



Nemko Test Report: 4L0613RUS3

Applicant: Motion Computing, Inc.
8601 RR 2222 Bldg 2
Building 1, Suite 250
Austin, TX 78730

**Equipment Under Test:
(E.U.T.)** LE1600 Series, Model T004 with Intel 2200 BG card

In Accordance With: **FCC Part 15, Subpart C, 15.247**
Digital Transmission System Transceiver

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

Authorized By:

A handwritten signature in black ink that reads 'John Fish'.

John Fish, EMC Engineer

Date: 14 Apr 2005

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EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

Section 1. Summary of Test Results

Manufacturer: Motion Computing, Inc.

Model No.: T004

Serial No.: None

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 in 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
- Production Unit
- Class II Permissive Change
- Pre-Production Unit

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: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

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
Channel Separation	15.247(a)(1)	Complies
Pseudorandom Hopping Algorithm	15.247(a)(1)	Complies
Time of Occupancy	15.247(a)(1)(ii)	Complies
20 dB Occupied Bandwidth	15.247(a)(1)	Complies
Maximum Peak Power Output	15.247(b)(1)	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	Complies
Spurious Emissions (Restricted Bands)	15.247(c)	Complies
Peak Power Spectral Density	15.247(d)	Complies

Footnotes:

EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

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

General Equipment Information

Frequency Band: 902 – 928 MHz
 2400 – 2483.5 MHz
 5725 – 5850 MHz

Channel Spacing: 5 MHz

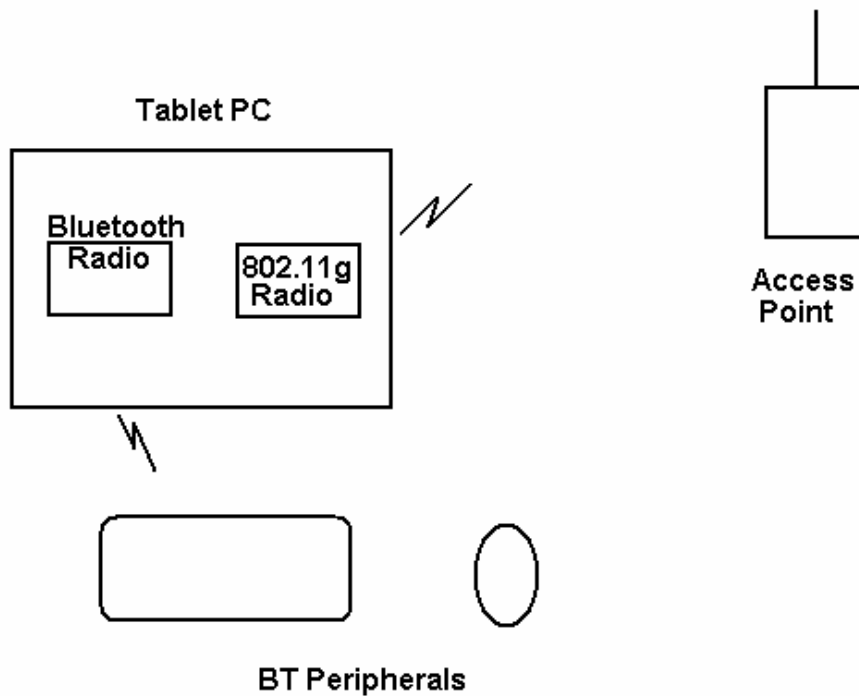
User Frequency Adjustment: Software controlled

Description of EUT

The T004 is a portable computer platform based on ultra-portable tablet PC technology utilizing Microsoft's Tablet version of Windows XP. The PC is compatible with 802.11b and g technologies.

The PC also has Bluetooth capability.

System Diagram



EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: Kevin Rose	DATE: 12/20/04


Test Results: Complies.

Measurement Data: See attached plots.

Measurement Uncertainty: +/- 1.7 dB

NOTE: The device was tested with both radio modules transmitting simultaneously (Bluetooth and WiLAN).

Test Data – Powerline Conducted Emissions



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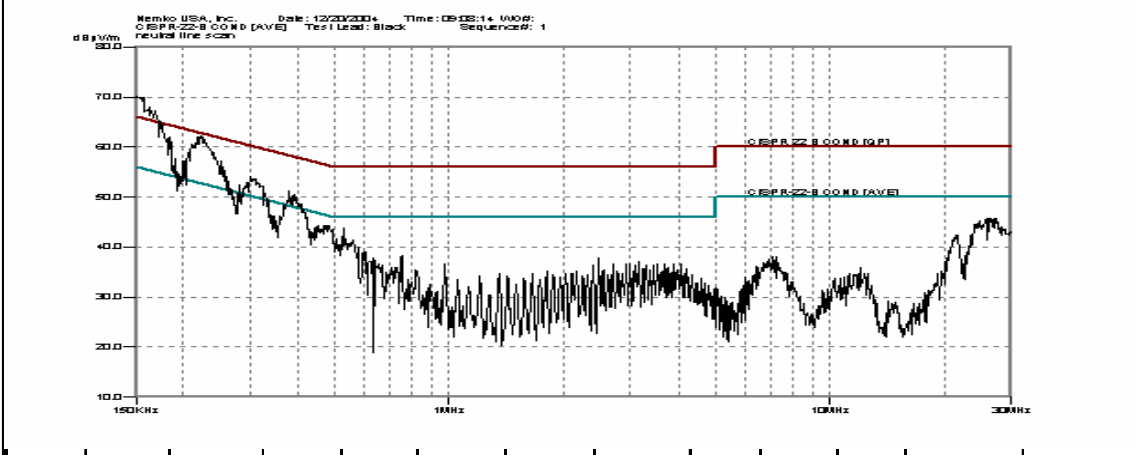
Conducted Emissions
Powerline Voltage Measurement

Complete Preliminary X Job # : 4I0613e Page 1 Test # : CEPV-01 of 2

Client Name : Motion Computing Inc.
 EUT Name : LE1600 Series
 EUT Model # : T004
 EUT Part # : EDX20
 EUT Serial # : 56
 EUT Config. : transmitting max power and DVD operating

Specification : <u>FCC B</u> Transducer # : <u>969</u> Temp. (deg. C) : <u>20</u> HP Filter # : <u>1433</u> Humidity (%) : <u>19</u> Cable 1 # : <u>1998</u> EUT Voltage : <u>120</u> Cable 2 # : <u>1129</u> EUT Frequency : <u>60</u> Detector 1 # : <u>718</u> Peak Bandwidth: <u>10 kHz</u> Detector 2 # : <u>966</u> QP Bandwidth <u>10 kHz</u> Limiter # : _____ Avg. Bandwidth <u>10 kHz</u>	Reference : <u>EN 55022 Class B</u> Date : <u>12/20/04</u> Time : <u>10:26</u> Staff : <u>KEVIN ROSE</u> Location : <u>ROOM 2</u> Photo ID : <u>4L0613E CEPV-01</u>
--	--

Meas. Freq. (MHz)	EUT Test Point	Detector Type (P,QP, A)	Limit Type (QP, A)	Meter Reading (dBuV)	Path Loss (dB)	Transducer Factor (dB)	Corrected Reading (dBuV)	Spec.limit (dBuV)		CR/SL Diff. (dB)	Pass Fail Unc.	Comment
								Q.P.	Avg.			
0.1527	Neutral	A	A	47.0	0	0	47.0	65.85	55.852	-8.9	Pass	
0.1527	Neutral	QP	QP	56.8	0	0	56.8	65.85	55.852	-9.1	Pass	
0.2298	Neutral	A	A	36.0	0	0	36.0	62.46	52.457	-16.5	Pass	
0.2298	Neutral	QP	QP	45.2	0	0	45.2	62.46	52.457	-17.3	Pass	
0.4568	Neutral	A	A	32.5	0	0	32.5	56.75	46.751	-14.3	Pass	
0.4568	Neutral	QP	QP	36.2	0	0	36.2	56.75	46.751	-20.6	Pass	



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Test Data – Powerline Conducted Emissions



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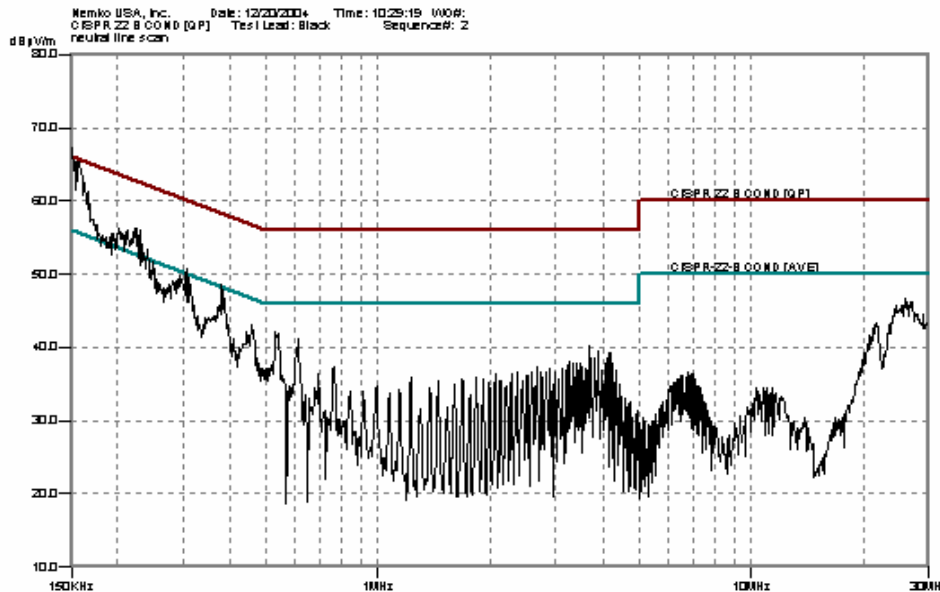
Conducted Emissions
Powerline Voltage Measurement

Complete X Preliminary _____ Job # : 4I0613e Test # : CEPV-01
Page 2 of 2

Client Name : Motion Computing Inc.
EUT Name : LE1600 Series
EUT Model # : T004
EUT Part # : EDX20
EUT Serial # : 56
EUT Config. : transmitting max power and DVD operating

Specification : FCC B Reference : EN 55022 Class B

Meas. Freq. (MHz)	EUT Test Point	Detector Type (P,QP, A)	Limit Type (QP, A)	Meter Reading (dBuV)	Path Loss (dB)	Transducer Factor (dB)	Corrected Reading (dBuV)	Spec.limit (dBuV)		CR/SL Diff. (dB)	Pass Fail Unc.	Comment
								Q.P.	Avg.			
0.1527	Hot	A	A	46.0	0.0	0.0	46.0	65.85	55.852	-9.9	Pass	
0.1527	Hot	QP	QP	57.2	0.0	0.0	57.2	65.85	55.852	-8.7	Pass	
0.2298	Hot	A	A	38.0	0.0	0.0	38.0	62.46	52.457	-14.5	Pass	
0.2298	Hot	QP	QP	47.0	0.0	0.0	47.0	62.46	52.457	-15.5	Pass	
0.4568	Hot	A	A	25.6	0.0	0.0	25.6	56.75	46.751	-21.2	Pass	
0.4568	Hot	QP	QP	35.2	0.0	0.0	35.2	56.75	46.751	-21.6	Pass	



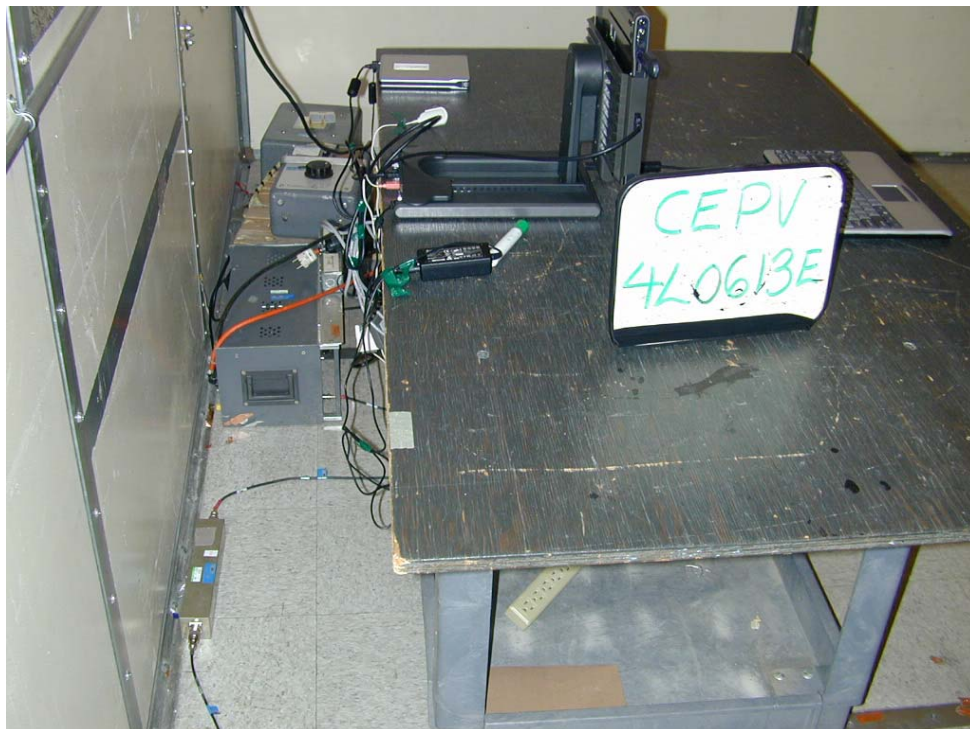
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Photos – Powerline Conducted Emissions

Front



Side



EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: David Light	DATE: 12/21/04

Test Results: Complies.

802.11g

Measurement Data: See 6 dB BW plot

Measured 6 dB bandwidth: 16.5 MHz
Channel Separation: 5 MHz

802.11b

Measurement Data: See 6 dB BW plot

Measured 6 dB bandwidth: 10 MHz
Channel Separation: 5 MHz

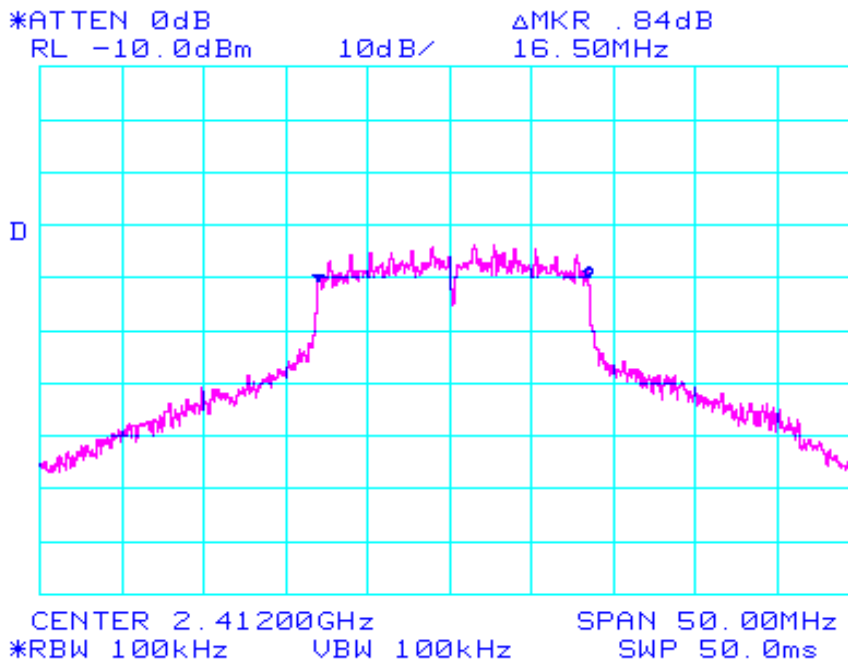
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Data Plot		Occupied Bandwidth	
Page 1 of 4		Date: 12/21/2004	Complete <input checked="" type="checkbox"/> X
Job No.: 4L0613		Temperature(°C): 22	Preliminary: <input type="checkbox"/>
Specification: 15.247		Relative Humidity(%): 45	
Tested By: David Light		E.U.T.: TABLET PC	
Configuration: TX W/ TX UTILITY SET TO 25 POWER			
Sample Number: 1		RBW: 100 kHz	
Location: AC 3		VBW: 100 kHz	
Detector Type: Peak			
Test Equipment Used			
Antenna: 1304	Directional Coupler:	Cable #1: 1484	
Pre-Amp:		Cable #2: 1485	
Filter:		Cable #3:	
Receiver: 1464		Cable #4:	
Attenuator #1:		Mixer:	
Attenuator #2:			
Additional equipment used:			
Measurement Uncertainty: +/-1.7 dB			



Notes: Channel 1
802.11g @ 54 Mbps

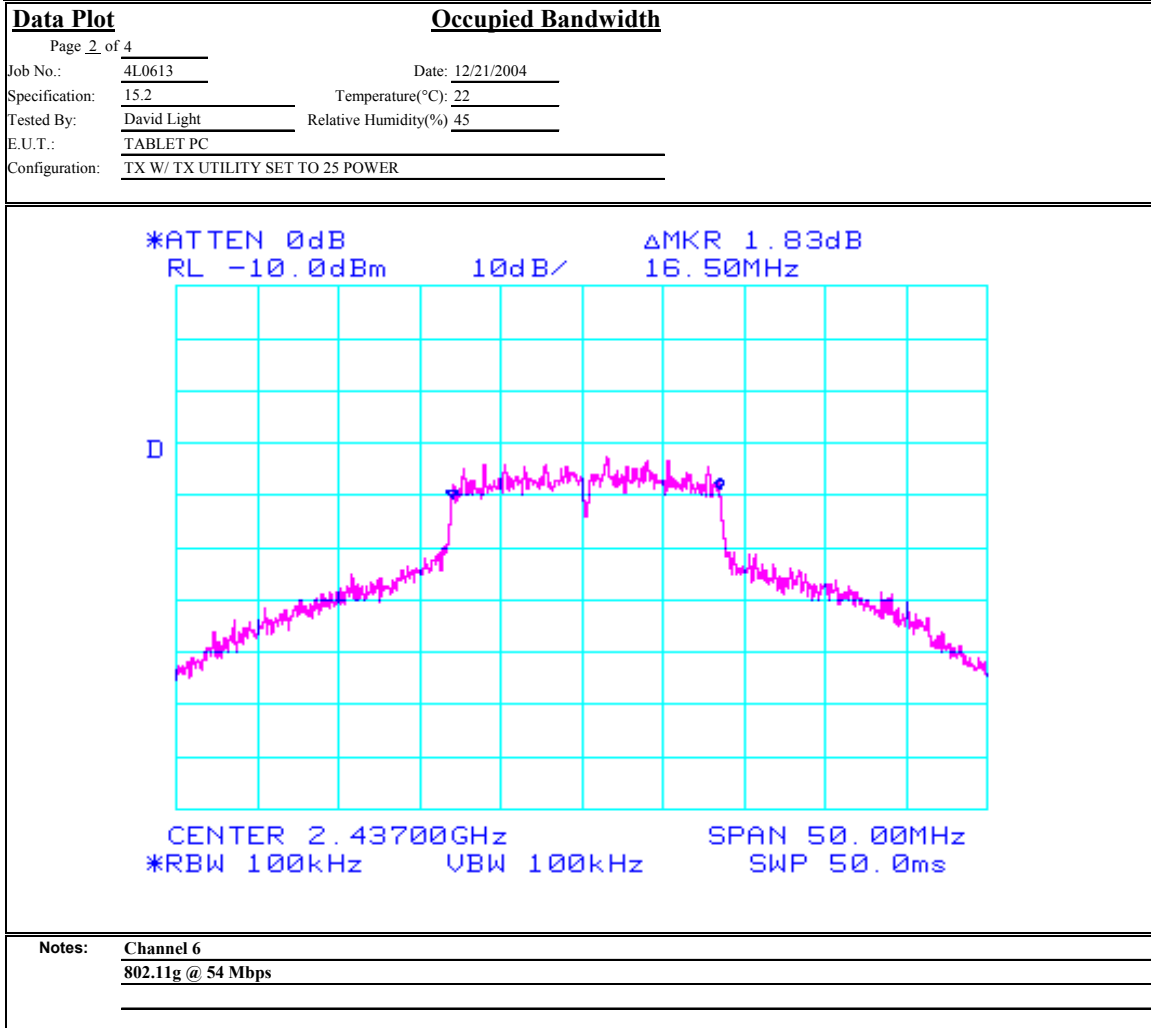
EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

802.11g



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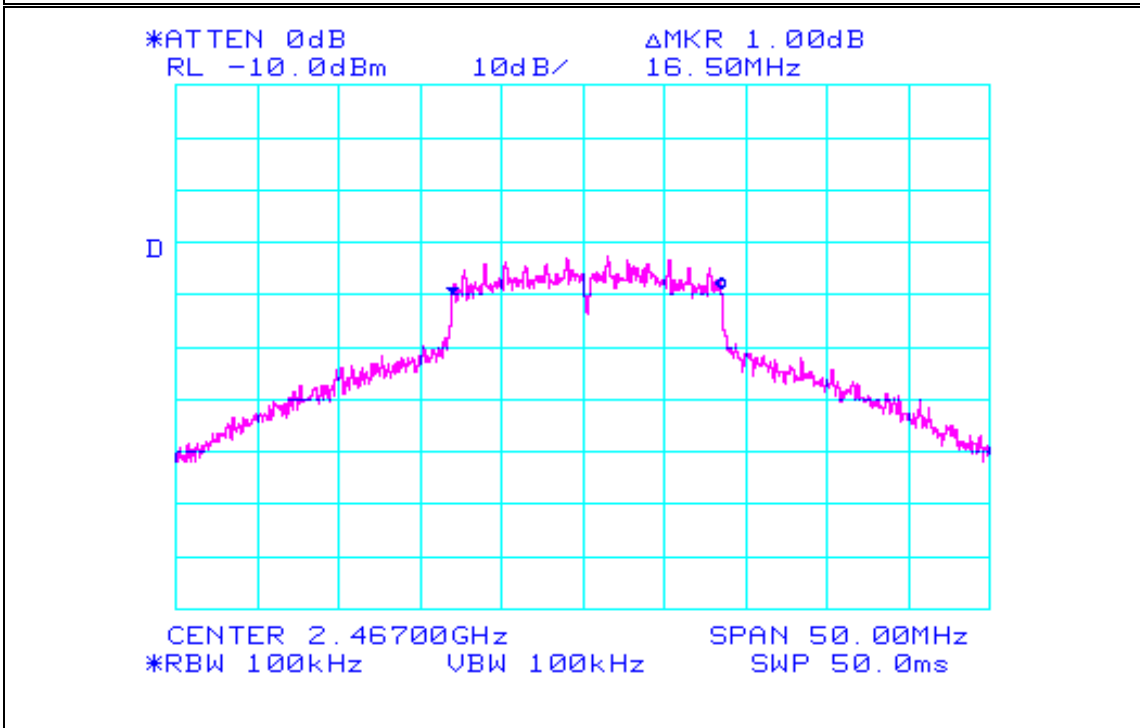
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Table with 2 columns: Data Plot and Occupied Bandwidth. Includes fields for Job No., Date, Specification, Temperature, Tested By, Relative Humidity, E.U.T., and Configuration.



Notes: Channel 11, 802.11g @ 54 Mbps

EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

802.11b



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Data Plot		Occupied Bandwidth		Complete <u> X </u>
Page <u> 1 </u> of <u> 4 </u>		Date: <u> 12/21/2004 </u>	Preliminary: <u> </u>	
Job No.:	<u> 4L0613 </u>	Temperature(°C):	<u> 22 </u>	
Specification:	<u> 15.247 </u>	Relative Humidity(%)	<u> 45 </u>	
Tested By:	<u> David Light </u>	E.U.T.: <u> TABLET PC </u>		
Configuration:	<u> TX UPRIGHT - TX POWER SET TO 25 IN TEST UTILITY </u>			
Sample Number:	<u> 1 </u>	RBW: <u> 100 kHz </u>		
Location:	<u> AC 3 </u>	VBW: <u> 100 kHz </u>		
Detector Type:	<u> Peak </u>			
Test Equipment Used				
Antenna:	<u> 1304 </u>	Directional Coupler:	<u> </u>	
Pre-Amp:	<u> </u>	Cable #1:	<u> 1484 </u>	
Filter:	<u> </u>	Cable #2:	<u> 1485 </u>	
Receiver:	<u> 1464 </u>	Cable #3:	<u> </u>	
Attenuator #1	<u> </u>	Cable #4:	<u> </u>	
Attenuator #2:	<u> </u>	Mixer:	<u> </u>	
Additional equipment used:	<u> </u>			
Measurement Uncertainty:	<u> +/-1.7 dB </u>			
<p>*ATTEN 0dB ΔMKR - .33dB RL -10.0dBm 10dB/ 9.92MHz</p> <p>D</p> <p>CENTER 2.41200GHz SPAN 50.00MHz *RBW 100kHz VBW 100kHz SWP 50.0ms</p>				
Notes:	<u> Channel 1 </u>			
	<u> 802.11b @ 11 Mbps </u>			

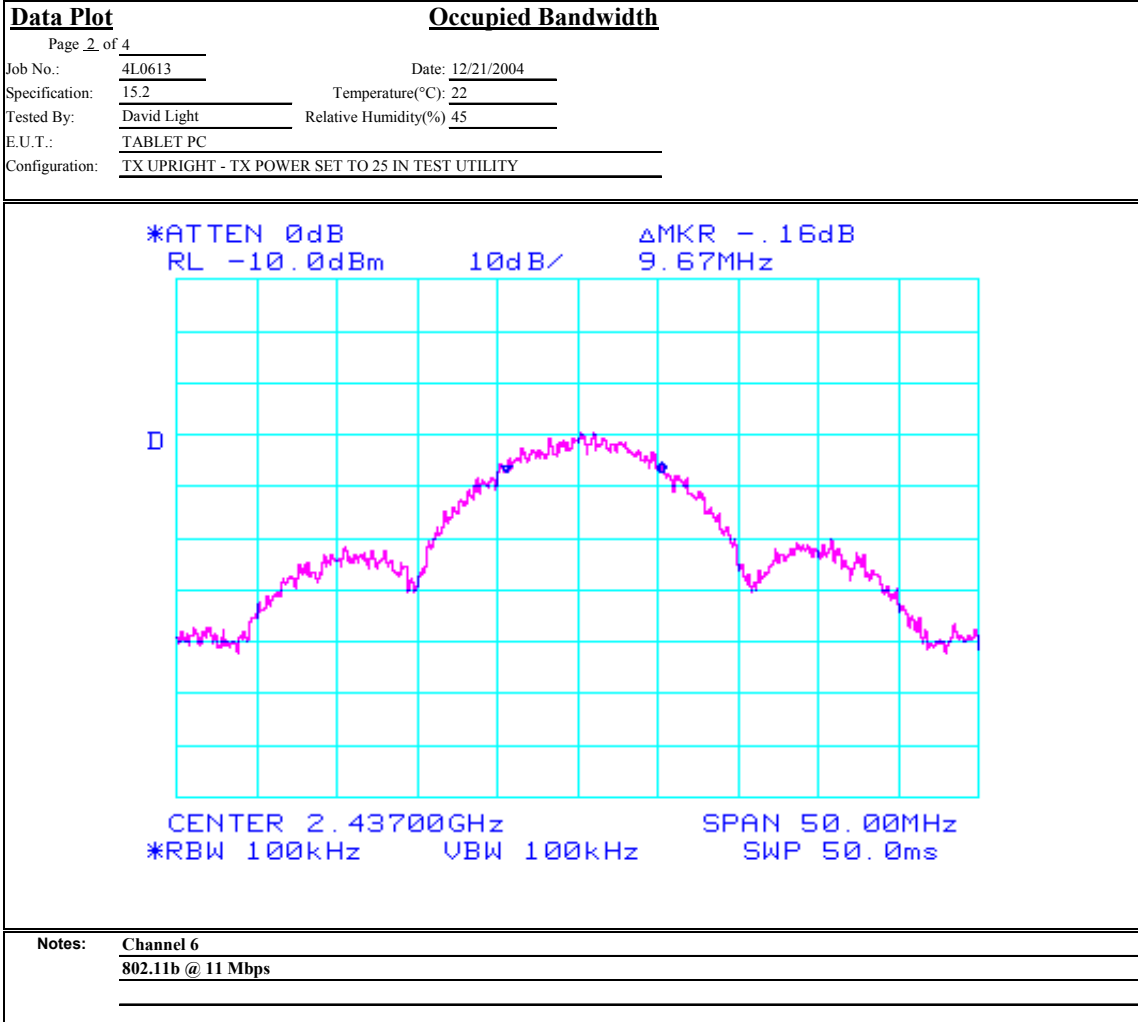
EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

802.11b



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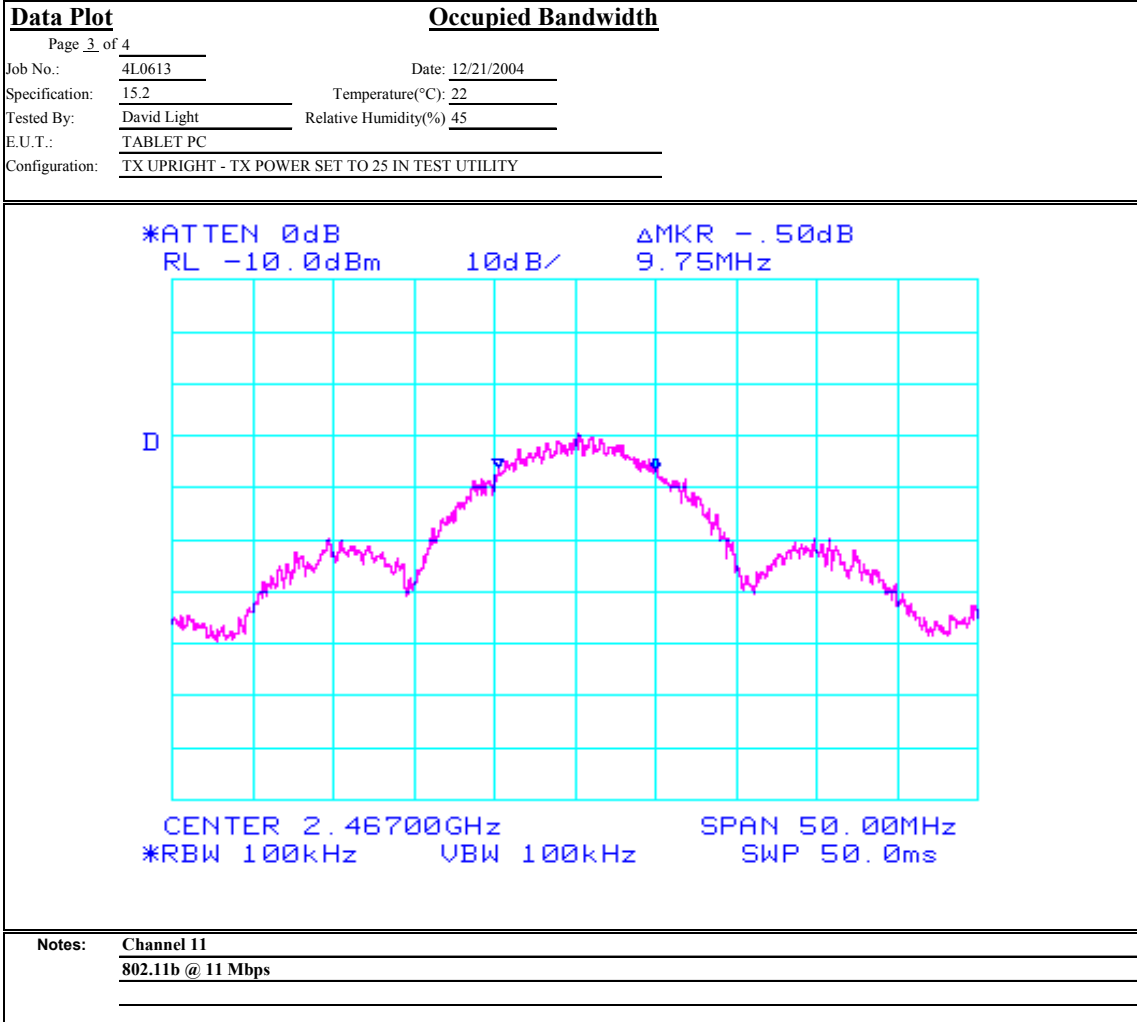


802.11b



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EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

Section 5. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(1)
TESTED BY: David Light	DATE: 12/21/04

Test Results: Complies.

Measurement Data: Refer to attached data

Frequency (MHz)	Mode	Peak Power (dBm)	Peak Power (mW)	Antenna Gain (dBi)
2412	802.11b	13.8	23.99	0
2437	802.11b	13.5	22.39	0
2462	802.11b	13.4	21.88	0
2412	802.11g	13.6	22.91	0
2437	802.11g	13.4	21.88	0
2462	802.11g	13.1	20.42	0

The measurement was repeated at +/- 15% of nominal supply voltage with no variation noted in rf power output.

EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

Section 6. RF Exposure

NAME OF TEST: RF Exposure	PARA. NO.: 15.247(b)(4)
TESTED BY:	DATE:

Test Results: [Please refer to SAR report for body SAR results.](#)

Measurement Data:

EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

Section 7 Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions at Antenna Terminals	PARA. NO.: 15.247 (c)
TESTED BY: David Light	DATE: 1/5/05

Test Results: Complies.

Measurement Data: See attached plots.

The spectrum was thoroughly searched from 30 MHz to 26 GHz in all modes on three channels. There were no emissions detected within 20 dB of the specification limit of -20 dBc in any 100 kHz bandwidth. Plots are presented to demonstrate compliance at the band edges.

Test Equipment: 1464-1626-1470-988-989

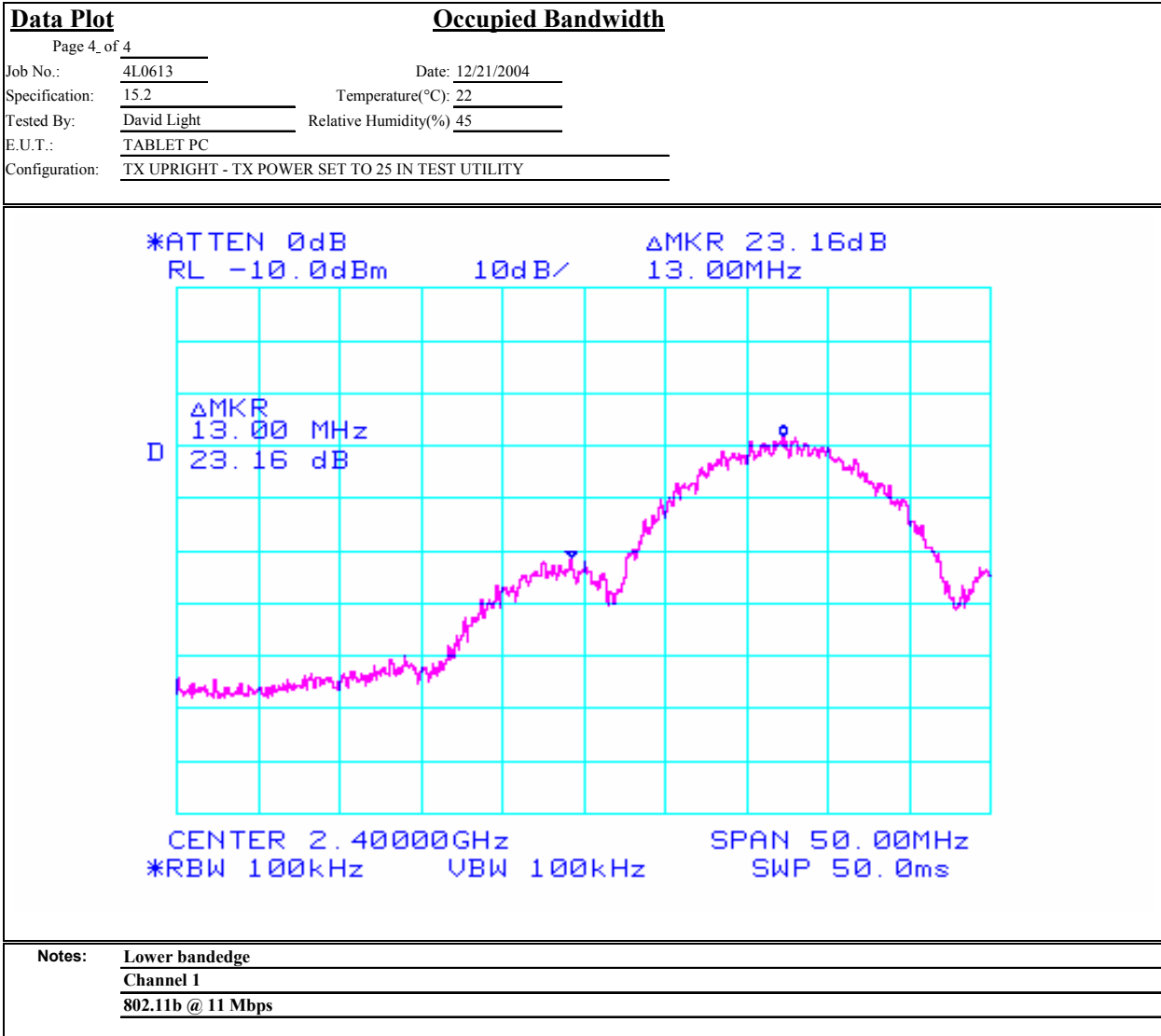
EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

Test Data – Spurious Emissions at Antenna Terminals
802.11b



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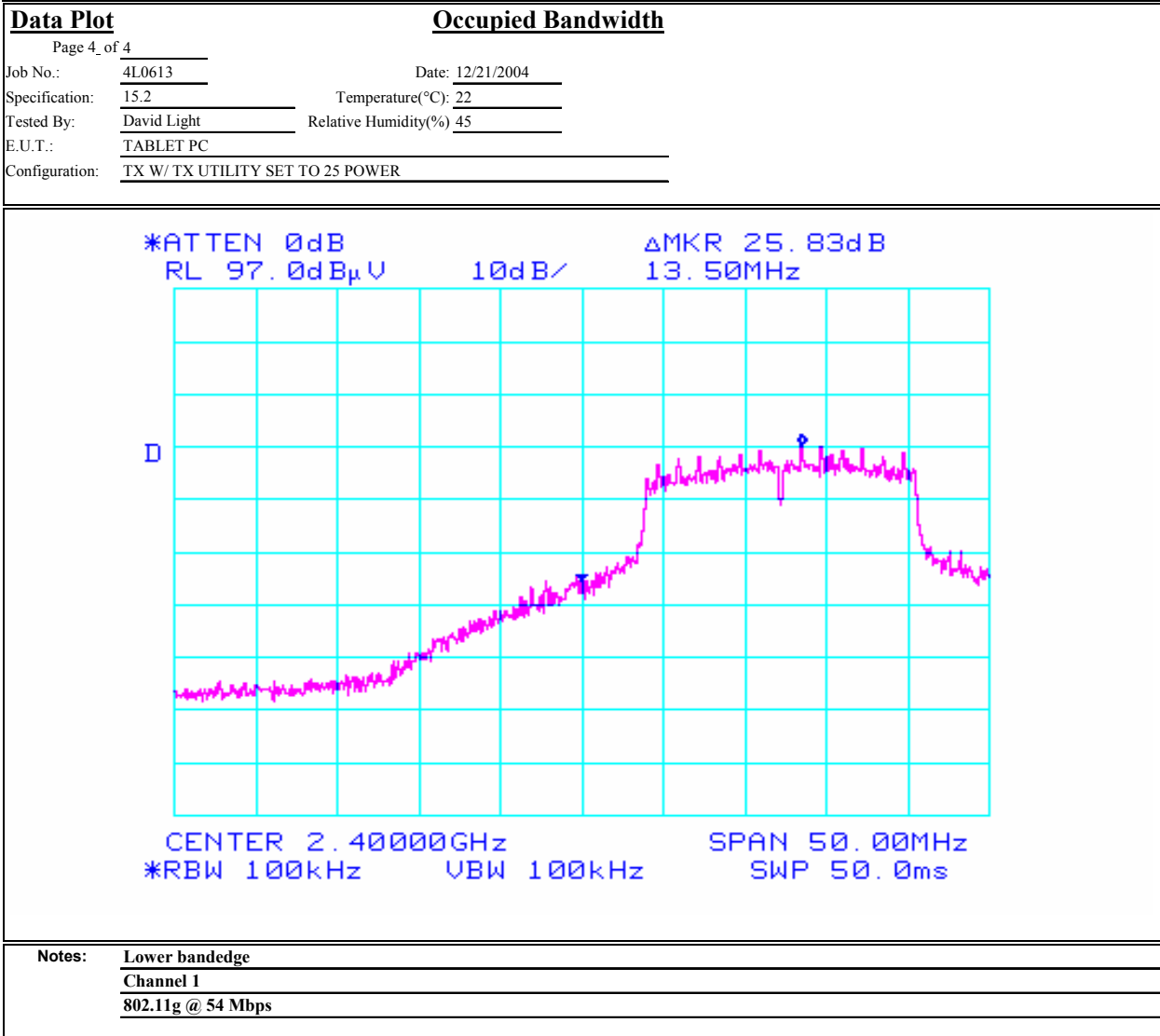
Test Data – Spurious Emissions at Antenna Terminals

802.11g



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EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

Section 8. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.247 (c)
TESTED BY: David Light	DATE: 1/29/04

Test Results: Complies.

Measurement Data: See attached table.

EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

Radiated Emissions – 802.11b



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<u>Radiated Emissions</u>								
Page 1 of 1								
Job No.:	4L0050			Date: 12/28/2004				
Specification:	15.247/15.205		Temperature(°C): 20					
Tested By:	David Light		Relative Humidity(%) 50					
E.U.T.:	TABLET PC w/802.11b							
Configuration:	Upright on long edge - Continuous transmit @ 11 Mbps Tx utility set at 25							
Sample Number:	1							
Location:	AC 3			RBW: 1 MHz				
Detector Type:	Peak			Peak VBW: 1 MHz				
	Avg VBW 10 Hz							
<u>Test Equipment Used</u>								
Antenna:	1304			Directional Coupler: #N/A				
Pre-Amp:	1016			Cable #1: 1484				
Filter:	1650			Cable #2: 1485				
Receiver:	1464			Cable #3: #N/A				
Attenuator #1	#N/A			Cable #4: #N/A				
Attenuator #2:	#N/A			Mixer: #N/A				
Additional test equipment:	988-983-991-992							
Measurement Uncertainty:	+/- 3.6 dB							
Frequency (MHz)	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
								Tx 2462 MHz
2483.5	41.0	28.2	3.1	0.0	72.3	74	54	Peak/Horizontal
2483.5	22.3	28.2	3.1	0.0	53.6	74	54	Average/Horizontal
2483.5	38.0	28.2	3.1	0.0	69.3	74	54	Peak/Vertical
2483.5	22.0	28.2	3.1	0.0	53.3	74	54	Average/Vertical
Notes:	The device was tested on 3 channels. The spectrum was searched to 25GHz. No emissions were detected above the noise floor. Bandedge data provided.							

Radiated Emissions – 802.11g



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Radiated Emissions	
Page <u>1</u> of <u>1</u>	
Job No.: 4L0613	Date: 12/28/2004
Specification: 15.247/15.205	Temperature(°C): <u>20</u>
Tested By: <u>David Light</u>	Relative Humidity(%) <u>50</u>
E.U.T.: <u>TABLET PC w/802.11g</u>	
Configuration: <u>Upright on long edge - Continuous transmit @ 54 Mbps Tx utility set at 25</u>	
Sample Number: <u>1</u>	
Location: <u>AC 3</u>	RBW: <u>1 MHz</u>
Detector Type: <u>Peak</u>	Peak VBW: <u>1 MHz</u>
	Avg VBW: <u>10 Hz</u>
Test Equipment Used	
Antenna: <u>1304</u>	Directional Coupler: <u>#N/A</u>
Pre-Amp: <u>1016</u>	Cable #1: <u>1484</u>
Filter: <u>1650</u>	Cable #2: <u>1485</u>
Receiver: <u>1464</u>	Cable #3: <u>#N/A</u>
Attenuator #1: <u>#N/A</u>	Cable #4: <u>#N/A</u>
Attenuator #2: <u>#N/A</u>	Mixer: <u>#N/A</u>
Additional test equipment: <u>988-983-991-992</u>	
Measurement Uncertainty: <u>+/- 3.6 dB</u>	

Frequency (MHz)	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
								Tx 2462 MHz
2483.5	34.5	28.2	3.1	0.0	65.8	74	54	Peak/Horizontal
2483.5	22.6	28.2	3.1	0.0	53.9	74	54	Average/Horizontal
2483.5	33.0	28.2	3.1	0.0	64.3	74	54	Peak/Vertical
2483.5	22.4	28.2	3.1	0.0	53.7	74	54	Average/Vertical
Notes: The device was tested on 3 channels. The spectrum was searched to 25GHz								
No emissions were detected above noise floor. Band edge data provided								

Radiated Photographs



EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

Section 9. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(d)
TESTED BY: David Light	DATE: 1/4/05

Test Results: Complies.

Measurement Data: See attached data..

Peak Power Spectral Density

802.11b



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Data Plot		Peak Power Spectral Density		Complete <u> X </u>	
Page <u> 1 </u> of <u> 3 </u>		Date: <u> 1/4/2005 </u>		Preliminary: <u> </u>	
Job No.: <u> 4L0613 </u>		Temperature(°C): <u> 20 </u>			
Specification: <u> 15.247(e) </u>		Relative Humidity(%): <u> 60 </u>			
Tested By: <u> David Light </u>					
E.U.T.: <u> Tablet PC </u>					
Configuration: <u> Upright on long edge-Tx 11 Mbps-802.11b </u>					
Sample Number: <u> 1 </u>					
Location: <u> Lab 1 </u>		RBW: <u> 3 kHz </u>			
Detector Type: <u> Peak </u>		VBW: <u> 3 kHz </u>			
Test Equipment Used					
Antenna: <u> </u>		Directional Coupler: <u> </u>			
Pre-Amp: <u> </u>		Cable #1: <u> 1626 </u>			
Filter: <u> </u>		Cable #2: <u> </u>			
Receiver: <u> 1464 </u>		Cable #3: <u> </u>			
Attenuator #1: <u> 1470 </u>		Cable #4: <u> </u>			
Attenuator #2: <u> </u>		Mixer: <u> </u>			
Additional equipment used: <u> </u>					
Measurement Uncertainty: <u> +/-1.7 dB </u>					
Notes: <u> Channel 1 </u>					
<u> 802.11b @ 11 Mbps </u>					

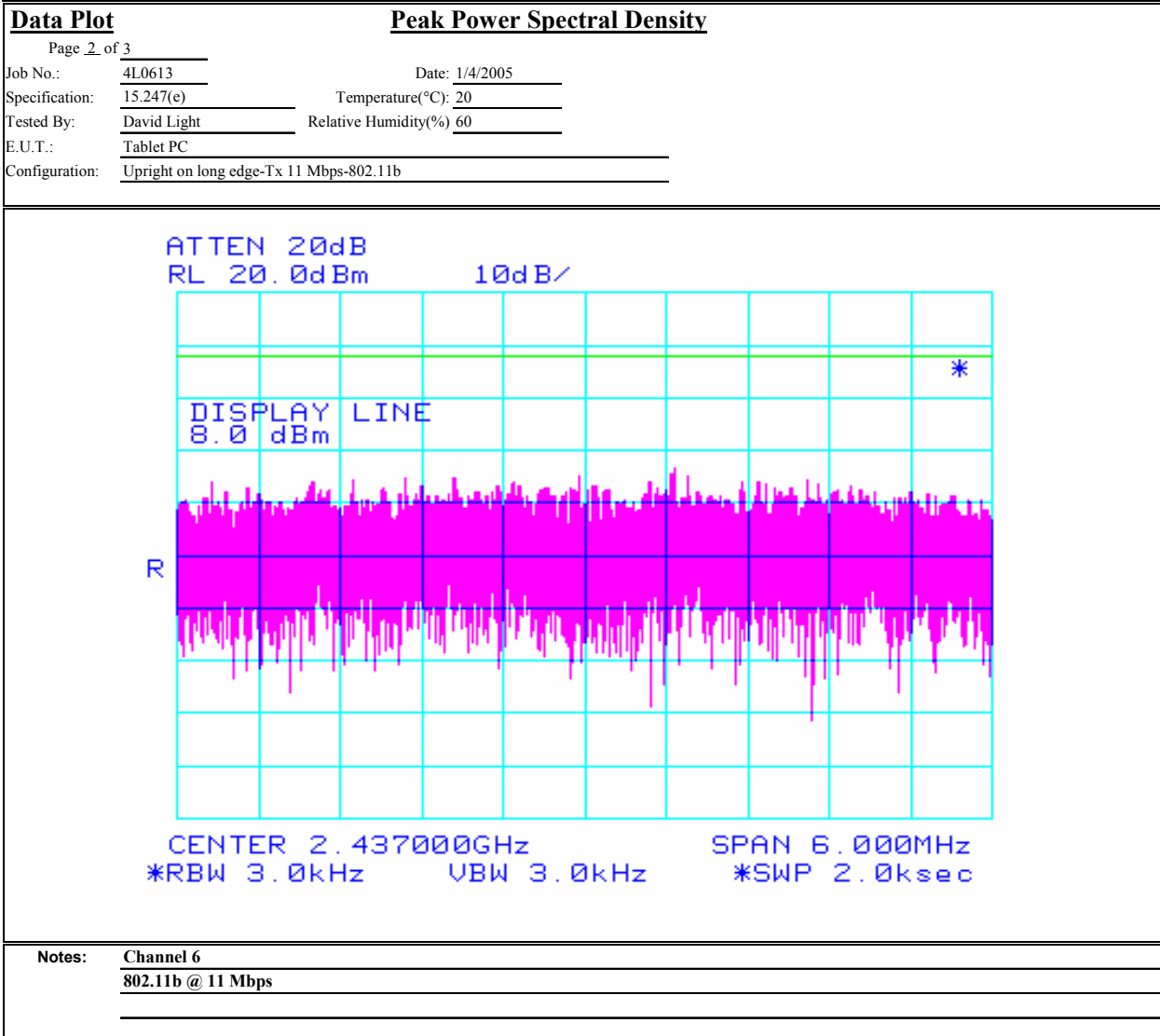
Peak Power Spectral Density

802.11b



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

Nemko Dallas, Inc.



Peak Power Spectral Density

802.11b



Dallas Headquarters:

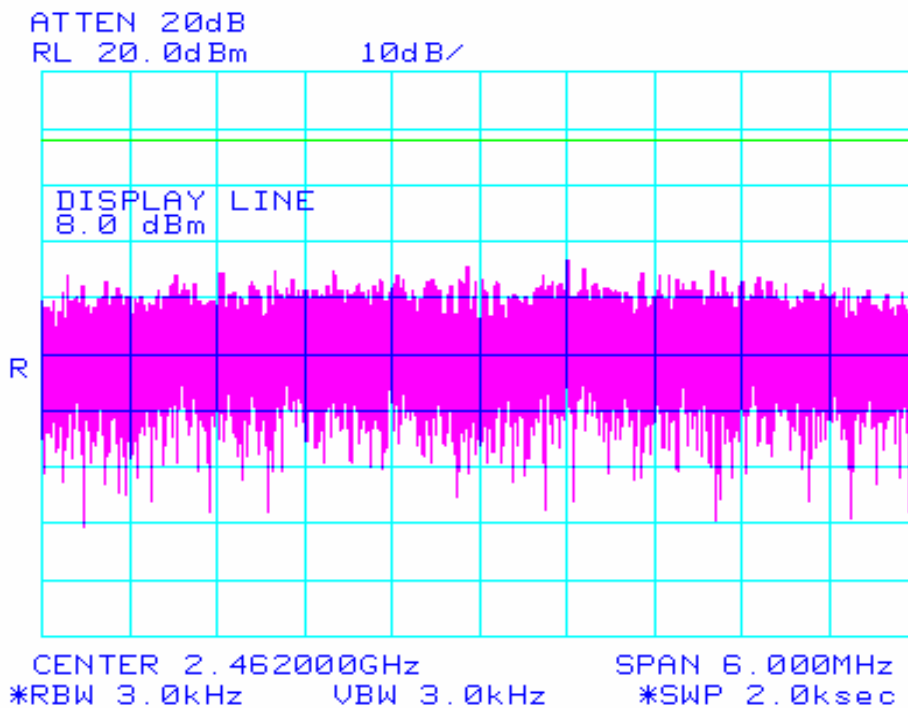
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Lewisville, TX 75057
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Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot Peak Power Spectral Density

Page 3 of 3

Job No.: 4L0613 Date: 1/4/2005
Specification: 15.247(e) Temperature(°C): 20
Tested By: David Light Relative Humidity(%) 60
E.U.T.: Tablet PC
Configuration: Upright on long edge-Tx 11 Mbps-802.11b



Notes: Channel 11
802.11b @ 11 Mbps

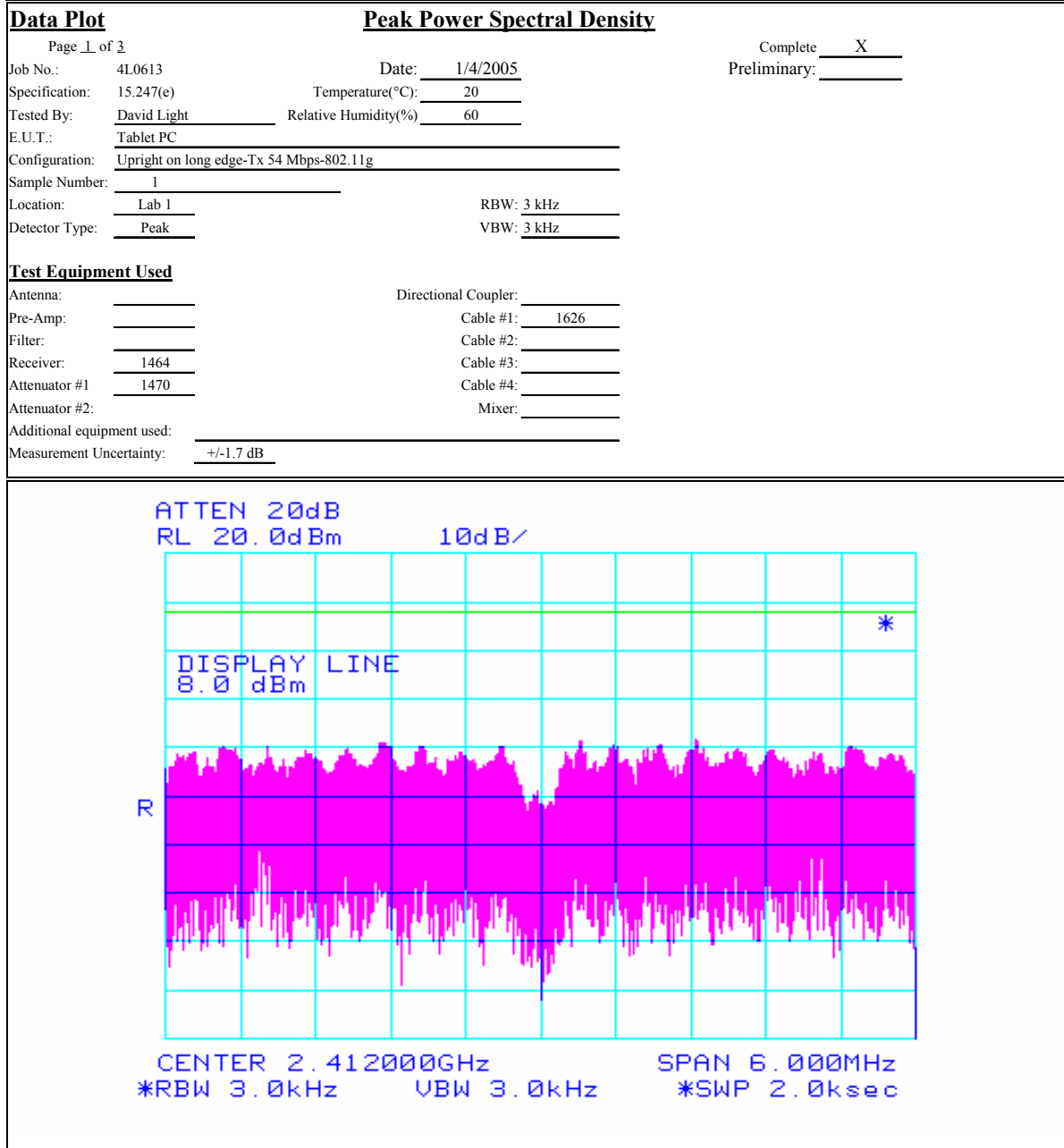
Peak Power Spectral Density

802.11g



Nemko Dallas, Inc.

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



Notes: Channel 1
802.11g @ 54 Mbps

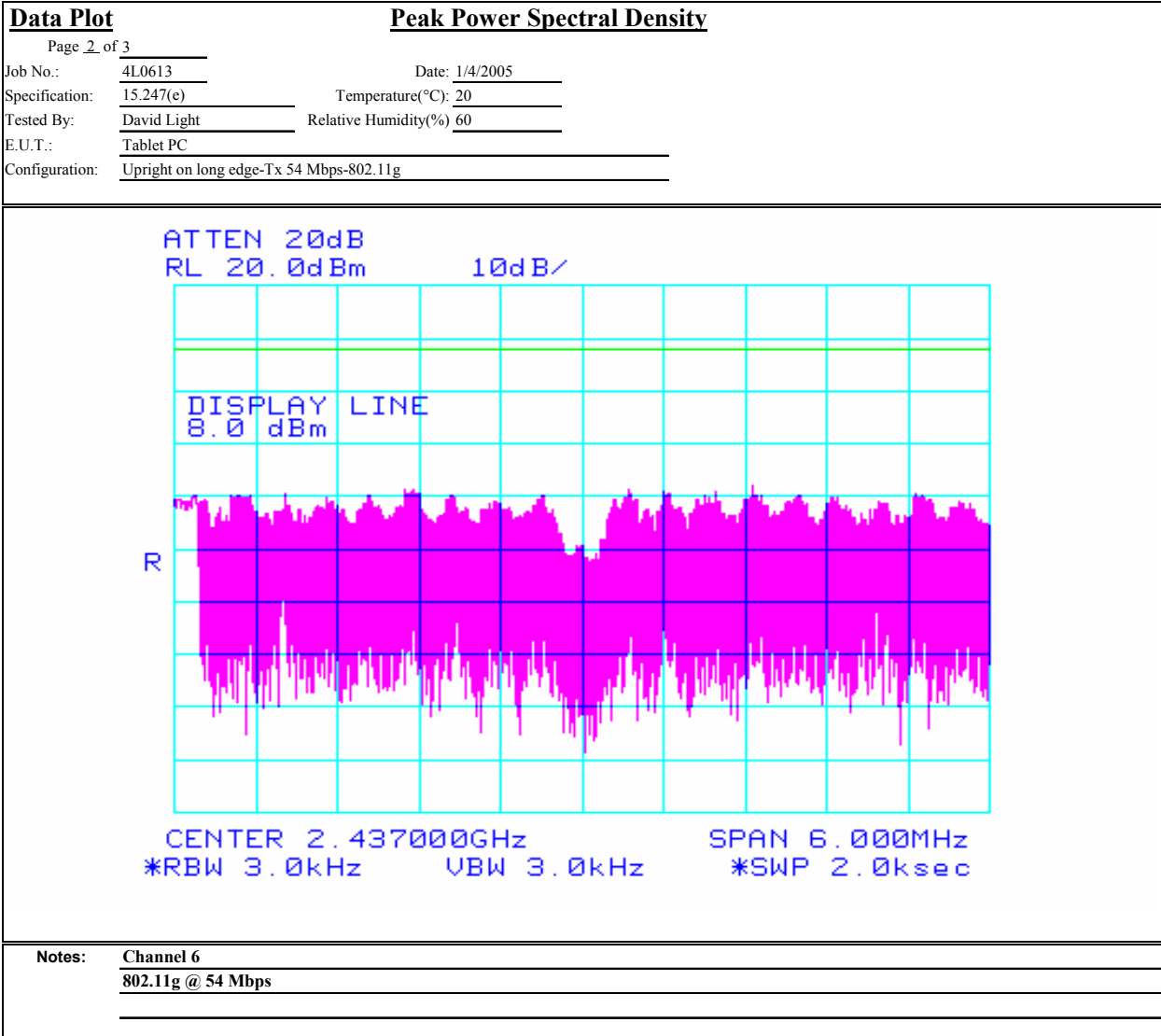
Peak Power Spectral Density

802.11g



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Peak Power Spectral Density

802.11g



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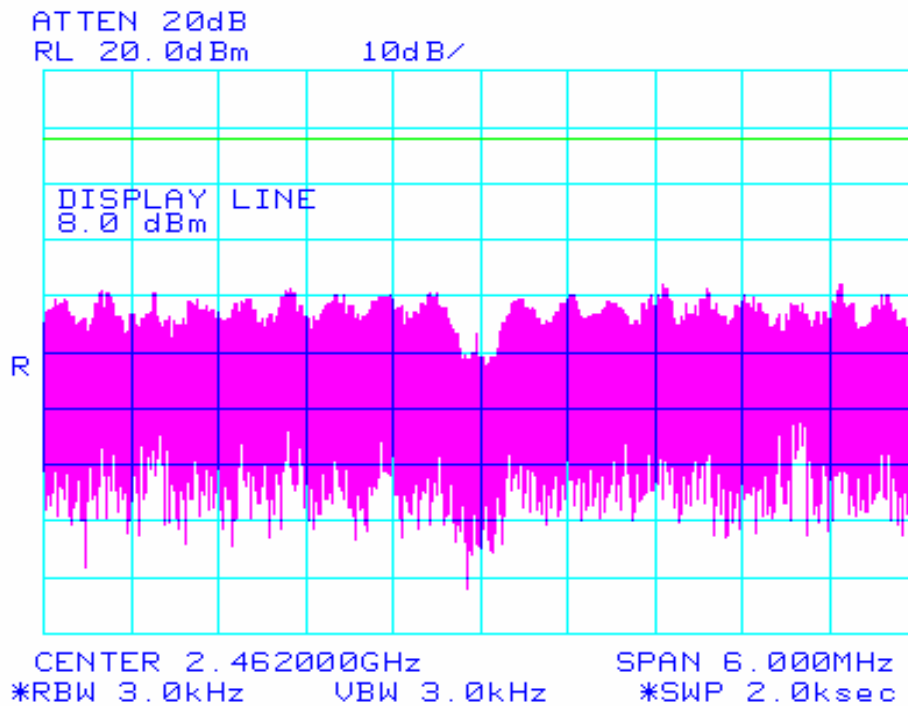
Nemko Dallas, Inc.

Data Plot

Peak Power Spectral Density

Page 3 of 3

Job No.: 4L0613 Date: 1/4/2005
Specification: 15.247(e) Temperature(°C): 20
Tested By: David Light Relative Humidity(%) 60
E.U.T.: Tablet PC
Configuration: Upright on long edge-Tx 54 Mbps-802.11g



Notes: Channel 11
802.11g @ 54 Mbps

EQUIPMENT: LE 1600 Series, Model T004 **TEST REPORT NO.:** 4L0613RUS3

Section 10. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	07/30/04	07/31/06
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
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
791	PREAMP, 25dB	ICC LNA25	398	11/12/04	11/12/05
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
988	HARMONIC MIXER	Hewlett Packard 11970A	2332A01929	CNR	N/A
989	HARMONIC MIXER	Hewlett Packard 11970U	2332A00116	CNR	N/A
1626	CABLE, 5 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1030	PEAK POWER SENSOR	HP 84811A	2539A03573	12/23/04	1/23/05
1029	PEAK POWER METER	HP 8900D	3303U0012	12/23/04	1/23/05
1470	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1650	WR90 Band Pass Filter	Nemko None	None	CBU	N/A
991	Horn antenna	EMCO 3160-10	9704-1049	CNR	N/A
992	Horn antenna	EMCO 3160-09	9705-1079	CNR	N/A

EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

ANNEX A - TEST DETAILS

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
---	----------------------

Minimum Standard: §15.207 Conducted limits.

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 mH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Conducted Emission (MHz)	Limit (dBmV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 mV within the frequency band 535-1705 kHz, as measured using a 50 mH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as provided in §15.205 and §§15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

EQUIPMENT: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
---	--------------------------------

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

NAME OF TEST: Maximum Peak Output Power	PARA. NO.: 15.247(b)(1)
---	-------------------------

Minimum Standard: The maximum peak output power shall not exceed 1 watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

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.

Substitution Antenna Method for Integral Antennas:

The peak field strength of the carrier is measured in a worst-case configuration with a RBW > 5 times the occupied bandwidth of the transmitted waveform. For cases where the RBW of the test instrument is not sufficient, the power is measured using a peak power meter instead of the spectrum analyzer.

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.

Number of channels tested:

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: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

NAME OF TEST: Channel Separation	PARA. NO.: 15.247(a)(1)
----------------------------------	-------------------------

Minimum Standard: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

NAME OF TEST: Pseudorandom Hopping Algorithm	PARA. NO.: 15.247(a)(1)
--	-------------------------

Minimum Standard: The system shall hop to channel frequencies that are selected from a pseudo-randomly ordered list of hopping frequencies. Each frequency must be used equally on average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their transmitters and shall shift frequencies in synchronization with the transmitted signals.

EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

NAME OF TEST: Time of Occupancy	PARA. NO.: 15.247(a)(1)(ii)
---------------------------------	-----------------------------

Minimum Standard:

Frequency Band (MHz)	20 dB Bandwidth	No. of Hopping Channels	Average Time of Occupancy
902 - 928	<250 kHz	50	=<0.4 sec. in 20 sec.
902 – 928	=>250 kHz	25	=<0.4 sec. in 10 sec.
2400 – 2483.5	-----	75	=<0.4 sec. in 30 sec.
5725 – 5850	-----	75	=<0.4 sec. in 30 sec.

Method Of Measurement:

The spectrum analyzer is set as follows:

- RBW: 1 MHz
- VBW: = RBW
- Span: 0 Hz
- LOG dB/div.: 10 dB
- Sweep: Sufficient to see one hop time sequence.
- Trigger: Video

The occupancy time of one hop is measured as above. The average time of occupancy is calculated over the appropriate period of time from above table (10, 20, or 30 seconds).

Avg. time of occupancy = (period from table/duration of one hop)/no. of channels multiplied by the duration of one hop.

For instance:

If a 2.4 GHz system has a measured hop duration time of 1 msec. and uses 75 channels, then the average time of occupancy would be:

$$(30 \text{ sec.} / .001 \text{ sec.}) / 75 \text{ chan.} = 400 \times 1 \text{ msec.} = 400 \text{ msec. or } 0.4 \text{ sec. in } 30 \text{ sec.}$$

EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
----------------------------------	-------------------------

Minimum Standard:

Frequency Band (MHz)	Maximum 20 dB Bandwidth
902 - 928	500 kHz
2400 – 2483.5	1 MHz
5725 – 5850	1 MHz

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: At least 1% of span/div.

VBW: >RBW

Span: Sufficient to display 20 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

Number of channels tested:

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: LE 1600 Series, Model T004 *TEST REPORT NO.:* 4L0613RUS3

NAME OF TEST: RF Exposure	PARA. NO.: 15.247(b)(4)
---------------------------	-------------------------

Minimum Standard: Systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines stipulated in 1.1307(b)(1) of CFR 47.

EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

NAME OF TEST: 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.

Number of channels tested:

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: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

NAME OF TEST: Radiated Spurious 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 (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 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		

Number of channels tested:

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: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

NAME OF TEST: Transmitter Power Density	PARA. NO.: 15.247(d)
---	----------------------

Minimum Standard: The transmitted power density averaged over any 1 second interval shall not be greater than +8 dBm in any 3 kHz bandwidth.

Method Of Measurement: The spectrum analyzer is set as follows:

- RBW: 3 kHz
- VBW: >3 kHz
- Span: => measured 6 dB bandwidth
- Sweep: Span(kHz)/3 (i.e. for a span of 1.5 MHz the sweep rate is 1500/3 = 500 sec.
- LOG dB/div.: 2 dB

Note: For devices with spectrum line spacing =< 3 kHz, the RBW of the analyzer is reduced until the spectral lines are resolved. The measurement data is normalized to 3 kHz by summing the power of all the individual spectral lines within a 3 kHz band in linear power units.

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.

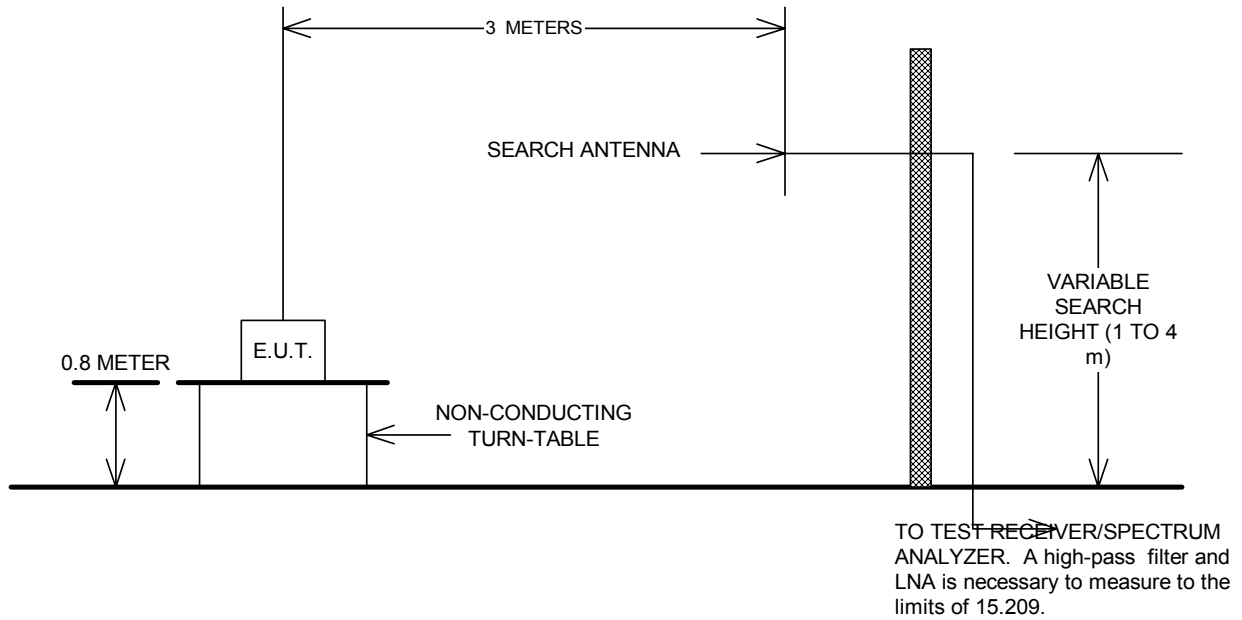
Number of channels tested:

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

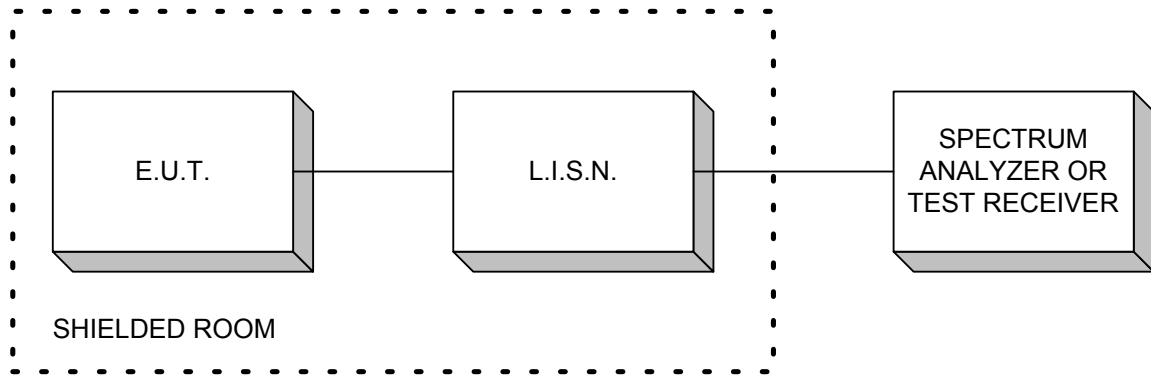
EQUIPMENT: LE 1600 Series, Model T004 TEST REPORT NO.: 4L0613RUS3

ANNEX B - TEST DIAGRAMS

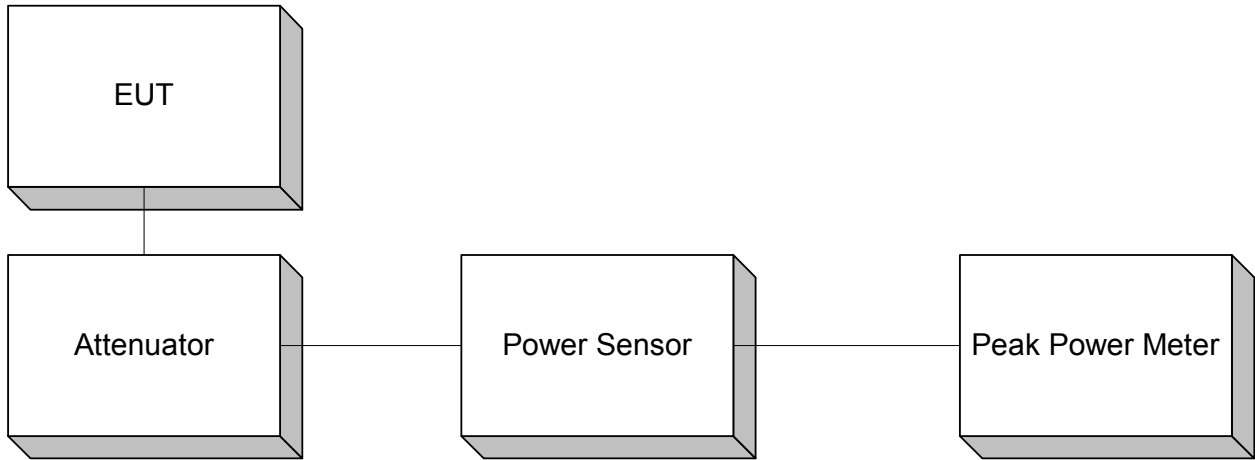
Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals



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

