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January 16, 2002

Chief, Equipment Authorization Branch,
Authorization and Evaluation Division,
Office of Engineering and Technology
FEDERAL COMMUNICATIONS COMMISSION
P.O. Box 358315
Pittsburgh, PA 15251-5315

Gentlemen:

The enclosed documents constitute a formal submittal and application for a Grant of Equipment Authorization pursuant to Subpart C of Part 15 of FCC Rules (CFR 47) regarding intentional radiators. Data within this report demonstrates that the equipment tested complies with the FCC limits for intentional radiators.

Elliott Laboratories, as duly authorized agent prepared this submittal. A copy of the letter of our appointment as agent is enclosed.
If there are any questions or if further information is needed, please contact Elliott Laboratories for assistance.

Sincerely,

David W. Bare
Chief Technical Officer

DWB/dmg
Enclosures: Application Fee
FCC Form 159
FCC Form 731
Agent Authorization Letter
Emissions Test Report with Exhibits

File: R45980

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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C Specifications for an Intentional Radiator on the Neptune Technology Group, Inc. Model: Pit and Wall MIU1

FCC ID:	P2SNTGCNWP1101
GRANTEE:	Neptune Technology Group, Inc. 1600 Alabama Highway 229 Tallahassee, AL. 36078
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	January 16, 2002
FINAL TEST DATE:	November 8 and November 19, 2001
AUTHORIZED SIGNATORY:	David W. Bare Chief Technical Officer

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SCOPE

An electromagnetic emissions test has been performed on the Neptune Technology Group, Inc. models Pit MIU1 and Wall MIU1 pursuant to Subpart C of Part 15 of FCC Rules 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.

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 Pit and Wall MIU1 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 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.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC 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, which are subsequently manufactured.

STATEMENT OF COMPLIANCE

The tested sample of Neptune Technology Group, Inc. model Pit and Wall MIU1 complied with the requirements of Subpart C of Part 15 of the FCC Rules for low power intentional radiators.

Maintenance of FCC compliance is the responsibility of the manufacturer. Any modification of the product that 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 Pit and Wall MIU1. The actual test results are contained in an exhibit of this report.

LIMITS OF CONDUCTED INTERFERENCE VOLTAGE

The EUT was not tested to comply with the limits detailed in FCC Rules Part 15 Section 15.207, as the EUT is battery powered.

LIMITS OF RADIATED INTERFERENCE FIELD STRENGTH

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.247 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.

Pit MIU1

Frequency MHz	Level dBuV/m	Pol v/h	FCC 15.209 / 15.247 Limit	Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
3670.000	67.8	V	74.0	-6.2	Pk	207	1.0	-

Wall MIU1

Frequency MHz	Level dBuV/m	Pol v/h	FCC 15.209 / 15.247 Limit	Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
960.900	52.3	v	54.0	-1.7	QP	247	1.1	

LIMITS OF POWER AND BANDWIDTH – Pit MIU1

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.247.

The maximum power output was 16.2 dBm. The maximum power spectral density in any 3 kHz band was –4.1 dBm. The minimum 6 dB bandwidth was 1.4 Megahertz.

LIMITS OF POWER AND BANDWIDTH – Wall MIU1

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.247.

The maximum power output was 15.8 dBm. The maximum power spectral density in any 3 kHz band was –1.8 dBm. The minimum 6 dB bandwidth was 1.38 Megahertz.

MEASUREMENT UNCERTAINTIES

ISO Guide 25 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	± 3.2

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Neptune Technology Group, Inc. model Pit and Wall MIU1 are water meter interface units (MIU's) which are designed to be wall or pit mounted during operation. The Wall and Pit MIU1 are identical except that the Pit MIU1 has an external antenna for mounting on the cover of a pit water meter box and the Wall MIU1 has an internal antenna and is intended for mounting on a wall. The samples were received on November 8, 2001 and tested on November 8 and November 19, 2001. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number
Neptune Wall MIU1 Water Meter MIU	-
Neptune Pit MIU1 Water Meter MIU	-

OTHER EUT DETAILS

The EUT's are battery operated.

ENCLOSURE

The Wall and Pit MIU1 enclosures are primarily constructed of fabricated sheet steel. They measure approximately 10 cm wide by 13 cm deep by 5 cm high.

MODIFICATIONS

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

SUPPORT EQUIPMENT

No support equipment was used during emissions testing on the Wall or Pit MIU1

EXTERNAL I/O CABLING

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
DC	Battery	14 Gauge wire	Unshielded	0.1
Meter port	-	14 Gauge wire	Unshielded	5

TEST SOFTWARE

During testing, the EUTs were transmitting every 1 second at full power.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on November 8 and November 19, 2001 at the Elliott Laboratories Open Area Test Site #3 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, which is 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.

POWER METER

A power meter and thermister mount are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

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 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 is 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:

CONDUCTED EMISSIONS SPECIFICATION LIMITS, SECTION 15.207

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

RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.209

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

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 - Per ANSI C63.4, 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, 300 - 1000 MHz, 03-Oct-01 11:01 AM
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	802	12	2/15/2001	2/15/2002
Hewlett Packard	Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	12	5/31/2001	5/31/2002

Fundamental Emissions, 03-Oct-01 11:01 AM
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	802	12	2/15/2001	2/15/2002
Hewlett Packard	Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	12	5/31/2001	5/31/2002

Radiated Emissions, 1 - 6.5 GHz, 08-Nov-01 03:41 PM
Engineer: jgonzalez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Dorado International Corp	Horn Antenna, 1 - 12 GHz	GH1-12N	1258	12	11/9/2000	11/9/2001
Elliott Laboratories	Biconical Antenna, 30-300 MHz	DM-105-T1	382	12	8/22/2001	8/22/2003
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1321	12	4/10/2001	4/10/2002
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	12	1/30/2001	1/30/2002
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	12	1/11/2001	1/11/2002
Narda West	High Pass Filter 1.9 GHz	HPF-161	248	12	3/16/2001	3/16/2002
Rohde & Schwarz	Test Receiver, 0.009-2000 MHz	ESN	1332(775)	12	10/12/2001	10/12/2002

Radiated Emissions, 30 - 9500 MHz, 08-Nov-01 11:13 PM
Engineer: volivas

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	DM-105-T1	382	12	8/22/2001	8/22/2003
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	12	2/7/2001	2/7/2002
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1321	12	4/10/2001	4/10/2002
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	12	1/30/2001	1/30/2002
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	12	1/11/2001	1/11/2002
Narda West	High Pass Filter 1.9 GHz	HPF-161	248	12	3/16/2001	3/16/2002
Rohde & Schwarz	Test Receiver, 0.009-2000 MHz	ESN	1332(775)	12	10/12/2001	10/12/2002

Radiated Emissions, 30 - 9175 MHz, 19-Nov-01 10:09 AM
Engineer: Chris

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	12	2/7/2001	2/7/2002
Hewlett Packard	High Pass filter, 1.5GHz	P/N 84300-80037	1158	12	2/28/2001	2/28/2002
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	12	1/25/2001	1/25/2002
Hewlett Packard	Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	12	5/31/2001	5/31/2002
Rohde & Schwarz	Test Receiver, 0.009-2000 MHz	ESN	1332(775)	12	10/12/2001	10/12/2002

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T44919	10 Pages
T45314	10 Pages
Processing Gain Calculation	4 Pages

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EMC Test Data

Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Emissions Spec:	FCC 15.247	Class:	Direct Sequence
Immunity Spec:	N/A	Environment:	-

EMC Test Data

For The

Neptune Technology Group, Inc

Model

Pit MIU

Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Emissions Spec:	FCC 15.247	Class:	Direct Sequence
Immunity Spec:	N/A	Environment:	-

EUT INFORMATION

General Description

The EUT is a water meter interface unit (MIU) which is designed to mounted into a pit lid during operation. Normally, the EUT would be placed on a pit lid during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the EUT is 3.3 V dc.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Neptune Technology	Pit MIU	Water Meter MIU	N/A	F9CTALWCNMIU1

Other EUT Details

EUT is DC operated.

EUT Enclosure

The EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 10 cm wide by 13 cm deep by 5 cm high.

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Emissions Spec:	FCC 15.247	Class:	Direct Sequence
Immunity Spec:	N/A	Environment:	-

Test Configuration #2

Local Support Equipment - None

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Ports

		Cable(s)		
Port	Connected To	Description	Shielded or Unshielded	Length(m)
DC	Battery pack	14 Gauge wire	Unshielded	0.1
Meter port	-	14 Gauge wire	Unshielded	5

EUT Operation During Emissions

Transmitting every 1 second at full power.

Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Spec:	FCC 15.247	Class:	N/A

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: 11/8/2001
Test Engineer: JuanG/JayD
Test Location: SVOATS #3

Config. Used: 2
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 23°C
Rel. Humidity: 37%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 - 9175 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-6.2dB @ 3670.154
2	6dB Bandwidth	15.247(a)	Pass	1.400 MHz
3	Output Power	15.247(b)	Pass	16.19dBm
4	Power Spectral Density (PSD)	15.247(d)	Pass	-4.1dBm
5	Processing Gain	15.247(e)	N/A	Manufacturer to provide data.

Elliott

EMC Test Data

Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Spec:	FCC 15.247	Class:	N/A

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

S/N 0003828485

Run #1: Radiated Spurious Emissions, 30-9175.8 MHz. Middle Channel @ 917 MHz

	H	V
Fundamental emission level @ 3m in 100kHz RBW:	105.1	109.2
Limit for emissions outside of restricted bands:	89.2 dBµV/m	

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
458.790	43.0	V	89.2	-46.2	QP	360	1.0	
300.015	16.5	V	89.2	-72.7	QP	0	1.0	
630.500	24.0	V	89.2	-65.2	QP	344	1.0	
961.000	42.2	h	54.0	-11.8	QP	258	1.0	
1835.000	51.0	H	89.2	-38.2	Pk			Non-restricted. Note 1
1835.000	30.5	H	89.2	-58.7	Avg			
2752.418	56.7	H	74.0	-17.3	Pk	360	1.0	Restricted emission. Note 1
2752.521	30.5	H	54.0	-23.6	Avg	360	1.0	Restricted emission. Note 1& 2
3670.000	67.8	H	74.0	-6.2	PK	0	1.0	Restricted emission. Note 1
3670.000	31.7	H	54.0	-22.4	Avg	0	1.0	Restricted emission. Note 1& 2
4587.107	36.7	H	54.0	-17.3	Avg	142	1.0	Restricted emission. Note 1& 2
4587.862	61.2	H	74.0	-12.8	Pk	142	1.0	Restricted emission. Note 1
5506.027	62.1	H	89.2	-27.1	Pk	0	1.0	Non-restricted. Note 1
5506.027	45.7	H	89.2	-43.5	Ang	0	1.0	
6422.822	63.8	H	89.2	-25.4	Pk	298	1.0	Non-restricted. Note 1
6422.822	32.1	H	89.2	-57.1	Avg	298	1.0	
7340.000	60.2	H	74.0	-13.8	Pk	90	1.1	Restricted emission. Note 1
7340.000	33.1	H	54.0	-20.9	Avg	90	1.1	Restricted emission. Note 1& 2
8258.000	57.1	H	74.0	-16.9	Pk	350	1.0	Restricted emission. Note 1
8258.000	31.5	H	54.0	-22.5	Avg	350	1.0	Restricted emission. Note 1& 2
9175.800	59.9	H	74.0	-14.1	Pk	180	1.5	Restricted emission. Note 1
9175.800	35.0	H	54.0	-19.0	Avg	180	1.5	Restricted emission. Note 1& 2
961.000	44.7	v	54.0	-9.3	QP	20	1.0	
1835.000	61.0	V	89.2	-28.3	Pk	0	1.0	Non-restricted. Note 1

Elliott

EMC Test Data

Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Spec:	FCC 15.247	Class:	N/A

Run# 1

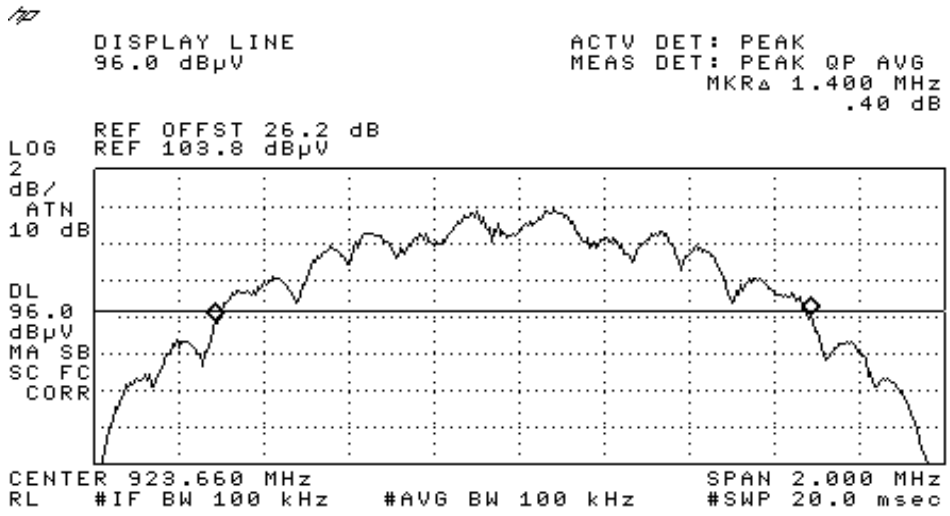
1835.000	28.5	V	89.2	-60.8	Avg	0	1.0	
2752.748	57.5	V	74.0	-16.5	PK	360	1.0	Restricted emission. Note 1
2752.848	28.5	V	54.0	-25.6	Avg	360	1.0	Restricted emission. Note 1& 2
3670.154	67.8	V	74.0	-6.2	PK	207	1.0	Restricted emission. Note 1& 2
3670.205	38.5	V	54.0	-15.6	Avg	207	1.0	Restricted emission. Note 1
4587.862	63.0	V	74.0	-11.1	Pk	230	1.0	Restricted emission. Note 1
4588.687	41.4	V	54.0	-12.6	Avg	230	1.0	Restricted emission. Note 1& 2
5506.027	65.9	V	89.2	-23.4	Pk	199	1.0	Non-restricted. Note 1
5506.027	39.7	V	89.2	-49.5	Avg	199	1.0	
6422.822	62.2	V	89.2	-27.0	Pk	0	1.4	Non-restricted. Note 1
6422.822	37.7	V	89.2	-51.5	Avg	0	1.4	
7340.000	60.3	V	74.0	-13.7	Pk	121	1.1	Restricted emission. Note 1
7340.000	36.4	V	54.0	-17.6	Avg	121	1.1	Restricted emission. Note 1& 2
8258.000	60.8	V	74.0	-13.2	Pk	271	1.3	Restricted emission. Note 1
8258.000	33.1	V	54.0	-20.9	Avg	271	1.3	Restricted emission. Note 1& 2
9175.800	65.0	V	74.0	-9.0	Pk	120	1.0	Restricted emission. Note 1
9175.800	39.0	V	54.0	-15.0	Avg	120	1.0	Restricted emission. Note 1& 2

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental. Applied Duty cycle to Average readings.
Note 2:	For Direct Sequence applied Duty Cycle (-13.15 dB) to Average Measurement and compared to average limit.
Note 3:	Set the transmitter to 4 seconds which gave a 71.2 dBuV/m @ 2752 MHz.

Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Spec:	FCC 15.247	Class:	N/A

Run #2: Signal Bandwidth

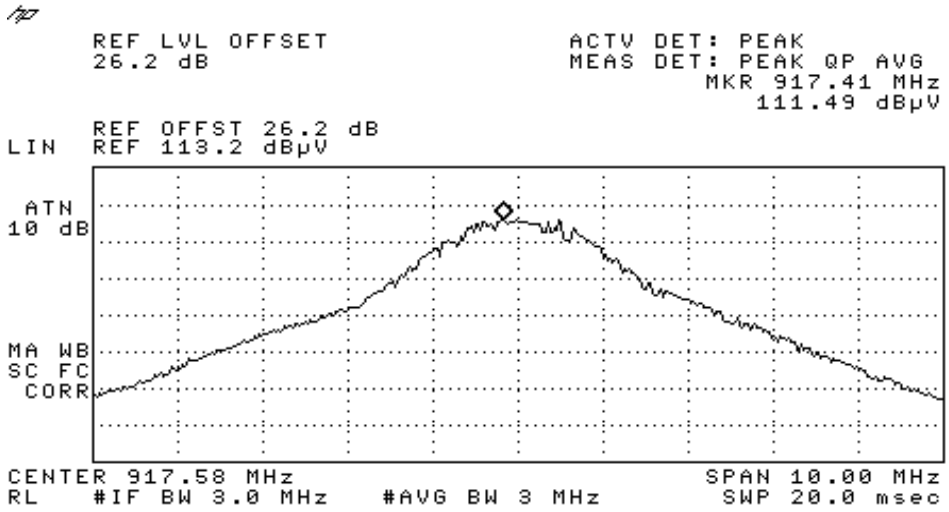
Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Comments
Mid	917.58	100 kHz	1.400 MHz	

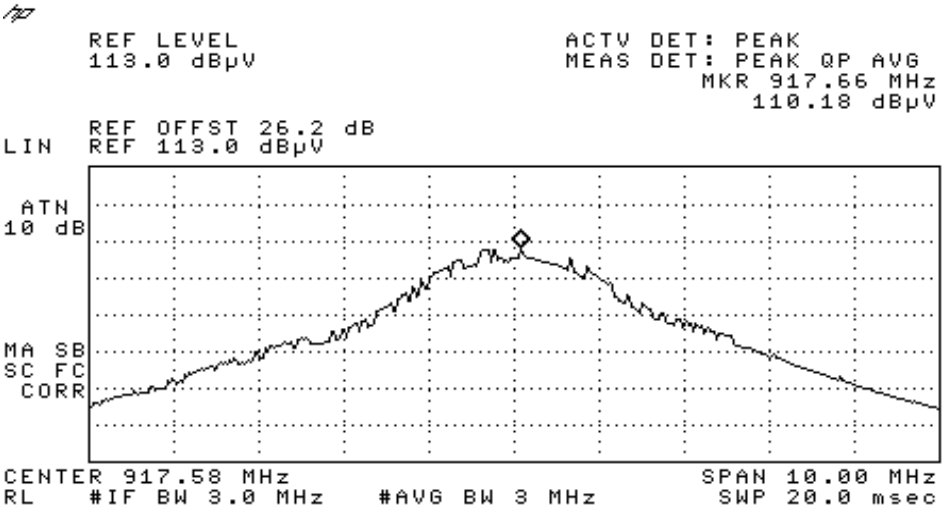


Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Spec:	FCC 15.247	Class:	N/A

Run #3: Output Power

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Mid	917.58	110.18	H	3 MHz	14.88
Mid	917.58	111.49	V	3 MHz	16.19

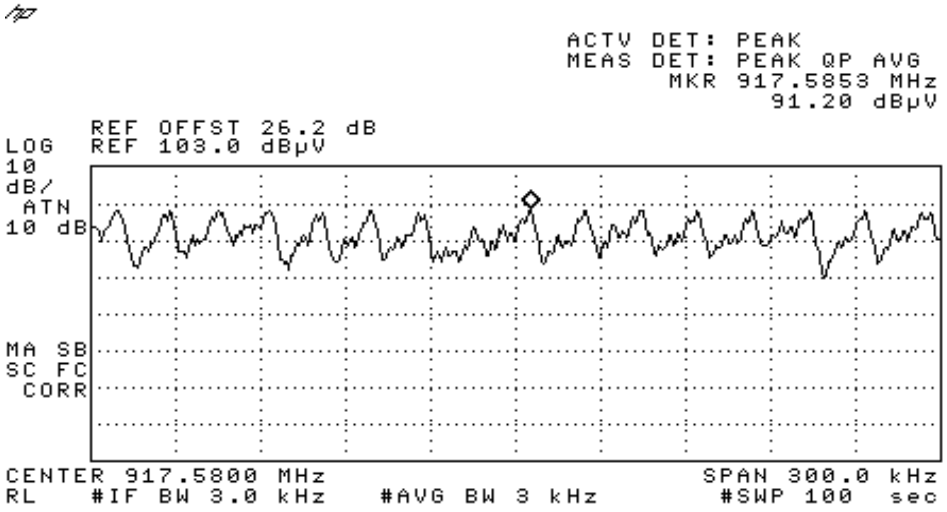




Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Spec:	FCC 15.247	Class:	N/A

Run #4: Power Spectral Density

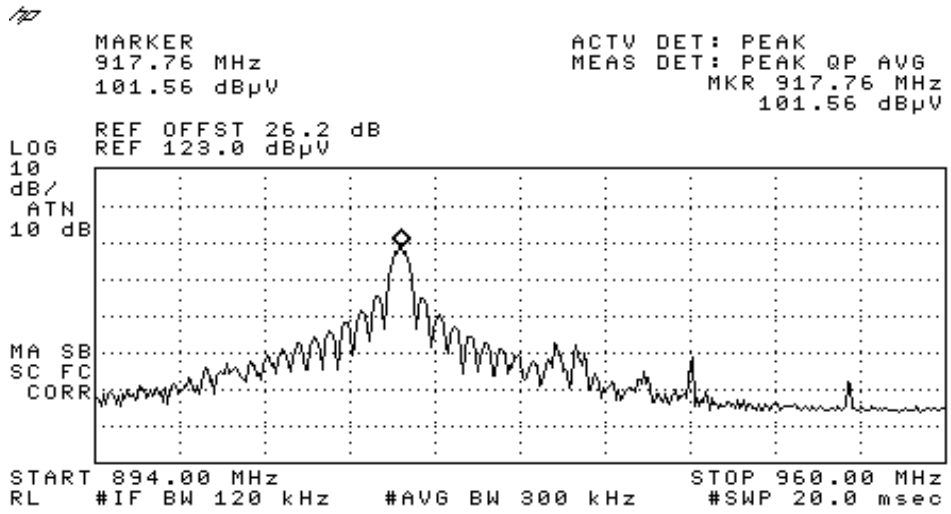
Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth)	P.S.D (dBm)
Mid	917.58	3 kHz	91.2	-4.1



Client:	Neptune Technology Group, Inc	Job Number:	J44913
Model:	Pit MIU	T-Log Number:	T44919
		Proj Eng:	David Bare
Contact:	Mohammed Ali		
Spec:	FCC 15.247	Class:	N/A

Run# 5: Bandedge Measurement

Measurements made at 3m per FCC requirements.



Note 1:	Applied correction factors to measurement.

Elliott

EMC Test Data

Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Emissions Spec:	FCC 15.247	Class:	Direct Sequence
Immunity Spec:		Environment:	

EMC Test Data

For The

Neptune Technology Group

Model

WALL MIU

Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Emissions Spec:	FCC 15.247	Class:	Direct Sequence
Immunity Spec:		Environment:	

EUT INFORMATION

General Description

The EUT is a water meter interface unit (MIU) which is designed to be wall mounted during operation. Normally, the EUT would be mounted on a wall/water meter during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the EUT is 3.3 V dc.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Neptune Technology	Wall Mount MIU	Water Meter MIU	N/A	

Other EUT Details

EUT is DC operated.

EUT Enclosure

The EUT enclosure is primarily constructed of fabricated molded plastic. It measures approximately 10 cm wide by 12.5 cm deep by 6 cm high.

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Elliott

EMC Test Data

Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Emissions Spec:	FCC 15.247	Class:	Direct Sequence
Immunity Spec:		Environment:	

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Neptune Technology	N/A	DC power source	N/A	N/A

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Ports

		Cable(s)		
Port	Connected To	Description	Shielded or Unshielded	Length(m)
DC	DC power source	14 Gauge wire	Unshielded	0.1
Meter port	-	14 Gauge wire	Unshielded	5

EUT Operation During Emissions

Transmitting every 1 second at full power.

Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Spec:	FCC 15.247	Class:	N/A

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: 11/8/2001
Test Engineer: JuanG/VictorO/JayD
Test Location: SVOATS #3
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 23°C
Rel. Humidity: 37%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 - 9175 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Passed	- 1.7dB @ 960.9MHz
2	6dB Bandwidth	15.247(a)	Passed	Refer to indiviual run
3	Output Power	15.247(b)	Passed	Refer to indiviual run
4	Power Spectral Density (PSD)	15.247(d)	Passed	Refer to indiviual run
5	Processing Gain	15.247(e)	N/A	Manufacturer to provide data.

Elliott

EMC Test Data

Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Spec:	FCC 15.247	Class:	N/A

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Run #1: Radiated Spurious Emissions, 30-9175.8 MHz. Low Channel @ 917.58 MHz

	H	V
Fundamental emission level @ 3m in 100kHz RBW:	107.6	107.2
Limit for emissions outside of restricted bands:	87.6 dBµV/m	

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
960.900	52.3	v	54.0	-1.7	QP	247	1.1	
960.600	51.3	v	54.0	-2.7	QP	236	1.1	
916.100	86.2	h	89.2	-3.0	QP	319	1.0	
916.100	86.1	v	89.2	-3.1	QP	268	1.3	
960.900	50.1	h	54.0	-3.9	QP	305	1.0	
961.000	49.0	v	54.0	-5.0	QP	249	1.1	
9175.800	70.1	H	74.0	-3.9	Pk			Restricted emission. Note 1
3670.154	65.7	V	74.0	-8.3	PK	26	1.0	Restricted emission. Note 1& 2
8258.000	65.5	H	74.0	-8.5	Pk			Restricted emission. Note 1
4587.862	64.6	H	74.0	-9.4	Pk	292	1.0	Restricted emission. Note 1
9175.800	64.6	V	74.0	-9.4	Pk			Restricted emission. Note 1
3670.000	64.2	H	74.0	-9.8	PK	260	1.7	Restricted emission. Note 1
4587.862	63.8	V	74.0	-10.2	Pk	361	1.0	Restricted emission. Note 1
3670.205	43.1	V	54.0	-10.9	Avg	30	1.0	Restricted emission. Note 1
2752.418	62.7	H	74.0	-11.3	Pk	0	1.0	Restricted emission. Note 1
8258.000	62.0	V	74.0	-12.1	Pk			Restricted emission. Note 1
7340.000	60.8	H	74.0	-13.2	Pk			Restricted emission. Note 1
4587.107	39.8	H	54.0	-14.3	Avg	292	1.0	Restricted emission. Note 1& 2
4588.687	38.5	V	54.0	-15.5	Avg	361	1.0	Restricted emission. Note 1& 2
7340.000	58.0	V	74.0	-16.1	Pk			Restricted emission. Note 1
2752.748	57.7	V	74.0	-16.3	PK	20	1.9	Restricted emission. Note 1

Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Spec:	FCC 15.247	Class:	N/A

Run #1: Radiated Spurious Emissions, 30-9175.8 MHz. Low Channel @ 917.58 MHz (cont)

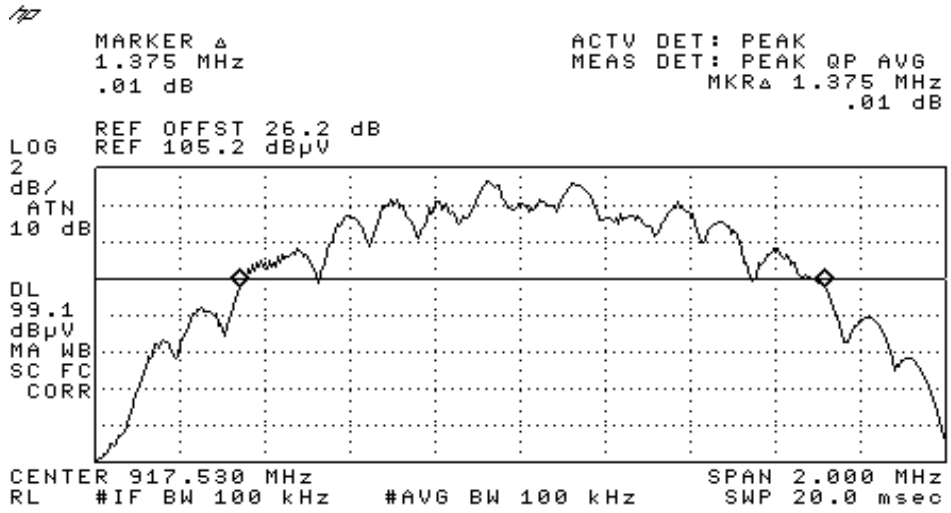
2752.521	37.1	H	54.0	-16.9	Avg	0	1.0	Restricted emission. Note 1& 2
906.000	72.3	V	89.2	-16.9	QP	180	1.0	
3670.000	36.3	H	54.0	-17.7	Avg	260	1.7	Restricted emission. Note 1& 2
9175.800	34.8	H	54.0	-19.2	Avg			Restricted emission. Note 1& 2
2752.848	33.5	V	54.0	-20.6	Avg	20	1.9	Restricted emission. Note 1& 2
5506.027	67.6	H	89.2	-21.6	Pk	292	1.3	Non-restricted. Note 1
8258.000	32.1	H	54.0	-21.9	Avg			Restricted emission. Note 1& 2
9175.800	32.0	V	54.0	-22.0	Avg			Restricted emission. Note 1& 2
7340.000	29.4	H	54.0	-24.6	Avg			Restricted emission. Note 1& 2
8258.000	29.2	V	54.0	-24.8	Avg			Restricted emission. Note 1& 2
7340.000	28.1	V	54.0	-25.9	Avg			Restricted emission. Note 1& 2
1835.000	63.2	H	87.6	-24.4	Pk	31	1.6	Non-restricted. Note 1
6422.822	61.9	V	87.6	-25.7	Pk	360	1.0	Non-restricted. Note 1
6422.822	61.8	H	87.6	-25.8	Pk	31	1.0	Non-restricted. Note 1
1835.000	61.7	V	87.6	-25.9	Pk	284	1.0	Non-restricted. Note 1
5506.027	56.7	V	87.6	-31.0	Pk	58	1.0	Non-restricted. Note 1
896.900	49.1	V	87.6	-38.5	QP	360	1.0	
5506.027	41.7	H	87.6	-45.9	Ang	292	1.3	
1835.000	39.9	H	87.6	-47.7	Avg	31	1.6	
1835.000	38.9	V	87.6	-48.7	Avg	284	1.0	
5506.027	38.7	V	87.6	-49.0	Avg	58	1.0	
810.800	38.0	V	87.6	-49.6	QP	133	1.0	
6422.822	37.3	H	87.6	-50.3	Avg	31	1.0	
6422.822	36.2	V	87.6	-51.4	Avg	360	1.0	
458.790	33.4	V	87.6	-54.2	QP	180	1.0	
630.500	21.4	V	87.6	-66.2	QP	250	1.0	
300.015	20.0	V	87.6	-67.6	QP	360	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental. Applied Duty cycle to Average readings.
Note 2:	For Direct Sequence applied Duty Cycle (-13.15 dB) to Average Measurement and compared to average limit.

Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Spec:	FCC 15.247	Class:	N/A

Run #2: Signal Bandwidth

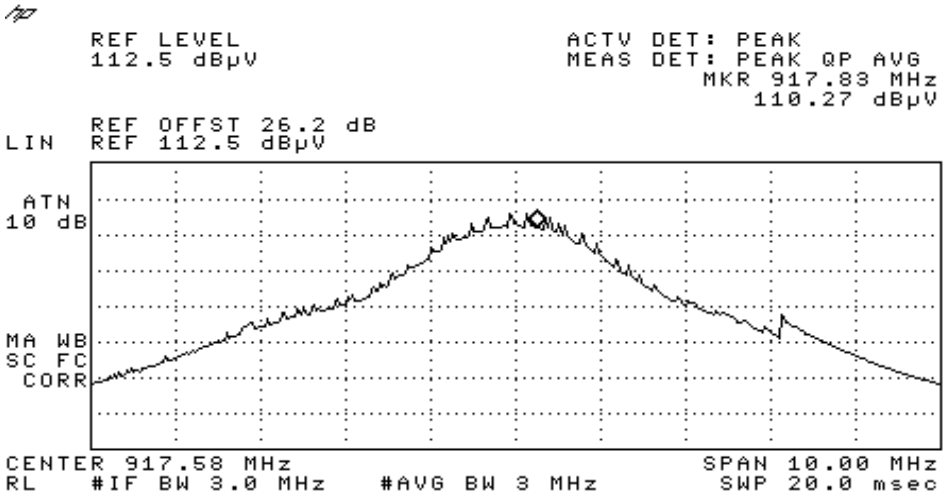
Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Comments
Mid	917.58	100 kHz	1.375 Mhz	

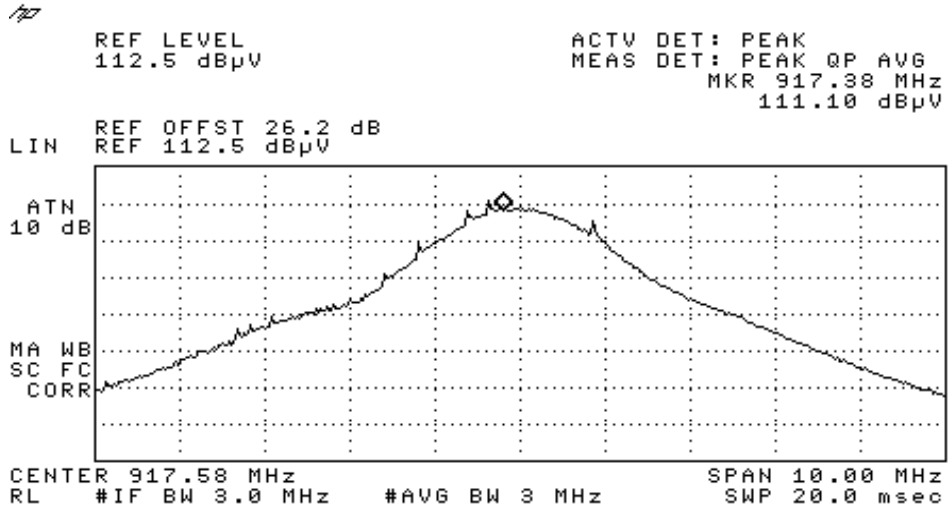


Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Spec:	FCC 15.247	Class:	N/A

Run #3: Output Power

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW	Output Power (dBm)
Mid	917.58	111.1	H	3 MHz	15.8
Mid	917.58	110.97	V	3 MHz	15.67

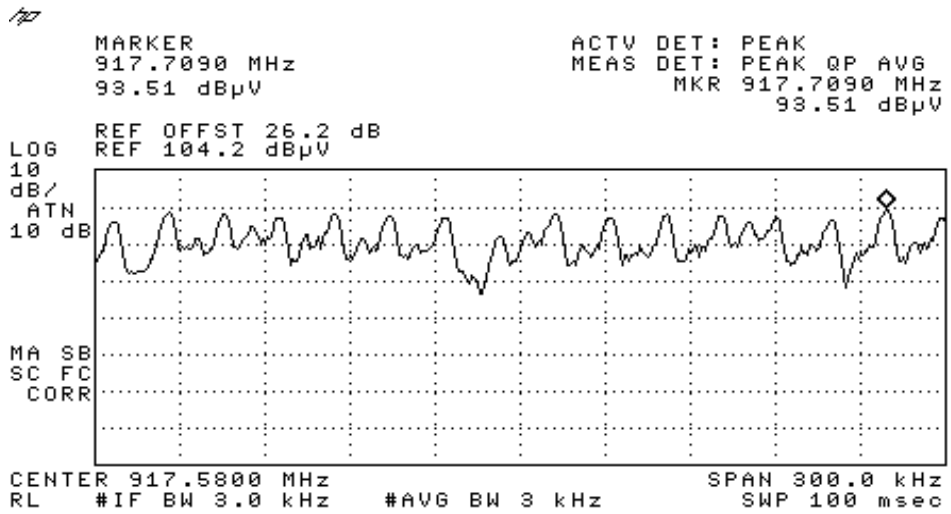




Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Spec:	FCC 15.247	Class:	N/A

Run #4: Power Spectral Density

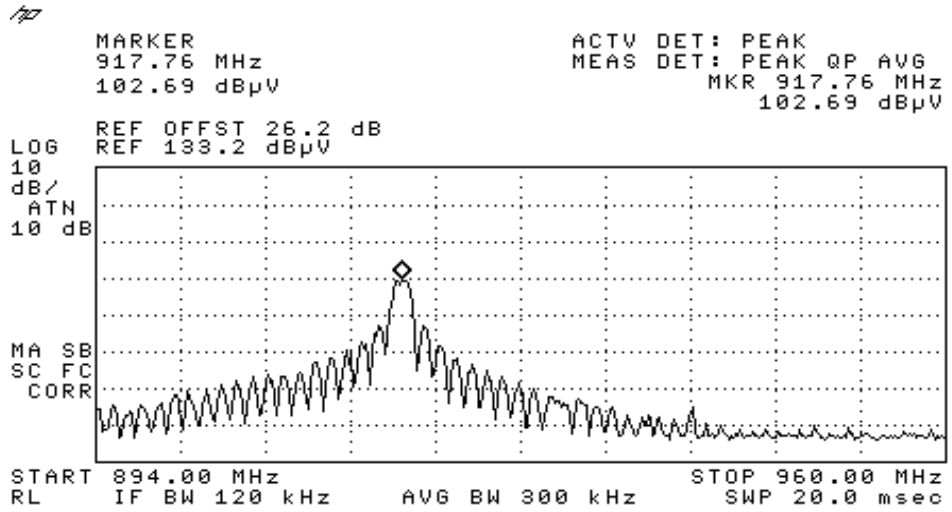
Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth)	P.S.D (dBm)
Mid	917.58	3 kHz	93.51	-1.79



Client:	Neptune Technology Group	Job Number:	J45313
Model:	WALL MIU	T-Log Number:	T45314
		Proj Eng:	David Bare
Contact:	Mohammed Ali/Kim Singh		
Spec:	FCC 15.247	Class:	N/A

Run# 5: Bandedge Measurement

Measurements made at 3m per FCC requirements.



Note 1:	Applied correction factors to measurement.

Test Name: **Processing Gain** **Test #: 3.B.1**
Test Summary: Verifies compliance to receiver processing gain specification at +25°C with an input signal level of -104 dBm.
Applies to Specification 3.2.2.7

Pass / Fail Criteria:
Every point must exhibit => 12 dB process gain. (FCC Requirement ≥ 10 dB)

Required Test Equipment:
HP9664B Signal Generator
Variable attenuator(s)
Power supply
Boonton Power Meter
HP8594E Spectrum Analyzer
IBM PC compatible computer with serial interface
Transceiver power cable, twisted pair, extended length
Transceiver serial cable, RJ45, extended length

Equipment Set Up:
The processing gain of the DSP receiver is measured by the spread signal to unspread signal method whereby a CW signal is injected in 50 KHz intervals from 917.3800 to 917.7800 MHz. The difference (in dB) of the correlated spread signal level applied separately, is the system process gain.

1. Each transceiver receive section will be programmed with default parameters using appropriate software/firmware. Select a receive frequency of 917.58 MHz for all tests.

2. HP9664A Signal Generator:

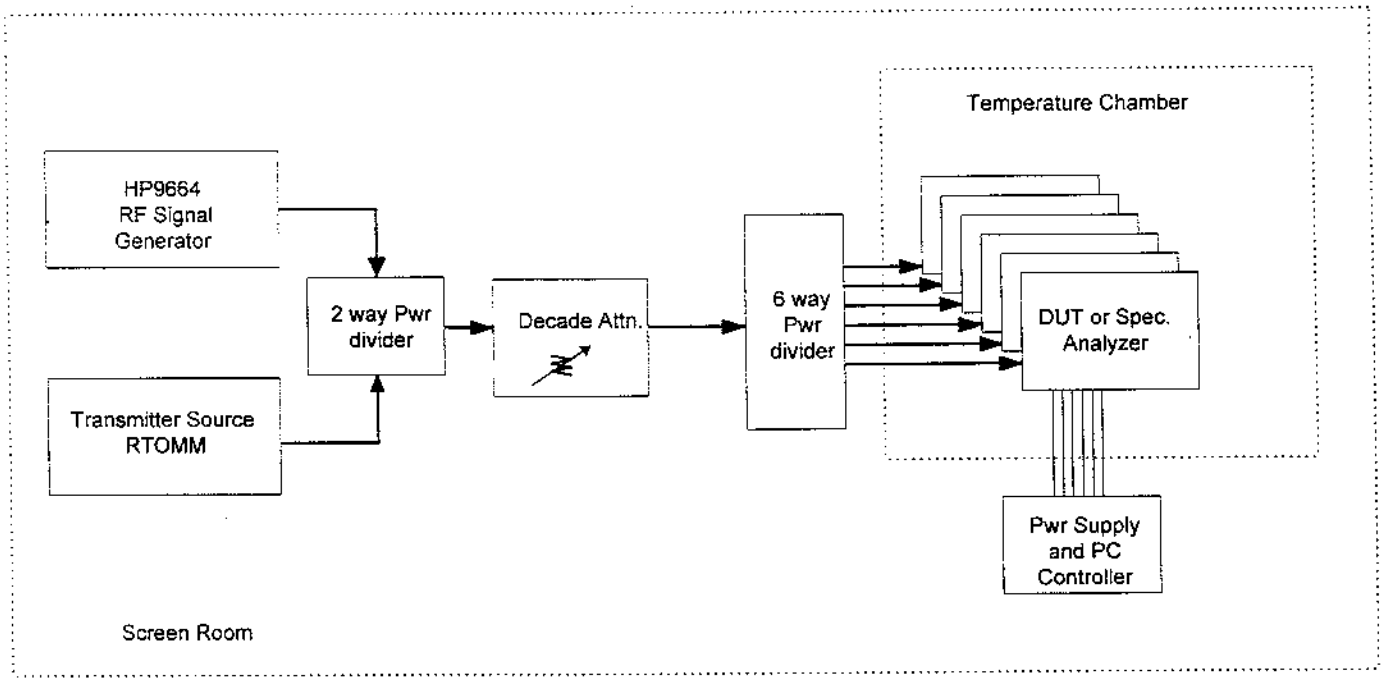
Center Frequency	=	917.38000 MHz
Signal Level	=	-30 dBm

3. HP8594E Spectrum Analyzer

Resolution Bandwidth	=	3 MHz
Video Bandwidth	=	1 MHz
Sweep	=	50 msec
Span	=	0 MHz
Attenuation	=	10 dB

4. Variable Attenuator = as required to achieve a -95 dBm spread signal.

Note: Ensure that all test equipment has been warmed up for 30 minutes and calibrated before measurements are taken.



3.B.1 Test Configuration for Process Gain

Procedure:

1. Place the transceiver(s) to be tested in the temperature chamber.
2. Label and route each wire and cable described below outside the temperature chamber.
3. Use the transceiver power cable to connect the device under test to the DC supply. Set the DC supply to provide 13.5 VDC to the device under test.
4. Determine the amount of power difference between the injected spread signal at 917.58 MHz and the injected CW signal at 917.58 MHz that produced the same signal level on the spectrum analyzer.
   a. Measure and record the power of the spread signal present at the input to any one of the DUTs by connecting it to the spectrum analyzer. Measure power during preamble portion of the message packet.
   b. Then, after turning the Spread signal OFF and switching ON the CW signal, measure and record the power of the CW signal present at the input of the same DUT by routing again the spectrum analyzer.
   c. Determine a calibration factor based on the difference between the measurements made in steps a. and b. This amount of attenuation shall be added or removed (as appropriate) from the circuit when configured for CW input measurements.
5. Apply a spread signal to the receiver. Record the indicated level of this signal after correlation.
6. Reconfigure the set-up to apply a CW signal at 917.58 MHz to the DSP input.
7. Apply (or remove) the appropriate amount of attenuation, as determined in step 4 above, such that the CW signal is at the same indicated input power level as the spread signal from step 5.
8. Input a spread signal level at - 80 dBm at 917.58 MHz, and then, input a CW signal beginning at 917.3800 MHz, and increment up in 50 KHz steps to 917.7800, record the delta (change in attenuator settings) that produces the same indicated output for the CW signal as the - 80 dBm spread signal. The indicated output is first of the last three bites in the reported packet as is a number between 0 and 255 which roughly corresponds to -128 and -30 dBm respectively.
9. Determine average process gain by averaging the linear equivalent in Watts of the values in the table below and then converting back to dB's.

PROCESS CAIN TEST

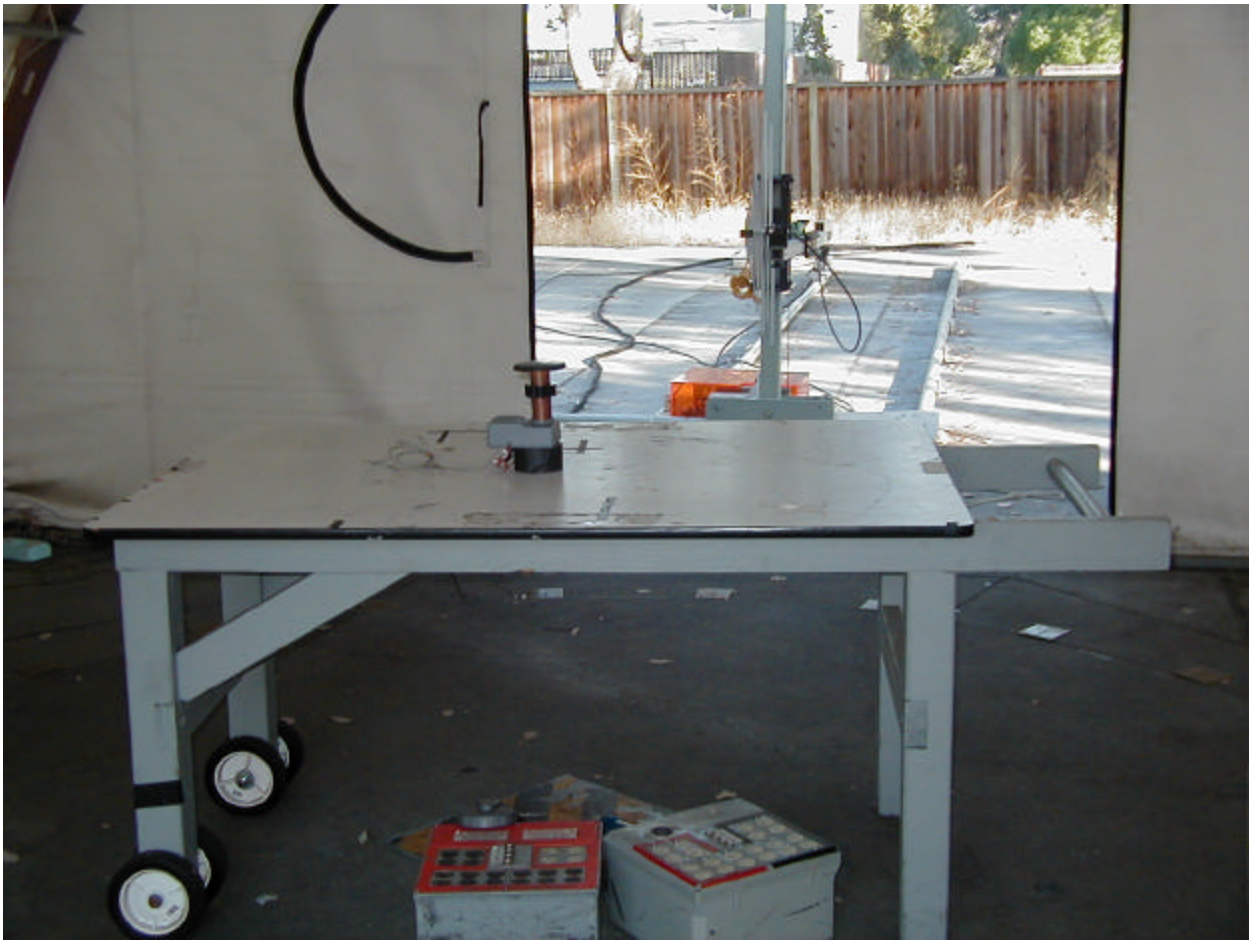
+25 C (only)	Frequency Offset (KHz)								
UNIT #	-200	-150	-100	-50	0	+50	+100	+150	+200
1	*14.8*	*14.5*	*14.5*	*14.0*	*15.0*	*14.4*	*15.0*	*15.7*	*15.1*
2	*16.3*	*16.0*	*15.7*	*15.0*	*15.0*	*15.7*	*16.1*	*17.0*	*16.2*
3	*16.2*	*15.8*	*15.7*	*15.2*	*16.0*	*15.8*	*16.4*	*16.6*	*16.6*
4	*16.0*	*16.0*	*15.0*	*14.4*	*15.0*	*14.5*	*15.3*	*15.6*	*15.5*
Pass/Fail (dB)	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12 dB

DUT # 1 Average Process Gain = *14.8* dB
DUT # 2 Average Process Gain = *16.0* dB
DUT # 3 Average Process Gain = *16.1* dB
DUT # 4 Average Process Gain = *15.3* dB

Acceptance Block:	**A signature below denotes that this test has met all pass criteria.**	
Signature:	*Gordon Furze*	Gordon Furze
Date:	*July 30, 1997*	July 30 1997

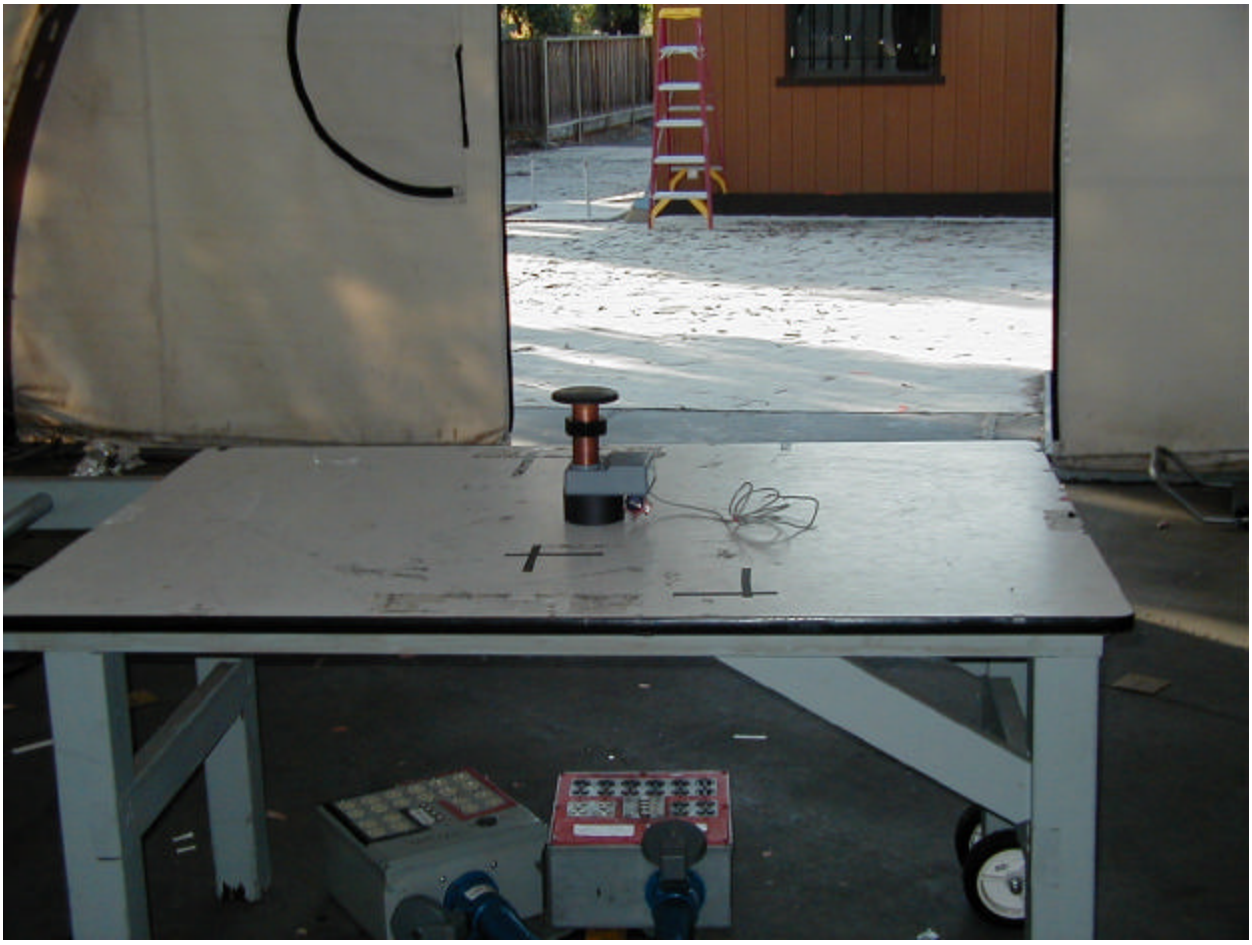
EXHIBIT 3: Radiated Emissions Test Configuration Photographs

Pit MIU1



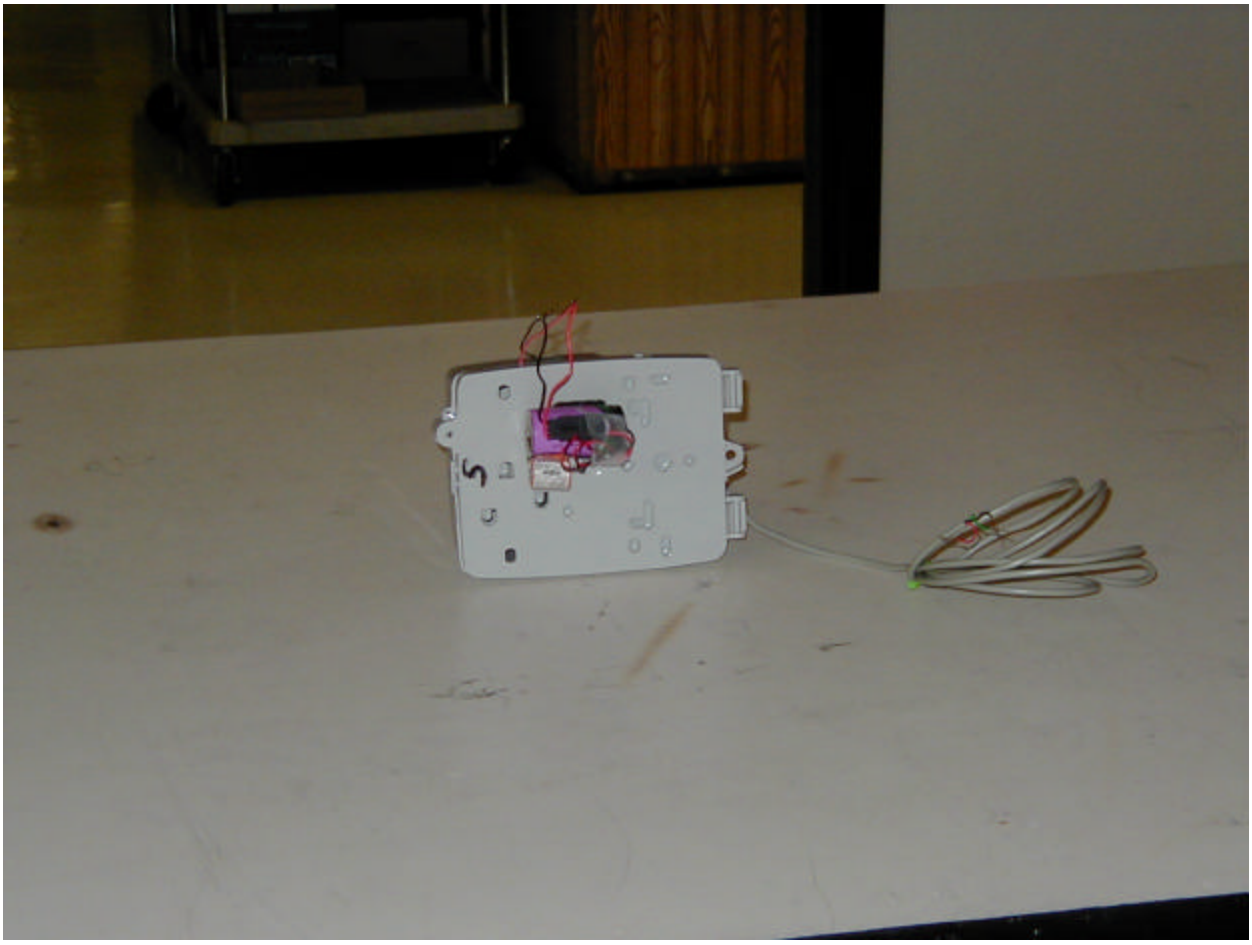
APPENDIX 3: Radiated Emissions Test Configuration Photographs

Pit MIU1



APPENDIX 3: Radiated Emissions Test Configuration Photographs

Wall MIU1



APPENDIX 3: Radiated Emissions Test Configuration Photographs

Wall MIU1

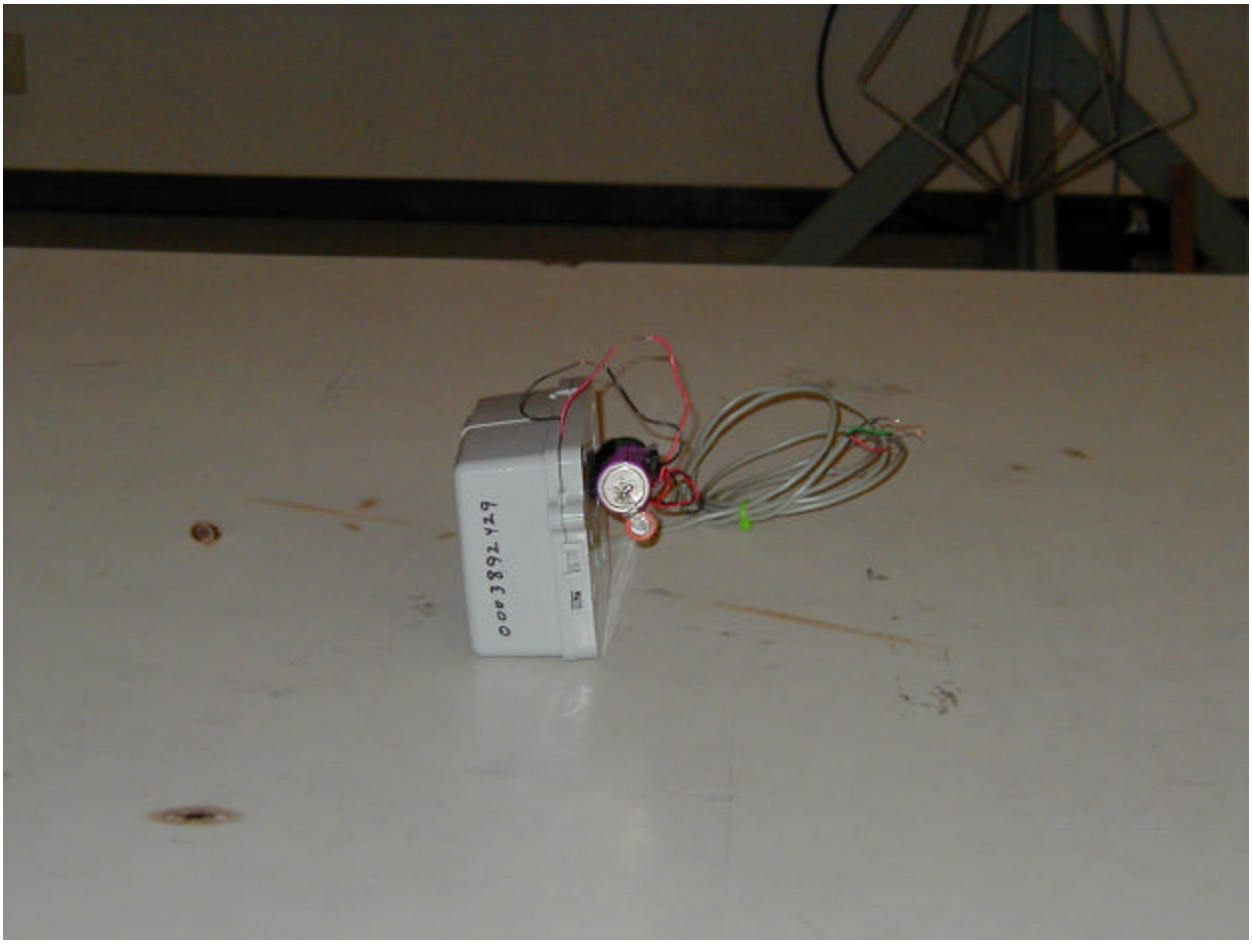


EXHIBIT 4: Proposed FCC ID Label & Label Location

Label.jpg 1 Page
Label Location.pdf 1 Page

EXHIBIT 5: Detailed Photographs of Neptune Technology Group, Inc. Model Pit and Wall MIU1 Construction

EXHIBIT 6: Operator's Manual for Neptune Technology Group, Inc. Model Pit and Wall MIU1

Wall MIU Manual.pdf 20 Pages
Pit MIU Manual.pdf 17 Pages

EXHIBIT 7: Block Diagram of Neptune Technology Group, Inc. Model Pit and Wall MIU1

Wall MIU Block.pdf 1 Page
Pit MIU Block.pdf 1 Page

EXHIBIT 8: Schematic Diagrams for Neptune Technology Group, Inc. Model Pit and Wall MIU1

Schematics.pdf 2 Pages

EXHIBIT 9: Theory of Operation for Neptune Technology Group, Inc. Model Pit and Wall MIU1

Wall MIU Theory.pdf 5 Pages
Pit MIU Theory.pdf 5 Pages