



Nemko Test Report: 5L0270RUS1Rev1

Applicant: Siemens Subscriber Networks, Inc.
4849 Alpha Rd.
Dallas, Texas 75244

**Equipment Under Test:
(E.U.T.)** SpeedStream 5883
060-5883-0XX

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

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

Authorized By: 
John Fish, EMC Engineer

Date: 20 July, 2005

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Section 1. Summary of Test Results

Manufacturer: Siemens Subscriber Networks, LLC

Model No.: SpeedStream 5883

Part. No.: 060-5883-0XX

Serial No.: 303

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 Digital Transmission Systems. Radiated tests were conducted in accordance with ANSI C63.4-2002. 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.

See "Summary of Test Data".

**NVLAP LAB CODE: 100426-0**

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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)	Complies
Spurious Emissions (Restricted Bands)	15.247(c)	Complies
Peak Power Spectral Density	15.247(d)	Complies

Footnotes:

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

General Equipment Information

Frequency Band: 2412 to 2462 MHz

Antenna: 5 dBi gain

Channel Spacing: 5 MHz

User Frequency Adjustment: Software controlled

Configuration of Equipment

EQUIPMENT CONFIGURATION LIST (HARDWARE/PERIPHERALS): on 060-5883-xxx

Place an "*" next to EUT and any item that is part of the EUT.

Item	*	Generic Description	Manufacturer	Model No.	Serial #	Rev.	FCC ID Status ¹
(A)	*	5883 Modem	Siemens/Efficient	060-5883-1xx/-0xx	SN#303 or 304, or 305	n/a	n/a
(B)	*	AC WallWart Adapter(Euro)	GCI	AM-1201000V	n/a	n/a	n/a
(C)	*	AC WallWart Adapter(Dom.)	Ten-Pao	S024AU1200150	n/a	n/a	n/a
(D)		Monitor	Gateway	E5005	HDA7JB001012	n/a	IAWE5005
(E)		Computer	Dell	MMS	ENUTB	n/a	n/a
(F)		Keyboard	Dell	SK-8000	CN-035KKW-38844-09D-B	A00	n/a
(G)		Mouse	Logitech-Dell	M-S34	LZA54814607	n/a	DZL210472
(H)		Laptop Computer	Dell	PPL	12800-966-3390	n/a	n/a
(I)		AC Adapter for Laptop Comp.	Dell	AA20031	CN09364U-1629113J0DQN	A00	n/a

¹ FCC ID STATUS

- | | |
|-------------------------|--|
| 1. FCC DOC | 3. None - (If performing FCC testing, contact lab manager) |
| 2. FCC A/B Verification | 4. Certification (include FCC ID in parenthesis) |

INTER-CONNECTION CABLES:

Place an "*" next to EUT and any item that is part of the EUT.

Item	*	Cable Type	Manufacturer	Ln (m)	Term ²	Shield	Qty.
(1)		CAT5E	General Cable	100m	3	no	5
(2)							
(3)							
(4)							
(5)							
(6)							
(7)							
(8)							
(9)							

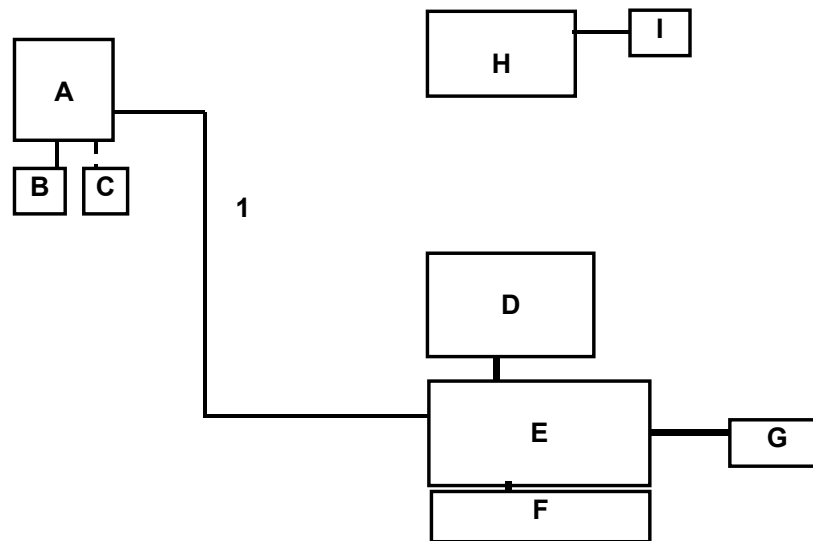
² TERMINATION

- | | |
|---------------|---------------------|
| 1. Peripheral | 4. Resistive |
| 2. Loopback | 5. Remote Equipment |
| 3. EUT | 6. Other |

Description of EUT

Wireless 802.11b/g Ethernet modem.

System Diagram



Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: Arturo Ruvalcaba	DATE: 6/8/2005

Test Results: Complies.

Measurement Data: See attached plots.

Measurement Uncertainty: +/- 2.27 dB

The worst-case emission is 50.5dB μ V at 0.153 MHz on the Neutral side of the line.
This is 5.3 dB below the average specification limit of 55.8dB μ V.

Test Data – Powerline Conducted Emissions

Conducted Emissions											
Powerline Voltage Measurement											
Complete	<u> X </u>		Job # : <u>5L0270E</u>				Test # : <u>CEPV-01</u>				
Preliminary	<u> </u>		Page <u> 1 </u>				of <u> 2 </u>				
Client Name : <u>Siemens Subscriber Networks, LLC.</u>											
EUT Name : <u>Siemens Subscriber Networks LLC SpeedStream Wireless Business Modem</u>											
EUT Model # : <u>SpeedStream 5883, 5881</u>											
EUT Part # : <u>060-5883-xxx</u>											
EUT Serial # : <u>SN#303</u>											
EUT Config : <u>Tx</u>											
Specification : <u>CFR 47 Part 15 Subpart B</u>											
Reference : <u>CISPR 22</u>											
Transducer # :	<u>545</u>	Temp. (deg. C) :	<u>23</u>	Date :		<u>06/08/05</u>					
HP Filter # :	<u>1555</u>	Humidity (%) :	<u>32</u>	Time :		<u>16:10</u>					
Cable 1 # :	<u>1553</u>	EUT Voltage :	<u>120 Vac</u>	Staff :		<u>Art Ruvalcaba</u>					
Cable 2 # :	<u>1998</u>	EUT Frequency :	<u>60Hz</u>	Location :		<u>SE</u>					
Detector 1 # :	<u>966</u>	Peak Bandwidth:	<u>10kHz</u>	Photo ID:		<u>5L0270E CEPV-01</u>					
Detector 2 # :	<u>1284</u>	QP Bandwidth	<u>9kHz</u>								
Limiter # :	<u>NA</u>	Avg. Bandwidth	<u>9kHz</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.			
0.153	N	P	A	50.0	1	0	50.5	65.84	55.836	-5.3	Pass	

Date: 06/08/2005 Time: 15:48:35 W/D#: CISPR22 B COND [QP] Test Lead: Black Sequence#: 1

N Line 120 Volts

The graph shows the measured powerline conducted emissions (black line) compared to the CISPR22 B COND [QP] (blue line) and CISPR22 B COND [AVE] (green line) limits. The measured emissions are consistently below the limits, indicating compliance with the standard.

Test Data – Powerline Conducted Emissions

Conducted Emissions												
Powerline Voltage Measurement												
Complete	<u>X</u>				Job # : <u>5L0270E</u>		Test # : <u>CEPV-01</u>					
Preliminary					Page <u>2</u>		of <u>2</u>					
Client Name :		<u>Siemens Subscriber Networks, LLC.</u>										
EUT Name :		<u>Siemens Subscriber Networks LLC SpeedStream Wireless Business Modem</u>										
EUT Model # :		<u>SpeedStream 5883, 5881</u>										
EUT Part # :		<u>060-5883-xxx</u>										
EUT Serial # :		<u>SN#303</u>										
EUT Config. :		<u>Tx</u>										
Specification :		<u>CFR 47 Part 15 Subpart B</u>					Reference : <u>CISPR 22</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.			
Date: 06/08/2005 Time: 15:54:24 WFO#: CISPR22 B COND [QP] Test Lead: Black Sequence#: 2												
dBuV/m H Line 120 Volts												
												
..\EMCShare\AUTOMATED\DATASHTS\CEP_Voltage Rev C.xls Document Control #EMC DS EM COND VOLT												

Photos – Powerline Conducted Emissions

Front



Side



Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: David Light	DATE: 6/20/05

Test Results: Complies.

Measurement Data: See 6 dB BW plot

Measured 6 dB bandwidth:

Channel Separation: 5 MHz

Test Data – Occupied Bandwidth

Data Plot		Occupied Bandwidth	
Page 1 of 3		Complete <u>X</u>	
Job No.: 5L0270	Date: 6/20/2005	Preliminary: _____	
Specification: 15.247	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: 5883			
Configuration: Tx set at 16 dBm using Atheros test utility			
Serial Number: 3			
Location: Lab 2	RBW: 100 kHz		
Detector Type: Peak	VBW: 100 kHz		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: _____		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1472	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: $\pm 1 \times 10^{-7}$ ppm			

Ref Lvl		Delta 1 [T1]		RBW	VBW	RF Att	Unit
30 dBm	0.58 dB	11.14228457 MHz	100 kHz	100 kHz	30 dB	dBm	
21.9 dB Offset				SWT	10 ms		

The spectrum plot shows a blue trace of the signal's power spectral density. The y-axis represents power in dBm, ranging from -70 to 30. The x-axis represents frequency in MHz, with a center frequency of 2.412 GHz and a span of 40 MHz. The signal is centered around 2.412 GHz, showing a typical Wi-Fi channel shape. Two red markers are placed on the trace: one at the peak (labeled '1') and another at the -3 dB point (labeled '1'). The peak power is 5.09 dBm, and the -3 dB power is 2.40634870 GHz. The -3 dB bandwidth is 0.58 dB, and the center frequency is 11.14228457 MHz. The plot is labeled '1VIEW' and '1MA'.

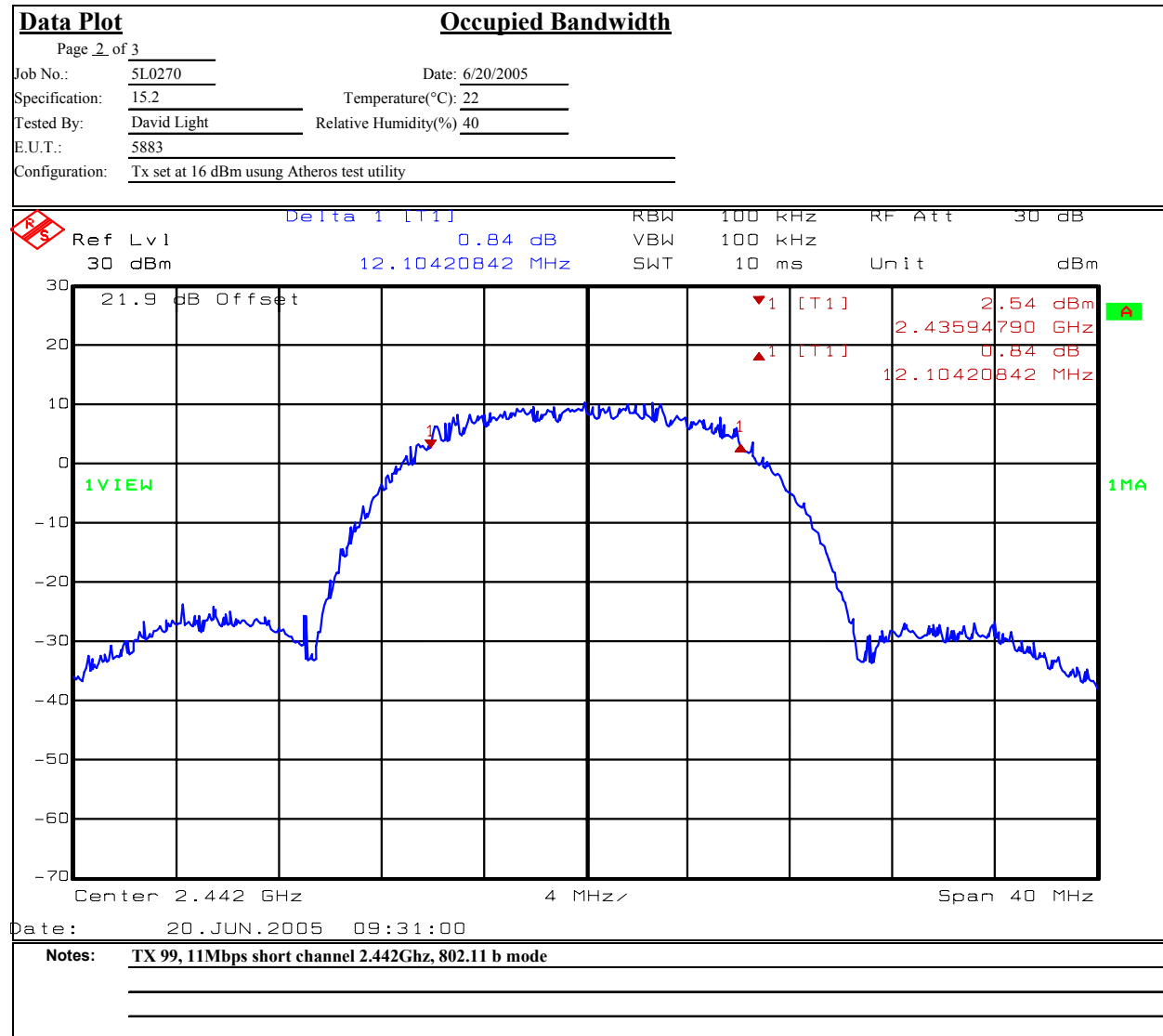
Marker	Type	Value
1	Peak	5.09 dBm
1	-3 dB	2.40634870 GHz
1	-3 dB	0.58 dB
1	-3 dB	11.14228457 MHz

Center 2.412 GHz 4 MHz Span 40 MHz

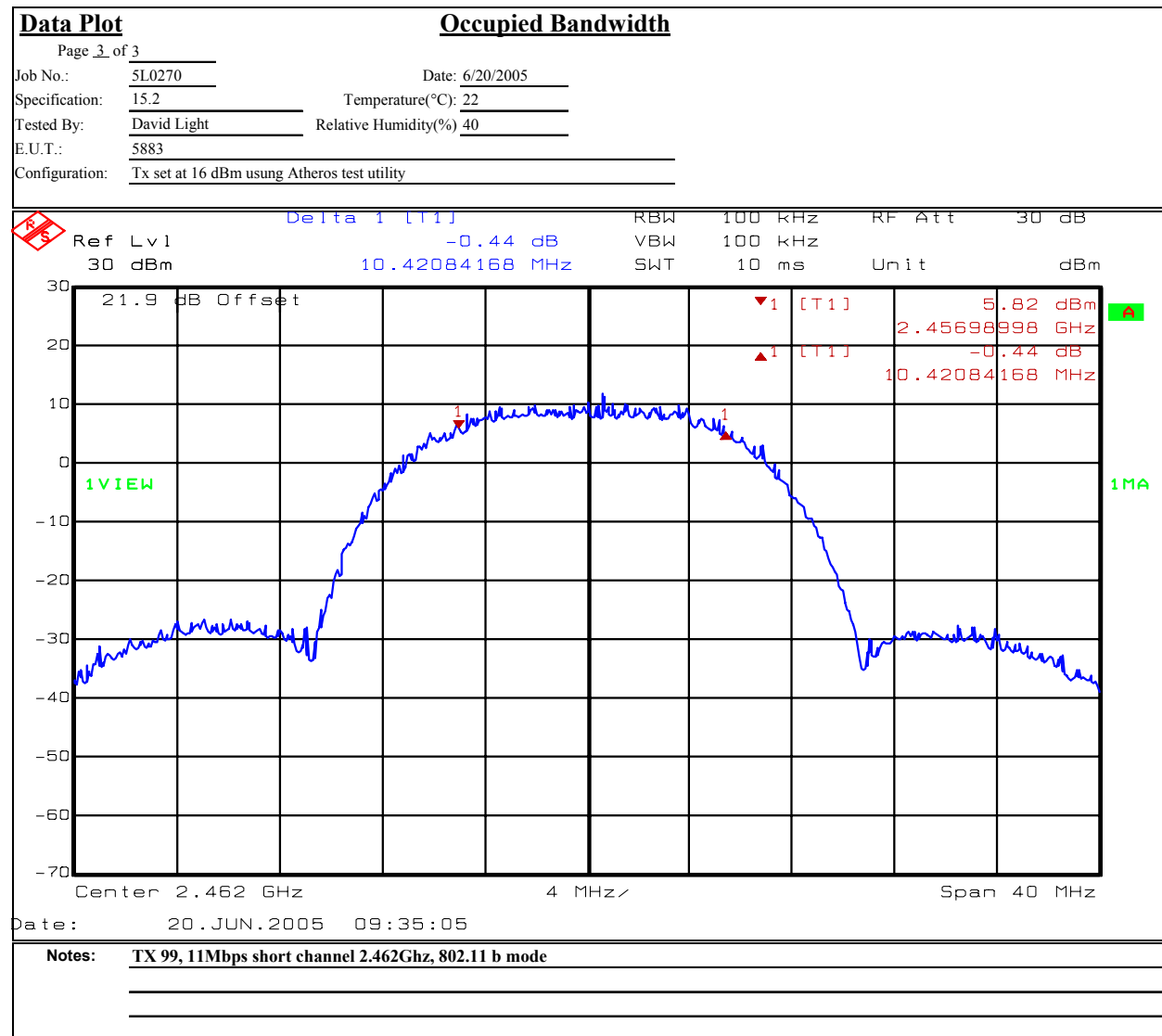
Date: 20.JUN.2005 09:29:08

Notes: TX 99, 11Mbps short channel 2.412Ghz, 802.11 b mode

Test Data – Occupied Bandwidth



Test Data – Occupied Bandwidth



Test Data – Occupied Bandwidth

Data Plot		Occupied Bandwidth	
Page 1 of 3		Complete <u>X</u>	
Job No.: 5L0270	Date: 5/20/2005	Preliminary: _____	
Specification: 15.247	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: 5883			
Configuration: Tx			
Serial Number: 3			
Location: Lab 2	RBW: 100 kHz		
Detector Type: Peak	VBW: 100 kHz		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: _____		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1472	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			

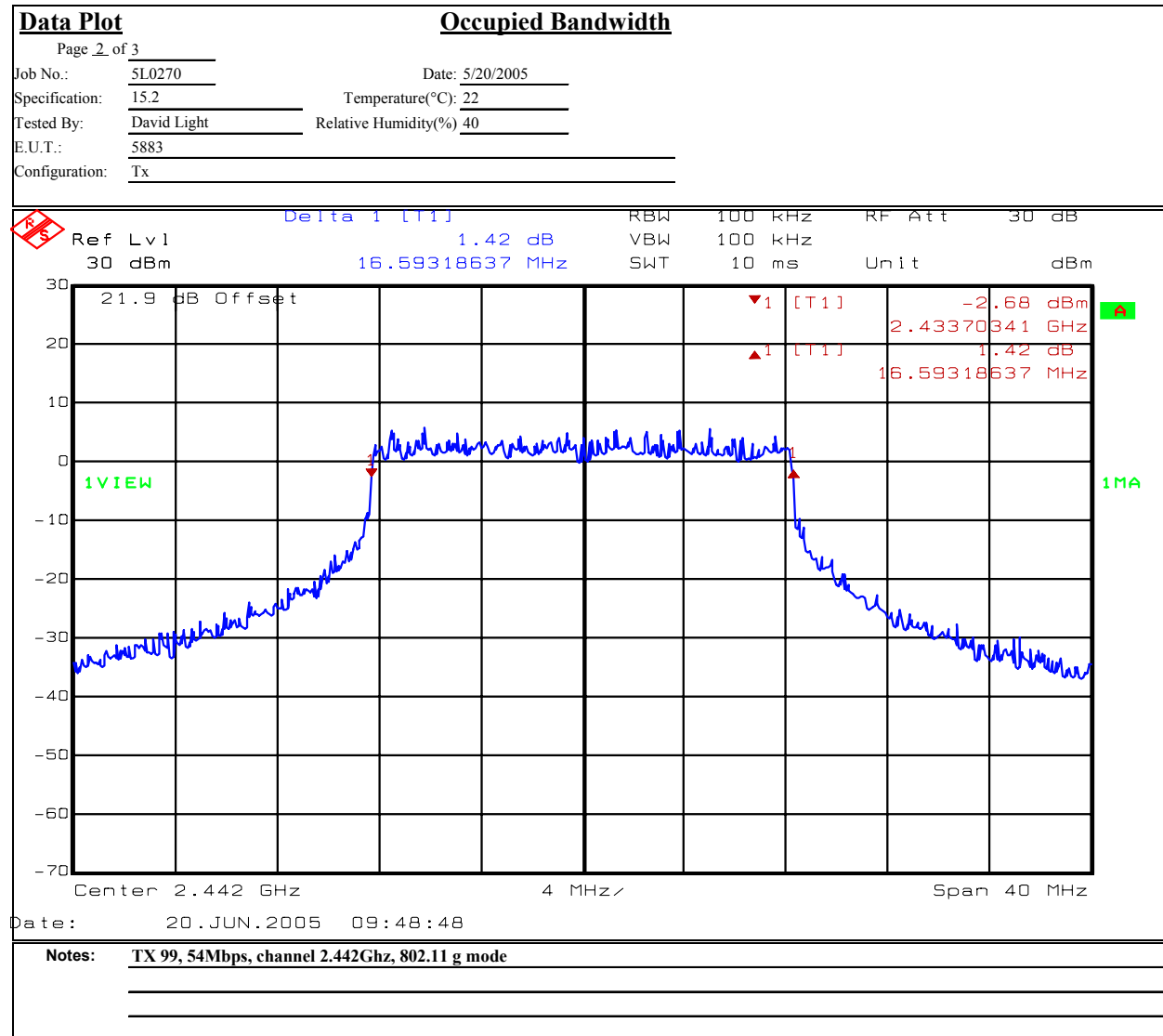
Ref	Lvl	Delta 1 [T1]	RBW	VBW	SWT	RF Att	Unit
30	dBm	0.84 dB	100 kHz	100 kHz	10 ms	30 dB	dBm

Center 2.412 GHz 4 MHz/ Span 40 MHz

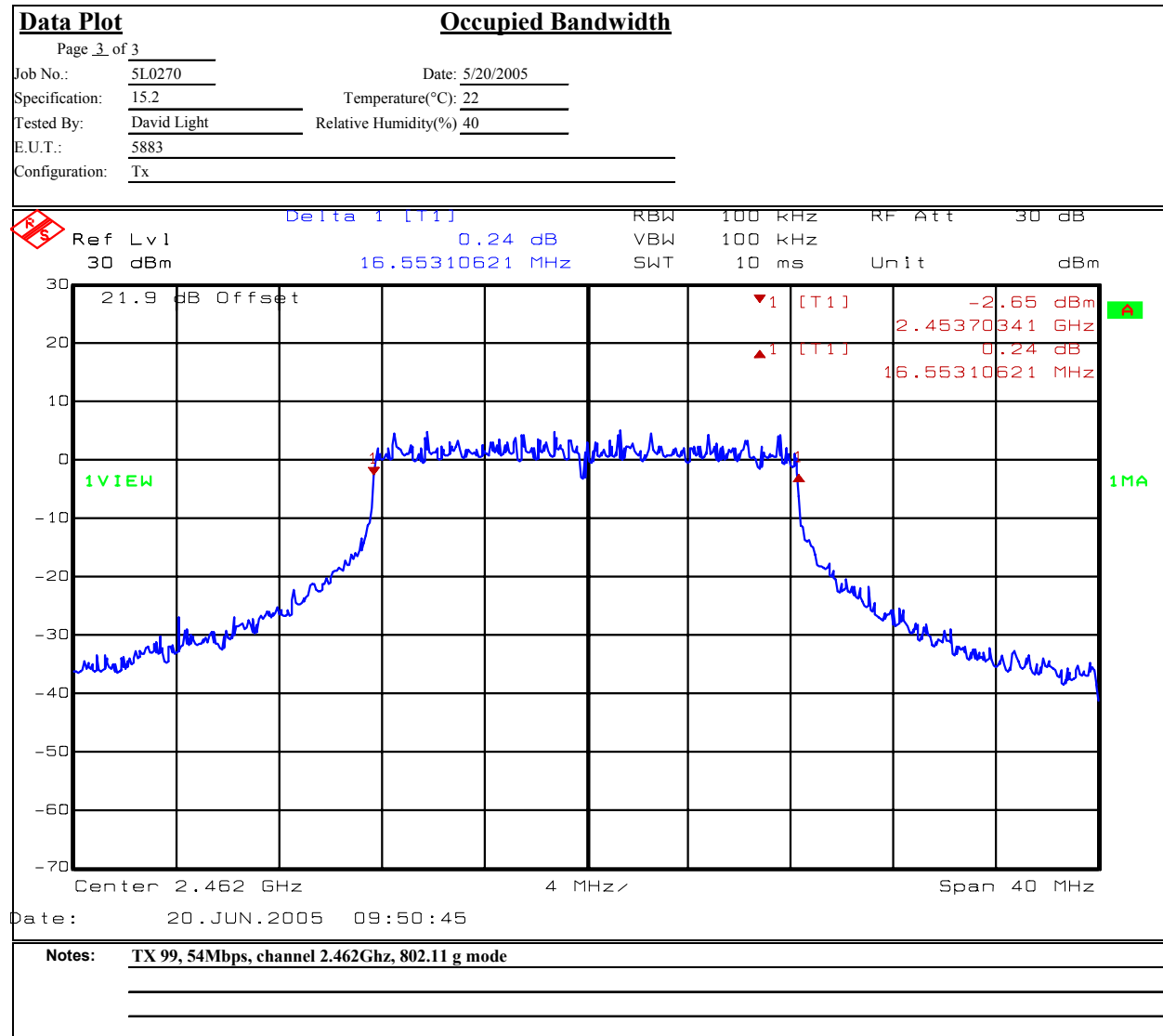
Date: 20 JUN. 2005 09:44:10

Notes: TX 99, 54Mbps, channel 2.412Ghz, 802.11 g mode

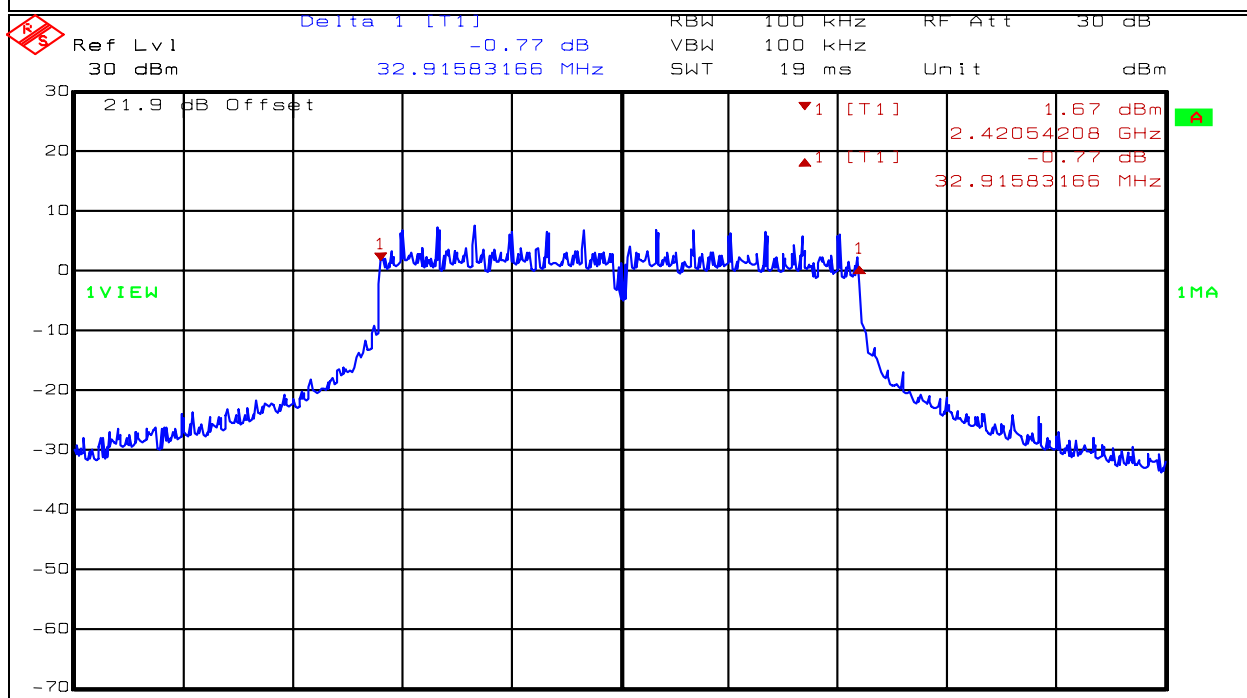
Test Data – Occupied Bandwidth



Test Data – Occupied Bandwidth



Test Data – Occupied Bandwidth

Data Plot		Occupied Bandwidth	
Page 1 of 1		Complete ☒ Preliminary ☐	
Job No.:	5L0270	Date:	5/20/2005
Specification:	15.247	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%):	40
E.U.T.:	5883		
Configuration:	TX		
Serial Number:	3		
Location:	Lab 2	RBW:	100 kHz
Detector Type:	Peak	VBW:	100 kHz
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:	1472	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty: $\pm 1 \times 10^{-7}$ ppm			
			
Date: 20 JUN 2005 09:58:06			
Notes: TX 99, 108Mbps, channel 2.437GHz, 802.11 g turbo mode			

Section 5. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(1)
TESTED BY: David Light	DATE: 6/20/2005

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.

Frequency (MHz)	Data Rate (Mbps)	Mode	Peak Power (dBm)	Peak Power (mW)
2412	11	b	21.63	145.6
2442	11	b	21.63	145.6
2462	11	b	21.39	137.8
2412	54	g	22.35	171.9
2442	54	g	22.62	182.8
2462	54	g	22.31	170.4
2437	108	g Turbo	22.51	178.1

NOTE: The antenna is 5.0 dBi gain. The rf power measurements above are conducted power at the antenna port.

Test Equipment: 1029-1030-1472

Test Conditions: 22°C
40% RH

Section 6 Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions at Antenna Terminals	PARA. NO.: 15.247 (c)
TESTED BY: David Light	DATE: 6/20/2005

Test Results: Complies.

Measurement Data: See attached plots.

Test Data – Spurious Emissions at Antenna Terminals

Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 4		Complete <u>X</u>	
Job No.: 5L0270	Date: 5/20/2005	Preliminary: _____	
Specification: 15.247	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: 5883			
Configuration: TX b mode			
Serial Number: 3			
Location: Lab 2	RBW: 100 kHz		
Detector Type: Peak	VBW: 100 kHz		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: _____		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1472	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			

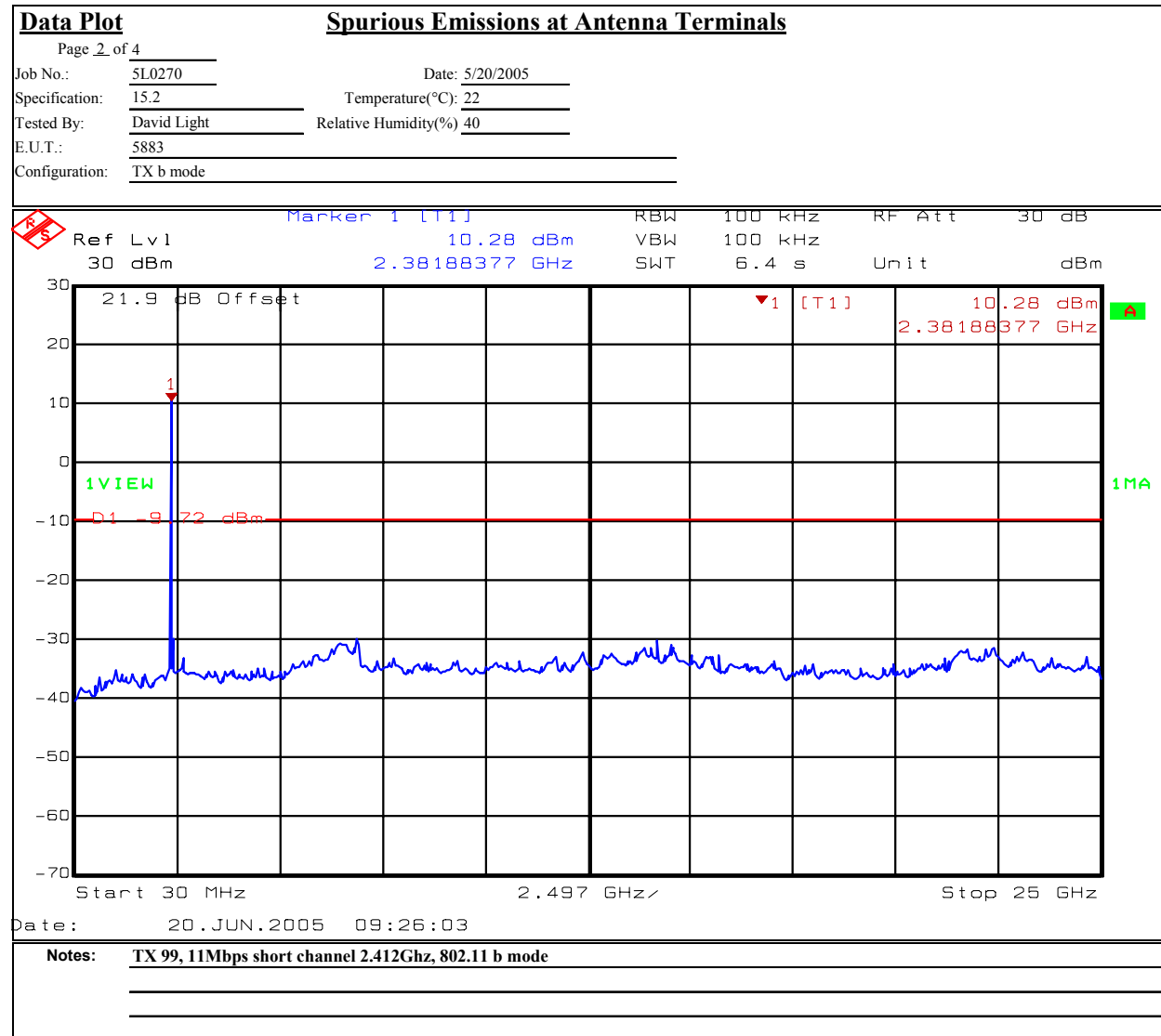
Ref	Lvl	Delta 1 [T1]	RBW	VBW	RF Att	Unit
30	dBm	36.40 dB	100 kHz	100 kHz	30 dB	dBm
30	dBm	13.91783567 MHz	7.5 ms			dBm

Center 2.4 GHz 3 MHz Span 30 MHz

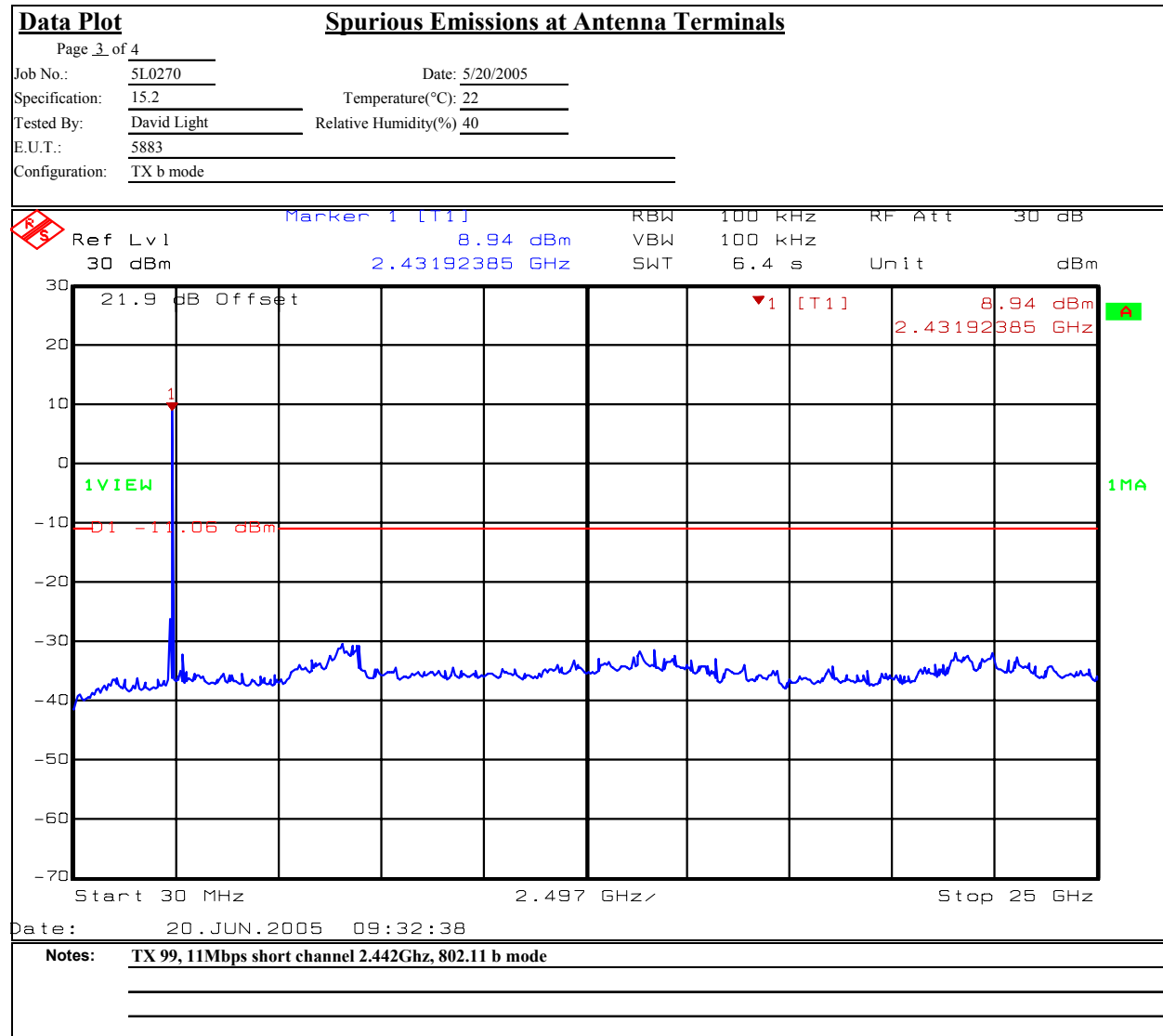
Date: 20.JUN.2005 09:22:17

Notes: TX 99, 11Mbps short channel 2.412Ghz, 802.11 b mode

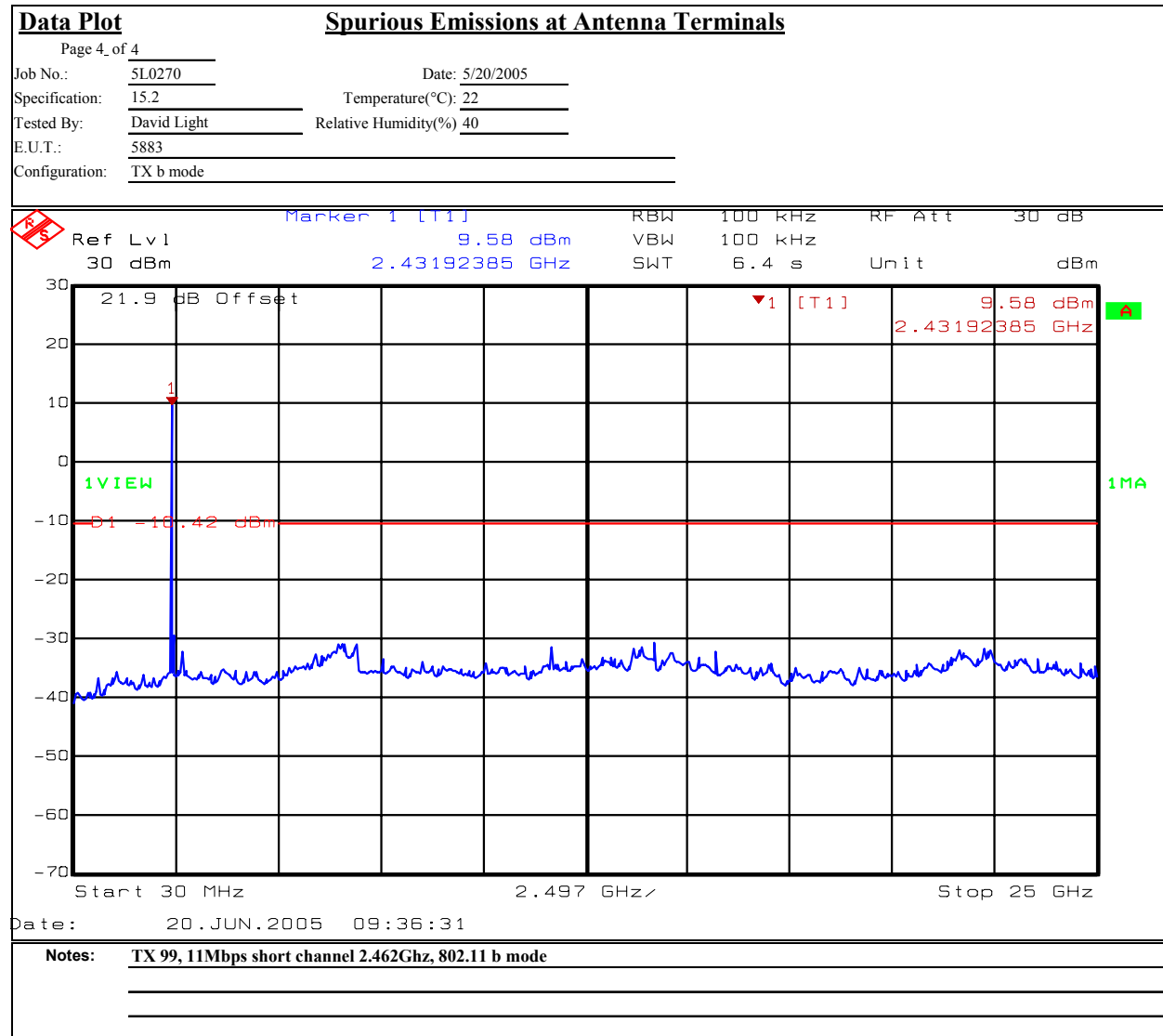
Test Data – Spurious Emissions at Antenna Terminals



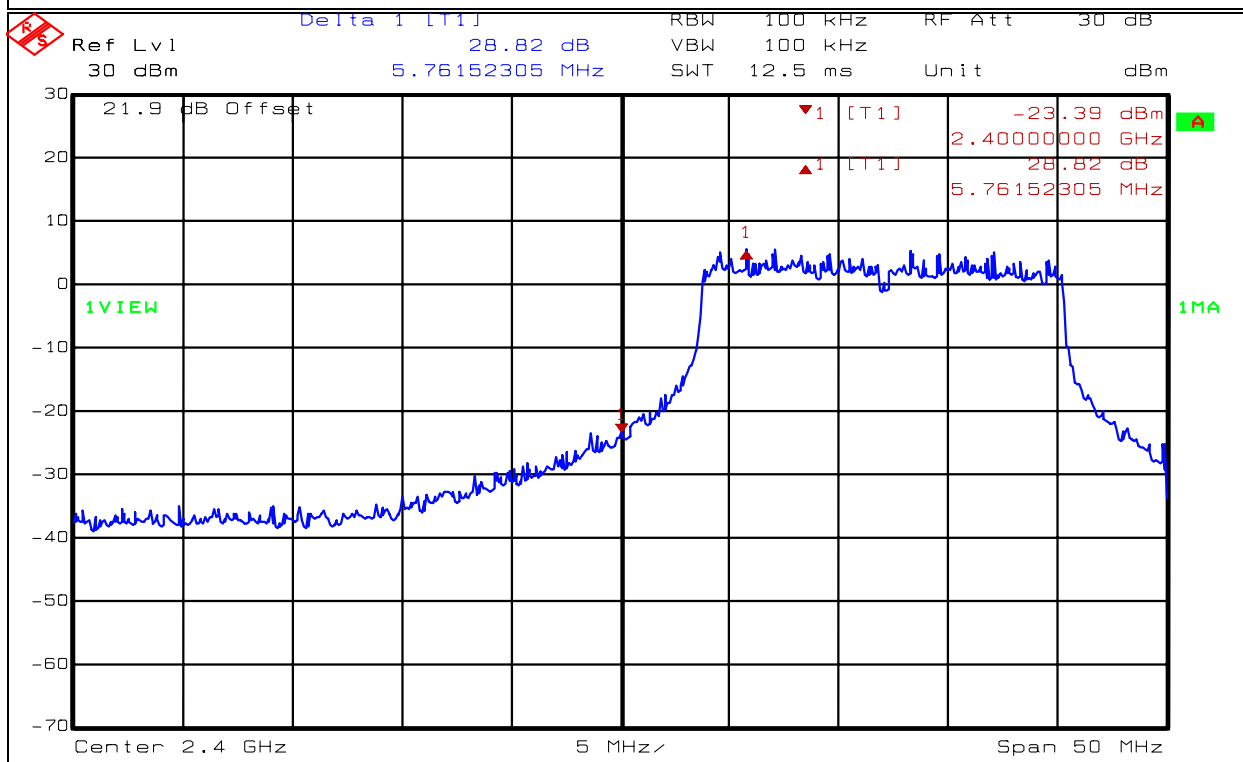
Test Data – Spurious Emissions at Antenna Terminals



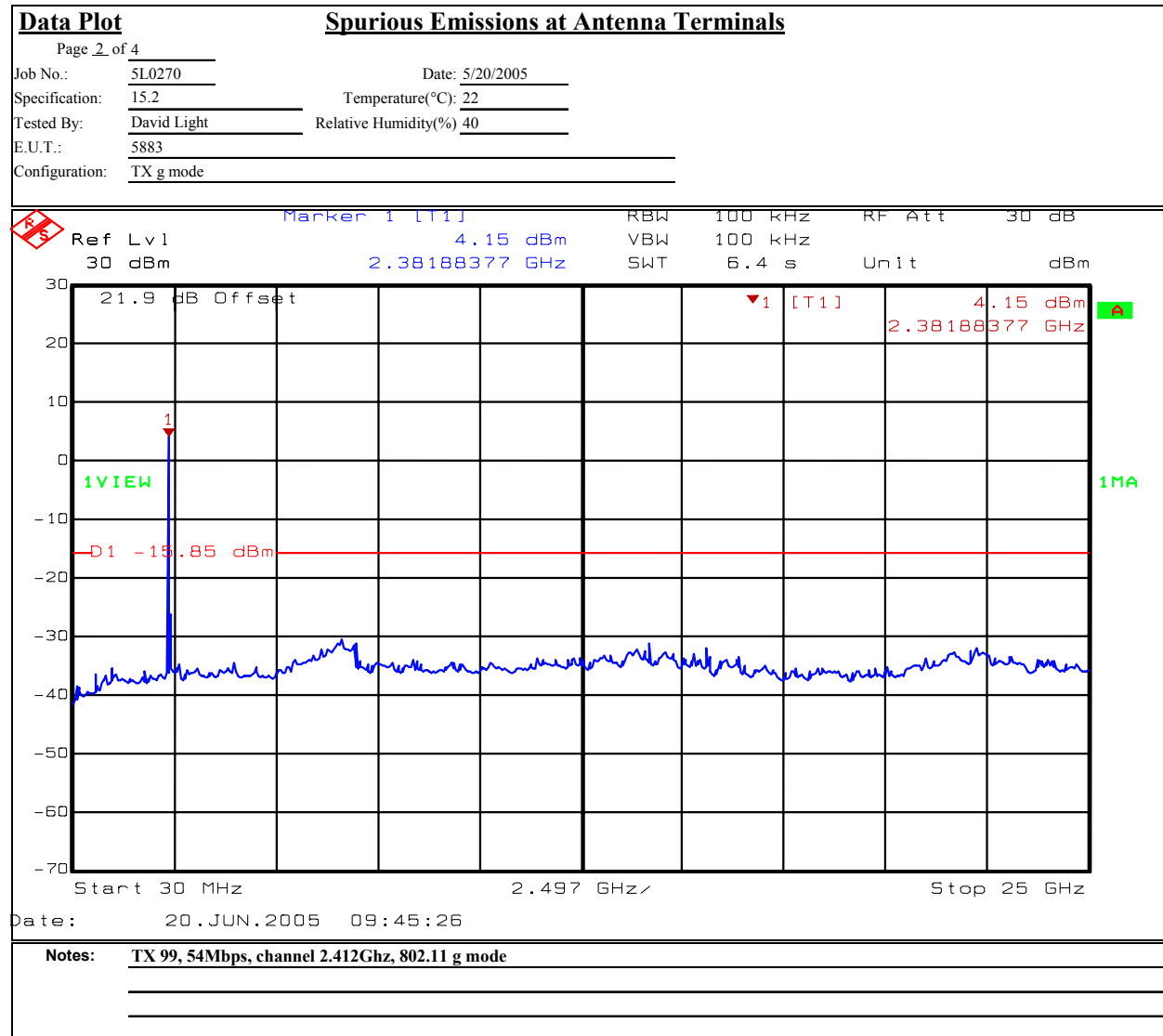
Test Data – Spurious Emissions at Antenna Terminals



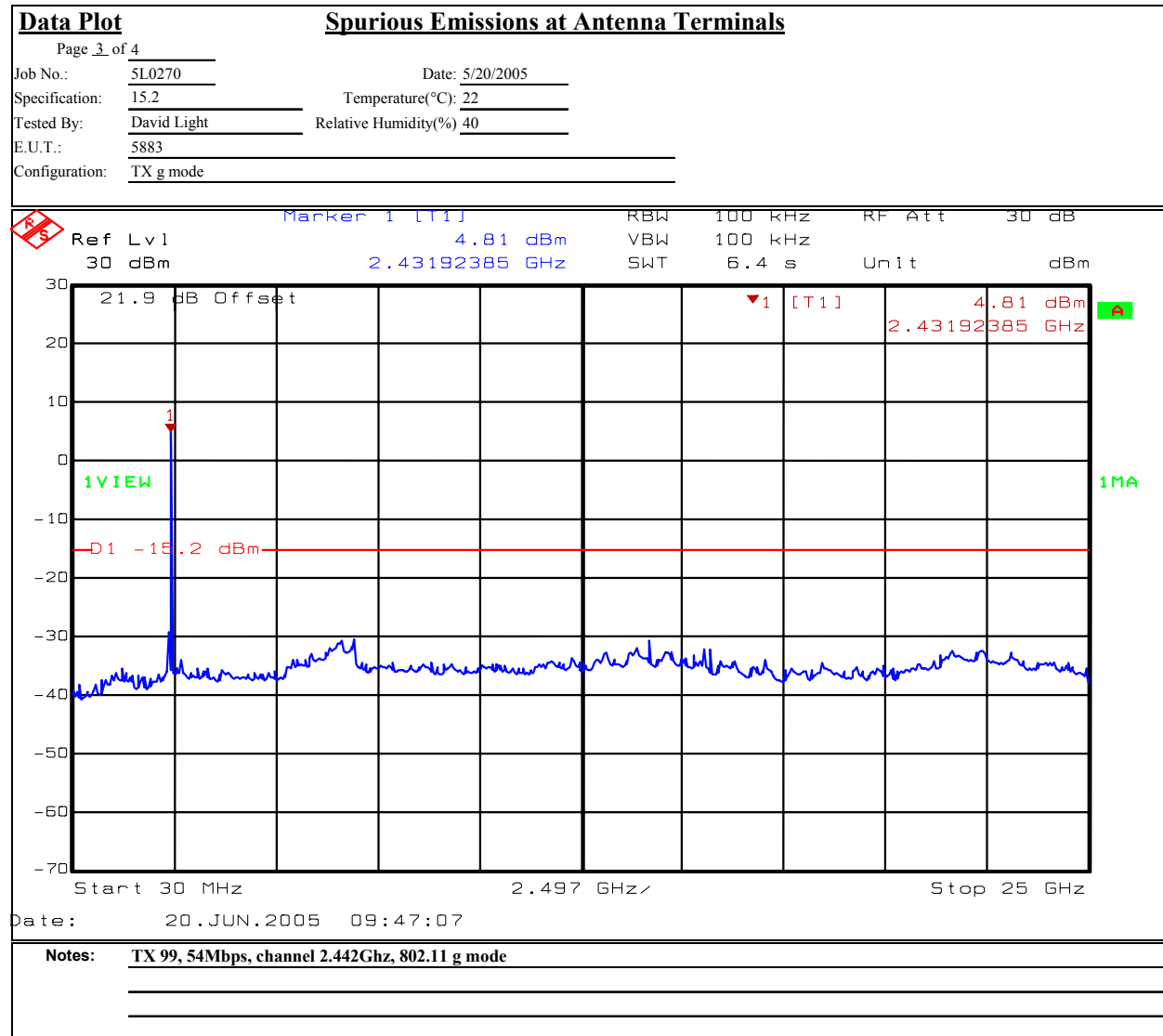
Test Data – Spurious Emissions at Antenna Terminals

Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 4		Complete <u>X</u>	
Job No.: 5L0270	Date: 5/20/2005	Preliminary: _____	
Specification: 15.247	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: 5883			
Configuration: TX g mode			
Serial Number: 3			
Location: Lab 2	RBW: 100 kHz		
Detector Type: Peak	VBW: 100 kHz		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: _____		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1472	Cable #4: _____		
Attenuator #2: 1478	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			
			
Date: 20.JUN.2005 09:41:09			
Notes: TX 99, 54Mbps, channel 2.412Ghz, 802.11 g mode			

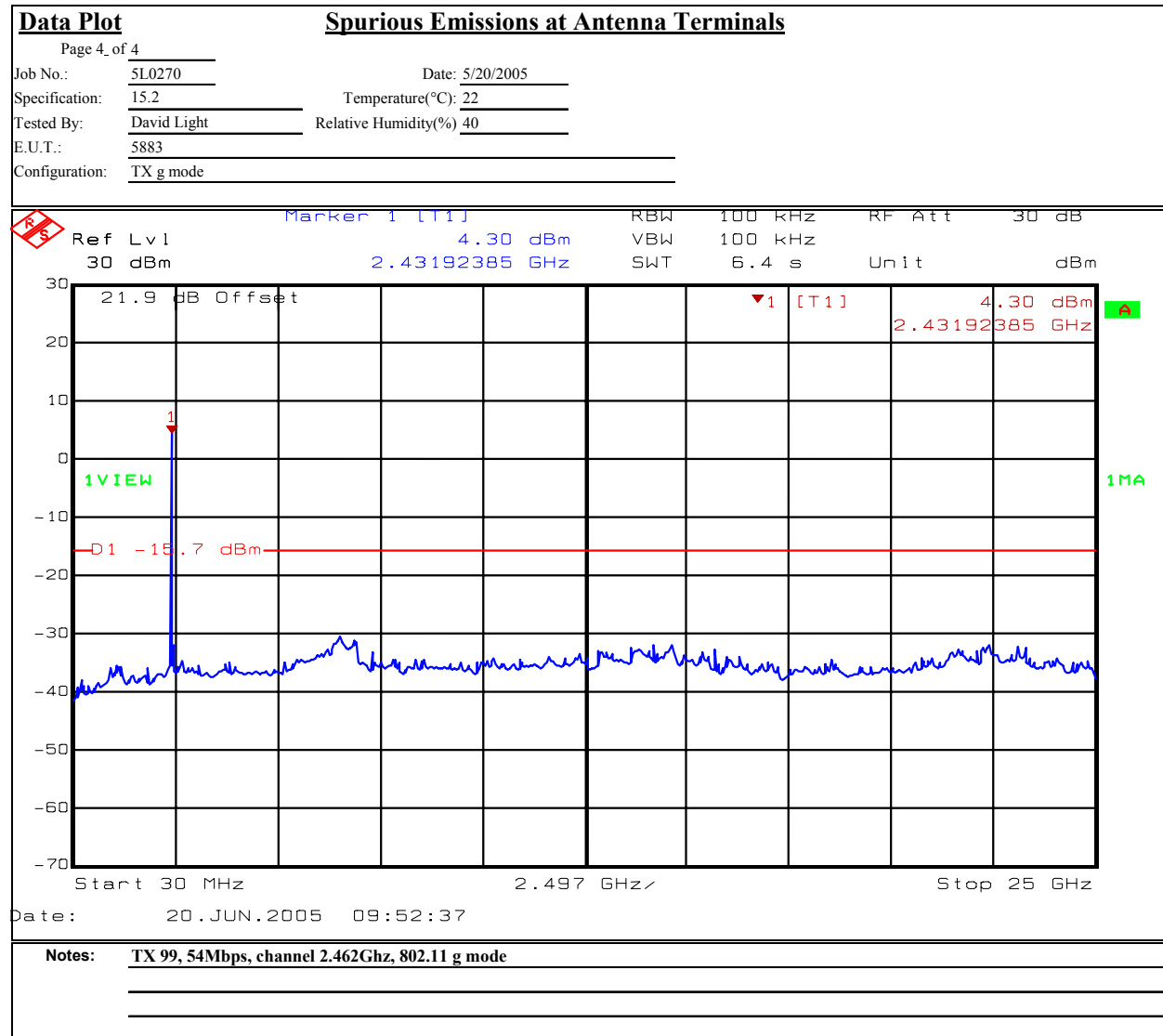
Test Data – Spurious Emissions at Antenna Terminals



Test Data – Spurious Emissions at Antenna Terminals



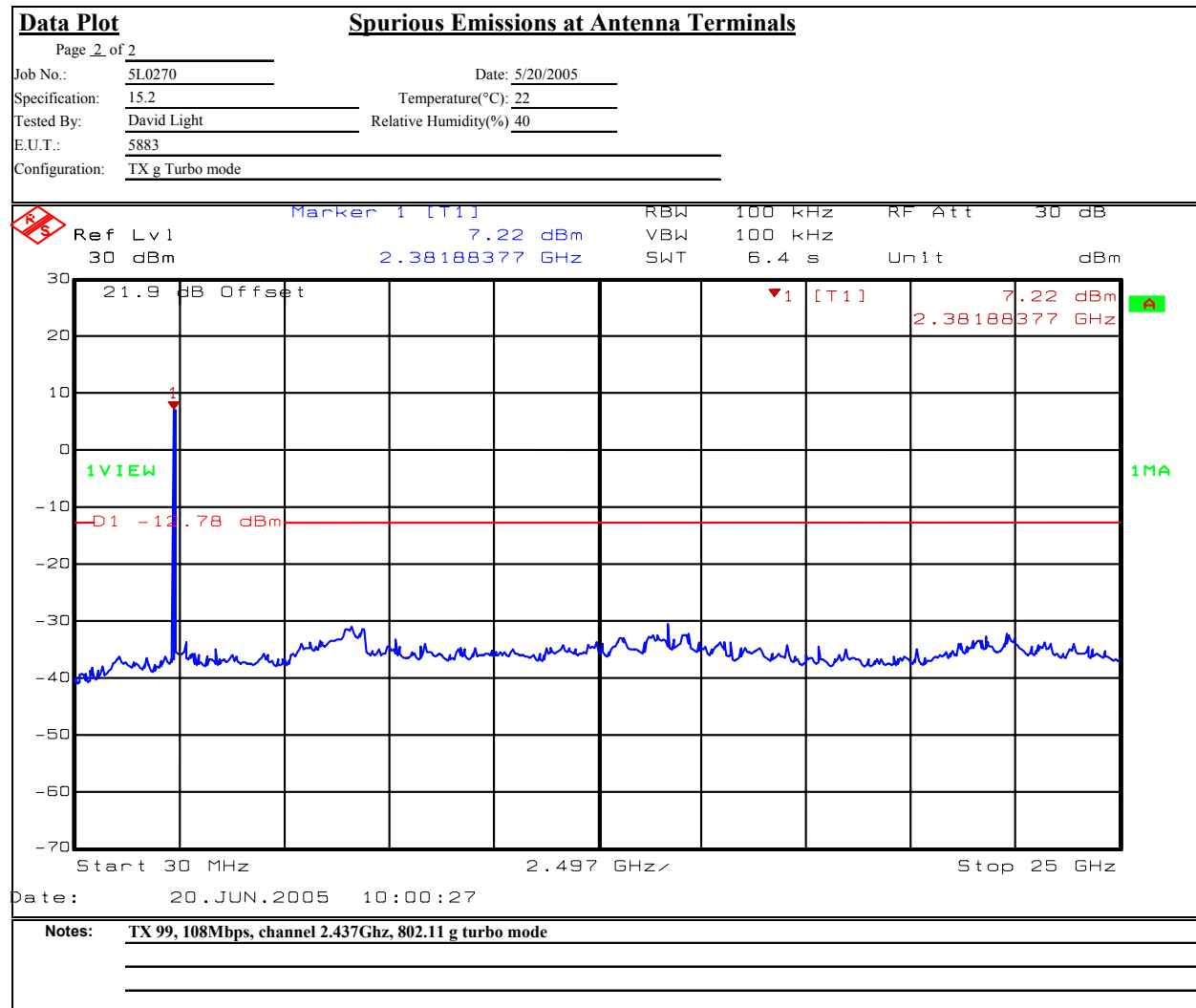
Test Data – Spurious Emissions at Antenna Terminals



Test Data – Spurious Emissions at Antenna Terminals

Data Plot		Spurious Emissions at Antenna Terminals		Complete <u>X</u>	
Page <u>1</u> of <u>2</u>				Preliminary: _____	
Job No.: 5L0270	Date: 5/20/2005				
Specification: 15.247	Temperature(°C): 22				
Tested By: David Light	Relative Humidity(%): 40				
E.U.T.: 5883					
Configuration: TX g Turbo mode					
Serial Number: 3					
Location: Lab 1		RBW: Refer to plots			
Detector Type: Peak		VBW: Refer to plots			
Test Equipment Used					
Antenna: _____		Directional Coupler: _____			
Pre-Amp: _____		Cable #1: _____			
Filter: _____		Cable #2: _____			
Receiver: 1036		Cable #3: _____			
Attenuator #1: 1472		Cable #4: _____			
Attenuator #2: 1478		Mixer: _____			
Additional equipment used: _____					
Measurement Uncertainty: +/-1.7 dB					
Notes: TX 99, 108Mbps, channel 2.437Ghz, 802.11 g turbo mode _____ _____ _____					

Test Data – Spurious Emissions at Antenna Terminals



Section 7. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.247 (c)
TESTED BY: Kevin Rose	DATE: 6/17/2005

Test Results: Complies.

Measurement Data: See attached table.

Radiated Emissions

Radiated Emissions								
Page <u>1</u> of <u>1</u>								
Job No.: 5L0270R		Date: <u>6/17/2005</u>						
Specification: 15.247		Temperature(°C): <u>21</u>						
Tested By: Kevin Rose		Relative Humidity(%) <u>42</u>						
E.U.T.: 5883								
Configuration: TX 99, 11Mbps short channel 2.462Ghz 802.11 b mode								
Sample Number: <u>1</u>								
Location: <u>AC 3</u>		RBW: <u>1 MHz</u>						
Detector Type: <u>Peak</u>		VBW: <u>1 MHz</u>						
<u>Test Equipment Used</u>								
Antenna: <u>1304</u>		Directional Coupler: <u>#N/A</u>						
Pre-Amp: <u>#N/A</u>		Cable #1: <u>1484</u>						
Filter: <u>#N/A</u>		Cable #2: <u>1485</u>						
Receiver: <u>1464</u>		Cable #3: <u>1081</u>						
Attenuator #1: <u>#N/A</u>		Cable #4: <u>#N/A</u>						
Attenuator #2: <u>#N/A</u>		Mixer: <u>#N/A</u>						
Measurement Uncertainty: +/- 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	33.3	28.2	3.1	0.0	64.6	74	54	Peak - / Vertical
2.4835	19.8	28.2	3.1	0.0	51.1	74	54	Average - / Vertical md
2.4835	43.2	28.2	3.1	12.8	61.7	74	54	Peak - / Horizontal
2.4835	32.3	28.2	3.1	12.8	50.8	74	54	Average - NF / Horizontal
								md=marker delta
Notes:		The spectrum was searched to 25 GHz						
		marker delta method was used for the bandedge measurement.A preamp and 20db pad was used						
		The device was tested at 2.412, 2.437 and 2.462 MHz and no emissions were found above the noise floor.						
		Data presented is to demonstrate upper bandedge compliance on channle 11						

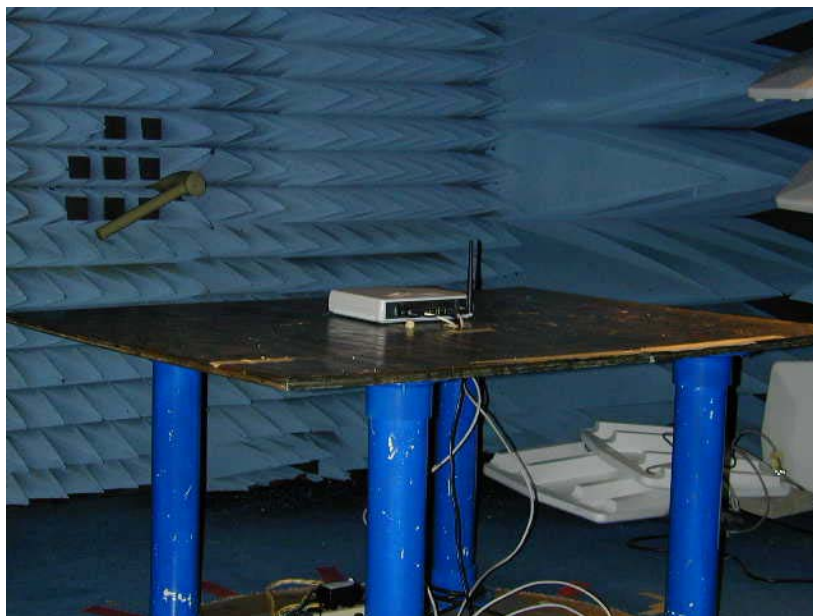
Radiated Emissions

Radiated Emissions								
Page <u>1</u> of <u>1</u>								
Job No.: 5L0270R		Date: <u>6/17/2005</u>						
Specification: 15.247		Temperature(°C): <u>21</u>						
Tested By: Kevin Rose		Relative Humidity(%) <u>42</u>						
E.U.T.: 5883								
Configuration: TX 99, 54Mbps channel 2.462Ghz 802.11 g mode								
Sample Number: <u>1</u>								
Location: <u>AC 3</u>		RBW: <u>1 MHz</u>						
Detector Type: <u>Peak</u>		VBW: <u>1 MHz</u>						
<u>Test Equipment Used</u>								
Antenna: <u>1304</u>		Directional Coupler: <u>#N/A</u>						
Pre-Amp: <u>#N/A</u>		Cable #1: <u>1484</u>						
Filter: <u>#N/A</u>		Cable #2: <u>1485</u>						
Receiver: <u>1464</u>		Cable #3: <u>1081</u>						
Attenuator #1: <u>#N/A</u>		Cable #4: <u>#N/A</u>						
Attenuator #2: <u>#N/A</u>		Mixer: <u>#N/A</u>						
Measurement Uncertainty: +/- 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	42.5	28.2	3.1	0.0	73.8	74	54	Peak - / Vertical
2.4835	20.4	28.2	3.1	0.0	51.7	74	54	Average - / Vertical md
2.4835	44.0	28.2	3.1	12.8	62.5	74	54	Peak - / Horizontal
2.4835	32.8	28.2	3.1	12.8	51.3	74	54	Average - NF / Horizontal
								md = marker delta
Notes:		The spectrum was searched to 25 GHz						
		marker delta method was used for the bandedge measurement. Horizontal a pre amp with a 20db pad was used						
		The device was tested at 2.412, 2.437 and 2.462 MHz and no emissions were found above the noise floor.						
		Data presented is to demonstrate upper bandedge compliance on channle 11						

Radiated Emissions

Radiated Emissions								
Page <u>1</u> of <u>1</u>								
Job No.: 5L0270R		Date: <u>6/17/2005</u>						
Specification: 15.247		Temperature(°C): <u>21</u>						
Tested By: Kevin Rose		Relative Humidity(%) <u>42</u>						
E.U.T.: 5883								
Configuration: TX 99, 108Mbps channel 2.437Ghz 802.11 g turbo mode								
Sample Number: <u>1</u>								
Location: <u>AC 3</u>		RBW: <u>1 MHz</u>						
Detector Type: <u>Peak</u>		VBW: <u>1 MHz</u>						
<u>Test Equipment Used</u>								
Antenna: <u>1304</u>		Directional Coupler: <u>#N/A</u>						
Pre-Amp: <u>#N/A</u>		Cable #1: <u>1484</u>						
Filter: <u>#N/A</u>		Cable #2: <u>1485</u>						
Receiver: <u>1464</u>		Cable #3: <u>1081</u>						
Attenuator #1: <u>#N/A</u>		Cable #4: <u>#N/A</u>						
Attenuator #2: <u>#N/A</u>		Mixer: <u>#N/A</u>						
Measurement Uncertainty: +/- 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	38.3	28.2	3.1	0.0	69.6	74	54	Peak - / Vertical
2.4835	22.7	28.2	3.1	0.0	54.0	74	54	Average - / Vertical md
2.4835	34.0	28.2	3.1	0.0	65.3	74	54	Peak - / Horizontal
2.4835	21.9	28.2	3.1	0.0	53.2	74	54	Average - NF / Horizontal
								md = marker delta
Notes:		The spectrum was searched to 25 GHz						
		The device was tested at 2.412, 2.437 and 2.462 MHz and no emissions were found above the noise floor.						
		Data presented is to demonstrate upper bandedge compliance on channle 11						

Radiated Photographs



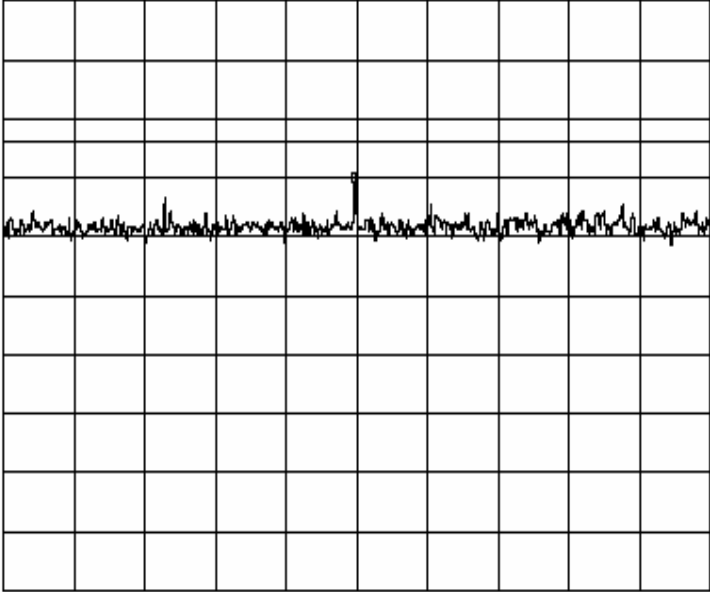
Section 8. Peak Power Spectral Density

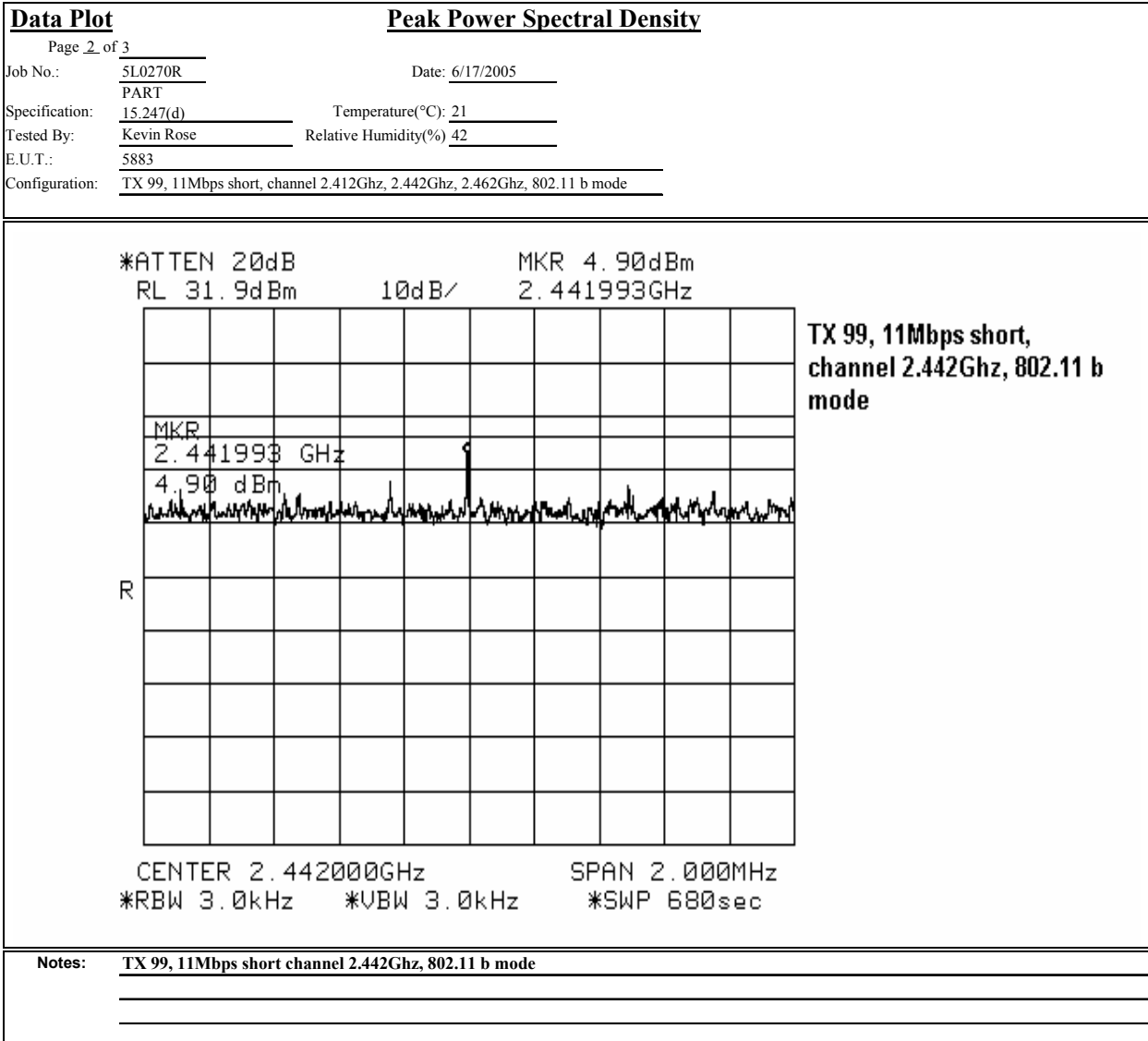
NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(d)
TESTED BY: Kevin Rose	DATE: 6/17/2005

Test Results: Complies.

Measurement Data: See attached data..

Peak Power Spectral Density

<u>Data Plot</u>	<u>Peak Power Spectral Density</u>	
Page <u>1</u> of <u>3</u>		Complete <u>X</u>
Job No.: <u>5L0270R</u>	Date: <u>6/17/2005</u>	Preliminary: _____
Specification: <u>PART 15.247(d)</u>	Temperature(°C): <u>21</u>	
Tested By: <u>Kevin Rose</u>	Relative Humidity(%): <u>42</u>	
E.U.T.: <u>5883</u>		
Configuration: <u>TX 99, 11Mbps short, channel 2.412Ghz, 2.442Ghz, 2.462Ghz, 802.11 b mode</u>		
Sample Number: <u>1</u>		
Location: <u>Lab 2</u>	RBW: <u>Refer to plots</u>	
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>	
<u>Test Equipment Used</u>		
Antenna: _____	Directional Coupler: _____	
Pre-Amp: _____	Cable #1: <u>1083</u>	
Filter: _____	Cable #2: _____	
Receiver: <u>1464</u>	Cable #3: _____	
Attenuator #1: <u>1477</u>	Cable #4: _____	
Attenuator #2: _____	Mixer: _____	
Additional equipment used: _____		
Measurement Uncertainty: <u>+/-1.7 dB</u>		
*ATTEN 20dB RL 31.9dBm 10dB/ MKR .90dBm 2.411993GHz  TX 99, 11Mbps short channel 2.412Ghz 802.11 b mode CENTER 2.412000GHz *RBW 3.0kHz SPAN 2.000MHz *VBW 3.0kHz *SWP 680sec		
Notes: <u>TX 99, 11Mbps short, channel 2.412Ghz, 802.11 b mode</u> _____ _____ _____		

Peak Power Spectral Density

Peak Power Spectral Density**Data Plot****Peak Power Spectral Density**

Page 3 of 3

Job No.: 5L0270R

Date: 6/17/2005

PART

Specification: 15.247(d)

Temperature(°C): 21

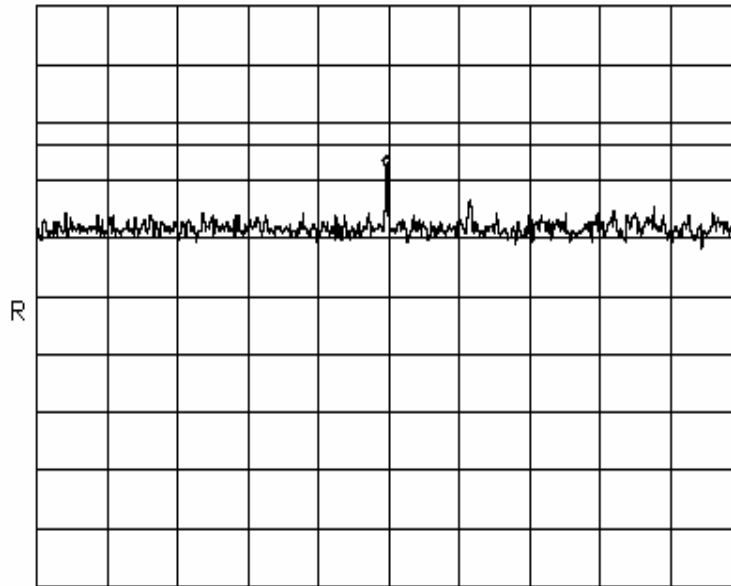
Tested By: Kevin Rose

Relative Humidity(%) 42

E.U.T.: 5883

Configuration: TX 99, 11Mbps short, channel 2.412Ghz, 2.442Ghz, 2.462Ghz, 802.11 b mode

*ATTEN 20dB MKR 4.23dBm
RL 31.9dBm 10dB/ 2.461993GHz



TX 99, 11Mbps short
channel 2.462Ghz, 802.11 b
mode

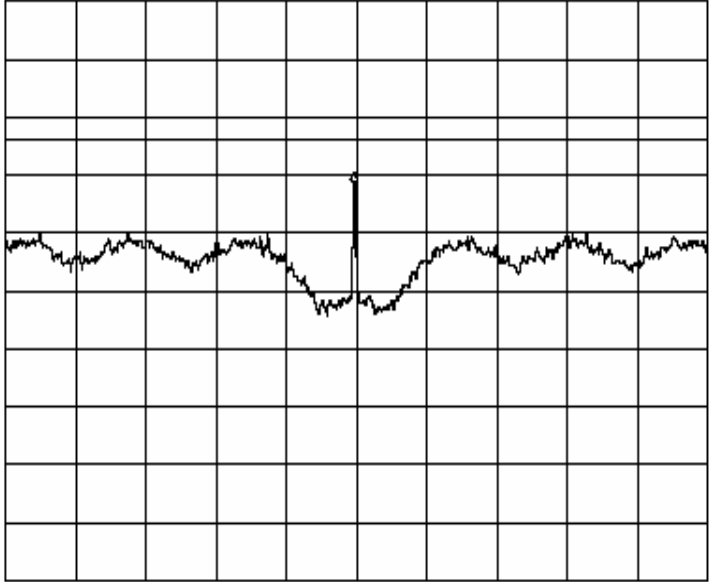
CENTER 2.462000GHz SPAN 2.000MHz
*RBW 3.0kHz *VBW 3.0kHz *SWP 680sec

Notes: TX 99, 11Mbps short channel 2.462Ghz, 802.11 b mode

Peak Power Spectral Density

Data Plot		Peak Power Spectral Density	
Page 1 of 3		Complete <u>X</u>	
Job No.:	5L0270R	Date:	6/17/2005
Specification:	PART 15.247(d)	Temperature(°C):	21
Tested By:	Kevin Rose	Relative Humidity(%):	42
E.U.T.:	5883		
Configuration:	TX 99, 54Mbps, channel 2.412Ghz, 2.442Ghz, 2.462Ghz, 802.11 g mode		
Sample Number:	1		
Location:	Lab 2	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1083
Filter:		Cable #2:	
Receiver:	1464	Cable #3:	
Attenuator #1:	1477	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-1.7 dB		

*ATTEN 20dB MKR .23dBm
RL 31.9dBm 10dB/ 2.411993GHz



TX 99, 54Mbps, channel
2.412Ghz, 802.11 g mode

CENTER 2.412000GHz SPAN 2.000MHz
*RBW 3.0kHz *VBW 3.0kHz *SWP 680sec

Notes:	TX 99, 54Mbps, channel 2.412Ghz, 802.11 g mode

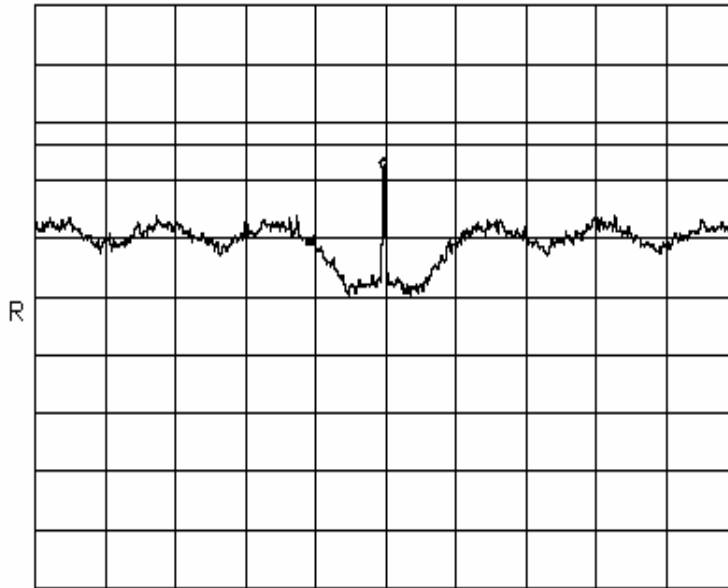
Peak Power Spectral Density**Data Plot**

Page 2 of 3

Job No.: 5L0270R
PART
Specification: 15.247(d) Temperature(°C): 21
Tested By: Kevin Rose Relative Humidity(%) 42
E.U.T.: 5883
Configuration: TX 99, 54Mbps, channel 2.412Ghz, 2.442Ghz, 2.462Ghz, 802.11 g mode

Peak Power Spectral Density

*ATTEN 20dB MKR 3.90dBm
RL 31.9dBm 10dB/ 2.441993GHz

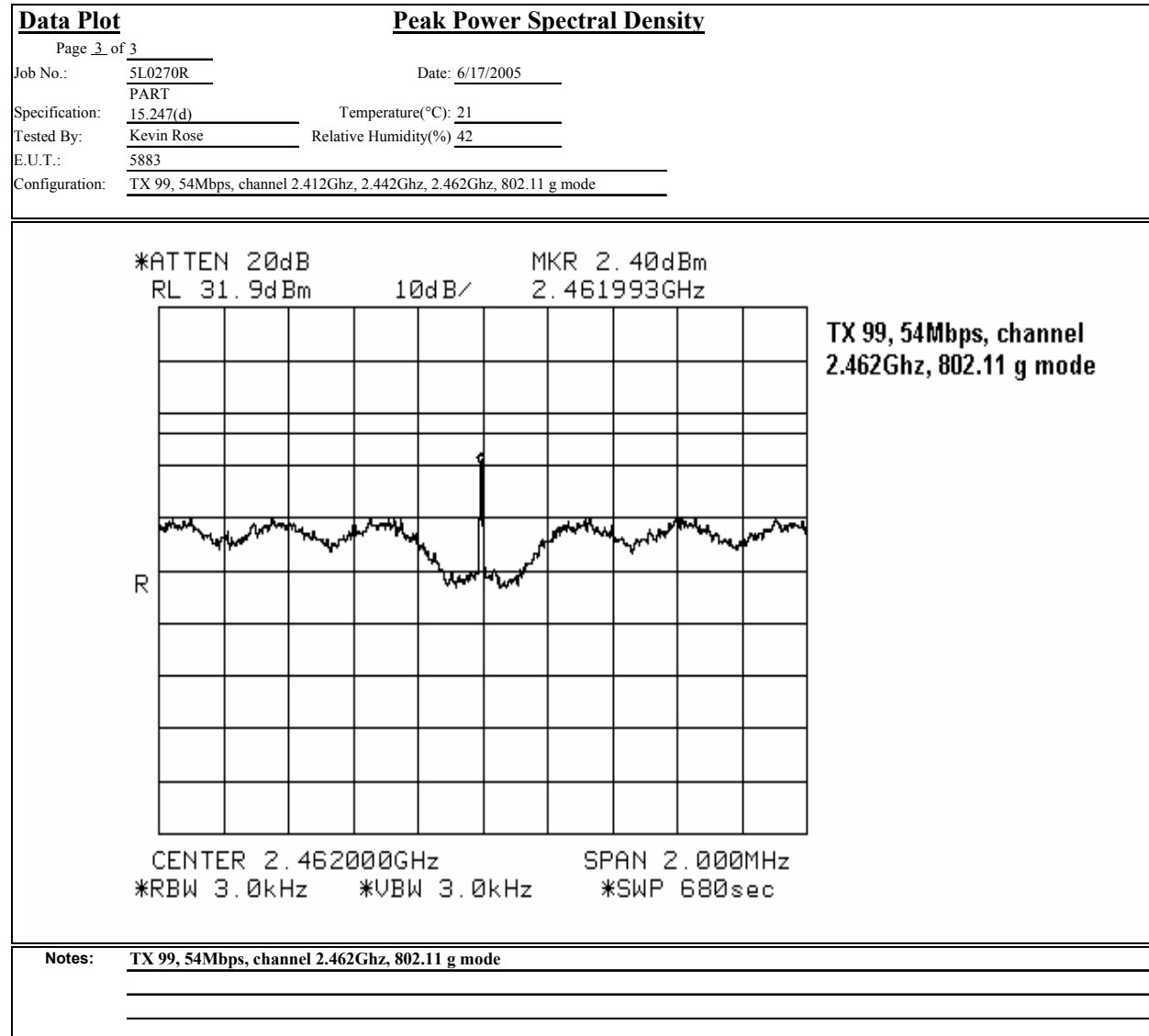


TX 99, 54Mbps, channel
2.442Ghz, 802.11 g mode

CENTER 2.442000GHz SPAN 2.000MHz
*RBW 3.0kHz *VBW 3.0kHz *SWP 680sec

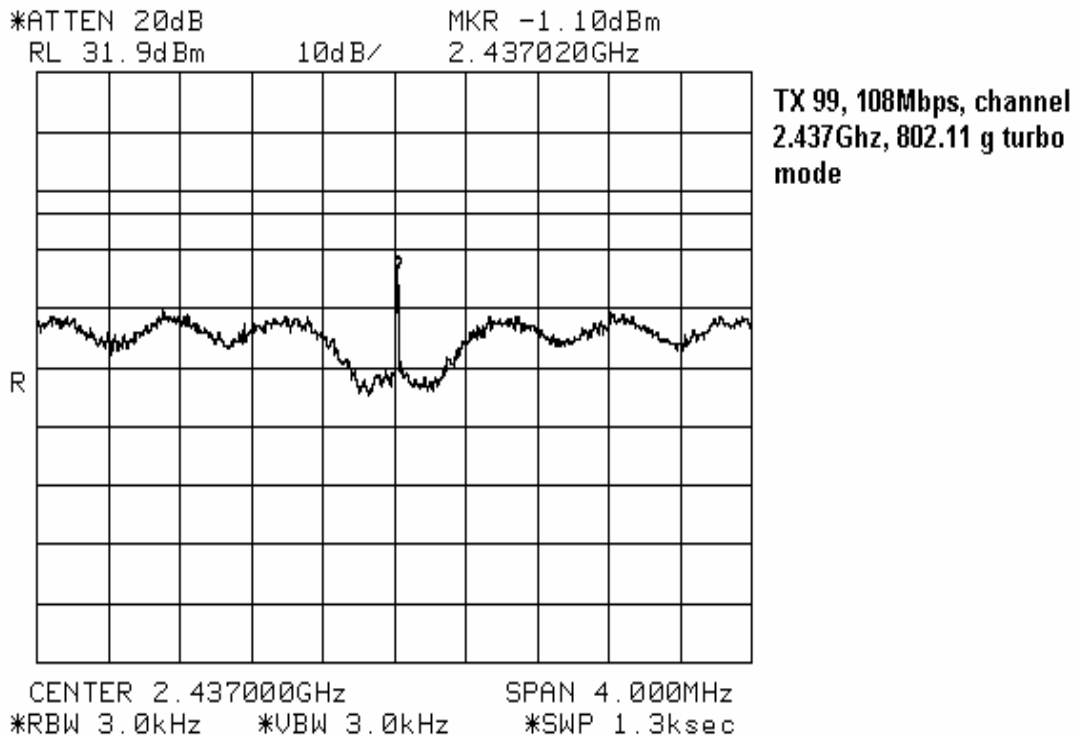
Notes: TX 99, 54Mbps, channel 2.442Ghz, 802.11 g mode

Peak Power Spectral Density



Peak Power Spectral Density

Data Plot		Peak Power Spectral Density	
Page 1 of 1		Complete <u>X</u>	
Job No.:	5L0270R	Date:	6/17/2005
Specification:	PART 15.247(d)	Temperature(°C):	21
Tested By:	Kevin Rose	Relative Humidity(%)	42
E.U.T.:	5883		
Configuration:	TX 99, 108Mbps, channel 2.437Ghz, 802.11 g turbo mode		
Sample Number:	1		
Location:	Lab 2	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1083
Filter:		Cable #2:	
Receiver:	1464	Cable #3:	
Attenuator #1:	1477	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-1.7 dB		



Notes: TX 99, 108Mbps, channel 2.437Ghz, 802.11 g turbo mode

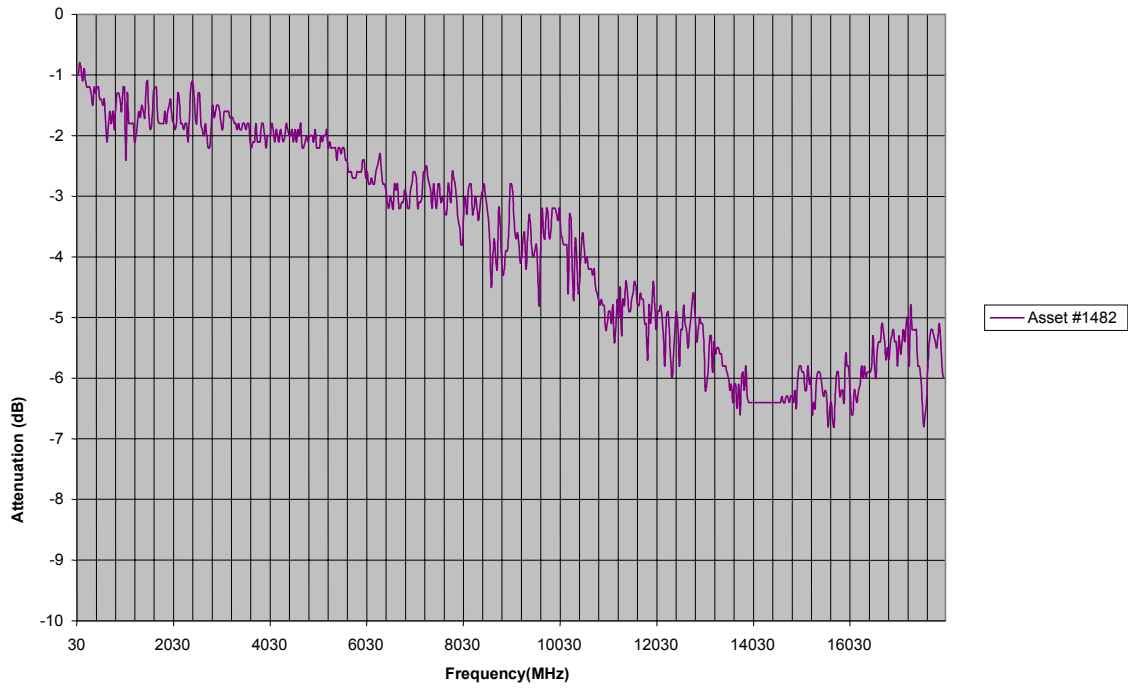
Section 9. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
545	LISN	Schwarz Beck 8120	8120350	09/17/04	09/17/05
1555	Filter high pass 5 kHz	Solar Electronics 7930-5.0	933125	04/20/05	04/20/06
1553	CABLE 1m	KTL RG223	N/A	06/09/04	06/09/05
1998	CABLE, 1m	KTL RG223	N/A	06/09/04	06/09/05
1284	Spectrum analyzer display	Hewlett Packard 8566B	1811A00223	01/10/05	01/10/06
966	Receiver	Rohde & Schwartz ESH2	880370/029	09/20/04	09/20/05
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	Cal. On use	Cal. On use
1081	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/26/04	08/26/05
1029	PEAK POWER METER	HP 8900D	3303U0012	12/23/04	12/22/05
1030	PEAK POWER SENSOR	HP 84811A	2539A03573	12/23/04	12/22/05
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
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
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
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	07/22/05
791	PREAMP, 25dB	ICC LNA25	398	11/12/04	11/12/05

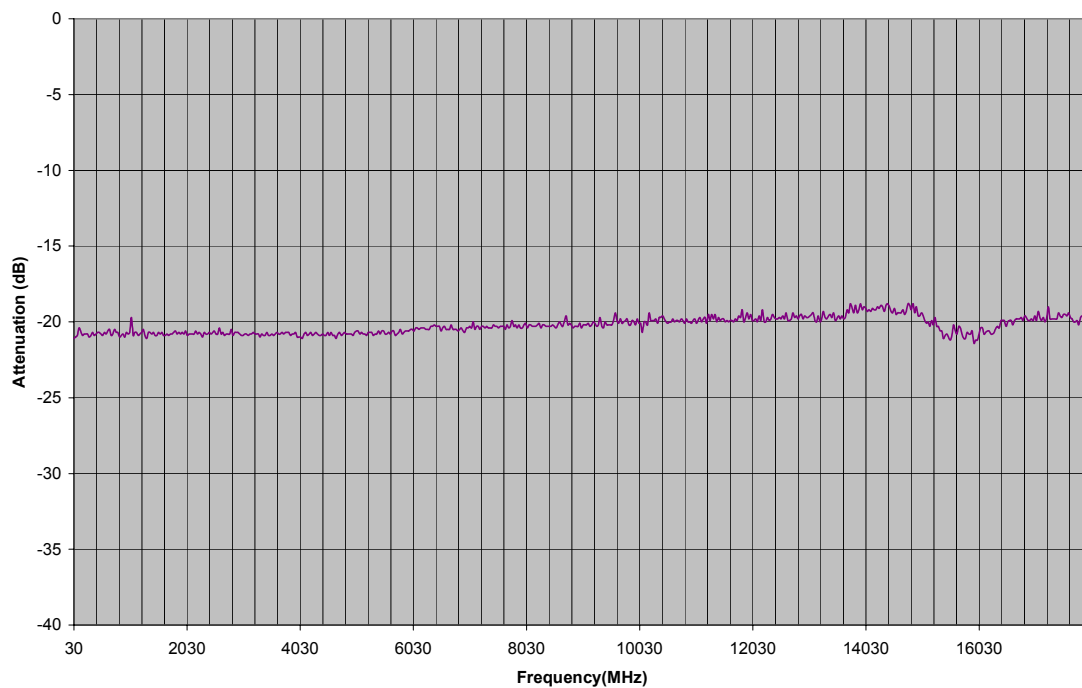
1083	Cable 2m	Astrolab 32027-2-29094-72TC	N/A	Cal. On use	Cal. On use
1477	20db Attenuator DC 18 GHz	MCL Inc. BW-S20W5	NONE	Cal. On use	Cal. On use
1478	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W6	NONE	02/21/05	02/21/06

*The calibration was extended on this equipment for one month according to Nemko quality system procedures.

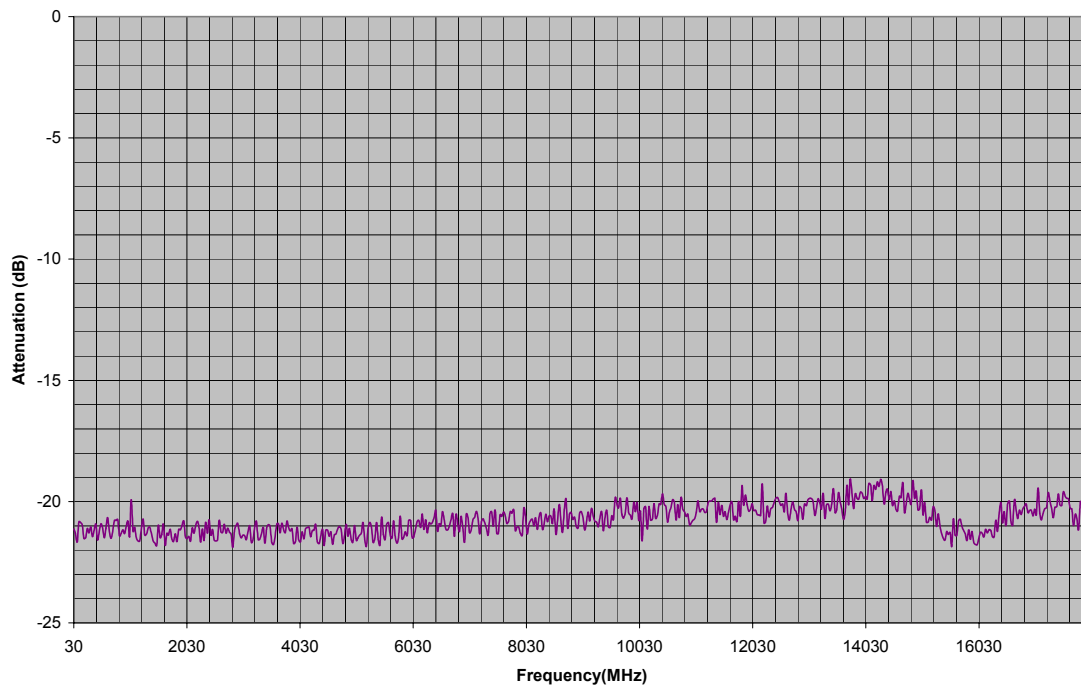
Asset #1083 Insertion Loss



Asset #1472 Insertion Loss



Asset #1477 Insertion Loss



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.

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

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.

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 sec./1.001 sec.)/75 chan. = 400 x 1 msec. = 400 msec. or 0.4 sec. in 30 sec.

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

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.

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 ($\mu\text{V/m}$ @ 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

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 ($\mu\text{V/m}$ @ 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

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:

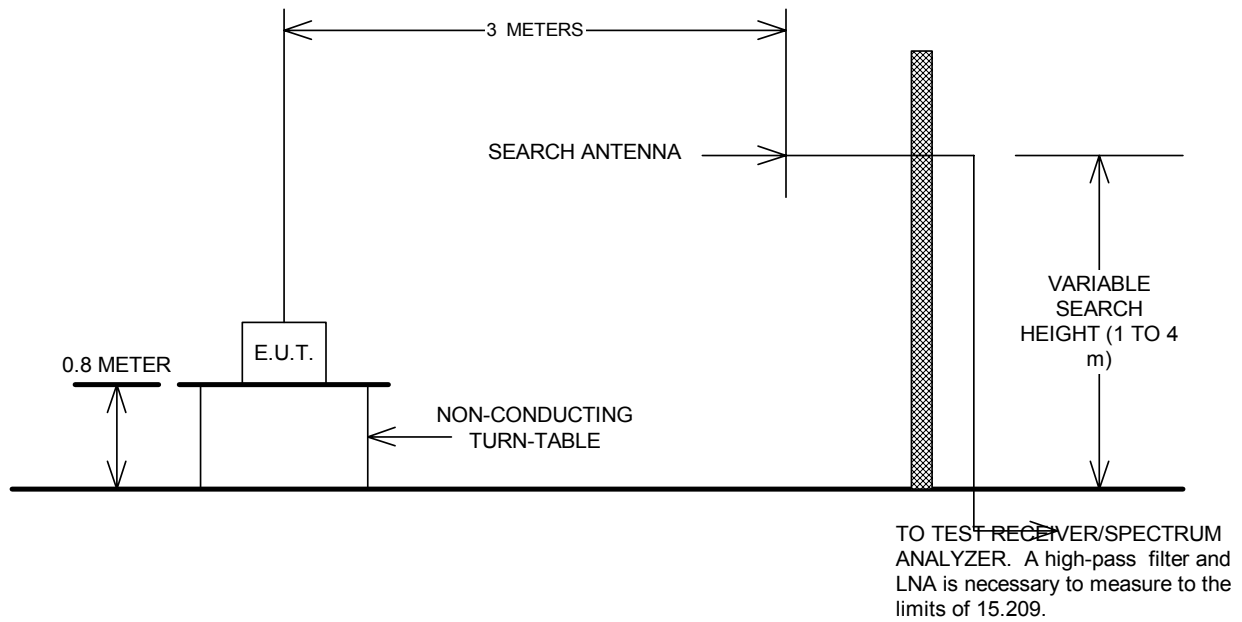
For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent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

Number of channels tested:

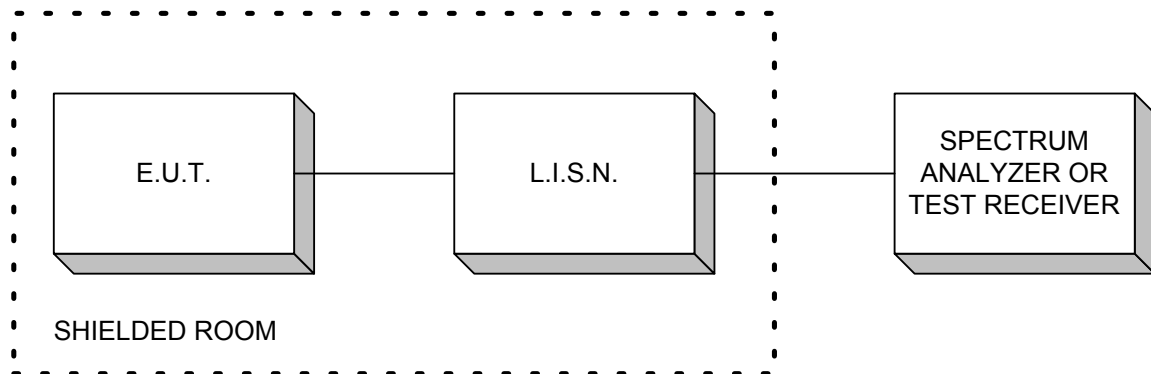
Tuning Range	Number Of Channels Tested	Channel Location In Band
1 MHz or Less	1	Middle
1 to 10 MHz	2	Top And Bottom
More Than 10 MHz	3	Top, Middle, Bottom

ANNEX B - TEST DIAGRAMS

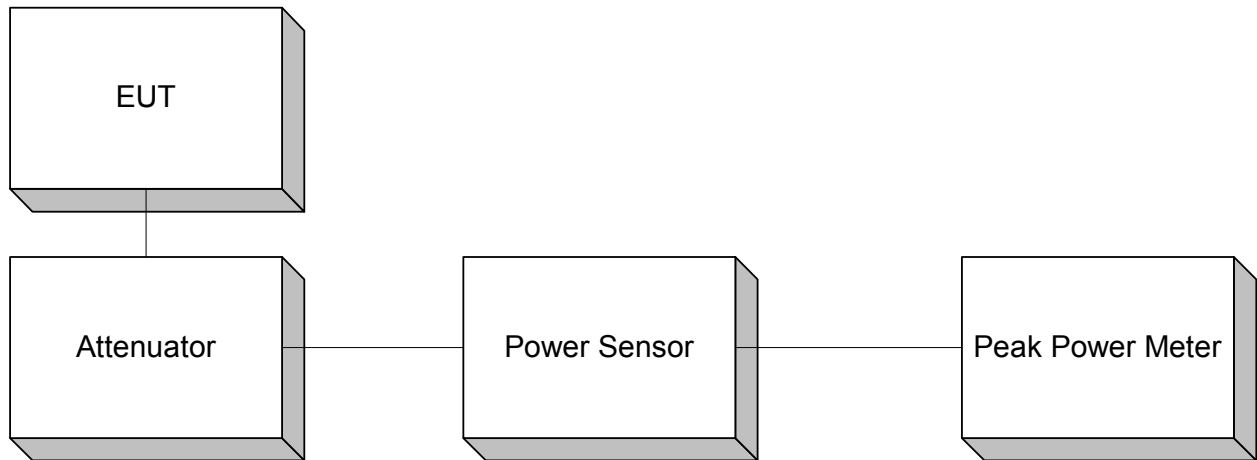
Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals



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

