TEST RESULT SUMMARY

FCC PART 15 SUBPART C
Section 15.245
Industry Canada RSS-210: Issue 5: 2001
A1: Nov. 2002, A2: Apr. 2003, A3: 2004, A4: 2004
Section 6.2.2(n)

MANUFACTURER'S NAME	Phoenix International
NAME OF EQUIPMENT	Eagle Radar Ground Speed Sensor
MODEL NUMBER	**90-137673**
MANUFACTURER'S ADDRESS	1441 44th St NW Fargo, ND 58102
TEST REPORT NUMBER	WC501664 REV. A
TEST DATE	04 & 11 April 2005

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart C Section 15.245 and RSS-210, section 6.2.2(n).

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C Section 15.245 and RSS-210, section 6.2.2(n).

Date: 13 April 2005

Location: Taylors Falls MN USA	J. C. Sausen Tested By	T. K. Swanson Reviewed By

Not Transferable

EMC EMISSION - T E S T R E P O R T

Test Report File No.	:	**WC501664 REV. A**	Date of issue:	13 April 2005

Model No.	:	**90-137673 / 100111**
Product Name	:	Eagle Radar Ground Speed Sensor
Applicant	:	Phoenix International
Manufacturer	:	Phoenix International
License holder	:	Phoenix International
Address	:	1441 44th St NW
	:	Fargo, ND 58102
Test Result	:	■ **Positive** ☐ **Negative**
Test Project Number Reference(s)	:	**WC501664 REV. A**
Total pages		30

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
		13 April 2005	Initial Release
A	30	16 June 2005	Revisions include: ▪ Corrected test equipment list on pages 20 and 22.

TABLE OF CONTENTS

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 50081-1 / 1991

☐ - EN 55011 / 1998 w/Amendment A1:1999 ☐ - Group 1 ☐ - Group 2 ☐ - Class A ☐ - Class B

☐ - EN 55013 / 1990

☐ - EN 55014 / 1987 ☐ - Household appliances and similar ☐ - Portable tools ☐ - Semiconductor devices

☐ - EN 55014 / A2: 1990

☐ - EN 55014 / 1993 ☐ - Household appliances and similar ☐ - Portable tools ☐ - Semiconductor devices

☐ - EN 55015 / 1987

☐ - EN 55015 / A1:1990

☐ - EN 55015 / 1993

☐ - EN 55022 / 1987 ☐ - Class A ☐ - Class B

■ - FCC Part 15 Subpart C Section 15.245

☐ - FCC Part 15 Subpart C Section 15.207 Conducted Emission Requirements

■ - RSS-210, Issue 5, 2001 – Section 6.2.2(n)

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Emission Test Results:

Fundamental Field Strength [FCC 15.245 (b)], [RSS-210 Section 6.2.2(n)]

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance 1 dB at 24.12 GHz

Remarks: The fundamental was measured to be 126.1 dBuV/m (2018.4 mV/m) in peak mode compared to a limit of 127.95 dBuV/m (2500mV/m).

Harmonic Emissions [FCC 15.245 (b)(1)], [RSS-210 Section 6.2.2(n)]

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance for Harmonics 34 dB at 48.234 GHz

Remarks: The first harmonic harmonic was measured to be 73.1 dBuV/m (4.52 mV/m) in peak mode compared to a limit of 108 dBuV/m (250 mV/m).

Radiated Emissions outside of the specified frequency bands [FCC 15.245 (b)(3)], [RSS-210 Section 6.2.2(n)]

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance for spurious emissions 8 dB at 50.99 MHz

Remarks: 50.99 MHz was measured to be 31.7 dBuV/m (.038 mV/m) in quasi-peak mode compared to a limit of 40 dBuV/m (100 mV/m).

Band Edge Compliance [FCC 15.245 (b)(3)], [RSS-210 Section 6.2.2(n)]

The requirements are ■ - MET ☐ - NOT MET

Remarks: Allowed band is 24.075 GHz to 24.175 GHz. (See page 27)

Emission Bandwidth [RSS-210 (5.9.1)]

Remarks: See plots on pages 29 and 30.

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Environmental conditions in the lab: TUV America Large Test Site

	Actual
Temperature	: 22 °C
Relative Humidity	: 21 %
Atmospheric pressure	: 98.0 kPa
Power supply system	: 13.8 VDC

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1993), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1993). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-2001 procedures and using the CISPR 22 Limits.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ±4.8 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit.

To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)

μV = Inverse log(dBμV/20)

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RADIATED EMISSIONS

The final level, expressed in dBμV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBμV), adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL (dBuV)		CABLE/ANT/PREAMP (dB)	(dB/m)	(dB)		FINAL (dBuV/m)		POL/HGT/AZ (m)	(deg)	DELTA1 EN 55022 A
60.80	42.5Qp	+	1.2	+ 10.9	- 25.5	=	29.1	V	1.0	0.0	-10.9

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-2001 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 100000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. The transmitter is rotated through 3 orthogonal axes in order to determine the maximum emission levels.

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DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:

SUMMARY:

The requirements according to the technical regulations are

■ - met

☐ - **not** met.

The device under test does

■ - fulfill the general approval requirements mentioned on page 3.

☐ - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 04 April 2005

Testing End Date: 11 April 2005

- TÜV PRODUCT SERVICE INC -

Thomas K. Swanson

Reviewed By:
T. K. Swanson

J C Sausen

Tested By:
J. C. Sausen

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Constructional Data Form(s)

and/or

Product Information Form(s)

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Form

EMC Test Plan and Constructional Data Form

TÜV AMERICA

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE.

Applicant -- ***NOTE: This information will be input into your test report as shown below.***
Press the F1 key at any time to get HELP for the current field selected.

Company:	Phoenix International		
Address:	1441 44th St NW		
	Fargo, ND 58102		
Contact:	Steve Lind	Position:	Design Engineer
Phone:	701-451-3750	Fax:	701-298-0439
E-mail Address:	slind@phoeintl.com		

General Equipment Description -- ***NOTE: This information will be input into your test report as shown below.***

EUT Description	Eagle Radar Ground Speed Sensor
EUT Name	NA Eagle Radar GND Speed
Model No.:	90-137673 Serial No.: 100111
Product Options:	n/a
Configurations to be tested:	Standard

Test Objective

- ☐ EMC Directive 89/336/EEC (EMC) Std:
- ☐ Machinery Directive 89/392/EEC (EMC Std:
- ☐ Medical Device Directive 93/42/EEC (EMC) Std:
- ☐ Vehicle Directive 72/245/EEC (EMC) Std:
- ☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)

- ☒ FCC: Class ☐ A ☐ B Part 15
- ☐ VCCI: Class ☐ A ☐ B
- ☐ BSMI: Class ☐ A ☐ B
- ☐ Canada: Class ☐ A ☐ B
- ☐ Australia: Class ☐ A ☐ B
- ☒ Other: FCC Title 47 Part 15 Subpart C Industry Canada RSS-210

TÜV Product Service Certification Requested

- ☐ Attestation of Conformity (AoC)
- ☒ Certificate of Conformity (CoC)
- ☐ EMC Certification (used with Octagon Mark)
- ☒ Compliance Document

Protection Class (N/A for vehicles) ☐ Class I ☐ Class II ☐ Class III

(Press **F1** when field is selected to show additional information on Protection Class.)

Attendance

Test will be: ☐ Attended by the customer ☒ Unattended by the customer

EMC Test Plan and Constructional Data Form

Failure - ***Complete this section if testing will not be attended by the customer.***

If a failure occurs, TUV Product Service should:

☒ Call contact listed above, if not available then stop testing. (After hrs phone): _____

☐ Continue testing to complete test series.

☐ Continue testing to define corrective action.

☐ Stop testing.

EUT Specifications and Requirements

Length: 6.5" Width: 6" Height: 6" Weight: 4 lbs

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 13.8V nominal, or 12V battery (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: DC

Current (Amps/phase(max)): 0.5 Current (Amps/phase(nominal)): 0.2

Other _____

Other Special Requirements

n/a

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Agricultural Equipment

EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): _____

☐ Shielded OR ☐ Unshielded

☒ Not Applicable

EMC Test Plan and Constructional Data Form

TÜV AMERICA

EUT Interface Ports and Cables

Type			During Test		Qty	Shielding			Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent
	Analog	Digital	Active	Passive		Yes	No	Type						
EXAMPLE: *RS232*	☐	☒	☒	☐	*2*	☒	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	☒	☐
Interface Connector	☐	☒	☒	☐	1	☐	☒	none	Metric-Pack 150 Series	10 Metric-Pack	open		☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
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	☐	☐	☐	☐		☐	☐						☐	☐

EMC Test Plan and Constructional Data Form

AMERICA

EUT Software.

Revision Level: 2.07

Description:

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Active Mode. EUT will be powered but with no stimulation - detecting zero speed.

2.

3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #
n/a			

EMC Test Plan and Constructional Data Form

AMERICA

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc) This information is required for FCC & Taiwan testing.

Description	*Model #*	*Serial #*	*FCC ID #*
n/a			

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
10MHz	40MHz	opposite of EUT connector	DSP crystal

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
n/a			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*

EMC Test Plan and Constructional Data Form

AMERICA

Critical EMI Components (Capacitors, ferrites, etc.)				
Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

Metal housing. 4 layer PCB (ground and power planes)

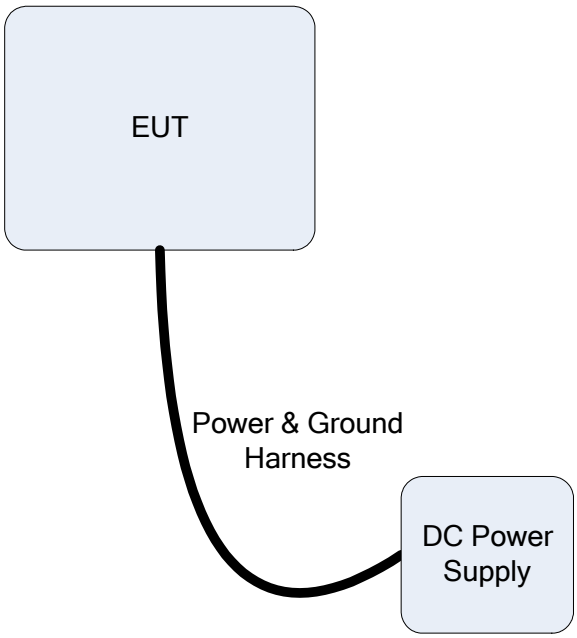
(PLEASE INSERT "**ELECTRONIC SIGNATURE**" BELOW IF POSSIBLE)

Authorization Signatures

Steve Lind	3/31/05
Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date

EMC Block Diagram Form

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



(Note: Use the same setup for both products tested)

Authorization Signatures

Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date

Test Data

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Fundamental Field Strength

Specifications:
FCC Specification: Paragraph: 15.245 (b)
IC Specification: RSS-210, 6.2.2(n)

The *FUNDAMENTAL FIELD STRENGTH* measurements were performed at the following test location:

☐ - Test not applicable

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■	3367	E4440A	Agilent	Spectrum Analyzer	MY43362222	25-Aug-05
■ -	2788	3116	Electro-Mechanics	Ridge Guide Ant 18-40 GHz	2005	27-Sep-05

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

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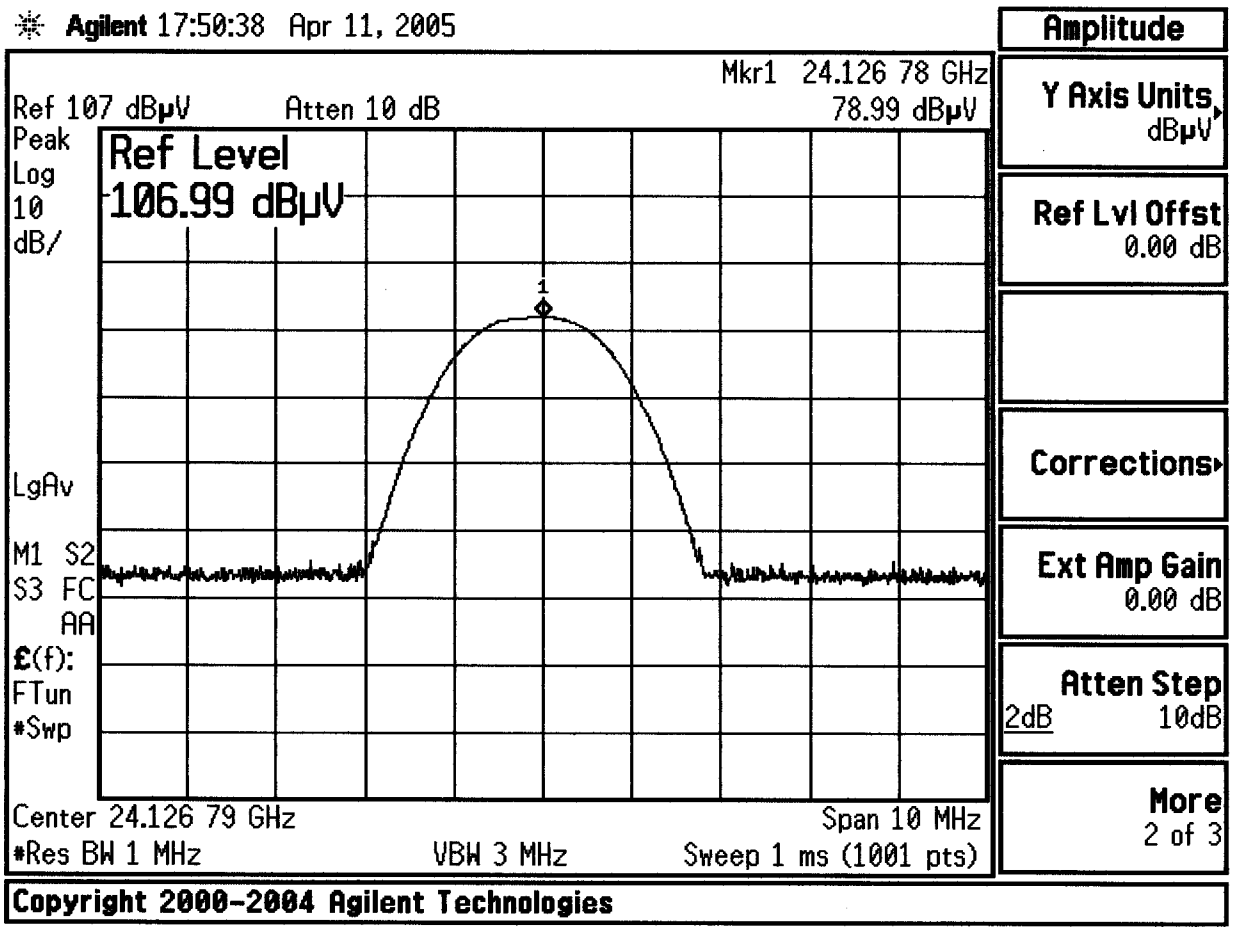


ANT # 1 - on near side

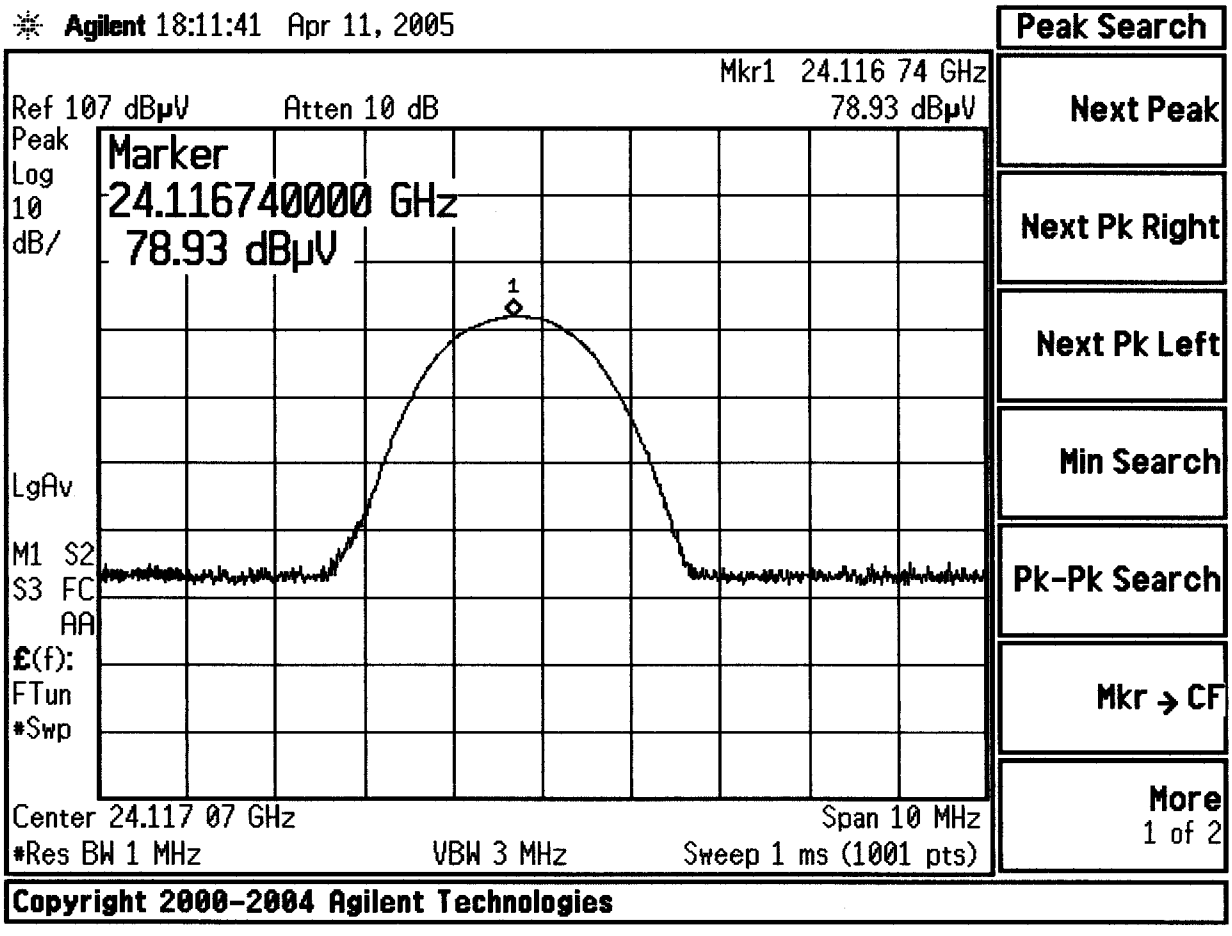
RCV. ANTENNA HOR. - 3M AWAY

78.9 + 46 + 1.2 = 126.1 dBµV/m

A.F. C.L.

(#3897)

EAGLE



ANT #2 - on pwr. connector side

RCV ANTENNA VERT. POL.

78.9 + 46 + 1.2 = 126.1 dBµV/m

A.F. C.L.

EAGLE

Harmonic Emissions

Specifications:
FCC Specification: Paragraph: 15.245 (b)(1)
IC Specification: RSS-210, 6.2.2(n)

The *Harmonic Emission* measurements were performed at the following test location:

☐ **- Test not applicable**

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■-	8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	24-Mar-06
■ -	8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	24-Mar-06
■ -	2127	11975A	Hewlett Packard	Amplifier 2- 8 GHz	2738A01200	Code B 25-May-05
■ -	2919	11970U	Hewlett-Packard	Harm Mixer – 40-60 GHz	3003A01395	11-Jul-06
■ -	2922	11970W	Hewlett-Packard	Harm Mixer – 75-110 GHz	2521A01336	23-Oct-06
■ -	2920	11970V	Hewlett-Packard	Harm Mixer – 50-75 GHz	2521A01172	23-Oct-06
■ -	2918	19-7025	Aerowave Inc	Horn Antenna – 40-60 GHz		N/A
■ -	2917	15-7025	Aerowave Inc	Horn Antenna – 50-75 GHz		N/A
■ -	2916	10-7025	Aerowave Inc	Horn Antenna–75-110 GHz		N/A

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

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RADIATED EMISSIONS

Test Report #:	WC501664	Test Area:	LTS		
EUT Model #:	90-137673	Date:	04 April 2005		
EUT Serial #:	100111	EUT Power:	13.8 VDC	Temperature:	22.0 °C
Test Method:	FCC B - HARMONIC EMISSIONS 15.245(B)(1)			Air Pressure:	98.0 kPa
Customer:	Phoenix			Rel. Humidity:	21.0 %
EUT Description:	Eagle radar ground speed sensor				
Notes:					
Data File Name:				Page:	1 of 1

Harmonics: Horn 1

Measurement Distance:	1 meter
Frequency of Signal:	48.234 GHz
Uncorrected Peak Level:	34.0 dBuV (Maximized EUT / Antenna orientation)
ACF:	39.1 dB/m
Corrected Field Strength:	34.0 dBuV + 39.1 dB ACF = 73.1 dBuV/m Pk
Limit:	108 dBuV/m
Delta From Limit:	-34.9 dB (Pass)

Tested by: J. C. Sausen — Printed — Signature

Reviewed by: TKS — Printed — Signature

Radiated Emissions Outside of the specified frequency bands

Specifications:
FCC Specification: Paragraph: 15.245 (b)(3)
IC Specification: RSS-210, 6.2.2(n)

The *Radiated Emission* measurements were performed at the following test location:

☐ **- Test not applicable**

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■	2681	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00562	03-Feb-06
■-	8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	24-Mar-06
■ -	8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	24-Mar-06
■ -	3204	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	21-Oct-05
■ -	2670	8447D	Electro-Mechanics (EMCO)	Preamplifier	2443A03954	Code B 17-Oct-05
■ -	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	24-Nov-05
■-	3958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B 24-May-05
■ -	2127	11975A	Hewlett Packard	Amplifier 2- 8 GHz	2738A01200	Code B 25-May-05
■ -	2788	3116	Electro-Mechanics (EMCO)	Ridge Guide Ant 18-40 GHz	2005	27-Sep-05
■ -	2662	11970K	Hewlett-Packard	Harm Mixer – 18-26.5 GHz	2332A01170	11-Jul-06
■ -	2661	11970A	Hewlett-Packard	Harm Mixer – 26.5-40 GHz	2332A01861	11-Jul-06
■ -	2918	19-7025	Aerowave Inc	Horn Antenna – 40-60 GHz		N/A
■ -	2919	11970U	Hewlett-Packard	Harm Mixer – 40-60 GHz	3003A01395	11-Jul-06
■ -	2916	10-7025	Aerowave Inc	Horn Antenna - 75-110 GHz		N/A
■ -	2922	11970W	Hewlett-Packard	Harm Mixer – 75-110 GHz	2521A01336	23-Oct-05
■ -	2920	11970V	Hewlett-Packard	Harm Mixer – 50-75 GHz	2521A01172	23-Oct-06
■ -	2917	15-7025	Aerowave Inc	Horn Antenna – 50-75 GHz		N/A

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

RADIATED EMISSIONS

Test Report #:	WC501664 Run 1	Test Area:	LTS		
EUT Model #:	90-137673	Date:	4/4/05		
EUT Serial #:	100111	EUT Power:	13.8 VDC	Temperature:	22.0 °C
Test Method:	EN55022 B			Air Pressure:	98.0 kPa
Customer:	Phoenix International			Rel. Humidity:	21.0 %
EUT Description:	Eagle Radar Ground Speed Sensor				
Notes:					
Data File Name:	1664.dat			Page:	1 of 3

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m	DELTA2 FCC B >1GHz 3m
50.991 MHz	44.25 Qp	0.6 / 13.9 / 27.05 / 0.0	31.7	V / 1.00 / 0	-8.3	n/a
52.791 MHz	41.45 Qp	0.6 / 13.37 / 27.0 / 0.0	28.42	V / 1.00 / 0	-11.58	n/a
62.637 MHz	43.4 Qp	0.65 / 10.9 / 27.0 / 0.0	27.95	V / 1.00 / 0	-12.05	n/a
84.112 MHz	37.5 Qp	0.8 / 7.28 / 26.9 / 0.0	18.68	V / 1.00 / 0	-21.32	n/a
120.0 MHz	34.2 Qp	0.9 / 9.07 / 27.1 / 0.0	17.07	V / 1.00 / 0	-26.43	n/a
400.001 MHz	29.2 Qp	1.7 / 16.07 / 27.82 / 0.0	19.15	V / 1.00 / 0	-26.85	n/a
50.9 MHz maxed:						
50.991 MHz	43.6 Qp	0.6 / 13.9 / 27.05 / 0.0	31.05	V / 1.10 / 5	-8.95	n/a
52.785 MHz	40.05 Qp	0.6 / 13.37 / 27.0 / 0.0	27.02	V / 1.10 / 5	-12.98	n/a
84 MHz maxed: no level changes noted. 120 MHz maxed: No level changes noted.						
400 MHz maxed:						
400.001 MHz	30.31 Qp	1.7 / 16.07 / 27.82 / 0.0	20.26	V / 1.00 / 223	-25.74	n/a
320 MHz maxed:						
320.003 MHz	32.69 Qp	1.5 / 13.77 / 27.5 / 0.0	20.46	H / 1.00 / 219	-25.54	n/a
240.003 MHz	28.67 Qp	1.3 / 11.32 / 27.2 / 0.0	14.09	H / 1.00 / 219	-31.91	n/a
840.003 MHz	31.69 Qp	2.49 / 21.81 / 27.8 / 0.0	28.19	H / 1.00 / 219	-17.81	n/a
840 MHz maxed:						
840.003 MHz	36.09 Qp	2.49 / 21.81 / 27.8 / 0.0	32.59	H / 1.50 / 126	-13.41	n/a
839.963 MHz	36.81 Qp	2.49 / 21.81 / 27.8 / 0.0	33.31	H / 1.50 / 126	-12.69	n/a
919.963 MHz	31.41 Qp	2.62 / 22.61 / 27.6 / 0.0	29.04	H / 1.50 / 126	-16.96	n/a
No further EUT emissions detected 1 GHz to 18 GHz, vert and hor ant.						

Tested by: J. C. Sausen — Printed — J C Sausen — Signature

Reviewed by: TKS — Printed — Thomas K. Swanson — Signature

RADIATED EMISSIONS

Test Report #:	WC501664 Run 1	Test Area:	LTS		
EUT Model #:	90-137673	Date:	4/4/05		
EUT Serial #:	100111	EUT Power:	13.8 VDC	Temperature:	22.0 °C
Test Method:	EN55022 B			Air Pressure:	98.0 kPa
Customer:	Phoenix International			Rel. Humidity:	21.0 %
EUT Description:	Eagle Radar Ground Speed Sensor				
Notes:					
Data File Name:	1664.dat			Page:	2 of 3

Measurement summary for limit1: FCC-B <1GHz 3m (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m
50.991 MHz	44.25 Qp	0.6 / 13.9 / 27.05 / 0.0	31.7	V / 1.00 / 0	-8.3
52.791 MHz	41.45 Qp	0.6 / 13.37 / 27.0 / 0.0	28.42	V / 1.00 / 0	-11.58
62.637 MHz	43.4 Qp	0.65 / 10.9 / 27.0 / 0.0	27.95	V / 1.00 / 0	-12.05
839.963 MHz	36.81 Qp	2.49 / 21.81 / 27.8 / 0.0	33.31	H / 1.50 / 126	-12.69
919.963 MHz	31.41 Qp	2.62 / 22.61 / 27.6 / 0.0	29.04	H / 1.50 / 126	-16.96
84.112 MHz	37.5 Qp	0.8 / 7.28 / 26.9 / 0.0	18.68	V / 1.00 / 0	-21.32
320.003 MHz	32.69 Qp	1.5 / 13.77 / 27.5 / 0.0	20.46	H / 1.00 / 219	-25.54
400.001 MHz	30.31 Qp	1.7 / 16.07 / 27.82 / 0.0	20.26	V / 1.00 / 223	-25.74
120.0 MHz	34.2 Qp	0.9 / 9.07 / 27.1 / 0.0	17.07	V / 1.00 / 0	-26.43
240.003 MHz	28.67 Qp	1.3 / 11.32 / 27.2 / 0.0	14.09	H / 1.00 / 219	-31.91

Tested by: J. C. Sausen — Printed

J C Sausen — Signature

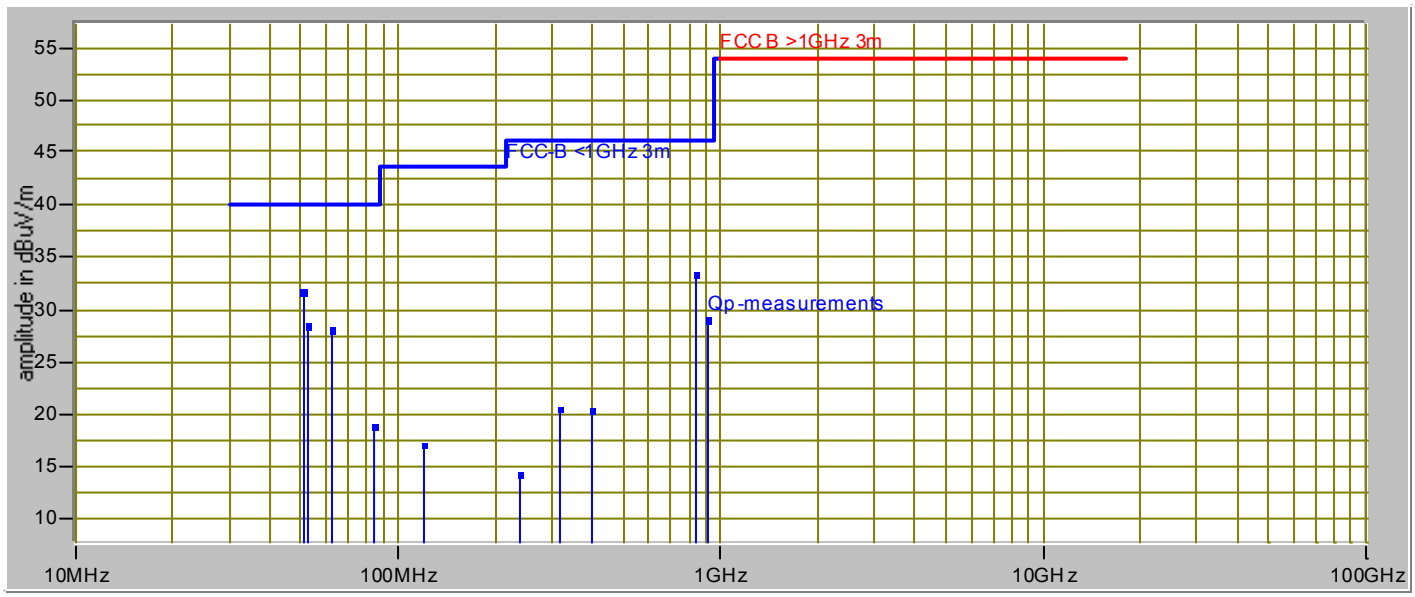
Reviewed by: TKS — Printed

Thomas K. Swanson — Signature

RADIATED EMISSIONS

Test Report #:	WC501664 Run 1	Test Area:	LTS		
EUT Model #:	90-137673	Date:	4/4/05		
EUT Serial #:	100111	EUT Power:	13.8 VDC	Temperature:	22.0 °C
Test Method:	EN55022 B			Air Pressure:	98.0 kPa
Customer:	Phoenix International			Rel. Humidity:	21.0 %
EUT Description:	Eagle Radar Ground Speed Sensor				
Notes:					
Data File Name:	1664.dat			Page:	3 of 3

Graph:



Tested by: J. C. Sausen

Printed _____ Signature _____

Reviewed by: TKS

Printed _____ Signature _____

Band Edge Compliance

Specifications:
FCC Specification: Paragraph: 15.245 (b)(3)
IC Specification: RSS-210, 6.2.2(n)

The *Band Edge* measurements were performed at the following test location:

☐ - Test not applicable

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

Test equipment used :

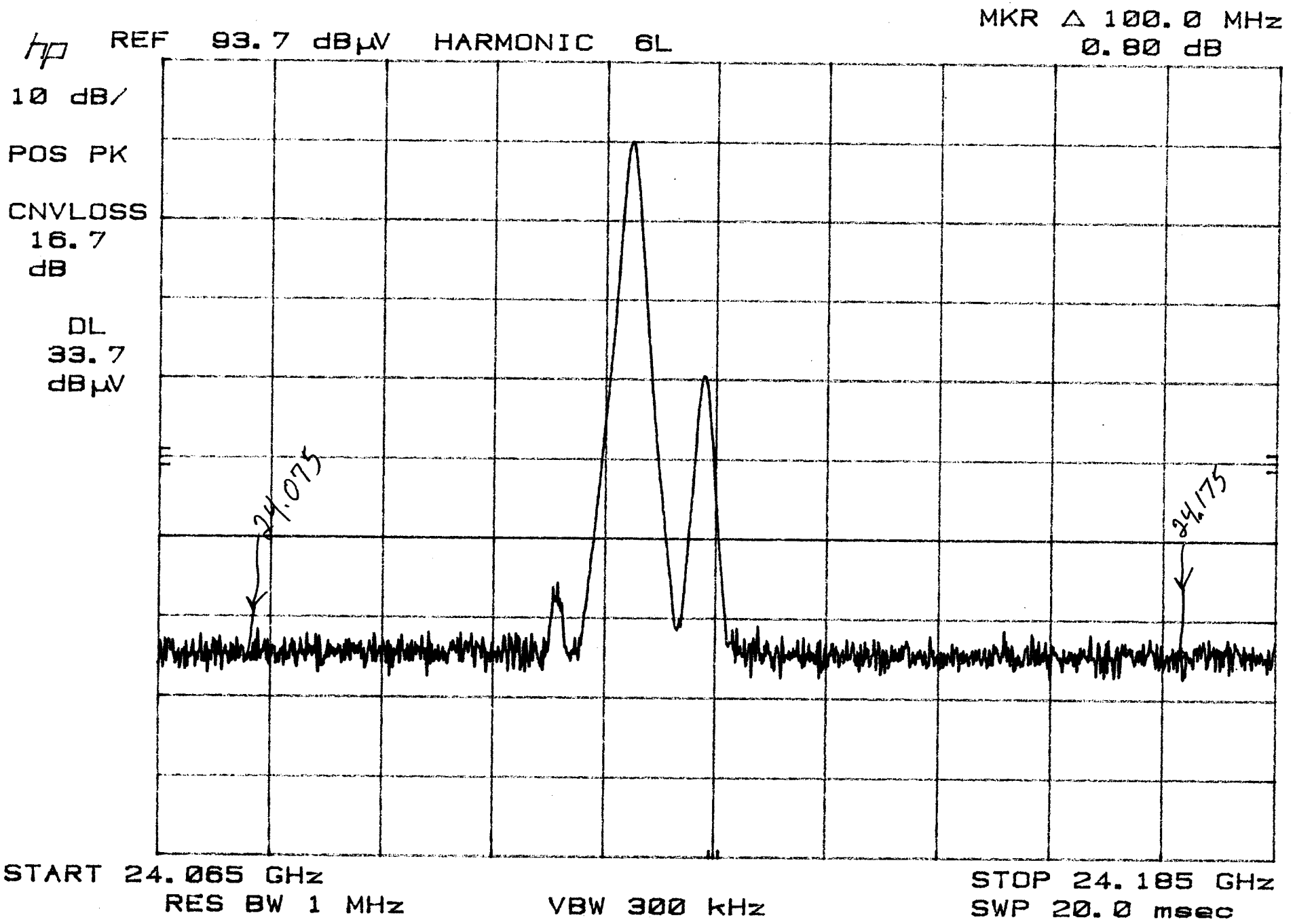
	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■-	8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	24-Mar-06
■ -	8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	24-Mar-06
■ -	2127	11975A	Hewlett Packard	Amplifier 2- 8 GHz	2738A01200	Code B 25-May-05
■ -	2788	3116	Electro-Mechanics (EMCO)	Ridge Guide Ant 18-40 GHz	2005	27-Sep-05
■ -	2662	11970K	Hewlett-Packard	Harm Mixer – 18-26.5 GHz	2332A01170	11-Jul-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

Model # 90-137673
Band edge with -50dBc display line



Emission Bandwidth

Specifications:
FCC Specification: N/A
IC Specification: RSS-210, 5.9.1

The *Emission Bandwidth* measurements were performed at the following test location:

☐ **- Test not applicable**

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■-	8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	24-Mar-06
■ -	8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	24-Mar-06
■ -	2127	11975A	Hewlett Packard	Amplifier 2- 8 GHz	2738A01200	Code B 25-May-05
■ -	2788	3116	Electro-Mechanics (EMCO)	Ridge Guide Ant 18-40 GHz	2005	27-Sep-05
■ -	2662	11970K	Hewlett-Packard	Harm Mixer – 18-26.5 GHz	2332A01170	11-Jul-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

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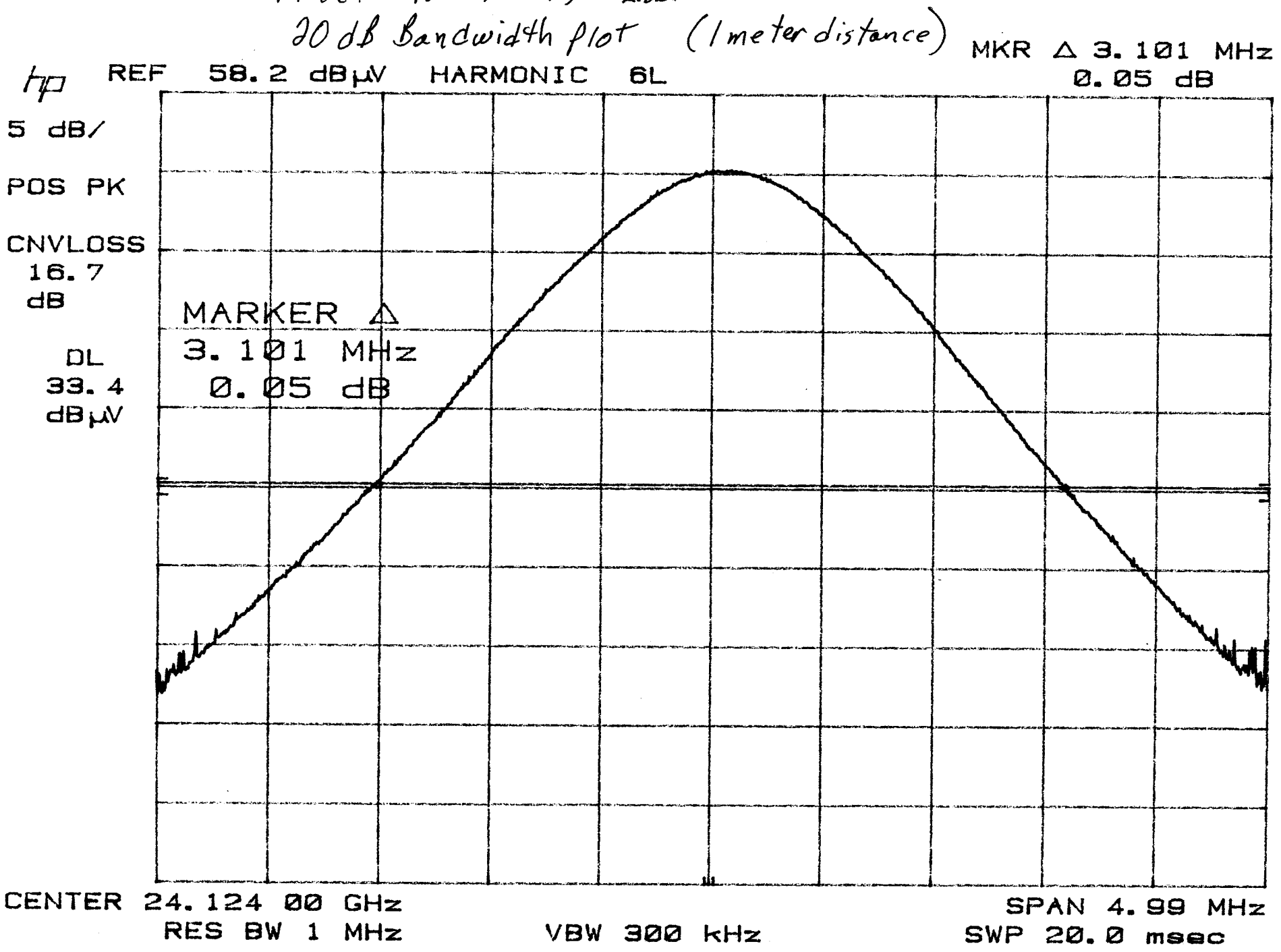
Model #90-137673 T.S.S.

20 dB Bandwidth plot (1 meter distance)



Model # 90-137673 E.S.S.

20dB Bandwidth plot (1 meter distance)