Test Certificate

A sample of the following product received on November 8, 2009 and tested on January 22, January 28 and February 1, 2010 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 R78445.

Summit Data Communications Inc.

Model SDC-MSD30AG

Mark E. Hill
Staff Engineer

Summit Data Communications Inc.

Printed Name

ACCREDITED

Testing Cert #2016-01

Elliott Laboratories 684 West Maude Avenue 408-245-7800 Phone
www.elliottlabs.com Sunnyvale, CA 94085-3518 408-245-3499 Fax

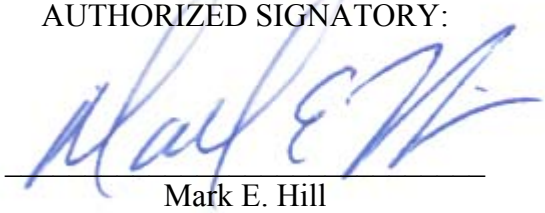
Radio Test Report

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-MSD30AG

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
REPORT DATE:	March 10, 2010
FINAL TEST DATES:	January 22, January 28 and February 1, 2010

AUTHORIZED SIGNATORY:



Mark E. Hill
Staff Engineer
Elliott Laboratories

ACCREDITED

Testing Cert #2016-01

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	March 10, 2010	First release	

TABLE OF CONTENTS

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-MSD30AG, 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.

STATEMENT OF COMPLIANCE

The tested sample of Summit Data Communications Inc. model SDC-MSD30AG complied with the requirements of:

EN 301 893 V1.5.1

Although all measurements were below the specification limit, one or more measurements were below the limit by a margin less than the measurement uncertainty. It is not therefore possible to state that the tested sample complied with the requirements based upon a 95% level of confidence. However, where a confidence level of less than 95% is acceptable, the device is considered to be in compliance with the requirements.

The test results recorded herein are based on a single type test of Summit Data Communications Inc. model SDC-MSD30AG and therefore apply only to the tested sample. The sample was selected and prepared by Jerry Pohmurski 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

EN 301 893 V1.5.1

Section	Description	Channel	Measured Value	Limit	Result
802.11a					
4.3.2	Nominal Channel Bandwidth and Occupied Channel Bandwidth	5180MHz 5320MHz 5500MHz 5700MHz	16.47 MHz MHz	80-100% of the nominal channel bandwidth	Complies
4.4.2.1	RF output power and power density at the highest power level (5150-5350 MHz)	5180MHz 5320MHz	16.9 dBm	23.0dBm	Complies
			9.7 dBm/MHz	10 dBm/MHz	Complies
	RF output power and power density at the highest power level (5470-5725MHz)	5500MHz 5700MHz	22.1 dBm	30.0 dBm	Complies
			15.2 dBm/MHz	17 dBm/MHz	Complies
4.5.2	Transmitter In-Band Spurious Emissions	5180MHz 5320MHz 5500MHz 5700MHz	complied with the mask	Figure 2 Spectral mask	Complies
Spurious Emissions - Worst-case value for all modes					
4.5.1.2	Transmitter Out-Of Band Conducted Spurious Emissions	5180MHz 5320MHz 5500MHz 5700MHz	-46.1dBm @ 6906.65 MHz (Margin: -16.1 dB)	Table 4	Complies
	Transmitter Out-Of Band Radiated Spurious Emissions		-36.8 dBm erp @ 10360.7MHz (-6.8 dB Margin)	Table 4	Complies
4.6	Receiver Conducted Spurious Emissions	5180MHz 5320MHz 5500MHz 5700MHz	-65.8dBm @ 3546.68 MHz (Margin: -18.8 dB)	25 – 1000 MHz: -47dBm 1 – 26.5 GHz: -57dBm	Complies
	Receiver Radiated Spurious Emissions		-53.7 dBm erp @ 3546.7MHz (-6.7 dB Margin)		Complies
Other Requirements					
4.7.2	DFS operational modes	-	Slave Device	Master and/or Slave Device	Complies
4.7.2.1.2 4.7.2.2.2 4.7.2.3.2 4.7.2.4.2	Requirements related to DFS	These requirements have been assessed separately and are covered under the scope of Elliott test report R78277.			
4.7.2.5.2	Uniform Spreading – use of available spectrum and probability of channel selection.				
4.8.2	Medium Access Protocol	-	The system uses the 802.11 protocol to facilitate spectrum sharing.	A medium access protocol shall be implemented by the equipment and shall be active under all circumstances.	Complies

Section	Description	Channel	Measured Value	Limit	Result
4.9.2	User Access Restrictions	-	The manufacturer attests to the fact that the DFS controls are not accessible and cannot be disabled/altered by the end user.	DFS controls (hardware or software) related to radar detection shall not be accessible to the user so that the DFS functions can neither be disabled nor altered.	Complies
Note – Although the measurement is below the specification limit, it is below the limit by a margin less than the measurement uncertainty.					

EXTREME CONDITIONS

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

Temperature extremes used during testing were -10°C to +55°C (taken from AS/NZS 4268) and based on the manufacturer declared values for extremes based on operating range of host or equipment."

MEASUREMENT UNCERTAINTIES

ISO/IEC 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	1.7×10^{-7}
RF power, conducted	dBm	25 to 7000 MHz	± 0.52 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBμV/m	25 to 1000 MHz	± 3.6 dB
Transmitter switch off time	Seconds	-	0.1 sec

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Summit Data Communications Inc. model SDC-MSD30AG is a 802.11ag compliant wireless LAN radio Module which is designed to provide wireless local area networking connectivity. Normally, the EUT would be embedded in various types of mobile and stationary computing devices such as handheld and vehicle mounted data terminals during operation. The EUT was, therefore, placed in this position during emissions testing to simulate the end user environment. The electrical rating of the EUT is 3.3 VDC =/-5%. It's typical power consumption is 400mA (1320mW) while in transmit mode, 180mA (594mW) while in receive mode and 10mA (33mW) while in standby mode.

The sample was received on November 8, 2009 and tested on January 22, January 28 and February 1, 2010. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Summit Data Communications Inc.	SDC-MSD30AG	802.11AG Mini Compact Flash Module with antenna connectors	-	TWG-SDCMSD30AG

OTHER EUT DETAILS

Monopole Antenna - 2.4 and 5GHz bands, Huber+Suhner, SOA 2459/360/5/0/V_C, 3dBi (2.4GHz), 6.5dBi (5GHz)
Dipole Antenna #1 - 2.4 and 5GHz bands - Larsen, R380.500.314, 1.6dBi (2.4GHz), 5dBi (5GHz)
Dipole Antenna #2 - 2.4 GHz only - Cisco Air-Ant 4941 2dBi(2.4GHz)
Dipole Antenna #3 - 5GHz only - Cisco Air-Ant 5135 3.5dBi(5GHz)
Dipole Antenna #4 - 2.4GHz only - Summit SDC-CF22G - 0dBi

For purposes of this evaluation, the worse case antenna gains of 3dBi (2.4GHz) and 6.5dBi (5GHz) were used.

ENCLOSURE

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer or system.

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
Hewlett Packard	iPAQ	Handheld Computer	-	-

No remote support equipment was used during testing.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
iPAQ Power	AC Mains	2wire	Unshielded	1.5
Flash Module	iPAQ Module Port	-	-	-

EUT OPERATION

During emissions testing the EUT was configured to transmit at the Low, Middle, and High Channel. Testing performed at 6Mbs for 802.11a mode.

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

Final radiated spurious emissions measurements were taken at the Elliott Laboratories Anechoic Chambers and/or Open Area Test Site(s) listed below. The sites conform to the requirements of ANSI C63.4: 2003 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are registered with the VCCI and are on file with the FCC and industry Canada.

Site	Registration Numbers			Location
	VCCI	FCC	Canada	
SVOATS #2	R709 C729	90593	IC 2845A-2	684 West Maude Ave, Sunnyvale CA 94085-3518

In the case of Open Area Test Sites, ambient levels are at least 6 dB below the specification limits with the exception of predictable local TV, radio, and mobile communications traffic.

Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements.

RADIATED EMISSIONS CONSIDERATIONS

CISPR has determined that radiated measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an Open Area Test Site or anechoic chamber, as defined in CISPR 16-1-4 and Annex A of EN 300 328 / EN 301 893 / EN 300 440-1. The test site is maintained free of conductive objects within the CISPR defined elliptical area.

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.

ANTENNAS

A combination of biconical, log periodic or bi-log antennas are used to cover the range from 25 MHz to 1000 MHz. Broadband antennas or tuned dipole antennas are used over the entire 25 to 1000 MHz frequency range as the reference antenna for substitution measurements.

Above 1000 MHz, a dual-ridge guide horn antenna or octave horn antenna are used as reference and measurement antennas.

The antenna calibration factors are included in site factors that are programmed into the test receivers and instrument control software when measuring the radiated field strength.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

The test height above ground for non-body worn devices shall be 150 centimeters. Floor mounted equipment will be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

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/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.

CARRIER FREQUENCIES

If the device can operate in an un-modulated mode then the carrier frequency is measured in that mode, otherwise the carrier frequency is calculated using the (f1 +f2)/2 method, where f1 and f2 are the –10dB points.

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[1], with video gating used where the transmit duty cycle is less than 1.

[1] When using video averaging the span is set to ensure the analyzer bin size does not exceed one half the measurement bandwidth.

RADIATED SPURIOUS EMISSIONS

Radiated emissions measurements are performed in two phases. A preliminary scan of emissions is conducted in either an anechoic chamber or on an OATS during which all significant EUT frequencies are identified with the system in a nominal configuration.

At least two scans are performed across the complete frequency range of interest and at each operating frequency identified in the reference standard. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. 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). Where applicable, final measurements may be made with video averaging enabled.

During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit. The limit is a field strength limit derived from the ERP limit specified in the standard(s).

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.

DFS – THRESHOLD, CHANNEL CLOSING TRANSMISSION TIME AND CHANNEL MOVE TIME

The threshold level for DFS radar detection is determined by using the test methods outlined in section 5.3.7 of EN 301 893 (section 5.3.6 of EN 302 502). Typically the unit under test is configured to report when it detects a burst of radar rather than to change channel on detecting radar to expedite these measurements.

Channel clearing and closing times are measured by applying a radar burst with the device configured to change channel and by observing the original channel for transmissions.

DFS CHANNEL AVAILABILITY CHECK TIME

The channel availability check time is determined by using the test methods outlined in section 5.3.7 of EN 301 893 (section 5.3.6 of EN 302 502). Radar bursts are applied during the EUT boot sequence to verify that a check for radar on the selected channel is performed for at least 60 seconds prior to commencing transmissions on that channel.

UNIFORM LOADING

The channel loading, where appropriate (i.e. when channel selection is not determined under control of the network), is determined by re-booting the EUT multiple times and recording the channel initially selected. The number of times each channel is selected is divided by the total number of times the device was re-booted to calculate the utilization. This is compared to the theoretical loading of 1/n, where n is the total number of channels available.

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

SAMPLE CALCULATIONS - RADIATED SPURIOUS EMISSIONS

Receiver readings are compared directly to a converted specification limit (decibel form). The conversion uses the effective radiated power limit specified in the standard to calculate the expected field strength in free space using the following formula:

$$E = \frac{\sqrt{30\ P\ G}}{d}$$

where:

E = Field Strength in V/m
P = Power in Watts
G = Gain of antenna in numeric gain[2]
D = distance in meters

The field strength limit is then converted to decibel form (dBuV/m) and the margin of a given emission peak relative to the limit is calculated as follows:

$$M = R_c - L_S$$

where:

R_c = Corrected Receiver Reading in dBuV/m
L_S = Calculated specification Limit in dBuV/m
M = Margin in dB Relative to Spec

When substitution measurements are required (all signals with less than 6dB of margin relative the field strength limit) the margin of the emissions relative to the effective radiated power limit is calculated from:

$$P_S - S = M$$

where:

P_S = effective radiated power determined from antenna substitution (dBm)
S = Specification Limit in dBm
M = Margin to Specification in +/- dB

[2] Although the gain relative to a dipole should be used for limits expressed as an erp, the isotropic gain is used as this produces a more conservative limit.

Appendix A Test Equipment Calibration Data

Radiated Emissions, 1000 - 26,500 MHz, 23-Jan-10

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	8/19/2010
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	3/12/2010
EMCO	Antenna, Horn, 1-18 GHz	3117	1662	4/11/2010

Environmental test, 01-Feb-10

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	11/10/2010
Rohde & Schwarz	Power Sensor 100 uW - 10 Watts	NRV-Z53	1796	6/3/2010
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	1/6/2011
Thermotron	Temp Chamber (w/ F4 Watlow Controller)	S1.2	2170	6/29/2010

Appendix B Test Data

T78058 23 Pages

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		-
Emissions Standard(s):	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Summit Data Communications

Model

802.11abg Module

Date of Last Test: 2/5/2010

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	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: 2/1/2010
Test Engineer: Mehran Birgani
Test Location: Environmental Chamber
Config. Used: 1
Config Change: Module 2C
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: 15.2 dBm/MHz
1	Output Power over extreme conditions (5150-5350 MHz)	EN 301 893	Pass	802.11a: 16.9 dBm
1	Output Power over extreme conditions (5470-5725 MHz)	EN 301 893	Pass	802.11a: 22.1 dBm
2	Carrier Frequency	EN 301 893	Pass	Error = 4.3 ppm
3	Occupied Bandwidth	EN 301 893	Pass	802.11a: 16.5 MHz
4	Usage of the spectrum available	EN 301 893 V1.5.1 (60%)	-	5150- 5350 MHz: 80 % 5470 - 5725 MHz: 63 %
5	Transmitter conducted spurious emissions, 30MHz - 26,500MHz	EN 301 893	Pass	-46.1dBm @ 6906.65 MHz
6	Receiver conducted spurious emissions, 30MHz - 26,500MHz	EN 301 893	Pass	-65.8dBm @ 3546.68 MHz

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

For the Occupied Channel bandwidth measurement the refrence level used to determine the -6dB points was taken as the top of the signal, ignoring the carrier breakthrough. By ignoring the carrier breakthrough, the actual spectrum usage is better defined.

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	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 (nominal/normal voltage defined as 230 V):

X	Voltage extremes for AC-powered equipment +/10% of nominal
	Voltage extremes for Lead-Acid Battery 1.3 and 0.9 times nominal
	Voltage extremes for Leclanché or lithium type battery: 0.85 and 1.15 times the nominal voltage of the battery
	Voltage extremes for Mercury or nickel-cadmium type of battery: 0.9 times and 1.15 times the nominal voltage of the battery
Temperature extremes:	
	-20°C to +55°C (Limits for unrestricted use taken from EN 300 328 / EN 300 220)
	0°C to +35°C (Limits for indoor use taken from EN 300 328 / EN 300 220)
X	-10°C to +55°C (taken from AS/NZS 4268)

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	19	20.7	1	20.7
9	19	20.5	1	20.5
12	19	20.5	1	20.5
18	19	20.4	1	20.4
24	19	20.5	1	20.5
36	19	20.4	1	20.4
48	19	20.4	1	20.4
54	19	20.5	1	20.5

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:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	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 a thermocouple detector (or an equivalent thereof) connected to the IF output of the spectrum analyzer, with the analyzer set to positive peak detector with RB= VB = 1MHz.
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	Frequency	PSD[2]	Gain[3]	Duty	EIRP[5]	PSD[6]	
MHz	MHz	dBm	dBi	Cycle[4]	PSD	Limit	Margin
5180	5180.110	2.9	6.5	1.0	9.4	10.0	-0.6
5320	5319.970	3.2	6.5	1.0	9.7	10.0	-0.3
5500	5499.950	8.7	6.5	1.0	15.2	17.0	-1.8
5700	5703.313	6.9	6.5	1.0	13.4	17.0	-3.6

Highest Average Power under normal and extreme operating conditions

Power Setting	Channel (MHz)	Average Power (dBm)[1] For Operating Condition					Max Antenna Gain[3]	Duty Cycle[4]	Max Average Power (EIRP)[5]	Maximum permitted EIRP
		Normal	Extreme							
		20°C	-10°C		55°C					
		230.0 V	207.0 V	253.0 V	207.0 V	253.0 V				
11	5180	9.0	10.4	10.4	8.8	8.8	6.5	1.0	16.9	23.0
14	5320	8.7	9.5	9.5	8.6	8.6	6.5	1.0	16.0	23.0
18	5500	14.8	15.6	15.6	14.4	14.4	6.5	1.0	22.1	30.0
18	5700	12.4	13.6	13.6	11.8	11.8	6.5	1.0	20.1	30.0

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Run #2: Carrier Frequency - Extreme and Normal Temperature

Carrier frequency measured over extreme conditions at the lowest and highest centre frequencies (carrier frequencies) in each band. The carrier frequency shall remain within 20ppm of the nominal carrier frequency.

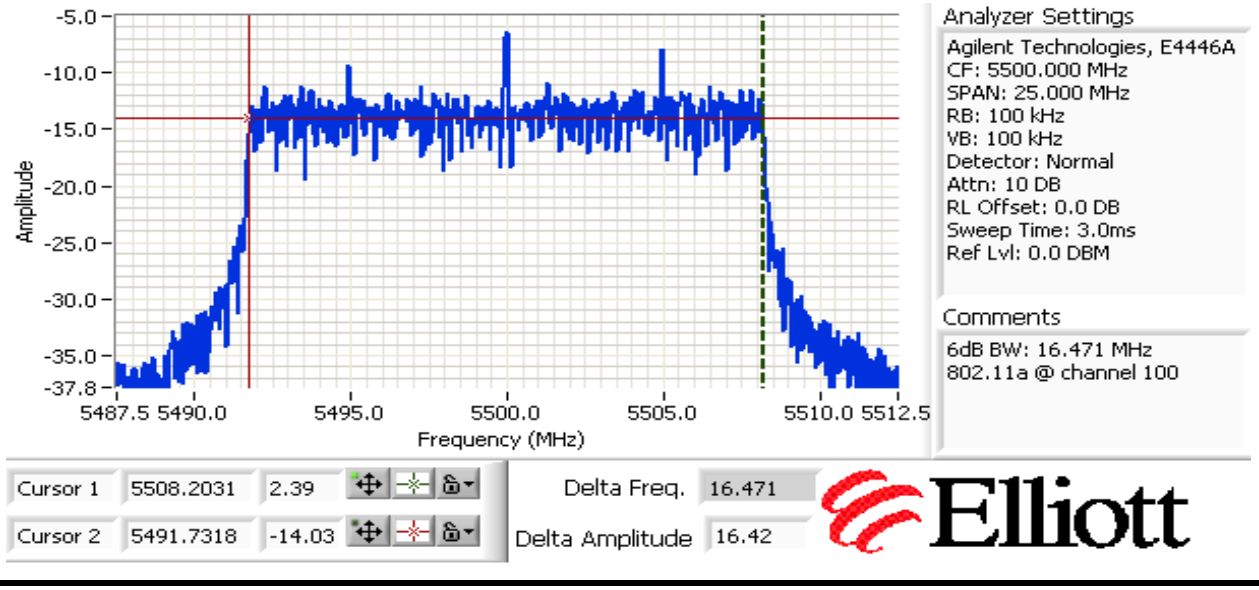
Channel Frequency (MHz)	Measured Frequency (MHz) For Operating Condition					Maximum Frequency Error (kHz)	Maximum Frequency Error (ppm)
	Normal	Extreme					
	20°C	-10°C		55°C			
	230.0 V	207.0 V	253.0 V	207.0 V	253.0 V		
5180.00	5179.9789	5180.0225	5180.0225	5179.9805	5179.9805	22.488	4.341
5320.00	5319.9787	5320.0217	5320.0217	5319.9797	5319.9797	21.699	4.079
5500.00	5499.9790	5500.0238	5500.0238	5499.9800	5499.9800	23.836	4.334
5700.00	5699.9779	5700.0230	5700.0230	5699.9789	5699.9789	22.978	4.031
						Worst case error (ppm):	4.341

Run #3: Occupied Channel Bandwidth

The occupied channel bandwidth measurement is performed on the lowest and highest frequencies in each band for every declared nominal bandwidth within each band (5150 - 5350 MHz and/or 5470 - 5725 MHz). Measurements are made under normal conditions only.

The measurement is made using the spectrum analyzer to measure the 6dB bandwidth of the modulated signal. The analyzer is configured with RB=VB=100kHz, peak detector and max hold, with the span set to twice the nominal bandwidth.

Channel frequency MHz	Mode	Nominal Bandwidth MHz	Occupied Channel Bandwidth		Result
			Measured (MHz)	Limit (MHz)	
5180	802.11a	20.00	16.54	16 - 20	Pass
5320	802.11a	20.00	16.80	16 - 20	Pass
5500	802.11a	20.00	16.47	16 - 20	Pass
5700	802.11a	20.00	16.54	16 - 20	Pass



Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Run #4: Band Usage

Each of the declared channel plans (combination of centre frequencies and declared nominal bandwidths) shall make use of at least 60 % of the spectrum available in the applicable sub-band(s).

This requirements is taken from EN 301 893 V1.5.1 based on the requirement in the Official Journal that the 5600-5650MHz sub band be excluded from use except when the 10-minute CAC and additional precautions are taken to protect meteorological radar systems. V1.4.1 requires 80% spectrum utilization but does not consider the potential exclusion of the 5600-5650MHz sub band.

Channel Plan	Band	Nominal Bandwidth	Number of channels	Usage	Comments
20MHz	5150 - 5350 MHz	20.0	8	80%	
	5470 - 5725 MHz	20.0	8	63%	5600-5650MHz excluded from use

The Uniform Spreading is a mechanism to be used by the RLAN to provide, on aggregate, a uniform loading of the spectrum across all devices. The Uniform Spreading is limited to the channels being declared as part of the channel plan.

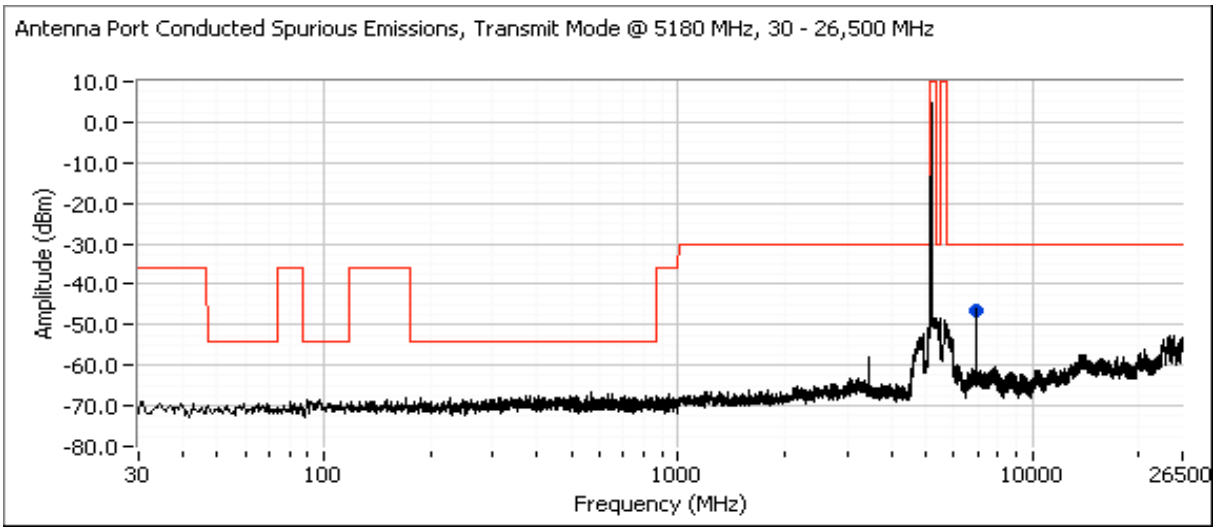
NOTE: The required spreading may be achieved by various means. These means include network management functions controlling large numbers of RLAN devices as well as the channel selection function in an individual RLAN device.

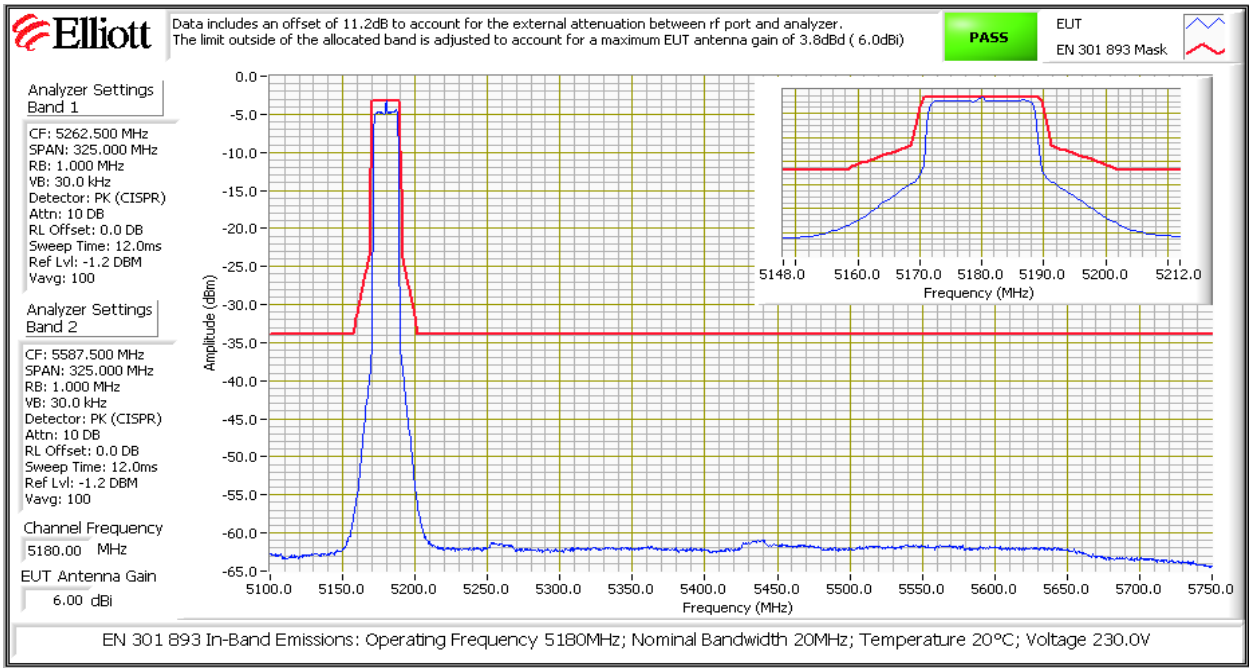
The uniform spreading mechanism is not applicable to a client device that does not support ad-hoc operation, the spreading mechanism is achieved by the master device.

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Run #5: Antenna Port Conducted Spurious Emissions, Transmit Mode, 30 - 26,500 MHz

802.11a @ 5180 MHz with maximum power setting

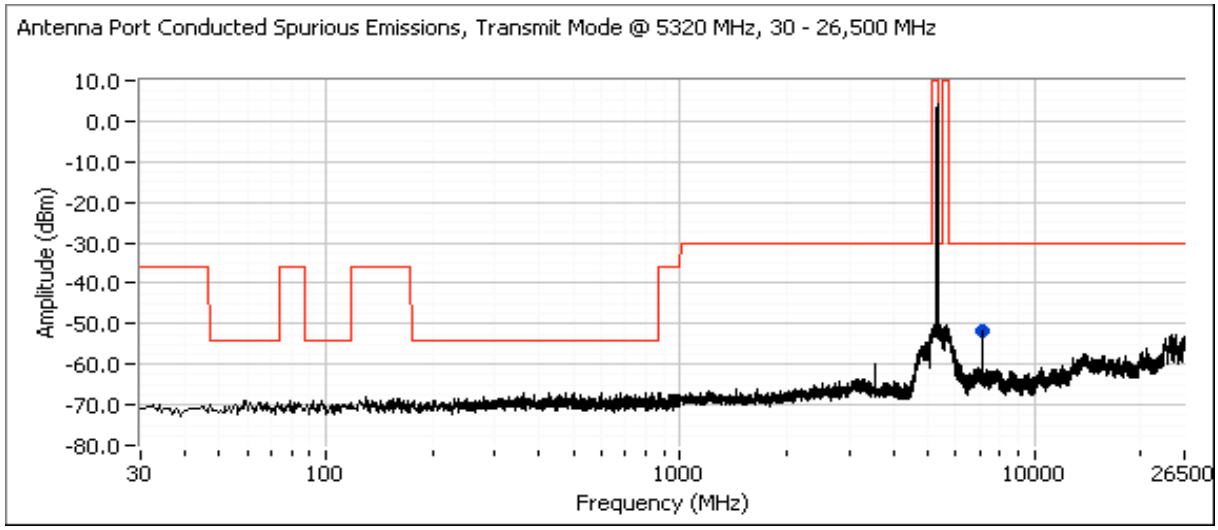


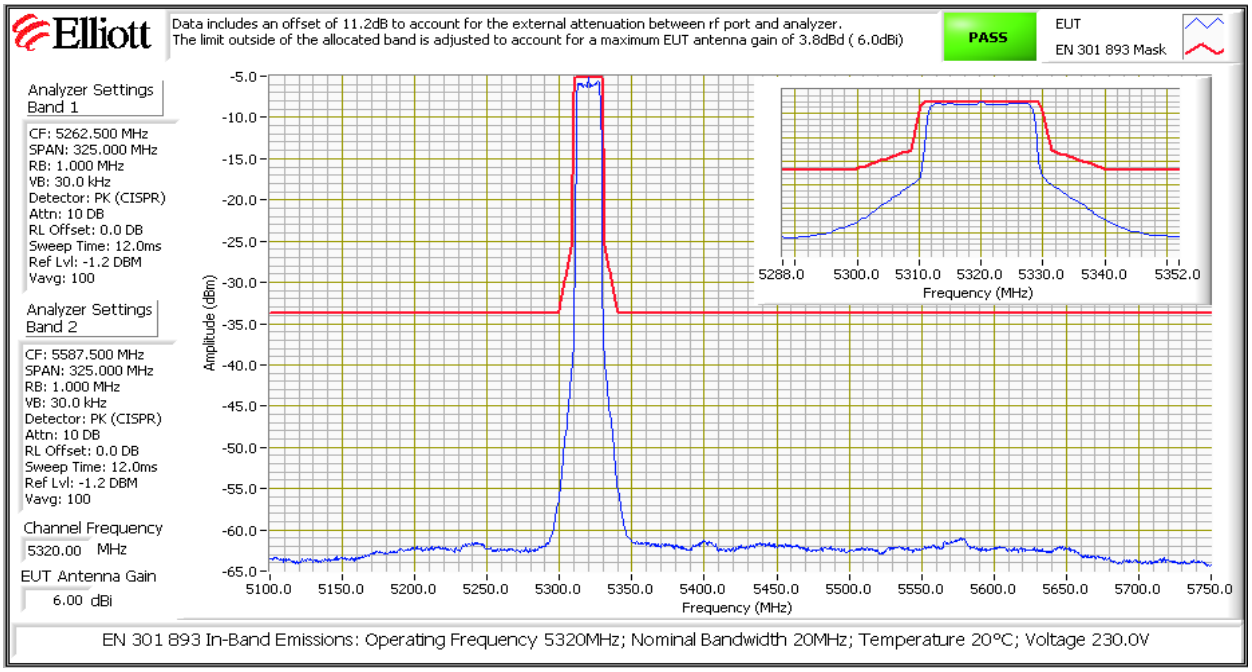


Frequency MHz	Level dBm	Port	EN 301 893 Limit	EN 301 893 Margin	Detector	Channel	Mode	Comments
6906.650	-46.1	RF Port	-30.0	-16.1	Peak	36	a	

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

802.11a @ 5320 MHz with maximum power setting

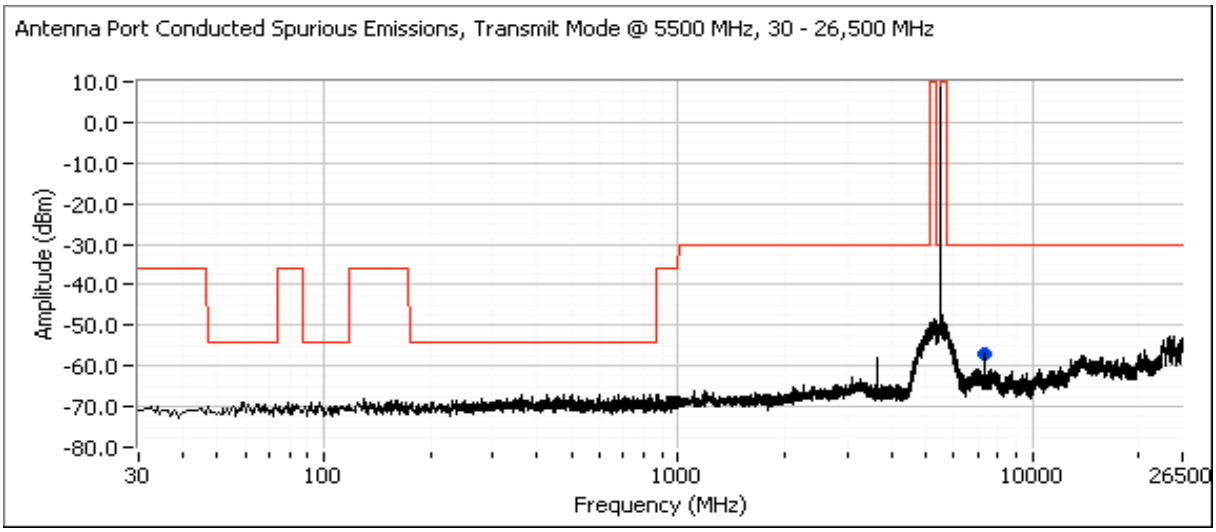


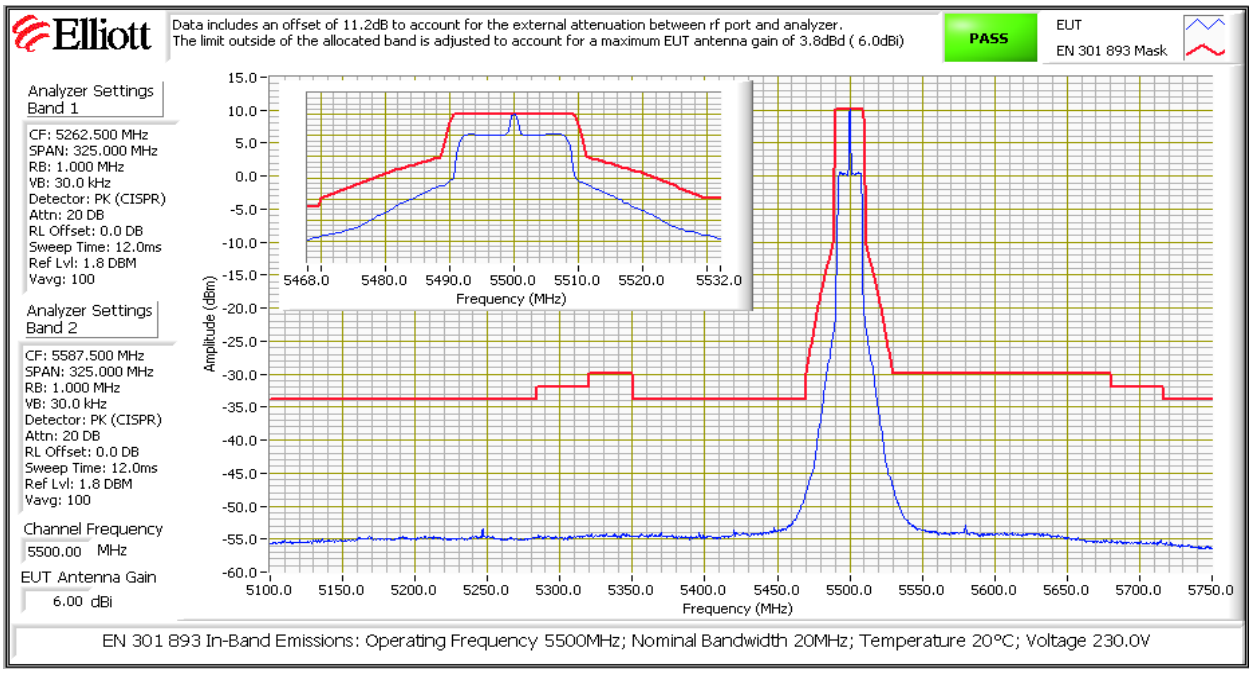


Frequency MHz	Level dBm	Port	EN 301 893 Limit	EN 301 893 Margin	Detector	Channel	Mode	Comments
7093.310	-51.6	RF Port	-30.0	-21.6	Peak	64	a	

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

802.11a @ 5500 MHz with maximum power setting

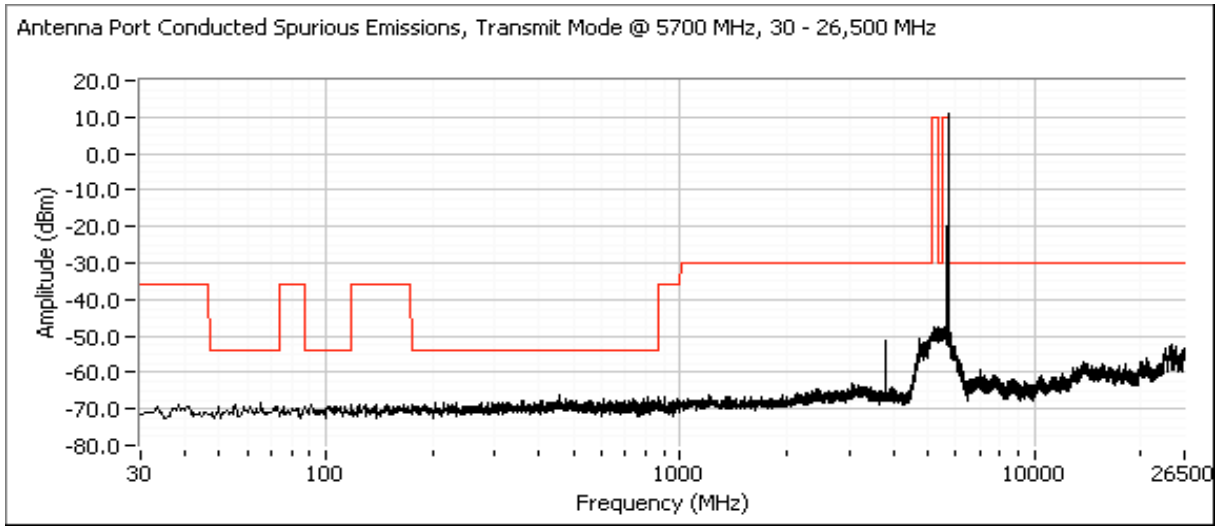


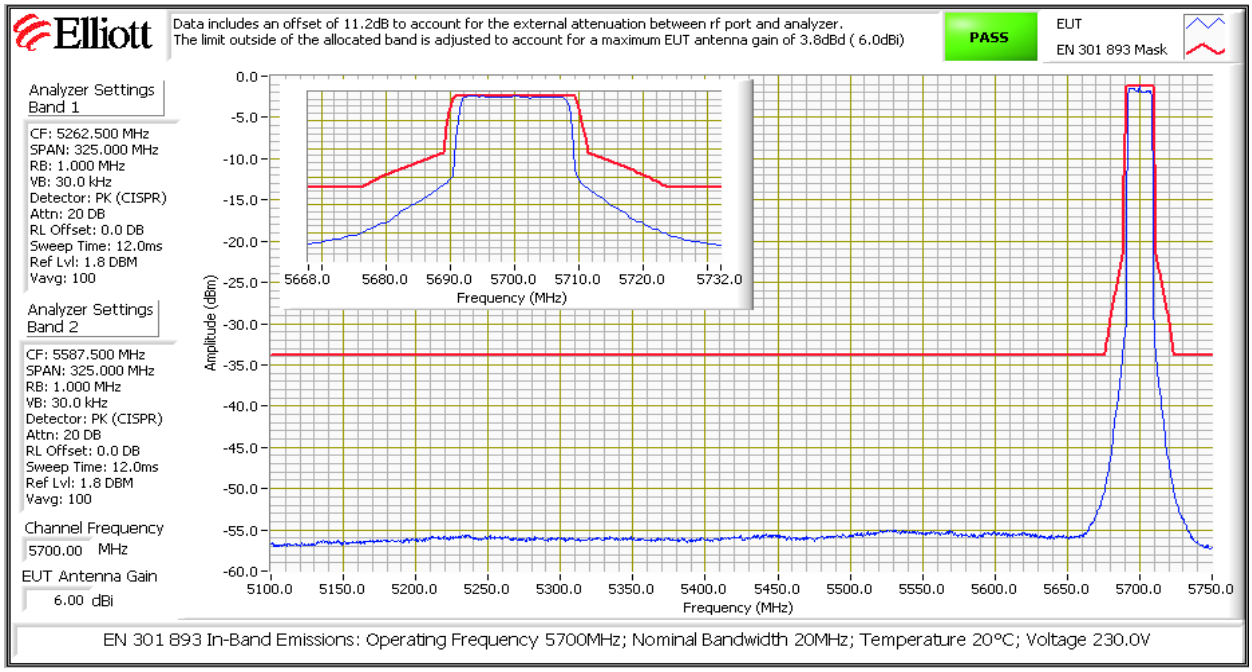


Frequency MHz	Level dBm	Port	EN 301 893 Limit	EN 301 893 Margin	Detector	Channel	Mode	Comments
7333.330	-57.1	RF Port	-30.0	-27.1	Peak	100	a	

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

802.11a @ 5700 MHz with maximum power setting

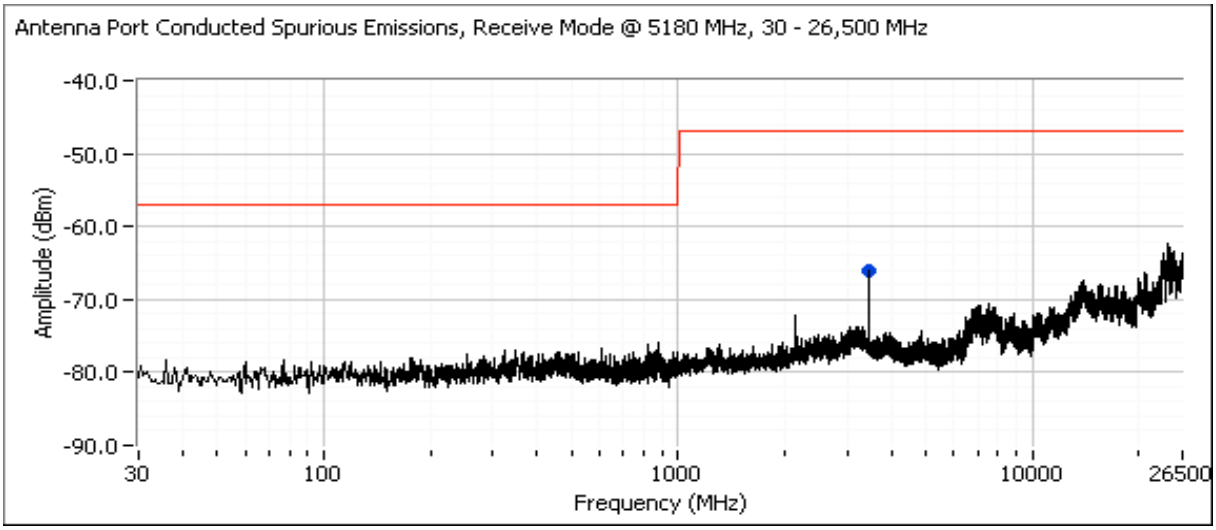


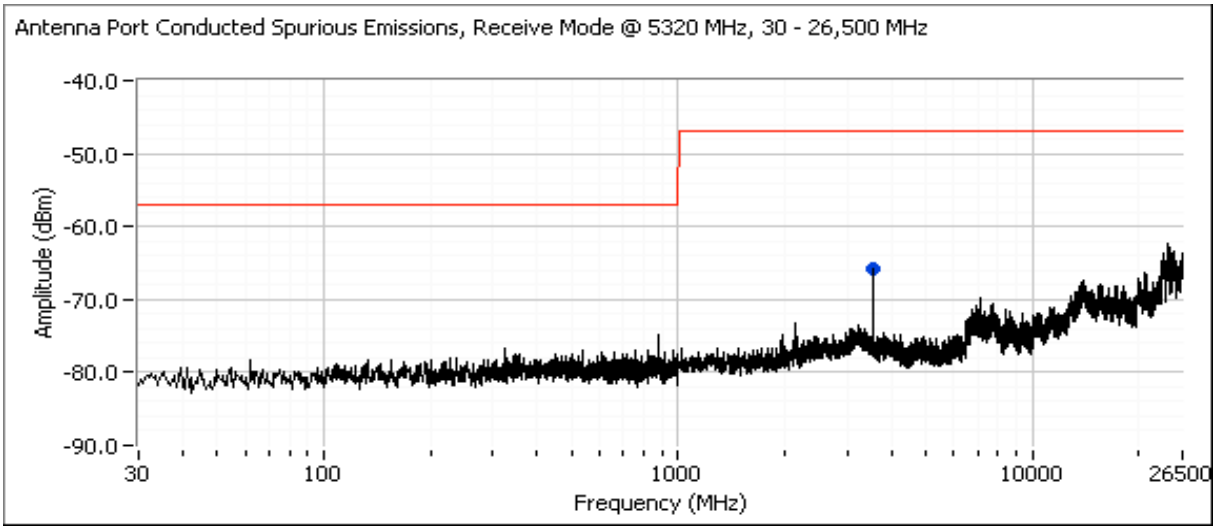


Frequency MHz	Level dBm	Port	EN 301 893 Limit	EN 301 893 Margin	Detector	Channel	Mode	Comments
3799.940	-51.1	RF Port	-30.0	-21.1	Peak	140	a	

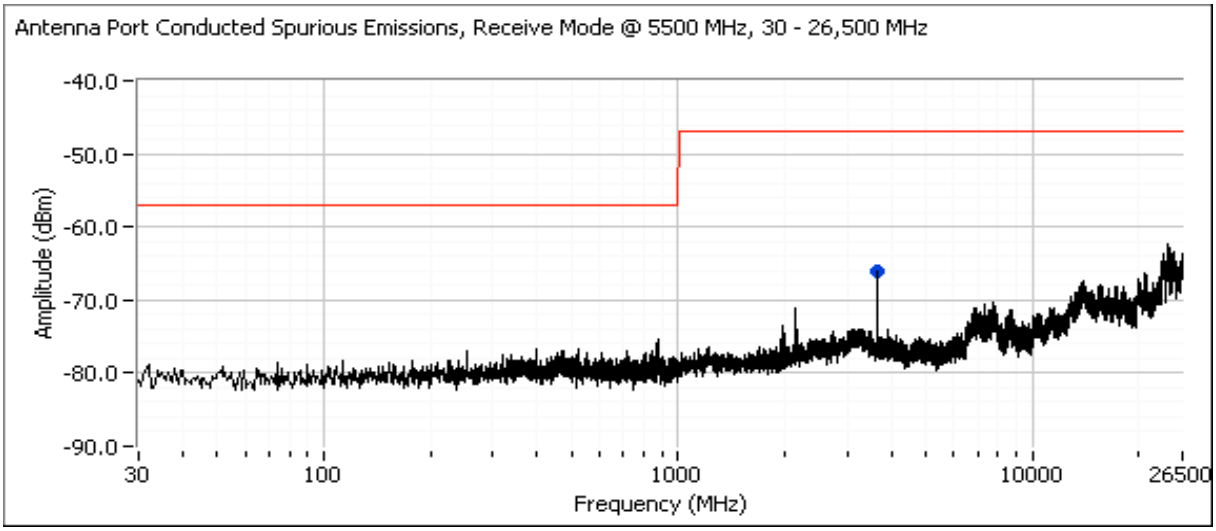
Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

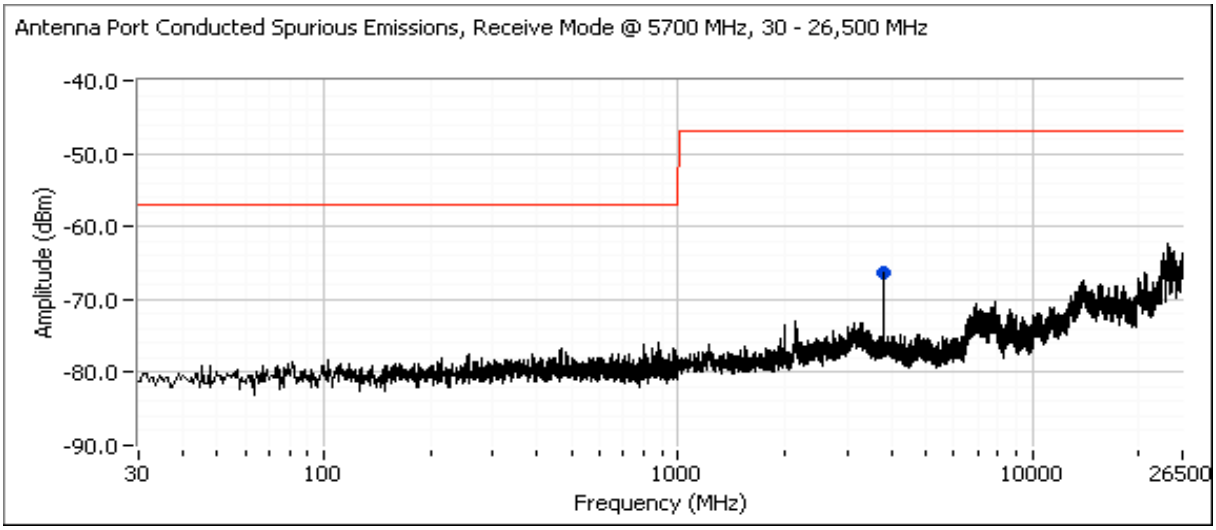
Run #6: Antenna Port Conducted Spurious Emissions, Receive Mode, 30 - 26,500 MHz





Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A





Frequency MHz	Level dBm	Port	EN 301 893 Limit	EN 301 893 Margin	Detector	Channel	Mode	Comments
3453.300	-66.1	RF Port	-47.0	-19.1	Peak	36	a	
3546.680	-65.8	RF Port	-47.0	-18.8	Peak	64	a	
3666.660	-66.0	RF Port	-47.0	-19.0	Peak	100	a	
3800.010	-66.3	RF Port	-47.0	-19.3	Peak	140	a	

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Radiated Spurious Emissions, EN 301 893

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.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

The measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 10-15 °C
Rel. Humidity: 40-60 %

Date of Test: Refer to each run
Test Engineer: Refer to each run
Test Location: Refer to each run

Config. Used: 1
Config Change: None
Host EUT Voltage: 230V/50Hz

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
2	Spurious Emissions Transmit Mode 30 - 26000 MHz	EN 301 893	Pass	-36.8 dBm erp @ 10360.7MHz (-6.8 dB Margin)
4	Spurious Emissions Receive/Stand-By Mode 30 - 26000 MHz	EN 301 893	Pass	-53.7 dBm erp @ 3546.7MHz (-6.7 dB Margin)

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:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

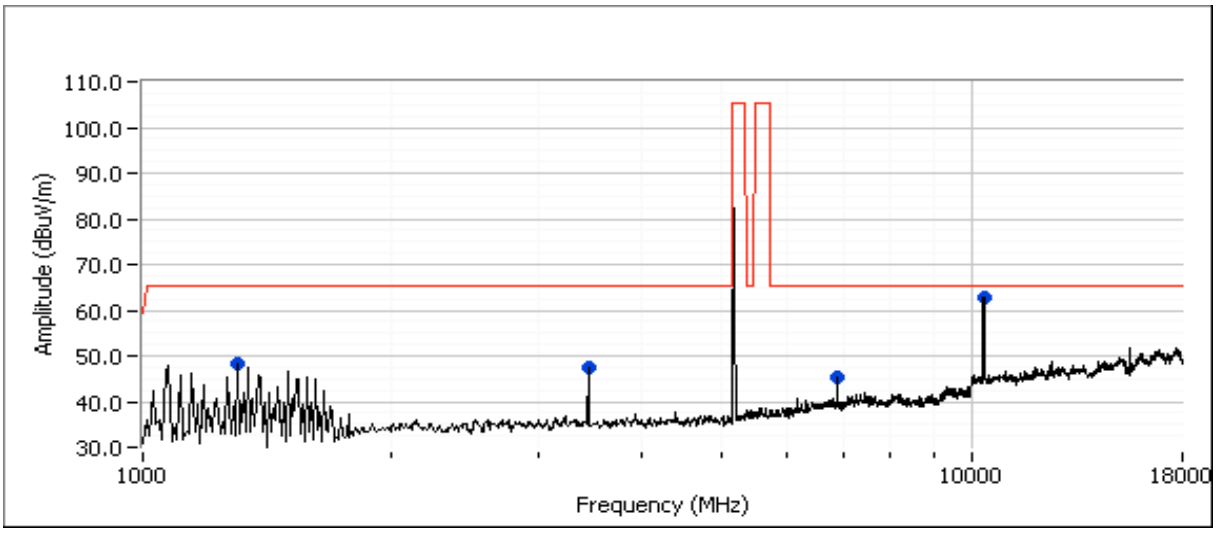
Run #1: Radiated Spurious Emissions, Transmit Mode, 30 - 26000 MHz

Date of Test: 01/22/10 Test Location: Chamber #2

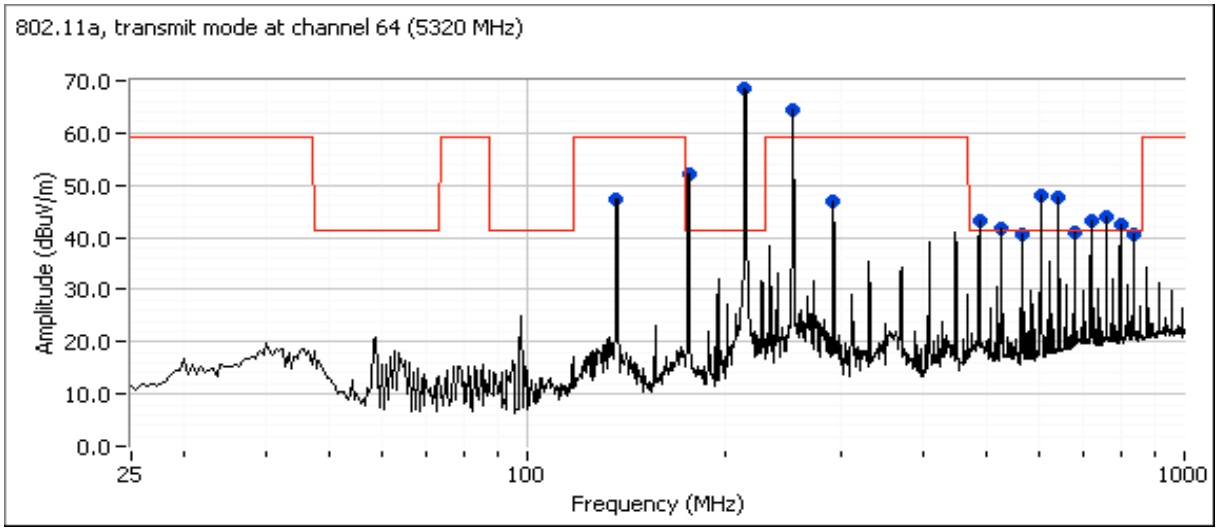
Test Engineer: Rafael Varelas

Measurements made at 3m

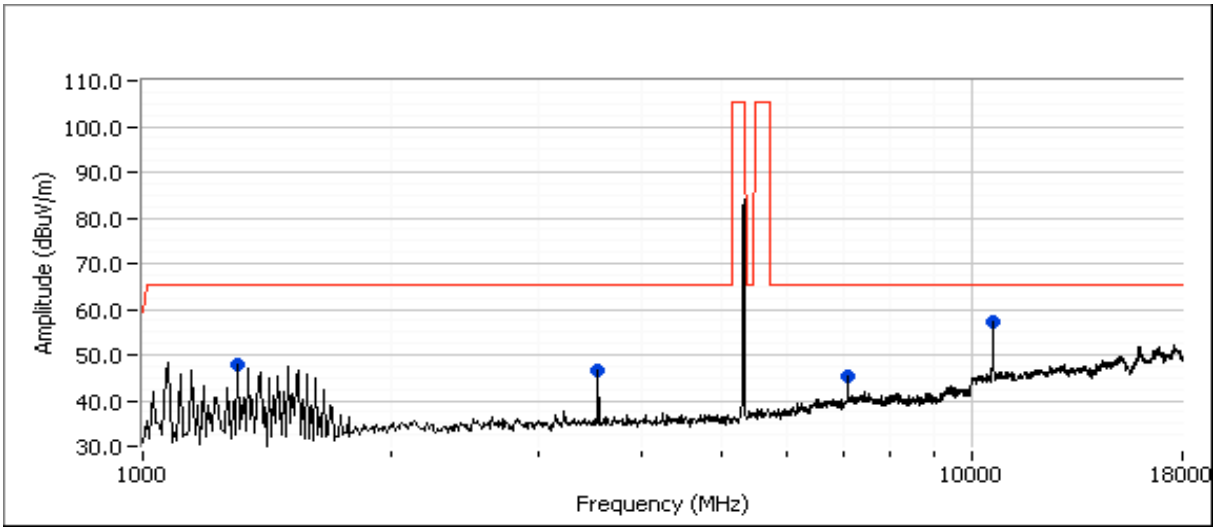
Graph - Channel: 36 5180 MHz, Mode: 802.11a



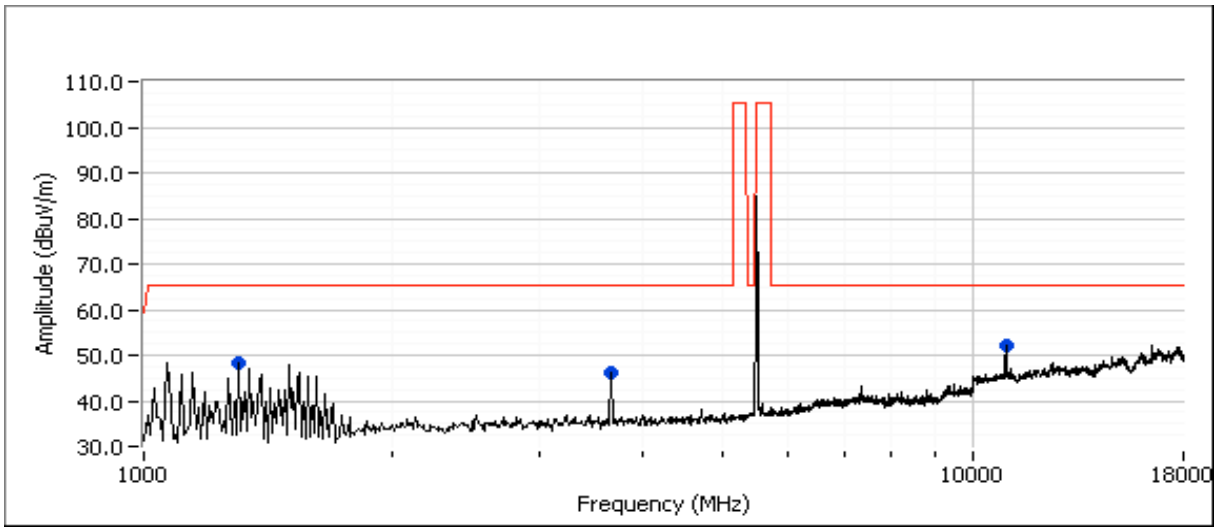
Graph - Channel: 64, 5320 MHz, Mode: 802.11a



Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

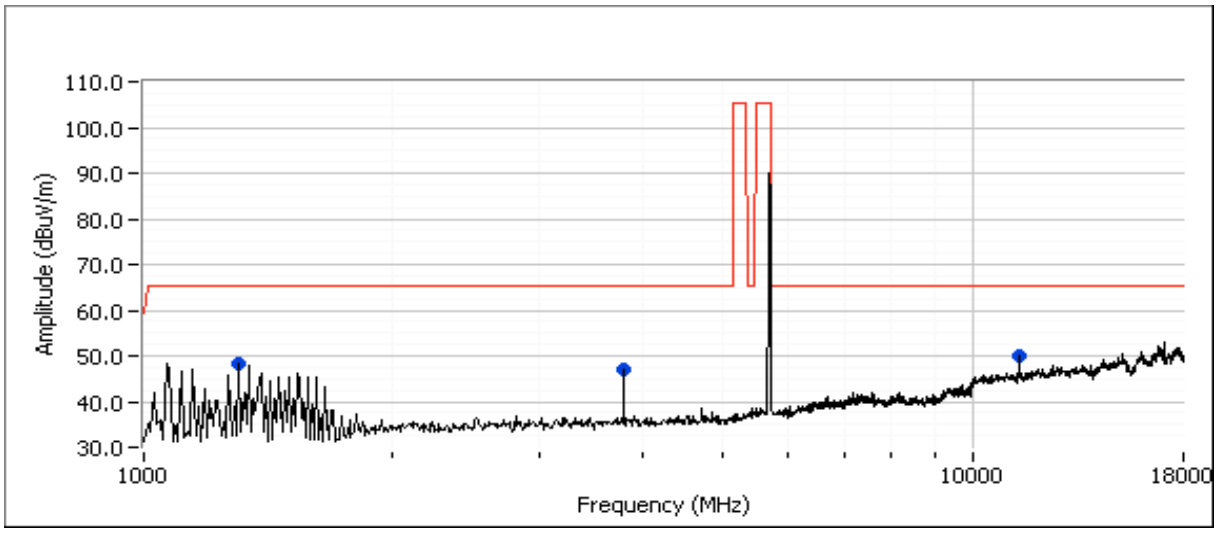


Graph - Channel: 100, 5500 MHz, Mode: 802.11a



Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Graph - Channel: 140, 5700MHz, Mode: 802.11a



Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Results Table - All channels

Frequency	Level	Pol	EN 301 893 Note 1		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		and mode
10359.840	62.6	V	65.3	-2.7	Peak	142	1.7		36, a
10641.730	57.2	V	65.3	-8.1	Peak	141	1.7		64, a
10986.000	52.1	V	65.3	-13.2	Peak	31	1.7		100, a
11386.670	50.1	V	65.3	-15.2	Peak	342	1.7		140, a
1302.500	48.4	V	65.3	-16.9	Peak	331	1.7		36, a
1302.500	48.4	H	65.3	-16.9	Peak	218	1.7		100, a
1302.500	48.4	V	65.3	-16.9	Peak	346	1.7		140, a
1302.500	47.8	V	65.3	-17.5	Peak	353	1.7		64, a
3447.500	47.6	V	65.3	-17.7	Peak	246	1.7		36, a
3795.830	47.2	V	65.3	-18.1	Peak	274	1.7		140, a
3548.330	46.7	H	65.3	-18.6	Peak	90	1.7		64, a
3658.330	46.0	H	65.3	-19.3	Peak	89	1.7		100, a
6908.330	45.5	V	65.3	-19.8	Peak	206	1.7		36, a
7095.000	45.5	V	65.3	-19.8	Peak	358	1.7		64, a
214.488	68.6	H	41.3	27.3	Peak	239	1.7	Digital device emission	64, a
175.493	52.2	H	41.3	10.9	Peak	269	1.7	Digital device emission	64, a
604.473	47.9	H	41.3	6.6	Peak	97	1.7	Digital device emission	64, a
643.478	47.5	H	41.3	6.2	Peak	93	1.7	Digital device emission	64, a
253.491	64.3	H	59.3	5.0	Peak	239	1.7	Digital device emission	64, a
760.468	44.1	H	41.3	2.8	Peak	76	1.7	Digital device emission	64, a
487.433	43.3	H	41.3	2.0	Peak	313	1.7	Digital device emission	64, a
721.466	43.2	H	41.3	1.9	Peak	76	1.7	Digital device emission	64, a
799.422	42.6	H	41.3	1.3	Peak	118	1.7	Digital device emission	64, a
526.442	41.6	H	41.3	0.3	Peak	313	1.7	Digital device emission	64, a
682.422	41.1	H	41.3	-0.2	Peak	104	1.7	Digital device emission	64, a
565.425	40.7	H	41.3	-0.6	Peak	277	1.7	Digital device emission	64, a
838.410	40.6	H	41.3	-0.7	Peak	277	1.7	Digital device emission	64, a
136.497	47.4	H	59.3	-11.9	Peak	239	1.7	Digital device emission	64, a
292.484	47.1	H	59.3	-12.2	Peak	299	1.7	Digital device emission	64, a

Note 1:	The field strength limit in the tables above was calculated from the erp/eirp limit detailed in the standard using the free space propagation equation: $E=\sqrt{(30PG)}/d$. This limit is conservative - it does not consider the presence of the ground plane and, for erp limits, the dipole gain (2.2dBi) has not been included. The erp or eirp for all signals with less than 10dB of margin relative to this field strength limit is determined using substitution measurements.

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Run #2: Radiated Spurious Emissions, Transmit Mode: Final Field Strength and Substitution Measurements

Date of Test: 01/28/10 Test Location: SV OATS #2

Test Engineer: Mehran Birgani

Measurements made at 3m

Frequency	Level	Pol	EN 301 893 Note 1		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters		and mode
10360.740	60.8	V	65.3	-4.5	PK	327	1.3		36, a
10638.030	57.7	V	65.3	-7.6	PK	269	1.0		64, a

Vertical

Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
10360.740	-20.0	11.7	87.1	95.4	60.8	-34.6	-36.8		-30.0	-6.8
10638.030	-20.0	11.7	87.4	95.7	57.7	-38.0	-40.2		-30.0	-10.2

Note 1:	Pin is the input power (dBm) to the substitution antenna
Note 2:	Gain is the gain (dBi) for the substitution antenna. A dipole has a gain of 2.2dBi.
Note 3:	FS is the field strength (dBuV/m) measured from the substitution antenna.
Note 4:	Site Factor - this is the site factor to convert from a field strength in dBuV/m to an eirp in dBm.
Note 5:	EUT field strength as measured during initial run.

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

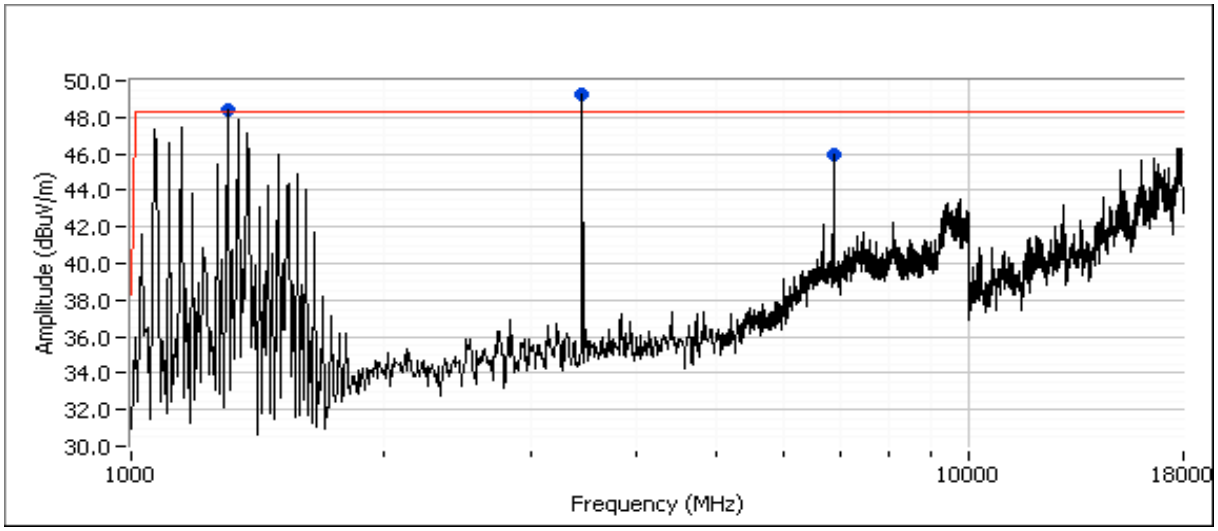
Run #3: Radiated Spurious Emissions, Receive Mode, 30-26000 MHz

Date of Test: 01/22/10 Test Location: Chamber #2

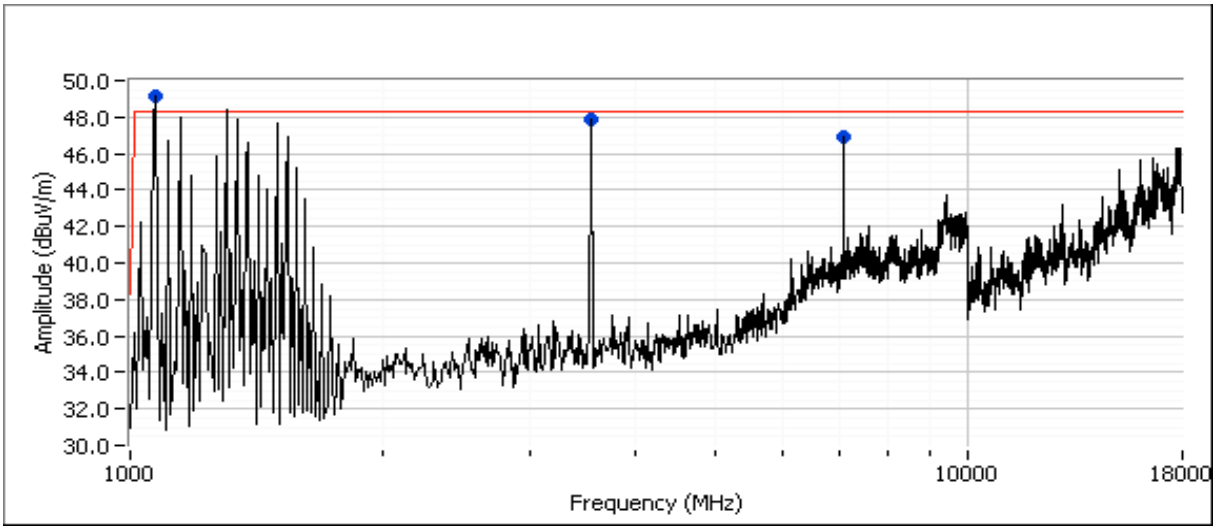
Test Engineer: Rafael Varelas

Measurements made at 3m

Graph - Channel: 36, 5180 MHz, Mode: 802.11a

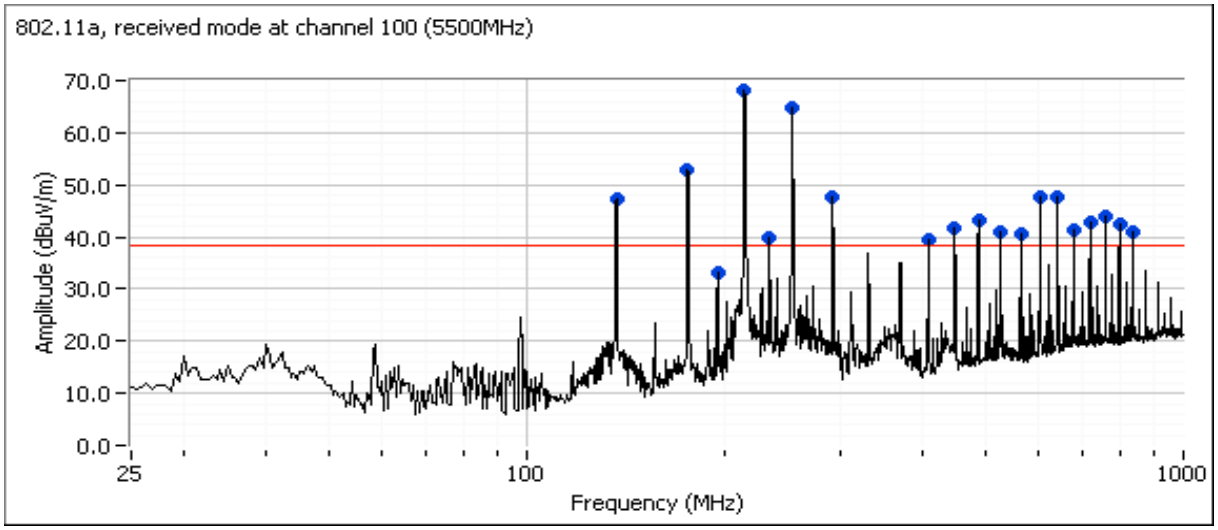


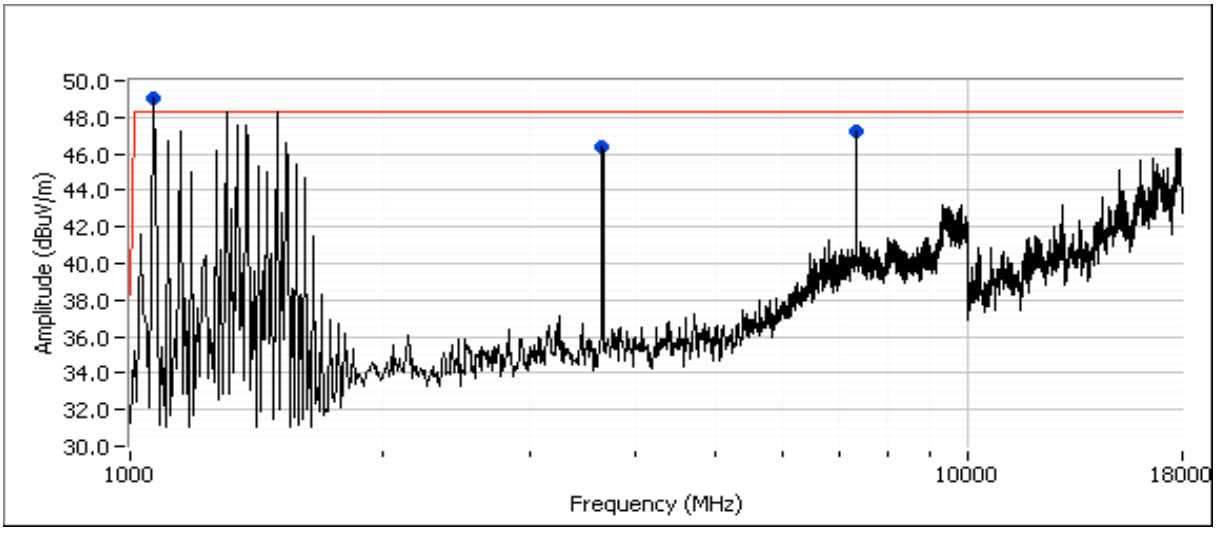
Graph - Channel: 64, 5320 MHz, Mode: 802.11a



Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

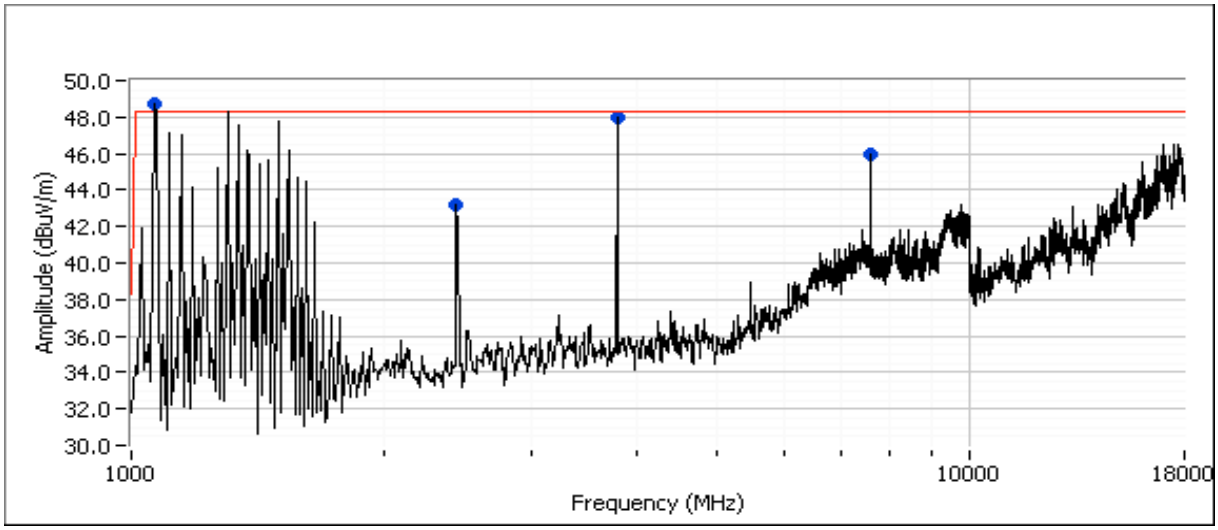
Graph - Channel: 100, 5500 MHz, Mode: 802.11a





Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Graph - Channel: 140, 5700MHz, Mode: 802.11a



Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Results Table - All channels

Frequency MHz	Level dBµV/m	Pol v/h	EN 301 893 Note 1 Limit	Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Channel Frequency
1306.450	48.4	V	48.3	0.1	Peak	228	1.7		36
3453.480	49.3	V	48.3	1.0	Peak	247	1.7		36
6906.700	46.0	V	48.3	-2.3	Peak	213	1.7		36
1072.580	49.2	H	48.3	0.9	Peak	324	1.7		64
3546.730	47.9	V	48.3	-0.4	Peak	262	1.7		64
7093.370	46.9	V	48.3	-1.4	Peak	217	1.7		64
1052.960	49.0	H	48.3	0.7	Peak	324	1.7		100
3666.870	46.4	V	48.3	-1.9	Peak	85	1.7		100
7333.420	47.2	H	48.3	-1.1	Peak	356	1.7		100
1040.040	48.7	H	48.3	0.4	Peak	333	1.7		140
2429.880	43.2	H	48.3	-5.1	Peak	253	1.7		140
3800.100	48.0	V	48.3	-0.3	Peak	265	1.7		140
7600.120	46.0	H	48.3	-2.3	Peak	186	1.7		140
214.491	68.1	H	38.3	29.8	Peak	241	1.7	Digital debvice emission	100
253.473	64.8	H	38.3	26.5	Peak	241	1.7	Digital debvice emission	100
175.487	52.7	H	38.3	14.4	Peak	271	1.7	Digital debvice emission	100
604.465	47.6	H	38.3	9.3	Peak	103	1.7	Digital debvice emission	100
292.481	47.5	H	38.3	9.2	Peak	301	1.7	Digital debvice emission	100
643.431	47.5	H	38.3	9.2	Peak	103	1.7	Digital debvice emission	100
136.493	47.2	H	38.3	8.9	Peak	241	1.7	Digital debvice emission	100
760.418	43.9	H	38.3	5.6	Peak	74	1.7	Digital debvice emission	100
487.480	43.3	H	38.3	5.0	Peak	307	1.7	Digital debvice emission	100
721.423	43.0	H	38.3	4.7	Peak	74	1.7	Digital debvice emission	100
799.422	42.4	H	38.3	4.1	Peak	114	1.7	Digital debvice emission	100
448.489	41.8	H	38.3	3.5	Peak	92	1.7	Digital debvice emission	100
682.426	41.5	H	38.3	3.2	Peak	103	1.7	Digital debvice emission	100
526.438	41.1	H	38.3	2.8	Peak	64	1.7	Digital debvice emission	100
838.369	40.8	H	38.3	2.5	Peak	28	1.7	Digital debvice emission	100
565.425	40.4	H	38.3	2.1	Peak	282	1.7	Digital debvice emission	100
233.988	39.9	H	38.3	1.6	Peak	211	1.7	Digital debvice emission	100
409.485	39.5	H	38.3	1.2	Peak	103	1.7	Digital debvice emission	100
194.997	33.1	H	38.3	-5.2	Peak	241	1.7	Digital debvice emission	100

Note 1:	The field strength limit in the tables above was calculated from the erp/eirp limit detailed in the standard using the free space propagation equation: $E=\sqrt{(30PG)}/d$. This limit is conservative - it does not consider the presence of the ground plane and, for erp limits, the dipole gain (2.2dBi) has not been included. The erp or eirp for all signals with less than 10dB of margin relative to this field strength limit is determined using substitution measurements.

Client:	Summit Data Communications	Job Number:	J77268
Model:	802.11abg Module	T-Log Number:	T78058
		Account Manager:	Christine Krebill
Contact:	Jerry Pohmurski		
Standard:	EN 300 328 v1.7.1/EN 301 893 v1.5.1	Class:	N/A

Run #4: Radiated Spurious Emissions, Receive Mode: Final Field Strength and Substitution Measurements

Date of Test: 01/28/10 Test Location: SV OATS #2

Test Engineer: Mehran Birgani

Measurements made at 3m

Frequency	Level	Pol	EN 301 893 Note 1		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		Frequency
6906.710	46.6	V	48.3	-1.7	PK	105	1.4		36
3546.680	46.2	V	48.3	-2.1	PK	3	1.3		64
3453.480	45.4	V	48.3	-2.9	PK	3	1.0		36
7093.340	45.2	V	48.3	-3.1	PK	354	1.4		64
7333.340	44.8	H	48.3	-3.5	PK	121	1.0		100
3800.010	43.5	V	48.3	-4.8	PK	220	1.4		140
3666.660	43.4	V	48.3	-4.9	PK	220	1.0		100
7600.010	43.4	H	48.3	-4.9	PK	26	1.0		140
1306.630	40.0	V	48.3	-8.3	PK	360	1.0		36
1039.970	35.3	H	48.3	-13.0	PK	63	1.0		140
2429.150	30.6	H	48.3	-17.7	PK	88	1.0		140
1052.920	25.2	H	48.3	-23.1	PK	260	1.7		100

Horizontal

Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
7333.340	-20.0	10.6	88.5	97.9	44.8	-53.1	-55.3		-47.0	-8.3
7600.010	-20.0	10.9	89.2	98.3	43.4	-54.9	-57.1		-47.0	-10.1

Vertical

Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
6906.710	-20.0	11.0	89.2	98.2	46.6	-51.6	-53.8		-47.0	-6.8
3546.680	-20.0	9.3	87.0	97.7	46.2	-51.5	-53.7		-47.0	-6.7
3453.480	-20.0	9.3	87.2	97.9	45.4	-52.5	-54.7		-47.0	-7.7
7093.340	-20.0	10.9	89.4	98.5	45.2	-53.3	-55.5		-47.0	-8.5
3800.010	-20.0	9.3	86.9	97.6	43.5	-54.1	-56.3		-47.0	-9.3
3666.660	-20.0	9.3	88.0	98.7	43.4	-55.3	-57.5		-47.0	-10.5
1306.630	-20.0	7.0	85.0	98.0	40.0	-58.0	-60.2		-47.0	-13.2

Note 1:	Pin is the input power (dBm) to the substitution antenna
Note 2:	Gain is the gain (dBi) for the substitution antenna. A dipole has a nominal gain of 2.2dBi, however the dipole balun loss may reduce the gain of the substitution dipole used.
Note 3:	FS is the field strength (dBuV/m) measured from the substitution antenna, maximized for receive antenna height and transmit antenna azimuth.
Note 4:	Site Factor - this is the site factor to convert from a field strength in dBuV/m to an eirp in dBm.
Note 5:	EUT field strength as measured during initial run.

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: ___ MHz

Channel Bandwidth 3: ___ MHz

NOTE: Add more lines if the equipment has more channel Bandwidths.

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_{low}): ……. dBm

Highest setting (P_{high}): ……. dBm

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 Plow (dBm)	EIRP for Phigh (dBm)

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

DFS Threshold level[3]: dBm ☐ at the antenna connector

☐ in front of the antenna

3 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.

TPC range 2:

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 Output Power or ☐ EIRP

Lowest setting (P_{low}): ……. dBm

Highest setting (P_{high}): ……. dBm

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 Plow (dBm)	EIRP for Phigh (dBm)

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

DFS Threshold level[4]: dBm ☐ at the antenna connector

☐ in front of the antenna

4 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.

g) If the equipment has **no TPC feature**, the maximum transmitter output power level (or maximum EIRP level in case of integrated antenna equipment), the intended antenna assemblies, the corresponding operating frequency range and the corresponding DFS threshold level. If the equipment has multiple power levels and corresponding antenna assemblies, than this information should be provided for each of the stated power levels.

NOTE 2: Add more sections similar to the ones below if the equipment has more power levels.

Power Level 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

Power level 16.9/22.1 dBm ☐ TX Output Power or ☒ EIRP

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

Intended Antenna Assemblies[5]:

Antenna Assembly name	Antenna Gain (dBi)	EIRP (dBm)
Huber&Suhner, SOA 2459/360/5/0/V_C	6.5	22.1 dBm
Larson, R380.500.314	5.0	
Cisco, Air-Ant 5135	3.5	

DFS Threshold level[6]: dBm ☐ at the antenna connector

☐ in front of the antenna

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

6 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.

Power Level 2

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

Power level …….. dBm ☐ TX Output Power or ☐ EIRP

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

Intended Antenna Assemblies[7]:

Antenna Assembly name	Antenna Gain (dBi)	EIRP (dBm)

DFS Threshold level[8]: dBm ☐ at the antenna connector

☐ in front of the antenna

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

8 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: .....-10°C to +55°C.....

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……..

☐ 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)

.....

.....

.....

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: …G1D…….

☐ 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.

If not, the equipment submitted are pre-production models ?

If pre-production equipment is submitted, the final production equipment will be identical in all respects with the equipment tested.

If not, supply full details: .....

.....

☐ 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:

.....

List Of Technical Requirements To Be Tested

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

Transmitter parameters	
EN Clause	**Transmitter parameters**
4.2	Carrier Frequencies
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
4.4.2	Transmitter unwanted emissions within the 5 GHz RLAN bands
4.6	Dynamic Frequency Selection (DFS)
4.6.2.1	Channel Availability Check
4.6.2.2	In-Service Monitoring
4.6.2.3	Channel Shutdown
4.6.2.4	Non-Occupancy Period
4.6.2.5	Uniform Spreading

Receiver parameters	
EN Clause	**Receiver parameters**
4.5	Receiver spurious emissions

Appendix D Photographs