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Test Report

AIR-CAP1532I-A-K9

Cisco Aironet 802.11n Dual Band Mesh Access Points

FCC ID: LDK102090P

IC: 2461B-102090P

Also covers:

AIR-CAP1532I -N-K9

AIR- CAP1532I -T-K9

AIR- CAP1532I -Z-K9

5470-5725 MHz

Against the following Specifications: CFR47 Part 15.407 RSS210 LP0002

> **Cisco Systems** 170 West Tasman Drive San Jose, CA 95134

Test Engineer: Bud Chillin Date: 9-16-2013

Page No: 1 of 99

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SECTION 1: OVERVIEW	2
1.1 Test Summary	2
SECTION 2: ASSESSMENT INFORMATION	3
2.1 GENERAL	3
2.2 DATE OF TESTING	4
2.3 Report Issue Date	4
2.4 TESTING FACILITIES	4
2.5 Equipment Assessed (EUT)	4
2.6 EUT DESCRIPTION	5
SECTION 4: SAMPLE DETAILS	6
APPENDIX A: EMISSION TEST RESULTS	7
TARGET MAXIMUM CHANNEL POWER	7
99% and 26dB Bandwidth	8
PEAK OUTPUT POWER	15
Power Spectral Density	15
PEAK EXCURSION	34
CONDUCTED SPURIOUS EMISSIONS	41
Conducted Bandedge	69
20dB Bandwidth	80
APPENDIX B: EMISSION TEST RESULTS	86
RADIATED SPURIOUS EMISSIONS	
CONDUCTED EMISSIONS	943
RADIATED EMISSIONS	94
MAXIMUM PERMISSIBLE EXPOSURE (MPE) CALCULATIONS	96
APPENDIX C: TEST EQUIPMENT/SOFTWARE USED TO PERFORM THE TEST	

Page No: 1 of 98

Section 1: Overview

1.1 Test Summary

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

Emission	Immunity
CFR47 Part 15.407 RSS210	N/A

The specifications listed above represent actual tests performed to demonstrate compliance against the specifications

and basic standards listed on the front cover of this report. This list is not a one to one match to the front cover for one or more of the following reasons.

or more of the following reasons.

- 1. Basic standards call up many different test phenomena specifications such as the 61000-4-X series. The basic standards define which elements and levels shall be applied from these specifications and as such it is not appropriate to list the individual specifications on the front cover.
- 2. A Standard listed on the front cover may be required in a particular country but is not appropriate for the particular technologies included in the equipment under test. E.g. You cannot test a DC product to the mains Harmonics requirements in EN61000-3-2. See section 3.2.
- 3. Test results against a particular standard or specification may be included in a different test report. See section 3.2 for an EDCS reference of this data.
- 4. Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
- 5. Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.
- 6. Testing may have been performed to an equivalent test that satisfies the requirements of the standards and specifications listed on the front cover of the report. See section 3.2.
- Where radiated emissions testing has been performed to EN55022/CISPR22 the additional requirements of VCCI: V- 3/2006.04, EN55022: 1994 +A1/2 and CAN/CSA- CISPR 22-02 have also been evaluated unless otherwise stated.
- Testing to the requirements of CFR47 Part 15 was performed against the CISPR22 limits. The results are therefore deemed satisfactory evidence of compliance with Industry Canada Interference Causing Equipment Standard ICES-003.
- 9. Where assessment has been performed to CISPR24, all the applicable test requirements may have not been covered. Refer to the results section for the tests performed.

Notes:

- 1) Where a specification listed on the front cover of this report has deviations from the basic standards listed above, the additional technical requirements of the specification were also assessed.
- 2) Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
- 3) Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.

Page No: 2 of 98



Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc:

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 and measurement tolerances.
- 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:

Temperature15°C to 35°C (54°F to 95°F)Atmospheric Pressure860mbar to 1060mbar (25.4" to 31.3")

Humidity 10% to 75*%

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.

e) All AC testing was performed at one or more of the following supply voltages:

110V 60 Hz (+/-20%) 220V 50 Hz (+/-20%)

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Page No: 3 of 98



2.2 Date of testing

7/12/2013

2.3 Report Issue Date

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2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,	Cisco Systems, Inc.
4125 Highlander Parkway	170 West Tasman Drive
Richfield, OH 44286	San Jose, CA 95134
USA	USA

Test Engineers

James Nicholson, Bud Chiller

2.5 Equipment Assessed (EUT) AIR-CAP1532I-A-K9 Cisco Aironet 802.11n Mesh Access Point

Page No: 4 of 98



2.6 EUT Description

The 1532 Series Cisco Aironet 802.11n Radio Modules support the following modes of operation. The modes are further defined in the radio Theory of Operation. The modes included in this report represent the worst case data for all modes.

Non HT/VHT-20, One Antenna, 6 to 54 Mbps Non HT/VHT-20, Two Antennas, 6 to 54 Mbps

HT/VHT-20, One Antenna, M0 to M7 HT/VHT-20, Two Antennas, M0 to M15

HT/VHT-20 STBC, Two Antennas, M0 to M7 HT/VHT-20 STBC, Three Antennas, M0 to M7

Non HT/VHT-40 Duplicate, One Antenna, 6-54 Mbps Non HT/VHT-40 Duplicate, Two Antennas, 6-54 Mbps

HT/VHT-40, One Antenna, M0 to M7 HT/VHT-40, Two Antennas, M0 to M15

HT/VHT-40 STBC, Two Antennas, M0 to M7

The following antennas are supported by this product series.

The data included in this report represent the worst case data for all antennas.

Frequency	Part Number	Antenna Type	Antenna Gain (dBi)
2.4 / 5 GHz	Internal	Dual-resonant Omni	3 / 5

Page No: 5 of 98



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. Please also refer to the "Justification for worst Case test Configuration" section of this report for further details on the selection of EUT samples.

4.1 Sample Details (Photographs of the test samples, where appropriate can be found in appendix H)

Sample No.	Equipment Details	Part Number	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	AIR-CAP1532I-A-K9		Cisco Systems	NA	NA	NA	
S02	PoE supply	9501GO	Microsemi	NA	NA	NA	

4.2 System Details

System #	Description	Samples
1	EUT	S01, S02

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting

Page No: 6 of 98

Appendix A: Emission Test Results

Testing Laboratory: Cisco Systems, Inc., 4125 Highlander Parkway, Richfield, OH, USA

Target Maximum Channel Power

The following table details the maximum supported Total Channel Power for all operating modes.

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	Maximum Channel Power (dBm) Frequency (MHz)				
Operating Mode	5500	5560	5700		
Non HT-20, 6 to 54 Mbps	21	21	21		
HT-20, M0 to M15	22	21	21		
HT-20 STBC, M0 to M7	21 21 21				
	5510	5550			
Non HT-40 Duplicate, 6 to 54 Mbps	18	23			
HT-40, M0 to M15	19	23			
HT-40 STBC, M0 to M7	19	23			

Page No: 7 of 98

99% and 26dB Bandwidth

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

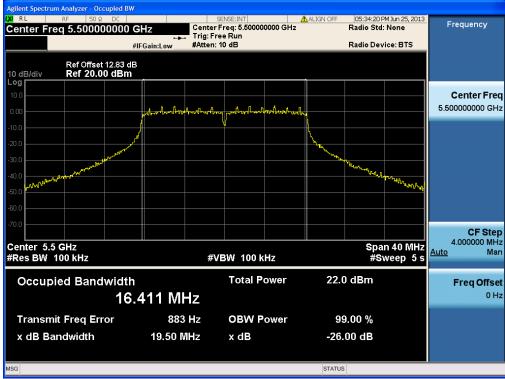
Center Frequency:	Frequency from table below
Span:	2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	5 s
Resolution Bandwidth:	1%-3% of 26 dB Bandwidth
Video Bandwidth:	≥Resolution Bandwidth
X dB Bandwidth:	26 dB
Detector:	Peak
Trace:	Single

Place the radio in continuous transmit mode. View the transmitter waveform on the spectrum analyzer, and record the pertinent measurements:

Page No: 8 of 98

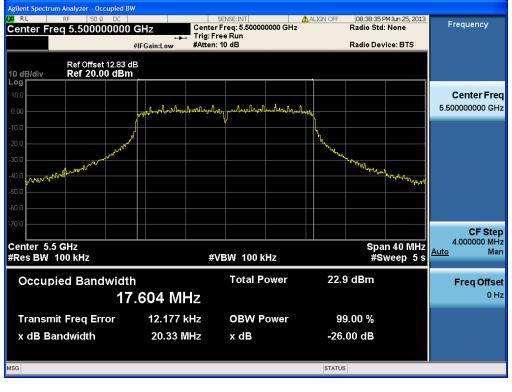
Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)		
5500	Non HT-20, 6 to 54 Mbps	6	19.5	16.4		
5500	HT-20, M0 to M23	m0	20.3	17.6		
5510	Non HT-40, 6 to 54 Mbps	6	39.6	36.1		
5510	HT-40, M0 to M23	m0	39.9	36.1		
	Non HT-40, 6 to 54 Mbps	6	39.5	36.1		
5550	HT-40, M0 to M23	m0	39.7	36		
	-					
FFCO	Non HT-20, 6 to 54 Mbps	6	19.3	16.4		
5560	HT-20, M0 to M23	m0	20.2	17.6		
5700	Non HT-20, 6 to 54 Mbps	6	19.5	16.4		
5700	HT-20, M0 to M23	m0	20.3	17.6		

Page No: 9 of 98



26dB / 99% Bandwidth, 5500 MHz, Non HT-20, 6 to 54 Mbps

26dB / 99% Bandwidth, 5500 MHz, HT-20, M0 to M23

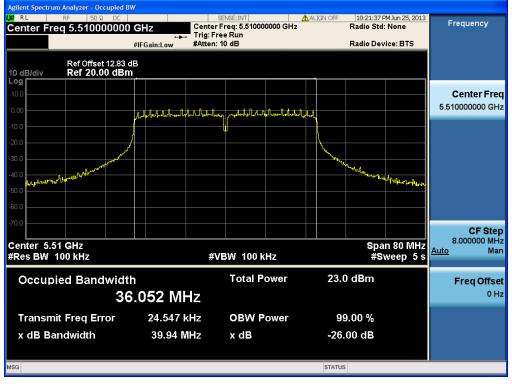


Page No: 10 of 98

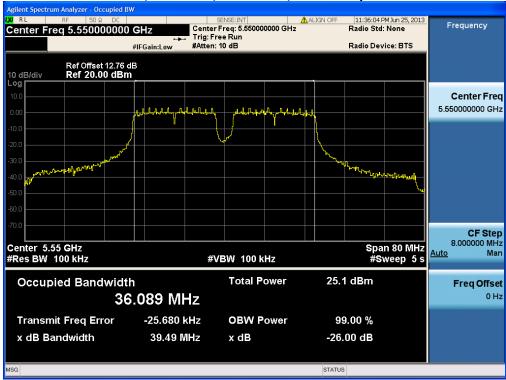


26dB / 99% Bandwidth, 5510 MHz, Non HT-40, 6 to 54 Mbps

26dB / 99% Bandwidth, 5510 MHz, HT-40, M0 to M23

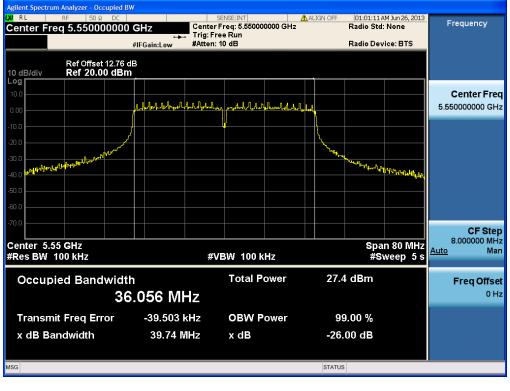


Page No: 11 of 98

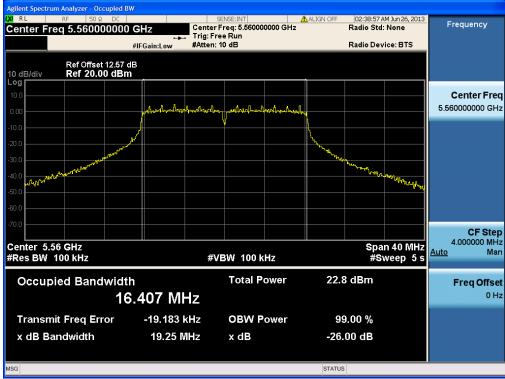


26dB / 99% Bandwidth, 5550 MHz, Non HT-40, 6 to 54 Mbps

26dB / 99% Bandwidth, 5550 MHz, HT-40, M0 to M23

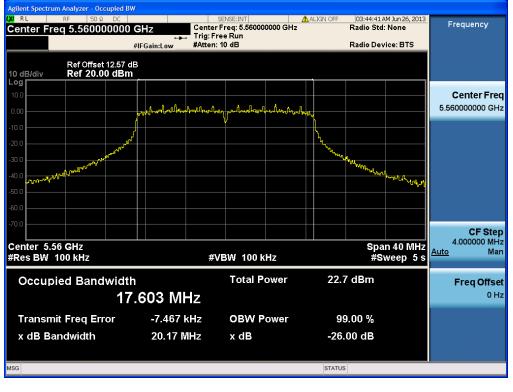


Page No: 12 of 98

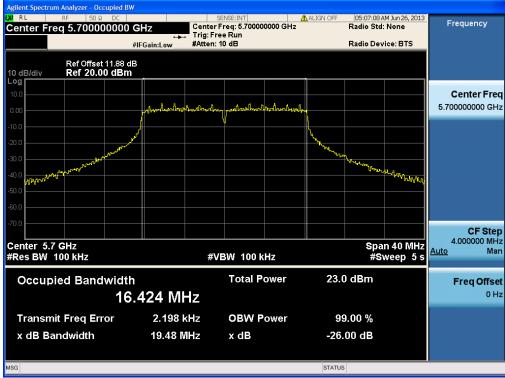


26dB / 99% Bandwidth, 5560 MHz, Non HT-20, 6 to 54 Mbps

26dB / 99% Bandwidth, 5560 MHz, HT-20, M0 to M23



Page No: 13 of 98



26dB / 99% Bandwidth, 5700 MHz, Non HT-20, 6 to 54 Mbps

26dB / 99% Bandwidth, 5700 MHz, HT-20, M0 to M23



Page No: 14 of 98

Peak Output Power

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

The smallest 26dB bandwidth for all channels is 20.4 MHz. The maximum conducted output power is calculated as 11dBm+10*log(20.4MHz) = 24dBm

The maximum supported antenna gain for all bands is 5dBi. The peak correlated gain for each mode is listed in the table below. See the Theory of Operation for details on the correlated gain for each mode.

The "measure-and-sum technique" is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units.

Power Spectral Density

15.407: For the bands 5.25-5.35 and 5.47-5.725 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum supported antenna gain is 5dBi. The peak correlated gain for each mode is listed in the table below. See the Theory of Operation for details on the correlated gain for each mode.

The "Measure and add 10 log(N) dB technique", where N is the number of outputs, is used for measuring in-band Power Spectral Density. With this technique, spectrum measurements are performed at each output of the device, and the quantity 10 log(4) (or 6dB) is added to the worst case spectrum value before comparing to the emission limit. Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below.

Enable "Channel Power" function of analyzer Center Frequency: Frequency from table below Span: 20 MHz (must be greater than 26dB bandwidth, adjust as necessary) Ref Level Offset: Correct for attenuator and cable loss. 20 dBm Reference Level: Attenuation: 20 dB Sweep Time: 100ms, Single sweep Resolution Bandwidth: 1 MHz Video Bandwidth: 3 MHz Detector: Sample Trace: Trace Average 100 traces in Power Averaging Mode Integration BW: =99% BW from 99% Bandwidth Data

After averaging 100 traces of the transmitter waveform on the spectrum analyzer, record the spectrum analyzer Channel Power. Perform a Marker Peak Search function, and record this value as the Power Spectral Density.

Page No: 16 of 98

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	Peak Power Table							
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Total Tx Channel Power (dBm)	Limit (dBm)	Margin (dB)
	Non HT-20, 6 to 54 Mbps	1	5	20.7		20.7	24	3.3
	Non HT-20, 6 to 54 Mbps	2	5	15.6	16.0	18.8	24	5.2
5500	HT-20, M0 to M7	1	5	21.6		21.6	24	2.4
55	HT-20, M0 to M7	2	5	16.2	17.0	19.6	24	4.4
	HT-20, M8 to M15	2	5	17.8	18.8	21.3	24	2.7
	HT-20 STBC, M0 to M7	2	5	17.8	18.8	21.3	24	2.7
	Non HT-40, 6 to 54 Mbps	1	5	16.3		16.3	24	7.7
	Non HT-40, 6 to 54 Mbps	2	5	15.3	15.4	18.4	24	5.6
5510	HT-40, M0 to M7	1	5	15.9		15.9	24	8.1
55	HT-40, M0 to M7	2	5	15.9	16.3	19.1	24	4.9
	HT-40, M8 to M15	2	5	15.9	16.3	19.1	24	4.9
	HT-40 STBC, M0 to M7	2	5	15.9	16.3	19.1	24	4.9
		-			-			
	Non HT-40, 6 to 54 Mbps	1	5	23.1		23.1	24	0.9
	Non HT-40, 6 to 54 Mbps	2	5	18.3	19.1	21.7	24	2.3
5550	HT-40, M0 to M7	1	5	22.7		22.7	24	1.3
56	HT-40, M0 to M7	2	5	18.8	19.6	22.2	24	1.8
	HT-40, M8 to M15	2	5	19.7	20.5	23.1	24	0.9
	HT-40 STBC, M0 to M7	2	5	19.7	20.5	23.1	24	0.9
		-	_					
	Non HT-20, 6 to 54 Mbps	1	5	21.3		21.3	24	2.7
	Non HT-20, 6 to 54 Mbps	2	5	16.2	16.2	19.2	24	4.8
560	HT-20, M0 to M7	1	5	21.0		21.0	24	3.0
51	HT-20, M0 to M7	2	5	15.9	15.9	18.9	24	5.1
	HT-20, M8 to M15	2	5	18.1	18.8	21.5	24	2.5
	HT-20 STBC, M0 to M7	2	5	18.1	18.8	21.5	24	2.5
		1	F	20.7		20.7	24	2.2
	Non HT-20, 6 to 54 Mbps	1	5	20.7	107	20.7	24	3.3
	Non HT-20, 6 to 54 Mbps	2	5	15.0	16.7	18.9	24	5.1
5700	HT-20, M0 to M7	1	5	18.7	10 5	18.7	24	5.3
ы	HT-20, M0 to M7	2	5	15.0	16.5	18.8	24	5.2
	HT-20, M8 to M15	2	5	16.8	18.6	20.8	24	3.2
	HT-20 STBC, M0 to M7	2	5	16.8	18.6	20.8	24	3.2

Page No: 17 of 98

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R	PSD Table							
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 PSD (dBm/MHz)	Tx 2 PSD (dBm/MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
	Non HT-20, 6 to 54 Mbps	1	5	10.1		10.1	11.0	0.9
	Non HT-20, 6 to 54 Mbps	2	8	5.4	5.7	8.6	9.0	0.4
5500	HT-20, M0 to M7	1	5	10.7		10.7	11.0	0.3
55	HT-20, M0 to M7	2	8	5.4	6.2	8.8	9.0	0.2
	HT-20, M8 to M15	2	5	7.0	8.1	10.6	11.0	0.4
	HT-20 STBC, M0 to M7	2	5	7.0	8.1	10.6	11.0	0.4
	Non HT-40, 6 to 54 Mbps	1	5	9.7		9.7	11.0	1.3
	Non HT-40, 6 to 54 Mbps	2	8	5.1	6.0	8.6	9.0	0.4
5510	HT-40, M0 to M7	1	5	9.2		9.2	11.0	1.8
55	HT-40, M0 to M7	2	8	5.2	6.4	8.9	9.0	0.1
	HT-40, M8 to M15	2	5	6.3	7.1	9.7	11.0	1.3
	HT-40 STBC, M0 to M7	2	5	6.3	7.1	9.7	11.0	1.3
	Non HT-40, 6 to 54 Mbps	1	5	9.3		9.3	11.0	1.7
	Non HT-40, 6 to 54 Mbps	2	8	4.8	5.9	8.4	9.0	0.6
5550	HT-40, M0 to M7	1	5	8.8		8.8	11.0	2.2
5	HT-40, M0 to M7	2	8	4.9	5.8	8.4	9.0	0.6
	HT-40, M8 to M15	2	5	5.7	6.6	9.2	11.0	1.8
	HT-40 STBC, M0 to M7	2	5	5.7	6.6	9.2	11.0	1.8
			_					
	Non HT-20, 6 to 54 Mbps	1	5	10.9		10.9	11.0	0.1
	Non HT-20, 6 to 54 Mbps	2	8	5.7	5.6	8.7	9.0	0.3
560	HT-20, M0 to M7	1	5	10.4		10.4	11.0	0.6
5	HT-20, M0 to M7	2	8	5.3	5.7	8.5	9.0	0.5
	HT-20, M8 to M15	2	5	7.7	8.2	11.0	11.0	0.0
	HT-20 STBC, M0 to M7	2	5	7.7	8.2	11.0	11.0	0.0
		4	-	10.0		10.0	11.0	1.0
	Non HT-20, 6 to 54 Mbps	1	5	10.0	F 0	10.0	11.0	1.0
	Non HT-20, 6 to 54 Mbps	2	8	4.7	5.9	8.4	9.0	0.6
5700	HT-20, M0 to M7	1	5	10.2	6.4	10.2	11.0	0.8
ъ	HT-20, M0 to M7	2	8	4.4	6.1	8.3	9.0	0.6
	HT-20, M8 to M15	2	5	6.2	7.9	10.1	11.0	0.9
	HT-20 STBC, M0 to M7	2	5	6.2	7.9	10.1	11.0	0.9

Page No: 18 of 98

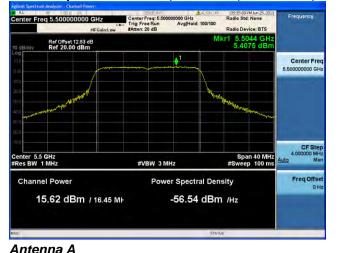


Peak Output Power / PSD, 5500 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

Peak Output Power / PSD, 5500 MHz, Non HT-20, 6 to 54 Mbps





Antenna B

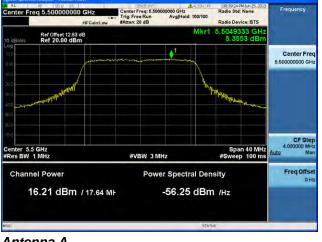
Page No: 19 of 98

08:05:57 PM Jun 25 Radio Std: None 000 GHz AvgiHol vice: BT 5.5042 G 10.730 dl Ref Offset 12.83 dE Ref 20.00 dBm Center Fre CFS Span 40 MHz #Sweep 100 ms Center 5.5 GHz #Res BW 1 MHz #VBW 3 MHz Channel Power Power Spectral Density Freq Off 21.61 dBm / 17.64 MF -50.85 dBm /Hz

Peak Output Power / PSD, 5500 MHz, HT-20, M0 to M7



Peak Output Power / PSD, 5500 MHz, HT-20, M0 to M7





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Antenna A



Page No: 20 of 98

Peak Output Power / PSD, 5500 MHz, HT-20, M8 to M15 Radio Device: BTS 1 5.505 GI 6.9728 dB Ref Offset 12.83 di Ref 20.00 dBm Center Fred CFS Span 40 MH #Sweep 100 m Center 5.5 GHz #Res BW 1 MHz #VBW 3 MHz Channel Power Power Spectral Density Freq Offs 17.77 dBm / 17.64 MF -54.70 dBm /Hz

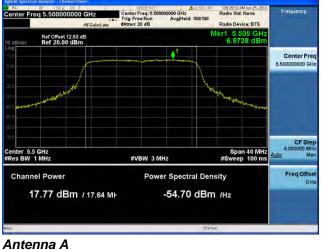


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Antenna A



Peak Output Power / PSD, 5500 MHz, HT-20 STBC, M0 to M7





Antenna B

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Page No: 21 of 98



Peak Output Power / PSD, 5510 MHz, Non HT-40, 6 to 54 Mbps



Peak Output Power / PSD, 5510 MHz, Non HT-40, 6 to 54 Mbps





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Antenna A

Antenna B

Page No: 22 of 98



Peak Output Power / PSD, 5510 MHz, HT-40, M0 to M7

Antenna A

Peak Output Power / PSD, 5510 MHz, HT-40, M0 to M7





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Frequency

Antenna A

Antenna B

Page No: 23 of 98



10:22:27 PM Jun 2 Radio Std: None 00 GH: Radio Device: BTS 2,1590 Ref Offset 12.83 dE Ref 20.00 dBm

Peak Output Power / PSD, 5510 MHz, HT-40, M8 to M15

Antenna A

Peak Output Power / PSD, 5510 MHz, HT-40 STBC, M0 to M7



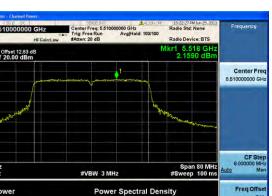


Antenna B

Page No: 24 of 98

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Center 5.51 GHz #Res BW 1 MHz Channel Power 16.28 dBm / 36.13 MF



-59.30 dBm /Hz

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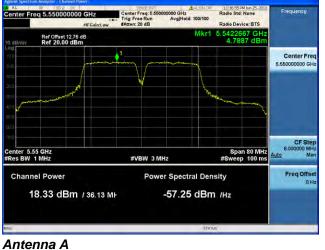
Antenna B

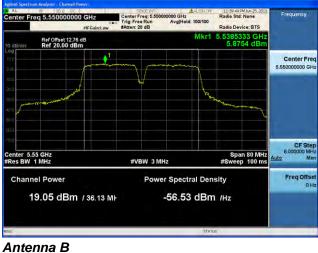


Peak Output Power / PSD, 5550 MHz, Non HT-40, 6 to 54 Mbps



Peak Output Power / PSD, 5550 MHz, Non HT-40, 6 to 54 Mbps





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Page No: 25 of 98



Peak Output Power / PSD, 5550 MHz, HT-40, M0 to M7



Peak Output Power / PSD, 5550 MHz, HT-40, M0 to M7



Antenna A



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Antenna B

Page No: 26 of 98

Peak Output Power / PSD, 5550 MHz, HT-40, M8 to M15 Center Freq 5.550000000 GHz Fig Freq & Mith 1 5.5503 GHz Ref 00:04 12.76 dB Center Freq 5.550 GHz Ref 00:04 12.76 dB Center Store 12.76 dB Freq Offset DB Center Store 12.76 dB Freq Offset DB Center Store 12.76 dB Center Store 12.76 dB Center Store 12.76 dB Center Store 12.76 dB Freq Offset DB Center Store 12.76 dB Center Store 12.76 dB Center Store 12.76 dB Center Store 12.76 dB Freq Offset DB Center Store 12.76 dB Center Store 12.76 dB Center Store 12.76 dB Center Store 12.76 dB Freq Offset DB Center Store 12.76 dB Center Store 12

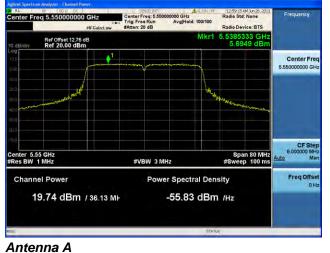


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Antenna A



Peak Output Power / PSD, 5550 MHz, HT-40 STBC, M0 to M7





Antenna B

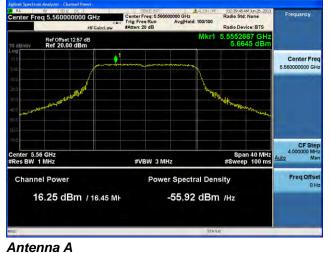
Page No: 27 of 98



Peak Output Power / PSD, 5560 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Peak Output Power / PSD, 5560 MHz, Non HT-20, 6 to 54 Mbps





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Antenna B

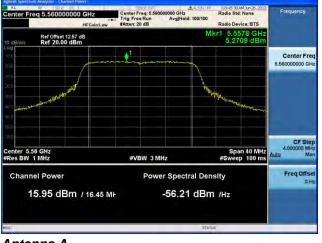
Page No: 28 of 98



Peak Output Power / PSD, 5560 MHz, HT-20, M0 to M7



Peak Output Power / PSD, 5560 MHz, HT-20, M0 to M7





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Antenna A



Page No: 29 of 98

Peak Output Power / PSD, 5560 MHz, HT-20, M8 to M15 Center Freq 5.560000000 GHz Tig Freq Low Auto: 22 dB Mkr 1 5.654 GHz Freq 20.00 dB Center Freq 5.5600000 GHz Tig Freq Low Auto: 22 dB Mkr 1 5.654 GHz Freq 20.00 dB Center Freq 5.5600000 GHz Tig Freq Low Auto: 22 dB Mkr 1 5.654 GHz Freq 20.00 dB Center Freq 5.5600000 GHz Tig Freq Low Auto: 20 dB Mkr 1 5.654 GHz Freq 20.00 dB Center Freq 5.5600000 GHz Tig Freq Low Auto: 20 dB Mkr 1 5.654 GHz Freq 0.0000 MHz Source 12.57 dB Center Freq 5.5600000 GHz Tig Freq Low Auto: 20 dB Freq 0.0000 MHz Auto: 20 dB Freq 0.00000 MHz Auto: 20 dB Freq 0.0000 MHz Auto: 20 dB Freq 0.0000 MHz Auto: 20 dB Freq 0.0000 MHz Auto: 20 dB Mkr 1 5.650 Freq 0.0000 MHz Auto: 20 dB Freq 0.0000 MHz Auto: 20 dB



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Frequency

Center Free

Radio Device: BTS

8.2437

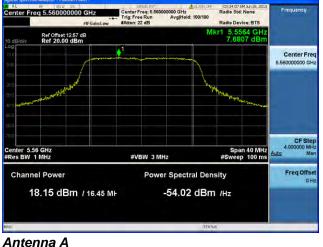
Antenna A



Freq 5.56000000 GH

Ref Offset 12.57 dE Ref 20.00 dBm

Peak Output Power / PSD, 5560 MHz, HT-20 STBC, M0 to M7



18.78 d



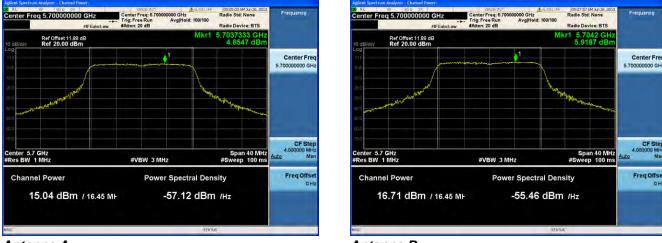
Antenna B

Page No: 30 of 98



Peak Output Power / PSD, 5700 MHz, Non HT-20, 6 to 54 Mbps

Antenna A



Peak Output Power / PSD, 5700 MHz, Non HT-20, 6 to 54 Mbps

Antenna A



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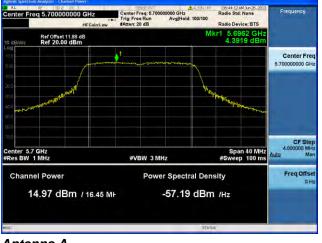
Page No: 31 of 98



Peak Output Power / PSD, 5700 MHz, HT-20, M0 to M7



Peak Output Power / PSD, 5700 MHz, HT-20, M0 to M7





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Antenna A



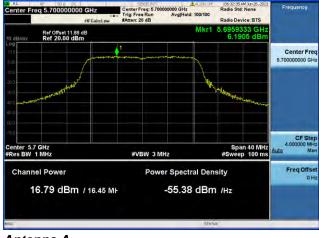
Page No: 32 of 98

Peak Output Power / PSD, 5700 MHz, HT-20, M8 to M15 Center Freq 5700000000 GHz Tig Free fue Aughed to 10000 Radio Se None Status: 20 dB Mkt 1 5.69333 GHz Span 40 MHz Status None None Freq Offset DHz Some None None

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Antenna B

Peak Output Power / PSD, 5700 MHz, HT-20 STBC, M0 to M7



Antenna A





Page No: 33 of 98

Peak Excursion

15.407: The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Set the spectrum analyzer span to view the entire emission bandwidth. The largest difference between the following two traces must be <= 13 dB for all frequencies across the emission bandwidth.

Set the spectrum analyzer span to view the entire emission bandwidth. The largest difference between the following two traces must be <= 13 dB for all frequencies across the emission bandwidth.

1st Trace: (Peak)

Set Span to encompass the entire emission bandwidth of the signal.

RBW = 1 MHz, VBW = 3 MHz

Detector = Peak

Sweep = Auto Trace 1 = Max-hold

Ref Level Offset = correct for attenuator and cable loss

Ref Level = 20dBm

Atten = 10dBm

2nd Trace: (Average)

Trace 2 = clear right

Detector = Sample

Avg/VBW type = Pwr(RMS)

Average = 100

Sweep = single

Set marker Deltas

Trace 1 & Peak search Marker Delta Trace 2 & Peak search

Record the difference between the Peak and Average Markers

Page No: 34 of 98

Frequency (MHz)	Mode	Data Rate (Mbps)	Peak Excursion (dB)	Limit (dBm/MHz)	Margin (dB)
5500	Non HT-20, 6 to 54 Mbps	6	7.1	13	5.9
	HT-20, M0 to M23	m0	7.2	13	5.8
5510	Non HT-40, 6 to 54 Mbps	6	7.1	13	5.9
	HT-40, M0 to M23	m0	7.2	13	5.8
5550	Non HT-40, 6 to 54 Mbps	6	7.5	13	5.5
	HT-40, M0 to M23	m0	7.5	13	5.5
5560	Non HT-20, 6 to 54 Mbps	6	7.2	13	5.8
	HT-20, M0 to M23	m0	7.5	13	5.5
5700	Non HT-20, 6 to 54 Mbps	6	7.2	13	5.8
	HT-20, M0 to M23	m0	7.3	13	5.7

Page No: 35 of 98

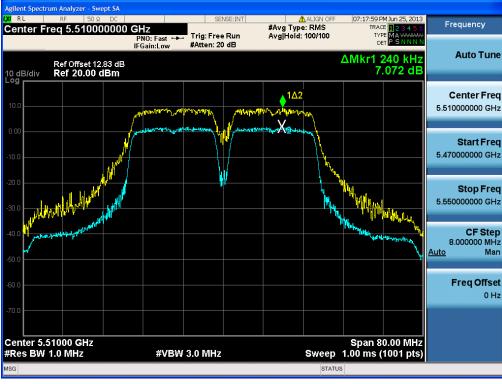


Peak Excursion, 5500 MHz, Non HT-20, 6 to 54 Mbps

Peak Excursion, 5500 MHz, HT-20, M0 to M23



Page No: 36 of 98



Peak Excursion, 5510 MHz, Non HT-40, 6 to 54 Mbps

Peak Excursion, 5510 MHz, HT-40, M0 to M23



Page No: 37 of 98

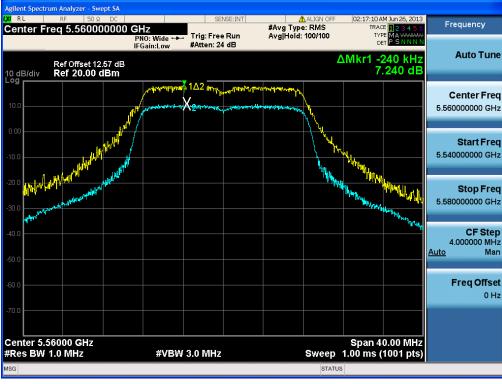


Peak Excursion, 5550 MHz, Non HT-40, 6 to 54 Mbps

Peak Excursion, 5550 MHz, HT-40, M0 to M23



Page No: 38 of 98



Peak Excursion, 5560 MHz, Non HT-20, 6 to 54 Mbps

Peak Excursion, 5560 MHz, HT-20, M0 to M23



Page No: 39 of 98



Peak Excursion, 5700 MHz, Non HT-20, 6 to 54 Mbps

Peak Excursion, 5700 MHz, HT-20, M0 to M23



Page No: 40 of 98

Conducted Spurious Emissions

15.407: For transmitters operating in the 5.25-5.35 and 5.47-5.725 GHz band: all emissions outside of the 5.25-5.35 and 5.47-5.725 GHz bands shall not exceed an EIRP of -27dBm/MHz.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	30 MHz-40 GHz
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	10 s
Resolution Bandwidth:	1 MHz
Video Bandwidth:	3 MHz
Detector:	Peak
Trace:	Single
Marker:	Peak

Record the marker waveform peak to spur difference

Page No: 41 of 98

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Total Conducted Spur (dBm)	Average Limit (dBm)	Margin (dB)
	Non HT-20, 6 to 54 Mbps	1	5	-57.1		-57.1	-41.25	15.9
	Non HT-20, 6 to 54 Mbps	2	5	-57.0	-56.9	-53.9	-41.25	12.7
5500	HT-20, M0 to M7	1	5	-57.0		-57.0	-41.25	15.8
55	HT-20, M0 to M7	2	5	-56.9	-56.9	-53.9	-41.25	12.6
	HT-20, M8 to M15	2	5	-57.0	-56.9	-53.9	-41.25	12.7
	HT-20 STBC, M0 to M7	2	5	-57.0	-56.9	-53.9	-41.25	12.7
	Non HT-40, 6 to 54 Mbps	1	5	-57.0		-57.0	-41.25	15.8
	Non HT-40, 6 to 54 Mbps	2	5	-56.9	-56.9	-53.9	-41.25	12.6
5510	HT-40, M0 to M7	1	5	-57.0		-57.0	-41.25	15.8
55	HT-40, M0 to M7	2	5	-57.0	-56.8	-53.9	-41.25	12.6
	HT-40, M8 to M15	2	5	-57.0	-56.8	-53.9	-41.25	12.6
	HT-40 STBC, M0 to M7	2	5	-57.0	-56.8	-53.9	-41.25	12.6
	Non HT-40, 6 to 54 Mbps	1	5	-57.3		-57.3	-41.25	16.1
	Non HT-40, 6 to 54 Mbps	2	5	-57.2	-57.2	-54.2	-41.25	12.9
5550	HT-40, M0 to M7	1	5	-56.9		-56.9	-41.25	15.7
55	HT-40, M0 to M7	2	5	-57.2	-57.2	-54.2	-41.25	12.9
	HT-40, M8 to M15	2	5	-57.1	-57.1	-54.1	-41.25	12.8
	HT-40 STBC, M0 to M7	2	5	-57.1	-57.1	-54.1	-41.25	12.8
	Non HT-20, 6 to 54 Mbps	1	5	-57.6		-57.6	-41.25	16.4
	Non HT-20, 6 to 54 Mbps	2	5	-57.6	-57.7	-54.6	-41.25	13.4
5700	HT-20, M0 to M7	1	5	-57.5		-57.5	-41.25	16.3
51	HT-20, M0 to M7	2	5	-57.6	-57.6	-54.6	-41.25	13.3
	HT-20, M8 to M15	2	5	-57.4	-57.7	-54.5	-41.25	13.3
	HT-20 STBC, M0 to M7	2	5	-57.4	-57.7	-54.5	-41.25	13.3

Page No: 42 of 98

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Total Conducted Spur (dBm)	Peak Limit (dBm)	Margin (dB)
	Non HT-20, 6 to 54 Mbps	1	5	-47.9		-47.9	-27	20.9
	Non HT-20, 6 to 54 Mbps	2	5	-48.0	-48.9	-45.4	-27	18.4
5500	HT-20, M0 to M7	1	5	-48.6		-48.6	-27	21.6
55	HT-20, M0 to M7	2	5	-46.7	-47.5	-44.1	-27	17.1
	HT-20, M8 to M15	2	5	-49.5	-47.5	-45.4	-27	18.4
	HT-20 STBC, M0 to M7	2	5	-49.5	-47.5	-45.4	-27	18.4
		_	_	_	_	_	_	
	Non HT-40, 6 to 54 Mbps	1	5	-49.5		-49.5	-27	22.5
	Non HT-40, 6 to 54 Mbps	2	5	-49.7	-49.3	-46.5	-27	19.5
5510	HT-40, M0 to M7	1	5	-48.0		-48.0	-27	21.0
55	HT-40, M0 to M7	2	5	-48.0	-48.1	-45.0	-27	18.0
	HT-40, M8 to M15	2	5	-48.0	-48.1	-45.0	-27	18.0
	HT-40 STBC, M0 to M7	2	5	-48.0	-48.1	-45.0	-27	18.0
	Non HT-40, 6 to 54 Mbps	1	5	-48.7		-48.7	-27	21.7
	Non HT-40, 6 to 54 Mbps	2	5	-45.7	-46.1	-42.9	-27	15.9
5550	HT-40, M0 to M7	1	5	-47.2		-47.2	-27	20.2
55	HT-40, M0 to M7	2	5	-49.5	-48.7	-46.1	-27	19.1
	HT-40, M8 to M15	2	5	-48.1	-48.9	-45.5	-27	18.5
	HT-40 STBC, M0 to M7	2	5	-48.1	-48.9	-45.5	-27	18.5
	Non HT-20, 6 to 54 Mbps	1	5	-49.7		-49.7	-27	22.7
	Non HT-20, 6 to 54 Mbps	2	5	-48.9	-49.1	-46.0	-27	19.0
5700	HT-20, M0 to M7	1	5	-47.9		-47.9	-27	20.9
57	HT-20, M0 to M7	2	5	-50.3	-51.0	-47.6	-27	20.6
	HT-20, M8 to M15	2	5	-49.1	-50.5	-46.7	-27	19.7
	HT-20 STBC, M0 to M7	2	5	-49.1	-50.5	-46.7	-27	19.7

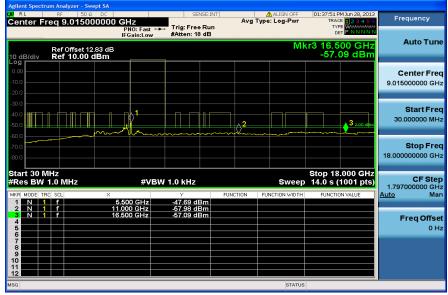
Page No: 43 of 98

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gilent Spectr										
RL		50 Ω DC		SE	NSE:INT	Aun	ALIGN OFF		AM Jul 08, 2013	Frequency
enter F		000000000	PNO: Fast IFGain:High			Avy	iype. Log-r wi	TYI	PENNNNN	Auto Tune
) dB/div og r		0.00 dBm								
0.0 0.0 0.0										Center Fred 29.000000000 GHz
o									-52.00 dBm	
0 0 <mark>Wellings</mark>	shapenta	www.	yter when	allon and a plantic states	₩₩₩₽₽₩₽₽₩₩	nnnpeantae	uquativephil ^{nequ} lus	wayyer and	udomenan	Start Freq 18.000000000 GHz
										Stop Fred 40.000000000 GHz
art 18.0 es BW	0 GHz 1.0 MHz		#V	BW 3.0 MHz			Sweep		0.00 GHz 1001 pts)	CF Step 2.20000000 GHz
R MODE TH	RC SCL	×		Y	FU	NCTION	FUNCTION WIDTH	FUNCTIO	ON VALUE	<u>Auto</u> Mar
										Freq Offset 0 Hz
2										

Conducted Spurs, All Antennas 18GHZ to 40 GHz

Page No: 44 of 98



Conducted Spurs Average, 5500 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Conducted Spurs Average, 5500 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

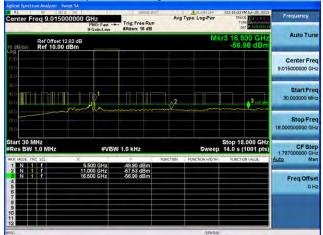


Page No: 45 of 98

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RL RF 500 DC anter Freq 9.015000000 GHz PNO: Fast IFGainLow	Trig: Free Run #Atten: 18 dB	Avg 1	ALIGNOF Vpe: Log-Pwr	TRA	M Jun 28, 2013	Frequency
Ref Offset 12.83 dB dB/div Ref 10.00 dBm	Auto Tun					
τ τ τ τ						Center Freq 9.015000000 GHz
]_ _⊘ 2			3 2 m optim	Start Freq 30.000000 MHz
α						Stop Freq 18.00000000 GHz
	V 1.0 kHz		Sweep	14.0 s (.000 GHz 1001 pts)	CF Step 1.797000000 GH:
P MODE TRO SCL X N 1 f 5.500 GHz N 1 f 11.000 GHz N 1 f 16.500 GHz	-52.79 dBm -57.95 dBm	UNCTION	FUNCTION WIDTH	FUNCTI	ON VALUE	<u>Auto</u> Mar
a N 1 f 16.500 GHz	-56.91 dBm					Freq Offse

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Conducted Spurs Average, 5500 MHz, HT-20, M0 to M7

Antenna A

Conducted Spurs Average, 5500 MHz, HT-20, M0 to M7



Antenna A



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Antenna B

Page No: 46 of 98

er Freq 9.015000000 GHz Avg Type: Trig: Free Run Auto Tun Ref Offset 12.83 dB Ref 10.00 dBm Center Free 9.015000000 GI Start Fre Stop Fre art 30 MHz les BW 1.0 MHz Stop 18.000 GHz Sweep 14.0 s (1001 pts) CF Ste #VBW 1.0 kHz 1.79700 5.500 GHz 11.000 GHz 16.500 GHz -57.74 dB -57.04 dB Freq Offs

RL RF 500 EC anter Freq 9.015000000 GHz PND: Fast ---- Trig: Free Run If Gaint.ov #Atten: 18 dB Avg Type: Log-Pw Auto Tur Ref Offset 12.83 dB Ref 10.00 dBm Center Fre 9.015000000 GH Start Fre Stop Fre tart 30 MHz Res BW 1.0 MHz Stop 18.000 GHz Sweep 14.0 s (1001 pts) CFSt W 1.0 kHz 1.79700 5.500 GHz 11.000 GHz 16.500 GHz -51.47 dB -57.95 dB -56.94 dB Freq Offs

Antenna A

Antenna B

Conducted Spurs Average, 5500 MHz, HT-20 STBC, M0 to M7

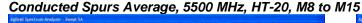
requency	TYPE WANNAN	1	Type: Log-Pwr	Avg	Trig: Free Run #Atten: 18 dB	PNO: Fast	eq 9.01500	er Fr
Auto Tu	6.500 GHz 7.04 dBm		Mk				Ref Offset 123 Ref 10.00 d	fdiy
Center Fr 9.015000000 G								
Start Fr 30.000000 M	¢ ³			2 ²				
Stop Fr 18.00000000 G								
CF St 1.797000000 G	18.000 GHz s (1001 pts)		Sweep		1.0 kHz	#VBW	IHz 1.0 MHz	30 N BW
Auto M	NETION VALUE	FUN	FUNCTION WIDTH	FUNCTION	-51.74 dBm	× 5.500 GHz	C SCL	DDE TR
Freq Offs 0					-57.74 dBm -57.04 dBm	11.000 GHz 16.500 GHz	-{	N 1 N 1

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Antenna A



Page No: 47 of 98



er Freq 9.015000000	GHz PNO: Fast	Trig: Free Run #Atten: 18 dB		ALIGN OF Type: Log-Pwr	TRACE	1 Jun 28, 2013	Frequency
Ref Offset 12.83 dB				MI	r3 16.50 -56.9	00 GHz 4 dBm	Auto Tune
							Center Freq 9.015000000 GHz
			¢ ²			3	Start Freq 30.000000 MHz
							Stop Freq 18.00000000 GHz
30 MHz BW 1.0 MHz	#VBW	1.0 kHz		Sweep		001 pts)	CF Step 1.797000000 GHz
1 1 1	5.500 GHz 1.000 GHz 5.500 GHz	-51.47 dBm -57.95 dBm -56.94 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION	N VALUE	Auto Man Freq Offset 0 Hz
				STATIO			

Conducted Spurs Average, 5510 MHz, Non HT-40, 6 to 54 Mbps



Antenna A

Conducted Spurs Average, 5510 MHz, Non HT-40, 6 to 54 Mbps



Antenna A



Antenna B

Page No: 48 of 98

Conducted Spurs Average, 5510 MHz, HT-40, M0 to M7



Antenna A

Conducted Spurs Average, 5510 MHz, HT-40, M0 to M7



Antenna A



Antenna B

Page No: 49 of 98



Conducted Spurs Average, 5510 MHz, HT-40, M8 to M15



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Antenna A

Antenna B

Conducted Spurs Average, 5510 MHz, HT-40 STBC, M0 to M7

RL NF 550 EC Center Freq 9.015000000	GHz PNO: Fast -• IFGain:Low	Trig: Free Ru #Atten: 18 dB	Ave	ALIGN OF Type: Log-Pwr	04:21:06 PM Jun 28, 2013 TRACE 1 2 1 4 5 TYPE WWWWWW DET P NN N N	Frequency
Ref Offset 12.83 dB		-		MI	kr3 16.500 GHz -56.96 dBm	Auto Tuni
τα ία						Center Fre 9.015000000 GH
	[0 ¹		2 ²		3 ± (11 c)e	Start Fre 30.000000 MH
70.0						Stop Fre 18.00000000 GH
Start 30 MHz Res BW 1.0 MHz	#VBV	V 1.0 kHz		Sweep	Stop 18.000 GHz 14.0 s (1001 pts)	CF Ste 1.797000000 GH
KR MODE THE SEL X	5.510 GHz	-55.03 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
	1.000 GHz 5.500 GHz	-57.72 dBm -56.96 dBm				Freq Offse
7 8 9 9 10 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8						
12 13 14 14 14 1 4				STATUS		

Avg Type: Log-Pw DOODO GHz PNO: Fast ----Eccain:Low #Atten: 18 dB ter Freq 9.0150 Auto Tur Ref Offset 12.83 dB Ref 10.00 dBm Center Fre 9.015000000 GH Start Fre Stop Fre Stop 18.000 GHz Sweep 14.0 s (1001 pts) tart 30 MHz Res BW 1.0 MHz CFSte #VBW 1.0 kHz 1.79700 5.510 (11.000 (16.500 (-65 01 d -67 53 d -66 83 d Freq Offse

Antenna A



Page No: 50 of 98

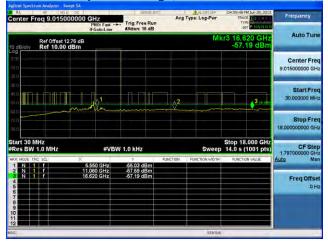


Conducted Spurs Average, 5550 MHz, Non HT-40, 6 to 54 Mbps



Antenna A

Conducted Spurs Average, 5550 MHz, Non HT-40, 6 to 54 Mbps

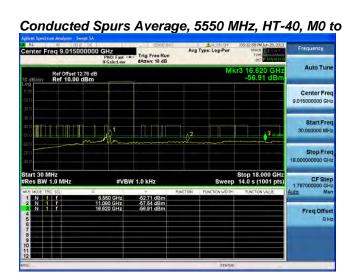


Antenna A



Antenna B

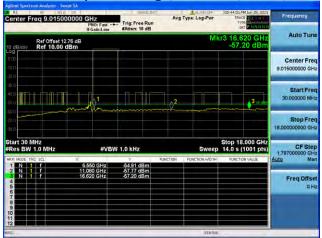
Page No: 51 of 98



Conducted Spurs Average, 5550 MHz, HT-40, M0 to M7

Antenna A

Conducted Spurs Average, 5550 MHz, HT-40, M0 to M7



Antenna A



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Antenna B

Page No: 52 of 98



Conducted Spurs Average, 5550 MHz, HT-40, M8 to M15



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Antenna A

Antenna B

Conducted Spurs Average, 5550 MHz, HT-40 STBC, M0 to M7

RL RF 500 CC Center Freq 9.015000001	PNO: Fast	Trig: Free Run #Atten: 18 dB		ALIGN OF Type: Log-Pwr	05:41:16 PM Jun 28, 201 TRACE 2 2 4 5 TYPE DET P NN NIN	Frequency
Ref Offset 12.76 dE	3	-		MI	kr3 16.620 GH: -57.08 dBm	Auto Tune
τα ίαα 						Center Free 9.015000000 GH
30 1 40 0 40 0	[0 ¹		2 ²		3	Start Free 30.000000 MH
						Stop Fre 18.00000000 GH
Start 30 MHz #Res BW 1.0 MHz	#VB	V 1.0 kHz		Sweep	Stop 18.000 GH: 14.0 s (1001 pts	CF Ste
MKR MODE TRC SCL X	5.650 GHz	-54.60 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Mar
3 N 1 f 4 5 6	11.080 GHz 16.620 GHz	-57.72 dBm -57.08 dBm				Freq Offse 0 H
7 8 9 10 11 12						
ISC				STATUS		

Avg Type: Log-Pw DOODO GHz PNO: Fast ----IFGain:Low #Atten: 18 dB ter Freq 9.0150 Auto Tur Ref Offset 12.76 dB Ref 10.00 dBm Center Fre 9.015000000 GH Start Fre ا کاراک 13 Stop Fri Stop 18.000 GHz Sweep 14.0 s (1001 pts) tart 30 MHz Res BW 1.0 MHz CFSte #VBW 1.0 kHz 1.79700 11.080 -57.61 d Freq Offse

Antenna A



Page No: 53 of 98



Conducted Spurs Average, 5700 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

Conducted Spurs Average, 5700 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

nter Freq 9.01500000	GHz PNO: Fast	Trig: Free Run #Atten: 18 dB		ALIGNOUT Type: Log-Pwr	ID5:38:34 PM Jun TRACE TYPE DET		Frequency
Ref Offset 11.88 dB				MI	r3 17.100 -57.72		Auto Tune
							Center Fred 9.015000000 GH:
			^2			3	Start Free 30.000000 MH:
							Stop Fred 18.00000000 GH
art 30 MHz les BW 1.0 MHz	#VBW	1.0 kHz		Sweep	Stop 18.00 14.0 s (100		CF Step 1.797000000 GH2
	5.700 GHz	-45.77 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VA	LUE	<u>Auto</u> Man
	1.400 GHz 7.100 GHz	-59.04 dBm -57.72 dBm					Freq Offse 0 Hz
				STATUS			

Antenna B

Page No: 54 of 98



Conducted Spurs Average, 5700 MHz, HT-20, M0 to M7



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Frequency

Antenna A

Antenna B

Conducted Spurs Average, 5700 MHz, HT-20, M8 to M15



Antenna A



Page No: 55 of 98





RL RF 500 DC Center Freq 9.015000000	O GHZ	SBISEINT Trig: Free Run Atten: 18 dB	Avg Type: Log-	Wr TRACE	Frequency
Ref Offset 11.88 dB 10 dB/div Ref 10.00 dBm	3			Mkr3 17.100 -57.75	
-100					Center Free 9,015000000 GH
300 420 200			 ⊘2		30.000000 MH
-00 0 -70 0 en 0					Stop Fre 18.00000000 GH
Start 30 MHz #Res BW 1.0 MHz MKR MODE THD SQL X	#VBW 1		SW	Stop 18.00 reep 14.0 s (100	1 pts) CF Ste 1.797000000 GH
1 N 1 F 2 N 1 F	5.700 GHz 11.400 GHz	-43.84 dBm -58.83 dBm -57.75 dBm	CHOM TONCHOR	Internet in	FreqOffse
4 5 6					0 H

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Conducted Spurs Average, 5700 MHz, HT-20 STBC, M0 to M7

Antenna A



Page No: 56 of 98



Conducted Spurs Peak, 5500 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Conducted Spurs Peak, 5500 MHz, Non HT-20, 6 to 54 Mbps



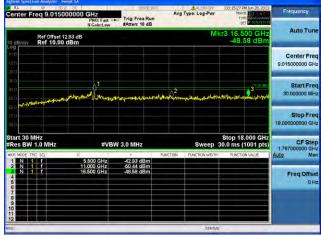
Antenna A



Antenna B

Page No: 57 of 98

Conducted Spurs Peak, 5500 MHz, HT-20, M0 to M7



Antenna A

Conducted Spurs Peak, 5500 MHz, HT-20, M0 to M7

enter Freq 9.0150000		Trig: Free Run #Atten: 18 dB		ALIGN OF	03:31:57 PM Jun 28, 2013 TRACE 2 4 4 TYPE 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Frequency
Ref Offset 12.83				Mk	r3 16.500 GHz -46.71 dBm	Auto Tuni
α α α α						Center Fre 9,015000000 GH
A REAL PROPERTY OF	umm framma	an the second second second	transformer	ynon, portal da	3 100 and	Start Fre 30.000000 MH
0.0 0.0 0.0						Stop Fre 18.00000000 GH
tart 30 MHz Res BW 1.0 MHz	#VB	W 3.0 MHz			Stop 18.000 GHz 0.0 ms (1001 pts)	CF Ste 1.797000000 GH
KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f	× 5.500 GHz 11.000 GHz 16.500 GHz	-45.79 dBm -48.48 dBm -46.71 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Ma Freg Offse
4 5 6 7 8 9 9 0						DH
4			-	-		

Antenna A

RL RF 800 DC enter Freq 9.015000000	PNO: Fast Trig: Free Ru #Atten: 18 dB	Avg Type: Log-Pwr	03:33:19 PM Jun 28, 2013 TRACE 2 3 4 E TYPE WOMMONT	Frequency
Ref Offset 12.83 dB dB/div Ref 10.00 dBm		MI	47.53 dBm	Auto Tune
α α α				Center Freq 9.015000000 GHz
10 10 10	1	married Science, stafferend to rade	allahiantering halo gamere	Start Freq 30.000000 MHz
				Stop Freq 18.00000000 GHz
art 30 MHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep	Stop 18.000 GHz 30.0 ms (1001 pts)	CF Step
R MODE TRC SCL X	5.500 GHz -46.54 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Man
	6.500 GHz 46.54 dBm 11.000 GHz 49.38 dBm 16.500 GHz 47.53 dBm			Freq Offse

Antenna B

Page No: 58 of 98

RL RF S00 DC Avg Type: Log-P Trig: Free Run Auto Tun Ref Offset 12.83 dB Ref 10.00 dBm 49 47 Center Fred 9.015000000 GHa Start Free Stop Fre CF Ster 000000 GH Mr Stop 18.000 GHz Sweep 30.0 ms (1001 pts) tart 30 MHz Res BW 1.0 MHz #VBW 3.0 MHz 1.797000 5.500 GHz 11.000 GHz 16.500 GHz 44.55 dB 49.47 dB 49.53 dB Freq Offse

Antenna A



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Page No: 59 of 98

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Conducted Spurs Peak, 5500 MHz, HT-20, M8 to M15

Conducted Spurs Peak, 5500 MHz, HT-20 STBC, M0 to M7



Avg Type: Log-Pw RL RE Center Freq 9.01 Trig: Free Run Auto Tu Ref Offset 12.83 dB Ref 10.00 dBm Center Fre Start Fr Stop Fr Start 30 MHz #Res BW 1.0 MHz Stop 18.000 GF Sweep 30.0 ms (1001 pt #VBW 3.0 MHz CFS 11,000 GH -43.39 dB -50.35 dB -47.45 dB Freq Offs 01

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Antenna A

Antenna B

Conducted Spurs Peak, 5510 MHz, Non HT-40, 6 to 54 Mbps

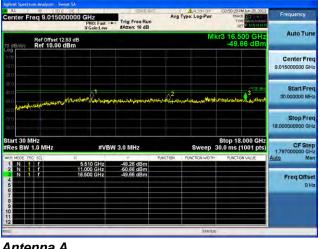
RL RF 35.0 DC enter Freq 9.015000000	GHz PNO: Fast	Trig: Free Run #Atten: 18 dB		Allow Ser Type: Log-Pwr	02:47:33 PM Jun 28, 2013 TRACE 2 2 4 TYPE P NNNH 0	Frequency
Ref Offset 12.83 dB 0 dB/div Ref 10.00 dBm				MI	r3 16.500 GHz -49.47 dBm	Auto Tune
ià ci						Center Free 9.015000000 GH
na aa na na	- Remon	nytraydy-delinesty nirytyski	manufanter	whenter	3 Whyherfulanning and grace friefland	Start Free 30.000000 MH
						Stop Fre
						18.00000000 GH
tart 30 MHz	#VB	W 3.0 MHz		Sweep	Stop 18.000 GHz 30.0 ms (1001 pts)	CF Ste
tart 30 MHz Res BW 1.0 MHz RR MODE TRO SCL X	5.510 GHz	-47.80 dBm	FUNCTION	Sweep Function width		
an o start 30 MHz Res BW 1.0 MHz RR, MODE TRIC SCL × 2 N 1 f 1		Y	PUNCTION		30.0 ms (1001 pts)	CF Ste 1,797000000 GH

Antenna A

Page No: 60 of 98

Conducted Spurs Peak, 5510 MHz, Non HT-40, 6 to 54 Mbps

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ann Sertin Karry Rt. 1997 1990 199 anter Freq 9.015000000 GHz PRO Fast ----IFGslictew Attan: 18 dB Avg Type: Log-Pw Auto Tur Ref Offset 12.83 dB Ref 10.00 dBm Center Fre 9.015000000 GH Start Fre Stop Fre Stop 18.000 GHz Sweep 30.0 ms (1001 pts) Res BW 1.0 MHz CF Ste #VBW 3.0 MHz 1.797000 5.510 GHz 11.000 GHz 16.500 GHz 49.56 dB 49.28 dB Freq Offse

Antenna A

Antenna B

Conducted Spurs Peak, 5510 MHz, HT-40, M0 to M7



Antenna A

Page No: 61 of 98

Conducted Spurs Peak, 5510 MHz, HT-40, M0 to M7

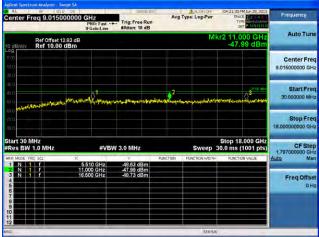




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Conducted Spurs Peak, 5510 MHz, HT-40, M8 to M15



Antenna A

PNO: East -+- Trig: I	ree Run		4:22:53 PM Jun 28, 2013 TRACE 2 4 FT TYPE DET EN NUMBER	Frequency
		Mkr3	16.500 GHz -48.10 dBm	Auto Tune
				Center Freq 9.015000000 GHz
on Rahamangan	and and a more thanks and a second		3-00 cm	Start Freq 30.000000 MHz
				Stop Free 18.00000000 GH2
#VBW 3.0 M	Iz	Sweep 30.0	op 18.000 GHz) ms (1001 pts)	CF Step
5.510 GHz -45.6	dBm	UNCTION WIDTH	FUNCTION VALUE	Auto Mar
	dBm			Freq Offset 0 Hz
	#VBW 3.0 MH	Avg Ty PROC Fact and the second seco	Avg Type: Log-Pvr. PHO: Fast	Avg Type: Log-Pwr Thus: Tip: The Tip: Tip: Tip: Tip: Tip: Tip: Tip: Tip:

Antenna B

Page No: 62 of 98

Conducted Spurs Peak, 5510 MHz, HT-40 STBC, M0 to M7



Avg Type: Log-Pw RL RE Center Freq 9.01 Trig: Free Run Auto Tu Ref Offset 12.83 dB Ref 10.00 dBm Center Fre Start Fr Stop Fr Stop 18.000 GH Sweep 30.0 ms (1001 pt Start 30 MHz Res BW 1.0 MHz #VBW 3.0 MHz CFS 11.000 GH -49.87 dE -49.10 dE Freq Offs 01

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Antenna A

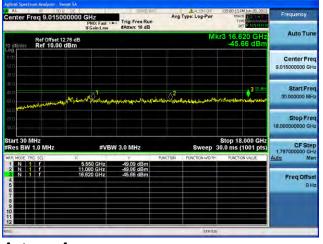
Antenna B

Conducted Spurs Peak, 5550 MHz, Non HT-40, 6 to 54 Mbps

RL RF 350 DC Center Freq 9.015000000	GHZ PNO: Fast -• IFGain:Low	Trig: Free Run #Atten: 18 dB		ALIGN OFF	04:49:04 FM Jun 28, 2013 TRACE 2 2 4 E TYPE DET 2 N.N.N.N.N	Frequency
Ref Offset 12.76 dB				MI	48.73 dBm	Auto Tune
10 00 10 00 10 0						Center Free 9,015000000 GH
n a a a n a 	1 Julium upon	allight the second stage	ringer ange	and the second states	apapeutisticitation	Start Free 30.000000 MH
						Stop Fre 18.00000000 GH
tart 30 MHz Res BW 1.0 MHz	#VBV	V 3.0 MHz		Sweep 3	Stop 18.000 GHz 30.0 ms (1001 pts)	CF Ste 1.797000000 GH
	.550 GHz .080 GHz	-45.07 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
3 N 1 F 18 5 5 6 7 8	.620 GHz	-49.73 dBm				Freq Offse QH
9 10 11 12				status		

Antenna A

Page No: 63 of 98



Conducted Spurs Peak, 5550 MHz, Non HT-40, 6 to 54 Mbps



Antenna A



Conducted Spurs Peak, 5550 MHz, HT-40, M0 to M7



Antenna A

Page No: 64 of 98

Conducted Spurs Peak, 5550 MHz, HT-40, M0 to M7





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Antenna A



Conducted Spurs Peak, 5550 MHz, HT-40, M8 to M15



Antenna A



Antenna B

Page No: 65 of 98



Avg Type: Log-Pw RL RF Center Freq 9.01 Trig: Free Run Auto Tu Ref Offset 12.76 dB Ref 10.00 dBm Center Fre Start Fr Stop Fr Start 30 MHz #Res BW 1.0 MHz Stop 18.000 GF Sweep 30.0 ms (1001 pt #VBW 3.0 MHz CFS -49.89 di -49.45 di 11.080 G Freq Offs 01

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Antenna A

Antenna B

Conducted Spurs Peak, 5700 MHz, Non HT-20, 6 to 54 Mbps

enter Freq 9.015000		Trig: Free Run #Atten: 18 dB	Aug Type: Log-Pwr	06:20:56 PM Jun 28, 2013 TRACE 12:34 P TYPE DET P JUN DININ	Frequency
Ref Offset 11.88 dB/div Ref 10.00 dB			N	lkr3 17.100 GHz -49.65 dBm	Auto Tuni
1 00 					Center Free 9,015000000 GH
10 10 10 10 10 10	miner of and write	estanograpiation	2 martine and a strategy of	alahti sedaji seta ang se	Start Free 30.000000 MH
					Stop Fre 18.00000000 GH
tart 30 MHz Res BW 1.0 MHz	#VBV	V 3.0 MHz	Sweep	Stop 18.000 GHz 30.0 ms (1001 pts)	CF Step 1.797000000 GH
RR MODE TRC SCL	× 5.700 GHz 11.400 GHz	-34.20 dBm -50.37 dBm	PUNCTION FUNCTION WIDT	H FUNCTION VALUE	<u>Auto</u> Ma
a N 1 f 4 5 7	17.100 GHz	-49.65 dBm			Freq Offse 0 H
8					
9					

Antenna A

Page No: 66 of 98

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Conducted Spurs Peak, 5550 MHz, HT-40 STBC, M0 to M7

Conducted Spurs Peak, 5700 MHz, Non HT-20, 6 to 54 Mbps



RL RF 1800 00 Center Freq 9.0150000	00 GHz PNO: Fast -+	- Trig: Free Run	Avg 1	ALIGN OF	06:38:57 PM Jun 28, 2 TRACE 12 C	Frequency
Ref Offset 11.88	IFGain:Low	#Atten: 18 dB		M	49.10 dB	Auto Tune
99 100 110 110						Center Fred 9.015000000 GHz
n a na na na na na na na na na na na na na	rough the participation	weither and the state of the st	marker a	Louistiekeeneeneelikkee		Start Free 30.000000 MH:
00						Stop Fred 18.000000000 GH:
tart 30 MHz Res BW 1.0 MHz		V 3.0 MHz			Stop 18.000 G 30.0 ms (1001 p	(S) 1.797000000 GHz
1 N 1 f 2 N 1 f 3 N 1 f 4 5 6	× 5.700 GHz 11.400 GHz 17.100 GHz	-38.53 dBm -51.23 dBm -49.10 dBm	PUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Mar Freq Offset 0 Ha
7						

Antenna A



Conducted Spurs Peak, 5700 MHz, HT-20, M0 to M7



Antenna A

Page No: 67 of 98

er Freq 9.015000000 GHz Avg Type: Log Trig: Free Run Auto Tun Ref Offset 11.88 dB Ref 10.00 dBm Center Fred 9.015000000 GI Start Fre Stop Fre Stop 18.000 GHz Sweep 30.0 ms (1001 pts) tart 30 MHz Res BW 1.0 MH CF Ste #VBW 3.0 MHz 1.79700 5.700 GHz 11.400 GHz 17.100 GHz -41.89 dB -50.26 dB -50.61 dB Freq Offs

Antenna A

RL RF 300 DC

Antenna B

tart 30 MHz Res BW 1.0 MH

Conducted Spurs Peak, 5700 MHz, HT-20, M8 to M15

Avg Type: Log-Pw

Trig: Free Run #Atten: 18 dB Auto Tu Ref Offset 11.88 dB Ref 10.00 dBm 11.400 Center Free 9.015000000 GI Start Fre Stop Fre 000000 G Stop 18.000 GHz ep 30.0 ms (1001 pts Start 30 MHz Res BW 1.0 MH CFSt #VBW 3.0 MH 1.7970 11.400 GHz 17.100 GHz -49.08 dBm -49.08 dBm -51.68 dBm

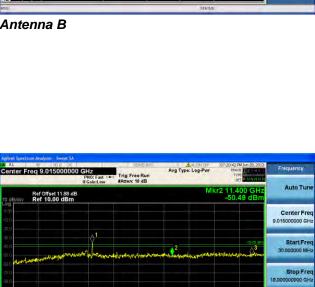
Antenna A

Antenna B

Start 30 MHz #Res BW 1.0 MH

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Page No: 68 of 98



#VBW 3.0 MH;

-50.49 dBm -50.53 dBm

11.400 GHz 17.100 GHz

#VBW 3.0 MH;

-51.00 dB -51.20 dB

11.400 GHz 17.100 GHz

Conducted Spurs Peak, 5700 MHz, HT-20, M0 to M7 seef new 2015/00/000 GHz er Freq 9.015000000 GHz PR0: Fast ----If Gaint ew SAtten: 18 dB Ref Offset 11.88 dB Ref 10.00 dBm

requency

Freq Offse



Stop 18.000 GHz Sweep 30.0 ms (1001 pts)

Stop 18.000 GHz ep 30.0 ms (1001 pts)

CFSt

Freq Offse

1.7970

CF Ste

Freq Offse

1.797000



Additis Source Source Source Source Source Source Source Source Frequency Center Freq 9.015000000 GHz Profile Bits Extra Arg Tyres: Leg Pyr Bits Extra Arg Tyres: Leg Pyr Bits Extra Auto Tune Ref Offset 118.90 Bits Extra Arg Tyres: Leg Pyr Bits Extra Auto Tune 10 Bits Extra Bits Extra Arg Tyres: Leg Pyr Bits Extra Auto Tune 10 Bits Extra Bits Extra Bits Extra Bits Extra Auto Tune 10 Bits Extra Bits Extr Bits Extr Bits Extr<

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Antenna A

Antenna B

Conducted Bandedge

15.407: For transmitters operating in the 5.25-5.35 and 5.47-5.725 GHz band: all emissions outside of the 5.25-5.35 and 5.47-5.725 GHz bands shall not exceed an EIRP of -27dBm/MHz.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	30 MHz-40 GHz
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	10 s
Resolution Bandwidth:	1 MHz
Video Bandwidth:	3 MHz
Detector:	Peak
Trace:	Single
Marker:	Peak

Record the marker waveform peak to spur difference

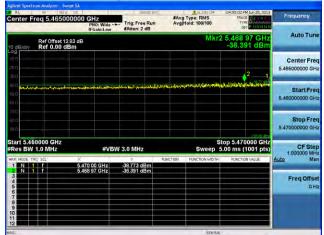
Page No: 69 of 98

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Conducted Spurs Peak, 5700 MHz, HT-20 STBC, M0 to M7

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
	Non HT-20, 6 to 54 Mbps	1	5	-36.4		-31.4	-27	4.4
	Non HT-20, 6 to 54 Mbps	2	5	-47.5	-41.2	-35.3	-27	8.3
5500	HT-20, M0 to M7	1	5	-35.7		-30.7	-27	3.7
55	HT-20, M0 to M7	2	5	-46.5	-40.0	-34.1	-27	7.1
	HT-20, M8 to M15	2	5	-43.9	-38.9	-32.7	-27	5.7
	HT-20 STBC, M0 to M7	2	5	-43.9	-38.9	-32.7	-27	5.7
	Non HT-40, 6 to 54 Mbps	1	5	-32.8		-27.8	-27	0.8
	Non HT-40, 6 to 54 Mbps	2	5	-34.7	-37.2	-27.8	-27	0.8
5510	HT-40, M0 to M7	1	5	-36.1		-31.1	-27	4.1
55	HT-40, M0 to M7	2	5	-36.1	-36.1	-28.1	-27	1.1
	HT-40, M8 to M15	2	5	-36.1	-36.1	-28.1	-27	1.1
	HT-40 STBC, M0 to M7	2	5	-36.1	-36.1	-28.1	-27	1.1
		_				_		
	Non HT-20, 6 to 54 Mbps	1	5	-32.3		-27.3	-27	0.3
	Non HT-20, 6 to 54 Mbps	2	5	-41.1	-39.4	-32.2	-27	5.2
8	HT-20, M0 to M7	1	5	-32.6		-27.6	-27	0.6
5700	HT-20, M0 to M7	2	5	-41.1	-36.3	-30.1	-27	3.1
	HT-20, M8 to M15	2	5	-38.8	-34.1	-27.8	-27	0.8
	HT-20 STBC, M0 to M7	2	5	-38.8	-34.1	-27.8	-27	0.8

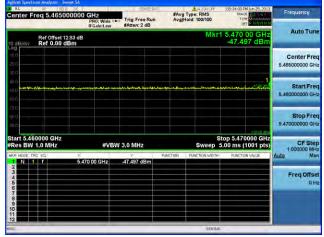
Page No: 70 of 98



Conducted Bandedge Peak, 5500 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Conducted Bandedge Peak, 5500 MHz, Non HT-20, 6 to 54 Mbps



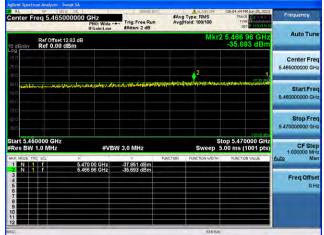
Center Freq 5.46500000 GHz #Avg Type: RMS Avg[Hold: 100/100 Frequency Trig: Free Run Auto Tu Ref Offset 12.83 dB Ref 0.00 dBm Center Fre 5.465000000 G Start Fre 5.46 Stop Fri 5.47 000000 G Start 5.460000 GHz #Res BW 1.0 MHz Stop 5.470000 GHz ep 5.00 ms (1001 pts CFSt #VBW 3.0 MH; 1.00000 Freq Offs

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Antenna A



Page No: 71 of 98



Conducted Bandedge Peak, 5500 MHz, HT-20, M0 to M7

Antenna A

Conducted Bandedge Peak, 5500 MHz, HT-20, M0 to M7



#Avg Type: RMS Avg[Hold: 100/100 enter Freq 5.465000000 GHz Frequency Trig: Free Run #Atten: 2 dB Auto Tu Ref Offset 12.83 dB Ref 0.00 dBm Center Fre 465000000 G Start Fre 5.46 Stop Fri 5.47 000000 G Start 5.460000 GHz #Res BW 1.0 MHz Stop 5.470000 GHz ep 5.00 ms (1001 pts CFS #VBW 3.0 MH; 1.00000 Freq Offs

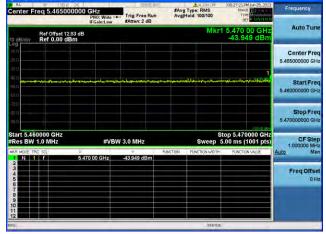
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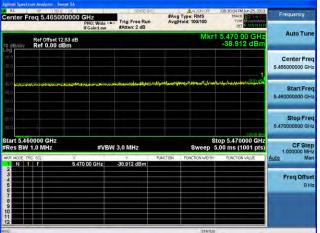
Antenna A



Page No: 72 of 98

Conducted Bandedge Peak, 5500 MHz, HT-20, M8 to M15





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Antenna A

Antenna B

Conducted Bandedge Peak, 5500 MHz, HT-20 STBC, M0 to M7

Frequency	06:27:21 PM Jun 25, 2013 TRACE 2 2 4 5 TYPE M	Type: RMS fold: 100/100	#A1	SBISE INT Trig: Free Run #Atten: 2 dB	PNO: Wide -+	000000		req		Cen
Auto Tun	5.470 00 GHz -43.949 dBm	Mkr1		WAllen, 2 db	IFGain:Low		f Offset 1 f 0.00 d		B/div	10 dE
Center Fre 5.465000000 GH										20 A.
Start Fre 5,46000000 GH	ngtaan daa ngtacidaa sidaa	والم معادمة من من المالي مراد معمد المربو من من المالي	hay the first of	ulaisen erstet off atomet	ملىيەت بور جەملورام	u a Bongman	ۍ ز. بندوکې	8	Mp	50.0 40.0 50.0 60.0
Stop Fra 5.47000000 Gi	450.00.000									70.0 60.0 50.0
CF Ste 1.000000 M	op 5.470000 GHz .00 ms (1001 pts)			3.0 MHz	#VBV		0 GHz MHz		t 5.46 s BW	
Auto M	FUNCTION VALUE	FUNCTION WIDTH	PUNCTION	43.949 dBm	'0 00 GHz	× 5.47				
Freq Offs 01										34567
										8 9 10 11 12
	-	STATUS				_				sa

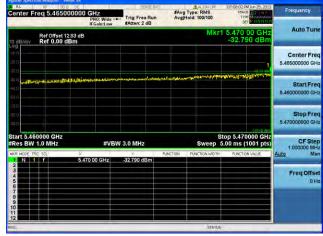
#Avg Type: RMS Avg[Hold: 100/100 ter Freq 5.4650 0000 GHz ide --- Trig: Free Run Auto Tur Ref Offset 12.83 dB Ref 0.00 dBm Center Fre 5.465000000 GH Start Fre 5.46000000 G Stop Fri 5 47 tart 5.460000 GH Res BW 1.0 MHz Stop 5.470000 GH Sweep 5.00 ms (1001 pts #VBW 3.0 MHz CF St 1.000000 N Freq Offs 01

Antenna A



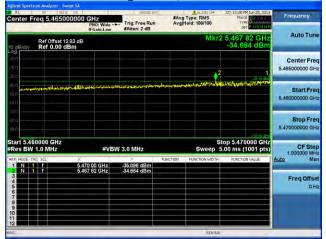
Page No: 73 of 98

Conducted Bandedge Peak, 5510 MHz, Non HT-40, 6 to 54 Mbps



Antenna A

Conducted Bandedge Peak, 5510 MHz, Non HT-40, 6 to 54 Mbps



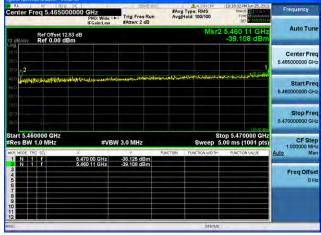
Antenna A

	trum Analyzer							
Center	Freq 5.46	500000	O GHZ	Trig: Free Run	#Avg	Type: RMS Hold: 100/100	07:16:12 FM Jun 25, 2013 TRACE 12:14 E TYPE M	Frequency
10 dB/div	Ref Offs Ref 0.0	et 12.83 dB 0 dBm	IFGain:Low	#Atten: 2 dB		Mkr1	5.470 00 GHz -37.196 dBm	Auto Tune
.09 10 0 20 0								Center Freq 5.465000000 GHz
30.0 40 0	nende Verdenne	nder of a second	งส _า ญกับสุดระสะจับไข่ห	n lander, we would not	ant des nortes in	aten de seelige des Ande	สประเทศและสิ่งไขให้หลัง	Start Freq 5.46000000 GHz
70.0 ejo.0 sa d							157.00/@m	Stop Freq 5.470000000 GHz
	60000 GH V 1.0 MHz	z	#VBV	V 3.0 MHz		Sweep 5	top 5.470000 GHz 5.00 ms (1001 pts)	CF Step
	TRC SCL	× 5.	470 00 GHz	-37.196 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 3 4 5 6 7 8 9 10 11 12								Freq Offset Q Hz
ISCI		_				STATUS		



Page No: 74 of 98

Conducted Bandedge Peak, 5510 MHz, HT-40, M0 to M7



Antenna A

Conducted Bandedge Peak, 5510 MHz, HT-40, M0 to M7

		SERVERINT		ALIGN OFF	10:18:32 PM Jun 25, 2013	
nter Freq 5.46500000	PNO: Wide - IFGain:Low	Trig: Free Run #Atten: 2 dB	#Avg Avgl	Type: RMS Hold: 100/100	TYPE MUNICIPALE	Frequency
Ref Offset 12.83 dB dB/div Ref 0.00 dBm				Mkr2	5.460 11 GHz -39.108 dBm	Auto Tune
						Center Free 5,465000000 GH:
an a	tellop anaptick	nternanssetter at the set of the set	rusts-wi	yddiaethalaidayndiaeth	and an and a second	Start Free 5.460000000 GH:
0 0 0					-i50 00 Cen	Stop Free 5.470000000 GH:
art 5.460000 GHz tes BW 1.0 MHz	#VB	W 3.0 MHz			op 5.470000 GHz .00 ms (1001 pts)	CF Ster 1.000000 MH
R MODE TRC SCL X	70 00 GHz	-36,125 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Mar
N 1 F 5.4	60 11 GHz	-39.108 dBm				Freq Offse 0 H

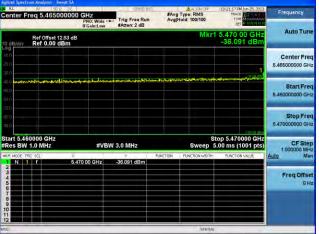
Antenna A

Agilent Spectru							
	eq 5.465	000000 GHz PNO: Wide	Trig: Free Run #Atten: 2 dB	#Av	Type: RMS Hold: 100/100	10:21:17 FM Jun 25, 2013 TRACE 2014	Frequency
10 dB/div	Ref Offset Ref 0.00		#Atten: 2 dB		Mkr	5.470 00 GHz -36.091 dBm	Auto Tune
Log 10 0 -20 0						1	Center Freq 5.465000000 GHz
	ultradina.	aftinan numerous a houders	e and store the repeated of	lanan dina da	un nanka sharak	and a second on the second	Start Freq 5,46000000 GHz
-70.0 -60.0 -50.0							Stop Freq 5.470000000 GHz
Start 5.460 #Res BW		#VI	BW 3.0 MHz		Sweep :	top 5.470000 GHz 5.00 ms (1001 pts)	CF Step
MKR MODE TRO		× 5.470 00 GHz	-36.091 dBm	PUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Man
2 3 4 5 6 7 8 9 10 11							Freq Offset Q Hz
MSG					STATUS		

Antenna B

Page No: 75 of 98

ter Freq 5.465000000 GHz ency #Avg Type: RMS Avg|Hold: 100/10 Trig: Free Run Auto Tun Ref Offset 12.83 dB Ref 0.00 dBm Center Free 5.465000000 GI Start Free Stop Fre Stop 5.470000 GHz Sweep 5.00 ms (1001 pts) art 5.460000 GH Res BW 1.0 MHz CF Ste 1.000000 M #VBW 3.0 MHz 5.470 00 GHz 5.460 11 GHz -36.125 dB -39.108 dB Freq Offs



Antenna A

Antenna B

Conducted Bandedge Peak, 5510 MHz, HT-40 STBC, M0 to M7

RL RF 500 DC Center Freq 5,465000000	PNO: Wide -+	Trig: Free Run #Atten: 2 dB		ALIGN 09F mpe: RMS id: 100/100	10:18:32 PM J.n 25, 2013 TRACE 2 2 4 E Type M DET E MIN M M	Frequency
Ref Offset 12.83 dB				Mkr2	5.460 11 GHz -39.108 dBm	Auto Tune
10 m					1	Center Fre 5,465000000 GH
40 0 1 10000000000000000000000000000000	stalling-waarsterland	annaistean tanaintalana	naadaharinteki	antra katalaga di seka	urrent and a state of the state	Start Fre 5.460000000 GH
70 0 ęp 0 90 0					150.00.00	Stop Fre 5.470000000 GH
Start 5.460000 GHz #Res BW 1.0 MHz	#VBW	/ 3.0 MHz		Sweep 5.	op 5.470000 GHz 00 ms (1001 pts)	CF Ste 1 000000 MH
1 N 1 1 5.	70 00 GHz	-36.125 dBm	PUNCTION I	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
2 1 1 7 0. 3 4 5 6 7	100 TT 0H2	-59.106 UB/II				Freq Offse
/ 8 9 10 11						
ISQ			-	STATUS		

Antenna A

Center Fi	req 5.46500000	GHz PNO: Wide	Trig: Free Run #Atten: 2 dB	#Aug Type: RMS Avg Hold: 100/100	10:21:17 PM Jun 25, 2013 TRACE 2:34 TYPE M DET E NN N NN	Frequency
0 dB/div	Ref Offset 12.83 dB Ref 0.00 dBm			Mkr	1 5.470 00 GHz -36.091 dBm	Auto Tune
10 0 20 0 30 0						Center Freq 5,465000000 GHz
	notri sensiti penno	ayaa gaana daasaa	adaption data separat de Perlaman		ernframenen gerijskister	Start Freq 5.46000000 GHz
70 0 90 0 99 0					150.00.00	Stop Freq 5.47000000 GHz
Res BW	AC SCL X				Stop 5.470000 GHz 5.00 ms (1001 pts) FUNCTION VALUE	CF Step 1.000000 MHz Auto Man
N 1 2345678	f 5.4	70 00 GHz	-36.091 dBm			Freq Offset a Hz
9 10 11 12				sinite		

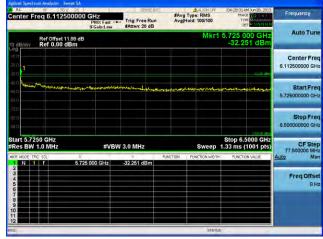
Antenna B

Page No: 76 of 98

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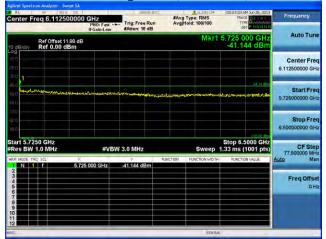
Conducted Bandedge Peak, 5510 MHz, HT-40, M8 to M15

Conducted Bandedge Peak, 5700 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

Conducted Bandedge Peak, 5700 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

RL enter Fr	RF 500 EC eq 6.1125000		Trig: Free Run #Atten: 16 dB	#Av	ALIGN OF Type: RMS Hold: 100/100	05:06:47 4M Jun 26, 201 TRACE 2 2 4 TYPE M DET P NIN NIN	Frequency
0 dB/div	Ref Offset 11.88 o Ref 0.00 dBm	iВ			Mkr1	5.725 000 GHz -39.410 dBm	
og 10 0 10 0							Center Freq 6.112500000 GHz
:0 m	400-yelizariana	rommercanthe	، «الجدسية المريط أسيرية المراجع	and all the	ารระทร์เรียงร่วงการที่สามาร์และเห	an 11 the sector of the sector	Start Freq 5,725000000 GHz
10.0 10.0 10.0							Stop Freq 6.500000000 GHz
tart 5.72 Res BW	1.0 MHz	#VB\ ×	V 3.0 MHz	PUNCTION	Sweep 1	Stop 6.5000 GHz 1.33 ms (1001 pts FUNCTION VALUE	
N 1 2 3 4 5 6 7 8 9 0		725 000 GHz	-39.410 dBm				Freq Offset 0 Hz
1					STATUS		

Antenna B

Page No: 77 of 98



Conducted Bandedge Peak, 5700 MHz, HT-20, M0 to M7



Conducted Bandedge Peak, 5700 MHz, HT-20, M0 to M7

RL RF 500 DC Center Freq 6.112500000	PNO: Fast IFGain:Low #Atten: 14 dB	#Avg Type: RMS Avg Hold: 100/100	06:43:02 AM Jun 26, 2013 TRACE 2 2 4 4 TYPE M DET P NN N NN	Frequency
Ref Offset 11.88 dB		Mkr1	5.725 000 GHz -41.119 dBm	Auto Tune
20 a				Center Free 6.112500000 GH
43 0 50 0 ED 0	meturonaga tender Nikisen sarandan disen Lages	s stift and share and strategy when	al 12 des Nava-Raytucare-Malyat	Start Free 5,725000000 GH
40 0 40 0			150.00.000	Stop Free 6.500000000 GH
Start 5.7250 GHz Res BW 1.0 MHz	#VBW 3.0 MHz		Stop 6.5000 GHz 1.33 ms (1001 pts)	CF Ster 77.500000 MH
N 1 C 5,72	25 000 GHz _41.119 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
3 4 5 6 7 8 9 9				Freq Offse 0 H
10 11 12				

er Freq 6.112500000 GHz Frig: Free Run Frid: Free Run Frid: Free Run #Atten: 16 dB #Avg Type: RMS Avg[Hold: 100/100 Auto Tur Ref Offset 11.88 dB Ref 0.00 dBm Center Fre 6.112500000 GH Start Fre 5.7250000 Stop Fri Start 5.7250 GHz Res BW 1.0 MH Stop 6.5000 GHz Sweep 1.33 ms (1001 pts) #VBW 3.0 MHz CFS 77.5000 5 725 000 G Freq Offs 01

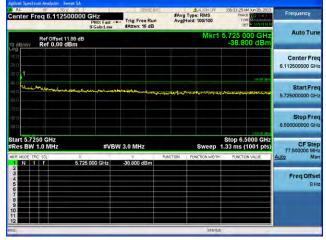
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Antenna A



Page No: 78 of 98

Conducted Bandedge Peak, 5700 MHz, HT-20, M8 to M15





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Antenna A

Antenna B

Conducted Bandedge Peak, 5700 MHz, HT-20 STBC, M0 to M7

Frequency	06:31:25 AM 3un 26, 2013 TRACE 2 2 4 5 TYPE MULTINE DET PLUNENN	Type: RMS fold: 100/100	#A:	SBREAN Trig: Free Run #Atten: 16 dB	GHZ PNO: Fast	2500000			ent
Auto Tun	5.725 000 GHz -38.800 dBm	Mkr1					Ref Offsel Ref 0.00	div	D dE
Center Fre 6.112500000 GF									
Start Fre 5,725000000 GH	-1840 (En	- 19-29 - 19-10-10-10-10-10-10-10-10-10-10-10-10-10-		entressent	un-m/~	ميدالروسانو هنه	Marrisolar	havis	0 0 0 0 0 0 0 0
Stop Fre 6.500000000 GH	i 50 00 / Em								10 1.q 1.g
CF Ste 77.500000 MH	Stop 6.5000 GHz 1.33 ms (1001 pts)	Sweep 1		3.0 MHz	#VBW		0 GHz .0 MHz		
Auto Ma	FUNCTION VALUE	FUNCTION WIDTH	PUNCTION	¥ 38.800 dBm	000 GHz	× 5.725			
Freq Offse									434557
									89012
	-	STATUS							4

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<t

Antenna A



Page No: 79 of 98

20dB Bandwidth

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency:	Frequency from table be.low
Span:	2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	5 s
Resolution Bandwidth:	1%-3% of 20 dB Bandwidth
Video Bandwidth:	≥Resolution Bandwidth
X dB Bandwidth:	20 dB
Detector:	Peak
Trace:	Single

Place the radio in continuous transmit mode. View the transmitter waveform on the spectrum analyzer, and record the pertinent measurements:

Page No: 80 of 98

Frequency (MHz)	Mode	Data Rate (Mbps)	20dB BW (MHz)	Limit (kHz)	Margin (MHz)
5550	Non HT-40, 6 to 54 Mbps	6	5569	5600	31
5550	HT-40, M0 to M23	m0	5569	5600	31
5560	Non HT-20, 6 to 54 Mbps	6	5569	5600	31
5500	HT-20, M0 to M23	m0	5569	5600	31
F.680	Non HT-20, 6 to 54 Mbps	6	5671	5650	21
5680	HT-20, M0 to M23	m0	5670	5650	20

Page No: 81 of 98



20dB BW, 5550 MHz, Non HT-40, 6 to 54 Mbps

20dB BW, 5550 MHz, HT-40, M0 to M23



Page No: 82 of 98



20dB BW, 5560 MHz, Non HT-20, 6 to 54 Mbps

20dB BW, 5560 MHz, HT-20, M0 to M23



Page No: 83 of 98



20dB BW, 5680 MHz, Non HT-20, 6 to 54 Mbps

20dB BW, 5680 MHz, HT-20, M0 to M23



Page No: 84 of 98



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Page No: 85 of 98

Appendix B: Emission Test Results

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

Radiated Spurious Emissions

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

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 18 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV @3m 2) Peak plot (Vertical and Horizontal), Limit = 74dBuV @3m

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands.

This report represents the worst case data for all supported operating modes and antennas. There are no measurable emissions above 18 GHz.

Page No: 86 of 98

Transmitter Radiated Spurious Emissions



Radiated Transmitter Spurs, All Rates, All Modes, Peak 1-18GHz Agilent 11:46:47 Jul 22, 2013 RΤ Freq/Channel EMiSoft Vasona: EMi Emission Software 17.809 GHz Mkr1 **Center Freq** Ref 90 dB**µ**V #Peak #Atten 0 dB 59.11 dB**µ**V 9.50000000 GHz Log 10 Start Freq dB/ 1.00000000 GHz Stop Freq 18.0000000 GHz DI 74.0 dB**µ**V Mall And which was not the board 11.64 CF Step 10.0000000 MHz #LgAv Luui: Auto Man W1 S2 S3 FS Freq Offset 0.00000000 Hz A £(f): Signal Track FTun 0n <u>0ff</u> Swp Start 1.000 GHz Stop 18.000 GHz #Sweep 56.85 ms (1601 pts) #Res BW 1 MHz #VBW 1 MHz 2000-2008 Agilent Technologie Copyright

Radiated Transmitter Spurs, All Rates, All Modes, Average 1-18GHz

Page No: 87 of 98

Start Freq 18.000000000	GHz PNO: Fast	Trig: Free Run #Atten: 4 dB	Avg Type: Voltage	08:56:20 AM 3/18, 2013 TRACE 1 2 3 4 TVPE Without to DET P P P P P P	Frequency
IO dE/dly Ref 80.00 dBµV			M	kr1 26.420 GHz 29.88 dBµV	Auto Tune
70.0					Center Fred 22 249999500 GH:
97 0 20.0				\$4.00 mey y	Start Free 18.000000000 GHa
43.0 30.0					Stop Free 26.499999000 GH:
22 0	~	~~~~~			CF Step 10.000000 MH Auto Mar
0.001					Freq Offse 0 H
start 18.000 GHz Res BW (CISPR) 1 MHz	#VBW	1.0 kHz	Sweet	Stop 26.500 GHz 9.75 s (1601 pts)	

Radiated Transmitter Spurs, All Rates, All Modes, Average 18-26.5 GHz

Radiated Transmitter Spurs, All Rates, All Modes, Peak 18-26.5 GHz

Start Fre	q 18.00000	P	Z NO: Fast 🗝		Avg Type	: Voltage	08:58:10 AM 3/18, 2013 TRACE 1 2 3 4 TYPE DET P P P P P	Frequency
10 dE/div	Ref 80.00	dBµV				N	kr1 26.484 GHz 38.81 dBµV	Auto Tune
70.0							74 ttb cetyle	Center Fred 22.249999500 GH:
60 0 50 0								Start Free 18.000000000 GH:
40.0 20.0 1440	a filighter a f	malificity	ar Miniada	shi hidiyayiya	nytinythight	ANH MAR	ertinledelight wind states	Stop Free 26.499999000 GH
20.0								CF Step 10.000000 MH Auto <u>Ma</u>
0,00								Freq Offse 0 H
Start 18.0							Stop 26.500 GHz	
Res BW	(CISPR) 1 N	IHZ	#VBW	1.0 MHz		Sweep		

Page No: 88 of 98



Radiated Transmitter Spurs, All Rates, All Modes, Average 26.5-40 GHz

Radiated Transmitter Spurs, All Rates, All Modes, Peak 26.5 to 40GHz

larker 1 28.297187500000 GHz PNO: Fast IFGaint ov	Trig: Free Run #Atten: 4 dB	Avg Type: Voltage	09:05:34 AM JJ 18, 2013 TRACE 1 2 3 4 1 TYPE WATCHING	Peak Search
미 레타/레아 Ref 80.00 dBµV		М	kr1 28.297 GHz 51.40 dBµV	NextPeak
0.0			74.00 otsjave	Next Pk Right
1 0.0 100 200 100 101				Next Pk Left
WAARPAN TO WATCH TO WAARPAN TO STATE OF A STATE OF	vehijdningenaatsingenaaleden	yteleddor yn dewidd ant.	estatsishiphatatatalanaki	Marker Delta
sq.				Mkr→Cf
ώ 				Mkr→RefLv
tart 26.500 GHz Res BW (CISPR) 1 MHz #VI	5W 1.0 MHz	Sween	Stop 40.000 GHz 31.0 ms (1601 pts)	More 1 of 2

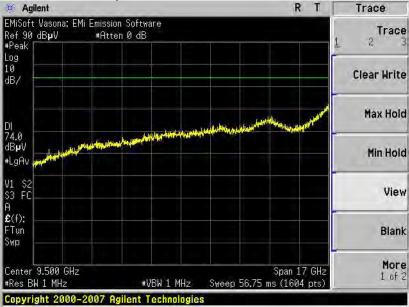
Page No: 89 of 98

Receiver Radiated Spurious Emissions



Radiated Receiver Spurs, All Rates, All Modes, Average

Radiated Receiver Spurs, All Rates, All Modes, Peak



Page No: 90 of 98

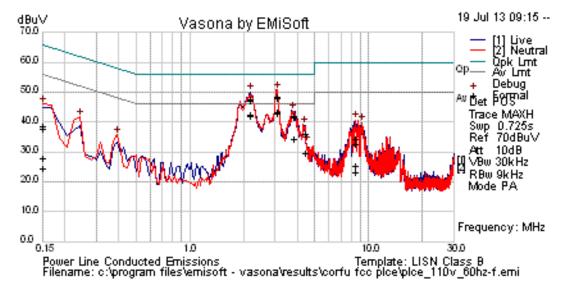


Radiated Test Setup 1–18GHz



Radiated Test Setup 18–40GHz

Page No: 91 of 98



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Conducted Emissions

No	Frequency MHz	Raw dBuV		Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail
1	3.079	23.2	20.0	.0	43.2	Average	Neutral	46.0	-2.8	Pass
2	3.079	23.1	20.0	.0	43.1	Average	Live	46.0	-2.9	Pass
3	2.183	22.3	20.0	. O	42.3	Average	Neutral	46.0	-3.7	Pass
4	2.184	22.2	20.0	. O	42.2	Average	Live	46.0	-3.8	Pass
5	3.079	28.3	20.0	. O	48.3	Quasi Peak	Neutral	56.0	-7.7	Pass
6	3.079	28.2	20.0	. O	48.2	Quasi Peak	Live	56.0	-7.8	Pass
7	2.183	27.4	20.0	.0	47.5	Quasi Peak	Neutral	56.0	-8.6	Pass
8	2.184	27.3	20.0	.0	47.3	Quasi Peak	Live	56.0	-8.7	Pass
9	3.819	14.3	20.0	. 1	34.3	Average	Neutral	46.0	-11.7	Pass
10	3.819	14.3	20.0	. 1	34.3	Average	Live	46.0	-11.7	Pass
11	3.819	22.0	20.0	. 1	42.0	Quasi Peak	Neutral	56.0	-14.0	Pass
12	3.819	21.6	20.0	. 1	41.6	Quasi Peak	Live	56.0	-14.4	Pass
13	4.420	9.5	20.0	. 1	29.5	Average	Neutral	46.0	-16.5	Pass
14	4.420	9.4	20.0	. 1	29.5	Average	Live	46.0	-16.5	Pass
15	4.420	16.1	20.0	. 1	36.2	Quasi Peak	Live	56.0	-19.8	Pass
16	4.420	16.0	20.0	. 1	36.1	Quasi Peak	Neutral	56.0	-19.9	Pass
17	8.469	5.0	20.1	. 1	25.2	Average	Neutral	50.0	-24.8	Pass
18	8.469	14.3	20.1	.1	34.5	Quasi Peak	Neutral	60.0	-25.5	Pass
19	8.469	2.8	20.1	.1	23.0	Average	Live	50.0	-27.0	Pass
20	.150	17.3	21.4	.1	38.8	Quasi Peak	Neutral	66.0	-27.2	Pass

Page No: 92 of 98

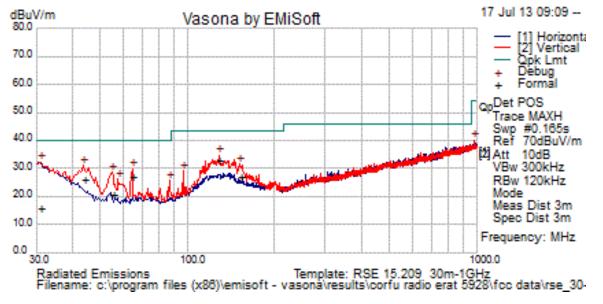
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21	8.469	12.6	20.1	. 1	32.8	Quasi Peak	Live	60.0	-27.2	Pass
22	.150	6.3	21.4	. 1	27.8	Average	Neutral	56.0	-28.2	Pass
23	.150	16.2	21.4	. 1	37.7	Quasi Peak	Live	66.0	-28.3	Pass
24	.150	2.9	21.4	. 1	24.4	Average	Live	56.0	-31.6	Pass



Conducted Emissions Test Setup

Page No: 93 of 98

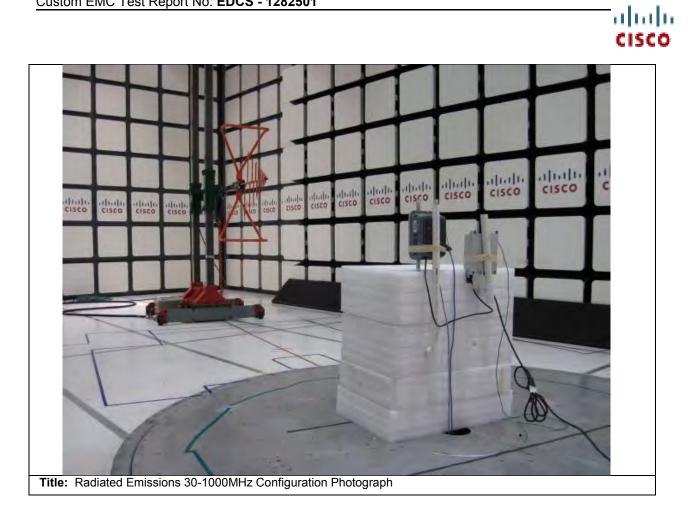


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Radiated emissions

Test Results Table

Page No: 94 of 98



Page No: 95 of 98

Maximum Permissible Exposure (MPE) Calculations

15.407: U-NII devices are subject to the radio frequency radiation exposure requirements specified in Sec. 1.1307(b), Sec. 2.1091 and Sec. 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a ``general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

Given

 $E=\sqrt{(30^{*}P^{*}G)/d}$ and $S=E^{2}/3770$

where

E=Field Strength in Volts/meter P=Power in Watts G=Numeric Antenna Gain d=Distance in meters S=Power Density in mW/cm^2

Combine equations and rearrange the terms to express the distance as a function of the remaining variables:

```
d=√((30*P*G)/(3770*S))
```

P(mW)=P(W)/1000

Changing to units of power in mW and distance in cm, using:

d(cm)=100*d(m)

yields

d=100*√((30*(P/1000)*G)/(3770*S)) d=0.282*√(P*G/S)

where

d=Distance in cm P=Power in mW G=Numerica Antenna Gain S=Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

violdo	P(mW)=10^(P(dBm)/10)	G(numeric)=10^(G(dBi)/10)	
yields	d=0.282*10^((P+G)/20)/√S		Equation (1)
and	s=((0.282*10^((P+G)/20))/d)^2		Equation (2)
where	d=MPE distance in cm		
	P=Power in dBm		
	G=Antenna Gain in dBi		
	S=Power Density in mW/cm ²		

Page No: 96 of 98

Equation (1) and the measured peak power are used to calculate the MPE distance. Note that for mobile or fixed location transmitters such as an access point, the minimum separation distance is 20 cm even if the calculations indicate that the MPE distance may be less.

S=1mW/cm² maximum. The highest supported antenna gain is 5 dBi. Using the peak power levels recorded in the test report along with Equation 1 above, the MPE distances are calculated as follows.

Frequency (MHz)	Power Density (mW/cm^2)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)	Limit (cm)	Margin (cm)
5500	1	22.0	5	6.31	20	13.69
5700	1	21.0	5	5.63	20	14.37

MPE Calculations

To maintain compliance, installations will assure a separation distance of at least 20cm.

Using Equation 2, the MPE levels (s) at 20 cm are calculated as follows:

		Peak				
	MPE	Transmit	Antenna	Power		
Frequency	Distance	Power	Gain	Density	Limit	Margin
(MHz)	(cm)	(dBm)	(dBi)	(mW/cm^2)	(mW/cm^2)	(mW/cm^2)
5500	20	22.0	5	0.10	1	0.90
5700	20	21	5	0.08	1	0.92

Page No: 97 of 98



Equip #	Manufacturer	Model	Description	Last Cal	Next Due
44940	Rohde & Schwarz	ESU	Spectrum Analyzer	15May13	15May14
40514	Agilent	E4440A	Spectrum Analyzer	12-NOV-12	12-NOV-13
47299	Agilent	PXA	Signal Analyzer	04Sept12	04Sept13
3003	HP	8373B	Signal Generator	26Mar13	26Mar14
30654	Sunol Sciences	JB1	Combination Antenna	16Oct12	16Oct13
4882	EMCO	3115	Horn Antenna	28Jun13	28Jun14
41935	Newport	iBTHP-5-DB9	Temperature Probe	25MAR13	25MAR14
5691	Miteq	NSP1800-25-S1	1GHz to 18GHz Pre-Amplifier	01Feb13	01Feb14
41979	Cisco	1840	18-40GHz EMI Test Head	09Jul13	09Jul14
25658	Micro-Coax	UFB311A-1-0840-504504	RF Cable	13Feb13	13Feb14
21117	Micro-Coax	UFB311A-0-2484-520520	RF Cable	24Aug12	24Aug13
48720	Huber Suhner	Sucoflex 106PA	RF Cable	20Aug12	20Aug13
47300	Agilent	MXE	EMI Receiver	13Nov12	13Nov13
8195	TTE	H613-150K-50-21378	Filter	04Jan13	04Jan14
8496	Fischer Custom	FCC-450B-2.4-N	Pulse limiter	20May13	20May14
39110	Coleman	RG-223	RF Cable, 25 ft., N	29Nov12	29Nov13
29957	Fischer	FCC-LISN-50/250-50-2-01	LISN	02Aug12	02Aug13
29959	Fischer	FCC-LISN-PA-NENA-5-15	LISN Adapter	02Aug12	02Aug13
44023	Fischer	M2	CDN	16Nov12	16Nov13
31919	Midwest Microwave	TRM-2048-MC-BNC-10	50Ohm Terminator	30Aug12	30Aug13
39162	Coleman	RG-223	RF Cable, 2 ft. BNC	09Oct12	09Oct13
25001	Micro-Coax	UFB197C-1-0240-504504	RF Cable, 2 ft.	24Mar13	24Mar14

Appendix C: Test Equipment/Software Used to perform the test

Page No: 98 of 98