



## Test Certificate

A sample of the following product received on November 6, 2009 and tested on December 16 and December 18, 2009 complied with the requirements of

- EN 301 893 V1.5.1 "Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive"

given the measurement uncertainties detailed in Elliott report R77874.

**Summit Data Communications Inc.  
Model SDC-PE15N**

\_\_\_\_\_  
Mark E. Hill  
Staff Engineer

\_\_\_\_\_  
Summit Data Communications Inc.

\_\_\_\_\_  
Printed Name



Testing Cert #2016-01

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Elliott Laboratories  
www.elliottlabs.com

684 West Maude Avenue  
Sunnyvale, CA 94085-3518

408-245-7800 Phone  
408-245-3499 Fax



*Radio Test Report*

*EN 301 893 V1.5.1*

*ElectroMagnetic Compatibility and Radio spectrum Matters  
(ERM); Broadband Radio Access Networks (BRAN); 5 GHz  
high performance RLAN*

*Model: SDC-PE15N*

COMPANY: Summit Data Communications Inc.  
526 South Main St. Suite 805  
Akron, OH 44311

TEST SITE(S): Elliott Laboratories  
684 W. Maude Avenue  
Sunnyvale, CA 94085  
and 41039 Boyce Road.  
Fremont, CA. 94538-2435

REPORT DATE: February 11, 2010

FINAL TEST DATES: December 16 and December 18, 2009

AUTHORIZED SIGNATORY:

A handwritten signature in blue ink, appearing to read "Mark E. Hill", written over a horizontal line.

Mark E. Hill  
Staff Engineer  
Elliott Laboratories



Testing Cert #2016-01

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**REVISION HISTORY**

Rev#	Date	Comments	Modified By
-	February 11, 2010	First release	

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## SCOPE

The European Committee for Electrotechnical Standardization (CENELEC) and the European Telecommunications Standards Institute (ETSI) publish standards regarding ElectroMagnetic Compatibility and Radio spectrum Matters for radio-communications devices.

Tests have been performed on the Summit Data Communications Inc. model SDC-PE15N, pursuant to the relevant requirements of the following harmonized EN standard(s) covering essential requirements under article 3.2 of the R&TTE Directive:

- EN 301 893 V1.5.1 “Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive”

## OBJECTIVE

The objective of the manufacturer is to comply with the harmonized standards identified in the previous section. In the case of most equipment, this document requires testing to other EN specifications. In order to demonstrate compliance, the manufacturer or a contracted laboratory makes measurements and takes the necessary steps to ensure that the equipment complies with the appropriate technical standards.

Testing was performed only on model SDC-PE15N. This model was considered representative of the following models.

The SDC-PE15N was previously tested against the requirements of EN 301 893. The purpose of this evaluation is to add new, higher gain antennas.

### **STATEMENT OF COMPLIANCE**

The tested sample of Summit Data Communications Inc. model SDC-PE15N complied with the requirements of:

EN 301 893 V1.5.1

The test results recorded herein are based on a single type test of Summit Data Communications Inc. model SDC-PE15N and therefore apply only to the tested sample. The sample was selected and prepared by Ron Seide of Summit Data Communications Inc..

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

### **DEVIATIONS FROM THE STANDARDS**

No deviations were made from the published requirements listed in the scope of this report.

**TEST RESULTS**

Note, only those tests applicable to the addition of a higher gain antenna were performed.

**EN 301 893 V1.5.1**

Section	Description	Channel	Measured Value	Limit	Result
<b>802.11a</b>					
4.4.2.1	RF output power and power density at the highest power level (5150-5350 MHz)	5180MHz 5320MHz	20.8 dBm	23.0dBm	Complies
			6.8 dBm/MHz	10 dBm/MHz	Complies
	RF output power and power density at the highest power level (5470-5725MHz)	5500MHz 5700MHz	20.4 dBm	30.0 dBm	Complies
			5.6 dBm/MHz	17 dBm/MHz	Complies
4.4.2.2	RF output power at the lowest power level of the TPC range	5180MHz 5320MHz	16.0 dBm	17.0 dBm	Complies
		5180MHz 5320MHz	20.4 dBm	24.0 dBm	Complies
4.5.1.2	Transmitter Out-Of Band Conducted Spurious Emissions	5180MHz 5320MHz 5500MHz 5700MHz	See Appendix B	Table 3	Complies
<b>802.11n – 20 MHz</b>					
4.4.2.1	RF output power and power density at the highest power level (5150-5350 MHz)	5180MHz 5320MHz	19.6 dBm	23.0dBm	Complies
			4.6 dBm/MHz	10 dBm/MHz	Complies
	RF output power and power density at the highest power level (5470-5725MHz)	5500MHz 5700MHz	22.4 dBm	30.0 dBm	Complies
			6.6 dBm/MHz	17 dBm/MHz	Complies
4.4.2.2	RF output power at the lowest power level of the TPC range	5180MHz 5320MHz	16.4 dBm	17.0 dBm	Complies
		5180MHz 5320MHz	22.4 dBm	24.0 dBm	Complies
4.5.1.2	Transmitter Out-Of Band Conducted Spurious Emissions	5180MHz 5320MHz 5500MHz 5700MHz	See Appendix B	Table 3	Complies
<b>802.11n – 40 MHz</b>					
4.4.2.1	RF output power and power density at the highest power level (5150-5350 MHz)	5190MHz 5310MHz	20.0 dBm	23.0dBm	Complies
			-0.9 dBm/MHz	10 dBm/MHz	Complies
	RF output power and power density at the highest power level (5470-5725MHz)	5510MHz 5670MHz	21.0 dBm	30.0 dBm	Complies
			0.1 dBm/MHz	17 dBm/MHz	Complies
4.4.2.2	RF output power at the lowest power level of the TPC range	5190MHz 5310MHz	16.0 dBm	17.0 dBm	Complies
		5510MHz 5670MHz	21.0 dBm	24.0 dBm	Complies
4.5.1.2	Transmitter Out-Of Band Conducted Spurious Emissions	5180MHz 5320MHz 5500MHz 5700MHz	See Appendix B	Table 3	Complies

**EXTREME CONDITIONS**

Voltage extremes used during testing were those for AC-powered equipment, +/-10% of nominal.

Temperature extremes used during testing were those for unrestricted use, -20°C to +55°C.

**MEASUREMENT UNCERTAINTIES**

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2) and were calculated in accordance with NAMAS document NIS 81 and M3003.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF frequency	Hz	25 to 7000 MHz	$1.7 \times 10^{-7}$
RF power, conducted	dBm	25 to 7000 MHz	$\pm 0.52$ dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	$\pm 0.7$ dB



**EQUIPMENT UNDER TEST (EUT) DETAILS****GENERAL**

The Summit Data Communications Inc. model SDC-PE15N is a 802.11abgn PCI-E module that is designed to provide wireless network connectivity in the 2.4 and 5GHz bands. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The EUT is powered from the host device.

The sample was received on November 6, 2009 and tested on December 16 and December 18, 2009. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Summit Data Communications	SDC-PE15N	802.11abgn PCI-E module	PE15N09082400 01FS	TWG-SDCPE15N

**OTHER EN 301 893 V1.4.1 PRODUCT INFORMATION**

Refer to Appendix C.

**ENCLOSURE**

The EUT has no enclosure. It is designed to be installed within the enclosure of a host computer.

**MODIFICATIONS**

No modifications were made to the EUT during the time the product was at Elliott.

**SUPPORT EQUIPMENT**

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Lenovo	4446	Laptop	L3-BNN1E	DoC
Lenovo	PA-1650-52LC	AC Adapter	-	N/A

No remote support equipment was used during testing.

**EUT INTERFACE PORTS**

The I/O cabling configuration during testing was as follows:

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
PCMCIA	EUT Extender Board	N/A - Direct Connection	-	-
AC Power Adapter	AC Mains	3Wire	Unshielded	1.5
DC Power Laptop	AC Adapter	Multiconductor	Shielded	1.5

**EUT OPERATION**

During emissions testing the EUT was configured to transmit on a selected channel at the desired output power. Unless otherwise noted, the EUT was configured to transmit at 1Mbps for 802.11b mode testing, 6 Mbps for 802.11g and a mode testing, and HT0 for HT20 and HT40 testing.

## **EMISSIONS TESTING**

### **GENERAL INFORMATION**

Antenna port measurements were taken at the Elliott Laboratories test site located at 684 West Maude Ave, Sunnyvale, CA 94085-3518.

### **CONDUCTED EMISSIONS CONSIDERATIONS**

Conducted emissions measurements are performed with the EUT's rf input/output connected to the input of a spectrum analyzer. When required an attenuator or dc block is placed between the EUT and the spectrum analyzer.

## **EMISSIONS MEASUREMENT INSTRUMENTATION**

### **RECEIVER SYSTEM**

An EMI receiver as specified in CISPR 16-1-1 is used for radiated emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis.

Measurement bandwidths for the test instruments are set in accordance with the requirements of the standards referenced in this document.

### **INSTRUMENT CONTROL COMPUTER**

Software control is used to convert the receiver measurements to the field strength at an antenna, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are exported in a graphic and/or tabular format, as appropriate.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer runs automated data collection programs that control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

### **FILTERS/ATTENUATORS**

External filters and precision attenuators are often connected between the EUT antenna port or receiving antenna and the test receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

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**RADIO STANDARD TEST PROCEDURES****OUTPUT POWER**

Output power is measured using an average sensor head. If the device is operating with a duty cycle during the measurement the measurement time is set to exceed the on/off duty cycle and the measured value is then corrected by adding a factor of  $10 \log(1/\text{duty cycle})$  to the measured value.

Power density is initially measured as a peak bandwidth (RBW=VBW=1MHz). If the power density is within 3dB of the limit it is re-measured via the IF output of the spectrum analyzer using an average sensor.

Power measurements made directly on the rf power port are, when appropriate, converted to an EIRP by adding the gain of the highest gain antenna that can be used with the device under test, as specified by the manufacturer.

**CONDUCTED SPURIOUS EMISSIONS**

Conducted emissions are measured at the output of the device using a RF cable and attenuator if required. Initial scans are made using a peak detector (RBW=VBW) and using scan rates to ensure that the EUT transmits before the sweep moves out of each resolution bandwidth (for transmit mode).

When devices being evaluated against the requirements of EN 301 893 have emissions close to the limit are tested using Video Averaging<sup>1</sup>, with video gating used where the transmit duty cycle is less than 1.

All signals within 10dB of this calculated limit are re-measured on an OATS or Semi-anechoic chamber. The field strength is recorded and the EUT is then replaced with a substitution antenna of known gain (typically a dipole antenna or a double-ridged horn antenna). The erp of the substitution antenna is measured and used to calculate the erp of the EUT as outlined in section C3 of EN 300 328 and EN 301 893.

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<sup>1</sup> When using video averaging the span is set to ensure the analyzer bin size does not exceed one half the measurement bandwidth.

## **SAMPLE CALCULATIONS**

### **SAMPLE CALCULATIONS - CONDUCTED SPURIOUS EMISSIONS**

Measurements are compared directly to the conducted emissions specification limit (decibel form). The calculation is as follows:

$$R_r - S = M$$

where:

- $R_r$  = Measured value in dBm
- $S$  = Specification Limit in dBm
- $M$  = Margin to Specification in +/- dB

**Appendix A Test Equipment Calibration Data****Environmental Test, 16-18 of Dec 2009****Engineer: Mehran Birgani**

<b><u>Manufacturer</u></b>	<b><u>Description</u></b>	<b><u>Model #</u></b>	<b><u>Asset #</u></b>	<b><u>Cal Due</u></b>
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	10-Nov-10
Rohde & Schwarz	Power Sensor 100 uW - 10 Watts	NRV-Z53	1796	03-Jun-10
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	30-Dec-09
Thermotron	Temp Chamber (w/ F4 Watlow Controller)	S1.2	2170	29-Jun-10

## *Appendix B Test Data*

T76933 20 Pages



*EMC Test Data*

Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
		Account Manager:	Christine Krebill
Contact:	Ron Seide		-
Emissions Standard(s):	EN 300 328/EN 301 893	Class:	-
Immunity Standard(s):	-	Environment:	-

**EMC Test Data**

For The

**Summit Data Communications**

Model

802.11abgn Module

Date of Last Test: 12/17/2009



Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 300 328/EN 301 893	Class:	N/A

**Radio Performance Test - EN 301 893 V1.4.1 / V1.5.1  
RF Port Measurements**

**Test Specific Details**

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/16-18/2009	Config. Used: -
Test Engineer: M/ Birgani / R. Varelas	Config Change: -
Test Location: Environmental Chamber	Host EUT Voltage: 230V/ 50Hz

**General Test Configuration**

The EUT's rf port was connected to the measurement instrument's rf port, via an attenuator or dc-block if necessary.

**Summary of Results**

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power spectral density at normal conditions	EN 301 893	Pass	802.11a: 6.8 dBm/MHz (-3.2dB) 802.11n 20: 4.6 dBm/MHz (-5.4dB) 802.11n 40: -0.9 dBm/MHz(-10.9dB)
1	Output Power over extreme conditions (5150-5350 MHz)	EN 301 893	Pass	802.11a: 20.8 dBm 802.11n 20: 19.6 dBm 802.11n 40: 20.0 dBm
1	Output Power over extreme conditions (5470-5725 MHz)	EN 301 893	Pass	802.11a: 20.4 dBm 802.11n 20: 22.4 dBm 802.11n 40: 21.0 dBm
2	Conducted Bandedges	EN 301 893	Pass	All signals were more than 15dB below the limit

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

No deviations were made from the requirements of the standard.

Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 300 328/EN 301 893	Class:	N/A

**Normal and Extreme Operating Conditions:**

Extreme operating conditions are defined as the extremes of the intended operating voltage and temperature range specified by the manufacturer. As guidance, the following extreme conditions detailed in EN 300 328 v1.6.1 may be used:

Voltage extremes:

AC-powered equipment +/-10% of nominal;

Temperature extremes:

Unrestricted use: -20°C to +55°C

Extremes used were based on original report.

**Run #1: Power Measurements - Spread spectrum (Digital Modulation)**

Initial measurements made on the center channel to determine the data rate with the highest output power. All final measurements made with device operating at the highest power level.

Rate	Setting	Pmeas	Duty Cycle	Pout
6	Max	13.5	1	13.5
9			1	0
12			1	0
18			1	0
24			1	0
36			1	0
48			1	0
54			1	0

Setting: software power setting of EUT

Pmeas: Measured output power (average)

Duty Cycle: Duty cycle of transmissions (1 = 100%)

Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 300 328/EN 301 893	Class:	N/A

**Run #1: Power Measurements - PSD under normal conditions, Average Power under normal and extreme conditions  
Single-chain or single-transmitter operation**

Note 1:	Power measured using a wideband, calibrated RF power meter with a thermocouple detector (or an equivalent thereof).
Note 2:	PSD measured using the internal PSD measurement function of the spectrum analyzer.
Note 3:	Gain is the maximum gain of the antenna assembly that can be used with the EUT at this power level for each individual chain.
Note 4:	Duty Cycle - the duty cycle of the transmitter during the power measurement [time on / (time off + time on)]
Note 5:	EIRP levels are the measured levels corrected for duty cycle [10log(1/duty cycle)] and EUT antenna gain.

**Power spectral Density under normal operating conditions**

Channel MHz	Frequency MHz	PSD <sup>2</sup> dBm	Gain <sup>3</sup> dBi	Duty Cycle <sup>4</sup>	EIRP <sup>5</sup> PSD	PSD <sup>6</sup> Limit   Margin	
5180	5176.340	-1.3	6.5	1.0	5.2	10.0	-4.8
5320	5324.500	0.3	6.5	1.0	6.8	10.0	-3.2
5500	5506.300	-1.5	6.5	1.0	5.0	17.0	-12.0
5700	5704.380	-0.9	6.5	1.0	5.6	17.0	-11.4

**Highest Average Power under normal and extreme operating conditions**

Power Setting	Channel (MHz)	Average Power (dBm) <sup>1</sup> For Operating Condition					Max Antenna Gain <sup>3</sup>	Duty Cycle <sup>4</sup>	Max Average Power (EIRP) <sup>5</sup>	Maximum permitted EIRP
		Normal 20°C 230.0 V	Extreme							
			0°C 207.0 V	253.0 V	50°C 207.0 V   253.0 V					
Max	5180	13.6	13.7	13.7	13.2	13.2	6.5	1.0	20.2	23.0
Max	5320	13.6	13.9	13.9	14.3	14.3	6.5	1.0	20.8	23.0
Max	5500	12.6	12.7	12.7	13.0	13.0	6.5	1.0	19.5	30.0
Max	5700	13.5	13.6	13.6	13.9	13.9	6.5	1.0	20.4	30.0

**Average Power at the lowest setting under normal and extreme operating conditions**

Power Setting	Channel (MHz)	Average Power (dBm) <sup>1</sup> For Operating Condition					Max Antenna Gain <sup>3</sup>	Duty Cycle <sup>4</sup>	Max Average Power (EIRP) <sup>5</sup>	Maximum permitted EIRP
		Normal 20°C 230.0 V	Extreme							
			0°C 207.0 V	253.0 V	50°C 207.0 V   253.0 V					
70%	5180	8.6	8.7	8.7	8.2	8.2	6.5	1.0	15.2	17.0
70%	5320	9.3	9.5	9.5	9.2	9.2	6.5	1.0	16.0	17.0
Max	5500	12.6	12.7	12.7	13.0	13.0	6.5	1.0	19.5	24.0
Max	5700	13.5	13.6	13.6	13.9	13.9	6.5	1.0	20.4	24.0

Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 300 328/EN 301 893	Class:	N/A

**Multi-chain/transmitter operation**

Note 1:	Power measured using a wideband, calibrated RF power meter with a thermocouple detector (or an equivalent thereof).
Note 2:	PSD measured using the internal PSD measurement function of the spectrum analyzer.
Note 3:	Gain is the maximum gain of the antenna assembly that can be used with the EUT at this power level for each individual chain. It is assumed that beam-forming is not used and so the total eirp is the sum of the eirp from each individual chain.
Note 3:	Gain is the maximum gain of the antenna assembly that can be used with the EUT at this power level for each individual chain.
Note 4:	Duty Cycle - the duty cycle of the transmitter during the power measurement [time on / (time off + time on)]
Note 5:	EIRP levels are the measured levels corrected for duty cycle [10log(1/duty cycle)] and EUT antenna gain.

**Highest Average Power under normal and extreme operating conditions - MIMO Device**

Power Setting	Channel (MHz)	Chain	Average Power (dBm) <sup>1</sup> For Operating Condition					Max Antenna Gain <sup>3</sup>	Duty Cycle <sup>4</sup>
			Normal 20°C	Extreme		50°C			
				0°C	253.0 V	207.0 V	253.0 V		
Max	5180	A	8.8	9.1	9.1	9.4	9.4	6.5	1.0
Max	802.11n	B	8.7	8.9	8.9	8.3	8.3	6.5	1.0
	20MHz	Total eirp <sup>5</sup>	18.3	18.5	18.5	18.4	18.4		
Maximum eirp			18.5 dBm		Limit		23.0 dBm	Pass	
Max	5320	A	9.7	10.2	10.2	10.3	10.3	6.5	1.0
Max	802.11n	B	9.5	10.0	10.0	9.6	9.6	6.5	1.0
	20MHz	Total eirp <sup>5</sup>	19.1	19.6	19.6	19.5	19.5		
Maximum eirp			19.6 dBm		Limit		23.0 dBm	Pass	
Max	5500	A	12.3	12.5	12.5	12.2	12.2	6.5	1.0
Max	802.11n	B	11.5	11.9	11.9	11.6	11.6	6.5	1.0
	20MHz	Total eirp <sup>5</sup>	21.4	21.7	21.7	21.4	21.4		
Maximum eirp			21.7 dBm		Limit		30.0 dBm	Pass	
Max	5700	A	12.9	13.4	13.4	13.7	13.7	6.5	1.0
Max	802.11n	B	12.0	12.2	12.2	11.9	11.9	6.5	1.0
	20MHz	Total eirp <sup>5</sup>	22.0	22.4	22.4	22.4	22.4		
Maximum eirp			22.4 dBm		Limit		30.0 dBm	Pass	
Max	5190	A	9.8	10.1	10.1	10.2	10.2	6.5	1.0
Max	802.11n	B	9.1	9.2	9.2	8.6	8.6	6.5	1.0
	40MHz	Total eirp <sup>5</sup>	19.0	19.2	19.2	19.0	19.0		
Maximum eirp			19.2 dBm		Limit		23.0 dBm	Pass	

Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 300 328/EN 301 893	Class:	N/A

**Highest Average Power under normal and extreme operating conditions - MIMO Device**

Max	5310	A	10.7	11.0	11.0	11.0	11.0	6.5	1.0	
Max	802.11n	B	9.8	9.9	9.9	9.8	9.8	6.5	1.0	
	40MHz	Total eirp <sup>5</sup>	19.8	20.0	20.0	20.0	20.0			
Maximum eirp			20.0 dBm			Limit		23.0 dBm		Pass
Max	5510	A	11.7	11.9	11.9	11.6	11.6	6.5	1.0	
Max	802.11n	B	10.2	10.3	10.3	10.1	10.1	6.5	1.0	
	40MHz	Total eirp <sup>5</sup>	20.5	20.7	20.7	20.4	20.4			
Maximum eirp			20.7 dBm			Limit		30.0 dBm		Pass
Max	5670	A	11.9	12.0	12.0	12.5	12.5	6.5	1.0	
Max	802.11n	B	10.5	10.8	10.8	10.2	10.2	6.5	1.0	
	40MHz	Total eirp <sup>5</sup>	20.8	21.0	21.0	21.0	21.0			
Maximum eirp			21.0 dBm			Limit		30.0 dBm		Pass

Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
Contact:	Ron Seide	Account Manager:	Christine Krebill
Standard:	EN 300 328/EN 301 893	Class:	N/A

**Average Power under normal and extreme operating conditions At Lowest Power Setting - MIMO Device**

Power Setting	Channel (MHz)	Chain	Average Power (dBm) <sup>1</sup> For Operating Condition					Max Antenna Gain <sup>3</sup>	Duty Cycle <sup>4</sup>
			Normal 20°C	Extreme			253.0 V		
				0°C	207.0 V	50°C			
			230.0 V	207.0 V	253.0 V	207.0 V	253.0 V		
30%	5180 802.11n 20MHz	A	6.4	6.6	6.6	6.7	6.7	6.5	1.0
30%		B	5.3	5.5	5.5	4.8	4.8	6.5	1.0
		Total eirp <sup>5</sup>	15.4	15.6	15.6	15.4	15.4		
Maximum eirp			15.6 dBm			Limit		17.0 dBm	Pass
30%	5320 802.11n 20MHz	A	7.0	7.1	7.1	7.4	7.4	6.5	1.0
30%		B	6.3	6.6	6.6	6.3	6.3	6.5	1.0
		Total eirp <sup>5</sup>	16.2	16.4	16.4	16.4	16.4		
Maximum eirp			16.4 dBm			Limit		17.0 dBm	Pass
Max	5500 802.11n 20MHz	A	12.3	12.5	12.5	12.2	12.2	6.5	1.0
Max		B	11.5	11.9	11.9	11.6	11.6	6.5	1.0
		Total eirp <sup>5</sup>	21.4	21.7	21.7	21.4	21.4		
Maximum eirp			21.7 dBm			Limit		24.0 dBm	Pass
Max	5700 802.11n 20MHz	A	12.9	13.4	13.4	13.7	13.7	6.5	1.0
Max		B	12.0	12.2	12.2	11.9	11.9	6.5	1.0
		Total eirp <sup>5</sup>	22.0	22.4	22.4	22.4	22.4		
Maximum eirp			22.4 dBm			Limit		24.0 dBm	Pass
30%	5190 802.11n 40MHz	A	6.3	6.5	6.5	6.1	6.1	6.5	1.0
30%		B	4.5	4.6	4.6	3.9	3.9	6.5	1.0
		Total eirp <sup>5</sup>	15.0	15.2	15.2	14.6	14.6		
Maximum eirp			15.2 dBm			Limit		17.0 dBm	Pass
30%	5310 802.11n 40MHz	A	7.2	7.3	7.3	7.0	7.0	6.5	1.0
30%		B	5.4	5.6	5.6	5.2	5.2	6.5	1.0
		Total eirp <sup>5</sup>	15.9	16.0	16.0	15.7	15.7		
Maximum eirp			16.0 dBm			Limit		17.0 dBm	Pass
Max	5510 802.11n 40MHz	A	11.7	11.9	11.9	11.6	11.6	6.5	1.0
Max		B	10.2	10.3	10.3	10.1	10.1	6.5	1.0
		Total eirp <sup>5</sup>	20.5	20.7	20.7	20.4	20.4		
Maximum eirp			20.7 dBm			Limit		24.0 dBm	Pass
Max	5670 802.11n 40MHz	A	11.9	12.0	12.0	12.5	12.5	6.5	1.0
Max		B	10.5	10.8	10.8	10.2	10.2	6.5	1.0
		Total eirp <sup>5</sup>	20.8	21.0	21.0	21.0	21.0		
Maximum eirp			21.0 dBm			Limit		24.0 dBm	Pass

Client:	Summit Data Communications	Job Number:	J76855
Model:	802.11abgn Module	T-Log Number:	T76933
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 300 328/EN 301 893	Class:	N/A

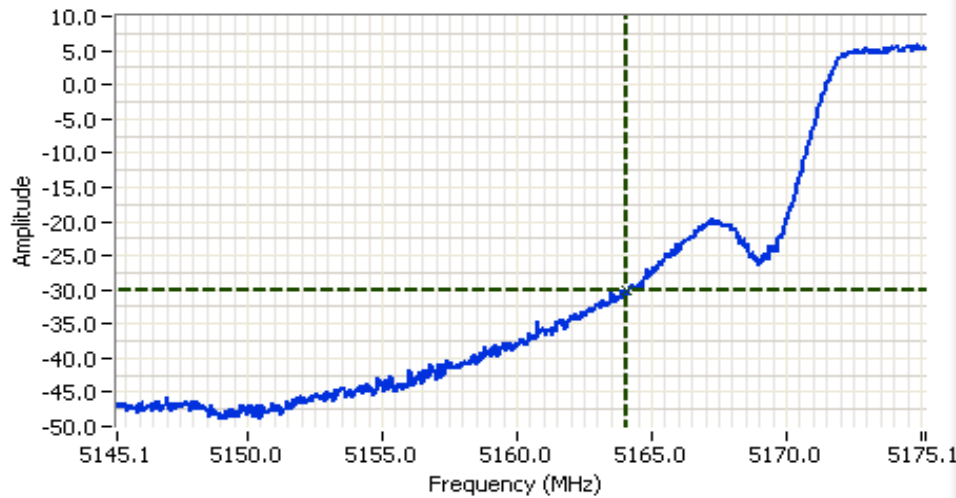
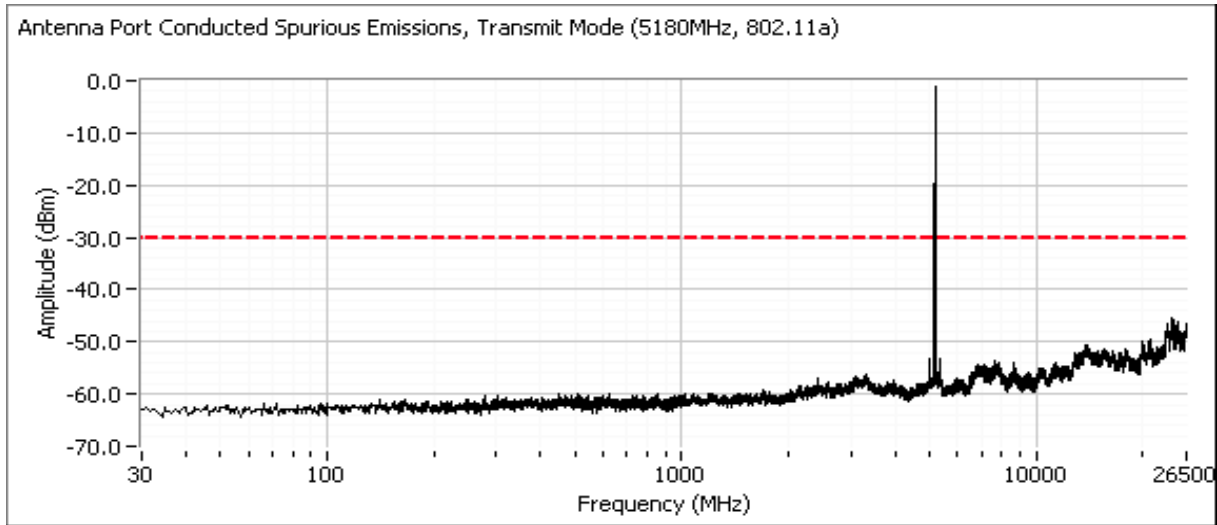
**Power spectral Density under normal operating conditions - MIMO Modes**

Power Setting	Channel (MHz)	Chain	Power Spectral Density <sup>1</sup>	Max Antenna Gain <sup>3</sup>	Duty Cycle <sup>4</sup>
Max	5180 802.11n 20MHz	A	-6.3	6.5	1.0
Max		B	-6.1	6.5	1.0
		Total eirp <sup>5</sup>	3.3		
Limit	10.0 dBm/MHz		Pass		
Max	5320 802.11n 20MHz	A	-4.5	6.5	1.0
Max		B	-5.4	6.5	1.0
		Total eirp <sup>5</sup>	4.6		
Limit	10.0 dBm/MHz		Pass		
Max	5500 802.11n 20MHz	A	-3.2	6.5	1.0
Max		B	-4.2	6.5	1.0
		Total eirp <sup>5</sup>	5.8		
Limit	17.0 dBm/MHz		Pass		
Max	5700 802.11n 20MHz	A	-2.4	6.5	1.0
Max		B	-3.5	6.5	1.0
		Total eirp <sup>5</sup>	6.6		
Limit	17.0 dBm/MHz		Pass		
Max	5190 802.11n 40MHz	A	-9.9	6.5	1.0
Max		B	-11.1	6.5	1.0
		Total eirp <sup>5</sup>	-0.9		
Limit	10.0 dBm/MHz		Pass		
Max	5310 802.11n 40MHz	A	-10.0	6.5	1.0
Max		B	-11.1	6.5	1.0
		Total eirp <sup>5</sup>	-1.0		
Limit	10.0 dBm/MHz		Pass		
Max	5510 802.11n 40MHz	A	-8.1	6.5	1.0
Max		B	-11.2	6.5	1.0
		Total eirp <sup>5</sup>	0.1		
Limit	17.0 dBm/MHz		Pass		
Max	5670 802.11n 40MHz	A	-8.1	6.5	1.0
Max		B	-12.0	6.5	1.0
		Total eirp <sup>5</sup>	-0.1		
Limit	17.0 dBm/MHz		Pass		

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

Run #2: Antenna Port Conducted Spurious Emissions, Transmit Mode, at Bandedge

802.11a - Legacy  
5180 MHz



**Analyzer Settings**

- HP8564E
- CF: 5160.150 MHz
- SPAN: 30.000 MHz
- RB 1.000 MHz
- VB 30.0 kHz
- Detector Normal
- Att 10
- RL Offset 15.00
- Sweep Time 50.0ms
- Ref Lvl: 15.00DBM

**Comments**

- 802.11a
- Channel 36, 5180MHz

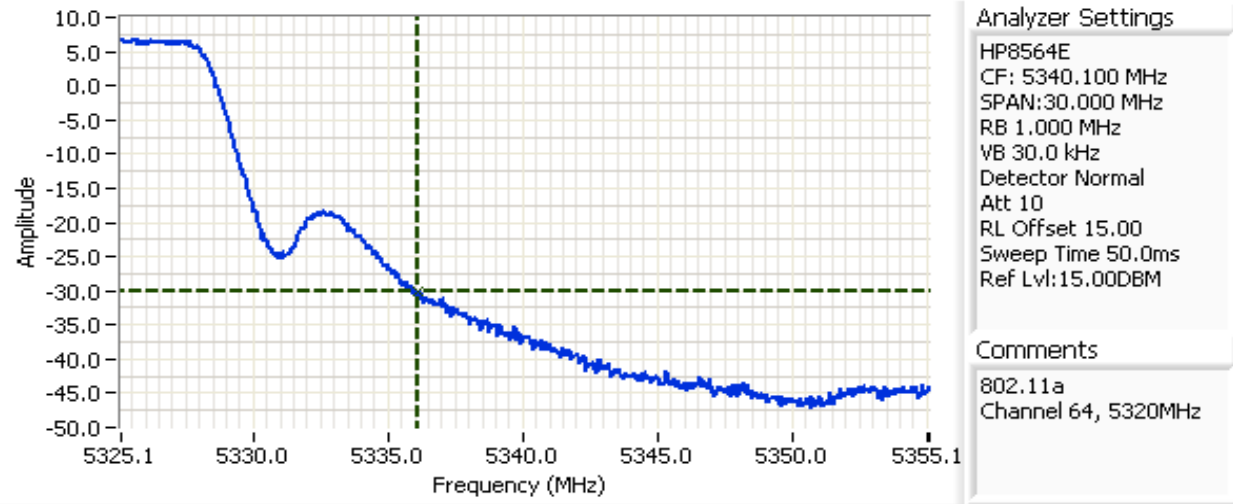
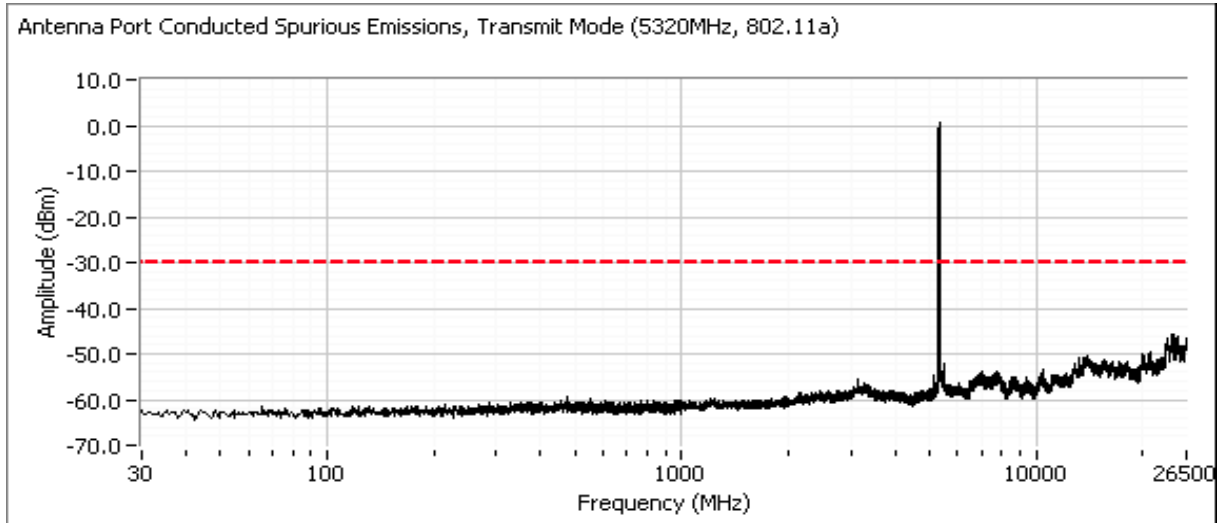
Cursor 1 5164.0562 -30.00

0.0000 0.00



Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5320 MHz



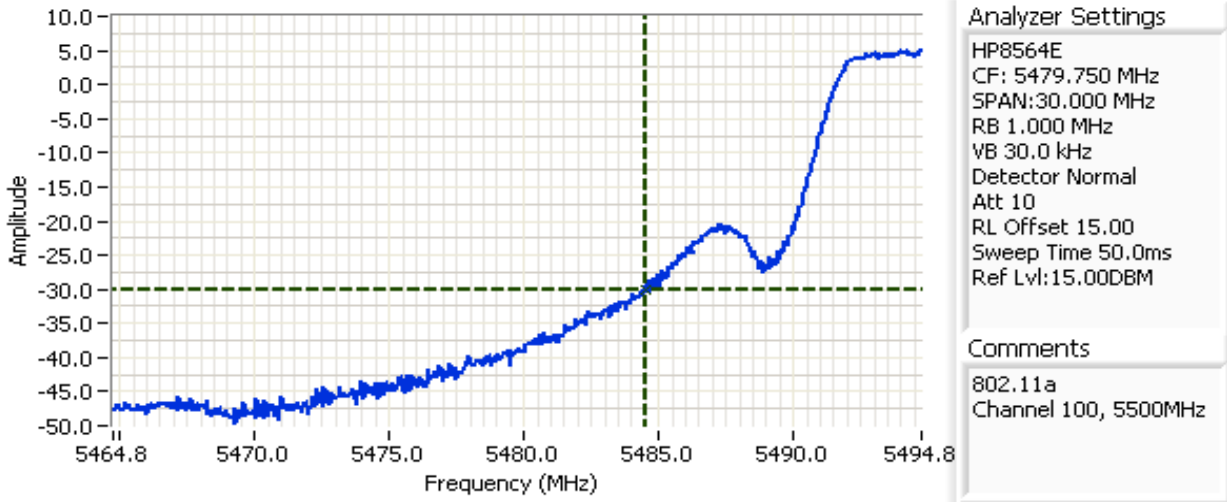
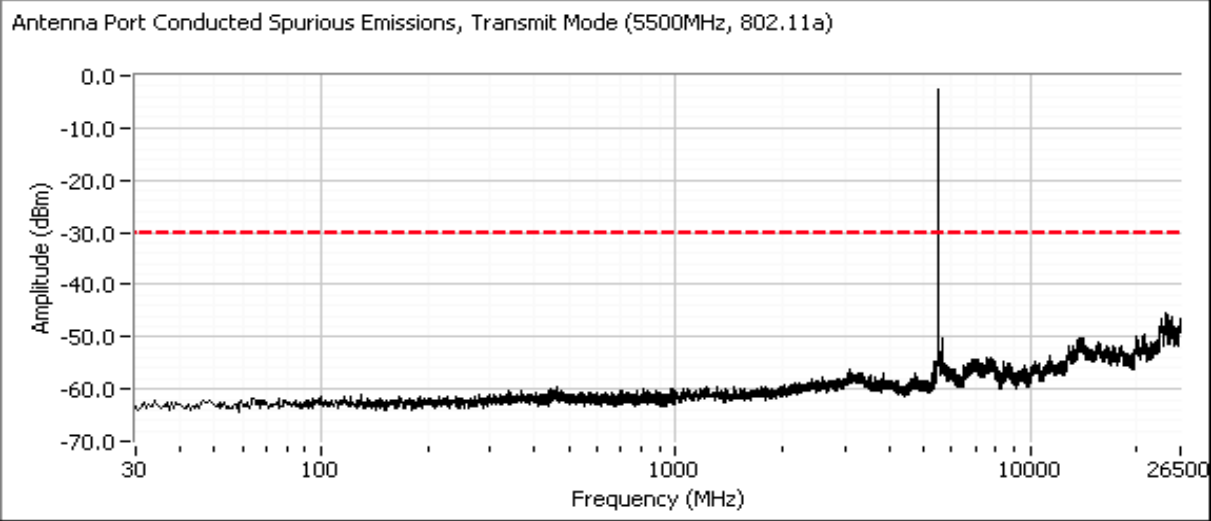
Cursor 1 5336.1157 -30.00

0.0000 0.00



Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5500 MHz

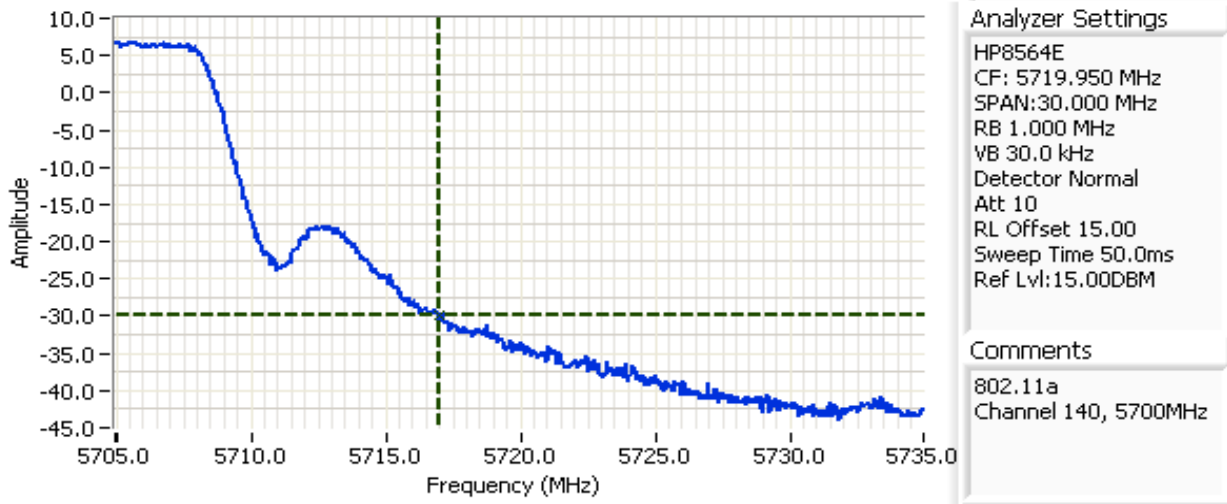
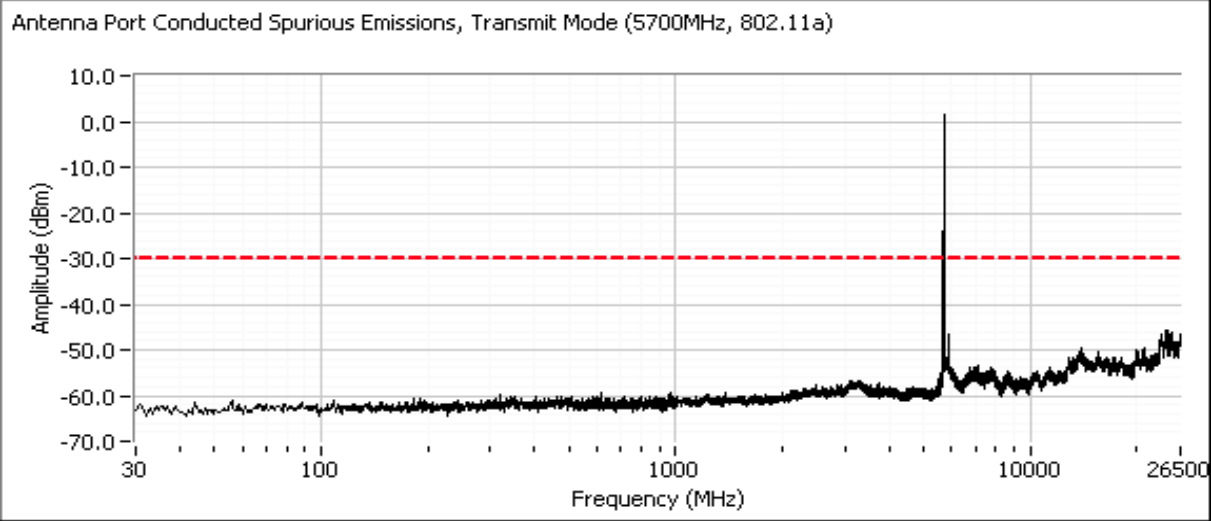


Cursor 1 5484.5156 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5700 MHz

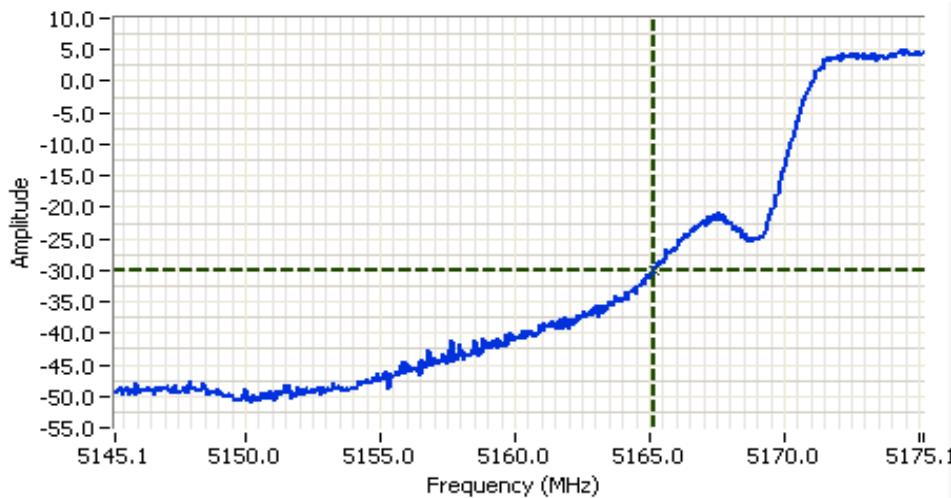
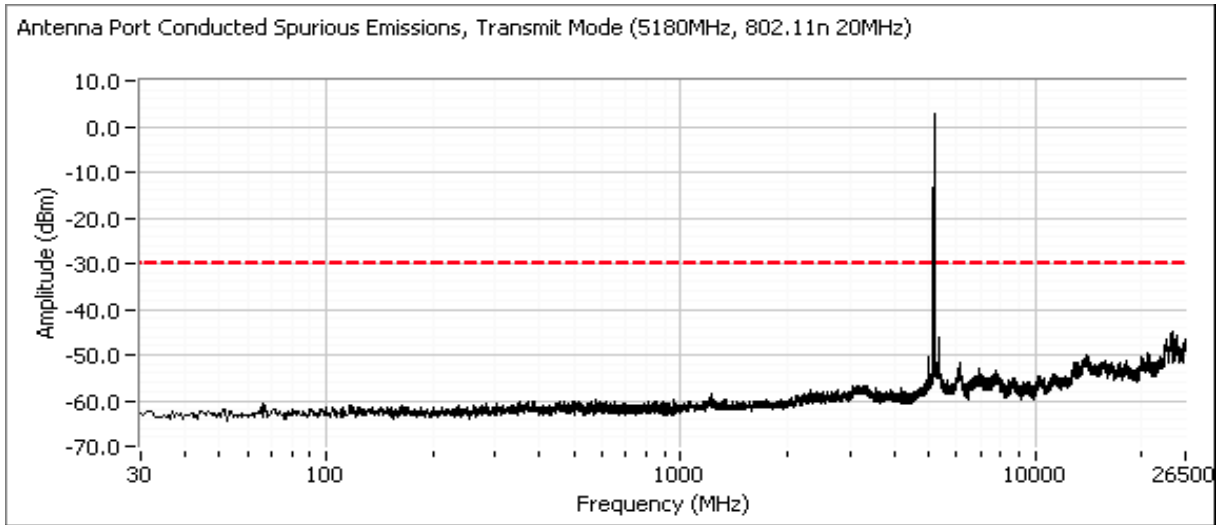


Cursor 1 5716.9814 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

802.11 - HT20  
5180 MHz



**Analyzer Settings**

- HP8564E
- CF: 5160.150 MHz
- SPAN: 30.000 MHz
- RB 1.000 MHz
- VB 30.0 kHz
- Detector Normal
- Att 10
- RL Offset 18.00
- Sweep Time 50.0ms
- Ref Lvl: 18.10DBM

**Comments**

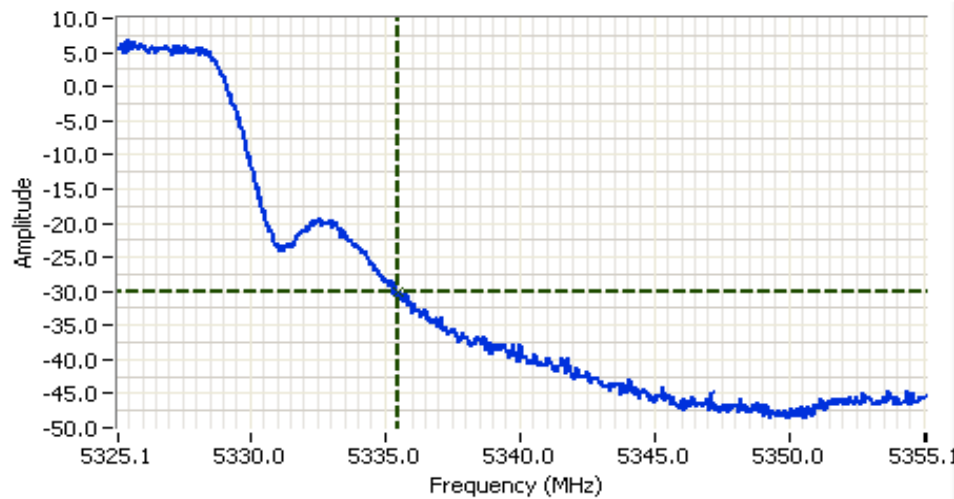
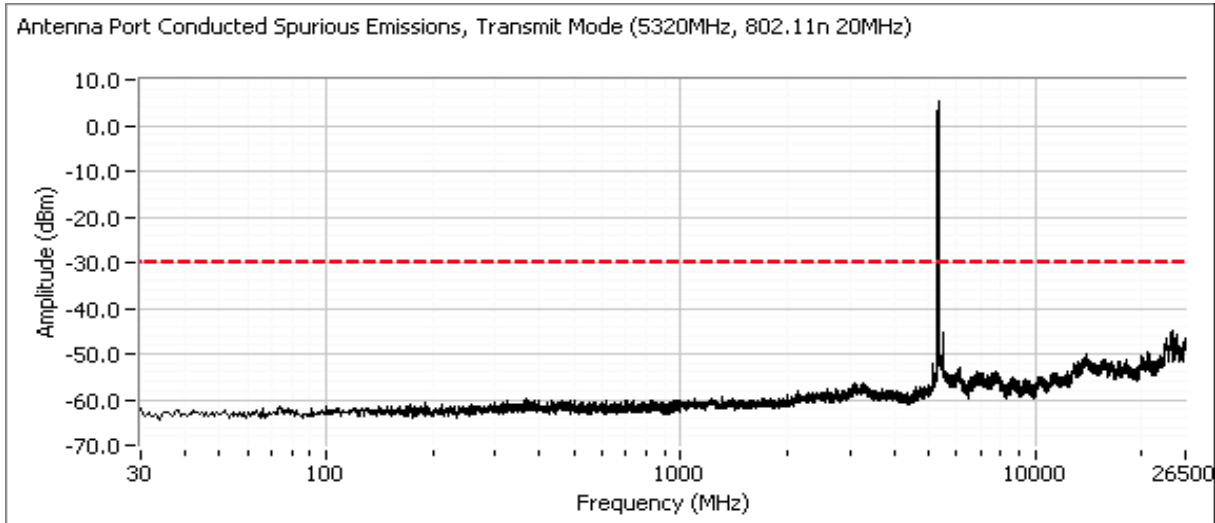
- 802.11n 20MHz
- Channel 36, 5180MHz

Cursor 1 5165.1499 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5320 MHz



**Analyzer Settings**

- HP8564E
- CF: 5340.100 MHz
- SPAN: 30.000 MHz
- RB 1.000 MHz
- VB 30.0 kHz
- Detector Normal
- Att 10
- RL Offset 18.00
- Sweep Time 50.0ms
- Ref Lvl: 18.00DBM

**Comments**

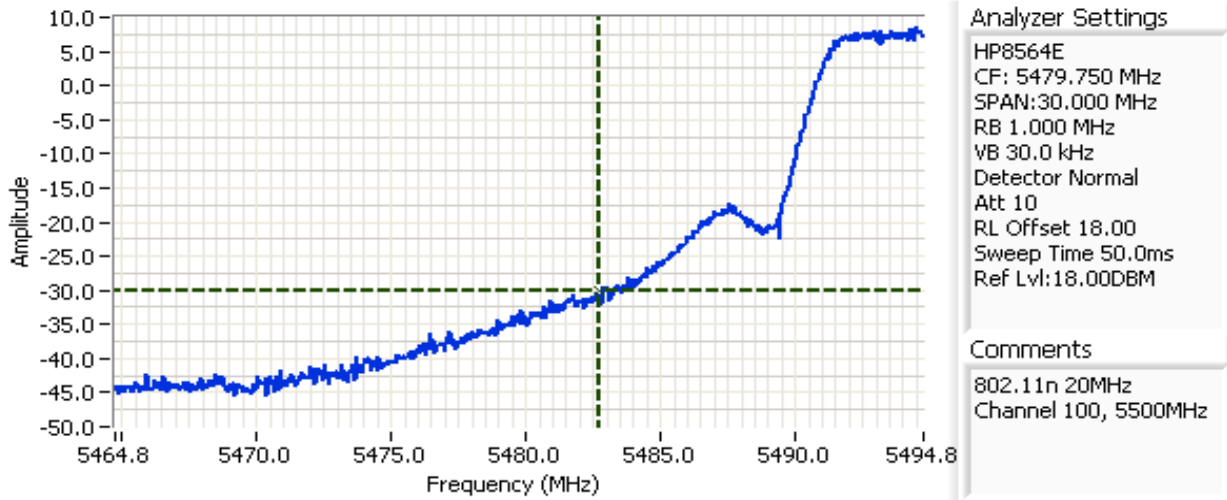
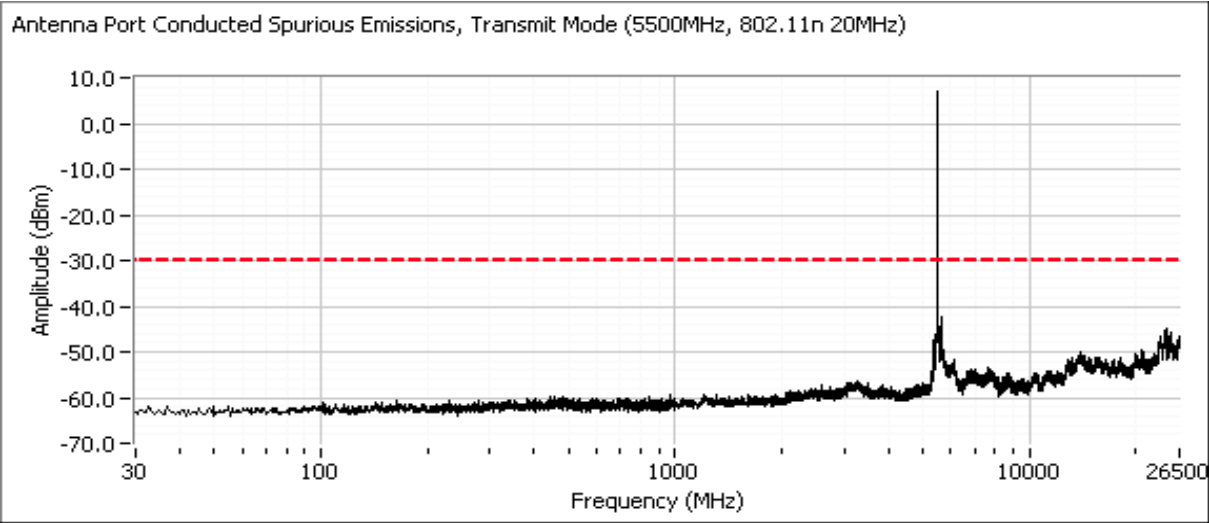
- 802.11n 20MHz
- Channel 64, 5320MHz

Cursor 1 5335.4907 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5500 MHz

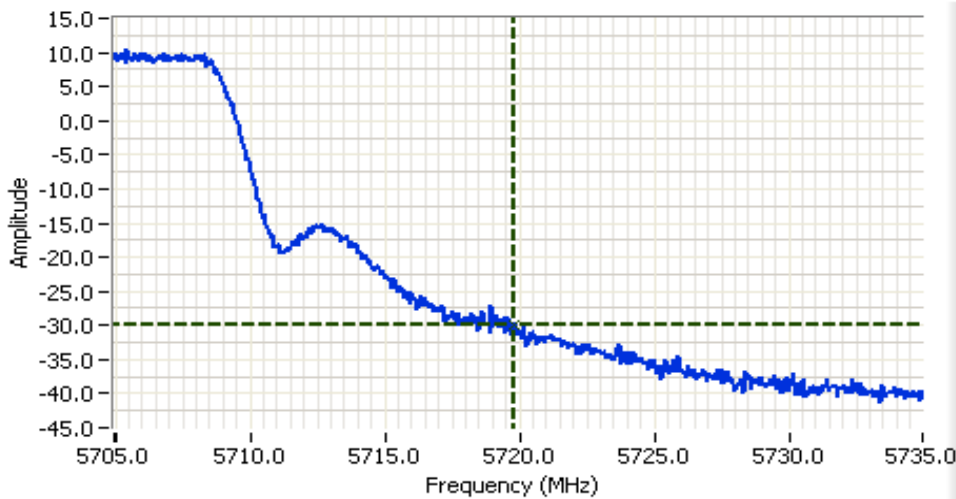
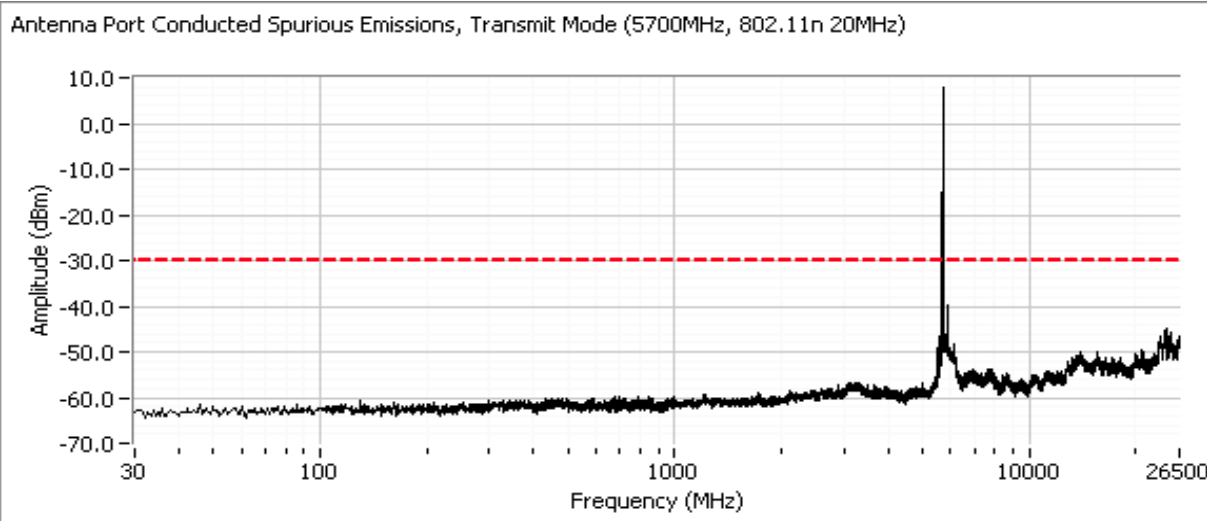


Cursor 1 5482.7187 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5700 MHz



**Analyzer Settings**

HP8564E  
 CF: 5719.950 MHz  
 SPAN:30.000 MHz  
 RB 1.000 MHz  
 VB 30.0 kHz  
 Detector Normal  
 Att 10  
 RL Offset 18.00  
 Sweep Time 50.0ms  
 Ref Lvl:18.00DBM

**Comments**

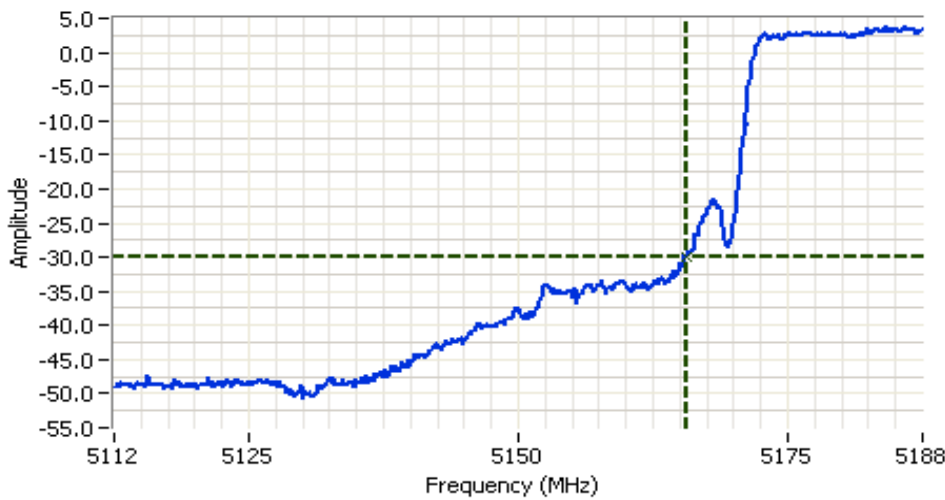
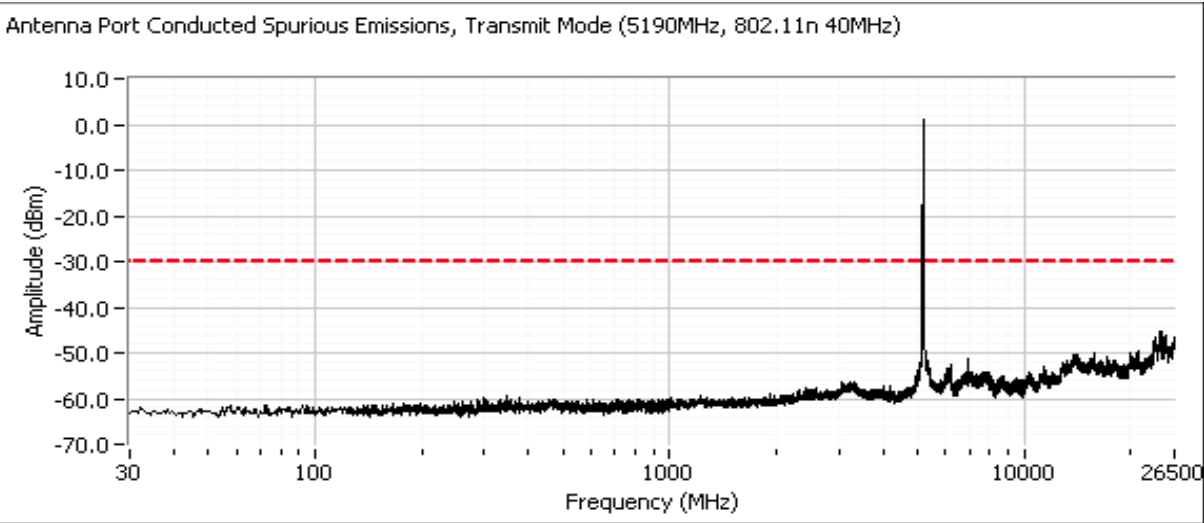
802.11n 20MHz  
 Channel 140, 5700MHz

Cursor 1 5719.7939 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

802.11 - HT40  
5190 MHz



Analyzer Settings

HP8564E  
CF: 5150.000 MHz  
SPAN: 75.000 MHz  
RB 1.000 MHz  
VB 30.0 kHz  
Detector Normal  
Att 10  
RL Offset 18.00  
Sweep Time 50.0ms  
Ref Lvl: 18.00DBM

Comments

802.11n 40MHz  
Channel 38, 5190MHz

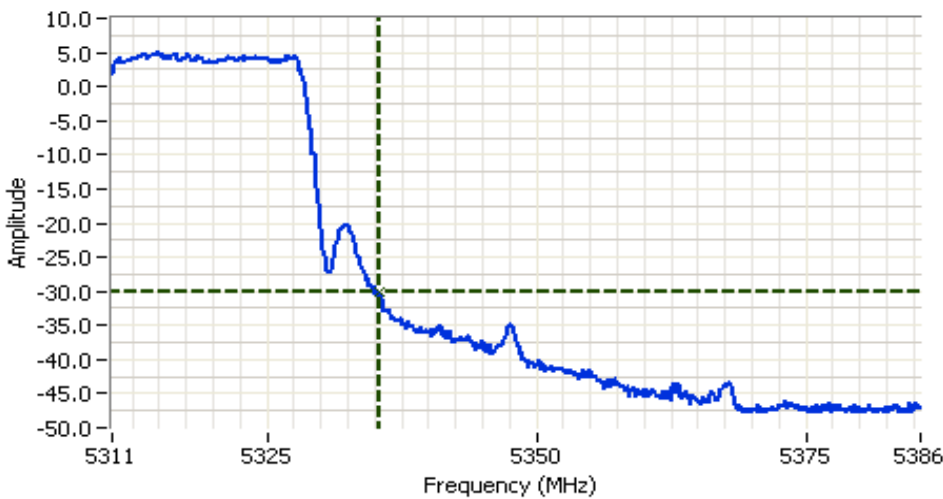
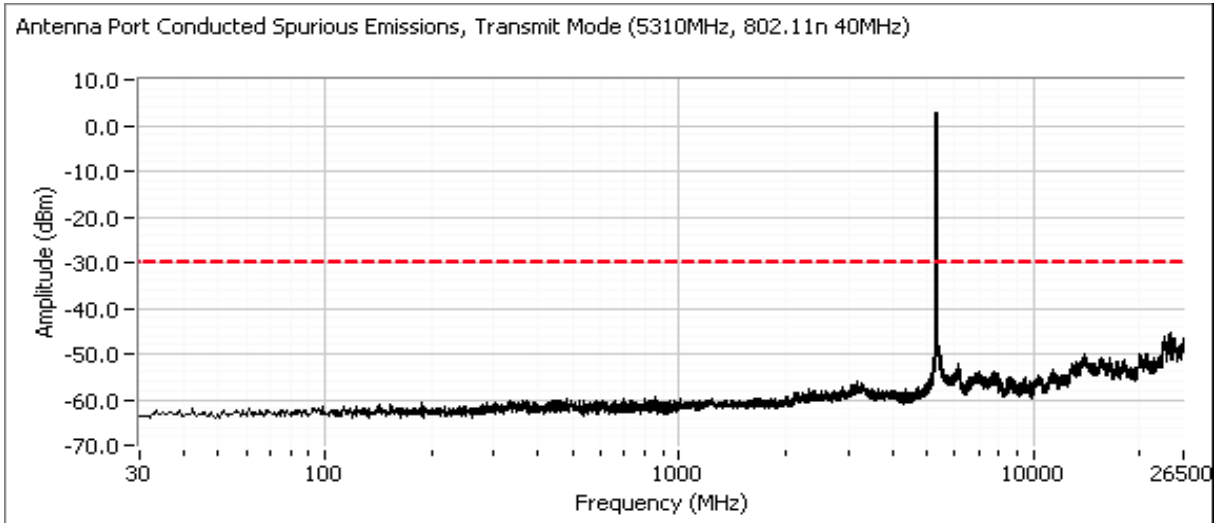
Cursor 1 5165.6250 -30.00

0.0000 0.00



Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5310 MHz



Analyzer Settings

HP8564E  
CF: 5348.125 MHz  
SPAN: 75.000 MHz  
RB 1.000 MHz  
VB 30.0 kHz  
Detector Normal  
Att 10  
RL Offset 18.00  
Sweep Time 50.0ms  
Ref Lvl: 18.00DBM

Comments

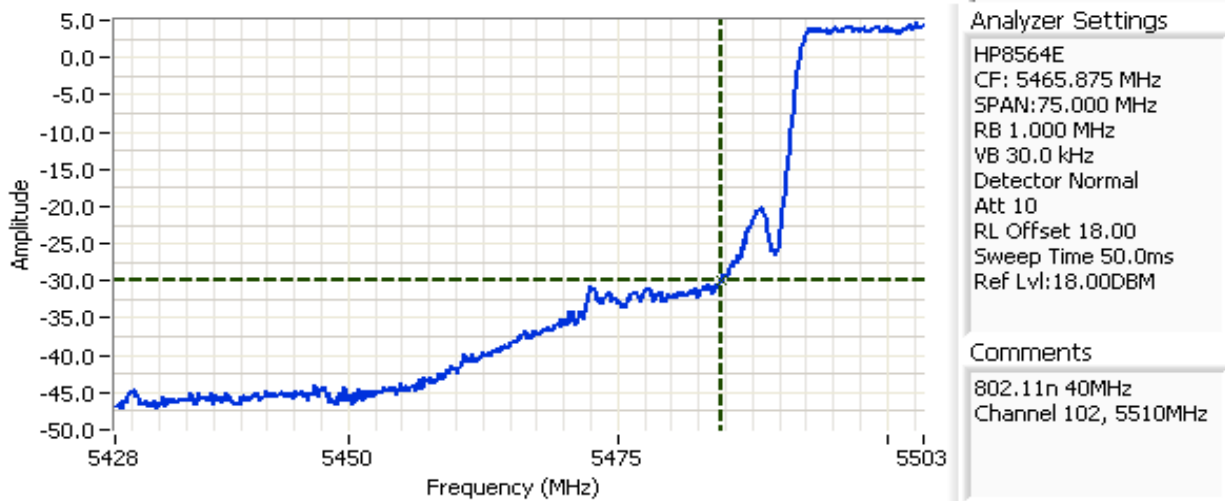
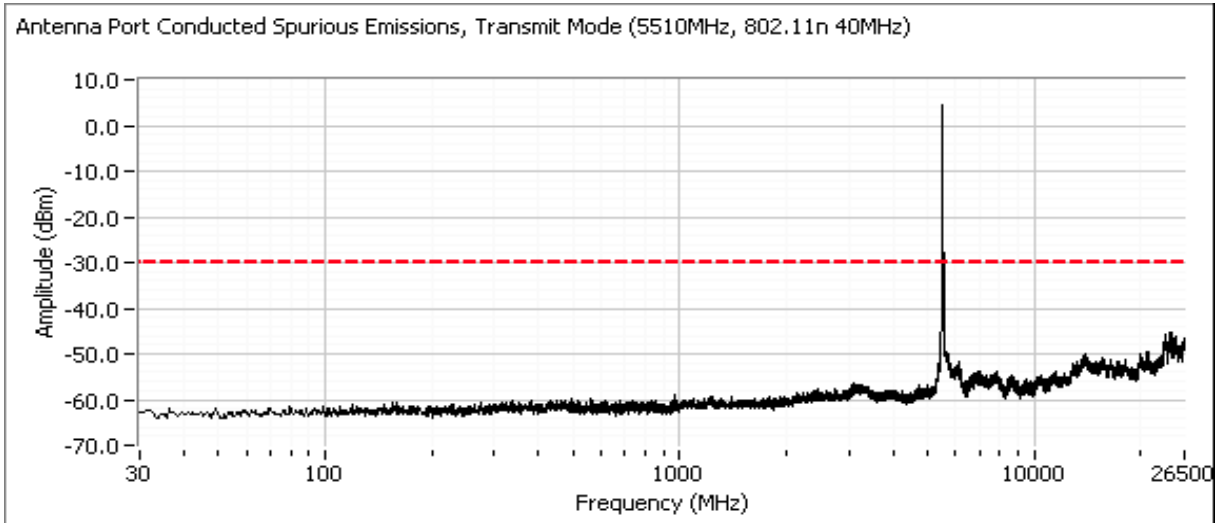
802.11n 40MHz  
Channel 62, 5310MHz

Cursor 1 5335.4297 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5510 MHz

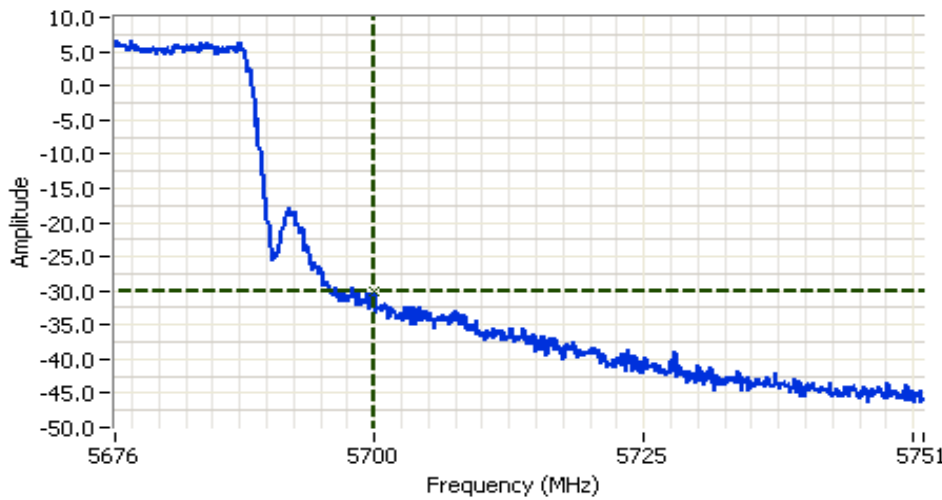
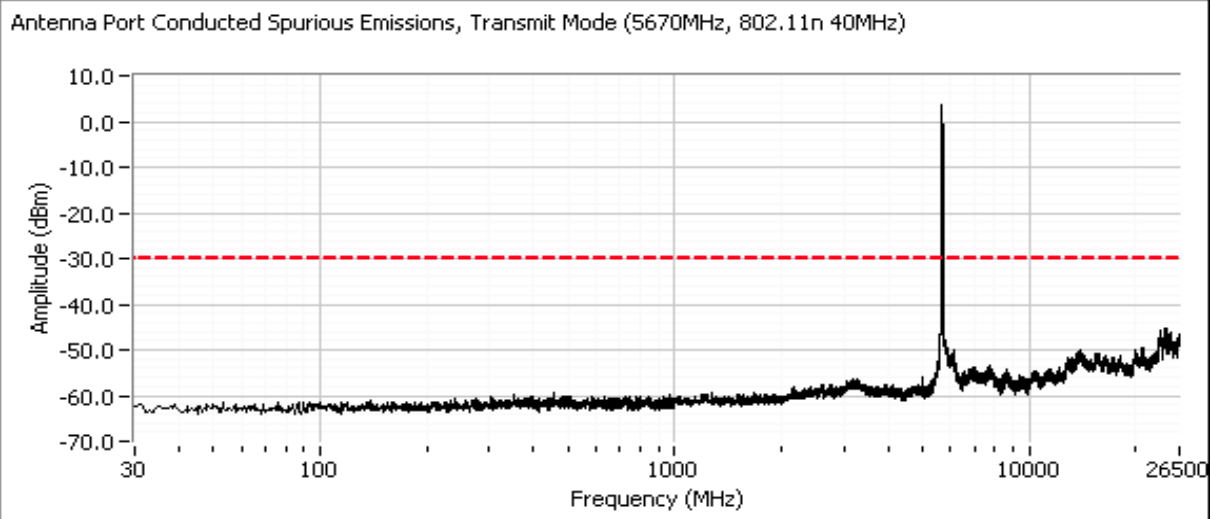


Cursor 1 5484.6250 -30.00

0.0000 0.00

Client: Summit Data Communications	Job Number: J76855
Model: 802.11abgn Module	T-Log Number: T76933
	Account Manager: Christine Krebill
Contact: Ron Seide	
Standard: EN 300 328/EN 301 893	Class: N/A

5670 MHz



**Analyzer Settings**

- HP8564E
- CF: 5713.450 MHz
- SPAN: 75.000 MHz
- RB 1.000 MHz
- VB 30.0 kHz
- Detector Normal
- Att 10
- RL Offset 18.00
- Sweep Time 50.0ms
- Ref Lvl: 18.00DBM

**Comments**

- 802.11n 40MHz
- Channel 134, 5670MHz

Cursor 1 5699.9736 -30.00

0.0000 0.00

## Appendix C Product Information Specific To EN 301 893

### Information required by EN 301 893

In accordance with clause 5.3.1, the following information was provided by the submitter:

a) The occupied channel bandwidth(s):

Channel Bandwidth 1: 20 MHz

Channel Bandwidth 2: 40 MHz

b) The DFS related operating mode(s) of the equipment:

Master

Slave with radar detection

Slave without radar detection

NOTE: If the equipment has more than 1 operating mode, tick all that apply.

c) The equipment can operate in the following ad-hoc modes:

no ad-hoc operation

ad-hoc operation in the frequency range 5 150 MHz to 5 250 MHz without DFS

ad-hoc operation with DFS

NOTE: If more than 1 is applicable, tick all that apply.

d) Operating Frequency Range(s):

Range 1: 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz

Range 2: 5 470 MHz to 5 725 MHz only

Range 3: 5 150 MHz to 5 250 MHz (ad-hoc without DFS)

Range 4: other,.....

NOTE: If the equipment has more than 1 Operating Frequency Range, tick all that apply.

e) TPC feature available:

Yes – complete section (f)

No – complete section (g)

NOTE 1: You may decide to declare that the equipment can operate with and without a TPC feature in which case complete both (f) and (g)

f) If the equipment has a TPC range, the lowest and highest power level (or lowest and highest EIRP level in case of integrated antenna equipment), intended antenna assemblies and corresponding operating frequency range for the TPC range (or for each of the TPC ranges if more than one is implemented).

NOTE: Add more sections similar to the ones below if the equipment has more than 2 TPC ranges.

**TPC range 1:**

Applicable Frequency Range:

5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz (Indoor)

5 470 MHz to 5 725 MHz only (Outdoor only)

Applicable power levels (see note): Tx out / EIRP

Lowest setting (P<sub>low</sub>): 100%

Highest setting (P<sub>high</sub>): 30%

NOTE: Indicated whether the power levels specified are Transmitter Output Power levels or EIRP levels in case of integrated antenna equipment

Intended Antenna Assemblies:

Antenna Assembly name	Antenna Gain (dBi)	EIRP for P <sub>low</sub> (dBm)	EIRP for P <sub>high</sub> (dBm)
Huber&Suhner, SOA 2459/360/5/0/V_C	6.5	16.4	22.4

NOTE: Add more rows into the table If more antenna assemblies are intended for this TPC range.

DFS Threshold level<sup>2</sup>:                      dBm     at the antenna connector

in front of the antenna

2 NOTE: For equipment with a maximum EIRP below 200 mW, the DFS threshold level shall be -62 dBm or less, for equipment with an EIRP of 200 mW or above, the DFS threshold level shall be -64 dBm or less. These levels assume a 0 dBi antenna gain. To define the applicable threshold level at the (temporary) antenna connector, the gain of the antenna (in dBi) shall be added to the threshold level. If more than one antenna is intended for this TPC range or power setting, the antenna gain of the antenna with the lowest gain shall be used.

h) The extreme operating temperature range that apply to the equipment:

- 20°C to +55°C (Outdoor and Indoor usage)
- 0°C to +35°C (Indoor usage only)
- Other: .....

The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices.

Details provided are for the:

- stand-alone equipment                       combined (or host) equipment                       test jig

Supply Voltage

- AC mains State AC voltage .....230V/50Hz.....
- DC State DC voltage .....                      State DC current .....

In case of DC, indicate the type of power source:

- Internal Power Supply
- External Power Supply or AC/DC adapter
- Battery Nickel Cadmium
- Alkaline
- Nickel-Metal Hydride
- Lithium-Ion
- Lead acid (Vehicle regulated)
- Other .....

i) The test sequences used (see also EN 301 893 [2], clause 5.1.2)

Continuous transmit mode (duty cycle varied with data rate)  
.....

j) Type of Equipment

- Stand-alone
- Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
- Plug-in radio device (Equipment intended for a variety of host systems)
- Other .....

**Additional Information**

a) Modulation:

ITU Class of emission: .....

- Transmitter can operate un-modulated
- Transmitter cannot operate un-modulated

b) Duty Cycle

- The transmitter is intended for: Continuous duty
- Intermittent duty
- Continuous operation possible for testing purposes

c) About the UUT

The equipment submitted are representative production models.

- The equipment submitted is CE marked:
- The CE marking does include the Class-II identifier (Alert Sign).
- The CE marking does include a 4 digit number referring to the Notified Body involved.

*List of ancillary and/or support equipment*

Where possible, the information below should include a description, brand name, model number etc. for each of the equipment provided:

Refer to the EUT section of the test report for details.

---

*List Of Technical Requirements To Be Tested*

The list of technical requirements called for in EN 301 893 [2] is given below.

<b>Transmitter parameters</b>	
<b>EN Clause</b>	<b>Transmitter parameters</b>
4.3	RF Output power, Transmit Power Control (TPC) and power Density
4.4	Transmitter unwanted emissions
4.4.1	Transmitter unwanted emissions outside the 5 GHz RLAN bands

**The EUT has been previously tested against the requirements of EN 301 893. The purpose of this report is the addition of higher gain antennas.**