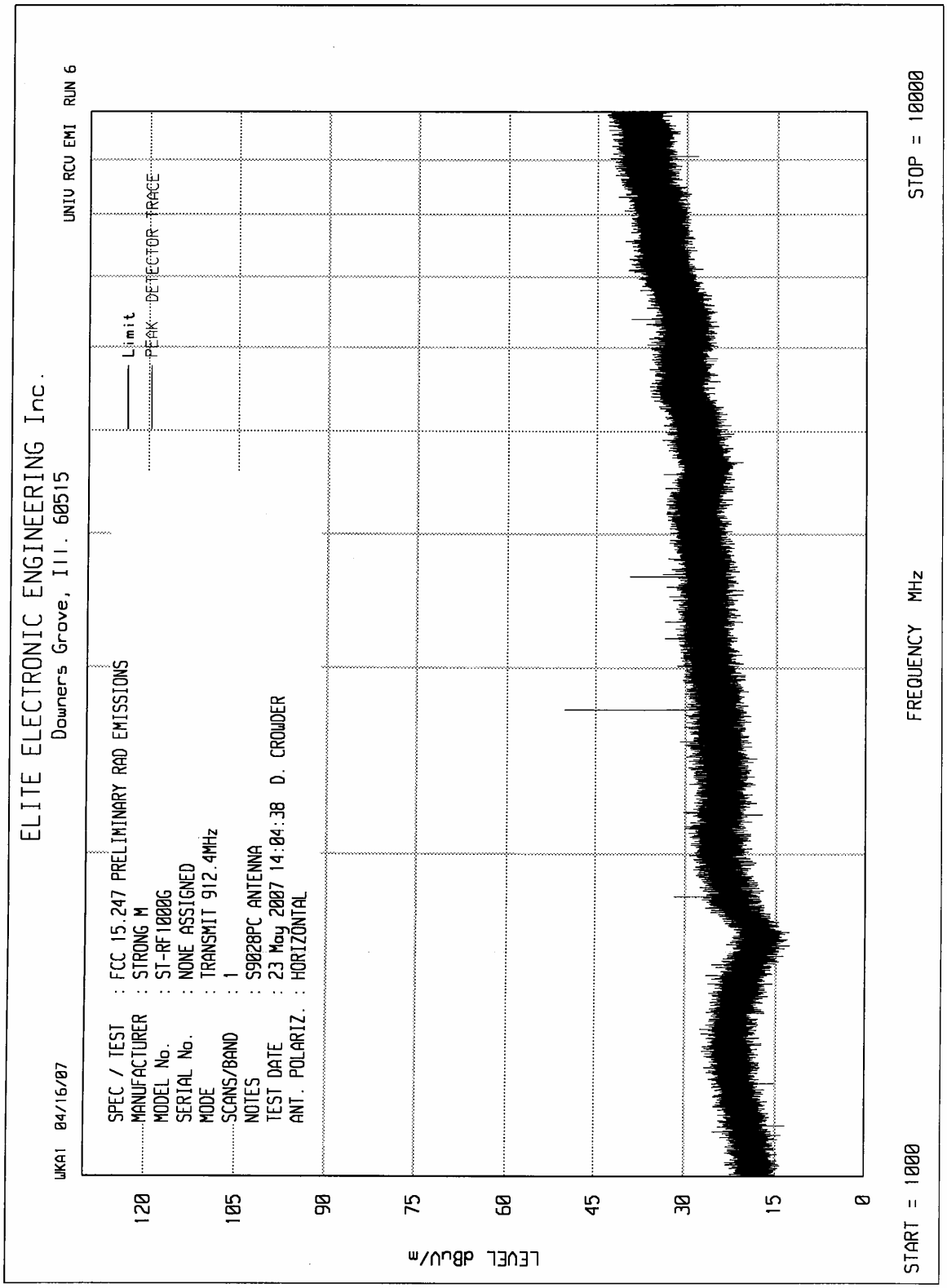
Average Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain + Duty Cycle Correction Factor

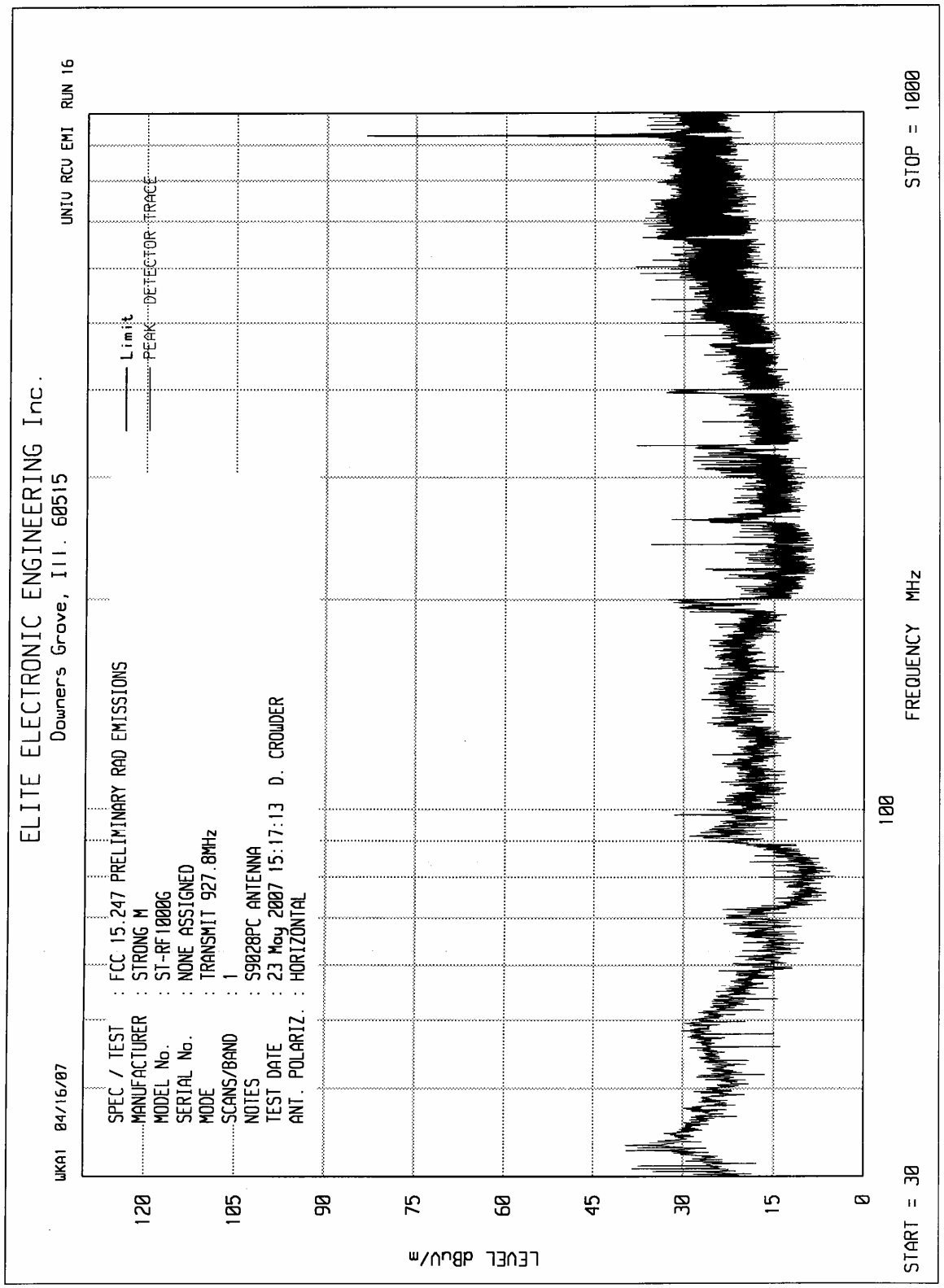
Checked By : MARK E. LONGINOTTI

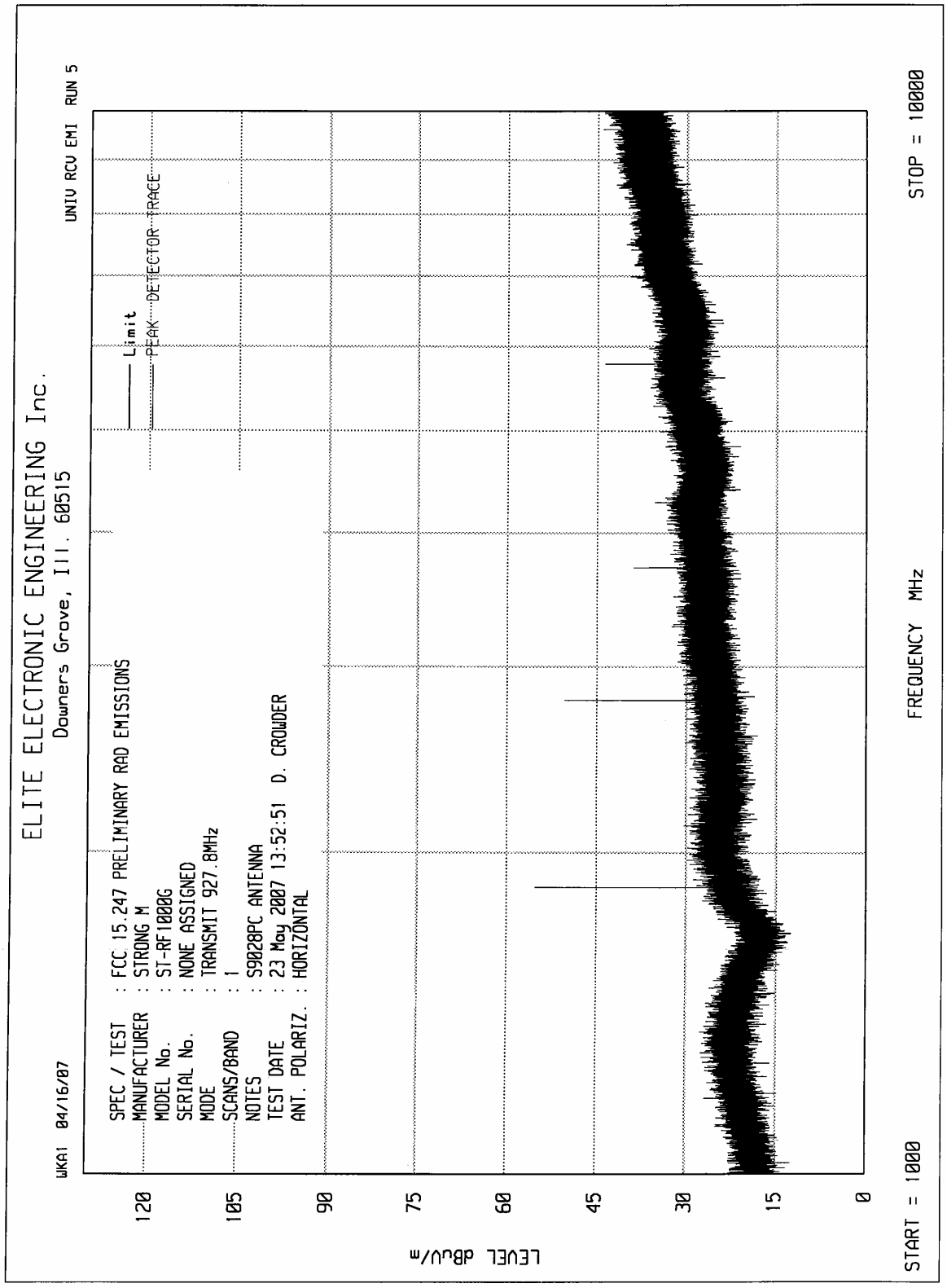

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 18
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 902.2MHz
SCANS/BAND : 1
NOTES : S9028PC ANTENNA
TEST DATE : 23 May 2007 15:27:22 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 902.2MHz
SCANS/BAND : 1
NOTES : S9020PC ANTENNA
TEST DATE : 23 May 2007 14:09:18 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 17
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 912.4MHz
SCANS/BAND : 1
NOTES : S902BPC ANTENNA
TEST DATE : 23 May 2007 15:23:44 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 912.4MHz
SCANS/BAND : 1
NOTES : S9028PC ANTENNA
TEST DATE : 23 May 2007 14:04:38 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 16
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 927.8MHz
SCANS/BAND : 1
NOTES : S9028PC ANTENNA
TEST DATE : 23 May 2007 15:17:13 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/16/07
SPEC / TEST : FCC 15.247 PRELIMINARY RAD EMISSIONS
MANUFACTURER : STRONG M
MODEL No. : ST-RF1000G
SERIAL No. : NONE ASSIGNED
MODE : TRANSMIT 927.8MHz
SCANS/BAND : 1
NOTES : S9028PC ANTENNA
TEST DATE : 23 May 2007 13:52:51 D. CROWDER
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 902.2MHz with S9028PC Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Peak Total dBuV/m	Peak Total uV/m	Peak Limit uV/m
2706.60	H	67.8		3.7	31.4	-40.3	62.6	1342.2	5000.0
2706.60	V	64.4		3.7	31.4	-40.3	59.2	907.4	5000.0
3608.80	H	51.0	Ambient	4.4	32.5	-40.1	47.7	243.3	5000.0
3608.80	V	49.9	Ambient	4.4	32.5	-40.1	46.6	214.3	5000.0
4511.00	H	50.5	Ambient	4.8	32.8	-40.0	48.2	256.5	5000.0
4511.00	V	49.5	Ambient	4.8	32.8	-40.0	47.2	228.6	5000.0
5413.20	H	53.0	Ambient	5.2	35.2	-40.1	53.4	465.8	5000.0
5413.20	V	52.7	Ambient	5.2	35.2	-40.1	53.1	450.0	5000.0
8119.80	H	51.4	Ambient	7.1	37.6	-39.6	56.5	668.4	5000.0
8119.80	V	51.0	Ambient	7.1	37.6	-39.6	56.1	638.4	5000.0
9022.00	H	50.8	Ambient	7.5	37.9	-39.1	57.1	720.1	5000.0
9022.00	V	50.6	Ambient	7.5	37.9	-39.1	56.9	703.7	5000.0

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 902.2MHz with S9028PC Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Total uV/m	Average Limit uV/m
2706.60	H	67.8		3.7	31.4	-40.3	-23.6	39.0	88.7	500.0
2706.60	V	64.4		3.7	31.4	-40.3	-23.6	35.6	60.0	500.0
3608.80	H	51.0		4.4	32.5	-40.1	-23.6	24.1	16.1	500.0
3608.80	V	49.9	Ambient	4.4	32.5	-40.1	-23.6	23.0	14.2	500.0
4511.00	H	50.5	Ambient	4.8	32.8	-40.0	-23.6	24.6	16.9	500.0
4511.00	V	49.5	Ambient	4.8	32.8	-40.0	-23.6	23.6	15.1	500.0
5413.20	H	53.0	Ambient	5.2	35.2	-40.1	-23.6	29.8	30.8	500.0
5413.20	V	52.7	Ambient	5.2	35.2	-40.1	-23.6	29.5	29.7	500.0
8119.80	H	51.4	Ambient	7.1	37.6	-39.6	-23.6	32.9	44.2	500.0
8119.80	V	51.0	Ambient	7.1	37.6	-39.6	-23.6	32.5	42.2	500.0
9022.00	H	50.8	Ambient	7.5	37.9	-39.1	-23.6	33.5	47.6	500.0
9022.00	V	50.6	Ambient	7.5	37.9	-39.1	-23.6	33.3	46.5	500.0

V – Vertical

H – Horizontal

Average Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain + Duty Cycle Correction Factor

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 912.4MHz with S9028PC Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Peak Total dBuV/m	Peak Total uV/m	Peak Limit uV/m
2737.20	H	75.2		3.7	31.4	-40.3	70.0	3146.4	5000.0
2737.20	V	73.5		3.7	31.4	-40.3	68.3	2587.1	5000.0
3649.60	H	62.5		4.4	32.5	-40.1	59.2	914.2	5000.0
3649.60	V	60.0	Ambient	4.4	32.5	-40.1	56.7	685.6	5000.0
4562.00	H	59.4	Ambient	4.8	32.8	-40.0	57.1	714.7	5000.0
4562.00	V	59.1	Ambient	4.8	32.8	-40.0	56.8	690.4	5000.0
7299.20	H	54.6	Ambient	6.6	37.5	-39.8	59.0	890.6	5000.0
7299.20	V	54.1	Ambient	6.6	37.5	-39.8	58.5	840.8	5000.0
8211.60	H	55.4	Ambient	7.1	37.6	-39.6	60.5	1059.4	5000.0
8211.60	V	54.5	Ambient	7.1	37.6	-39.6	59.6	955.1	5000.0
9124.00	H	54.2	Ambient	7.5	37.9	-39.1	60.5	1065.1	5000.0
9124.00	V	54.0	Ambient	7.5	37.9	-39.1	60.3	1040.9	5000.0

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 912.4MHz with S9028PC Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Total uV/m	Average Limit uV/m
2737.20	H	75.2		3.7	31.4	-40.3	-23.6	46.4	207.9	500.0
2737.20	V	73.5		3.7	31.4	-40.3	-23.6	44.7	170.9	500.0
3649.60	H	62.5	Ambient	4.4	32.5	-40.1	-23.6	35.6	60.4	500.0
3649.60	V	60.0	Ambient	4.4	32.5	-40.1	-23.6	33.1	45.3	500.0
4562.00	H	59.4	Ambient	4.8	32.8	-40.0	-23.6	33.5	47.2	500.0
4562.00	V	59.1	Ambient	4.8	32.8	-40.0	-23.6	33.2	45.6	500.0
7299.20	H	54.6	Ambient	6.6	37.5	-39.8	-23.6	35.4	58.8	500.0
7299.20	V	54.1	Ambient	6.6	37.5	-39.8	-23.6	34.9	55.6	500.0
8211.60	H	55.4	Ambient	7.1	37.6	-39.6	-23.6	36.9	70.0	500.0
8211.60	V	54.5	Ambient	7.1	37.6	-39.6	-23.6	36.0	63.1	500.0
9124.00	H	54.2	Ambient	7.5	37.9	-39.1	-23.6	36.9	70.4	500.0
9124.00	V	54.0	Ambient	7.5	37.9	-39.1	-23.6	36.7	68.8	500.0

V – Vertical

H – Horizontal

Average Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain + Duty Cycle Correction Factor

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 927.8MHz with S9028PC Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Peak Total dBuV/m	Peak Total uV/m	Peak Limit uV/m
2783.40	H	64.2		3.7	31.4	-40.3	59.0	888.8	5000.0
2783.40	V	62.4		3.7	31.4	-40.3	57.2	720.8	5000.0
3711.20	H	54.2	Ambient	4.4	32.5	-40.1	50.9	351.6	5000.0
3711.20	V	53.6	Ambient	4.4	32.5	-40.1	50.3	328.1	5000.0
4639.00	H	51.5	Ambient	4.8	32.8	-40.0	49.2	287.8	5000.0
4639.00	V	48.7	Ambient	4.8	32.8	-40.0	46.4	208.5	5000.0
7422.40	H	51.4	Ambient	6.6	37.5	-39.8	55.8	616.1	5000.0
7422.40	V	52.7	Ambient	6.6	37.5	-39.8	57.1	715.6	5000.0
8350.20	H	50.5	Ambient	7.1	37.6	-39.6	55.6	602.6	5000.0
8350.20	V	51.2	Ambient	7.1	37.6	-39.6	56.3	653.2	5000.0

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Strong M
MODEL NO. : ST-RF 1000G
SERIAL NO. : 378833
TEST SPECIFICATION : FCC 15.247, Radiated Emissions
MODE : Transmit @ 927.8MHz with S9028PC Antenna
TEST DATE : May 23, 2007
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Preamp Gain dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Total uV/m	Average Limit uV/m
2783.40	H	64.2		3.7	31.4	-40.3	-23.6	35.4	58.7	500.0
2783.40	V	62.4		3.7	31.4	-40.3	-23.6	33.6	47.6	500.0
3711.20	H	54.2		4.4	32.5	-40.1	-23.6	27.3	23.2	500.0
3711.20	V	53.6		4.4	32.5	-40.1	-23.6	26.7	21.7	500.0
4639.00	H	51.5	Ambient	4.8	32.8	-40.0	-23.6	25.6	19.0	500.0
4639.00	V	48.7	Ambient	4.8	32.8	-40.0	-23.6	22.8	13.8	500.0
7422.40	H	51.4	Ambient	6.6	37.5	-39.8	-23.6	32.2	40.7	500.0
7422.40	V	52.7	Ambient	6.6	37.5	-39.8	-23.6	33.5	47.3	500.0
8350.20	H	50.5	Ambient	7.1	37.6	-39.6	-23.6	32.0	39.8	500.0
8350.20	V	51.2	Ambient	7.1	37.6	-39.6	-23.6	32.7	43.2	500.0

V – Vertical

H – Horizontal

Average Total = Peak Meter Reading + Cable Factor + Antenna Factor + Preamp Gain + Duty Cycle Correction Factor

Checked By : MARK E. LONGINOTTI