





**BUREAU
VERITAS**

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

Test Report

Report No	EM2419-1
Client	Airvana
Address	19 Alpha Road Chelmsford, MA 01824
Phone	978-250-2622
Item tested	Femto Cell 750721
FCC ID	QHYHUBBUBC4500-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	October 29, 30, & 31, 2012 and November 1, 6, & 7, 2012
Results	As detailed within this report
Prepared by	 Arik Zwimer
Authorized by	 Mairaj Hussain – EMC Supervisor
Issue Date	March 29, 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. 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.

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

During line conducted emissions and radiated spurious measurements, the product was removed from the plastic enclosure which should have no effects on EMI results.

For antenna port conducted spurious emissions testing 30MHz-20GHz range was checked..

Release Control Record

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

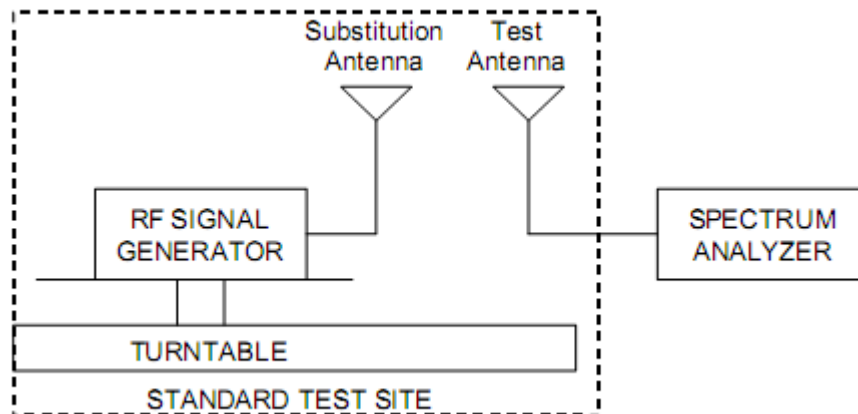


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Radiated spurious emissions emission were performed in the frequency range of 30MHz-20GHz.

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: M2419 Company: Airvana Company Address: 19 Alpha Road Chelmsford, MA 01824 Contact: Stuart MacEachern Person Present: Stuart MacEachern										
		MN			PN			SN		
EUT:		750721			---			Sample 1		
EUT Description: Train 7 Femto Cell EUT Max Frequency: 1000MHz										
Support Equipment:		MN						SN		
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	
Ethernet	Ethernet	3	3	Cat.5	No	None	1.5m	100m	indoor	
GPS	other	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 2	Part 22, 24, 90	Comments
2.1033(c)(4)		CDMA is the type of RF modulation.
2.1033(c)(6)		RF output power is not adjustable to end users.
2.1049(l)		Occupied bandwidth measured
2.1033(c)(9)		The Femto Cell 705703 does not require a tune-up procedure.
2.1055(a)(d)		Frequency stability within 1.5ppm
	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
	90.213(a)	Frequency stability within 1.5ppm
	90.635	Meets power limit: 100W ERP

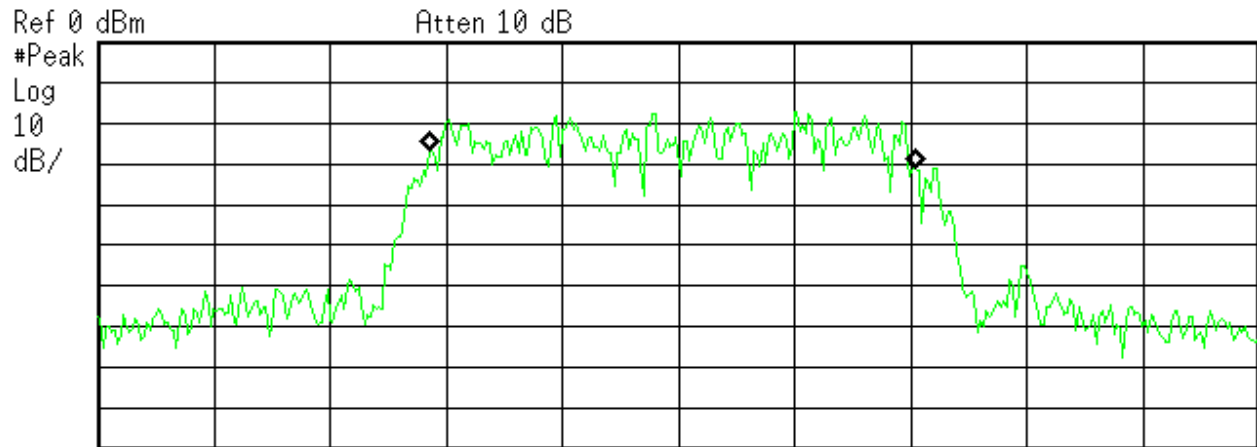


Tests Specific to Part 22

Bandwidth

Bandwidth Measurements				
Date: 12-Nov-12		Company: Airvana		Work Order: M2419
Engineer: Arik Zwirner		EUT Desc: 750721 Femto Cell		EUT Power: 120Vac/60Hz
Temp: 23°C		Humidity: 23%		Pressure: 1011mbar
Frequency Range: 869-894MHz, FCC Part 22				
Notes:				
OUTPUT	CHANNEL POSITION	CHANNEL NUMBER	FREQUENCY (MHz)	26dB BANDWIDTH (MHz)
Beacon BC0	Low	1	870.03	1.420
	Mid	320	879.6	1.406
	High	640	889.2	1.410
Test Site: 1DCC-OATS-3M-I			Spectrum Analyzer: Brown	





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

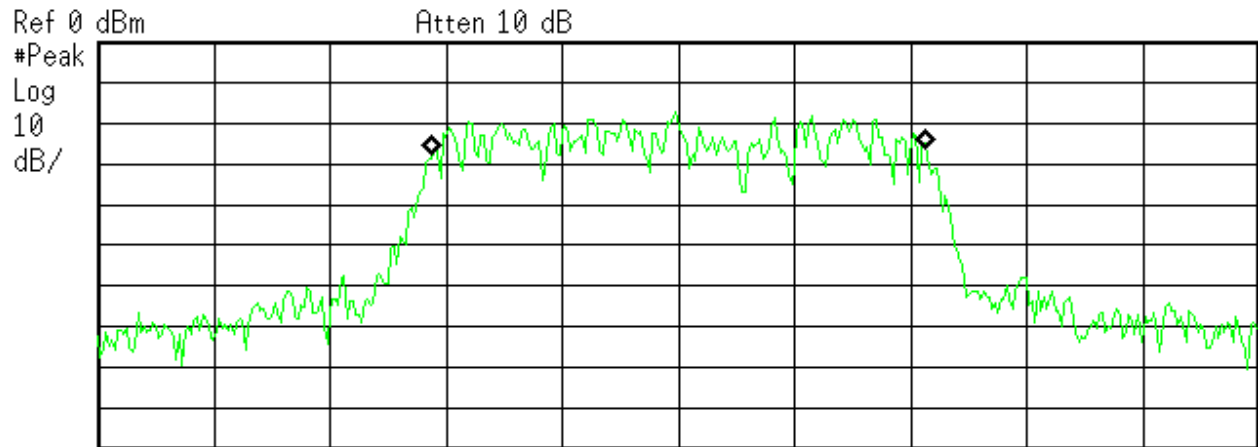
Occupied Bandwidth
 1.2556 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error -15.322 kHz
 x dB Bandwidth 1.420 MHz*

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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)

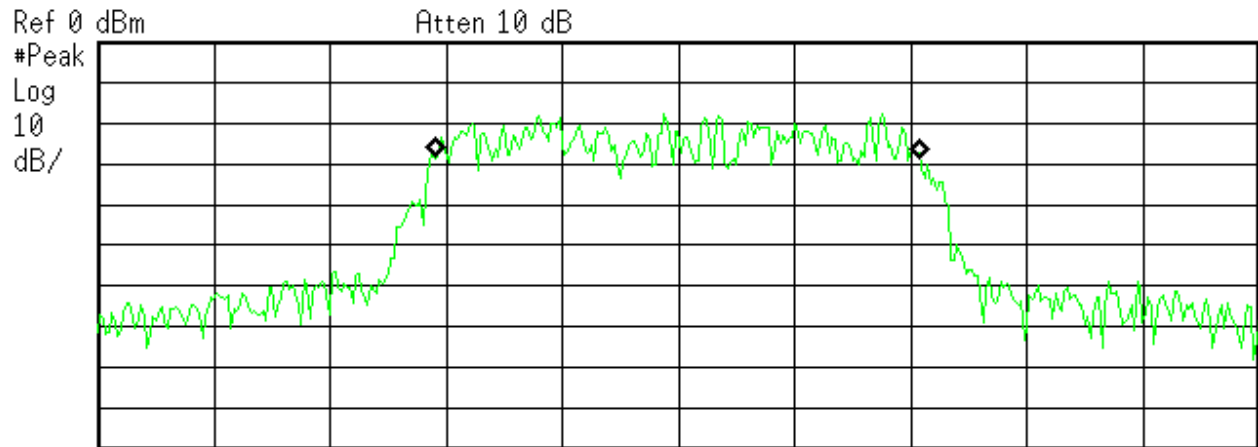
Occupied Bandwidth
 1.2750 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 2.684 kHz
 x dB Bandwidth 1.406 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
1.2569 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -3.091 kHz
x dB Bandwidth 1.410 MHz*

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Beacon BC0 High Channel (Ch. 640)

ERP

ERP Using Substitution Method

Date: 13-Nov-12		Company: Airvana		Work Order: M2419				
Engineer: Arik Zwimer		EUT Desc: 750721 T7		EUT Operating Voltage/Frequency: 120Vac/60Hz				
Temp: 22°C		Humidity: 23%		Pressure: 1004mbar				
Frequency Range: Part 22 ERP measurements				Measurement Distance: 3 m				
Notes: Band Class 0 7W = 38.45dBm								
Antenna Polarization (H / V)	Frequency (MHz)	Signal Generator Power Output (dBm)						
			Tx Cable (dB)	Tx Ant Gain (dBi)	Adjusted ERP (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
Channel 1			---	---	---	---	---	---
H	870.03	3.2	0.9	0.0	2.3	38.45	-36.2	Pass
V	870.03	5.5	0.9	0.0	4.6	38.45	-33.9	Pass
			---	---	---	---	---	---
Channel 320			---	---	---	---	---	---
H	879.6	4.6	0.9	0.0	3.7	38.45	-34.8	Pass
V	879.6	6.8	0.9	0.0	5.9	38.45	-32.6	Pass
			---	---	---	---	---	---
Channel 640			---	---	---	---	---	---
H	889.2	2.6	0.9	0.0	1.7	38.45	-36.8	Pass
V	889.2	5.9	0.9	0.0	5.0	38.45	-33.5	Pass
Test Site: 1DCC-OATS-3M-I			Signal Generato: Rental Sweeper			Receive Cable: EMIR-HIGH-22		
Analyzer: Rental #1			Receive Antenna: Green			Transmit Cable: EMIR-HIGH-21		
			Transmit Antenna: Dipole					

Rev. 11/5/2012

Spectrum Analyzers / Receivers / Preselectors

Rental SA #1 (Brown)

Range	MN	Mfr	SN	Asset	Cat	Calibration Due
9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	2/14/2013

Radiated Emissions Sites

1DCC-OATS-3M-I

FCC Code	IC Code	VCCI Code	Cat	Calibration Due
719150	2762A-8	A-0015	II	11/7/2012

Antennas

Adjustable Dipole

Range	MN	Mfr	SN	Asset	Cat	Calibration Due
30-1000MHz	3121C	EMCO	1370	757	I	12/1/2012

Meteorological Meters

Temp./Humidity/Atm. Pressure Gauge
1DCC-OATS-3M-I Thermohygrometer

MN	Mfr	SN	Asset	Cat	Calibration Due
7400 Perception II	Davis	N/A	965	I	4/4/2013
35519-044	Control Company	72457635	1334	II	8/19/2013

Cables

REMI-High-21
REMI-High-22

Range	Mfr	Cat	Calibration Due
9kHz - 26.5GHz	C-S	II	1/31/2013
9kHz - 15GHz	C-S	II	1/31/2013

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

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

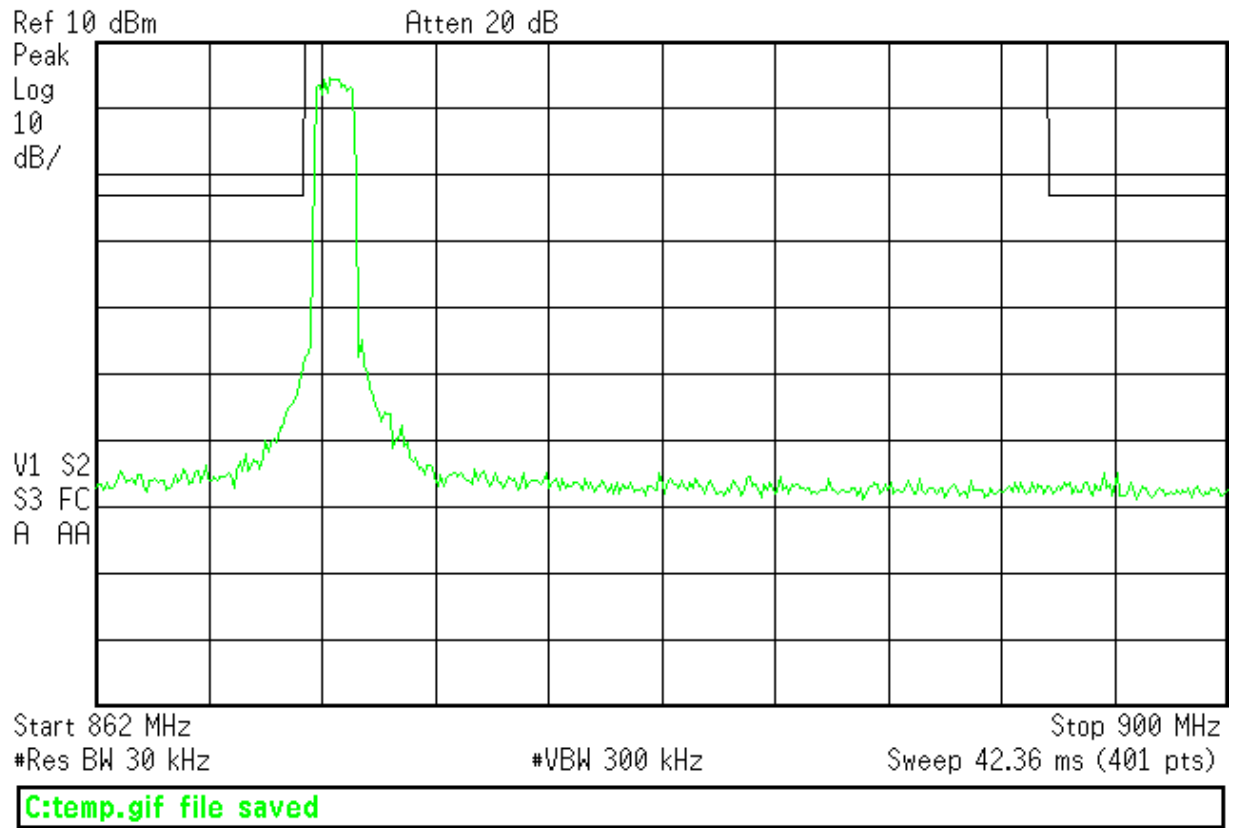
§ 22.359 Emission limitations.

(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.

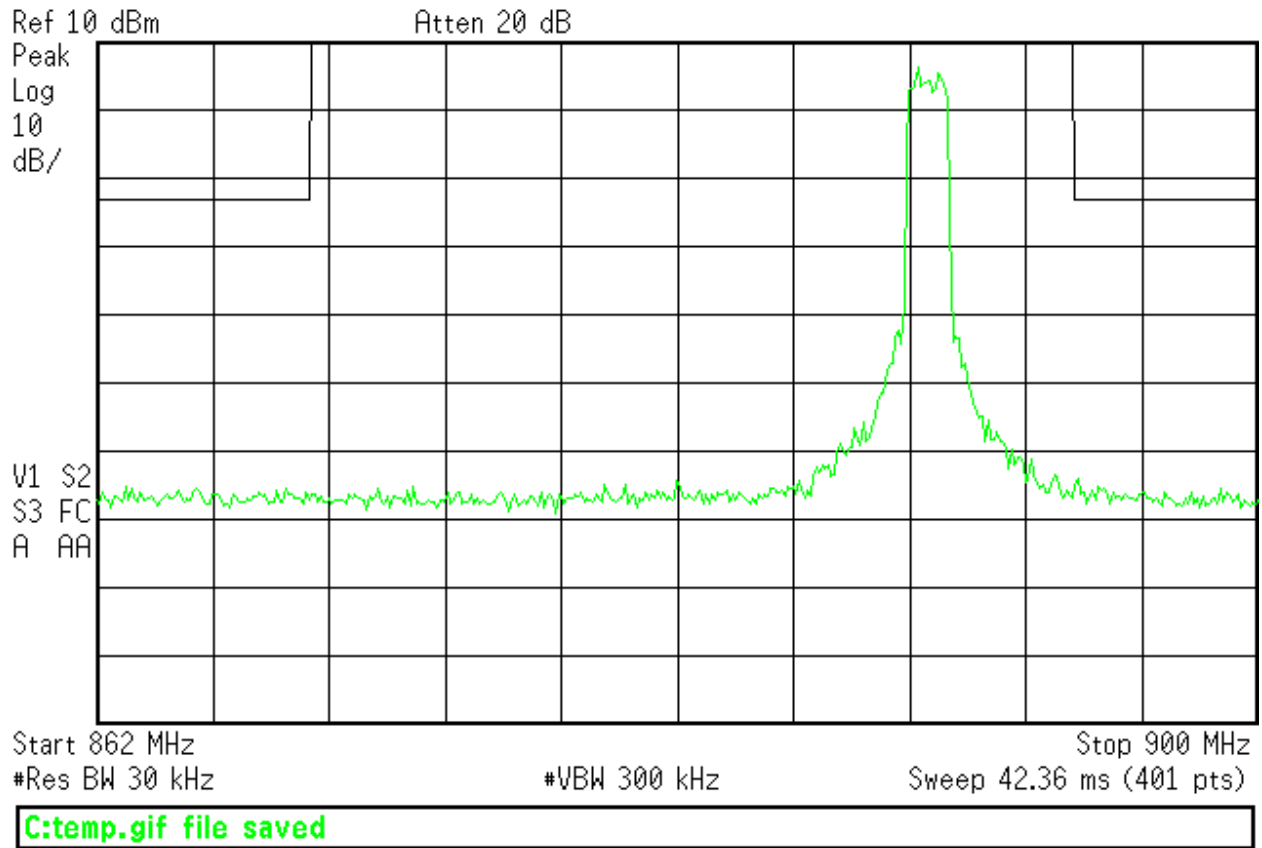
MEASUREMENTS / RESULTS

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.



Beacon BC0 Low Channel



Beacon BC0 High 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.



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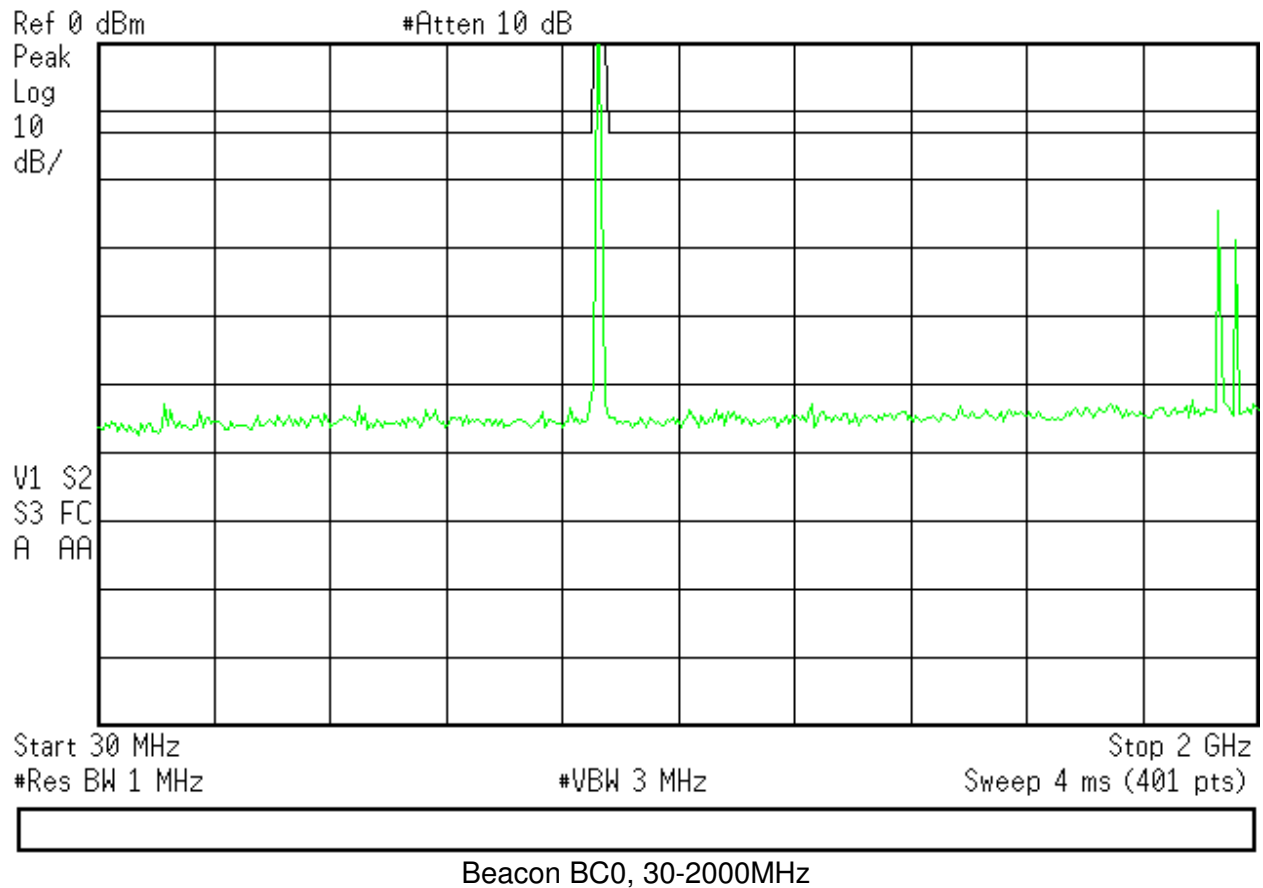


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PLOTS

 Agilent

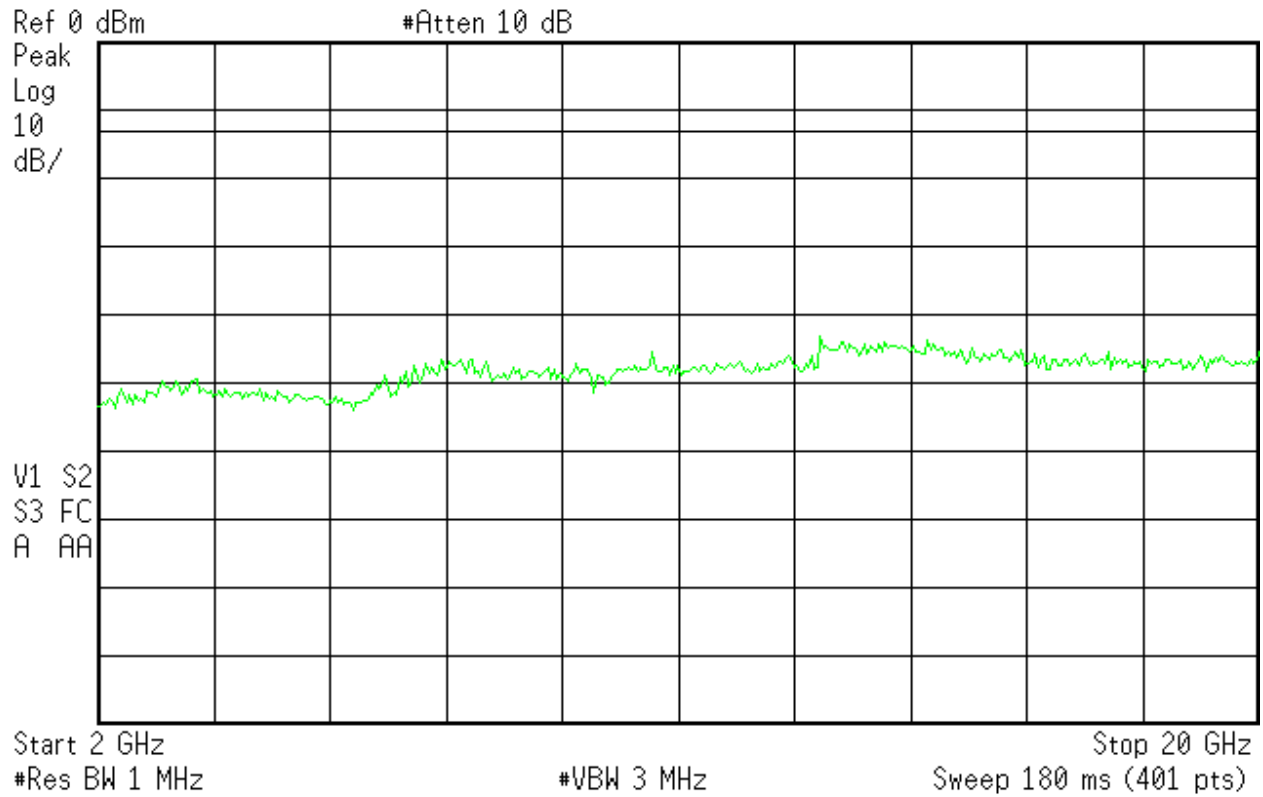
R T



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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

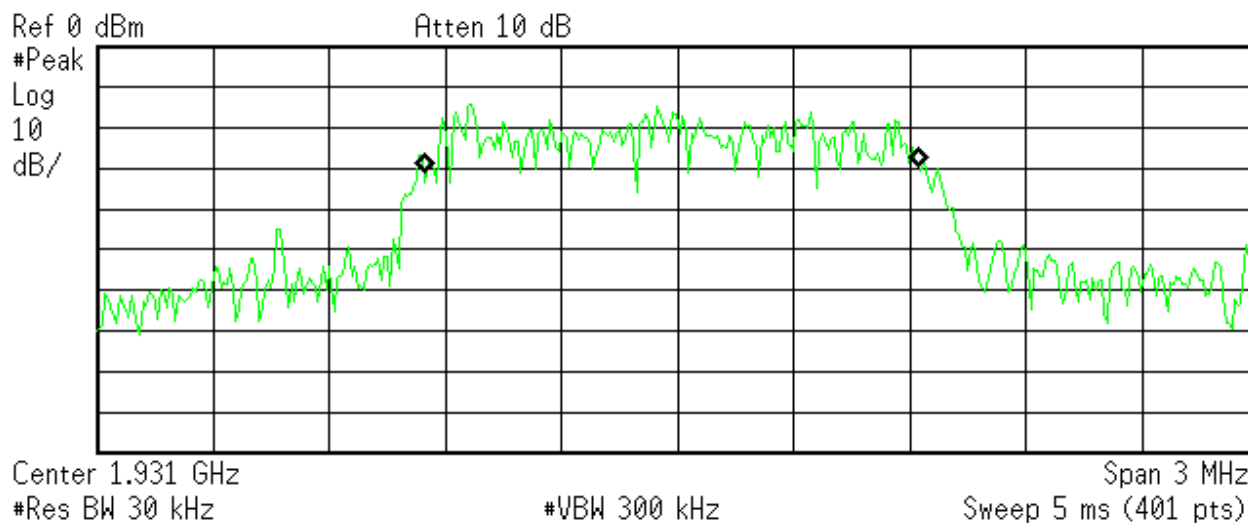
Bandwidth Measurements				
Date: 12-Nov-12		Company: Airvana		Work Order: M2419
Engineer: Arik Zwirner		EUT Desc: 750721 Femto Cell		EUT Power: 120Vac/60Hz
Temp: 23°C		Humidity: 23%		Pressure: 1011mbar
Frequency Range: 1930-1990MHz, FCC Part 24 E				
Notes:				
OUTPUT	CHANNEL POSITION	CHANNEL NUMBER	FREQUENCY (MHz)	26dB BANDWIDTH (MHz)
EVDO	Low	25	1931.25	1.429
	Mid	525	1956.25	1.409
	High	1175	1988.75	1.418
One-X	Low	25	1931.25	1.420
	Mid	525	1956.25	1.399
	High	1175	1988.75	1.418
Beacon BC1	Low	25	1931.25	1.404
	Mid	525	1956.25	1.412
	High	1175	1988.75	1.399
Test Site: 1DCC-OATS-3M-I			Spectrum Analyzer: Brown	



EVDO

Agilent

R T



Occupied Bandwidth
1.2749 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -11.646 kHz
x dB Bandwidth 1.429 MHz*

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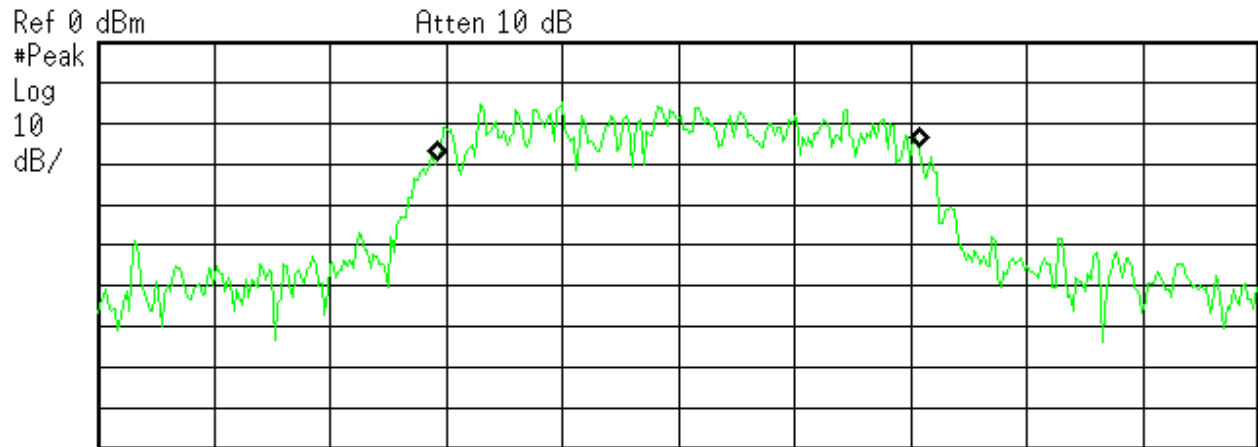
EVDO Low Channel



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

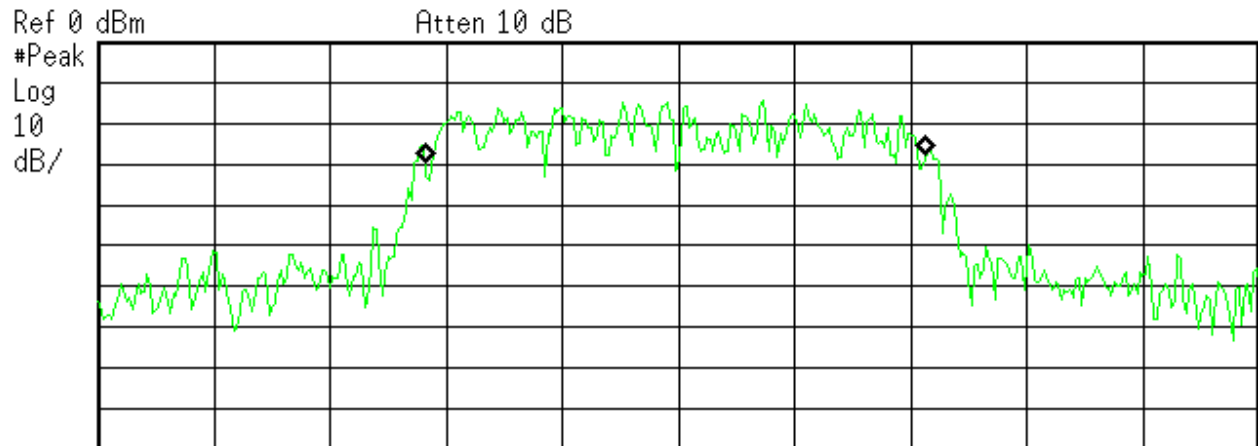
Occupied Bandwidth
1.2455 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -2.761 kHz
x dB Bandwidth 1.409 MHz*

Missing parameter

EVDO Mid Channel



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

Occupied Bandwidth
1.2969 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -7.259 kHz
x dB Bandwidth 1.418 MHz*

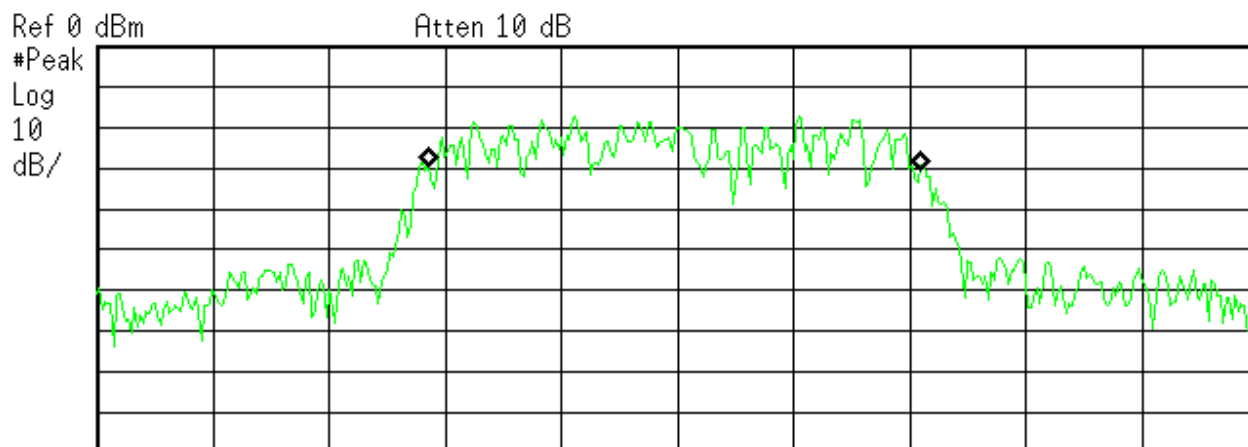
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EVDO High Channel

One-X

Agilent

R T



Center 1.931 GHz Span 3 MHz
#Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
1.2760 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -10.416 kHz
x dB Bandwidth 1.420 MHz*

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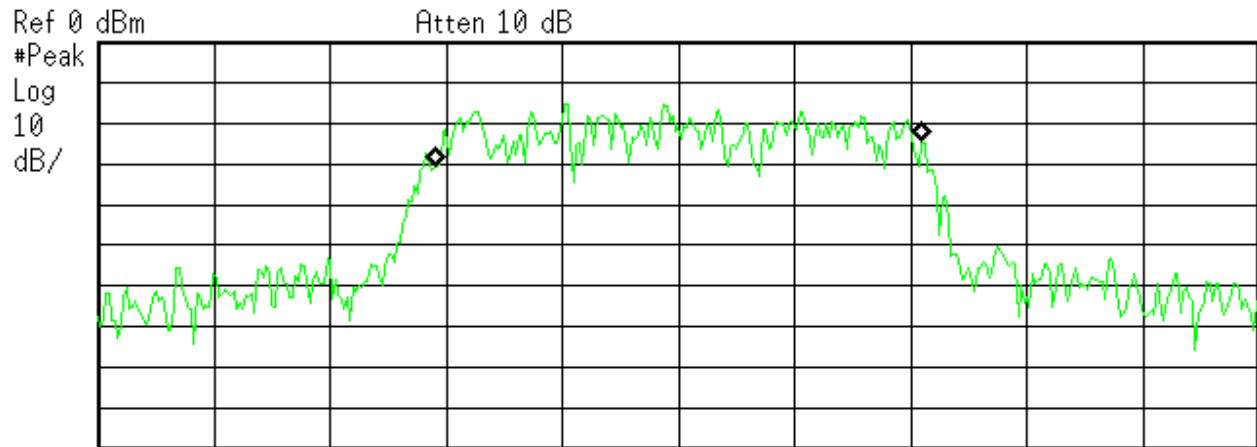
One-X Low Channel



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

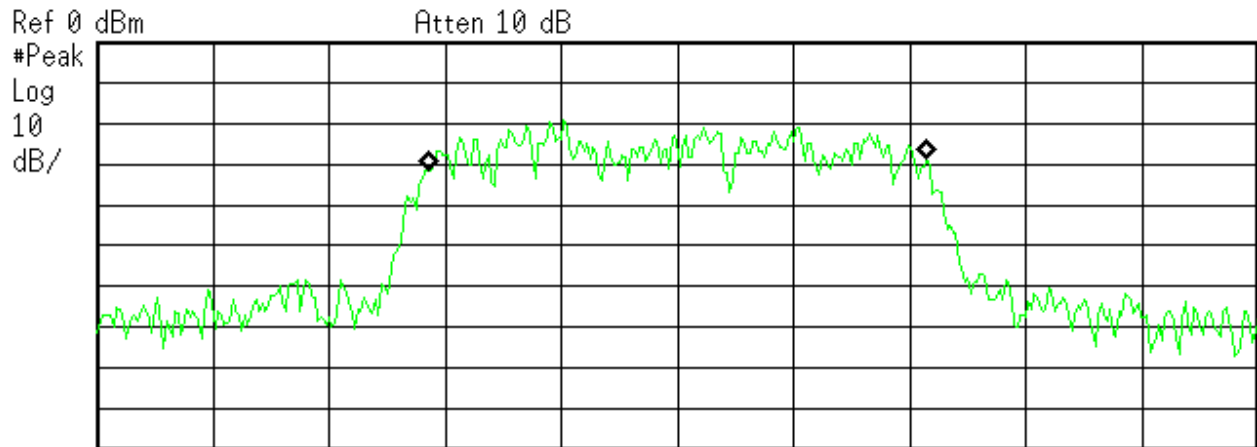
Occupied Bandwidth
 1.2609 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 1.013 kHz
 x dB Bandwidth 1.399 MHz*

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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
1.2890 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 504.957 Hz
x dB Bandwidth 1.418 MHz*

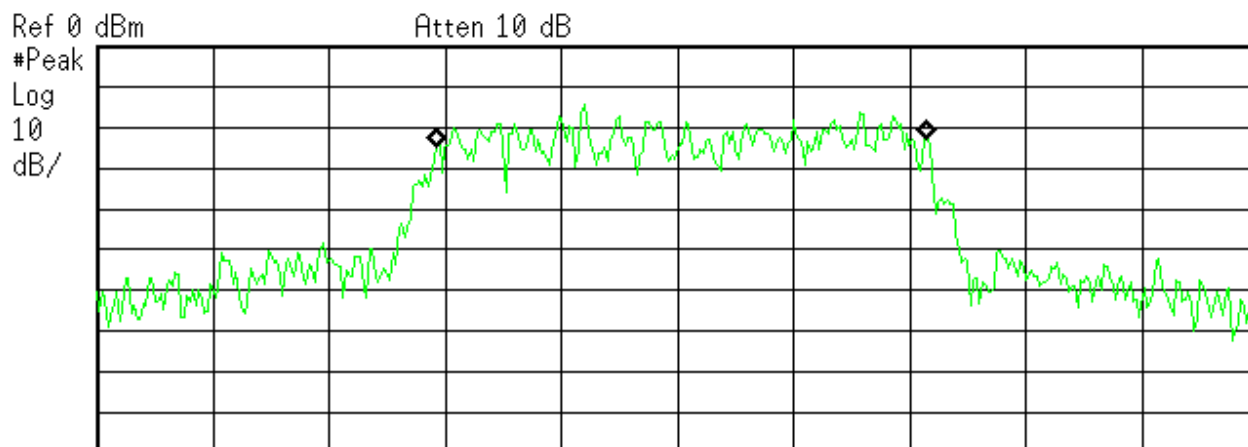
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One-X High Channel

Beacon BC1

Agilent

R T



Center 1.931 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2713 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 11.374 kHz
 x dB Bandwidth 1.404 MHz*

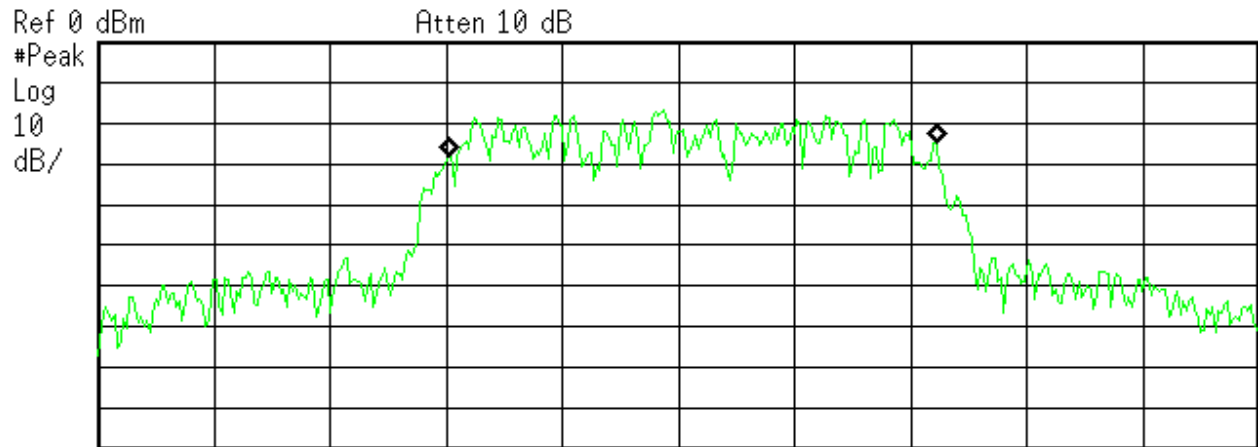
Beacon BC1 Low Channel



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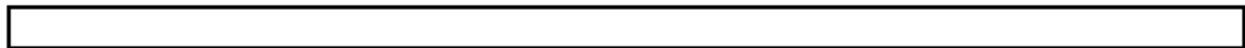


Center 1.956 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

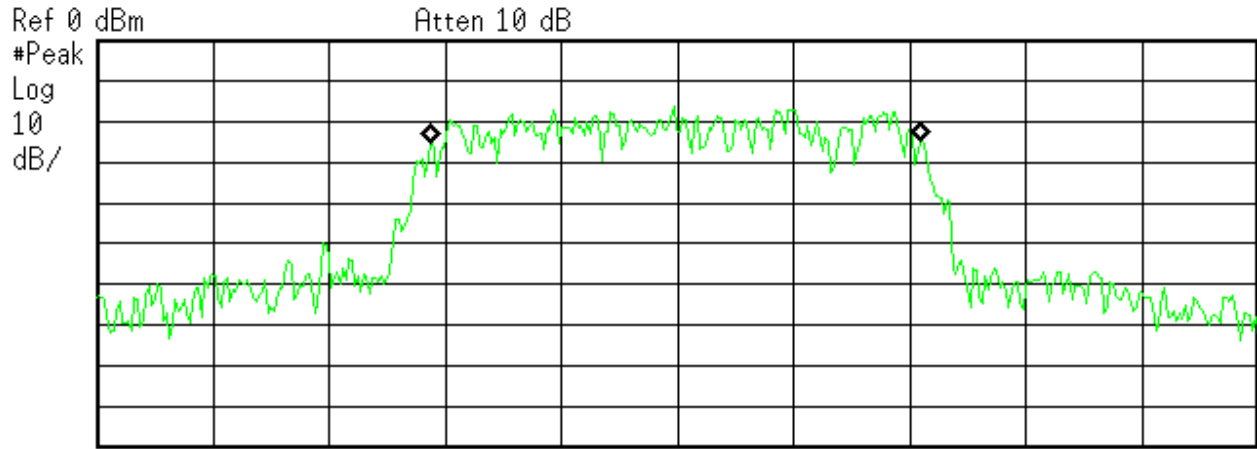
Occupied Bandwidth
 1.2594 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 34.294 kHz
 x dB Bandwidth 1.412 MHz*



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
1.2694 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -3.639 kHz
x dB Bandwidth 1.399 MHz*

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)]

EIRP Using Substitution Method

Date: 13-Nov-12		Company: Airvana		Work Order: M2419				
Engineer: Arik Zwimer		EUT Desc: 750721 T7		EUT Operating Voltage/Frequency: 120Vac/60Hz				
Temp: 22°C		Humidity: 23%		Pressure: 1004mbar				
Frequency Range: Part 24 E, EIRP measurements				Measurement Distance: 3 m				
Notes:								
Antenna Polarization (H / V)	Frequency (MHz)	Signal Generator Power Output (dBm)				FCC 24.232 section c		
			Tx Cable (dB)	Tx Ant Gain (dBi)	Adjusted ERP (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
EVDO Ch. 25			---	---	---	---	---	---
<i>H</i>	<i>1931.25</i>	<i>12.1</i>	<i>1.5</i>	<i>7.6</i>	<i>18.2</i>	33.0	-14.8	Pass
<i>V</i>	<i>1931.25</i>	<i>13.1</i>	<i>1.5</i>	<i>7.6</i>	<i>19.2</i>	33.0	-13.8	Pass
EVDO Ch. 525			---	---	---	---	---	---
<i>H</i>	<i>1956.25</i>	<i>11.5</i>	<i>1.5</i>	<i>7.6</i>	<i>17.6</i>	33.0	-15.4	Pass
<i>V</i>	<i>1956.25</i>	<i>16.2</i>	<i>1.5</i>	<i>7.6</i>	<i>22.3</i>	33.0	-10.7	Pass
EVDO Ch. 1175			---	---	---	---	---	---
<i>H</i>	<i>1988.75</i>	<i>14.2</i>	<i>1.5</i>	<i>7.7</i>	<i>20.4</i>	33.0	-12.6	Pass
<i>V</i>	<i>1988.75</i>	<i>16.5</i>	<i>1.5</i>	<i>7.7</i>	<i>22.7</i>	33.0	-10.3	Pass
One-X Ch. 25			---	---	---	---	---	---
<i>H</i>	<i>1931.25</i>	<i>-0.8</i>	<i>1.5</i>	<i>7.6</i>	<i>5.3</i>	33.0	-27.7	Pass
<i>V</i>	<i>1931.25</i>	<i>4.5</i>	<i>1.5</i>	<i>7.6</i>	<i>10.6</i>	33.0	-22.4	Pass
One-X Ch. 525			---	---	---	---	---	---
<i>H</i>	<i>1956.25</i>	<i>6.0</i>	<i>1.5</i>	<i>7.6</i>	<i>12.1</i>	33.0	-20.9	Pass
<i>V</i>	<i>1956.25</i>	<i>7.9</i>	<i>1.5</i>	<i>7.6</i>	<i>14.0</i>	33.0	-19.0	Pass
One-X Ch. 1175			---	---	---	---	---	---
<i>H</i>	<i>1988.75</i>	<i>4.5</i>	<i>1.5</i>	<i>7.7</i>	<i>10.7</i>	33.0	-22.3	Pass
<i>V</i>	<i>1988.75</i>	<i>2.9</i>	<i>1.5</i>	<i>7.7</i>	<i>9.1</i>	33.0	-23.9	Pass
Beacon Ch. 25			---	---	---	---	---	---
<i>H</i>	<i>1931.25</i>	<i>9.9</i>	<i>1.5</i>	<i>7.6</i>	<i>16.0</i>	33.0	-17.0	Pass
<i>V</i>	<i>1931.25</i>	<i>10.9</i>	<i>1.5</i>	<i>7.6</i>	<i>17.0</i>	33.0	-16.0	Pass
Beacon Ch. 525			---	---	---	---	---	---
<i>H</i>	<i>1956.25</i>	<i>9.5</i>	<i>1.5</i>	<i>7.6</i>	<i>15.6</i>	33.0	-17.4	Pass
<i>V</i>	<i>1956.25</i>	<i>8.4</i>	<i>1.5</i>	<i>7.6</i>	<i>14.5</i>	33.0	-18.5	Pass
Beacon Ch. 1175			---	---	---	---	---	---
<i>H</i>	<i>1988.75</i>	<i>9.7</i>	<i>1.5</i>	<i>7.7</i>	<i>15.9</i>	33.0	-17.1	Pass
<i>V</i>	<i>1988.75</i>	<i>9.1</i>	<i>1.5</i>	<i>7.7</i>	<i>15.3</i>	33.0	-17.7	Pass
Test Site: 1DCC-OATS-3M-I			Signal Generato: Rental Sweeper			Receive Cable: EMIR-HIGH-22		
Analyzer: Brown (Rental #1)			Receive Antenna: Black Horn			Transmit Cable: EMIR-HIGH-21		
			Transmit Antenna: Orange Horn					



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Rev. 11/5/2012

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

Range	MN	Mfr	SN	Asset	Cat	Calibration Due
9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	2/14/2013

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

FCC Code	IC Code	VCCI Code	Cat	Calibration Due
719150	2762A-8	A-0015	II	11/7/2012

Antennas

Black Horn
Orange Horn

Range	MN	Mfr	SN	Asset	Cat	Calibration Due
1-18GHz	3115	EMCO	9703-5148	56	I	6/29/2013
1-18GHz	3115	EMCO	0004-6123	390	I	7/27/2013

Meteorological Meters

Temp./Humidity/Atm. Pressure Gauge
1DCC-OATS-3M-I Thermohygrometer

MN	Mfr	SN	Asset	Cat	Calibration Due
7400 Perception II	Davis	N/A	965	I	4/4/2013
35519-044	Control Company	72457635	1334	II	8/19/2013

Cables

REMI-High-21
REMI-High-22

Range	Mfr	Cat	Calibration Due
9kHz - 26.5GHz	C-S	II	1/31/2013
9kHz - 15GHz	C-S	II	1/31/2013

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.

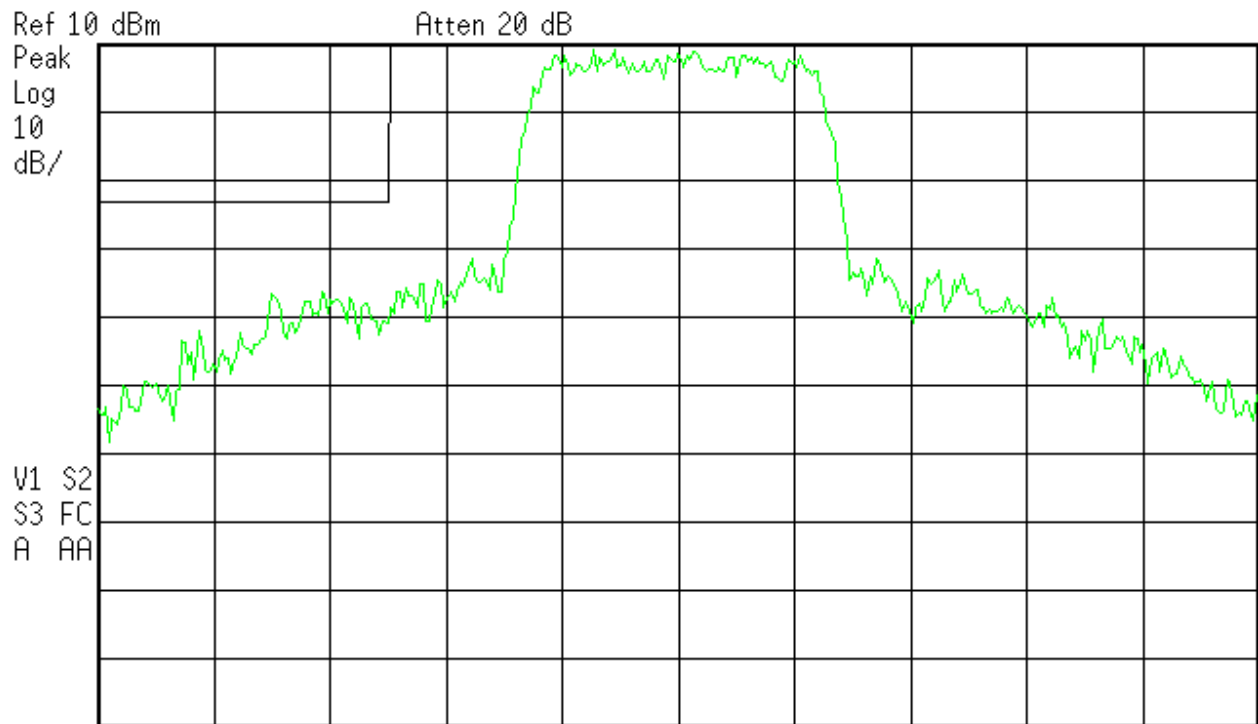
Spectrum analyzer screen plots for EVDO, One-X, and Beacon BC1 are shown on the following pages.



EVDO



R T



Center 1.931 GHz Span 5 MHz
#Res BW 30 kHz #VBW 300 kHz Sweep 5.574 ms (401 pts)

C:\temp.gif file saved

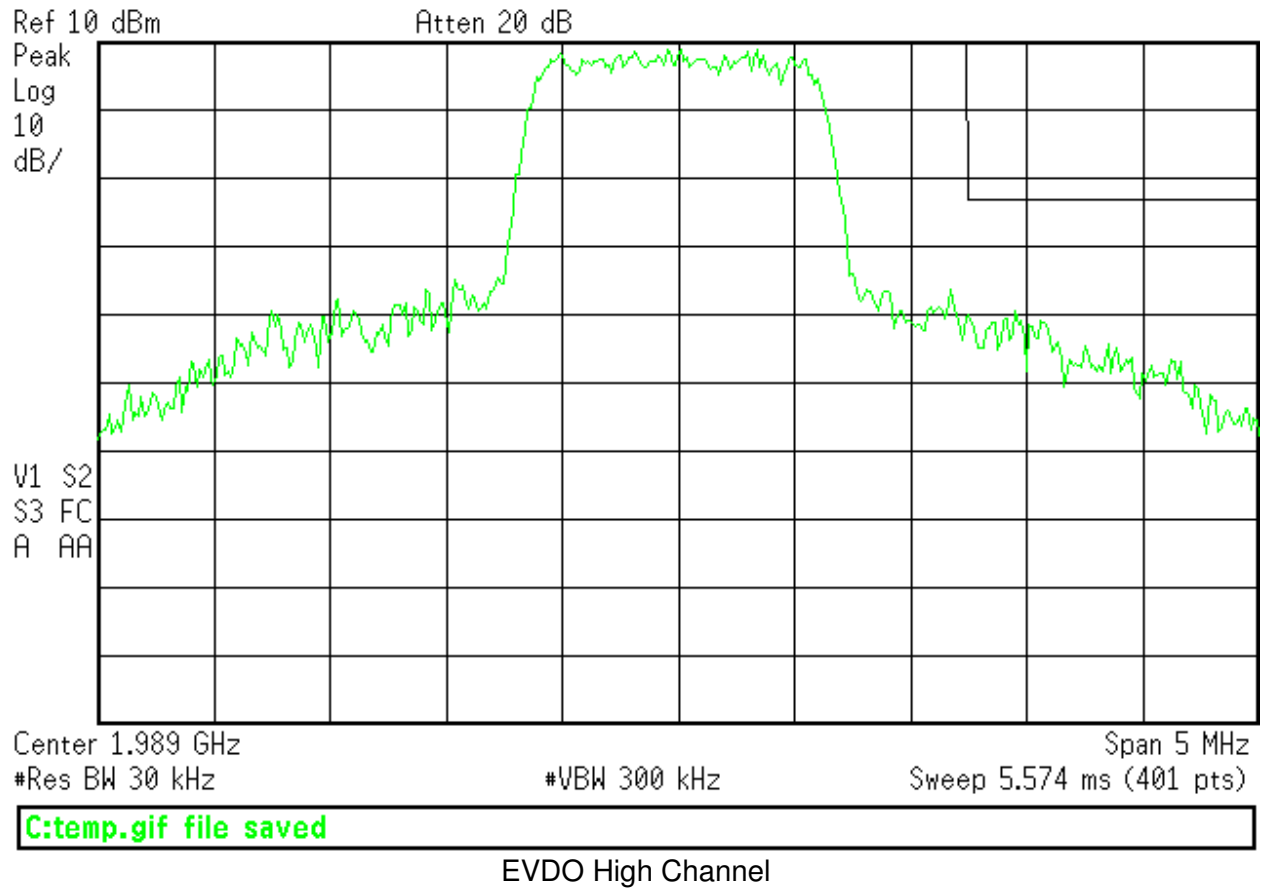
EVDO Low Channel



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One-X



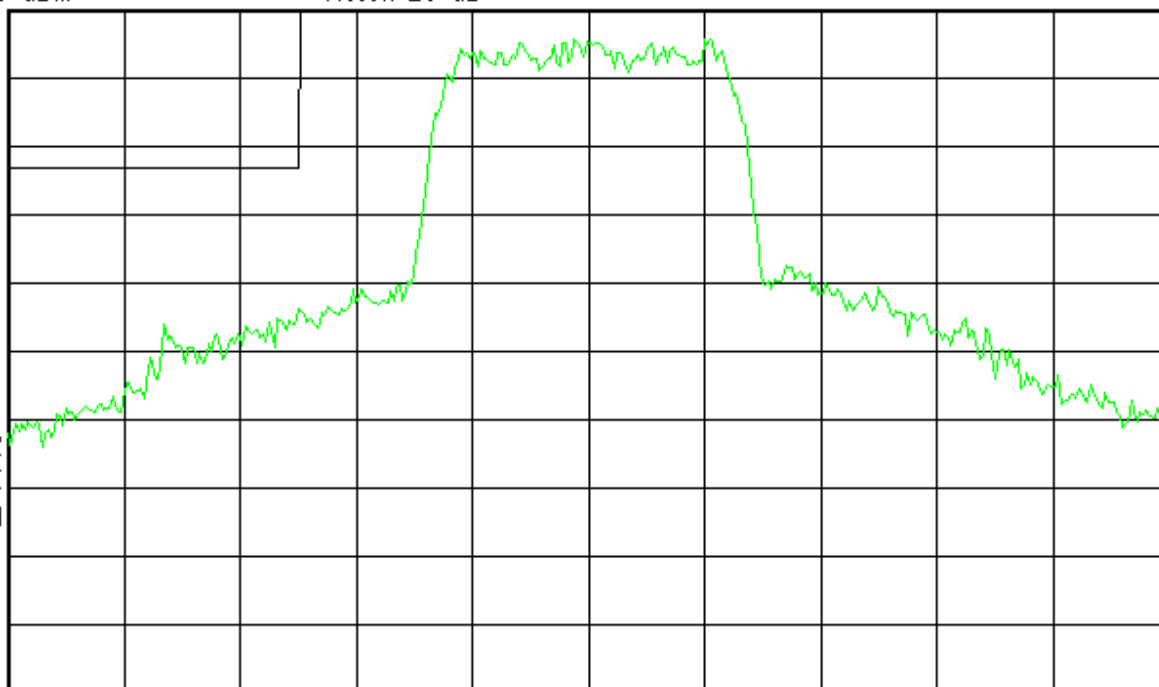
R T

Ref 10 dBm

Atten 20 dB

Peak
Log
10
dB/

V1 S2
S3 FC
A AA



Center 1.931 GHz

Span 5 MHz

#Res BW 30 kHz

#VBW 300 kHz

Sweep 5.574 ms (401 pts)

C:\temp.gif file saved

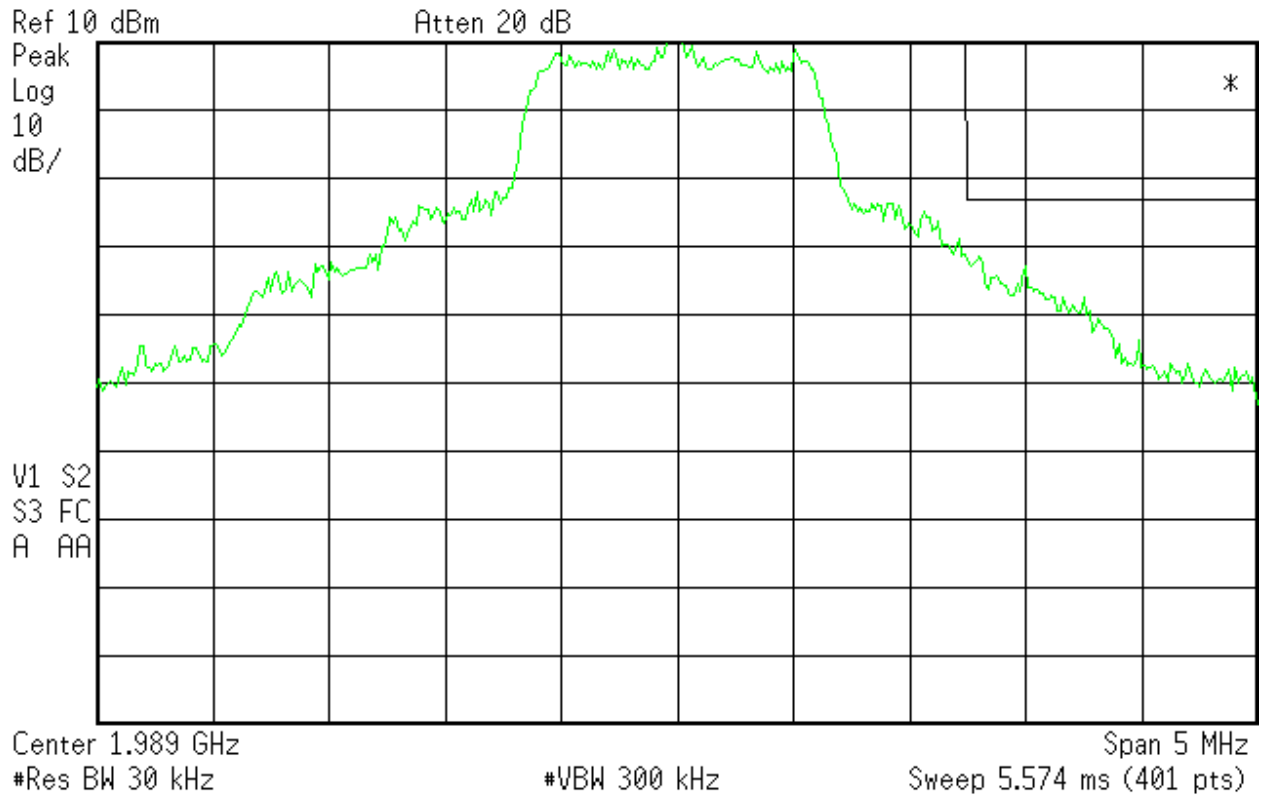
One-X Low Channel



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One-x High Channel

Beacon BC1

Agilent

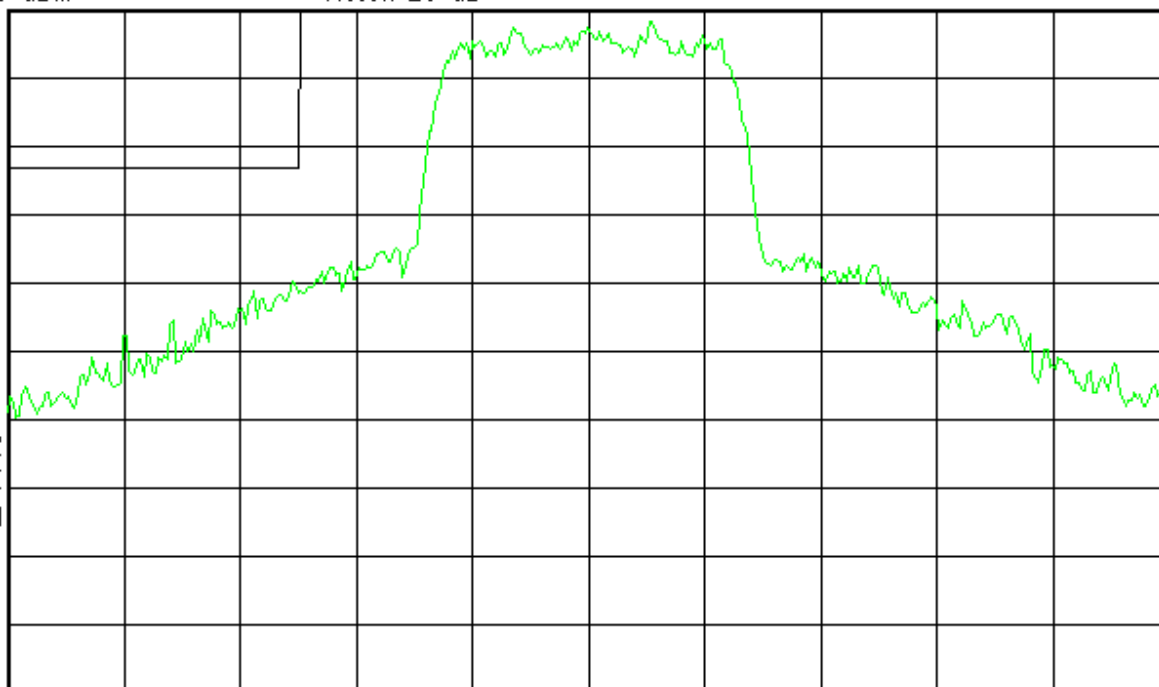
R T

Ref 10 dBm

Atten 20 dB

Peak
Log
10
dB/

V1 S2
S3 FC
A AA



Center 1.931 GHz

Span 5 MHz

#Res BW 30 kHz

#VBW 300 kHz

Sweep 5.574 ms (401 pts)

C:\temp.gif file saved

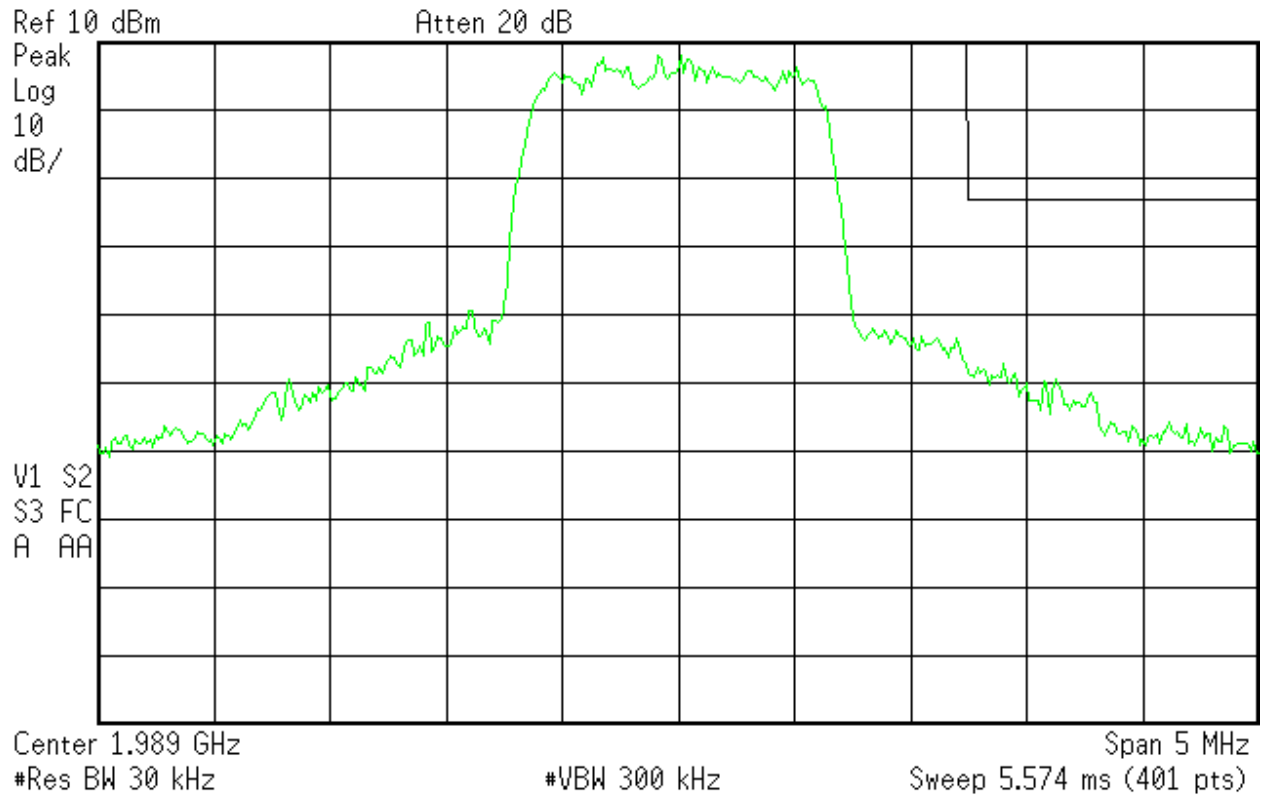
Beacon BC1 Low Channel



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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.

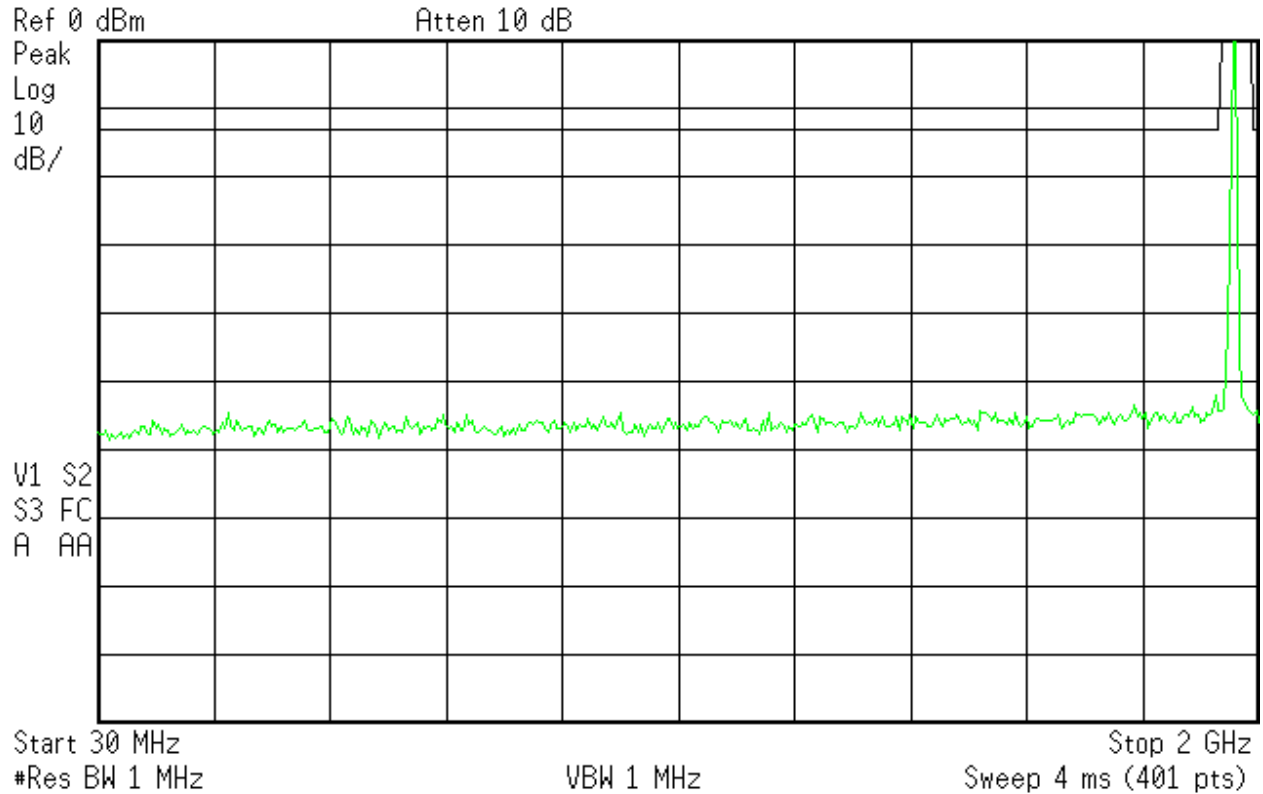


PLOTS

EVDO

Agilent

R T



C:\temp.gif file saved

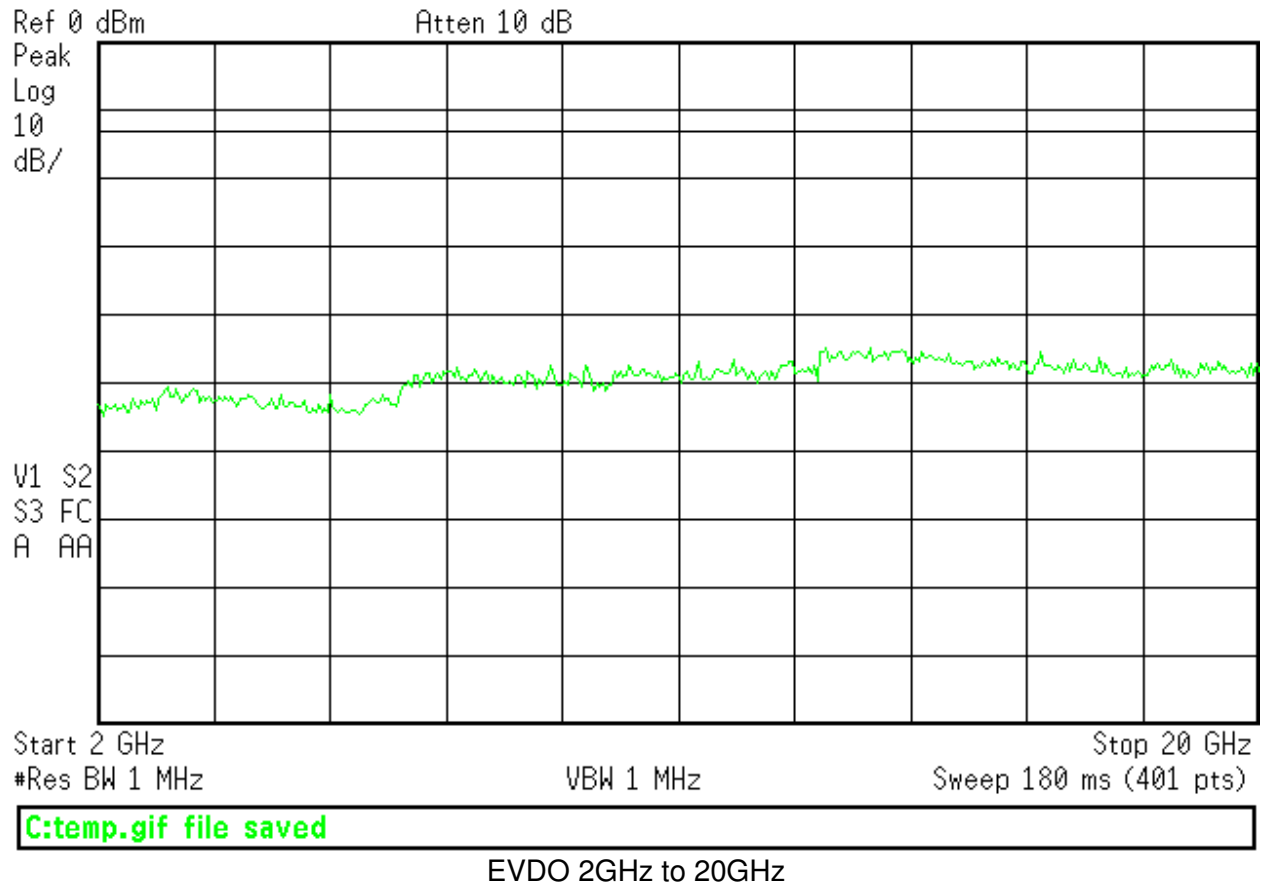
EVDO 30MHz to 2GHz



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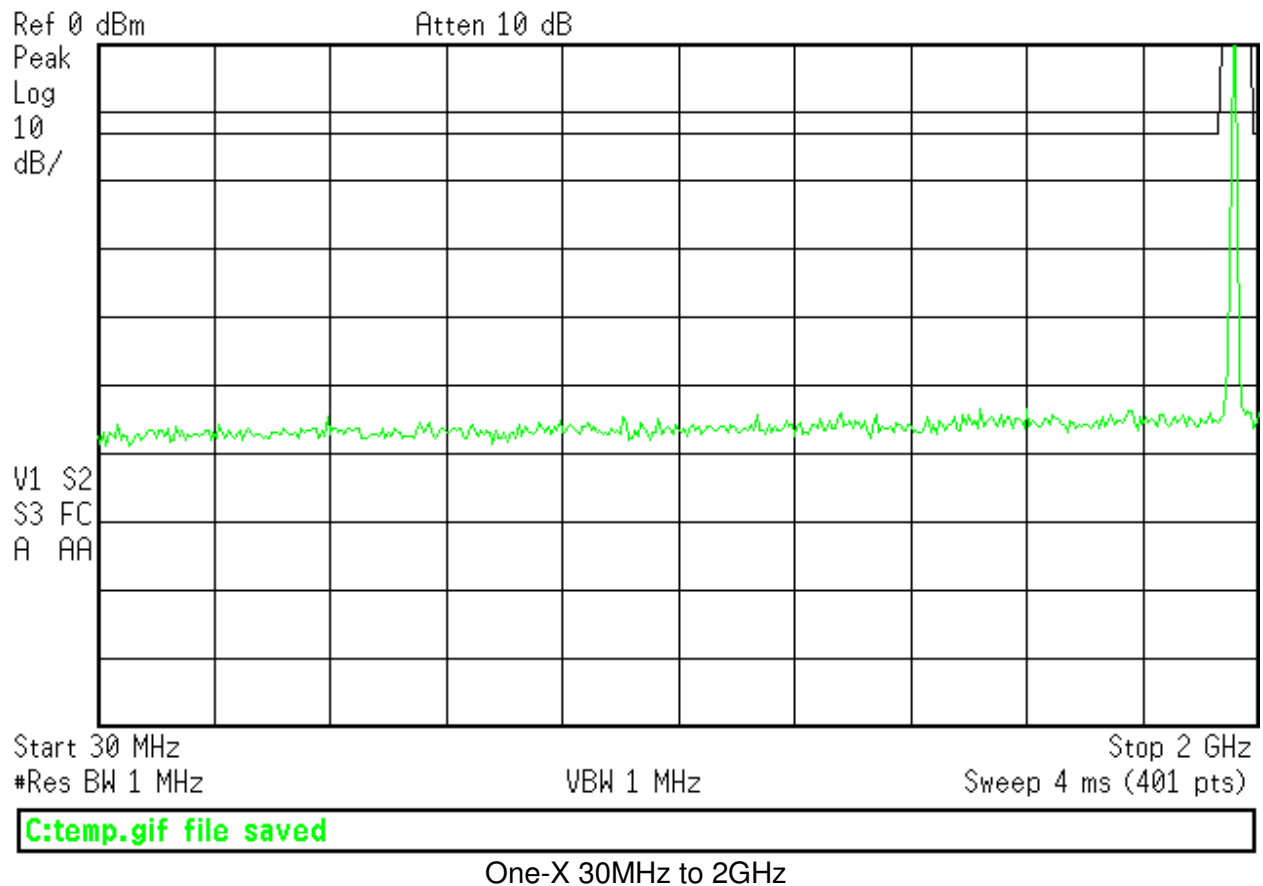
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One-X



R T



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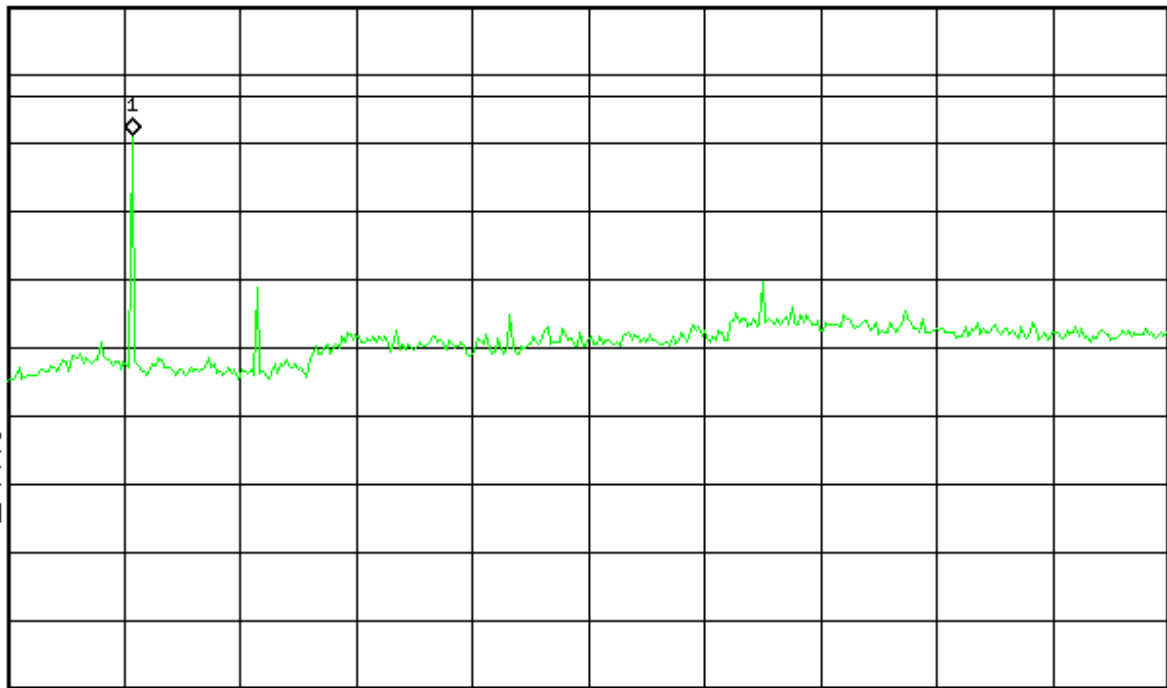
Mkr1 3.935 GHz
-18.85 dBm

Ref 0 dBm

Atten 10 dB

Peak
Log
10
dB/

V1 S2
S3 FC
A AA



Start 2 GHz

Stop 20 GHz

#Res BW 1 MHz

VBW 1 MHz

Sweep 180 ms (401 pts)

C:\temp.gif file saved

One-X 2GHz to 20GHz



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Beacon BC1



R T

Ref 0 dBm

Atten 10 dB

Peak

Log

10

dB/

V1 S2

S3 FC

A AA

Start 30 MHz

#Res BW 1 MHz

VBW 1 MHz

Stop 2 GHz

Sweep 4 ms (401 pts)

Data out of range

Beacon BC1 30MHz to 2GHz

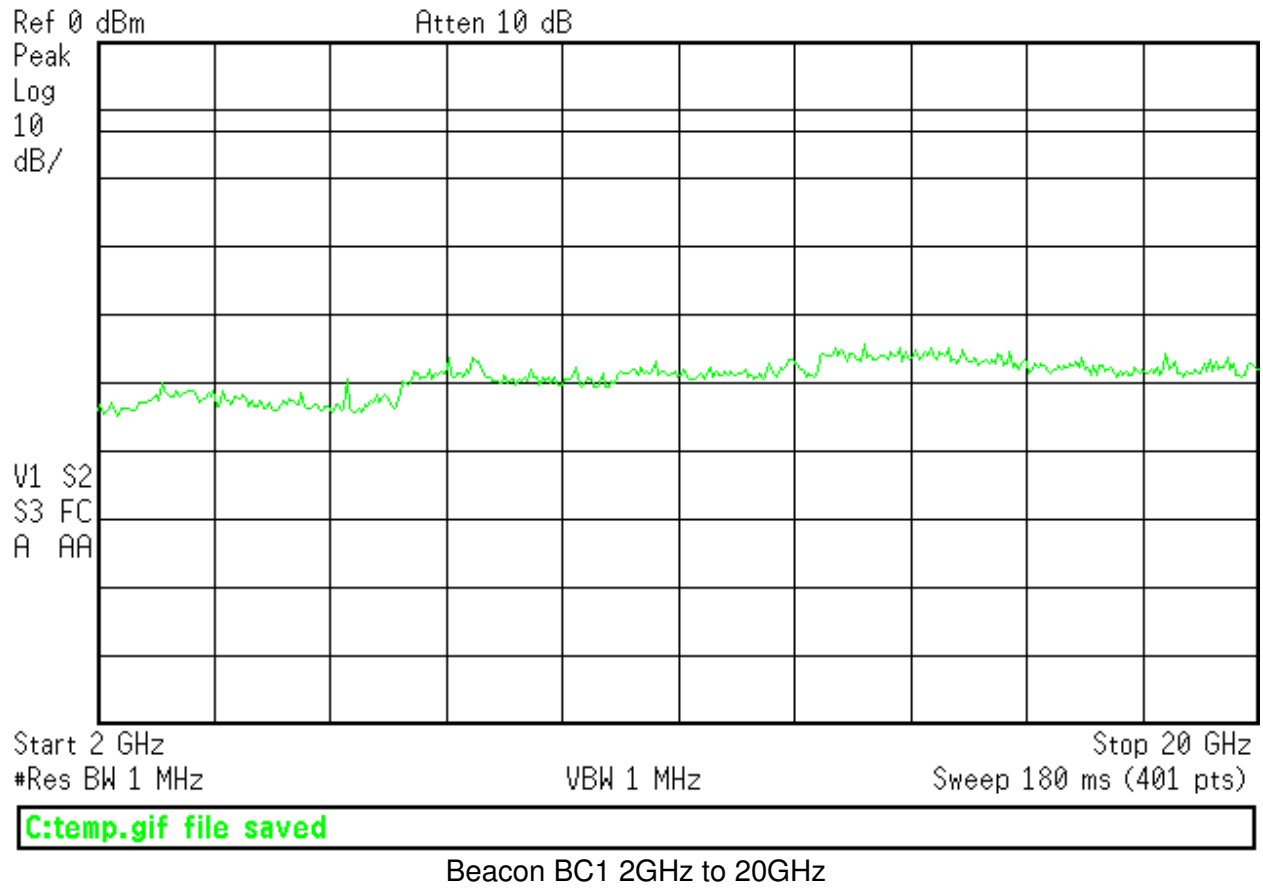


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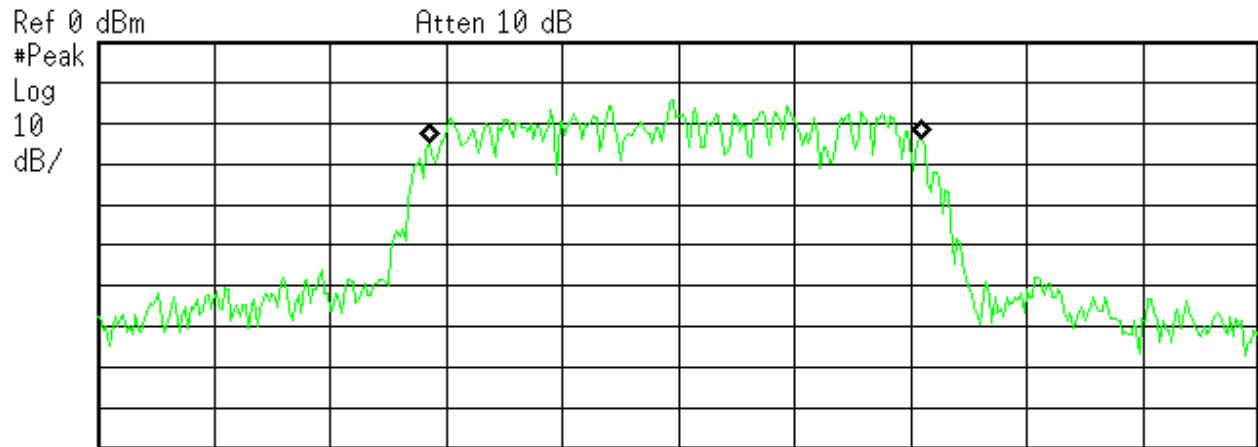


Tests Specific to Part 90

Occupied Bandwidth

Bandwidth Measurements				
Date: 12-Nov-13		Company: Airvana		Work Order: M2419
Engineer: Arik Zwirner		EUT Desc: 750721 Femto Cell		EUT Power: 120Vac/60Hz
Temp: 23°C		Humidity: 23%		Pressure: 1011mbar
Frequency Range: 862-869MHz, FCC Part 90				
Notes:				
OUTPUT	CHANNEL POSITION	CHANNEL NUMBER	FREQUENCY	26dB BANDWIDTH
			(MHz)	(MHz)
Beacon BC10	Low	476	862.90	1.403
	Mid	576	865.4	1.419
	High	676	867.9	1.408
Test Site: 1DCC-OATS-3M-I			Spectrum Analyzer: Brown	





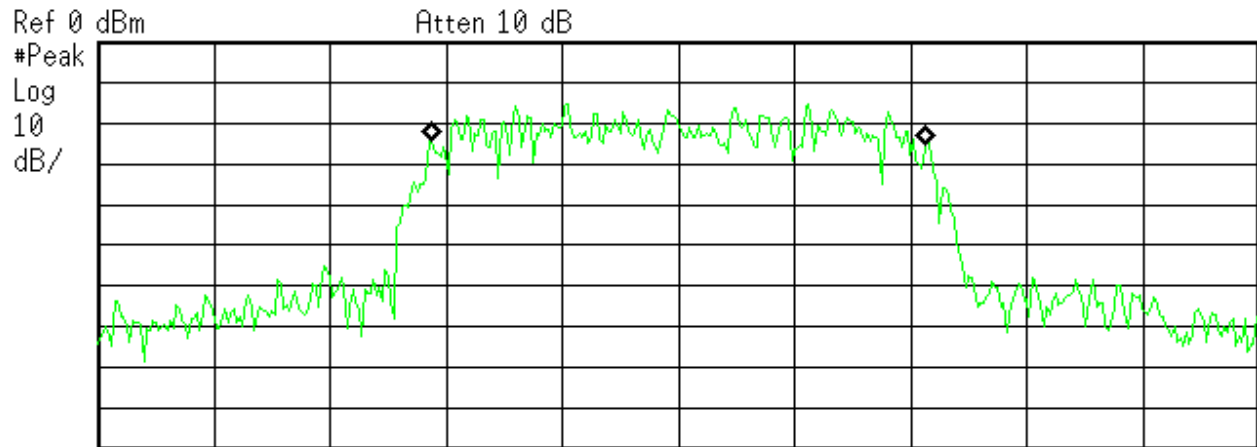
Center 862.9 MHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2739 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error -8.311 kHz
 x dB Bandwidth 1.403 MHz*

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)

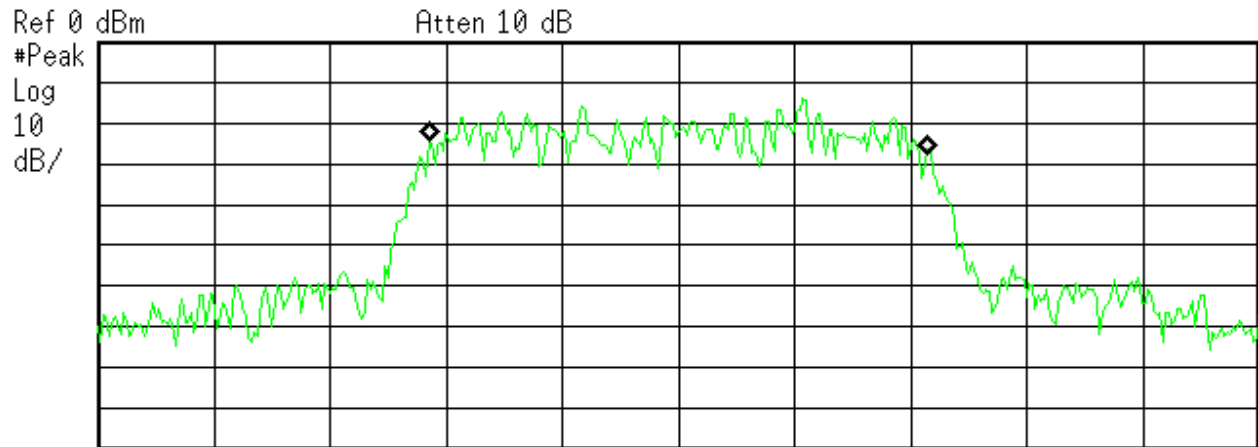
Occupied Bandwidth
1.2791 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 1.663 kHz
x dB Bandwidth 1.419 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
1.2868 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.776 kHz
x dB Bandwidth 1.408 MHz*

C:\temp.gif file saved

Beacon BC10 High Channel (Ch. 676)

ERP

ERP Using Substitution Method

Date: 13-Nov-12		Company: Airvana		Work Order: M2419				
Engineer: Arik Zwirner		EUT Desc: 750721 T7		EUT Operating Voltage/Frequency: 120Vac/60Hz				
Temp: 22°C		Humidity: 23%		Pressure: 1004mbar				
Frequency Range: Part 90 ERP measurements				Measurement Distance: 3 m				
Notes: Band Class 10								
Antenna Polarization (H / V)	Frequency (MHz)	Signal Generator Power Output (dBm)				FCC 90.635 (b)		
			Tx Cable (dB)	Tx Ant Gain (dBi)	Adjusted ERP (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
Channel 476			---	---	---	---	---	---
H	862.9	3.7	0.9	0.0	2.8	50.0	-47.2	Pass
V	862.9	4.2	0.9	0.0	3.3	50.0	-46.7	Pass
			---	---	---	---	---	---
Channel 576			---	---	---	---	---	---
H	865.4	4.7	0.9	0.0	3.8	50.0	-46.2	Pass
V	865.4	6.0	0.9	0.0	5.1	50.0	-44.9	Pass
			---	---	---	---	---	---
Channel 676			---	---	---	---	---	---
H	867.9	4.8	0.9	0.0	3.9	50.0	-46.1	Pass
V	867.9	6.3	0.9	0.0	5.4	50.0	-44.6	Pass
Test Site: 1DCC-OATS-3M-I			Signal Generato: Rental Sweeper			Receive Cable: EMIR-HIGH-22		
Analyzer: Brown			Receive Antenna: Green			Transmit Cable: EMIR-HIGH-21		
			Transmit Antenna: Dipole					

Rev. 11/5/2012

Signal Generators Rental Sweeper	Range 0.01-20.0GHz	MN HP83752B	Mfr Agilent	SN 3610A01297	Asset Rental	Cat I	Calibration Due 8/28/2013
Spectrum Analyzers / Receivers / Preselectors Rental SA #1 (Brown)	Range 9kHz-26.5GHz	MN E4407B	Mfr Agilent	SN SG44210511	Asset 1510	Cat I	Calibration Due 2/14/2013
Radiated Emissions Sites 1DCC-OATS-3M-I	FCC Code 719150	IC Code 2762A-8	VCCI Code A-0015			Cat II	Calibration Due 11/7/2012
Antennas Green Bilog Adjustable Dipole	Range 30-2000MHz 30-1000MHz	MN CBL6112B 3121C	Mfr Chase EMCO	SN 2742 1370	Asset 620 757	Cat I I	Calibration Due 1/28/2013 12/1/2012
Meteorological Meters Temp./Humidity/Atm. Pressure Gauge 1DCC-OATS-3M-I Thermohyrometer		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
Cables REMI-High-21 REMI-High-22	Range 9kHz - 26.5GHz 9kHz - 15GHz		Mfr C-S C-S			Cat II II	Calibration Due 1/31/2013 1/31/2013

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



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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:

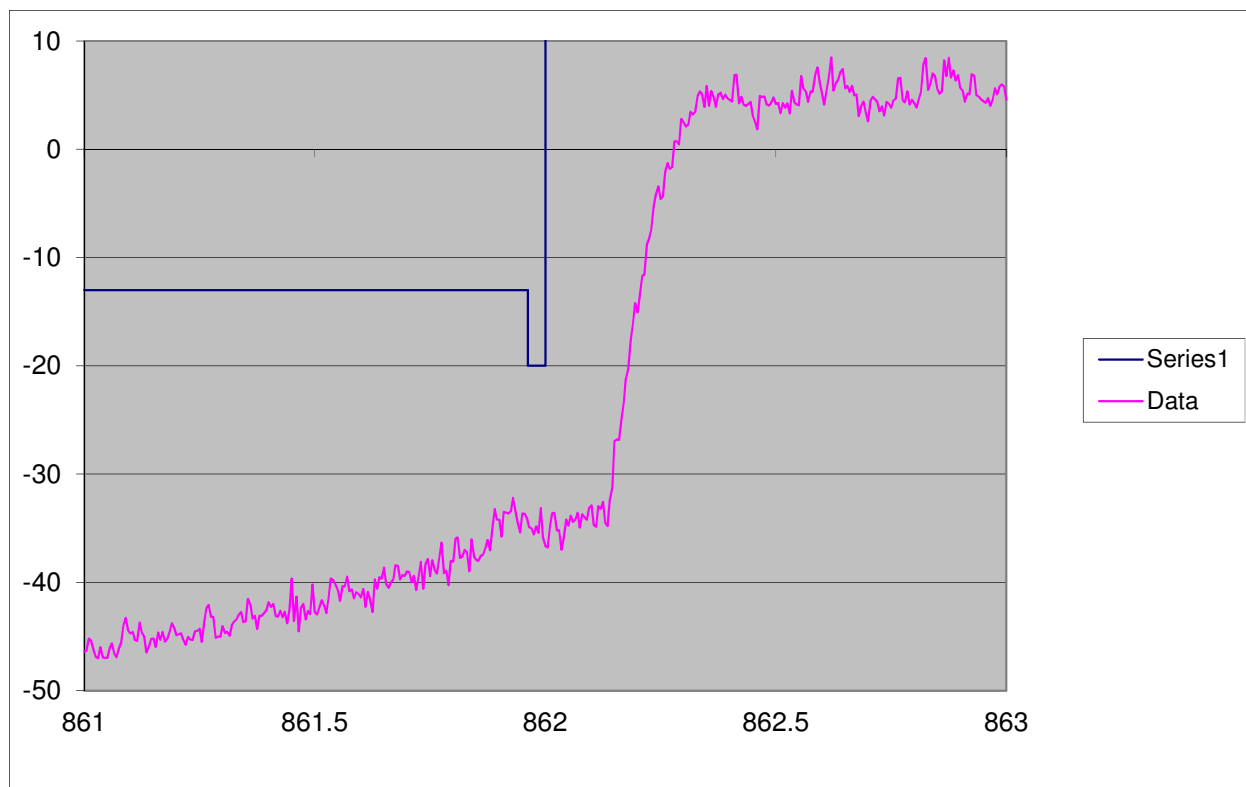
The following limits are applied in the spectral plots:

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

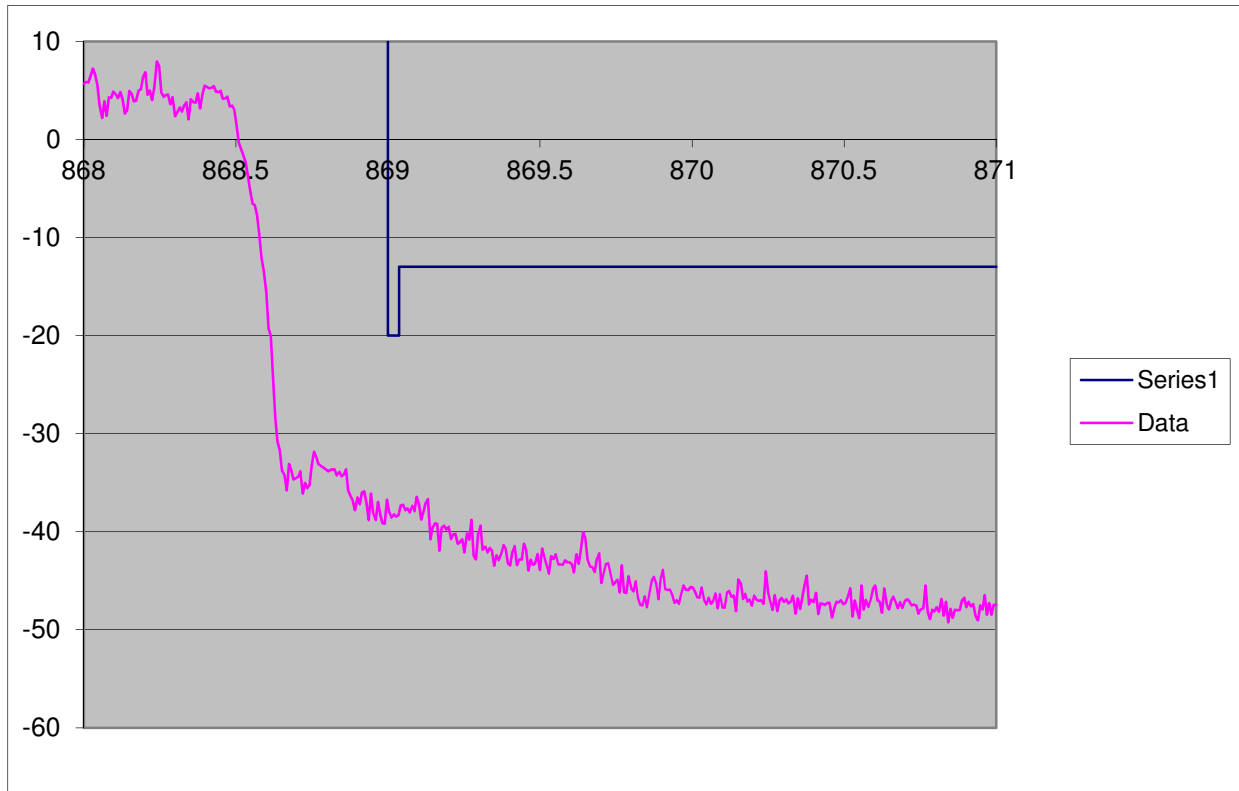
Attenuation beyond 37.5kHz from band: $43 + 10 \log(P)$, resulting in -13dBm



PLOTS



Beacon BC10 Low Channel



Beacon BC10 High Channel

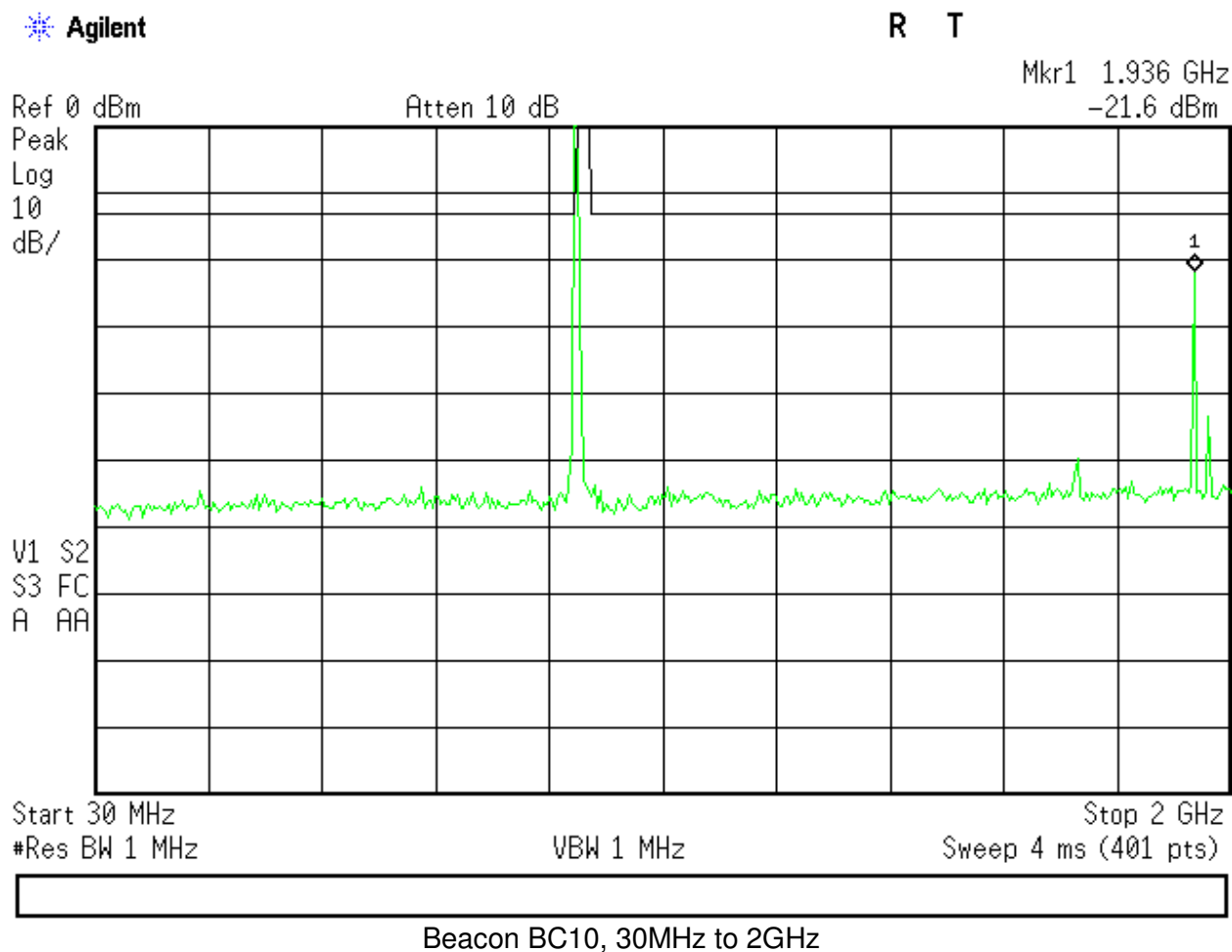
Conducted Spurious Emissions at Antenna Port LIMITS

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 $10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation.

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

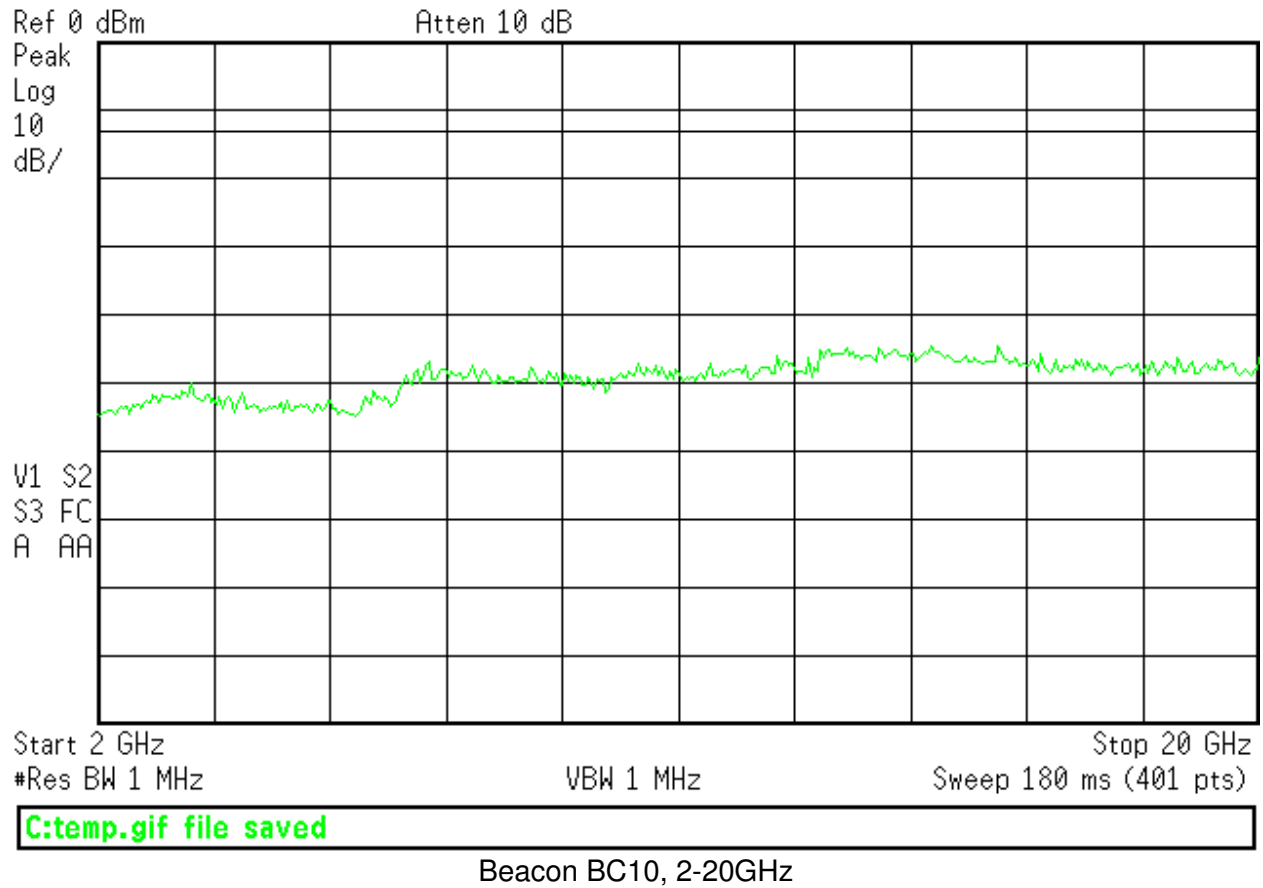
PLOTS



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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: 06-Nov-12			Company: Airvana						Work Order: M2419			
Engineer: Chris Bramley			EUT Desc: Train 7 Femto Cell (750721)						EUT Operating Voltage/Frequency: 120V/60Hz			
Temp: 23.9°C			Humidity: 20%			Pressure: 1016mBar						
Frequency Range: 30-1000MHz							Measurement Distance: 3 m					
Notes: Transmitter Fundamental Freq 863MHz							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	43.8	39.8	22.5	11.1	0.6	29.0	---	---	---	40.0	-11.0	Pass
v	45.2	40.5	22.5	10.2	0.7	28.9	---	---	---	40.0	-11.1	Pass
h	250.0	48.1	22.5	11.5	1.6	38.7	---	---	---	46.0	-7.3	Pass
h	375.0	38.0	22.4	15.0	2.1	32.7	---	---	---	46.0	-13.3	Pass
h	500.0	33.8	22.4	17.6	2.4	31.4	---	---	---	46.0	-14.6	Pass
v	625.0	37.1	22.1	19.2	2.7	36.9	---	---	---	46.0	-9.1	Pass
h	750.0	30.2	22.1	20.6	3.1	31.8	---	---	---	46.0	-14.2	Pass
h	875.0	37.3	22.0	21.9	3.2	40.4	---	---	---	46.0	-5.6	Pass
Table Result: Pass by -5.6 dB Worst Freq: 875.0 MHz												
Test Site: EMI Chamber 1			Cable 1: Asset #1505						Cable 2: EMIR-05			
Analyzer: Gold			Preamp: Blue						Antenna: Red-Black			

Rev. 1/15/2013

Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold		100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/3/2013
Radiated Emissions Sites		FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due
EMI Chamber 1		719150	2762A-6	A-0015			II	2/16/2014
Preamps / Couplers Attenuators / Filters		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Blue		0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	6/5/2013
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red-Black Bilog		30-2000MHz	JB1	Sunol	A091604-2	1106	I	Sent out for Cal
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
CHAMBER1 Thermohygrometer			35519-044	Control Company	72457642	1345	II	8/19/2013
Cables		Range		Mfr			Cat	Calibration Due
Asset #1505		9kHz - 18GHz		Florida RF			II	2/9/2013
REMI-05		9kHz - 2GHz		C-S			II	10/15/2013

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



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Radiated Emissions Table

Date: 18-Jan-13			Company: Airvana			Work Order: M2419										
Engineer: Edward Breen			EUT Desc: Train 7 Femto Cell			EUT Operating Voltage/Frequency: 120V/60Hz										
Temp: 22.5°C			Humidity: 16%			Pressure: mBar										
Frequency Range: 1-18GHz									Measurement Distance: 3 m							
Notes: Software was updated to fix an error that caused the radio to malfunction.																
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	3917.7	33.7	20.9	21.0	32.7	8.0	53.4	40.6	74.0	-20.6	Pass	54.0	-13.4	Pass		
V	3917.7	36.4	24.9	21.0	32.7	8.0	56.1	44.6	74.0	-17.9	Pass	54.0	-9.4	Pass		
H	3977.0	32.7	19.2	20.9	32.8	8.0	52.6	39.1	74.0	-21.4	Pass	54.0	-14.9	Pass		
V	3977.0	32.8	19.1	20.9	32.8	8.0	52.7	39.0	74.0	-21.3	Pass	54.0	-15.0	Pass		
Table Result:									Pass		by		-9.4 dB		Worst Freq: 3917.7 MHz	
Test Site: EMI Chamber 2				Cable 1: Asset #1506				Cable 2: EMIR-HIGH-22								
Analyzer: Gold				Preamp: Asset #1517				Antenna: Black Horn								

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Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold		100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/3/2013
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
1517 HF Preamp		1-20GHz	CS	CS	N/A	1517	II	4/17/2013
High Pass Filter		0.03-14.5 GHz	11SH10-3000/T9000-0/0	K&L	1	1311	II	1/2/2014
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Black Horn		1-18GHz	3115	EMCO	9703-5148	56	I	6/29/2013
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
CHAMBER2 Thermohygrometer			35519-044	Control Company	72457639	1347	II	8/19/2013
Cables		Range		Mfr			Cat	Calibration Due
Asset #1506		9kHz - 18GHz		Florida RF			II	2/2/2013
REMI-High-22		9kHz - 15GHz		C-S			II	1/31/2013

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Radiated Emissions Table

Date: 18-Jan-13		Company: Airvana				Work Order: M2419									
Engineer: Edward Breen		EUT Desc: Train 7 Femto Cell				EUT Operating Voltage/Frequency: 120V/60Hz									
Temp: 22.5°C		Humidity: 16%				Pressure: 1011mBar									
Frequency Range: 18-20GHz						Measurement Distance: 0.1 m									
Notes: Software was updated to fix an error that caused the radio to malfunction.															
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: Gold					Preamp: 18-26.5GHz					Antenna: 18-26.5GHz Horn					

Rev. 1/17/2013

Spectrum Analyzers / Receivers /Preselectors Gold	Range 100Hz-26.5 GHz	MN E4407B	Mfr Agilent	SN MY45113816	Asset 1284	Cat I	Calibration Due 2/3/2013
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 HF (Yellow) High Pass Filter	Range 18-26.5GHz 0.03-14.5 GHz	MN AFS4-18002650-60-8P-4 11SH10-3000/T9000-0/0	Mfr CS K&L	SN 467559 1	Asset 1266 1311	Cat I II	Calibration Due 10/13/2013 1/2/2014
Antennas HF (White) Horn	Range 18-26.5GHz	MN 801-WLM	Mfr Waveline	SN 758	Asset 758	Cat I	Calibration Due Verify before Use
Meteorological Meters Temp./Humidity/Atm. Pressure Gauge CHAMBER2 Thermohygrometer		MN 7400 Perception II 35519-044	Mfr Davis Control Company	SN N/A 72457639	Asset 965 1347	Cat I II	Calibration Due 4/4/2013 8/19/2013
Cables REMI-High-22	Range 9kHz - 15GHz		Mfr C-S			Cat II	Calibration Due 1/31/2013

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Radiated Emissions Table

Date: 18-Jan-13				Company: Airvana				Work Order: M2419							
Engineer: Edward Breen				EUT Desc: Train 7 Femto Cell				EUT Operating Voltage/Frequency: 120V/60Hz							
Temp: 22.5°C				Humidity: 16%				Pressure: mBar							
Frequency Range: 6-18GHz								Measurement Distance: 1 m							
Notes: Software was updated to fix an error that caused the radio to malfunction.															
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 #1506				Cable 2: EMIR-HIGH-22							
Analyzer: Gold				Preamp: Asset #1517				Antenna: Black Horn							

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Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold		100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/3/2013
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
1517 HF Preamp		1-20GHz	CS	CS	N/A	1517	II	4/17/2013
High Pass Filter		0.03-14.5 GHz	11SH10-3000/T9000-0/0	K&L	1	1311	II	1/2/2014
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Black Horn		1-18GHz	3115	EMCO	9703-5148	56	I	6/29/2013
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
CHAMBER2 Thermohygrometer			35519-044	Control Company	72457639	1347	II	8/19/2013
Cables		Range		Mfr			Cat	Calibration Due
Asset #1506		9kHz - 18GHz		Florida RF			II	2/2/2013
REMI-High-22		9kHz - 15GHz		C-S			II	1/31/2013

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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: 14-Nov-12					Company: Airvana					Work Order: M2419				
Engineer: Arik Zwirner					EUT Desc: 750723 T7									
Temp: 21.0 °C					Humidity: 23%					Pressure: 1028 mBar				
Notes:														
Frequency Range: 0.15-30MHz														
EUT Input Voltage/Frequency: 120Vac/60Hz														
Frequency (MHz)	Quasi-Peak Readings		Average Readings		LISN Factors		Cable Factor (dB)	ATTN Factor (dB)	FCC/CISPR Class B			FCC/CISPR Class B		
	QP1 (dBuV)	QP2 (dBuV)	AVG1 (dBuV)	AVG2 (dBuV)	L1 (dB)	L2 (dB)			QP Limit (dB)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dB)	Margin (dB)	Result (Pass/Fail)
0.166	29.7	31.4	12.1	18.5	-1.0	-0.4	-0.1	-20.6	65.2	-12.7	Pass	55.2	-15.6	Pass
0.179	30.9	30.5	18.6	21.4	-0.9	-0.3	-0.1	-20.6	64.5	-12.0	Pass	54.5	-12.1	Pass
0.213	24.8	24.5	13.3	15.1	-0.7	-0.2	-0.1	-20.6	63.1	-16.9	Pass	53.1	-17.1	Pass
0.314	15.5	17.3	10.0	7.4	-0.6	-0.2	-0.1	-20.6	59.9	-21.7	Pass	49.9	-18.6	Pass
4.33	18.4	17.3	12.7	10.4	-0.1	-0.1	-0.2	-20.6	56.0	-16.8	Pass	46.0	-12.5	Pass
10.68	10.8	11.3	4.5	3.3	-0.2	-0.2	-0.2	-20.6	60.0	-27.8	Pass	50.0	-24.6	Pass
Result: Pass					Worst Margin: -12.0 dB					Frequency: 0.179 MHz				
Measurement Device: 230VAC LISN Asset 1492					Cable: CEMI-03					Spectrum Analyzer: Black				
					Attenuator: 20dB Attenuator-77					Site: CEMI 6				

Rev. 11/5/2012

Spectrum Analyzers / Receivers / Preselectors Black	Range 9kHz-12.8GHz	MN 8596E	Mfr Agilent	SN 3710A00944	Asset 337	Cat I	Calibration Due 12/2/2012
LISNs/Measurement Probes 230VAC LISN Asset 1492	Range 10kHz-50MHz	MN 9252-50-R-24-BNC	Mfr Solar	SN 84713	Asset 1492	Cat I	Calibration Due 5/10/2013
Conducted Test Sites (Mains / Telco) CEMI 6	FCC Code 719150		VCCI Code A-0015			Cat III	Calibration Due NA
Meteorological Meters Temp./Humidity/Atm. Pressure Gauge CEMI6 Thermohygrometer		MN 7400 Perception II 35519-044	Mfr Davis Control Company	SN N/A 72457730	Asset 965 1344	Cat I II	Calibration Due 4/4/2013 8/19/2013
Cables CEMI-03	Range 9kHz - 2GHz		Mfr C-S			Cat II	Calibration Due 10/13/2013
Attenuators 20dB Attenuator-77	Range 9kHz-2GHz	MN	Mfr	SN N/A	Asset	Cat II	Calibration Due 10/4/2013

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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 Zwirner		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.			



Test Equipment Used

Rev. 12/5/2012

Spectrum Analyzers / Receivers / Preselectors							
	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Black	9kHz-12.8GHz	8596E	Agilent	3710A00944	337	I	1/2/2013
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/3/2013
Rental SA #1 (Brown)	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	2/14/2013
Radiated Emissions Sites							
	FCC Code	IC Code	VCCI Code			Cat	Calibration Due
1DCC-OATS-3M-I	719150	2762A-8	A-0015			II	12/7/2012
EMI Chamber 1	719150	2762A-6	A-0015			II	2/16/2014
Preamps /Couplers Attenuators / Filters							
	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	6/5/2013
Red-Green	1-20GHz	PM2-38-218-4R5-17-15-SFF	CS	N/A	1256	II	6/18/2013
HF (Yellow)	18-26.5GHz	AFS4-18002650-60-8P-4	CS	467559	1266	I	10/13/2013
Antennas							
	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Green Bilog	30-2000MHz	CBL6112B	Chase	2742	620	I	1/28/2013
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	1/3/2013
Yellow Horn	1-18GHz	3115	EMCO	9608-4898	37	I	6/17/2013
Black Horn	1-18GHz	3115	EMCO	9703-5148	56	I	6/29/2013
Orange Horn	1-18GHz	3115	EMCO	0004-6123	390	I	7/27/2013
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	758	758	I	Verify before Use
Adjustable Dipole	30-1000MHz	3121C	EMCO	1370	757	I	12/1/2012
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
CEMI3 Thermohygrometer		35519-044	Control Company	72457729	1338	II	8/19/2013
1DCC-OATS-3M-I Thermohygrometer		35519-044	Control Company	72457635	1334	II	8/19/2013
CHAMBER1 Thermohygrometer		35519-044	Control Company	72457642	1345	II	8/19/2013
Cables							
	Range		Mfr			Cat	Calibration Due
Asset #1505	9kHz - 18GHz		Florida RF			II	2/9/2013
Asset #1507	9kHz - 26.5GHz		Florida RF			II	1/31/2013
Asset #1522	9kHz - 26.5GHz		Florida RF			II	2/8/2013
CEMI-07	9kHz - 2GHz		C-S			II	5/1/2013
REMI-High-21	9kHz - 26.5GHz		C-S			II	1/31/2013
Attenuators							
	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
20dB Atten-4	9kHz-2GHz			N/A		II	12/6/2013
LISNs/Measurement Probes							
	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Green LISN	9kHz-50MHz	8012-50-R-24-BNC	Solar	411658	987	I	5/10/2013
Conducted Test Sites (Mains / Telco)							
	FCC Code		VCCI Code			Cat	Calibration Due
CEMI 3	719150		A-0015			III	NA

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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.
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



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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

