





**BUREAU
VERITAS**

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS

Test Report

| | |
|---------------------|--|
| Report No | EN1043-2 |
| Client | Airvana |
| Address | 19 Alpha Road Chelmsford, MA 01824 |
| Phone | 978-250-2622 |
| Item tested | Femto Cell 750721 |
| FCC ID | QHYHUBBUBC4501-RT |
| FRN | 0021466594 |
| Equipment Type | PCS Licensed Transmitter |
| Equipment Code | PCB |
| Emission Designator | 1M27D7D |
| FCC Rule Parts | 47 CFR 22 Subpart H 47 CFR 24 Subpart E 47 CFR 90 Subpart S |
| Test Dates | April 26, 2013; May 22, 23, and 24, 2013 |
| Results | As detailed within this report |
| Prepared by |  Arik Zwirner |
| Authorized by |  Mairaj Hussain – EMC Supervisor |
| Issue Date | June 20, 2013 |

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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Form Final Report REV 7-20-07 (DW)



Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 22 Subpart H, 47 CFR 24 Subpart E, and 47 CFR 90 Subpart S.

The product is the Femto Cell 750721, FCC ID QHYHUBBUBC4501-RT. It is a transceiver that operates in the ranges 862-869MHz, 869-894MHz, and 1930-1990MHz.

We found that the product met the above requirements without modification. The test sample was received in good condition.

Release Control Record

| Issue No. | Reason for change | Date Issued |
|-----------|-------------------|-----------------|
| 1 | Original Release | August 14, 2007 |



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Test Methodology

Radiated emission testing was performed according to the procedures specified in ANSI C63.4 (2003) and TIA-603-C. Radiated Emissions were maximized by rotating the device around its upright axes as well as varying the test antenna's height and polarity.

Conducted measurements at the antenna port were performed.

The EUT operating voltage is 120Vac 60Hz.

The Femto Cell 750721 has five transmitters, identified as One-X, EVDO, Beacon BC0, Beacon BC1, and Beacon BC10. Three of these transmitters, One-X, EVDO, & Beacon BC1, operate in the 1930-1990MHz band and were tested for Part 24. The Beacon BC0 operates in the 869-894MHz band and was tested for Part 22. The Beacon BC10 operates in the 862-869MHz band and was tested for Part 90.

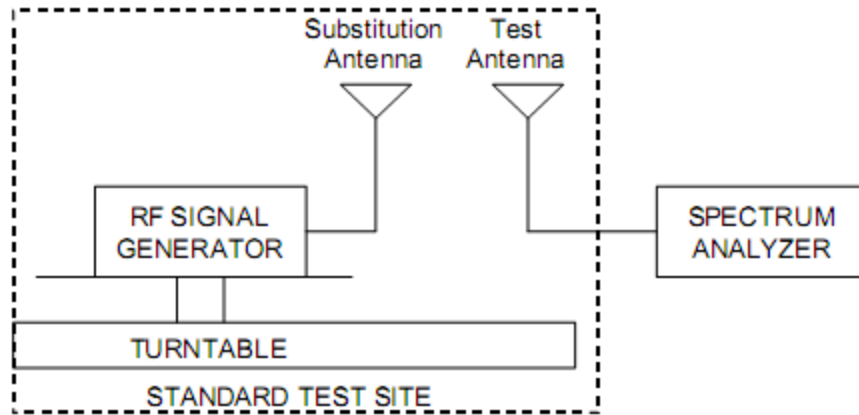
Per Airvana, the device under test prevents the operation of 3 transmit channels operating on the same frequency at the same time. Thus it is not allowed for the One-X, EVDO, & Beacon BC1 to simultaneously operate at the same frequency.

Modulation is QAM -16 for each of the different types of channels.

For Part 22, the lowest and highest operating frequencies are 870.03MHz and 889.2MHz, respectively. For Part 24, the lowest and highest operating frequencies are 1931.25MHz and 1988.75MHz, respectively. For Part 90, the lowest and highest operating frequencies are 862.9MHz and 867.9MHz, respectively

The substitution method is used for ERP and EIRP measurements. The method is performed as follows. When performing ERP or EIRP measurements, the fundamental emission of the EUT is measured in terms of field strength. The EUT is then substituted with a calibrated antenna, cable, and signal generator. The initially measured field strength is reproduced and matched by the substituting equipment. The power of the substitution source (the signal generator) is noted and this value is then corrected for the cable loss and the antenna gain (dBi) to determine the ERP or EIRP of the EUT.





Sample calculation for substitution method.

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

where:

P_d is the dipole equivalent power and

P_g is the generator output power into the substitution antenna.

Product Tested - Configuration Documentation

| EUT Configuration | | | | | | | | | | | |
|--|-----------|--------------|---------------|------------|----------|-----------|--------|------------|------------------|--------------------|--|
| Work Order: N1043 Company: Airvana Company Address: 19 Alpha Road Chelmsford, MA 01824 Contact: Kevin Craig Person Present: Kevin Craig | | | | | | | | | | | |
| MN | | | | | | SN | | | | | |
| EUT: 750721 | | | | | | Sample 1 | | | | | |
| EUT Description: Train 7 Femto Cell Rev3 EUT Max Frequency: 125MHz | | | | | | | | | | | |
| Support Equipment: | | | | | | MN | | | | | |
| Dell Laptop | | | | | | PP1LL | | | | | |
| IQ Nav GPS Test System | | | | | | Litepoint | | | | | |
| EUT Ports: | | | | | | | | | | | |
| Port Label | Port Type | No. of ports | No. Populated | Cable Type | Shielded | Ferrites | Length | Max Length | In/Out NEBS Type | Unpopulated Reason | |
| Power | Power AC | 1 | 1 | 2 Wire AC | No | None | 1.5m | N/A | indoor | | |
| LAN ethernet | RJ-45 | 2 | 2 | cat5 | No | None | 1.5m | 100m | indoor | | |
| WAN ethernet | RJ-45 | 1 | 1 | cat5 | No | None | 1.5m | 100m | indoor | | |
| GPS | MCX | 1 | 1 | Coaxial | Yes | None | 10m | 10m | indoor | | |
| Software / Operating Mode Description: GPS is active and the ethernet is pinging internally with loopbacks on each cable. EUT is running operational software as opposed to Diag software. | | | | | | | | | | | |
| Performance Criteria: The LEDs shall continue to blink | | | | | | | | | | | |



Statement of Conformity

The Femto Cell 750721 has been found to conform to the following parts of 47 CFR 22, 47 CFR 24, & 47 CFR 90 as detailed below:

| | | |
|--------------|----------------|--|
| | Part 22 | |
| | 22.913(a) | Meets ERP limit: 7W |
| | 22.359 | Band edge |
| | 22.917(a) | Spurious emissions within limit of -13dBm |
| | | |
| | Part 24 | |
| 2.1033(c)(7) | 24.232(c) | Meets power limit: 2W EIRP. |
| | 24.235 | Fundamental is within authorized frequency block |
| | | |
| | Part 90 | |
| 2.1051 | 90.691(a) | Spurious emissions within limit of -13dBm |
| 2.1053 | 90.691(a) | Spurious emissions within limit of -13dBm |
| | 90.635 | Meets power limit: 100W ERP |



Tests Specific to Part 22

Bandwidth

| Bandwidth Measurements | | | | |
|--|------------------|-----------------------------|------------------------------|-------------------------|
| Date: 24-May-13 | | Company: Airvana | | Work Order: N1043 |
| Engineer: Edward Breen | | EUT Desc: 750721 Femto Cell | | EUT Power: 120V/60Hz |
| Temp: 23.1°C | | Humidity: 36% | | Pressure: 998mbar |
| Frequency Range: 869-894MHz, FCC Part 22 | | | | |
| Notes: | | | | |
| OUTPUT | CHANNEL POSITION | CHANNEL NUMBER | FREQUENCY (MHz) | 26dB BANDWIDTH (MHz) |
| Beacon BC0 | Low | 1 | 870.03 | 1.383 |
| | Mid | 320 | 879.6 | 1.402 |
| | High | 640 | 889.2 | 1.424 |
| Test Site: 1DCC-OATS-3M-II | | | Spectrum Analyzer: Rental #1 | |

Rev. 5/15/2013

| | | | | | | | |
|--|-----------------|----------------|------------------|--------------|--------------|------------|------------------------|
| Spectrum Analyzers / Receivers / Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Preamps / Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| HF 20dB 50W Attenuator | 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |

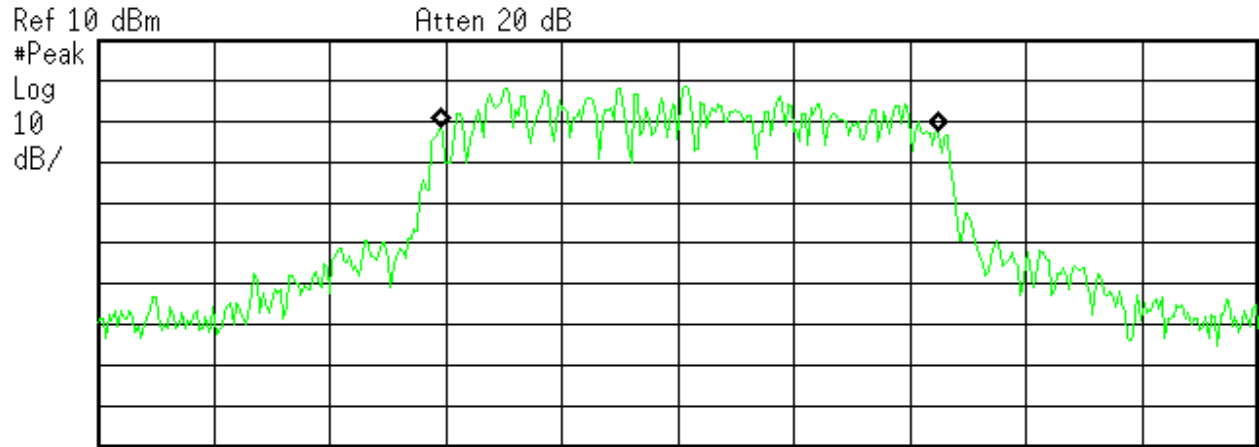
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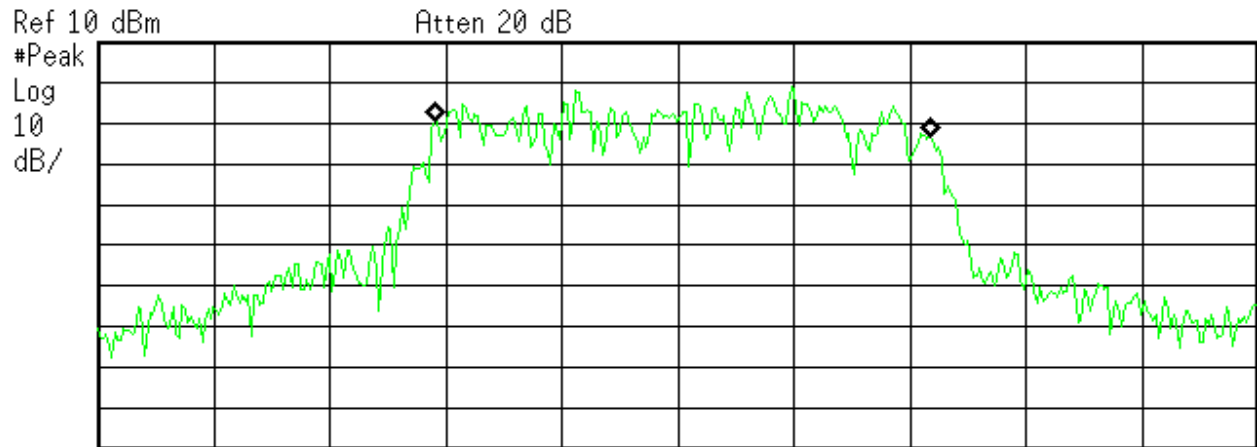
Center 870 MHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2882 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 28.040 kHz
 x dB Bandwidth 1.383 MHz*

Beacon BC0 Low Channel (Ch. 1)



Center 879.6 MHz Span 3 MHz
#Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

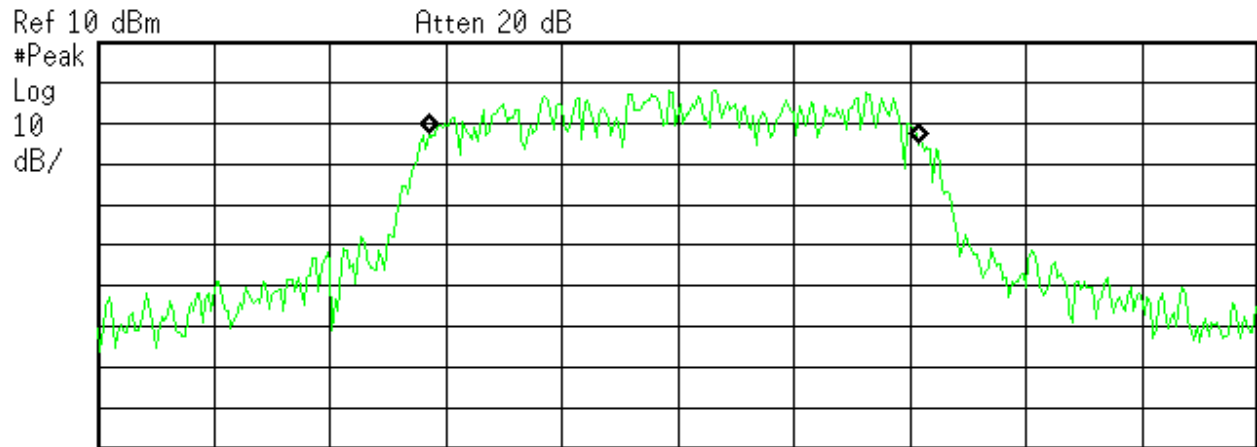
Occupied Bandwidth
1.2840 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 10.136 kHz
x dB Bandwidth 1.402 MHz*

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Beacon BC0 Mid Channel (Ch. 320)



Center 889.2 MHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2707 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error -9.463 kHz
 x dB Bandwidth 1.424 MHz*

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Beacon BC0 High Channel (Ch. 640)

ERP

| ERP Using Substitution Method | | | | | | | | | | | |
|--|-----------------|-------------------------------|-----------------------------|---------------|--------------------|--|-------------|--------------------|----------------------------------|-------------|--------------------|
| Date: 23-May-13 | | | Company: Airvana | | | Work Order: N1043 | | | | | |
| Engineer: Edward Breen | | | EUT Desc: 750721 Femto Cell | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | |
| Temp: 23.2°C | | | Humidity: 33% | | | Pressure: 1002mBar | | | | | |
| Frequency Range: Part 22 ERP measurements | | | | | | Measurement Distance: 3m | | | | | |
| Notes: Band Class 0 7W = 38.45dBm | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Signal Generator Output (dBm) | Tx Antenna Gain (dB/m) | Tx Cable (dB) | Adjusted ERP (dBm) | --- | | | --- | | |
| | | | | | | Limit (dBm) | Margin (dB) | Result (Pass/Fail) | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) |
| Channel 1 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | 870.03 | 6.1 | 0.0 | 0.5 | 5.6 | 38.5 | -32.9 | Pass | --- | --- | --- |
| V | 870.03 | 10.1 | 0.0 | 0.5 | 9.6 | 38.5 | -28.9 | Pass | --- | --- | --- |
| | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel 320 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | 879.6 | 4.4 | 0.0 | 0.5 | 3.9 | 38.5 | -34.6 | Pass | --- | --- | --- |
| V | 879.6 | 8.9 | 0.0 | 0.5 | 8.4 | 38.5 | -30.1 | Pass | --- | --- | --- |
| | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel 640 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | 889.2 | 7.0 | 0.0 | 0.6 | 6.4 | 38.5 | -32.1 | Pass | --- | --- | --- |
| V | 889.2 | 8.5 | 0.0 | 0.6 | 7.9 | 38.5 | -30.6 | Pass | --- | --- | --- |
| | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table Result: Pass by -28.9 Worst Freq: 870.03 MHz | | | | | | | | | | | |
| Test Site: 1DCC-OATS-3M-II | | | Receive Antenna: Red-Brown | | | Transmit Antenna: Dipole #756 | | | Signal Generator: Rental Sweeper | | |
| Analyzer: Rental SA#1 | | | Receive Cable: #1506 | | | Transmit Cable: #1787 | | | | | |

Rev. 5/15/2013

| Spectrum Analyzers / Receivers / Preselectors | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|---|--|--------------|-----------|-------------------|------------|--------|-----|-----------------|
| Rental SA #1 (Brown) | | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Antennas | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Red-Brown Bilog | | 30-2000MHz | JB1 | Sunol | A0032406 | 1218 | I | 1/8/2015 |
| Adjustable Dipole | | 30-1000MHz | 3121C | EMCO | 1371 | 756 | I | 12/28/2014 |
| Meteorological Meters | | | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Weather Clock (Pressure Only) | | | BA928 | Oregon Scientific | C3166-1 | 831 | I | 3/20/2014 |
| 1DCC-OATS-3M-I Thermohygrometer | | | 35519-044 | Control Company | 72457635 | 1334 | II | 8/19/2013 |
| Cables | | Range | | Mfr | | | Cat | Calibration Due |
| Asset #1506 | | 9kHz - 18GHz | | Florida RF | | | II | 2/2/2014 |
| Asset #1787 | | 9kHz - 18GHz | | Florida RF | | | II | 3/14/2014 |
| Signal Generators | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Rental Sweeper | | 0.01-20.0GHz | HP83752B | Agilent | 3610A01297 | Rental | I | 8/28/2013 |

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



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Band Edge Measurements

LIMITS

§ 22.359 Emission limitations.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

MEASUREMENTS / RESULTS

Limit = $10 \cdot \log(P[\text{mW}]) - (43 + 10 \cdot \log(P[\text{W}])) = -13\text{dBm}$

Note: Mask lines are set to -13dBm at 869MHz and 894MHz.

TEST EQUIPMENT USED

Rev. 5/15/2013

| Spectrum Analyzers / Receivers / Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|---|--------------|--------------------|-----------------|------------|-------|-----|-----------------|
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Preamps / Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| HF 20dB 50W Attenuator | 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |
| Meteorological Meters | | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Temp./Humidity/Atm. Pressure Gauge | | 7400 Perception II | Davis | N/A | 965 | I | 4/4/2013 |
| 1DCC-OATS-3M-I Thermohygrometer | | 35519-044 | Control Company | 72457635 | 1334 | II | 8/19/2013 |

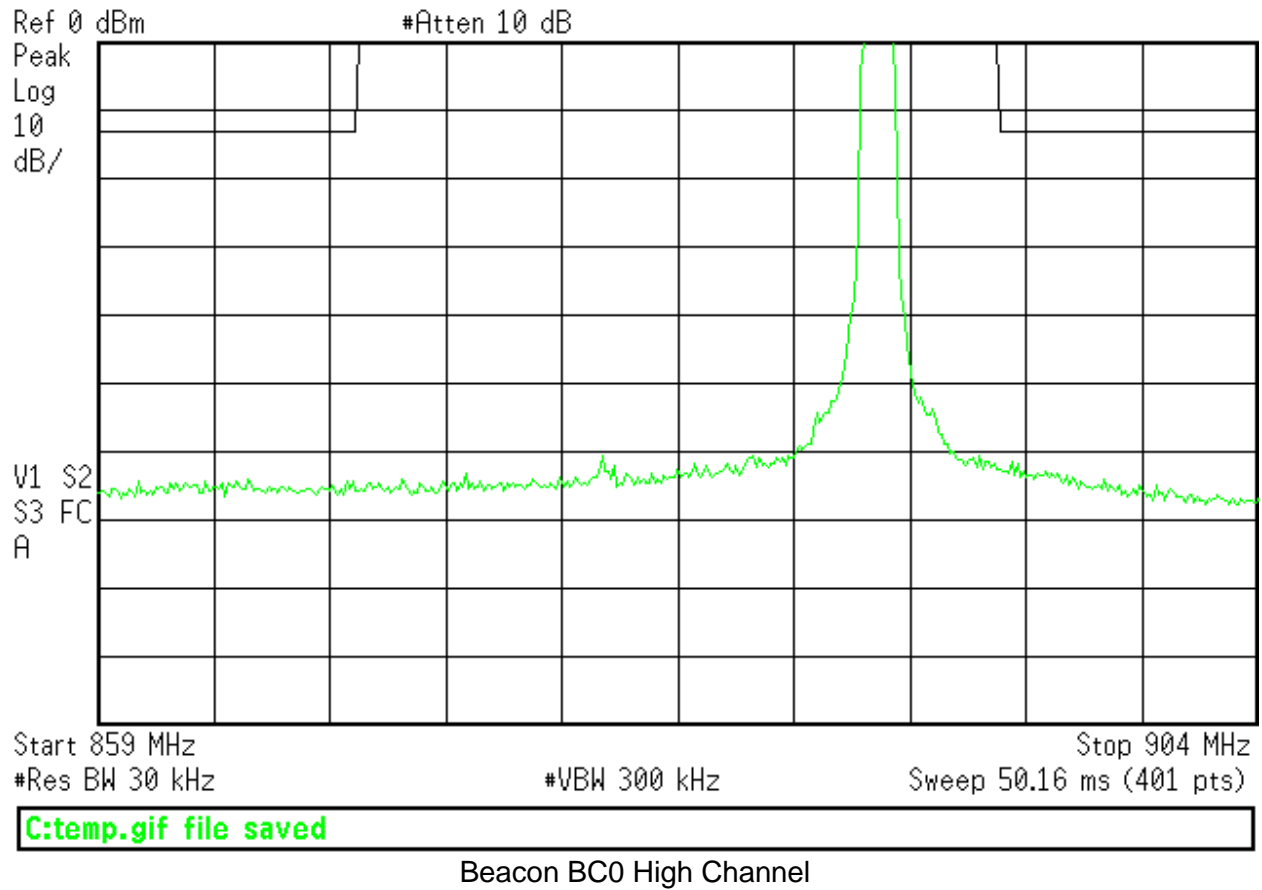
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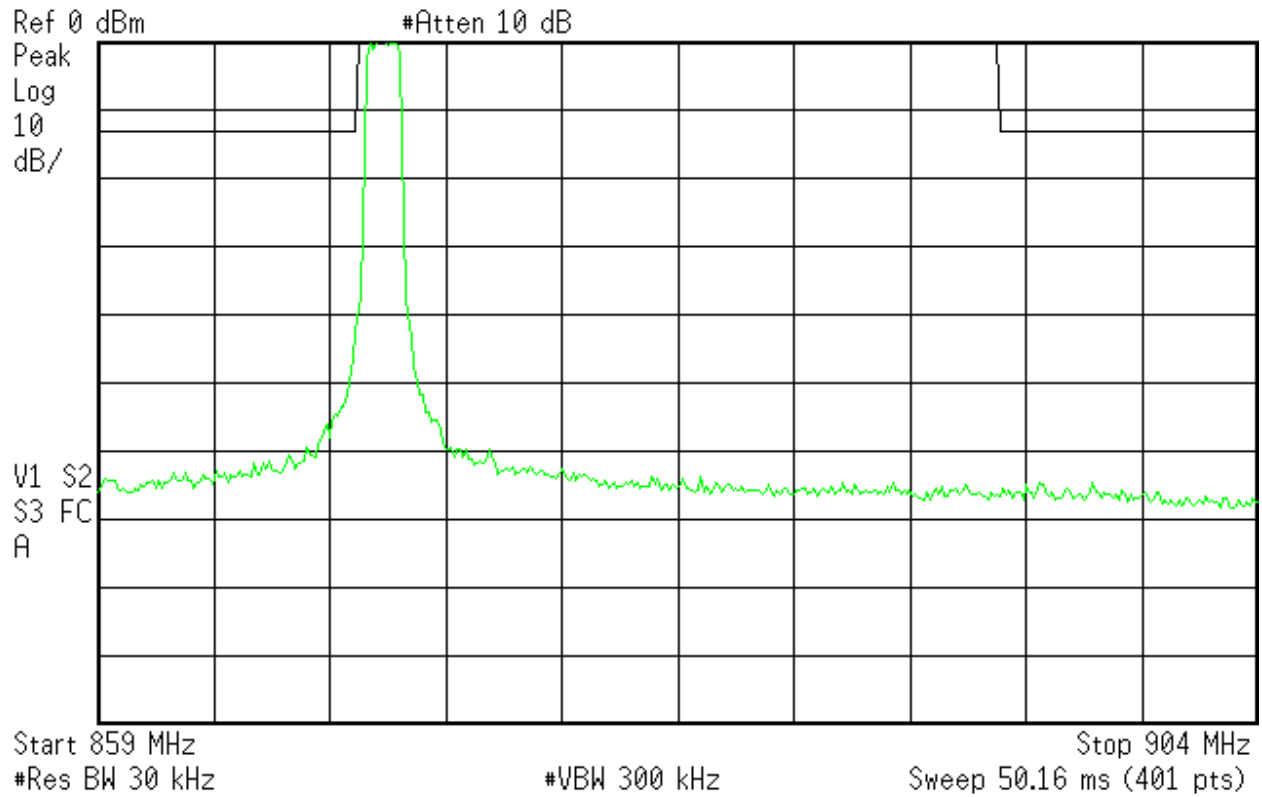


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Beacon BC0 Low Channel

Conducted Spurious Emissions at Antenna Port LIMITS

§ 22.359 Emission limitations.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

MEASUREMENTS / RESULTS

Limit = $10 \cdot \log(P[\text{mW}]) - (43 + 10 \cdot \log(P[\text{W}])) = -13\text{dBm}$

Note: Limit lines are set to -13dBm at 30-869MHz and 894-20000MHz.

TEST EQUIPMENT USED

Rev. 5/15/2013

| | | | | | | | |
|---|------------------------------|--|--|------------------------------|-----------------------------|-----------------------|---|
| Spectrum Analyzers / Receivers / Preselectors Rental SA #1 (Brown) | Range 9kHz-26.5GHz | MN E4407B | Mfr Agilent | SN SG44210511 | Asset 1510 | Cat I | Calibration Due 4/15/2014 |
| Radiated Emissions Sites 1DCC-OATS-3M-II | FCC Code 719150 | IC Code 2762A-10 | VCCI Code A-0015 | Range 30-1000MHz | | Cat II | Calibration Due 5/11/2015 |
| Preamps/Couplers Attenuators / Filters HF 20dB 50W Attenuator | Range 0.009-18 GHz | MN PE 7019-20 | Mfr Pasternack | SN 1 | Asset 791 | Cat II | Calibration Due 6/1/2013 |
| Meteorological Meters Temp./Humidity/Atm. Pressure Gauge 1DCC-OATS-3M-I Thermohygrometer | | MN 7400 Perception II 35519-044 | Mfr Davis Control Company | SN N/A 72457635 | Asset 965 1334 | Cat I II | Calibration Due 4/4/2013 8/19/2013 |

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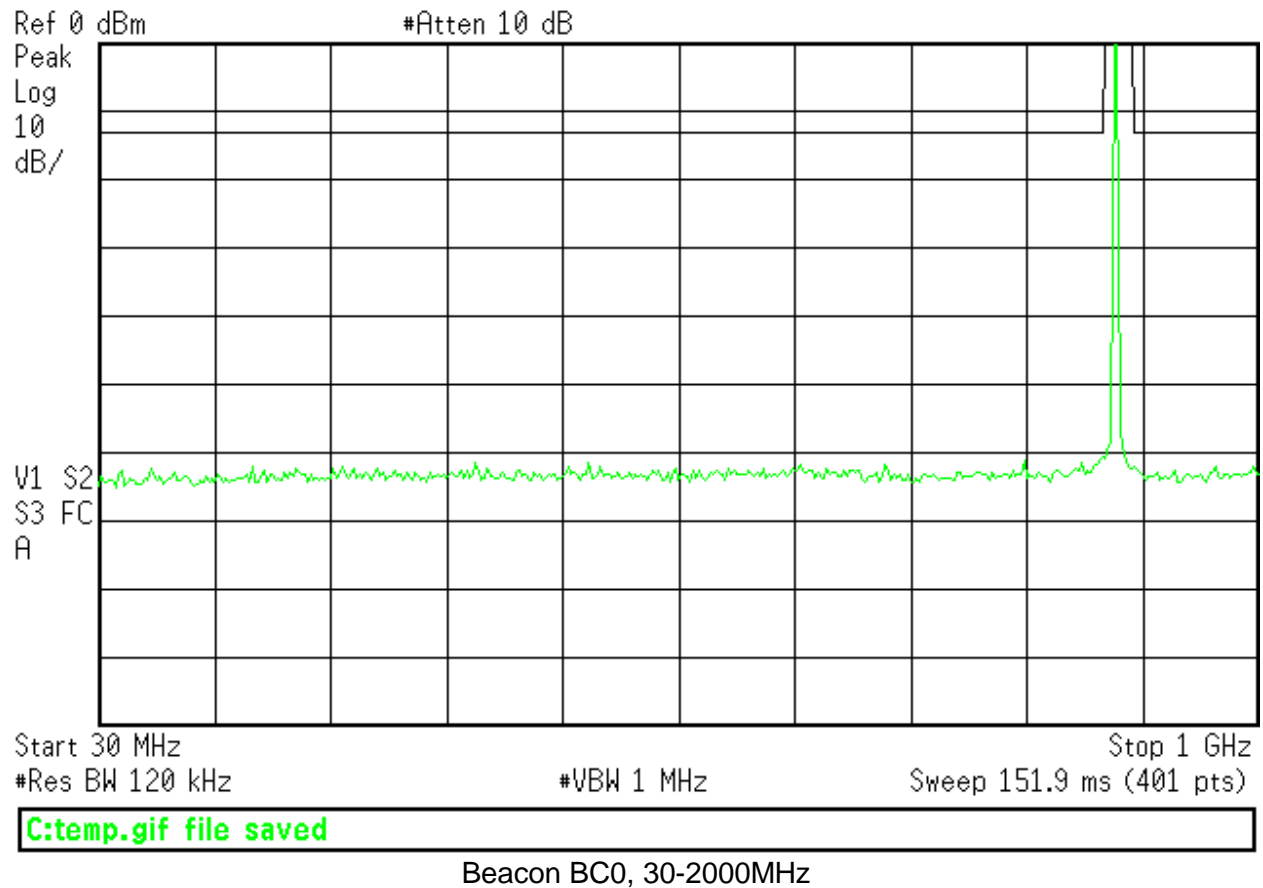


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PLOTS

Agilent

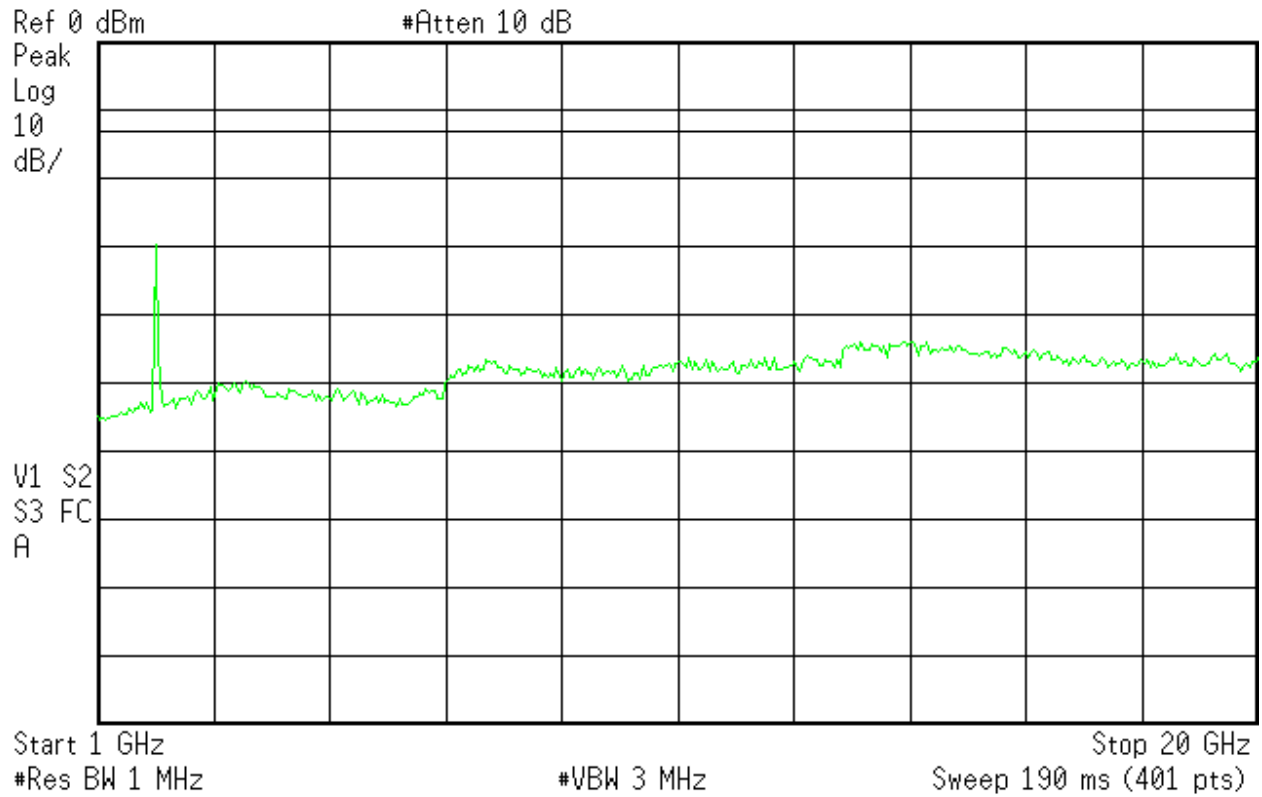
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Beacon BC0, 2-20GHz

Tests Specific to Part 24

Bandwidth

LIMIT

"The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power." [24.238(b)]

MEASUREMENTS / RESULTS

| Bandwidth Measurements | | | | |
|--|------------------|-----------------------------|------------------------------|-------------------------|
| Date: 24-May-13 | | Company: Airvana | | Work Order: N1043 |
| Engineer: Edward Breen | | EUT Desc: 750721 Femto Cell | | EUT Power: 120V/60Hz |
| Temp: 23.1°C | | Humidity: 36% | | Pressure: 998mbar |
| Frequency Range: 1930-1990MHz, FCC Part 24 E | | | | |
| Notes: | | | | |
| OUTPUT | CHANNEL POSITION | CHANNEL NUMBER | FREQUENCY (MHz) | 26dB BANDWIDTH (MHz) |
| EVDO | Low | 25 | 1931.25 | 1.415 |
| | Mid | 525 | 1956.25 | 1.411 |
| | High | 1175 | 1988.75 | 1.418 |
| One-X | Low | 25 | 1931.25 | 1.400 |
| | Mid | 525 | 1956.25 | 1.405 |
| | High | 1175 | 1988.75 | 1.401 |
| Beacon BC1 | Low | 25 | 1931.25 | 1.405 |
| | Mid | 525 | 1956.25 | 1.403 |
| | High | 1175 | 1988.75 | 1.406 |
| Test Site: 1DCC-OATS-3M-II | | | Spectrum Analyzer: Rental #1 | |

Rev. 5/15/2013

Spectrum Analyzers / Receivers / Preselectors
Rental SA #1 (Brown)

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--------------|--------|---------|------------|-------|-----|-----------------|
| 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |

Radiated Emissions Sites
1DCC-OATS-3M-II

| FCC Code | IC Code | VCCI Code | Range | Cat | Calibration Due |
|----------|----------|-----------|------------|-----|-----------------|
| 719150 | 2762A-10 | A-0015 | 30-1000MHz | II | 5/11/2015 |

Preamps / Couplers Attenuators / Filters
HF 20dB 50W Attenuator

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--------------|------------|------------|----|-------|-----|-----------------|
| 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |

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



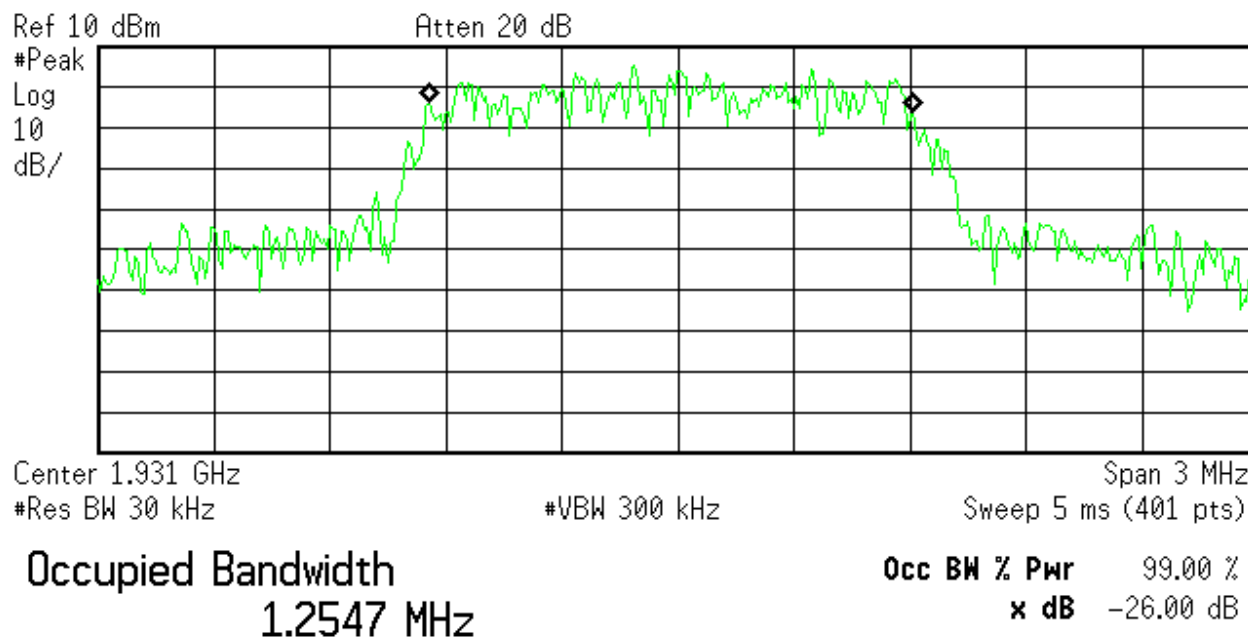
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EVDO

Agilent

R T



Transmit Freq Error -18.646 kHz

x dB Bandwidth 1.415 MHz*

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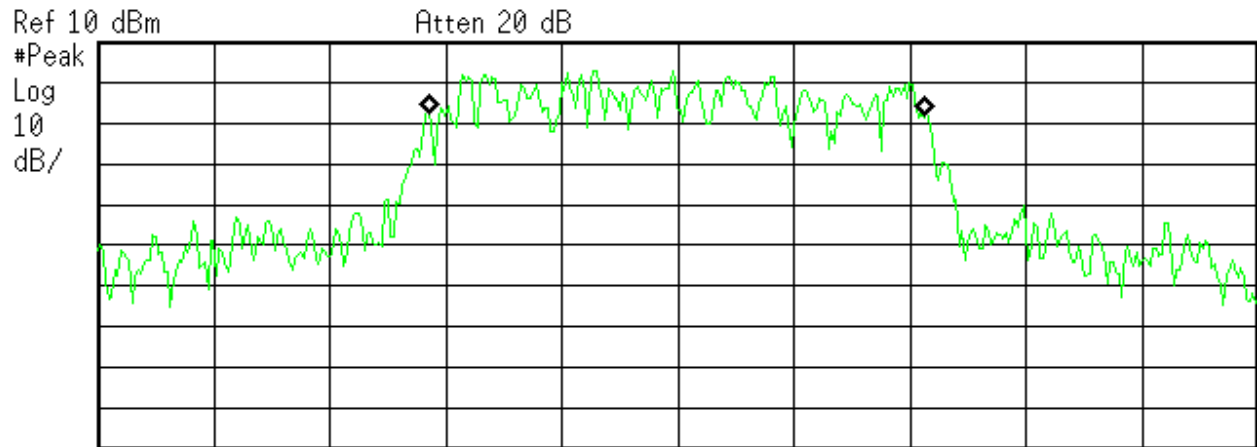
EVDO Low Channel



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Center 1.956 GHz Span 3 MHz
#Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

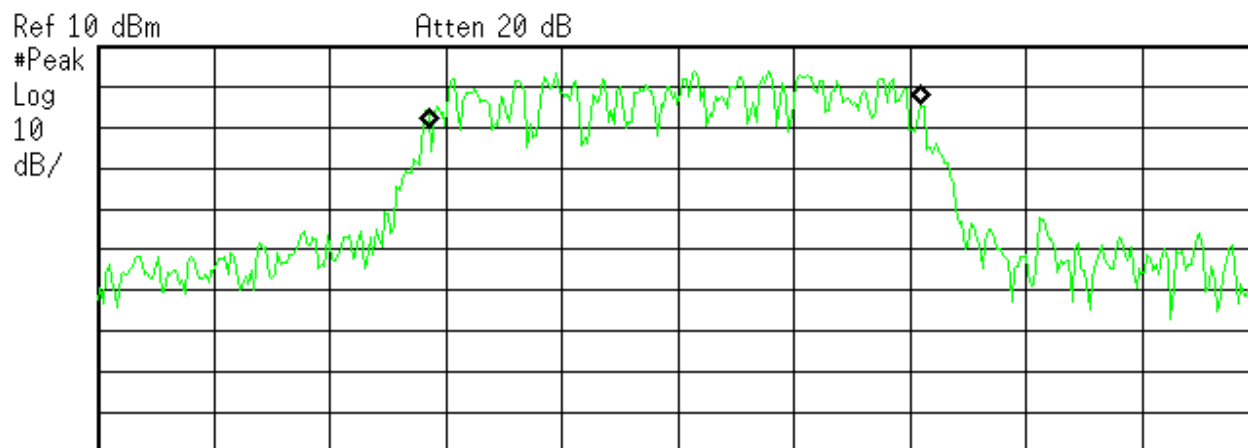
Occupied Bandwidth
1.2790 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -3.655 kHz
x dB Bandwidth 1.411 MHz*

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EVDO Mid Channel



Center 1.989 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2735 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error -5.531 kHz
 x dB Bandwidth 1.418 MHz*

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EVDO High Channel

One-X

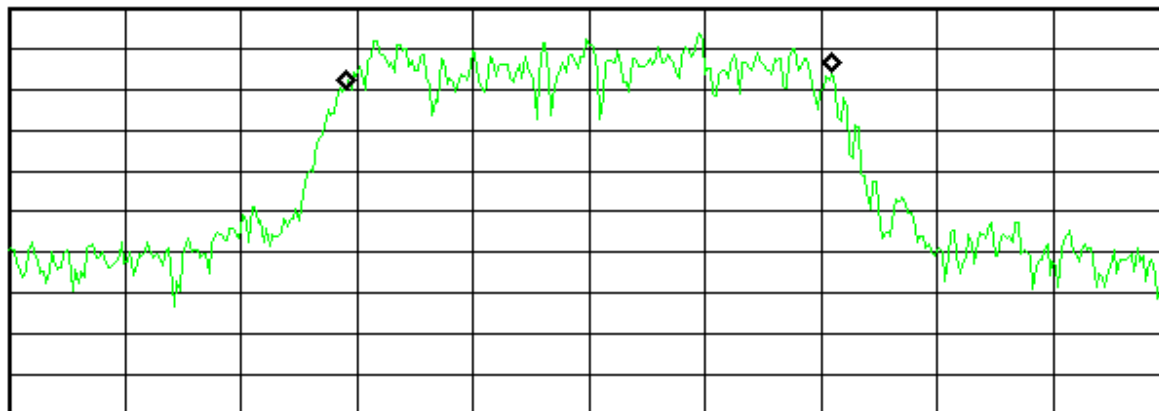
Agilent

R T

Ref 10 dBm

Atten 20 dB

#Peak
Log
10
dB/



Center 1.931 GHz

Span 3 MHz

#Res BW 30 kHz

#VBW 300 kHz

Sweep 5 ms (401 pts)

Occupied Bandwidth
1.2592 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -466.966 Hz
x dB Bandwidth 1.400 MHz*

C:\temp.gif file saved

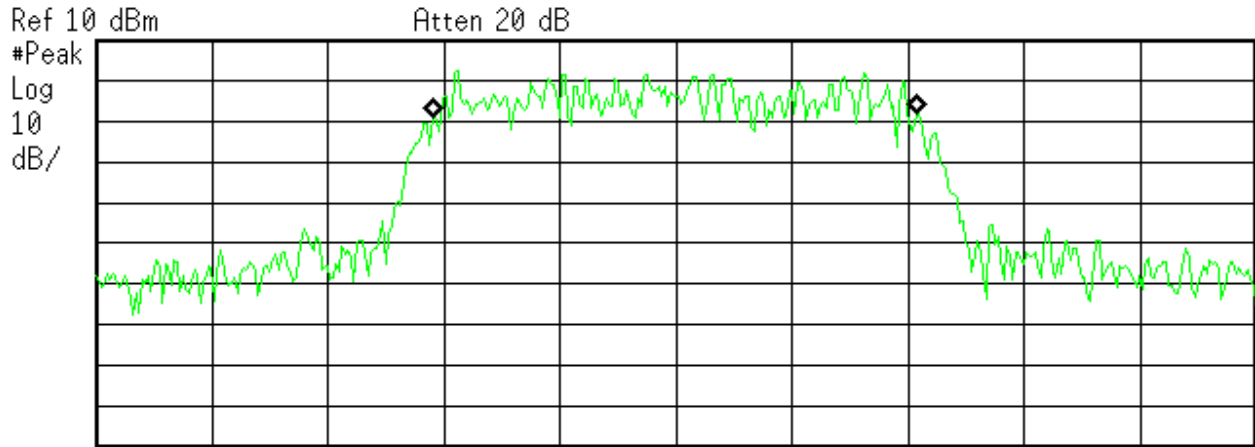
One-X Low Channel



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Center 1.956 GHz
#Res BW 30 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 5 ms (401 pts)

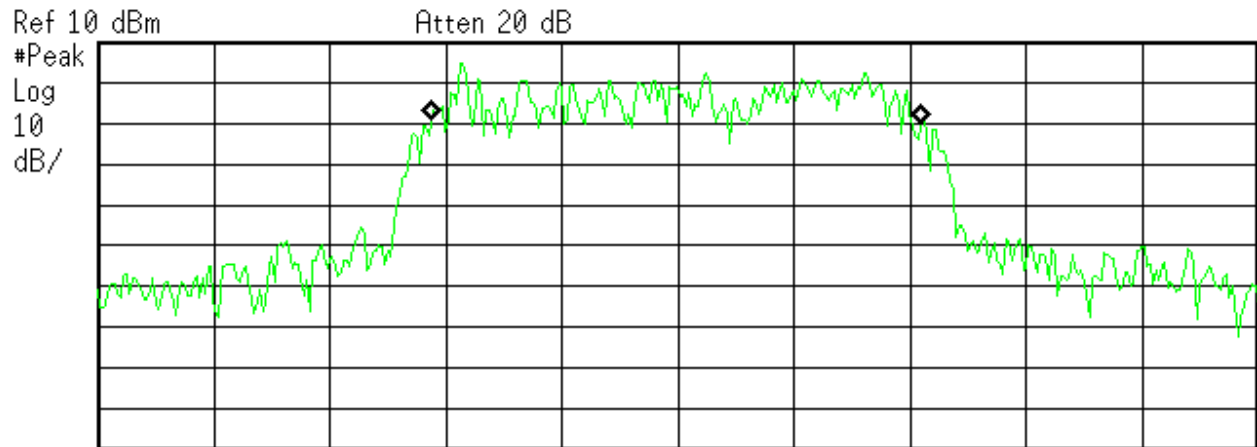
Occupied Bandwidth
1.2560 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.910 kHz
x dB Bandwidth 1.405 MHz*

C:\temp.gif file saved

One-X Mid Channel



Center 1.989 GHz Span 3 MHz
#Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
1.2671 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -4.159 kHz
x dB Bandwidth 1.401 MHz*

C:temp.gif file saved

One-X High Channel

Beacon BC1

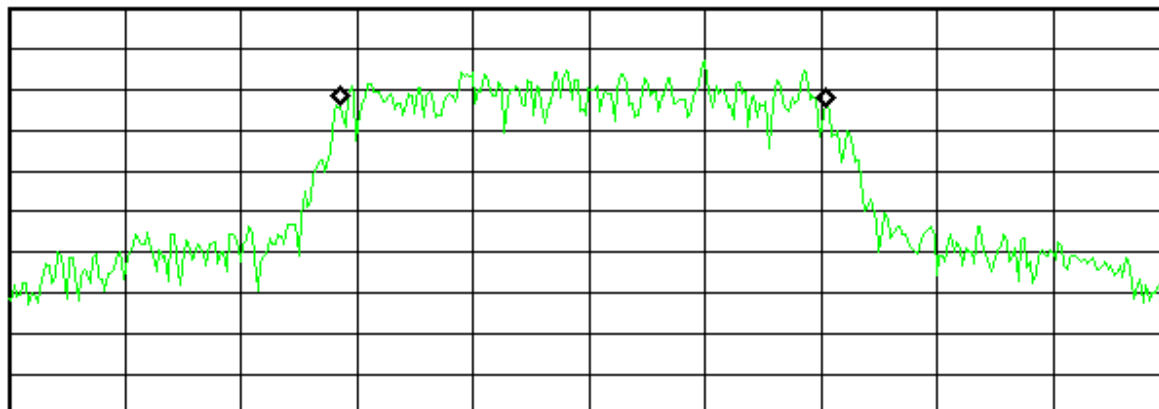
Agilent

R T

Ref 10 dBm

Atten 20 dB

#Peak
Log
10
dB/



Center 1.931 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 3 MHz

Sweep 5 ms (401 pts)

Occupied Bandwidth
1.2670 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -14.990 kHz
x dB Bandwidth 1.405 MHz*

C:temp.gif file saved

Beacon BC1 Low Channel



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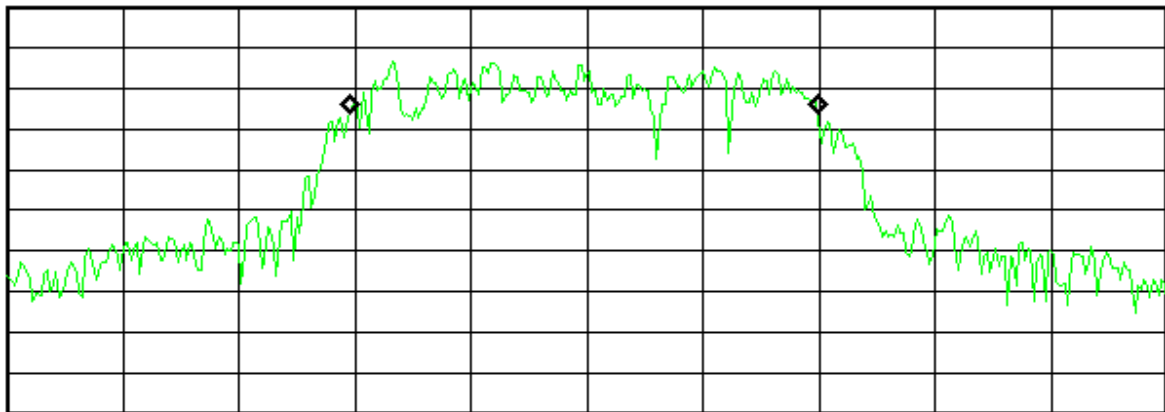


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Ref 10 dBm

Atten 20 dB

#Peak
Log
10
dB/



Center 1.956 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 3 MHz

Sweep 5 ms (401 pts)

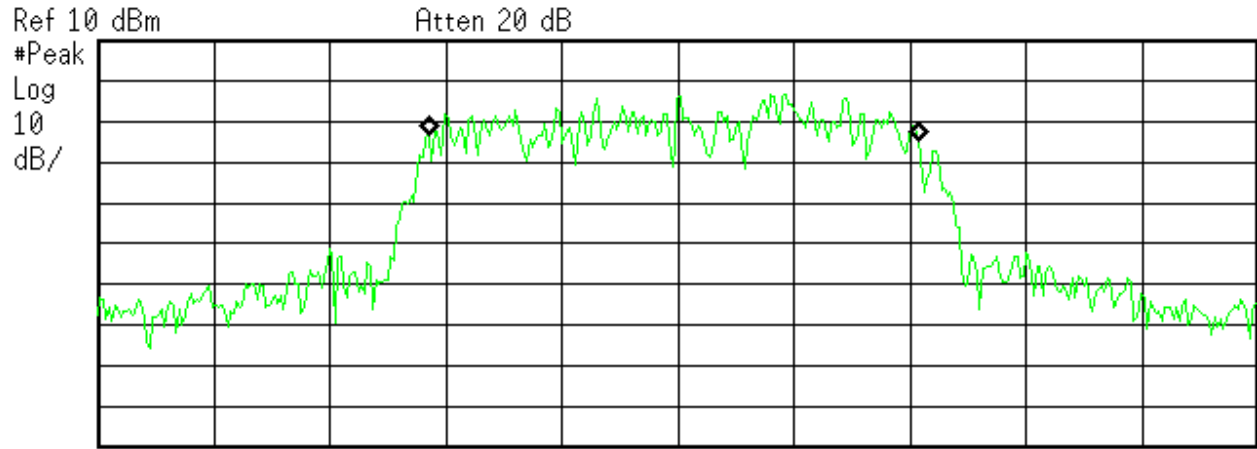
Occupied Bandwidth
1.2133 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -10.224 kHz
x dB Bandwidth 1.403 MHz*

C:\temp.gif file saved

Beacon BC1 Mid Channel



Center 1.989 GHz Span 3 MHz
#Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
1.2695 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -11.601 kHz
x dB Bandwidth 1.406 MHz*

C:\temp.gif file saved

Beacon BC1 High Channel

EIRP

"Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications."
[24.232 (c)]

| Radiated Emissions Table | | | | | | | | | | | |
|--|--------------------|-------------------------------------|------------------------------|-------------------------|--------------------------|--|----------------|-----------------------|----------------------------------|--|--|
| Date: 23-May-13 | | | Company: Airvana | | | Work Order: N1043 | | | | | |
| Engineer: Edward Breen | | | EUT Desc: 750721 Femto Cell | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | |
| Temp: 23.2°C | | | Humidity: 33% | | | Pressure: 1002mBar | | | | | |
| Frequency Range: Part 24 E, EIRP measurements | | | | | | Measurement Distance: 3m | | | | | |
| Notes: | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Signal Generator Output (dBm) | Tx Cable (dB) | Tx Ant Gain (dBi) | Adjusted ERP (dBm) | FCC 24.232 section c | | | | | |
| | | | | | | Limit (dBm) | Margin (dB) | Result (Pass/Fail) | | | |
| Beacon BC1 Ch. 25 H V | 1931.25 | 6.1 | 0.7 | 8.0 | 13.4 | 33.0 | -19.6 | Pass | | | |
| | 1931.25 | 8.2 | 0.7 | 8.0 | 15.5 | 33.0 | -17.5 | Pass | | | |
| Beacon BC1 Ch. 525 H V | 1956.25 | 6.4 | 0.7 | 8.0 | 13.7 | 33.0 | -19.3 | Pass | | | |
| | 1956.25 | 7.1 | 0.7 | 8.0 | 14.4 | 33.0 | -18.6 | Pass | | | |
| Beacon BC1 Ch. 1175 H V | 1988.75 | 8.6 | 0.8 | 8.0 | 15.8 | 33.0 | -17.2 | Pass | | | |
| | 1988.75 | 9.0 | 0.8 | 8.0 | 16.2 | 33.0 | -16.8 | Pass | | | |
| One-X Ch. 25 H V | 1931.25 | 6.0 | 0.7 | 8.0 | 13.3 | 33.0 | -19.7 | Pass | | | |
| | 1931.25 | 6.5 | 0.7 | 8.0 | 13.8 | 33.0 | -19.2 | Pass | | | |
| One-X Ch. 525 H V | 1956.25 | 6.7 | 0.7 | 8.0 | 14.0 | 33.0 | -19.0 | Pass | | | |
| | 1956.25 | 9.4 | 0.7 | 8.0 | 16.7 | 33.0 | -16.3 | Pass | | | |
| One-X Ch. 1175 H V | 1988.75 | 9.5 | 0.8 | 8.0 | 16.7 | 33.0 | -16.3 | Pass | | | |
| | 1988.75 | 10.7 | 0.8 | 8.0 | 17.9 | 33.0 | -15.1 | Pass | | | |
| EVDO Ch. 25 H V | 1931.25 | 14.9 | 0.7 | 8.0 | 22.2 | 33.0 | -10.8 | Pass | | | |
| | 1931.25 | 17.9 | 0.7 | 8.0 | 25.2 | 33.0 | -7.8 | Pass | | | |
| EVDO Ch. 525 H V | 1956.25 | 15.3 | 0.7 | 8.0 | 22.6 | 33.0 | -10.4 | Pass | | | |
| | 1956.25 | 16.1 | 0.7 | 8.0 | 23.4 | 33.0 | -9.6 | Pass | | | |
| EVDO Ch. 1175 H V | 1988.75 | 15.3 | 0.8 | 8.0 | 22.5 | 33.0 | -10.5 | Pass | | | |
| | 1988.75 | 15.6 | 0.8 | 8.0 | 22.8 | 33.0 | -10.2 | Pass | | | |
| Table Result: Pass by -7.8 Worst Freq: 1931.25 MHz | | | | | | | | | | | |
| Test Site: 1DCC-OATS-3M-II | | | Receive Antenna: Yellow Horn | | | Transmit Antenna: Black Horn | | | Signal Generator: Rental Sweeper | | |
| Analyzer: Rental SA#1 | | | Receive Cable: #1506 | | | Transmit Cable: #1787 | | | | | |



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Rev. 5/15/2013

Spectrum Analyzers / Receivers / Preselectors
Rental SA #1 (Brown)

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--------------|--------|---------|------------|-------|-----|-----------------|
| 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |

Radiated Emissions Sites
1DCC-OATS-3M-II

| FCC Code | IC Code | VCCI Code | Range | Cat | Calibration Due |
|----------|----------|-----------|------------|-----|-----------------|
| 719150 | 2762A-10 | A-0015 | 30-1000MHz | II | 5/11/2015 |

Antennas

Yellow Horn
Black Horn

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|---------|------|------|-----------|-------|-----|-----------------|
| 1-18GHz | 3115 | EMCO | 9608-4898 | 37 | I | 6/17/2013 |
| 1-18GHz | 3115 | EMCO | 9703-5148 | 56 | I | 6/29/2013 |

Meteorological Meters

Weather Clock (Pressure Only)
1DCC-OATS-3M-I Thermohygrometer

| MN | Mfr | SN | Asset | Cat | Calibration Due |
|-----------|-------------------|----------|-------|-----|-----------------|
| BA928 | Oregon Scientific | C3166-1 | 831 | I | 3/20/2014 |
| 35519-044 | Control Company | 72457635 | 1334 | II | 8/19/2013 |

Cables

Asset #1506
Asset #1787

| Range | Mfr | Cat | Calibration Due |
|--------------|------------|-----|-----------------|
| 9kHz - 18GHz | Florida RF | II | 2/2/2014 |
| 9kHz - 18GHz | Florida RF | II | 3/14/2014 |

Signal Generators

Rental Sweeper

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--------------|----------|---------|------------|--------|-----|-----------------|
| 0.01-20.0GHz | HP83752B | Agilent | 3610A01297 | Rental | I | 8/28/2013 |

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



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Band Edge Measurements

LIMITS

"The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB."

[24.238(a)]

"A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1MHz or 1 percent of emission bandwidth, as specified)." [24.238(b)]

MEASUREMENTS / RESULTS

Note: Mask lines are set to -13dBm at 1930MHz and 1990MHz.

Spectrum analyzer screen plots for EVDO, One-X, and Beacon BC1 are shown on the following pages.

TEST EQUIPMENT USED

Rev. 5/15/2013

| | | | | | | | |
|---|-----------------|--------------------|------------------|--------------|--------------|------------|------------------------|
| Spectrum Analyzers / Receivers /Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Preamps/Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| HF 20dB 50W Attenuator | 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |
| Meteorological Meters | | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Temp./Humidity/Atm. Pressure Gauge | | 7400 Perception II | Davis | N/A | 965 | I | 4/4/2013 |
| 1DCC-OATS-3M-I Thermohygrometer | | 35519-044 | Control Company | 72457635 | 1334 | II | 8/19/2013 |

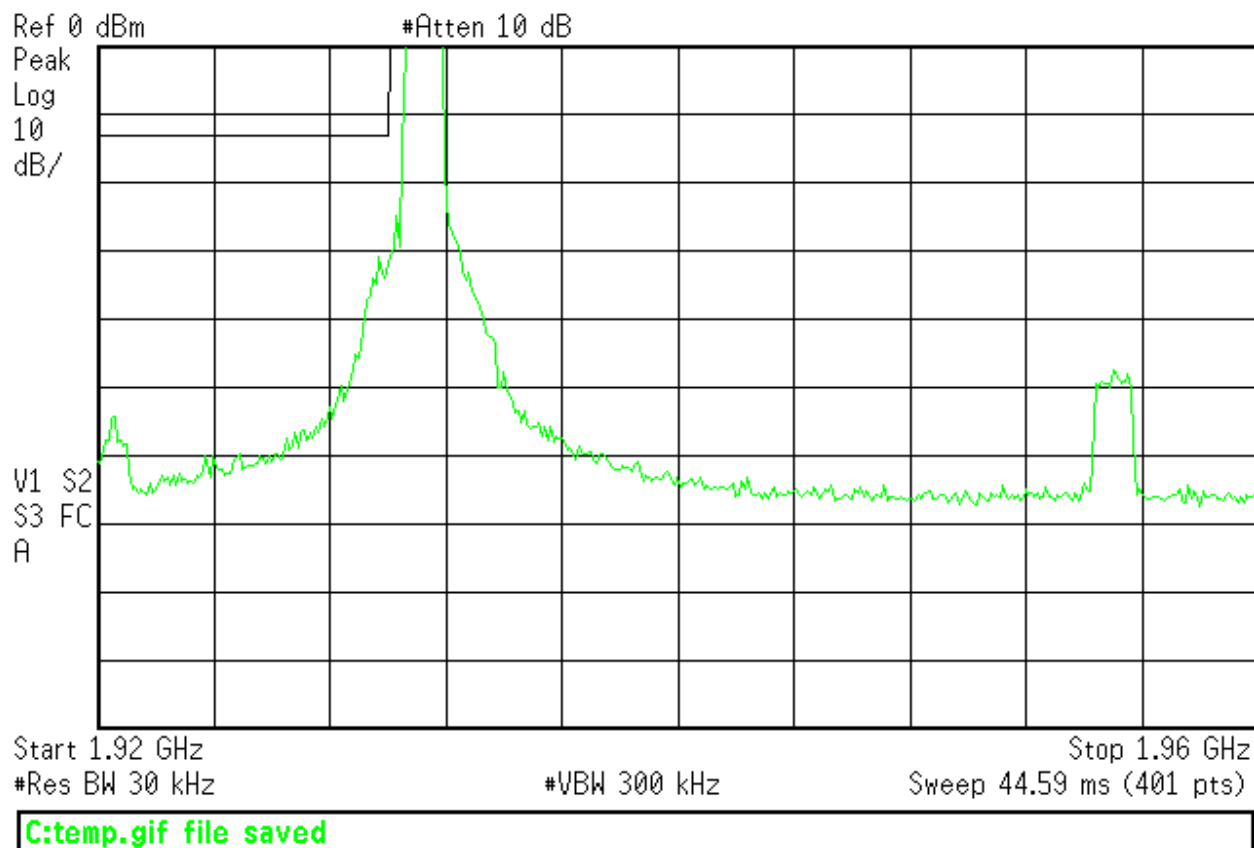
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



EVDO

Agilent

R T



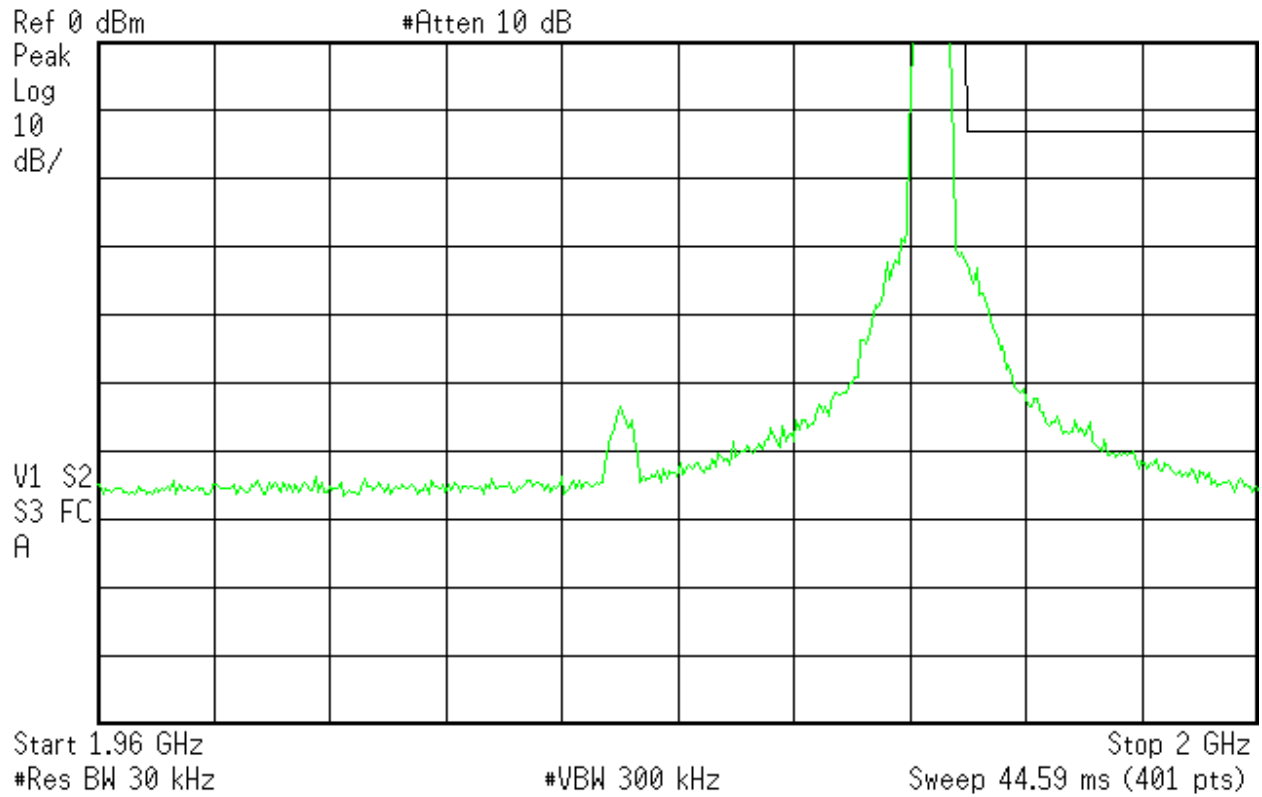
EVDO Low Channel



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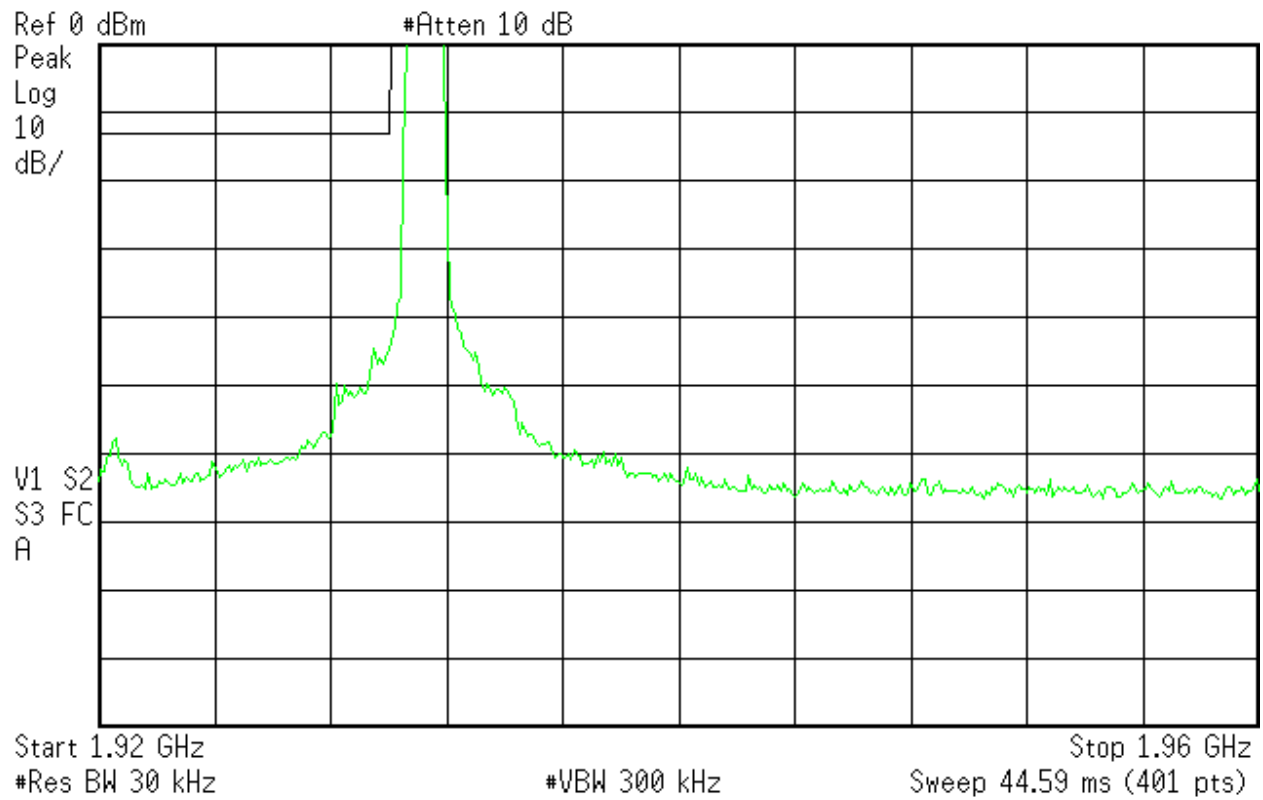
C:\temp.gif file saved

EVDO High Channel

One-X



R T



C:\temp.gif file saved

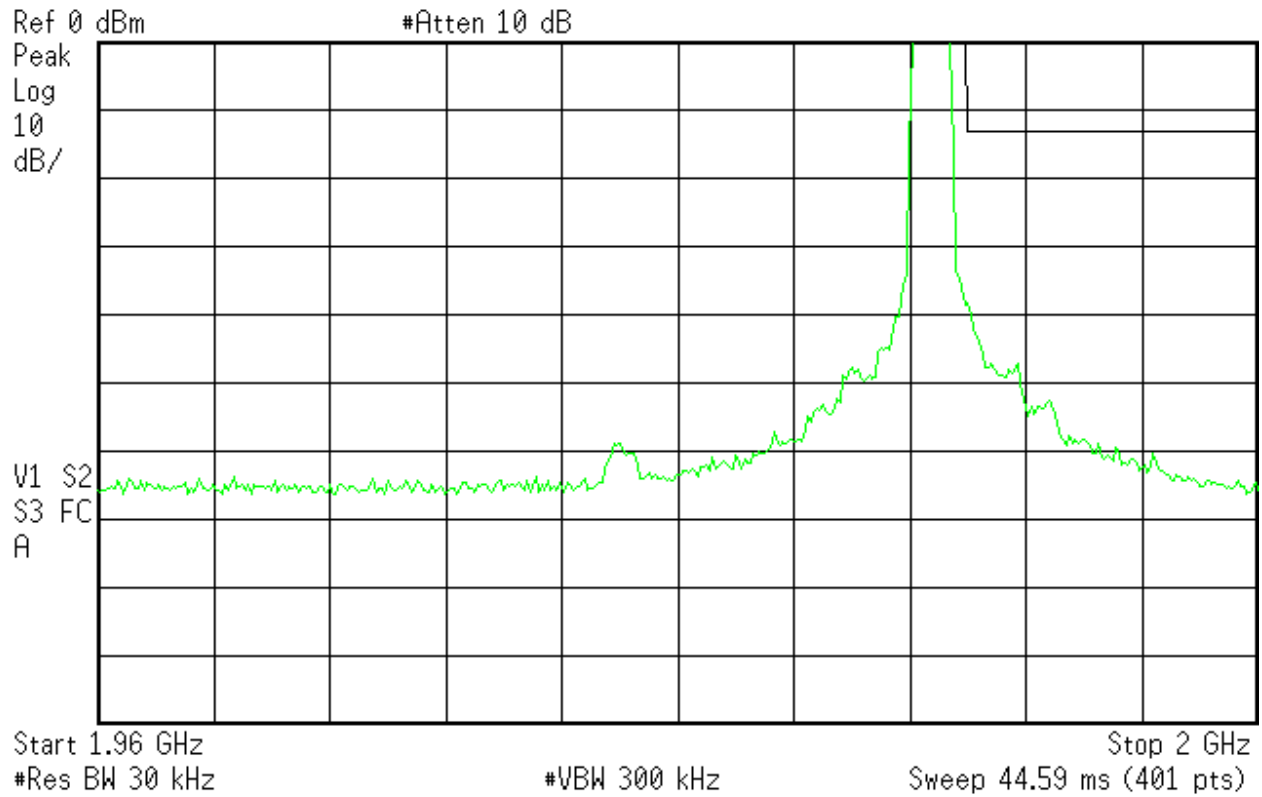
One-X Low Channel



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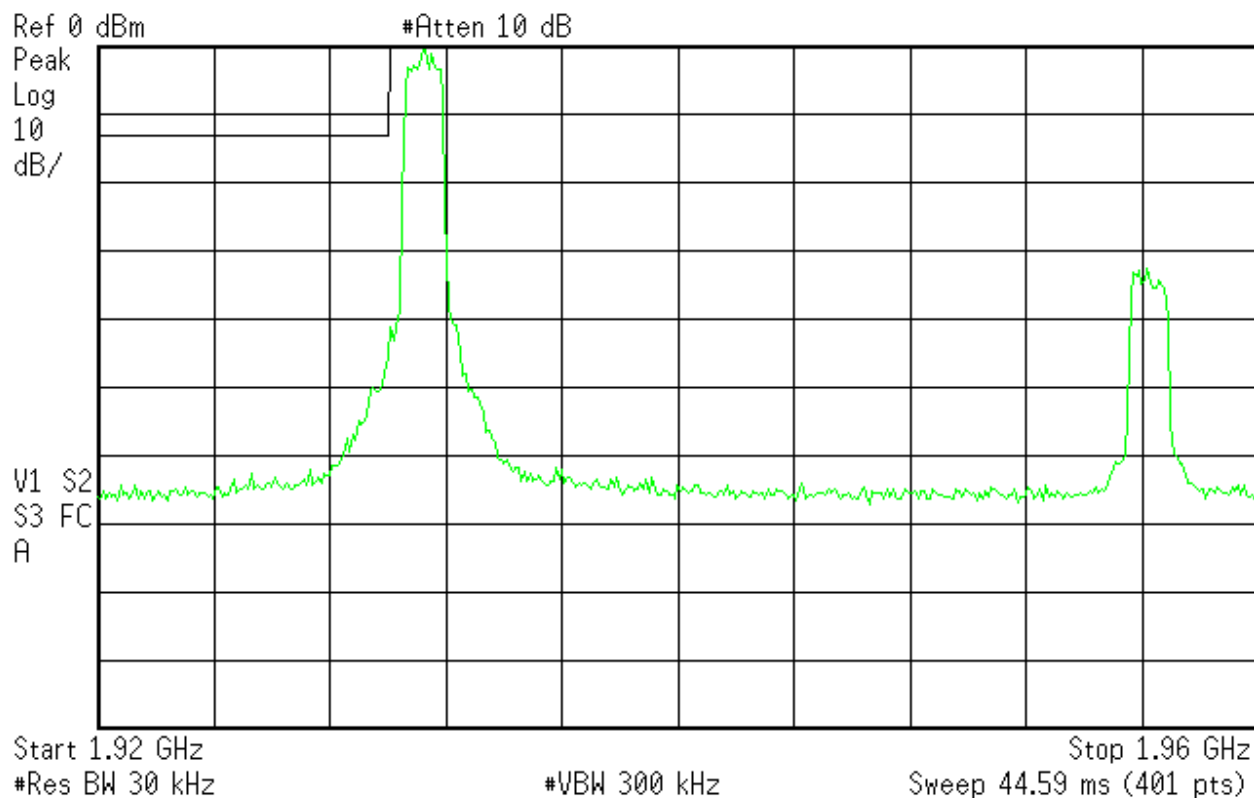
C:\temp.gif file saved

One-x High Channel

Beacon BC1



R T



C:\temp.gif file saved

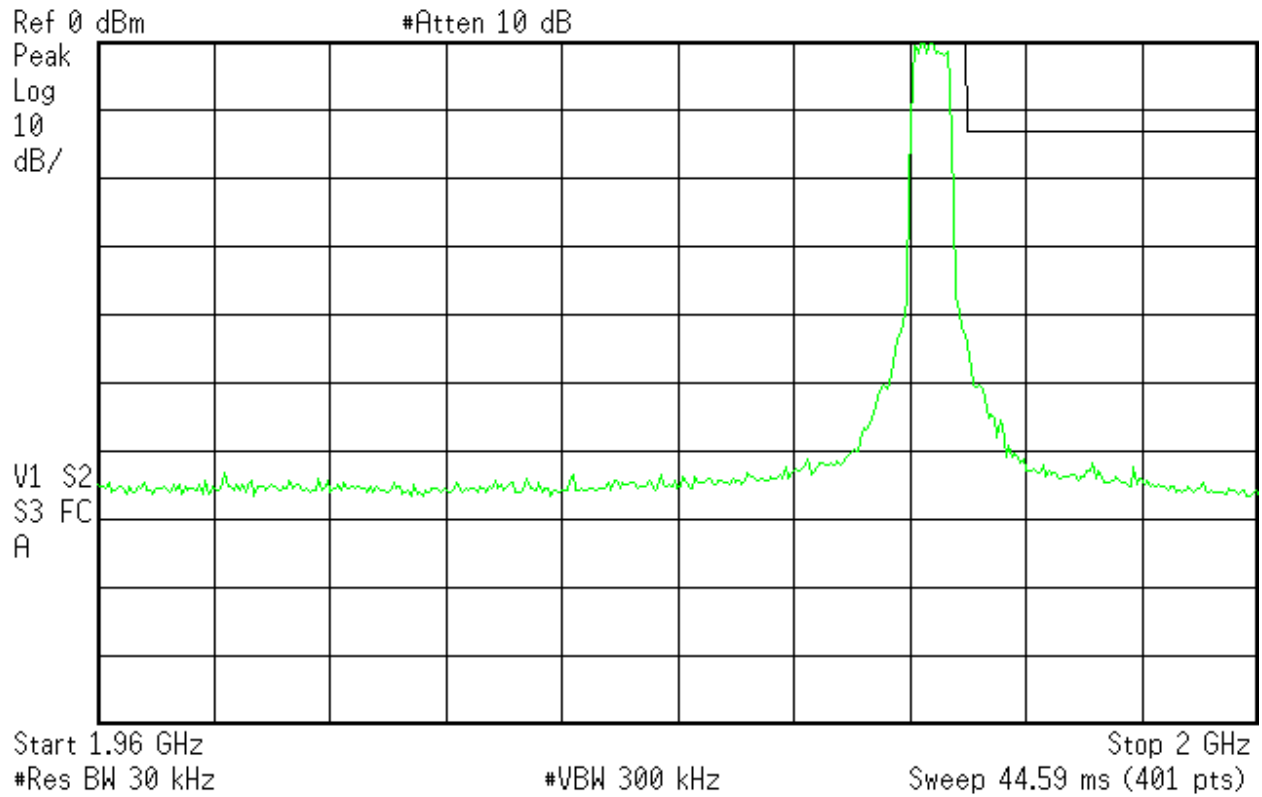
Beacon BC1 Low Channel



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Beacon BC1 High Channel

Conducted Spurious Emissions at Antenna Port

LIMITS

"The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB."
[24.238(a)]

$$\text{Limit} = 10 \cdot \log(P[\text{mW}]) - (43 + 10 \cdot \log(P[\text{W}])) = -13\text{dBm}$$

Spectrum analyzer screen plots for EVDO, One-X, and Beacon BC1 are shown on the following pages.

TEST EQUIPMENT USED

Rev. 5/15/2013

| | | | | | | | |
|--|-----------------|--------------------|------------------|--------------|--------------|------------|------------------------|
| Spectrum Analyzers / Receivers / Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Preamps/Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| HF 20dB 50W Attenuator | 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |
| Meteorological Meters | | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Temp./Humidity/Atm. Pressure Gauge | | 7400 Perception II | Davis | N/A | 965 | I | 4/4/2013 |
| 1DCC-OATS-3M-I Thermohygrometer | | 35519-044 | Control Company | 72457635 | 1334 | II | 8/19/2013 |

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



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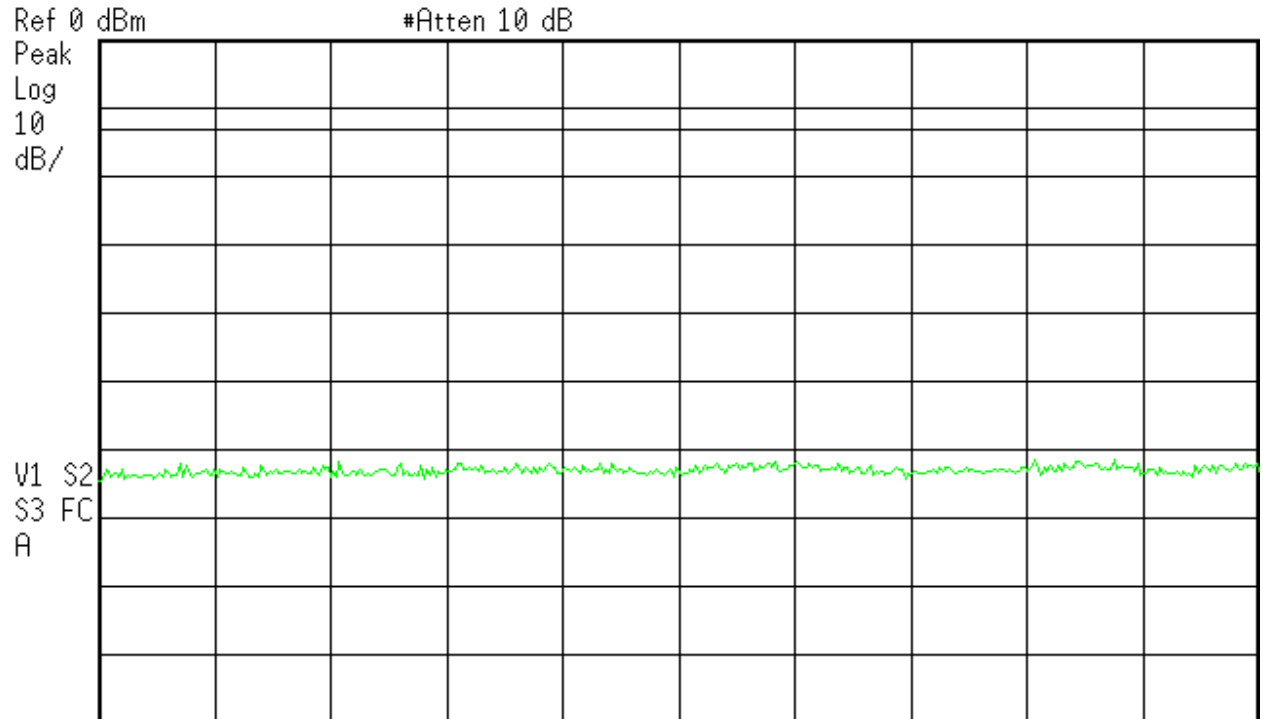
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PLOTS

EVDO



R T



Start 30 MHz Stop 1 GHz
#Res BW 120 kHz #VBW 1 MHz Sweep 151.9 ms (401 pts)

C:\temp.gif file saved

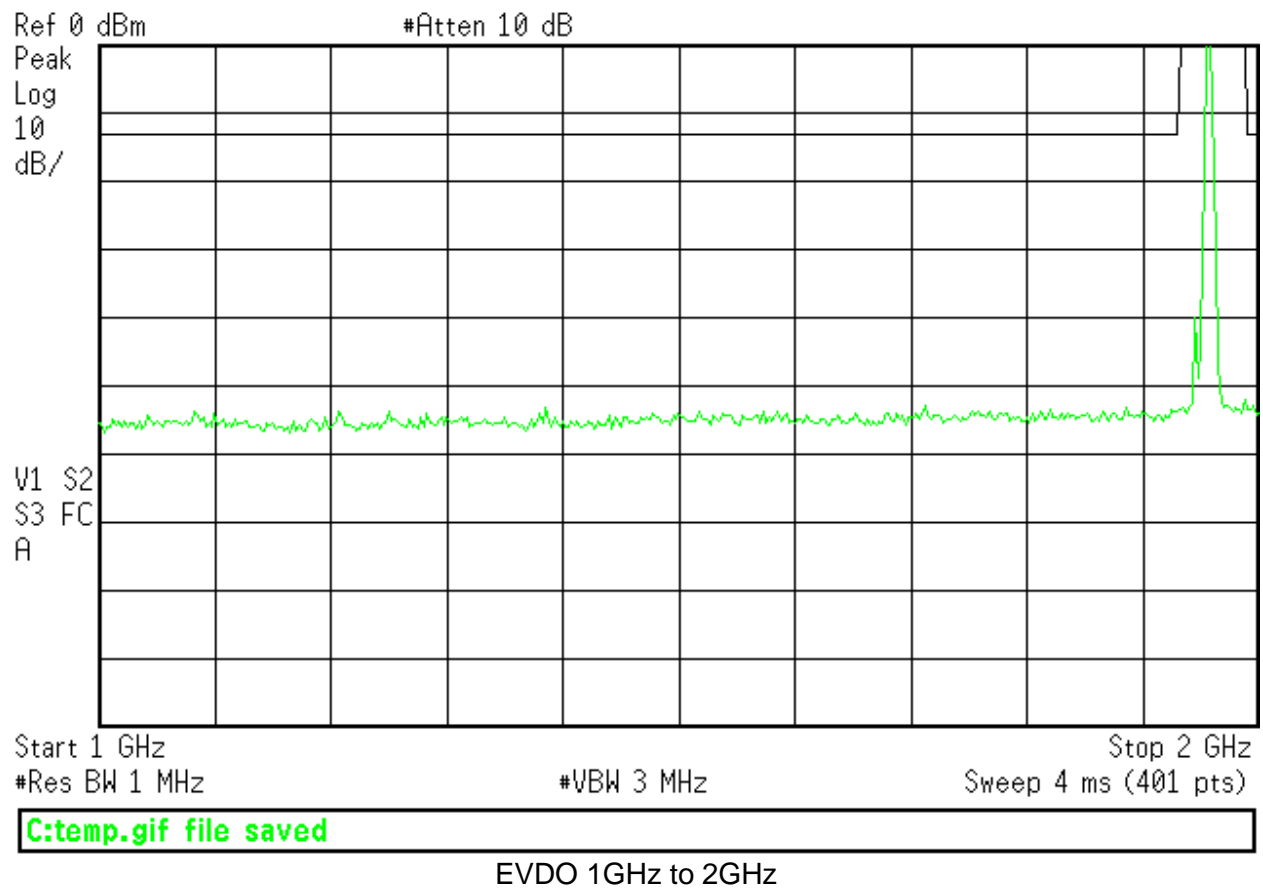
EVDO 30MHz to 1GHz

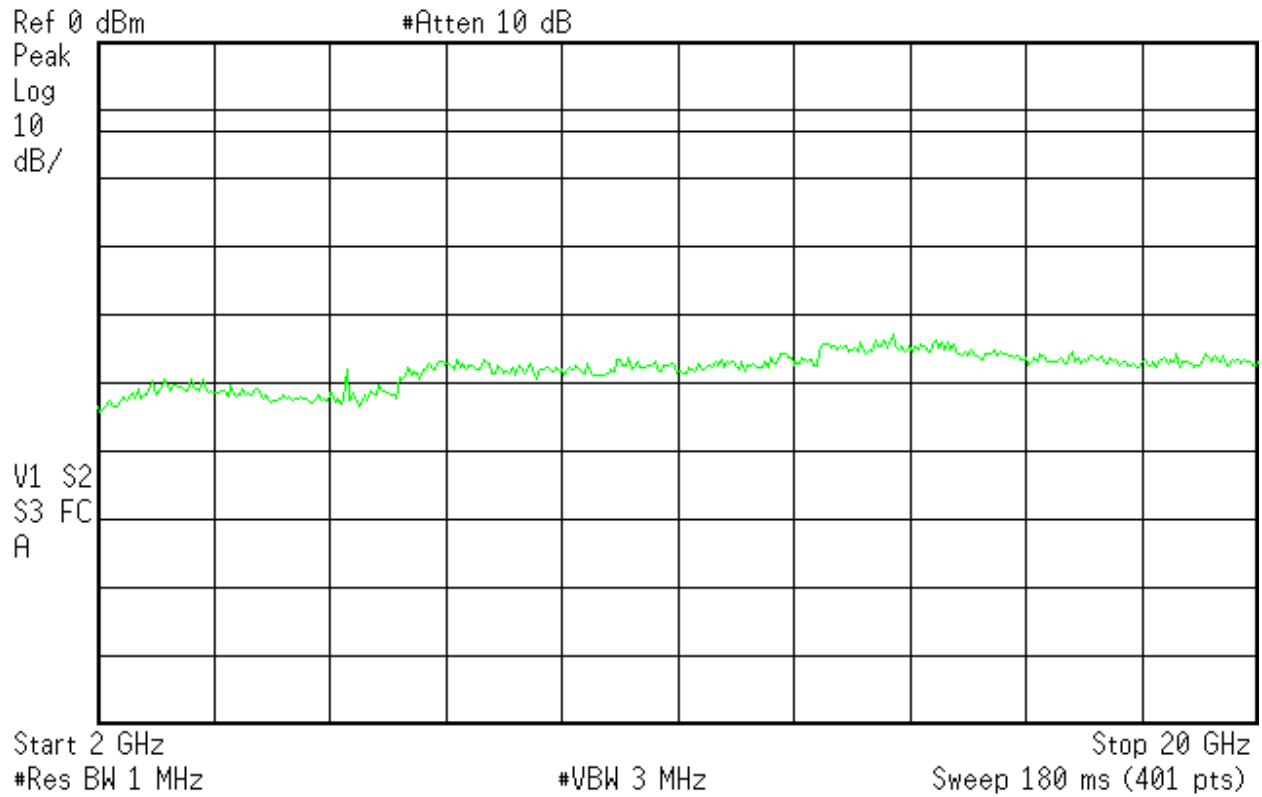


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EVDO 2GHz to 20GHz

One-X



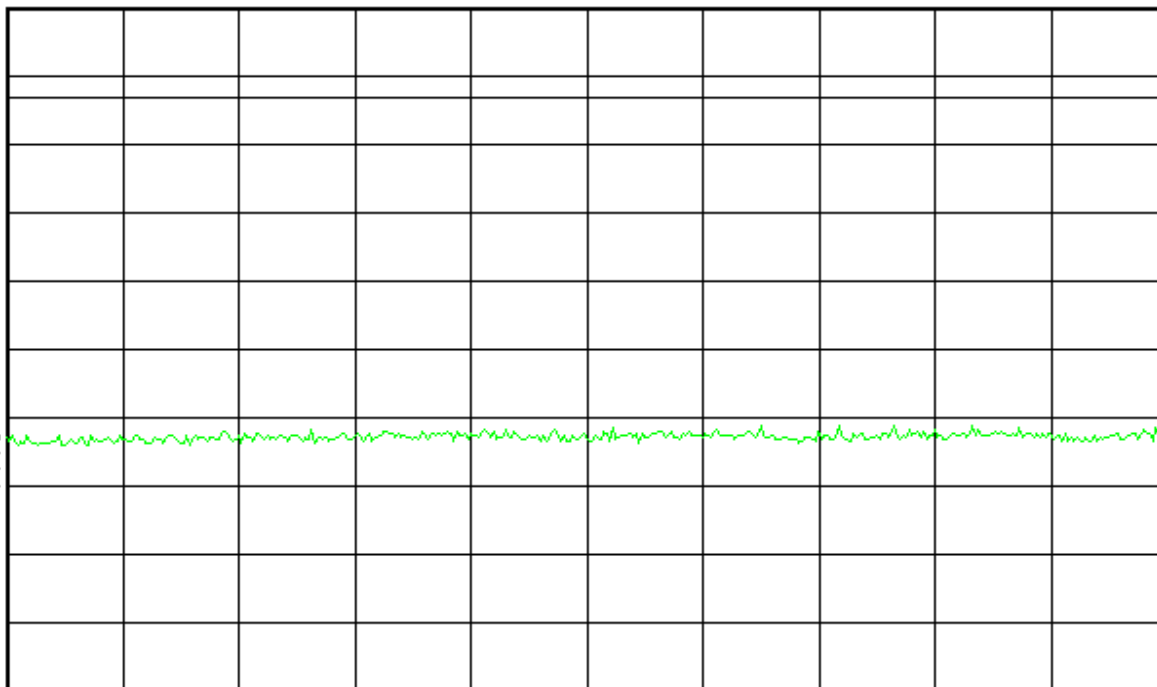
R T

Ref 0 dBm

#Atten 10 dB

Peak
Log
10
dB/

V1 S2
S3 FC
A



Start 30 MHz

Stop 1 GHz

#Res BW 120 kHz

#VBW 1 MHz

Sweep 151.9 ms (401 pts)

C:\temp.gif file saved

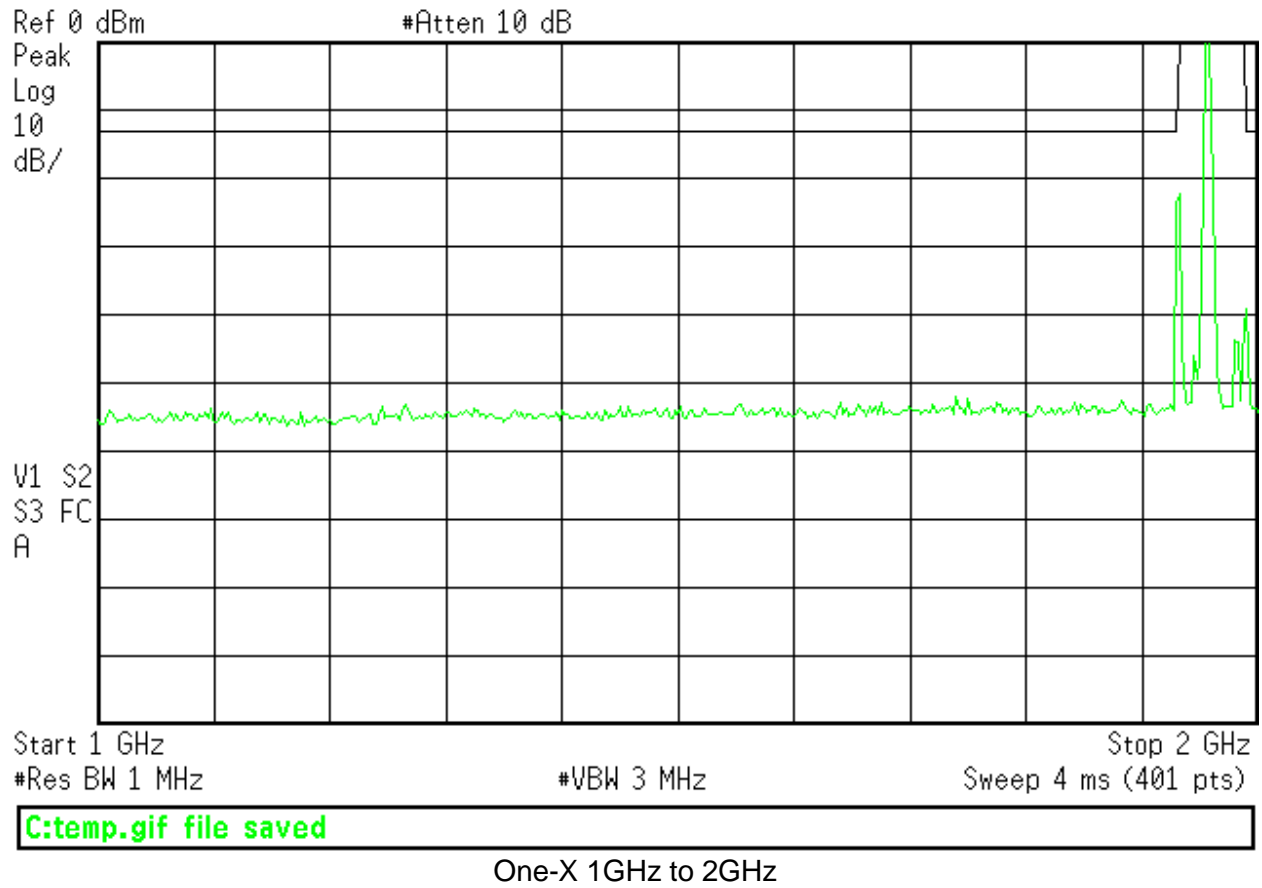
One-X 30MHz to 1GHz

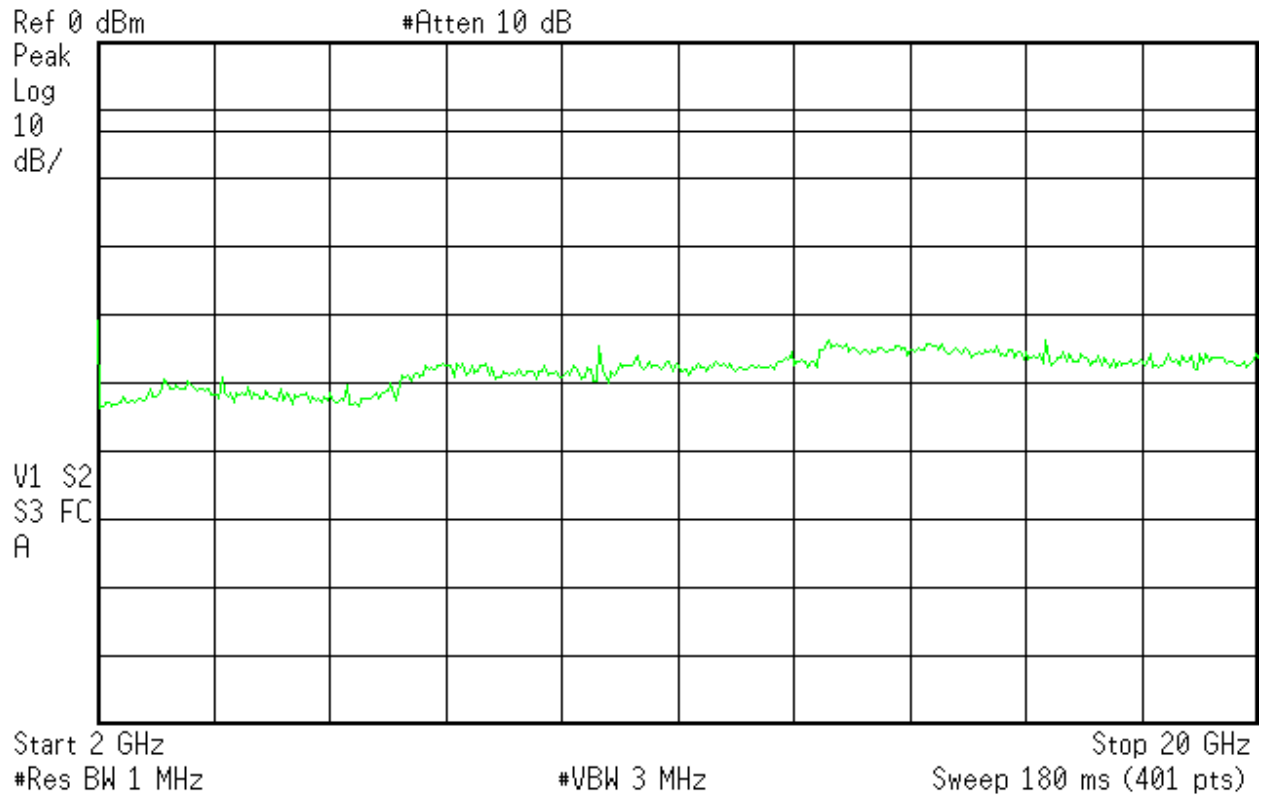


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C:\temp.gif file saved

One-X 2GHz to 20GHz

Beacon BC1



R T

Ref 0 dBm

#Atten 10 dB

Peak

Log

10

dB/

V1 S2

S3 FC

A

Start 30 MHz

#Res BW 120 kHz

#VBW 1 MHz

Stop 1 GHz

Sweep 151.9 ms (401 pts)

C:\temp.gif file saved

Beacon BC1 30MHz to 1GHz

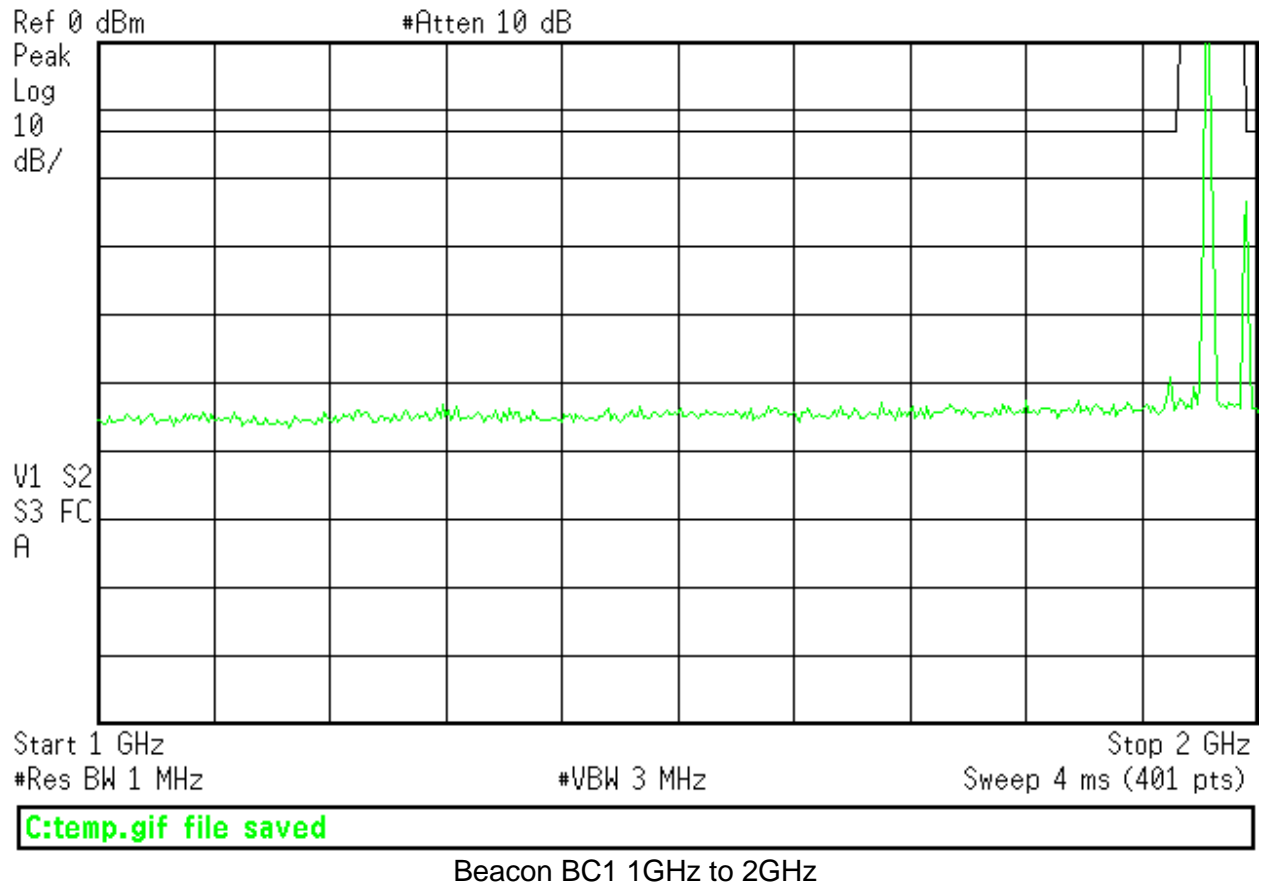


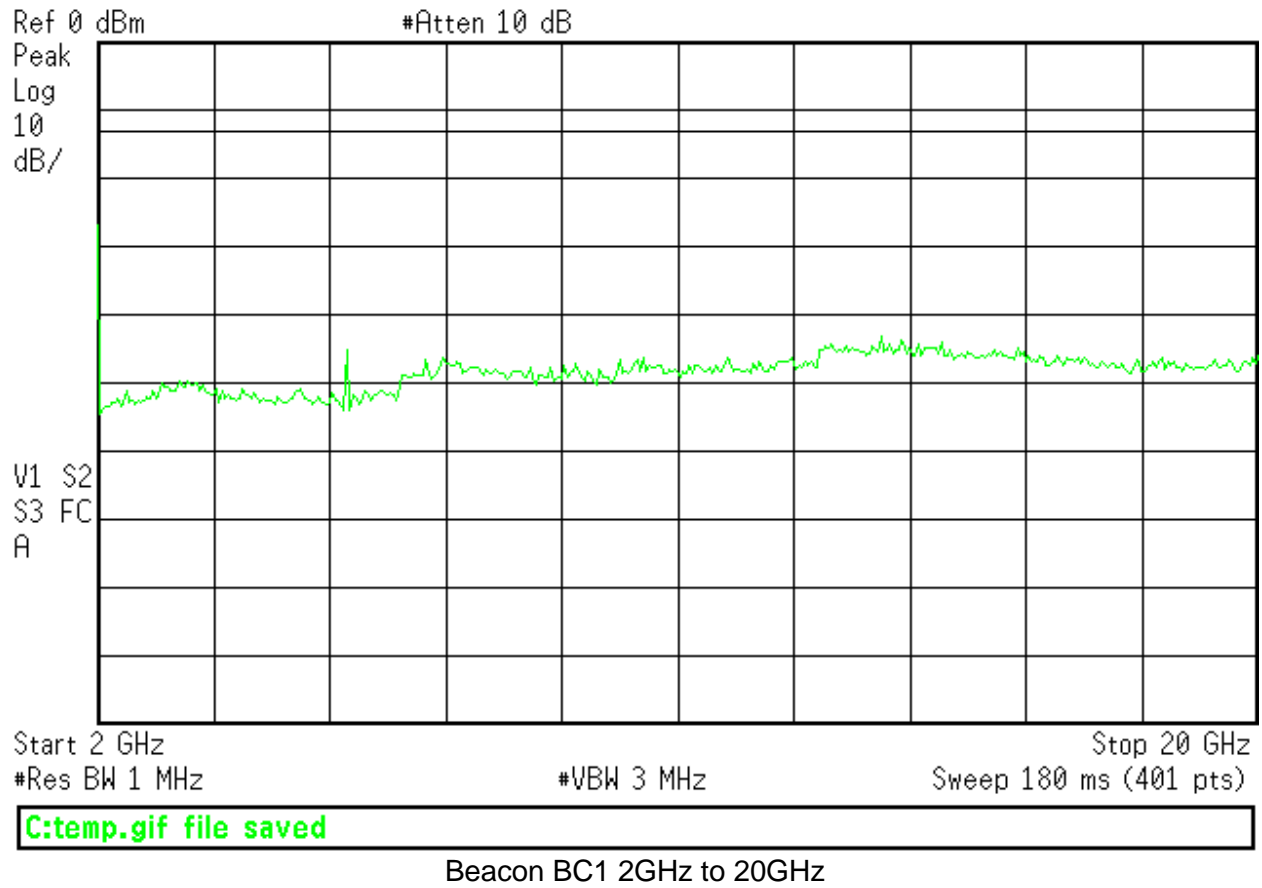
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Tests Specific to Part 90

Occupied Bandwidth

| Bandwidth Measurements | | | | |
|--|------------------|-----------------------------|------------------------------|----------------------|
| Date: 24-May-13 | | Company: Airvana | | Work Order: N1043 |
| Engineer: Edward Breen | | EUT Desc: 750721 Femto Cell | | EUT Power: 120V/60Hz |
| Temp: 23.1°C | | Humidity: 36% | | Pressure: 998mbar |
| Frequency Range: 862-869MHz, FCC Part 90 | | | | |
| Notes: | | | | |
| OUTPUT | CHANNEL POSITION | CHANNEL NUMBER | FREQUENCY | 26dB BANDWIDTH |
| | | | (MHz) | (MHz) |
| Beacon BC10 | Low | 476 | 862.90 | 1.411 |
| | Mid | 576 | 865.4 | 1.417 |
| | High | 676 | 867.9 | 1.417 |
| Test Site: 1DCC-OATS-3M-II | | | Spectrum Analyzer: Rental #1 | |

Rev. 5/15/2013

| | | | | | | | |
|--|-----------------|----------------|------------------|--------------|--------------|------------|------------------------|
| Spectrum Analyzers / Receivers / Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Preamps / Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| HF 20dB 50W Attenuator | 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |

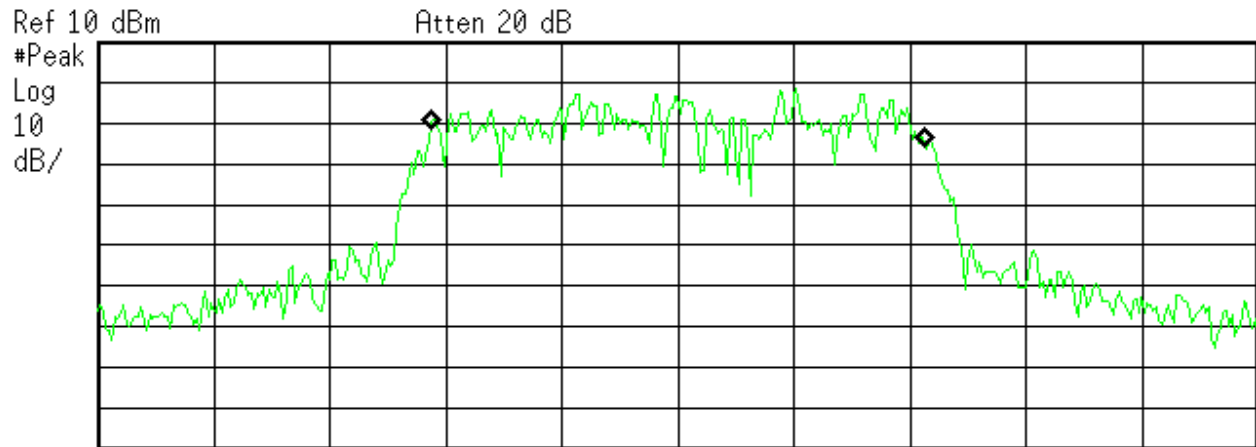
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



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Center 862.9 MHz Span 3 MHz
#Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

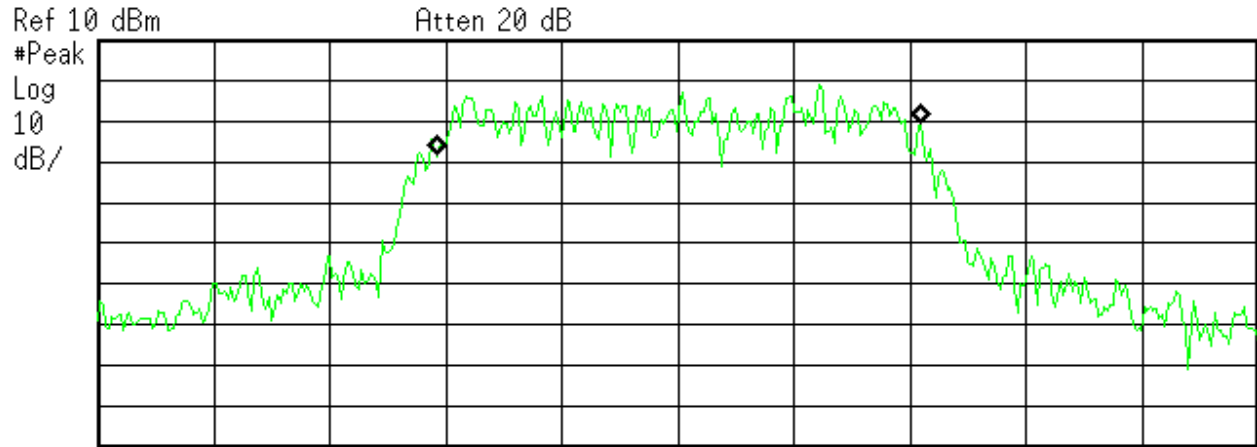
Occupied Bandwidth
1.2819 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 113.154 Hz
x dB Bandwidth 1.411 MHz*

C:\temp.gif file saved

Beacon BC10 Low Channel (Ch. 476)



Center 865.4 MHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

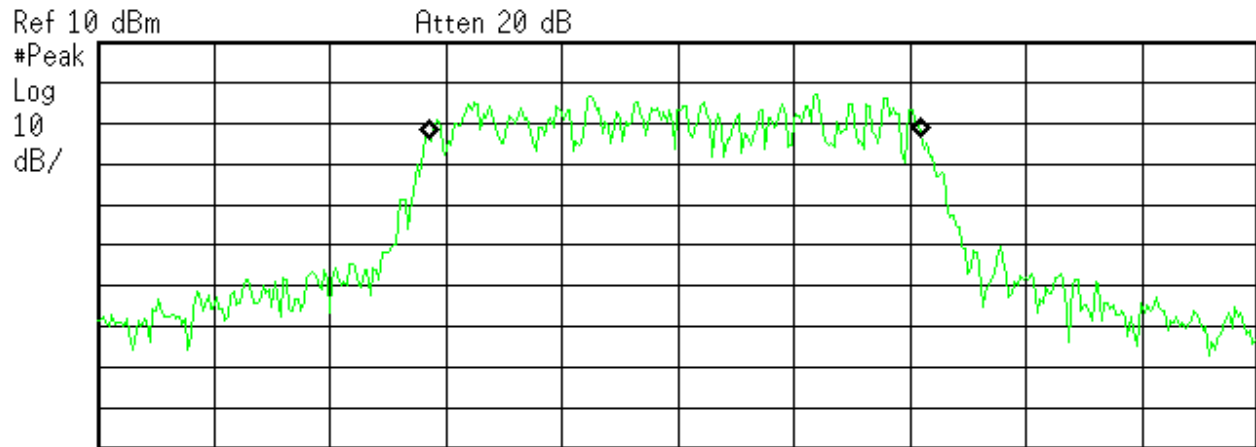
Occupied Bandwidth
 1.2534 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 1.337 kHz
 x dB Bandwidth 1.417 MHz*

C:\temp.gif file saved

Beacon BC10 Mid Channel (Ch. 576)



Center 867.9 MHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2738 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error -5.952 kHz
 x dB Bandwidth 1.417 MHz*

C:\temp.gif file saved

Beacon BC10 High Channel (Ch. 676)

ERP

ERP Using Substitution Method

| Date: 23-May-13 | | | Company: Airvana | | | Work Order: N1043 | | | | | |
|---|--------------------|-------------------------------------|-----------------------------|---------------------|--------------------------|--|----------------|-----------------------|----------------------------------|----------------|-----------------------|
| Engineer: Edward Breen | | | EUT Desc: 750721 Femto Cell | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | |
| Temp: 23.2°C | | | Humidity: 33% | | | Pressure: 1002mBar | | | | | |
| Frequency Range: Part 90 ERP measurements | | | | | | Measurement Distance: 3m | | | | | |
| Notes: Band Class 10 | | | | | | | | | | | |
| Antenna Polarization (H/ V) | Frequency (MHz) | Signal Generator Output (dBm) | Tx Antenna Gain (dBi) | Tx Cable (dB) | Adjusted ERP (dBm) | FCC 90.635 (b) | | | --- | | |
| | | | | | | Limit (dBm) | Margin (dB) | Result (Pass/Fail) | Limit (dBuV/m) | Margin (dB) | Result (Pass/Fail) |
| Channel 476 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | 862.9 | 5.3 | 0.0 | 0.5 | 4.8 | 50.0 | -45.2 | Pass | --- | --- | --- |
| V | 862.9 | 11.1 | 0.0 | 0.5 | 10.6 | 50.0 | -39.4 | Pass | --- | --- | --- |
| | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel 576 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | 865.4 | 4.2 | 0.0 | 0.5 | 3.7 | 50.0 | -46.3 | Pass | --- | --- | --- |
| V | 865.4 | 10.1 | 0.0 | 0.5 | 9.6 | 50.0 | -40.4 | Pass | --- | --- | --- |
| | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel 676 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | 867.9 | 6.4 | 0.0 | 0.5 | 5.9 | 50.0 | -44.1 | Pass | --- | --- | --- |
| V | 867.9 | 10.7 | 0.0 | 0.5 | 10.2 | 50.0 | -39.8 | Pass | --- | --- | --- |
| | | | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table Result: | | | Pass by -39.4 | | | Worst Freq: | | | 862.9 MHz | | |
| Test Site: 1DCC-OATS-3M-II | | | Receive Antenna: Red-Brown | | | Transmit Antenna: Dipole #756 | | | Signal Generator: Rental Sweeper | | |
| Analyzer: Rental SA#1 | | | Receive Cable: #1506 | | | Transmit Cable: #1787 | | | | | |

Rev. 5/15/2013

Spectrum Analyzers / Receivers/Preselectors

Rental SA #1 (Brown)

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--------------|--------|---------|------------|-------|-----|-----------------|
| 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |

Radiated Emissions Sites

1DCC-OATS-3M-II

| FCC Code | IC Code | VCCI Code | Range | Cat | Calibration Due |
|----------|----------|-----------|------------|-----|-----------------|
| 719150 | 2762A-10 | A-0015 | 30-1000MHz | II | 5/11/2015 |

Antennas

Red-Brown Bilog
Adjustable Dipole

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|------------|-------|-------|----------|-------|-----|-----------------|
| 30-2000MHz | JB1 | Sunol | A0032406 | 1218 | I | 1/8/2015 |
| 30-1000MHz | 3121C | EMCO | 1371 | 756 | I | 12/28/2014 |

Meteorological Meters

Weather Clock (Pressure Only)
1DCC-OATS-3M-I Thermohygrometer

| MN | Mfr | SN | Asset | Cat | Calibration Due |
|-----------|-------------------|----------|-------|-----|-----------------|
| BA928 | Oregon Scientific | C3166-1 | 831 | I | 3/20/2014 |
| 35519-044 | Control Company | 72457635 | 1334 | II | 8/19/2013 |

Cables

Asset #1506
Asset #1787

| Range | Mfr | Cat | Calibration Due |
|--------------|------------|-----|-----------------|
| 9kHz - 18GHz | Florida RF | II | 2/2/2014 |
| 9kHz - 18GHz | Florida RF | II | 3/14/2014 |

Signal Generators

Rental Sweeper

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--------------|----------|---------|------------|--------|-----|-----------------|
| 0.01-20.0GHz | HP83752B | Agilent | 3610A01297 | Rental | I | 8/28/2013 |

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Emission Mask

LIMITS

47 CFR 90.961:

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

MEASUREMENTS / RESULTS

Spectrum Analyzer settings:

Resolution Bandwidth: 30kHz
Video Bandwidth: 300kHz
Peak detector

Emission Mask:

The following limits are applied in the spectral plots:

Attenuation within 37.5kHz of band: $50 + 10 \log(P)$, resulting in -20dBm
Attenuation beyond 37.5kHz from band: $43 + 10 \log(P)$, resulting in -13dBm

TEST EQUIPMENT USED

Rev. 5/15/2013

| Spectrum Analyzers / Receivers / Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--|-----------------|----------------|------------------|--------------|--------------|------------|------------------------|
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Preamps / Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| HF 20dB 50W Attenuator | 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |

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



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PLOTS

Agilent

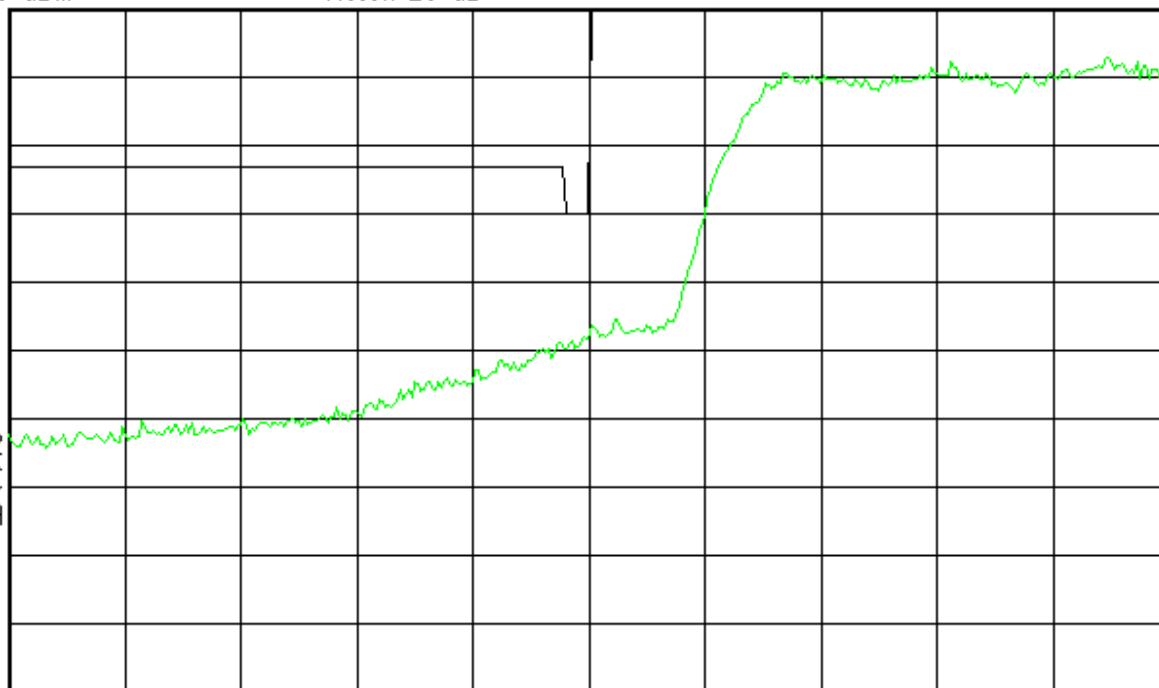
R T

Ref 10 dBm

Atten 20 dB

Peak
Log
10
dB/

V1 S2
S3 FC
A AA



Start 861 MHz

#Res BW 30 kHz

#VBW 300 kHz

Stop 863 MHz

Sweep 5 ms (401 pts)

C:\temp.gif file saved

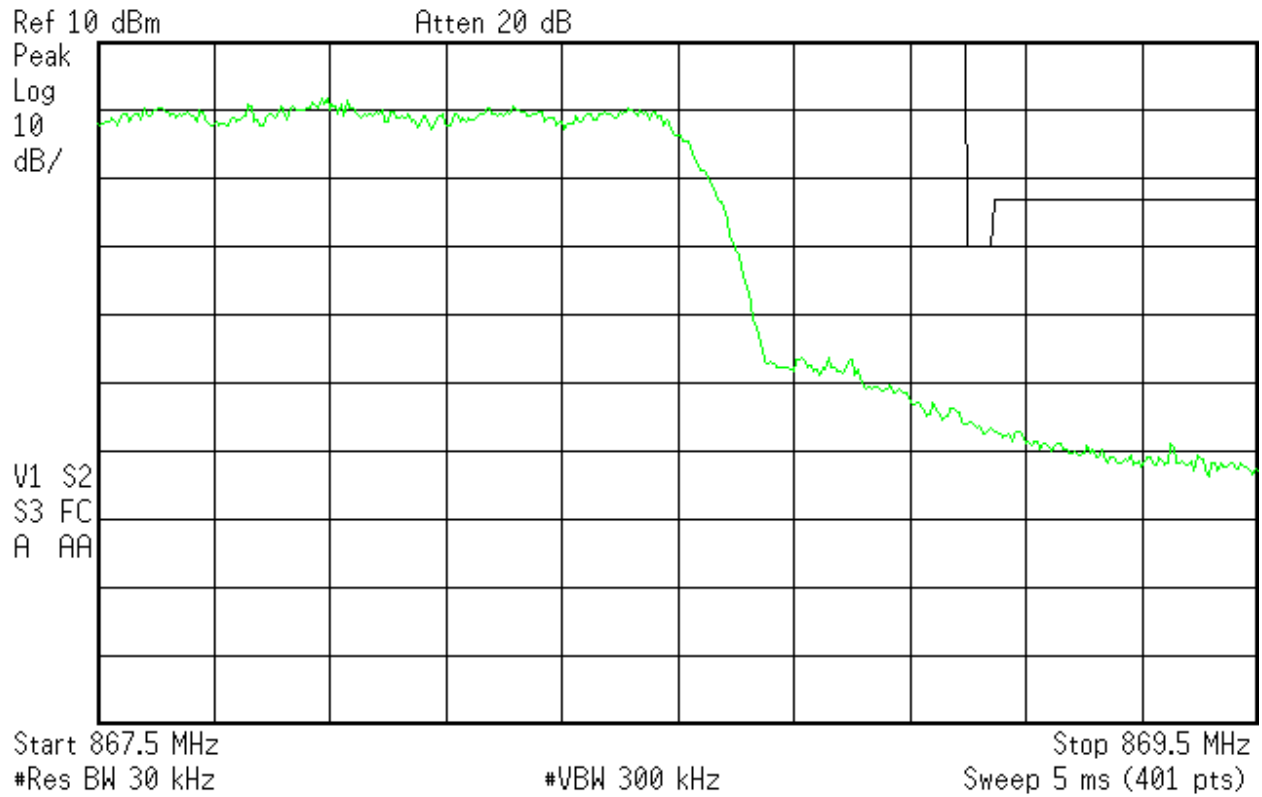
Beacon BC10 Low Channel



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Beacon BC10 High Channel

Conducted Spurious Emissions at Antenna Port

LIMITS

90.669 Emission limits.

(a) On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 plus 10 log₁₀ (P) decibels or 80 decibels, whichever is the lesser attenuation.

$$\text{Limit} = 10 \cdot \log(P[\text{mW}]) - (43 + 10 \cdot \log(P[\text{W}])) = -13\text{dBm}$$

TEST EQUIPMENT USED

Rev. 5/15/2013

| Spectrum Analyzers / Receivers / Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--|-----------------|----------------|------------------|--------------|--------------|------------|------------------------|
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| 1DCC-OATS-3M-II | 719150 | 2762A-10 | A-0015 | 30-1000MHz | | II | 5/11/2015 |
| Preamps / Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| HF 20dB 50W Attenuator | 0.009-18 GHz | PE 7019-20 | Pasternack | 1 | 791 | II | 6/1/2013 |

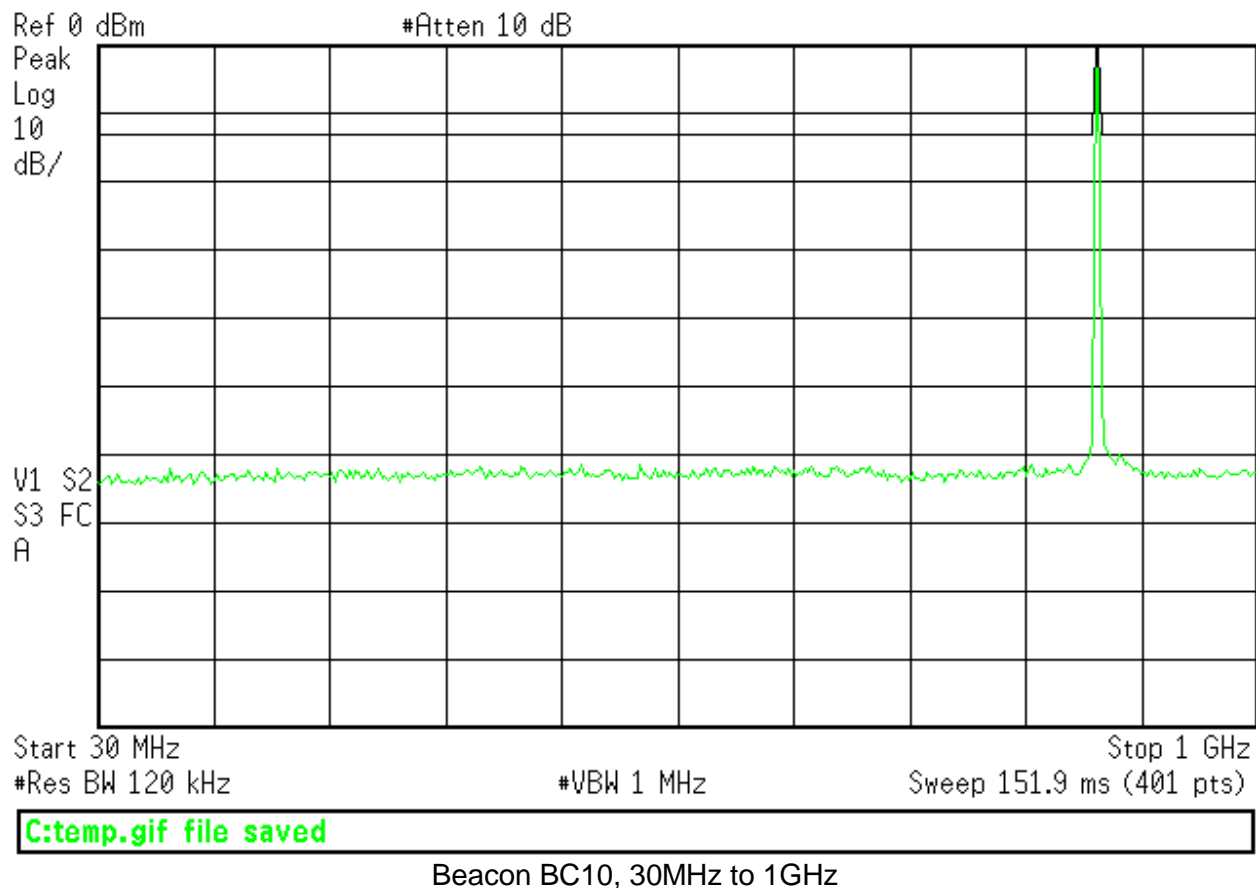
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



PLOTS



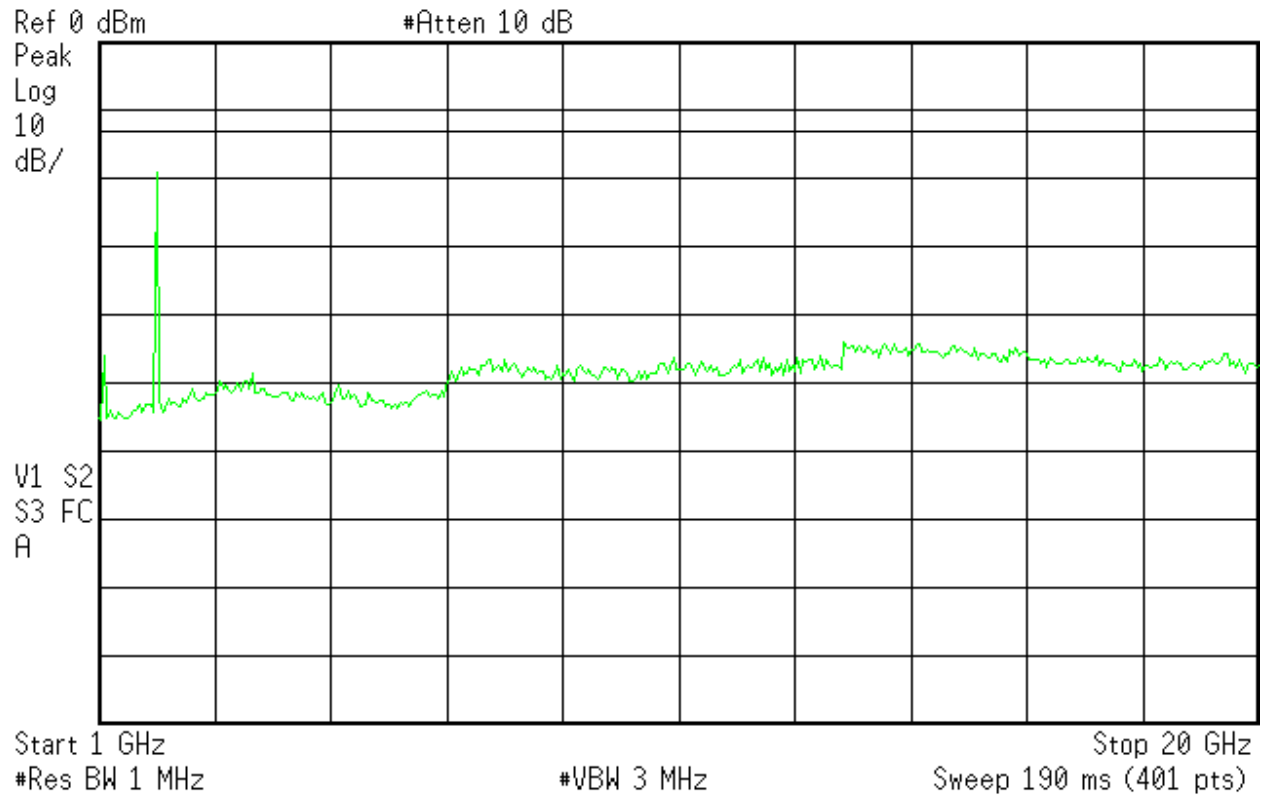
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Beacon BC10, 1-20GHz

Tests for Parts 22, 24, & 90

Radiated Spurious Emissions Measurements

MEASUREMENTS / RESULTS

Note that the EUT passes the FCC Class B limit, which is much lower than the -13dBm limit (82.158dBuV/m at 3 meters) for licensed transmitter spurious emissions. Only worst-case radiated spurious data is presented.



Radiated Emissions Table

| Date: 26-Apr-13 | | Company: Airvana | | | | Work Order: N1043 | | | | | | |
|---|--------------------|--|-----------------------|--------------------------|----------------------|--|-------------------|----------------|-----------------------|-------------------|----------------|-----------------------|
| Engineer: Edward Breen | | EUT Desc: Train 7 Fempto Cell (750721) | | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | | |
| Temp: 22°C | | Humidity: 18% | | Pressure: 1020mBar | | | | | | | | |
| Frequency Range: 30-1000MHz | | | | | | Measurement Distance: 3 m | | | | | | |
| Notes: | | | | | | EUT Max Freq: 1000MHz | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dBµV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dBµV/m) | --- | | | FCC Class B | | |
| | | | | | | | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) |
| V | 42.9 | 48.2 | 25.8 | 11.3 | 0.4 | 34.1 | --- | --- | --- | 40.0 | -5.9 | Pass |
| H | 42.9 | 33.2 | 25.8 | 11.3 | 0.4 | 19.1 | --- | --- | --- | 40.0 | -20.9 | Pass |
| V | 47.8 | 49.4 | 25.8 | 8.6 | 0.5 | 32.7 | --- | --- | --- | 40.0 | -7.3 | Pass |
| H | 47.8 | 41.8 | 25.8 | 8.6 | 0.5 | 25.1 | --- | --- | --- | 40.0 | -14.9 | Pass |
| V | 79.77 | 51.3 | 25.7 | 7.6 | 0.6 | 33.8 | --- | --- | --- | 40.0 | -6.2 | Pass |
| H | 79.77 | 40.0 | 25.7 | 7.6 | 0.6 | 22.5 | --- | --- | --- | 40.0 | -17.5 | Pass |
| V | 250.0 | 42.7 | 25.7 | 11.6 | 1.0 | 29.6 | --- | --- | --- | 46.0 | -16.4 | Pass |
| H | 250.0 | 42.0 | 25.7 | 11.6 | 1.0 | 28.9 | --- | --- | --- | 46.0 | -17.1 | Pass |
| V | 375.0 | 42.2 | 25.8 | 15.1 | 1.3 | 32.8 | --- | --- | --- | 46.0 | -13.2 | Pass |
| H | 375.0 | 46.3 | 25.8 | 15.1 | 1.3 | 36.9 | --- | --- | --- | 46.0 | -9.1 | Pass |
| V | 500.0 | 37.3 | 25.9 | 18.0 | 1.3 | 30.7 | --- | --- | --- | 46.0 | -15.3 | Pass |
| H | 500.0 | 41.5 | 25.9 | 18.0 | 1.3 | 34.9 | --- | --- | --- | 46.0 | -11.1 | Pass |
| V | 625.0 | 39.6 | 26.1 | 19.4 | 1.7 | 34.6 | --- | --- | --- | 46.0 | -11.4 | Pass |
| H | 625.0 | 38.1 | 26.1 | 19.4 | 1.7 | 33.1 | --- | --- | --- | 46.0 | -12.9 | Pass |
| V | 750.0 | 32.2 | 25.9 | 20.8 | 1.9 | 29.0 | --- | --- | --- | 46.0 | -17.0 | Pass |
| H | 750.0 | 37.6 | 25.9 | 20.8 | 1.9 | 34.4 | --- | --- | --- | 46.0 | -11.6 | Pass |
| V | 875.0 | 46.9 | 25.7 | 22.0 | 2.1 | 45.3 | --- | --- | --- | 46.0 | -0.7 | Pass |
| H | 875.0 | 46.6 | 25.7 | 22.0 | 2.1 | 45.0 | --- | --- | --- | 46.0 | -1.0 | Pass |
| Table Result: Pass by -0.7 dB Worst Freq: 875.0 MHz | | | | | | | | | | | | |
| Test Site: EMI Chamber 2 | | | Cable 1: Asset #1782 | | | Cable 2: Asset #1784 | | | | | | |
| Analyzer: Rental SA#1 | | | Preamp: Orange | | | Antenna: Red-Brown | | | | | | |

Rev. 4/21/2013

| | | | | | | | |
|--|--|---------------------------------|--|----------------------------------|-----------------------------|------------------------|--|
| Spectrum Analyzers / Receivers / Preselectors Rental SA #1 (Brown) | Range 9kHz-26.5GHz | MN E4407B | Mfr Agilent | SN SG44210511 | Asset 1510 | Cat I | Calibration Due 4/15/2014 |
| Radiated Emissions Sites EMI Chamber 2 | FCC Code 719150 | IC Code 2762A-7 | VCCI Code A-0015 | Range | | Cat II | Calibration Due 2/15/2014 |
| Preamps / Couplers Attenuators / Filters Orange | Range 0.009-2000MHz | MN ZFL-1000-LN | Mfr CS | SN N/A | Asset 765 | Cat II | Calibration Due 2/2/2014 |
| Antennas Red-Brown Bilog | Range 30-2000MHz | MN JB1 | Mfr Sunol | SN A0032406 | Asset 1218 | Cat I | Calibration Due 1/8/2015 |
| Meteorological Meters Weather Clock (Pressure Only) CHAMBER2 Thermohygrometer | | MN BA928 35519-044 | Mfr Oregon Scientific Control Company | SN C3166-1 72457639 | Asset 831 1347 | Cat I II | Calibration Due 3/20/2014 8/19/2013 |
| Cables Asset #1782 Asset #1784 | Range 9kHz - 18GHz 9kHz - 18GHz | | Mfr Florida RF Florida RF | | | Cat II II | Calibration Due 3/6/2014 3/14/2014 |

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



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Radiated Emissions Table

| Date: 26-Apr-13 | | | | Company: Airvana | | | | | Work Order: N1043 | | | | | |
|---------------------------------|--------------------|------------------------|---------------------------|--|--------------------------|----------------------|-----------------------------------|----------------------------------|--|----------------|-----------------------|--------------------------------------|----------------|-----------------------|
| Engineer: Edward Breen | | | | EUT Desc: Train 7 Fempto Cell (750721) | | | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | |
| Temp: 22°C | | | | Humidity: 18% | | | | | Pressure: 1020mBar | | | | | |
| Frequency Range: 1-5GHz | | | | | | | | | Measurement Distance: 3 m | | | | | |
| Notes: Unintentional radiators | | | | | | | | | EUT Max Freq: 1000MHz | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Peak Reading (dBµV) | Average Reading (dBµV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dBµV/m) | Adjusted Avg Reading (dBµV/m) | FCC Class B High Frequency - Peak | | | FCC Class B High Frequency - Average | | |
| | | | | | | | | | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) |
| H | 1125.0 | 36.0 | 26.4 | 19.5 | 25.0 | 2.3 | 43.8 | 34.2 | 74.0 | -30.2 | Pass | 54.0 | -19.8 | Pass |
| V | 1125.0 | 36.6 | 27.2 | 19.5 | 25.0 | 2.3 | 44.4 | 35.0 | 74.0 | -29.6 | Pass | 54.0 | -19.0 | Pass |
| H | 1250.0 | 31.3 | 18.8 | 19.0 | 25.7 | 2.3 | 40.3 | 27.8 | 74.0 | -33.7 | Pass | 54.0 | -26.2 | Pass |
| V | 1250.0 | 31.8 | 18.8 | 19.0 | 25.7 | 2.3 | 40.8 | 27.8 | 74.0 | -33.2 | Pass | 54.0 | -26.2 | Pass |
| H | 1500.0 | 32.9 | 22.4 | 18.2 | 25.8 | 2.7 | 43.2 | 32.7 | 74.0 | -30.8 | Pass | 54.0 | -21.3 | Pass |
| V | 1500.0 | 31.5 | 20.7 | 18.2 | 25.8 | 2.7 | 41.8 | 31.0 | 74.0 | -32.2 | Pass | 54.0 | -23.0 | Pass |
| Table Result: | | | | | | | | | Pass by -19.0 dB | | | Worst Freq: 1125.0 MHz | | |
| Test Site: EMI Chamber 2 | | | | Cable 1: Asset #1782 | | | | | Cable 2: Asset #1784 | | | | | |
| Analyzer: Rental SA#1 | | | | Preamp: Brown | | | | | Antenna: Orange Horn | | | | | |

Rev. 4/29/2013

| Spectrum Analyzers / Receivers /Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--|--------------|-----------|-----------------|------------|-------|-----|-----------------|
| Rental SA #1 (Brown) | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| EMI Chamber 2 | 719150 | 2762A-7 | A-0015 | | | II | 2/15/2014 |
| Preamps /Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Brown | 1-18GHz | CS | CS | N/A | 1523 | II | 2/27/2014 |
| Antennas | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Orange Horn | 1-18GHz | 3115 | EMCO | 0004-6123 | 390 | I | 7/27/2013 |
| Meteorological Meters | | MN | Mfr | SN | Asset | Cat | Calibration Due |
| CHAMBER2 Thermohygrometer | | 35519-044 | Control Company | 72457639 | 1347 | II | 8/19/2013 |

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Radiated Emissions Table

| Date: 26-Apr-13 | | Company: Airvana | | | | Work Order: N1043 | | | | | | | | |
|--|-----------------|--|------------------------|--------------------|-----------------------|--|--------------------------------|-------------------------------|-----------------------------------|----------------------|--------------------|--------------------------------------|-------------|--------------------|
| Engineer: Edward Breen | | EUT Desc: Train 7 Fempto Cell (750721) | | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | | | | |
| Temp: 22°C | | Humidity: 18% | | | | Pressure: 1020mBar | | | | | | | | |
| Frequency Range: 1-6GHz | | | | | | | | Measurement Distance: 3 m | | | | | | |
| Notes: Intentional radiators | | | | | | | | EUT Max Freq: 1000MHz | | | | | | |
| Antenna Polarization (H/ V) | Frequency (MHz) | Peak Reading (dBμV) | Average Reading (dBμV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dBμV/m) | Adjusted Avg Reading (dBμV/m) | FCC Class B High Frequency - Peak | | | FCC Class B High Frequency - Average | | |
| | | | | | | | | | Limit (dBμV/m) | Margin (dB) | Result (Pass/Fail) | Limit (dBμV/m) | Margin (dB) | Result (Pass/Fail) |
| H | 1979.0 | 48.9 | 34.0 | 18.2 | 28.1 | 3.0 | 61.8 | 46.9 | 74.0 | -12.2 | Pass | 54.0 | -7.1 | Pass |
| V | 1979.0 | 46.2 | 27.3 | 18.2 | 28.1 | 3.0 | 59.1 | 40.2 | 74.0 | -14.9 | Pass | 54.0 | -13.8 | Pass |
| H | 1061.0 | 39.6 | 26.1 | 19.7 | 24.5 | 2.2 | 46.6 | 33.1 | 74.0 | -27.4 | Pass | 54.0 | -20.9 | Pass |
| V | 1061.0 | 42.8 | 29.3 | 19.7 | 24.5 | 2.2 | 49.8 | 36.3 | 74.0 | -24.2 | Pass | 54.0 | -17.7 | Pass |
| H | 3910.0 | 29.9 | 18.0 | 18.0 | 32.7 | 4.4 | 49.0 | 37.1 | 74.0 | -25.0 | Pass | 54.0 | -16.9 | Pass |
| V | 3910.0 | 37.0 | 27.2 | 18.0 | 32.7 | 4.4 | 56.1 | 46.3 | 74.0 | -17.9 | Pass | 54.0 | -7.7 | Pass |
| Table Result: Pass by -7.1 dB Worst Freq: 1979.0 MHz | | | | | | | | | | | | | | |
| Test Site: EMI Chamber 2 | | | | | Cable 1: Asset #1782 | | | | | Cable 2: Asset #1784 | | | | |
| Analyzer: Rental SA#1 | | | | | Preamp: Brown | | | | | Antenna: Orange Horn | | | | |

Rev. 4/29/2013

Spectrum Analyzers / Receivers /Preselectors
Rental SA #1 (Brown)

Range 9kHz-26.5GHz **MN** E4407B **Mfr** Agilent **SN** SG44210511

Radiated Emissions Sites
EMI Chamber 2

FCC Code 719150 **IC Code** 2762A-7 **VCCI Code** A-0015 **Range**

Preamps /Couplers Attenuators / Filters
Brown

Range 1-18GHz **MN** CS **Mfr** CS **SN** N/A

Antennas
Orange Horn

Range 1-18GHz **MN** 3115 **Mfr** EMCO **SN** 0004-6123

Meteorological Meters
CHAMBER2 Thermohygrometer

MN 35519-044 **Mfr** Control Company **SN** 72457639

Rev. 4/29/2013

| Cables | Range | Mfr | Cat | Calibration Due |
|-------------|--------------|------------|-----|-----------------|
| Asset #1782 | 9kHz - 18GHz | Florida RF | II | 3/6/2014 |
| Asset #1782 | 9kHz - 18GHz | Florida RF | II | 3/6/2014 |
| Asset #1784 | 9kHz - 18GHz | Florida RF | II | 3/14/2014 |

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| Radiated Emissions Table | | | | | | | | | | | | | | |
|---|-----------------|---------------------|------------------------|--|-----------------------|-------------------|--------------------------------|--|-----------------------------------|-------------|--------------------|--------------------------------------|-------------|--------------------|
| Date: 26-Apr-13 | | | | Company: Airvana | | | | Work Order: N1043 | | | | | | |
| Engineer: Edward Breen | | | | EUT Desc: Train 7 Fempto Cell (750721) | | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | | |
| Temp: 22°C | | | | Humidity: 18% | | | | Pressure: 1020mBar | | | | | | |
| Frequency Range: 6-18GHz | | | | | | | | Measurement Distance: 3 m | | | | | | |
| Notes: Intentional radiators | | | | | | | | EUT Max Freq: 1000MHz | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Peak Reading (dBµV) | Average Reading (dBµV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dBµV/m) | Adjusted Avg Reading (dBµV/m) | FCC Class B High Frequency - Peak | | | FCC Class B High Frequency - Average | | |
| | | | | | | | | | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) |
| | | | | | | | | | | | | | | |
| No emissions in this range | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table Result: --- by --- dB Worst Freq: --- MHz | | | | | | | | | | | | | | |
| Test Site: EMI Chamber 2 | | | | Cable 1: Asset #1782 | | | | Cable 2: Asset #1784 | | | | | | |
| Analyzer: Rental SA#1 | | | | Preamp: Brown | | | | Antenna: Orange Horn | | | | | | |

Rev. 4/29/2013

| | | | | | | | | |
|---|--|-----------------|----------------|------------------|--------------|--------------|------------|------------------------|
| Spectrum Analyzers / Receivers /Preselectors | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Rental SA #1 (Brown) | | 9kHz-26.5GHz | E4407B | Agilent | SG44210511 | 1510 | I | 4/15/2014 |
| Radiated Emissions Sites | | FCC Code | IC Code | VCCI Code | Range | | Cat | Calibration Due |
| EMI Chamber 2 | | 719150 | 2762A-7 | A-0015 | | | II | 2/15/2014 |
| Preamps /Couplers Attenuators / Filters | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Brown | | 1-18GHz | CS | CS | N/A | 1523 | II | 2/27/2014 |
| Antennas | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Orange Horn | | 1-18GHz | 3115 | EMCO | 0004-6123 | 390 | I | 7/27/2013 |
| Meteorological Meters | | | MN | Mfr | SN | Asset | Cat | Calibration Due |
| CHAMBER2 Thermohygrometer | | | 35519-044 | Control Company | 72457639 | 1347 | II | 8/19/2013 |

Rev. 4/29/2013

| | | | | |
|---------------|--------------|------------|------------|------------------------|
| Cables | Range | Mfr | Cat | Calibration Due |
| Asset #1782 | 9kHz - 18GHz | Florida RF | II | 3/6/2014 |
| Asset #1782 | 9kHz - 18GHz | Florida RF | II | 3/6/2014 |
| Asset #1784 | 9kHz - 18GHz | Florida RF | II | 3/14/2014 |

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



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Radiated Emissions Table

| | | | | | | | | | | | | | | | | | | |
|------------------------------|-----------------|---------------------|--|-----------------------|-----------------------|-------------------|--------------------------------|-------------------------------|--|-------------|--------------------|--------------------------------------|-------------|--------------------|--------------------------|-----|--|--|
| Date: 26-Apr-13 | | | Company: Airvana | | | | | | Work Order: N1043 | | | | | | | | | |
| Engineer: Edward Breen | | | EUT Desc: Train 7 Fempto Cell (750721) | | | | | | EUT Operating Voltage/Frequency: 120V/60Hz | | | | | | | | | |
| Temp: 22°C | | | Humidity: 18% | | | | | | Pressure: 1020mBar | | | | | | | | | |
| Frequency Range: 18-26.5GHz | | | | | | | | | Measurement Distance: 0.1 m | | | | | | | | | |
| Notes: Intentional radiators | | | | | | | | | | | | | | | | | | |
| Antenna Polarization (H/ V) | Frequency (MHz) | Peak Reading (dBµV) | Average Reading (dBµV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dBµV/m) | Adjusted Avg Reading (dBµV/m) | FCC Class B High Frequency - Peak | | | FCC Class B High Frequency - Average | | | | | | |
| | | | | | | | | | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) | Limit (dBµV/m) | Margin (dB) | Result (Pass/Fail) | | | | |
| No emissions in this range | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | | | |
| Table Result: | | | | --- | | by | | --- | | dB | | Worst Freq: | | --- | | MHz | | |
| Test Site: EMI Chamber 2 | | | | Cable 1: EMIR-HIGH-22 | | | | | | | | | | | | | | |
| Analyzer: Rental SA#1 | | | | Preamp: 18-26.5GHz | | | | | | | | | | | Antenna: 18-26.5GHz Horn | | | |

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| | | | | | | | |
|---|--|-----------------|-----------------------|------------------|--------------|--------------|------------------------|
| Cables | | Range | | Mfr | | Cat | Calibration Due |
| REMI-High-22 | | 9kHz - 15GHz | | C-S | | II | 2/2/2014 |
| Spectrum Analyzers / Receivers /Preselectors | | Range | MN | Mfr | SN | Asset | Calibration Due |
| Rental SA #1 (Brown) | | 9kHz- 26.5GHz | E4407B | Agilent | SG44210511 | 1510 | 4/15/2014 |
| Radiated Emissions Sites | | FCC Code | IC Code | VCCI Code | Range | Cat | Calibration Due |
| EMI Chamber 2 | | 719150 | 2762A-7 | A-0015 | | II | 2/15/2014 |
| Preamps /Couplers Attenuators / Filters | | Range | MN | Mfr | SN | Asset | Calibration Due |
| HF (Yellow) | | 18-26.5GHz | AFS4-18002650-60-8P-4 | CS | 467559 | 1266 | 10/13/2013 |
| Antennas | | Range | MN | Mfr | SN | Asset | Calibration Due |
| HF (White) Horn | | 18-26.5GHz | 801-WLM | Waveline | 758 | 758 | Verify before Use |
| Meteorological Meters | | | MN | Mfr | SN | Asset | Calibration Due |
| CHAMBER2 Thermohygrrometer | | | 35519-044 | Control Company | 72457639 | 1347 | 8/19/2013 |

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Conducted AC Mains Spurious Emissions Measurements

MEASUREMENTS / RESULTS

Note that only worst-case conducted spurious data is presented.

| AC Conducted Emissions Data Table | | | | | | | | | | | | | | |
|--|------------------------|---------------|---------------------|----------------|------------------------|------------|---|------------------------|--------------------|---|--|---------------------|----------------|-----------------------|
| Date: 26-Apr-13 Engineer: Edward Breen Temp: 22.8 °C Notes: | | | | | | | Company: Airvana EUT Desc: Train 7 Fempto Cell (750721) Humidity: 18% | | | | Work Order: N1043 Pressure: 1020 mBar | | | |
| Frequency Range: 0.15-30MHz | | | | | | | | | | | | | | |
| EUT Input Voltage/Frequency: 120V/60Hz | | | | | | | | | | | | | | |
| Frequency (MHz) | Quasi-Peak Readings | | Average Readings | | LISN Factors | | Cable Factor (dB) | ATTN Factor (dB) | FCC/CISPR Class B | | | FCC/CISPR Class B | | |
| | OP1 (dBµV) | QP2 (dBµV) | AVG1 (dBµV) | AVG2 (dBµV) | L1 (dB) | L2 (dB) | | | OP Limit (dBµV) | Margin (dB) | Result (Pass/Fail) | AVG Limit (dBµV) | Margin (dB) | Result (Pass/Fail) |
| 0.18 | 8.0 | 7.7 | 2.7 | 2.4 | -0.1 | -0.1 | -0.1 | -20.8 | 64.7 | -35.7 | Pass | 54.7 | -31.0 | Pass |
| 4.27 | 13.1 | 14.0 | 10.6 | 11.3 | 0.0 | -0.1 | -0.1 | -20.8 | 56.0 | -21.0 | Pass | 46.0 | -13.7 | Pass |
| 4.84 | 17.1 | 17.5 | 13.8 | 14.0 | 0.0 | -0.1 | -0.1 | -20.8 | 56.0 | -17.5 | Pass | 46.0 | -11.0 | Pass |
| 10.90 | 15.2 | 15.4 | 12.7 | 13.4 | -0.1 | -0.1 | -0.2 | -20.8 | 60.0 | -23.5 | Pass | 50.0 | -15.5 | Pass |
| 14.32 | 17.3 | 14.1 | 15.7 | 12.1 | -0.1 | -0.1 | -0.3 | -20.8 | 60.0 | -21.6 | Pass | 50.0 | -13.2 | Pass |
| 29.91 | 5.2 | 5.8 | 1.4 | 2.1 | -0.2 | -0.3 | -0.3 | -20.8 | 60.0 | -32.9 | Pass | 50.0 | -26.6 | Pass |
| Result: Pass | | | | | Worst Margin: -11.0 dB | | | | | Frequency: 4.843 MHz | | | | |
| Measurement Device: LISN ASSET 1726(Line 1) LISN ASSET 1727(Line 2) | | | | | | | Cable: CEMI-09 Attenuator: 20dB Atten-4 | | | Spectrum Analyzer: Gold Site: CEMI 2 | | | | |

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Spectrum Analyzers / Receivers / Preselectors

Gold

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|----------------|--------|---------|------------|-------|-----|-----------------|
| 100Hz-26.5 GHz | E4407B | Agilent | MY45113816 | 1284 | I | 3/18/2014 |

LISNs/Measurement Probes

LISN Asset 1726
LISN Asset 1727

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|--------------|---------|-----------|--------|-------|-----|-----------------|
| 150kHz-30MHz | LI-150A | Com-Power | 201092 | 1726 | I | 1/11/2014 |
| 150kHz-30MHz | LI-150A | Com-Power | 201093 | 1727 | I | 1/2/2014 |

Conducted Test Sites (Mains / Telco)

CEMI 2

| FCC Code | VCCI Code | Cat | Calibration Due |
|----------|-----------|-----|-----------------|
| 719150 | A-0015 | III | NA |

Meteorological Meters

Weather Clock (Pressure Only)
CEMI2 Thermohygrometer

| MN | Mfr | SN | Asset | Cat | Calibration Due |
|-----------|-------------------|----------|-------|-----|-----------------|
| BA928 | Oregon Scientific | C3166-1 | 831 | I | 3/20/2014 |
| 35519-044 | Control Company | 72436083 | 1336 | II | 8/19/2013 |

Cables

CEMI-09

| Range | Mfr | Cat | Calibration Due |
|-------------|-----|-----|-----------------|
| 9kHz - 2GHz | C-S | II | 5/23/2013 |

Attenuators

20dB Atten-4

| Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|-----------|----|-----|-----|-------|-----|-----------------|
| 9kHz-2GHz | | | N/A | | II | 12/6/2013 |

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Frequency Stability **REQUIREMENTS**

Part 22:

Per 22.355, Table C-1, the frequency stability shall remain within 1.5ppm for this device.

Part 24:

"The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." [24.235]

Part 90:

Per 90.213(a), the frequency stability shall remain within 1.5ppm for this device.

MEASUREMENTS / RESULTS

| Frequency Stability | | | Curtis-Straus LLC |
|---|--------------------------|---------------------------|------------------------------|
| Engineer: Arik Zwimer | | Company: Airvana | |
| Date: 16-Nov-12 | | EUT: Femto Cell 750721 T7 | |
| Spectrum Analyzer: Rental #1 | | Work Order: M2419 | |
| Cable: EMIR-High-06 | | | |
| Notes: Reference Conditions: 110Vac/60Hz, 20°C | | | |
| Temperature (°C) | Supply Voltage (60Hz) | Center Frequency (Hz) | Frequency Deviation (ppm) |
| -30 | 110Vac | 1956250000 | 0.0 |
| -20 | 110Vac | 1956250000 | 0.0 |
| -10 | 110Vac | 1956250000 | 0.0 |
| 0 | 110Vac | 1956250000 | 0.0 |
| 10 | 110Vac | 1956250000 | 0.0 |
| 20 | 93.5Vac | 1956250000 | 0.0 |
| 20 | 110Vac | 1956250000 | 0.0 |
| 20 | 126.5Vac | 1956250000 | 0.0 |
| 30 | 110Vac | 1956250000 | 0.0 |
| 40 | 110Vac | 1956250000 | 0.0 |
| 50 | 110Vac | 1956250000 | 0.0 |
| The EUT has an intentional transmitter that operates at both 800 and 1900MHz bands. The hardware utilized for both bands is the same while the software controls the different bands. Testing was performed at the 1900MHz band only to satisfy the 800MHz band requirements as a single oscillator is used as the source for both. | | | |

Note: Frequency stability data is presented from the original Train 7 testing since the RF oscillator(s) are same between the two units.



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Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and "CURTIS-STRAUS" (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.



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13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

Rev.160009121(2)_#684340 v13CS

