

Test Report No. 8412312674

For RadWin Ltd.

Equipment Under Test:

***Point-to-Point Broadband Wireless
Transmitter System***

Model:

WinLink 1000/F24 ; AirMux-200/F24;

FibeAir™ 4824

***From The Standards Institution
Of Israel***

Industry Division

Telematics Laboratory

EMC Section



Certificate No.1487-01

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1 Applicant information

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Equipment under test information

Test items: "WinLink", Point-to-Point Broadband Wireless Transmitter System
Manufacturer: RadWin Ltd
Model: WinLink 1000/F24; AirMux-200/F24; FibeAir™ 4824
Software revision of radio unit as tested: 1.1
Equipment serial number: I240618000001-ODU
IB2E0000001 -IDU

2 Test performance

Location: SII EMC Section
RadWin LTD
Purpose of test: Apparatus compliance verification in accordance with emission requirements
Test specifications: 47CFR part 15 §§15.247, 15.107, 15.109,15.207, 15.209 part 1 §1.1310

This Test Report contains 83 pages
and may be used only in full.

This Test Report applies only to the specimen tested and may not
be applied to other specimens of the same product.

**Test report No: 8412312674****Page 4 of 83 Pages****Title: Point-to-Point Broadband Wireless Transmitter System****Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824****3 Summary of test:**

The EUT was found to be in compliance with requirements of: 47CFR Part 15, §§ 15.247, 15.209, 15.207, 15.109, and 15.107

| Parameter | Subclasses | Date tested | Remarks |
|--|--------------------------|--------------------|--------------------------------------|
| Transmitter characteristics | | | |
| Minimum 6 dB bandwidth | a(2) | 4, 5 July 2004 | |
| Maximum peak output power | b(3) | 12 July 2005 | |
| Exposure compliance requirements | b(5) | NA | Refer to the test report section 4.3 |
| Spurious emissions (conducted) | c | 4, 5, 11 July 2004 | |
| Spurious emissions (radiated) in restricted bands | 15.209, 15.205 (a, c) | 6, 11 July 2004 | |
| Peak power spectral density | d | 5, 6 July 2004 | |
| Unintentional radiation | | | |
| Conducted emissions | 15.107, 15.207 | 6 July 2004 | |
| Radiated emissions | 15.109 | 8 July 2004 | |

Test performed by: Mr. Michael Feldman test technician

Test report prepared by: Mr. Michael Feldman test technician

Test report approved by: Mr. Yuri Rozenberg. Head of EMC Branch

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4. Equipment Under Test description

4.1 General description

WinLink1000 family is a carrier class, high capacity and low cost Point-to-Point broadband wireless transmission system. WinLink1000 is offered to enterprises with multiple sites and transparent connection of their LAN and PBX systems. The EUT provides high capacity connectivity of up to 54 Mbps. It includes Indoor Unit (IDU) and Outdoor Unit (ODU) interconnected by CAT-5 FTP cable with maximum length of 100m and is powered from mains via AC/DC power adapter.

EUT ports and lines

| Port Type | Port Description | Connected from / to | | Connector type | Qty. | Cable Type | Cable Length | Indoor / Outdoor |
|----------------|-------------------------|---------------------|----------------|--|------|------------|--------------|------------------|
| Signal | WAN Power over Ethernet | IDU | ODU | RJ45/RJ45 | 1 | *Note | Up to 100m | Outdoor |
| Signal | Ethernet | IDU | Laptop | RJ45 | 1 | FTP | <100m | Indoor |
| Power | DC power | IDU | AC/DC adapter. | T.B. | 1 | 2 Wire | 2m | Indoor |
| RF | Antenna | ODU | Load 50Ω | N-type | 1 | NA | NA | Outdoor |
| Function Earth | Screw | ODU | GND | NA | 1 | NA | NA | NA |
| Function Earth | Screw | IDU | GND | NA | 1 | NA | NA | NA |
| Signal | Monitor /RS232 | ODU | PC | Not connected (for configuration and service use only) | | | | |
| Signal | Monitor /RS232 | IDU | PC | Not connected (for configuration and service use only) | | | | |

*Four-pair Cat 5e double jacket 4x2x24 AWG FTP

Support and test equipment

| Description | Manufacturer | Model number | Serial number |
|---------------|--------------|---------------|---------------------|
| AC/DC adaptor | HITRON | HE551-58007 | 0022 |
| Lap top | Compaq | Armada PP2060 | AESP3600T4X12DC6458 |

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| Source | Frequency (MHz) |
|----------------------|-----------------|
| Digital part | 2.048 |
| Digital part | 10.0 |
| Digital part | 16.38 |
| Digital part | 25.0 |
| Digital part | 33.0 |
| Digital part | 33.33 |
| LO reference | 40.0 |
| Transmitter/Receiver | 2412 – 2462 |

EUT technical characteristics

| Type of equipment | | | | | | |
|--|---|--|-----------|--------------------------------|-----------|--|
| Stand-alone | X | (Equipment with or without its own control provisions) | | | | |
| Intended use | | Condition of use | | | | |
| Fixed | X | Always at a distance more than 2 m from all people | | | | |
| Assigned frequency range | | 2400 – 2483.5 MHz | | | | |
| Operating frequency range | | 2412 – 2462 MHz | | | | |
| RF channel spacing | | 5 MHz | | | | |
| Maximum rated output power | At transmitter 50 Ω RF output connector | 19 dBm @ 2417 – 2457 MHz | | | | |
| | | 17 dBm @ 2412; 2462 MHz | | | | |
| Antenna connection | | | | | | |
| Unique coupling | X | integral | X | with temporary RF connector | X | |
| | | Standard connector: N-TYPE | | without temporary RF connector | | |
| External antenna/s technical characteristics | | | | | | |
| Type | Manufacturer | Model number | Gain | | | |
| Planar Array (integral) | Mars Antennas & RF Systems | MA-WA24-1X | 17dBi | | | |
| Parabolic grid (external) | Pacific Wireless | PMANT24-HD-PF1P | 24 dBi | | | |
| Transmitter 99% power bandwidth | | 20MHz | | | | |
| Transmitter aggregate data rate/s | | 16.25 MBaud | | | | |
| Type of modulation | | BPSK, 4QAM, 16QAM, 64QAM | | | | |
| Type of multiplexing | | OFDM | | | | |
| Modulating test signal (baseband) | | PRBS | | | | |
| Maximum transmitter duty cycle in normal use | 50 % | Tx | 0.5 msec | Period | 1.0 msec | |
| Transmitter duty cycle supplied for test | 100 % | Tx |msec | Period |msec | |
| Spread spectrum technique used | | | | | | |
| Frequency hopping (FHSS) | | | | | | |
| Digital transmission system (DTS) | | X | | | | |
| Hybrid | | | | | | |

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Complies to requirement of the section 15.203

| | |
|---|------------------------------------|
| The intentional radiator has a standard connector and must be professionally installed. | Professional installation provided |
| No antenna other than furnished by responsible party can be used with the devise. | Provided by customer |

4.2 EUT test configuration

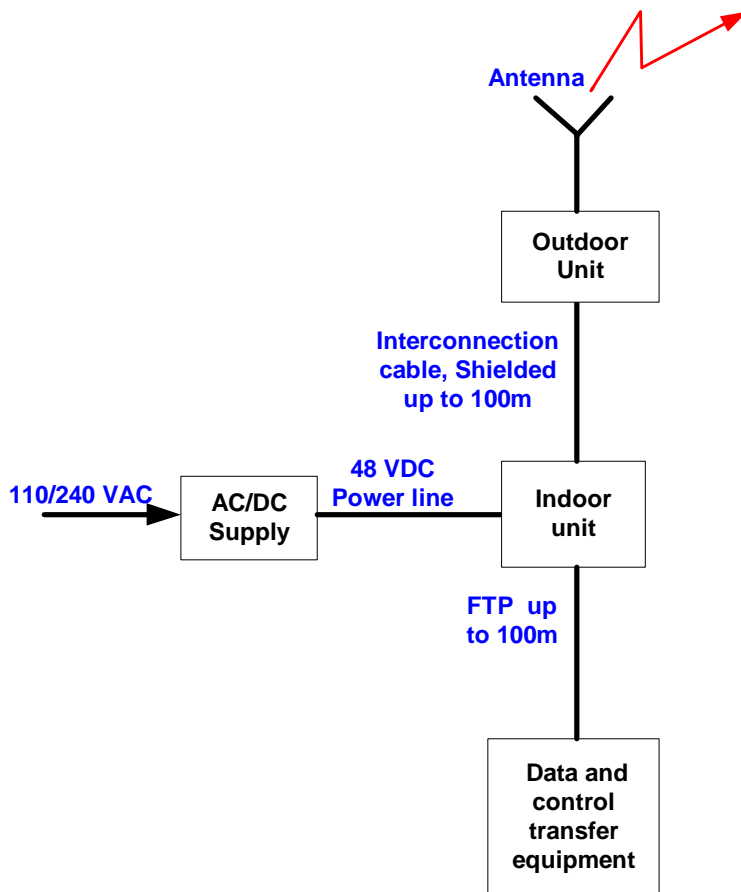


Fig. 1

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Power density limit for 2412 – 2462 MHz range is 1 mW/cm² for general population (uncontrolled exposure)

The power density limit S (W/m²) = 10 (W/ m²)

Pt - The transmitted power EIRP (W)

Pt- the transmitted power is equal to the maximum output power 19 dBm plus antenna gain - 24 dBi

The maximum EIRP = 43 dBm = 19.95 W

The minimum allowed safe distance for fixed transmitter was calculated from following equation

$$r = \sqrt{Pt/4\pi S} = \sqrt{19.95/4\pi 10} = 0.36 \text{ m}$$

The allowed distance “r”, where RF exposure limits may not be exceeded, is 0.36 m from the unit antenna main lobe.

The EUT with the attached antenna are mounted only outside the building on the high level pole or wall, at distance at least 2m from general public, see the manufacturer instructions for installation provided in attached documentation.

EUT found comply with safety requirement.



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5 Test results

5.1 Transmitter characteristics

5.1.1 Occupied 6 dB bandwidth for digitally modulated systems according to § 15.247(a) (2)

Method of measurement ANSI 63.4 §13.1.7
 Date 4, 5 July 2004
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1009 hPa
 Operating Frequency Range 2.412 – 2.462 GHz
 Measurement Uncertainty ± 524 Hz

| Carrier frequency MHz | Data rate, Mbit/s | Measured 6 dB bandwidth, MHz | Verdict | Reference to Plot in Appendix A |
|-----------------------|-------------------|------------------------------|---------|---------------------------------|
| 2412 | 6 | 16.60 | Pass | A1 |
| | 24 | 16.67 | Pass | A2 |
| | 54 | 16.67 | Pass | A3 |
| 2442 | 6 | 16.60 | Pass | A4 |
| | 24 | 16.67 | Pass | A5 |
| | 54 | 16.73 | Pass | A6 |
| 2462 | 6 | 16.35 | Pass | A7 |
| | 24 | 16.45 | Pass | A8 |
| | 54 | 16.50 | Pass | A9 |

LIMIT

Minimum allowed bandwidth - ≥ 500 kHz @ 6 dBc

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 2.412 - 2.462 GHz frequency range under all data transfer bit rates. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.

TEST EQUIPMENT USED:

| | | | | | | |
|---|---|---|--|--|--|--|
| 1 | 3 | 5 | | | | |
|---|---|---|--|--|--|--|



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5.1.2 Maximum peak output power test according to §15.247 (b)(3)

Method of measurement ANSI 63.4 §13.1.4
 Date 12 July 2005
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1009 hPa
 Operating Frequency Range 2.412 – 2.462 GHz
 Measurement Uncertainty ± 0.6 dB

| Carrier frequency MHz | Maximum output power (6 Mbit/rate) dBm | Maximum output power limit** dBm | Margin dBm | Maximum output power (54 Mbit/s rate) dBm | Maximum output power limit** dBm | Margin dBm |
|--------------------------|--|--|---------------|---|--|---------------|
| 2412 | 16.6 | 24 | 7.4 | 16.9 | 24 | 7.1 |
| 2417 | 18.8 | 24 | 5.2 | 19.0 | 24 | 5.0 |
| 2442 | 18.9 | 24 | 5.1 | 18.8 | 24 | 5.2 |
| 2457 | 18.6 | 24 | 5.4 | 18.8 | 24 | 5.2 |
| 2462 | 16.8 | 24 | 7.2 | 16.7 | 24 | 7.3 |

LIMIT

Maximum peak output power, W – 1.0

*Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi;

****For fixed point-to-point operations:**

The maximum directional antenna gain is 24 dBi, the maximum peak output limit is 30 dBm – (24-6)/3 =24 dBm

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 2.412 - 2.462 GHz frequency range under all data transfer bit rates and repeated at 2417 and 2457 MHz carrier frequencies. The EUT RF output was connected to the wide band crystal detector and oscilloscope. Measured level was noted and transmitter replaced by signal generator with output level adjusted to EUT output level. Signal generator output level was then noted in the table above.

TEST EQUIPMENT USED:

| | | | | | | |
|---|---|---|----|--|--|--|
| 2 | 3 | 4 | 15 | | | |
|---|---|---|----|--|--|--|



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5.1.3 Out of band conducted emissions test according to §15.247(c)

Date 4, 5 July 2004
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1009 hPa
 Operating Frequency Range 2.412 – 2.462 GHz
 Measurement Uncertainty ± 2.5 dB

| Frequency, MHz | Carrier frequency, MHz | Resolution bandwidth, KHz | Spurious emission level, dBm | Spurious calculated limit, dBm | Margin dB |
|----------------|------------------------|---------------------------|------------------------------|--------------------------------|-----------|
| 2399.7 | 2412 | 100 | - 44.6 | - 30.3 | 14.3 |
| 2485.26 | 2462 | 100 | - 43.3 | - 30.3 | 13.0 |

* The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency. The emission levels of the EUT in peak mode more than 20 dB lower than the specified limit were not recorded in the table above. For the test results refer to Plots A10-A24 in Appendix A

LIMIT

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

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 2.412 - 2.462 GHz frequency range. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings

TEST EQUIPMENT USED:

| | | | | | | |
|---|---|---|--|--|--|--|
| 1 | 3 | 5 | | | | |
|---|---|---|--|--|--|--|

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Method of measurement ANSI 63.4 §13.1.4
 Date 6, 11 July 2004
 Ambient Temperature - 23⁰ C Relative Humidity - 49% Air Pressure - 1009 hPa
 Operating Frequency Range 2.412 – 2.462 GHz

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency. The emission levels of the EUT more than 20 dB lower than the specified limit were not recorded in the tables. For the test results refer to Plots in Appendix A

Test results found in 30 – 1000 MHz are brought in section 5.2 of this test report

Carrier frequency = 2412 MHz**Peak detector, RBW = 1 MHz; VBW ≥ VBW**

| Frequency, MHz | Radiated emissions, dB (μV/m) | Limit, dB (μV/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|-------------------------------------|---------------------|---------------|---------|--|
| 2390 | 64.0 | 74 | 10.0 | Pass | 17 dBi |
| 2688 | 59.4 | 74 | 14.6 | Pass | 17 dBi |
| 2390 | 69.1 | 74 | 4.9 | Pass | 24 dBi |
| 2689 | 62.5 | 74 | 11.5 | Pass | 24 dBi |

Average detector, RBW = 1 MHz; VBW = 30 Hz

| Frequency, MHz | Radiated emissions, dB (μV/m) | Limit, dB (μV/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|-------------------------------------|---------------------|---------------|---------|--|
| 2390 | 51.6 | 54 | 2.4 | Pass | 17 dBi |
| 2688 | 42.1 | 54 | 11.9 | Pass | 17 dBi |
| 2389.4 | 51.9 | 54 | 2.1 | Pass | 24 dBi |
| 2688 | 42.0 | 54 | 12.0 | Pass | 24 dBi |

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| Frequency, MHz | Radiated emissions, dB (μV/m) | Limit, dB (μV/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|-------------------------------------|---------------------|---------------|---------|--|
| 2390 | 71.7 | 74 | 2.3 | Pass | 17 dBi |
| 2390 | 69.9 | 74 | 4.1 | Pass | 24dBi |

Average detector, RBW = 1 MHz; VBW = 30 Hz

| Frequency, MHz | Radiated emissions, dB (μV/m) | Limit, dB (μV/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|-------------------------------------|---------------------|---------------|---------|--|
| 2390 | 52.6 | 54 | 1.4 | Pass | 17 dBi |
| 2390 | 51.6 | 54 | 2.4 | Pass | 24 dBi |

Carrier frequency = 2442 MHz**Peak detector, RBW = 1 MHz; VBW ≥ VBW**

| Frequency, MHz | Radiated emissions, dB (μV/m) | Limit, dB (μV/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|-------------------------------------|---------------------|---------------|---------|--|
| 2688 | 58.8 | 74 | 15.2 | Pass | 17 dBi |
| 2688.1 | 61.3 | 74 | 12.7 | Pass | 24 dBi |

Average detector, RBW = 1 MHz; VBW = 30 Hz

| Frequency, MHz | Radiated emissions, dB (μV/m) | Limit, dB (μV/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|-------------------------------------|---------------------|---------------|---------|--|
| 2485 | 41.4 | 54 | 12.6 | Pass | 17 dBi |
| 2483.5 | 50.6 | 54 | 3.4 | Pass | 24 dBi |
| 2688 | 44.7 | 54 | 9.3 | Pass | 24 dBi |

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| Frequency, MHz | Radiated emissions, dB (μ V/m) | Limit, dB (μ V/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|---|---------------------------|---------------|---------|--|
| 2484 | 70.9 | 74 | 3.1 | Pass | 17 dBi |
| 2486 | 65.8 | 74 | 8.2 | Pass | 24 dBi |

Average detector, RBW = 1 MHz; VBW = 30 Hz

| Frequency, MHz | Radiated emissions, dB (μ V/m) | Limit, dB (μ V/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|---|---------------------------|---------------|---------|--|
| 2483.5 | 52.7 | 54 | 1.3 | Pass | 17 dBi |
| 2688 | 44.7 | 54 | 9.3 | Pass | 17 dBi |
| 2483.5 | 50.6 | 54 | 3.4 | Pass | 24 dBi |
| 2688 | 44.0 | 54 | 10 | Pass | 24 dBi |

Carrier frequency = 2462 MHz**Peak detector, RBW = 1 MHz; VBW \geq VBW**

| Frequency, MHz | Radiated emissions, dB (μ V/m) | Limit, dB (μ V/m) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|---|---------------------------|---------------|---------|--|
| 2485 | 70.6 | 74 | 3.4 | Pass | 17 dBi |
| 2685 | 58.8 | 74 | 15.2 | Pass | 17 dBi |
| 2373 | 57.8 | 74 | 6.2 | Pass | 24 dBi |
| 2485 | 72.3 | 74 | 1.7 | Pass | 24 dBi |

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Average detector, RBW = 1 MHz; VBW = 30 Hz

| Frequency, MHz | Radiated emissions, dB ($\mu\text{V}/\text{m}$) | Limit, dB ($\mu\text{V}/\text{m}$) | Margin, dB | Verdict | Reference to Plots of antenna in Appendix A |
|-------------------|---|---|---------------|---------|--|
| 2483.5 | 52.9 | 54 | 1.1 | Pass | 17 dBi |
| 2688 | 44.5 | 54 | 9.5 | Pass | 17 dBi |
| 2389.2 | 39.4 | 54 | 14.6 | Pass | 24 dBi |
| 2483.5 | 53.3 | 54 | 0.7 | Pass | 24 dBi |
| 2688 | 41.5 | 54 | 12.5 | Pass | 24 dBi |

TEST PROCEDURE

The test was performed with transmitter operating in 3 carrier frequencies with antennas 17 dBi and 24 dBi

$F_{\min} = 2412$ MHz; $F_{\text{cent}} = 2442$ MHz; $F_{\max} = 2462$ MHz and repeated at 2417 and 2457 MHz carrier frequencies
The EUT was placed on a wooden 80 cm height turntable. The measurements were performed in Max hold mode at 3 m test distance.

To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

LIMIT

Radiated emissions, which fall in the restricted bands, must comply with §15.209 (limits).

TEST EQUIPMENT USED:

| | | | | | | |
|---|---|---|---|----|----|----|
| 5 | 6 | 7 | 8 | 11 | 13 | 14 |
|---|---|---|---|----|----|----|

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Date 4, 11 July 2004
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1009 hPa
 Operating Frequency Range 2.412 – 2.462 GHz
 Measurement Uncertainty ± 2.5 dB

| Carrier frequency MHz | Data rate Mbit/s | Test result dBm | Margin | Verdict |
|--------------------------|---------------------|--------------------|--------|---------|
| 2412 | 6 Mbit/s | -6.17 | 14.17 | PASS |
| | 24 Mbit/s | -6.33 | 14.33 | |
| | 54 Mbit/s | -4.50 | 12.50 | |
| 2442 | 6 Mbit/s | -5.33 | 13.33 | PASS |
| | 24 Mbit/s | -4.17 | 12.17 | |
| | 54 Mbit/s | -4.33 | 12.33 | |
| 2462 | 6 Mbit/s | -4.33 | 12.33 | PASS |
| | 24 Mbit/s | -4.0 | 12.0 | |
| | 54 Mbit/s | -4.67 | 12.67 | |

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 2.412 - 2.462 GHz frequency range. The EUT RF output was connected to the Spectrum Analyzer through 30 dB attenuator and accounted with cable loss in measurement.

LIMIT

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

TEST EQUIPMENT USED:

| | | | | | | |
|---|---|---|--|--|--|--|
| 1 | 3 | 5 | | | | |
|---|---|---|--|--|--|--|

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5.2 Radiated emissions test according to § 15.109, 15.209

| | |
|-----------------------|-------------------|
| Method of measurement | ANSI 63.4 §13.1.4 |
| Date | 6, July 2004 |
| Ambient Temperature | 24 ⁰ C |
| Relative Humidity | 55 % |
| Air Pressure | 1012 hPa |

Test description:

The measurements were performed at the Open Area Test Site. The test configuration is shown in Fig.1
The EUT was arranged on a wooden table 0.8 m placed on the turn - table.

The measurements were performed at a 10 m measurement distance. The Biconilog 30 MHz-2 GHz antenna was used. The frequency range was investigated from 30 MHz to 1 GHz. The measurements were performed at each frequency at which the signal was 10 dB below the limit or less. The level were maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna polarization from vertical to horizontal.

Requirements:

EUT radiated emission shall not exceed value required in section 15.109 (a)

Radiated emissions test result:

Test results are presented in Table 1.

Test equipment used

| | | | | | |
|---|----|--|--|--|--|
| 7 | 11 | | | | |
|---|----|--|--|--|--|

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| Frequency (MHz) | Turn- table Angle (°) | Antenna Polariz. | Antenna Height (m) | Emission Level Note 1 (dB μ V/m) | Limit @ 3 m (dB μ V/m) | Margin Note 2 (dB) | Results |
|--------------------|--------------------------------|---------------------|--------------------------|---|----------------------------------|--------------------------|----------|
| 70.9 | 130 | V | 1.1 | 33.4 | 40.0 | 6.6 | Complies |
| 103.0 | 62 | H | 1.3 | 34.7 | 43.5 | 8.8 | Complies |
| 134.6 | 108 | V | 1.4 | 27.0 | 43.5 | 16.5 | Complies |
| 199.5 | 172 | H | 1.8 | 28.2 | 43.5 | 15.3 | Complies |
| 332.5 | 63 | H | 2.3 | 40.2 | 46 | 5.8 | Complies |
| 465.5 | 159 | H | 2.4 | 41.7 | 46 | 4.3 | Complies |
| 856.4 | 237 | H | 1.1 | 36.2 | 46 | 9.8 | Complies |

Note 1: Emission level = E Reading (dB μ V) + Cable loss (dB) + Antenna Factor (dB/m) + 10.5 dB

Where 10.5 dB is an extrapolation distance factor.

For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: Margin (dB) = Limit (dB μ V/m) – Emission level (dB μ V/m)



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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

5.3 Conducted emissions according to § 15.107, 15.207

Method of measurement ANSI 63.4 §13.1.3
 Date 6, July 2004
 Ambient Temperature 23⁰ C
 Relative Humidity 49%
 Air Pressure 1009 hPa

| Frequency, MHz | Class B equipment, dB (µV) | |
|----------------|----------------------------|----------|
| | QP | AVRG |
| 0.15 - 0.5 | 66 - 56* | 56 - 46* |
| 0.5 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

EUT was placed on a wooden table in a shielded chamber at a height of 80 cm from the floor and 40 cm from the vertical reference plane. The measurements were performed at mains terminals by means of LISN, connected to spectrum analyzer in the frequency range as referred to in the table above. The measurements were made with quasi-peak and average (CISPR) detectors.

The position of the EUT cables was varied to determine maximum emission level.

Test results:

Test results are shown at plots # 1 for line Phase and # 2 for line Neutral

Test equipment used

| | | | | | |
|---|---|----|--|--|--|
| 8 | 9 | 10 | | | |
|---|---|----|--|--|--|



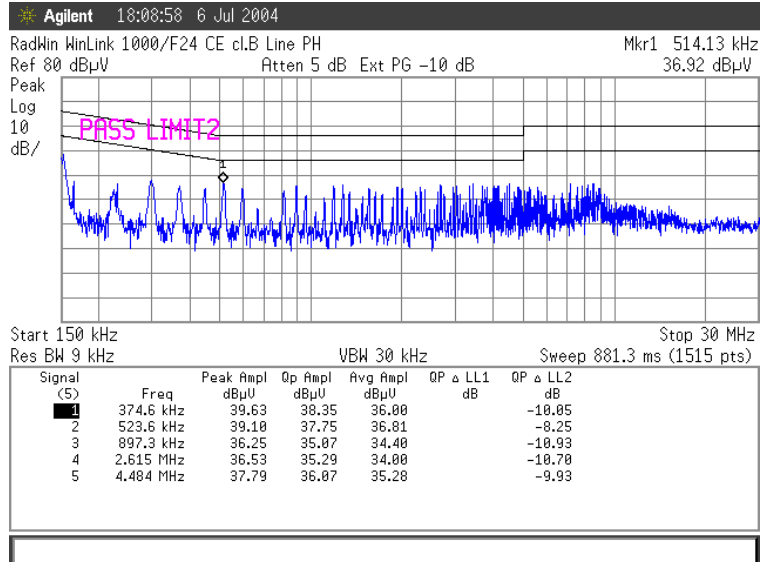
Test report No: 8412312674

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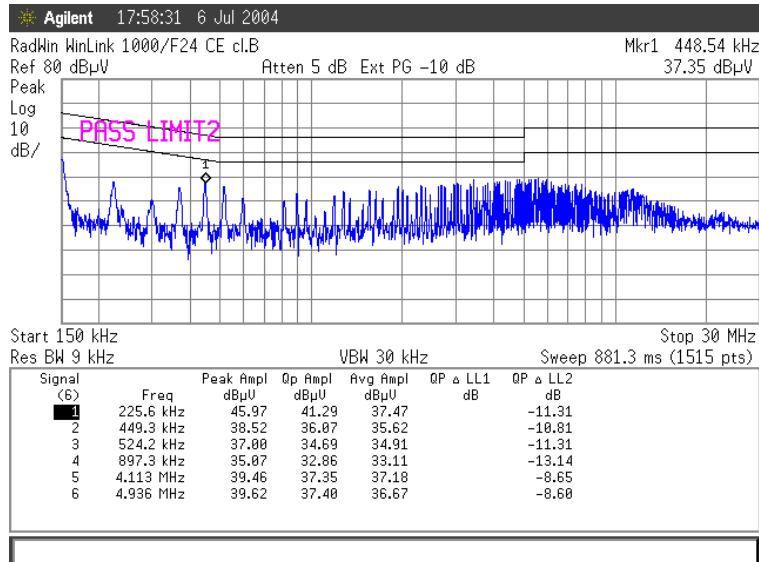
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted emissions test. 120V AC. Plot # 1



Conducted emissions test. 120V AC. Plot # 2





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Title: Point-to-Point Broadband Wireless Transmitter System

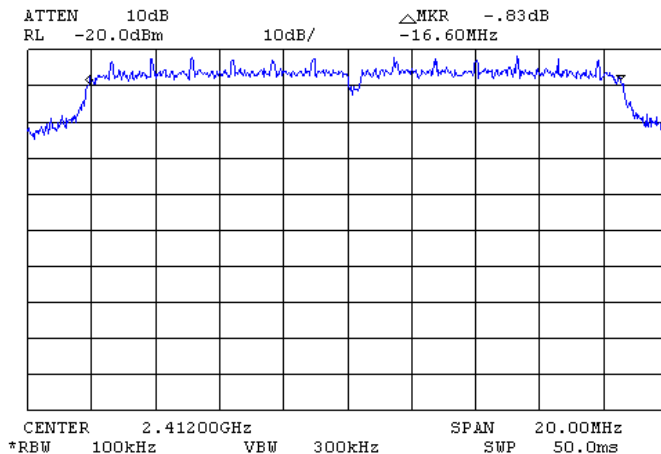
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Appendix A

6 dB Emission Bandwidth 15.247a (2)

Carrier Frequency 2.412 GHz

PRBS 6 Mbit/s

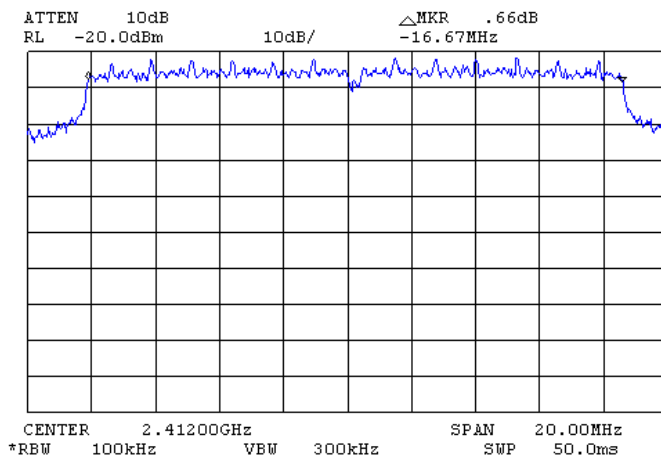


Plot A1

6 dB Emission Bandwidth 15.247a (2)

Carrier Frequency 2.412 GHz

PRBS 24 Mbit/s



Plot A2



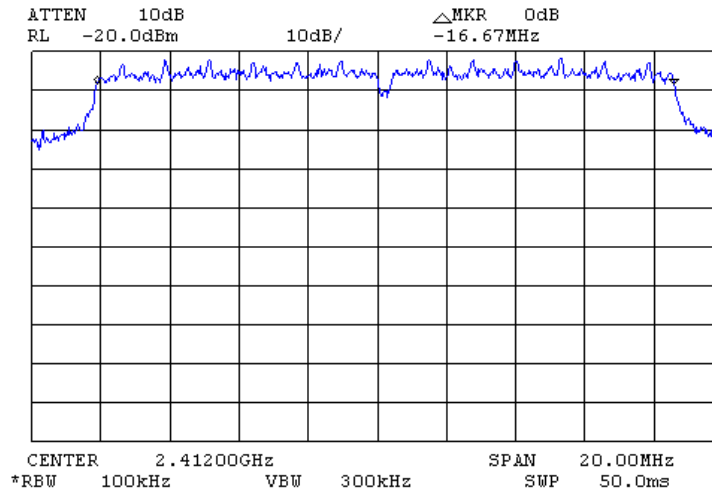
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

6 dB Emission Bandwidth 15.247a (2)
Carrier Frequency 2.412 GHz
PRBS 54 Mbit/s



Plot A3



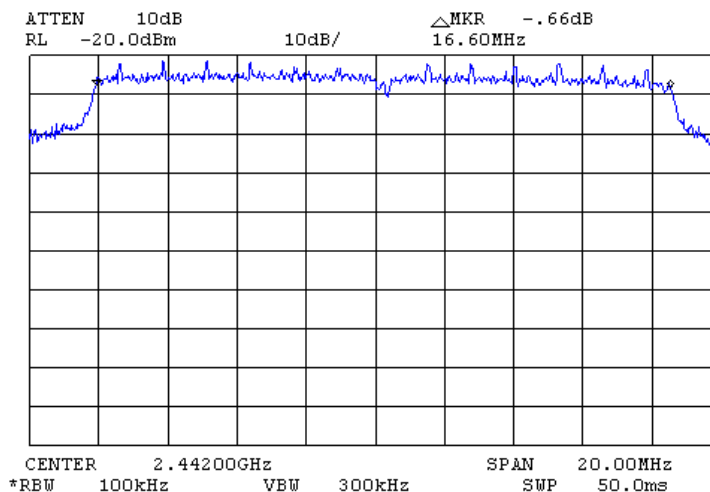
Test report No: 8412312674

Page 23 of 83 Pages

Title: Point-to-Point Broadband Wireless Transmitter System

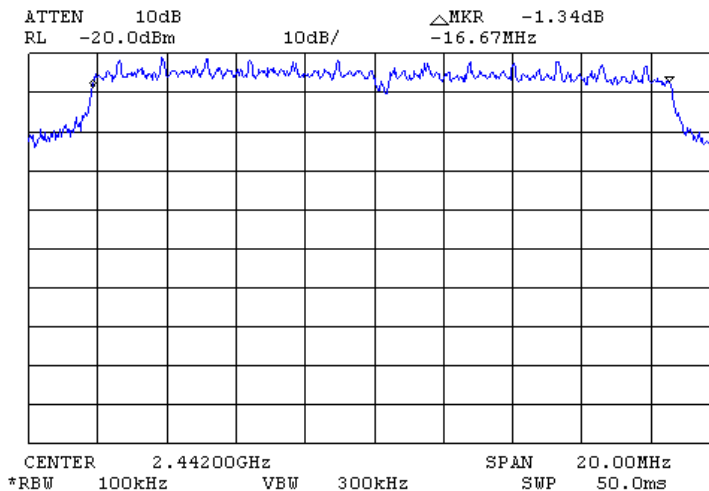
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

6 dB Emission Bandwidth 15.247a (2)
Carrier Frequency 2.442 GHz
PRBS 6 Mbit/s



Plot A4

6 dB Emission Bandwidth 15.247a (2)
Carrier Frequency 2.442 GHz
PRBS 24 Mbit/s



Plot A5



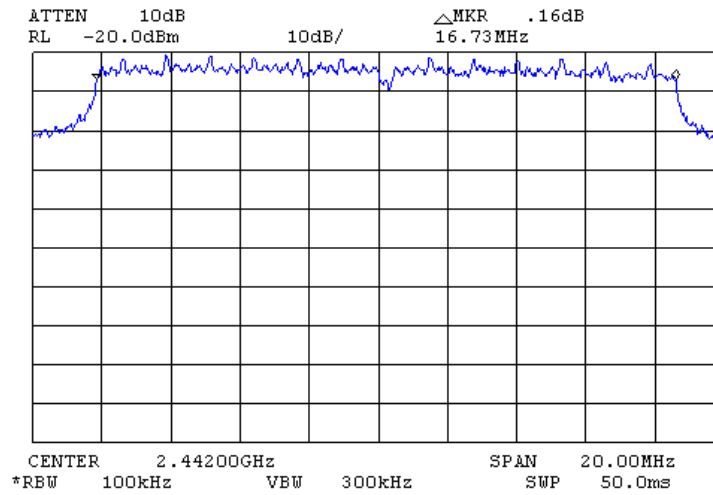
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

6 dB Emission Bandwidth 15.247a (2)
Carrier Frequency 2.442 GHz
PRBS 54 Mbit/s



Plot A6



Test report No: 8412312674

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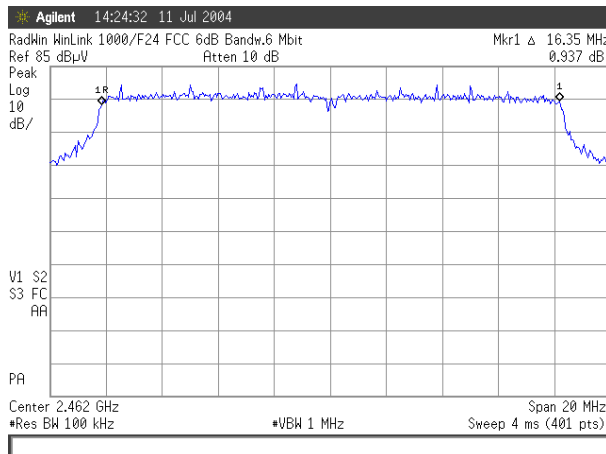
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

6 dB Emission Bandwidth 15.247a (2)

Carrier Frequency 2.462 GHz

PRBS 6 Mbit/s

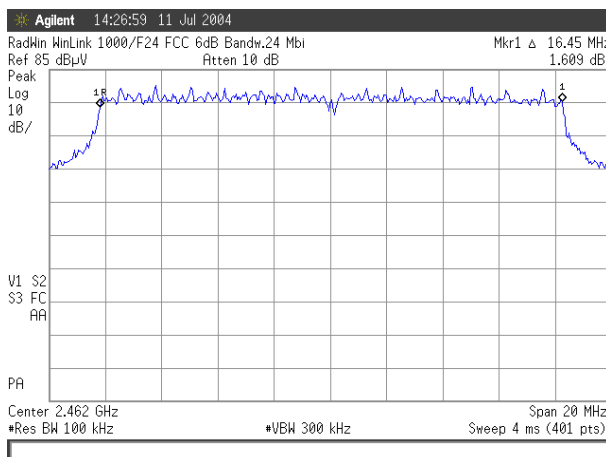


Plot A7

6 dB Emission Bandwidth 15.247a (2)

Carrier Frequency 2.462 GHz

PRBS 24 Mbit/s



Plot A8



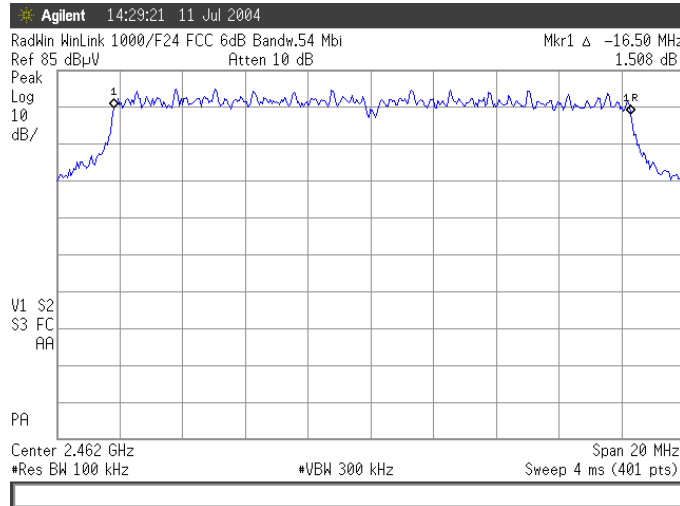
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

6 dB Emission Bandwidth 15.247a (2)
Carrier Frequency 2.472 GHz
PRBS 54 Mbit/s



Plot A9



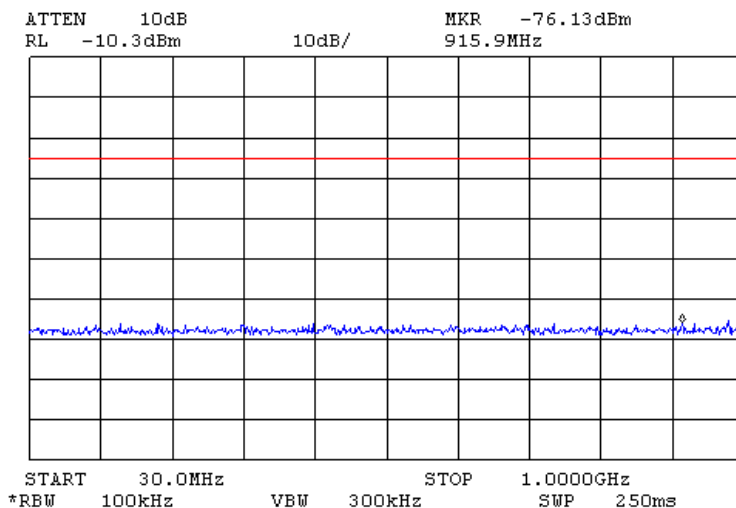
Test report No: 8412312674

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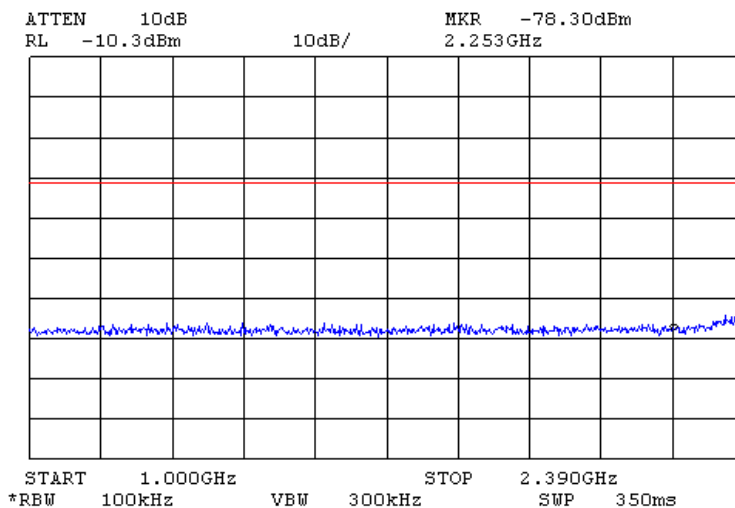
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted Spurious Emission 15.247c
Maximum Output power – 18 dBm
Carrier Frequency 2.412 GHz



Plot A10



Plot A11



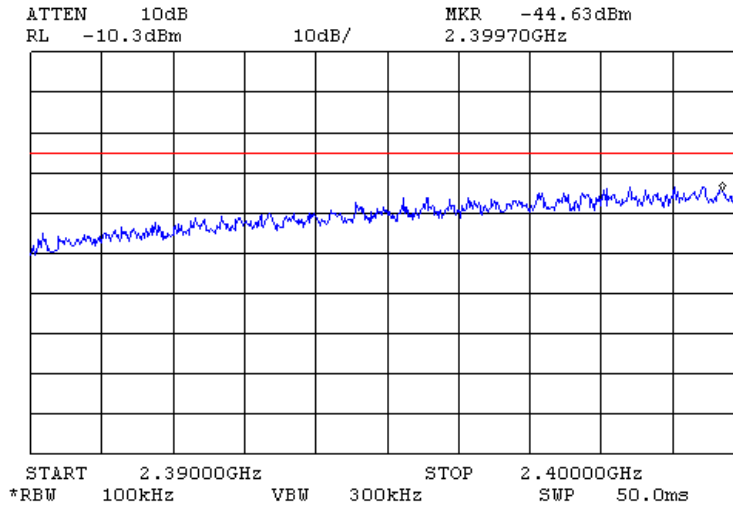
Test report No: 8412312674

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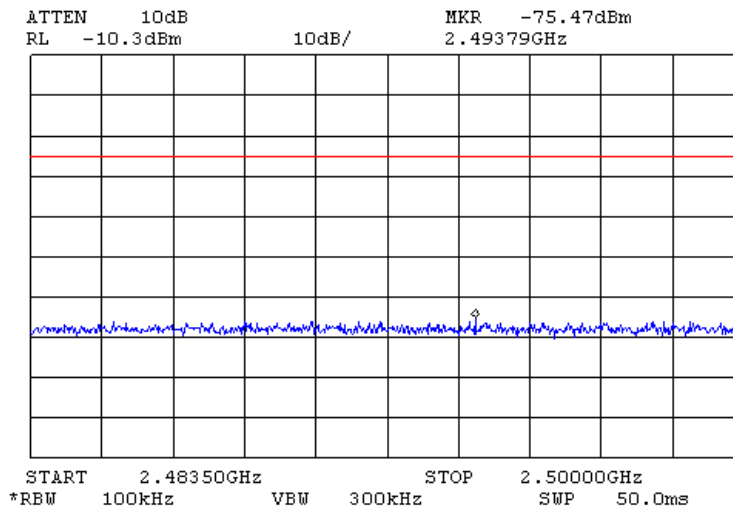
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted Spurious Emission 15.247c
Maximum Output power – 18 dBm
Carrier Frequency 2.412 GHz



Plot A12



Plot A13



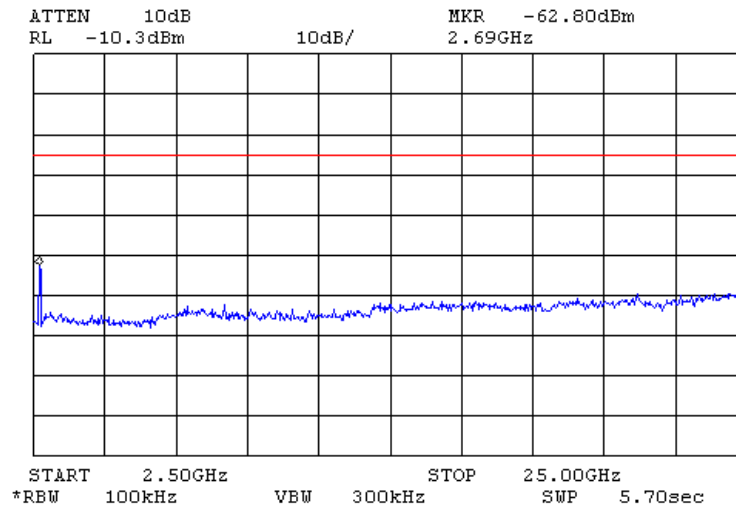
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

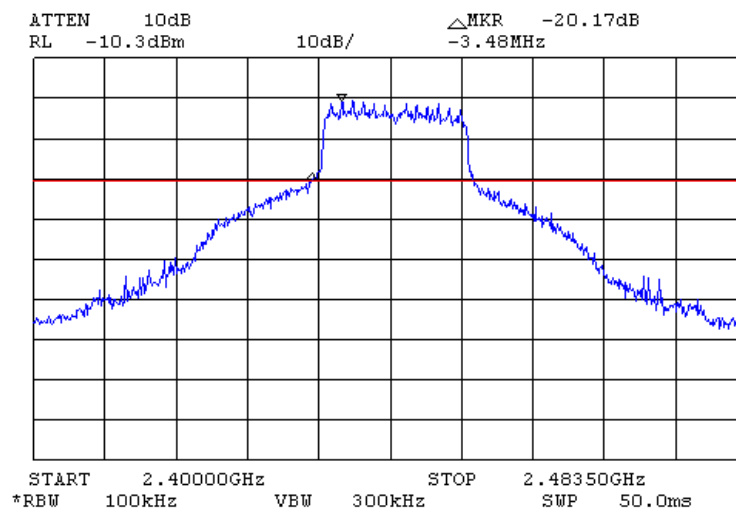
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted Spurious Emission 15.247c
Maximum Output power – 18 dBm
Carrier Frequency 2.412 GHz



Plot A14

20 dB reference level = -30.3 dBm
Output power = 18 dBm



Plot A15



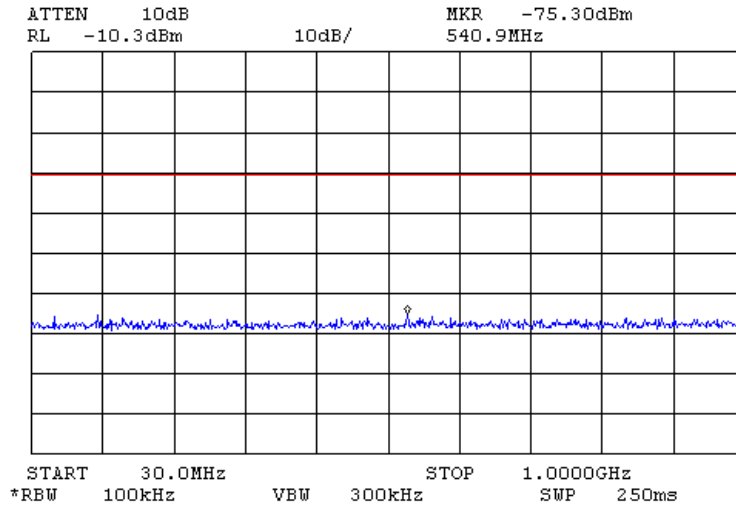
Test report No: 8412312674

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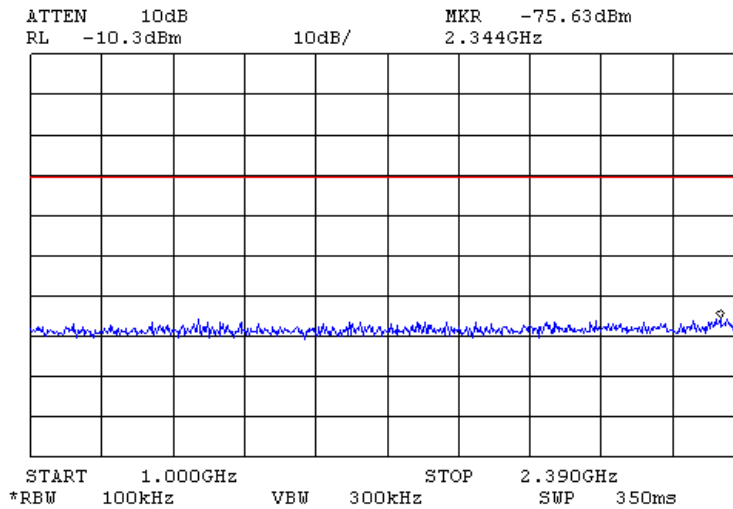
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted Spurious Emission 15.247c
Maximum Output power – 18 dBm
Carrier Frequency 2.442 GHz



Plot A16



Plot A17



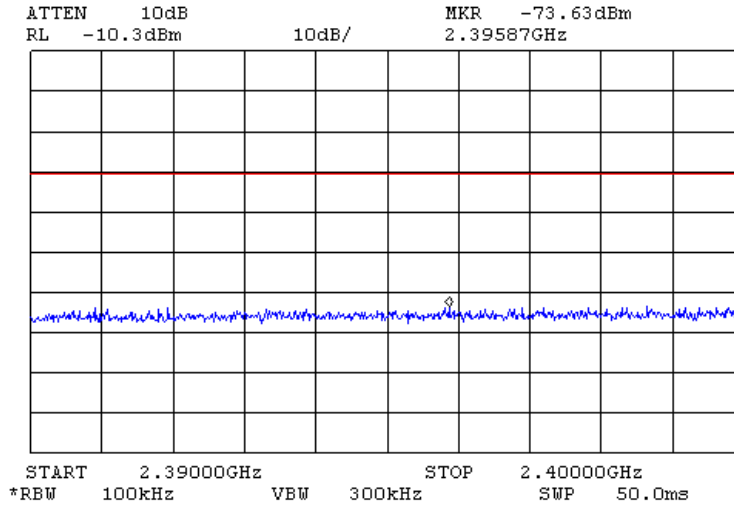
Test report No: 8412312674

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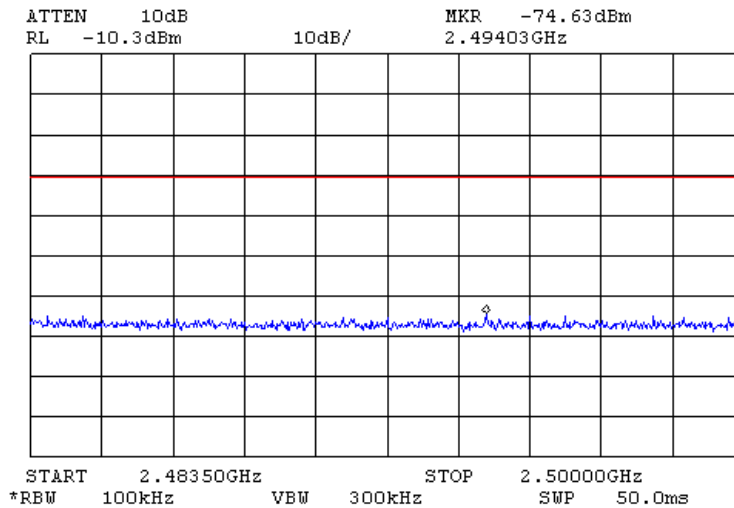
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted Spurious Emission 15.247c
Maximum Output power – 18 dBm
Carrier Frequency 2.442 GHz



Plot A18



Plot A19



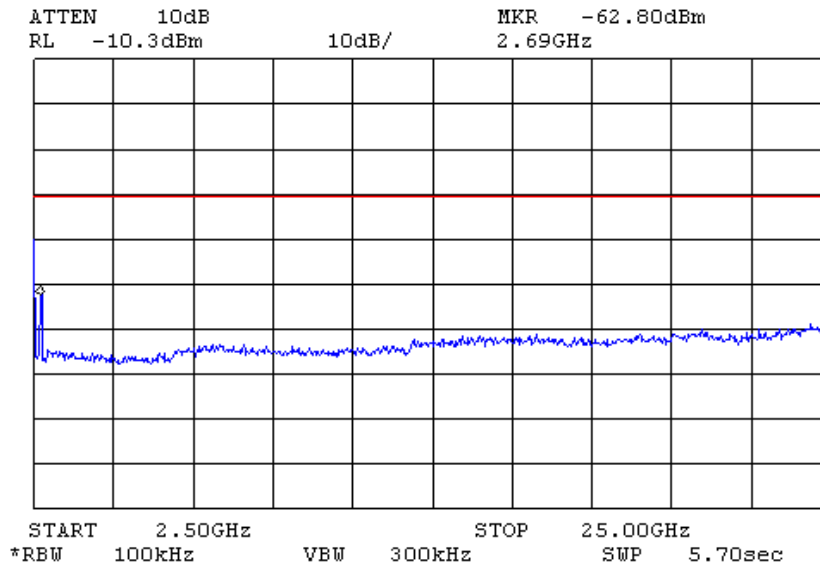
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted Spurious Emission 15.247c
Maximum Output power – 18 dBm
Carrier Frequency 2.442 GHz



Plot A20



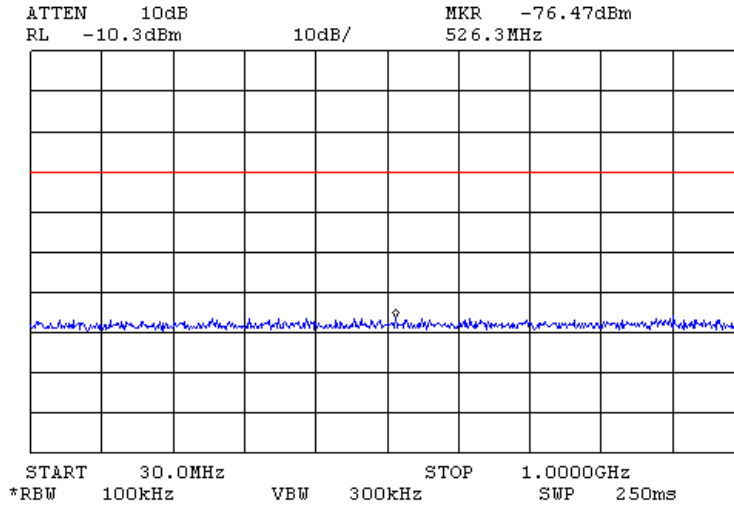
Test report No: 8412312674

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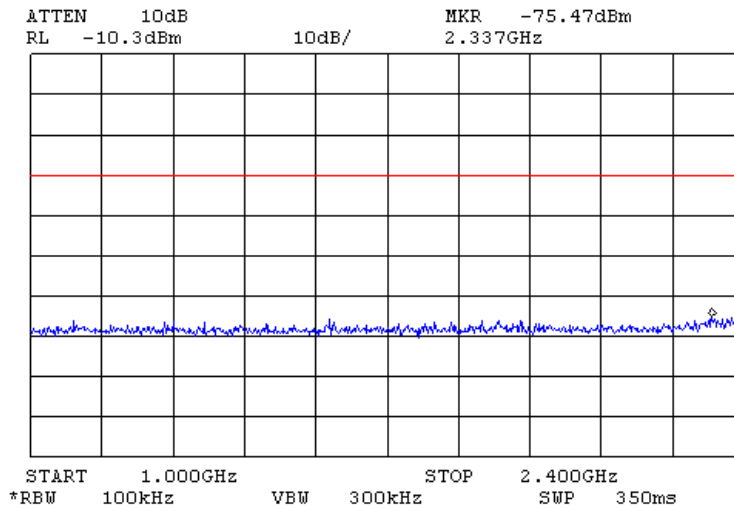
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Conducted Spurious Emission 15.247c
Maximum Output power – 18 dBm
Carrier Frequency 2.462GHz



Plot A21



Plot A22



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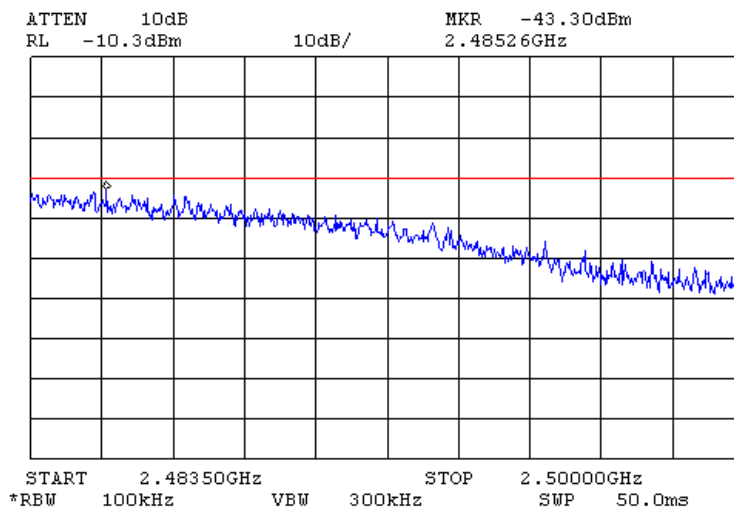
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

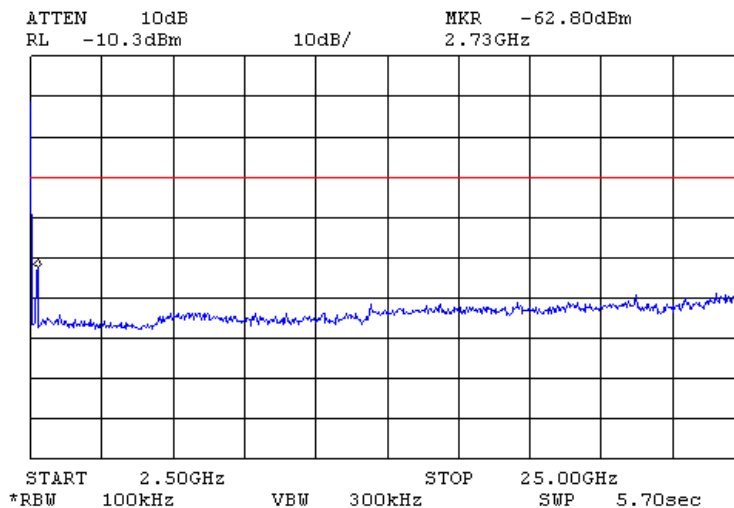
Conducted Spurious Emission 15.247c

Maximum Output power – 18 dBm

Carrier Frequency 2.462GHz



Plot A23



Plot A24



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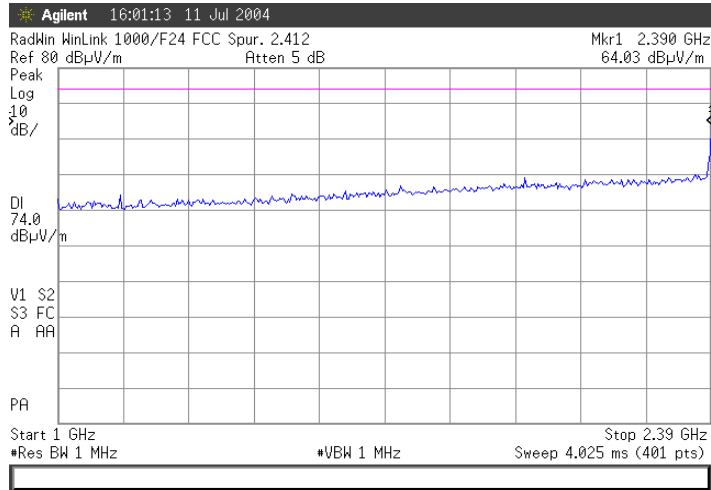
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

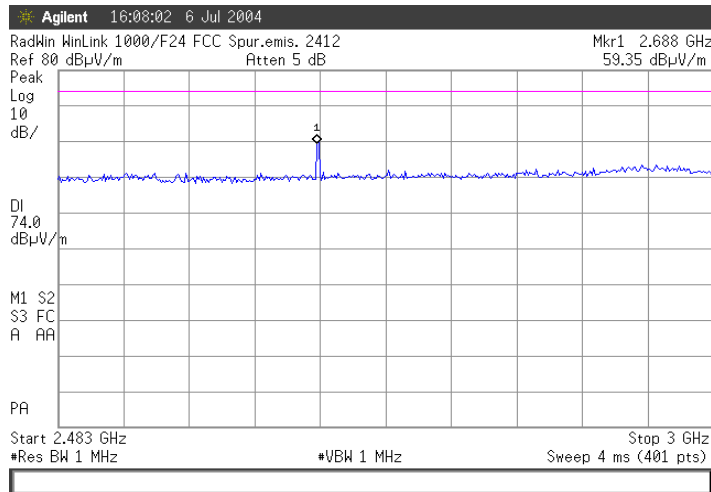
Radiated Spurious Emissions in restricted bands 15.247(c), 15.205

Antenna 17 dBi

| | | | |
|-------------------|----------|----------|------|
| Carrier Frequency | 2412 MHz | Detector | Peak |
| Output power | 16 dBm | Limit | Peak |



Plot A25



Plot A26



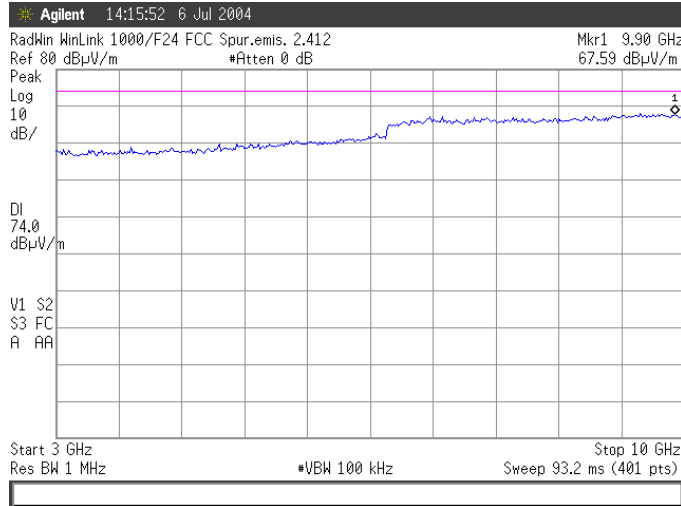
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

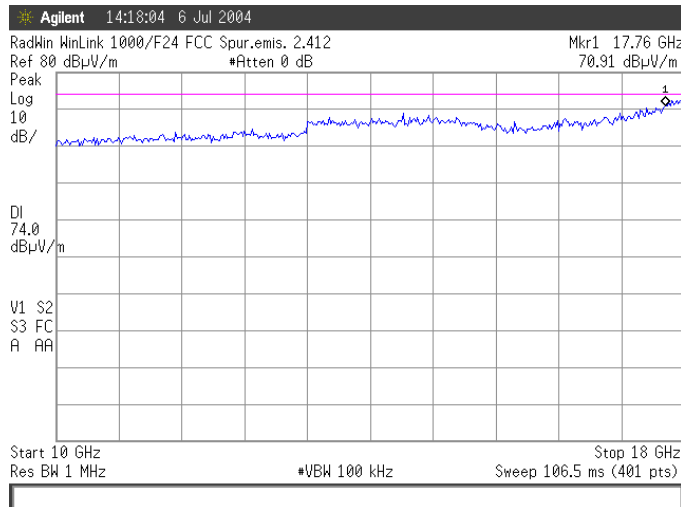
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------------|------|
| Carrier Frequency | 2412 MHz | Detector Limit | Peak |
| Output power | 16 dBm | | Peak |



Plot A27

]



Plot A28



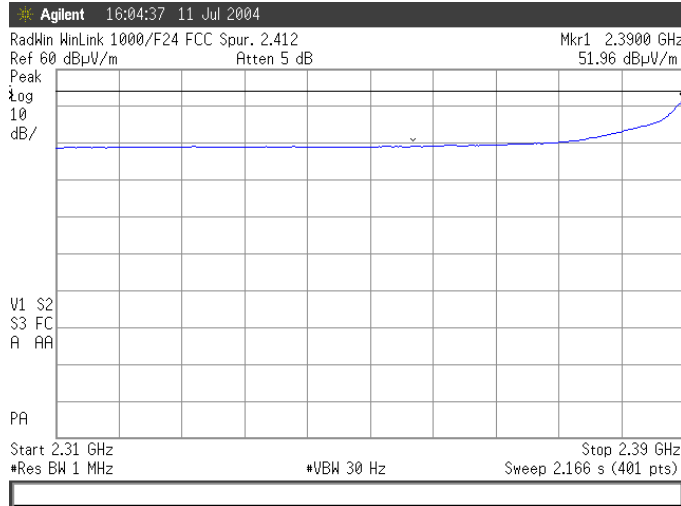
Test report No: 8412312674

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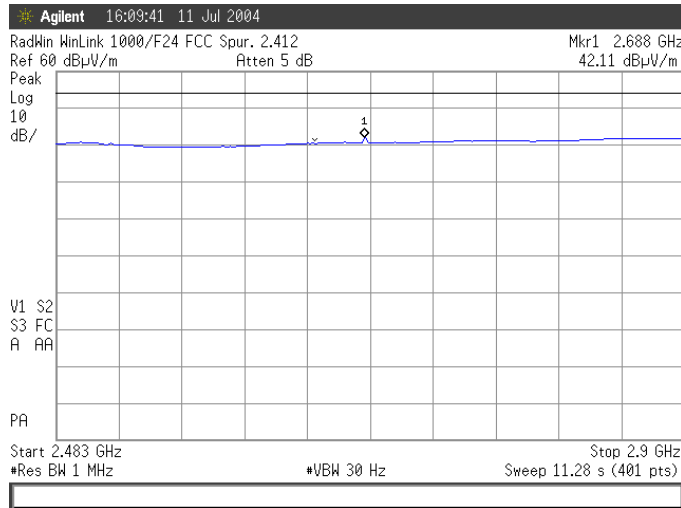
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|---------|
| Carrier Frequency | 2412 MHz | Detector | Average |
| Output power | 16 dBm | Limit | Average |



Plot A29



Plot A30



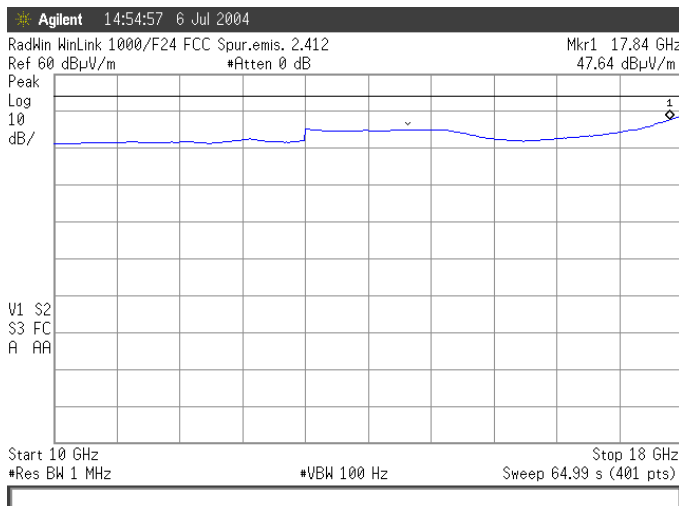
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|---------|
| Carrier Frequency | 2412 MHz | Detector | Average |
| Output power | 16 dBm | Limit | Average |



Plot A31



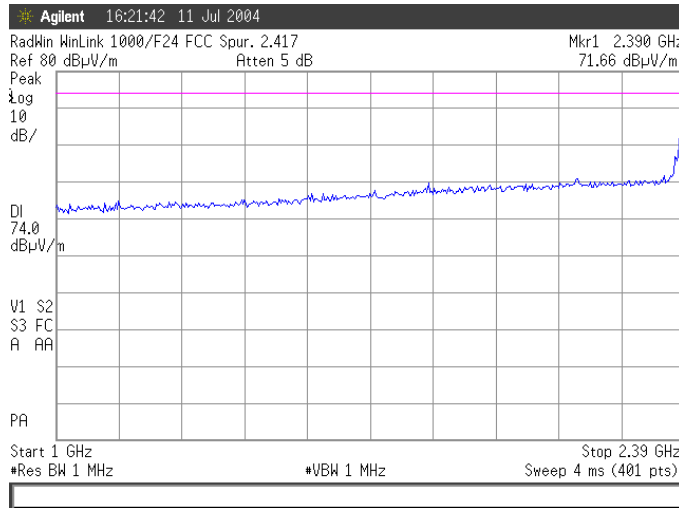
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

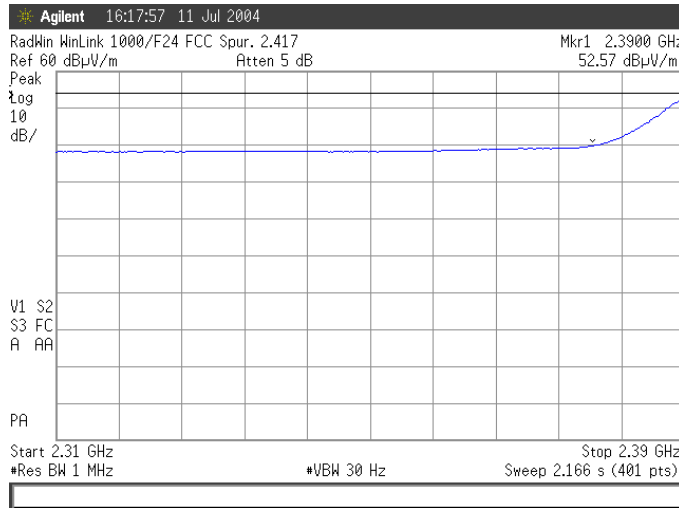
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|------|
| Carrier Frequency | 2417 MHz | Detector | Peak |
| Output power | 18 dBm | Limit | Peak |



Plot A32

| | | | |
|-------------------|----------|----------|---------|
| Carrier Frequency | 2417 MHz | Detector | Average |
| Output power | 18 dBm | Limit | Average |



Plot A33



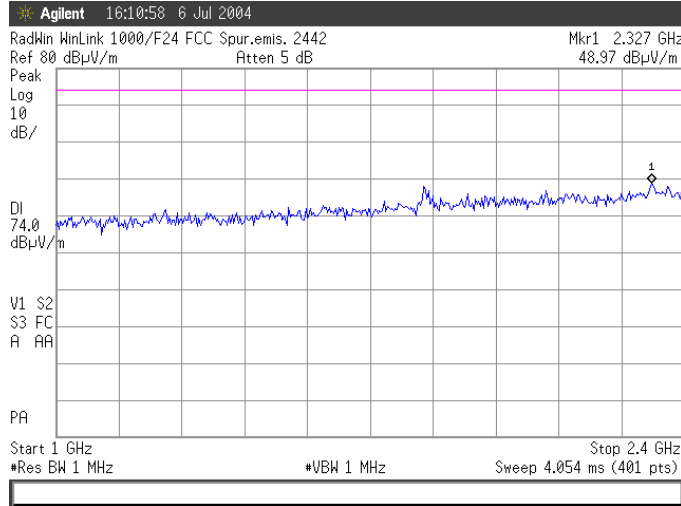
Test report No: 8412312674

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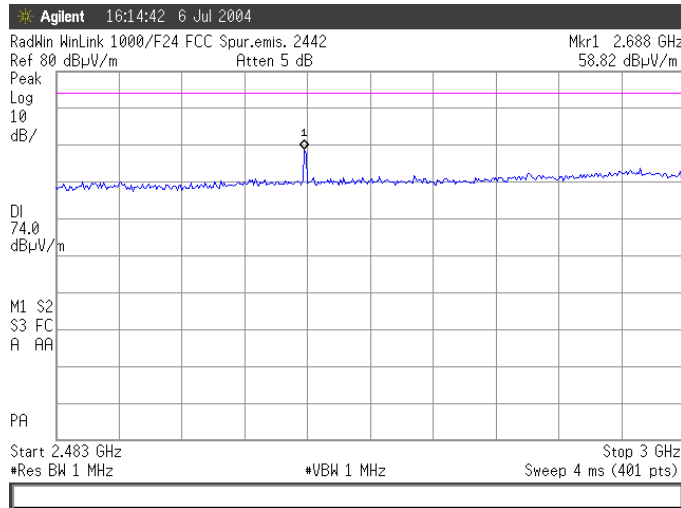
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|------|
| Carrier Frequency | 2442 MHz | Detector | Peak |
| Output power | 18 dBm | Limit | Peak |



Plot A34



Plot A35



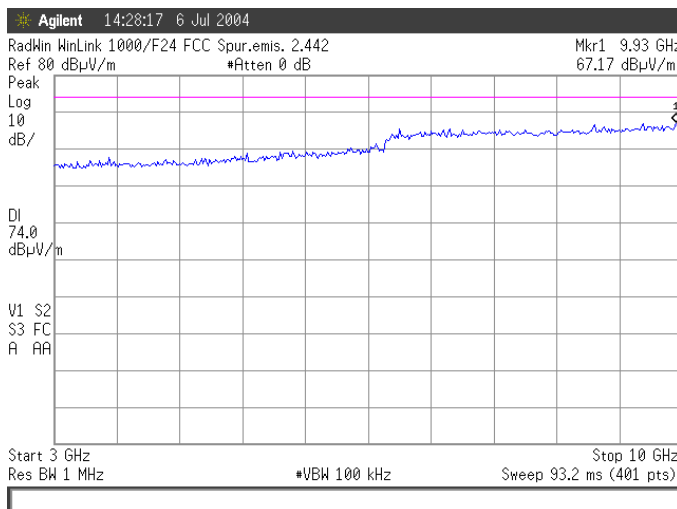
Test report No: 8412312674

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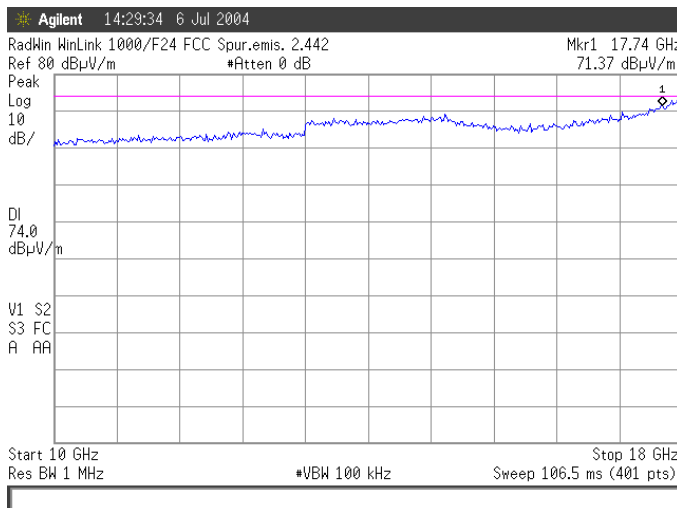
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|------|
| Carrier Frequency | 2442 MHz | Detector | Peak |
| Output power | 18 dBm | Limit | Peak |



Plot A36



Plot A37



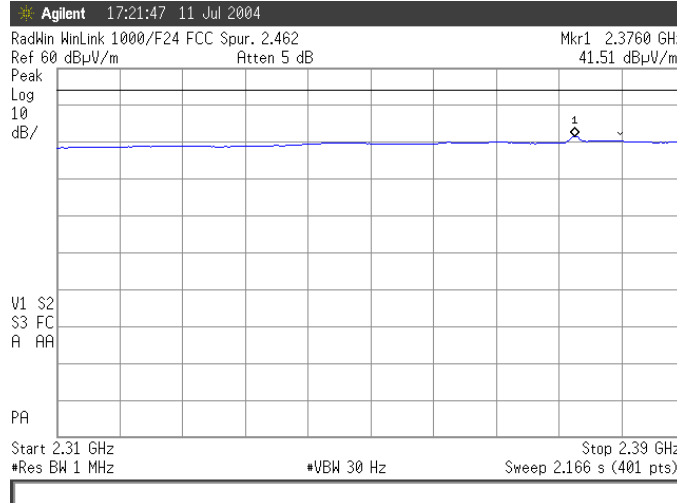
Test report No: 8412312674

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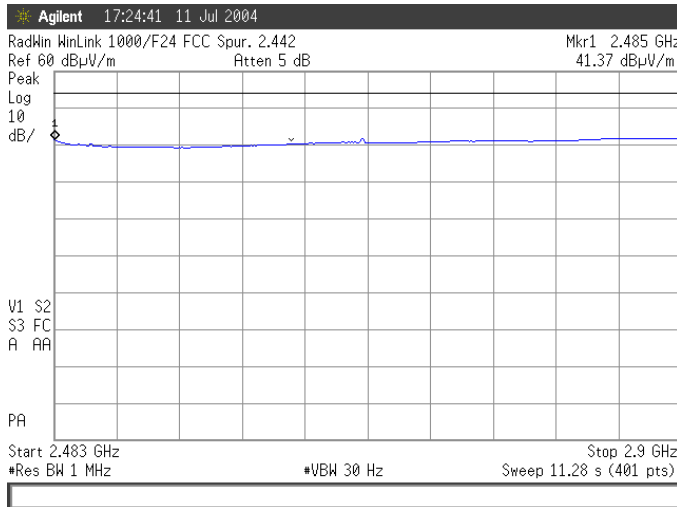
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Carrier Frequency 2442 MHz Detector Average
Output power 18 dBm Limit Average



Plot A38



Plot A39



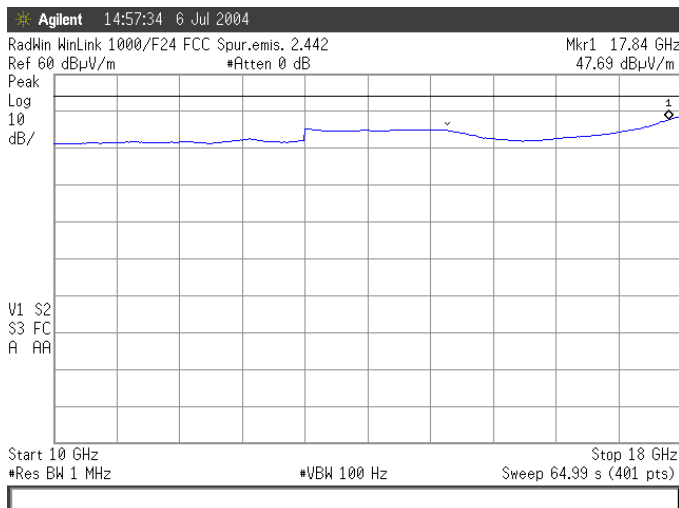
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|---------|
| Carrier Frequency | 2442 MHz | Detector | Average |
| Output power | 18 dBm | Limit | Average |



Plot A40



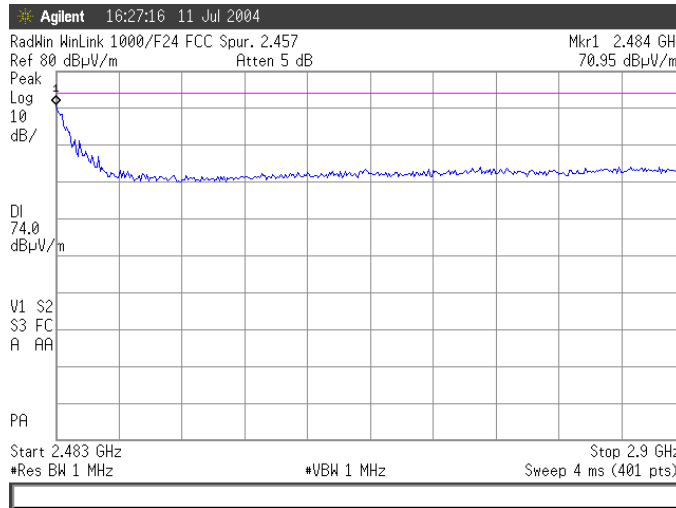
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

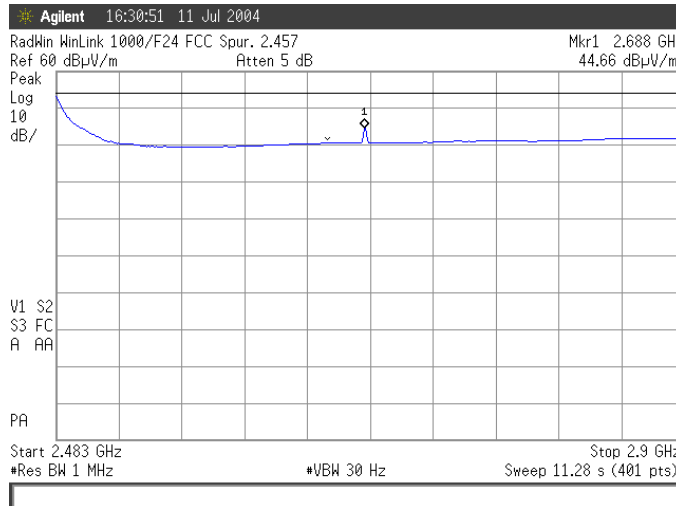
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|------|
| Carrier Frequency | 2457 MHz | Detector | Peak |
| Output power | 18 dBm | Limit | Peak |



Plot A41

| | | | |
|-------------------|----------|----------|---------|
| Carrier Frequency | 2457 MHz | Detector | Average |
| Output power | 18 dBm | Limit | Average |



Plot A42



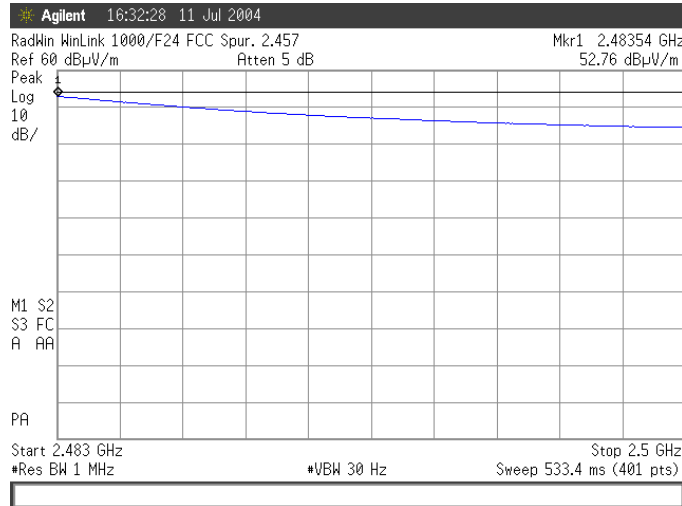
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|---------|
| Carrier Frequency | 2457 MHz | Detector | Average |
| Output power | 18 dBm | Limit | Average |



Plot A43



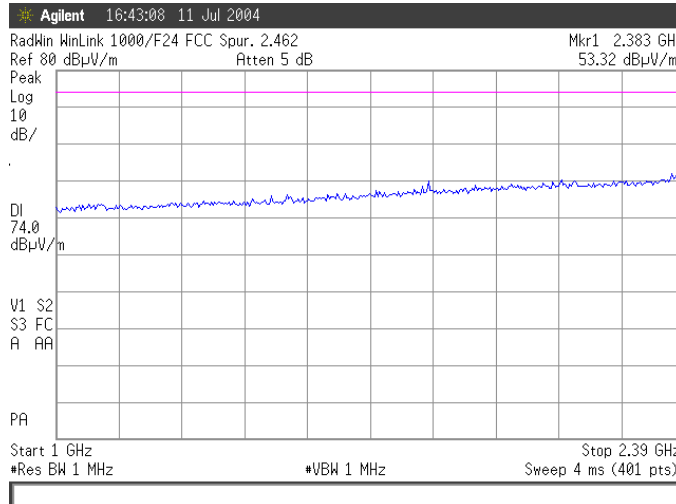
Test report No: 8412312674

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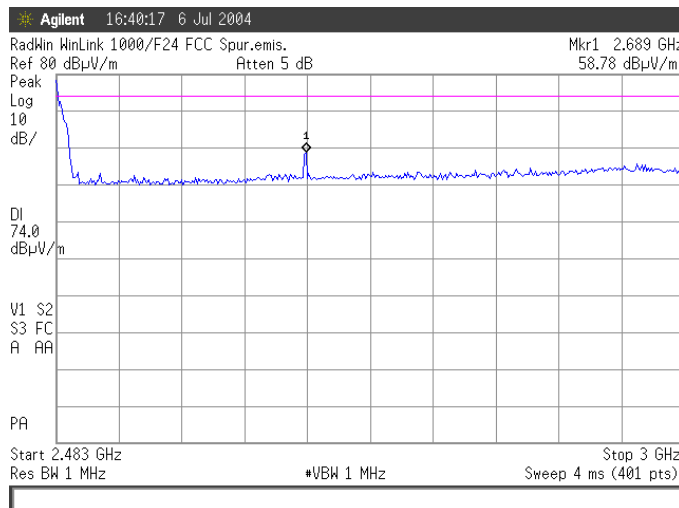
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|------|
| Carrier Frequency | 2462 MHz | Detector | Peak |
| Output power | 16 dBm | Limit | Peak |



Plot A44



Plot A45



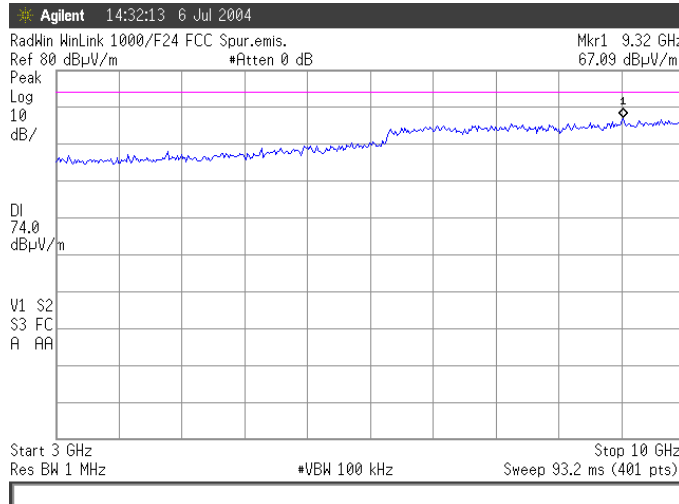
Test report No: 8412312674

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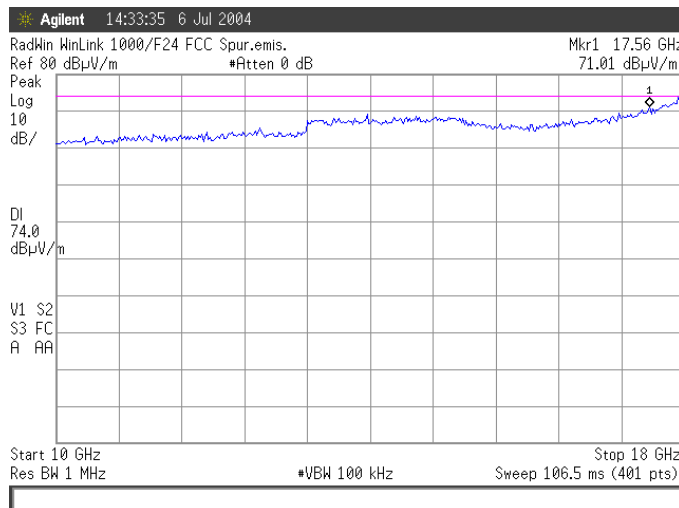
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|------|
| Carrier Frequency | 2462 MHz | Detector | Peak |
| Output power | 16 dBm | Limit | Peak |



Plot A46



Plot A47



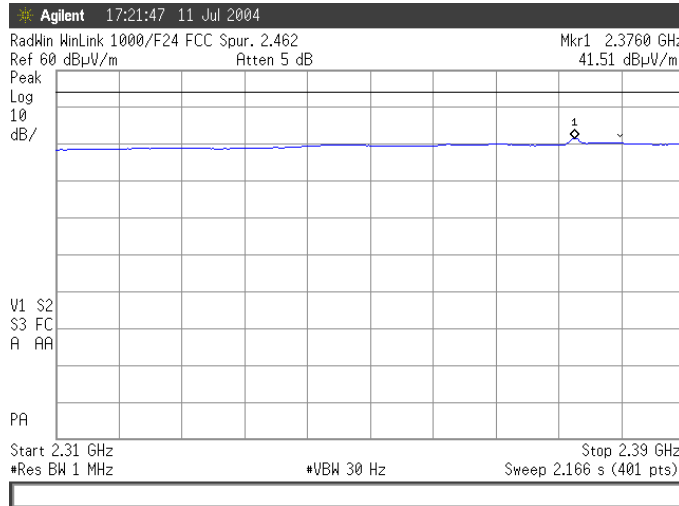
Test report No: 8412312674

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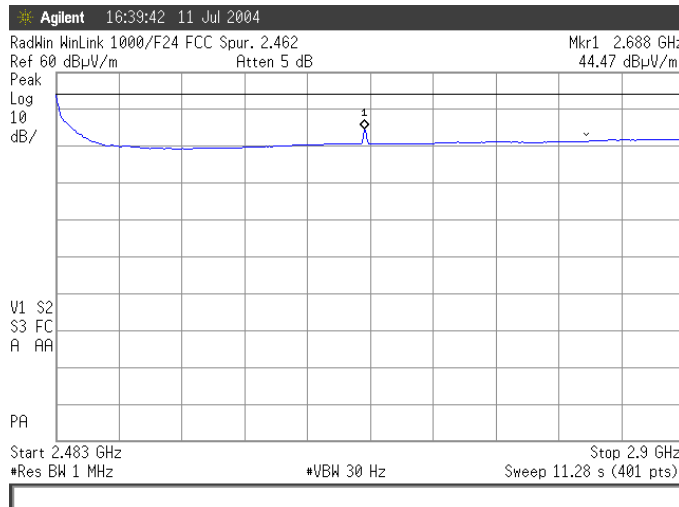
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|----------|----------|---------|
| Carrier Frequency | 2462 MHz | Detector | Average |
| Output power | 16 dBm | Limit | Average |



Plot A48



Plot A49



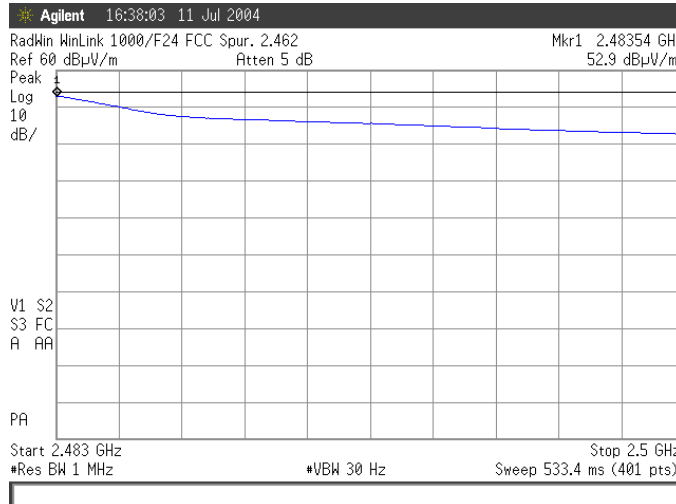
Test report No: 8412312674

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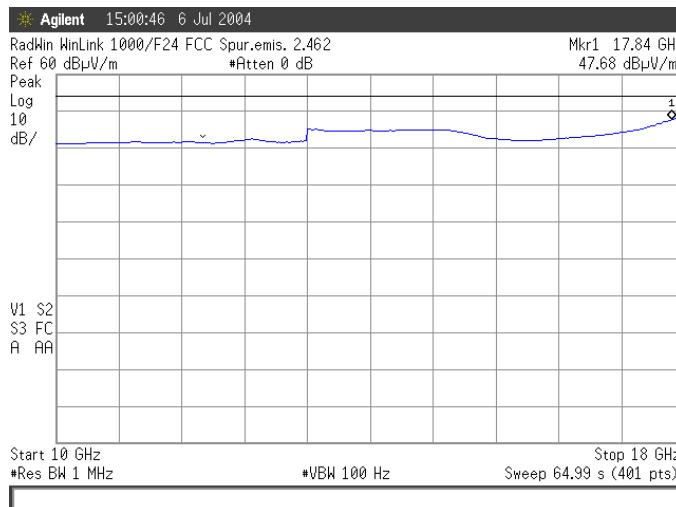
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|-----------|----------|---------|
| Carrier Frequency | 2.462 GHz | Detector | Average |
| Output power | 16 dBm | Limit | Average |



Plot A50



Plot A51



Test report No: 8412312674

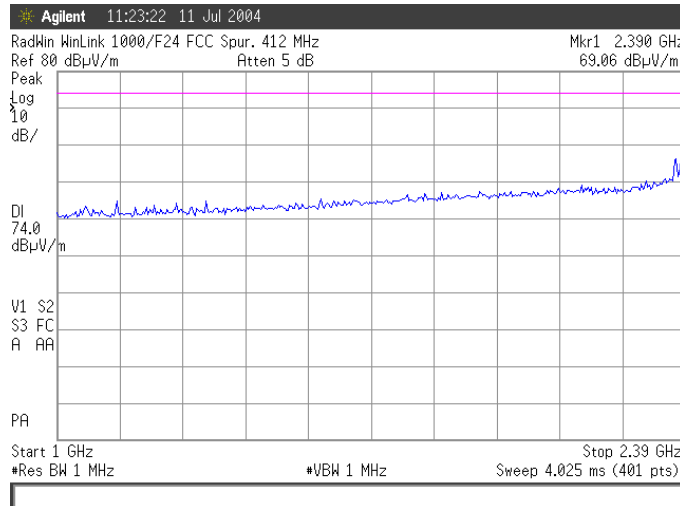
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Title: Point-to-Point Broadband Wireless Transmitter System

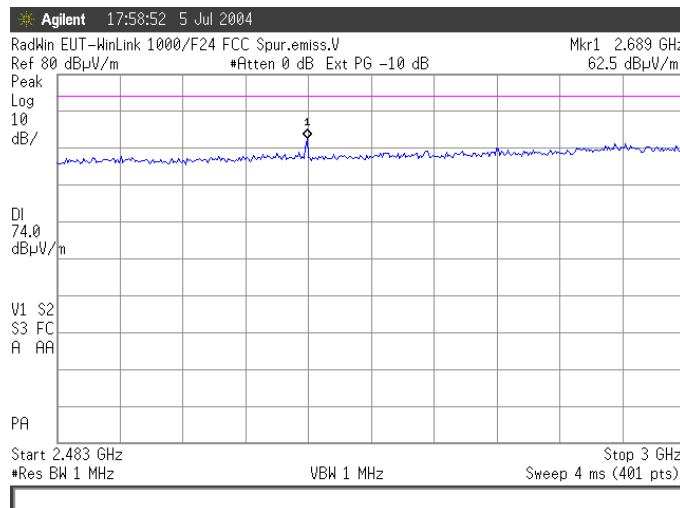
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

**Radiated Spurious Emissions in restricted bands 15.247(c), 15.205
Antenna 24 dBi**

| | | | |
|-------------------|-----------|----------|------|
| Carrier Frequency | 2.412 GHz | Detector | Peak |
| Output power | 16 dBm | Limit | Peak |



Plot A52



Plot A53



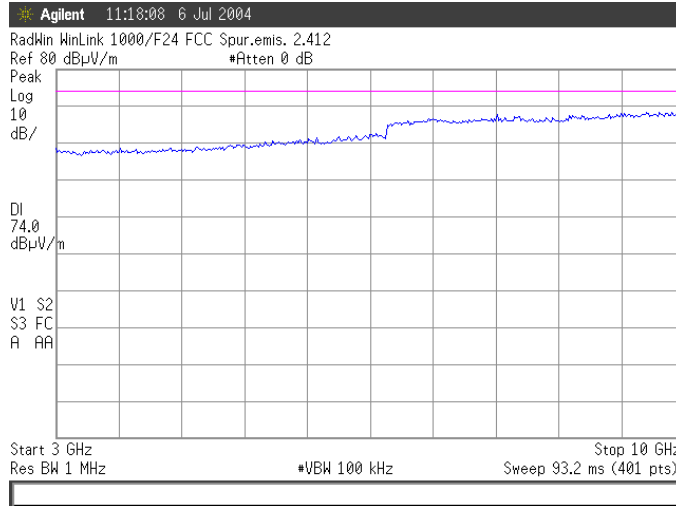
Test report No: 8412312674

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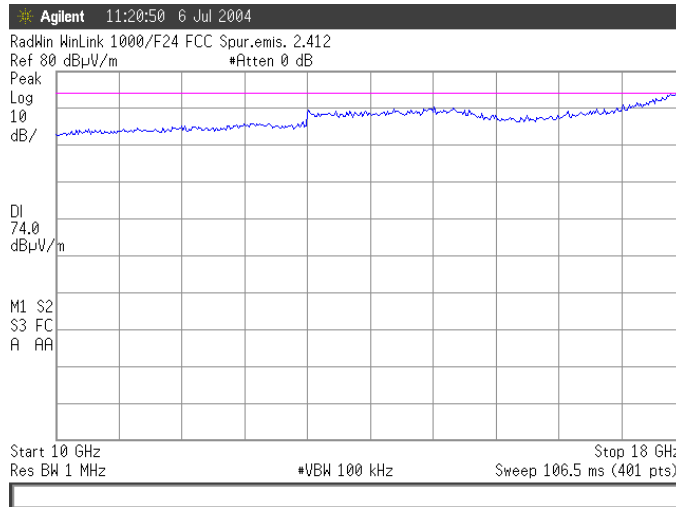
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|-----------|----------|------|
| Carrier Frequency | 2.412 GHz | Detector | Peak |
| Output power | 16 dBm | Limit | Peak |



Plot A54



Plot A55



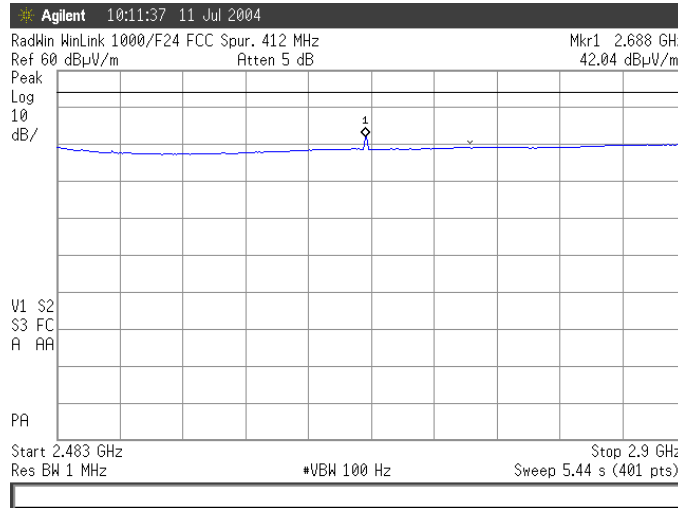
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

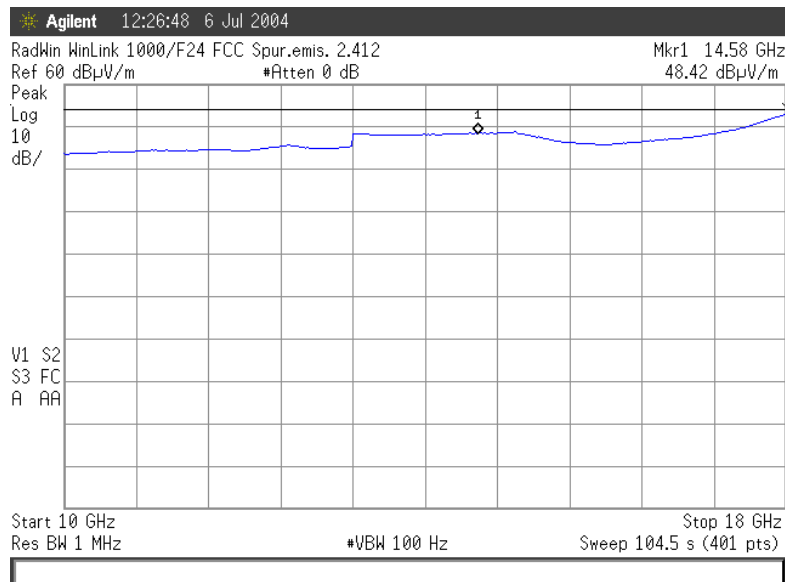
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|-----------|----------|---------|
| Carrier Frequency | 2.412 GHz | Detector | Average |
| Output power | 16 dBm | Limit | Average |



Plot A56

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.412 GHz. | Detector | Average. |
| Output power | 16 dBm. | Limit | Average. |



Plot A57



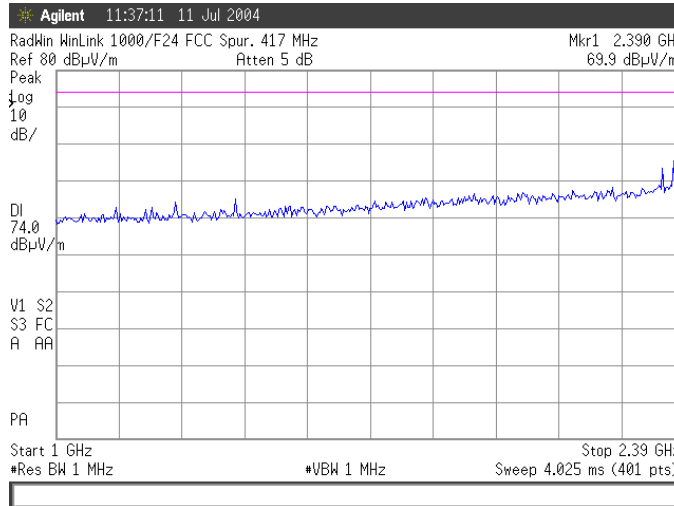
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

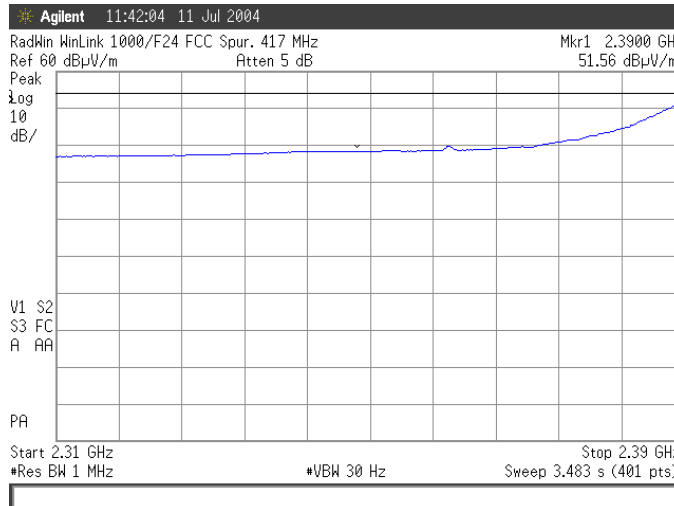
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.417 GHz. | Detector | Peak. |
| Output power | 18 dBm. | Limit | Peak. |



Plot A58

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.417 GHz. | Detector | Average. |
| Output power | 18 dBm. | Limit | Average. |



Plot A59



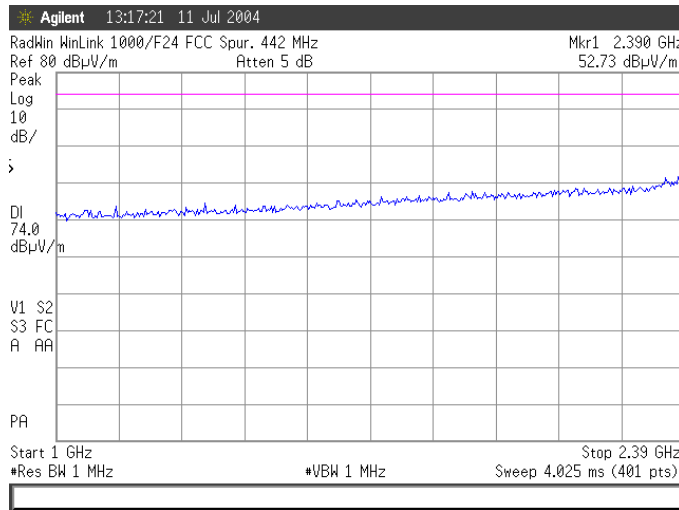
Test report No: 8412312674

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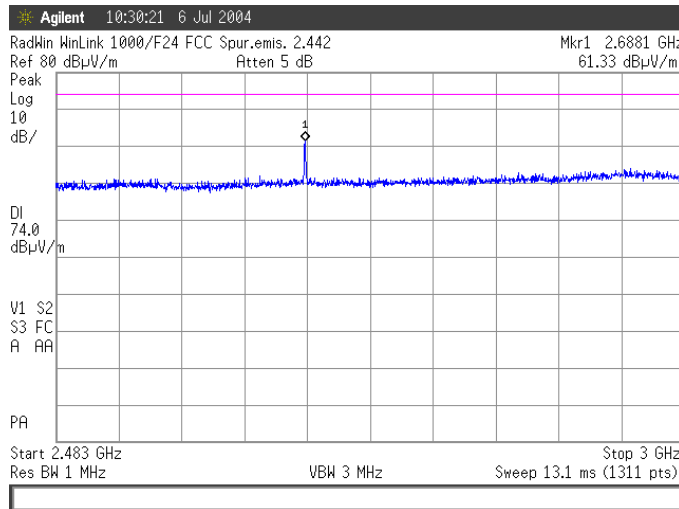
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.442 GHz. | Detector | Peak. |
| Output power | 18 dBm. | Limit | Peak. |



Plot A60



Plot A61



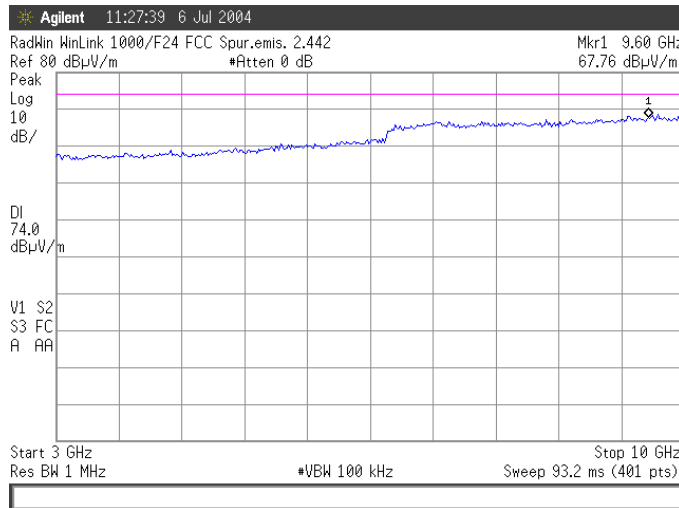
Test report No: 8412312674

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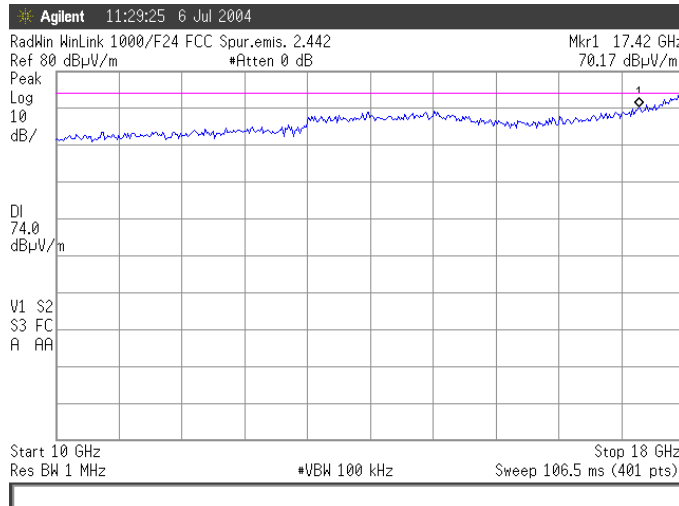
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.442 GHz. | Detector | Peak. |
| Output power | 18 dBm. | Limit | Peak. |



Plot A62



Plot A63



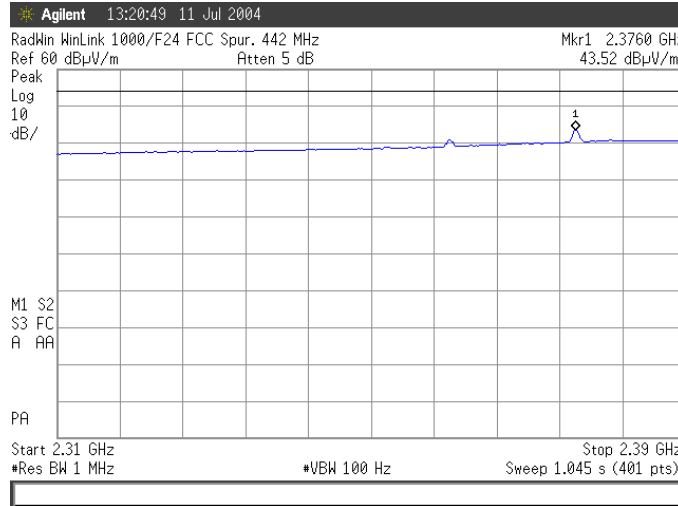
Test report No: 8412312674

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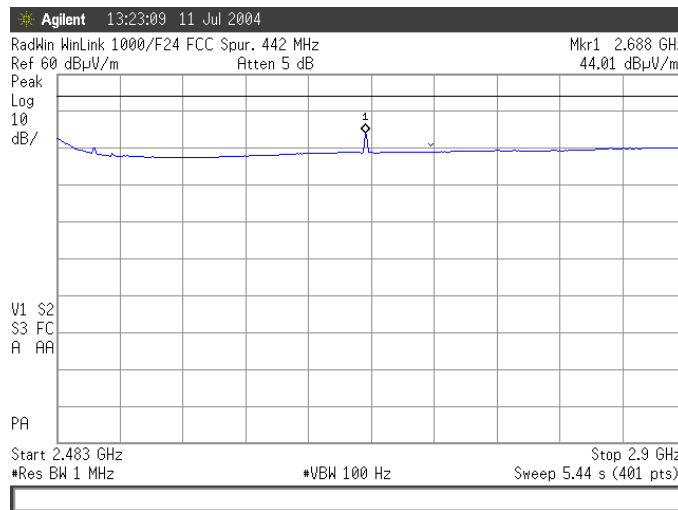
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.442 GHz. | Detector | Average. |
| Output power | 18 dBm. | Limit | Average. |



Plot A64



Plot A65



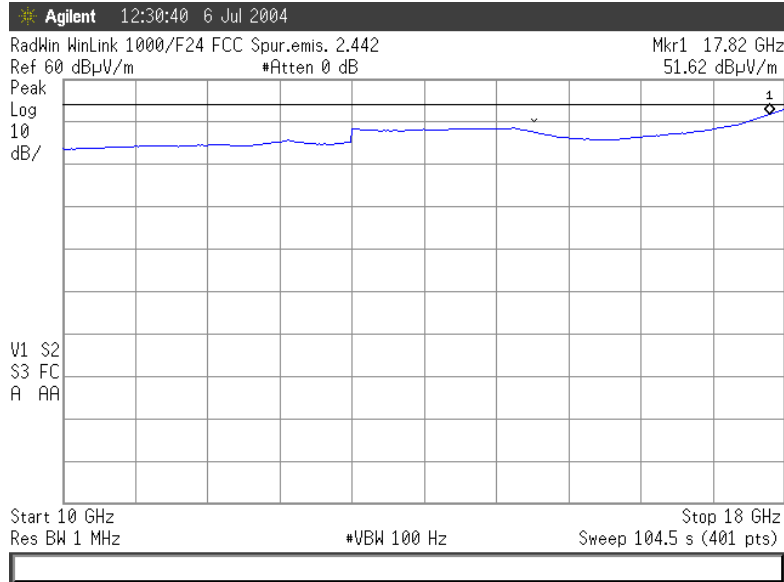
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.442 GHz. | Detector | Average. |
| Output power | 18 dBm. | Limit | Average. |



Plot A66



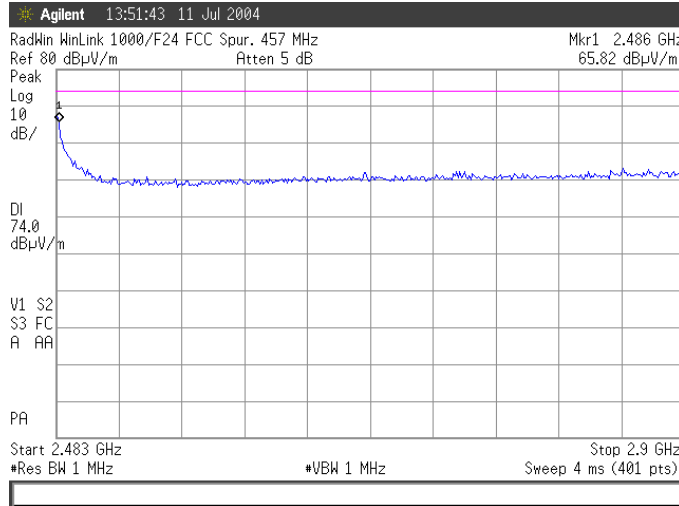
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

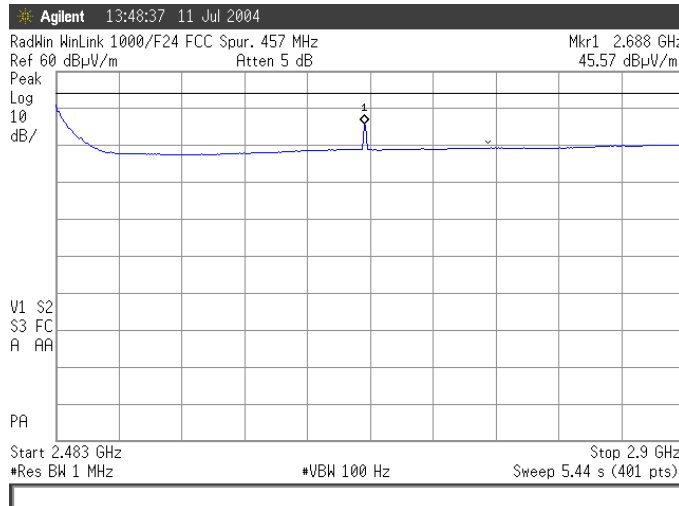
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.457 GHz. | Detector | Peak. |
| Output power | 18 dBm. | Limit | Peak. |



Plot A67

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.457 GHz. | Detector | Average. |
| Output power | 18 dBm. | Limit | Average. |



Plot A68



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Title: Point-to-Point Broadband Wireless Transmitter System

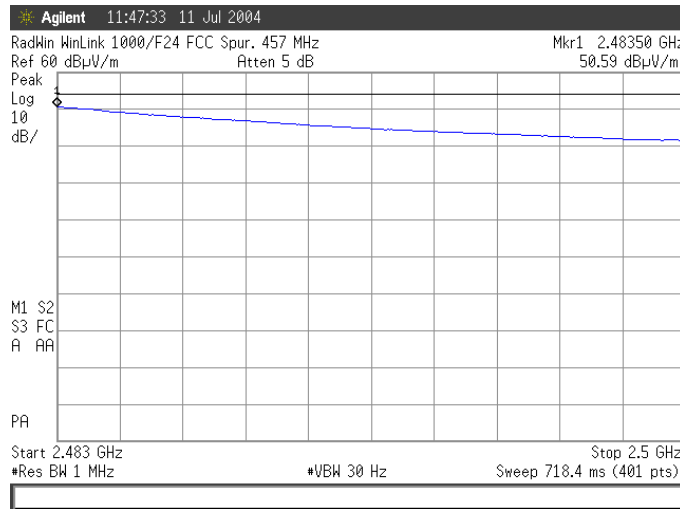
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Carrier Frequency
Output power

2.457 GHz.
18 dBm.

Detector
Limit

Average.
Average.



Plot A69



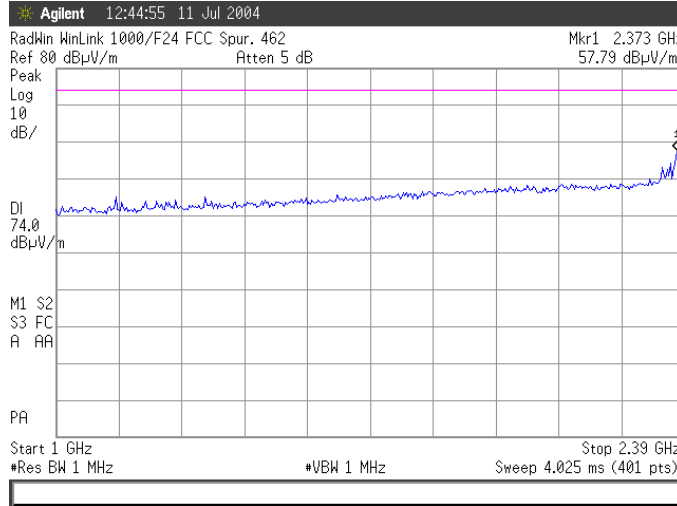
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

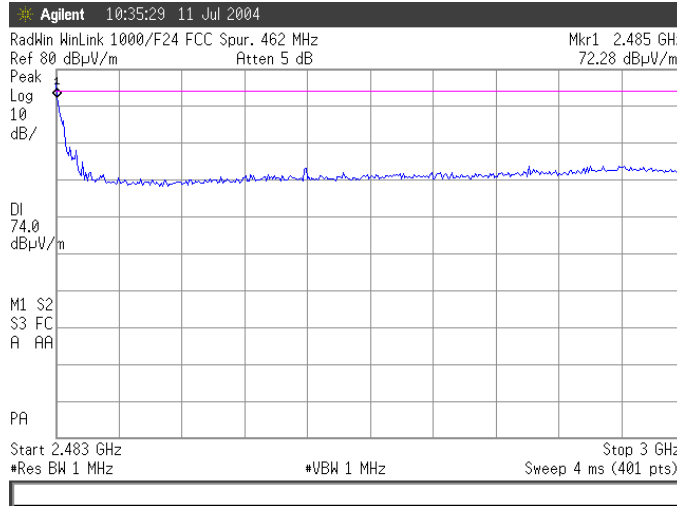
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.462 GHz. | Detector | Peak. |
| Output power | 16 dBm. | Limit | Peak. |



Plot A70

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.462 GHz. | Detector | Peak. |
| Output power | 16 dBm. | Limit | Peak. |



Plot A71



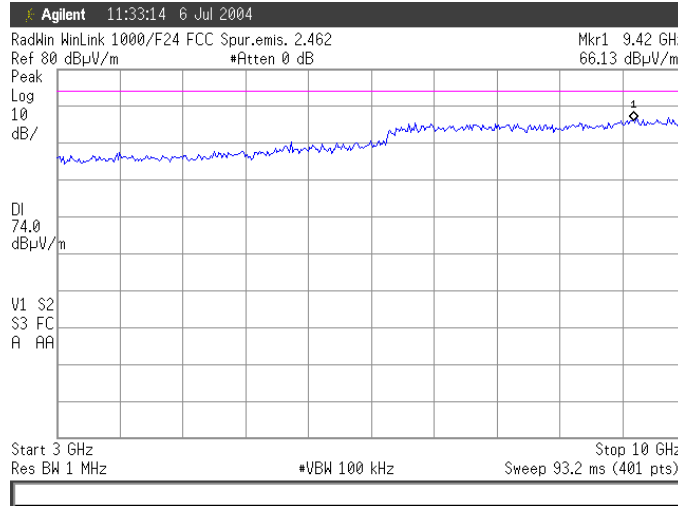
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

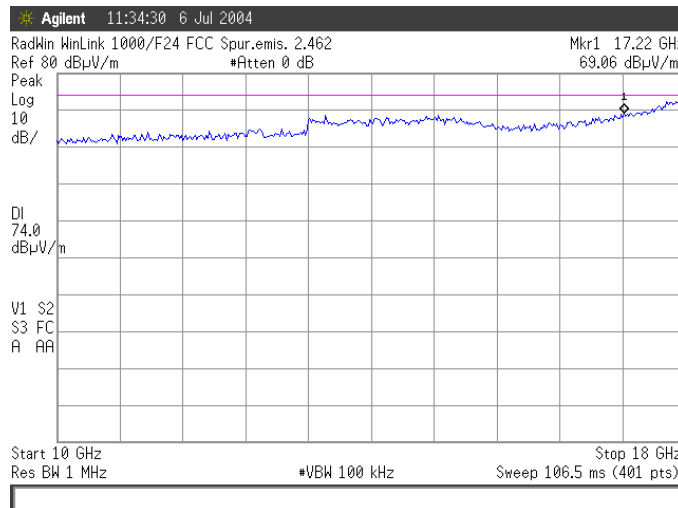
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.462 GHz. | Detector | Peak. |
| Output power | 16 dBm. | Limit | Peak. |



Plot A72

| | | | |
|-------------------|------------|----------|-------|
| Carrier Frequency | 2.462 GHz. | Detector | Peak. |
| Output power | 16 dBm. | Limit | Peak. |



Plot A73



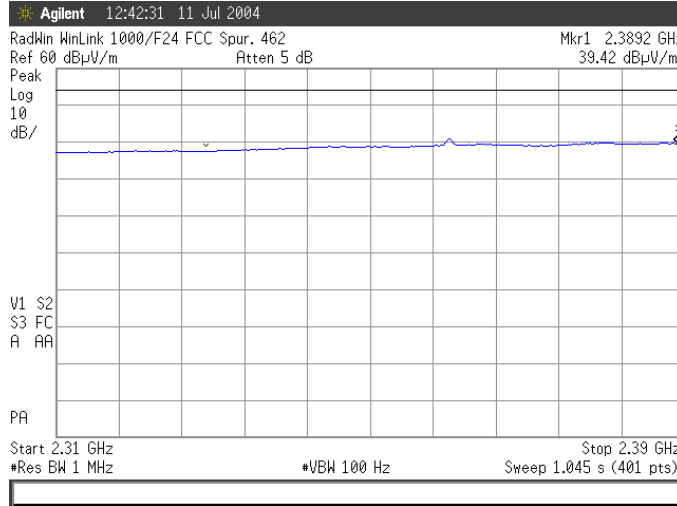
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

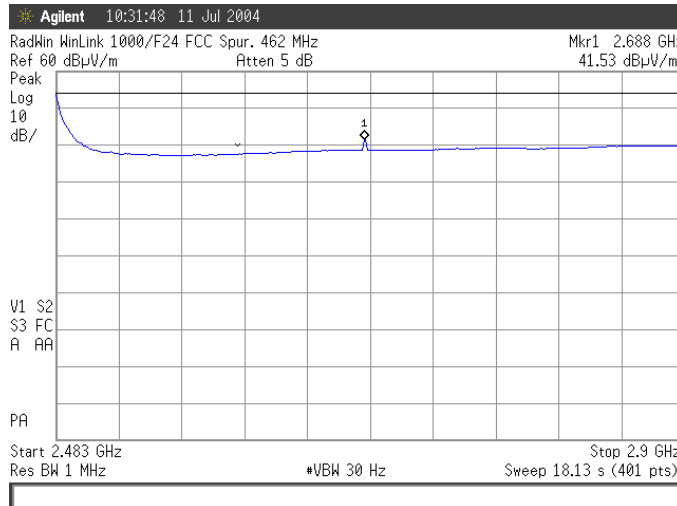
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.462 GHz. | Detector | Average. |
| Output power | 16 dBm. | Limit | Average. |



Plot A74

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.462 GHz. | Detector | Average. |
| Output power | 16 dBm. | Limit | Average. |



Plot A75



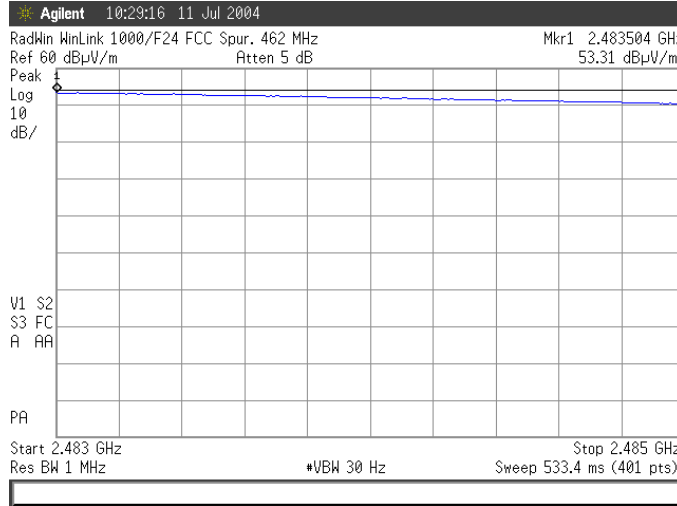
Test report No: 8412312674

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Title: Point-to-Point Broadband Wireless Transmitter System

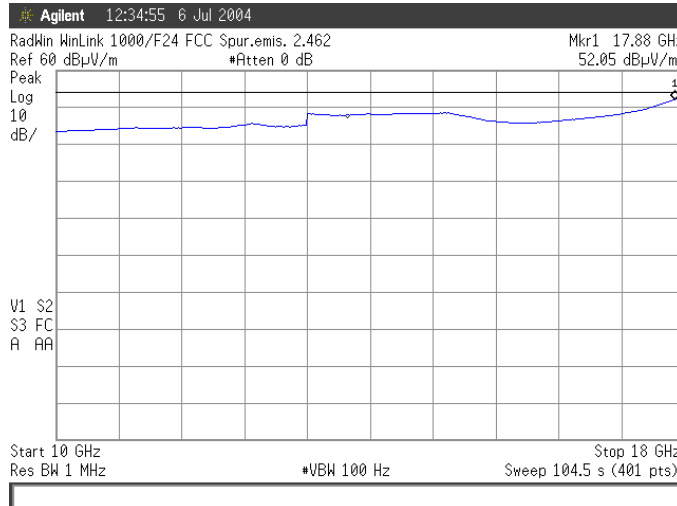
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.462 GHz. | Detector | Average. |
| Output power | 16 dBm. | Limit | Average. |



Plot A76

| | | | |
|-------------------|------------|----------|----------|
| Carrier Frequency | 2.462 GHz. | Detector | Average. |
| Output power | 16 dBm. | Limit | Average. |



Plot A77



Test report No: 8412312674

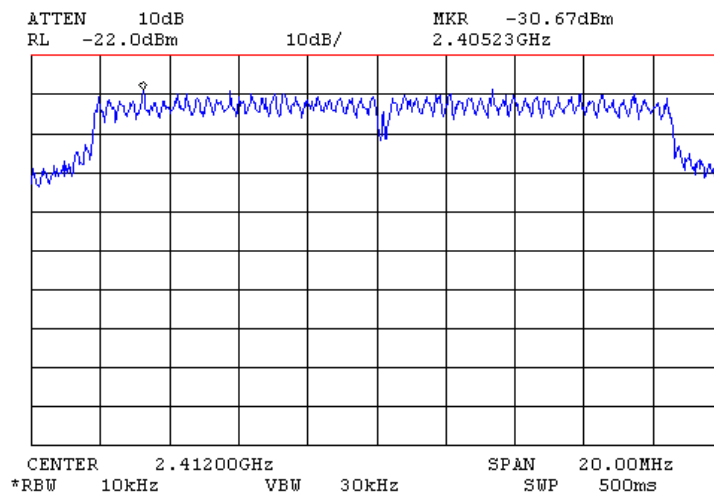
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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

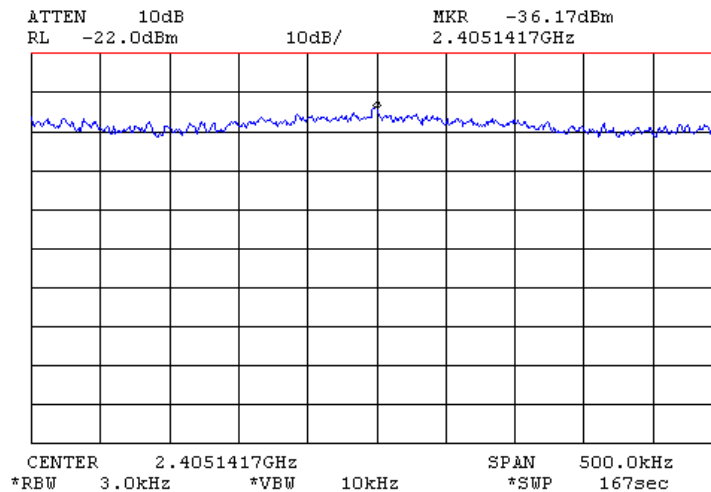
Peak Power Spectral Density 15.247d
Carrier Frequency 2.412 GHz
Data rate – 6Mbit/s PRBS

External attenuator = 30 dB
Limit = 8 dBm – 30dB = -22 dBm



Plot A78

Margin = 14.17 dBm



Plot A79



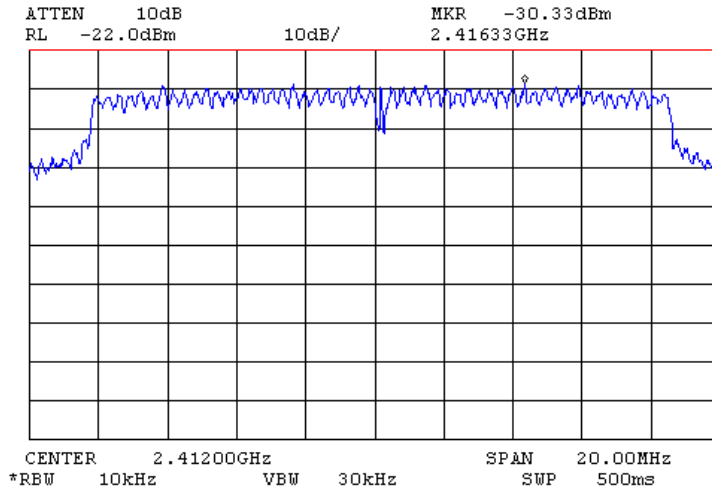
Test report No: 8412312674

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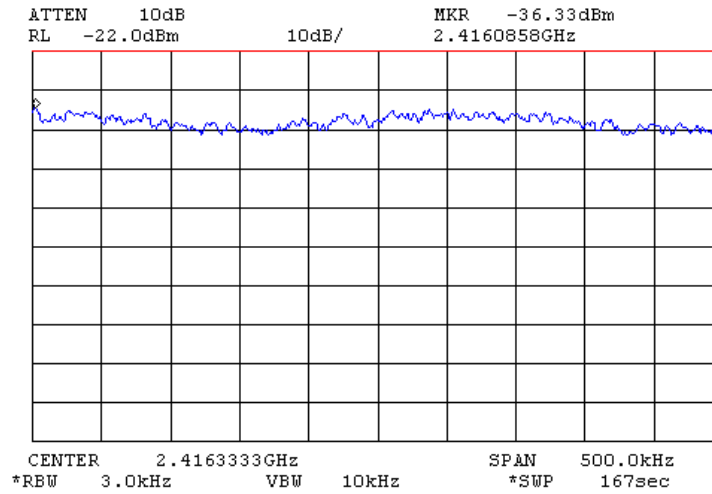
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.412 GHz
Data rate – 24 Mbit/s PRBS



Plot A80



Plot A81



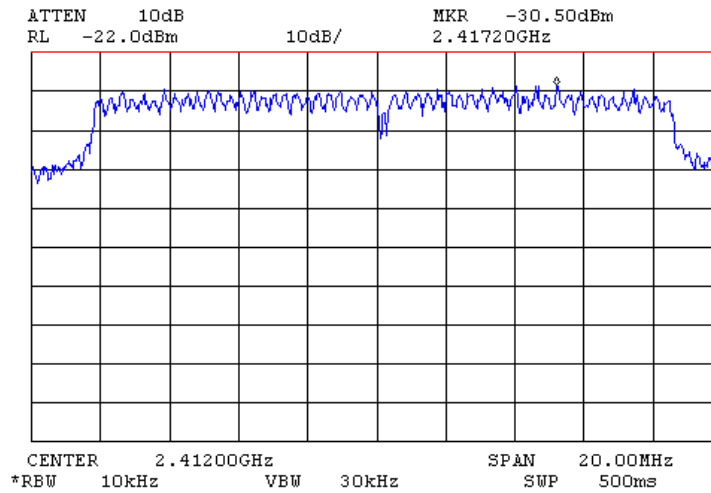
Test report No: 8412312674

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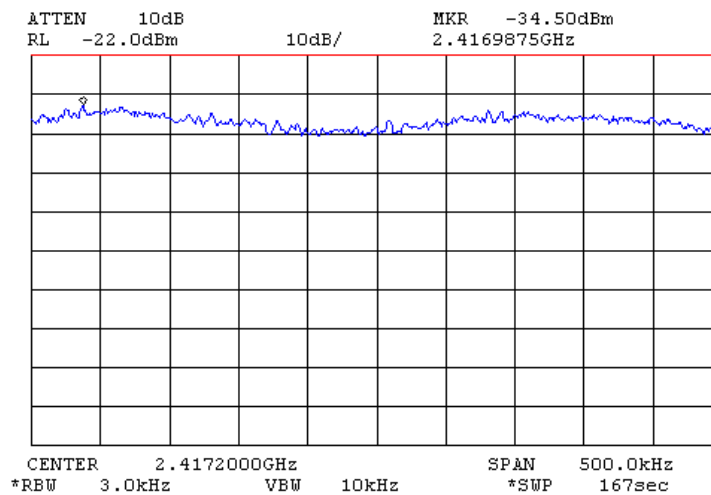
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.412 GHz
Data rate – 54 Mbit/s PRBS



Plot A82



Plot A83



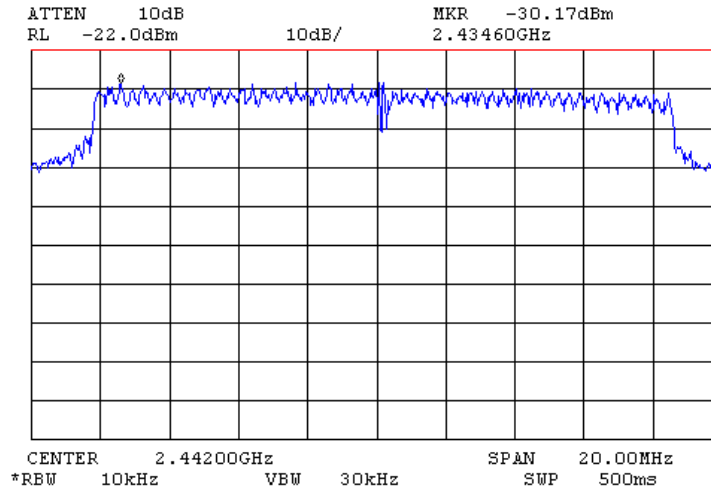
Test report No: 8412312674

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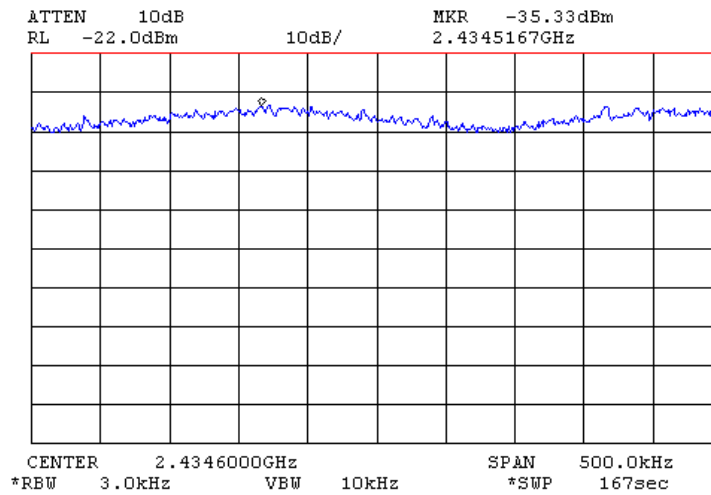
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.442 GHz
Data rate – 6 Mbit/s PRBS



Plot A84



Plot A85



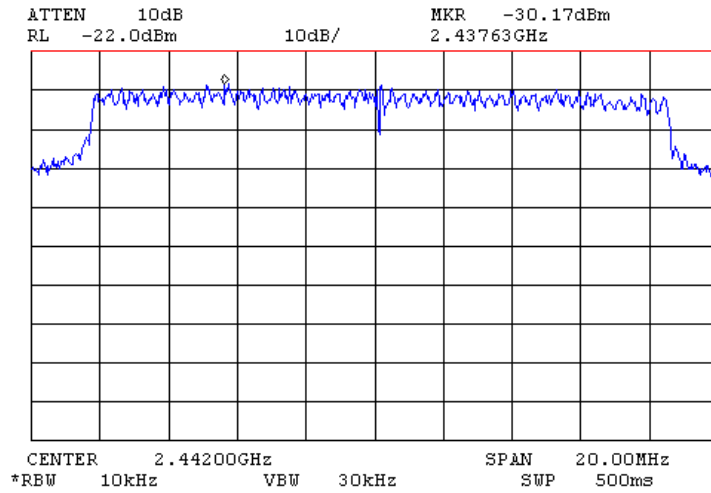
Test report No: 8412312674

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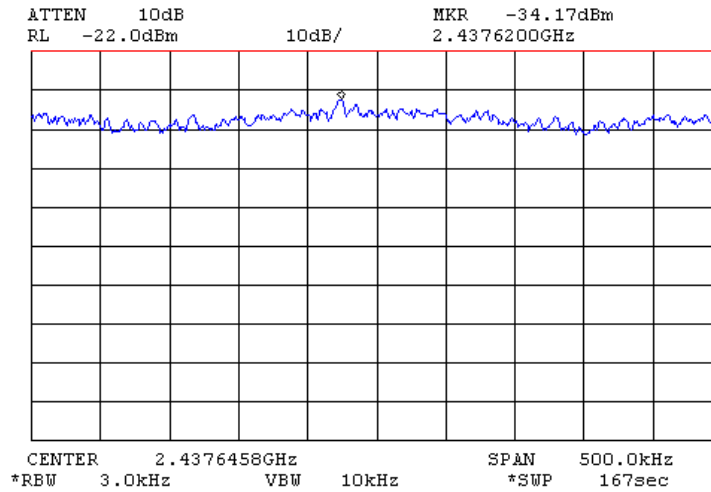
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.442 GHz
Data rate – 24 Mbit/s PRBS



Plot A86



Plot A87



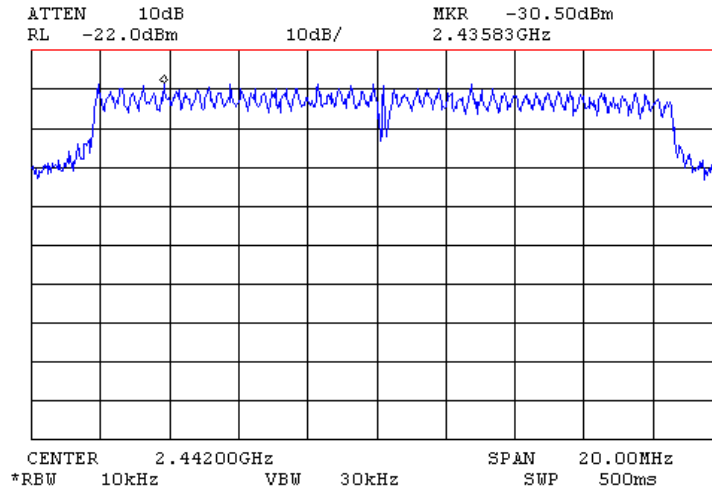
Test report No: 8412312674

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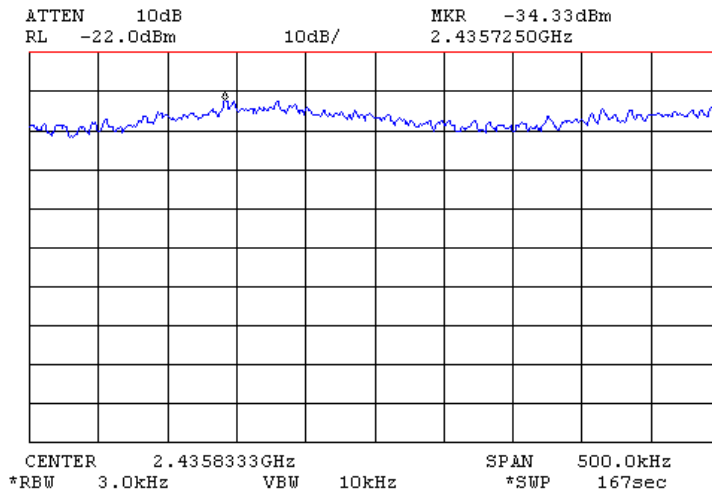
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.442 GHz
Data rate – 54 Mbit/s PRBS



Plot A88



Plot A89



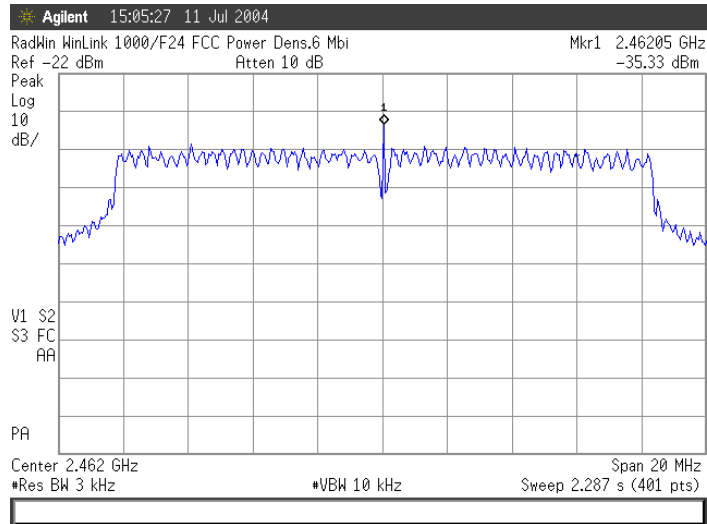
Test report No: 8412312674

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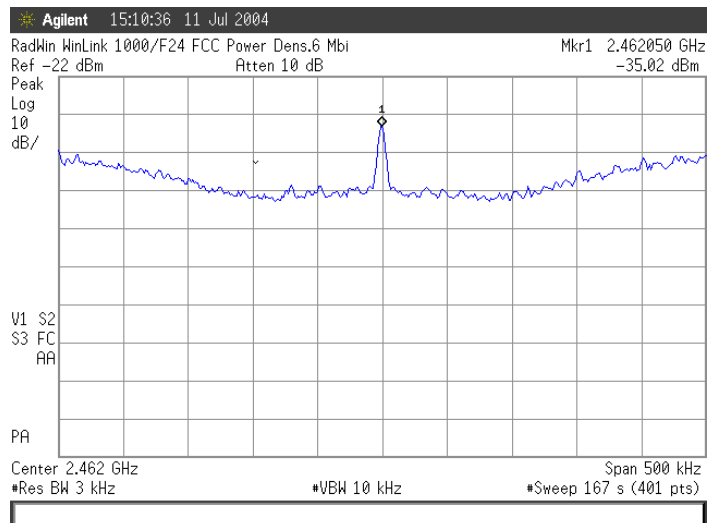
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.462 GHz
Data rate – 6 Mbit/s PRBS



Plot A90



Plot A91



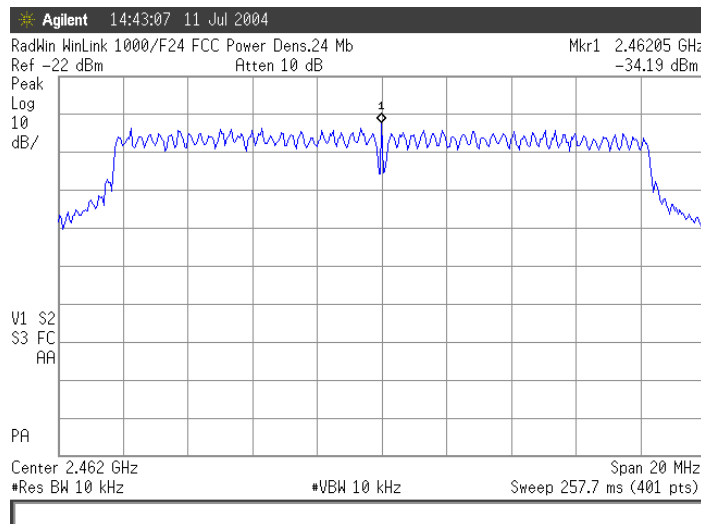
Test report No: 8412312674

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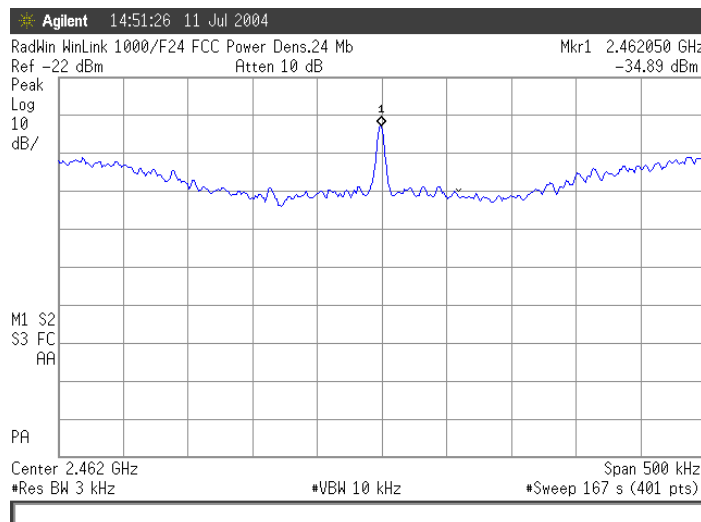
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.462 GHz
Data rate – 24 Mbit/s PRBS



Plot A92



Plot A93



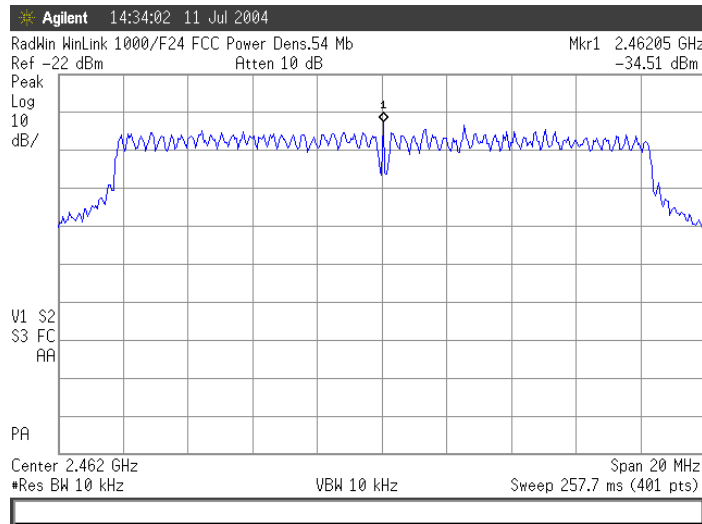
Test report No: 8412312674

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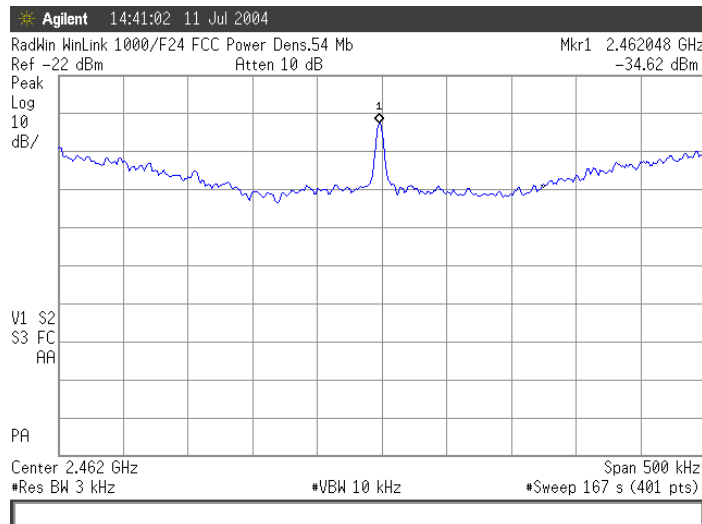
Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Peak Power Spectral Density 15.247d
Carrier Frequency 2.462 GHz
Data rate – 54 Mbit/s PRBS



Plot A94



Plot A95

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Title: Point-to-Point Broadband Wireless Transmitter System

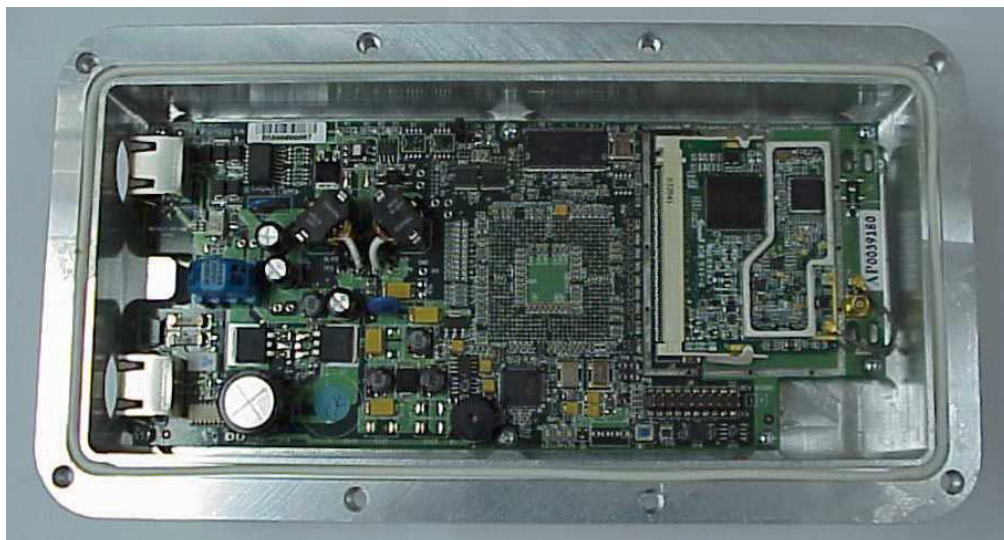
Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

APPENDIX B

**Photo 1. Outdoor unit. External view. Top
External antenna**



Photo 2. Outdoor unit. Internal view. Component side



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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Photo 5. Outdoor unit. External view. Bottom



Photo 6. Outdoor unit. External view. Connector side



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Title: Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824

Photo 7. Indoor unit. External view



Photo 8. Spurious emissions measurements set up. Internal antenna

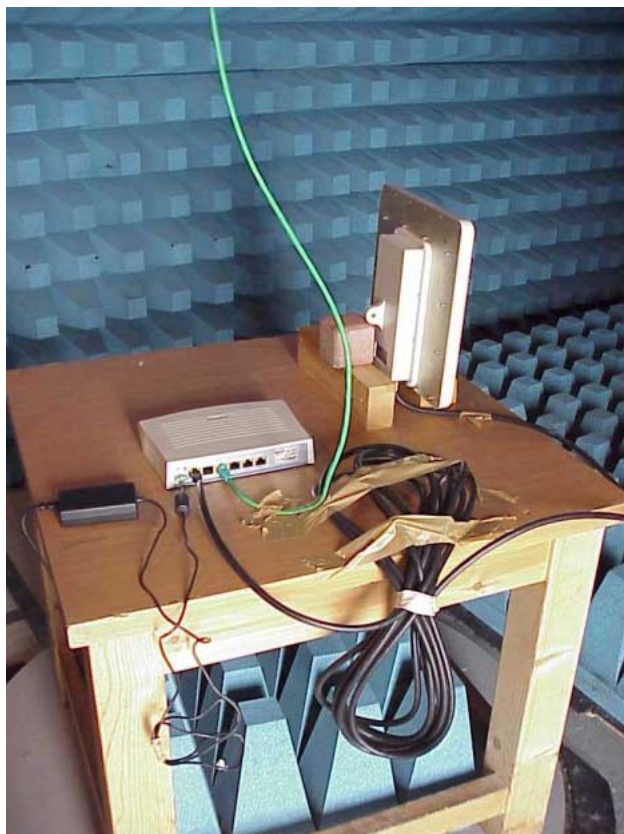
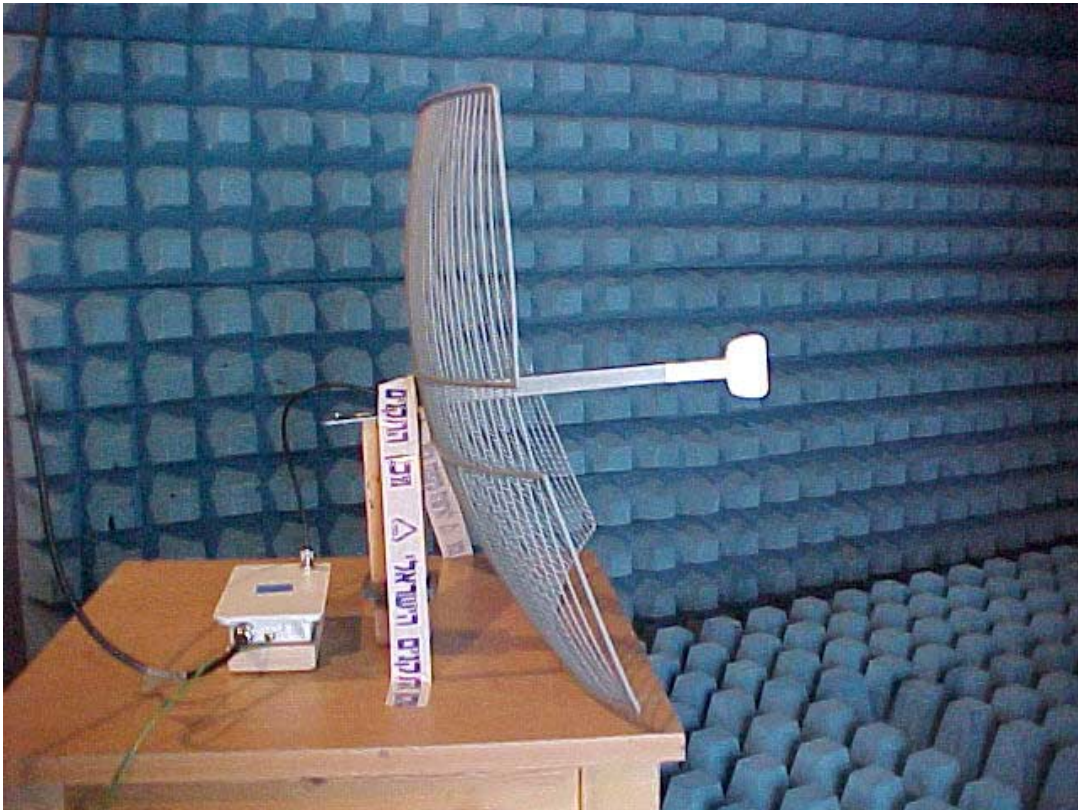


Photo 9. Spurious emissions measurements set up. External antenna



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| No | Description | Manufacturer information | | | Due Calibration date |
|----|--|--------------------------|----------------------|------------|----------------------|
| | | Name | Model No | Serial No | |
| 1 | Spectrum Analyzer 9 kHz - 26.5 GHz | Agilent | 8563E | A11404 | Aug 2004 |
| 2 | Oscilloscope 300 MHz | Lekroy | 9361 | SII 4009 | Aug 2005 |
| 3 | Attenuators set (10, 20, 30 dB) DC - 18 GHz | M/A-COM | 2082 | 1650 | Aug 2004 |
| 4 | Wide band crystal detector | HP | 423B | 1822A12457 | Aug 2005 |
| 5 | Cable RF 1m | Huber-Suhner | Sucoflex 104 | 21324/4PE | Aug 2004 |
| 6 | Double Ridged Guide Antenna 1 – 18 GHz | EMCO | 3115 | 5802 | Dec 2004 |
| 7 | Antenna Biconilog 30 – 2000 MHz | Schaffner- Chase | CBL6112B | S/N 2531 | Dec 2004 |
| 8 | EMI Receiver 9 kHz-6.5 GHz | HP | 8546A+8546 0A | SII 4068 | July 2005 |
| 9 | LISN 9 kHz – 30 MHz | FCC | LISN 250- 32-4-16 | SII5023 | Oct 2004 |
| 10 | Transient limiter 0.009-200 MHz | HP | 11947A | 3107105 | May 2004 |
| 11 | Spectrum analyzer 10 KHz-26.5 GHz | HP | E7405A | SII 4944 | May 2005 |
| 12 | Attenuator 50 Ohm 30 dB DC-18 GHz | HP | 8491B | 50655 | May 2005 |
| 13 | Cable RF 3m | Huber-Suhner | Sucoflex 104PE | 21328/4PE | Aug 2004 |
| 14 | Loop Antenna 9 kHz – 30 MHz | ETS | 6502 | 3283 | Oct 2004 |
| 15 | RF signal generator | Anritsu | 68347B | SII 4898 | Aug 2005 |

**Test report No: 8412312674****Page 80 of 83 Pages****Title: Point-to-Point Broadband Wireless Transmitter System****Model: WinLink 1000/F24, AirMux - 200/F24, FibeAir™ 4824****Cable Loss (10m cable + Mast)**

| Point | Frequency (MHz) | Cable Loss (dB) | Point | Frequency (MHz) | Cable Loss (dB) |
|-------|-----------------|-----------------|-------|-----------------|-----------------|
| 1 | 30 | 0.53 | 21 | 1000 | 3.68 |
| 2 | 50 | 0.75 | 22 | 1100 | 3.82 |
| 3 | 100 | 1.08 | 23 | 1200 | 4.07 |
| 4 | 150 | 1.39 | 24 | 1300 | 4.24 |
| 5 | 200 | 1.61 | 25 | 1400 | 4.43 |
| 6 | 250 | 1.752 | 26 | 1500 | 4.6 |
| 7 | 300 | 2.00 | 27 | 1600 | 4.7 |
| 8 | 350 | 2.15 | 28 | 1700 | 4.85 |
| 9 | 400 | 2.26 | 29 | 1800 | 4.98 |
| 10 | 450 | 2.383 | 30 | 1900 | 5.19 |
| 11 | 500 | 2.52 | 31 | 2000 | 5.34 |
| 12 | 550 | 2.606 | 32 | 2100 | 5.51 |
| 13 | 600 | 2.75 | 33 | 2200 | 5.69 |
| 14 | 650 | 2.856 | 34 | 2300 | 5.89 |
| 15 | 700 | 3.06 | 35 | 2400 | 6.07 |
| 16 | 750 | 3.201 | 36 | 2500 | 6.22 |
| 17 | 800 | 3.27 | 37 | 2600 | 6.28 |
| 18 | 850 | 3.38 | 38 | 2700 | 6.41 |
| 19 | 900 | 3.46 | 39 | 2800 | 6.53 |
| 20 | 950 | 3.55 | 40 | 2900 | 6.84 |

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10 m Calibration

| Horizontal Polarization | | | | Vertical Polarization | | | |
|-------------------------|-----------------------|-----------------|-----------------------|-----------------------|-----------------------|-----------------|-----------------------|
| Frequency (MHz) | Antenna Factor (dB/m) | Frequency (MHz) | Antenna Factor (dB/n) | Frequency (MHz) | Antenna Factor (dB/m) | Frequency (MHz) | Antenna Factor (dB/m) |
| 30 | 19.7 | 725 | 19.7 | 30 | 17.6 | 725 | 19.8 |
| 40 | 13.8 | 750 | 20.1 | 40 | 16.1 | 750 | 20.0 |
| 50 | 8.5 | 775 | 20.1 | 50 | 8.2 | 775 | 20.0 |
| 60 | 6.3 | 800 | 20.1 | 60 | 6.0 | 800 | 20.1 |
| 70 | 6.4 | 825 | 20.3 | 70 | 6.2 | 825 | 20.3 |
| 80 | 7.2 | 850 | 20.5 | 80 | 7.7 | 850 | 20.6 |
| 90 | 9.1 | 875 | 20.7 | 90 | 9.2 | 875 | 20.8 |
| 100 | 10.8 | 900 | 20.7 | 100 | 10.6 | 900 | 20.9 |
| 110 | 11.7 | 925 | 20.9 | 110 | 11.4 | 925 | 21.0 |
| 120 | 12.0 | 950 | 21.0 | 120 | 11.7 | 950 | 21.2 |
| 130 | 11.8 | 975 | 21.4 | 130 | 11.8 | 975 | 21.3 |
| 140 | 11.3 | 1000 | 21.5 | 140 | 11.3 | 1000 | 21.4 |
| 150 | 10.5 | 1050 | 22.0 | 150 | 10.4 | 1050 | 21.9 |
| 160 | 10.0 | 1100 | 22.2 | 160 | 9.8 | 1100 | 22.2 |
| 170 | 9.6 | 1150 | 22.7 | 170 | 9.4 | 1150 | 22.6 |
| 180 | 9.2 | 1200 | 23.2 | 180 | 9.4 | 1200 | 23.1 |
| 190 | 9.0 | 1250 | 23.6 | 190 | 9.6 | 1250 | 23.5 |
| 200 | 9.3 | 1300 | 24.0 | 200 | 9.9 | 1300 | 23.8 |
| 225 | 9.8 | 1350 | 24.1 | 225 | 10.5 | 1350 | 24.0 |
| 250 | 12.7 | 1400 | 24.6 | 250 | 12.6 | 1400 | 24.3 |
| 275 | 12.9 | 1450 | 24.9 | 275 | 13.2 | 1450 | 24.7 |
| 300 | 13.3 | 1500 | 25.1 | 300 | 13.4 | 1500 | 25.0 |
| 325 | 13.8 | 1550 | 25.2 | 325 | 13.8 | 1550 | 25.2 |
| 350 | 14.6 | 1600 | 25.4 | 350 | 14.6 | 1600 | 25.3 |
| 375 | 15.0 | 1650 | 25.9 | 375 | 15.1 | 1650 | 25.8 |
| 400 | 15.9 | 1700 | 26.1 | 400 | 16.0 | 1700 | 26.0 |
| 425 | 16.6 | 1750 | 26.4 | 425 | 16.7 | 1750 | 26.2 |
| 450 | 16.8 | 1800 | 26.4 | 450 | 16.7 | 1800 | 26.4 |
| 475 | 17.5 | 1850 | 26.7 | 475 | 17.4 | 1850 | 26.7 |
| 500 | 17.7 | 1900 | 27.3 | 500 | 17.7 | 1900 | 27.3 |
| 525 | 18.0 | 1950 | 27.6 | 525 | 18.0 | 1950 | 27.3 |
| 550 | 19.3 | 2000 | 27.6 | 550 | 19.1 | 2000 | 27.7 |
| 575 | 19.4 | | | 575 | 19.1 | | |
| 600 | 19.3 | | | 600 | 19.3 | | |
| 625 | 19.7 | | | 625 | 19.5 | | |
| 650 | 19.6 | | | 650 | 19.5 | | |
| 675 | 19.5 | | | 675 | 19.5 | | |
| 700 | 19.4 | | | 700 | 19.5 | | |

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Antenna Factor
Double Ridged Guide Antenna mfr EMCO model 3115

| Point | Frequency (MHz) | Antenna Factor (dB/m) |
|-------|-----------------|-----------------------|
| 1 | 2000 | 27.4 |
| 2 | 2500 | 28.9 |
| 3 | 3000 | 31.0 |
| 4 | 4000 | 33.1 |
| 5 | 4500 | 32.5 |
| 6 | 5000 | 32.4 |
| 7 | 6000 | 53.7 |
| 8 | 6500 | 35.6 |
| 9 | 7000 | 36.4 |
| 10 | 7500 | 36.9 |
| 11 | 8000 | 37.0 |
| 12 | 8500 | 38.0 |
| 13 | 9000 | 38.6 |
| 14 | 9500 | 38.4 |
| 15 | 10000 | 38.4 |
| 16 | 10500 | 38.4 |
| 17 | 11000 | 38.9 |
| 18 | 11500 | 39.6 |
| 19 | 12000 | 39.4 |
| 20 | 12500 | 39.2 |
| 21 | 13000 | 40.3 |
| 22 | 13500 | 41.0 |
| 23 | 14000 | 41.2 |
| 24 | 14500 | 41.3 |
| 25 | 15000 | 40.0 |
| 26 | 15500 | 38.0 |
| 27 | 16000 | 38.1 |
| 28 | 16500 | 40.3 |
| 29 | 17000 | 42.2 |
| 30 | 17500 | 44.6 |
| 31 | 18000 | 46.2 |

Cable Loss

Type: Sucoflex 104PE; Ser.No.21328/4PE; 3 m length

| Point | Frequency (GHz) | Cable Loss (dB) |
|-------|-----------------|-----------------|
| 0 | 0.0-1.8 | 1.67 |
| 1 | 1.8 - 3.6 | 2.39 |
| 2 | 3.6 - 5.4 | 3.04 |
| 3 | 5.4-7.2 | 3.58 |
| 4 | 7.2-9.0 | 4.06 |
| 5 | 9.0-10.8 | 4.49 |
| 6 | 10.8-12.6 | 4.91 |
| 7 | 12.6-14.4 | 5.31 |
| 8 | 14.4-16.2 | 5.66 |
| 9 | 16.2-18.00 | 6.01 |

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APPENDIX D

Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

| | |
|----------------|---|
| AC | alternating current |
| cm | centimeter |
| dB | decibel |
| dBm | decibel referred to one milliwatt |
| dB(μ V) | decibel referred to one microvolt |
| dB(μ V/m) | decibel referred to one microvolt per meter |
| EMC | electromagnetic compatibility |
| EUT | equipment under test |
| GHz | gigahertz |
| H | height |
| Hz | hertz |
| kHz | kilohertz |
| L | length |
| LNA | low noise amplifier |
| m | meter |
| Mbps | megabit per second |
| MHz | megahertz |
| NA | not applicable |
| OFDM | Orthogonal Frequency Division Multiple Access |
| PRBS | pseudo random binary sequence |
| QP | quasi-peak |
| RF | radio frequency |
| RE | radiated emission |
| rms | root mean square |
| W | width |

Specification references

| | |
|----------------------|---|
| 47 CFR part 15: 2003 | Radio Frequency Devices |
| ANSI C63.2: 1996 | American National Standard for Instrumentation Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz Specifications. |
| ANSI C63.4: 1992 | American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |