



Test Report

| | |
|---|--|
| Report No | EF0551-1 |
| Client | Millennial Net |
| Phone | 781-222-1030 |
| Fax | 781-222-1039 |
| FRN | 0011054871 |
| Models | 5409-URM-G |
| FCC ID IC # | R8N-URM-G-916 5127A-URMG916 |
| Equipment Type Equipment Code Emission Designator | Low Power Communications Device Transmitter DXX A1D |
| Results | As detailed within this report |
| Prepared by |  _____ Josh LeBlanc – Test Engineer |
| Authorized by |  _____ Michael Buchholz – EMC Manager |
| Issue Date | 8/29/05 |
| Conditions of issue | This Test Report is issued subject to the conditions stated in 'terms and conditions' section of this |

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.



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Summary

This report is an application for certification of a modular transmitter operating pursuant to 47 CFR 15.249 and RSS-210 6.2 provided for the operation in the band of 902-928MHz. The product covered by this report is the 5409-URM-G. It is a modular wireless sensor gateway that has both a transmitter and receiver which operate at 916.5MHz with a ± 200 kHz frequency tolerance.

A detailed description of the antennas is provided in the antenna exhibit.

Test Methodology

Radiated emissions testing was performed according to the procedures specified in ANSI C63.4 (2003). The EUT was maximized around all three orthogonal axes. The EUT has an external antenna which was maximized separately. The EUT was tested while connected to an application board which was powered by a Unifive model UL305-0905 AC to DC power supply. The standard test voltage was 120Vac to the input of the AC to DC power supply. For the voltage variations testing, the DC voltage to the 5409-URM-G module was varied $\pm 15\%$. The ambient environmental conditions were as follows:

| Date | Temperature | Humidity |
|---------|-------------|----------|
| 7/19/05 | 28.2°C | 33% |
| 7/20/05 | 26.3°C | 33% |
| 7/21/05 | 27.1°C | 33% |

| | |
|--------------------------------------|-------------------|
| Frequency range investigated: | 30 MHz- 9.166 GHz |
|--------------------------------------|-------------------|

| Measurement Distance: | | |
|-------------------------------------|--------------|-----------|
| Frequency (MHz) | Distance (m) | Comments |
| AC conducted 0.15 – 30MHz | - | Conducted |
| Fundamental 916.6MHz | 3 m | Radiated |
| Spurious & harmonics 30 – 10000 MHz | 3 m | Radiated |

All readings are peak unless otherwise noted.

Per the user guide, 3 antennas may be used with this module: two $\frac{1}{2}$ wave and one $\frac{1}{4}$ wave monopoles. The $\frac{1}{4}$ wave and the highest gain $\frac{1}{2}$ wave were chosen for testing.

EUT Configuration

| EUT Configuration | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-----------|--------|----------|------------------------|-----|--------------------------------------|---|-------------------|--------------------------------------|-------------------|-----------------------------------|---------------------------------------|----------------|-------------------------|-----------|----|------|----|---------------|---|-----|-----|----|
| Work Order: F0551 Company: Millennial Net Company Address: 2 Fourth Ave Burlington, Ma 01803 Contact: Dave Oswill Person Present: Faraz Firoozabadi | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>MN</th> <th>SN</th> </tr> </thead> <tbody> <tr> <td>EUT: 5409-URM-G 5409-URM-G</td> <td>405180178 used for intentional tests 405180176 used for spurious tests</td> </tr> <tr> <td>Application board</td> <td>405180059 used for intentional tests</td> </tr> <tr> <td>Application board</td> <td>405180052 used for spurious tests</td> </tr> <tr> <td>Unifive AC/DC power supply UL305-0905</td> <td>405-0131469</td> </tr> </tbody> </table> | | | | | MN | SN | EUT: 5409-URM-G 5409-URM-G | 405180178 used for intentional tests 405180176 used for spurious tests | Application board | 405180059 used for intentional tests | Application board | 405180052 used for spurious tests | Unifive AC/DC power supply UL305-0905 | 405-0131469 | | | | | | | | | | |
| MN | SN | | | | | | | | | | | | | | | | | | | | | | | |
| EUT: 5409-URM-G 5409-URM-G | 405180178 used for intentional tests 405180176 used for spurious tests | | | | | | | | | | | | | | | | | | | | | | | |
| Application board | 405180059 used for intentional tests | | | | | | | | | | | | | | | | | | | | | | | |
| Application board | 405180052 used for spurious tests | | | | | | | | | | | | | | | | | | | | | | | |
| Unifive AC/DC power supply UL305-0905 | 405-0131469 | | | | | | | | | | | | | | | | | | | | | | | |
| EUT Description: Modular wireless sensor network gateway EUT Max Frequency: 916.5MHz | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Support Equipment:</th> <th>MN</th> <th>SN</th> </tr> </thead> <tbody> <tr> <td>IBM laptop</td> <td>G40</td> <td>2G-0006L</td> </tr> <tr> <td>endnode</td> <td>EN-5409-ASM</td> <td>405210410</td> </tr> <tr> <td>terminal board</td> <td>not available</td> <td>405110017</td> </tr> </tbody> </table> | | | | | Support Equipment: | MN | SN | IBM laptop | G40 | 2G-0006L | endnode | EN-5409-ASM | 405210410 | terminal board | not available | 405110017 | | | | | | | | |
| Support Equipment: | MN | SN | | | | | | | | | | | | | | | | | | | | | | |
| IBM laptop | G40 | 2G-0006L | | | | | | | | | | | | | | | | | | | | | | |
| endnode | EN-5409-ASM | 405210410 | | | | | | | | | | | | | | | | | | | | | | |
| terminal board | not available | 405110017 | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>EUT Cables:</th> <th>Qty</th> <th>Shielded?</th> <th>Length</th> <th>Ferrites</th> </tr> </thead> <tbody> <tr> <td>Serial cable on app. Board</td> <td>1</td> <td>yes</td> <td>3m</td> <td>no</td> </tr> <tr> <td>Power from AC/DC supply</td> <td>1</td> <td>no</td> <td>1.5m</td> <td>no</td> </tr> <tr> <td>Antenna cable</td> <td>1</td> <td>yes</td> <td>6in</td> <td>no</td> </tr> </tbody> </table> | | | | | EUT Cables: | Qty | Shielded? | Length | Ferrites | Serial cable on app. Board | 1 | yes | 3m | no | Power from AC/DC supply | 1 | no | 1.5m | no | Antenna cable | 1 | yes | 6in | no |
| EUT Cables: | Qty | Shielded? | Length | Ferrites | | | | | | | | | | | | | | | | | | | | |
| Serial cable on app. Board | 1 | yes | 3m | no | | | | | | | | | | | | | | | | | | | | |
| Power from AC/DC supply | 1 | no | 1.5m | no | | | | | | | | | | | | | | | | | | | | |
| Antenna cable | 1 | yes | 6in | no | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Unpopulated EUT Ports:</th> <th>Qty</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>none</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | Unpopulated EUT Ports: | Qty | Reason | none | | | | | | | | | | | | | | | | |
| Unpopulated EUT Ports: | Qty | Reason | | | | | | | | | | | | | | | | | | | | | | |
| none | | | | | | | | | | | | | | | | | | | | | | | | |
| Software / Operating Mode Description: The EUT was set to operate in TX and RX modes. | | | | | | | | | | | | | | | | | | | | | | | | |

Statement of Conformity

The 5409-URM-G has been found to conform to the following parts of the 47 CFR as detailed below:

| RSS-210 | 47 CFR Part # | Comments |
|----------------|----------------------|---|
| 5.7 | 15.15(b) | The product contains no user accessible controls that increase transmission power above allowable levels. |
| 5.10 | 15.19 | The label is shown in the label exhibit. |
| 5.11 | 15.21 | Information to the user is shown in the instruction manual exhibit. |
| | 15.27 | No special accessories are required for compliance. |
| | 15.31(e) | The dc input voltage to the module was varied to $\pm 15\%$ of the rated voltage. |
| 5.5 | 15.203 | The device utilizes a reverse SMA non-standard antenna jack. |
| 5.5 | 15.204 | See attached documentation describing the antennas. |
| 6.2.1 | 15.205 15.209 | The fundamental is not in a restricted band and the spurious emissions in the restricted bands comply with the general emission limits of 15.209. |
| 6.6 | 15.207 | Product complies with AC line conducted emissions limits. |
| 6.2.2 | 15.249(a) | The EUT meets the field strength limit of 50mV/m (94dB μ V/m) at the fundamental, and 500 μ V/m (54dB μ V/m) at the harmonics. |
| 6.2.1 | 15.249 (d) | Spurious emissions meet the general radiated emissions limits of section 15.209. |
| 6.2.1 | 15.249 (e) | Spurious emissions found above 1GHz meet the limits of 15.209. |

Modifications required for compliance:

In order to meet the fundamental emission limit, R10 was changed to 10k Ω from 3.3k Ω and R8 was changed to 5.23k Ω from 0 Ω . This yields a total resistance on the TXMOD line of 15.23k Ω .

Spurious Radiated Emissions**Sections 15.247(d), 15.205, 15.209, & 6.2.1**

The half wave antenna was seen as a worst case and was used for all spurious emissions testing.

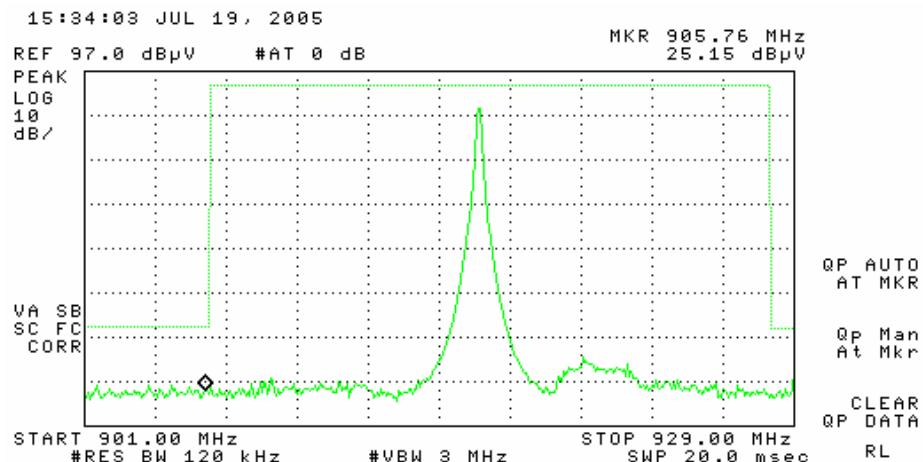
| Spurious Radiated Emissions Table | | | | | | | | | | Curtis-Straus LLC | | | | | | | | |
|---------------------------------------|-----------------|----------------------|------------------------|-----------------------|-------------------|---------------------------------|-------------------------------|----------------------|-------------------|---------------------------|-------------|-------|------|--|--|--|--|--|
| Date: 20-Jul-05 | | | Company: Millenial Net | | | | | | Work Order: F0551 | | | | | | | | | |
| Engineer: Josh LeBlanc | | | | | | | | | | EUT Desc: 5409-URM-G | | | | | | | | |
| Frequency Range: 30-1000MHz | | | | | | | | | | Measurement Distance: 3 m | | | | | | | | |
| Notes: The 1/2 wave antenna was used. | | | | | | | | | | EUT Max Freq: 916.6MHz | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | FCC Class B | | | | | | | |
| V | 56.75 | 33.9 | 22.4 | 7.7 | 0.8 | 20.0 | --- | --- | --- | --- | 40.0 | -20.0 | Pass | | | | | |
| V | 63.15 | 36.5 | 22.4 | 6.8 | 0.8 | 21.7 | --- | --- | --- | --- | 40.0 | -18.3 | Pass | | | | | |
| V | 83.6 | 46.2 | 22.4 | 8.3 | 1.0 | 33.1 | --- | --- | --- | --- | 40.0 | -6.9 | Pass | | | | | |
| V | 99.8 | 41.2 | 22.3 | 11.3 | 1.1 | 31.3 | --- | --- | --- | --- | 43.5 | -12.2 | Pass | | | | | |
| V | 110.73 | 46.6 | 22.3 | 12.2 | 1.2 | 37.7 | --- | --- | --- | --- | 43.5 | -5.9 | Pass | | | | | |
| V | 133.73 | 47.5 | 22.3 | 12.6 | 1.4 | 39.2 | --- | --- | --- | --- | 43.5 | -4.3 | Pass | | | | | |
| V | 179.1 | 43.8 | 22.4 | 10.0 | 1.6 | 33.0 | --- | --- | --- | --- | 43.5 | -10.5 | Pass | | | | | |
| V | 200.84 | 44.5 | 22.4 | 10.7 | 1.7 | 34.5 | --- | --- | --- | --- | 43.5 | -9.0 | Pass | | | | | |
| H | 240.8 | 44.1 | 22.4 | 12.6 | 1.9 | 36.2 | --- | --- | --- | --- | 46.0 | -9.8 | Pass | | | | | |
| H | 277.8 | 41.3 | 22.3 | 13.5 | 2.0 | 34.5 | --- | --- | --- | --- | 46.0 | -11.5 | Pass | | | | | |
| H | 333.0 | 34.7 | 22.2 | 14.8 | 2.4 | 29.7 | --- | --- | --- | --- | 46.0 | -16.3 | Pass | | | | | |
| Table Result: Pass by -4.3 dB | | | | | | | Worst Freq: 133.73 MHz | | | | | | | | | | | |
| Test Site: "F" | Pre-Amp: Blue | Cable: EMIR-01 | Analyzer: Yellow | Antenna: Grn-Blk | | | | | | | | | | | | | | |

| Spurious Radiated Emissions Table | | | | | | | | | | Curtis-Straus LLC | | | | | | | | |
|---|-----------------|----------------------|------------------------|-----------------------|-------------------|---------------------------------|-----|----------------------|-------------------|---------------------------|-------------|-----|-----|--|--|--|--|--|
| Date: 20-Jul-05 | | | Company: Millenial Net | | | | | | Work Order: F0551 | | | | | | | | | |
| Engineer: Josh LeBlanc | | | | | | | | | | EUT Desc: 5409-URM-G | | | | | | | | |
| Frequency Range: 1-10GHz | | | | | | | | | | Measurement Distance: 3 m | | | | | | | | |
| Notes: The 1/2 wave antenna was used. Tested RX and TX with endnrode as support equipment. | | | | | | | | | | EUT Max Freq: 916.6MHz | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | FCC Class B | | | | | | | |
| No emissions found. | | | | | | | --- | --- | --- | --- | --- | --- | --- | | | | | |
| Test Site: "F" | Pre-Amp: White | Cable: 3 RG142LL | Analyzer: Orange | Antenna: Orange Horn | | | | | | | | | | | | | | |

Sample Calculation:

Adjusted Reading = Reading – Pre Amp_(factor) + Antenna_(factor) + Cable_(factor)

Bandedge Plot

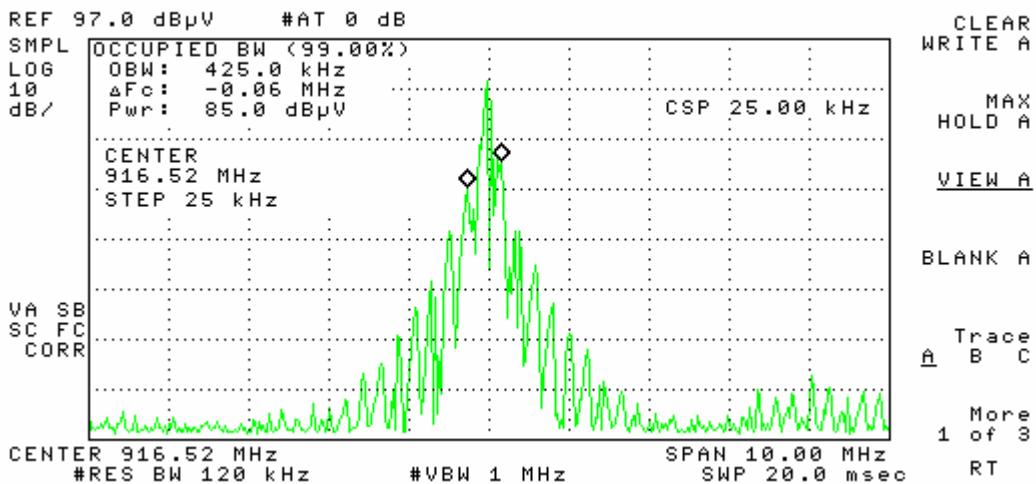


Conclusion: As seen on the above plot, the fundamental is >10dB below the limit line shown and thus meets the spurious limit at the bandedge.

Emission Bandwidth

Section 5.9.1

15:36:20 JUL 19, 2005



Fundamental and Harmonics Field Strength**Section 15.249(a) & 6.2.2**

| Fundamental Radiated Emission | | | | | | | | | | | Curtis-Straus LLC | | | | | | | | | |
|--|--------------------|-------------------------|--------------------------|-----------------------------|-------------------------|---------------------------------------|-----|-------------------------|----------------|-----------------------|---------------------------|----------------|-----------------------|--|--|--|--|--|--|--|
| Date: 19-Jul-05 | | | Company: Millenial Net | | | | | | | Work Order: F0551 | | | | | | | | | | |
| Engineer: Josh LeBlanc | | | | | | | | | | | EUT Desc: 5409-URM-G | | | | | | | | | |
| Frequency Range: 916.6MHz | | | | | | | | | | | Measurement Distance: 3 m | | | | | | | | | |
| Notes: with half wave antenna attached | | | | | | | | | | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | | | | | | | |
| H | 916.6 | 65.1 | 0.0 | 22.9 | 4.5 | 92.5 | --- | --- | --- | 94.0 | -1.5 | Pass | | | | | | | | |
| Test Site: "F" | | Pre-Amp: none | | Cable: EMIR-01 | | Analyzer: Yellow | | Antenna: Red-White | | | | | | | | | | | | |

| Fundamental Radiated Emission | | | | | | | | | | | Curtis-Straus LLC | | | | | | | | | |
|---------------------------------------|--------------------|-------------------------|--------------------------|-----------------------------|-------------------------|---------------------------------------|-----|-------------------------|----------------|-----------------------|---------------------------|----------------|-----------------------|--|--|--|--|--|--|--|
| Date: 20-Jul-05 | | | Company: Millenial Net | | | | | | | Work Order: F0551 | | | | | | | | | | |
| Engineer: Josh LeBlanc | | | | | | | | | | | EUT Desc: 5409-URM-G | | | | | | | | | |
| Frequency Range: 916.6MHz | | | | | | | | | | | Measurement Distance: 3 m | | | | | | | | | |
| Notes: with 1/4 wave antenna attached | | | | | | | | | | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | | | | | | | |
| H | 916.6 | 61.5 | 0.0 | 22.9 | 4.5 | 88.9 | --- | --- | --- | 94.0 | -5.1 | Pass | | | | | | | | |
| Test Site: "F" | | Pre-Amp: none | | Cable: EMIR-01 | | Analyzer: Yellow | | Antenna: Red-White | | | | | | | | | | | | |

| Harmonics of the Fundamental Radiated Emission | | | | | | | | | | | Curtis-Straus LLC | | | | | | | | | |
|--|--------------------|-------------------------|--------------------------|-----------------------------|-------------------------|---------------------------------------|-------------------------------|-------------------------|----------------|-----------------------|---------------------------|----------------|-----------------------|--|--|--|--|--|--|--|
| Date: 20-Jul-05 | | | Company: Millenial Net | | | | | | | Work Order: F0551 | | | | | | | | | | |
| Engineer: Josh LeBlanc | | | | | | | | | | | EUT Desc: 5409-URM-G | | | | | | | | | |
| Frequency Range: Harmonics | | | | | | | | | | | Measurement Distance: 3 m | | | | | | | | | |
| Notes: | | | | | | | | | | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | | | | | | | |
| Havg | 1833.3 | 28.3 | 17.8 | 28.0 | 1.8 | 40.3 | --- | --- | --- | 54.0 | -13.7 | Pass | | | | | | | | |
| Hpk | 1833.3 | 39.0 | 17.8 | 28.0 | 1.8 | 51.0 | --- | --- | --- | 74.0 | -23.0 | Pass | | | | | | | | |
| Table Result: Pass by -13.7 dB | | | | | | | Worst Freq: 1833.3 MHz | | | | | | | | | | | | | |
| Test Site: "F" | | Pre-Amp: White | | Cable: 3 RG142LL | | Analyzer: Orange | | Antenna: Orange Horn | | | | | | | | | | | | |

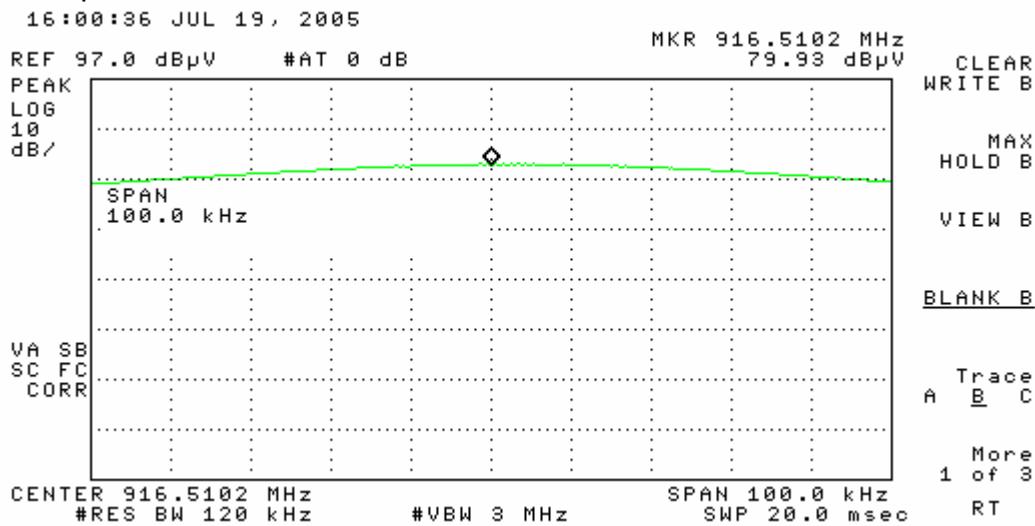
Sample Calculation:Adjusted Reading = Reading – Pre Amp_(factor) + Antenna_(factor) + Cable_(factor)

Voltage Variations

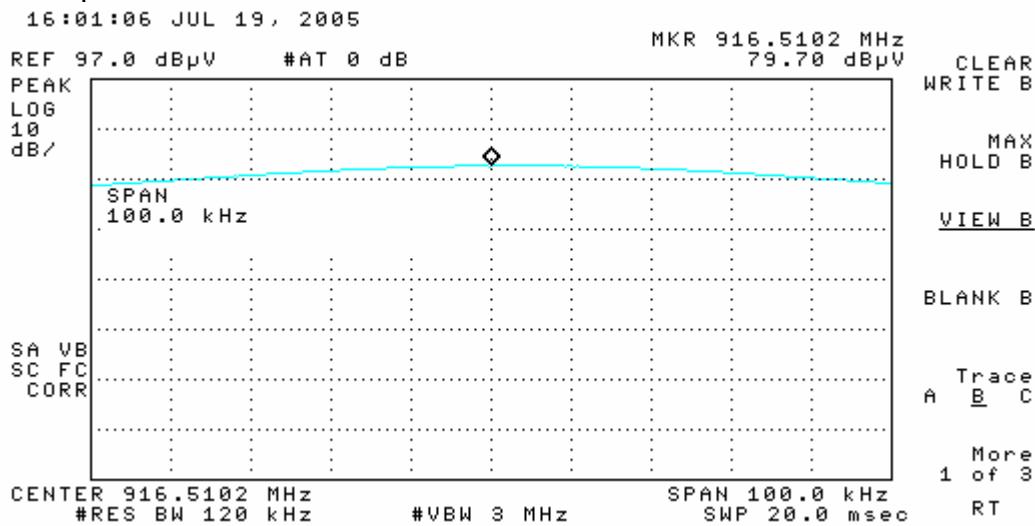
Section 15.31(e)

The DC input voltage to the module was varied to $\pm 15\%$ of the rated voltage of 3.3Vdc. The DC voltage was measured at the input of the radio module.

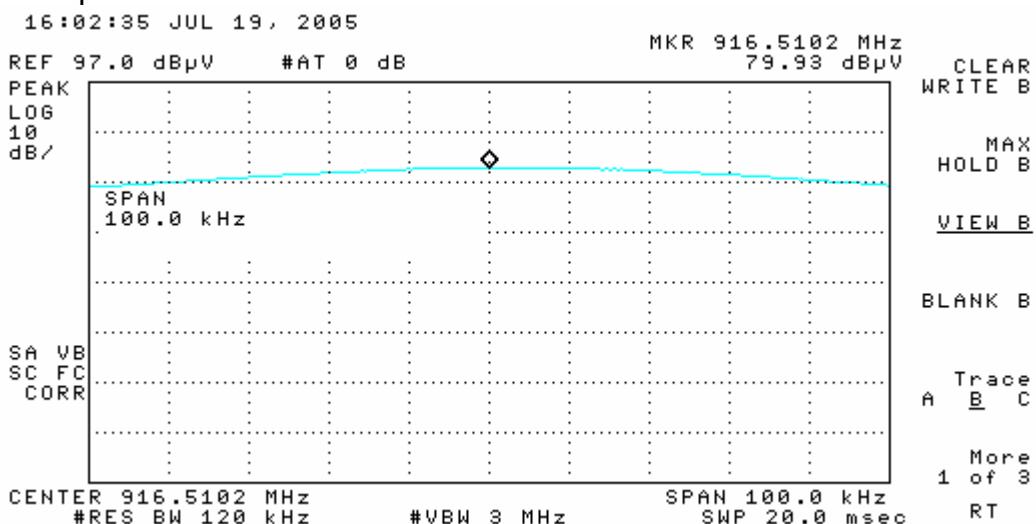
3.3Vdc input



2.8Vdc input



3.8Vdc input



AC Line Conducted Emission Measurements**Section 15.207, 6.6 & 9**

| AC Mains Conducted Emissions | | | | | | | | | | Curtis-Straus LLC | | | | | | | | | | | |
|------------------------------|---------------------|-------------------------|---------------------|---------------------|---------------------|------|-----------------------|-------------------|--------------------------|-------------------|---------------------------|----------------------------------|------------------|--|--|--|--|--|--|--|--|
| Date: 20-Jul-05 | | Company: Millennial Net | | | | | | Work Order: F0551 | | | | | | | | | | | | | |
| Engineer: Josh LeBlanc | | EUT Desc: 5409-URM-G | | | | | | Test Site: EMI1 | | | | | | | | | | | | | |
| Notes: | | | | | | | | | | | | | | | | | | | | | |
| LISN(s): Yellow Orange | | | | | | | | | | | | | | | | | | | | | |
| Range: 0.15-30MHz | | | | | | | | | | | | | | | | | | | | | |
| Other Equipment: --- | | | | | | | | | | | | | | | | | | | | | |
| Spectrum Analyzer: Red | | | | | | | | | | | | | | | | | | | | | |
| Frequency (MHz) | Q.P. Readings | | Ave. Readings | | Impedance Factor | --- | | FCC/CISPR B | | FCC/CISPR B | | Overall Result (Pass/Fail) | | | | | | | | | |
| | QP1 (dB μ V) | QP2 (dB μ V) | AV1 (dB μ V) | AV2 (dB μ V) | | (dB) | Limit (dB μ V) | Margin dB | qp Limit (dB μ V) | qp Margin dB | AVE Limit (dB μ V) | | AVE Margin dB | | | | | | | | |
| 0.15 | 27.6 | 28.4 | 21.1 | 22.0 | 20.0 | --- | --- | 66.0 | -17.6 | 56.0 | -14.0 | Pass | | | | | | | | | |
| 8.80 | 30.3 | 31.4 | 14.3 | 14.7 | 20.0 | --- | --- | 60.0 | -8.6 | 50.0 | -15.3 | Pass | | | | | | | | | |
| 9.44 | 32.4 | 33.2 | 17.5 | 15.5 | 20.0 | --- | --- | 60.0 | -6.8 | 50.0 | -12.5 | Pass | | | | | | | | | |
| 9.82 | 33.0 | 32.4 | 17.8 | 16.7 | 20.0 | --- | --- | 60.0 | -7.0 | 50.0 | -12.2 | Pass | | | | | | | | | |
| 10.59 | 33.1 | 30.9 | 19.6 | 18.2 | 20.0 | --- | --- | 60.0 | -6.9 | 50.0 | -10.4 | Pass | | | | | | | | | |
| 11.43 | 30.9 | 29.2 | 18.3 | 17.2 | 20.0 | --- | --- | 60.0 | -9.1 | 50.0 | -11.7 | Pass | | | | | | | | | |
| 12.23 | 26.9 | 26.1 | 13.6 | 14.1 | 20.0 | --- | --- | 60.0 | -13.1 | 50.0 | -15.9 | Pass | | | | | | | | | |
| Table Result: | | Pass | by | -6.80 dB | | | | | Worst Freq: | | 9.44 MHz | | | | | | | | | | |

Line conducted testing was performed with $50\Omega/50\mu\text{H}$ LISN.

Test Equipment Used

REV. 01-JUL-2005

| SPECTRUM ANALYZERS / RECEIVERS | | RANGE | MN | MFR | SN | ASSET | CALIBRATION DUE |
|--|--------------------|------------------|-------------------|------------|-----------------|-----------------|-----------------|
| RED | 9kHz-1.8GHz | 8591E | HP | 3441A03559 | 00024 | 13-JAN-2006 | |
| YELLOW | 9kHz-2.9GHz | 8594E | HP | 3523A01958 | 00100 | 20-APR-2006 | |
| ORANGE | 9kHz-26.5GHz | E4407B | HP | US39440975 | 00394 | 22-JUN-2006 | |
| LISNs/MEASUREMENT PROBES | | RANGE | MN | MFR | SN | ASSET | CALIBRATION DUE |
| ORANGE | 10kHz-30MHz | 8012-50-R-24-BNC | SOLAR | 903707 | 00754 | 02-MAY-2006 | |
| YELLOW | 10kHz-30MHz | 8012-50-R-24-BNC | SOLAR | 0411658 | 1080 | 04-MAY-2006 | |
| OPEN AREA TEST SITE (OATS) | | FCC CODE | IC CODE | VCCI CODE | CALIBRATION DUE | | |
| SITE F | | 93448 | IC 2762-F | R-1688 | 04-APR-2007 | | |
| LINE CONDUCTED TEST SITES | | FCC CODE | IC CODE | VCCI CODE | CALIBRATION DUE | | |
| EMI 1 | | 93448 | N/A | C-1801 | 01-MAY-2006 | | |
| PREAMPS / ATTENUATORS / FILTERS | | RANGE | MN | MFR | SN | ASSET | CALIBRATION DUE |
| BLUE | 0.01-2000MHz | ZFL-1000-LN | C-S | N/A | 00759 | 26-JUL-2005 | |
| WHITE | 1-20GHz | SMC-12A | C-S | 426643 | 00760 | 21-JUL-2005 | |
| ANTENNAS | | RANGE | MN | MFR | SN | ASSET | CALIBRATION DUE |
| GREEN-BLACK BILOG | 30-2000MHz | CBL6112B | CHASE | 2412 | 00127 | 06-JAN-2006 | |
| RED-WHITE BILOG | 30-2000MHz | JB1 | SUNOL | A091604-1 | 01105 | 28-SEP-2006 | |
| ORANGE HORN | 1-18GHz | 3115 | EMCO | 0004-6123 | 00390 | 09-JUN-2007 | |
| RMS VOLTMETERS/CURRENT CLAMP | | MN | MNFR | SN | ASSET | CALIBRATION DUE | |
| TRUE-RMS MULTIMETER | | 79III | FLUKE | 71700298 | 00769 | 21-OCT-2005 | |
| METEOROLOGICAL METERS | | MN | MFR | SN | ASSET | CALIBRATION DUE | |
| TEMP./HUMIDITY/ATM. PRESSURE GAUGE | 7400 PERCEPTION II | | DAVIS | N/A | 00965 | 08-FEB-2007 | |
| TEMPERATURE /HUMIDITY GAUGE | THG-912 | | HUGER | 4000562 | 00789 | 01-FEB-2007 | |
| WEATHER CLOCK (PRESSURE ONLY) | BA928 | | OREGON SCIENTIFIC | C3166-1 | 00831 | 02-FEB-2007 | |

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Terms And Conditions

Paragraph 1. SERVICES. LABORATORY will:

- 1.1 Use the degree of care and skill ordinarily exercised by and consistent with the standards of the profession.
- 1.2 Perform all technical services in substantial accordance with the generally accepted laboratory principles and practices.
- 1.3 Retain all pertinent records relating to the services performed for a period of three (3) years following submission of the report describing such services, during which period the records will be made available to CLIENT upon reasonable request.

Paragraph 2. CLIENT'S RESPONSIBILITIES. CLIENT or his authorized representative will:

- 2.1 Provide LABORATORY with all plans, schematics, specifications, addenda, change orders, drawings and other information for the proper performance of technical services.
- 2.2 Designate a person to act as CLIENT's representative with respect to LABORATORY's services to be performed on behalf of the CLIENT; such person or firm to have complete authority to transmit instructions, receive information and data, interpret and define CLIENT's policies and decisions with respect to the LABORATORY's work on behalf of the CLIENT and to order, at CLIENT's expense, such technical services as may be required.
- 2.3 Designate a person who is authorized to receive copies of LABORATORY's reports.
- 2.4 Undertake the following:
 - (a) Secure and deliver to LABORATORY, without cost to LABORATORY, preliminary representative samples of the equipment proposed to require technical services, together with any relevant data.
 - (b) Furnish such labor and equipment needed by LABORATORY to handle samples at the LABORATORY and to facilitate the specified technical services.

Paragraph 3. GENERAL CONDITIONS:

- 3.1 LABORATORY, by the performance of services covered hereunder, does not in any way assume any of those duties or responsibilities customarily vested in the CLIENT, its employees, or any other party, agency or authority.
- 3.2 LABORATORY shall not be responsible for acts of omissions of any other party or parties involved in the design, manufacture or maintenance of the equipment or the failure of any employee, contractor or subcontractor to undertake any aspect of equipment's design, manufacture or maintenance.
- 3.3 LABORATORY is not authorized to revoke, alter, release, enlarge or release any requirement of the equipment's design, manufacture or maintenance unless specifically authorized by CLIENT or his authorized representative.
- 3.4 THE ONLY WARRANTY MADE BY LABORATORY IN CONNECTION WITH ITS SERVICE PERFORMED HEREUNDER IS THAT IT WILL USE THAT DEGREE OF CARE AND SKILL AS SET FORTH IN PARAGRAPH 1 ABOVE. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE OR INTENDED FOR SERVICES PROVIDED HEREUNDER.
- 3.5 Where the LABORATORY indicates that additional testing is advisable to obtain more valid or useful data, and where such testing has not been authorized, CLIENT agrees to view such test reports as inconclusive and preliminary.
- 3.6 The LABORATORY will supply technical service and prepare a report based solely on the sample submitted to the LABORATORY by the CLIENT. The CLIENT understands that application of the data to other devices is highly speculative and should be applied with extreme caution.
- 3.7 The LABORATORY agrees to exercise ordinary care in receiving, preserving and shipping (F.O.B. Littleton, MA) any sample to be tested, but assumes no responsibility for damages, either direct or consequential, which arise from loss, damage or destruction of the samples due to the act of examination, modification or testing, or technical services or circumstances beyond LABORATORY's control.
- 3.8 The LABORATORY will hold samples for thirty (30) days after tests are completed, or until the CLIENT's outstanding debts to the LABORATORY are satisfied, whichever is later.
- 3.9 The CLIENT recognizes that generally accepted error variances apply and agrees to consider such error variances in its use of test data.
- 3.10 It is agreed between LABORATORY and CLIENT that no distribution of any tests, reports or analysis other than that described below shall be made to any third party without the prior written consent of both parties unless such distribution is mandated by operation of law. It is agreed that tests, reports, or analysis results may be disclosed to third party auditors of the laboratory at the laboratory facility in the course of accreditation maintenance audits. No reference to reports or technical services of the LABORATORY shall be made in any advertising or promotional literature without the express written permission of the LABORATORY.
- 3.11 The CLIENT acknowledges that all employees of LABORATORY operate under employment contracts with the LABORATORY and CLIENT agrees not to solicit employment of such employees or to solicit information related to other clients from said employees.
- 3.12 In recognition of the relative risks and benefits of the project to both CLIENT and LABORATORY, the risks have been allocated such that the CLIENT agrees, to the fullest extent permitted by law, to limit the liability of the LABORATORY to the CLIENT for any and all claims, losses, costs, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of the LABORATORY to the CLIENT shall not exceed \$100,000, or the LABORATORY'S total fee for services rendered on this project, whichever is greater. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

Paragraph 4. INSURANCE:

- 4.1 LABORATORY shall secure and maintain throughout the full period of the services provided to the CLIENT adequate insurance to protect it from claims under applicable Workmen's Compensation Acts and also shall maintain one million dollars of general liability coverage to cover claims for bodily injury, death or property damage as may arise from the performance of its services.
- 4.2 The CLIENT hereby warrants that it has sufficient insurance to protect its employees adequately under applicable Workmen's Compensation Acts and for bodily injury, death, or property damage.

4.3 No insurance of whatever kind or type, which may be carried by either party is to be considered as in any way limiting any other party's responsibility for damages resulting from their operations or for furnishing work and materials.

Paragraph 5. PAYMENT:

5.1 CLIENT shall pay to LABORATORY such fees for services as previously agreed, orally or in writing, within 30 days of presentation of a bill for such services performed. In the event CLIENT ordered, orally or in writing, services but such services were not assigned a rate for billing, such services shall be billed at the LABORATORY's reasonable and customary rate.

5.2 CLIENT shall be responsible for all shipping, customs and other expenses related to services provided by LABORATORY to the CLIENT, and shall fully insure any test sample or other equipment provided to LABORATORY by the CLIENT.

5.3 Amounts overdue from CLIENT to LABORATORY shall be charged interest at a rate of 1½% per month.

Paragraph 6. ISO/IEC GUIDE 17025 ADDITIONS:

6.1 CLIENT agrees that this test report will not be reproduced except in full, without written approval from the LABORATORY.

6.2 CLIENT agrees that this test report shall not be used to claim product endorsement by A2LA or ANSI or any agency of the U.S. Government.

6.3 CLIENT agrees that test results presented herein relate only to the sample tested by the LABORATORY.

A2LA Accreditation

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| SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999 CURTIS-STRAUS ¹ 527 Great Road Littleton, MA 01460 Barry Quinlan Phone: 978-486-8880 ELECTRICAL Valid until: September 30, 2005 Certificate Number: 1627-01 In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following <u>Electromagnetic Compatibility (EMC), Telecommunications, and Product Safety tests:</u> Electromagnetic Compatibility (EMC) Radiated emissions testing (electric and magnetic fields); Conducted emissions testing (voltage and current); Electrostatic Discharge testing; Electrical Fast Transient testing; Radiated Immunity testing; Conducted Immunity testing; Lightning Immunity testing; Voltage Dips, Interrupts and Voltage Variations testing; Magnetic Immunity testing; RF Power measurements; Frequency Stability measurements; Longitudinal Induction measurements; Harmonic emissions testing; Light flicker testing; Low frequency disturbance voltage testing; Disturbance Power measurements | | EN 55011 1991, 1998 SABS CISPR 11:1997 Canada ICES-001 1998 CNS13803 AS/NZS 2064: 1997 CSA C108.8 – M1983 CISPR 13:1996, 1998, 2001 EN 55013: 1990, 2001 EN 55013 Amend 12 1994 SABS CISPR 13: 1996 CNS 13439 AS/NZS 1053: 1999 CISPR 14 1993 <i>(except discontinuous disturbances)</i> EN 55014 1993, 1997 <i>discontinuous disturbances</i> AS/NZS 1044: 1995 <i>discontinuous disturbances</i> Immunity CNS13783-1 SABS CISPR 14-1 1993 SABS CISPR 14-2 1997 + A1:2001 (A2LA Cert. No. 1627-01) 7/25/05 | | Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment. Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics Limits and methods of measurement Industrial, scientific and medical radio frequency generators Industrial, Scientific and Medical Instrument Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment. Electromagnetic Emission from Data Processing Equipment and Electronic Office Machines Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment. Sound and television broadcast receivers and associated equipment: Electromagnetic compatibility. Part 1: Specification for limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment. Limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment. Amendment 12 Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment. Broadcast receiver and associated equipment Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment. Limits and methods of measurement of radio disturbance characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and electric apparatus. Limits and methods of measurement of radio disturbance (<i>except</i> characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus. Limits and methods of measurement of radio disturbance (<i>except</i> characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus. Household Electrical Appliances Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 1: Emission – Product family standard Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity – Product family standard | | |
| (A2LA Cert. No. 1627-01) 7/25/05 | Page 1 of 11 | | Page 2 of 11 | | | |
| CISPR 14-2 1996, 1997 + A1:2001 CISPR 20: 1995, 2002 with amendment 3 <i>(associated group only)</i> EN 55020: 1995, 2002 <i>(associated group only)</i> CISPR 24 SABS CISPR 24 1997 AS/NZS 3200.1.2: 1995 | Immunity requirements for household appliances, tools and similar apparatus. Limits and methods of measurement of immunity characteristics of sound and television broadcast receivers and associated equipment. Electromagnetic immunity of broadcast receivers and Associated equipment. Information technology equipment – Immunity characteristics – Limits and methods of measurement Information technology equipment – Immunity characteristics – Limits and methods of measurement Approval and test specification – Medical electrical Equipment – General requirements for safety – Collateral Standard: Electromagnetic compatibility – Requirements and tests. | | EN 61000-6-1: 1997, 2001 EN 61000-6-2: 1998, 2001 EN 50091-2 1996 EN 55024 1998 EN 55103-1 1997 EN 55103-2 1997 <i>(excluding Annex A3)</i> EN 61326 1998 EN 61547 1996 EN 50130-4 1996 EN 55104 1995 EN 50083-2 1995 EN 60601-1-2: 1993, 2002 IEC 1800-3 1995 EN 60555 Part 2 1987 EN 60555 Part 3 1987 EN 61000-3-2: 1995, 2000 AS/NZS 61000.3.2 1998 EN 61000-3-3 1995 AS/NZS 61000.3.3 1999 ETS 300 386-1 1994 | | Electromagnetic Compatibility (EMC)- Part 6: Generic standards-Section 1: Immunity for residential, commercial and light-industrial environments Electromagnetic Compatibility (EMC)- Part 6: Generic standards-Section 2: Immunity for industrial environments Specification for Uninterruptible Power Systems (UPS). Part 2: EMC requirements Information technology equipment – Immunity Characteristics – Limits and methods of measurement Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control professional use. Part 2: Immunity Electrical equipment for measurement, control and laboratory use – EMC requirements Equipment for general lighting purposes – EMC immunity requirements Alarm Systems. Part 4: Electromagnetic compatibility. Product family standard: Immunity requirements for components of fire, intruder and social alarm systems. Electromagnetic compatibility immunity – requirements for household appliances, tools and similar apparatus. Product family standard. Cabled distribution systems for television and sound signals. Part 2: Electromagnetic compatibility for equipment. Medical electrical equipment Part 1: general requirements for safety Section 2: Collateral standard: Electromagnetic compatibility – requirements and tests Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods. Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 2: Harmonics Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 3: Voltage fluctuations. Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limits for harmonic current emissions Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limitation of voltage fluctuations and flicker in low-voltage supply systems. Equipment Engineering (EE); Public telecommunication network equipment electro-magnetic compatibility (EMC) requirements Part 1: Product family overview, compliance criteria and test levels | |
| European Union Basic EMC Standards EN 61000-4-2: 1995, 1999, 2001 EN 61000-4-3:1997, 1998, 2002 AS/NZS 61000.4.3 1999 EN 61000-4-4 1995 EN 61000-4-5 1995 AS/NZS 61000.4.5 1999 EN 61000-4-6 1996 AS/NZS 61000.4.6 1999 EN 61000-4-8 1994 EN 61000-4-11 1994 ENV 61000-2-2 1993 EU Product Family Standards EN 50081-1 1992 EN 50081-2 1993 EN 50082-1 1992, 1998 EN 50082-2 1995 | Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test. Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication (EMC) Part 4: Testing and measurement techniques. Section 5: Surge immunity test. Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields. Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency magnetic field immunity test. (EMC) Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage Variations immunity tests. Electromagnetic compatibility (EMC). Part 2: Environment, Section 2: Compatibility levels for low-frequency conducted disturbances and signaling in public low-voltage power supply systems (IEC 1000-2-2:1990) | | (A2LA Cert. No. 1627-01) 7/25/05 | | | |
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| ETS EN 300 386-2 1997, 1998, ETS EN 300 386 2000 v1.2.1, 2001 v1.3.1 | Electromagnetic compatibility and radio spectrum matters (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements; Part 2: Product family standard. | EN 300 328-2:2001 v1.2.1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive |
| ETS 300 132-1 1996 | Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources | EN 301 489-1:2002 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements |
| ETS 300 132-2 1996 | Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc) | EN 60669-2-1:2002 | Switches for household and similar fixed electrical installations -- Part 2-1: Particular requirements -- Electronic switches |
| ETR 283 1997 | Equipment Engineering (EE); Transient voltages at Interface A on telecommunications direct current (DC) power distributions. | <i>Canada Radio Standards</i> Canadian GL-36 1995 | |
| <i>EU radio standards</i> (ETSI EN 300 385 v1.2.1: 1998, 1999 | Electromagnetic compatibility and Radio spectrum matters (ERM); Electromagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment (ETSI) | Canadian RSS-119 1999, 2000 Issue 6 | Industry Canada – technical requirements for low power Devices in the 2400 – 2483.5 MHz band. |
| EN 300 330 v1.2.1: 1998, 1999 | Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices (SRD); Technical characteristics and test methods for radio equipment in the range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz | Canadian RSS-134 1996 & 2000, Issue 1 Rev 1 | Industry Canada – Land mobile and fixed radio Transmitters and receivers, 27.41 to 900.0 MHz |
| ETS 300 328 1996 | Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques | Canadian RSS-210 2000 Issue 3, RFS29 1998 | Industry Canada – 900 MHz narrowband personal communications services |
| ETS EN 300 440 v1.2.1 1999 | Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices; Technical characteristics and test methods for radio equipment to be used in the 1 GHz to 40 GHz frequency range | <i>FCC Standards</i> 47 CFR FCC low power transmitters operating on frequencies below 1 GHz, emergency alert systems, unintentional radiators and ISM devices. | Industry Canada – Low power license-exempt radio 2001 Issue 5 communication devices |
| EN 301 893:2002 v1.2.1 | Broadband Radio Access Networks (BRAN); 5 GHz (draft) high performance RLAN; Harmonized EN covering Essential requirements of article 3.2 of the R&TTE Directive | 47 CFR FCC low power transmitters operating on frequencies above 1 GHz, with the exception of spread spectrum devices | Specification for Restricted Radiation Radio Apparatus (New Zealand) |
| ETS 300 836-1:1998 | Broadband Radio Access Networks (BRAN); High Performance Radio Local Area Network (HIPERLAN) Type I; Conformance testing specification; Part 1: Radio Type approval and Radio Frequency (RF) conformance test specification | 47 CFR FCC Unlicensed Personal Scope Communications System (PCS) devices | |
| EN301 489-17:2002 v1.2.1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2.4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment | 47 CFR FCC Unlicensed National Scope Information Infrastructure devices and low power transmitters using spread spectrum techniques. | |
| | | 47 CFR FCC Personal mobile Scope Radio Services in the following FCC Rule Parts 22, 24, 25, 27. | |
| | | 47 CFR FCC General Mobile Radio Scope Services in the following FCC Rule Parts 22, 74, 90, 95, 97. | |
| | | 47 CFR FCC Maritime and Aviation Scope RadioServices in 47 CFR Parts 80 and 87 | |
| | | 47 CFR FCC Microwave Radio Services Scope in 47 CFR Parts 21, 74 and 101. | |
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| FCC/OST MP-5 1986 | FCC (Federal Communications Commission) methods Of measurement of radio noise emissions from industrial, scientific and medical equipment. | TIA/EIA-IS-968 | Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network |
| GR-1089-CORE: 1997, 1999 issue 2/ 2002 Issue 3 | Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment. | TIA/EIA-IS-883 | Telecommunications Telephone Terminal Equipment Supplemental Technical Requirements for Connection of Stutter Dial Tone Detection Devices and ADSL Modems to the Telephone Network |
| <i>ANSI EMC Standards</i> ANSI C63.4: 1992, 1999, 2001, 2003 | American National Standard for methods of measurement of radio-noise emissions for low-voltage electrical and electronic equipment in the range of 9 kHz to 40GHz. | TIA-968-A | Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network |
| ANSI C63.5 1988 | American National Standard for electromagnetic compatibility – radiated emissions measurements in electromagnetic interference (EMI) control – calibration of antennas. | T1.TRQ.6-2001 | Technical Requirements for SHDSL, HDSL2, HDSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Telephone Network Industry |
| <i>IEEE EMC Standards</i> IEEE C62.41: 1980, 1991 | IEEE recommended practice on surge voltages in low-voltage AC power circuits | Canada VDSL Issue 1 January 2003 | Terminal Attachment Program Requirements and Test Methods for Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment |
| <i>Swedish EMC Standards</i> BAKOM 3336.3 1995 | Electromagnetic compatibility and electrical safety (EMC & S) for wired terminal equipment. Harmonization document information over the OFCOM requirements. | AS/ACIF S002-2001 | Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network |
| <i>South African EMC standards other than CISPR equivalents</i> SABS 1718-1: 1996 | South African Bureau of Standards: Specification for Gaming equipment. Part 1: Casino equipment. | AS/ACIF S016-2001 | Requirements for Customer Equipment for connection to hierarchical digital interfaces |
| <i>Japanese VCCI Standards</i> VCCI V-3/99.05 1999 VCCI V-4/99.05 1999 | Technical Requirements Instruction for Test Conditions for Requirement under Test | AS/ACIF S031-2001 AS/ACIF S038-2001 AS/ACIF S043-2001 | Requirements for ISDN Basic Access Interface Requirements for ISDN Primary Rate Access Interface Requirements for Customer Equipment for Connection to a Metallic Local Loop Interface of a Telecommunications Network — Part 1: General Part 2: Broadband |
| <i>Telecommunications</i> | Telecommunications Registration; General test methods; Lightning surge; Drop testing; Balance testing; Signal power (metallic and longitudinal); Frequency measurements; Pulse templates; Leakage testing; Impedance testing; Hearing Aid Compatibility testing (<i>excluding volume control</i>); Protocol analysis and Jitter testing. | ITU-T G.703 HKTA 2028 HKTA 2029 TBR 1 : 1995 | Part 3: DC, Low Frequency AC and Voiceband Physical/electrical characteristics of hierarchical Digital interfaces Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 1544 kbit/s Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 2048 kbit/s Attachment requirements for terminal equipment to be connected to circuit switched data networks and leased circuits using a CCITT Recommendation X.21 interface, or at an interface physically, functionally and electrically compatible with CCITT Recommendation X.21 but operating at any data signaling rate up to, and including, 1 984 kbit/s |
| <i>Telecom Standards</i> | Title | TBR 2 : 1997 | Attachment requirements for Data Terminal Equipment (DTE) to connect to Packet Switched Public Data Networks (PSPDNs) for CCITT Recommendation X.25 interfaces at data signaling rates up to 1 920 kbit/s utilizing interfaces derived from CCITT Recommendations X.21 and X.21 bit. |
| FCC 47 CFR Part 68 Telephone | Connection of terminal equipment to the telephone Terminal Equipment network. Analog and Digital Equipment. TCB Scope C1. | | |
| CS-03 Issue 8 1996 through amendment 5 | Specification for terminal equipment, terminal systems, Network protection devices, connection arrangements and hearing aids compatibility. | | |
| TIA/EIA TSB31-B 1998 | Bulletin Part 68 Rationale and Measurement Guidelines (Feb 1998) | | |
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| TBR 3 : 1995 + Amdt : 1997 | Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access | IEC 60950 2000 EN 60950 1997, 1998, 2000 IEC 60950-1 2001 UL 60950-1 2003 CSA C22.2 No. 60950-00 CSA C22.2 No. 60950-1 03 AS/NZS 3260 1993 | Safety of information technology equipment Safety of information technology equipment, including Electrical business equipment. |
| TBR 4 : 1995 + Amdt : 1997 | Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access | | |
| TBR 012 : 1993 + Amdt : 1996 | Business Telecommunications (BT); Open Network Provision (ONP) technical requirements; 2 048 kbit/s digital unstructured leased line (D2048U) Attachment requirements for terminal equipment | AS/NZS 3260 Supp 1 1996 | Approval and test specification – Safety of information technology equipment including electrical business Equipment. |
| TBR 013 : 1996 | Business TeleCommunications (BTC); 2 048 kbit/s digital structured leased lines (D2048S); Attachment requirements for terminal equipment interface | ACA TS 001 1997 | Approval and test specification – Safety of information technology equipment including electrical business equipment – Alphabetical reference index to IEC 950 (Supplement to AS/NZS 3260:1993) Australian Communications Authority – Safety requirements for customer equipment. |
| TBR 21 : 1998 | Terminal Equipment (TE); Attachment requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) of TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signaling | UL 1459 1995 IEC 1010-1 1990 IEC 61010-1 1993 EN 61010-1 1993, 2001 IEC 61010-1 2001 UL 61010B-1 2003 UL 3101-1 1993 CAN/CSA 1010-1 1999 (<i>Including AM 2</i>) UL 3111-1 1996 UL 3121-1 1995 IEC 60601-1 1995 EN 60601-1 1995 (<i>Including AM 2</i>) UL 2601-1 1997 IEC 60065 1998, 2000 ANSI/UL 6500: 1998 CAN/CSA 60065-00 AS/NZS 3250 1995 AS/NZS 60065 2000 | Telephone Equipment Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements. Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements. |
| TBR 24 : 1997 | Business TeleCommunications (BTC); 34 Mbit/s digital Unstructured and structured leased lines (D34U and D34S); Attachment requirements for terminal equipment interface | | Electrical equipment for laboratory use Part 1: General requirements. Electrical measuring and test equipment. Part 1: General requirements. |
| <i>Australia</i> | | | Medical electrical equipment. Part 1: General requirements for safety. |
| TS 002 : 1997 | Analogue Interworking and Non interference Requirements for Customer Equipment Connected to the Public Switched Telephone Network | | Medical electrical equipment |
| TS 016 : 1997 | General Requirements for Customer Equipment Connected to Hierarchical Digital Interfaces | | Medical electrical equipment. Part 1: General Requirements for safety. |
| TS 031 : 1997 | Requirements for ISDN Basic Access Interface | | Audio, video and similar electronic apparatus – Safety requirements |
| TS 038 : 1997 | Requirements for ISDN Primary Rate Access Interface | | Audio/video and musical instrument apparatus for Household, commercial and similar general use |
| AS/ACIF S043.2:2001 | Requirements for Customer Equipment for connection to a metallic loop interface of a Telecommunications Network – Part 2 Broadband | | Australian/New Zealand Standard – Approval and test |
| <i>Product Safety</i> | | | Specification – Mains operated electronic and related Equipment for household and similar general use |
| General test methods; Input tests; Electric strength tests; Impulse tests; Permanency of marking tests; Accessibility tests; Energy Hazard measurements; Capacitor discharge tests; Humidity conditioning; Earthing tests; Limited power source measurements; Stability tests; Steel ball tests; Lithium Battery Reverse Current measurements; Leakage current tests; Transformer abnormal tests; Telecom leakage tests; Over voltage/power cross tests (<i>excluding x-ray tests</i>). | | | Audio, video and similar electronic equipment. Consumer and 1994, commercial products |
| <u>Product Safety Standards</u> | <u>Title</u> | | Safety requirements for main operated electronic and related apparatus for household and similar general use. |
| Specific Product Safety Standards | | | Radiation safety of laser products, equipment Classification, requirements and user's guide. |
| IEC 950 1991 | Safety of information technology equipment including Includes Amendments 1, 2, 3, and 4 electrical business equipment. | | Safety of laser products Part 1: equipment Classification, requirements and user's guide. |
| UL 1950 1998 | Safety of information technology equipment, including electrical business equipment. | | Safety of laser products – Part 2: Safety of optical communication systems |
| CSA C22.2 No 950-95 | Safety of Information Technology Equipment (UL 1950) | | Safety of laser products – Part 4: Laser guards |
| UL 60950 2000 | Safety of information technology equipment | | Safety of household and similar electrical appliances |
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| UL 61010A-1 : 2002 | Electrical equipment for laboratory use; part 1: General requirements | | |
| EN 61010-1 : 2001 | Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements | | |
| AS/NZS 60950 : 2000 | Safety information technology equipment | | |
| <i>Environmental</i> ² | | | |
| <u>Environmental Standards</u> | <u>Title</u> | | |
| GR-63-CORE | NEBS Requirements: Physical Protection | | |
| ETS 300 019 | Environmental conditions and environmental tests For telecommunications equipment | | |
| (vibration up to 1000Hz) | | | |

² Environmental testing is performed at the satellite facility located at 168 Ayer Rd, Littleton, MA 01460