4L0701RUS1Rev1
Siemens Subscriber Networks, Inc.
SpeedStream 6520 / 6515
FCC Part 15, Subpart C, 15.247 Spread Spectrum Transmitters

Tested By:

Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136

Jon Till

Authorized By:

Tom Tidwell, Frontline Manager

Date:

8 Dec. 2004

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EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

Section 1. Summary of Test Results

Manufacturer: Siemens Subsciber Networks, Inc.

Model No.: SpeedStream 6520 (Model Tested) SpeedStream 6515 (Variant)

Part No.: 060-N651-A01

REMARKS:

This report contains the test results for the Siemens Subscribers Networks Model Speedstream 6520/ Speedstream 6515. Power was provided by an external power adapter.

Model No's:	Part No's:
Speedstream 6520	060-N651-Axx
Speedstream 6515	060-N551-Axx

The Speedstream 6520 is the base model. Model Speedstream 6515 is identical except that the USB is removed.

General: All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 for Direct Sequence Spread Spectrum devices. Radiated tests were conducted is accordance with ANSI C63.4-2001. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission

Production Unit

Class II Permissive Change

Pre-Pro

Pre-Production Unit

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE See "Summary of Test Data".

NVLAP LAB CODE: 100426-0

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PROJECT NO. 4L0701RUS1Rev1

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT	
Powerline Conducted Emissions	15.207(a)		Complies	
Minimum 6 dB Bandwidth	15.247(a)(2)	>500 kHz	Complies	
Maximum Peak Power Output	15.247(b)(1)	<1 Watt	Complies	
Spurious Emissions	15.247(c)	-20 dBc/100kHz	Complies	
(Antenna Conducted)	13.247(0)	-20 dbc/100kHz	Complies	
Spurious Emissions	15.247(a)	< 74 dBuV/m Peak	Compliag	
(Restricted Bands)	13.247(0)	< 54 dBuV/m Avg	Complies	
Peak Power Spectral Density	15.247(d)	+8 dBm/3kHz	Complies	

Footnotes:

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Band:

 $2412 \mbox{ to } 2462 \mbox{ MHz}$

Channel Spacing:

5 MHz

User Frequency Adjustment:

Software controlled

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

Description of EUT

The device is a DSL/wireless 802.11b/g modem.

Power supply, GCI, model AM-1200800V, No S/N. Input: 120 VAC, Output 12 VDC, 1.5 A

System Diagram



Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: Arturo Ruvalcaba	DATE: 11/18/04

Test Results: Complies.

Measurement Data: See attached plots.

Measurement Uncertainty: +/- <u>1.7</u> dB

Test Data – Powerline Conducted Emissions



Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667

Conducted Emissions																
Complete X																
Prelimina	e arv											1				
1 ICIIIIII	ur y															
Client Na	ame :	Siemens Subscriber Networks, Inc.														
EUT Nar	ne :	Compact Wireless Gateway														
EUT Mo	del # :	SpeedStream 6520 / 6515 / 5450														
EUT Par	t#:	060-N651-AXX / 060-N551-AXX / 060-U451-AXX														
EUT Ser	ial # :	MAE:00:0B:23:D0:79:E8														
EUT Cor	nfig. :	EUT DSL connected to ADSL2+ (CO) suppor EUT USB cable connected to USB support computer														
		EUT Ethernet cables (4) connected to support compute EUT Wireless activated														
Specifica	ation :	CFR 47 F	Part 15, S	Subpart E	B, Class E	3		Refe	rence :	CISPR	22					
Transdu	cer#:	969		Temp. (deg. C):	21				Date :	11/18/04					
HP Filter	*#:	1433		Humidit	y (%) :	35				Time :	11:15					
Cable 1	#:	1113		EUT Vo	Itage :	115VAC				Staff :	Art Ruvalcal	Ja				
Cable 2	#:	1019		EUT Fre	equency :	60Hz			Lo	cation :	Lab 6					
Detector	1#:	966		Peak Ba	andwidth:	10kHz			Ph	noto ID:	4L0701E CE	:PV-01				
Detector	2#:	NA		QP Ban	dwidth	10kHz										
Limiter #	:	NA		Avg. Ba	ndwidth	10kHz										
Meas.	EUT	Detector	Limit	Meter	Path	Transducer	Corrected	Spe	c.limit	CR/SL	Pass					
Freq.	Test	Туре	Туре	Reading	Loss	Factor	Reading	(dE	BuV)	Diff.	Fail					
(MHz)	Point	(P,QP, A)	(QP, A)	(dBuV)	(dB)	(dB)	(dBuV)	Q.P.	Avg.	(dB)	Unc.	Comment				
0.15	Ν	QP	QP	49.5	0	0	49.5	66	56	-16.5	Pass					
0.15	Ν	А	Α	11.0	0	0	11.0	66	56	-45.0	Pass					
0.252	Ν	QP	QP	46.0	0	0	46.0	61.69	51.691	-15.7	Pass					
0.252	Ν	A	A	9.0	0	0	9.0	61.69	51.691	-42.7	Pass					
0.309	Ν	QP	QP	44.0	0	0	44.0	60	49.998	-16.0	Pass					
0.309	Ν	A	A	10.0	0	0	10.0	60	49.998	-40.0	Pass					
0.367	Ν	QP	QP	42.0	0	0	42.0	58.57	48.569	-16.6	Pass					
0.367	Ν	A	A	9.0	0	0	9.0	58.57	48.569	-39.6	Pass					
0.425	Ν	QP	QP	40.0	0	0	40.0	57.35	47.35	-17.4	Pass					
0.425	Ν	A	A	8.0	0	0	8.0	57.35	47.35	-39.4	Pass					
0.483	N	QP	QP	38.5	0	0	38.5	56.29	46.288	-17.8	Pass					
0.483	N	A	A	7.0	0	0	7.0	56.29	46.288	-39.3	Pass					
0.155	H	QP	QP	50.0	0	0	50.0	65.73	55.728	-15.7	Pass					
0.155	<u> H</u>	A	A	11.0	0	0	11.0	65.73	55.728	-44.7	Pass					
0.252	<u>H</u>	QP	QP	46.0	0	0	46.0	61.69	51.691	-15.7	Pass					
0.252	<u> H</u>	A	A	9.0	0	0	9.0	01.69	51.691	-42.7	Pass					
0.309	<u> </u>	QP	QP	44.0	0	0	44.0	60	49.998	-16.0	Pass					
0.309	<u>H</u>	A	A	9.0	0	0	9.0	60	49.998	-41.0	Pass					
0.367	H		۹µ ^	42.0	0	0	42.0	50.57	48.569	-10.0	Pass					
0.307	<u>Н</u>		A	9.0	0	0	9.0	50.5/	48.569	-39.6	Pass					
0.425			<u>ب</u> لا ۲	40.0	0	0	40.0	57.35	47.35	-17.4	Pass					
0.425	<u>п</u>		A	0.0	0	0	0.0	57.35	47.35	-39.4	Pass					
23	П		А	30.0	U	U	JØ.U	00	50	-12.0	Pass	2014				
											Scanned .150-	SUMITZ				
\EMCS	hare\Al J	TOMATE	DATASH	ITS\CEF	. Voltage	Rev C.xl	Documen	t Contro	ol #EMC	DS EM	COND VOI					

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Photos – Powerline Conducted Emissions



Section 4. Minimum 6 dB Bandwidth

NAME OF TEST: Minimum 6 dB Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY David Light	DATE: 11/17/04

Test Results:

Complies.

Measurement Data:	See 6 dB BW plot	
	Measured 6 dB bandwidth:	16.6 MHz Max
	Channel Separation:	5 MHz

PROJECT NO. 4L0701RUS1Rev1

Test Data –	Occupied	Bandwidth
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Nen	nko Da	llas, Inc.	îì	K O						Dallas H 802 Lewisvi Tel: (9 Fax: (9	leadquarters: P. Kealy Ile, TX 75057 72) 436-9600 72) 436-2667		
Data Plot Page <u>1</u> or Job No.: Specification: Tested By: E.U.T.: Configuration:	f <u>6</u> 4L0701 15.247 David L WIREL TX	ight ESS GATEW	T Relat AY	D Temperature ive Humidit	Occup	ied Ban 7/2004 22 65	<u>idwidth</u>		Complete X Preliminary:				
Sample Number: Location: Detector Type:	1 Lab Pea	2 k				RBW: <u>100</u> VBW: <u>100</u>	0 kHz 0 kHz		Meas I	surement Distance: <u>NA</u>	Am		
Test Equipme Antenna: Pre-Amp: Filter: Receiver: Attenuator #1 Attenuator #2: Additional equip Measurement Un	ent Use	d 7 d: HP8563 +/−1.7	3E S/N 3611. ' dB	404877 (RE	Directional ((((((NTELCO) C	Coupler: Cable #1: Cable #2: Cable #3: Cable #4: Mixer: CAL DUE: 24	1973 AUG 06						
	f	AT TEN RL 20	1 10c 3.0d1	IB 3m	10	∂d B∕	1	МКR 6.60	1.34 MHz	dB			
	D	ΔΜΚ 16.0 1.34	60 M⊦ 4 dB	1 zmm)	nuhain	of the second second	producesh	/~Ingelia	alemine L				
	R	SHANDAN KAN		,						A. A	Mundull		
	(*F	CENTE RBW 1	ER 2. .00kH	4120 Iz	00GH: VBV	z V 100)kHz	SP	AN 3 SWP	0.00 50.0)MHz)ms		
Notes:	CHAN	NEL 1 - 54	Mbs										

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Ner	nko Dall	as Inc				Fax: (972) 436-2667							
Data Plot		as, mc.			Occup	ied Ban	dwidth						
Page <u>2</u> o Job No.: Specification: Tested By: E.U.T.: Configuration:	Current Data of 6 4L0701 15.2 David Light Relative Humidity(%) 65 WIRELESS GATEWAY TX												
ATTEN 10dB∆MKR67dB RL 20.0dBm 10dB⁄ 12.58MHz													
	-												
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					/ '			* v					
	R		JAN P	W.I]				Y I W	h.Mu			
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		ENTE	.r 2.	4120	00GHz			SP	AN 5	0.00	MHz		
	*R	BW 1	00kH	Ηz	٨B٢	1 100)kHz		SWP	50.C	lms		
Notes:	CHANN	IEL 1											
	1 Mbs												

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Data Plot	Plot Occupied Bandwidth														
Page <u>3</u> o ob No.: pecification: ested By: .U.T.: configuration:	Deccupied Datawidth of 6														
	ATTEN 10dBAMKR .33dB RL 20.0dBm 10dB∕ 16.60MHz														
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	_		and the second	4.						Λ					
	R	MAN AN	ur -							אוייי"	minut				
	*	CENTE RBW 1	ER 2. 100kh	4370 Iz	00GH₂ VB⊧	z 100	lk Hz	SP	AN 3 SWP	0.00 50.0	MHz Ims				
Notes:	CHA	NNEL 6													
	54 M	bs													

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							Tel: (972) 436-9600 Fax: (972) 436-2667				
Nen	nko Dallas,	nc.		0	• 1.0	1 • 1/1					
Ata Plot Page 4 c	<u>t</u> 016			Occup	bied Ban	ldwidth					
No.: cification: ed By: T.: figuration:	4L0701 15.2 David Light WIRELESS G. TX	Rel ATEWAY	l Temperature ative Humidit	Date: <u>11/17/</u> (°C): <u>22</u> y(%) <u>65</u>	2004		-				
	ATT RL	EN 100 20.0d)	dB Bm	10	3d B∕	∆ 1	MKR 2.58	67 MHz	dB		
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	CEN *RBW	TER 2 100kł	l . 4120 Hz	L 0ØGH₂ VB⊮	z 1 100	lkHz	SF	I YAN 5 SWP	0.00 50.0	MHz Ims	
Notes:	CHANNEL	<u>.</u>									
10165.	1 Mbs	,									

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Data Plo	t	-,			Occup	ied Ban	dwidth					
Page <u>5</u> of Job No.: Specification: Tested By: E.U.T.: Configuration:	f 6 41.0701 Date: 11/17/2004 15.2 Temperature(°C): 22 David Light Relative Humidity(%) 65 WIRELESS GATEWAY TX											
	F	ATTEN	10a). 0d1	d B Bm	10]dB∕	△ 1	MKR 6.60	-1.8 MHz	3d B		
				from the	an lewite	www	իսեր	anthe day	1.M.			
	D]								
				ľ					, ,	<u>.</u>		
	R	wywh ^{res}								Mr. W	Marithay	
) *F	CENTE RBW 1	R 2 00kH	. 4620 Iz)ØGH₂ VB⊧	z 100	lkHz	SP	AN 3 SWP	0.00 50.0	IMHz Ims	
Notes:	CHAN 54 Mb	NEL 11										
	34 MD	3										

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Ner	nko Da	llas. Inc.							Fax: (972)) 436-2667		
Data Plot Page <u>6</u> o ob No.: pecification: 'ested By: C.U.T.: Configuration:	f <u>6</u> 4L0701 15.2 David L WIREL TX	ight ESS GATEW	, Rela VAY	I Temperature tive Humidit	Occup Date: 11/17/2 (°C): 22 y(%) 65	2004	<u>idwidth</u>					
	F F	ATTEN RL 20	l 10a).0d1	IB ∃m	10	∂d B∕	∆ 1	MKR 3.50	–.50 MHz	dB		
							աներու հերություններու հերուներություններո					
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) ¥F	LENTE RBW 1	L. IR 2. ØØkt	4620 Iz	DØGHz VBM	1 z 1 100	kHz	SP	AN 5 SWP	6.00 50.0	MHz ms	
Notes:	CHAN 1 Mbs	NEL 11										

Section 5. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(1)
TESTED BY: David Light	DATE: 11/18/04

Test Results: Complies.

Measurement Data:

Antennas: Monopole

Frequency (MHz)	Data Rate (Bps)	Antenna Gain (dBi)	Peak Power (dBm)	Peak Power	EIRP (dBm)
(171112)	(Dp3)	(uDI)	(ubiii)	(1117)	(uDiii)
2412	1	2	20.8	120	
2437	1	2	21.1	130	
2462	1	2	20.8	120	
2412	54	2	21.1	130	
2437	54	2	21.5	140	
2462	54	2	21.5	140	

Note: Emissions are made at the antenna port using a test connector. Measurements are Peak, measured with a Peak Power Meter.

Supply voltage was varied from 85% to 115% of nominal input voltage (102 – 138 VAC)

Equipment Used: 1029-1030-1477

Measurement Uncertainty: +/- 0.7 dB

Temperature: 22 °C

Relative Humidity: 45 %

Section 6. Spurious Emissions (conducted)

NAME OF TEST: Spurious Emissions (conducted)	PARA. NO.: 15.247(c)
TESTED BY: David Light	DATE: 11/17/04

Test Results: Complies.

Measurement Data: See attached plots.

PROJECT NO. 4L0701RUS1Rev1

Test Data – Spurious Emissions at Antenna Terminals

(N)			Lew	802 N. Kealy isville, TX 750	057				
							Tel: Fax:	(972) 436-96 (972) 436-26	600 667
Ne	mko Dallas, Inc.							(,	
<u>Data Plot</u>		<u>Spurious</u>	Emissions at .	Antenna	a Termi	<u>nals</u>		37	
Page <u>1</u> o Job No.:	4L0701		Date: 11/17/2004			Pr	Complete eliminary:	X	
Specification:	15.247	Temperatu	re(°C): 22				·····		
Tested By:	David Light	Relative Humic	lity(%) 65						
E.U.T.: Configuration:	WIRELESS GATEW	WAY							
Sample Number:	1								
Location:	Lab 2		RBW:	100 kHz		Ν	leasurement		
Detector Type:	Peak		VBW:	100 kHz			Distance:	NA I	m
Test Equipm	ent Used								
Antenna:			Directional Coupler:						
Pre-Amp: Filter:			Cable #1:	1973					
Receiver:	·		Cable #2: Cable #3:						
Attenuator #1	1477		Cable #4:		_				
Attenuator #2:			Mixer:						
Additional equip	ment used: HP8:	563E S/N 3611A04877 (F	RENTELCO) CAL DUE	: 28 AUG 06					
Measurement Ur	hcertainty: +/-	1./ dB							
	ATTEN	4 10dB		Δ	MKR	33.5	0d B		
	RL 20). Ød Bm	10d B⁄	1	5.50	MHz			
								Q	
					<u> </u>	الى يەر	<u>JTWW</u>	MWM	
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								\vdash	
	CENTE	R 2.4000	ØGHz		SF	AN 3	80.00	MHz	
	*RBW 1	.00kHz	VBW 100	lkHz		SMP	50.0	Jms	
Notes:	CHANNEL 1								
	1 Mbs								
	Lower band edge								

Test Data – Spurious Emissions at Antenna Terminals

Ne	emko Da	allas, Inc.							Dallas 80 Lewis Tel: (Fax: (Headquart 02 N. Kealy ville, TX 750 972) 436-96 972) 436-26	9 57 900 67		
<u>Data Plo</u>	<u>t</u>			<u>Spuriou</u>	<u>s Emiss</u>	ions at .	Antenn	a Termi	inals				
Page <u>2</u> o Job No.: Specification: Tested By: E.U.T.: Configuration:	of 6 4L0701 15.2 David L WIREL TX	ight ESS GATEV	WAY	Temperat Relative Humi	Date: 11// ure(°C): 22 idity(%) 65	17/2004		_					
	F F	ATTEN RL 20	4 10 3.0d	d B Bm	10	∂d B∕	∆ 7	MKR .10M	31.3 Hz	4d B			
	D	∆MKF 7.10 31.3	а мн 34 d	z B				j mm.k	๛ไๅฦฦไฦ		prwywyh		
	R			MAN	and the second	pilitalbu?	Alexand and a second						
		44-x1x448*87											
) *F	CENTE RBW 1	 ER 2 100k	 .4000 Hz	00GH2 VBV	2 1 100	 kHz	SP	AN 3 SWP	 0.00 50.0	IMHz Ims		
Notes:	CHAN 54 Mb Lower	NEL 1 s band edge	;									 	

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. Data Plot **Spurious Emissions at Antenna Terminals** Page 3 of 6 4L0701 Job No.: Date: 11/17/2004 15.2 Temperature(°C): 22 Specification: Tested By: David Light Relative Humidity(%) 65 E.U.T.: WIRELESS GATEWAY Configuration: ΤX MKR -1.83dBm ATTEN 10dB 2.44GHz RL 20.0dBm 10d B/ DISPLAY LINE -21 8 dBm D R الم الم START 30MHz STOP 25.00GHz ∦RBW 100kHz VBW 100kHz SWP 6.30sec Notes: CHANNEL 1 54 Mbs

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. <u>Data Plot</u> **Spurious Emissions at Antenna Terminals** Page 4_ of 6 4L0701 Job No.: Date: 11/17/2004 15.2 Temperature(°C): 22 Specification: Tested By: David Light Relative Humidity(%) 65 E.U.T.: WIRELESS GATEWAY Configuration: ΤX ATTEN 10dB MKR -1.33dBm RL 20.0dBm 10d B⁄ 2.44GHz D R يوار START 30MHz STOP 25.00GHz *RBW 100kHz VBW 100kHz SWP 6.30sec Notes: CHANNEL 6 54 Mbs

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. <u>Data Plot</u> **Spurious Emissions at Antenna Terminals** Page 5 of 6 4L0701 Job No.: Date: 11/17/2004 15.2 Temperature(°C): 22 Specification: Tested By: David Light Relative Humidity(%) 65 E.U.T.: WIRELESS GATEWAY Configuration: ΤX ATTEN 10dB MKR -2.00dBm RL 20.0dBm 10d B/ 2.49GHz DIS₱LAY LINE -22 0 dƁm D R سعامه and a START 30MHz STOP 25.00GHz ∦RBW 100kHz VBW 100kHz SWP 6.30sec Notes: CHANNEL 11 54 Mbs

Section 7. Spurious Emissions (Restricted Bands)

NAME OF TEST: Spurious Emissions (Restricted Bands)	PARA. NO.: 15.247 (c)
TESTED BY: David Light	DATE: 11/18/04

Test Results: Complies.

Measurement Data: See attached table.

Test Data	a – Rad	iated E	missi	ons				
						Dall	as Headquar	ters:
							802 N. Kealy	
L N						Lev	visville, TX 75	057
		,				Te	: (972) 436-9	600
Nen	nko Dallas	, Inc.				Fa	x: (972) 436-2	667
				Ra	diated Emissio	ons		
Page 1 of	f <u>1</u>							
Job No.:	4L0701r			Date:	11/18/2004			
Specification:	15.247/15.2	05	Tem	perature(°C):	20	-		
Tested By:	David Light		Relative	Humidity(%)	45	-		
E.U.T.:	Wireless Ga	iteway						
Configuration:	TX in flat p	osition (worst	case)					
Sample Number:	1			_				
Location:	AC 3				RBW:	1 MHz		
Detector Type:	Peak				VBW:	1 MHz		
			<u>Test Equ</u>	ipment Used	<u>l</u>			
Antenna:	1304			Direct	tional Coupler:	#N/A		
Pre-Amp:	1016	-			Cable #1:	1484		
Filter:	1482	-			Cable #2:	1485		
Receiver:	#N/A	-			Cable #3:	#N/A		
Attenuator #1	#N/A				Cable #4:	#N/A		
Attenuator #2:	#N/A				Mixer:	#N/A		
Measurement Un	certainty: +/-	3.6 dB						
Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Detector / Polarity
2.4835	35.7	28.2	3.1	0.0	67.0	74	54	Peak - / Vertical
2.4835	22.3	28.2	3.1	0.0	53.6	74	54	Average - NF / Vertical
2.484	32.2	28.2	3.1	0.0	63.5	74	54	Peak - / Horizontal
2.484	21.0	28.2	3.1	0.0	52.3	74	54	Average - NF / Horizontal
Notes:	The spectr	um was sear	ched to 25	5 GHz	•	•	•	·
	The devive	was tested i	n the two	orientations	s that is mean	t for normal u	se.	
	The device	was tested a	at 2.412. 2	2.437 and 2.4	462 MHz and	no emissions	were found a	bove the noise floor.

Data presented is to demonstrate upper bandedge compliance on channle 11

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

Setup Photos



EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

Section 8. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(d)
TESTED BY: David Light	DATE: 11/17/04

Test Results: Complies.

Measurement Data: See attached plots.

Test Data – Spectral Density

Nerr	iko Da	NC Allas, Inc.	m	(•						Dallas 80 Lewisv Tel: (§ Fax: (§	Headquarter 2 N. Kealy /ille, TX 7505 972) 436-960 972) 436-266	s: 7) 7
Data Plot Page <u>1</u> of Job No.: Specification: Tested By: E.U.T.:	5 <u>6</u> 4L0701 15.247 David I WIREI	Light LESS GATE	Rela WAY	<u>Pe</u> T Temperature ative Humidit	Pak Pow Date: 11/ e(°C):	er Spec 17/2004 22 65	tral De	<u>nsity</u>	Preli	Complete minary:	X	
Sample Number: Location: Detector Type:	1x Lab Per	ed				RBW: <u>3</u> VBW: <u>3</u>	kHz kHz	- - -	Mea	isurement Distance: <u>N</u>	<u>A</u> m	
Antenna: Pre-Amp: Filter: Receiver: Attenuator #1 Attenuator #2: Additional equipt Measurement Un	147 nent use certainty	d: <u>HP856</u> r: <u>+/-1</u> .	53E S/N 361 7 dB	A04877 (RE	Directiona	l Coupler: Cable #1: Cable #2: Cable #3: Cable #4: Mixer: CAL DUE: 2	1973 4 AUG 06					
	F	ATTEN RL 40	4 30c 0.1d1	IB 3m	10)dB∕						
	D	DISF 8.0	PLAY dBm	LINE	-						*	
	R	4 4,, 1⁰-2 ,50 ⁻	~~~	<u>`</u>	~~	\sim	j. V	~~~	~~~	<u>م</u> م کر کر	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
Notoci	(*F	CENTE RBW 3	ER 2. 3.ØkH	4120 Iz	00GH VB4	Hz ↓ 3.0)kHz	SP *	AN 5 SWP	.000 1.7k	MHz .sec	
notes:		111EL I - 54	+ IVIDS									

PROJECT NO. 4L0701RUS1Rev1

Test Data – Spectral Density



Dallas Headquarters:						
802 N. Kealy						
Lewisville, TX 75057						
Tel: (972) 436-9600						
Fax: (972) 436-2667						

Nemko Dallas, Inc. **Peak Power Spectral Density Data Plot** Page <u>2</u> of <u>6</u> 4L0701 Job No.: Date: 11/17/2004 15.2 Temperature(°C): 22 Specification: Tested By: David Light Relative Humidity(%) 65 E.U.T.: WIRELESS GATEWAY Configuration: ΤX ATTEN 30dB RL 40.1dBm 10d B/ * D R Columbration of the second **WWW** CENTER 2.412000GHz SPAN 5.000MHz *RBW 3.0kHz VBW 3.0kHz *SWP 1.7ksec CHANNEL 1 Notes: 1 Mbs

PROJECT NO. 4L0701RUS1Rev1

Test Data – Spectral Density



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Lewisville, TX 75057					
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Fax: (972) 436-2667					

) / D'	етко Da	llas, Inc.										
<u>Jata Plo</u>	<u>ot</u>			Pe	ak Pow	er Spec	tral Der	<u>ısity</u>				
Page 3	of <u>6</u>											
b No.:	4L0701			I	Date: 11/17/2	2004						
ecification:	15.2 Deci11	1.1.4	p.1	Temperature	(°C): <u>22</u>							
sted By:	David I	Jgnt	Kela	tive Humidit	y(%) <u>65</u>							
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		CENTE	ER 2.	4370	300GI	Ηz		SP	AN 5	5.000	MHz	
	*	₹ВМ З	3.Øk⊦	Ηz	VΒΝ	13.0)kHz	*	€SWP	1.7k	sec	
Notes:	CHAN	NEL 6										
Notes:	CHAN 54 Mb	NEL 6 s										

PROJECT NO. 4L0701RUS1Rev1

Test Data – Spectral Density



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Lewisville, TX 75057					
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Fax: (972) 436-2667					

Nei	nko Da	llas, Inc.							- (-)			
Data Plo	t			Pe	ak Pow	er Spec	tral Der	nsity				
Page 4_0 b No.: becification: ested By: U.T.: pofiguration:	of 6 4L0701 15.2 David I WIREL	.ight ESS GATE	Date: 11/17/2004 Temperature(°C): 22 Relative Humidity(%) 65 GATEWAY									
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) איני			4370	100GI	 Hz		SP	AN 5	.000	MHz	
Notes			5. ØKI	12	VBV	N J.U	KHZ	*	5WP	1. rk	sec	
NOICS.	1 Mbs	UVEL V										

PROJECT NO. 4L0701RUS1Rev1

Test Data – Spectral Density



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Lewisville, TX 75057					
Tel: (972) 436-9600					
Fax: (972) 436-2667					

Nemko Dallas, Inc. Data Plot **Peak Power Spectral Density** Page <u>5</u> of <u>6</u> Job No.: 4L0701 Date: 11/17/2004 Specification: 15.2 Temperature(°C): 22 David Light Relative Humidity(%) 65 Tested By: E.U.T.: WIRELESS GATEWAY Configuration: ΤХ ATTEN 30dB RL 40.1dBm 10d B/ D R SPAN 5.000MHz CENTER 2.462000GHz ∗SWP 1.7ksec *RBW 3.0kHz VBW 3.0kHz Notes: CHANNEL 11 54 Mbs

PROJECT NO. 4L0701RUS1Rev1

Test Data – Spectral Density



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Lewisville, TX 75057					
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Fax: (972) 436-2667					

Nemko Dallas, Inc. Data Plot Peak Power Spectral Density Page <u>6</u> of <u>6</u> Job No.: 4L0701 Date: 11/17/2004 Temperature(°C): 22 Specification: 15.2 David Light Relative Humidity(%) 65 Tested By: E.U.T.: WIRELESS GATEWAY Configuration: ΤХ ATTEN 30dB RL 40.1dBm 10d B/ DISPLAY 8.0 dBm LINE D R MANY MANY · · · · 1.1 14.4.0 VILLAND LAND CENTER 2.462000GHz SPAN 5.000MHz *RBW 3.0kHz VBW 3.0kHz *SWP 1.7ksec Notes: CHANNEL 11 1 Mbs

Section 9. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration	Calibration Due 09/22/05	
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03		
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	08/26/04	08/26/05	
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	08/02/04	08/02/05	
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	11/12/04	11/12/05	
791	PREAMP, 25dB	ICC LNA25	398	11/12/04	11/12/05	
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	07/23/04	07/23/05	
760	Antenna biconical	Electro Metrics MFC-25	477	06/22/04	06/22/05	
1983	CABLE	KTL Site A OATS	N/A	03/11/04	03/11/05	
1477	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W5	NONE	CBU	N/A	
1973	CABLE, 1m	KTL 0	N/A	08/02/04	08/02/05	
Rentelco	Spectrum Analyzer	HP 8563E	3611A04877	08/26/04	08/26/06	
1029	PEAK POWER METER	HP 8900D	3303U0012	12/23/03	12/22/04	
1030	PEAK POWER SENSOR	HP 84811A	2539A03573	12/23/03	12/22/04	

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

ANNEX A - TEST DETAILS

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
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Minimum Standard:The R.F. that is conducted back onto the AC power line on any
frequency within the band 0.45 to 30 MHz shall not exceed $250\mu V$
(48 dB μV) across 50 ohms.

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

NAME OF TEST: Minimum 6 dB bandwidth PA

PARA. NO.: 15.247(a)(2)

Minimum Standard: The minimum 6 dB bandwidth shall be at least 500 kHz

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

NAME OF TEST: Maxim	um Peak Output Power	PARA. NO.: 15.247(b)(1)
Minimum Standard	The maximum neak output	nower shall not exceed 1 watt
Iviininum Stanuaru.	The maximum peak output	power shan not exceed 1 watt.
	If transmitting antennas of used, the power shall be rea directional gain of the anter	directional gain greater than 6 dBi are duced by the amount in dB that the nna exceeds 6 dBi.
	Systems operating in the 24 exclusively for fixed, point transmitting antennas with provided the maximum pea every 3 dB that the direction	400-2483.5 MHz band that are used to point operation may employ directional gain greater than 6 dBi k output power is reduced by 1 dB for nal gain of the antenna exceed 6 dBi.
	Systems operating in the 57 exclusively for fixed, point transmitting antennas with without any corresponding power.	725 – 5850 MHz band that are used -to-point operation may employ directional gain greater than 6 dBi reduction in transmitter peak output

Direct Measurement Method For Detachable Antennas:

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

Calculation Of EIRP For Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation GP/4 π R² = E²/120 π and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts E = the maximum measured field strength in V/m R = the measurement range (3 meters) G = the numeric gain of the transmit antenna in relation to an isotropic radiator The RBW of the spectrum analyzer shall be set to a value greater than the measured 6 dB occupied bandwidth of the E.U.T.

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

PROJECT NO. 4L0701RUS1Rev1

NAME OF TEST	Spurious Emissions(conducted)	PARA NO \cdot 15 247(c)
NAME OF TEST.	Spurious Emissions		$1 \Lambda \Lambda \Lambda \Lambda \Lambda 0 10.247(0)$

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (µV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM IS SEARCHED TO THE 10th HARMONIC OF THE HIGHEST FREQUENCY GENERATED IN THE EUT.

Method Of Measurement:

30 MHz - 10th harmonic plot RBW: 100 kHz VBW: 300 kHz Sweep: Auto Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div. VBW: >RBW Span: As necessary to display any spurious at band edge. Sweep: Auto Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz Marker: Peak of fundamental emission Marker Δ: Peak of highest spurious level below center frequency.

Upper Band Edge

RBW: At least 1% of span/div.VBW: >RBWSpan: As necessary to display any spurious at band edge.Sweep: AutoCenter Frequency: 928 MHz, 2483.5 MHz, or 5850 MHzMarker: Peak of fundamental emissionMarker Δ: Peak of highest spurious level above center frequency.

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

|--|

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency	Field Strength	Field Strength
(MHz)	(µV/m @ 3m)	(dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands				
MHz	MHz	MHz	GHz	
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25	
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46	
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75	
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5	
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2	
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5	
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7	
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4	
6.31175-6.31225	123-138	2200-2300	14.47-14.5	
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2	
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4	
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12	
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0	
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8	
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5	
12.57675-12.57725	322-335.4	3600-4400	Above 38.6	
13.36-13.41	1718			

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

NAME OF TEST: Transmitt	er Power Density	PARA. NO.: 15.247(d)
Minimum Standard:	The transmitted power d interval shall not be grea	ensity averaged over any 1 second ter than +8 dBm in any 3 kHz bandwidth.
Method Of Measurement:	The spectrum analyzer is	s set as follows:
	RBW: 3 kHz VBW: >3 kHz Span: => measured 6 dH Sweep: Span(kHz)/3 (i.e 1500/3 = 500 sec. LOG dB/div.: 2 dB	3 bandwidth e. for a span of 1.5 MHz the sweep rate is
Note:	For devices with spectru analyzer is reduced until measurement data is nor of all the individual spec power units.	m line spacing =< 3 kHz, the RBW of the the spectral lines are resolved. The malized to 3 kHz by summing the power tral lines within a 3 kHz band in linear

For Devices With Integral Antenna:

For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent isotropic radiated power using the same method as described for Peak Power output.

Tuning Range	Number Of Channels Tested	Channel Location In Band
1 MHz or Less	1	Middle
1 to 10 MHz	2	Top And Bottom
More Than 10 MHz	3	Top, Middle, Bottom

EQUIPMENT: SpeedStream 6520 / 6515

PROJECT NO. 4L0701RUS1Rev1

ANNEX B - TEST DIAGRAMS

Test Site For Radiated Emissions



TO TEST RECEIVER/SPECTRUM ANALYZER. A high-pass filter and LNA is necessary to measure to the limits of 15.209.

Conducted Emissions



Peak Power At Antenna Terminals



Minimum 6 dB Bandwidth Peak Power Spectral Density Spurious Emissions (conducted)

