

***Test Report No. 8412312771***

***For RadWin LTD***

***Equipment Under Test:***

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

***Model:***

***WinLink 1000/F53; AirMux 200/F53;  
FibeAir™ 4853***

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

***Industry Division***

***Telematics Laboratory***

***EMC Section***



***Certificate No.1487-01***

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## 1 Applicant information

Company: RadWin Ltd.  
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Contact name: Menashe Ezra  
E-mail: e\_menashe@radwin.com

## 2 Equipment under test information

Test items "WinLink", Point-to-Point Broadband Wireless Transmitter System  
Manufacturer: RadWin Ltd  
Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853  
Software revision of radio unit as tested: 1.1  
Equipment serial number: I240618000001-ODU  
IB2E0000001 -IDU

## 3 Test performance

**Location:** SII EMC Section  
RadWin LTD  
**Purpose of test:** Apparatus compliance verification in accordance with emission requirements

**Test specifications:** 47CFR part 15 Subpart E §§ 15.407, 15.109, 15.107, part 1 §1.1310

This Test Report contains 73 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.

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Parameter	Subclasses	Date tested	Remarks
Transmitter characteristics			
<b>26 dB bandwidth</b>	a(2)	18 July 2004	
<b>Peak transmit power</b>	a(2)	17 July 2005	
<b>Peak power spectral density</b>	a(2)	17 July 2005	
<b>Ratio of the peak excursion of the modulation envelope to the peak transmit power</b>	a(6)	18 July 2004	
<b>Undesirable emissions (radiated)</b>	b(2)	19, 20 July 2004	
<b>Unwanted emissions below 1 GHz</b>	b(5)	8 July 2004	
<b>Spurious emissions (radiated) in restricted bands</b>	b(6)	12, 13 July 2005	
<b>Automatically discontinue transmission in case of absence of information or operational failure.</b>	c	NA	Provided by manufacturer
<b>Exposure compliance requirements</b>	f	NA	Refer to the test report section 4.3
Unintentional radiation			
<b>Conducted emissions</b>	15.107, 15.207	6 July 2004	
<b>Radiated emissions</b>	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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### EUT operating frequencies

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	5260 – 5330 MHz

### EUT technical characteristics

Type of equipment						
Stand-alone	<input checked="" type="checkbox"/>	(Equipment with or without its own control provisions)				
Intended use		Condition of use				
Fixed	<input checked="" type="checkbox"/>	Always at a distance more than 2 m from all people				
Assigned frequency range		5250 – 5350 MHz				
Operating frequency range		5260 – 5330 MHz				
RF channel spacing		5 MHz				
Maximum rated output power	At transmitter 50 Ω RF output connector	2 dBm @ External antenna				
		8 dBm @ Integral antenna				
Antenna connection						
Unique coupling	<input checked="" type="checkbox"/>	integral	<input checked="" type="checkbox"/>	with temporary RF connector		<input checked="" type="checkbox"/>
		Standard connector: <b>N-TYPE</b>		without temporary RF connector		
External antenna/s technical characteristics						
Type	Manufacturer	Model number	Gain			
<b>Planar Array (integral)</b>	<b>MTI</b>	<b>MT-485028\C\A</b>	<b>22 dBi</b>			
<b>Planar Array (external)</b>	<b>MTI</b>	<b>MT-486001</b>	<b>28 dBi</b>			
Transmitter 99% power bandwidth		20MHz				
Transmitter aggregate data rate/s		16.25; 31.25; 61.25; 91.25 Mbps depend on rate				
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	500 μsec	Period	1000 μsec	
Transmitter duty cycle supplied for test	49 %	Tx	490 μsec	Period	1000 μsec	
Spread spectrum technique used						
Frequency hopping (FHSS)						
Digital transmission system (DTS)		<input checked="" type="checkbox"/>				
Hybrid						

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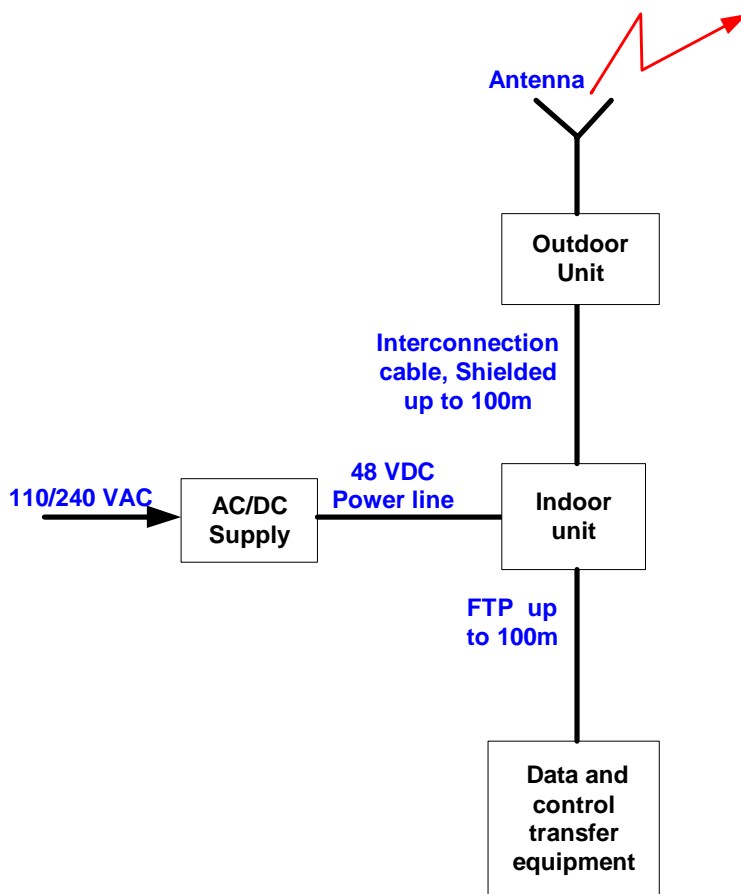
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**Complies to requirement of the section 15.203**

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 device.	Provided by manufacturer.

**4.2 EUT test configuration**



**Fig. 1**

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Power density limit for 5250 –5350 MHz range is 1 mW/cm<sup>2</sup> for general population (uncontrolled exposure)

The power density limit  $S$  (W/m<sup>2</sup>) = 10 (W/ m<sup>2</sup>)

Pt - The transmitted power EIRP (W)

Pt- the transmitted power which is equal to the maximum output power 8 dBm plus antenna gain - 22 dBi

The maximum EIRP = 30 dBm = 1W

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

$$r = \sqrt{Pt/4\pi S} = \sqrt{1/4\pi 10} = 0.089 \text{ m}$$

The allowed distance “r”, where RF exposure limits may not be exceeded, is 8.9 cm 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 comply with safety requirement.



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## 5 Test results

### 5.1 Transmitter characteristics

#### 5.1.1 Occupied 26 dB bandwidth according to § 15.407(a)(2)

Method of measurement      FCC Public Notice DA 02-2138, Appendix A  
 Date                              18 July 2004  
 Ambient Temperature    23<sup>0</sup> C    Relative Humidity      49%    Air Pressure      1009 hPa  
 Operating Frequency Range    5.260–5.330 GHz  
 Measurement Uncertainty      ± 1124 Hz

Carrier frequency GHz	Data rate, Mbit/s	Measured 26 dB bandwidth, MHz	Reference to Plot in Appendix A
5.260	6	20.33	A1
	54	20.50	A2
5.300	6	20.58	A3
	54	20.50	A4
5.330	6	20.83	A5
	54	20.83	A6

### TEST PROCEDURE

The measurements were performed in continuous transmit mode of operation for carrier (channel) frequencies at bottom, middle and the top of the 5.260 – 5.330 GHz frequency range under all data transfer bit rates and the worse case result noted in table above.

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 transmit power test according to §15.407 (a)(2)**

Method of measurement FCC Public Notice DA 02-2138, Appendix A  
 Ambient Temperature 23<sup>0</sup> C Relative Humidity 49% Air Pressure 1009 hPa  
 Operating Frequency Range 5.260–5.330 GHz

Carrier frequency MHz	Maximum output power (6 Mbit/rate) dBm	Maximum output power limit** dBm	Margin dB	Maximum output power (54 Mbit/s rate) dBm	Maximum output power limit** dBm	Margin dB
5260	1.31	2	0.69	1.29	2	0.71
5300	1.17	2	0.83	1.18	2	0.82
5330	1.20	2	0.80	1.34	2	0.66
5260	7.37	8	0.63	7.58	8	0.42
5300	6.37	8	1.63	6.65	8	1.35
5330	7.42	8	0.58	7.61	8	0.39

**LIMIT**

For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26-dB emission.  
 If transmitting antennas of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum 26-dB emission bandwidth is 20.83 MHz at 5330 MHz channel frequency and the limit is equal to 11 dBm + 10log 20.83 = 24.18 dBm > 250 mW (24 dBm), hence 24 dBm limit was used.

\*\*The maximum directional antenna gain is 22 dBi for integral antenna and 28 dBi for external antenna. Maximum output power is reduced to 24-(22-6) = 8 dBm and to 24-(28-6) = 2 dBm with external antenna gain 28 dBi.

**TEST PROCEDURE**

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 5.260- 5.330 GHz frequency range under all data transfer bit rates according to method #3 of Public Notice DA 02-2138, Appendix A for peak conducted transmit output power. Video bandwidth was calculated from maximum usable pulse duration T, shown in plots A7 a), b)  $VBW \geq 1/T=1/0.476 \text{ ms} = 2.1 \text{ kHz}$ . Calculated VBW = 3 kHz  
 Calculation were made by using alternative method:  $P_{max} = 10\log[(U_{lin})^2/50\Omega]+30\text{dB}+10\log(26\text{dB BW/RBW})$ . Test results are noted in the table above and in the plots A8 to A19 in Appendix A.

**TEST EQUIPMENT USED:**

1	3	5				
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**5.1.3 Peak Power Spectral Density test according to §15.407 a (2)**

Method of measurement FCC Public Notice DA 02-2138, Appendix A  
 Ambient Temperature 23<sup>0</sup> C Relative Humidity 49% Air Pressure 1009 hPa  
 Operating Frequency Range 5.260–5.330 GHz  
 Measurement Uncertainty ± 2.5dB

Carrier frequency GHz	Data rate Mbit/s	Output power 8 dBm (dBm)	Calculated Limit dBm	Margin dB	Output power 2 dBm (dBm)	Calculated Limit dBm	Margin dB	Verdict
5.260	6 Mbit/s	-8.7	-5.0	3.7	-15.2	-11.0	4.2	PASS
	54 Mbit/s	-9.0	-5.0	4.0	-15.3	-11.0	4.3	
5.300	6 Mbit/s	-9.8	-5.0	4.8	-16.2	-11.0	5.2	PASS
	54 Mbit/s	-10.1	-5.0	5.1	-16.0	-11.0	5.0	
5.330	6 Mbit/s	-8.7	-5.0	3.7	-16.2	-11.0	6.2	PASS
	54 Mbit/s	-8.3	-5.0	3.3	-16.0	-11.0	6.0	

**TEST PROCEDURE**

The measurements were performed in continuous transmitting mode of operation for carrier (channel) frequency at bottom, middle and the top of the 5.260 – 5.330 GHz frequency range according to method #2 of the FCC Public Notice DA 02-2138, Appendix A PPSD procedure. The EUT RF output was connected to the Spectrum Analyzer through 20 dB attenuator and accounted with cable loss in measurements. For plots result refer to plots A20 to A31 in Appendix A.

**LIMIT**

The peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Calculated limit for 8 dBm maximum output power is  $11 - (22-6) = -5$  dBm and for output power 2 dBm is  $11 - (28-6) = -11$  dBm.

**TEST EQUIPMENT USED:**

1	3	5				
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**5.1.4 Ratio of the peak excursion of the modulation envelope to the peak transmit power according to §15.407 a (6)**

Method of measurement FCC Public Notice DA 02-2138, Appendix A  
 Ambient Temperature 23<sup>0</sup> C Relative Humidity 49% Air Pressure 1009 hPa  
 Operating Frequency Range 5.260–5.330 GHz  
 Measurement Uncertainty ± 2.5dB

Carrier frequency GHz	Data rate Mbit/s	Test result dB	Limit dB	Margin dB	Verdict
5.260	6 Mbit/s	12.0	13.0	1.0	PASS
	54 Mbit/s	11.67	13.0	1.33	
5.300	6 Mbit/s	11.83	13.0	1.17	PASS
	54 Mbit/s	11.34	13.0	1.66	
5.330	6 Mbit/s	10.83	13.0	2.17	PASS
	54 Mbit/s	10.33	13.0	2.67	

**TEST PROCEDURE**

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 5.260 – 5.330 GHz frequency range according to method of FCC Public Notice DA 02-2138, Appendix A procedure. The EUT RF output was connected to the Spectrum Analyzer through 20 dB attenuator and accounted with cable loss in measurement. The maximum peak excursion of the modulation envelope to the peak transmit power was measured as a difference between 2 traces. Trace 1 with RBW=1 MHz VBW=3 MHz, trace 2 RBW=1MHz VBW=3 kHz. Test result noted in table above from plots A32 to A37 in Appendix A.

**LIMIT**

The ratio of the peak excursion of the modulation envelope to the peak transmit power shall not exceed 13 dB across any 1 MHz bandwidth or the emissions bandwidth whichever is less.

**TEST EQUIPMENT USED:**

1	3	5				
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**5.1.5 Out of band radiated emissions test according to §15.407 b (2) (5)**

Method of measurement FCC part 15 §15.407 b (4)  
 Date July 2004, May 2005  
 Ambient Temperature 23° C Relative Humidity 49% Air Pressure 1009 hPa  
 Operating Frequency Range 5.260–5.330 GHz  
 Measurement Uncertainty ± 4.2 dB

Frequency, MHz	Carrier frequency, MHz	Resolution bandwidth, MHz	Spurious emission level, dB(µV/m)	Spurious emissions limit, dB(µV/m)	Margin dB
4963	5260	1.0	52.30	68.2	16.1
5249.5	5260	1.0	56.93	68.2	11.27
5233.8	5300	1.0	49.62	68.2	18.82
5249.3	5330	1.0	49.61	68.2	18.81
5350.13	5335	1.0	60.1	68.2	8.1

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the 40 GHz. 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 plot results refer to Plots A37 – A52 in Appendix A.

**LIMIT**

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (correspondent to 68.23 dB(µV/m) field strength at 3m distance). Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band. Unwanted emissions below 1 GHz must comply with the general field strength limit set forth in Section 15.209.

**TEST PROCEDURE**

The test was performed with transmitter operating in 3 carrier frequencies  $F_{min} = 5260$  MHz;  $F_{cent} = 5300$  MHz;  $F_{max} = 5330$  MHz. The EUT was placed on a wooden 80 cm height turntable and 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.

**TEST EQUIPMENT USED:**

1	3	5				
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**5.1.6 Radiated emissions, which fall in restricted bands test according to §15.407(6) and § 15.205, § 15.209(a)**

Method of measurement           ANSI 63.4 §13.1.4  
 Ambient Temperature - 23<sup>0</sup> C   Relative Humidity -   49%   Air Pressure - 1009 hPa  
 Operating Frequency Range       5.260–5.330 GHz  
 Measurement Uncertainty         ± 4.2 dB

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to 40 GHz. 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

**Carrier frequency = 5260 MHz**

**Peak detector, RBW = 1 MHz; VBW = 3 MHz**

Frequency, MHz	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
5108	57.5	74	16.5	Pass	53
5387	57.0	74	17.0	Pass	55

**Average detector, RBW = 1 MHz; VBW = 3 kHz**

Frequency, MHz	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
4978	40.0	54	14.0	Pass	54
5373.7	43.2	54	10.8	Pass	56

**Carrier frequency = 5300 MHz**

**Peak detector, RBW = 1 MHz; VBW = 3 MHz**

Frequency, MHz	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
4994	55.5	74	18.5	Pass	58
5379	59.9	74	14.1	Pass	60

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Average detector, RBW = 1 MHz; VBW = 3 kHz

Frequency, MHz	Radiated emissions, dB (μV/m)	Limit, dB (μV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
5143.5	41.9	54	12.1	Pass	59
5377.5	43.2	54	10.8	Pass	61

**Carrier frequency = 5330 MHz**

Peak detector, RBW = 1 MHz; VBW = 3 MHz

Frequency, MHz	Radiated emissions, dB (μV/m)	Limit, dB (μV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
5056	55.24	74	18.76	Pass	58
5350.6	65.24	74	8.76	Pass	61

Average detector, RBW = 1 MHz; VBW = 3 kHz

Frequency, MHz	Radiated emissions, dB (μV/m)	Limit, dB (μV/m)	Margin, dB	Verdict	Reference to Plots in Appendix A
5141.9	40.8	54	13.2	Pass	64
5350	50.7	54	3.3	Pass	67

## TEST PROCEDURE

The test was performed with transmitter operating in 3 carrier frequencies  $F_{min} = 5260$  MHz;  $F_{centr} = 5300$  MHz;  $F_{max} = 5330$  MHz. The EUT was placed on a wooden 80 cm height turntable and measurements were performed in Max hold mode at 3 m test distance. To find maximum radiation the turntable was rotated  $360^\circ$ , measuring antenna height was changed, and the antennas polarization was changed from vertical to horizontal. Measurements were performed with peak and average detectors. VBW for average detector was calculated  $> 1/T = 1/0.476 \text{ msec} = 2.1 \text{ kHz}$ . VBW = 3 kHz

## LIMIT

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

## TEST EQUIPMENT USED:

5	6	7	8	11	13	14
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**5.2 Radiated emissions test according to § 15.109**

Method of measurement      ANSI 63.4 §13.1.4  
 Date                                6, July 2004  
 Ambient Temperature        24<sup>0</sup> 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 was 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

**Radiated emissions test result:**

Test results are presented in Table 1.

**Test equipment used**

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

**Table 1. Radiated emission test results**

Frequency (MHz)	Turn- table Angle (°)	Antenna Polariz.	Antenna Height (m)	Emission Level Note 1 (dBμV/m)	Limit @ 3 m (dBμV/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 (dBμV) + 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 (dBμV/m) – Emission level (dBμV/m)



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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

### 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        23<sup>0</sup> 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			
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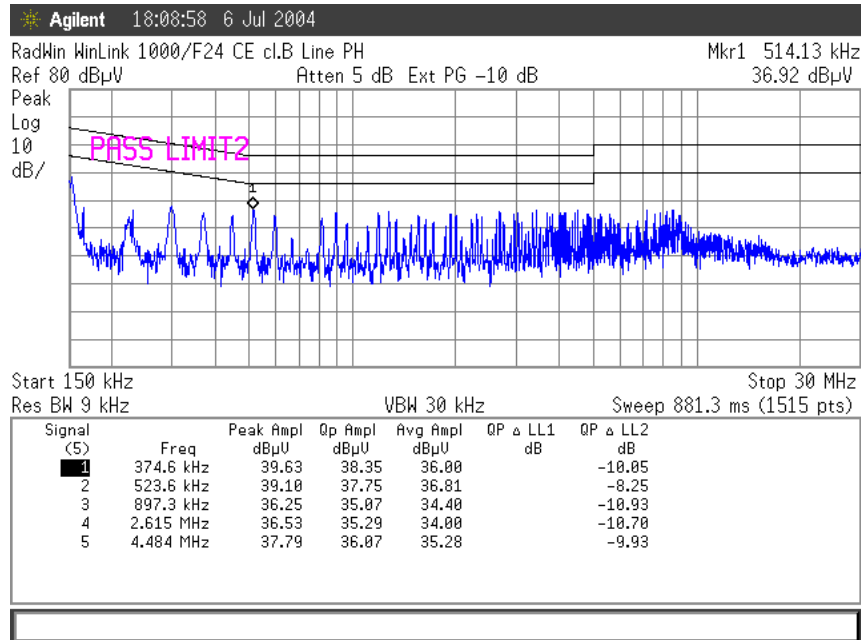
**Test Report No.:** 8412312771

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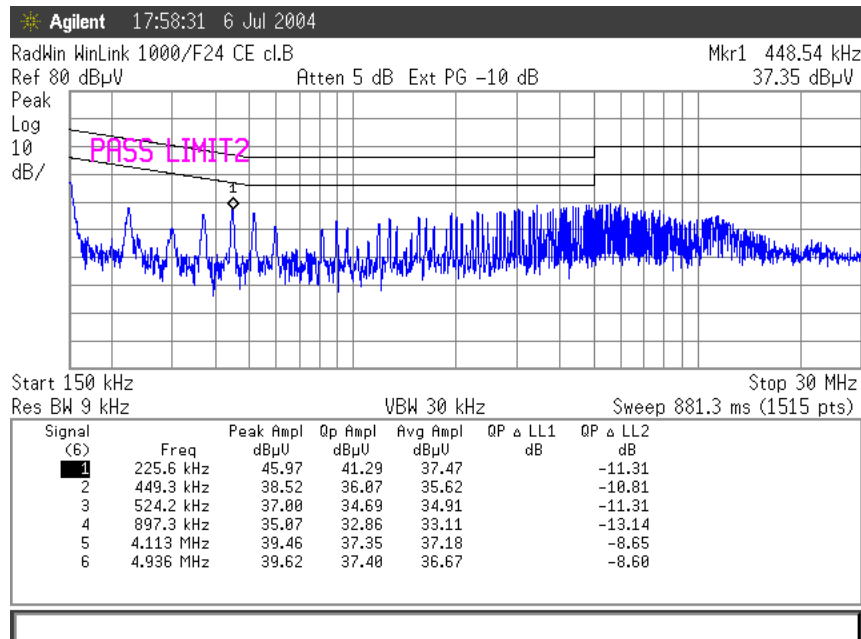
**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

**Conducted emissions test. 120 V AC. Plot # 1**



**Conducted emissions test. 120V AC. Plot # 2**



**Test Report No.:** 8412312771

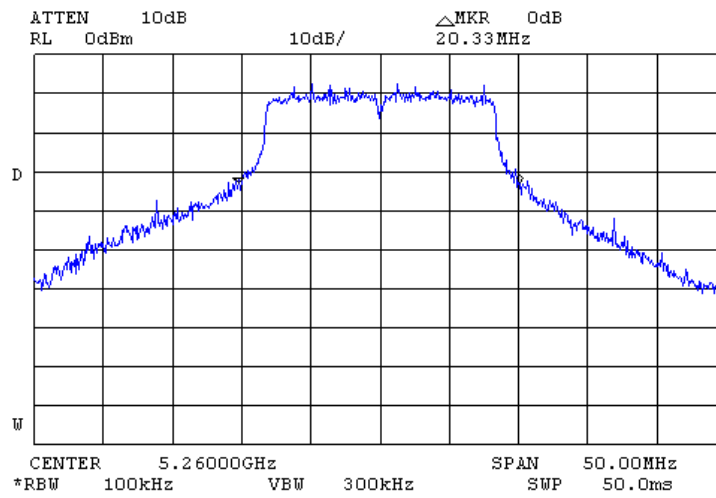
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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

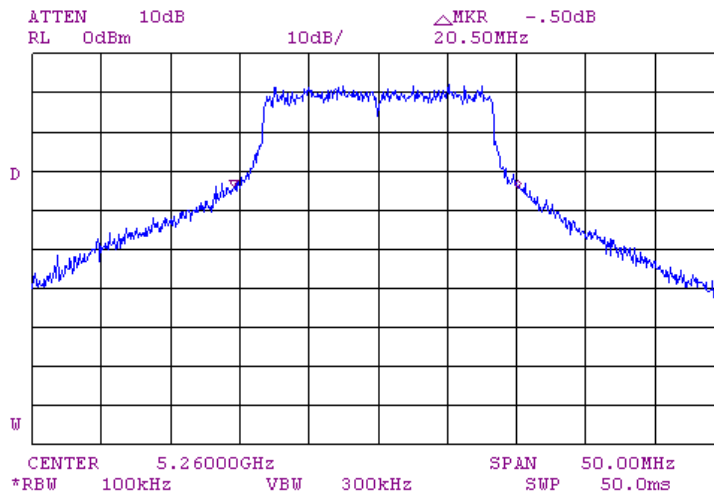
Appendix A

26 dB Emission Bandwidth 15.407a (2)  
 Carrier Frequency 5.260 GHz  
 PRBS 6 Mbit/s



Plot A1

26 dB Emission Bandwidth 15.407a (2)  
 Carrier Frequency 5.260 GHz  
 PRBS 54 Mbit/s



Plot A2



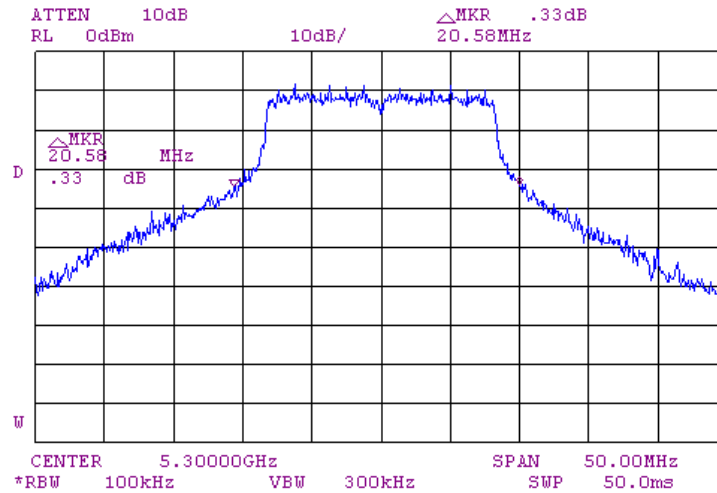
Test Report No.: 8412312771

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Title: Test on Point-to-Point Broadband Wireless Transmitter System

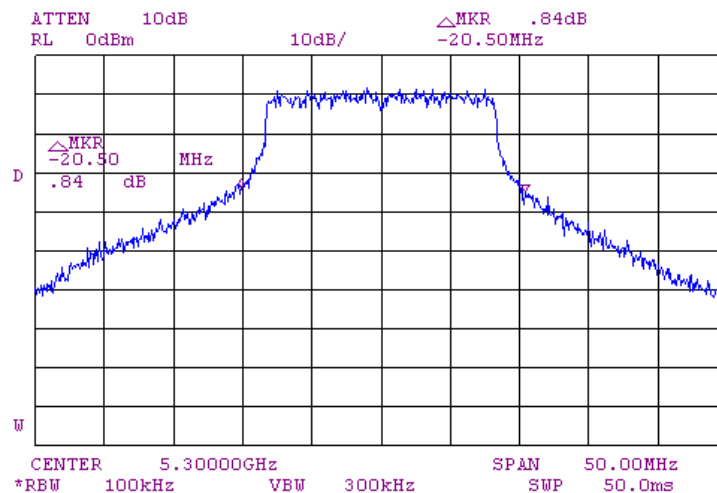
Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

26 dB Emission Bandwidth 15.407a (2)  
Carrier Frequency 5.300 GHz  
PRBS 6 Mbit/s



Plot A3

26 dB Emission Bandwidth 15.407a (2)  
Carrier Frequency 5.300 GHz  
PRBS 54 Mbit/s



Plot A4



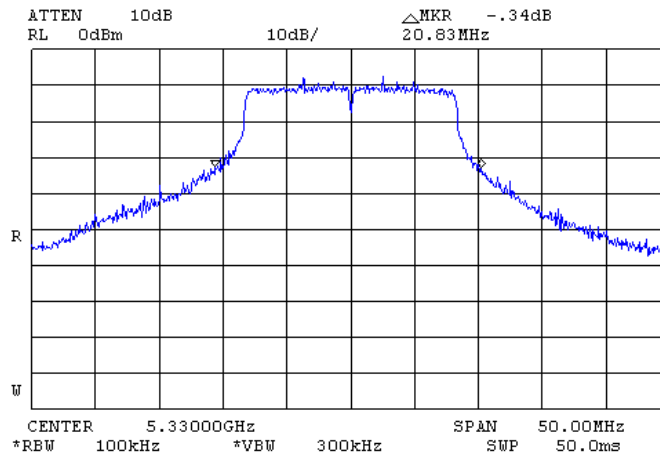
Test Report No.: 8412312771

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Title: Test on Point-to-Point Broadband Wireless Transmitter System

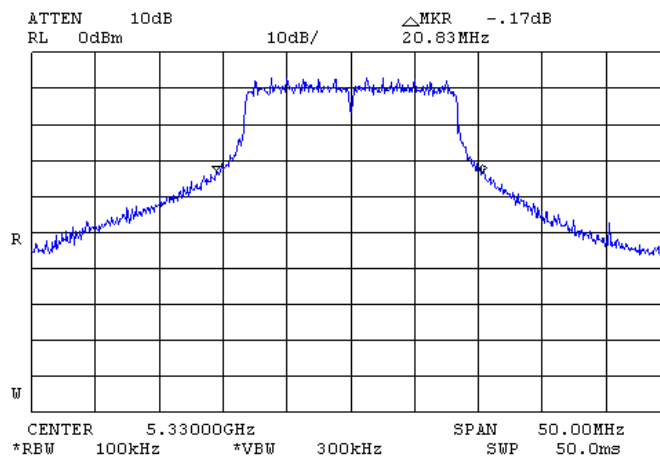
Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

26 dB Emission Bandwidth 15.407a (2)  
Carrier Frequency 5.330 GHz  
PRBS 6 Mbit/s



Plot A5

26 dB Emission Bandwidth 15.407a (2)  
Carrier Frequency 5.330 GHz  
PRBS 54 Mbit/s

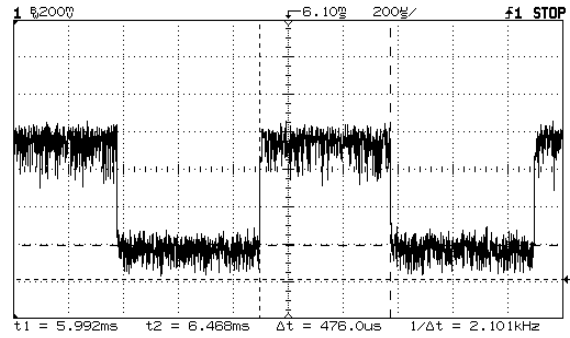


Plot A6

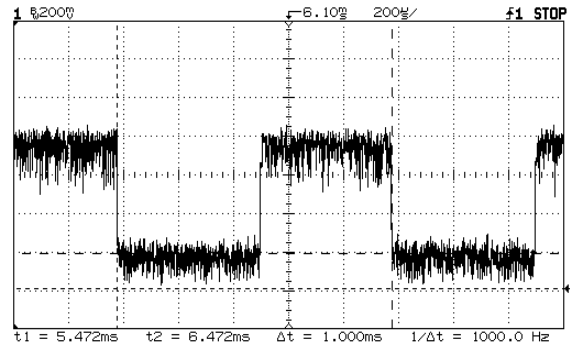
**Test Report No.:** 8412312771**Page 23 of 73 Pages****Title:** Test on Point-to-Point Broadband Wireless Transmitter System**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853**Transmission pulse duration test**

Plot A7 a),b)

Transmission duration 0.476 ms



Transmission period 1.0 ms





Test Report No.: 8412312771

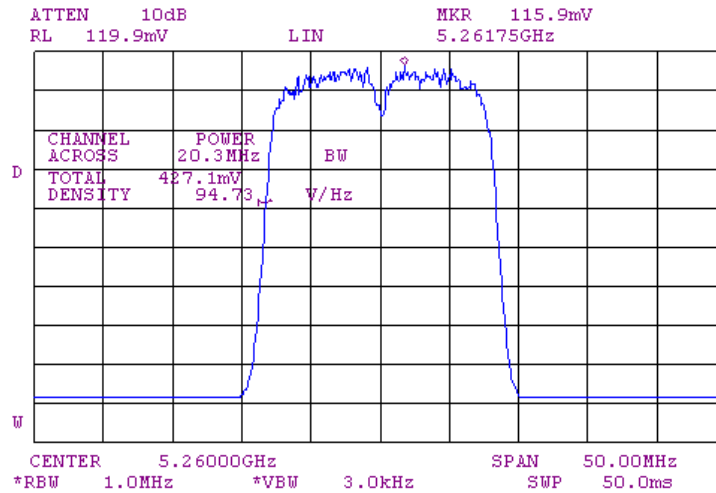
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.260 GHz. Output power 8 dBm  
PRBS 6 Mbit/s

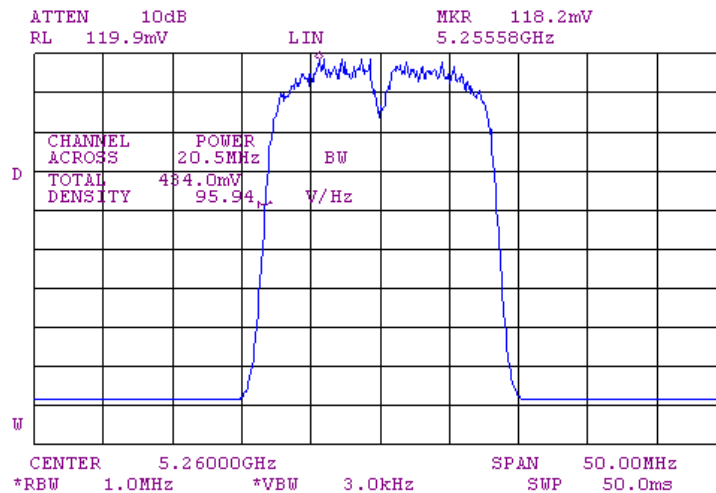
$P_{max} = 10\log[(U_{lin})^2/50]+30\text{dB}+10\log(26\text{dB BW/RBW})$   
 $P_{max} = 10\log[(115.9\text{mV})^2/50\Omega]+30\text{dB}+10\log(20.3/1) = 7.37 \text{ dBm}$



Plot A8

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.260 GHz. Output power 8 dBm  
PRBS 54 Mbit/s

$P_{max} = 10\log[(118.2\text{mV})^2/50\Omega]+30\text{dB}+10\log(20.5/1) = 7.58 \text{ dBm}$



Plot A9





Test Report No.: 8412312771

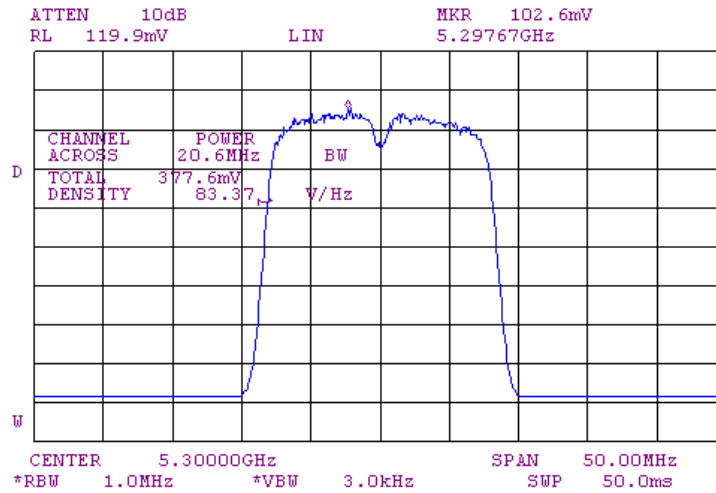
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.300 GHz. Output power 8 dBm  
PRBS 6 Mbit/s

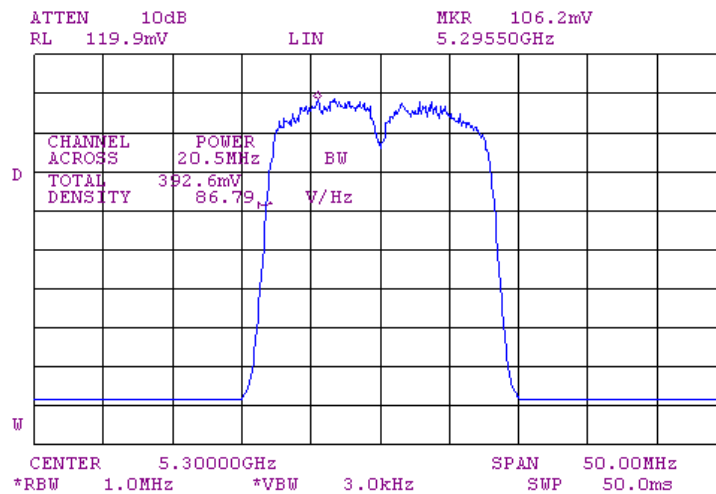
Amount calculating of output power = 6.37 dBm



Plot A10

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.300 GHz Output power 8 dBm  
PRBS 54 Mbit/s

Amount calculating of output power = 6.65 dBm



Plot A11



Test Report No.: 8412312771

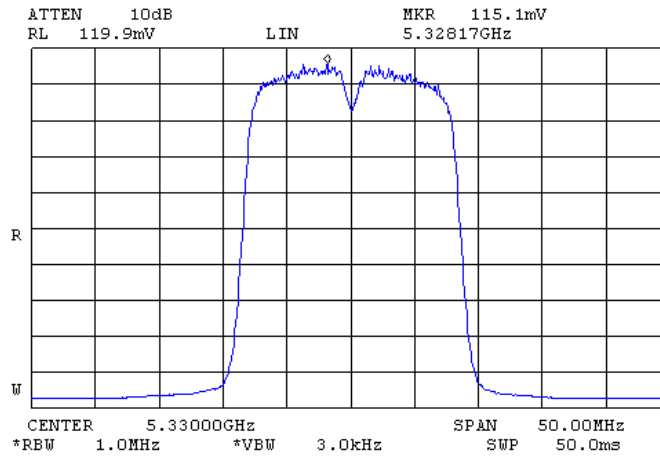
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.330 GHz. Output power 8 dBm.  
PRBS 6 Mbit/s

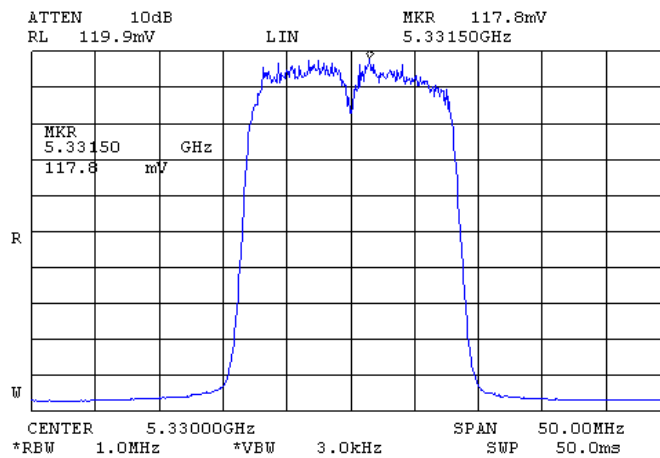
Amount calculating of output power = 7.42 dBm



Plot A12

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.330 GHz. Output power 8 dBm.  
PRBS 54 Mbit/s

Amount calculating of output power = 7.61 dBm



Plot A13

**Test Report No.: 8412312771**

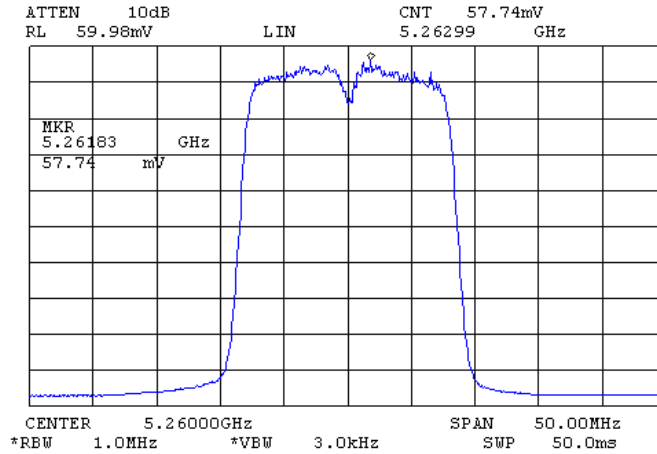
**Page 27 of 73 Pages**

**Title: Test on Point-to-Point Broadband Wireless Transmitter System**

**Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853**

Maximum Output Power 15.407a (2)  
 Carrier Frequency 5.260 GHz. Output power 2 dBm  
 PRBS 6 Mbit/s

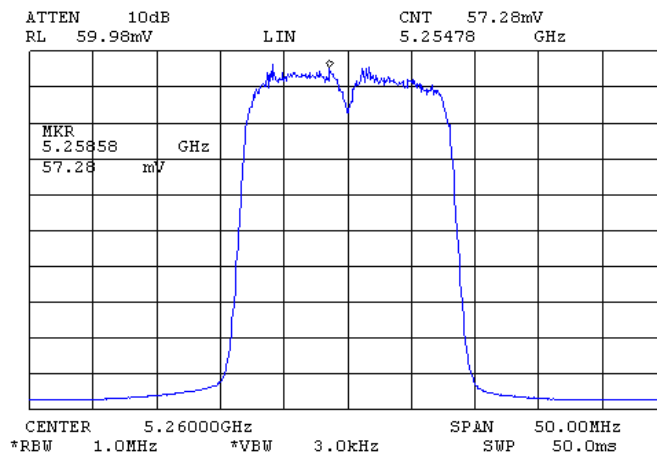
$$P_{max} = 10\log[(57.7\text{mV})^2/50\Omega] + 30\text{dB} + 10\log(20.3/1) = 1.31 \text{ dBm}$$



Plot A14

Maximum Output Power 15.407a (2)  
 Carrier Frequency 5.260 GHz. Output power 2 dBm  
 PRBS 54 Mbit/s

$$P_{max} = 10\log[(0.0573\text{mV})^2/50\Omega] + 30\text{dB} + 10\log(20.5/1) = 1.29 \text{ dBm}$$



Plot A15



Test Report No.: 8412312771

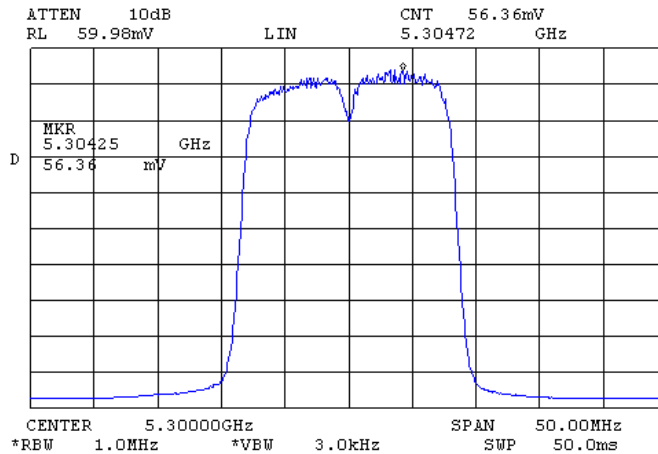
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.300 GHz. Output power 2 dBm  
PRBS 6 Mbit/s

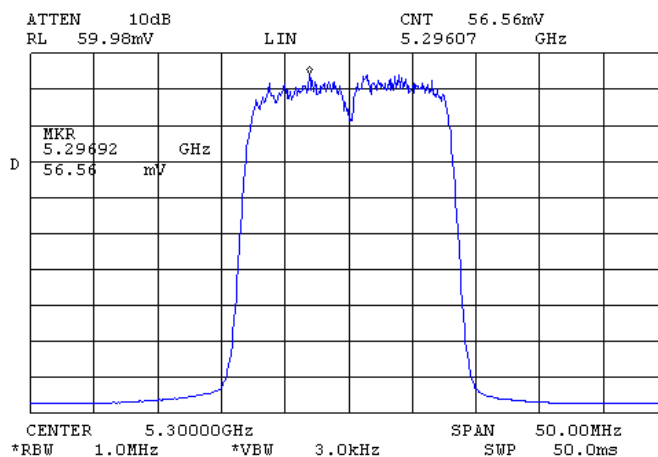
Amount calculating of output power = 1.17 dBm



Plot A16

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.300 GHz. Output power 2 dBm  
PRBS 54 Mbit/s

Amount calculating of output power = 1.18 dBm



Plot A17



Test Report No.: 8412312771

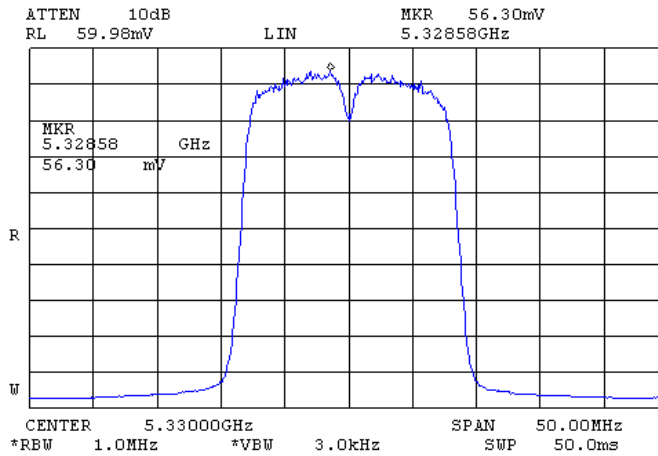
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.330 GHz. Output power 2 dBm  
PRBS 6 Mbit/s

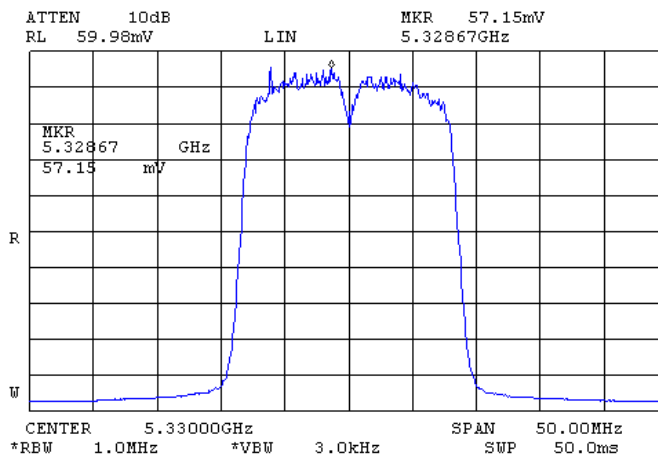
Amount calculating of output power = 1.20 dBm



Plot A18

Maximum Output Power 15.407a (2)  
Carrier Frequency 5.330 GHz. Output power 2 dBm  
PRBS 54 Mbit/s

Amount calculating of output power = 1.34 dBm



Plot A19



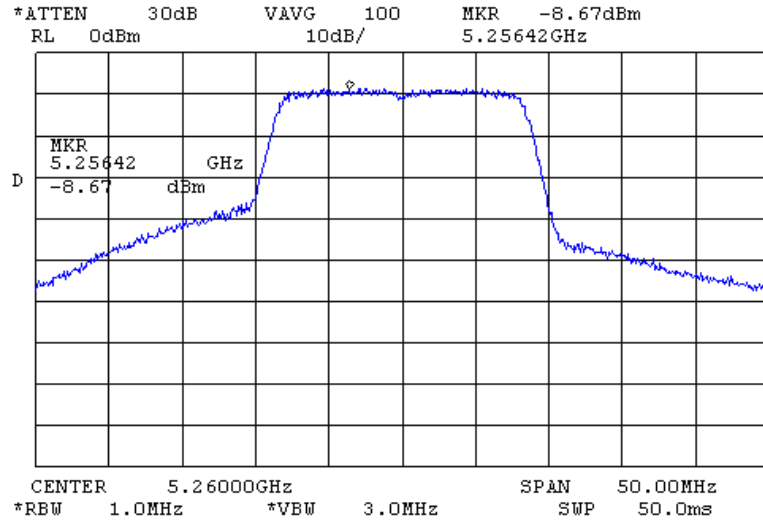
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

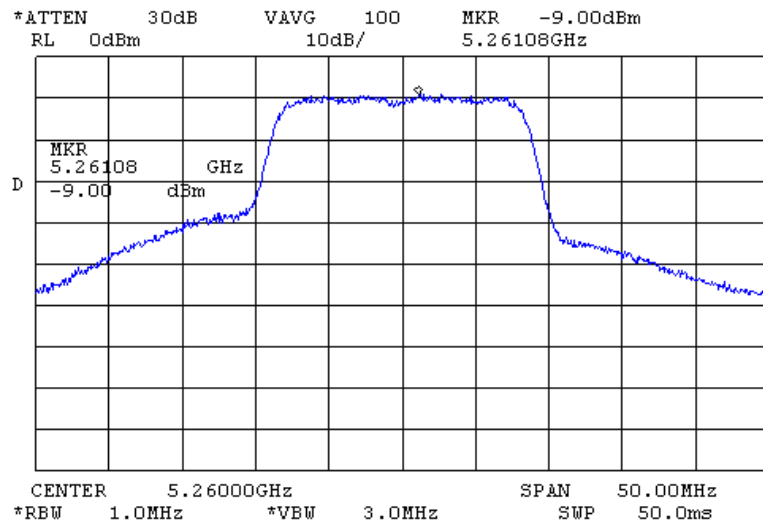
Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Peak Power Spectral Density 15.407a (2)  
Carrier Frequency 5.260 GHz. Output power 8 dBm  
PRBS 6 Mbit/s



Plot A20

Peak Power Spectral Density 15.407a (2)  
Carrier Frequency 5.260 GHz. Output power 8 dBm  
PRBS 54 Mbit/s



Plot A21



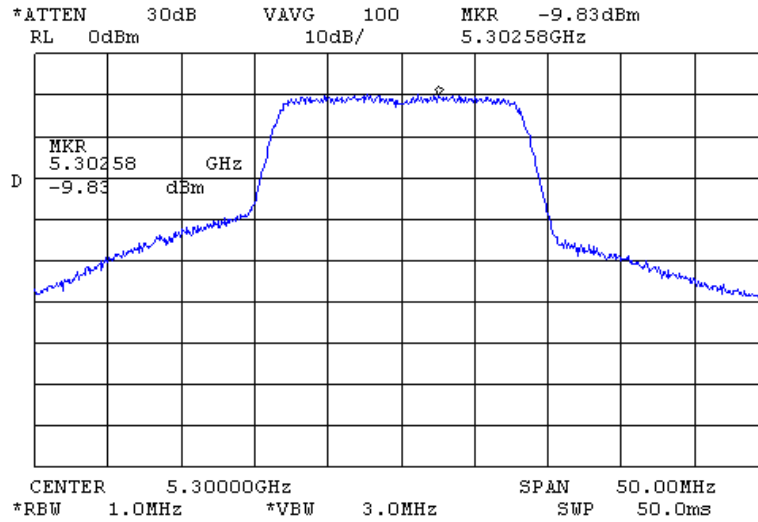
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

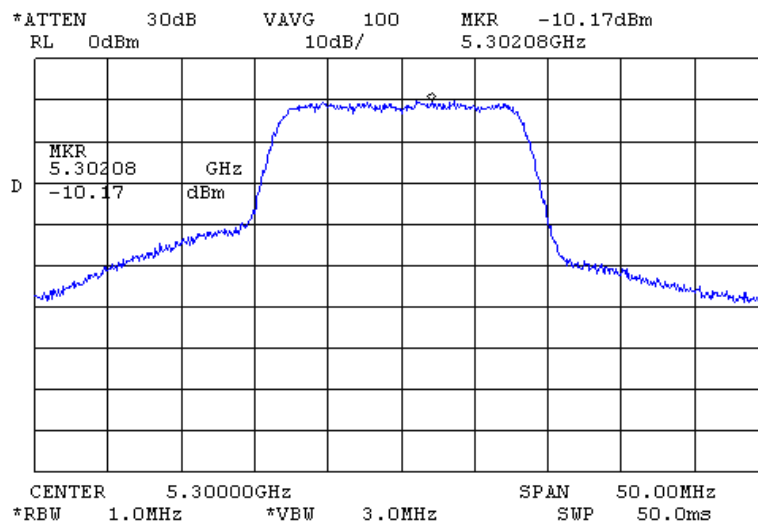
Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Peak Power Spectral Density 15.407a (2)  
Carrier Frequency 5.300 GHz. Output power 8 dBm  
PRBS 6 Mbit/s



Plot A22

Peak Power Spectral Density 15.407a (2)  
Carrier Frequency 5.300 GHz. Output power 8 dBm  
PRBS 54 Mbit/s



Plot A23

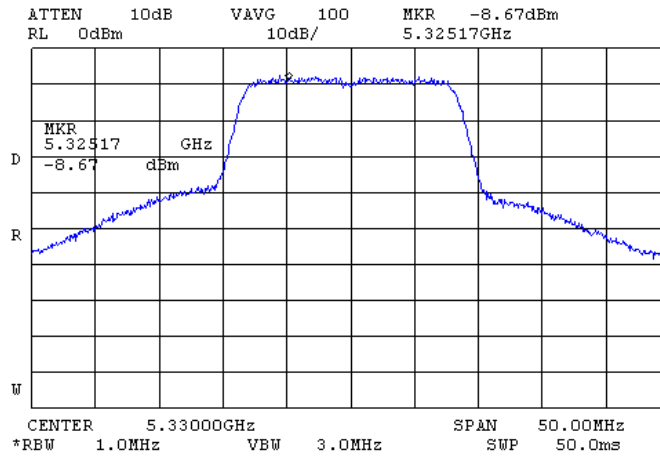
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

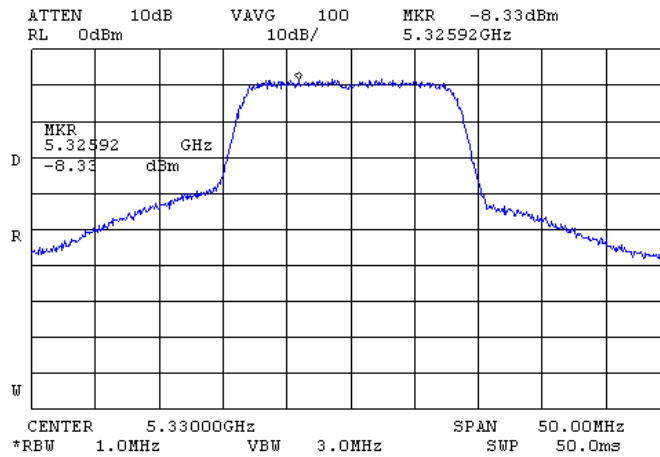
**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Peak Power Spectral Density 15.407a (2)  
 Carrier Frequency 5.330 GHz. Output power 8 dBm  
 PRBS 6 Mbit/s



Plot A24

Peak Power Spectral Density 15.407a (2)  
 Carrier Frequency 5.330 GHz. Output power 8 dBm  
 PRBS 54 Mbit/s



Plot A25



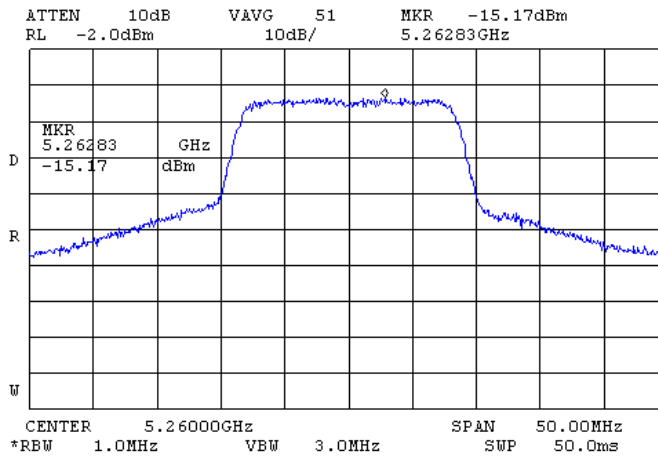
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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

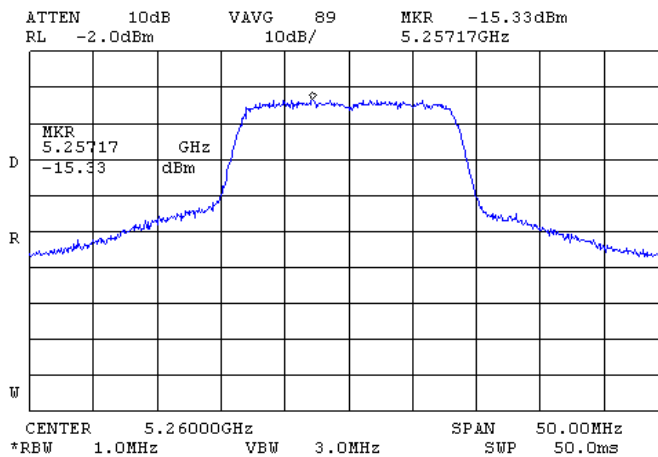
**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Peak Power Spectral Density 15.407a (2)  
 Carrier Frequency 5.330 GHz. Output power 2 dBm  
 PRBS 6 Mbit/s



Plot A26

Peak Power Spectral Density 15.407a (2)  
 Carrier Frequency 5.330 GHz. Output power 2 dBm  
 PRBS 54 Mbit/s



Plot A27

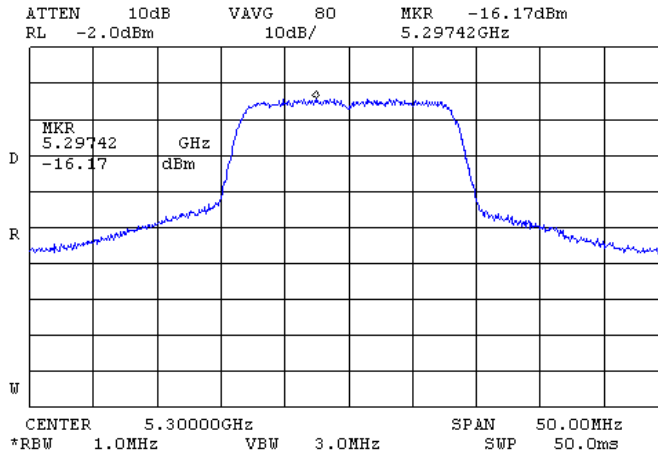
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

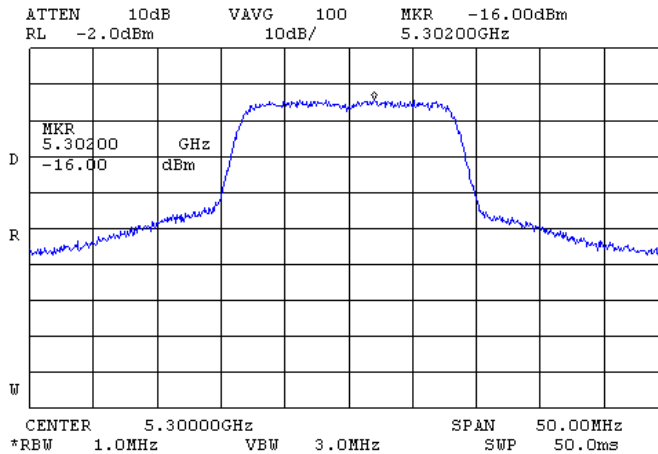
**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Peak Power Spectral Density 15.407a (2)  
 Carrier Frequency 5.300 GHz. Output power 2 dBm  
 PRBS 6 Mbit/s



Plot A28

Peak Power Spectral Density 15.407a (2)  
 Carrier Frequency 5.300 GHz. Output power 2 dBm  
 PRBS 54 Mbit/s



Plot A29



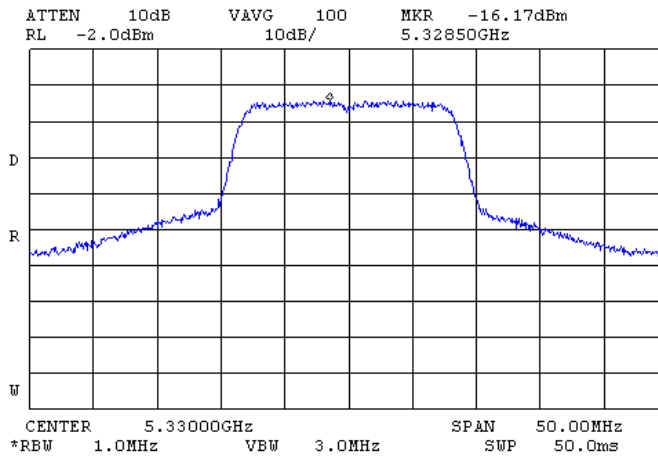
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

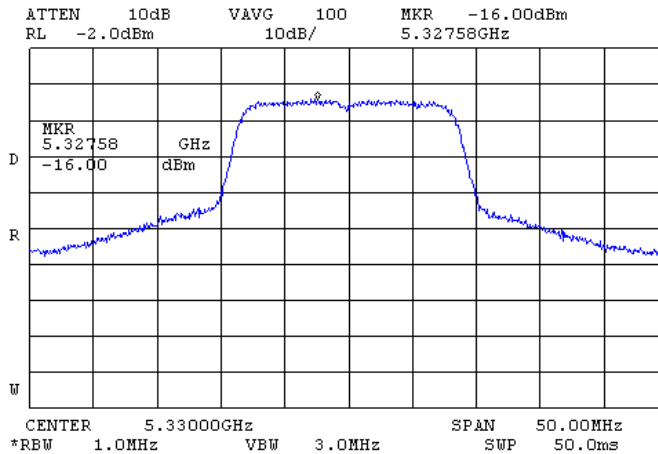
Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Peak Power Spectral Density 15.407a (2)  
Carrier Frequency 5.330 GHz. Output power 2 dBm  
PRBS 6 Mbit/s



Plot A30

Peak Power Spectral Density 15.407a (2)  
Carrier Frequency 5.330 GHz. Output power 2 dBm  
PRBS 54 Mbit/s



Plot A31

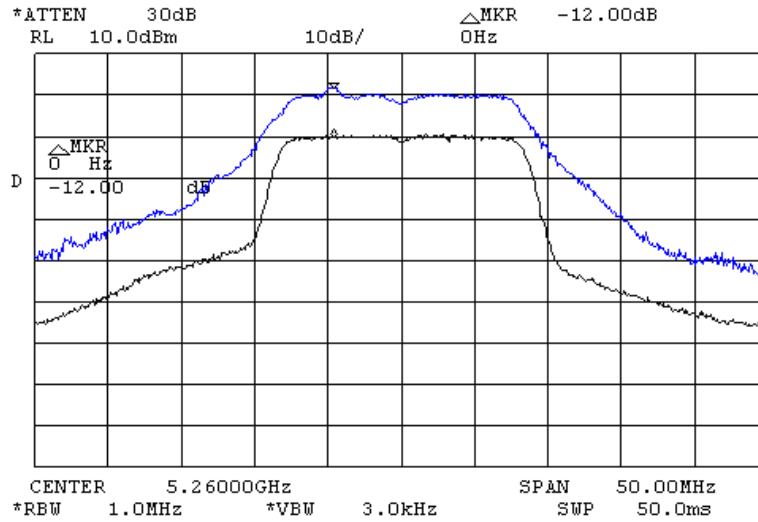
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

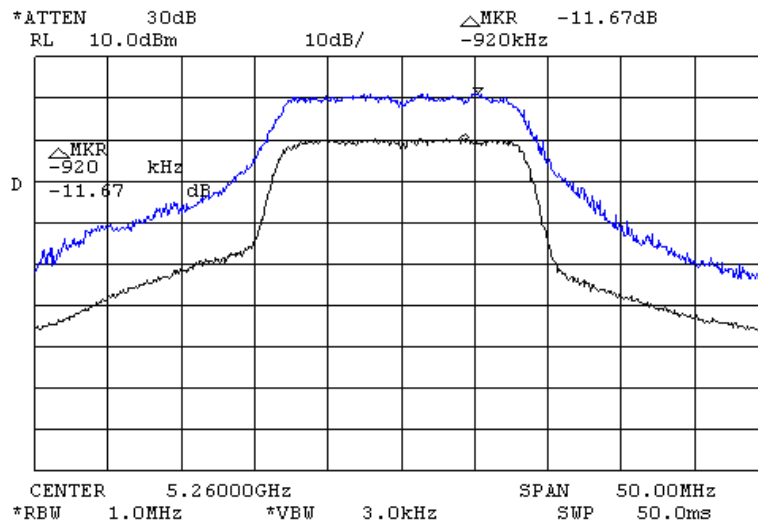
**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Ratio of the Peak Execution 15.407a (6)  
Carrier Frequency 5.260 GHz  
PRBS 6 Mbit/s



Plot A32

Ratio of the Peak Execution 15.407a (6)  
Carrier Frequency 5.260 GHz  
PRBS 54 Mbit/s



Plot A33

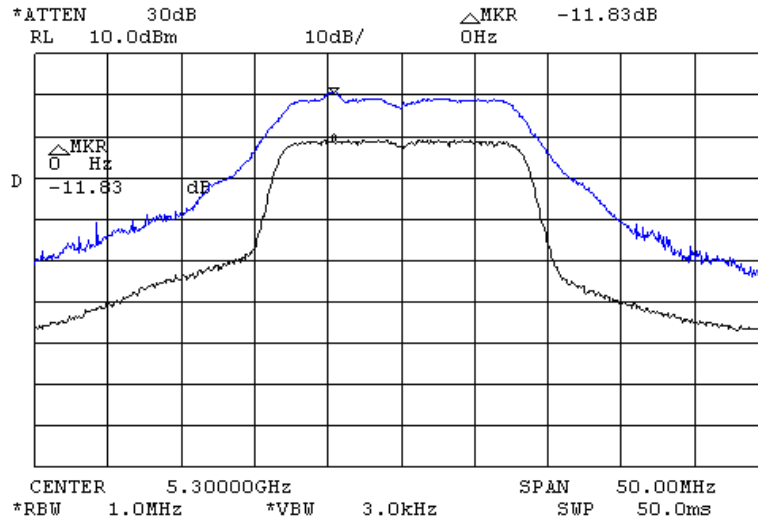
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

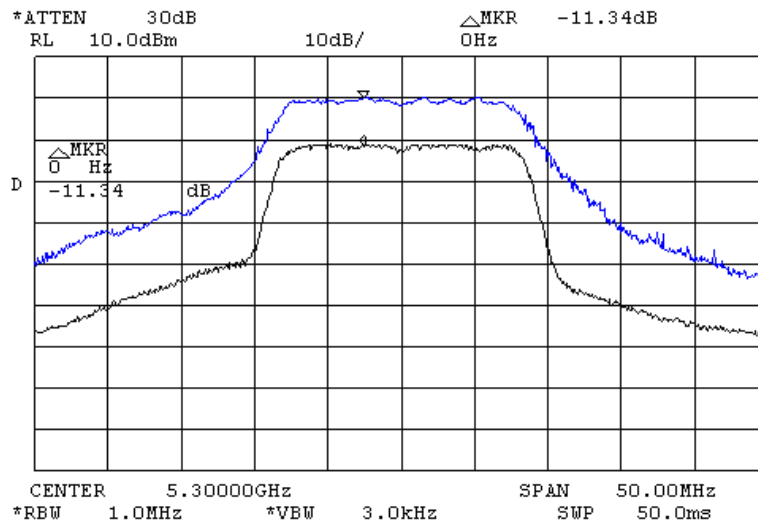
**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Ratio of the Peak Execution 15.407a (6)  
 Carrier Frequency 5.300 GHz  
 PRBS 6 Mbit/s



Plot A33

Ratio of the Peak Execution 15.407a (6)  
 Carrier Frequency 5.300 GHz  
 PRBS 54 Mbit/s



Plot A34



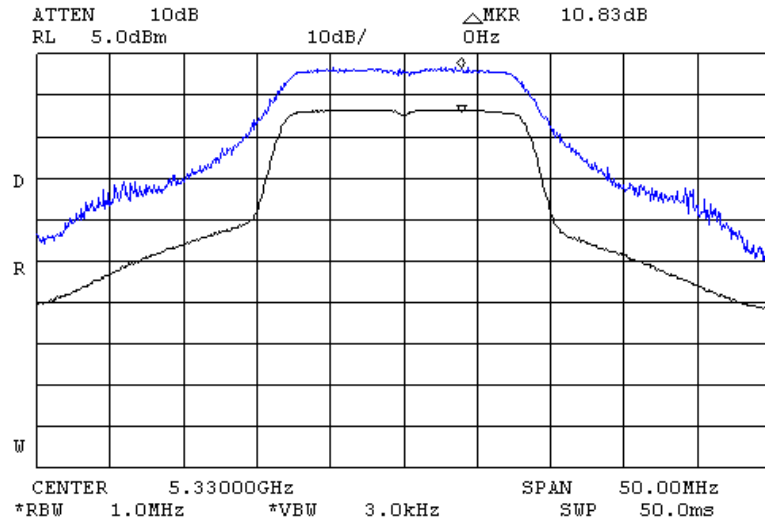
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

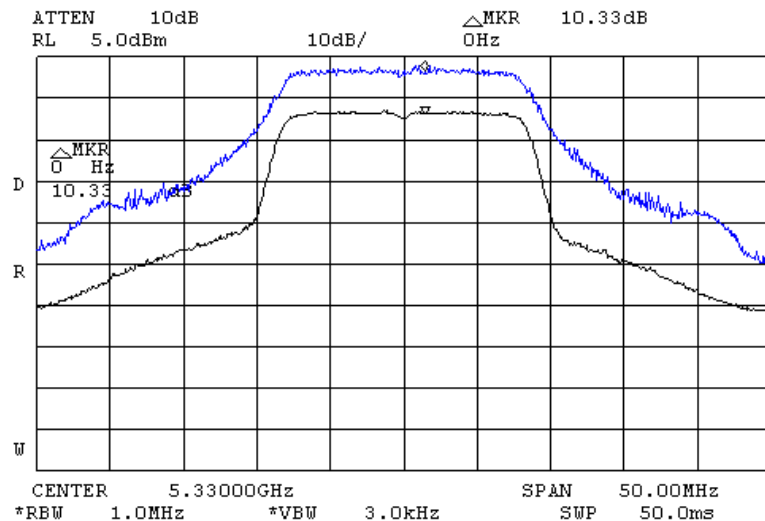
Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Ratio of the Peak Execution 15.407a (6)  
Carrier Frequency 5.330 GHz  
PRBS 6 Mbit/s



Plot A35

Ratio of the Peak Execution 15.407a (6)  
Carrier Frequency 5.330 GHz  
PRBS 54 Mbit/s



Plot A36



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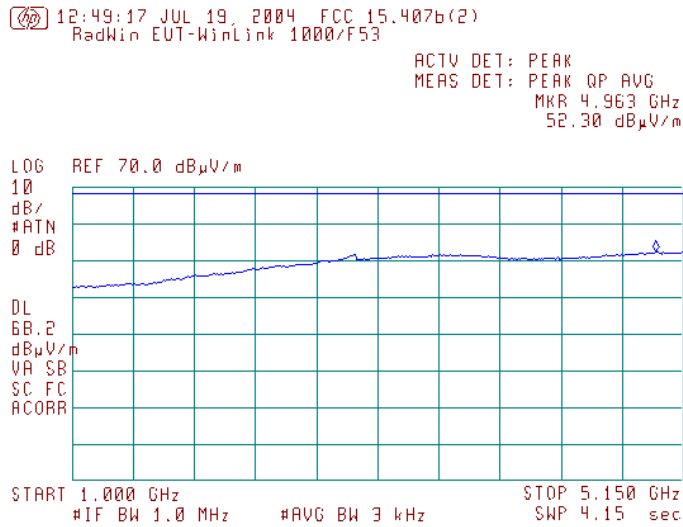
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

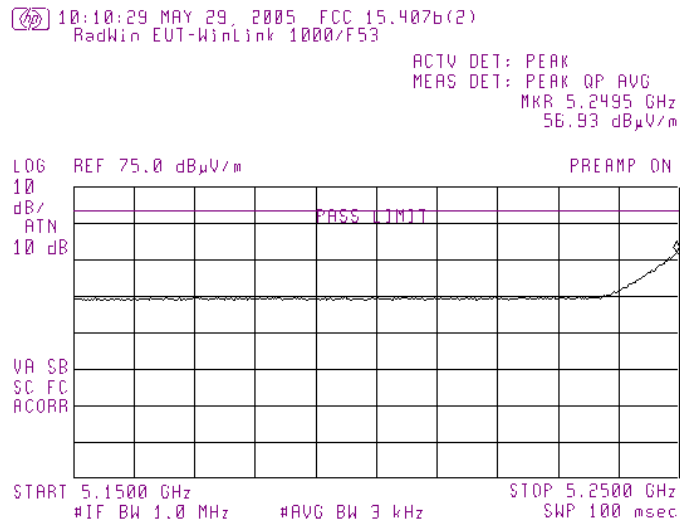
Radiated Spurious Emissions 15.407b (2)

Carrier Frequency 5.260 GHz

Limit line = -27 dBm/MHz correspondent to 68.23 dB(μV/m) @ 3m distance



Plot A37



Plot A38



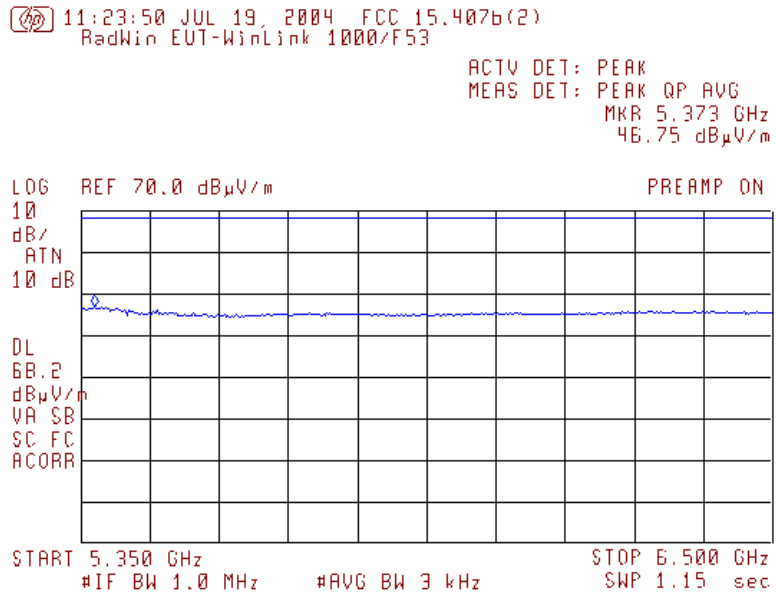
Test Report No.: 8412312771

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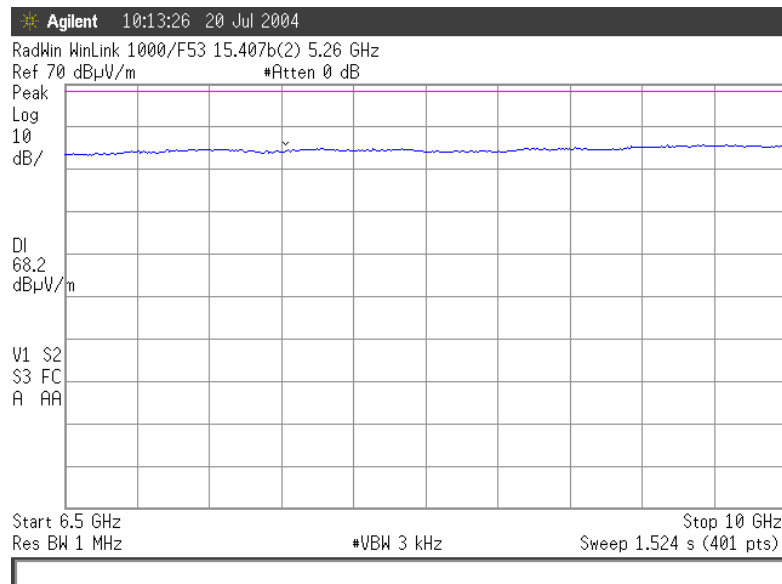
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.260 GHz



Plot A39



Plot A40





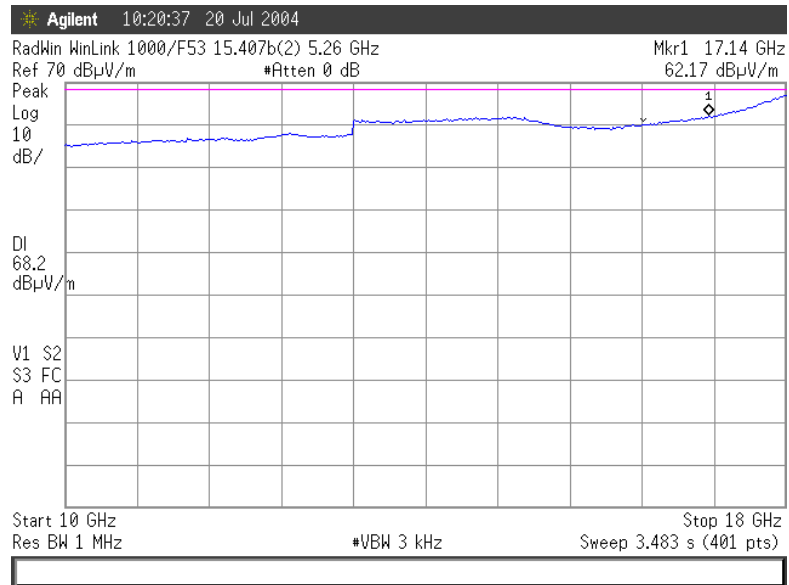
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.260 GHz



Plot A41



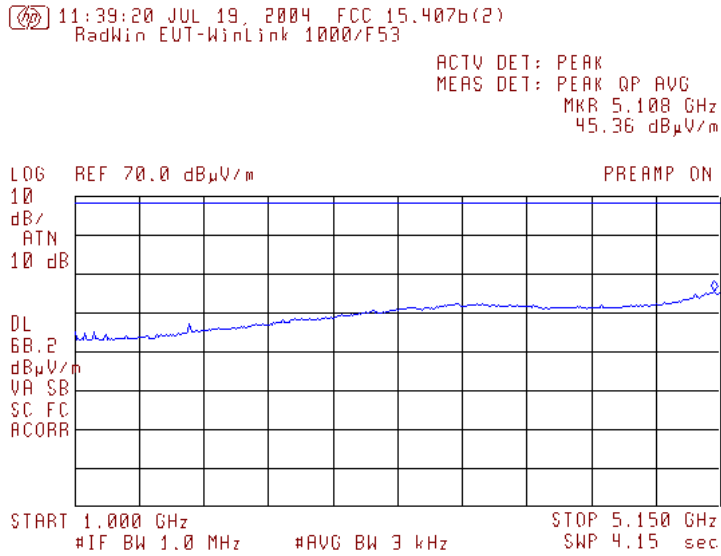
Test Report No.: 8412312771

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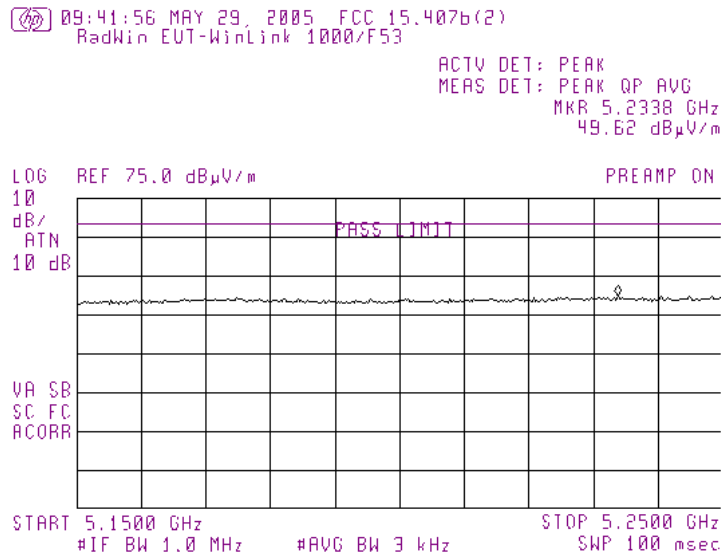
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.300 GHz



Plot A42



Plot A43



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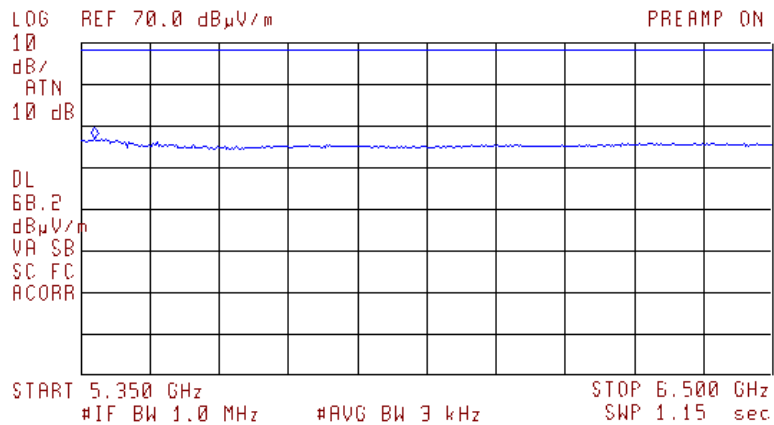
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

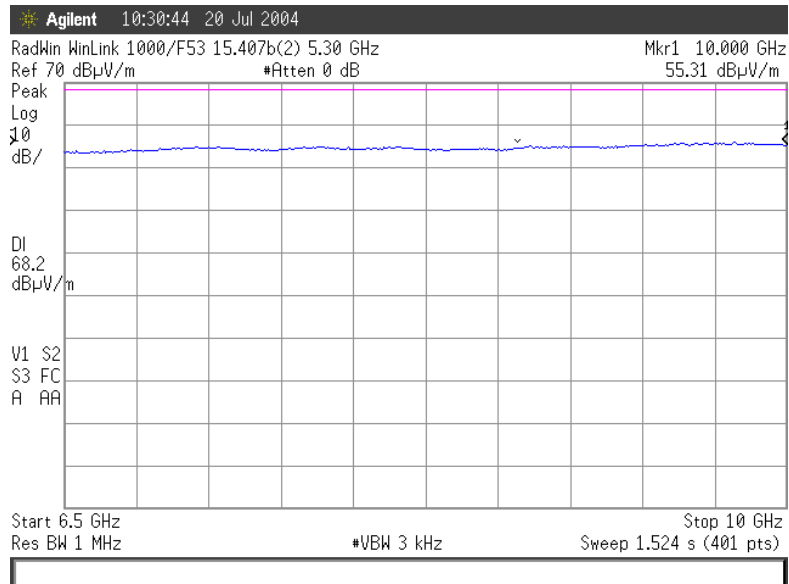
Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.300 GHz

11:23:50 JUL 19, 2004 FCC 15.407b(2)  
RadWin EUT-WinLink 1000/F53

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.373 GHz  
46.75 dB $\mu$ V/m



Plot A44



Plot A45



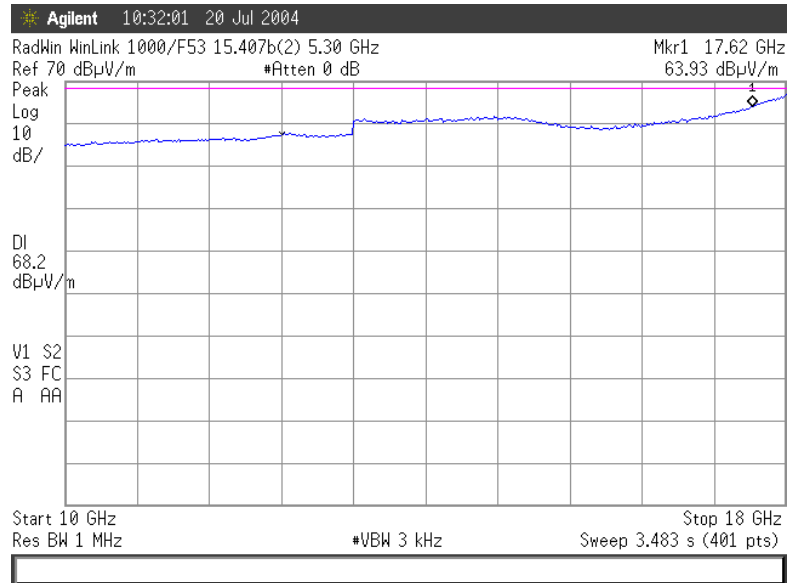
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.300 GHz



Plot A46



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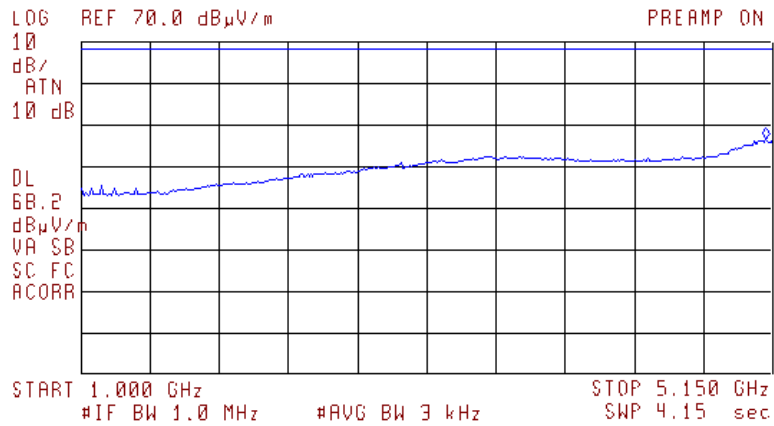
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.330 GHz

11:47:51 JUL 19, 2004 FCC 15.407b(2)  
RadWin EUT-WinLink 1000/F53

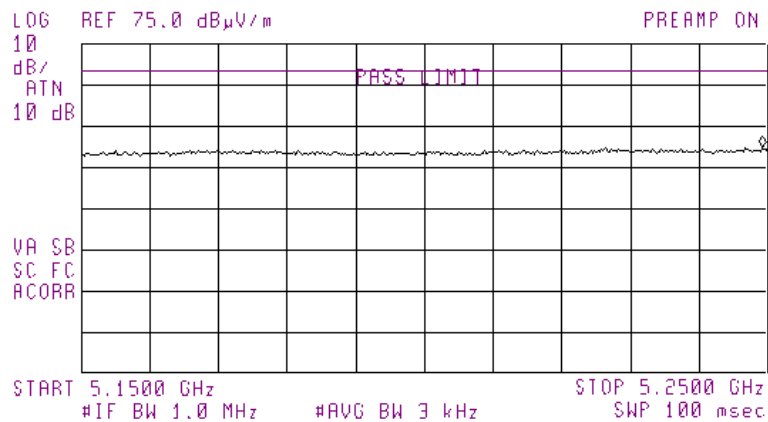
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.108 GHz  
46.44 dBμV/m



Plot A47

09:47:56 MAY 29, 2005 FCC 15.407b(2)  
RadWin EUT-WinLink 1000/F53

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.2493 GHz  
49.61 dBμV/m



Plot A48



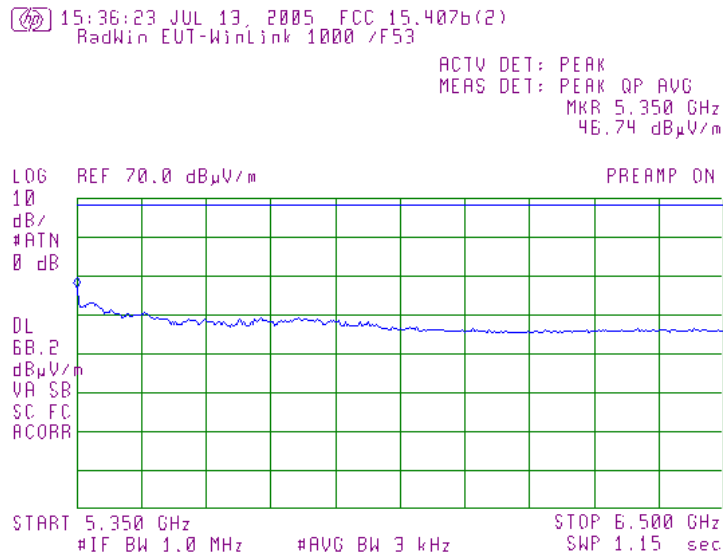
Test Report No.: 8412312771

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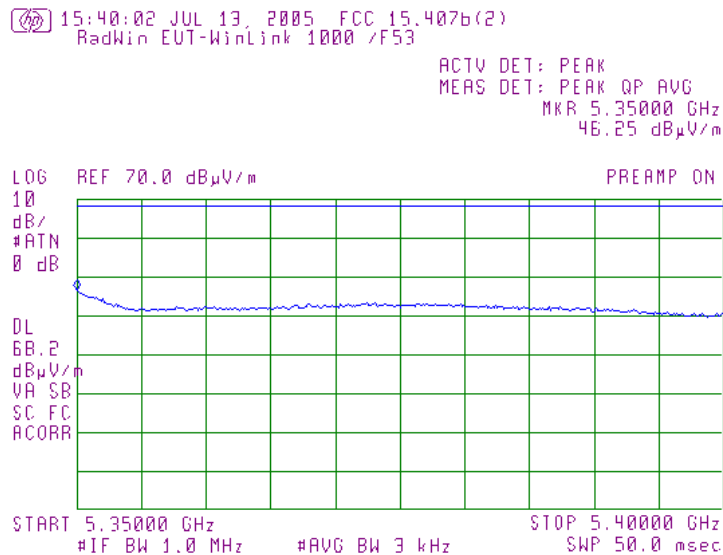
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.330 GHz



Plot A49



Plot A50



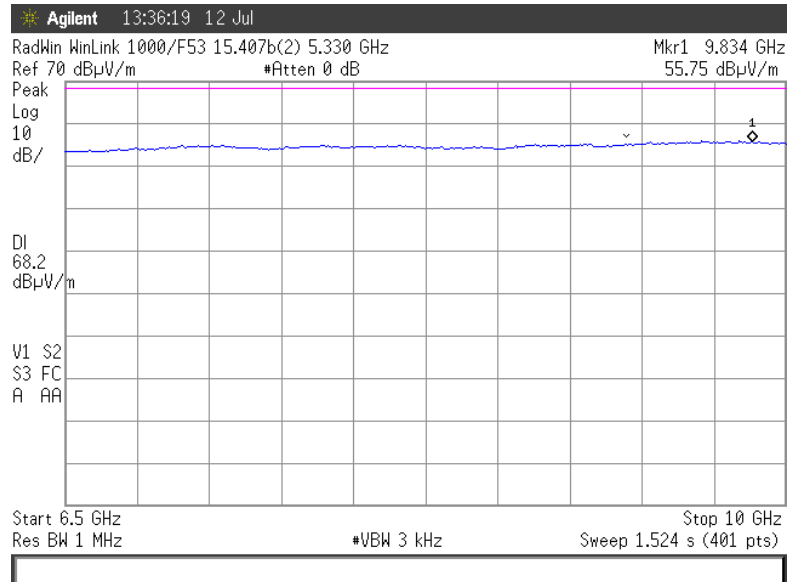
Test Report No.: 8412312771

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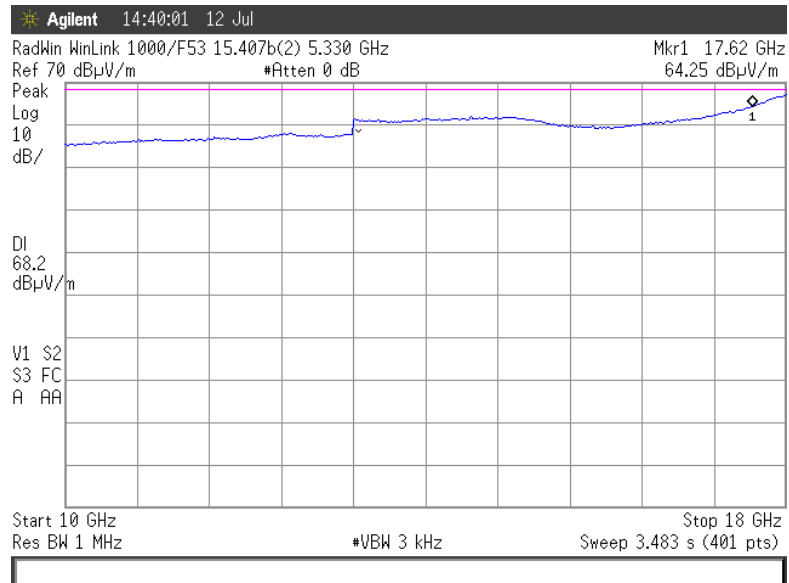
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (2)  
Carrier Frequency 5.330 GHz



Plot A51



Plot A52



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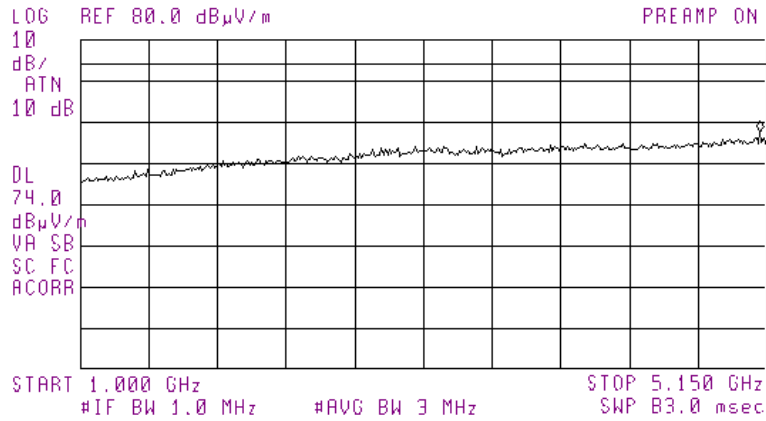
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions with fall in restricted bands 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB (μV/m) @ 3m  
Carrier Frequency 5.260 GHz

14:59:31 JUL 13, 2005 FCC 15.407b(6)  
RadWin EUT-WinLink 1000 /F53

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.108 GHz  
57.47 dBμV/m



Plot A53





Test Report No.: 8412312771

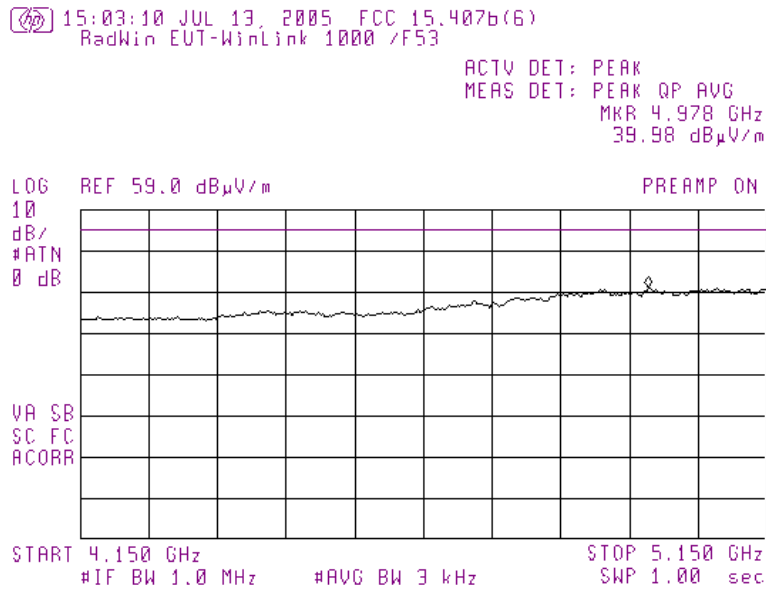
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Average. Limit = 54 dB(μV/m)@ 3m  
Carrier Frequency 5.260 GHz

4.5 – 5.15 GHz restricted band



Plot A54



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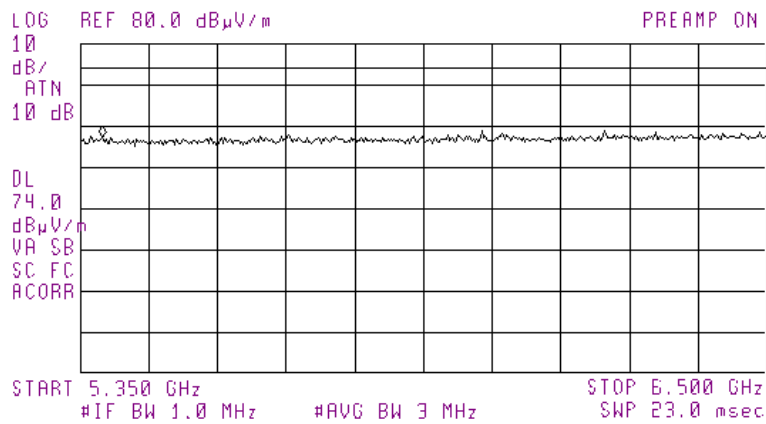
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB (μV/m) @ 3m  
Carrier Frequency 5.260 GHz

15:06:42 JUL 13, 2005 FCC 15.407b(6)  
RadWin EUT-WinLink 1000 /F53

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.387 GHz  
56.97 dBμV/m



Plot A55



Test Report No.: 8412312771

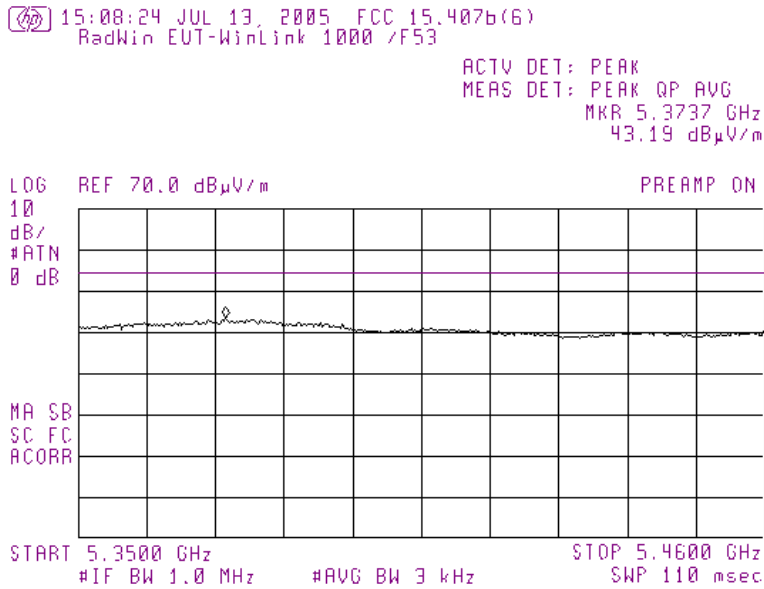
Page 51 of 73 Pages

Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Average. Limit = 54 dB (µV/m) @ 3m  
Carrier Frequency 5.260 GHz

5.35 – 5.46 GHz restricted band



Plot A56



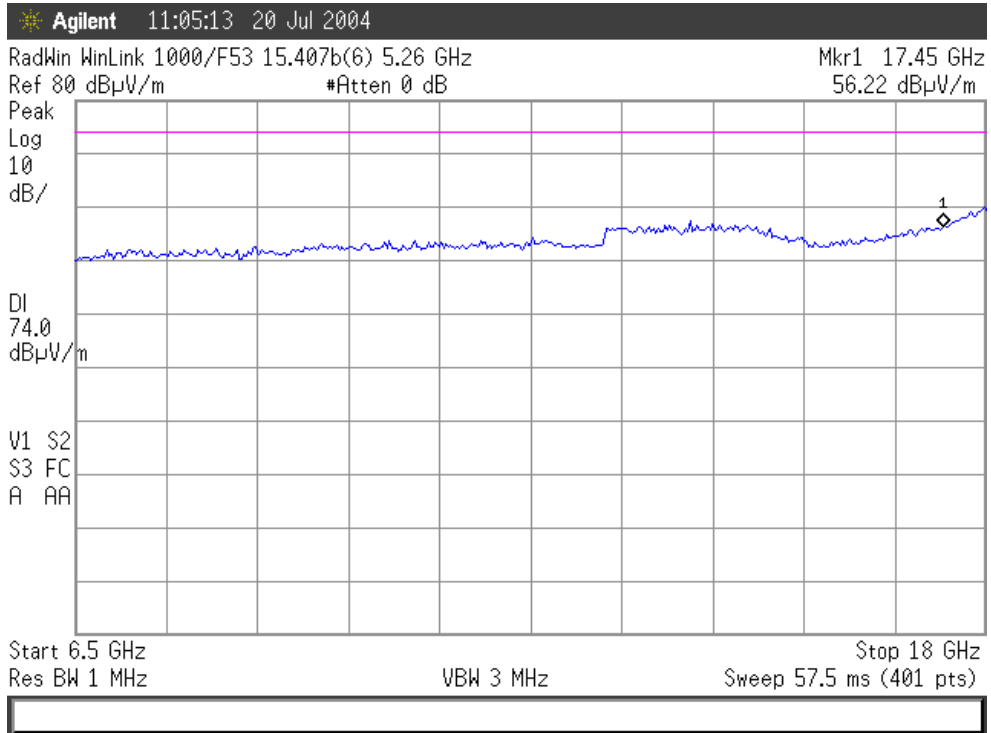
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB ( $\mu\text{V}/\text{m}$ ) @ 3m  
Carrier Frequency 5.260 GHz



Plot A57



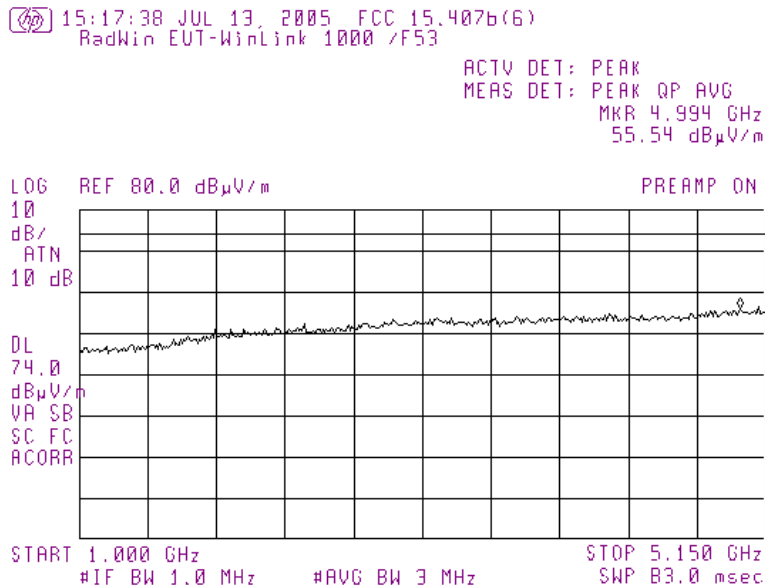
Test Report No.: 8412312771

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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB (μV/m) @ 3m  
Carrier Frequency 5.300 GHz



Plot A58



Test Report No.: 8412312771

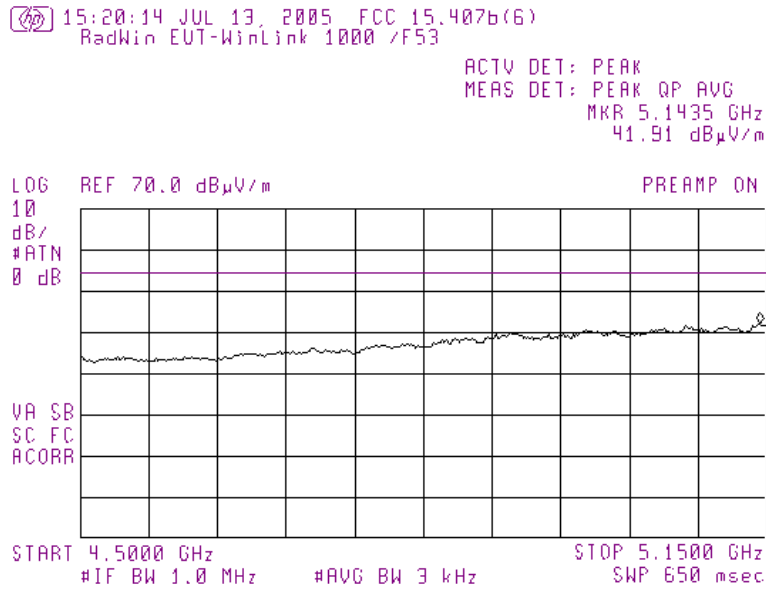
Page 54 of 73 Pages

Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Average. Limit = 54 dB (μV/m) @ 3m  
Carrier Frequency 5.300 GHz

4.5 – 5.15 GHz restricted band



Plot A59



Test Report No.: 8412312771

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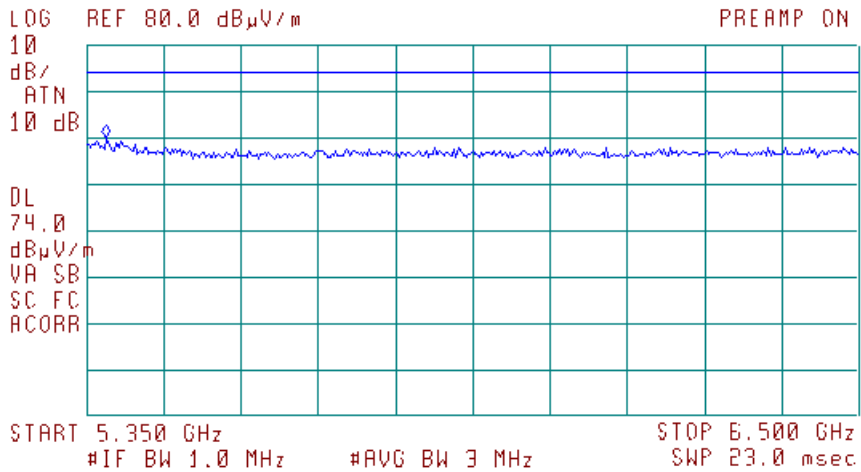
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB (μV/m) @ 3m  
Carrier Frequency 5.300 GHz

13:52:34 JUL 19, 2004 FCC 15.407b(6)  
RadWin EUT-WinLink 1000/F53

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.379 GHz  
59.91 dBμV/m



Plot A60



Test Report No.: 8412312771

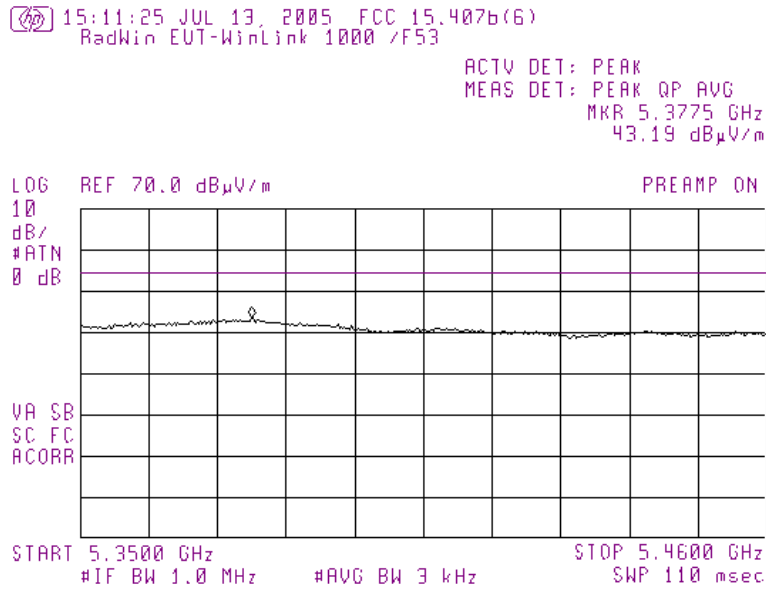
Page 56 of 73 Pages

Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Average. Limit = 54 dB (μV/m) @ 3m  
Carrier Frequency 5.300 GHz

5.35 – 5.46 GHz restricted band



Plot A61





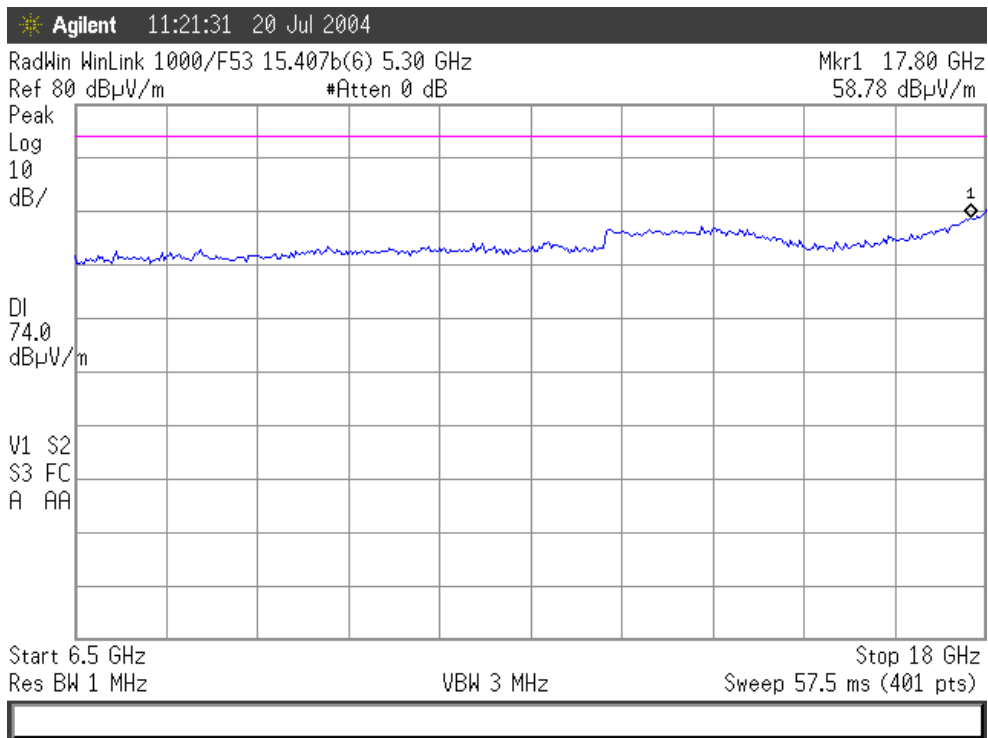
**Test Report No.:** 8412312771

**Page 57 of 73 Pages**

**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB ( $\mu\text{V}/\text{m}$ ) @ 3m  
Carrier Frequency 5.300 GHz



Plot A62



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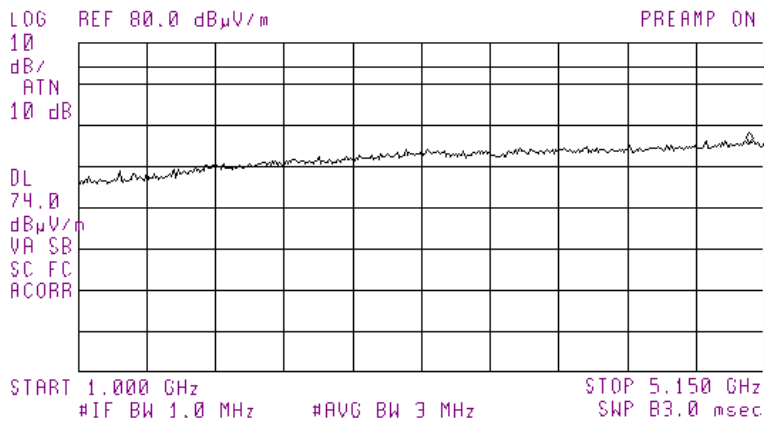
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB (μV/m) @ 3m  
Carrier Frequency 5.330 GHz

14:46:59 JUL 13, 2005 FCC 15.407b(6)  
RadWin EUT-WinLink 1000 /F53

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.056 GHz  
55.24 dBμV/m



Plot A63



Test Report No.: 8412312771

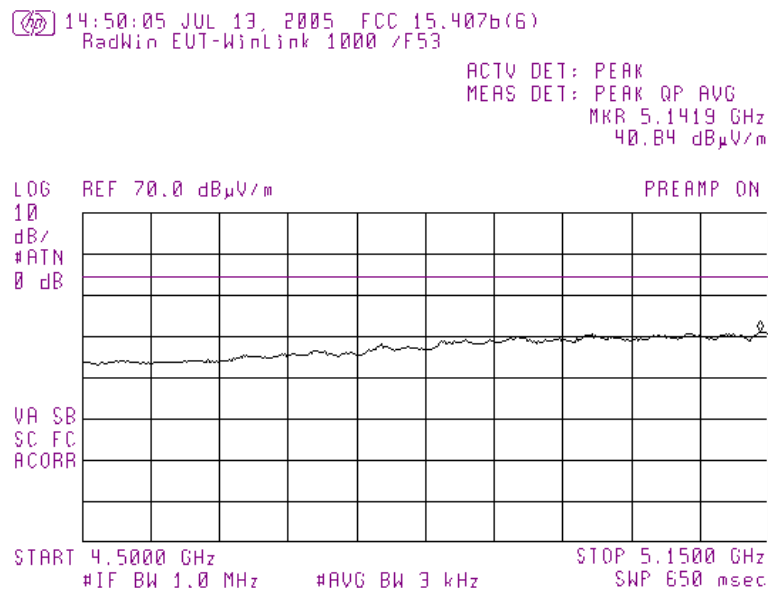
Page 59 of 73 Pages

Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Average. Limit = 54 dB ( $\mu\text{V}/\text{m}$ ) @ 3m  
Carrier Frequency 5.330 GHz

4.5 – 5.15 GHz restricted band



Plot A64



Test Report No.: 8412312771

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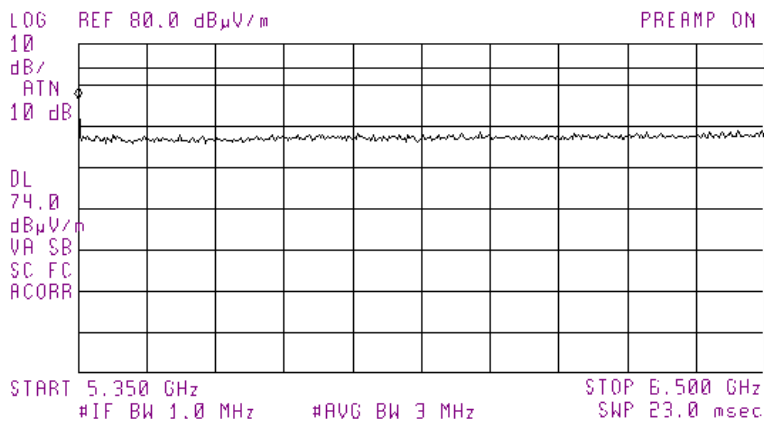
Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB (µV/m) @ 3m  
Carrier Frequency 5.330 GHz

14:42:36 JUL 13, 2005 FCC 15.407b(6)  
RadWin EUT-WinLink 1000 /F53

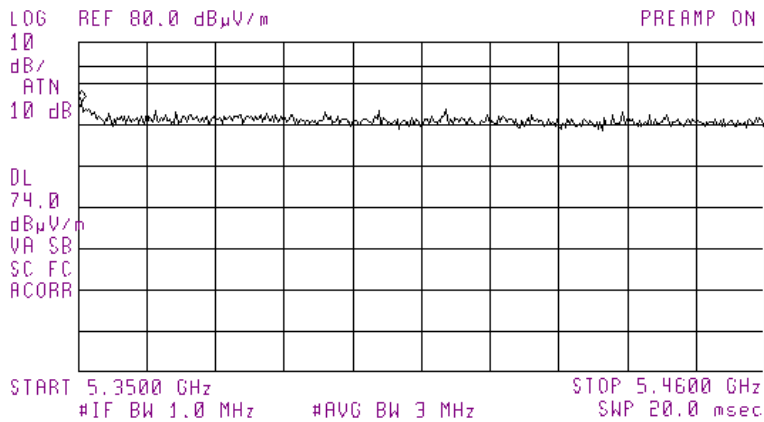
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.350 GHz  
66.42 dBµV/m



Plot A65

14:35:23 JUL 13, 2005 FCC 15.407b(6)  
RadWin EUT-WinLink 1000 /F53

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.3506 GHz  
65.24 dBµV/m



Plot A66



Test Report No.: 8412312771

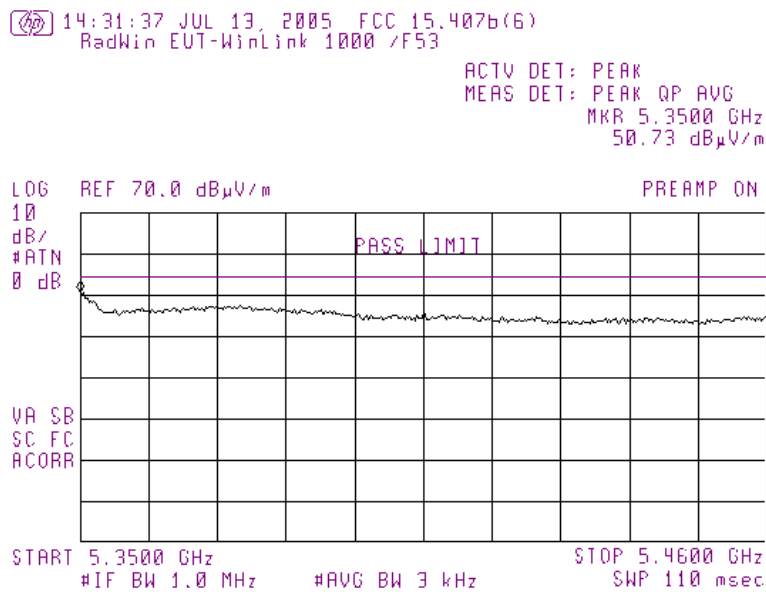
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Title: Test on Point-to-Point Broadband Wireless Transmitter System

Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Average. Limit = 54 dB (μV/m) @3m  
Carrier Frequency 5.330 GHz

5.35 GHz – 5.46 GHz restricted band



Plot A67



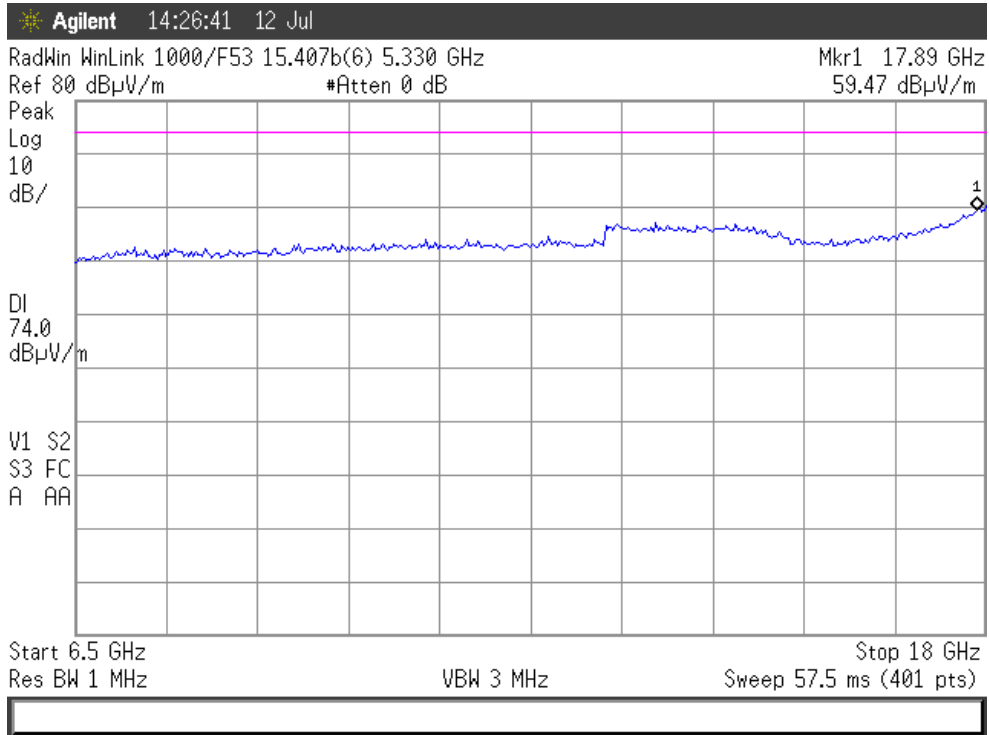
**Test Report No.:** 8412312771

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

Radiated Spurious Emissions 15.407b (6), 15.205  
Detector Peak. Limit = 74 dB ( $\mu\text{V}/\text{m}$ ) @ 3m  
Carrier Frequency 5.330 GHz



Plot A68

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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

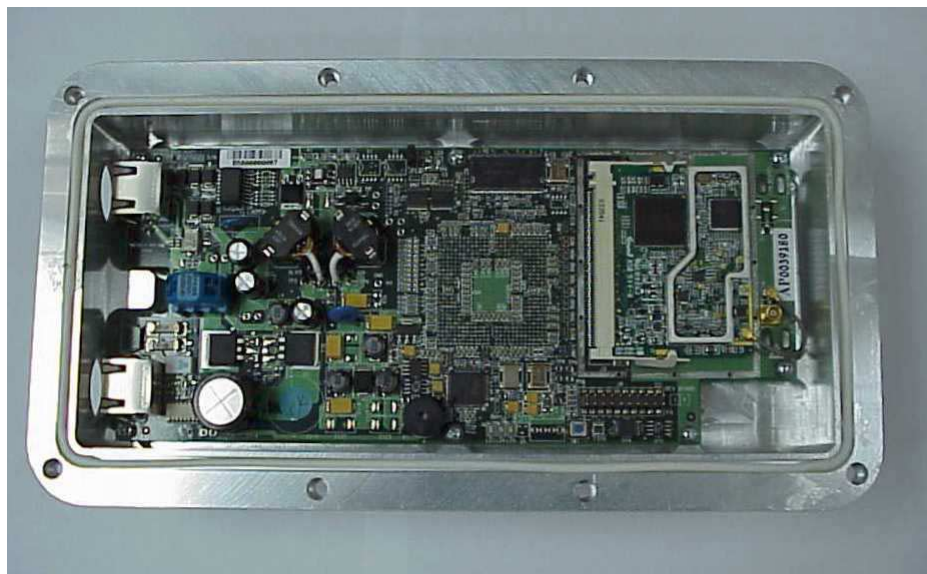
**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

## APPENDIX B

**Photo 1. External view of the outdoor unit. Top  
External antenna**



**Photo 2. Internal view of the outdoor unit. Component side**



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**Photo 3. EUT card. Top view**



**Photo 4. EUT card. Back view**





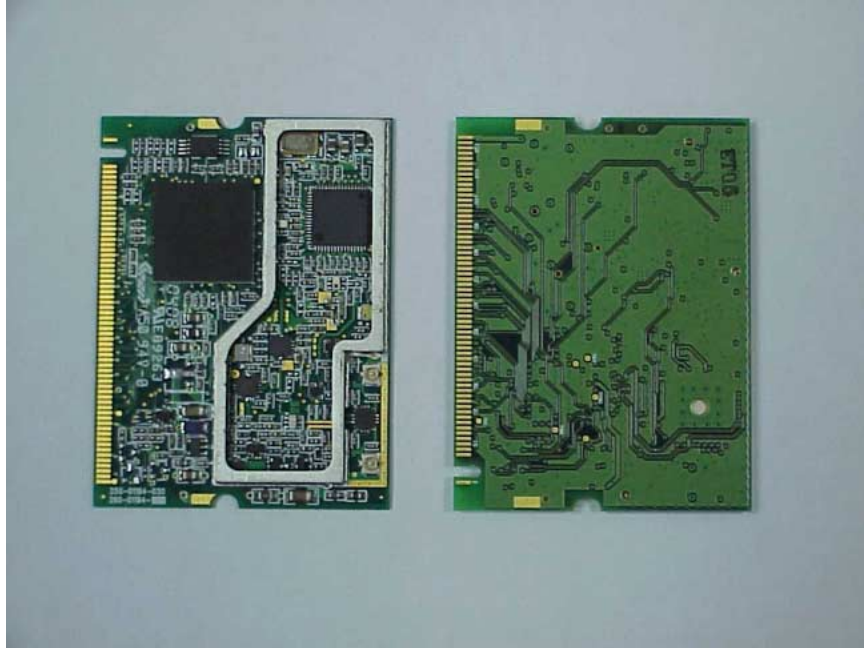
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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

**Photo 5. Mini PCI card view**



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**Photo 6. External view of the outdoor unit. Bottom**



**Photo 7. External view of the outdoor unit. Connector side**



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**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

**Photo 8. Indoor unit. External view**



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**Photo 9. Spurious emissions measurements set up. External antenna**



**Test Report No.:** 8412312771**Page 69 of 73 Pages****Title:** Test on Point-to-Point Broadband Wireless Transmitter System**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853**APPENDIX C****Test equipment used**

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	EPM Series Power Meter	HP	437B	291200989	Aug 2004
3	Attenuators set (10, 20, 30 dB) DC - 18 GHz	M/A-COM	2082	1650	Aug 2004
4	Power Sensor	HP	8481H	12120	Aug 2004
5	Cable RF 1m	Huber-Suhner	Sucoflex 104	21324/4PE	Aug 2004
6	Double Ridged Guide Antenna 1 – 18 GHz	EMCO	3115	5802	Dec 2005
7	Antenna Biconilog 30 – 2000 MHz	Schaffner- Chase	CBL6112B	2531	Dec 2004
8	EMI Receiver 9 kHz-6.5 GHz	HP	8546A+85460A	SII 4068	March 2006
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	EMCO	6502	3283	Oct 2004

**Test Report No.:** 8412312771**Page 70 of 73 Pages****Title:** Test on Point-to-Point Broadband Wireless Transmitter System**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853**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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**Title: Test on Point-to-Point Broadband Wireless Transmitter System**

**Model: WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853**

For Biconilog Antenna, Model Number: CBL-6112B, S/N: 2531  
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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**Title:** Test on Point-to-Point Broadband Wireless Transmitter System

**Model:** WinLink 1000/F53; AirMux-200/F53; FibeAir™ 4853

**Antenna Factor**

**Double Ridged Guide Antenna mfr EMCO model 3115 S/N 5802**

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( $\mu$ V)	decibel referred to one microvolt
dB( $\mu$ 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: 2001	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
FCC Public Notice DA 02-2138	Measurement procedure updated for peak transmit power in U-NII bands