



6.4. POWER SPECTRAL DENSITY

LIMITS

FCC Part15, Subpart E/ RSS-247		
Test Item	Limit	Frequency Range (MHz)
Power Spectral Density	For FCC: Other than Mobile and portable:17dBm/MHz Mobile and portable:11dBm/MHz	5150-5250
	For RSS:10dBm/MHz	
	11dBm/MHz	5250-5350
	11dBm/MHz	For FCC:5470-5725 For IC:5470-5600 5650-5725
	30dBm/500kHz	5725-5850

Note: 1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi, where N_{ANT} is the number of outputs, G_{ANT} is the Antenna gain.

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

For U-NII-1, U-NII-2A and U-NII-2C band:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	1MHz
VBW	$\geq 3 \times \text{RBW}$
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

For U-NII-3:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	500KHz

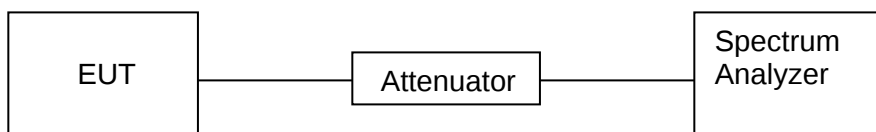


VBW	$\geq 3 \times \text{RBW}$
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

Note:

1. For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v01, section II.F.5., it is acceptable to set RBW at 1MHz and VBW at 3MHz if the spectrum analyzer does not have 500kHz RBW.
 2. The value measured with RBW=1MHz is to be added with $10\log(500\text{kHz}/1\text{MHz})$ which is - 3dB. For example, if the measured value is +10dBm using RBW=1MHz (that is +10dBm/MHz), then the converted value will be +7dBm/500kHz.
- Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
- 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

TEST SETUP



RESULTS



6.4.1. 1TX MODE

Mode	Channel	Antenna	PSD (dBm)	Limit (dBm)
a	5260	C	5.02	5.5
	5300	C	4.82	5.5
	5320	C	4.78	5.5
	5500	C	5.17	5.5
	5580	C	4.74	5.5
	5700	C	4.20	5.5
	5720	C	4.71	5.5
n20	5260	C	5.01	5.5
	5300	C	4.92	5.5
	5320	C	4.95	5.5
	5500	C	5.08	5.5
	5580	C	4.68	5.5
	5700	C	3.06	5.5
	5720	C	4.67	5.5
ac20	5260	C	5.04	5.5
	5300	C	5.04	5.5
	5320	C	5.17	5.5
	5500	C	5.21	5.5
	5580	C	4.96	5.5
	5700	C	2.93	5.5
	5720	C	4.62	5.5
n40	5270	C	3.95	5.5
	5310	C	4.36	5.5
	5510	C	0.548	5.5
	5550	C	3.41	5.5
	5670	C	3.50	5.5
	5710	C	3.64	5.5
ac40	5270	C	3.98	5.5
	5310	C	4.23	5.5
	5510	C	0.283	5.5
	5550	C	3.50	5.5



ac80	5670	C	3.52	5.5
	5710	C	3.54	5.5
	5290	C	-3.34	5.5
	5530	C	-7.91	5.5
	5610	C	-0.85	5.5
	5690	C	-0.89	5.5

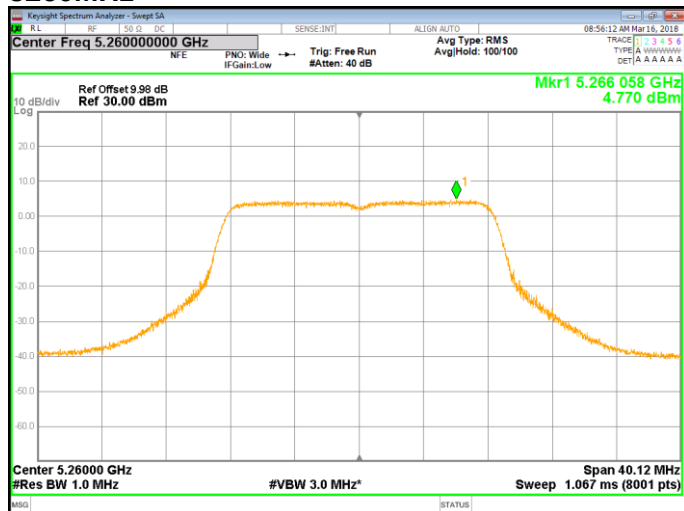
Note: PSD= TEST PLOT Value + 10 log (1/x), where x is the duty cycle.

Note: All the antenna ports had been tested, but only the worst data recorded in the report.

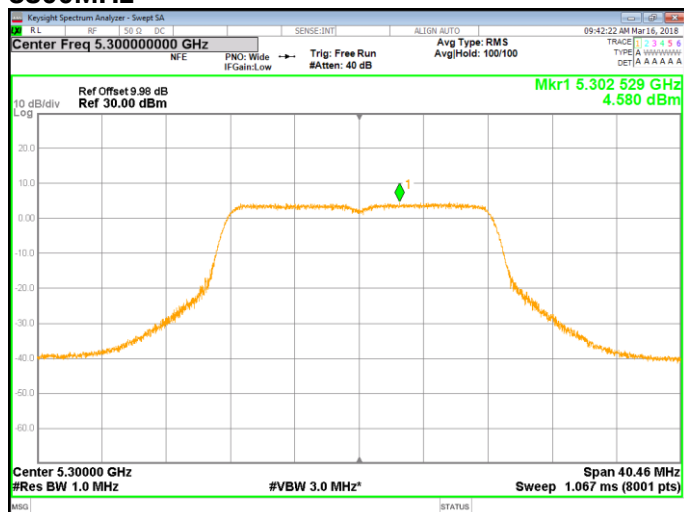
TEST PLOT FOR ANTENNA C

802.11a Mode

5260MHz

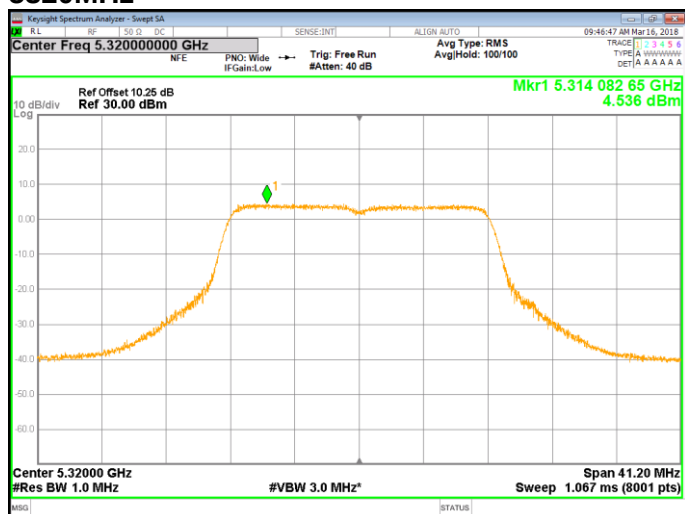


5300MHz

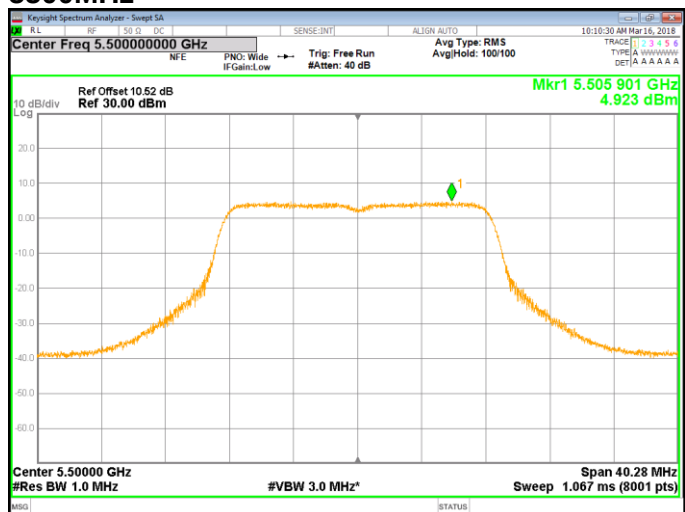




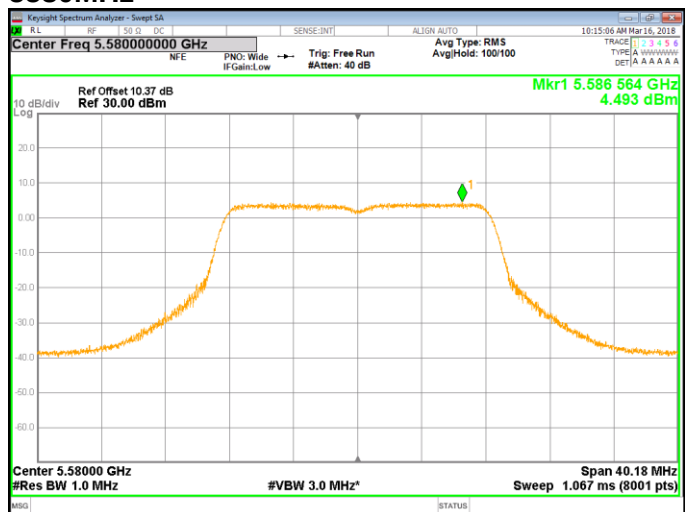
5320MHz



5500MHz

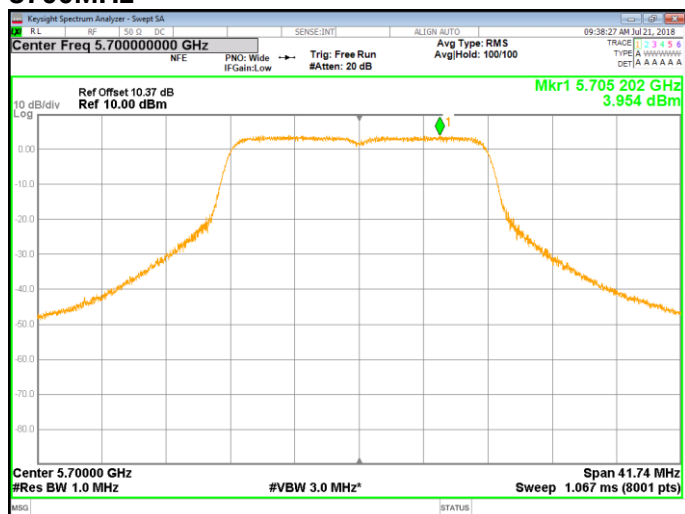


5580MHz

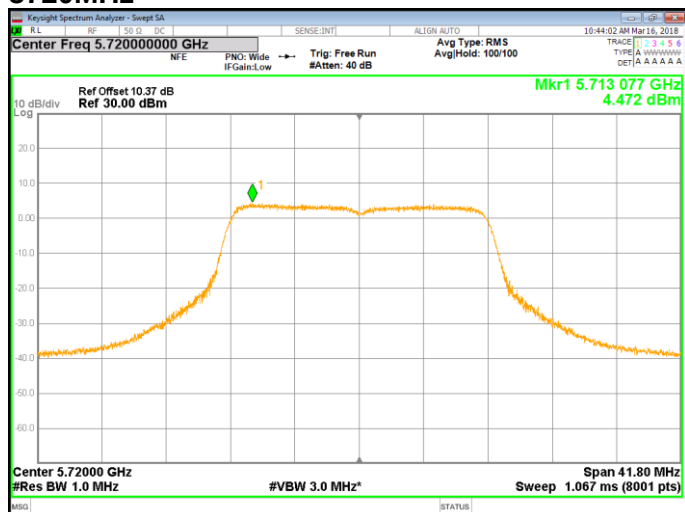




5700MHz



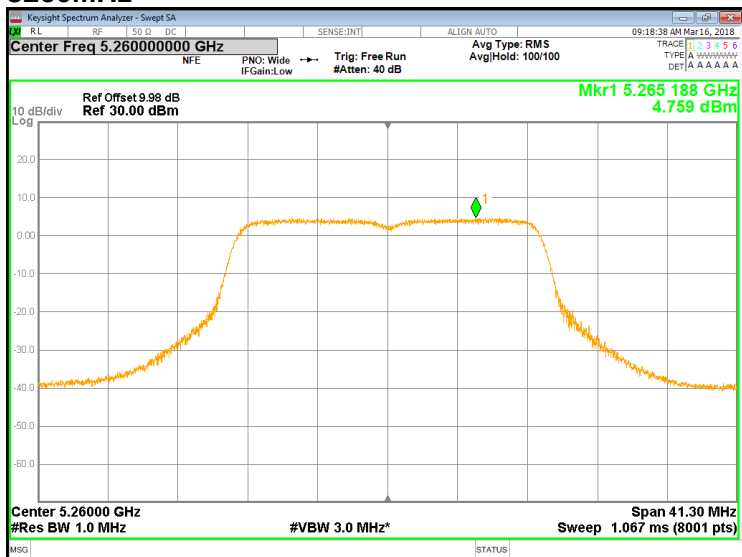
5720MHz



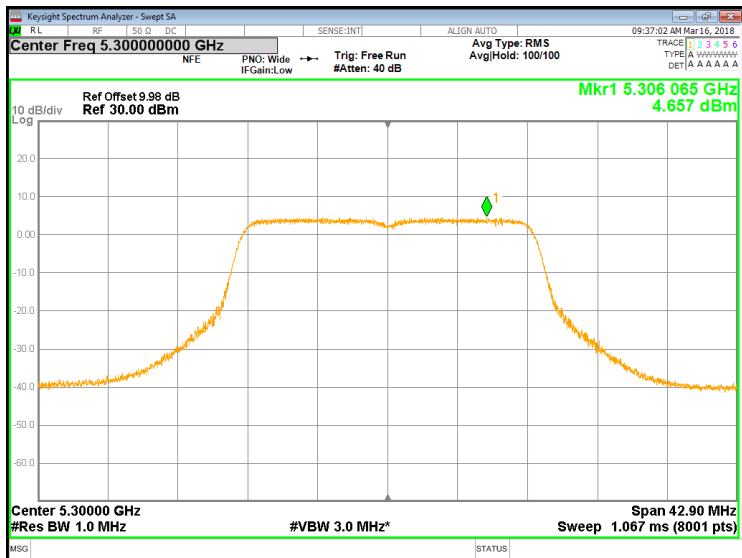


802.11 n20 Mode

5260MHz

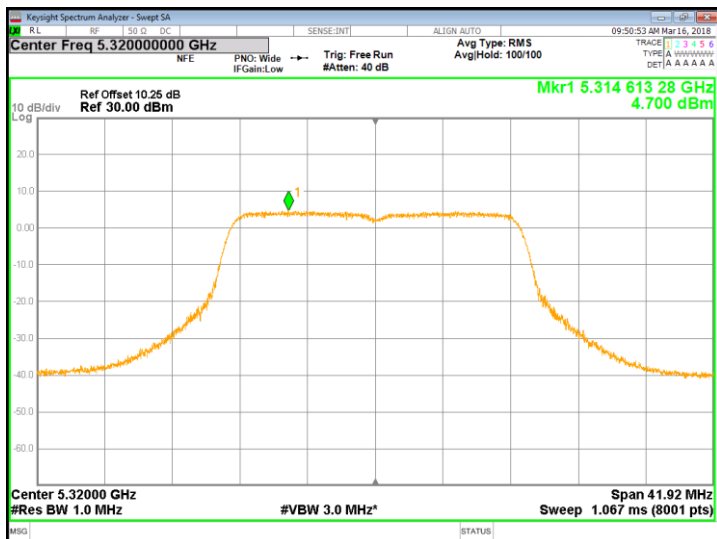


5300MHz

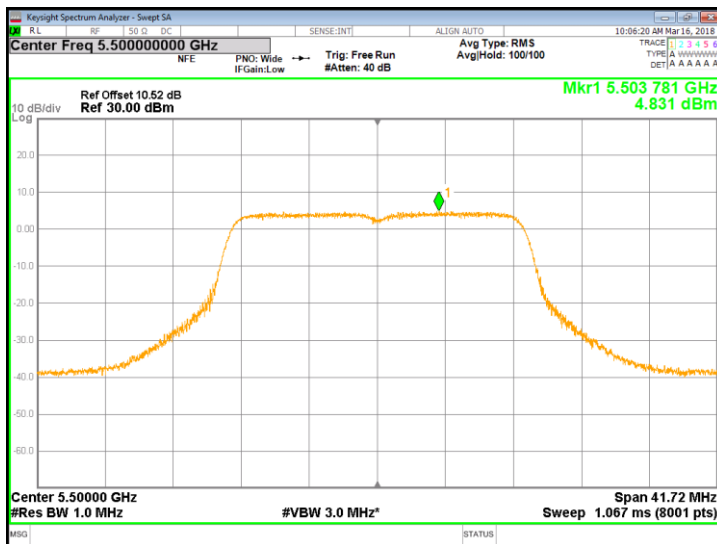




5320MHz

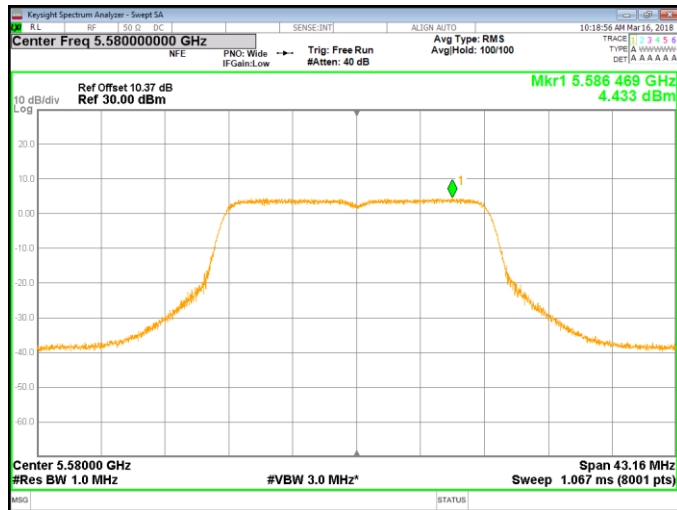


5500MHz

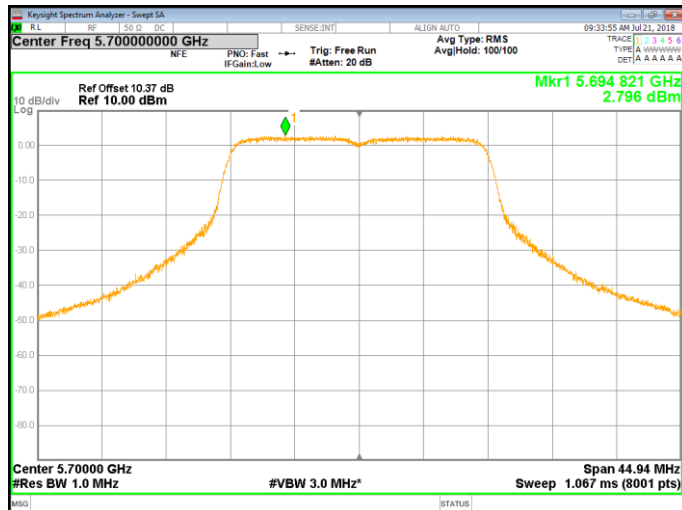




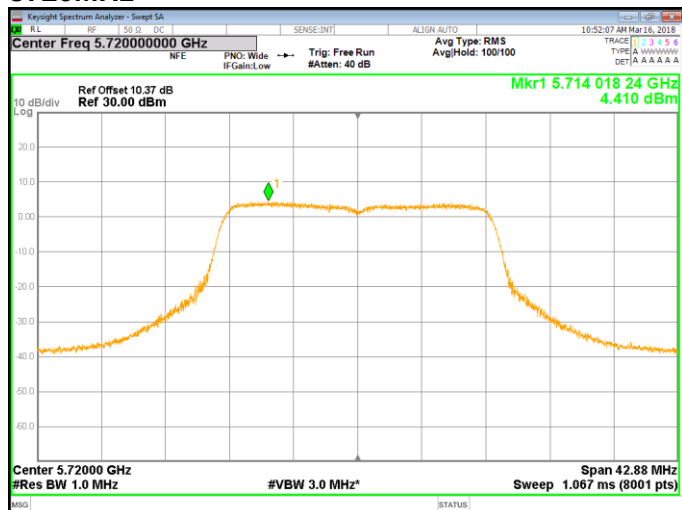
5580MHz



5700MHz

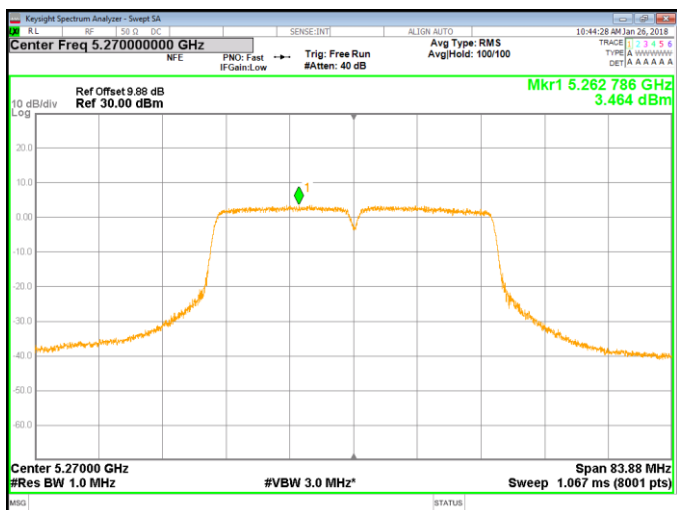


5720MHz

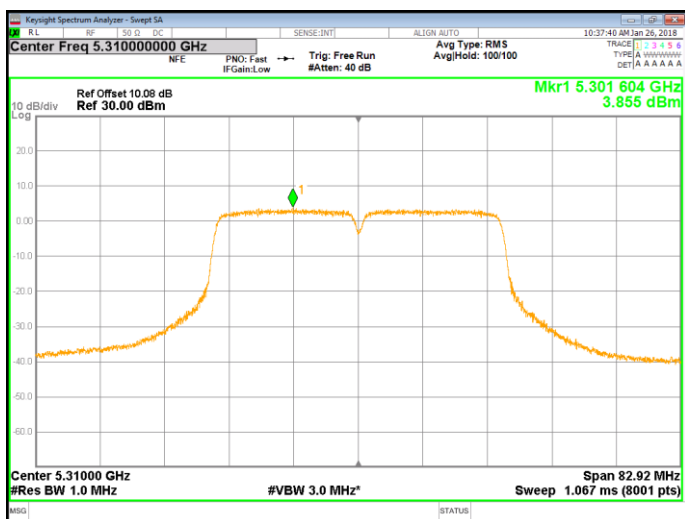




802.11n40 Mode 5270MHz

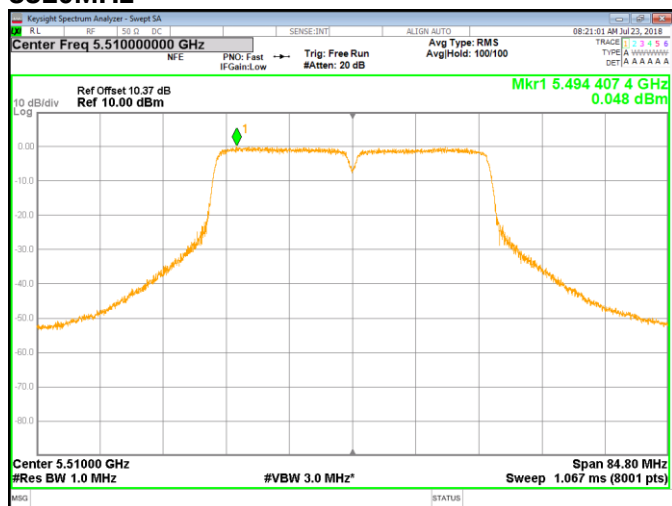


5310MHz

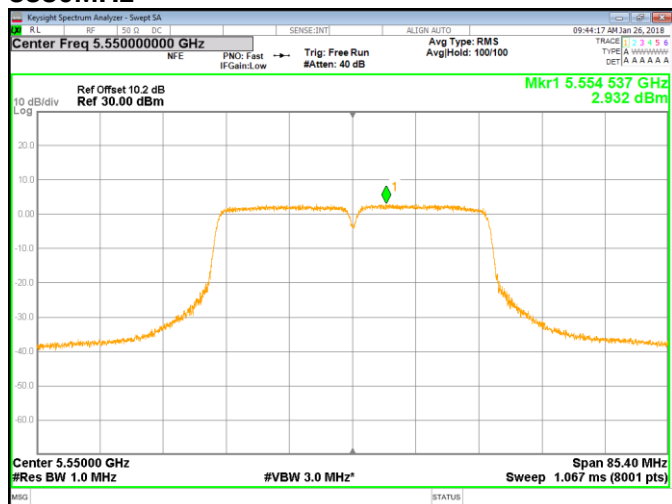




5510MHz

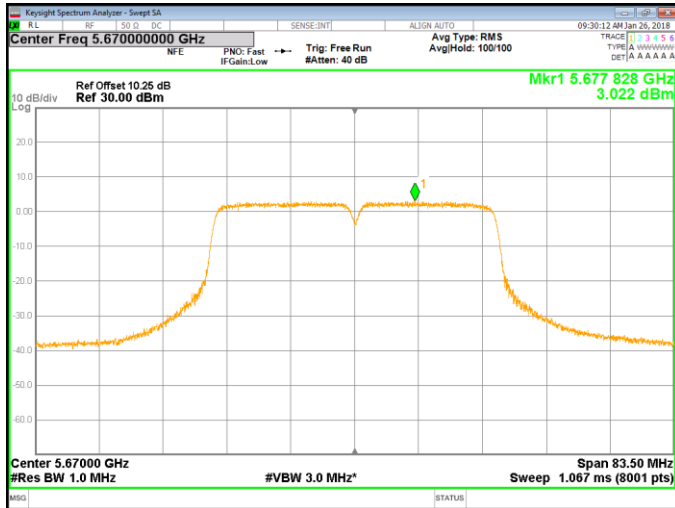


5550MHz

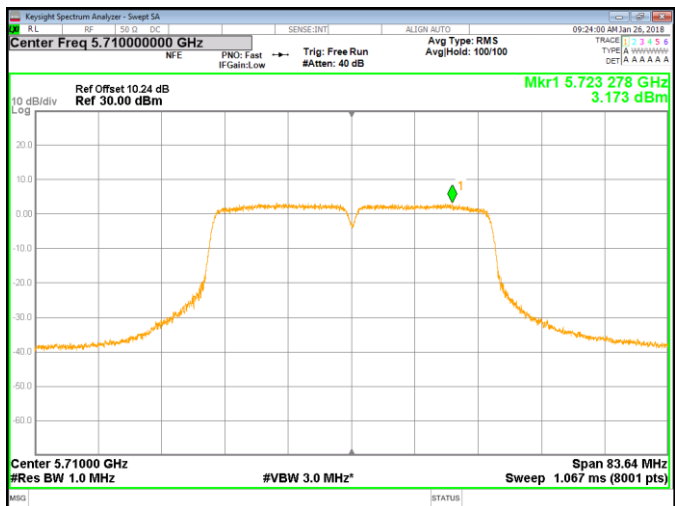




5670MHz



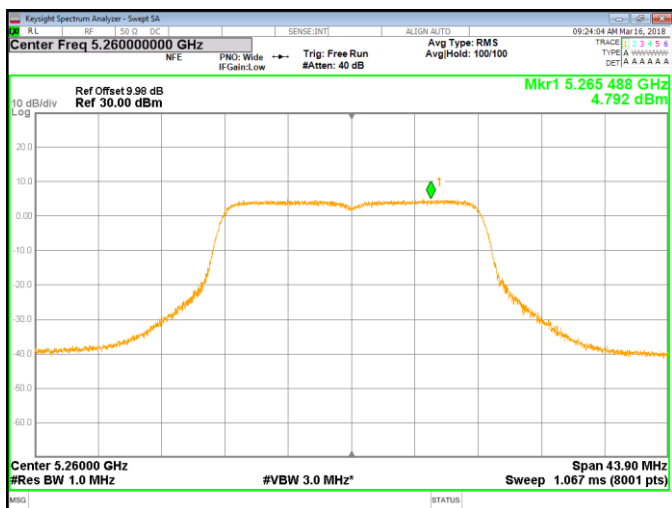
5710MHz



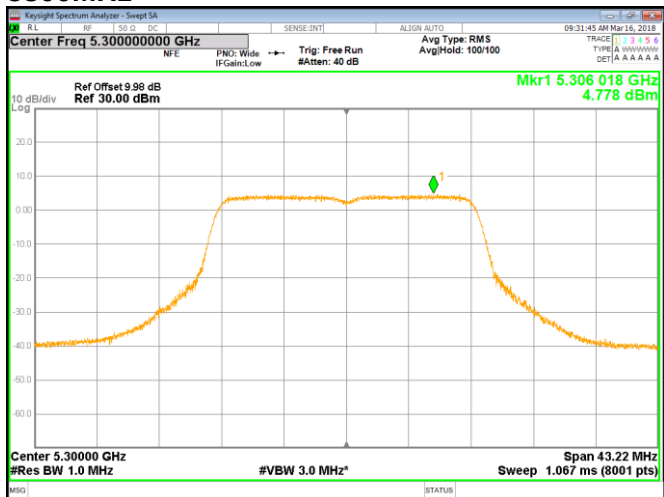


802.11 ac20 Mode

5260MHz

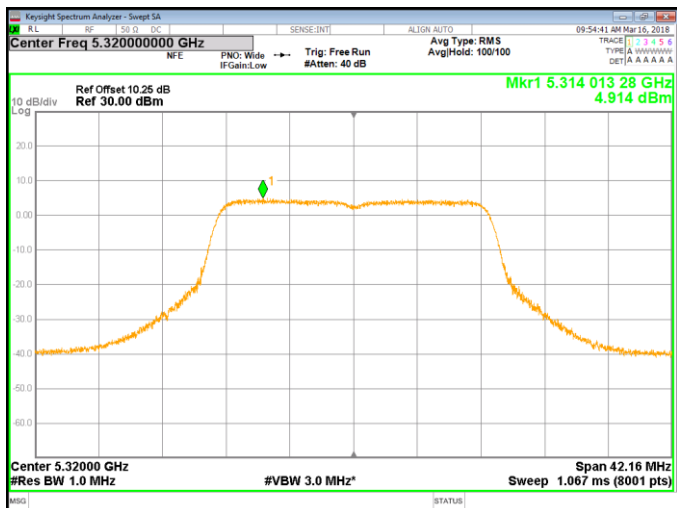


5300MHz

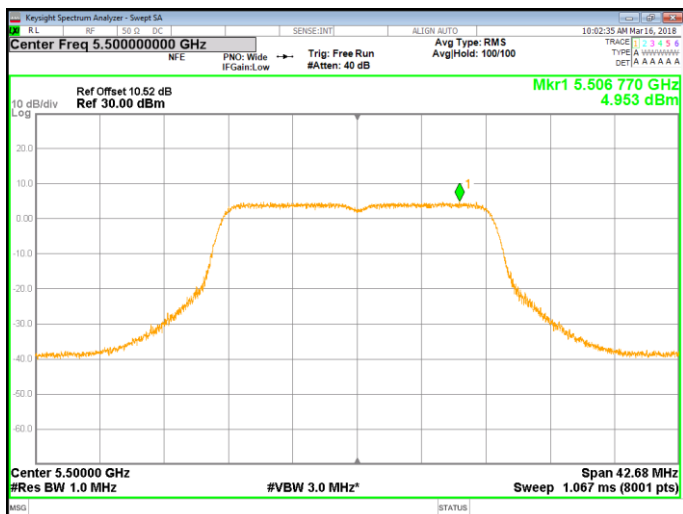




5320MHz

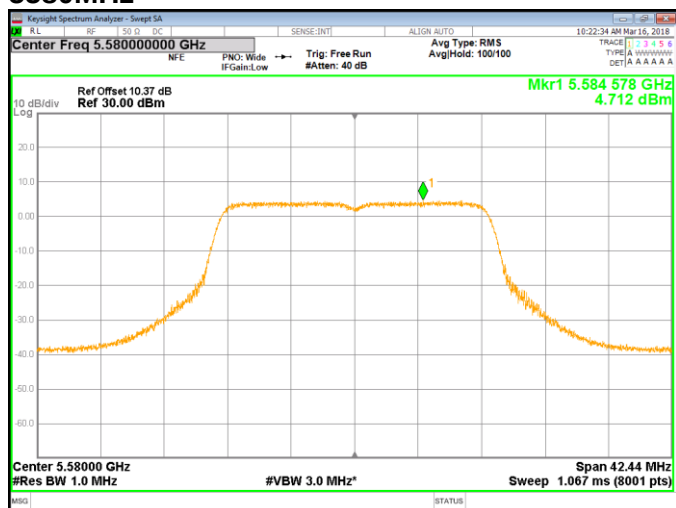


5500MHz

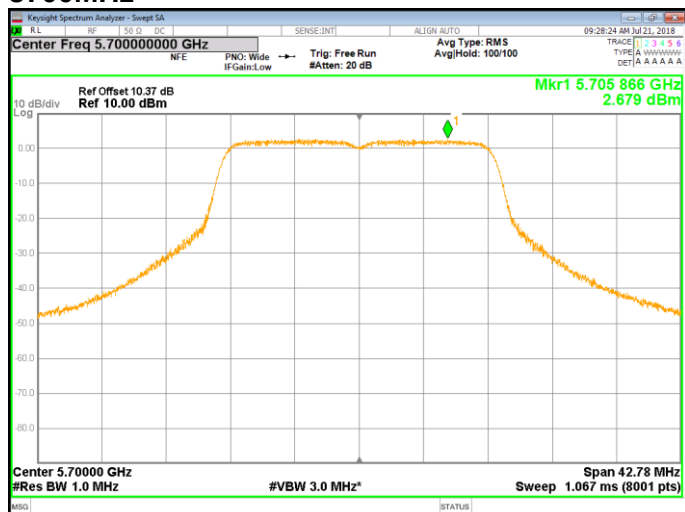




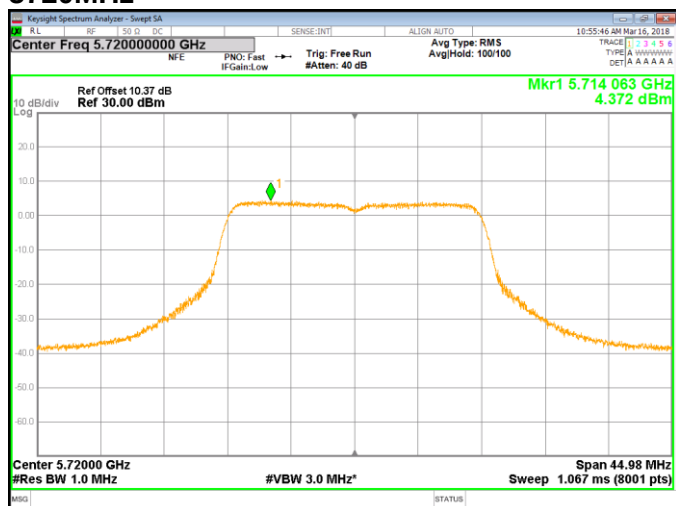
5580MHz



5700MHz



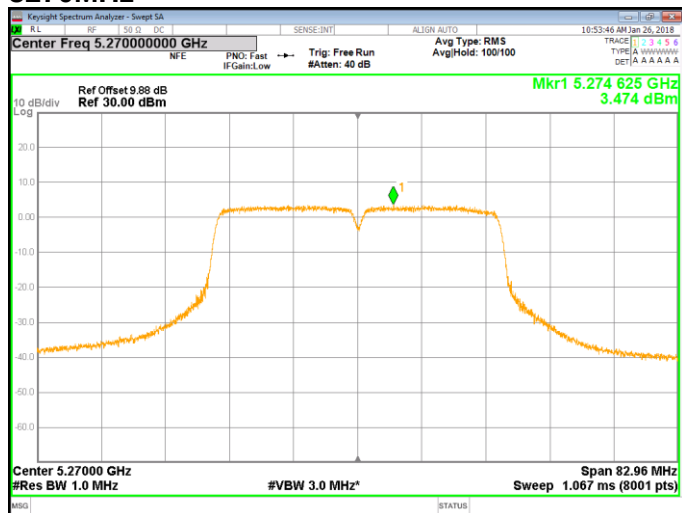
5720MHz



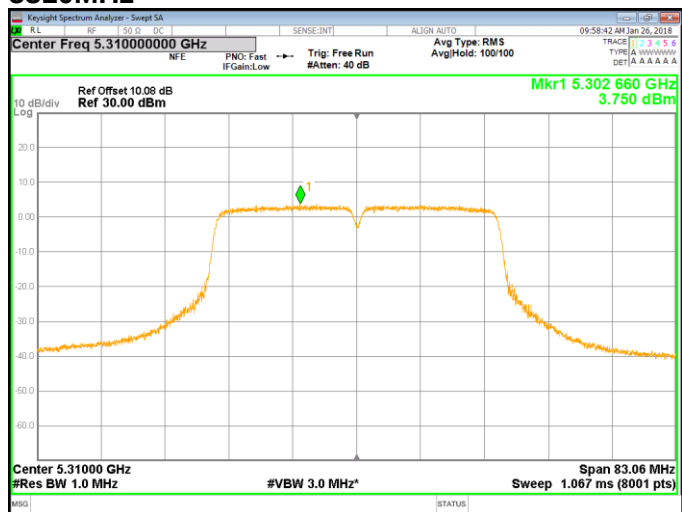


802.11ac40 Mode

5270MHz

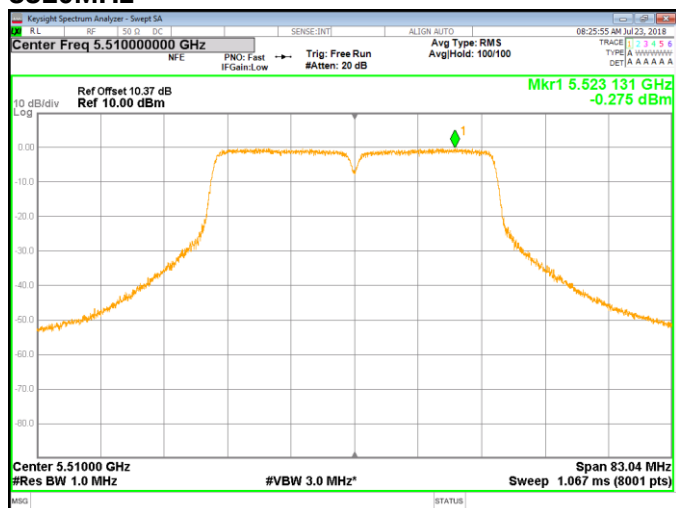


5310MHz

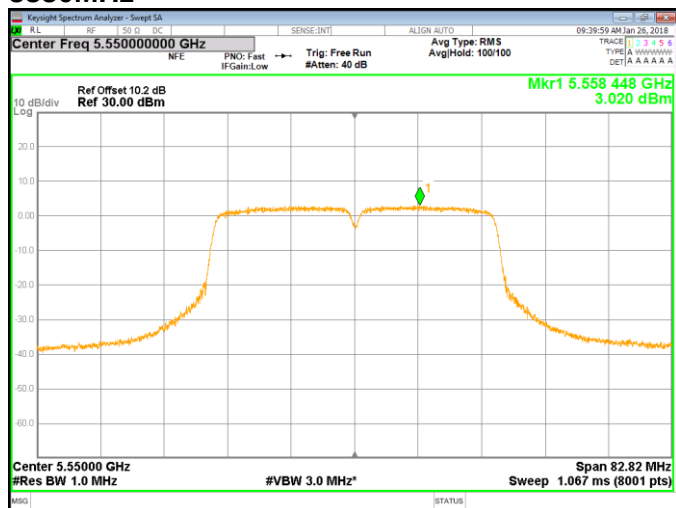




5510MHz

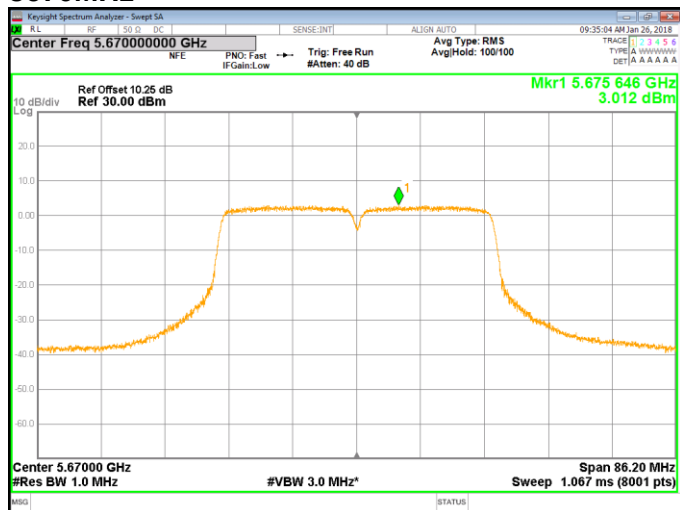


5550MHz

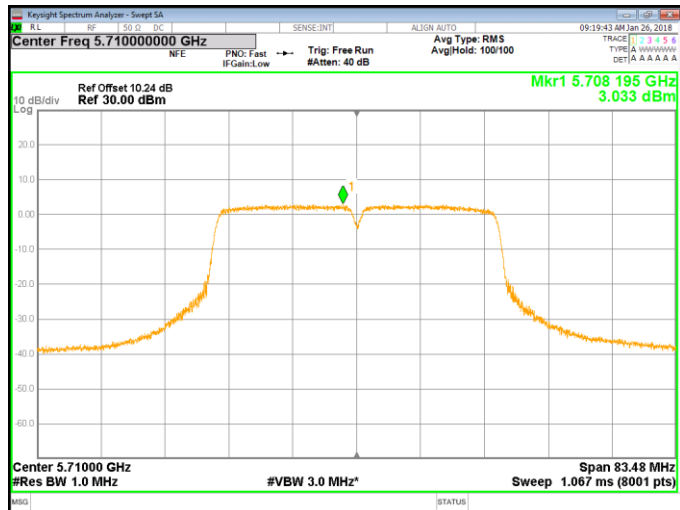




5670MHz



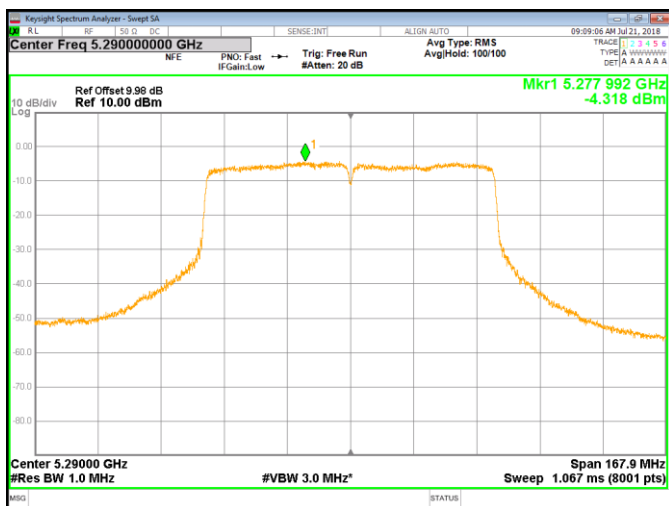
5710MHz



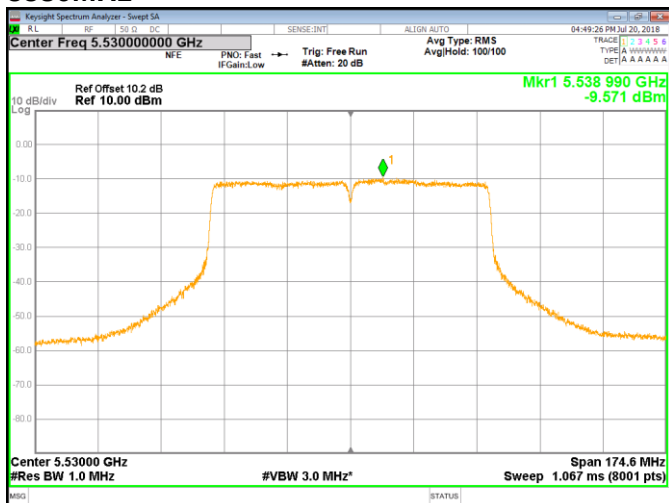


802.11ac80 Mode

5290MHz

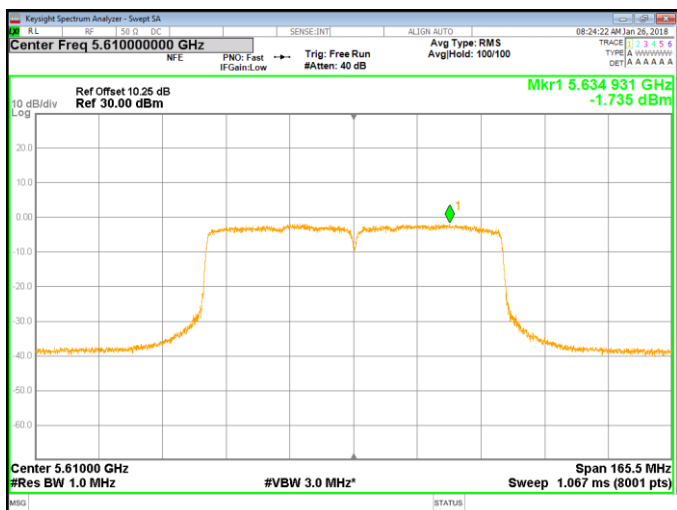


5530MHz

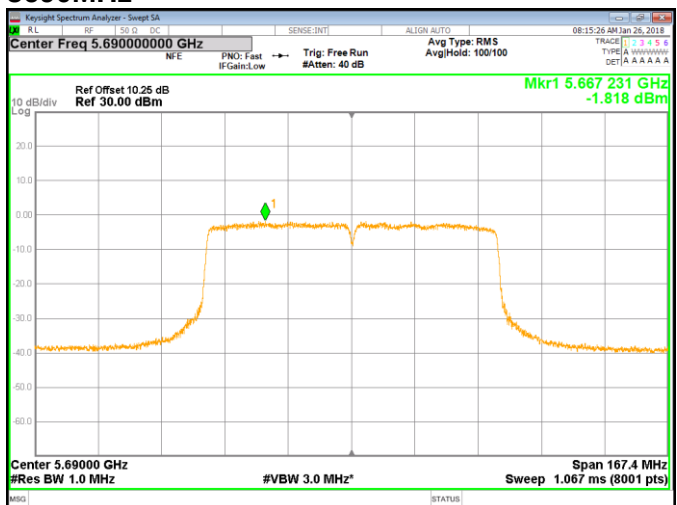




5610MHz



5690MHz





6.4.2. 2TX MODE

Mode	Channel	Antenna	PSD(dBm)		Limit(dBm)
			Single	Total	
a	5260	B	-0.731	2.26	2.5
		C	-0.768		2.5
	5300	B	-0.969	2.18	2.5
		C	-0.704		2.5
	5320	B	-0.563	2.43	2.5
		C	-0.608		2.5
	5500	B	-1.757	1.57	2.5
		C	-1.15		2.5
	5580	B	-1.073	1.82	2.5
		C	-1.319		2.5
	5700	B	-0.151	2.42	2.5
		C	-1.075		2.5
n20	5260	B	-1.112	1.85	2.5
		C	-1.214		2.5
	5300	B	-1.255	1.87	2.5
		C	-1.017		2.5
	5320	B	-1.009	2.01	2.5
		C	-0.988		2.5
	5500	B	-1.575	1.81	2.5
		C	-0.857		2.5
	5580	B	-0.742	2.25	2.5
		C	-0.784		2.5
	5700	B	-0.549	2.08	2.5
		C	-1.339		2.5
ac20	5260	B	-1.018	1.98	2.5
		C	-1.047		2.5
	5300	B	-1.384	1.73	2.5
		C	-1.176		2.5
	5720	B	-0.573	2.04	2.5
		C	-1.422		2.5
		C	5.293		21.5



	5320	B	-1.228	1.91	2.5
		C	-0.971		2.5
	5500	B	-1.438	1.95	2.5
		C	-0.717		2.5
	5580	B	-0.714	2.24	2.5
		C	-0.825		2.5
	5700	B	-0.478	2.31	2.5
		C	-0.92		2.5
	5720	B	-0.465	2.27	2.5
		C	-1.028		2.5
n40	5270	B	-1.425	1.62	2.5
		C	-1.355		2.5
	5310	B	-1.64	1.57	2.5
		C	-1.241		2.5
	5510	B	-3.3	0.39	2.5
		C	-2.03		2.5
	5550	B	-2.809	0.55	2.5
		C	-2.13		2.5
	5670	B	-1.079	1.73	2.5
		C	-1.486		2.5
	5710	B	-0.71	1.92	2.5
		C	-1.517		2.5
ac40	5270	B	-1.67	1.44	2.5
		C	-1.479		2.5
	5310	B	-1.51	1.78	2.5
		C	-0.972		2.5
	5510	B	-3.35	0.24	2.5
		C	-2.26		2.5
	5550	B	-2.629	0.83	2.5
		C	-1.779		2.5
	5670	B	-1.402	1.77	2.5
		C	-1.094		2.5
	5710	B	-0.726	1.95	2.5
		C	-1.409		2.5



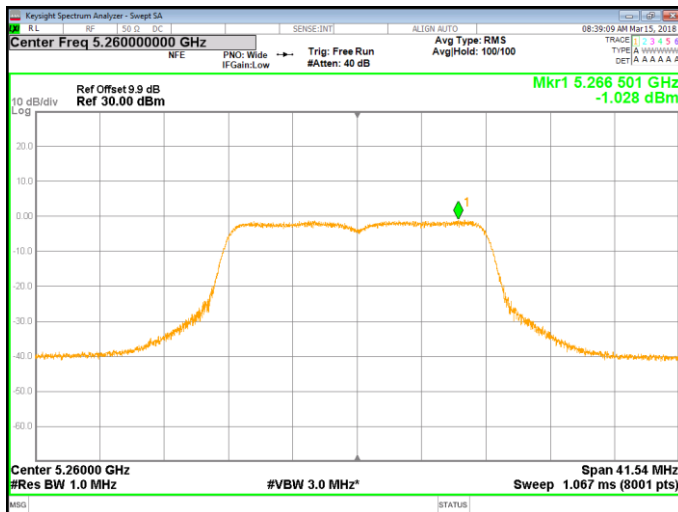
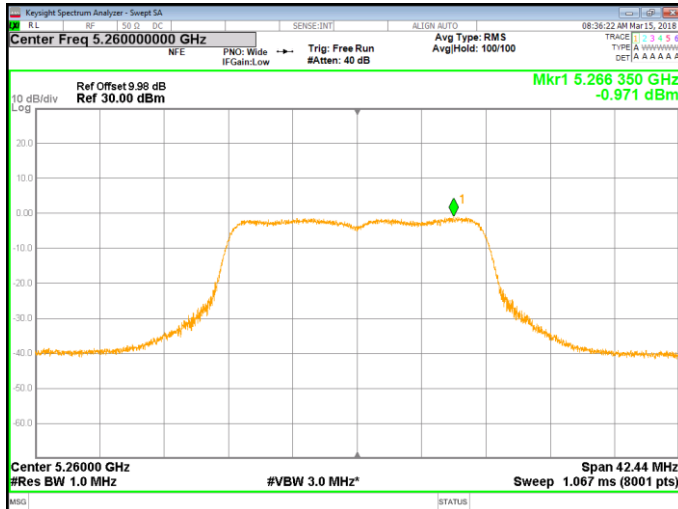
ac80	5290	B	-5.286	-1.81	2.5
		C	-4.39		2.5
	5530	B	-11.009	-6.57	2.5
		C	-11.293		2.5
	5610	B	-5.10	-1.84	2.5
		C	-4.607		2.5
	5690	B	-4.545	-1.7	2.5
		C	-4.885		2.5
Note: PSD= TEST PLOT Value + 10 log (1/x), where x is the duty cycle.					

Note: All the antenna ports had been tested, but only the worst data recorded in the report.



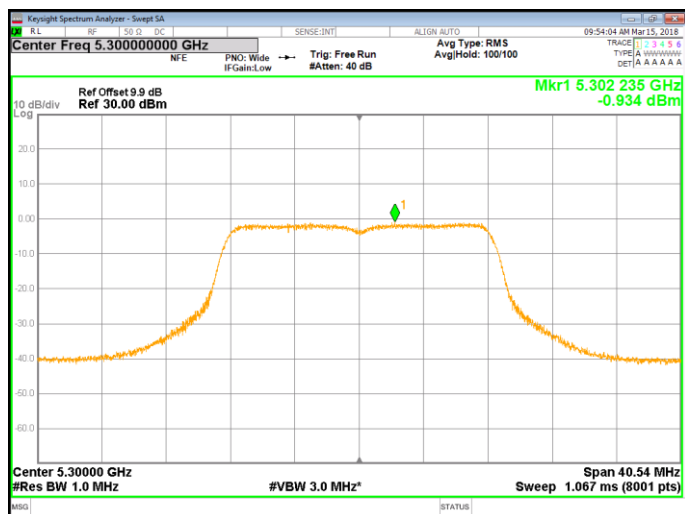
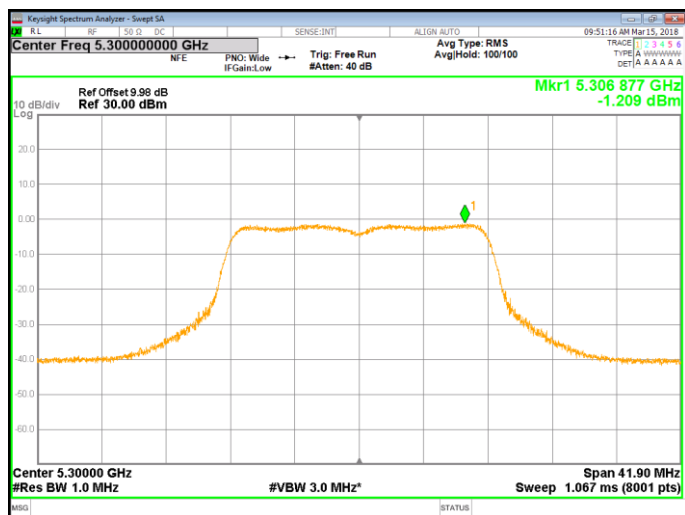
TEST PLOT FOR ANTENNA B AND C

802.11a Mode 5260MHz



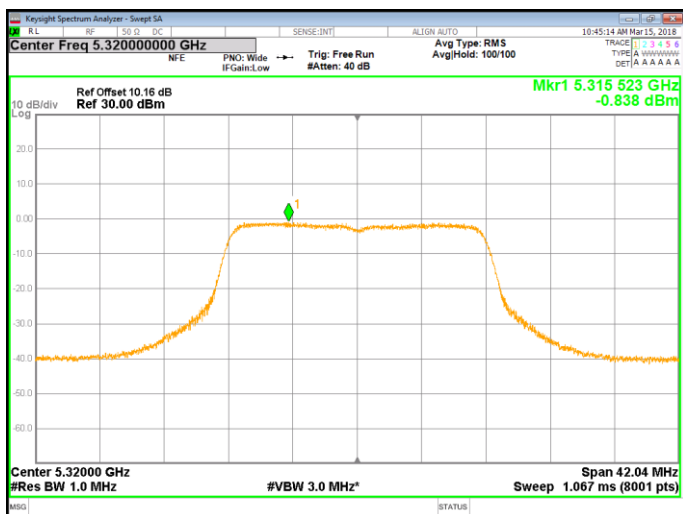
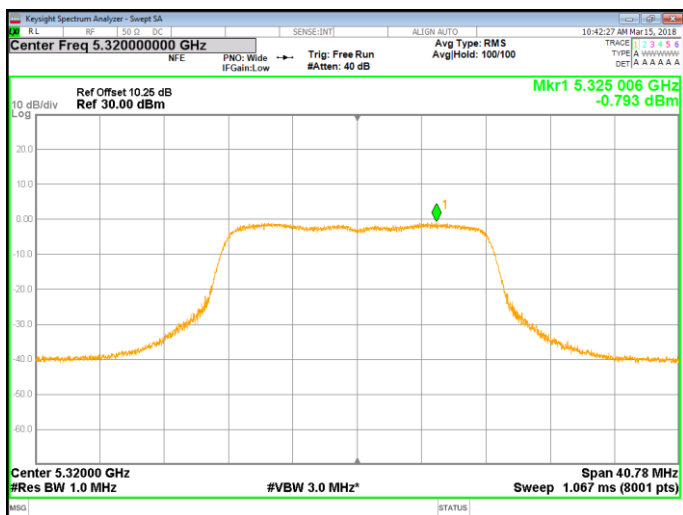


5300MHz



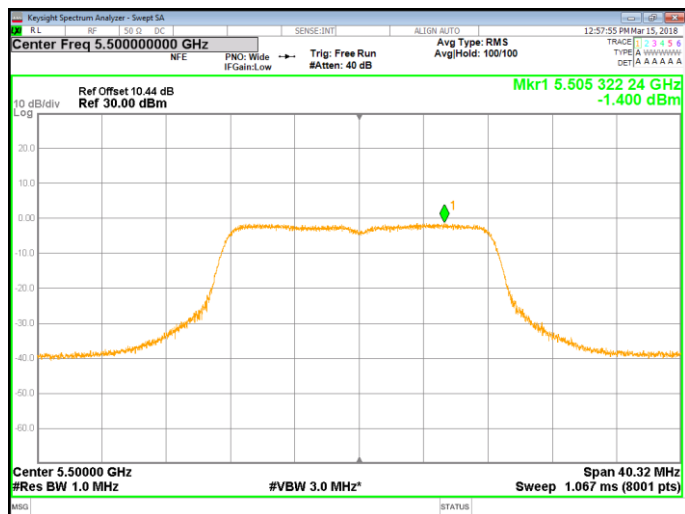
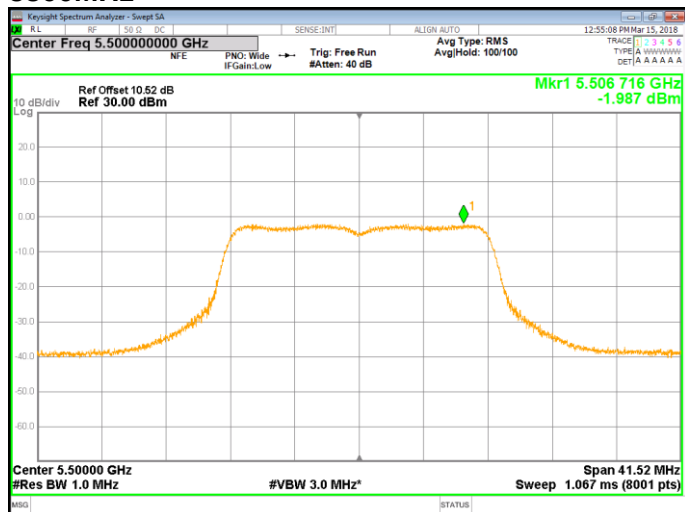


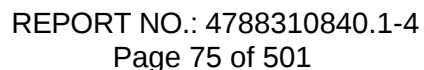
5320MHz





5500MHz





Keyight Spectrum Analyzer - Sweep SA

AL RF 150.0 BC SENSE:INTV ALIGN:ALTO

02:09:09 PM Mar 15, 2018

Center Freq 5.58000000 GHz

NFE PKG: Wide IF Gain: Low Trig: Free Run #Atten: 40 dB

Avg Type: RMS Avg/Hold: 100/100

TRACE 1 2 3 4 5 6

TYPE A W W W W W W

SET A A A A A A

Ref Offset 10.37 dB

Ref 30.00 dBm

Mkr1 5.586 580 GHz

-1.323 dBm

10 dB/div

Log

20.0

10.0

0.00

-10.0

-20.0

-30.0

-40.0

-50.0

-60.0

Center 5.58000 GHz

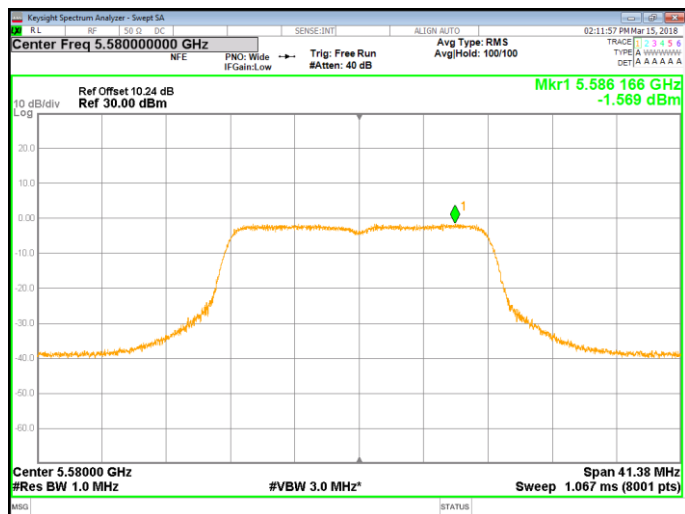
#Res BW 1.0 MHz

#VBW 3.0 MHz*

Span 43.90 MHz

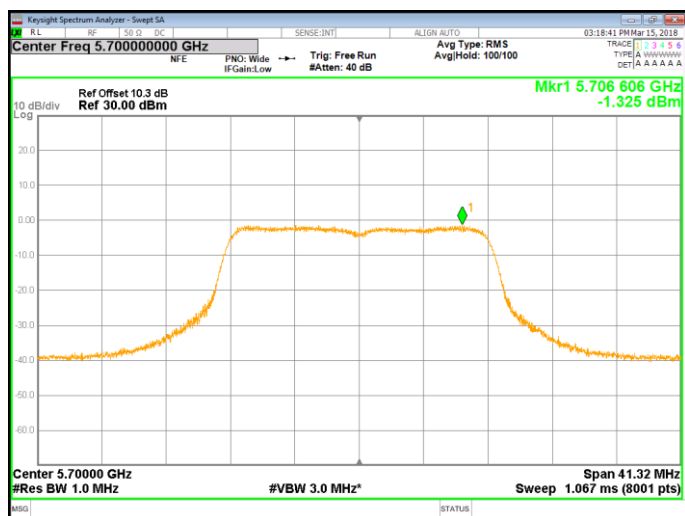
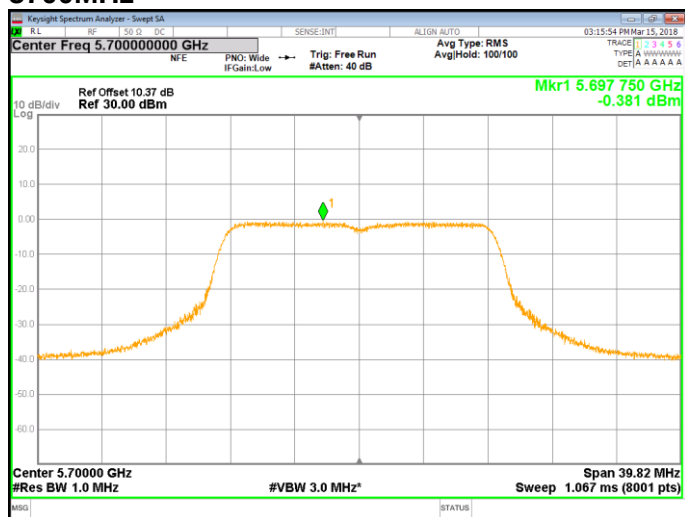
Sweep 1.067 ms (8001 pts)

MSG STATUS



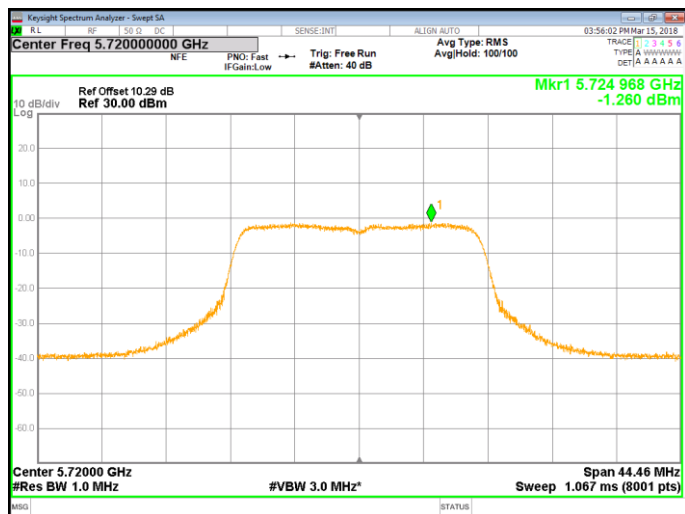
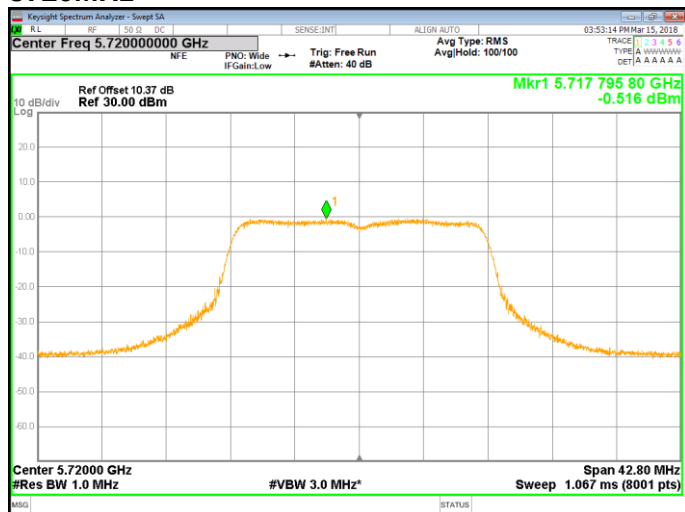


5700MHz





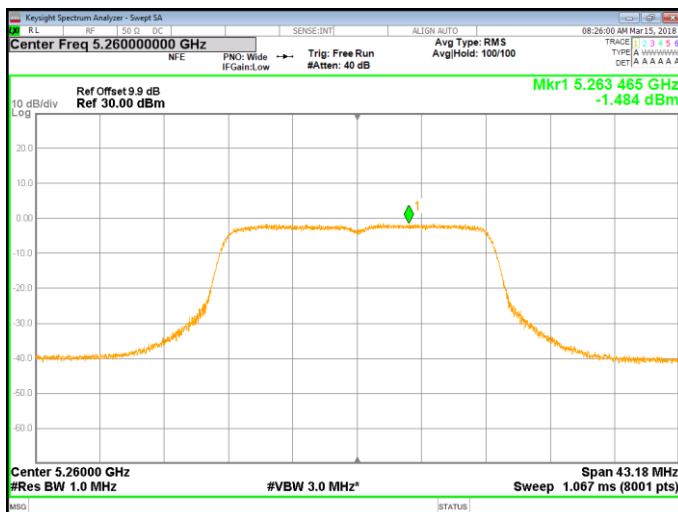
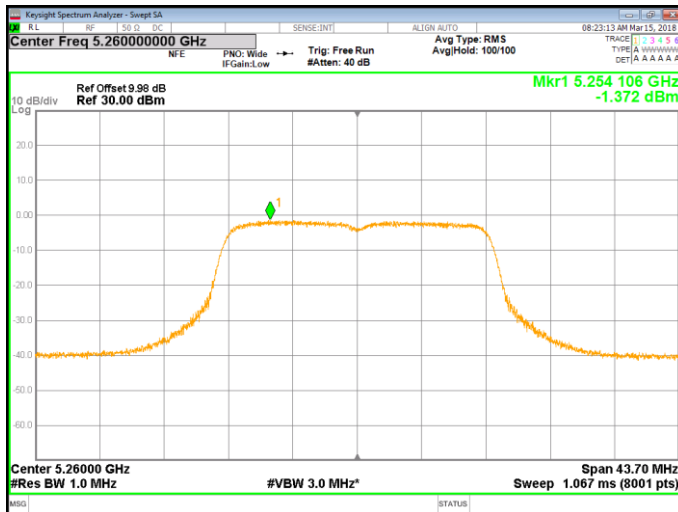
5720MHz





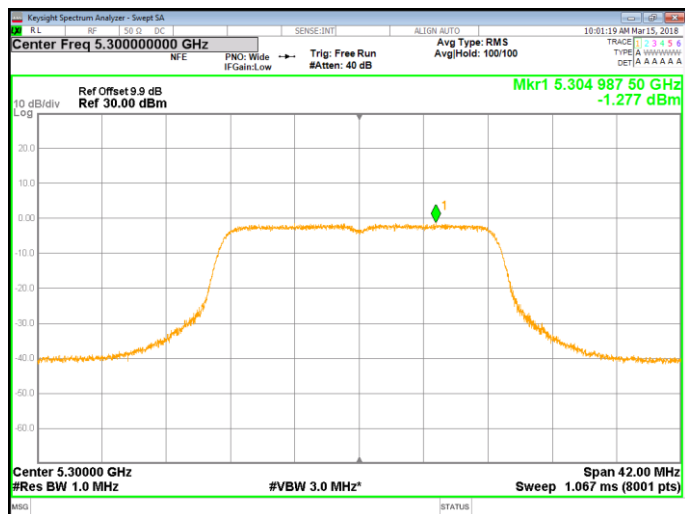
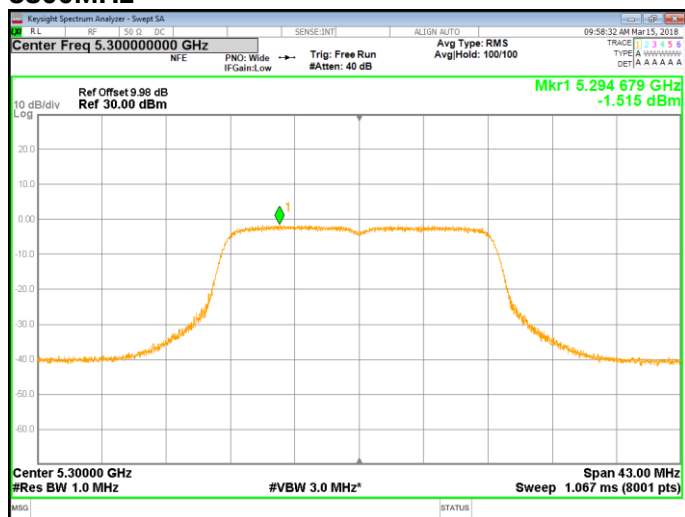
802.11 n20 Mode

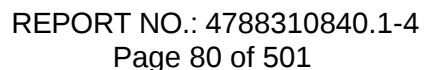
5260MHz





5300MHz





Keysight Spectrum Analyzer - Swept SA

RL RF 150 Ω DC SENSE: INT1 ALIGN: AUTO 10:34:05 AM Mar 15, 2018

Center Freq 5.320000000 GHz PNO: Wide IF Gain: Low Trig: Free Run #Atten: 40 dB Avg Type: RMS Avg Hold: 100/100

NFE TRACE 1 2 3 4 5 6
TYPE A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
SET A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Ref Offset: 10.25 dB
Ref 30.00 dBm

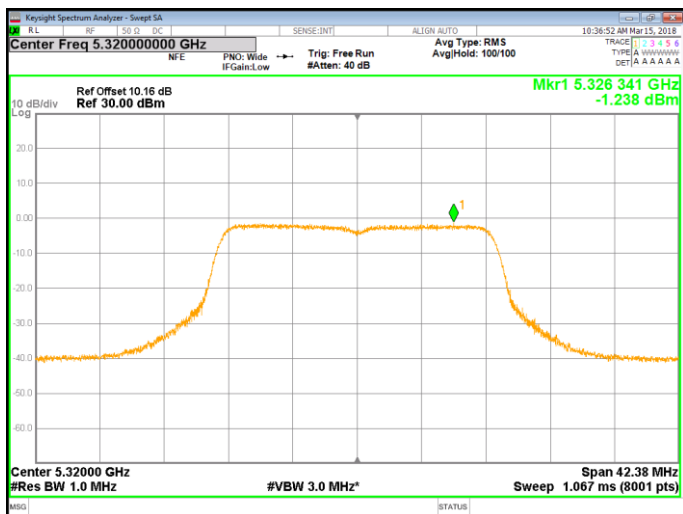
Mkr1 5.325 206 GHz
-1.259 dBm

10 dB/div
Log

Center 5.32000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*

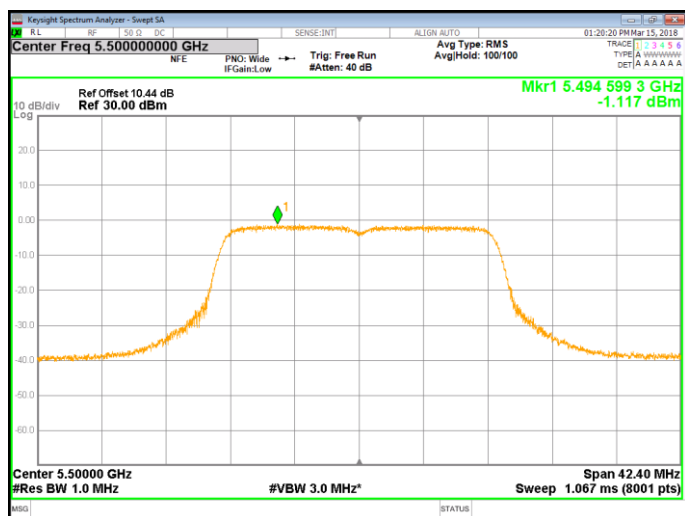
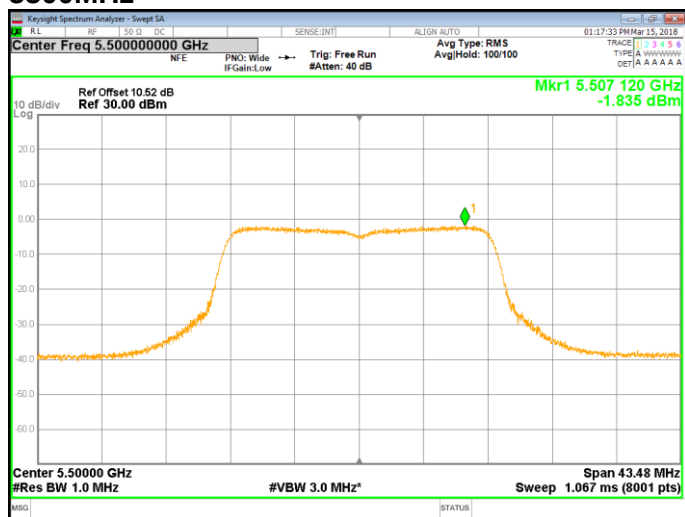
Span 43.34 MHz
Sweep 1.067 ms (8001 pts)

MISO STATUS



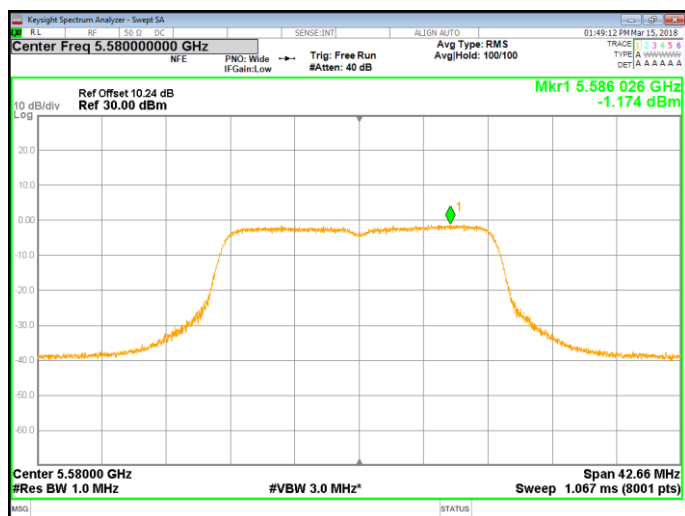
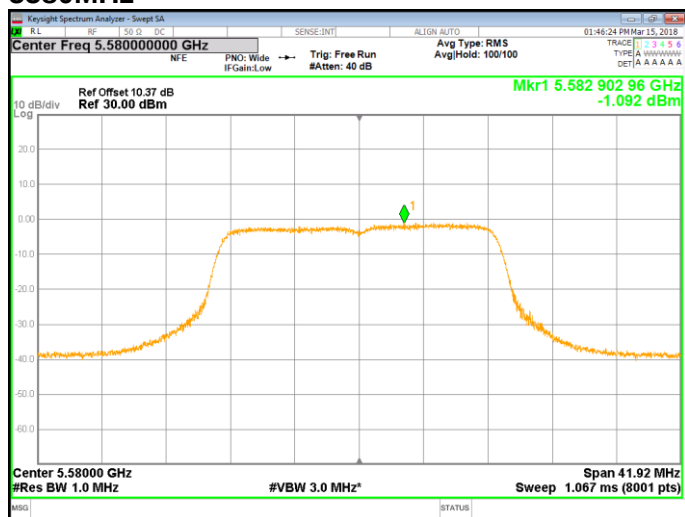


5500MHz



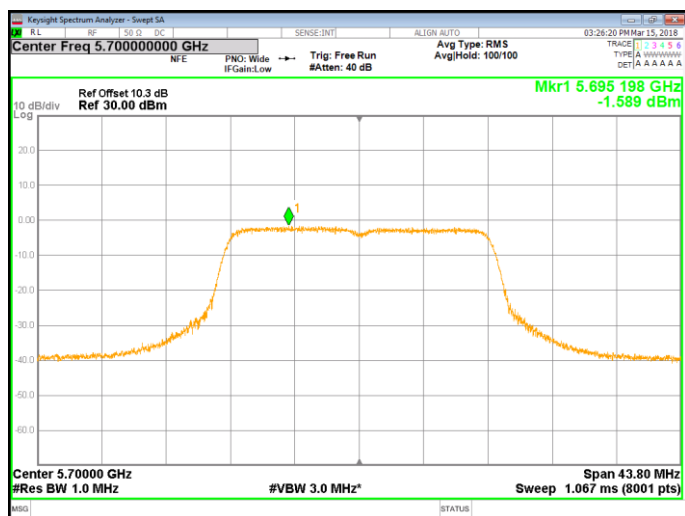
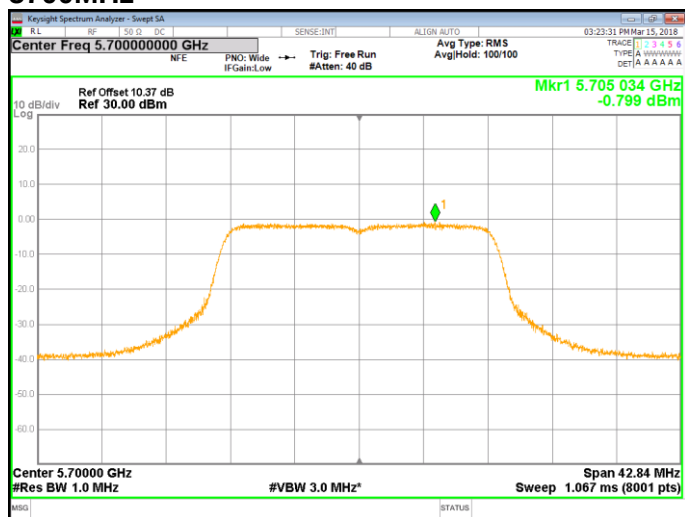


5580MHz



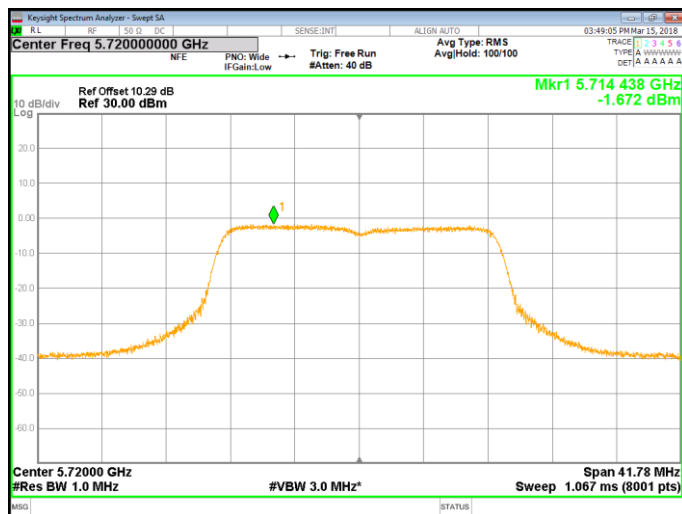
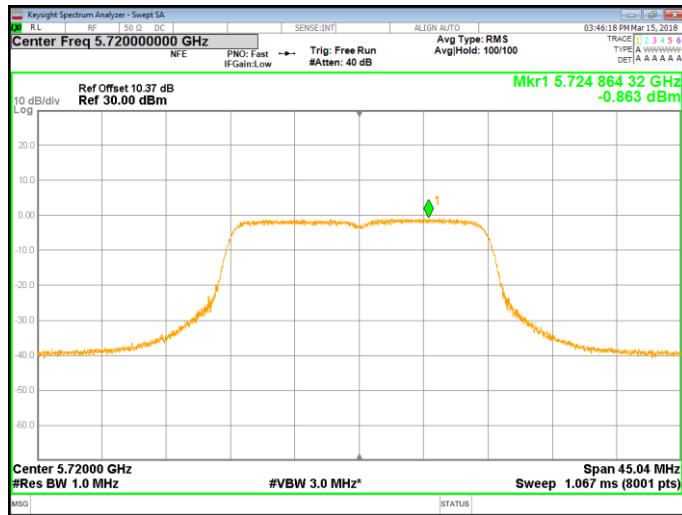


5700MHz





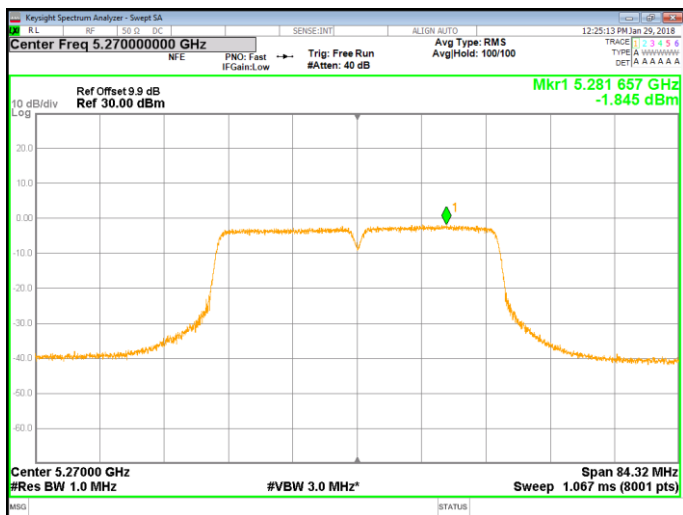
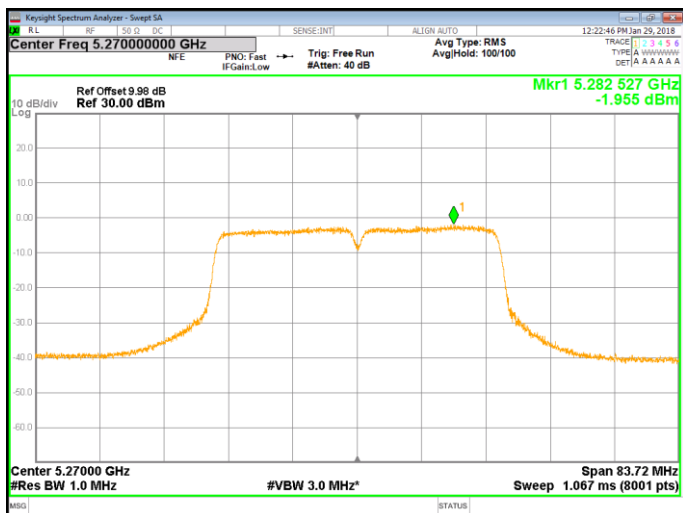
5720MHz





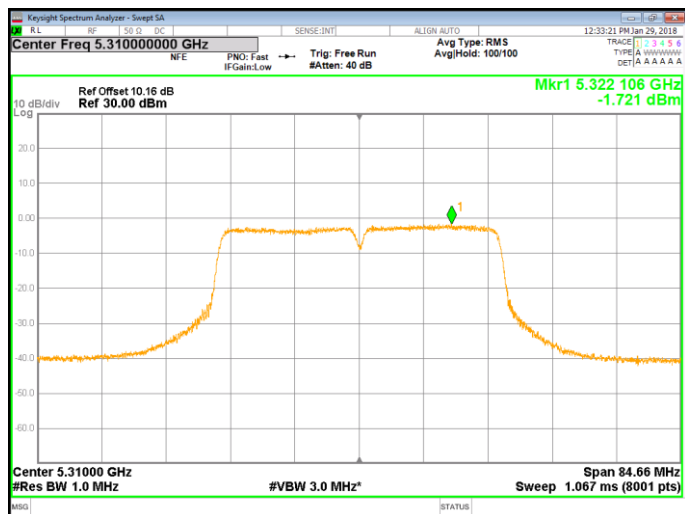
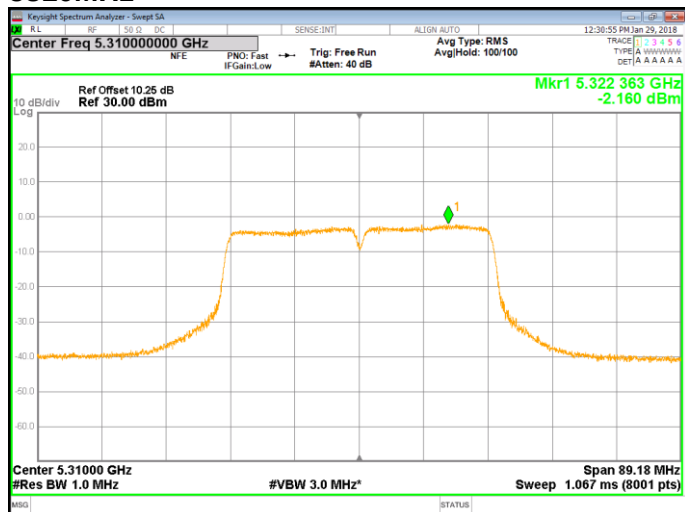
802.11n40 Mode

5270MHz



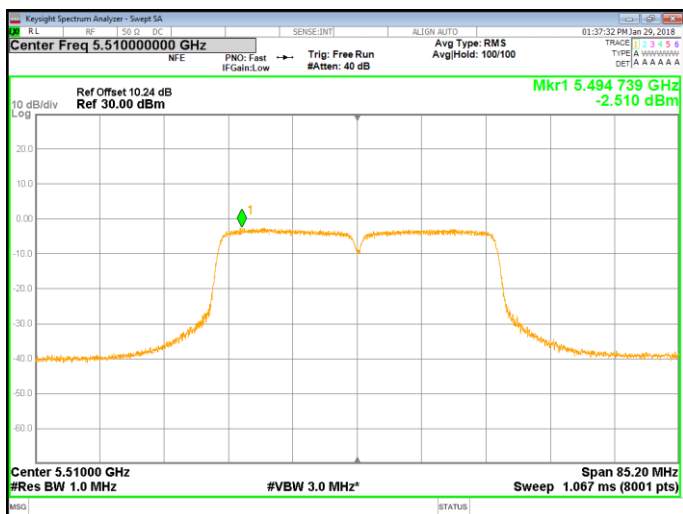
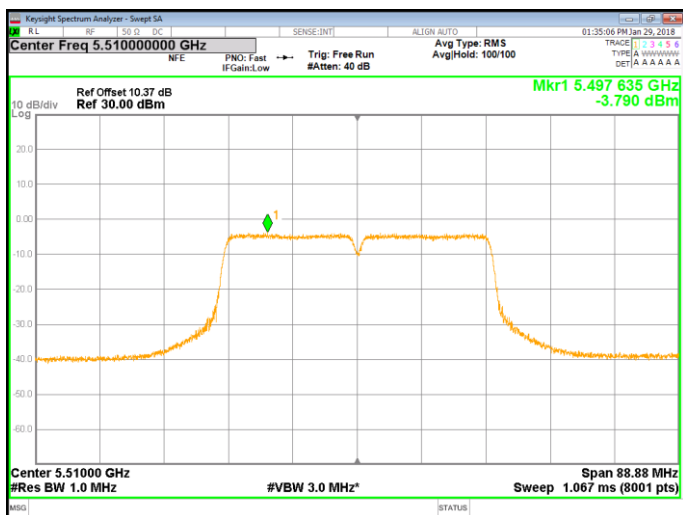


5310MHz



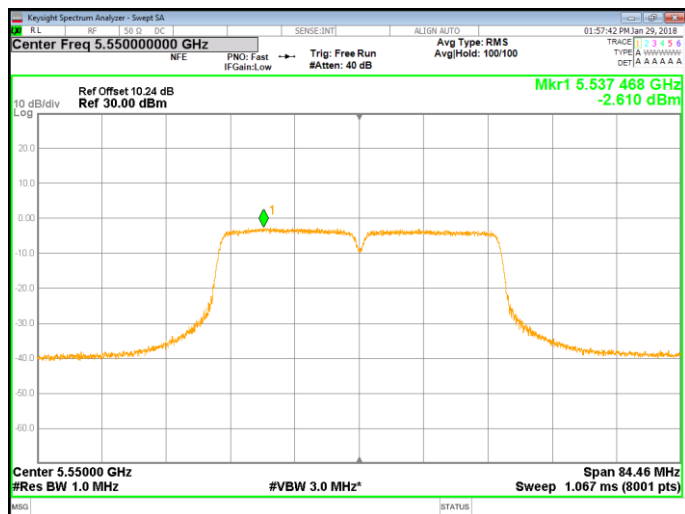
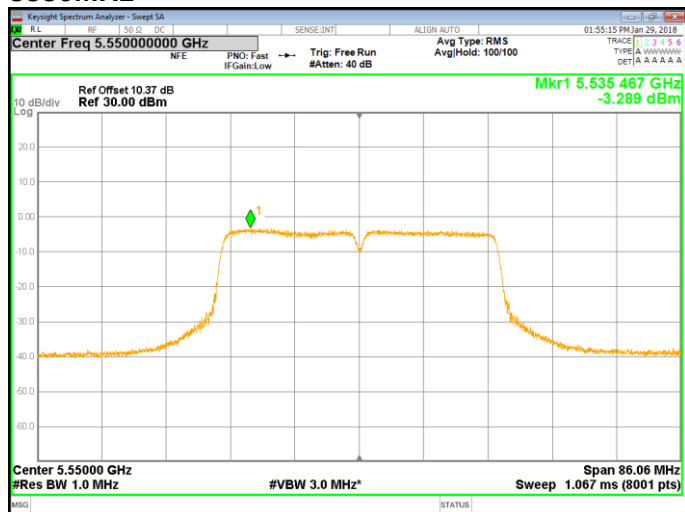


5510MHz





5550MHz





5670MHz

