

## 7.8 Occupied Bandwidth

### ■ Test Requirements, RSS-Gen[6.6]

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

### ■ Test Configuration

Refer to the APPENDIX I.

### ■ Test Procedure

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

### ■ Test Result : **Comply**

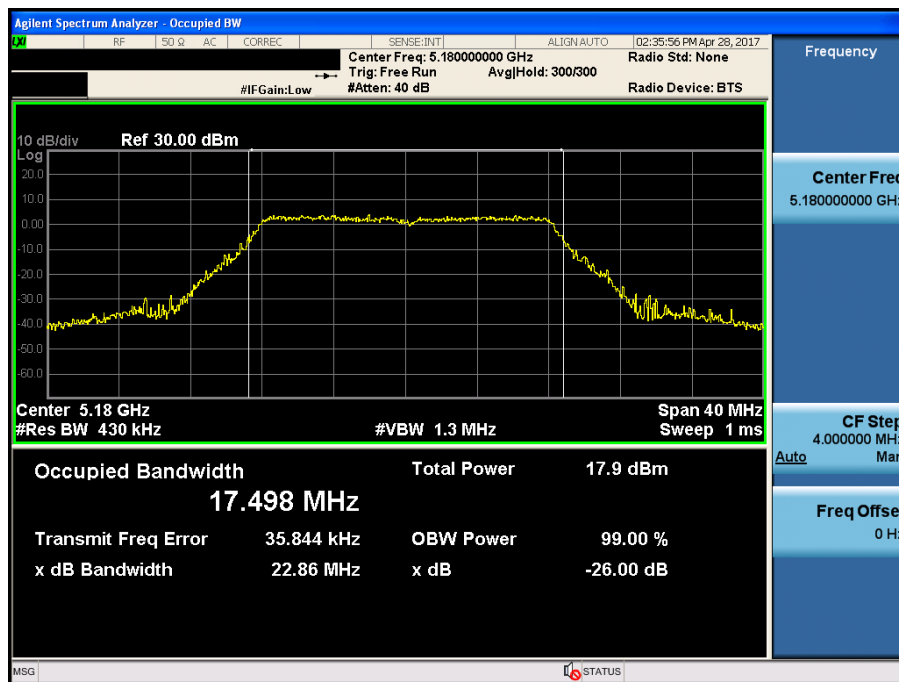
#### Multiple transmit

Mode	Bands	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	17.498
		40	5200	17.382
		48	5240	17.475
	U-NII 2A	52	5260	17.455
		60	5300	17.475
		64	5320	17.473
	U-NII 2C	100	5500	17.506
		116	5580	17.400
		140	5700	17.432
	U-NII 3	149	5745	17.568
		157	5785	17.360
		165	5825	17.486
802.11n HT20	U-NII 1	36	5180	18.336
		40	5200	18.347
		48	5240	18.421
	U-NII 2A	52	5260	18.313
		60	5300	18.333
		64	5320	18.427
	U-NII 2C	100	5500	18.446
		116	5580	18.379
		140	5700	18.433
	U-NII 3	149	5745	18.356
		157	5785	18.363
		165	5825	18.301
802.11n HT40	U-NII 1	38	5190	36.599
		46	5230	36.613
	U-NII 2A	54	5270	36.619
		62	5310	36.516
	U-NII 2C	102	5510	36.588
		110	5550	36.612
		134	5670	36.492
	U-NII 3	151	5755	36.505
		159	5795	36.472

## RESULT PLOTS

### Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.36



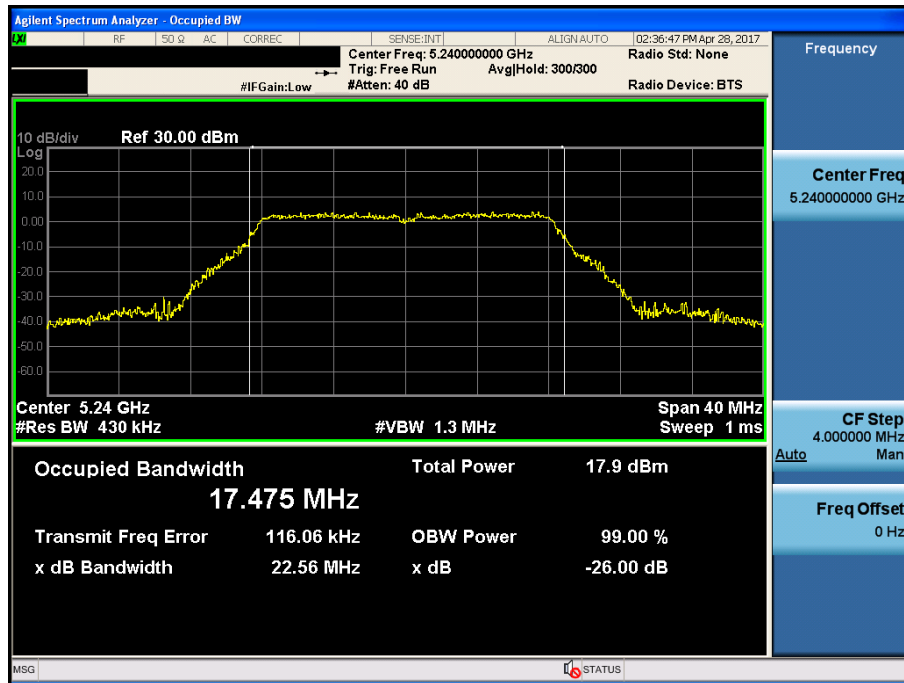
### Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.40



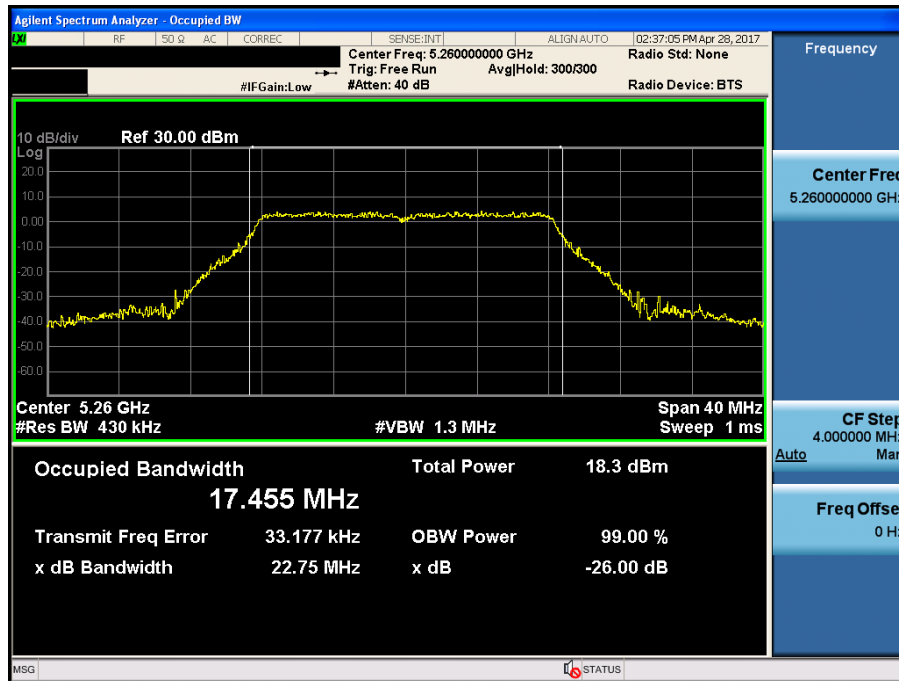
# Occupied Bandwidth 99%

Test Mode: 802.11a &amp; Ch.48



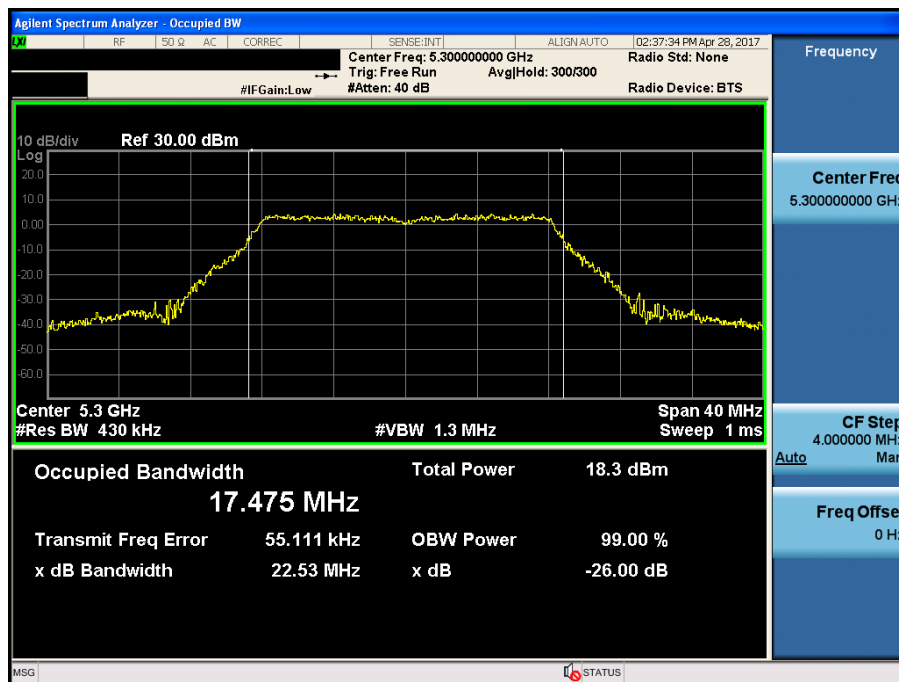
## Occupied Bandwidth 99%

Test Mode: 802.11a &amp; Ch.52



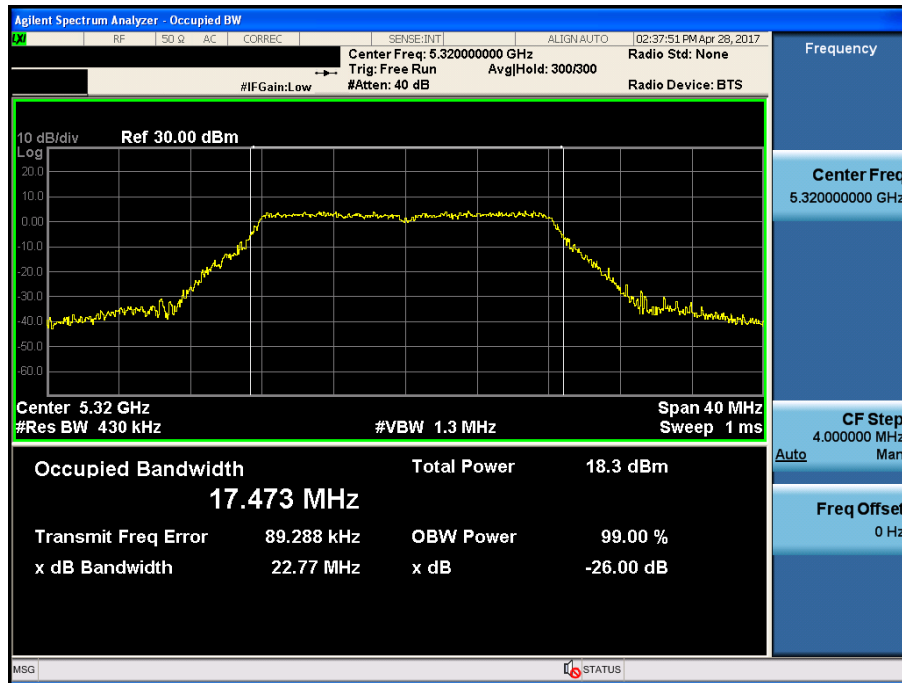
## Occupied Bandwidth 99%

Test Mode: 802.11a &amp; Ch.60



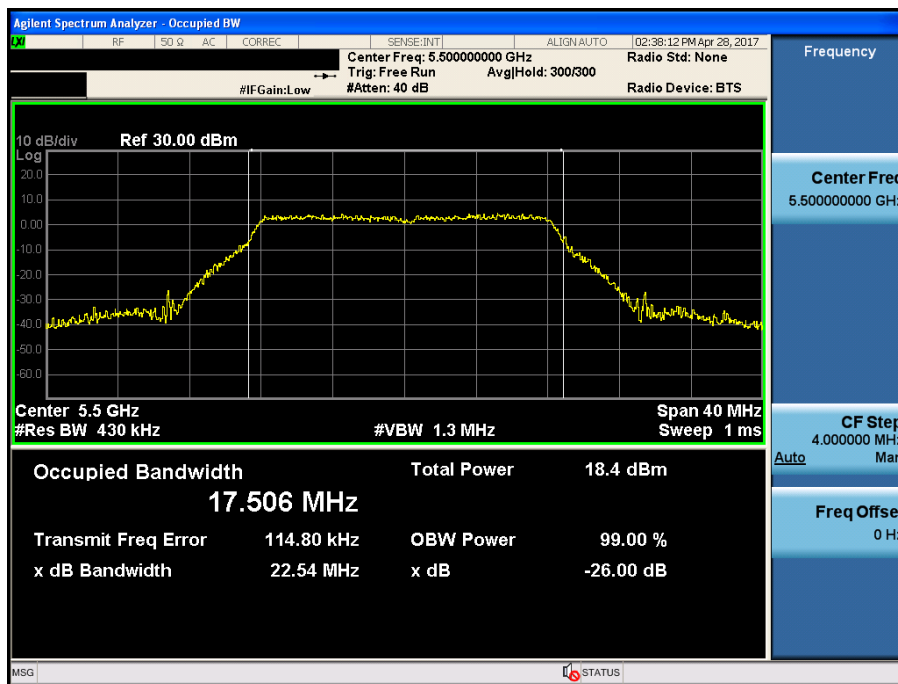
# Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.64



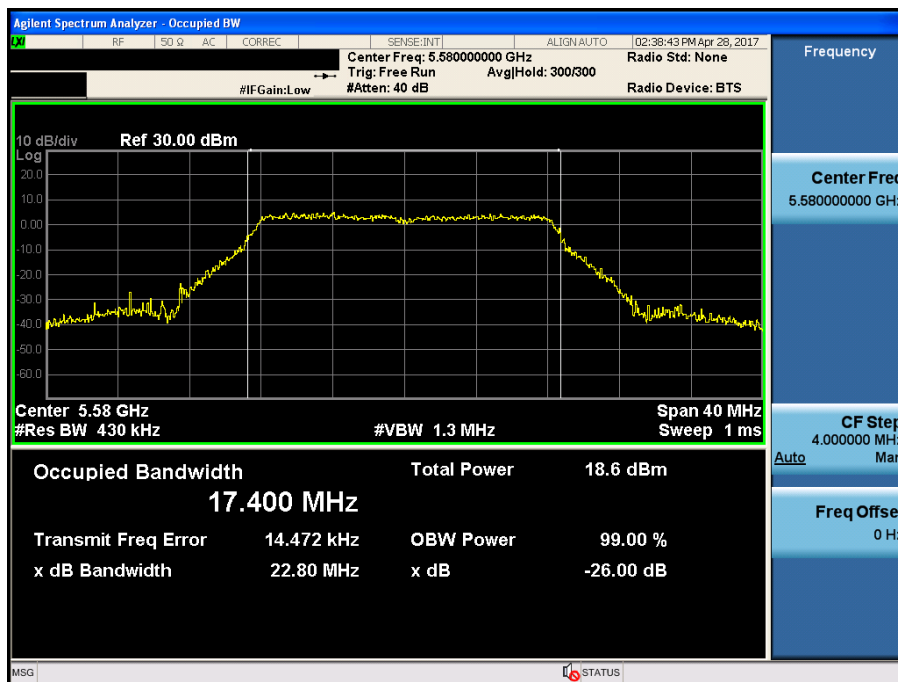
## Occupied Bandwidth 99%

Test Mode: 802.11a &amp; Ch.100



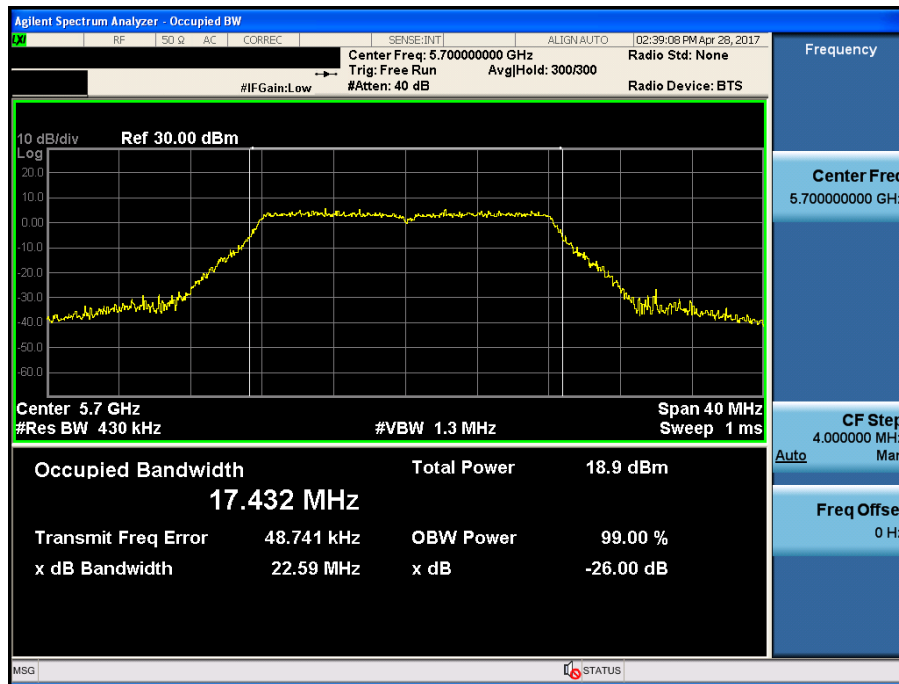
## Occupied Bandwidth 99%

Test Mode: 802.11a &amp; Ch.116



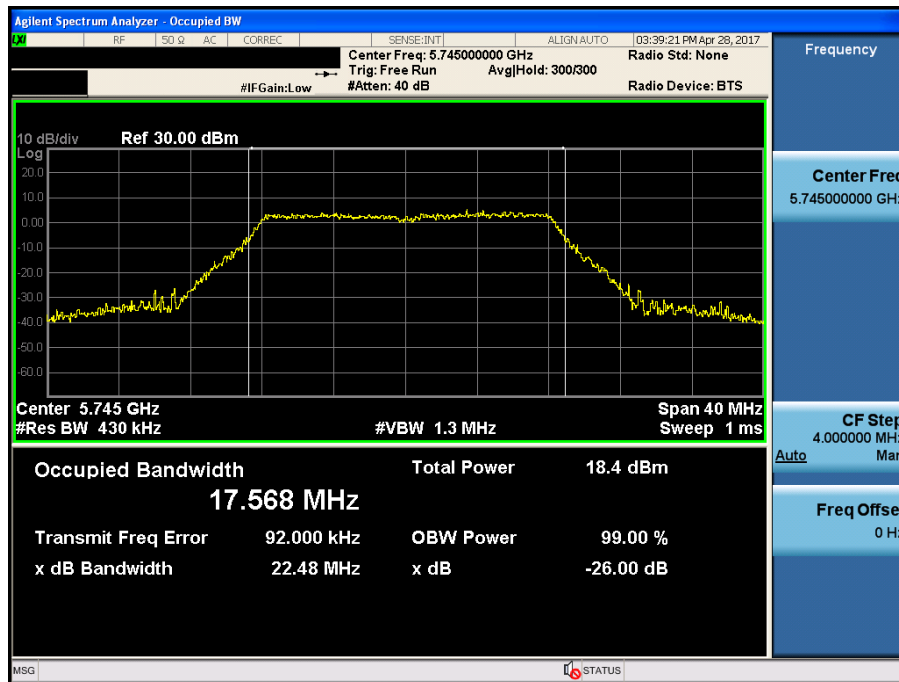
# Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.140



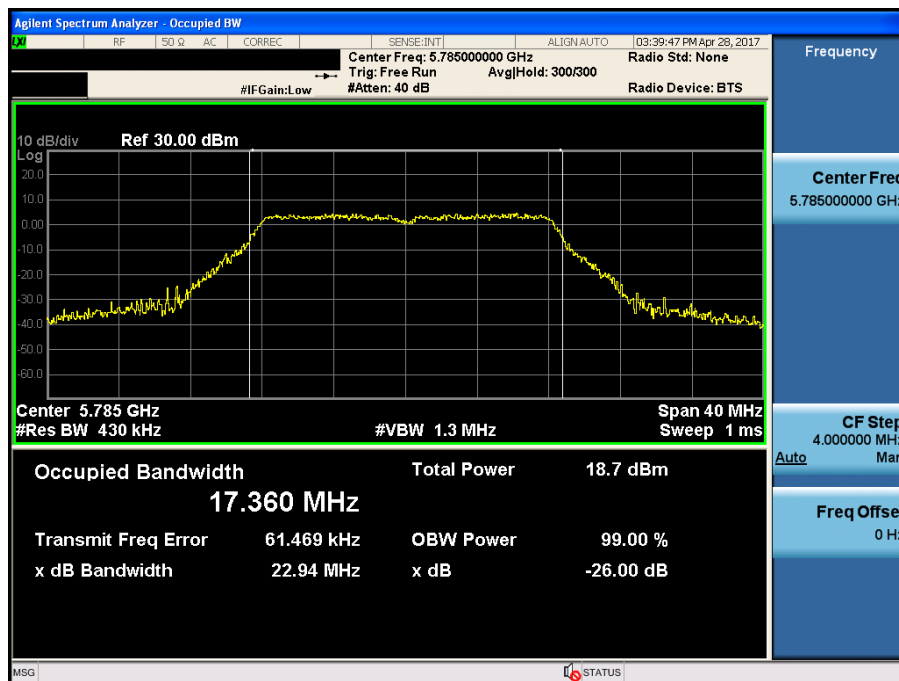
## Occupied Bandwidth 99%

Test Mode: 802.11a &amp; Ch.149



## Occupied Bandwidth 99%

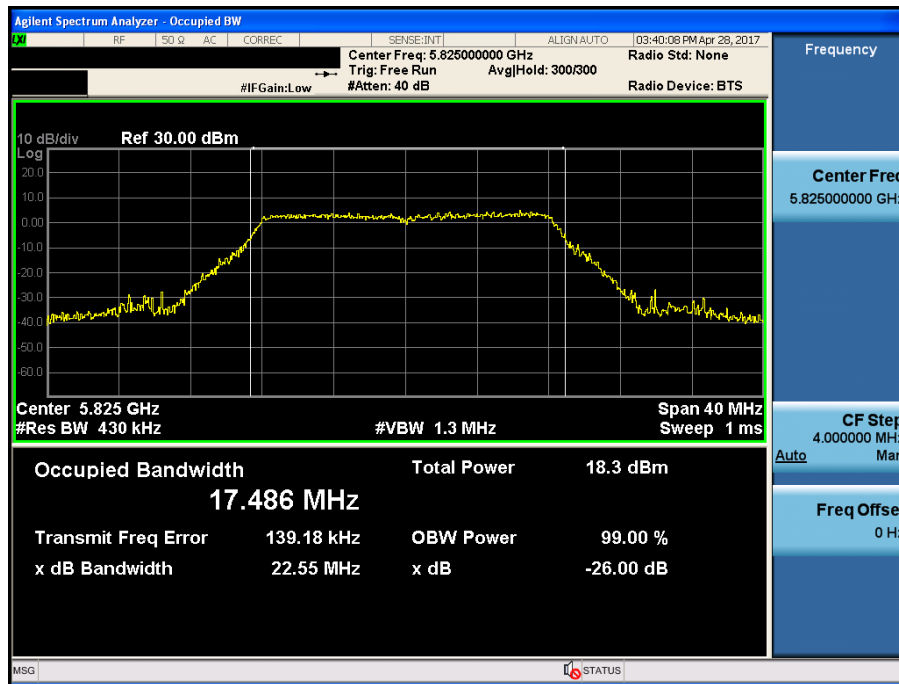
Test Mode: 802.11a &amp; Ch.157





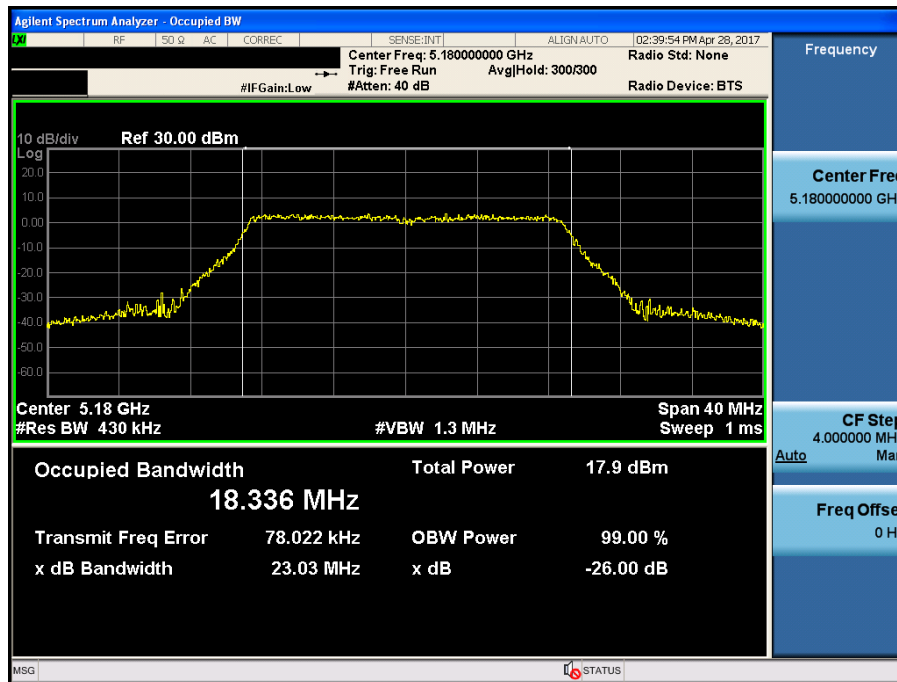
# Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.165



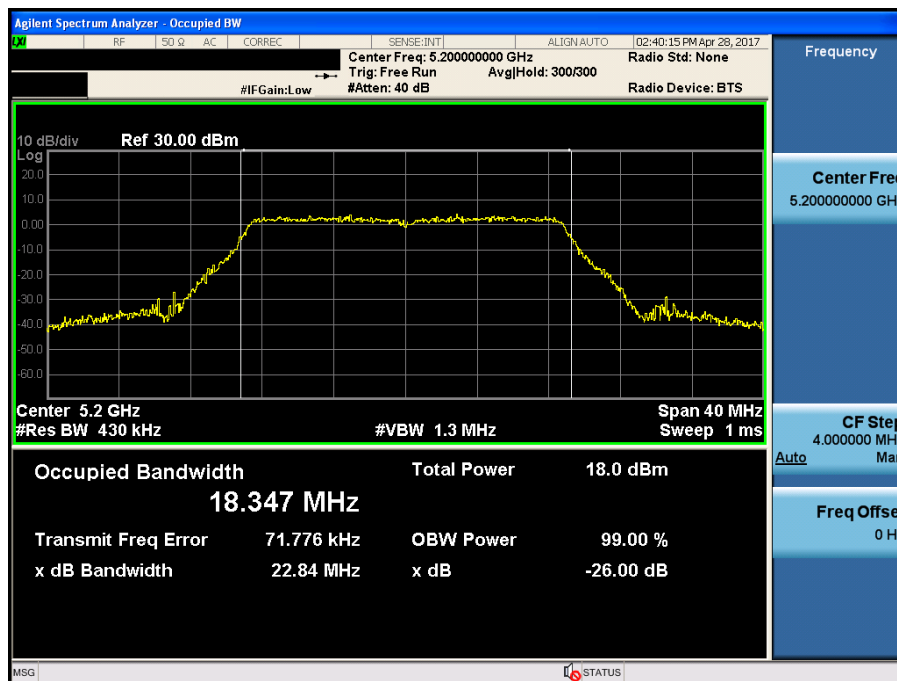
## Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) &amp; Ch.36



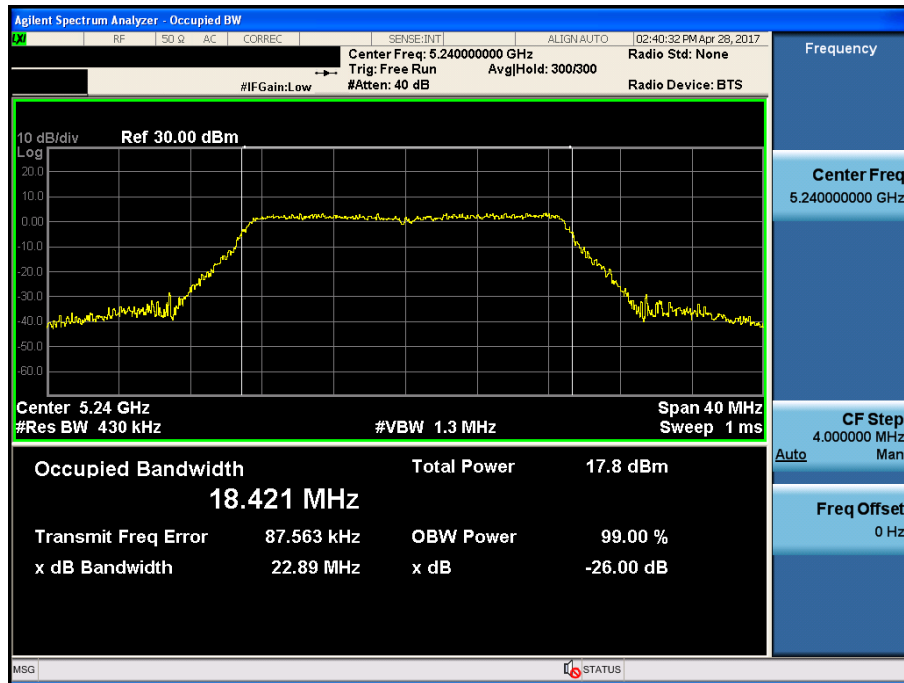
## Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) &amp; Ch.40



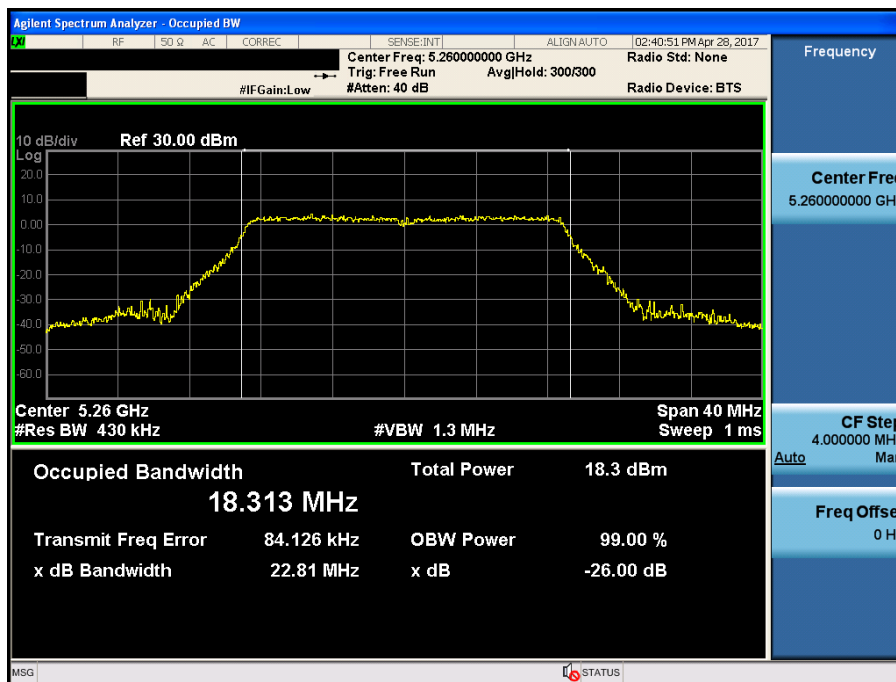
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.48



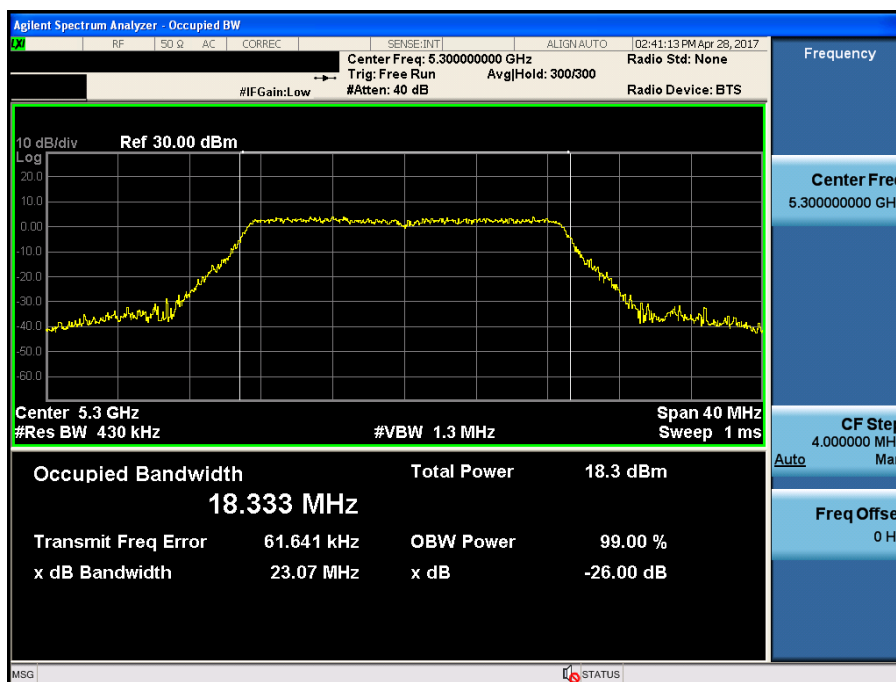
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) &amp; Ch.52



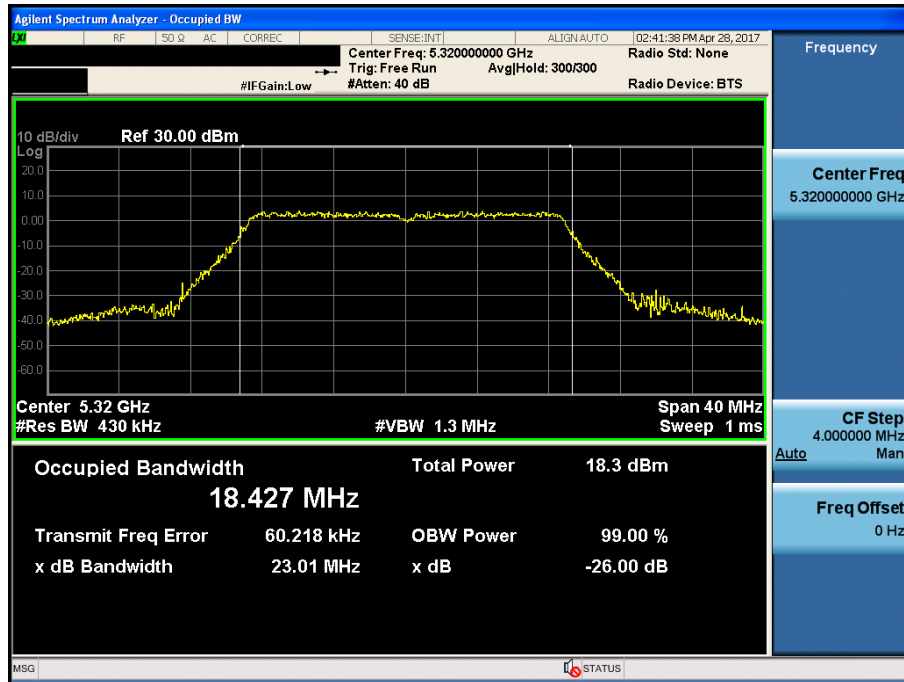
# Occupied Bandwidth 99%

Test Mode: 802.11n HT20 &amp; Ch.60



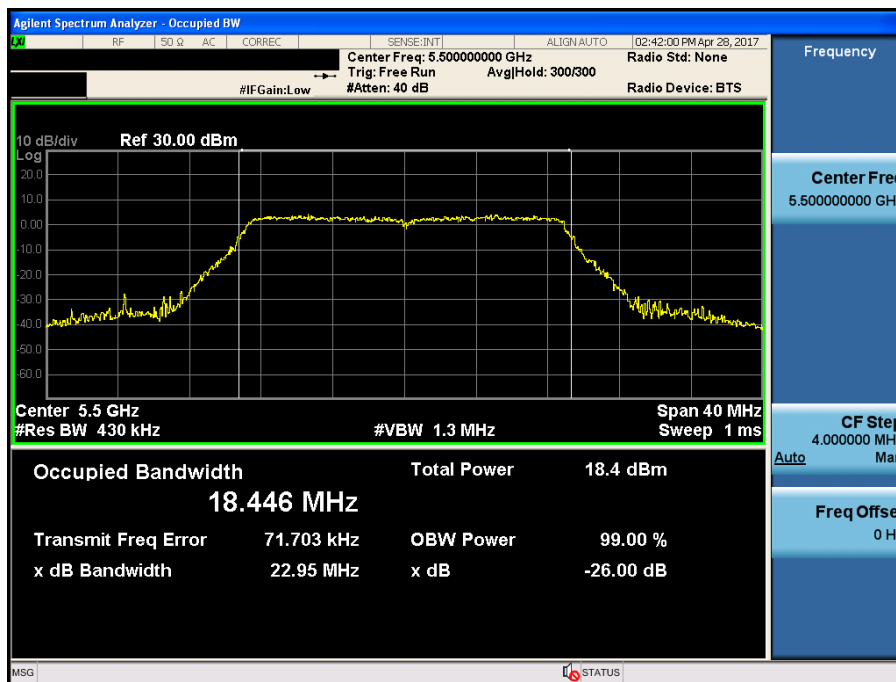
## Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) &amp; Ch.64



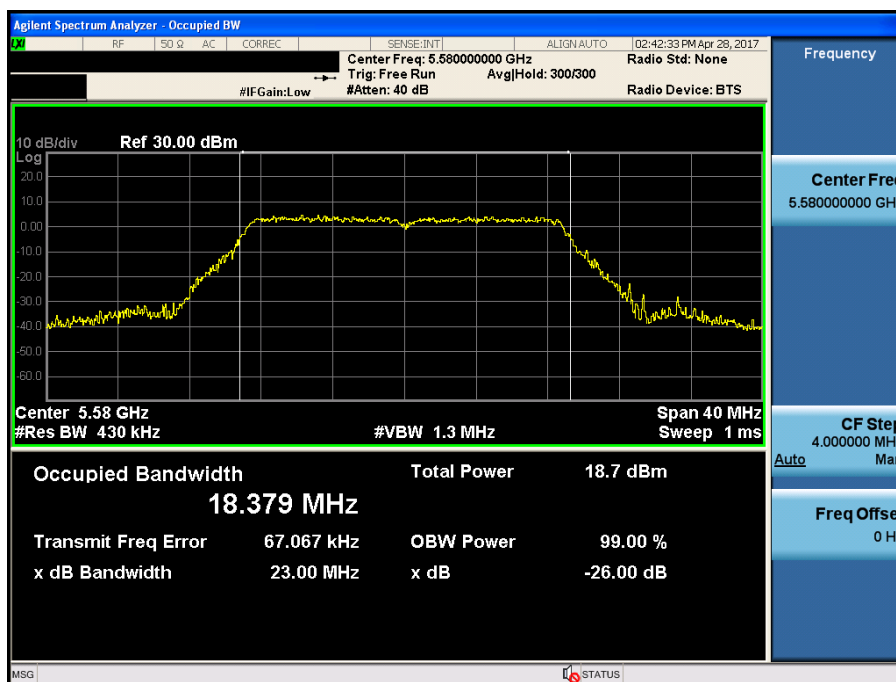
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.100



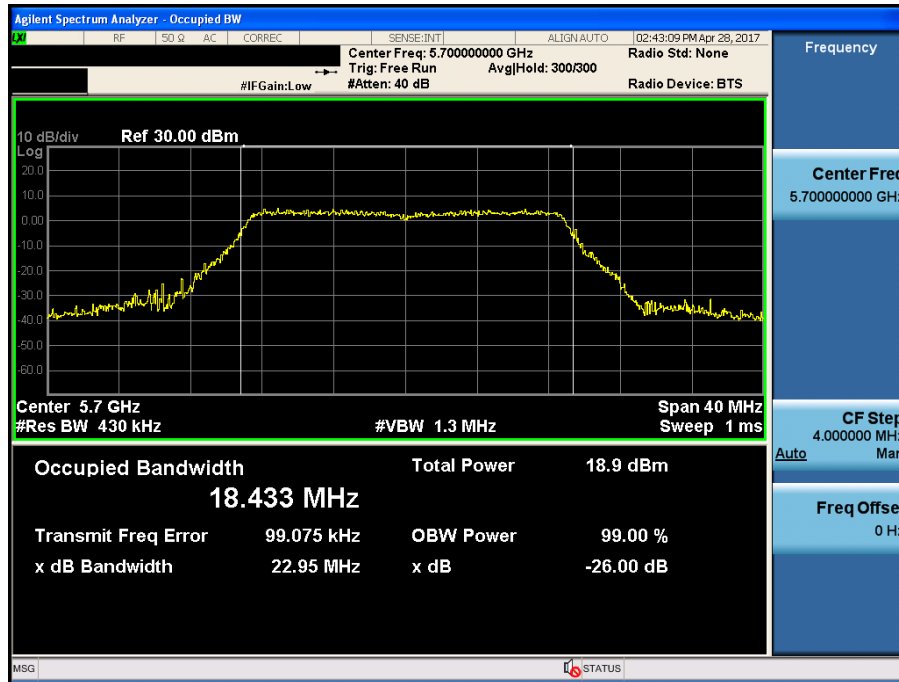
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.116



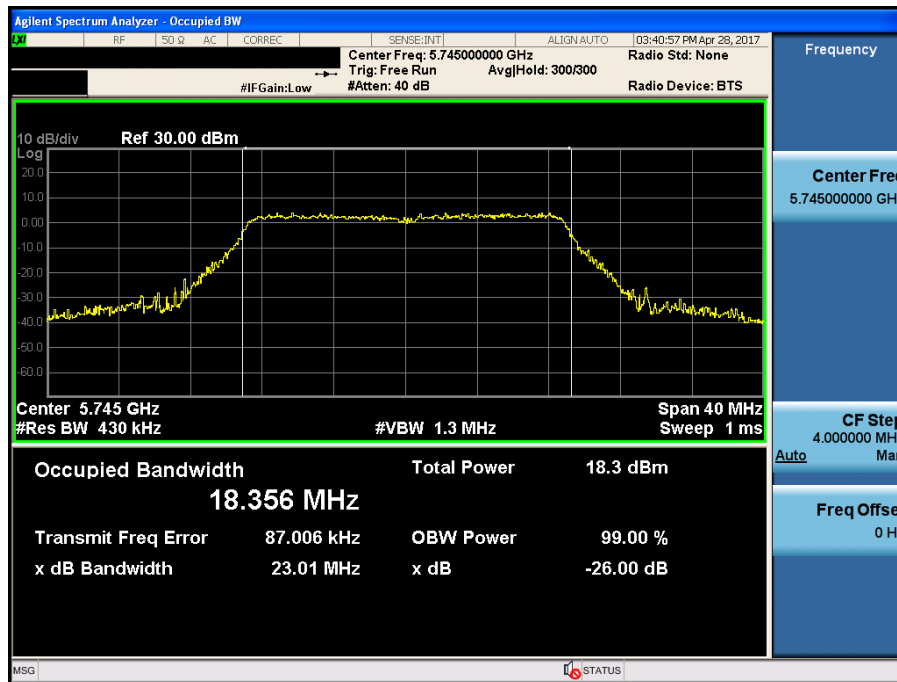
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.140



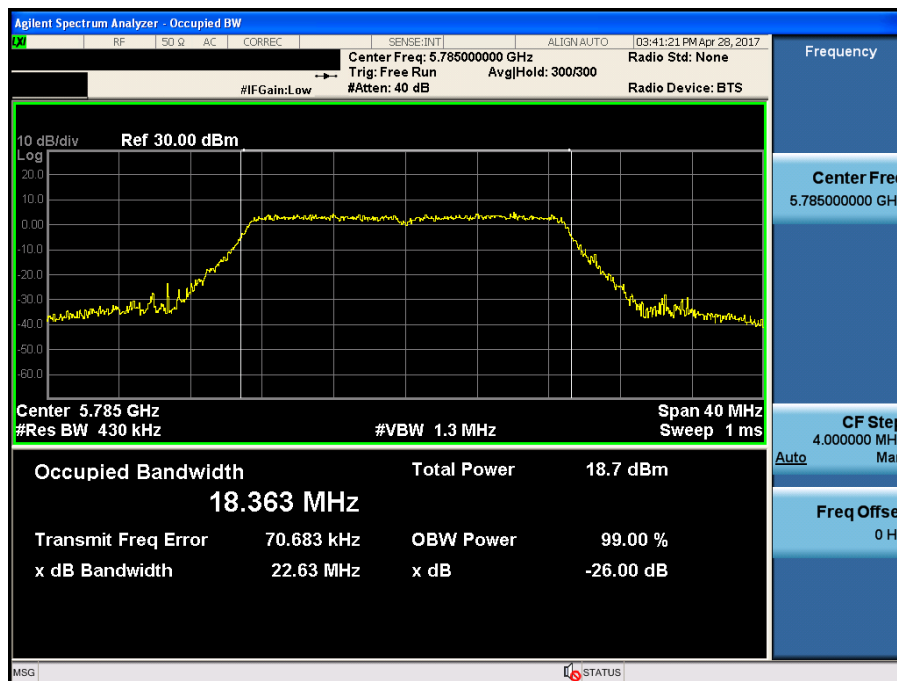
## Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) &amp; Ch.149



## Occupied Bandwidth 99%

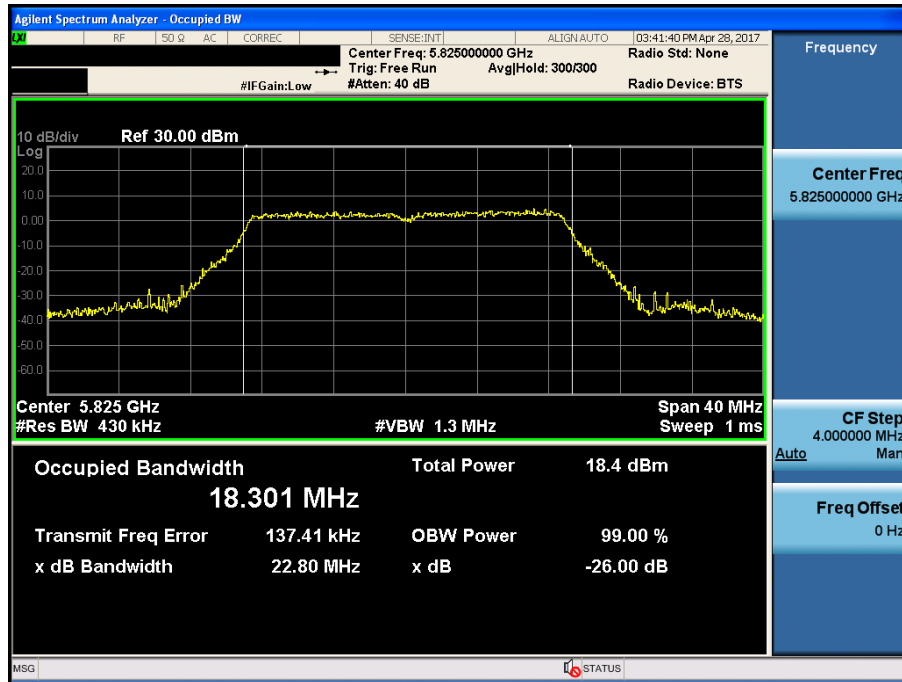
Test Mode: 802.11n(HT20) &amp; Ch.157





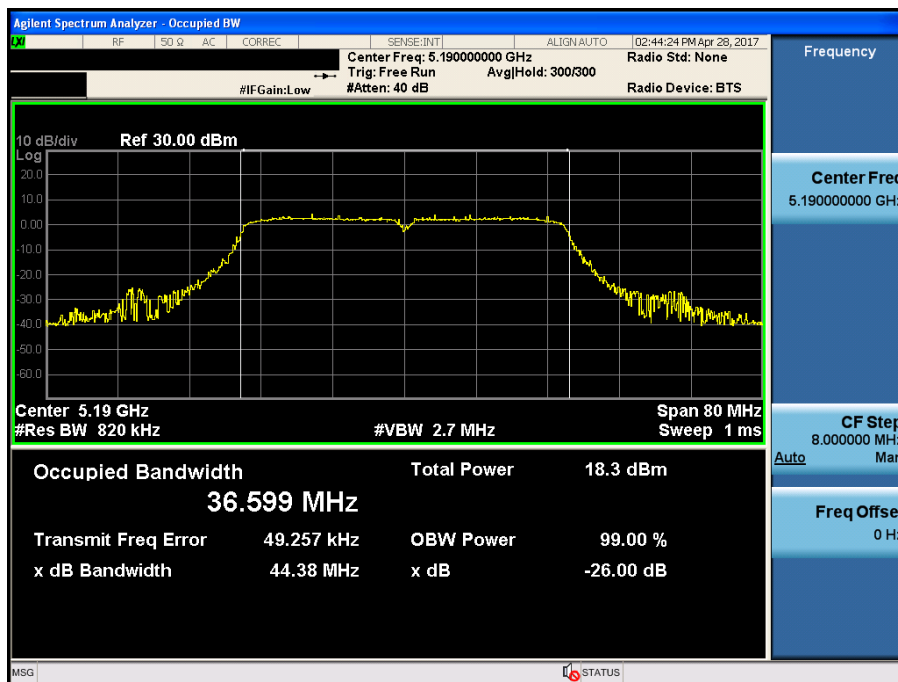
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.165



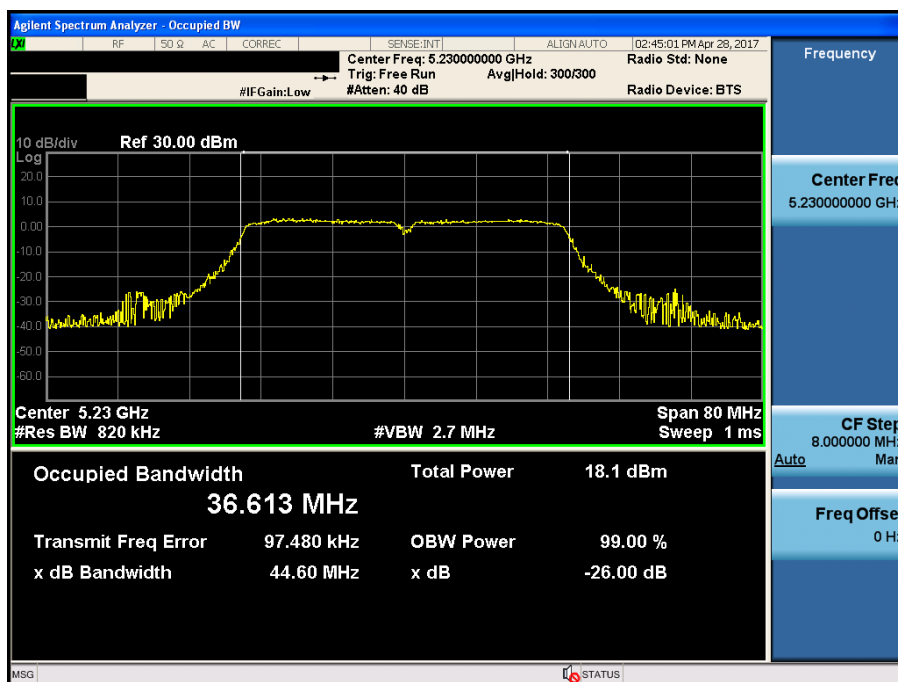
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.38



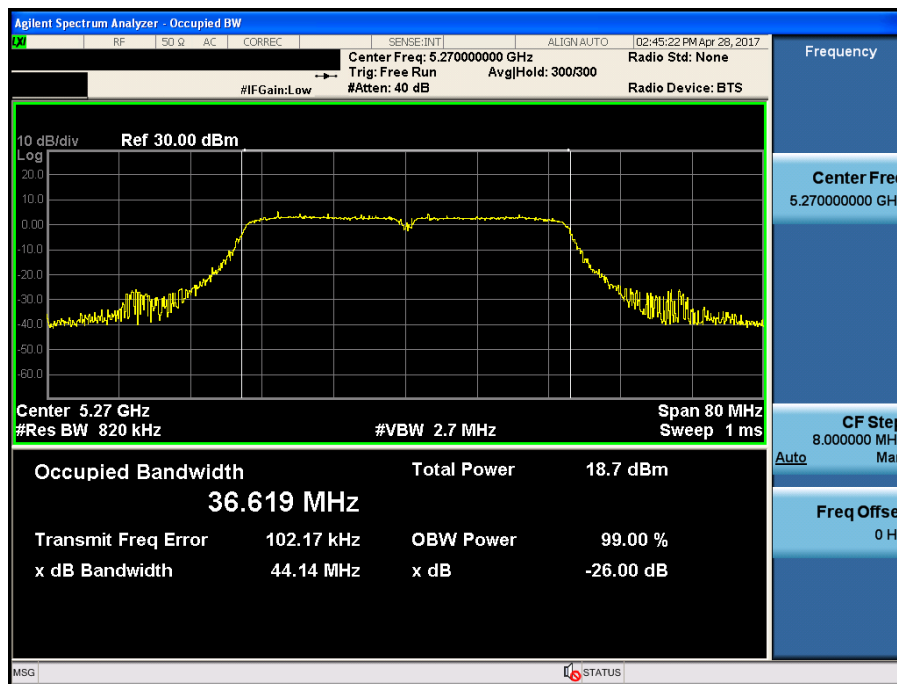
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.46



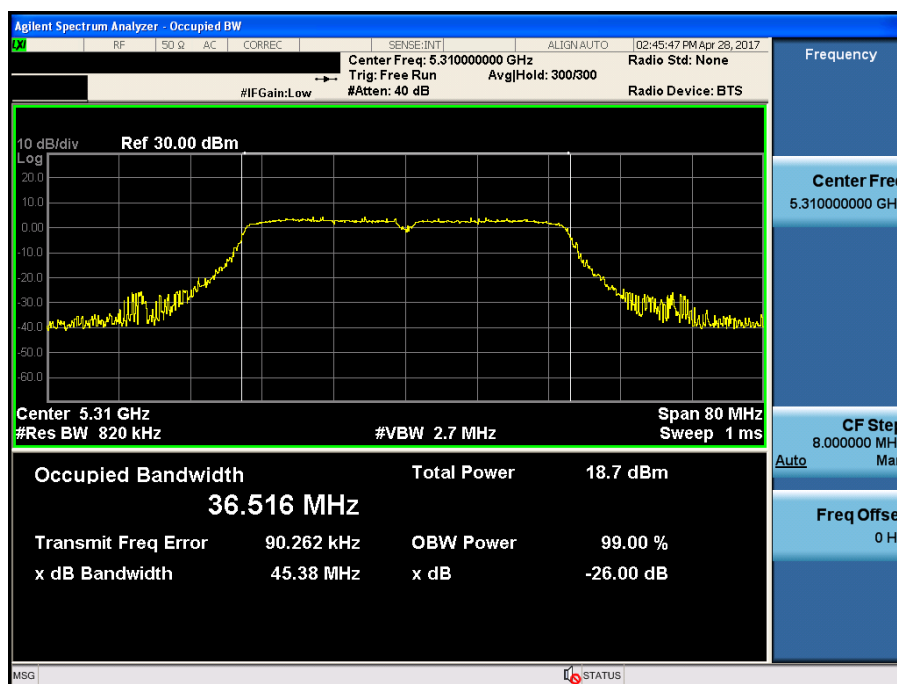
## Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) &amp; Ch.54



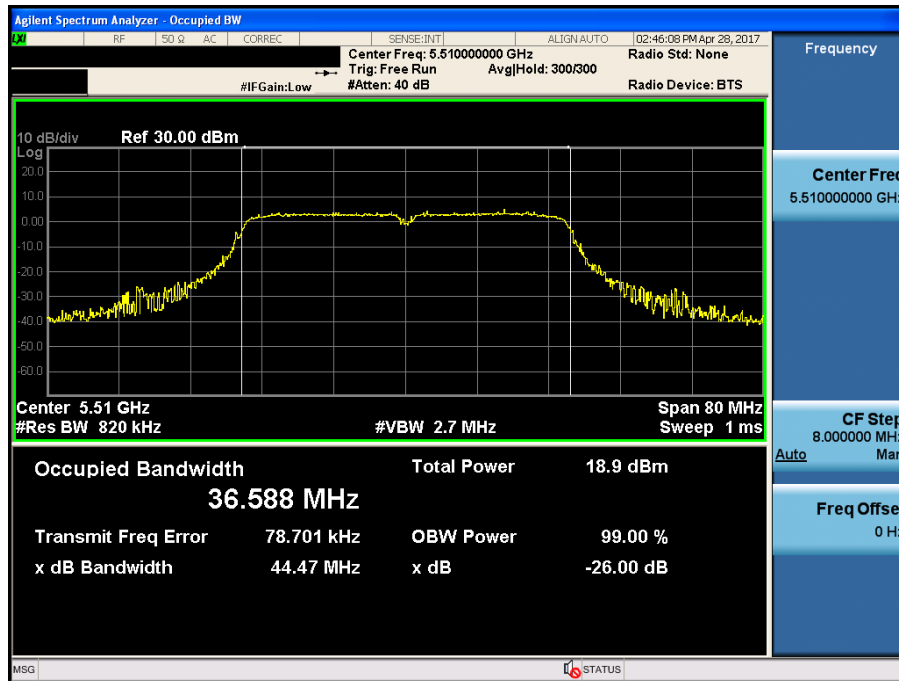
## Occupied Bandwidth 99%

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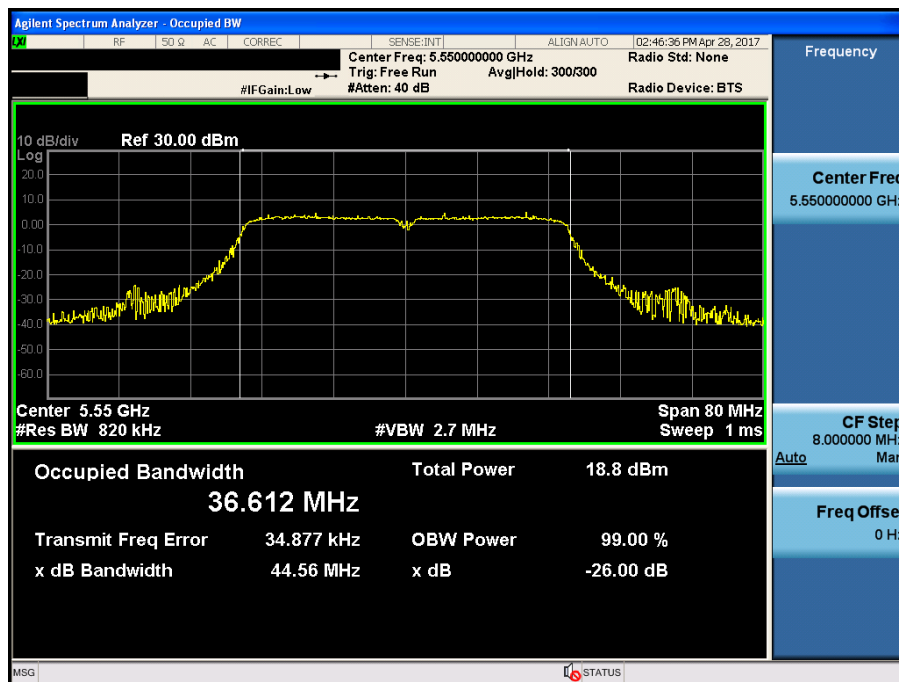
## Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) &amp; Ch.102



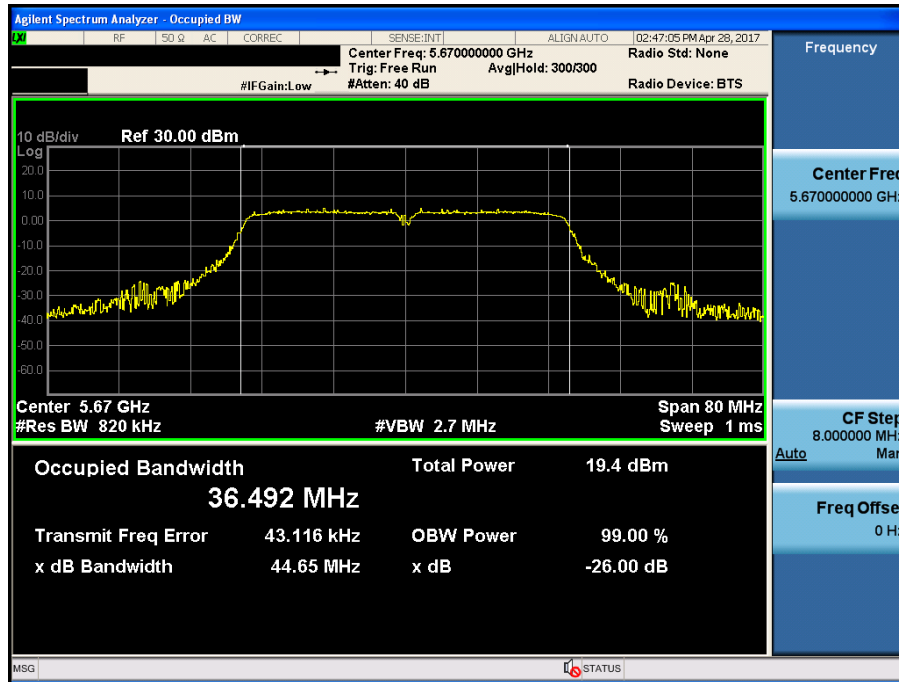
## Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) &amp; Ch.110



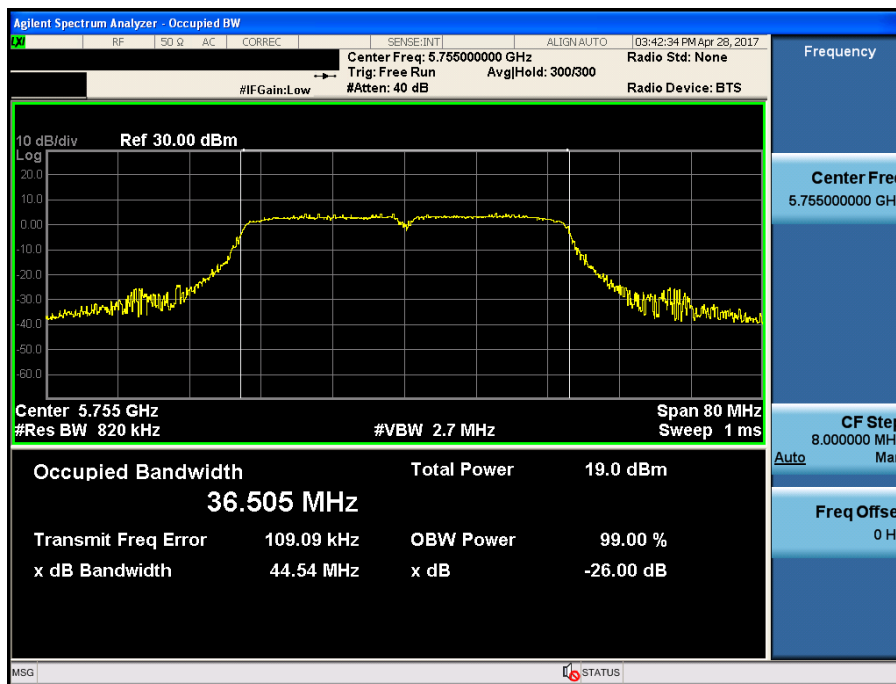
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.134



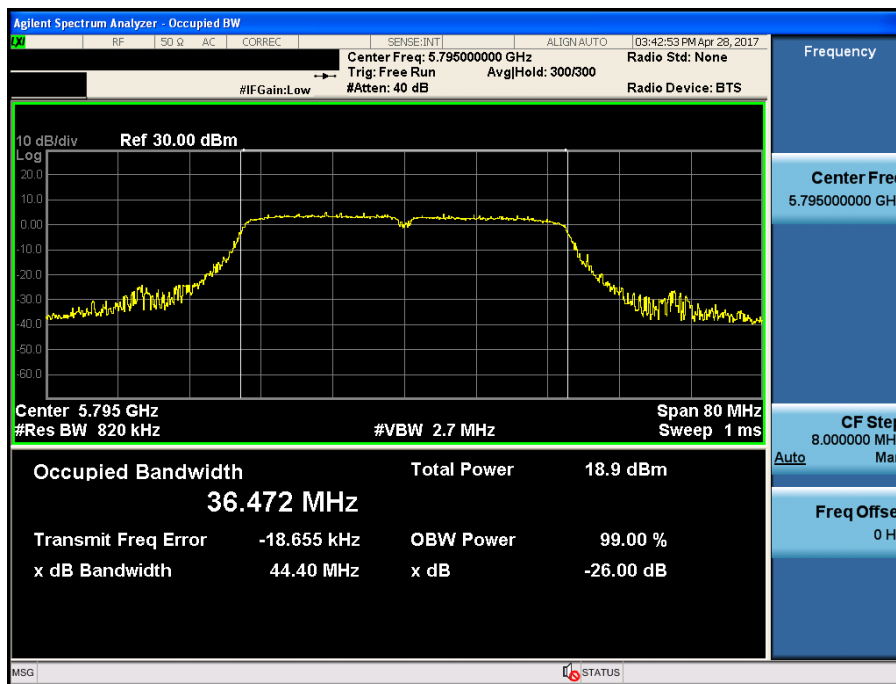
# Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.151



# Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.159



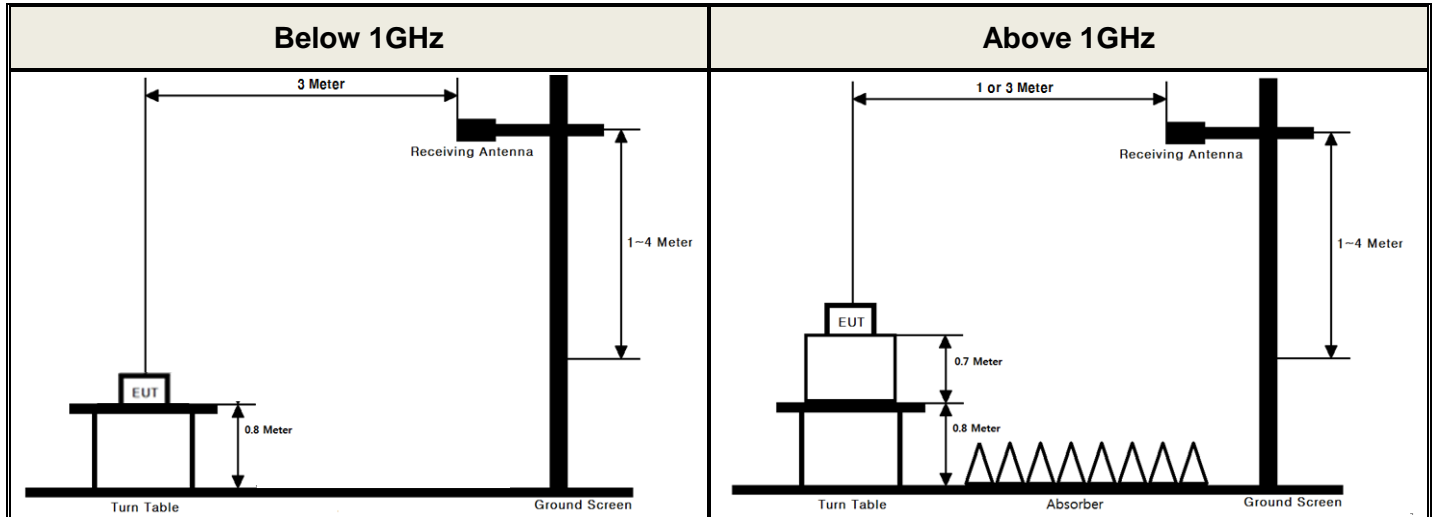
## 8. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	16/08/18	17/08/18	MY46471601
Spectrum Analyzer	Agilent Technologies	N9020A	16/10/11	17/10/11	MY46471251
Spectrum Analyzer	Agilent Technologies	N9030A	16/10/18	17/10/18	MY53310140
Multimeter	FLUKE	17B	17/04/12	18/04/12	26030065WS
DC Power Supply	Agilent Technologies	66332A	17/01/11	18/01/11	US37473831
Signal Generator	Rohde Schwarz	SMBV100A	17/01/04	18/01/04	255571
Signal Generator	Rohde Schwarz	SMF100A	16/06/23	17/06/23	102341
Thermohygrometer	HCT	HCT-1	16/09/09	17/09/09	NONE
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
Bilog Antenna	Schwarzbeck	VULB 9160	16/05/13	18/05/13	3358
Horn Antenna	ETS-LINDGREN	3117	16/05/03	18/05/03	00140394
Horn Antenna	A.H.Systems Inc.	SAS-574	15/09/03	17/09/03	155
PreAmplifier	Agilent	8449B	17/01/11	18/01/11	3008A00370
PreAmplifier	TSJ	MLA-010K01-B01-27	17/03/06	18/03/06	1844539
PreAmplifier	A.H.Systems Inc.	PAM-1840VH	16/12/04	17/12/04	163
EMI Test Receiver	Rohde Schwarz	ESR7	17/02/16	18/02/16	101061
EMI TEST RECEIVER	R&S	ESCI	17/02/26	18/02/16	100364
Highpass Filter	Wainwright Instruments	WHNX6-6320-8000-26500-40CC	16/09/13	17/09/13	1
Temp & Humi Test Chamber	SJ Science	TEMI850-10	17/01/25	18/01/25	SJ-TH-S50-120203
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	16/10/19	17/10/19	1338003 1249304
50W 10dB ATT	SMAJK	SMAJK-50-10	16/10/18	17/10/18	2-50-10
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	17/01/03	18/01/03	101334
SINGLE-PHASE MASTER	NF	4420	16/09/08	17/09/08	3049354420023
Artificial Mains Network	Narda S.T.S. / PMM	PMM L2-16B	16/06/22	17/06/22	000WX20305

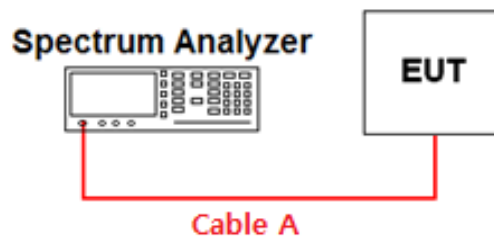
## APPENDIX I

### Test set up diagrams

#### ▪ Radiated Measurement



#### ▪ Conducted Measurement





## APPENDIX II

### Duty Cycle Information

#### ■ Test Procedure

**Duty Cycle  $[X = \text{On Time} / (\text{On} + \text{Off time})]$**  is measured using Measurement Procedure of **KDB789033 D02 V01**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW  $\geq$  EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW  $\geq$  RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are  $> 50/T$** , where  $T$  is defined in section II.B.1.a), and **the number of sweep points across duration  $T$  exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if  $T \leq 16.7$  microseconds.)

$T$  : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

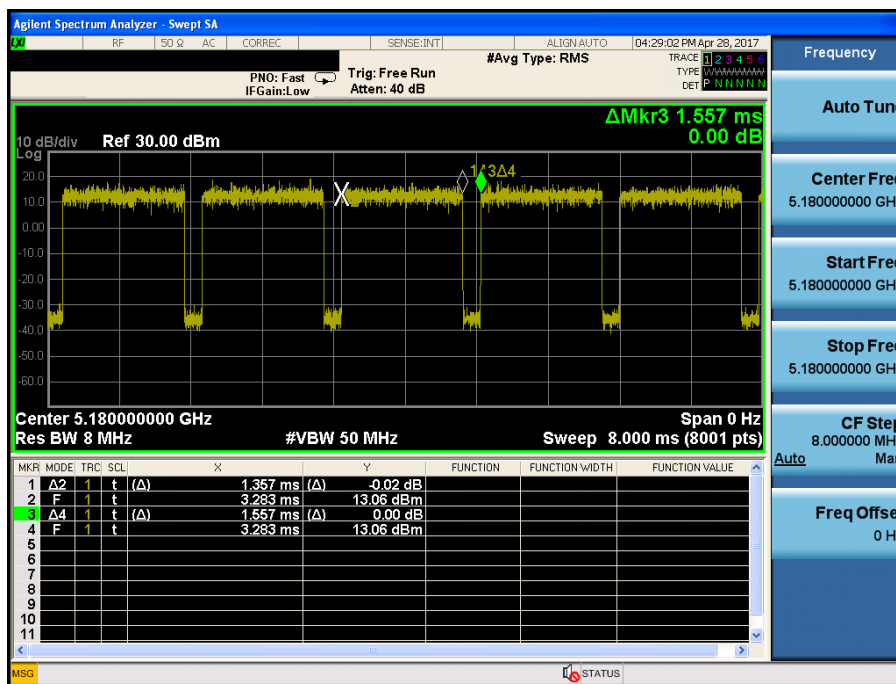
( $T = \text{On time}$  of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

#### ■ Test Results:

Mode	Channel	Tested Frequency [MHz]	Maximum Achievable Duty Cycle ( $x$ ) = On / (On+Off)			Duty Cycle Correction Factor [dB]	1/T [Hz]
			On Time [ms]	On+OffTime [ms]	$x$		
802.11a	36	5180	1.357	1.557	0.87	0.61	736.92
802.11n (HT20)	36	5180	1.272	1.472	0.86	0.66	786.17
802.11n (HT40)	38	5190	0.631	0.831	0.75	1.25	1584.79

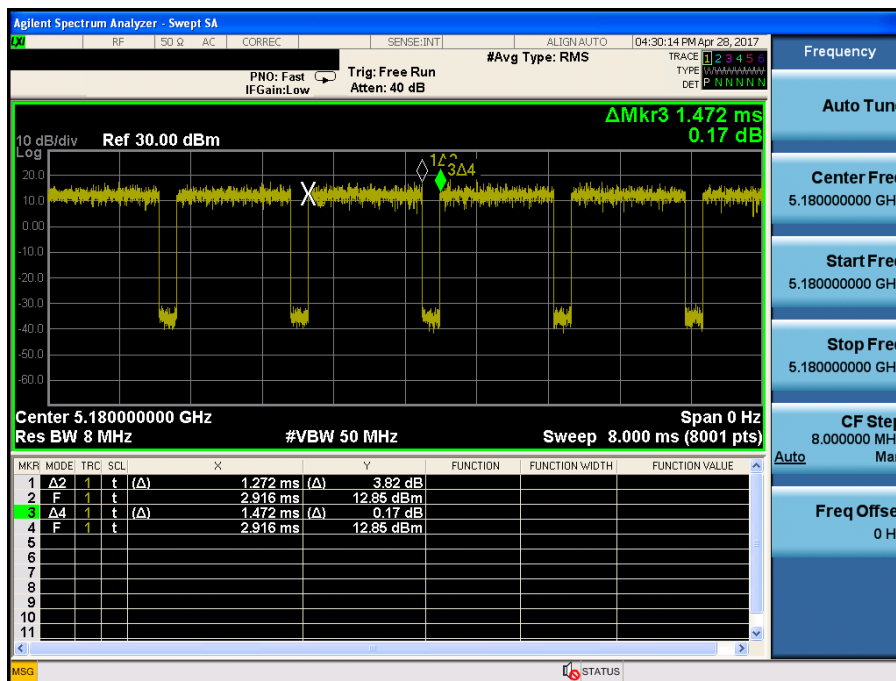
## Duty Cycle

Test Mode: 802.11a & Ch.36



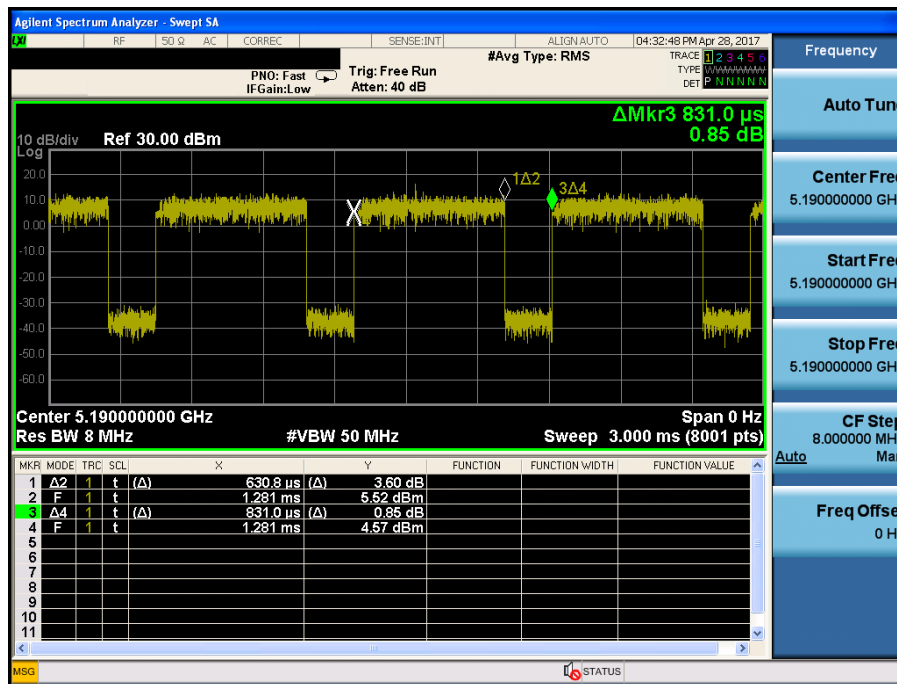
## Duty Cycle

Test Mode: 802.11n(HT20) & Ch.36



# Duty Cycle

Test Mode: 802.11n(HT40) & Ch.38

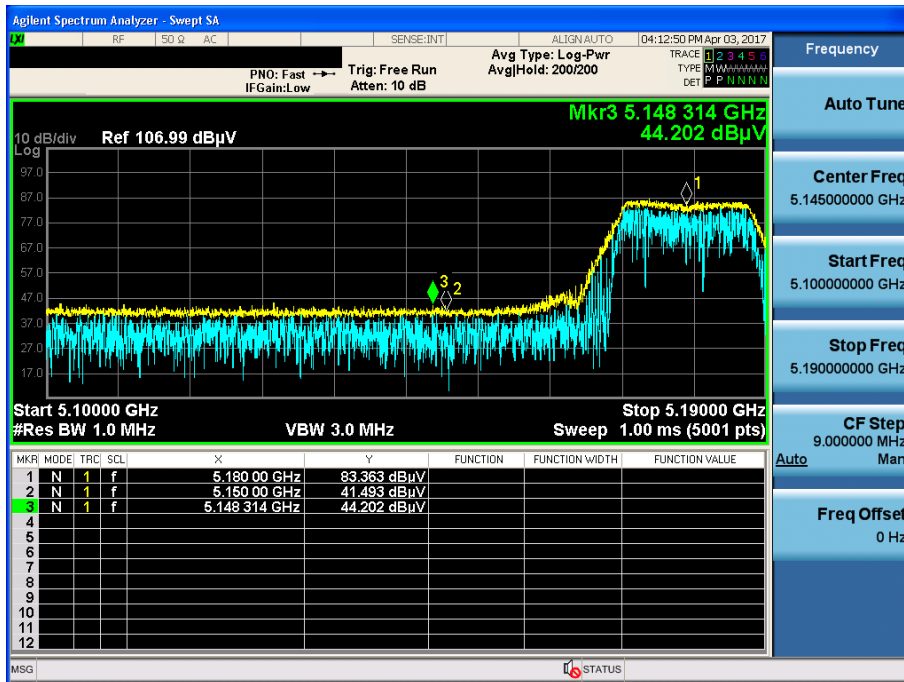


## APPENDIX III

## Unwanted Emissions (Radiated) Test Plot

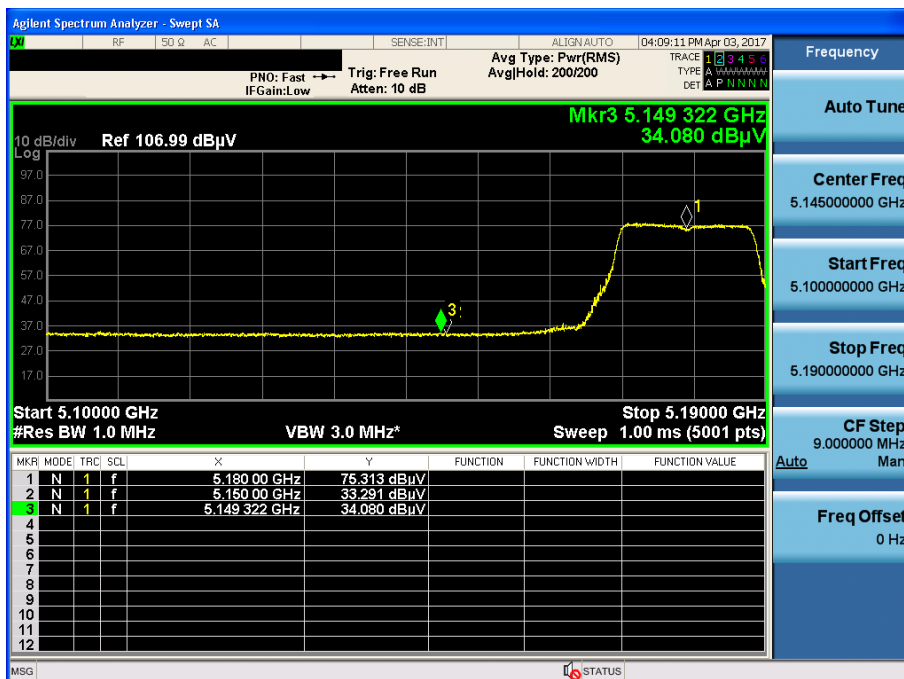
802.11a &amp; U-NII 1 &amp; Ch.36 &amp; X axis &amp; Hor

Detector Mode : PK



802.11a &amp; U-NII 1 &amp; Ch.36 &amp; X axis &amp; Hor

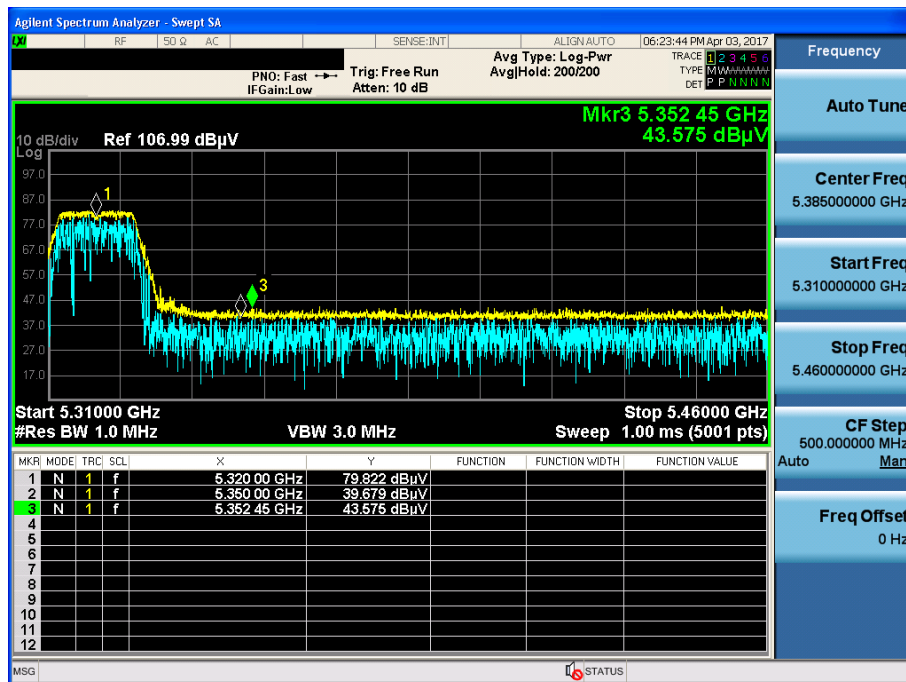
Detector Mode : AV





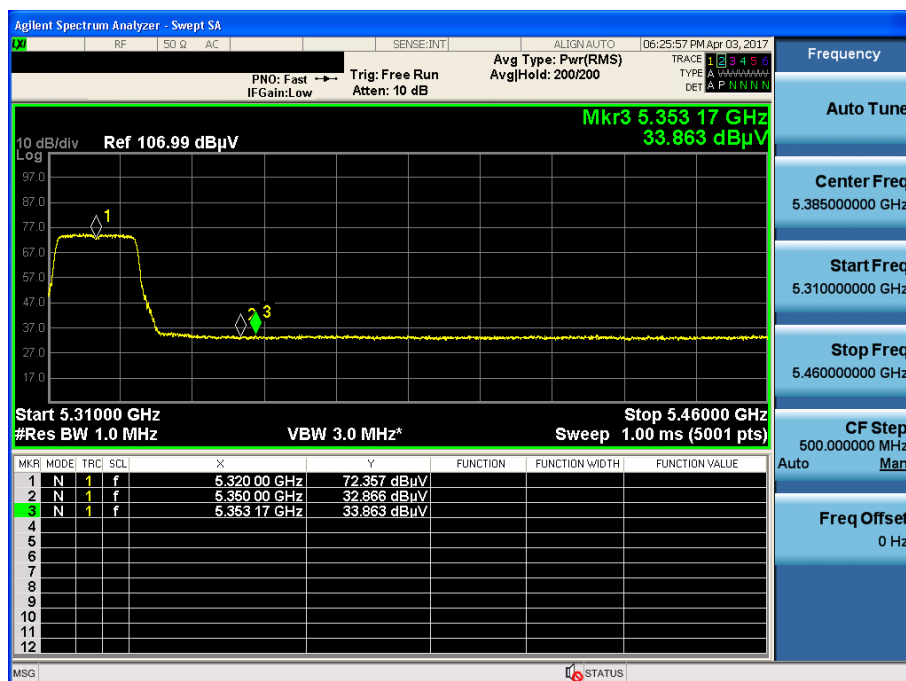
802.11a &amp; U-NII 2A &amp; Ch.64 &amp; X axis &amp; Ver

Detector Mode : PK



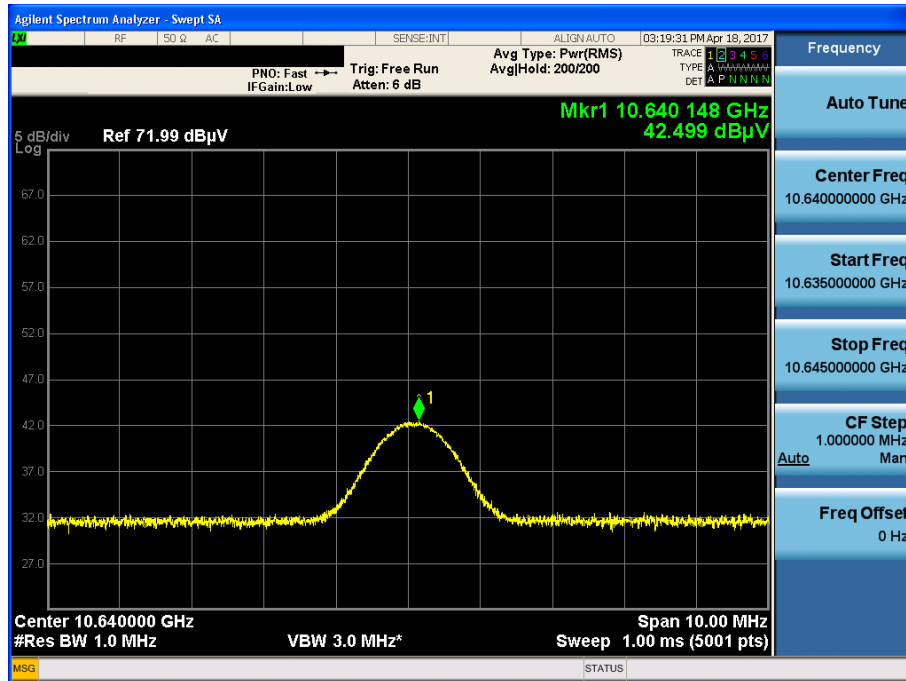
802.11a &amp; U-NII 2A &amp; Ch.64 &amp; X axis &amp; Ver

Detector Mode : AV



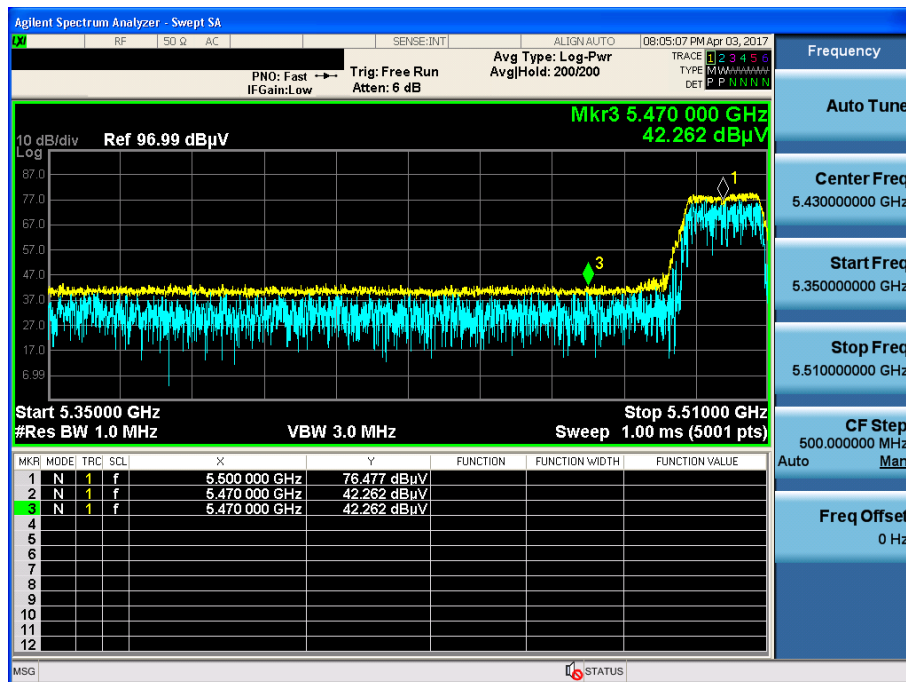
802.11a & U-NII 2A & Ch.60 & Z axis & Ver

Detector Mode : AV



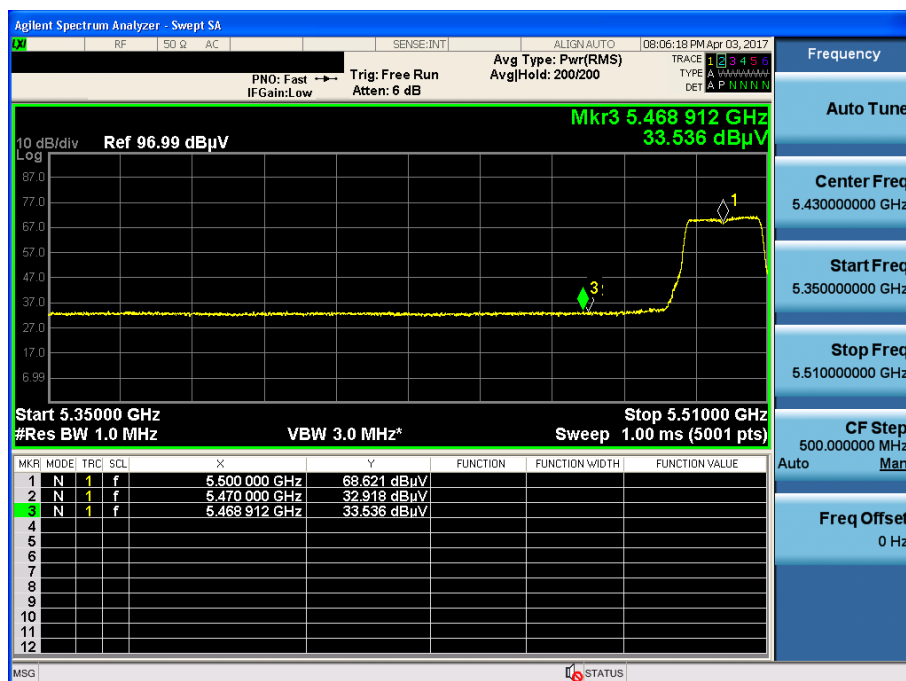
802.11a &amp; U-NII 2C &amp; Ch.100 &amp; X axis &amp; Ver

Detector Mode : PK



802.11a &amp; U-NII 2C &amp; Ch.100 &amp; X axis &amp; Ver

Detector Mode : AV

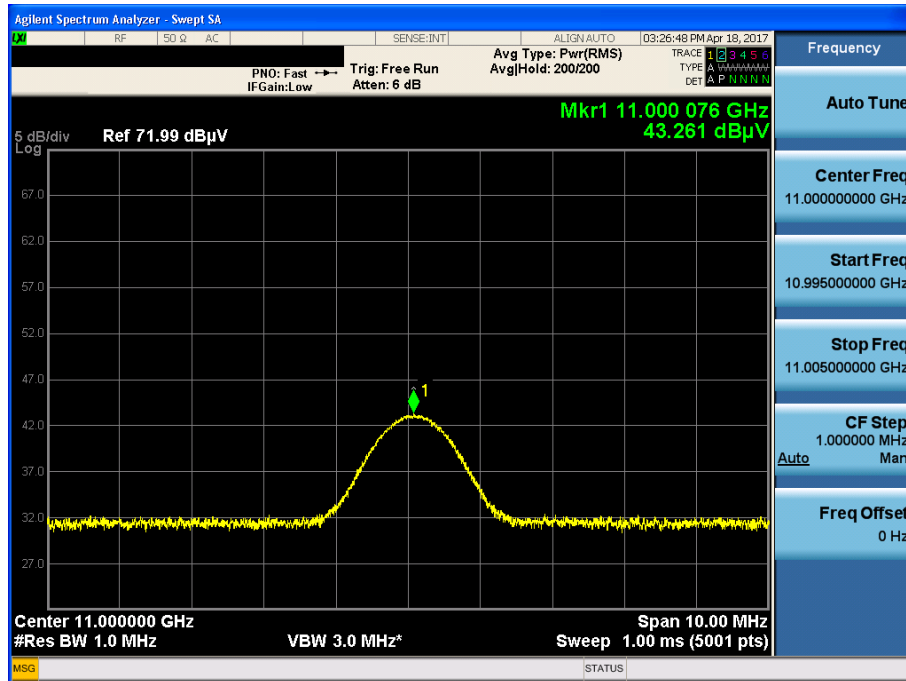






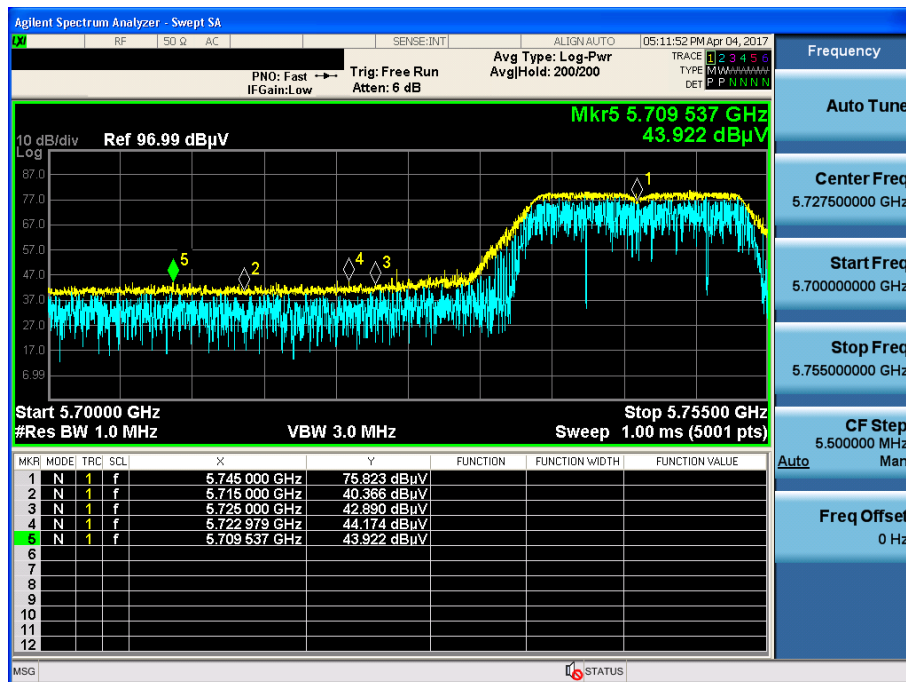
802.11a & U-NII 2C & Ch.100 & Z axis & Ver

Detector Mode : AV



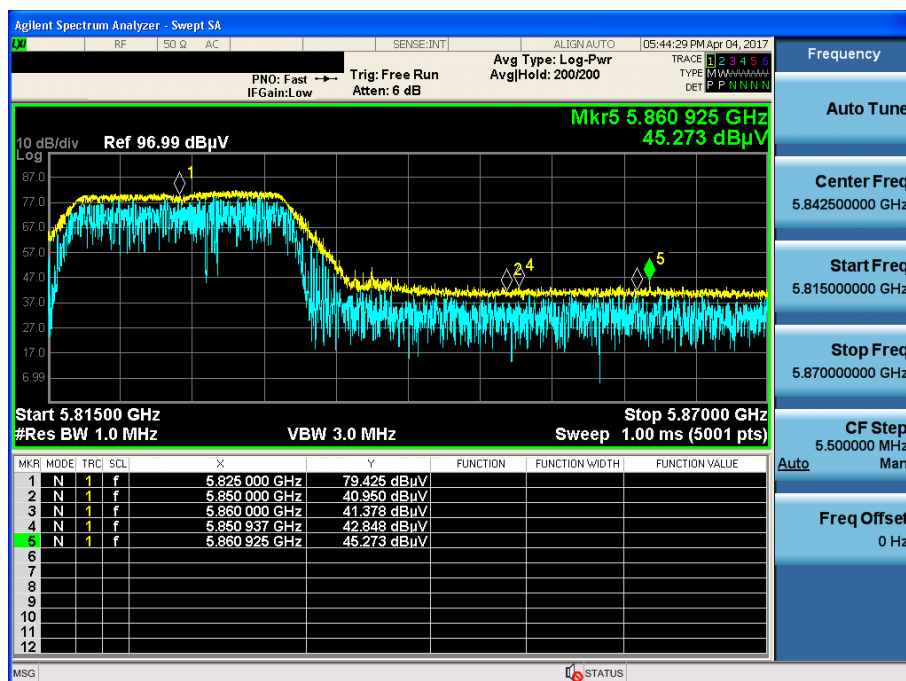
## 802.11a &amp; U-NII 3 &amp; Ch.149 &amp; Z axis &amp; Ver

Detector Mode : PK



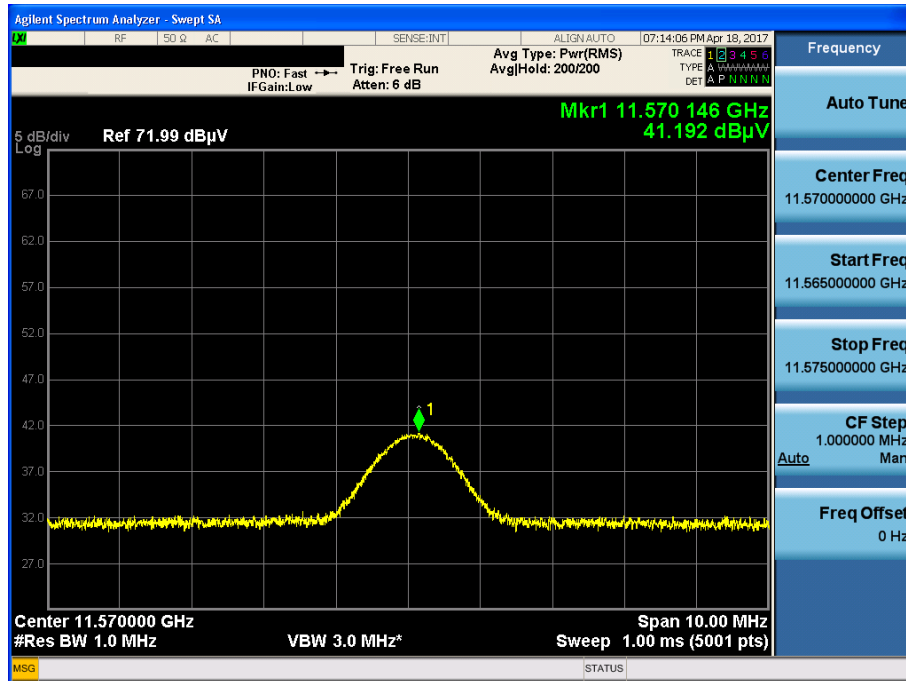
## 802.11a &amp; U-NII 3 &amp; Ch.165 &amp; Z axis &amp; Ver

Detector Mode : PK

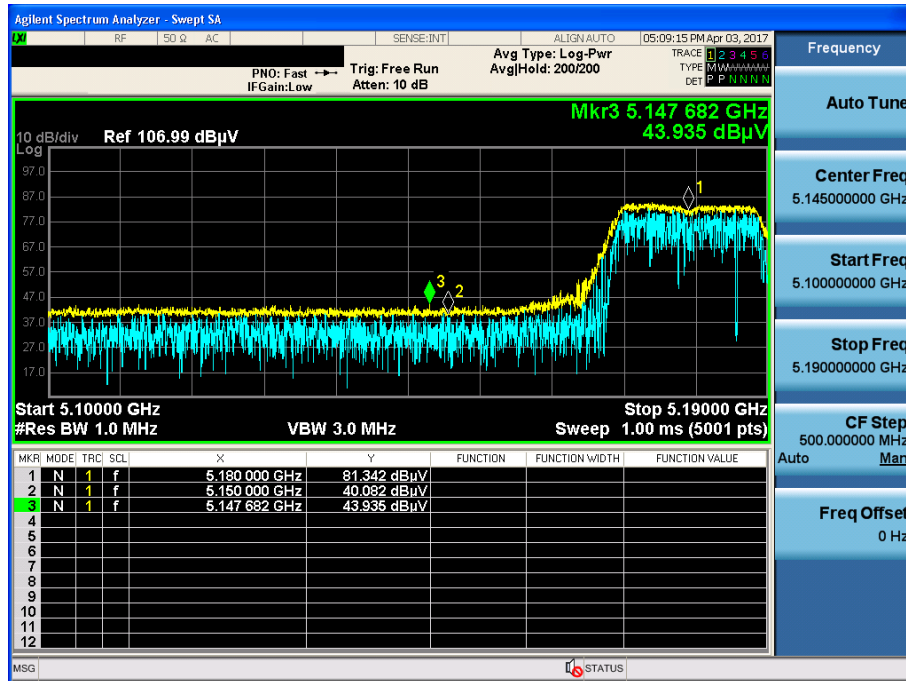


802.11a & U-NII 3 & Ch.157 & Z axis & Ver

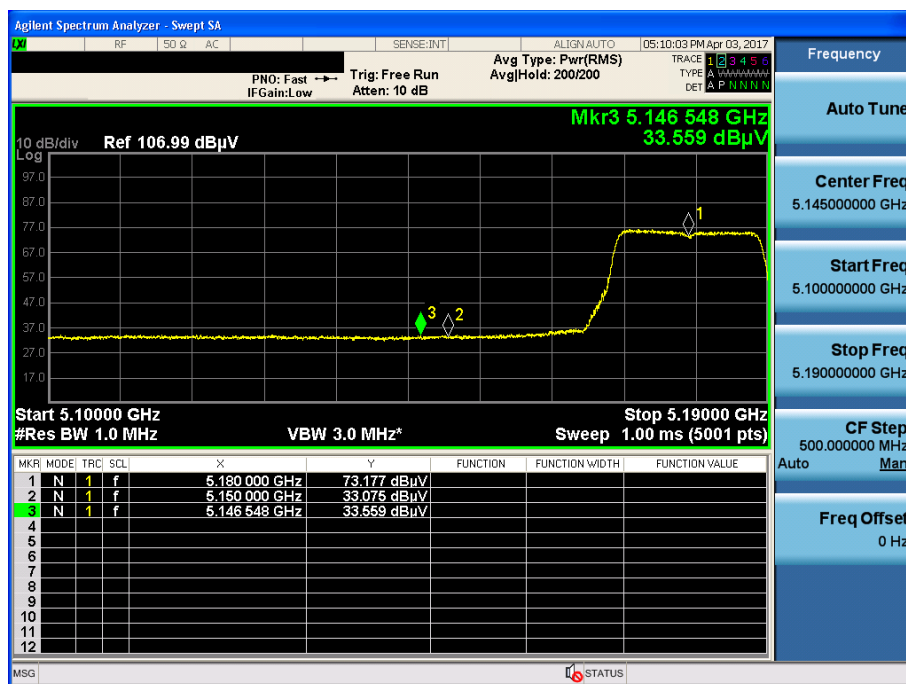
Detector Mode : AV



**Detector Mode : PK**

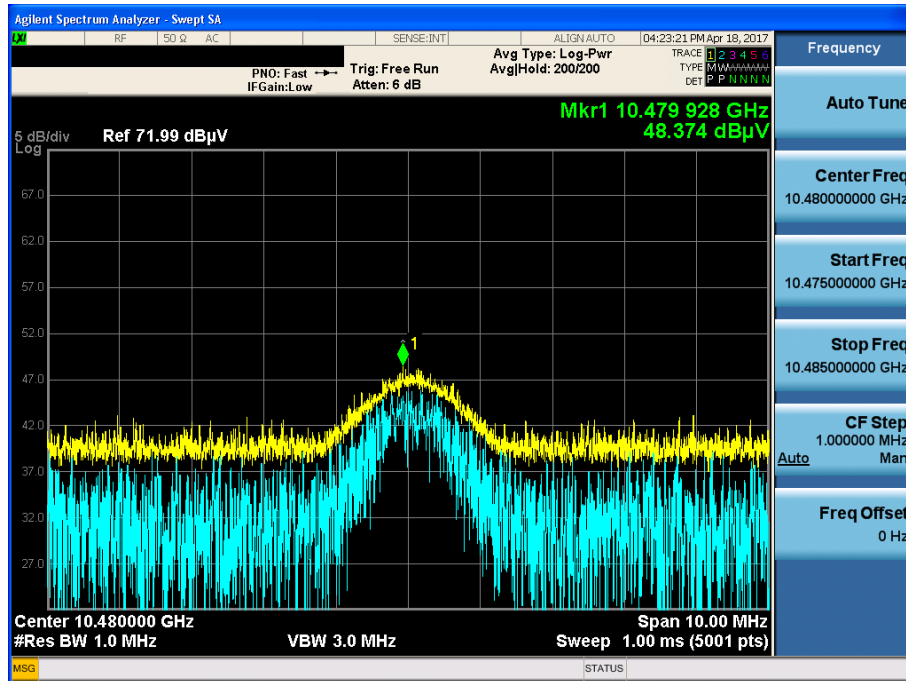


**Detector Mode : AV**



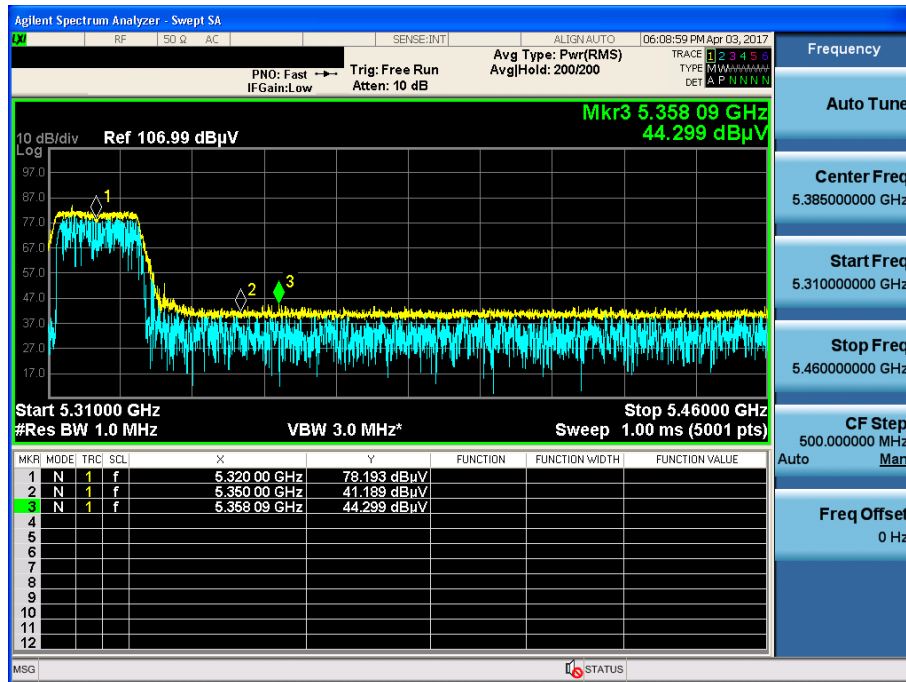
802.11n(HT20) & U-NII 1 & Ch.48 & Z axis & Ver

Detector Mode : PK



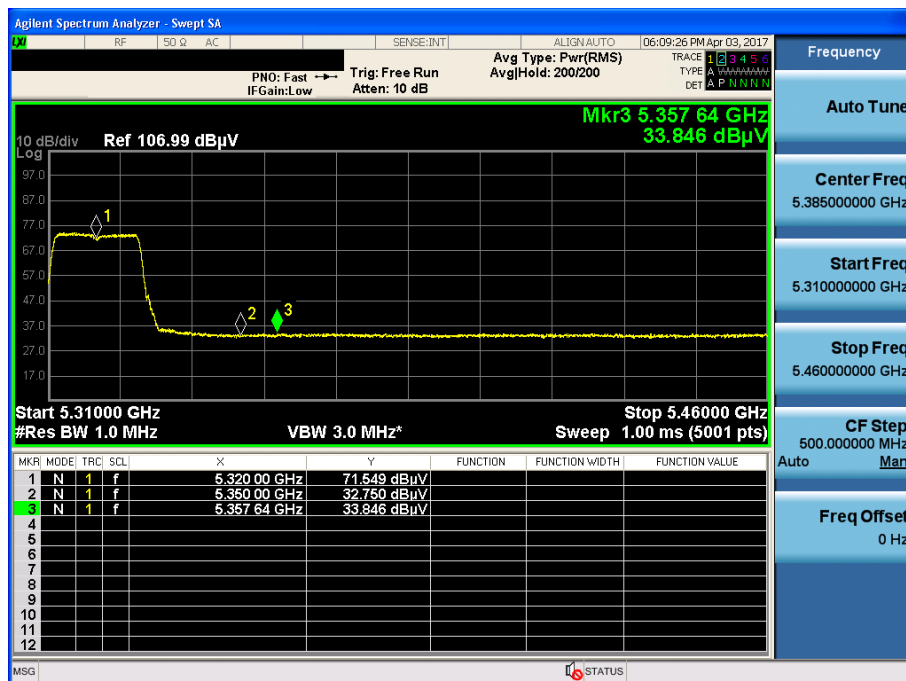
802.11n(HT20) &amp; U-NII 2A &amp; Ch.64 &amp; X axis &amp; Ver

Detector Mode : PK



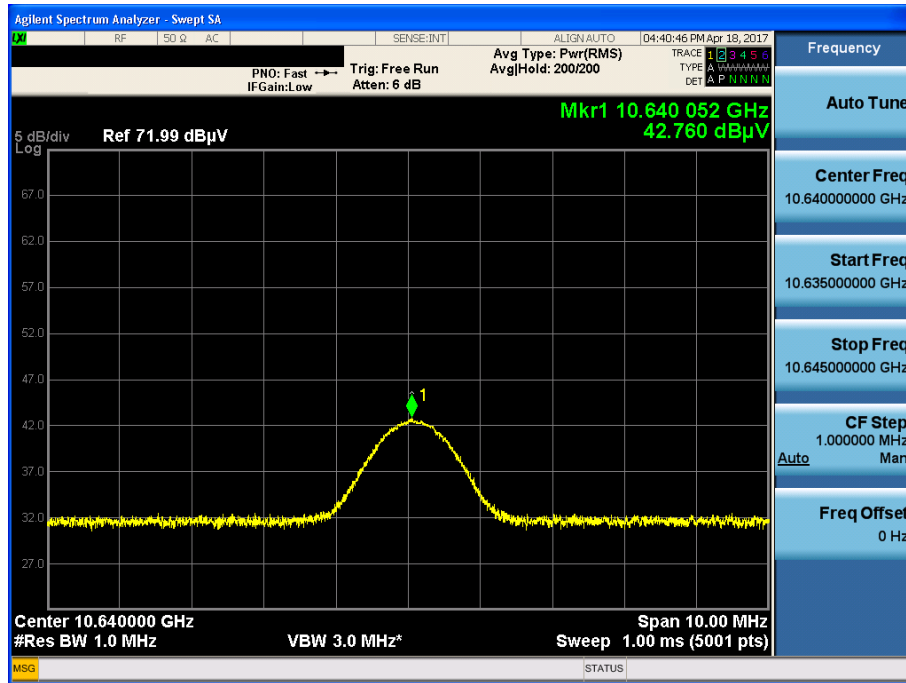
802.11n(HT20) &amp; U-NII 2A &amp; Ch.64 &amp; X axis &amp; Ver

Detector Mode : AV



802.11n(HT20) & U-NII 2A & Ch.64 & Z axis & Ver

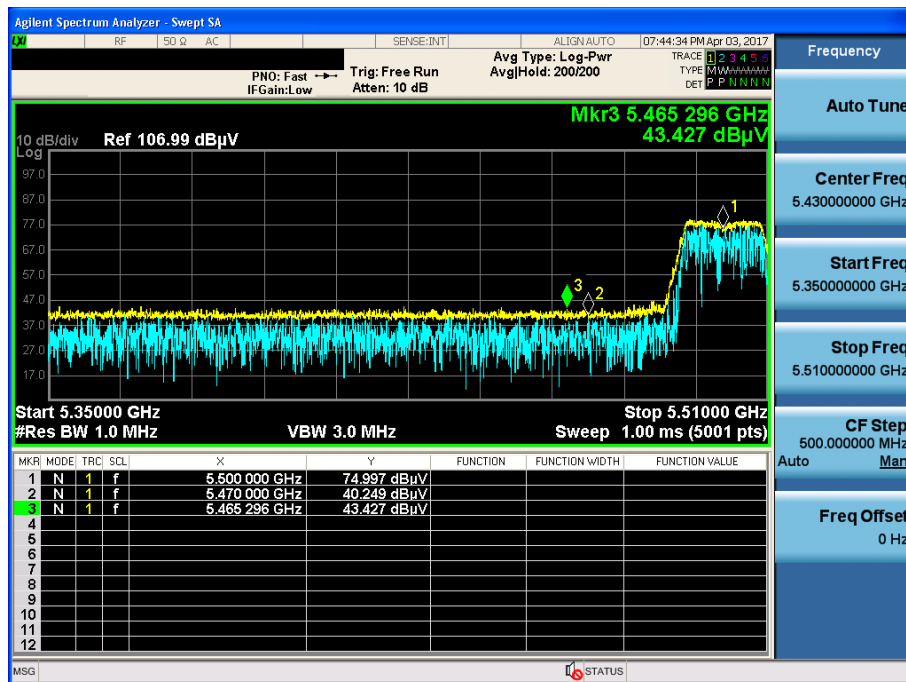
Detector Mode : AV





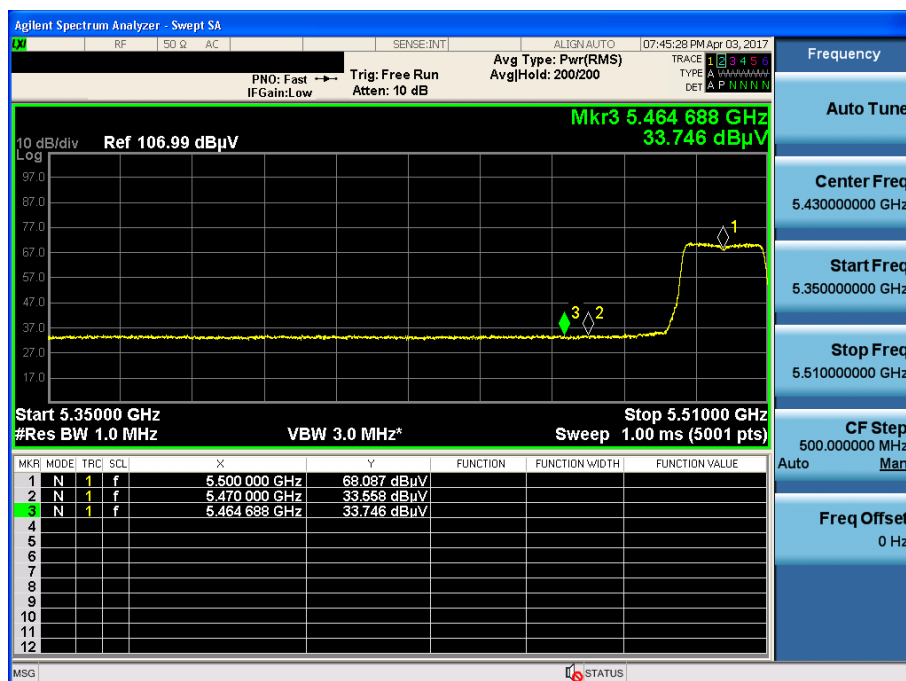
802.11n(HT20) &amp; U-NII 2C &amp; Ch.100 &amp; X axis &amp; Ver

Detector Mode : PK



802.11n(HT20) &amp; U-NII 2C &amp; Ch.100 &amp; X axis &amp; Ver

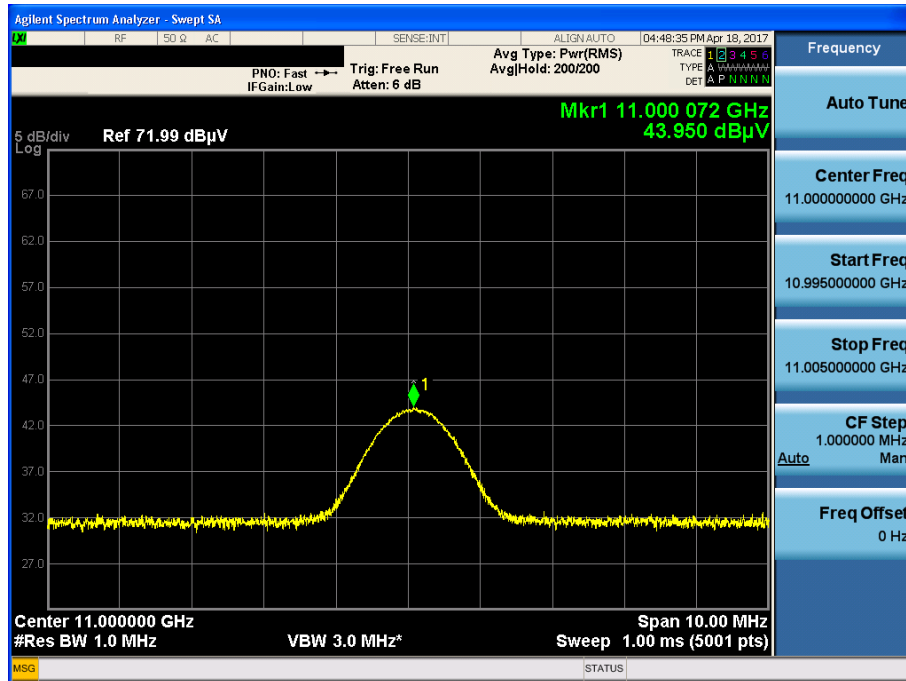
Detector Mode : AV



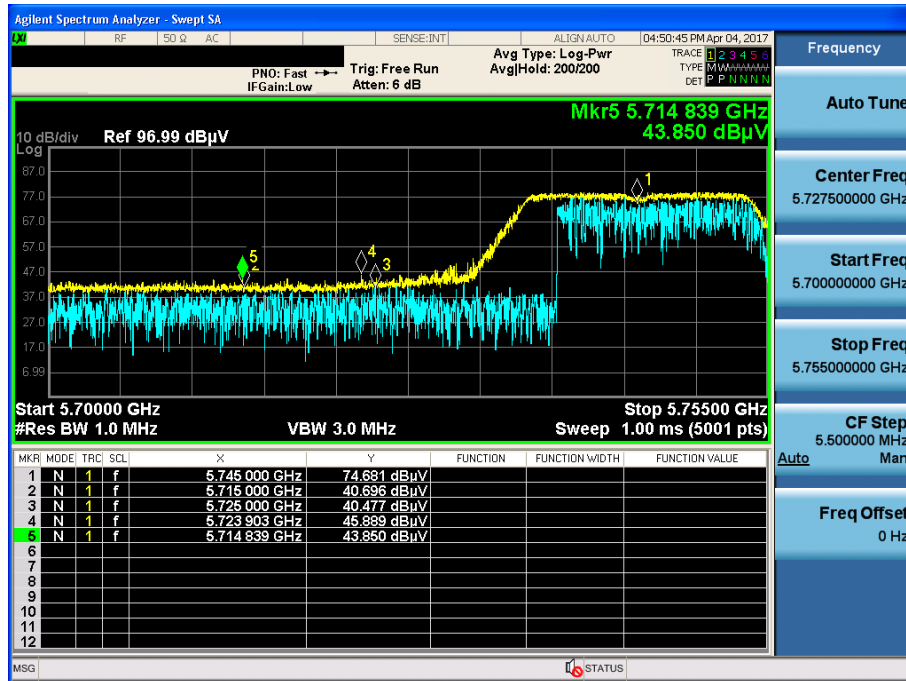


802.11n(HT20) & U-NII 2C & Ch.100 & Z axis & Ver

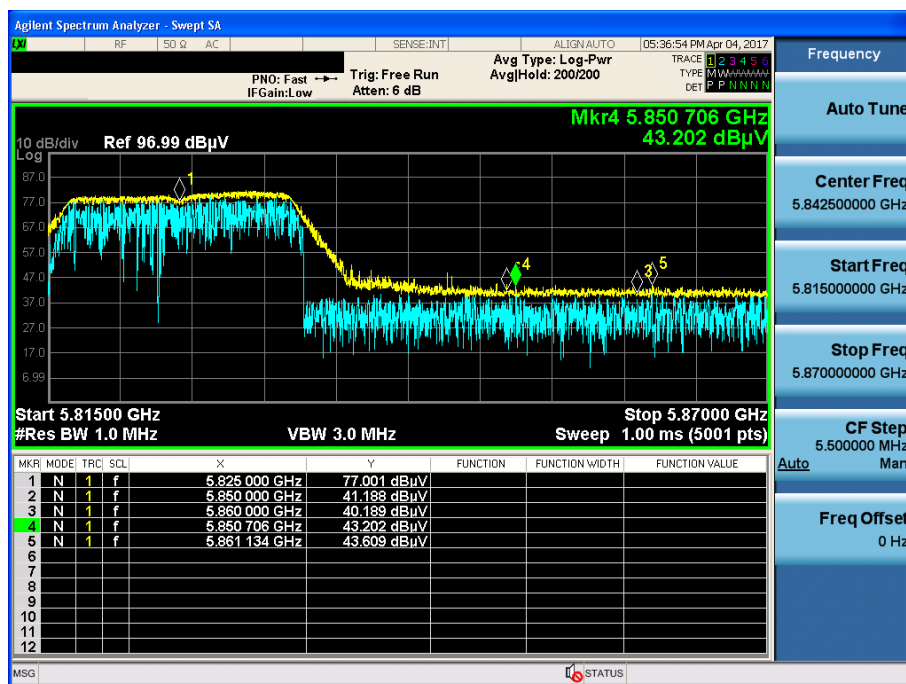
Detector Mode : AV



**Detector Mode : PK**

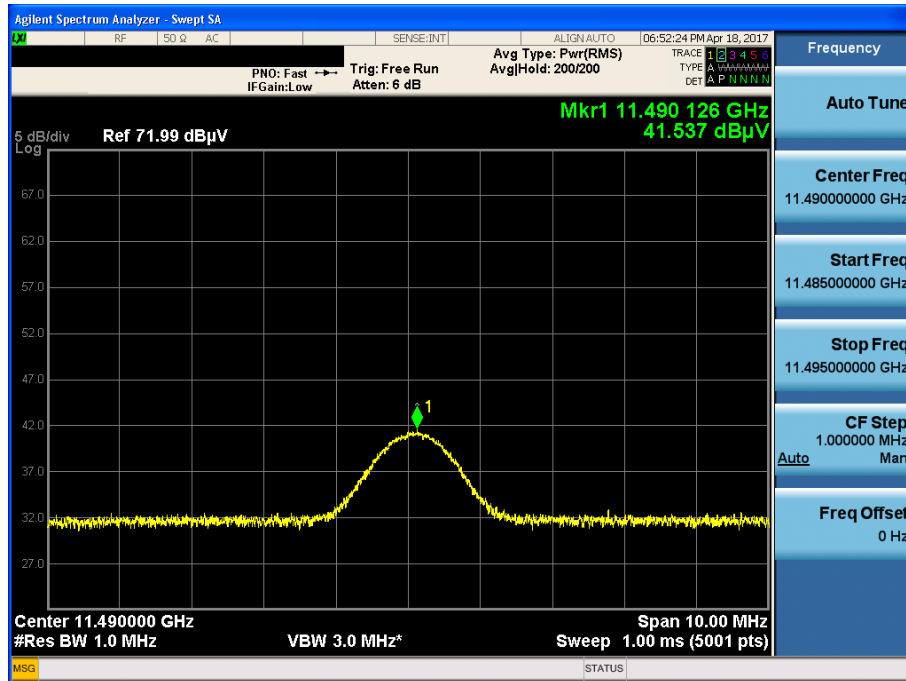


**Detector Mode : PK**



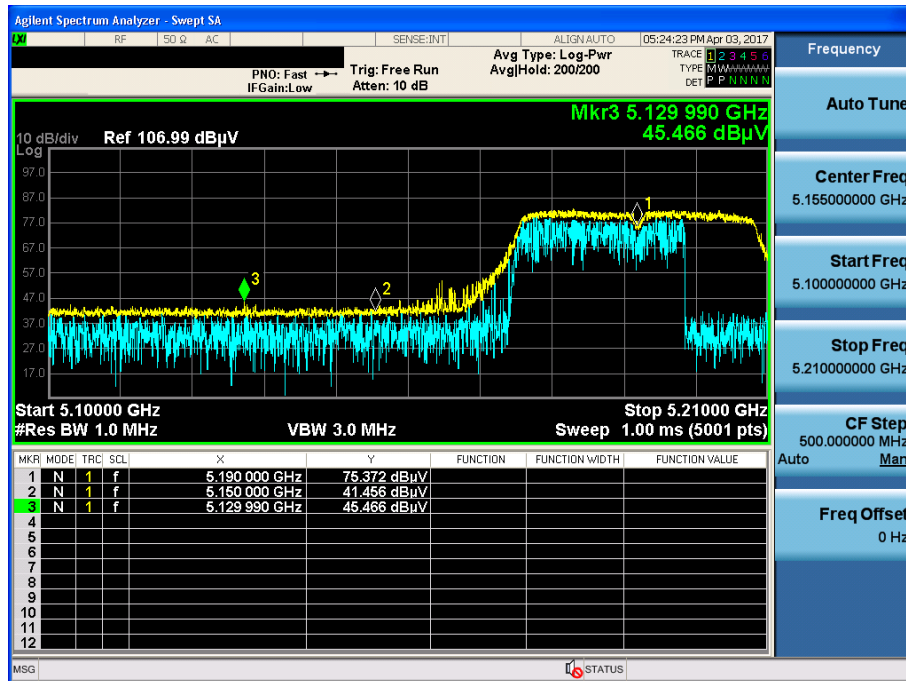
802.11n(HT20) & U-NII 3 & Ch.149 & Z axis & Ver

Detector Mode : AV



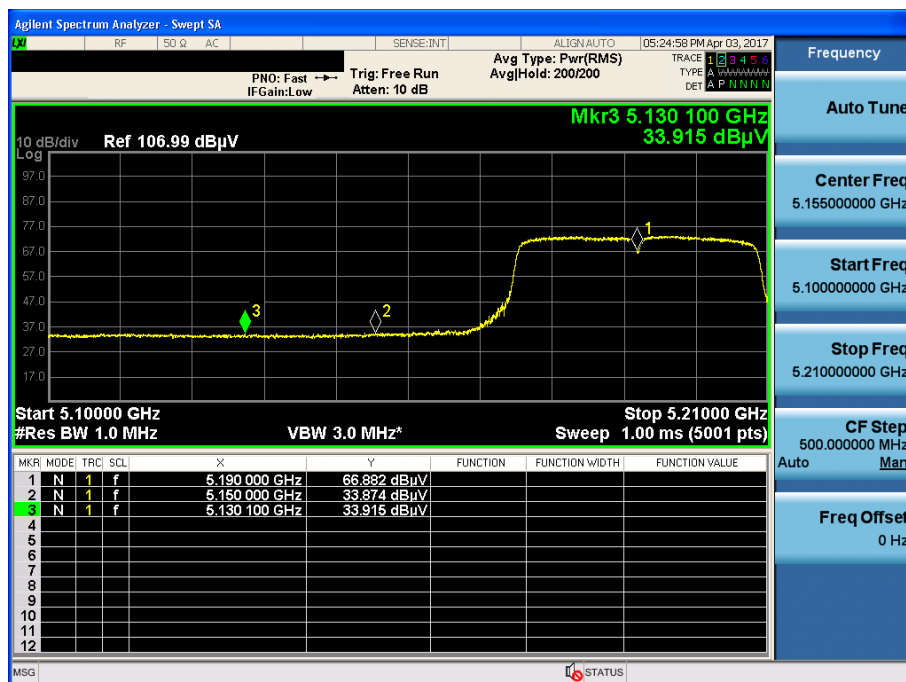
802.11n(HT40) &amp; U-NII 1 &amp; Ch.38 &amp; X axis &amp; Hor

Detector Mode : PK



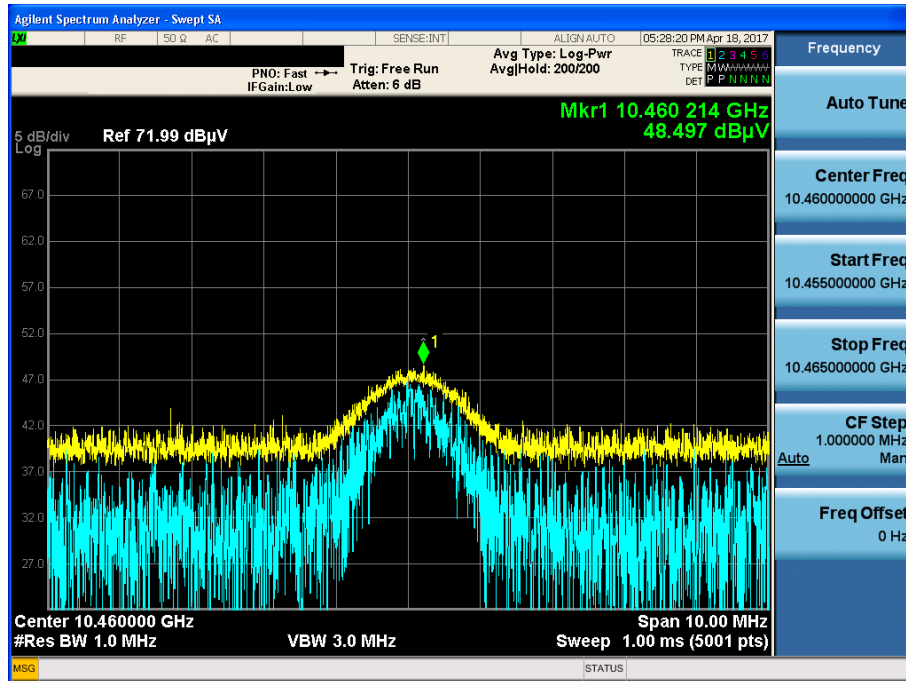
802.11n(HT40) &amp; U-NII 1 &amp; Ch.38 &amp; X axis &amp; Hor

Detector Mode : AV



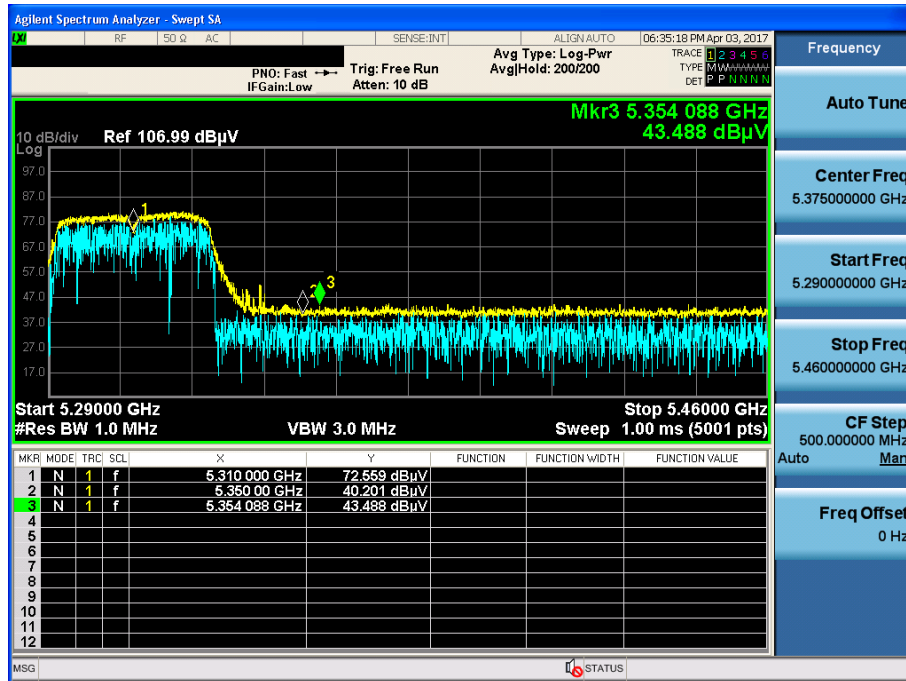
802.11n(HT40) & U-NII 1 & Ch.46 & Z axis & Ver

Detector Mode : PK



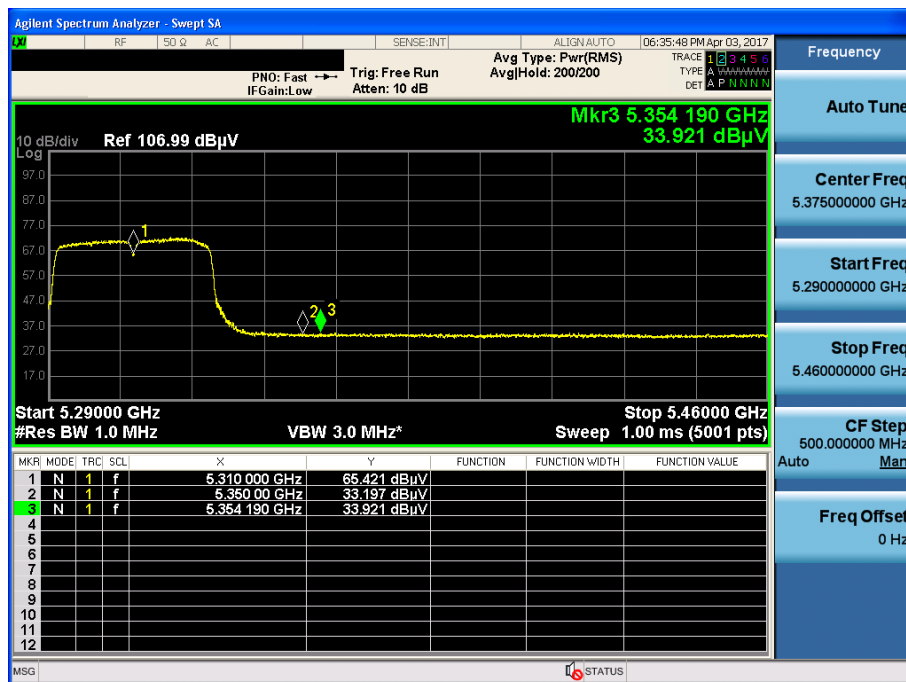
802.11n(HT40) & U-NII 2A & Ch.62 & X axis & Hor

Detector Mode : PK



802.11n(HT40) & U-NII 2A & Ch.62 & X axis & Hor

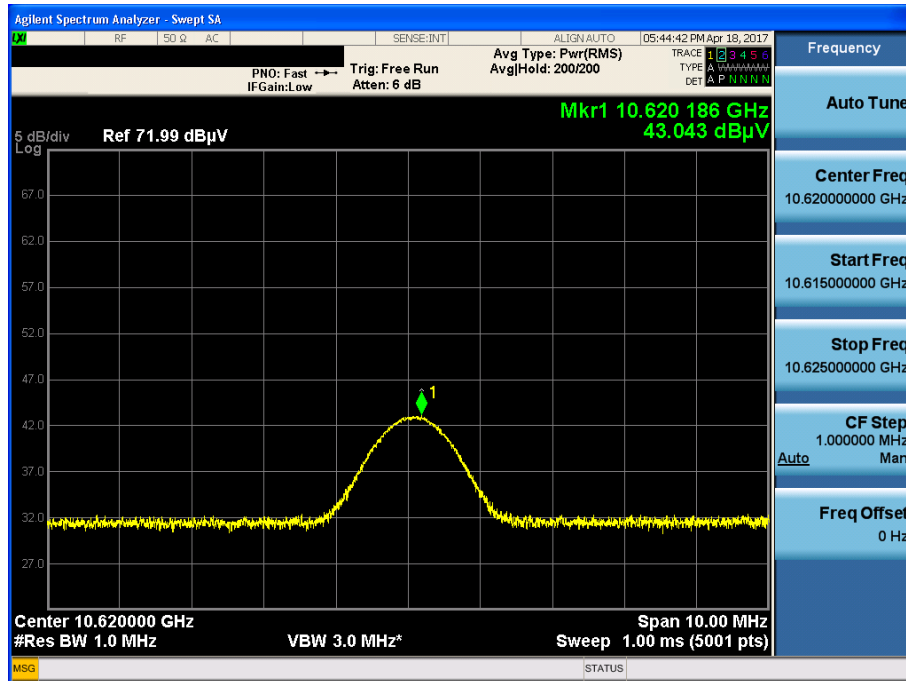
Detector Mode : AV





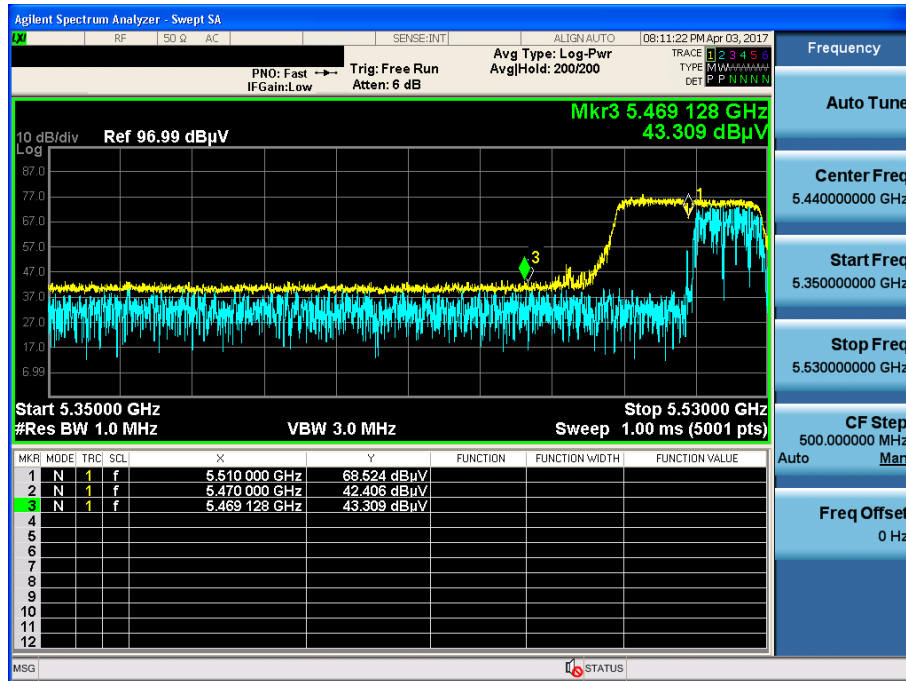
802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Ver

Detector Mode : AV



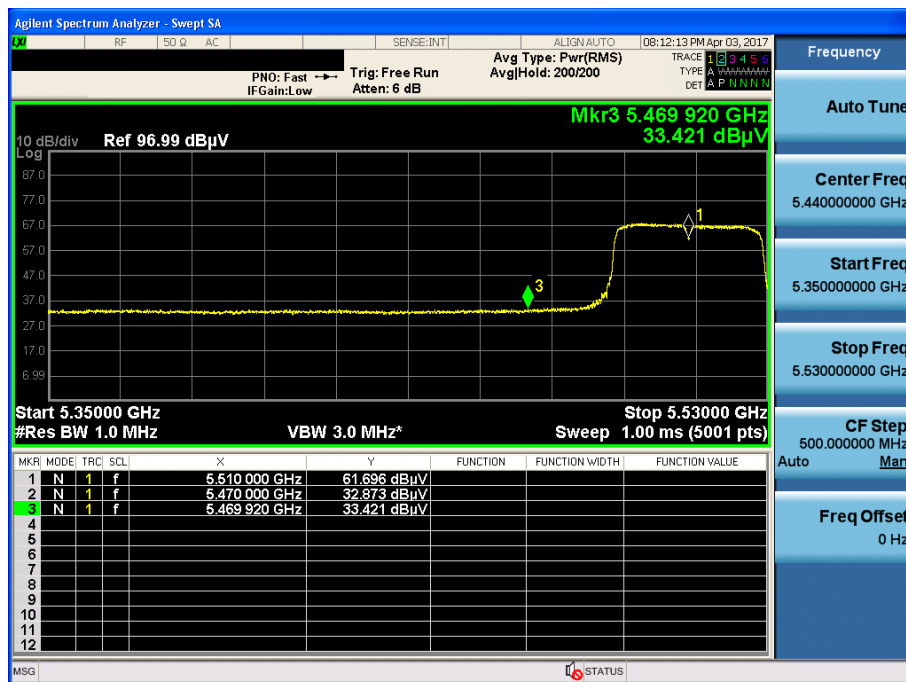
802.11n(HT40) &amp; U-NII 2C &amp; Ch.102 &amp; X axis &amp; Hor

Detector Mode : PK



802.11n(HT40) &amp; U-NII 2C &amp; Ch.102 &amp; X axis &amp; Hor

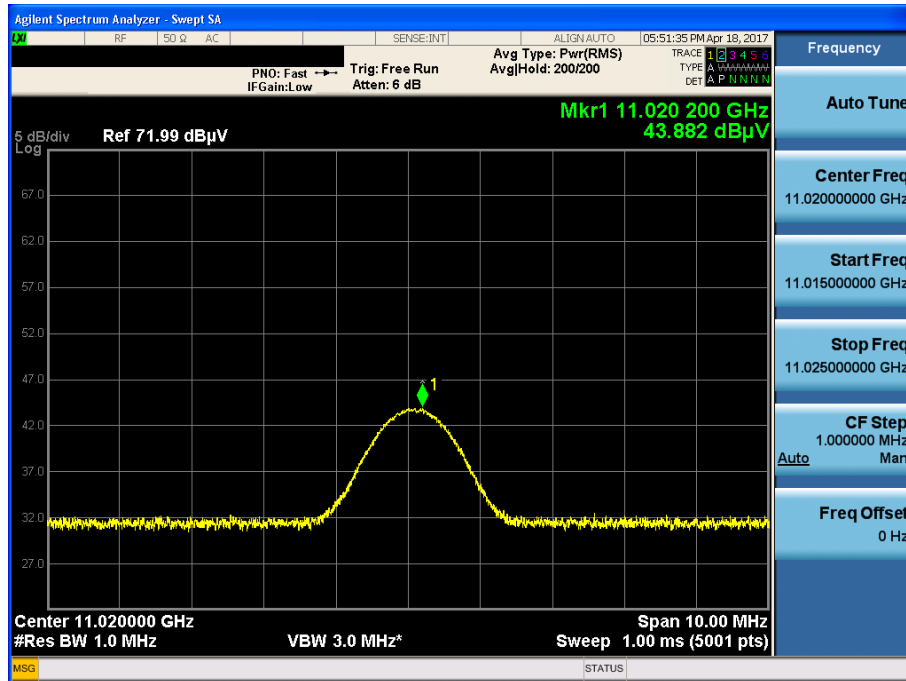
Detector Mode : AV



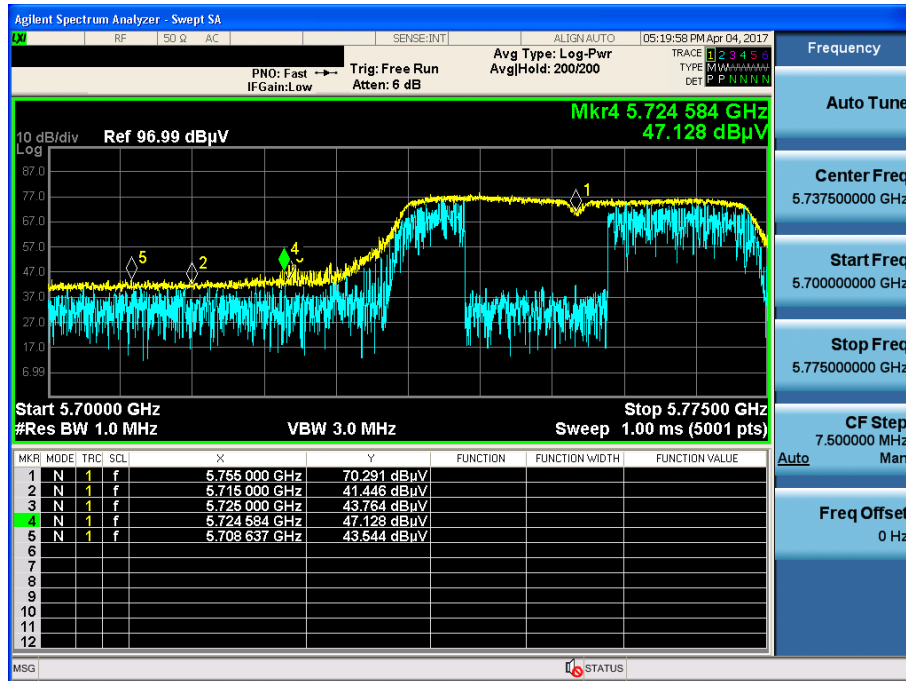


802.11n(HT40) & U-NII 2C & Ch.102 & Z axis & Ver

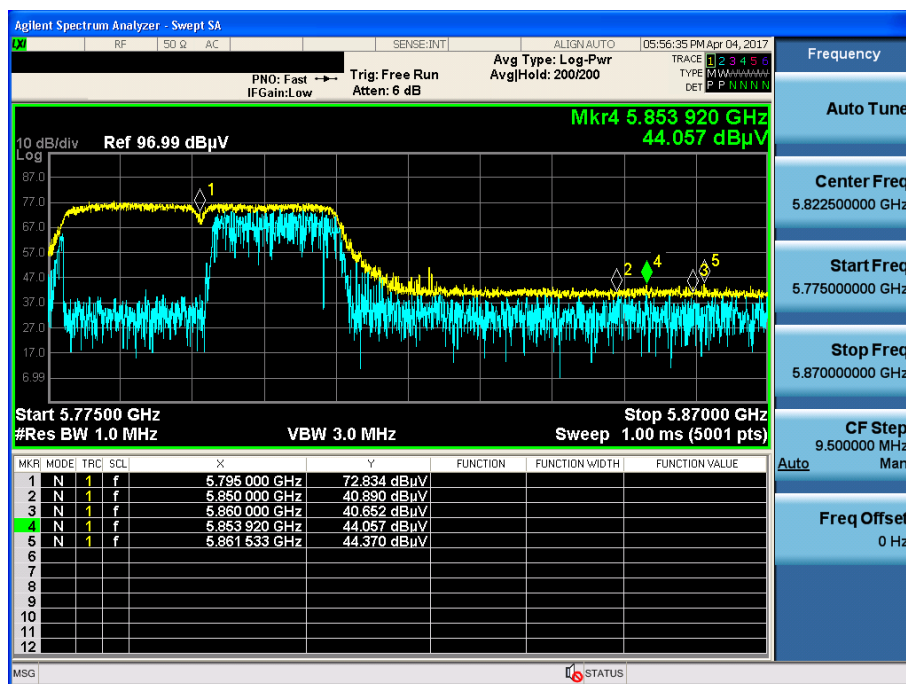
Detector Mode : AV



**Detector Mode : PK**



**Detector Mode : PK**



802.11n(HT40) &amp; U-NII 3 &amp; Ch.151 &amp; Z axis &amp; Ver

Detector Mode : AV

