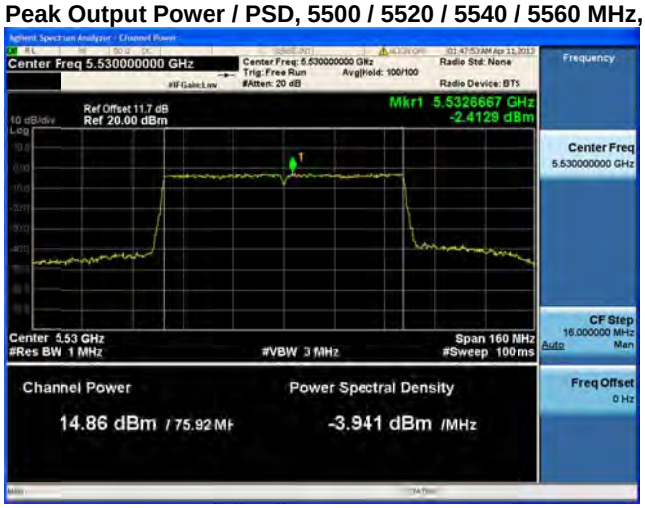
Peak Output Power / PSD, 5500 / 5520 / 5540 / 5560 MHz, HT/VHT80 STBC, M0 to M7, M0.1 to M9.1

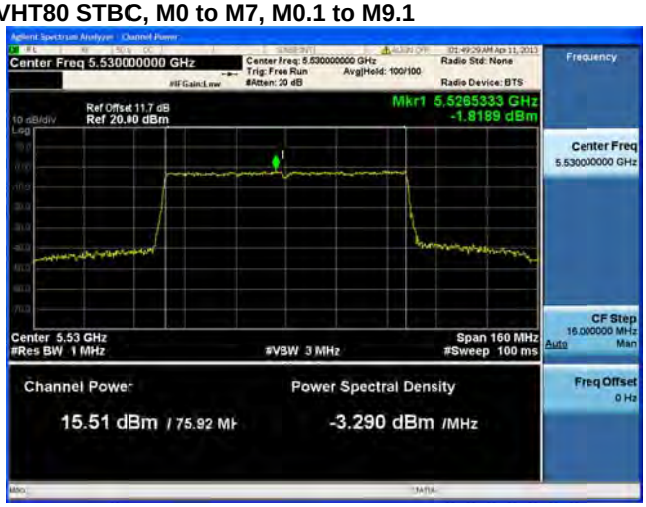
Antenna A

Antenna B

Peak Output Power / PSD, 5500 / 5520 / 5540 / 5560 MHz, HT/VHT80 STBC, M0 to M7, M0.1 to M9.1



Antenna A



Antenna B

Antenna C

Peak Output Power / PSD, 5500 / 5520 / 5540 / 5560 MHz, HT/VHT80 STBC, M0 to M7, M0.1 to M9.1

Antenna A

Antenna B

Antenna C

Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, Non HT/VHT40, 6 to 54 Mbps

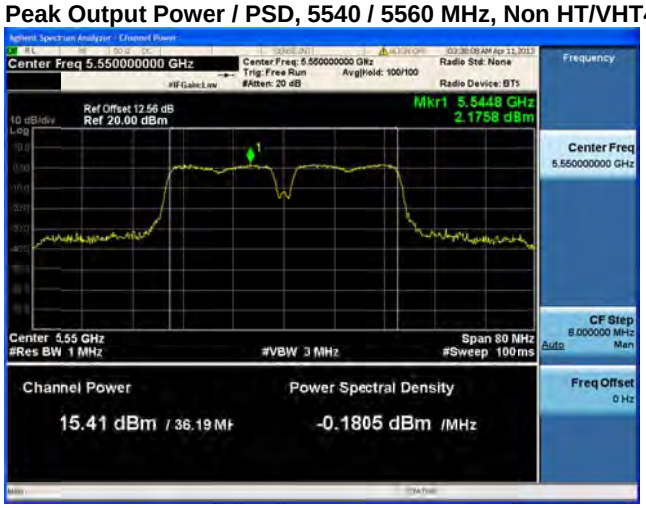
Antenna A

Peak Output Power / PSD, 5540 / 5560 MHz, Non HT/VHT40, 6 to 54 Mbps

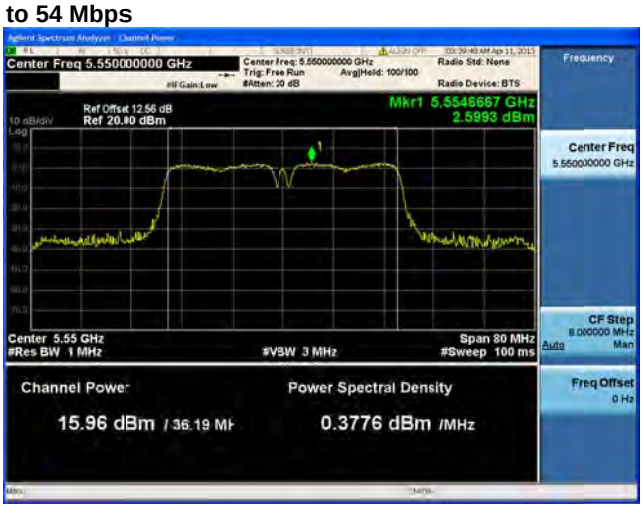
Antenna A

Antenna B

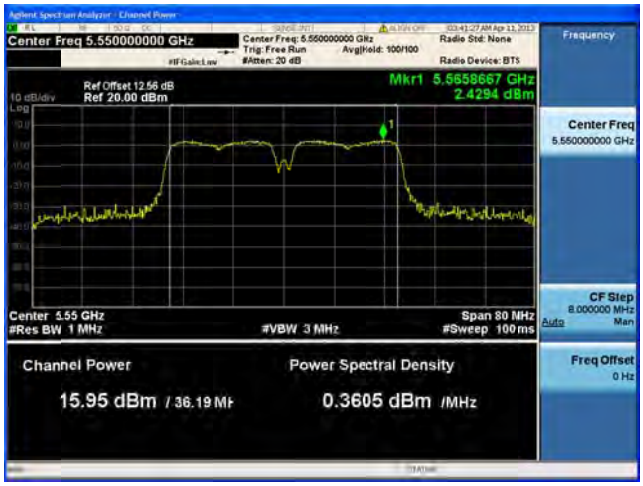
Peak Output Power / PSD, 5540 / 5560 MHz, Non HT/VHT40, 6 to 54 Mbps



Antenna A



Antenna B



Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, Non HT/VHT40, 6 to 54 Mbps

Antenna A

Antenna B

Antenna C

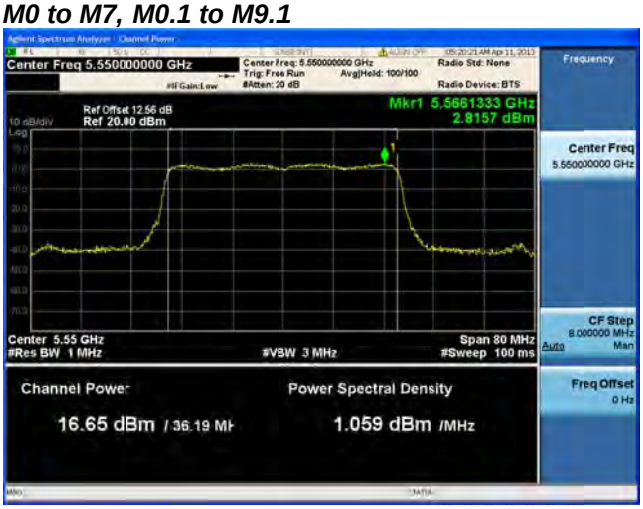
Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1

Antenna A

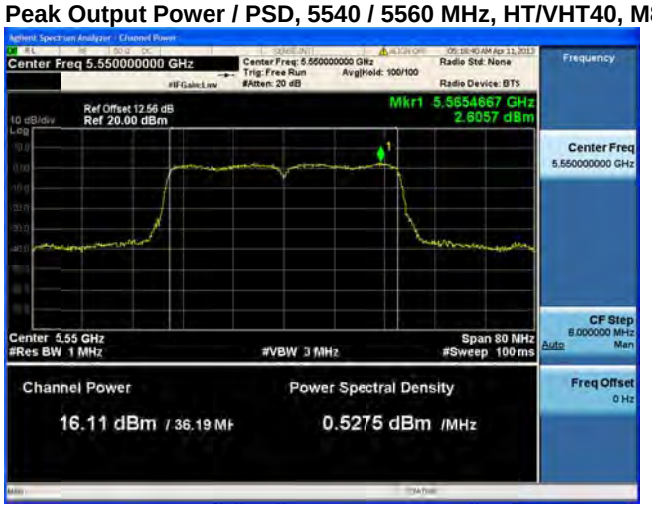
Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1

Antenna A



Antenna B

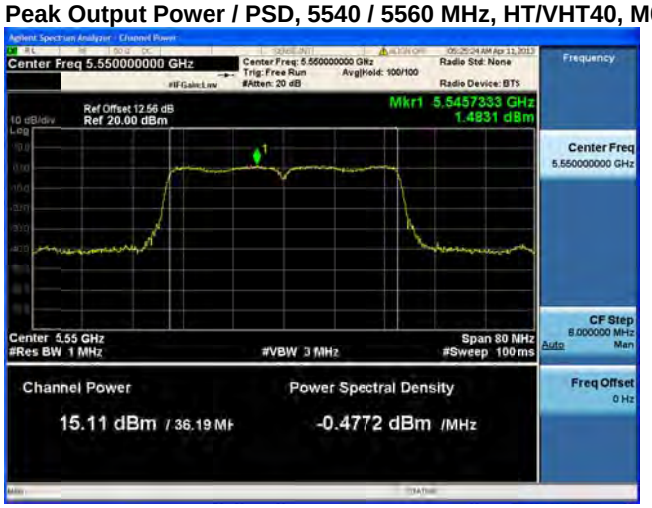
Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2



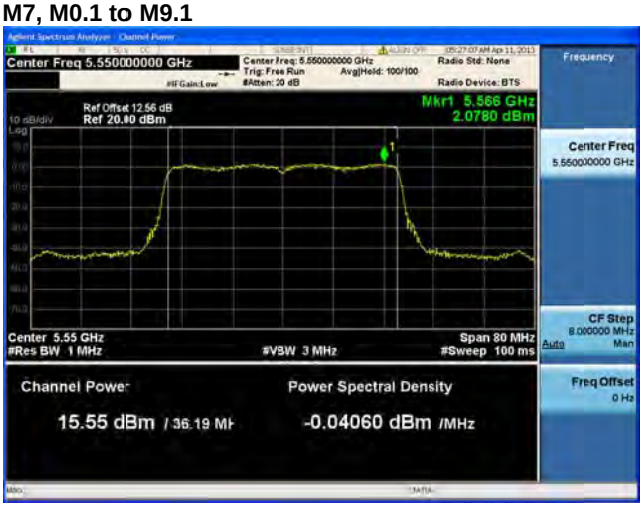
Antenna A

Antenna B

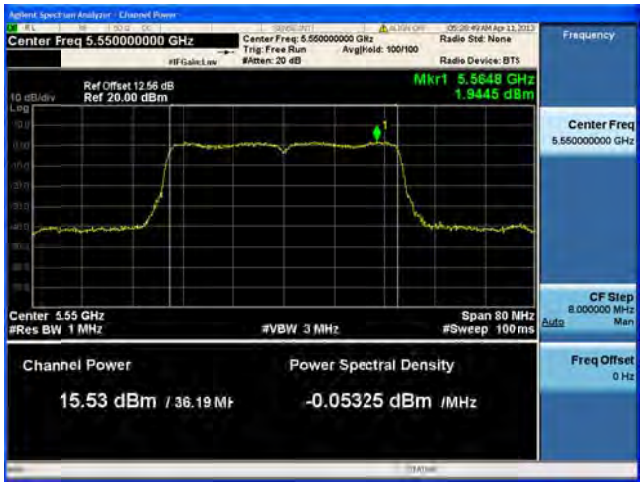
Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1



Antenna A



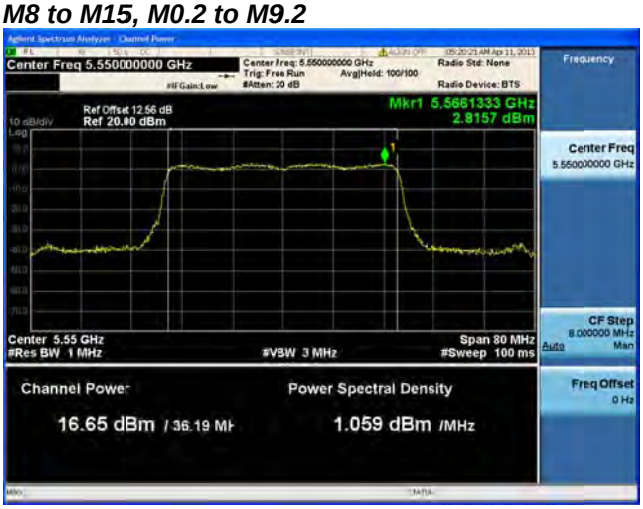
Antenna B



Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2

Antenna A

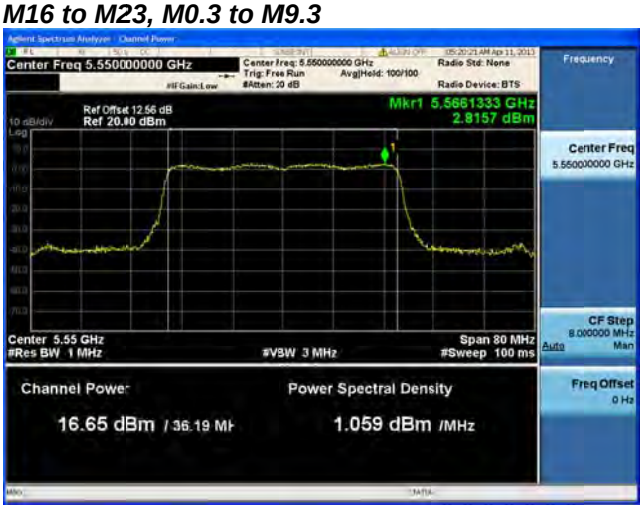


Antenna B

Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M16 to M23, M0.3 to M9.3

Antenna A

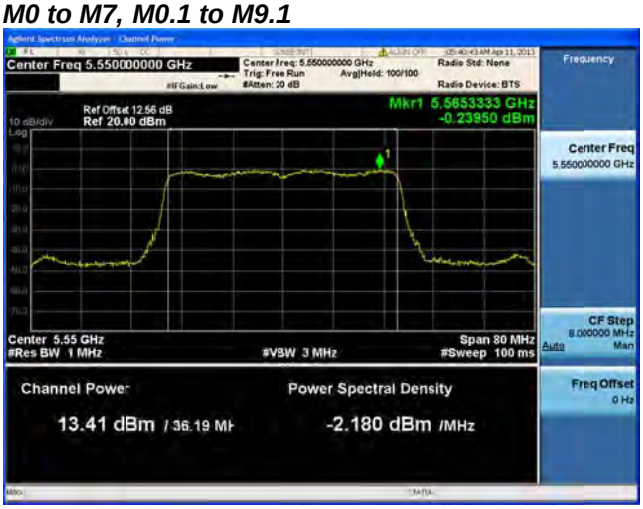


Antenna B

Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1

Antenna A



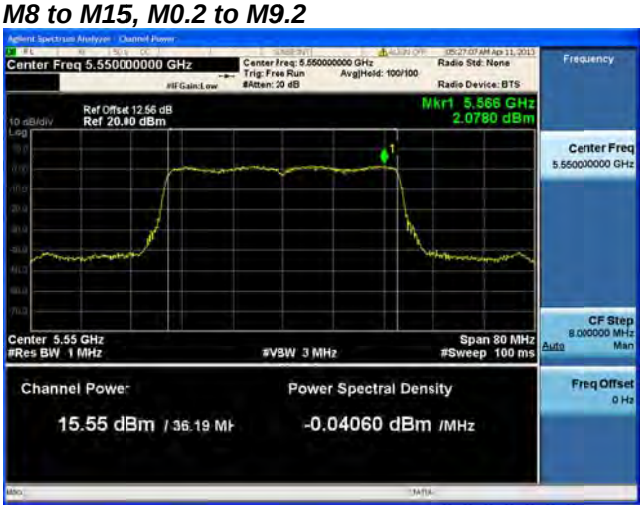
Antenna B

Antenna C

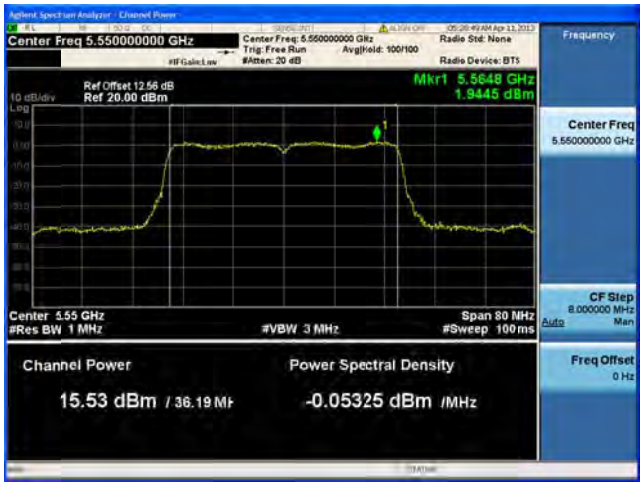
Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2

Antenna A



Antenna B

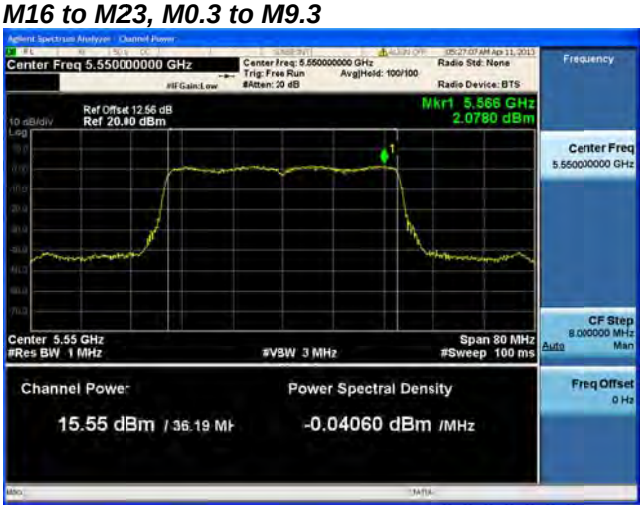


Antenna C

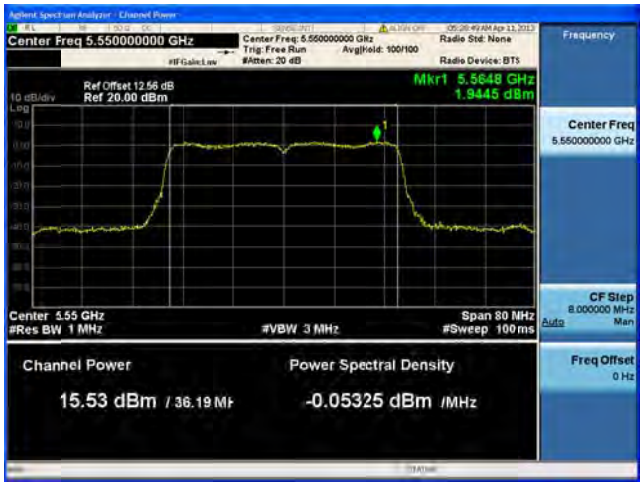
Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40, M16 to M23, M0.3 to M9.3

Antenna A



Antenna B



Antenna C

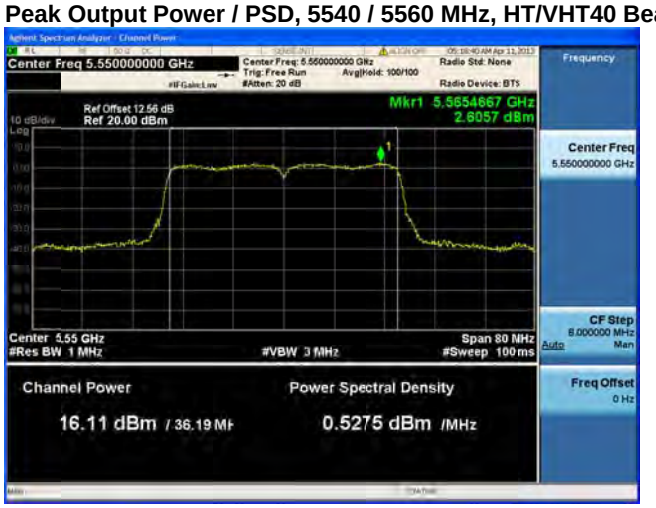
Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M0 to M7, M0.1 to M9.1

Antenna A

Antenna B

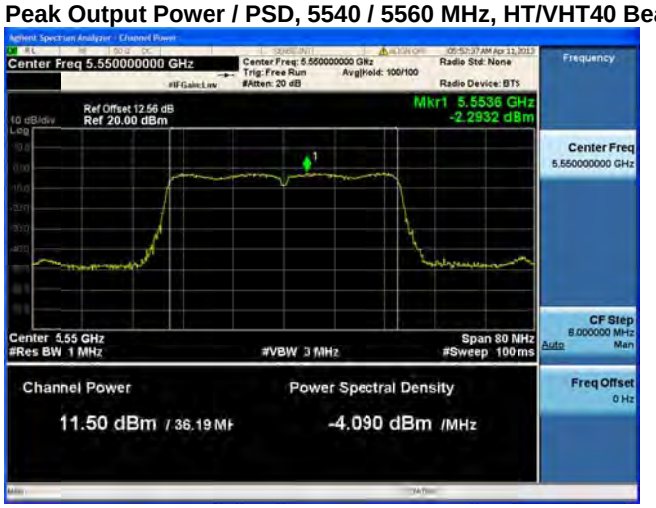
Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M8 to M15, M0.2 to M9.2



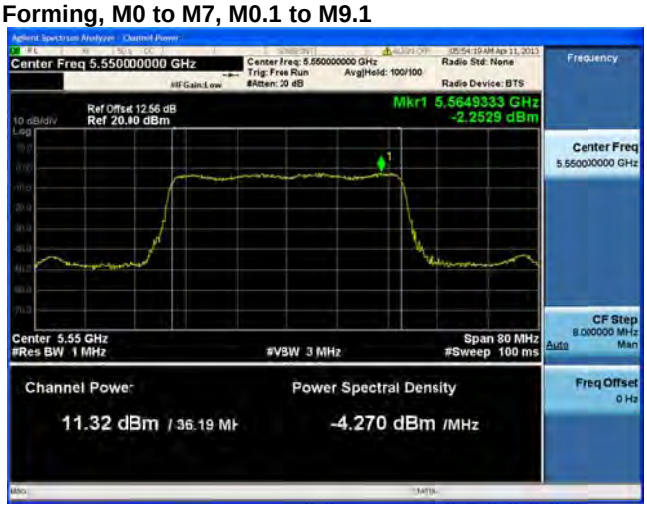
Antenna A

Antenna B

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M0 to M7, M0.1 to M9.1



Antenna A



Antenna B

Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M8 to M15, M0.2 to M9.2

Antenna A

Antenna B

Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3

Antenna A

Antenna B

Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M0 to M7, M0.1 to M9.1

Antenna A

Antenna B

Antenna C

Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M8 to M15, M0.2 to M9.2

Antenna A

Antenna B

Antenna C

Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3

Antenna A

Antenna B

Antenna C

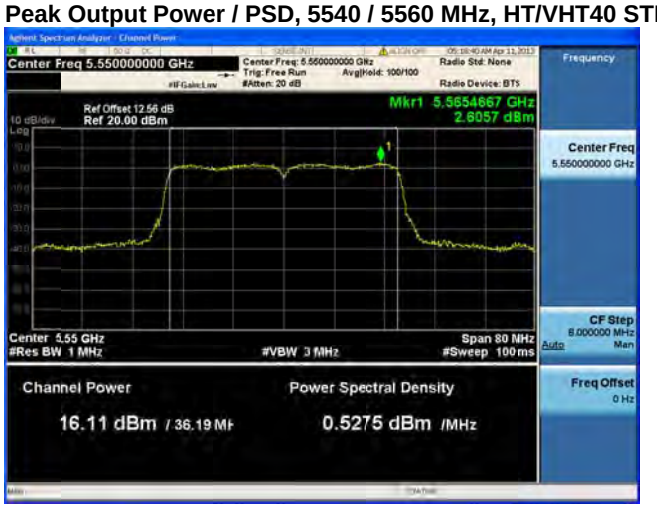
Antenna D

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 STBC, M0 to M7, M0.1 to M9.1

Antenna A

Antenna B

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 STBC, M0 to M7, M0.1 to M9.1



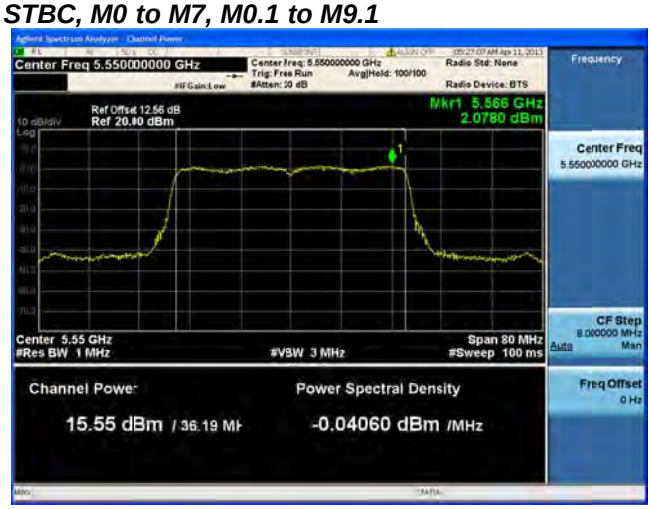
Antenna A

Antenna B

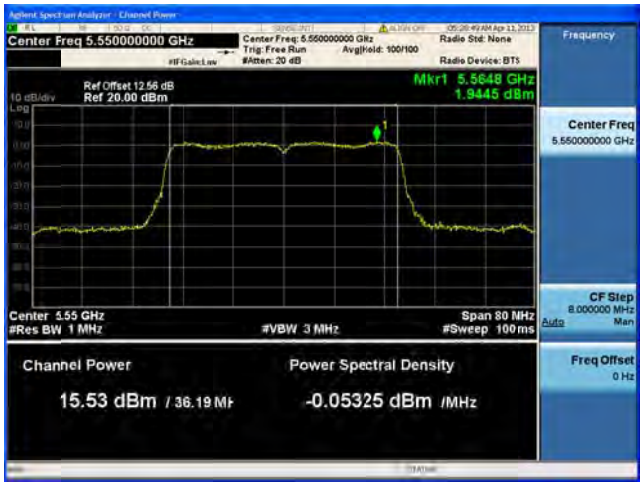
Antenna C

Peak Output Power / PSD, 5540 / 5560 MHz, HT/VHT40 STBC, M0 to M7, M0.1 to M9.1

Antenna A



Antenna B



Antenna C

Antenna D

Peak Output Power / PSD, 5560 MHz, Non HT/VHT20, 6 to 54 Mbps

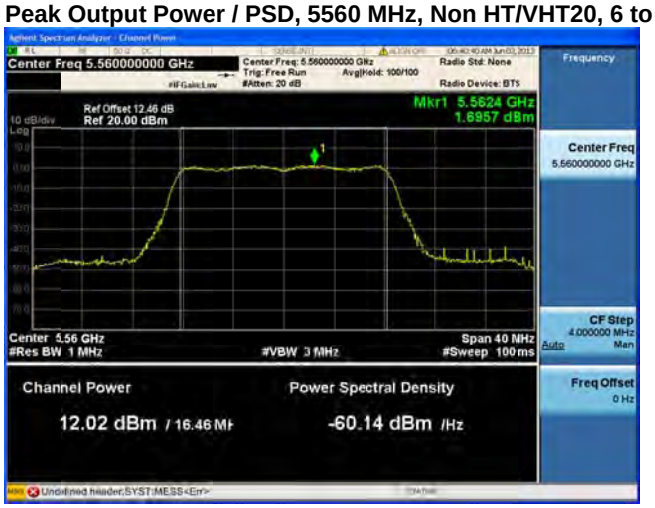
Antenna A

Peak Output Power / PSD, 5560 MHz, Non HT/VHT20, 6 to 54 Mbps

Antenna A

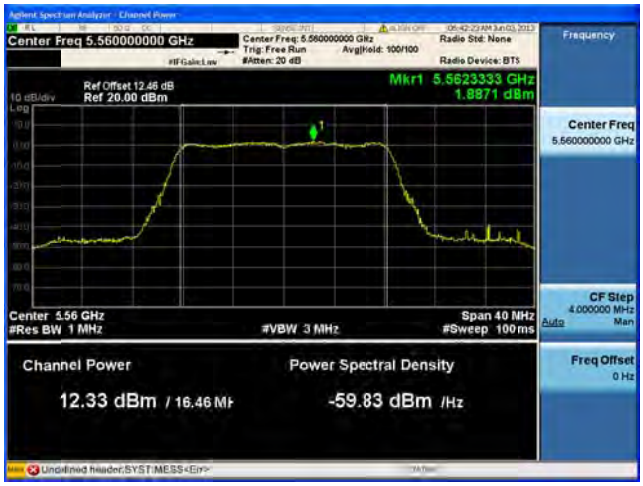
Antenna B

Peak Output Power / PSD, 5560 MHz, Non HT/VHT20, 6 to 54 Mbps



Antenna A

Antenna B

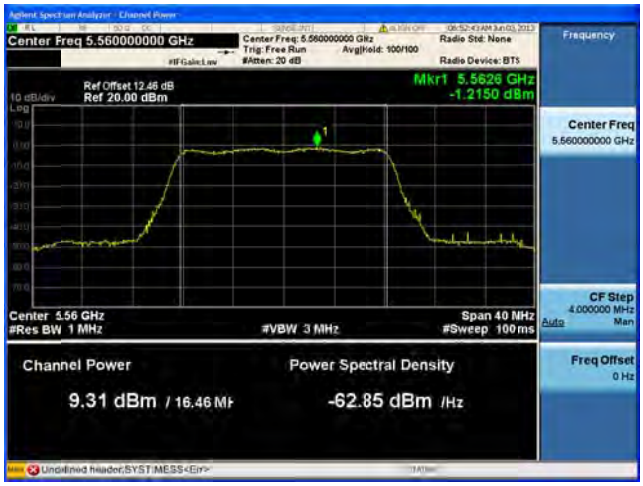


Antenna C

Peak Output Power / PSD, 5560 MHz, Non HT/VHT20, 6 to 54 Mbps

Antenna A

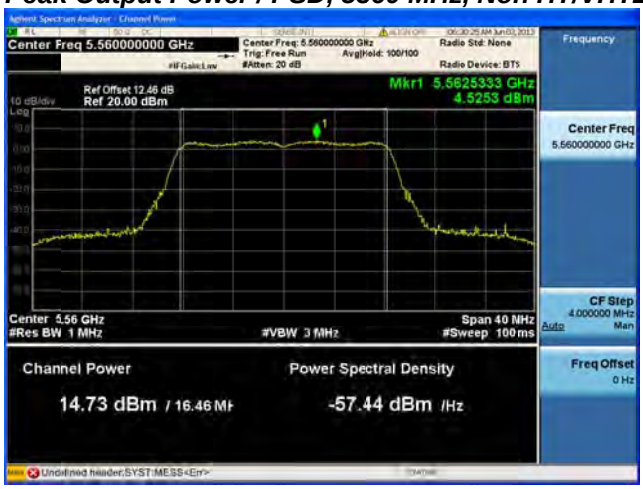
Antenna B



Antenna C

Antenna D

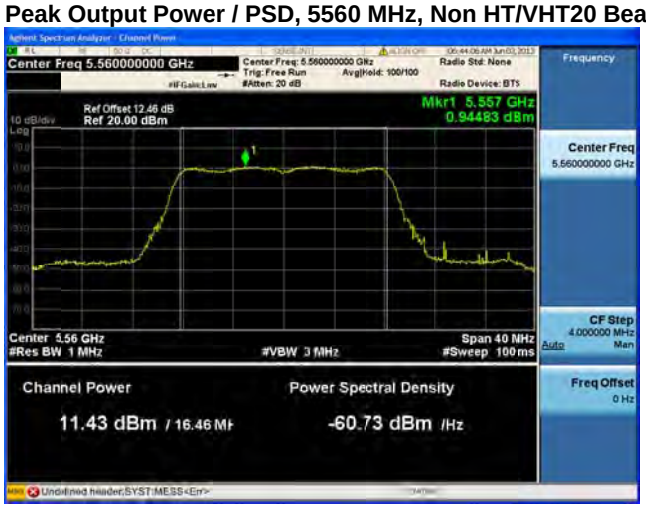
Peak Output Power / PSD, 5560 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps



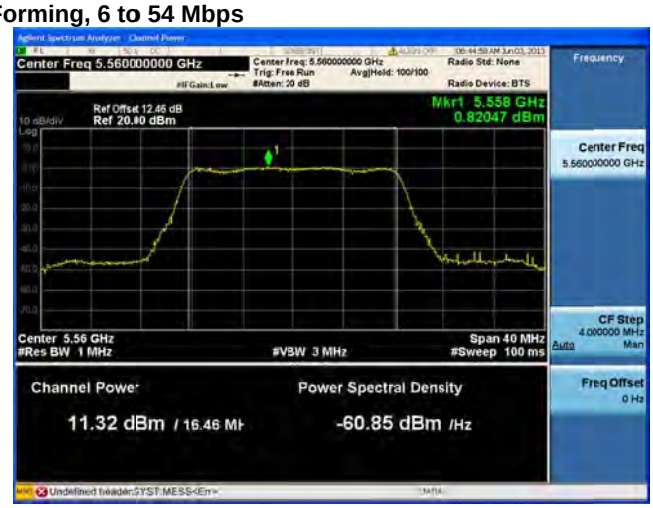
Antenna A

Antenna B

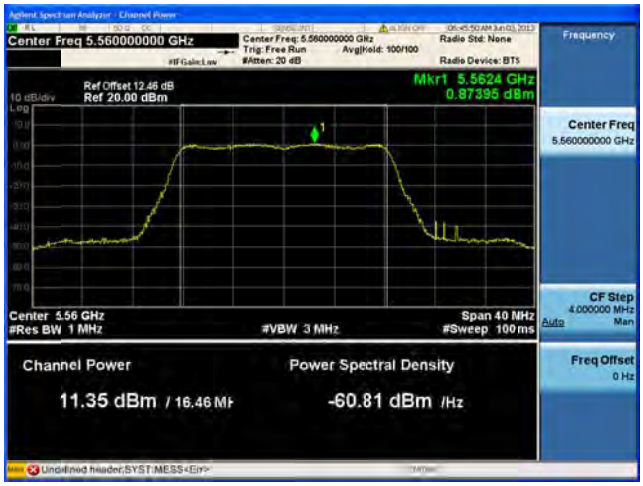
Peak Output Power / PSD, 5560 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps



Antenna A



Antenna B

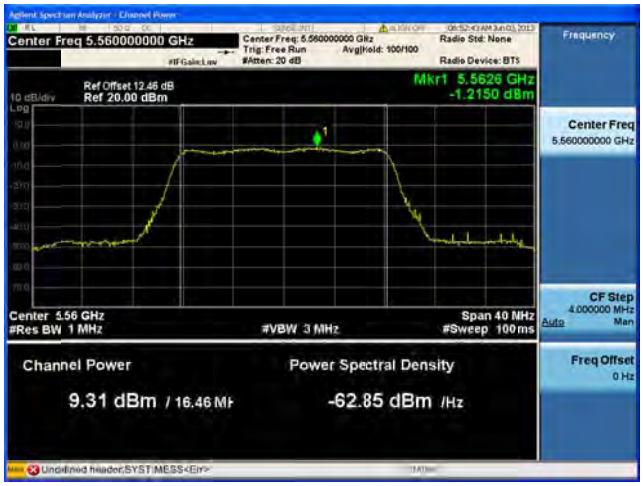


Antenna C

Peak Output Power / PSD, 5560 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps

Antenna A

Antenna B



Antenna C

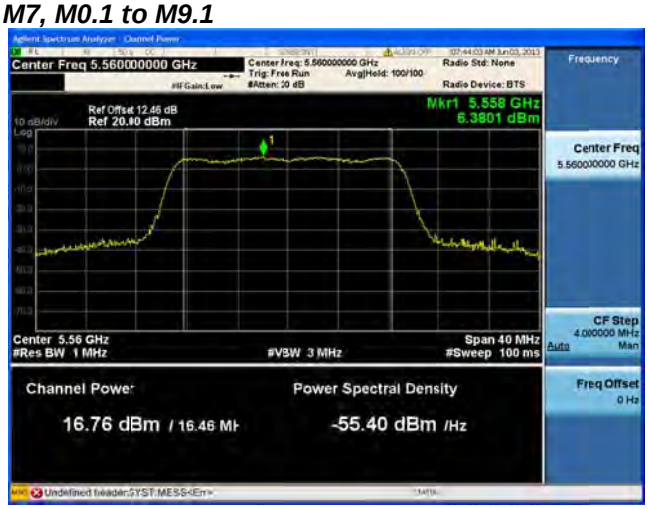
Antenna D

Peak Output Power / PSD, 5560 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1

Antenna A

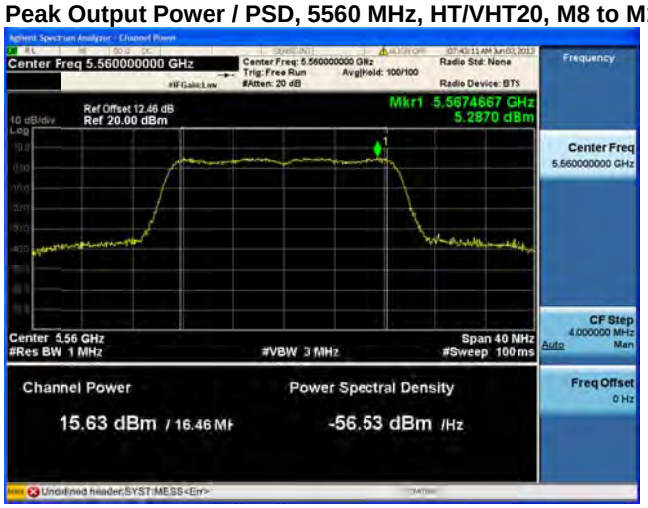
Peak Output Power / PSD, 5560 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1

Antenna A

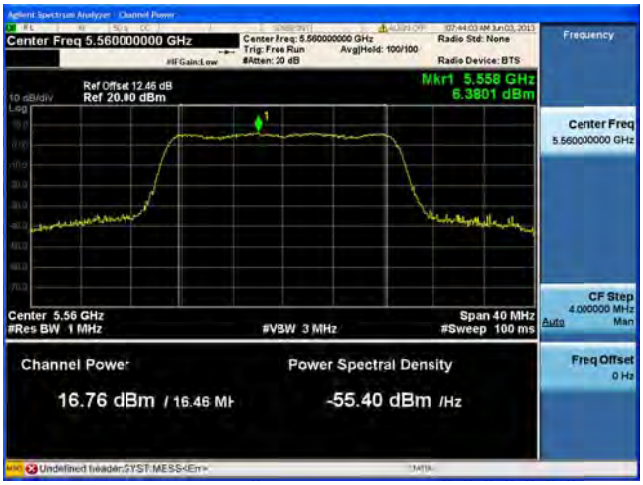


Antenna B

Peak Output Power / PSD, 5560 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2

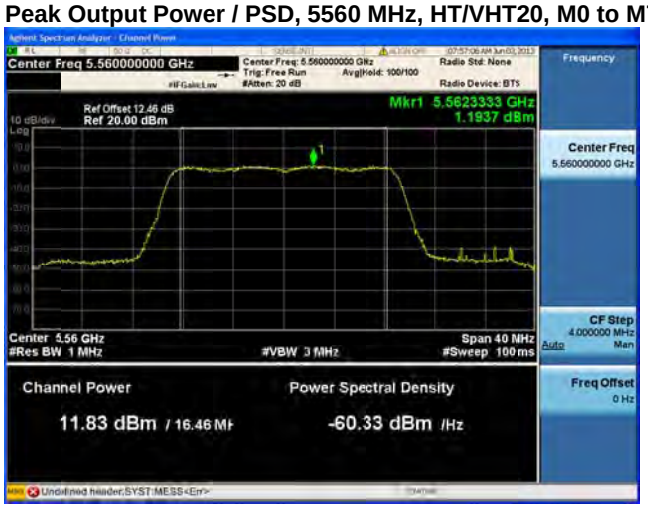


Antenna A



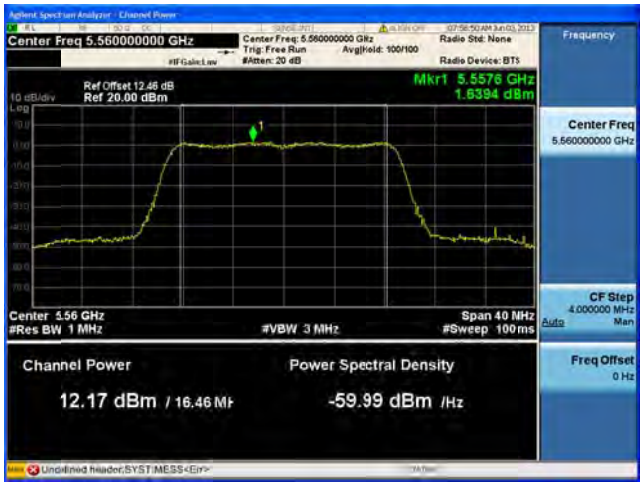
Antenna B

Peak Output Power / PSD, 5560 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1



Antenna A

Antenna B



Antenna C

Peak Output Power / PSD, 5560 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2

Antenna A

Antenna B

Antenna C

Peak Output Power / PSD, 5560 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3

Antenna A

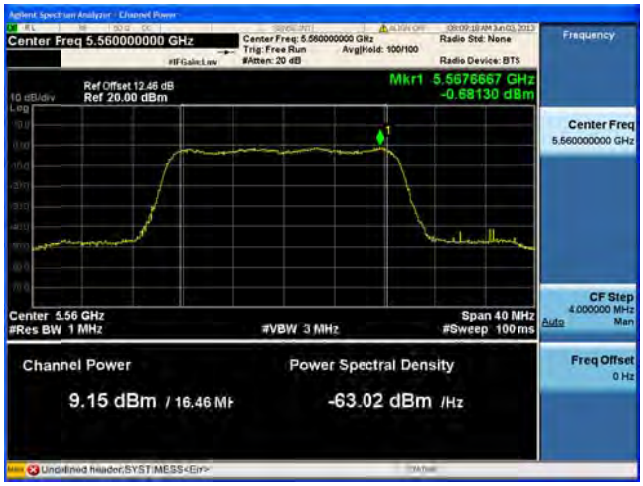
Antenna B

Antenna C

Peak Output Power / PSD, 5560 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1

Antenna A

Antenna B



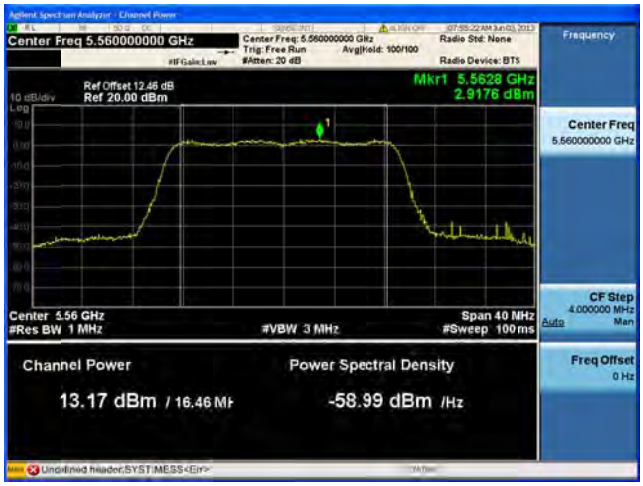
Antenna C

Antenna D

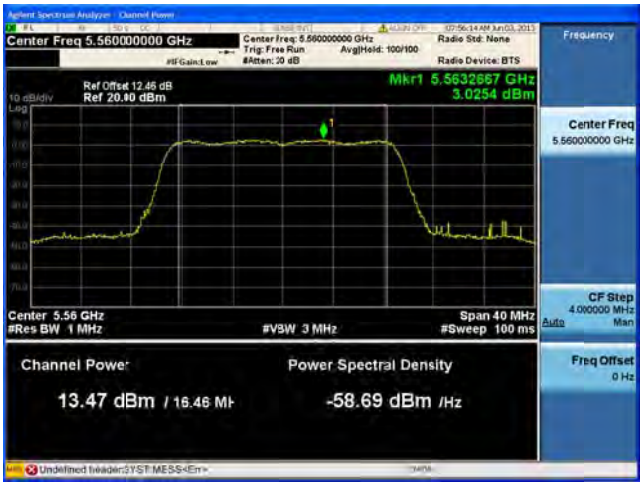
Peak Output Power / PSD, 5560 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2

Antenna A

Antenna B



Antenna C

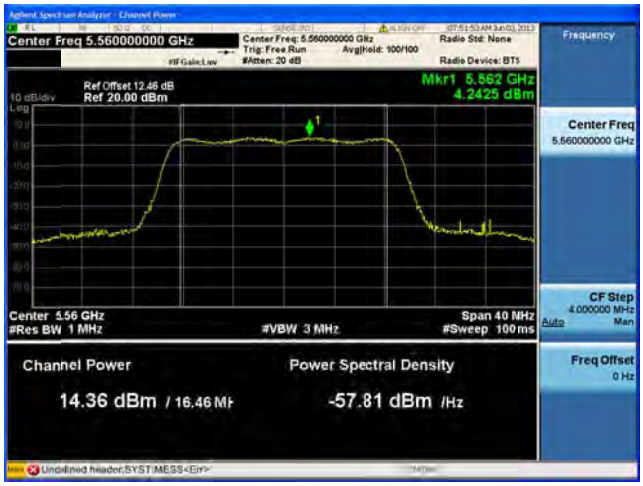


Antenna D

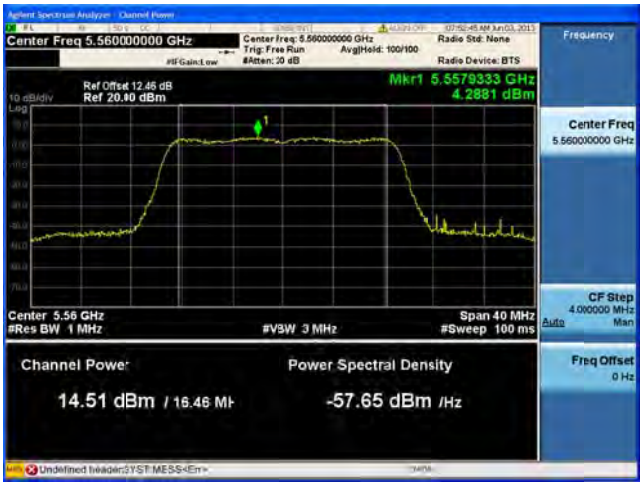
Peak Output Power / PSD, 5560 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3

Antenna A

Antenna B



Antenna C



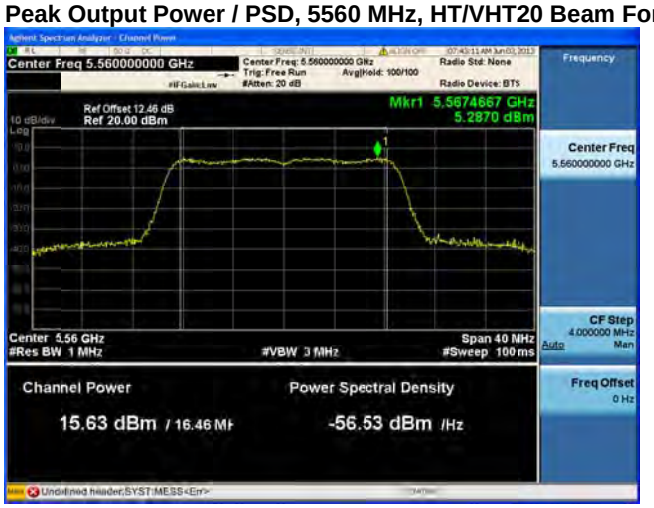
Antenna D

Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1

Antenna A

Antenna B

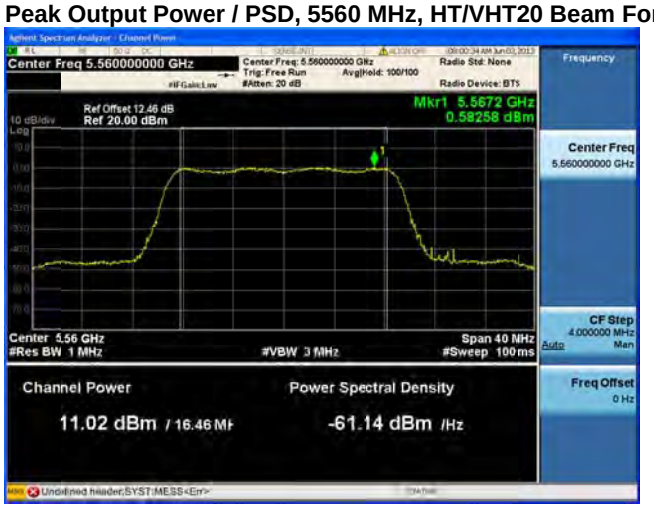
Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2



Antenna A

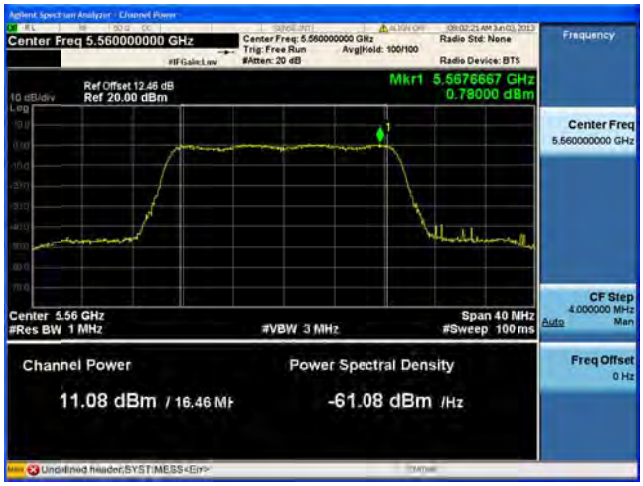
Antenna B

Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1



Antenna A

Antenna B

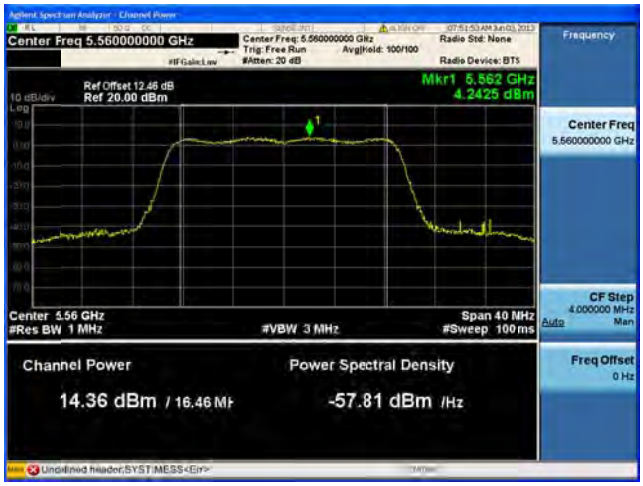


Antenna C

Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2

Antenna A

Antenna B



Antenna C

Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3

Antenna A

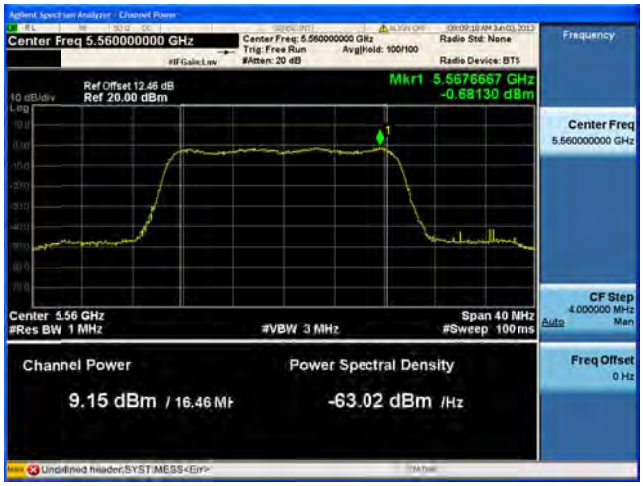
Antenna B

Antenna C

Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1

Antenna A

Antenna B



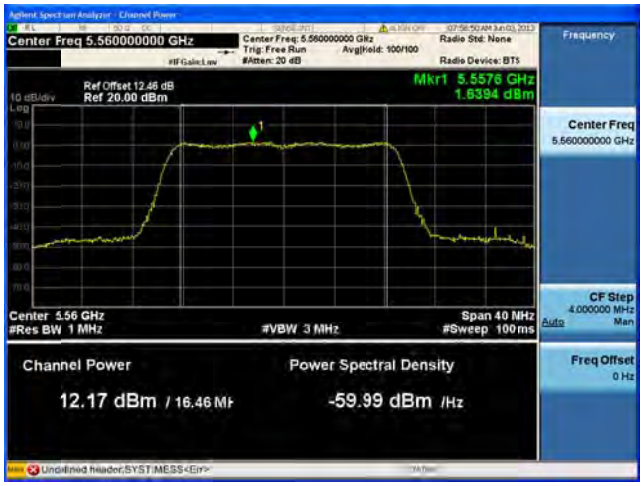
Antenna C

Antenna D

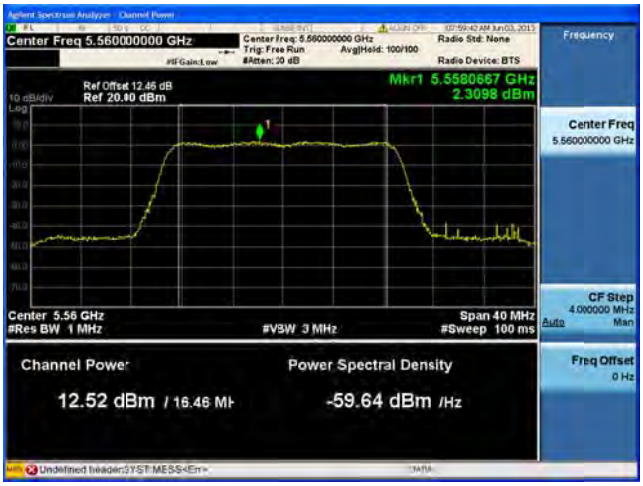
Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2

Antenna A

Antenna B



Antenna C

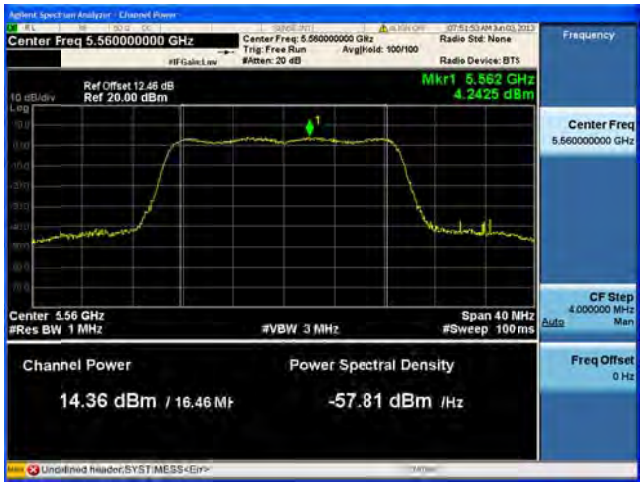


Antenna D

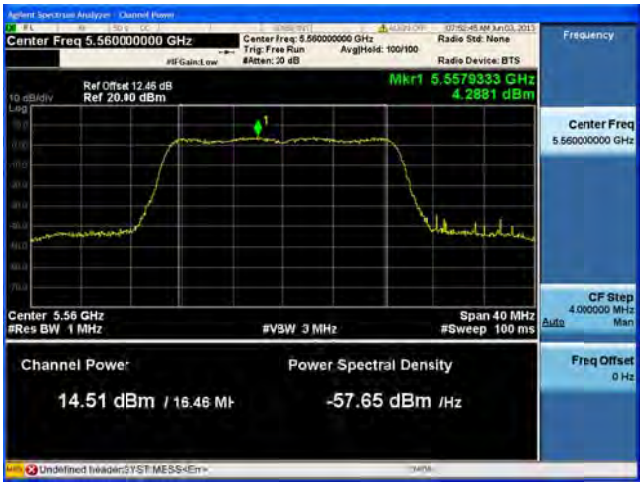
Peak Output Power / PSD, 5560 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3

Antenna A

Antenna B



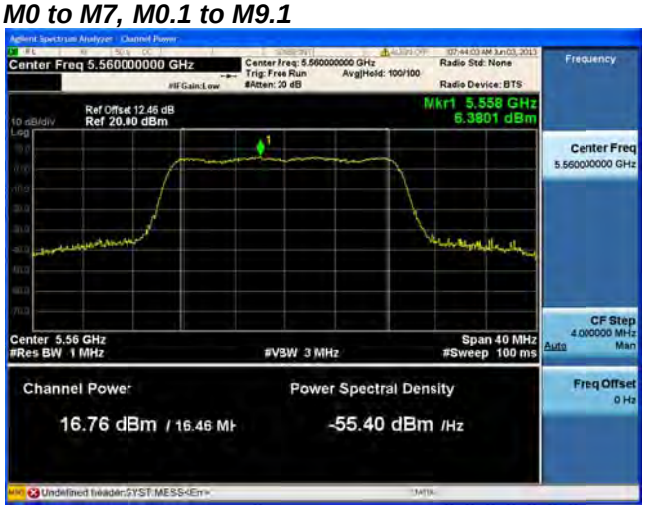
Antenna C



Antenna D

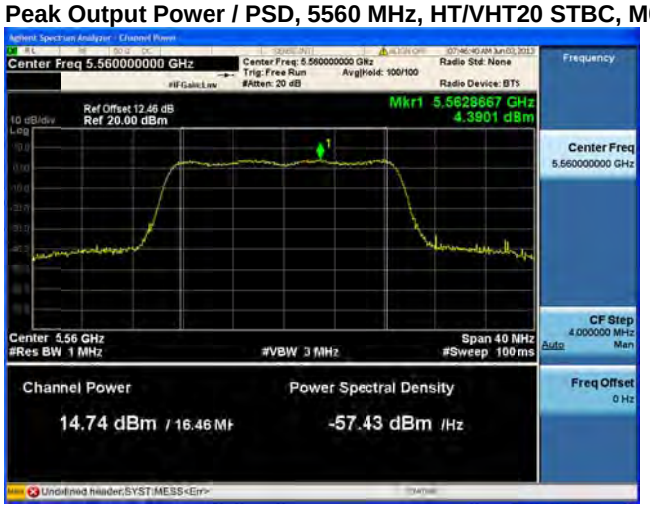
Peak Output Power / PSD, 5560 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1

Antenna A

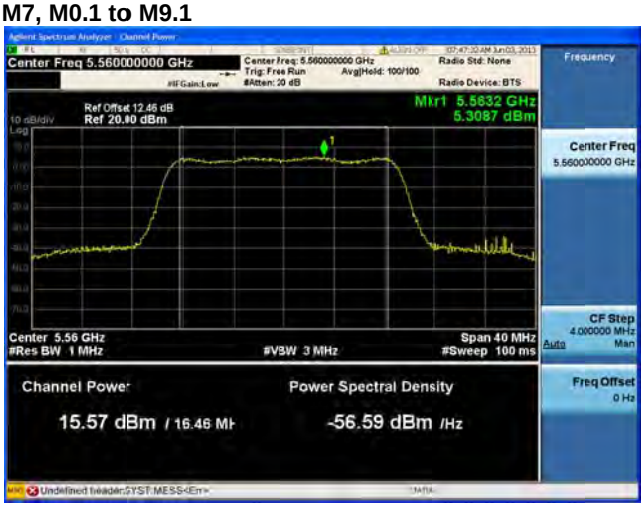


Antenna B

Peak Output Power / PSD, 5560 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1



Antenna A

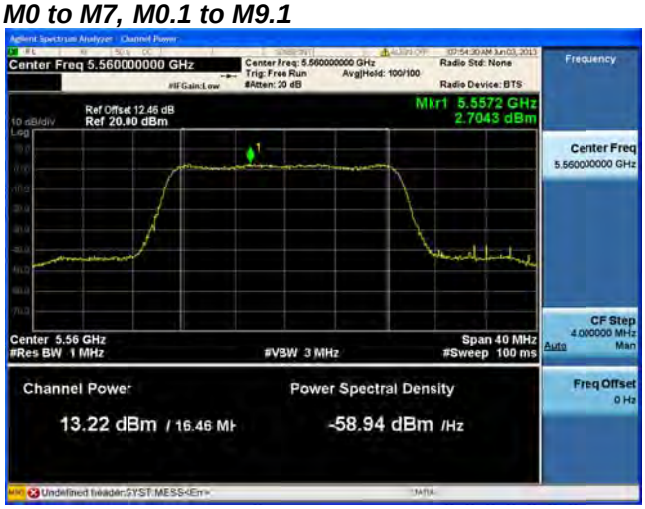


Antenna B

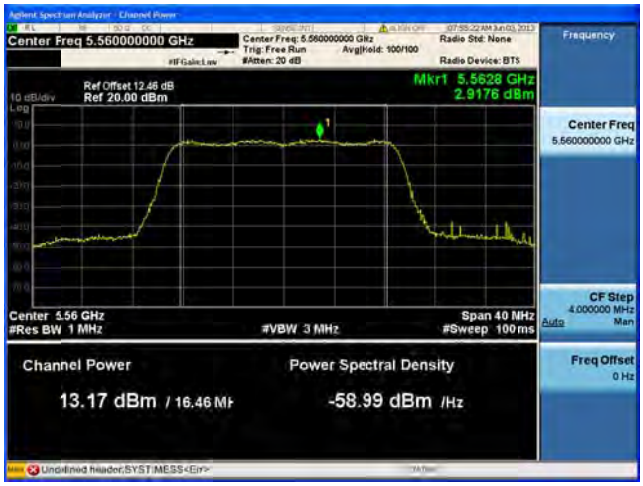
Antenna C

Peak Output Power / PSD, 5560 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1

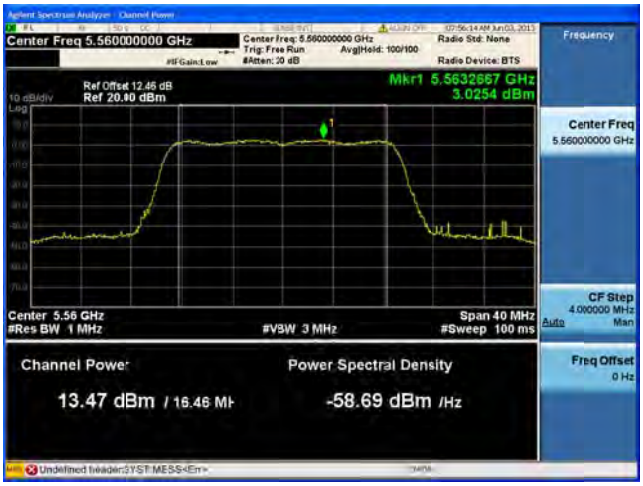
Antenna A



Antenna B



Antenna C



Antenna D

Peak Output Power / PSD, 5700 MHz, Non HT/VHT20, 6 to 54 Mbps

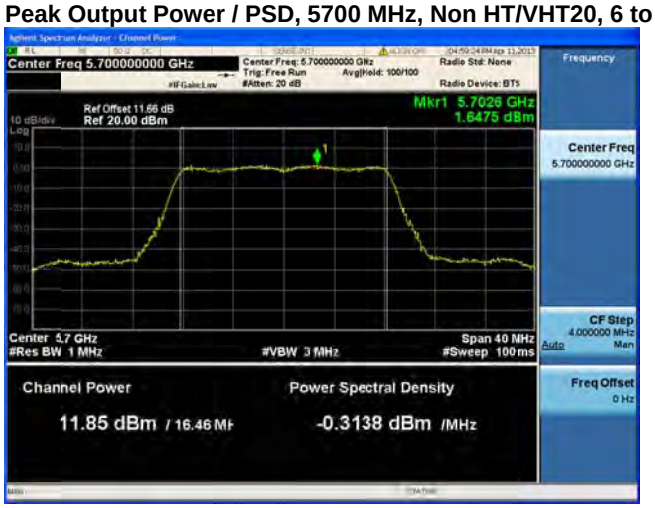
Antenna A

Peak Output Power / PSD, 5700 MHz, Non HT/VHT20, 6 to 54 Mbps

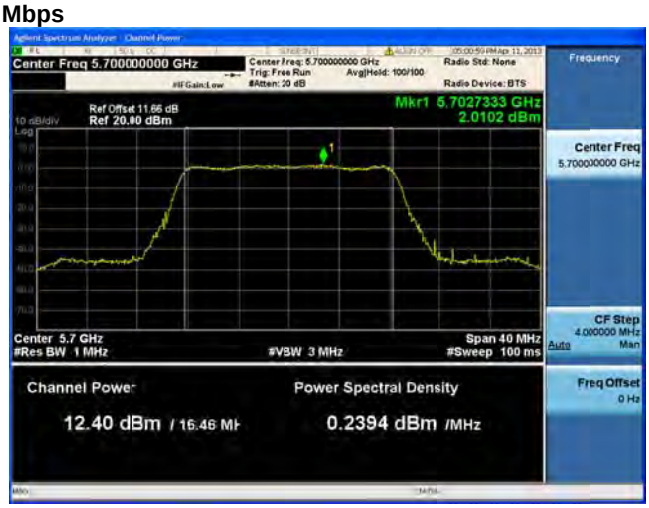
Antenna A

Antenna B

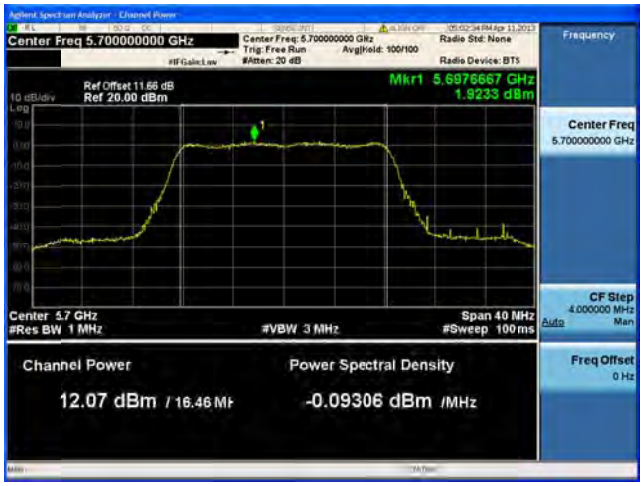
Peak Output Power / PSD, 5700 MHz, Non HT/VHT20, 6 to 54 Mbps



Antenna A



Antenna B

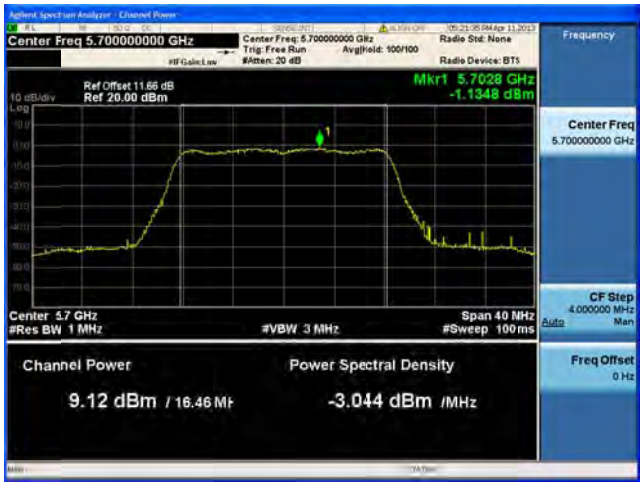


Antenna C

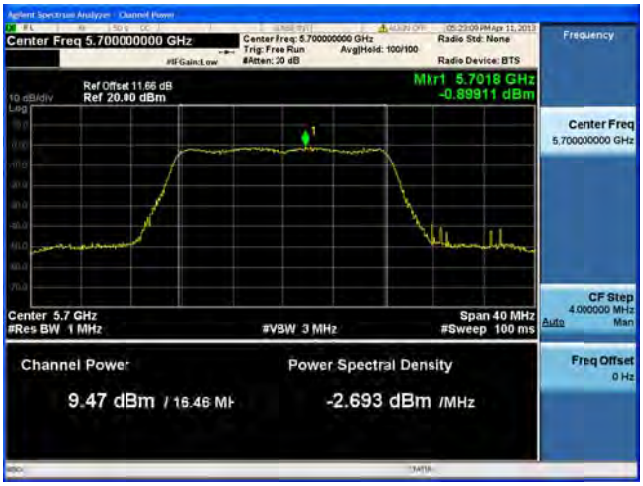
Peak Output Power / PSD, 5700 MHz, Non HT/VHT20, 6 to 54 Mbps

Antenna A

Antenna B



Antenna C



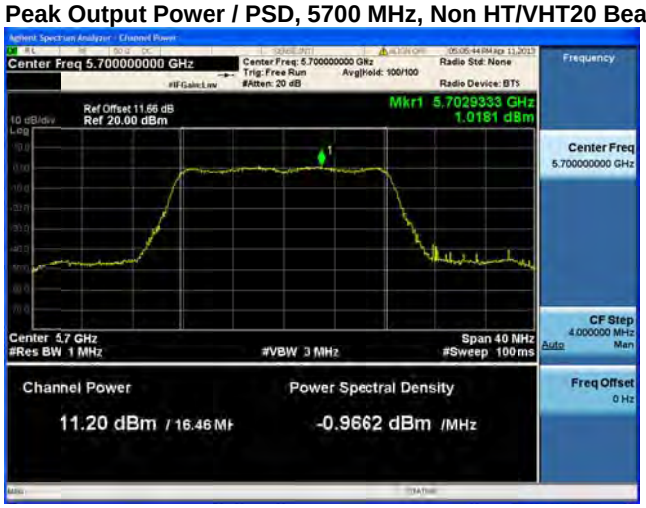
Antenna D

Peak Output Power / PSD, 5700 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps

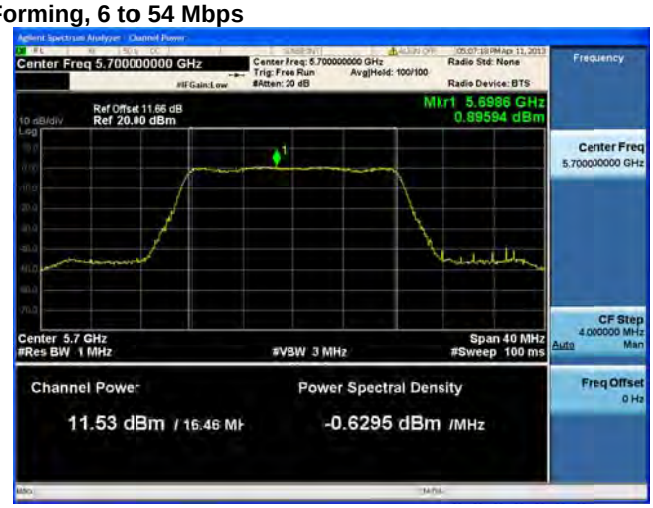
Antenna A

Antenna B

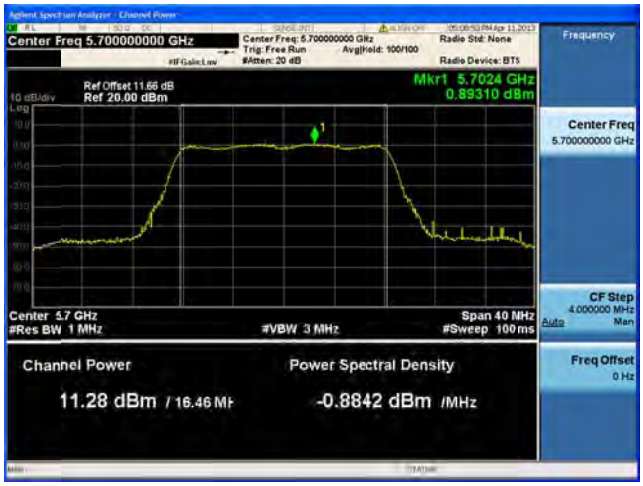
Peak Output Power / PSD, 5700 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps



Antenna A



Antenna B

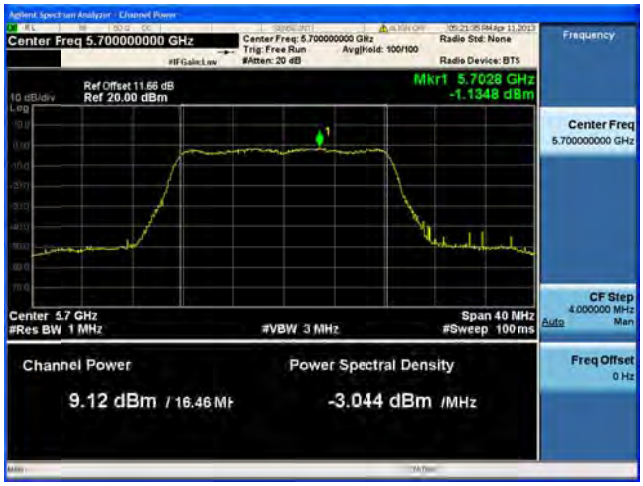


Antenna C

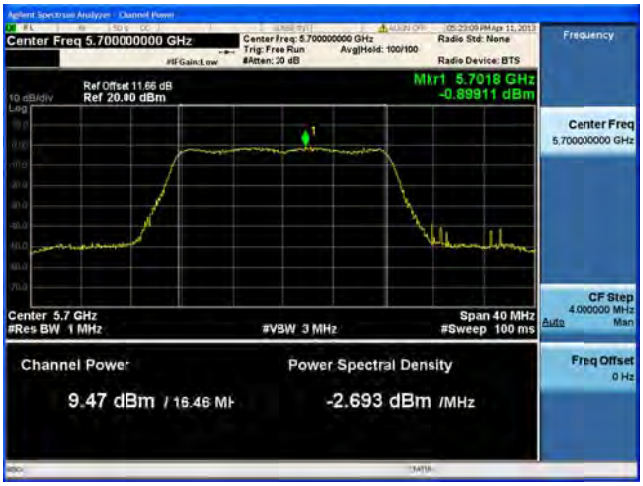
Peak Output Power / PSD, 5700 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps

Antenna A

Antenna B



Antenna C



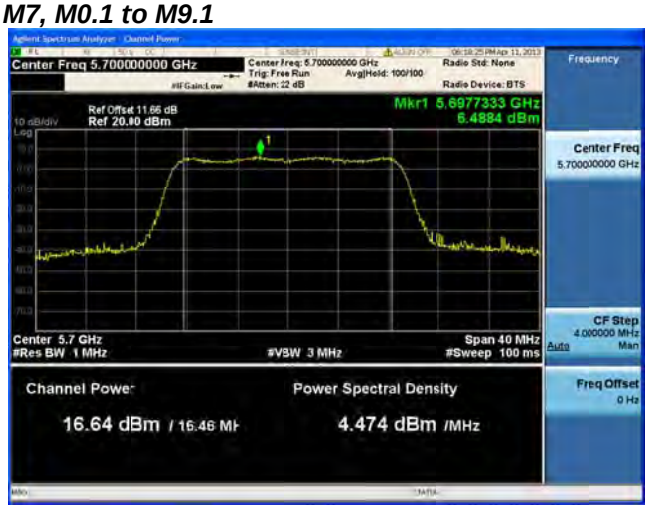
Antenna D

Peak Output Power / PSD, 5700 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1

Antenna A

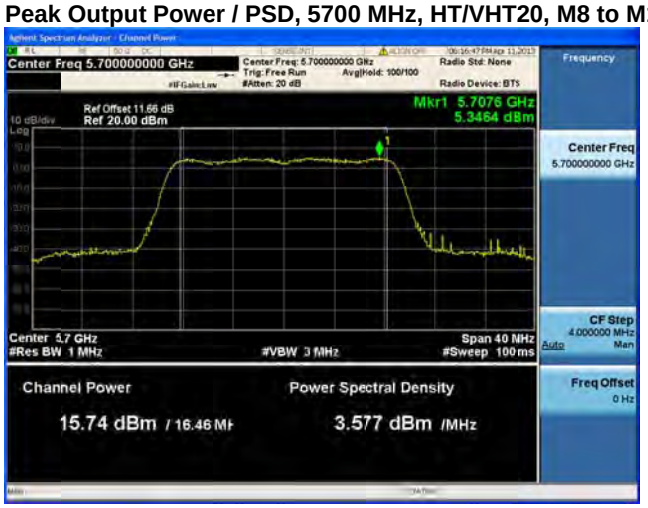
Peak Output Power / PSD, 5700 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1

Antenna A

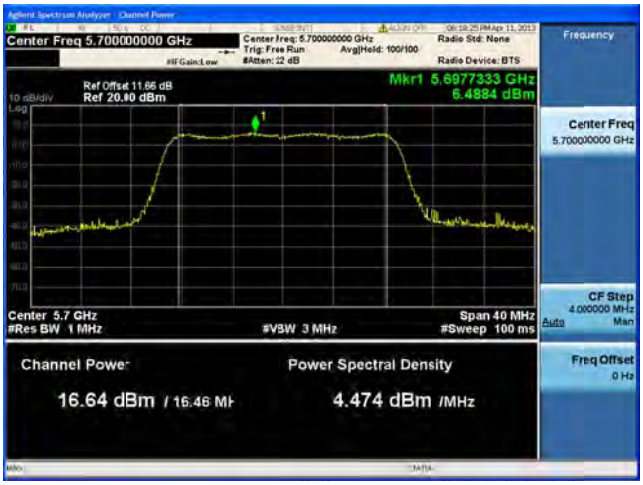


Antenna B

Peak Output Power / PSD, 5700 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2

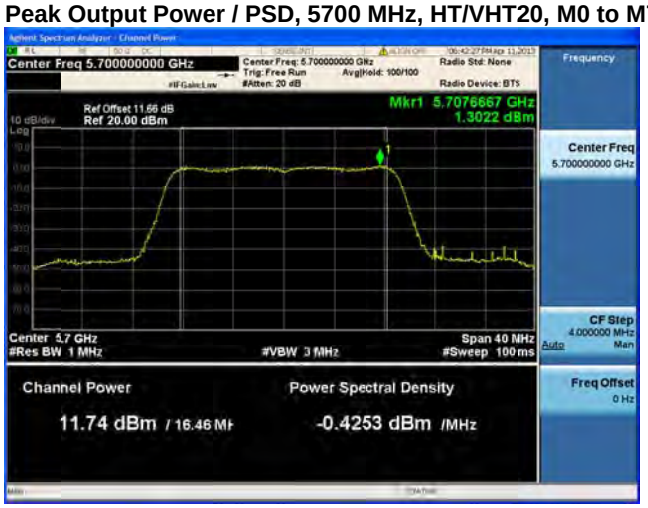


Antenna A

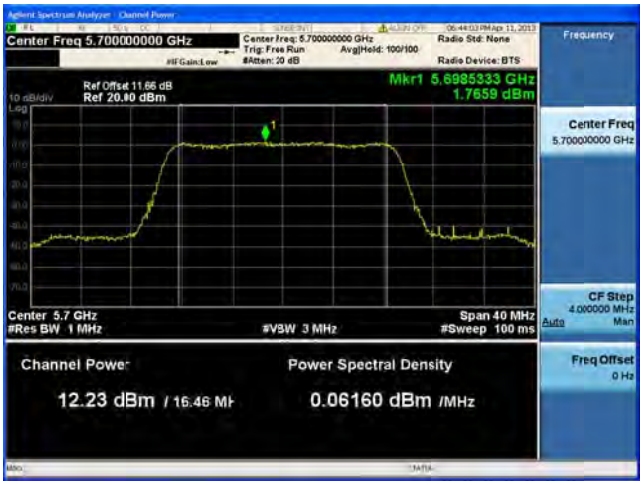


Antenna B

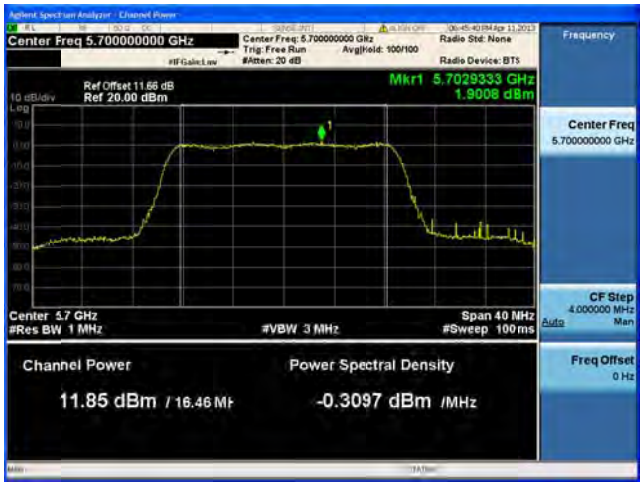
Peak Output Power / PSD, 5700 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1



Antenna A



Antenna B



Antenna C

Peak Output Power / PSD, 5700 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2

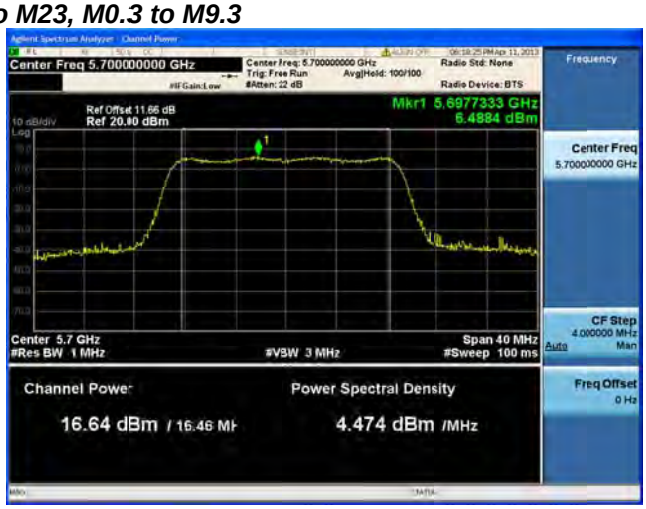
Antenna A

Antenna B

Antenna C

Peak Output Power / PSD, 5700 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3

Antenna A

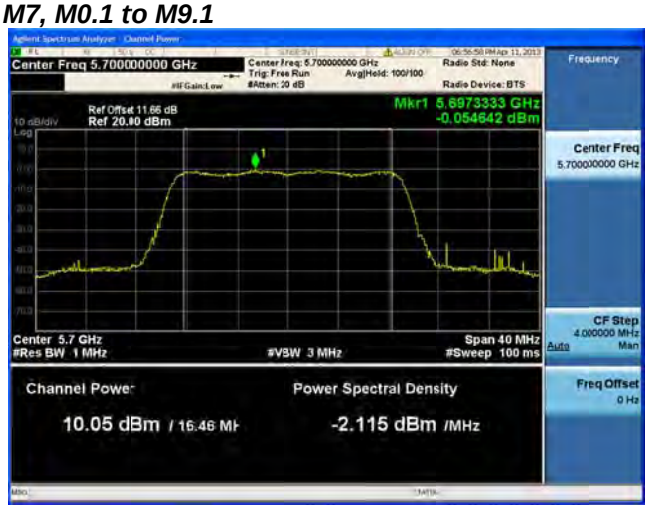


Antenna B

Antenna C

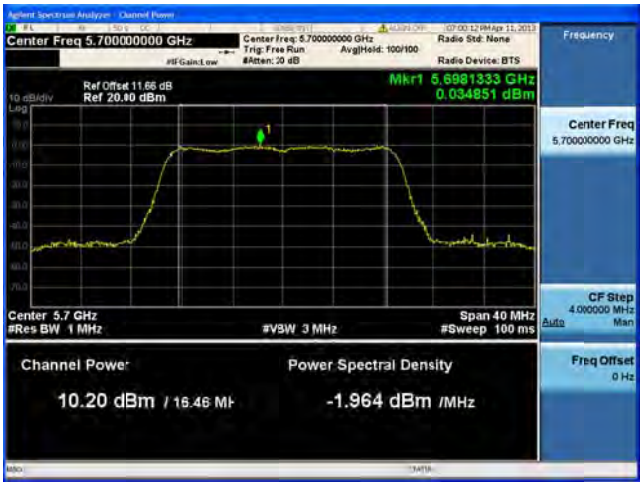
Peak Output Power / PSD, 5700 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1

Antenna A



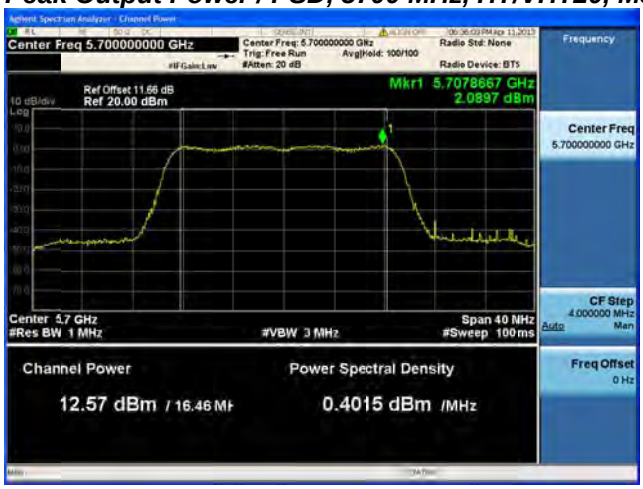
Antenna B

Antenna C



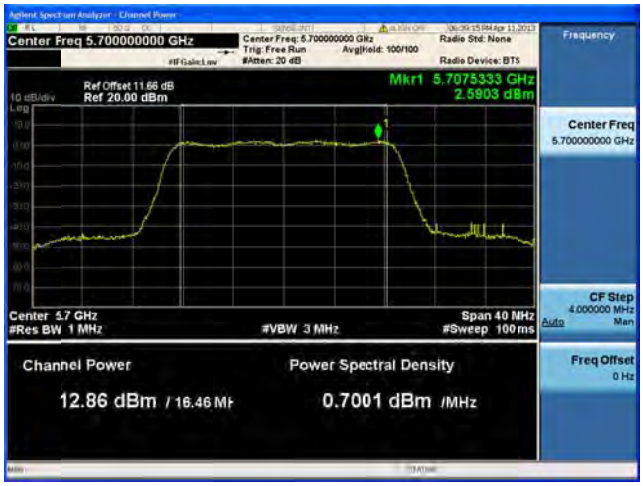
Antenna D

Peak Output Power / PSD, 5700 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2

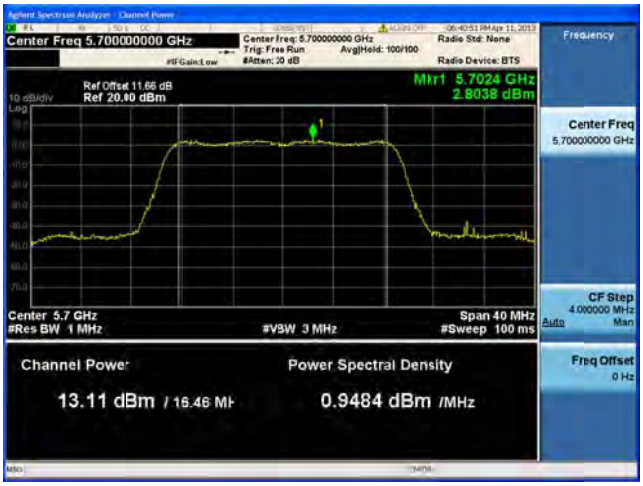


Antenna A

Antenna B



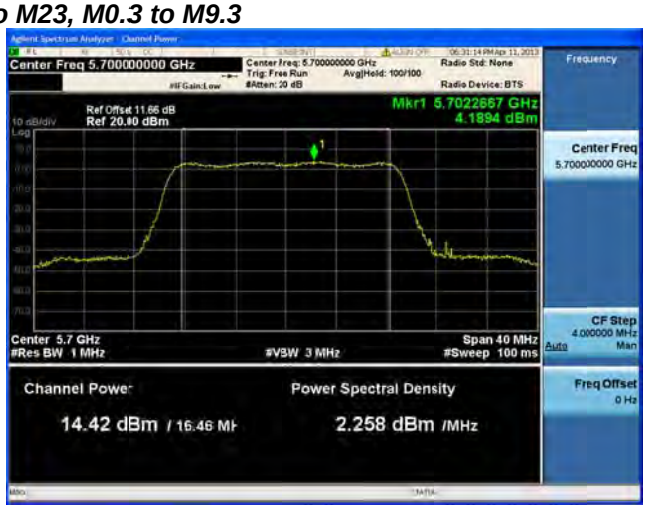
Antenna C



Antenna D

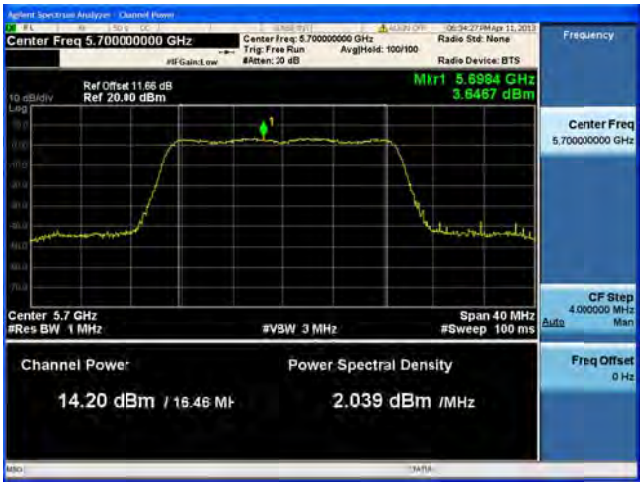
Peak Output Power / PSD, 5700 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3

Antenna A



Antenna B

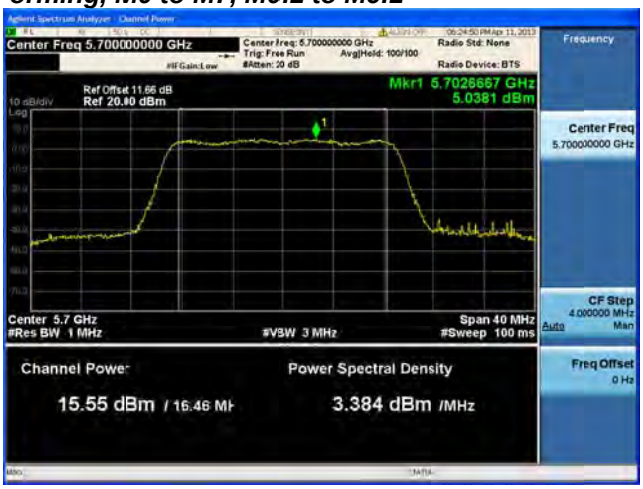
Antenna C



Antenna D

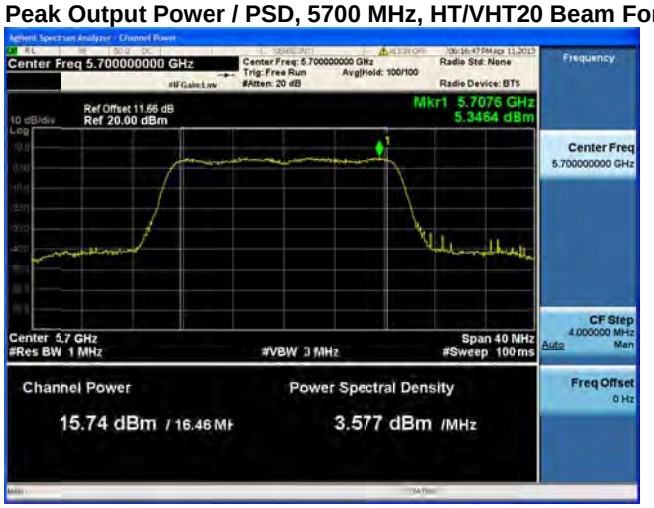
Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1

Antenna A



Antenna B

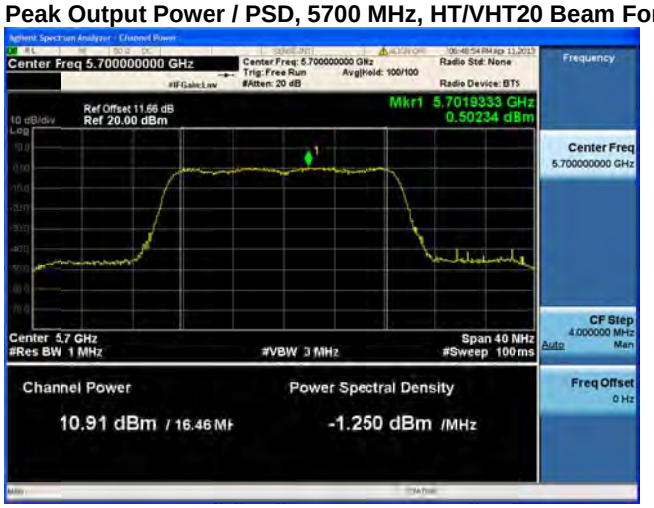
Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2



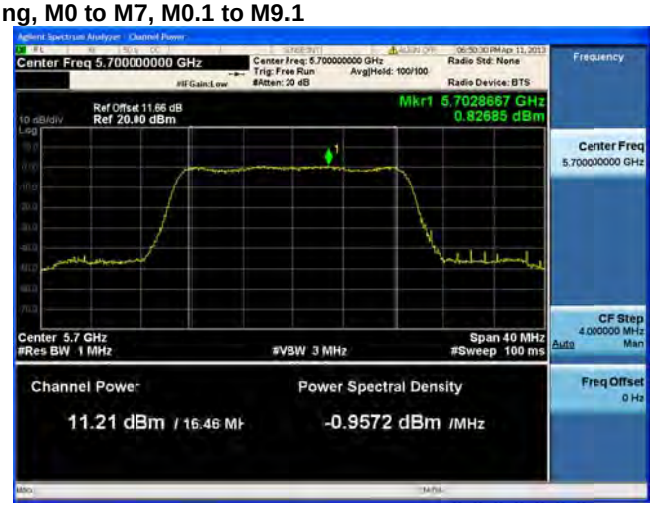
Antenna A

Antenna B

Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1



Antenna A



Antenna B

Antenna C

Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2

Antenna A

Antenna B

Antenna C

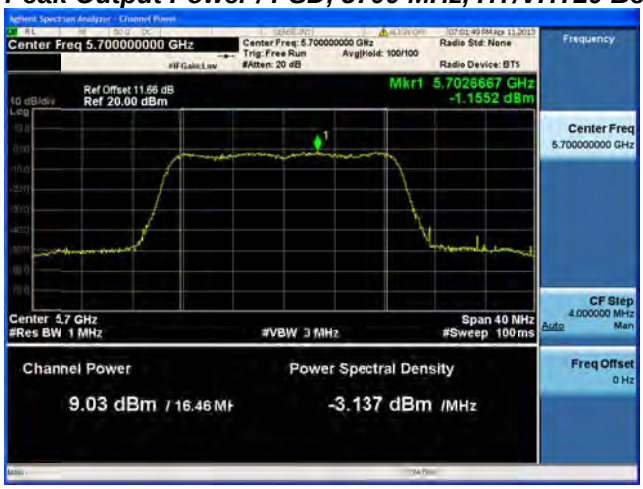
Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3

Antenna A

Antenna B

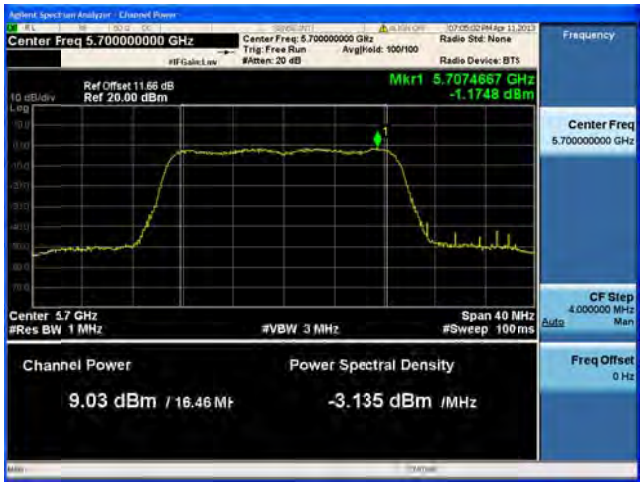
Antenna C

Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1

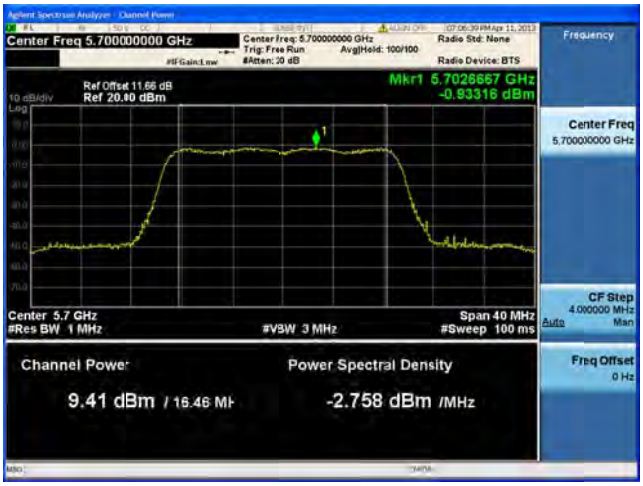


Antenna A

Antenna B

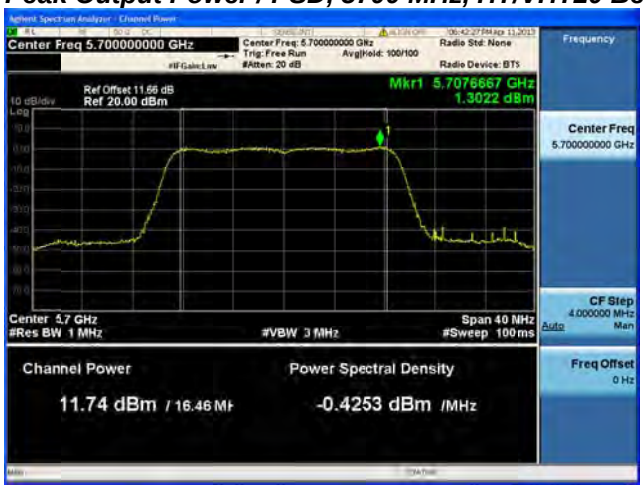


Antenna C



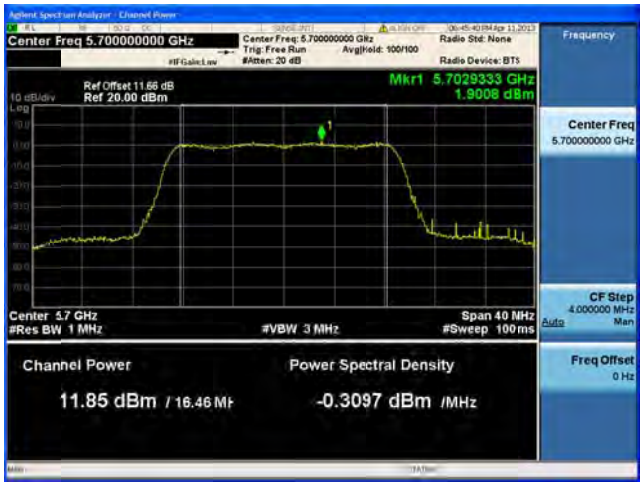
Antenna D

Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2

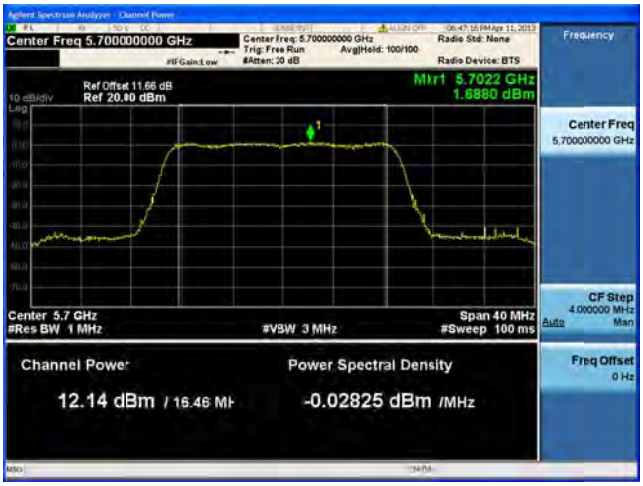


Antenna A

Antenna B



Antenna C



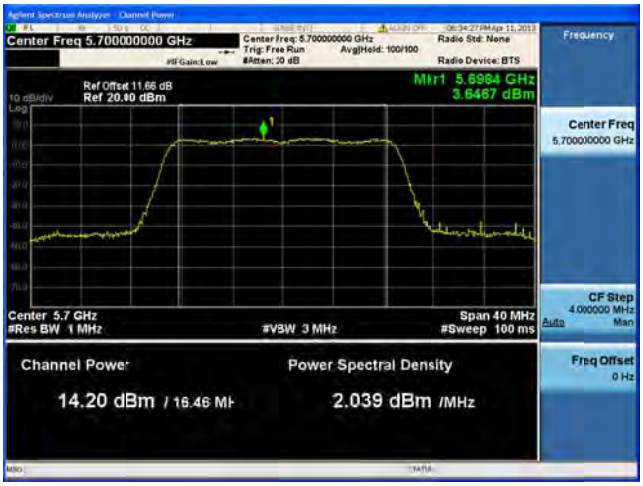
Antenna D

Peak Output Power / PSD, 5700 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3

Antenna A

Antenna B

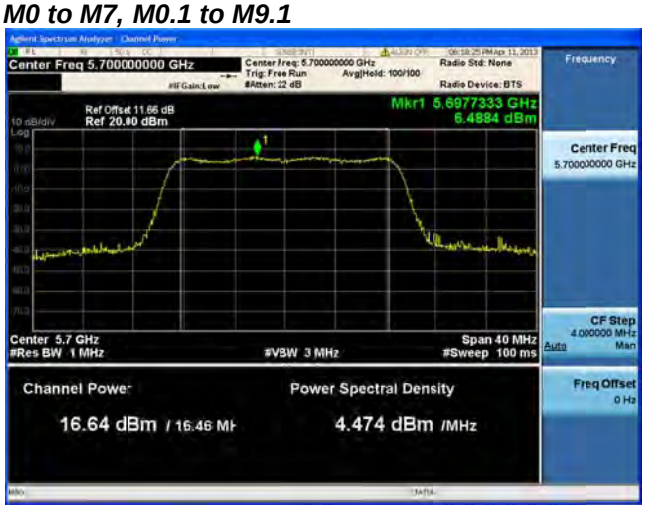
Antenna C



Antenna D

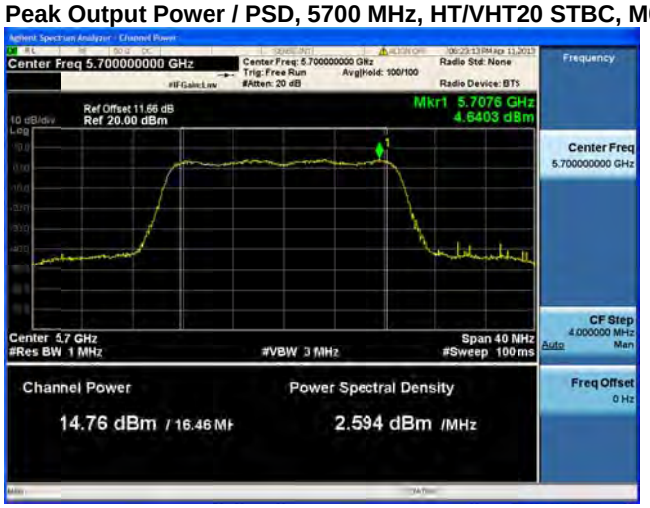
Peak Output Power / PSD, 5700 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1

Antenna A

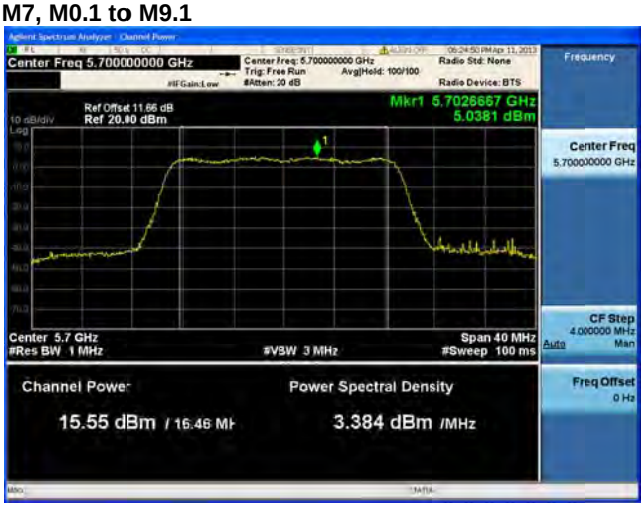


Antenna B

Peak Output Power / PSD, 5700 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1



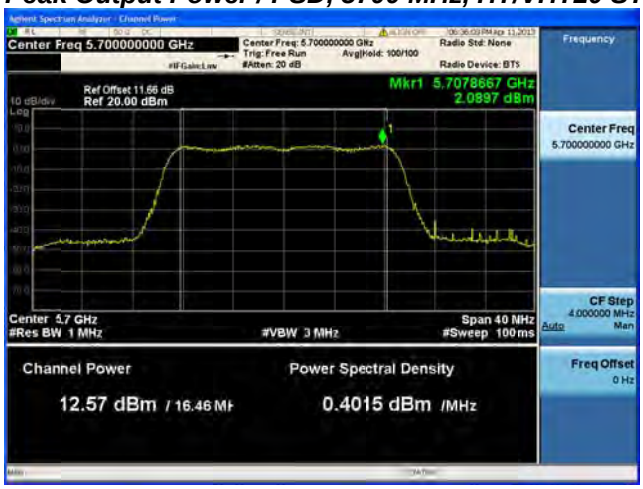
Antenna A



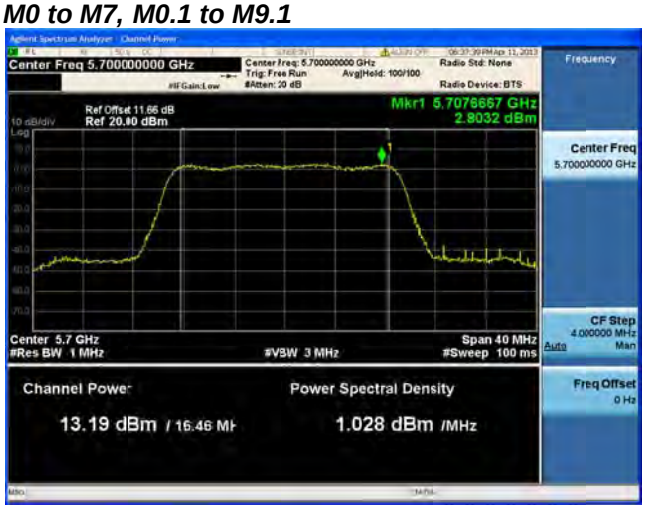
Antenna B

Antenna C

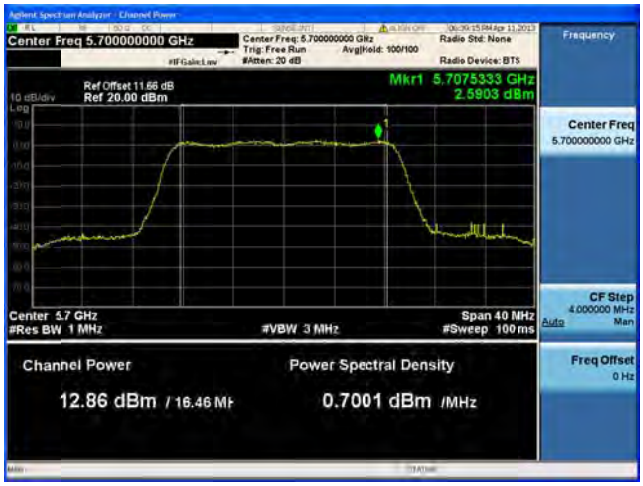
Peak Output Power / PSD, 5700 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1



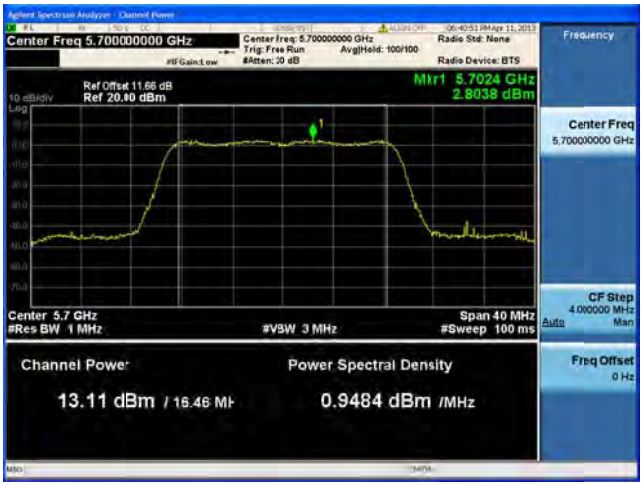
Antenna A



Antenna B



Antenna C



Antenna D

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).

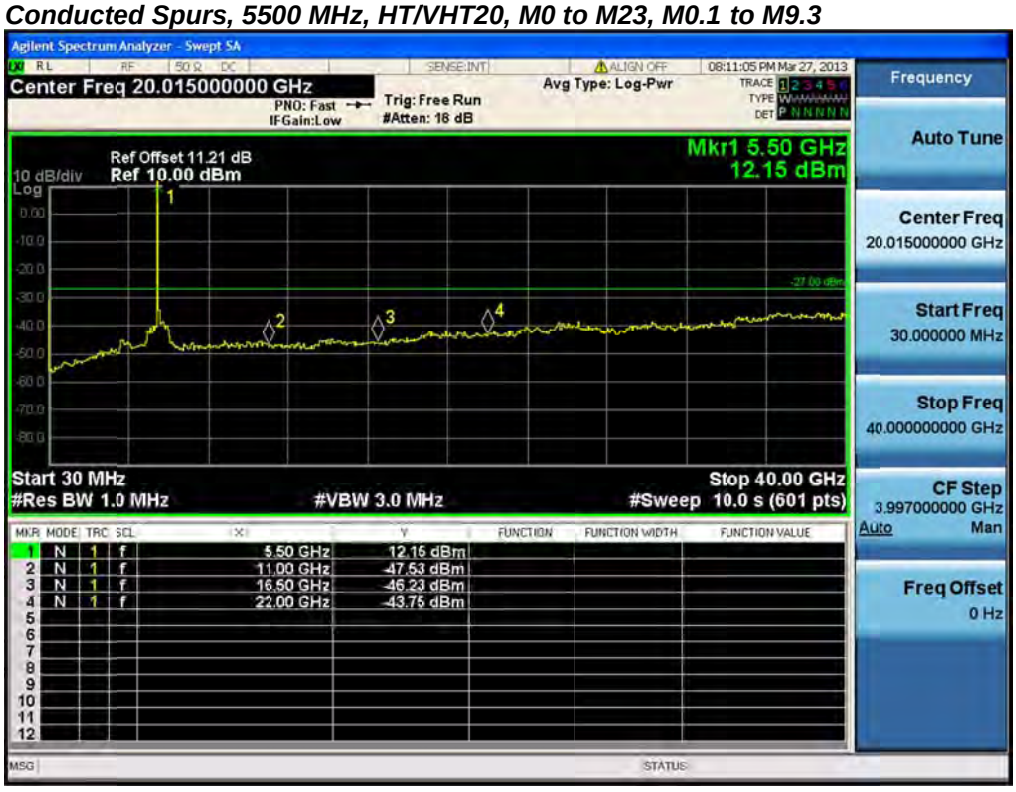
Span:	30 MHz-40 GHz
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	10 s
Resolution Bandwidth:	1 MHz
Video Bandwidth:	3 MHz
Detector:	Peak
Trace:	Single
Marker:	Peak

Record the marker waveform peak to spur difference

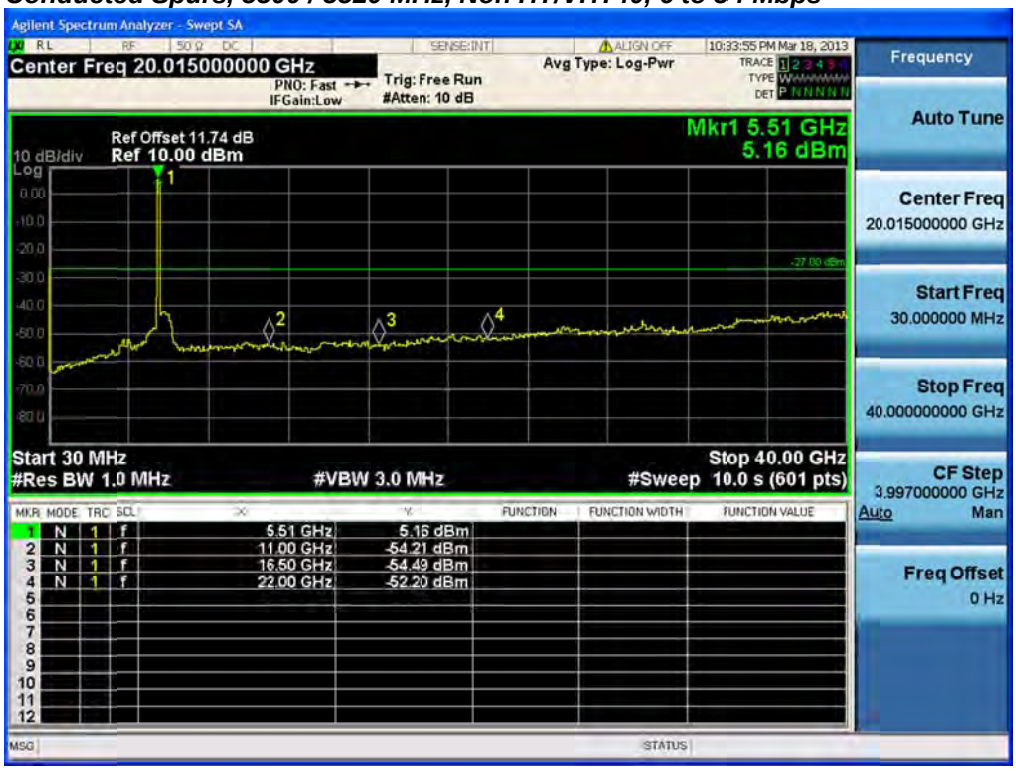
Frequency (MHz)	Mode	Data Rate (Mbps)	Conducted Spurs Delta (MHz)	Limit (kHz)	Margin (MHz)
5500	Non HT/VHT20, 6 to 54 Mbps	2	11	-52.1	-38.1
	HT/VHT20, M0 to M23, M0.1 to M9.3	3	5	-43.8	-34.0
5500/5520	Non HT/VHT40, 6 to 54 Mbps	1	5	-52.2	-47.2
	HT/VHT40, M0 to M23, M0.1 to M9.3	3	5	-47	-37.2
5500/5520 5540/5560	Non HT/VHT80, 6 to 54 Mbps	1	5	-52.4	-47.4
	HT/VHT80, M0 to M23, M0.1 to M9.3	3	5	-47.4	-37.6
5540/5560	Non HT/VHT40, 6 to 54 Mbps	1	5	-51	-46.0
	HT/VHT40, M0 to M23, M0.1 to M9.3	3	5	-45.4	-35.6
5560	Non HT/VHT20, 6 to 54 Mbps	2	11	-50.5	-36.5
	HT/VHT20, M0 to M23, M0.1 to M9.3	3	5	-44.8	-35.0
5700	Non HT/VHT20, 6 to 54 Mbps	2	11	-50.8	-36.8
	HT/VHT20, M0 to M23, M0.1 to M9.3	3	5	-45.7	-35.9

Conducted Spurs, 5500 MHz, Non HT/VHT20, 6 to 54 Mbps

Conducted Spurs, 5500 MHz, HT/VHT20, M0 to M23, M0.1 to M9.3

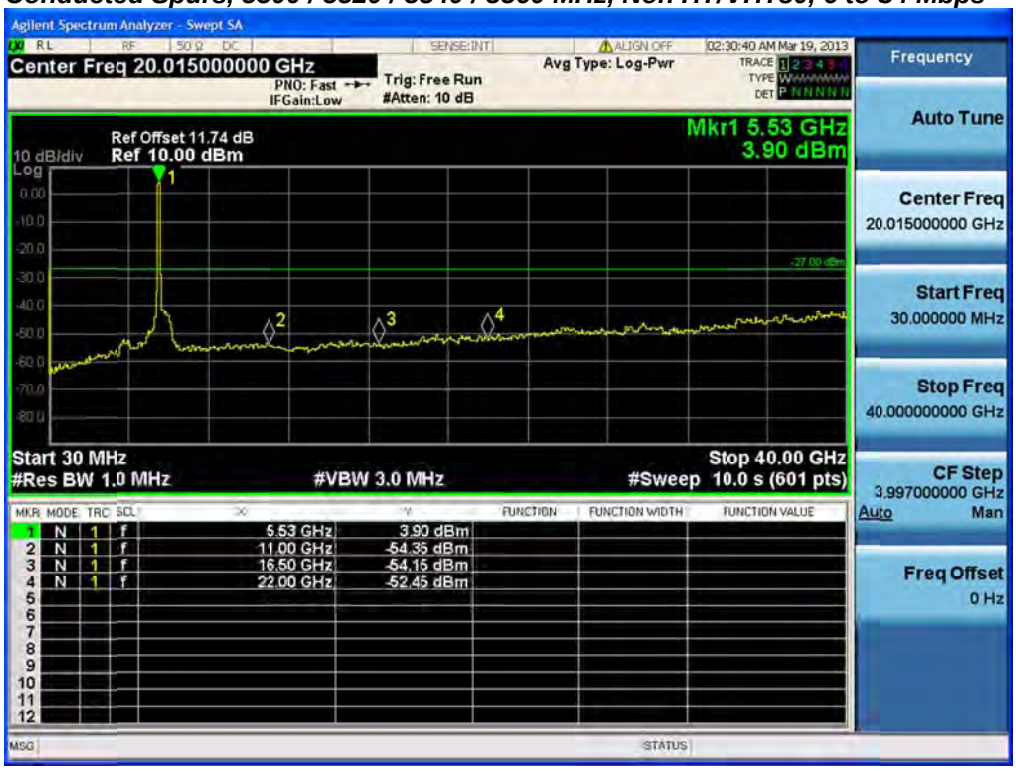


Conducted Spurs, 5500 / 5520 MHz, Non HT/VHT40, 6 to 54 Mbps

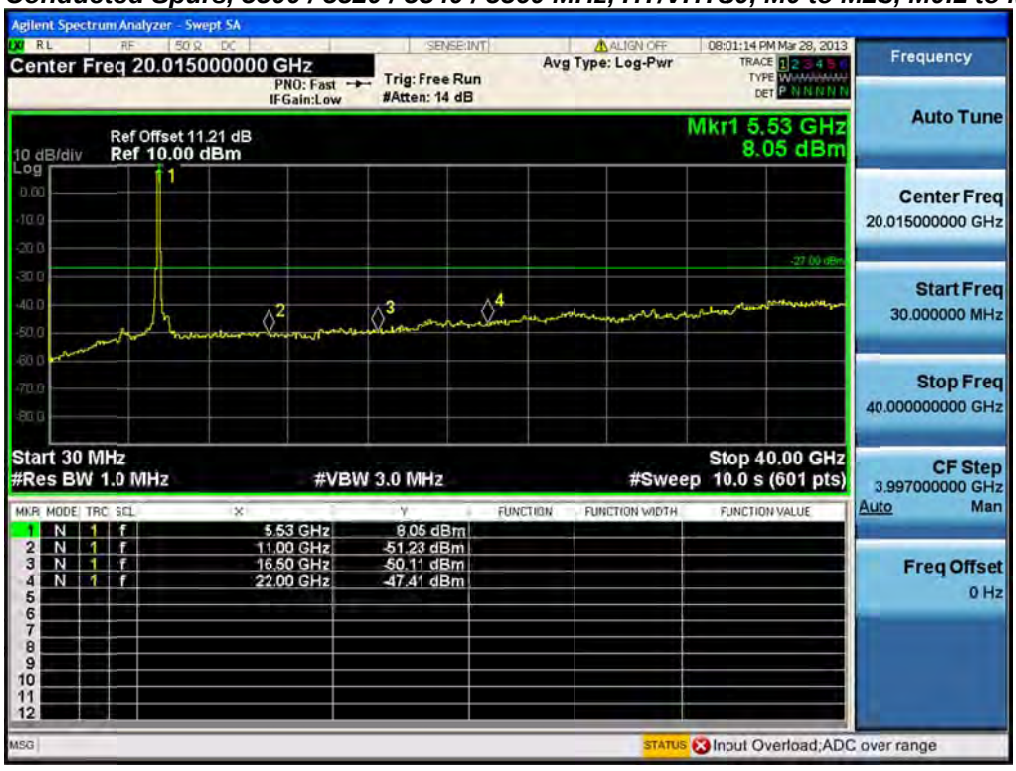


Conducted Spurs, 5500 / 5520 MHz, HT/VHT40, M0 to M23, M0.1 to M9.3

Conducted Spurs, 5500 / 5520 / 5540 / 5560 MHz, Non HT/VHT80, 6 to 54 Mbps



Conducted Spurs, 5500 / 5520 / 5540 / 5560 MHz, HT/VHT80, M0 to M23, M0.1 to M9.3



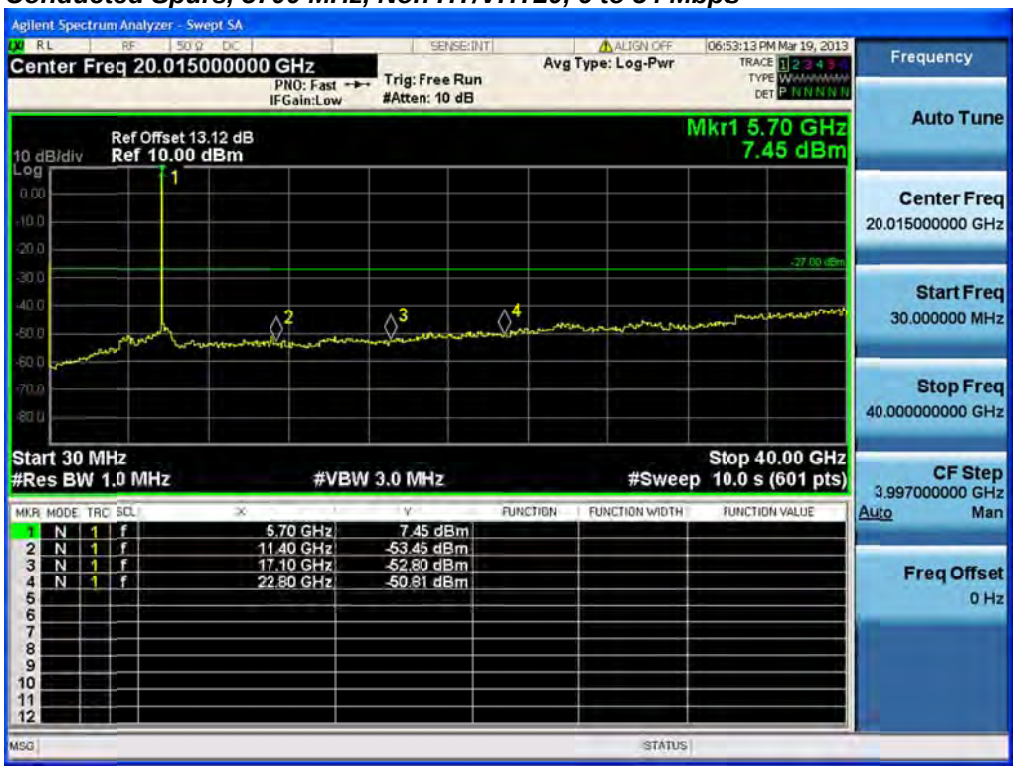
Conducted Spurs, 5540 / 5560 MHz, Non HT/VHT40, 6 to 54 Mbps

Conducted Spurs, 5540 / 5560 MHz, HT/VHT40, M0 to M23, M0.1 to M9.3

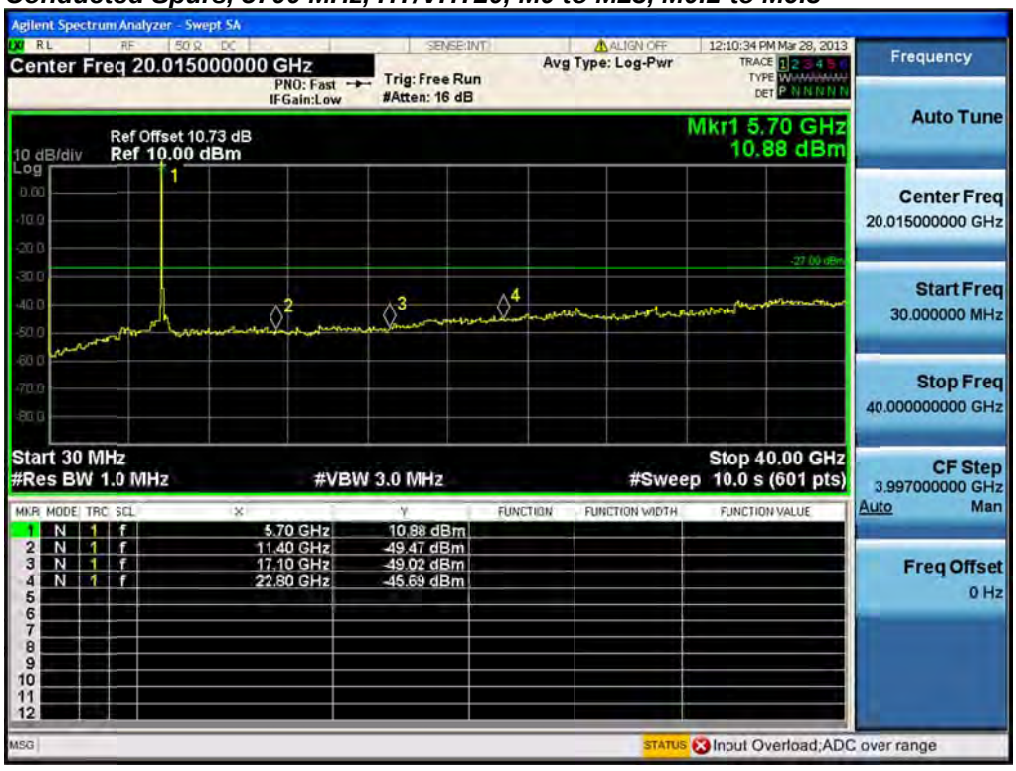
Conducted Spurs, 5560 MHz, Non HT/VHT20, 6 to 54 Mbps

Conducted Spurs, 5560 MHz, HT/VHT20, M0 to M23, M0.1 to M9.3

Conducted Spurs, 5700 MHz, Non HT/VHT20, 6 to 54 Mbps



Conducted Spurs, 5700 MHz, HT/VHT20, M0 to M23, M0.1 to M9.3



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.

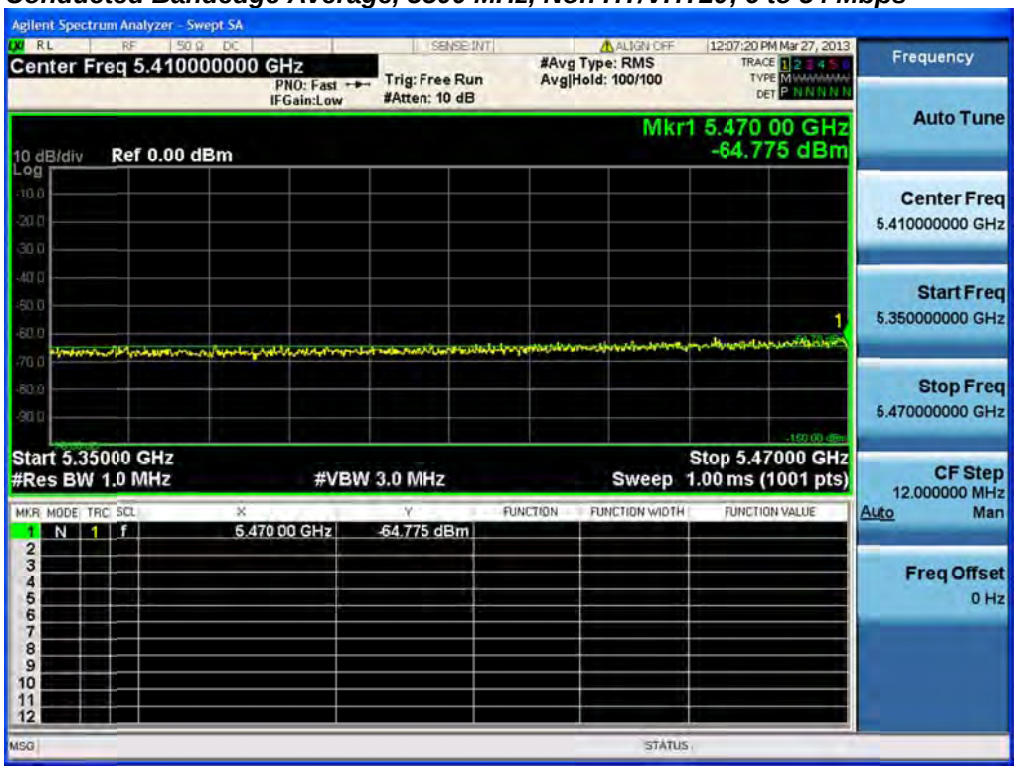
Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

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

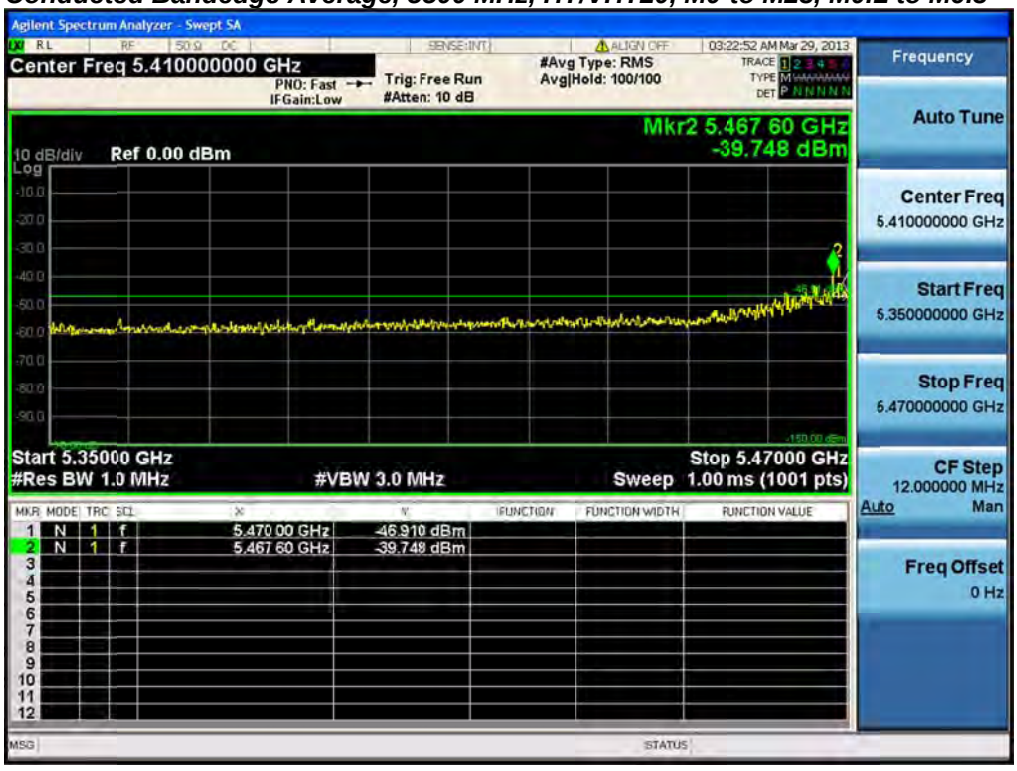
Record the marker waveform peak to spur difference

Frequency (MHz)	Mode	Data Rate (Mbps)	Correlated Antenna Gain (dBi)	Conducted Bandedge Level (dBm/MHz)	Total Bandedge Level (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
5500	Non HT/VHT20, 6 to 54 Mbps	3	5	-64.8	-55.0	-27	28.0
	HT/VHT20, M0 to M23, M0.1 to M9.3	2	5	-39.7	-31.7	-27	4.7
5500/5520	Non HT/VHT40, 6 to 54 Mbps	2	5	-38.2	-30.2	-27	3.2
	HT/VHT40, M0 to M23, M0.1 to M9.3	1	5	-32.9	-27.9	-27	0.9
5500/5520 5540/5560	Non HT/VHT80, 6 to 54 Mbps	2	5	-36.8	-28.8	-27	1.8
	HT/VHT80, M0 to M23, M0.1 to M9.3	2	5	-37.9	-29.9	-27	2.9
5700	Non HT/VHT20, 6 to 54 Mbps	1	5	-38.5	-33.5	-27	6.5
	HT/VHT20, M0 to M23, M0.1 to M9.3	2	5	-39.7	-31.7	-27	4.7

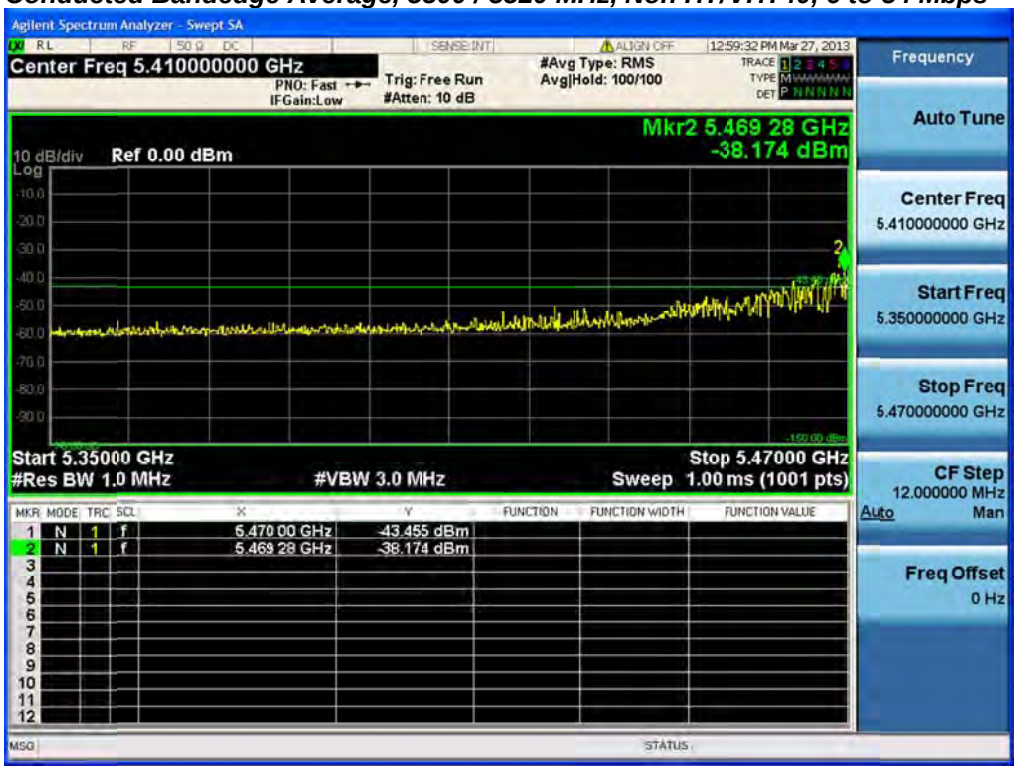
Conducted Bandedge Average, 5500 MHz, Non HT/VHT20, 6 to 54 Mbps



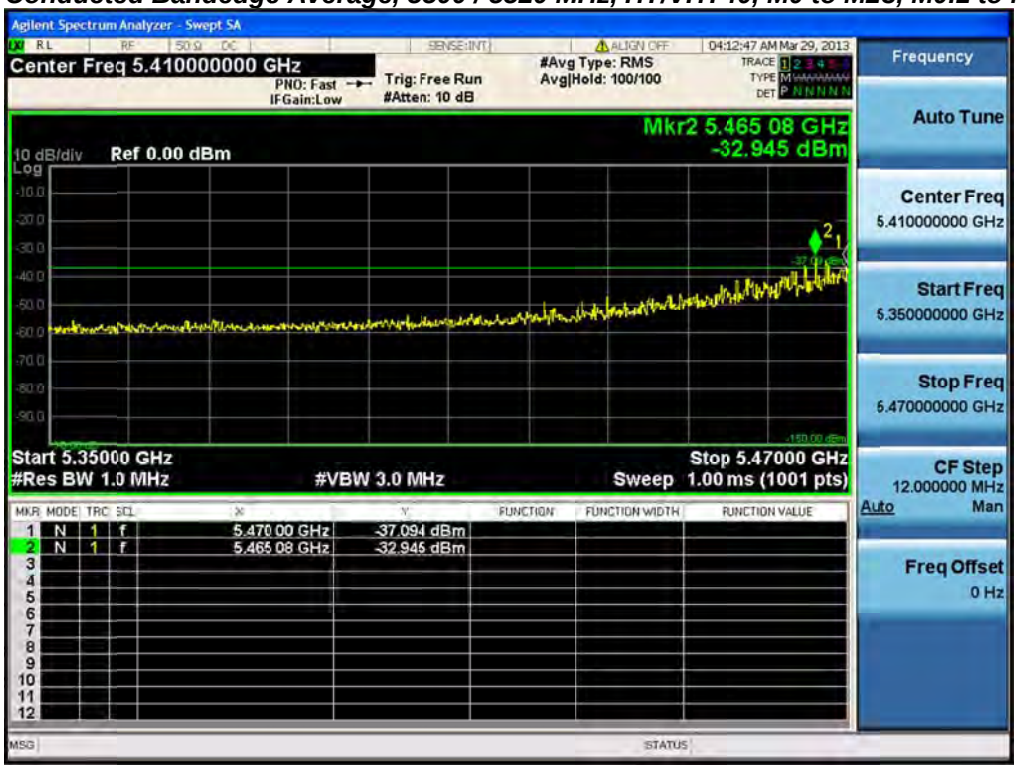
Conducted Bandedge Average, 5500 MHz, HT/VHT20, M0 to M23, M0.1 to M9.3



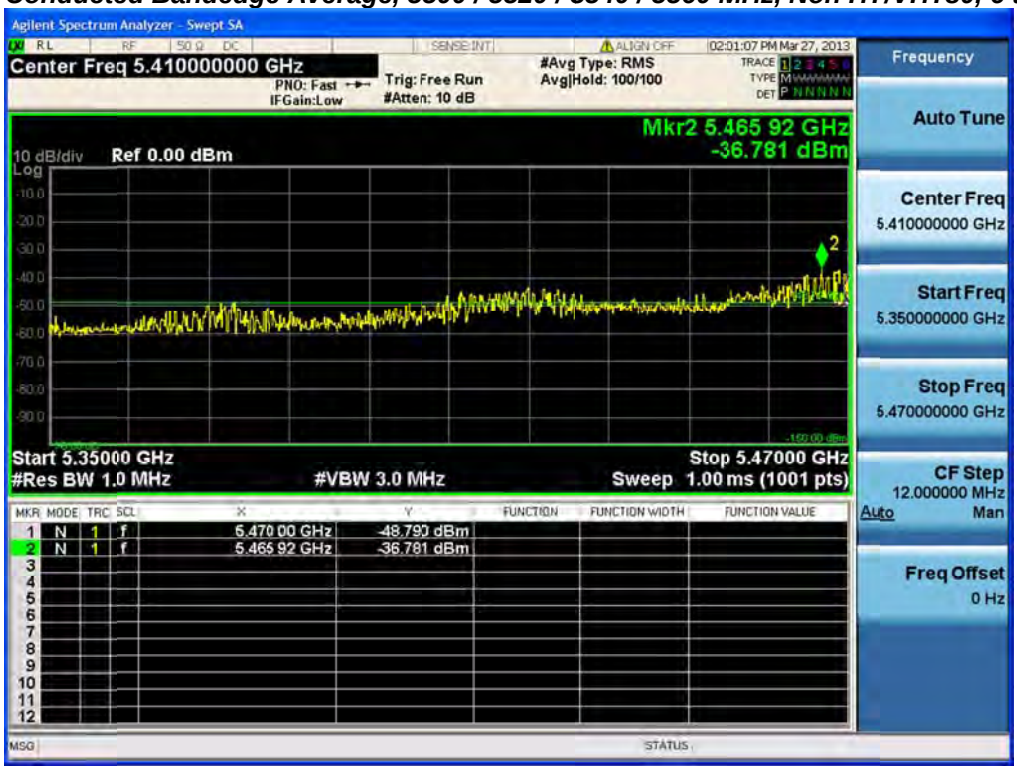
Conducted Bandedge Average, 5500 / 5520 MHz, Non HT/VHT40, 6 to 54 Mbps



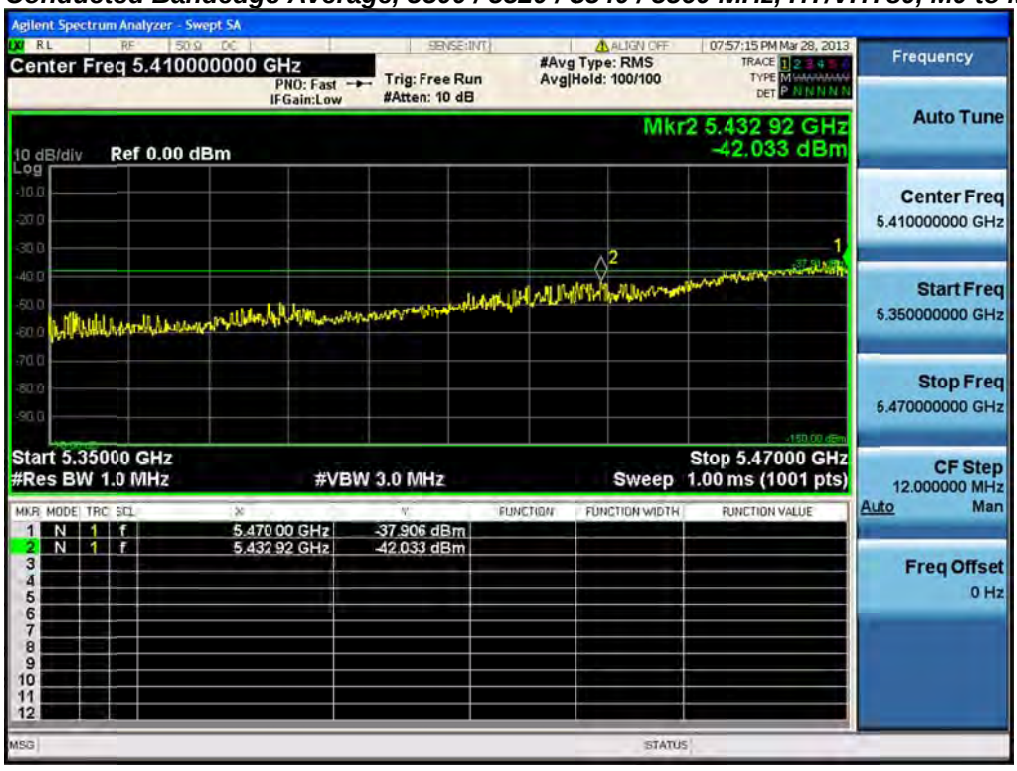
Conducted Bandedge Average, 5500 / 5520 MHz, HT/VHT40, M0 to M23, M0.1 to M9.3



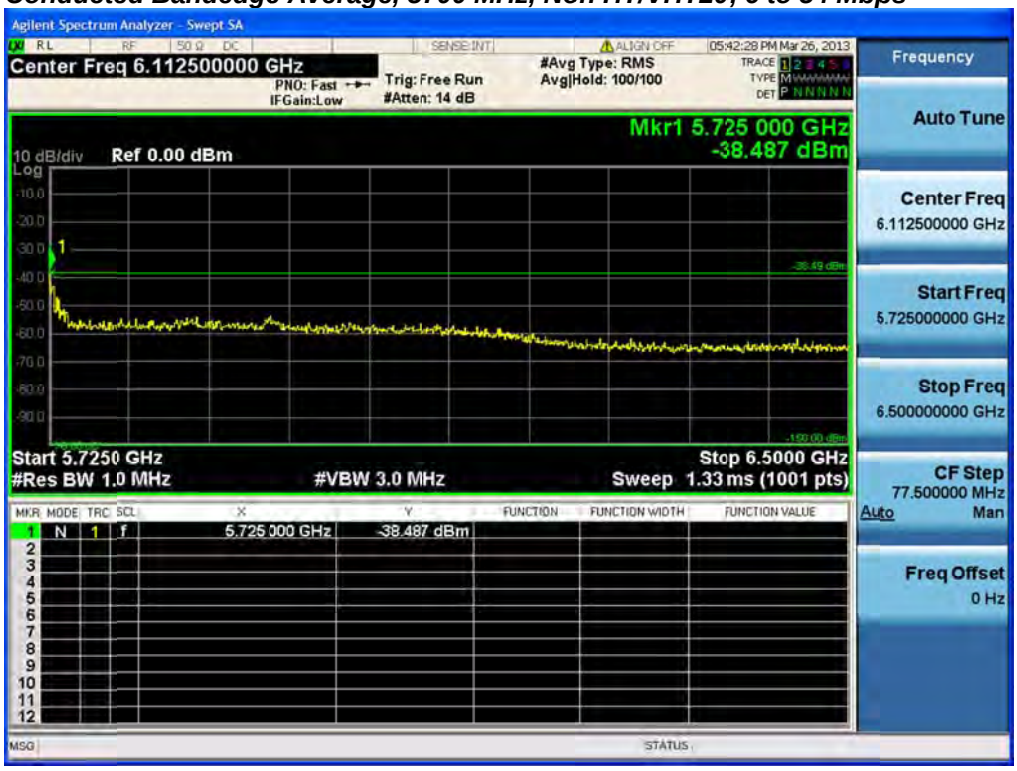
Conducted Bandedge Average, 5500 / 5520 / 5540 / 5560 MHz, Non HT/VHT80, 6 to 54 Mbps



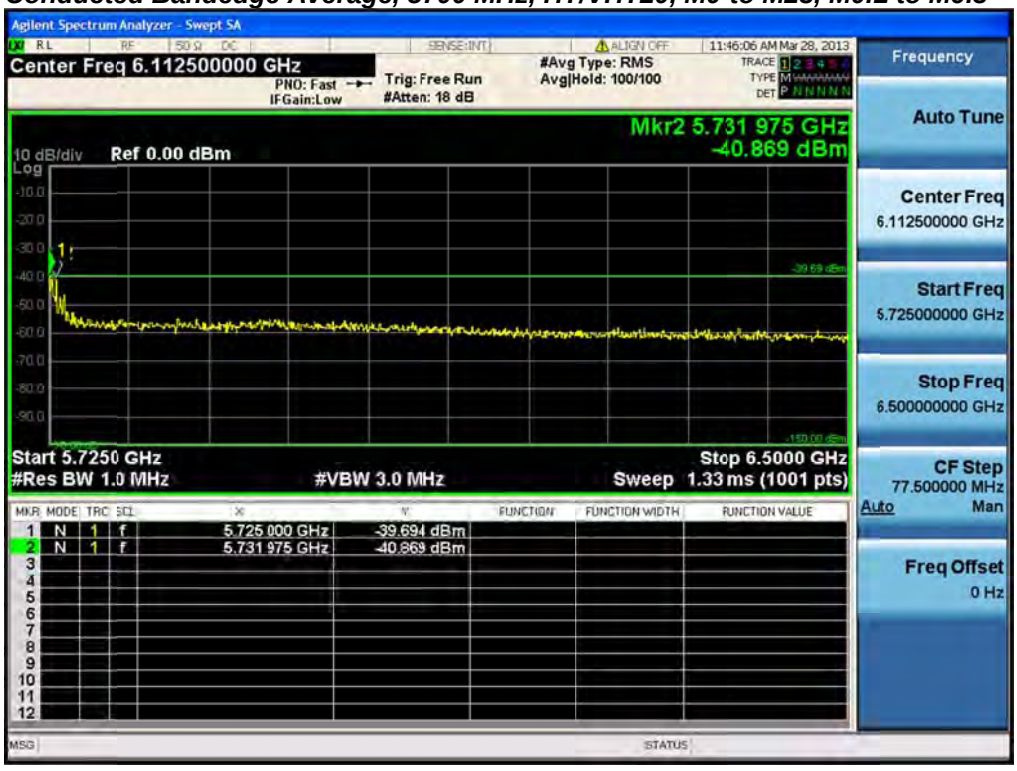
Conducted Bandedge Average, 5500 / 5520 / 5540 / 5560 MHz, HT/VHT80, M0 to M23, M0.1 to M9.3



Conducted Bandedge Average, 5700 MHz, Non HT/VHT20, 6 to 54 Mbps



Conducted Bandedge Average, 5700 MHz, HT/VHT20, M0 to M23, M0.1 to M9.3



20dB Bandwidth

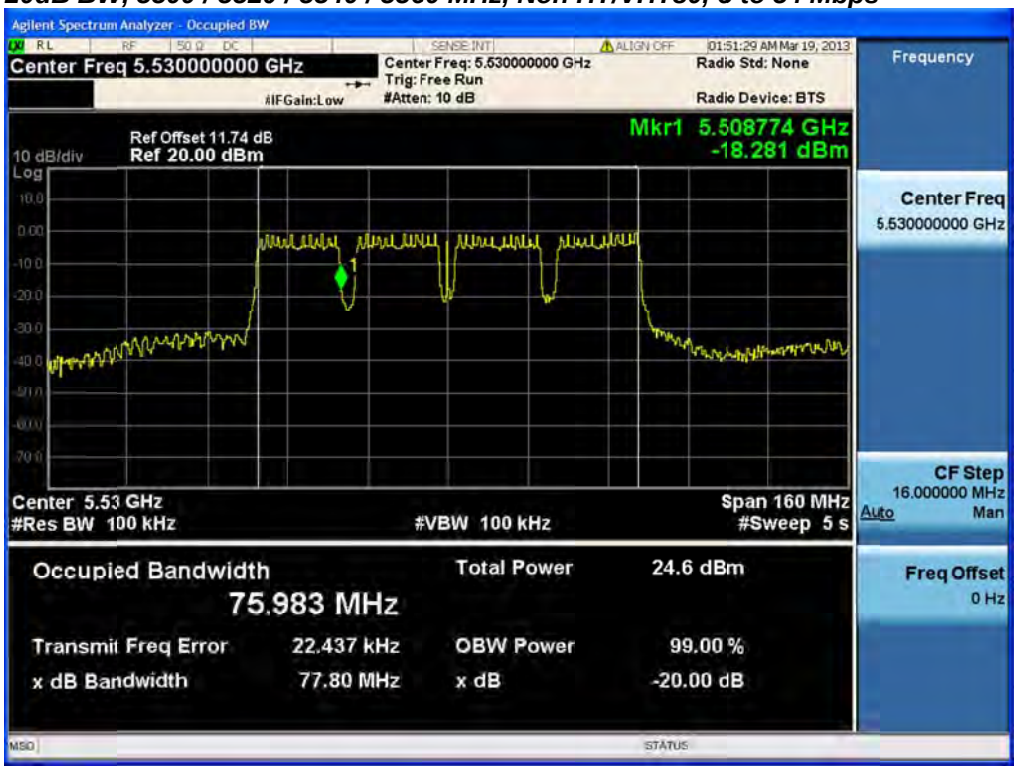
Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

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:

Frequency (MHz)	Mode	Data Rate (Mbps)	20dB BW (MHz)	Limit (kHz)	Margin (MHz)
5500/5520 5540/5560	Non HT/VHT80, 6 to 54 Mbps	6	5509	5600	91
	HT/VHT80, M0 to M23, M0.1 to M9.3	m0x1	5569	5600	31
5540/5560	Non HT/VHT40, 6 to 54 Mbps	6	5549	5600	51
	HT/VHT40, M0 to M23, M0.1 to M9.3	m0	5569	5600	31

20dB BW, 5500 / 5520 / 5540 / 5560 MHz, Non HT/VHT80, 6 to 54 Mbps



20dB BW, 5500 / 5520 / 5540 / 5560 MHz, HT/VHT80, M0 to M23, M0.1 to M9.3

20dB BW, 5540 / 5560 MHz, Non HT/VHT40, 6 to 54 Mbps

20dB BW, 5540 / 5560 MHz, HT/VHT40, M0 to M23, M0.1 to M9.3

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=√(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))

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

P(mW)=P(W)/1000 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:

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

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/cm^2 maximum. The highest supported antenna gain is 5 dBi (11dBi with beamforming). Using the peak power levels recorded in the test report along with Equation 1 above, the MPE distances are calculated as follows.

Frequency (MHz)	Bit Rate (Mbps)	Power Density (mW/cm^2)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)	Limit (cm)	Margin (cm)
5560	54	1	15.7	11	**6.10**	20	13.90

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:

Frequency (MHz)	Bit Rate (Mbps)	MPE Distance (cm)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Margin (mW/cm^2)
5560	54	20	15.7	11	**0.09**	1	0.91

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

Equip #	Manufacturer	Model	Description	Last Cal	Next Due
CIS049381	Agilent	N9030A	Spectrum Analyzer	28-Aug-12	28-Aug-13