



Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Ohmart/ Vega
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Cincinnati, OH 45209
United States

MODEL: PULS616263
FCC ID: MOIPULS616263
July 29, 2003

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
ANSI C63.4-2001	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS

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

REPORT PREPARED BY TEST ENGINEER: DESMOND FRASER

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1 GENERAL INFORMATION

The following Type Certification Report is prepared on behalf of Ohmart/Vega in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was Model # PULS61, 62, 63; 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, 1992. 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 1992).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application report.

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
ANSI C63.4-2001	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS

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

We, 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: July 29, 2003

Typed/Printed Name: Desmond Fraser

Position: President

Signature:  _____

Date: July 29, 2003

Typed/Printed Name: Desmond Fraser

Position: Test Engineer



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.

2.1 EXERCISING THE EUT

The EUT was configured to continuously transmit at 100% duty cycle in measurement mode. 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 desensitization factor was not required. This approach was used because the EUT produces extremely low output power. The EUT was setup at an antenna to EUT test distance of **0.03m** in order to achieve sufficient dynamic range including the use of harmonic mixer as a result of the carrier low output power. The unit's spurious emissions were also investigated and tested in the restricted and non restricted band from 9 KHz to 110GHz. 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 26.0GHz.

3 CONDUCTED LIMITS - §15.207

These unit is 24 VDC powered. Conducted emission is not applicable. This device would be installed in industrial sites where 24VDC supply already exists.

4 RADIATED EMISSION LIMITS - §15.209

4.1 RADIATED EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands were investigated from 0.009 KHz to 110 GHz, C63.4, 2001 was the standard used for the test. 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 110GHz except the carrier at 26GHz. The EUT was investigated and tested with four housing namely: Stainless steel, Aluminum, Double chamber Aluminum, and Plastic housing. The Plastic housing configuration demonstrated the worst case results. The data below is for the worst case configuration and four antenna configurations.

4.2 FIELD STRENGTH CALCULATION

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

$$\text{Spectrum Analyzer Level Corrected (dBuV/m)} = \text{Spectrum Analyzer Level (dBuV/m)} + \text{AF (dB/m)} + \text{CL (dB)}$$

AF = antenna factor

CL = cable loss

4.3 RADIATED EMISSION LIMITS TEST DATA

TABLE 4-1: FIELD STRENGTH OF CARRIER WITH 19.5 DBI ROD ANTENNA AND PLASTIC HOUSING

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)
26	Peak		5.20 (1,2,3)	1	16.8		74.0	
26	Avg	H	5.20 (1,2,3)	1	16.8	23.0	54.0	-31.0

Note 1: Corrected by -40dB due to 3 centimeters antenna test distance

Note 2: The mixer conversion loss is factored within the Spectrum Analyzer level reading

Note 3: Duty cycle correction was not used in the final calculation

TABLE 4-2: FIELD STRENGTH OF CARRIER WITH 21.2 DBI ROD ANTENNA AND PLASTIC HOUSING

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)
26	Peak		11.4 (1,2,3)	1	16.8		74.0	
26	Avg	V	11.4 (1,2,3)	1	16.8	29.2	54.0	-24.8

Note 1: Corrected by -40dB due to 3 centimeters antenna test distance

Note 2: The mixer conversion loss factor is within the Spectrum Analyzer level

Note 3: Duty cycle correction was not used in the final calculation

TEST PERSONNEL:

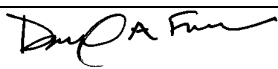
DESMOND FRASER		JUNE 18, 2003
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

TABLE 4-3: FIELD STRENGTH OF CARRIER WITH 19.0 DBI HORN ANTENNA WITH PLASTIC HOUSING

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)
26	Peak		6.20 (1,2,3)	1	16.8		74.0	
26	Avg	H	6.20 (1,2,3)	1	16.8	24.0	54.0	-34.0

Note 1: Corrected by -40dB due to 3 centimeters antenna test distance

Note 2: The mixer conversion loss is factored within the Spectrum Analyzer level reading

Note 3: Duty cycle correction was not used in the final calculation

TABLE 4-4: FIELD STRENGTH OF CARRIER WITH 24.7 HORN ANTENNA WITH PLASTIC HOUSING

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)
26	Peak		12.5 (1,2,3)	1	16.8		74.0	
26	Avg	H	12.5 (1,2,3)	1	16.8	29.8	54.0	-24.2

Note 1: Corrected by -40dB due to 3 centimeters antenna test distance

Note 2: The mixer conversion loss is factored within the Spectrum Analyzer level reading

Note 3: Duty cycle correction was not used in the final calculation

TABLE 4-5: FIELD STRENGTH OF CARRIER WITH ALL ANTENNAS AND PLASTIC HOUSING

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	16.8	---	74.0	---
0.009-110	Avg	-(4)-	---	1	16.8	---	54.0	---

Note 4: No emission above the noise floor detected

TEST PERSONNEL:

DESMOND FRASER		JUNE 18, 2003
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

4.4 TEST EQUIPMENT USED FOR TESTING

TABLE 4-6: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	Calibration Due Date
900717	HEWLETT PACKARD	11970U	Harmonic Mixer (40 - 60 GHz)	2332A01110	2/19/04
901218	EMCO	3160-09	Horn Antenna (18-26 GHz)	960281-003	6/14/04
900392	HEWLETT PACKARD	11970K	Harmonic Mixer (18 - 26 GHz)	3525A00159	2/01/04
900715	HEWLETT PACKARD	11970V	Harmonic Mixer (50 - 75 GHz)	2521A00512	7/19/04
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	3160-9	Horn Antenna (1-18GHz)	6748	2/04/05
900723	HP		AMP-1GHz-26GHz	NA	6/08/05
900744	Olsen	Mixer	90-220 GHz	F80814-1	1/04/05
900744	Olsen	Mixer	140-220 GHz	G80814-1	1/04/05
900444	Miteq	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	9KHz to 30 MHz loop antenna	827525	8/09/03
900772	EMCO	3161-02	2-4GHz	9804-1044	7/08/04
900321	EMCO	3161-03	4-8.2GHz	9508-1020	7/08/04
900323	EMCO	3161-07	8.2-12GHz	9508-1054	7/08/06

5 TESTED 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 5-1: EQUIPMENT UNDER TEST (EUT)

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	FCC ID	CABLE DESCRIPTIONS	RTL BAR CODE
Transmitter (EUT)	Ohmart/Vega	PULS616263	N/A	MOIPULS616263	Unshielded	15198
Antenna	Ohmart/Vega	19.5 dBi Rod	N/A	N/A	N/A	15316
Antenna	Ohmart/Vega	21.2 dBi Rod	N/A	N/A	N/A	15197
Antenna	Ohmart/Vega	19.0 dBi Horn	N/A	N/A	N/A	15165
Antenna	Ohmart/Vega	24.7 dBi Horn	N/A	N/A	N/A	15425

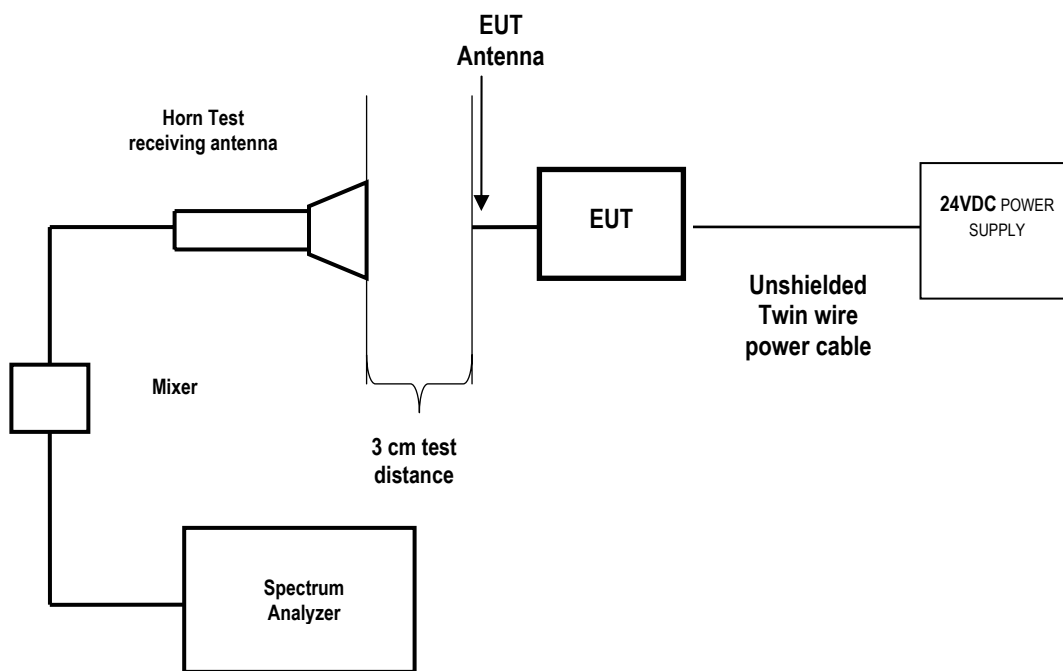
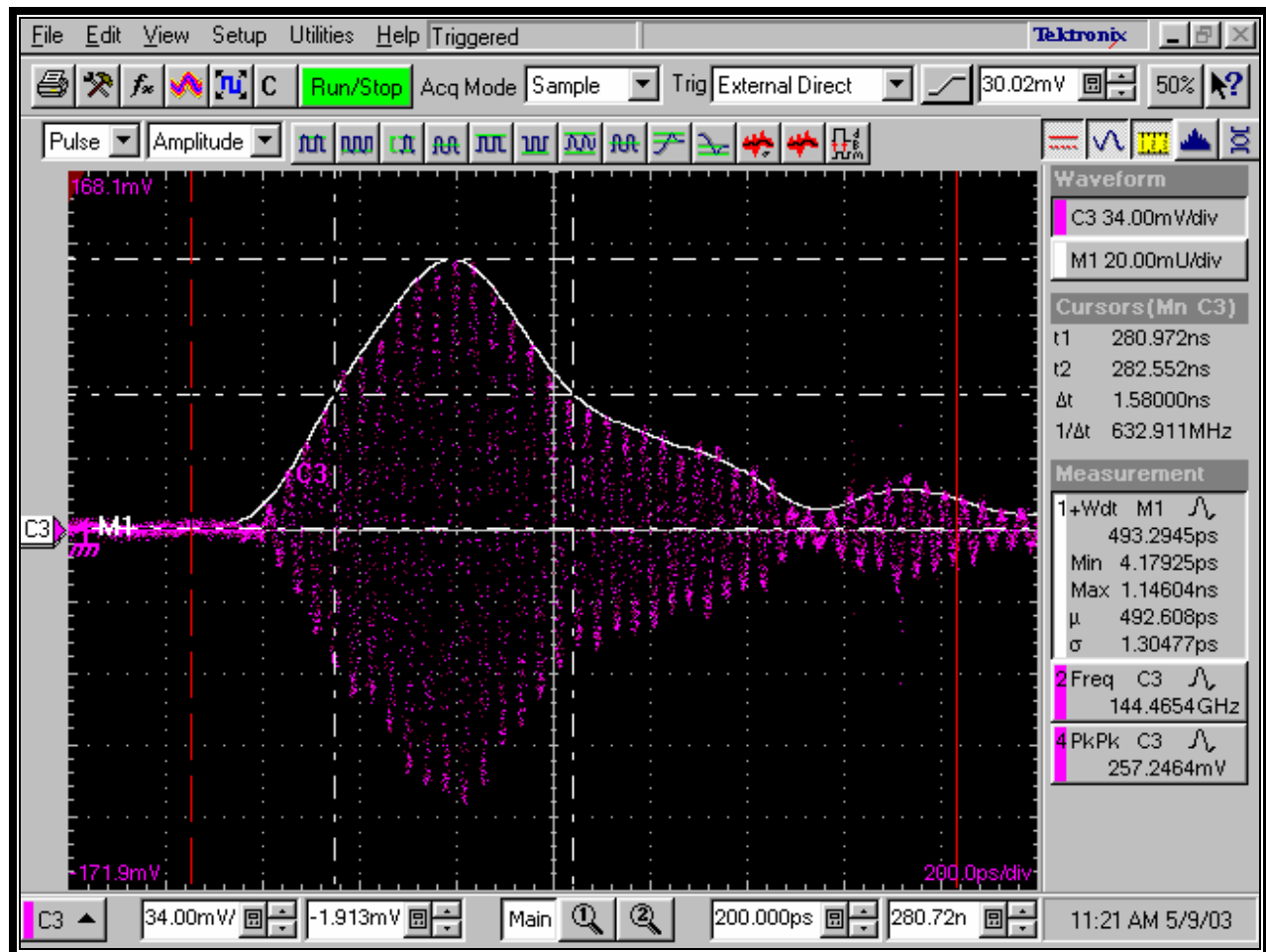
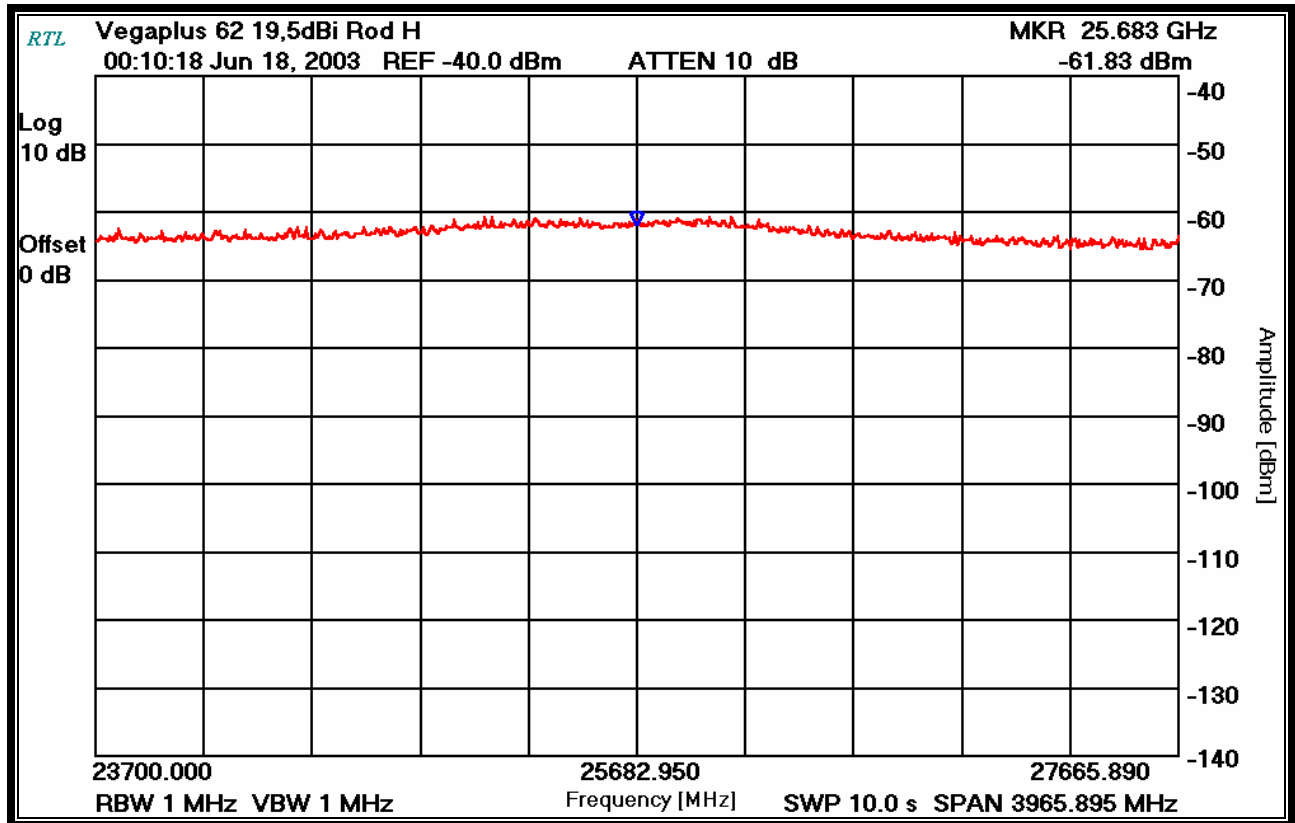


FIGURE 5-1: CONFIGURATION OF TESTED SYSTEM

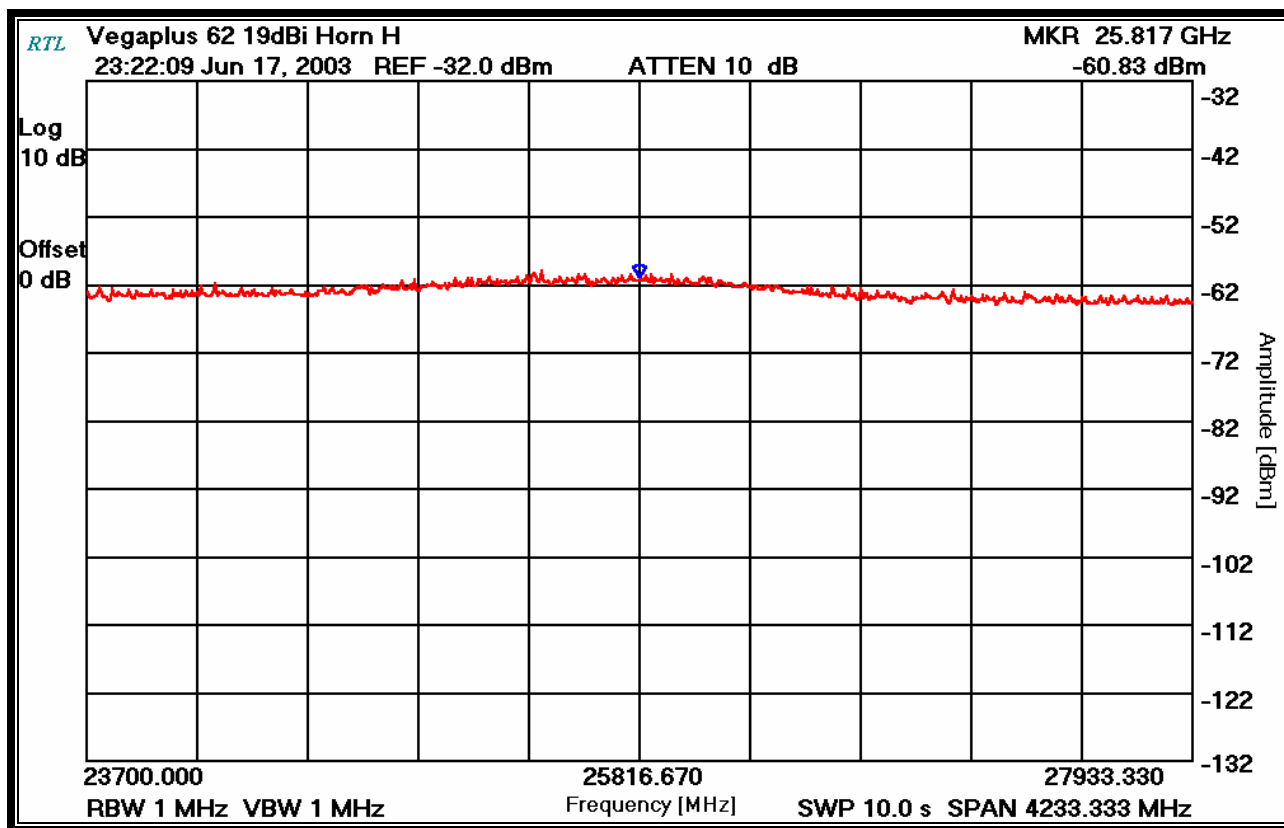
6 TEST PLOTS



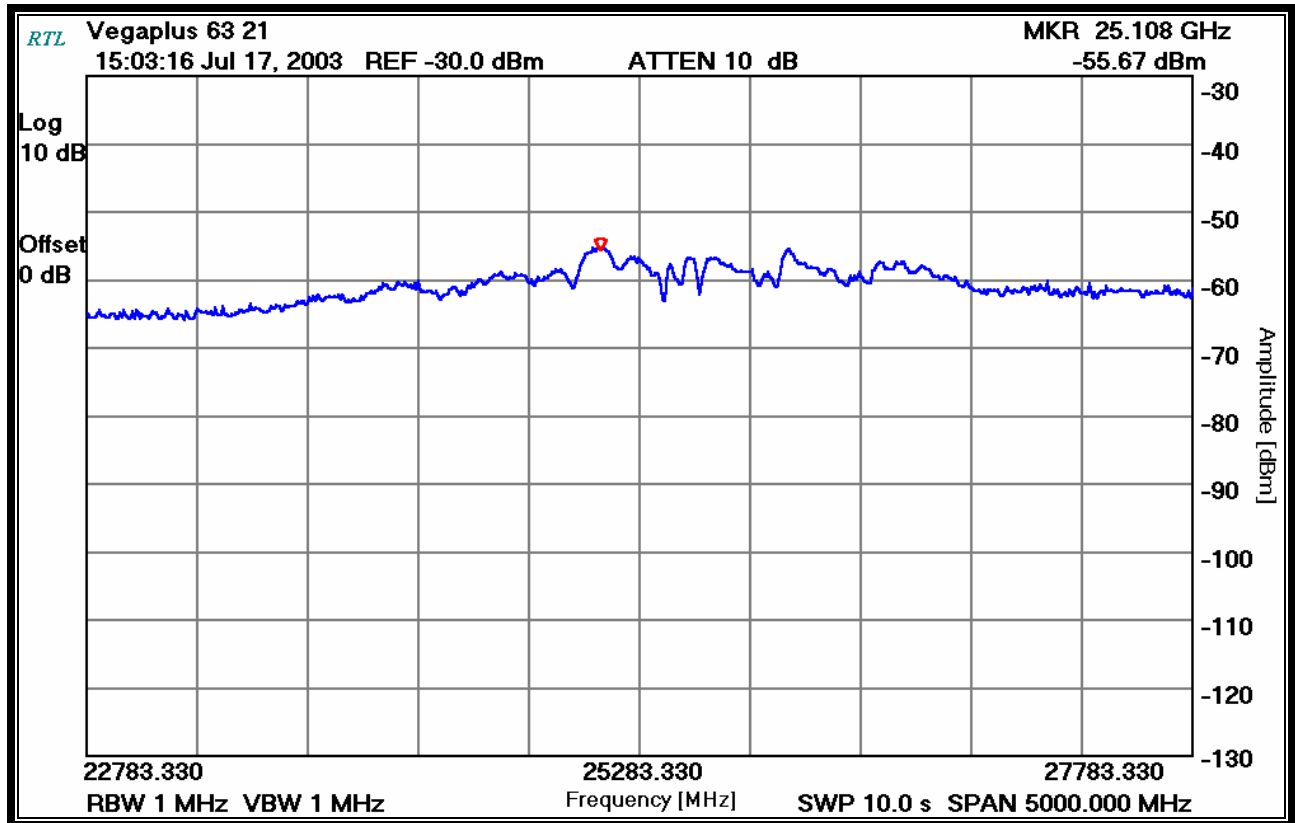
PLOT 6-1 PULSE WIDTH and RISE TIME NORMAL MEASUREMENT MODE



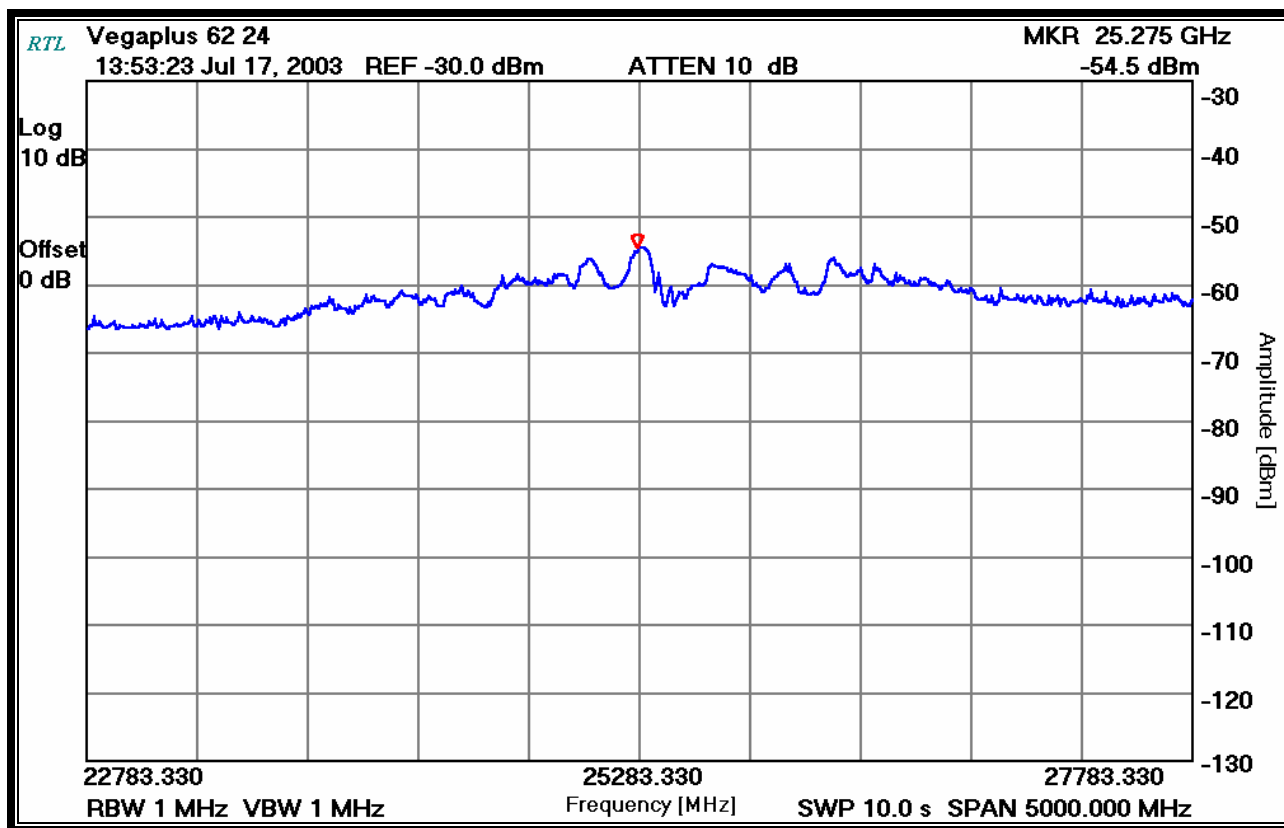
PLOT 6-2 EUT 19.5 ROD DBI ANTENNA 100% DUTY CYCLE MODE



PLOT 6-3 EUT 19.0 DBI HORN ANTENNA 100% DUTY CYCLE MODE



PLOT 6-4 EUT 21.7 DBI HORN ANTENNA 100% DUTY CYCLE MODE



PLOT 6-5 EUT 24.7 DBI HORN ANTENNA 100% DUTY CYCLE MODE

7 CONCLUSION

The data in this measurement report shows that the Ohmart/Vega, Inc., Model # PULS616263, FCC ID: MOIPULS616263 complies with all the requirements of Parts 2, and 15 of the FCC Rules, and Regulations.