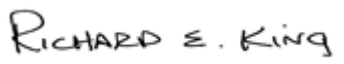




Measurement of RF Interference from an MSD9 Rev. A Multi-Band Radio Module Transceiver

For	XetaWave LLC 1668 Valtec Lane, Suite G Boulder, CO 80301
P.O. Number	120890
Date Received	August 27, 2012
Date Tested	August 27 th – September 6 th , 2012
Test Personnel	Ian Carnegie, Rick King
Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Frequency Hopping Spread Spectrum Intentional Radiators Operating within the bands 902-928MHz,

Test Report By:

 
Ian Carnegie, Rick King
EMC Engineer

Requested By:

David Greene
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Approved By:

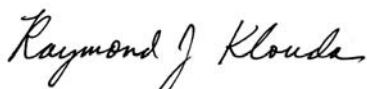

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REVISION HISTORY

Revision	Date	Description
—	26 September 2012	Initial release

**Measurement of RF Emissions from a Multi-Band Radio Module,
Part No. MSD9 Rev. A Transceiver**

1. INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on a XetaWave LLC Multi-Band Radio Module, Part No. MSD9 Rev. A, Serial No. S/N 2, transceiver (hereinafter referred to as the EUT). The EUT is a frequency hopping spread spectrum transceiver. The transceiver was designed to transmit and receive in the 902-928 MHz band using an External antenna. The EUT was tested with both a Laird Model FG9026 Omni - Directional antenna with 6dBd gain and a Radiall-Larsen Model YA5900W Yagi antenna with 12dBd gain. The EUT was manufactured and submitted for testing by XetaWave LLC located in Boulder, CO.

1.2 Purpose

The test series was performed to determine if the EUT 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, for receivers and Subpart C, Sections 15.207 and 15.249 for Intentional Radiators Operating within the 902-928 MHz band.

Testing was performed in accordance with ANSI C63.4-2009.

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 43%.

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, Subparts B and C, dated 1 October 2011
- ANSI C63.4-2009, "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"
- FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000

3. EUT SET-UP AND OPERATION

3.1 General Description

The EUT is a Multi-Band Radio Module, Part No. MSD9 Rev. A. A block diagram of the EUT setup is shown as Figure 1 and Figure 2.

3.1.1 Power Input

For test purposes, the EUT was powered by 4 VDC from a DC power supply. The EUT is typically powered by batteries.



3.1.2 Peripheral Equipment

The following peripheral equipment was submitted with the EUT:

Item	Description
Sony Viao Laptop	Model PCG-8N2L used to program the EUT

3.1.3 Interconnect Cables

The following interconnect cables were submitted with the EUT:

Item	Description
Interconnect Cable	0.5 meter, 10 wire, unshielded cable to provide power and serial connection to the EUT

3.1.4 Grounding

The EUT was ungrounded during the tests.

3.2 Operational Mode

For all tests, the EUT was placed on an 80cm high non-conductive stand. The EUT was energized. The unit was programmed to operate in one of the following modes:

- Transmit at 902.025MHz
- Transmit at 915.0MHz
- Transmit at 927.975MHz

The EUT was also programmed to operate with one of the following modulations:

- 2FSK – 57kbps
- 2FSK – 114kbps
- 2FSK – 153kbps
- 2FSK – 229kbps
- 2FSK – 365kbps

3.3 EUT Modifications

No modifications were required for compliance.

4. TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2009 for site attenuation.

4.2 Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1.

4.3 Calibration Traceability

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

4.4 Measurement Uncertainty

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

The measurement uncertainty for these tests is presented below:

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

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

5. TEST PROCEDURES

5.1 Transmitter

5.1.1 Powerline Conducted Emissions

5.1.1.1 Requirements

Since the EUT is typically powered by internal batteries and does not connect to AC power lines, conducted emissions tests are not required.

5.1.2 20dB Bandwidth

5.1.2.1 Requirements

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

5.1.2.2 Procedures

The output of the EUT was connected to the spectrum analyzer through 39.2dB of attenuation.

With the hopping function disabled, the EUT 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 $\geq 1\%$ of the 20 dB BW. The span was set to approximately 2 to 3 times the 20 dB bandwidth.

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

5.1.2.3 Results

The maximum 20 dB bandwidth for each modulation type is listed below. The plots are shown on pages 21 through 35.

Modulation Type	Max. 20dB BW
2FSK /57kbps	132.2kHz
2FSK /114kbps	123.9kHz
2FSK /153kbps	212.4kHz
2FSK /229kbps	300.6kHz
2FSK /365kbps	444.8kHz

Where the 20dB bandwidth is less than 250kHz, the system shall use at least 50 hopping channels. Where the

20dB bandwidth is 250kHz or greater, but not greater than 500kHz, the system shall use at least 25 hopping channels.

5.1.3 Carrier Frequency Separation

5.1.3.1 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.

5.1.3.2 Procedures

The output of the EUT was connected to the spectrum analyzer through 39.2dB of attenuation. With the hopping function enabled, the EUT was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to > 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.

5.1.3.3 Results

The carrier frequency separation measured for each modulation type is listed below. In each case the carrier frequency separation was greater than the 20dB BW. The plots are shown on data pages 36 through 40.

Modulation Type	CF Separation	20dB BW
2FSK/57kbps	150.7kHz	132.2kHz
2FSK/114kbps	149.1kHz	123.9kHz
2FSK/153kbps	226.9kHz	212.4kHz
2FSK/229kbps	301.4kHz	300.6kHz
2FSK/365kbps	448.9kHz	444.8kHz

5.1.4 Number of Hopping Frequencies

5.1.4.1 Requirements

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.

5.1.4.2 Results

The number of hopping frequencies for each modulation type is listed below. In each case the number of hopping frequencies was equal to or greater than the minimum number required.

Modulation Type	Number of Hopping Frequencies	Minimum Required
2FSK/57kbps	171	50
2FSK/114kbps	171	50
2FSK/153kbps	113	50
2FSK/229kbps	84	25
2FSK/365kbps	57	25

5.1.5 Time of Occupancy

5.1.5.1 Requirements

Where the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

Where the 20dB bandwidth of the hopping channel is 250kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

5.1.5.2 Procedures

The output of the EUT was connected to the spectrum analyzer through 39.2dB of attenuation. With the hopping function enabled, the EUT 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 either 10 or 20seconds

5.1.5.3 Results

The time of occupancy (dwell time) for each modulation type is listed below. In each case the time of occupancy was less than the maximum allowed by the requirement. The data plots are presented on Pages 54 through k.

Modulation Type	Dwell Time per Hop	Number of Hops	Time of Occupancy	Maximum Allowed
2FSK/57kbps	40.4mS	1	0.040 sec	0.4
2FSK/114kbps	20.2mS	4	0.081 sec	0.4
2FSK/153kbps	15.2mS	5	0.076 sec	0.4
2FSK/229kbps	10.2mS	5	0.051 sec	0.4
2FSK/365kbps	6.4Ms	4	0.025 sec	0.4

5.1.6 Peak Output Power

5.1.6.1 Requirements

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). If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below 30dBm by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.1.6.2 Procedures

For the conducted measurement, the output of the EUT was connected to the spectrum analyzer through 39.2dB of attenuation. With the hopping function disabled, the EUT 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 greater than the 20dB bandwidth. The span was set to approximately 5 times the 20 dB bandwidth. The 'Max-Hold' function was engaged. The maximum meter reading was recorded. The peak power output was calculated for the low, middle and high hopping frequencies.

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

5.1.6.3 Results

The maximum peak conducted output power from the transmitter measured 0.95W (29.8 dBm) which is below the 1 Watt limit. The data plots are presented on pages 64 through 78.

The EIRP measured from the transmitter with the Radiall Larsen YA5900W antenna was 35.0 dBm or 3.16 W which is below the 4 Watt limit. The conducted power was reduced to 23.3dBm in order to comply with the 4 Watt requirement.

The EIRP measured from the transmitter with the Laird Technologies FG9026 antenna was 35.4 dBm or 3.5 W which is below the 4 Watt limit. The conducted power was reduced to 25.6dBm in order to comply with the 4 Watt requirement.

The EIRP results are presented on pages 78 and 79.

5.1.7 Duty Cycle Factor Measurements

5.1.7.1 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 (adjust this for what you need). 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 the "on-time". The trace is recorded.

Next the spectrum analyzer center frequency is set to the transmitter frequency with a zero span width and 10msec/div. This shows if the word is longer than 100msec or shorter than 100msec. If the word period is less than 100msec, the display is set to show at least one word. 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).

5.1.7.2 Results

The EUT transmits two 6.4mS pulses every 100 mS. The duty cycle correction factor was calculated. The plots for duty cycle are shown on data pages 81 and 82.

$$-13.9\text{dB} = 20 \cdot \log(2 \cdot 6.4 / 100\text{msec}).$$

5.1.8 Antenna Conducted Spurious Emissions

5.1.8.1 Requirements

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.

5.1.8.2 Procedures

The frequency hopping function was disabled. The output of the EUT was connected to the spectrum analyzer. External attenuation was added to protect the analyzer. The amplitude offset was set to compensate for the external attenuation.. The resolution bandwidth (RBW) was set to 100kHz. The peak detector and 'Max-Hold' function were engaged. The emissions in the frequency range from 30MHz to 10GHz were observed and plotted separately with the EUT transmitting at low, middle and high hopping frequencies.

5.1.8.3 Results

The antenna conducted spurious emission levels were plotted. These plots are presented on pages 83 through 85. These plots show that the spurious emissions were at least 20 dB below the level of the fundamental.

5.1.9 Radiated Spurious Emissions Measurements

5.1.9.1 Requirements

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

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

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

5.1.9.2 Procedures

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

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 10.0GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 10.0GHz.

- 1) For all emissions in the restricted bands, the following procedure was used:
 - a) The field strengths of all emissions below 1 GHz were measured using a bi-log antenna. The bi-log antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 120 kHz was used on the spectrum analyzer.
 - b) The field strengths of all emissions above 1 GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 1 MHz 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 EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
 - iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer. The measuring antenna was not raised or lowered to ensure maximized readings, instead the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
 - d) For all radiated emissions measurements below 1 GHz, 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 1 GHz, 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 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).
- f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken. If the dwell time per channel of the hopping signal is less than 100msec, then the reading obtained with the 10 Hz video bandwidth may be further adjusted by a "duty cycle correction factor", derived from $20 \cdot \log(\text{dwell time}/100\text{msec})$. These readings must be no greater than the limits specified in 15.209(a).

If the dwell time per channel of the hopping signal is less than 100msec, then the reading obtained with the 10 Hz video bandwidth may be further adjusted by a "duty cycle correction factor", derived from $20 \cdot \log(\text{dwell time}/100\text{msec})$. These readings must be no greater than the limits specified in 15.209(a).

5.1.9.3 Results

Preliminary radiated emissions plots for both antennas with the EUT transmitting at 902.25MHz, 915MHz, and 927.75MHz are shown on pages 85 through 108. Final radiated emissions data are presented on data pages 109 through 120. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figures 3 through 6.

5.1.10 Band Edge Compliance

5.1.10.1 Requirements

Per section 15.247(d), the emissions at the band-edges must be at least 20dB below the highest level measured within the band but attenuation below the general limits listed in 15.209(a) is not required.

5.1.10.2 Procedures

5.1.10.2.1 Low Band Edge

- 1) The output of the EUT was connected to the spectrum analyzer through 39.2dB of attenuation.
- 2) The EUT was set to transmit continuously at the channel closest to the low band-edge (hopping function disabled).
- 3) To determine the band edge compliance, the following spectrum analyzer settings were used:
 - a. Center frequency = low band-edge frequency.
 - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
 - c. Resolution bandwidth (RBW) $\geq 1\%$ of the span.
 - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
 - e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)
 - f. The analyzer's display was plotted using a 'screen dump' utility.
- 4) Step 3) was repeated with the frequency hopping function enabled.

5.1.10.2.2 High Band Edge

- 1) The output of the EUT was connected to the spectrum analyzer through 39.2dB of attenuation.
- 2) The EUT was set to transmit continuously at the channel closest to the high band-edge (hopping function disabled).
- 3) To determine the band edge compliance, the following spectrum analyzer settings were used:
 - a. Center frequency = high band-edge frequency.
 - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
 - c. Resolution bandwidth (RBW) $\geq$ 1% of the span.
 - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
 - e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the right of the center frequency (band-edge) must be below the display line.)
 - f. The analyzer's display was plotted using a 'screen dump' utility.
- 4) Step 3) was repeated with the frequency hopping function enabled.

5.1.10.3 Results

Pages 122 through 141 show the conducted band-edge compliance results. As can be seen from these plots, the emissions at the low end band edge and the high end band edge are below the 20 dB down limits.

6. CONCLUSIONS

It was determined that the XetaWave LLC Multi-Band Radio Module, Part No. MSD9 Rev. A frequency hopping spread spectrum transceiver, Serial No. S/N 2, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 902-928 MHz band, when tested per ANSI C63.4-2009.

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 EUT at the test date. Any electrical or mechanical modification made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

8. ENDORSEMENT DISCLAIMER

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

9. EQUIPMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
CDX2	COMPUTER	ELITE	WORKSTATION	---	---	N/A	
CDX8	COMPUTER	ELITE	WORKSTATION			N/A	
CLT3	LAPTOP COMPUTER	SONY	PCG-GRT390ZP	3001143	---	NOTE 1	
GBR6	SIGNAL GENERATOR	HEWLETT PACKARD	8648C	3642U02047	9KHZ-3000MHZ	2/22/2012	2/22/2013
MFB0	FREQUENCY COUNTER	HEWLETT PACKARD	5334A	2426A02162	0-100MHZ	6/27/2012	6/27/2013
NTA3	BILOG ANTENNA	TESEQ	6112D	28040	25-1000MHz	2/16/2012	2/16/2013
NWP1	DOUBLE RIDGED WAVEGUIDE ANTENNA	EATON	3115	2100	1GHZ-12.4GHZ	3/6/2012	3/6/2013
RAKI	RF SECTION	HEWLETT PACKARD	85462A	3411A00181	0.009-6500MHZ	3/15/2012	3/15/2013
RAKJ	RF FILTER SECTION	HEWLETT PACKARD	85460A	3330A00154	---	3/15/2012	3/15/2013
RBA0	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100145	20HZ-26.5GHZ	3/8/2012	3/8/2013
RBA1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100146	20HZ-26.5GHZ	11/15/2011	11/15/2012
SHB0	DC POWER SUPPLY	HEWLETT PACKARD	6644A	MY40000115	0-60V/0-3.5A	NOTE 1	
T2D7	20DB, 25W ATTENUATOR	WEINSCHL	46-20-43	AY9246	DC-18GHZ	8/6/2012	8/6/2013
T2S3	20DB 25W ATTENUATOR	WEINSCHL	46-20-34	BV3544	DC-18GHZ	1/3/2012	1/3/2013
XLJ1	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-052	2	DC-2GHZ	8/6/2012	8/6/2013

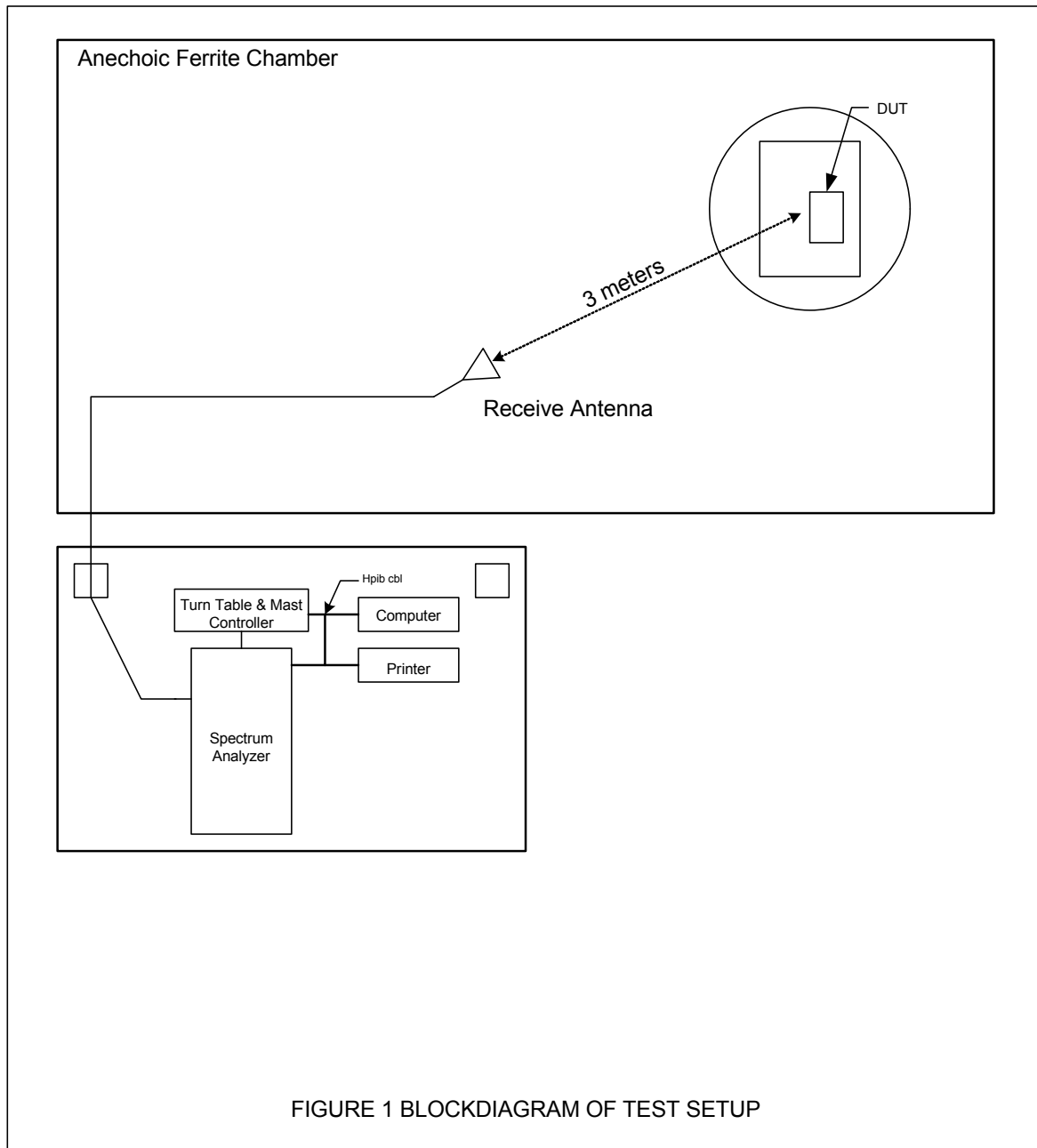
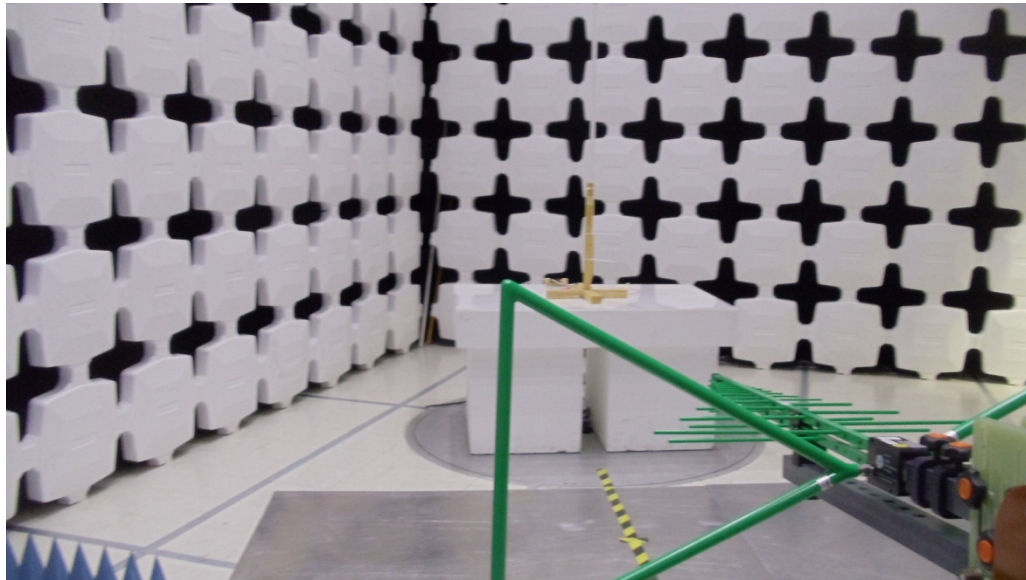
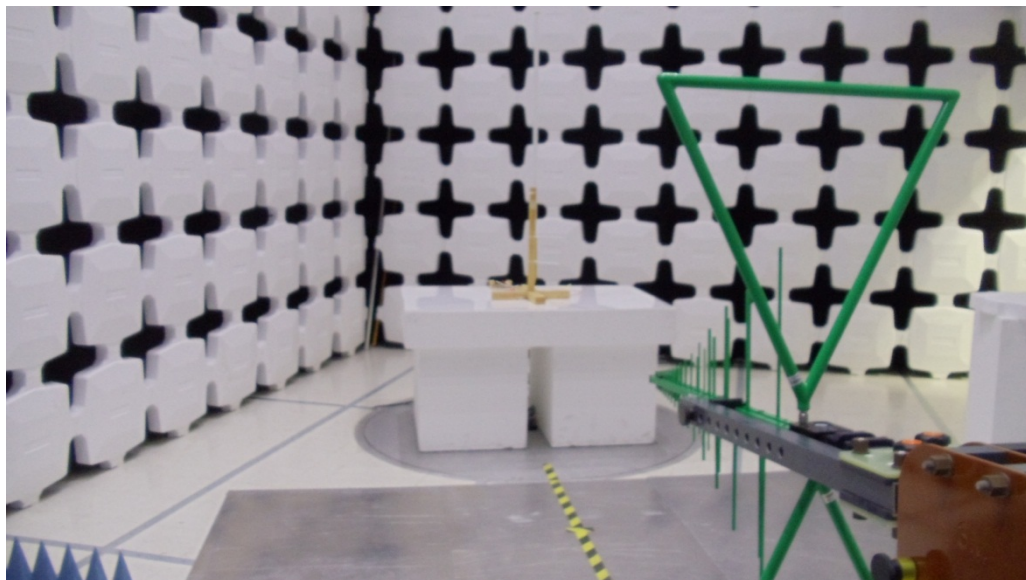


Figure 3



Test Setup for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization – Laird Antenna

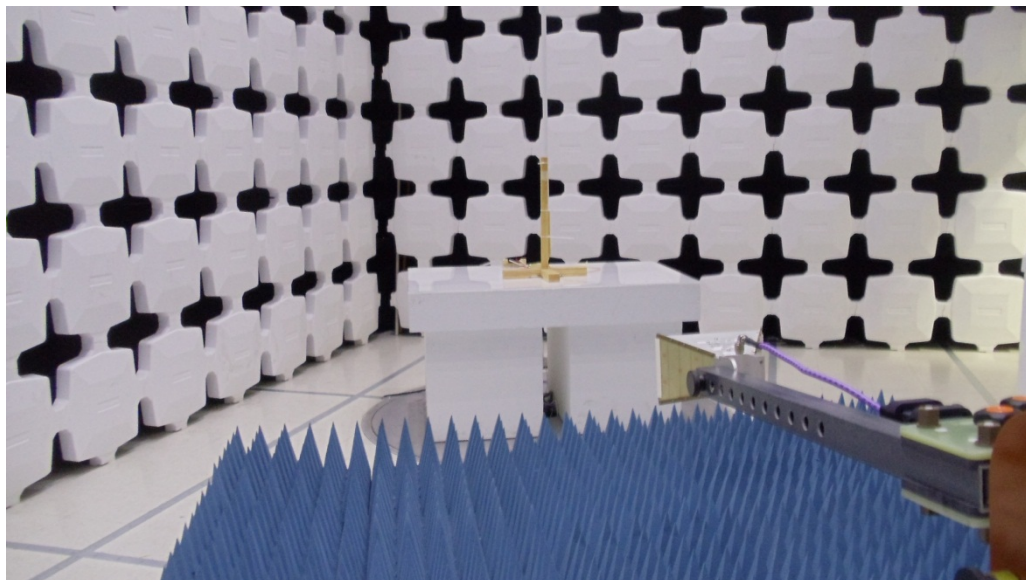


Test Setup for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization – Laird Antenna

Figure 4

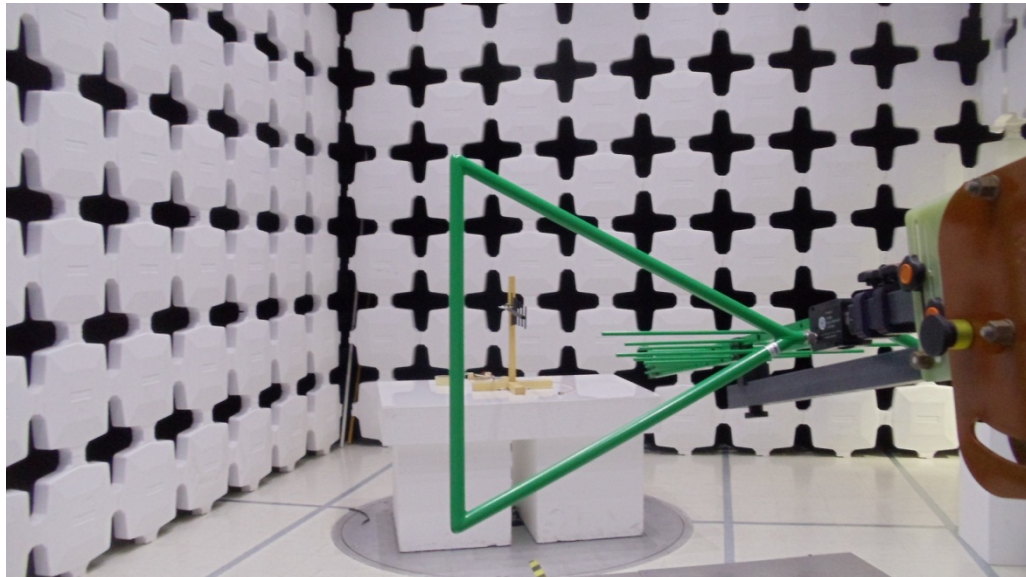


Test Setup for Radiated Emissions, 1GHz to 10GHz – Horizontal Polarization – Laird Antenna

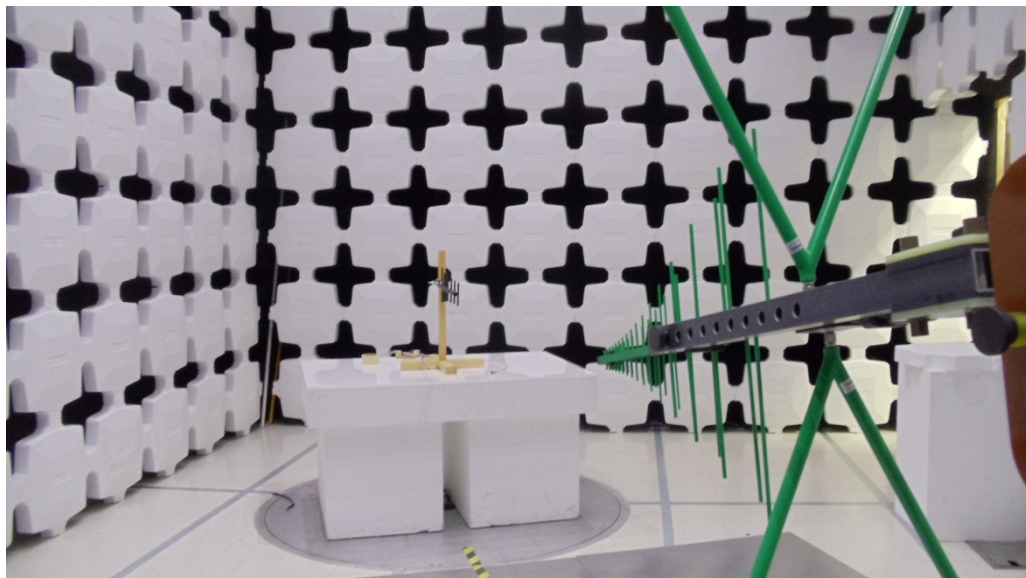


Test Setup for Radiated Emissions, 1GHz to 10GHz – Vertical Polarization – Laird Antenna

Figure 5

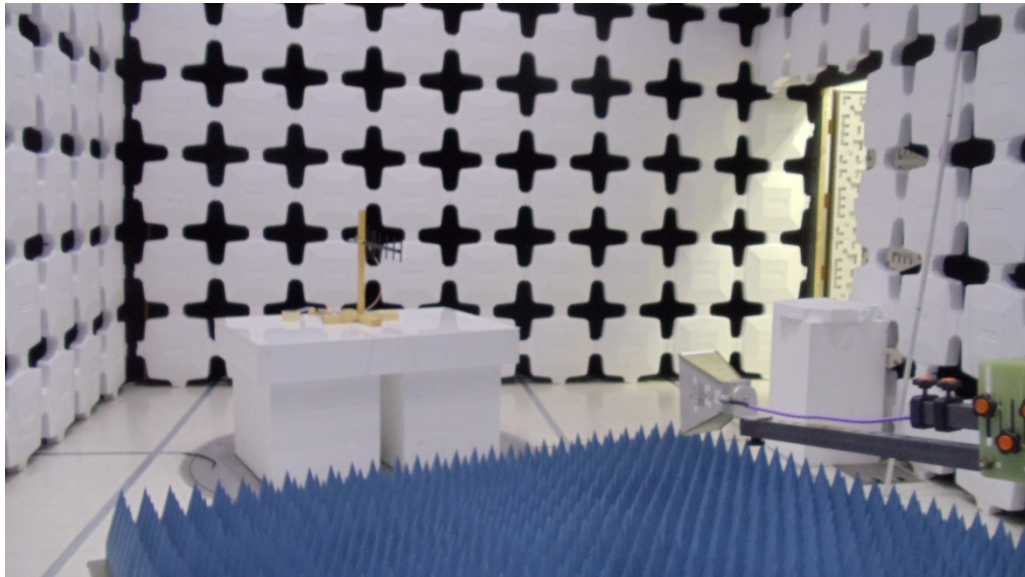


Test Setup for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization – Radial Larsen Antenna

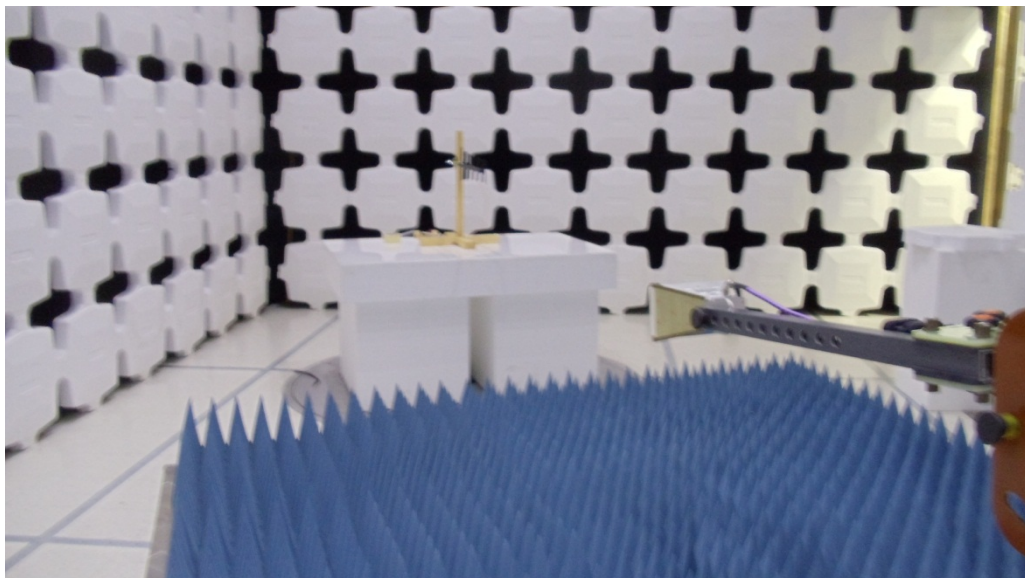


Test Setup for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization – Radial Larsen Antenna

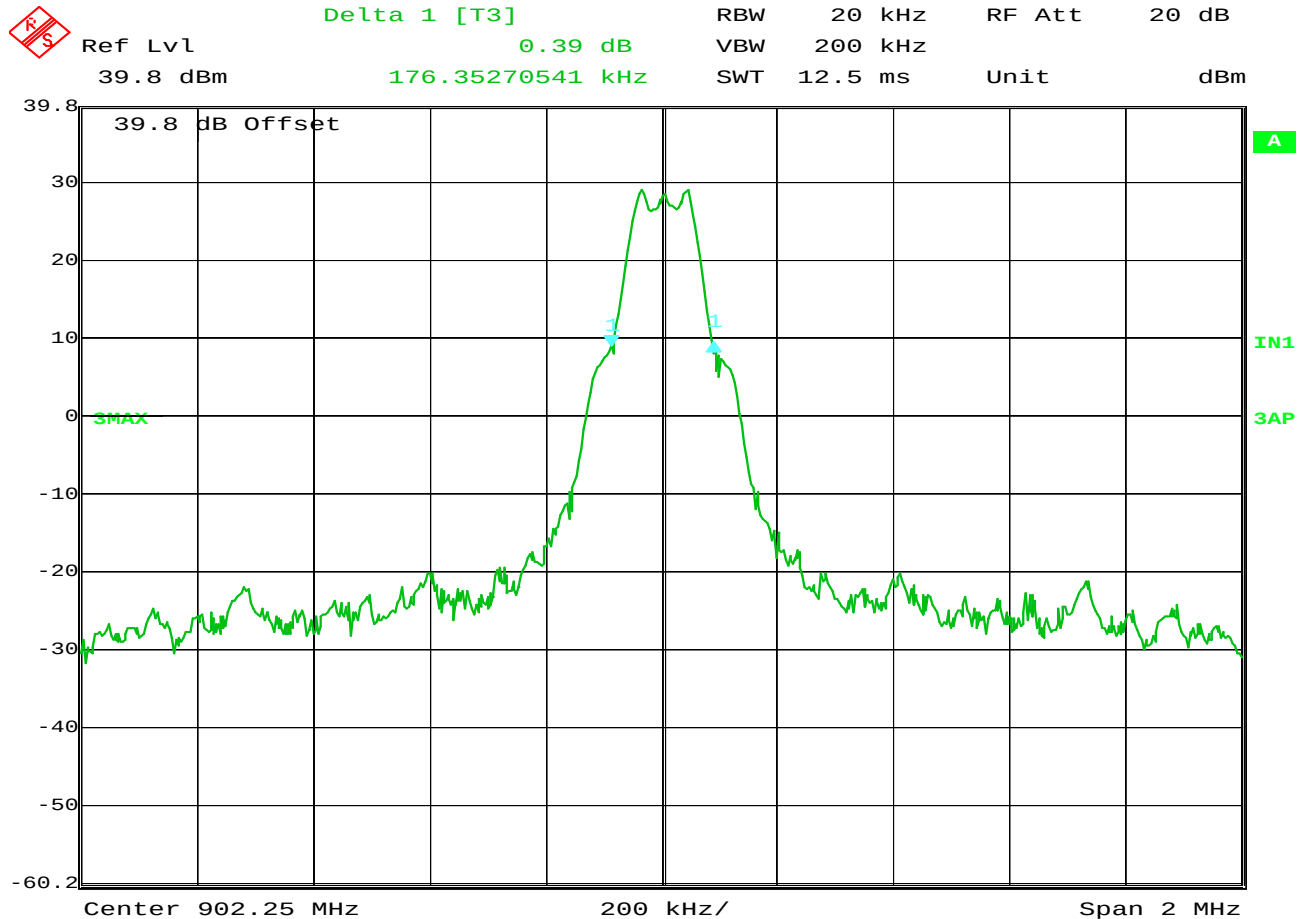
Figure 6



Test Setup for Radiated Emissions, 1GHz to 10GHz – Horizontal Polarization – Radial Larsen Antenna



Test Setup for Radiated Emissions, 1GHz to 10GHz – Vertical Polarization – Radial Larsen Antenna



Date: 31.AUG.2012 09:54:39

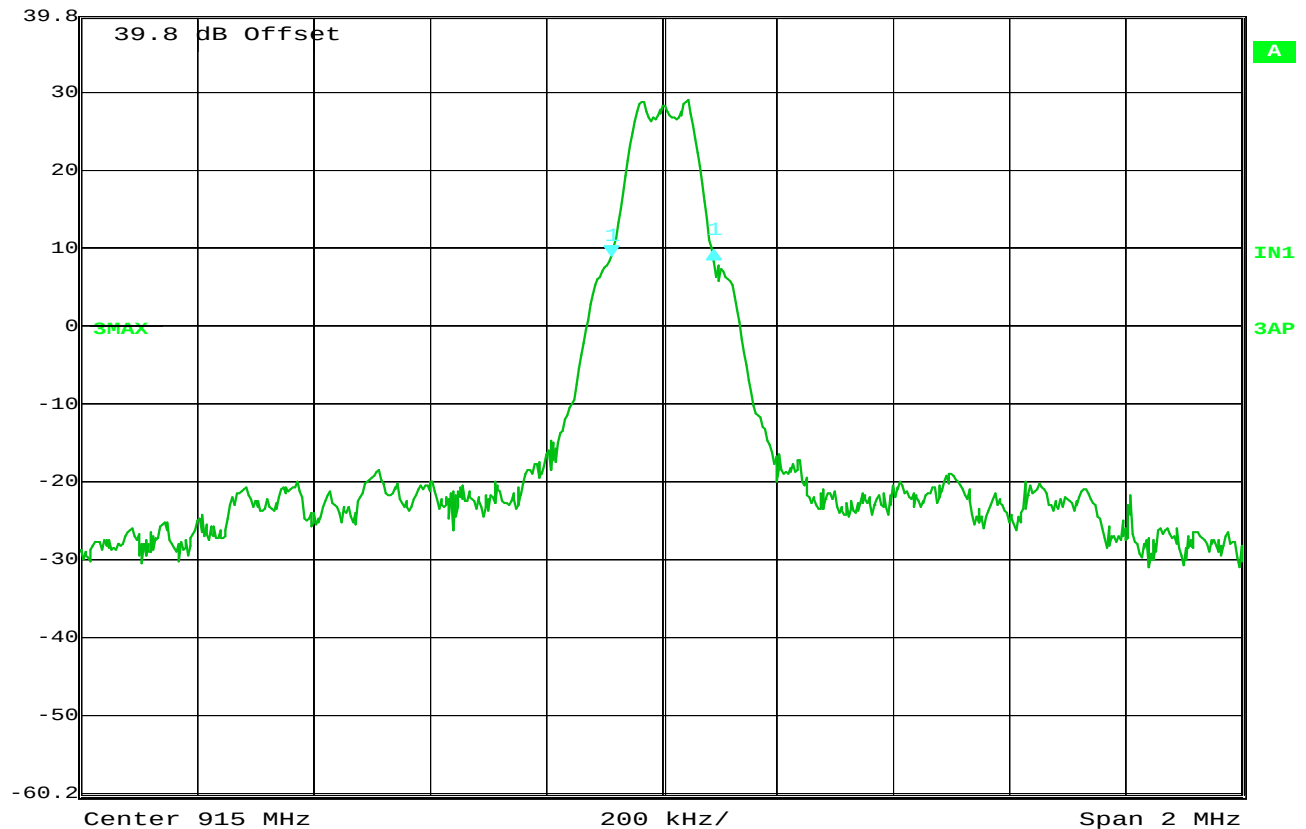
FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (Low: 902.25MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Delta 1 [T3] RBW 20 kHz RF Att 20 dB
Ref Lvl 0.95 dB VBW 200 kHz
39.8 dBm 176.35270541 kHz SWT 12.5 ms Unit dBm



Date: 31.AUG.2012 09:59:28

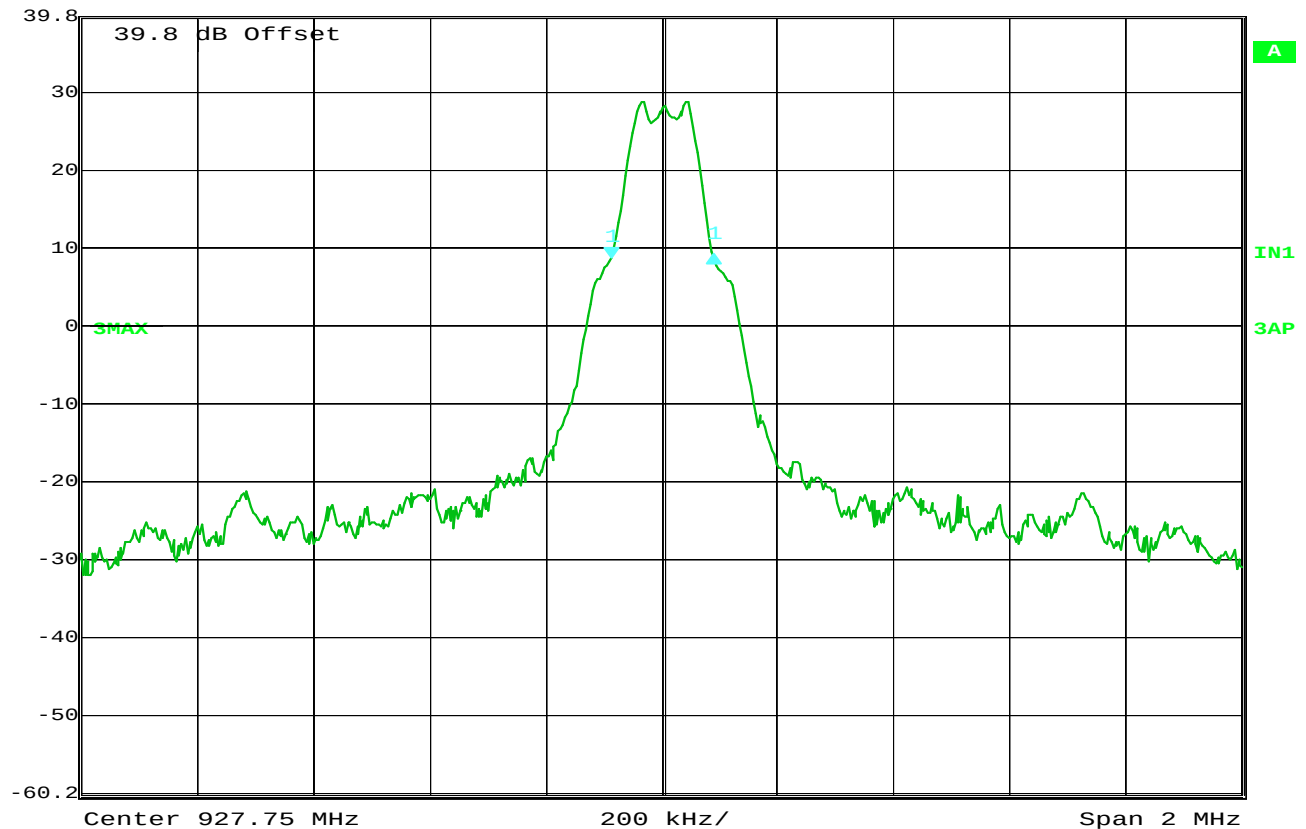
FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Delta 1 [T3] RBW 20 kHz RF Att 20 dB
Ref Lvl 0.59 dB VBW 200 kHz
39.8 dBm 176.35270541 kHz SWT 12.5 ms Unit dBm

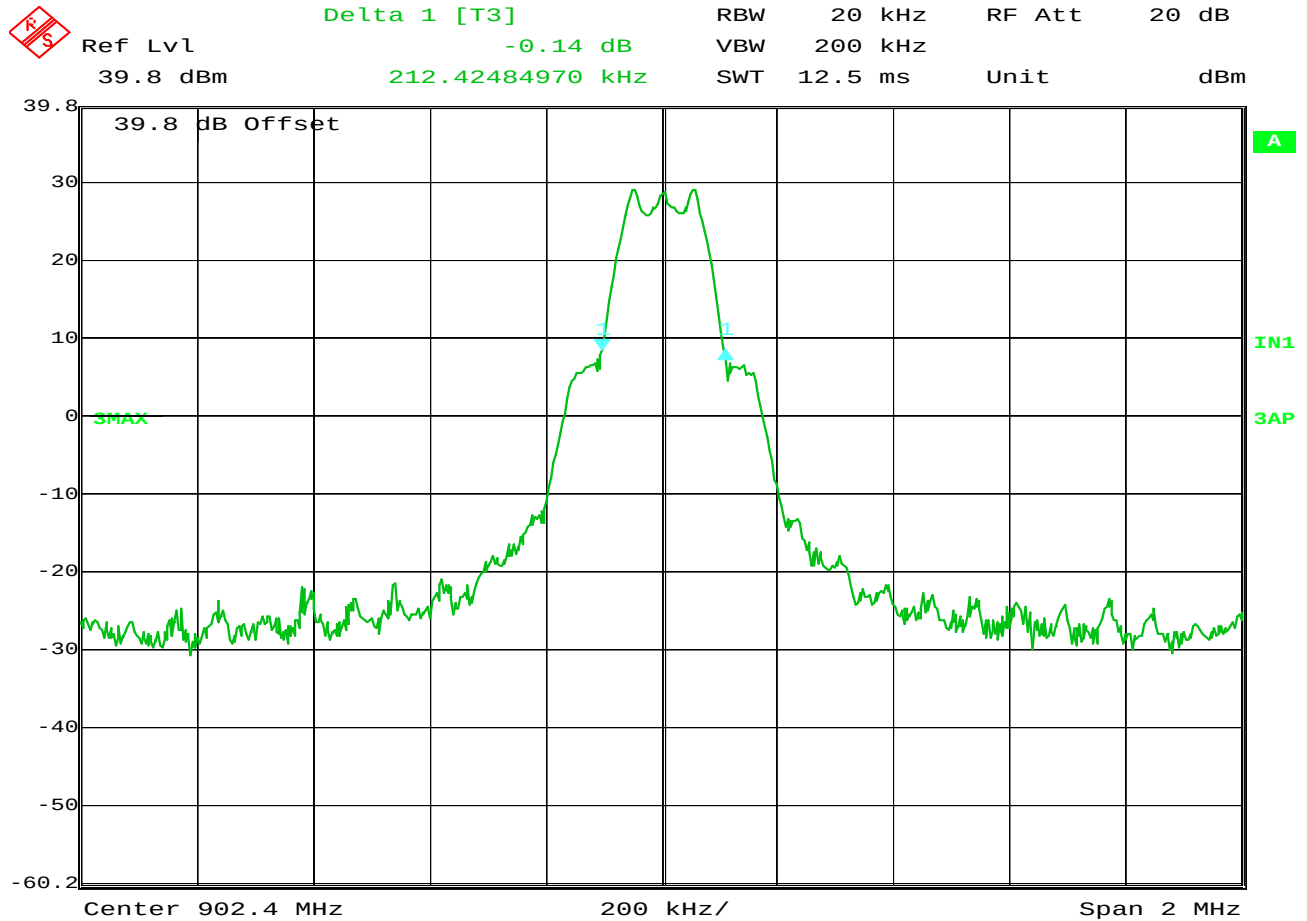


Date: 31.AUG.2012 10:05:25

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (High: 927.75MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

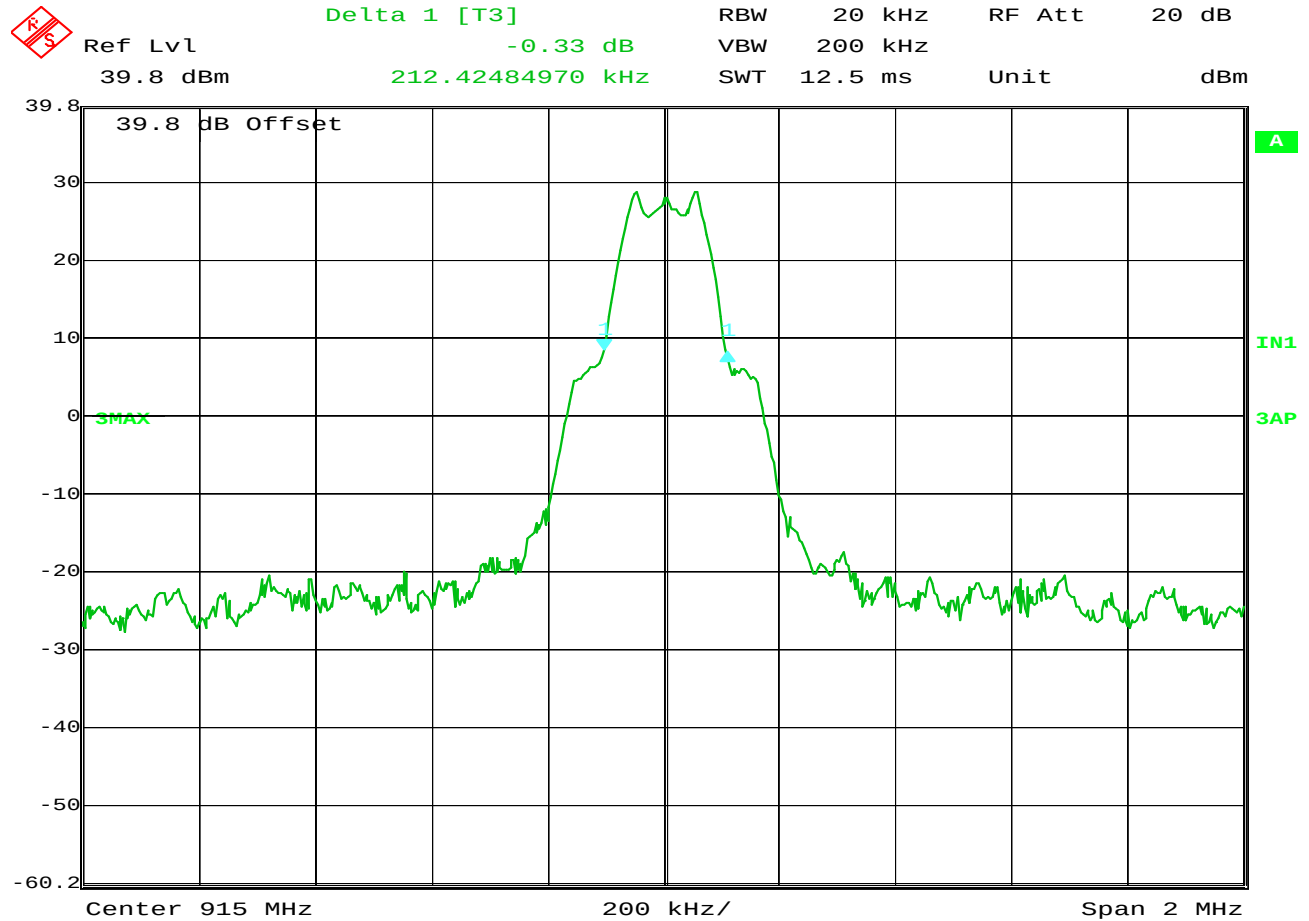


Date: 31.AUG.2012 08:57:27

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/153kbps (Low: 902.4MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

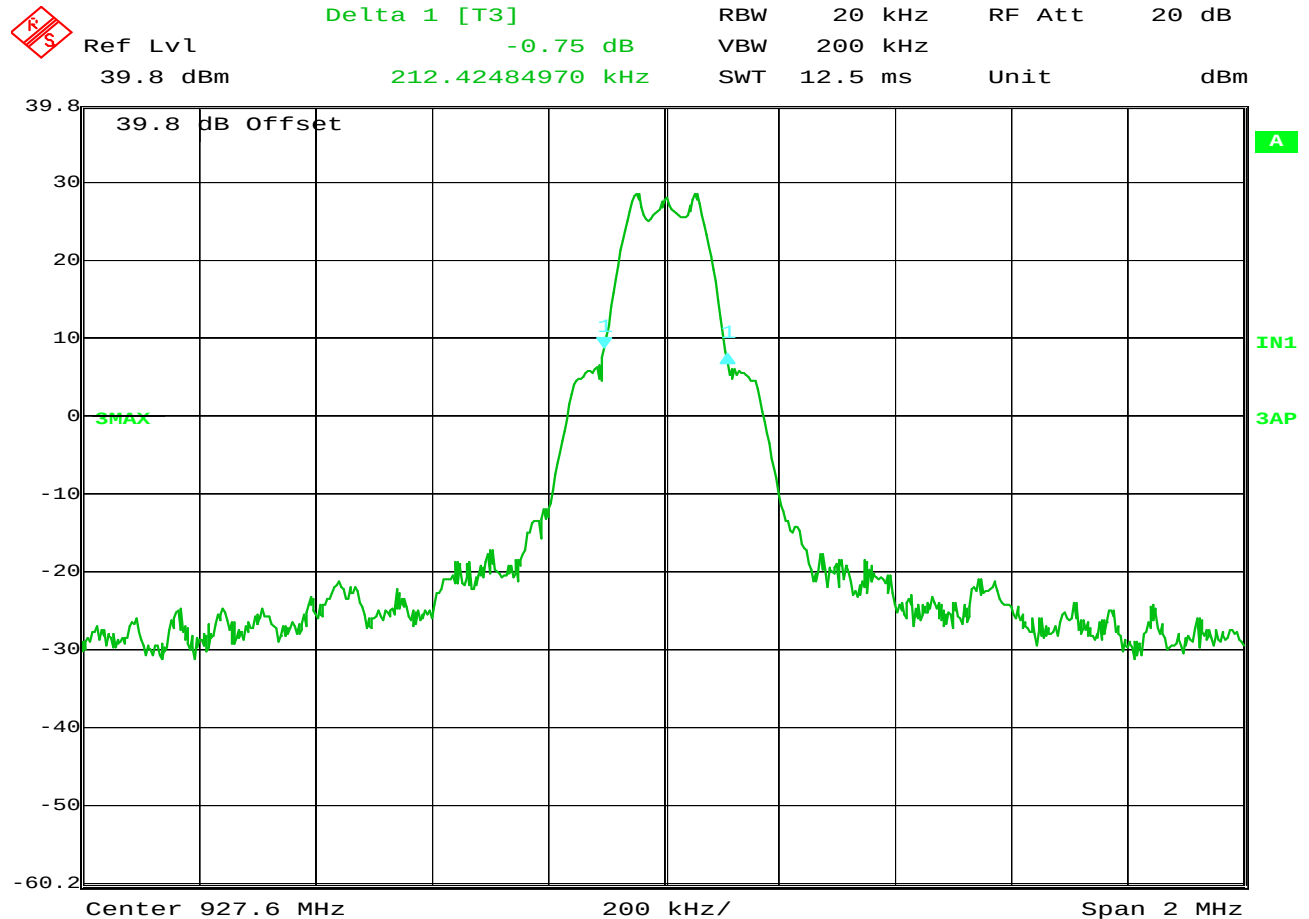


Date: 31.AUG.2012 09:01:25

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/153kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

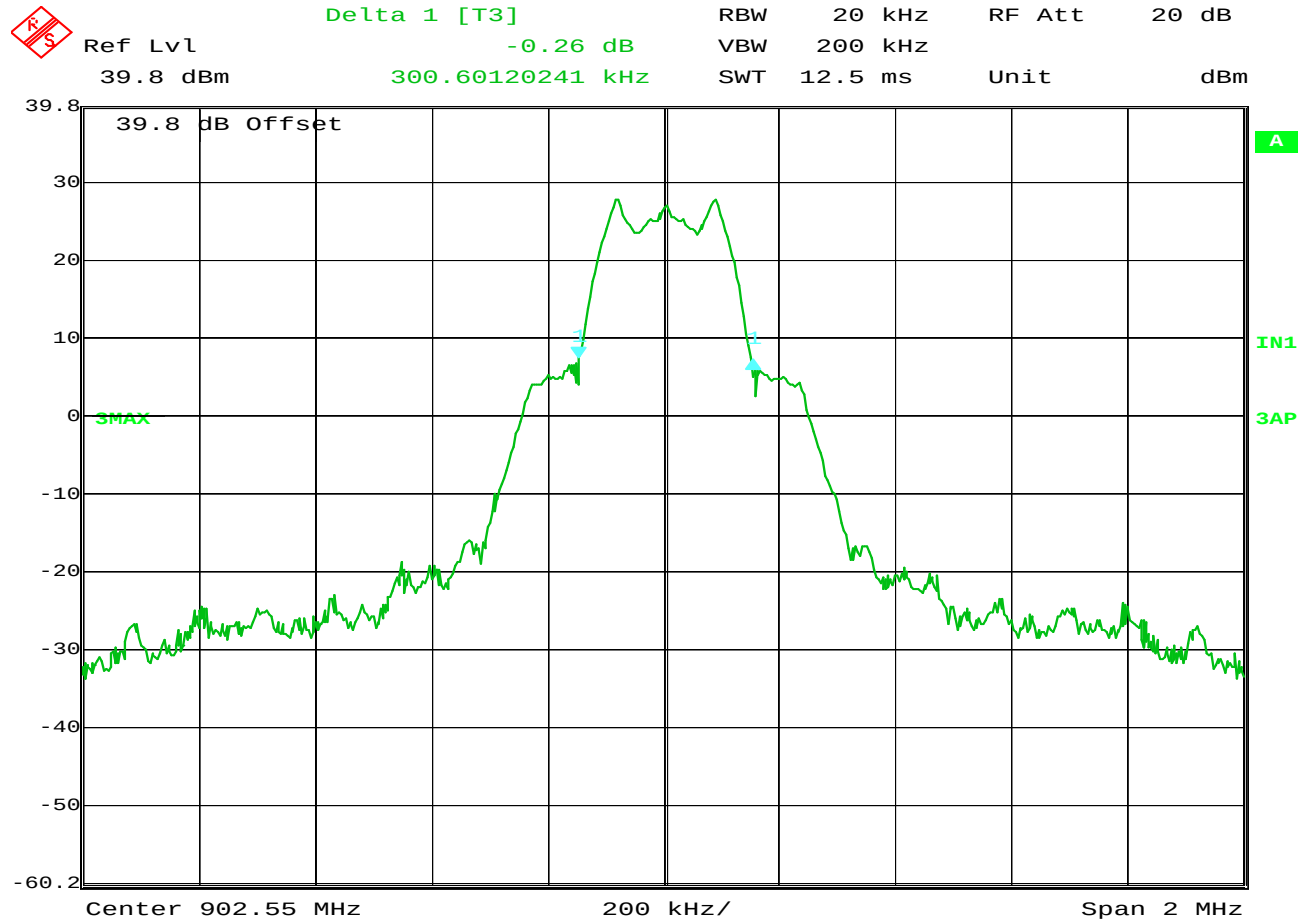


Date: 31.AUG.2012 09:07:26

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/153kbps (High: 927.6MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

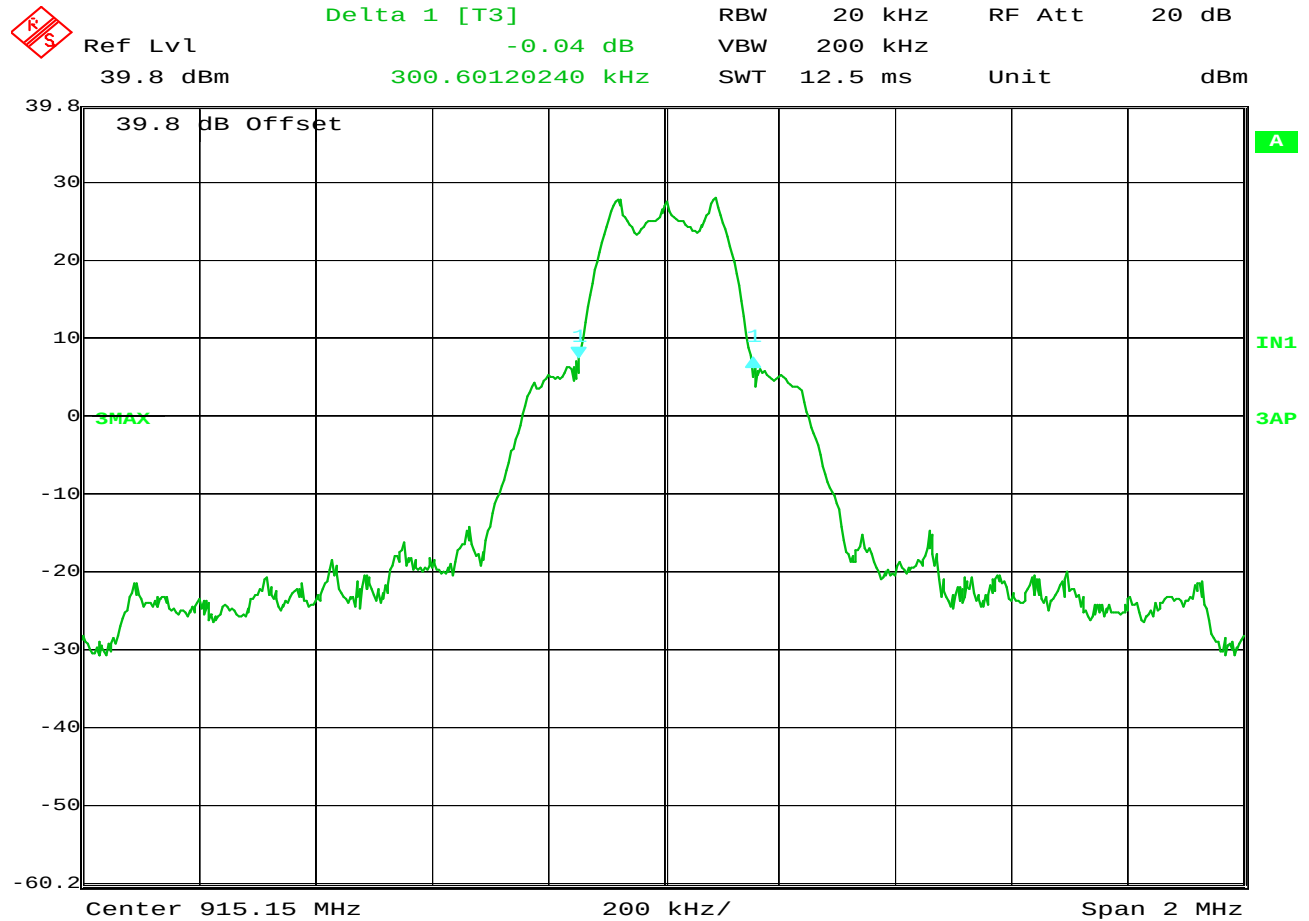


Date: 30.AUG.2012 17:26:19

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (Low: 902.55MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

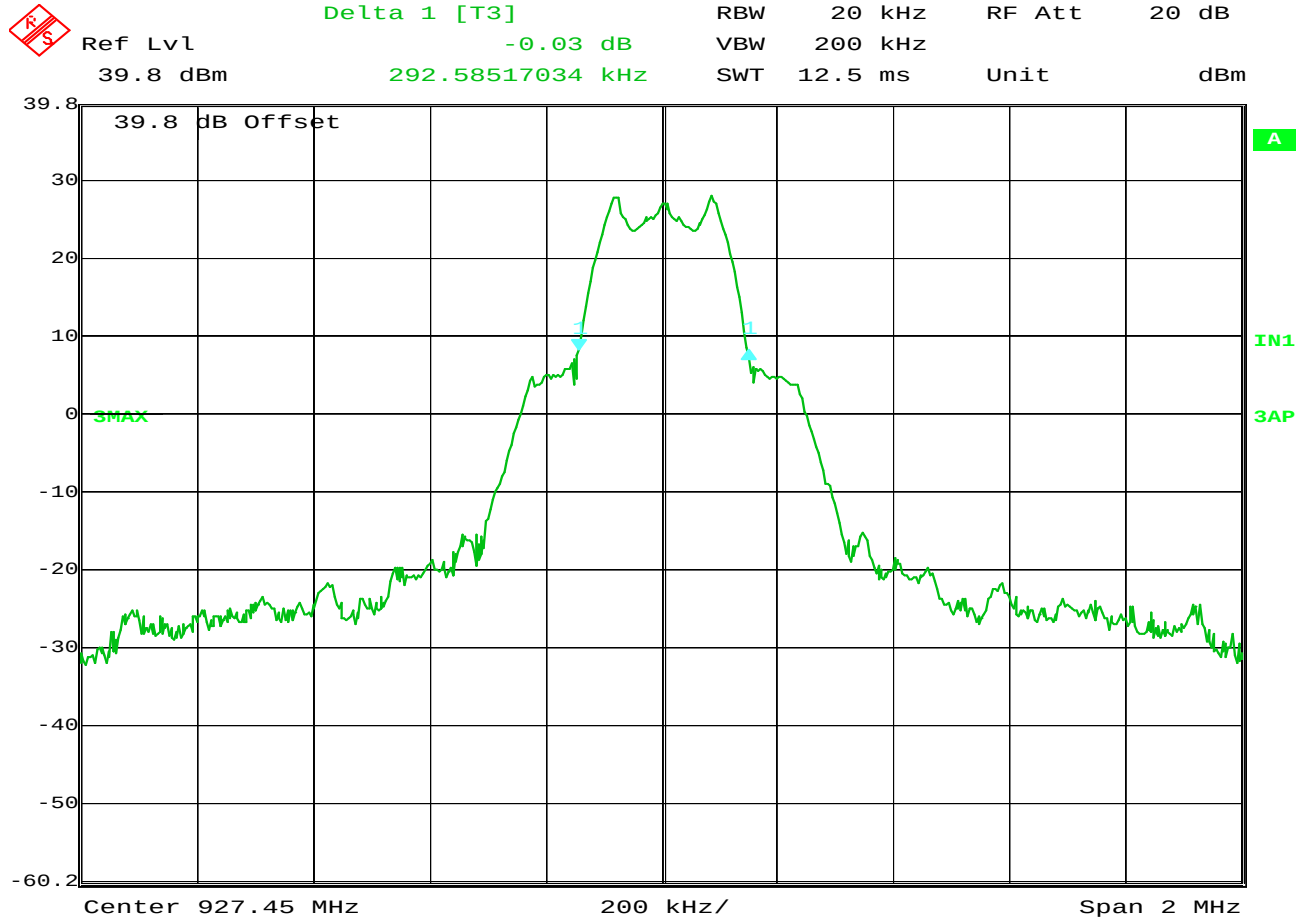


Date: 30.AUG.2012 17:16:34

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (Mod: 915.15MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 30.AUG.2012 16:58:05

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (High: 927.45MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (Low: 902.4MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

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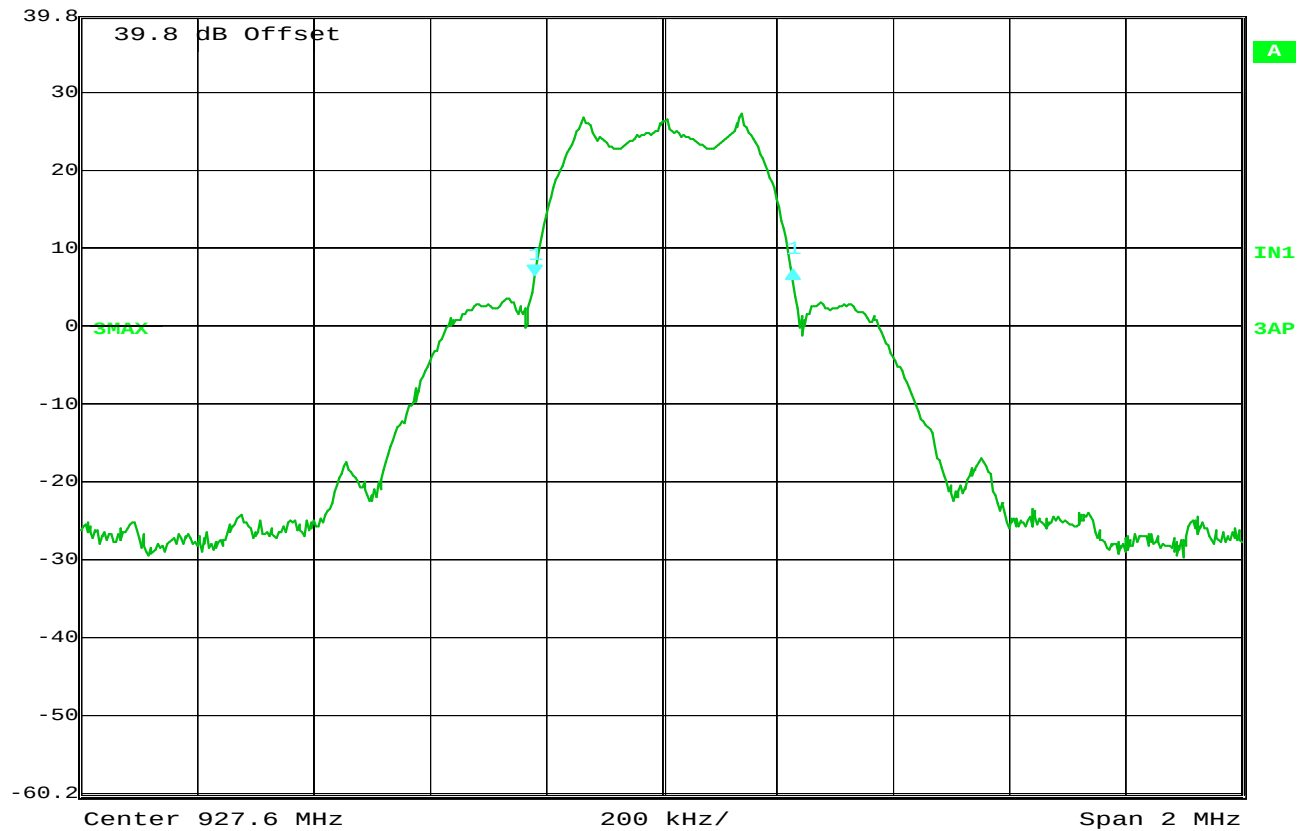


MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (Med: 915MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

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Ref Lvl 39.8 dBm
Delta 1 [T3] 0.62 dB
444.88977956 kHz
RBW 20 kHz
VBW 200 kHz
SWT 12.5 ms
RF Att 20 dB
Unit dBm

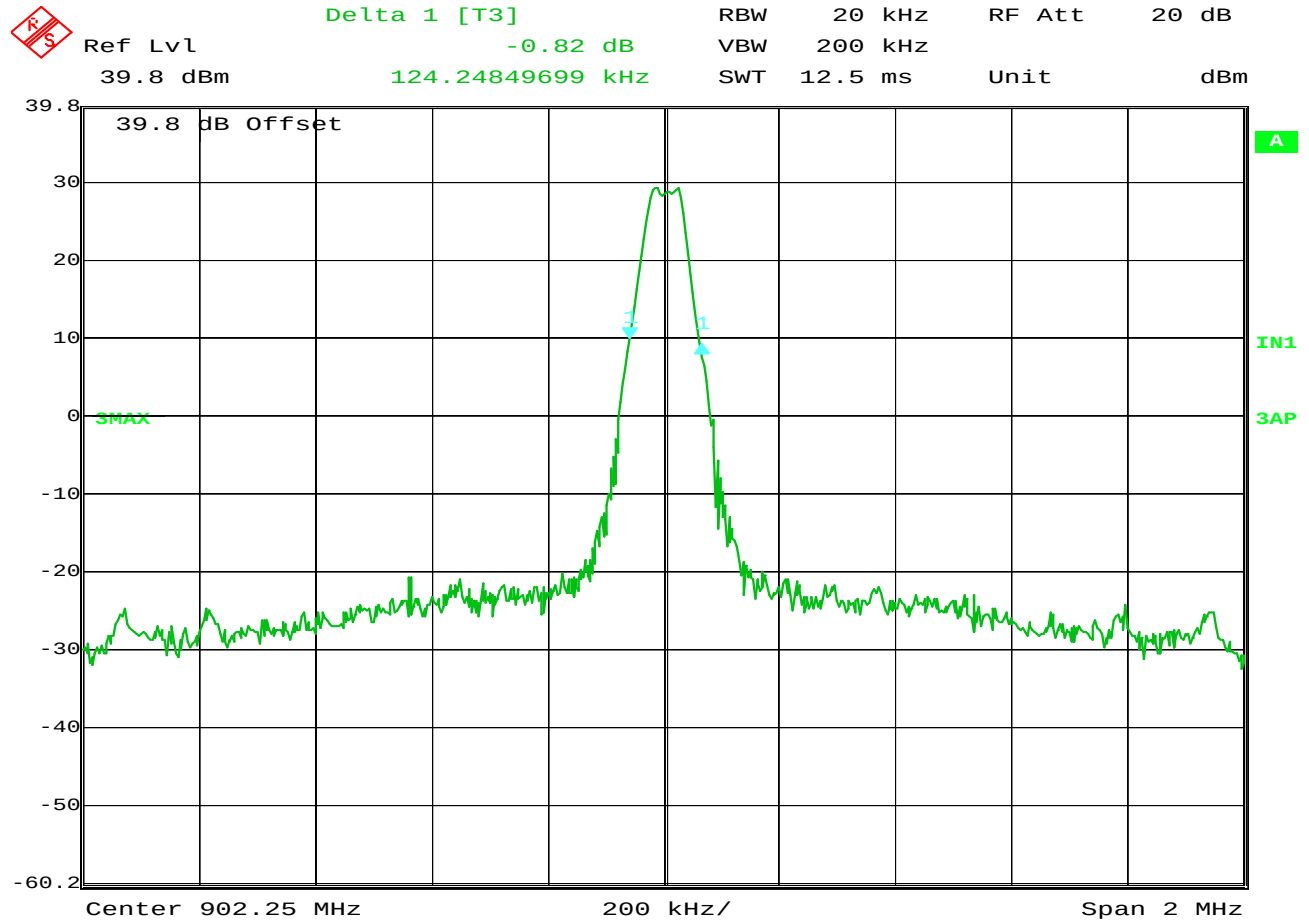


Date: 30.AUG.2012 16:09:37

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (High: 927.6MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

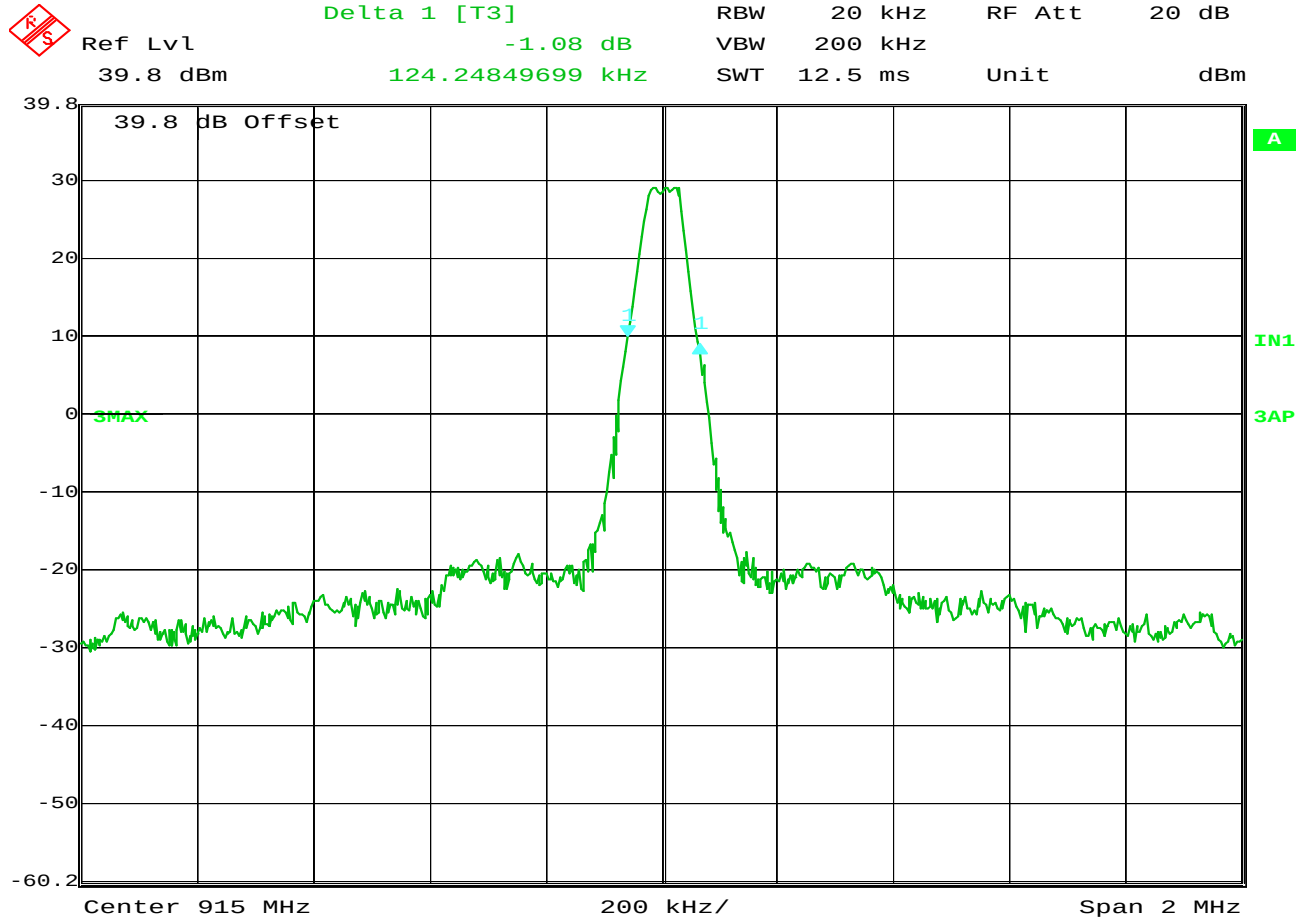


Date: 31.AUG.2012 09:24:17

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (Low: 902.25MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

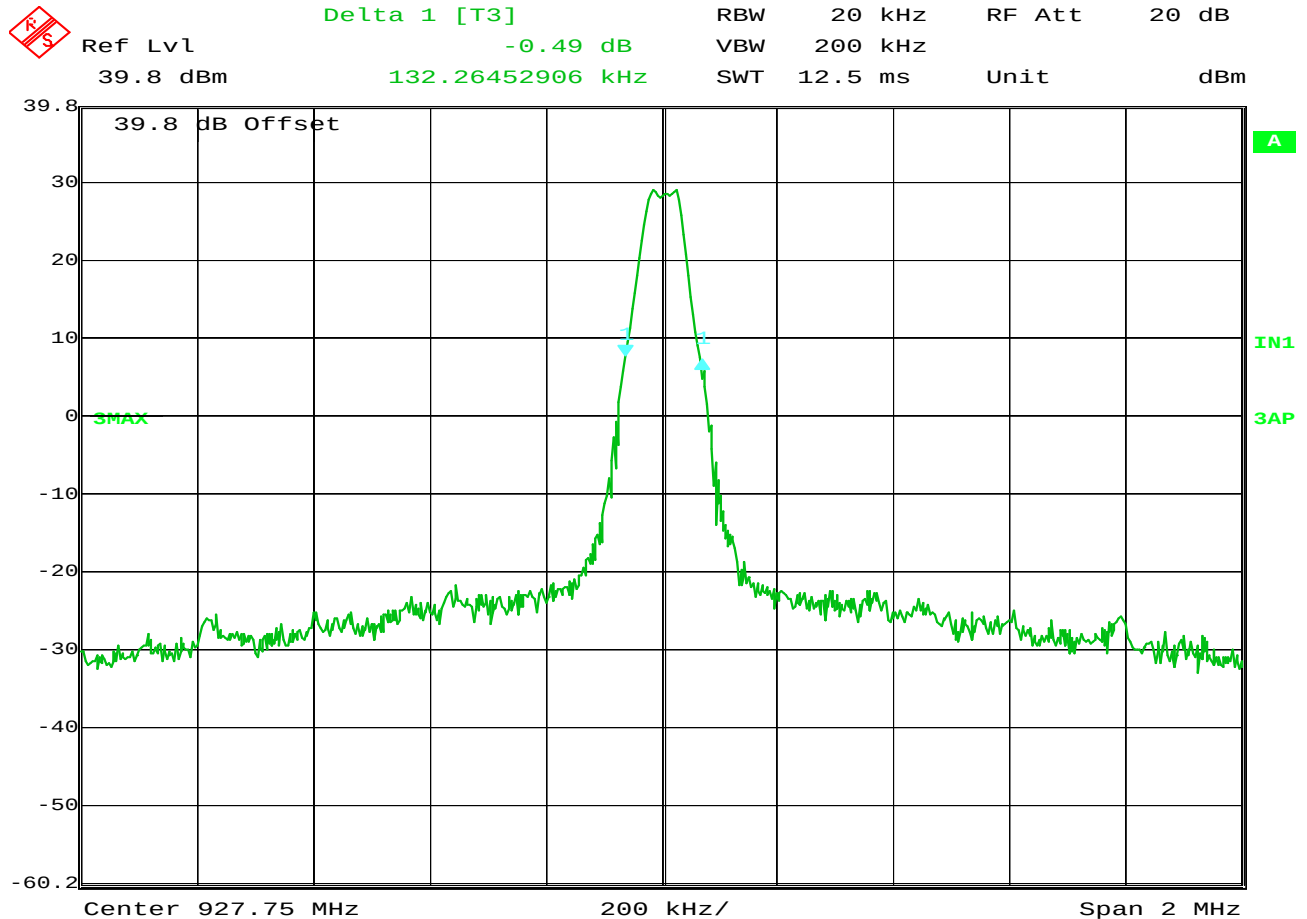


Date: 31.AUG.2012 09:21:09

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

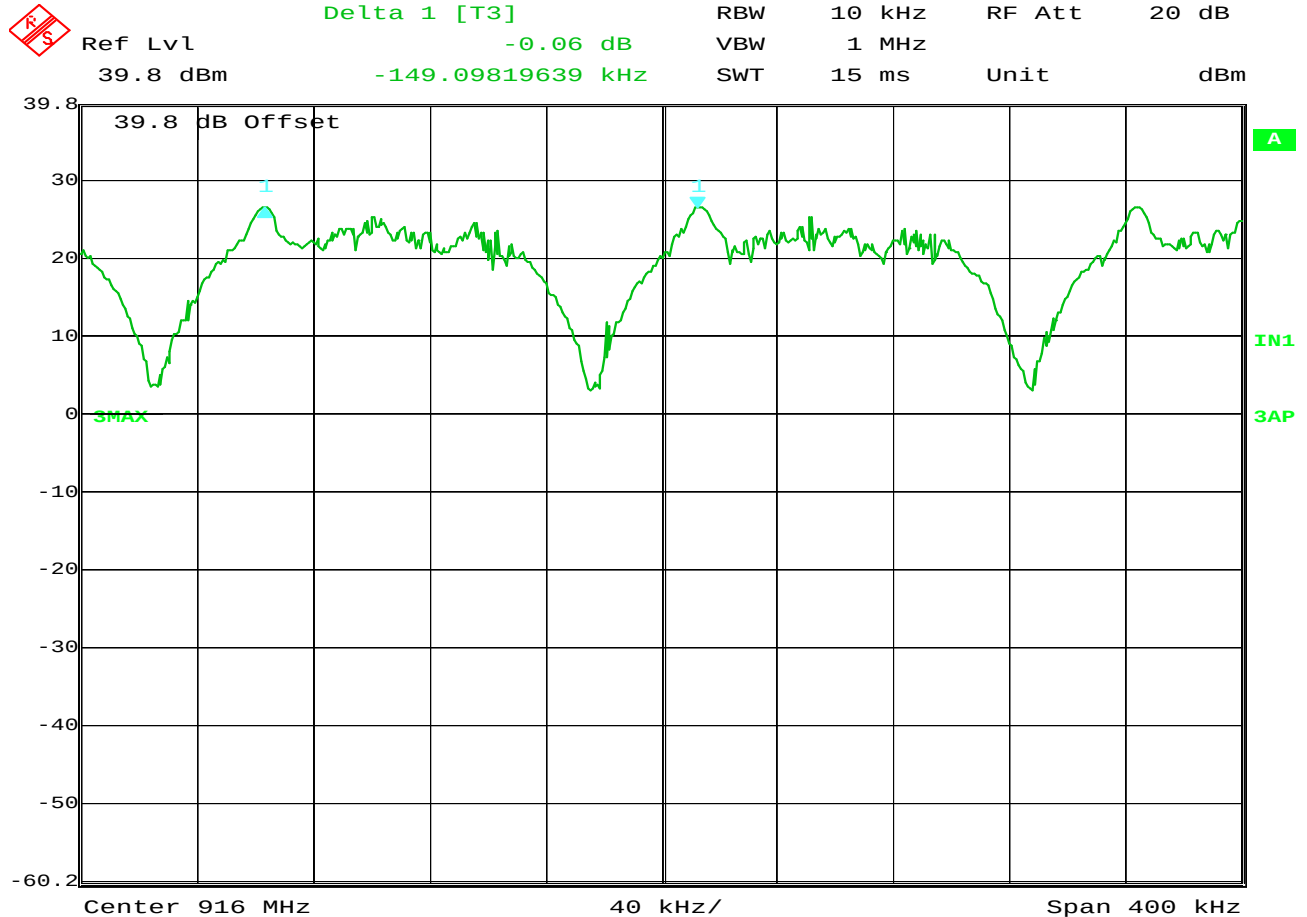


Date: 31.AUG.2012 09:15:26

FCC 15.247: 20db Bandwidth Measurements

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (High: 927.75MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

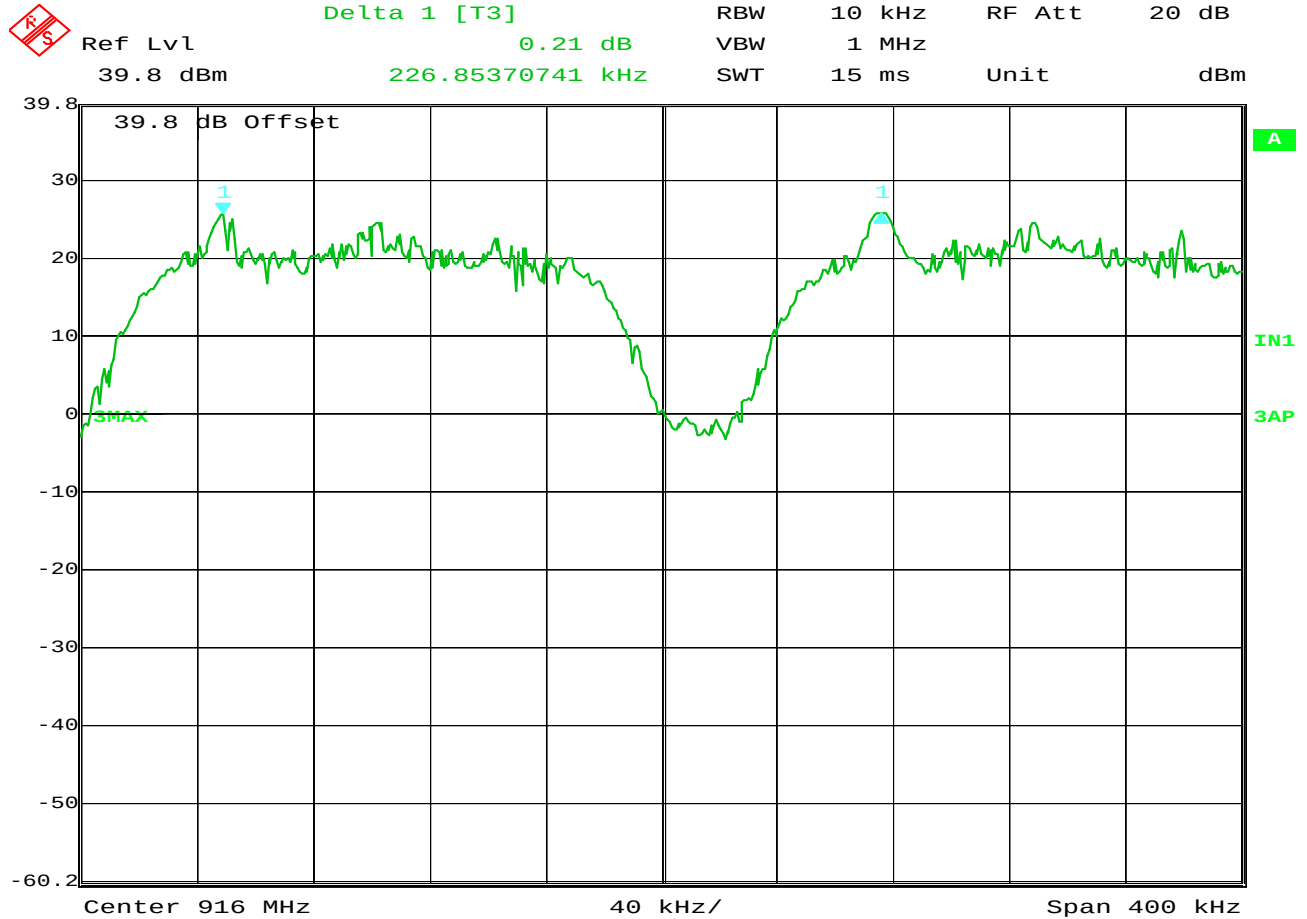


Date: 4.SEP.2012 11:01:51

FCC 15.247: Carrier Frequency Separation

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/114kbps
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

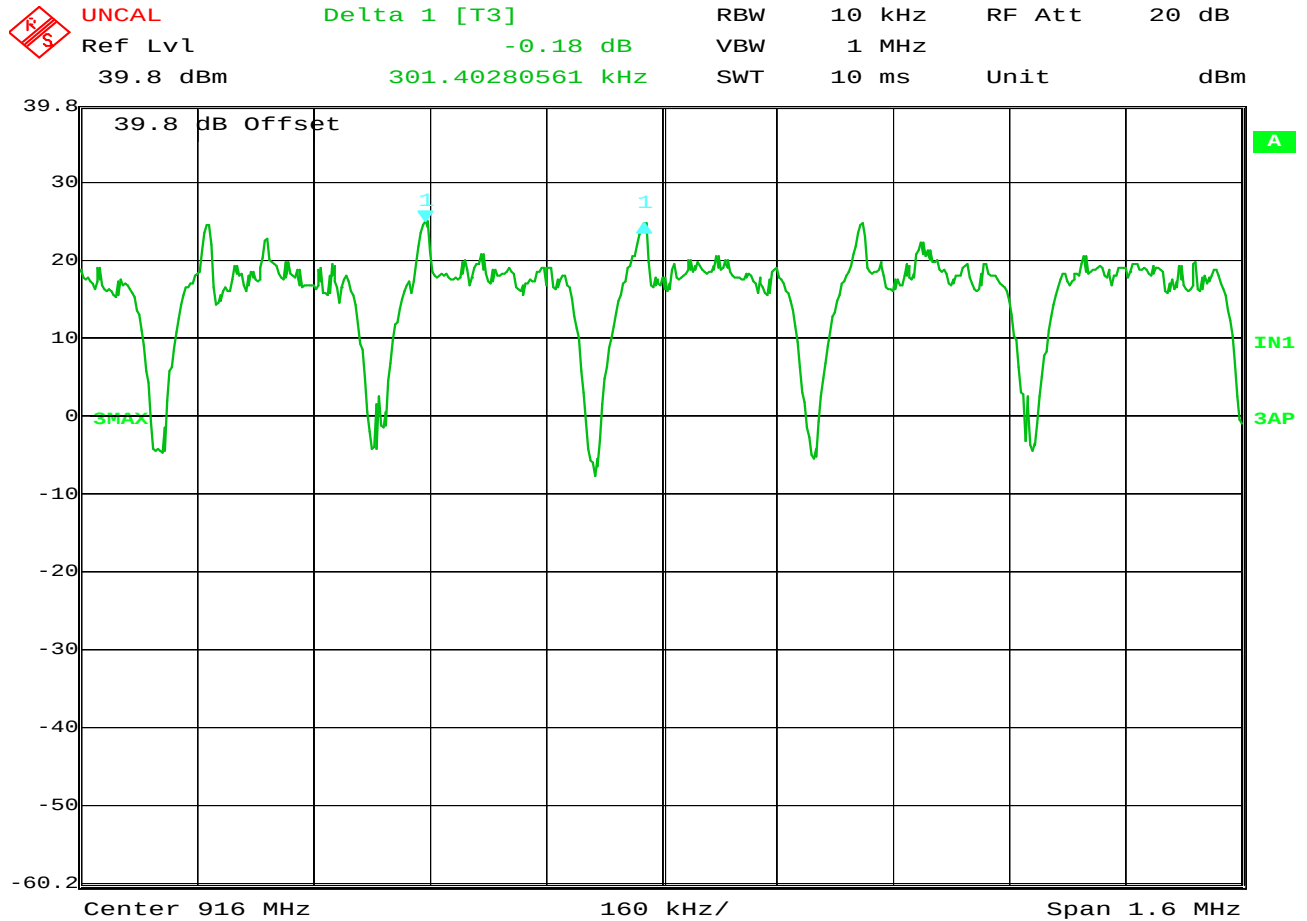


Date: 4.SEP.2012 15:55:41

FCC 15.247: Carrier Frequency Separation

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

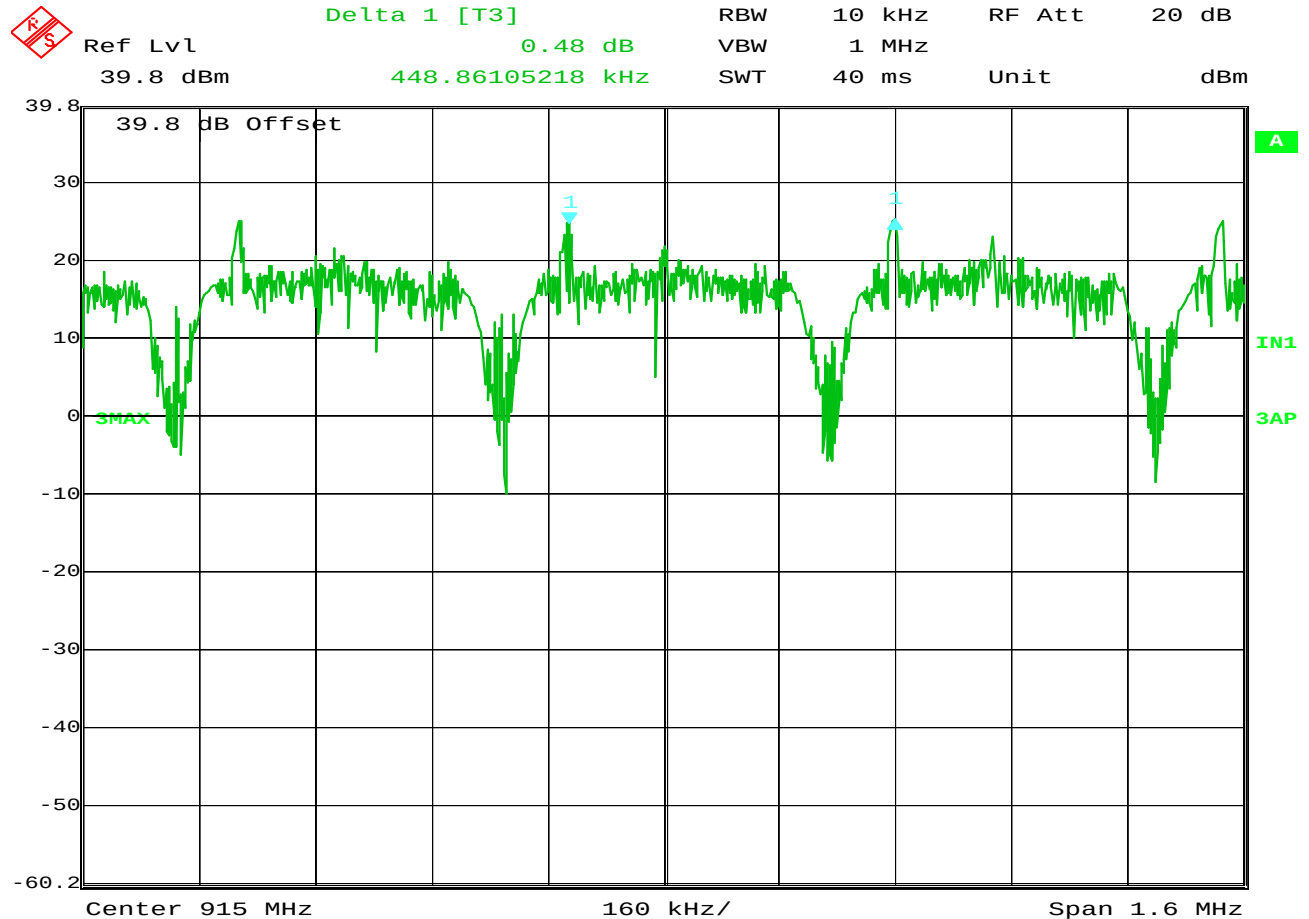


Date: 4.SEP.2012 16:05:12

FCC 15.247: Carrier Frequency Separation

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/229kbps
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

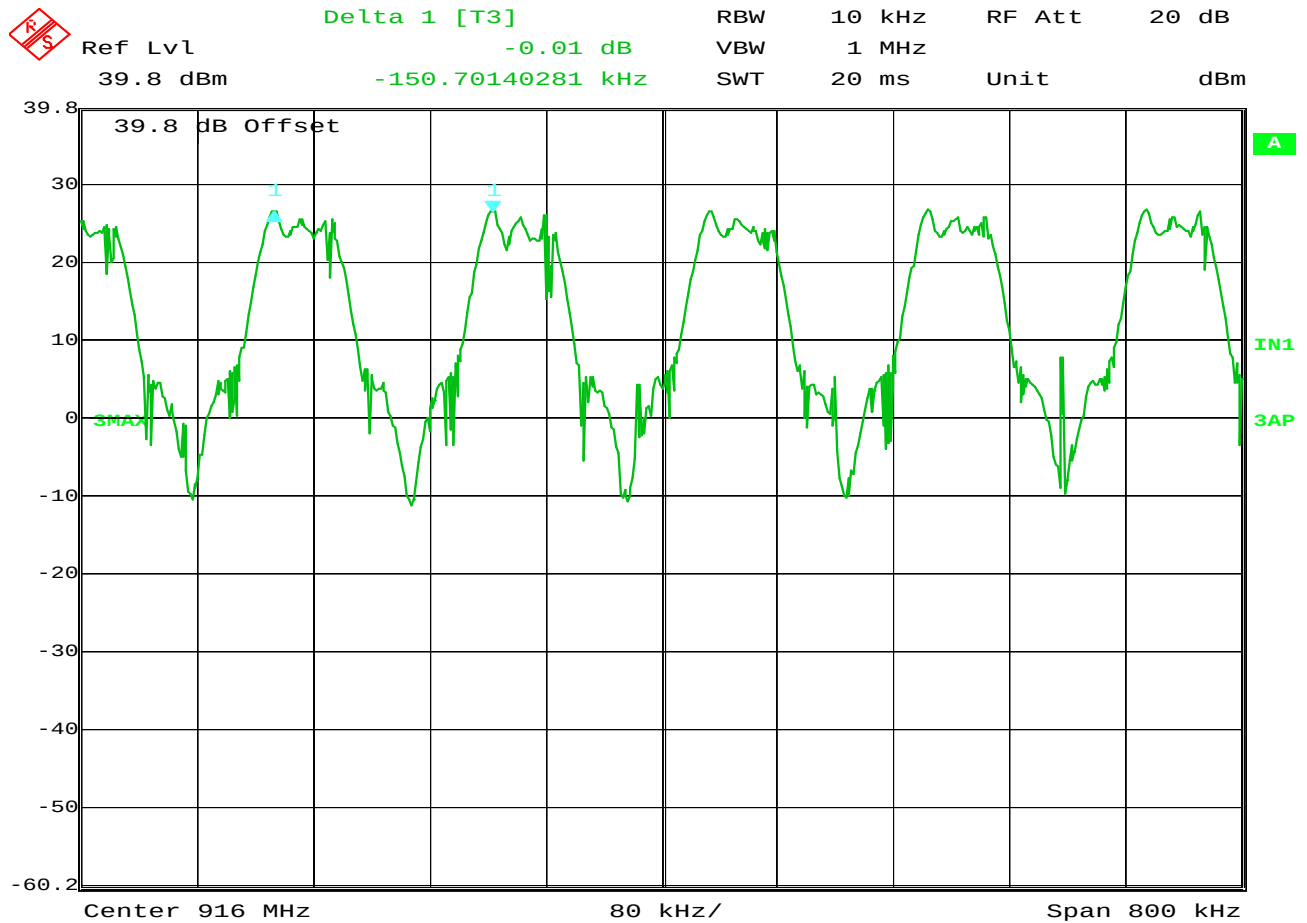


Date: 31.AUG.2012 15:23:59

FCC 15.247: Carrier Frequency Separation

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 4.SEP.2012 13:30:06

FCC 15.247: Carrier Frequency Separation

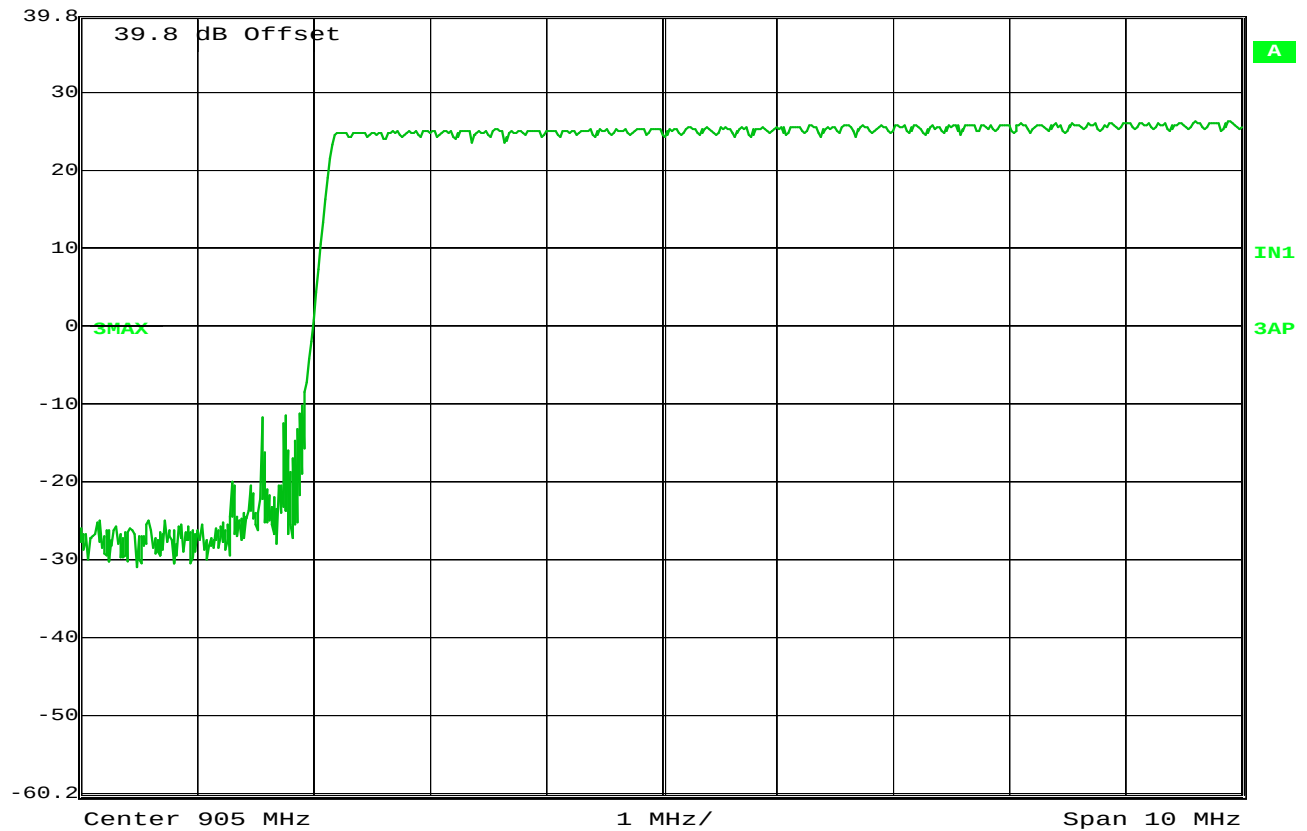
MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/57kbps
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl
39.8 dBm

RBW 100 kHz RF Att 20 dB
VBW 1 MHz
SWT 5 ms Unit dBm

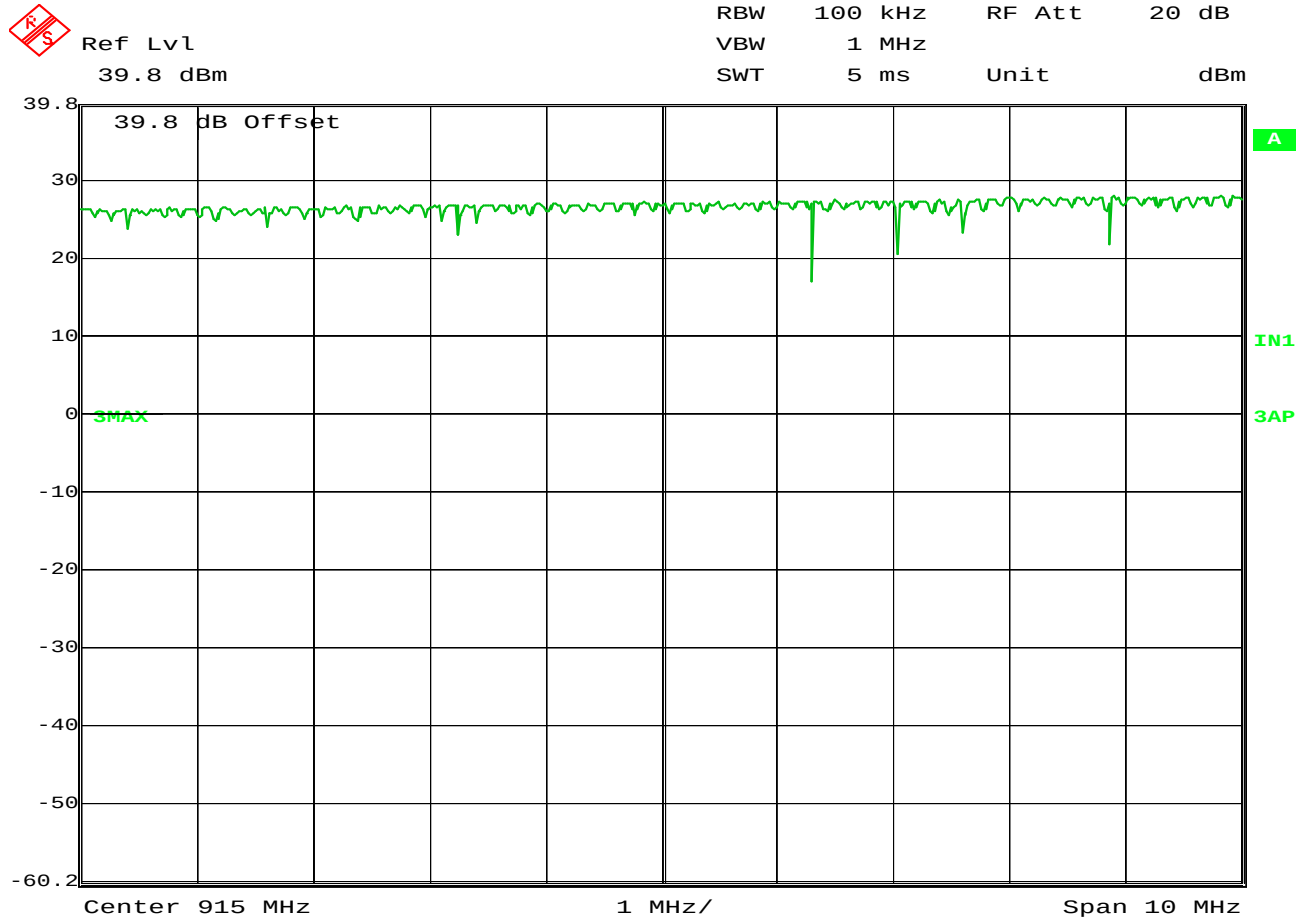


Date: 4.SEP.2012 10:19:27

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (1/3)
TEST PARAMETERS : 171 Channels (52 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

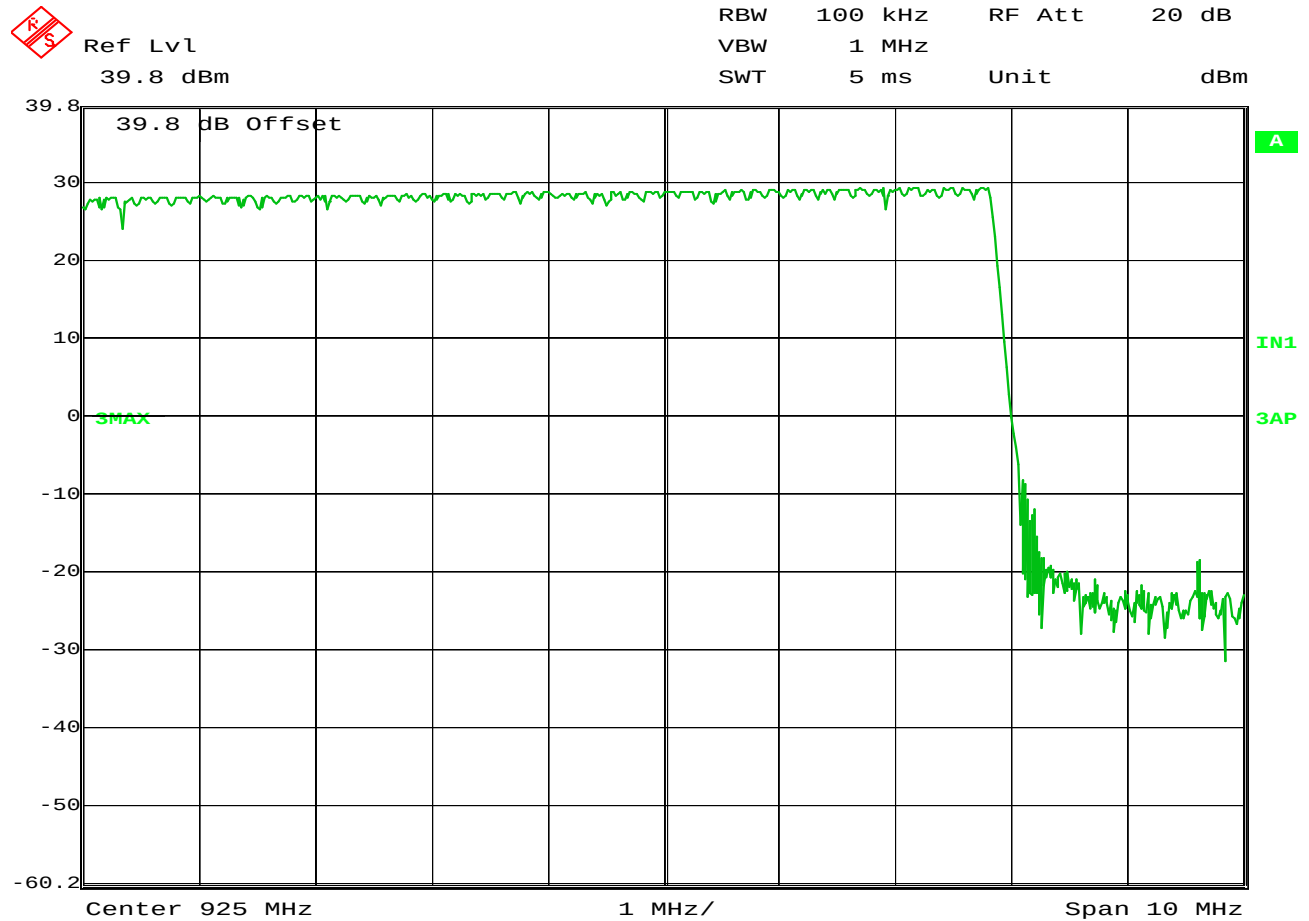


Date: 4.SEP.2012 10:35:08

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (2/3)
TEST PARAMETERS : 171 Channels (67 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 4.SEP.2012 10:39:41

FCC 15.247: Number of Hop Frequencies

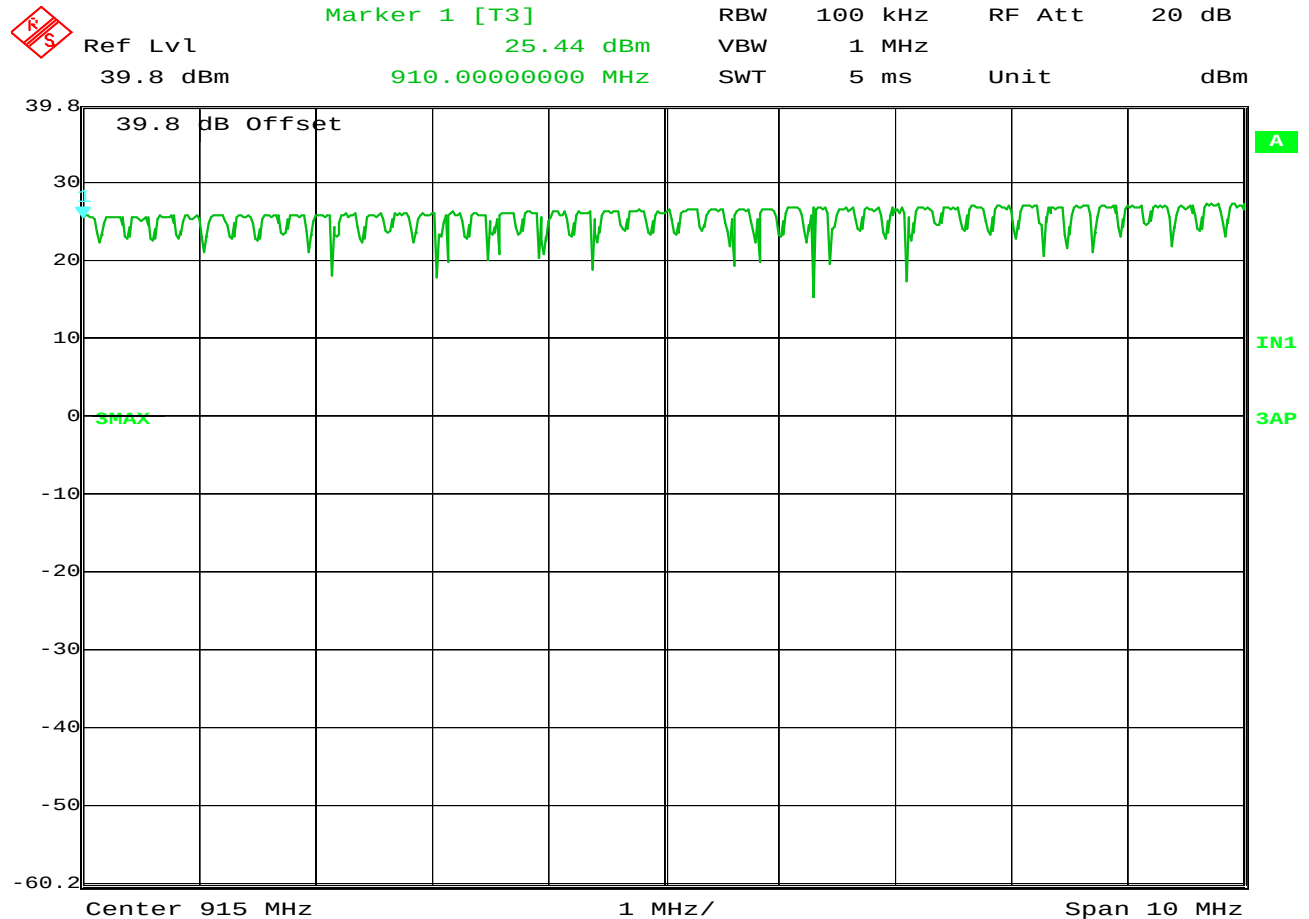
MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (3/3)
TEST PARAMETERS : 171 Channels (52 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps (1/3)
TEST PARAMETERS : 113 Channels (34 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

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Date: 4.SEP.2012 15:44:10

FCC 15.247: Number of Hop Frequencies

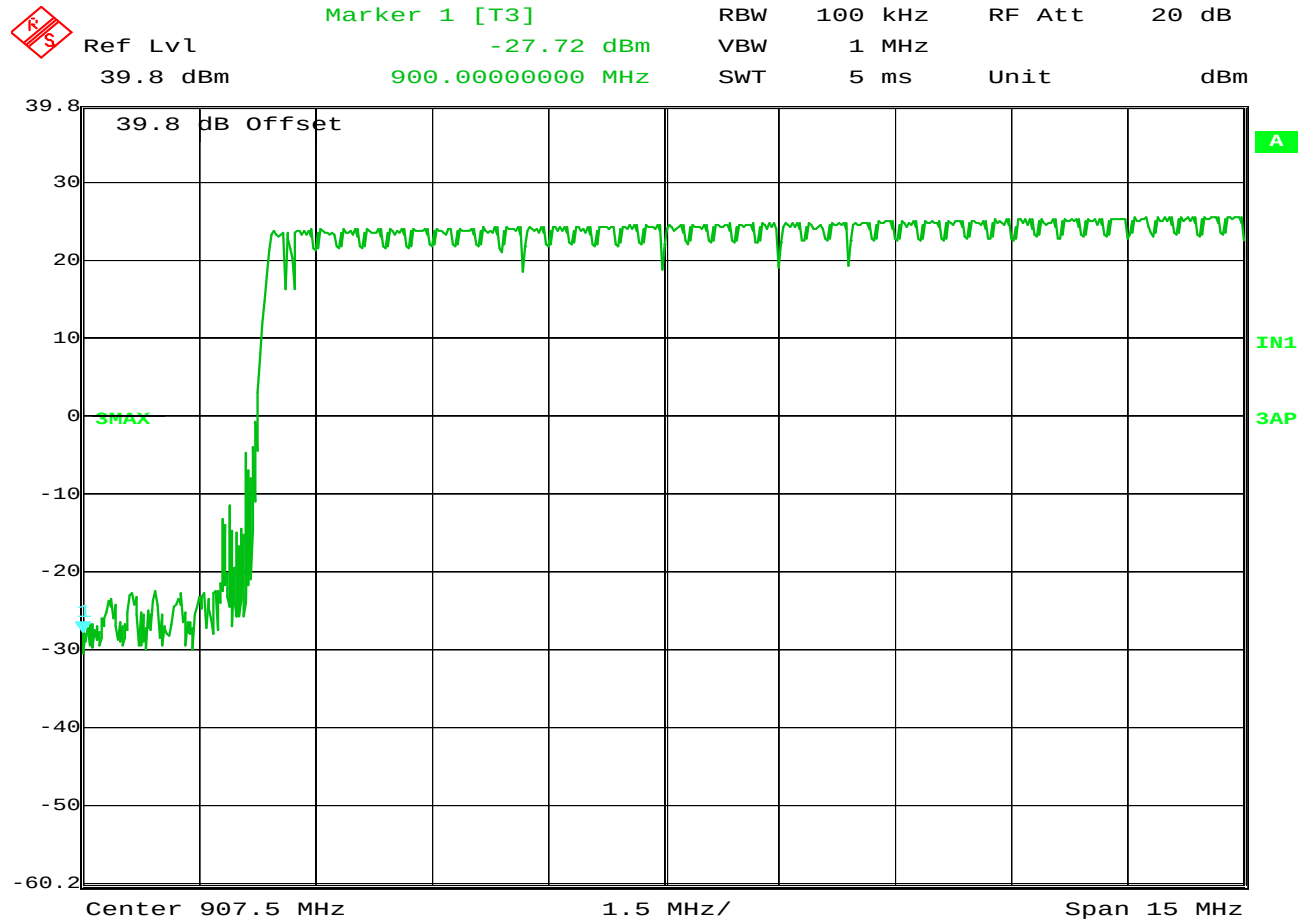
MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps (2/3)
TEST PARAMETERS : 113 Channels (45 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps (3/3)
TEST PARAMETERS : 113 Channels (34 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

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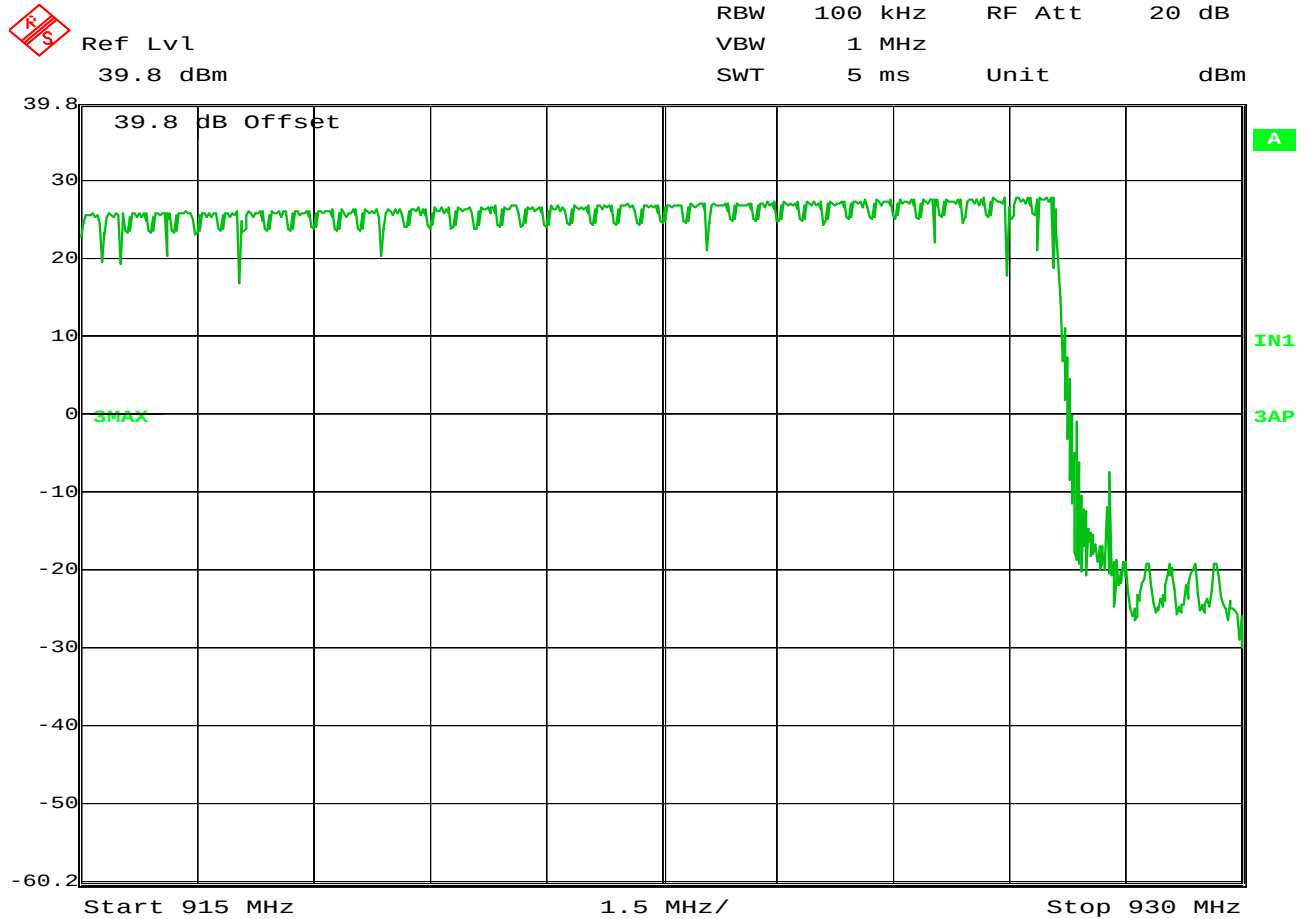


Date: 4.SEP.2012 16:18:47

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/229kbps (1/2)
TEST PARAMETERS : 84 Channels (42 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

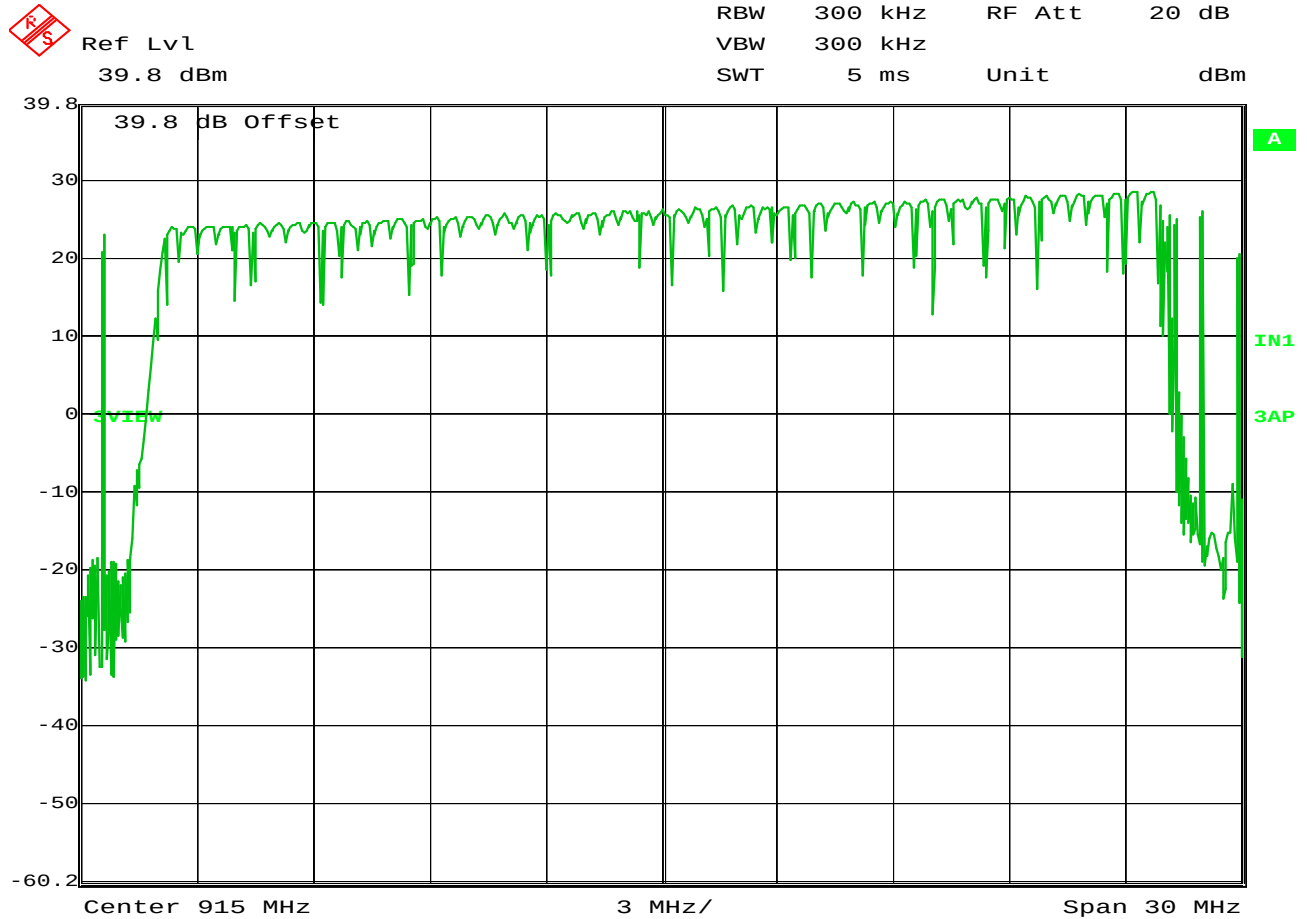


Date: 4.SEP.2012 16:28:03

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/229kbps (2/2)
TEST PARAMETERS : 84 Channels (42 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

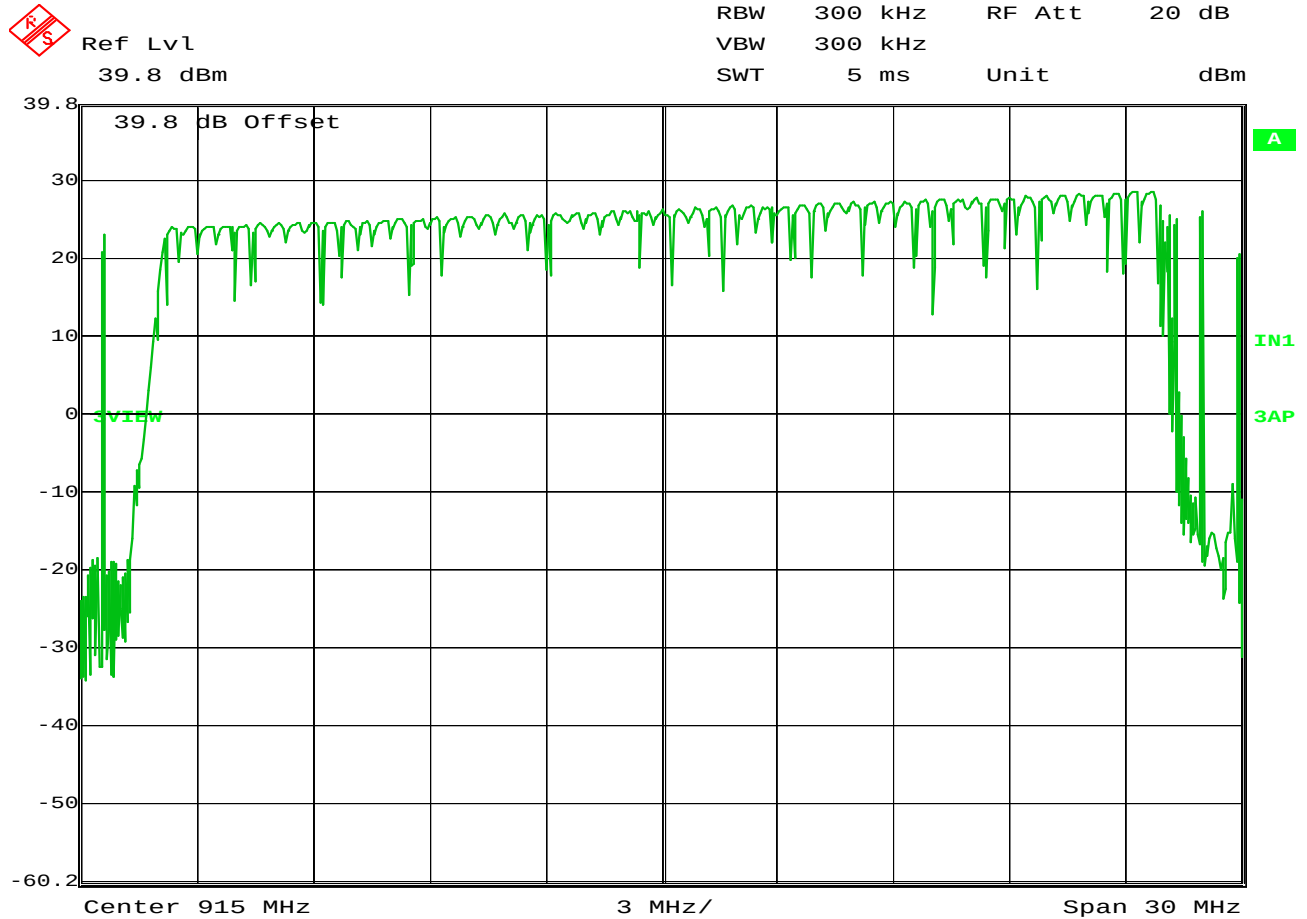


Date: 31.AUG.2012 16:15:25

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/365kbps
TEST PARAMETERS : 57 Channels
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

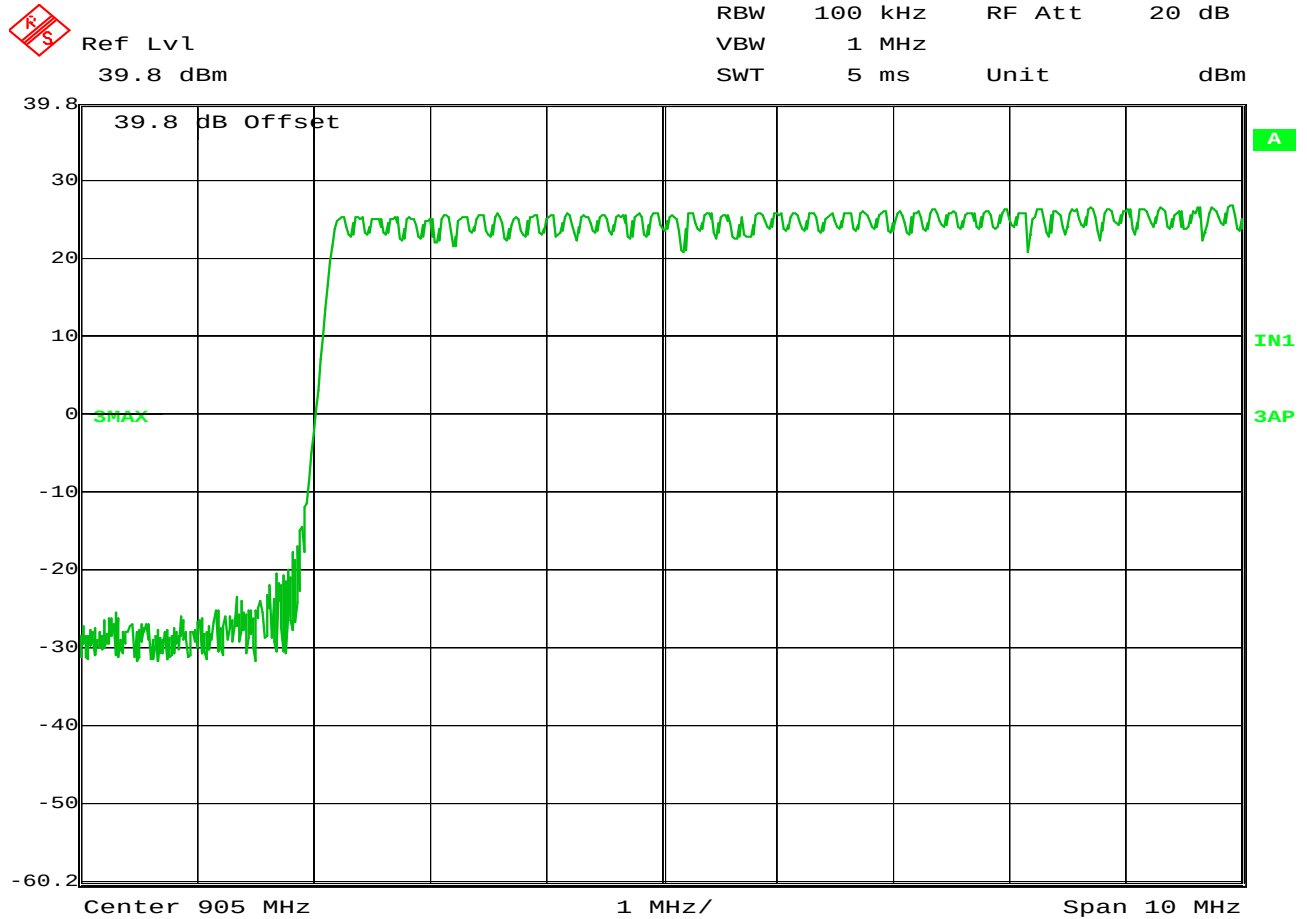


Date: 31.AUG.2012 16:15:25

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS : 57 Channels
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 4.SEP.2012 12:22:47

FCC 15.247: Number of Hop Frequencies

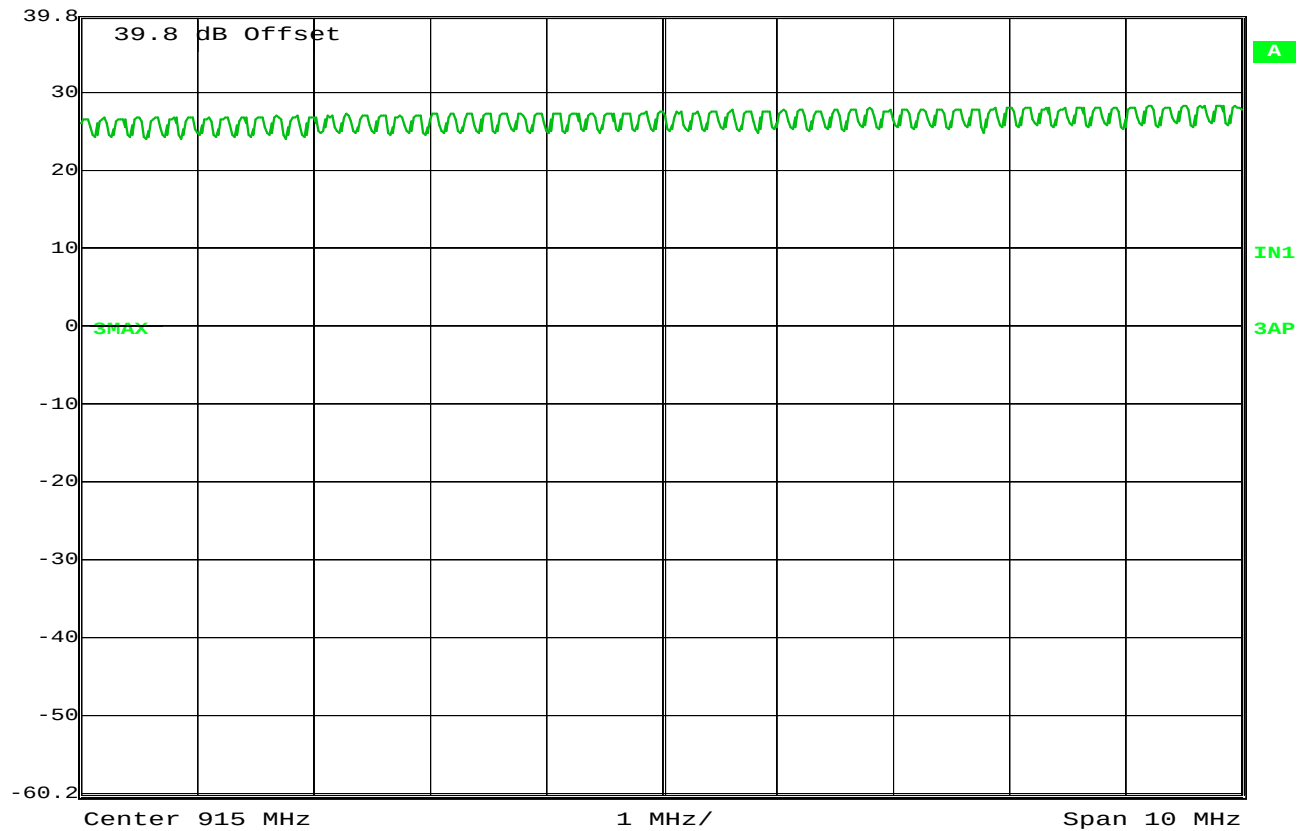
MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (1/3)
TEST PARAMETERS : 171 Channels (52 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl
39.8 dBm

RBW 100 kHz RF Att 20 dB
VBW 1 MHz
SWT 5 ms Unit dBm

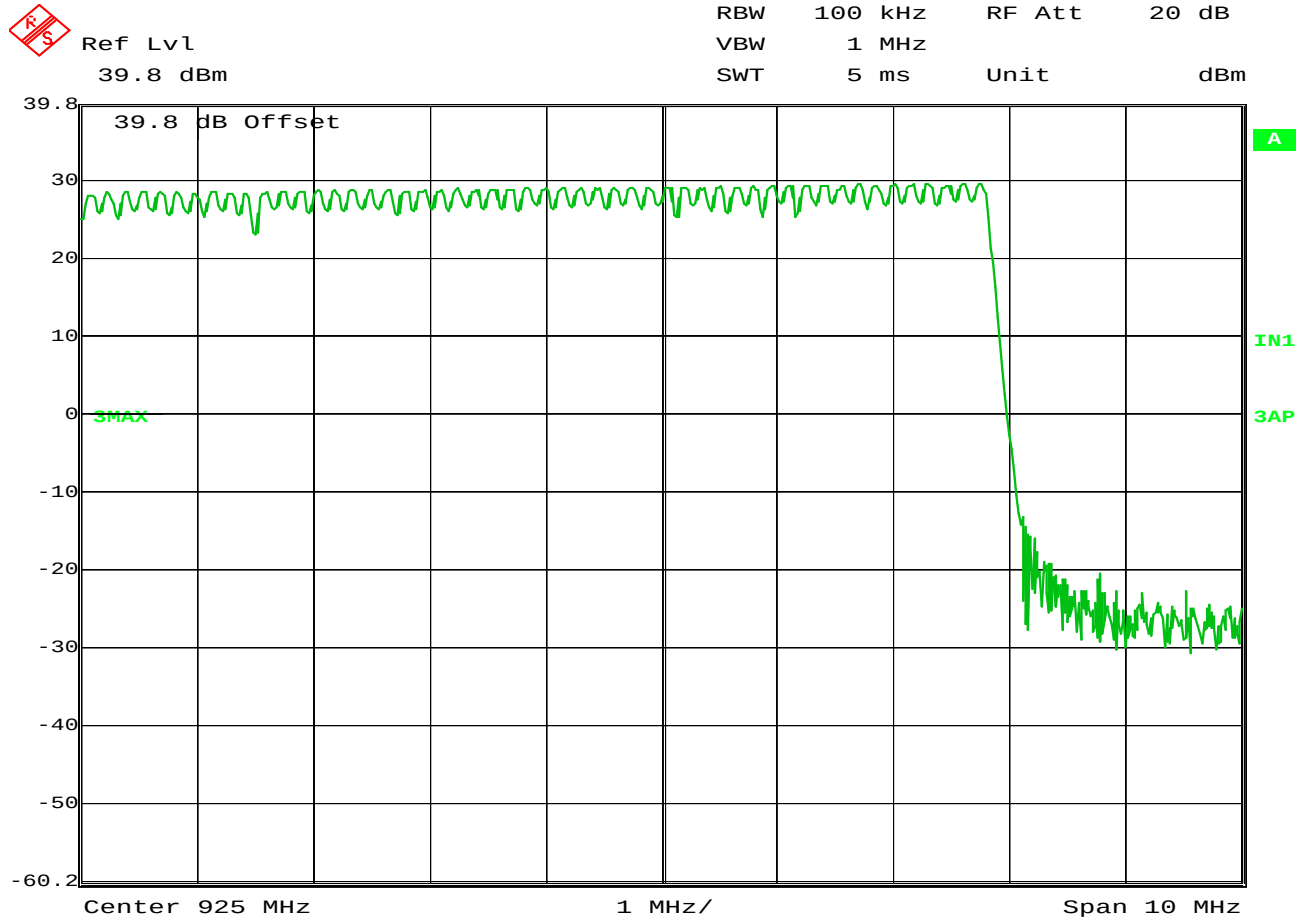


Date: 4.SEP.2012 12:30:15

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (2/3)
TEST PARAMETERS : 171 Channels (67 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

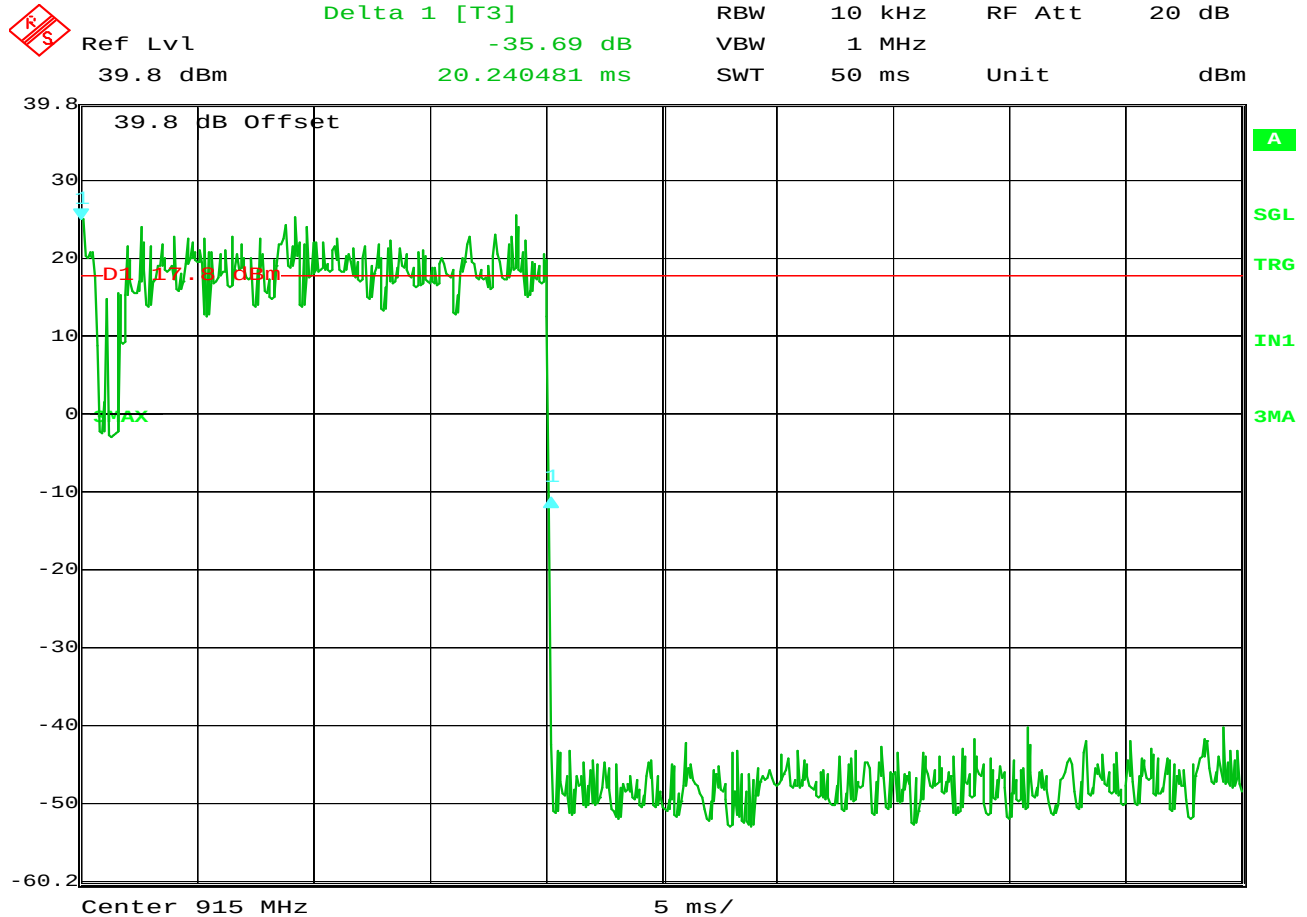


Date: 4.SEP.2012 12:33:22

FCC 15.247: Number of Hop Frequencies

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/57kbps (3/3)
TEST PARAMETERS : 171 Channels (52 counted in this range)
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

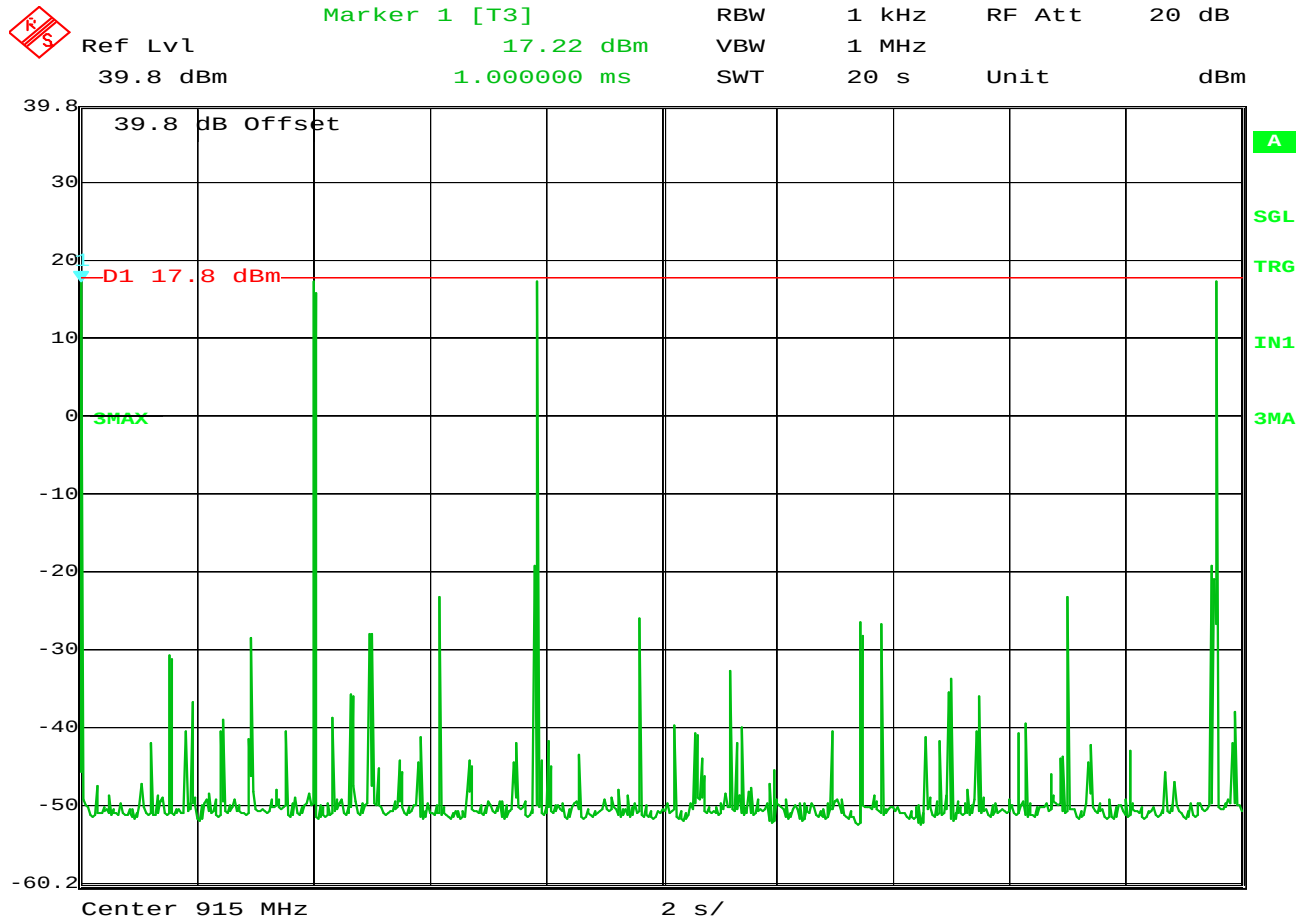


Date: 4.SEP.2012 11:47:57

FCC 15.247: Time of Occupancy (pulse width)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/114kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: Pulse width is 20.2ms

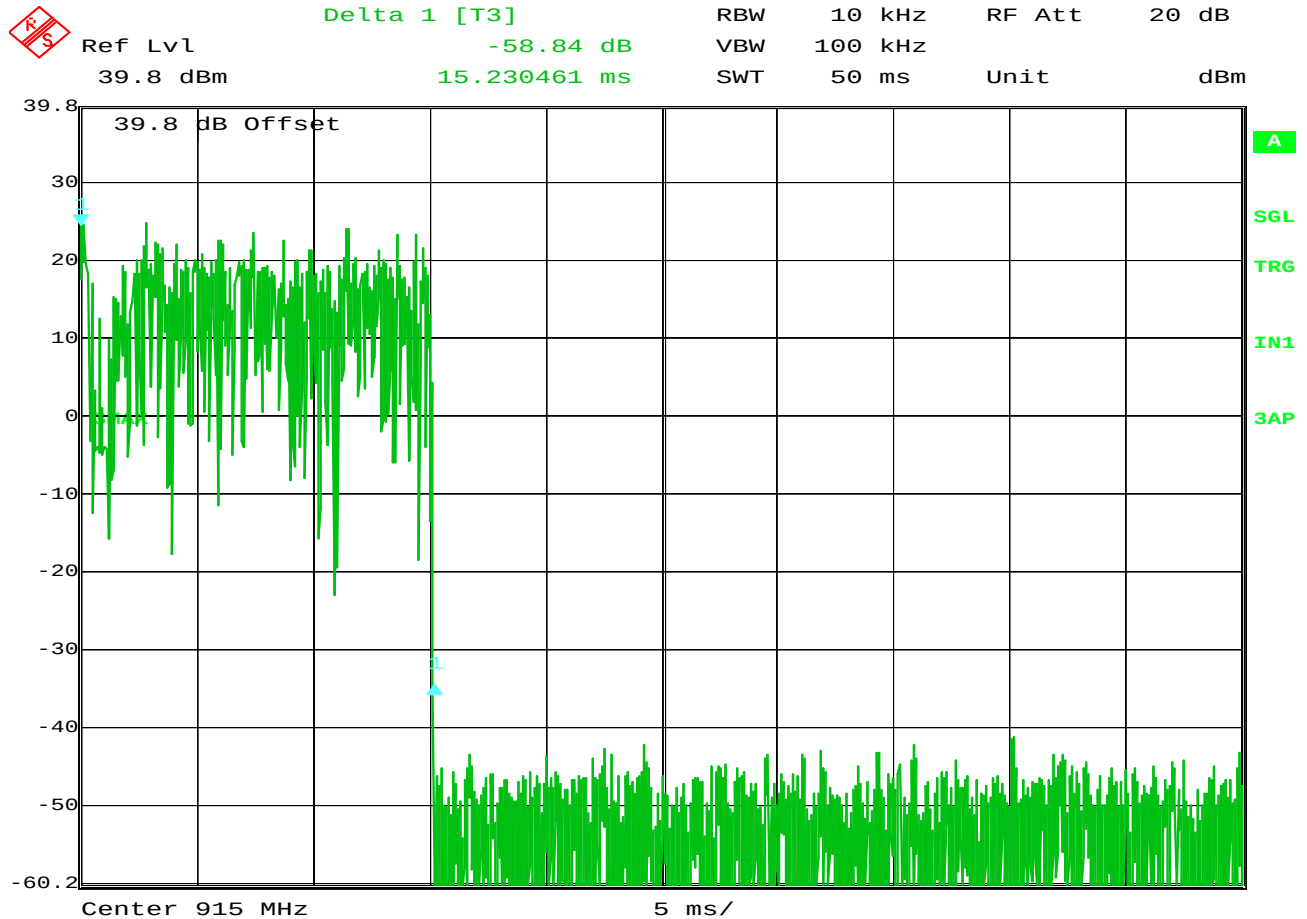


Date: 4.SEP.2012 11:18:32

FCC 15.247: Time of Occupancy (20 seconds)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/114kbps
TEST PARAMETERS : Must be less than 400ms in 20 second period
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: 4 pulses in 20 seconds
4 pulses x 20.2ms = 80.8ms

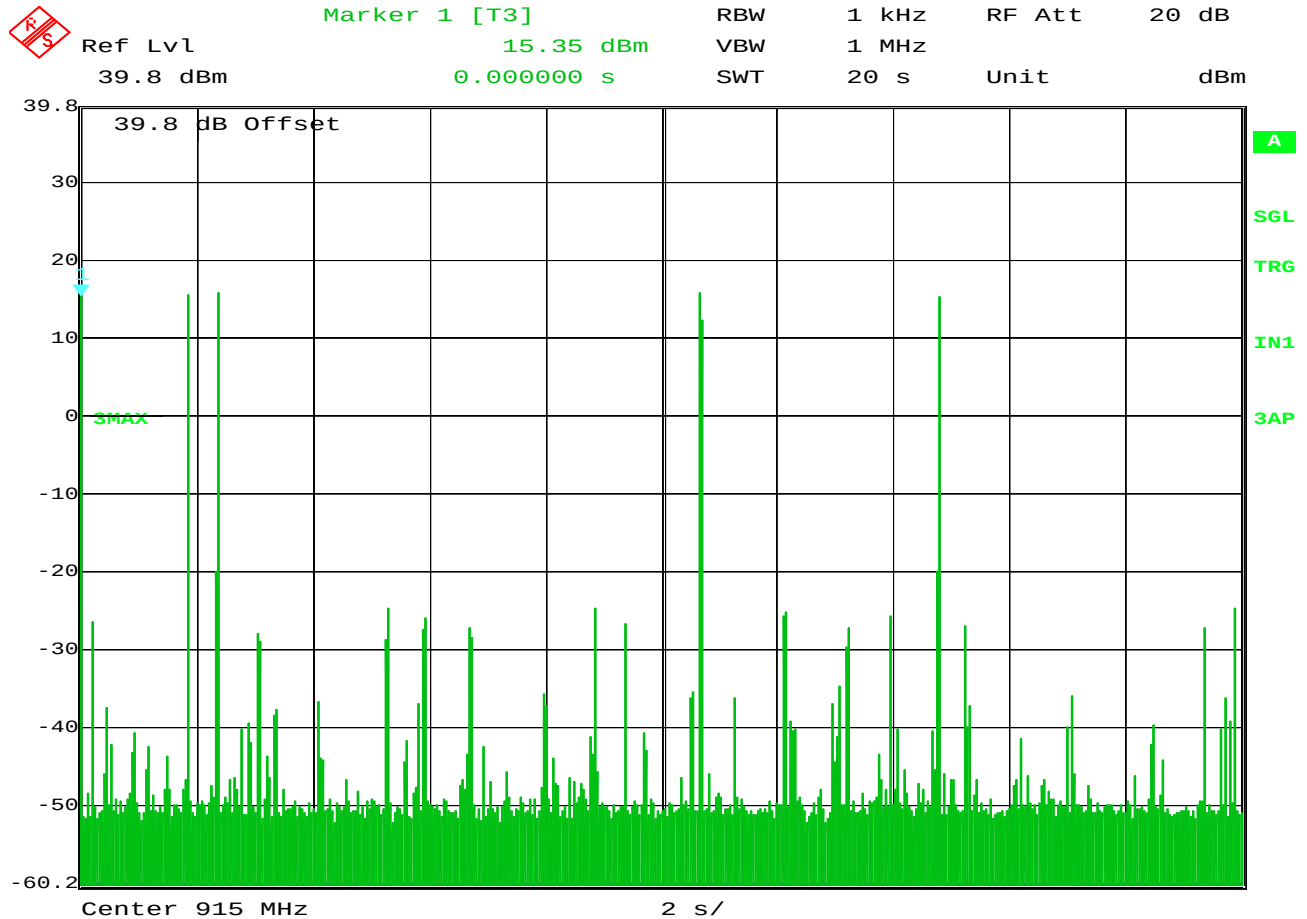


Date: 4.SEP.2012 14:56:59

FCC 15.247: Time of Occupancy (pulse width)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: 1 pulse in 100 milliseconds
1 pulse x 15.2ms = 15.2ms

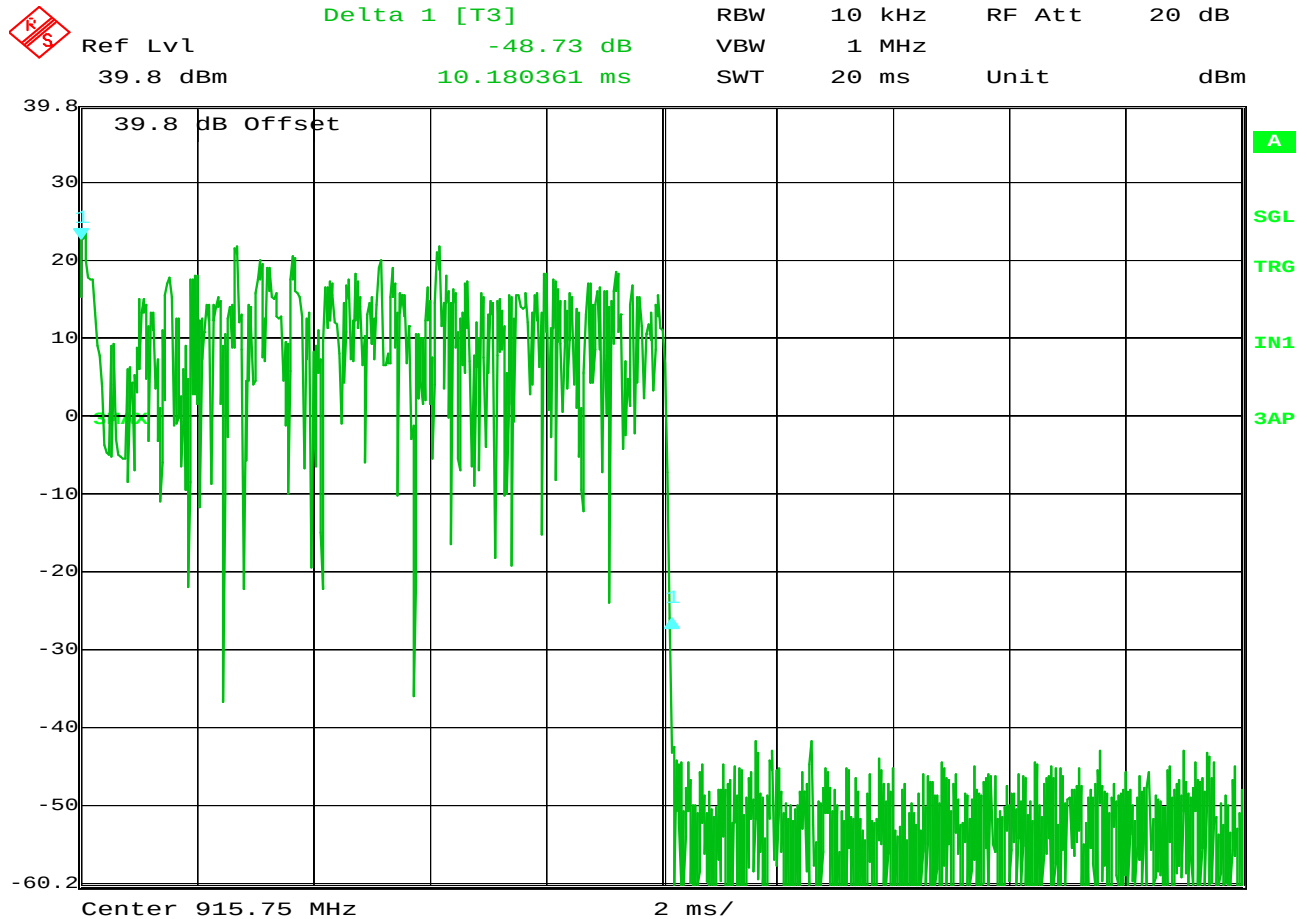


Date: 4.SEP.2012 15:22:11

FCC 15.247: Time of Occupancy (20s)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: 5 pulse in 20 seconds
5 pulse x 15.2ms = 76.0ms



Date: 4.SEP.2012 16:37:29

FCC 15.247: Time of Occupancy (pulse width)

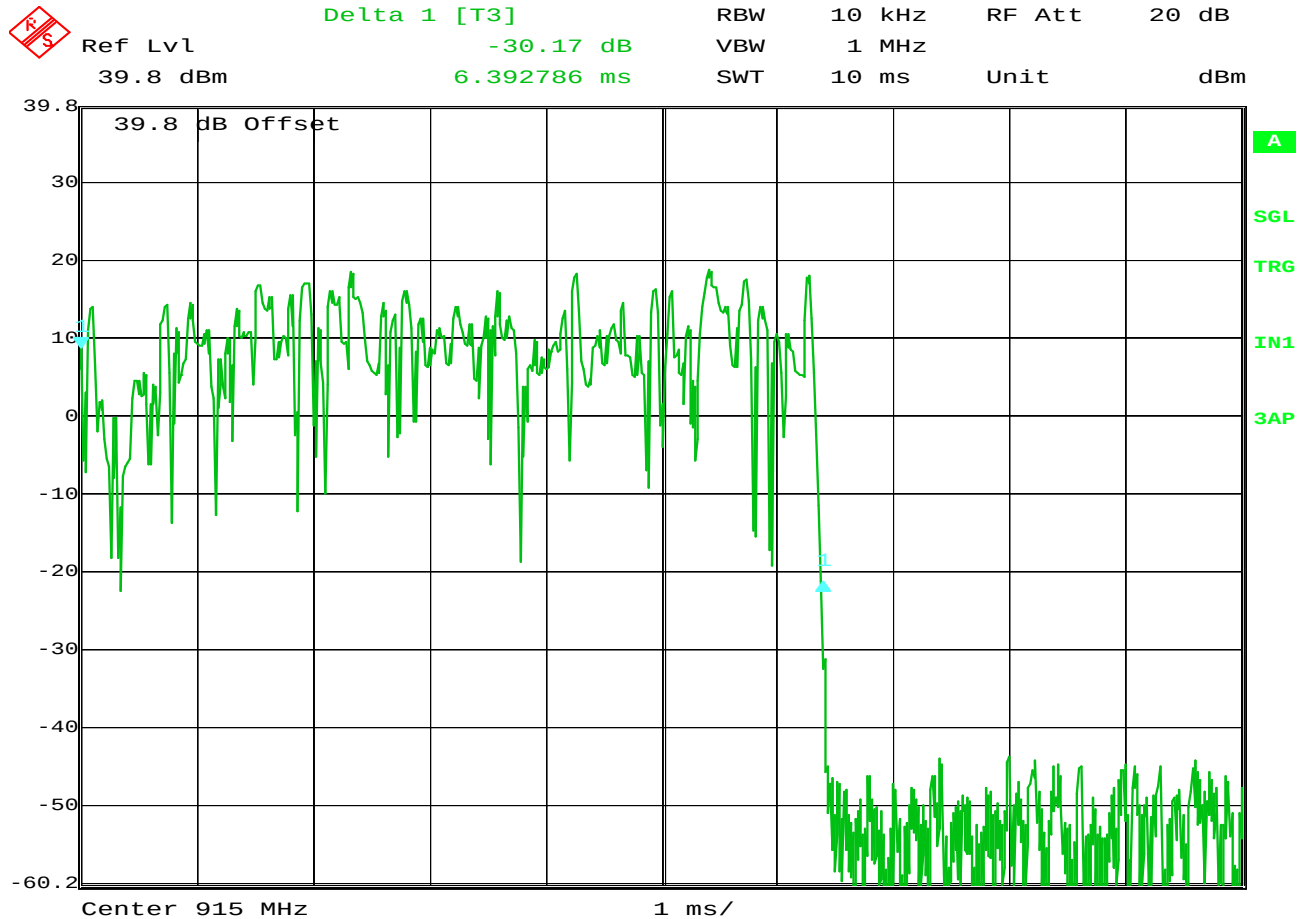
MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/229kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: Pulse width is 10.2ms



MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/229kbps
TEST PARAMETERS : 20dB BW is >250kHz: Up time must be < 400ms in 10 second period
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

Page 58 of 140

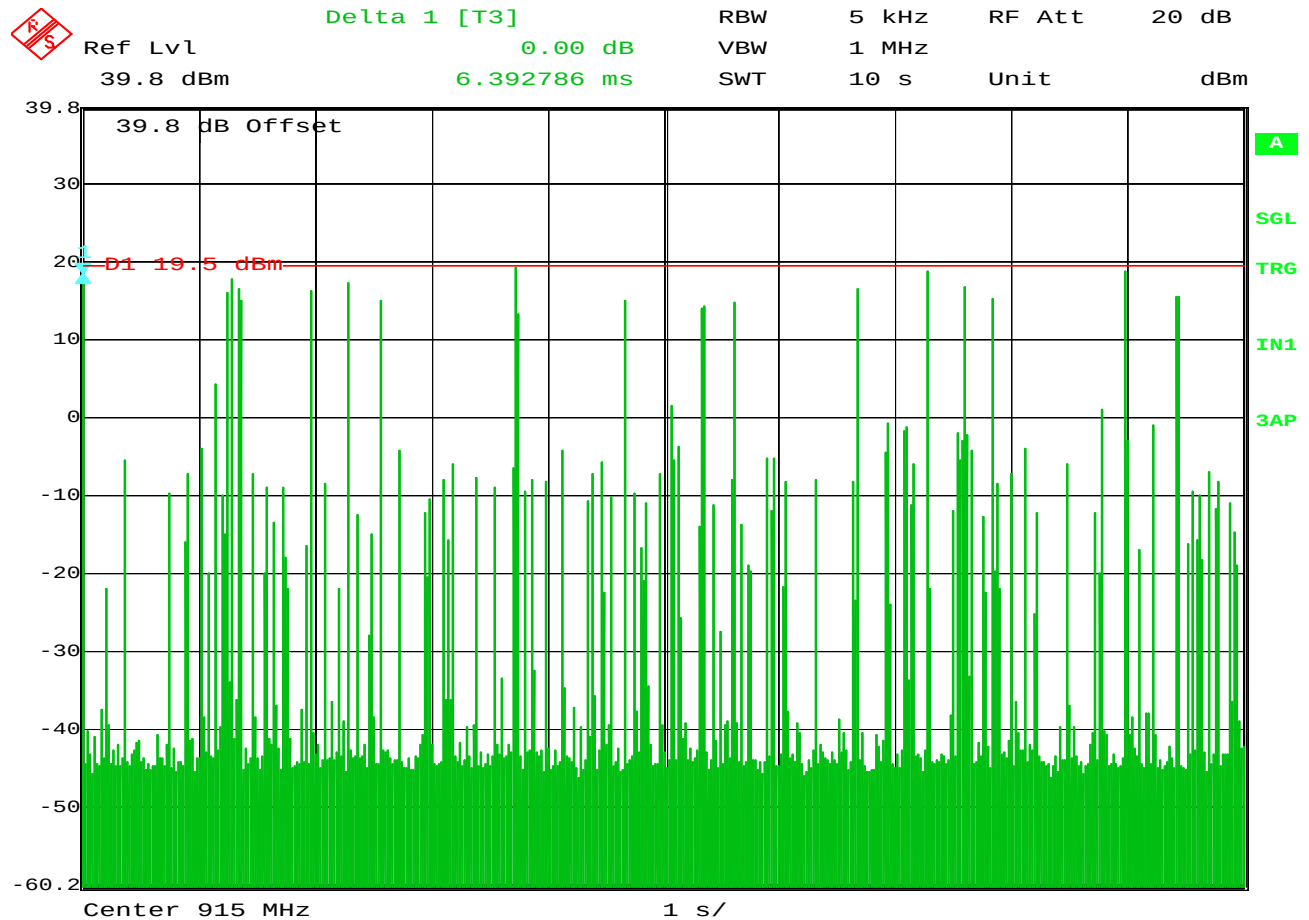


Date: 31.AUG.2012 15:30:24

FCC 15.247: Time of Occupancy (pulse width)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/365kbps
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: Pulse width is 6.4ms

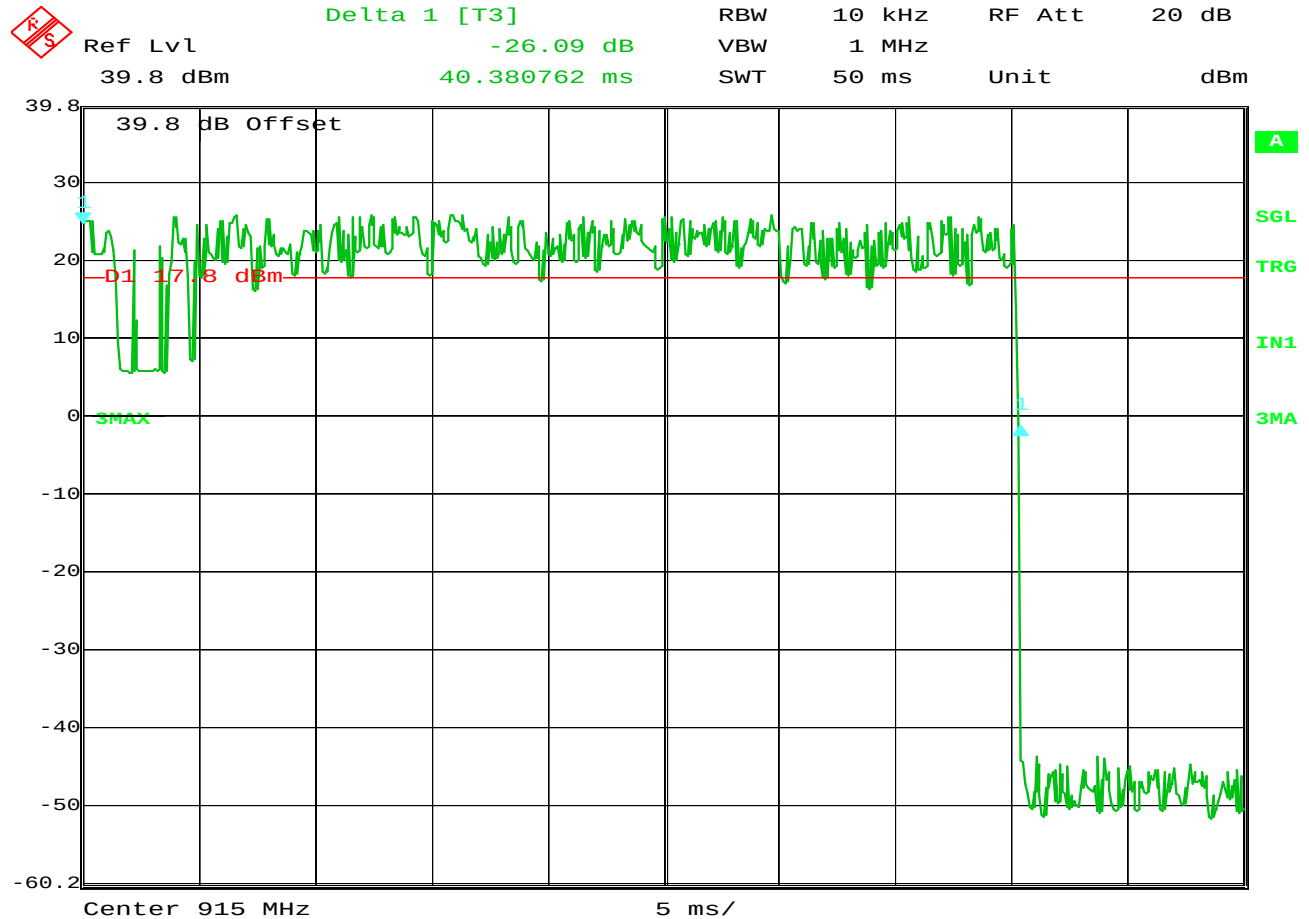


Date: 31.AUG.2012 15:42:45

FCC 15.247: Time of Occupancy (10 seconds)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/365kbps
TEST PARAMETERS : Must be less than 400ms in 10 second period
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: 4 pulses in 10 seconds
4 pulses x 6.4ms = 25.2ms

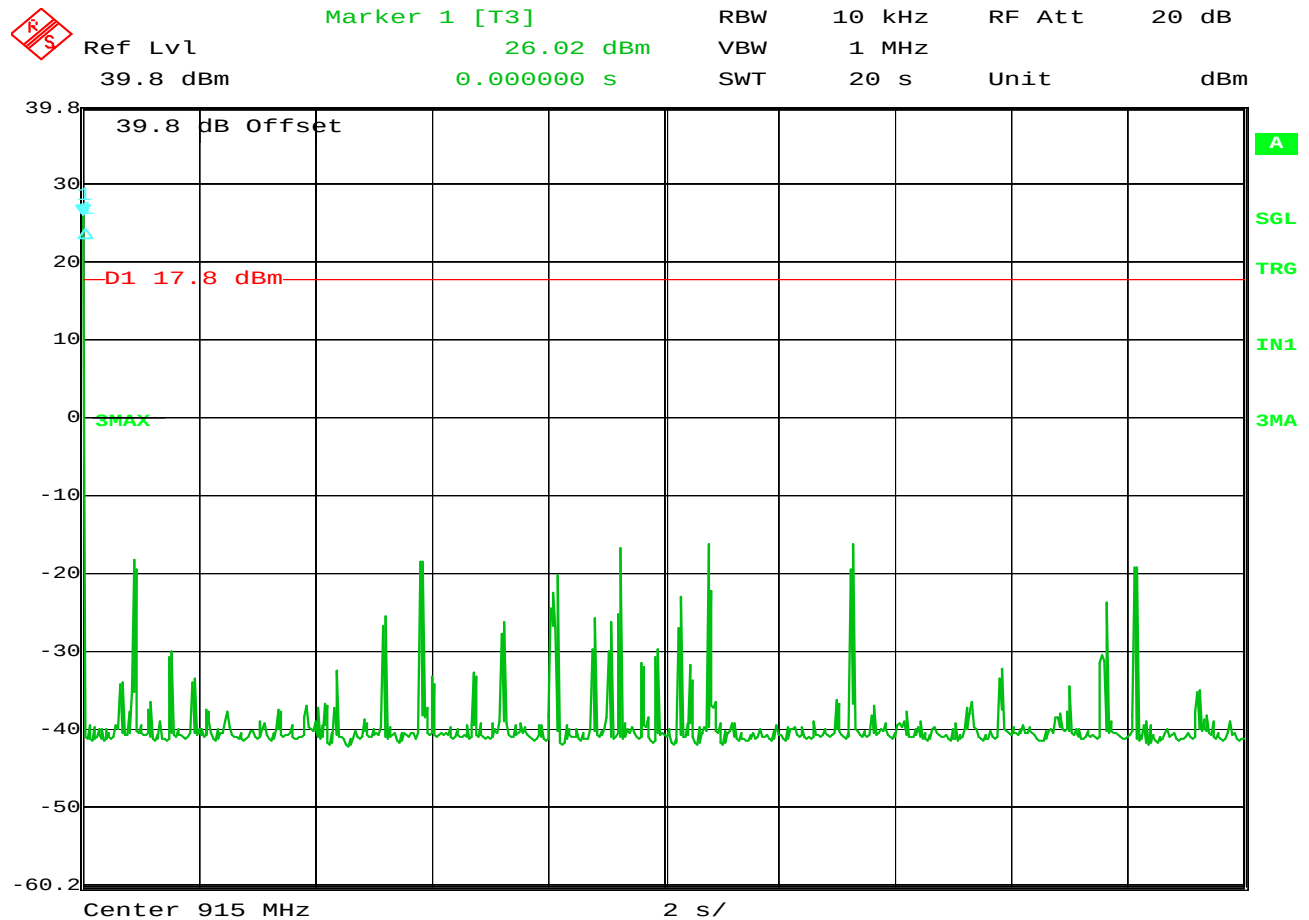


Date: 4.SEP.2012 12:01:00

FCC 15.247: Time of Occupancy (pulse width)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/57kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: Pulse width is 40.4ms

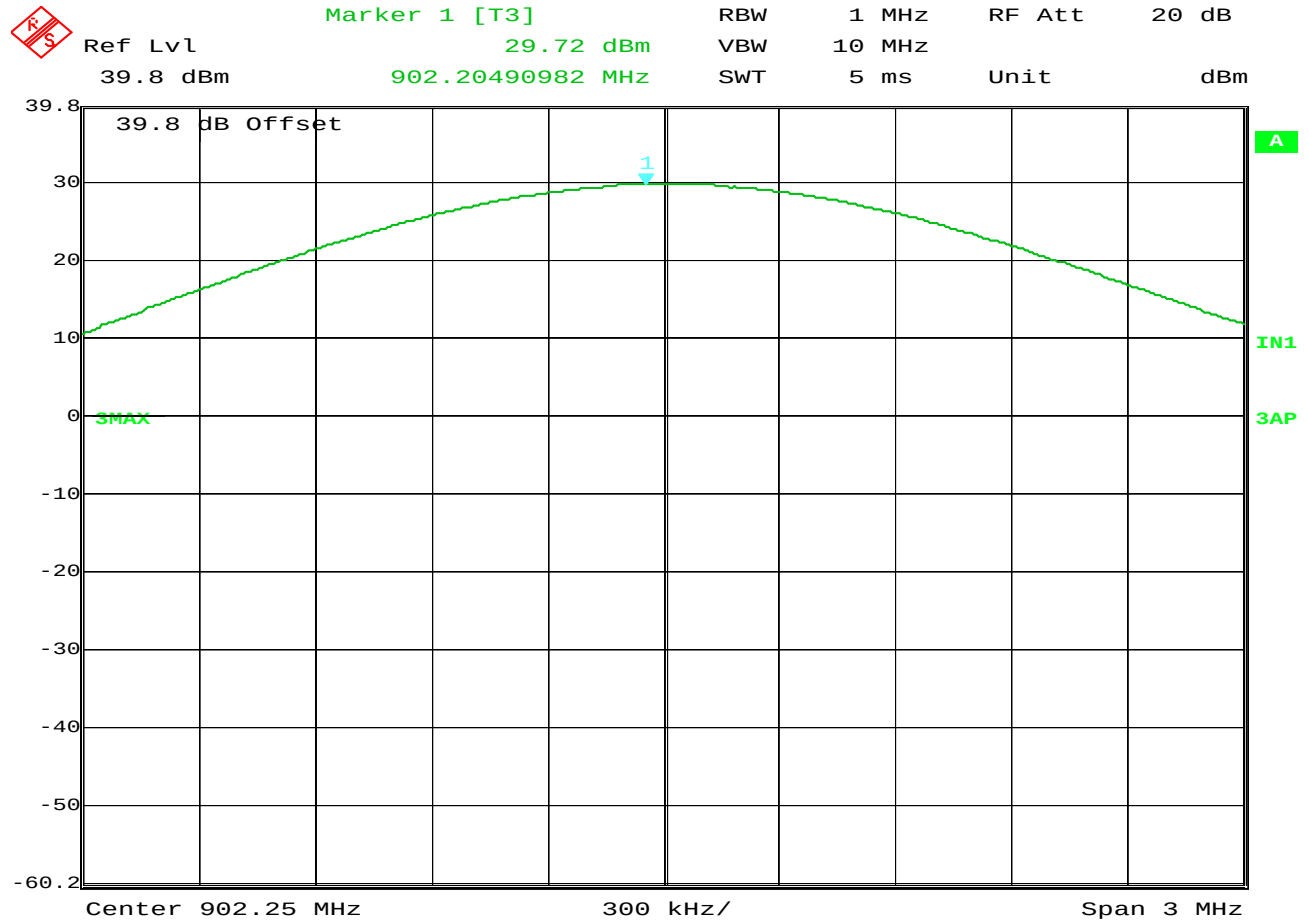


Date: 4.SEP.2012 12:11:17

FCC 15.247: Time of Occupancy (20s)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/57kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: 1 pulse in 20 seconds
1 pulse x 40.4ms = 40.4ms



Date: 31.AUG.2012 09:56:17

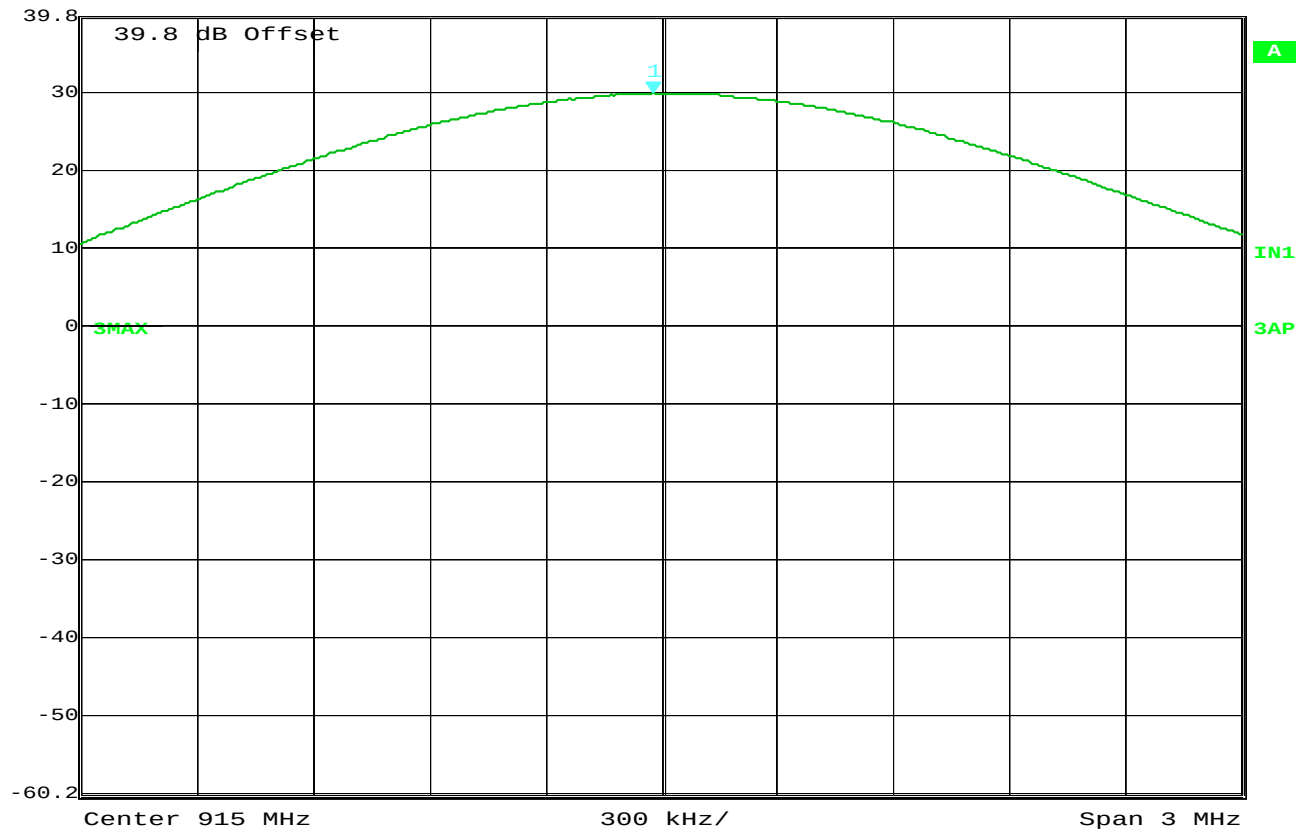
FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (Low: 902.25MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.86 dBm
914.97895792 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm

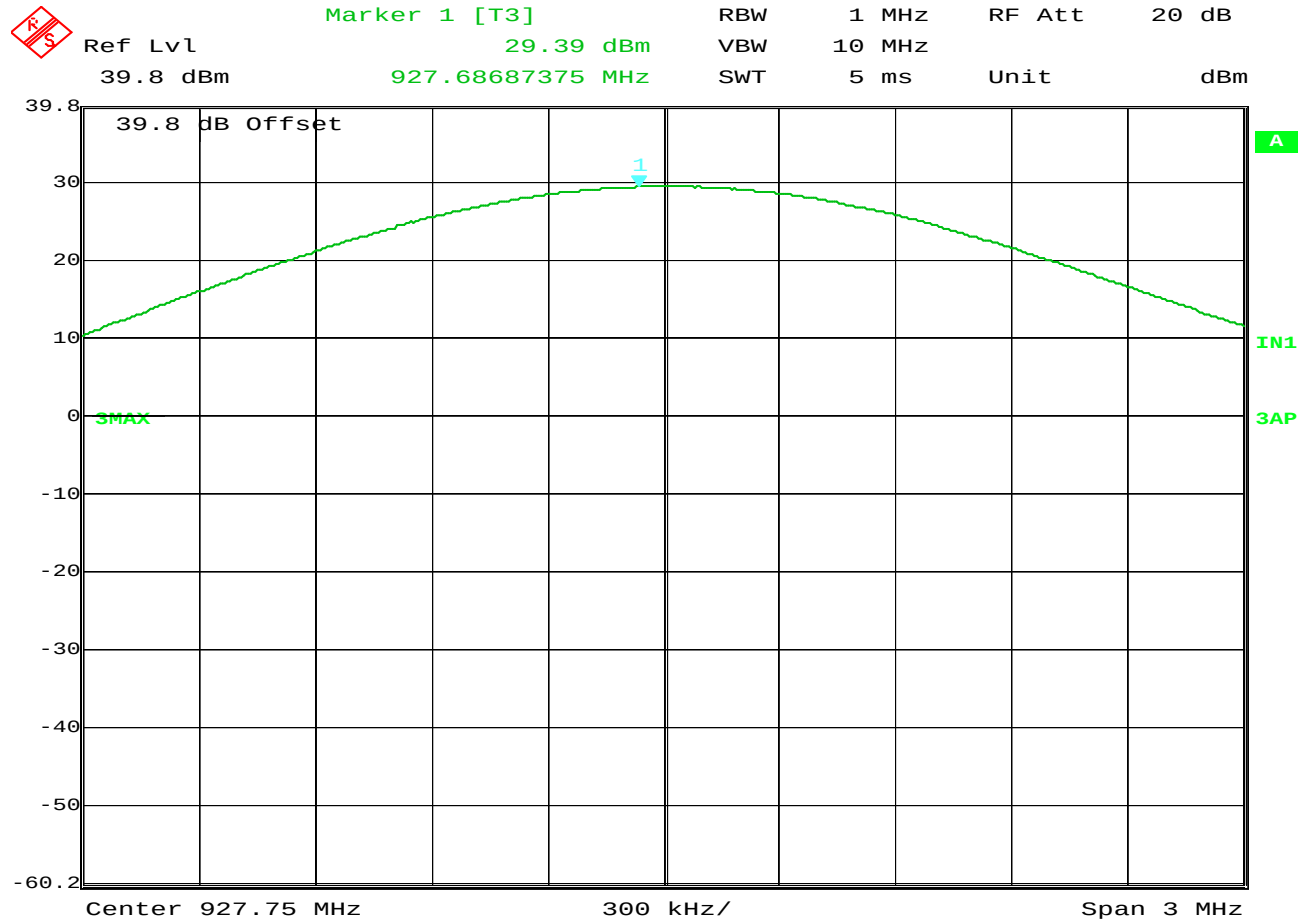


Date: 31.AUG.2012 09:58:01

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

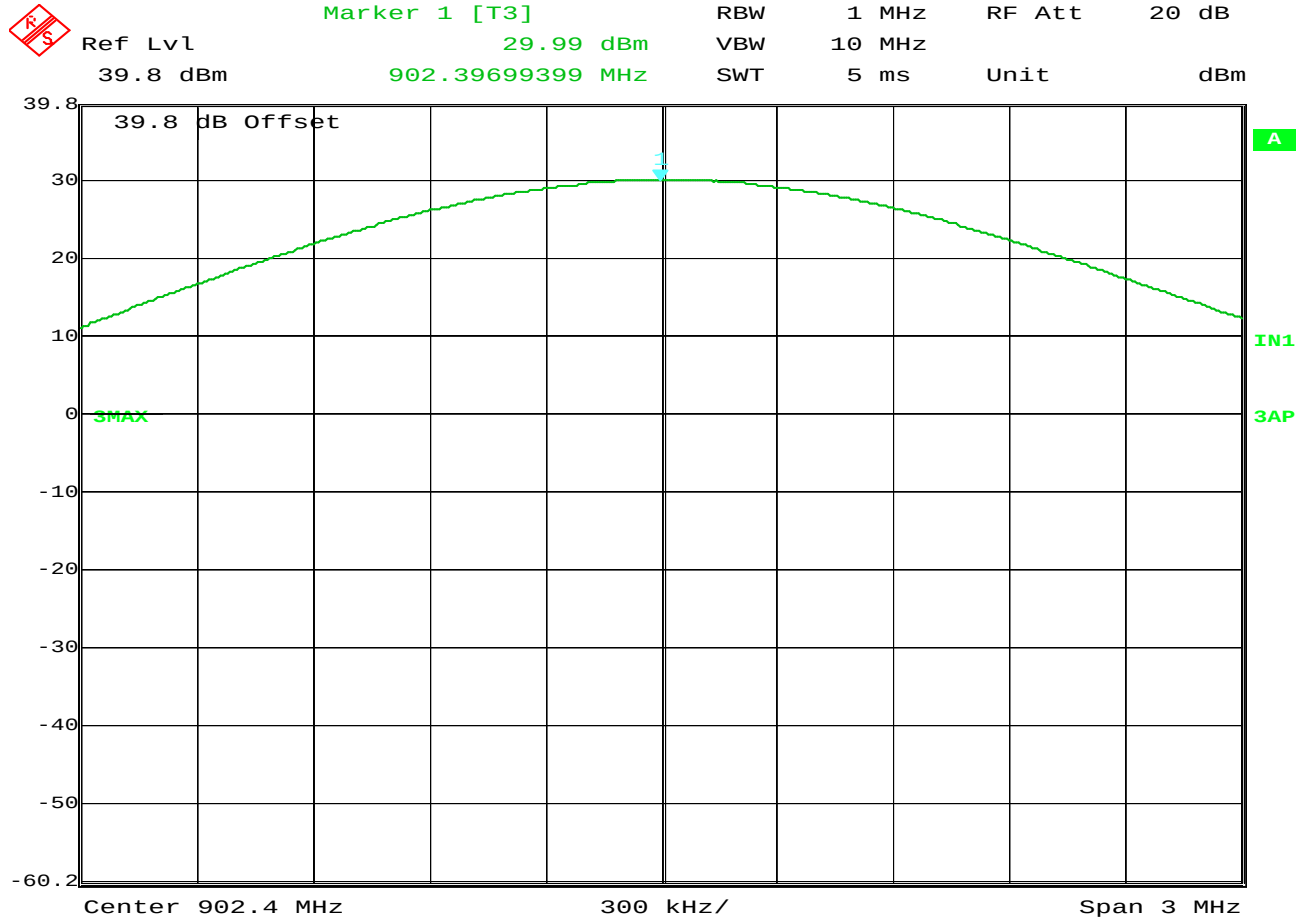


Date: 31.AUG.2012 10:29:49

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (High: 927.75MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 31.AUG.2012 08:54:40

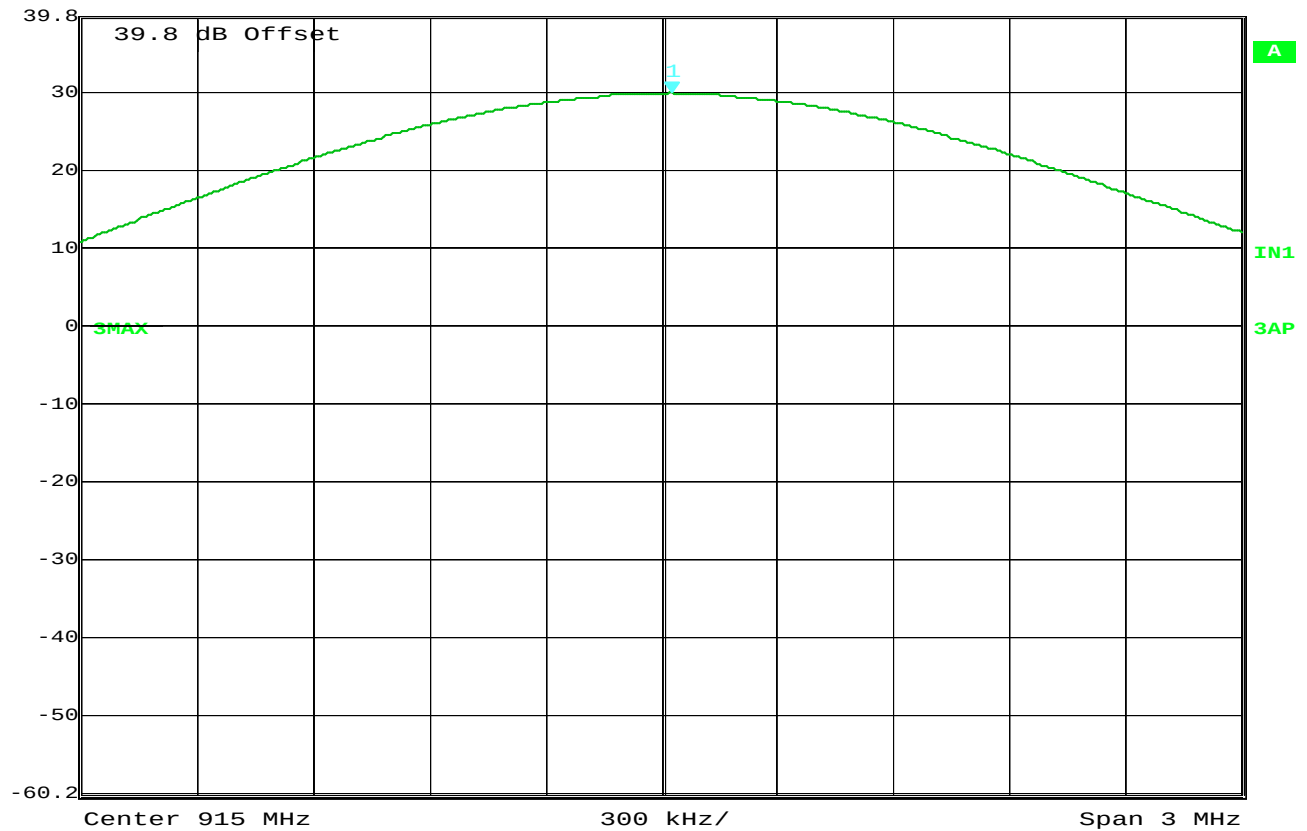
FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/153kbps (Low: 902.4MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.86 dBm
915.02705411 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm



Date: 31.AUG.2012 09:03:02

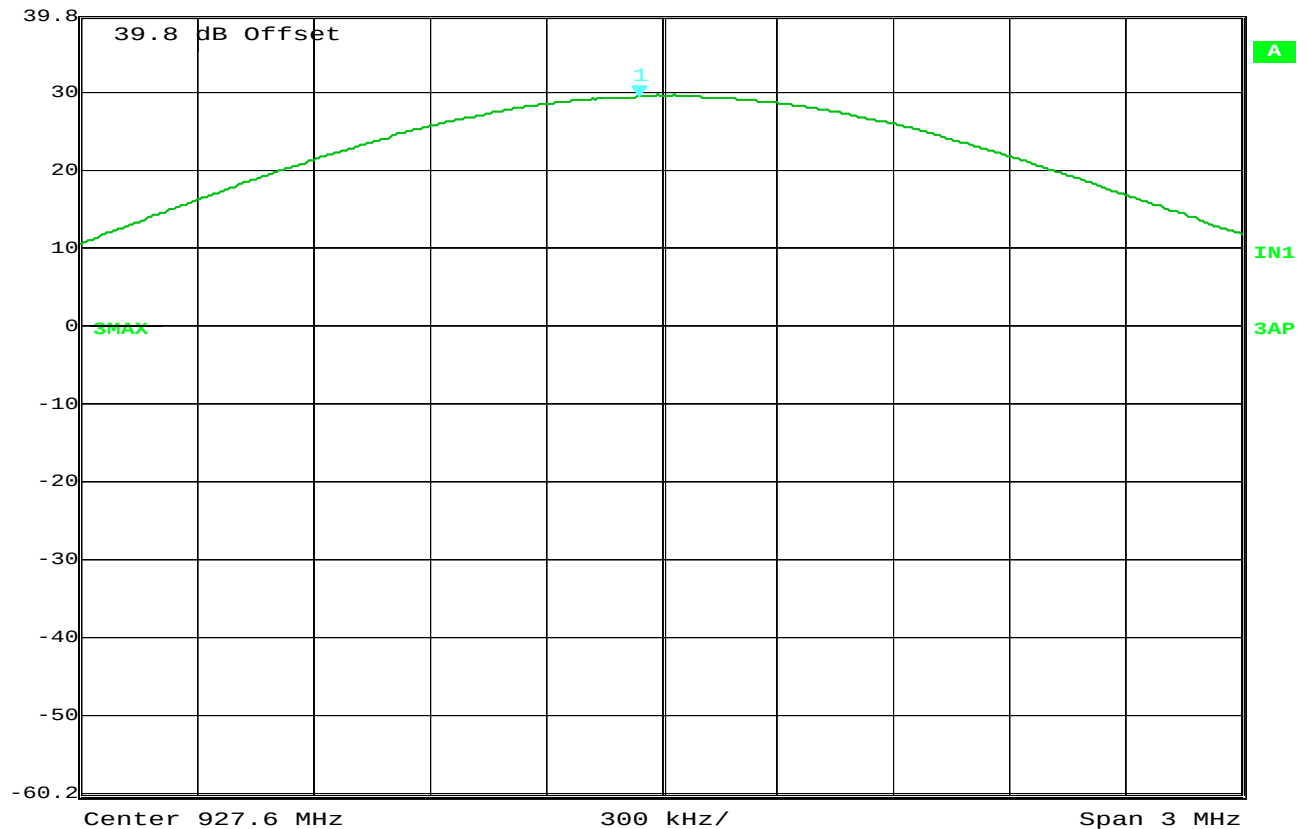
FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/153kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.39 dBm
927.54288577 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm



Date: 31.AUG.2012 09:05:11

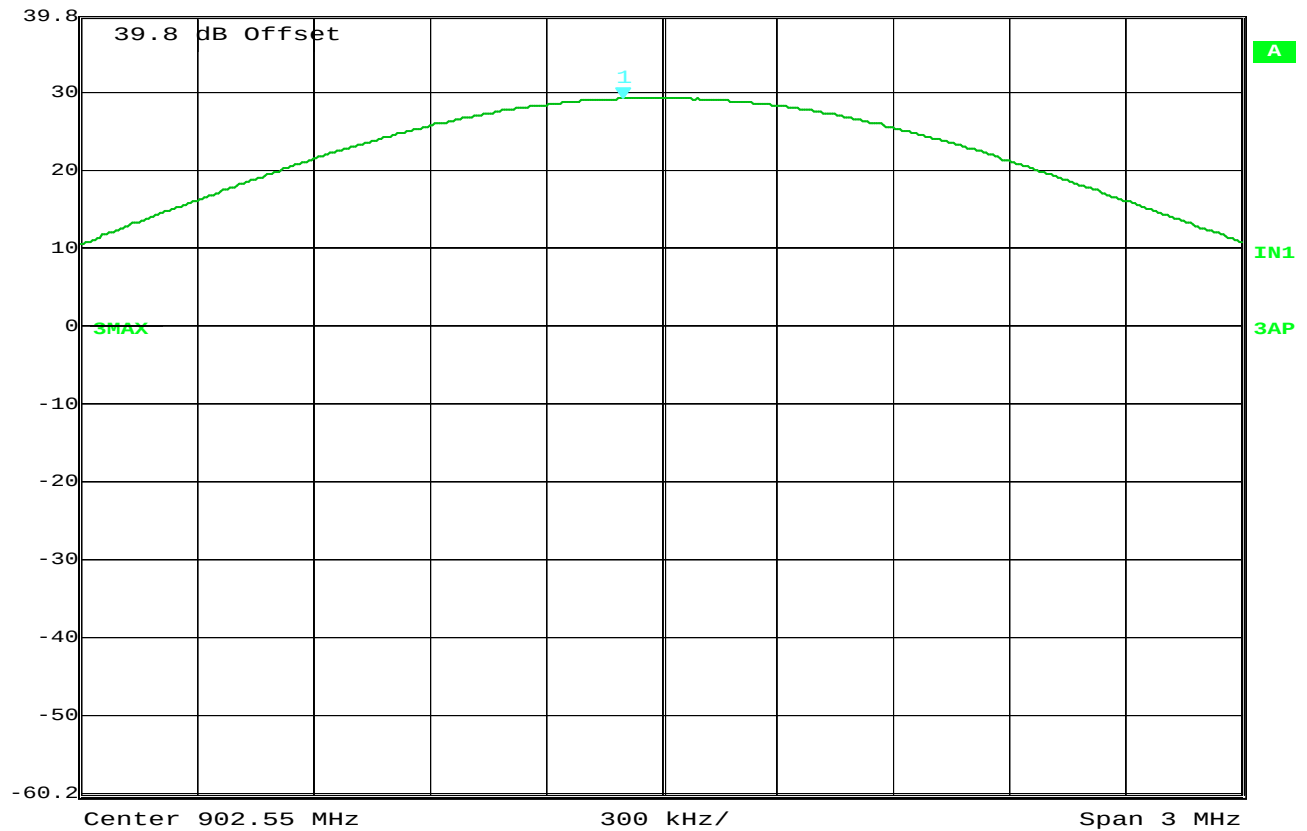
FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/153kbps (High: 927.6MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.07 dBm
902.45080160 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm

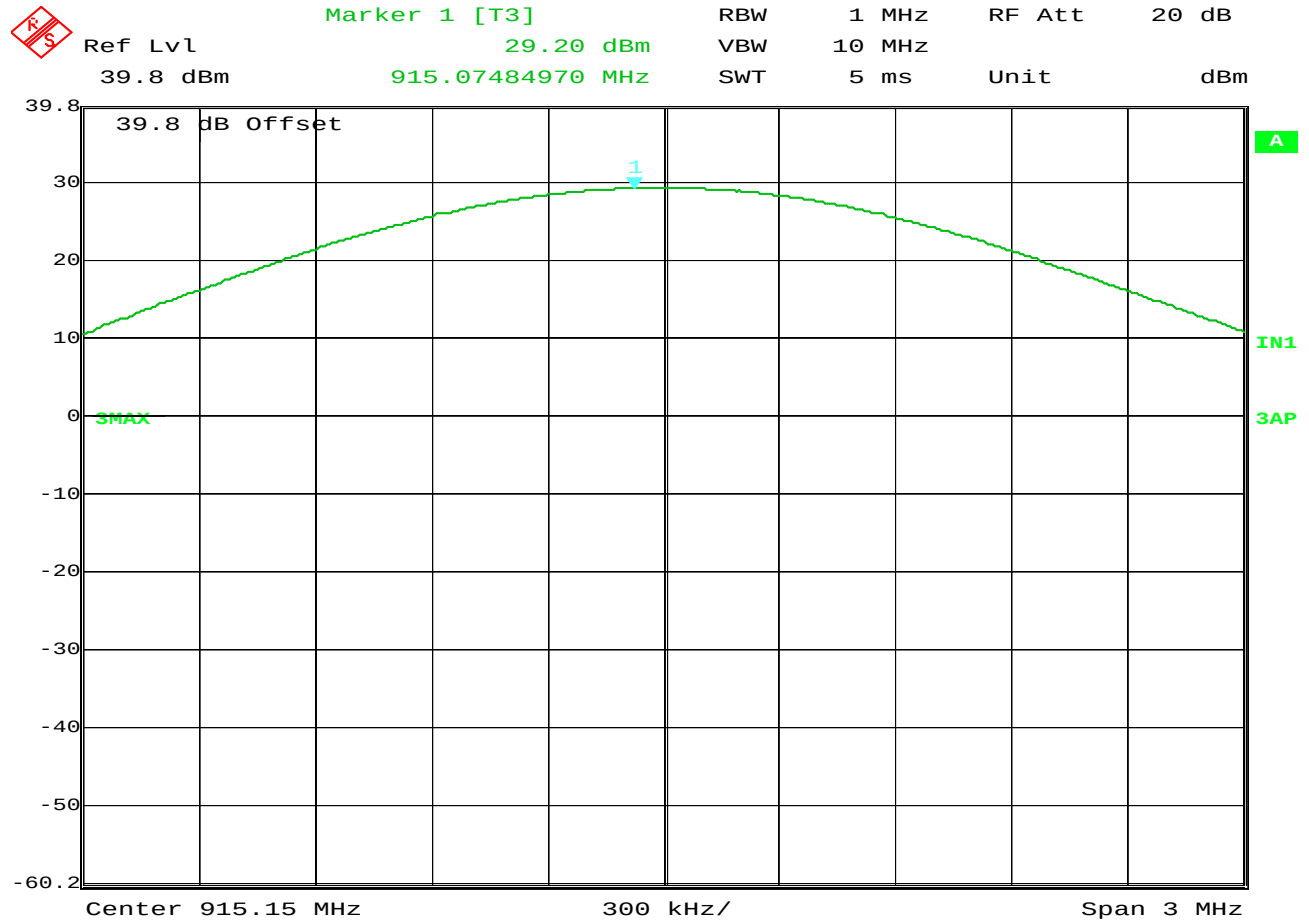


Date: 30.AUG.2012 17:21:43

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (Low: 902.55MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

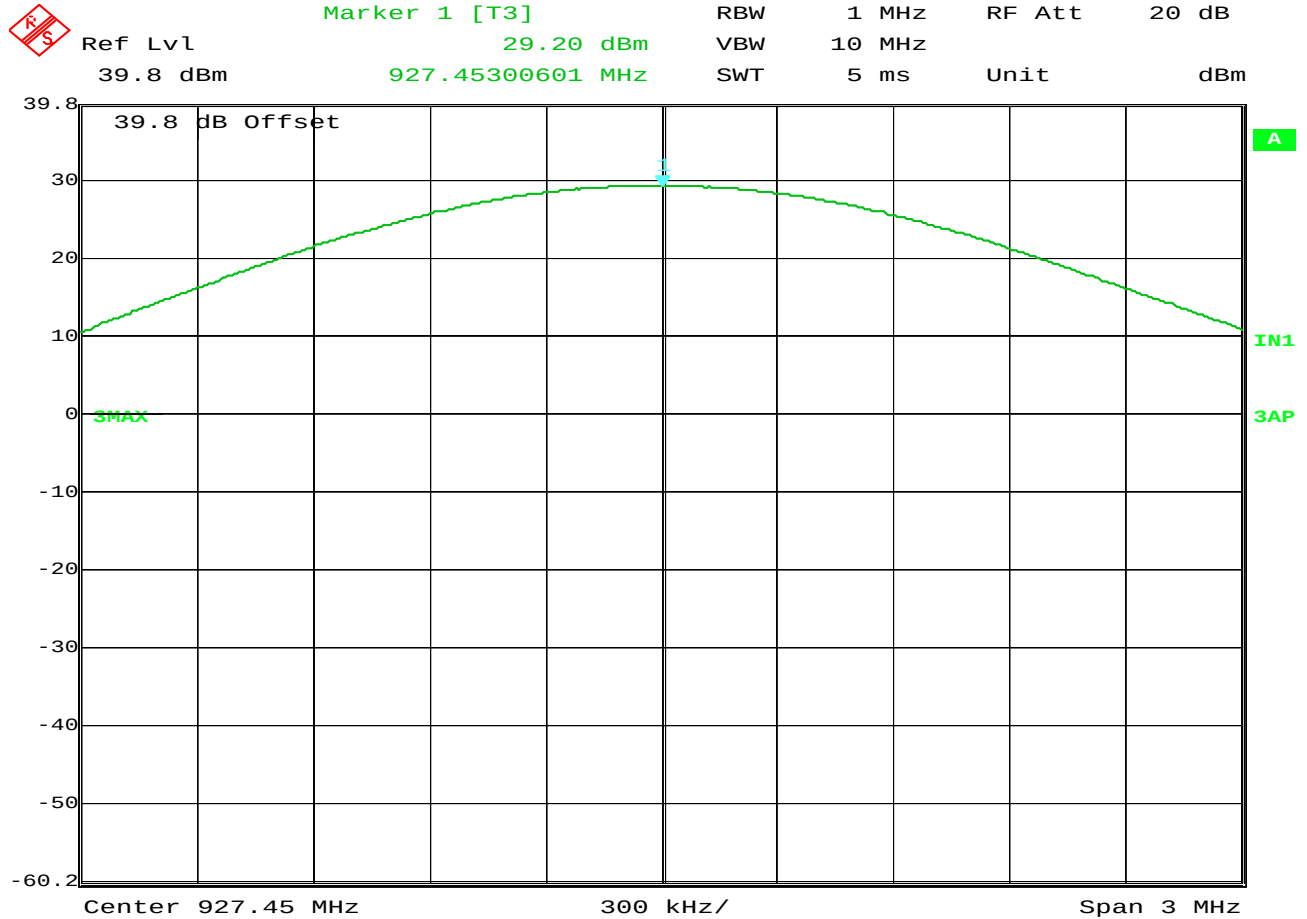


Date: 30.AUG.2012 17:19:05

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (Mod: 915.15MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 30.AUG.2012 16:54:53

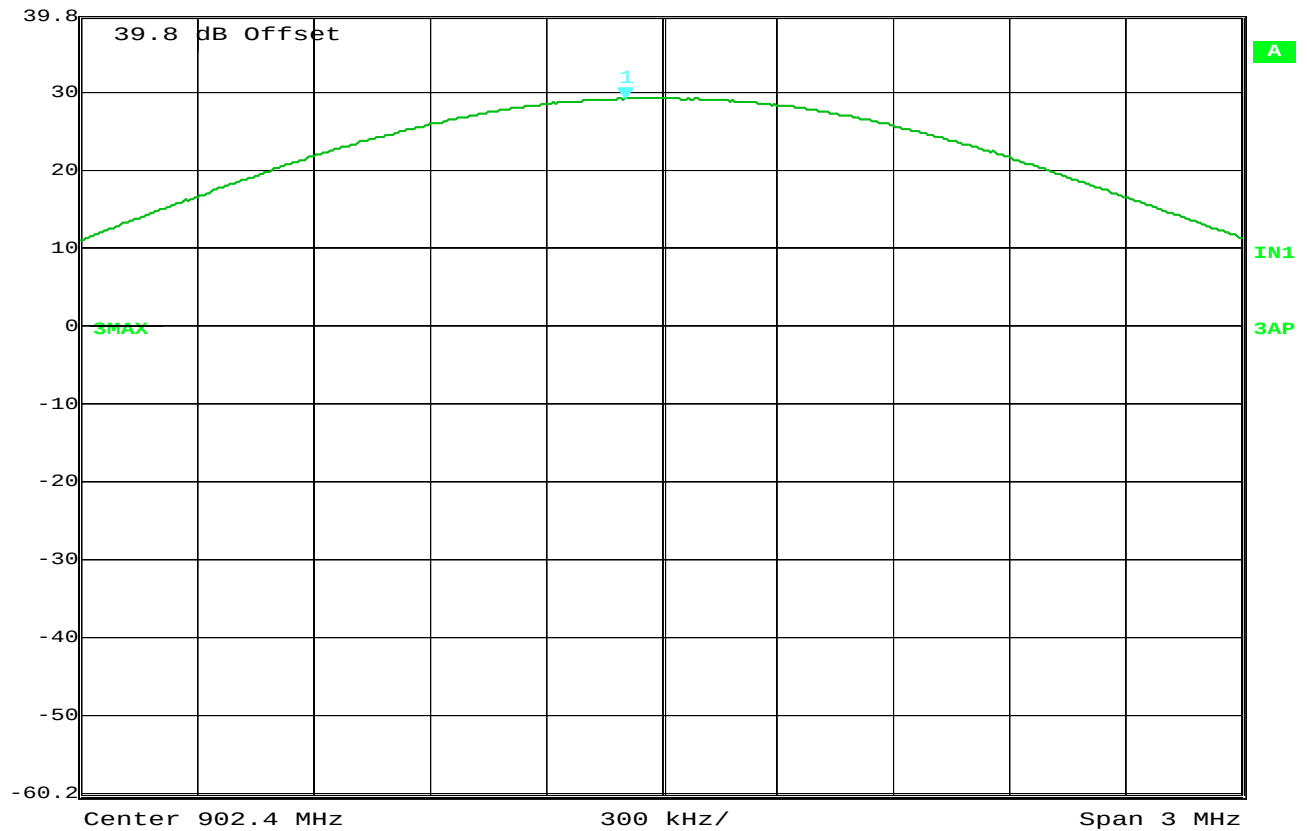
FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (High: 927.45MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.07 dBm
902.30681363 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm

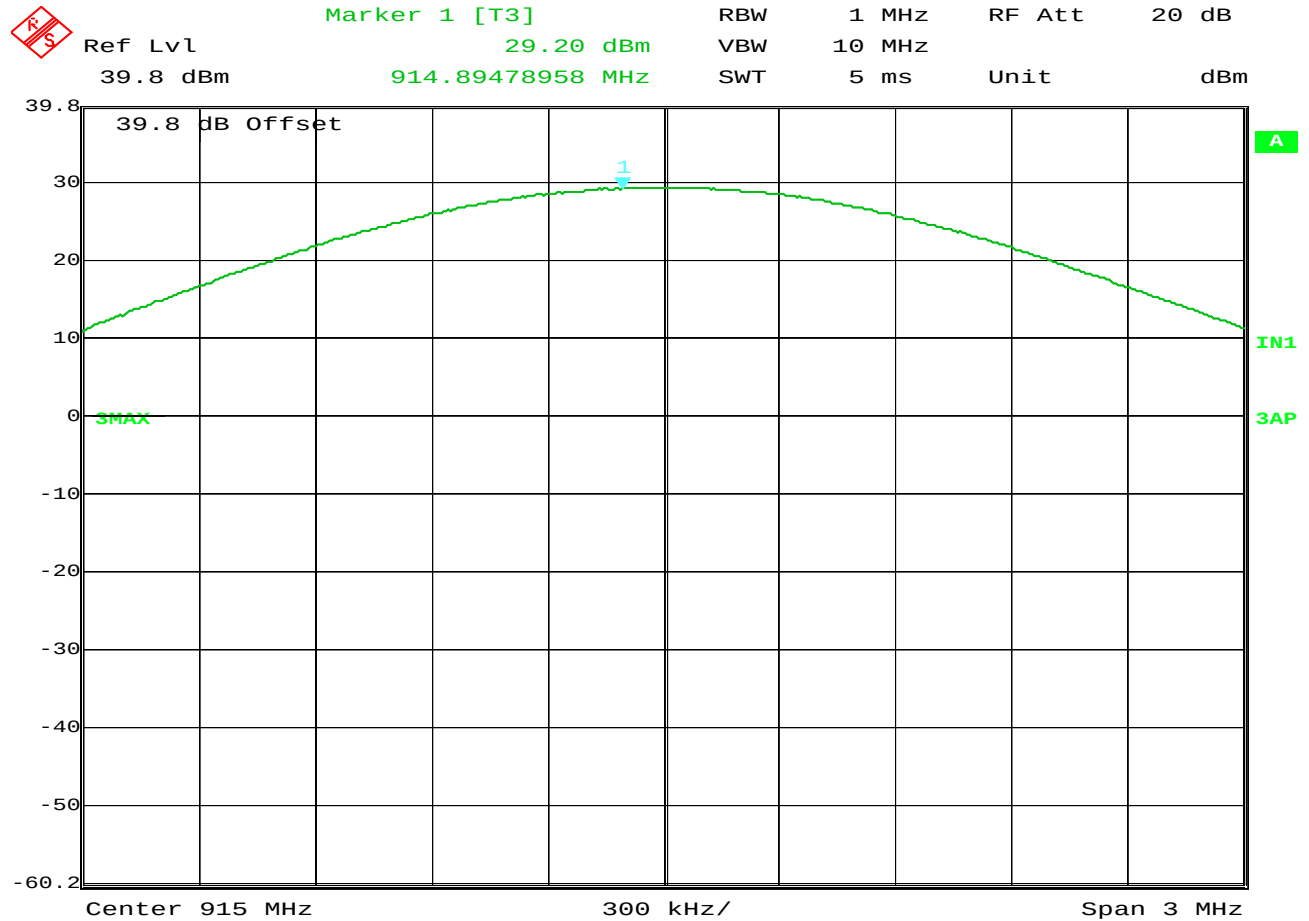


Date: 30.AUG.2012 15:42:17

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (Low: 902.4MHz @ 15500 power level)
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 30.AUG.2012 15:51:17

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.07 dBm
927.50080160 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm



Date: 30.AUG.2012 16:26:34

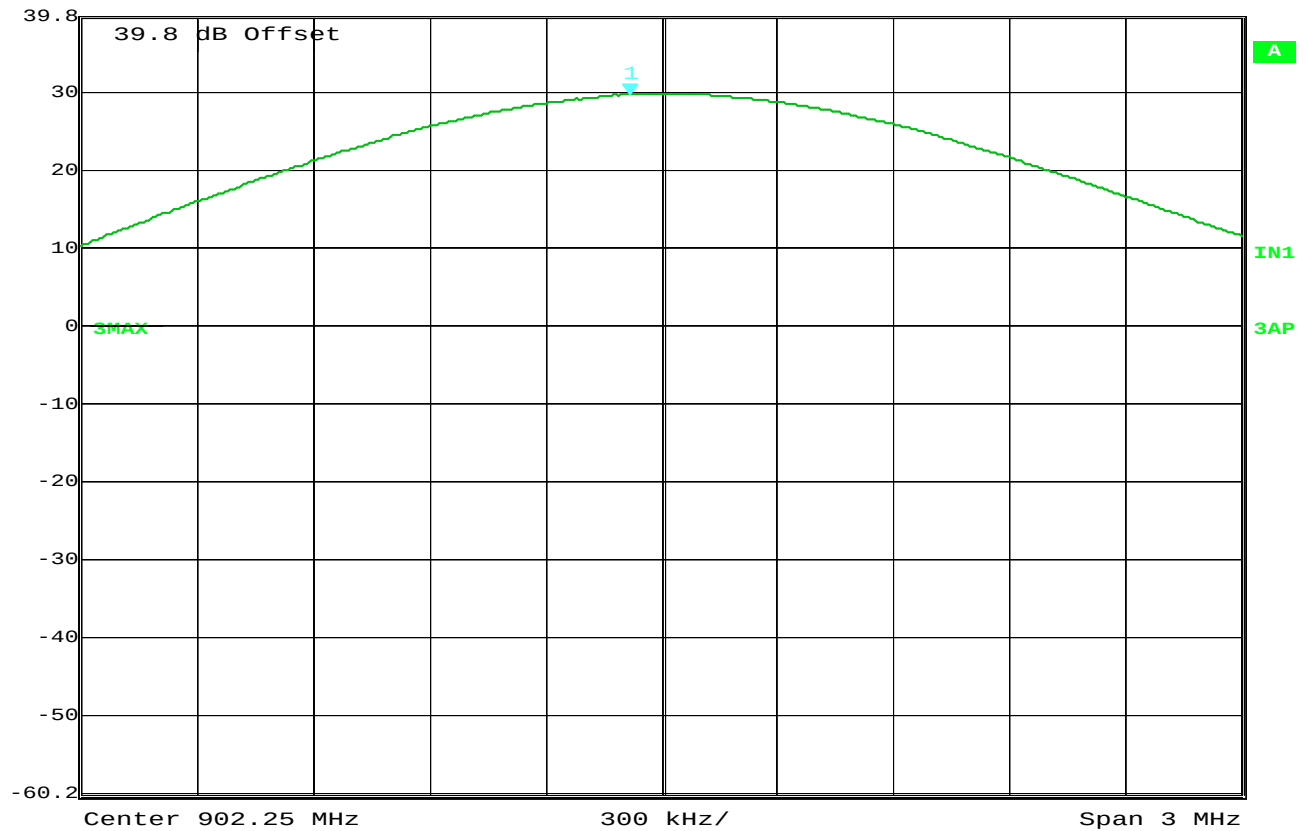
FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (High: 927.6MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.72 dBm
902.16883768 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm



Date: 31.AUG.2012 09:27:30

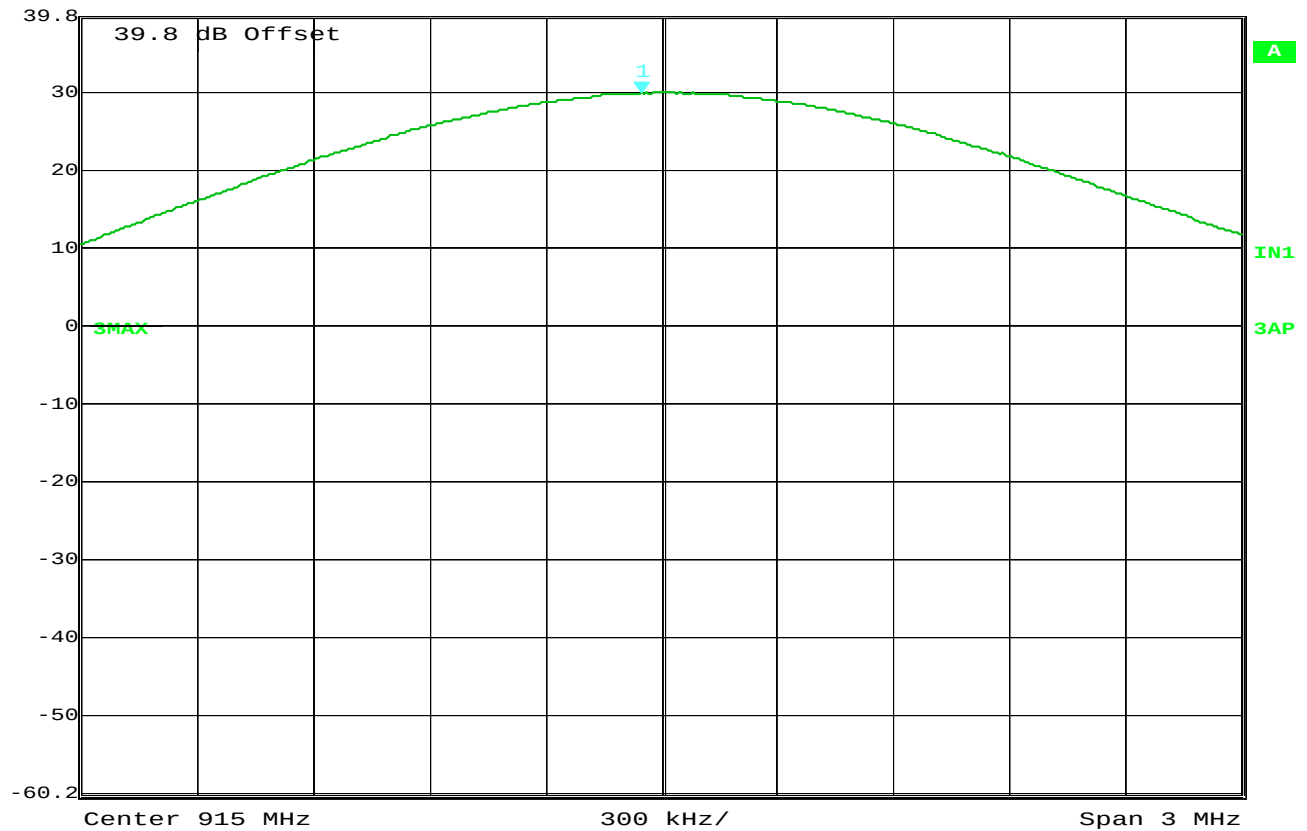
FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (Low: 902.25MHz @ 15500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 29.86 dBm
914.94889780 MHz
RBW 1 MHz
VBW 10 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm

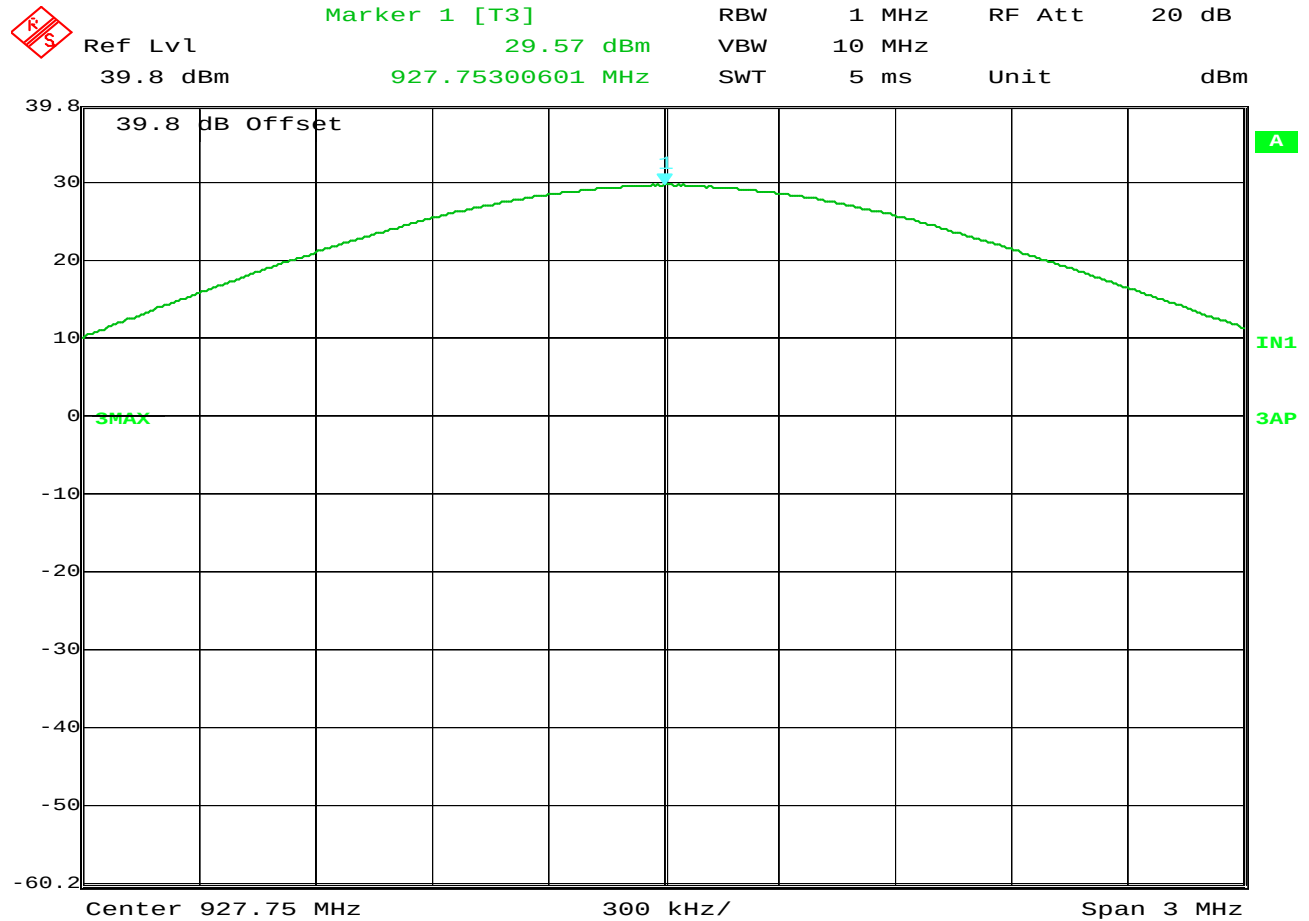


Date: 31.AUG.2012 09:18:44

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (Mod: 915MHz @ 12500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 31.AUG.2012 09:16:44

FCC 15.247: Power Output

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (High: 927.75MHz @ 9500 power level)
TEST PARAMETERS : Minimum 20 dB bandwidth from peak shall be no larger than 500 kHz
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Manufacturer : XetaWave LLC
Test Item : Multi-Band Radio Module
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, EIRP
Date : September 1, 2012
Notes : Laird Omni antenna MN: FG9026, Conducted output power reduced to 25.6dBm

EIRP = Sig. Gen. Reading + Antenna Gain – Cable Loss

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dB)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)
902.25	H	93.6	12.5	2.2	2.0	12.7	36.0
902.25	V	105.9	34.1	2.2	2.0	34.3	36.0
915.00	H	93.1	12.0	2.2	2.0	12.2	36.0
915.00	V	104.6	32.8	2.2	2.0	33.0	36.0
927.75	H	89.1	8.0	2.2	2.0	8.2	36.0
927.75	V	107.0	35.2	2.2	2.0	35.4	36.0

Checked BY RICHARD E. King :

Richard E. King



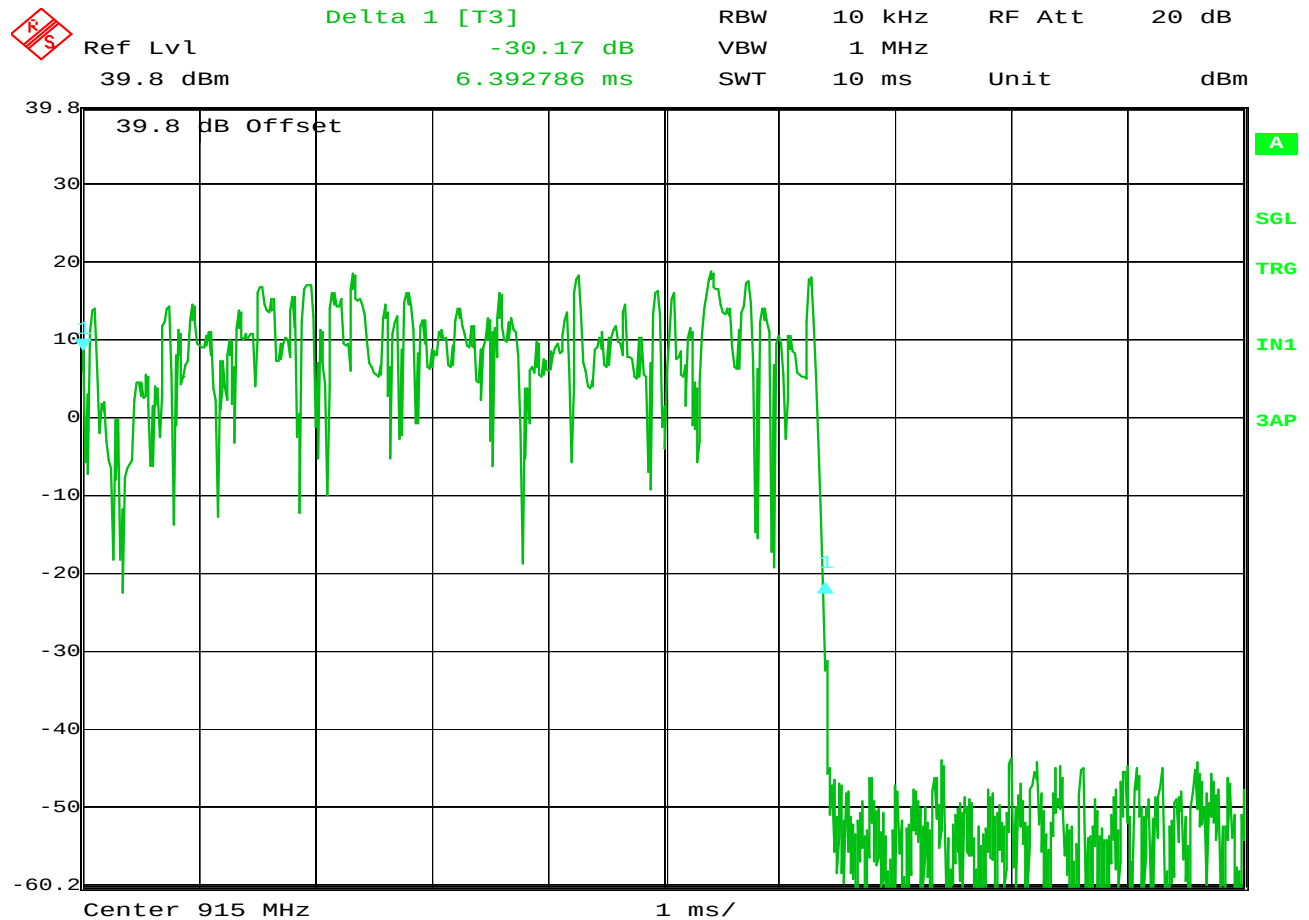
Manufacturer : XetaWave LLC
Test Item : Multi-Band Radio Module
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Peak Output Power
Date : September 1, 2012
Notes : Radiall Larsen YA5900W, Conducted output power reduced to 23.3dBm

EIRP = Sig. Gen. Reading + Antenna Gain – Cable Loss

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dB)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)
902.25	H	88.2	7.1	2.2	2.0	7.3	36.0
902.25	V	105.2	33.3	2.2	2.0	33.5	36.0
915.00	H	91.2	10.1	2.2	2.0	10.3	36.0
915.00	V	106.6	34.7	2.2	2.0	34.9	36.0
927.75	H	91.2	10.1	2.2	2.0	10.3	36.0
927.75	V	106.6	34.8	2.2	2.0	35.0	36.0

Checked BY RICHARD E. KING :

Richard E. King

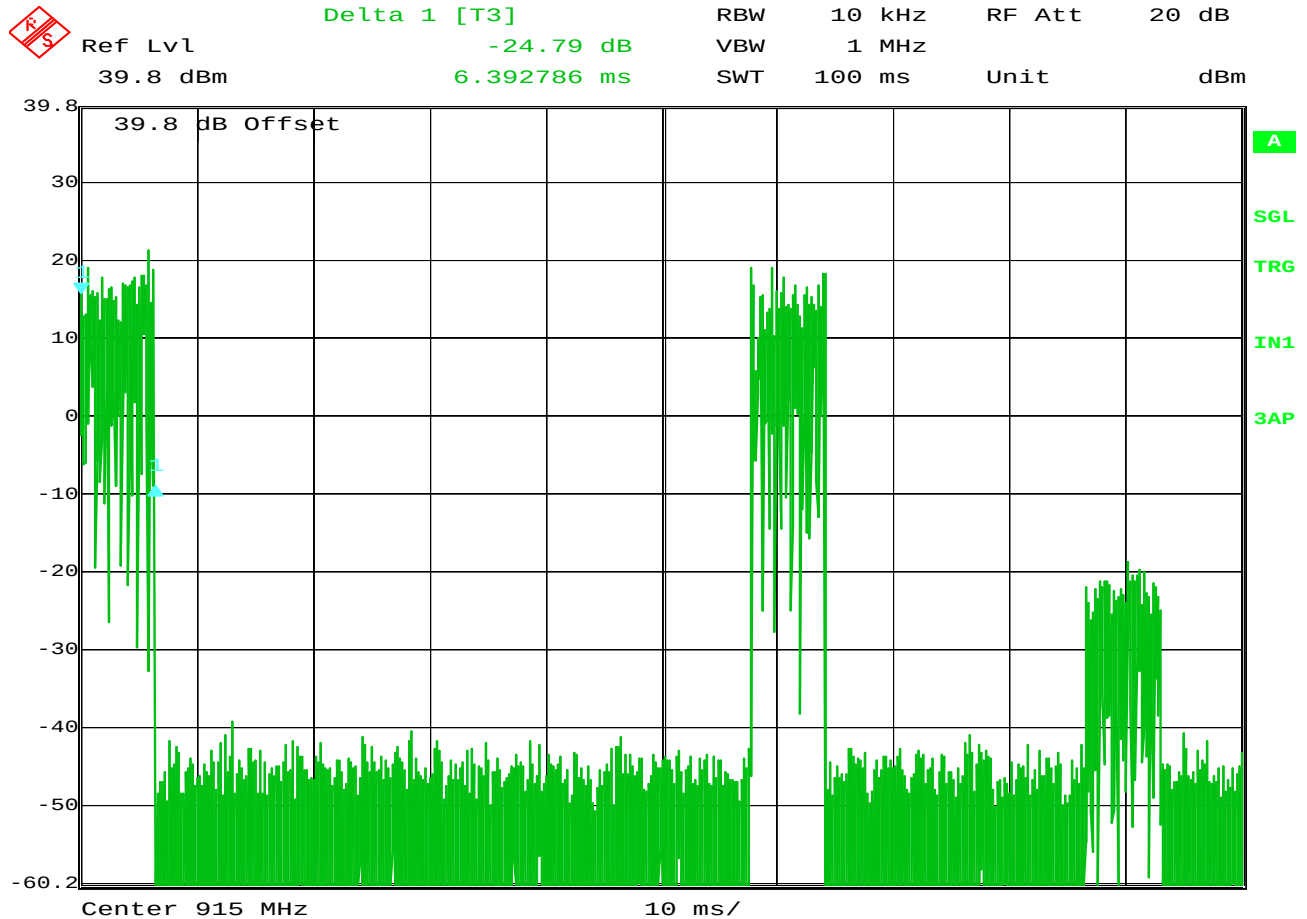


Date: 31.AUG.2012 15:30:24

FCC 15.247: Time of Occupancy (pulse width)

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/365kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES: Pulse width is 6.4ms

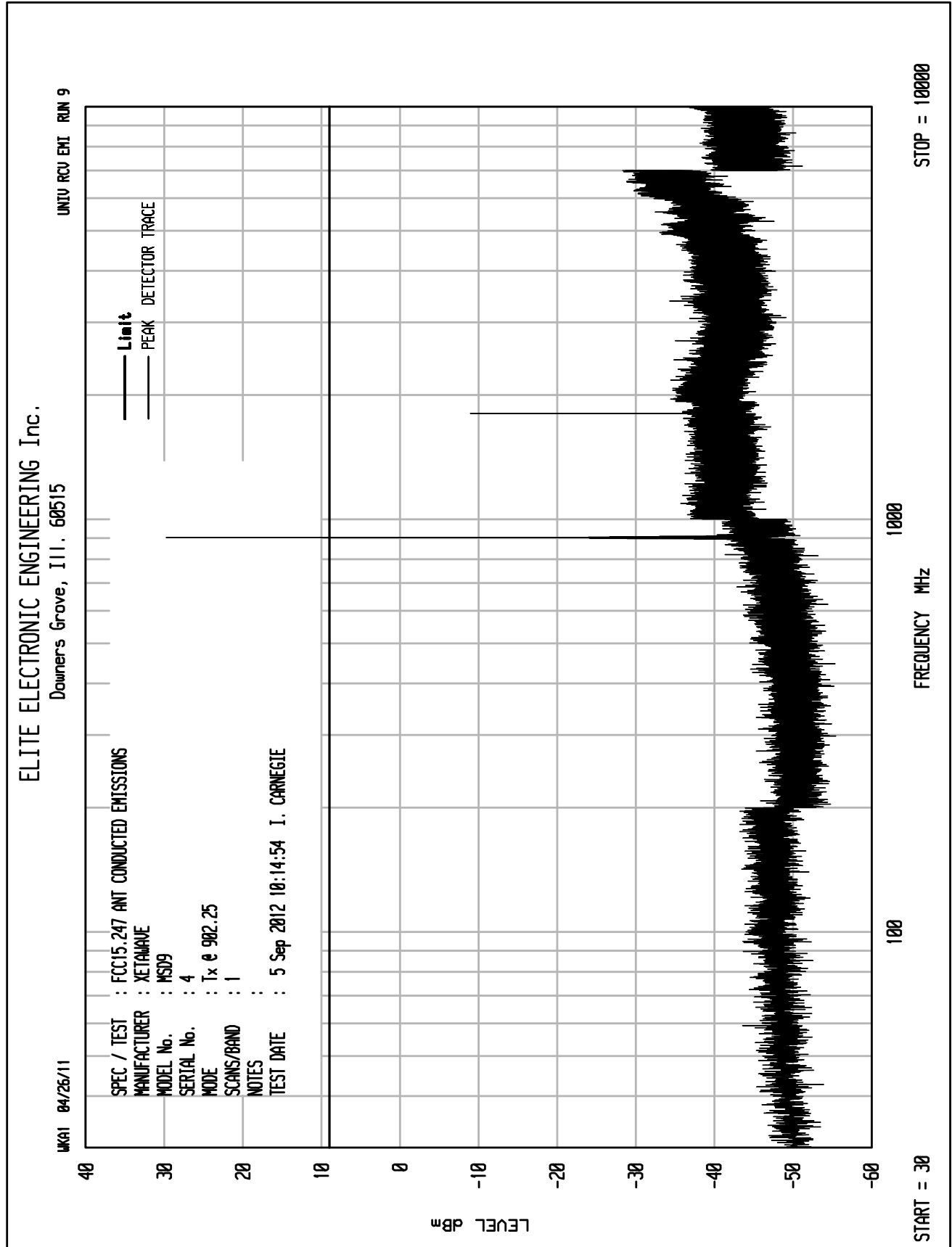


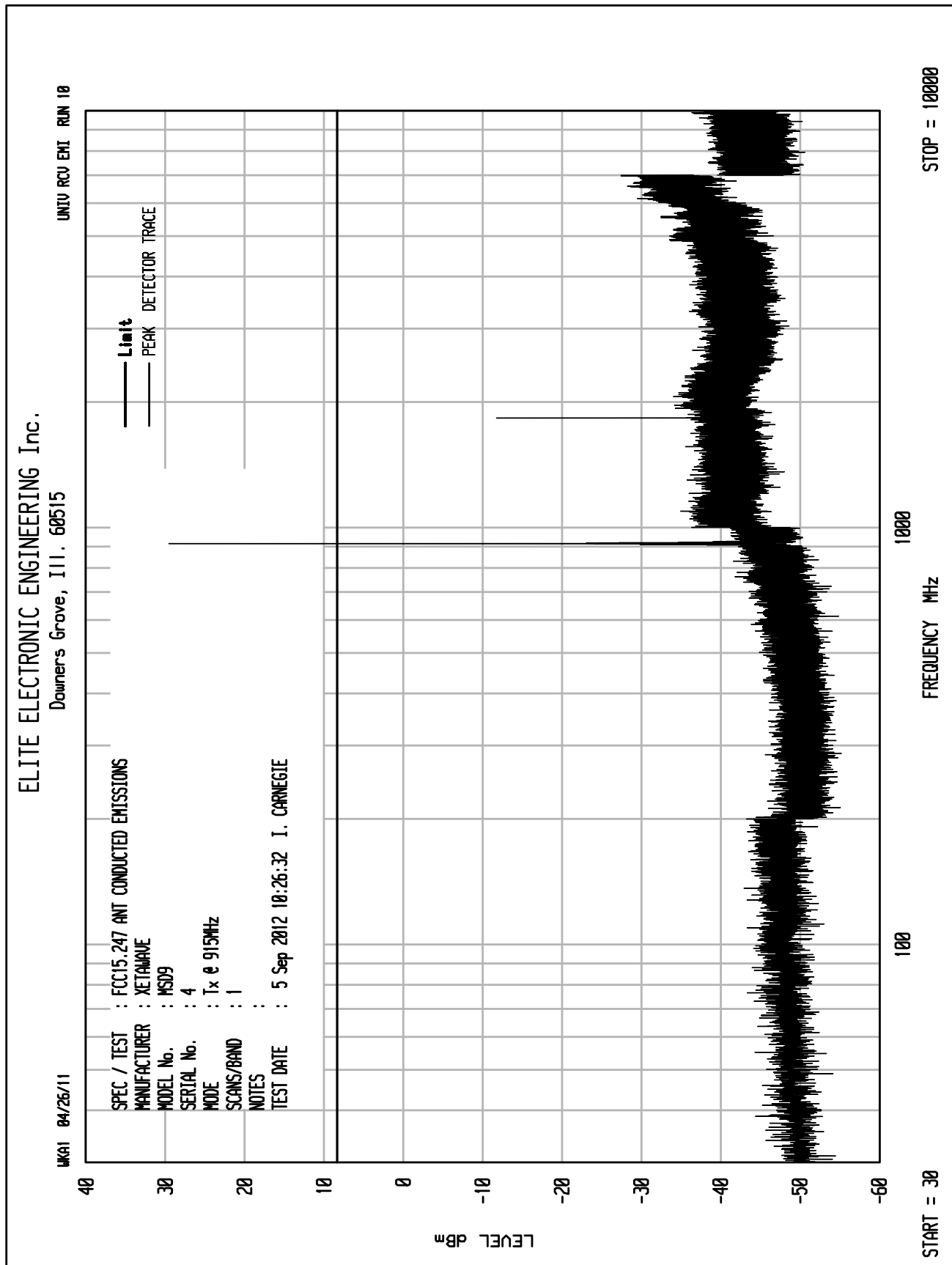
Date: 31.AUG.2012 15:34:16

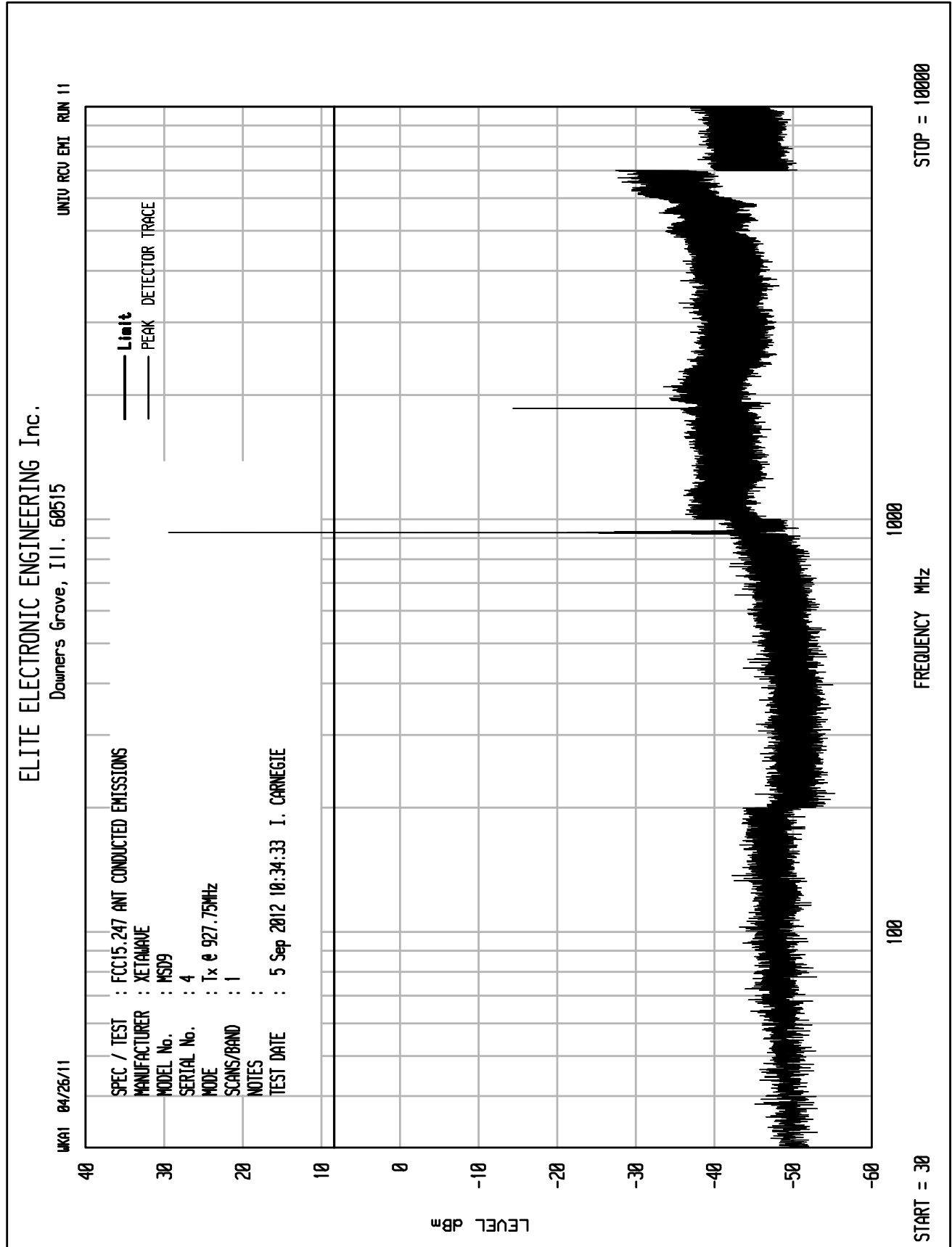
FCC 15.247: Time of Occupancy (100ms)

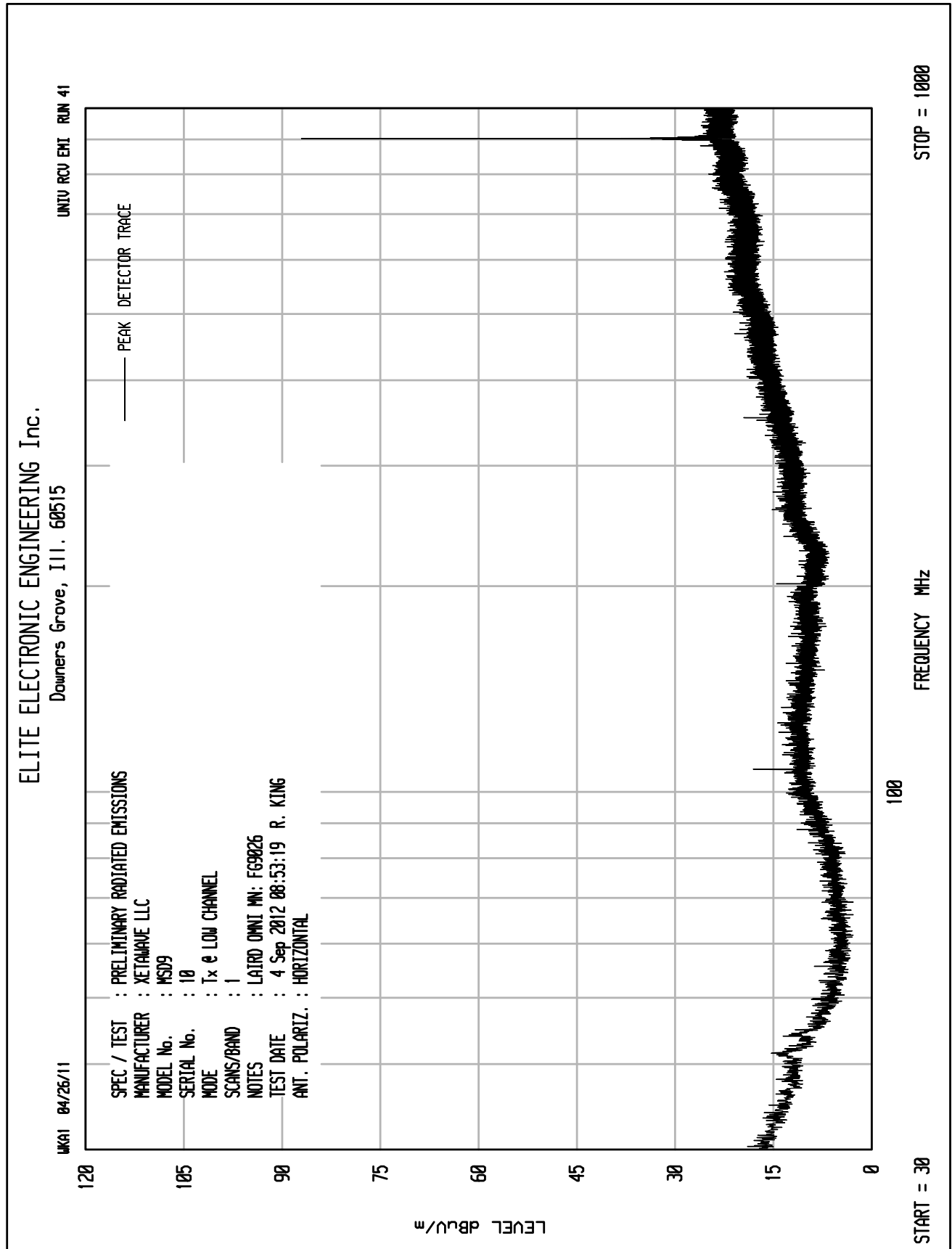
MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/365kbps
TEST PARAMETERS :
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

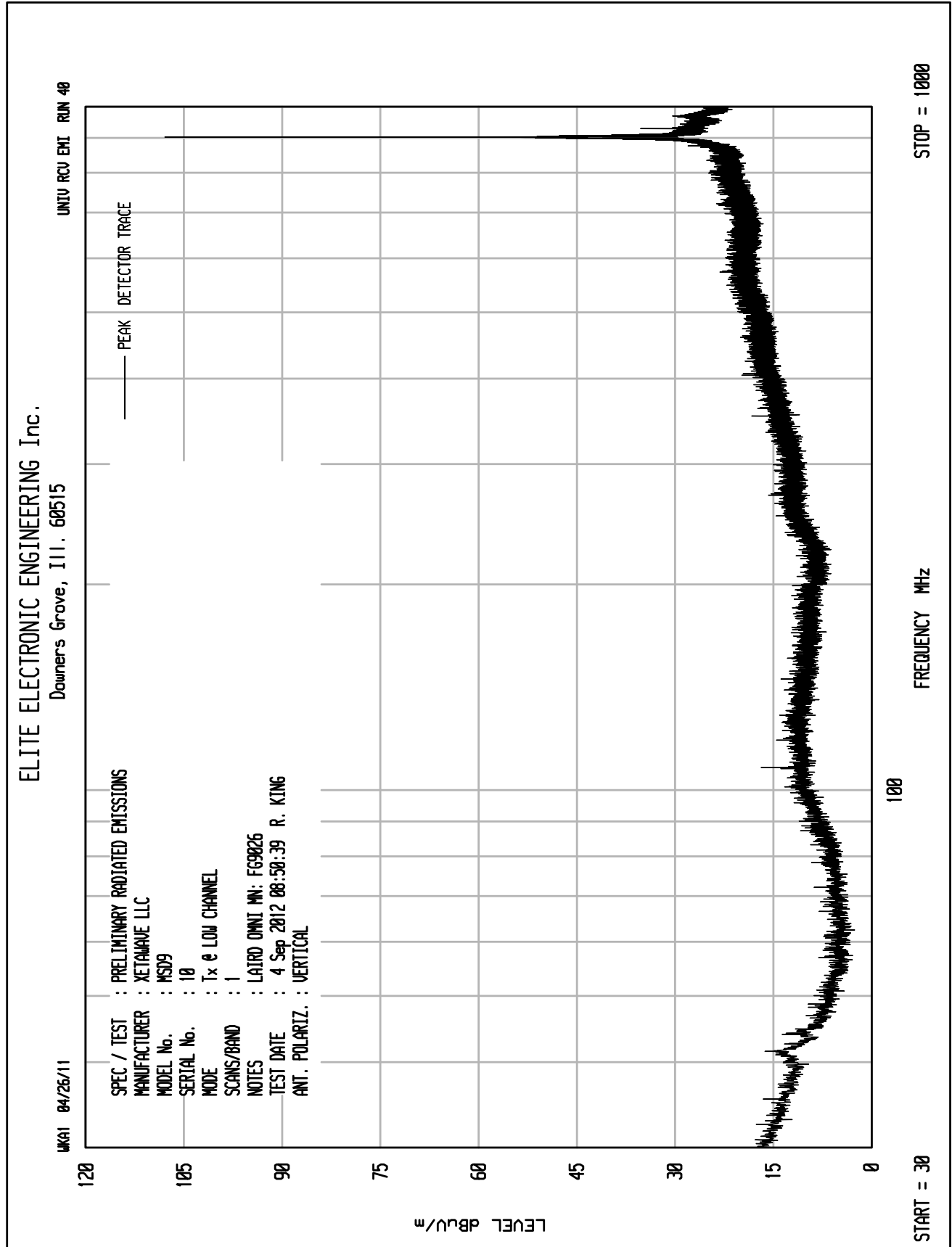
NOTES: 2 pulses in 100 milliseconds
2 pulses x 6.4ms = 12.8ms

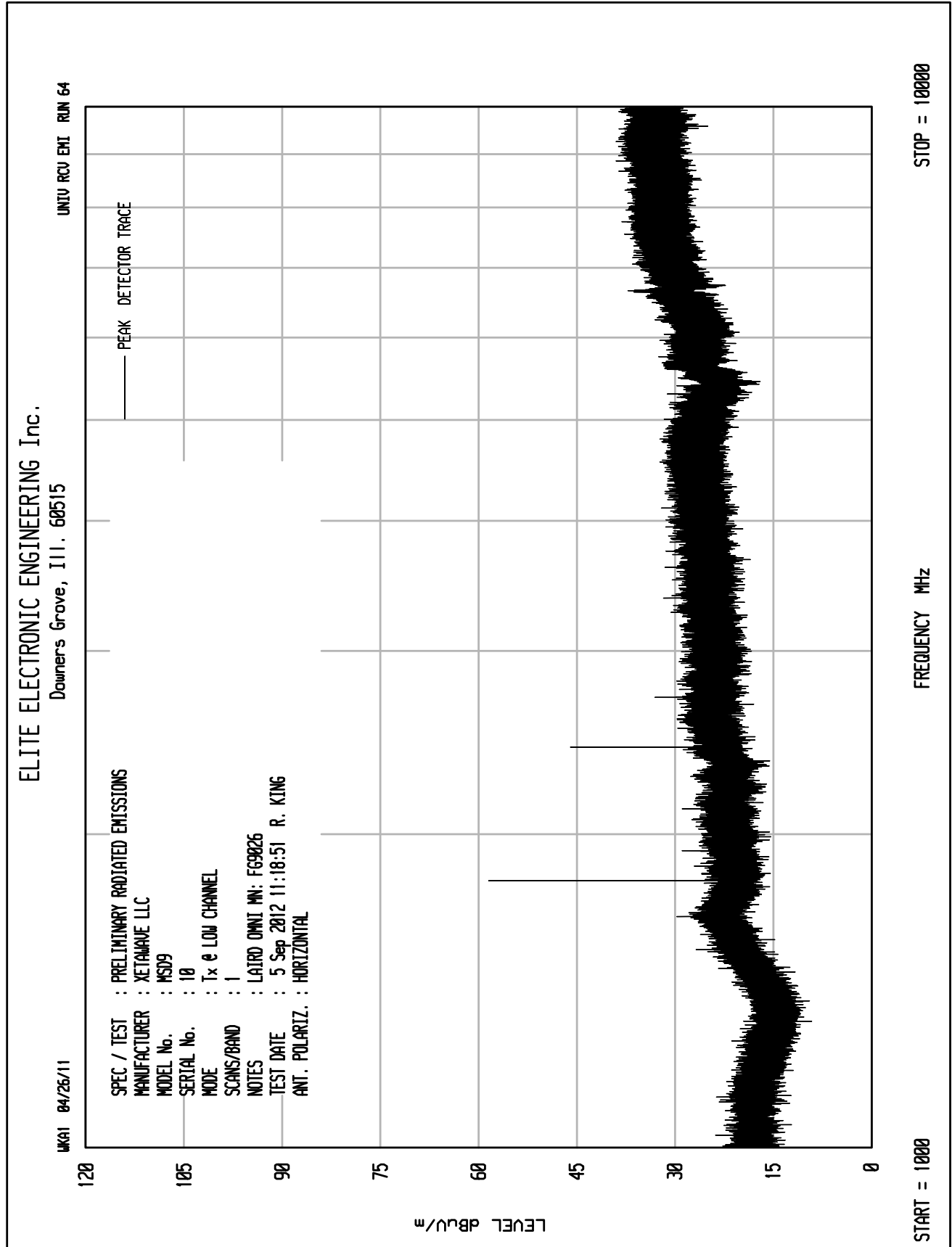


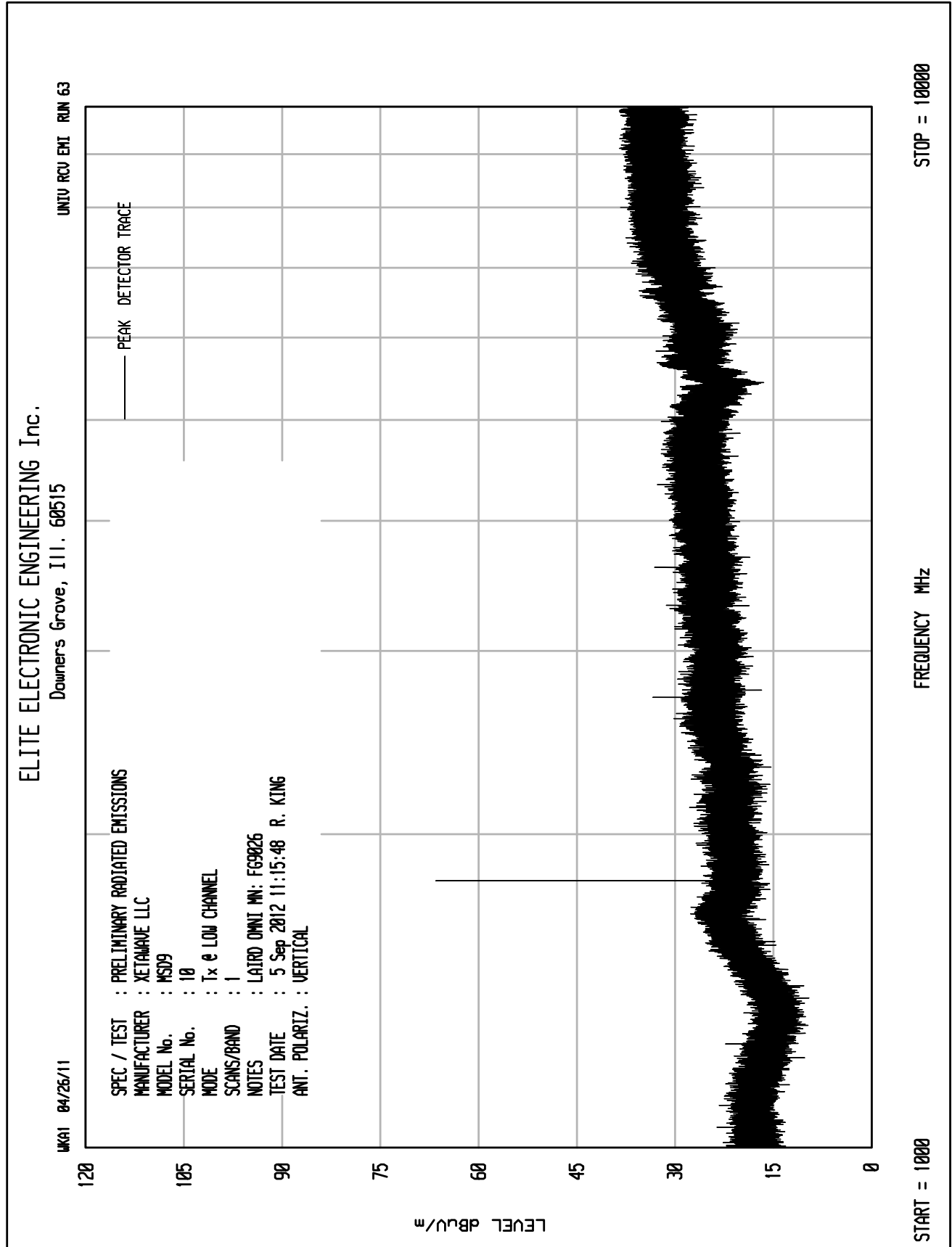


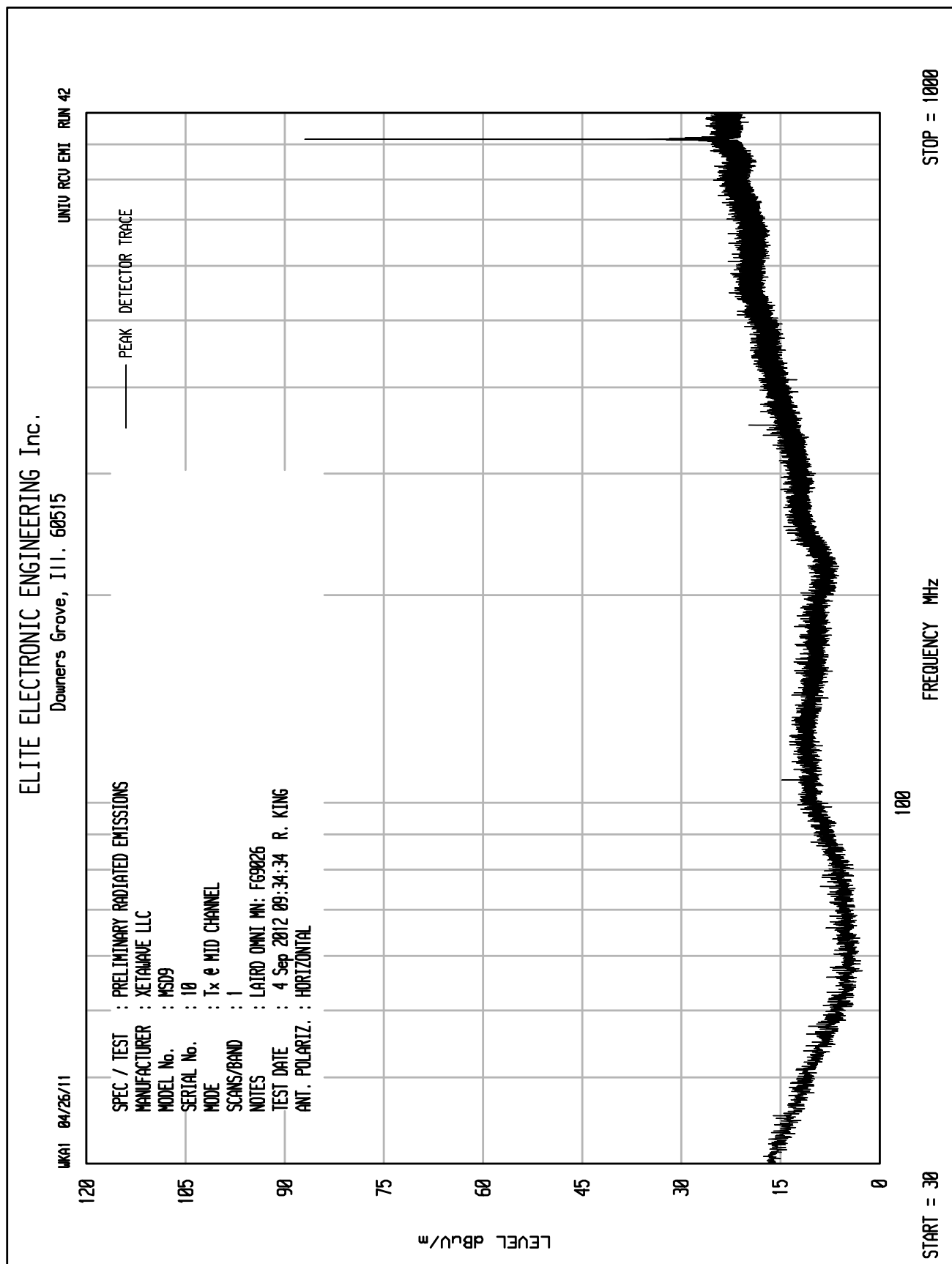


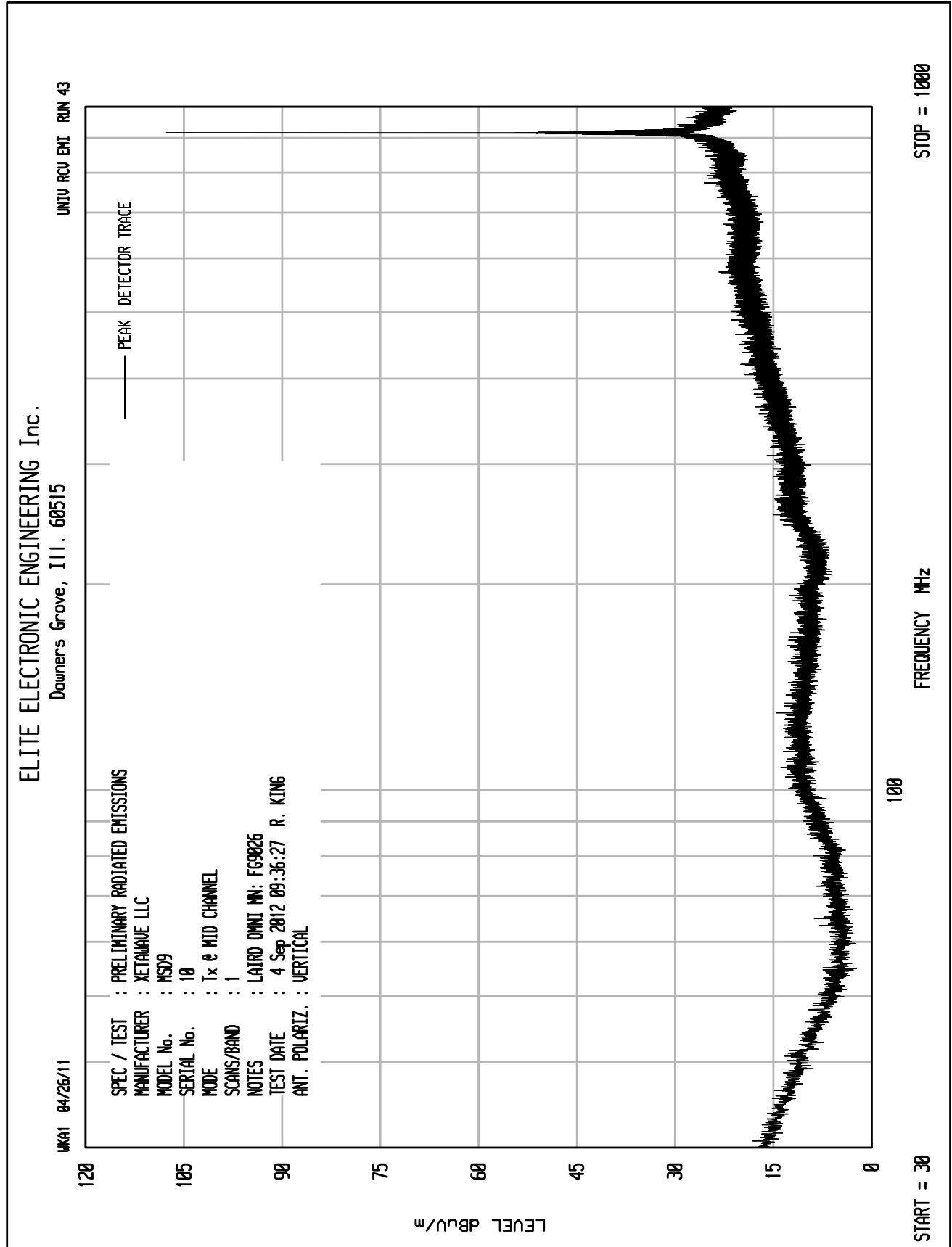


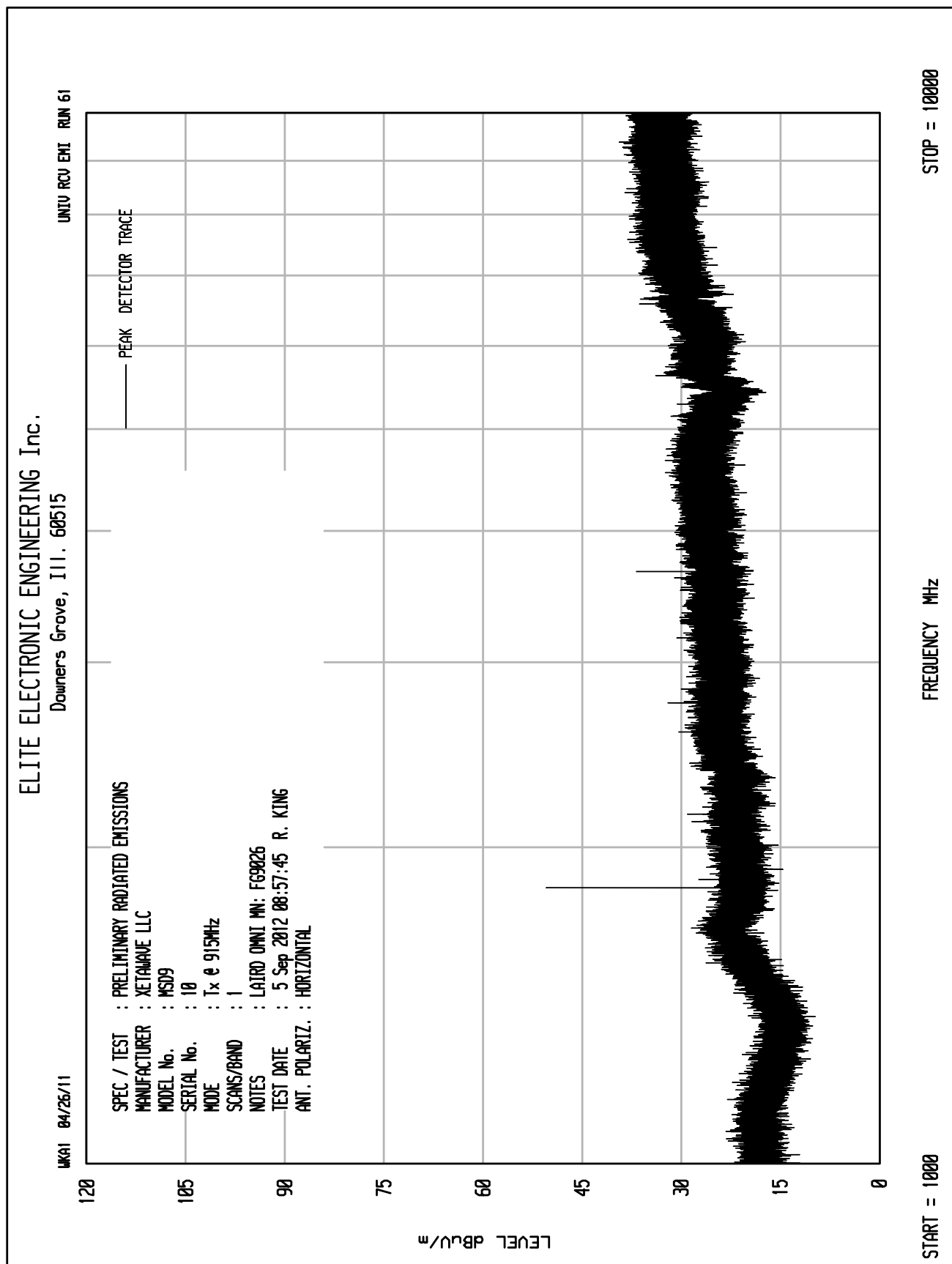


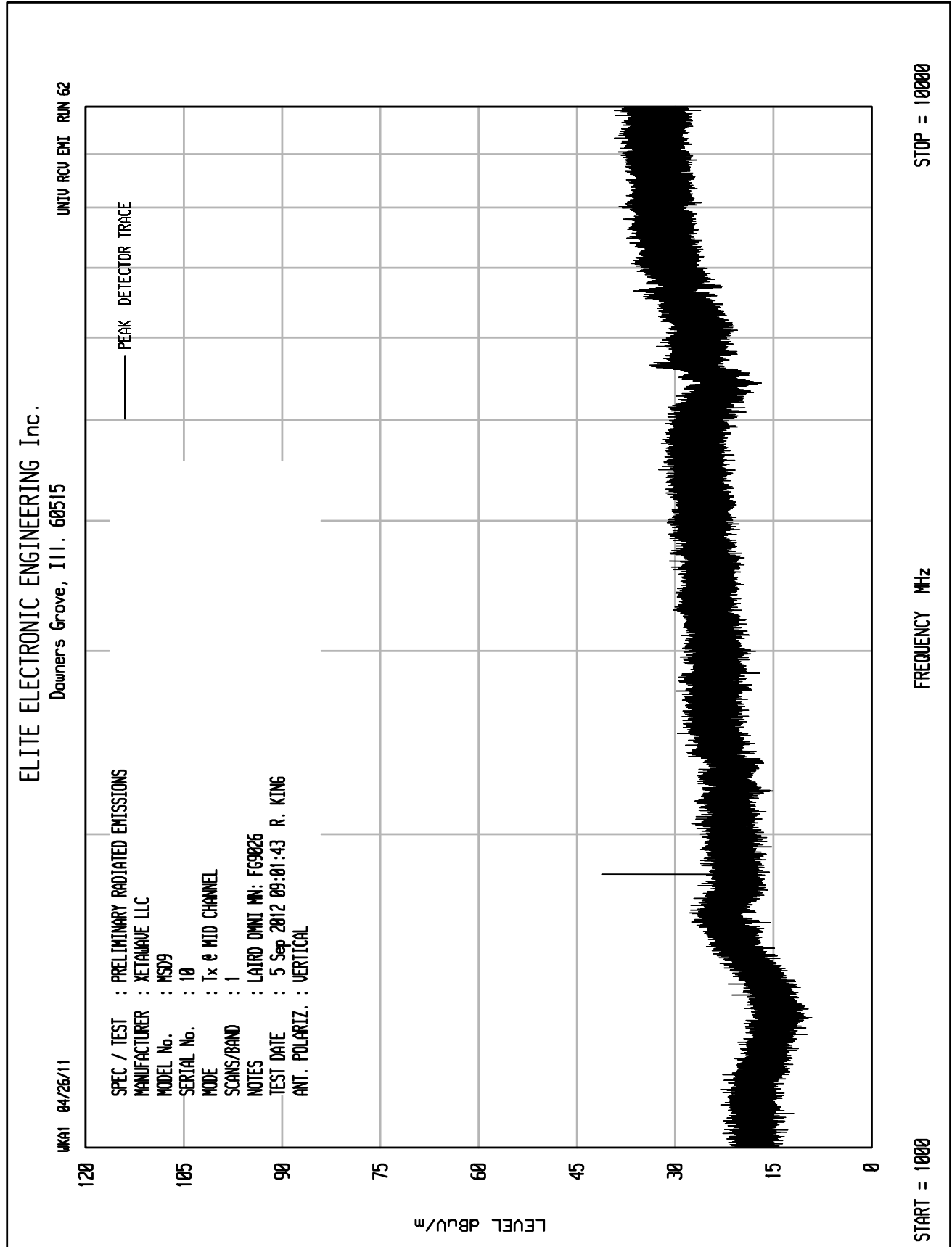


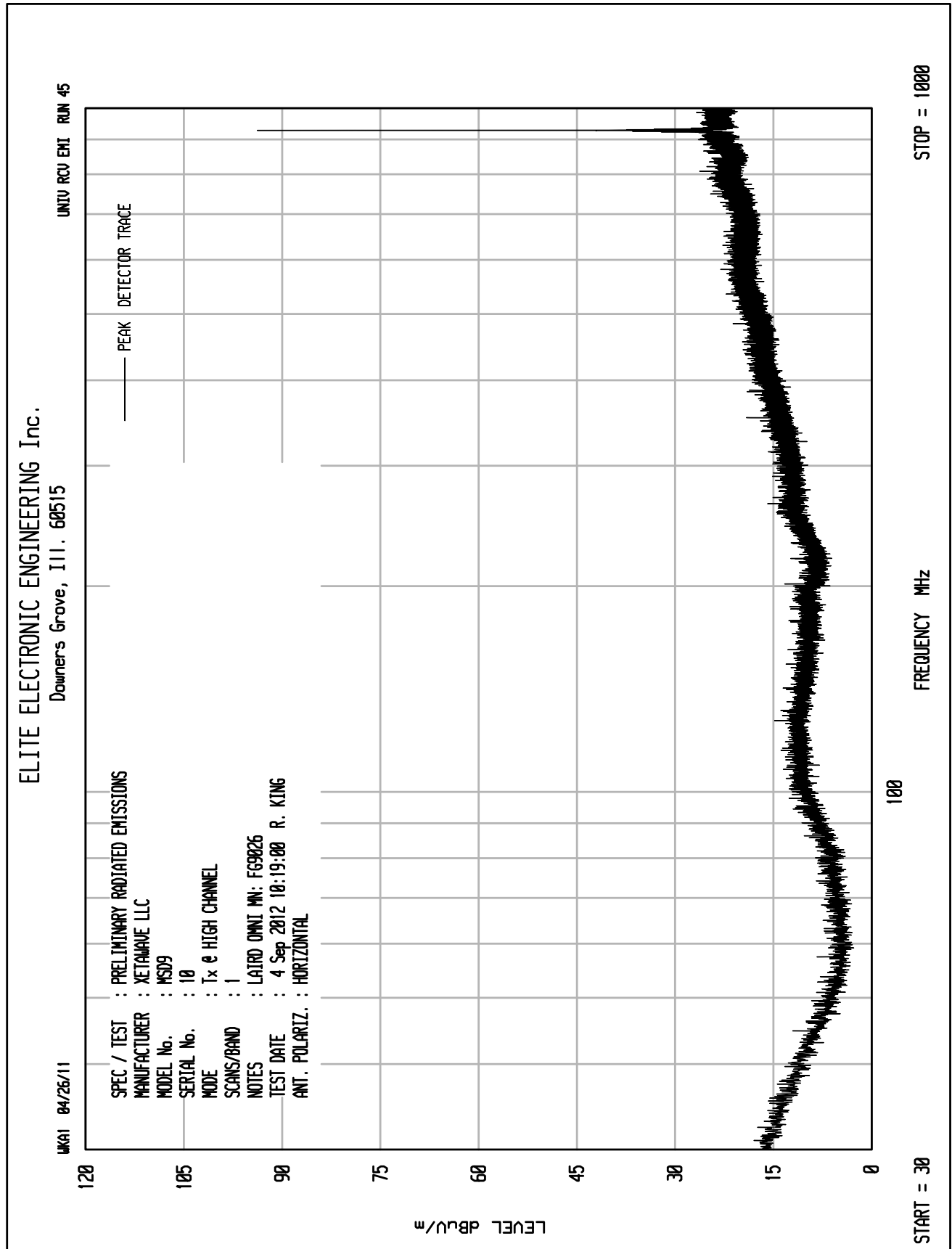


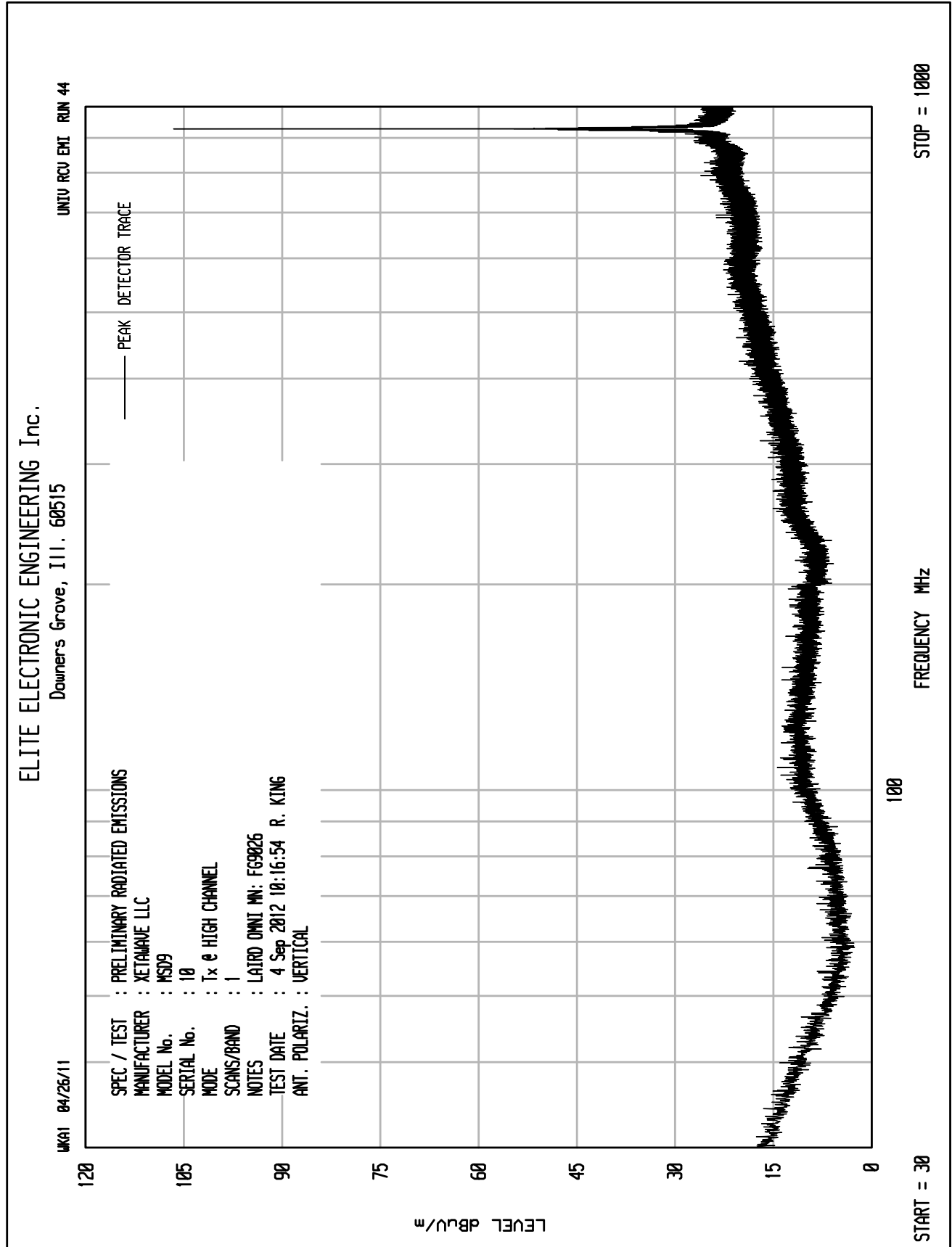


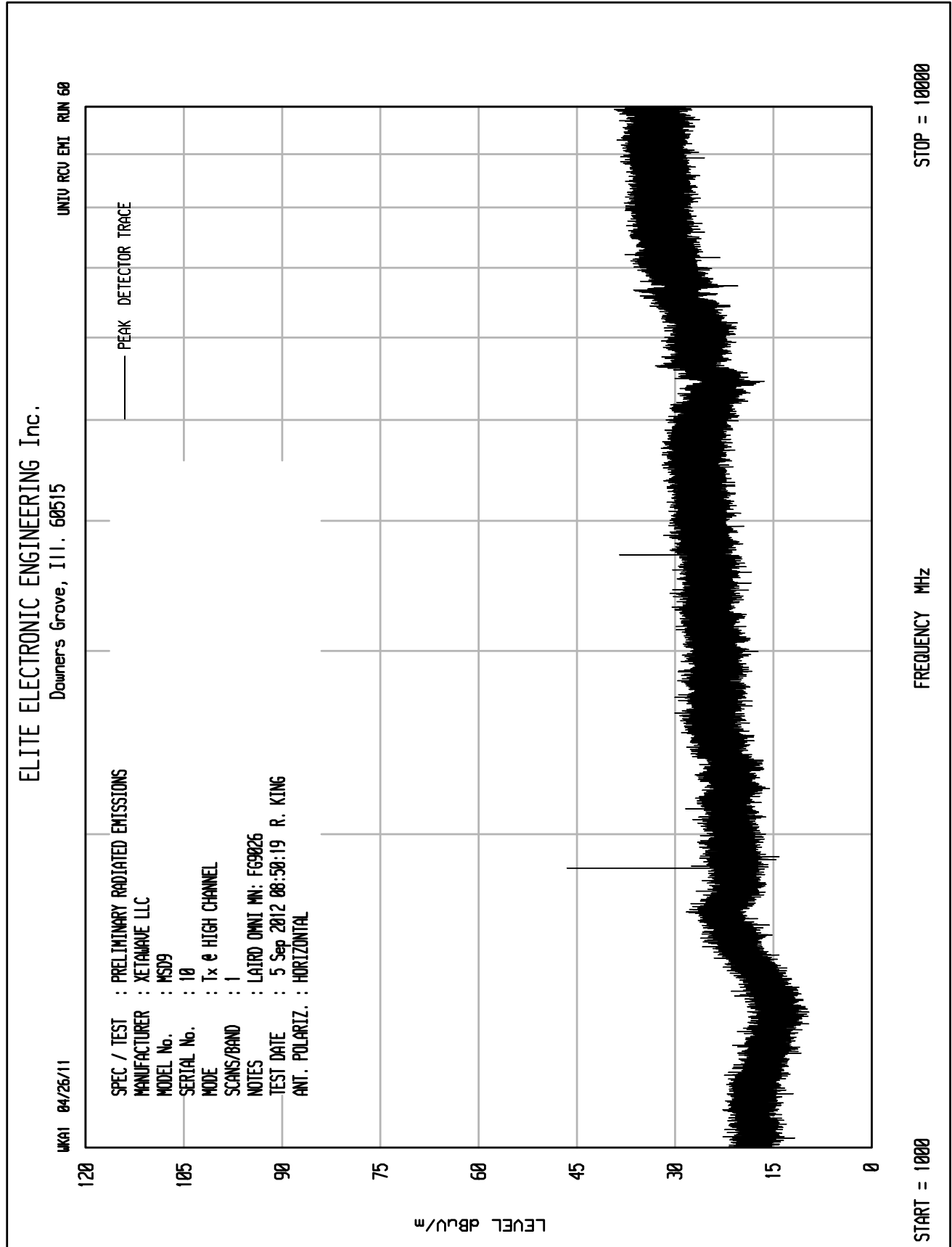


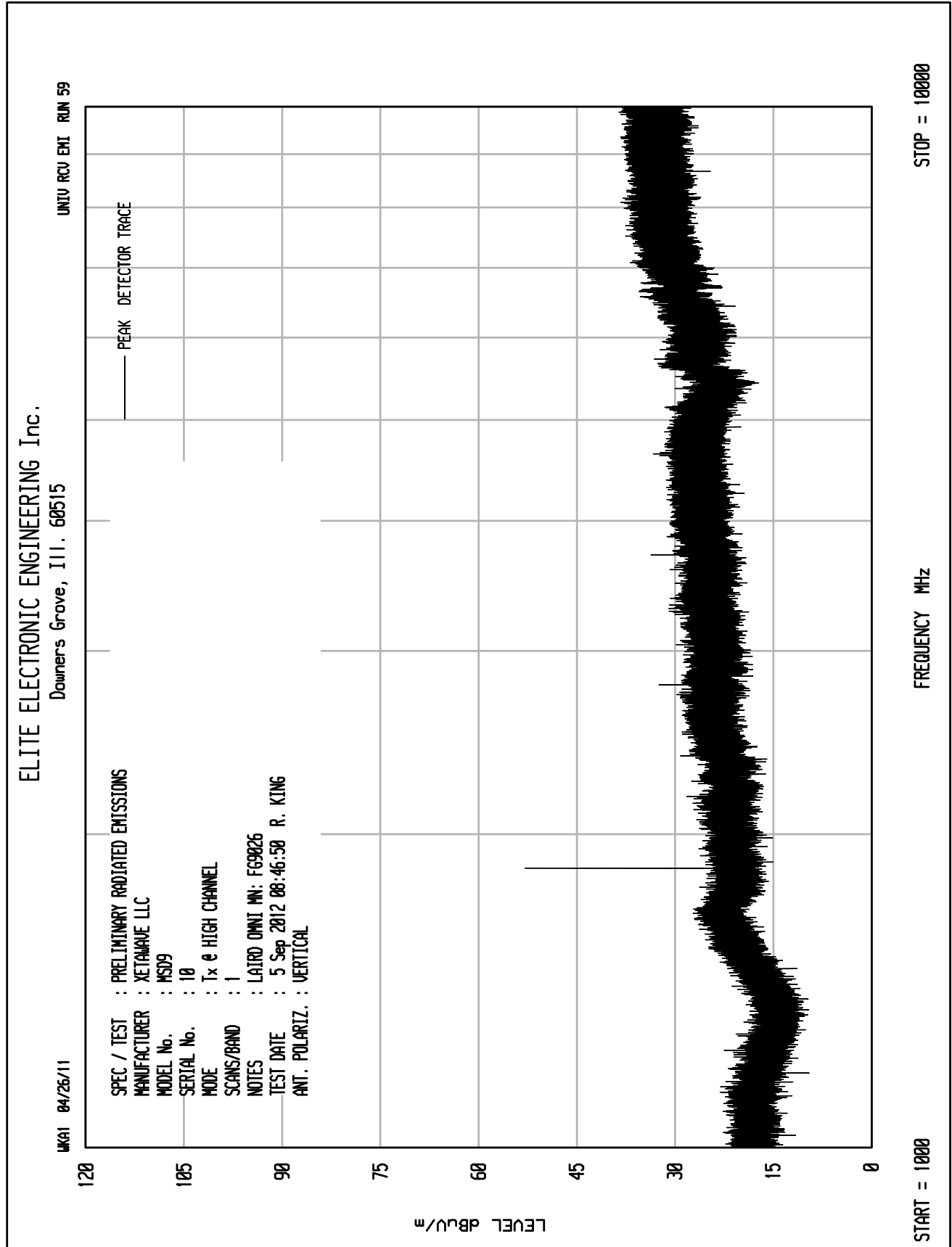


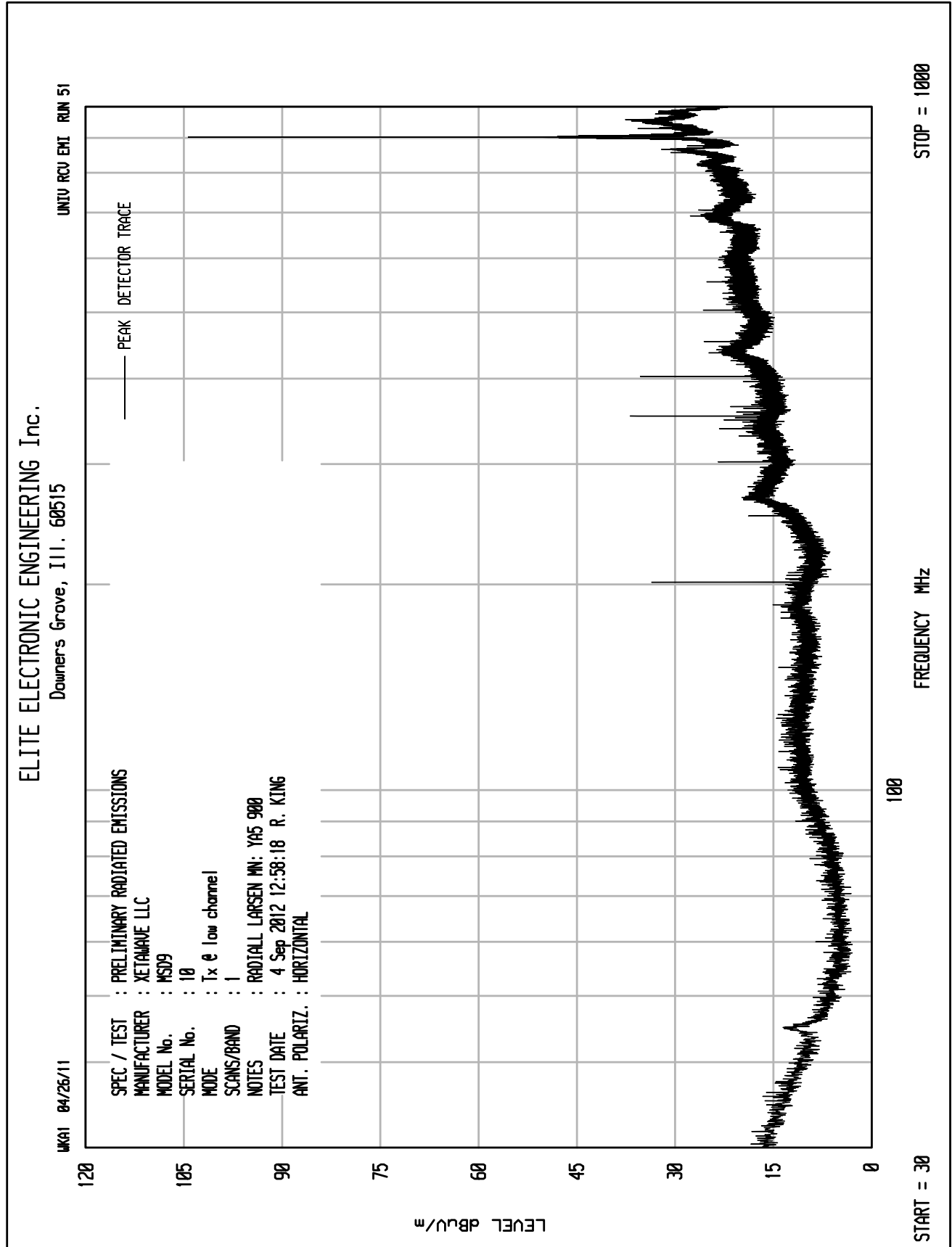


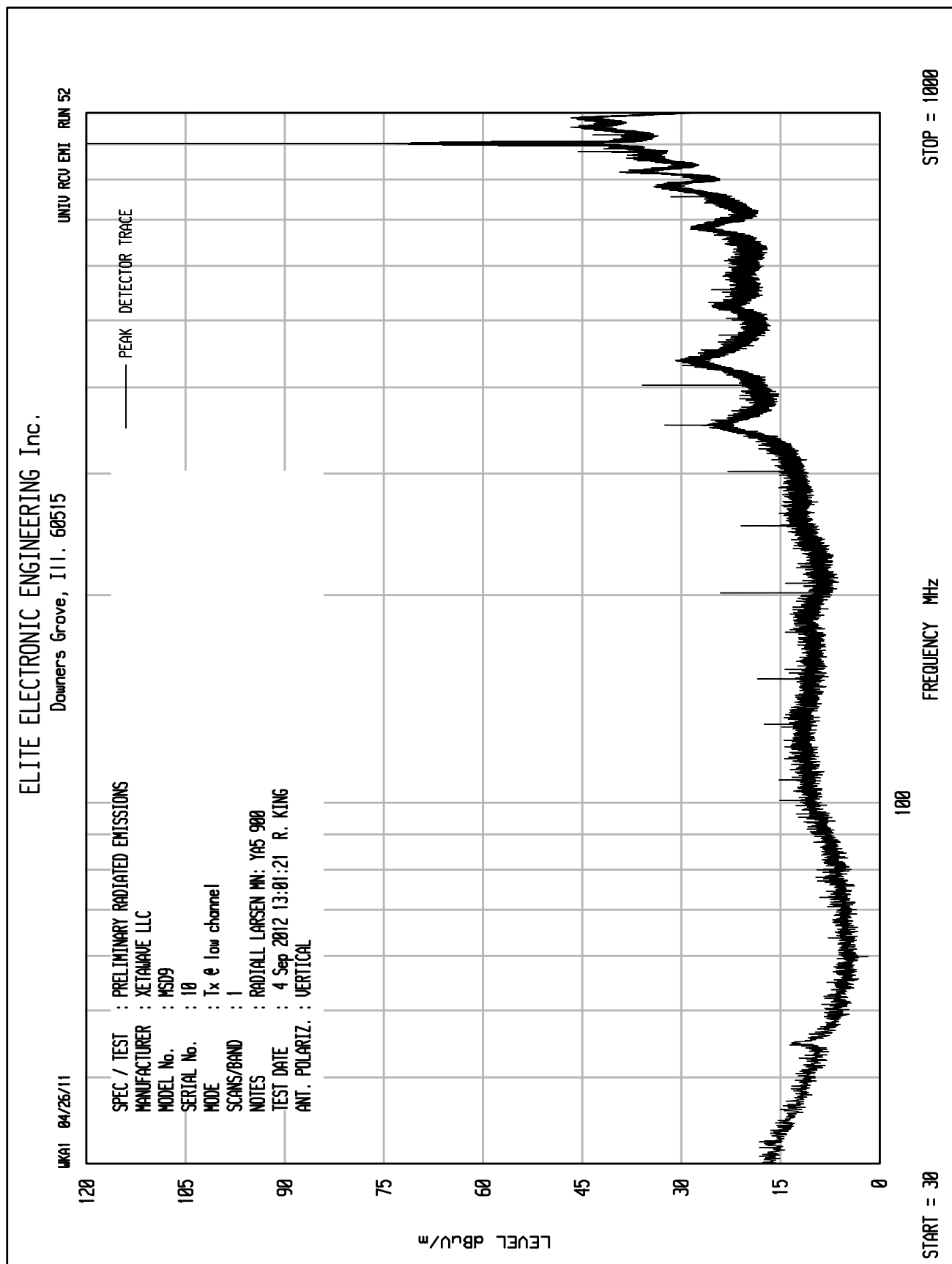


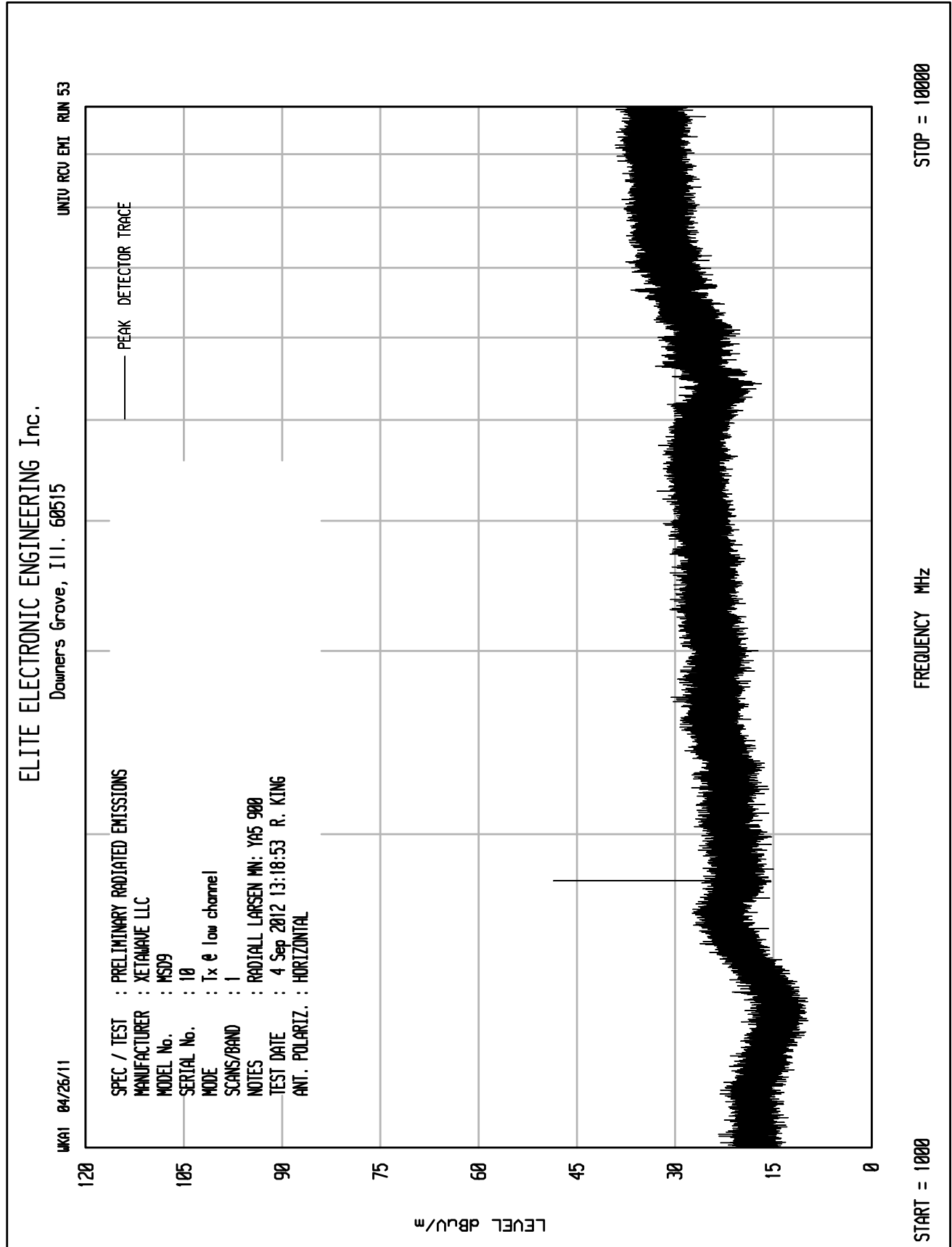


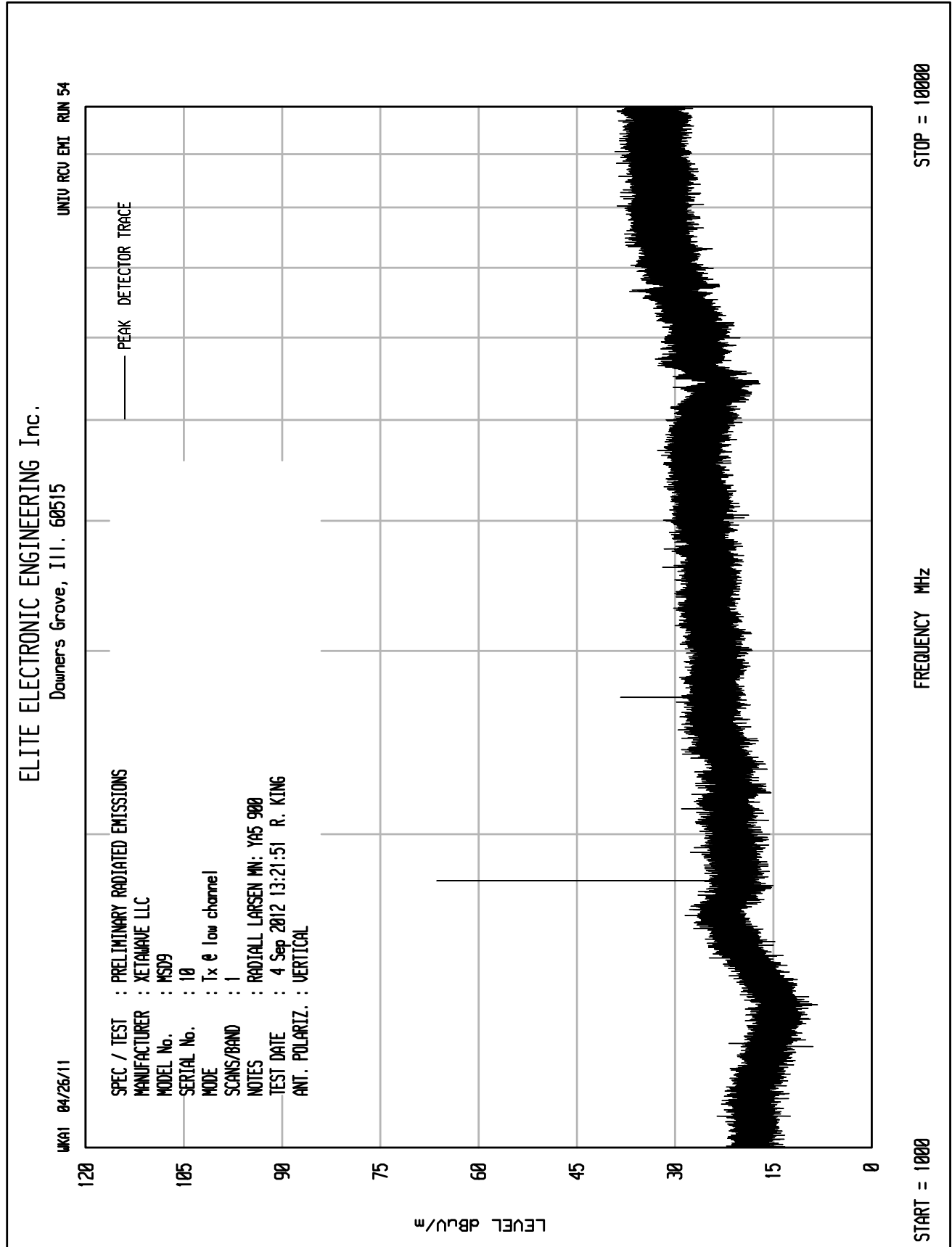


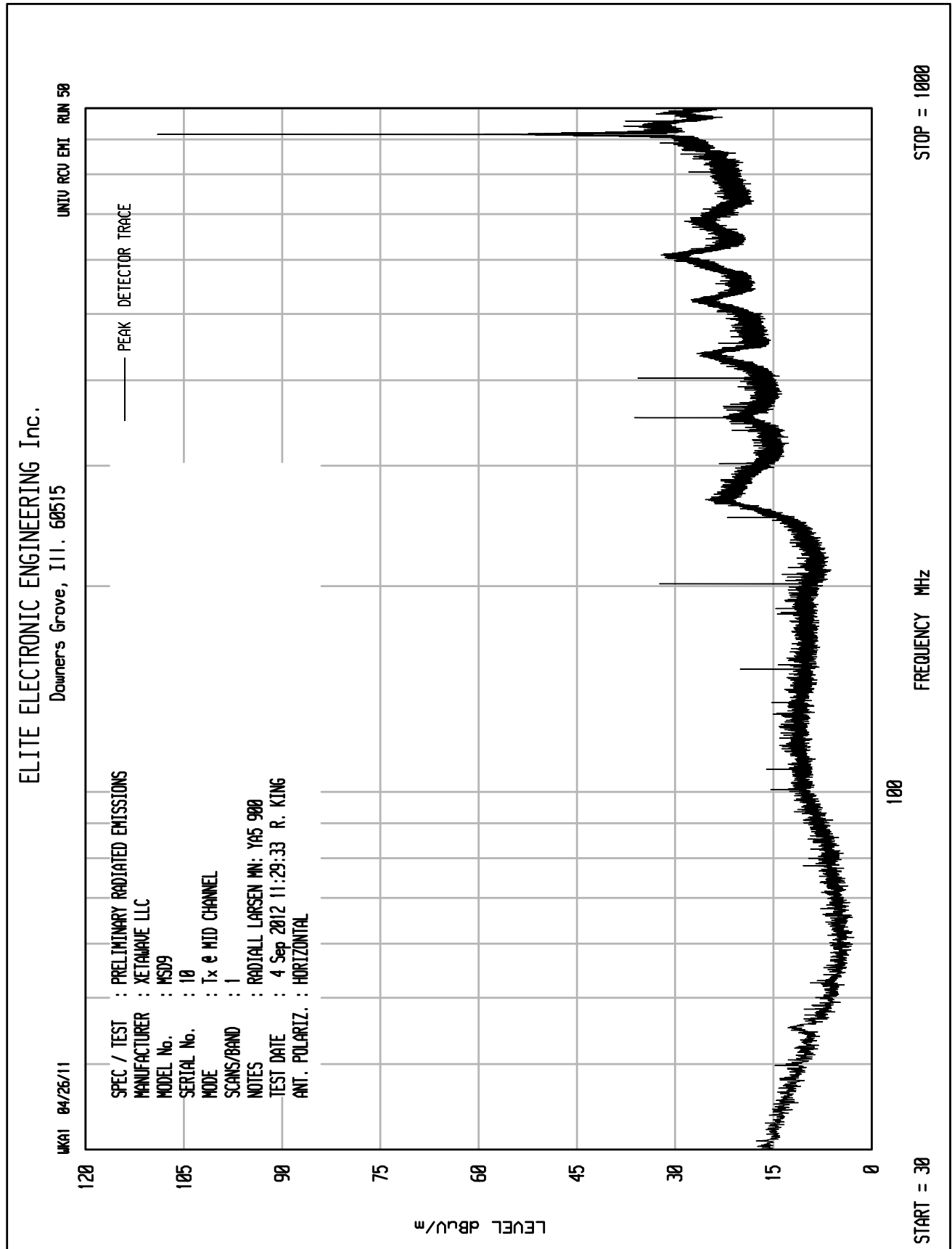


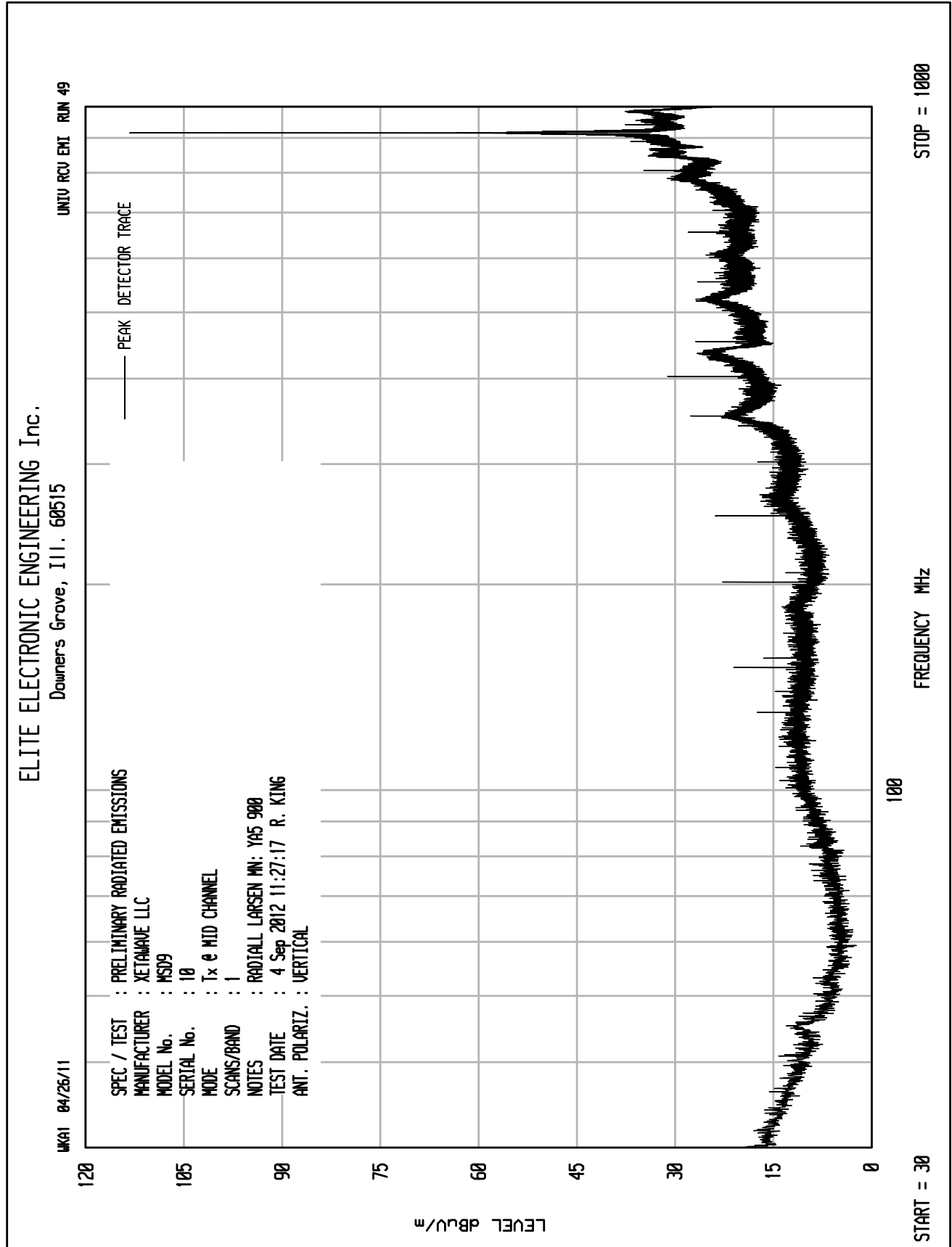


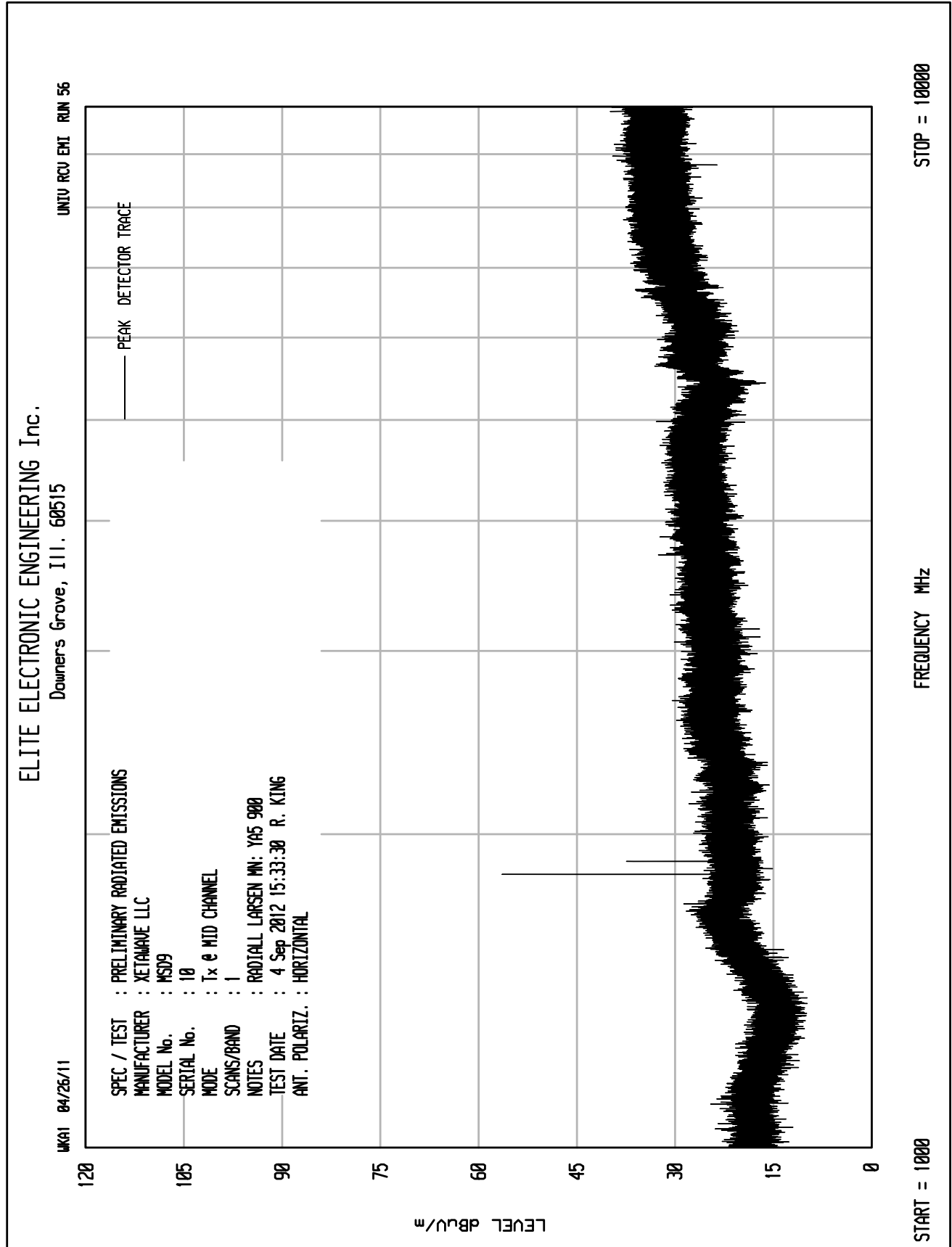


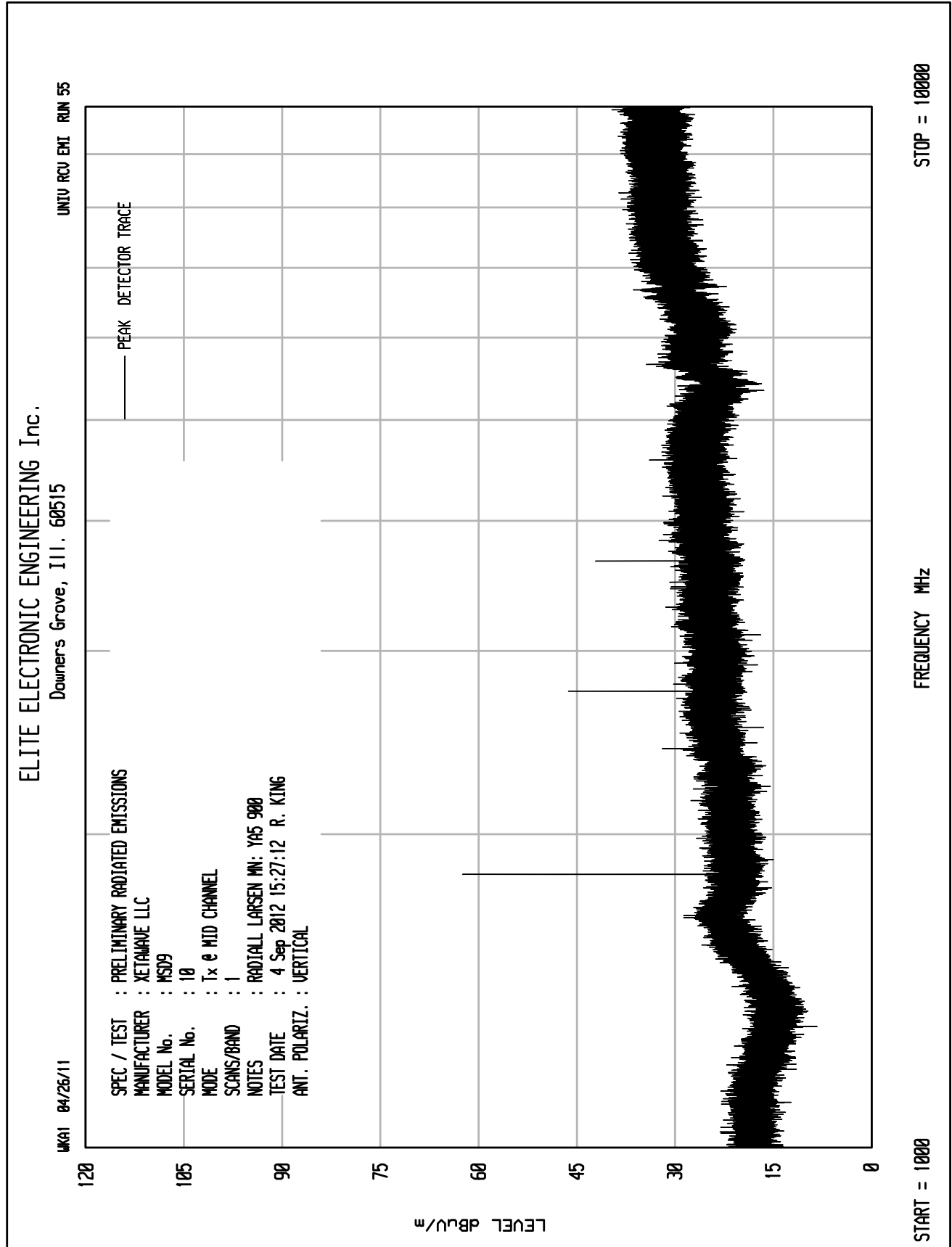


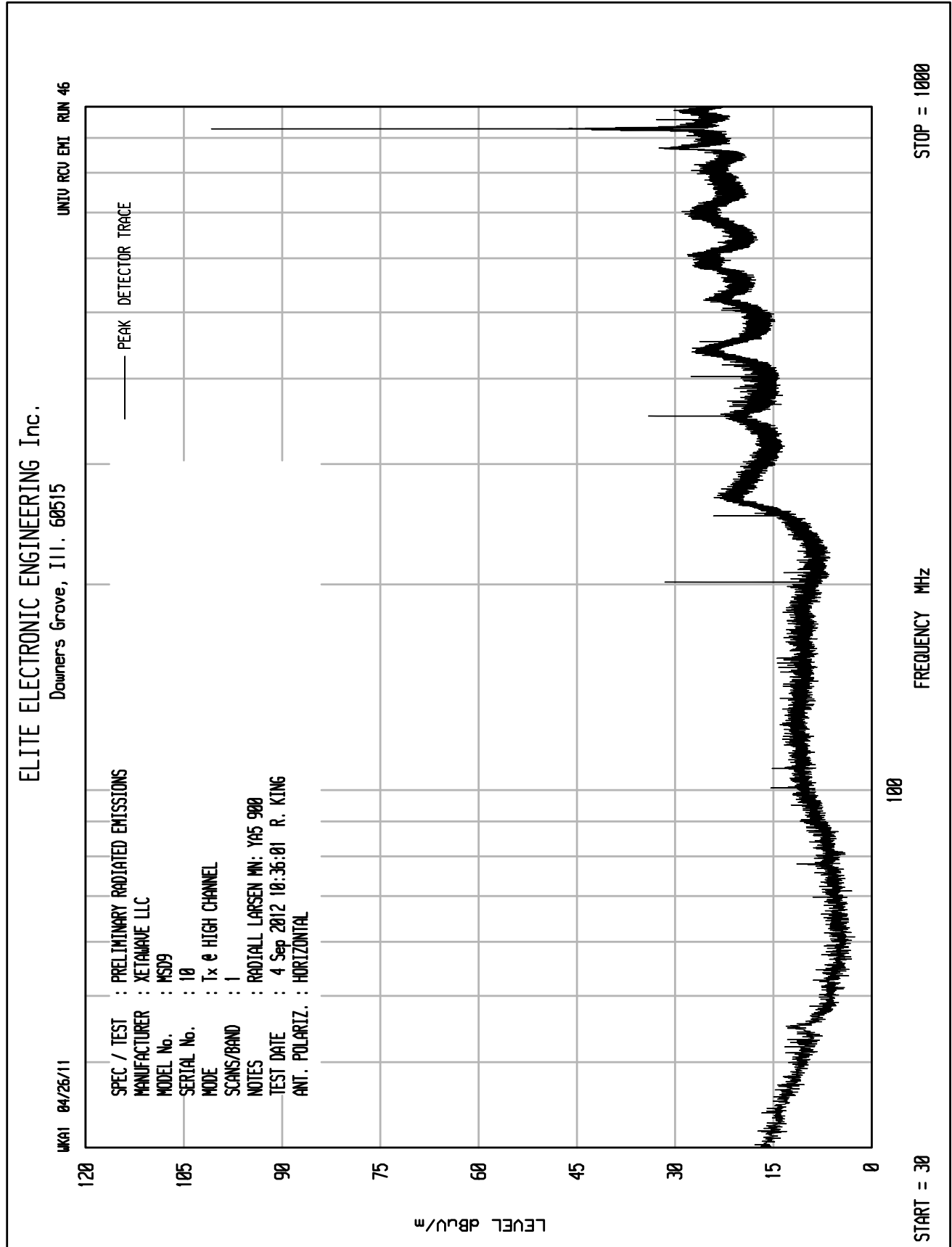


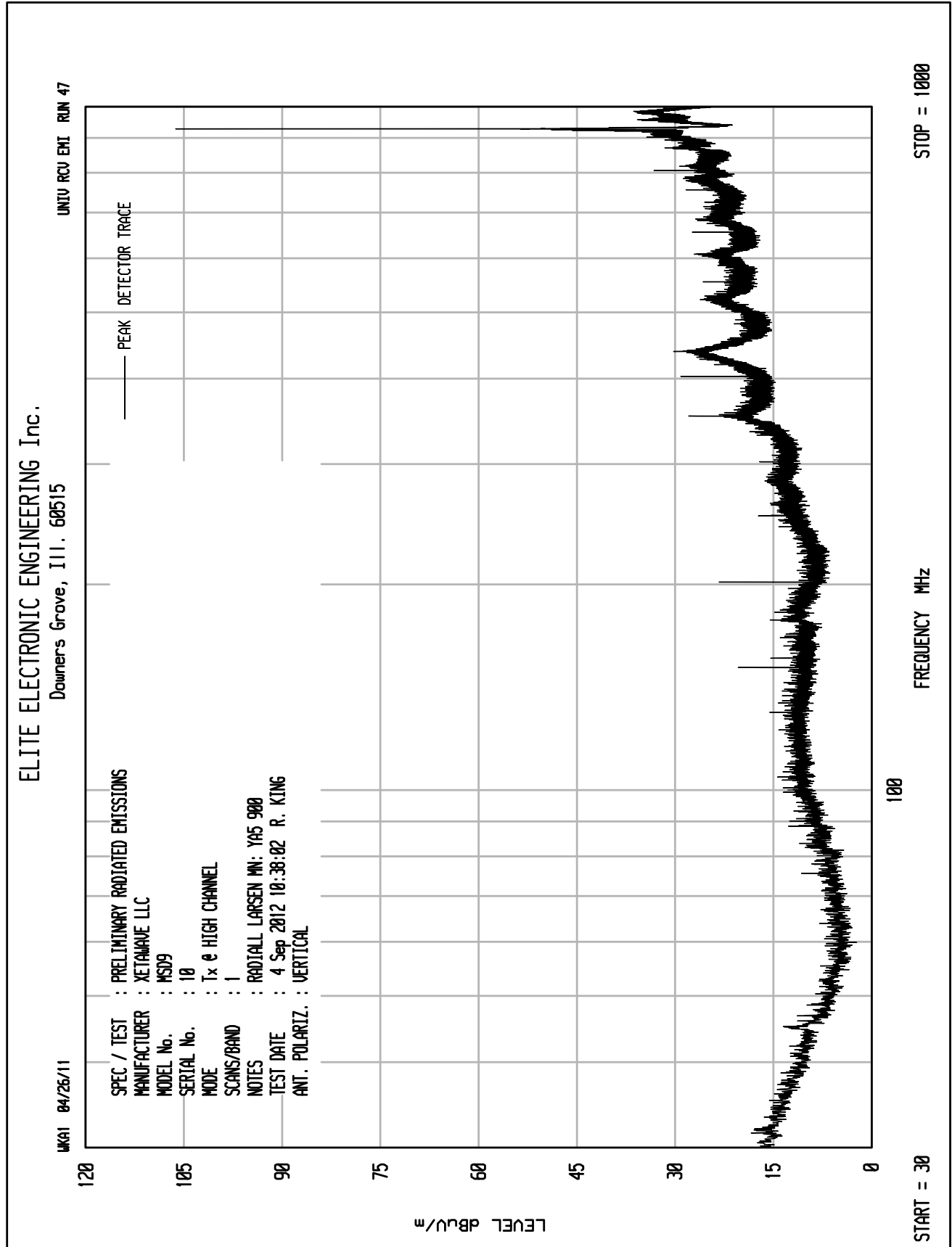


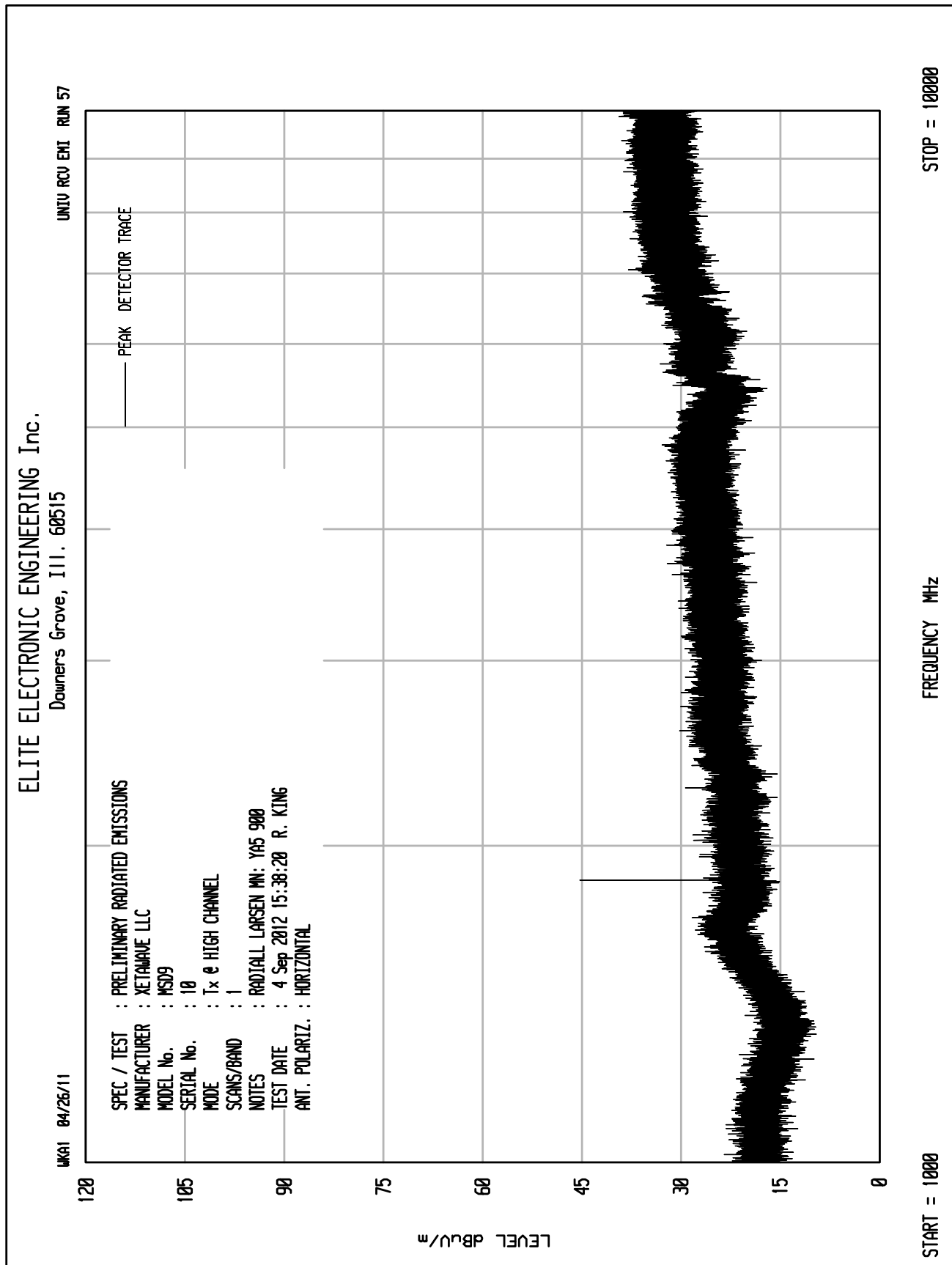


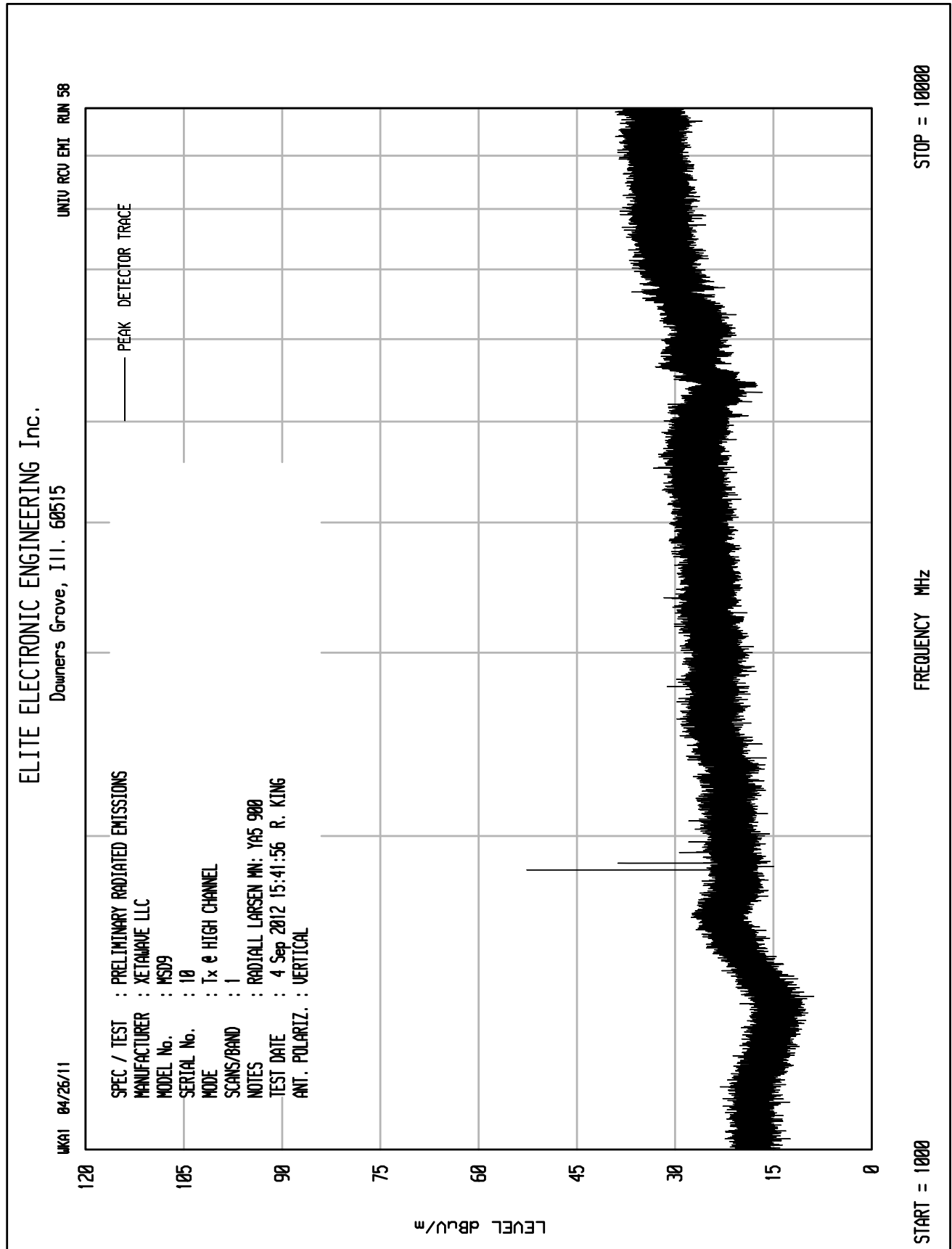














DATA PAGE

Manufacturer : XetaWave LLC
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 1, 2012
Mode : Transmit @ 902.25MHz
External Antenna : Laird Omni – FG9026
Test Distance : 3 meters
Notes : Conducted output power reduced to 25.6dBm
Notes : Peak Detector
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2706.75	H	54.7	2.8	31.4	-40.2	48.7	272.7	5000.0	-25.3
2706.75	V	53.2	2.8	31.4	-40.2	47.2	229.7	5000.0	-26.8
3609.00	H	50.9	3.2	33.4	-39.2	48.3	261.0	5000.0	-25.6
3609.00	V	52.0	3.2	33.4	-39.2	49.5	298.7	5000.0	-24.5
4511.25	H	46.1	3.6	34.1	-39.0	44.7	172.3	5000.0	-29.3
4511.25	V	47.5	3.6	34.1	-39.0	46.1	202.4	5000.0	-27.9
5413.50	H	40.2	3.9	36.4	-39.3	41.2	114.7	5000.0	-32.8
5413.50	V	37.1	3.9	36.4	-39.3	38.2	80.9	5000.0	-35.8
8120.25	H	43.9	4.9	39.2	-39.4	48.6	270.4	5000.0	-25.3
8120.25	V	44.0	4.9	39.2	-39.4	48.8	274.8	5000.0	-25.2
9022.50	H	44.4	4.9	40.1	-39.3	50.1	321.6	5000.0	-23.8
9022.50	V	44.7	4.9	40.1	-39.3	50.4	331.8	5000.0	-23.6

DATA PAGE

Manufacturer : XetaWave LLC
 Model No. : MSD9 Rev. A
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
 Date : September 1, 2012
 Mode : Transmit @ 902.25MHz
 External Antenna : Laird Omni – FG9026
 Test Distance : 3 meters
 Notes : Conducted output power reduced to 25.6dBm
 Notes : Average Readings in Restricted Bands
 Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2706.75	H	54.69	2.8	31.4	-40.2	-13.9	34.8	55.0	500.0	-19.2
2706.75	V	53.2	2.8	31.4	-40.2	-13.9	33.3	46.4	500.0	-20.7
3609.00	H	50.9	3.2	33.4	-39.2	-13.9	34.4	52.7	500.0	-19.5
3609.00	V	52.0	3.2	33.4	-39.2	-13.9	35.6	60.3	500.0	-18.4
4511.25	H	46.1	3.6	34.1	-39.0	-13.9	30.8	34.8	500.0	-23.2
4511.25	V	47.5	3.6	34.1	-39.0	-13.9	32.2	40.9	500.0	-21.8
5413.50	H	40.2	3.9	36.4	-39.3	-13.9	27.3	23.2	500.0	-26.7
5413.50	V	37.1	3.9	36.4	-39.3	-13.9	24.3	16.3	500.0	-29.7
8120.25	H	43.9	4.9	39.2	-39.4	-13.9	34.7	54.6	500.0	-19.2
8120.25	V	44.0	4.9	39.2	-39.4	-13.9	34.9	55.5	500.0	-19.1
9022.50	H	44.4	4.9	40.1	-39.3	-13.9	36.2	64.9	500.0	-17.7
9022.50	V	44.7	4.9	40.1	-39.3	-13.9	36.5	67.0	500.0	-17.5



DATA PAGE

Manufacturer : XetaWave LLC
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 1, 2012
Mode : Transmit @ 915MHz
External Antenna : Laird Omni – FG9026
Test Distance : 3 meters
Notes : Conducted output power reduced to 25.9dBm
Notes : Peak Detector
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2745.00	H	52.6	2.8	31.6	-40.1	46.8	219.6	5000.0	-27.1
2745.00	V	52.4	2.8	31.6	-40.1	46.7	216.3	5000.0	-27.3
3660.00	H	49.3	3.3	33.5	-39.1	46.8	219.8	5000.0	-27.1
3660.00	V	50.3	3.3	33.5	-39.1	47.8	246.4	5000.0	-26.1
4575.00	H	45.9	3.6	34.3	-39.0	44.7	172.7	5000.0	-29.2
4575.00	V	43.7	3.6	34.3	-39.0	42.6	135.4	5000.0	-31.3
7320.00	H	43.7	4.7	38.9	-39.4	47.9	248.5	5000.0	-26.1
7320.00	V	43.2	4.7	38.9	-39.4	47.3	233.0	5000.0	-26.6
8235.00	H	44.6	4.9	39.2	-39.4	49.3	292.8	5000.0	-24.6
8235.00	V	44.3	4.9	39.2	-39.4	49.1	283.8	5000.0	-24.9
9150.00	H	44.8	5.0	40.0	-39.3	50.5	336.6	5000.0	-23.4
9150.00	V	44.0	5.0	40.0	-39.3	49.7	306.6	5000.0	-24.2

DATA PAGE

Manufacturer : XetaWave LLC
 Model No. : MSD9 Rev. A
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
 Date : September 1, 2012
 Mode : Transmit @ 915MHz
 External Antenna : Laird Omni – FG9026
 Test Distance : 3 meters
 Notes : Conducted output power reduced to 25.9dBm
 Notes : Average Readings in Restricted Bands
 : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2745.00	H	52.56	2.8	31.6	-40.1	-13.9	32.9	44.3	500.0	-21.0
2745.00	V	52.4	2.8	31.6	-40.1	-13.9	32.8	43.7	500.0	-21.2
3660.00	H	49.3	3.3	33.5	-39.1	-13.9	32.9	44.4	500.0	-21.0
3660.00	V	50.3	3.3	33.5	-39.1	-13.9	33.9	49.7	500.0	-20.0
4575.00	H	45.9	3.6	34.3	-39.0	-13.9	30.8	34.9	500.0	-23.1
4575.00	V	43.7	3.6	34.3	-39.0	-13.9	28.7	27.3	500.0	-25.2
7320.00	H	43.7	4.7	38.9	-39.4	-13.9	34.0	50.2	500.0	-20.0
7320.00	V	43.2	4.7	38.9	-39.4	-13.9	33.4	47.0	500.0	-20.5
8235.00	H	44.6	4.9	39.2	-39.4	-13.9	35.4	59.1	500.0	-18.5
8235.00	V	44.3	4.9	39.2	-39.4	-13.9	35.2	57.3	500.0	-18.8
9150.00	H	44.8	5.0	40.0	-39.3	-13.9	36.6	67.9	500.0	-17.3
9150.00	V	44.0	5.0	40.0	-39.3	-13.9	35.8	61.9	500.0	-18.1



DATA PAGE

Manufacturer : XetaWave LLC
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 1, 2012
Mode : Transmit @ 927.75MHz
External Antenna : Laird Omni – FG9026
Test Distance : 3 meters
Notes : Conducted output power reduced to 26.3dBm
Notes : Peak Detector
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2783.25	H	52.2	2.8	31.7	-40.1	46.6	213.5	5000.0	-27.4
2783.25	V	49.0	2.8	31.7	-40.1	43.4	148.6	5000.0	-30.5
3711.00	H	50.0	3.3	33.5	-39.1	47.7	242.3	5000.0	-26.3
3711.00	V	52.0	3.3	33.5	-39.1	49.7	306.1	5000.0	-24.3
4638.75	H	47.1	3.6	34.6	-39.1	46.3	206.1	5000.0	-27.7
4638.75	V	45.5	3.6	34.6	-39.1	44.6	170.5	5000.0	-29.3
7422.00	H	43.6	4.7	38.9	-39.3	47.9	249.3	5000.0	-26.0
7422.00	V	43.6	4.7	38.9	-39.3	47.9	249.3	5000.0	-26.0
8349.75	H	45.5	4.9	39.2	-39.4	50.3	327.0	5000.0	-23.7
8349.75	V	44.4	4.9	39.2	-39.4	49.2	289.8	5000.0	-24.7

DATA PAGE

Manufacturer : XetaWave LLC
 Model No. : MSD9 Rev. A
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
 Date : September 1, 2012
 Mode : Transmit @ 927.75MHz
 External Antenna : Laird Omni – FG9026
 Test Distance : 3 meters
 Notes : Conducted output power reduced to 26.3dBm
 Notes : Average Readings in Restricted Bands
 Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2783.25	H	52.17	2.8	31.7	-40.1	-13.9	32.7	43.1	500.0	-21.3
2783.25	V	49.0	2.8	31.7	-40.1	-13.9	29.5	30.0	500.0	-24.4
3711.00	H	50.0	3.3	33.5	-39.1	-13.9	33.8	48.9	500.0	-20.2
3711.00	V	52.0	3.3	33.5	-39.1	-13.9	35.8	61.8	500.0	-18.2
4638.75	H	47.1	3.6	34.6	-39.1	-13.9	32.4	41.6	500.0	-21.6
4638.75	V	45.5	3.6	34.6	-39.1	-13.9	30.7	34.4	500.0	-23.2
7422.00	H	43.6	4.7	38.9	-39.3	-13.9	34.0	50.3	500.0	-19.9
7422.00	V	43.6	4.7	38.9	-39.3	-13.9	34.0	50.3	500.0	-19.9
8349.75	H	45.5	4.9	39.2	-39.4	-13.9	36.4	66.0	500.0	-17.6
8349.75	V	44.4	4.9	39.2	-39.4	-13.9	35.3	58.5	500.0	-18.6



DATA PAGE

Manufacturer : XetaWave LLC
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 1, 2012
Mode : Transmit @ 902.25MHz
External Antenna : Radiall Larsen – YA5900W
Test Distance : 3 meters
Notes : Conducted output power reduced to 23.5dBm
Notes : Peak Detector
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2706.75	H	53.4	2.8	31.4	-40.2	47.5	236.2	5000.0	-26.5
2706.75	V	61.6	2.8	31.4	-40.2	55.6	604.3	5000.0	-18.4
3609.00	H	52.7	3.2	33.4	-39.2	50.1	320.8	5000.0	-23.9
3609.00	V	51.5	3.2	33.4	-39.2	49.0	281.3	5000.0	-25.0
4511.25	H	47.6	3.6	34.1	-39.0	46.3	205.5	5000.0	-27.7
4511.25	V	47.3	3.6	34.1	-39.0	45.9	196.7	5000.0	-28.1
5413.50	H	47.3	3.9	36.4	-39.3	48.3	259.8	5000.0	-25.7
5413.50	V	47.6	3.9	36.4	-39.3	48.7	271.4	5000.0	-25.3
8120.25	H	45.5	4.9	39.2	-39.4	50.2	324.7	5000.0	-23.7
8120.25	V	45.1	4.9	39.2	-39.4	49.9	310.8	5000.0	-24.1
9022.50	H	45.0	4.9	40.1	-39.3	50.7	342.3	5000.0	-23.3
9022.50	V	44.7	4.9	40.1	-39.3	50.4	331.8	5000.0	-23.6

DATA PAGE

Manufacturer : XetaWave LLC
 Model No. : MSD9 Rev. A
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
 Date : September 1, 2012
 Mode : Transmit @ 902.25MHz
 External Antenna : Radiall Larsen – YA5900W
 Test Distance : 3 meters
 Notes : Conducted output power reduced to 23.5dBm
 Notes : Average Readings in Restricted Bands
 Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2706.75	H	53.44	2.8	31.4	-40.2	-13.9	33.6	47.7	500.0	-20.4
2706.75	V	61.6	2.8	31.4	-40.2	-13.9	41.7	122.0	500.0	-12.3
3609.00	H	52.7	3.2	33.4	-39.2	-13.9	36.2	64.7	500.0	-17.8
3609.00	V	51.5	3.2	33.4	-39.2	-13.9	35.1	56.8	500.0	-18.9
4511.25	H	47.6	3.6	34.1	-39.0	-13.9	32.4	41.5	500.0	-21.6
4511.25	V	47.3	3.6	34.1	-39.0	-13.9	32.0	39.7	500.0	-22.0
5413.50	H	47.3	3.9	36.4	-39.3	-13.9	34.4	52.4	500.0	-19.6
5413.50	V	47.6	3.9	36.4	-39.3	-13.9	34.8	54.8	500.0	-19.2
8120.25	H	45.5	4.9	39.2	-39.4	-13.9	36.3	65.5	500.0	-17.6
8120.25	V	45.1	4.9	39.2	-39.4	-13.9	36.0	62.7	500.0	-18.0
9022.50	H	45.0	4.9	40.1	-39.3	-13.9	36.8	69.1	500.0	-17.2
9022.50	V	44.7	4.9	40.1	-39.3	-13.9	36.5	67.0	500.0	-17.5



DATA PAGE

Manufacturer : XetaWave LLC
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 1, 2012
Mode : Transmit @ 915MHz
External Antenna : Radiall Larsen – YA5900W
Test Distance : 3 meters
Notes : Conducted output power reduced to 23.5dBm
Notes : Peak Detector
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2745.00	H	50.3	2.8	31.6	-40.1	44.5	168.5	5000.0	-29.4
2745.00	V	57.0	2.8	31.6	-40.1	51.3	365.2	5000.0	-22.7
3660.00	H	53.2	3.3	33.5	-39.1	50.8	345.6	5000.0	-23.2
3660.00	V	50.8	3.3	33.5	-39.1	48.3	260.6	5000.0	-25.7
4575.00	H	47.3	3.6	34.3	-39.0	46.1	202.9	5000.0	-27.8
4575.00	V	45.3	3.6	34.3	-39.0	44.2	162.8	5000.0	-29.7
7320.00	H	45.0	4.7	38.9	-39.4	49.2	287.3	5000.0	-24.8
7320.00	V	45.7	4.7	38.9	-39.4	49.9	311.4	5000.0	-24.1
8235.00	H	46.1	4.9	39.2	-39.4	50.9	349.6	5000.0	-23.1
8235.00	V	45.8	4.9	39.2	-39.4	50.6	337.7	5000.0	-23.4
9150.00	H	46.2	5.0	40.0	-39.3	51.9	394.1	5000.0	-22.1
9150.00	V	44.5	5.0	40.0	-39.3	50.2	324.0	5000.0	-23.8



DATA PAGE

Manufacturer : XetaWave LLC
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 1, 2012
Mode : Transmit @ 915MHz
External Antenna : Radiall Larsen – YA5900W
Test Distance : 3 meters
Notes : Conducted output power reduced to 23.5dBm
Notes : Average Readings in Restricted Bands
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2745.00	H	50.26	2.8	31.6	-40.1	-13.9	30.6	34.0	500.0	-23.3
2745.00	V	57.0	2.8	31.6	-40.1	-13.9	37.4	73.7	500.0	-16.6
3660.00	H	53.2	3.3	33.5	-39.1	-13.9	36.9	69.8	500.0	-17.1
3660.00	V	50.8	3.3	33.5	-39.1	-13.9	34.4	52.6	500.0	-19.6
4575.00	H	47.3	3.6	34.3	-39.0	-13.9	32.2	41.0	500.0	-21.7
4575.00	V	45.3	3.6	34.3	-39.0	-13.9	30.3	32.9	500.0	-23.6
7320.00	H	45.0	4.7	38.9	-39.4	-13.9	35.3	58.0	500.0	-18.7
7320.00	V	45.7	4.7	38.9	-39.4	-13.9	36.0	62.8	500.0	-18.0
8235.00	H	46.1	4.9	39.2	-39.4	-13.9	37.0	70.6	500.0	-17.0
8235.00	V	45.8	4.9	39.2	-39.4	-13.9	36.7	68.2	500.0	-17.3
9150.00	H	46.2	5.0	40.0	-39.3	-13.9	38.0	79.5	500.0	-16.0
9150.00	V	44.5	5.0	40.0	-39.3	-13.9	36.3	65.4	500.0	-17.7

DATA PAGE

Manufacturer : XetaWave LLC
 Model No. : MSD9 Rev. A
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
 Date : September 1, 2012
 Mode : Transmit @ 927.75MHz
 External Antenna : Radiall Larsen – YA5900W
 Test Distance : 3 meters
 Notes : Conducted output power reduced to 23.3dBm
 Notes : Peak Detector
 Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2783.25	H	49.9	2.8	31.7	-40.1	44.3	164.2	5000.0	-29.7
2783.25	V	55.1	2.8	31.7	-40.1	49.5	298.5	5000.0	-24.5
3711.00	H	49.8	3.3	33.5	-39.1	47.4	235.7	5000.0	-26.5
3711.00	V	51.8	3.3	33.5	-39.1	49.5	297.0	5000.0	-24.5
4638.75	H	47.5	3.6	34.6	-39.1	46.7	215.3	5000.0	-27.3
4638.75	V	44.7	3.6	34.6	-39.1	43.9	155.8	5000.0	-30.1
7422.00	H	44.8	4.7	38.9	-39.3	49.2	287.2	5000.0	-24.8
7422.00	V	43.2	4.7	38.9	-39.3	47.5	237.5	5000.0	-26.5
8349.75	H	44.2	4.9	39.2	-39.4	49.0	280.9	5000.0	-25.0
8349.75	V	44.8	4.9	39.2	-39.4	49.7	303.8	5000.0	-24.3



DATA PAGE

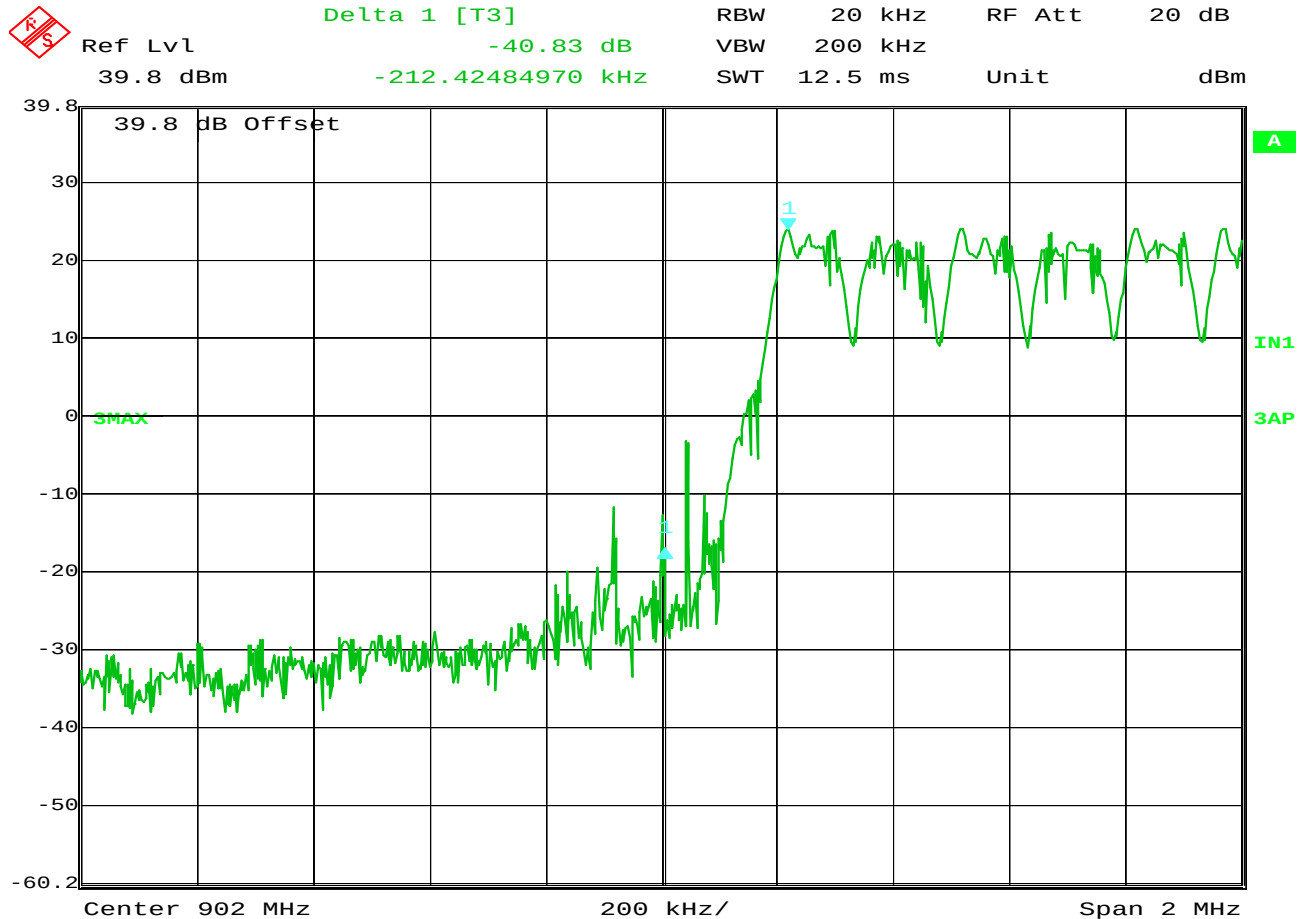
Manufacturer : XetaWave LLC
Model No. : MSD9 Rev. A
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : September 1, 2012
Mode : Transmit @ 927.75MHz
External Antenna : Radiall Larsen – YA5900W
Test Distance : 3 meters
Notes : Conducted output power reduced to 23.3dBm
Notes : Average Readings in Restricted Bands
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2783.25	H	49.89	2.8	31.7	-40.1	-13.9	30.4	33.2	500.0	-23.6
2783.25	V	55.1	2.8	31.7	-40.1	-13.9	35.6	60.3	500.0	-18.4
3711.00	H	49.8	3.3	33.5	-39.1	-13.9	33.5	47.6	500.0	-20.4
3711.00	V	51.8	3.3	33.5	-39.1	-13.9	35.6	60.0	500.0	-18.4
4638.75	H	47.5	3.6	34.6	-39.1	-13.9	32.8	43.5	500.0	-21.2
4638.75	V	44.7	3.6	34.6	-39.1	-13.9	30.0	31.4	500.0	-24.0
7422.00	H	44.8	4.7	38.9	-39.3	-13.9	35.3	58.0	500.0	-18.7
7422.00	V	43.2	4.7	38.9	-39.3	-13.9	33.6	47.9	500.0	-20.4
8349.75	H	44.2	4.9	39.2	-39.4	-13.9	35.1	56.7	500.0	-18.9
8349.75	V	44.8	4.9	39.2	-39.4	-13.9	35.8	61.3	500.0	-18.2



MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (Low: 902.25MHz @ 15500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

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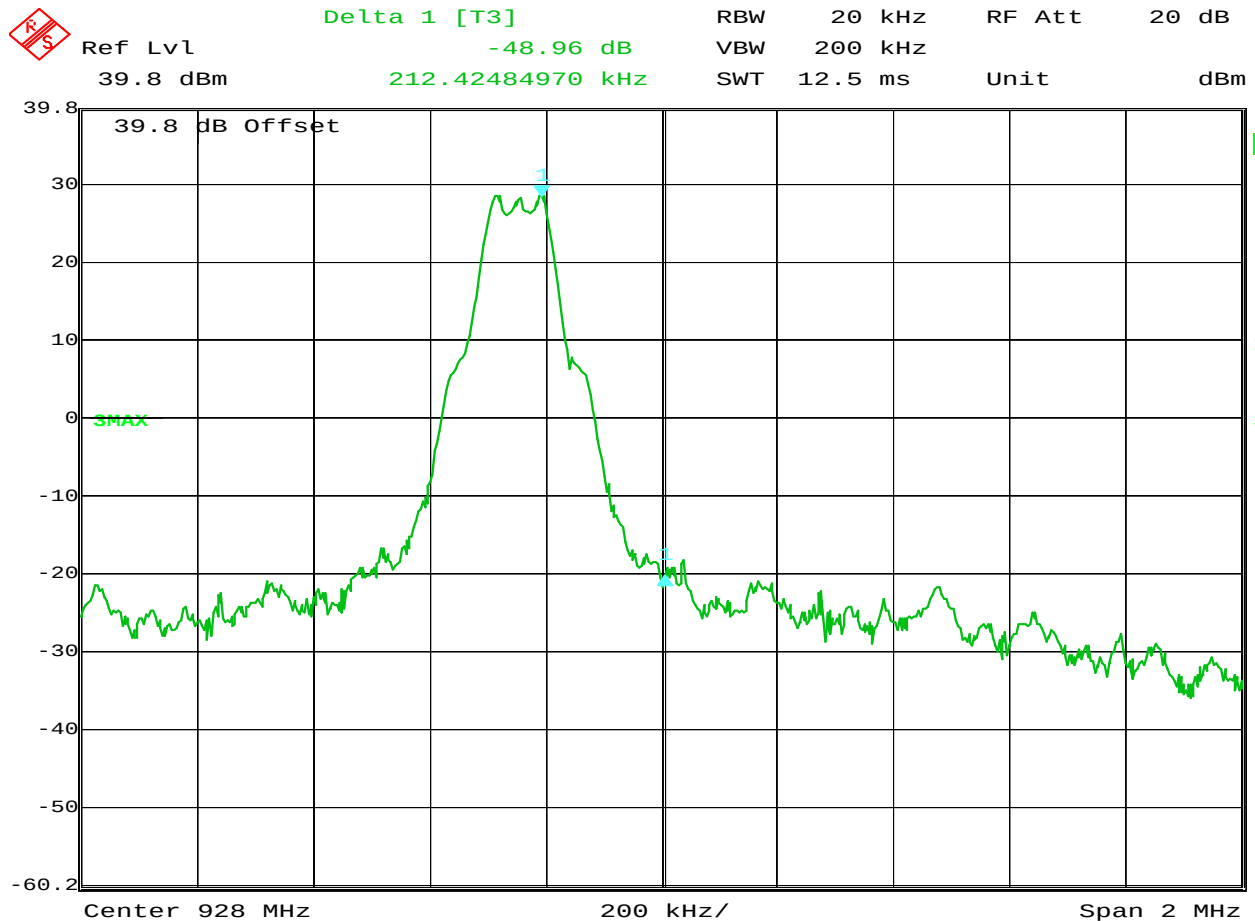


Date: 4.SEP.2012 14:28:45

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/114kbps (Bottom, 902MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

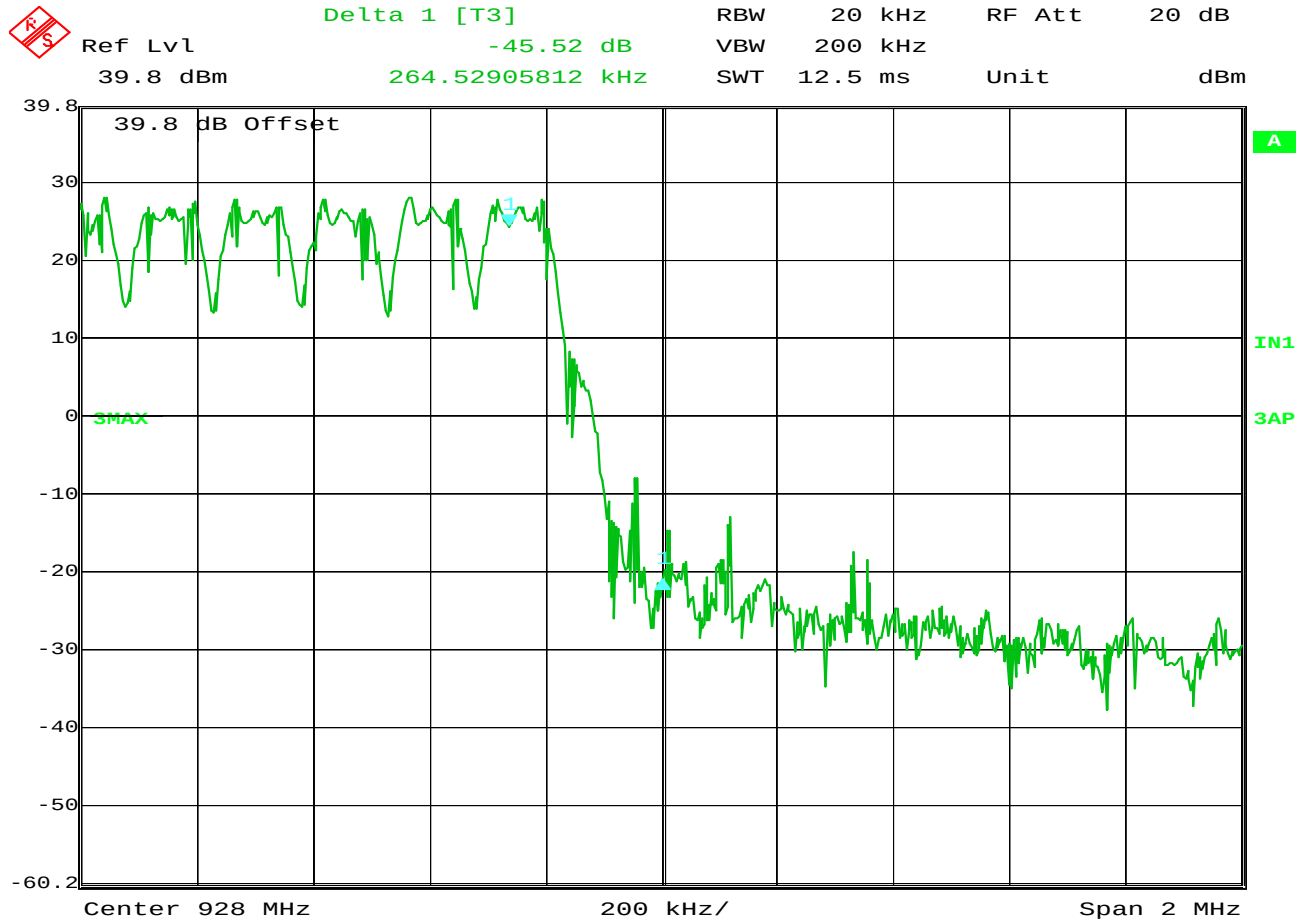


Date: 31.AUG.2012 10:16:47

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/114kbps (High: 927.75MHz @ 9500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 4.SEP.2012 14:24:21

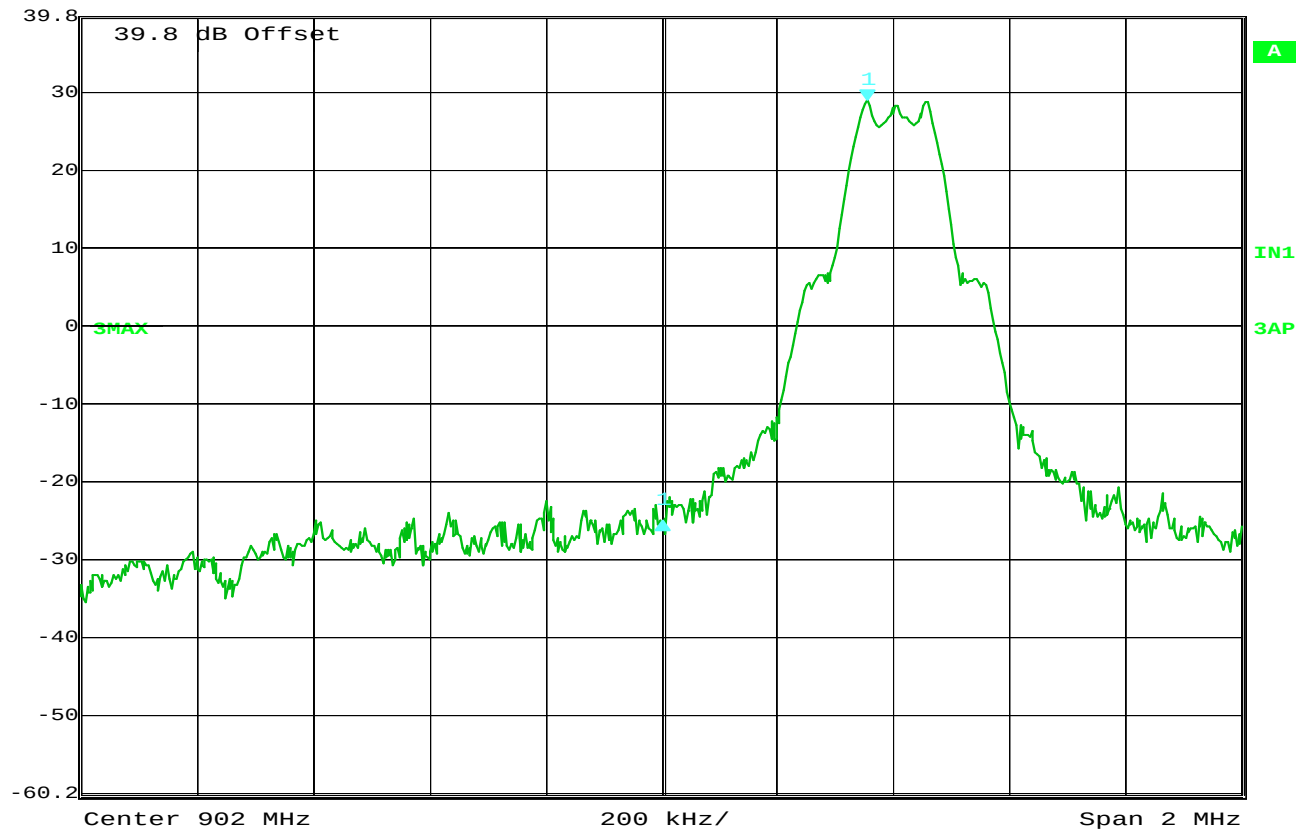
FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/114kbps (Top, 928MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Delta 1 [T3] RBW 20 kHz RF Att 20 dB
Ref Lvl -53.88 dB VBW 200 kHz
39.8 dBm -352.70541082 kHz SWT 12.5 ms Unit dBm

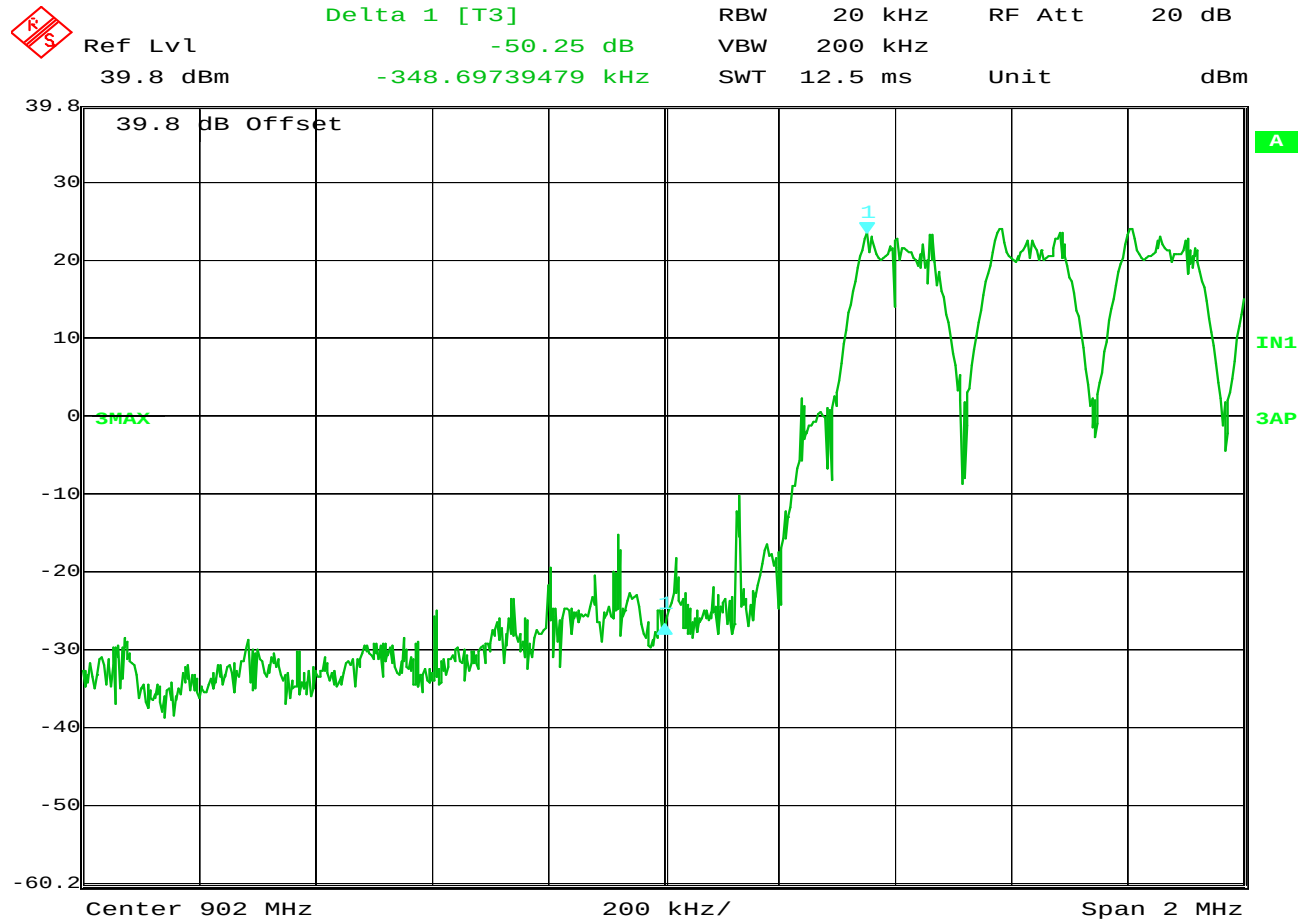


Date: 31.AUG.2012 08:59:15

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (Low: 902.55MHz @ 15500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

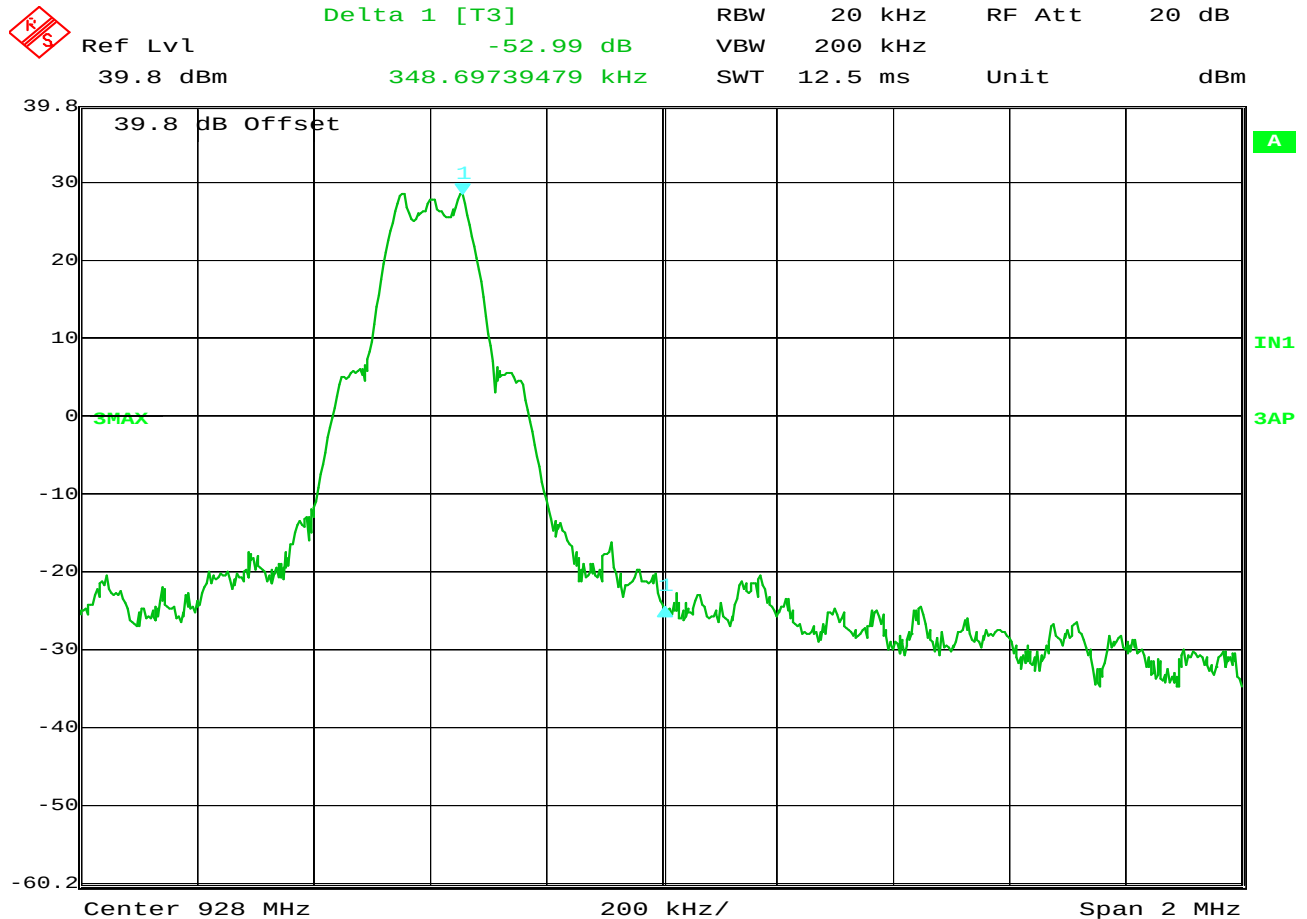


Date: 4.SEP.2012 14:35:23

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps (Bottom, 902MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

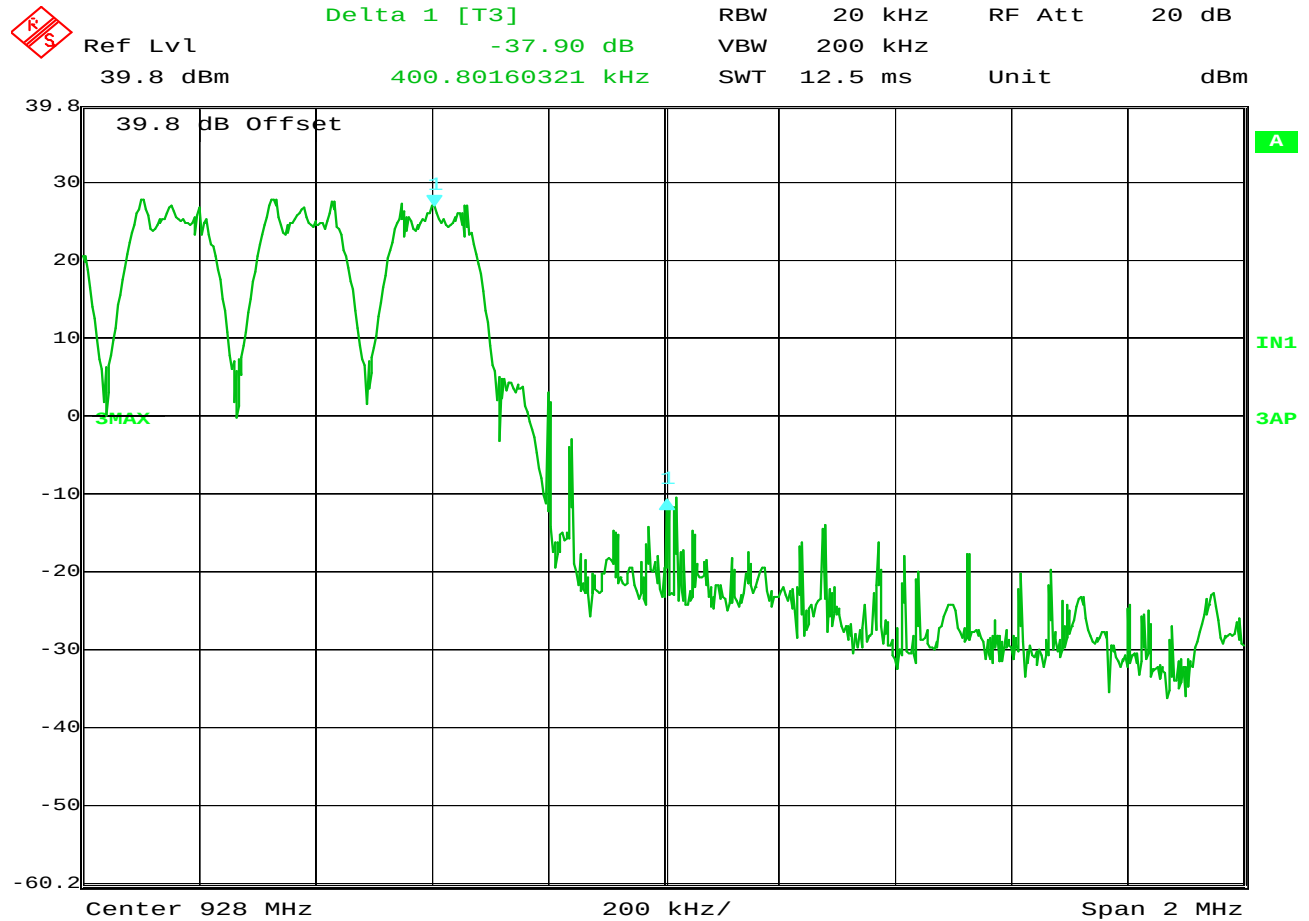


Date: 31.AUG.2012 09:09:32

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/153kbps (High: 927.6MHz @ 9500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

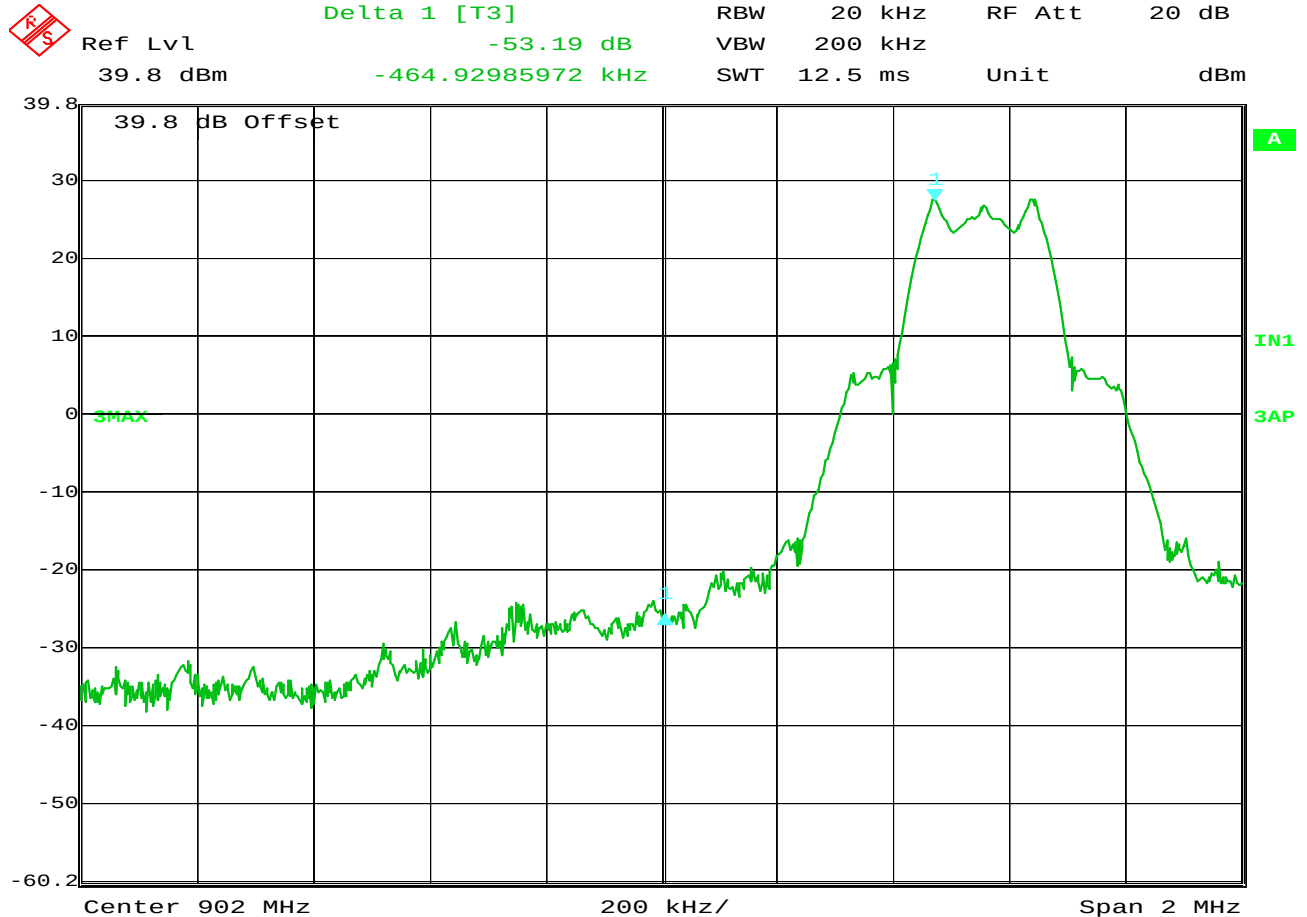


Date: 4.SEP.2012 14:46:14

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/153kbps (Top, 928MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 30.AUG.2012 17:29:06

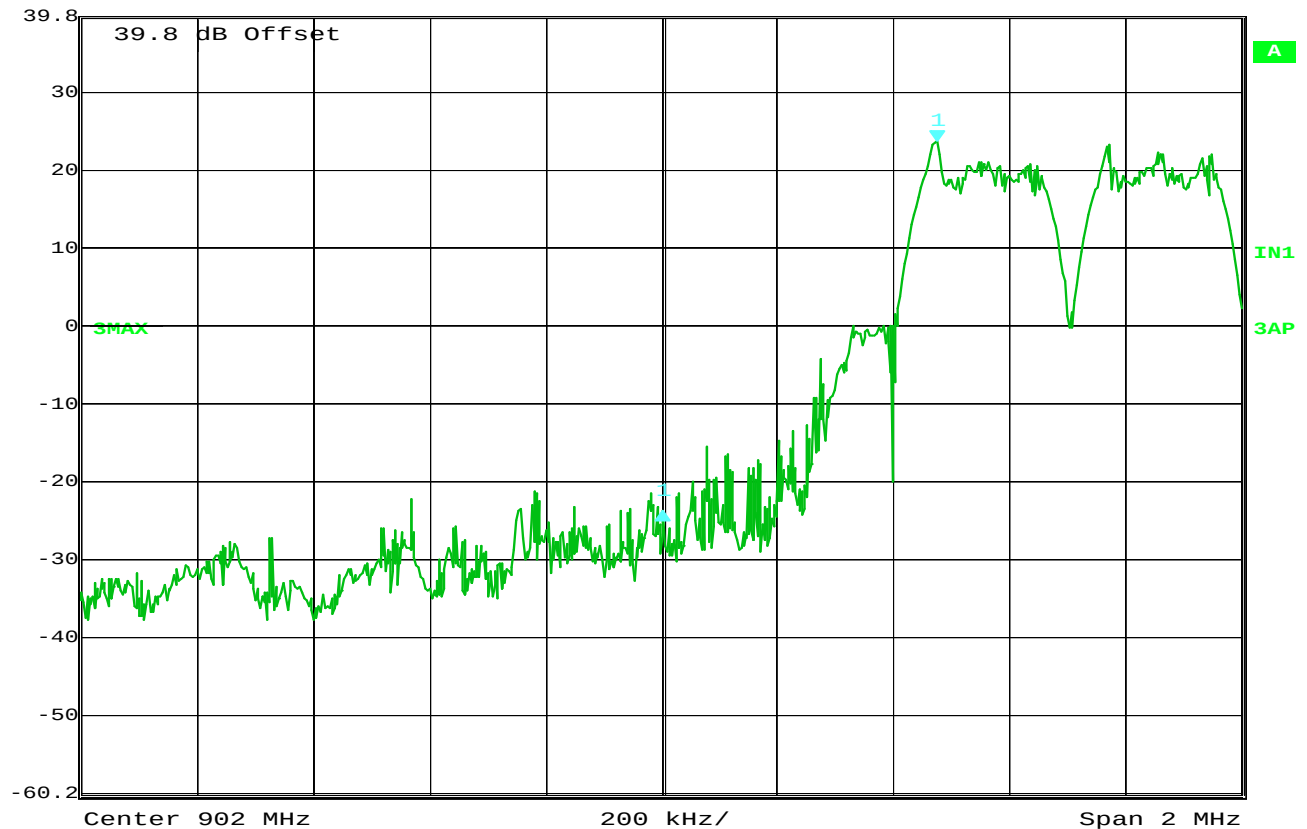
FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (Low: 902.55MHz @ 15500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Delta 1 [T3] RBW 20 kHz RF Att 20 dB
Ref Lvl -47.36 dB VBW 200 kHz
39.8 dBm -472.94589178 kHz SWT 12.5 ms Unit dBm



Date: 4.SEP.2012 17:07:15

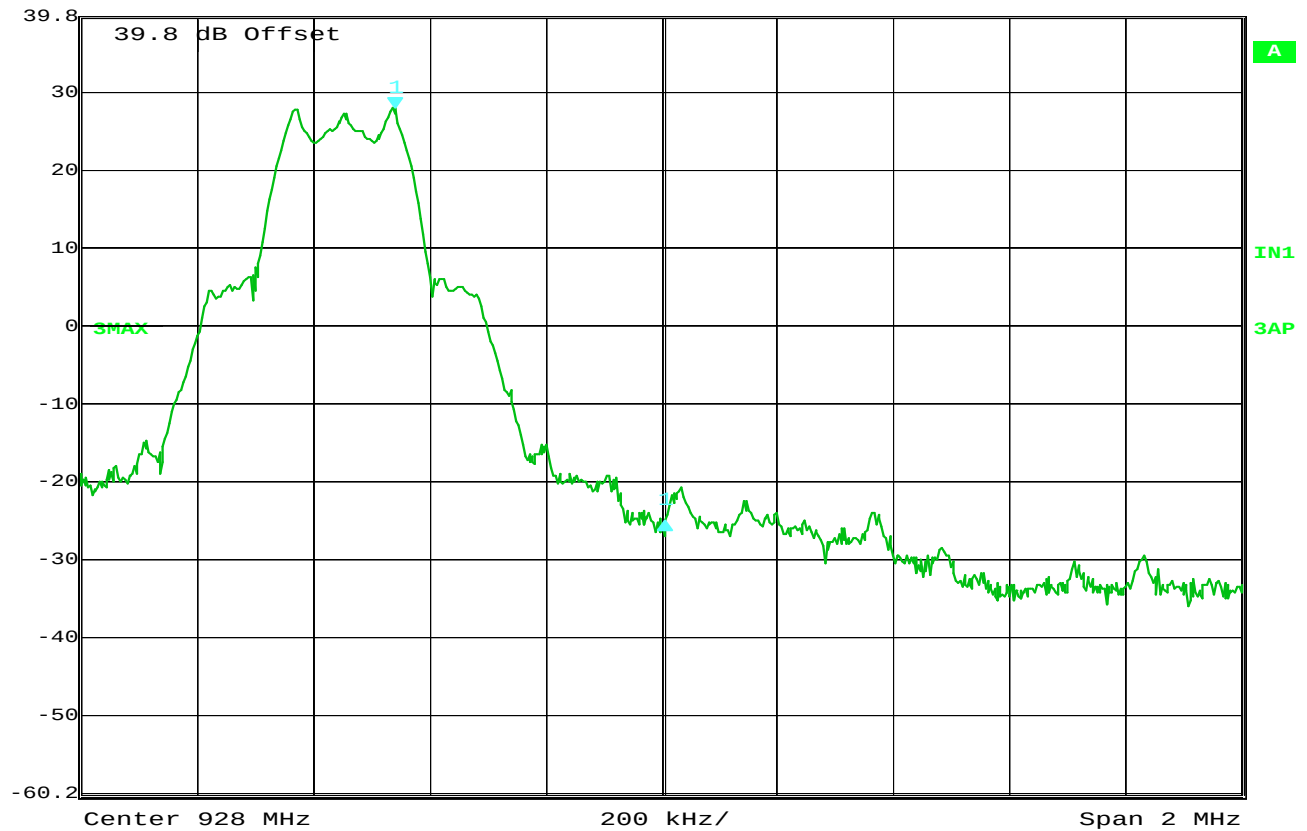
FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/229kbps (Bottom, 902MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Delta 1 [T3] -52.86 dB
464.92985972 kHz
RBW 20 kHz
VBW 200 kHz
SWT 12.5 ms
RF Att 20 dB
Unit dBm



Date: 30.AUG.2012 17:02:42

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/229kbps (High: 902.55MHz @ 15500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

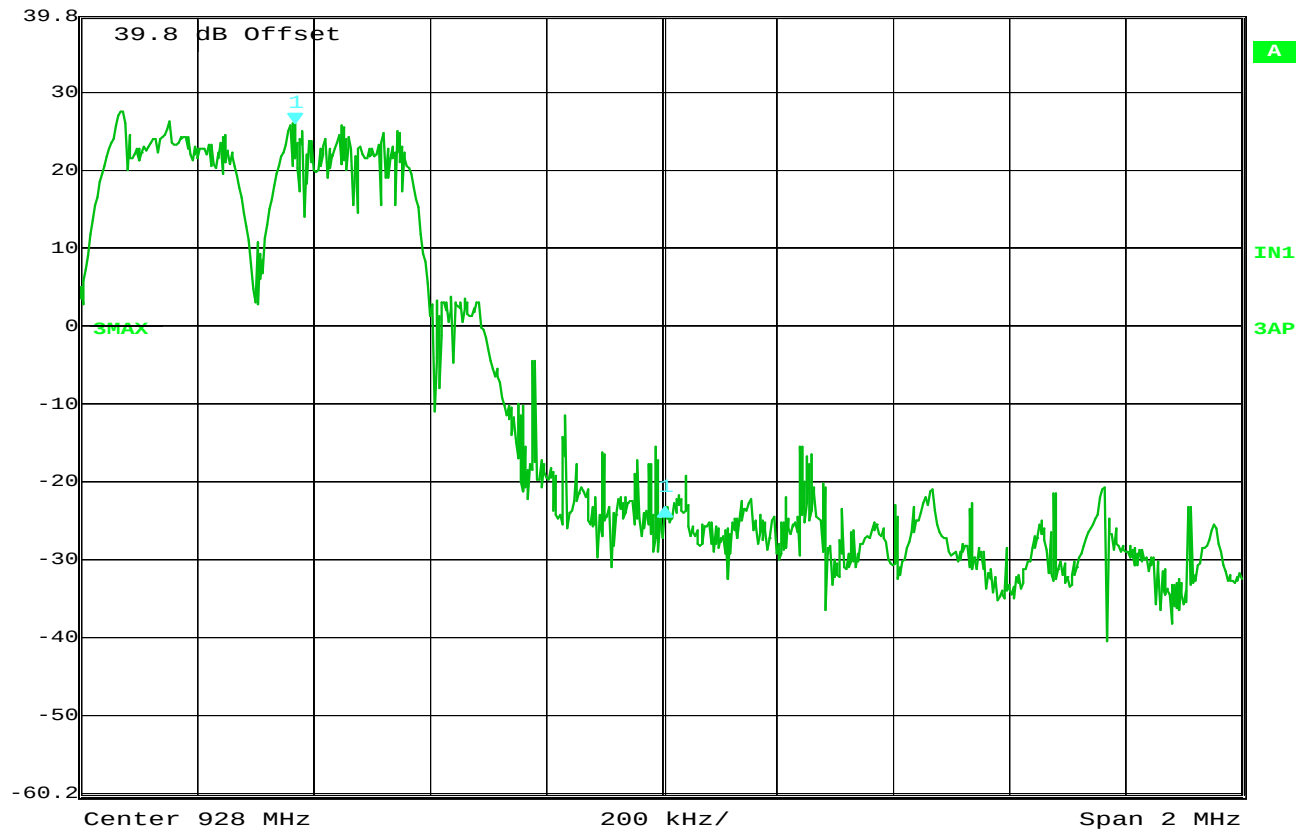
NOTES



Ref Lvl
39.8 dBm

Delta 1 [T3]
-49.42 dB
637.27454910 kHz

RBW 20 kHz RF Att 20 dB
VBW 200 kHz
SWT 12.5 ms Unit dBm



Date: 4.SEP.2012 17:13:52

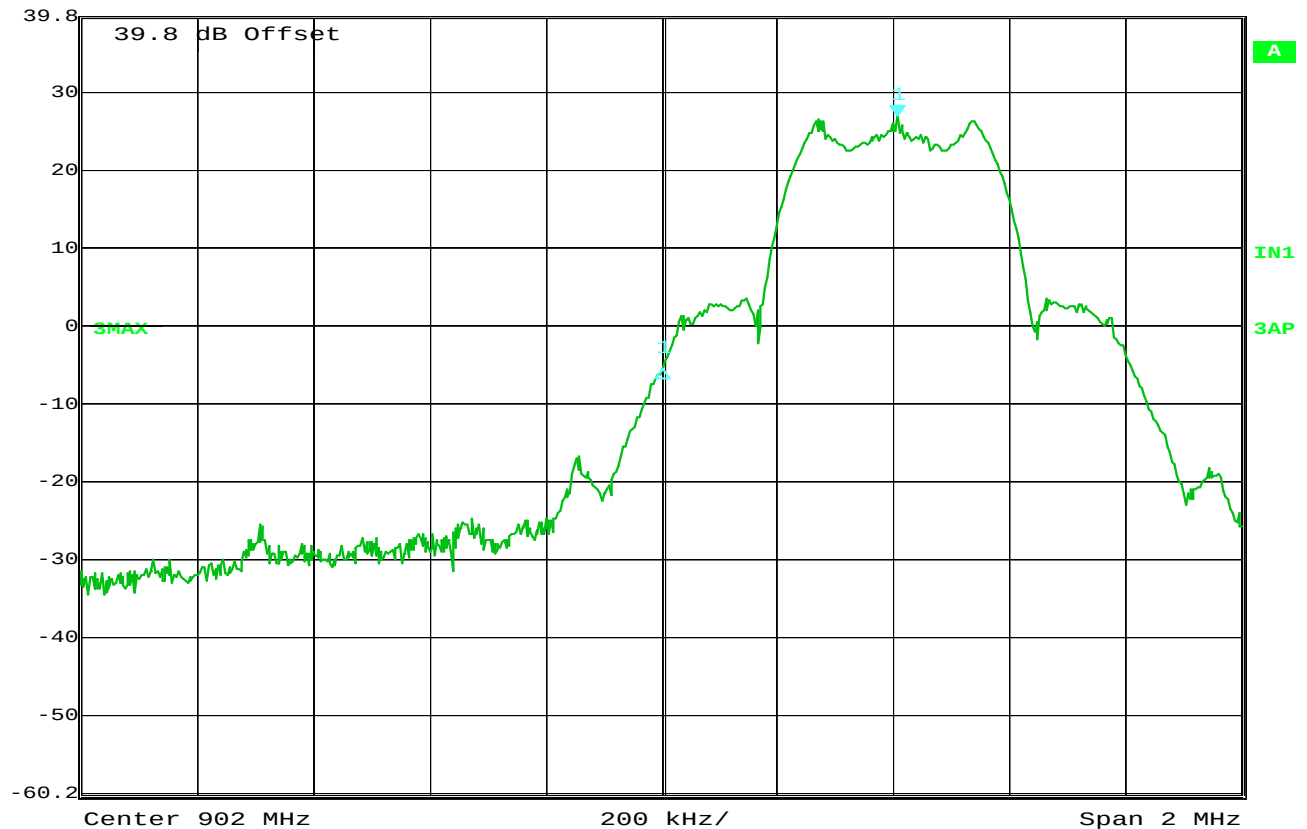
FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/229kbps (Top, 928MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Marker 1 [T3] 26.85 dBm
902.40681363 MHz
RBW 20 kHz
VBW 200 kHz
RF Att 20 dB
SWT 12.5 ms
Unit dBm



Date: 30.AUG.2012 15:22:57

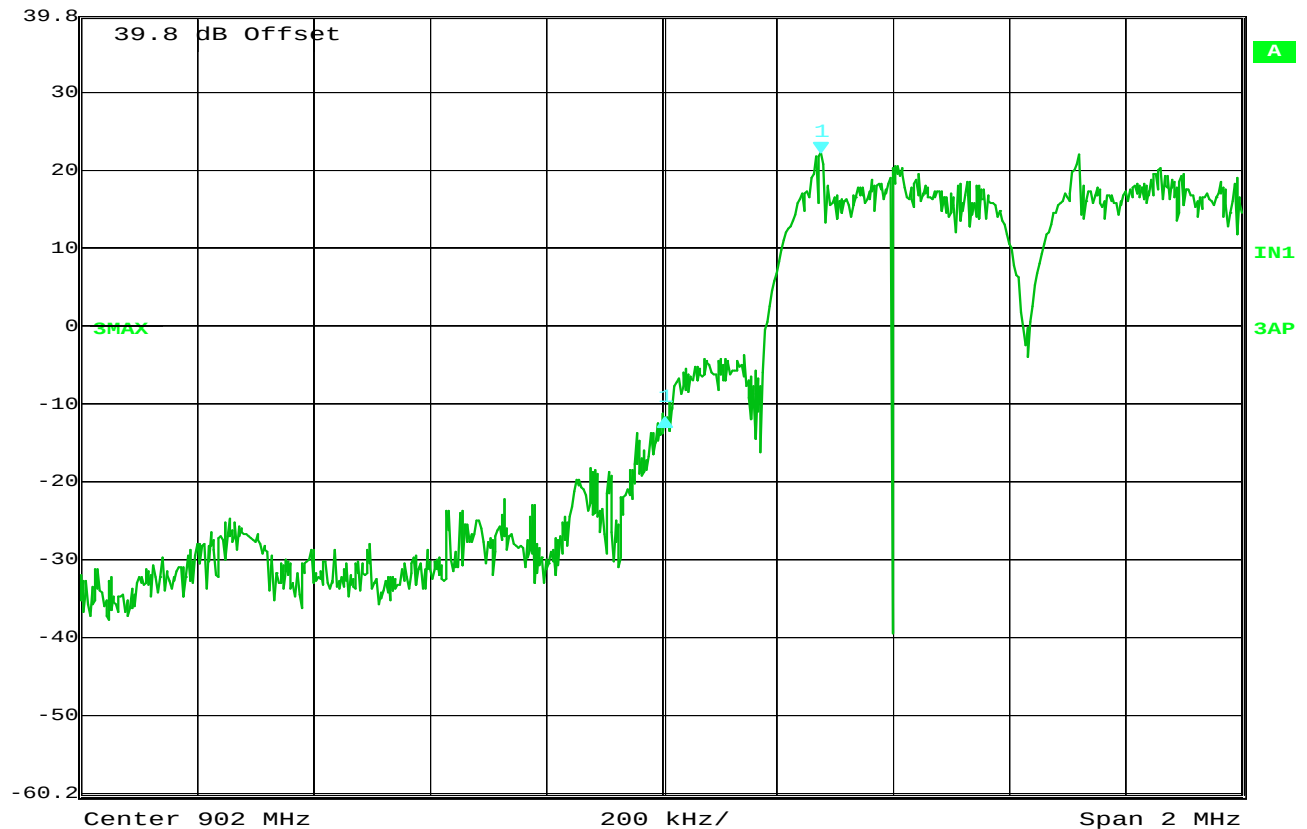
FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK (Low: 902.4MHz @ 15500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Delta 1 [T3] RBW 20 kHz RF Att 20 dB
Ref Lvl -33.85 dB VBW 200 kHz
39.8 dBm -268.53707415 kHz SWT 12.5 ms Unit dBm

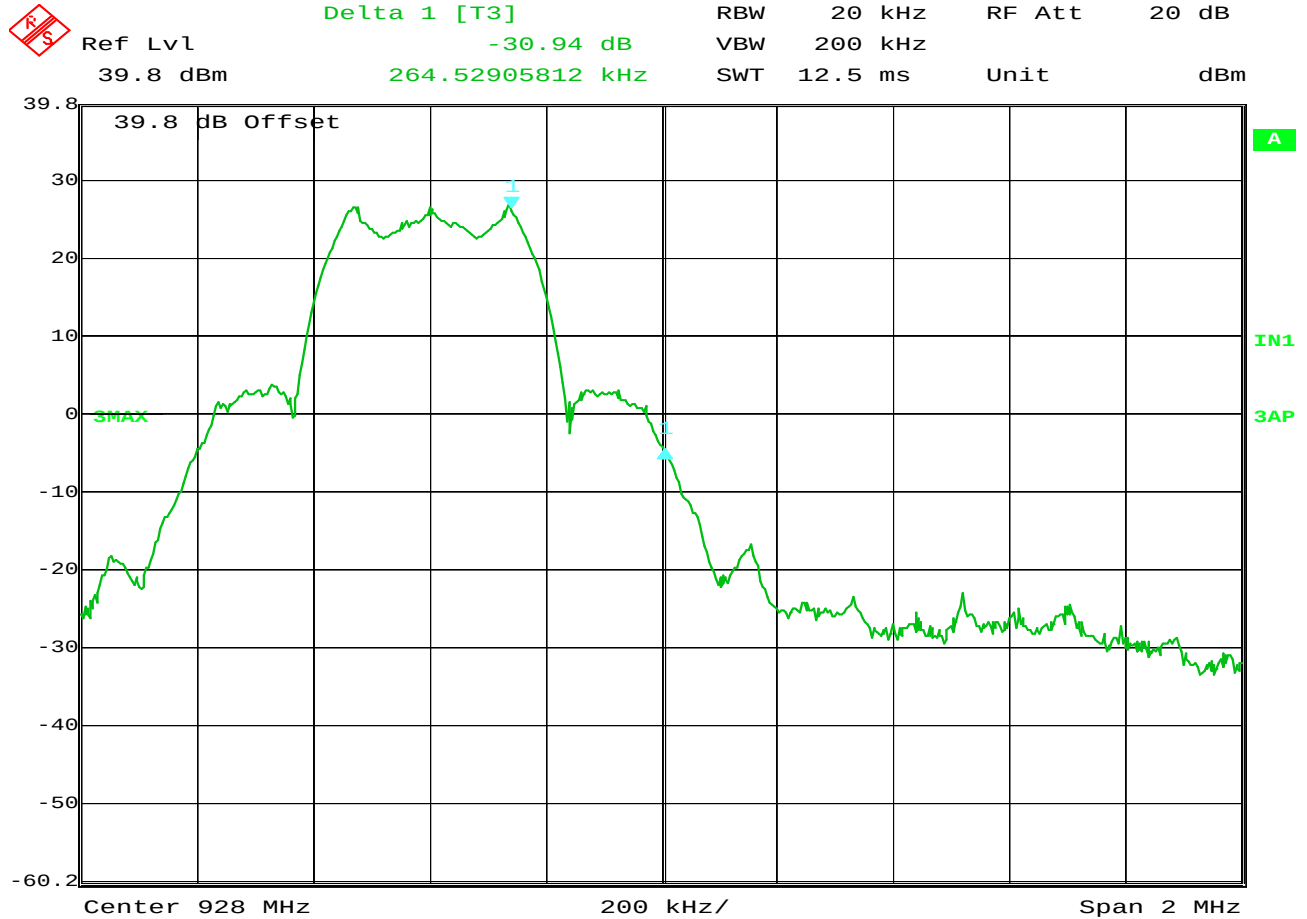


Date: 4.SEP.2012 13:56:32

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/365kbps (Bottom, 902MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

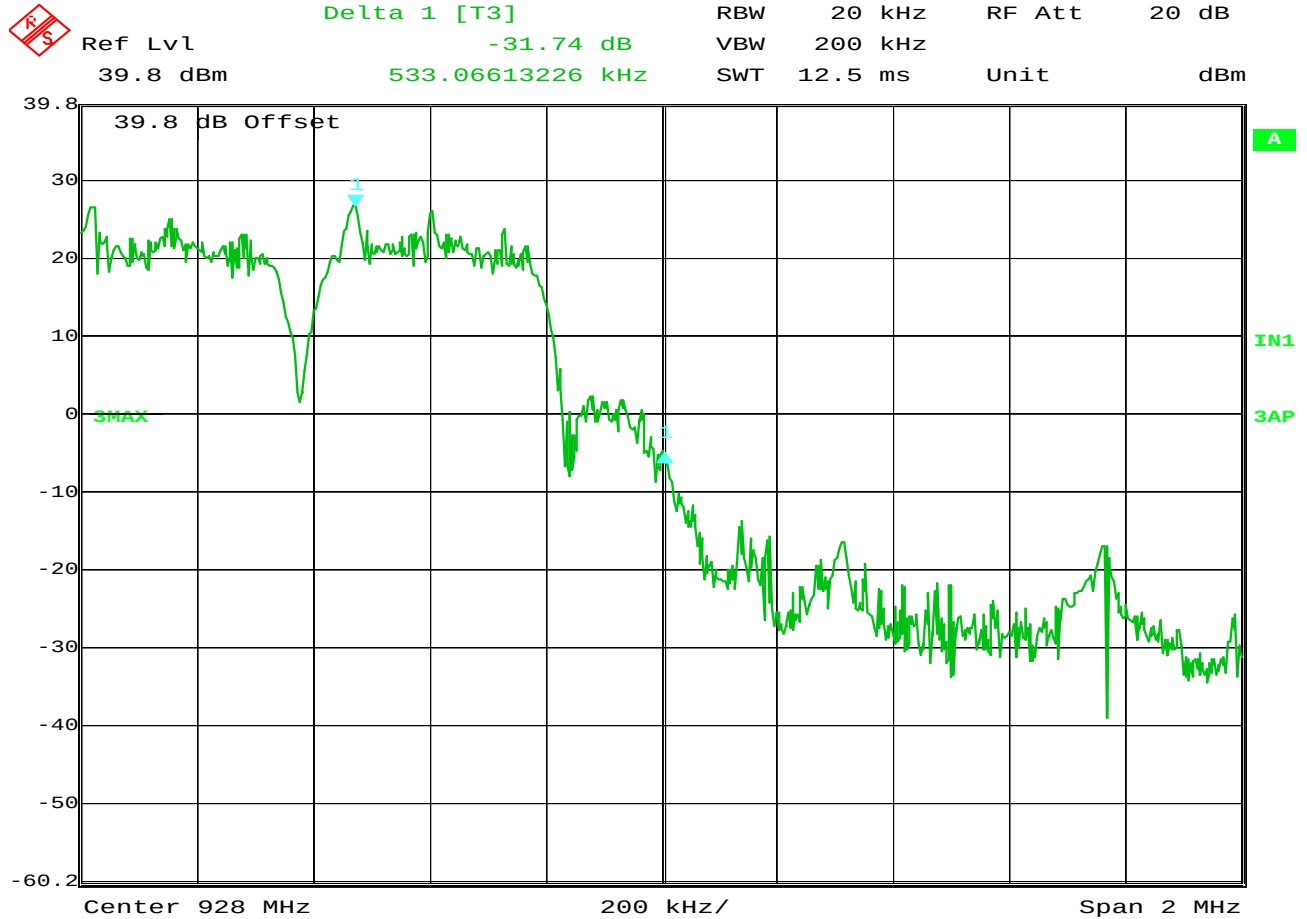


Date: 30.AUG.2012 16:18:57

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/365kbps (High: 927.6MHz @ 9500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

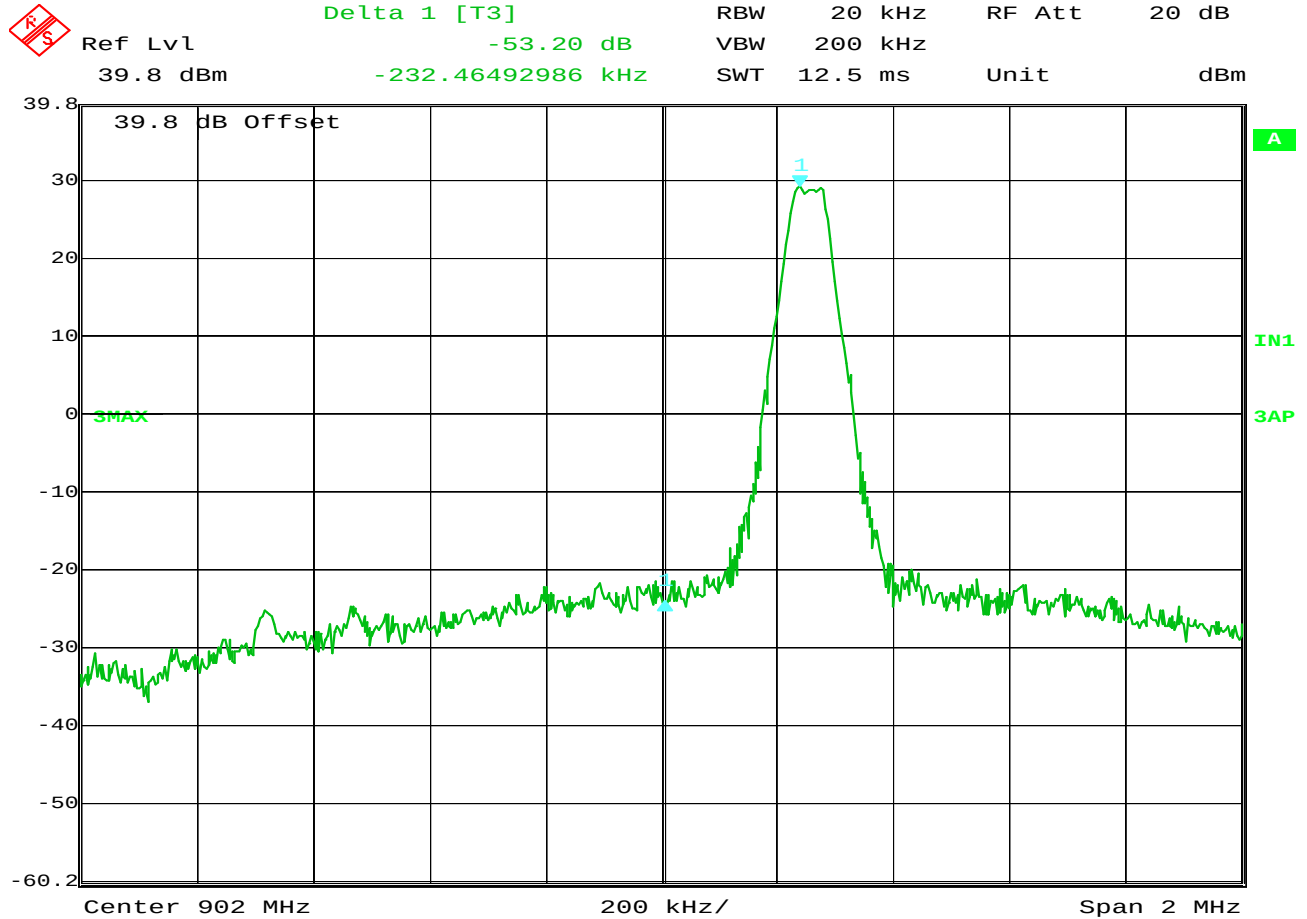


Date: 4.SEP.2012 14:04:36

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/365kbps (Top, 928MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES

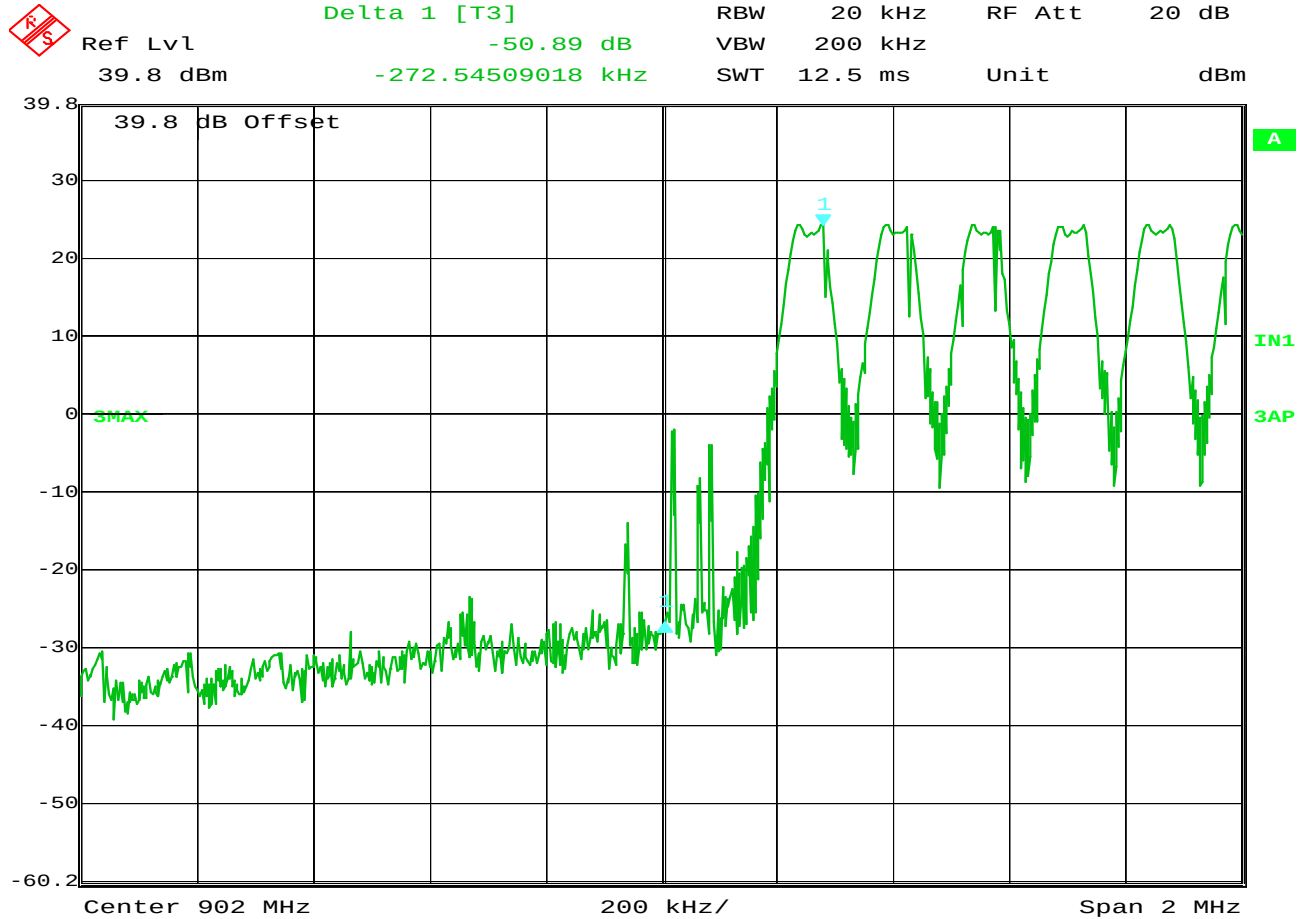


Date: 31.AUG.2012 09:25:53

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (Low: 902.25MHz @ 15500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Date: 4.SEP.2012 14:14:42

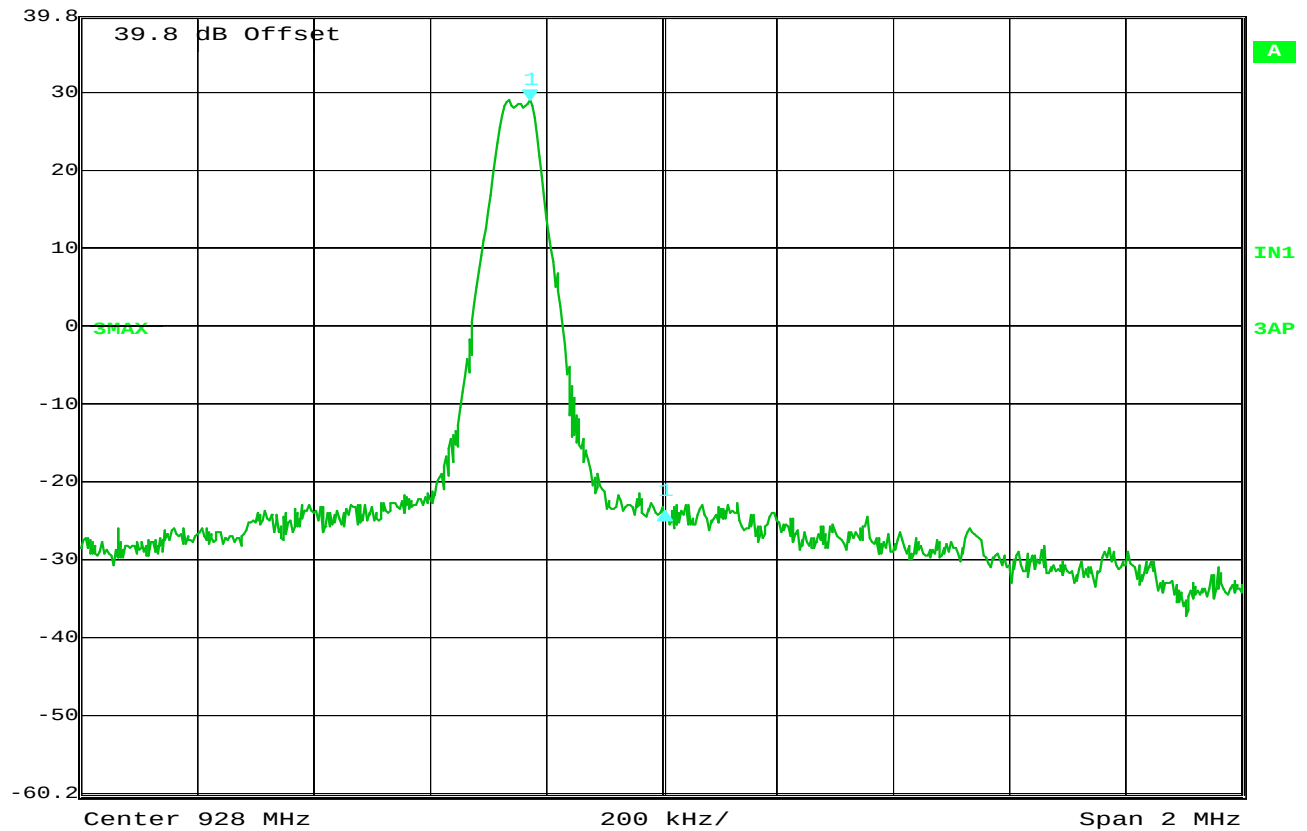
FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/57kbps (Bottom, 902MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Ref Lvl 39.8 dBm
Delta 1 [T3] -52.58 dB
232.46492986 kHz
RBW 20 kHz
VBW 200 kHz
SWT 12.5 ms
RF Att 20 dB
Unit dBm



Date: 31.AUG.2012 09:12:48

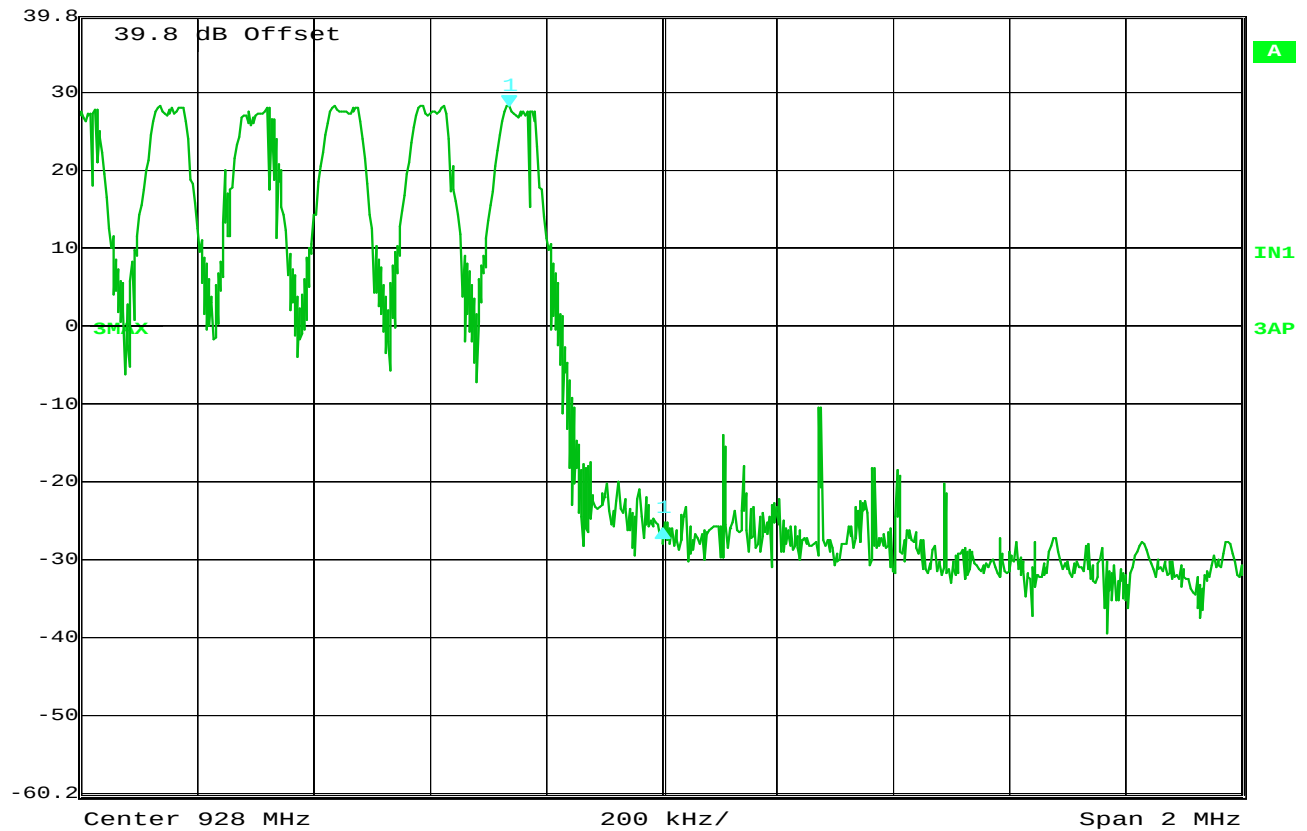
FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 2
TEST MODE : 2FSK/57kbps (High: 927.75MHz @ 9500 power level)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES



Delta 1 [T3] RBW 20 kHz RF Att 20 dB
Ref Lvl -54.31 dB VBW 200 kHz
39.8 dBm 264.52905812 kHz SWT 12.5 ms Unit dBm



Date: 4.SEP.2012 14:18:16

FCC 15.247: Band Edge

MANUFACTURER : XetaWave
MODEL NUMBER : MSD9 Rev. A
SERIAL NUMBER : 4
TEST MODE : 2FSK/57kbps (Top, 928MHz)
TEST PARAMETERS : 20 dBm down from band edge
EQUIPMENT USED : RBA1, T2S3, T2D7, GBR6, CLT3, SHB0

NOTES