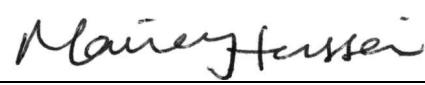




Test Report

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

| | |
|---------------------|---|
| Report No | EM2057-1 |
| Client | Signal Fire Telemetry |
| Address | 43 Broad Street, Unit A-403 Hudson, MA 01749 |
| Phone | (978) 212-2868 |
| Items tested | Sentinel Node Radio |
| FCC ID | W8V-SENTINEL |
| IC ID | 8373A-SENTINEL |
| FRN | 001814347 |
| Equipment Type | DSS |
| Equipment Code | Part 15, Frequency Hopping Spread Spectrum Transmitter |
| FCC/IC Rule Parts | 47 CFR 15.247, RSS 210 issue 8 and RSS GEN issue 3, 47 CFR 15 B |
| Test Dates | September 10-11, 2012 |
| Results | As detailed within this report |
| Prepared by |  Edward Breen – Test Engineer |
| Authorized by |  Mairaj Hussain – EMC Supervisor |
| Issue Date | 9/27/12 |
| Conditions of Issue | This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 38 of this report. |

Curtis-Straus LLC is accredited to ISO/IEC 17025 by A2LA for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation. See our scope of accreditation at the end of this test report. Any opinions or interpretations expressed in this report are outside the scope of our A2LA accreditation as A2LA only accredits testing.

Testing Cert. No. 1627-01

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Testing Cert. No. 1627-01

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



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Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.247 and RSS-210. The product is the Sentinel Node Radio. It is a frequency hopping transmitter that operates in the range 905-925MHz.

We found that the product met the above requirements without modification. Josh Schadel from Signal Fire Telemetry was present during the testing. The test sample was received in good condition.

Test Methodology

Radiated emission and AC line conducted emission testing was performed according to the procedures specified in ANSI C63.4 (2003), FCC public notice DA00-705 and RSS-GEN.

Radiated Emissions were maximized by rotating the device around three orthogonal axes as well as varying the test antenna's height and polarity. The device antenna is hard wired to the board and could not be maximized separately. Product can be powered through an on board custom 3.6V battery or an external DC source. Radiated emissions and antenna port conducted emission testing was performed while operating through a bench top power supply. AC mains conducted emissions were performed on the AC side of support power supply.

Conducted emission at the antenna port was performed, as required by rule section.

The product was configured for the transmission to either be in the range of 902-915Mhz, or 915-928MHz during testing.

This report also covers unintentional portion of the device.

The following bandwidths were used during radiated spurious and line conducted emissions.

| Frequency | RBW | VBW |
|------------|--------|-------|
| 0.15-30MHz | 9kHz | 30kHz |
| 30-1000MHz | 120kHz | 1MHz |
| 1-10GHz | 1MHz | 3MHz |

Release Control Record

| | | |
|-----------|-------------------|------------------|
| Issue No. | Reason for change | Date Issued |
| 1 | Original Release | October 11, 2012 |

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Product Tested - Configuration Documentation

| EUT Configuration | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
| Work Order: M2057 | | | | | | | | |
| Company: Signal Fire Telemetry | | | | | | | | |
| Company Address: 43 Broad Street, Suite A-403 | | | | | | | | |
| Hudson, MA 01749 | | | | | | | | |
| Contact: Josh Schadel | | | | | | | | |
| Person Present: Josh Schadel | | | | | | | | |
| EUT Configuration | | | | | | | | |
| EUT: Sentinel Node | | | | | | | | |
| EUT Description: Sentinel Node Radio | | | | | | | | |
| EUT Tx Frequency: 905-925MHz | | | | | | | | |
| Support Equipment: | | | | | | | | |
| MN | | | | | | | | |
| HP DC Power Supply | | | | | | | | |
| E3612A | | | | | | | | |
| HP PC | | | | | | | | |
| MXD3480FQN | | | | | | | | |
| Monitor | | | | | | | | |
| -- | | | | | | | | |
| 08G16 | | | | | | | | |
| Mouse | | | | | | | | |
| -- | | | | | | | | |
| 97599 | | | | | | | | |
| Keyboard | | | | | | | | |
| -- | | | | | | | | |
| 09C487 | | | | | | | | |
| EUT Ports: | | | | | | | | |
| Port Label | | | | | | | | |
| No. | | | | | | | | |
| Port Type | | | | | | | | |
| No. of ports | | | | | | | | |
| Populated | | | | | | | | |
| Cable Type | | | | | | | | |
| Shielded | | | | | | | | |
| Ferrites | | | | | | | | |
| Length | | | | | | | | |
| Max Length | | | | | | | | |
| In/Out | | | | | | | | |
| NEBS Type | | | | | | | | |
| Unpopulated Reason | | | | | | | | |
| None | | | | | | | | |
| Software / Operating Mode Description: | | | | | | | | |
| EUT is transmitting from 905-925MHz | | | | | | | | |
| Performance Criteria: | | | | | | | | |
| EMI Only | | | | | | | | |



Statement of Conformity

The Sentinel Node Radio has been found to conform to the following parts of 47 CFR and RSS 210 as detailed below:

| RSS-GEN | RSS 210 | Part 15 | Comments |
|----------------|---------|------------------|---|
| 5.4 | | 15.15(b) | There are no controls accessible to the user that varies the output power. |
| 5.2 | | 15.19 | The label is shown in the label exhibit. |
| 7.1.3 7.1.2 | | 15.21 | Information to the user is shown in the instruction manual exhibit. |
| | | 15.27 | No special accessories are required for compliance. |
| 4.1 | | 15.31 | The EUT was tested in accordance with the measurement standards in this section. |
| | | 15.33 | Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates. |
| | | 15.35 | The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates. |
| 7.1.2 | | 15.203 | The antenna for this device is hardwired to the PCB. |
| | 2.5 | 15.205 15.209 | The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209. |
| 7.2.4 | | 15.207 | EUT meets the AC Line conducted emissions requirements of 15.207. |
| | Annex 8 | 15.247 | The unit complies with the requirements of 15.247 |
| 4.6.1 | | | Occupied Bandwidth measurements were made. |



Modifications Required for Compliance

No Modifications were required for compliance.



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Test Results

Bandwidth

LIMIT

The 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies. [15.247(a) (1) (i)]

MEASUREMENTS / RESULTS

| 20dB Bandwidth | | | Work Order: M2057 |
|---|---|--------------------|---|
| Date: 10-Sep-12 | Company: Signal Fire Telemetry | | |
| Engineer: Chris Reynolds | EUT Desc: Signal Fire Telemetry Sentinel Node | | EUT Operating Voltage/Frequency: 3.6VDC |
| Temp: 24.1 °C | Humidity: 31% | Pressure: 1007mBar | |
| Frequency Range: 902-928MHz | | | |
| Notes: RBW = 30kHz VBW = 30kHz | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (KHz) | |
| low channel | 905.0 | 90.0 | |
| mid channel | 915.0 | 87.5 | |
| high channel | 925.0 | 87.5 | |
| Test Site: 1DCC-OATS-3M-I Analyzer: Gold | | | |

Rev. 9/8/2012

| 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 |
| Meteorological Meters | | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Temp./Humidity/Atm. Pressure Gauge 1DCC-OATS-3M-I Thermohygrometer | | 7400 Perception II 35519-044 | Davis Control Company | N/A 72457635 | 965 1334 | I II | 4/4/2013 8/19/2013 |

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



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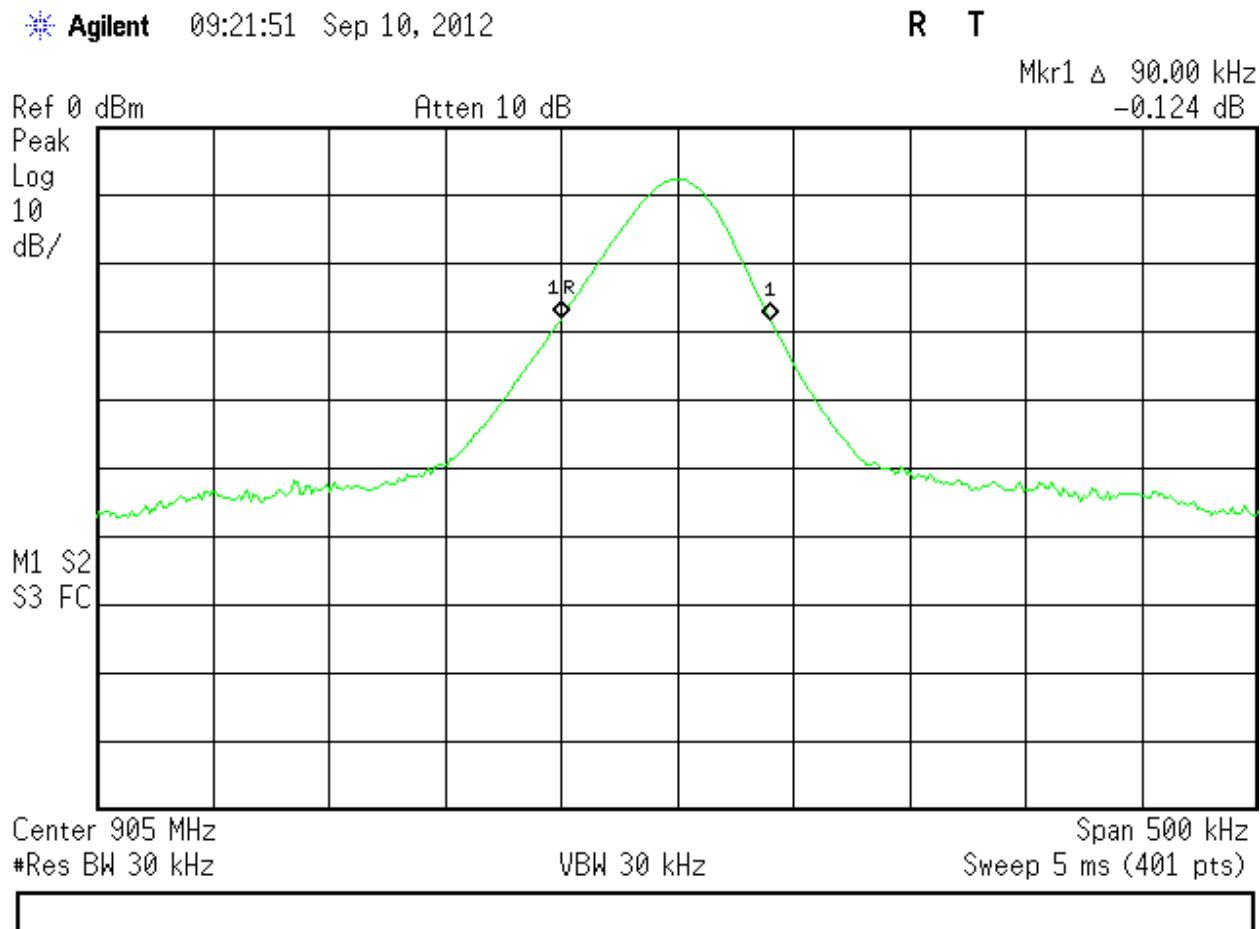
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Testing Cert. No. 1627-01

PLOT

Low Channel



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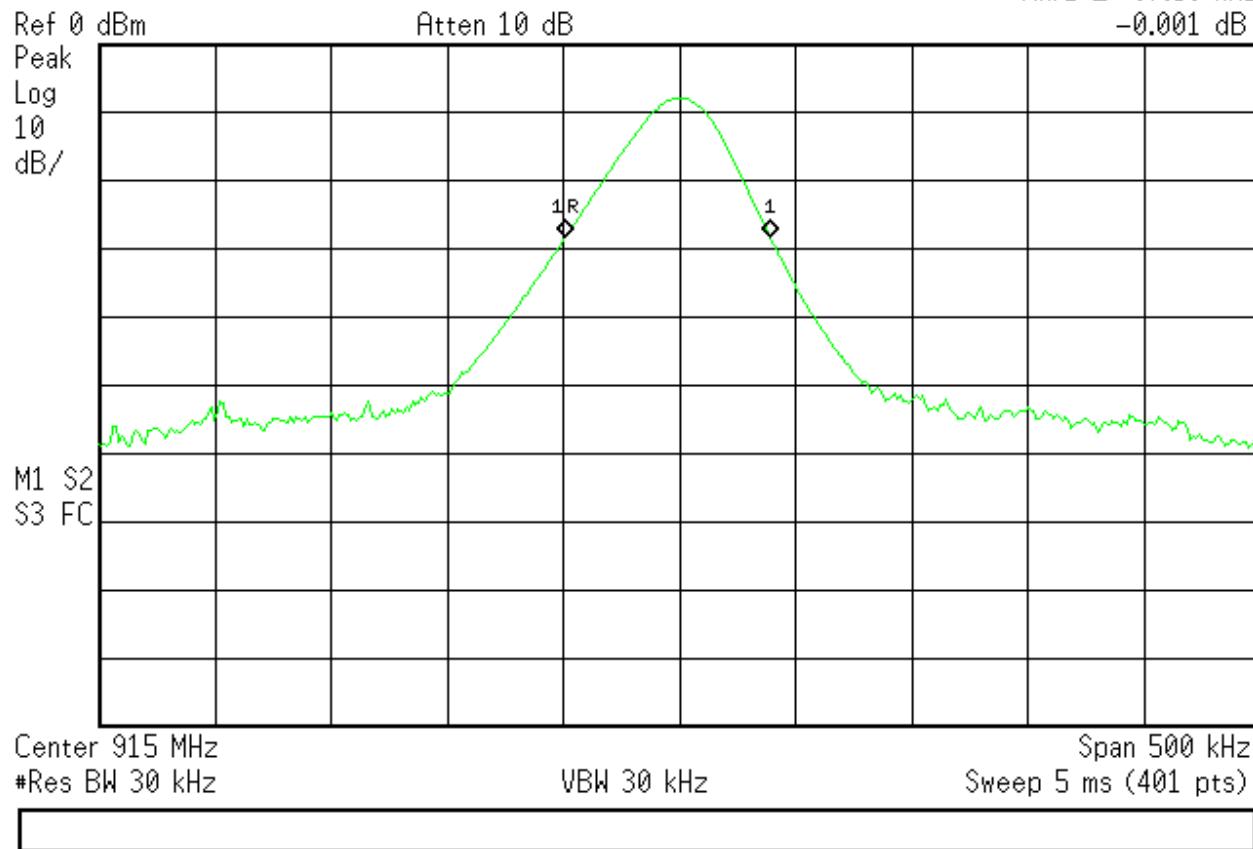
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Mid Channel

Agilent 09:25:02 Sep 10, 2012

R T

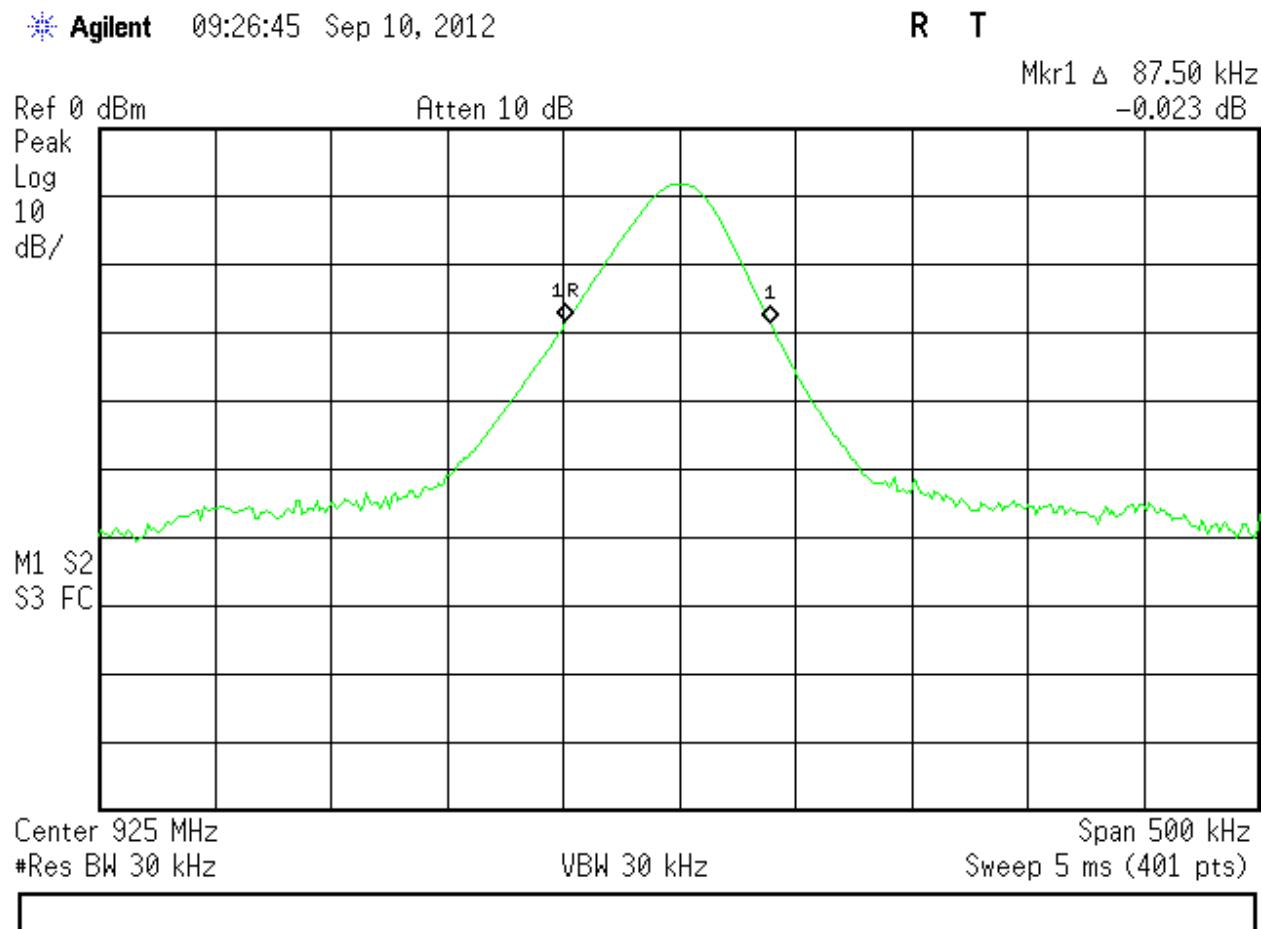
Mkr1 Δ 87.50 kHz
-0.001 dB

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High Channel



Frequency Hopping Requirements

Channel Spacing

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

[15.247 (a) (1)]

| | |
|----------|-----------|
| Engineer | CR |
| Date | 9-10-2012 |
| Site | 3Min |

Test Equipment Used

Rev. 9/24/2012

| 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 1DCC-OATS-3M-I | FCC Code 719150 | IC Code 2762A-8 | VCCI Code A-0015 | | | Cat II | Calibration Due 10/7/2012 |

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



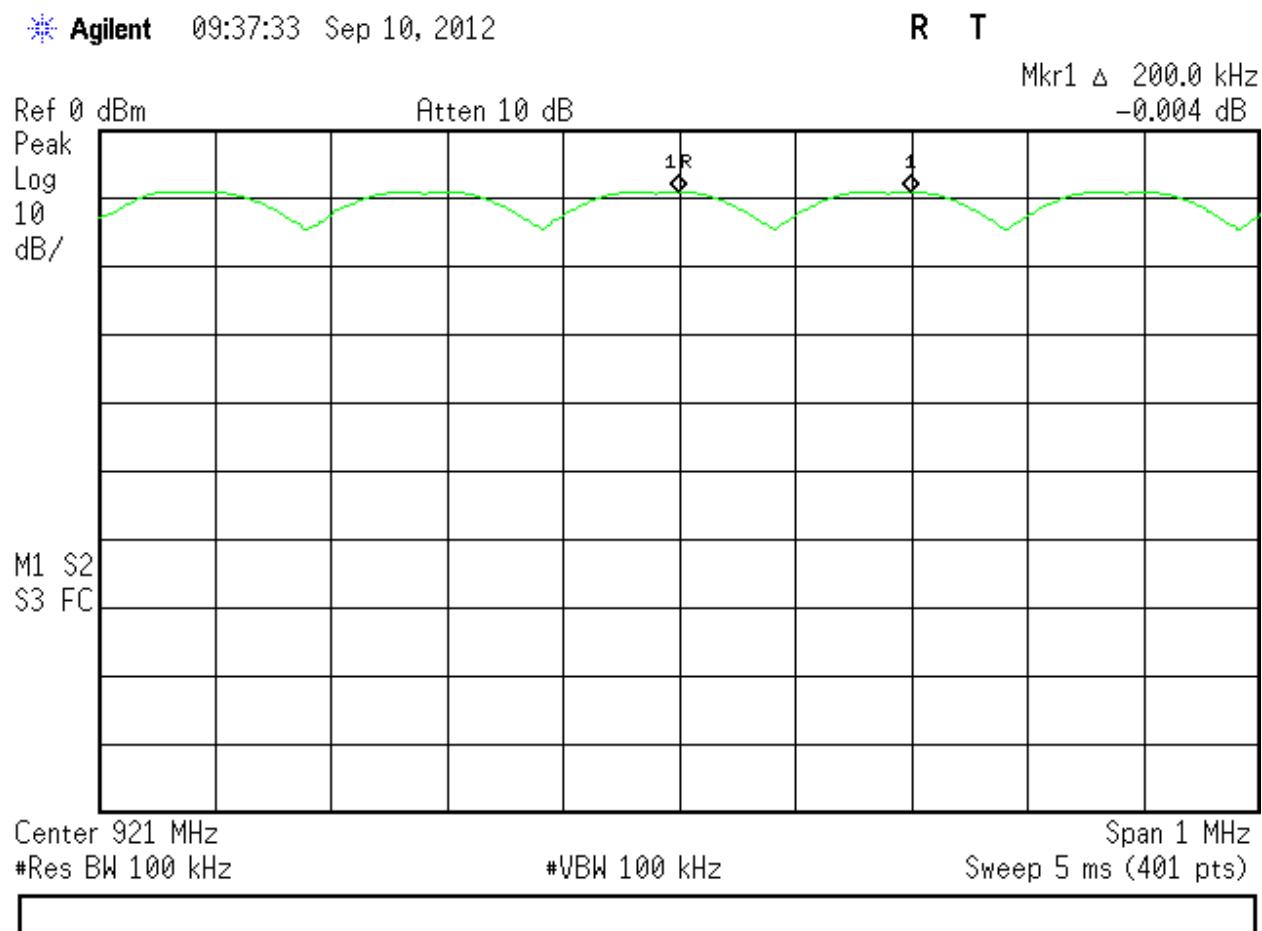
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Plots

Channel spacing between carrier frequencies 200.0kHz > 20dB bandwidth



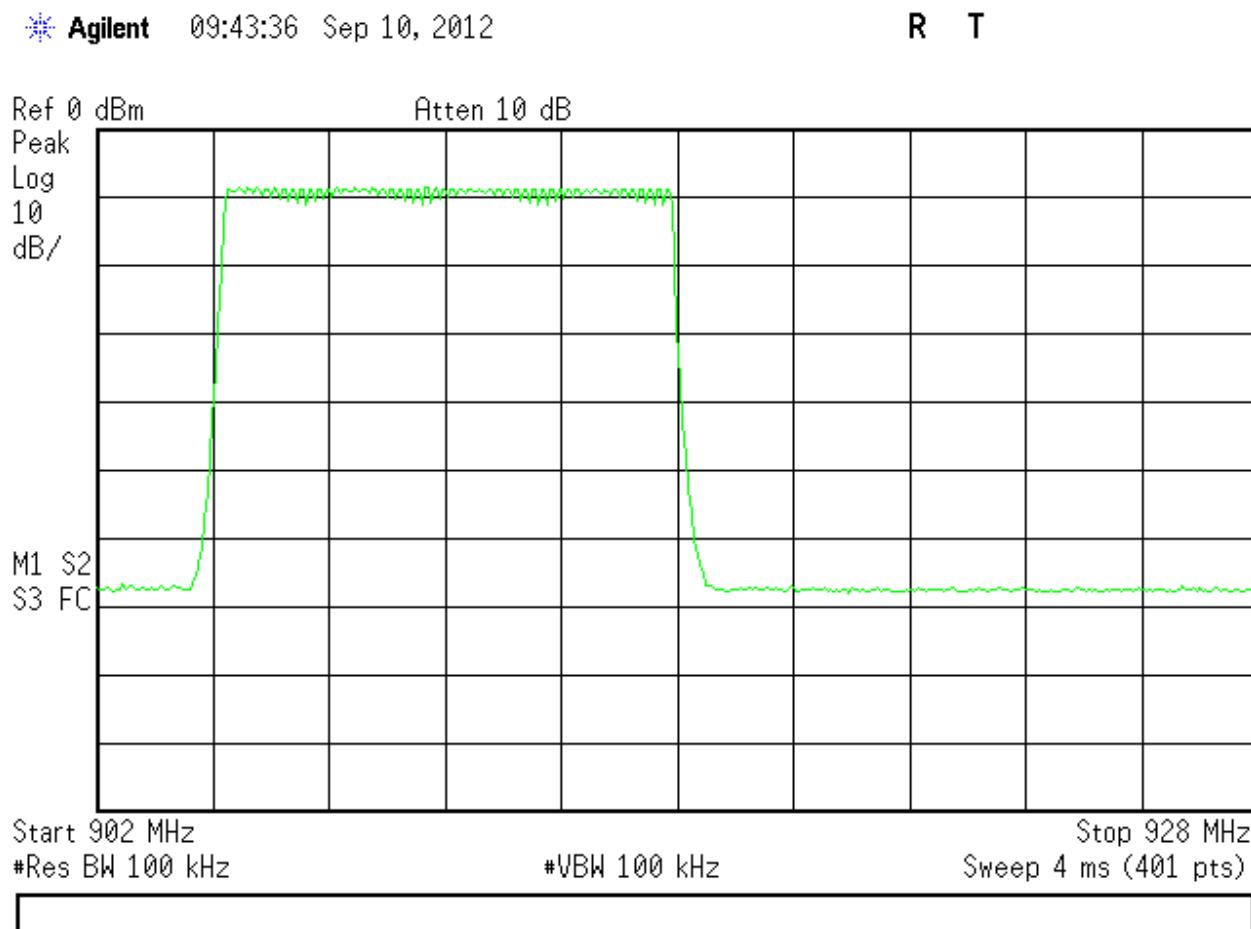
Number of Channels

For frequency hopping systems operating in the 902-928MHz band: if the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies

[15.247 (a) (1) (i)]

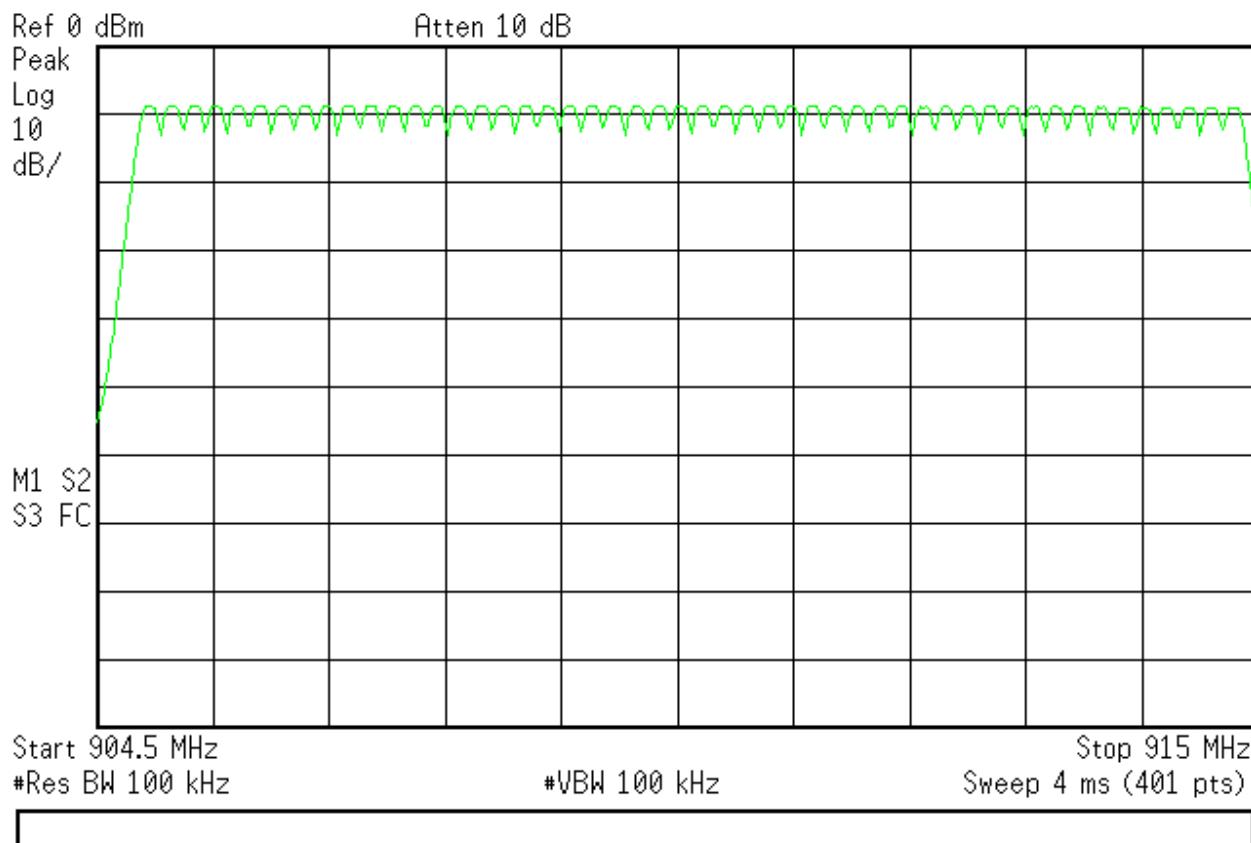
Plots

50 channels – low band



 Agilent 10:01:10 Sep 10, 2012

R T



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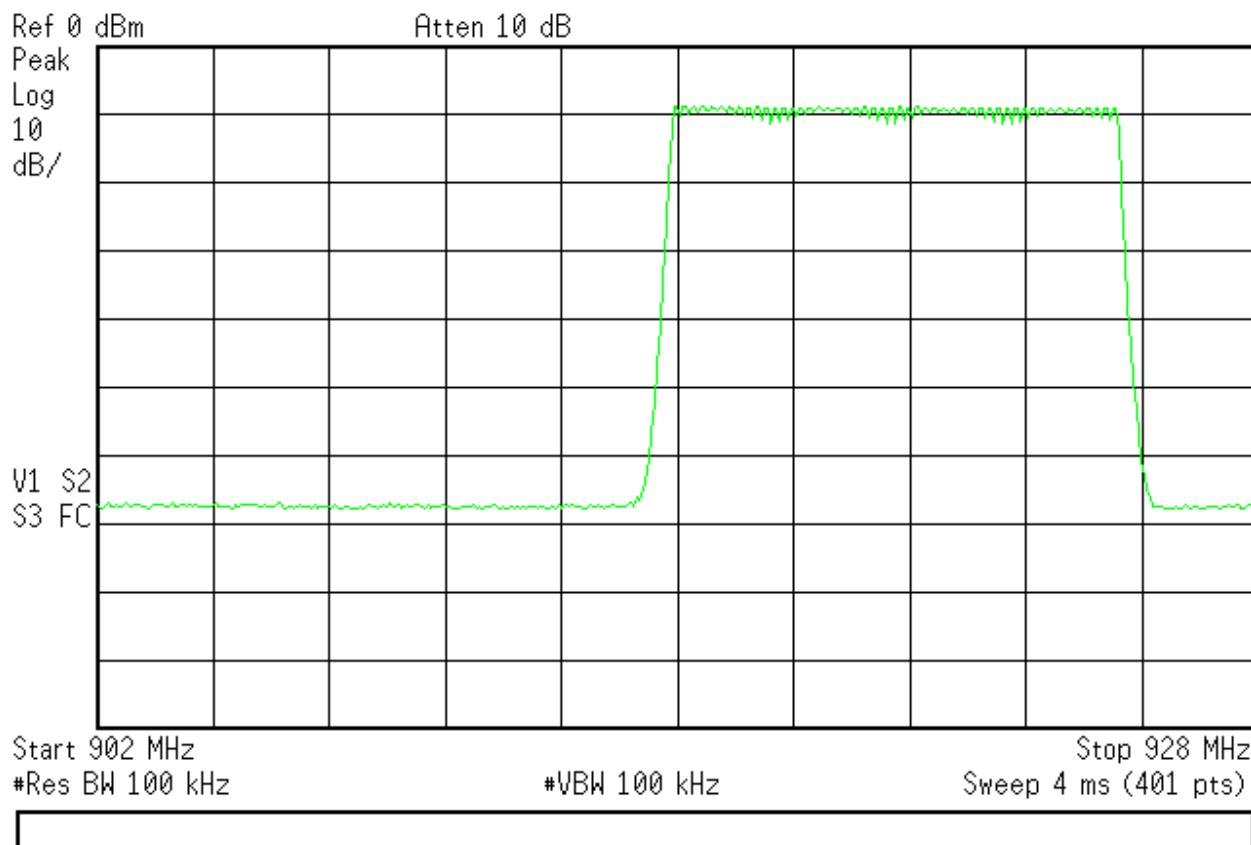
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50 channels – high band

 **Agilent** 09:47:37 Sep 10, 2012

R T



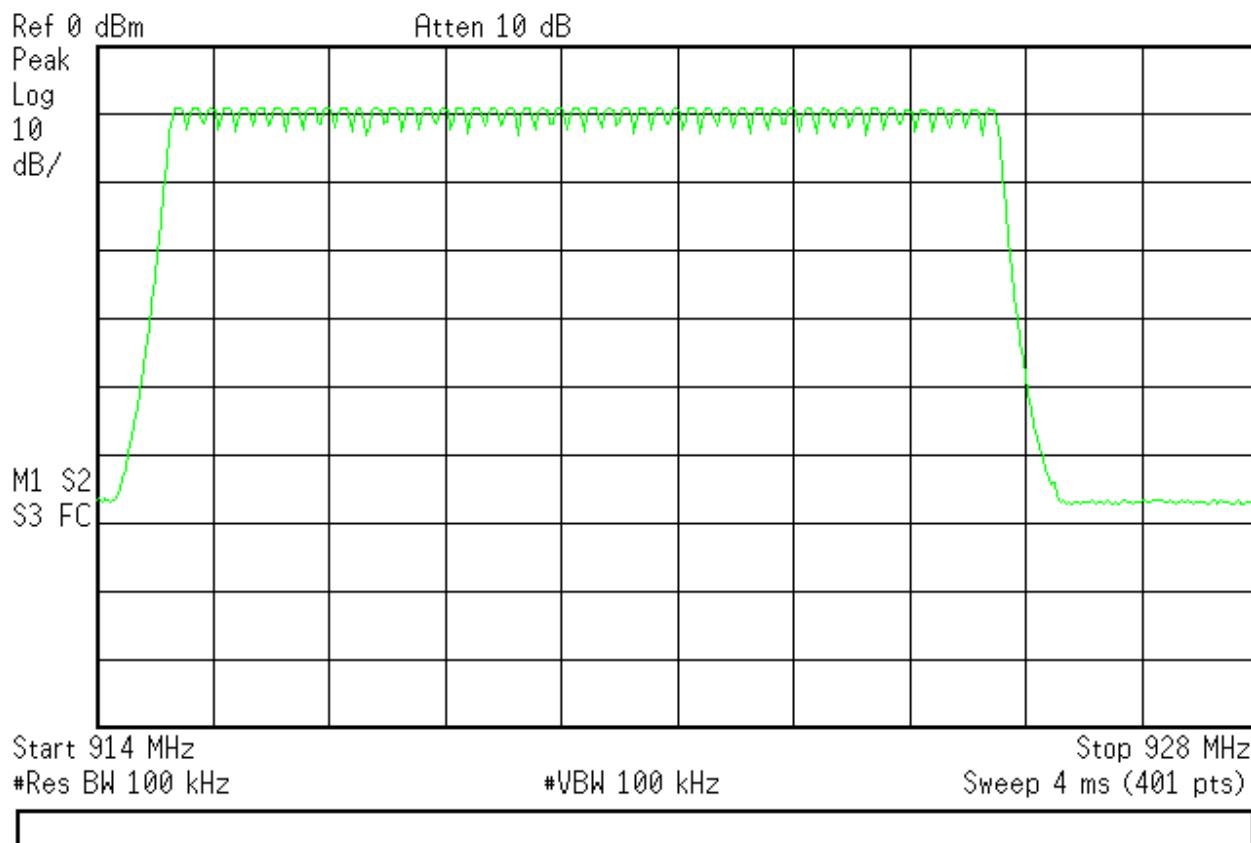
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 Agilent 10:05:32 Sep 10, 2012

R T



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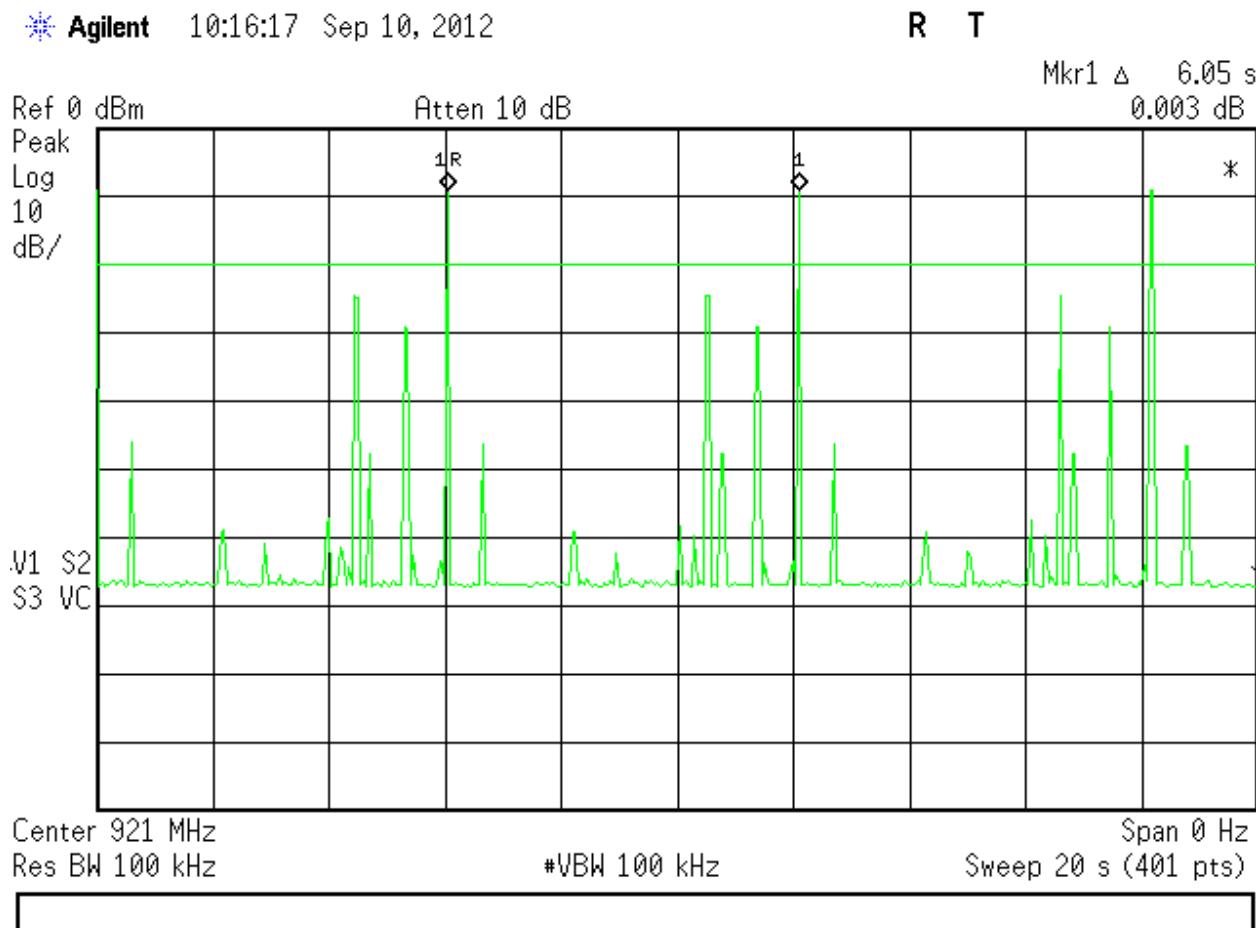


Occupancy Time

For frequency hopping systems operating in the 902-928MHz band:: if the 20dB bandwidth of the hopping channel is less than 250kHz ...the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period;

[15.247 (a) (1) (i)]

Plots



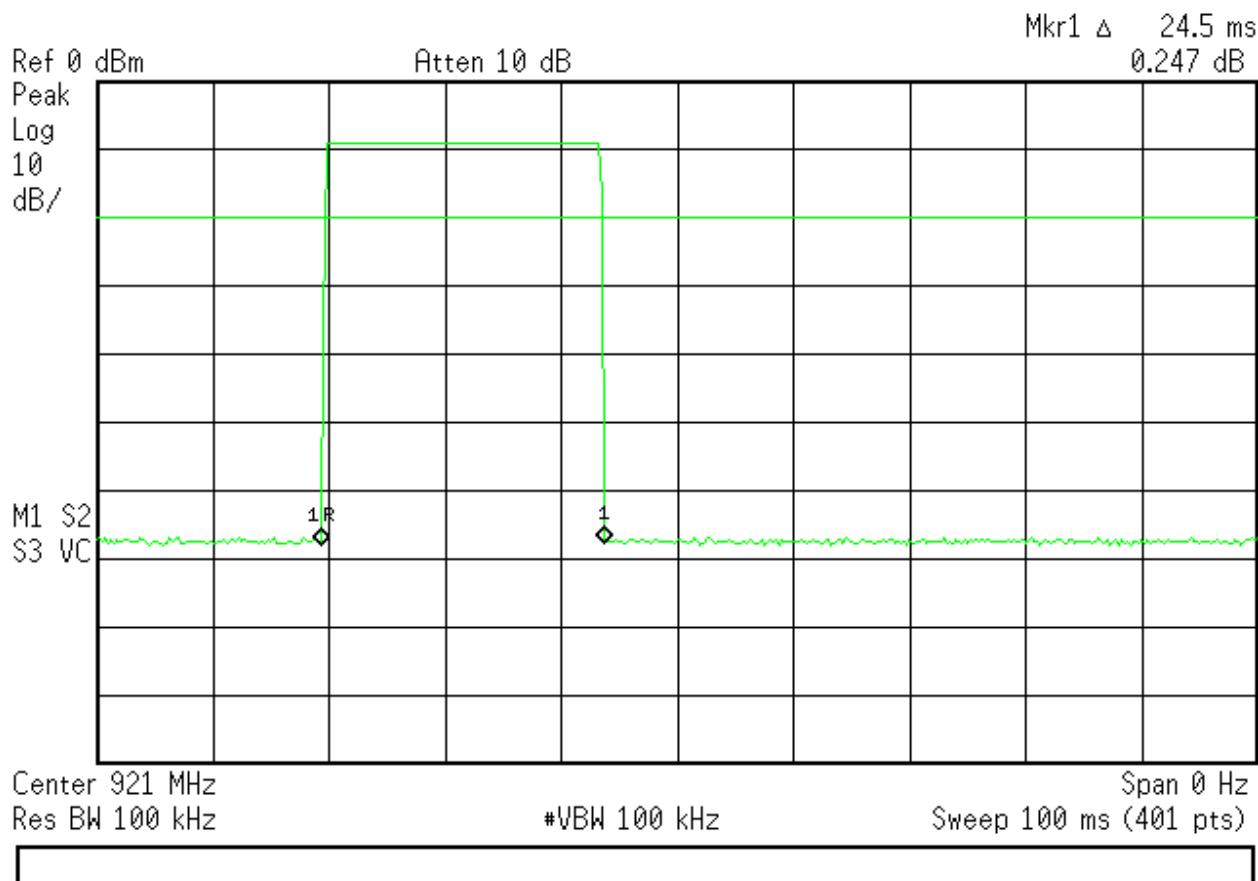
The frequency is only transmitted once during a transmission burst

During 20 seconds, the transmission occurs 4 times



Agilent 10:23:10 Sep 10, 2012

R T



Time dwelled on a carrier frequency is 24.5 milliseconds.

Therefore 4×0.0245 seconds = 0.098 seconds < 0.4 seconds

So within any 20 second window, either before or after the transmission, it shall be less than 0.4 seconds.



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Peak Power

LIMIT

Conducted Output Power

1 Watt

[15.247(b) (2)]

MEASUREMENTS / RESULTS

| Peak Output Power | | | | | | | | | | FCC Section 15.247(b)(2) | | | | | | | | | |
|--|--------------------|------------------|---|------------------------------|-----|---|-----|-----|-----|----------------------------------|----------------|----------------|-----------------------|--|--|--|--|--|--|
| Date: 10-Sep-12 | | | Company: Signal Fire Telemetry | | | Work Order: M2057 | | | | | | | | | | | | | |
| Engineer: Chris Reynolds | | | EUT Desc: Signal Fire Telemetry Sentinel Node | | | EUT Operating Voltage/Frequency: 3.6VDC | | | | | | | | | | | | | |
| Temp: 23.2°C | | | Humidity: 34% | | | Pressure: 1007mBar | | | | | | | | | | | | | |
| Frequency Range: 902-928MHz | | | | | | | | | | Measurement Distance: Conductive | | | | | | | | | |
| Notes: RBW = 1MHz VBW = 3MHz | | | | | | | | | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dBm) | Attenuator Factor (dB) | Adjusted Reading (dBm) | | | | --- | | | Limit (dBm) | Margin (dB) | Result (Pass/Fail) | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| low channel | 905.0 | -8.5 | 19.6 | 11.1 | --- | --- | --- | --- | --- | 30.0 | -18.9 | Pass | | | | | | | |
| mid channel | 915.0 | -8.5 | 19.6 | 11.1 | --- | --- | --- | --- | --- | 30.0 | -18.9 | Pass | | | | | | | |
| high channel | 925.0 | -8.4 | 19.6 | 11.2 | --- | --- | --- | --- | --- | 30.0 | -18.8 | Pass | | | | | | | |
| Test Site: 1DCC-OATS-3M-I Attenuator: PE7019-20 Analyzer: Gold | | | | | | | | | | | | | | | | | | | |

Rev. 9/8/2012

| | | | | | | | |
|--|---------------------------------------|---------------------------------|-----------------------|----------------------|----------------|--|-----------------------------|
| 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 |
| Preamps /Couplers Attenuators / Filters HF 20dB 50W Attenuator | Range 0.009-18 GHz | MN PE 7019-20 | Mfr Pasterнак | SN 1 | Asset 791 | Cat II | Calibration Due 6/1/2013 |
| Meteorological Meters Temp./Humidity/Atm. Pressure Gauge 1DCC-OATS-3M-I Thermohygrometer | MN 7400 Perception II 35519-044 | Mfr Davis Control Company | SN N/A 72457635 | Asset 965 1334 | Cat I II | Calibration Due 4/4/2013 8/19/2013 | |

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



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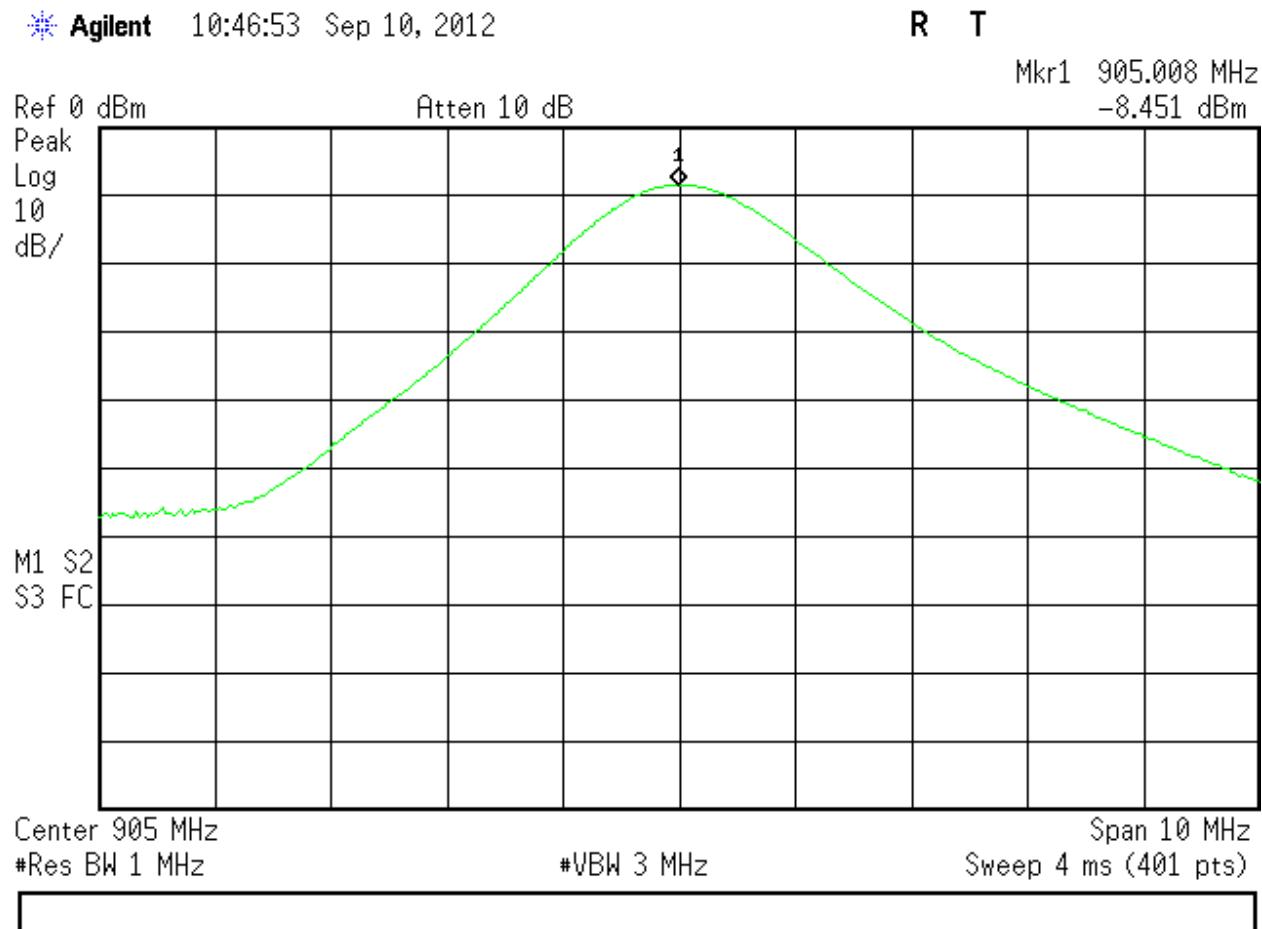
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Testing Cert. No. 1627-01

PLOTS

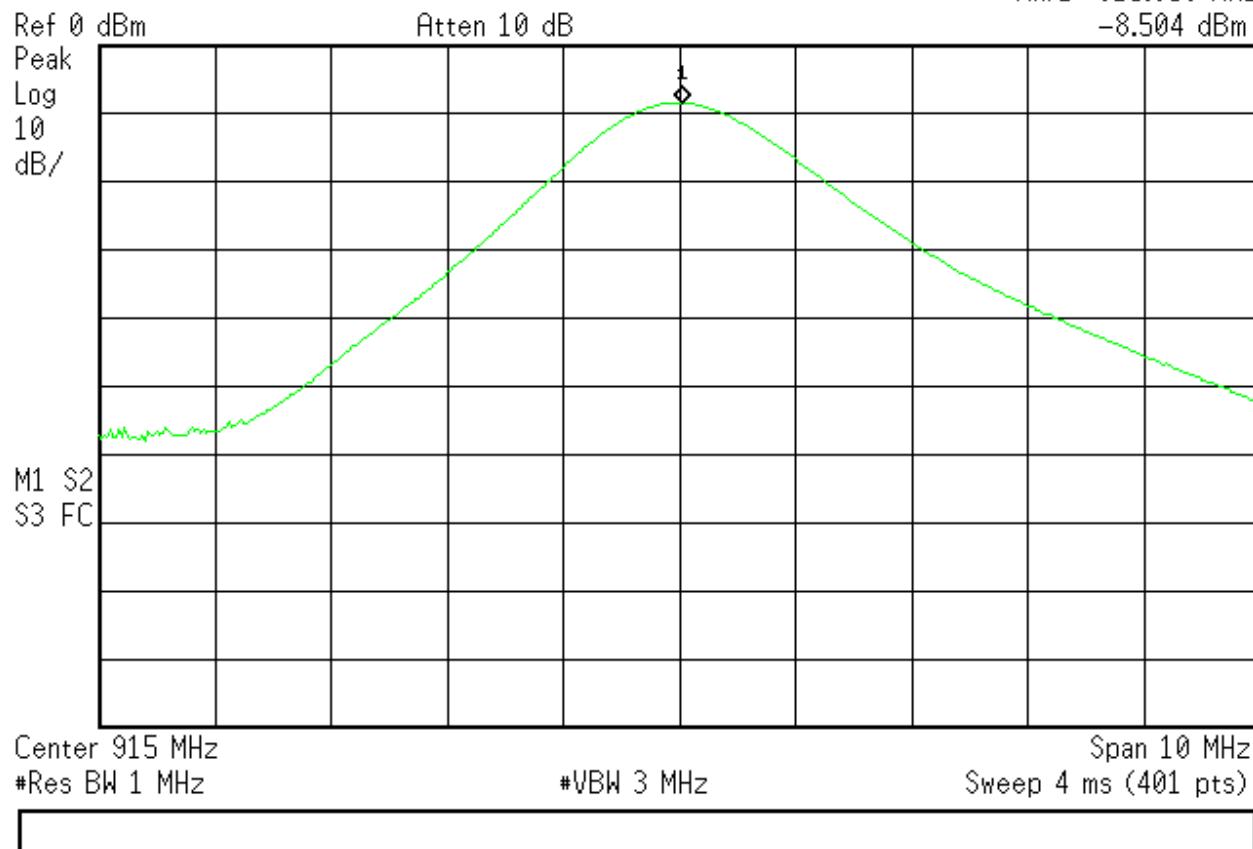
Low Channel



Mid Channel

Agilent 10:52:49 Sep 10, 2012

R T

Mkr1 915.050 MHz
-8.504 dBm

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High Channel

Agilent 10:53:55 Sep 10, 2012

R T

Mkr1 925.025 MHz
-8.384 dBm

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Band Edge Measurements

LIMITS

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either a RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

[15.247(d)]

| | |
|----------|-----------|
| Engineer | CR |
| Date | 9-10-2012 |
| Site | 3Min |

Test Equipment Used

Rev. 9/24/2012

| 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 1DCC-OATS-3M-I | FCC Code 719150 | IC Code 2762A-8 | VCCI Code A-0015 | | | Cat II | Calibration Due 10/7/2012 |

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



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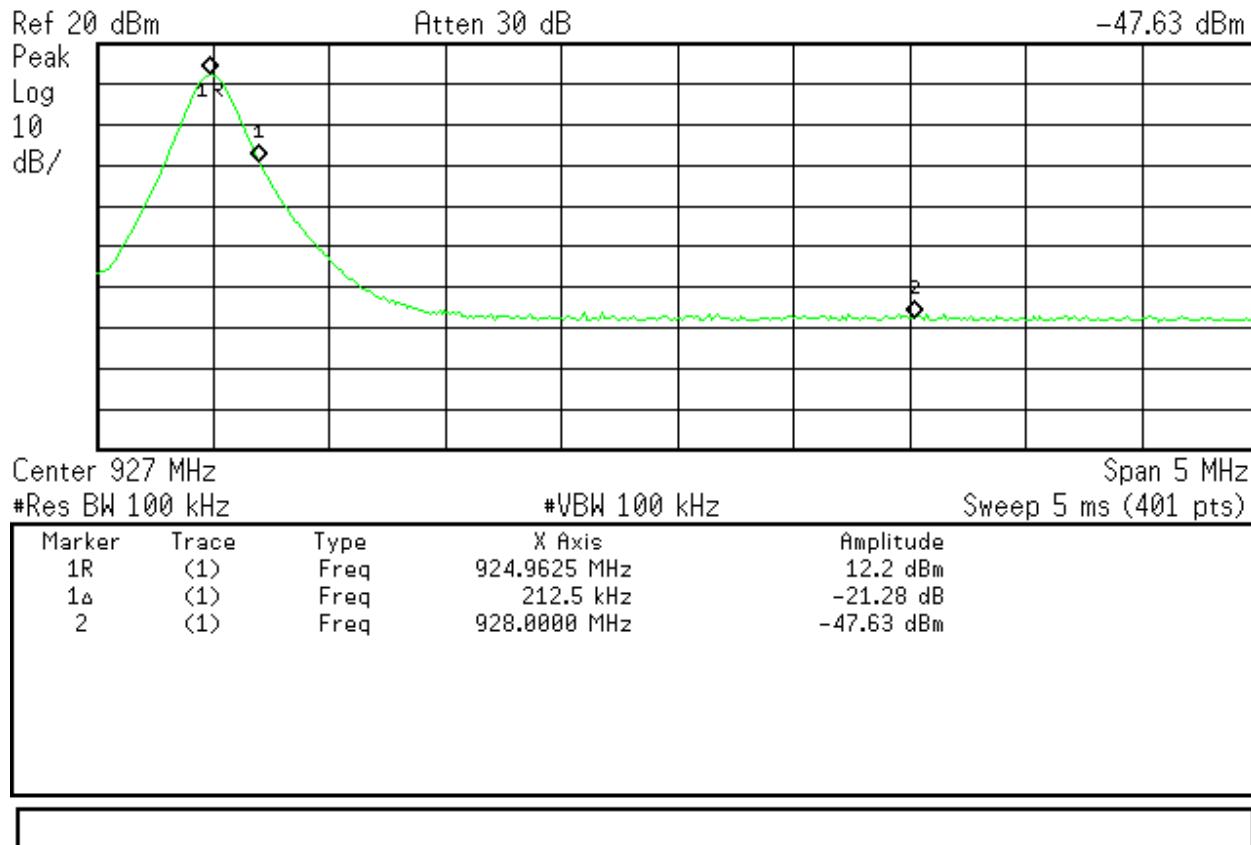


PLOTS

928MHz Edge

Agilent 14:44:05 Sep 10, 2012

R T

Mkr2 928.0000 MHz
-47.63 dBm

902MHz Band Edge



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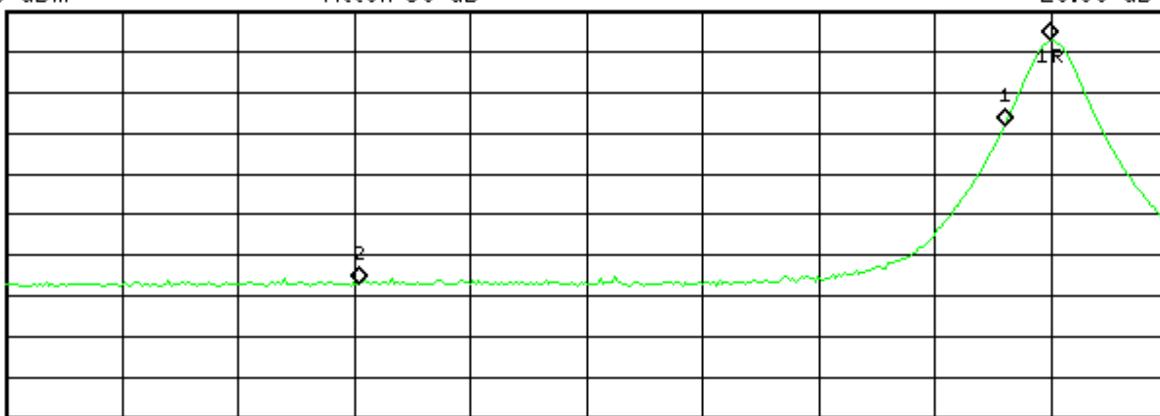
Agilent 14:40:22 Sep 10, 2012

R T

Mkr1 Δ -200.0 kHz
-20.69 dB

Ref 20 dBm

Atten 30 dB

Peak
Log
10
dB/Center 903 MHz
#Res BW 100 kHz

#VBW 100 kHz

Span 5 MHz

Sweep 5 ms (401 pts)

| Marker | Trace | Type | X Axis | Amplitude |
|--------|-------|------|--------------|------------|
| 1R | (1) | Freq | 904.9750 MHz | 12.64 dBm |
| 1Δ | (1) | Freq | -200.0 kHz | -20.69 dB |
| 2 | (1) | Freq | 902.0000 MHz | -47.03 dBm |



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Radiated Spurious Emissions

LIMITS

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
[15.247(d)]

Radiated emission measurements were also taken for the digital circuitry for compliance to FCC part 15 class A or class B products. These emissions were not present during the transmission function being active only.

MEASUREMENTS / RESULTS

Radiated Emissions Table

| Date: 11-Sep-12 | Company: Signal Fire Telemetry | Work Order: M2057 | | | | | | | | | | |
|--------------------------------------|---|---|--------------------------|-----------------------------|-------------------------|---------------------------------------|-------------------------|----------------|-----------------------|-------------------------|----------------|-----------------------|
| Engineer: Chris Bramley | EUT Desc: Signal Fire Telemetry Sentinel Node | EUT Operating Voltage/Frequency: 3.6Vdc | | | | | | | | | | |
| Temp: 23.7°C | Humidity: 24% | Pressure: 1017mBar | | | | | | | | | | |
| Frequency Range: 30-1000MHz | | Measurement Distance: 3 m | | | | | | | | | | |
| Notes: EUT is transmitting at 925MHz | | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | | | FCC Class B | | |
| | | | | | | | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) |
| Noise Floor Readings, Peak Values | | | | | | | --- | --- | --- | 43.5 | -24.9 | Pass |
| v | 154.0 | 24.7 | 19.8 | 12.6 | 1.1 | 18.6 | --- | --- | --- | 43.5 | -29.4 | Pass |
| v | 175.0 | 21.1 | 19.8 | 11.6 | 1.2 | 14.1 | --- | --- | --- | 46.0 | -23.2 | Pass |
| v | 323.0 | 27.1 | 19.8 | 13.9 | 1.6 | 22.8 | --- | --- | --- | 46.0 | -26.7 | Pass |
| v | 348.0 | 23.0 | 19.5 | 14.1 | 1.7 | 19.3 | --- | --- | --- | 46.0 | -23.3 | Pass |
| v | 640.0 | 20.2 | 19.6 | 19.6 | 2.5 | 22.7 | --- | --- | --- | 46.0 | -18.6 | Pass |
| v | 828.0 | 22.3 | 19.2 | 21.5 | 2.8 | 27.4 | --- | --- | --- | 46.0 | - | |
| Table Result: Pass | | | by | -18.6 dB | | | Worst Freq: | | | 828.0 MHz | | |
| Test Site: EMI Chamber 1 | | | Cable 1: Asset #1505 | | | Cable 2: Asset #1507 | | | Antenna: Red-White | | | |
| Analyzer: Asset #1327 | | | Preamp: Red | | | | | | | | | |



Radiated Emissions Table

| Date: 11-Sep-12 | Company: Signal Fire Telemetry EUT Desc: Signal Fire Telemetry Sentinel Node Humidity: 24% | | | | | | | | Work Order: M2057 EUT Operating Voltage/Frequency: 3.6Vdc Pressure: 1017mBar | | | | | | | | | | | | | |
|--|--|---------------------------------|------------------------------------|--------------------------|-----------------------------|-------------------------|--|---|--|---|-----------------------|--|--|--|--|--|--|--|--|--|--|--|
| Engineer: Chris Bramley | Frequency Range: 1-10GHz | | | | | | | | | Measurement Distance: 3 m | | | | | | | | | | | | |
| Temp: 23.7°C | Notes: EUT is transmitting at 925MHz Duty Cycle Correction Factor of -12.2dB applied | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Peak Reading (dB μ V) | Average Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dB μ V/m) | Adjusted Avg Reading (dB μ V/m) | FCC Class B High Frequency - Peak | FCC Class B High Frequency - Average | | | | | | | | | | | | |
| | | | | | | | | | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | | | | | | | | | | | |
| | | | | | | | | | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | | | | | | | | | | | |
| Readings for Harmonics in Restricted Bands | | | | | | | | | | | | | | | | | | | | | | |
| HPF Asset 1287 | | | | | | | | | | | | | | | | | | | | | | |
| h | 2775.0 | 66.45 | 54.3 | 41.0 | 28.6 | 4.1 | 58.2 | 46.0 | 74.0 | -15.8 | Pass | | | | | | | | | | | |
| v | 2775.0 | 66.07 | 53.9 | 41.0 | 28.6 | 4.1 | 57.8 | 45.6 | 74.0 | -16.2 | Pass | | | | | | | | | | | |
| HPF Asset 1311 | | | | | | | | | | | | | | | | | | | | | | |
| h | 3700.0 | 68.29 | 56.1 | 40.2 | 32.2 | 5.3 | 65.6 | 53.4 | 74.0 | -8.4 | Pass | | | | | | | | | | | |
| v | 3700.0 | 64.61 | 52.4 | 40.2 | 32.2 | 5.3 | 61.9 | 49.7 | 74.0 | -12.1 | Pass | | | | | | | | | | | |
| h | 4625.0 | 53.17 | 41.0 | 39.5 | 32.6 | 5.9 | 52.2 | 40.0 | 74.0 | -21.8 | Pass | | | | | | | | | | | |
| v | 4625.0 | 53.31 | 41.1 | 39.5 | 32.6 | 5.9 | 52.3 | 40.1 | 74.0 | -21.7 | Pass | | | | | | | | | | | |
| Table Result: | | | Pass | by | -0.6 dB | | | | | | | | | | | | | | | | | |
| Test Site: EMI Chamber 1 | | | Cable 1: Asset #1505 | | | Cable 2: Asset #1507 | | | Antenna: Yellow Horn | | | | | | | | | | | | | |
| Analyzer: Asset #1327 | | | Preamp: Red-Green | | | | | | | | | | | | | | | | | | | |

Rev. 9/8/2012

| | | | | | | | |
|--|---|--|--|-------------------------------------|-----------------------------|------------------------|--|
| Spectrum Analyzers / Receivers / Preselectors SA EMI Chamber (1327) | Range 9kHz-13.2 GHz | MN E4405B | Mfr Agilent | SN MY45103416 | Asset 1327 | Cat I | Calibration Due 5/30/2013 |
| Radiated Emissions Sites EMI Chamber 1 | FCC Code 719150 | IC Code 2762A-6 | VCCI Code A-0015 | | | Cat II | Calibration Due 2/16/2014 |
| Preamps / Couplers Attenuators / Filters Red Red-Green | Range 0.009-2000MHz 1-20GHz | MN ZFL-1000-LN PM2-38-218-4R5-17-15-SFF | Mfr CS CS | SN N/A N/A | Asset 798 1256 | Cat II II | Calibration Due 4/13/2013 6/18/2013 |
| Antennas Red-White BiLog Yellow Horn | Range 30-2000MHz 1-18GHz | MN JB1 3115 | Mfr Sunol EMCO | SN A091604-1 9608-4898 | Asset 1105 37 | Cat I I | Calibration Due 1/28/2013 6/17/2013 |
| Meteorological Meters Temp/Humidity/Atm. Pressure Gauge CHAMBER1 Thermohygrometer | Range 7400 Perception II 35519-044 | MN 7400 Perception II 35519-044 | Mfr Davis Control Company | SN N/A 72457642 | Asset 965 1345 | Cat I II | Calibration Due 4/4/2013 8/19/2013 |
| Cables Asset #1505 Asset #1507 | Range 9kHz - 18GHz 9kHz - 26.5GHz | | Mfr Florida RF Florida RF | | | Cat II II | Calibration Due 2/9/2013 1/31/2013 |

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



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Testing Cert. No. 1627-01

Receive Mode

Radiated Emissions Table

| Date: 20-Sep-12 | Company: Signal Fire Telemetry | Work Order: M2057 | | | | | | | | | | |
|--|---|--|--------------------------|-----------------------------|-------------------------|---------------------------------------|-------------------------|----------------|-----------------------|-------------------------|----------------|-----------------------|
| Engineer: MH | EUT Desc: Signal Fire Telemetry Sentinel Node | EUT Operating Voltage/Frequency: 3.6V DC | | | | | | | | | | |
| Temp: 24.8°C | Humidity: 23% | Pressure: mBar | | | | | | | | | | |
| Frequency Range: 30 - 1000MHz | | Measurement Distance: 3 m | | | | | | | | | | |
| Notes: Rx Mode peak readings | | EUT Max Freq: 925MHz | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | | | FCC Class B | | |
| | | | | | | | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) |
| v | 48.4 | 24.6 | 20.0 | 8.5 | 0.6 | 13.7 | --- | --- | --- | 40.0 | -26.3 | Pass |
| v | 61.5 | 25.2 | 20.0 | 7.6 | 0.6 | 13.4 | --- | --- | --- | 40.0 | -26.6 | Pass |
| v | 152.3 | 24.6 | 19.8 | 12.4 | 1.1 | 18.3 | --- | --- | --- | 43.5 | -25.2 | Pass |
| v | 177.0 | 28.0 | 19.9 | 11.3 | 1.2 | 20.6 | --- | --- | --- | 43.5 | -22.9 | Pass |
| v | 186.7 | 24.0 | 19.8 | 11.2 | 1.2 | 16.6 | --- | --- | --- | 43.5 | -26.9 | Pass |
| v | 422.0 | 23.1 | 19.8 | 16.3 | 1.9 | 21.5 | --- | --- | --- | 46.0 | -24.5 | Pass |
| Table Result: Pass | | by | -22.9 dB | | Worst Freq: | | 177.0 MHz | | | | | |
| Test Site: EMI Chamber 1 | Cable 1: Asset #1505 | Cable 2: Asset #1507 | Cable 3: --- | | | | | | | | | |
| Analyzer: Asset #1328 | Preamp: Red | Antenna: Red-Brown | Preselector: --- | | | | | | | | | |

Radiated Emissions Table

| Date: 20-Sep-12 | Company: Signal Fire Telemetry | Work Order: M2057 | | | | | | | | | | |
|--------------------------------------|---|--|--------------------------|-----------------------------|-------------------------|---------------------------------------|-------------------------|----------------|-----------------------|-------------------------|----------------|-----------------------|
| Engineer: MH | EUT Desc: Signal Fire Telemetry Sentinel Node | EUT Operating Voltage/Frequency: 3.6V DC | | | | | | | | | | |
| Temp: 24.8°C | Humidity: 23% | Pressure: 1013mBar | | | | | | | | | | |
| Frequency Range: 30 - 1000MHz | | Measurement Distance: 3 m | | | | | | | | | | |
| Notes: Rx Mode | | EUT Max Freq: 925MHz | | | | | | | | | | |
| Antenna Polarization (H / V) | Frequency (MHz) | Reading (dB μ V) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Reading (dB μ V/m) | --- | | | FCC Class B | | |
| | | | | | | | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) | Limit (dB μ V/m) | Margin (dB) | Result (Pass/Fail) |
| No emissions found | | | | | | | | | | | | |
| Table Result: --- | | by | --- dB | | Worst Freq: | | --- MHz | | | | | |
| Test Site: EMI Chamber 1 | Cable 1: Asset #1505 | Cable 2: Asset #1507 | Cable 3: --- | | | | | | | | | |
| Analyzer: Asset #1328 | Preamp: Red-Green | Antenna: Black Horn | Preselector: --- | | | | | | | | | |



Conducted Spurious Emissions

LIMITS

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth that contains the highest level of desired power...

[15.247(d)]

| | |
|----------|-----------|
| Engineer | CR |
| Date | 9-10-2012 |
| Site | 3Min |

Test Equipment Used

Rev. 9/24/2012

| 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 1DCC-OATS-3M-I | FCC Code 719150 | IC Code 2762A-8 | VCCI Code A-0015 | | | Cat II | Calibration Due 10/7/2012 |

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

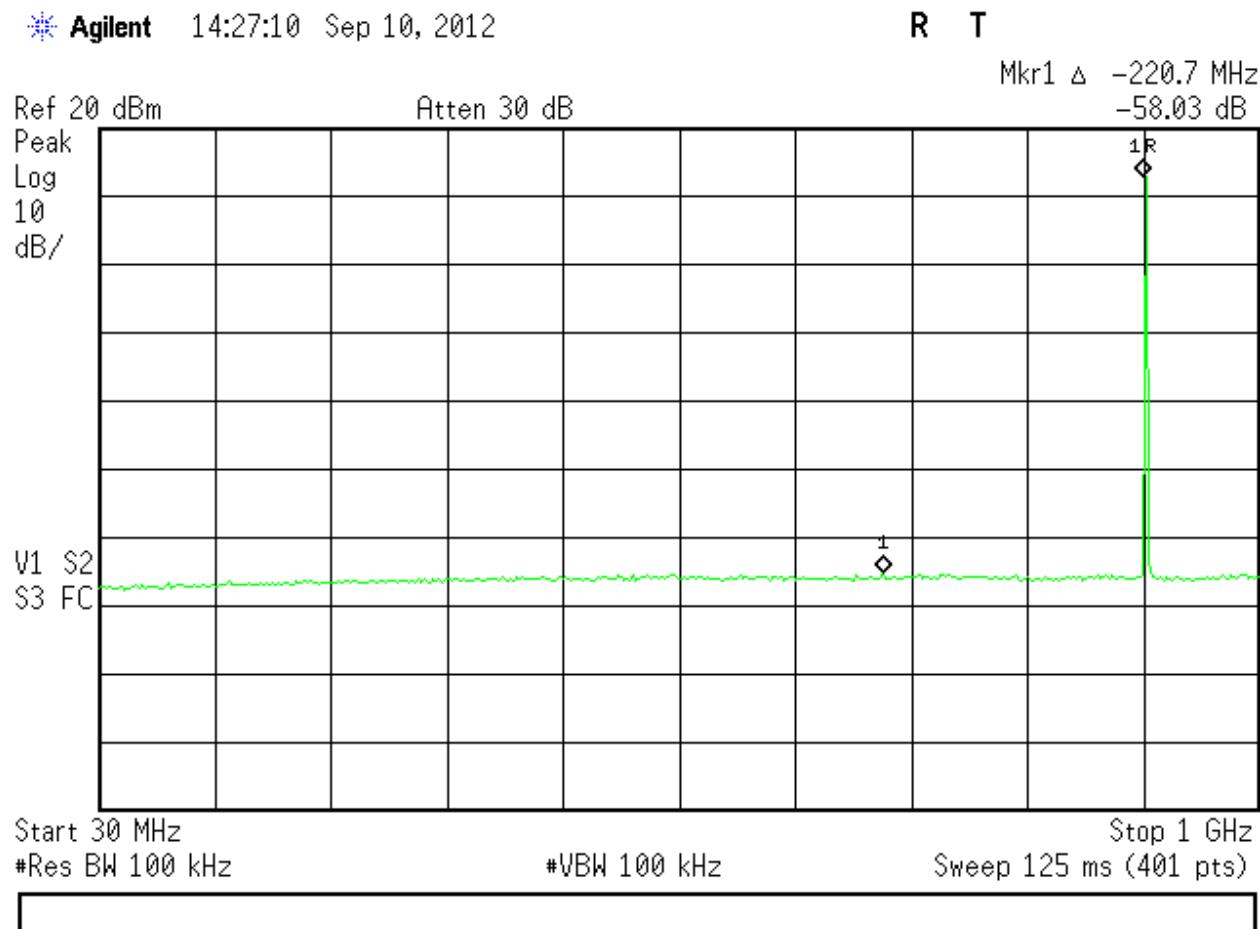


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MEASUREMENTS / RESULTS



Agilent 14:30:32 Sep 10, 2012**R T**Mkr1 Δ 2.070 GHz
-54.96 dB

Ref 20 dBm

Atten 30 dB

Peak 1R

Log

10

dB/

V1 S2
S3 FCStart 900 MHz
#Res BW 100 kHz

#VBW 100 kHz

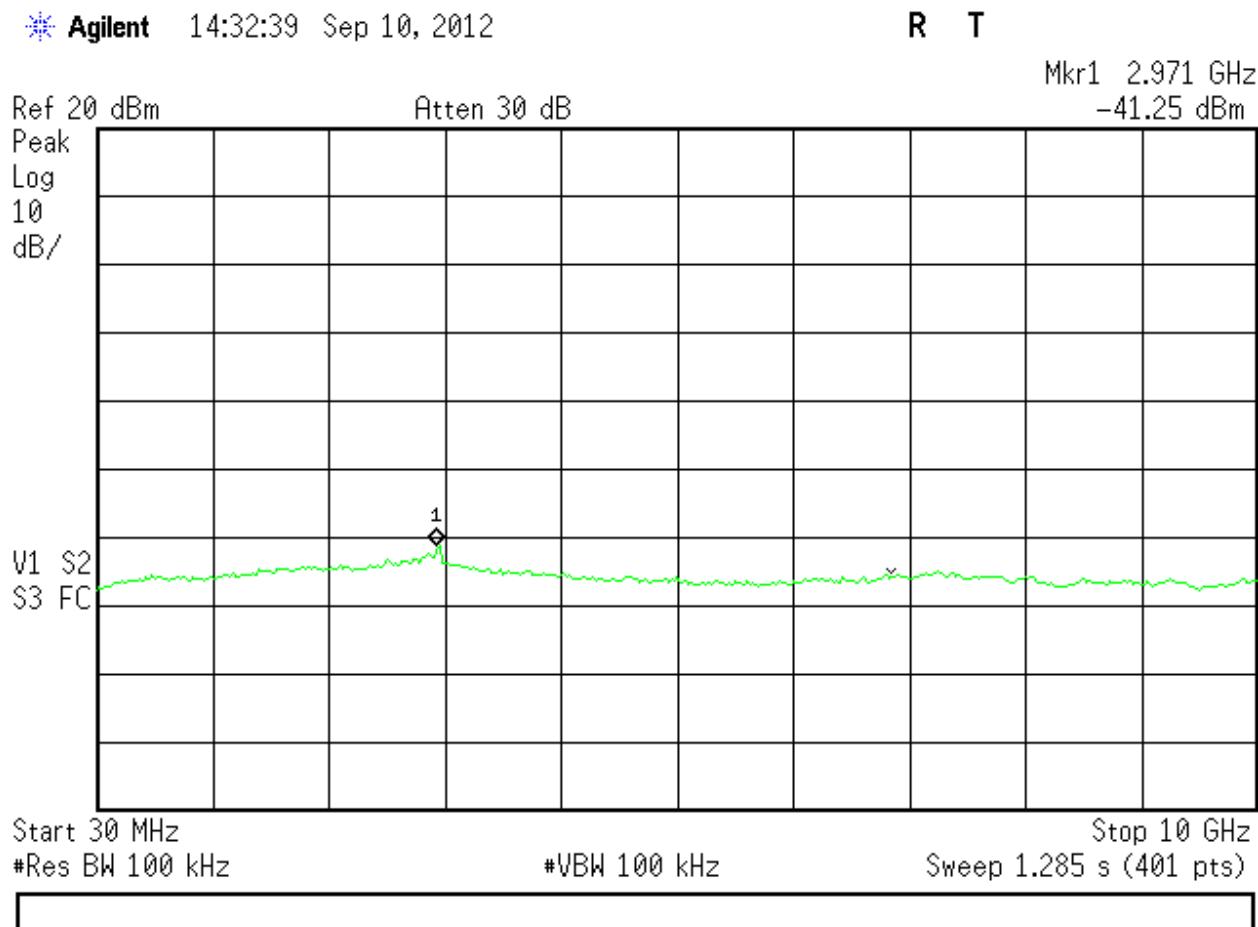
Stop 10 GHz
Sweep 1.172 s (401 pts)

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Receive Mode



Occupied Bandwidth

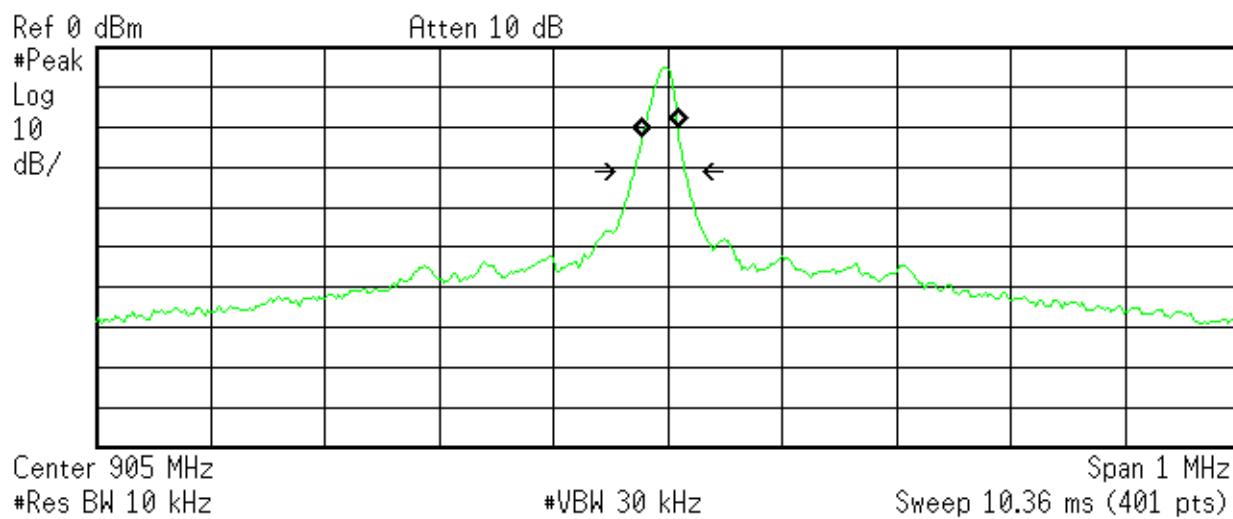
REQUIREMENT

When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured. [RSS-GEN 4.6.1]

Low Channel

Agilent 10:29:36 Oct 10, 2012

R L



Transmit Freq Error -6.554 kHz
x dB Bandwidth 45.316 kHz



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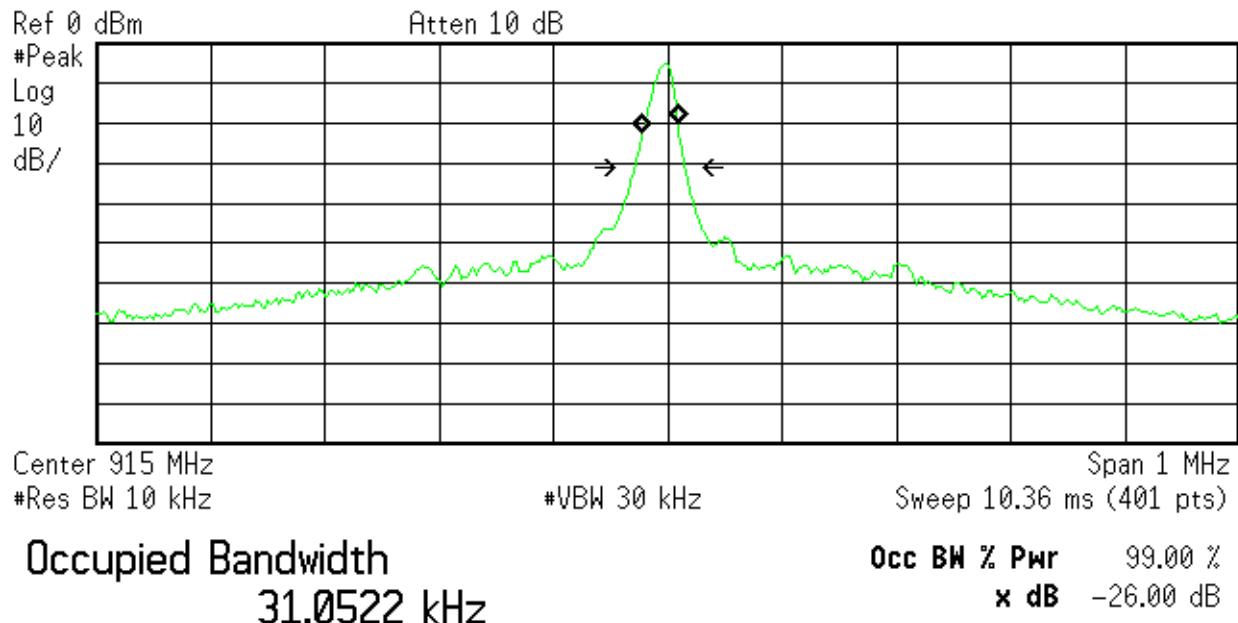
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Mid Channel

 Agilent 10:32:48 Oct 10, 2012

R L



Transmit Freq Error -6.571 kHz
x dB Bandwidth 45.165 kHz

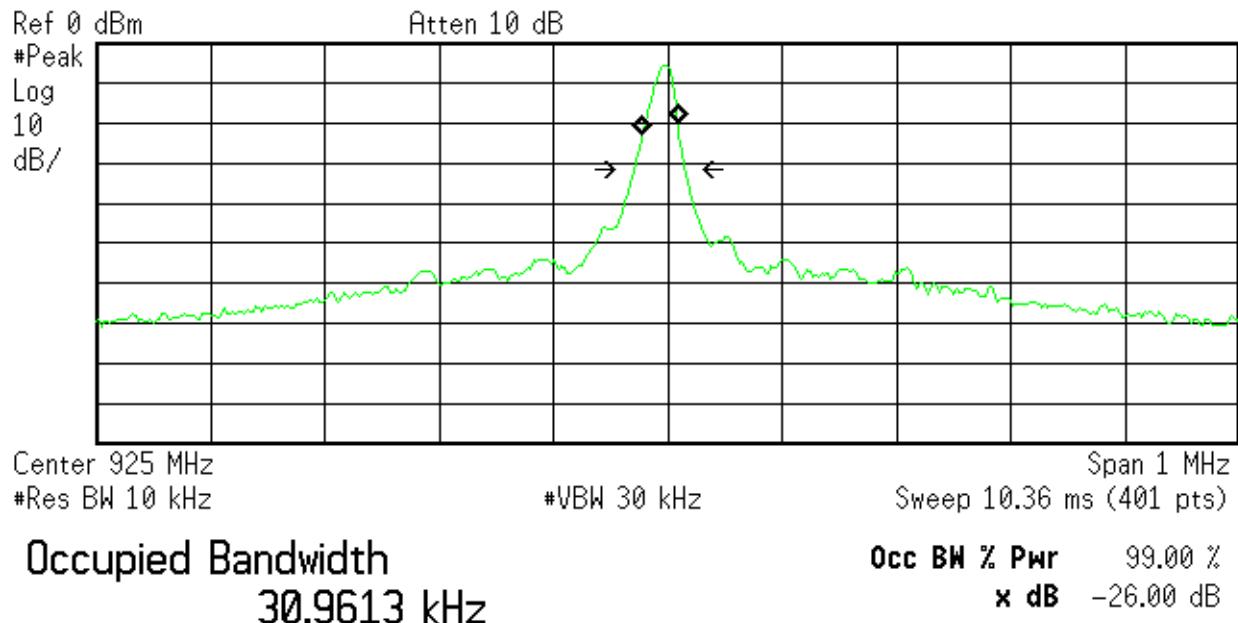
Occ BW % Pwr 99.00 %
x dB -26.00 dB



High Channel

* Agilent 10:34:23 Oct 10, 2012

R L



Transmit Freq Error -6.598 kHz
x dB Bandwidth 45.170 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB



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AC Line Conducted Emissions

LIMITS

| Frequency of emission (MHz) | Quasi-peak limit (dB μ V) | Average limit (dB μ V) |
|-----------------------------|-------------------------------|----------------------------|
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

[47 CFR 15.207(a)]

MEASUREMENTS / RESULTS

| AC Side of a DC Supply Conducted Emissions | | | | | | | | | | Frequency Range: 0.15-30MHz | | | | |
|--|---------------------|------------------|-------------------|-------------------|-----------------------------|---------|-------------------|------------------|-------------------|---|--------------------|-------------------|-------------|--------------------|
| | | | | | Frequency Range: 0.15-30MHz | | | | | EUT Input Voltage/Frequency: 120VAC, 60Hz, 3.6VDC | | | | |
| Frequency (MHz) | Quasi-Peak Readings | | Average Readings | | LISN Factors | | Cable Factor (dB) | ATTN Factor (dB) | FCC/CISPR Class B | | | FCC/CISPR Class B | | |
| | QP1 (dB μ V) | QP2 (dB μ V) | AVG1 (dB μ V) | AVG2 (dB μ V) | L1 (dB) | L2 (dB) | | | QP Limit (dB) | Margin (dB) | Result (Pass/Fail) | AVG Limit (dB) | Margin (dB) | Result (Pass/Fail) |
| 0.15 | 15.8 | 16.0 | 10.2 | 9.9 | -0.1 | -0.1 | -20.8 | -20.8 | 66.0 | -29.0 | Pass | 56.0 | -24.7 | Pass |
| 0.50 | 8.8 | 9.1 | 2.2 | 3.1 | -0.1 | -0.1 | -20.8 | -20.8 | 56.0 | -26.0 | Pass | 46.0 | -22.0 | Pass |
| 1.00 | 7.1 | 7.4 | 1.3 | 1.5 | -0.1 | 0.0 | -20.8 | -20.8 | 56.0 | -27.6 | Pass | 46.0 | -23.5 | Pass |
| 5.00 | 5.6 | 5.7 | -0.4 | -0.4 | -0.1 | -0.1 | -20.8 | -20.8 | 60.0 | -33.3 | Pass | 50.0 | -29.4 | Pass |
| 10.00 | 4.5 | 4.3 | -1.5 | -1.5 | -0.1 | -0.1 | -20.8 | -20.8 | 60.0 | -34.4 | Pass | 50.0 | -30.3 | Pass |
| 15.00 | 4.2 | 4.2 | -1.8 | -1.9 | -0.2 | -0.2 | -20.8 | -20.8 | 60.0 | -34.5 | Pass | 50.0 | -30.5 | Pass |
| 20.00 | 4.0 | 4.1 | -1.9 | -1.9 | -0.3 | -0.4 | -20.8 | -20.8 | 60.0 | -34.5 | Pass | 50.0 | -30.4 | Pass |

Result: Pass

Worst Margin: -22.0 dB

Frequency: 0.50 MHz

Measurement Device: 230VAC LISN Asset 1495

Cable: CEMI-07

Spectrum Analyzer: Red

Attenuator: 20dB Atten-4

Site: CEMI 1

Equipment Factor Sheet rev: 9/8/2012

C-S CEMI Calculator Version 3.0.8

| Rev. 9/8/2012 | | | | | | | | | |
|--|--|--|--------------------|------------------|-----------------|------------|-------|-----|-----------------|
| Spectrum Analyzers / Receivers /Preselectors | | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| Red | | | 9kHz-1.8GHz | 8591E | Agilent | 3441A03559 | 24 | I | 5/23/2013 |
| LISNs/Measurement Probes | | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| 230VAC LISN Asset 1495 | | | 10kHz-50MHz | 9252-50-R-24-BNC | Solar | 84716 | 1495 | I | 6/7/2013 |
| Conducted Test Sites (Mains / Telco) | | | FCC Code | | VCCI Code | | | III | Calibration Due |
| CEMI 1 | | | 719150 | | A-0015 | | | | NA |
| 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 |
| CEMI1 Thermohygrometer | | | 35519-044 | | Control Company | 72457738 | 1335 | II | 8/19/2013 |
| Cables | | | Range | | Mfr | | | Cat | Calibration Due |
| CEMI-07 | | | 9kHz - 2GHz | | C-S | | | II | 5/1/2013 |
| Attenuators | | | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
| 20dB Atten-4 | | | 9kHz-2GHz | | | N/A | | II | 12/6/2013 |

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



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Product Documentation

The following documentation has been provided by the client for inclusion in this report.



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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**," "**BVCP**," "**MTL**," "**ACTS**," "**MTL-ACTS**" and **CURTIS-STRAU** (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 were 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 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.

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