# KN-22 Class A Emissions Test Report for Product:

## Intel® Ethernet Server Adapter

## X520-DA1OCP2

Oregon Certification
EMC Lab

5200 NE Elam Young
Parkway
Hillsboro, OR 97124

**Report Number: 13OR072**

**September 16, 2013**

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# Facility Accreditation and Authorization

TEST LAB
Cert. # 1130-01

**American Association for Laboratory Accreditation (A2LA)**
The Intel Corporation OCEL (Oregon Certification EMC Lab) is accredited for emissions and immunity testing. The scope of this accreditation is in adherence to the requirements of ISO/IEC 17025: 2005. The OCEL A2LA Lab Code is 110083 and is valid to March 31, 2014.

**Federal Communication Commission (FCC)**
The 3 & 10 meter Open Area Test Site, 3 Meter Semi Anechoic Chamber (EMC 2) and conducted emissions measurement facilities have been fully described in reports filed with the Federal Communication Commission. Registration number: 90687. The site listing is valid until December 12, 2015.

**The Voluntary Control Council for Interference (VCCI)**
The 10 Meter OATS, 3 Meter Semi-Anechoic Chamber and Conducted Emissions Test Facilities have been registered with the VCCI. The registration number for the Oregon Certification EMC Lab is A-0007 with expiration of March 31, 2014

**NEMKO**
The Intel Corporation Oregon Certification EMC Laboratory is authorized by NEMKO under the TBM scheme. The Laboratory Authorization number TBM-361 is valid through 31 December 2014.

The data produced by TBM-361 is accepted into the Territory of the Russian Federation. The certificate of accreditation, dated Sept. 10, 1998, was issued by the Certification Body of information, instrumental, medical & electrical equipment on behalf of the Russian Goststandart (GOST R) organization. Through MRA between NEMKO and the current Russian Organization of Certified Bodies, acceptance of data by TBM-352 remains valid for a scope, which includes GOST R 51318.22 and GOST R 50628-95.

**APEC Conformity Assessment of Telecommunications Equipment**
This laboratory (identifier# US0069) participates in the NIST phase-1 Laboratory CAB designation for the following economies.

**Chinese - Taipei BSMI**
Accreditation # SL2-IN-E-1025

**Korea Communication Commission**

**Socialist Republic of Vietnam**

The CAB status' remains in effect while the Laboratory's A2LA scope of accreditation is valid.

# Contents

# Supplemental Information

## Estimated Measurement Uncertainty

| **Intel Corporation-Oregon Certification EMC Lab<br>Measurement Uncertainty of Test Equipment** | | |
|---|---|---|
| The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, provide a level of confidence of approximately 95%. | | |
| Specified Test | Units | Uncertainty of Measurement |
| Radiated Emissions-EMC Chamber 2: 30-1000 MHz | dB | +4.66 and -4.76 |
| Radiated Emissions-EMC Chamber 2: 1-18 GHz | dB | +3.16 and -4.00 |
| Radiated Emissions-Open Area Test Site: 30-1000 MHz | dB | ± 5.5 |
| Conducted Emissions-Using Artificial Mains Networks | dB | ± 1.2 |
| Conducted Emissions- Telecommunication Ports Using an Impedance Stabilization Network | dB | + 1.28 and – 1.3 |

## Background

This test report documents the results of the electromagnetic compatibility testing performed by Intel Corporation, Oregon Environmental Laboratory. The results contained within this test report pertain only to the equipment under test.

## Regulatory Compliance Statement

Intel Ethernet Server Adapter (X520-DA1OCP2) complies as a Class A device with the following regulatory standards:

**KN22:2005 (CISPR 22 Ed. 5.0:2005-04)**
**RRA No. 2012-13 (2012.06.28)**
**RRA No. 2012-21 (2012.06.28)**

## Signatures

This test report documents the results of the electromagnetic compatibility testing performed by Intel Corporation, Oregon EMC Laboratory.

| | | | |
|---|---|---|---|
| Written By: | Bryan Case<br>EMC Engineer/Technician | Signature: | Bryan Case |
| Reviewed/<br>Approved By: | Duane Niesen<br>EMC Engineer/Technician | Signature: | P. Duane Niesen 2013.09.20 12:36:41 -07'00' |

## Applicant Information

| | |
|---|---|
| **Manufactured by:** | Intel Corporation |
| **Applicant:** | Intel Corporation |
| **Product Address:** | 2200 Mission College Blvd., Santa Clara, CA 95052 |
| **Product Name:** | Intel Ethernet Server Adapter |
| **Model Number:** | X520-DA1OCP2 |

## Compliance Summary

| Test Type | Test Date | Judgement | Test Engineer/Technician | Certified Test Engineer/Technician |
|---|---|---|---|---|
| Radiated Emissions Class | 9/10/13 | Passed by 8.5 dB | N/A | Bryan Case |
| Conducted Emissions Class | 9/11/13 | Passed by 16.3 dB | N/A | Bryan Case |

## Environmental Conditions

| Test Type | Temperature (Celsius) | Relative Humidity (%) |
|---|---|---|
| Radiated Emissions OATS | 35 | 29 |
| Radiated Emissions Chamber | 22 | 63 |
| Conducted Emissions | 23 | 33 |

# Test Equipment & Software

| ACN | Test Station | Equipment | Manufacturer | Model | Serial # | Cal due |
|---|---|---|---|---|---|---|
| 01-11036 | CE | EMI test Receiver 20Hz to 40GHz | Rohde & Schwarz | ESIB40 | 100104 | 11/28/2013 |
| 01-04009 | CE | AC LISN 16A 250V | FISCHER COMM. | FCC-LISN-50-16-2-07 | 120735 | 6/18/2014 |
| 01-11047 | CE | Conducted Emissions Software | Toyo Corporation | EP5/CE V3.8 | 806054 | 5/5/2014 |
| 01-05003 | CE | Thermo-Hygrometer | LUFFT | HTAB 176 | 46281 | 1/15/2014 |
| 01-05007 | EMC2 | Thermo-Hygrometer | LUFFT | HTAB 176 | 40635 | 8/7/2014 |
| 01-07035 | EMC2 | Bilog Antenna | Teseq | CBL 6111D | 27088 | 3/18/2014 |
| 01-07005 | EMC2 | Horn Antenna | EMCO | 3117 | OO51797 | 2/6/2014 |
| 01-00030 | EMC2 | Preamplifier 1-1000MHz | Miteq | AM-3A-000110-N-1179 | 465350 | 12/18/2013 |
| 01-00053 | EMC2 | Preamplifier High Gain 1-18G | Miteq | AMF-7D-01001800-22-10P | 1595747 | 12/18/2013 |
| 01-02005 | EMC2 | PSA Spectrum Analyzer 3Hz-26.5GHz | Agilent Technologies | E4440A | MY46188052 | 11/9/2013 |
| 01-02008 | EMC2 | Pre-Selector | Agilent Technologies | N9039A | MY46520278 | 11/9/2013 |
| 01-00029 | EMC2/ OATS | Radiated Emissions Software | Toyo Corporation | EP5/RE V4.0 | 901070 | 5/5/2014 |
| 01-11007 | OATS | EMI test receiver 20Hz to 40GHz | Rohde & Schwarz | ESIB40 | 100204 | 1/21/2014 |
| 01-07047 | OATS | Bilog Antenna 30M-3GHz | CHASE | CBL 6112B | 2665 | 10/23/2013 |
| 01-05008 | OATS | Thermo-Hygrometer | LUFFT | HTAB 176 | 14630 | 8/7/2014 |

# 1. Equipment Under Test

## 1.1 Description

- Generic product type: LAN Card
- Manufacturer: Intel
- Model number: RMN G62327
- Serial Number: A0369F17FCA0
- PBA Number: G96215-001

## 1.2 I/O Ports

The Host has a total of ( 2 ) I/O ports, which includes:

- ( 1 ) Universal serial bus (USB)
- ( 1 ) Video (VGA)

## 1.3 Add-in card connectors

The Host has a total of ( 2 ) add-in card connectors, which consist of:

- ( 2 ) PCI

## 1.4 Power supply/cord

- The Host has 1 power supplies.
- The Host uses an Un-Shielded power cord

## 1.5 Frequencies on which the EUT operates or tunes.

- 25MHz

## 1.6 Laboratory Receipt Date of Test Sample

- Test sample was received on 8/12/2013

## 1.7 Laboratory Job Number

- HF130910208528E

## 1.8 Condition of EUT upon Laboratory Receipt

- The laboratory received the EUT in an operational condition.

## 1.9 Additional Model Numbers

Additional model numbers encompassed by the findings documented in this report:

- N/A

## 1.10 Justification for including Additional Model Numbers

- N/A

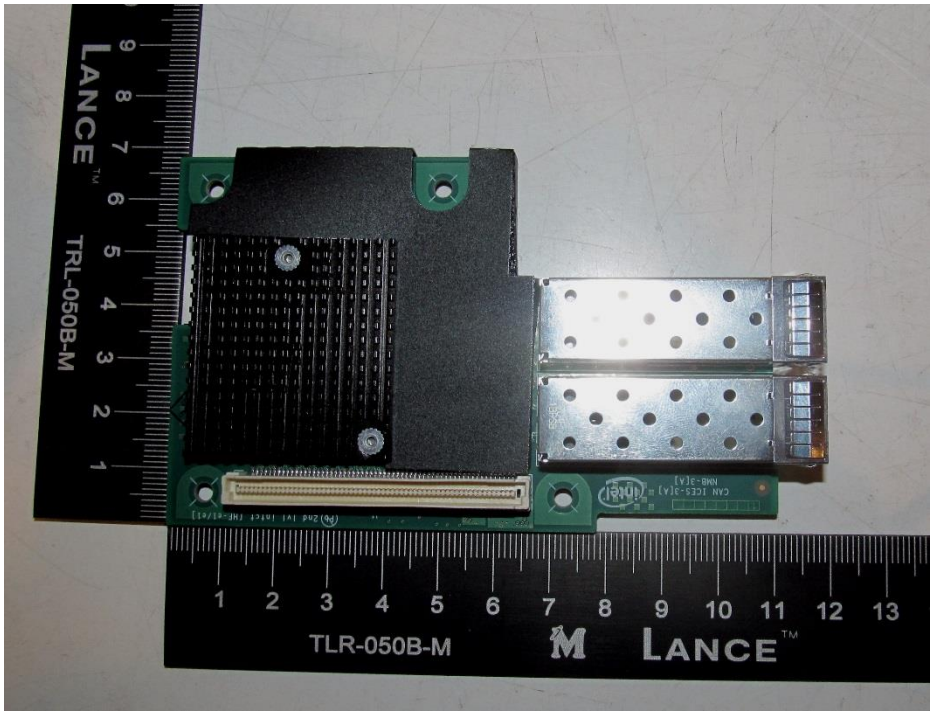
### 1.11 System Modification

- Copper tape was added to connect the VGA shield and network ports shield to the chassis
- Metal covers were added to both ends and top of the Host to shield components from ESD discharge

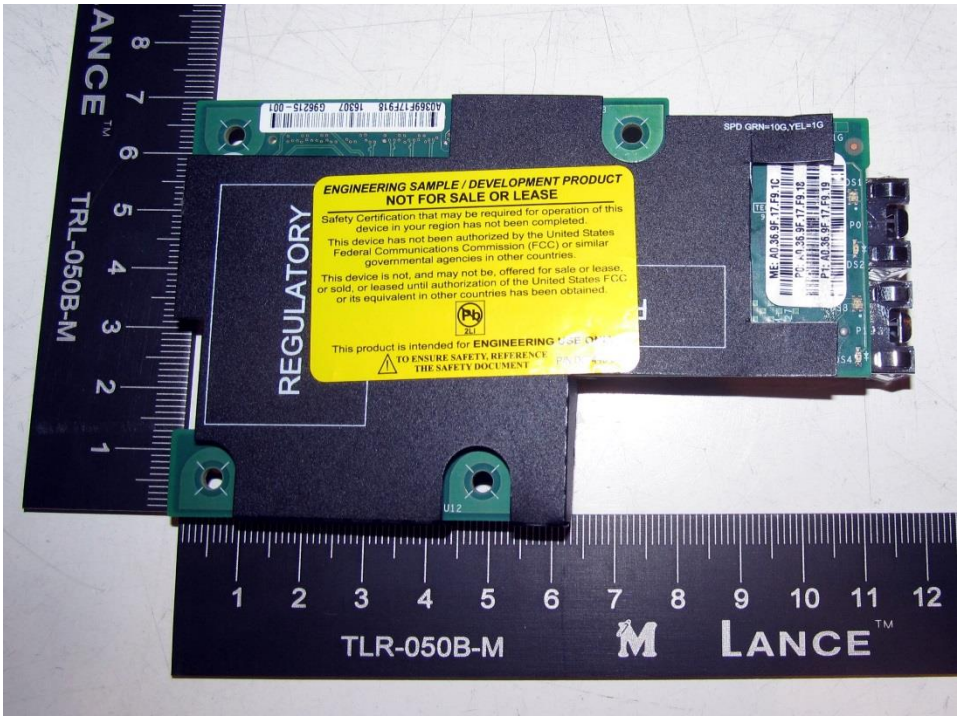
**Table 1. Hardware Internal to the Host**

| Description | Manufacturer | Model |
|---|---|---|
| Hard Drive | HGST | H3V5003272S |
| Power Supply | Power One | SPAFCBK-03G |
| Motherboard | Quanta | Windmill EP |
| Video Card | GeForce | 210 512MB |

## 1.1. EUT Photos

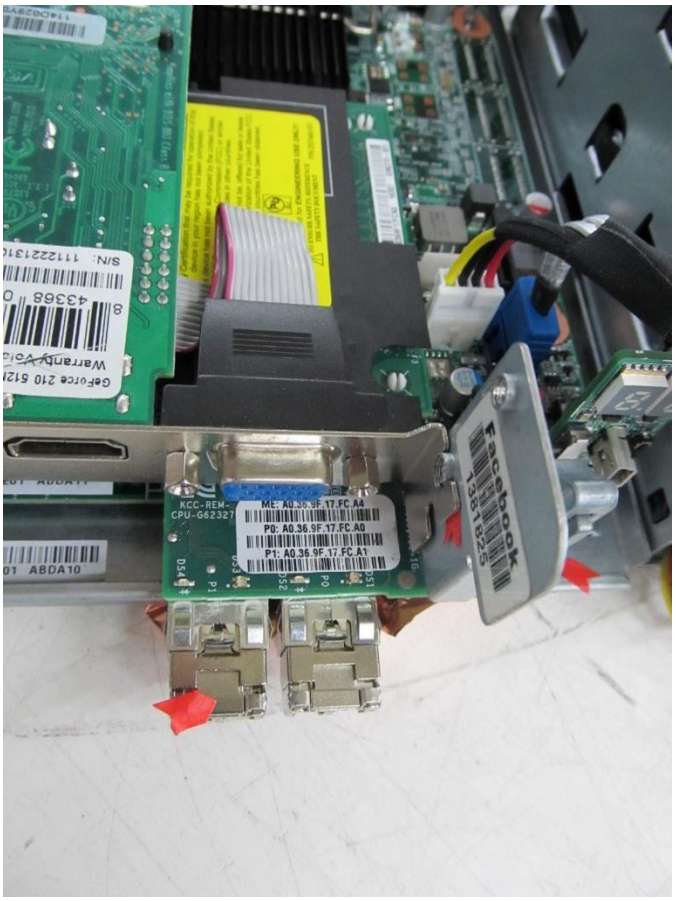



**EUT, Front View**



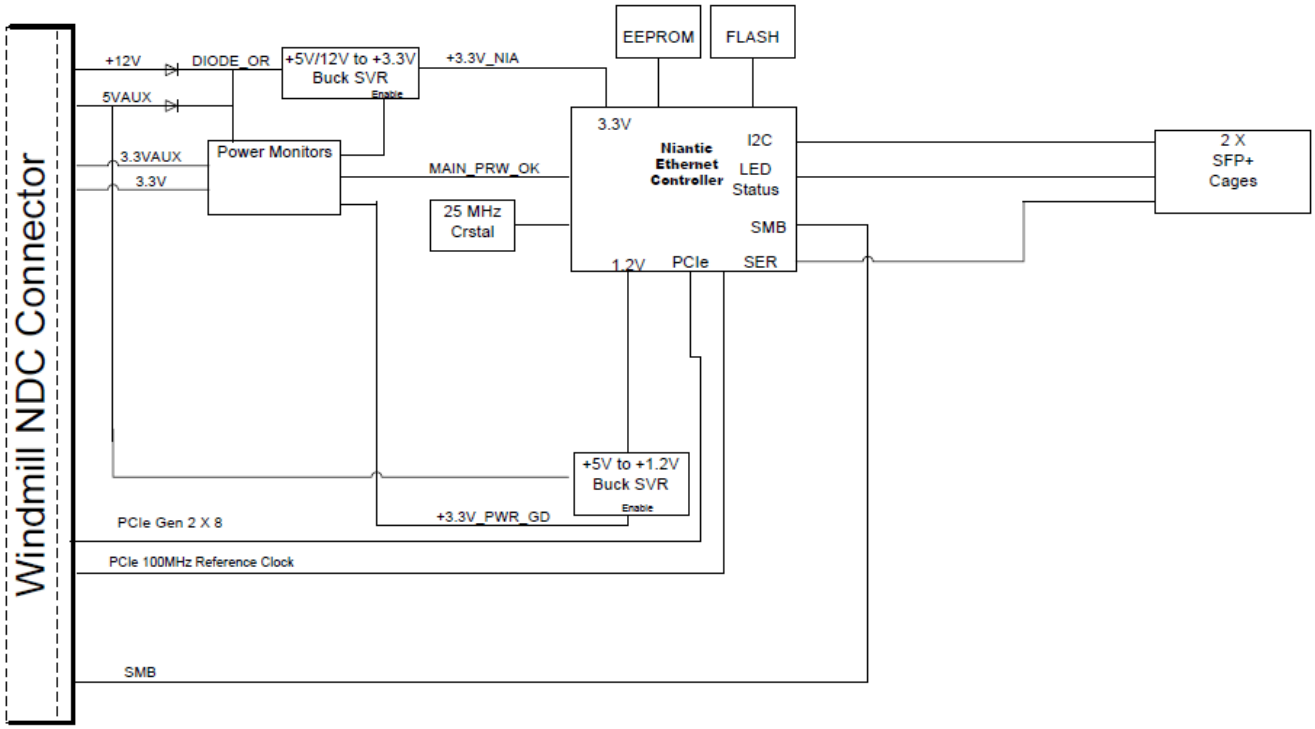

**EUT, Rear View**

**EUT, Internal View**



## 1.2. EUT Clock Frequency Block Diagram

**Clock Frequency Block Diagram**



## 1.3. EUT Regulatory Label

**Regulatory Label**

# 2. Test Configuration

Pre-scans of the EUT were performed in a 3 meter semi-anechoic chamber to investigate the worst case of cable placement, video resolution and refresh rate. All test data in this report refers to the established worst-case configuration.

## 2.1. Worst Case Configuration Summary

- Voltage: 220 V @ 60 Hz
- LAN speed for radiated emissions: 10GHz Fiber
- LAN speed for conducted emissions: 10GHz Fiber

## 2.2. Investigated Configurations

AC Input Voltages Tested:

- 220 V @ 60 Hz

**NOTE:** No other resolutions were investigated because the video card was certified by its manufacturer.

## 2.3. EUT Exercise Software

The following program, was used to exercise the EUT during testing, and executed with Microsoft Windows 2008 server R2 operating system.

**Intel® EMC Exerciser Version 1.0.89.0**
The program exercised the system in a manner similar to typical use. This program was contained on the EUT's Hard Disk and once loaded; the program sequentially exercised each system component in turn.

**Lanconf 1.22.3.0**
An Intel internal network testing utility. The tool sends packets across Intel network cards and display a measurement of packets sent and received.

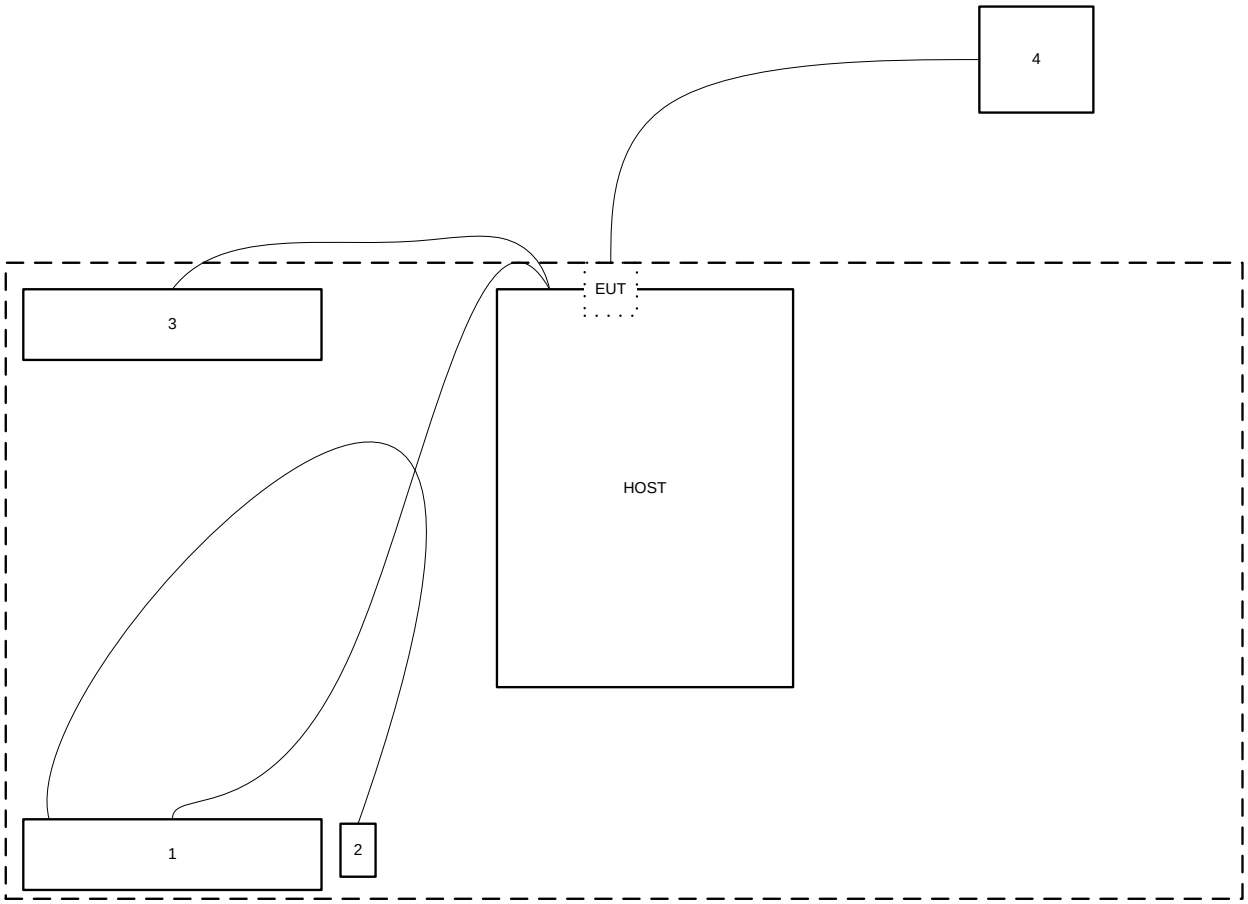
## 2.4. Adapters/ Peripherals/ I/O Devices

The peripheral devices and cables (external of the Host) used during testing are reflected in the table and diagram below.

**Table 2. Peripherals and I/O Cables External of the Host**

| Diagram | Device Type | Manufacturer | Model | Serial # | Cable type | ACN |
|---|---|---|---|---|---|---|
| 1 | USB Keyboard | Dell | SK-8125 | CN-Q6W610-71616-3CH-2374 | 1.8m shielded USB cable hardwired to peripheral | N/A |
| 2 | USB Mouse | Logitech | B 120 | 810-001861 | 1.8m shielded USB cable with ferrite bead hardwired to peripheral | N/A |
| 3 | Monitor | BenQ | QS24W5 | ETD6701608SL0 | 1.8m shielded VGAcable with ferrite bead hardwired to peripheral | 10-00168 |
| 4 | Client PC | HP | Z220 | 2UA3081HGL | Finisar fiber optics LR | NA |

**Diagram 1 Test Setup Block Diagram**



# 3. Conducted Emissions Test

## 3.1. Test Procedure

Using the spectrum analyzer mode of the receiver, peaks of the disturbances are identified by sweeping the following bands: 0.15 to 5 MHz, 5 MHz to 10 MHz, 10MHz to 15 MHz, 15 MHz to 20 MHz, 20 MHz to 25 MHz, 25 MHz to 30 MHz. Each band is dwelled on for 6 seconds with a sweep time of 155 ms. this results in more than 35 sweeps per band. The peak scans capture the maximum emissions during that time period. If the required margin is not met during the peak scan, the maximum quasi-peak and average emission is measure by scanning across the peak disturbances in the EMI receiver mode. The frequency and amplitude of the highest six emissions are reported for each line measured. The LAN cable is fixed to the back of the table edge 40 cm from the vertical reference plane as far as possible before being routed to the TLISN.

| Resolution bandwidth | |
|---|---|
| 150 kHz to 30 MHz | 9 kHz |

**AC Port(s):**
A LISN is used to test the power line ports Power line conducted emissions testing was performed while running the worst case LAN configuration.

## 3.2. Test Method Deviations

No deviations from the test method were implemented to achieve regulatory compliance.

## 3.3. Determining Compliance to the Limit

KN22:2005, Annex B, has a decision tree for peak detector measurements. This decision tree is used to determine compliance to the limit.

Summarizing the decision tree:

Is the Peak measurement passing the Average Limit? If yes the measurement is a pass.

For the testing reported in this report, if the peak measurement is passing the average limit we do not perform QP and Average measurements. If the peak measurement is not passing the average limit we perform QP and Average measurements.

### 3.4. Power Line Conducted LISN Test Data

a. Power Supply 1 – 220VAC/60Hz

**OREGON CERTIFICATION & EMC LAB**

## INFORMATION:

| | | | | | |
|---|---|---|---|---|---|
| Customer | : | Robert Sem | Job No. | : | HF130910208528E |
| Product | : | Davis Flat | Test Standard | : | Korea Class A |
| Model | : | X520DA2OCP | Date/Time | : | 11 September,2013 10:57 |
| Serial No. | : | A0369F17FCA0 | Operator | : | Bryan Case |
| AC Line | : | 220 VAC / 60 Hz | Temperature, Humidity | : | 23 C, 33% RH |
| Remark | : | Finisar Optics LR 10GB PBA G96215-001 K | | | |

## TEST DATA:

**Data List**

| Frequency MHz | Line Phase | Reading dB(uV) QP | Reading dB(uV) AV | Factor dB | Level dB(uV) QP | Level dB(uV) AV | Limit dB(uV) QP | Limit dB(uV) AV | Margin dB QP | Margin dB AV | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10.88361 | L1 | 54.3 | 43.3 | 0.4 | 54.7 | 43.7 | 73.0 | 60.0 | 18.3 | 16.3 | Pass |
| 10.74374 | L1 | 53.7 | 42.5 | 0.4 | 54.1 | 42.9 | 73.0 | 60.0 | 18.9 | 17.1 | Pass |
| 10.59023 | L1 | 53.1 | 42.1 | 0.4 | 53.5 | 42.5 | 73.0 | 60.0 | 19.5 | 17.5 | Pass |
| 11.22239 | L1 | 52.7 | 41.7 | 0.4 | 53.1 | 42.1 | 73.0 | 60.0 | 19.9 | 17.9 | Pass |
| 11.53783 | L1 | 52.4 | 41.4 | 0.4 | 52.8 | 41.8 | 73.0 | 60.0 | 20.2 | 18.2 | Pass |
| 11.27761 | L1 | 52.3 | 40.8 | 0.4 | 52.7 | 41.2 | 73.0 | 60.0 | 20.3 | 18.8 | Pass |
| 11.44474 | L1 | 51.9 | 40.7 | 0.4 | 52.3 | 41.1 | 73.0 | 60.0 | 20.7 | 18.9 | Pass |
| 11.05576 | L1 | 52.3 | 40.5 | 0.4 | 52.7 | 40.9 | 73.0 | 60.0 | 20.3 | 19.1 | Pass |
| 10.49283 | L1 | 51.9 | 40.4 | 0.4 | 52.3 | 40.8 | 73.0 | 60.0 | 20.7 | 19.2 | Pass |
| 10.63341 | L2 | 52.1 | 40.2 | 0.4 | 52.5 | 40.6 | 73.0 | 60.0 | 20.5 | 19.4 | Pass |

## TRACE:

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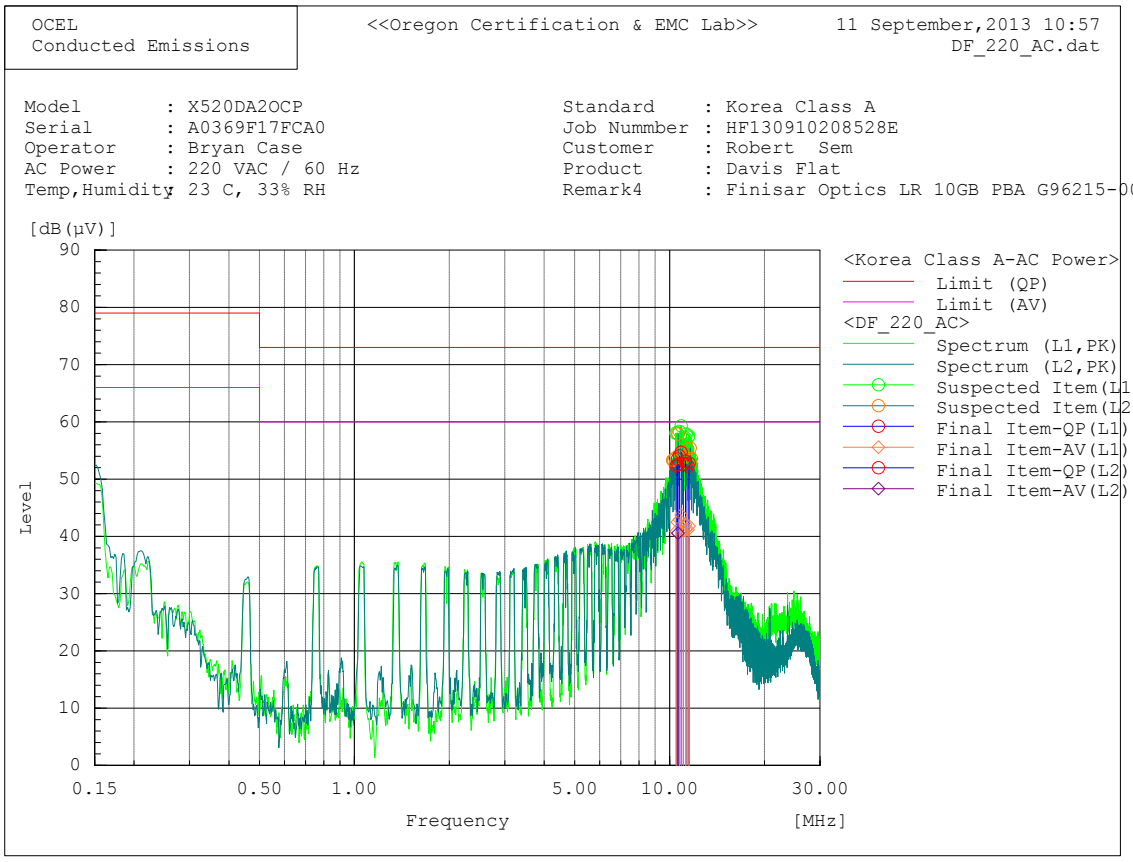


# 4. Radiated Emissions Test

## 4.1. Test Procedure

The worst case radiated emissions are determined in a 3.0 m semi-anechoic chamber. The EUT is setup on a nonconductive 0.8 m tall table. The table is placed on the turntable to allow 360º of rotation. The receive antenna is mounted on the antenna mast 3.0 m from the EUT. Below 1 GHz the height of the receive antenna is scanned from 1.0 m to 4.0 m in height. The emissions are measured in both vertical and horizontal polarities.

The method below for testing above 1 GHz is used for CISPR 22 and derivative standards.

3 dB beamwidth for above 1 GHz testing:

For each frequency the smallest beamwidth of the horizontal and vertical planes was used for calculation. This will give the smallest beamwidth at the test distance to ensure the EUT is within the 3 dB beamwidth for both polarities. The table shows the beamwidth for both 1 and 3 meters test distances. If the EUT height is larger than the smallest 3dB beamwidth then a height scan is performed so that the full height of the EUT is covered by the 3dB beamwidth from 1 to 6 GHz.
The beamwidth was calculated using manufacturers' beamwidth data and the following formula.

$$w = 2 \times d \times \tan(0.5 \times \theta_{3dB})$$

*Where:*

- $w$ = beamwidth at d
- d = distance
- $\theta_{3dB}$ = antenna beamwidth from manufacturer

| | **ETS 3117 Horn Antenna** | | | **EMCO 3115 Horn Antenna** | | |
|---|---|---|---|---|---|---|
| | | d = 1m | d = 3m | | d = 1m | d = 3m |
| Frequency GHz | $\theta_{3dB}$ (º) | $w$ (m) | $w$ (m) | $\theta_{3dB}$ (º) | $w$ (m) | $w$ (m) |
| 1 | 82 | 1.74 | 5.22 | 57 | 1.10 | 3.26 |
| 2 | 55.4 | 1.05 | 3.15 | 55.2 | 1.04 | 3.14 |
| 3 | 76.4 | 1.57 | 4.72 | 35.6 | 0.64 | 1.93 |
| 4 | 54.6 | 1.03 | 3.10 | 39.4 | 0.72 | 2.15 |
| 5 | 50.6 | 0.95 | 2.84 | 38.6 | 0.70 | 2.10 |
| 6 | 49.6 | 0.92 | 2.77 | 39 | 0.71 | 2.12 |

The receiver resolution bandwidth was set as shown in the chart below.

| Resolution bandwidth | |
|---|---|
| 30 MHz to 1 GHz | 120 kHz |
| > 1 GHz | 1 MHz |

Data is measured using automation software. The software controls the turntable azimuth, antenna mast height, antenna polarity and the receiver. The worst case radiated emissions data is in Section 5.2.

The highest frequency of testing was determined by using the table below. Look in the left column and find the highest frequency the EUT operates or tunes and then look in the same row in the right column to see how high in frequency to test. Refer to Section 1 Equipment Under Test for the EUT frequency list.

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz):: | Upper frequency of measurement range (MHz): |
|---|---|
| Below 1.705 | 30 |
| 1.705 – 108 | 1000 |

| | |
|---|---|
| 108 – 500 | 2000 |
| 500 – 1000 | 5000 |
| Above 1000 | 5th harmonic of the highest frequency or 6 GHz, whichever is lower. |

| |
|---|
| The frequency range investigated based on the result of using the table above |
| The highest frequency from section 1.5 is 25MHz. 30 MHz to 6 GHz |

Certification data:

30 MHz to 1000 MHz certification data is measured on the OATS if 10 m measurement distance is required by the standard. At least the 10 highest frequencies of the worst case configuration determined in the semi-anechoic chamber are measured. If a frequency is masked by an ambient signal when testing on the OATS, the 3 m distance data taken in the semi-anechoic chamber is used to determine compliance.

Unless otherwise designated, radiated emissions testing were performed at the following antenna to EUT distance:

- 10 meters for measurements below 1 GHz is measured on the OATS.
- 3 meters for measurements below 1 GHz can be measured in the semi-anechoic chamber if necessary.
- 3 meters for measurements above 1 GHz is measured in the semi-anechoic chamber.

**Field Strength Calculation**

The field strength was calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading.

The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBμV is obtained.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBμV/m (corrected field strength reading)

## 4.2. Radiated Emissions Test Data with EUT powered by 220 VAC @ 60 Hz

a. OATS Data

# OCEL OATS

## INFORMATION:

| | | | | | |
|---|---|---|---|---|---|
| Customer | : | Robert Sem | Job No. | : | HF130910208528E |
| Product | : | Davis Flat | Test Standard | : | Korea Class A |
| Model | : | X520DA2OCP | Date/ Time | : | 10 September,2013 14:25 |
| Serial No. | : | A0369F17FCA0 | Operator | : | Bryan Case |
| AC Line | : | 220 VAC / 60 Hz | Temperature, Humidity | : | 22 C, 63% RH |
| Remark | : | Finisar Optics LR 10GB PBA G96215-001 K | | | |

## TEST DATA:

### QP Data

| Frequency MHz | Polarity | Reading dB(uV) QP | Factor dB | Level dB(uV) QP | Limit dB(uV) QP | Margin dB | Pass/ Fail | Height cm | Angle deg | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 799.994 | V | 15.6 | 22.9 | 38.5 | 47.0 | 8.5 | Pass | 167.5 | 16.0 | |
| 784.750 | V | 8.1 | 23.1 | 31.2 | 47.0 | 15.8 | Pass | 176.8 | 12.2 | |
| 147.919 | V | 9.7 | 12.9 | 22.6 | 40.0 | 17.4 | Pass | 369.5 | 203.6 | |
| 58.727 | H | 14.5 | 7.4 | 21.9 | 40.0 | 18.1 | Pass | 399.4 | 60.4 | |
| 722.786 | H | 3.9 | 22.6 | 26.5 | 47.0 | 20.5 | Pass | 138.5 | 114.3 | |
| 180.353 | V | Masked by ambient. Use chamber data | | | | | | | | |
| 76.773 | H | | | | | | | | | |
| 145.094 | V | | | | | | | | | |
| 32.666 | V | | | | | | | | | |
| 96.146 | H | | | | | | | | | |

a. 30 MHz to 1 GHz Chamber Data

# OCEL EMC CHAMBER 2

## INFORMATION:

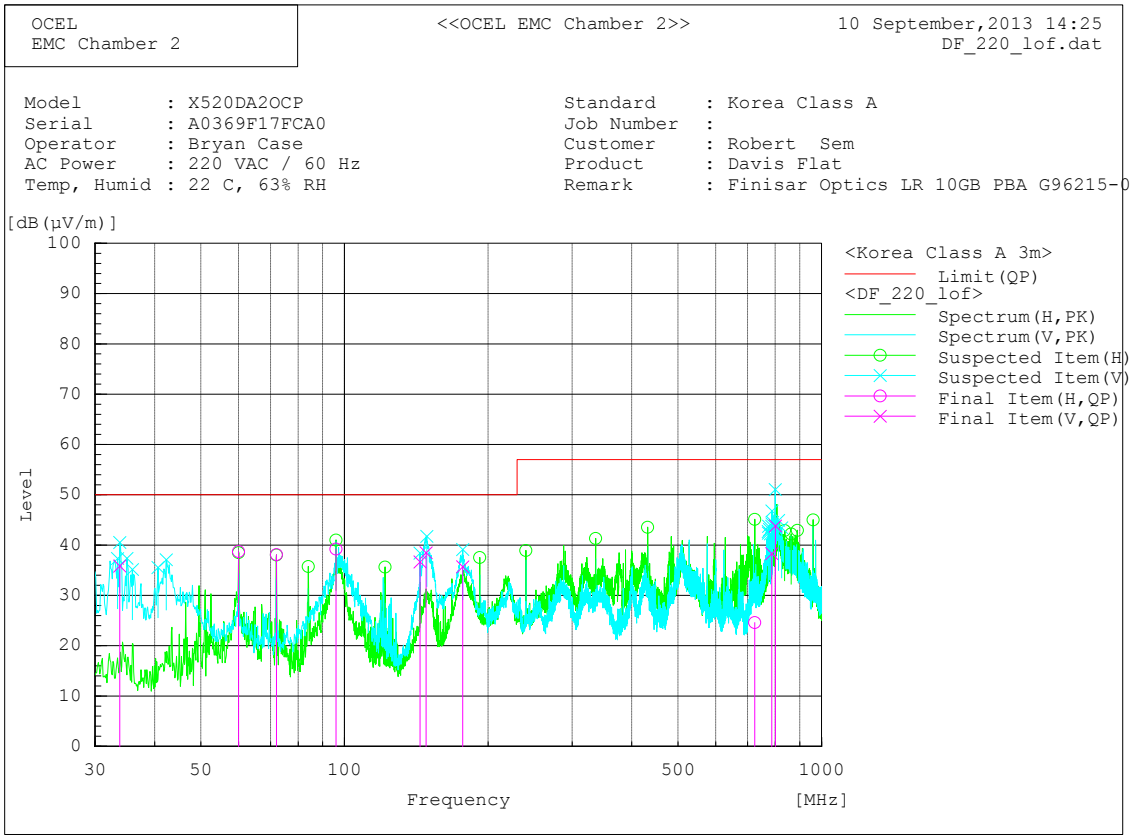
| | | | | | |
|---|---|---|---|---|---|
| Customer | : | Robert Sem | Job No. | : | HF130910208528E |
| Product | : | Davis Flat | Test Standard | : | Korea Class A |
| Model | : | X520DA2OCP | Date/ Time | : | 10 September,2013 14:25 |
| Serial No. | : | A0369F17FCA0 | Operator | : | Bryan Case |
| AC Line | : | 220 VAC / 60 Hz | Temperature, Humidity | : | 22 C, 63% RH |
| Remark | : | Finisar Optics LR 10GB PBA G96215-001 K | | | |

## TEST DATA:

### Data List (QP data compared to QP limit)

| Frequency MHz | Polarity | Reading dB(uV) QP | Factor dB | Level dB(uV/m) QP | Limit dB(uV/m) QP | Margin dB | Pass/ Fail | Height cm | Angle deg | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 96.019 | H | 66.2 | -27.0 | 39.2 | 50.0 | 10.8 | Pass | 380.3 | 274.0 | |
| 72.014 | H | 67.8 | -29.7 | 38.1 | 50.0 | 11.9 | Pass | 399.1 | 116.1 | |
| 143.993 | V | 62.3 | -25.6 | 36.7 | 50.0 | 13.3 | Pass | 108.9 | 233.7 | |
| 33.802 | V | 56.0 | -20.2 | 35.8 | 50.0 | 14.2 | Pass | 100.3 | 2.5 | |
| 176.906 | V | 63.1 | -27.4 | 35.7 | 50.0 | 14.3 | Pass | 101.6 | 180.4 | |

## TRACE:



b. 1 GHz to 6 GHz Chamber Data

# OCEL EMC CHAMBER 2

## INFORMATION:

| | | | | | |
|---|---|---|---|---|---|
| Customer | : | Robert Sem | Job No. | : | HF130910208528E |
| Product | : | Davis Flat | Test Standard | : | Korea Class A 3m |
| Model | : | X520DA2OCP | Date/ Time | : | 10 September,2013 12:07 |
| Serial No. | : | A0369F17FCA0 | Operator | : | Bryan Case |
| AC Line | : | 220 VAC / 60 Hz | Temperature, Humidity | : | 22 C, 63% RH |
| Remark | : | Finisar Optics LR 10GB PBA G96215-001 K | | | |

## TEST DATA:

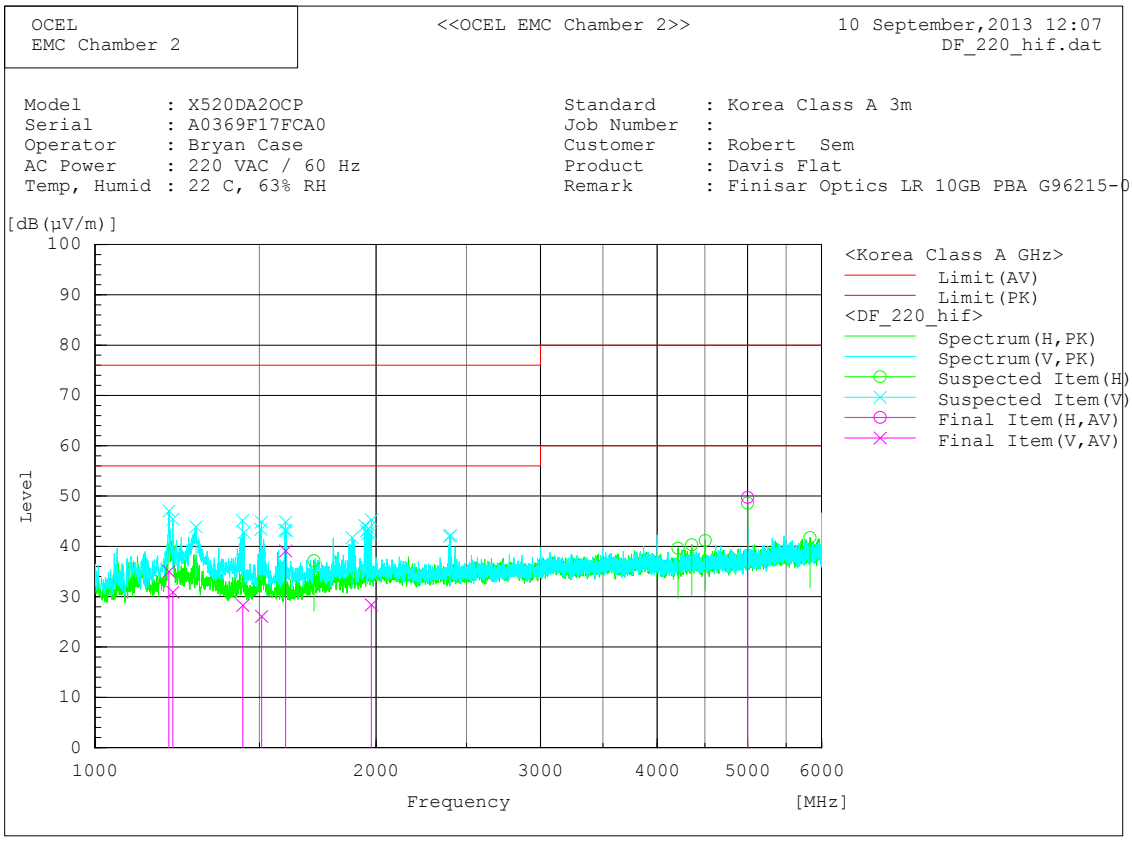
### A. Peak Data

| Frequency MHz | Polarity | Reading dB(uV) | Factor dB | Level dB(uV/m) | Limit dB(uV/m) Peak | Margin dB | Pass/ Fail | Height cm | Angle deg | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1200.220 | V | 68.4 | -21.4 | 47.0 | 76.0 | 29.0 | Pass | 100.0 | 55.8 | |
| 1211.818 | V | 66.6 | -21.2 | 45.4 | 76.0 | 30.6 | Pass | 100.0 | 47.3 | |
| 1977.292 | V | 62.1 | -16.9 | 45.2 | 76.0 | 30.8 | Pass | 100.0 | 147.7 | |
| 1438.286 | V | 66.0 | -20.8 | 45.2 | 76.0 | 30.9 | Pass | 100.0 | 167.2 | |
| 1507.264 | V | 65.8 | -20.9 | 44.9 | 76.0 | 31.1 | Pass | 100.0 | 180.6 | |
| 1600.049 | V | 65.7 | -20.9 | 44.8 | 76.0 | 31.2 | Pass | 100.0 | 2.2 | |
| 5000.122 | H | 62.1 | -13.5 | 48.6 | 80.0 | 31.4 | Pass | 100.0 | 238.4 | |
| 1944.329 | V | 61.3 | -17.2 | 44.1 | 76.0 | 31.9 | Pass | 100.0 | 153.4 | |
| 1282.627 | V | 64.3 | -20.4 | 43.9 | 76.0 | 32.1 | Pass | 100.0 | 2.6 | |
| 1962.032 | V | 60.6 | -17.0 | 43.6 | 76.0 | 32.4 | Pass | 100.0 | 153.4 | |
| 1505.433 | V | 64.3 | -20.9 | 43.4 | 76.0 | 32.6 | Pass | 100.0 | 167.2 | |
| 1596.997 | V | 64.1 | -20.9 | 43.2 | 76.0 | 32.8 | Pass | 100.0 | 2.6 | |
| 1603.101 | V | 64.0 | -20.9 | 43.1 | 76.0 | 32.9 | Pass | 100.0 | 2.6 | |
| 1953.486 | V | 60.2 | -17.1 | 43.1 | 76.0 | 32.9 | Pass | 100.0 | 153.4 | |
| 1444.390 | V | 63.6 | -20.8 | 42.8 | 76.0 | 33.2 | Pass | 100.0 | 175.3 | |
| 1957.759 | V | 59.7 | -17.1 | 42.6 | 76.0 | 33.4 | Pass | 100.0 | 153.4 | |
| 1970.578 | V | 59.5 | -17.0 | 42.5 | 76.0 | 33.5 | Pass | 100.0 | 153.4 | |
| 2403.370 | V | 59.3 | -17.1 | 42.2 | 76.0 | 33.8 | Pass | 100.0 | 324.0 | |
| 2396.655 | V | 59.0 | -17.0 | 42.0 | 76.0 | 34.0 | Pass | 100.0 | 324.0 | |
| 1885.118 | V | 59.8 | -18.0 | 41.8 | 76.0 | 34.2 | Pass | 100.0 | 209.9 | |
| 5832.133 | H | 55.5 | -13.7 | 41.8 | 80.0 | 38.2 | Pass | 100.0 | 359.6 | |
| 4503.846 | H | 56.6 | -15.4 | 41.2 | 80.0 | 38.8 | Pass | 100.0 | 359.6 | |
| 1716.030 | H | 56.9 | -19.7 | 37.2 | 76.0 | 38.9 | Pass | 100.0 | 124.5 | |
| 4356.733 | H | 56.8 | -16.5 | 40.3 | 80.0 | 39.7 | Pass | 100.0 | 0.0 | |
| 4211.452 | H | 56.9 | -17.3 | 39.6 | 80.0 | 40.4 | Pass | 100.0 | 177.1 | |

**B. Average Data**

| Frequency MHz | Polarity | Reading dB(uV) | Factor dB | Level dB(uV/m) | Limit dB(uV/m) AV | Margin dB | Pass/ Fail | Height cm | Angle deg | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 5000.004 | H | 63.2 | -13.5 | 49.7 | 60.0 | 10.3 | Pass | 100.0 | 239.3 | |
| 1600.044 | V | 60.0 | -20.9 | 39.1 | 56.0 | 16.9 | Pass | 100.0 | 2.5 | |
| 1199.638 | V | 56.4 | -21.4 | 35.0 | 56.0 | 21.0 | Pass | 100.0 | 64.5 | |
| 1211.522 | V | 52.1 | -21.2 | 30.9 | 56.0 | 25.1 | Pass | 100.0 | 49.3 | |
| 1976.773 | V | 45.3 | -16.9 | 28.4 | 56.0 | 27.6 | Pass | 100.0 | 155.7 | |
| 1439.889 | V | 49.1 | -20.8 | 28.3 | 56.0 | 27.7 | Pass | 100.0 | 179.9 | |
| 1507.926 | V | 47.0 | -20.9 | 26.1 | 56.0 | 29.9 | Pass | 100.0 | 159.3 | |

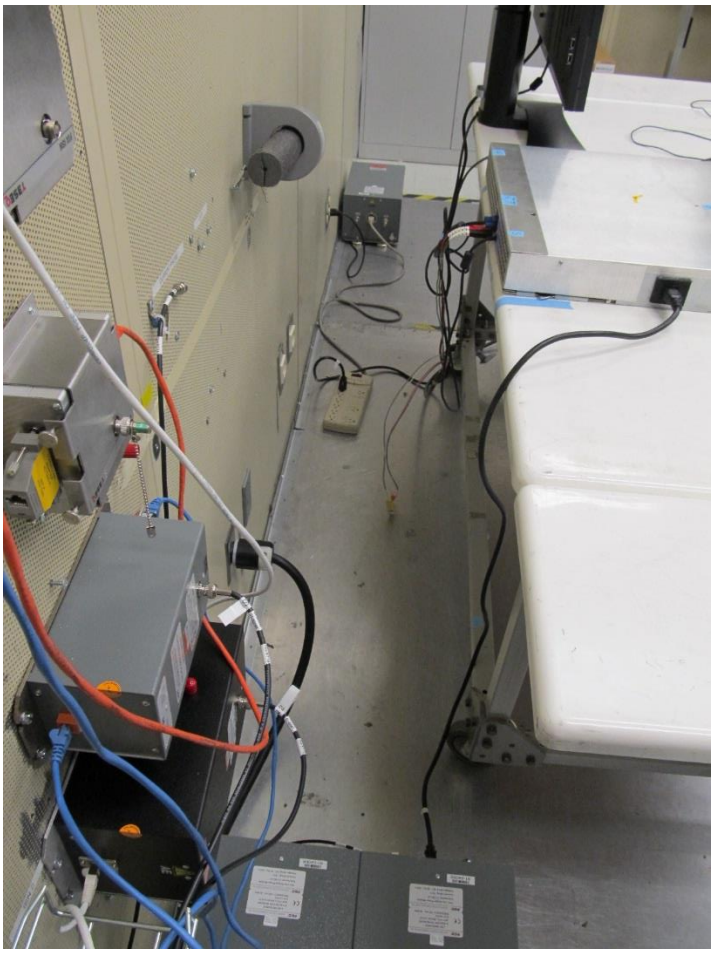
## TRACE:



# 5. Test Setup Photos

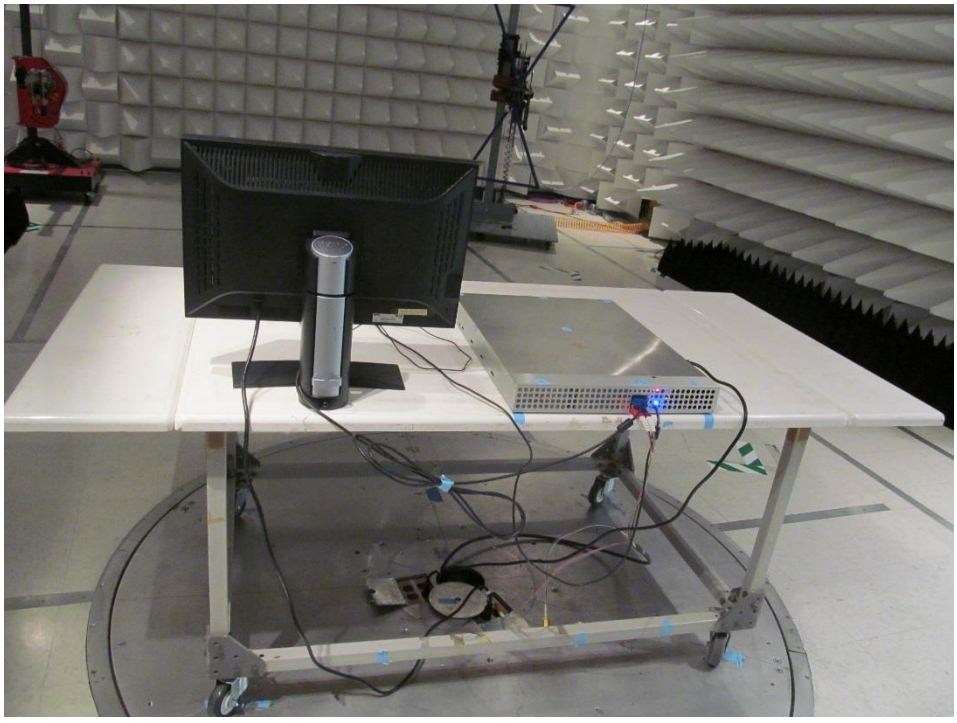
**Conducted Emission Test Setup, Front View**

**Conducted Emission Test Setup, Rear View**

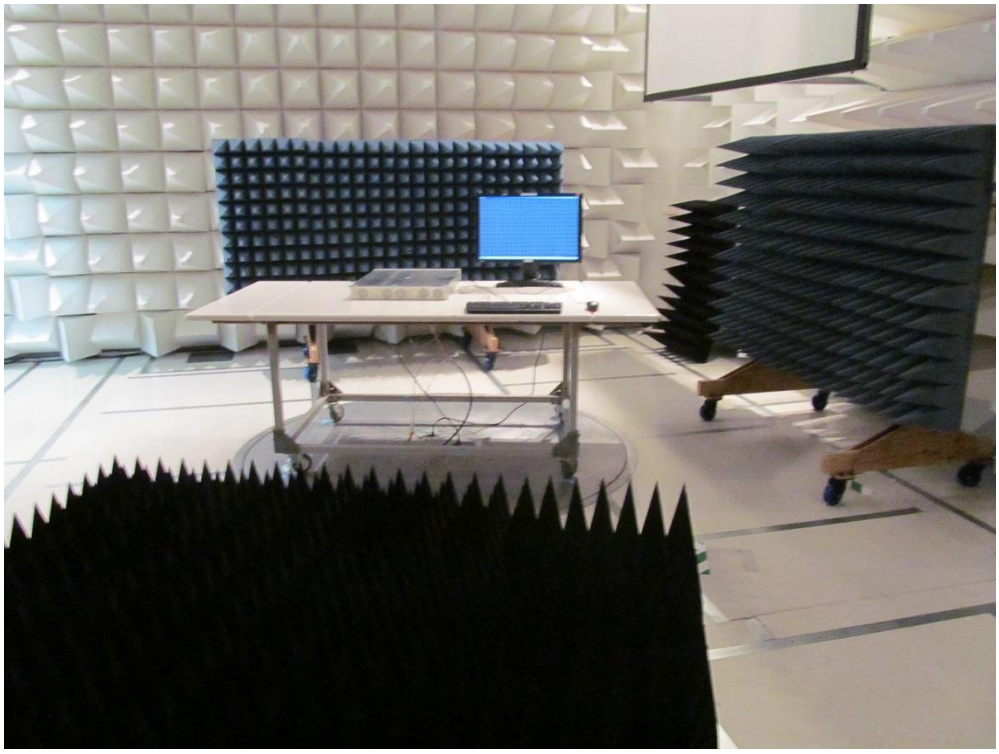


**Low Frequency Radiated Emissions Semi-Anechoic Chamber Test Setup, Front View**

**Low Frequency Radiated Emissions Semi-Anechoic Chamber Test Setup, Rear View**



**High Frequency Radiated Emissions Semi-Anechoic Chamber Test Setup, Front View**



**High Frequency Radiated Emissions Semi-Anechoic Chamber Test Setup, Rear View**