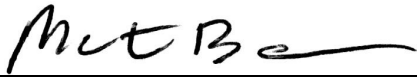
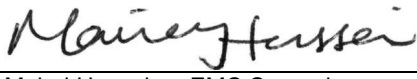




**BUREAU
VERITAS**

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

Test Report

Report No	EL2238-1
Client	Airvana
Address	19 Alpha Road Chelmsford, MA 01824
Phone	978-250-2622
Item tested	Femto Cell 750701
FCC ID	QHYHUBBUBC4000-RT
FRN	0021466594
Equipment Type	PCS Licensed Transmitter
Equipment Code	PCB
Emission Designator	1M27D7D
FCC Rule Parts	47 CFR 24 Subpart E
Test Dates	January 9-12 th , 2012
Results	As detailed within this report
Prepared by	 Matthew Burman – Test Engineer
Authorized by	 Mairaj Hussain – EMC Supervisor
Issue Date	<u>February 3, 2012</u>

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 24 Subpart E. The product is the Femto Cell 750701. It is a transceiver that operates in the range 1930-1990MHz.

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

The EUT utilizes 64-QAM modulation on all transmissions.

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.

For EIRP and antenna port spurious emissions, the frequency range investigated as 1930-1990MHz

The EUT contains 3 intentional transmitters identified as 1x, DO, and Beacon. Possibly, all 3 transmitters could be operating at the same time on the same frequency; therefore a combined EIRP calculation was performed. The Beacon also operates in the 862-869MHz band and was tested as FCC part 90 (Report issued EL2238-2).

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 30MHz to 20GHz was checked.

Radiated spurious emissions the frequency range of 30MHz to 20GHz was inspected, along with the digital circuitry.

The digital circuitry is compliant to FCC part 15 class B limits for unintentional radiators as issued in work order EM0015.

For radiated measurements, the substitution method was used. In the substitution method we initially take field strength readings of the intended and unintended emissions from the product, in maximized position. The product is then replaced and the field strength measurement is repeated with a calibrated antenna, cable and signal generator. The field strength measurement is then converted to a power measurement by subtracting the cable loss and adding the antenna gain to the output level of the signal generator.

Release Control Record

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



Product Tested - Configuration Documentation

EUT Configuration										
Work Order: L2238 Company: Airvana Company Address: 19 Alpha Road Chelmsford, MA 01824 Contact: Stuart MacEachern Person Present: Stuart MacEachern										
		MN		PN		SN				
EUT:		750701		---		Sample 1				
EUT Description:		Femto Cell								
EUT Max Frequency:		1000MHz								
Support Equipment:		MN						SN		
IQNAV GPS Generator		IQN00962						---		
Dell Latitude Laptop		D610						---		
EUT Ports:										
Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason
AC Power	Power AC	1	1	2 Wire AC	No	None	1.5m	NA	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:										
All three radios are simultaneously active. (Beacon(1941), 1X(1953.8), and 10X (1965MHz))										

Low Channel = 1932.5MHz
 Middle Channel = 1965MHz
 High Channel = 1988.75MHz



Statement of Conformity

The Femto Cell 750701 has been found to conform to the following parts of 47 CFR 24 as detailed below:

Part 2	Part 24	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.
	24.235	Fundamental is within authorized frequency block
2.1033(c)(7)	24.232(c)	Power limit: 2W EIRP.
2.1033(c)(9)		The Femto Cell 705701 does not require a tune-up procedure.



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

26dB Bandwidth
Airvana
L2238

Test Engineer: Matthew Burman
Date: 1/10/2012
Spectrum Analyzer: Asset #1491
Attenuator: PE7019-20

Site: EMC2
Temp: 22.0°C
Humidity: 22%
Pressure: 1008mbar

Output	Channel	Frequency (MHz)	Bandwidth (MHz)
DO	Low	1932.5	1.429
	Mid	1965	1.429
	High	1988.75	1.432
1x	Low	1932.5	1.435
	Mid	1965	1.431
	High	1988.75	1.427
Beacon	Low	1932.5	1.425
	Mid	1965	1.432
	High	1988.75	1.424

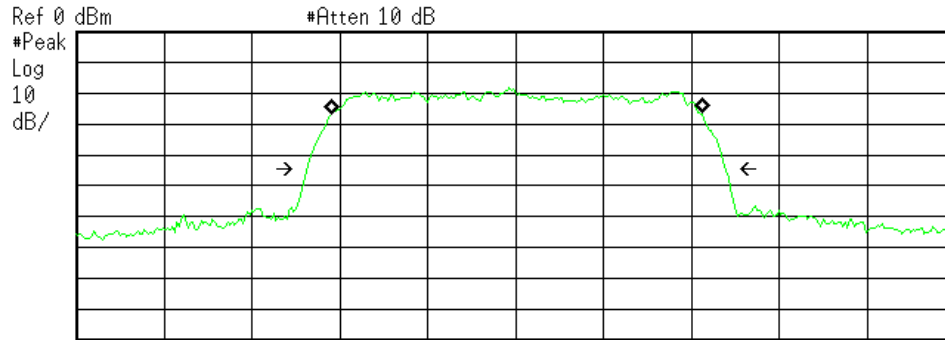


DO

Low Channel

Agilent 23:44:13 Jan 10, 2012

R L



Ref 0 dBm #Atten 10 dB
 Center 1.933 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2658 MHz

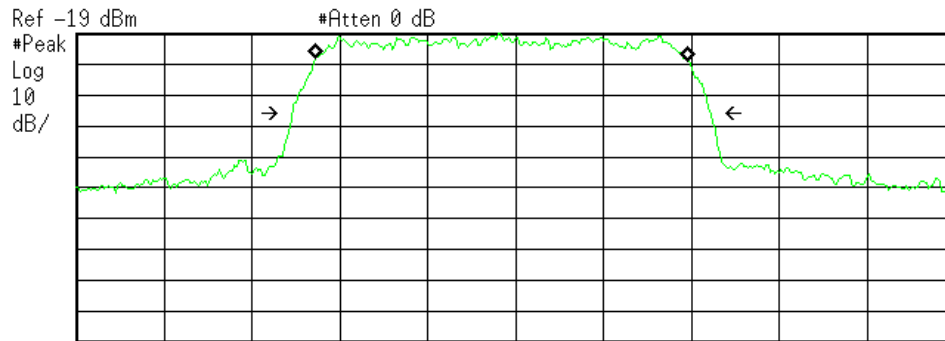
Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 2.979 kHz
 x dB Bandwidth 1.429 MHz

Mid Channel

Agilent 23:06:03 Jan 10, 2012

R L



Ref -19 dBm #Atten 0 dB
 Center 1.965 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2672 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

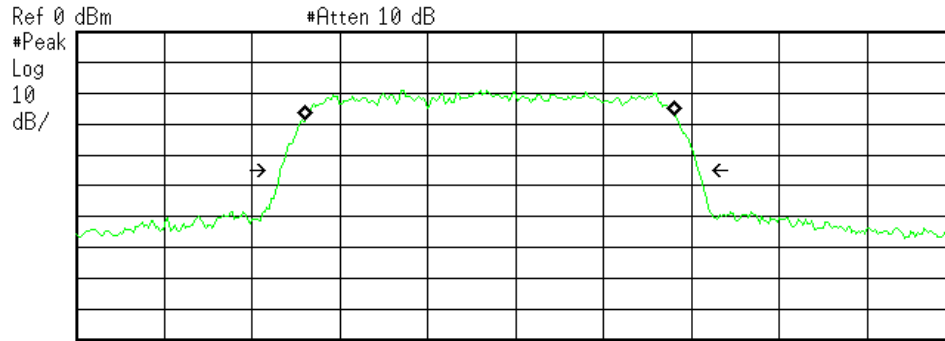
Transmit Freq Error -46.189 kHz
 x dB Bandwidth 1.429 MHz



High Channel

Agilent 00:07:45 Jan 11, 2012

R L



Center 1.989 GHz #Atten 10 dB Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2596 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

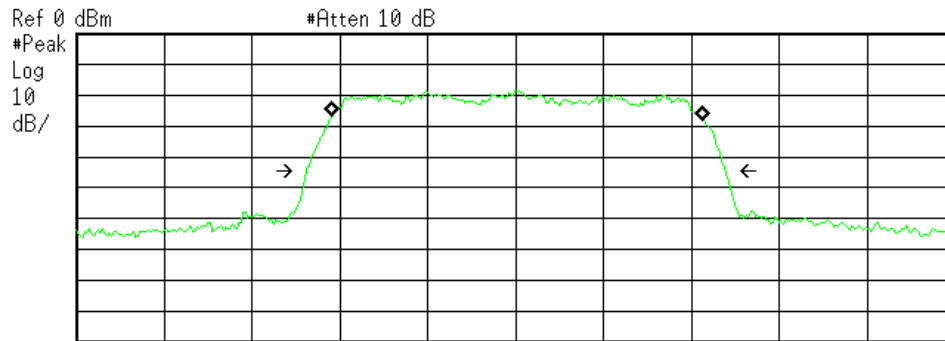
Transmit Freq Error -86.828 kHz
x dB Bandwidth 1.425 MHz

1x

Low Channel

Agilent 00:49:19 Jan 11, 2012

R L



Center 1.933 GHz #Atten 10 dB Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2636 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

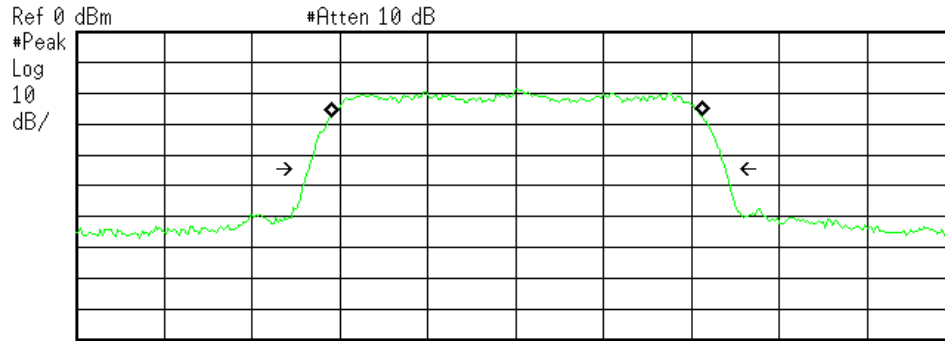
Transmit Freq Error 5.186 kHz
x dB Bandwidth 1.431 MHz



Mid Channel

Agilent 00:33:12 Jan 11, 2012

R L



Ref 0 dBm #Atten 10 dB
 Center 1.965 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2653 MHz

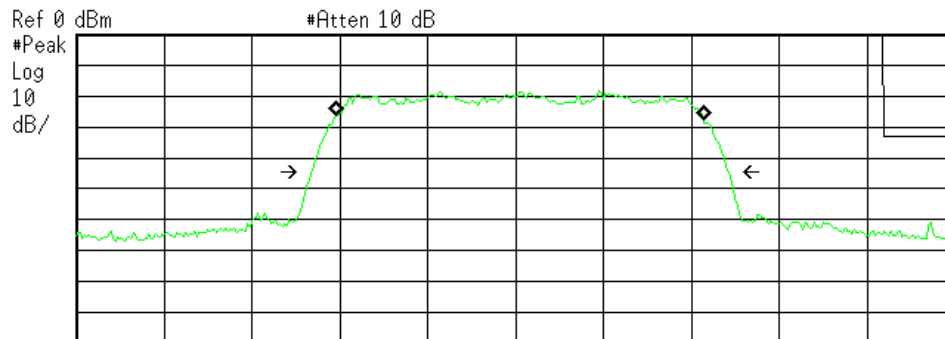
Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 2.974 kHz
 x dB Bandwidth 1.427 MHz

High Channel

Agilent 02:12:30 Jan 11, 2012

R L



Ref 0 dBm #Atten 10 dB
 Center 1.989 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 1.2584 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 13.054 kHz
 x dB Bandwidth 1.423 MHz

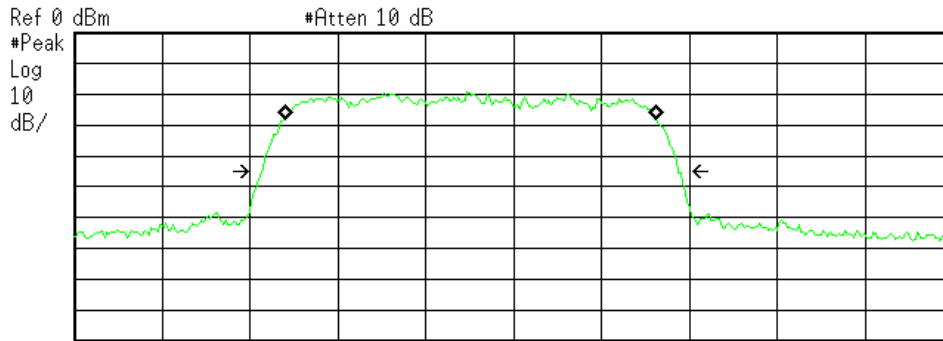


Beacon

Low Channel

Agilent 02:46:10 Jan 11, 2012

R L



Center 1.933 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
1.2699 MHz

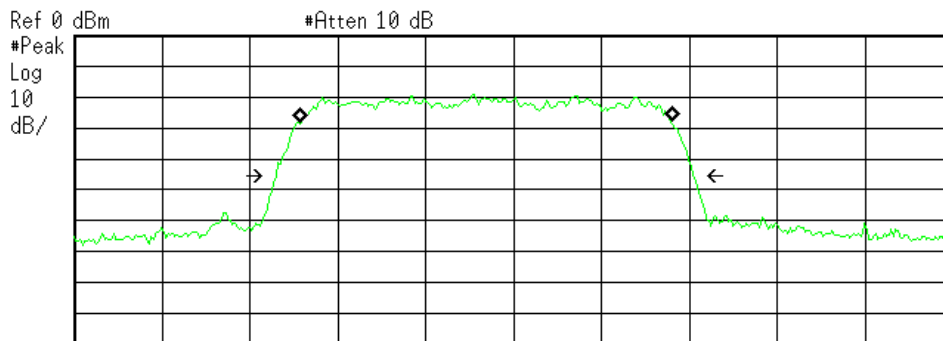
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -146.712 kHz
x dB Bandwidth 1.421 MHz

Mid Channel

Agilent 03:00:27 Jan 11, 2012

R L



Center 1.965 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 300 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
1.2663 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

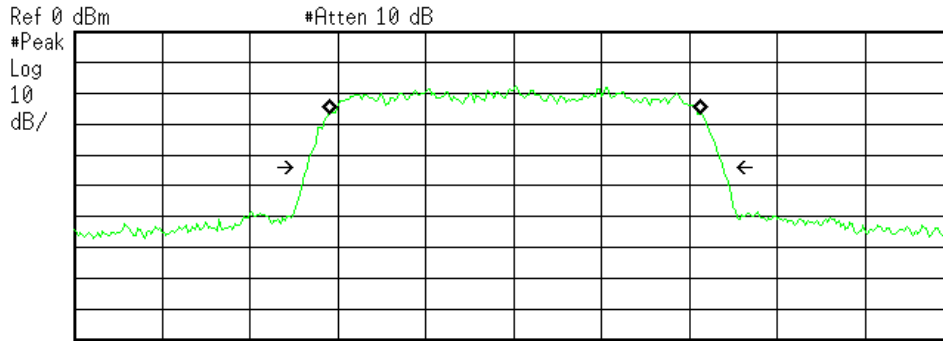
Transmit Freq Error -96.878 kHz
x dB Bandwidth 1.425 MHz



High Channel

Agilent 03:15:32 Jan 11, 2012

R L



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

Occupied Bandwidth
 1.2709 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 4.418 kHz
 x dB Bandwidth 1.420 MHz



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											
Date: 12-Jan-12			Company: Airvana			Work Order: L2238					
Engineer: Matthew Burman			EUT Desc: Femto Cell 750701			EUT Operating Voltage/Frequency: 120Vac 60Hz					
Temp: 21.0°C			Humidity: 21%			Pressure: 997mBar					
Frequency Range: 1930-1990MHz						Measurement Distance: 3 m					
Notes: Substitution Method											
2W = 33dBm											
Antenna Polarization (H / V)	Frequency (MHz)	Field Strength (dBµV/m)	Signal Generator Power (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Adjusted Power (dBm)	FCC 24.232 (c)				
							Limit (dBm)	Margin (dB)	Result (Pass/Fail)		
DO		---	---	---	---	---	---	---	---	---	---
Low Channel		---	---	---	---	---	---	---	---	---	---
V	1932.5	107.5	2.8	6.3	1.4	7.7	---	---	33.0	-25.3	Pass
H	1932.5	108.2	4.3	5.7	1.4	8.6	---	---	33.0	-24.4	Pass
Mid Channel		---	---	---	---	---	---	---	---	---	---
V	1965.0	111.03	8.8	6.3	1.4	13.7	---	---	33.0	-19.3	Pass
H	1965.0	113.03	8.2	5.7	1.4	12.5	---	---	33.0	-20.5	Pass
High Channel		---	---	---	---	---	---	---	---	---	---
V	1988.75	110.85	9.0	6.3	1.4	13.9	---	---	33.0	-19.1	Pass
H	1988.75	113.4	8.8	5.7	1.4	13.1	---	---	33.0	-19.9	Pass
1x		---	---	---	---	---	---	---	---	---	---
Low Channel		---	---	---	---	---	---	---	---	---	---
V	1932.5	109.91	6.2	6.3	1.4	11.1	---	---	33.0	-21.9	Pass
H	1932.5	108.29	4.4	5.7	1.4	8.7	---	---	33.0	-24.3	Pass
Mid Channel		---	---	---	---	---	---	---	---	---	---
V	1965.0	105.5	3.2	6.3	1.4	8.1	---	---	33.0	-24.9	Pass
H	1965.0	102.68	4.0	5.7	1.4	8.3	---	---	33.0	-24.7	Pass
High Channel		---	---	---	---	---	---	---	---	---	---
V	1988.75	108.2	6.6	6.3	1.4	11.5	---	---	33.0	-21.5	Pass
H	1988.75	102.88	-1.8	5.7	1.4	2.5	---	---	33.0	-30.5	Pass
Beacon		---	---	---	---	---	---	---	---	---	---
Low Channel		---	---	---	---	---	---	---	---	---	---
V	1932.5	108.71	4.9	6.3	1.4	9.8	---	---	33.0	-23.2	Pass
H	1932.5	108.29	4.4	5.7	1.4	8.7	---	---	33.0	-24.3	Pass
Mid Channel		---	---	---	---	---	---	---	---	---	---
V	1965.0	110.56	8.1	6.3	1.4	13.0	---	---	33.0	-20.0	Pass
H	1965.0	113.44	8.9	5.7	1.4	13.2	---	---	33.0	-19.8	Pass
High Channel		---	---	---	---	---	---	---	---	---	---
V	1988.75	103.91	2.1	6.3	1.4	7.0	---	---	33.0	-26.0	Pass
H	1988.75	107.57	3.0	5.7	1.4	7.3	---	---	33.0	-25.7	Pass
Table Result:			Pass								
Test Site: 1DCC-OATS-3M-I			Signal Generator: Red			Receive Cable: EMIR-High-22					
Analyzer: Rental SA#5			Receive Antenna: Orange Horn			Transmit Cable: EMIR-High-21					
			Transmit Antenna: Red Horn								



Combined EIRP Calculations

3 Transmitters on same frequency

Frequency (MHz)	EIRP 1 (dBm)	EIRP 2 (dBm)	EIRP 3 (dBm)	Total EIRP (dBm)	Limit (dBm)	Result
1932.5	8.6	11.1	9.8	14.724168	33	Pass
1965	13.7	8.3	13.2	17.083876	33	Pass
1988.75	13.9	11.5	7.3	16.438747	33	Pass

2 Transmitters on same frequency

Frequency (MHz)	EIRP 1 (dBm)	EIRP 2 (dBm)	Total EIRP (dBm)	Limit (dBm)	Result
1932.5	8.6	11.1	13.0377592	33	Pass
1965	13.7	8.3	14.8005178	33	Pass
1988.75	13.9	11.5	15.8740185	33	Pass



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)]

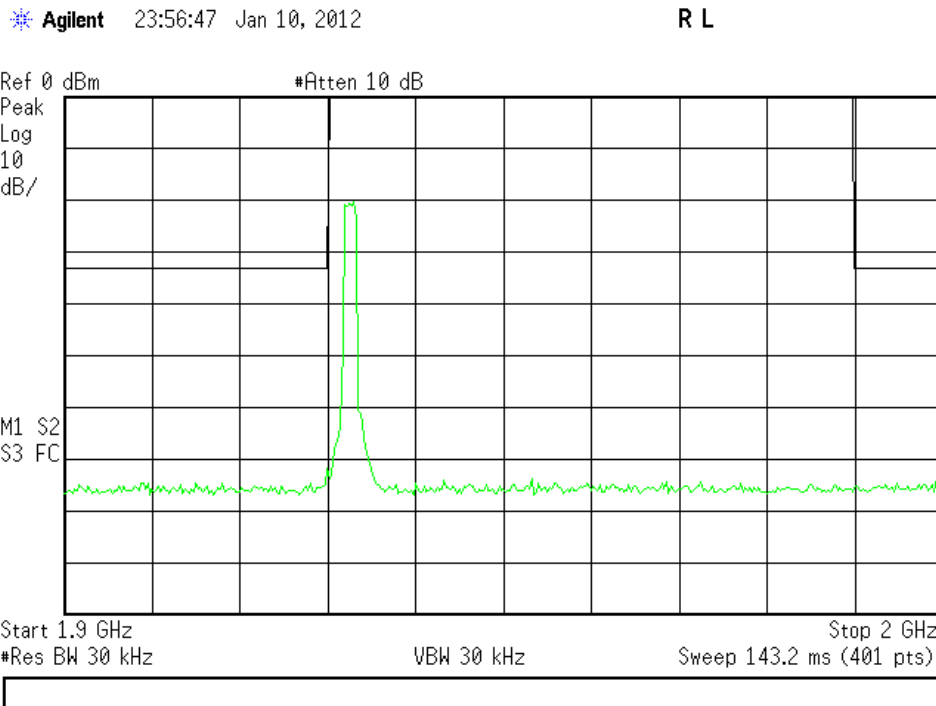
"A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1MHz or 1 percent of emission bandwidth, as specified)."[24.238(b)]

MEASUREMENTS / RESULTS

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

DO

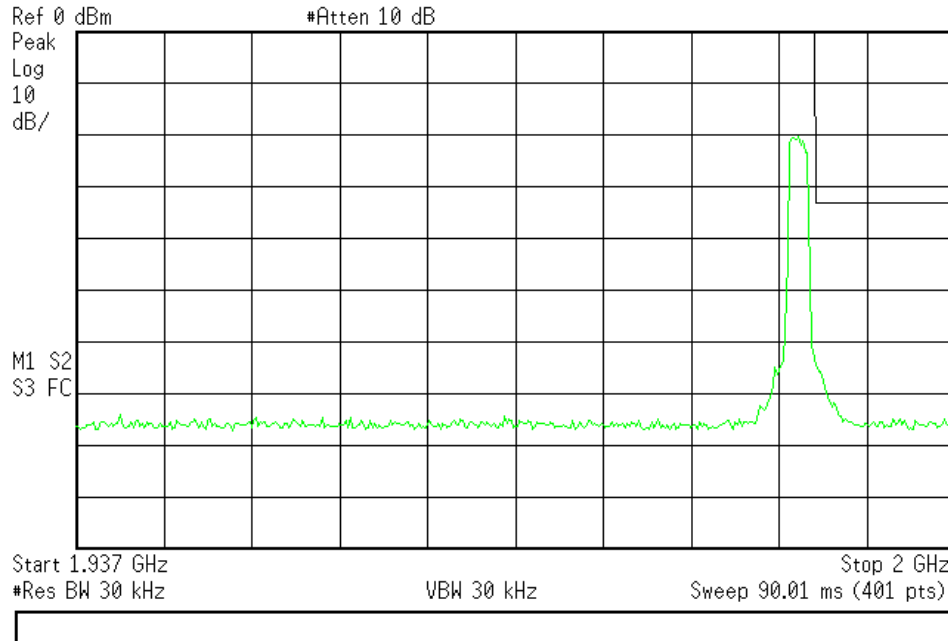
Low Channel



High Channel

Agilent 00:06:15 Jan 11, 2012

R L

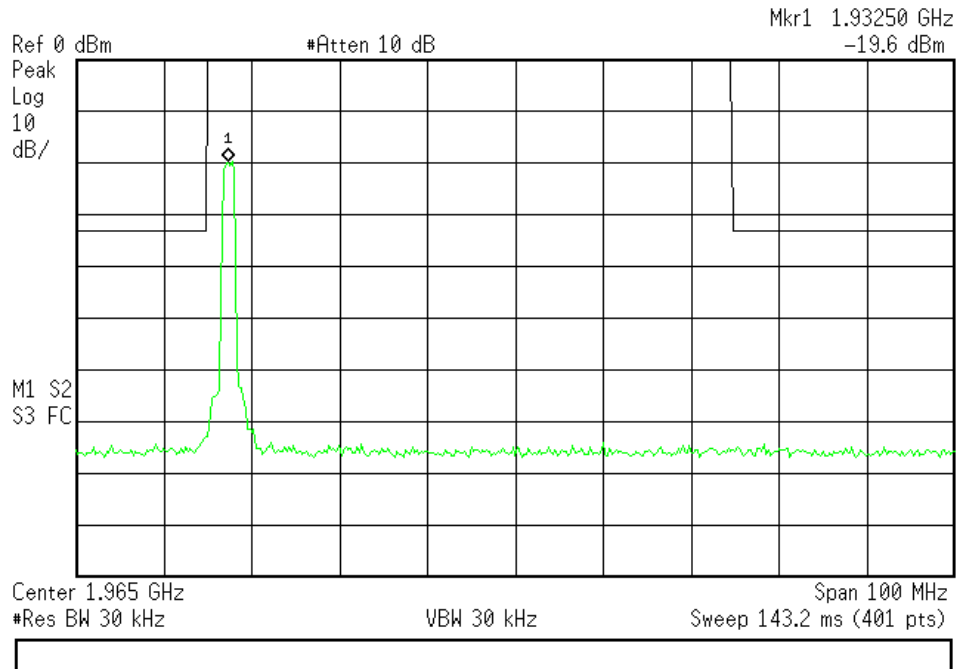


1x

Low Channel

Agilent 00:48:14 Jan 11, 2012

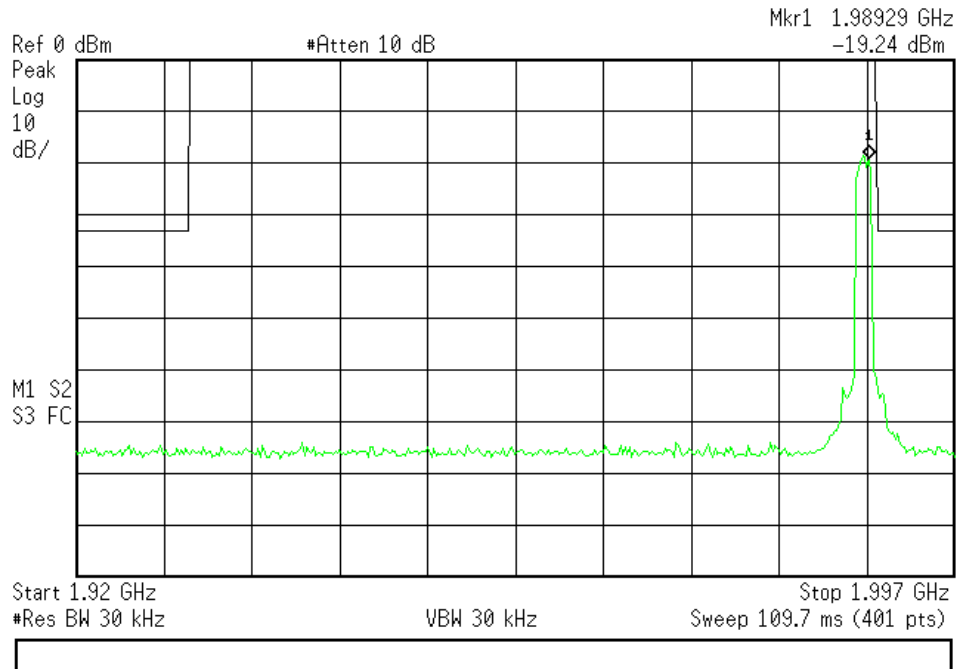
R L



High Channel

Agilent 02:11:06 Jan 11, 2012

R L

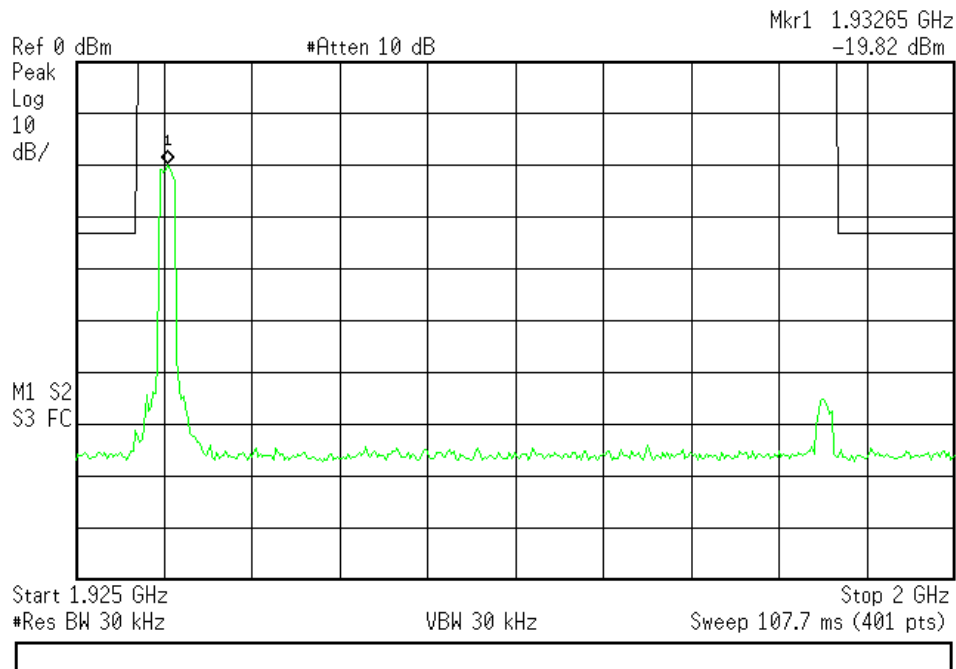


Beacon

Low Channel

Agilent 02:44:43 Jan 11, 2012

R L

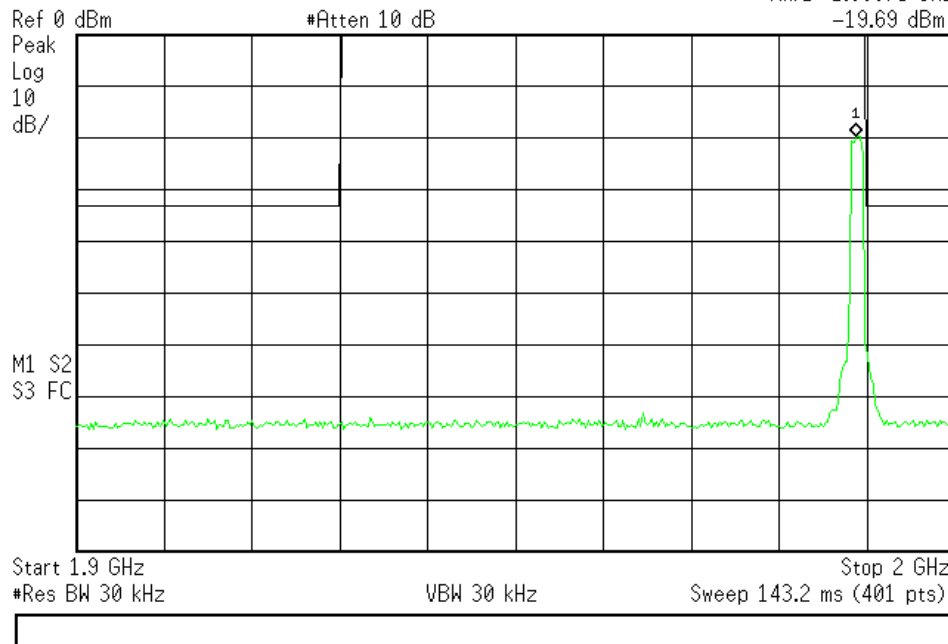


High Channel

Agilent 03:13:38 Jan 11, 2012

R L

Mkr1 1.98875 GHz
-19.69 dBm



Radiated Spurious Emissions 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)]

MEASUREMENTS / RESULTS

Radiated Emissions Table												
Date: 09-Jan-12			Company: Airvana				Work Order: L2238					
Engineer: Ahmed Ahmed			EUT Desc: 750701 Fempto Cell				EUT Operating Voltage/Frequency: 120VAC, 60Hz					
Temp: 23.1°C			Humidity: 16%				Pressure: 998mBar					
Frequency Range: 30-1000MHz						Measurement Distance: 3 m						
Notes:												
-13dBm = 82.157dBuV/m at 3m												
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBuV/m)	---			FCC Part 24.238 (a)		
							Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)
V	33.11	31.3	22.8	18.8	0.6	27.9	---	---	---	82.2	-54.3	Pass
V	48.45	36.0	22.9	8.5	0.6	22.2	---	---	---	82.2	-60.0	Pass
V	61.68	42.8	22.8	8.0	0.6	28.6	---	---	---	82.2	-53.6	Pass
V	100.0	46.9	22.7	10.2	0.7	35.1	---	---	---	82.2	-47.1	Pass
V	135.4	36.3	22.8	13.6	0.8	27.9	---	---	---	82.2	-54.3	Pass
V	185.2	35.0	22.8	10.7	1.0	23.9	---	---	---	82.2	-58.3	Pass
H	199.8	39.6	22.9	12.1	1.0	29.8	---	---	---	82.2	-52.4	Pass
V	200.0	45.7	22.9	12.1	1.0	35.9	---	---	---	82.2	-46.3	Pass
H	265.9	46.2	22.8	12.8	1.2	37.4	---	---	---	82.2	-44.8	Pass
H	400.0	34.0	22.6	15.4	1.4	28.2	---	---	---	82.2	-54.0	Pass
V	625.0	33.5	22.7	19.2	1.9	31.9	---	---	---	82.2	-50.3	Pass
H	834.2	28.7	21.9	21.6	2.2	30.6	---	---	---	82.2	-51.6	Pass
Table Result: Pass			by -44.8 dB							Worst Freq: 265.9 MHz		
Test Site: EMI Chamber 2			Cable 1: Asset #1506				Cable 2: Asset #1507					
Analyzer: Asset #1328			Preamp: Blue				Antenna: Red-Black					

Radiated Emissions Table												
Date: 09-Jan-12			Company: Airvana				Work Order: L2238					
Engineer: Ahmed Ahmed			EUT Desc: 750701 Fempto Cell				EUT Operating Voltage/Frequency: 120VAC, 60Hz					
Temp: 23.1°C			Humidity: 16%				Pressure: 998mBar					
Frequency Range: 1-6GHz						Measurement Distance: 3 m						
Notes: Substitution method												
Antenna Polarization (H/V)	Frequency (MHz)	Field Strength (dBuV/m)	Signal Generator Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Adjusted Power (dBm)	---			FCC Part 24.238 (a)		
							Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)
H	1088.0	56.55	-47.5	1.1	4.9	-43.7	---	---	---	-13.0	-30.7	Pass
V	1088.0	63.41	-40.6	1.1	4.9	-36.8	---	---	---	-13.0	-23.8	Pass
V	1166.0	53.7	-50.7	1.1	5.2	-46.6	---	---	---	-13.0	-33.6	Pass
V	1731.0	60.48	-46.5	1.3	8.0	-39.8	---	---	---	-13.0	-26.8	Pass
H	3930.0	67.08	-39.7	2.1	8.6	-33.2	---	---	---	-13.0	-20.2	Pass
V	3930.0	69.2	-37.6	2.1	8.6	-31.1	---	---	---	-13.0	-18.1	Pass
Table Result: Pass			by -18.1							Worst Freq: 3930.0 MHz		
Receive Setup												
Test Site: EMI Chamber 2			Cable 1: Asset #1506				Cable 2: Asset #1507					
Analyzer: Rental SA#1			Preamp: Brown				Antenna: Yellow Horn					
Transmit Setup												
Test Site: EMI Chamber 2			Cable 1: EMIR-High -21									
Antenna: Red Horn			Signal Generator: Rental SA#1									



Radiated Emissions Table												
Date: 09-Jan-12			Company: Airvana				Work Order: L2238					
Engineer: Ahmed Ahmed			EUT Desc: 750701 Fempto Cell				EUT Operating Voltage/Frequency: 120VAC, 60Hz					
Temp: 23.1 °C			Humidity: 16%				Pressure: 998mBar					
Frequency Range: 6-18GHz						Measurement Distance: 1 m						
Notes:												
Antenna Polarization (H / V)	Frequency (MHz)	Field Strength (dBµV/m)	Signal Generator Power (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Adjusted Power (dBm)	FCC Part 24.238 (a)					
							Limit (dBm)	Margin (dB)	Result (Pass/Fail)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
H	11210.0	77.7	-45.1	18.6	3.9	-30.4	---	---	-13.0	-17.4	Pass	
Table Result:			Pass			by 17.4dB			Worst Freq: 11210.0 MHz			
Test Site: EMI Chamber 2			Tx Cable 1: Asset #1506				Signal Generator: Rental Sweeper					
Analyzer: Rental SA#1			Preamp: Brown				Transmit Antenna: Red Horn					
Tx Cable 2: Asset #1507			Receive Antenna: Yellow Horn				Transmit Cable: EMIR-High-21					

Radiated Emissions Table												
Date: 09-Jan-12			Company: Airvana				Work Order: L2238					
Engineer: Ahmed Ahmed			EUT Desc: 750701 Fempto Cell				EUT Operating Voltage/Frequency: 120VAC, 60Hz					
Temp: 23.1 °C			Humidity: 16%				Pressure: 998mBar					
Frequency Range: 18-20GHz						Measurement Distance: 1 m						
Notes:												
-13dBm = 91.7dBuV/m at 1m												
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	FCC Part 24.238 (a)					
							Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
No Emissions Found												
Table Result:			---			by --- dB			Worst Freq: --- MHz			
Test Site: EMI Chamber 2			Cable 1: 40GHz Mixer/18-26.5GHz no cable				Antenna: 18-26.5GHz Horn					
Analyzer: Rental SA#1			Preamp: 18-26.5GHz									



Conducted Spurious Emissions 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)]

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

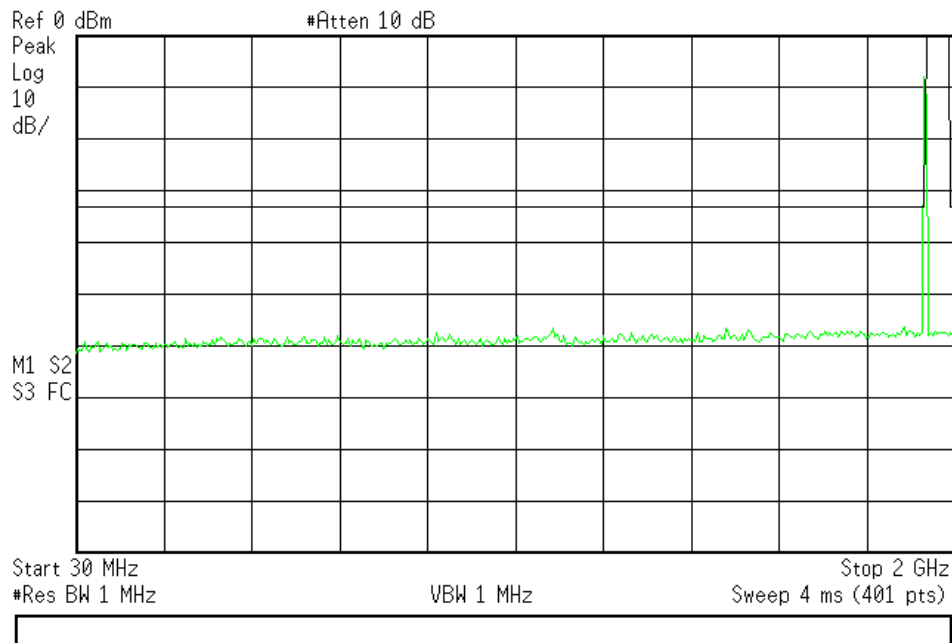
PLOTS

DO

30MHz to 2GHz

Agilent 23:52:43 Jan 10, 2012

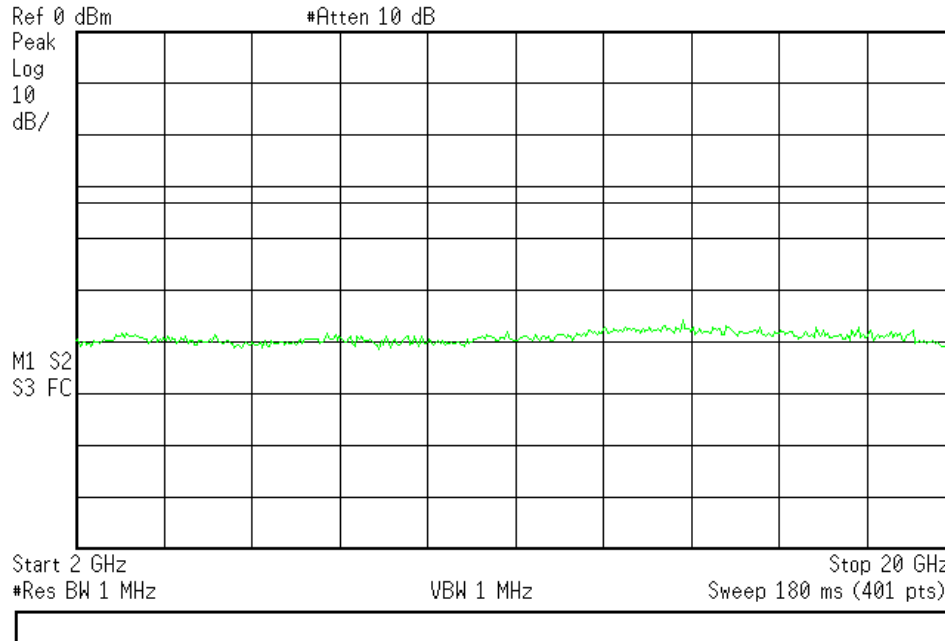
R L



2GHz to 20GHz

Agilent 23:54:13 Jan 10, 2012

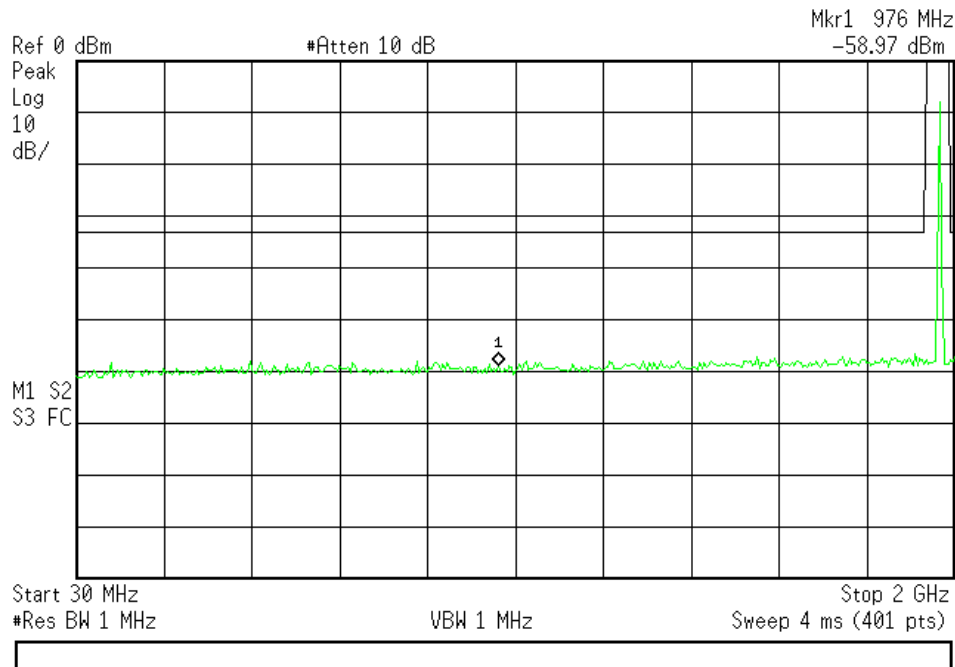
R L



1x
30MHz to 2GHz

Agilent 00:37:18 Jan 11, 2012

R L

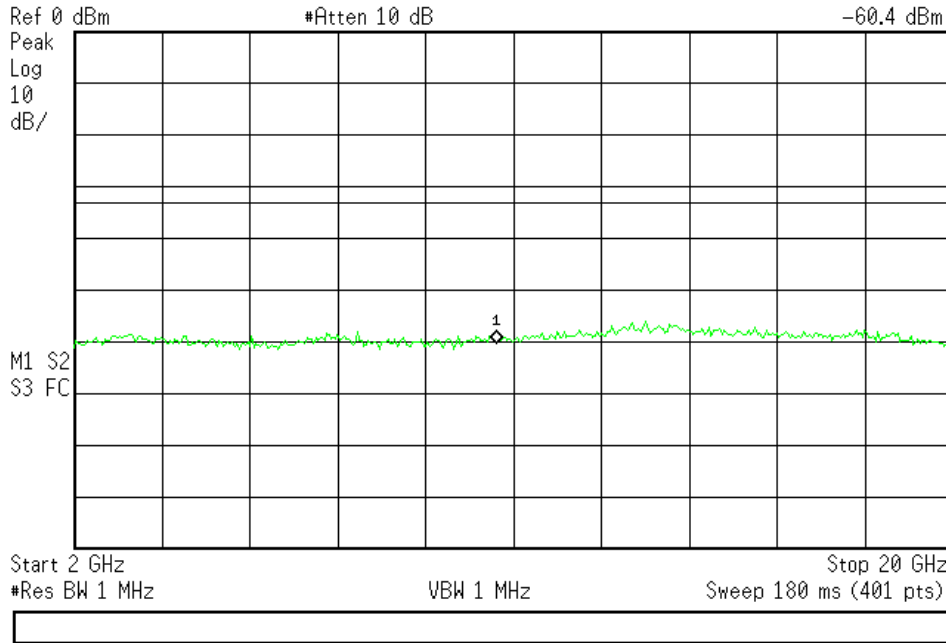


2GHz to 20GHz

Agilent 00:38:00 Jan 11, 2012

R L

Mkr1 10.640 GHz
-60.4 dBm



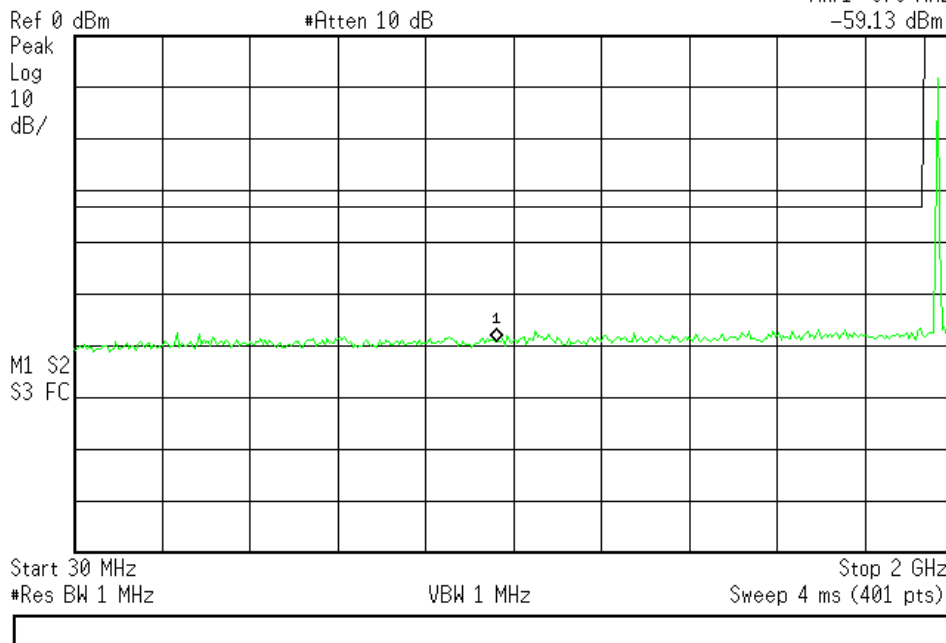
Beacon

30MHz to 2GHz

Agilent 03:03:39 Jan 11, 2012

R L

Mkr1 976 MHz
-59.13 dBm

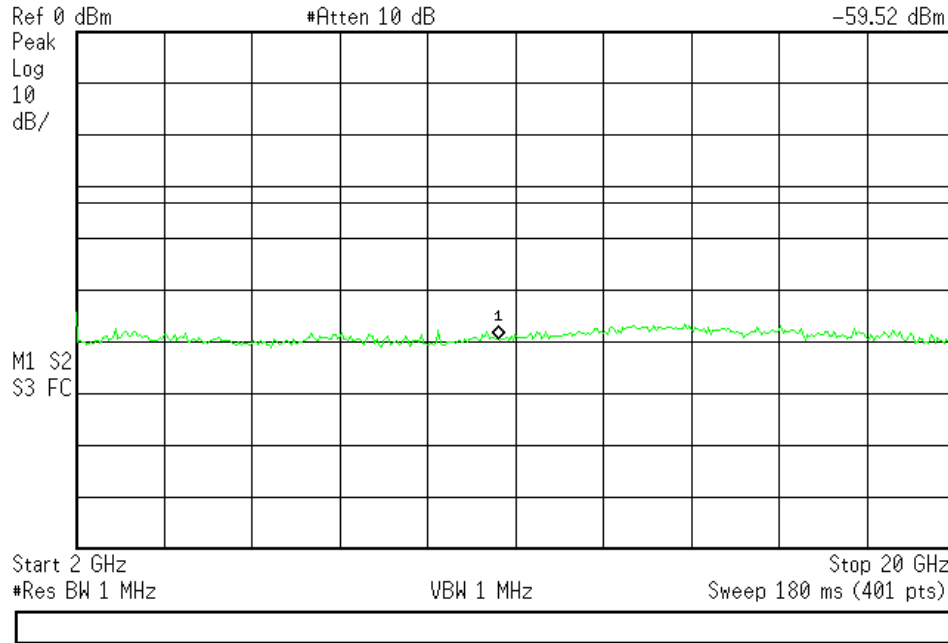


2GHz to 20GHz

Agilent 03:04:21 Jan 11, 2012

R L

Mkr1 10.640 GHz
-59.52 dBm



Frequency Stability

REQUIREMENT

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

MEASUREMENTS / RESULTS

Frequency Stability		Curtis-Straus LLC	
Engineer: Matthew Burman		Company: Airvana	
Date: 1/11/2012		EUT: 750701 Fempto Cell	
Analyzer: Asset #1491		Work Order: L2238	
Cable: EMIR-High-22			
Note: Reference: 20°C 110VAC			
Temperature	Supply Voltage	Center Frequency	Frequency Delta
(°C)	(VAC)	(Hz)	(ppm)
-30	110	1932499910	0.00
-20	110	1932499910	0.00
-10	110	1932499910	0.00
0	110	1932499910	0.00
10	110	1932499920	-0.01
20	93.5	1932499910	0.00
20	110	1932499910	0.00
20	126.5	1932499895	0.01
30	110	1932499890	0.01
40	110	1932499910	0.00
50	110	1932499925	-0.01



Test Equipment Used

Spectrum Analyzers / Receivers /Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Rental SA #5		9kHz-26.5 GHz	E4407B	Agilent	MY44220066	1491	I	17-Mar-2012
Radiated Emissions Sites		FCC Code	IC Code	VCCI Code			Cat	Calibration Due
1DCC-OATS-3M-I		719150	2762A-8	R-3109, G-494			II	7-Feb-2012
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Orange Horn		1-18GHz	3115	EMCO	0004-6123	390	I	27-Jul-2013
Red Horn		1-10GHz	3115	EMCO		1687	II	See RFI Systems
Meteorological Meters			MN	Mfr	SN	Asset	Cat	Calibration Due
Temp./Humidity/Atm. Pressure Gauge			7400 Perception II	Davis	N/A	965	I	4-Apr-2013
1DCC-OATS-3M-I Thermohyrometer			35519-044	Control Company	72457635	1334	II	19-Aug-2013
Cables		Range		Mfr			Cat	Calibration Due
REMI-High-21		9kHz - 26.5GHz		C-S			II	18-Jan-2012
REMI-High-22		9kHz - 15GHz		C-S			II	18-Jan-2012
Signal Generators		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red		0.09-2000MHz	HP8648B	Agilent	3847U02192	366	I	13-Jul-2012

Rev: 30-Dec-2011

Spectrum Analyzers / Receivers /Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
SA EMI Chamber (1328)		9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	4-Mar-2012
Rental SA #1 (Brown)		9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	12-Apr-2012
Radiated Emissions Sites		FCC Code	IC Code	VCCI Code			Cat	Calibration Due
EMI Chamber 2		719150	2762A-7	R-3033, G-107			I	12-Mar-2013
Preamps /Couplers Attenuators / Filters		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Blue		0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	1-Jun-2012
Brown		1-18GHz	CS	CS	N/A	1523	II	10-Dec-2012
HF 20dB 50W Attenuator		0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	1-Jun-2013
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red-Black Bilog		30-2000MHz	JB1	Sunol	A091604-2	1106	I	3-Dec-2012
Yellow Horn		1-18GHz	3115	EMCO	9608-4898	37	I	17-Jun-2013
Signal Generators		Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Rental Sweeper		0.01-20.0GHz	HP83752B	Agilent	3610A01297	Rental	I	1-Jun-2012
Meteorological Meters			MN	Mfr	SN	Asset	Cat	Calibration Due
Temp./Humidity/Atm. Pressure Gauge			7400 Perception II	Davis	N/A	965	I	4-Apr-2013
CHAMBER2 Thermohyrometer			35519-044	Control Company	72457639	1347	II	19-Aug-2013
Cables		Range		Mfr			Cat	Calibration Due
Asset #1506		9kHz - 18GHz		Florida RF			II	19-Aug-2012
Asset #1507		9kHz - 26.5GHz		Florida RF			II	18-Jan-2012

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



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

