MEASUREMENT AND TECHNICAL REPORT

EFFICIENT NETWORKS INCORPORATED
4849 Alpha Road
Dallas, TX 75244

DATE: 09 October 2002

This Report Concerns:	Original Grant:	Class II Change: X
Equipment Type:	SpeedStream 2624 Wireless DSL/Cable Router, Model SS2624	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: **Defer until:**	No: X
Company Name **agrees to notify the Commission by:** **of the intended date of announcement of the product so that the grant can be issued on that date.**	N/A	
Transition Rules Request per 15.37?	Yes:	No: X*

(*) FCC Part 15, Paragraph(s) **15.209(a)**

Report Prepared by:

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1.0 GENERAL INFORMATION

1.1 Product Description

General Equipment Description -- ***NOTE: This information will be input into your test report as shown below.***

EUT Description: 802.11b Wireless DSL/Cable Router

EUT Name: SpeedStream 2624 Wireless DSL/Cable Router

Model No.: SS2624 Serial No.: --

Product Options: SS2624 can be used with the SS2206 dBi antenna

Configurations to be tested: SS2624 is to be tested with the SS2206 dBi antenna

EUT Specifications and Requirements

Length: 127mm Width: 204 mm Height: 29mm Weight: --

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 120VAC 60Hz (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases:

Current (Amps/phase(max)): -- Current (Amps/phase(nominal)): 500mA (ACmA)

Other --

Other Special Requirements

--

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Home or small business

EUT Power Cable

☐ Permanent OR ■ Removable Length (in meters): --
☐ Shielded OR ☐ Unshielded
☐ Not Applicable

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EUT Interface Ports and Cables

Interface			Shielding							
Type	Analog / Digital	Qty	Yes / No	Type	Termination	Connector Type	Port Termination	Length (In meters)	Removable / Permanent
EXAMPLE: *RS232*	☐ ☒	*2*	☒ ☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	☒ ☐
DB-25	☐ ■	1	☐ ☐	--	--	Metallized 25-pin D-Sub	--	--	☐ ■
RJ-45	■ ☐	5	■ ☐	--	--	8-Pin Modular	Characteristic Impedance	0	☐ ■
SMA	■ ☐	--	■ ☐	--	Coaxial	SMA	Characteristic Impedance	0	☐ ■

EUT Software.

Revision Level: --

Description: --

EUT Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing.
Consult with your TÜV Product Service Representative if additional assistance is required.

1. --

EUT System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
--			

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Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	*Model #*	*Serial #*	*FCC ID #*
--			

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
25 MHz	--	Y1	--

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
--	MW48-1201200	--	☐ Switched-mode: (Frequency) -- ■ Linear ☐ Other:

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*
--		

Critical EMI Components (Capacitors, ferrites, etc.)

Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*
--				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

--

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1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demostrate compliance with the ANSI C63.4 setup.

TEST	FCC CFR 47#	PASS/FAIL
Radiated Emissions	15.209(a)	Pass

Both Conducted and Radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 25 GHz).

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

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The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Block Diagram

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Block Diagram

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3.0 RADIATED EMISSIONS EQUIPMENT/DATA

See following page(s).

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Test Conditions: RADIATED EMISSIONS: FCC Part 15.209(a)

The RADIATED EMISSIONS measurements were performed at the San Diego Testing Facility:

☐ **- Test not applicable**

■ - Roof (Small Open Area Test Site) (Calibration Due Date: 16 July 2002)
■ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego (Calibration Due Date: 12 July 2002)

Testing was performed at a test distance of:

■ - 3 meters

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
LPB 2520/A	739	Antenna, Bilog	Antenna Research	1170	05/03
ESVS 30	466	EMI Test Receiver	Rohde & Schwarz	833825/003	03/03
3115	251	Double Ridge Guide Antenna	EMCO	2495	12/03
HP8566	6676	Spectrum Analyzer	Hewlett Packard	2332A02751	05/03

Remarks: _____

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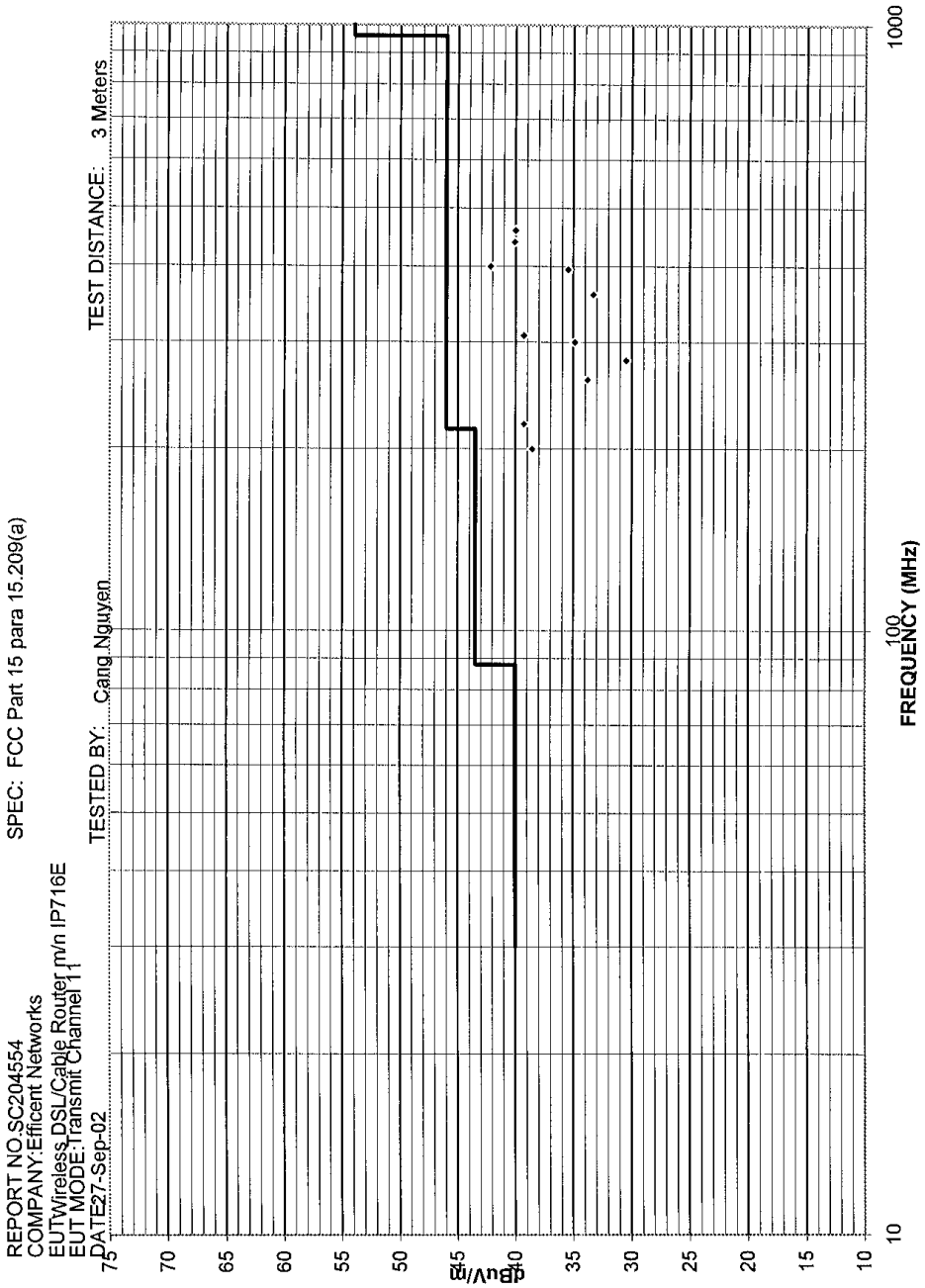
REPORT NO:SC204554
COMPANY:Efficent Networks
EUT:Wireless DSL/Cable Router m/n IP716E
EUT MODE:Transmit Channel 11
DATE:27-Sep-02
SPEC: FCC Part 15 para 15.209(a)
TESTED BY: Cang Nguyen
TEST DISTANCE: 3 Meters
dBuV/m
FREQUENCY (MHz)
75
70
65
60
55
50
45
40
35
30
25
20
15
10
10
100
1000

REPORT No: SC204554 SPEC: FCC Part 15 para 15.209(a)

CUSTOMER: Efficent Networks TEST DIST: 3 Meters

E U T: Wireless DSL/Cable Router m/n IP716E TEST SITE: 2

EUT MODE: Transmit Channel 11 BICONICAL: 739

DATE: 27-Sep-02 TESTED BY: Cang Nguyen LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth. RCVR: 466

110Vac/60Hz

Temperature: 28 Relative Humidity: 50%

EUT MARGIN -3.8 dB at 400 MHz ver 1.8

FREQUENCY (MHz)	VERTICAL measured (dBuv)	HORIZONTAL measured (dBuV)	CORRECTION FACTOR (dB/m)	MAXIMUM CORRECTED (dBuV/m)	SPECIFIED LIMIT (dBuV/m)	EUT MARGIN (dB)	EUT ROTATION (degrees)	ANTENNA HEIGHT (meters)	NOTE
280.00	13.9	12	16.6	**30.5**	46	-15.5	200	1	Restricted Band
400.00	17.6	22.2	20.0	**42.2**	46	-3.8	90	1	Restricted Band
200.00	24.8	20.2	13.8	**38.6**	43.5	-4.9	0	1	
220.00	19.4	24	15.3	**39.3**	46	-6.7	0	2	
260.00	16	17.1	16.7	**33.8**	46	-12.2	180	1	
300.00	17.5	17.1	17.4	**34.9**	46	-11.1	180	1.5	
308.00	14.8	21.7	17.6	**39.3**	46	-6.7	340	1	
360.00	12.8	14.1	19.2	**33.3**	46	-12.7	220	1	
396.00	14.4	15.6	19.9	**35.5**	46	-10.5	255	3.5	
440.00	19	18.1	21.1	**40.1**	46	-5.9	0	1	
460.00	11.9	18	22.0	**40.0**	46	-6.0	0	1	

REPORT No: SC204554 TESTER: Jim Owen SPEC: FCC Part 15 para 15.209(a)

CUSTOMER: Efficent Networks TEST DIST: 3 Meters

E U T: SS2624 TEST SITE: Roof

EUT MODE: Cable/DSL Router BICONICAL: N/A

DATE: September 26, 2002 LOG: N/A

NOTES: OTHER: 251

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain + Preselector Loss

v.beta1a

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes
2412	80.4	76.4	67.1	63.3	36.7776	**117.2**	**113**							w/OEM antenna
4824	43.4	34.4	41.4		5.6496	**49.05**	**40**	74	54	-25	-14			Ambient - Restricted Band
12060	39.9		40.1		21.78	**61.88**	**21.8**	74	54	-12.1	-32.2			Ambient - Restricted Band
14472	41.6		41.9		25.3936	**67.29**	**25.4**	74	54	-6.71	-28.6			Ambient - Restricted Band
2412	78.4	74.5	70.1	66.3	36.7776	**115.2**	**111**							w/Efficent Antenna
4824	41.9		41.8		5.6496	**47.55**	**5.65**	74	54	-26.5	-48.4			Ambient - Restricted Band
12060	39.9		40.2		21.78	**61.98**	**21.8**	74	54	-12	-32.2			Ambient - Restricted Band
14472	41.4		42		25.3936	**67.39**	**25.4**	74	54	-6.61	-28.6			Ambient - Restricted Band
2437	72.6	69	66.9	63.2	36.8976	**109.5**	**106**							w/Efficent Antenna
4874	40.7		40.1		5.9196	**46.62**	**5.92**	74	54	-27.4	-48.1			Ambient - Restricted Band
7311	39		38.5		15.3952	**54.4**	**15.4**	74	54	-19.6	-38.6			Ambient - Restricted Band
12185	39.5		39.6		22.155	**61.76**	**22.2**	74	54	-12.2	-31.8			Ambient - Restricted Band
2462	76	71.9	74.2	70.6	37.0176	**113**	**109**							w/Efficent Antenna
4924	40.8		40.8		6.1896	**46.99**	**6.19**	74	54	-27	-47.8			Ambient - Restricted Band
7386	38.5		38.6		15.6352	**54.24**	**15.6**	74	54	-19.8	-38.4			Ambient - Restricted Band
12310	39.5		39.3		22.53	**62.03**	**22.5**	74	54	-12	-31.5			Ambient - Restricted Band
2483.5	31.7	10.3	28.8	7.3	37.1208	**68.82**	**47.4**	74	54	-5.18	-6.58			Band Edge-2483.5 to 2500 MHz
														Ambient - Restricted Band

4.0 ATTESTATION STATEMENT

GENERAL REMARKS:

SUMMARY:

All tests were performed per CFR 47, Part 15.209(a)

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part 15.209(a)

- TÜV AMERICA, INC. -

Responsible Engineer:

Jim Owen
(EMC Chief Engineer)

Responsible Technician:

Cang Nguyen
(EMC Technician)

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