EMI Research and Development Laboratory
Department of Electrical Engineering
Florida Atlantic University
3998 FAU Blvd, Suite 310
Boca Raton, Florida 33431
(561) 361-4390

Technical Report No. 08-015

EMI Evaluation of the XG Technology, VEYXMAXBS200 to FCC Part 15, Subpart C, Section 15.247, "Operation within the band of 902 – 928 MHz", Conducted and Radiated Emission Requirements

Performed:	15 & 25 February 2008
Customer:	XG Technology, Inc. 7771 W. Oakland Park Blvd. #231 Sunrise, FL 33351
Company Official Responsible for Product(s) Tested:	Nadeem Khan, Engineer (954) 572-0395 ext. 3327
Test Performed and Reported By:	Thierry Jean-Charles, BSEE FAU EMI R&D Laboratory
Approved by:	Vichate Ungvichian, Ph.D., P.E. Director, FAU EMI R&D Laboratory

1. INTRODUCTION

This document reports the FCC compliance results for the XG Technology, Inc.'s VEYXMAXBS200. The unit is a base station for transmission and reception of voice over IP within the ISM band of 902 to 928 MHz using an XG proprietary physical layer technology. The unit, with maximum operating clock frequency of 210 MHz uses three antennas to increase sectorial coverage. The VEYXMAXBS200 was evaluated for compliance to the FCC CFR-47, Part 15, Section 15.247 conducted and radiated emission requirements for both transmitting mode and receiving mode. The results apply only to the specific items of equipment, configurations and procedures supplied to the Florida Atlantic University EMI R&D Laboratory as reported in this document.

2. OBJECTIVE

This evaluation was performed to verify conformance of the XG Technology, VEYXMAXBS200 module to the U.S. Federal Communications Commission (FCC), Code of Federal Regulations (CFR), Title 47 - Telecommunication, FCC Part 15 Subpart C- Intentional Radiators, Section 15.247, "Operation within the bands 902-928 MHz" conducted and radiated emission requirements.

3. CONCLUSION

The XG Technology, VEYXMAXBS200 unit met the FCC, Part 15 Subpart C, Section 15.247, "Operation within the band of 902-928 MHz", conducted and radiated emission requirements, as described in the following pages.

4. TEST PROCEDURES AND RESULTS

4.1 TEST PROCEDURES

The measurement techniques identified in the measurement procedure of ANSI C63.4-2003 *"American National Standard of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"* were followed as close as practical during this evaluation. Complete details and specific procedures used are discussed in the respective test result sections.

4.2 CONDUCTED EMISSIONS TEST RESULTS

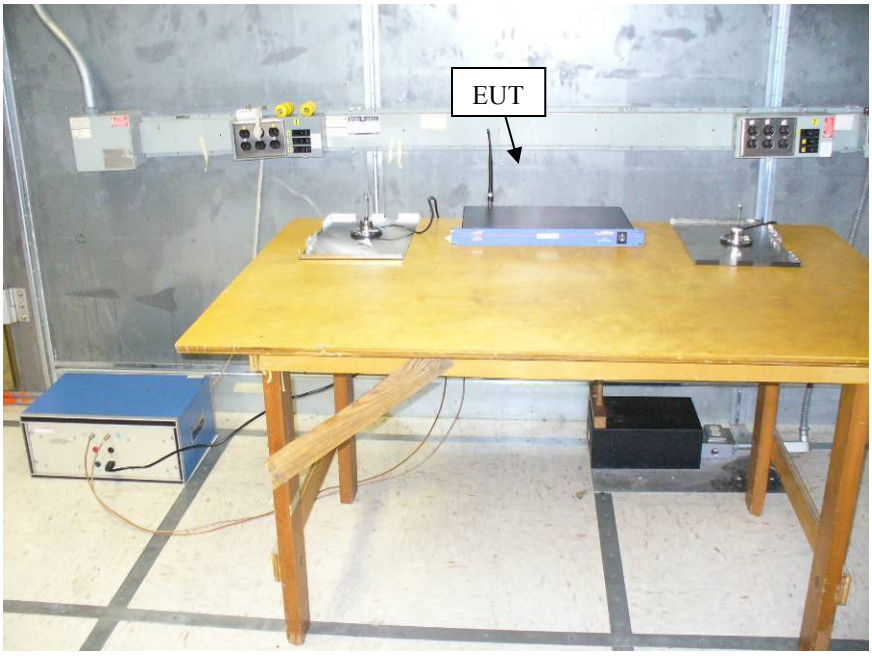
4.2.1 CONDUCTED POWERLINE EMISSIONS

The XG Technology, VEYXMAXBS200 unit was evaluated for conducted emission requirements for both transmitting and receiving modes of operation. The module, powered by an internal switching power supply, was assessed with a whip antenna and two other antennas on a metallic counterpoise on top of the wooden test table. The data was transmitted and received correctly as confirmed by the XG Technology Engineer. Photographs 1 and 2 show the setup used during the evaluations.

The system was installed in the FAU EMI Research facilities conducted emissions shielded enclosure, on a wooden test table 80 centimeters above the ground plane floor and 40 centimeters from the rear wall. The device was then plugged into a Line Impedance Stabilization Network (LISN) EMCO Model No.3825/2R Serial No. 1095.

Conducted power line emissions were measured on both the phase and neutral lines with reference to earth ground, over the specified 150 kHz to 30 MHz range on a Hewlett Packard HP 8566B Spectrum Analyzer operated in the peak detection mode, in conjunction with HP 85685A Preselector, with a bandwidth of 9 kHz obtained through the HP 85650A Quasi Peak Adapter.

Figures 1 and 2 show the conducted emissions on both the phase and neutral lines measured in the receiver peak detection mode.



Photographs 1 & 2: Conducted Emission Setup

4.2.1.1 RECEIVING MODE

Figure 1 presents the results for the system evaluated in the receiving mode.

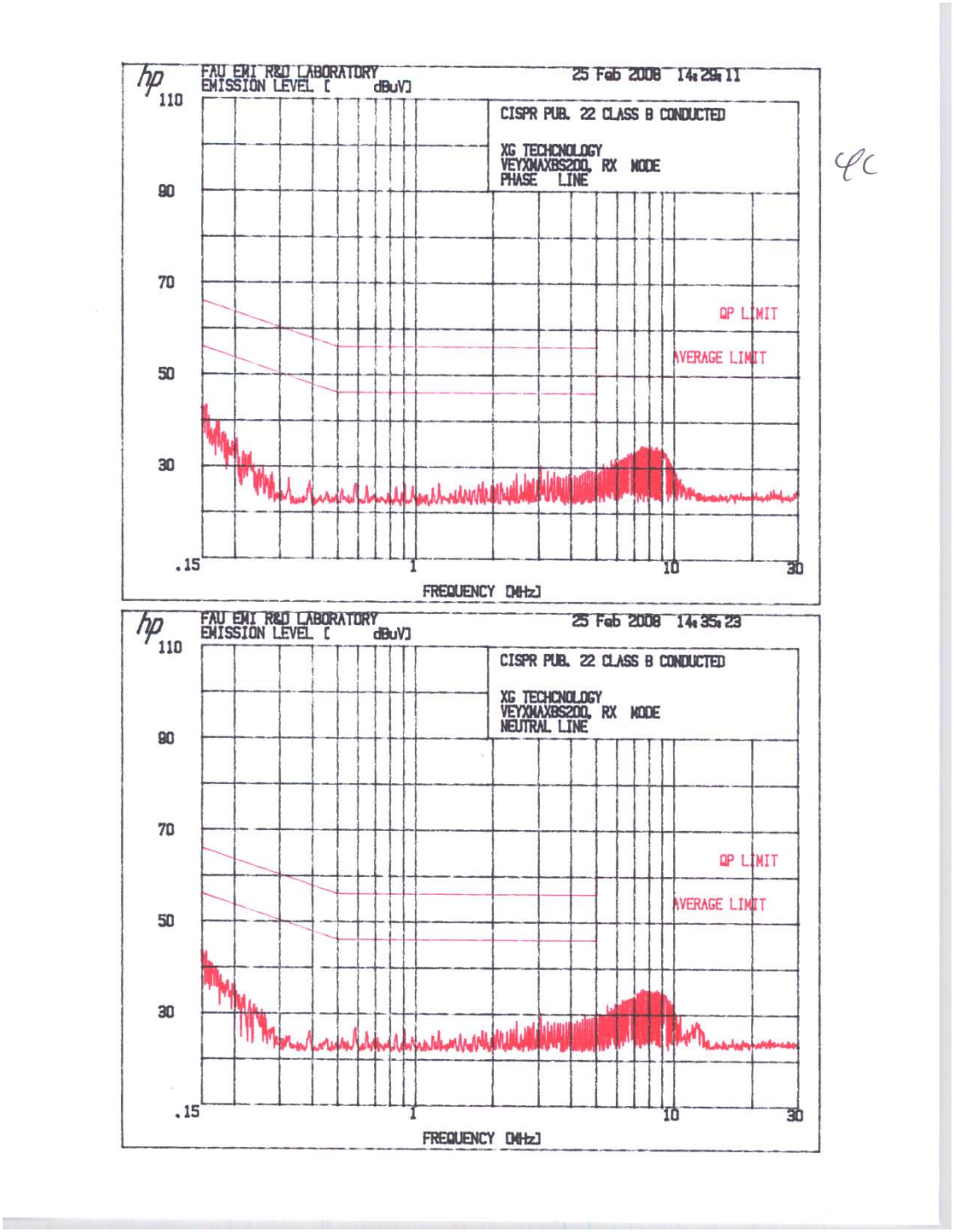


Figure 1: Phase and Neutral Conducted Emissions

4.2.1.2 TRANSMITTING MODE

Figure 2 presents the results for the unit evaluated in the transmitting mode. The unit was set to transmit packets within the ISM band of 902 to 928 MHz using an XG proprietary modulation scheme.

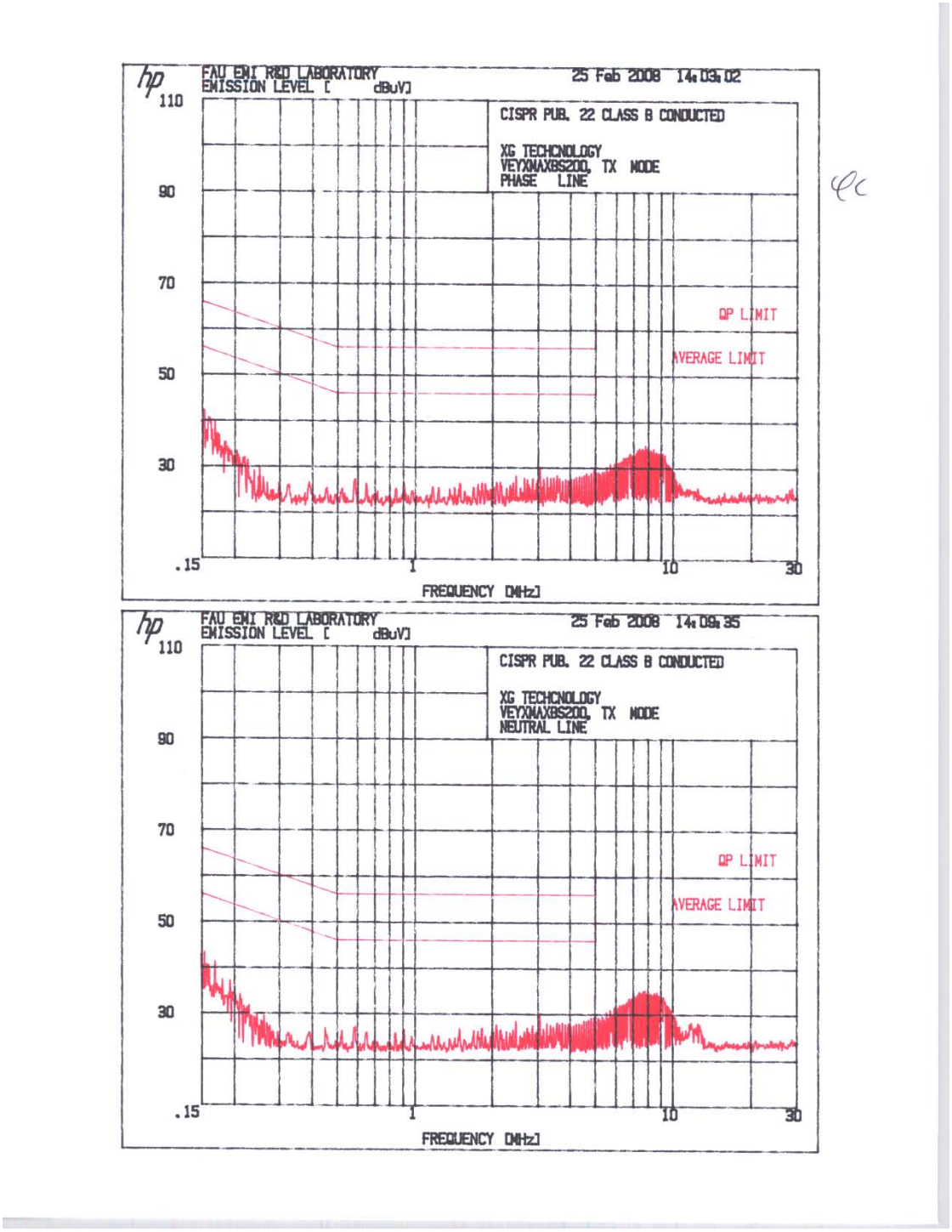


Figure 2: Phase and Neutral Conducted Emissions

From the above figures, the peak emissions are more than 5 dB below the average limit. Hence, there are no values to report on Table 1.

Line Tested	Frequency (kHz)	Peak Value (dBµV)	QP Value (dBµV)	Average Value (dBµV)	Avg. Limit (dBµV)	Margin to Avg. Limit (dB)*
Phase						
Neutral						

Table 1: Conducted Emission Peak Measurement

*Margin to Avg. Limit (dB) = Avg. Limit (dBµV) – the measured value (either Peak, Quasi-Peak or Average Value) in dBµV

It can be seen that on both the phase and neutral lines, the emissions did not exceed the limits. Hence, the system is in compliance.

4.3 RADIATED EMISSIONS TEST RESULTS

4.3.1 UNINTENTIONAL RADIATED EMISSIONS

The XG Technology, VEYXMAXBS200 unit was setup on a wooden table 80 centimeters above the ground plane turntable of the Semi-Anechoic test site, as shown in Photographs 3 & 4. A whip antenna and two other antennas, set on a metallic counterpoise were connected to the antenna ports of EUT. The VEYXMAXBS200 unit was connected to 110V/ 60 Hz power outlet located at the center of the turntable. The unit was evaluated for both transmitting and receiving mode.

An EMCO, Model 3104, S/N 299988A, Broadband Biconical antenna was installed on an EMCO pneumatically controlled antenna mast at a distance of 3 meters from the system. The 30 MHz to 200 MHz frequency range was automatically scanned on the HP 8566B Spectrum analyzer (SA) that was operated in the peak detector mode with a bandwidth of 120 kHz obtained through the HP 85650A Quasi Peak Adapter. It should be noted that the RES BW and VBW of the spectrum analyzer must be set to 1 MHz for the Quasi Peak Adaptor to provide a 120 kHz bandwidth correctly. Hence, in the figures, RES BW and VBW are still indicated as 1 MHz.

After setting the SA to operate between 30-200 MHz, the max hold switch on the SA was pressed. The Biconical antenna was set to horizontal polarization and at 1-m above the floor. The turntable was then rotated 360 degrees. After a full revolution, the turntable was rotated back to the previously noted azimuth angles where the higher E-fields occurred, and the antenna was then scanned from 1 to 4 meters high at those angles in order to determine the height that will provide to highest amplitude. The antenna was moved back to the location where the highest amplitude was observed and the turn table was rotated again 360º. The maximum value was plotted and presented herein. The antenna was then turned to measure the vertical polarized E-field and the above procedure was repeated.

For the 200-1000 MHz band, a Log Periodic antenna (EMCO 3146) was installed and the SA was set to operate between 200-1000 MHz. To collect data, the above procedure was then repeated.

For the 1 GHz to the 2 GHz band, a double rigged horn antenna as well as a microwave pre-amplifier were installed and the SA was set to operate between 1 GHz to 2 GHz. The RES BW and VBW were left on the 1 MHz setting and the bypass instrument function of the HP 85650A Quasi Peak Adapter was enabled. To collect the data, the procedure previously described was repeated again.

Figures 3-14 show the worse case radiated emissions of both configurations, for this evaluation, independent of azimuth or antenna height. The E-field is calculated using antenna factor, cable loss, and amplifier gain based on the following equation:

E (dBμV/m) = SA reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

Note that for the transmitting mode assessment, a Trilithic notch filter 7NM867/122-X1-AA was used at the receiver to notch the RF signal transmitted by the VEYXMAXBS200 module within the frequency band of 902 to 928 MHz.

Photographs 3 & 4: Radiated Emission Setup

4.3.1.1 RECEIVING MODE

Figures 3-8 present the results for the VEYXMAXBS200 module set to the receiving mode.

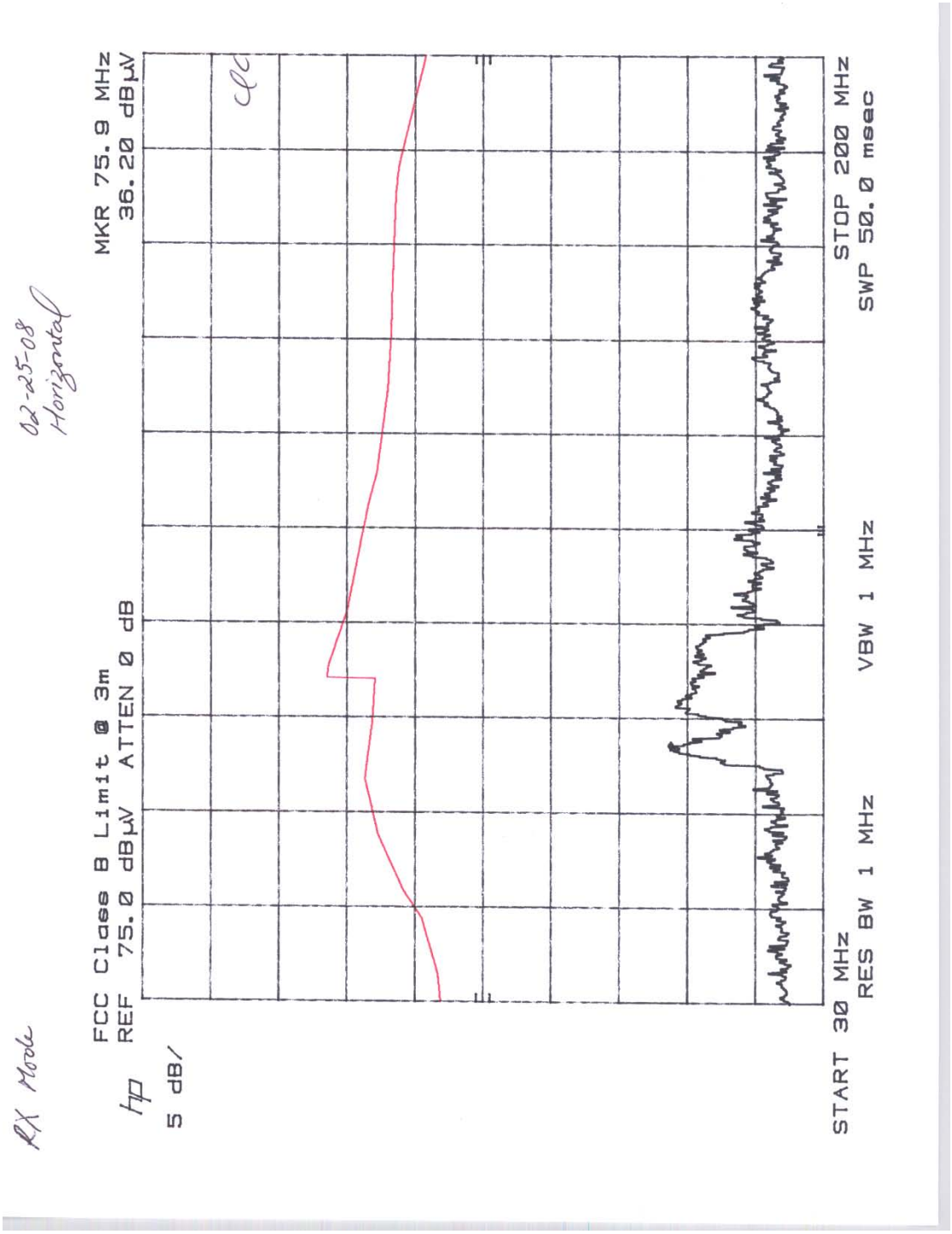


FIGURE 3: Radiated Emission 30 – 200 MHz Horizontal Polarization

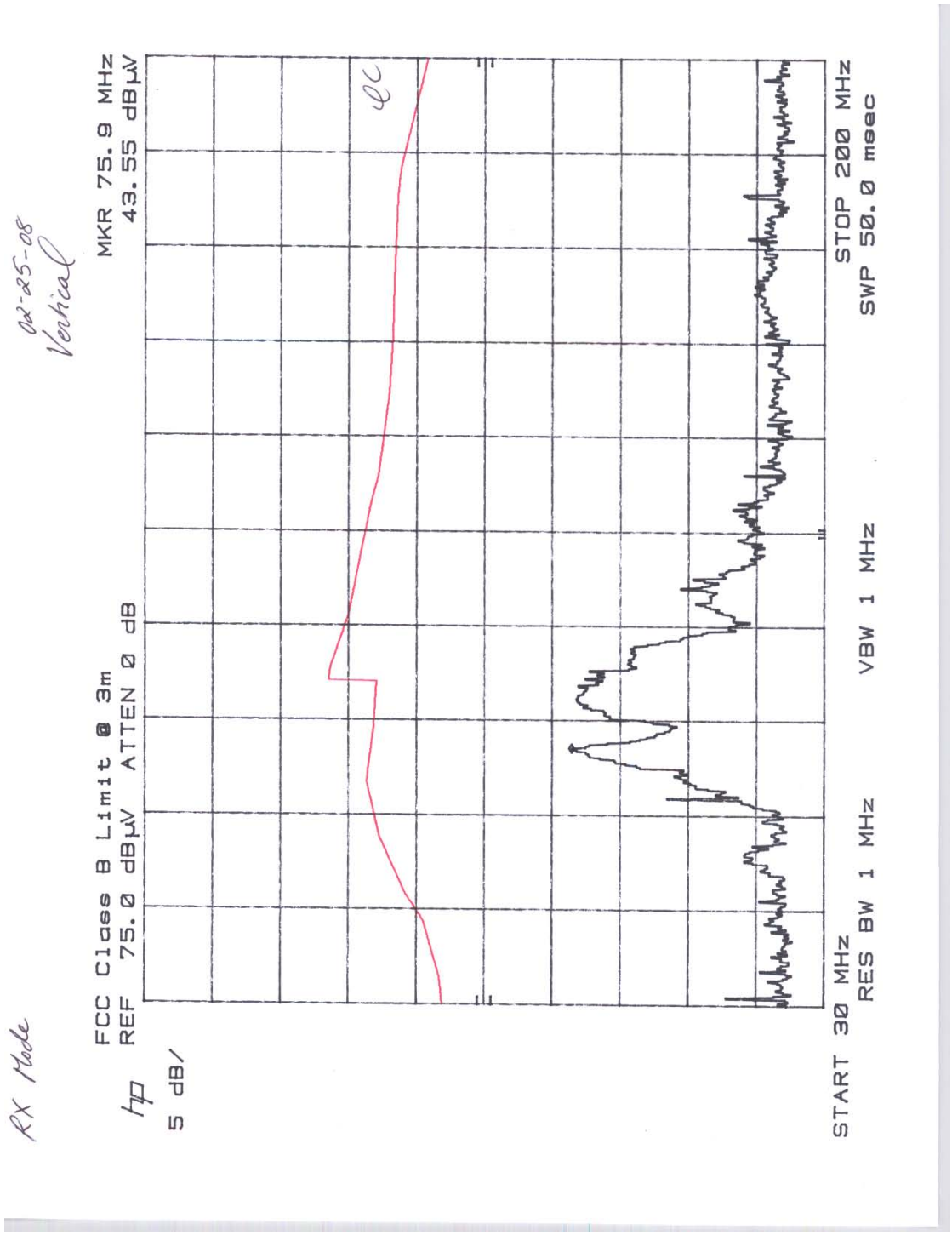


FIGURE 4: Radiated Emission 30 – 200 MHz Vertical Polarization

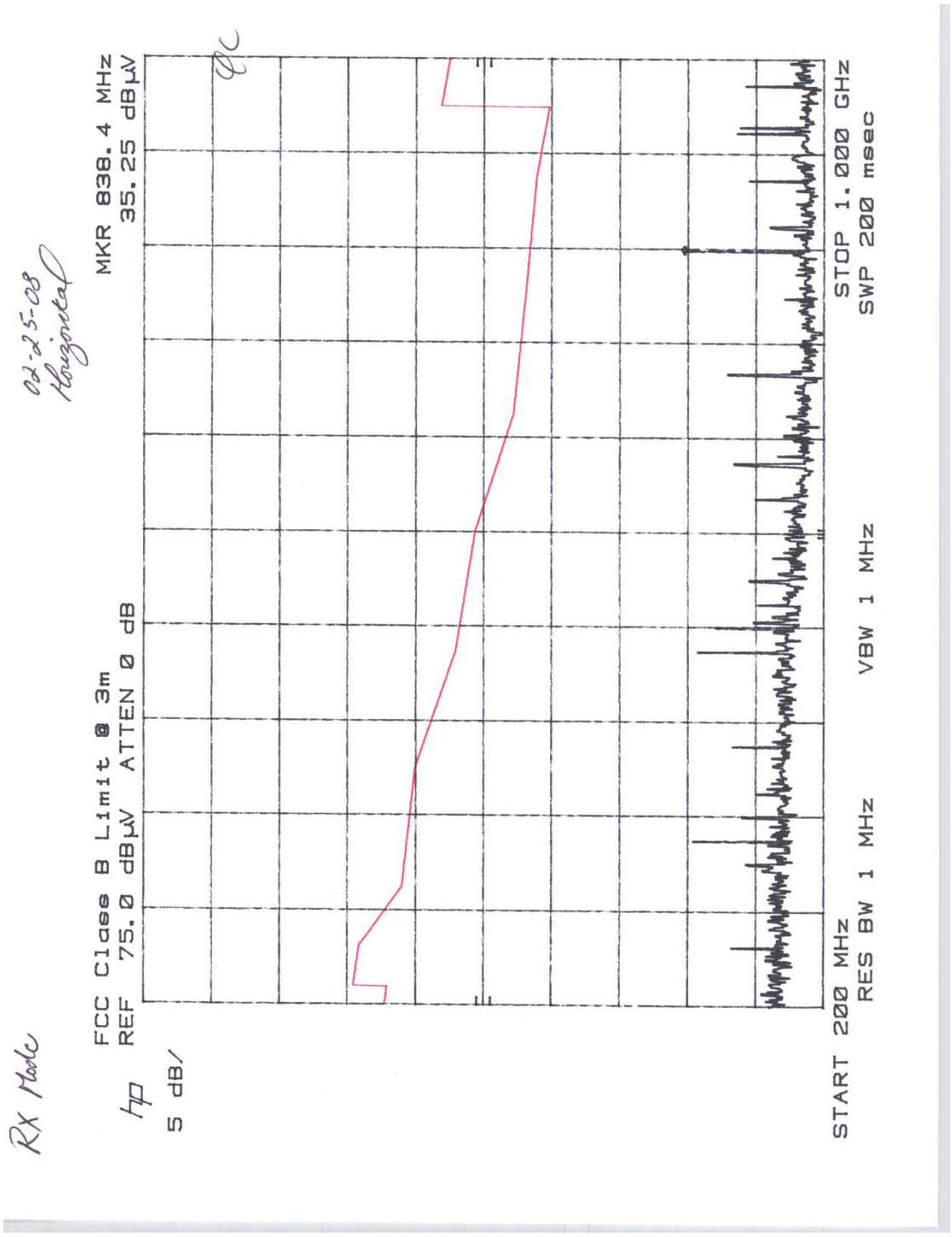


FIGURE 5: Radiated Emission 200 MHz – 1 GHz Horizontal Polarization

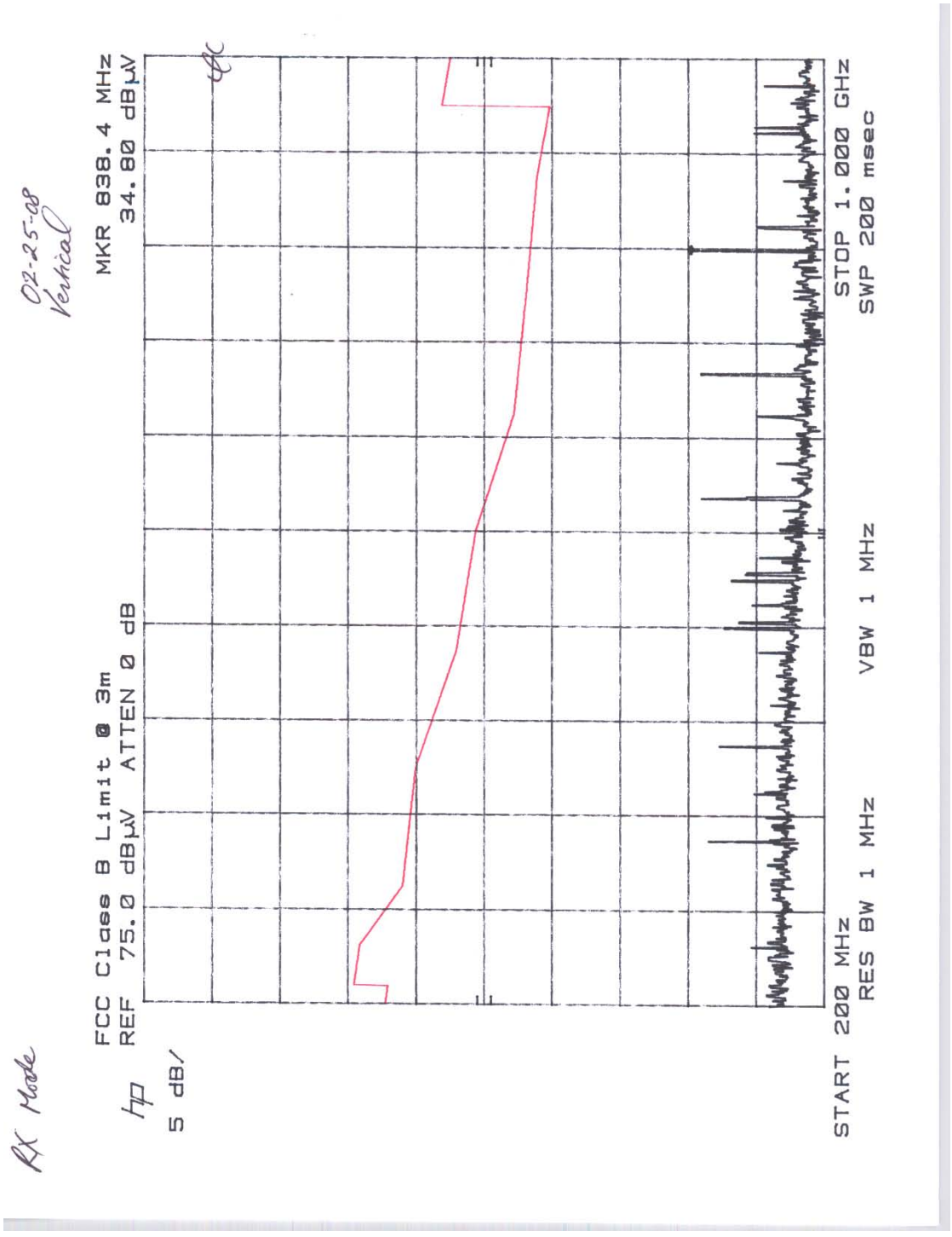


FIGURE 6: Radiated Emission 200 MHz – 1 GHz Vertical Polarization

Since the maximum operating clock frequency is 210 MHz, the unit was evaluated up to 2 GHz.

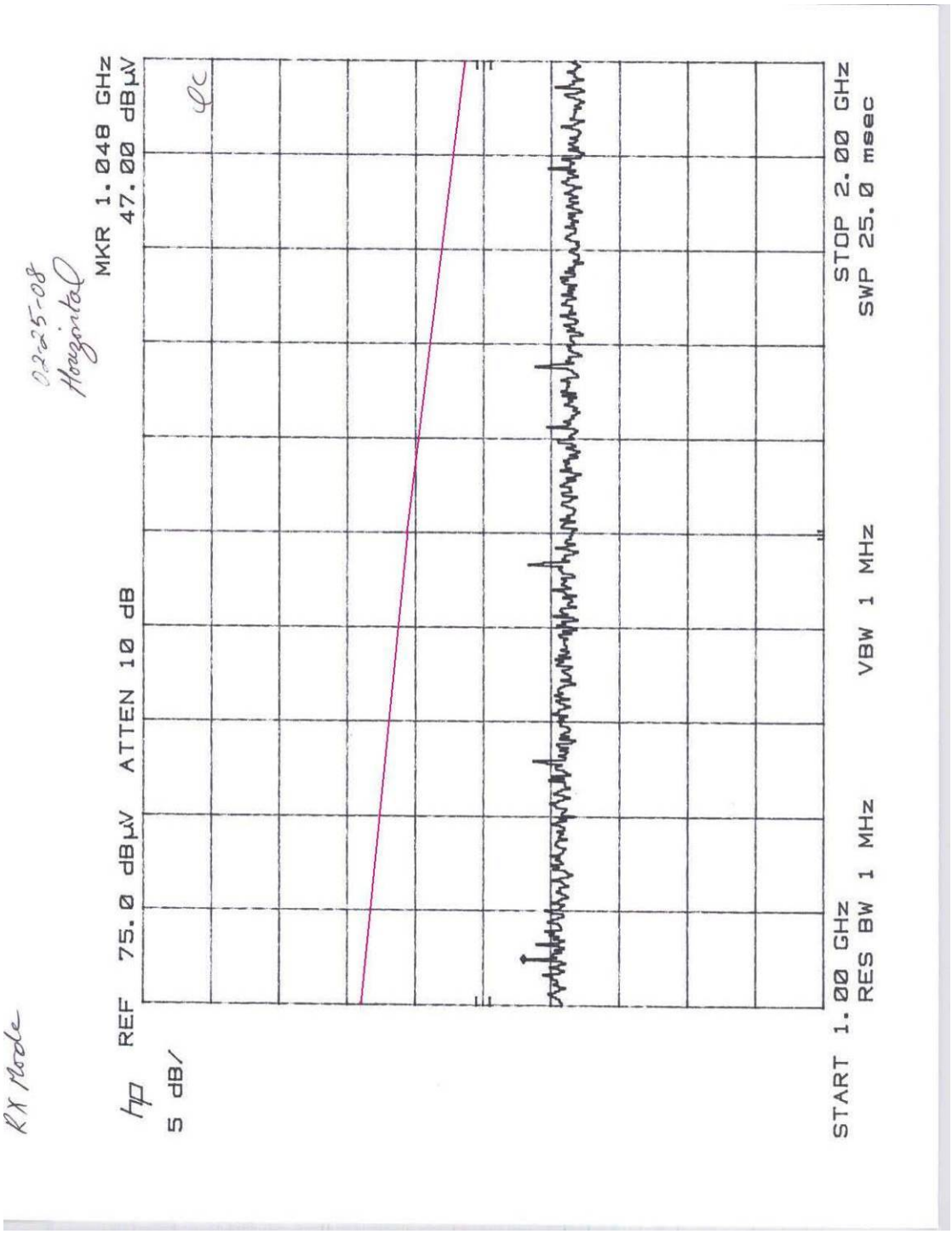


FIGURE 7: Radiated Emission 1 GHz – 2 GHz Horizontal Polarization

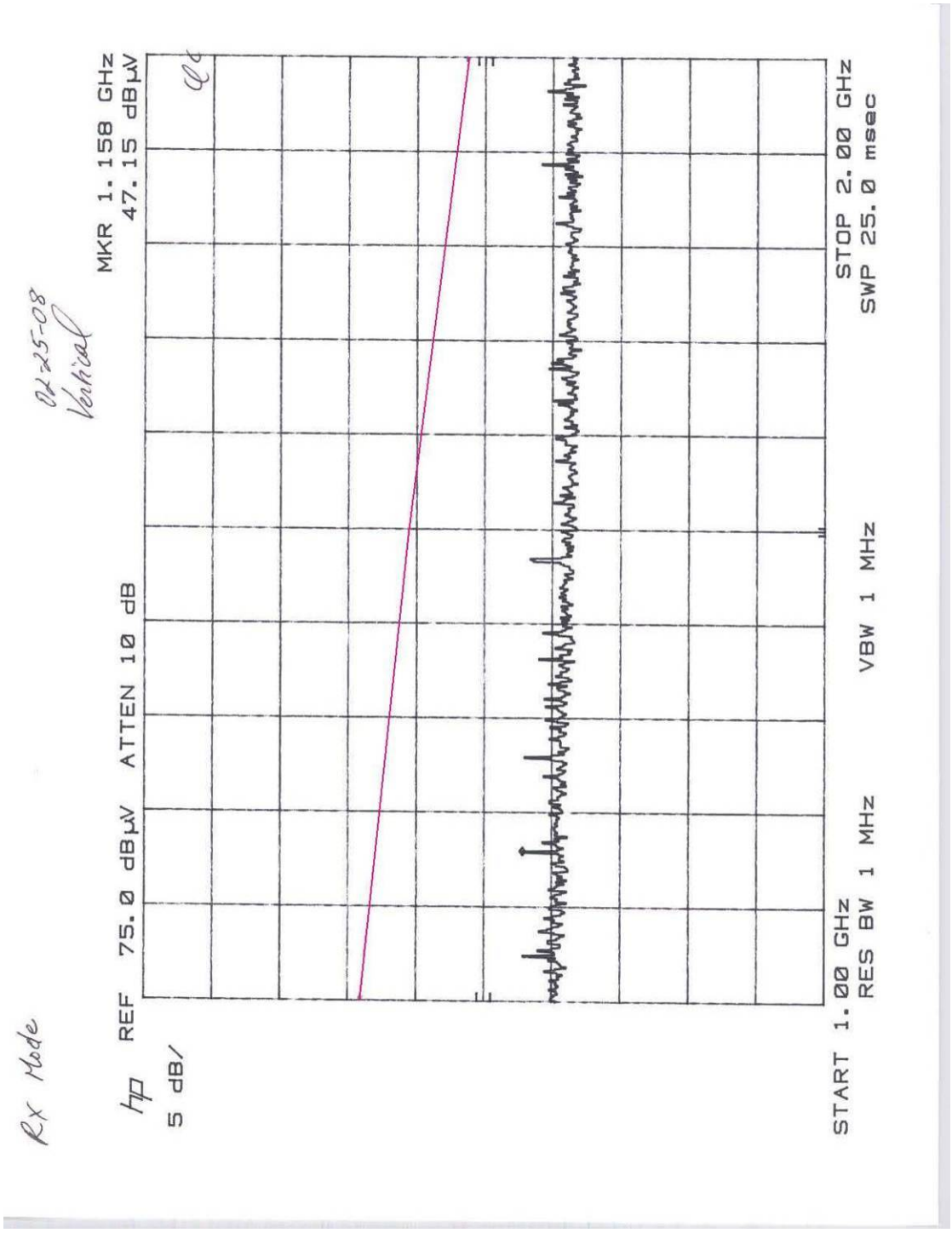


FIGURE 8: Radiated Emission 1 GHz – 2 GHz Vertical Polarization

4.3.1.2 TRANSMITTING MODE

Figures 9 to 14 present the results for the VEYXMAXBS200 unit evaluated in the transmitting mode with a 7NM867/122-X1-AA Trilithic filter at the receiver to notch the RF signal transmitted by the module within the frequency band of 902 to 928 MHz. It should be noted from Figures 11-12 the TX signal could still be measured despite the notch filter in the receiving system.

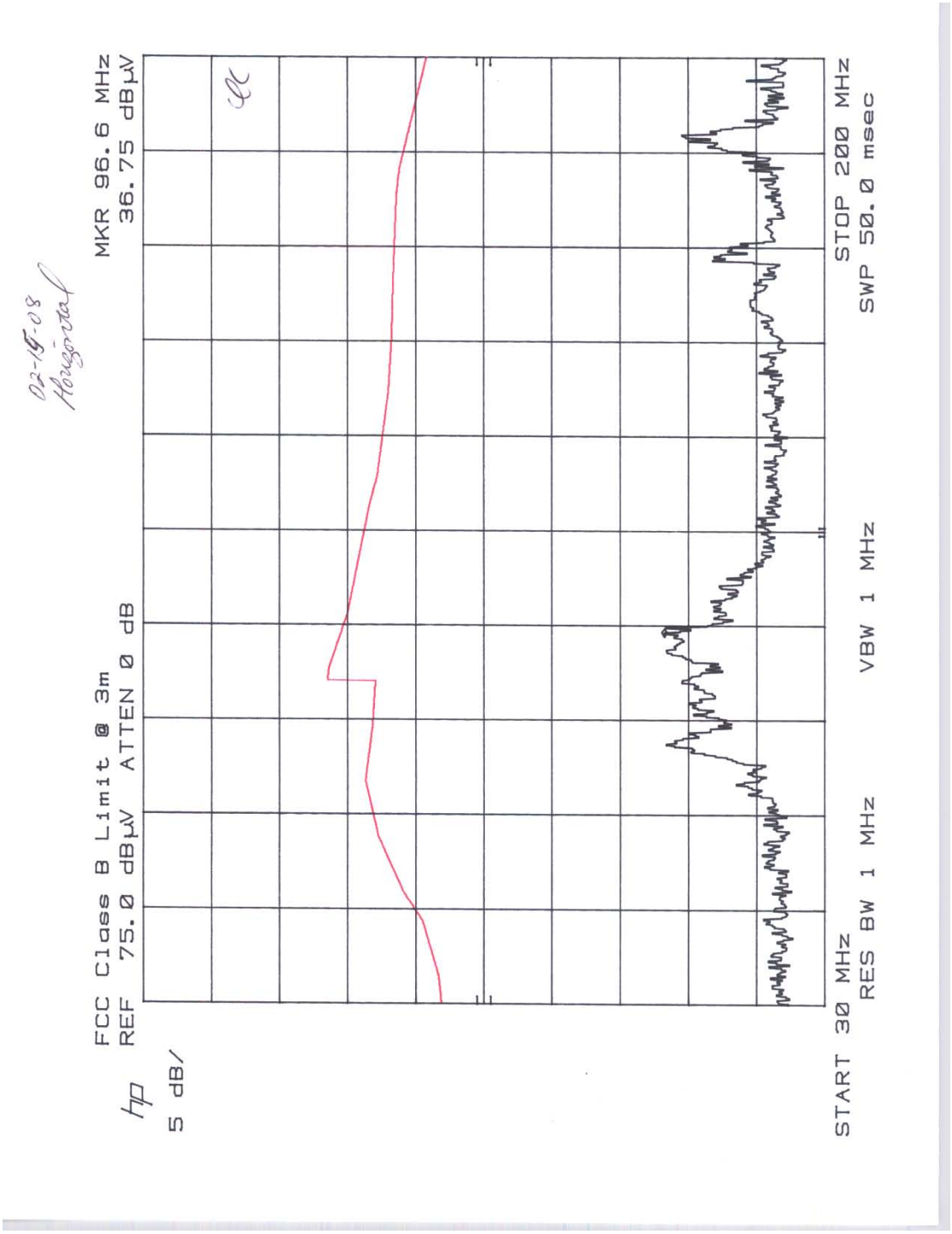


FIGURE 9: Radiated Emission 30 – 200 MHz Horizontal Polarization

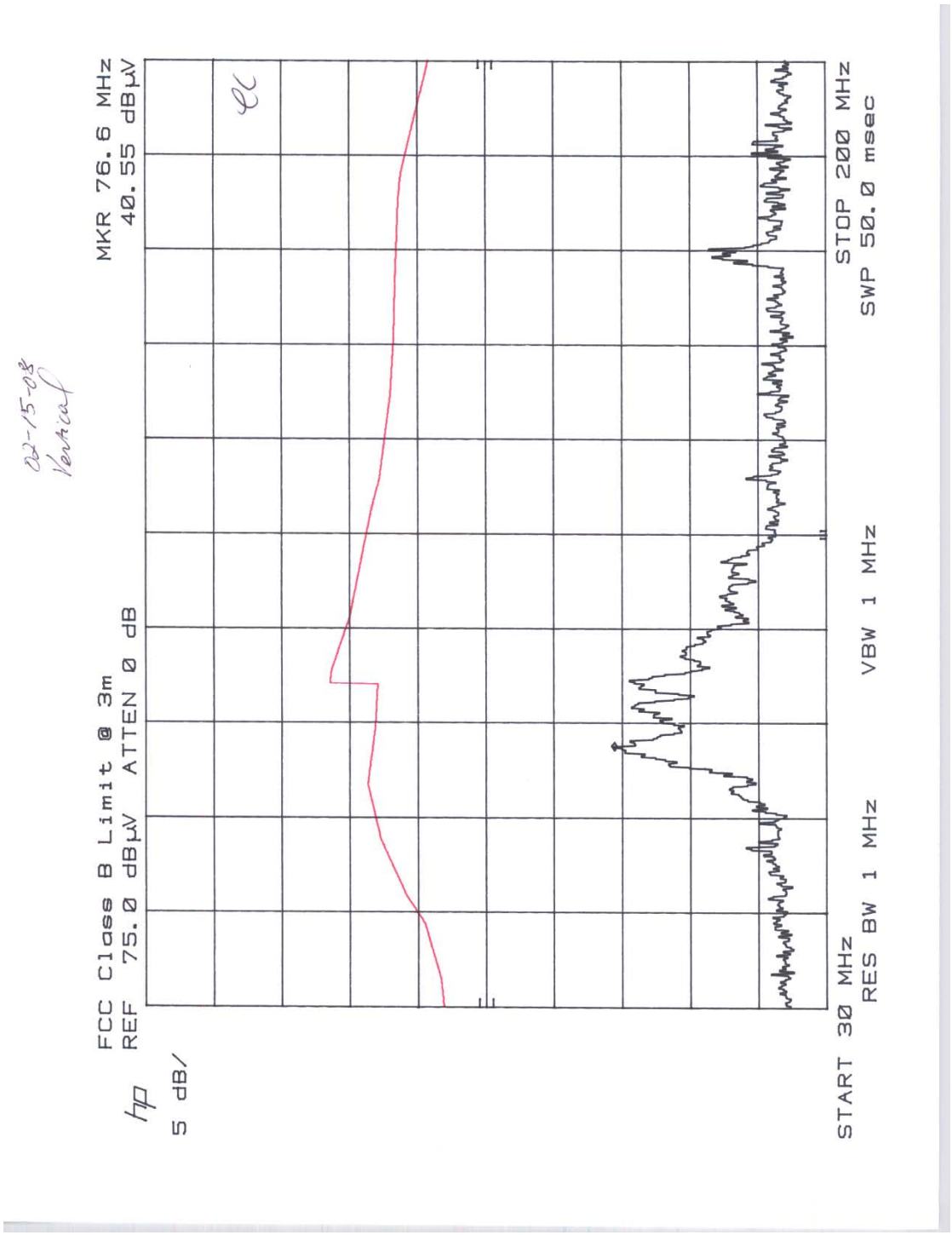


FIGURE 10: Radiated Emission 30 – 200 MHz Vertical Polarization

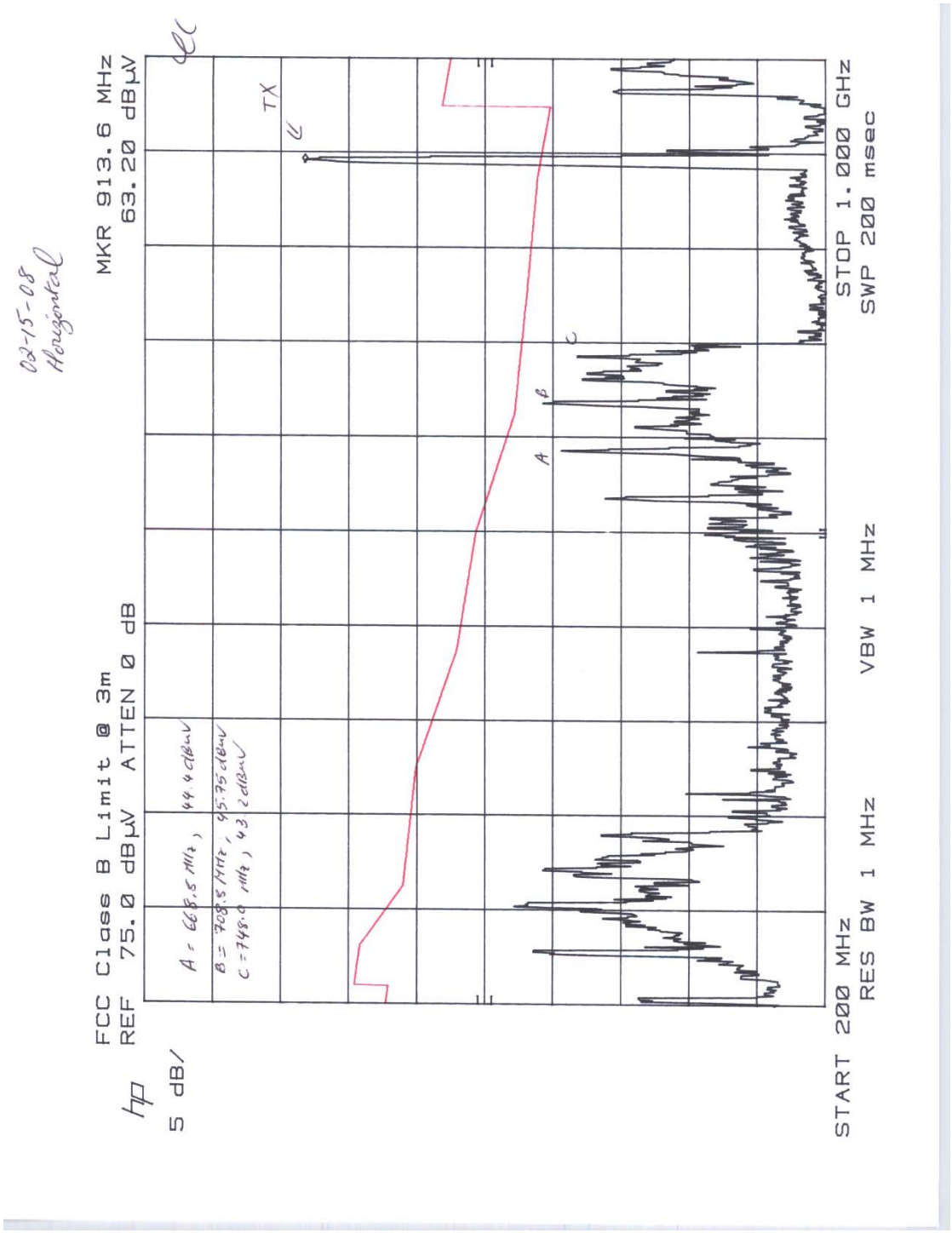


FIGURE 11: Radiated Emission 200 MHz – 1 GHz Horizontal Polarization

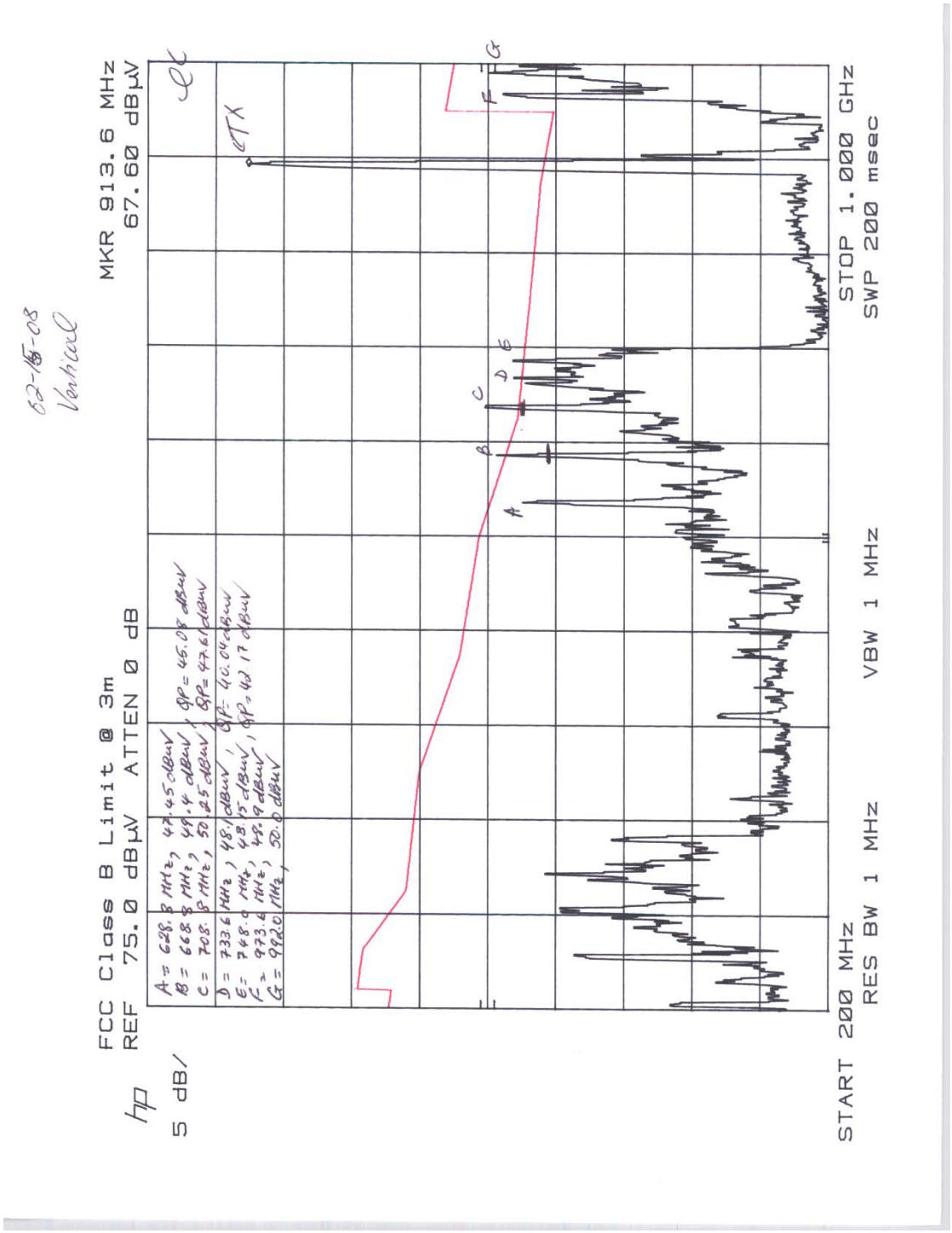


FIGURE 12: Radiated Emission 200 MHz – 1 GHz Vertical Polarization

Since the maximum operating clock frequency is 210 MHz, the unit was evaluated up to 2 GHz.

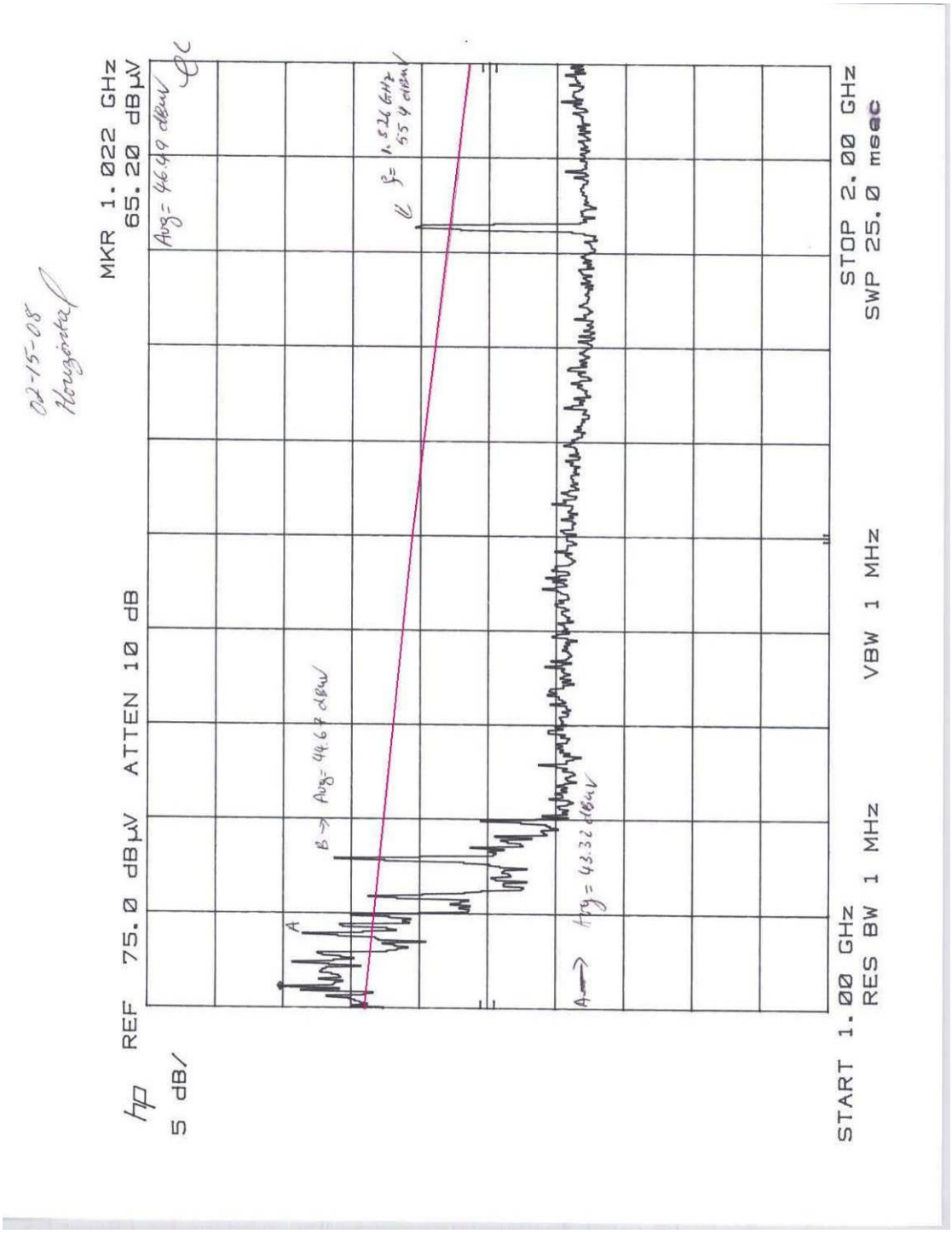


FIGURE 13: Radiated Emission 1 GHz – 2 GHz Horizontal Polarization

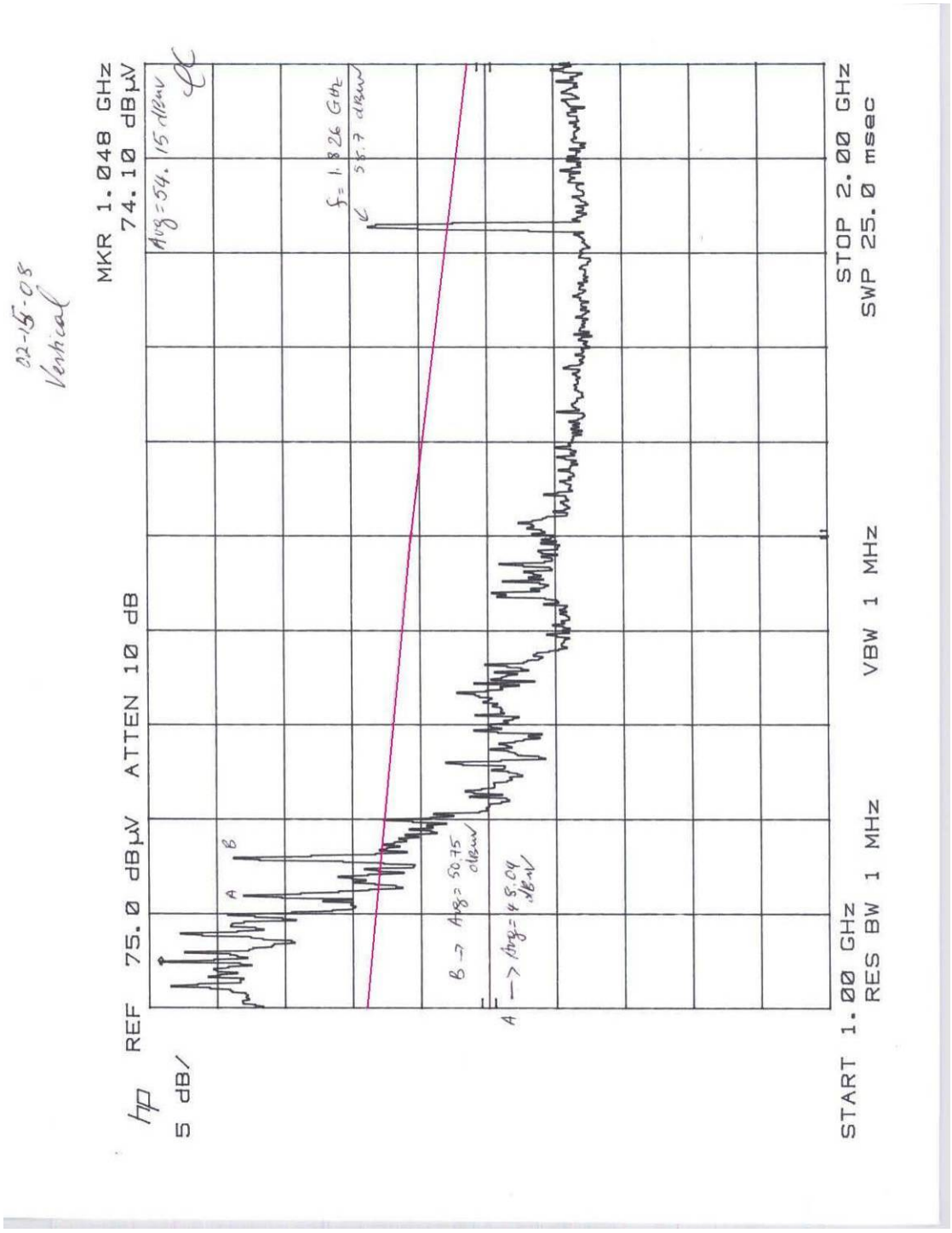


FIGURE 14: Radiated Emission 1 GHz – 2 GHz Vertical Polarization

From Figures 3-14, the unintentional peak emissions that exceeded or were within 5 dB of the limit are reported in Table 2. Note that the peak emissions at 913.6 MHz from Figures 11 and 12 represent the intentional RF signal transmitted by the module, attenuated by the 7NM867/122-X1-AA band reject Trilithic filter. Therefore, these values are not reported in Table 2. The characteristics of the transmitted signal are evaluated in the next sections.

Figure No.	Frequency (MHz)	Measured Peak (dBµV)	Quasi Peak (dBµV)	Average (dBµV)	Correction Factor (dB/m)	Peak Field* (dBµV/m)	FCC Limit (dBµV/m)	Margin to limit (dB)
11	668.8	44.40			2.69	41.71	46	4.29
	708.8	45.75			1.72	44.03	46	1.97
	748	43.20			1.37	41.83	46	4.17
12	628.8	47.45			3.83	43.62	46	2.38
	668.8	49.40	45.08		2.69	42.39	46	3.61
	708.8	50.25	47.61		1.72	45.89	46	0.11
	733.6	48.10	40.04		1.50	38.54	46	7.46
	748	48.15	42.70		1.37	41.33	46	4.67
	973.6	48.90			-1.08	49.98	54	4.02
	992	50.00			-1.37	51.37	54	2.63
13	1022	65.20		46.49	4.81	41.68	54	12.32
	1078	63.90		43.32	4.50	38.82	54	15.18
	1158	61.20		44.67	4.03	40.64	54	13.36
	1826	55.40		31.67	-0.75	32.42	54	21.58
14	1048	74.10		54.15	4.67	49.48	54	4.52
	1128	68.10		48.04	4.21	43.83	54	10.17
	1158	68.90		50.75	4.03	46.72	54	7.28
	1826	58.70		32.10	-0.75	32.85	54	21.15

Table 2: Peak Measurement Results

* Peak field (dBµV/m) = the measured value (either Peak, Quasi Peak or Average) in dBµV - Correction Factor (dB/m)

It can be seen from the previous figures that the unintentional radiated emissions are below limit. Hence the unit is in compliance.

4.3.2 INTENTIONAL RADIATED EMISSIONS

4.3.2.1 BAND EDGE EMISSION MEASUREMENTS

The XG Technology VEYXMAXBS200 , programmed to transmit a digitally modulated signal within the ISM band of 902 to 928 MHz using an XG proprietary modulation technique, was evaluated for compliance at the edges of the band of operation. The measurements were undertaken with the filters removed from the receiving end. The resolution and video bandwidths of the spectrum analyzer were set to 1 MHz to achieve a 120 kHz resolution bandwidth through the HP 85650A Quasi Peak Adapter. An HP 8495B variable attenuator set to 40 dB was connected to the SA input. The emissions were maximized using the procedure described in the previous sections.

Where applicable, the Delta-Marker Method was used to measure the correct value of the emissions at the edge. The measurement configuration and procedures were undertaken as per the guidelines presented in the FCC procedures for the measurement of digital transmission systems operating under Section 15.247. Figures 15 and 16 show the results for both vertical and horizontal polarizations of the Log Periodic antenna.

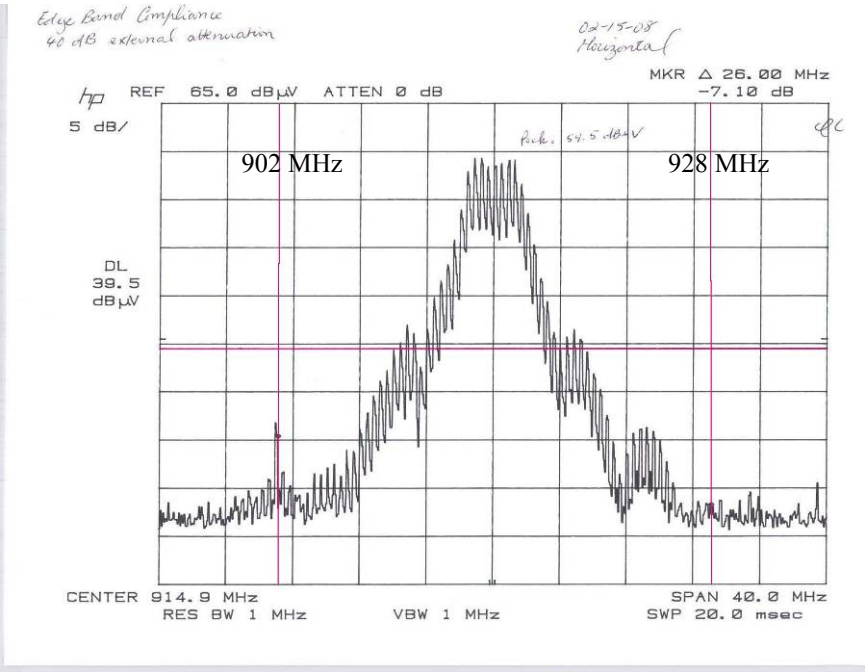


Figure 15: Band Edge Level Measurement (Horizontal Polarization)

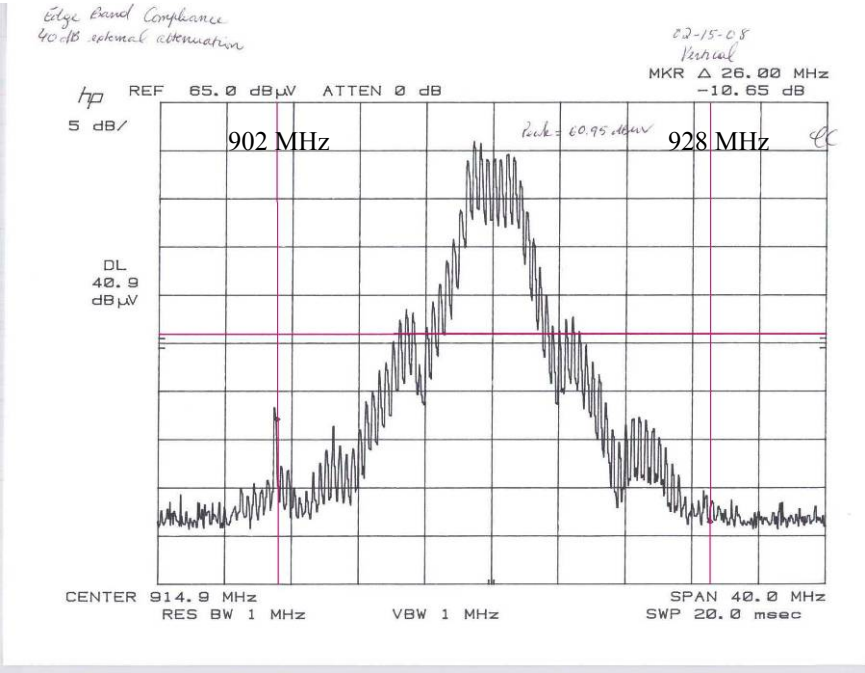


Figure 16: Band Edge Level Measurement (Vertical Polarization)

From Figures 15 and 16, the Delta-Marker Method is not necessary since the emissions at the edges of the band of 902 to 928 MHz are more than 20 dB below the level of fundamental carrier.

The emissions meet the band edge compliance requirements for the ISM band of 902 to 928 MHz.

4.3.2.2 SPURIOUS EMISSION MEASUREMENTS

For the measurement of the spurious emissions of the XG Technology VEYXMAXBS200 transmitting at 914.9 MHz, a Trilithic, Inc. 4HC1400-1-KK high-pass filter was connected to the input of the preamp. The peak spurious emissions from the harmonic frequencies of the 914.9 MHz were recorded on the HP 8566B Spectrum analyzer with the max hold key. The resolution and video bandwidths of the spectrum analyzer were both set to 1 MHz and the bypass instrument function of the quasi peak adapter was activated. The data was recorded with a frequency span of 50 MHz.

An EMCO, Model 3115, double rigged horn antenna, set to horizontal polarization, was installed on the EMCO pneumatically controlled antenna mast at a distance of 3 meters from the system and 1 meter above the ground floor. The turntable was then rotated 360 degrees. After a full revolution, the turntable was rotated back to the previously noted azimuth angles where the higher E-field occurred, and the antenna was then scanned from 1 to 4 meters high, in order to determine the highest E-field amplitude. The antenna was moved back to the location where the highest amplitude was observed and the turn table was rotated 360º again. The maximum value was recorded and presented herein. The antenna was then rotated to measure the vertical polarized E-field and the above procedure was repeated.

For the average measurements, the spectrum analyzer was set to linear scale with the video bandwidth reduced to 10 Hz, and sweep-time in auto mode. The emissions were maximized by rotating the turntable, and moving the antenna up and down as previously described. The harmonic frequencies falling within the restricted bands reported in Section 15.205 were evaluated as per the limits listed in Section 15.209. It was also verified that the harmonic frequencies falling outside of the restricted band were at least 20 dB below the fundamental carrier, or met the requirements of section 15.209.

The limits for the emissions falling outside of the restricted bands are based on the emission levels provided in Figures 15 and 16 and are reported in Table 3.

Polarization	Frequency (MHz)	Peak Reading @ 3m (dBµV)	Correction Factor* (dB/m)	E-field (dBµV/m)	Spurious Emissions Limit (dBµV/m)
Horizontal	914.9	59.5	-40.14	99.64	79.64
Vertical	914.9	60.95	-40.14	101.09	81.09

Table 3: Limits for Spurious Emissions falling outside of the Restricted Bands

*Note that the 40 dB external attenuator is included in the Correction Factor value.

Tables 4 and 5 present the maximum levels for the spurious emissions for horizontal and vertical polarizations of the receiving antenna respectively.

Frequency (GHz)	Peak Reading (dBµV)	Average Reading (dBµV)	CF (dB)	Peak E-Field (dBµV/m)	FCC Peak Limit (dBµV/m)	Margin to Peak Limit (dB)	Average E-Field (dBµV/m)	FCC Average Limit (dBµV/m)	Margin to Average Limit (dB)
1.830	57.88	31.67	-0.79	58.67	79.64	20.97	32.46	79.64	47.18
2.745	45.24	31.91	-5.59	50.83	74	23.17	37.50	54	16.50
3.660	43.46	32.30	-10.23	53.69	74	20.31	42.53	54	11.47
4.574	43.91	33.23	-12.52	56.43	74	17.57	45.75	54	8.25
5.489	42.76	30.92	-15.88	58.64	79.64	21.00	46.80	79.64	32.84
6.404	41.52	30.31	-18.81	60.33	79.64	19.31	49.12	79.64	30.52
7.319	41.34	29.69	-21.03	62.37	74	11.63	50.72	54	3.28
8.234	41.29	28.71	-21.97	63.26	74	10.74	50.68	54	3.32
9.149	41.85	28.20	-23.69	65.54	74	8.46	51.89	54	2.11

Table 4: Peak Spurious Emission Measurement Results (Horizontal Polarization)

Frequency (GHz)	Peak Reading (dBµV)	Average Reading (dBµV)	CF (dB)	Peak E-Field (dBµV/m)	FCC Peak Limit (dBµV/m)	Margin to Peak Limit (dB)	Average E-Field (dBµV/m)	FCC Average Limit (dBµV/m)	Margin to Average Limit (dB)
1.830	61.34	32.10	-0.79	62.13	81.09	18.96	32.89	81.09	48.20
2.745	44.45	32.15	-5.59	50.04	74	23.96	37.74	54	16.26
3.660	43.56	31.56	-10.23	53.79	74	20.21	41.79	54	12.21
4.574	43.68	32.67	-12.52	56.20	74	17.80	45.19	54	8.81
5.489	42.42	30.86	-15.88	58.30	81.09	22.79	46.74	81.09	34.35
6.404	41.88	30.08	-18.81	60.69	81.09	20.40	48.89	81.09	32.20
7.319	41.09	29.85	-21.03	62.12	74	11.88	50.88	54	3.12
8.234	41.81	28.80	-21.97	63.78	74	10.22	50.77	54	3.23
9.149	40.76	28.15	-23.69	64.45	74	9.55	51.84	54	2.16

Table 5: Peak Spurious Emission Measurement Results (Vertical Polarization)

Note that for the emissions falling outside of the restricted band, the FCC limits are 79.64 dBµV/m and 81.09 dBµV/m for horizontal and vertical polarizations of the antenna respectively. Emissions falling within the restricted bands, as defined in Section 15.205, were evaluated according to the limit of Section 15.209 which is 74 dBµV/m and 54 dBµV/m for peak and average emissions levels above 1 GHz respectively.

From Tables 4 and 5, it can be seen that the peak spurious emissions did not exceed the limit. Hence the unit is in compliance.

4.3.2.3 OCCUPIED BANDWIDTH

The XG Technology, Inc VEYXMAXBS200 was evaluated for occupied bandwidth for the signal transmitted within the ISM band of 902 to 828 MHz for the three antenna output ports. Each antenna output of EUT was respectively connected to the input of the HP8566B spectrum analyzer with an HP 8495B variable attenuator set to 40 dB (Photographs 5 and 6). The bypass instrument function of the quasi peak adapter was enabled and the resolution bandwidth of the spectrum analyzer was reduced to 100 kHz.

Figures 17 to 19 show the occupied bandwidth using 6 dB criterion. The measurement configuration and procedures were undertaken as per the guidelines presented in the FCC procedures for the measurement of digital transmission systems operating under Section 15.247.

Photographs 5 and 6: Bandwidth and Power Measurement Setup

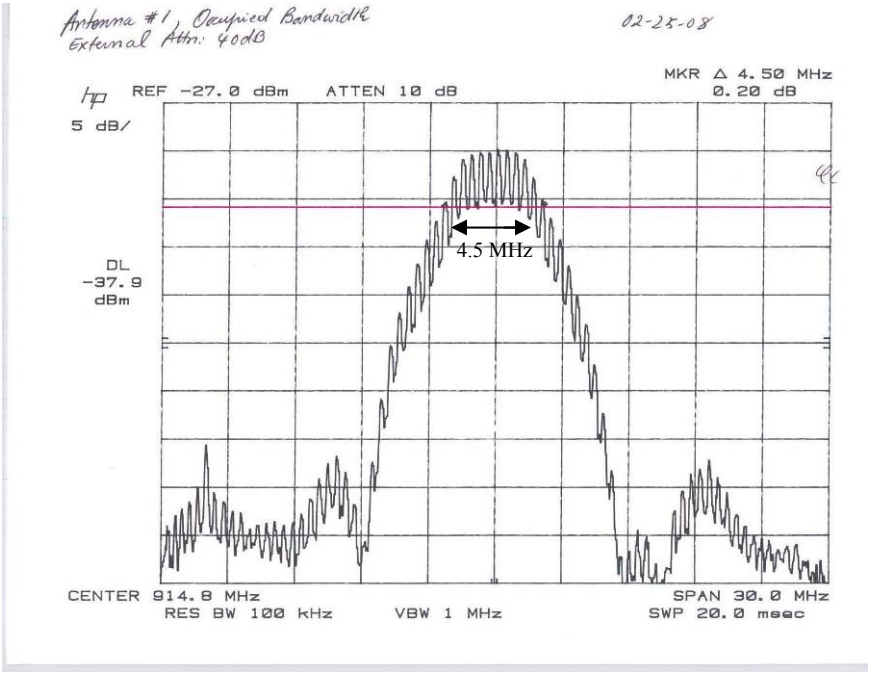


Figure 17: Occupied Bandwidth Results (Antenna Port 1)

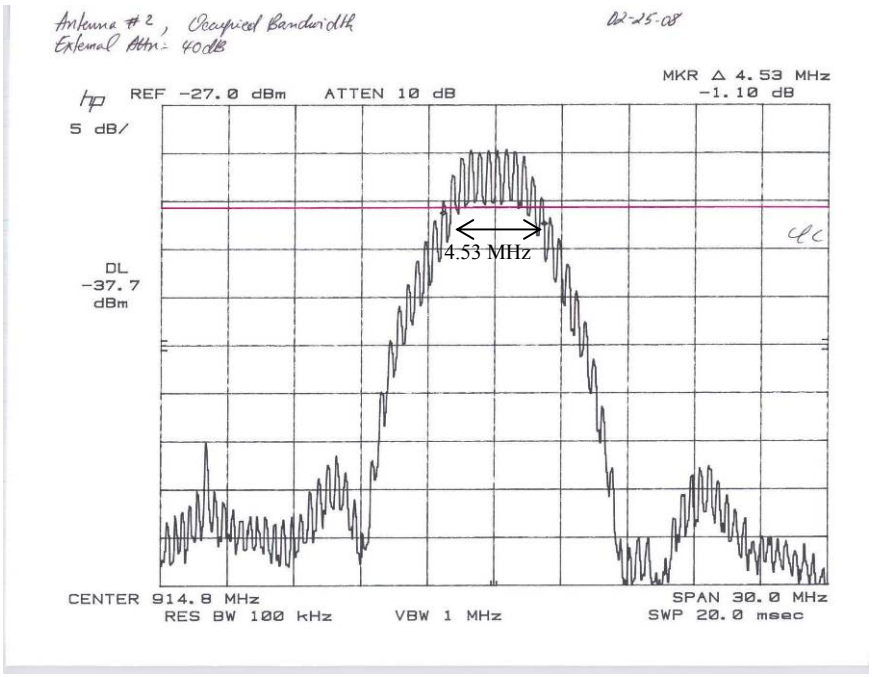


Figure 18: Occupied Bandwidth Results (Antenna Port 2)

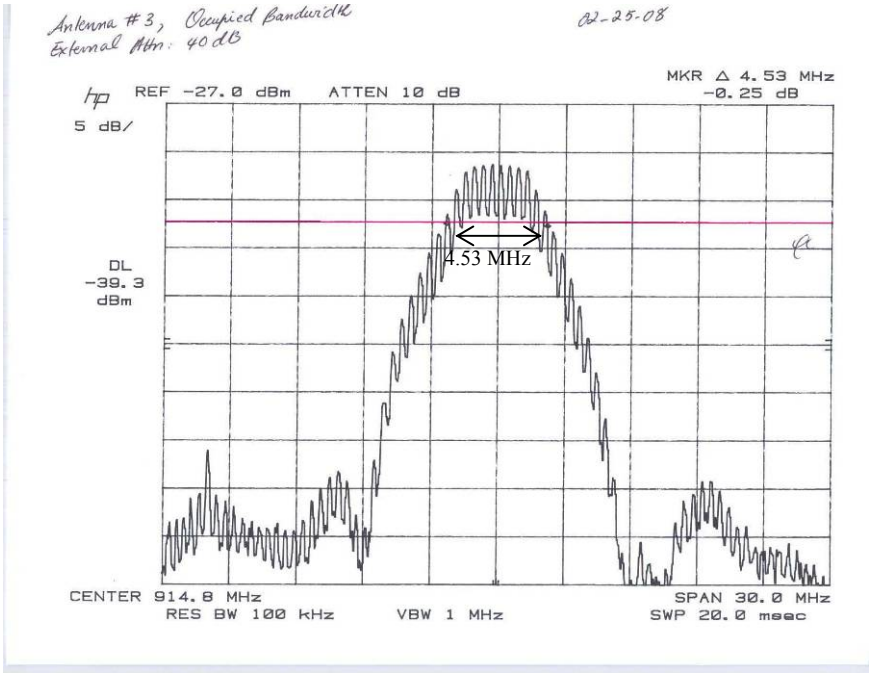


Figure 19: Occupied Bandwidth Results (Antenna Port 3)

	6-dB Bandwidth (MHz)		
Frequency (MHz)	Antenna Port 1	Antenna Port 2	Antenna Port 3
914.8	4.5	4.53	4.53

Table 6: Occupied Bandwidth Measurements

The 6 dB bandwidth of the XG Technology VEYXMAXBS200 unit was measured to be about 4.5 MHz at each antenna port, hence meeting the minimum bandwidth requirement of 500 kHz.

4.3.2.4 MAXIMUM OUTPUT POWER MEASUREMENTS

4.3.2.4.1 PULSE WIDTH AND REPETION FREQUENCY

From Figure 20 provided by XG Technology, Inc., the pulse characteristics of the VEYXMAXBS200 are determined as follows:

- Pulse width τ_{eff} = 220 ns
- Pulse repetition frequency, PRF = 400 kHz.

The pulse desensitization factor α_L can be computed as per Agilent Technologies "*Application Note 150-2*", (page 8):

$$\begin{aligned}\alpha_L &= 20\log_{10}\left(\tau_{eff}\times PRF\right) \quad (1)\\ &= 20\log_{10}\left(220\times10^{-9}\times400\times10^{3}\right)\\ &= 20\log_{10}\left(0.088\right)\\ &= -21.11dB\end{aligned}$$

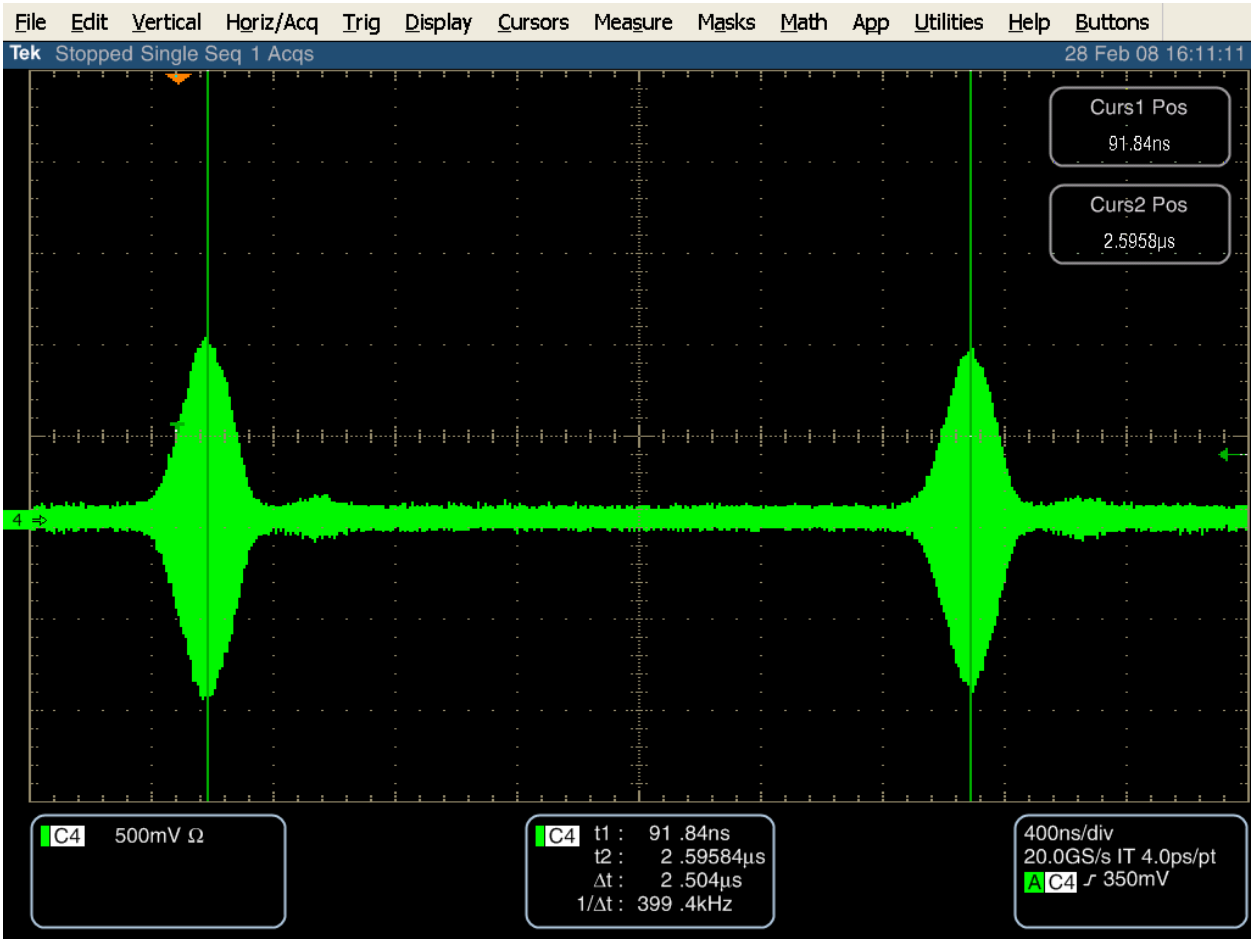


Figure 20: VEYXMAXBS200 Pulse Repetition Frequency

4.3.2.4.2 MAXIMUM OUTPUT POWER

The maximum output power at each antenna port of the XG Technology VEYXMAXBS200 unit was measured using the HP 8566B spectrum analyzer (SA) on the peak detector mode, while the "bypass" instrument function of the HP 85650A Quasi-Peak Adapter was activated. The output port for the VEYXMAXBS200 antenna was connected to SA in series with a HP 8495B variable attenuator set to 40 dB. Since the 4.5 MHz 6-dB bandwidth of the signal exceeds SA IF bandwidth limit, the peak power was determined using the pulse desensitization technique defined in the Agilent Technologies "*Application Note 150-2*".

The spectrum analyzer was centered to the peak of the fundamental frequency (914.9 MHz). Figures 21 to 23 present the measurement data with resolution bandwidth and the frequency span set to 30 kHz and 30 MHz, respectively. Note that the measurements, the resolution bandwidth met the Agilent Technologies "*Application Note 150-2*" (Equation 3) requirements for pulse desensitization using line spectra measurements:

$B = 30 \text{ kHz} < 0.1 \text{ PRF}$,

where PRF is equal to 400 kHz.

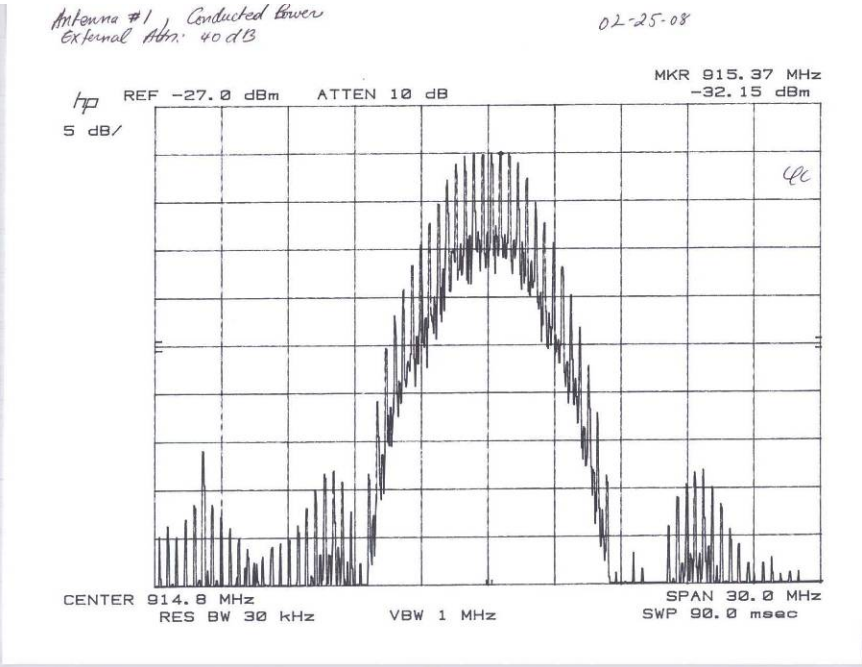


Figure 21: Peak Power Measurement Results (Antenna Port 1)

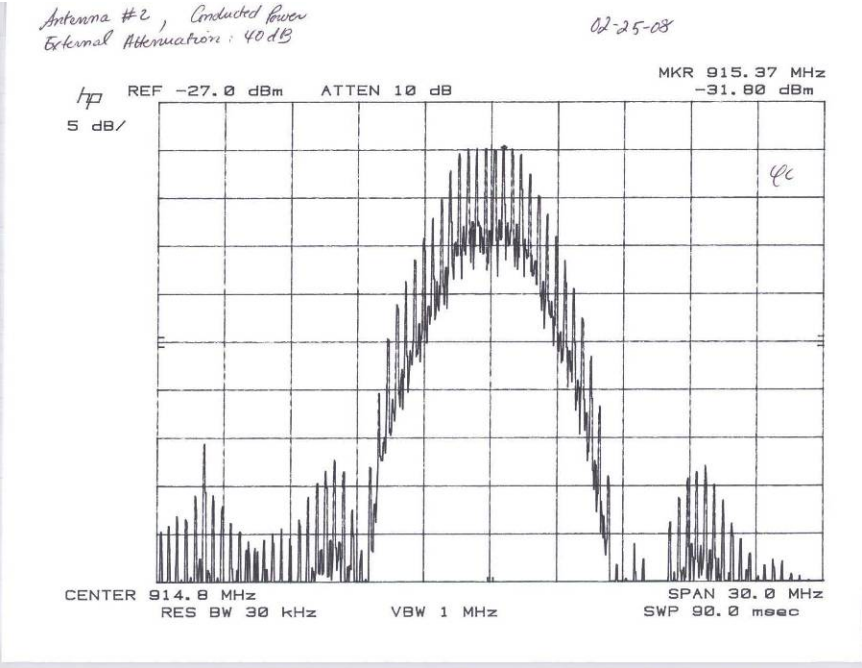


Figure 22: Peak Power Measurement Results (Antenna Port 2)

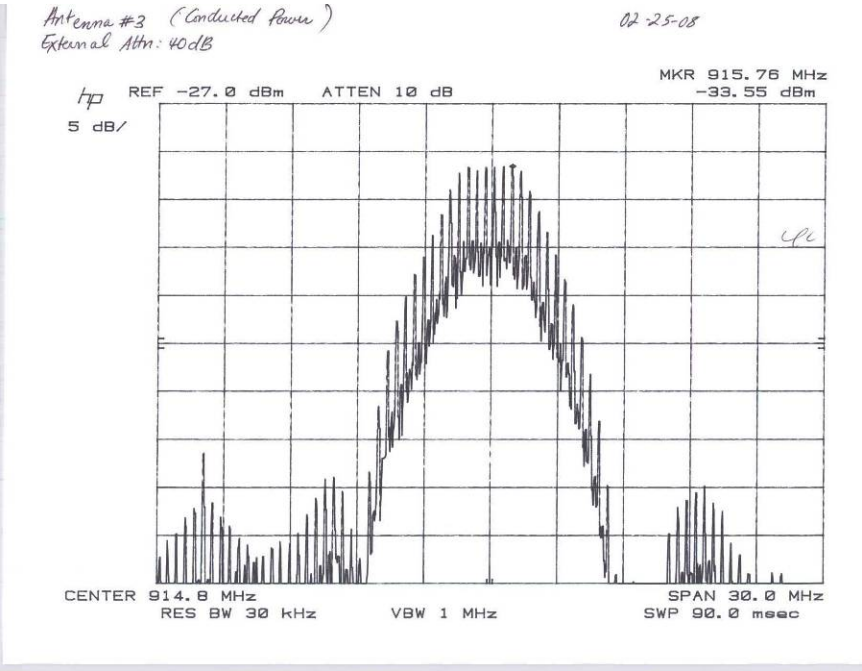


Figure 23: Peak Power Measurement Results (Antenna Port 3)

Table 7 lists the power levels computed at each antenna port, where the corrected power is given by the relation:

* Corrected Power (dBm) = SA Reading (dBm) + External Attenuation (dB) + Cable Loss (dB) - α_L (dB)

Antenna Port No.	SA Reading (dBm)	External Attenuation (dB)	Cable Loss (dB)	αL (dB)	Corrected Power (dBm)	Corrected Power (mW)
1	-32.15	40	0.41	-21.11	29.37	864.97
2	-31.80	40	0.41	-21.11	29.72	937.56
3	-33.55	40	0.41	-21.11	27.97	626.61

Table 7: Peak Power Measurement

It can be seen from the data above that the calculated maximum peak output power is 29.72 dBm, corresponding to 937.56 milliwatts, which is lower than the 1 watt limit. Hence, the device meets the maximum output power requirements of Section 15.247.

4.3.2.5 POWER SPECTRAL DENSITY

The power spectral density of the XG Technology VEYXMAXBS200, was measured on the HP 8566B spectrum analyzer on the peak detector mode while the "bypass" instrument function of the HP 85650A Quasi-Peak Adapter was activated. The coaxial feed for each of the VEYXMAXBS200 antennas was connected to SA in conjunction with an HP 8495B variable attenuator set to 40 dB. The resolution bandwidth was reduced to 3 kHz and the span to 510 KHz. The sweep time was set to 170 seconds to meet the specification of PSD Option 1 of the FCC guideline for "*Measurement of Digital Transmission Systems Operating under Section 15.247*", i.e., Sweep time = span / 3 kHz.

Figures 24 to 26 show the results for the measurements.

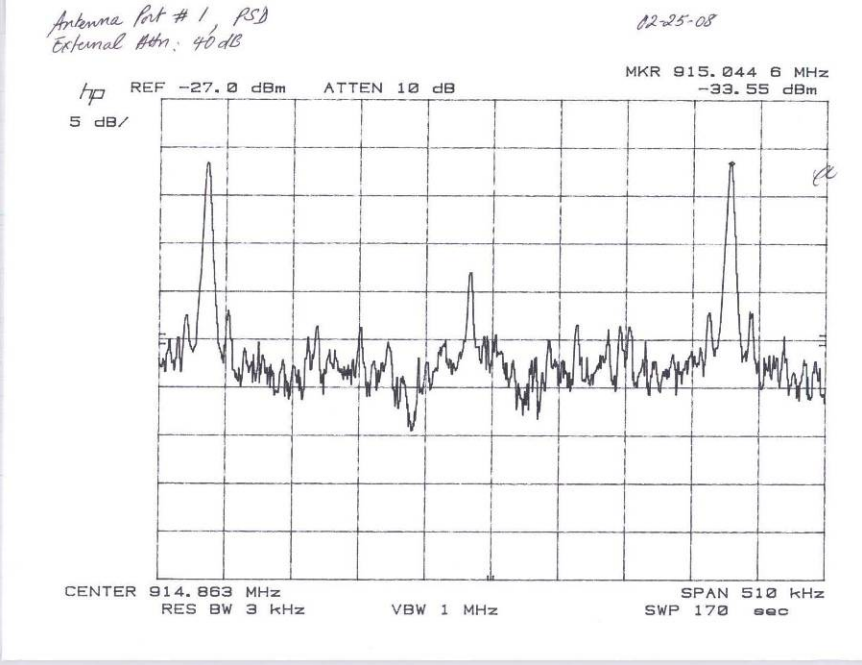


Figure 24: PSD Measurement Results (Antenna Port 1)

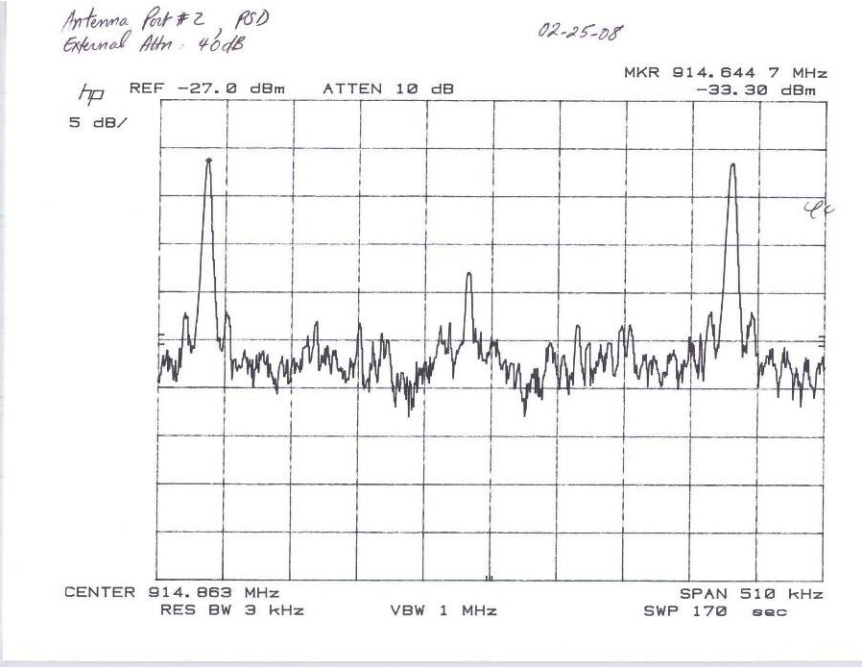


Figure 25: PSD Measurement Results (Antenna Port 2)

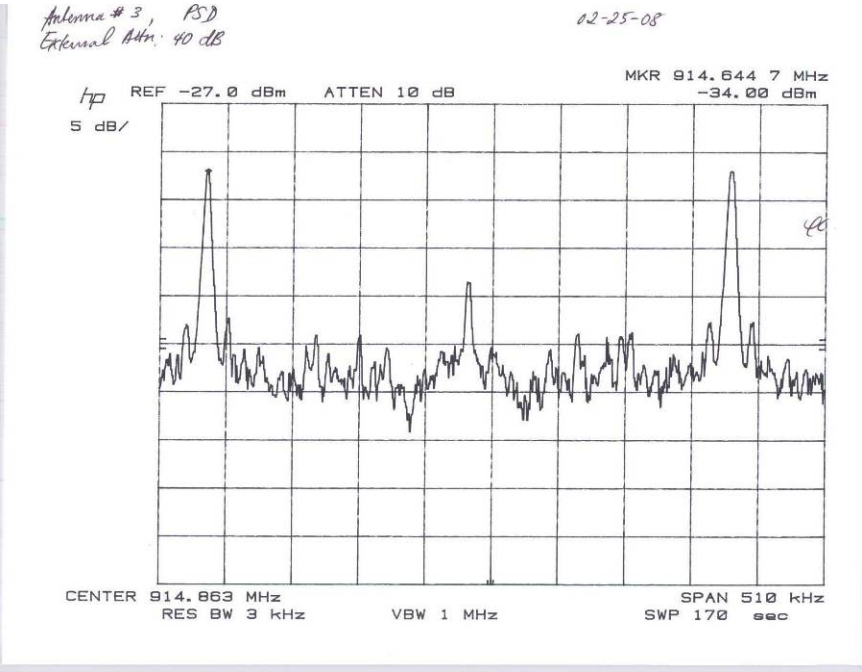


Figure 26: PSD Measurement Results (Antenna Port 3)

The corrected values of the PSD are provided in Table 8 where

Corrected PSD (dBm) = SA Reading (dBm) + External Attenuation (dB) + Cable Loss (dB)

Antenna Port No.	SA Reading (dBm)	External Attenuation (dB)	Cable Loss (dB)	Corrected PSD (dBm)	FCC Limit (dBm)	Margin to Limit (dB)
1	-33.55	40	0.41	6.86	8	1.14
2	-33.30	40	0.41	7.11	8	0.89
3	-34.00	40	0.41	6.41	8	1.59

Table 8: PSD Peak Measurements

It can be seen from Figures 24 to 26 and Table 2 that the power spectral density did not exceed the 8 dBm limit. Hence the unit meets the power spectral density requirements as per Section 15.247.

MAJOR TEST EQUIPMENT

FAU EMI R&D LABORATORY TEST EQUIPMENT						
Equipment Type	**Manufacturer**	**Description**	**Model**	**Serial No.**	**Calibration Date**	**Calibration Interval (Years)**
Spectrum Analyzer	Hewlett Packard	RF Section	8566B	2403A06381	Aug-22-06	2
Spectrum Analyzer	Hewlett Packard	Display	85662A	2407A06381	Aug-22-06	2
Spectrum Analyzer	Hewlett Packard	Quasi Peak Adapter	85650A	2430A00559	Aug-22-06	2
RF Preselector	Hewlett Packard	Preselector	85685A	2510A00151	Feb-8-06	2
LISN	EMCO	LISN	3825/2R	1095	March-10-06	2
Antenna	EMCO	Biconical	3108	2147	Feb-24-06	2
Antenna	EMCO	Log Periodic	3146	1385	Feb-24-06	2
Amplifier	Hewlett Packard	Amplifier	8447D	2443A03952	Dec-01-06	2
Amplifier	Hewlett Packard	Microwave Amplifier	83017A	3123A00324	Nov-27-06	2
Power Meter	Rohde & Schwarz	Thermal Power Sensor	NRP-Z55	10028	July-18-07	2

TEST FACILITY

EMI Research and Development Laboratory
Department of Electrical Engineering
Florida Atlantic University
Boca Raton, Florida 33431
(561) 361-4390

A2LA Certification No. 2129.01
FCC Registration: 90599
Industry of Canada: IC46405-4076

Description	The 3m semi-anechoic chamber and Power Line Conducted Spurious Voltage test setup are constructed and calibrated to meet the FCC requirements of Section 2.948, as well as Industry Canada RSS 212 Issue 1.
Site Filing	A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046, and with the Industry Canada, Certification and Engineering Bureau, 3701 Carling Ave., Building 94, P.O. Box 11490, Station "H", Ottawa Ontario, K2H 8S2.
Instrument	All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements.

End of Report