Applicant:Enfora661 E. 18th StreetPlano, Texas, 75024xxx

WLN1502

- Equipment Under Test: (E.U.T.)
- In Accordance With:

FCC Part 15, Subpart C, 15.247 Spread Spectrum Transmitters

Tested By:

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

Authorized By:

David Light, Senior Wireless Engineer

Date:

19 August 2005

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	Equipment Under Test (E.U.T.) Powerline Conducted Emissions Minimum 6 dB Bandwidth Maximum Peak Output Power Spurious Emissions (Radiated) Peak Power Spectral Density est Equipment List TEST DETAILS

PROJECT NO. 5L0047RUS1

Section 1.	Summary of Test Results
Manufacturer:	Enfora
Name:	Wi-Fi Adapter for Treo Smartphones
Model Number:	WLN1502
Serial Number:	None
Part Number:	None
Production Status:	Pre-production
E.U.T. Arrival Date:	7/19/2005

Description of E.U.T.:

Wi-Fi adapter sled for Palm Treo 600 and 650 smartphones

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 C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission

____ Pro

Production Unit

Class II Permissive Change



Pre-Production Unit

PROJECT NO. 5L0047RUS1

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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EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a)	Complies
Minimum 6 dB Bandwidth	15.247(a)(2)	Complies
Maximum Peak Power Output	15.247(b)(1)	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	NA
Spurious Emissions (Radiated)	15.247(c)	Complies
Peak Power Spectral Density	15.247(d)	Complies

Footnotes:

EUT has an integral antenna.

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:

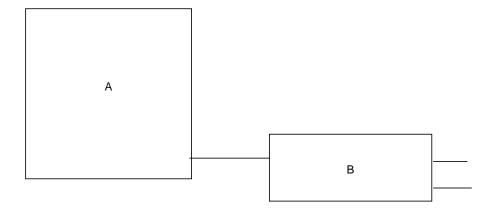
Software controlled

PROJECT NO. 5L0047RUS1

Description of EUT

Wi-Fi adapter sled for Palm Treo 600 and 650 smartphones

System Diagram



A) EUT

B) Power Supply: PHIHONG PSA11R-050, Input: 100 – 240 VAC, 50-60 Hz, Output: 5VDC, 2A.

Section 3. Powerline Conducted Emissions

Purpose:

The test is intended to demonstrate the compliance of the Equipment Under Test (E.U.T.) to the limits for conducted disturbance as defined by CFR 47, Part 15, Subpart B, Class B, Paragraph Number 15.107.

Specification Limits:

Frequency Range (MHz)	Quasi-peak Limits (dBuV)	Average Limits (dBuV)
0.15 to 0.50	66-56	56-46
0.50 to 5.00	56	46
5.00-30.0	60	50
The limit decreases with the log	garithm of the frequency in the ra	inge 0.15MHz to 0.5 MHz

Limits for conducted disturbance at the mains ports

Method of Measurement (Procedure ANSI C63.4-2001):

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 9 or 10 kHz bandwidth, CISPR Quasi-Peak detector.

See Sections 7 and 8

PROJECT NO. 5L0047RUS1

Test #:	CEPV-01
Tested By:	Brian Boyea
Date of Tests:	7/20/2005
Test Conditions:	
Test Voltage:	120Vac
Temperature:	22°C
Humidity:	33%

Test Results:

The E.U.T. complies.

The worst-case emission is $44.4dB\mu V$ at 0.6591 MHz on the Hot side of the line. This is 1.6 dB below the average specification limit of $46.0dB\mu V$.

TEST EQUIPMENT

Asset	Description	Manufacturer	Model Number	Serial	Last Cal	Cal Due
Number				Number		
545	LISN	Schwarz Beck	8120	8120350	09/17/04	09/17/05
968	Filter, High pass 5khz	Solartron	7930-5.0	933124	08/17/04	08/17/05
1019	CABLE, 9.5m	Nemko	RG223	N/A	07/27/04	07/27/05
1556	COUPLING DUAL	AMPLIFIER	DC3010	18722	09/21/04	09/21/05
	DIRECTIONAL	RESEARCH				
718	HP SPECTRUM	HEWLETT	8591EM	3639A00980	04/06/05	04/06/06
	ANALYZER	PACKARD				
674	LIMITER	HP	11947A	3107A02200	CBU	N/A

Nemko Dallas

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Test Data –Conducted Emissions, Power Lines Test#CEPV-01

				P			nissions Measure					
Complet Prelimin		X				-		Job # :	<u>5L0047</u> Page		Test # : of	CEPV-01 2
Client N		Enfora										
EUT Na EUT Mo		Wi-Fi Ada WLN150		Treo Sr	nartphon	es						
EUT MO EUT Pai		None										
EUT Ser		None										
EUT Co		Idle State	e, Transr	nit State	(Pinging	Router).						
Specifica		CFR Pt 1	5 Subpa					Refe	rence :			
Transdu		545			deg. C) :		,				07/20/05	
HP Filter Cable 1		<u>968</u> 1019	•	Humidit EUT Vo		33 120 Vac	,				5:00 P.M. Brian Boyea	
Cable 1 Cable 2		1556	-		equency				١٥	cation :		a
Detector		718			andwidth		•				5L0047E C	EPV-01
Detector			•	QP Ban		9kHz	•				0100.11	
Limiter #	ŧ :	674		Avg. Ba	Indwidth	9kHz						
Meas.	EUT	Detector	Limit	Meter	Path	Transducer	Corrected	Spee	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
0.6591	Н	Р	Α	44.4	0	0	44.4	56	46	-1.6	Pass	
dB	CISP	: 07/20/2005 R-22-B COND [< Lead	Time: 19:03 [AVE] Test I	:06 WO#: Lead:Black	Seque	nce#: 1						
	70.0											
	60.0							c	<u>ISPR 22 B C</u>	OND [QP]		
	50.0							c	ISPR-22-B (OND [AVE]		
				4								
	40.0											
	30.0	μ.										
	20.0 - W	nt MMP ^A yumMu	uhulpridur.hyun		MANUL	nkladra Walayya	namanarah	hayaritan taqat	www.whenphatel	avyladhqa,anna	normania	
	10.0											
	150KHz				1 MHz				10M	Hz	30M	Hz

PROJECT NO. 5L0047RUS1

Test Data Conducted Emissions, Power Lines Test#CEPV-01 Cont.

				F		Icted Emi		ient				
Comple [:] Prelimin		X	-			U		Job # :	5L0047I Page		Test # : of	CEPV-01 2
Fleminin	ary		-						Faye	;	0	2
Client N EUT Na		Enfora	anter for	Treo Sr	nartphone							
EUT Ma		WLN150		1100 01	nanphone	.5						
EUT Pa		None										
EUT Se EUT Co		None Idle State	e, Transr	nit State	e (Pinging	Router).						
Specific	ation :	CFR Pt 1						Refer	ence :			
-						1		-				
Meas. Freq.	EUT Test	Detector Type	Limit Type	Meter Reading	Path Loss	Transducer Factor	Corrected Reading		c.limit 3uV)	CR/SL Diff.	Pass Fail	
(MHz)	Point	(P,QP, A)	(QP, A)	(dBuV)	(dB)	(dB)	(dBuV)	Q.P.	Avg.	(dB)	Unc.	Comment
0.656	N	Р	A	41.9	0.0	0.0	41.9	59.0	46.0	-4.1	Pass	
dE	CIS	a: 07/20/2005 PR-22-B COND te Lead	Time: 19:05 [AVE] Test		Sequer	nce#. 2						
	60.0							CISP	R 22 B ¢ON	D [QP]		
	50.0							CISP	R-22-B CON	ID [AVE]		
	40.0											
	20.0											
	Wey	al upperlying	hordhuddinddyddiad	MYW WW	llygirigisiddirilly/ky	n Norren (Norren)	htere all all all and a second	Walnut and a second	Whentown	innlehanne	vilianovalita	
	10.0								4000			1
	150KHz				1MHz				10MHz		301	МНz

PROJECT NO. 5L0047RUS1

Test Photographs - Test # CEPV-01



Section 4. Minimum 6 dB Bandwidth

NAME OF TEST: Minimum 6 dB Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: Kevin Rose	DATE: 08/15/05

Test Results:Complies.Measurement Data:See 6 dB BW plot
Measured 6 dB bandwidth:10.2 MHz Max
5 MHz

PROJECT NO. 5L0047RUS1

							Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057					
		$(\exists$	mk	(\cdot)								
									(972) 436-96 : (972) 436-26			
Nen	nko Dallas	, Inc.						i ax	. (072) 700-20			
Data				Oc	cupied							
Page <u>1</u> o	f <u>2</u>				I			Complete Preliminary:	Х			
Job No.:	5L0047R			Date:	8/15/2004			Preliminary:				
Specification:	15.247			perature(°C):	21							
Tested By:	Kevin Rose		Relative l	Humidity(%)	42							
E.U.T.: Configuration:	WLN1501											
Sample Number:	TX 1											
Location:	Lab 2				RBW: 10)0 kHz		Measurement				
Detector Type:	Peak	-			VBW: 10			Distance:	NA n	ı		
51		_										
Test Equipme												
Antenna:	1480	-		Directi	onal Coupler:							
Pre-Amp: Filter:		-			Cable #1: Cable #2:	1484						
Receiver:	1036	_			Cable #2:							
Attenuator #1	1050	-			Cable #3:	1403						
Attenuator #2:		-			Mixer:							
Additional equip	ment used:											
Measurement Ur	certainty:	+/-1.7 d	В									
			Delta	1 [T 1]		КВМ	100 k	Hz RF	- Att	10 dB		
Kef	$L \vee 1$			Ο.	.84 dB	VBW	100 K	Hz				
-40	dBm		10	0.324649	330 MHz	SWT	8 m	s Ur	nit	dBr	n	
-40											1	
											A	
-50				1 mm	hann	making	M. 1					
				N. Martin			may					
-60			www								-	
			S.					5				
-70			<u> </u>								-	
1 MA	×		/					۲,	4		1MA	
-80 ~~~	lumber	when							motor	Amer	1	
-90												
-100											-	
-110					<u> </u>	l	<u> </u>			<u> </u>	1	
-120											-	
-130											1	
		T										
-140												
	ter 2.4	412 GH	lz		3.2	MHz/			Spar	n 32 MHz	:	
Date:		AUG.2		2:36:11								
Notes:	CHANNE											

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Nemko Dallas, Inc.		$\langle m{O}$		Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667				
age 2. of 2 : 5L0047R ation: 15.2 By: Kevin Rose WLN1501 TX		Date: <u>8/</u> erature(°C): <u>21</u> Iumidity(%) <u>42</u>						
Ref Lvl -40 dBm	Delta : 10		.73 dB 527 MHz	RBW VBW SWT	100 k 100 k 8 m	Hz	F Att nit	1U dB dBm
1VIEW	GHz		3.2	MHz/				n 32 MHz
: 15.AUG tes: CHANNEL 1	.2005 17	:39:43						

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Nemko Dallas, Inc.				802 I Lewisvill Tel: (97	eadquarters: N. Kealy e, TX 75057 2) 436-9600 2) 436-2667	
a 5L0047R ition: 15.2 y: Kevin Rose WLN1501 ation: TX						
Ref Lvl -40 dBm	Delta 1 [] -10.08	1] -0.09 dB 813627 MHz	RBW VBW SWT	100 kHz 100 kHz 8 ms	RF Att Unit	10 dB dBm
						Sur
Center 2.4368 15.AUG tes: CHANNEL6			MHz∕		Spa	n 32 MHz

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Nemko Dallas, Inc.	emko			Lewisville Tel: (972	l. Kealy , TX 75057) 436-9600) 436-2667	
ge 4, of 2 5L0047R ion: 15.2 :: Kevin Rose WLN1501 TX	E Temperature(Relative Humidity					
Ref Lvl -40 dBm	Delta 1 LT 10.45	1] 0.15 dB 290581 MHz	RBW VBW SWT	100 kHz 100 kHz 8 ms	RF Att Unit	10 dB dBr
	1	want	warkan	~~~~ 1		
				- Mary and		
1MAX when here					hum	mmu
Center 2.4366	64 GHz	3.2	MHz/		Spa	32 MHz

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Nemko Dallas, Inc.		\odot			802 Lewisvill Tel: (97	eadquarters: N. Kealy e, TX 75057 2) 436-9600 2) 436-2667	
ge <u>5</u> of <u>2</u> ion: 15.2 y: Kevin Rose WLN1501 TX	Tempe	Date: 8/2 rature(°C): 21 umidity(%) 42					
Ref Lvl -40 dBm	Delta 1 9	Ο.	.74 dB 673 MHz	RBW VBW SWT	100 kHz 100 kHz 8 ms	RF Att Unit	10 dB dBr
1 V I E W 	AN AM CONTRACT	w town				Le contra	ο
Center 2.462	GHz		3.2	MHz/		Spa	In 32 MHz

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Nemko Dallas, Inc.		\mathbf{O}			Lev Tel	as Headquard 802 N. Kealy visville, TX 75 : (972) 436-90 :: (972) 436-20	057 600	
Ita Junctify Page 6 of 2 5L0047R o.: 5L0047R ication: 15.2 IBy: Kevin Rose .: WLN1501 guration: TX	Temp	Date: <u>8/</u> perature(°C): <u>21</u> fumidity(%) <u>42</u>		КВМ	100 K		FAtt	10 ав
Ref Lvl -40 dBm 0			.04 dB 627 MHz	VBW SWT	100 k 8 m	Hz	nit	dBm
o o o	M	the the	my	mere	Lui	M. Maria		
1 V I E W ۲ میں بر ایک او کی کار کی کار کا	www.					<u> </u>	www	
D								
	GHZ			MHZZ			503	D 30 MHz
Center 2.462 e: 15.AUG Notes: <u>CHANNEL 11</u> 1 Mbs		:49:12	3.2	MHz/			Spa	n 32 MHz

Section 5. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(1)
TESTED BY: Kevin Rose	DATE: 08/15/05

Test Results: Complies.

Measurement Data:

Note: The AC supply to the device was varied from 102 Vac to 138 Vac with RF output power monitored. There was no variation of rf output power noted.

NOTE: The device has an integral antenna. The Peak rf output power was measured as eirp using a substitution antenna method of measurement. The integral antenna is a ¹/₄ wave antenna. The antenna conducted peak rf output power is interpolated by:

Peak conducted power = EIRP/G; where G = 1.64 (gain of a ¹/₄ wave antenna relative to an ideal isotropic radiator).

Peak conducted power = 14.5 mW/1.64 = 8.84 mW

Measurement Uncertainty: +/- 0.7 dB

Temperature: 21 °C

Relative Humidity: 42 %

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Test Data – Peak power

	ko Dallas	en , Inc.	nk		SUBSTITU	TION MI	THOD	Lew Tel:	as Headqua 802 N. Keal visville, TX 7 : (972) 436- :: (972) 436-	y '5057 9600
Page 1 of	1							Complete	Х	_
Job No.:	5L0047			Date:	8/17/2005			Preliminary	,	-
Specification:	15.247		Tem	perature(°C):	21					-
Tested By:	Kevin Rose		Relative	Humidity(%))46					
E.U.T.:	WLN1501	1								
Configuration:	TX MAX									
Sample No:	1									
Location:	AC 3				RBW:	10 MHz	-	Measurement	t	
Detector Type:	Peak				VBW:	10MHz		Distance	3	m
Test Equipm										
Antenna:	759			D	irectional Coupler:					
Pre-Amp:					Cable #1:	1484				
Filter:					Cable #2:					
Receiver:	1036				Cable #3:					
Attenuator #1					Cable #4:					
Attenuator #2:					Mixer:					
Additional equip										
Measurement U		+/-3.6 dB								
Frequency	Meter Reading	Correction Factor		Pre-Amp Gain	Substitution Antenna Gain		EIRP	EIRP	Polarity	Comments
(MHz)	(dBm)	(dB)		(dB)	(dBi)		(dBm)	(mW)		
2462	-31.6	34.1		0	9.0		11.5	13.96	v	11 mbps
2462	-31.4	34.1			9.0		11.6	14.554591	V	1 mbps
2436	-31.9	34.1		0	9.0		11.2	13.0316678	V	11 mbps
2436	-31.8	34.1			9.0		11.3	13.335214	V	1 mbps
2412	-34.1	34.1			9.0		9.0	7.925013	V	11 mbps
2412	-33.8	34.1			9.0		9.2	8.34	V	1 mbps
2462	-37.2	36.7			6.9		6.3	4.295364	Н	11 mbps
2462	-37.3	36.7			6.9		6.3	4.226686	Н	1 mbps
2436	-35.9	36.7			6.9		7.6	5.794287	Н	11 mbps
2436	-35.8	36.7			6.9		7.8	5.997911	Н	1 mbps
2412	-36.5	36.7			6.9		7.0	5.05	Н	11 mbps
2412	-36.3	36.7			6.9		7.3	5.345644	Н	1 mbps
				ļ						
				ļ						
L										
L										
L										

Section 6. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247 (c)
TESTED BY: Kevin Rose	DATE: 08/15/05

Test Results: Complies.

Measurement Data: See attached table.

PROJECT NO. 5L0047RUS1

						Dall	as Headquart	ers:
							802 N. Kealy	
		e				Lev	visville, TX 750)57
						Tel	: (972) 436-96	600
Nen	ıko Dallas	, Inc.					k: (972) 436-26	67
				Ra	diated Emissio	ns		
Page <u>1</u> of	<u>1</u>							
Job No.:	5L047R			Date:	8/15/2005			
Specification:	15.247		Temp	erature(°C):	21			
Tested By:	Kevin Rose		Relative H	Iumidity(%)	42			
E.U.T.:	WLN1501							
Configuration:	TX 11 MBPS	S						
Sample Number:	1			-				
Location:	AC 3				RBW:	1 MHz		
Detector Type:	Peak				VBW:	1 MHz		
			<u>Test Equ</u>	ipment Used				
Antenna:	1304			Direct	ional Coupler:	#N/A		
Pre-Amp:	#N/A				Cable #1:	1484		
Filter:	#N/A				Cable #2:	1485		
Receiver:	1464				Cable #3:	#N/A		
Attenuator #1	#N/A				Cable #4:	#N/A		
Attenuator #2:	#N/A				Mixer:	#N/A		
Measurement Unc	ertainty: +/- 3	8.6 dB						
							Average	
Frequency	Meter	Antenna	Cable	Pre-Amp	Corrected	Peak Limit	Limit	
(GHz)	Reading	Factor	Loss	Gain (dB)	Reading	(dBuV/m)	(dBuV/m)	Detector / Polarity
	(dBuV)	(dB)	(dB)		(dBuV/m)		. ,	
2.4835	48.3	28.2	3.1	32.8	46.8	74	54	Peak - / Vertical
2.4835	33.2	28.2	3.1	32.8	31.7	74	54	Average - / Vertical
2.4835	46.3	28.2	3.1	32.8	44.8	74	54	Peak - / Horizontal
2.4835	34.8	28.2	3.1	32.8	33.3	74	54	Average - NF / Horizontal
Notes:								
	÷	um was sear						
	The device	was tested	at 2.412, 2	2.437 and 2	.462 MHz an	d no emission	s were found	above the noise floor.
	Data preser	nted is to de	monstrate	e upper banc	ledge complia	ance on chanr	nle 11	

Test Data – Radiated Emissions

The noise floor of the measurement system is sufficient to measure emissions within 20 dB of the specification limit.

PROJECT NO. 5L0047RUS1

Test Data – Radiated Emissions continued

Nen	nko Dallas	, Inc.	m	(0		Lev Tel	as Headquart 802 N. Kealy visville, TX 756 : (972) 436-96 <: (972) 436-26	057 600
				Ra	diated Emissio	ns		
Page 1 of	<u>1</u>							
Job No.:	5L047R			Date:	8/15/2005			
Specification:	15.247		Temp	erature(°C):	21			
Tested By:	Kevin Rose		Relative I	Humidity(%)	42			
E.U.T.:	WLN1501							
Configuration:	TX 1 MBPS							
Sample Number:	1			-				
Location:	AC 3				RBW:	1 MHz		
Detector Type:	Peak				VBW:	1 MHz		
	1204		<u>Test Equ</u>	ipment Used		11 N T / A		
Antenna:	1304			Direct	ional Coupler:	#N/A		
Pre-Amp: Filter:	1016				Cable #1:	1484		
Receiver:	#N/A 1036				Cable #2: Cable #3:	1485 1081		
Attenuator #1	#N/A				Cable #3: Cable #4:	#N/A		
Attenuator #1	#N/A #N/A				Mixer:	#N/A #N/A		
Measurement Unc		6 dB			IVITACI.	#1N/A		
Weasurement One	certainty. 17- 5	.0 uD						
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	47.3	28.2	3.1	32.8	45.8	74	54	Peak - / Vertical
2.4835	35.0	28.2	3.1	32.8	33.5	74	54	Average - / Vertical
2.4835	46.2	28.2	3.1	32.8	44.7	74	54	Peak - / Horizontal
2.4835	34.2	28.2	3.1	32.8	32.7	74	54	Average - NF / Horizontal
Notes:	<u> </u>							
		im was sear						
ļ	4		,					above the noise floor.
	Data presei	nted is to de	monstrate	e upper banc	tedge complia	ance on chanr	nle 11	

The noise floor of the measurement system is sufficient to measure emissions within 20 dB of the specification limit.

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Setup Photos



Section 8. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(d)
TESTED BY: Kevin Rose	DATE: 08/16/05

Test Results: Complies.

Measurement Data: See attached plots.

Note – This measurement was made radiated. The limit applied of -35.1 dBm is equal to +8 dBm EIRP as determined by using the signal substitution method of measurement per TIA/EIA-603-1992, Section 2.2.12

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

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 Data Page <u>5</u> of <u>6</u> 510047R Job No.: Date: 8/17/2004 PART Specification: Temperature(°C): 21 15.247(d) Tested By: Kevin Rose Relative Humidity(%) 42 E.U.T.: WLN1501 Configuration: TRANSMITTING ATTEN 10dB MKR -60.33dBm RL -20.0dBm 10d B/ 2.462017GHz CENTER 2.462017GHz SPAN 2.000MHz *RBW 3.0kHz VBW 3.0kHz *SWP 680sec channel 11 11Mbs Notes: MINUS 35.1 DBM IS 8 DBM ERIP

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Test Data – Spectral Density



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

Nen	nko Dallas,	Inc.								,		
Data Page <u>6</u> o	f 6			Peak]	Powe	r Spe	ectra	L				
Job No.:	510047R			Date: 8/	17/2004							
Specification:	PART 15.247(d) Temperature(°C): 21											
Tested By:	Kevin Rose											
E.U.T.:	WLN1501			-								
Configuration:	TRANSMIT	ΓING										
		∖ 10d 20.0d		10d B⁄		KR - .462		7d Bm Hz				
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Notes:	channel 11		S 8 DBM EI	ID								
	MINUS 35	T DRM I	5 o DBM EI	ur								

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

Test Data – Spectral Density



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

Ner	nko Dallas,	Inc.											
Data Page 4_ c	- of 6			E	Peak]	Powe	e <mark>r Sp</mark>	ectra					
Job No.: Specification: Tested By: E.U.T.: Configuration:	510047R PART 15.247(d) Kevin Rose WLN1501	TING		Temperatu tive Humic					-				
Configuration.	TRANSIMIT	IINO							-				
	ATTEN RL -2			10	3dB∕			63.0 000G	0d Bm Hz				
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			her warden			*****	****	****	******			
			40.70	3990						MI 1_			
	CENTE *RBW 3					)kHz			.000 680s				
Notes:	channel 6				_								
	MINUS 35	5.1 DBM	IS 8 D	BM ERI	Р								



Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057

#### EQUIPMENT WLN1502

#### PROJECT NO. 5L0047RUS1

# 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 Data Page <u>3</u> of <u>6</u> 510047R Job No.: Date: 8/17/2004 PART Specification: Temperature(°C): 21 15.247(d) Tested By: Kevin Rose Relative Humidity(%) 42 WLN1501 E.U.T.: TRANSMITTING Configuration: MKR -59.17dBm ALLEN 10dB RL -20.0dBm 10d B⁄ 2.436153GHz and a contraction of the second Marty Radiation Products ~~~~~~~~ CENTER 2.437000GHz SPAN 2.000MHz VBW 3.0kHz *SWP 680sec ₩RBW 3.0kHz channel 6 1Mbs Notes: MINUS 35.1 DBM IS 8 DBM ERIP

# EQUIPMENT WLN1502

# PROJECT NO. 5L0047RUS1

# Test Data – Spectral Density



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

Nen	nko Dallas,	Inc.									,		
Data Page 2 o	- 0f 6			P	eak l	Powe	r Sp	ectra					
Job No.: Specification: Tested By:	510047R PART 15.247(d) Kevin Rose			-	Date: <u>8/1</u> re(°C): <u>21</u> lity(%) <u>42</u>		_						
E.U.T.: Configuration:	WLN1501 TRANSMIT	TING							-				
		N 100 20.0		10	∂d B∕		KR - .412		0d Bm Hz				
	-2	*****	anin arabai			r <b>ang-l</b> aka	e i e calification	-	-	es.est.ge-e			
		<u> </u>	41103	2204-	-			412	0000				
	START 2.411033GHz STOP 2.413033GHz *RBW 3.0kHz VBW 3.0kHz *SWP 680sec												
Notes:	channel 1 MINUS 35		IS 8 DB	M ERII	P								

# PROJECT NO. 5L0047RUS1

# Test Data – Spectral Density

Nen	nko Dallas, Inc.	nko		<b>Dallas Headquarters:</b> 802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667
Data	iko Dallas, ilic.	Peak P	ower Spectral	
Page <u>1</u> o. Job No.: Specification: Tested By: E.U.T.: Configuration: Sample Number: Location: Detector Type:	510047R PART 15.247(d) Kevin Rose WLN1501 TRANSMITTING	Date: 8 Temperature(°C): 7 Relative Humidity(%)	/17/2004 21 42 RBW: Refer to plots VBW: Refer to plots	Complete X Preliminary:
Test Equipme Antenna: Pre-Amp: Filter: Receiver: Attenuator #1 Attenuator #2: Additional equipi Measurement Un			al Coupler: Cable #1: Cable #2:1485 Cable #3: Cable #4: Mixer:	
	CENTER 2		SPAN 2	3Hz
Notes:	channel 1 1Mbs MINUS 35.1 DBM I	S 8 DBM ERIP		

# PROJECT NO. 5L0047RUS1

# Section 9. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
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	08/26/04	08/26/05
1081	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/26/04	08/26/05
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1472	20db Attenuator DC 18 Ghz	Omni Spectra 20600-20db	NONE	CBU	N/A
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
545	LISN	Schwarz Beck 8120	8120350	09/17/04	09/17/05
958	#N/A	#N/A #N/A	#N/A	#N/A	#N/A
1113	CABLE, 1m	KTL RG223	N/A	08/26/04	08/26/05
1019	CABLE, 9.5m	KTL RG223	N/A	07/27/04	07/27/05
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	07/30/04	07/31/06
716	Receiver cal extension	Polorad ESH2	879342/005	02/02/04	08/01/05
674	LIMITER	HP 11947A	3107A02200	CBU	CBU
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	11/12/04	11/12/05
1480	Bilog Antenna	Schaffner-Chase CBL6111C	2572	CalNotReq	N/A
1029	PEAK POWER METER	HP 8900D	3303U0012	12/23/04	12/22/05
1081	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/26/04	08/26/05
1474	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W2	NONE	CBU	N/A

EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

# **ANNEX A - TEST DETAILS**

PROJECT NO. 5L0047RUS1

#### Purpose:

The test is intended to demonstrate the compliance of the Equipment Under Test (E.U.T.) to the limits for conducted disturbance as defined by CFR 47, Part 15, Subpart B, Class B, Paragraph Number 15.107.

#### **Specification Limits:**

Limits for conducted disturbance at the mains ports

Frequency Range (MHz)	Quasi-peak Limits (dBuV)	Average Limits (dBuV)				
0.15 to 0.50	66-56	56-46				
0.50 to 5.00	56	46				
5.00-30.0	60	50				
The limit decreases with the logarithm of the frequency in the range 0.15MHz to 0.5 MHz						

#### Method of Measurement (Procedure ANSI C63.4-2001):

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 9 or 10 kHz bandwidth, CISPR Quasi-Peak detector.

### EQUIPMENT WLN1502

### PROJECT NO. 5L0047RUS1

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

#### PROJECT NO. 5L0047RUS1

NAME OF TEST: Maximum Peak Output PowerPARA. NO.: 15.247(b)(1)						
Minimum Standard:	The maximum peak output power shall not exceed 1 watt.					
	e e	directional gain greater than 6 dBi are luced by the amount in dB that the nna exceeds 6 dBi.				
	exclusively for fixed, point transmitting antennas with o provided the maximum peal	00-2483.5 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.				
	exclusively for fixed, point- transmitting antennas with o	25 – 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.

#### Measurement Method For Integral Antenna: TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

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

### EQUIPMENT WLN1502

#### PROJECT NO. 5L0047RUS1

NAME OF TEST: S	Spurious Emissions(conducted)	PARA. NO.: 15.247(c)

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: >RBW Span: As necessary to display any spurious at band edge. Sweep: Auto Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz Marker: Peak of fundamental emission Marker 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 WLN1502

#### PROJECT NO. 5L0047RUS1

NAME OF TEST: Radiated S	purious Emissions	PARA. NO.: 15.247(c)

**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)	( <b>dB</b> @ <b>3m</b> )
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 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 WLN1502

PROJECT NO. 5L0047RUS1

NAME OF TEST: Transmitter Power Density		PARA. NO.: 15.247(d)
Minimum Standard:	1	sity averaged over any 1 second r than +8 dBm in any 3 kHz bandwidth.
Method Of Measurement:	The spectrum analyzer is set as follows:	
Note:	<ul><li>1500/3 = 500 sec.</li><li>LOG dB/div.: 2 dB</li><li>For devices with spectrum analyzer is reduced until the measurement data is normalized to be a second to be a s</li></ul>	bandwidth for a span of 1.5 MHz the sweep rate is line spacing =< 3 kHz, the RBW of the he spectral lines are resolved. The alized to 3 kHz by summing the power al lines within a 3 kHz band in linear

#### For Devices With Integral Antenna: TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

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

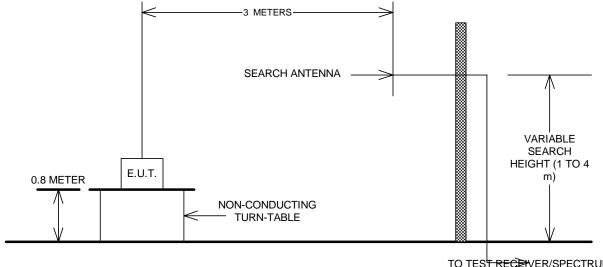
EQUIPMENT WLN1502

PROJECT NO. 5L0047RUS1

# **ANNEX B - TEST DIAGRAMS**

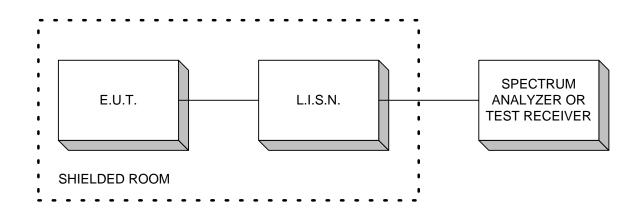
#### PROJECT NO. 5L0047RUS1

### **Test Site For Radiated Emissions**



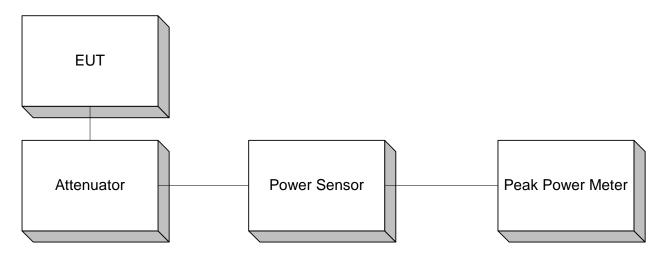
TO TEST RECEIVER/SPECTRUM ANALYZER. A high-pass filter and LNA is necessary to measure to the limits of 15.209.

### **Conducted Emissions**



## PROJECT NO. 5L0047RUS1

# **Peak Power At Antenna Terminals**



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

