Elliott Laboratories Inc. 684 West Maude Avenue 408-245-7800 Phone
www.elliottlabs.com Sunnyvale, CA 94086-3518 408-245-3499 Fax

Electromagnetic Emissions Test Report and Request for Class II Permissive Change pursuant to FCC Part 15, Subpart C Specifications for an Intentional Radiator on the Neptune Technology Group Inc. Model: Pocket ProReader RF

FCC ID:	P2SNTGPKT1101
Industry Canada CPN/UPN:	4171B12088
GRANTEE:	Neptune Technology Group Inc. 1600 Alabama Hwy 229 Tallassee, AL 36078
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	January 24, 2003
FINAL TEST DATE:	January 22, 2003
AUTHORIZED SIGNATORY:	Mark Briggs Director of Engineering

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SCOPE

An electromagnetic emissions test has been performed on the Neptune Technology Group Inc. model Pocket ProReader RF pursuant to Subpart C of Part 15 of FCC Rules and Industry Canada Radio Standard RSS 210 for intentional radiators. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures, FCC Part 15 and RSS-210, section 5.3.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Neptune Technology Group Inc. model Pocket ProReader RF and therefore apply only to the tested sample. The sample was selected and prepared by Mohammed Ali of Neptune Technology Group Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules and Industry Canada RSS210 for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules and RSP 100.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the certification body (FCC, TCB or Industry Canada). The certification body issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units subsequently manufactured.

STATEMENT OF COMPLIANCE

The tested sample of Neptune Technology Group Inc. model Pocket ProReader RF complied with the requirements of Subpart C of Part 15 of the FCC Rules and RSS 210 for low power intentional radiators.

Maintenance of FCC compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

EMISSION TEST RESULTS

The following emissions tests were performed on the Neptune Technology Group Inc. model Pocket ProReader RF. The actual test results are contained in an exhibit of this report.

LIMITS OF CONDUCTED INTERFERENCE VOLTAGE

The EUT is battery powered and is not intended to operate while connected directly, or indirectly, to an AC power outlet. The requirements for measuring the conducted interference voltage do not apply.

LIMITS OF RADIATED INTERFERENCE FIELD STRENGTH

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.249 and RSS 210 and 15.209 in the case of emissions falling within the frequency bands specified in Section 15.205.

The following measurement was extracted from the data recorded during the radiated electric field emissions scan and represents the highest amplitude emission relative to the specification limit. The actual test data and any correction factors are contained in an exhibit of this report.

Fundamental Signal

Frequency MHz	Level dBuV/m	Pol v/h	FCC 15.249 / RSS 210 Limit	Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
914.000	75.9	h	94.0	-18.1	QP	240	1.0	

Spurious Signals, 30MHz – 9140 MHz

Frequency MHz	Level dBuV/m	Pol v/h	FCC 15.249 / RSS 210 Limit	Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
4570.000	47.9	h	54.0	-6.1	Avg	275	1.8	

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Neptune Technology Group Inc. model Pocket ProReader RF is a transmitter that operates at 914 MHz and which is designed to read utility meters remotely. Normally, the EUT would be handheld during operation. The EUT was, therefore, placed in three orientations, front, side, and back to simulate the end user environment. The electrical rating of the EUT is 3.65Vdc via internal, rechargeable batteries. (Note that although the device can be connected to an AC-DC adapter tp recharge the batteries, the device cannot operate while the adapter is connected).

The sample was received on January 22, 2003 and tested on January 22, 2003. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number
Neptune Pocket ProReader RF Transmitter	-

ENCLOSURE

The EUT enclosure is primarily constructed of fabricated plastic. It measures approximately 6.9 cm wide by 4 cm deep by 15.5 cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

No support equipment was used during emissions testing.

EXTERNAL I/O CABLING

The I/O cabling configuration during emissions testing was as follows:

		Cable(s)		
EUT Port	Connected To	Description	Shielded or Unshielded	Length(m)
DC Power	Not connected			

Note: Power port is used for charging the internal batteries only. The device cannot operate while being charged or whenever a cable is connected to the dc power port.

TEST SOFTWARE

The unit was transmitting continuously during testing at the nominal frequency of 914 MHz.

PROPOSED MODIFICATION DETAILS

This section details the proposed modifications to the previously certified Neptune Technology Group Inc. model Pocket ProReader RF. All performance and construction deviations from the characteristics originally reported to the FCC are addressed

Due to receiver problems associated with the RFM chips bit rise time variations the following modifications to the design of the device are proposed:

1. Change RF modulation from OOK to ASK, using the same RFM TX6004 IC for generation of the transmit signal.
2. Optimize the antenna length for the intended center frequency of 914 MHz with no change to the transmit frequency.
3. Use a voltage switch circuit to keep the unit 100% on when transmitting and turn it 100% off when not transmitting to increase battery life.
4. Use proper pull-ups to en sure that the signal levels are correct for the RFM chip.
5. Update the RF output matching circuits to have more consistent RF power and reduced RF spurious noise
6. Kept the RF power under 1 mWatt as specified in the RFM TX6004 transmit chip.
7. Minor layout changes to incorporate items listed above.
8. Update firmware to change the RF modulation from OOK to ASK.

It is believed that these changes fall under the scope of Permissive Changes as detailed in both FCC Part 2 and Industry Canada RSP100.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on January 22, 2003 at the Elliott Laboratories Open Area Test Site #2 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal standardized RF impedance, provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde and Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors, which are programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these are with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

AC MAINS CONDUCTED EMISSIONS SPECIFICATION LIMITS, RSS 210

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

AC MAINS CONDUCTED EMISSIONS SPECIFICATION LIMITS, FCC SECTION 15.207

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

RADIATED EMISSIONS SPECIFICATION LIMITS, FUNDAMENTAL SIGNAL

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
902 - 928	50,000	94.0

RADIATED EMISSIONS SPECIFICATION LIMITS, SPURIOUS EMISSIONS

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

The limits on all other emissions, including the fundamental transmit frequency were taken from RSS210-6.2.2 (m2).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - B = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

* Broadband Level – Industry Canada Only - 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

Radiated Emissions, 23-Jan-03
Engineer: Rafael

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	12	5/13/2002	5/13/2003
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	12	3/11/2002	3/11/2003
EMCO	Log Periodic Antenna, 0.2-1 GHz	3146	1294	12	4/12/2002	4/12/2003
Hewlett Packard	High Pass filter, 1.5GHz	P/N 84300-80037	1158	12	3/4/2002	3/4/2003
Hewlett Packard	Microwave EMI test system (SA40, 9Hz - 40GHz), system 2	84125C	1410	12	4/2/2002	4/2/2003
Rohde & Schwarz	Test Receiver, 0.009-2000 MHz	ESN	1332	12	4/16/2002	4/16/2003

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T49966 6 Pages

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EMC Test Data

Client:	Neptune Technology Group Inc.	Job Number:	J49956
Model:	Pocket ProReader RF	T-Log Number:	T49966
		Proj Eng:	Mark Briggs
Contact:	Mohammed Ali		
Emissions Spec:	FCC 15.249	Class:	-
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Neptune Technology Group Inc.

Model

Pocket ProReader RF

Client:	Neptune Technology Group Inc.	Job Number:	J49956
Model:	Pocket ProReader RF	T-Log Number:	T49966
		Proj Eng:	Mark Briggs
Contact:	Mohammed Ali		
Emissions Spec:	FCC 15.249	Class:	-
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is a transmitter that operates at 914 MHz and which is designed to read utility meters remotely. Normally, the EUT would be handheld during operation. The EUT was, therefore, placed in three orientations, front, side, and back to simulate the end user environment. The electrical rating of the EUT is 3.65Vdc.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Neptune	Pocket ProReader RF	Transmitter		

EUT Enclosure

The EUT enclosure is primarily constructed of fabricated plastic. It measures approximately 6.9 cm wide by 4 cm deep by 15.5 cm high.

Modification History

Mod. #	Test	Date	Modification
1	-	-	None

Client:	Neptune Technology Group Inc.	Job Number:	J49956
Model:	Pocket ProReader RF	T-Log Number:	T49966
		Proj Eng:	Mark Briggs
Contact:	Mohammed Ali		
Emissions Spec:	FCC 15.249	Class:	-
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

EUT Interface Ports

EUT Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Power	Not connected			

Note: Power port is used for charging the internal batteries only. The device cannot operate while being charged.

EUT Operation During Emissions

The unit was transmitting continuously during testing.

Client:	Neptune Technology Group Inc.	Job Number:	J49956
Model:	Pocket ProReader RF	T-Log Number:	T49966
		Proj Eng:	Mark Briggs
Contact:	Mohammed Ali		
Spec:	FCC 15.249	Class:	-

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 1/22/2003
Test Engineer: Rafael
Test Location: SVOATS #2
Config. Used: 1
Config Change: None
EUT Voltage: 3.65Vdc

General Test Configuration

The EUT was located on the turntable for radiated emissions testing.
On the OATS, the measurement antenna was located 3m from the EUT for the frequency range 1 - 10 GHz.
Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.
Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB. A 1MHz Resolultion and Video Bandwidth was used.
For handheld or bodyworn transmitters, the EUT was tested in three orthogonal axes to determine worst case orientation, that produce the highest emission level closest to the limit The worst case orientation was then used for final measurements of the fundamental and spurious emissions. (ANSI C63.4-1992 (Section 13.1.4.1)

Ambient Conditions:

Temperature: 15°C
Rel. Humidity: 83%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Fundamental	15.249(a)	Pass	-18.1dB @ 914 MHz
2	RE, Harmonics	15.249(a)	Pass	-6.1dB @ 4570 MHZ
3	RE, Bandedge Measurement	15.249(c)	Pass	**Refer to Plot# 1**

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EMC Test Data

Client:	Neptune Technology Group Inc.	Job Number:	J49956
Model:	Pocket ProReader RF	T-Log Number:	T49966
		Proj Eng:	Mark Briggs
Contact:	Mohammed Ali		
Spec:	FCC 15.249	Class:	-

Run #1: Fundamental Frequency
Tested @ 3m
Used 120KHz IF and Quasi detector

Frequency	Level	Pol	FCC 15.249		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
EUT Vertical								
914.000	75.3	v	94.0	-18.7	QP	360	1.0	
914.000	68.1	h	94.0	-25.9	QP	360	1.0	
EUT Horizontal								
914.000	69.8	v	94.0	-24.2	QP	250	1.2	
914.000	74.4	h	94.0	-19.6	QP	110	1.0	
EUT on its side								
914.000	72.3	v	94.0	-21.7	QP	35	1.2	
914.000	75.9	h	94.0	-18.1	QP	240	1.0	

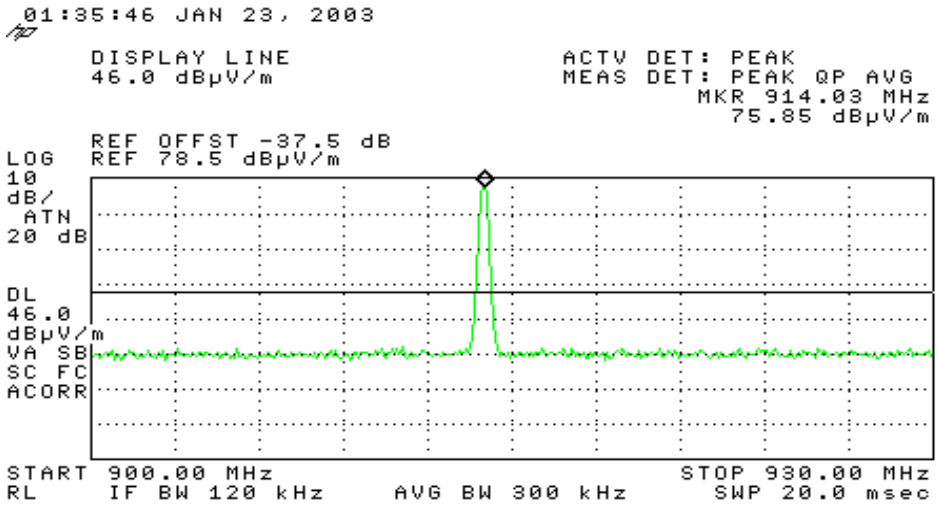
Run #2: Harmonics
Measurements made at 3m per FCC requirements.
EUT was tested on its Side, since it was worst case

Frequency	Level	Pol	FCC 15.249		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4570.000	47.9	h	54.0	-6.1	Avg	275	1.8	
4570.000	42.8	v	54.0	-11.2	Avg	40	1.0	
3656.000	42.2	h	54.0	-11.8	Avg	80	1.0	
3656.000	40.0	v	54.0	-14.0	Avg	345	1.8	
4570.000	56.0	h	74.0	-18.0	Pk	275	1.8	
3656.000	54.4	h	74.0	-19.6	Pk	80	1.0	
4570.000	53.9	v	74.0	-20.1	Pk	40	1.0	
1828.000	33.7	h	54.0	-20.3	Avg	145	1.0	
1828.000	32.2	v	54.0	-21.8	Avg	0	1.4	
3656.000	51.3	v	74.0	-22.7	Pk	345	1.8	
1828.000	45.7	h	74.0	-28.3	Pk	145	1.0	
1828.000	43.2	v	74.0	-30.8	Pk	0	1.4	
2742.000		h	54.0	-54.0	Avg			Noise Floor
5484.000		h	54.0	-54.0	Avg			Noise Floor
2742.000		v	54.0	-54.0	Avg			Noise Floor
5484.000		v	54.0	-54.0	Avg			Noise Floor
2742.000		h	74.0	-74.0	Pk			Noise Floor
5484.000		h	74.0	-74.0	Pk			Noise Floor
2742.000		v	74.0	-74.0	Pk			Noise Floor
5484.000		v	74.0	-74.0	Pk			Noise Floor

Note 1: No harmonic emission detected, after the 6 harmonic, close to 20-dB of the limit.

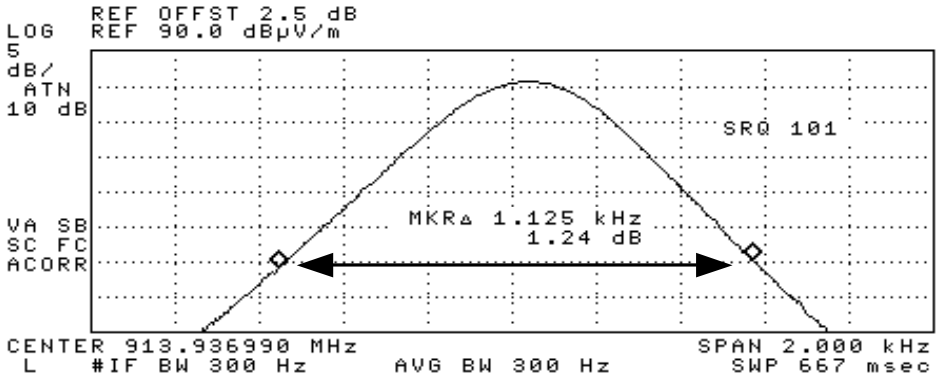
Client:	Neptune Technology Group Inc.	Job Number:	J49956
Model:	Pocket ProReader RF	T-Log Number:	T49966
		Proj Eng:	Mark Briggs
Contact:	Mohammed Ali		
Spec:	FCC 15.249	Class:	-

Run #3: Bandedge Measurement (15.249(c))



Signal at band edges is below the FCC 15.209 / RSS 210 limit for spurious emissions as demonstarted in the plot above.

Run #4: Occupied Bandwidth Measurement (RSS 210)



26dB bandwidth = 1.125kHz