Radio Intentional EMC Test Report: EDCS - 965717

For

CP-7926G-W-K9 2.4GHz Radio

Against the following Specifications :

47 CFR 15.247

RSS-210

RSS-102

Cisco Systems

EMC Laboratory

170 West Tasman Drive

San Jose, CA 95134

Author: Phillip Carranco
Approved By: Tim Lawler
Title: Telecom Compliance Engineer

This report replaces any previously entered test report under EDCS - 965717

This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

APPENDIX D: TEST PROCEDURES 78

Section 1: Overview

Test Summary

The samples were assessed against the tests detailed in section 3 under the requirements of the following standards:

Emissions:
CFR47 Part 15.247
RSS-210
RSS102

Notes:

1) Measurements were made in accordance with FCC docket #:DA 02-2138, ET docket 96-8, KDB Publication No. 558074& measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.

Section 2: Assessment Information

2.1 General

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal Government.

With regard to this assessment, the following points should be noted:

a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results, due to production tolerances and measurement uncertainties.

b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.

c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).

d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

e) All AC testing was performed at one or more of the following supply voltages:
110V (+/-10%) 60Hz
220V (+/-10%) 50 or 60Hz

f) Cisco Systems, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). The scope of accreditation, certificate number 1178-01 is referenced in appendix C, along with further details.

2.2 Start Date of Testing

15-Mar-2011

2.3 Report Issue Date

Cisco Systems, Inc. uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,
170 West Tasman Drive
San Jose, CA 95134,
USA

Registration Numbers for Industry Canada

Cisco System Site	Site Identifier
Building P, 10m Chamber	Company #: 4624-2
Building P, 5m Chamber	Company #: 4624-1
Building N, 5m Chamber	Company #: 6111
Building I, 5m Chamber	Company #: 6112

Test Engineers

Phillip Carranco

2.5 Equipment Assessed (EUT)

CP-7926G-W-K9

2.6 EUT Description

The CP-7926G-W-K9 is the next generation Wireless IP Phone with IR Scanner that will be more rugged and more resistant to dust, alcohol-based wipes, and liquid splashes, repeated drops and shocks therefore targeting the following markets: Retail, Warehouse, Distribution Centers, Manufacturing, Healthcare. It will also support Bluetooth as an optional interface for wireless headset.

The CP-7926G- will comprise of the MuRata LBEE1W9GVC module with support for TNET1253 for wlan and BRF6300 for Bluetooth support. The MuRata module will interface to the TNETV1700 host processor via SDIO interface, and it has 2 antenna interfaces, one for 2.4 GHz for both Bluetooth and 802.11b/g support, and an additional antenna for 5 GHz for 802.11a support.

2.7 Scope of Assessment

Tests have been performed in accordance with the relevant Test and Assessment Plan (TAP), a copy of which is contained in Appendix F of this report, and the relevant Cisco Systems, Inc. radio test procedures (EDCS-420238). This test report may not cover all of the tests highlighted in the test plan.

2.8 Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

Emission level [dBuV] = Indicated voltage level [dBuV] + Cable Loss [dB] + Other correction factors [dB]

The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss..

Note: to convert the results from dBuV/m to uV/m use the following formula:-

Level in uV/m = Common Antilogarithm [(X dBuV/m)/20] = Y uV/m

2.9 Report Template Control No.

EDCS#: 703456

Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Test Details / Comments	Result
Power Spectral Density	15.247: For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. *(RSS-210 A8.2)*	Pass
Peak Output Power	15.247: The maximum conducted output power of the intentional radiator for systems using digital modulation in the 2400-2483.5MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (*RSS-210 A8.4)*	Pass
6dB Bandwidth	15.247: Systems using digital modulation techniques may operate in the 5725-5850MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz. *(RSS-210 A8.2)*	Pass
Conducted Spurious Emissions	15.247: In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.(*RSS-210 A8.5)*	Pass

Radiated emissions

Basic Standard	Test Details / Comments	Result
Radiated Spurious and Harmonic Emissions	Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). (*RSS-210 Sec2.7)*	Pass
Restricted Bandedge Measurements	Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). (*RSS-210 Sec2.7)*	Pass

* SAR measurements to reported in separate report

Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. During preliminary testing all three planes (X, Y & Z) were evaluated to determine “Worst Case”. The data collected determine that the orientation used for this report was demined “Worst Case”.

4.1 Sample Details

Sample Number	Equipment Details	Serial Number	Part Number
S01	CP-7926G-W-K9	IAC1444E03U	74-7643-01

The following antennas were evaluated as part of this testing process. The antennas listed reflect the maximum gain allowed for each family type of antenna:

Fixed internal Antenna, Gain = 1.67dBi (no external antenna can be used.)

4.2 System Details

System #	Description	Samples
1	Radio Test Sample	S01

4.3 Mode of Operation Details

Mode#	Description	Comments
1	802.11B/G Test Mode	System is placed in a continuous Tx State at a Low, Middle, High Channel per Test Requirements. 802.11B running at 1Mbps while 802.11G running at 6Mbps

Section 5: Modifications

5.1 Sample Modifications Performed During Assessment

No modifications were performed during assessment.

Appendix A: Formal Test Results

6 dB Bandwidth

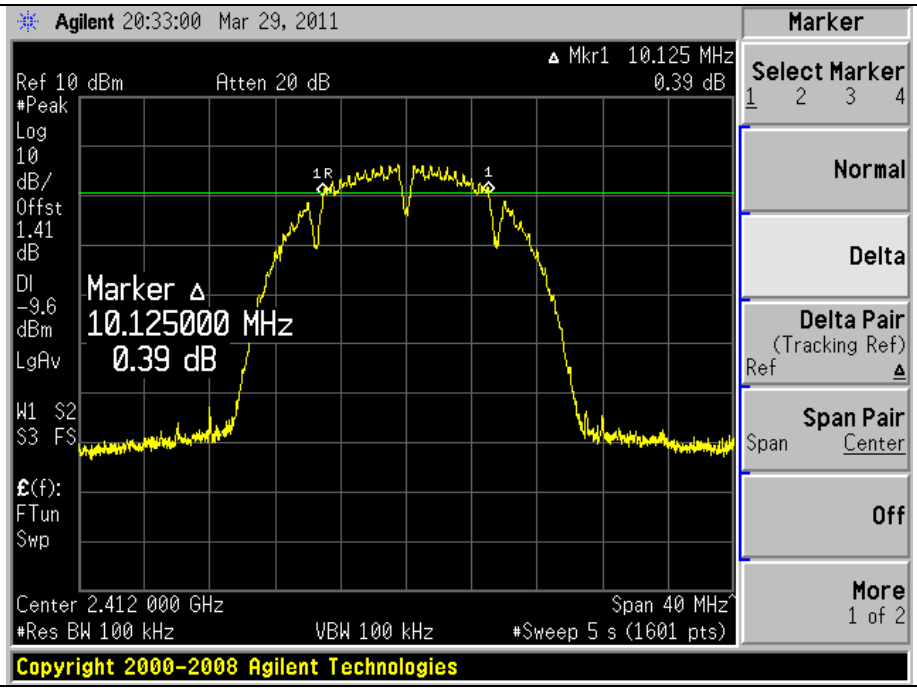
15.247 & RSS-210 A8.2:

Systems using digital modulation techniques may operate in the 2400-2483.5MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz

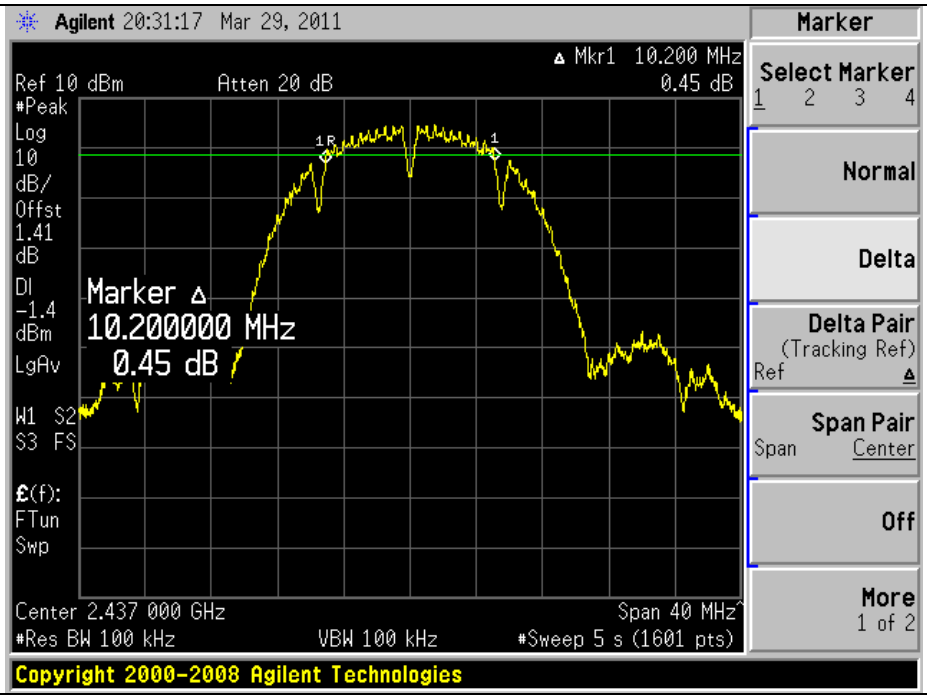
Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
2412	1	10125	500	-9625
2437	1	10200	500	-9700
2462	1	10125	500	-9625
2412	6	16350	500	-15850
2437	6	16350	500	-15850
2462	6	16200	500	-15700

Frequency (MHz)	Data Rate (Mbps)	99% Bandwidth (kHz)
2412	1	14338
2437	1	14399
2462	1	14296
2412	6	16440
2437	6	16602
2462	6	16435

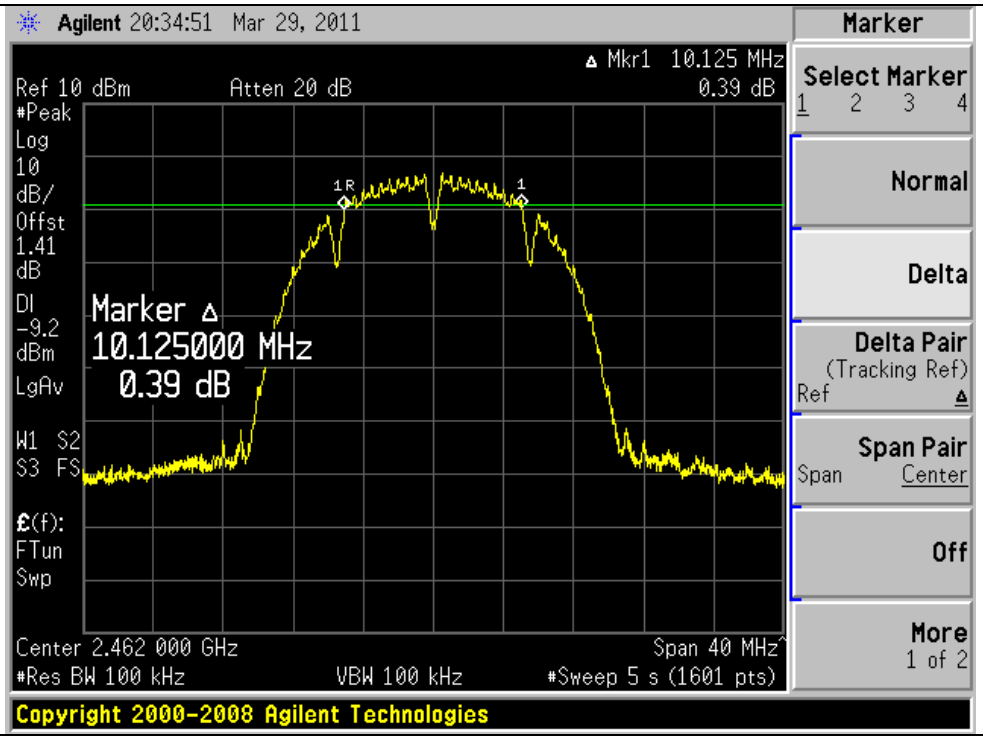
Graphical Test Results for 15.247 (6dB Bandwidth)



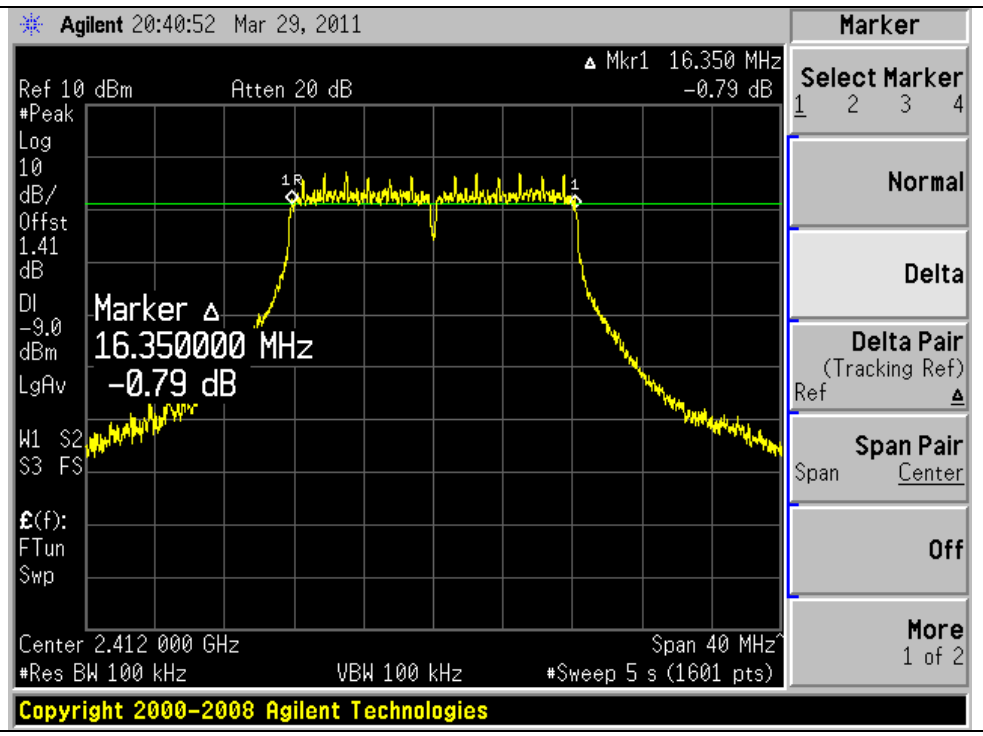
Title: 6dB Bandwidth 2412MHz at 1Mbps



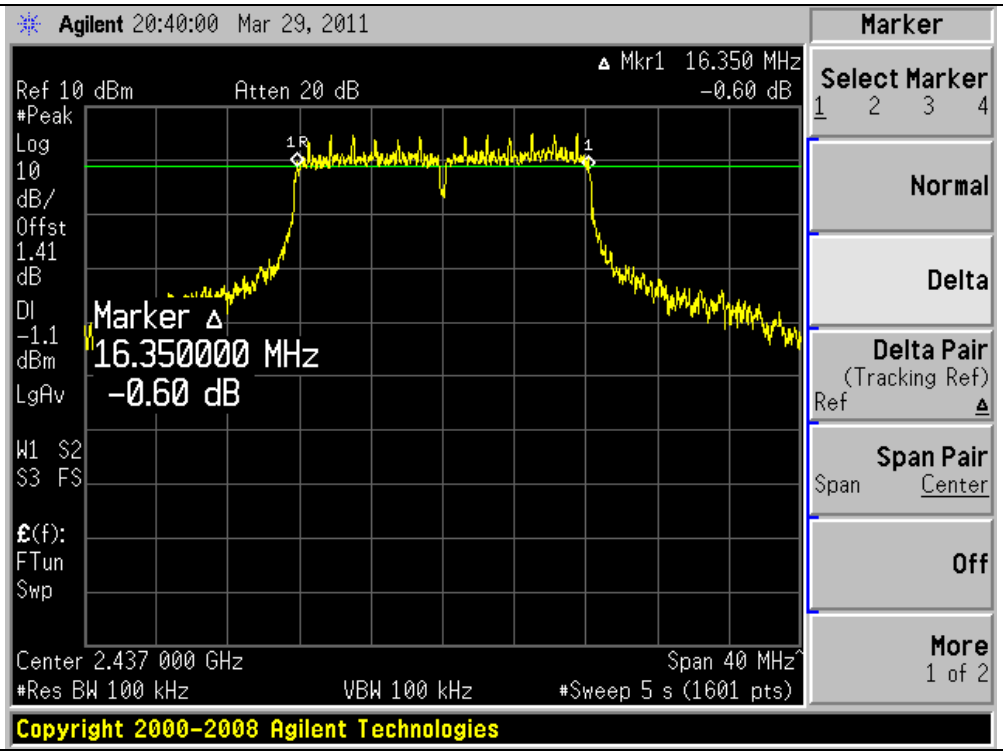
Title: 6dB Bandwidth 2437MHz at 1Mbps



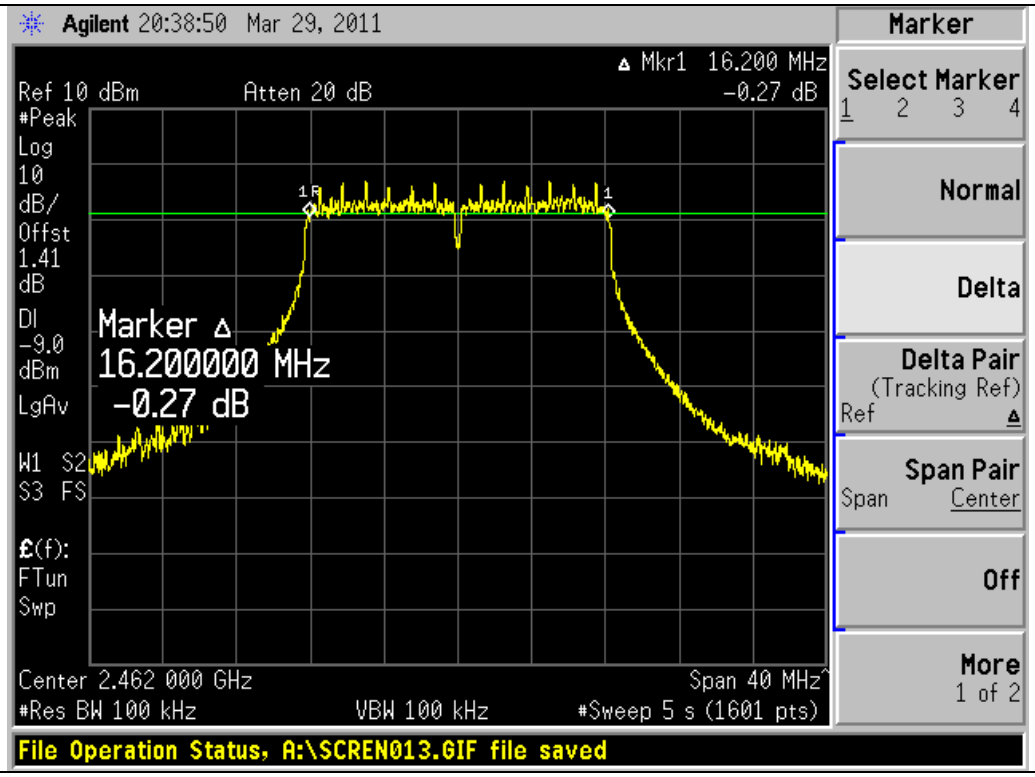
Title: 6dB Bandwidth 2462MHz at 1Mbps



Title: 6dB Bandwidth 2412MHz at 6Mbps (802.11G)

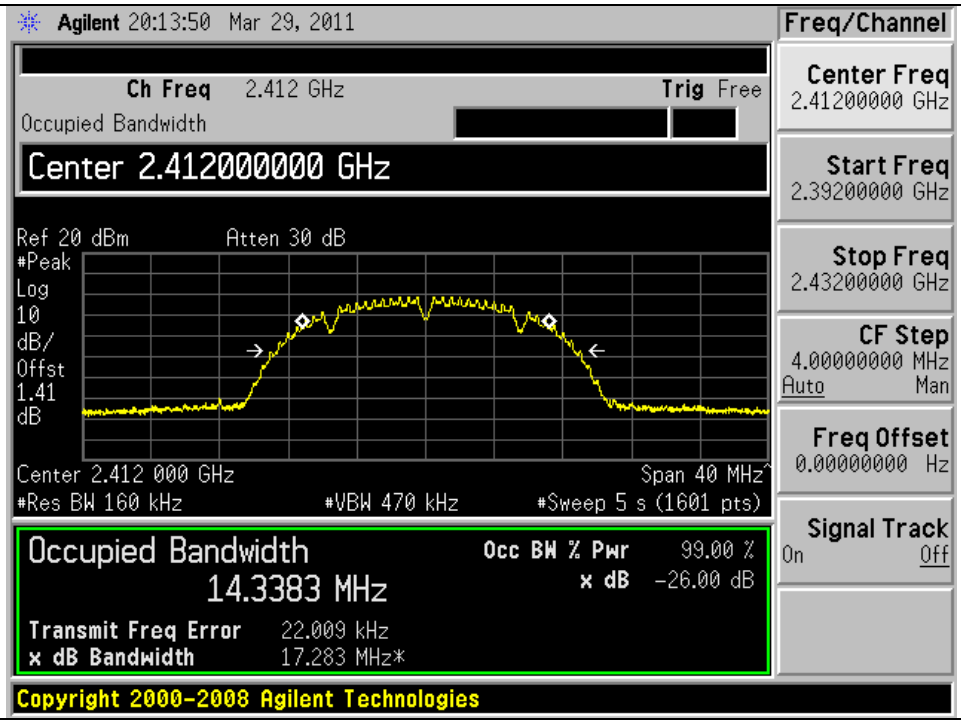


Title: 6dB Bandwidth 2437MHz at 6Mbps (802.11G)

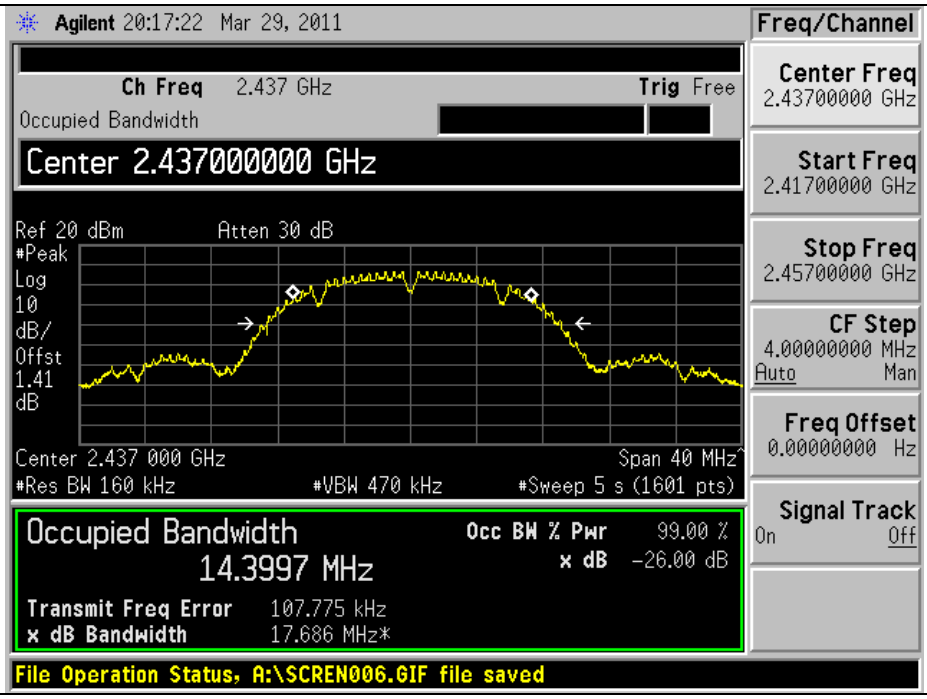


Title: 6dB Bandwidth 2462MHz at 6Mbps (802.11G)

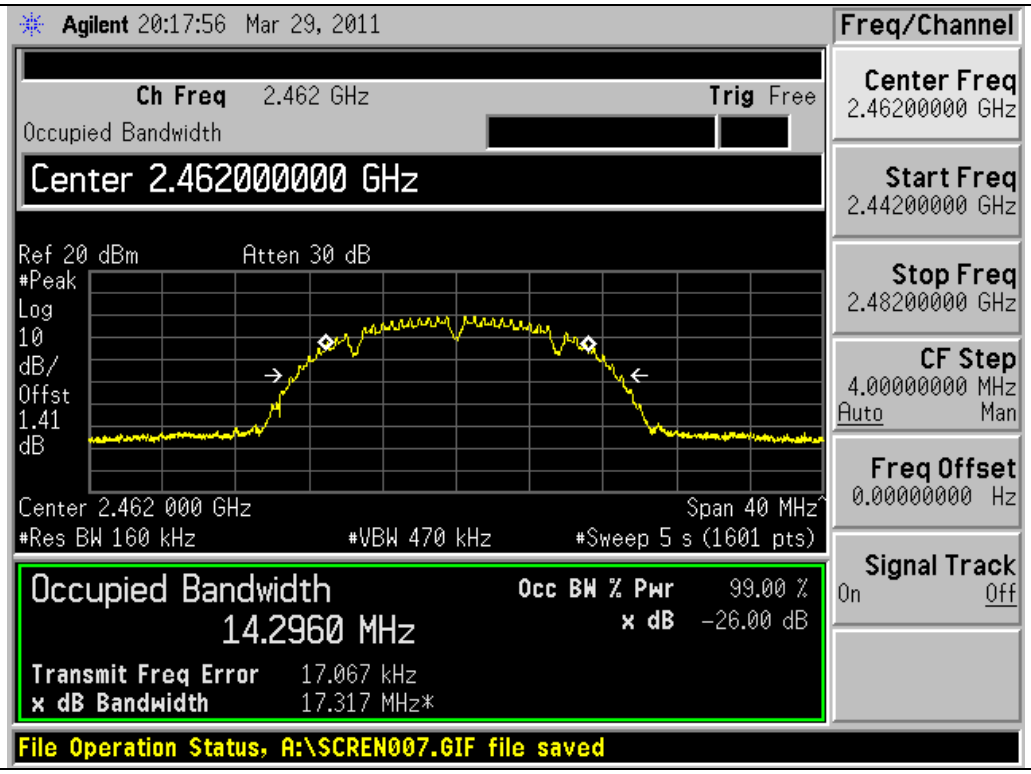
Graphical Test Results RSS210 (Occupied Bandwidth)



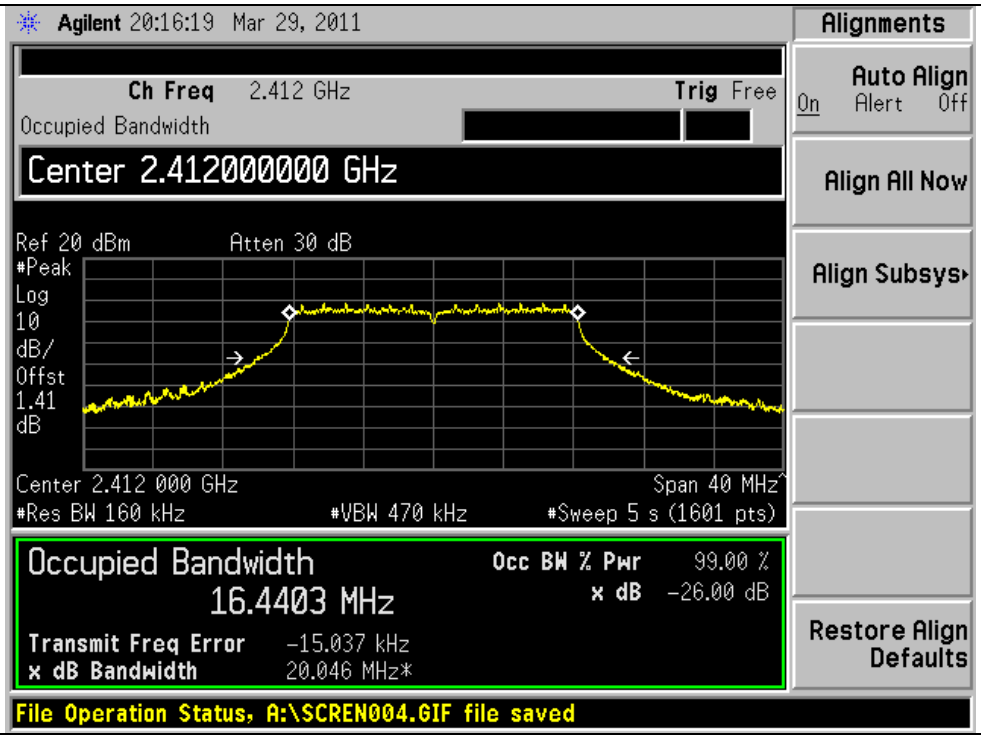
Title: 6dB Bandwidth 2412MHz at 1Mbps



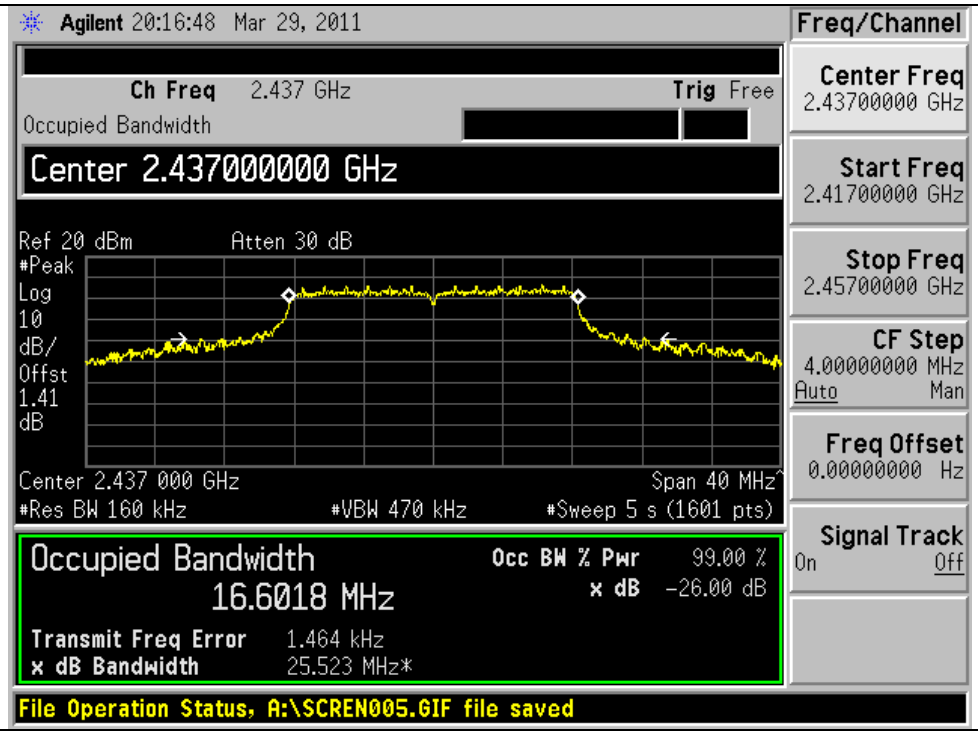
Title: 6dB Bandwidth 2437MHz at 1Mbps



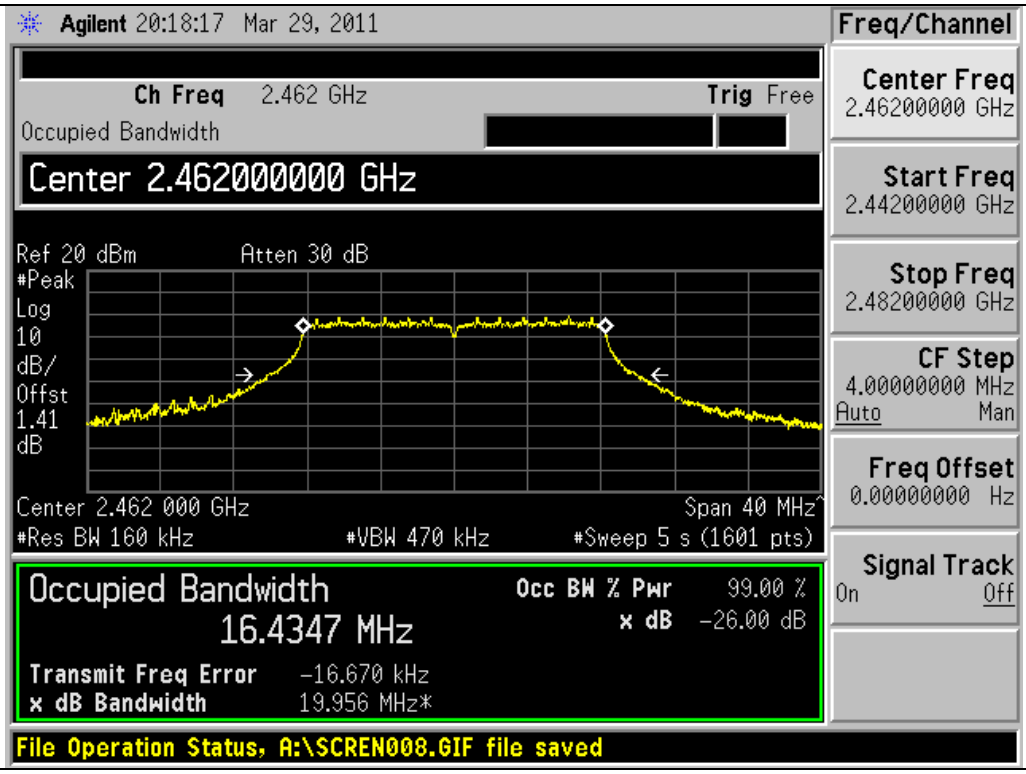
Title: 6dB Bandwidth 2462MHz at 1Mbps



Title: 6dB Bandwidth 2412MHz at 6Mbps



Title: 6dB Bandwidth 2437MHz at 6Mbps



Title: 6dB Bandwidth 2462MHz at 6Mbps

Peak Output Power

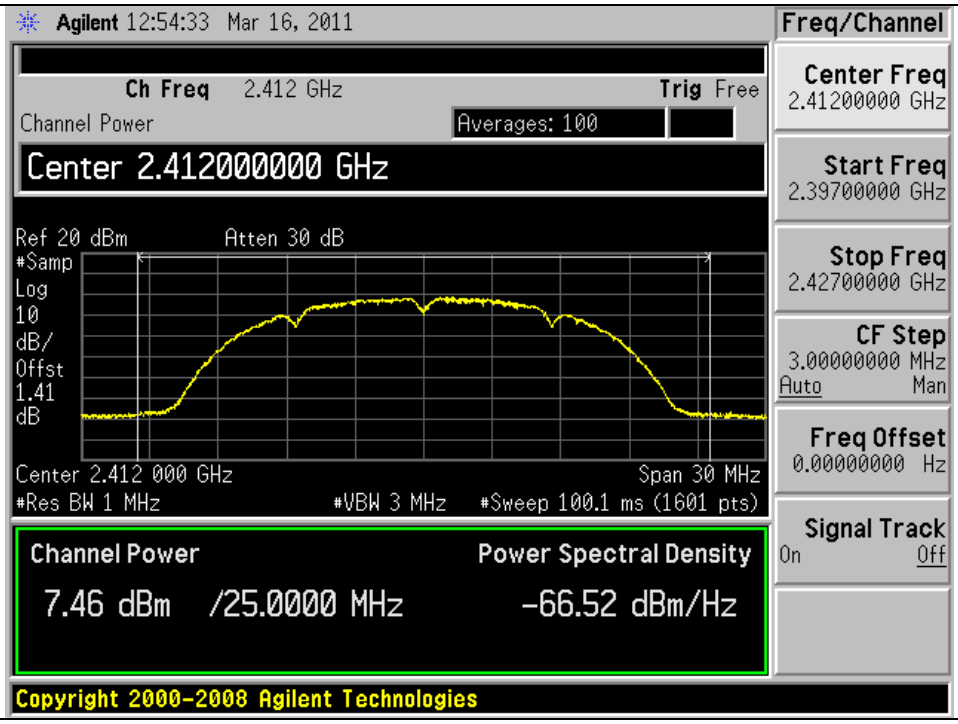
15.247 & RSS-210 A8.4:

The maximum conducted output power of the intentional radiator for systems using digital modulation in the 2400-2483.5MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

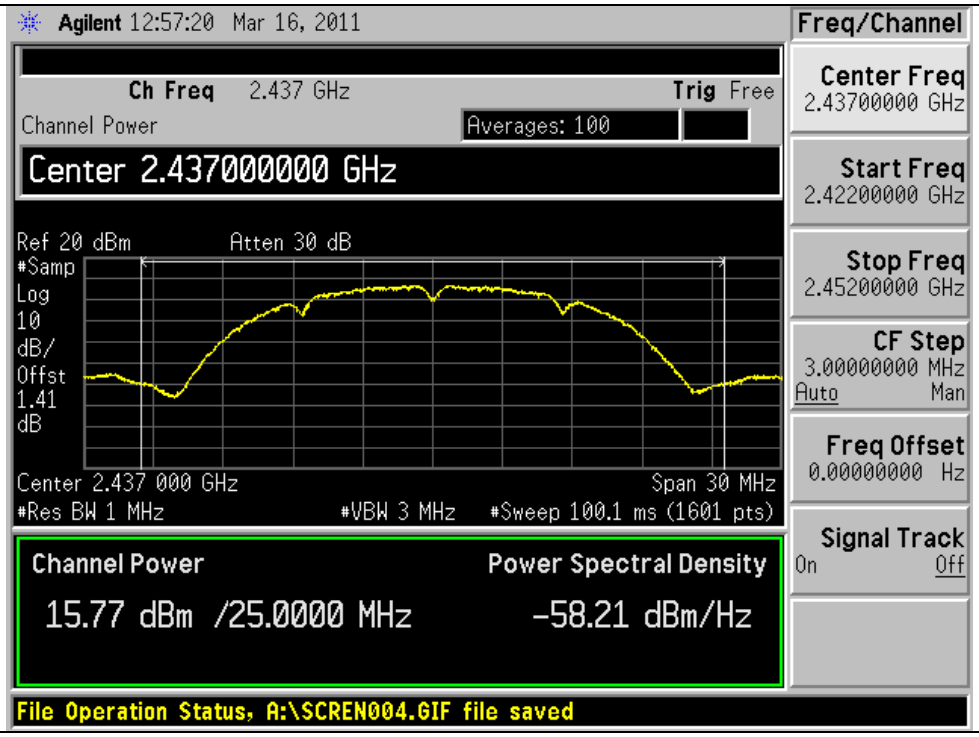
Frequency (MHz)	Data Rate (Mbps)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
2412	1	7.46	30	-22.54
2437	1	15.77	30	-14.23
2462	1	7.89	30	-22.11
2412	6	8.46	30	-21.54
2437	6	16.72	30	-13.28
2462	6	9.28	30	-20.72

b

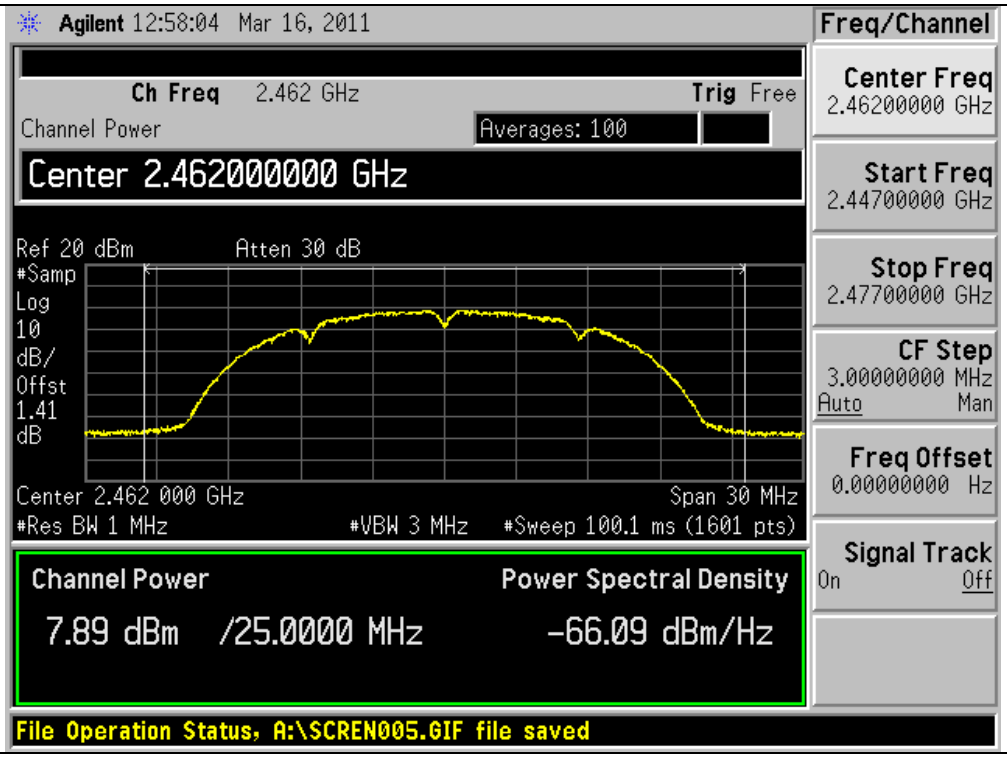
Measurement procedure as per KDB Publication No. 558074 power output option 1, peak power meter.



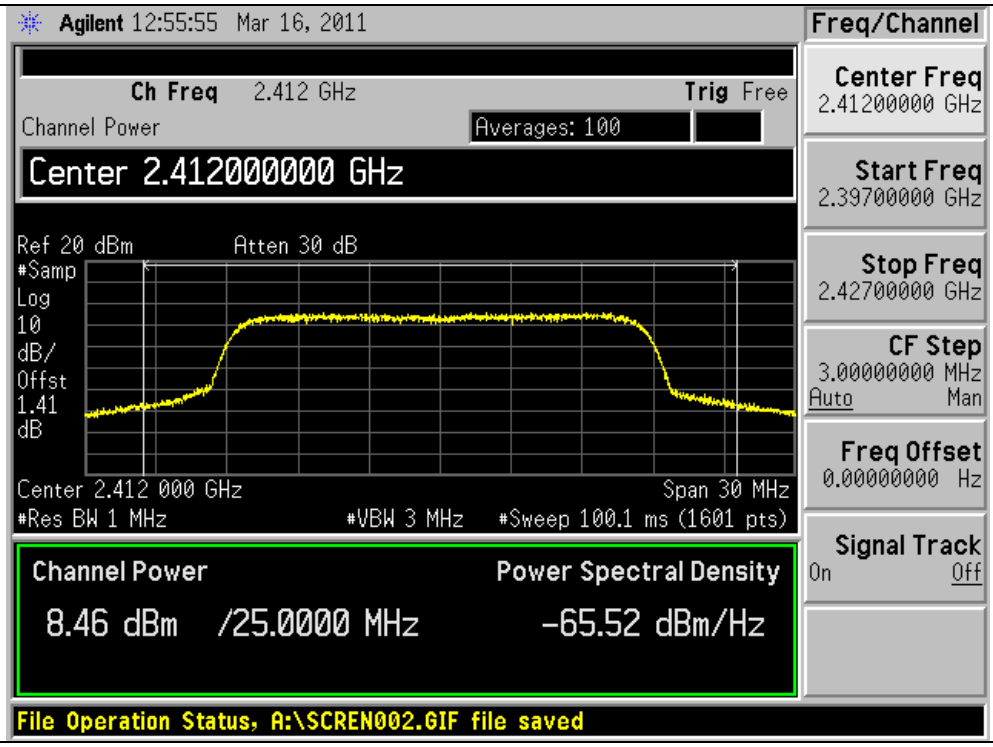
Title: **Peak Output Power, 2412 MHz at 1Mbps**



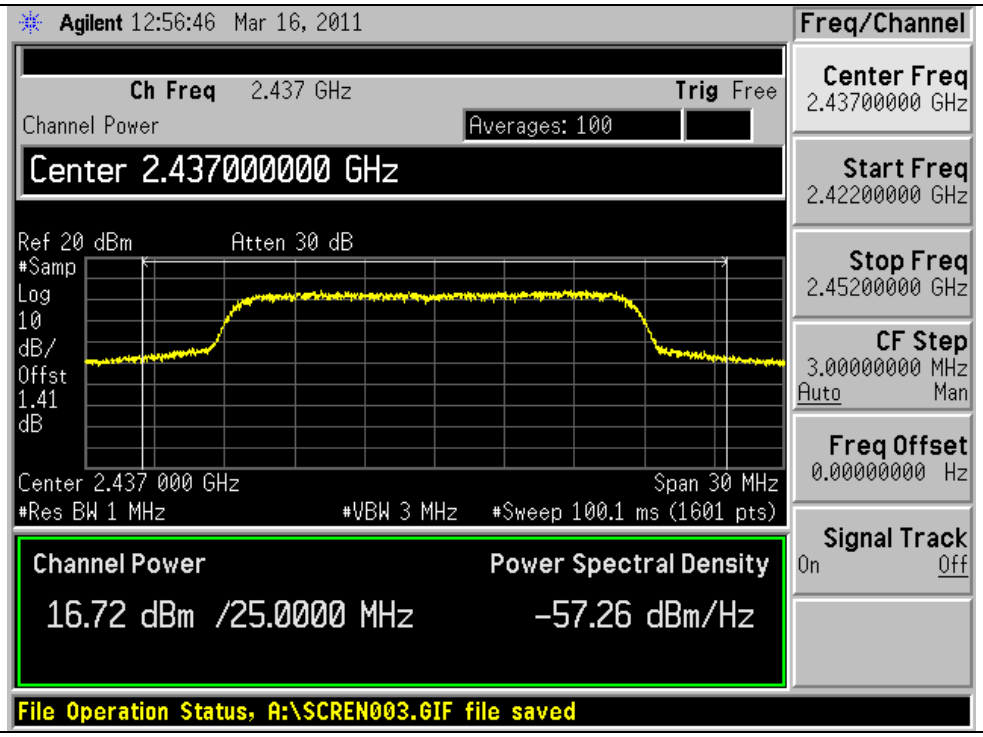
Title: **Peak Output Power, 2437 MHz at 1Mbps**



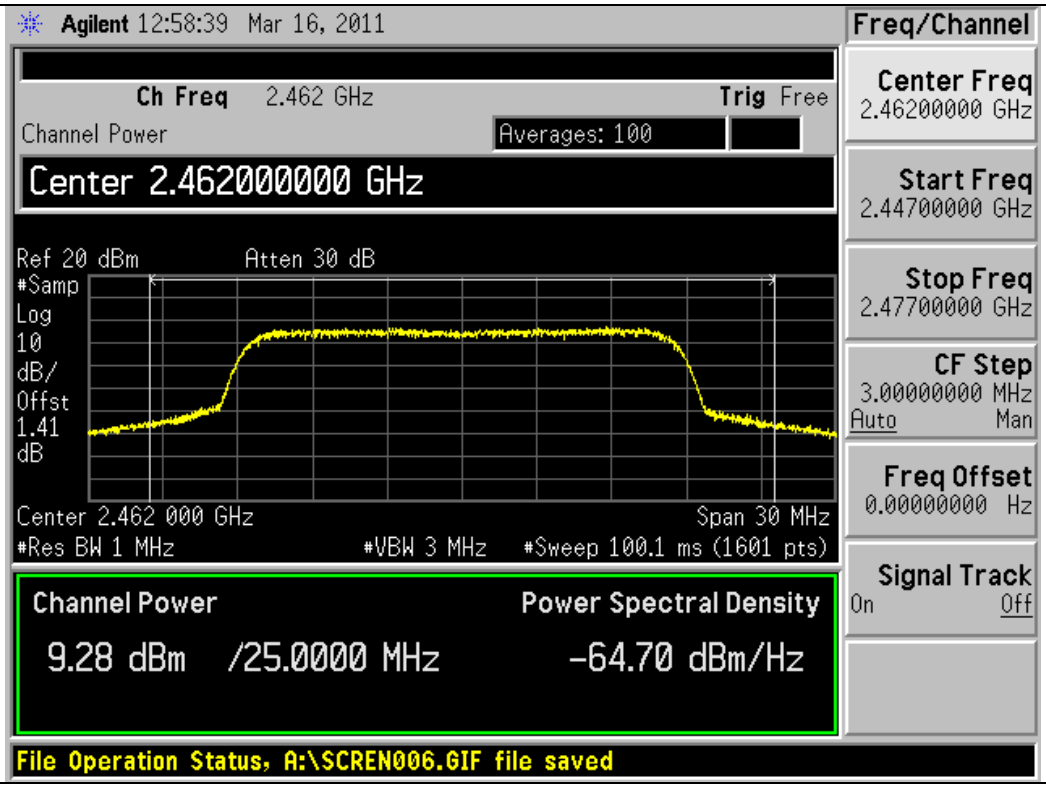
Title: **Peak Output Power, 2462 MHz at 1Mbps**



Title: **Peak Output Power, 2412 MHz at 6Mbps**



Title: **Peak Output Power, 2437 MHz at 6Mbps**



Title: **Peak Output Power, 2462 MHz at 6Mbps**

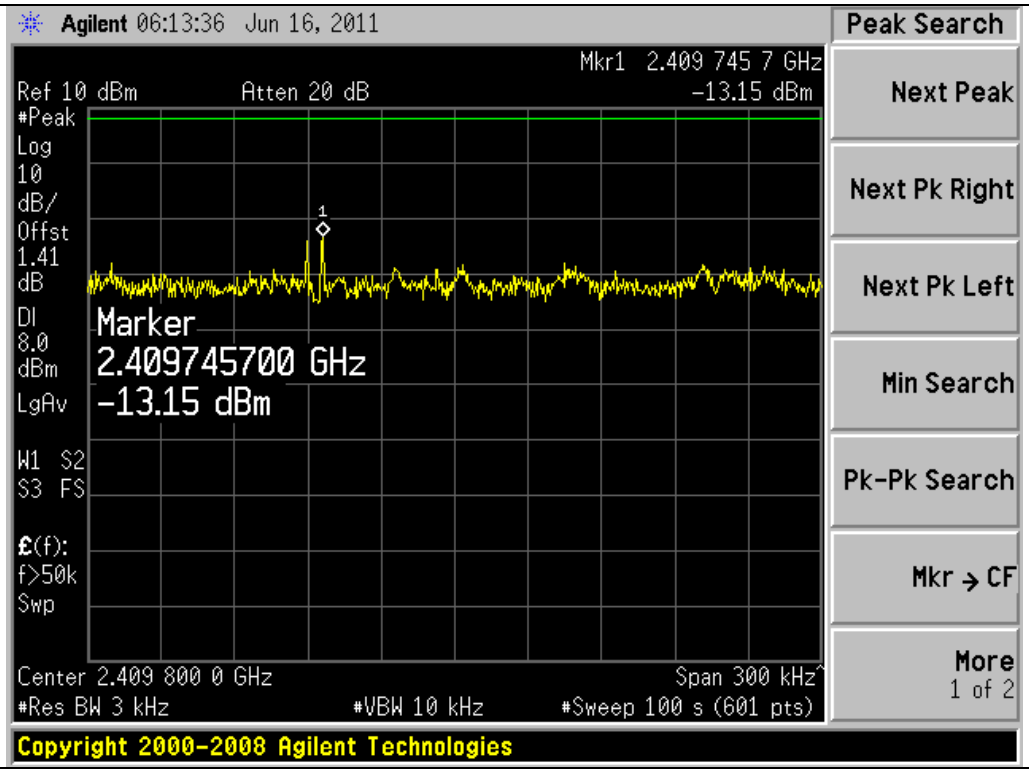
Power Spectral Density

15.247 & RSS-210 A8.2:

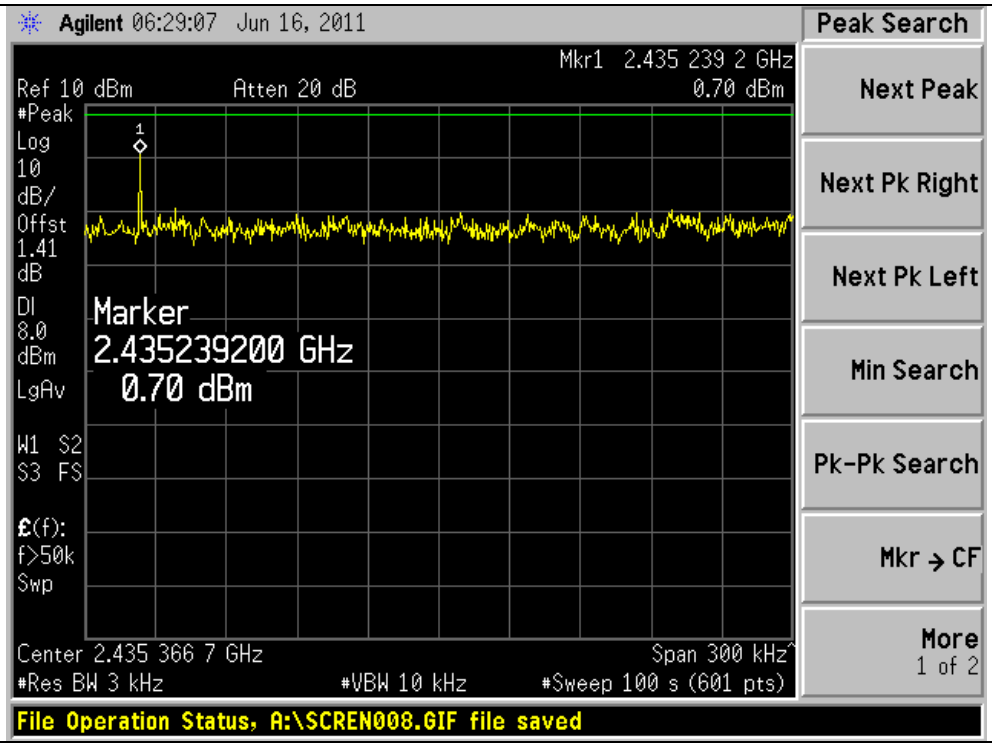
For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

Frequency (MHz)	Data Rate (Mbps)	Peak Power Spectral Density (dBm/3kHz)	Limit (dBm)	Margin (dB)
2412	1	-13.15	8	-21.15
2437	1	0.70	8	-7.30
2462	1	-6.01	8	-14.01
2412	6	-18.19	8	-26.19
2437	6	-10.04	8	-18.04
2462	6	-18.19	8	-26.19

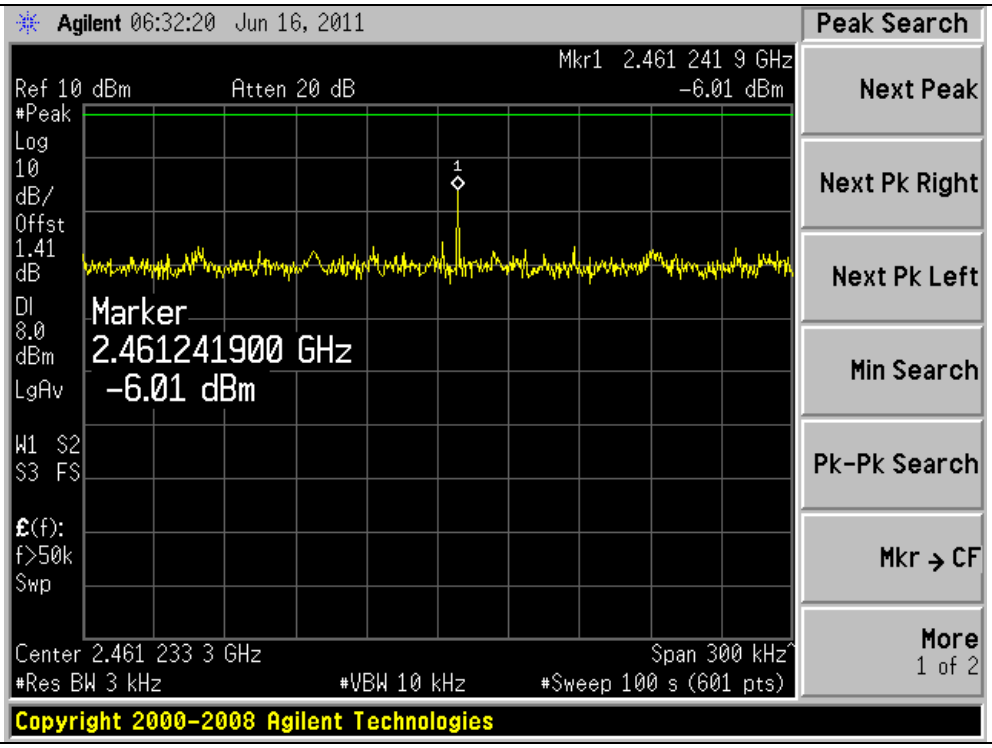
Graphical Test Results



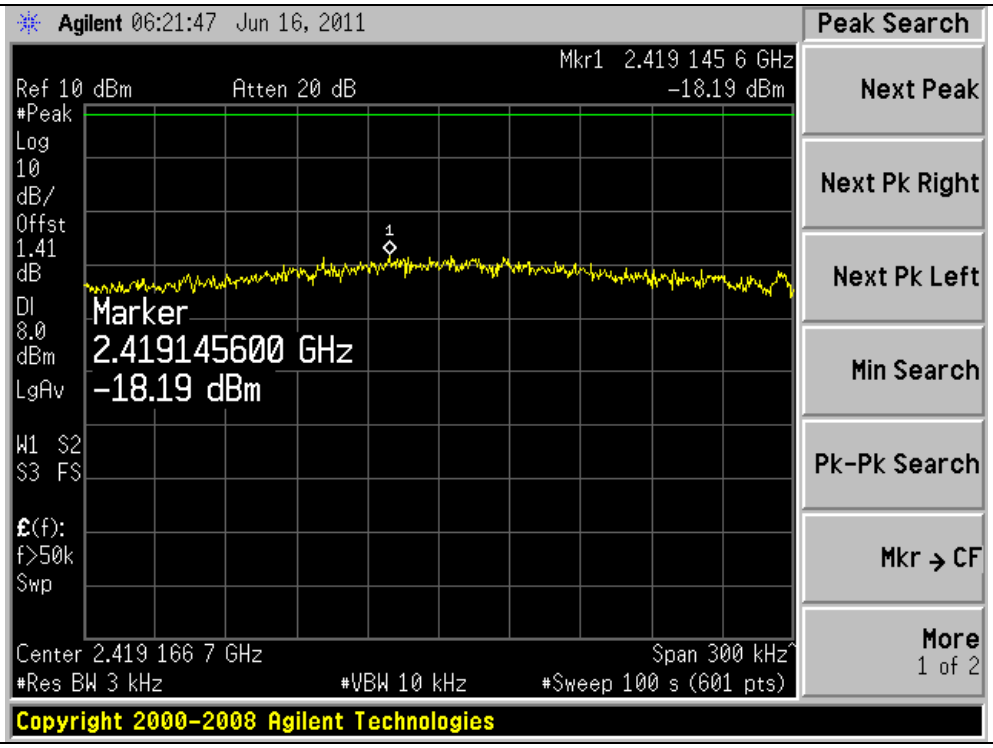
Title: **Power Spectral Density, 2412 MHz, 1 Mbps**



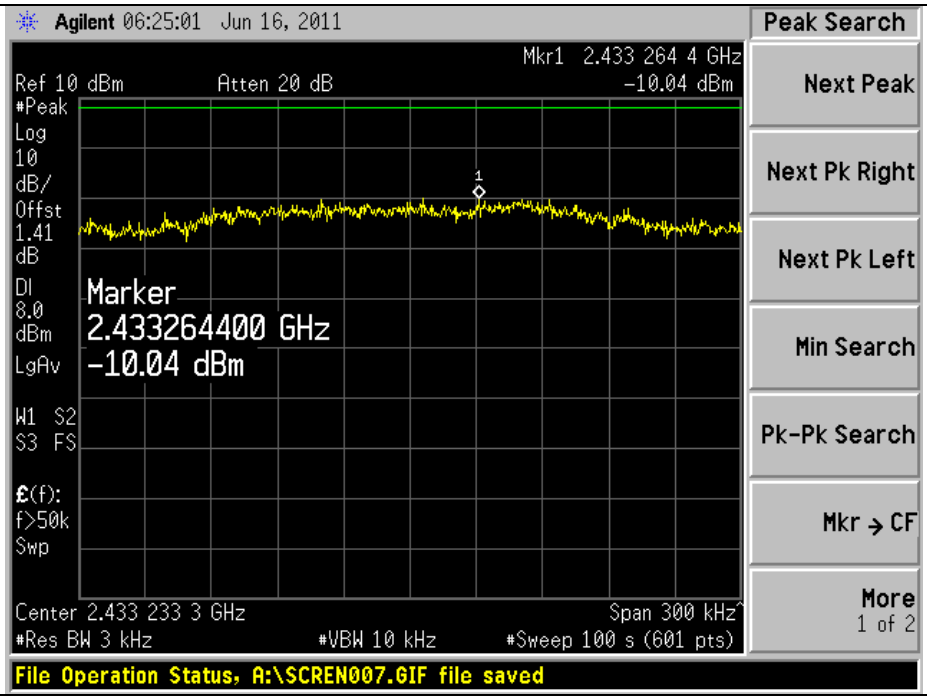
Title: **Power Spectral Density, 2437 MHz at 1Mbps**



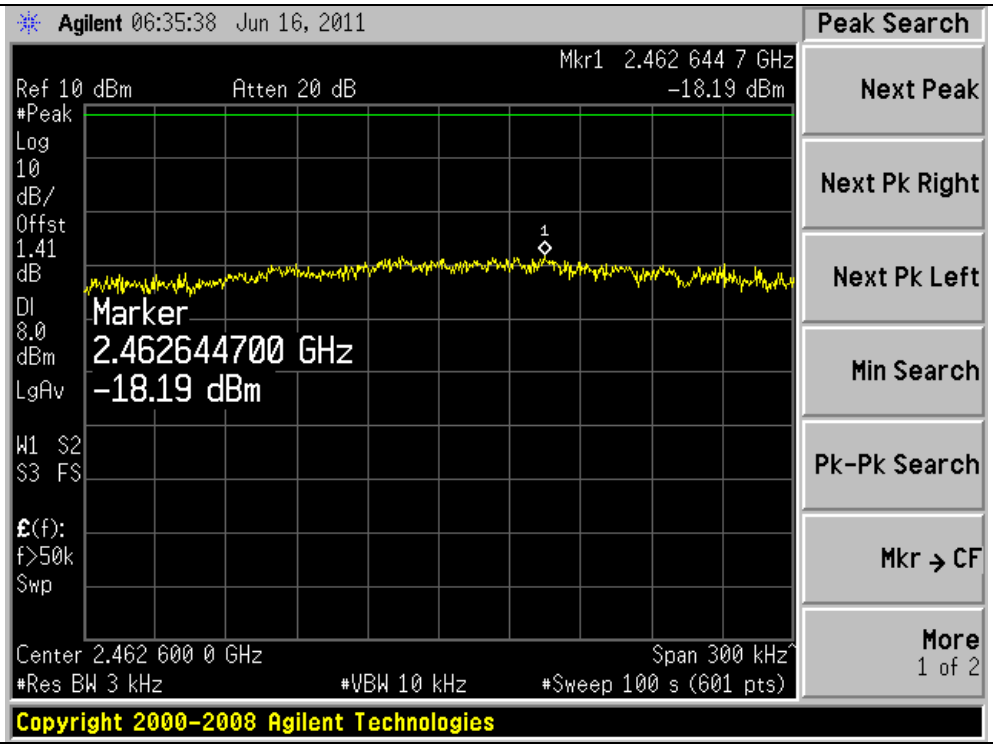
Title: **Power Spectral Density, 2462 MHz at 1Mbps**



Title: **Power Spectral Density, 2412 MHz at 6Mbps**



Title: **Power Spectral Density, 2437 MHz at 6Mbps**



Title: **Power Spectral Density, 2462 MHz at 6Mbps**

Conducted Spurious emissions

15.247 & RSS-210 A8.5:

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Results

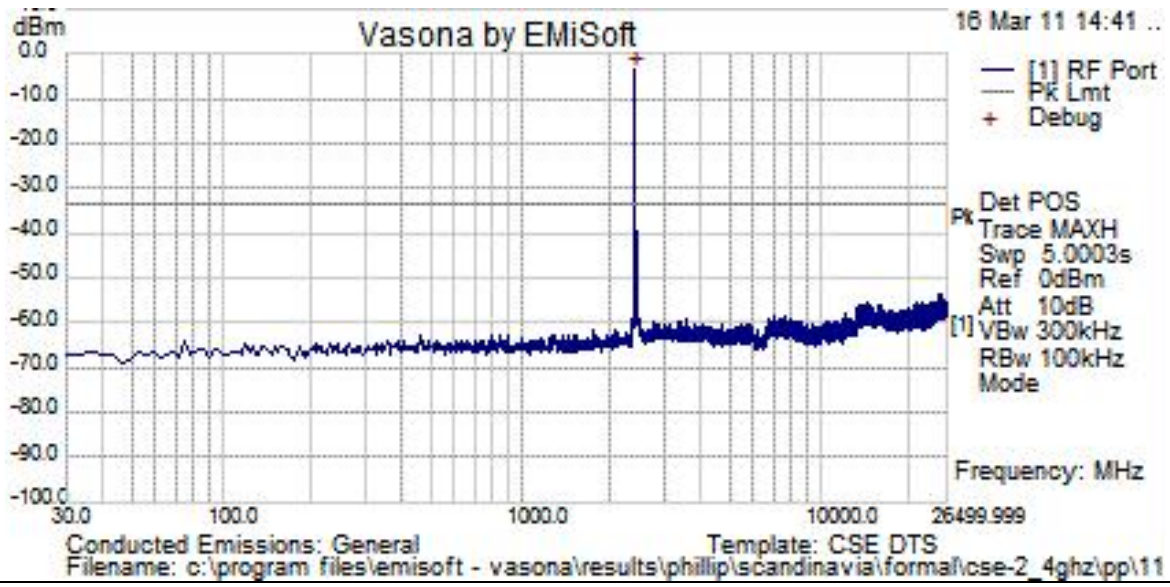
Test Number: 58308 **Spec ID:** 652				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
Conducted Spurious Emissions	RF Ports	N/A	30MHz - xGHz	Also complies with RSS 210, LP0002, HKTA1039
Operating Mode	**Mode :** 1, Radio Test Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

Subtest Number: 58308 - 1	**Subtest Date:** 16-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building B, Radio Area
Subtest Results	
Line Under Test	[A] Antenna Port
Transducer	Direct
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	30.0
Comments on the above Test Results	No further comments
Environmental Conditions:	
Temperature: within range of 54 to 95 F:	Yes
Humidity: between 10 and 75%:	Yes

Equipment used:

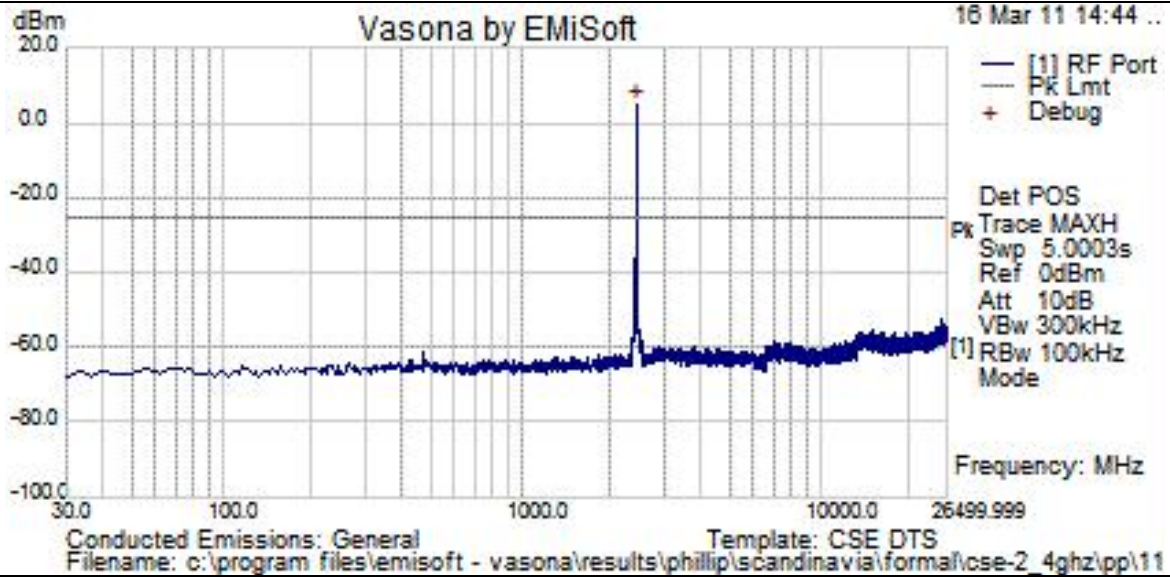
Equipment No	Manufacturer	Model	Description
CIS005972	HP	83712B	Synthesized CW Generator
CIS035095	Micro-Coax	UFA147A-0-0180-110200	RF Coaxial Cable, to 40 GHz, 18 in
CIS034974	Midwest Microwave	ATT-0640-20-29M-02	Attenuator, 20dB, DC-40GHz
CIS040514	Agilent	E4440A	Precision Spectrum Analyzer
CIS041986	Murata Electronics	MXGS83RK3000	Special Radio Test Adaptor Cable

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



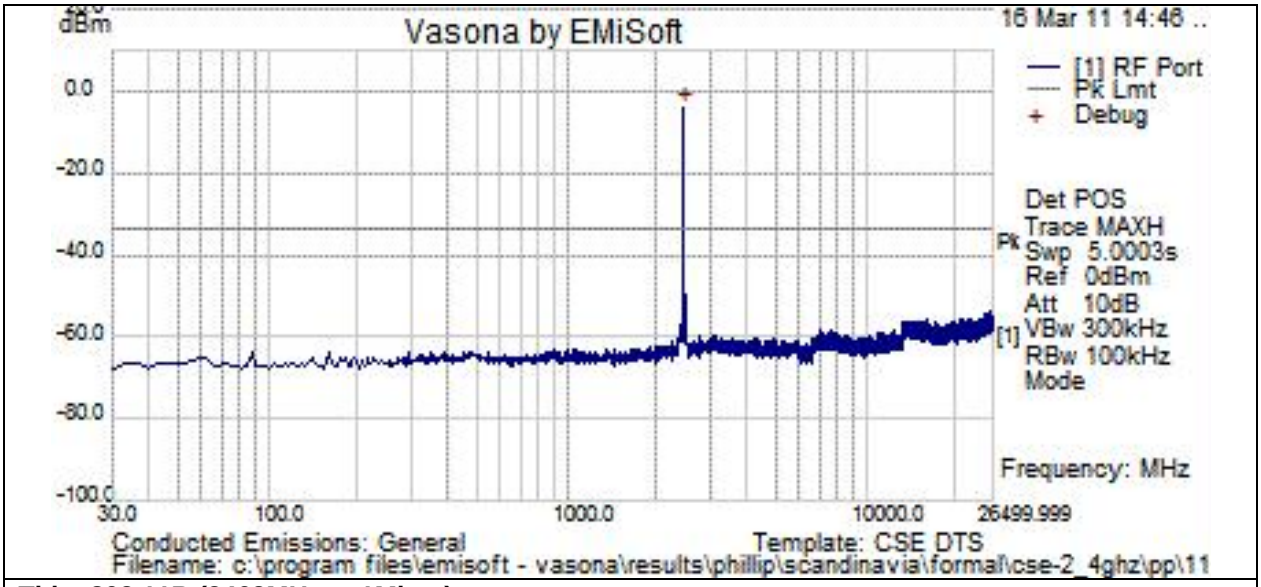
Title: 802.11B (2412MHz at 1Mbps)

Comments: No Signals seen within 6dB of the Limit.



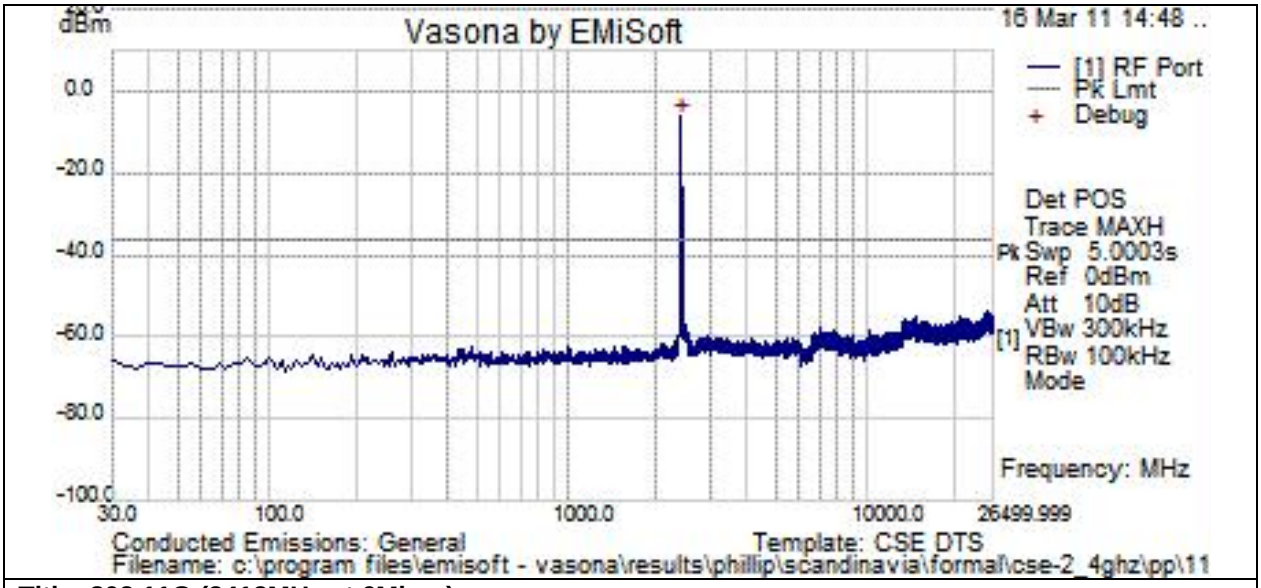
Title: 802.11B (2437MHz at 1Mbps)

Comments: No Signals seen within 6dB of the Limit.



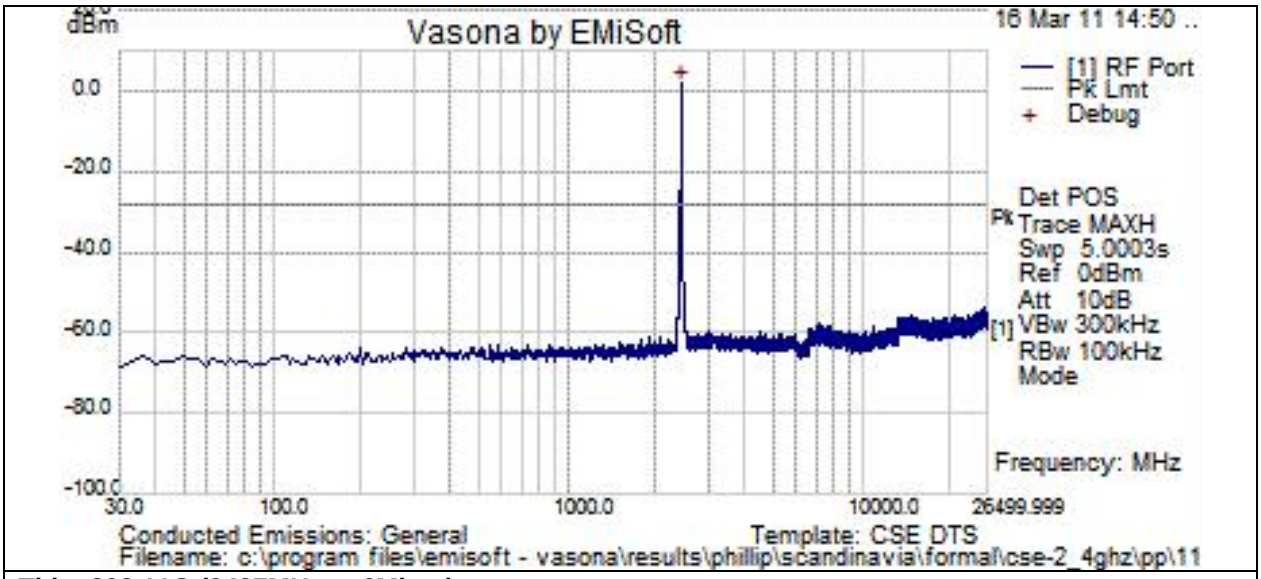
Title: 802.11B (2462MHz at 1Mbps)

Comments: No Signals seen within 6dB of the Limit.



Title: 802.11G (2412MHz at 6Mbps)

Comments: No Signals seen within 6dB of the Limit.



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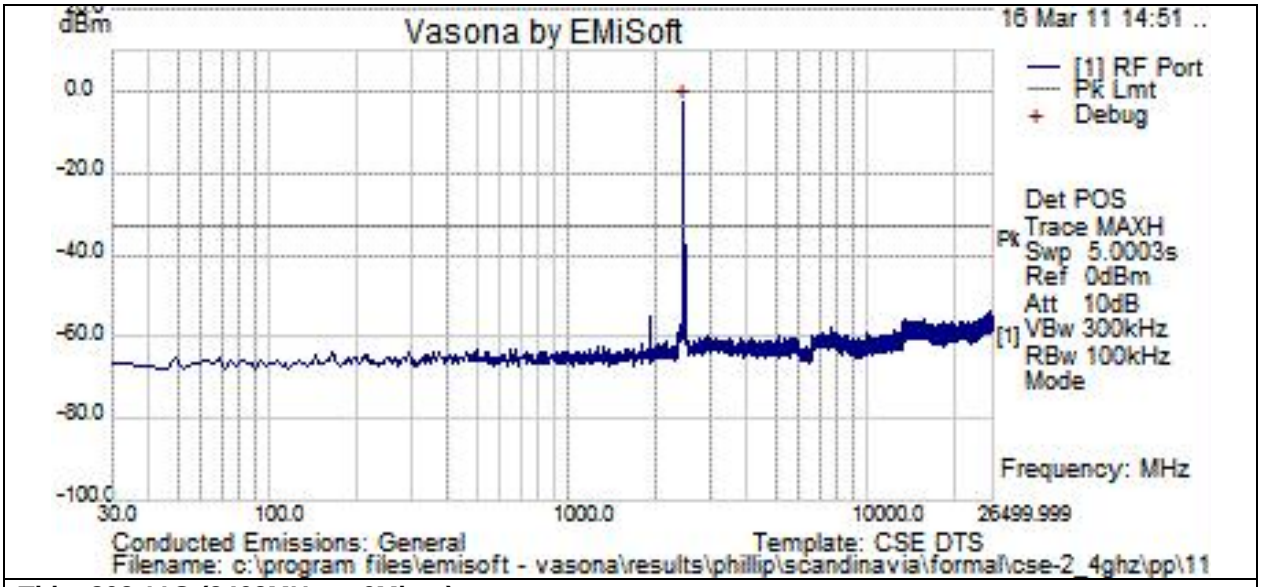
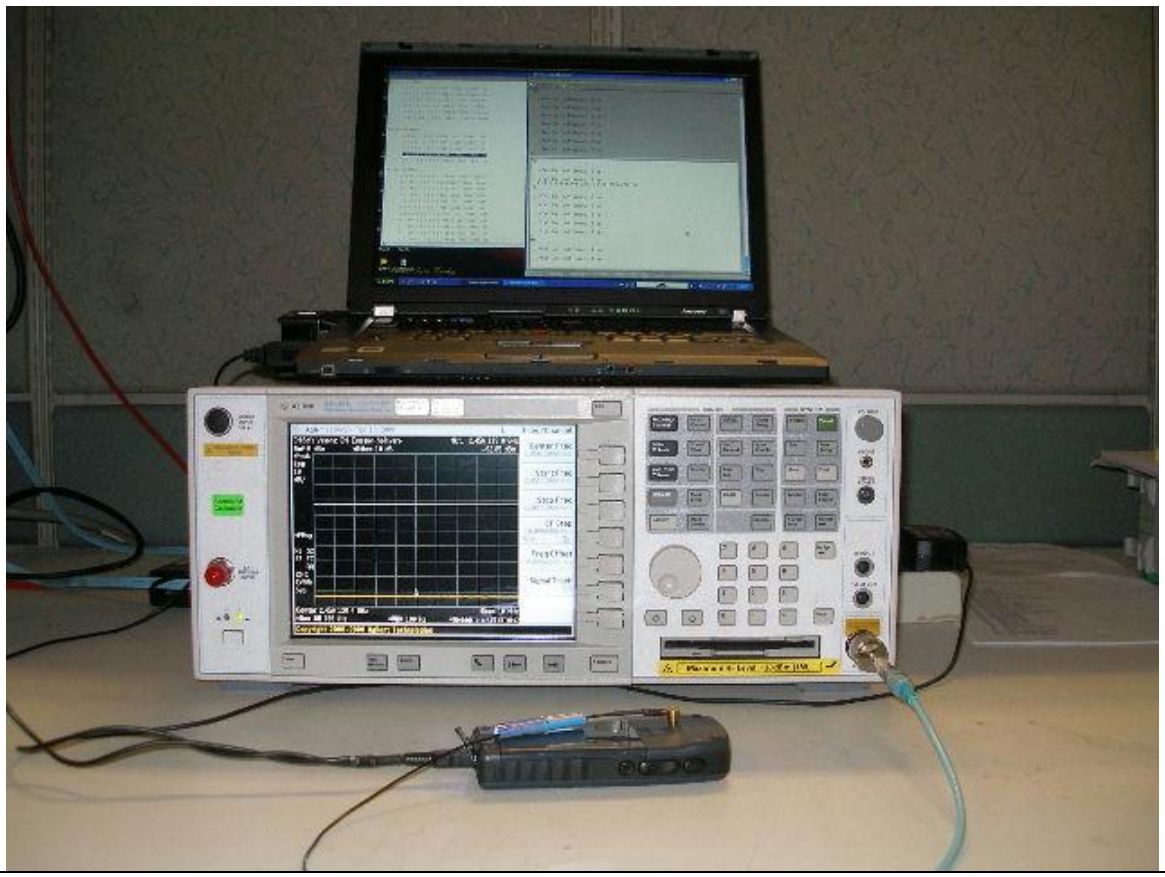
Comments: No Signals seen within 6dB of the Limit.



Title: 802.11G (2462MHz at 6Mbps)

Comments: No Signals seen within 6dB of the Limit.

Physical Test arrangement Photograph:



Title: setup test Bench

Comments on the above Photograph:

No further comments

Conducted Emissions

Test Number: 63991 **Spec ID:** 1373				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
CFR47 Part 15: 2008 (CAN/CSA-CISPR 22-02)	AC Power Line	B	0.15MHz - 30MHz	U.S line voltages must be used (e.g. 110V/ 208V 60Hz).
Operating Mode	**Mode :** 1, Adapter Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

System Number	**Description**	**Samples**	**System under test**	**Support equipment**
1	CP-7926G-W-K9 Tested	S01, S02, S03, S04, S05 and S15	☑	☐
2	Support Equipment	S06, S08, S09, S10, S11, S12, S13 and S14	☐	☑

Subtest Number: 63991 - 1	**Subtest Date:** 07-Jun-2011
Engineer	Phillip Carranco
Lab Information	Building B, Shield Room
Subtest Results	
Line Under Test	[A] AC Mains
Transducer	LISN
Subtest Result	Pass
Highest Frequency	30.0
Lowest Frequency	0.15
Comments on the above Test Results	No further comments
Environmental Conditions:	
Temperature: (59 to 95)F	72F
Humidity: (10 to 75)%:	36%
Comments:	

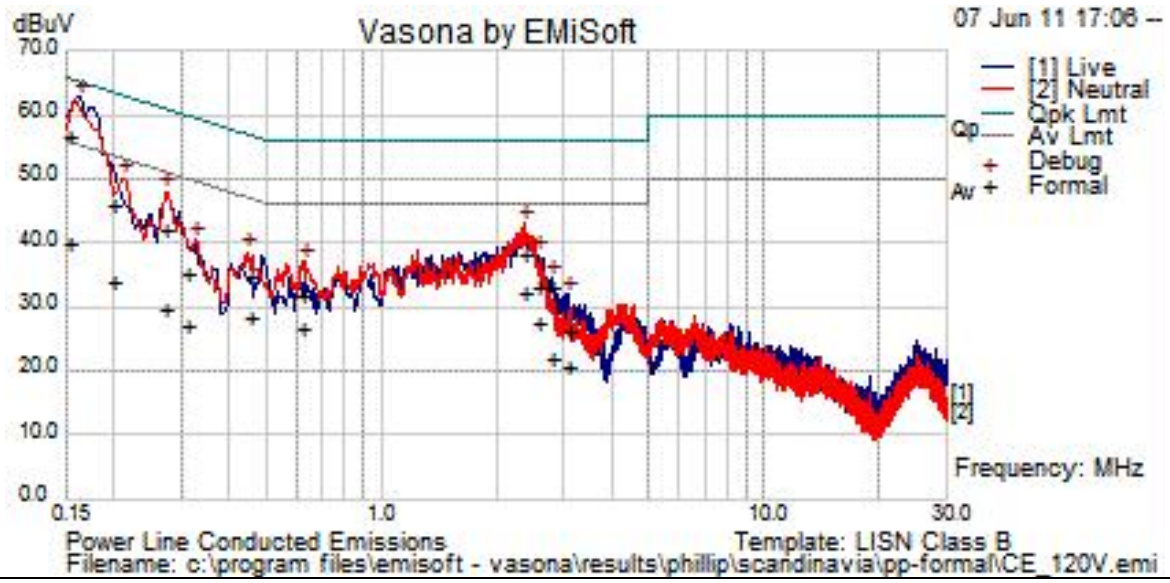
Equipment used:

Equipment No	Manufacturer	Model	Description
CIS008097	Huber + Suhner	RG-223	RG-233 Cable 9m
CIS004924	Rohde & Schwarz	ESHS30	EMI Receiver (9KHz-30MHz)
CIS008185	Fischer Custom Communications	FCC-450B-2.4-N	Instrumentation Limiter
CIS008197	TTE	H613-150K-50-21378	Hi Pass Filter - 150KHz cutoff

CIS008394	Coleman	RG-223	RG-223 Cable 6 ft
CIS008490	Bird	5-T-MN	5W 50 Ohm Terminator
CIS007036	HP	E7401A	Spectrum Analyzer
CIS018981	Fischer Custom Communications	FCC-801-M2-32A	Power Line Coupling/Decoupling Network
CIS020767	Fischer Custom Communications	FCC-450B-2.4-N	Instrumentation Limiter
CIS023874	Fischer Custom Communications	FCC-LISN-PA-NEMA-5-15	Power Adaptor, Polarized 120VAC
CIS036033	York	CNE V	Comparison Noise Emitter

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Conducted Emissions Test Results from 150k - 30MHz

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.1514	35.7	21	0.1	56.8	Qp	L	65.9	-9.2	Pass	
2.343	12.2	19.9	0	32.1	Av	N	46	-13.9	Pass	
0.1514	19	21	0.1	40	Av	L	55.9	-15.9	Pass	
2.343	18.2	19.9	0	38.2	Qp	N	56	-17.8	Pass	
0.1976	25	20.8	0	45.8	Qp	N	63.7	-17.9	Pass	
0.4531	8.2	20	0	28.2	Av	N	46.8	-18.6	Pass	
2.568	7.4	19.8	0	27.3	Av	L	46	-18.7	Pass	
0.2696	21.7	20.5	0	42.2	Qp	N	61.1	-18.9	Pass	
0.6171	6.6	20	0	26.6	Av	N	46	-19.4	Pass	

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.1976	13	20.8	0	33.8	Av	N	53.7	-20	Pass	
0.2696	9.3	20.5	0	29.8	Av	N	51.1	-21.3	Pass	
0.4531	14.7	20	0	34.7	Qp	N	56.8	-22.1	Pass	
2.568	13.2	19.8	0	33.1	Qp	L	56	-22.9	Pass	
2.784	13.2	19.8	0	33.1	Qp	L	56	-22.9	Pass	
0.3102	6.5	20.3	0	26.9	Av	N	50	-23.1	Pass	
0.6171	12	20	0	32	Qp	N	56	-24	Pass	
2.784	1.8	19.8	0	21.7	Av	L	46	-24.3	Pass	
0.3102	14.9	20.3	0	35.3	Qp	N	60	-24.7	Pass	
3.058	0.6	19.9	0	20.5	Av	L	46	-25.5	Pass	
3.058	6.3	19.9	0	26.2	Qp	L	56	-29.8	Pass	

Physical Test arrangement Photograph:

Title: Conducted Emissions Test Configuration

Radiated Spurious and Harmonics Emissions

15.205 & RSS-210 sec2.7:

Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a).

Note: All 3-axis (X,Y, Z) were evaluated during preliminary testing and the worse case orientation was for all formal testing shown below.

Test Number: 60837 **Spec ID:** 647				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
Radiated Spurious Emissions	Enclosure	B	30MHz - 26.5GHz	CFR47 Part 15.109CFR47 Part 15.247, RSS-210, LP0002, HKTA1039
Operating Mode	**Mode :** 1, 802.11B/G Test Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

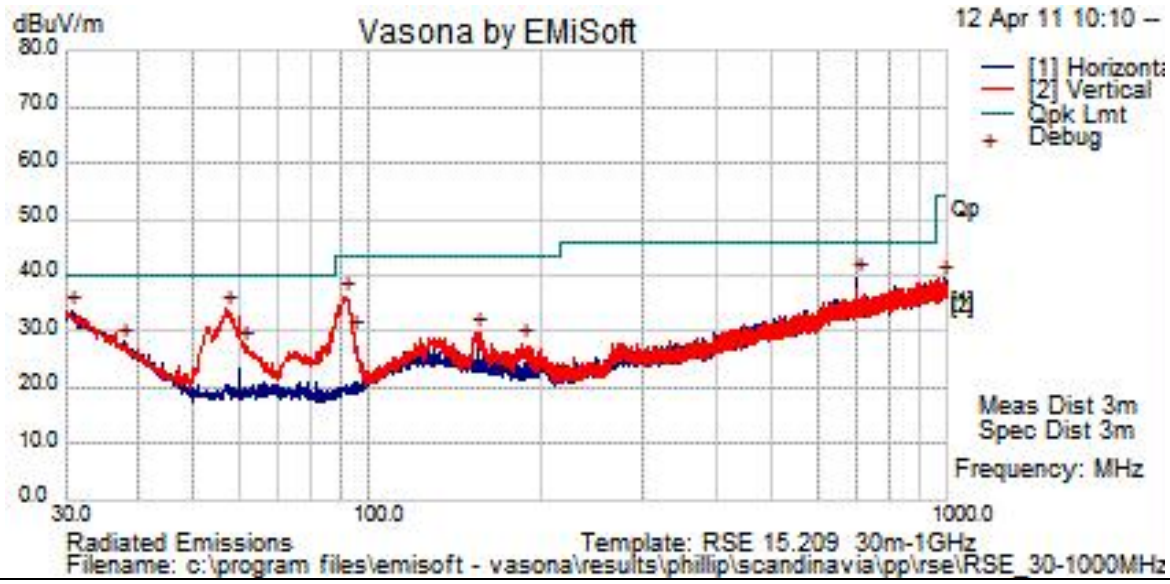
System Number	**Description**	**Samples**	**System under test**	**Support equipment**
1	Radio Test Sample	S01	☑	☐

Subtest Number: 60837 - 1		**Subtest Date:** 20-Apr-2011	
Engineer	Phillip Carranco		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	802.11B Radiated Spurious Emissions Results		
Subtest Result	Pass		
Highest Frequency	1000.0		
Lowest Frequency	30.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		
Equipment used:			
Equipment No	Manufacturer	Model	Description
CIS008024	Huber + Suhner	SF106A	3 meter Sucoflex cable
CIS027235	York	CNE V	Comparison Noise Emitter
CIS030443	Micro-Coax	UFB311A-0-1560-520520	RF Coaxial Cable, to 18GHz, 156 In.
CIS033602	Midwest Microwave	CSY-NMNM-80-273001	RF Coaxial Cable, 27ft. to 18GHz
CIS045588	Sunol Sciences	JB1	Combination Antenna, 30MHz-2GHz

CIS045051	Rohde & Schwarz	ESCI	EMI Test Receiver

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Spurious Emissions Results from 30 - 1000MHz

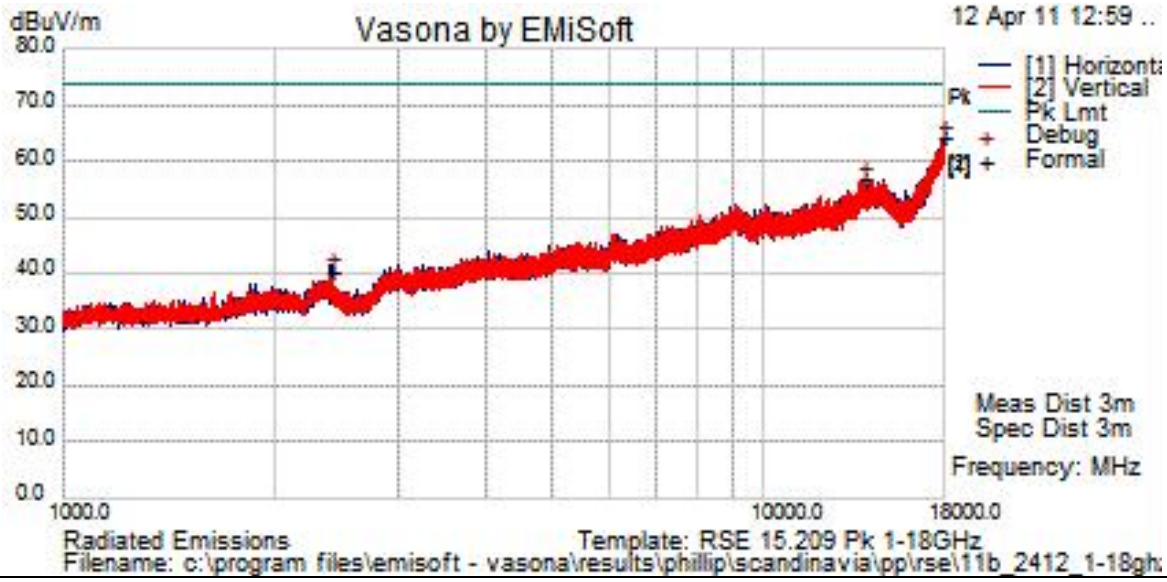
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
701.977	13.2	2.2	20.1	35.5	Qp	H	117	294	46	-10.5	Pass	
56.882	21.3	0.6	7	28.9	Qp	V	100	308	40	-11.1	Pass	
91.372	19.6	0.8	7.7	28	Qp	V	106	327	43.5	-15.5	Pass	
30.728	-3.6	0.4	20.7	17.5	Qp	H	100	308	40	-22.5	Pass	

Subtest Number: 60837 - 2		**Subtest Date:** 20-Apr-2011	
Engineer	Phillip Carranco		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	RSE 1-18GHz Peak Results for 802.11B (2412MHz)		
Subtest Result	Pass		
Highest Frequency	18000.0		
Lowest Frequency	1000.0		
Equipment used:			
Equipment No	Manufacturer	Model	Description
CIS002119	EMC Test Systems	3115	Double Ridged Guide Horn Antenna
CIS008022	Huber + Suhner	SF106A	1 meter Sucoflex cable
CIS008024	Huber + Suhner	SF106A	3 meter Sucoflex cable
CIS005691	Miteq	NSP1800-25-S1	Broadband Preamplifier (1-18GHz)
CIS027235	York	CNE V	Comparison Noise Emitter
CIS030443	Micro-Coax	UFB311A-0-1560-520520	RF Coaxial Cable, to 18GHz, 156 In.
CIS030666	Micro-Tronics	BRM50702-02	Band Reject Filter, Stop Band=2.4-2.5GHz
CIS033602	Midwest Microwave	CSY-NMNM-80-273001	RF Coaxial Cable, 27ft. to 18GHz
CIS042000	Agilent	E4440A	Spectrum Analyzer
CIS045588	Sunol Sciences	JB1	Combination Antenna, 30MHz-2GHz
CIS045051	Rohde & Schwarz	ESCI	EMI Test Receiver

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Peak Results for 802.11B (2412MHz)

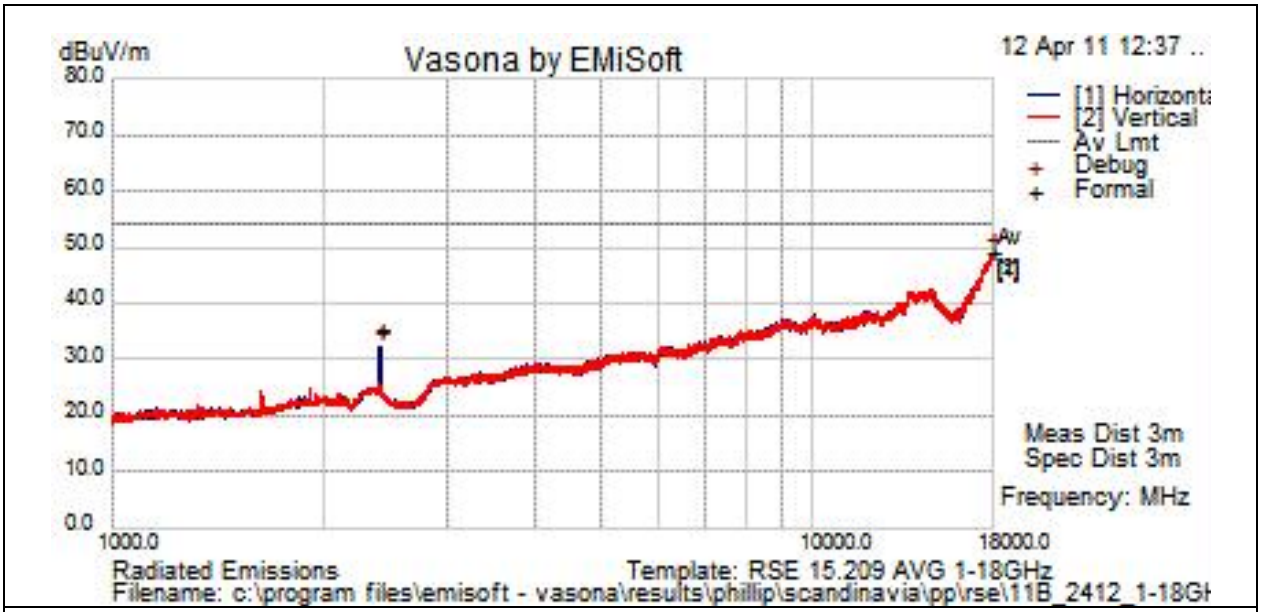
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17903.492	38.9	13.6	11.4	64	Pk	H	100	0	74	-10	Pass	Noise Floor
13874.527	38	11.7	7	56.7	Pk	V	100	0	74	-17.3	Pass	Noise Floor
2410.371	41	4.5	-5.5	40.1	Pk	H	157	181	74	-33.9	Pass	Tx Signal

Subtest Number: 60837 - 3	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Ave Results for 802.11B (2412MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Ave Results for 802.11B (2412MHz)

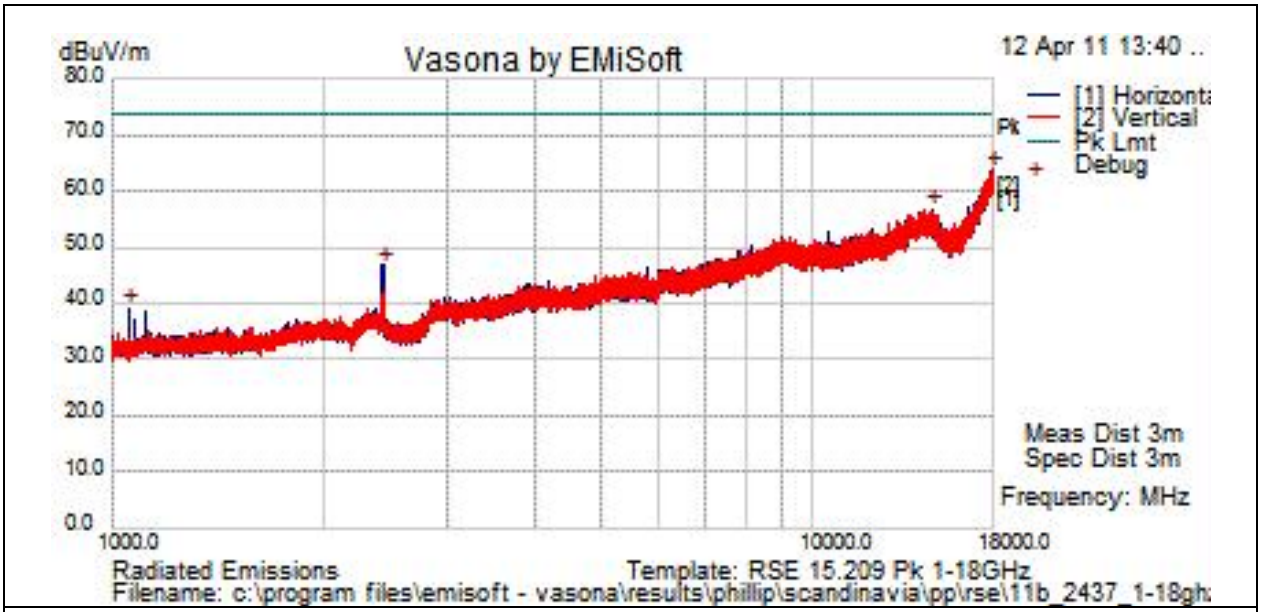
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17906.605	24	13.6	11.5	49	Av	V	100	0	54	-5	Pass	Noise Floor
2412.859	36.5	4.5	-5.5	35.5	Av	H	158	186	54	-18.5	Pass	Tx Signal

Subtest Number: 60837 - 4	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Peak Results for 802.11B (2437MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Peak Results for 802.11B (2437MHz)

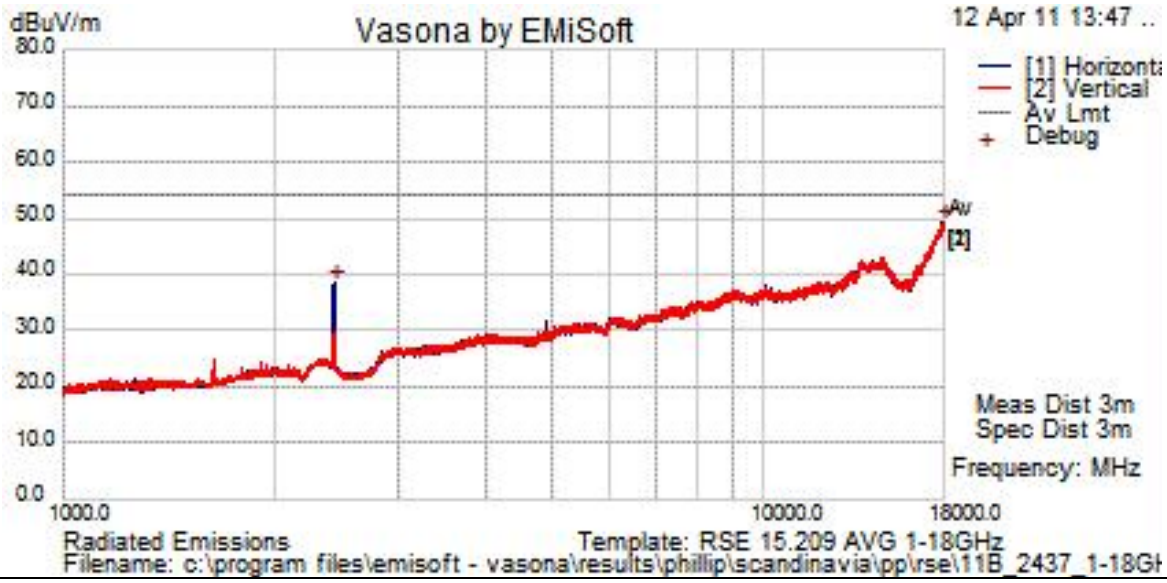
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17975.613	38.8	13.4	11.6	63.8	Pk	V	100	0	74	-10.2	Pass	Noise Floor
14746.734	38.6	11.9	6.4	56.8	Pk	H	100	0	74	-17.2	Pass	Noise Floor
2438.466	45.8	4.4	-5.6	44.6	Pk	H	106	191	74	-29.4	Pass	Tx Signal

Subtest Number: 60837 - 5	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Ave Results for 802.11B (2437MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Ave Results for 802.11B (2437MHz)

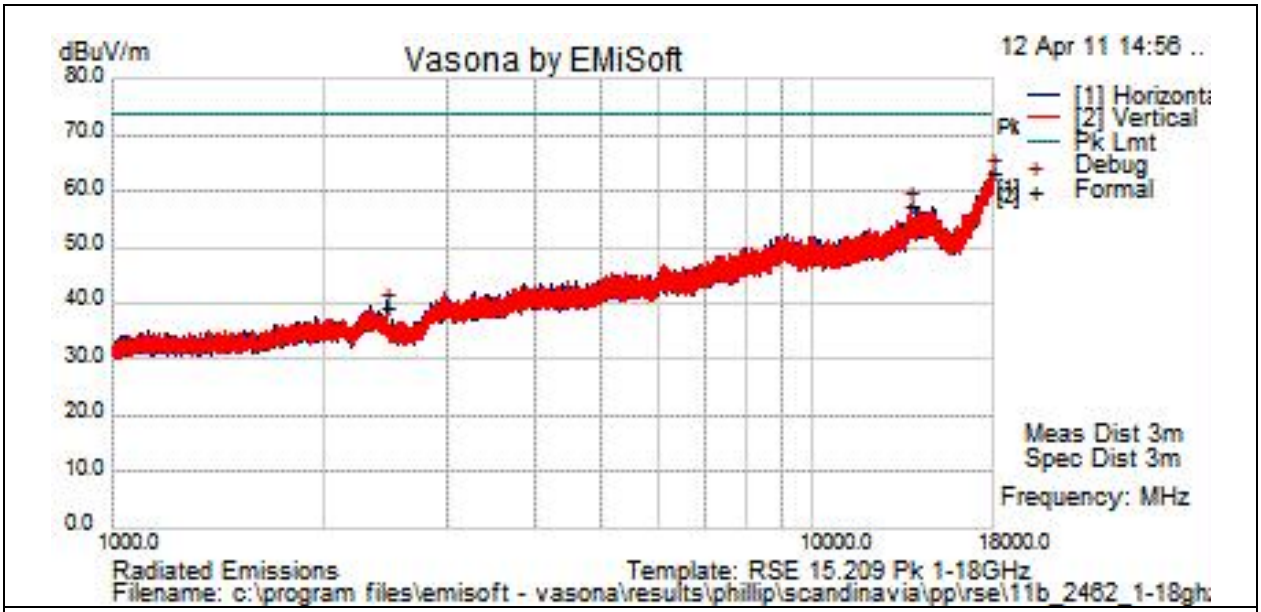
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17995.849	23.9	13.8	11.6	49.2	Av	V	100	0	54	-4.8	Pass	Noise Floor
2436.288	43	4.4	-5.6	41.9	Av	H	101	192	54	-12.1	Pass	

Subtest Number: 60837 - 6	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Peak Results for 802.11B (2462MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Peak Results for 802.11B (2462MHz)

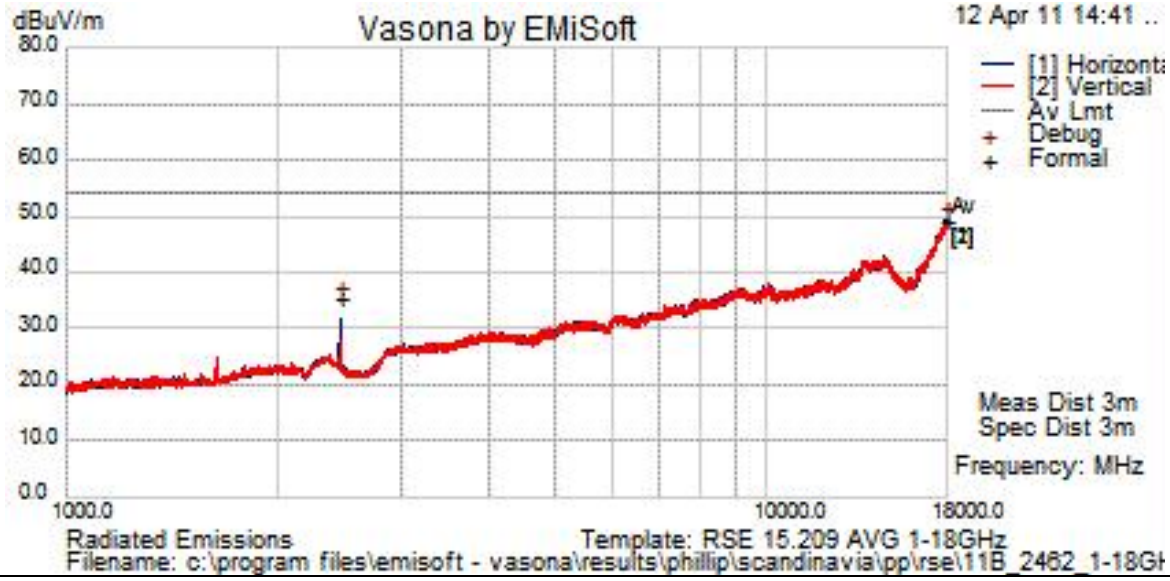
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17993.774	38.2	13.7	11.6	63.4	Pk	V	100	0	74	-10.6	Pass	Noise Floor
13727.689	39.1	11.8	6.7	57.6	Pk	V	100	0	74	-16.4	Pass	Noise Floor
2458.674	40.5	4.5	-5.7	39.3	Pk	H	156	187	74	-34.7	Pass	Tx Signal

Subtest Number: 60837 - 7	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Ave Results for 802.11B (2462MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Ave Results for 802.11B (2462MHz)

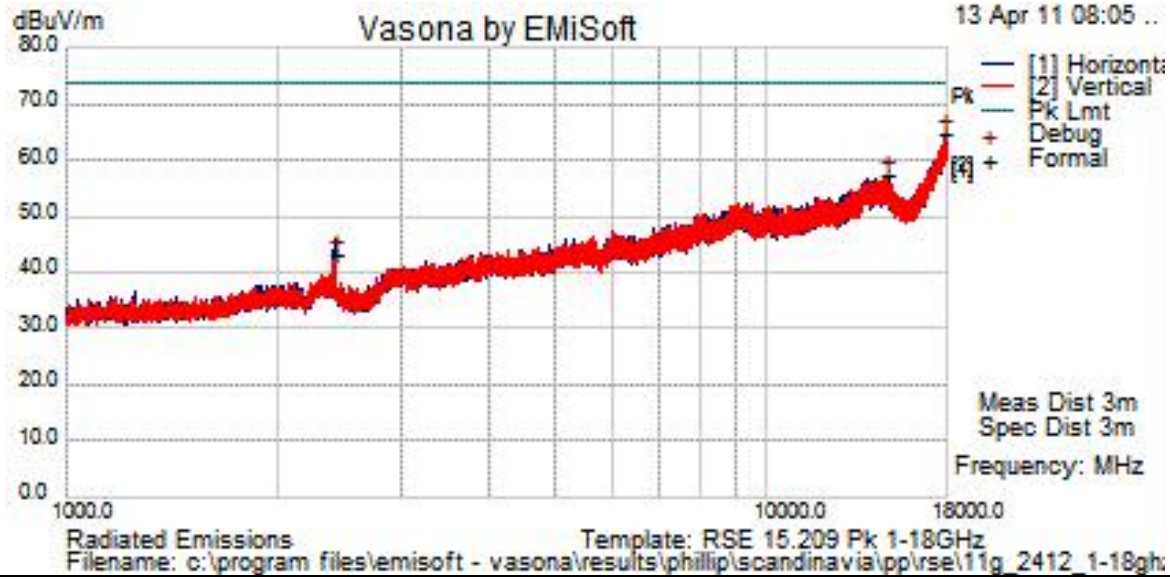
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17906.605	24	13.6	11.5	49.1	Av	H	100	0	54	-4.9	Pass	Noise Floor
2461.252	36.3	4.5	-5.7	35.1	Av	H	157	190	54	-18.9	Pass	Tx Signal

Subtest Number: 60837 - 8	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Peak Results for 802.11G (2412MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Peak Results for 802.11G (2412MHz)

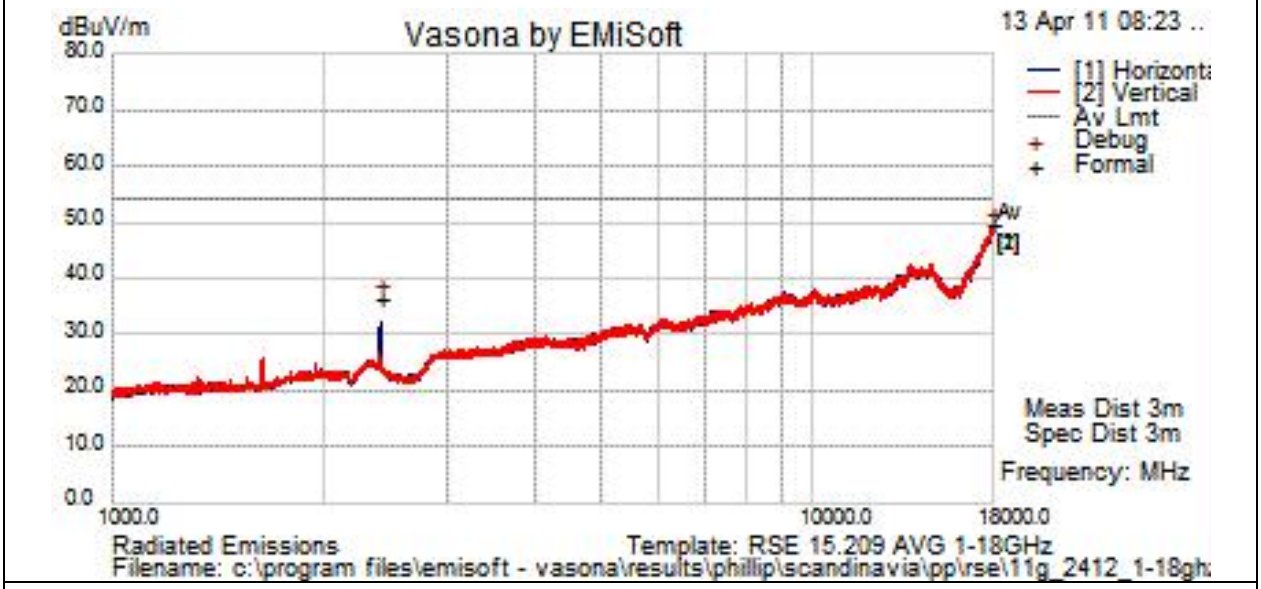
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17877.549	39.8	13.6	11.3	64.7	Pk	V	100	0	74	-9.3	Pass	Noise Floor
14807.441	39.1	12	6.1	57.2	Pk	V	100	0	74	-16.8	Pass	Noise Floor
2417.729	44.1	4.5	-5.5	43.1	Pk	H	159	182	74	-30.9	Pass	Tx Signal

Subtest Number: 60837 - 9	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Ave Results for 802.11G (2412MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Ave Results for 802.11G (2412MHz)

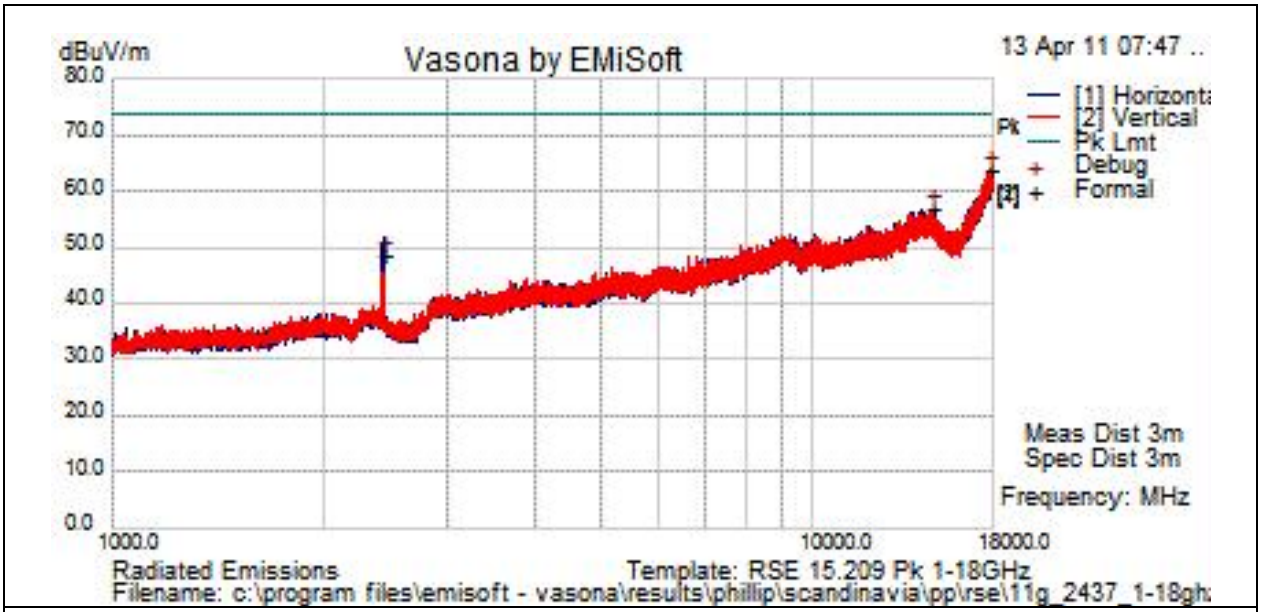
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17921.133	24.1	13.6	11.6	49.3	Av	V	100	0	54	-4.7	Pass	Noise Floor
2417.896	37.5	4.5	-5.5	36.5	Av	H	104	178	54	-17.5	Pass	

Subtest Number: 60837 - 10	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Peak Results for 802.11G (2437MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Peak Results for 802.11G (2437MHz)

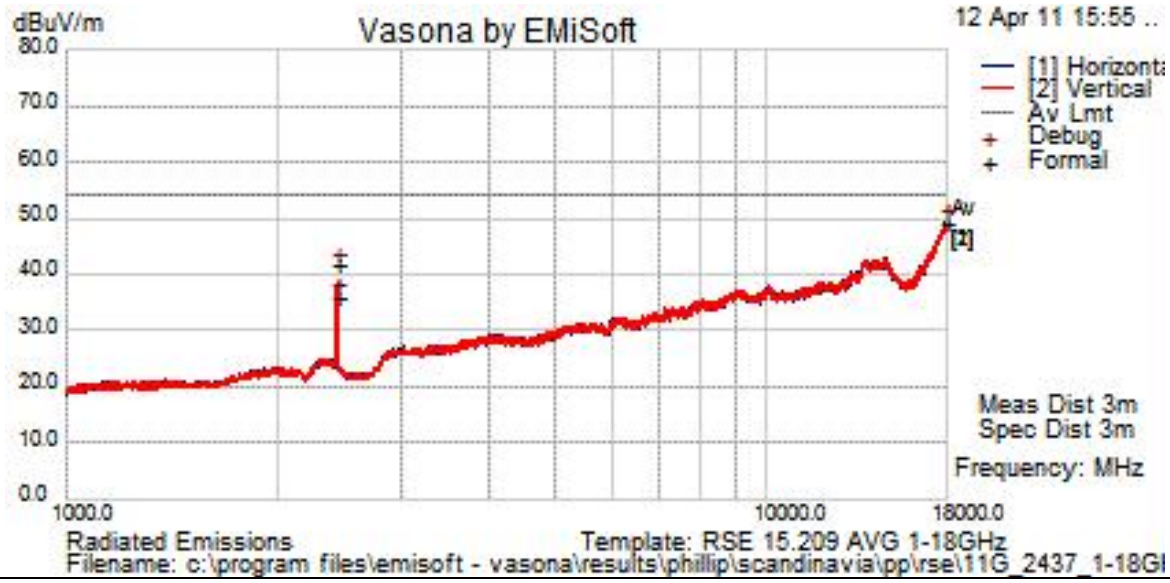
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17872.879	39	13.5	11.3	63.9	Pk	V	100	0	74	-10.1	Pass	Noise Floor
14733.244	38.4	12	6.4	56.8	Pk	V	100	0	74	-17.2	Pass	Noise Floor
2442.879	49.7	4.5	-5.7	48.5	Pk	H	105	171	74	-25.5	Pass	Tx Signal

Subtest Number: 60837 - 11	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Ave Results for 802.11G (2437MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Ave Results for 802.11G (2437MHz)

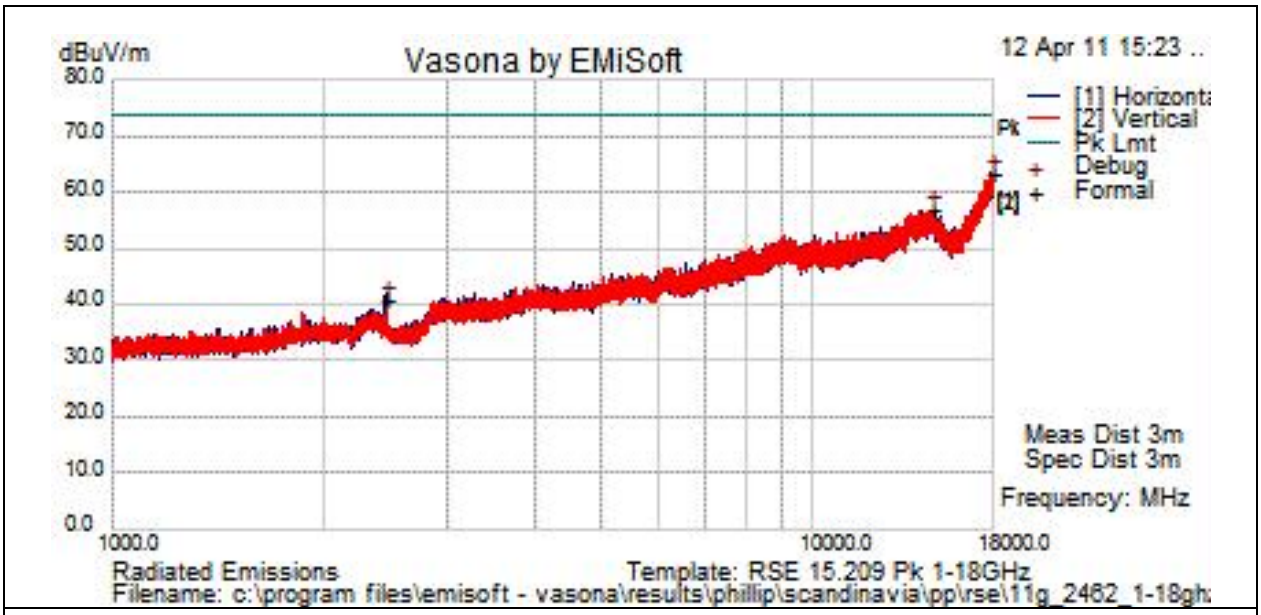
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17916.982	24.1	13.6	11.5	49.2	Av	H	100	0	54	-4.8	Pass	Noise Floor
2443.655	37.1	4.5	-5.7	35.9	Av	V	139	357	54	-18.1	Pass	Tx Signal
2443.879	42.7	4.5	-5.7	41.5	Av	H	101	174	54	-12.5	Pass	Tx Signal

Subtest Number: 60837 - 12	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Peak Results for 802.11G (2462MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Peak Results for 802.11G (2462MHz)

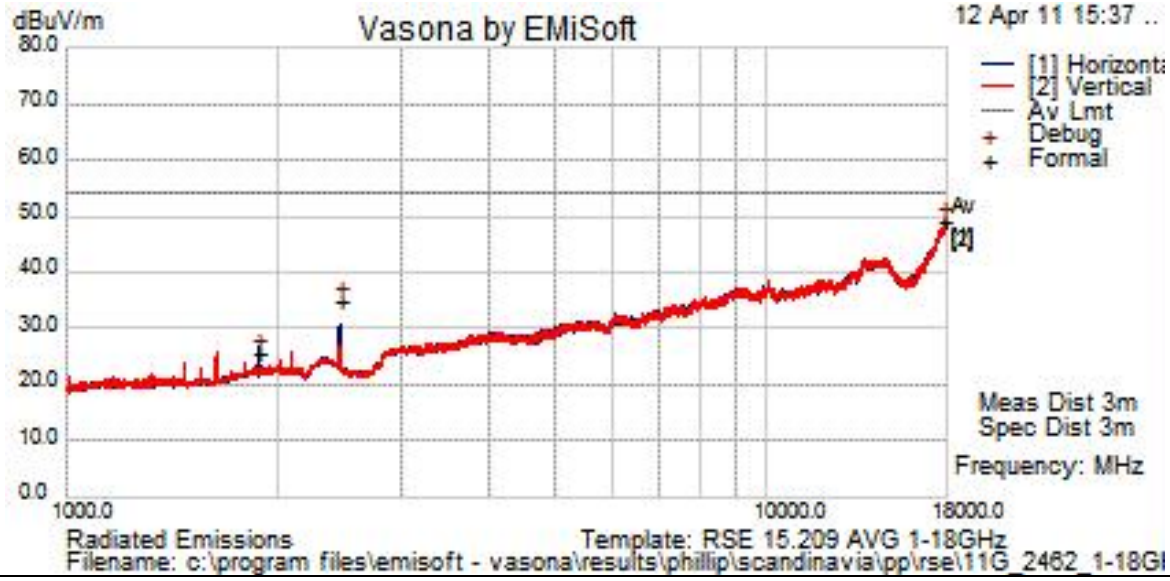
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17907.643	38.3	13.6	11.5	63.3	Pk	H	100	0	74	-10.7	Pass	Noise Floor
14784.611	38.7	11.9	6.2	56.8	Pk	V	100	0	74	-17.2	Pass	Noise Floor
2458.008	42	4.5	-5.7	40.8	Pk	H	102	192	74	-33.2	Pass	Tx Signal

Subtest Number: 60837 - 13	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 1-18GHz Ave Results for 802.11G (2462MHz)
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 1-18GHz Ave Results for 802.11G (2462MHz)

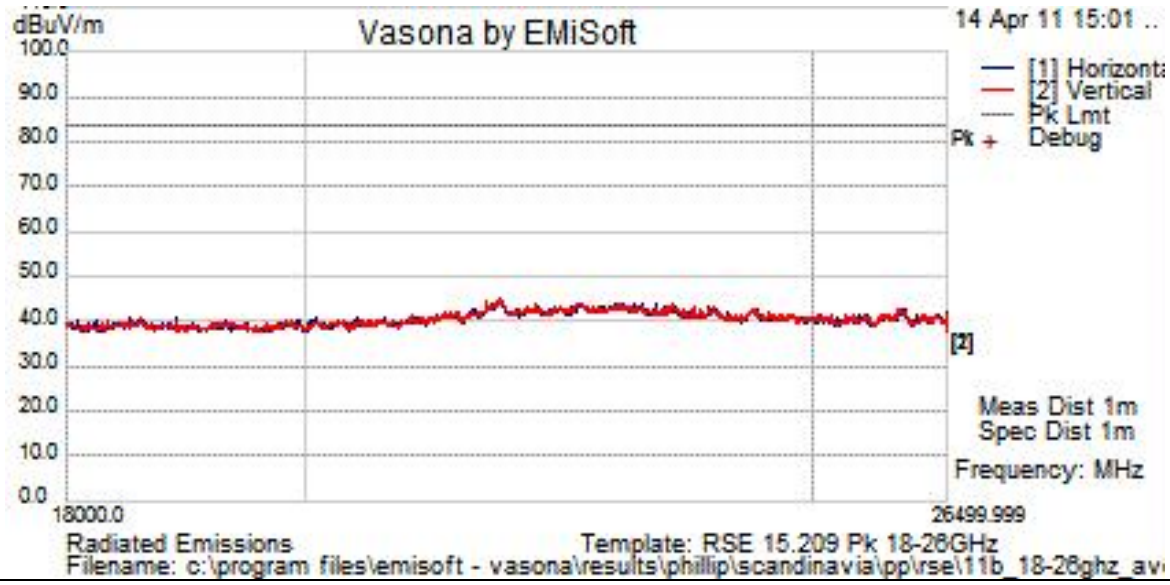
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17879.624	24.2	13.6	11.3	49.2	Av	V	100	0	54	-4.8	Pass	Noise Floor
2459.021	36.1	4.5	-5.7	34.8	Av	H	157	182	54	-19.2	Pass	Tx Signal
1878.077	27.4	3.9	-5.9	25.4	Av	H	100	183	54	-28.6	Pass	

Subtest Number: 60837 - 14	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 18-26GHz Peak Results for 802.11B
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signals seen within 10dB of the Limit

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 18-26GHz Peak Results for 802.11B

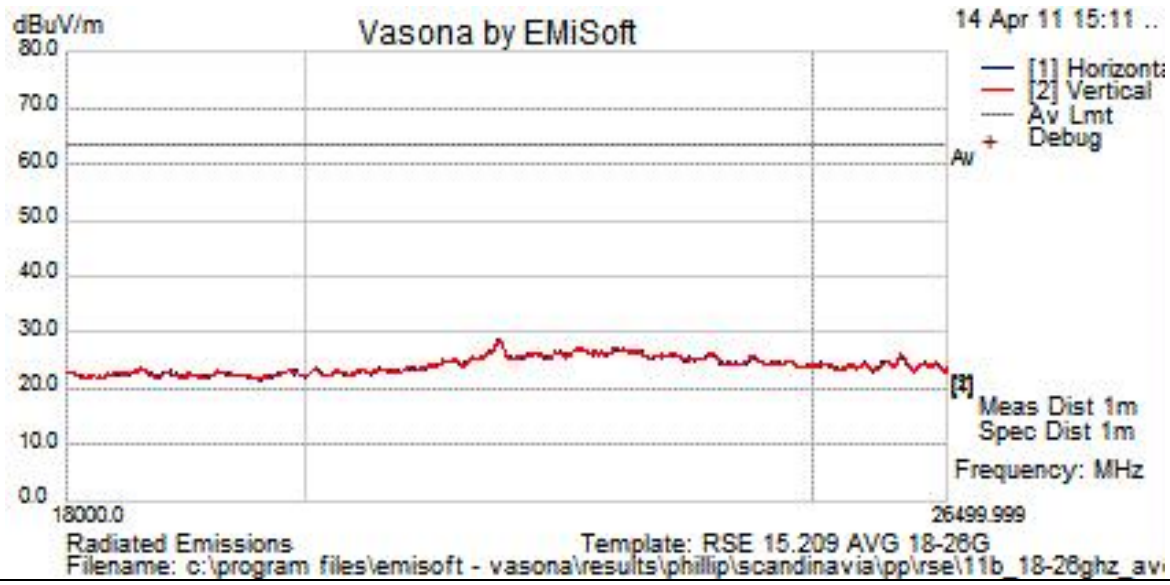
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Subtest Number: 60837 - 15	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 18-26GHz Ave Results for 802.11B
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signals seen within 10dB of the Limit

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 18-26GHz Ave Results for 802.11B

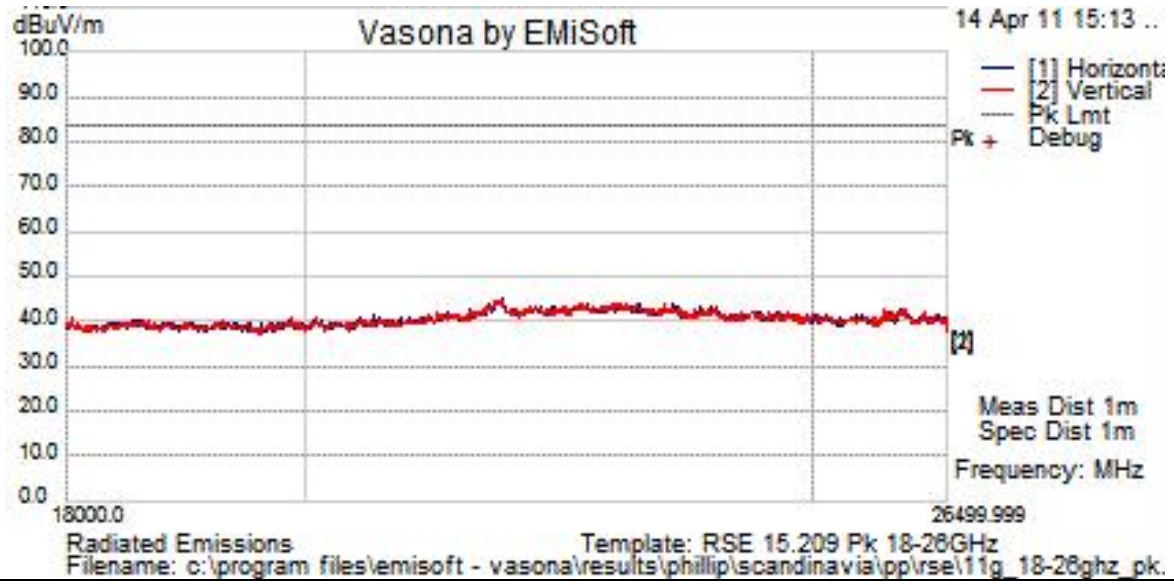
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Subtest Number: 60837 - 16	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 18-26GHz Peak Results for 802.11G
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signals seen within 10dB of the Limit

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 18-26GHz Peak Results for 802.11G

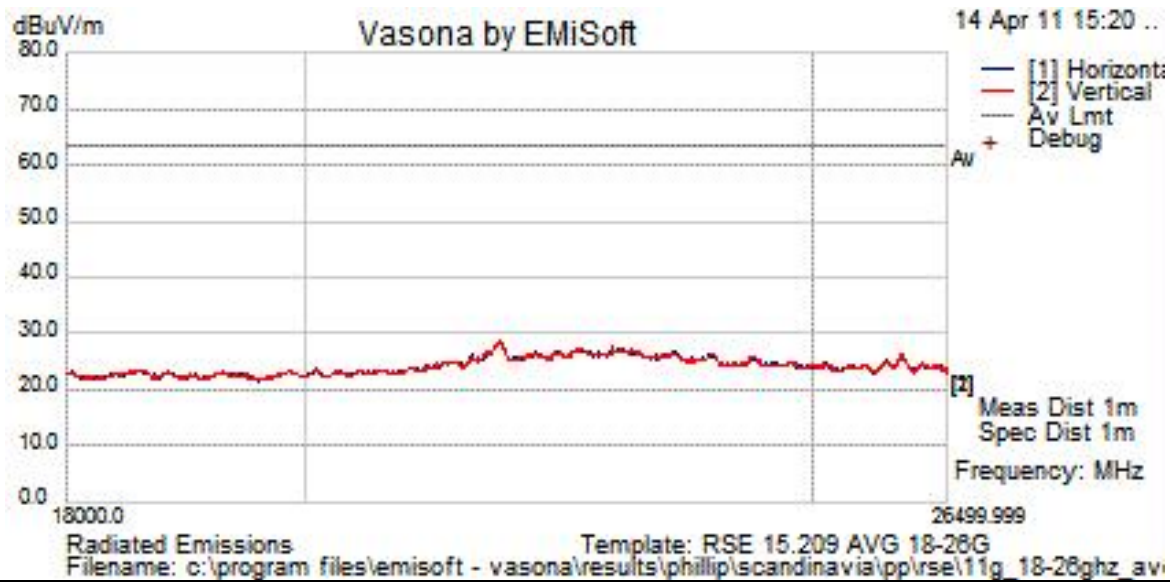
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Subtest Number: 60837 - 17	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	RSE 18-26GHz Ave Results for 802.11G
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signals seen within 10dB of the Limit

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: RSE 18-26GHz Ave Results for 802.11G

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Radiated Band Edge Measurements

15.205 & RSS-210 sec2.7:

Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a).

Note: All 3-axis (X,Y, Z) were evaluated during preliminary testing and the worse case orientation was for all formal testing shown below.

Test Number: 59127 **Spec ID:** 860				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
Restricted Bandedge Measurements	Enclosure	N/A	2.4GHz - 5.825GHz	CFR47 Part 15.205,CFR47 Part 15.209,LP002, RSS210HKTA1039
Operating Mode	**Mode :** 1, Radio Test Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

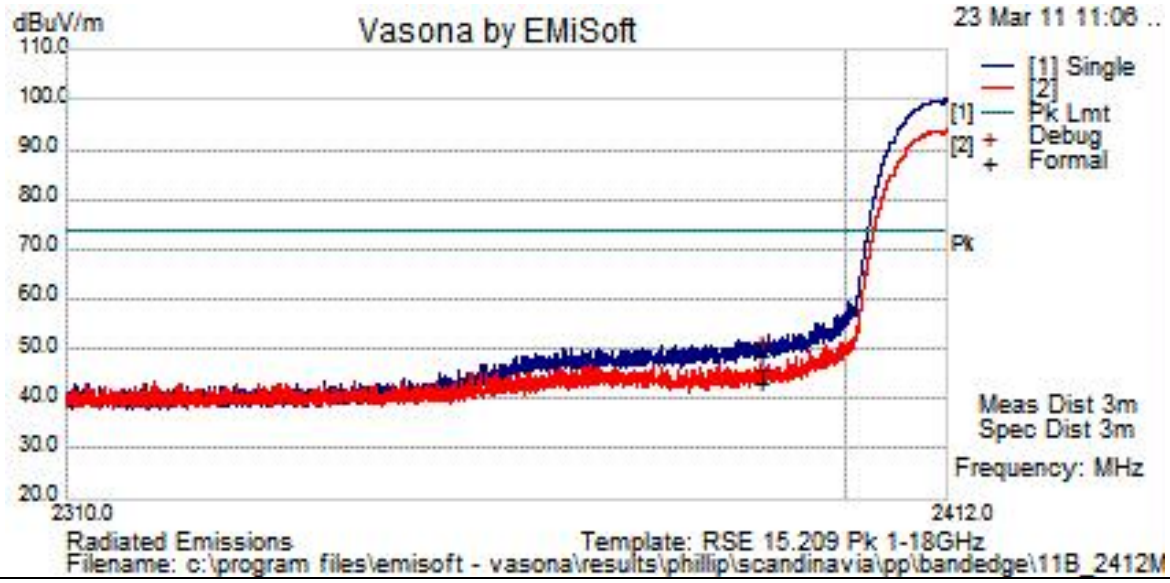
System Number	**Description**	**Samples**	**System under test**	**Support equipment**
1	2.4GHz Radio Test Sample	S01	☑	☐

Subtest Number: 59127 - 1		**Subtest Date:** 24-Mar-2011	
Engineer	Phillip Carranco		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	Radiated BandEdge for 802.11B (2412MHz - Peak)		
Subtest Result	Pass		
Highest Frequency	2412.0		
Lowest Frequency	2310.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		
Comments:			
Equipment used:			
Equipment No	Manufacturer	Model	Description
CIS002119	EMC Test Systems	3115	Double Ridged Guide Horn Antenna
CIS008022	Huber + Suhner	SF106A	1 meter Sucoflex cable

CIS008024	Huber + Suhner	SF106A	3 meter Sucoflex cable
CIS019511	Miteq	NSP1000-S1	RF Preamplifier, 1-10GHz
CIS030443	Micro-Coax	UFB311A-0-1560-520520	RF Coaxial Cable, to 18GHz, 156 In.
CIS033602	Midwest Microwave	CSY-NMNM-80-273001	RF Coaxial Cable, 27ft. to 18GHz
CIS041991	Cisco	TH0118	Mast Mount Preamplifier Array, 1-18GHz
CIS042000	Agilent	E4440A	Spectrum Analyzer

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



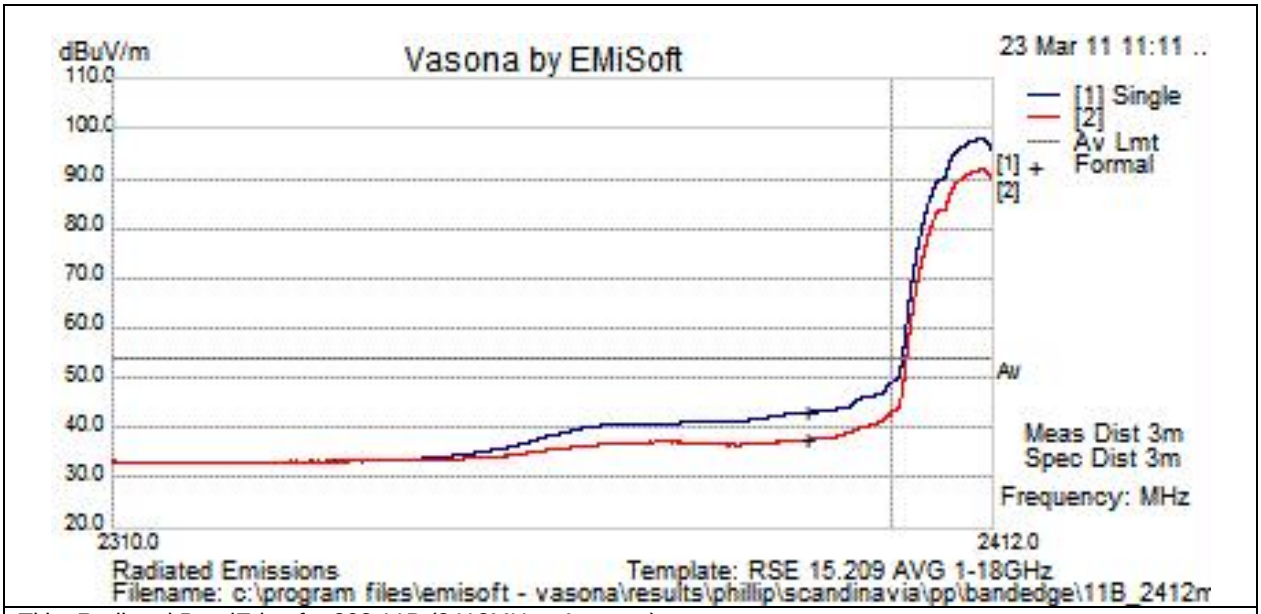
Title: Radiated BandEdge for 802.11B (2412MHz - Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2390	50.4	4.4	-6.2	48.6	Peak(Scan)	H	107	187	74	-25.4	Pass	
2390	45.2	4.4	-6.2	43.5	Peak(Scan)	V	111	162	74	-30.5	Pass	

Subtest Number: 59127 - 2	**Subtest Date:** 24-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated BandEdge for 802.11B (2412MHz - Average)
Subtest Result	Pass
Highest Frequency	2412.0
Lowest Frequency	2310.0
Comments on the above Test Results	No further comments

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



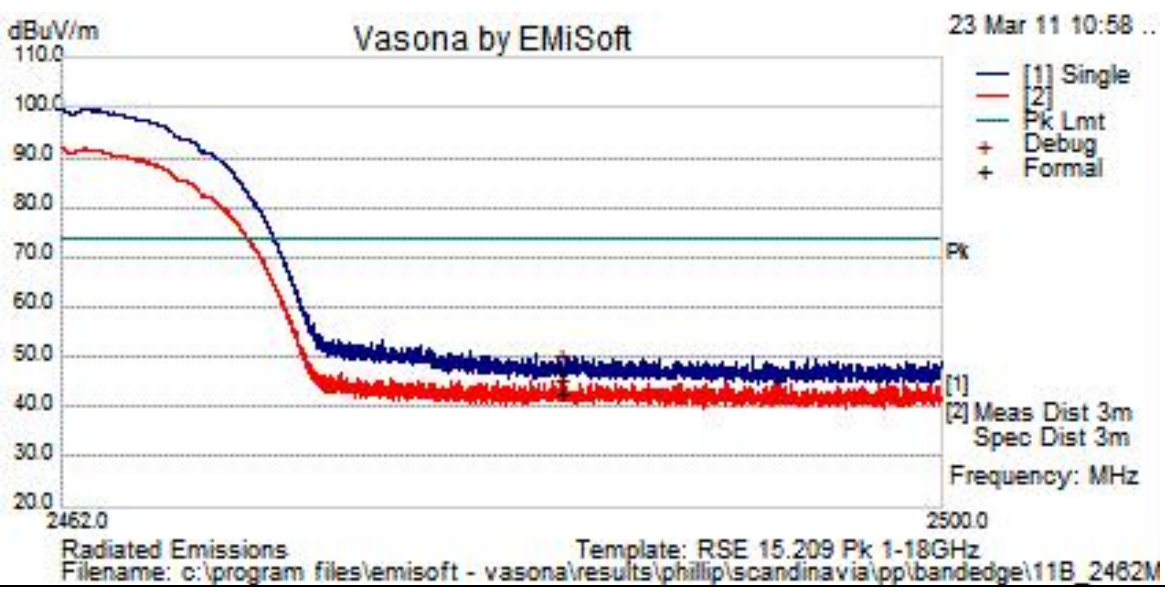
Title: Radiated BandEdge for 802.11B (2412MHz - Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2390	44.3	4.5	-6.9	42	Av	V	109	106	54	-12	Pass	
2390	43.3	4.5	-6.9	41	Av	H	158	54	54	-13	Pass	

Subtest Number: 59127 - 3	**Subtest Date:** 24-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated BandEdge for 802.11B (2462MHz - Peak)
Subtest Result	Pass
Highest Frequency	2500.0
Lowest Frequency	2462.0
Comments on the above Test Results	No further comments

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



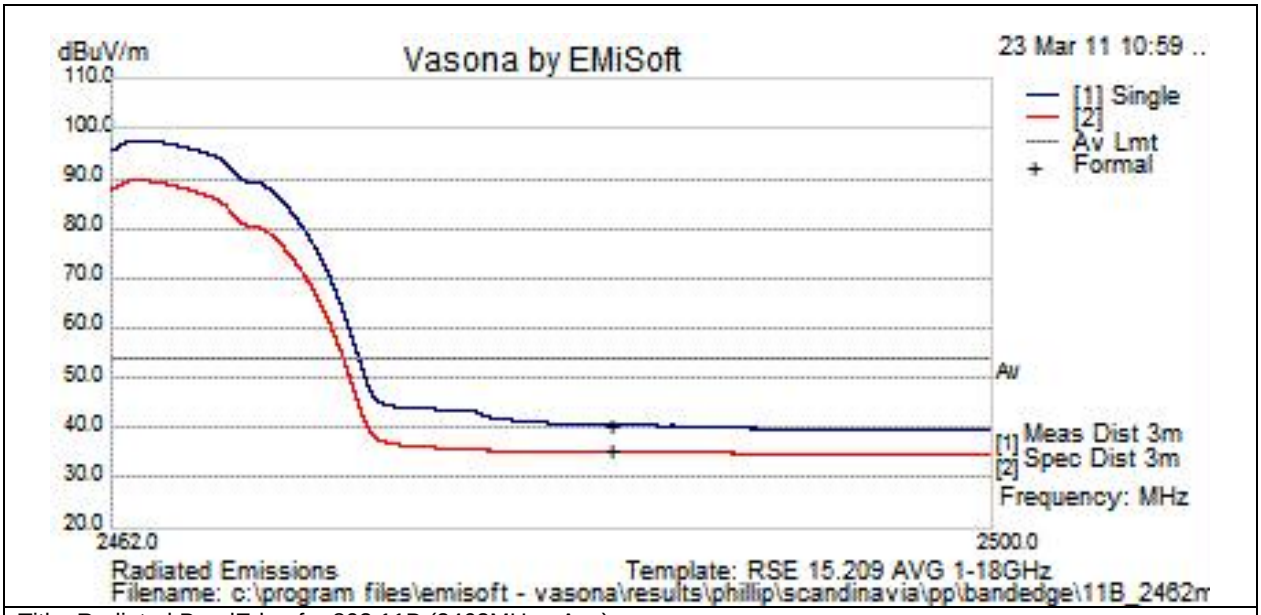
Title: Radiated BandEdge for 802.11B (2462MHz - Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2483.5	49.6	4.5	-6.4	47.6	Peak(Scan)	H	104	192	74	-26.4	Pass	
2483.5	44.4	4.5	-6.4	42.5	Peak(Scan)	V	137	175	74	-31.5	Pass	

Subtest Number: 59127 - 4	**Subtest Date:** 24-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated BandEdge for 802.11B (2462MHz - Ave)
Subtest Result	Pass
Highest Frequency	2500.0
Lowest Frequency	2462.0
Comments on the above Test Results	No further comments

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



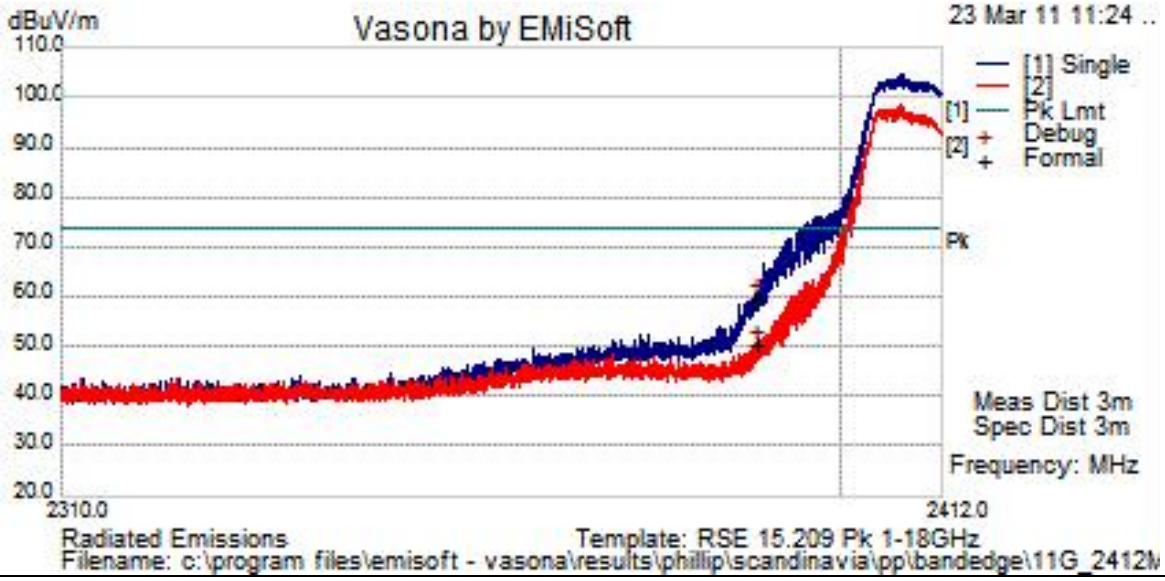
Title: Radiated BandEdge for 802.11B (2462MHz - Ave)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2483.5	42.6	4.5	-6.4	40.6	Av	H	104	192	54	-13.4	Pass	
2483.5	37.2	4.5	-6.4	35.2	Av	V	137	175	54	-18.8	Pass	

Subtest Number: 59127 - 5	**Subtest Date:** 24-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated BandEdge for 802.11G (2412MHz - Peak)
Subtest Result	Pass
Highest Frequency	2412.0
Lowest Frequency	2310.0
Comments on the above Test Results	No further comments

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



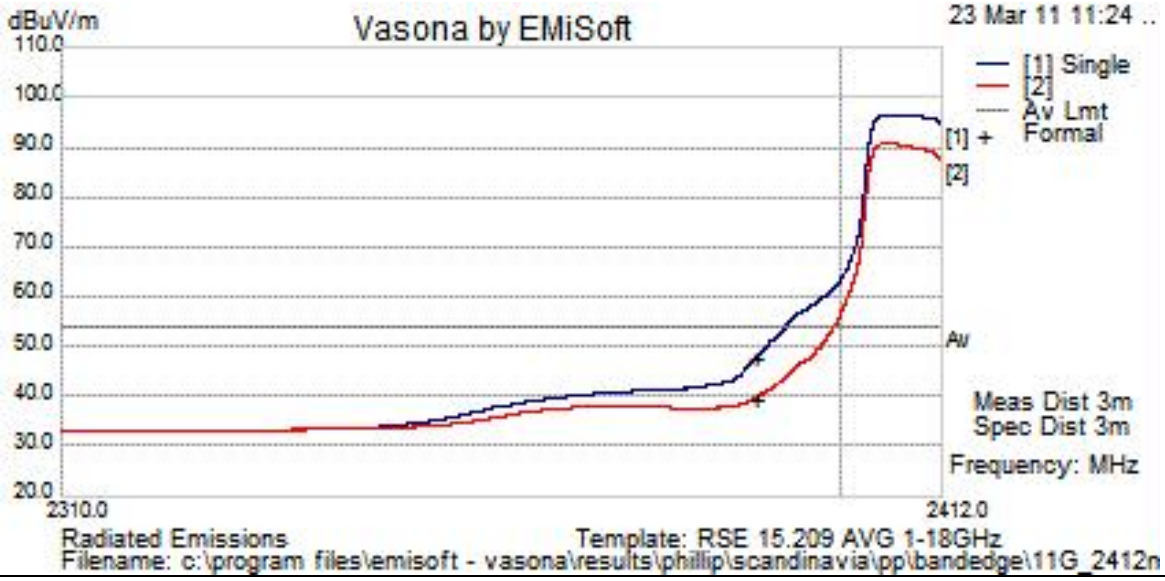
Title: Radiated BandEdge for 802.11G (2412MHz - Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2390	61.5	4.4	-6.2	59.8	Peak(Scan)	H	133	178	74	-14.2	Pass	
2390	52	4.4	-6.2	50.3	Peak(Scan)	V	112	133	74	-23.7	Pass	

Subtest Number: 59127 - 6	**Subtest Date:** 24-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated BandEdge for 802.11G (2412MHz - Ave)
Subtest Result	Pass
Highest Frequency	2412.0
Lowest Frequency	2310.0
Comments on the above Test Results	No further comments

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



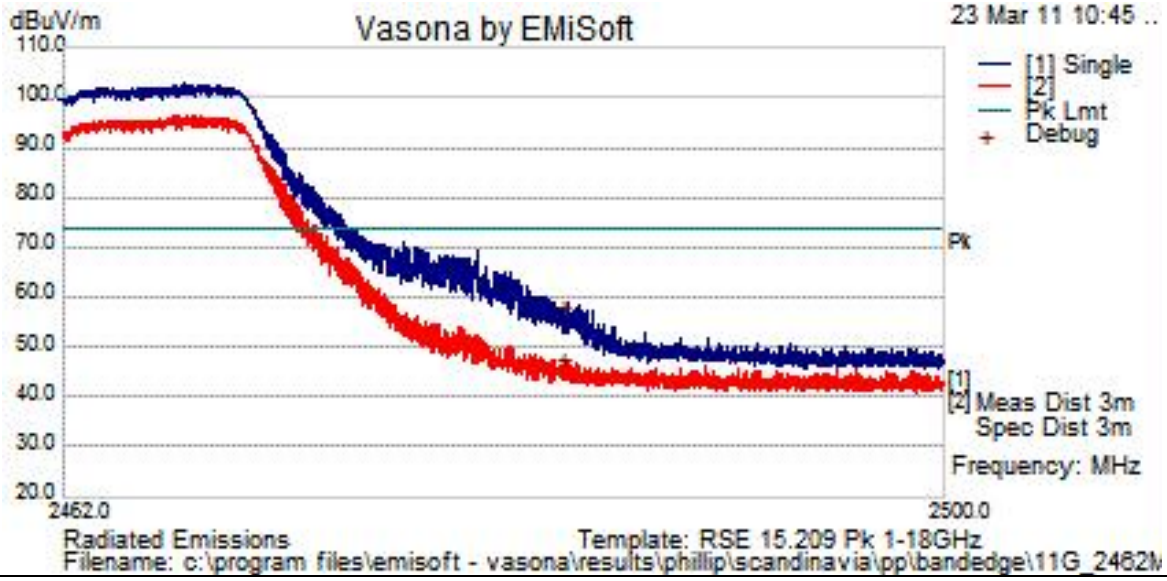
Title: Radiated BandEdge for 802.11G (2412MHz - Ave)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2390	49.1	4.4	-6.2	47.4	Av	H	133	178	54	-6.6	Pass	
2390	41.3	4.4	-6.2	39.6	Av	V	112	133	54	-14.4	Pass	

Subtest Number: 59127 - 7	**Subtest Date:** 24-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated BandEdge for 802.11G (2462MHz - Peak)
Subtest Result	Pass
Highest Frequency	2500.0
Lowest Frequency	2462.0
Comments on the above Test Results	No further comments

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



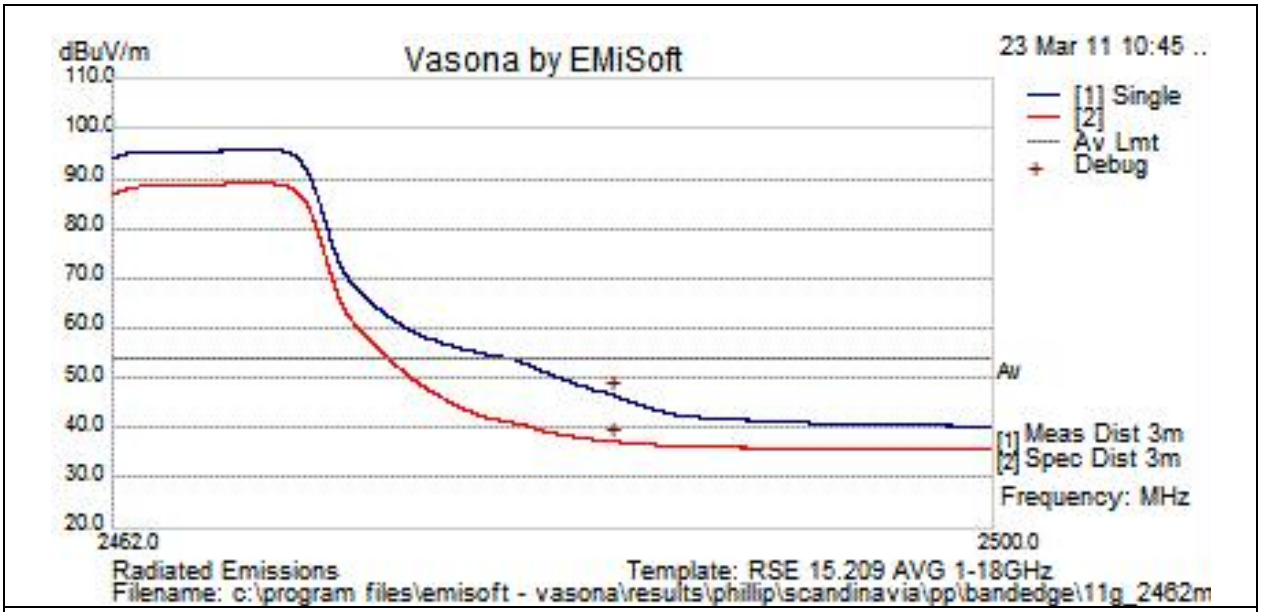
Title: Radiated BandEdge for 802.11G (2462MHz - Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2483.5	57	4.5	-6.4	55.1	Peak(Scan)	H	100	195	74	-18.9	Pass	
2483.5	47.1	4.5	-6.4	45.1	Peak(Scan)	V	100	241	74	-28.9	Pass	

Subtest Number: 59127 - 8	**Subtest Date:** 24-Mar-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated BandEdge for 802.11G (2462MHz - Ave)
Subtest Result	Pass
Highest Frequency	2500.0
Lowest Frequency	2462.0
Comments on the above Test Results	No further comments

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated BandEdge for 802.11G (2462MHz - Ave)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2483.5	48.7	4.5	-6.4	46.7	Peak(Scan)	H	100	195	54	-7.3	Pass	
2483.5	39.3	4.5	-6.4	37.3	Peak(Scan)	V	99	241	54	-16.7	Pass	

Co-Locator Radiated Spurious Emissions

15.205 & RSS-210 sec2.7:

Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a).

Note: All 3-axis (X,Y, Z) were evaluated during preliminary testing and the worse case orientation was for all formal testing shown below.

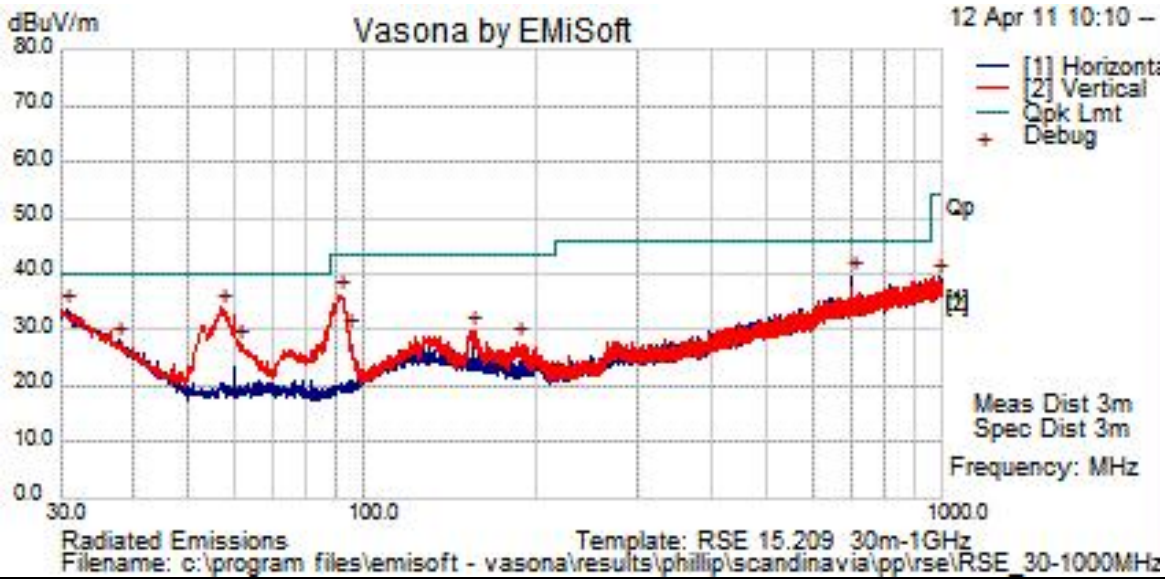
Test Number: 60888 **Spec ID:** 441				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
Co-Located Transmitters	Enclosure	N/A	1GHz-1.0GHz	Compliance based upon meeting the emission levels for radiated spurious emissions as stated in RSS-210, FCC part 15.209 and HKTA1039. CISPR limits are not applicable for this test
Operating Mode	**Mode :** 1, 802.11B/G Test Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

System Number	**Description**	**Samples**	**System under test**	**Support equipment**
1	Radio Test Sample	S01	☑	☐

Subtest Number: 60888 - 1	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 30 - 1000MHz
Subtest Result	Pass
Highest Frequency	1000.0
Lowest Frequency	30.0
Comments on the above Test Results	No further comments
Environmental Conditions:	
Temperature: within range of 54 to 95 F:	Yes
Humidity: between 10 and 75%:	Yes
Comments:	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Spurious Emissions from 30 - 1000MHz

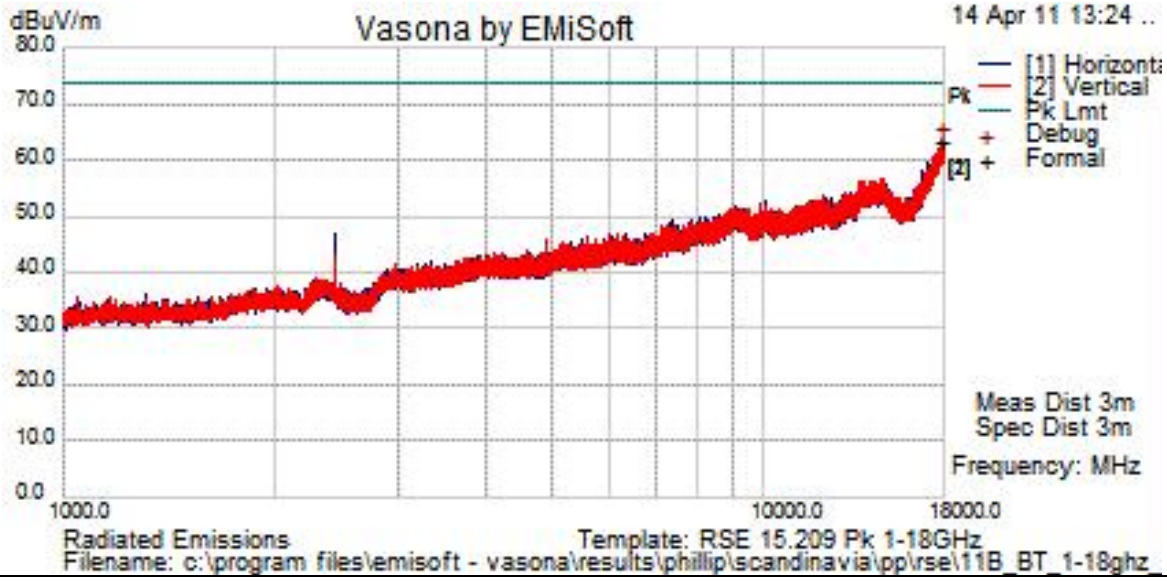
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
701.977	13.2	2.2	20.1	35.5	Qp	H	117	294	46	-10.5	Pass	
56.882	21.3	0.6	7	28.9	Qp	V	100	308	40	-11.1	Pass	
91.372	19.6	0.8	7.7	28	Qp	V	106	327	43.5	-15.5	Pass	
30.728	-3.6	0.4	20.7	17.5	Qp	H	100	308	40	-22.5	Pass	

Subtest Number: 60888 - 2	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 1-18GHz Peak for 802.11B & Bluetooth
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	No further comments

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Spurious Emissions from 1-18GHz Peak for 802.11B & Bluetooth

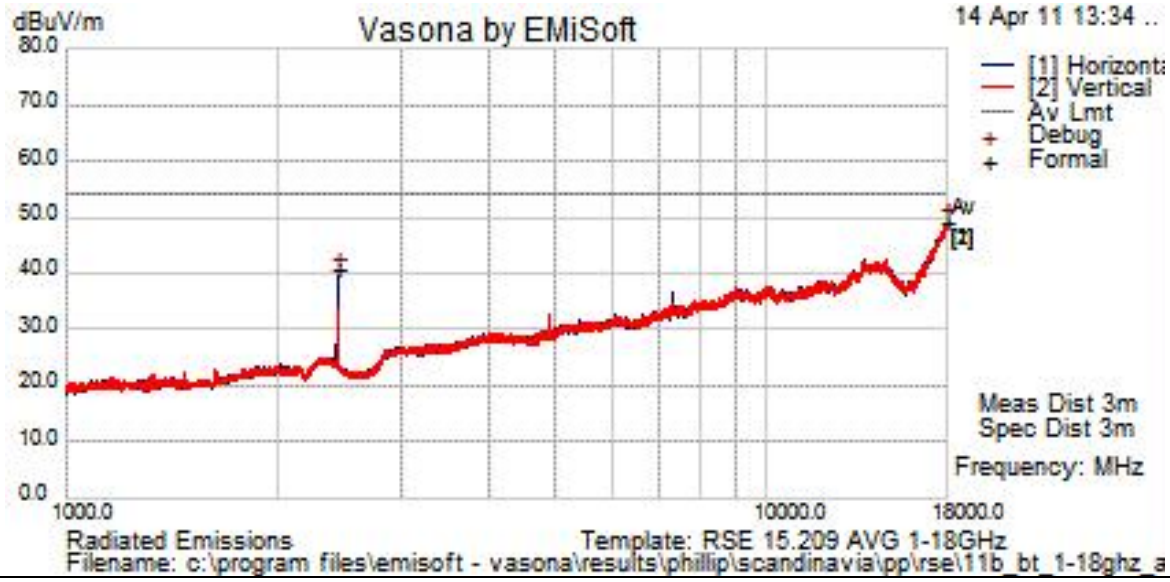
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17833.964	38.5	13.7	11.1	63.4	Pk	V	100	0	74	-10.6	Pass	Noise Floor

Subtest Number: 60888 - 3	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 1-18GHz Ave for 802.11B & Bluetooth
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	No further comments

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



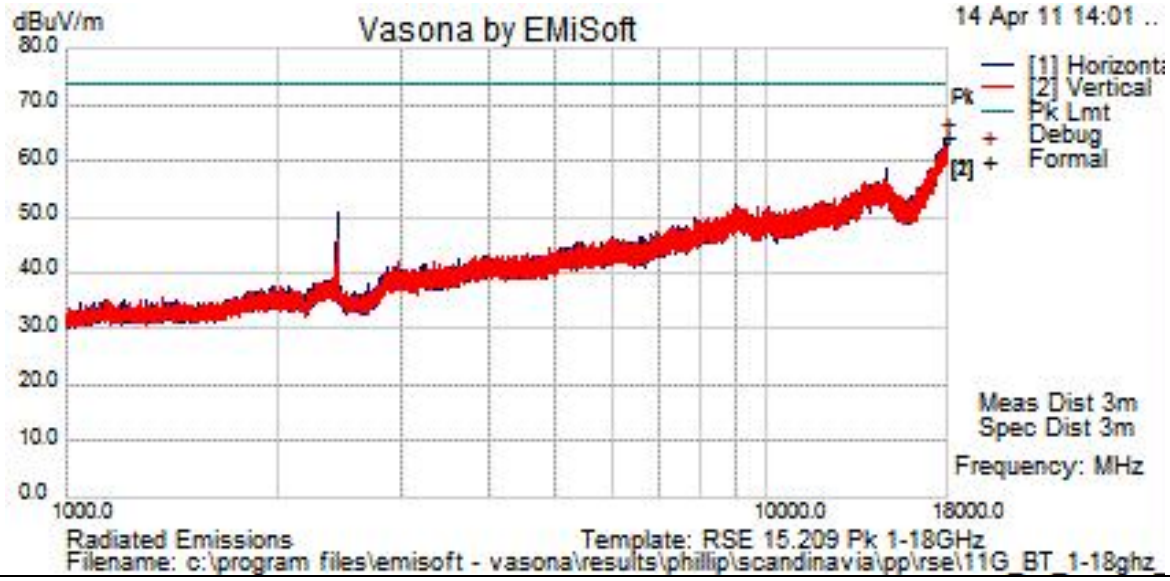
Title: Radiated Spurious Emissions from 1-18GHz Ave for 802.11B & Bluetooth

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17996.368	23.6	13.8	11.6	49	Av	H	100	0	54	-5	Pass	Noise Floor
2443.815	41.7	4.5	-5.7	40.5	Av	H	121	313	54	-13.5	Pass	

Subtest Number: 60888 - 4	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 1-18GHz Peak for 802.11G & Bluetooth
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Spurious Emissions from 1-18GHz Peak for 802.11G & Bluetooth

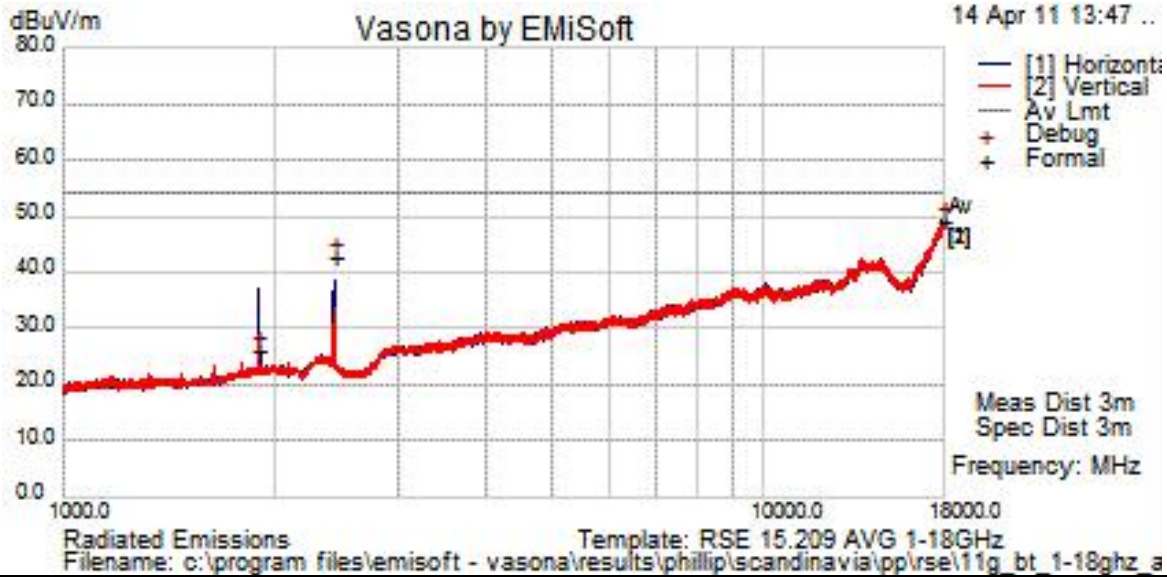
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17900.378	39	13.6	11.4	64	Pk	H	100	0	74	-10	Pass	Noise Floor

Subtest Number: 60888 - 5	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 1-18GHz Ave for 802.11G & Bluetooth
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Spurious Emissions from 1-18GHz Ave for 802.11G & Bluetooth

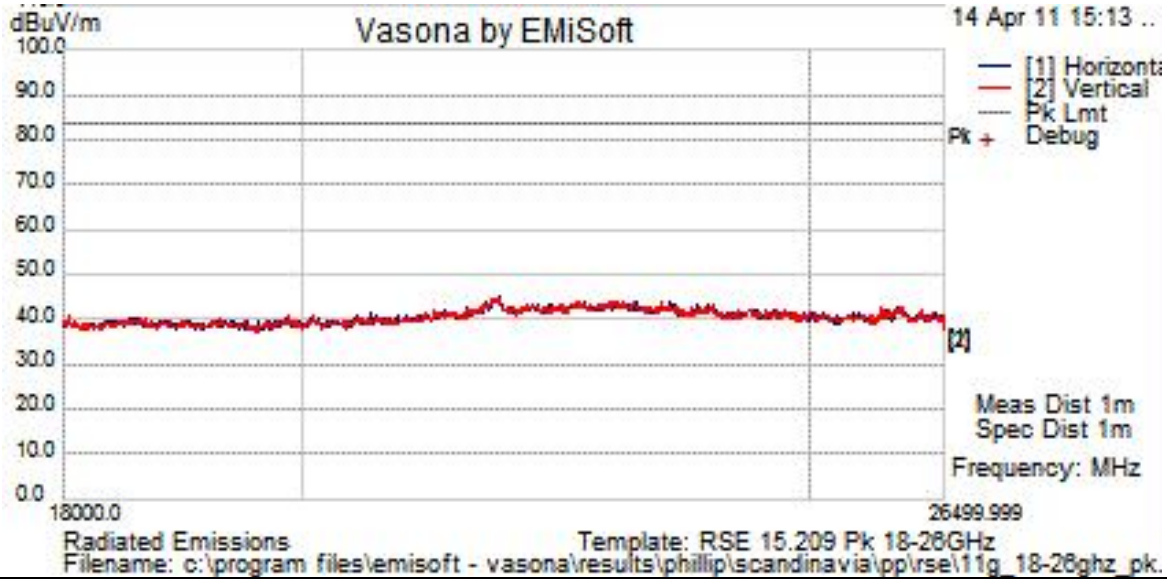
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17907.643	24.1	13.6	11.5	49.2	Av	H	100	0	54	-4.8	Pass	Noise Floor
2444.448	43.8	4.5	-5.7	42.6	Av	H	120	349	54	-11.4	Pass	
1894.288	27.6	3.9	-5.6	25.9	Av	H	110	236	54	-28.1	Pass	

Subtest Number: 60888 - 6	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 18-26GHz Peak for 802.11B & Bluetooth
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signal within 10dB of the Limit were observed.

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Spurious Emissions from 18-26GHz Peak for 802.11B & Bluetooth

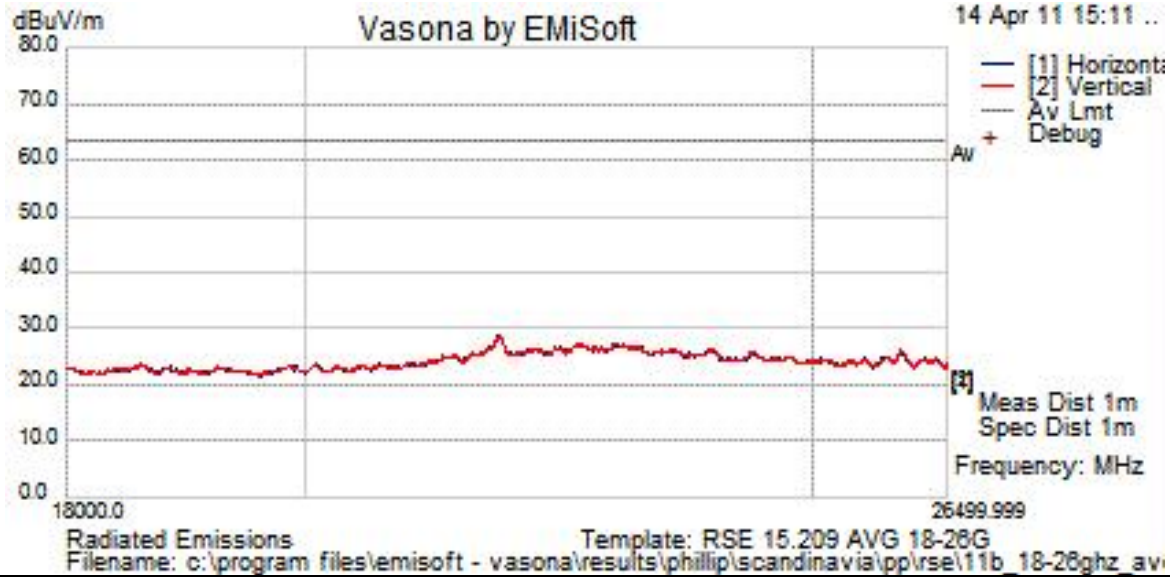
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Subtest Number: 60888 - 7	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 18-26GHz Ave for 802.11B & Bluetooth
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signal within 10dB of the Limit were observed.

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



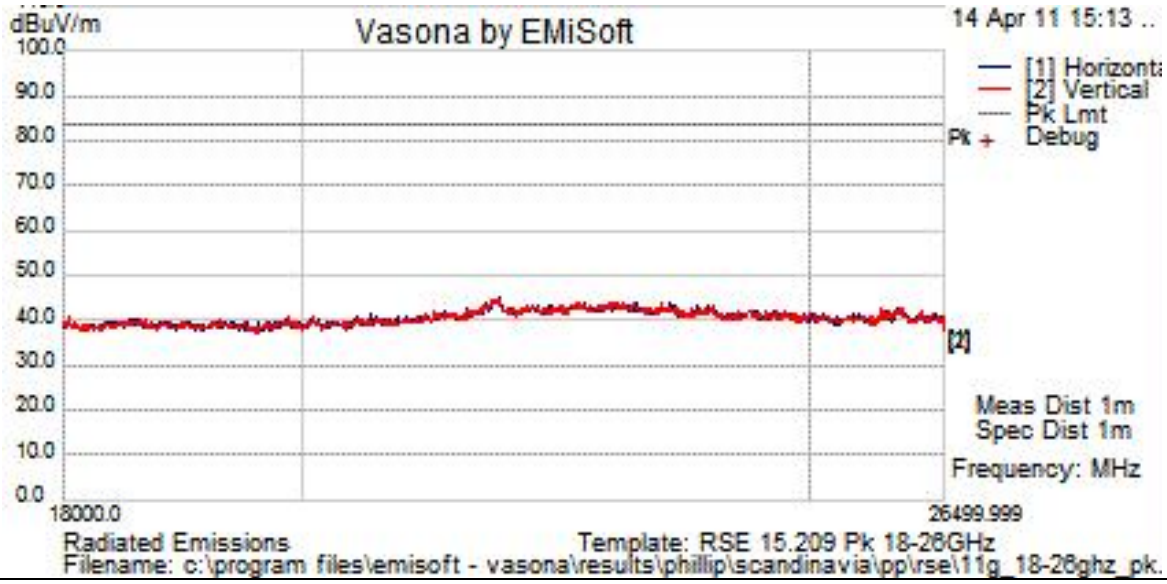
Title: Radiated Spurious Emissions from 18-26GHz Ave for 802.11B & Bluetooth

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Subtest Number: 60888 - 8	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 18-26GHz Peak for 802.11G & Bluetooth
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signal within 10dB of the Limit were observed.

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Radiated Spurious Emissions from 18-26GHz Peak for 802.11G & Bluetooth

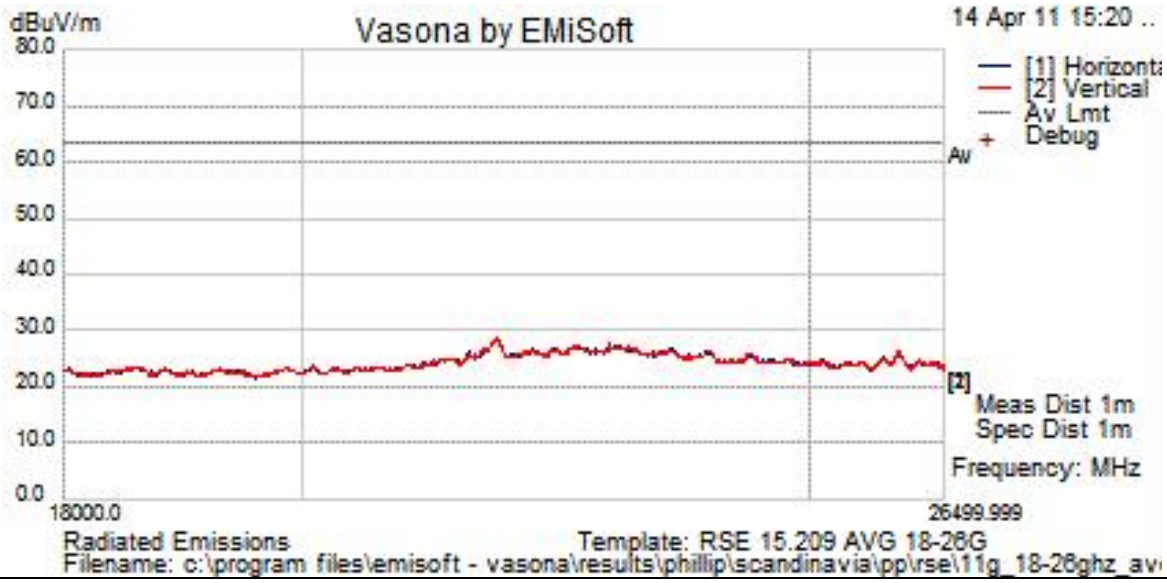
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Subtest Number: 60888 - 9	**Subtest Date:** 20-Apr-2011
Engineer	Phillip Carranco
Lab Information	Building I, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Spurious Emissions from 18-26GHz Ave for 802.11G & Bluetooth
Subtest Result	Pass
Highest Frequency	26499.999
Lowest Frequency	18000.0
Comments on the above Test Results	No Signal within 10dB of the Limit were observed.

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

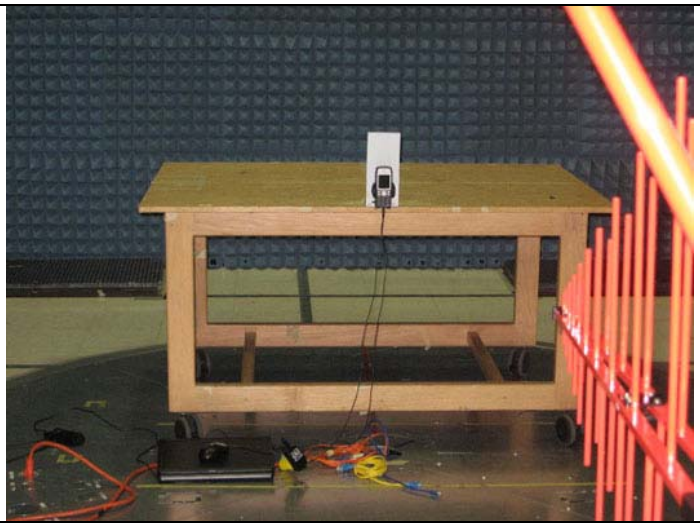


Title: Radiated Spurious Emissions from 18-26GHz Ave for 802.11G & Bluetooth

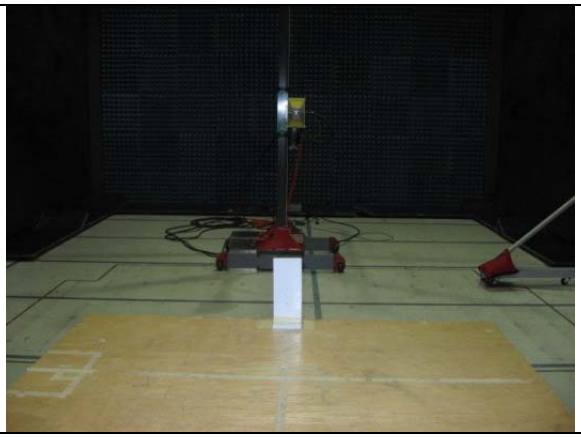
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

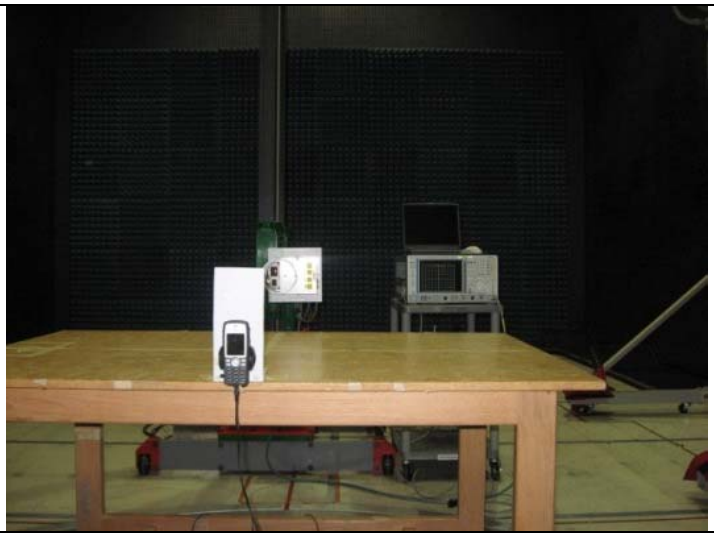
Physical Test arrangement Photograph:



Title: Radiated Spurious Emissions 30MHz – 1000MHz Test Setup

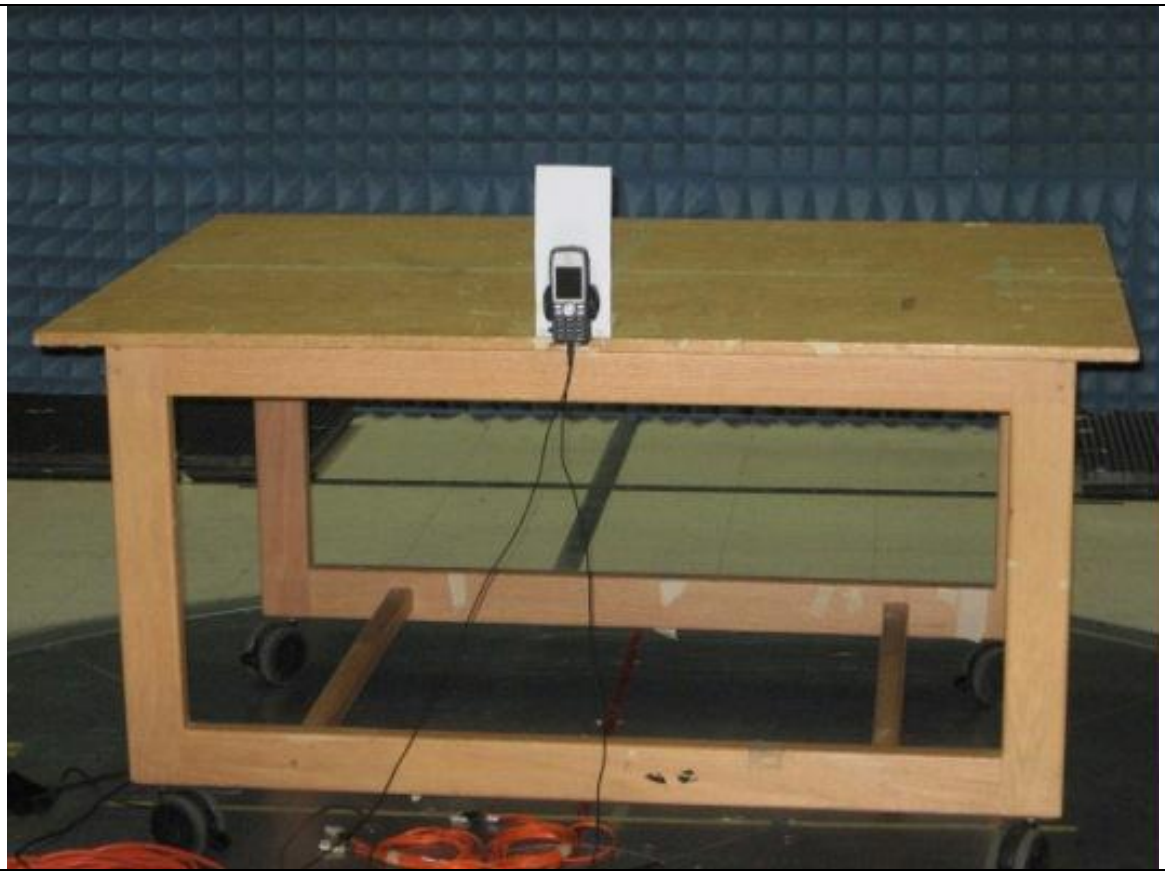


Title: Radiated Spurious Emissions 1 - 18GHz Test Setup

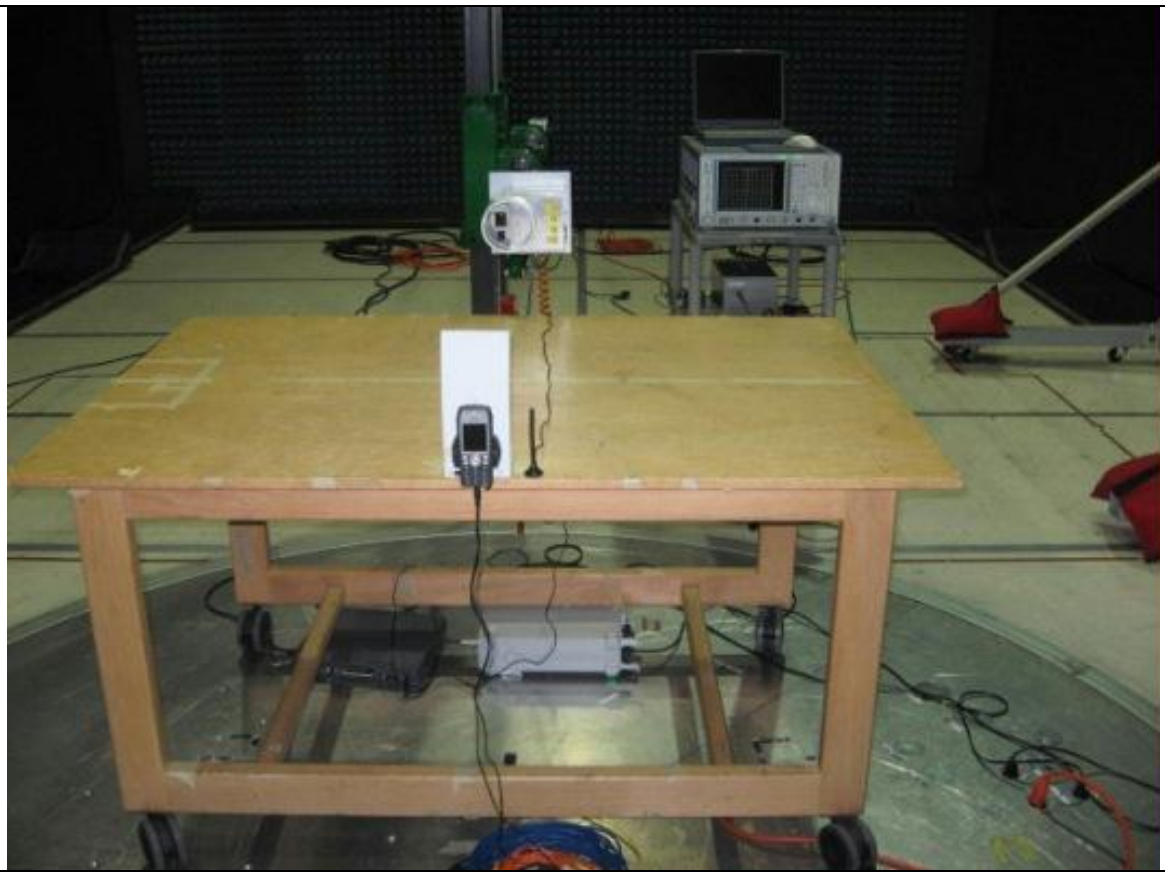


Title: Radiated Spurious Emissions 18G – 26.5GHz Test Setup

Comments on the above Photograph: No further comments



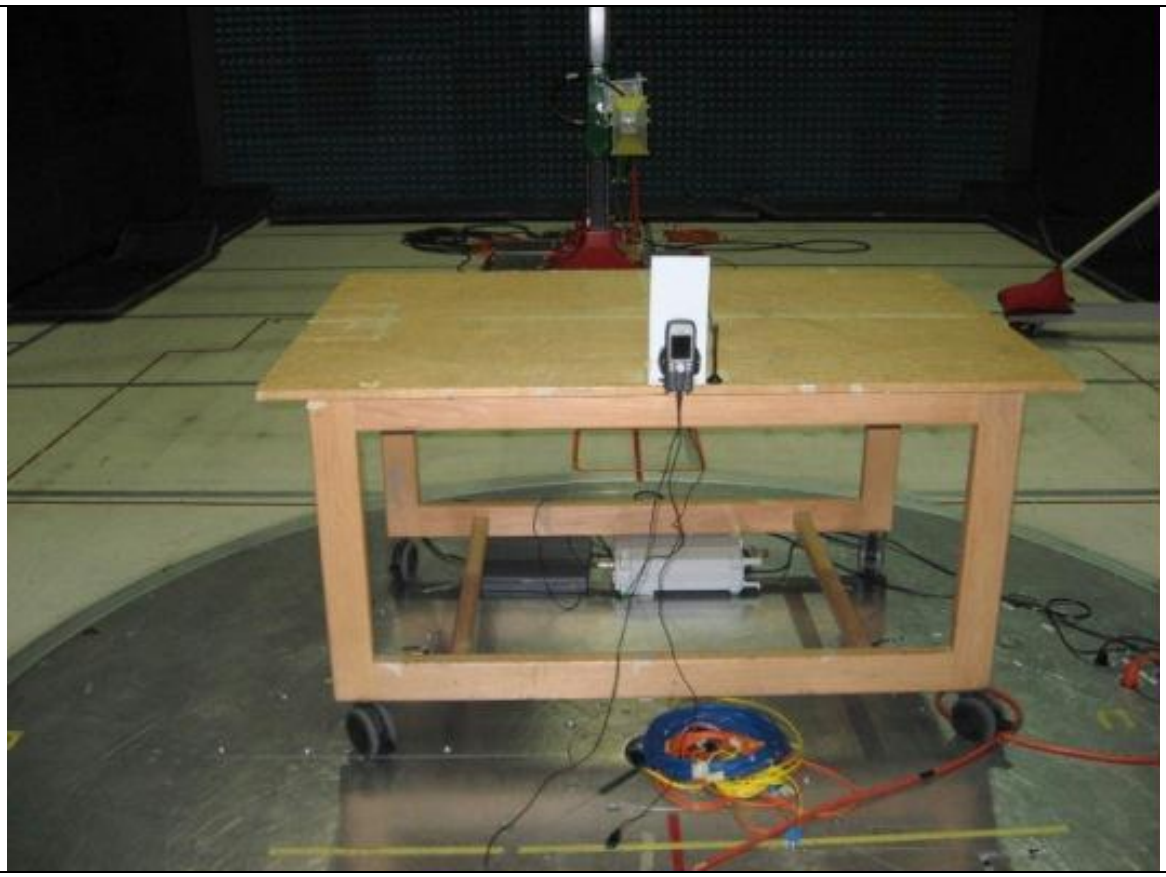
Title: Bandedge Setup Configure (Front View)



Title: Radiated Spurious Emissions Test Configuraiton for 18 - 26.5GHz

Comments on the above Photograph:

No further comments



Title: Radiated Spurious Emissions Test Configuraiton for 1 - 18GHz

Comments on the above Photograph:

No further comments

Title: Radiated Spurious Emissions Test Configuraiton for 30M - 1000MHz

Comments on the above Photograph:

Appendix B: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz ($1x10^3$)
EN	European Norm	MHz	MegaHertz ($1x10^6$)
IEC	International Electro technical Commission	GHz	Gigahertz ($1x10^9$)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt ($1x10^3$)
L1	Line 1	µV	Microvolt ($1x10^{-6}$)
L2	Line2	A	Amp
L3	Line 3	µA	Micro Amp ($1x10^{-6}$)
DC	Direct Current	mS	Milli Second ($1x10^{-3}$)
RAW	Uncorrected measurement value, as indicated by the measuring device	µS	Micro Second ($1x10^{-6}$)
RF	Radio Frequency	µS	Micro Second ($1x10^{-6}$)
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current

Appendix C: Test Equipment Used to perform the test

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
CIS005972	HP 83712B	Synthesized CW Generator	15-FEB-2011	15-FEB-2012
CIS035095	Micro-Coax UFA147A-0-0180-110200	RF Coaxial Cable, to 40 GHz, 18 in	13-OCT-2010	13-OCT-2011
CIS034974	Midwest Microwave ATT-0640-20-29M-02	Attenuator, 20dB, DC-40GHz	14-MAY-2010	14-MAY-2011
CIS040514	Agilent E4440A	Precision Spectrum Analyzer	09-NOV-2010	09-NOV-2011
CIS041986	Murata Electronics MXGS83RK3000	Special Radio Test Adaptor Cable	12-MAY-2010	12-MAY-2011
CIS008024	Huber + Suhner SF106A	3 meter Sucoflex cable	10-NOV-2010	10-NOV-2011
CIS030443	Micro-Coax UFB311A-0-1560-520520	RF Coaxial Cable, to 18GHz, 156 In.	10-NOV-2010	10-NOV-2011
CIS033602	Midwest Microwave CSY-NMNM-80-273001	RF Coaxial Cable, 27ft. to 18GHz	10-NOV-2010	10-NOV-2011
CIS045588	Sunol Sciences JB1	Combination Antenna, 30MHz-2GHz	03-DEC-2010	03-DEC-2011
CIS045051	Rohde & Schwarz ESCI	EMI Test Receiver	03-NOV-2010	03-NOV-2011
CIS002119	EMC Test Systems 3115	Double Ridged Guide Horn Antenna	30-JUN-2010	30-JUN-2011
CIS008022	Huber + Suhner SF106A	1 meter Sucoflex cable	16-DEC-2010	16-DEC-2011
CIS005691	Miteq NSP1800-25-S1	Broadband Preamplifier (1-18GHz)	02-FEB-2011	02-FEB-2012
CIS030666	Micro-Tronics BRM50702-02	Band Reject Filter, Stop Band=2.4-2.5GHz	04-JUN-2010	04-JUN-2011
CIS042000	Agilent E4440A	Precision Spectrum Analyzer	14-JUN-2010	14-JUN-2011
CIS008097	Huber + Suhner/ RG-223	RG-233 Cable 9m	26-JUL-10	26-JUL-11
CIS004924	Rohde & Schwarz/ ESHS30	EMI Receiver (9KHz-30MHz)	29-NOV-10	29-NOV-11
CIS008185	Fischer Custom Communications/ FCC-450B-2.4-N	Instrumentation Limiter	06-AUG-10	06-AUG-11
CIS008197	TTE/ H613-150K-50-21378	Hi Pass Filter - 150KHz cutoff	30-MAR-11	30-MAR-12
CIS008394	Coleman/ RG-223	RG-223 Cable 6 ft	27-MAY-11	27-MAY-12
CIS008490	Bird/ 5-T-MN	5W 50 Ohm Terminator	27-MAY-11	27-MAY-12
CIS007036	HP/ E7401A	Spectrum Analyzer	27-SEP-10	27-SEP-11
CIS018981	Fischer Custom Communications/ FCC-801-M2-32A	Power Line Coupling/Decoupling Network	03-MAY-11	03-MAY-12
CIS020767	Fischer Custom Communications/ FCC-450B-2.4-N	Instrumentation Limiter	06-AUG-10	06-AUG-11
CIS023874	Fischer Custom Communications/ FCC-LISN-PA-NEMA-5-15	Power Adaptor, Polarized 120VAC	22-SEP-10	22-SEP-11
CIS036033	York/ CNE V	Comparison Noise Emitter	Cal Not Required	N/A

Appendix D: Test Procedures

Measurements were made in accordance with

- FCC docket #:DA 00-0705,
- ET docket 96-8, KDB Publication No. 558074
- measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.
- ANSI PC63.10
- ANSI C63.4

Test procedures are summarized below

6dB Bandwidth	EDCS # - 422115
26dB Bandwidth	EDCS # - 422115
Co-Located Transmitter	EDCS # - 422118
Conducted Spurious Test	EDCS # - 422119
Peak Transmit Power Measurement	EDCS # - 422123
Power Spectral Density	EDCS # - 422113
Radiated Band Edge	EDCS # - 422124
Radiated Spurious Test	EDCS # - 422125