Test Report

IW3702 - 4E - UXK9

Cisco Industrial Wireless 802.11ac Dual Band Access Point

FCC ID: LDKIW3702
IC: 2461B-IW3702

5250-5350 MHz

Antenna Gain 7 dBi

Against the following Specifications:

CFR47 Part 15.407

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

ACCREDITED

Testing - Certificate Number : 1178-01

Author: Johanna Knudsen
Approved By: See EDCS
Title: See EDCS

This report replaces any previously entered test report under EDCS - 1497904

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

Section 1: Overview

1.1 Test Summary

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

Emission	Immunity
CFR47 Part 15.407	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.

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.
7. 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.
8. 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.

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:

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*%

*[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%.

All AC testing was performed at one or more of the following supply voltages:
110V 60 Hz (+/-20%)
220V 50 Hz (+/-20%)

2.2 Date of testing

5-May-2015 to 29-June-2015

2.3 Report Issue Date

Cisco 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, 5m Chamber	Company #: 2461N-1

Test Engineers

Johanna Knudsen, Vinay Ganji, Chris Blair

2.5 Equipment Assessed (EUT)

IW3702, Cisco Industrial Wireless 802.11ac Dual Band Access Point

2.6 EUT Description

The IW3702 Series Outdoor/Industrial 802.11ac Dual Band Access Point supports 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
Non HT/VHT-20, Three Antennas, 6 to 54 Mbps
Non HT/VHT-20, Four Antennas, 6 to 54 Mbps

Non HT/VHT-20 Beam Forming, Two Antennas, 6 to 54 Mbps
Non HT/VHT-20 Beam Forming, Three Antennas, 6 to 54 Mbps
Non HT/VHT-20 Beam Forming, Four Antennas, 6 to 54 Mbps

HT/VHT-20, One Antenna, M0 to M7, m0.1 to m9.1
HT/VHT-20, Two Antennas, M0 to M15, m0.1 to m9.2
HT/VHT-20, Three Antennas, M0 to M23, m0.1 to m9.3
HT/VHT-20, Four Antennas, M0 to M23, m0.1 to m9.3

HT/VHT-20 STBC, Two Antennas, M0 to M7, m0.1 to m9.1
HT/VHT-20 STBC, Three Antennas, M0 to M7, m0.1 to m9.1
HT/VHT-20 STBC, Four Antennas, M0 to M7, m0.1 to m9.1

HT/VHT-20 Beam Forming, Two Antennas, M0 to M15, m0.1 to m9.2
HT/VHT-20 Beam Forming, Three Antennas, M0 to M23, m0.1 to m9.3
HT/VHT-20 Beam Forming, Four Antennas, M0 to M23, m0.1 to m9.3

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

HT/VHT-40, One Antenna, M0 to M7, m0.1 to m9.1
HT/VHT-40, Two Antennas, M0 to M15, m0.1 to m9.2
HT/VHT-40, Three Antennas, M0 to M23, m0.1 to m9.3
HT/VHT-40, Four Antennas, M0 to M23, m0.1 to m9.3

HT/VHT-40 STBC, Two Antennas, M0 to M7, m0.1 to m9.1
HT/VHT-40 STBC, Three Antennas, M0 to M7, m0.1 to m9.1
HT/VHT-40 STBC, Four Antennas, M0 to M7, m0.1 to m9.1

HT/VHT-40 Beam Forming, Two Antennas, M0 to M15, m0.1 to m9.2
HT/VHT-40 Beam Forming, Three Antennas, M0 to M23, m0.1 to m9.3
HT/VHT-40 Beam Forming, Four Antennas, M0 to M23, m0.1 to m9.3

Non VHT-80 Duplicate, One Antenna, 6-54 Mbps
Non VHT-80 Duplicate, Two Antennas, 6-54 Mbps
Non VHT-80 Duplicate, Three Antennas, 6-54 Mbps
Non VHT-80 Duplicate, Four Antennas, 6-54 Mbps

VHT-80, One Antenna, M0 to M7, m0.1 to m9.1
VHT-80, Two Antennas, M0 to M15, m0.1 to m9.2
VHT-80, Three Antennas, M0 to M23, m0.1 to m9.3
VHT-80, Four Antennas, M0 to M23, m0.1 to m9.3

VHT-80 STBC, Two Antennas, M0 to M7, m0.1 to m9.1
VHT-80 STBC, Three Antennas, M0 to M7, m0.1 to m9.1
VHT-80 STBC, Four Antennas, M0 to M7, m0.1 to m9.1

VHT-80 Beam Forming, Two Antennas, M0 to M15, m0.1 to m9.2
VHT-80 Beam Forming, Three Antennas, M0 to M23, m0.1 to m9.3
VHT-80 Beam Forming, Four Antennas, M0 to M23, m0.1 to m9.3

The following antennas are supported by this product series.

The data included in this report represent the antennas in **bold** below.

AIR-ANT2547V-N	**Dual-band 4 dBi (2.4 GHz) 7 dBi (5 GHz) omnidirectional antenna with 1x type N (m) connector (white)**
AIR-ANT2547VG-N	**Dual-band 4 dBi (2.4 GHz) 7 dBi (5 GHz) omnidirectional antenna with 1x type N (m) connector (gray)**
AIR-ANT2513P4M-N	Dual-band 13 dBi (2.4 GHz) 13 dBi (5 GHz) patch antenna with 4x type N (f) connector
AIR-ANT2524V4C-R	Dual-band 2 dBi (2.4 GHz) 4 dBi (5 GHz) omni-directional antenna with 4x RP-TNC (m) connector (indoor only)
AIR-ANT2544V4M-R	Dual-band 4 dBi (2.4 GHz) 4 dBi (5 GHz) omni-directional antenna with 4x RP-TNC (m) connector
AIR-ANT2566P4W-R	Dual-band 6 dBi (2.4 GHz) 6 dBi (5 GHz) patch antenna with 4x RP-TNC (m) connector

Section 3: Results Summary

Conducted emissions

Basic Standard	Result
99% and 26dB Bandwidth	Pass
Peak Output Power	Pass
Power Spectral Density	Pass
Peak Excursion	Pass
Conducted Spurious Emissions	Pass
Restricted Band Edge Measurements	Pass

Radiated emissions

Basic Standard	Result
Radiated Spurious and Harmonic Emissions	Pass

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 A)

Sample No.	Equipment Details	Part Number	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	IW3702 - 4E - UXK9	68-5584-03	Cisco Systems	03	NA	NA	FOC18486MLL
S02	PWR-IE3000-AC	341-0304-01	Cisco Systems	01	NA	NA	DTM170704Z2
S03	IW3702 - 4E - UXK9	68-5584-04	Cisco Systems	04	NA	NA	FOC19167ZLE
S04	PWR-IE3000-AC	341-0304-01	Cisco Systems	01	NA	NA	DTM160801WH

4.2 System Details

System #	Description	Samples
1	EUT System used for all Conducted testing Image version: flash:/ap3g2-k9w7-mx.newptable_apr30/ap3g2-k9w7-xx.newptable_ap	S01, S02
2	EUT System used for all Radiated testing Image version: flash:/ap3g2-k9w7-mx.newptable_apr30/ap3g2-k9w7-xx.newptable_ap	S03, S04

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting

Maximum Channel Power

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

	Maximum Channel Power (dBm)	
	Frequency (MHz)	
Operating Mode	5260	5320
Non HT-20, 6 to 54 Mbps	16	16
Non HT-20 Beam Forming, 6 to 54 Mbps	16	16
HT-20, M0 to M23, M0.1 to M9.3	20	19
HT-20 STBC, M0 to M7, M0.1 to M9.1	20	19
HT-20 Beam Forming, M0 to M23, M0.1 to M9.3	20	19
	5260/5280	5300/5320
Non HT-40 Duplicate, 6 to 54 Mbps	19	16
HT-40, M0 to M23, M0.1 to M9.3	20	17
HT-40 STBC, M0 to M7, M0.1 to M9.1	20	17
HT-40 Beam Forming, M0 to M23, M0.1 to M9.3	20	17
	5260/5280/5300/5320	
Non HT-80 Duplicate, 6 to 54 Mbps	11	
HT-80, M0 to M23, M0.1 to M9.3	14	
HT-80 STBC, M0 to M7, M0.1 to M9.1	15	
HT-80 Beam Forming, M0 to M23, M0.1 to M9.3	15	

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).

KDB used: 789033 D01 General UNII Test Procedures Old Rules v01r04

C) Emission bandwidth

1) Set RBW = approximately 1% of the emission bandwidth.

2) Set the VBW > RBW.

3) Detector = Peak.

4) Trace mode = max hold.

5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

D) 99 Percent Occupied Bandwidth

The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is *required* only as a condition for using the optional band-edge measurement techniques described in section H)3)d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the 26-dB emission bandwidth to define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section E). However, the 26-dB bandwidth must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a). The following procedure shall be used for measuring (99 %) power bandwidth.

1) Set center frequency to the nominal EUT channel center frequency.

2) Set span = 1.5 times to 5.0 times the OBW.

3) Set RBW = 1 % to 5 % of the OBW

4) Set VBW $\geq 3 \cdot$ RBW

5) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

6) Use the 99 % power bandwidth function of the instrument (if available).

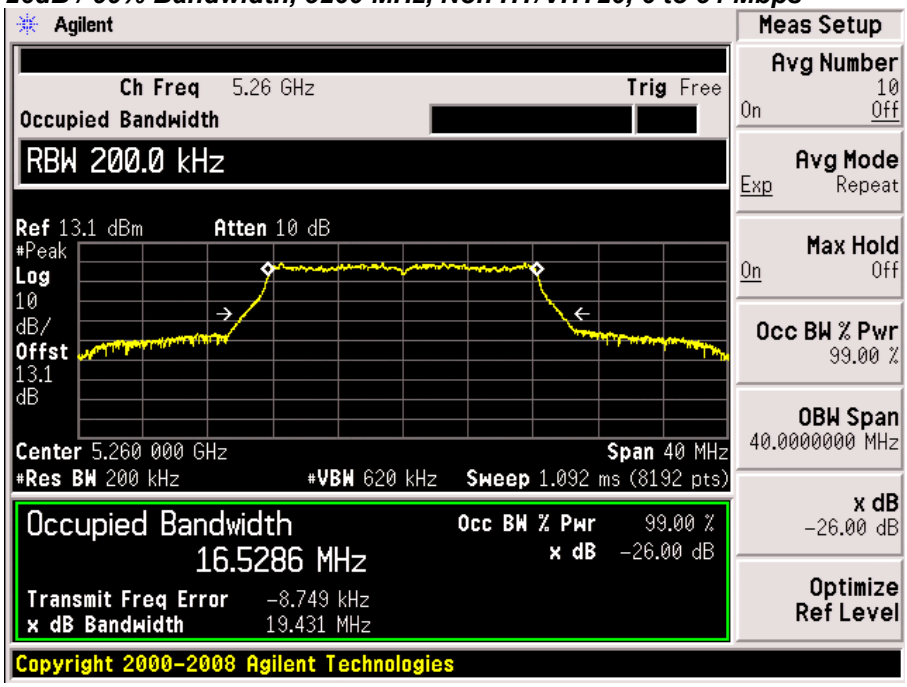
7) If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

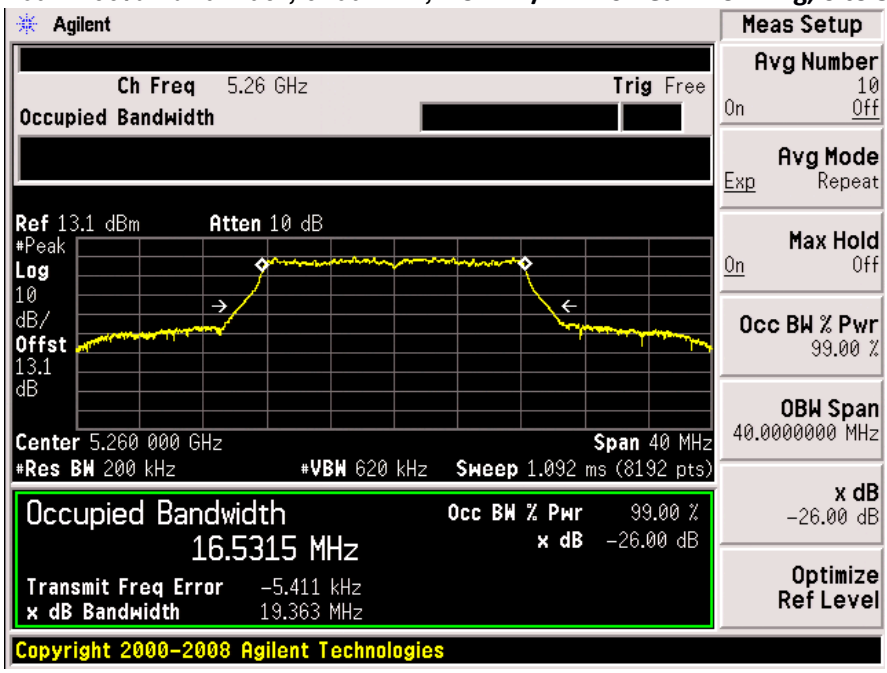
Radio was placed in continuous transmit mode. Peak detection with max hold was utilized.

Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
5260	Non HT/VHT20, 6 to 54 Mbps	6	19.431	16.529
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	6	19.363	16.532
	HT/VHT20, M16 to M23, M0.3 to M9.3	M16	19.317	17.582
	HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1	M0	19.696	17.607
	HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1	M0	20.023	17.612
5260/5280	Non HT/VHT40, 6 to 54 Mbps	6	39.967	36.233
	HT/VHT40, M8 to M15, M0.2 to M9.2	M8	39.377	36.177
	HT/VHT40, M8 to M15, M0.2 to M9.2	M8	40.130	36.092
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	M16	39.764	36.172
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	M16	39.164	36.042
5260/5280/ 5300/5320	Non HT/VHT80, 6 to 54 Mbps	6	82.318	76.240
	HT/VHT80, M0 to M7, M0.1 to M9.1	M0x1	83.979	76.274
	HT/VHT80, M16 to M23, M0.3 to M9.3	M0x3	83.842	75.929
	HT/VHT80 Beam Forming, M16 to M23, M0.3 to M9.3	M0x3	82.332	76.194
5300/5320	Non HT/VHT40, 6 to 54 Mbps	6	40.295	36.209
	HT/VHT40, M8 to M15, M0.2 to M9.2	M8	40.105	36.114
	HT/VHT40, Beamforming M16 to M23, M0.3 to M9.3	M16	39.620	36.166
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	M16	39.160	36.023
5320	Non HT/VHT20, 6 to 54 Mbps	6	19.476	16.543
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	6	19.502	16.545
	HT/VHT20, M16 to M23, M0.3 to M9.3	M16	19.247	17.602
	HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3	M16	19.975	17.655

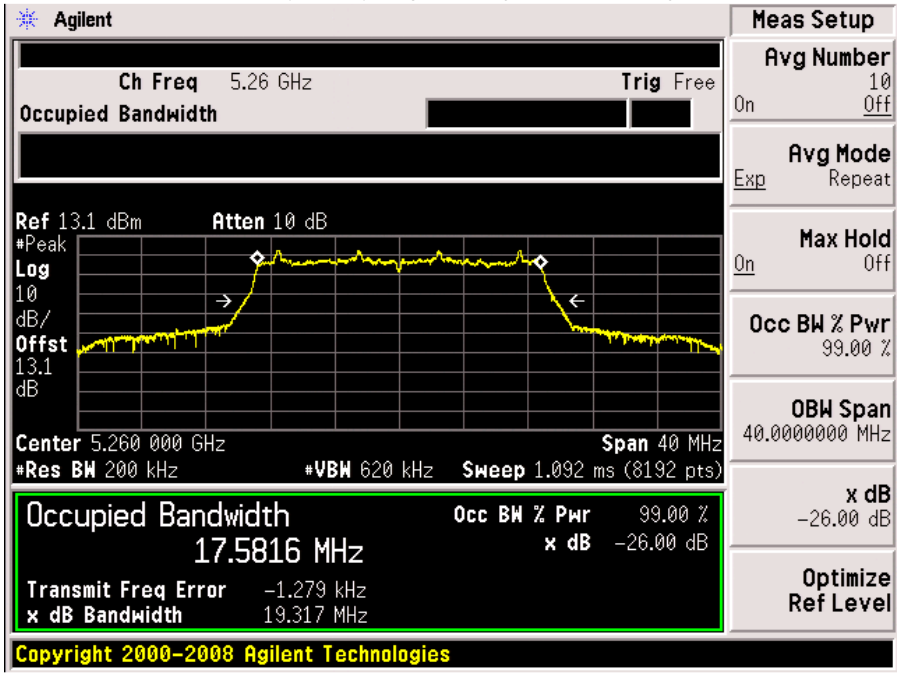
26dB / 99% Bandwidth, 5260 MHz, Non HT/VHT20, 6 to 54 Mbps



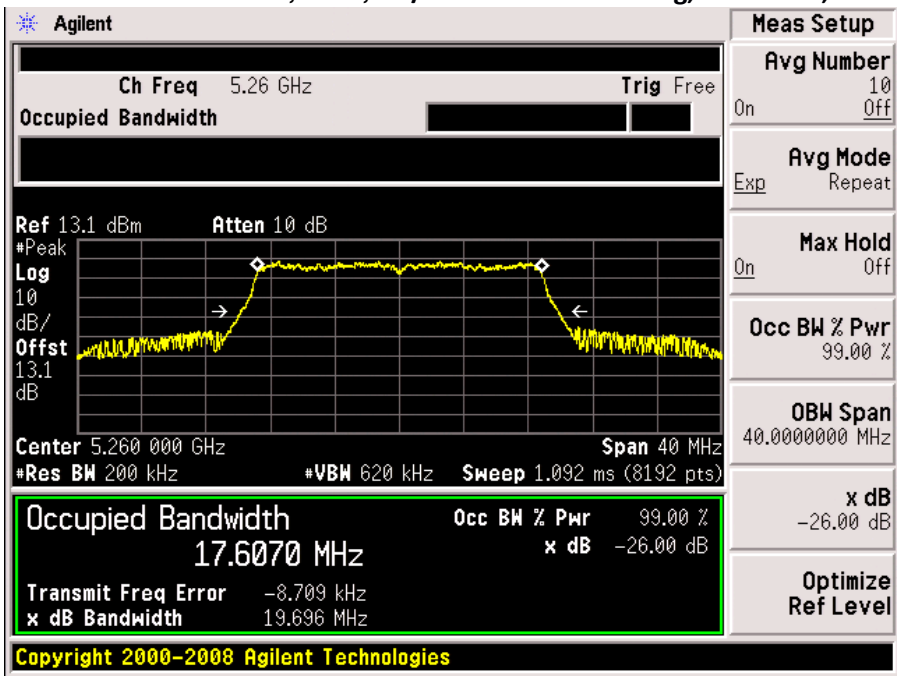
***26dB / 99% Bandwidth, 5260 MHz,* Non HT/VHT20 Beam Forming, 6 to 54 Mbps**



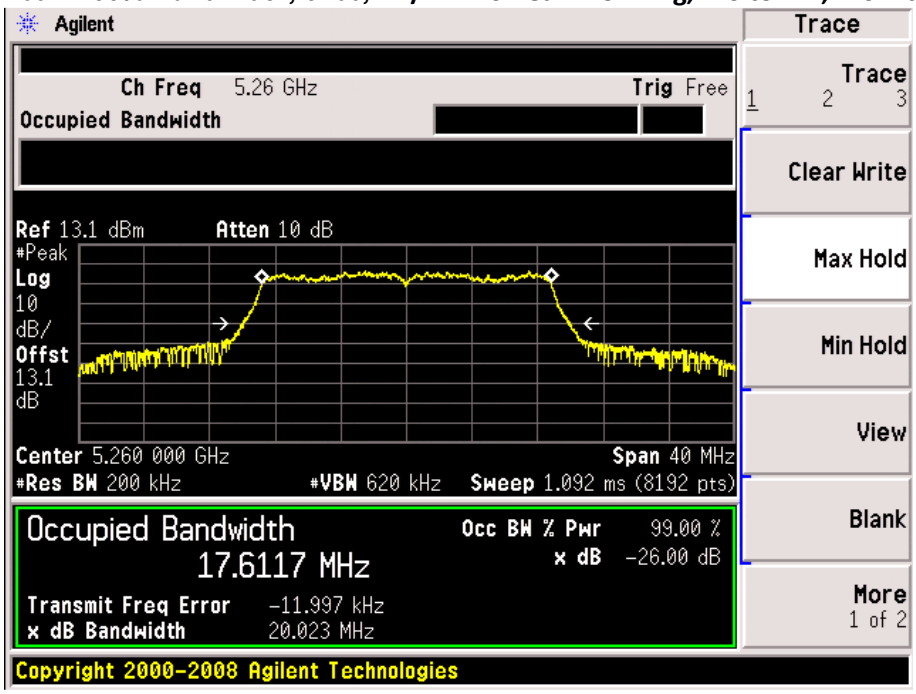
***26dB / 99% Bandwidth, 5260,* HT/VHT20, M16 to M23, M0.3 to M9.3**



***26dB / 99% Bandwidth, 5260,* HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1**



***26dB / 99% Bandwidth, 5260,* HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1**



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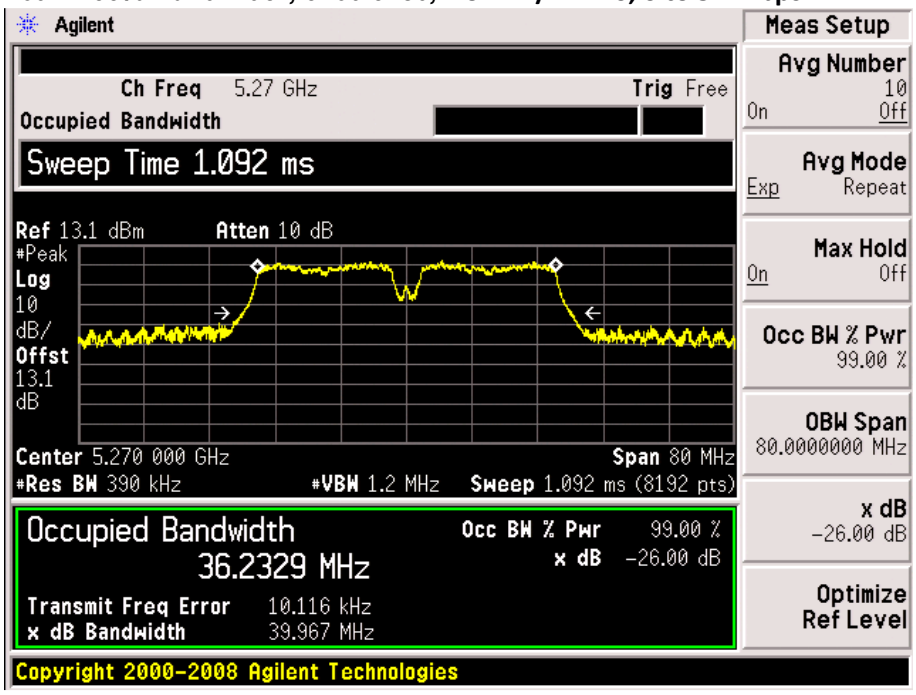
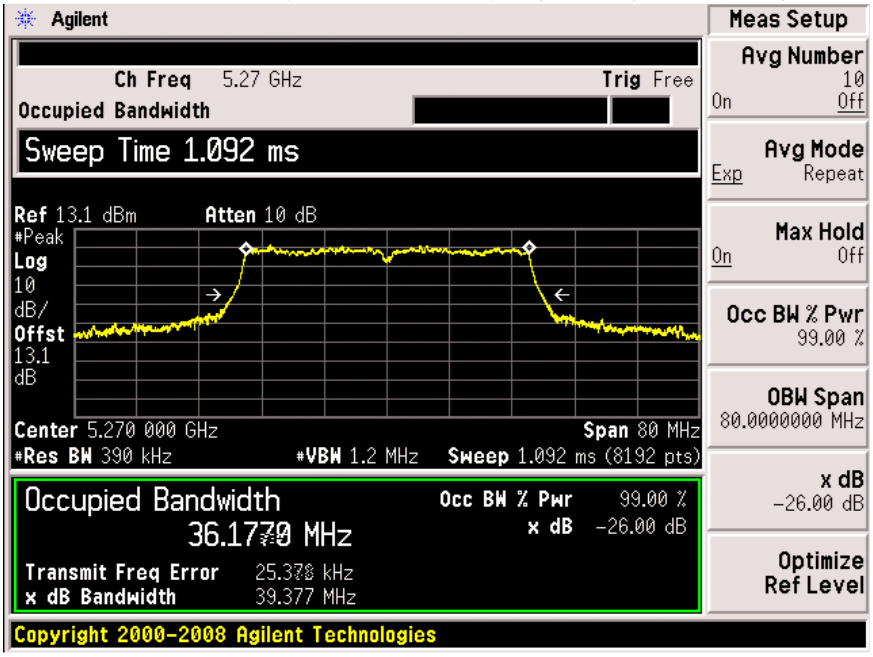
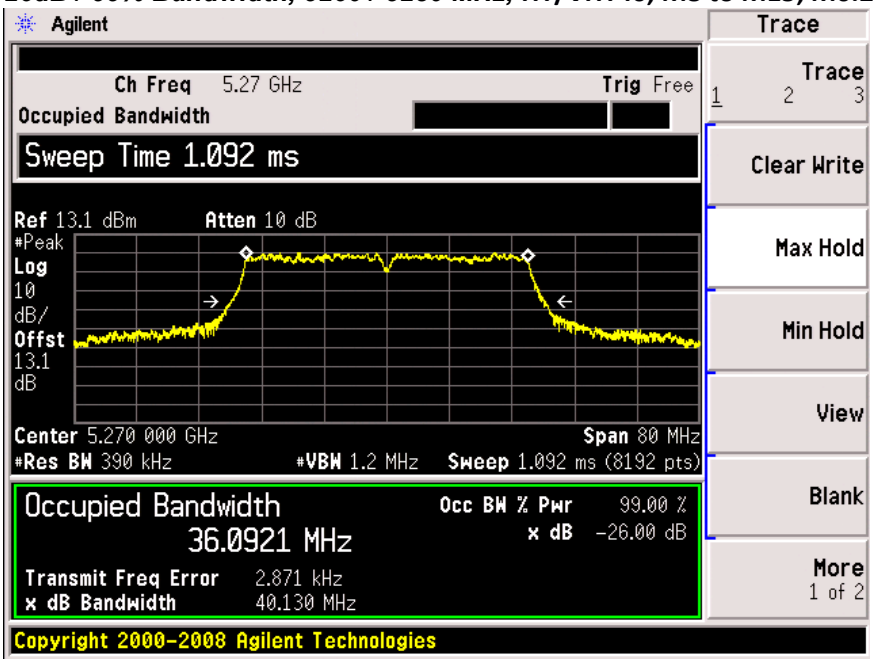


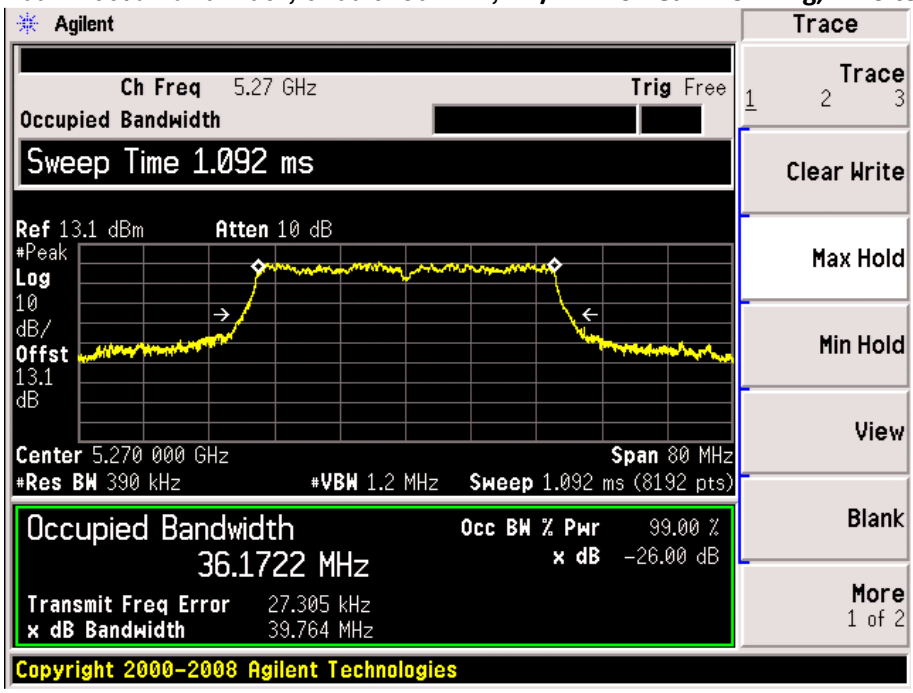
***26dB / 99% Bandwidth, 5260/5280 MHz,* HT/VHT40, M8 to M15, M0.2 to M9.2**



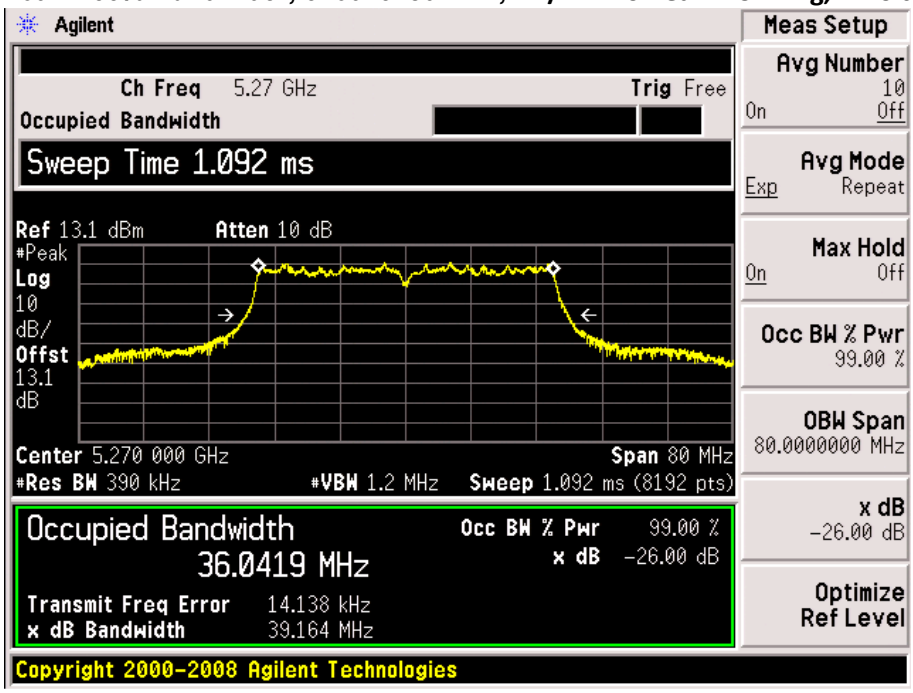
***26dB / 99% Bandwidth, 5260 / 5280 MHz,* HT/VHT40, M8 to M15, M0.2 to M9.2**



***26dB / 99% Bandwidth, 5260/5280 MHz*, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3**



***26dB / 99% Bandwidth, 5260/ 5280 MHz*, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3**



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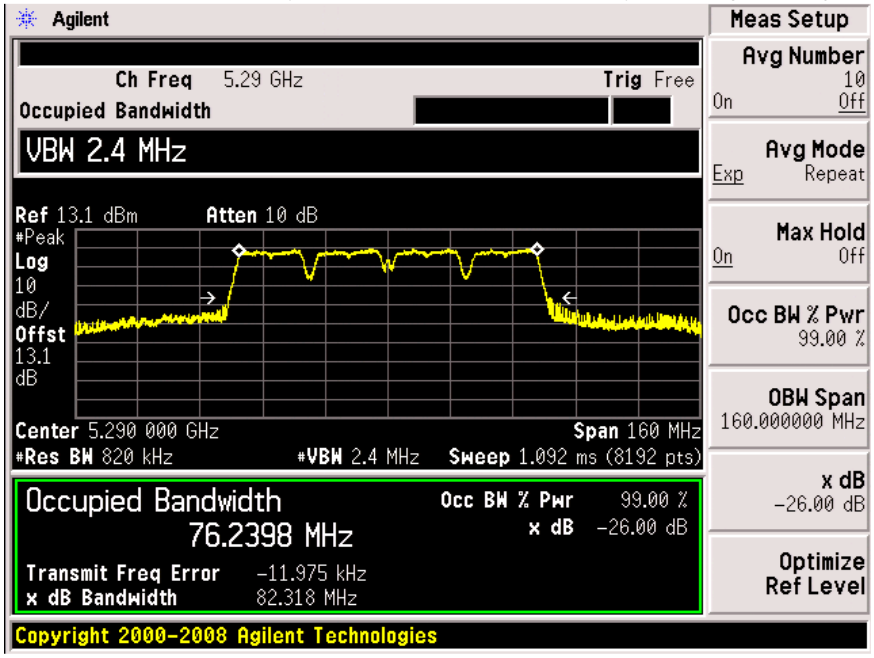
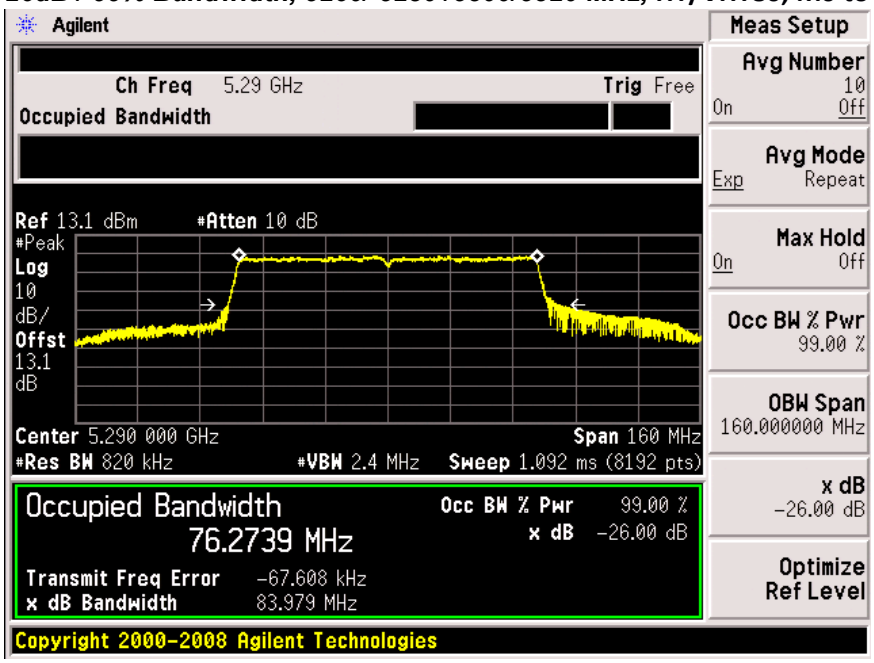
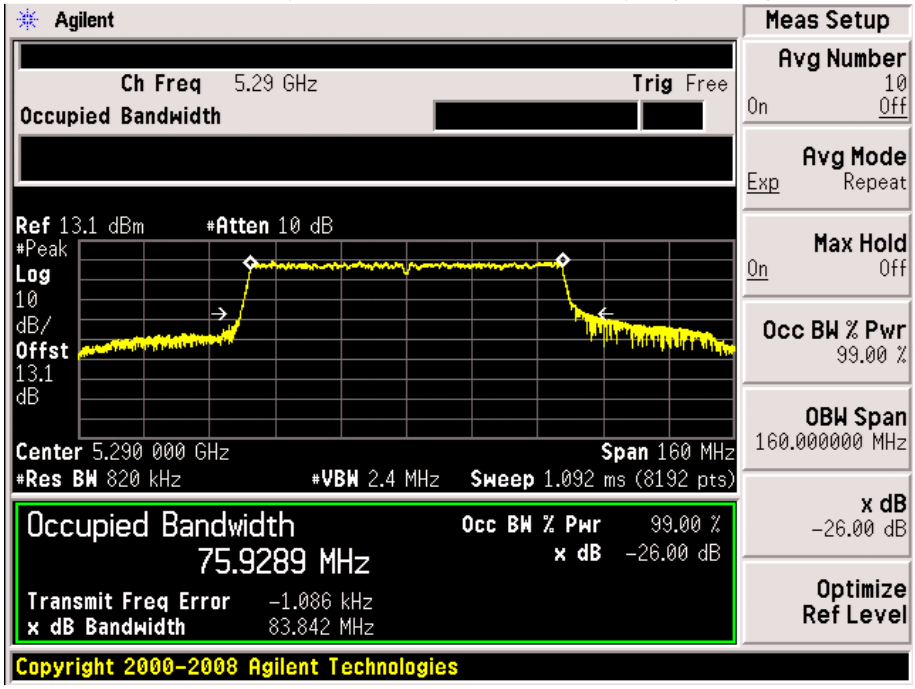


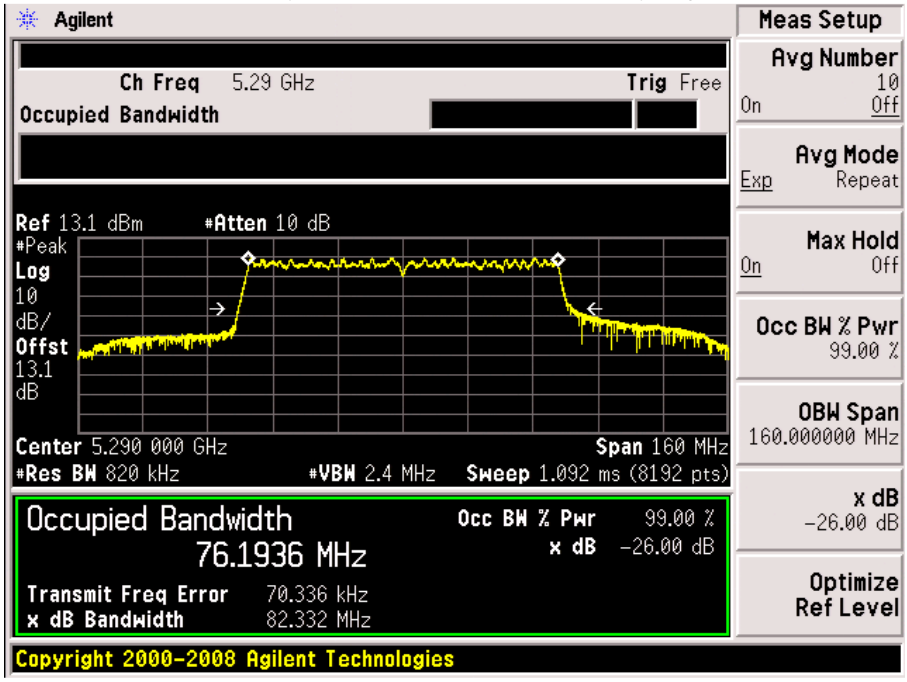
***26dB / 99% Bandwidth, 5260/ 5280 /5300/5320 MHz,* HT/VHT80, M0 to M7, M0.1 to M9.1**



***26dB / 99% Bandwidth, 5260/5280/5300/5320 MHz,* HT/VHT80, M16 to M23, M0.3 to M9.3**



***26dB / 99% Bandwidth, 5260/ 5280 /5300/5320 MHz,* HT/VHT80 Beam Forming, M16 to M23, M0.3 to M9.3**



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.

This is a sample calculation for the test case with the lowest limit. The maximum conducted output power is calculated as 11dBm+10*log(19.972MHz) = 24dBm. The limit is further reduced by 7dBi, which is the difference between the correlated antenna gain and 6dBi.The limit is 17dBm.

The maximum supported antenna gain for all bands is 7dBi. 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.

Method SA-2 from 789033 D01 General UNII Test Procedures Old Rules v01r04 was used.

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

(i) Measure the duty cycle, x, of the transmitter output signal as described in section B).

(ii) Set span to encompass the 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(iii) Set RBW = 1 MHz.

(iv) Set VBW ≥ 3 MHz.

(v) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(vi) Sweep time = auto.

(vii) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(viii) Do not use sweep triggering. Allow the sweep to “free run”.

(ix) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.

(x) Compute power by integrating the spectrum across the 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(xi) Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

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 7dBi. 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.

Test Procedure: follow Power procedure listed above, but also perform a Marker Peak Search function, and record this value as the Power Spectral Density.

Power Table

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Duty Cycle (%)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Tx 3 Max Power (dBm)	Tx 4 Max Power (dBm)	Total Tx Channel Power (dBm)	Total Tx Channel Power corrected for Duty Cycle (dBm)	Limit (dBm)	Margin (dB)
5260	Non HT/VHT20, 6 to 54 Mbps	2	7	99.3	12.8	12.19			15.52	15.55	22.87	7.32
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	10	99.4	12.79	12.2			15.52	15.54	19.88	4.34
	HT/VHT20, M16 to M23, M0.3 to M9.3	4	7	98.2	11.97	12.65	11.36	11.13	17.84	17.92	22.85	4.93
	HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1	2	10	99.3	12.26	12.38			15.33	15.36	19.97	4.61
	HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1	4	13	99.4	9.66	9.08	9.33	9.2	15.34	15.37	17.00	1.63
5260/5280	Non HT/VHT40, 6 to 54 Mbps	2	7	99.3	14.12	13.44			16.80	16.83	23.00	6.17
	HT/VHT40, M8 to M15, M0.2 to M9.2	3	7	97.3	13.81	13.28	12.75		16.73	16.85	23.00	6.15
	HT/VHT40, M8 to M15, M0.2 to M9.2	4	7	97.5	13.09	11.86	11.64	11.35	18.06	18.17	23.00	4.83
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	3	7	96.3	13.42	13.36	12.41		17.86	18.02	23.00	4.98
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	4	8	96.3	6.2	4.24	4.93	4.92	11.15	11.32	22.00	10.68
5260/5280/ 5300/5320	Non HT/VHT80, 6 to 54 Mbps	4	7	99.3	12.59	12.21	11.67	11.65	18.07	18.10	23.00	4.90
	HT/VHT80, M0 to M7, M0.1 to M9.1	4	7	95.4	12.47	11.48	10.9	10.91	17.51	17.71	23.00	5.29
	HT/VHT80, M16 to M23, M0.3 to M9.3	4	7	92.8	12.32	11.82	11.24	10.74	17.59	17.92	23.00	5.08
	HT/VHT80 Beam Forming, M16 to M23, M0.3 to M9.3	4	8	90.5	10.79	10.63	10.19	10.16	16.47	16.91	22.00	5.09

5300/5320	Non HT/VHT40, 6 to 54 Mbps	3	7	99.4	12.15	11.51	10.97		16.34	16.37	23.00	6.63
	HT/VHT40, M8 to M15, M0.2 to M9.2	4	7	97.3	12.91	12	11.44	11.58	18.04	18.16	23.00	4.84
	HT/VHT40, Beamforming M16 to M23, M0.3 to M9.3	3	7	95.9	13.19	13.41	12.34		17.78	17.96	23.00	5.04
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	4	13	96.3	11.98	10.61	10.55	10.75	17.03	17.20	19.95	2.75

5320	Non HT/VHT20, 6 to 54 Mbps	2	7	99.4	9.63	9.27			12.46	12.49	22.88	10.39
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	10	99.3	12.7	12.18			15.46	15.49	19.88	4.39
	HT/VHT20, M16 to M23, M0.3 to M9.3	4	7	97.9	5.53	6.31	5.07	4.93	11.51	11.61	22.86	11.25
	HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3	3	7	97.9	12.94	12.96	12.8		17.67	17.76	23.02	5.25

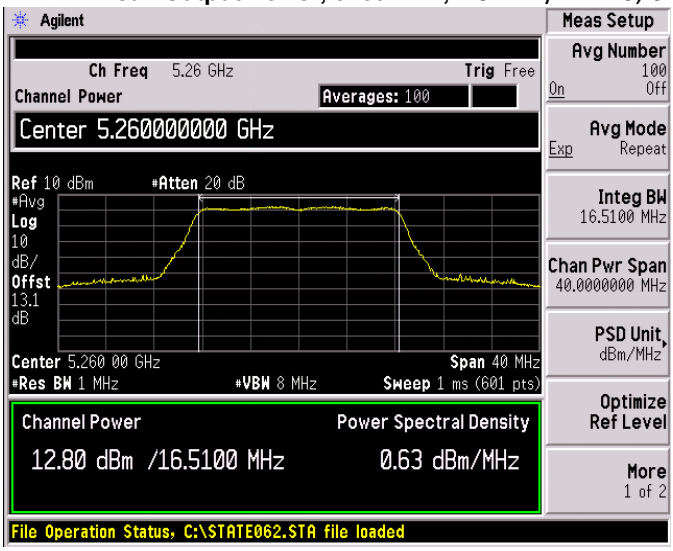
PSD Table

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)		Tx 1 PSD (dBm/MHz)	Tx 2 PSD (dBm/MHz)	Tx 3 PSD (dBm/MHz)	Tx 4 PSD (dBm/MHz)	Total PSD (dBm/MHz)		Limit (dBm/MHz)	Margin (dB)
5260	Non HT/VHT20, 6 to 54 Mbps	2	10	99.3	2.269	1.916			5.11	5.14	7.00	1.86
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	10	99.4	2.18	1.703			4.96	4.98	7.00	2.02
	HT/VHT20, M16 to M23, M0.3 to M9.3	4	8	98.2	1.112	1.508	1.582	0.981	7.32	7.40	9.00	1.60
	HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1	2	10	99.3	1.445	1.748			4.61	4.64	7.00	2.36
	HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1	4	13	99.4	-4.636	-5.619	-4.927	-4.807	1.04	1.07	4.00	2.93
5260/ 5280	Non HT/VHT40, 6 to 54 Mbps	2	10	99.3	0.503	-0.512			3.04	3.07	7.00	3.93
	HT/VHT40, M8 to M15, M0.2 to M9.2	3	9	97.3	-0.249	-0.969	-0.361		4.52	4.64	8.00	3.36
	HT/VHT40, M8 to M15, M0.2 to M9.2	4	10	97.5	-0.79	-2.045	-1.391	-1.548	4.60	4.71	7.00	2.29
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	3	7	96.3	-0.308	-0.236	-1.373		4.16	4.33	10.00	5.67
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	4	8	96.3	-1.945	-3.269	-2.971	-2.651	3.34	3.50	9.00	5.50
5260/ 5280/ 5300/ 5320	Non HT/VHT80, 6 to 54 Mbps	4	13	99.3	-3.903	-4.657	-4.883	-4.946	1.44	1.47	4.00	2.53
	HT/VHT80, M0 to M7, M0.1 to M9.1	4	13	95.4	-4.92	-6.077	-6.182	-6.282	0.19	0.40	4.00	3.60
	HT/VHT80, M16 to M23, M0.3 to M9.3	4	8	92.8	-4.807	-5.048	-5.457	-6.069	0.70	1.03	9.00	7.97
	HT/VHT80 Beam Forming, M16 to M23, M0.3 to M9.3	4	8	90.5	-5.568	-6.292	-6.481	-4.881	0.26	0.70	9.00	8.30
5300/ 5320	Non HT/VHT40, 6 to 54 Mbps	3	12	99.4	-1.368	-2.35	-2.288		2.79	2.82	5.00	2.18
	HT/VHT40, M8 to M15, M0.2 to M9.2	4	10	97.3	-0.879	-2.244	-1.682	-1.949	4.36	4.48	7.00	2.52
	HT/VHT40, Beamforming M16 to M23, M0.3 to M9.3	3	7	95.9	-0.814	-0.129	-0.951		4.16	4.34	10.00	5.66

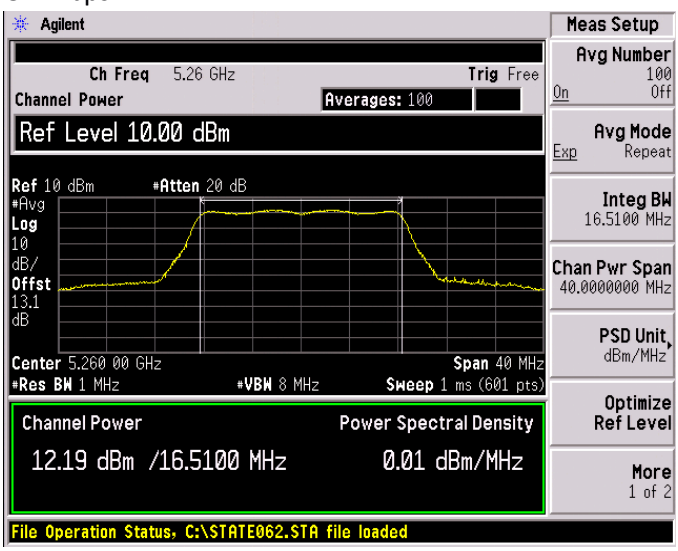
	HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3	4	8	96.3	-1.595	-3.035	-2.628	-2.447	3.63	3.79	9.00	5.21

5320	Non HT/VHT20, 6 to 54 Mbps	2	10	99.4	-0.975	-1.685			1.69	1.72	7.00	5.28
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	10	99.3	2.407	1.275			4.89	4.92	7.00	2.08
	HT/VHT20, M16 to M23, M0.3 to M9.3	4	8	97.9	-5.344	-4.395	-5.096	-5.529	0.95	1.04	9.00	7.96
	HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3	3	7	97.9	2.197	1.935	2.329		6.93	7.02	10.00	2.98

Peak Output Power, 5260 MHz, Non HT/VHT20, 6 to 54 Mbps

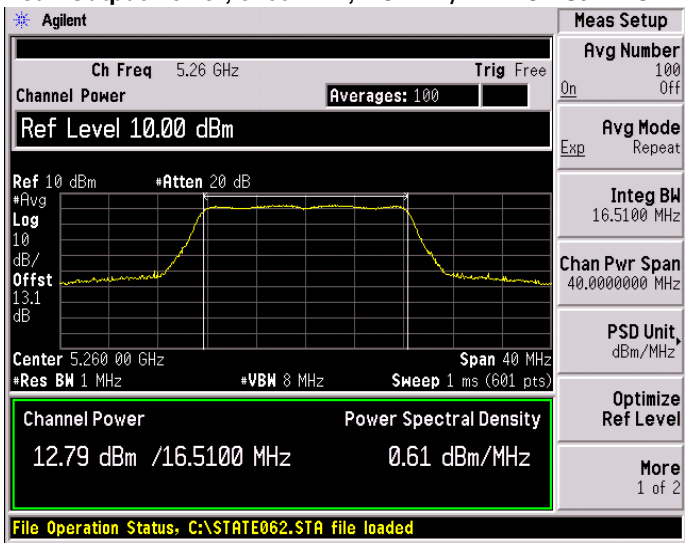


Antenna A



Antenna B

Peak Output Power, 5260 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps



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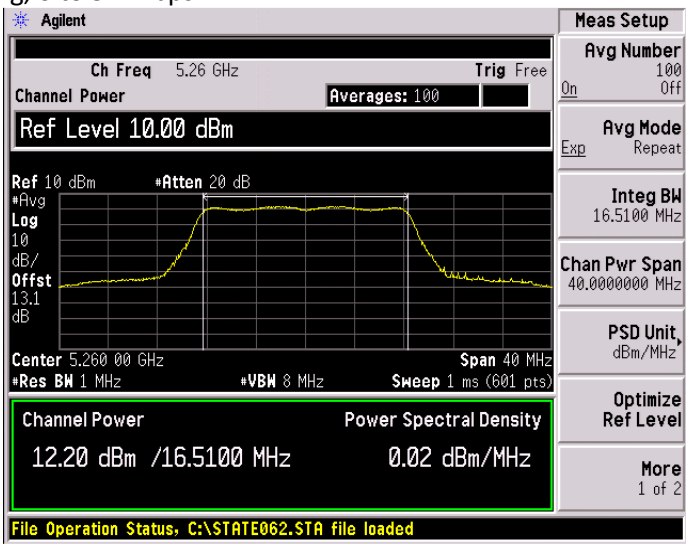
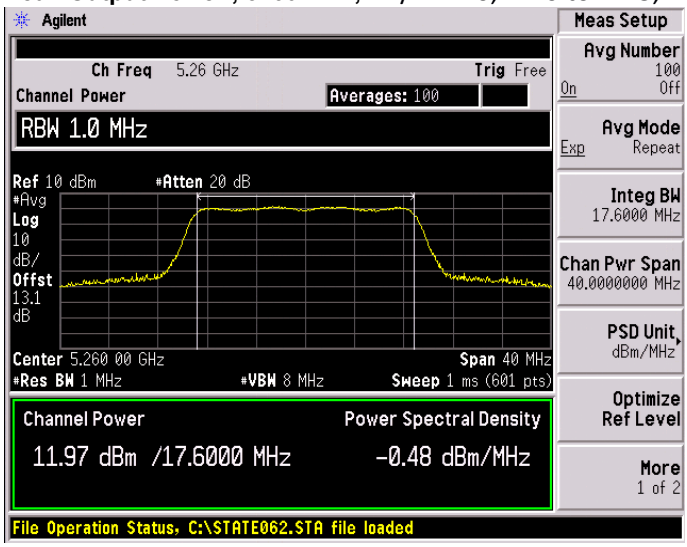


Antenna B

Peak Output Power , 5260 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3



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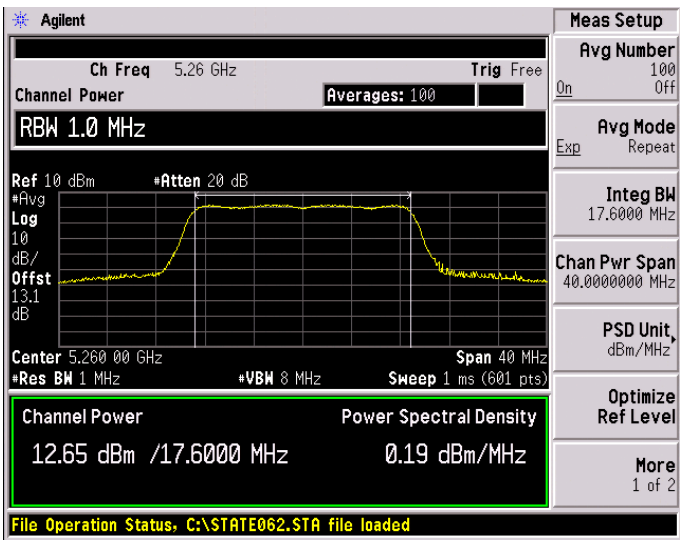
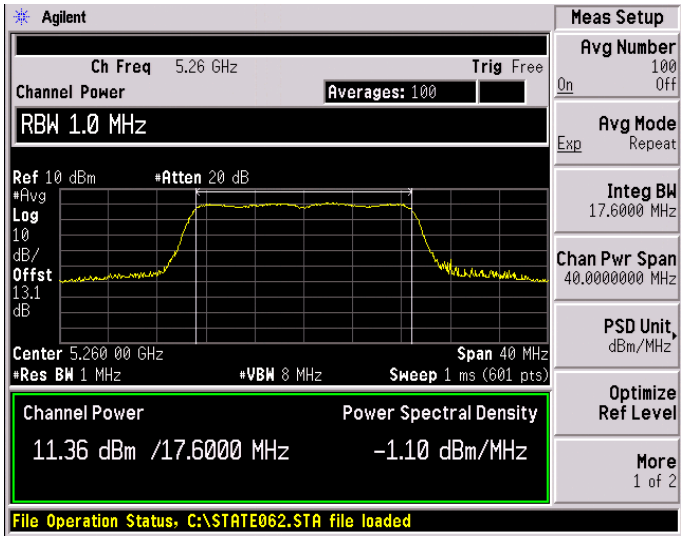
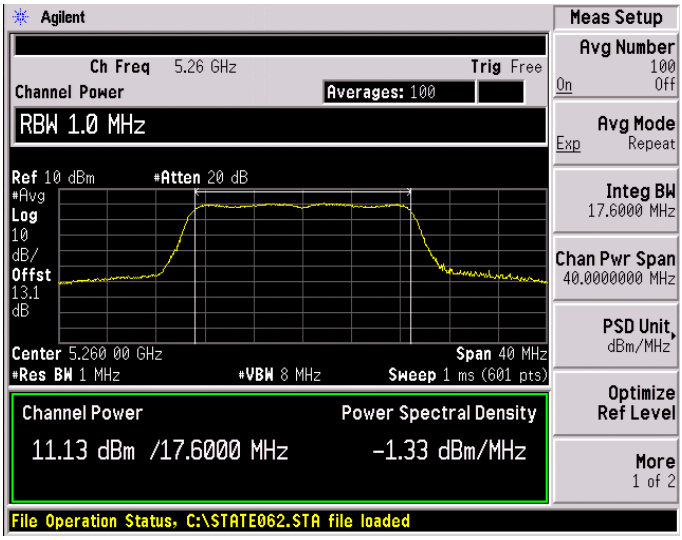


Antenna B

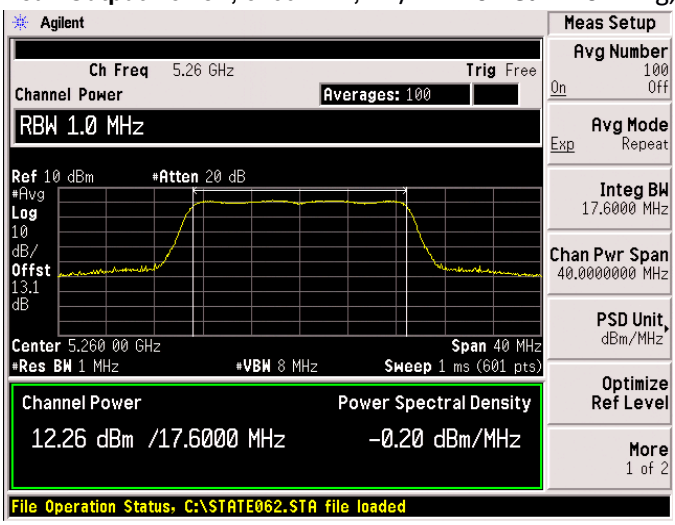


Antenna C

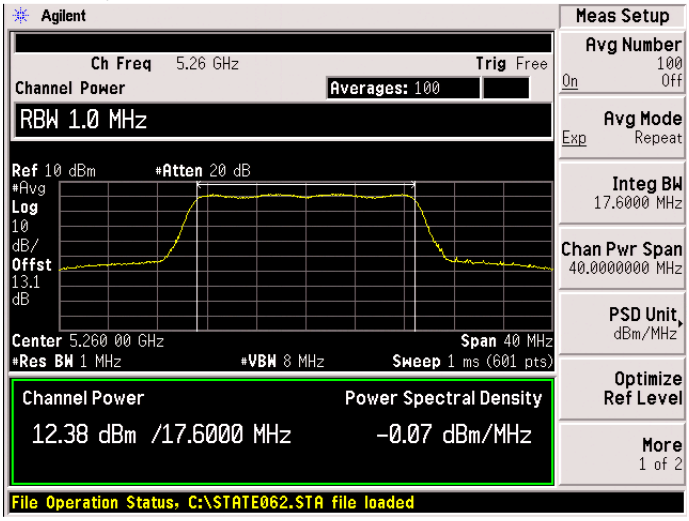


Antenna D

Peak Output Power , 5260 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1

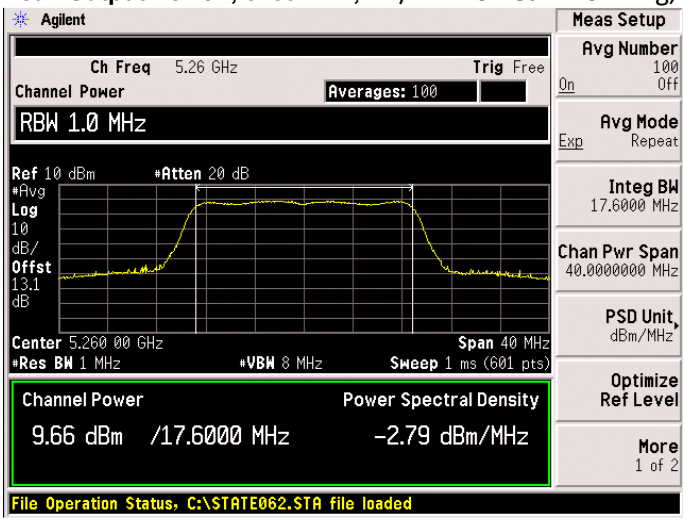


Antenna A

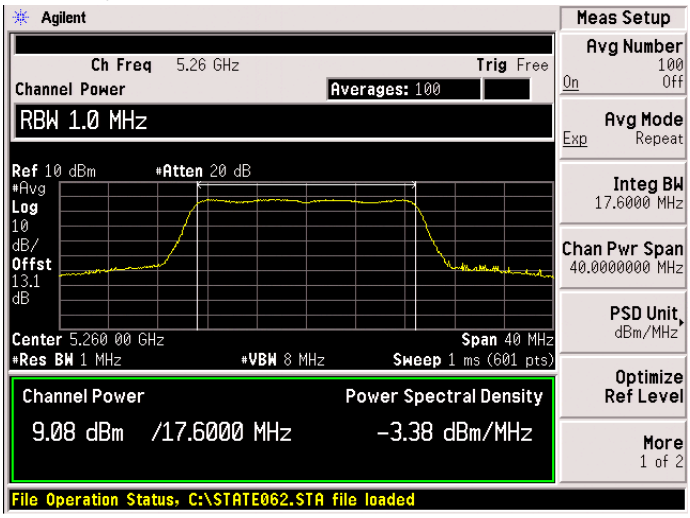


Antenna B

Peak Output Power , 5260 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1



Antenna A



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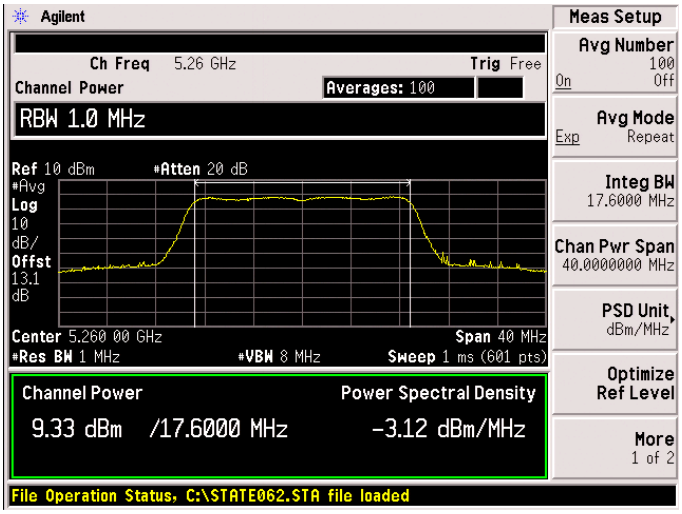
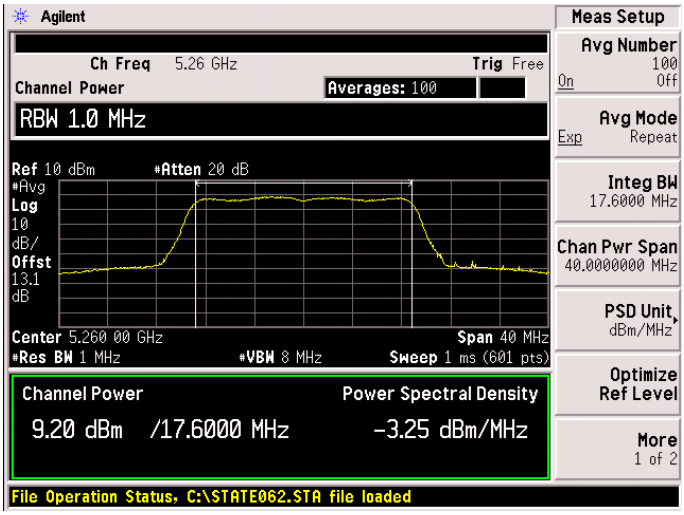
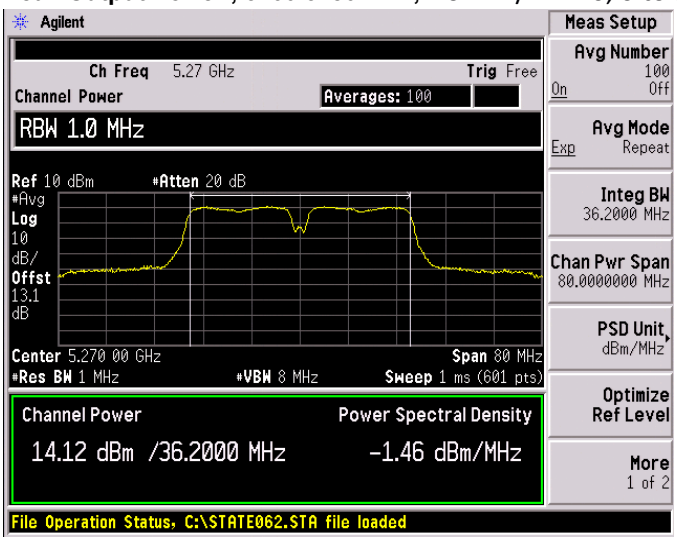


Antenna C



Antenna D

Peak Output Power , 5260/5280 MHz, Non HT/VHT40, 6 to 54 Mbps



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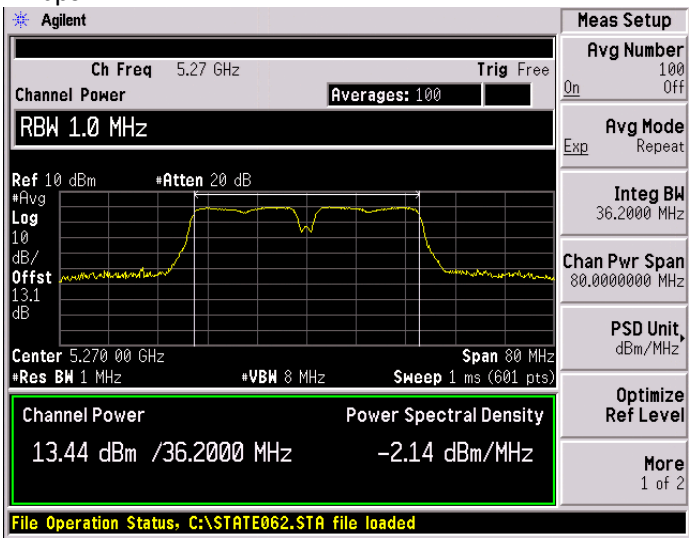
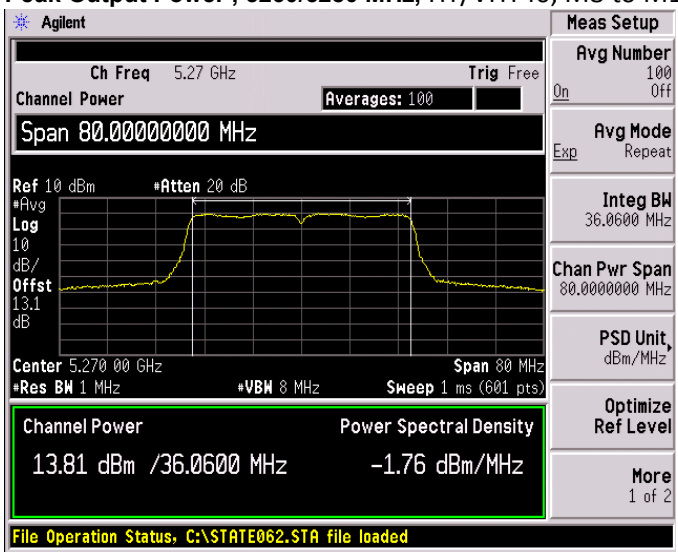
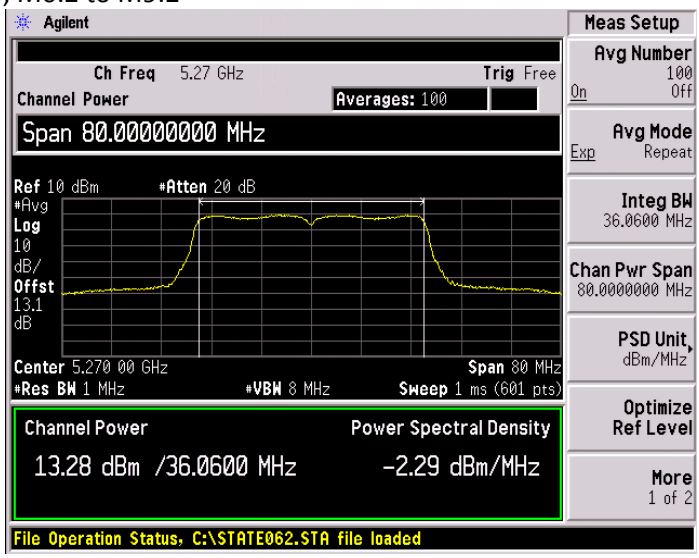


Antenna B

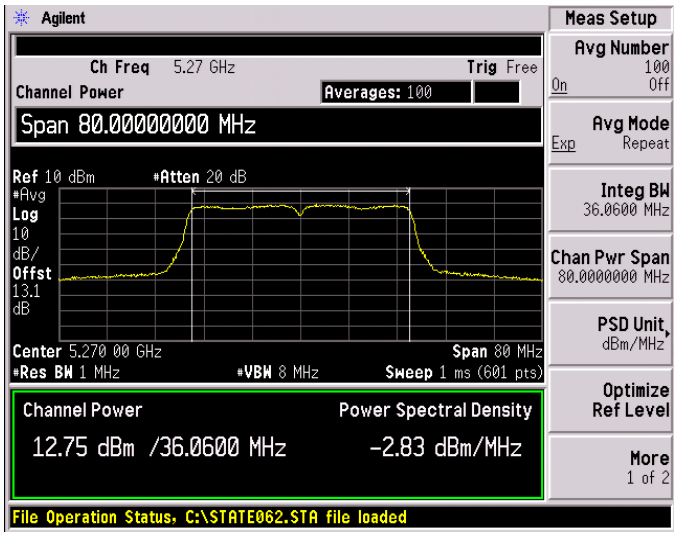
Peak Output Power , 5260/5280 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2



Antenna A

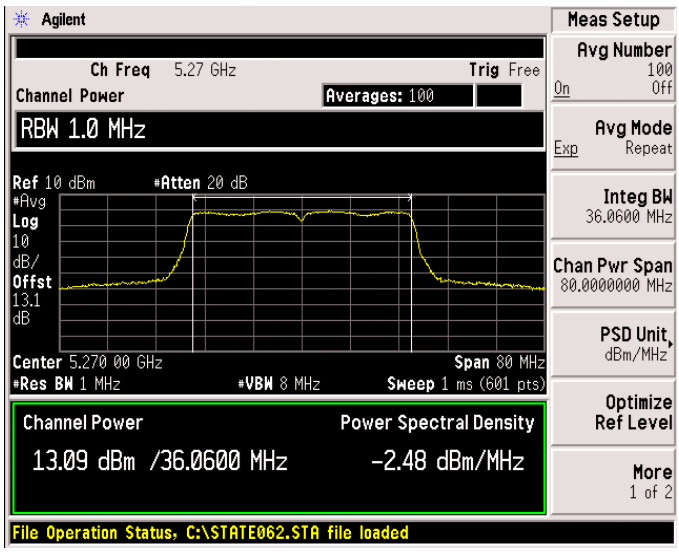


Antenna B

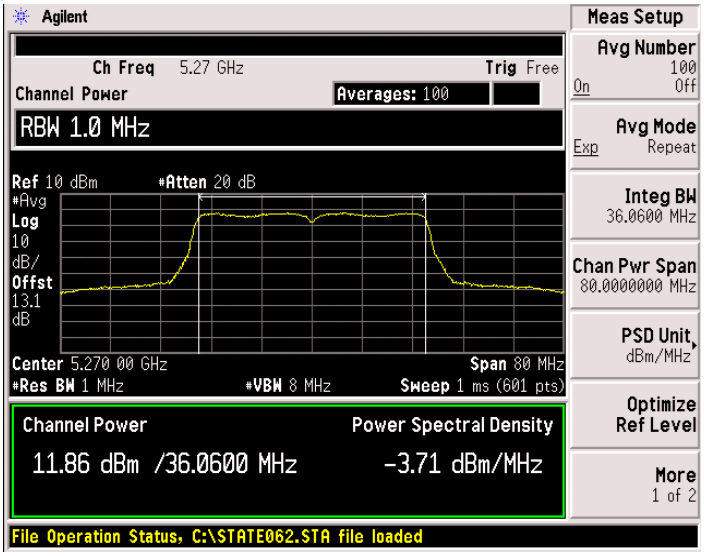


Antenna C

Peak Output Power , 5260/5280 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2



Antenna A



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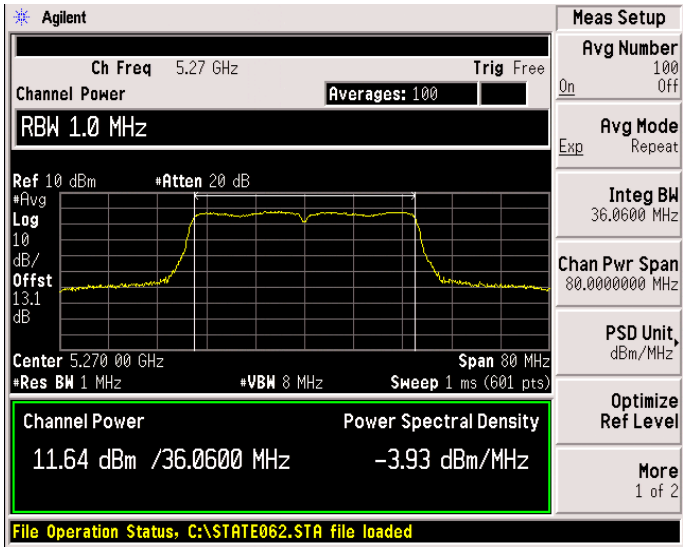

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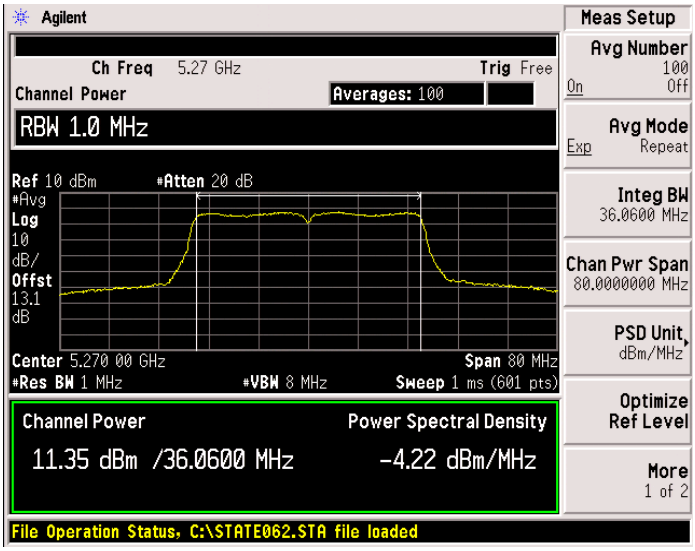
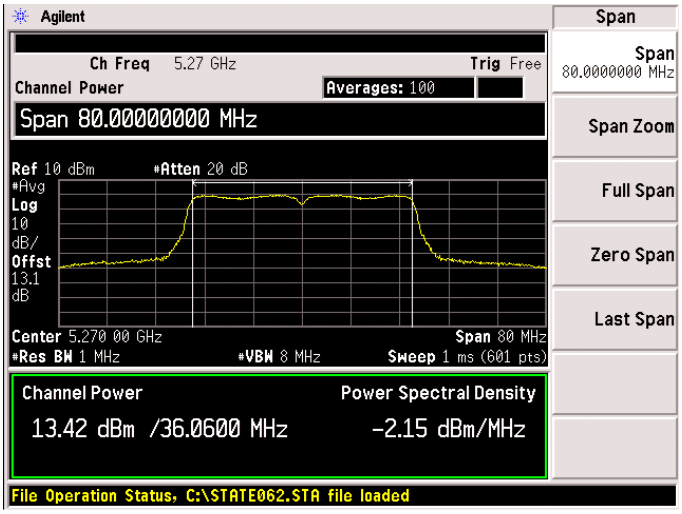
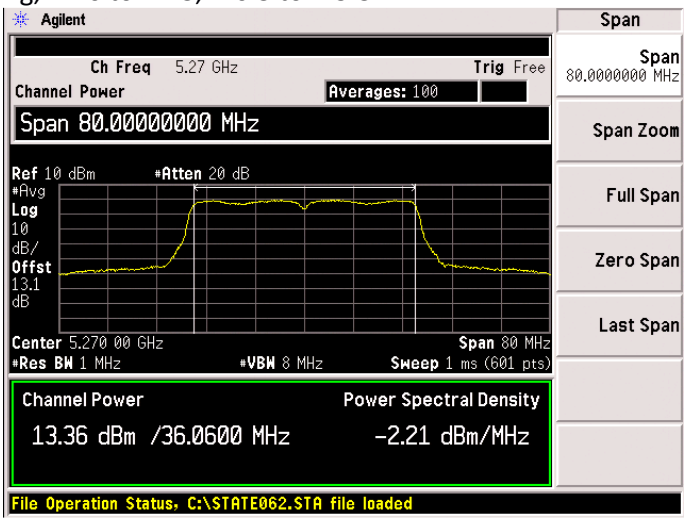


Antenna D

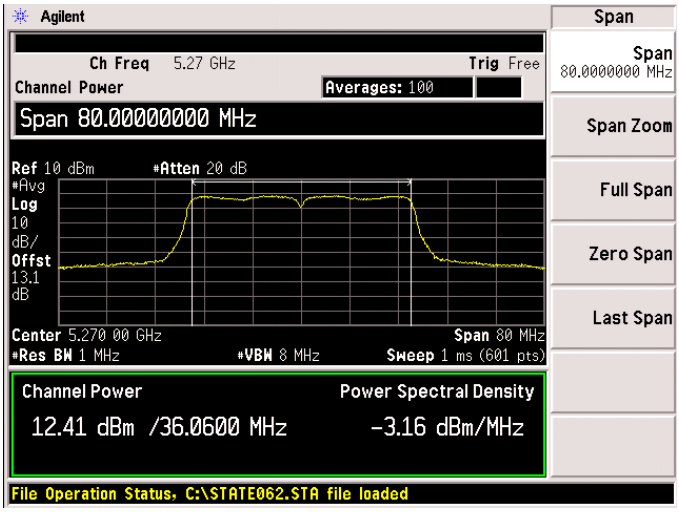
Peak Output Power , 5260/5280 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A

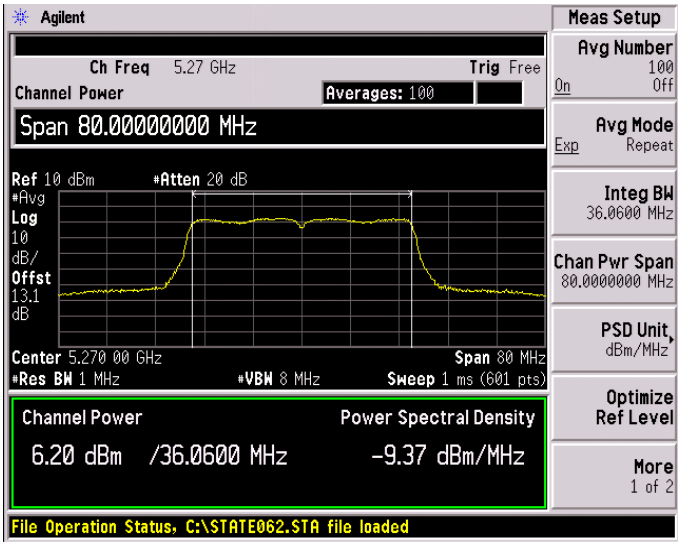


Antenna B

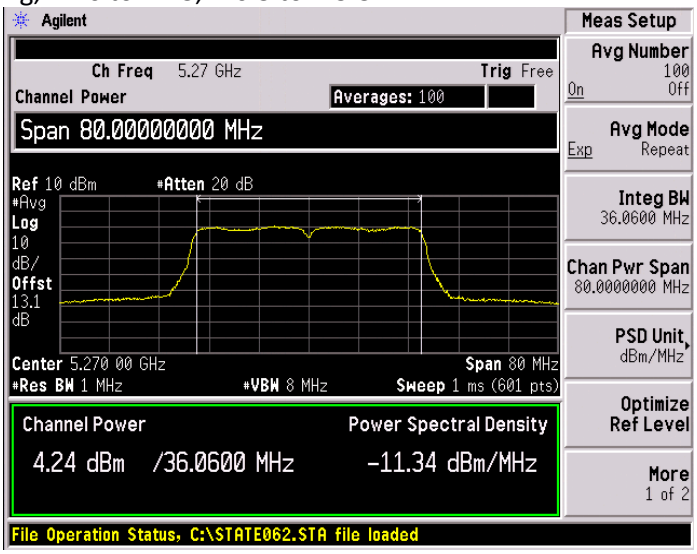


Antenna C

Peak Output Power , 5260/5280 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A



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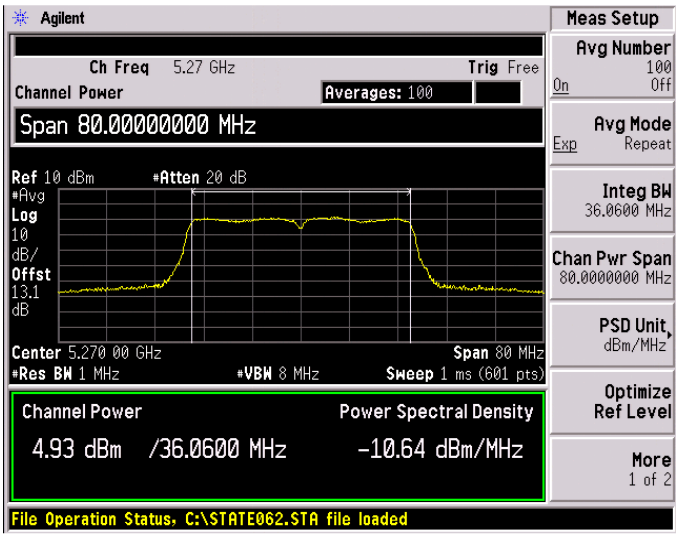
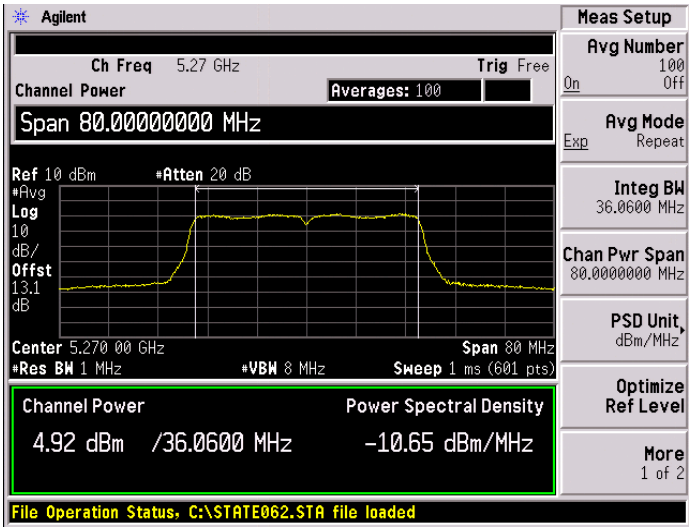
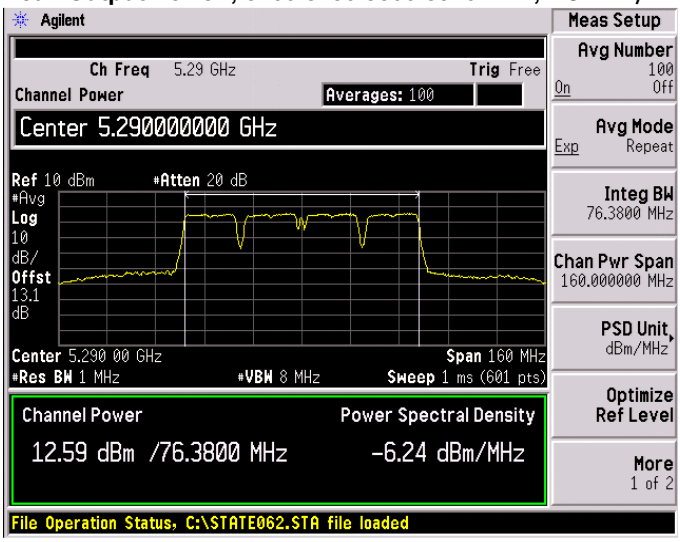


Antenna C

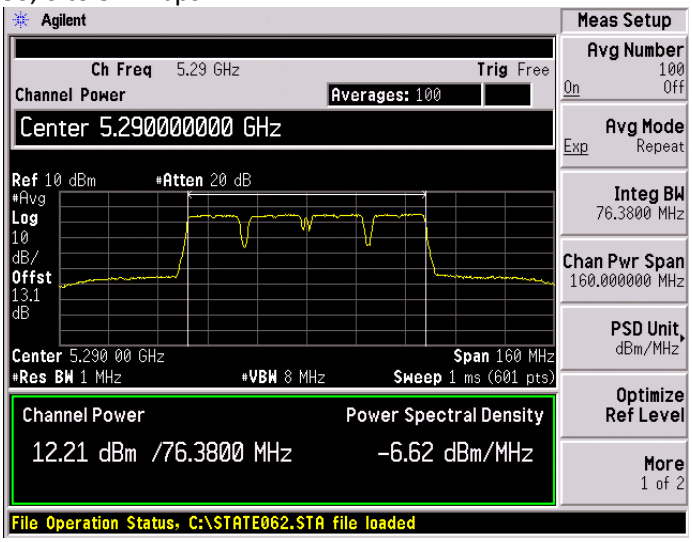


Antenna D

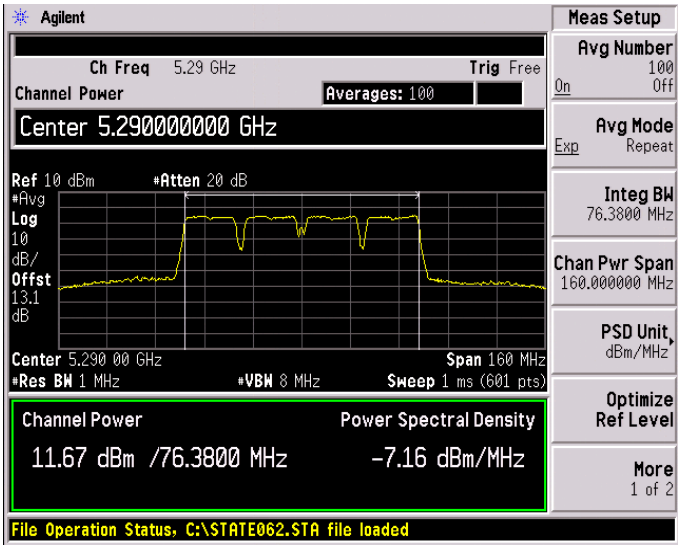
Peak Output Power , 5260/5280/5300/5320 MHz, Non HT/VHT80, 6 to 54 Mbps



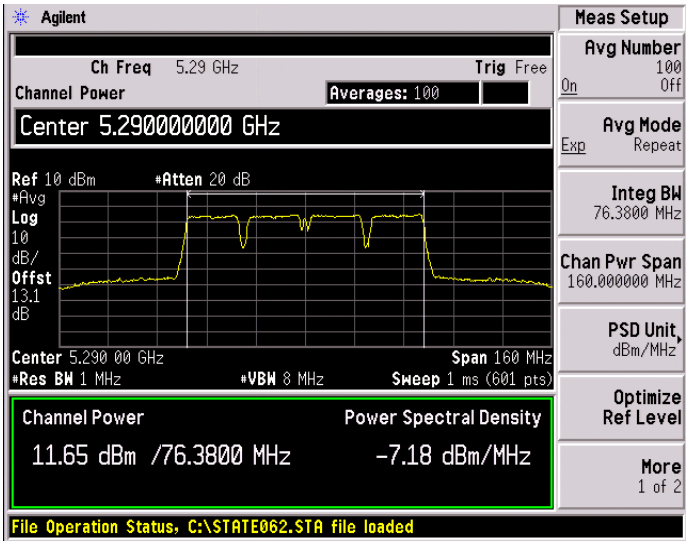
Antenna A



Antenna B

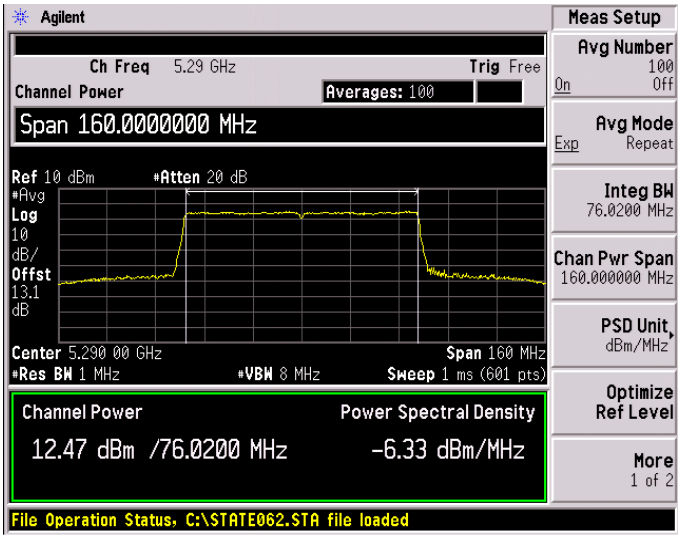


Antenna C

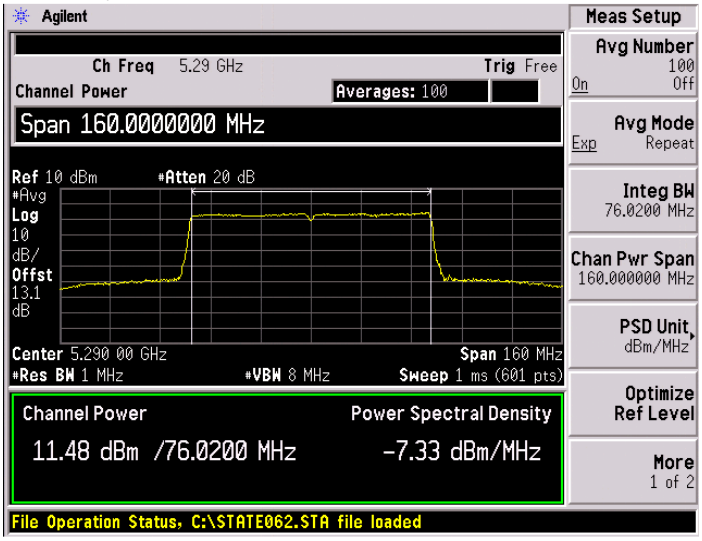


Antenna D

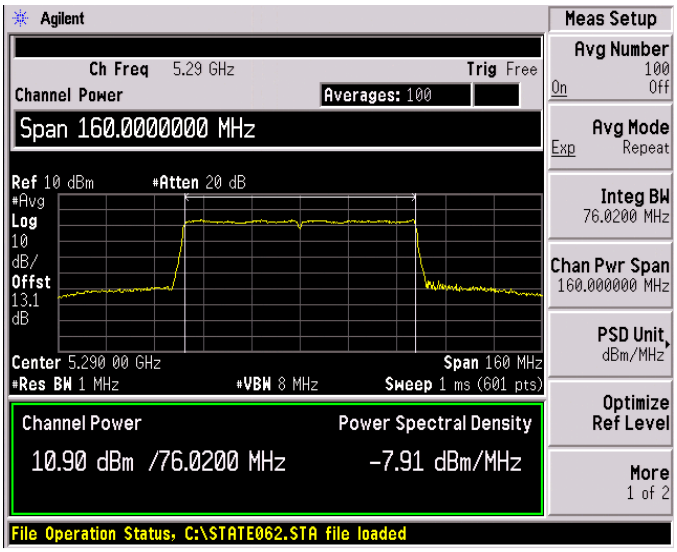
Peak Output Power , 5260/5280/5300/5320 MHz, HT/VHT80, M0 to M7, M0.1 to M9.1



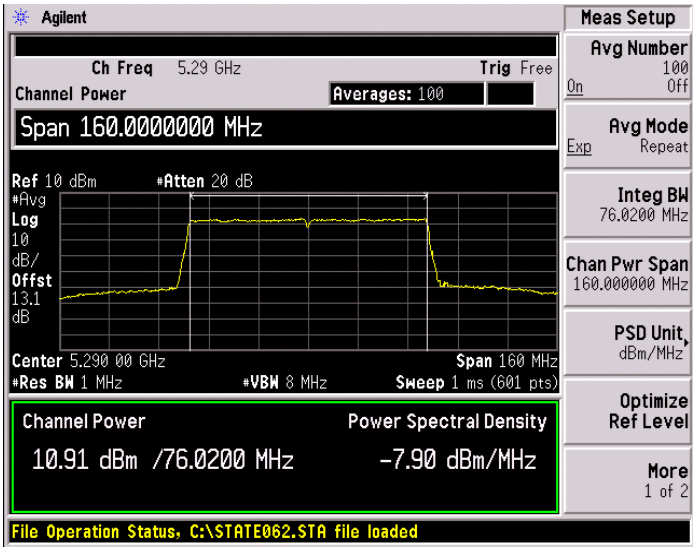
Antenna A



Antenna B

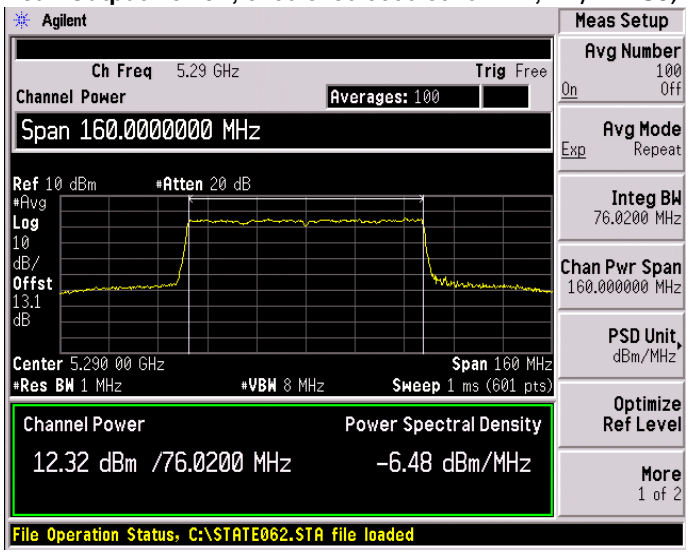


Antenna C

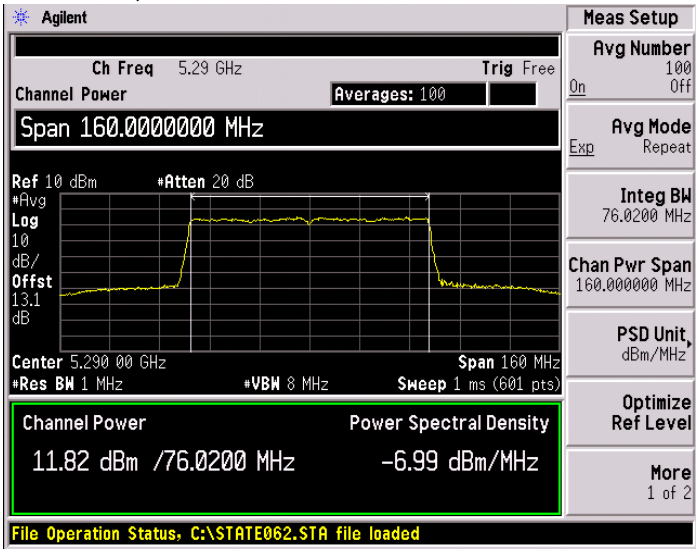


Antenna D

Peak Output Power , 5260/5280/5300/5320 MHz, HT/VHT80, M16 to M23, M0.3 to M9.3



Antenna A



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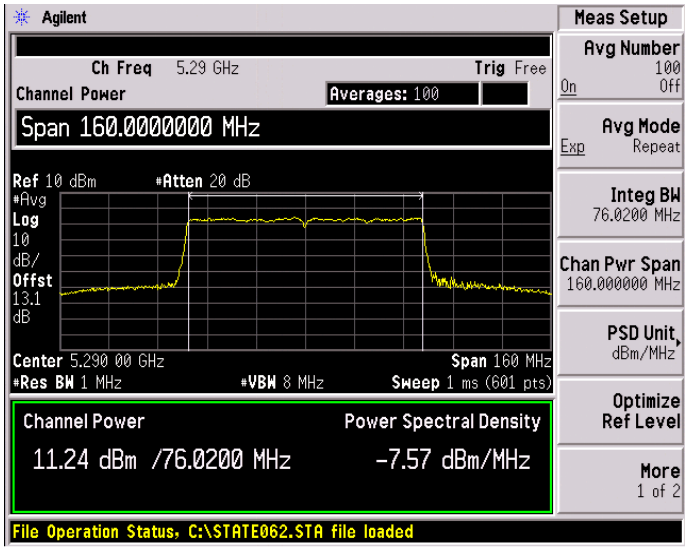

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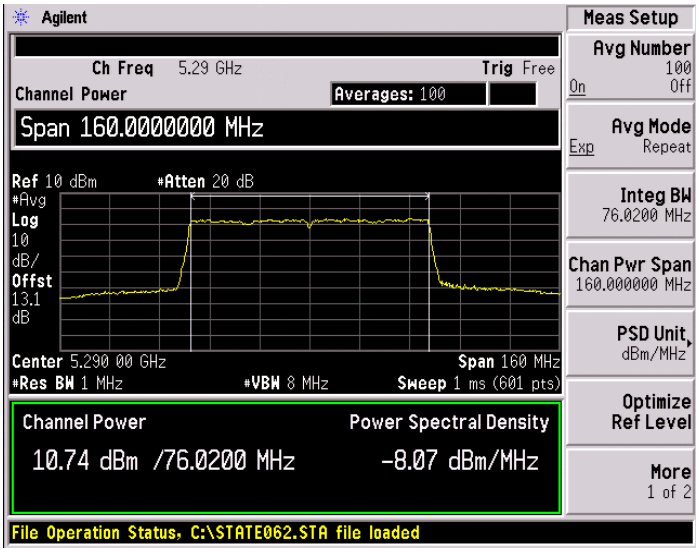
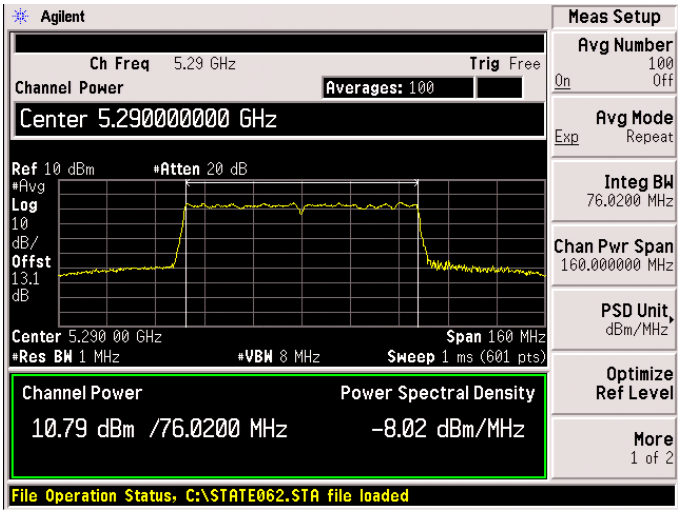
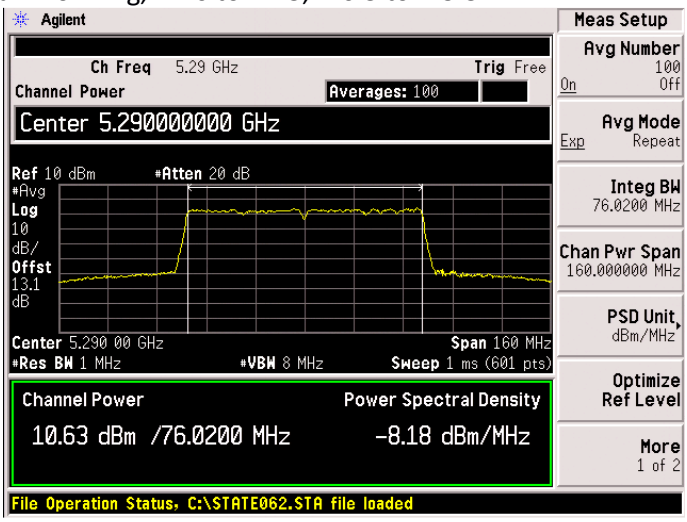


Antenna D

Peak Output Power 5260/5280/5300/5320 MHz, HT/VHT80 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A



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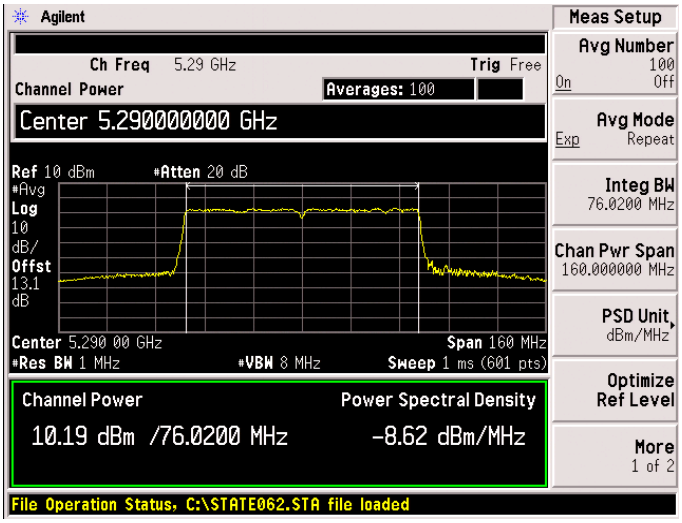
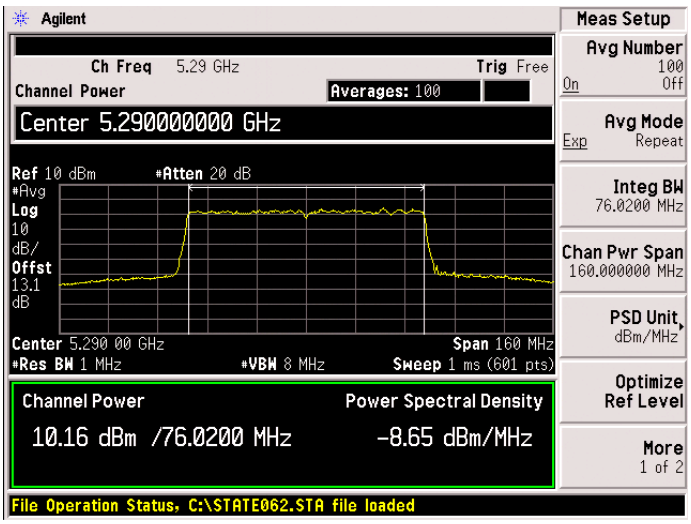
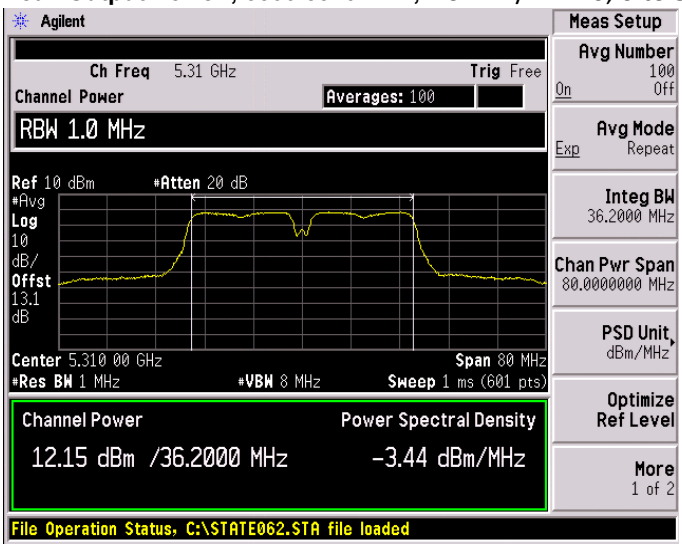


Antenna C

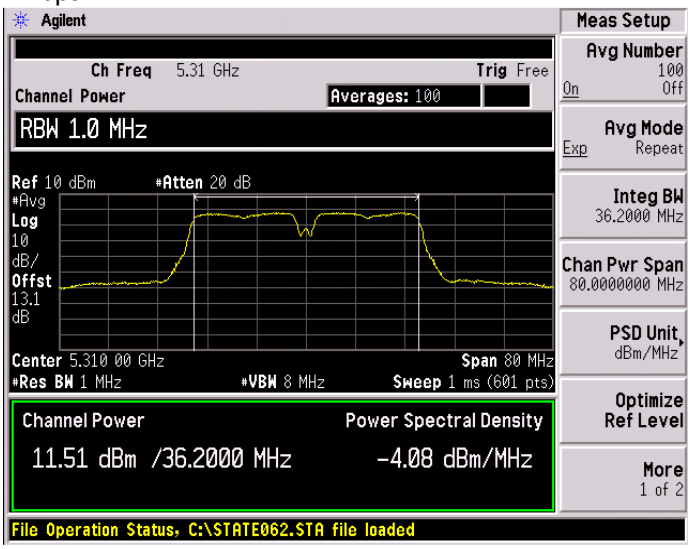


Antenna D

Peak Output Power , 5300/5320 MHz, Non HT/VHT40, 6 to 54 Mbps



Antenna A



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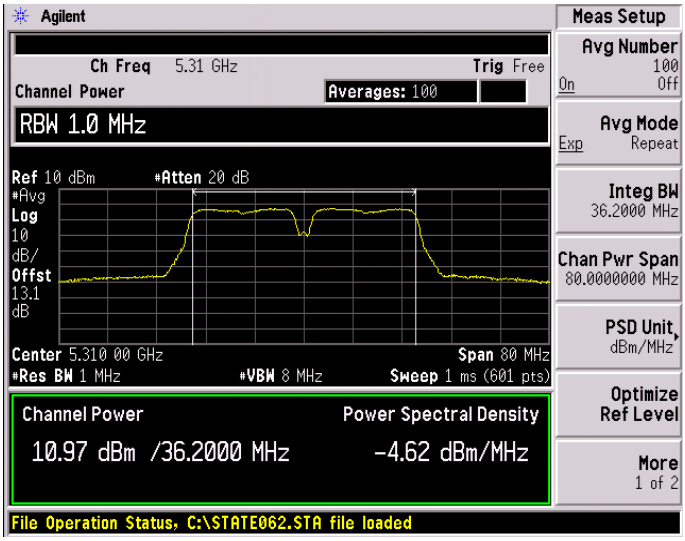
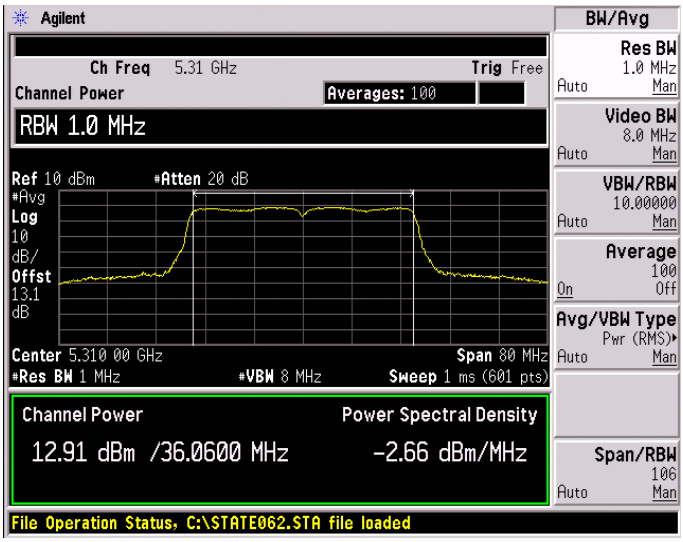
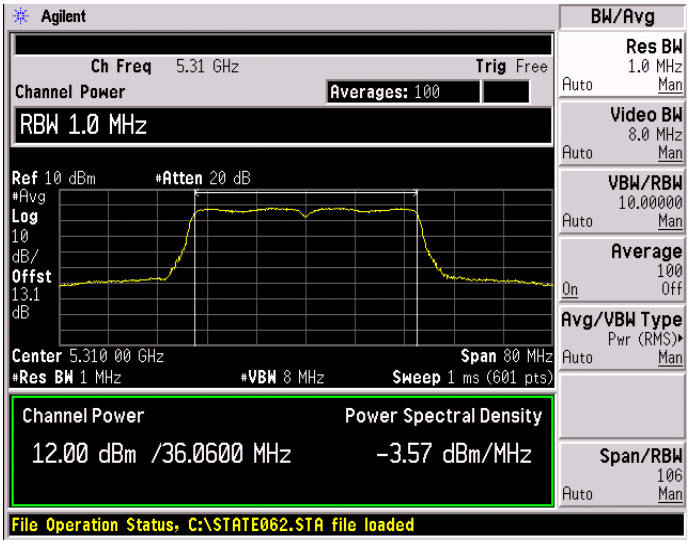


Antenna C

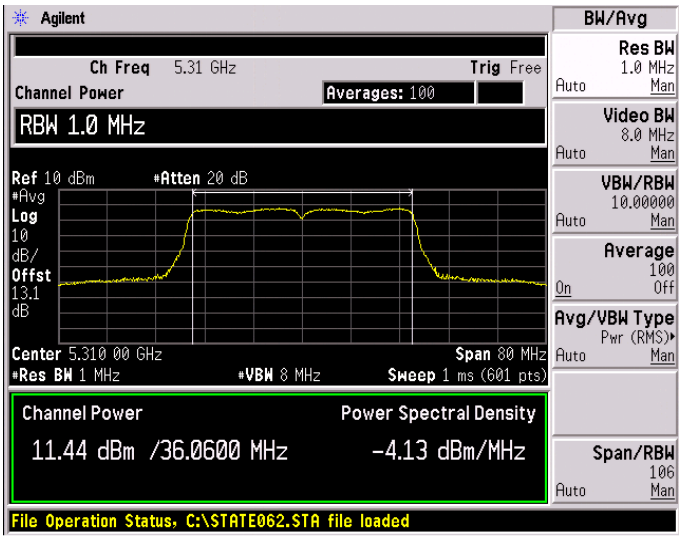
Peak Output Power , 5300/5320 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2



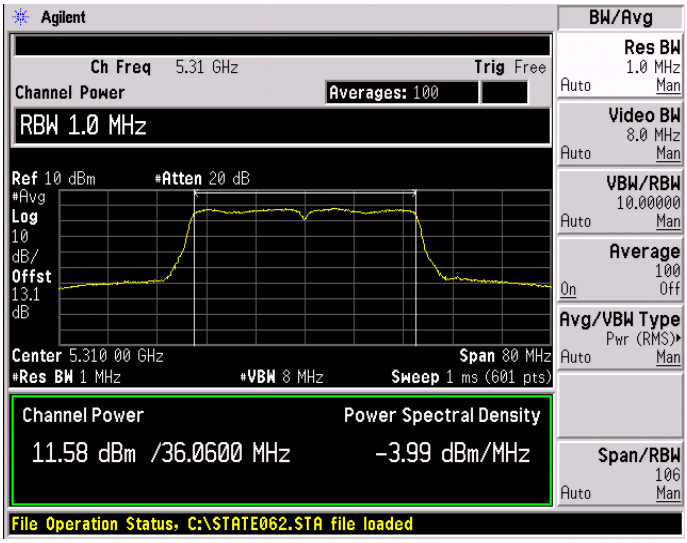
Antenna A



Antenna B

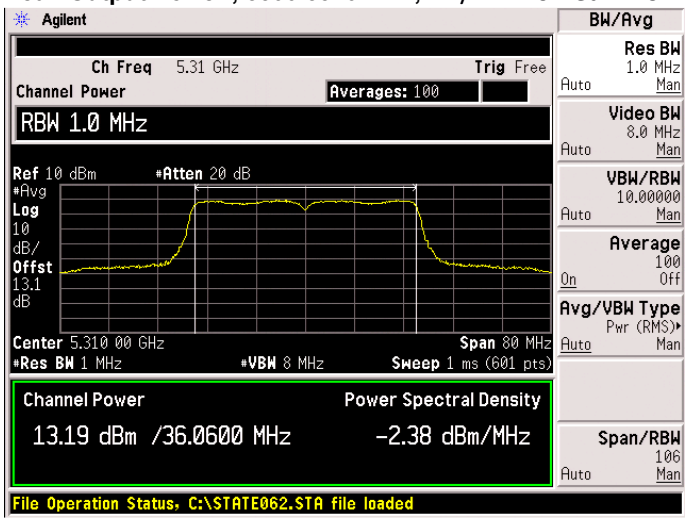


Antenna C

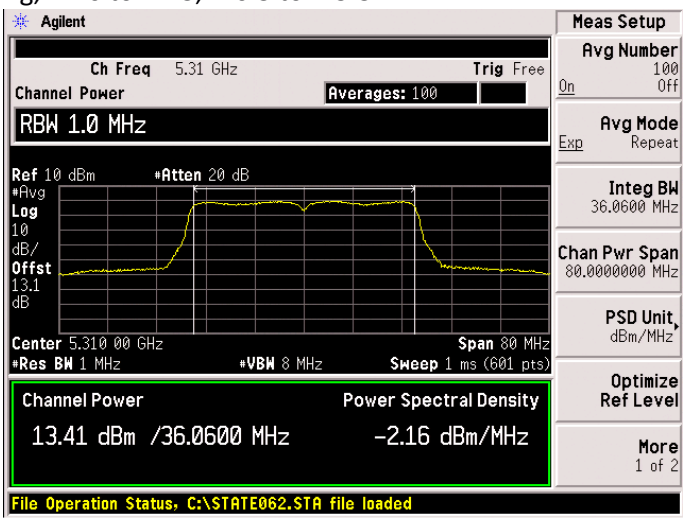


Antenna D

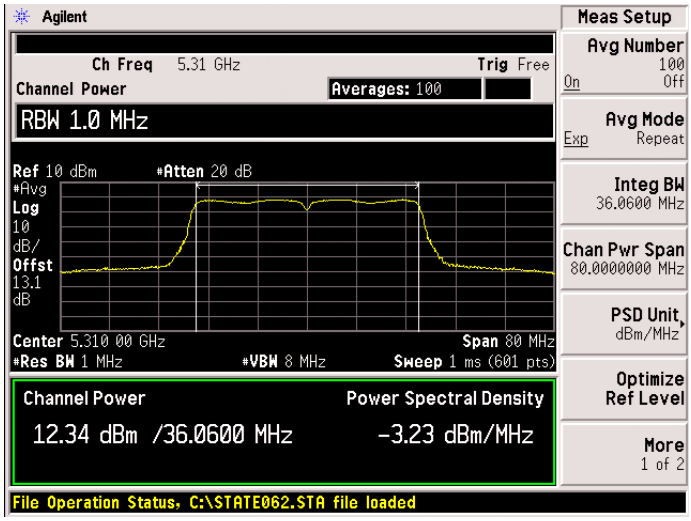
Peak Output Power , 5300/5320 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A

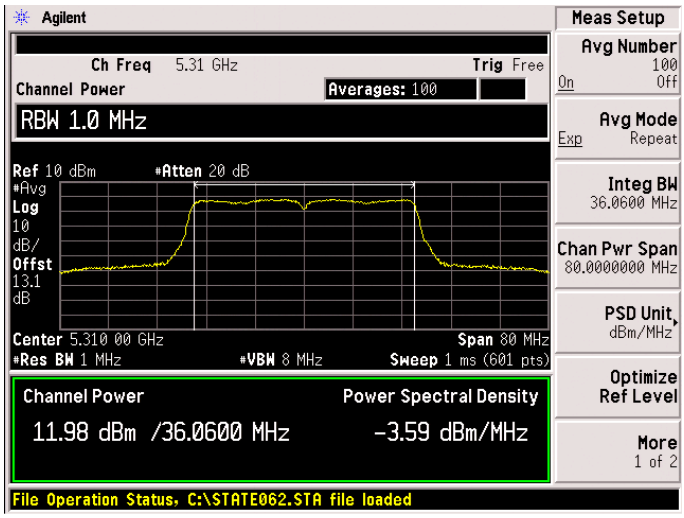


Antenna B

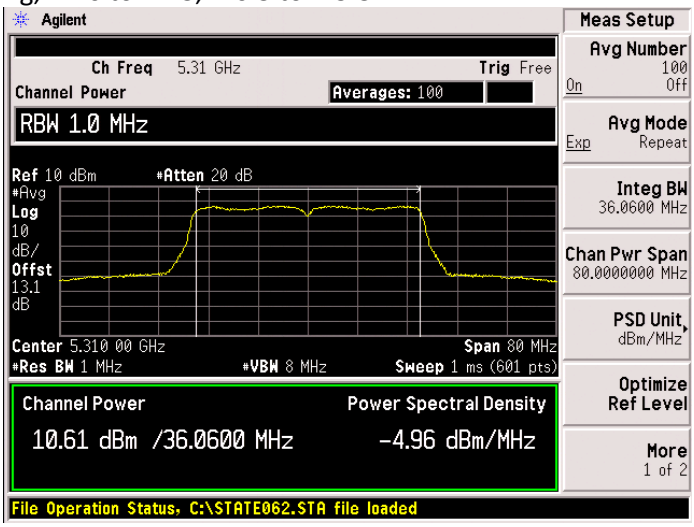


Antenna C

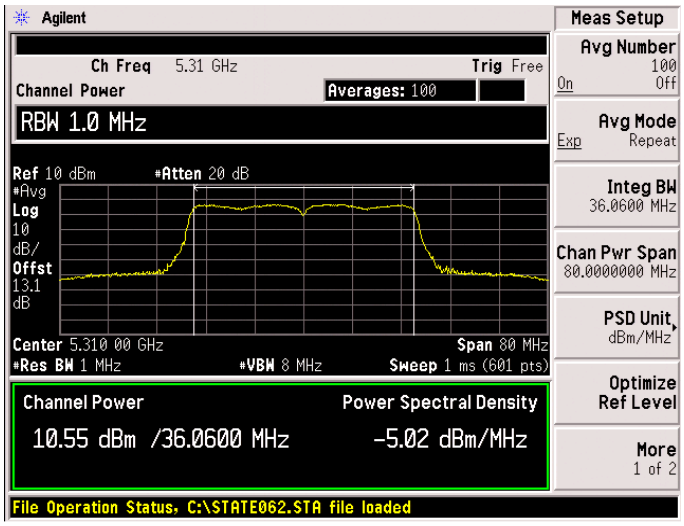
Peak Output Power , 5300/5320 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



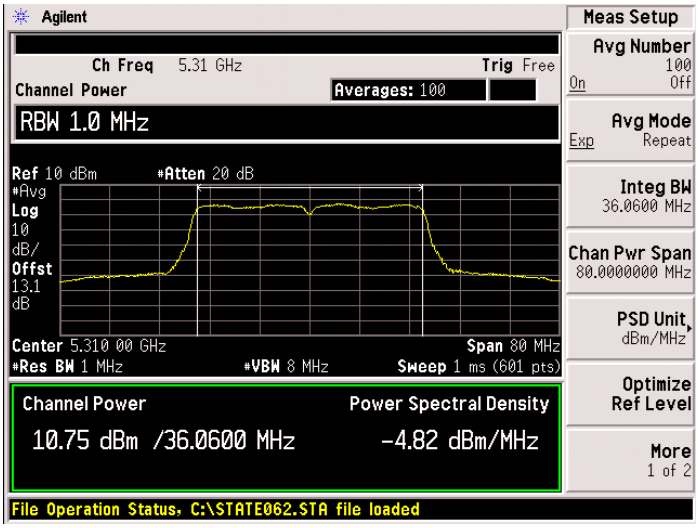
Antenna A



Antenna B

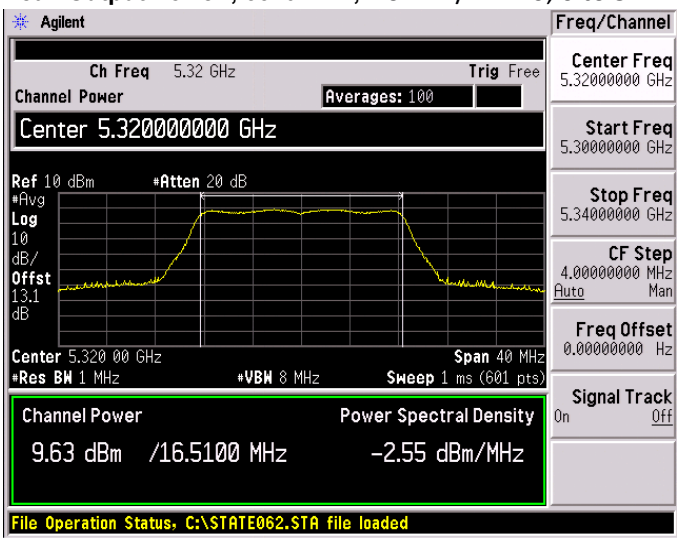


Antenna C

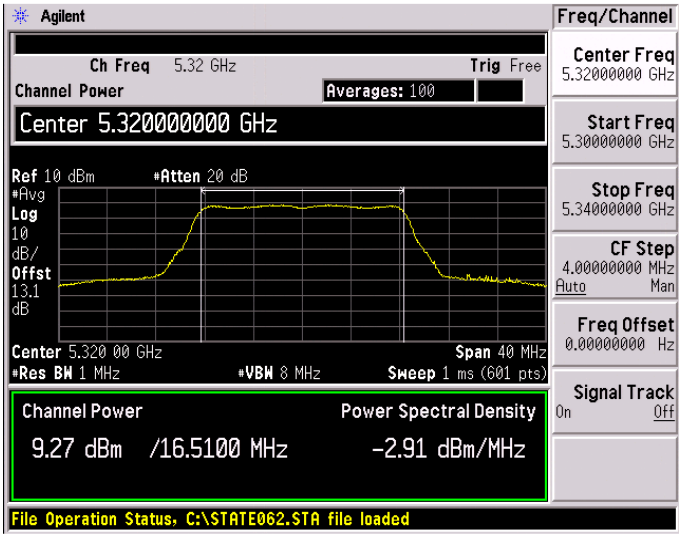


Antenna D

Peak Output Power , 5320 MHz, Non HT/VHT20, 6 to 54 Mbps

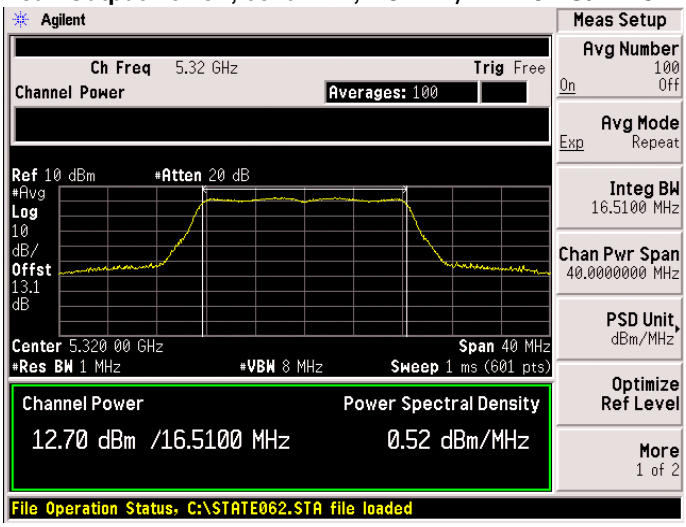


Antenna A

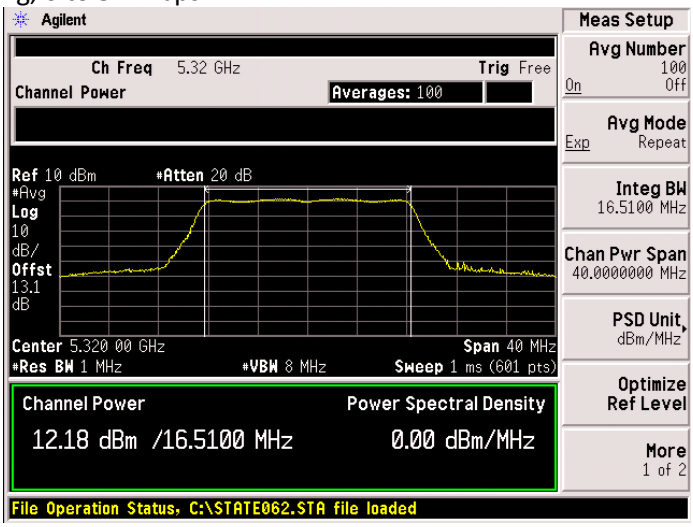


Antenna B

Peak Output Power , 5320 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps

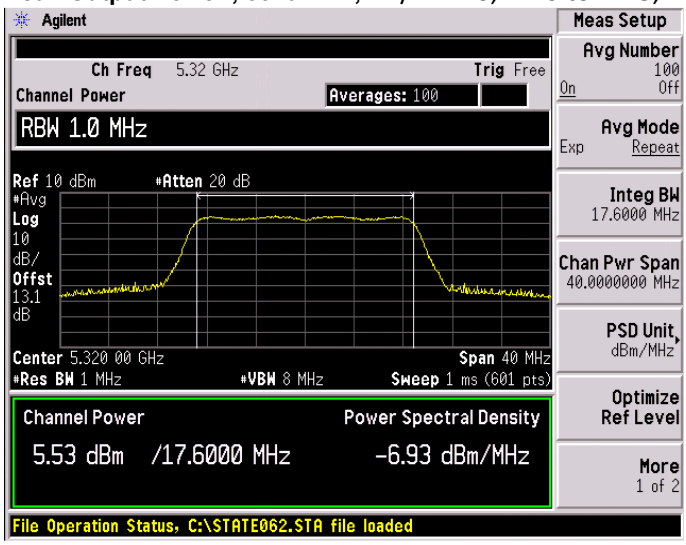


Antenna A

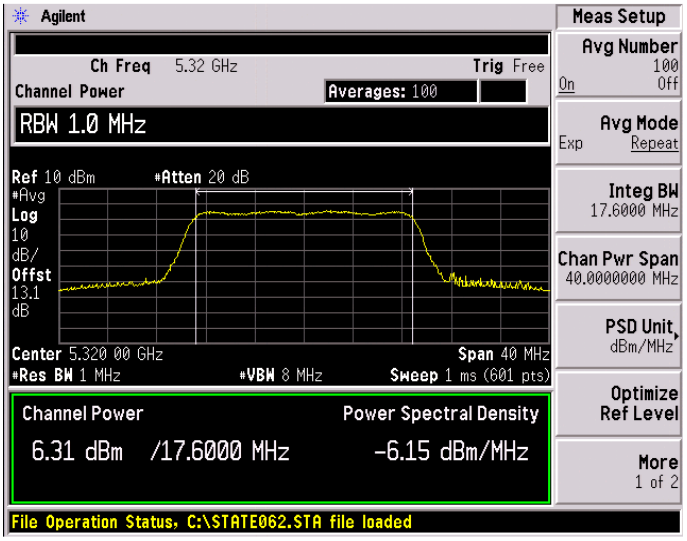


Antenna B

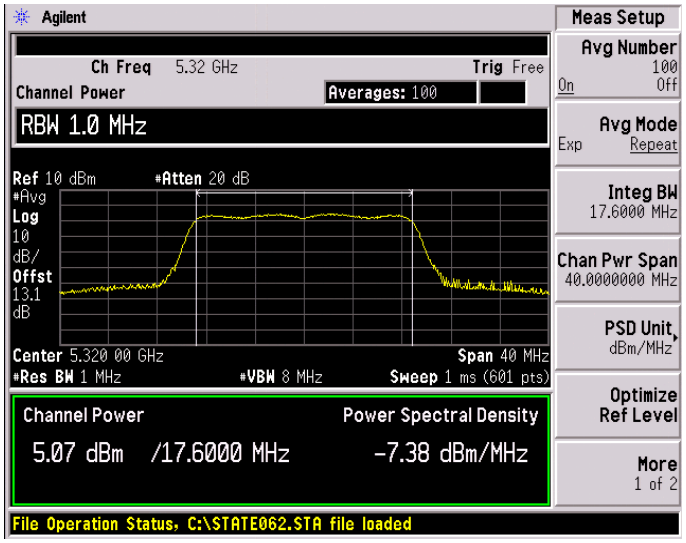
Peak Output Power , 5320 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3



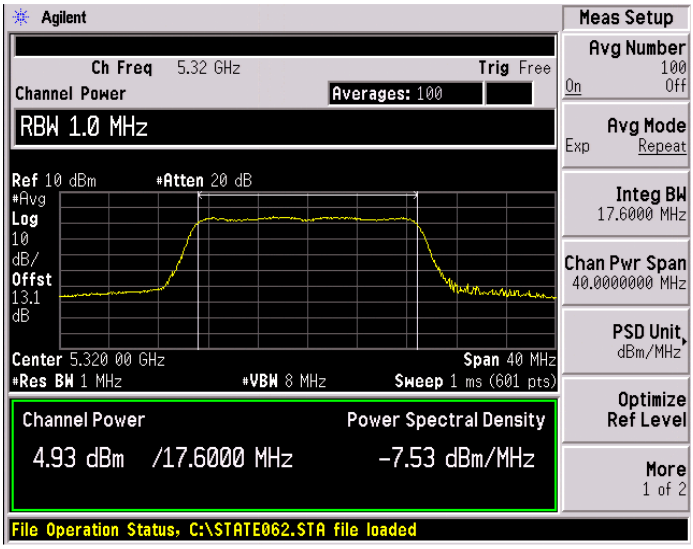
Antenna A



Antenna B

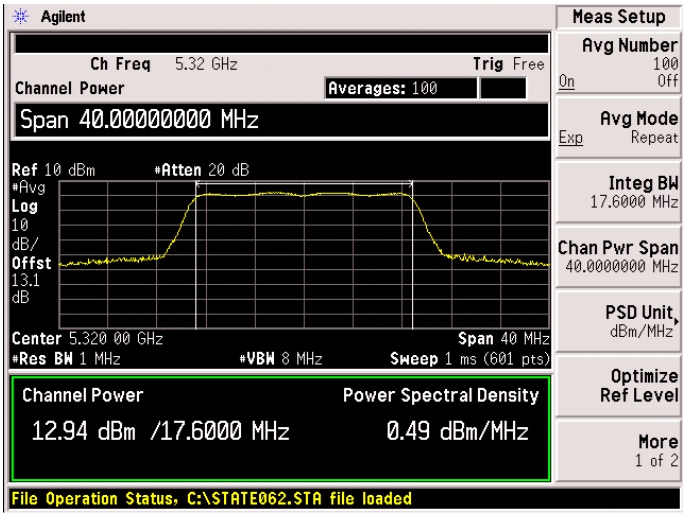


Antenna C

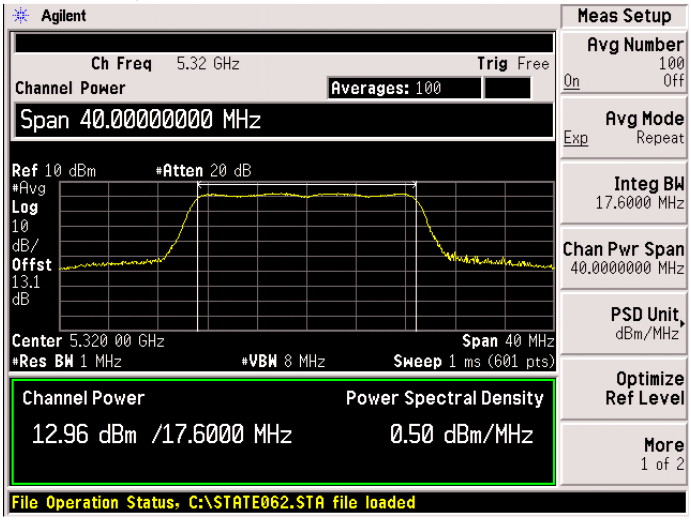


Antenna D

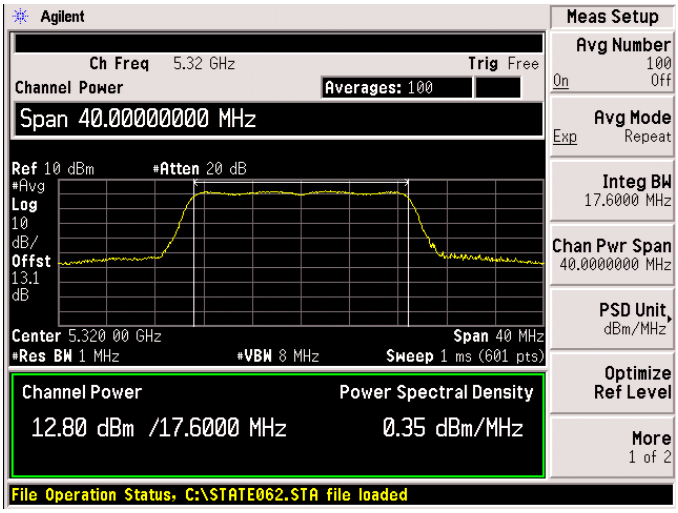
Peak Output Power , 5320 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A

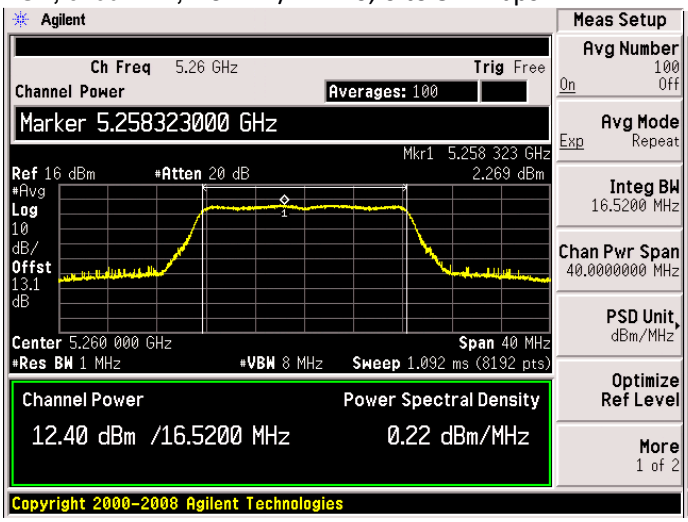


Antenna B

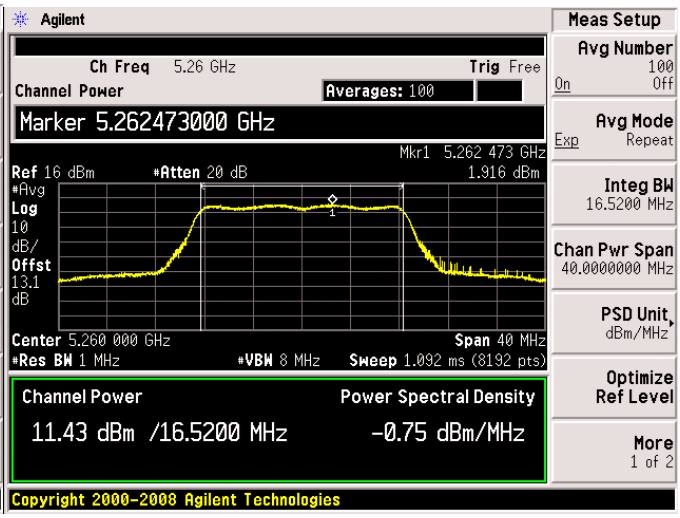


Antenna C

PSD, 5260 MHz, Non HT/VHT20, 6 to 54 Mbps

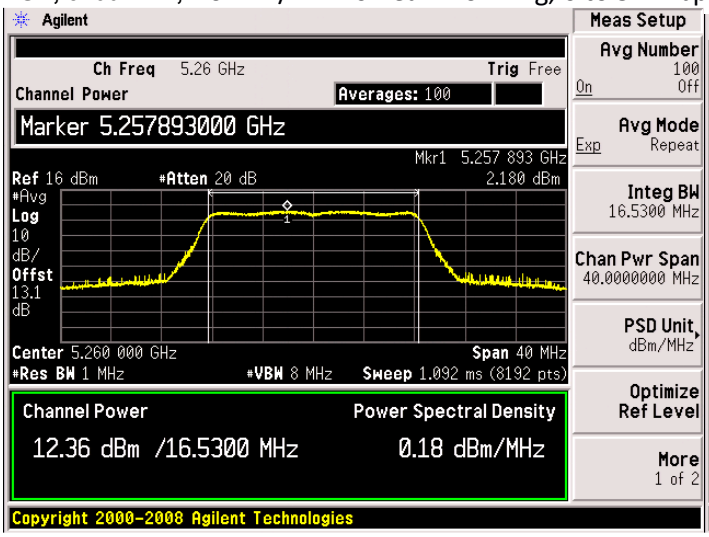


Antenna A

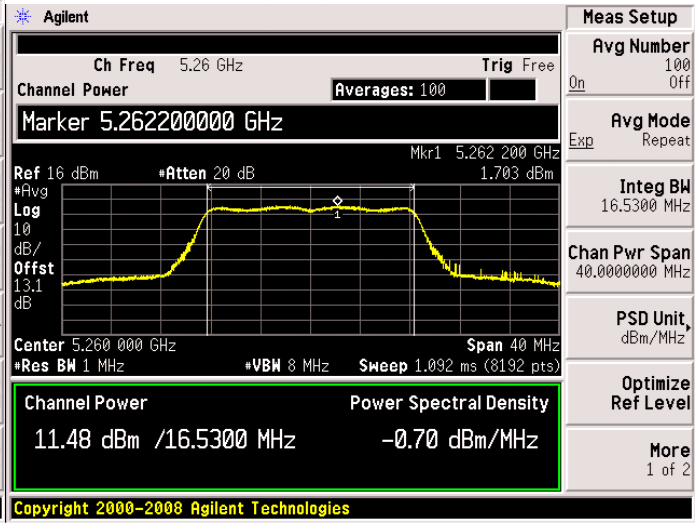


Antenna B

PSD, 5260 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps

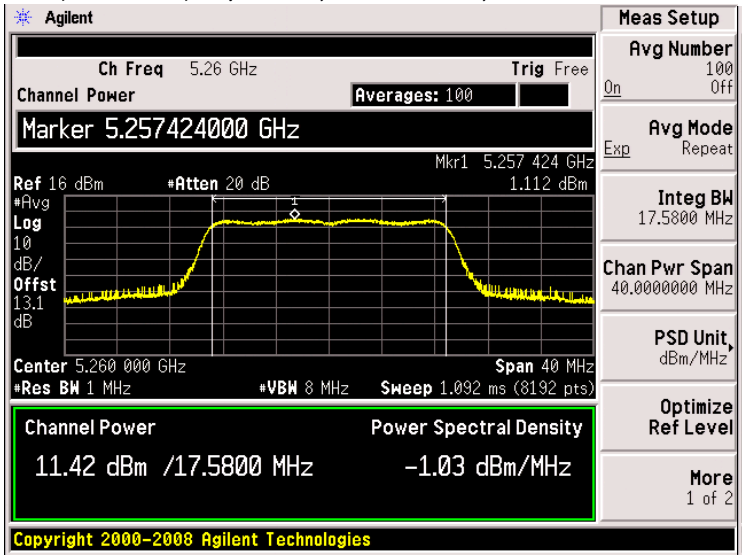


Antenna A

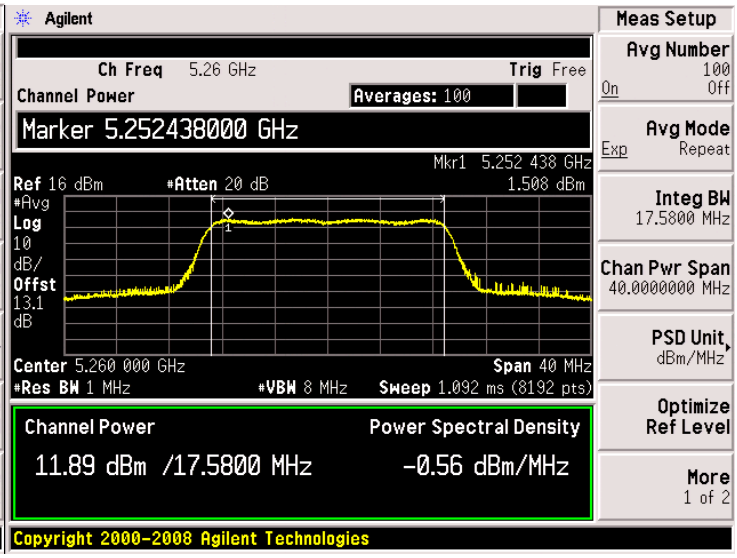


Antenna B

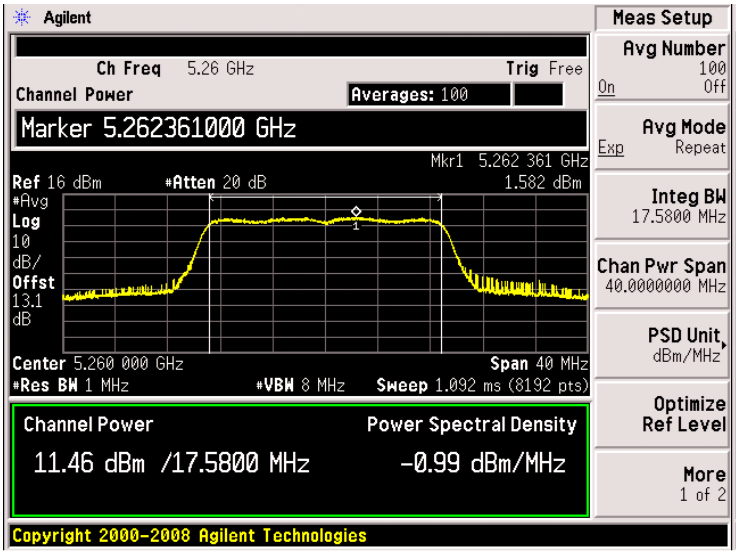
PSD , 5260 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3



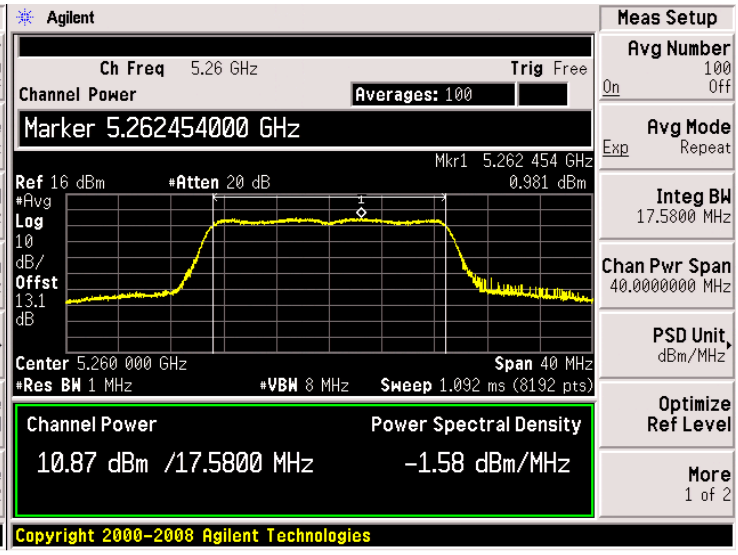
Antenna A



Antenna B

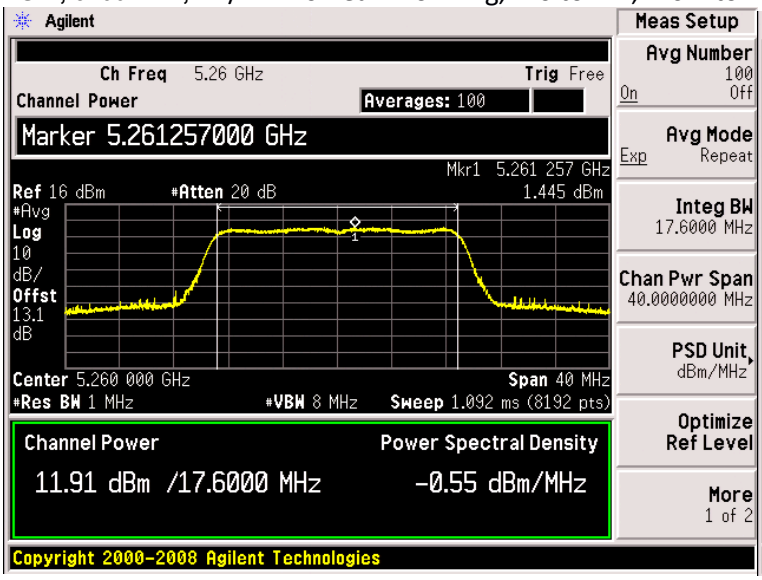


Antenna C

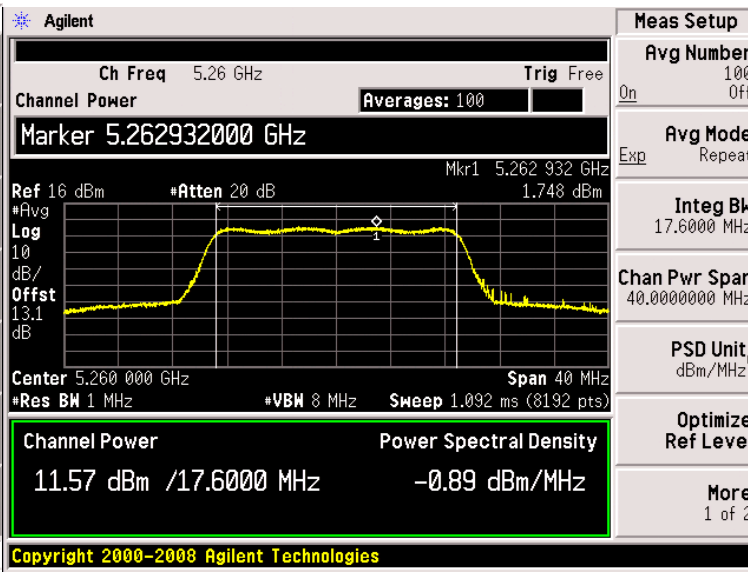


Antenna D

PSD , 5260 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1

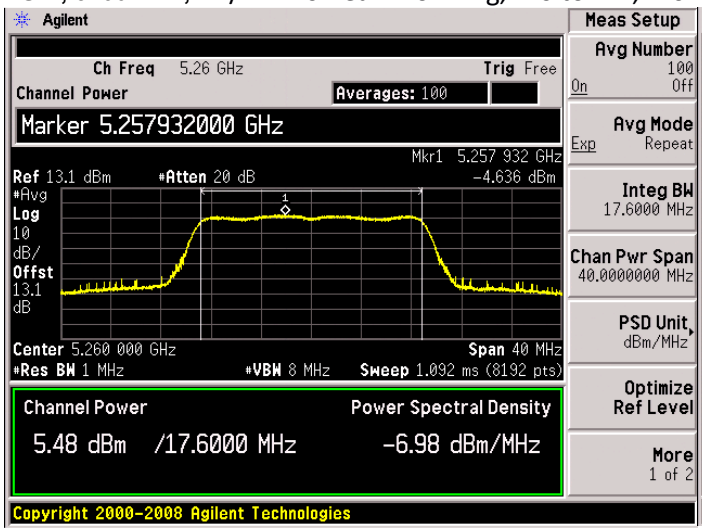


Antenna A

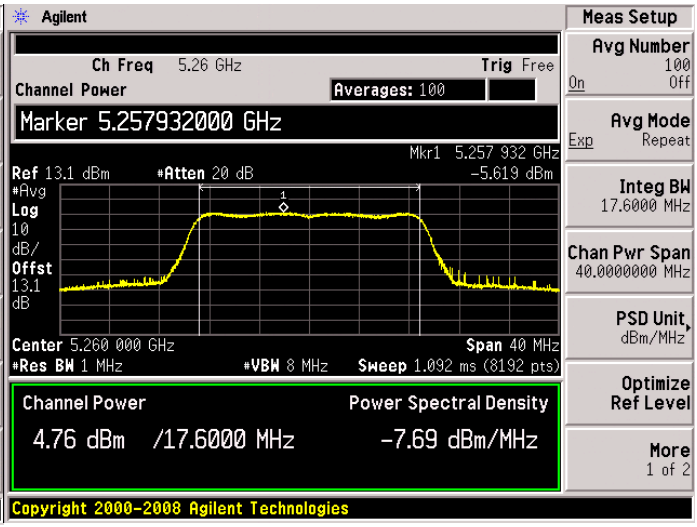


Antenna B

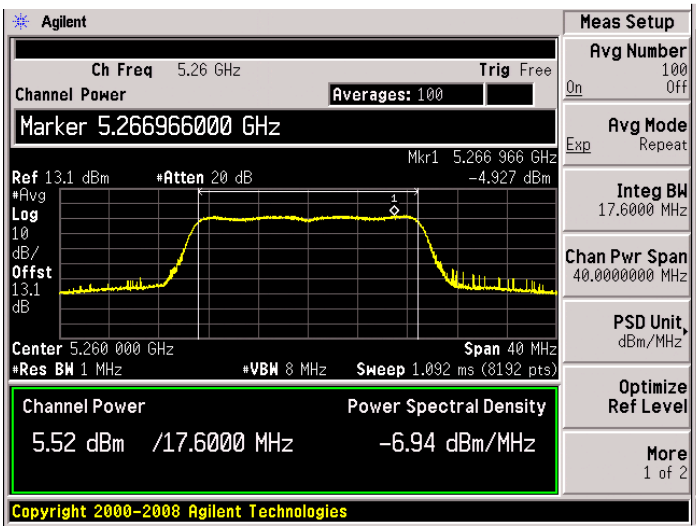
PSD , 5260 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1



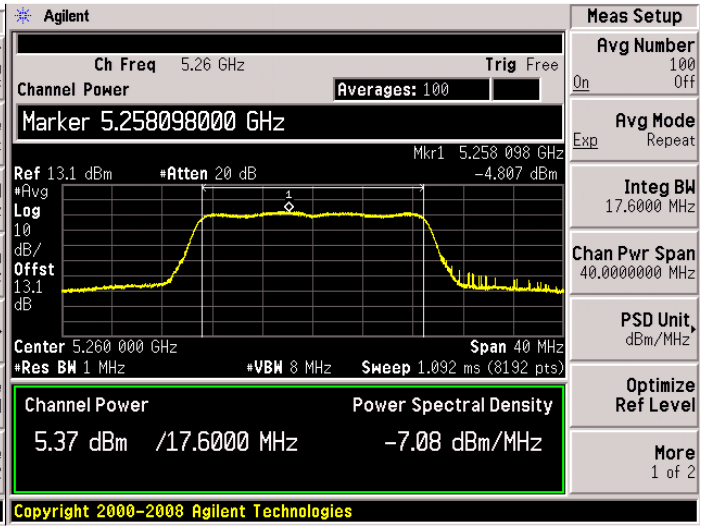
Antenna A



Antenna B

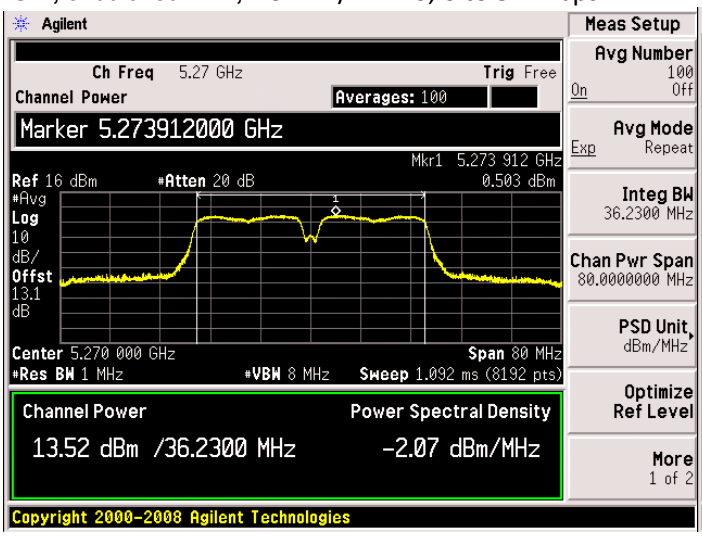


Antenna C

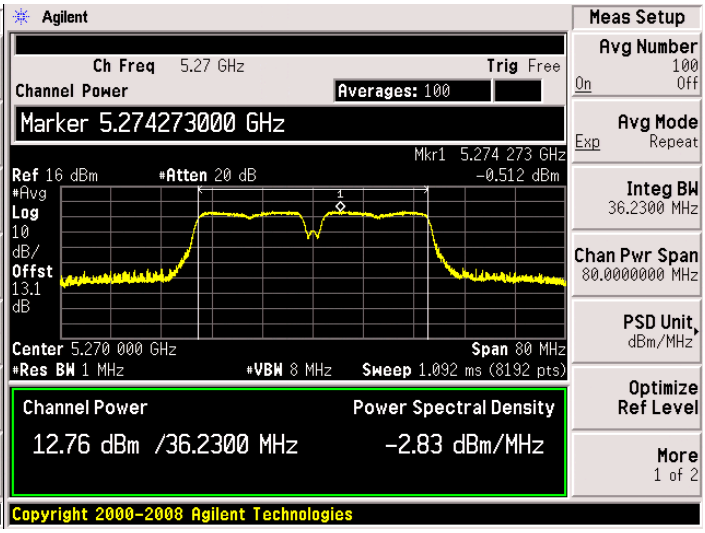


Antenna D

PSD , 5260/5280 MHz, Non HT/VHT40, 6 to 54 Mbps

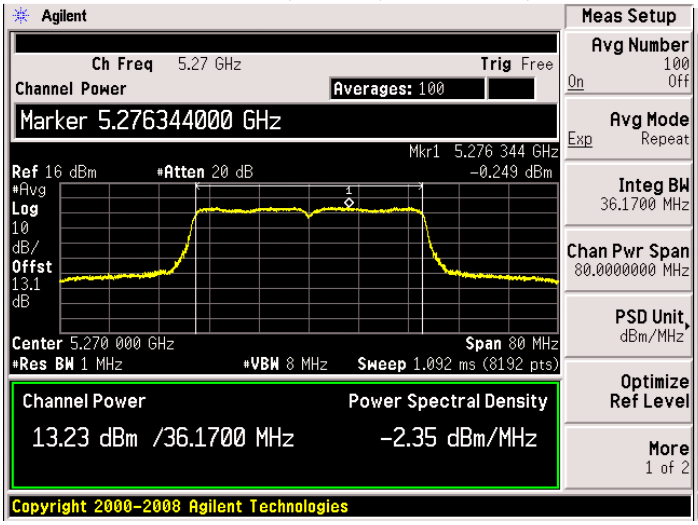


Antenna A

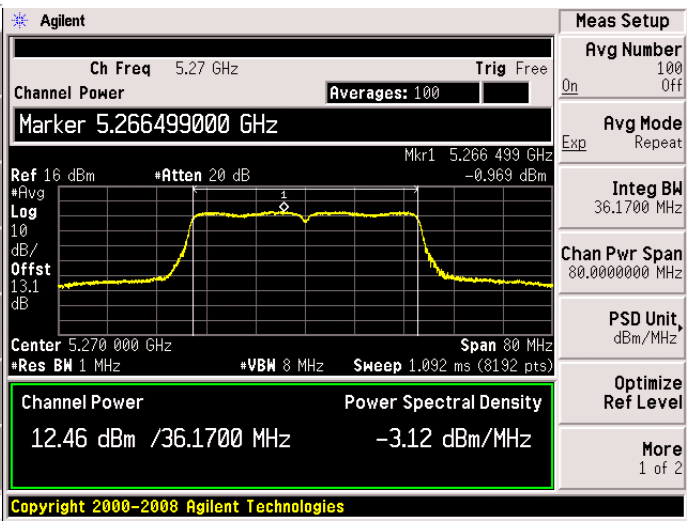


Antenna B

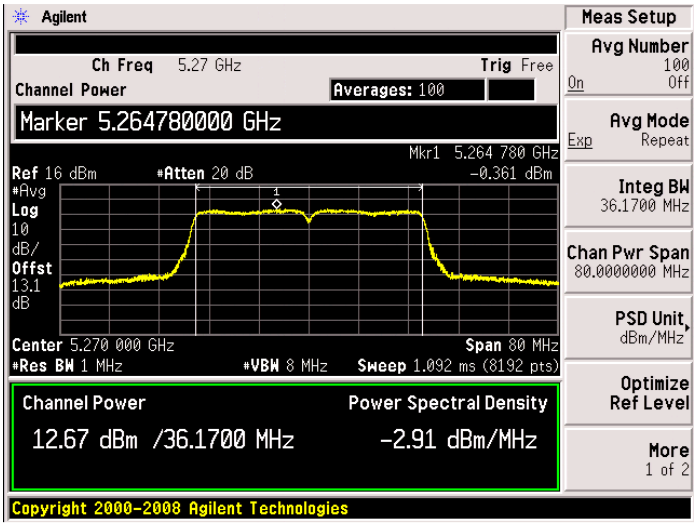
PSD , 5260/5280 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2



Antenna A

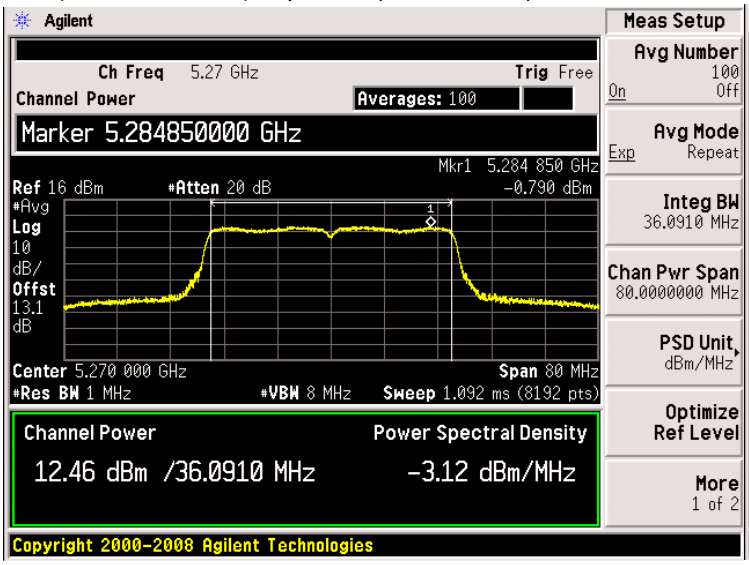


Antenna B

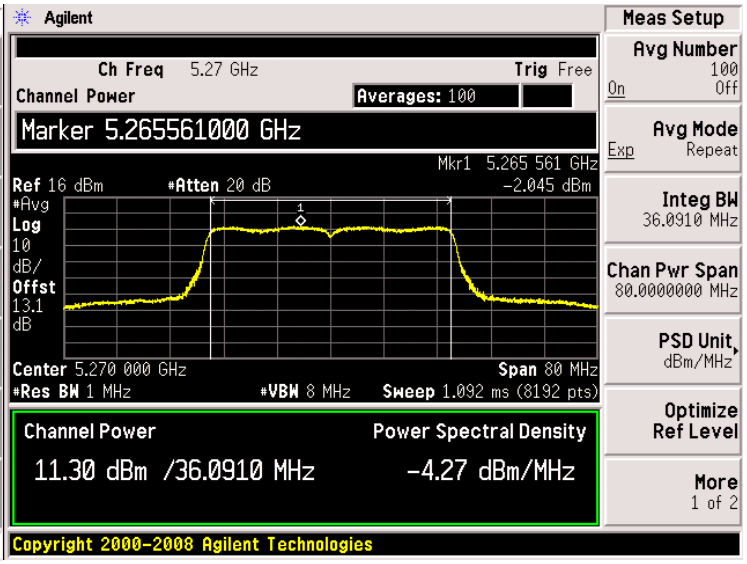


Antenna C

PSD , 5260/5280 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2



Antenna A



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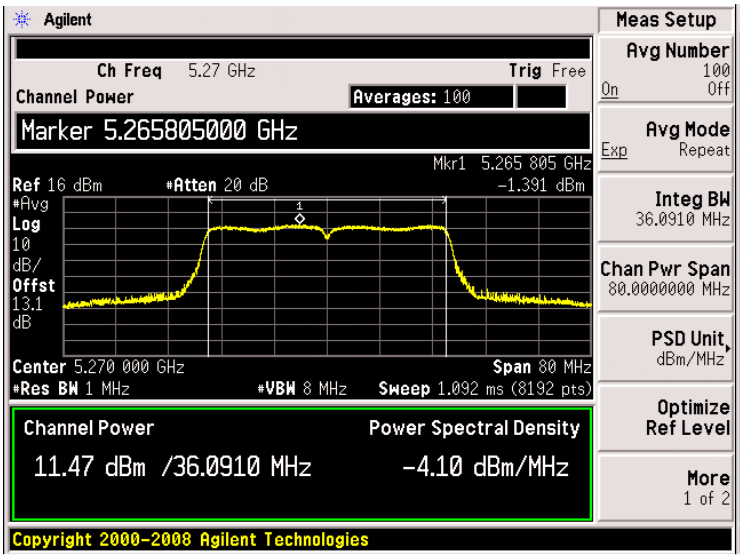
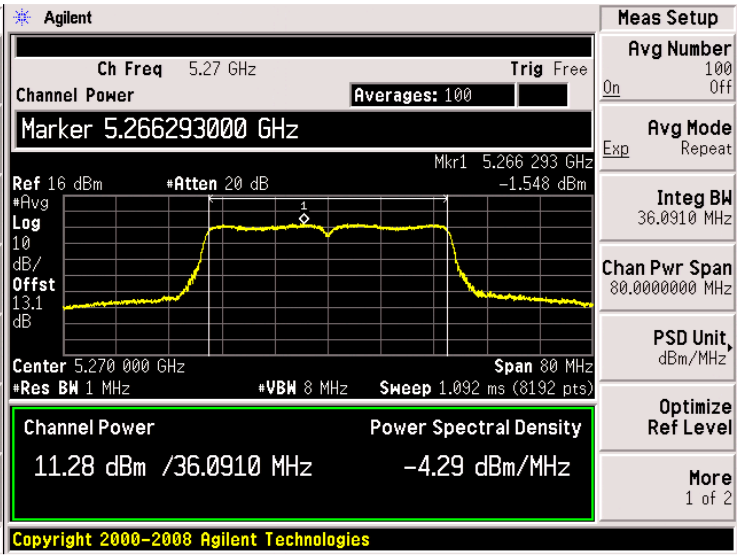
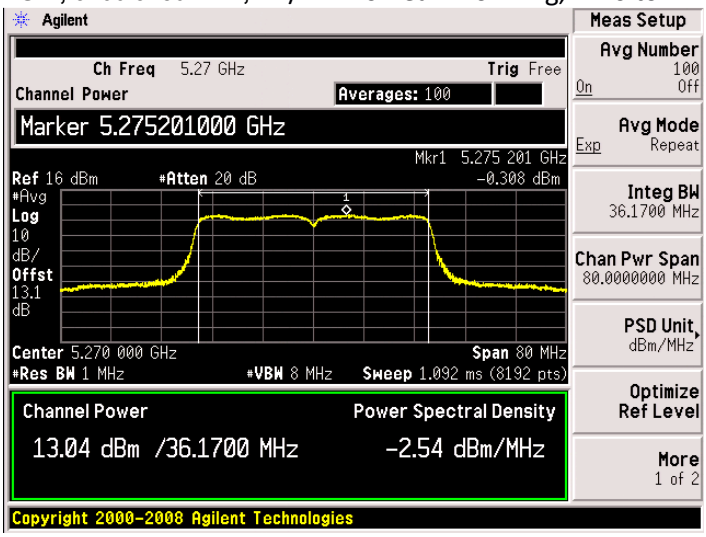


Antenna C

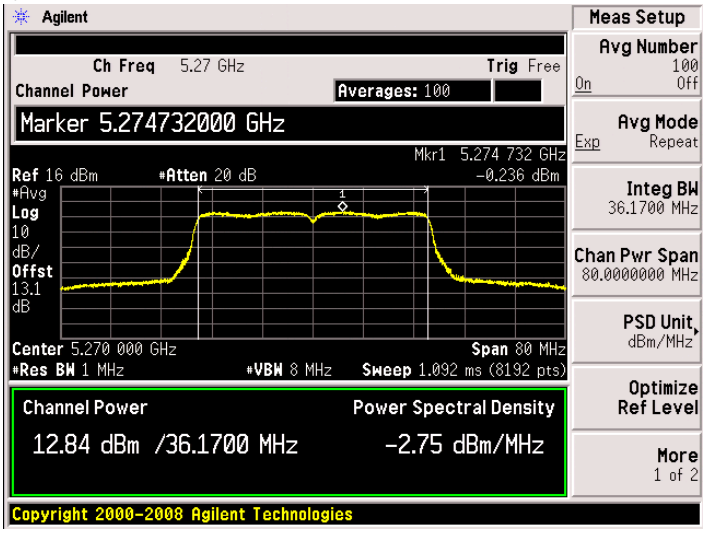


Antenna D

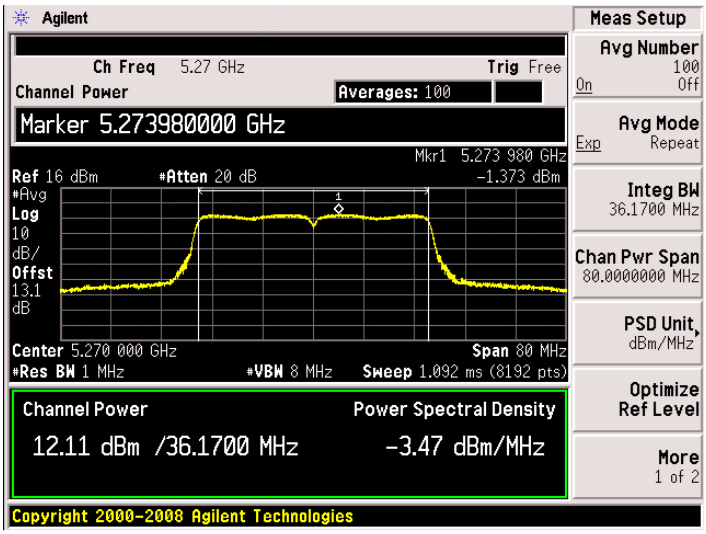
PSD , 5260/5280 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A

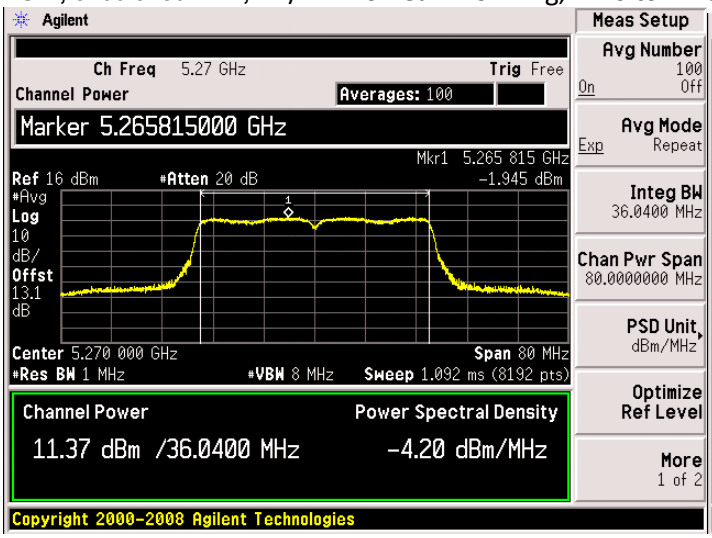


Antenna B

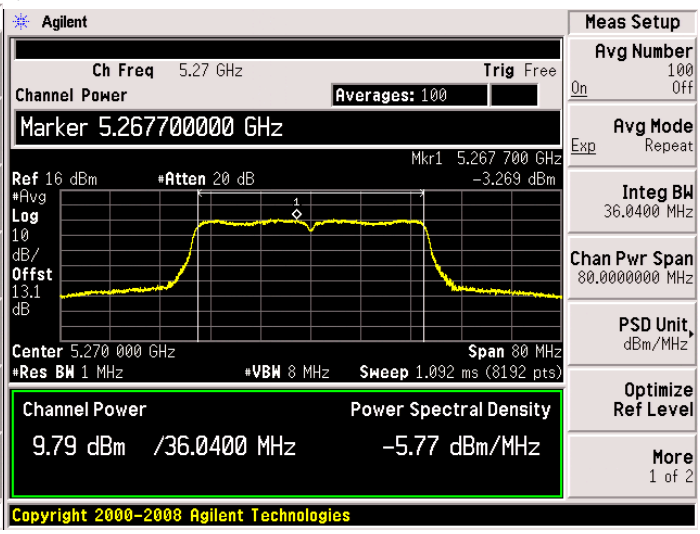


Antenna C

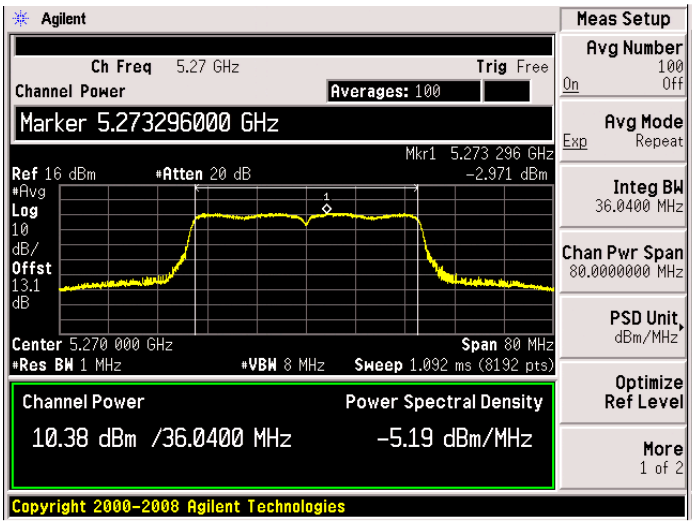
PSD , 5260/5280 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



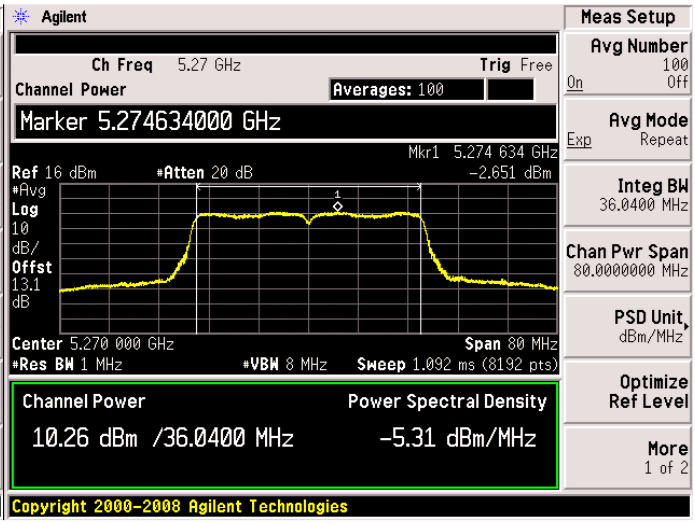
Antenna A



Antenna B

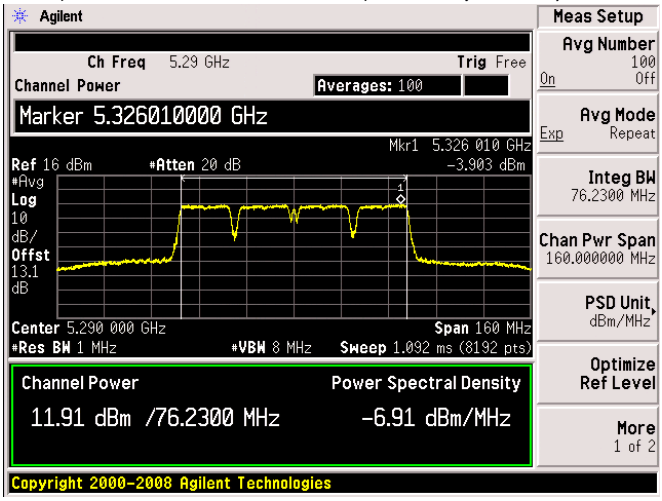


Antenna C

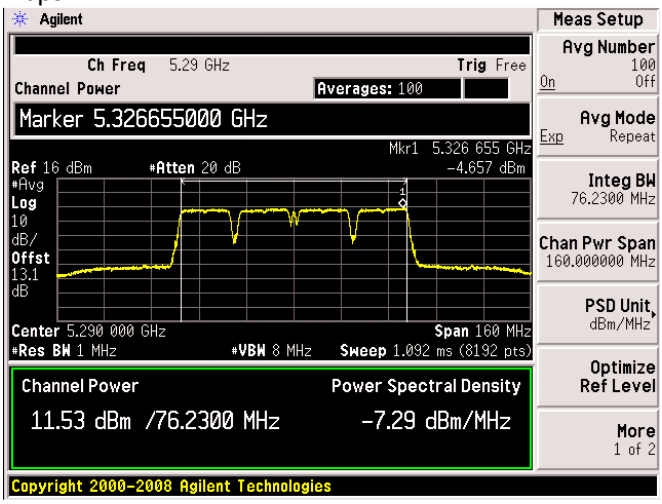


Antenna D

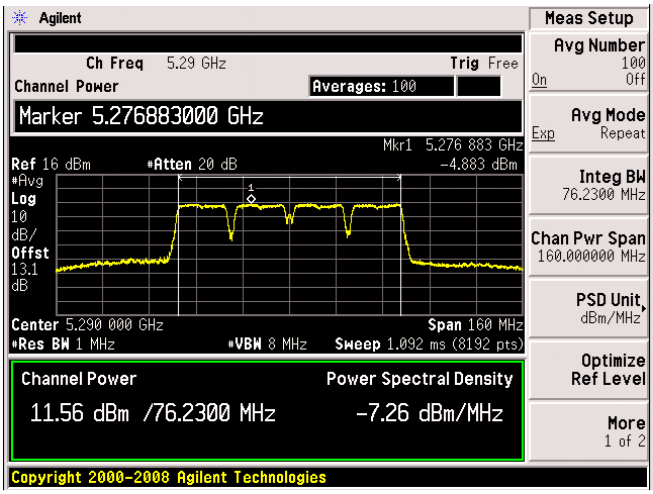
PSD , 5260/5280/5300/5320 MHz, Non HT/VHT80, 6 to 54 Mbps



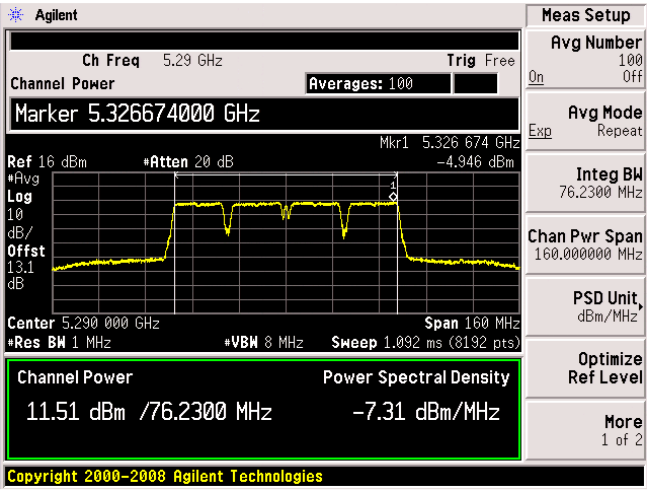
Antenna A



Antenna B

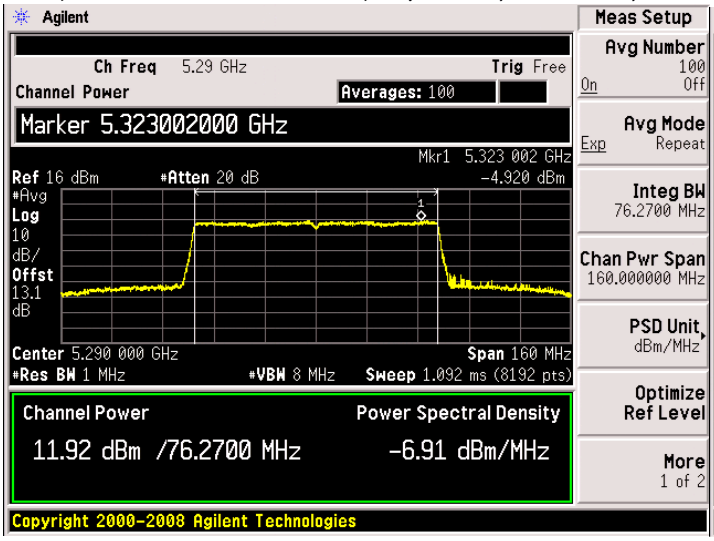


Antenna C

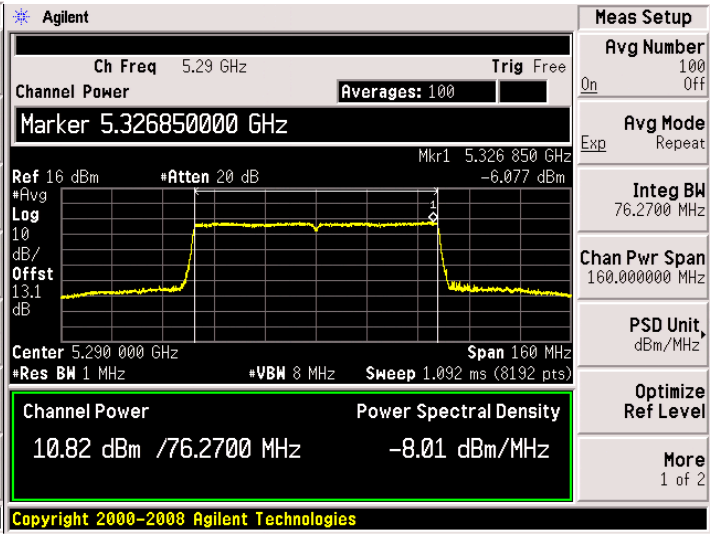


Antenna D

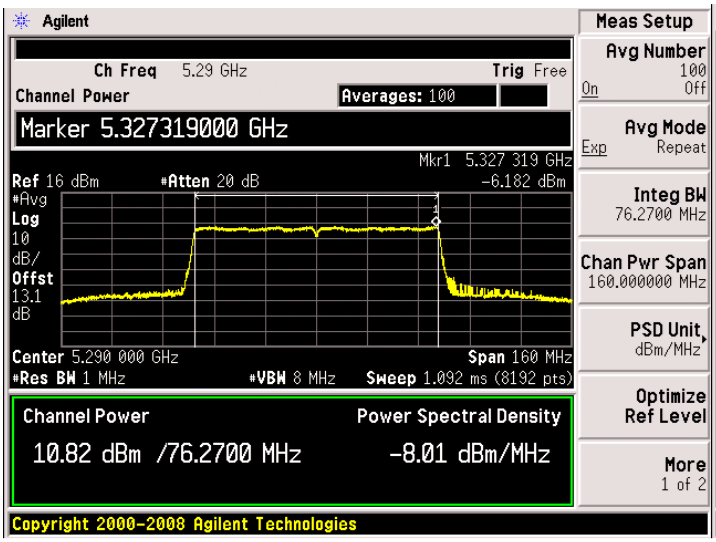
PSD , 5260/5280/5300/5320 MHz, HT/VHT80, M0 to M7, M0.1 to M9.1



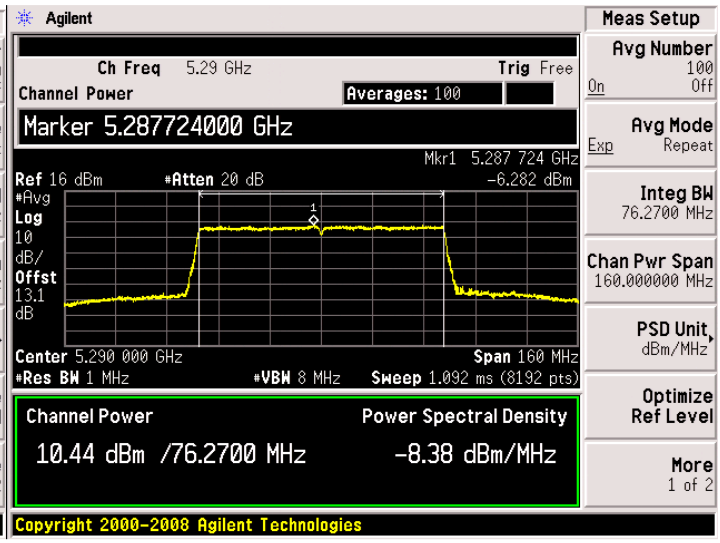
Antenna A



Antenna B

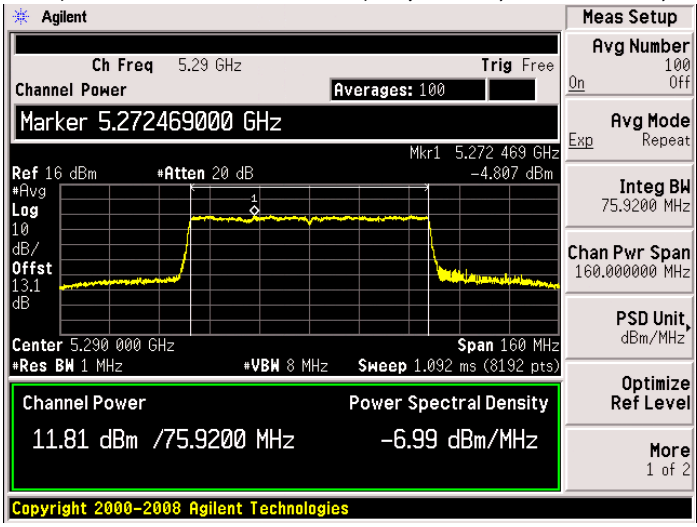


Antenna C

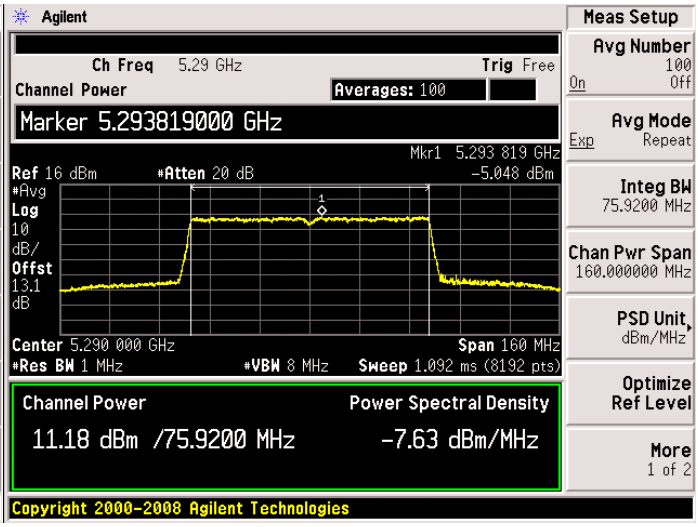


Antenna D

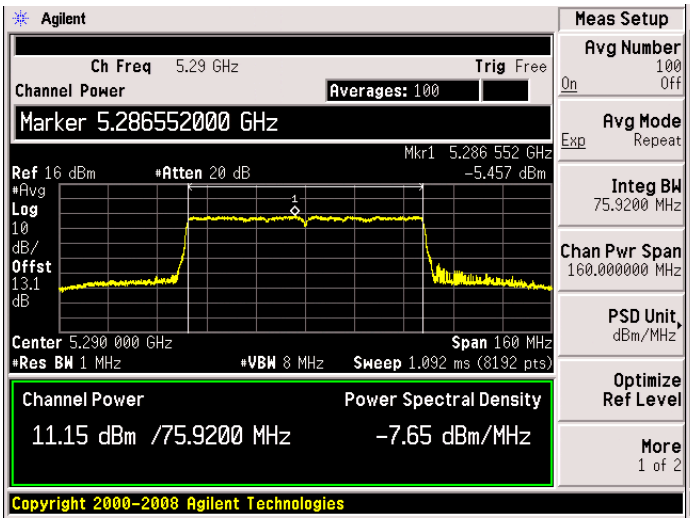
PSD , 5260/5280/5300/5320 MHz, HT/VHT80, M16 to M23, M0.3 to M9.3



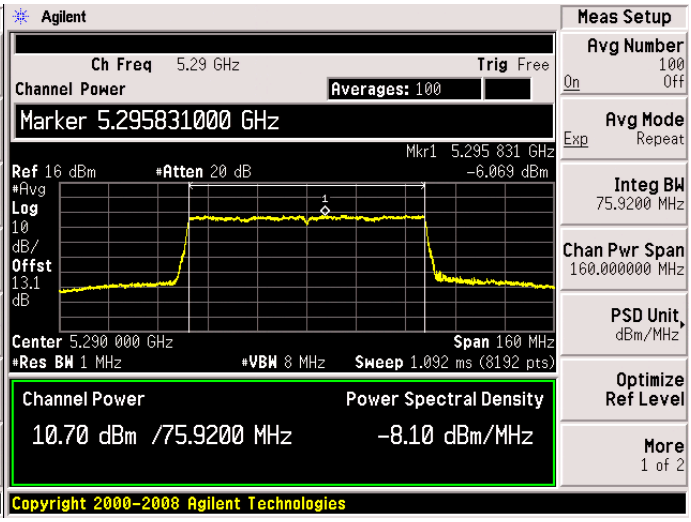
Antenna A



Antenna B

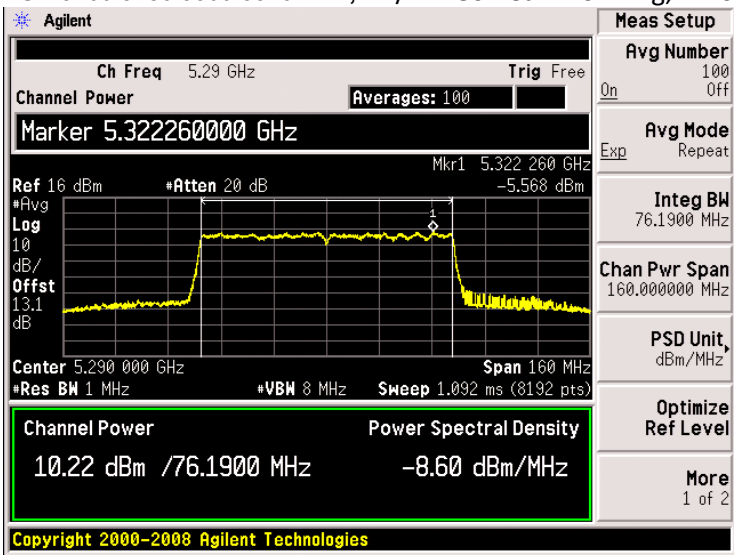


Antenna C

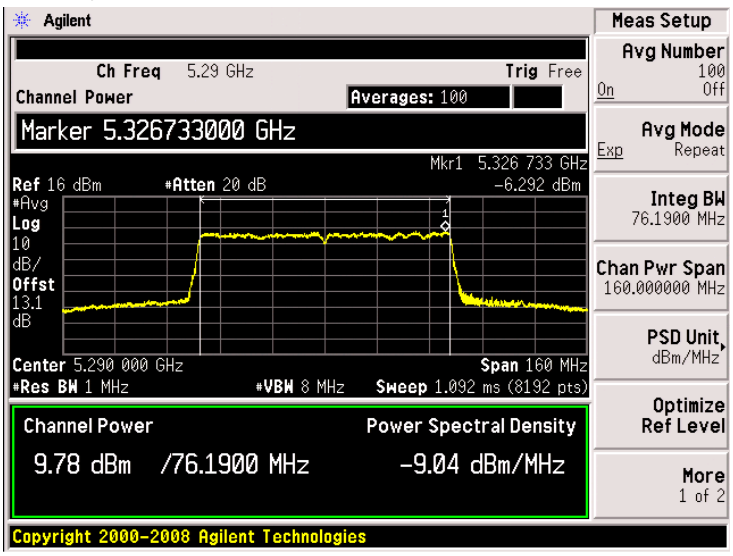


Antenna D

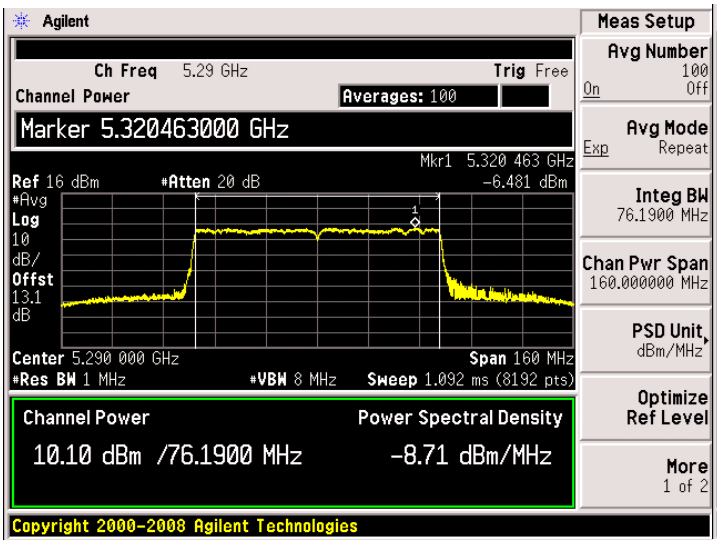
PSD 5260/5280/5300/5320 MHz, HT/VHT80 Beam Forming, M16 to M23, M0.3 to M9.3



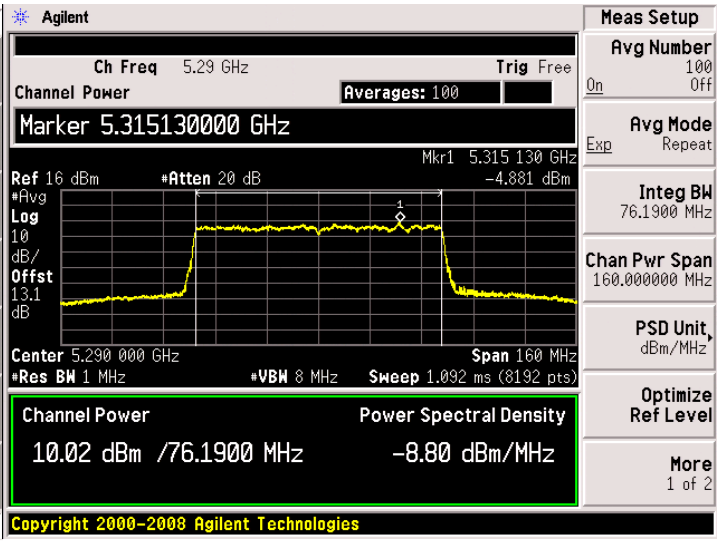
Antenna A



Antenna B

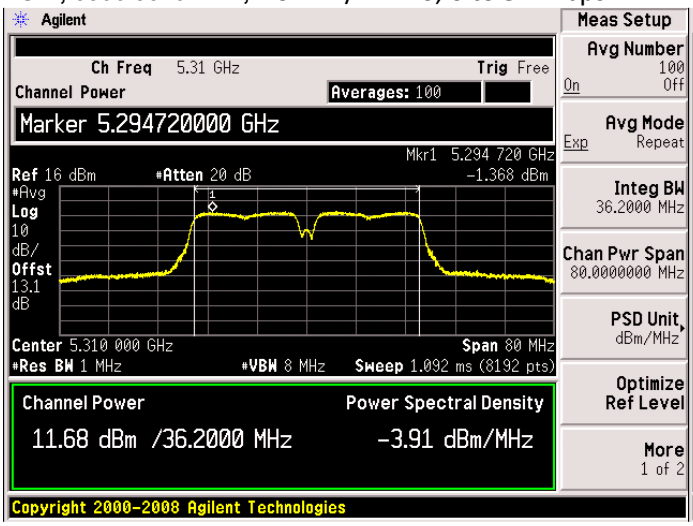


Antenna C

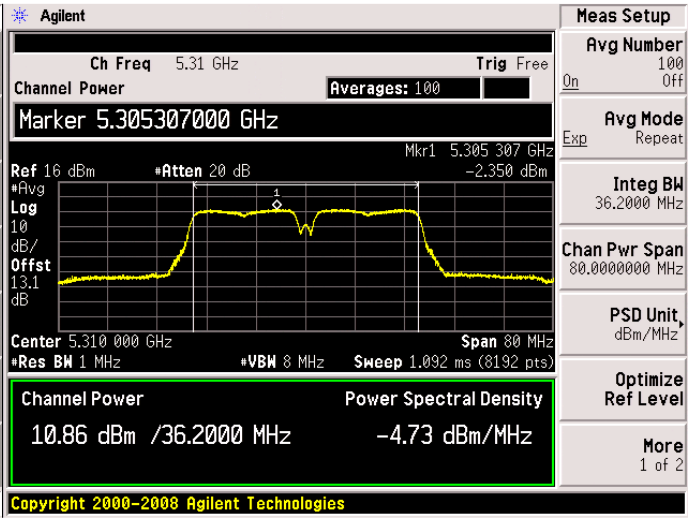


Antenna D

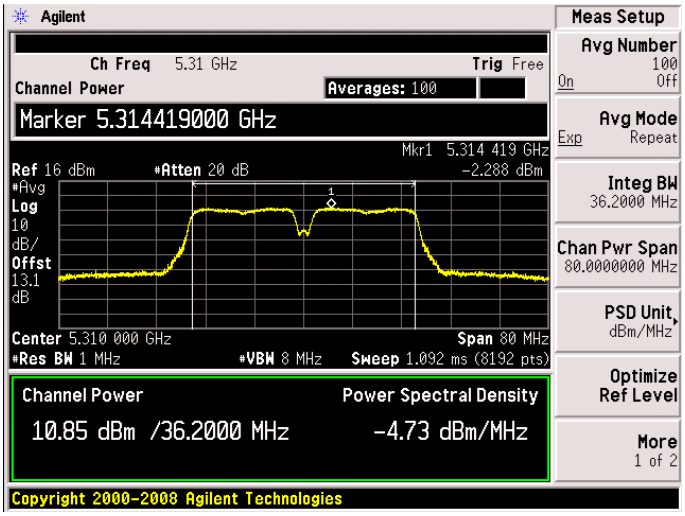
PSD , 5300/5320 MHz, Non HT/VHT40, 6 to 54 Mbps



Antenna A

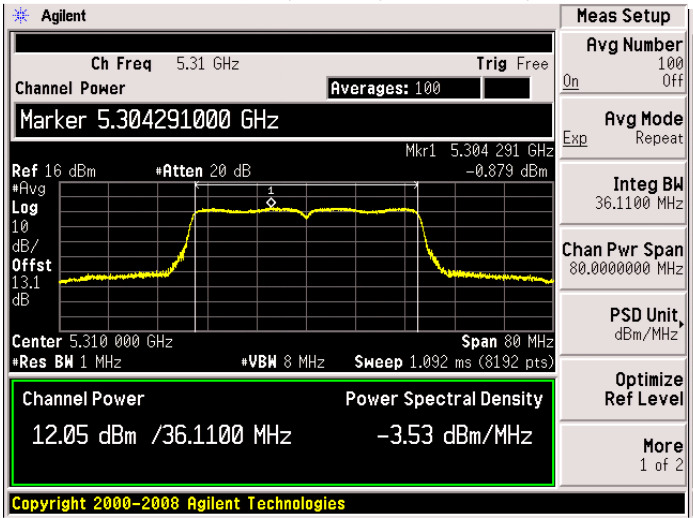


Antenna B

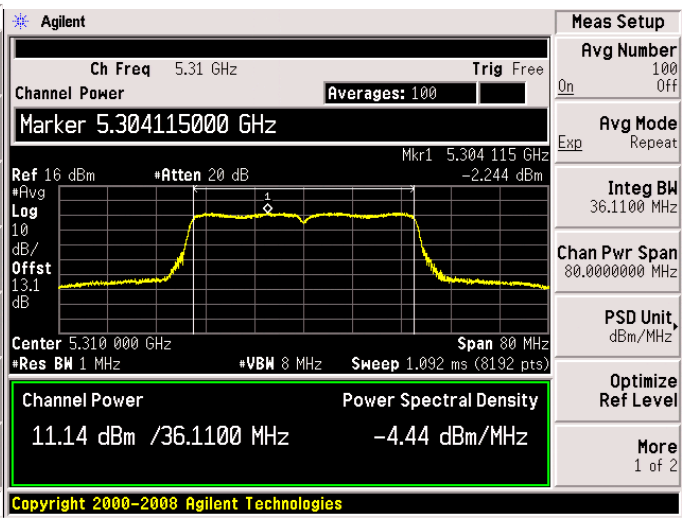


Antenna C

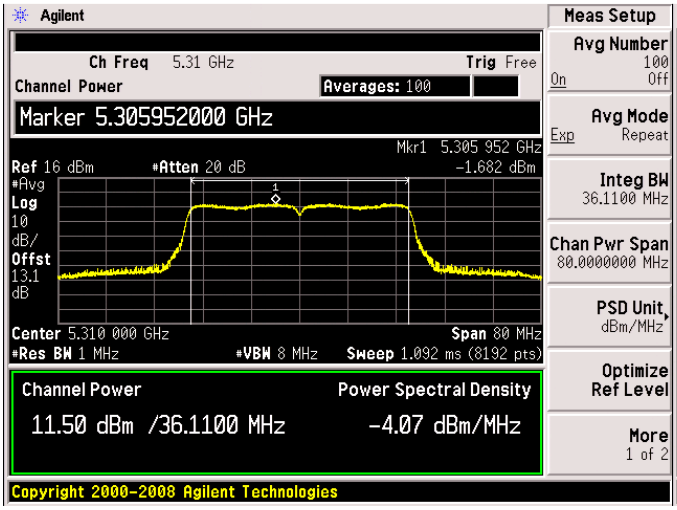
PSD , 5300/5320 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2



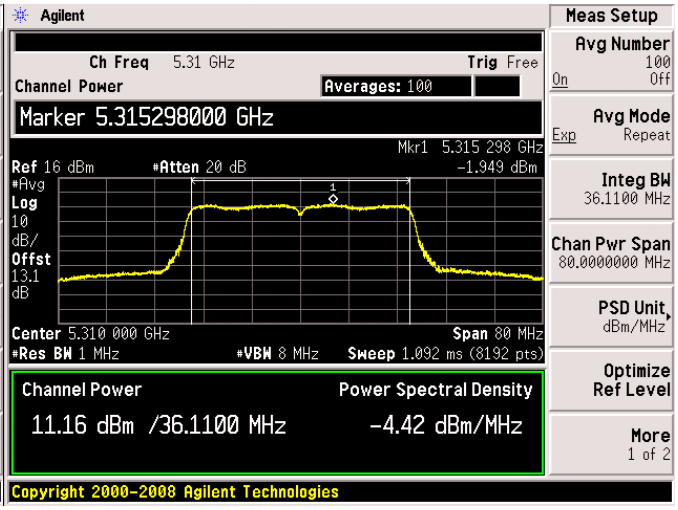
Antenna A



Antenna B

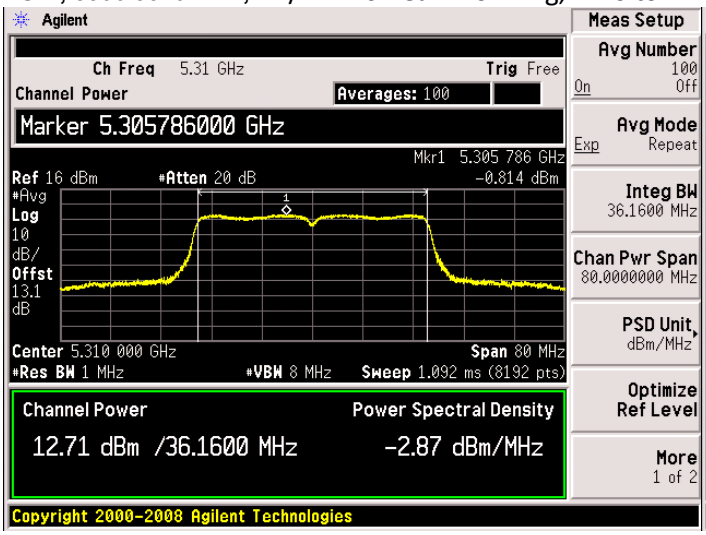


Antenna C

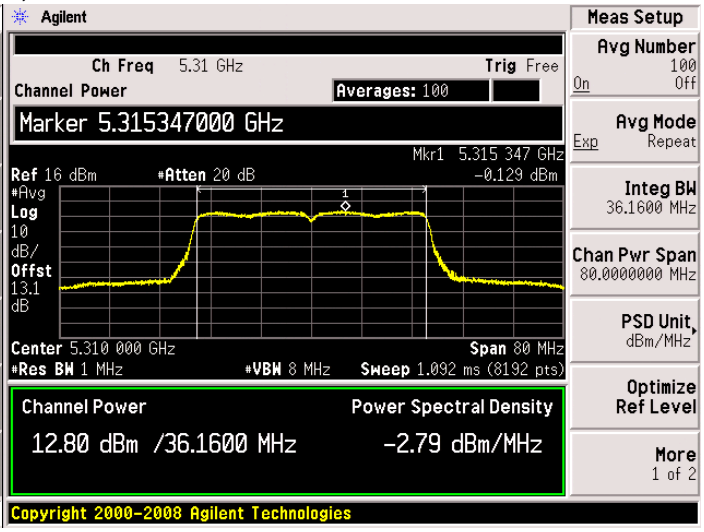


Antenna D

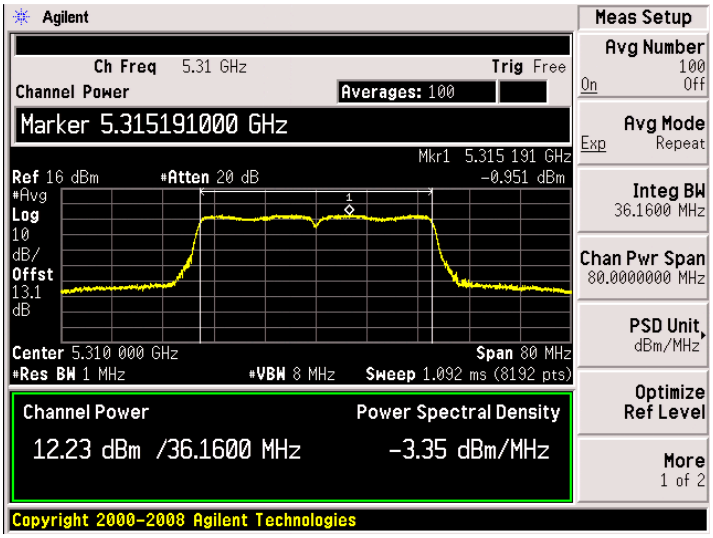
PSD , 5300/5320 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A

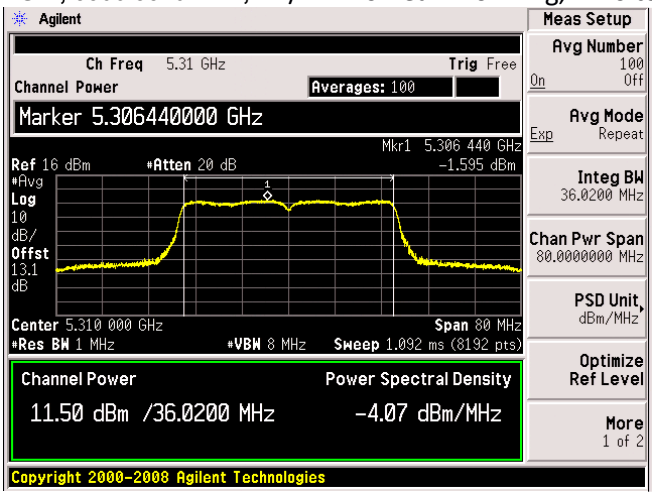


Antenna B

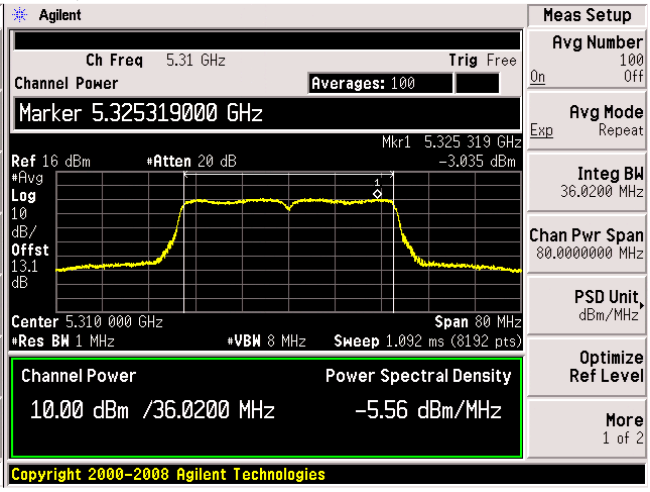


Antenna C

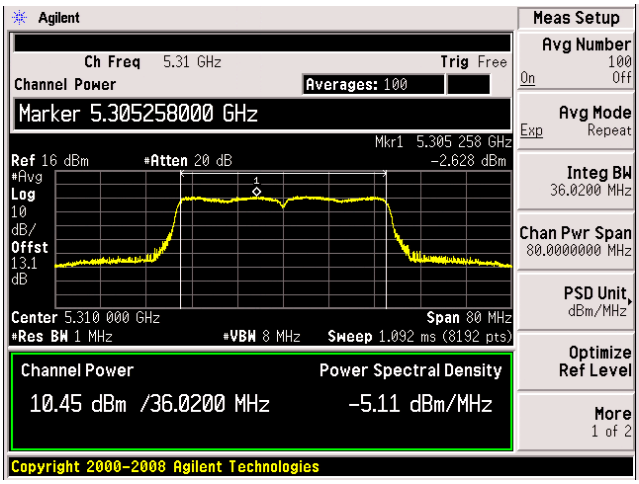
PSD , 5300/5320 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3



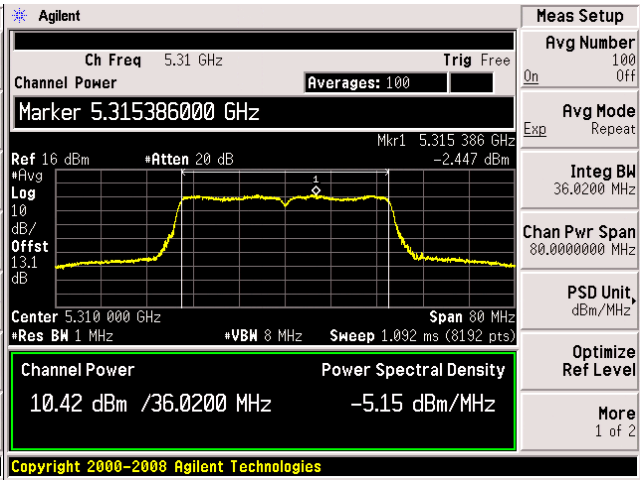
Antenna A



Antenna B

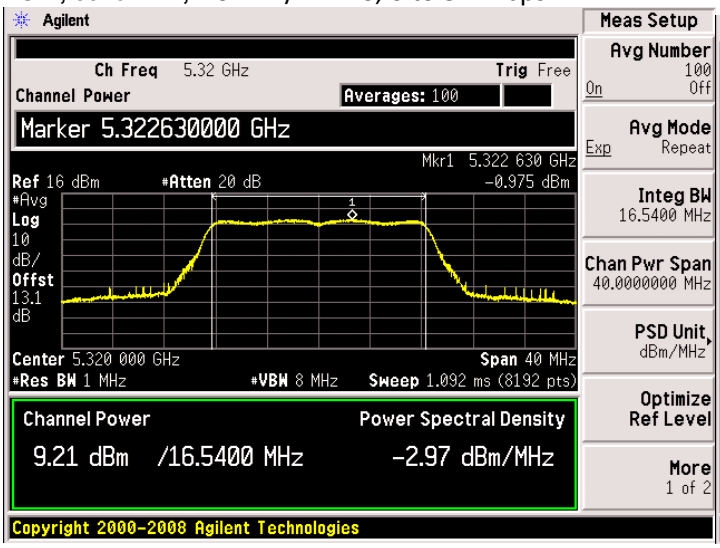


Antenna C

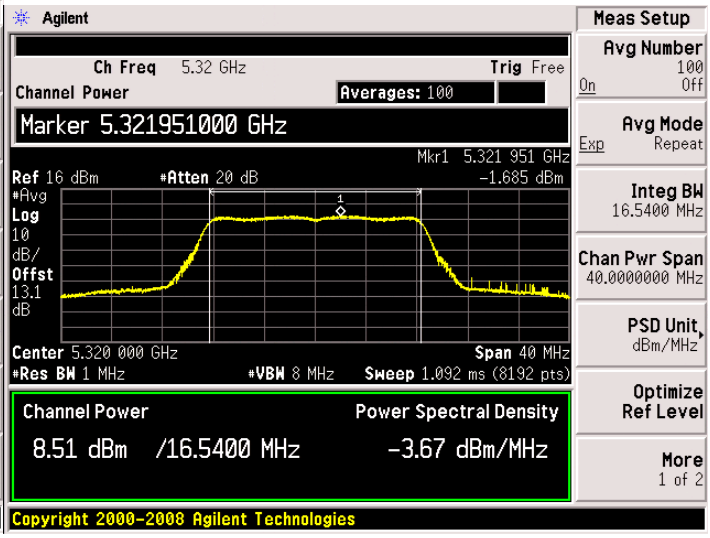


Antenna D

PSD , 5320 MHz, Non HT/VHT20, 6 to 54 Mbps

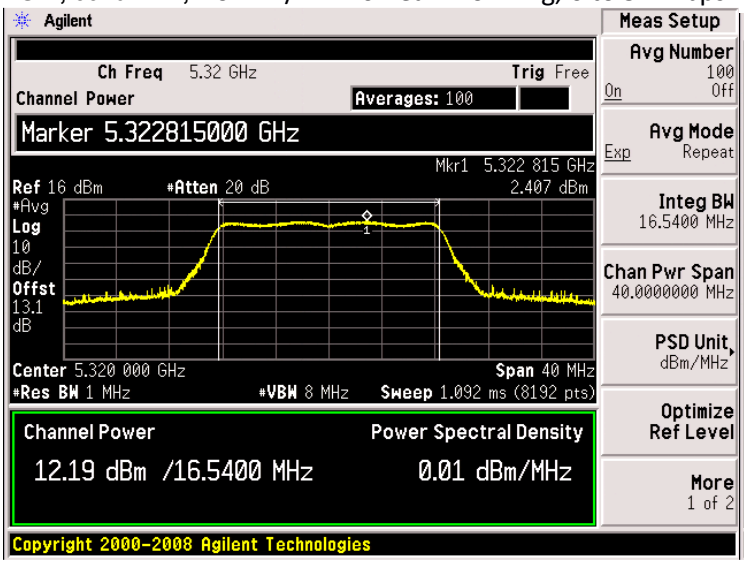


Antenna A

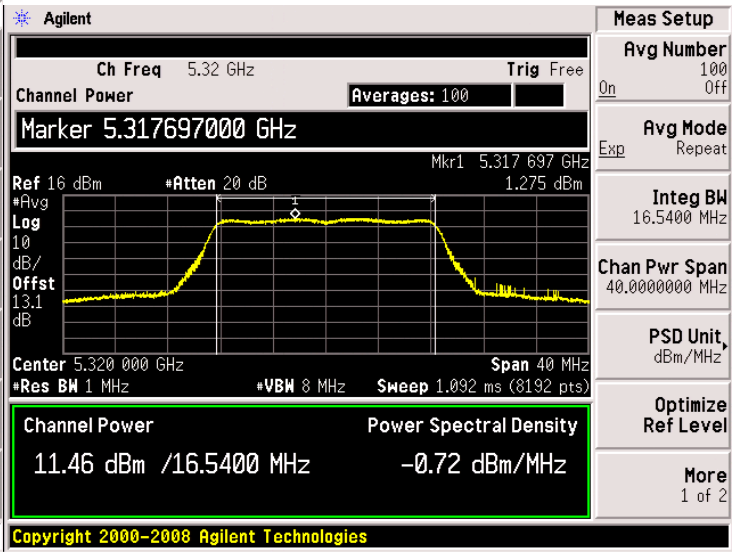


Antenna B

PSD , 5320 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps

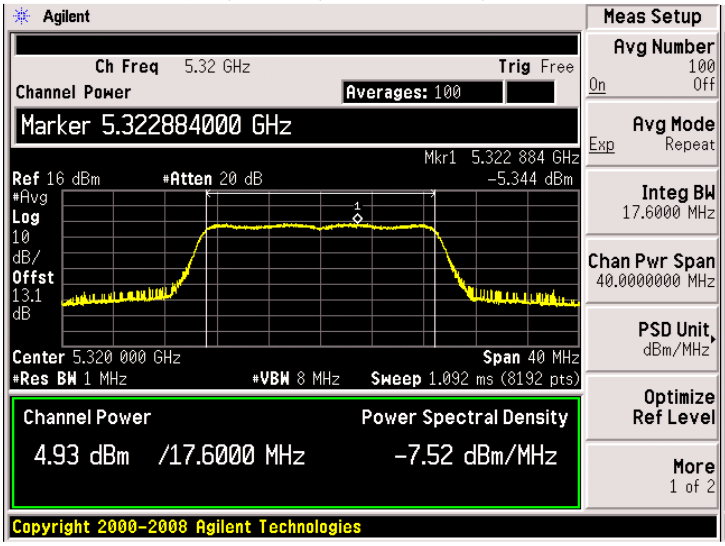


Antenna A

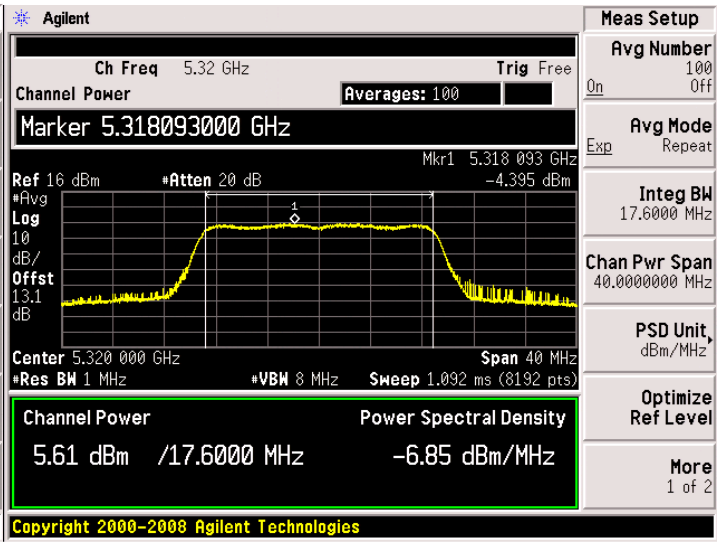


Antenna B

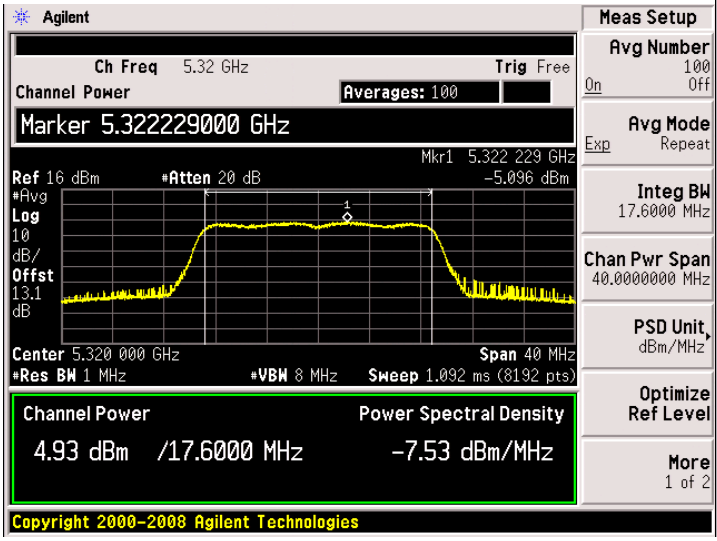
PSD , 5320 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3



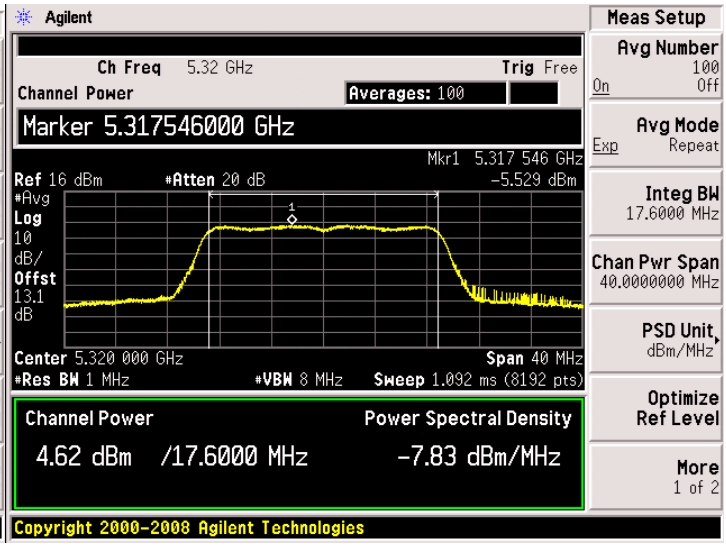
Antenna A



Antenna B

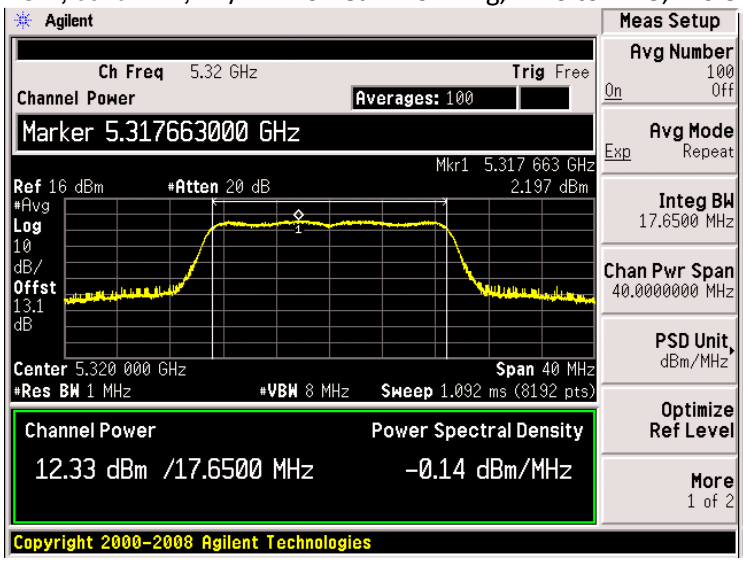


Antenna C

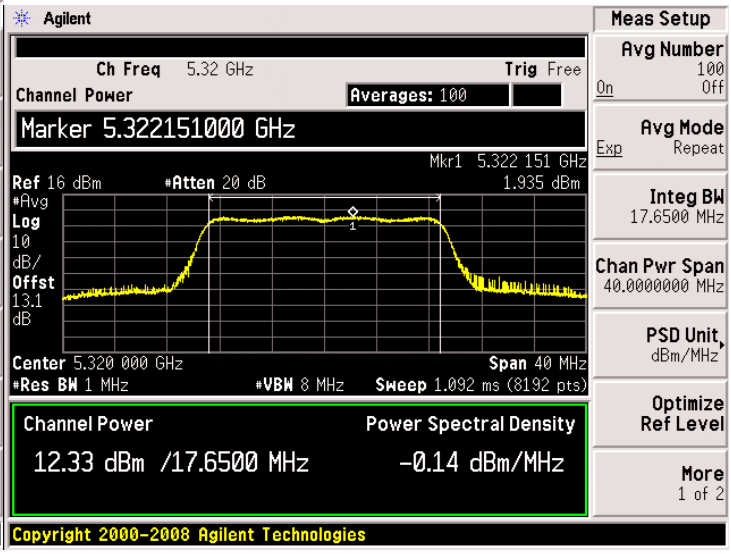


Antenna D

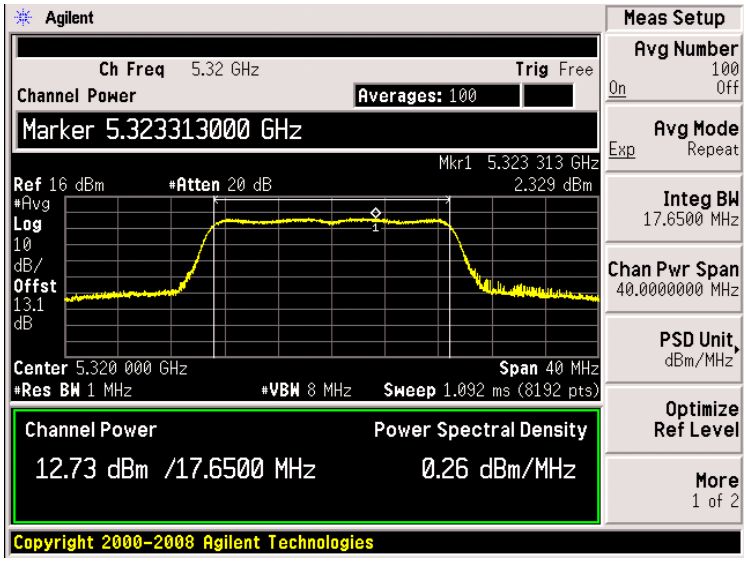
PSD , 5320 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3



Antenna A



Antenna B



Antenna C

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).

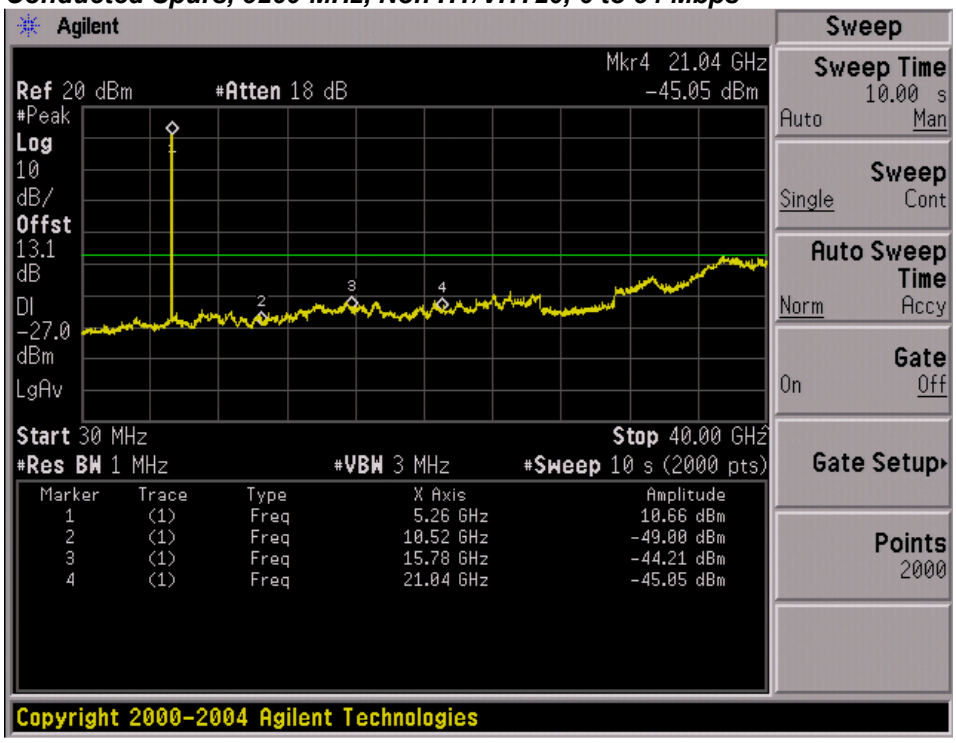
Span:	30 MHz-40 GHz
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	10 s
Resolution Bandwidth:	1 MHz
Video Bandwidth:	3 MHz
Detector:	Peak
Trace:	Single
Marker:	Peak

Record the marker waveform peak to spur difference

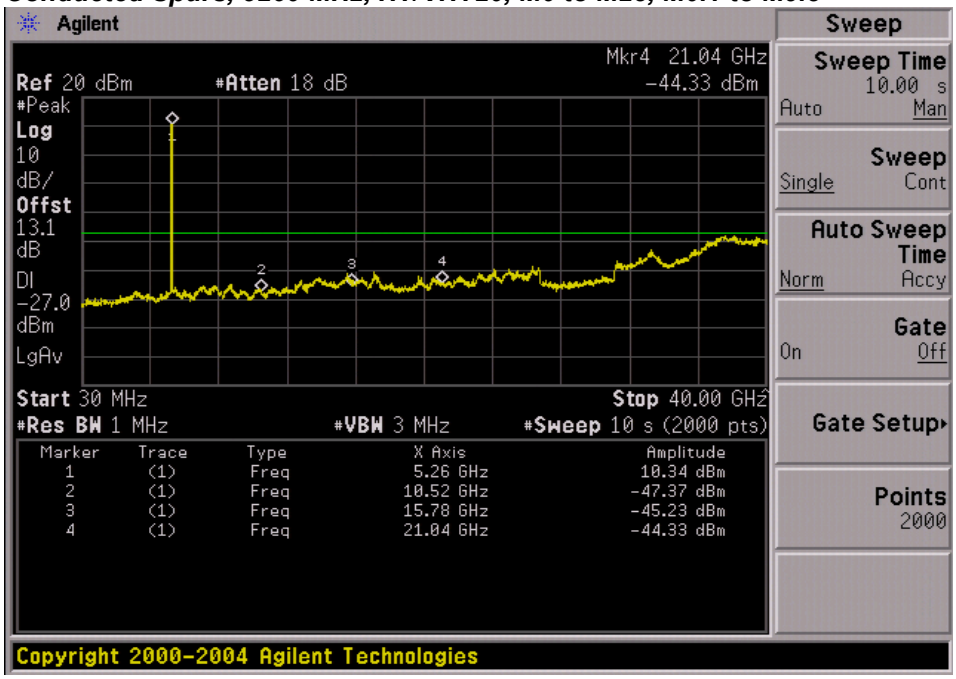
Please note that scans were performed to verify that duty cycle did not have a significant impact on the test results. Also, scans with reduced RBW and VBW settings were performed to verify that no significant emissions were present under the noise floor.

Frequency (MHz)	Mode	Antenna gain (dBi)	Limit (dBm/MHz)	Adjusted Limit (dBm/MHz)	Margin (dBm)
5260	Non HT/VHT20, 6 to 54 Mbps	7	-27	-34	>6dBm
	HT/VHT20, M0 to M23, M0.1 to M9.3	7	-27	-34	>6dBm
5260/5280	Non HT/VHT40, 6 to 54 Mbps	7	-27	-34	>6dBm
	HT/VHT40, M0 to M23, M0.1 to M9.3	7	-27	-34	>6dBm
5260/5280 5300/5320	Non HT/VHT80, 6 to 54 Mbps	7	-27	-34	>6dBm
	HT/VHT80, M0 to M23, M0.1 to M9.3	7	-27	-34	>6dBm
5300/5320	Non HT/VHT40, 6 to 54 Mbps	7	-27	-34	>6dBm
	HT/VHT40, M0 to M23, M0.1 to M9.3	7	-27	-34	>6dBm
5320	Non HT/VHT20, 6 to 54 Mbps	7	-27	-34	>6dBm
	HT/VHT20, M0 to M23, M0.1 to M9.3	7	-27	-34	>6dBm

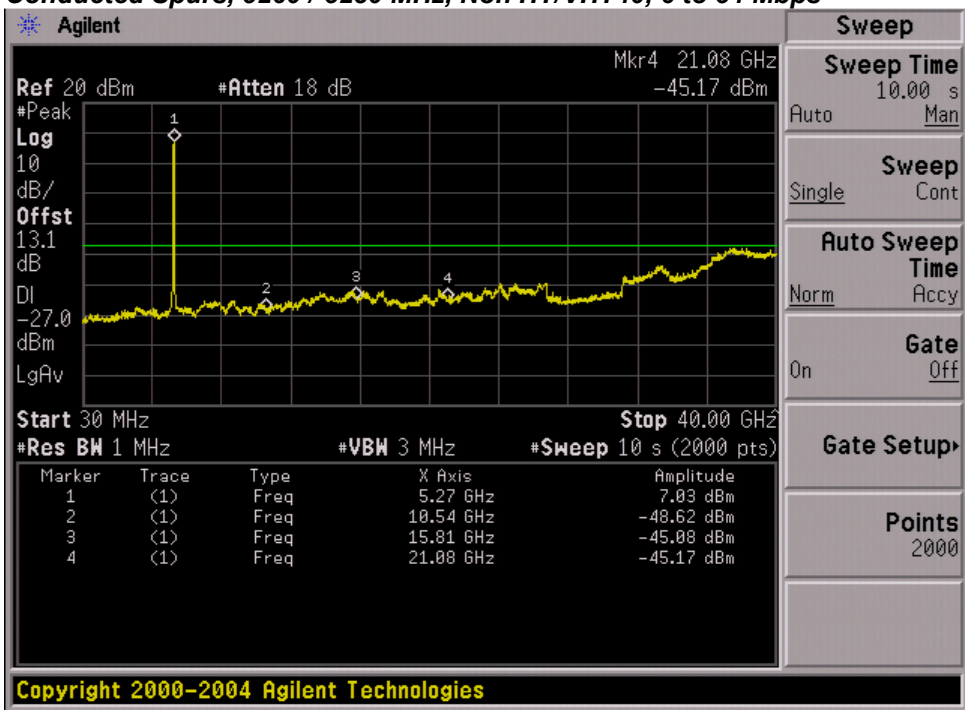
Conducted Spurs, 5260 MHz, Non HT/VHT20, 6 to 54 Mbps



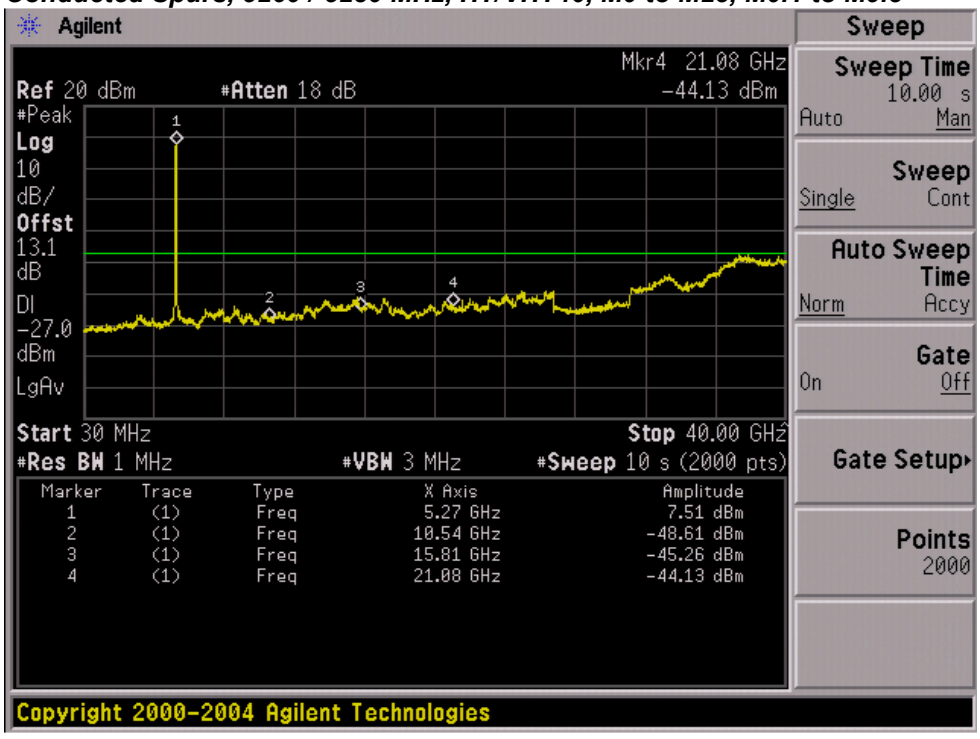
Conducted Spurs, 5260 MHz, HT/VHT20, M0 to M23, M0.1 to M9.3



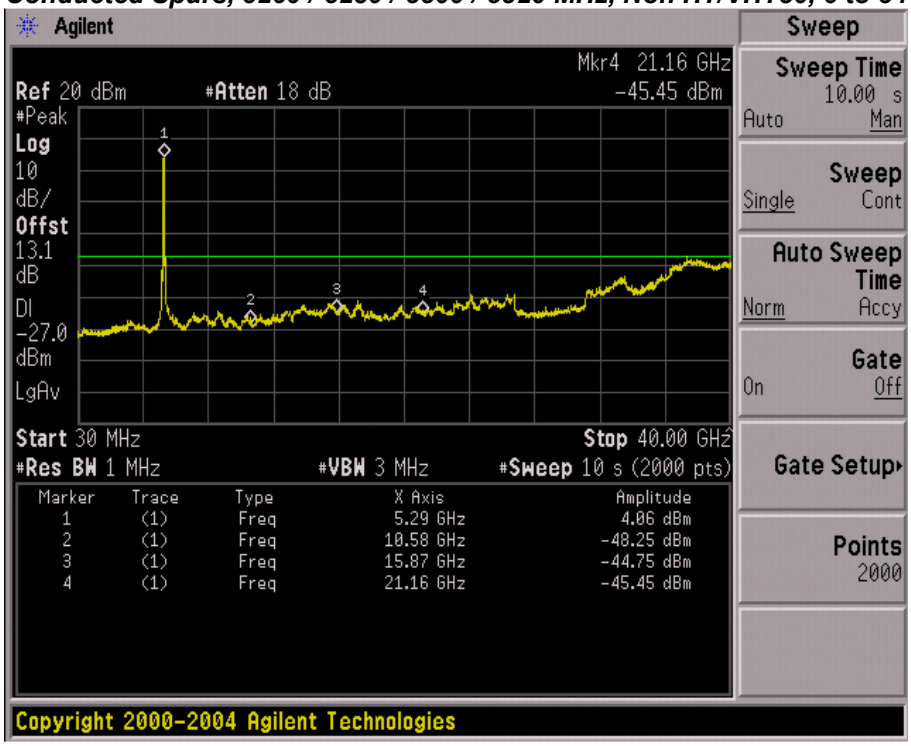
Conducted Spurs, 5260 / 5280 MHz, Non HT/VHT40, 6 to 54 Mbps



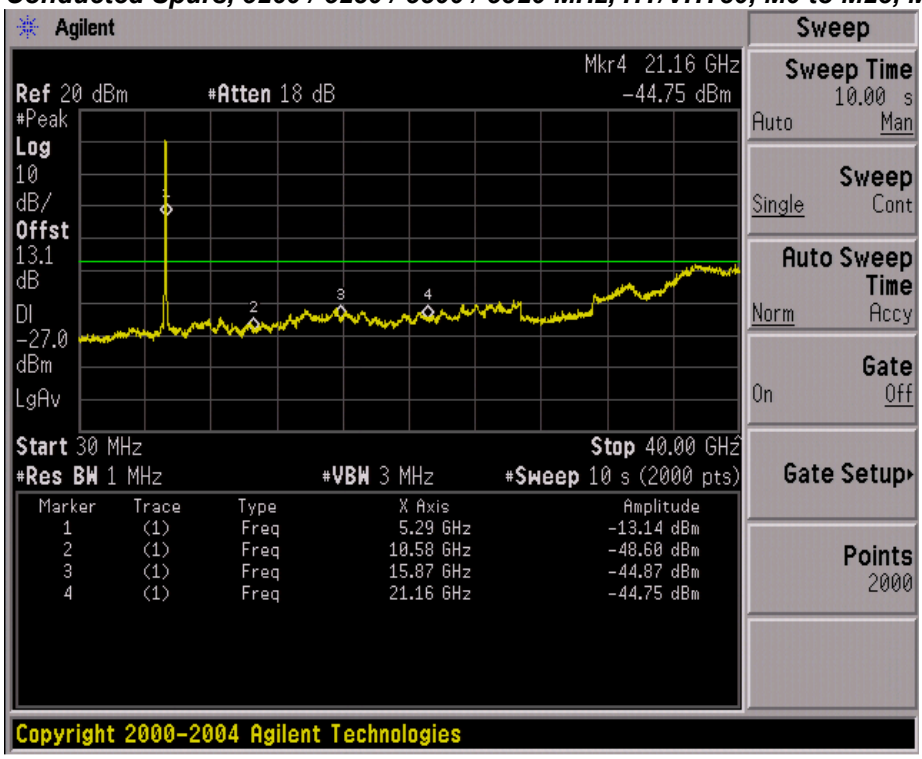
Conducted Spurs, 5260 / 5280 MHz, HT/VHT40, M0 to M23, M0.1 to M9.3



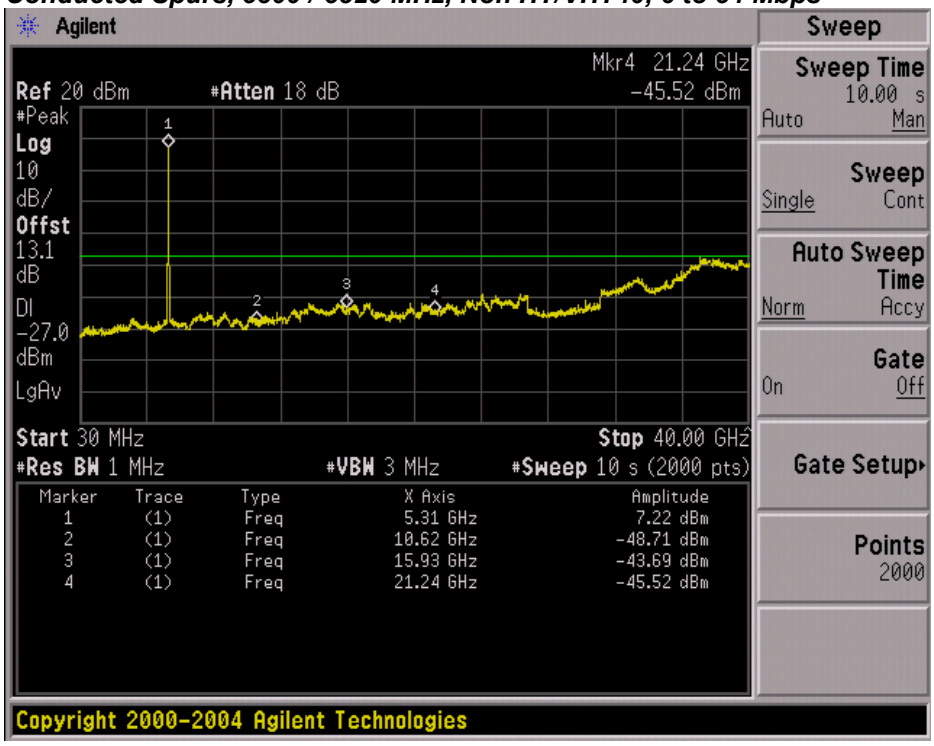
Conducted Spurs, 5260 / 5280 / 5300 / 5320 MHz, Non HT/VHT80, 6 to 54 Mbps



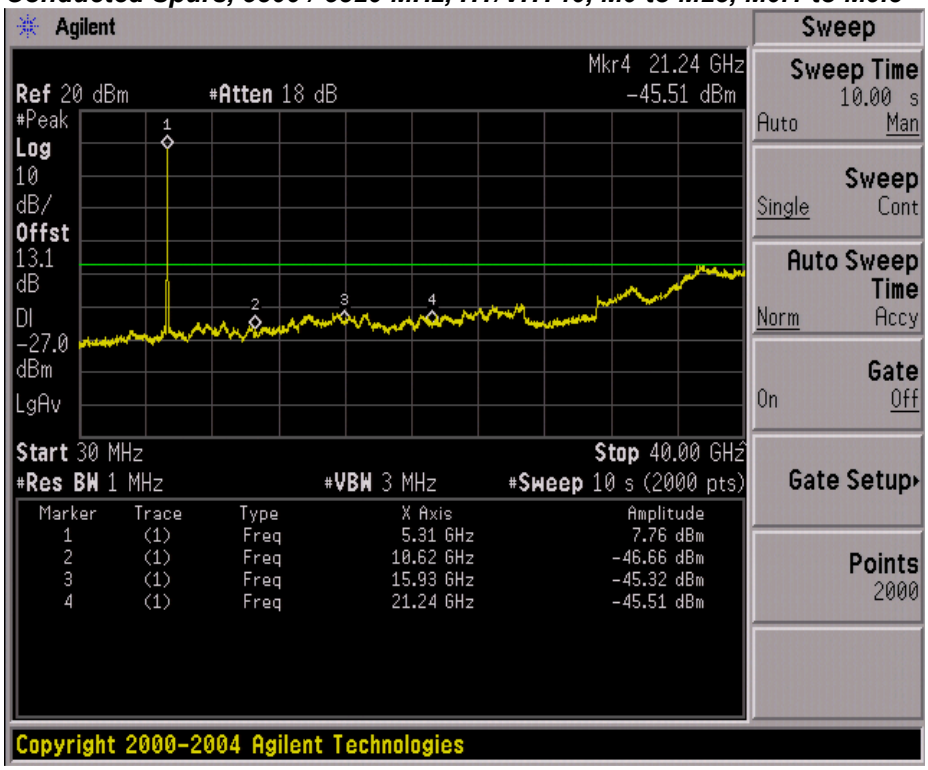
Conducted Spurs, 5260 / 5280 / 5300 / 5320 MHz, HT/VHT80, M0 to M23, M0.1 to M9.3



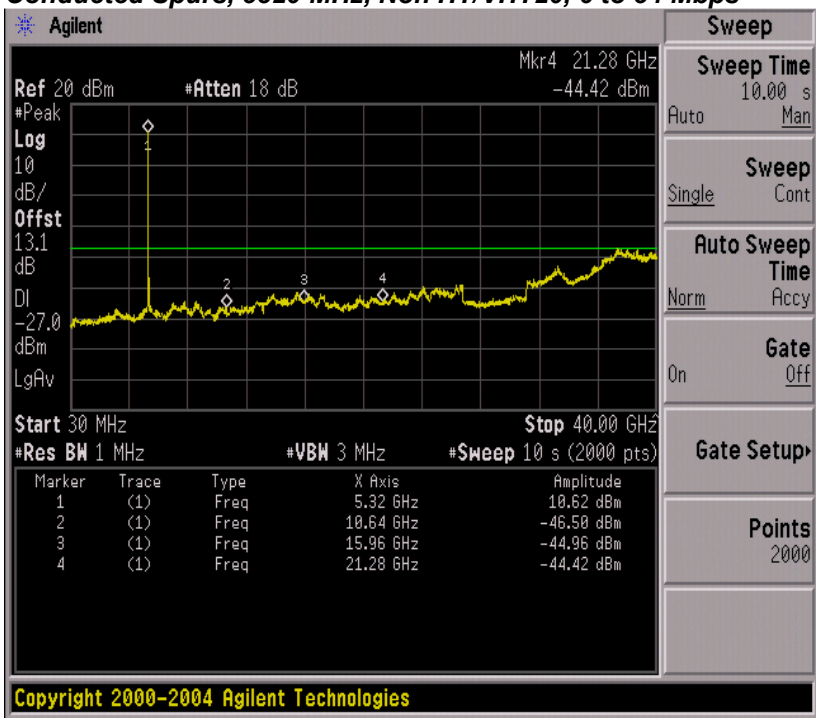
Conducted Spurs, 5300 / 5320 MHz, Non HT/VHT40, 6 to 54 Mbps



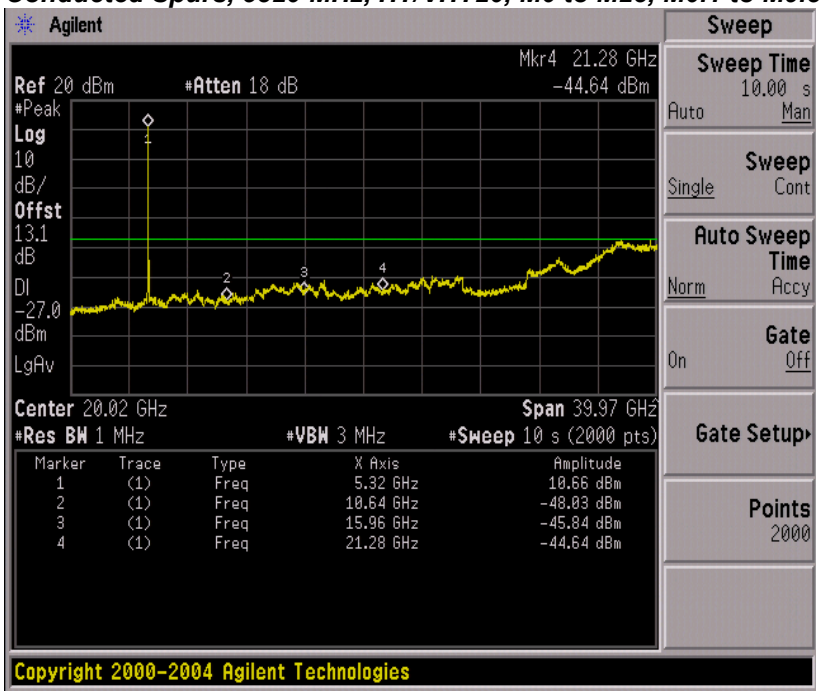
Conducted Spurs, 5300 / 5320 MHz, HT/VHT40, M0 to M23, M0.1 to M9.3



Conducted Spurs, 5320 MHz, Non HT/VHT20, 6 to 54 Mbps



Conducted Spurs, 5320 MHz, HT/VHT20, M0 to M23, M0.1 to M9.3



Conducted Bandedge

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)).

Use the procedures in 718828 D01 DTS Meas Guidance v01 to substitute conducted measurements in place of radiated measurements.
Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Be sure to enter all losses between the transmitter output and the spectrum analyzer.

Reference Level:	10 dBm
Attenuation:	4 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 100 Hz for average
Detector:	Peak

Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= -41.25 dBm eirp (54dBuV @3m)
2) Peak plot (Vertical and Horizontal), Limit = -21.25 dBm eirp (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.

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.

This report represents the worst case data for all supported operating modes and antennas.