Engineering and Testing for EMC and Safety Compliance

CLASS II PERMISSIVE CHANGE REPORT

Ohmart/VEGA
c/o The Ohmart Corporation
4241 Allendorf Drive
Cincinnati, OH 45209
United States

MODEL: VEGAPULS 616263
FCC ID: MOIPULS616163

January 18, 2005

STANDARDS REFERENCED FOR THIS REPORT	
Part 2: 2001	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2001	Radio frequency devices - §15.209: Radiated Emissions Limits
Industry Canada Standard	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)
ANSI C63.4-2003	Standard Format Measurement/Technical Report Personal Computer and Peripherals

Frequency Range	Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
26 GHz		N/A	N/A

REPORT PREPARED BY TEST ENGINEER: DESMOND FRASER

Report Number: 2004236-62

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1 GENERAL INFORMATION

The following Class II Permissive Change Report is prepared on behalf of Ohmart/VEGA Corporation, in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was Model VEGAPULS 616263; FCC ID: MOIPULS616263. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47, Industry Canada RSS-210, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2003. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 2000, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

THIS IS A CLASS II PERMISSIVE CHANGE for the original certification granted on July 30, 2003.
The only change since the original grant is the addition of a parabolic antenna option.

2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
Part 2: 2001	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2001	Radio frequency devices - §15.209: Radiated Emissions Limits
Industry Canada	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)
ANSI C63.4-2003	Standard Format Measurement/Technical Report Personal Computer and Peripherals

Frequency Range	Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
26 GHz		N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the above standards for Certification methodology.

Signature:  Date: January 18, 2005

Typed/Printed Name: Desmond Fraser Position: President

Signature:  Date: January 18, 2005

Typed/Printed Name: Desmond Fraser Position: Test Engineer

NVLAP *Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.*

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

3 TEST INFORMATION

3.1 EXERCISING THE EUT

The EUT was configured to continuously transmit data at 100% duty cycle in measurement mode in which the device maintains its full power. The manufacturer confirmed the conducted power under normal measurement mode to be 1 mW. The normal operating measurement mode is a radar pulse with a duty cycle less than 1:100. By configuring the unit to transmit continuously in the continuous measurement mode, a desensitization factor was not required, but a duty cycle factor calculated from the pulse width and the pulse period is used to calculate the average emission. This approach was used because of the 1:100 duty cycle normal operation that would have made it cumbersome to measure the spurious emission from the EUT. The EUT was set up at an antenna-to-EUT test distance of 0.3 meters in order to increase measurement dynamic range. The unit's spurious emissions were also investigated and tested in the restricted and non restricted band from 9 kHz to 110 GHz. The tests were performed with the EUT polarized horizontally and vertically in order to determine worst-case emissions. The EUT supports only one channel at 26.5 GHz.

3.2 TEST SYSTEM DETAILS

Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
Transmitter (EUT)	Ohmart/VEGA	VEGAPULS 616263	N/A	MOIPULS616263	Unshielded	15810
Antenna	Ohmart/VEGA	33 dBi Parabolic	N/A	N/A	N/A	N/A

3.3 CONFIGURATION OF TESTED SYSTEM

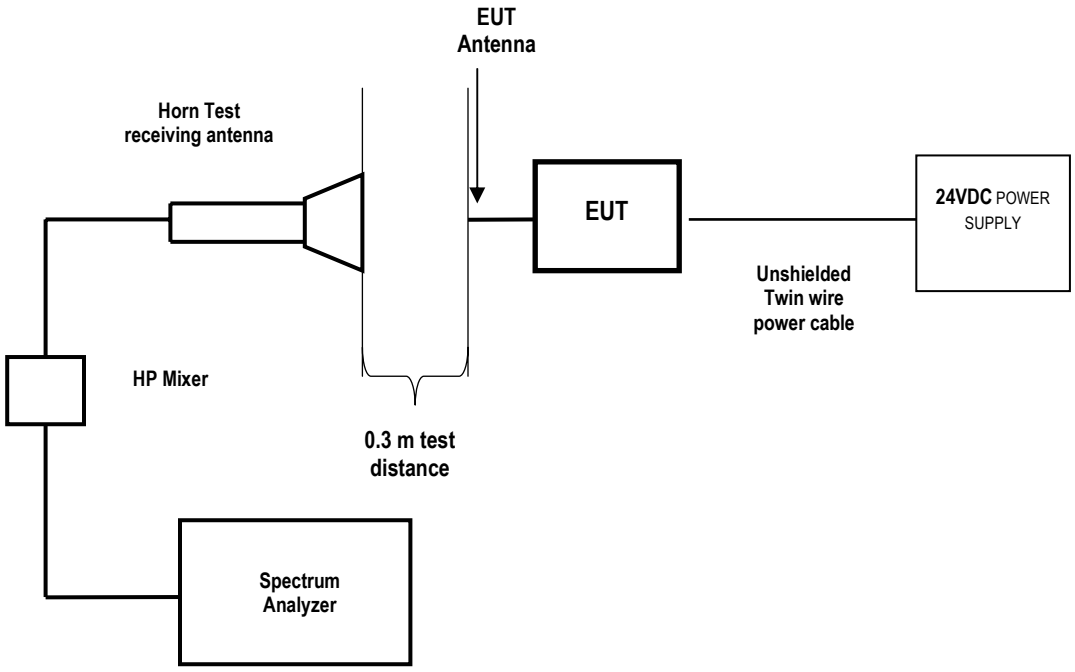


FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM

4 CONDUCTED LIMITS - §15.207

Conducted emissions were performed on the EUT using an off-the-shelf 24 volt power supply. The general conducted limit under Part 15.207 was applied. The EUT was investigated and tested with four housings, namely Stainless Steel, Aluminum, Double Chamber Aluminum, and Plastic. The Plastic housing configuration demonstrated the worst case results. The data below is for the worst case configuration and four antenna configurations.

5 CONDUCTED EMISSIONS

5.1 CONDUCTED EMISSION LIMITS TEST DATA

TABLE 5-1: CONDUCTED EMISSIONS LIMITS TEST DATA – NEUTRAL CONDUCTOR

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	CISPR A QP Limit (dBuV)	CISPR A QP Margin (dBuV)	CISPR A AV Limit (dBuV)	CISPR A AV Margin (dBuV)	Pass/ Fail
0.270	Pk	53.6	1.3	54.9	61.1	-6.2	51.1	3.8	Pass
1.220	Pk	47.7	1.0	48.7	56.0	-7.3	46.0	2.7	Pass
2.600	Pk	42.2	1.5	43.7	56.0	-12.3	46.0	-2.3	Pass
7.850	Pk	34.0	2.5	36.5	60.0	-23.5	50.0	-13.5	Pass
21.460	Pk	32.9	4.0	36.9	60.0	-23.1	50.0	-13.1	Pass
22.600	Pk	34.6	4.1	38.7	60.0	-21.3	50.0	-11.3	Pass
29.340	Pk	28.6	4.5	33.1	60.0	-26.9	50.0	-16.9	Pass

TABLE 5-2: CONDUCTED EMISSIONS LIMITS TEST DATA – PHASE CONDUCTOR

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	CISPR A QP Limit (dBuV)	CISPR A QP Margin (dBuV)	CISPR A AV Limit (dBuV)	CISPR A AV Margin (dBuV)	Pass/ Fail
0.240	Pk	41.9	1.4	43.3	62.1	-18.8	52.1	-8.8	Pass
1.220	Pk	37.2	1.0	38.2	56.0	-17.8	46.0	-7.8	Pass
2.720	Pk	42.6	1.5	44.1	56.0	-11.9	46.0	-1.9	Pass
3.490	Pk	38.9	1.6	40.5	56.0	-15.5	46.0	-5.5	Pass
7.850	Pk	32.7	2.5	35.2	60.0	-24.8	50.0	-14.8	Pass
22.480	Pk	36.3	4.1	40.4	60.0	-19.6	50.0	-9.6	Pass

TEST PERSONNEL:

Desmond Fraser
Test Engineer


Signature

01/6/2005
Date of Test

6 RADIATED EMISSION LIMITS - §15.209

6.1 RADIATED EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions (harmonics and spurious emissions) in the restricted and non-restricted bands were investigated from 0.009 kHz to 110 GHz. The test methods used during testing conform to the ANSI C63.4, 2003. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The EUT was tested in three orthogonal planes namely X, Y, and Z. The test antenna was horizontally and vertically polarized during testing. The general limit under Part 15.209 was applied for all frequencies 0.009 kHz to 110 GHz per FCC 15.209. There was no spurious noise detected from 0.009 kHz to 110 GHz except the carrier at 26 GHz. The EUT was investigated and tested with four housings, namely Stainless Steel, Aluminum, Double Chamber Aluminum, and Plastic. The Plastic housing configuration demonstrated the worst case results. The data below is for the worst case configuration and four antenna configurations.

6.2 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the antenna factor and cable factor from the measured Spectrum Analyzer reading.

Spectrum Analyzer Level Corrected (dBuV/m) = Spectrum Analyzer Level (dBuV/m) + AF (dB/m) + CL (dB)

AF = antenna factor
CL = cable loss

6.3 DUTY CYCLE CALCULATION

Pulse width = 600 pS
Pulse period = 280 nS

Duty Cycle = 20*Log 0.6/280 = 53.4dB

6.4 RADIATED EMISSION LIMITS TEST DATA

TABLE 6-1: FIELD STRENGTH OF CARRIER WITH WORST CASE PLASTIC HOUSING – 26.0 GHZ

Frequency (GHz)	Detector	Antenna POL	Spectrum Analyzer Level (dBuV)	Cable Loss (dB)	Antenna Gain dB/m	Spectrum Analyzer Level Corrected (dBuV/m)	FCC Limit (dBuV)	Margin (dB)
26.0	Peak	H	25.2 (1,3)	0	40	65.2	74.0	-8.8
26.0	Avg	H	-28.2 (1,2),	0	40	11.8	54.0	-42.2
26.0	Peak	V	5.2.0 (1,3)	0	40	45.2	74.0	-28.8
26.0	Avg	V	-48.2 (1,2),	0	40	-8.2	54.0	-62.2

Note 1: The mixer conversion loss plus cable loss is factored within the Spectrum Analyzer level reading shown on plot.
Note 2: 53.4 dB duty cycle correction factor is used in the final calculation found in the table above.
Note 3: The plot data is corrected by 20 dB from 20Log 0.3/3 test distance to limit distance ratio in the table above.

TABLE 6-2: FIELD STRENGTH OF CARRIER WITH WORST CASE PLASTIC HOUSING – 0.009-110 GHZ

Frequency (GHz)	Detector	Antenna POL	Spectrum Analyzer Level (dBuV)	Cable Loss (dB)	Antenna Gain	Spectrum Analyzer Level Corrected (dBuV/m)	FCC Limit (dBuV)	Margin (dB)
0.009-110	Peak	-(4)-	---	1	26.0	---	74.0	---
0.009-110	Avg	-(4)-	---	1	26.0	---	54.0	---

Note 4: No emission above the noise floor detected.

TEST PERSONNEL:

Desmond Fraser
Test Engineer


Signature

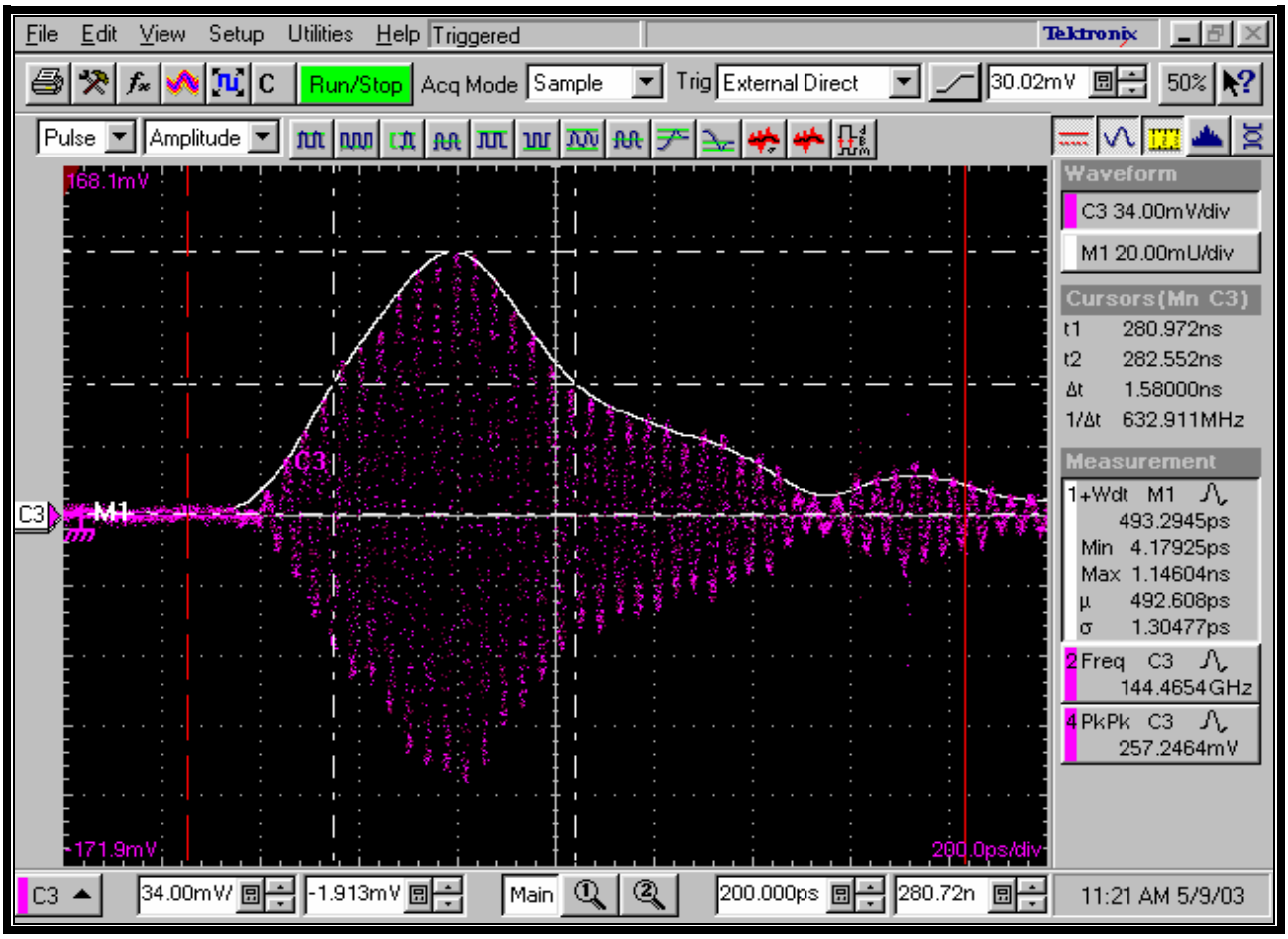
01/6/2005
Date of Test

6.5 TEST EQUIPMENT USED FOR TESTING

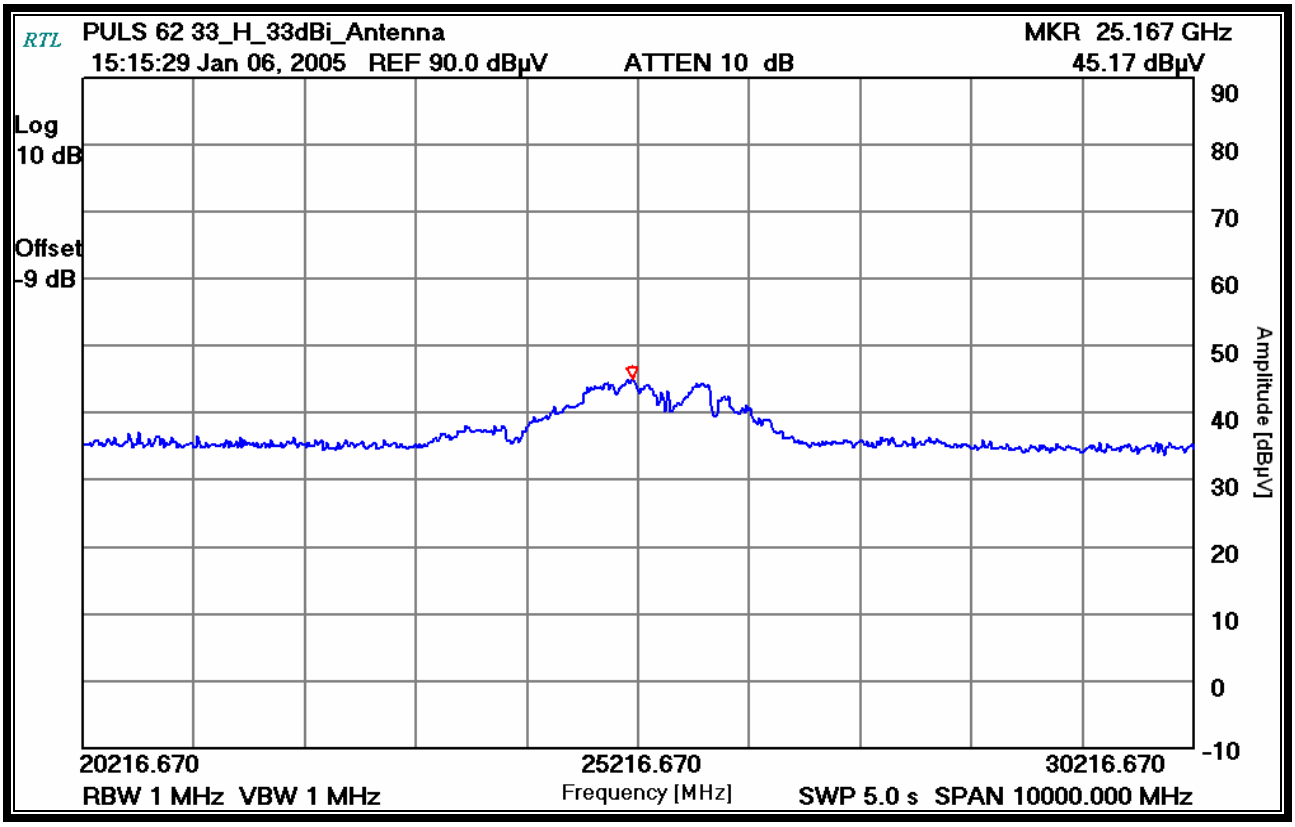
TABLE 6-3: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NO.	CALIBRATION DUE DATE
900717	Hewlett Packard	11970U	Harmonic Mixer (40 - 60 GHz)	2332A01110	2/19/06
901218	EMCO	3160-09	Horn Antenna (18 - 26 GHz)	960281-003	6/14/05
900392	Hewlett Packard	1197OK	Harmonic Mixer (18 - 26 GHz)	3525A00159	2/01/06
900715	Hewlett Packard	11970V	Harmonic Mixer (50 - 75 GHz)	2521A00512	7/19/05
900716	Hewlett Packard	11970W	Harmonic Mixer (75 - 110 GHz)	2521A00710	6/08/05
900126	Hewlett Packard	11970A	Harmonic Mixer (26 - 40 GHz)	2332A01199	6/08/05
900056	ATM	19-443-6	Horn Antenna (40 – 60 GHz)	8041704-01	6/08/05
901218	EMCO	3160-09	Horn Antenna (25 - 40 GHz)	960452-007	6/08/05
900826	ATM	08-443-6	Horn Antenna (90 – 140 GHz)	8041904-01	6/08/05
900719	ATM	05-443-6	Horn Antenna (140 – 220 GHz)	50685	6/08/05
90066	ATM	10-443-6	Horn Antenna (75 – 110GHz)	805 1905-1	6/08/05
901262	EMCO	3160-09	Horn Antenna (1 – 18 GHz)	6748	2/04/06
900723	Hewlett Packard		Amplifier (1 GHz - 26 GHz)	NA	6/08/05
900744	Olsen	Mixer	Mixer (90 - 220 GHz)	F80814-1	1/04/06
900744	Olsen	Mixer	Mixer (140 - 220 GHz)	G80814-1	1/04/06
900444	Miteq	Amplifier	Amplifier (30 – 1000 MHz)	PR1040	6/08/05
900791	Schaffner Chase	CBL6112	Antenna (25 MHz - 2 GHz)	2099	7/07/05
900151	Rohde & Schwarz	HFH2-Z2	Loop Antenna (9 kHz - 30 MHz)	827525	8/09/06
900772	EMCO	3161-02	Antenna (2 – 4 GHz)	9804-1044	7/08/05
900321	EMCO	3161-03	Antenna (4 - 8.2 GHz)	9508-1020	7/08/05
900323	EMCO	3161-07	Antenna (8.2 - 12 GHz)	9508-1054	7/08/06

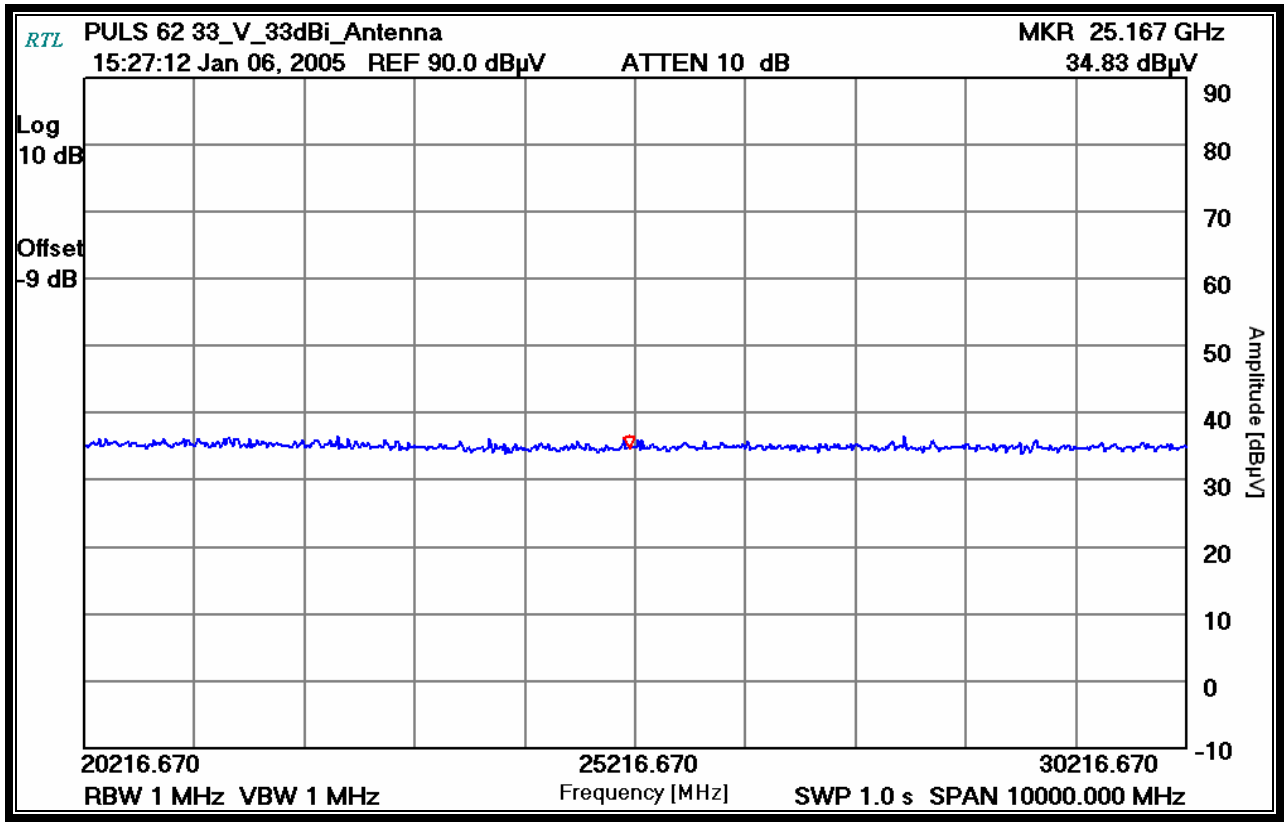
7 TEST PLOTS



PLOT 7-1 PULSE WIDTH and RISE TIME NORMAL MEASUREMENT MODE



PLOT 7-2 EUT PARABOLIC 33 DBI ANTENNA 100% DUTY CYCLE PEAK MODE H POL



PLOT 7-3 EUT PARABOLIC 33 DBI ANTENNA 100% DUTY CYCLE PEAK MODE V POL

8 CONCLUSION

The data in this measurement report shows that the Ohmart/VEGA Inc., Model VEGAPULS 616263**,** FCC ID: MOIPULS616263, complies with all the requirements of Parts 2, and 15 of the FCC Rules and Regulations, and Industry Canada RSS-210.