

Figure Channel 12: (Chain A)

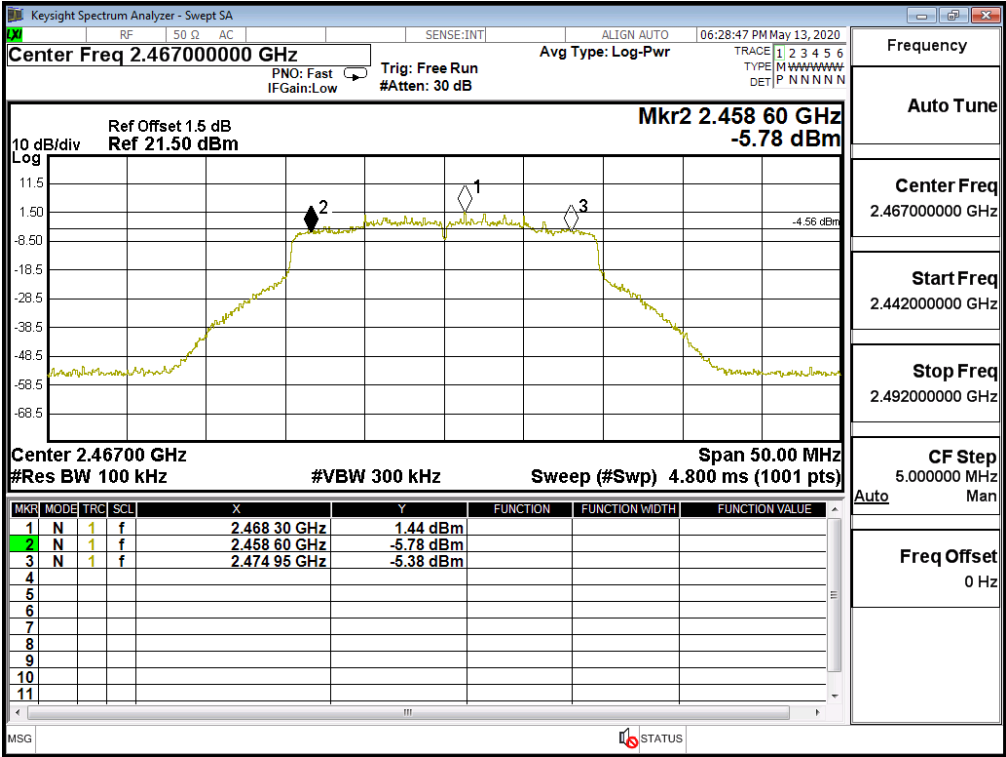
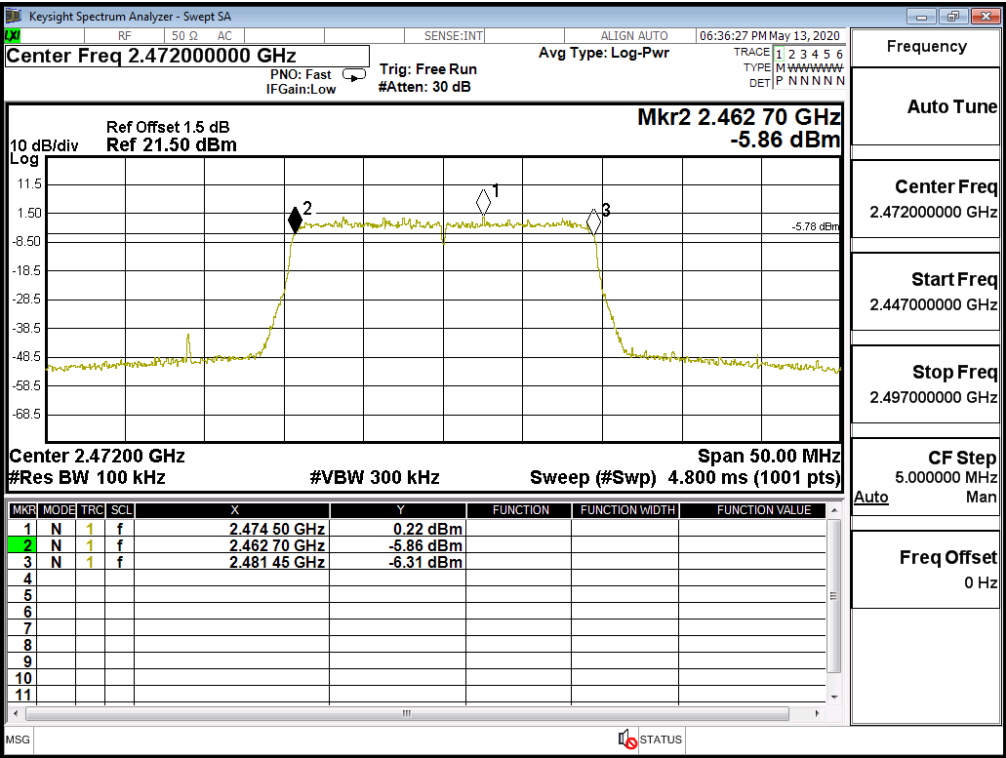


Figure Channel 13: (Chain A)



Product : Portable computer
 Test Item : 6dB Bandwidth Data
 Test Mode : Mode 15 MIMO: Transmit (802.11ax-20BW_17.2Mbps)

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412	14600	>500	Pass
7	2442	18700	>500	Pass
11	2462	15200	>500	Pass
12	2467	17850	>500	Pass
13	2472	18500	>500	Pass

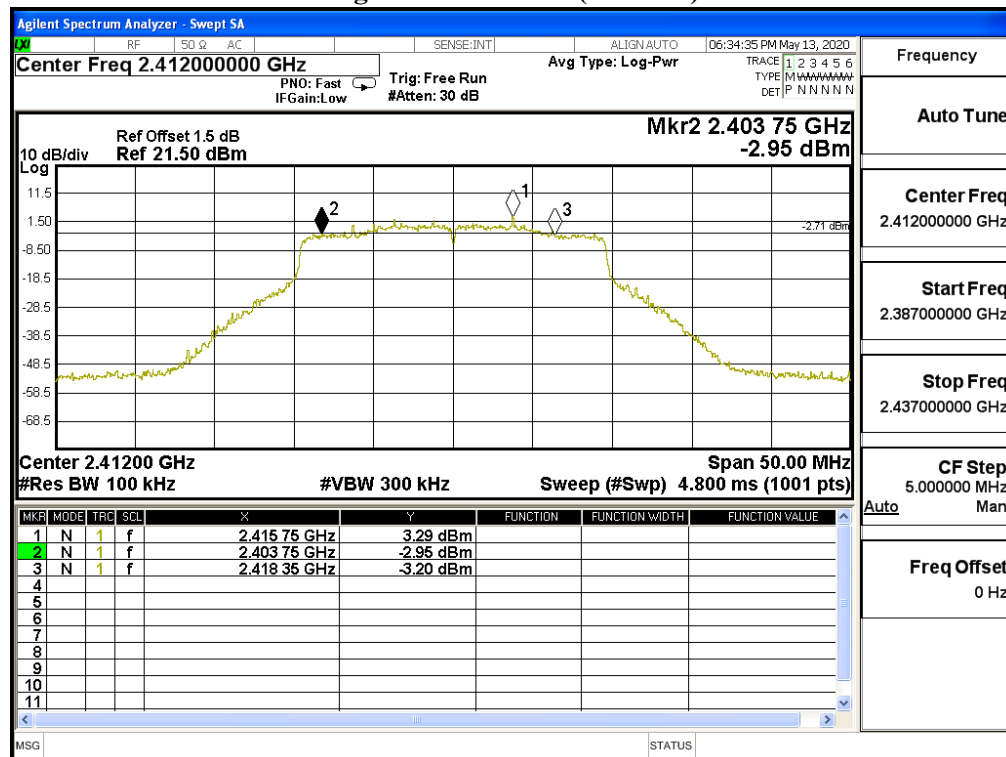
Figure Channel 01: (Chain B)

Figure Channel 07: (Chain B)

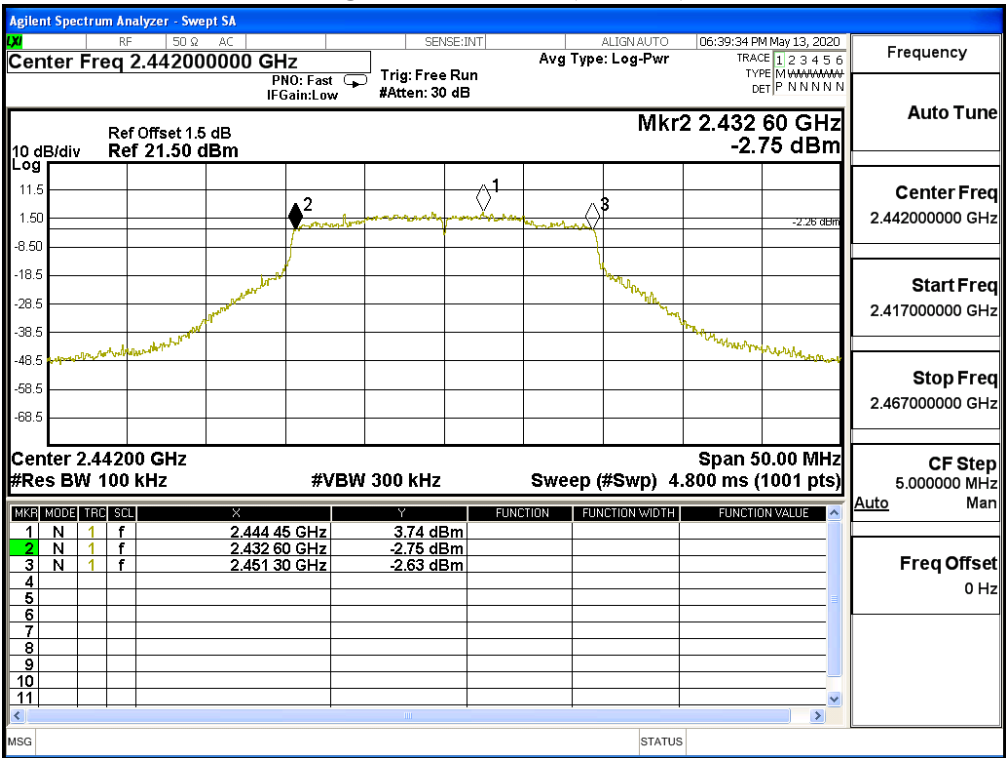


Figure Channel 11: (Chain B)

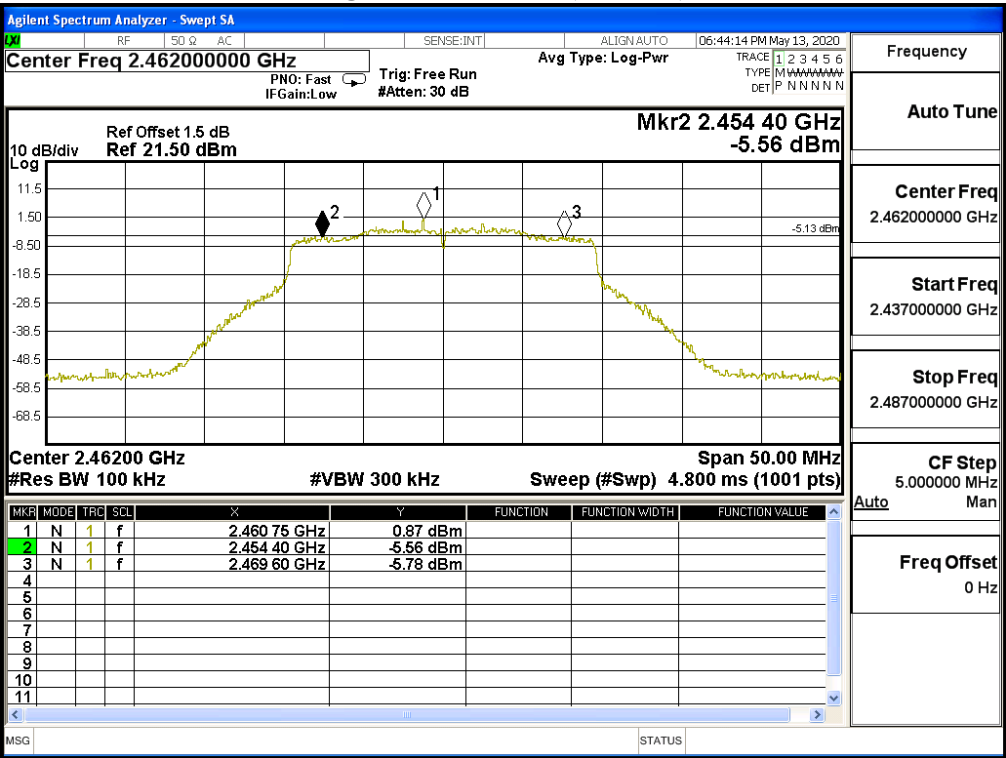


Figure Channel 12: (Chain B)

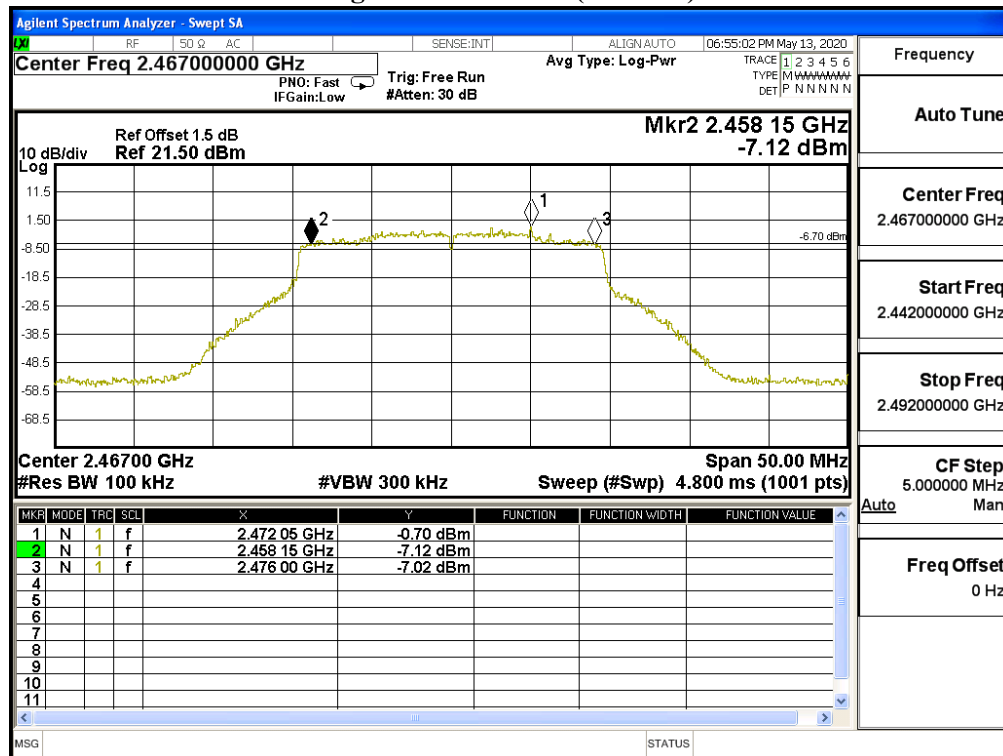
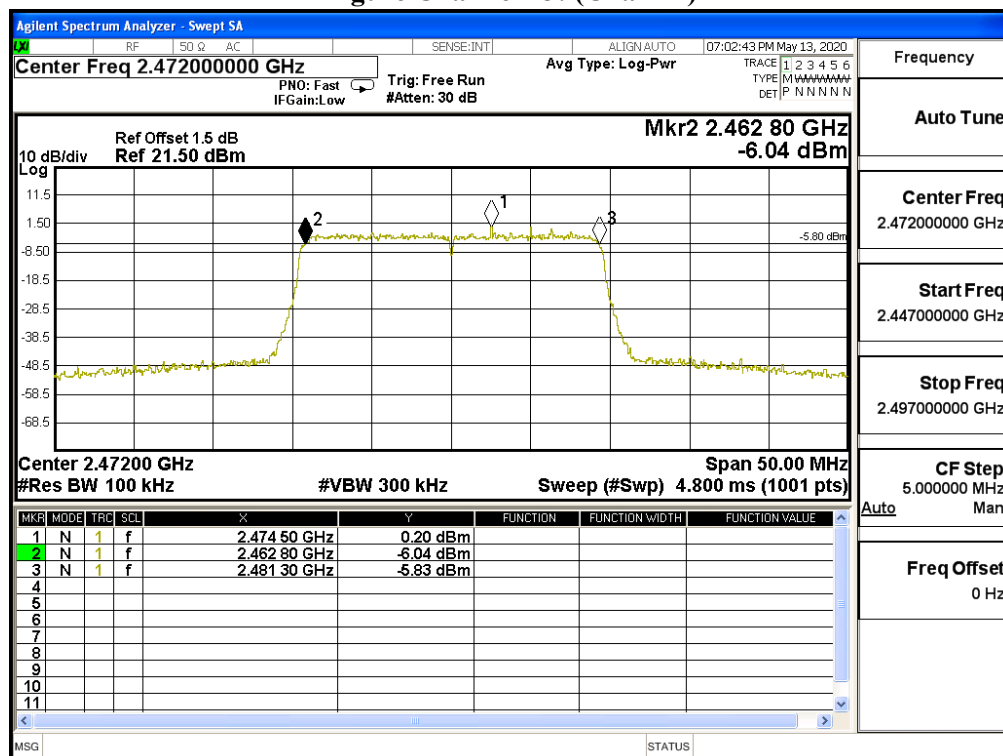


Figure Channel 13: (Chain B)



Product : Portable computer
 Test Item : 6dB Bandwidth Data
 Test Mode : Mode 16 MIMO: Transmit (802.11ax-40BW_34.4Mbps)

Chain A

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
3	2422	35800	>500	Pass
7	2442	35300	>500	Pass
9	2452	32800	>500	Pass
10	2457	36300	>500	Pass
11	2462	37600	>500	Pass

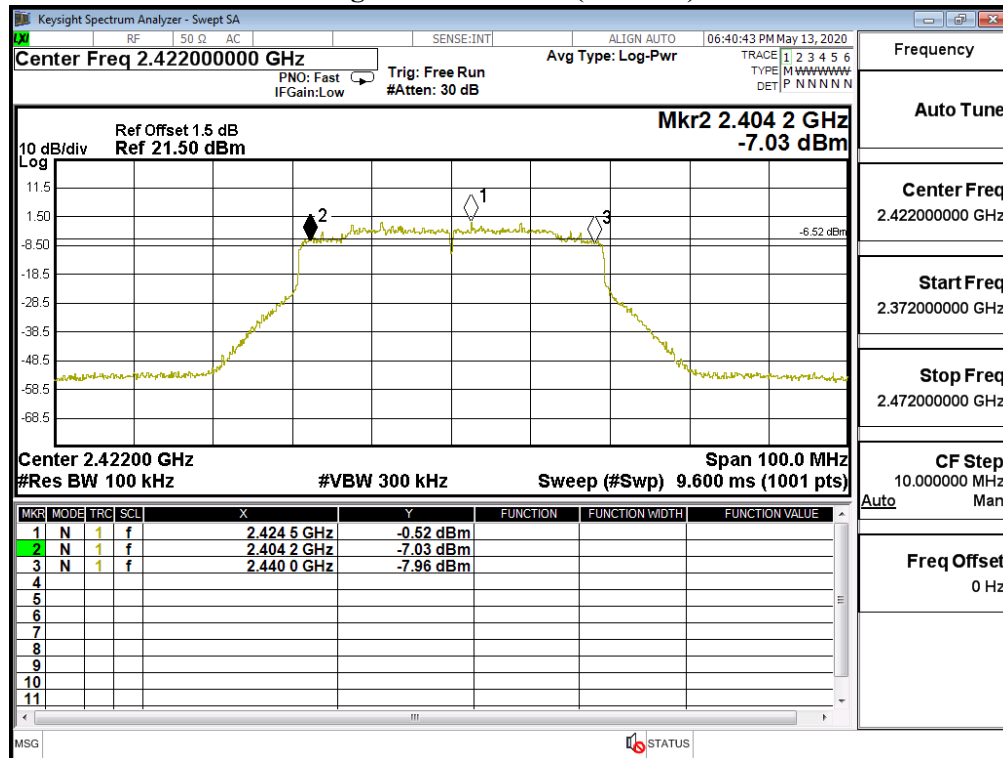
Figure Channel 03: (Chain A)

Figure Channel 07: (Chain A)

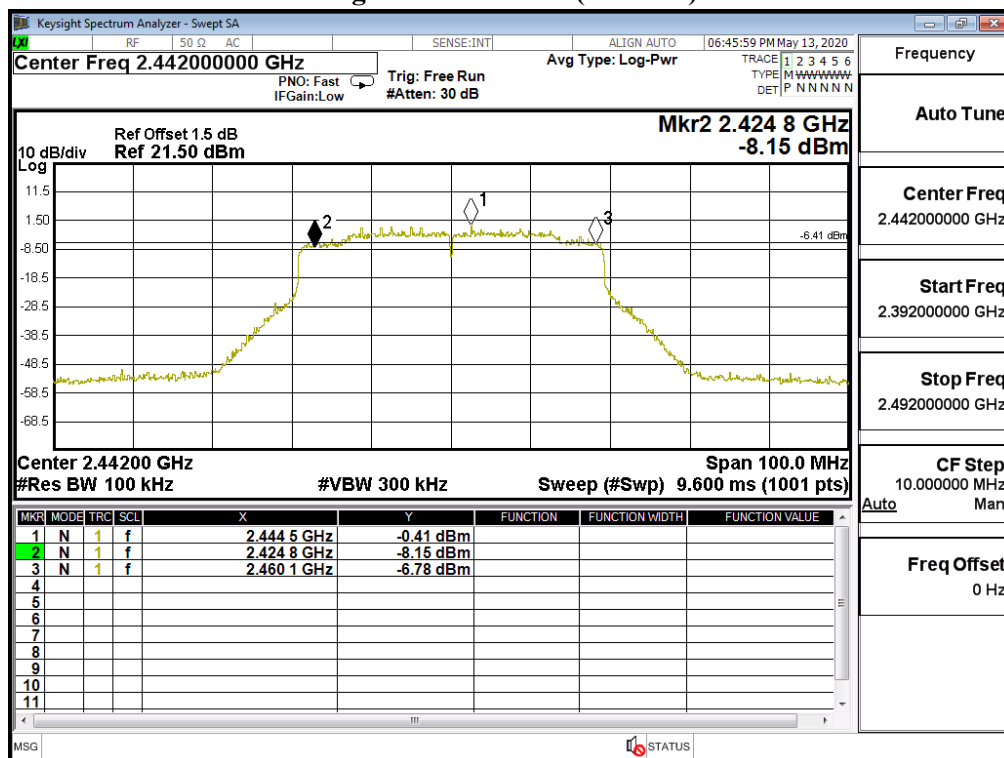


Figure Channel 09: (Chain A)

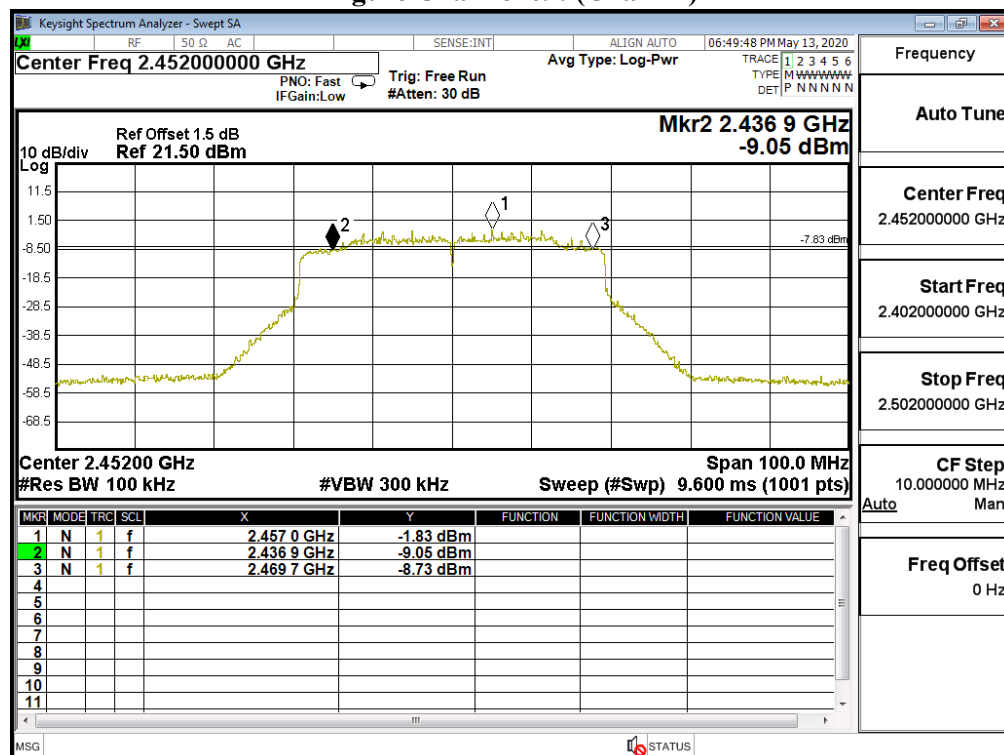


Figure Channel 10: (Chain A)

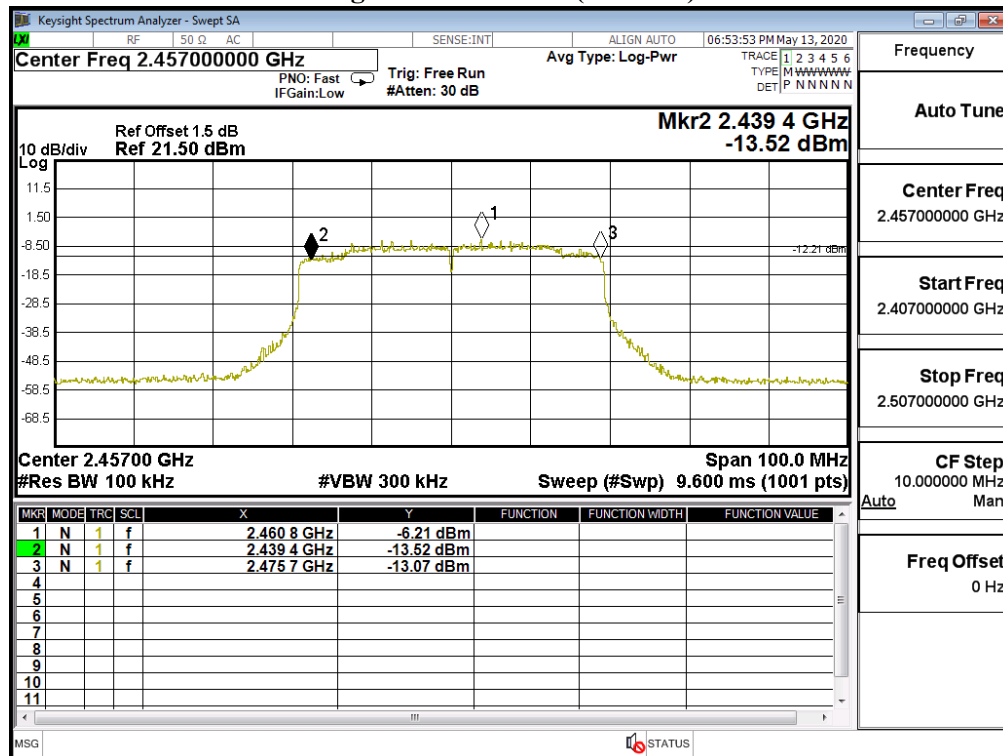
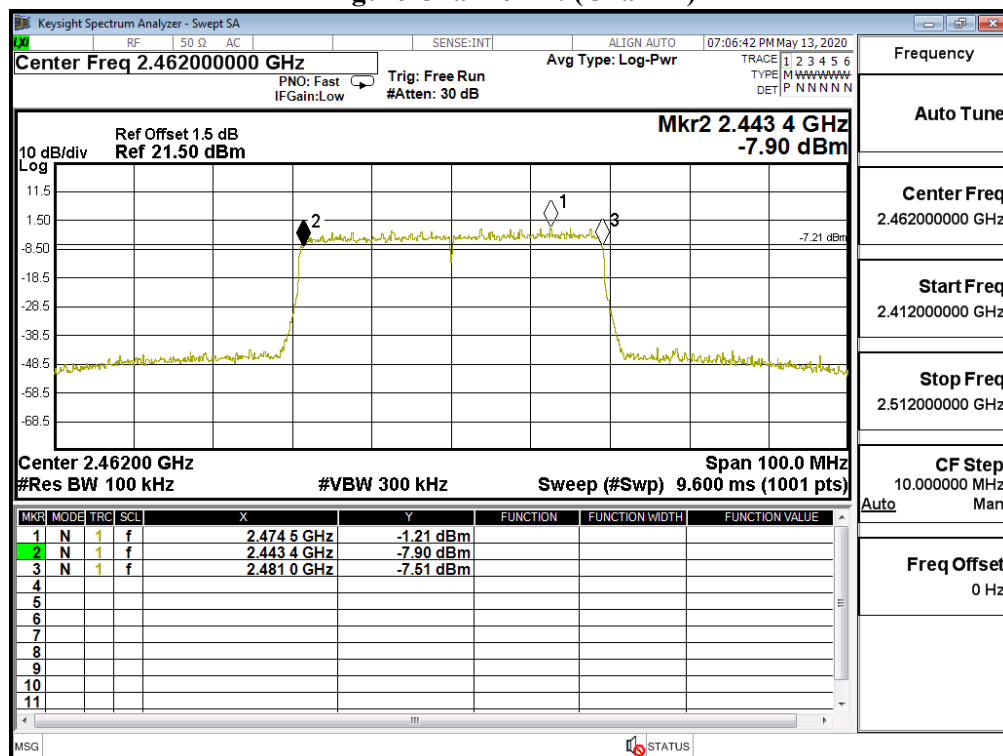


Figure Channel 11: (Chain A)



Product : Portable computer
 Test Item : 6dB Bandwidth Data
 Test Mode : Mode 16 MIMO: Transmit (802.11ax-40BW_34.4Mbps)

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
3	2422	35800	>500	Pass
7	2442	31600	>500	Pass
9	2452	35900	>500	Pass
10	2457	34700	>500	Pass
11	2462	37400	>500	Pass

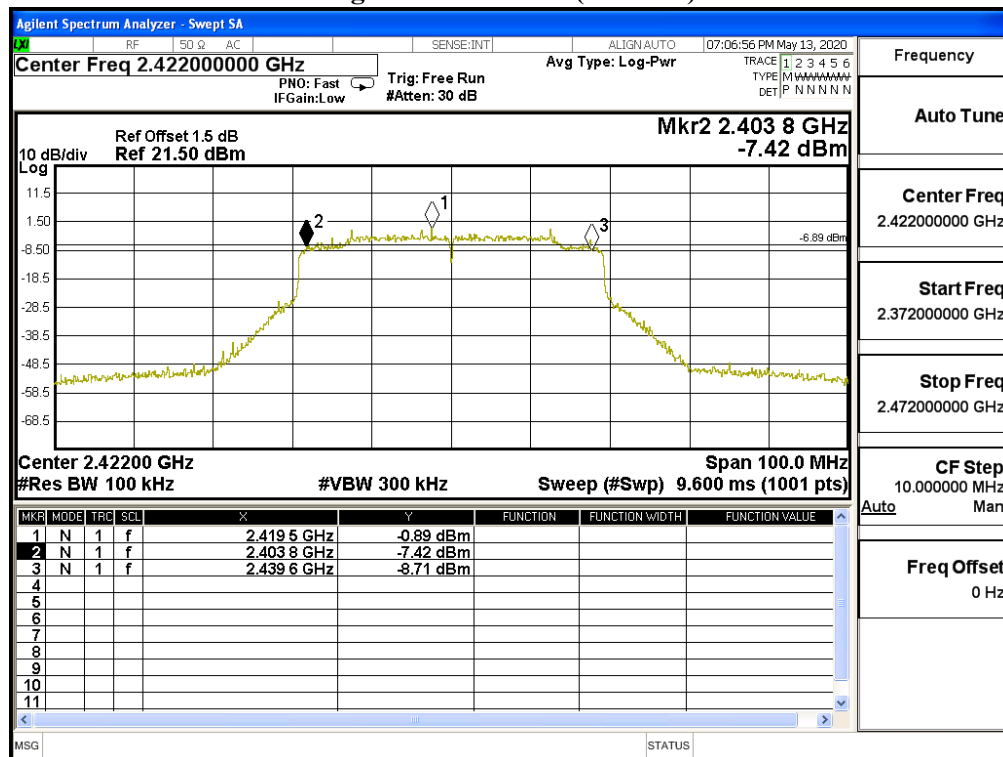
Figure Channel 03: (Chain B)

Figure Channel 07: (Chain B)

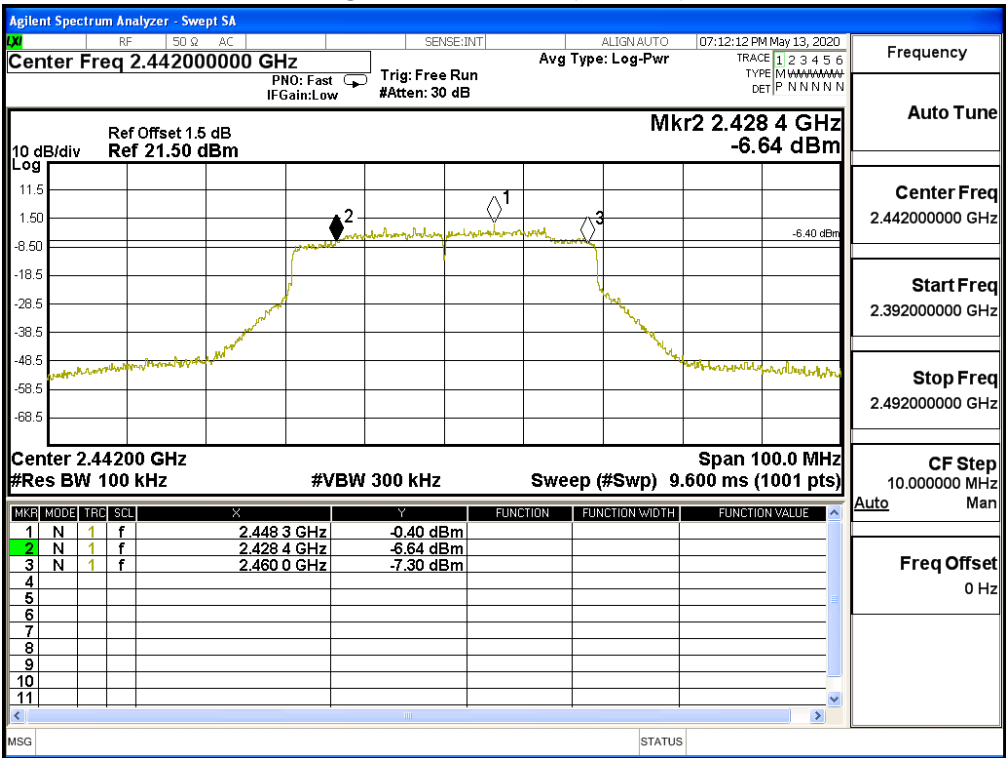


Figure Channel 09: (Chain B)

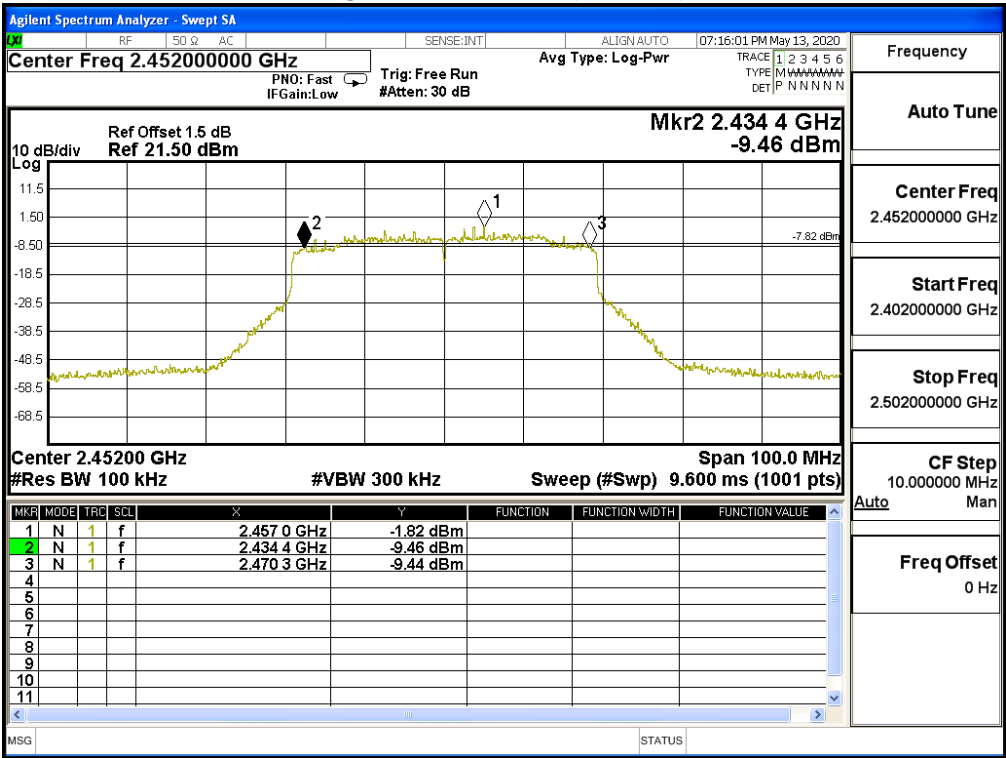


Figure Channel 10: (Chain B)

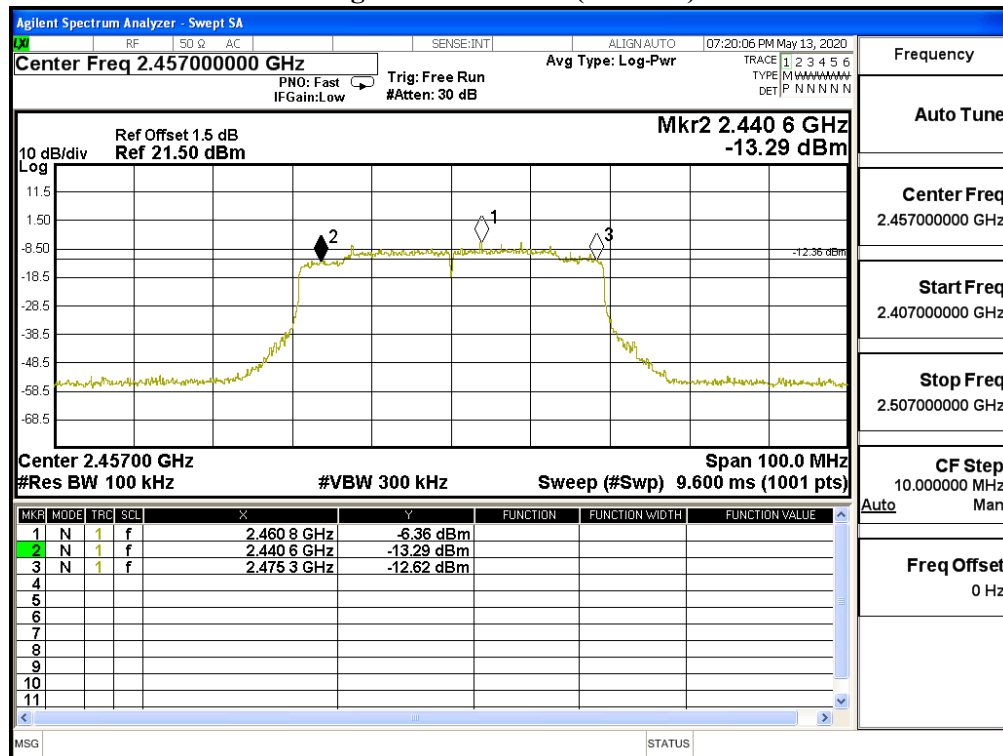
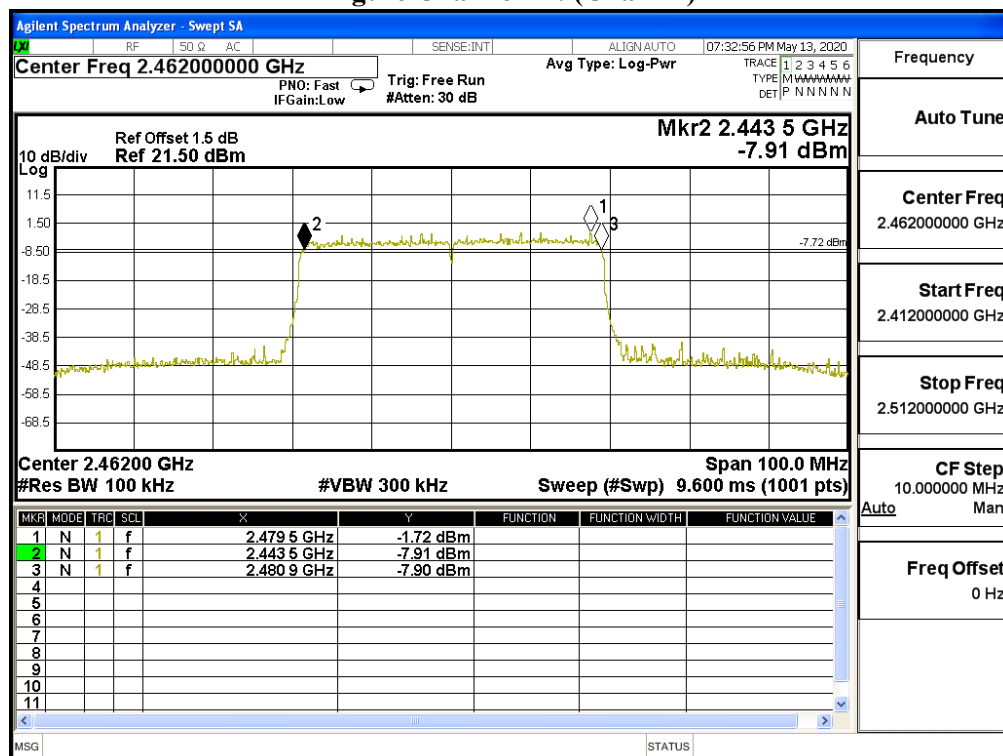
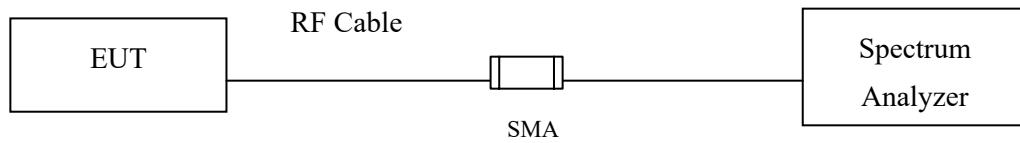


Figure Channel 11: (Chain B)



8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using C63.10 Section 11.10.2 Method PKPSD (peak PSD)

8.4. Uncertainty

± 1.20 dB

8.5. Test Result of Power Density

Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 7 SISO B: Transmit (802.11b_1Mbps)

Channel No.	Frequency (MHz)	PPSD/MHz (dBm)	Limit (dBm)	Result
1	2412	7.900	$\leq 8\text{dBm}$	Pass
7	2442	7.760	$\leq 8\text{dBm}$	Pass
11	2462	7.470	$\leq 8\text{dBm}$	Pass
12	2467	7.480	$\leq 8\text{dBm}$	Pass
13	2472	5.780	$\leq 8\text{dBm}$	Pass

Figure Channel 1:

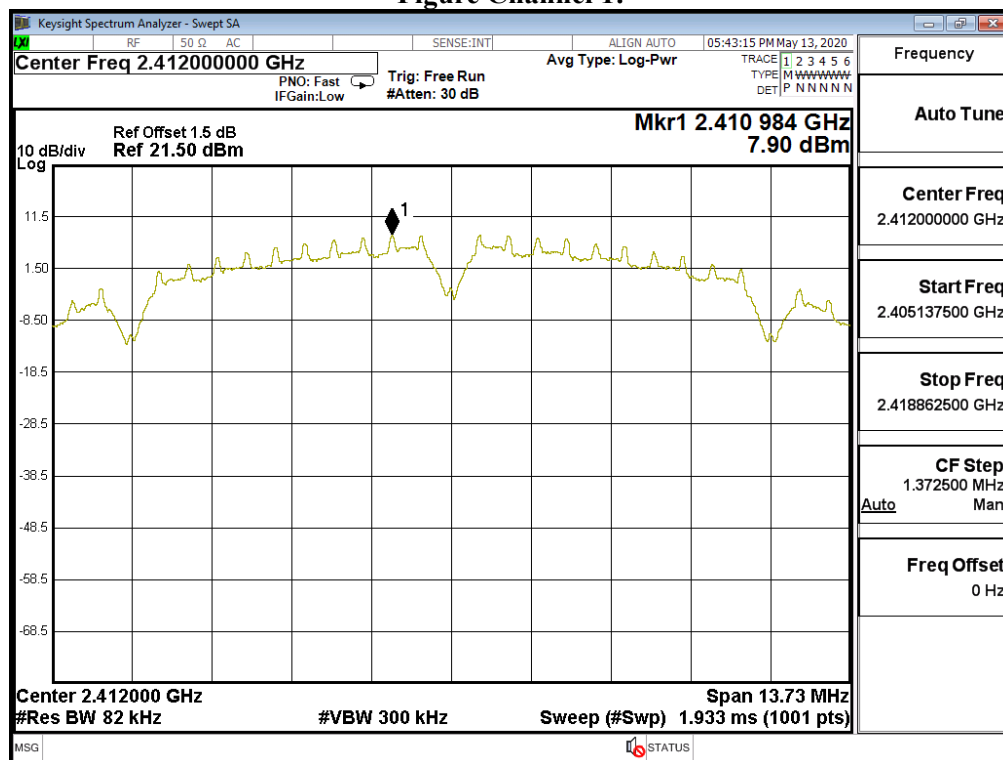


Figure Channel 7:

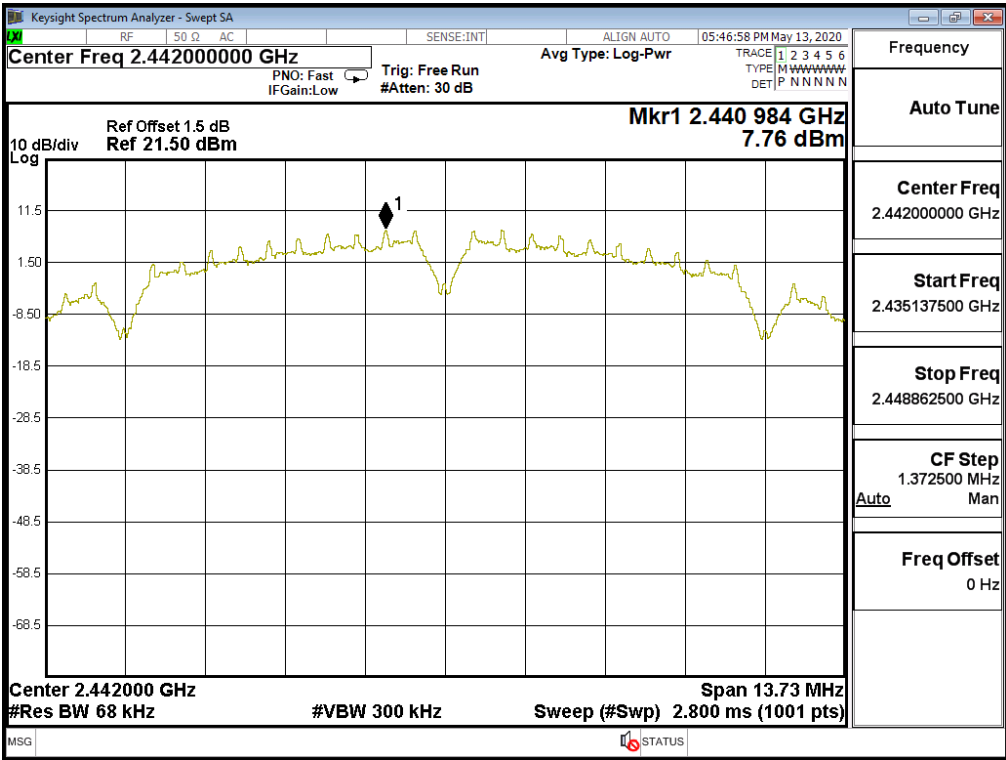


Figure Channel 11:

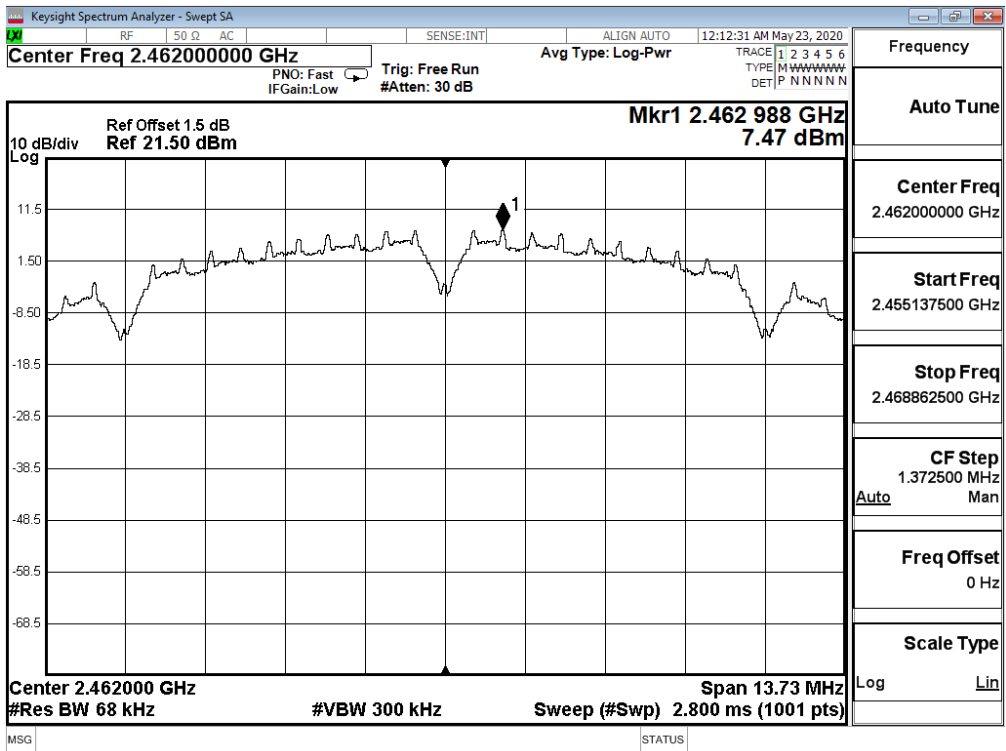


Figure Channel 12:

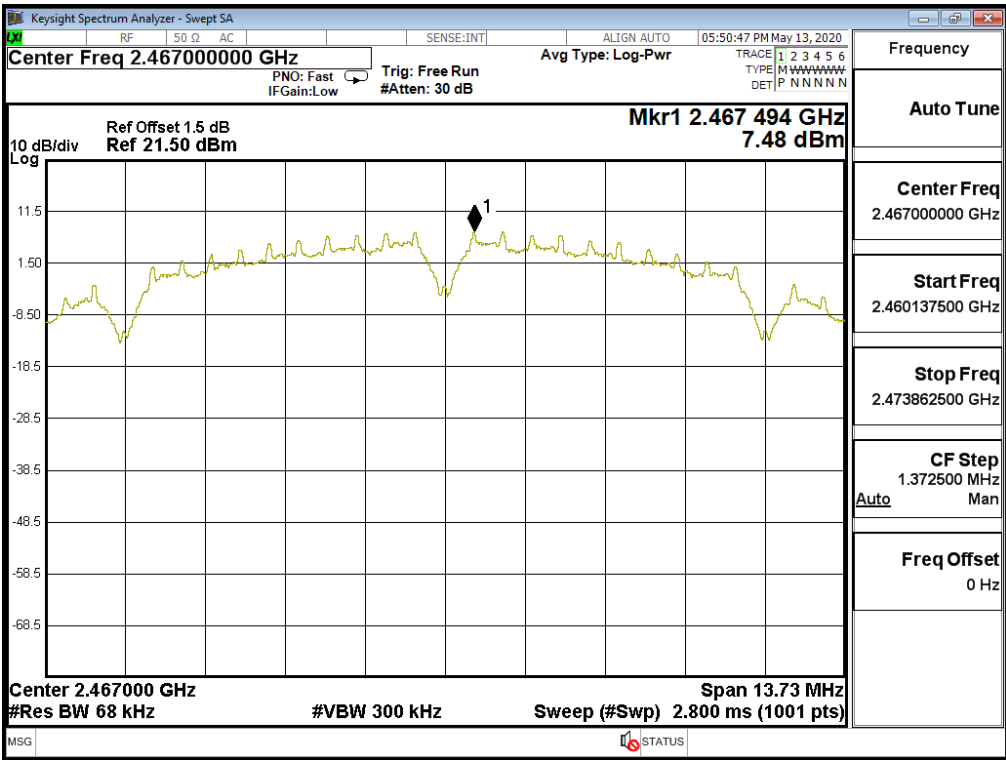
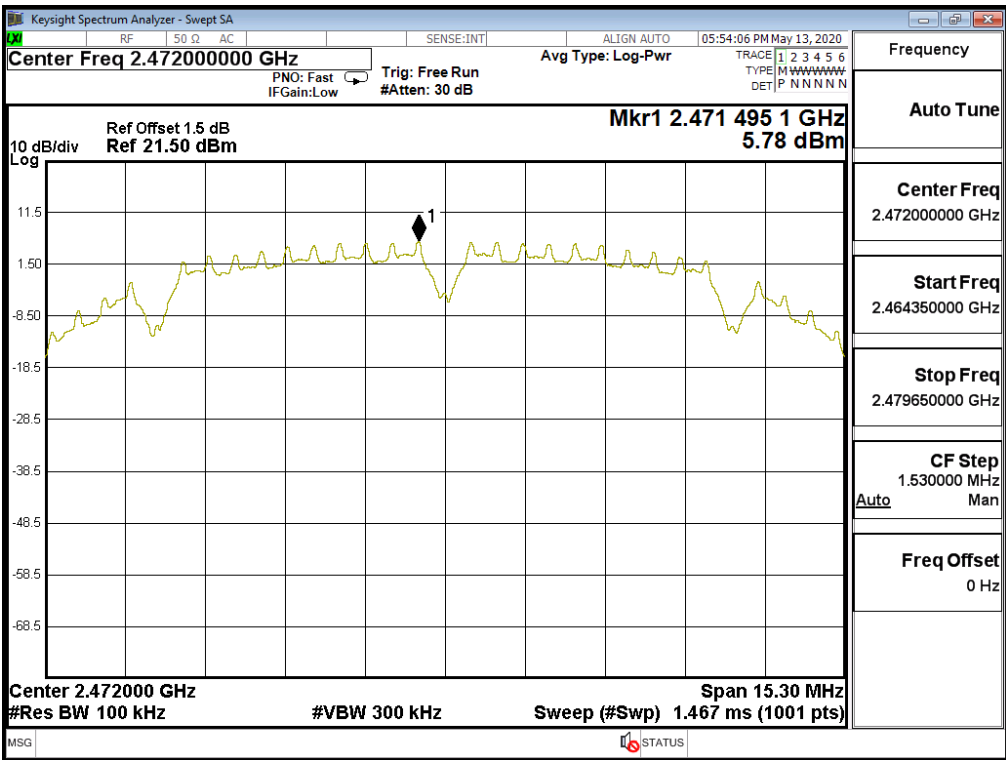


Figure Channel 13:



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 9 SISO B: Transmit (802.11n-20BW_7.2Mbps)

Channel No.	Frequency (MHz)	PPSD/MHz (dBm)	Limit (dBm)	Result
1	2412	6.410	≤ 8 dBm	Pass
7	2442	7.160	≤ 8 dBm	Pass
11	2462	7.260	≤ 8 dBm	Pass
12	2467	5.870	≤ 8 dBm	Pass
13	2472	3.720	≤ 8 dBm	Pass

Figure Channel 1:

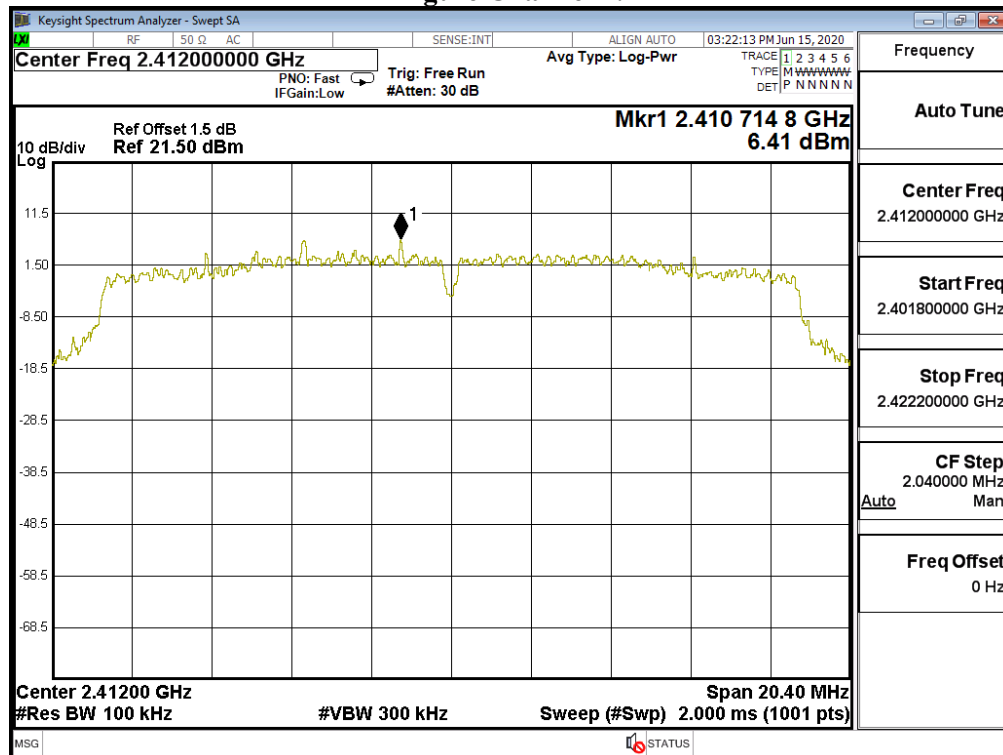


Figure Channel 7:

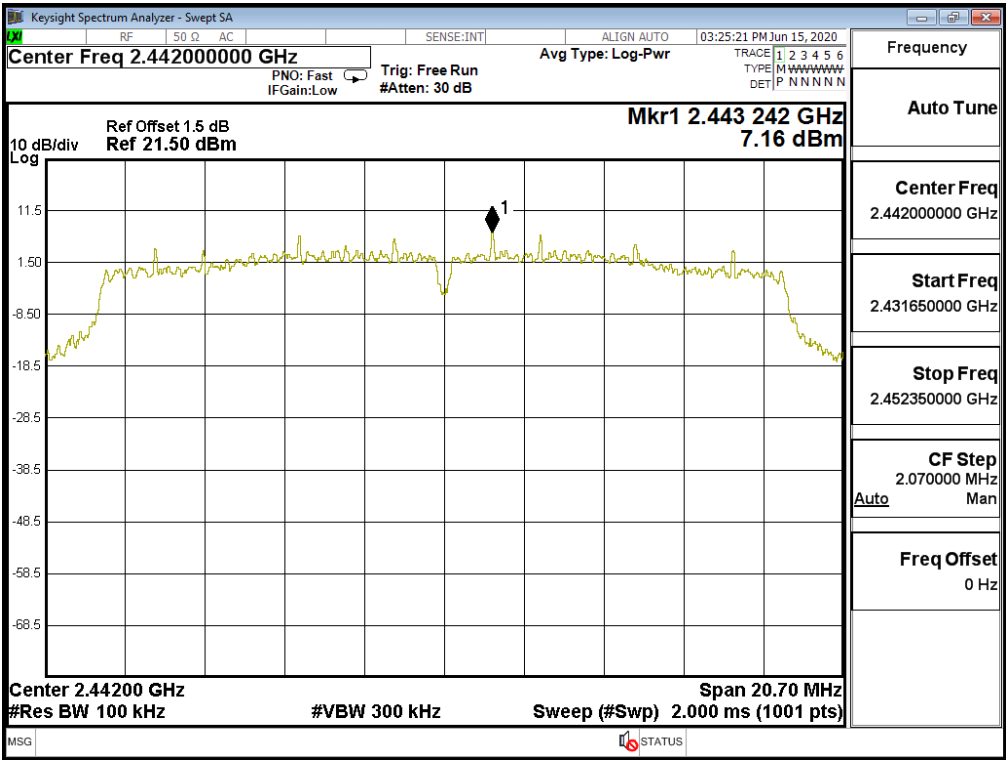


Figure Channel 11:

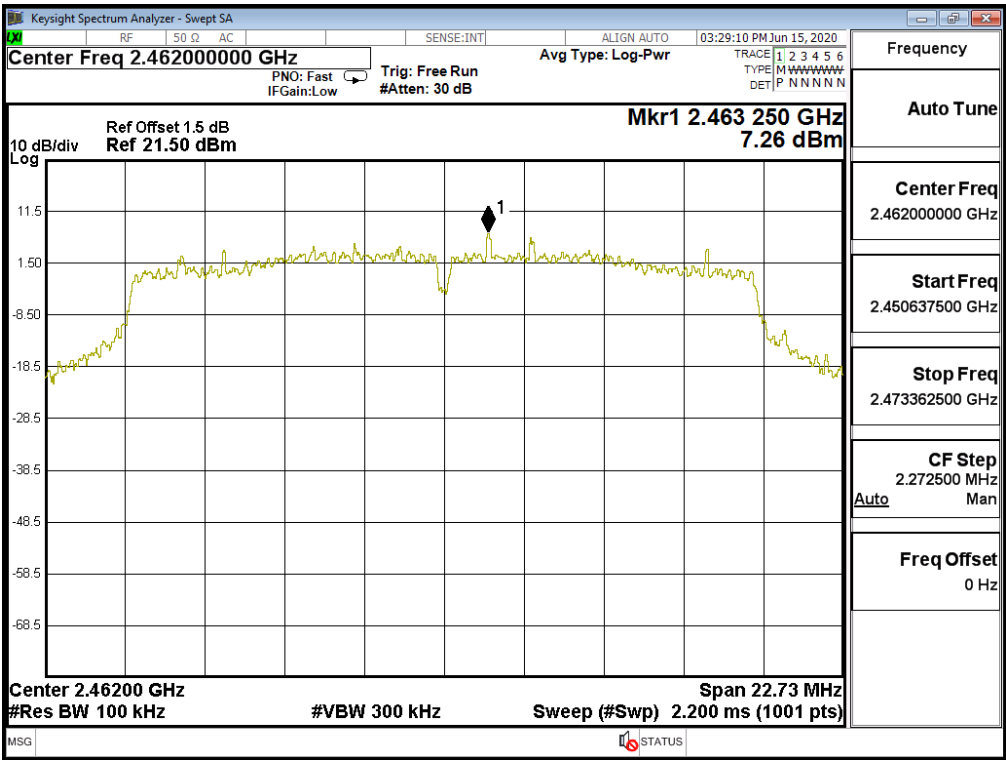


Figure Channel 12:

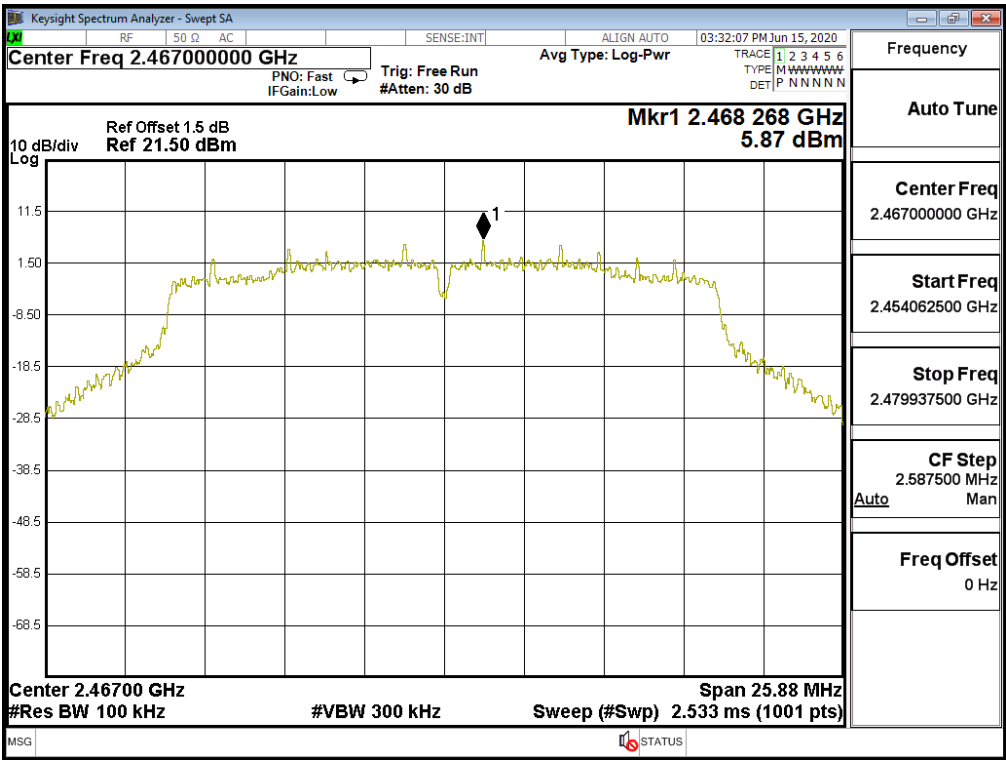
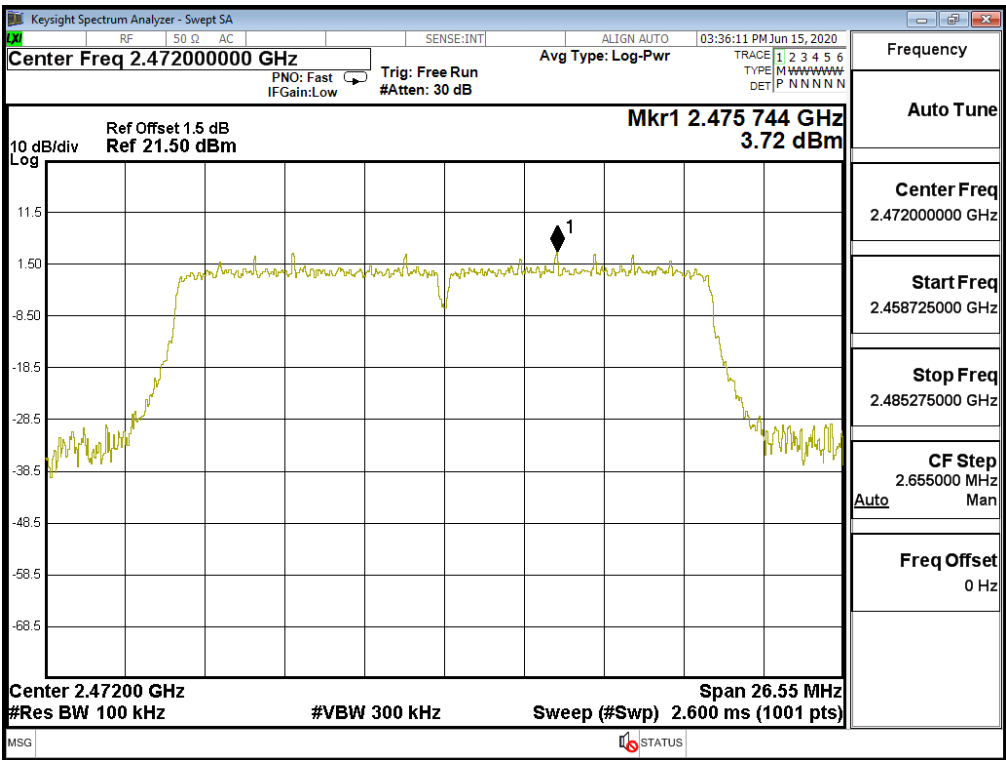


Figure Channel 13:



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 10 SISO B: Transmit (802.11n-40BW_15Mbps)

Channel No.	Frequency (MHz)	PPSD/MHz (dBm)	Limit (dBm)	Result
03	2422	3.690	$\leq 8\text{dBm}$	Pass
07	2442	4.180	$\leq 8\text{dBm}$	Pass
09	2452	2.650	$\leq 8\text{dBm}$	Pass
10	2457	-0.930	$\leq 8\text{dBm}$	Pass
11	2462	-1.420	$\leq 8\text{dBm}$	Pass

Figure Channel 3:

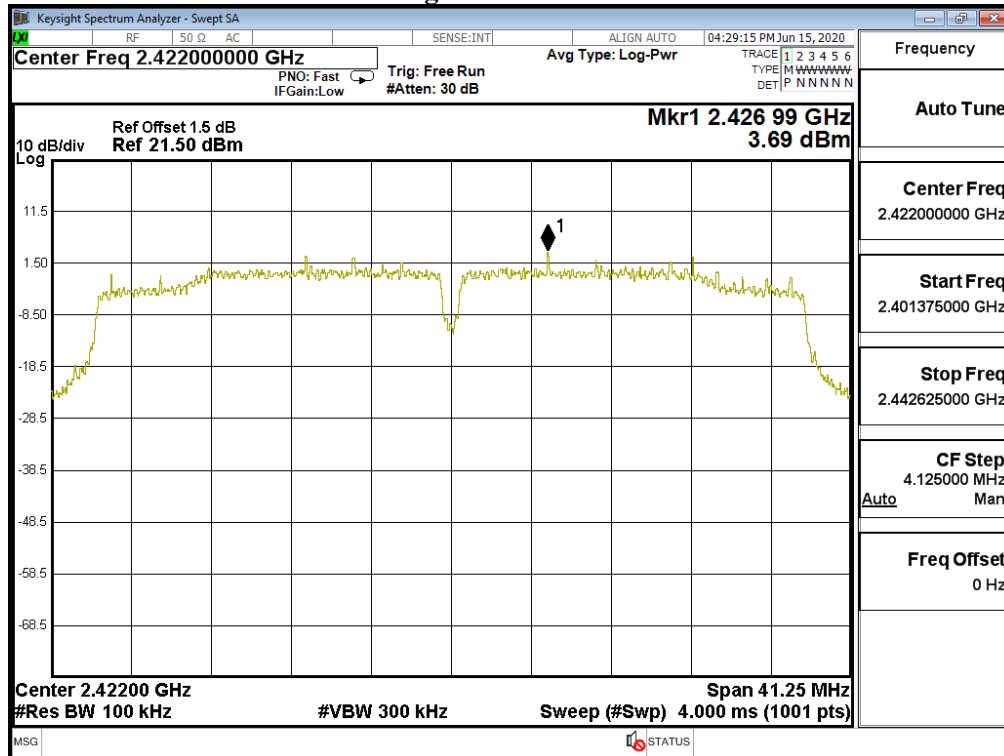


Figure Channel 7:

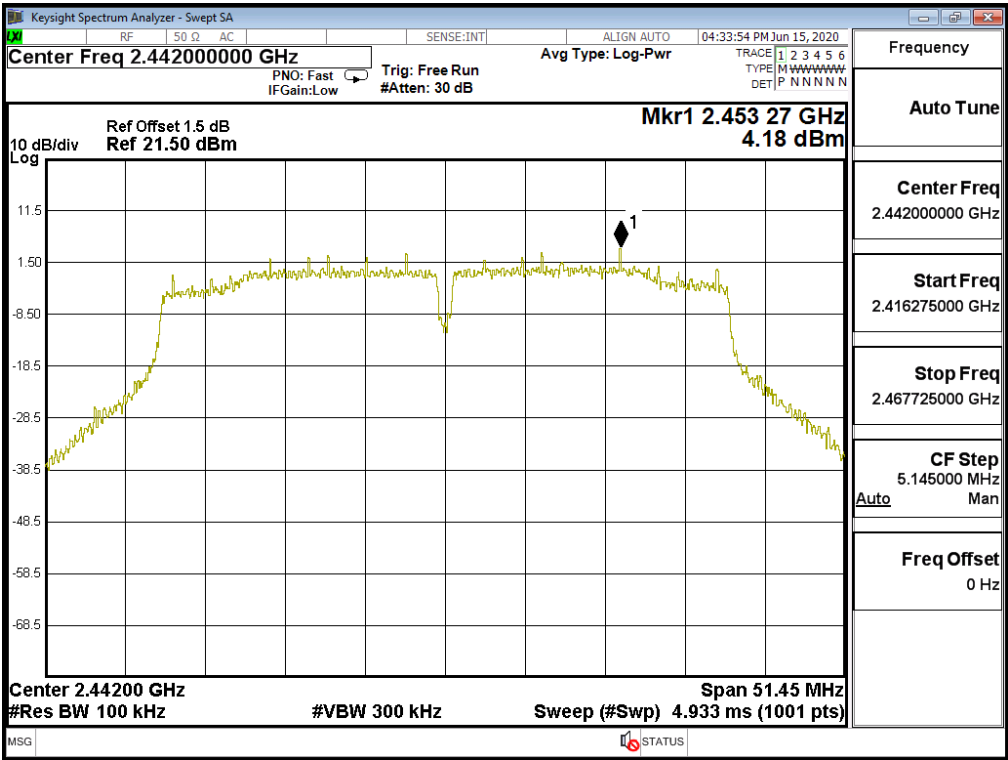


Figure Channel 9:

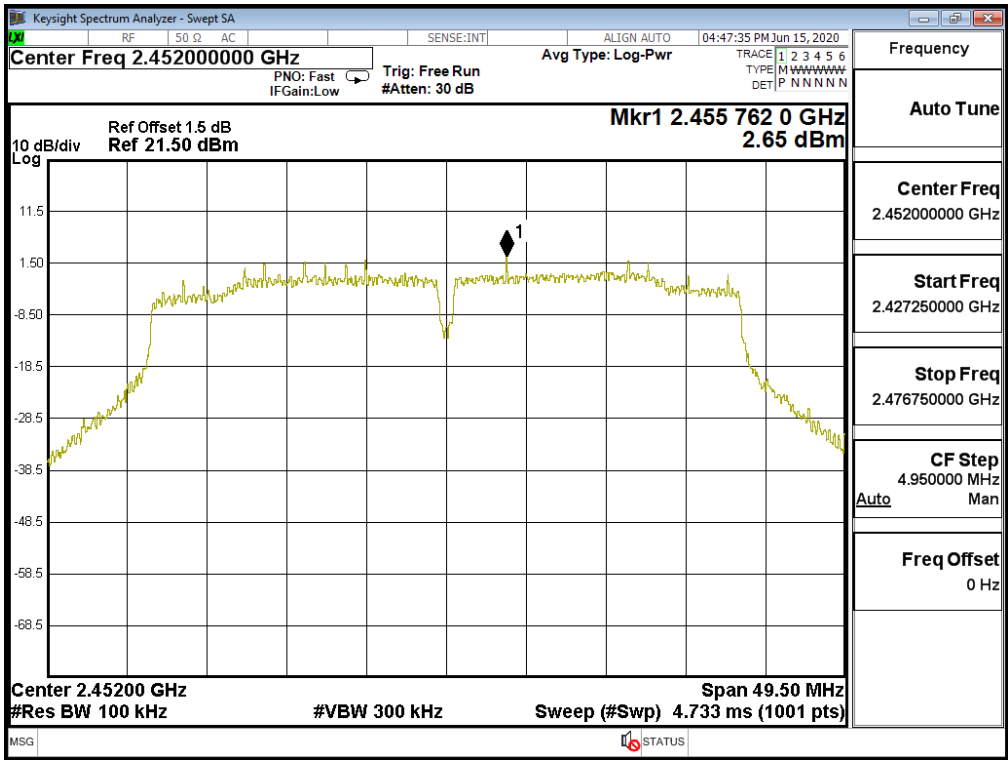


Figure Channel 10:

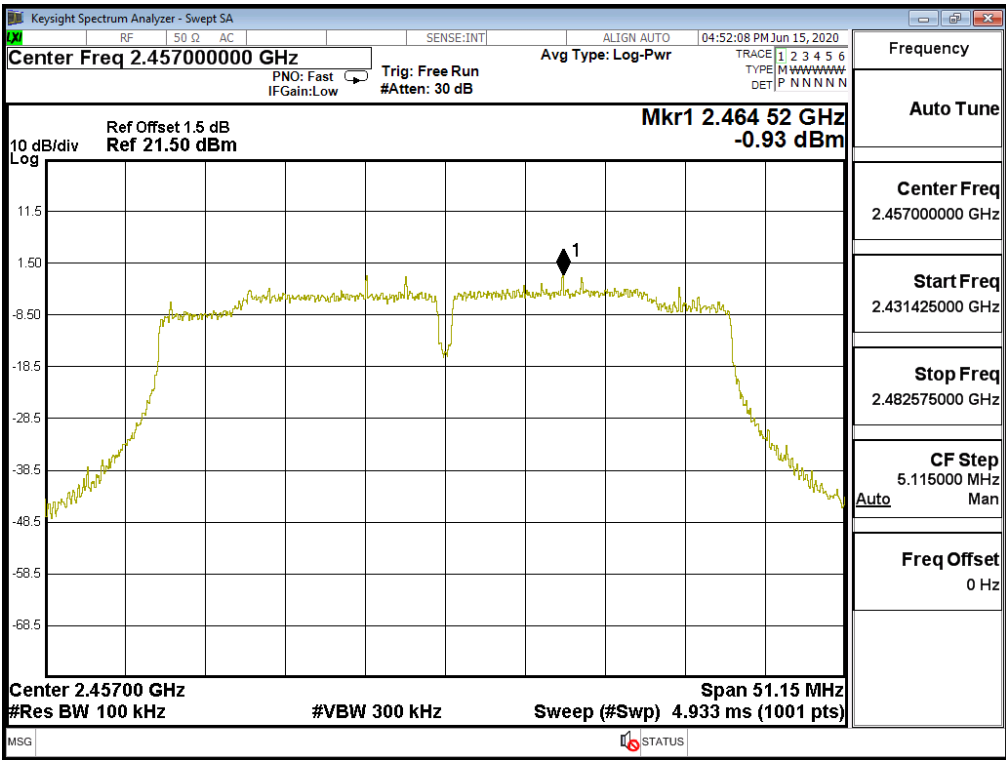
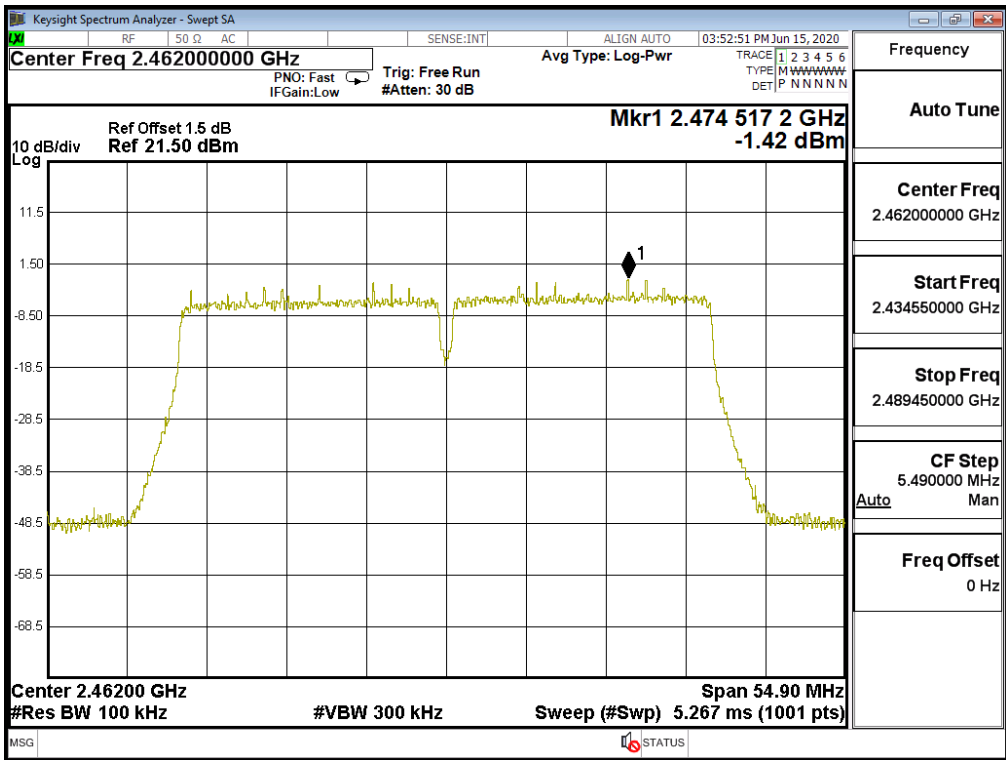


Figure Channel 11:



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 11 SISO B: Transmit (802.11ax-20BW_8.6Mbps)

RU config: Full

Channel No.	Frequency (MHz)	PPSD/MHz (dBm)	Limit (dBm)	Result
1	2412	6.280	≤ 8 dBm	Pass
7	2442	6.840	≤ 8 dBm	Pass
11	2462	7.050	≤ 8 dBm	Pass
12	2467	5.520	≤ 8 dBm	Pass
13	2472	0.060	≤ 8 dBm	Pass

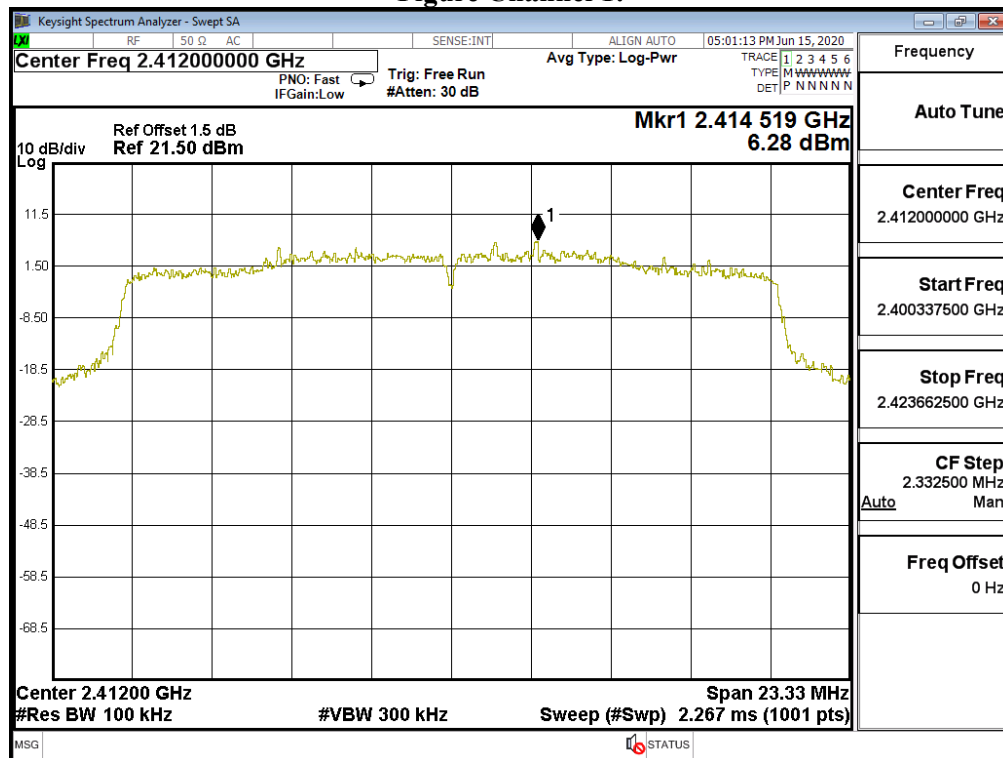
Figure Channel 1:

Figure Channel 7:

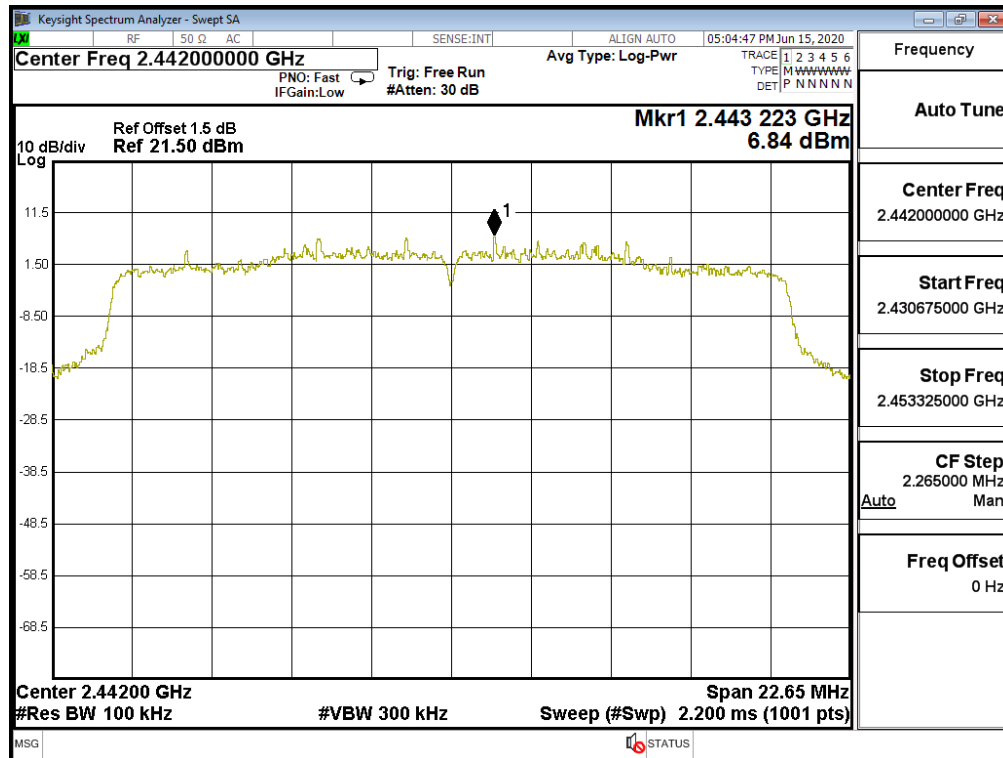


Figure Channel 11:

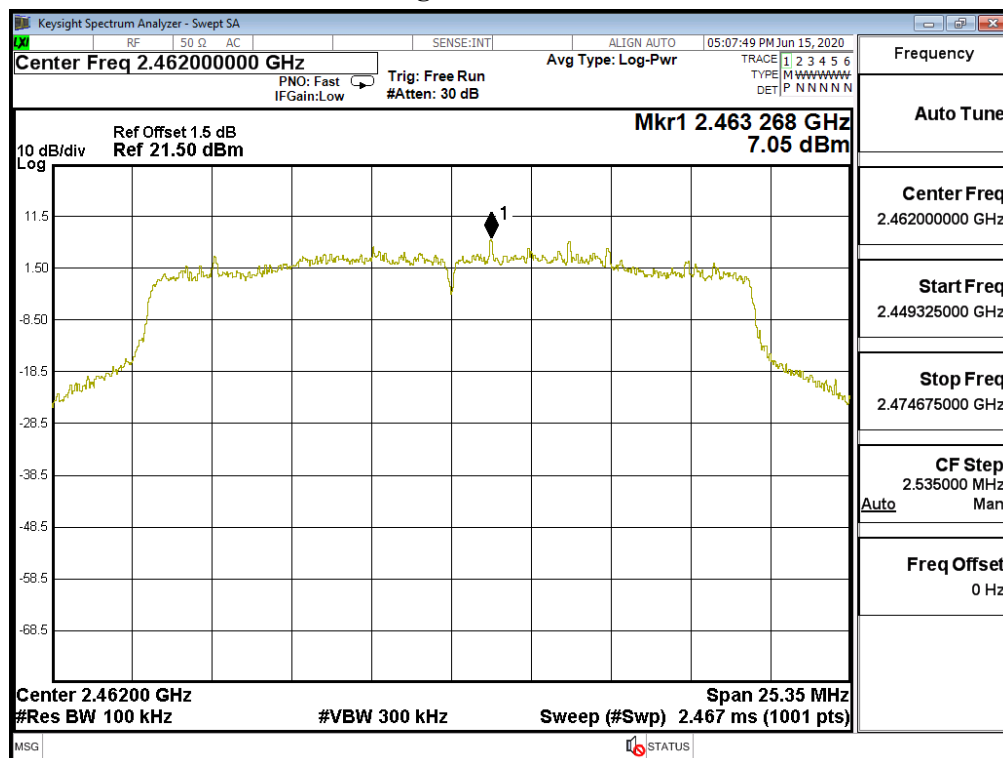


Figure Channel 12:

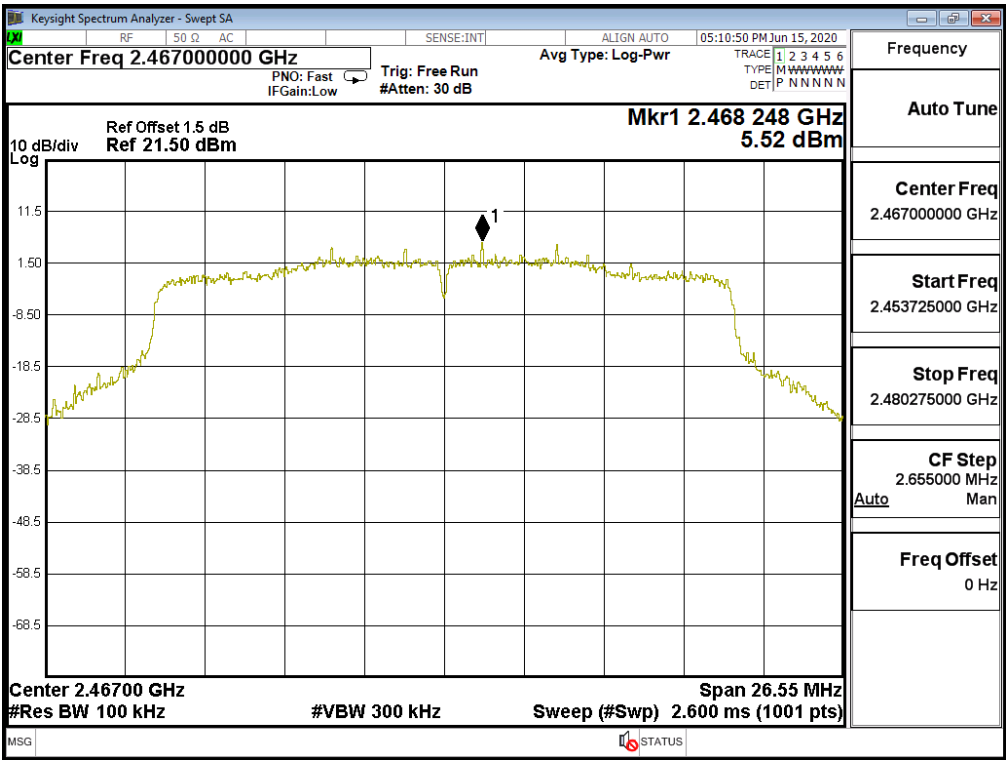
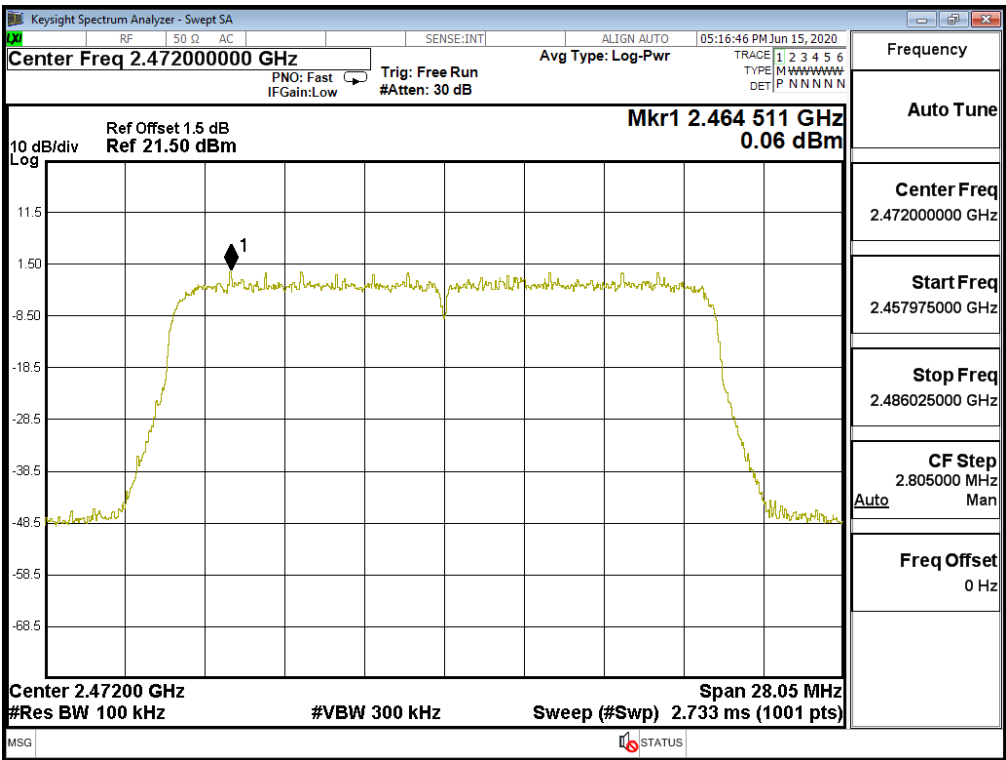


Figure Channel 13:



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 11 SISO B: Transmit (802.11ax-20BW_8.6Mbps)

RU config: Other

Channel No.	Frequency (MHz)	RU setting	PPSD/MHz (dBm)	Limit (dBm)	Result
1	2412	26/0	-1.722	≤ 8 dBm	Pass
		52/37	-1.146	≤ 8 dBm	Pass
		106/53	-1.713	≤ 8 dBm	Pass
13	2472	26/8	-0.583	≤ 8 dBm	Pass
		52/40	-3.073	≤ 8 dBm	Pass
		106/54	-6.424	≤ 8 dBm	Pass

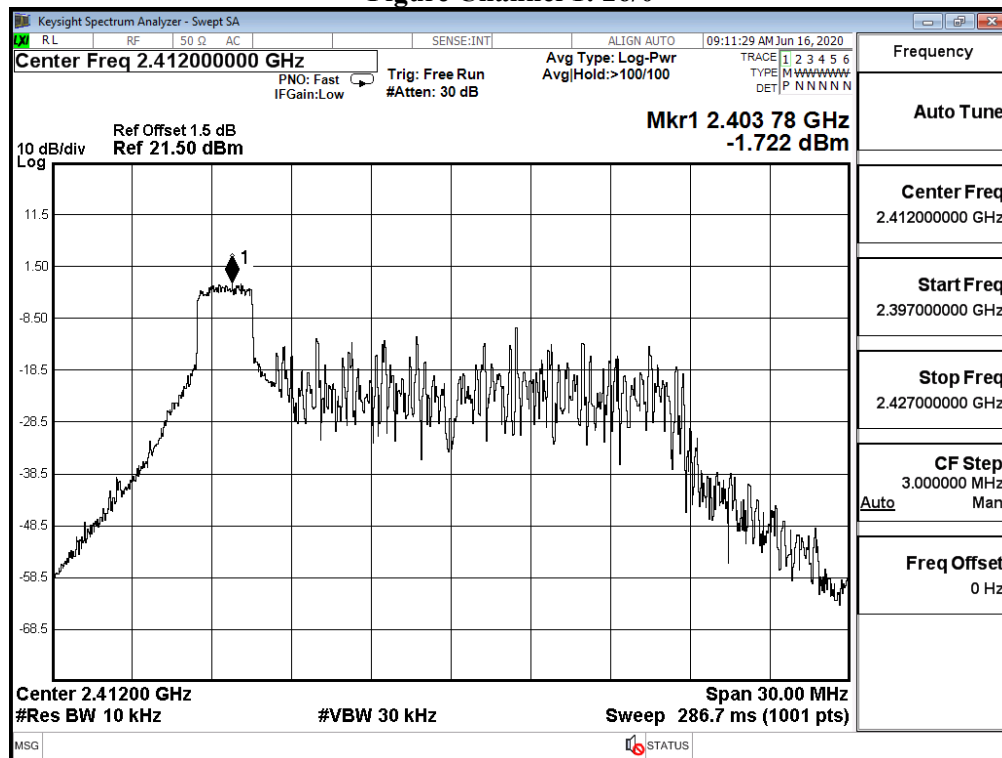
Figure Channel 1: 26/0

Figure Channel 1: 52/37

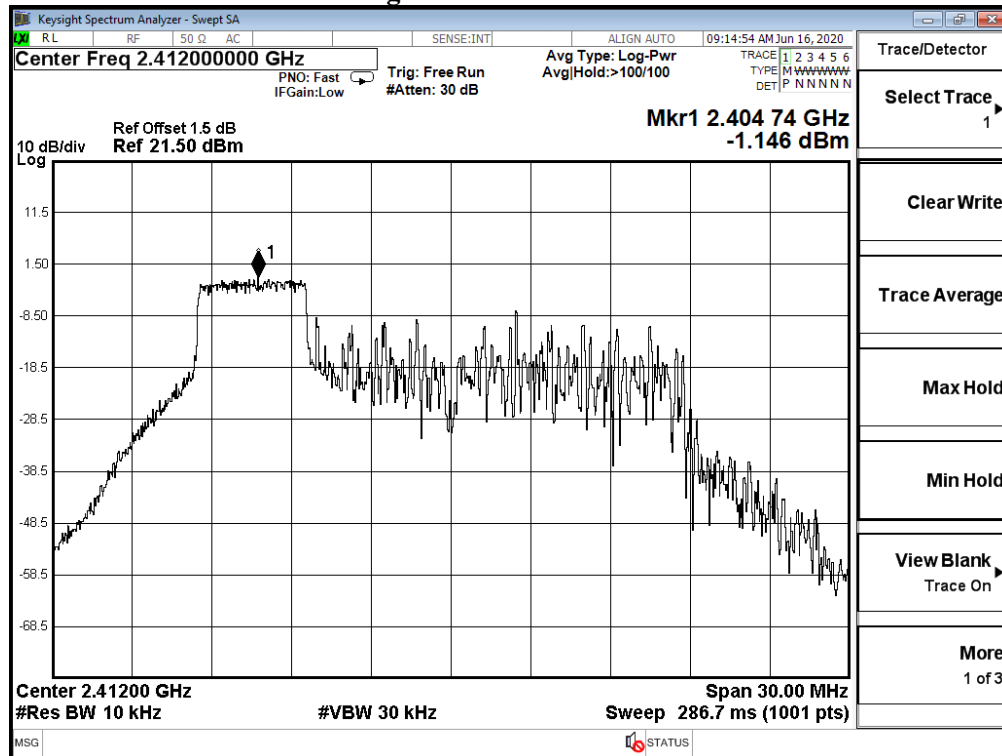


Figure Channel 1: 106/53

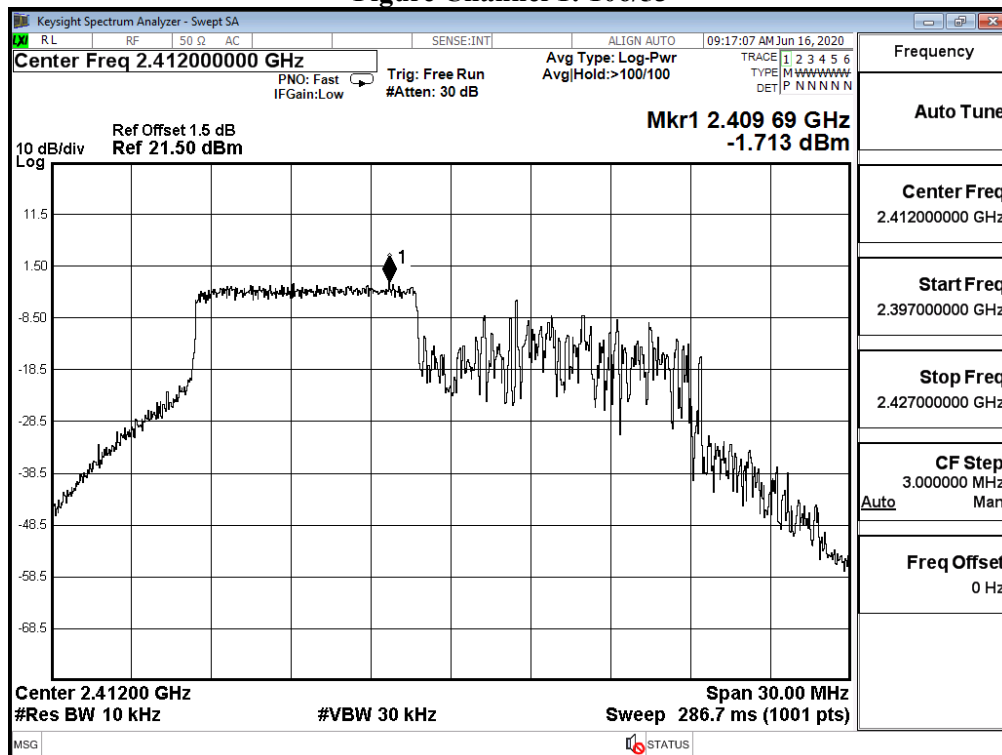


Figure Channel 13: 26/8

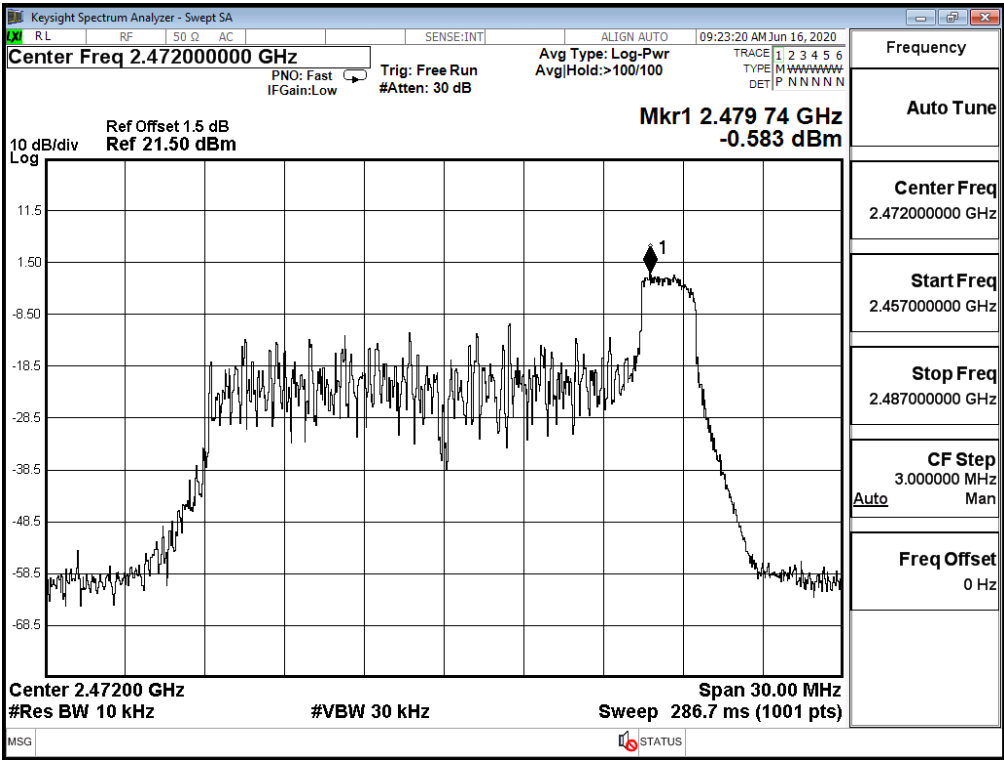


Figure Channel 13: 52/40

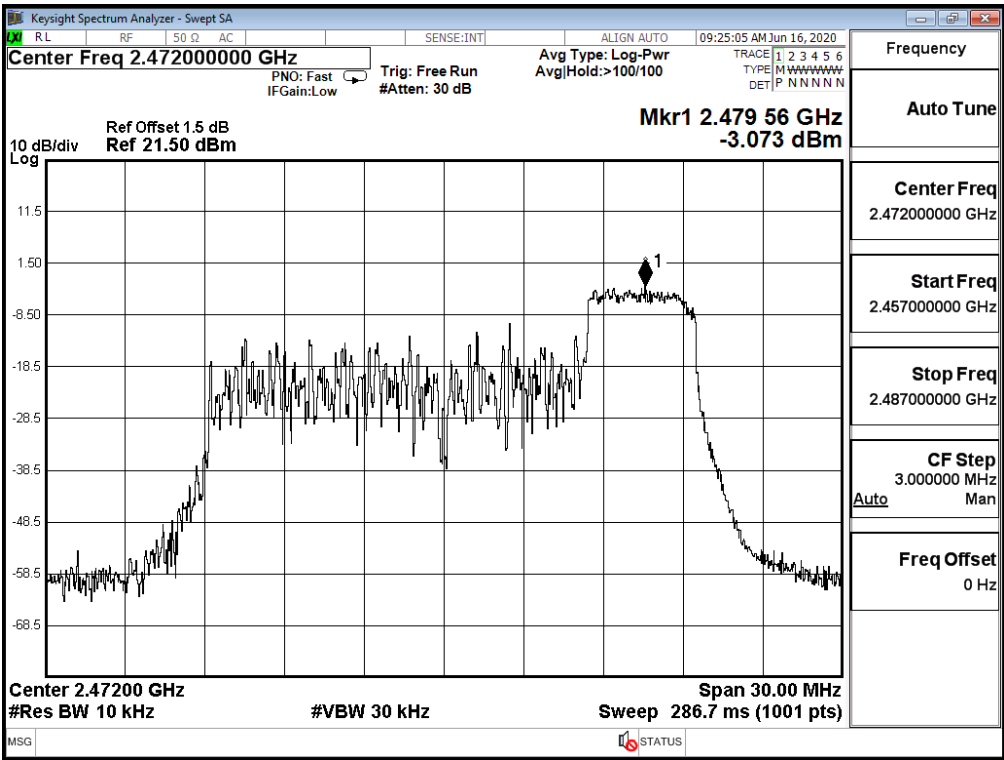
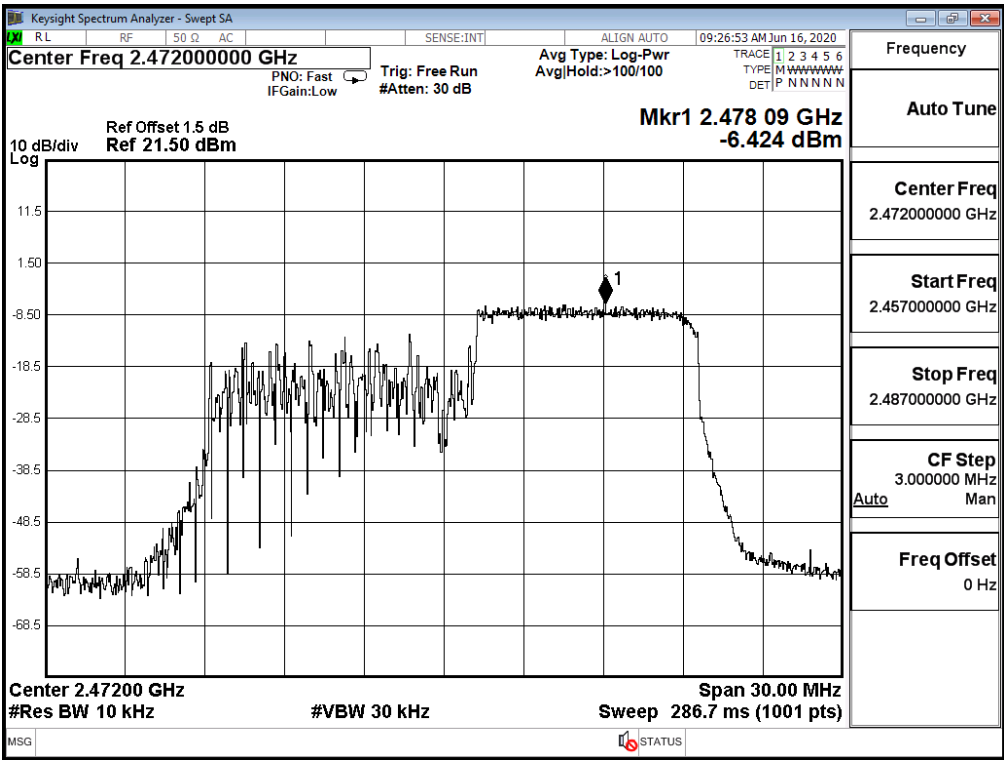


Figure Channel 13: 106/54



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 12 SISO B: Transmit (802.11ax-40BW_17.2Mbps)

RU config: Full

Channel No.	Frequency (MHz)	PPSD/MHz (dBm)	Limit (dBm)	Result
03	2422	3.300	≤ 8 dBm	Pass
07	2442	3.840	≤ 8 dBm	Pass
09	2452	2.570	≤ 8 dBm	Pass
10	2457	-0.580	≤ 8 dBm	Pass
11	2462	-2.750	≤ 8 dBm	Pass

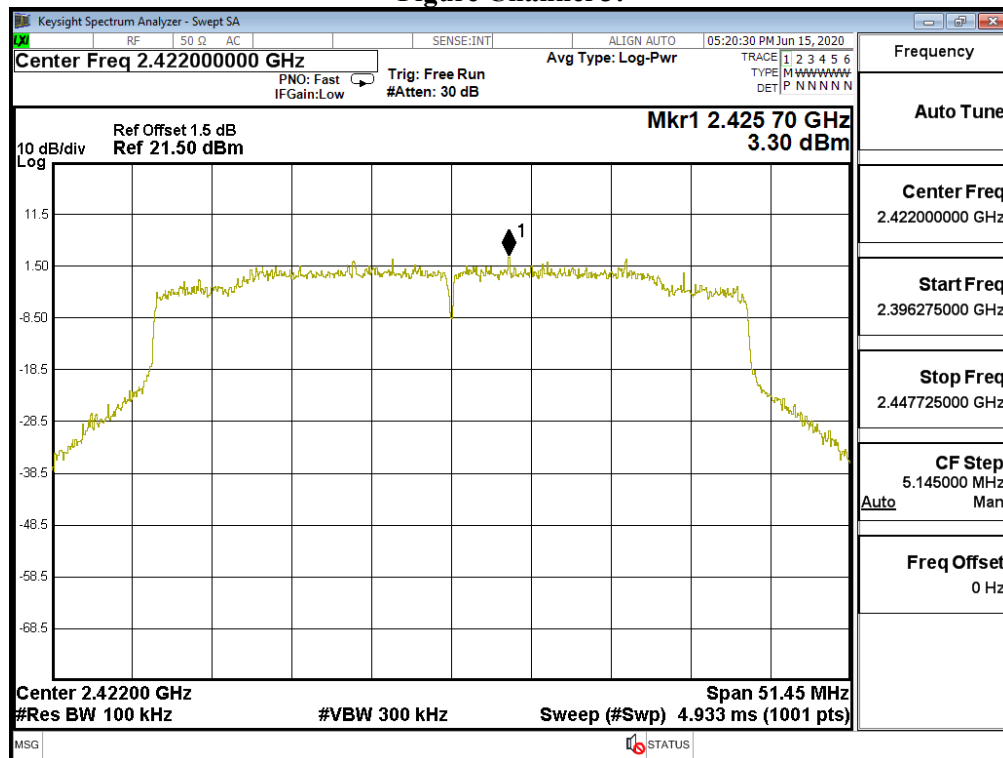
Figure Channel 3:

Figure Channel 7:

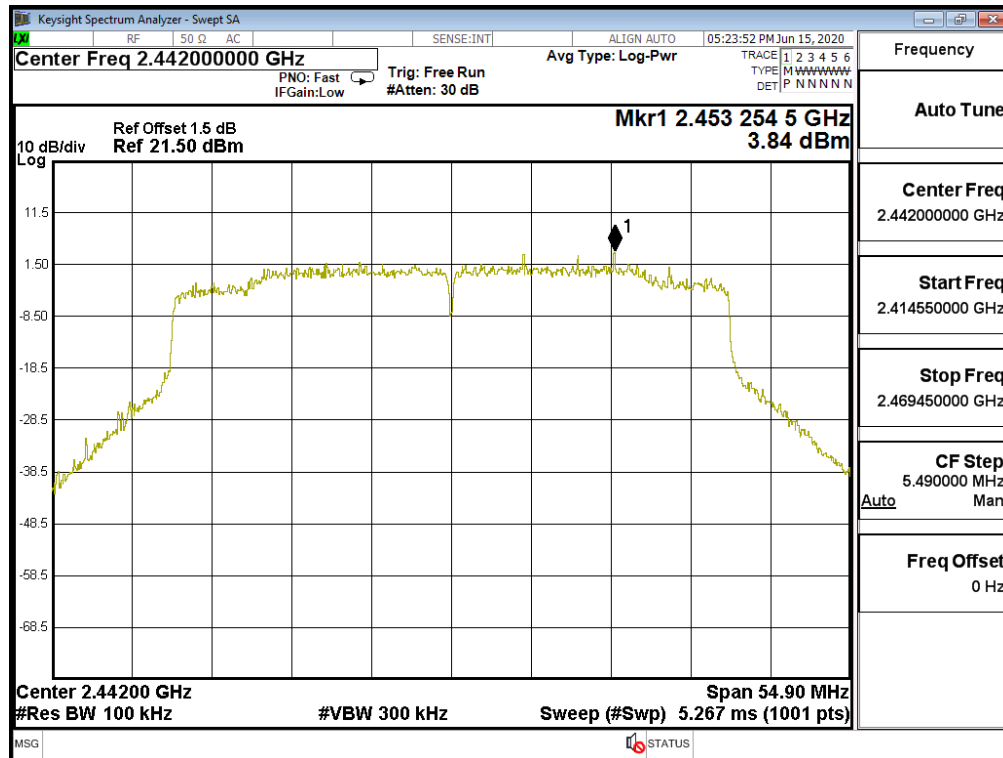


Figure Channel 9:

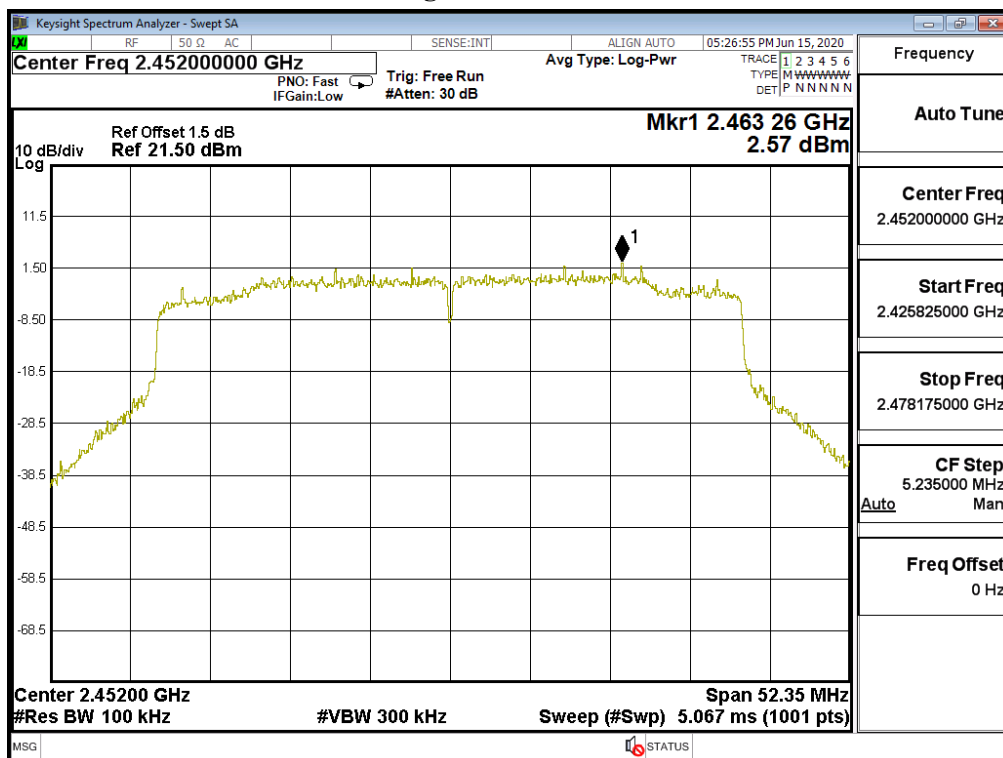


Figure Channel 10:

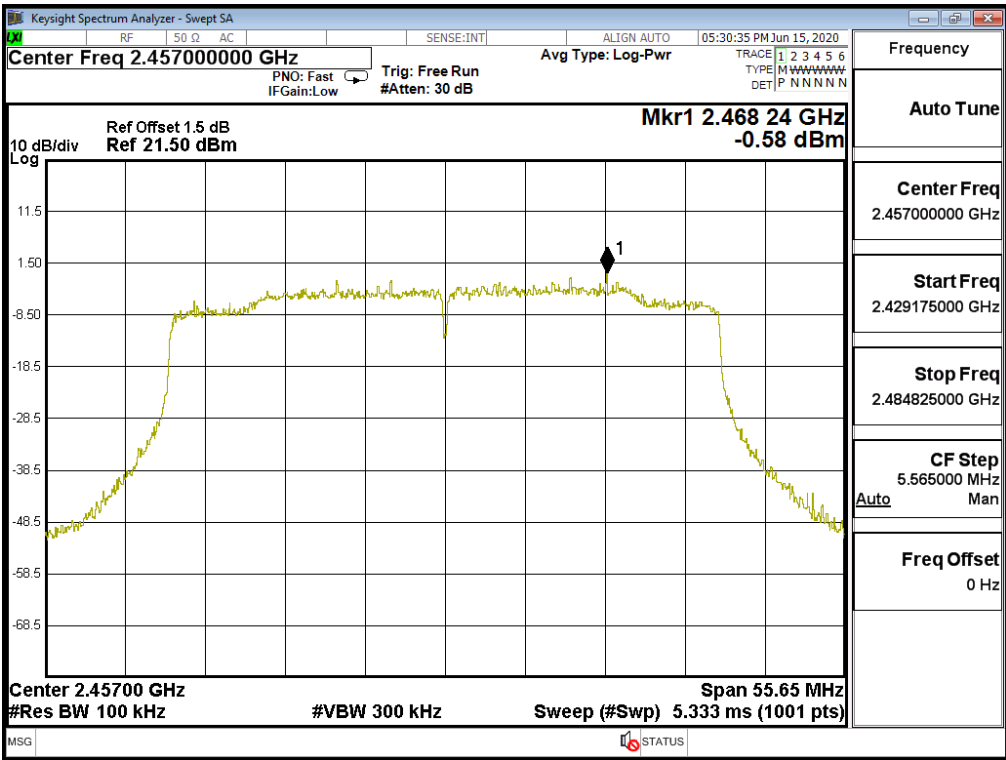
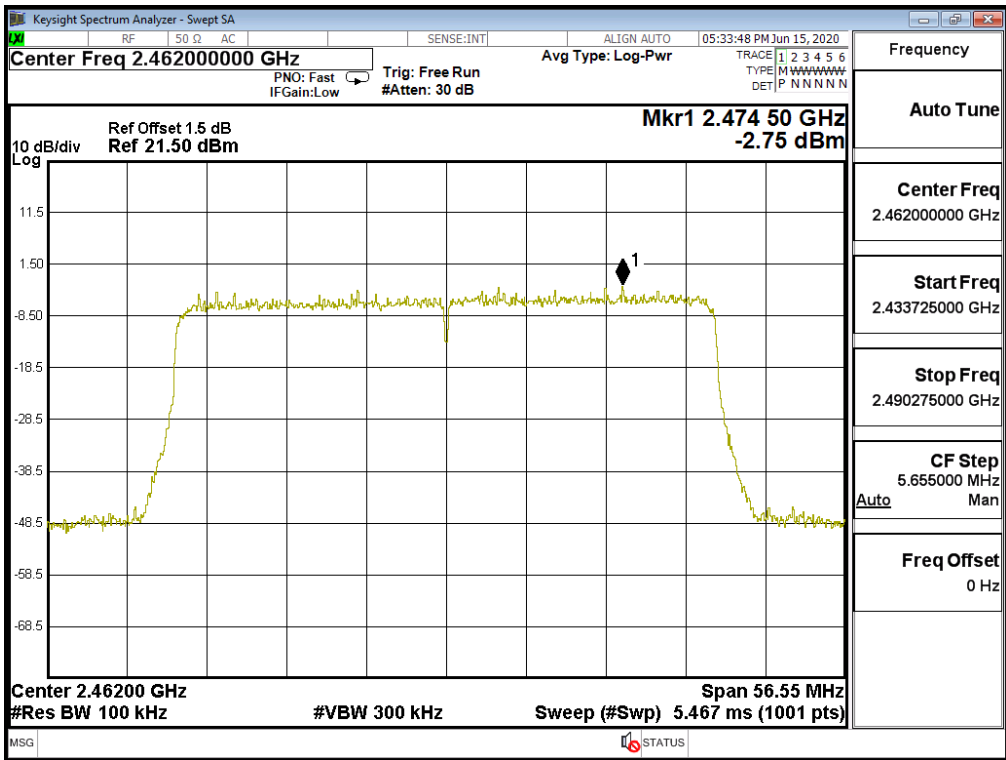


Figure Channel 11:



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 12 SISO B: Transmit (802.11ax-40BW_17.2Mbps)

RU config: Other

Channel No.	Frequency (MHz)	RU setting	PPSD/MHz (dBm)	Limit (dBm)	Result
3	2422	242/61	-4.182	≤ 8 dBm	Pass
11	2462	242/62	-7.560	≤ 8 dBm	Pass

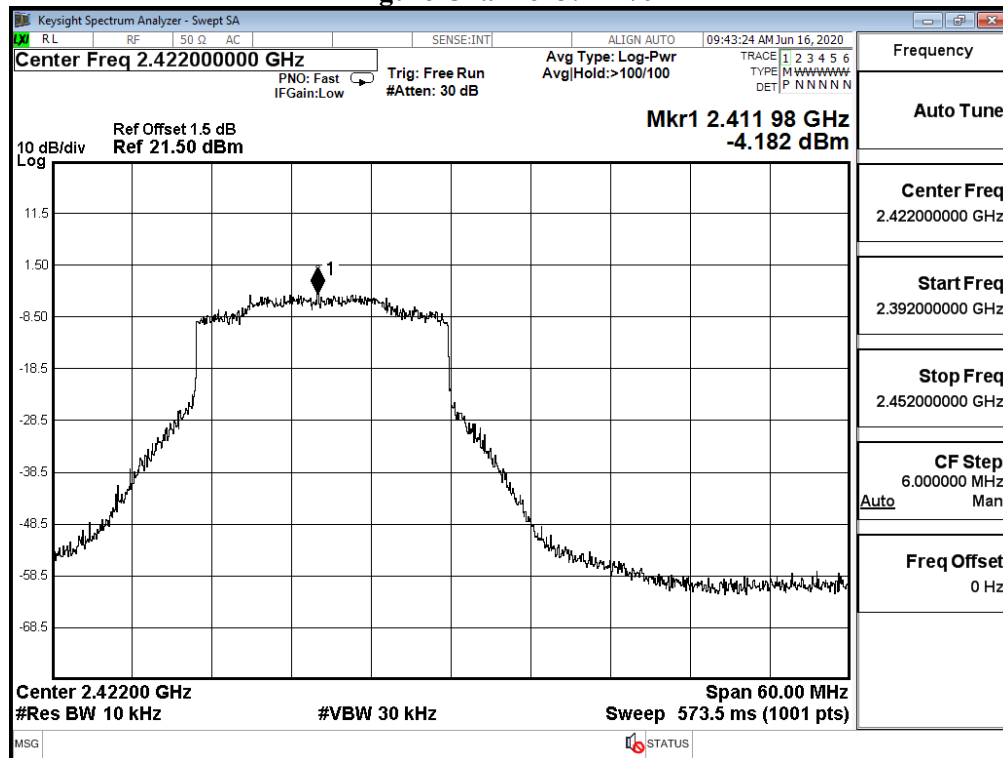
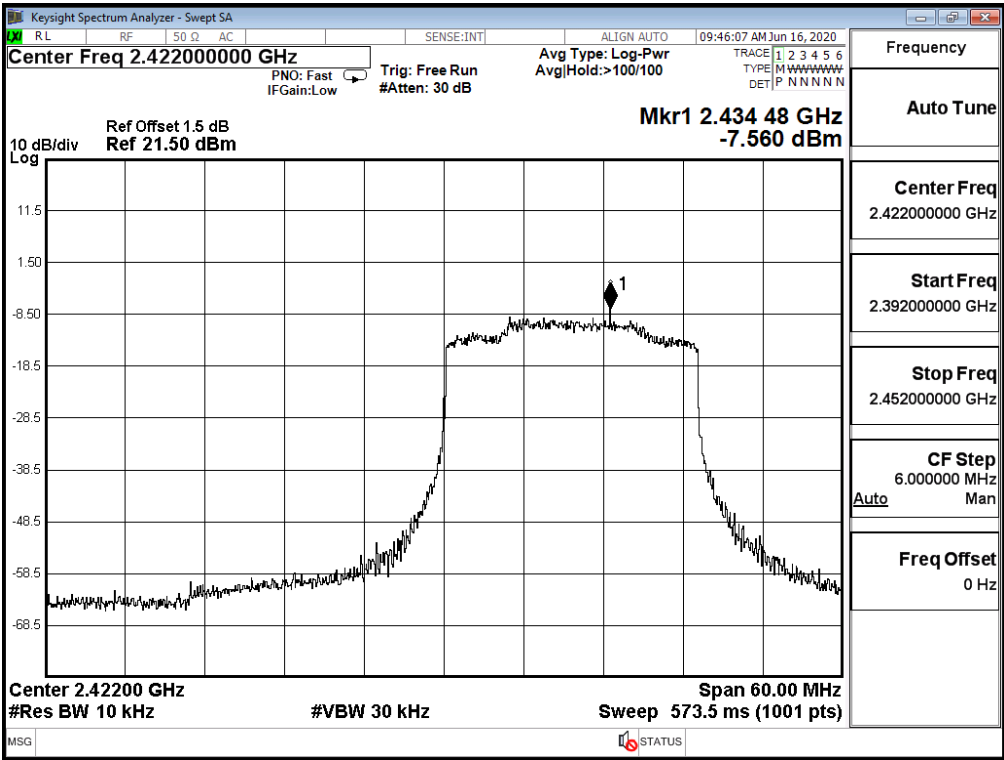
Figure Channel 3: 242/61

Figure Channel 11: 242/62



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 13 MIMO: Transmit (802.11n-20BW_14.4Mbps)

Channel No.	Frequency (MHz)	Chain	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
1	2412	A	3.620	6.630	$\leq 8\text{dBm}$	Pass
		B	3.150	6.160	$\leq 8\text{dBm}$	Pass
7	2442	A	3.530	6.540	$\leq 8\text{dBm}$	Pass
		B	3.760	6.770	$\leq 8\text{dBm}$	Pass
11	2462	A	3.470	6.480	$\leq 8\text{dBm}$	Pass
		B	3.000	6.010	$\leq 8\text{dBm}$	Pass
12	2467	A	-0.190	2.820	$\leq 8\text{dBm}$	Pass
		B	-1.670	1.340	$\leq 8\text{dBm}$	Pass
13	2472	A	-3.470	-0.460	$\leq 8\text{dBm}$	Pass
		B	-2.740	0.270	$\leq 8\text{dBm}$	Pass

Note :

The quantity $10 \cdot \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 1: (Chain A)

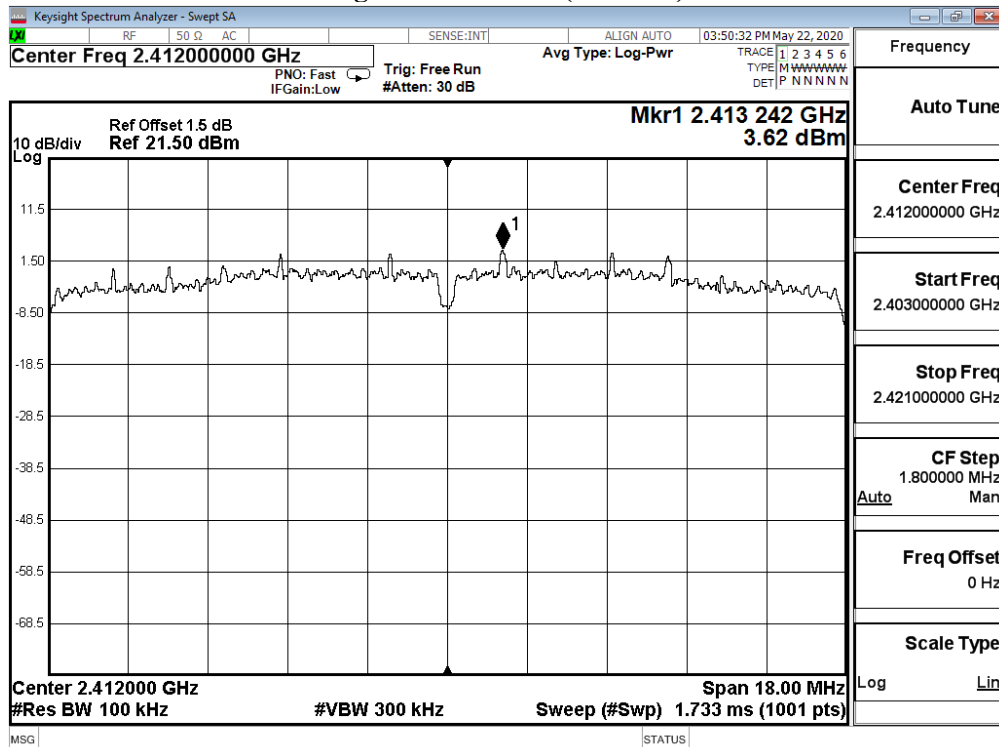


Figure Channel 7: (Chain A)

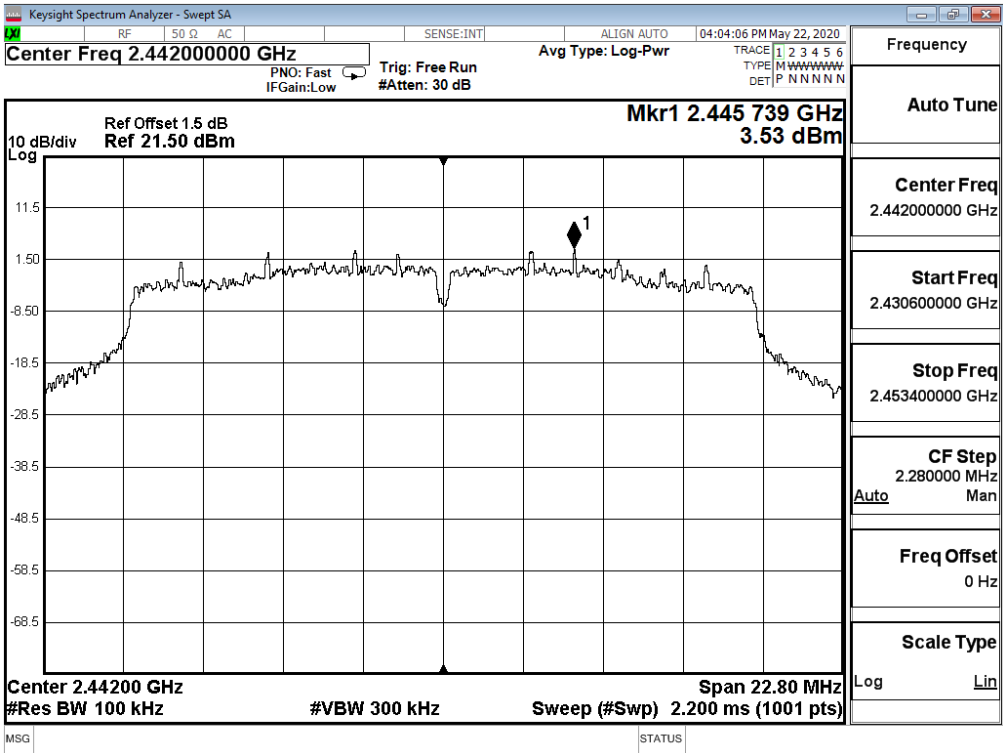


Figure Channel 11: (Chain A)

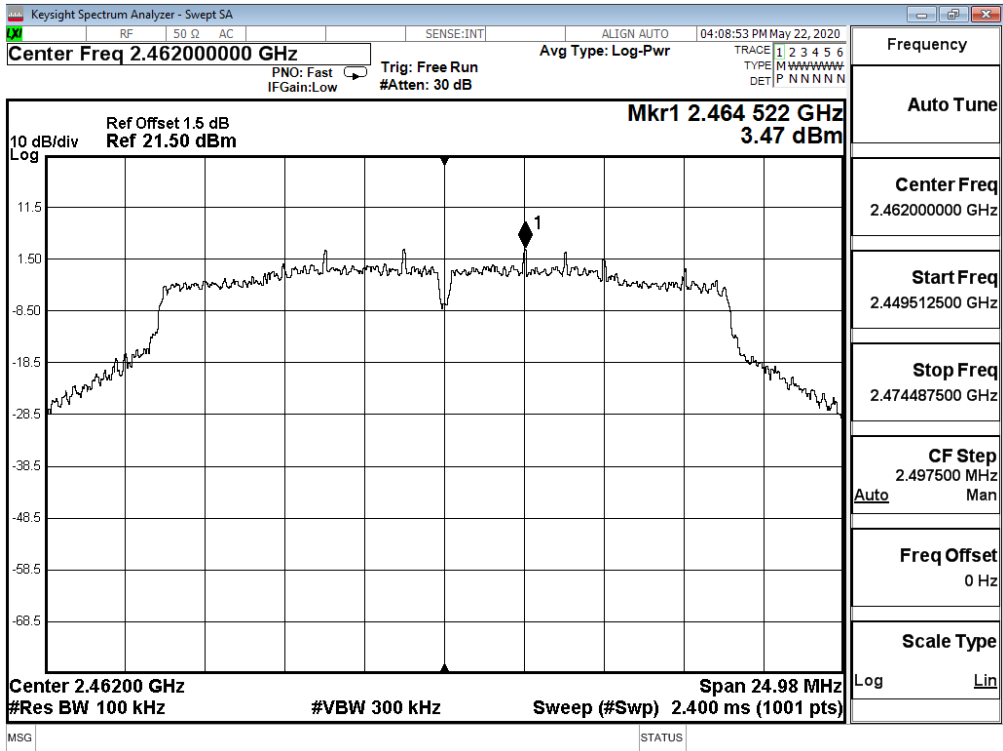


Figure Channel 12: (Chain A)

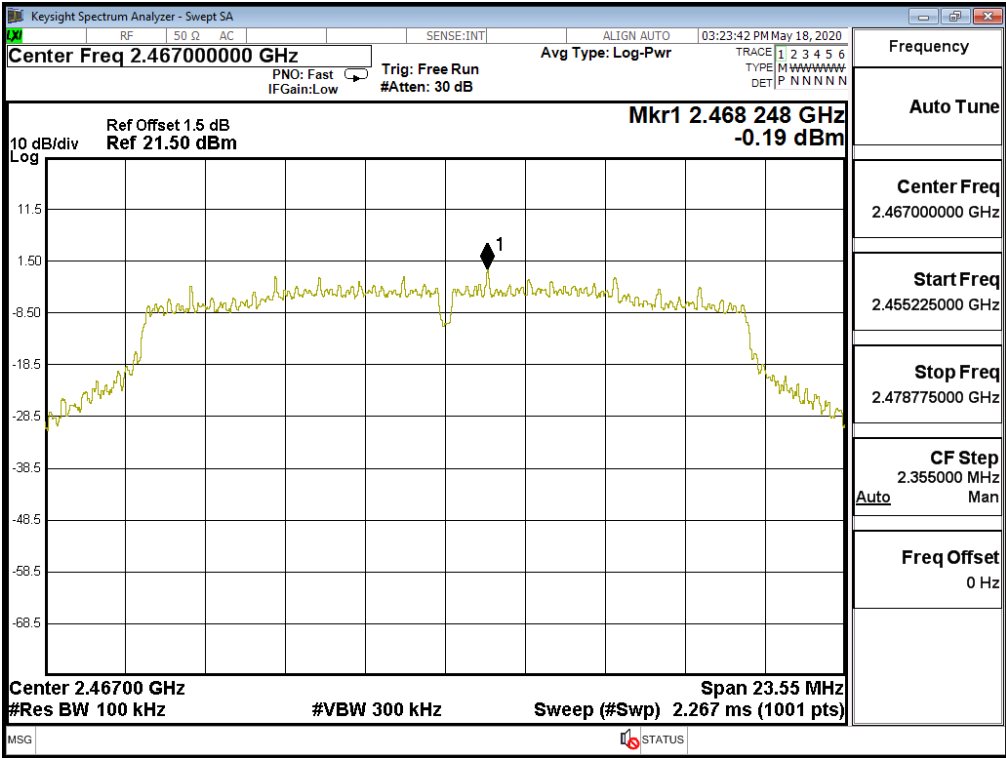


Figure Channel 13: (Chain A)

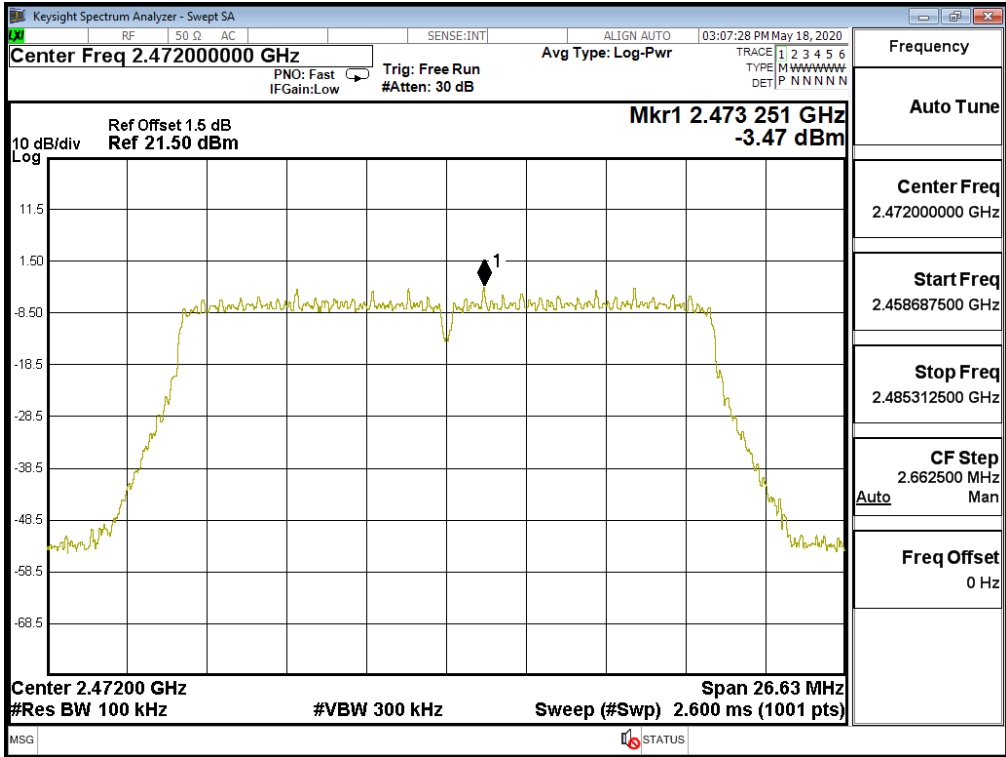


Figure Channel 1: (Chain B)

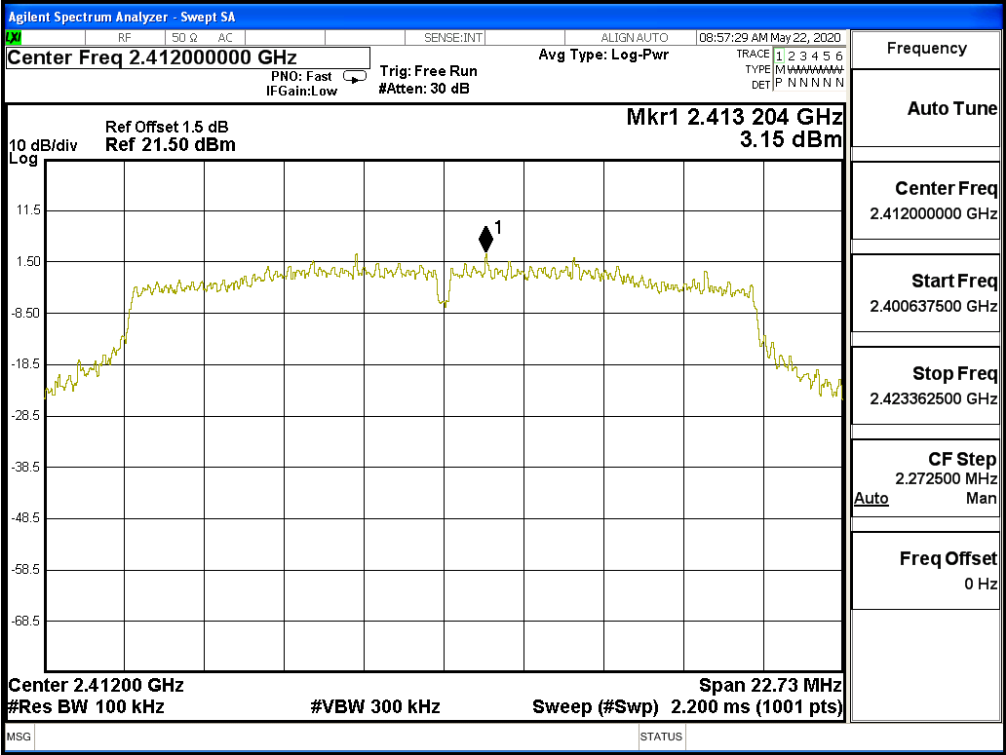


Figure Channel 7: (Chain B)

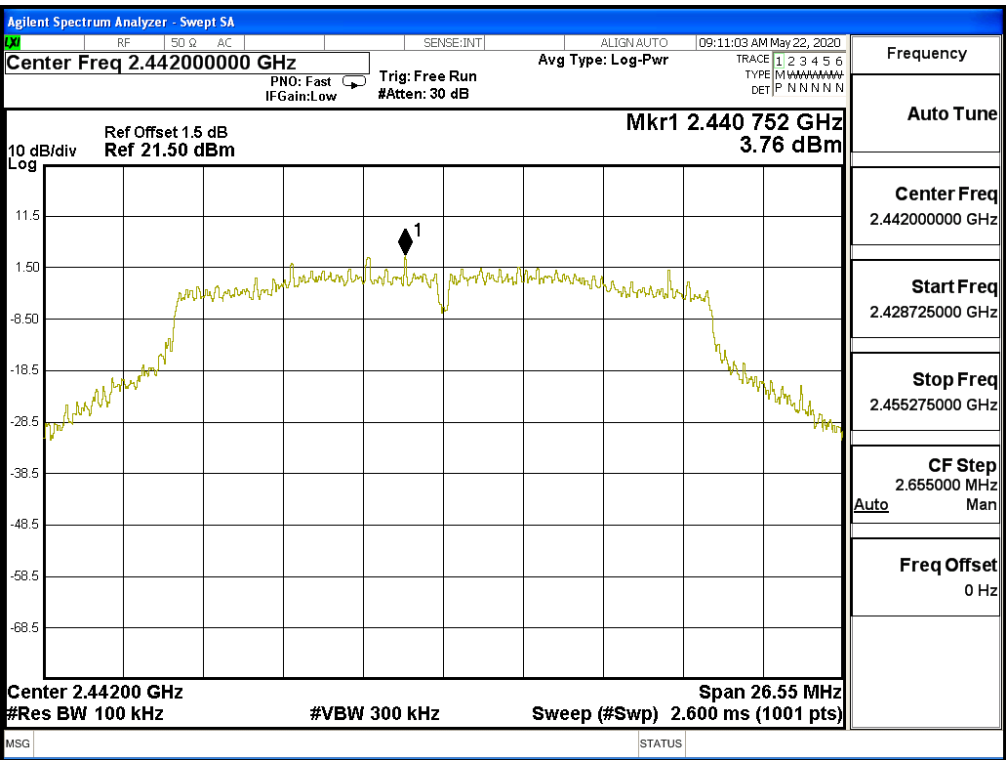


Figure Channel 11: (Chain B)

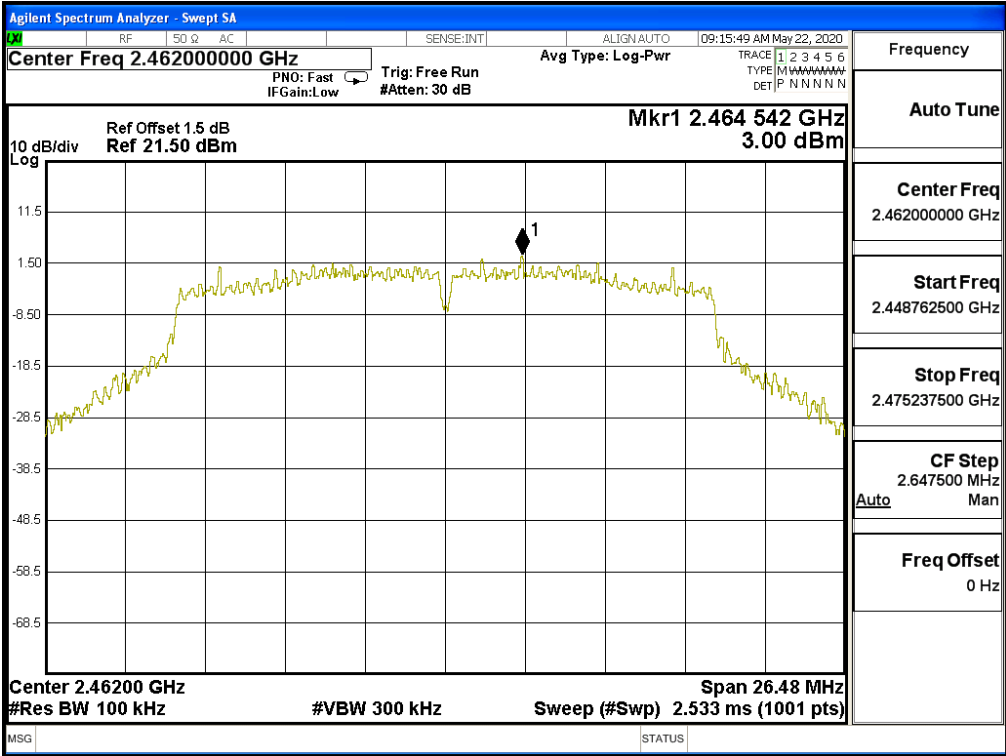


Figure Channel 12: (Chain B)

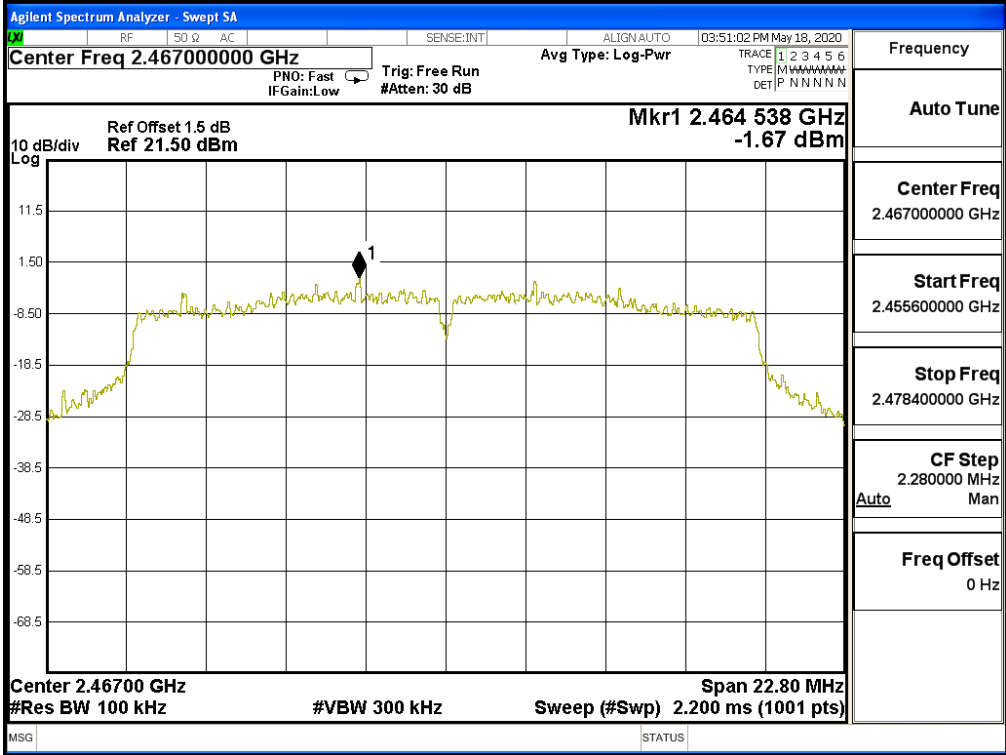
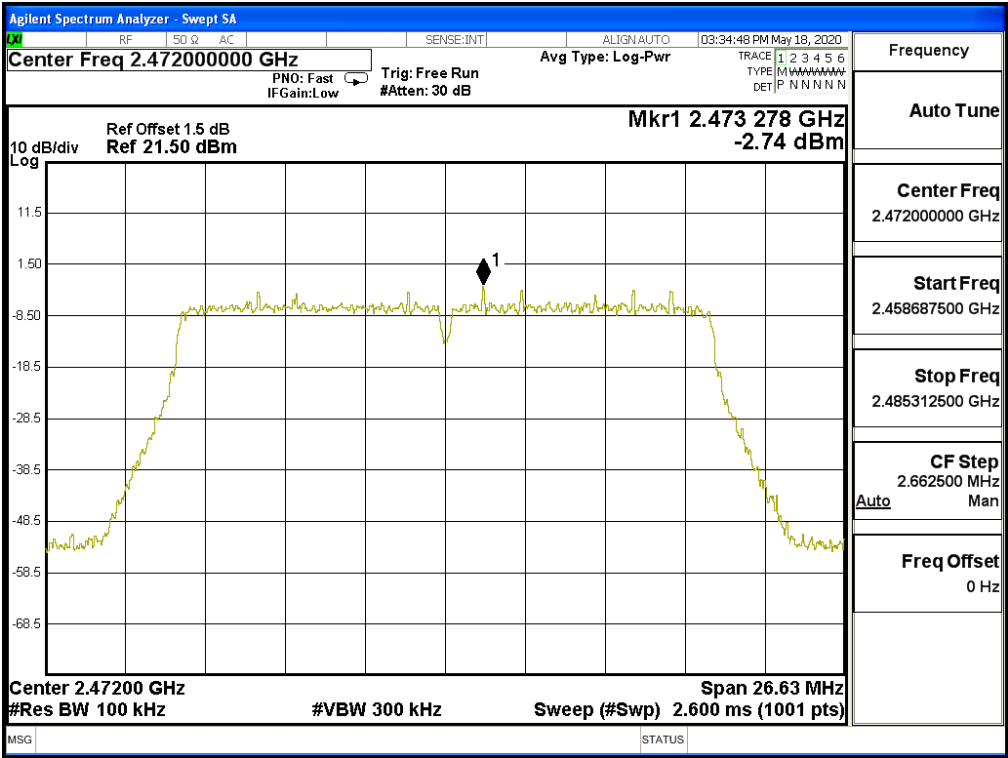


Figure Channel 13: (Chain B)



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 14 MIMO: Transmit (802.11n-40BW_30Mbps)

Channel No.	Frequency (MHz)	Chain	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
3	2422	A	-0.200	2.810	≤ 8 dBm	Pass
		B	0.160	3.170	≤ 8 dBm	Pass
7	2442	A	0.330	3.340	≤ 8 dBm	Pass
		B	0.300	3.310	≤ 8 dBm	Pass
9	2452	A	0.550	3.560	≤ 8 dBm	Pass
		B	1.530	4.540	≤ 8 dBm	Pass
10	2457	A	-4.510	-1.500	≤ 8 dBm	Pass
		B	-5.140	-2.130	≤ 8 dBm	Pass
11	2462	A	-1.570	1.440	≤ 8 dBm	Pass
		B	-1.220	1.790	≤ 8 dBm	Pass

Note :

The quantity $10 \cdot \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 3: (Chain A)

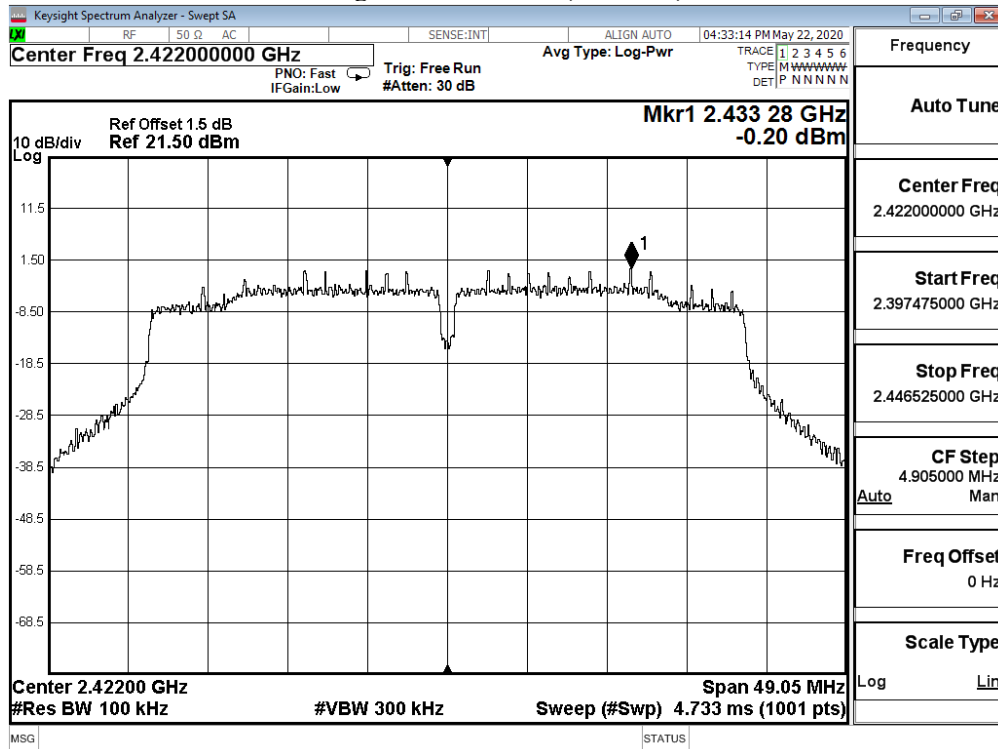


Figure Channel 7: (Chain A)

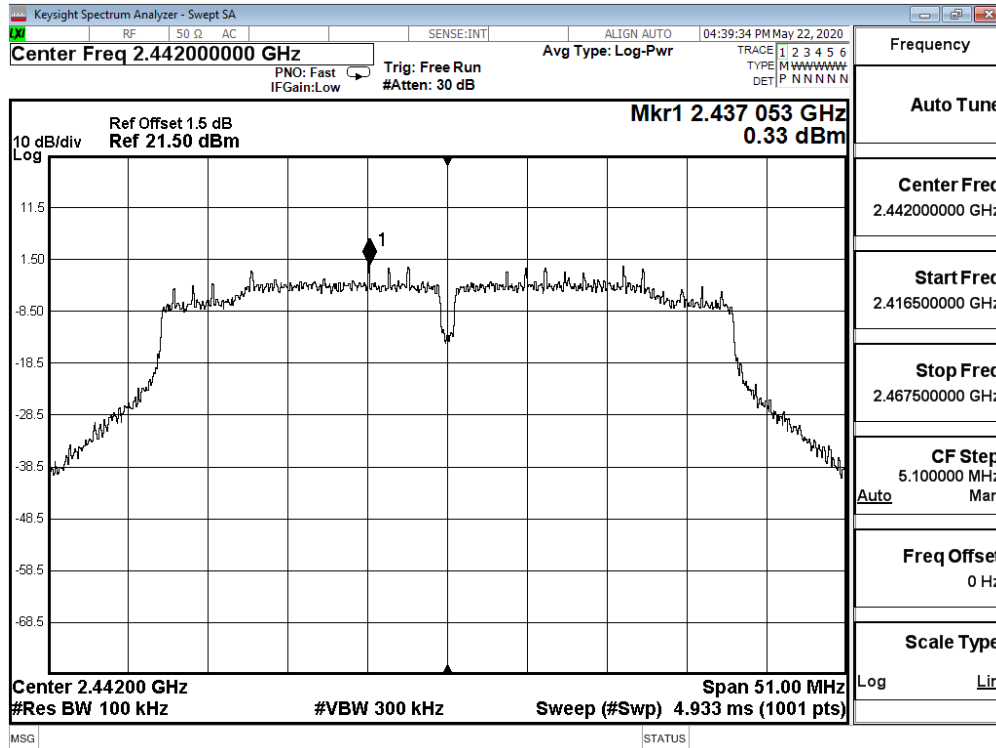


Figure Channel 9: (Chain A)

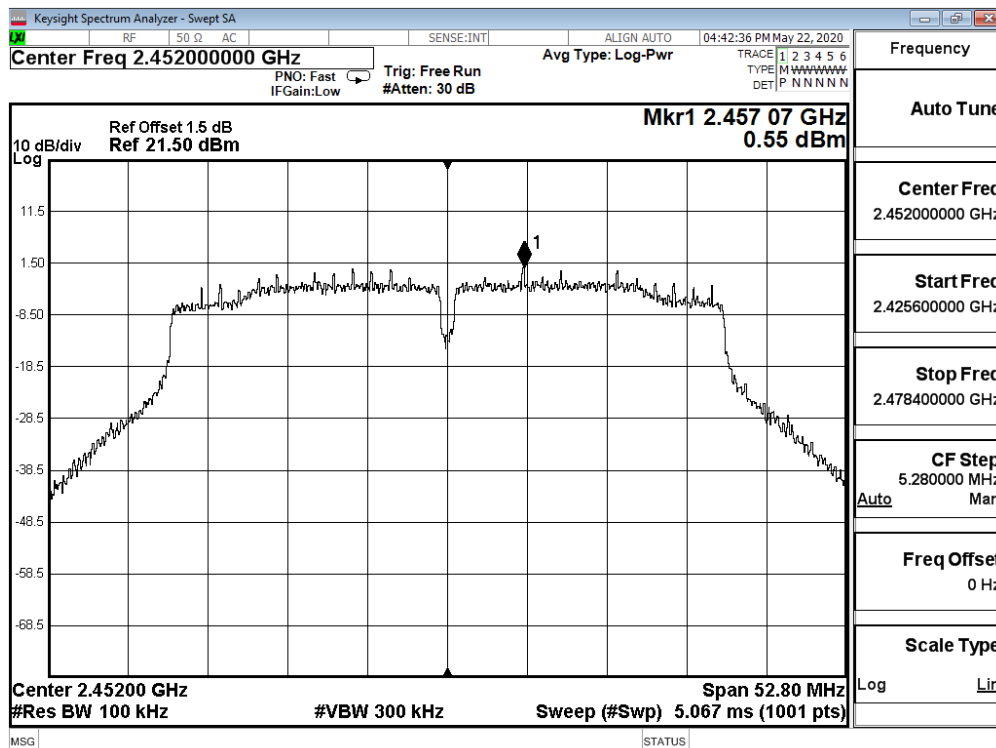


Figure Channel 10: (Chain A)

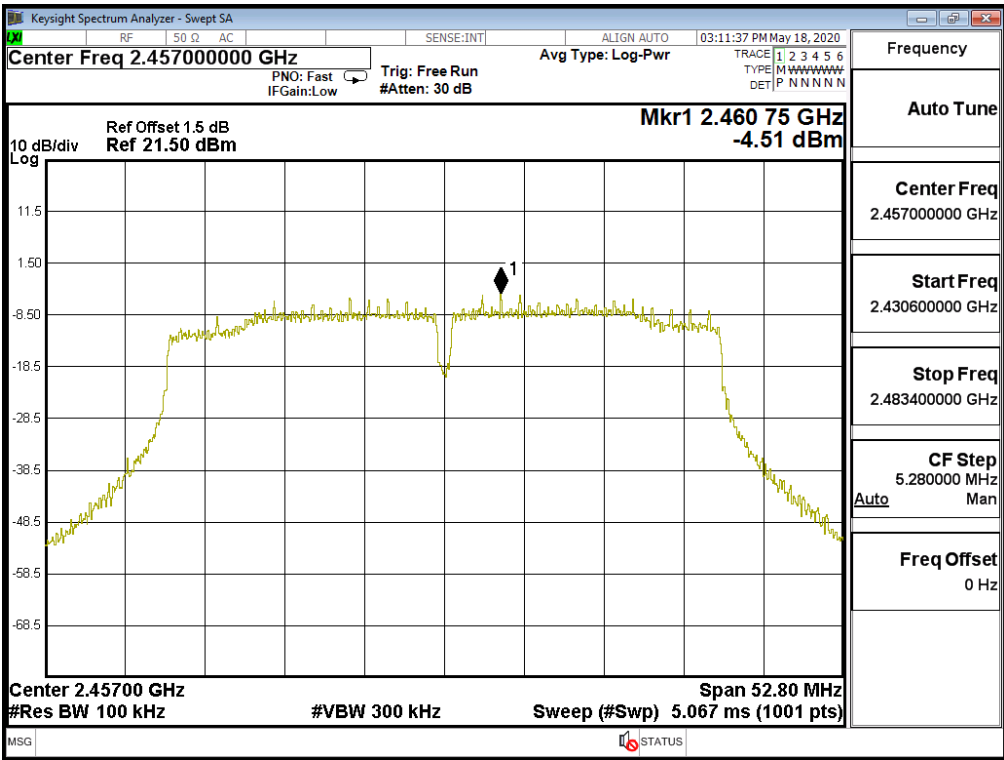


Figure Channel 11: (Chain A)

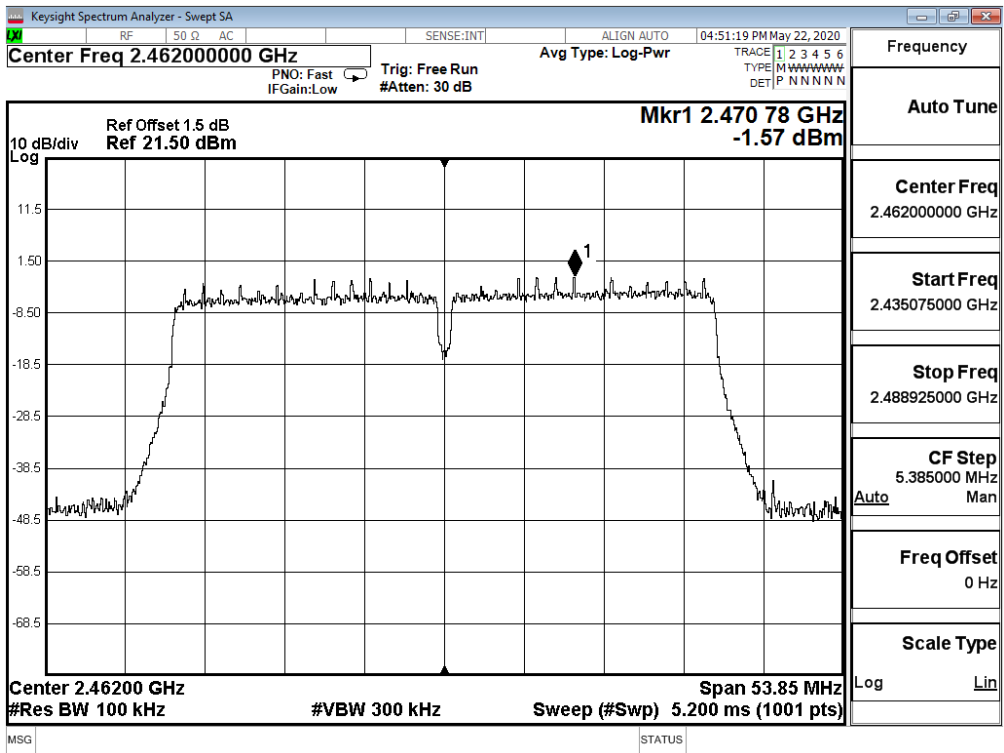


Figure Channel 3: (Chain B)

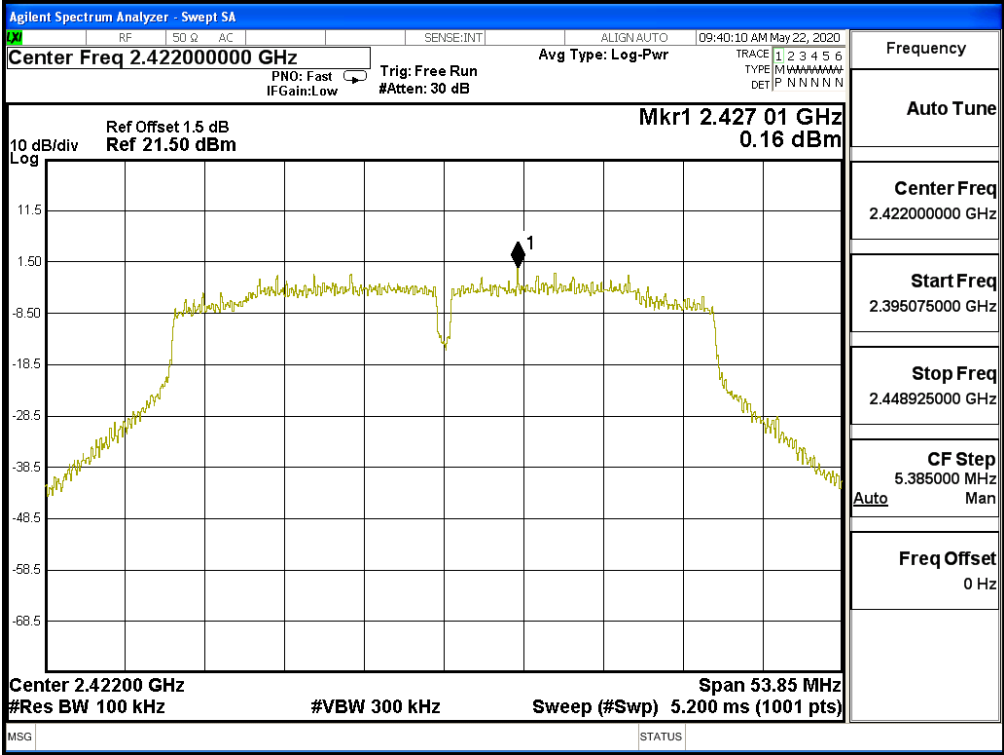
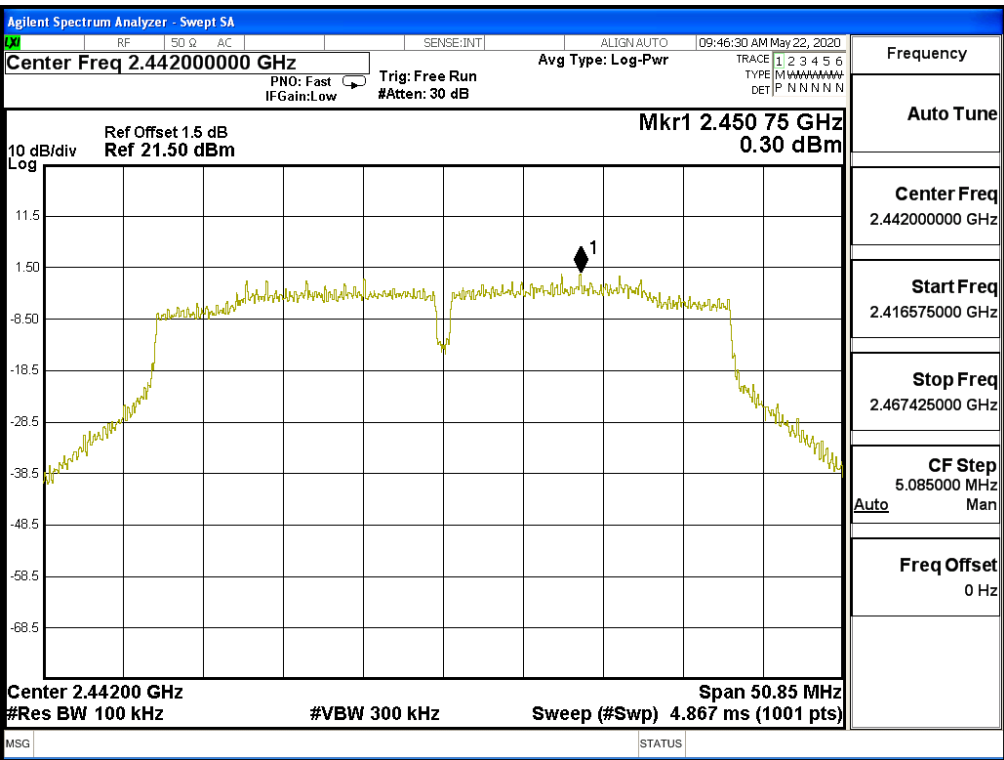


Figure Channel 7: (Chain B)



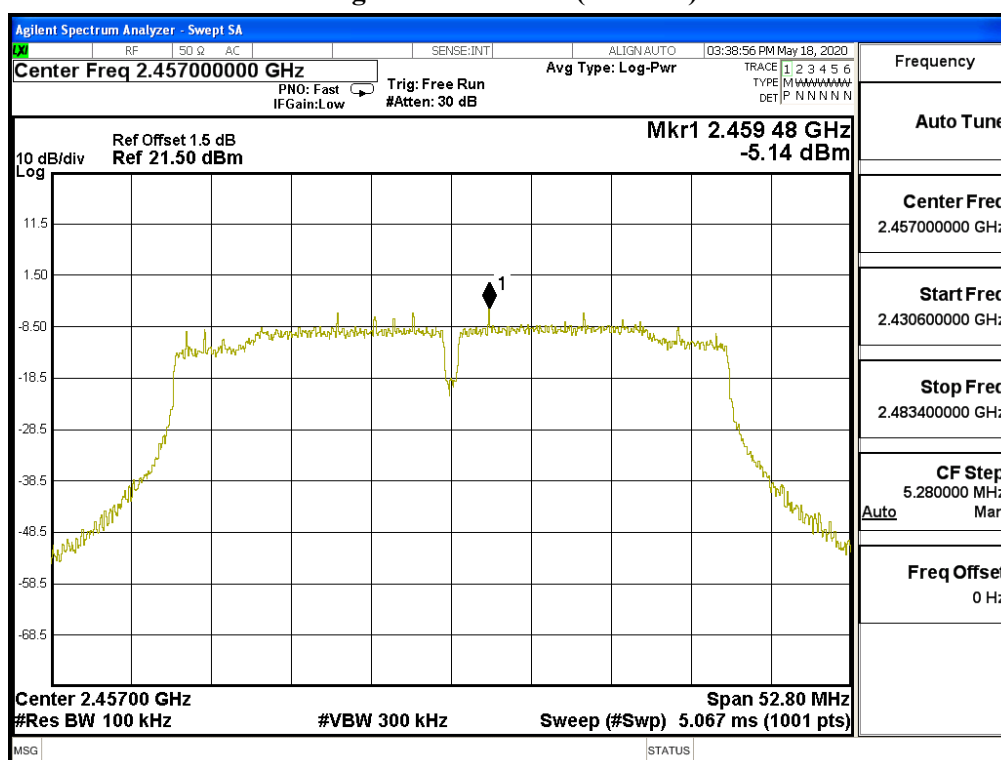
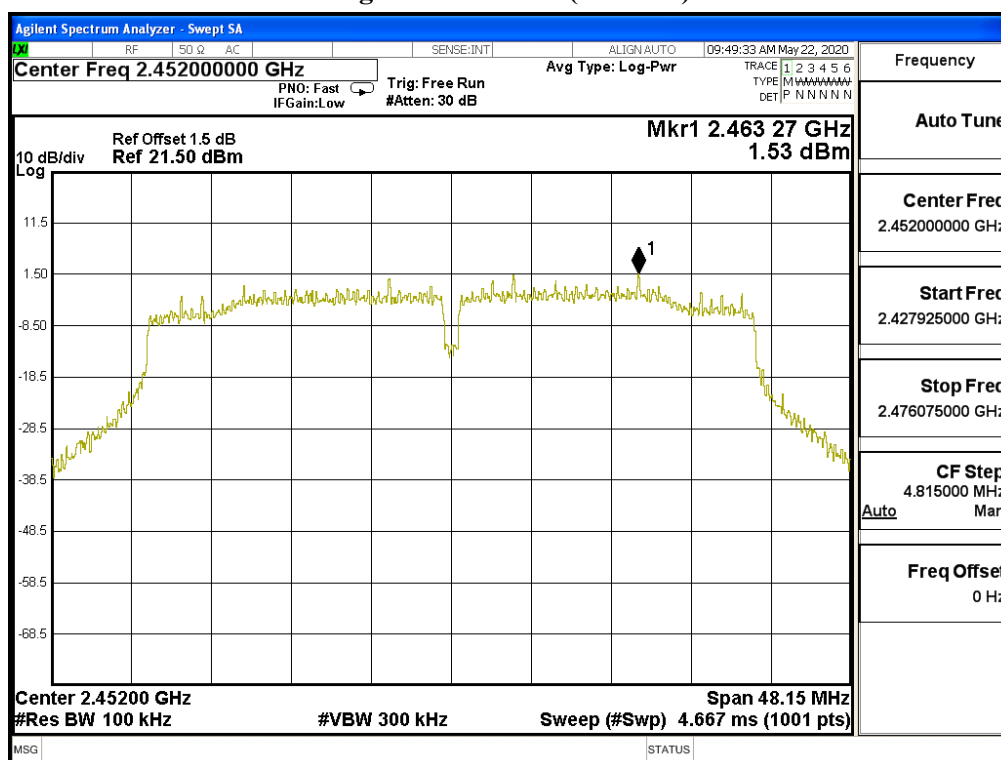
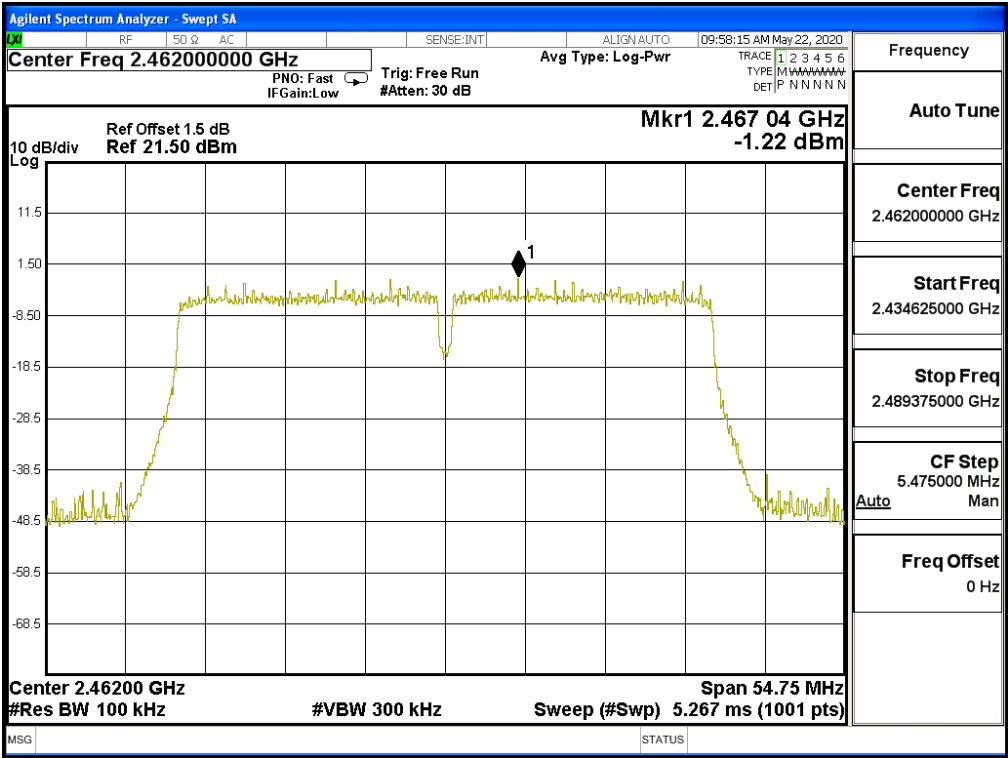


Figure Channel 11: (Chain B)



RU config: Full

The quantity $10 \cdot \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Keysight Spectrum Analyzer - Swept SA

RF 50 Ω AC SENSE:INT ALIGN AUTO 06:08:47 PM May 13, 2020

Center Freq 2.412000000 GHz PNO: Fast Trig: Free Run Avg Type: Log-Pwr

IF Gain: Low #Atten: 30 dB

TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P N N N N N

Ref Offset 1.5 dB Ref 21.50 dBm Mkr1 2.409 542 GHz 1.82 dBm

10 dB/div Log

Center 2.41200 GHz Span 24.83 MHz

#Res BW 100 kHz #VBW 300 kHz Sweep (#Swp) 2.400 ms (1001 pts)

MSG STATUS

Frequency

Auto Tune

Center Freq 2.412000000 GHz

Start Freq 2.399587500 GHz

Stop Freq 2.424412500 GHz

CF Step 2.482500 MHz

Auto Man

Freq Offset 0 Hz

Figure Channel 7: (Chain A)

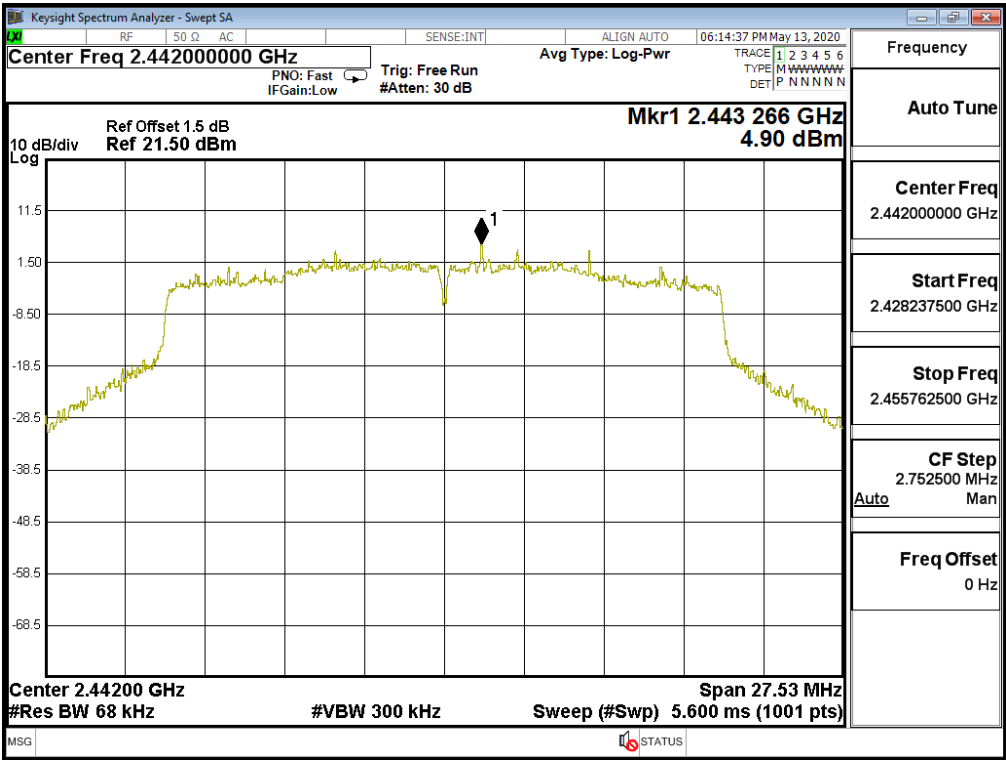


Figure Channel 11: (Chain A)

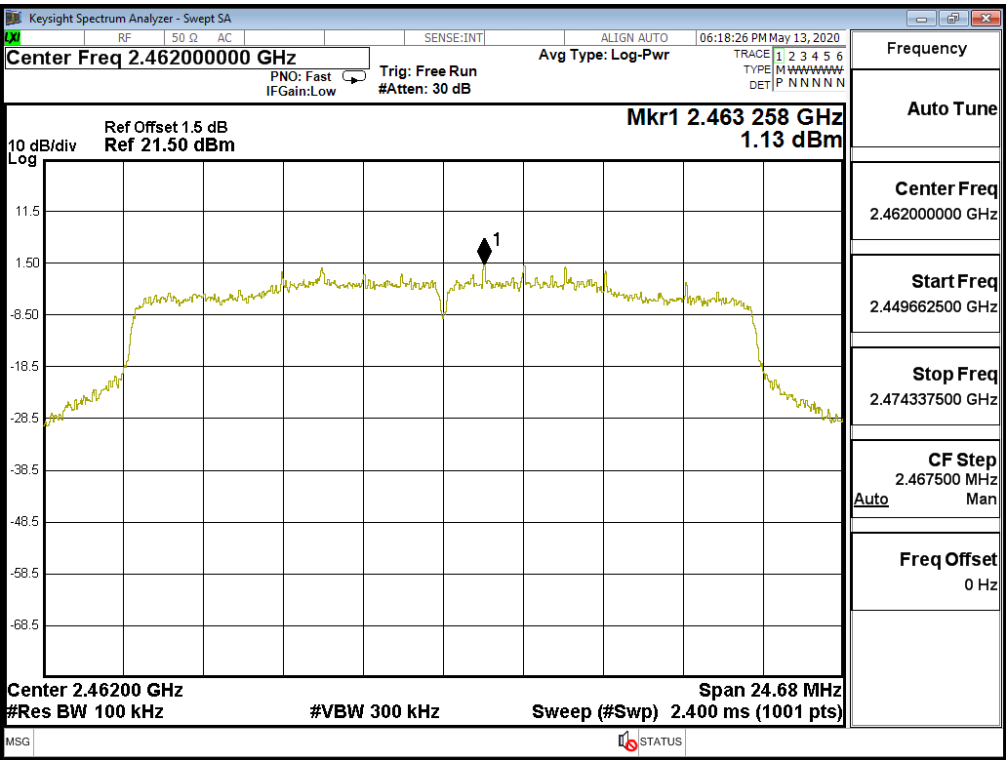


Figure Channel 12: (Chain A)

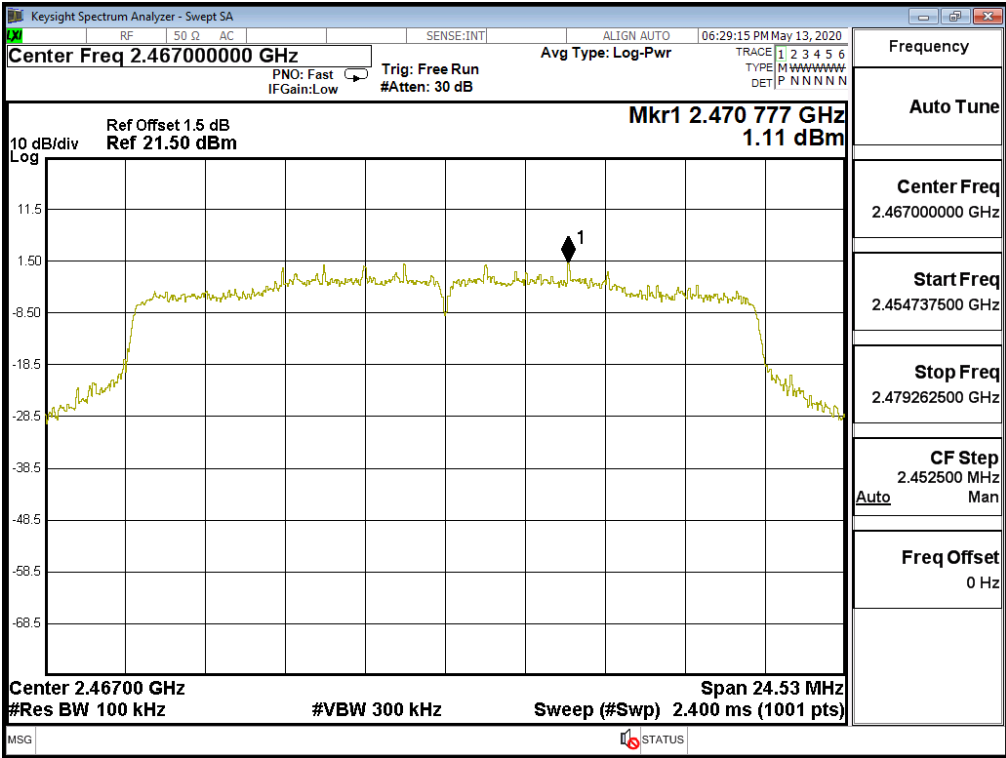


Figure Channel 13: (Chain A)

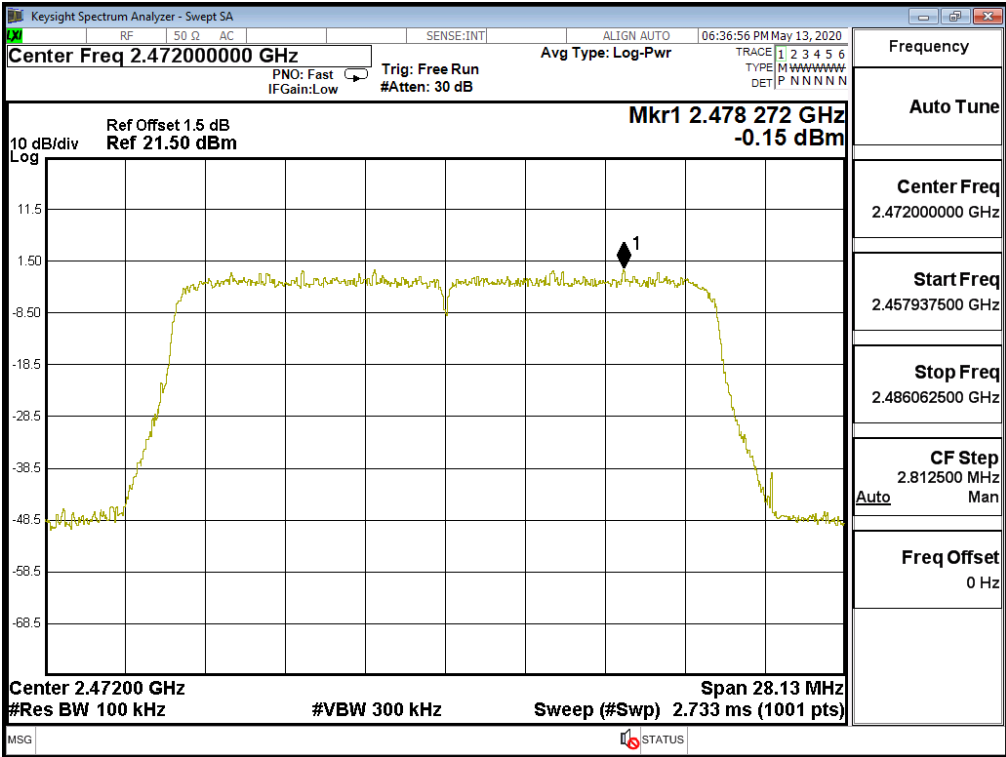


Figure Channel 1: (Chain B)

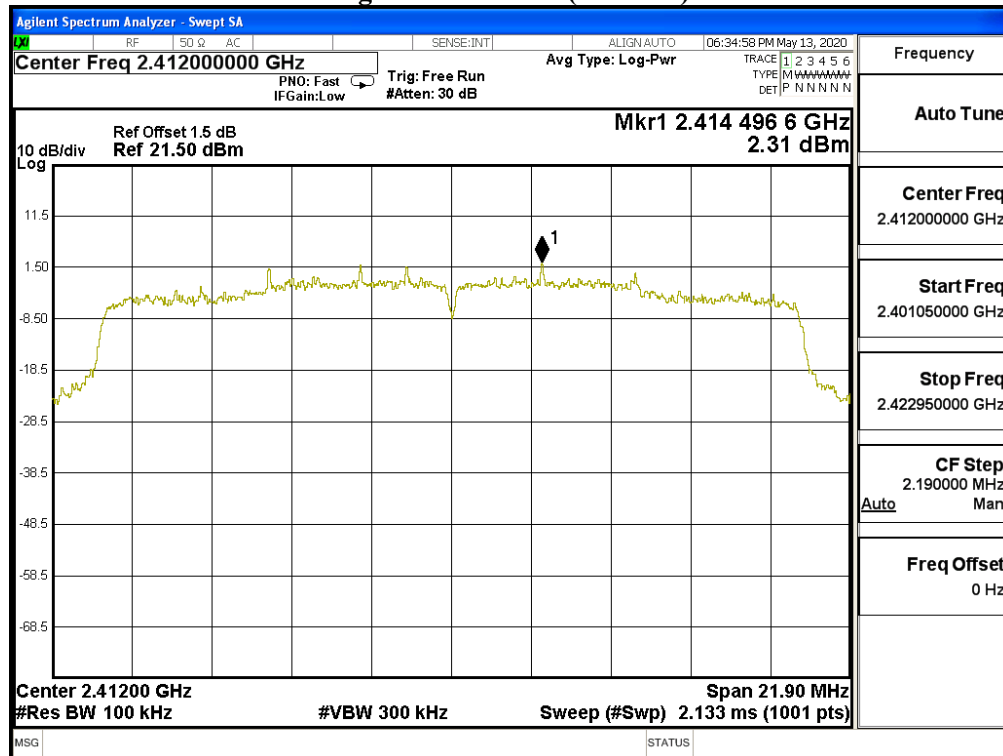


Figure Channel 7: (Chain B)

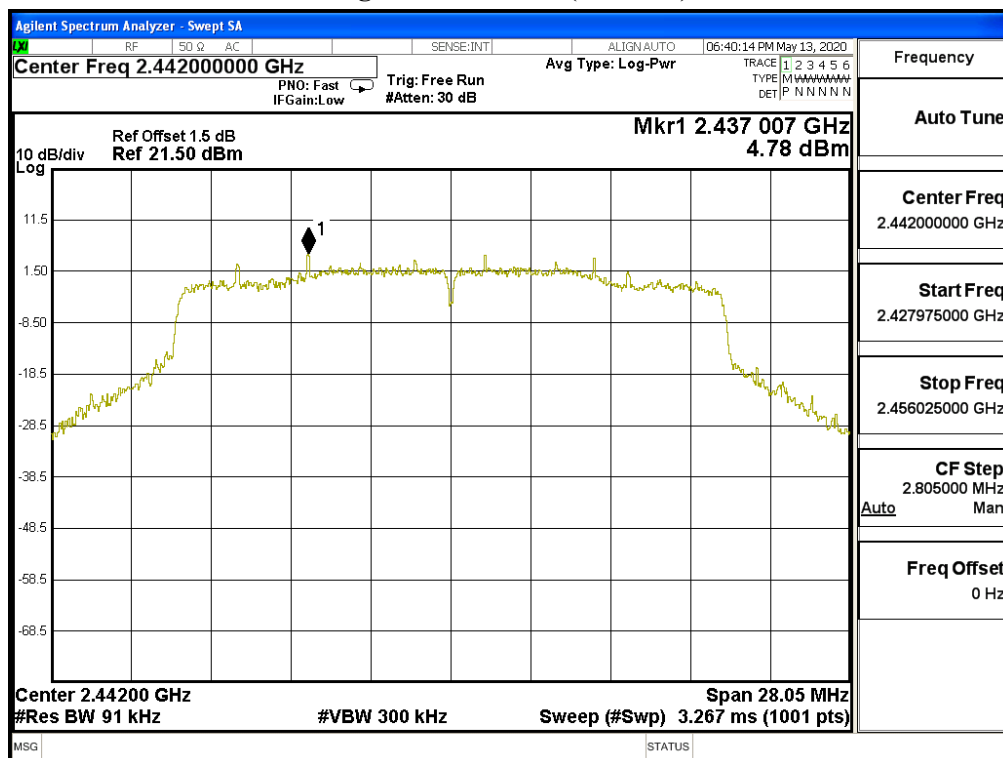


Figure Channel 11: (Chain B)

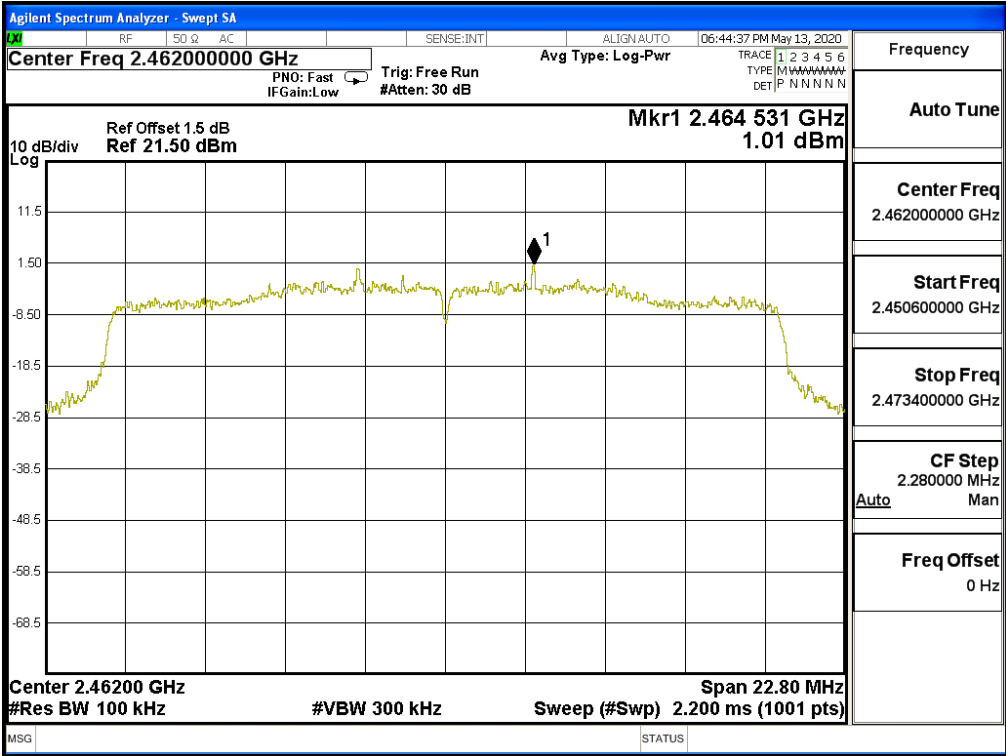


Figure Channel 12: (Chain B)

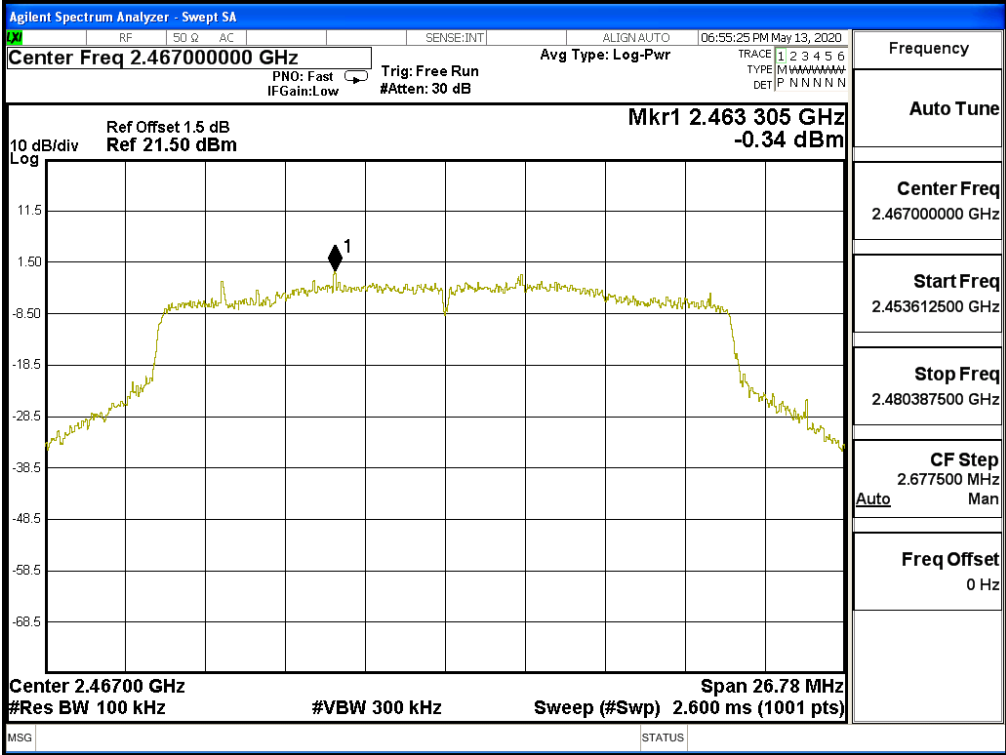
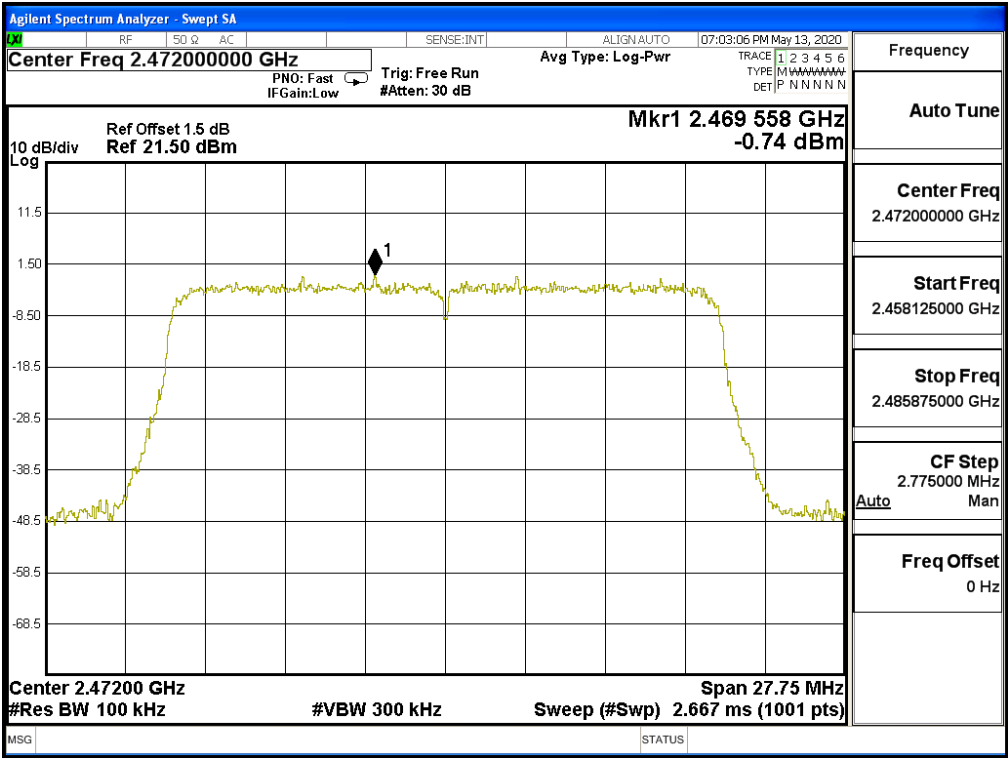


Figure Channel 13: (Chain B)



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 15 MIMO: Transmit (802.11ax-20BW_17.2Mbps)

RU config: Other

Channel	Frequency (MHz)	RU config	Chain	PPSD/MHz (dBm)	Total PPSP/MHz (dBm)	Limit (dBm)	Result
1	2412	26/0	A	3.296	6.306	$\leq 8\text{dBm}$	Pass
			B	2.967	5.977	$\leq 8\text{dBm}$	Pass
		52/37	A	2.811	5.821	$\leq 8\text{dBm}$	Pass
			B	4.199	7.209	$\leq 8\text{dBm}$	Pass
		106/53	A	-1.294	1.716	$\leq 8\text{dBm}$	Pass
			B	0.409	3.419	$\leq 8\text{dBm}$	Pass
13	2472	26/8	A	-8.032	-5.022	$\leq 8\text{dBm}$	Pass
			B	-6.822	-3.812	$\leq 8\text{dBm}$	Pass
		52/40	A	-10.972	-7.962	$\leq 8\text{dBm}$	Pass
			B	-9.047	-6.037	$\leq 8\text{dBm}$	Pass
		106/54	A	-12.934	-9.924	$\leq 8\text{dBm}$	Pass
			B	-12.403	-9.393	$\leq 8\text{dBm}$	Pass

Note :

The quantity $10 \cdot \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

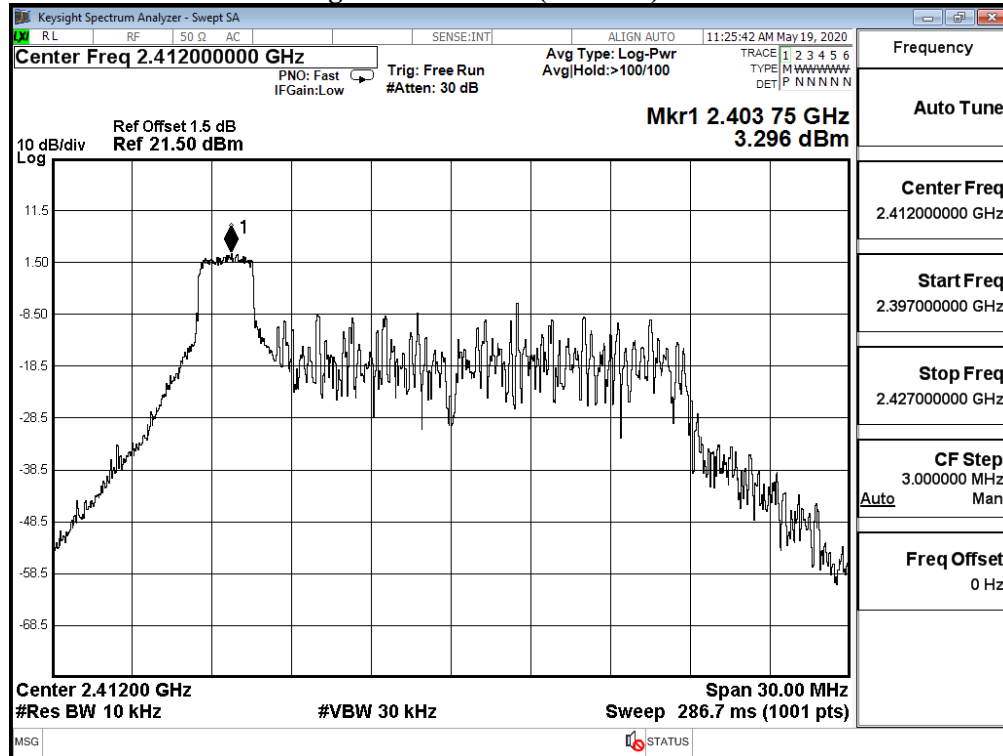
Figure Channel 1: (Chain A) 26/0

Figure Channel 1: (Chain A) 52/37

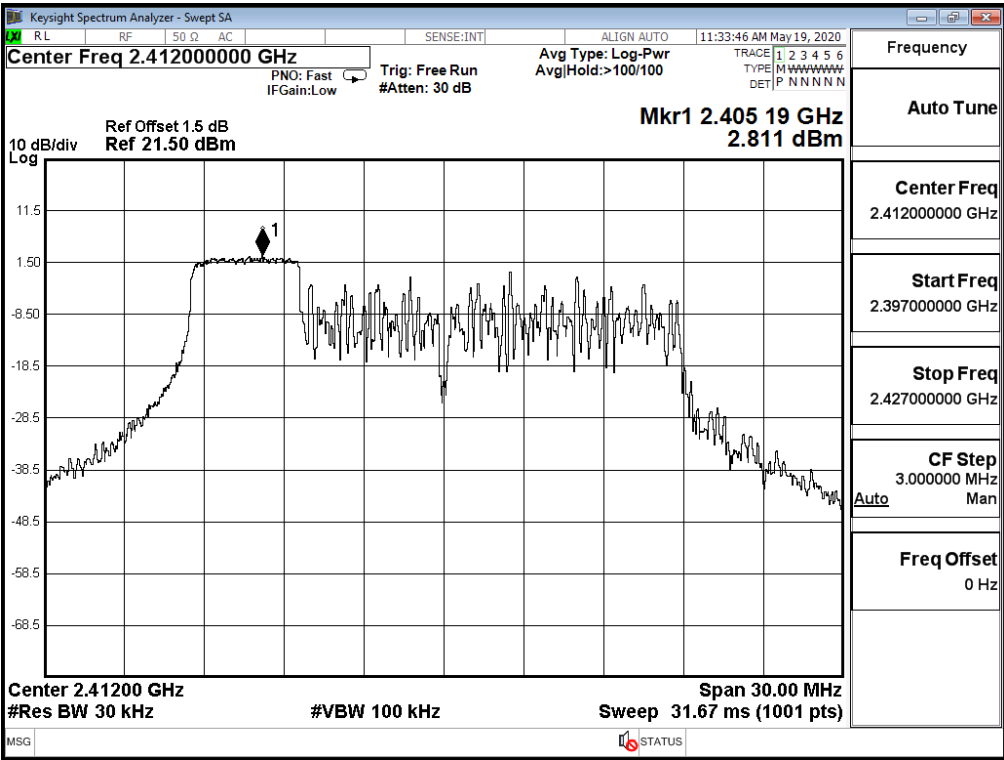


Figure Channel 1: (Chain A) 106/53

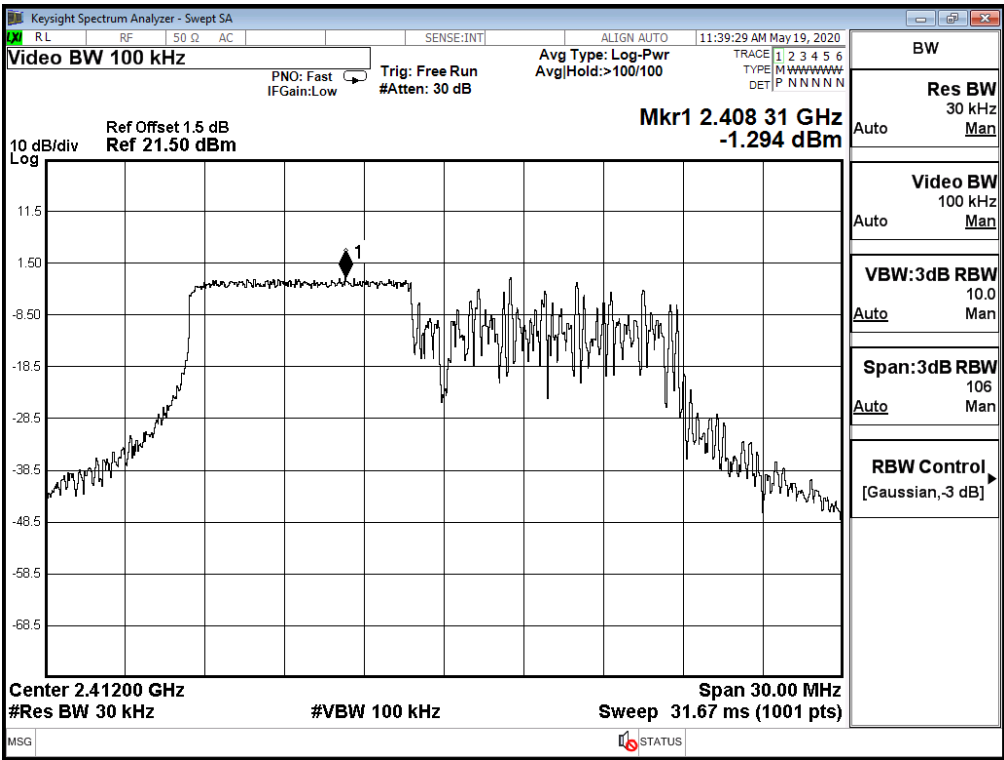


Figure Channel 13: (Chain A) 26/8

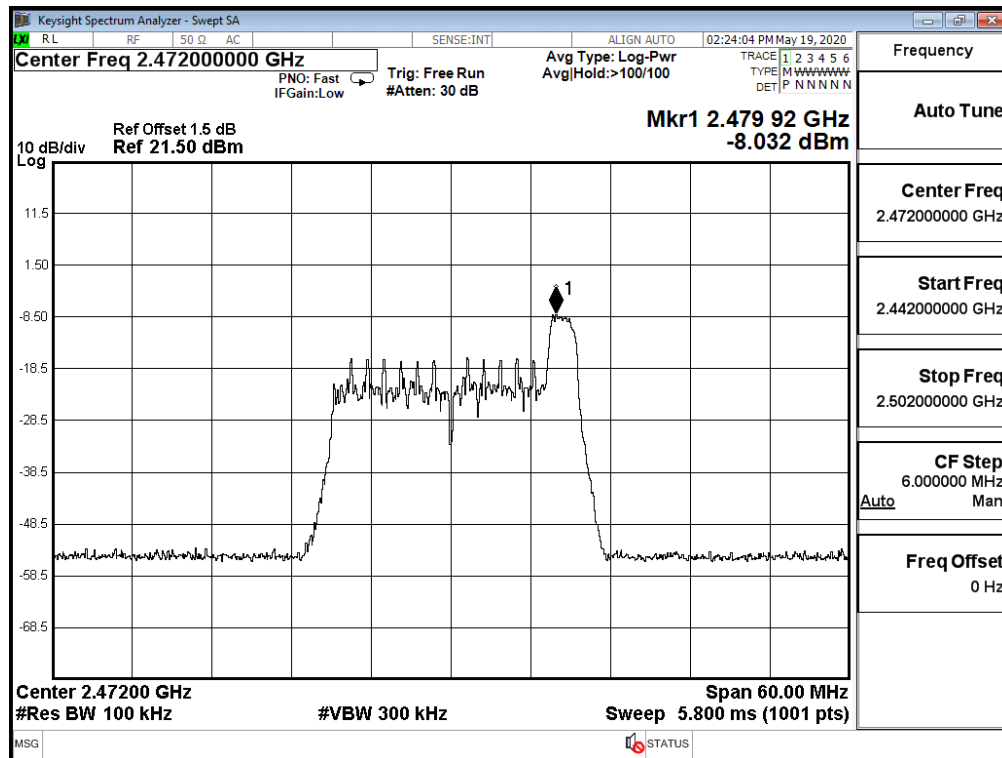


Figure Channel 13: (Chain A) 52/40

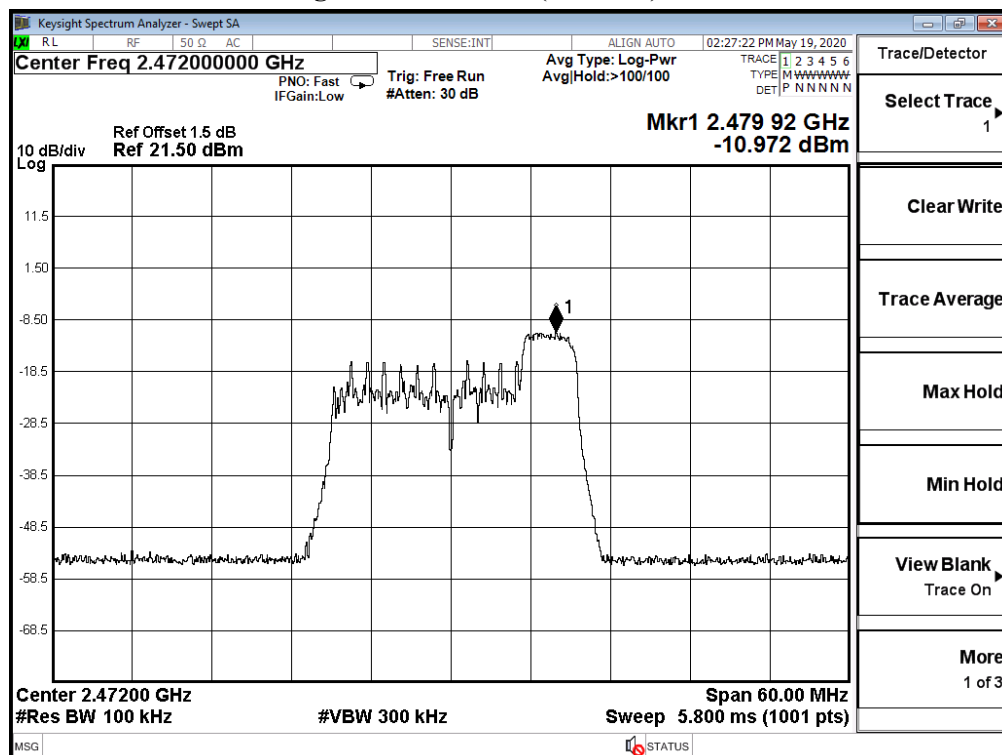


Figure Channel 13: (Chain A) 106/54

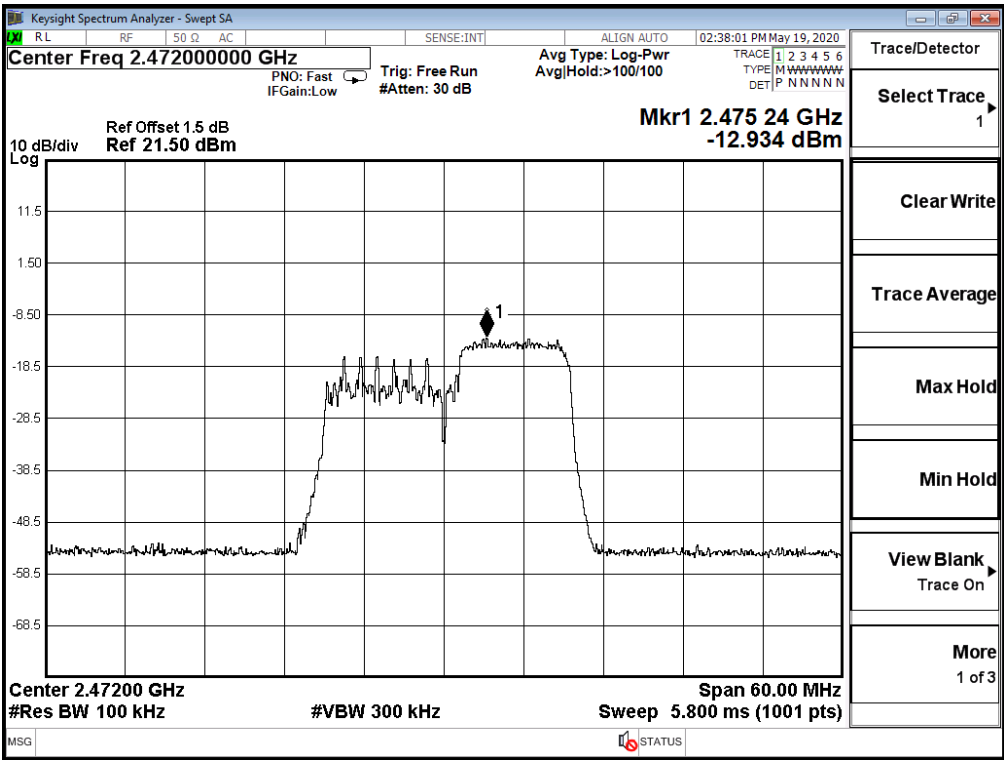


Figure Channel 1: (Chain B) 26/0

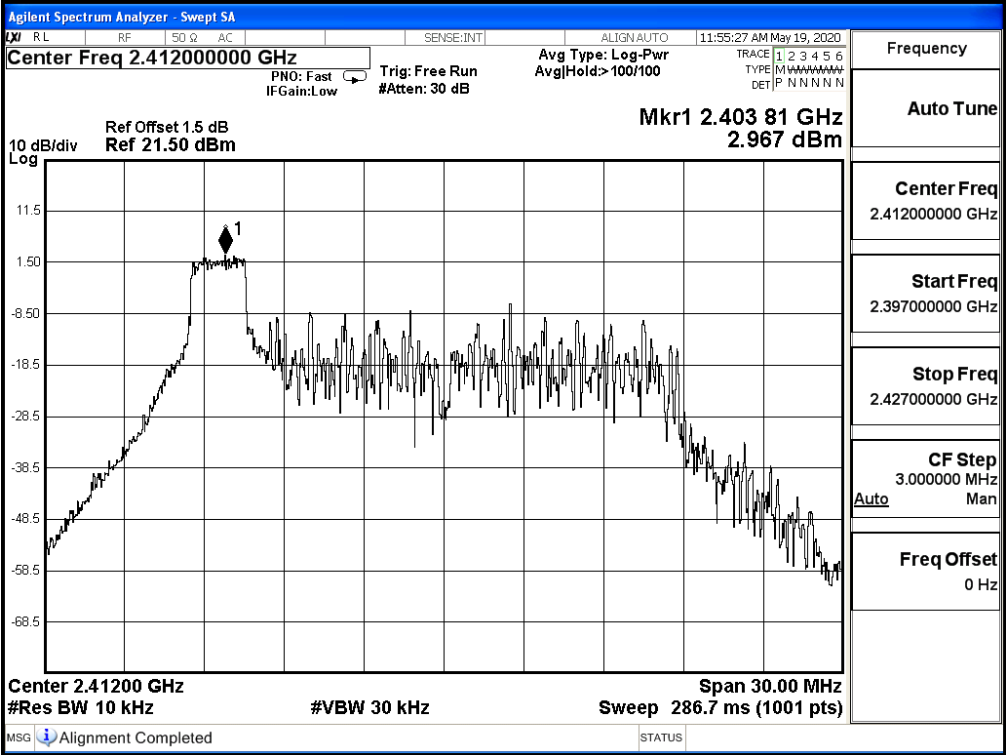


Figure Channel 1: (Chain B) 52/37

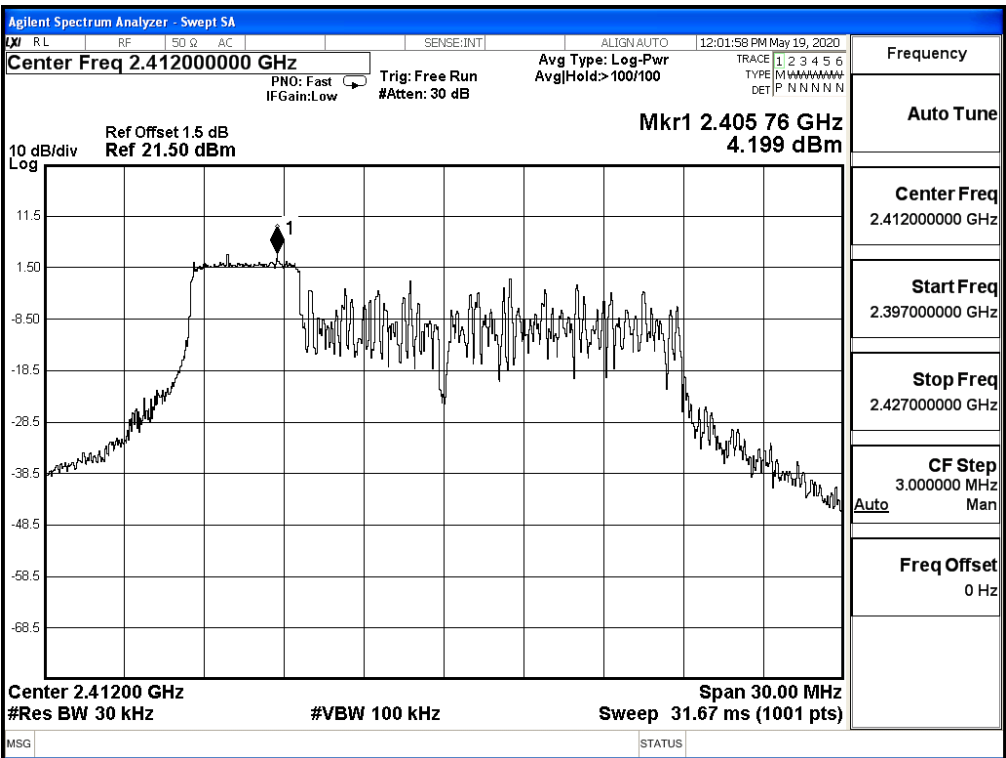


Figure Channel 1: (Chain B) 106/53

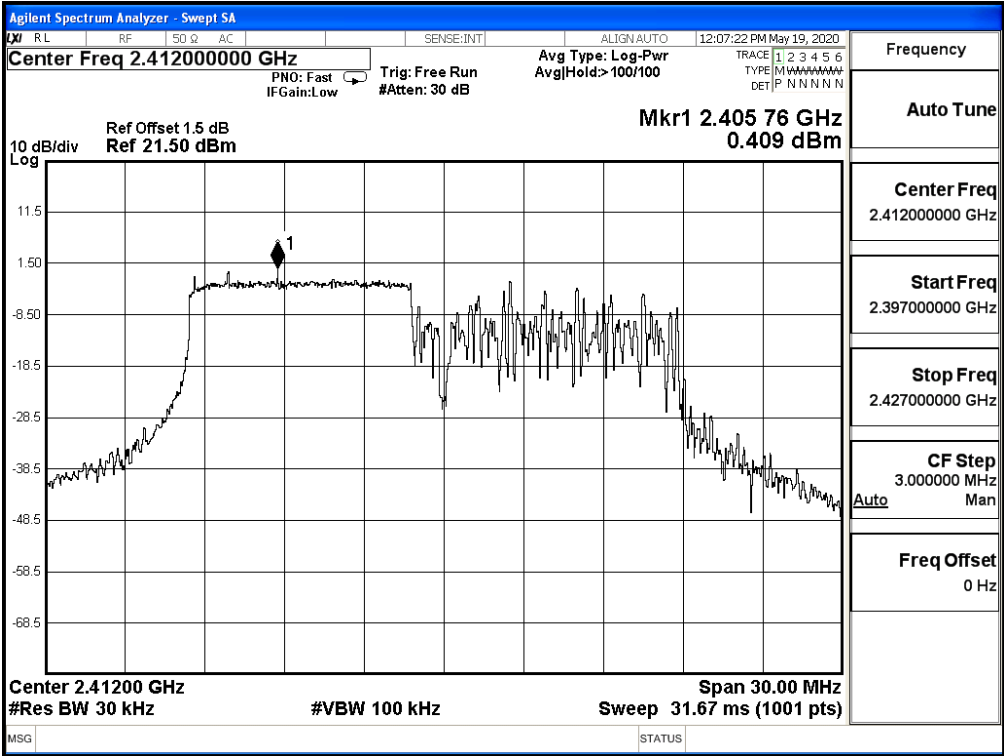


Figure Channel 13: (Chain B) 26/8

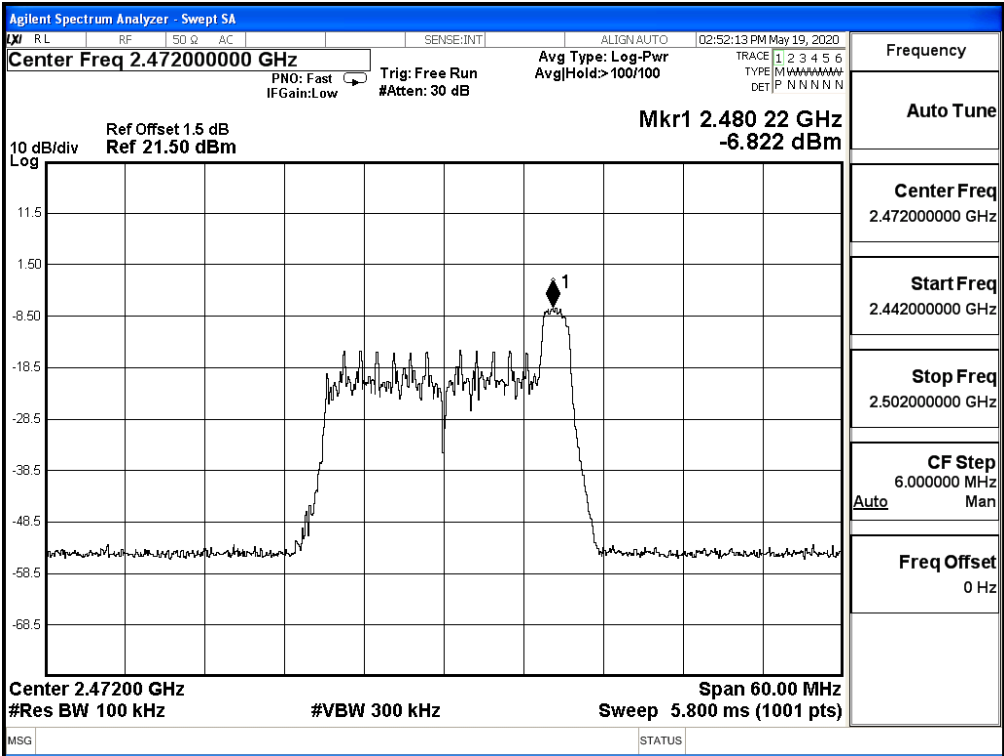


Figure Channel 13: (Chain B) 52/40

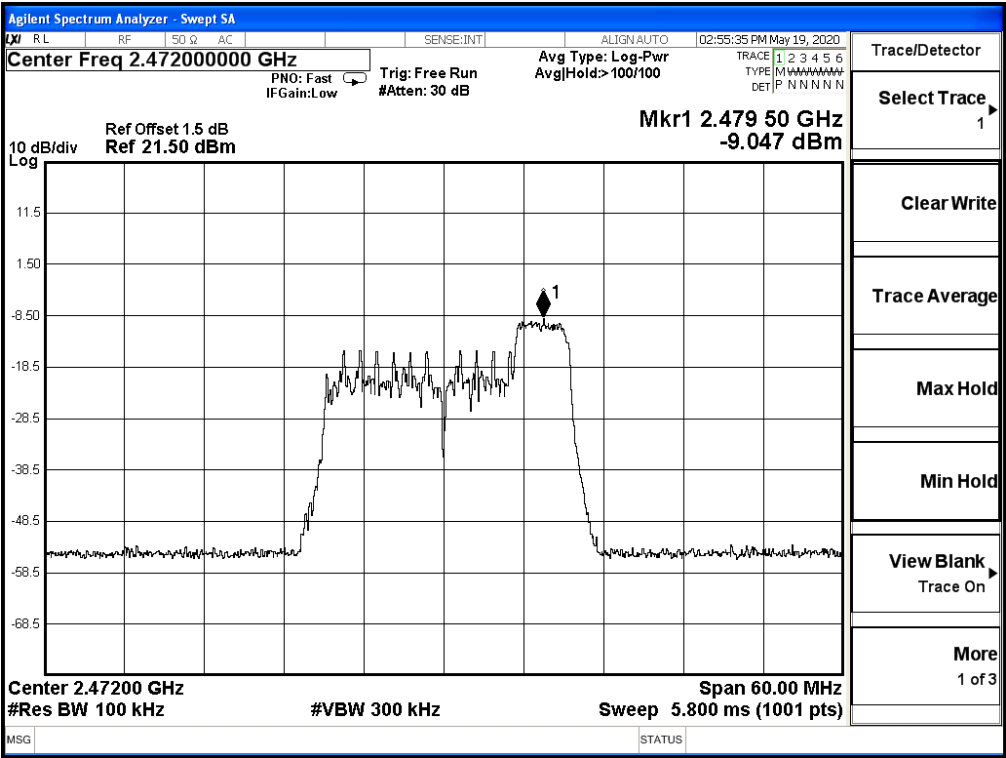
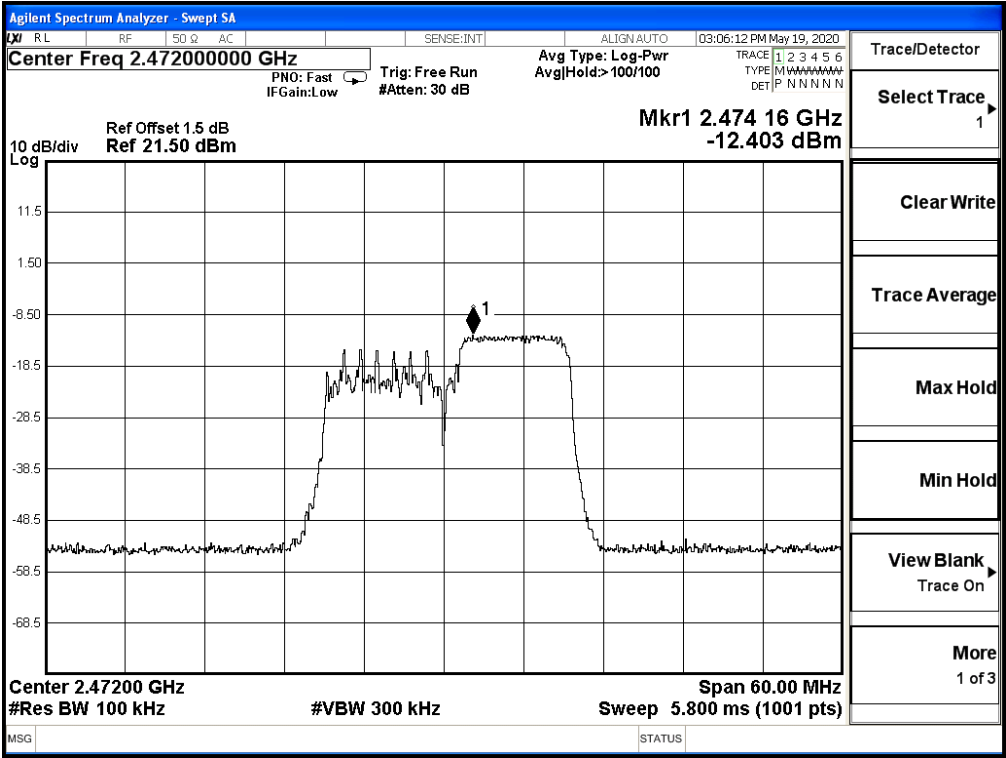


Figure Channel 13: (Chain B) 106/54



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 16 MIMO: Transmit (802.11ax-40BW_34.4Mbps)

RU config: Full

Channel No.	Frequency (MHz)	Chain	PPSD/MHz (dBm)	Total PPSSD/MHz (dBm)	Limit (dBm)	Result
3	2422	A	-0.270	2.740	≤ 8 dBm	Pass
		B	-0.570	2.440	≤ 8 dBm	Pass
7	2442	A	-0.400	2.610	≤ 8 dBm	Pass
		B	0.120	3.130	≤ 8 dBm	Pass
9	2452	A	-1.890	1.120	≤ 8 dBm	Pass
		B	-1.850	1.160	≤ 8 dBm	Pass
10	2457	A	-6.120	-3.110	≤ 8 dBm	Pass
		B	-5.970	-2.960	≤ 8 dBm	Pass
11	2462	A	-0.910	2.100	≤ 8 dBm	Pass
		B	-1.410	1.600	≤ 8 dBm	Pass

Note :

The quantity $10 \cdot \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

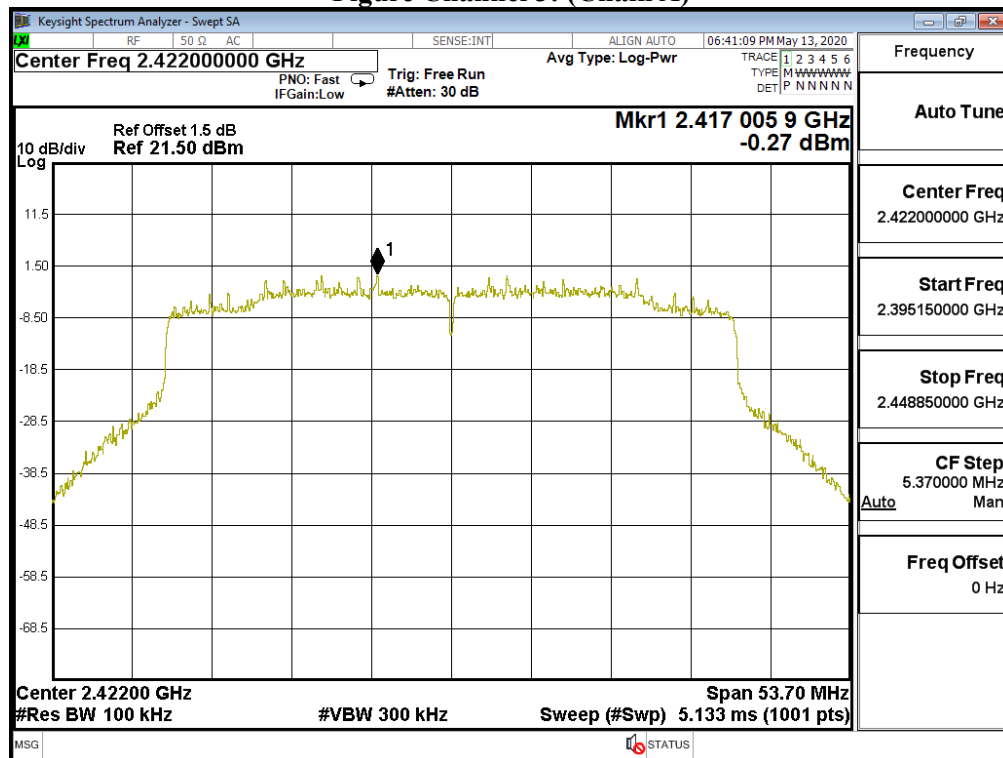
Figure Channel 3: (Chain A)

Figure Channel 7: (Chain A)

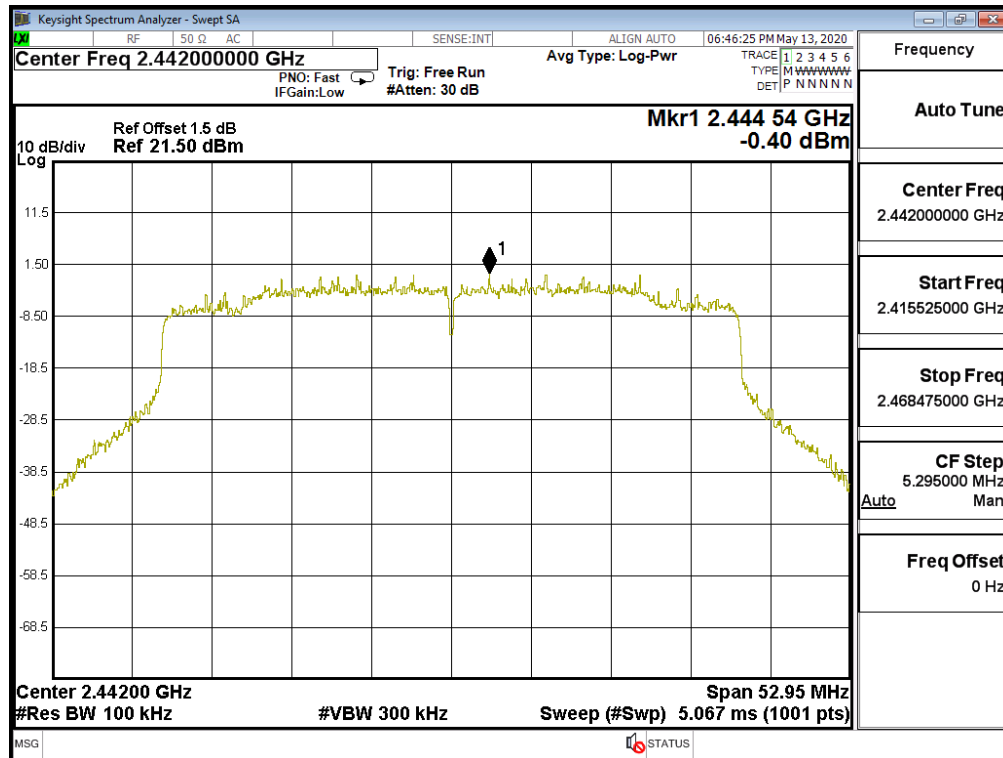


Figure Channel 9: (Chain A)

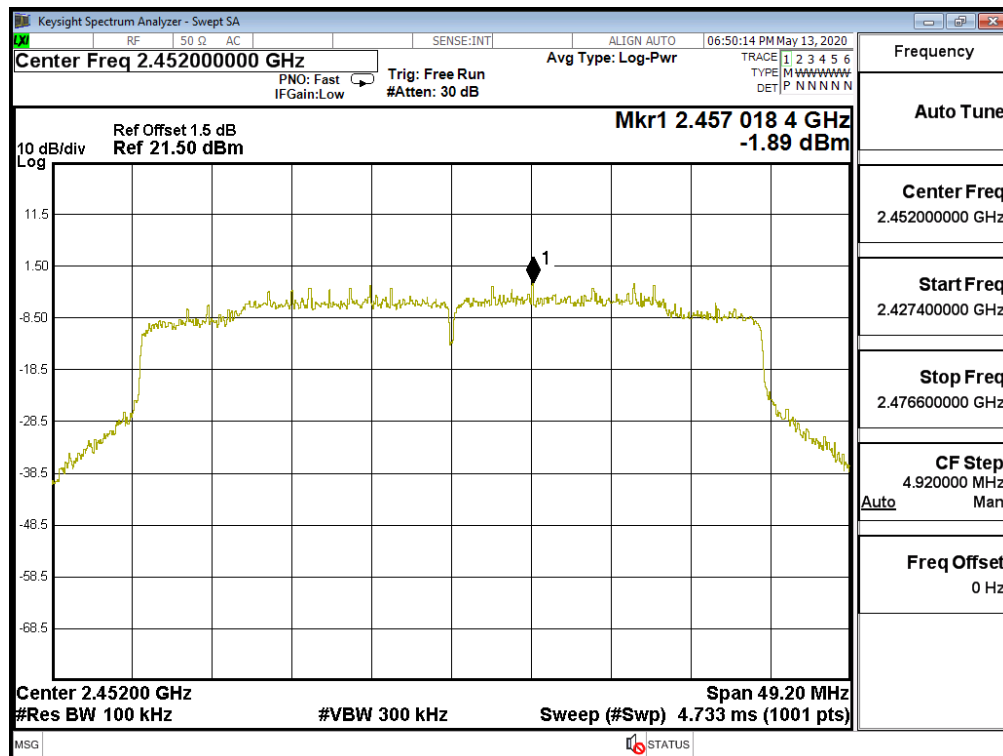


Figure Channel 10: (Chain A)

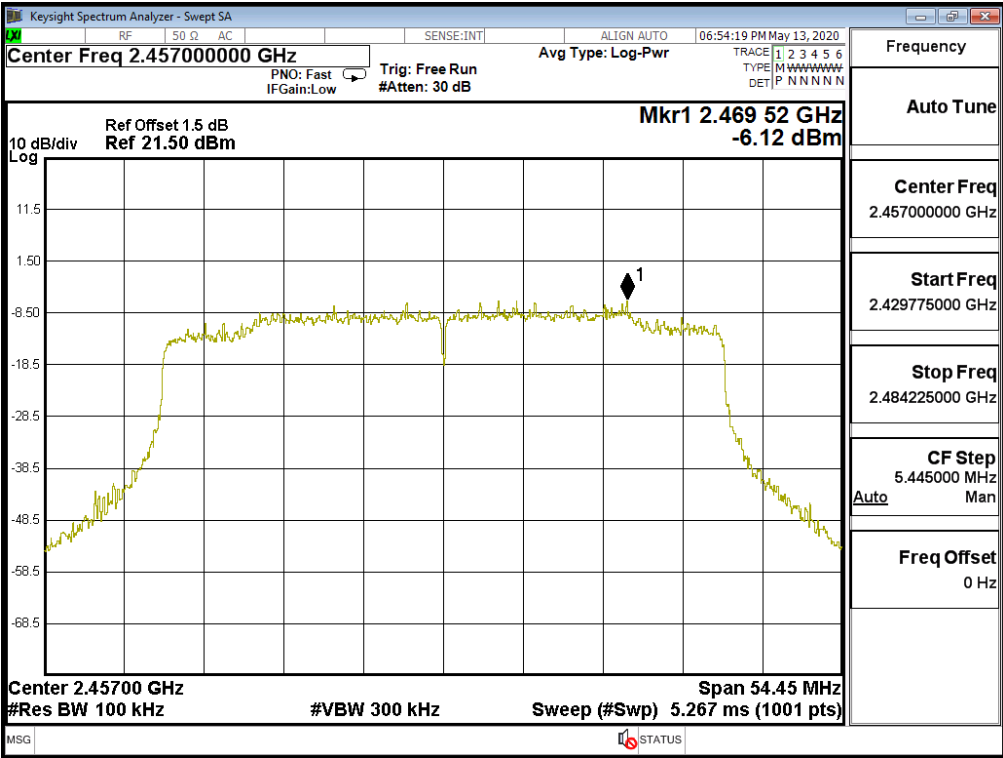


Figure Channel 11: (Chain A)

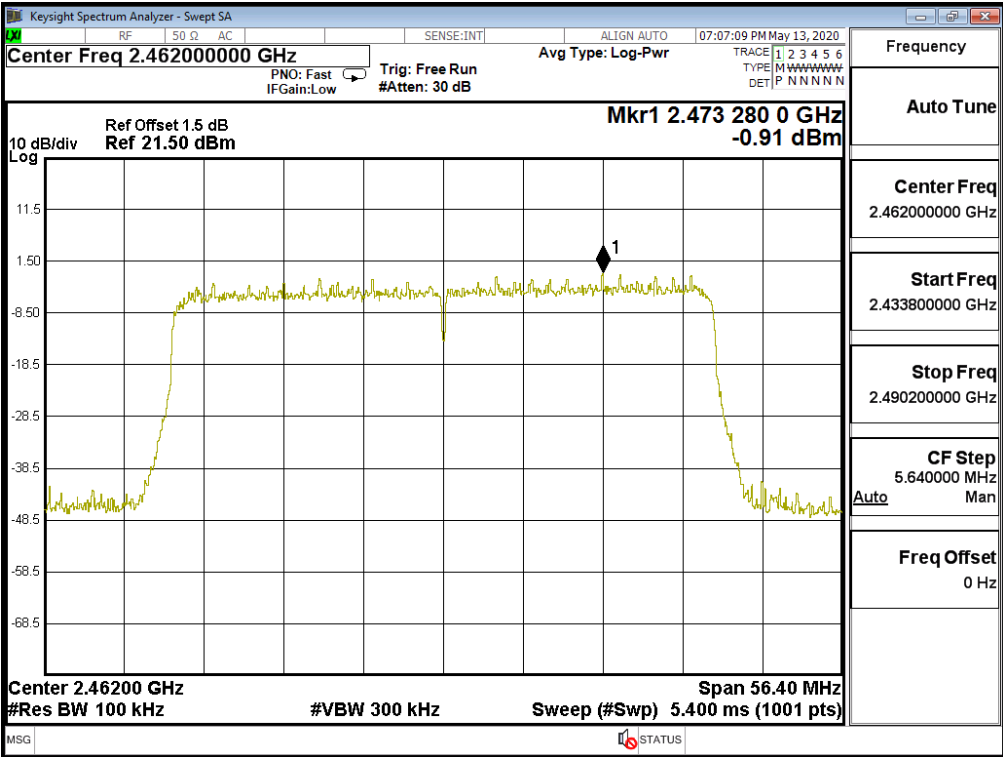


Figure Channel 3: (Chain B)

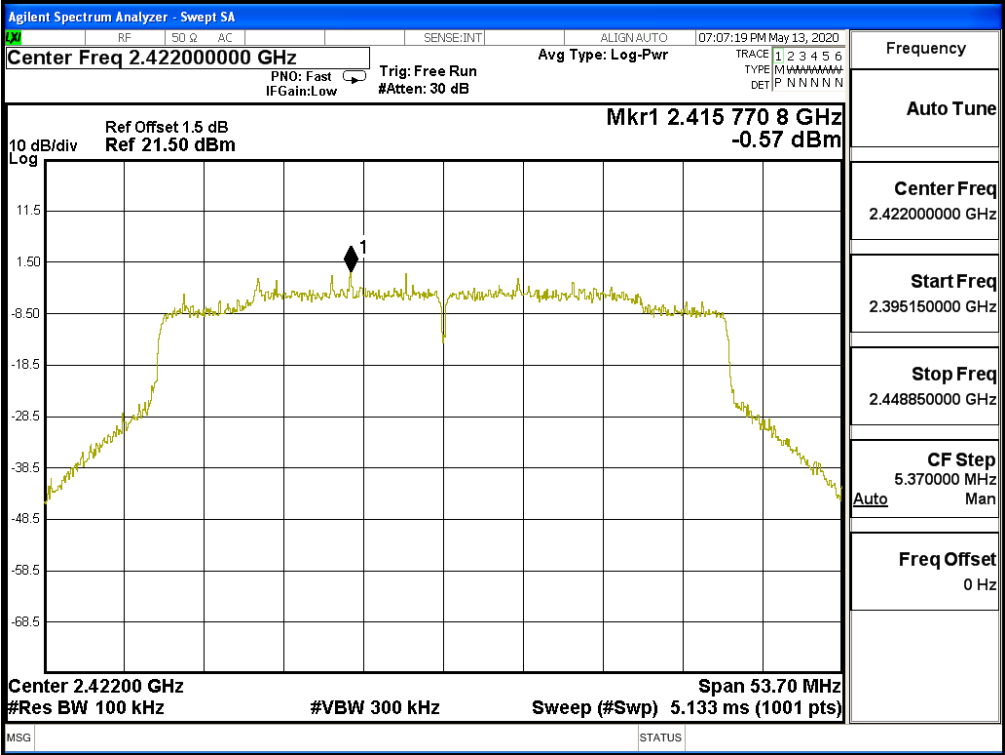


Figure Channel 7: (Chain B)

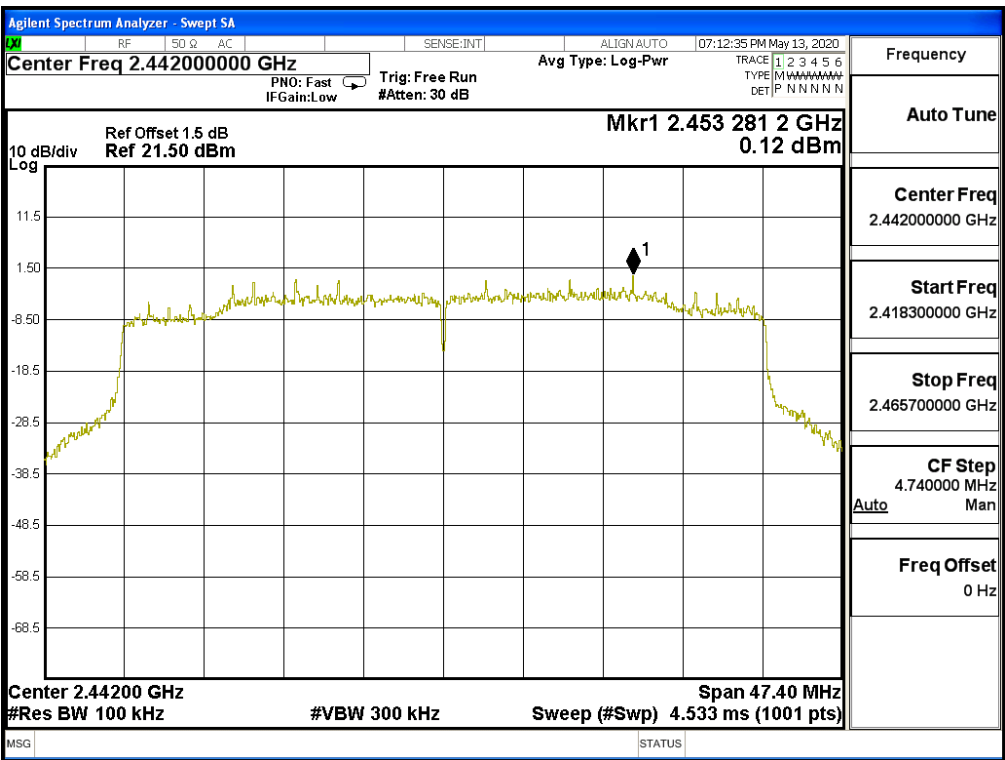


Figure Channel 9: (Chain B)

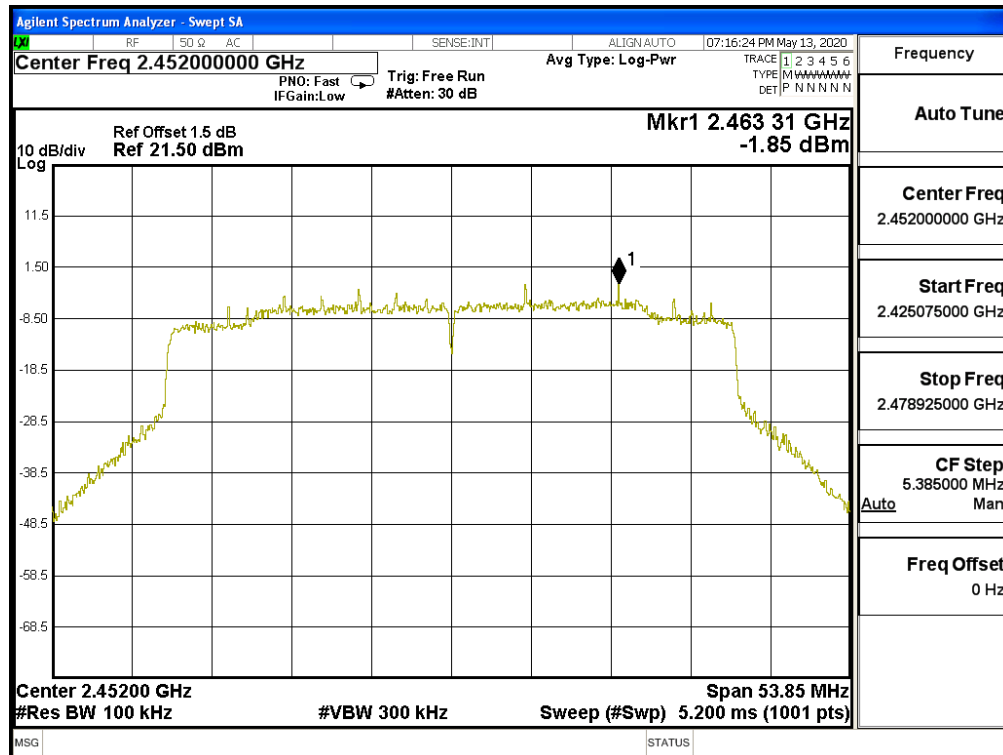


Figure Channel 10: (Chain B)

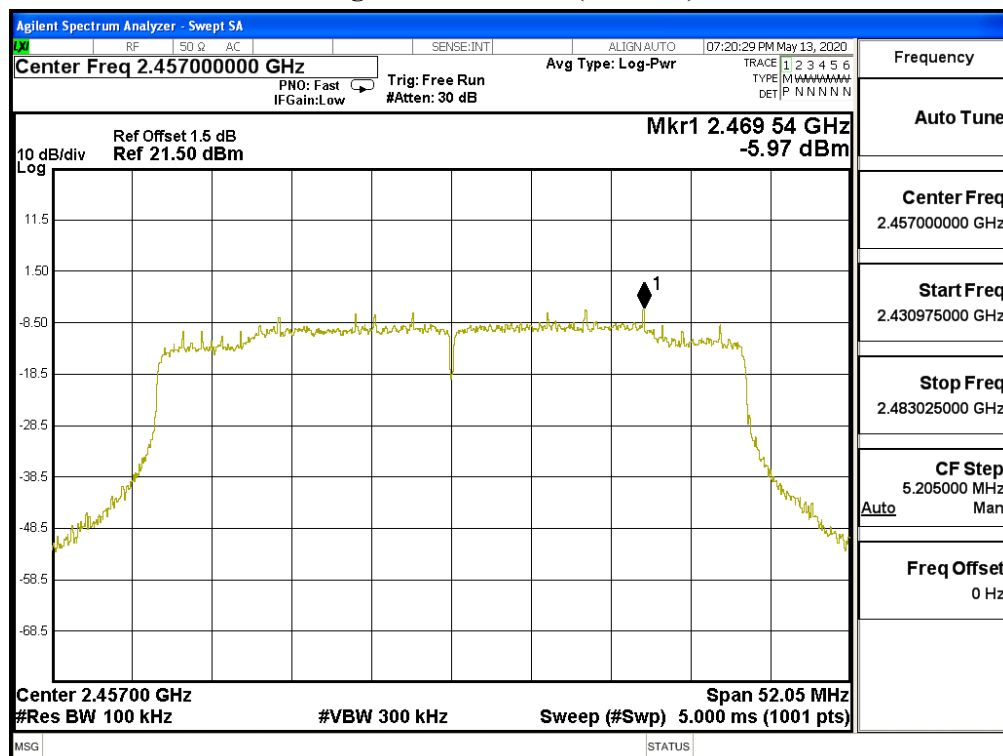
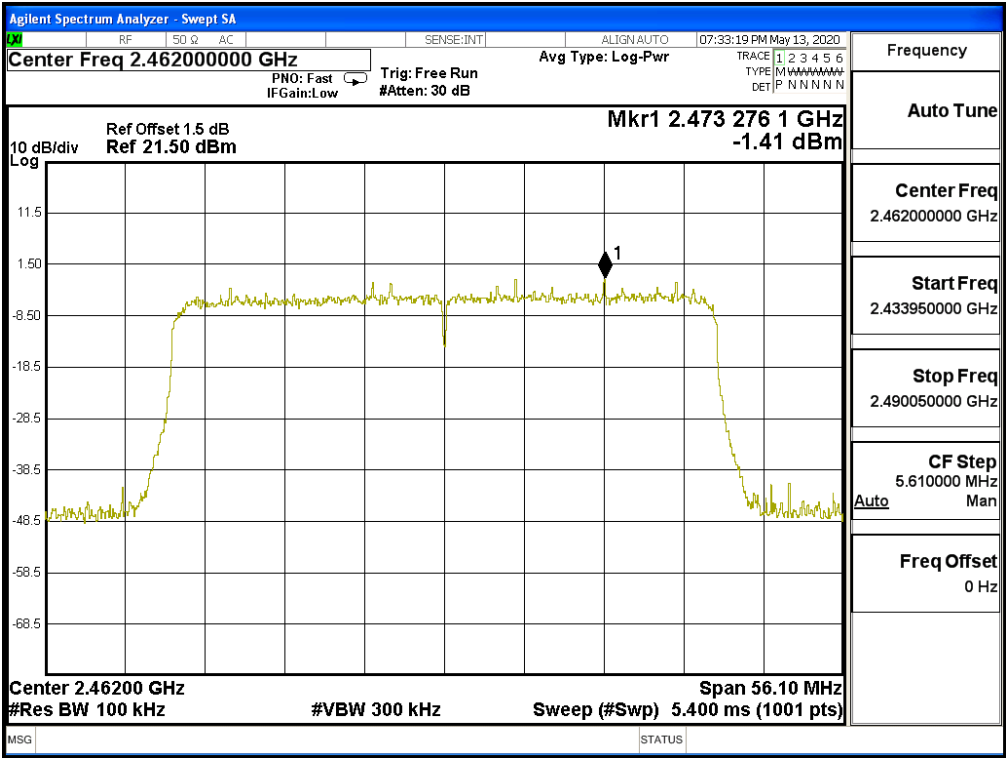


Figure Channel 11: (Chain B)



Product : Portable computer
 Test Item : Power Density Data
 Test Mode : Mode 16 MIMO: Transmit (802.11ax-40BW_34.4Mbps)

RU config: Other

Channel No.	Frequency (MHz)	RU config	Chain	PPSD/MHz (dBm)	Total PSD/MHz (dBm)	Limit (dBm)	Result
3	2422	242/61	A	2.019	5.029	$\leq 8\text{dBm}$	Pass
			B	1.740	4.750	$\leq 8\text{dBm}$	Pass
11	2462	242/62	A	0.990	4.000	$\leq 8\text{dBm}$	Pass
			B	0.566	3.576	$\leq 8\text{dBm}$	Pass

Note :

The quantity $10 \cdot \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 3: (Chain A) 242/61

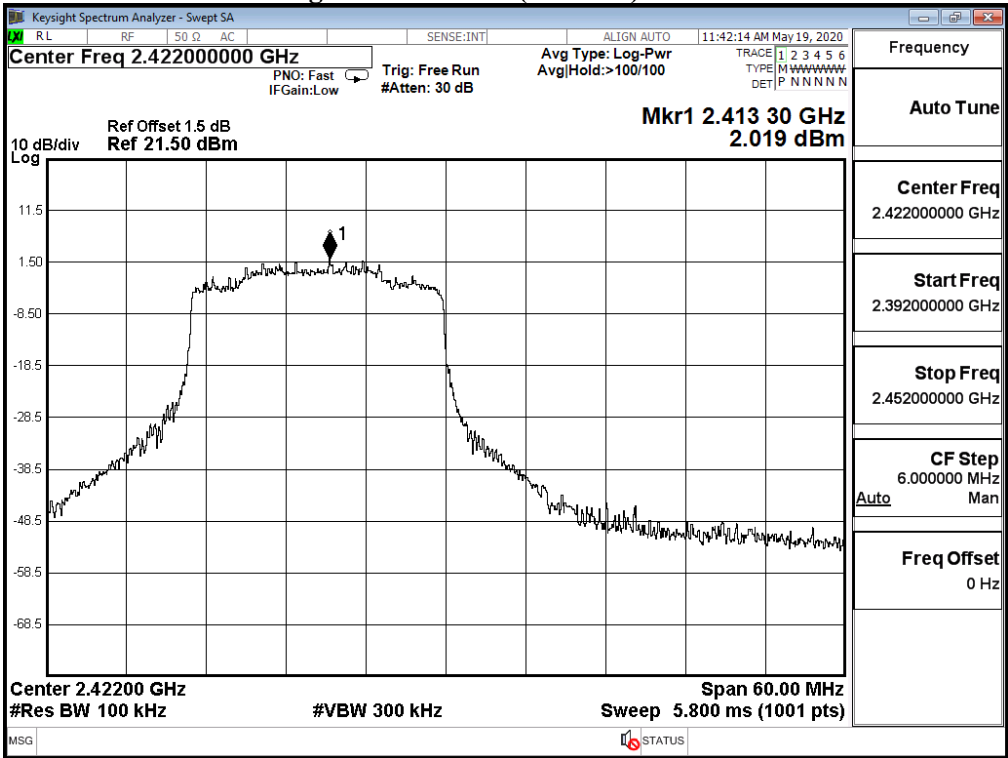


Figure Channel 3: (Chain B) 242/61

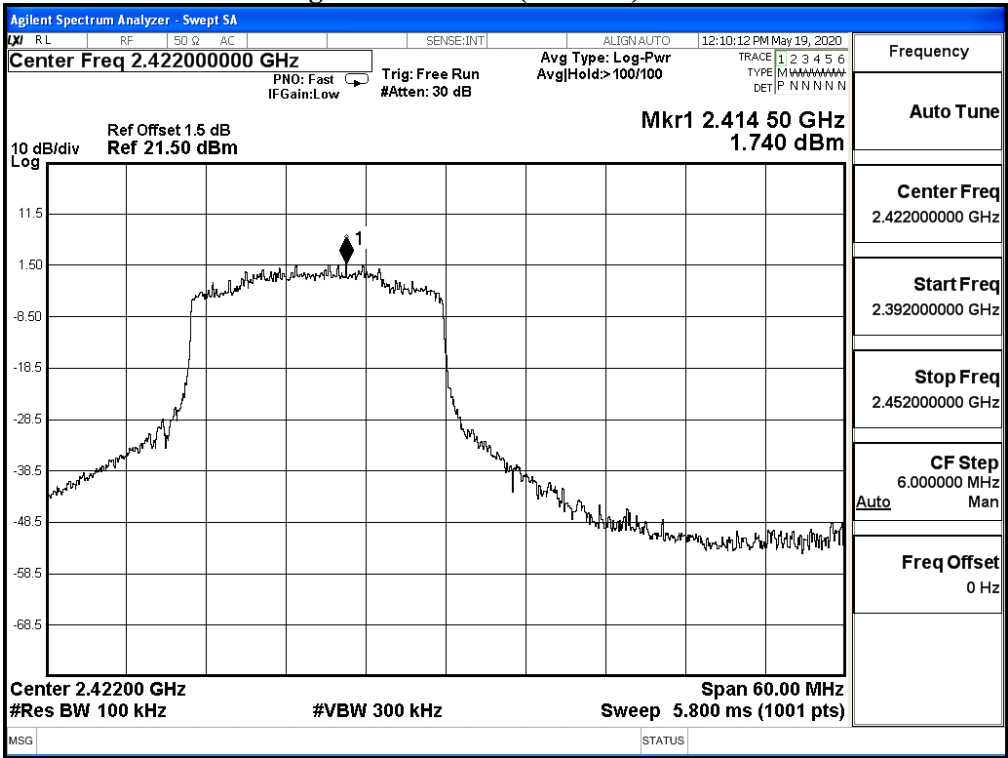


Figure Channel 11: (Chain A) 242/62

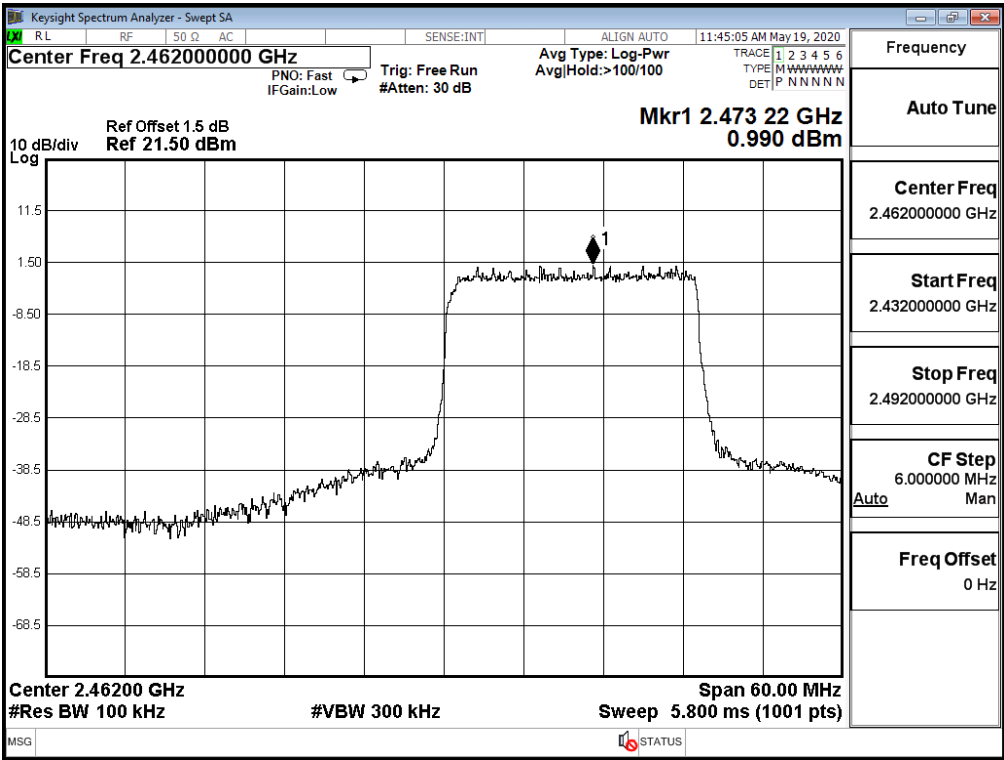
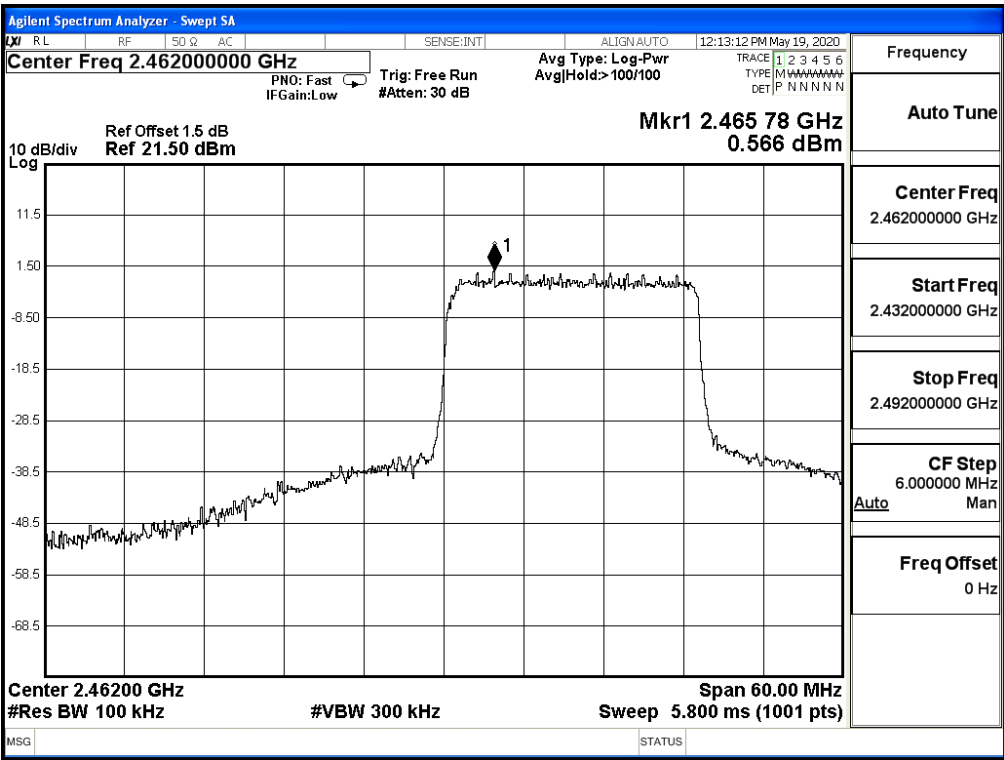
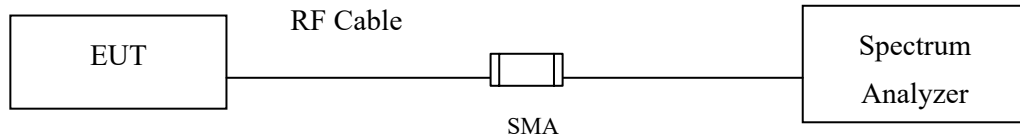


Figure Channel 11: (Chain B) 242/62



9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to ANSI C63.10 2013 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

$\pm 2.31\text{msec}$

9.4. Test Result of Duty Cycle

Product : Portable computer
 Test Item : Duty Cycle
 Test Mode : Transmit

Duty Cycle Formula:

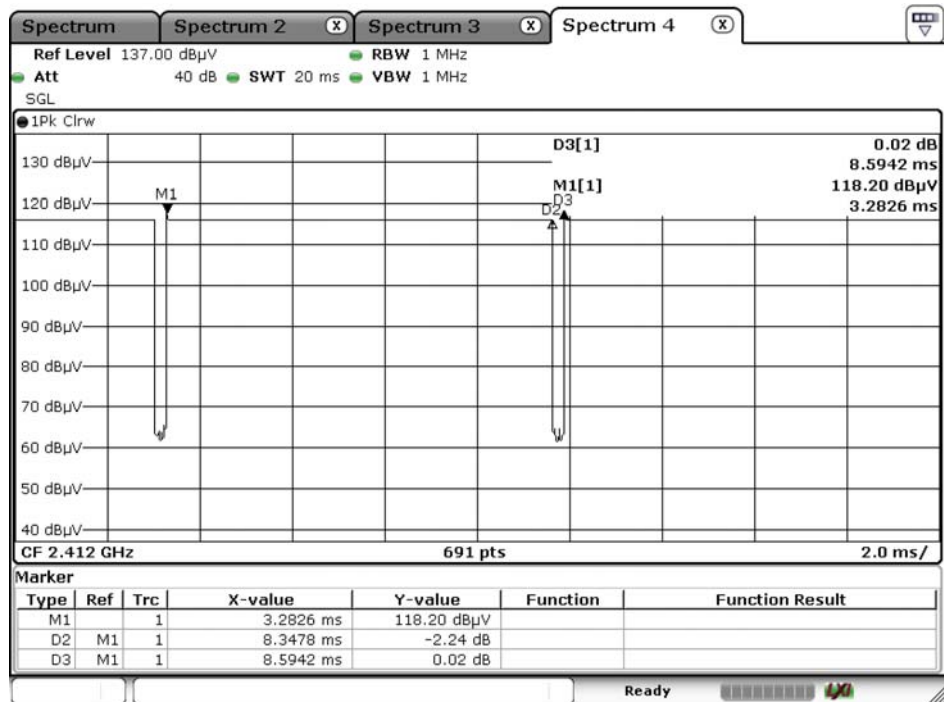
Duty Cycle = $T_{on} / (T_{on} + T_{off})$

Duty Factor = $10 \log (1/\text{Duty Cycle})$

Results:

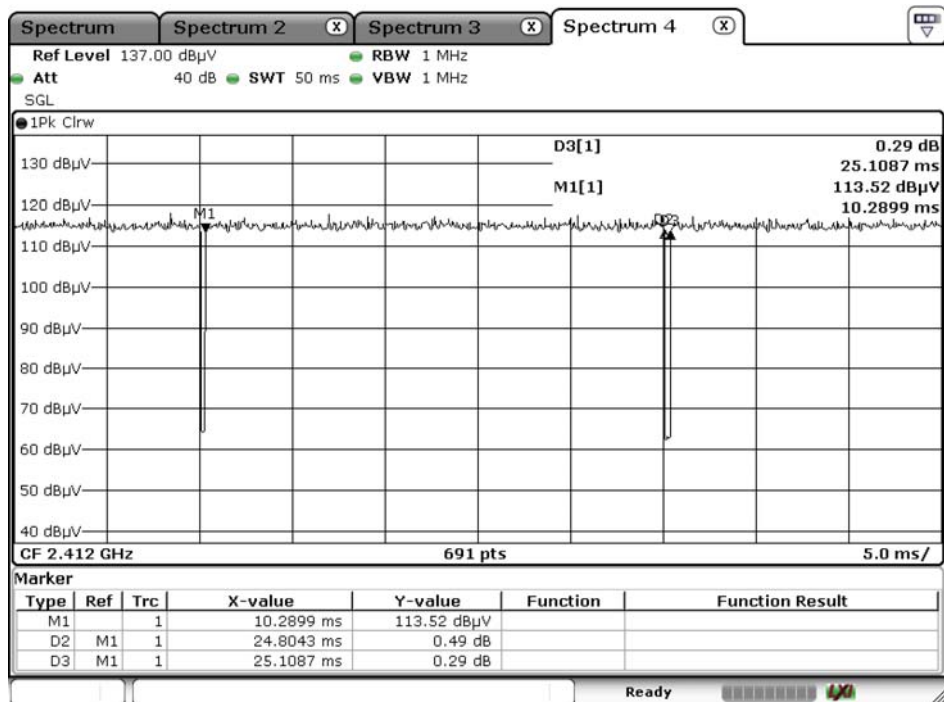
2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11 b-SISOB	8.3478	8.5942	97.13	0.13
802.11 n20-SISOB	24.8043	25.1087	98.79	0.05
802.11 n40-SISOB	36.8840	37.2610	98.99	0.04
802.11ax20-SISOB	24.7101	25.0870	98.50	0.07
802.11 ax40-SISOB	18.6232	18.9275	98.39	0.07
802.11 n20-MIMO	18.5507	18.7101	99.15	0.04
802.11 n40-MIMO	8.8406	9.2174	95.91	0.18
802.11ax20-MIMO	18.6957	18.9275	98.78	0.05
802.11 ax40-MIMO	9.2029	9.6522	95.35	0.21

802.11b-SISOB



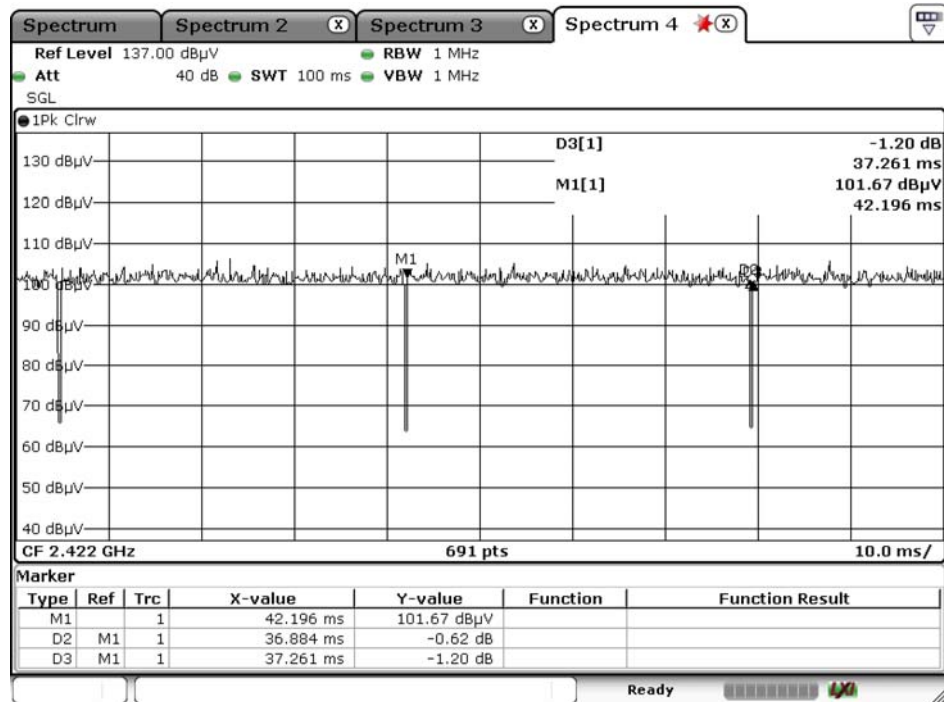
Date: 8.MAY.2020 11:35:41

802.11n20-SISOB



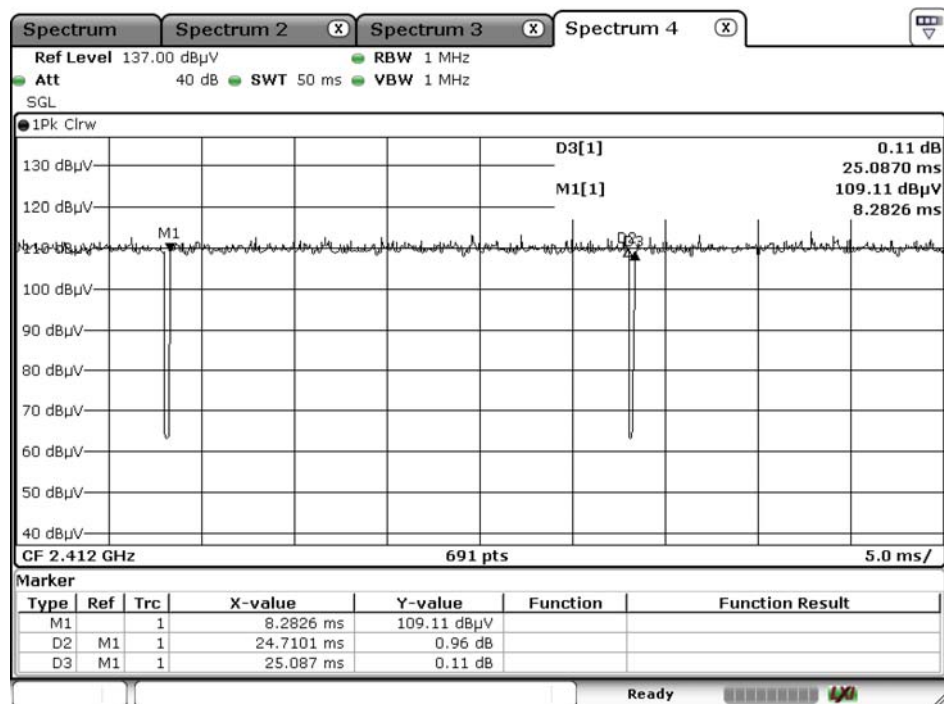
Date: 16.JUN.2020 08:02:15

802.11n40-SISOB



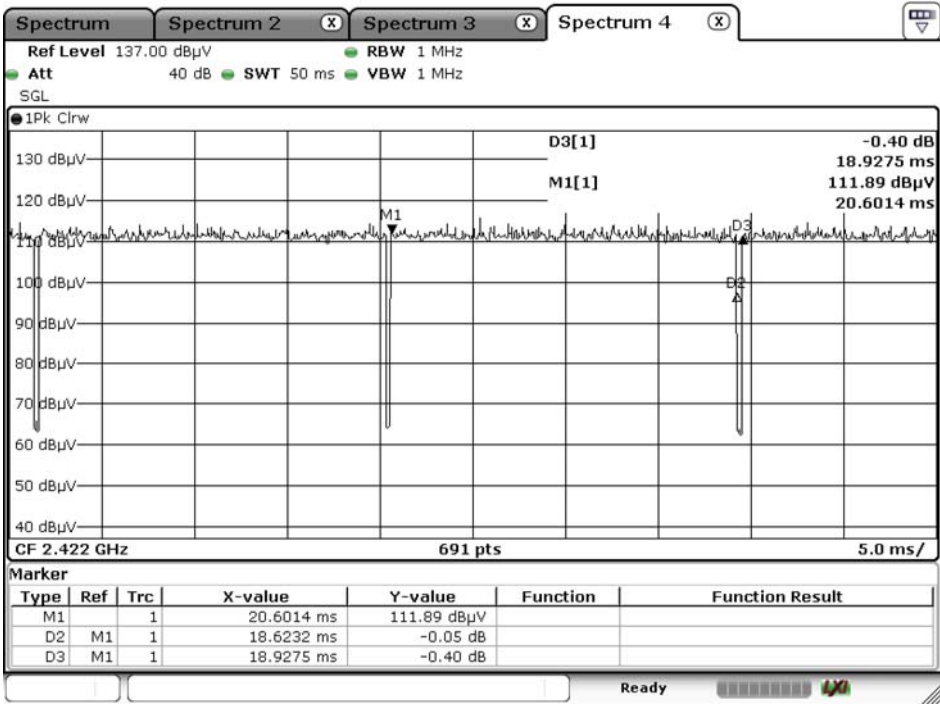
Date: 16.JUN.2020 10:59:12

802.11ax20-SISOB



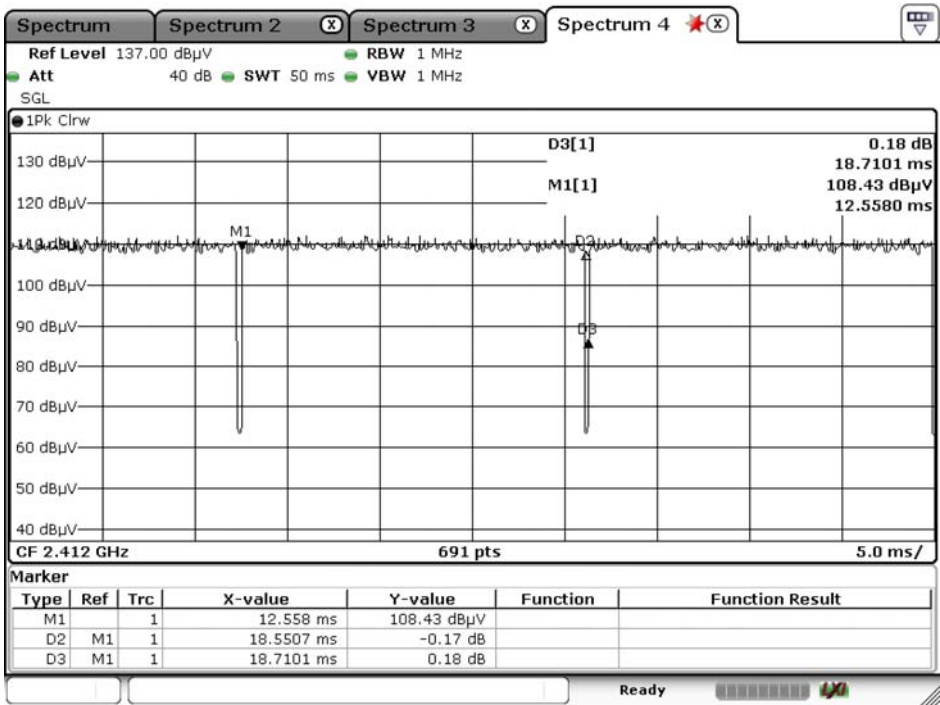
Date: 16.JUN.2020 08:48:40

802.11ax40-SISOB



Date: 16.JUN.2020 09:17:59

802.11n20-MIMO



Date: 19.MAY.2020 04:05:23