



Nemko Test Report: 5L0114RUS4Rev1

Applicant: Motion Computing, Inc.
8601 RR 2222 Bldg 2
Austin, Texas 78730

Equipment Under Test: LS800 TS01 with Atheros card
(E.U.T.)

FCC ID.: Q3QWMIA123AG

In Accordance With: **FCC Part 15, Subpart E**
UNII Band Transceiver

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

Authorized By: 
Tom Tidwell, Frontline Group Manager

Date: 1 December, 2005

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EQUIPMENT: TS01 w/ Atheros card*TEST REPORT NO.:* 5L0114RUS4Rev1

Section 1. Summary of Test Results

Manufacturer: Motion Computing, Inc.

Model No.: TS01 w/ Atheros card

Name: LS800

Serial No.: Proto 8

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 E for UNII 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: TS01 w/ Atheros cardTEST REPORT NO.: 5L0114RUS4Rev1

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a)	Complies
26 dB Bandwidth	15.407(a)	Complies
Maximum Peak Power Output	15.407(a)	Complies
Peak Excursion	15.407(b)	Comlies
Spurious Emissions (Antenna Conducted)	15.407(a)	Complies
Spurious Emissions (Restricted Bands)	15.407(a)	Complies
Peak Power Spectral Density	15.407(a)	Complies

Footnotes:

EQUIPMENT: TS01 w/ Atheros card

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

General Equipment Information

Frequency Band:

☒ 5170 – 5240 MHz

☒ 5260 – 5320 MHz

Channel Spacing:

5 MHz

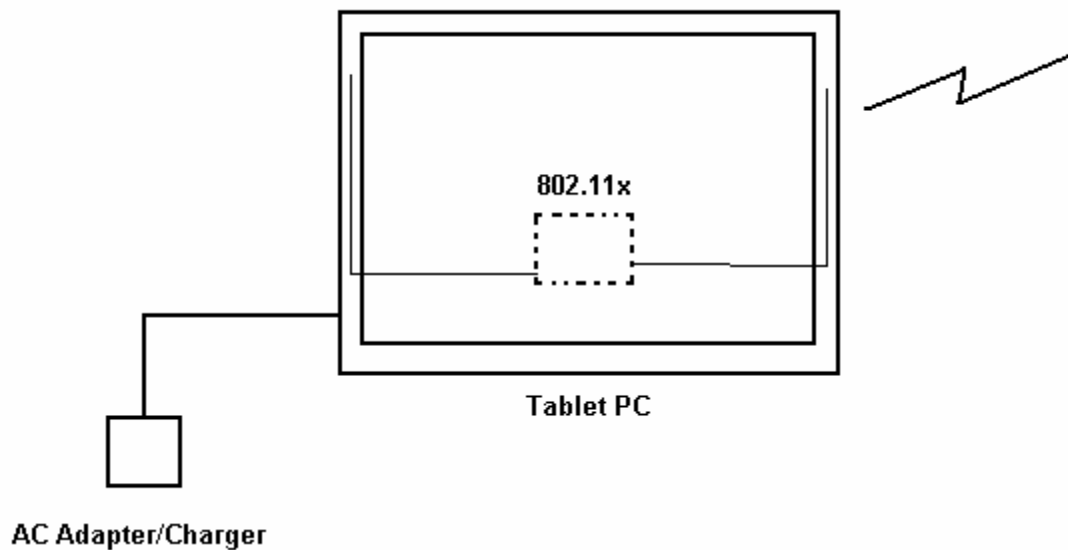
User Frequency Adjustment:

Software controlled

Description of EUT

The LS800 TS01 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 802.11a, b and g technologies.

The PC also has Bluetooth capability.

System Diagram

EQUIPMENT: TS01 w/ Atheros cardTEST REPORT NO.: 5L0114RUS4Rev1

Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions

PARA. NO.: 15.207(a)

TESTED BY: Brian Boyea

DATE: 4/19/05

Test Results: Complies.**Measurement Data:** See attached plots.**Measurement Uncertainty:** +/- 1.7 dB

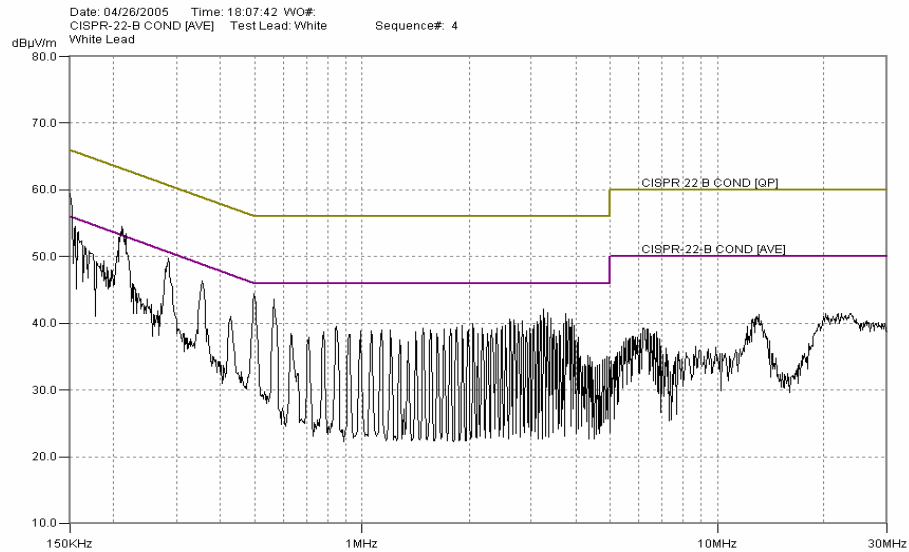
The worst case PEAK emission was 51 dB μ V at 150 kHz on the neutral line. This is 5 dB below the AVERAGE spec limit of 56 dB μ V.

EQUIPMENT: TS01 w/ Atheros card

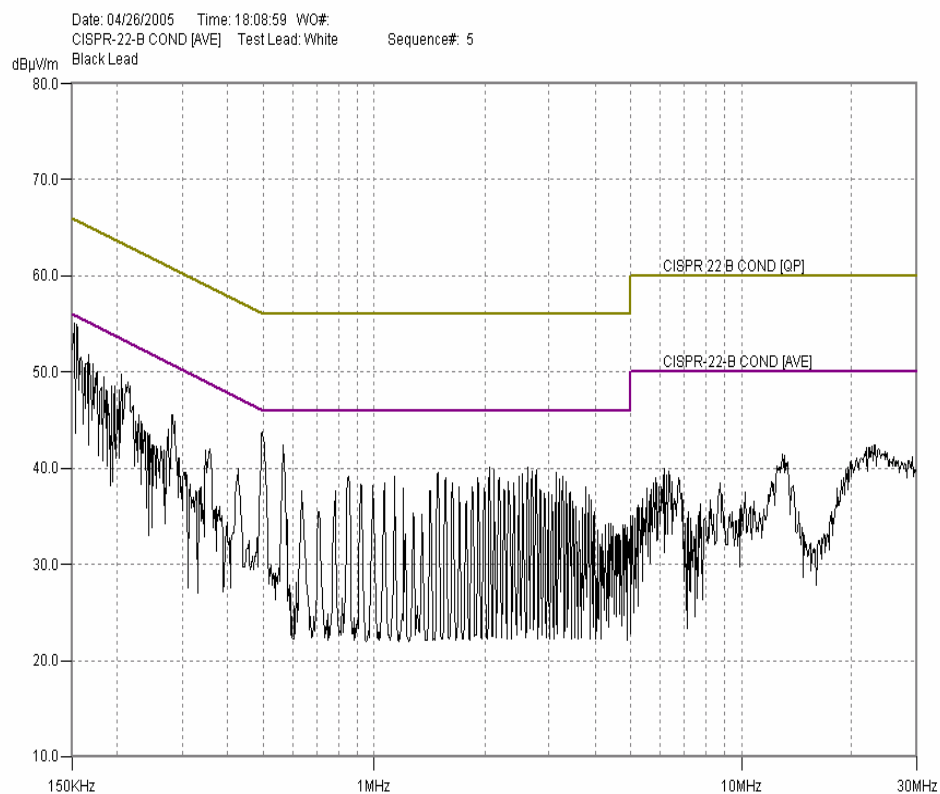
TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – Powerline Conducted Emissions

Neutral

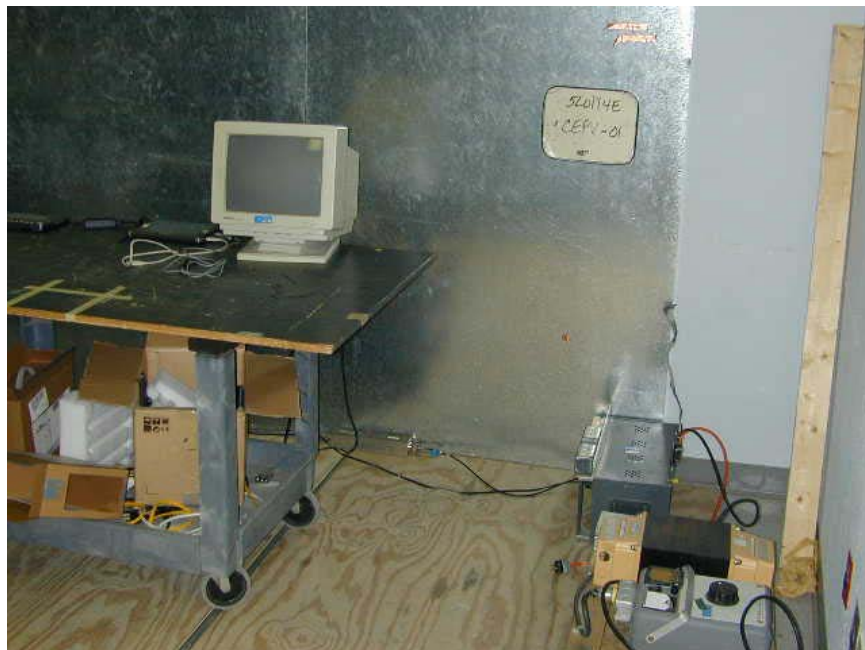


Hot



Photos – Powerline Conducted Emissions

Front



Side



EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Section 4. 26 dB Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.407(a)
TESTED BY: David Light	DATE: 03 May 2005

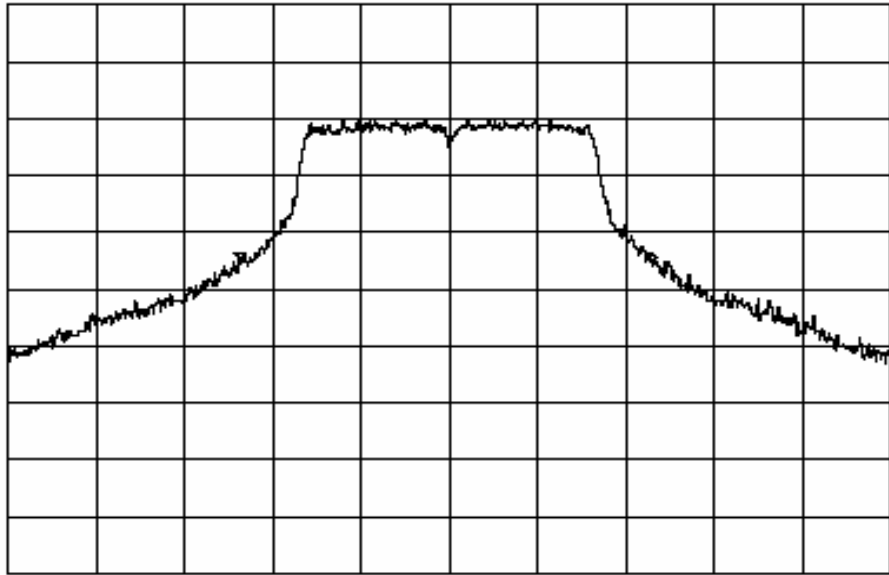
Test Results:

Complies.

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – 26 dB Bandwidth

<u>Data Plot</u>		<u>Occupied Bandwidth</u>	
Page <u>1</u> of 2		Complete <u>X</u>	
Job No.: 5L0114	Date: <u>5/11/2005</u>	Preliminary: _____	
Specification: 15.407(a)	Temperature(°C): <u>23</u>		
Tested By: <u>David Light</u>	Relative Humidity(%) <u>45</u>		
E.U.T.: <u>Tablet PC w/Atheros 802.11 a/b/g radio</u>			
Configuration: <u>Tx</u>			
Sample Number: <u>1</u>			
Location: <u>Lab 1</u>	RBW: <u>300 kHz</u>		
Detector Type: <u>Peak</u>	VBW: <u>300 kHz</u>		
<u>Test Equipment Used</u>			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: <u>1973</u>		
Filter: _____	Cable #2: _____		
Receiver: <u>1464</u>	Cable #3: _____		
Attenuator #1: <u>1472</u>	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: <u>+/-1.7 dB</u>			
ATTEN 10dB ΔMKR -.50dB RL -23.6dBm 10dB/ 23.33MHz  CENTER 5.17000GHz SPAN 50.00MHz *RBW 300kHz VBW 300kHz SWP 50.0ms			
Notes: _____ _____ _____			

EQUIPMENT: TS01 w/ Atheros card

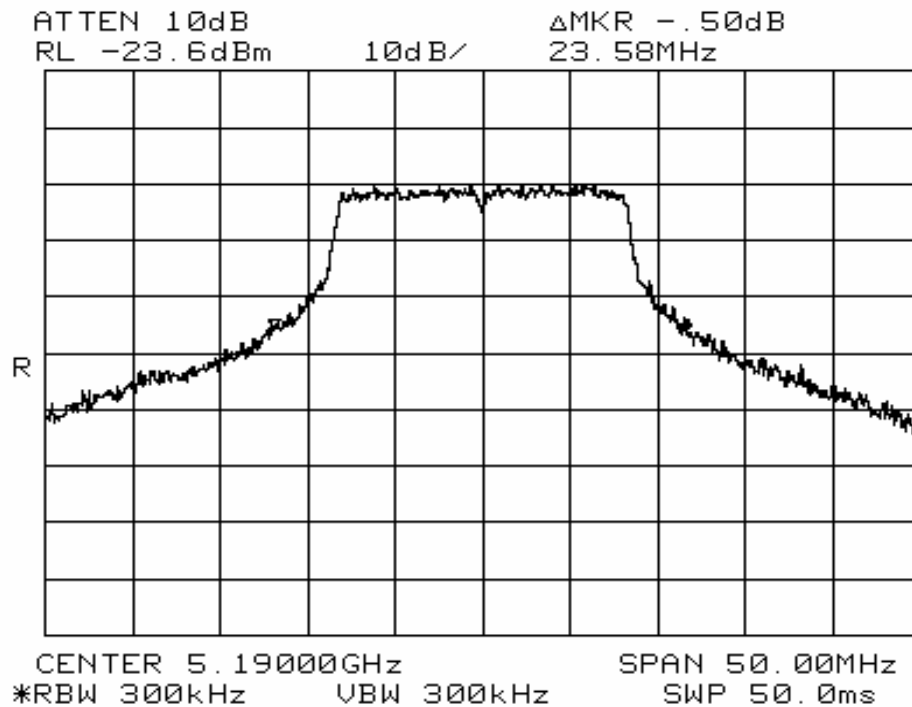
TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – 26 dB Bandwidth

Data Plot**Occupied Bandwidth**

Page 2 of 9

Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

EQUIPMENT: TS01 w/ Atheros card

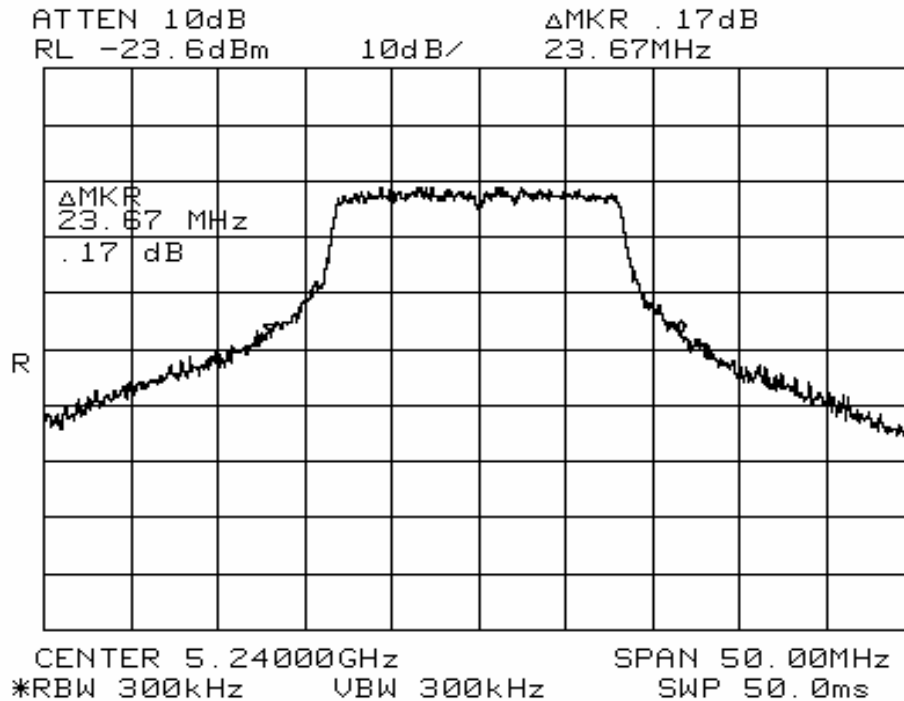
TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – 26 dB Bandwidth

Data Plot**Occupied Bandwidth**

Page 3 of 9

Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

EQUIPMENT: TS01 w/ Atheros card

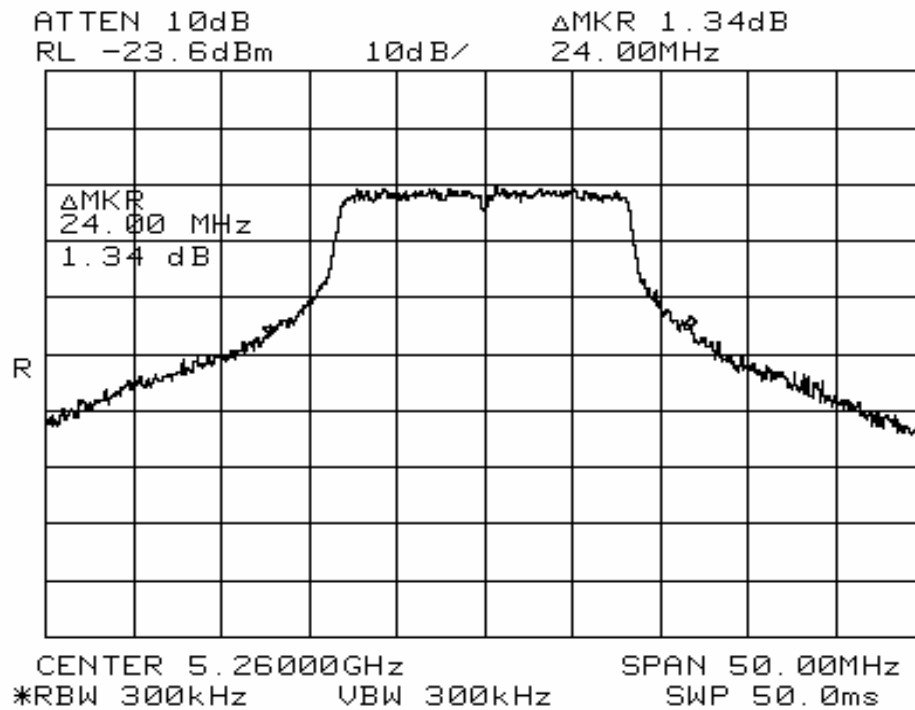
TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – 26 dB Bandwidth

Data Plot**Occupied Bandwidth**

Page 4_ of 9

Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

EQUIPMENT: TS01 w/ Atheros card

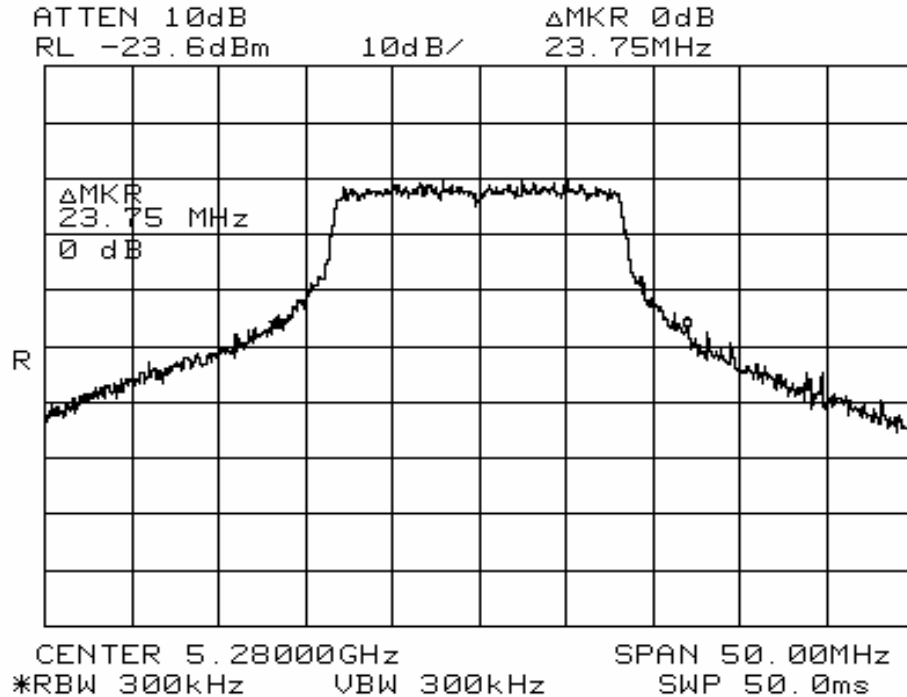
TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – 26 dB Bandwidth

Data Plot**Occupied Bandwidth**

Page 5 of 9

Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx

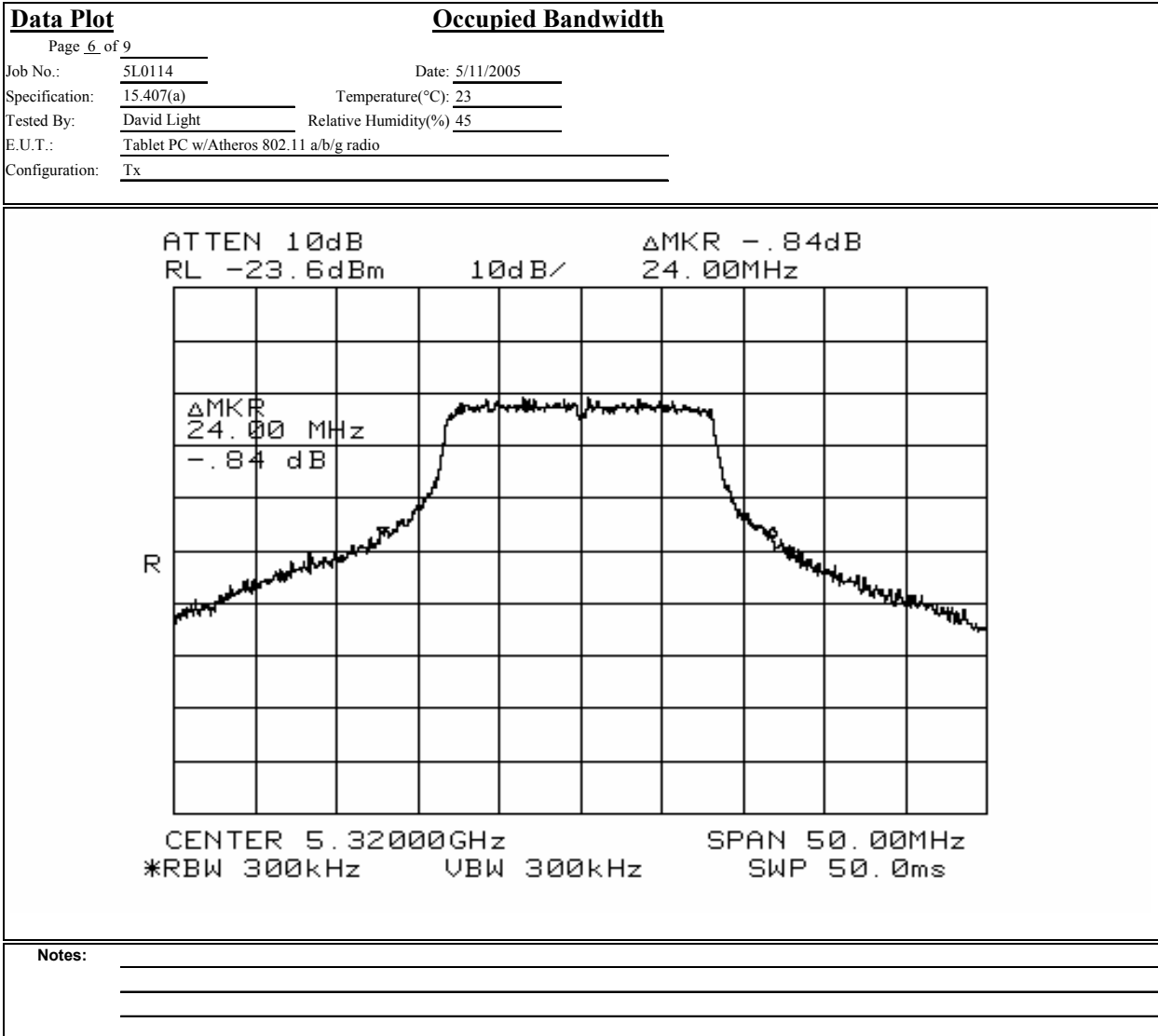


Notes:

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – 26 dB Bandwidth



Section 5. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.407(a)
TESTED BY: David Light	DATE: 03 May 2005

- (1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz.

Limit = lesser of 50 mW(17 dBm) or 4 dBm + 10log(20) = 17 dBm

Limit = 50 mW(+17 dBm)

- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

Limit = lesser of 250 mW(24 dBm) or 11 dBm + 10log(20) = +24 dBm

Limit = 250 mW(+24 dBm)

- (3) For the band 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Limit = lesser of 1 W (30 dBm) or 17 dBm + 10log(20) = +30 dBm

Limit = 1 W(+30 dBm)

EQUIPMENT: TS01 w/ Atheros card*TEST REPORT NO.:* 5L0114RUS4Rev1

Test Results: Complies.**Measurement Data:** Refer to attached data

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

Maximum Peak Power:

Frequency	Peak Power	Peak Power
(MHz)	(dBm)	(mW)
5150 – 5250 MHz band		
5170	17.3	54
5240	16.6	46
5250 – 5350 MHz band		
5260	17.3	54
5320	16.7	47

Test Equipment Used: 1464-1973-1472**Test Conditions:** 20°C
50% RH

The carrier is continuous and method #1 of FCC Public Notice DA 02-2138 was used to make the measurement.

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Section 6. Peak Excursion

NAME OF TEST: Peak Excursion	PARA. NO.: 15. 407
TESTED BY: David Light	DATE: 13 May 2005

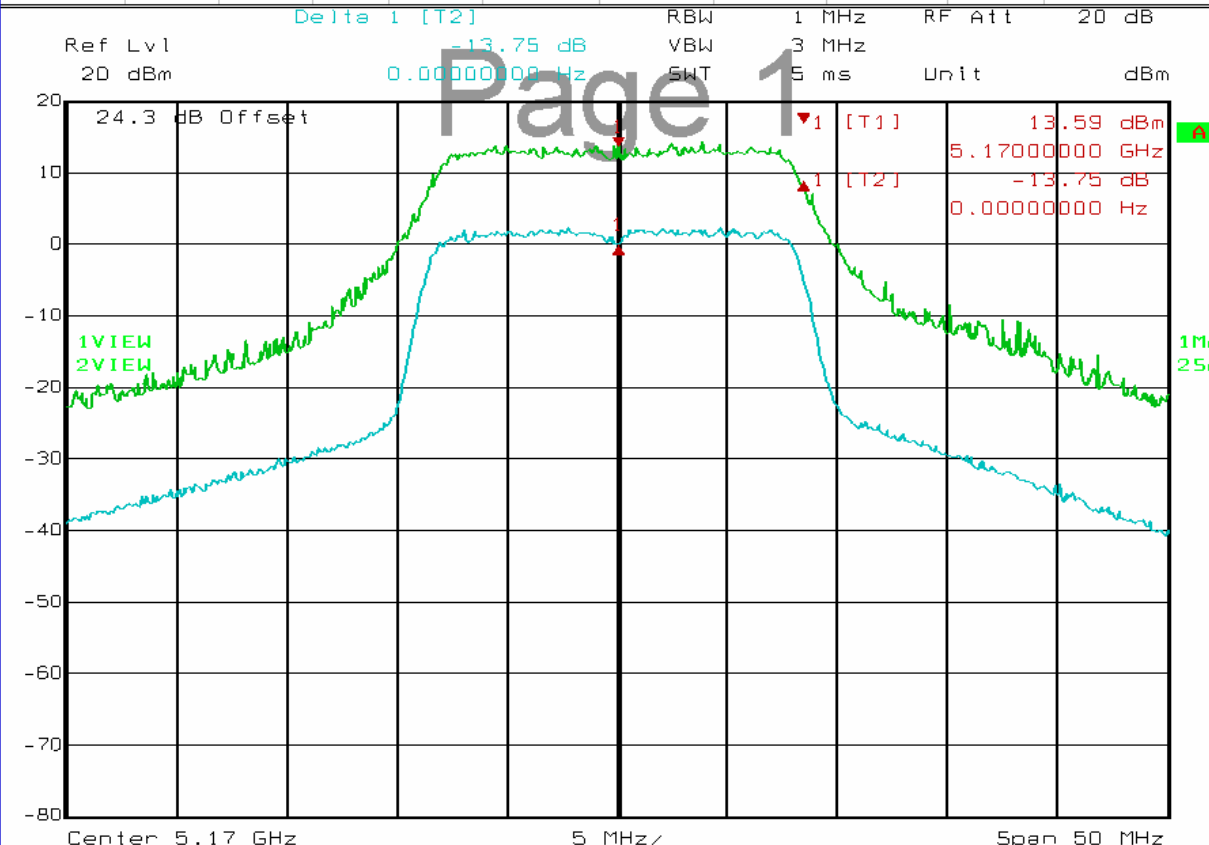
Test Results: Maximum excursion = 13.9 dB.

Measurement Data: See attached plots

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

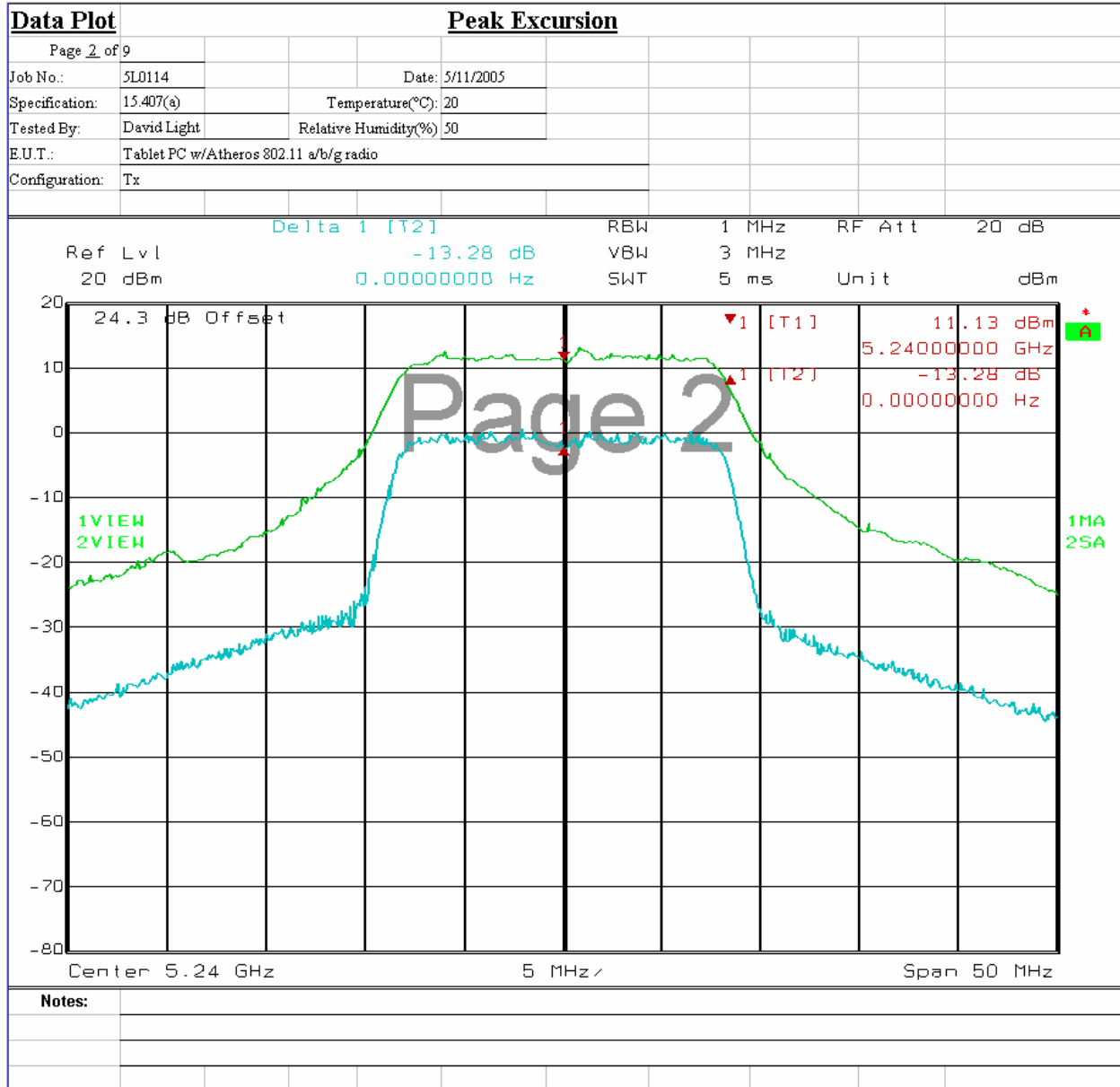
Test Data – Peak Excursion

Data Plot		Peak Excursion	
Page 1 of 9			Complete ☒
Job No.: 5L0114	Date: 5/11/2005	Preliminary:	
Specification: 15.407(a)	Temperature(°C): 20		
Tested By: David Light	Relative Humidity(%): 50		
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio			
Configuration: Tx			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots		
Detector Type: Peak	VBW: Refer to plots		
Test Equipment Used			
Antenna:	Directional Coupler:		
Pre-Amp:	Cable #1: 1081		
Filter:	Cable #2:		
Receiver: 1036	Cable #3:		
Attenuator #1: 1472	Cable #4:		
Attenuator #2:	Mixer:		
Additional equipment used:			
Measurement Uncertainty: +/-1.7 dB			
 Ref Lvl 20 dBm Delta 1 [T2] -13.75 dB 0.0000000 Hz RBW 1 MHz VBW 3 MHz SWT 5 ms Unit dBm 24.3 dB Offset 1V VIEW 2V VIEW 1MA 25A Center 5.17 GHz 5 MHz/ Span 50 MHz Peak 1 [T1] 13.59 dBm 5.1700000 GHz Peak 1 [T2] -13.75 dB 0.0000000 Hz			
Notes:			

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

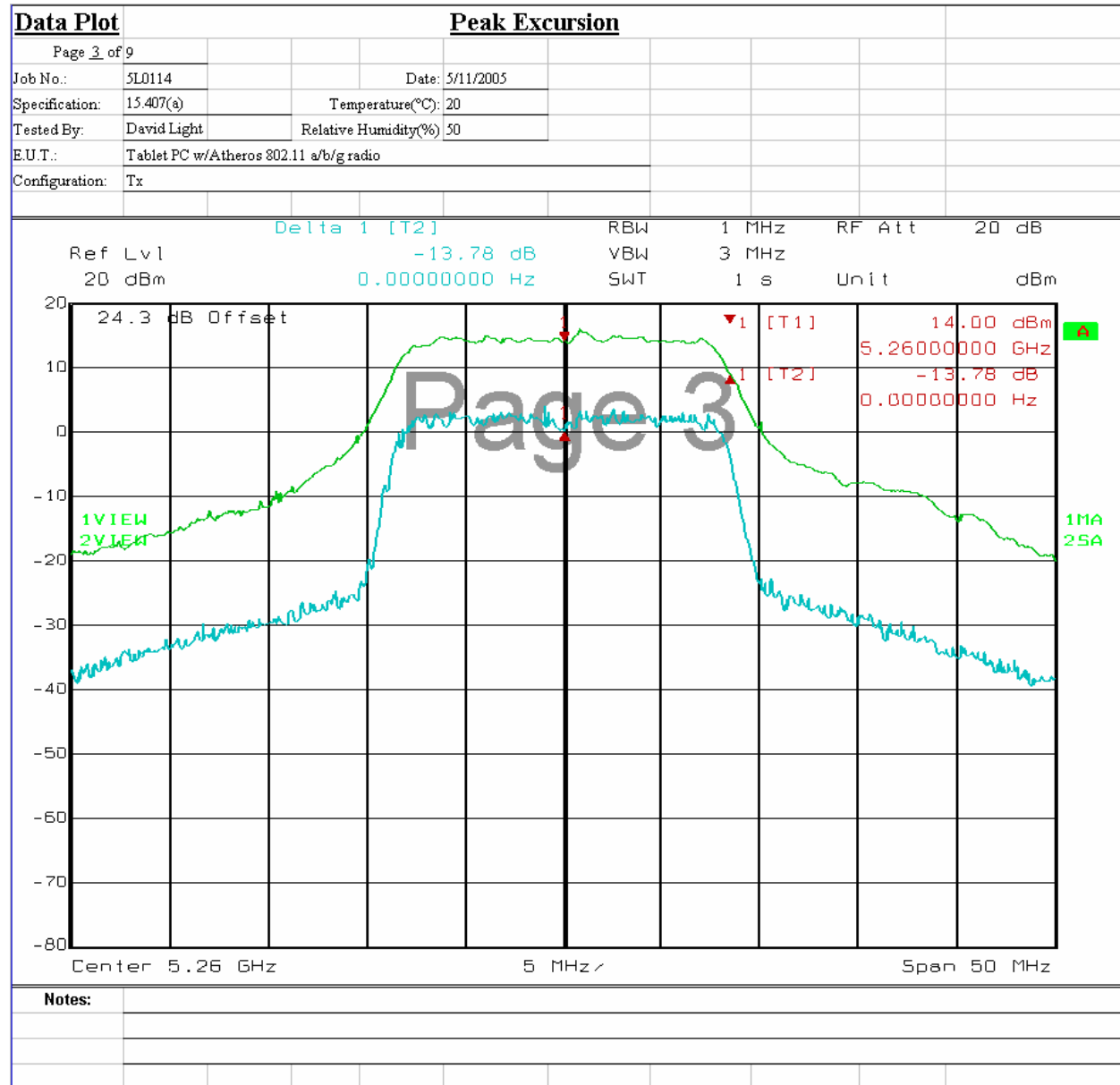
Test Data – Peak Excursion



EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

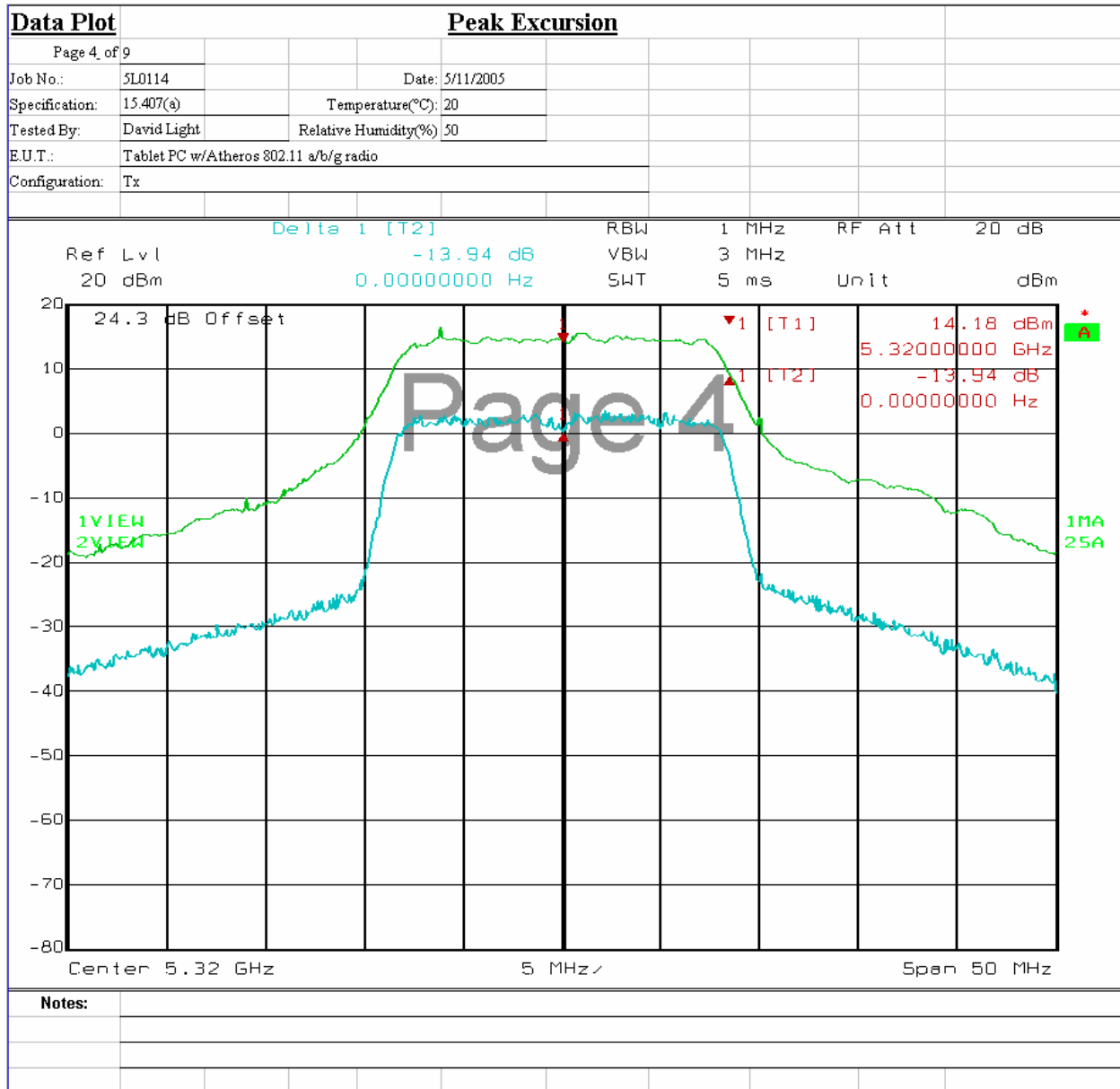
Test Data – Peak Excursion



EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

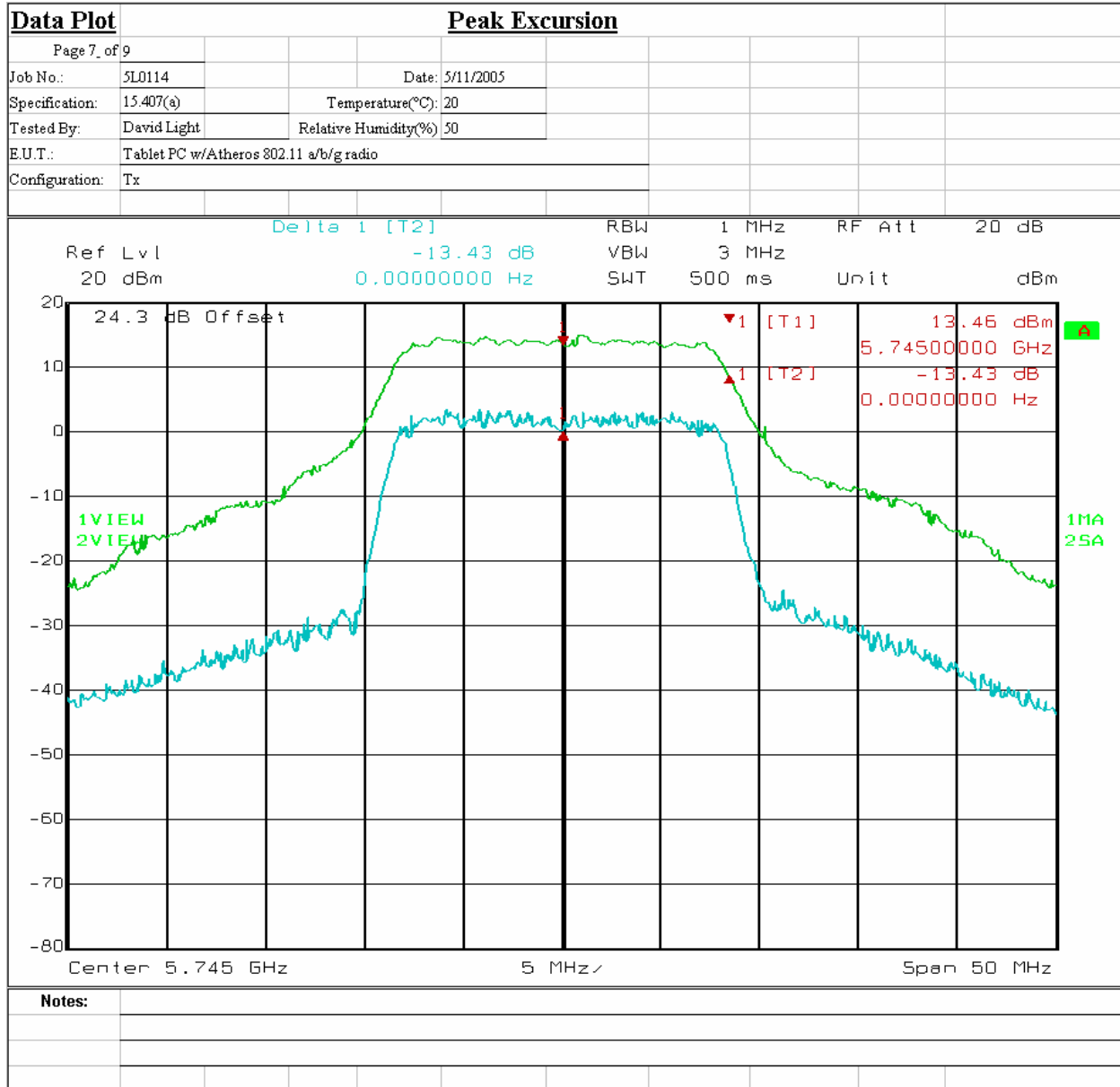
Test Data – Peak Excursion



EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

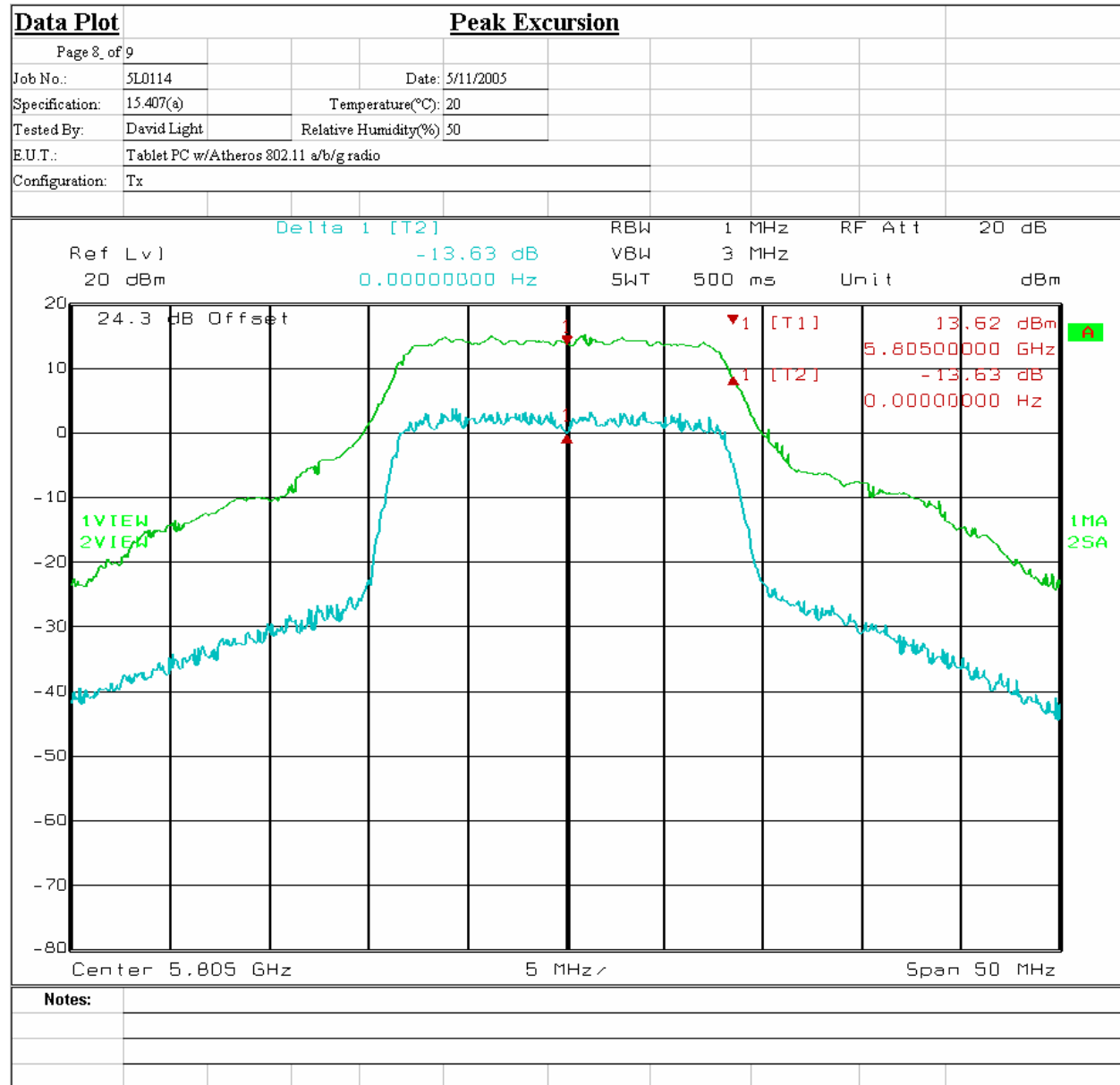
Test Data – Peak Excursion



EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – Peak Excursion



EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Section 7. Spurious Emissions (conducted)

NAME OF TEST: Spurious Emissions (conducted)	PARA. NO.: 15.407
TESTED BY: David Light	DATE: 5/12/05

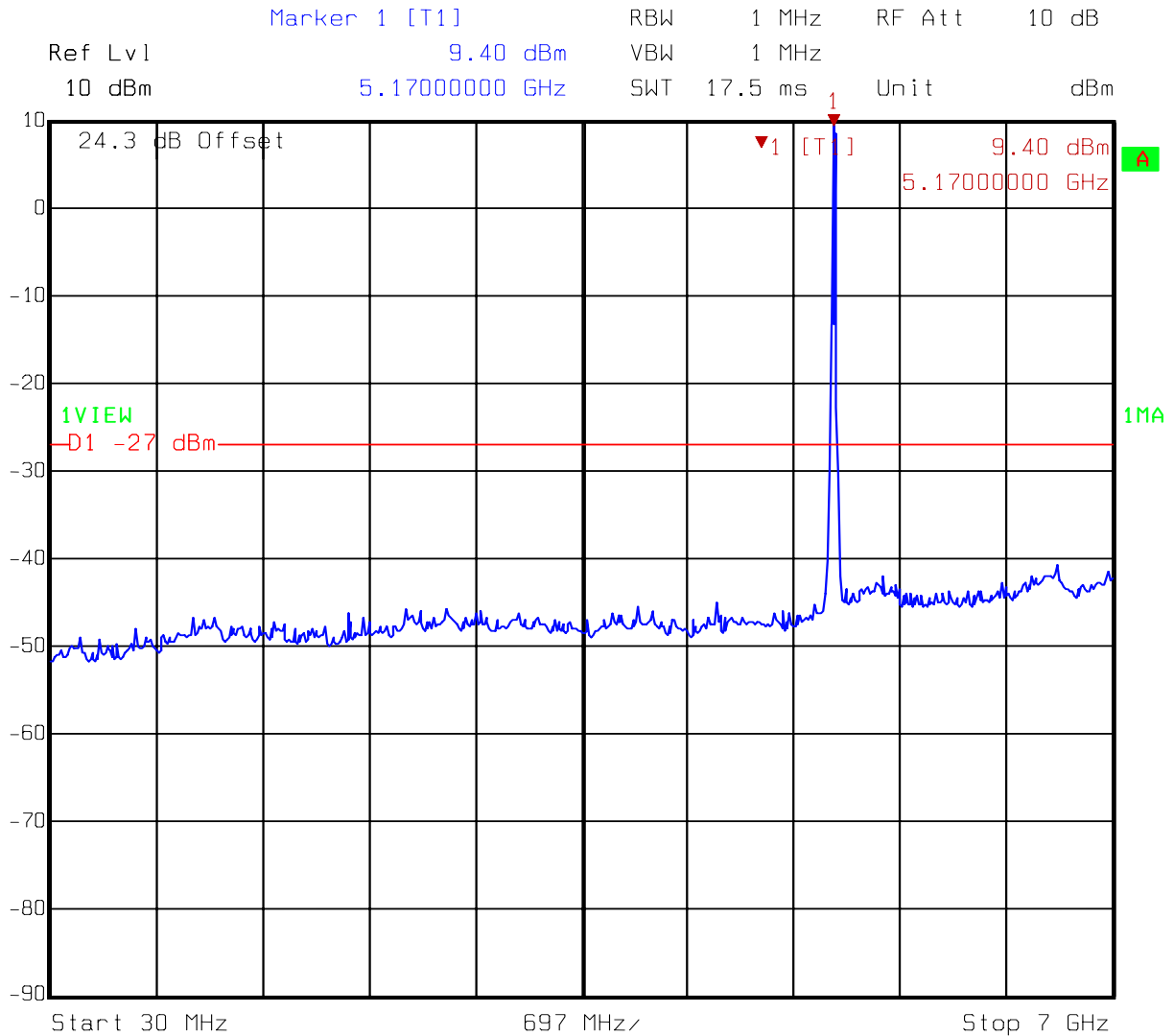
Test Results: Complies.

Measurement Data: Refer to attached plots

Test Equipment: 1036-1081-1472

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

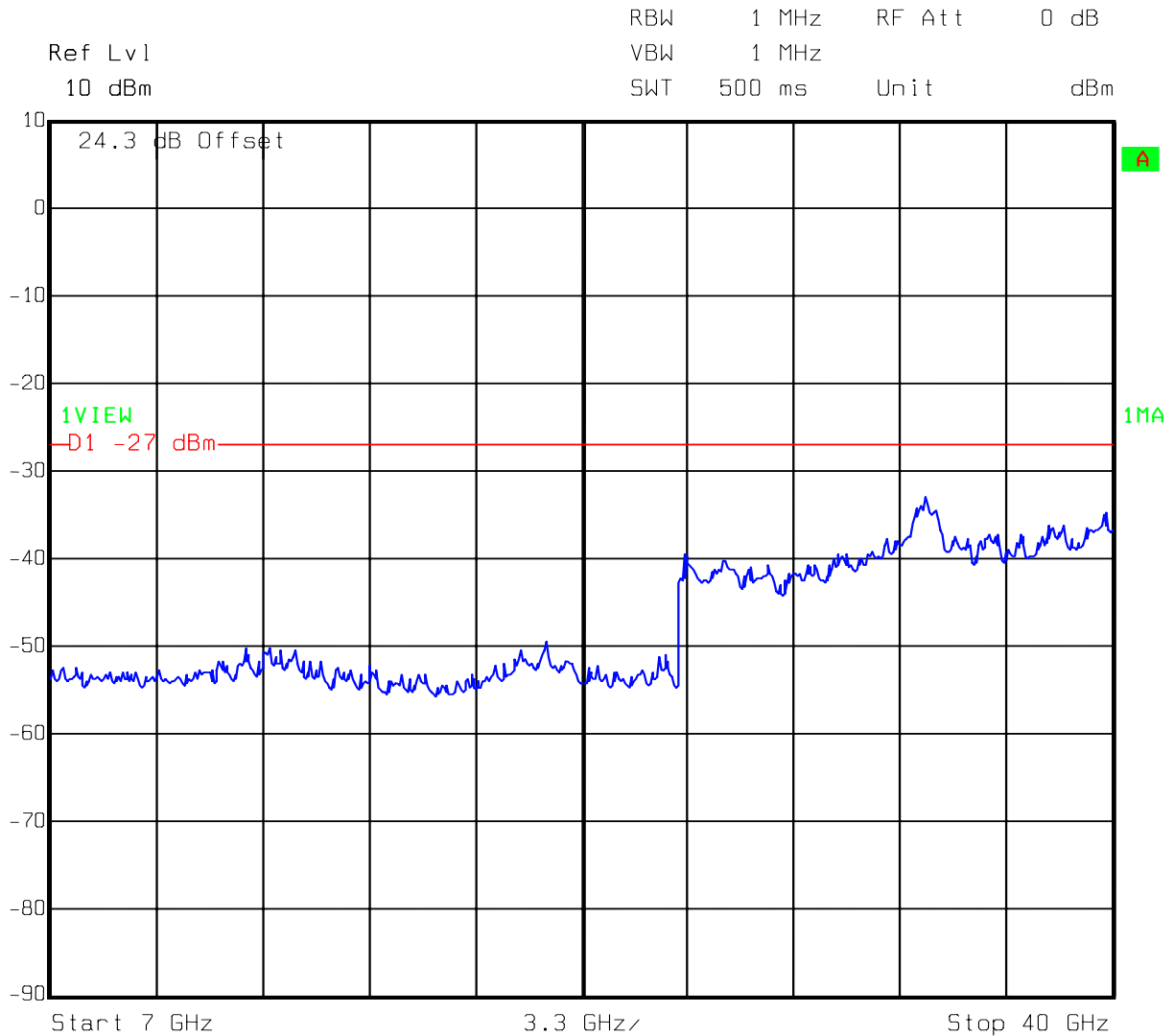
Test Data – Spurious Emissions (5170 MHz)

Date: 20.MAY 2005 10:19:12

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

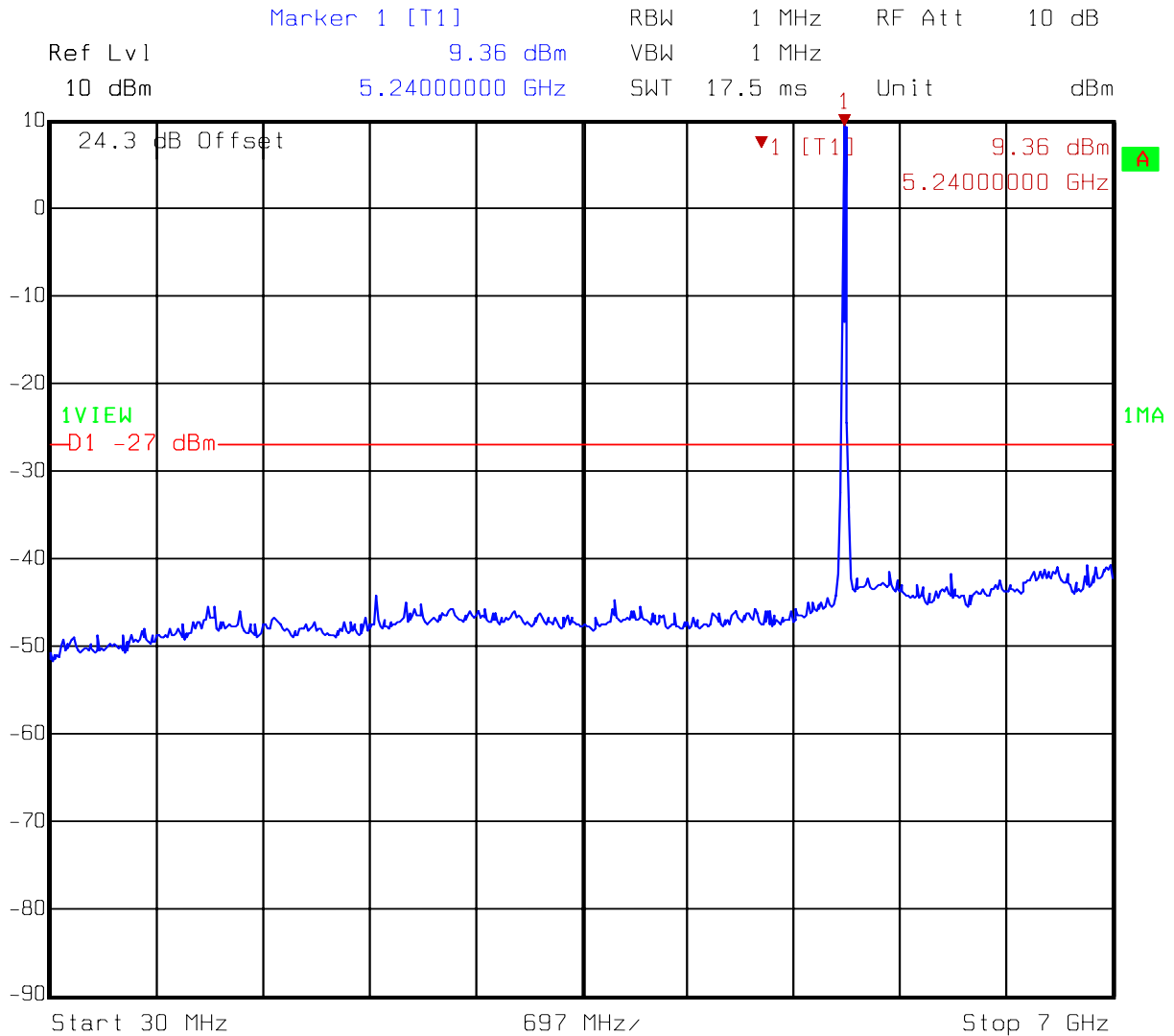
Test Data – Spurious Emissions (5170 MHz)



Date: 20.MAY 2005 10:01:33

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

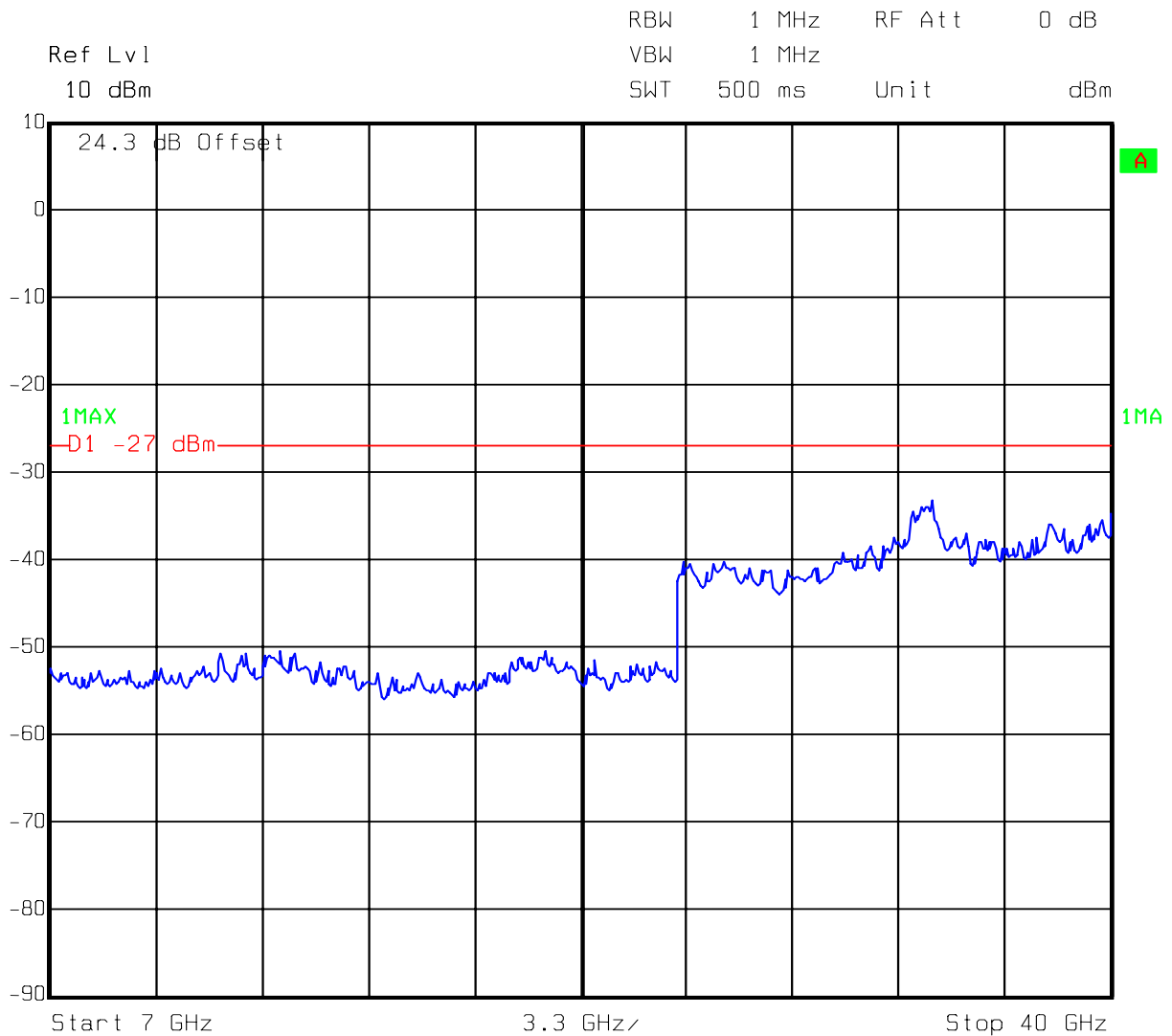
Test Data – Spurious Emissions (5240 MHz)

Date: 20.MAY 2005 10:18:34

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

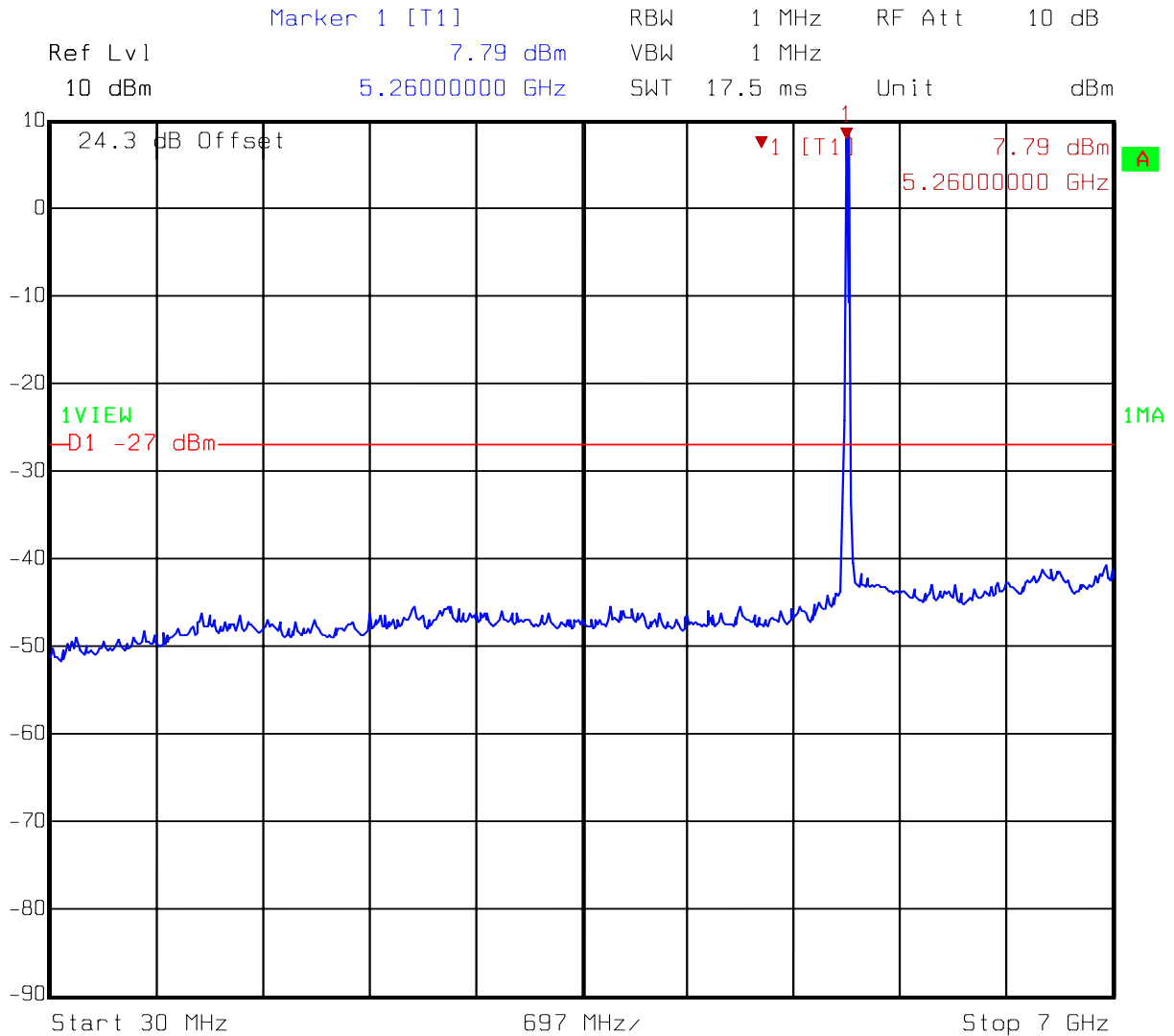
Test Data – Spurious Emissions (5240 MHz)



Date: 20.MAY 2005 10:02:15

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

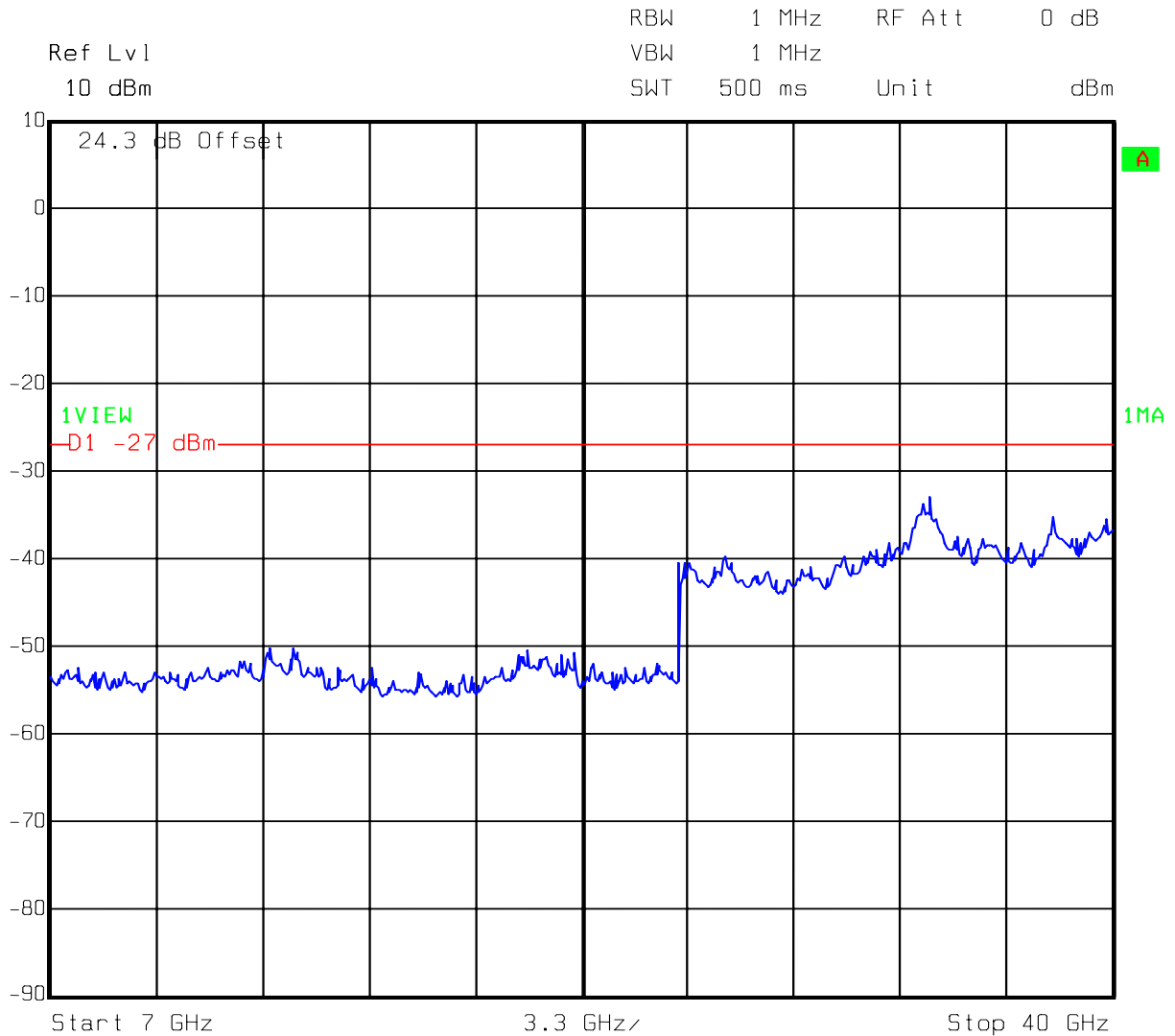
Test Data – Spurious Emissions (5260 MHz)

Date: 20.MAY 2005 10:17:57

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

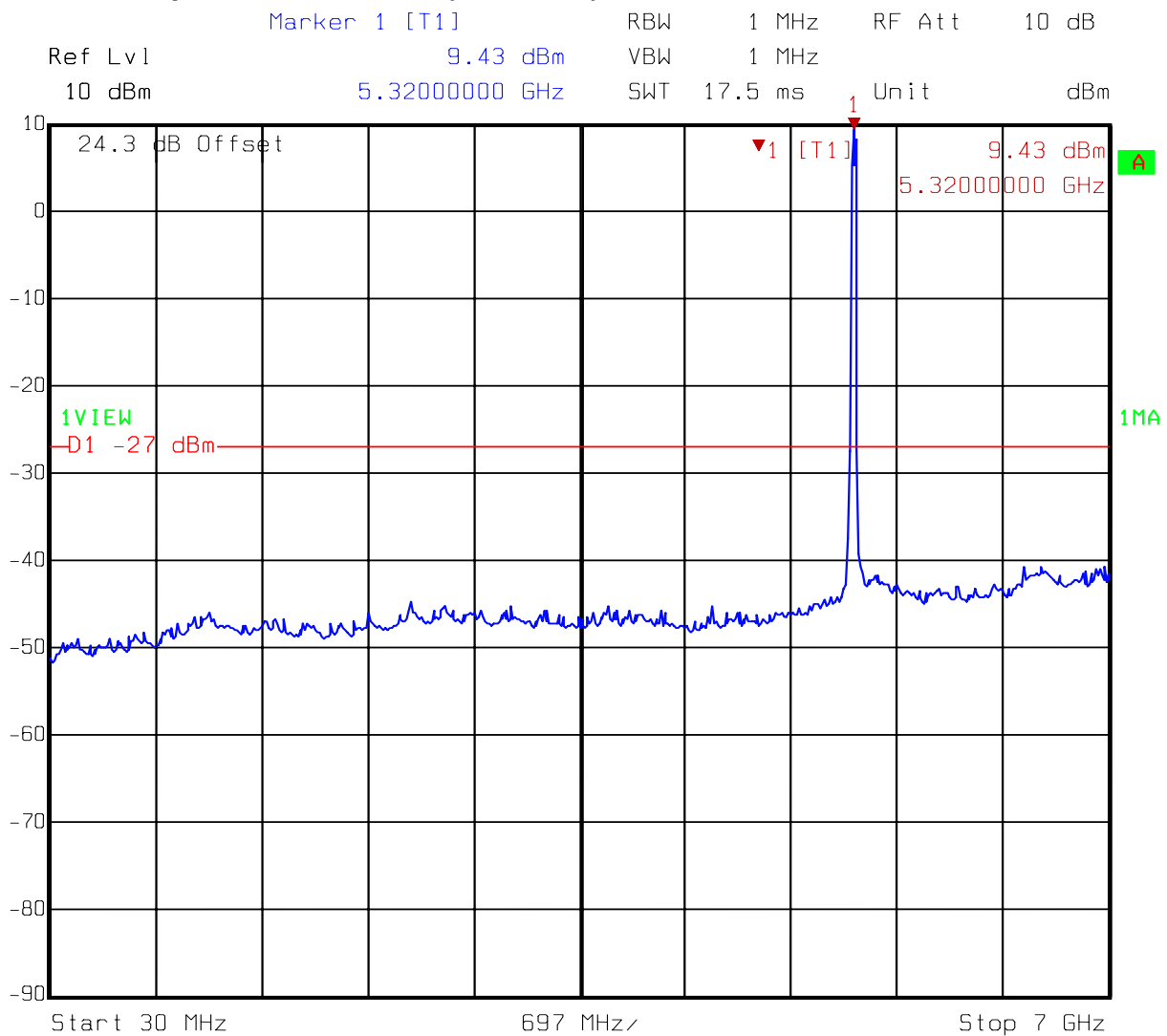
Test Data – Spurious Emissions (5260 MHz)



Date: 20.MAY 2005 10:03:04

EQUIPMENT: TS01 w/ Atheros card

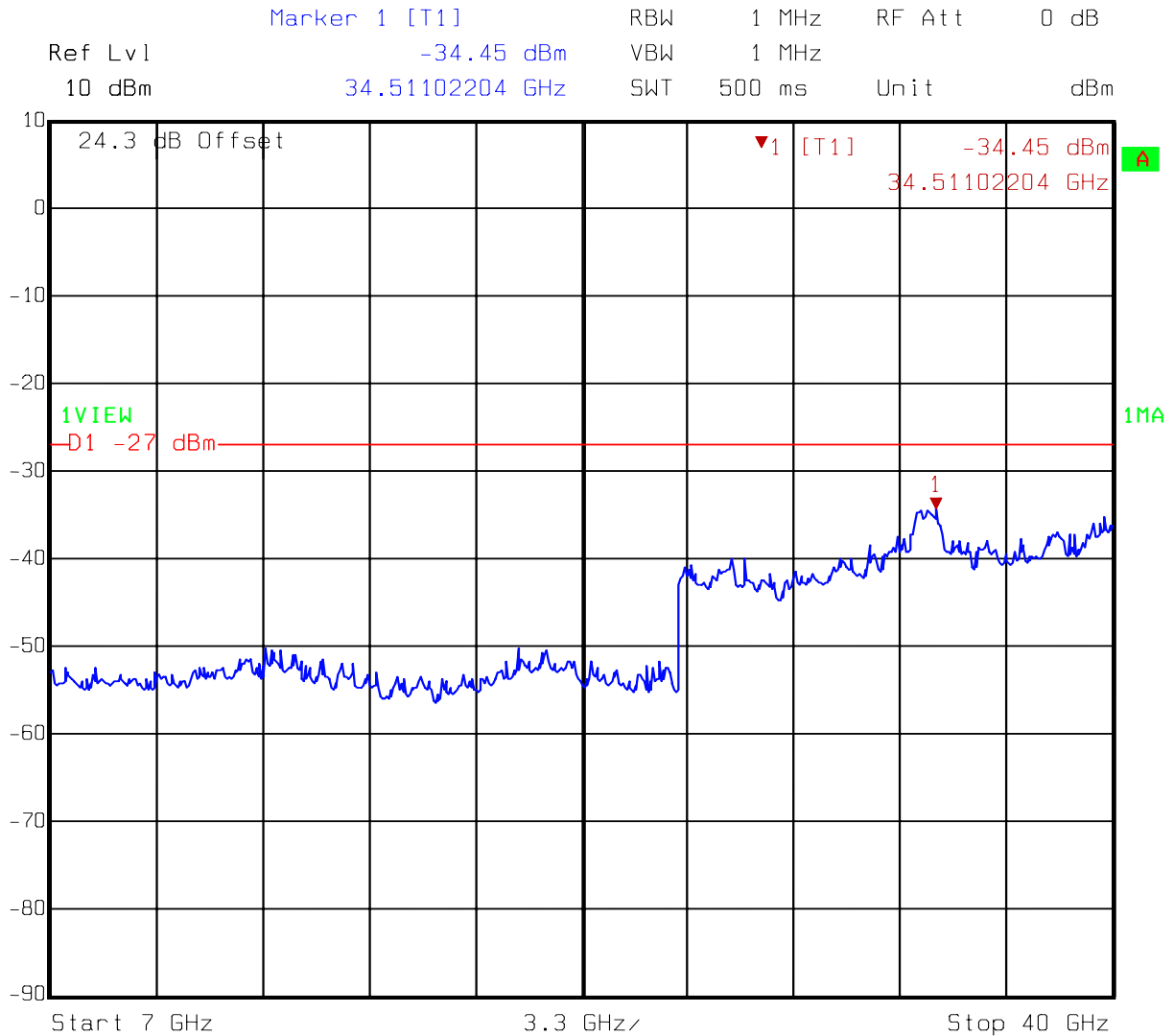
TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – Spurious Emissions (5320 MHz)

Date: 20.MAY 2005 10:14:41

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Test Data – Spurious Emissions (5320 MHz)

Date: 20.MAY 2005 10:03:55

EQUIPMENT: TS01 w/ Atheros cardTEST REPORT NO.: 5L0114RUS4Rev1

Section 8. Spurious Emissions (radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.407
TESTED BY: David Light	DATE: 5/12/05

Test Results: Complies.

Measurement Data: Statement:
This transmitter was tested in 802.11a mode and at 5170, 5240, 5260, 5320, 5745, and 5805 MHz. There were no emissions detected above the noise floor. The ambient threshold of sensitivity is sufficient to detect signals within 20 dB of the specification limit. A high-pass filter was used to reject the fundamental transmission.

Test Equipment: 1464-1484-1485-1016-1304-760-759-791

EQUIPMENT: TS01 w/ Atheros cardTEST REPORT NO.: 5L0114RUS4Rev1

Section 9. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density

PARA. NO.: 15.407

TESTED BY: David Light

DATE: 5/11/05

Test Results: Complies.**Measurement Data:** See attached data.

EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Data Plot**Peak Power Spectral Density**

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Complete X

Job No.: 5L0114

Date: 5/11/2005

Preliminary: _____

Specification: 15.407(a)

Temperature(°C): 23

Tested By: David Light

Relative Humidity(%) 45

E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio

Configuration: Tx

Sample Number: 1

Location: Lab 1

RBW: 1 MHz

Detector Type: Peak

VBW: 3 MHz

Test Equipment Used

Antenna: _____

Directional Coupler: _____

Pre-Amp: _____

Cable #1: 1973

Filter: _____

Cable #2: _____

Receiver: 1464

Cable #3: _____

Attenuator #1: 1472

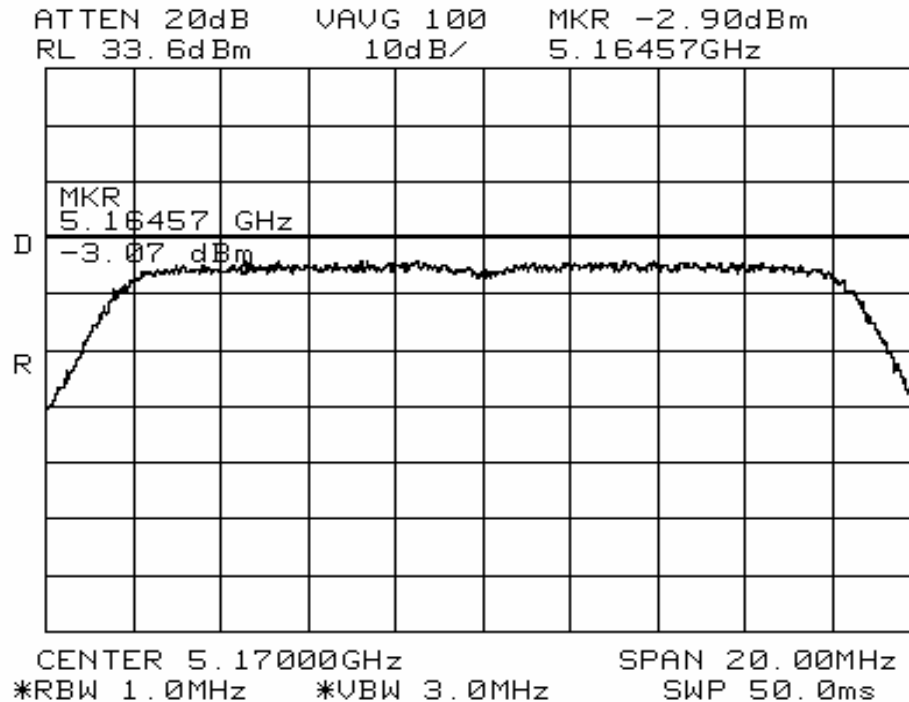
Cable #4: _____

Attenuator #2: _____

Mixer: _____

Additional equipment used: _____

Measurement Uncertainty: +/-1.7 dB

Notes: _____

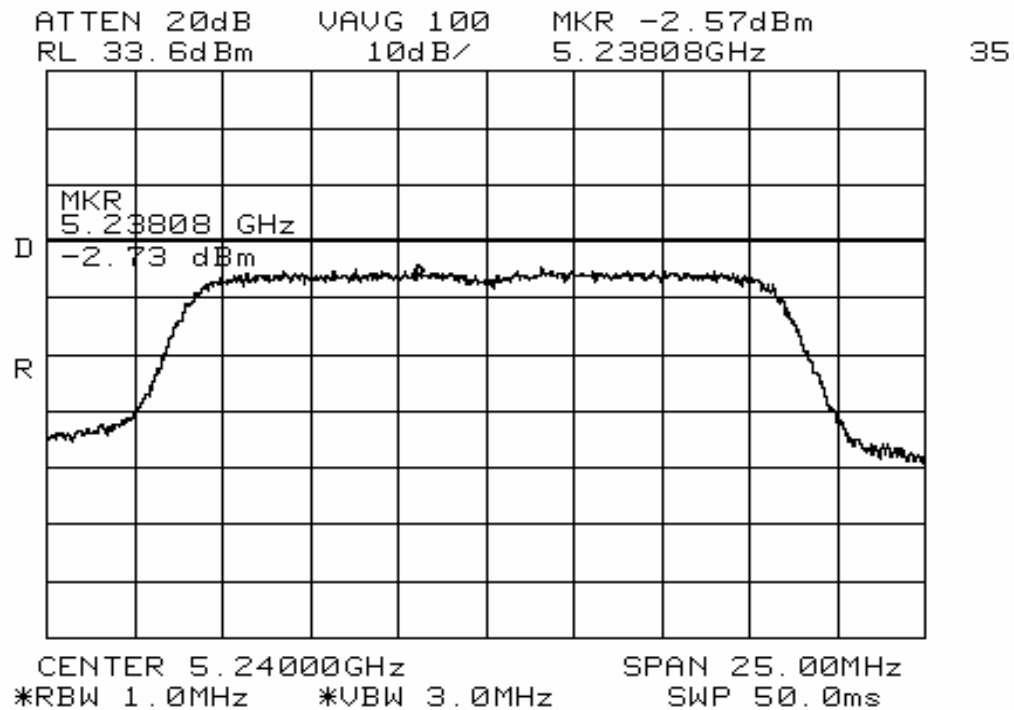
EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Data Plot**Peak Power Spectral Density**

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Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

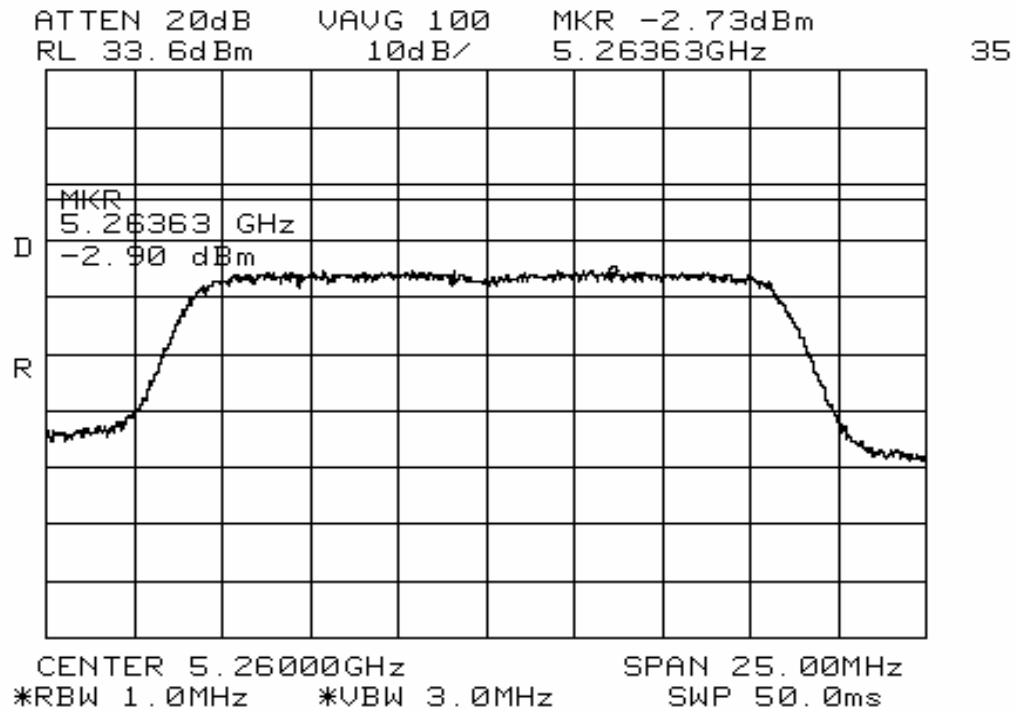
EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Peak Power Spectral Density

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Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

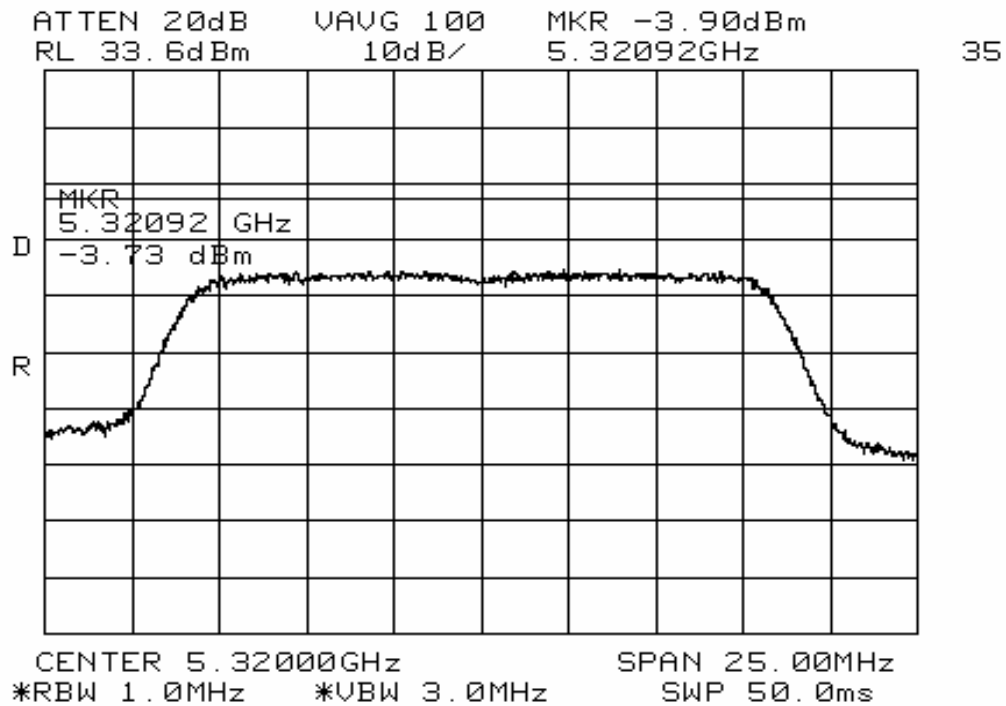
EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Data Plot**Peak Power Spectral Density**

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Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

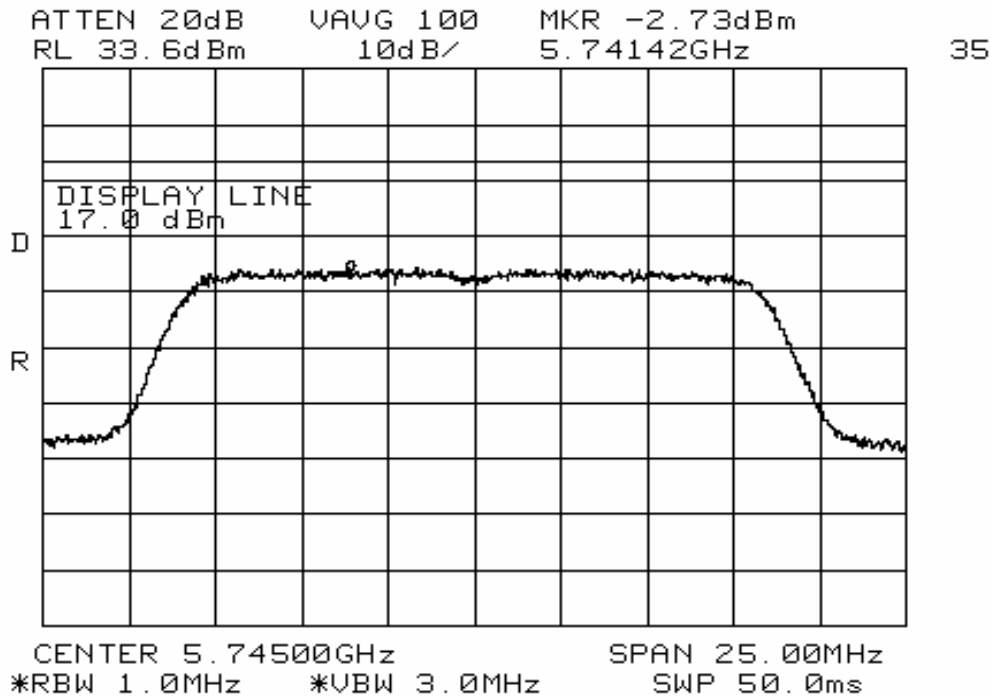
EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Data Plot**Peak Power Spectral Density**

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Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

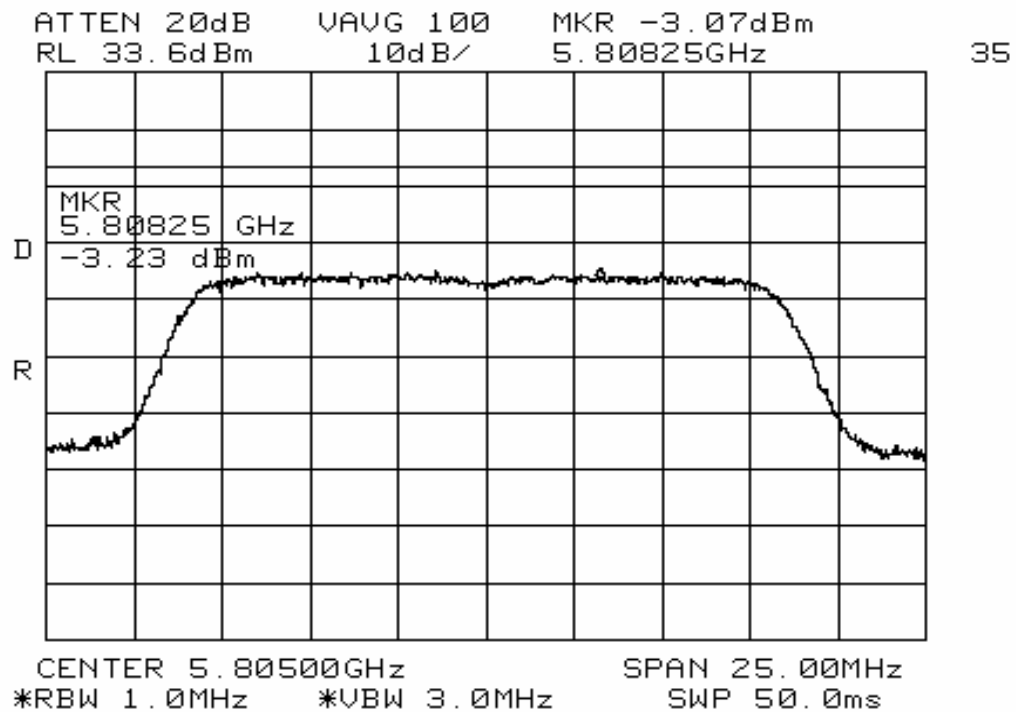
EQUIPMENT: TS01 w/ Atheros card

TEST REPORT NO.: 5L0114RUS4Rev1

Data Plot**Peak Power Spectral Density**

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Job No.: 5L0114 Date: 5/11/2005
Specification: 15.407(a) Temperature(°C): 23
Tested By: David Light Relative Humidity(%) 45
E.U.T.: Tablet PC w/Atheros 802.11 a/b/g radio
Configuration: Tx



Notes:

EQUIPMENT: TS01 w/ Atheros card

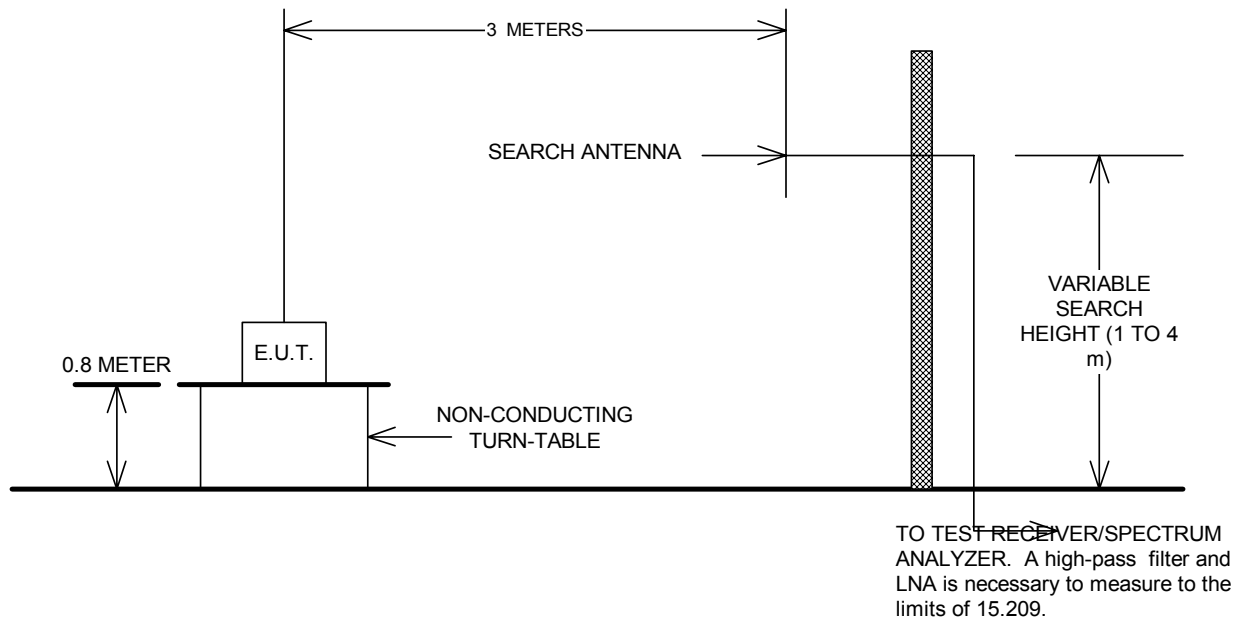
TEST REPORT NO.: 5L0114RUS4Rev1

Section 10. Test Equipment List

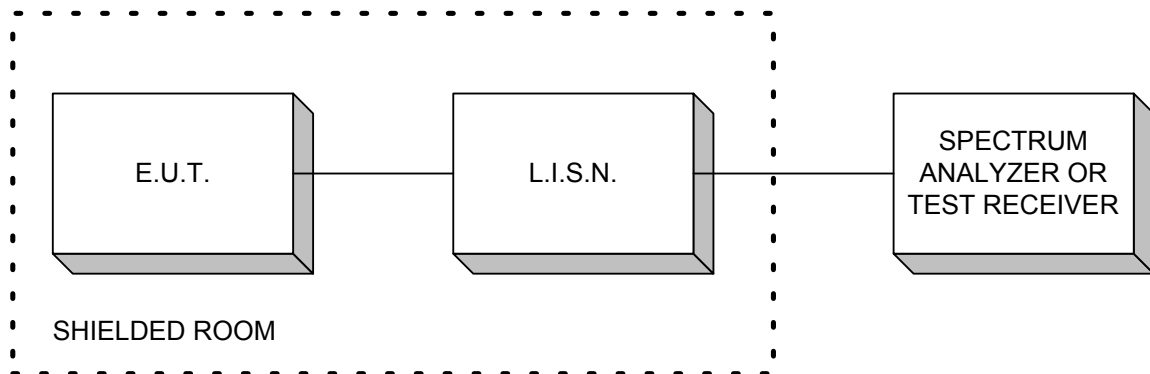
Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1973	CABLE, 1m	KTL 0	N/A	08/02/04	08/02/05
1472	20db Attenuator DC 18 Ghz	Omni Spectra 20600-20db	NONE	CBU	N/A
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
1484	Cable 2.0-18.0 Ghz	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
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	11/12/04	11/12/05
760	Antenna biconical	Electro Metrics MFC-25	477	06/22/04	06/22/05
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	07/23/04	07/23/05
791	PREAMP, 25dB	ICC LNA25	398	11/12/04	11/12/05
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
969	lisn	Schwarzbeck 8120	8120281	09/17/04	09/17/05
1547	CABLE .6m	KTL RG223	N/A	06/09/04	06/09/05
1115	CABLE, 4.5m	KTL RG223	N/A	04/27/05	04/27/06
718	HP SPECTRUM ANALYZER	HEWLETT PACKARD 8591EM	3639A00980	04/06/05	04/06/06
966	Receiver	Rohde & Schwartz ESH2	880370/029	09/20/04	09/20/05
1193	LIMITER	FISCHER FCC-450B-1.25N	956	02/24/04	02/24/05
1555	Filter high pass 5KHz	Solar Electronics 7930-5.0	933125	04/20/05	04/20/06

ANNEX A - TEST DIAGRAMS

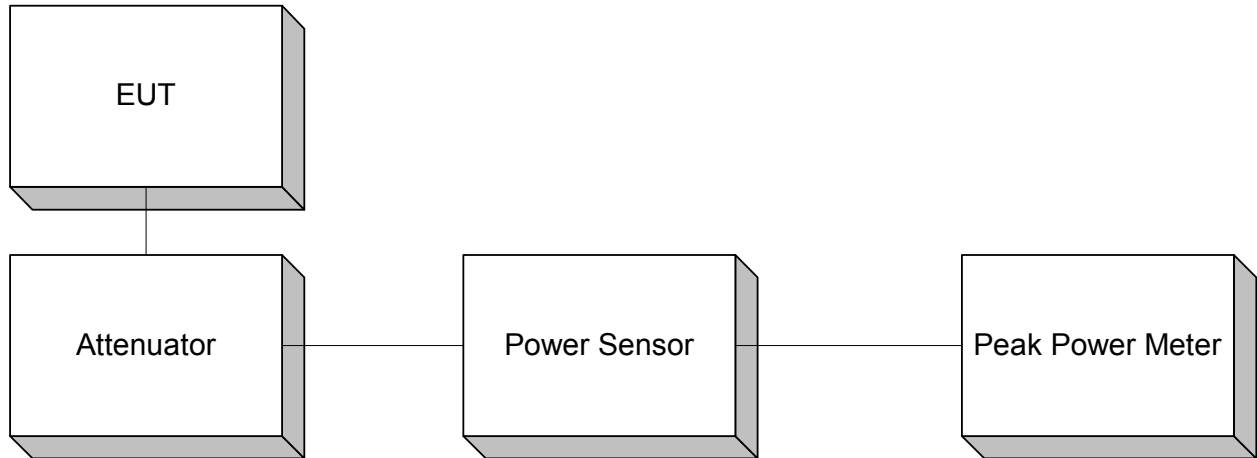
Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals



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

