

6GHz (40MHz Bandwidth)	6GHz (40MHz) 802.11ax Conducted Power [dBm]								
	Freq [MHz]	Channel	ANT1	ANT2	MIMO	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dBm]
	5965	3	7.79	6.82	10.34	0.47	10.81	24.0	-13.19
	6085	27	7.98	7.36	10.69	0.47	11.16	24.0	-12.84
	6165	43	7.99	7.45	10.74	0.47	11.21	24.0	-12.79
	6285	67	7.96	6.96	10.50	0.47	10.97	24.0	-13.03
	6405	91	7.62	7.27	10.46	0.47	10.93	24.0	-13.07
	6445	99	7.76	6.53	10.20	0.80	11.00	24.0	-13.00
	6485	107	7.80	6.73	10.31	0.80	11.11	24.0	-12.89
	6525	115	7.65	6.77	10.24	0.80	11.04	24.0	-12.96
6565	123	7.69	6.67	10.22	0.69	10.91	24.0	-13.09	
6685	147	7.64	6.72	10.21	0.69	10.90	24.0	-13.10	
6725	155	7.82	7.36	10.61	0.69	11.30	24.0	-12.70	
6845	179	7.65	7.37	10.52	0.69	11.21	24.0	-12.79	
6885	187	8.96	9.48	12.24	-0.15	12.09	24.0	-11.91	
7005	211	8.97	9.42	12.21	-0.15	12.06	24.0	-11.94	
7085	227	9.15	9.49	12.33	-0.15	12.18	24.0	-11.82	

Table 7-4. MIMO 40MHz BW 802.11ax (UNII) Maximum Conducted Output Power

6GHz (80MHz Bandwidth)	6GHz (80MHz) 802.11ax Conducted Power [dBm]								
	Freq [MHz]	Channel	ANT1	ANT2	MIMO	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dBm]
	5985	7	11.04	11.48	14.28	0.47	14.75	24.0	-9.25
	6065	23	10.99	11.49	14.26	0.47	14.73	24.0	-9.27
	6145	39	10.82	11.49	14.18	0.47	14.65	24.0	-9.35
	6305	71	11.21	11.33	14.28	0.47	14.75	24.0	-9.25
	6385	87	10.35	11.45	13.95	0.47	14.42	24.0	-9.58
	6465	103	10.83	11.33	14.10	0.80	14.90	24.0	-9.10
	6545	119	10.23	11.48	13.91	0.69	14.60	24.0	-9.40
	6705	151	10.81	11.32	14.08	0.69	14.77	24.0	-9.23
	6785	167	10.69	11.23	13.98	0.69	14.67	24.0	-9.33
	6865	183	10.64	11.44	14.07	0.69	14.76	24.0	-9.24
	6945	199	10.74	11.49	14.14	-0.15	13.99	24.0	-10.01
7025	215	10.48	11.42	13.99	-0.15	13.84	24.0	-10.16	

Table 7-5. MIMO 80MHz BW 802.11ax (UNII) Maximum Conducted Output Power

6GHz (160MHz Bandwidth)	6GHz (160MHz) 802.11ax Conducted Power [dBm]								
	Freq [MHz]	Channel	ANT1	ANT2	MIMO	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dBm]
	6025	15	10.88	11.31	14.11	0.47	14.58	24.0	-9.42
	6185	47	10.61	11.44	14.06	0.47	14.53	24.0	-9.47
	6345	79	10.41	11.46	13.98	0.47	14.45	24.0	-9.55
	6505	111	11.11	11.15	14.14	0.80	14.94	24.0	-9.06
	6665	143	11.22	10.97	14.11	0.69	14.80	24.0	-9.20
	6825	175	11.07	11.25	14.17	0.69	14.86	24.0	-9.14
	6985	207	11.32	11.47	14.41	-0.15	14.26	24.0	-9.74

Table 7-6. MIMO 160MHz BW 802.11ax (UNII) Maximum Conducted Output Power

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**Sample MIMO Calculation:**

At 5955MHz in 802.11a (20MHz BW) mode, the average conducted output power was measured to be 6.08 dBm for Antenna-1 and 6.49 dBm for Antenna-2.

$$\text{Antenna 1 + Antenna 2 = MIMO}$$

$$(6.08 \text{ dBm} + 6.49 \text{ dBm}) = (4.06 \text{ mW} + 4.46 \text{ mW}) = 8.52 \text{ mW} = 9.30 \text{ dBm}$$

**Sample Directional Gain Calculation:**

Per ANSI C63.10-2013 Section 14.4.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used.

$$\text{Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{ANT}] \text{ dBi}$$

**Sample e.i.r.p. Calculation:**

At 5955MHz in 802.11a (20MHz BW) mode, the average MIMO conducted power was calculated to be dBm with directional gain of 0.47 dBi.

$$\text{e.i.r.p. (dBm)} = \text{Conducted Power (dBm)} + \text{Ant gain (dBi)}$$

$$9.30 \text{ dBm} + 0.47 \text{ dBi} = 9.77 \text{ dBm}$$

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## 7.4 Maximum Power Spectral Density

### Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies. Method SA-1, as defined in ANSI C63.10-2013, was used to measure the power spectral density for 802.11a/ax.

***In the 5.925-7.125 GHz bands, the maximum power spectral density must not exceed  $-1$  dBm e.i.r.p. in any 1-megahertz band.***

### Test Procedure Used

ANSI C63.10-2013 – Section 12.3.2.2

ANSI C63.10-2013 – Section 14.3.2.2 Measure-and-Sum Technique

### Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation.
2. Span was set to encompass the entire emission bandwidth of the signal.
3. RBW = 1MHz
4. VBW = 3MHz
5. Number of sweep points  $\geq 2 \times$  (span/RBW)
6. Sweep time = auto
7. Detector = power averaging (RMS)
8. Trigger was set to free run for all modes.
9. Trace was averaged over 100 sweeps.
10. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-3. Test Instrument & Measurement Setup**

### Test Notes

None.

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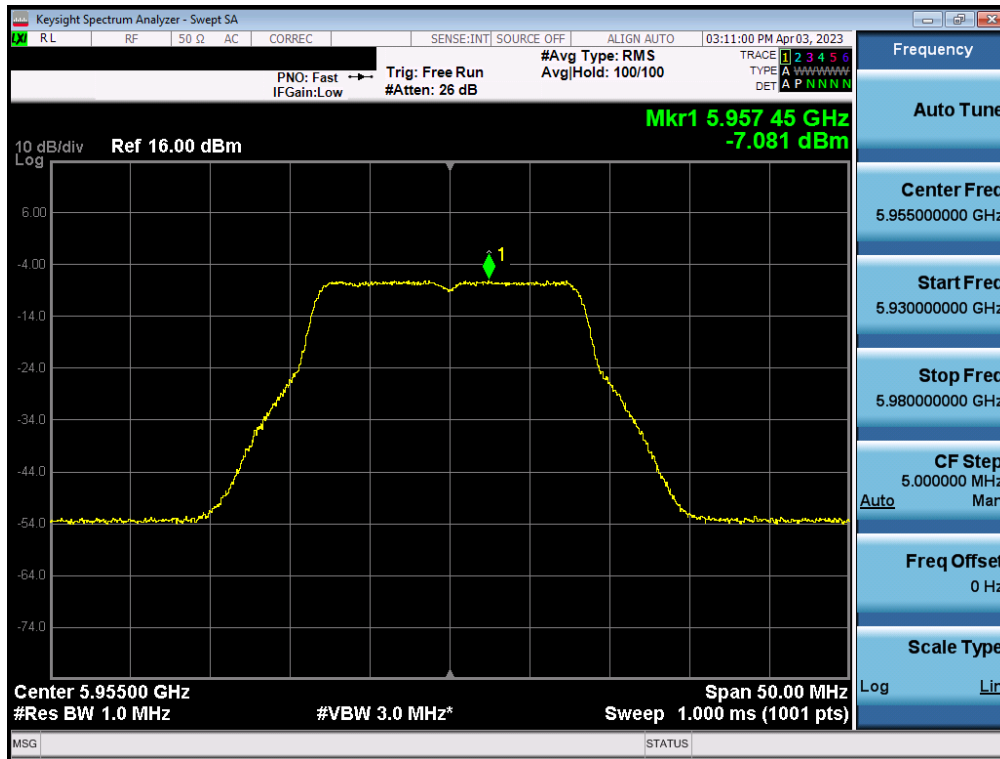
## MIMO Power Spectral Density Measurements

	Frequency [MHz]	Channel	802.11 MODE	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Summed MIMO Power Density [dBm/MHz]	Directional Gain [dBi]	e.i.r.p Density [dBm/MHz]	Max EIRP Density [dBm/MHz]	Margin [dB]
Band 5	5955	1	a	-7.08	-6.84	-3.95	0.47	-3.48	-1	-2.48
	6175	45	a	-6.61	-6.40	-3.49	0.47	-3.02	-1	-2.02
	6415	93	a	-7.22	-6.35	-3.75	0.47	-3.28	-1	-2.28
	5955	1	ax (20MHz)	-7.96	-7.71	-4.82	0.47	-4.35	-1	-3.35
	6175	45	ax (20MHz)	-7.73	-7.57	-4.64	0.47	-4.17	-1	-3.17
	6415	93	ax (20MHz)	-7.53	-6.98	-4.24	0.47	-3.76	-1	-2.76
	5965	3	ax (40MHz)	-7.88	-7.88	-4.87	0.47	-4.40	-1	-3.40
	6165	43	ax (40MHz)	-7.21	-7.35	-4.27	0.47	-3.80	-1	-2.80
	6405	91	ax (40MHz)	-7.79	-7.44	-4.60	0.47	-4.13	-1	-3.13
	5985	7	ax (80MHz)	-6.46	-6.64	-3.54	0.47	-3.06	-1	-2.06
	6145	39	ax (80MHz)	-6.62	-6.52	-3.56	0.47	-3.08	-1	-2.08
	6385	87	ax (80MHz)	-6.97	-6.41	-3.67	0.47	-3.20	-1	-2.20
	6025	15	ax (160MHz)	-9.49	-9.23	-6.34	0.47	-5.87	-1	-4.87
Band 6	6185	47	ax (160MHz)	-9.63	-9.20	-6.40	0.47	-5.92	-1	-4.92
	6345	79	ax (160MHz)	-9.47	-9.19	-6.32	0.47	-5.84	-1	-4.84
	6435	97	a	-6.69	-6.75	-3.71	0.80	-2.91	-1	-1.91
	6475	105	a	-7.06	-7.10	-4.07	0.80	-3.27	-1	-2.27
	6515	113	a	-7.10	-6.96	-4.02	0.80	-3.22	-1	-2.22
	6435	97	ax (20MHz)	-7.80	-7.72	-4.75	0.80	-3.95	-1	-2.95
	6475	105	ax (20MHz)	-7.60	-7.54	-4.56	0.80	-3.76	-1	-2.76
	6515	113	ax (20MHz)	-7.68	-7.11	-4.37	0.80	-3.58	-1	-2.58
	6445	99	ax (40MHz)	-7.66	-8.31	-4.96	0.80	-4.17	-1	-3.17
	6485	107	ax (40MHz)	-7.63	-8.11	-4.86	0.80	-4.06	-1	-3.06
	6525	115	ax (40MHz)	-7.72	-8.07	-4.88	0.80	-4.08	-1	-3.08
	6465	103	ax (80MHz)	-6.46	-6.85	-3.64	0.80	-2.84	-1	-1.84
	6505	111	ax (160MHz)	-9.33	-8.91	-6.11	0.80	-5.31	-1	-4.31
Band 7	6535	117	a	-7.18	-6.70	-3.92	0.69	-3.24	-1	-2.24
	6695	149	a	-7.05	-7.19	-4.10	0.69	-3.42	-1	-2.42
	6875	185	a	-7.03	-6.95	-3.98	0.69	-3.29	-1	-2.29
	6535	117	ax (20MHz)	-7.70	-7.43	-4.55	0.69	-3.87	-1	-2.87
	6695	149	ax (20MHz)	-7.61	-7.72	-4.66	0.69	-3.97	-1	-2.97
	6875	185	ax (20MHz)	-7.32	-7.48	-4.39	0.69	-3.70	-1	-2.70
	6565	123	ax (40MHz)	-7.63	-8.11	-4.85	0.69	-4.16	-1	-3.16
	6725	155	ax (40MHz)	-7.27	-7.41	-4.33	0.69	-3.64	-1	-2.64
	6845	179	ax (40MHz)	-7.38	-7.55	-4.45	0.69	-3.77	-1	-2.77
	6545	119	ax (80MHz)	-6.67	-6.33	-3.48	0.69	-2.80	-1	-1.80
	6705	151	ax (80MHz)	-6.56	-7.01	-3.77	0.69	-3.08	-1	-2.08
	6865	183	ax (80MHz)	-6.64	-6.62	-3.62	0.69	-2.93	-1	-1.93
	6665	143	ax (160MHz)	-8.82	-8.90	-5.85	0.69	-5.16	-1	-4.16
Band 8	6825	175	ax (160MHz)	-9.10	-9.06	-6.07	0.69	-5.38	-1	-4.38
	6895	189	a	-6.34	-6.17	-3.24	-0.15	-3.39	-1	-2.39
	6995	209	a	-5.90	-6.13	-3.00	-0.15	-3.15	-1	-2.15
	7115	233	a	-5.89	-6.19	-3.03	-0.15	-3.17	-1	-2.17
	6895	189	ax (20MHz)	-5.71	-6.10	-2.89	-0.15	-3.04	-1	-2.04
	6995	209	ax (20MHz)	-5.67	-6.03	-2.83	-0.15	-2.98	-1	-1.98
	7115	233	ax (20MHz)	-5.31	-5.42	-2.36	-0.15	-2.50	-1	-1.50
	6885	187	ax (40MHz)	-5.39	-5.31	-2.34	-0.15	-2.49	-1	-1.49
	7005	211	ax (40MHz)	-5.23	-5.40	-2.30	-0.15	-2.45	-1	-1.45
	7085	227	ax (40MHz)	-4.98	-5.51	-2.23	-0.15	-2.37	-1	-1.37
	6945	199	ax (80MHz)	-6.69	-6.72	-3.69	-0.15	-3.84	-1	-2.84
	7025	215	ax (80MHz)	-6.57	-6.18	-3.36	-0.15	-3.50	-1	-2.50
	6985	207	ax (160MHz)	-8.96	-9.11	-6.02	-0.15	-6.17	-1	-5.17

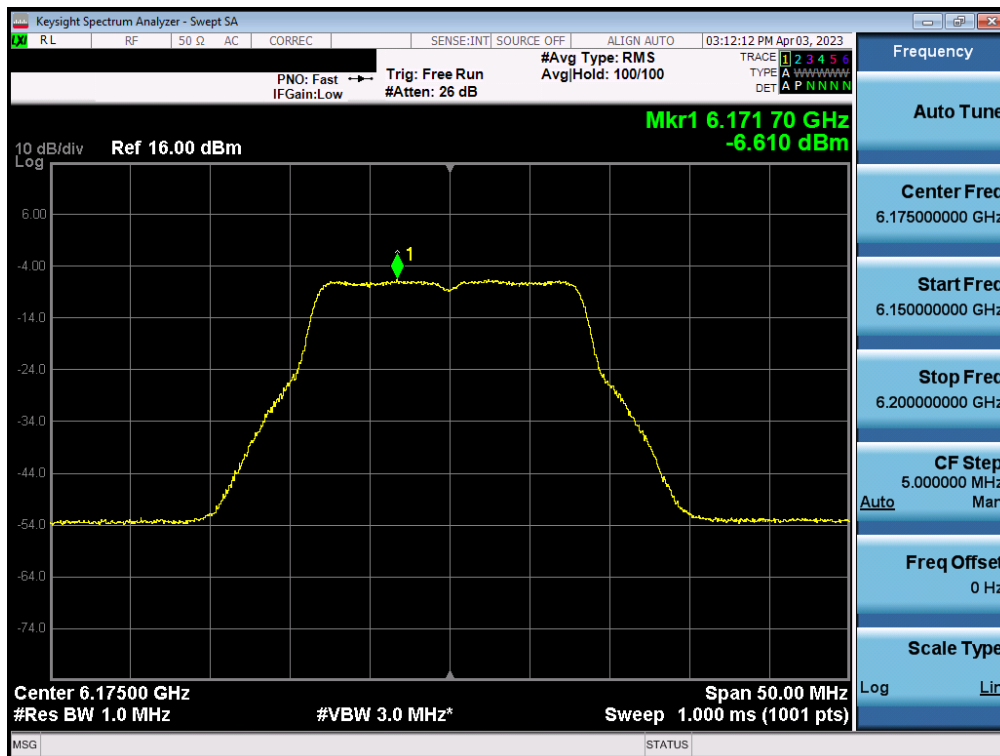
**Table 7-7. MIMO e.i.r.p. Conducted Power Spectral Density Measurements**

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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### 7.4.1 MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 5)

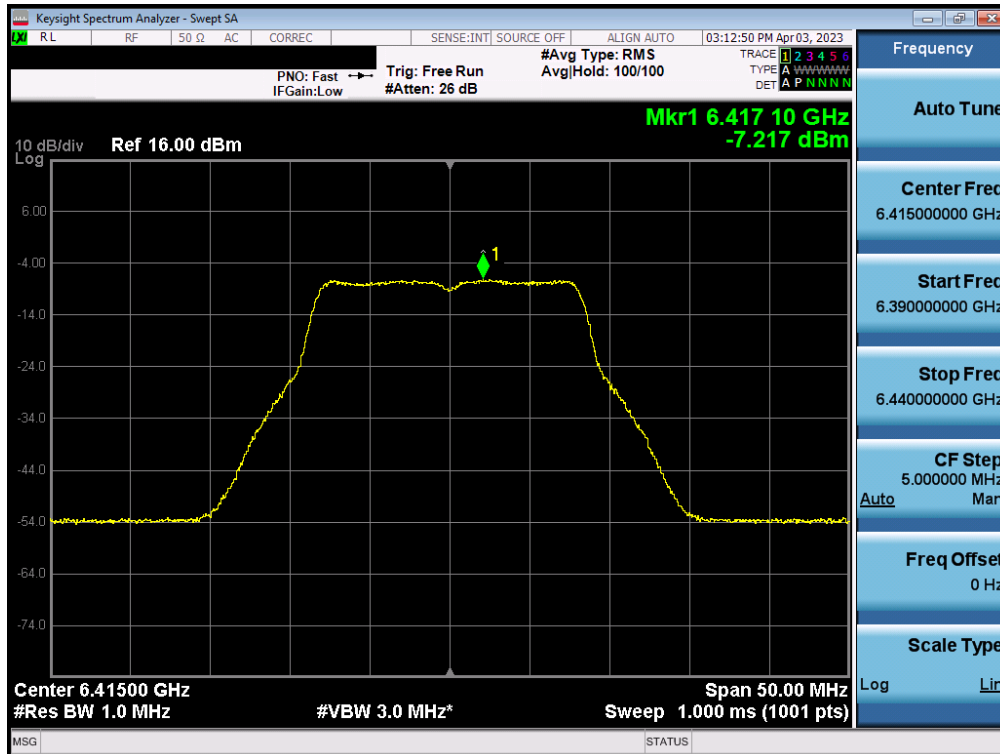


Plot 7-105. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 5) – Ch. 1)

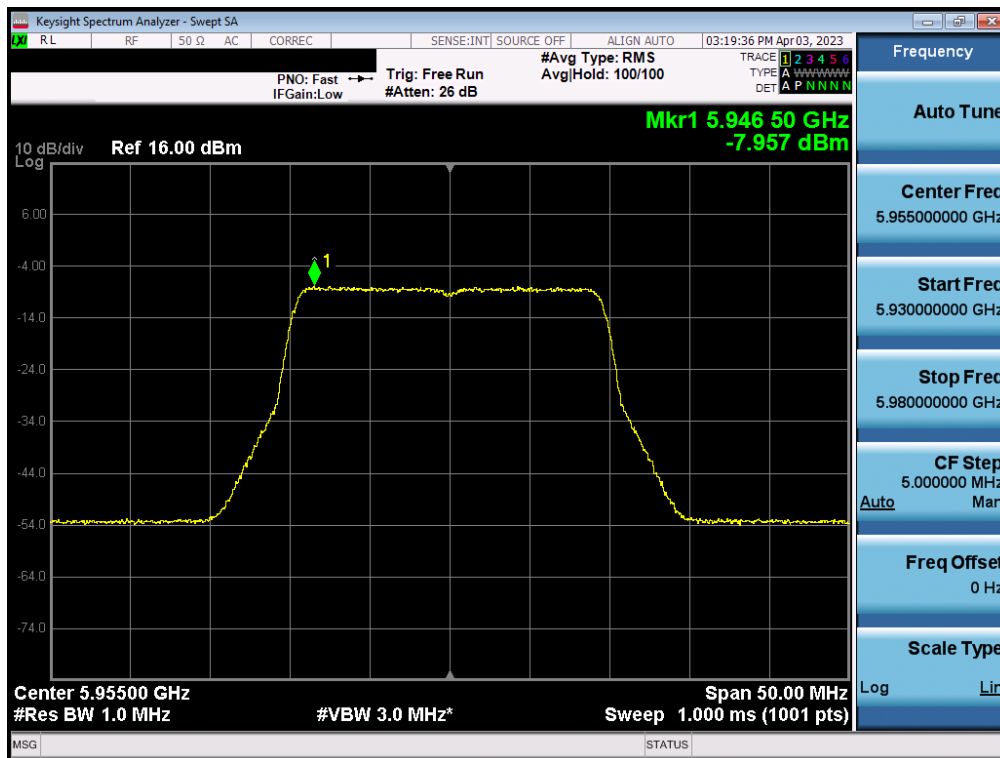


Plot 7-106. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 5) – Ch. 45)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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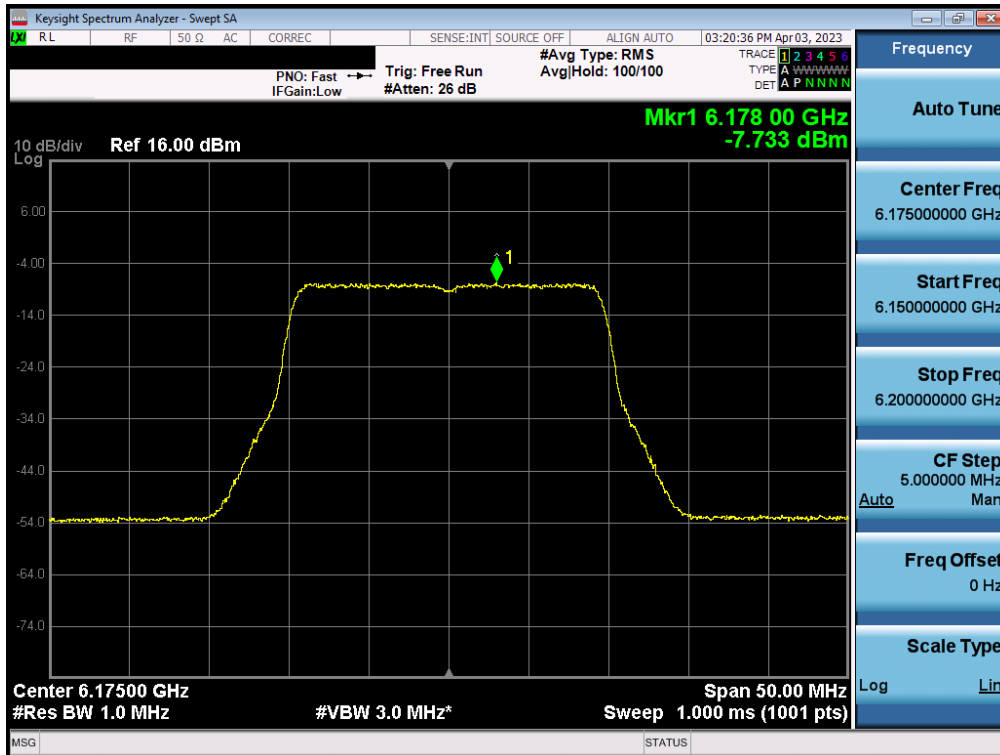


Plot 7-107. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 5) – Ch. 93)

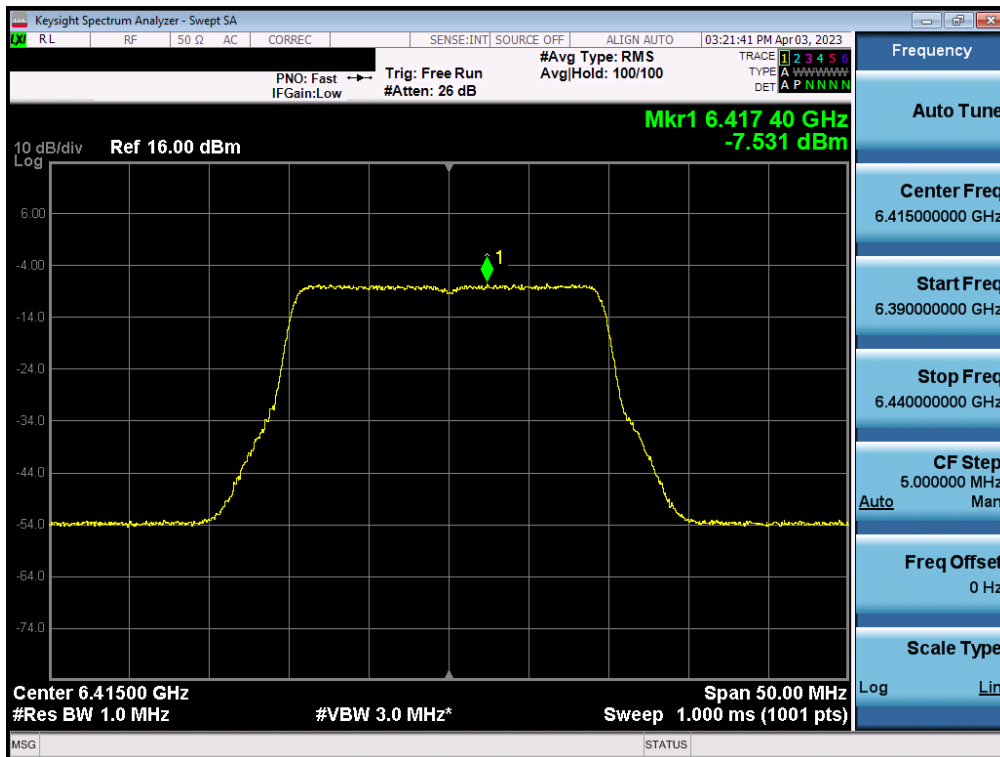


Plot 7-108. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 5) – Ch. 1)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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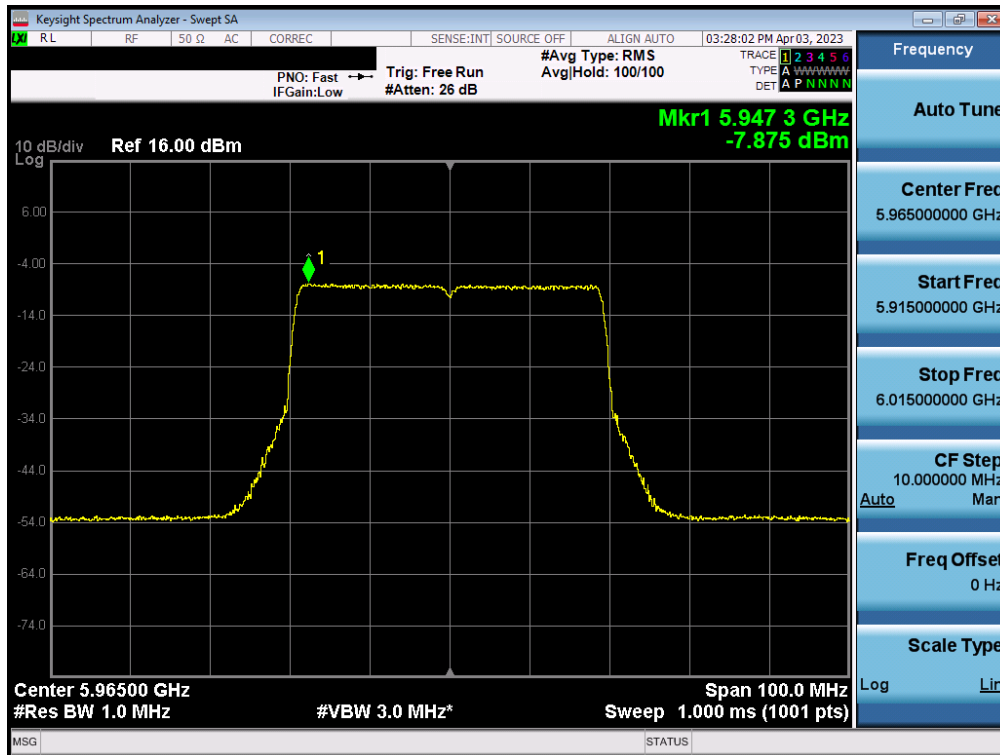


Plot 7-109. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 5) – Ch. 45)

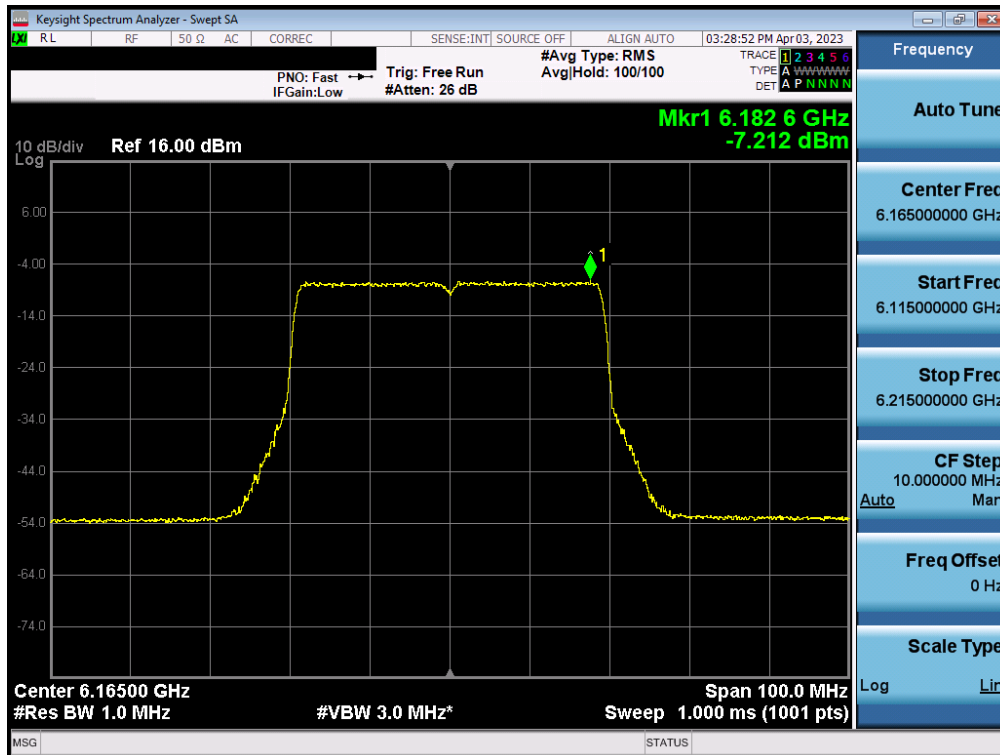


Plot 7-110. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 5) – Ch. 93)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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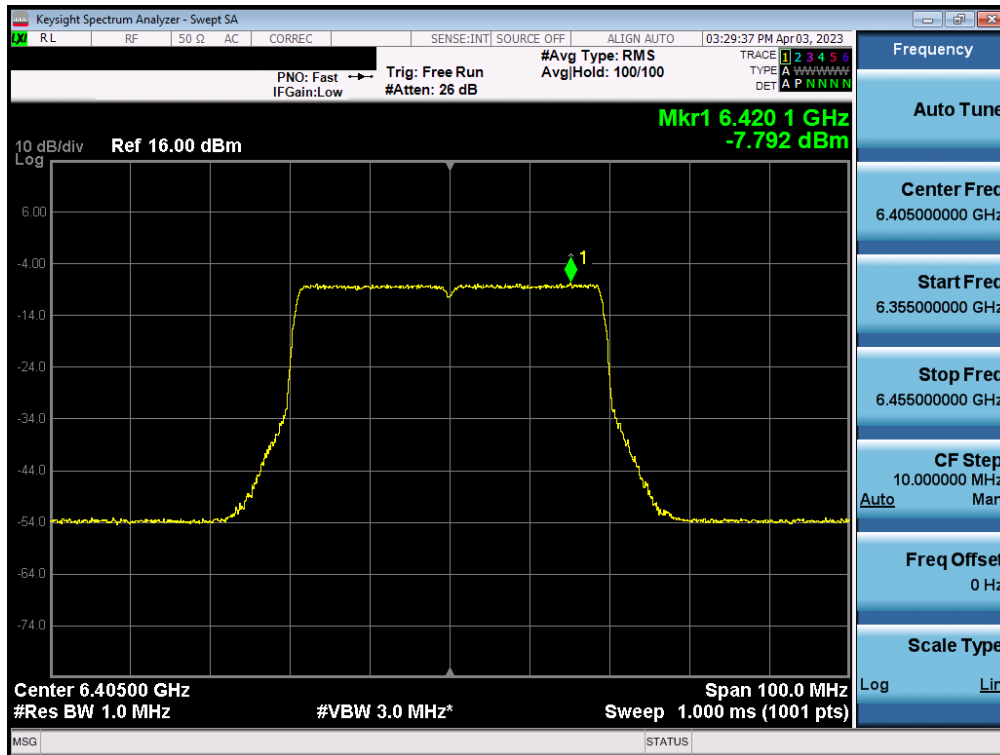
Plot 7-111. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 5) – Ch. 3)



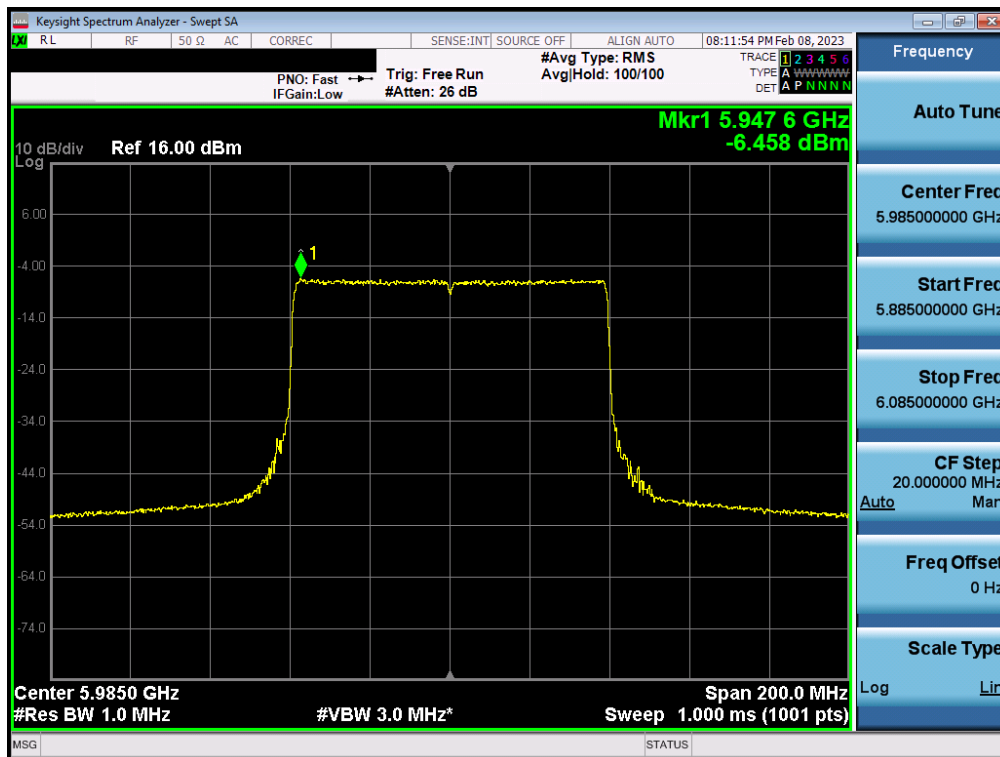
Plot 7-112. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 5) – Ch. 43)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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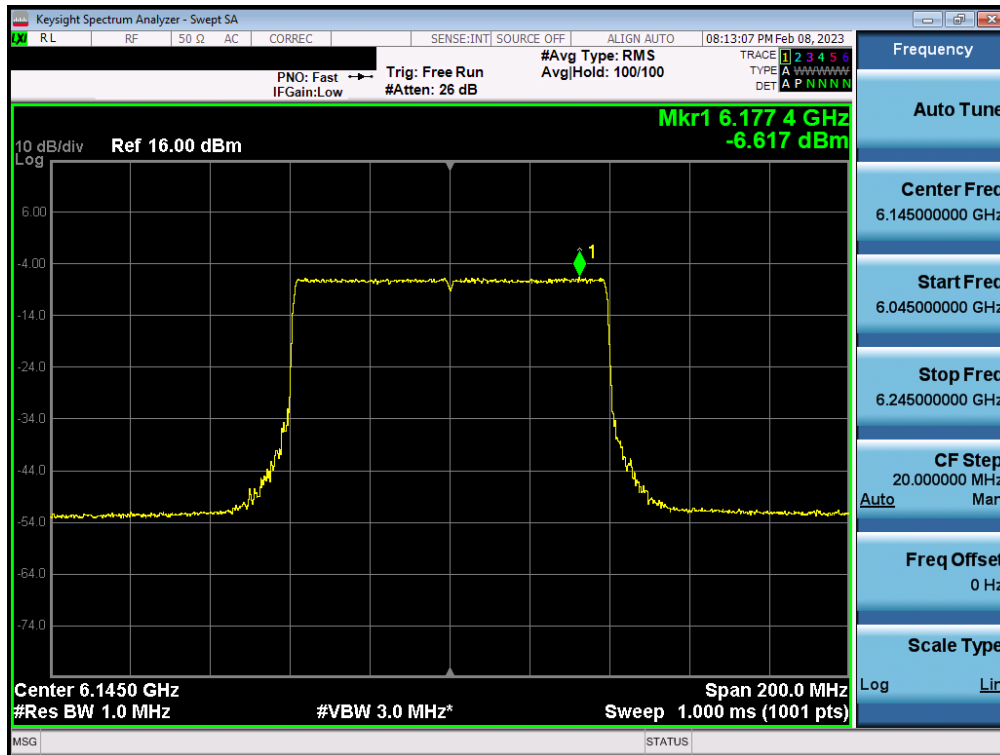


Plot 7-113. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 5) – Ch. 91)

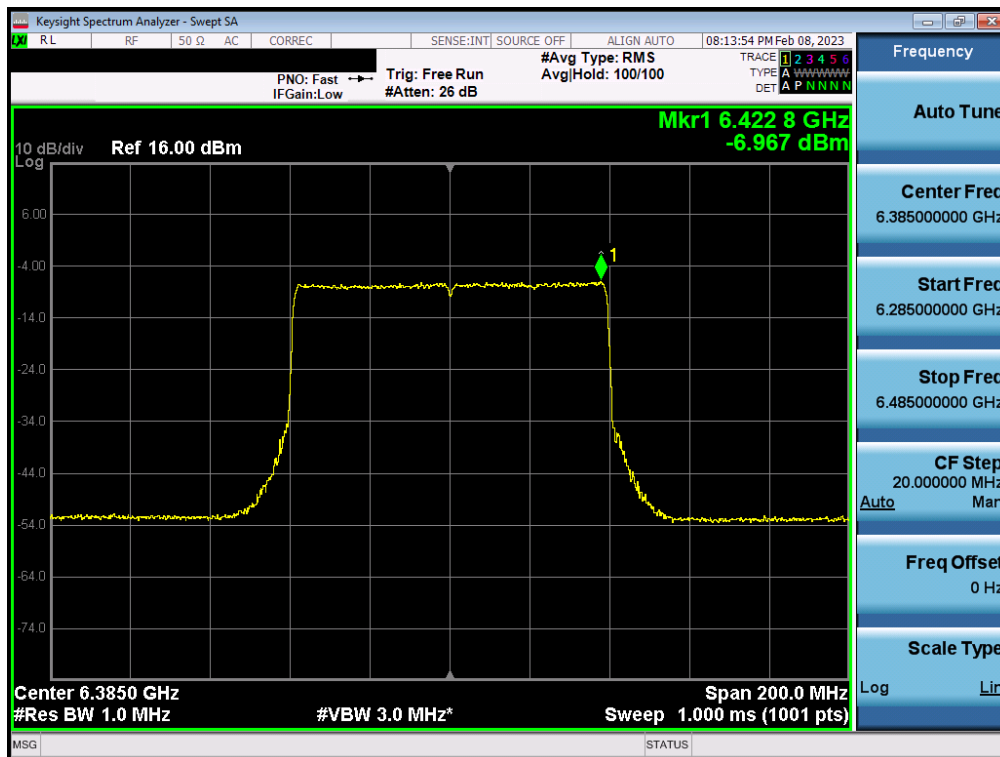


Plot 7-114. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 5) – Ch. 7)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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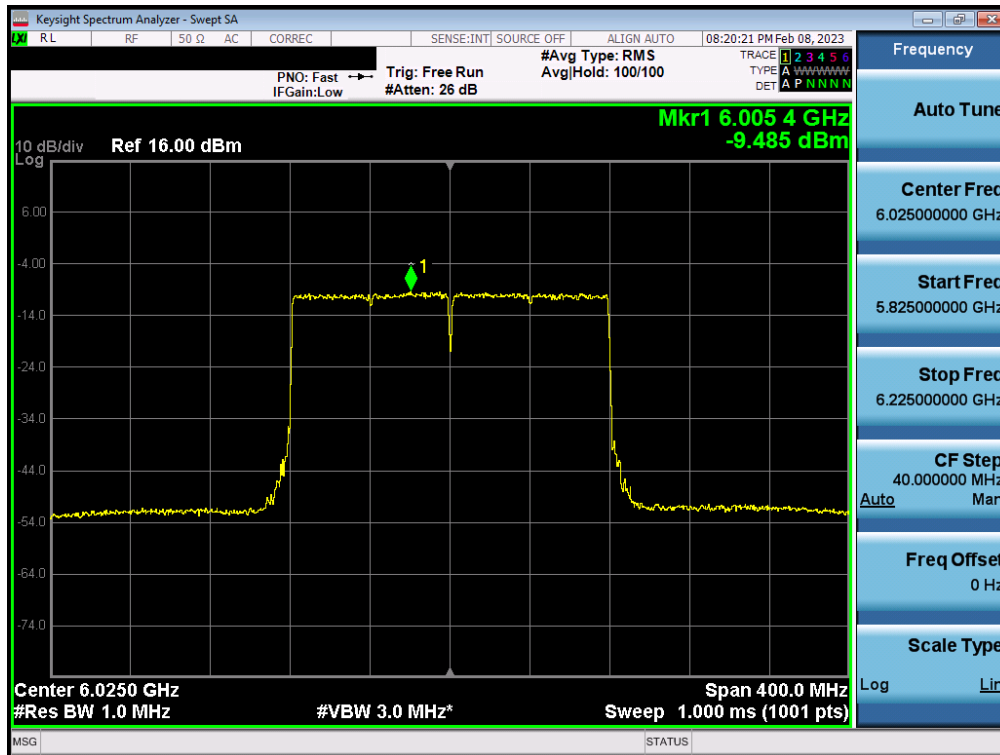


Plot 7-115. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 5) – Ch. 39)

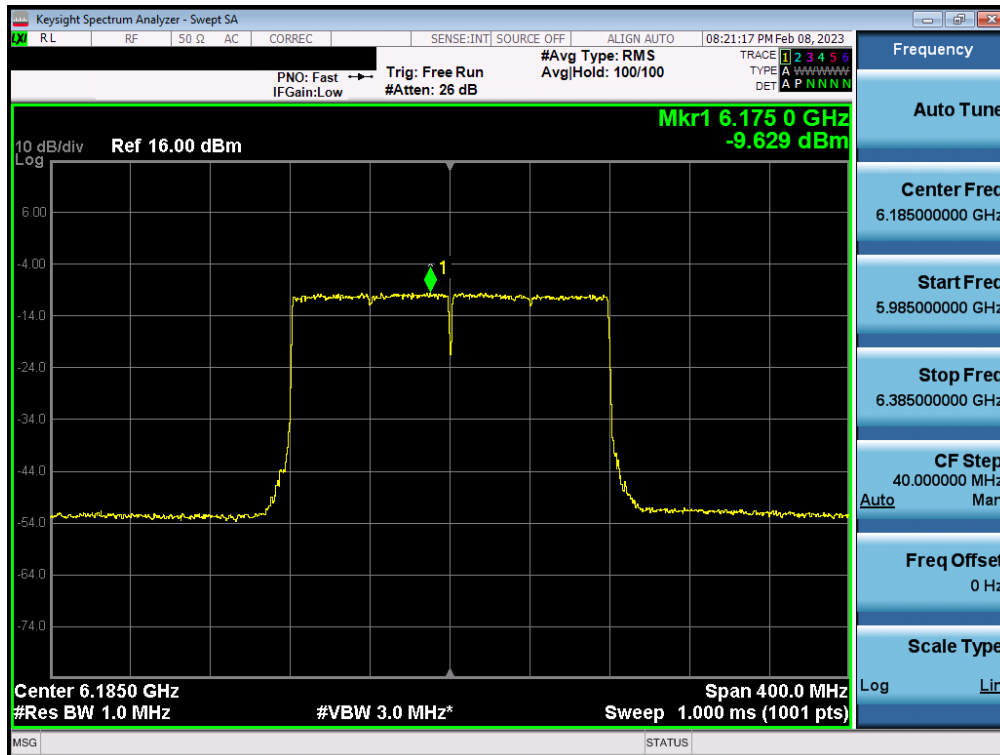


Plot 7-116. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 5) – Ch. 87)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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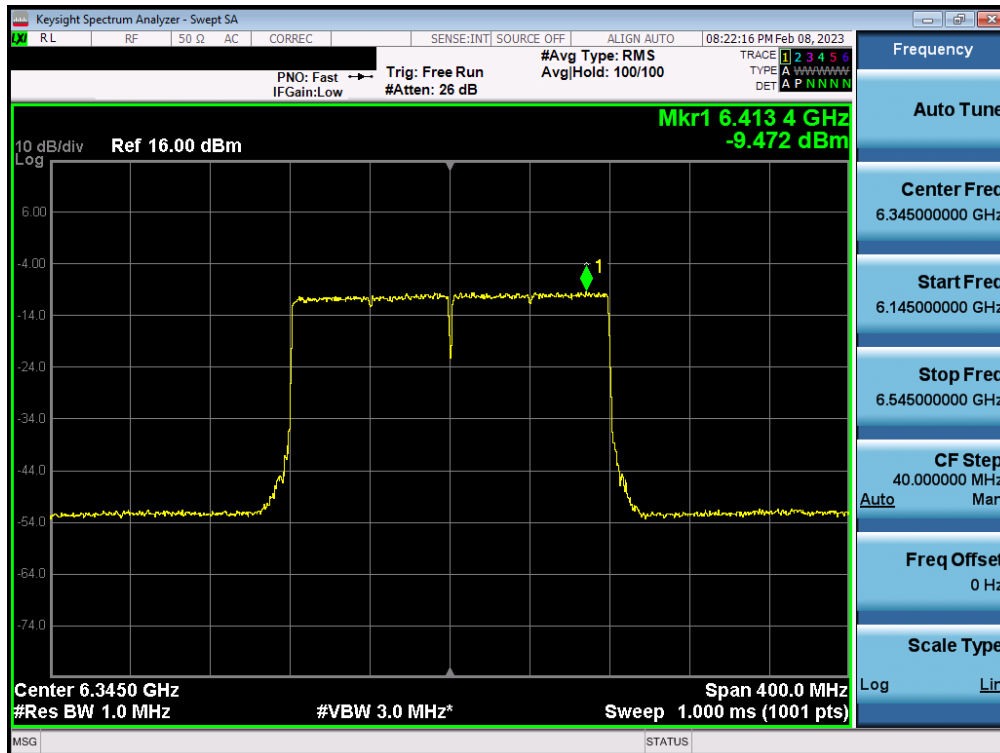


Plot 7-117. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 5) – Ch. 15)



Plot 7-118. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 5) – Ch. 47)

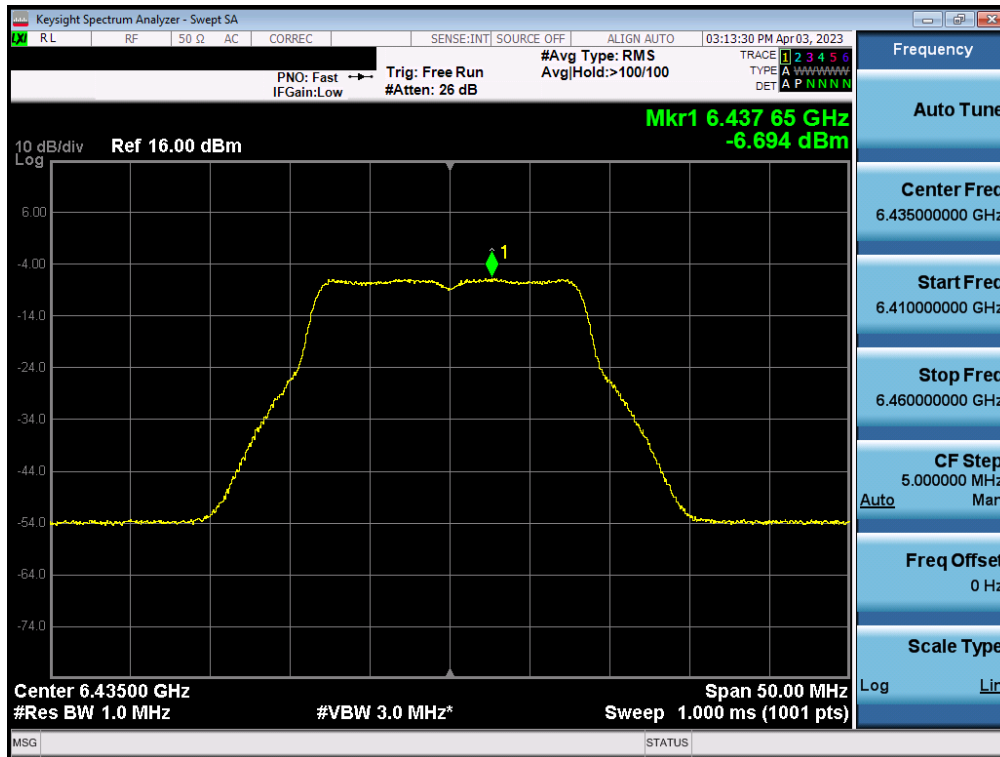
FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 83 of 237



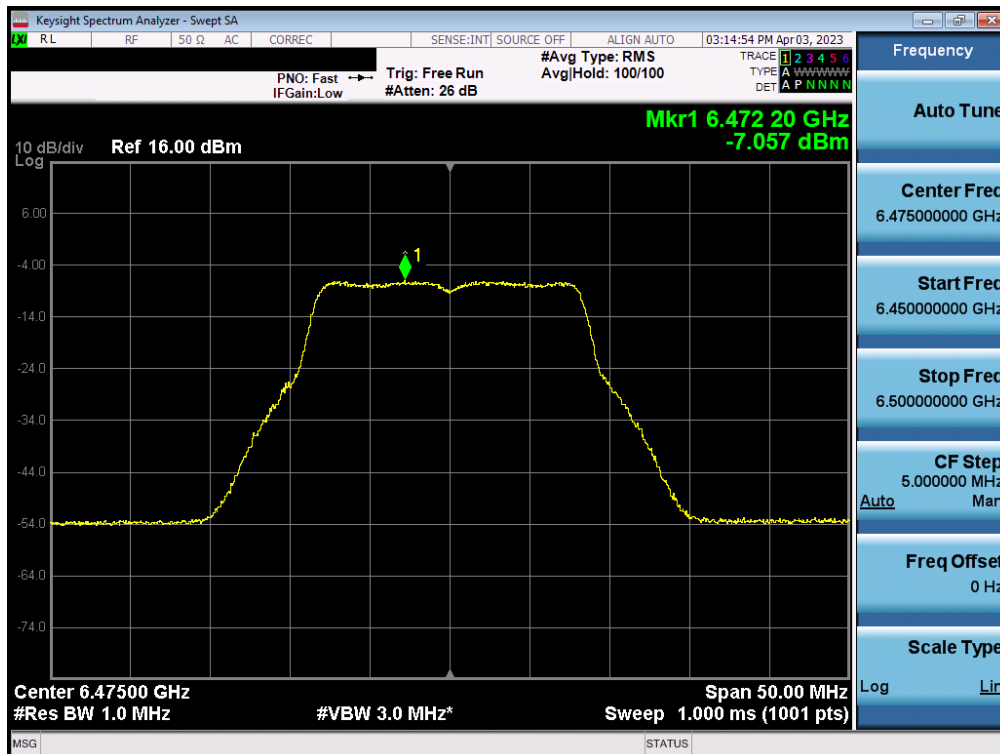
Plot 7-119. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 5) – Ch. 79)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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### 7.4.2 MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 6)

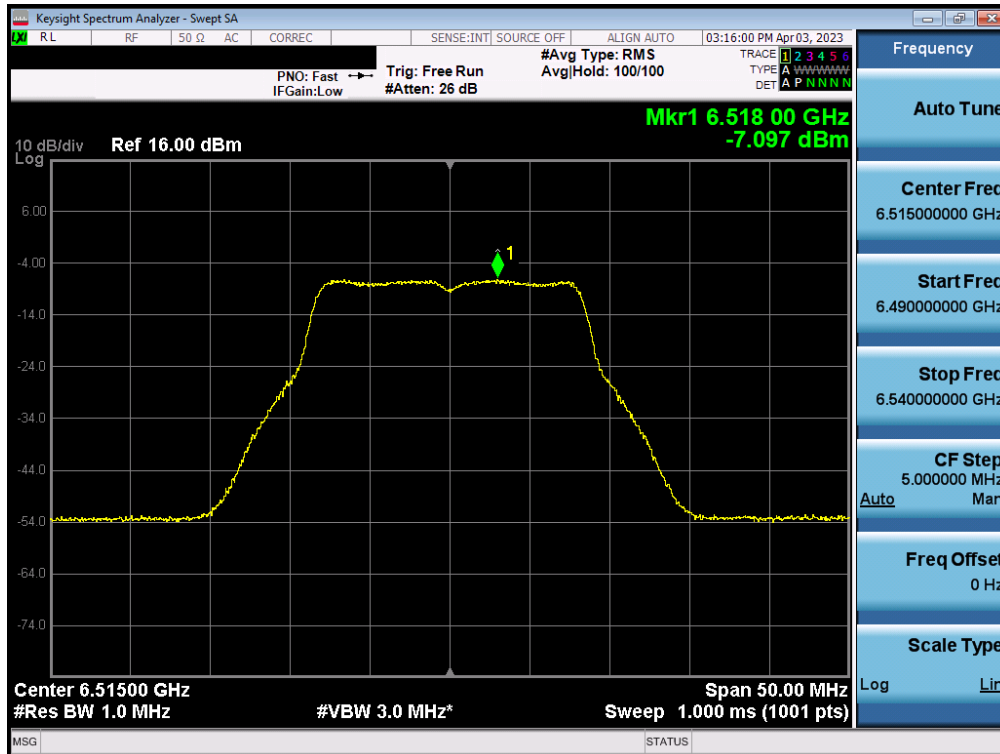


Plot 7-120. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 6) – Ch. 97)

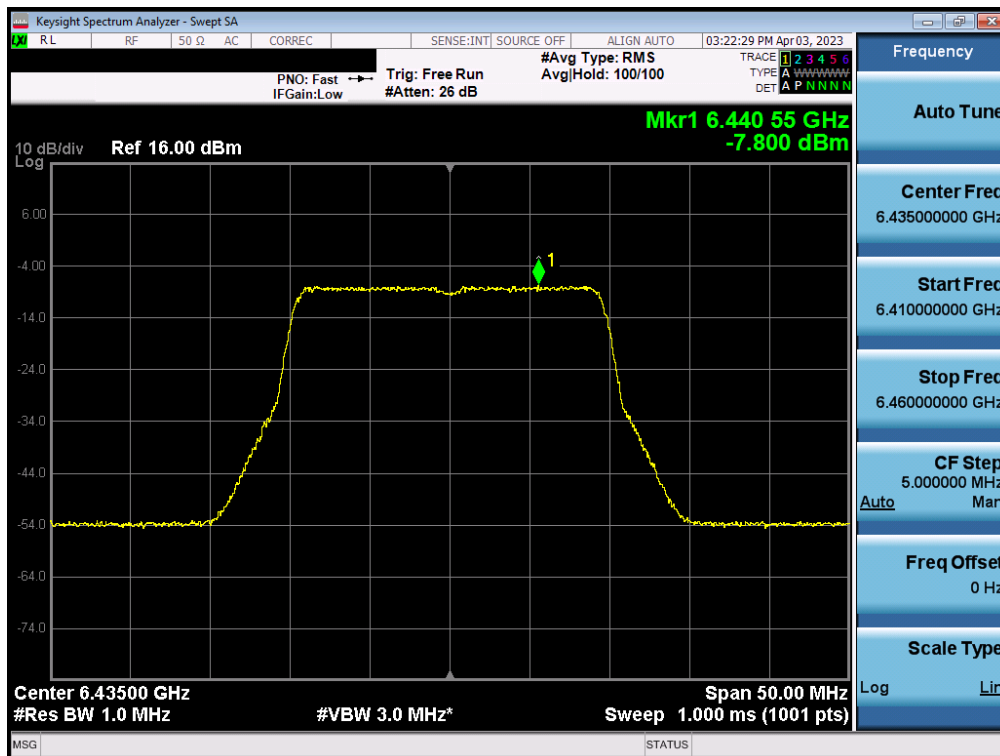


Plot 7-121. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 6) – Ch. 105)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 85 of 237

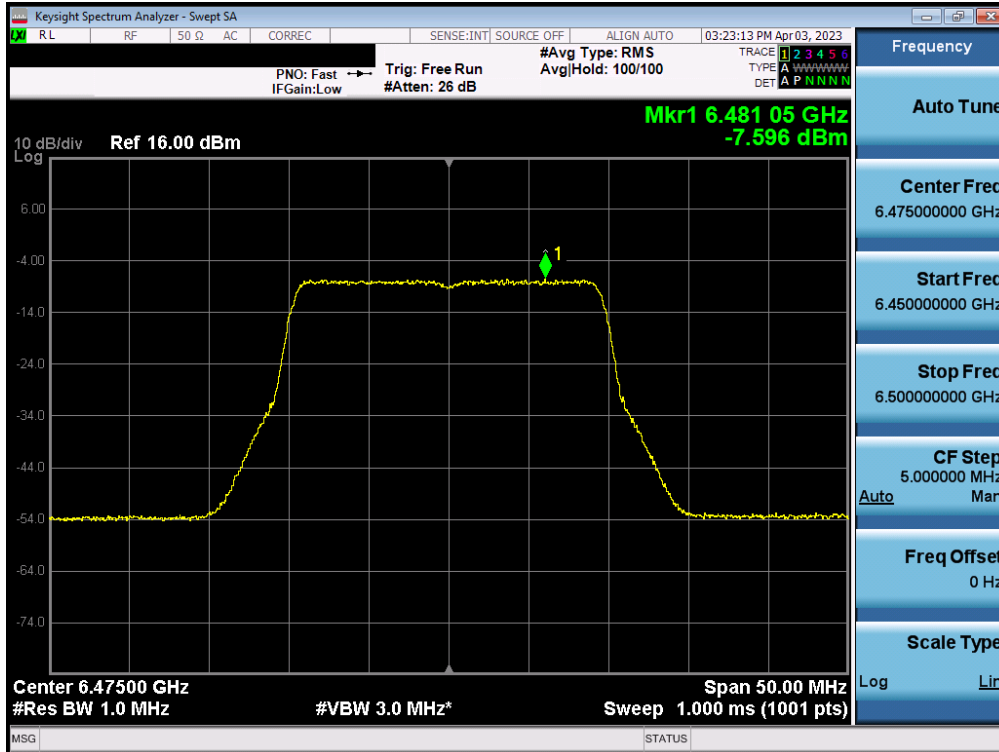


Plot 7-122. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 6) – Ch. 113)

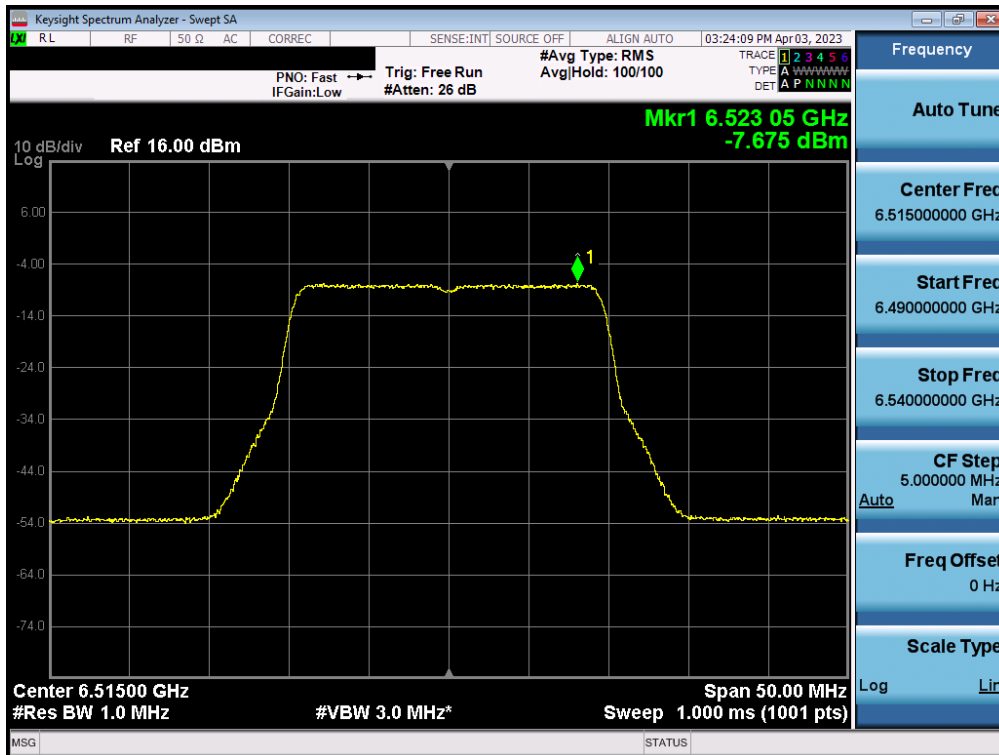


Plot 7-123. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 6) – Ch. 97)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 86 of 237

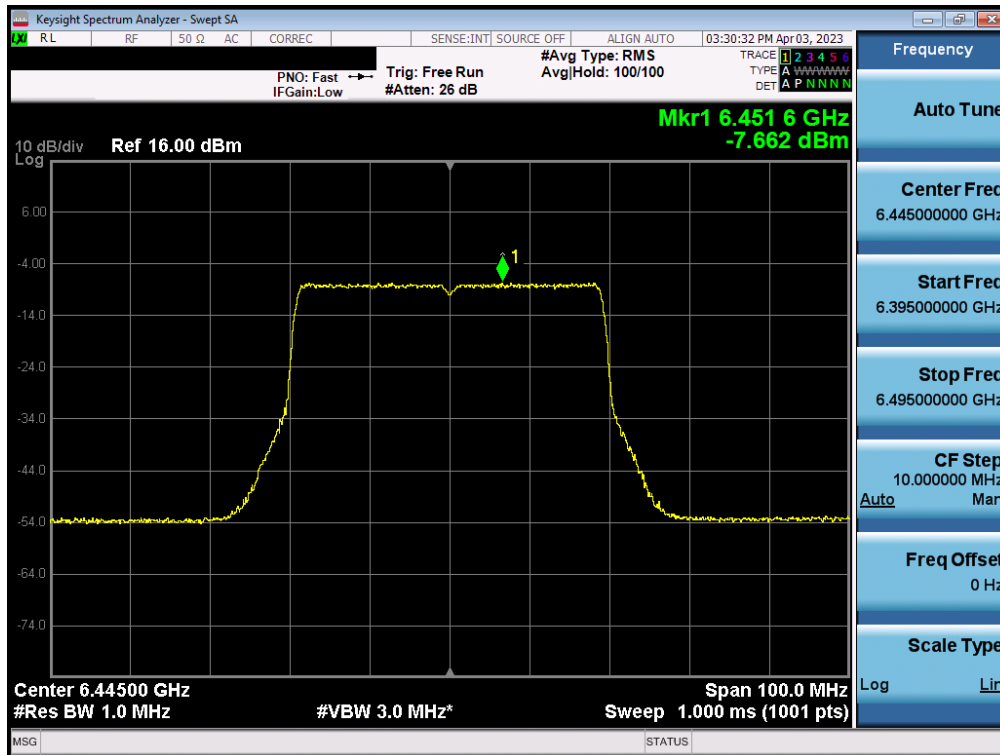


Plot 7-124. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 6) – Ch. 105)

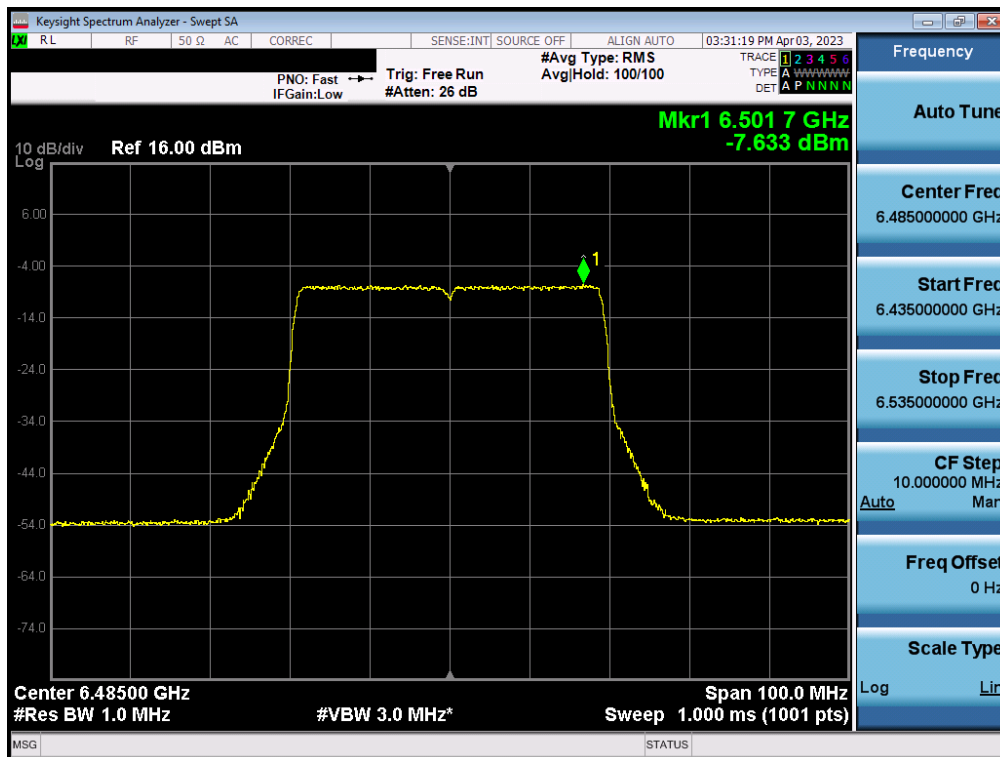


Plot 7-125. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 6) – Ch. 113)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 87 of 237



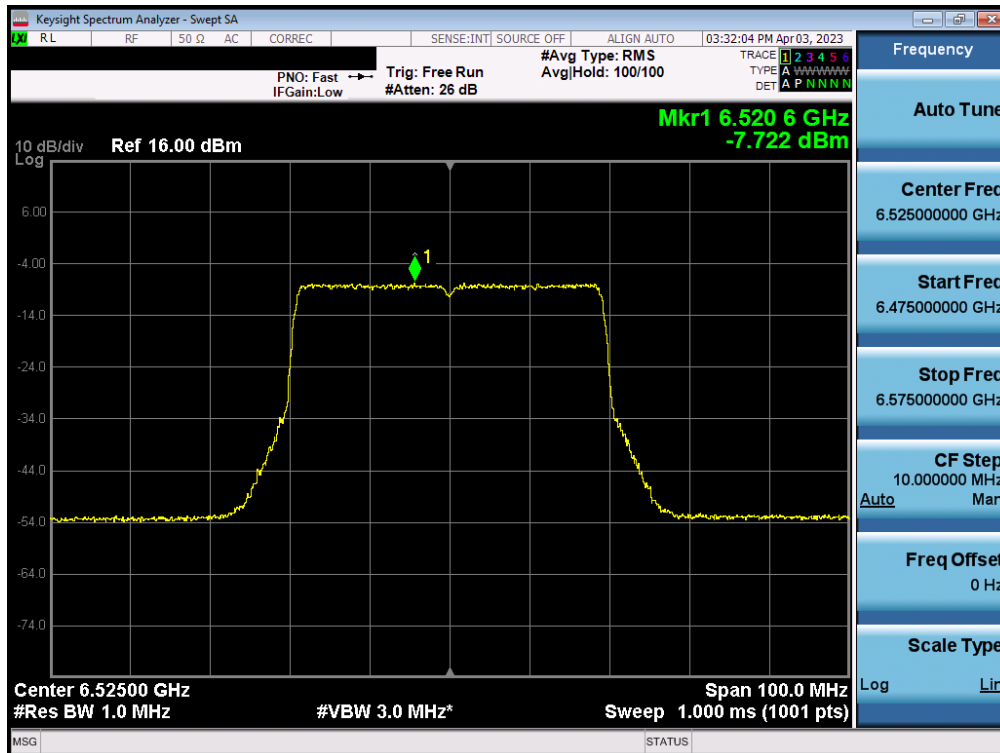
Plot 7-126. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 6) – Ch. 99)



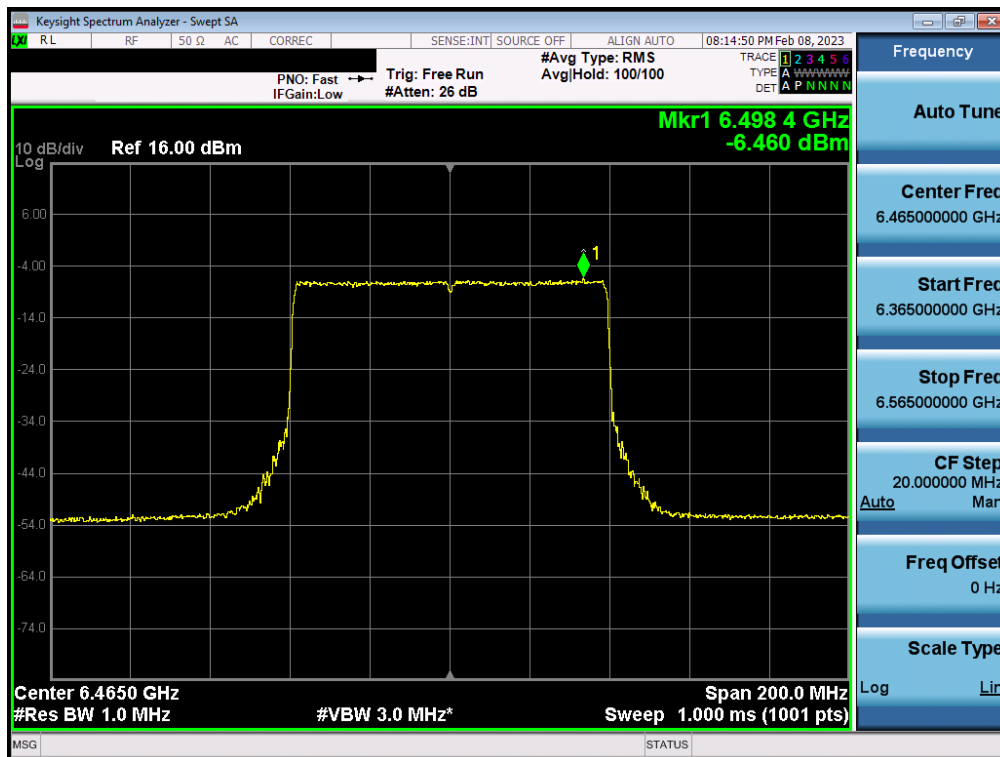
Plot 7-127. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 6) – Ch. 107)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 88 of 237



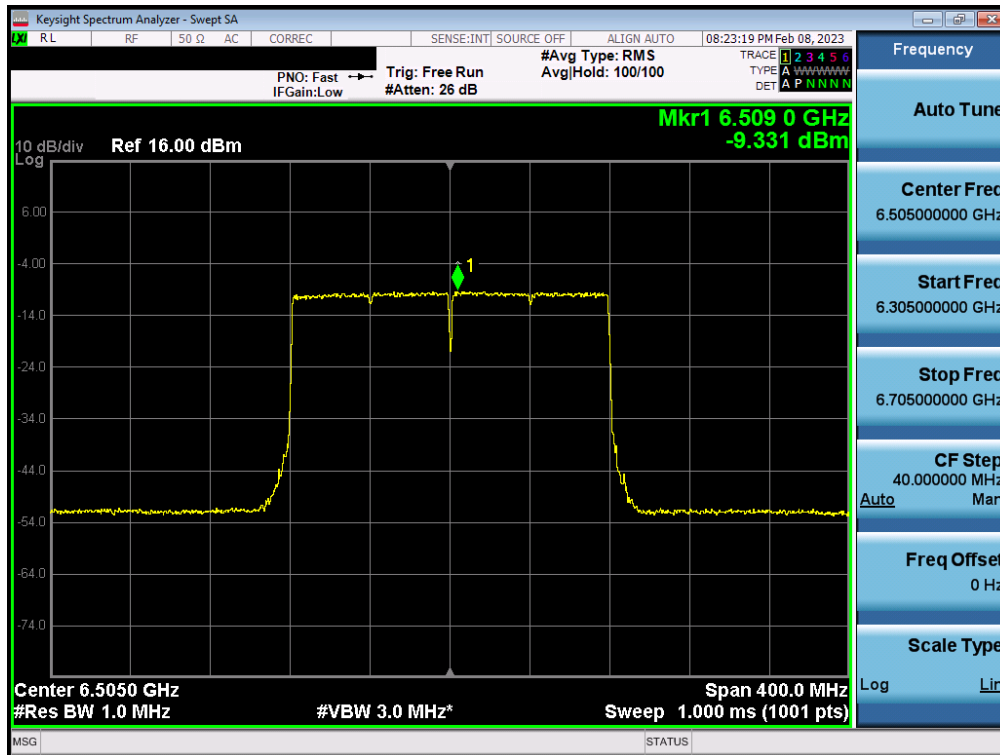


Plot 7-128. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 6) – Ch. 115)



Plot 7-129. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 6) – Ch. 103)

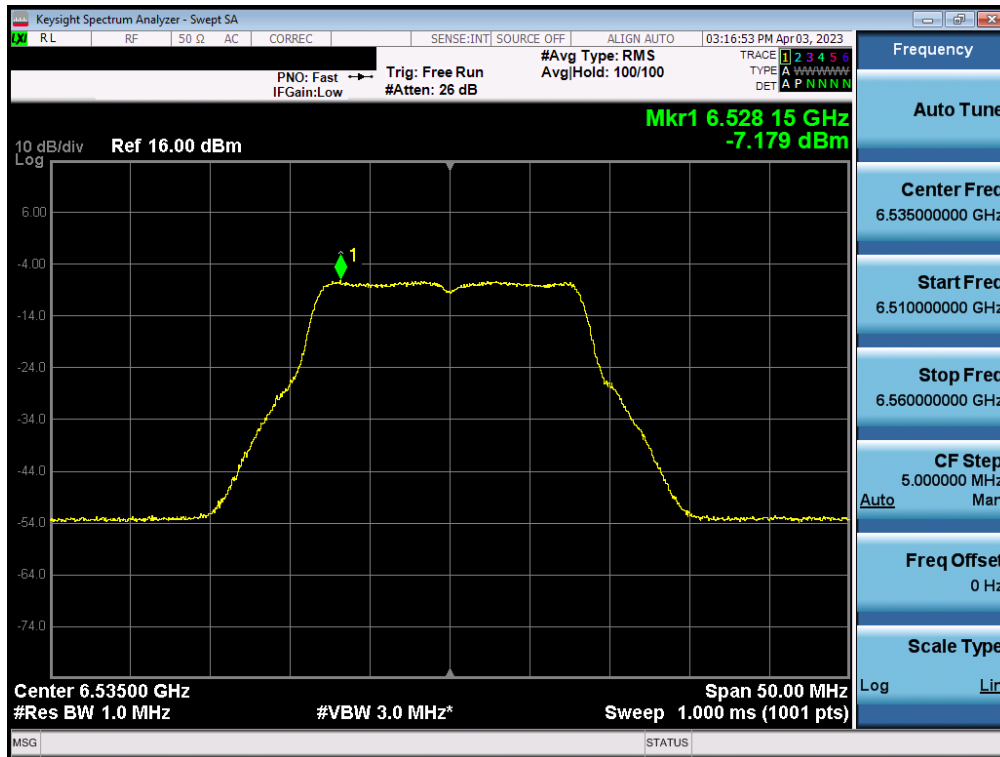
FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 89 of 237



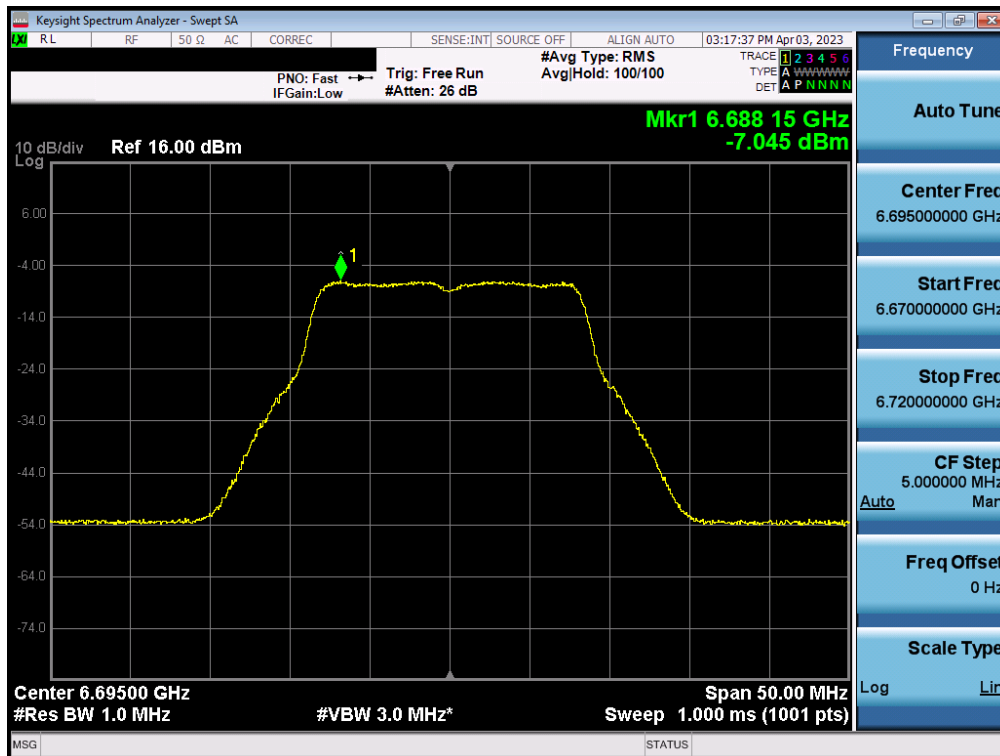
Plot 7-130. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 6) – Ch. 111)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 90 of 237

### 7.4.3 MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 7)

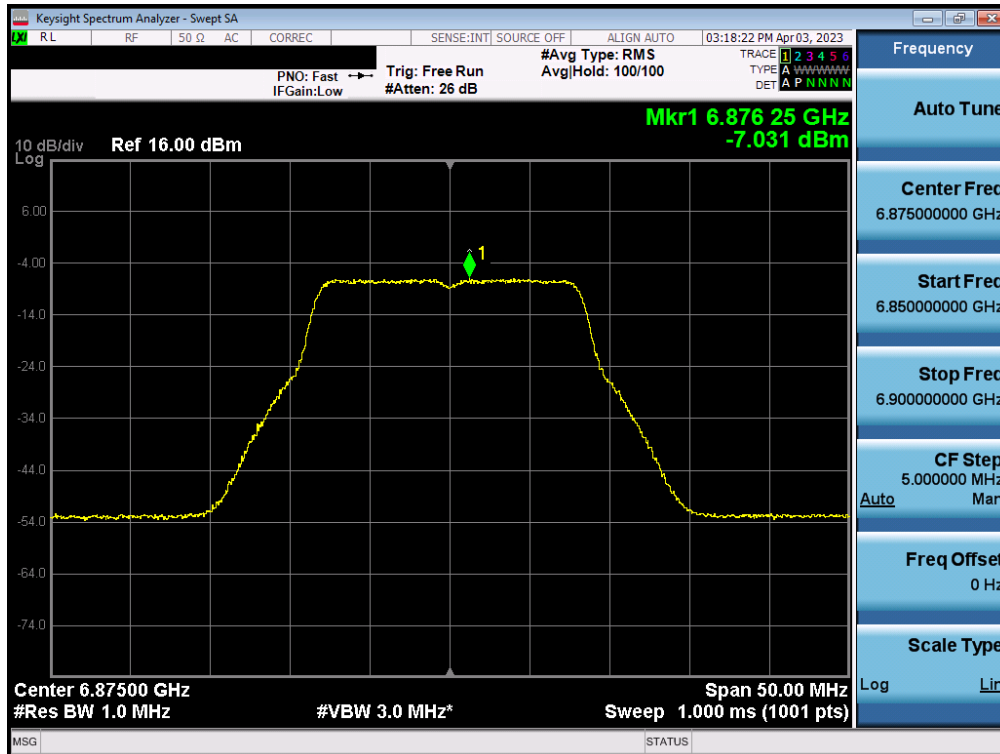


Plot 7-131. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 7) – Ch. 117)

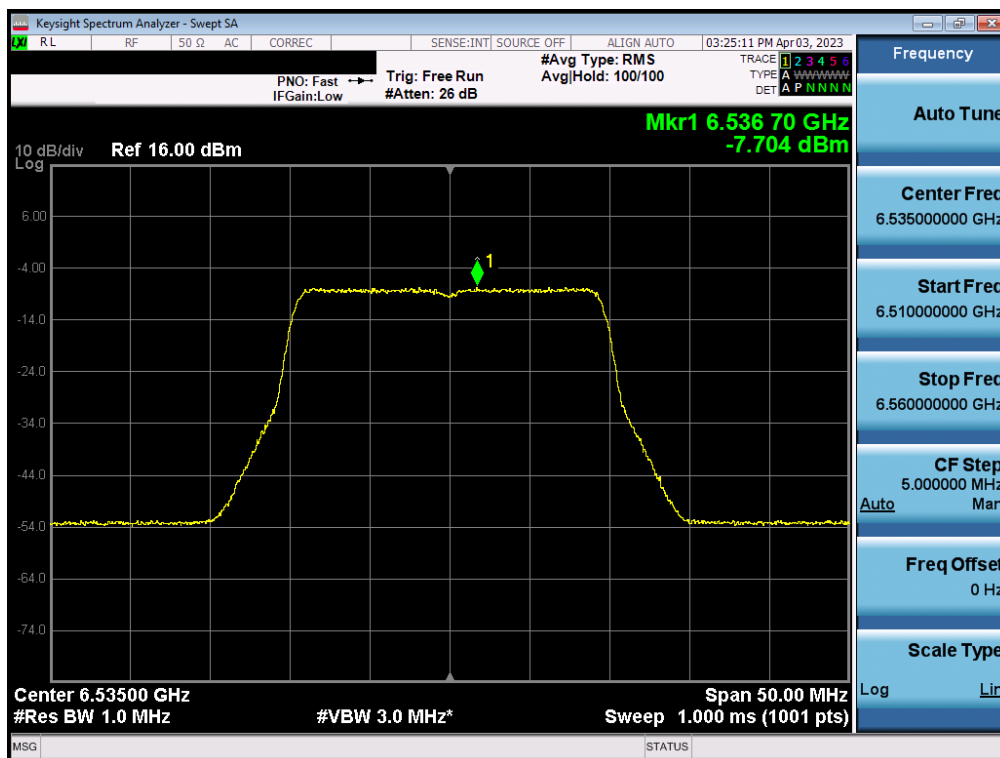


Plot 7-132. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 7) – Ch. 149)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 91 of 237

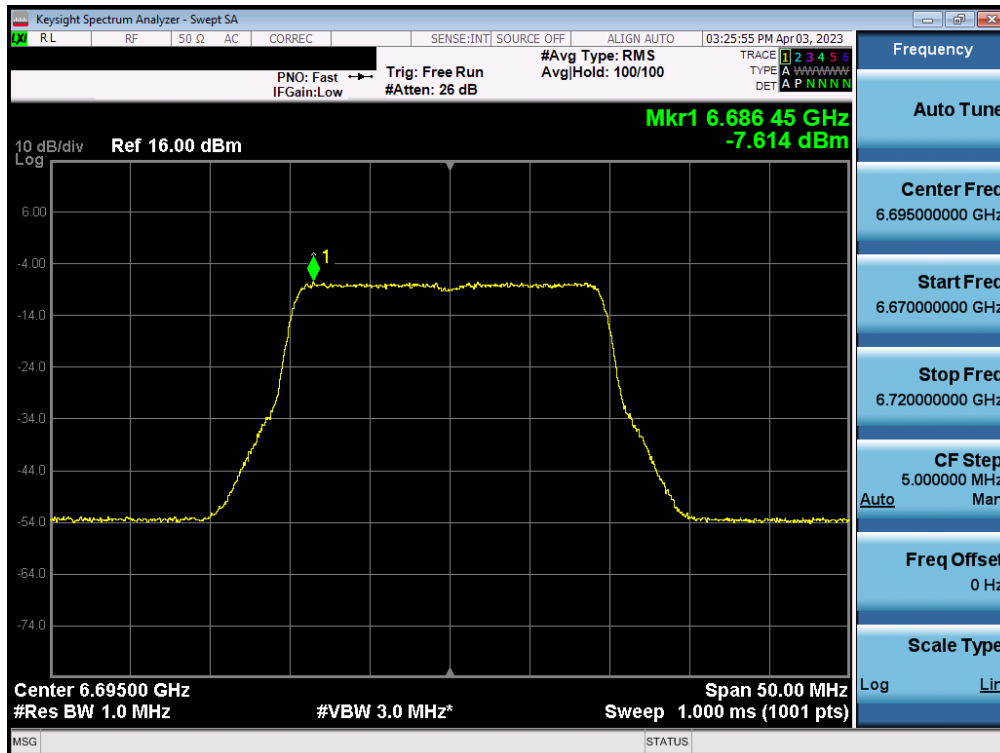


Plot 7-133. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 7) – Ch. 185)

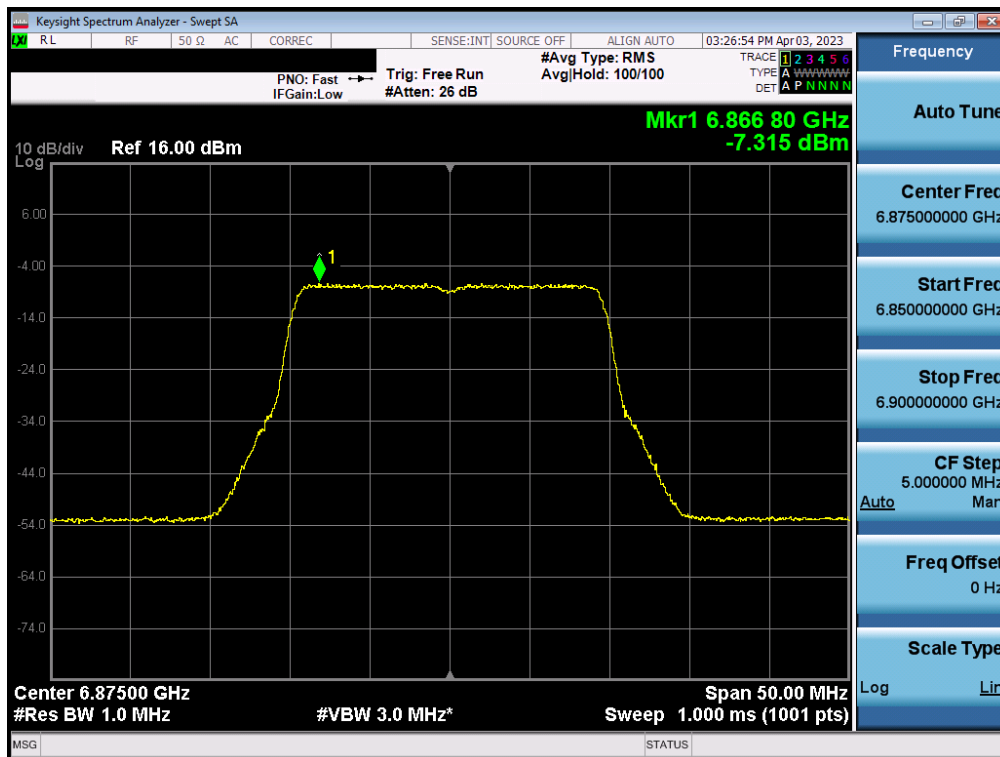


Plot 7-134. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 7) – Ch. 117)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 92 of 237

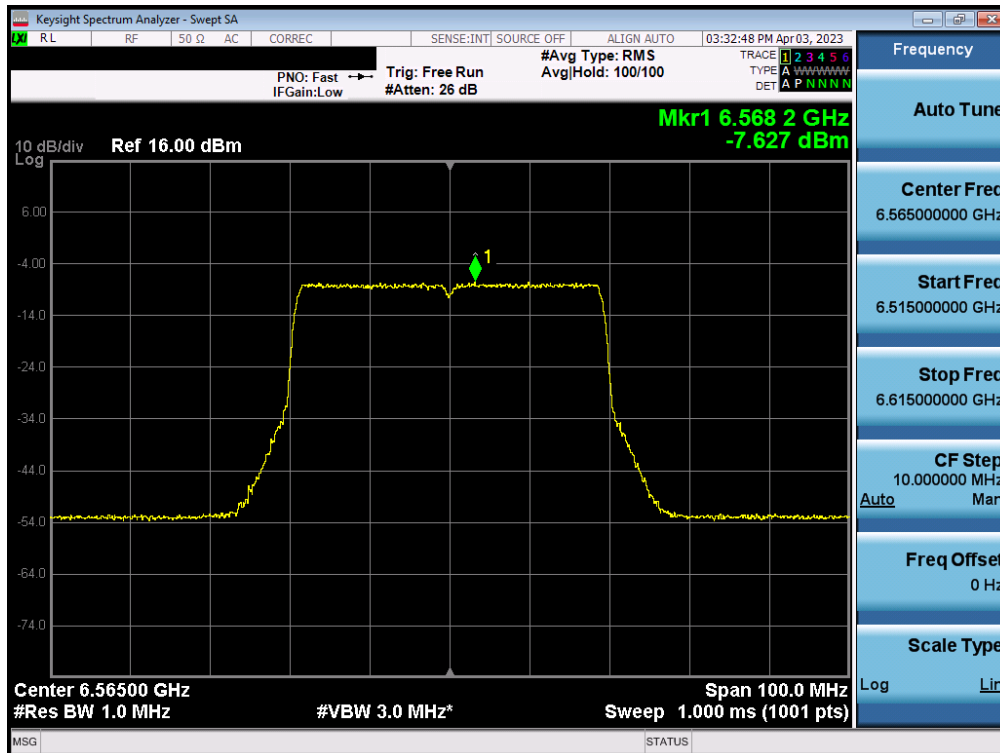


Plot 7-135. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 7) – Ch. 149)

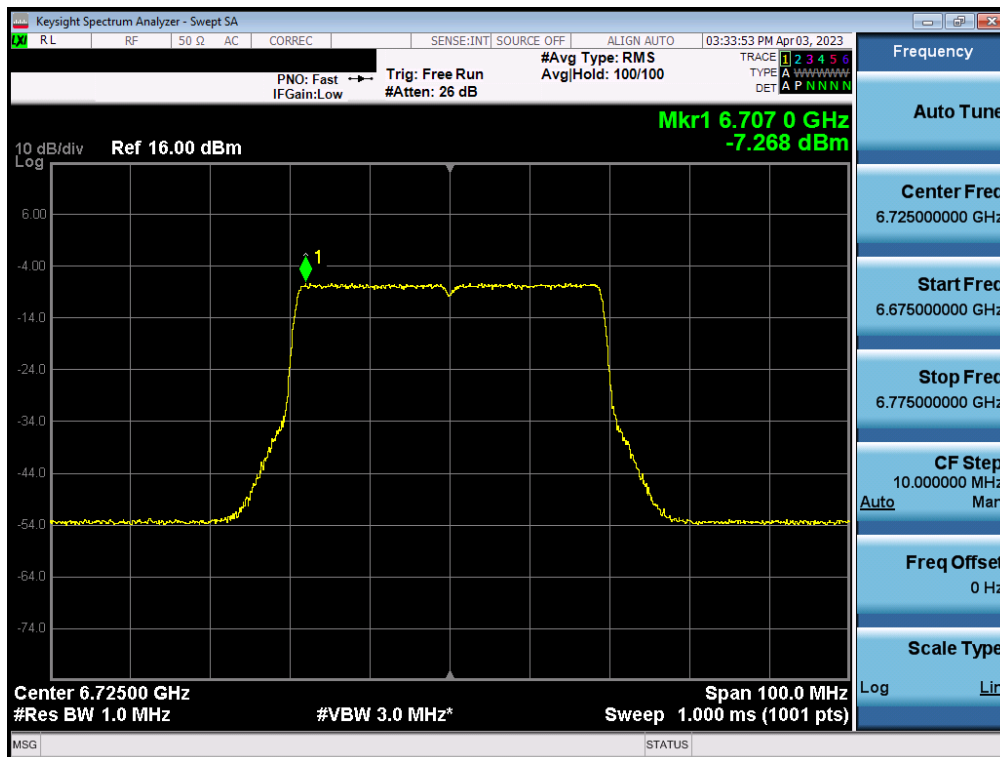


Plot 7-136. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 7) – Ch. 185)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 93 of 237

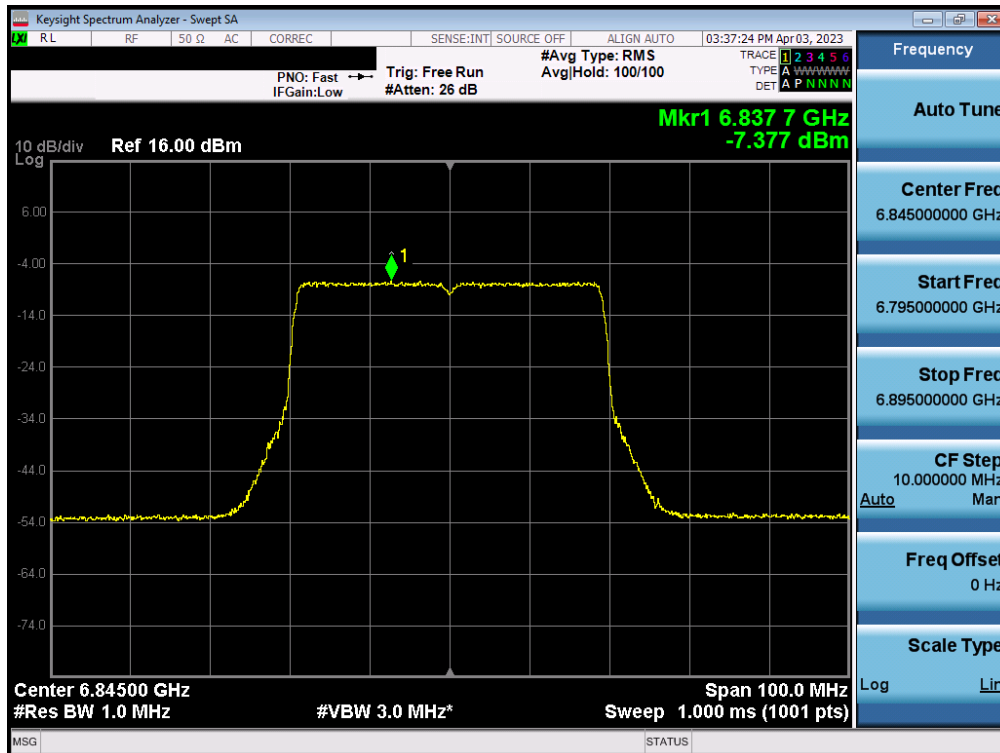


Plot 7-137. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 7) – Ch. 123)

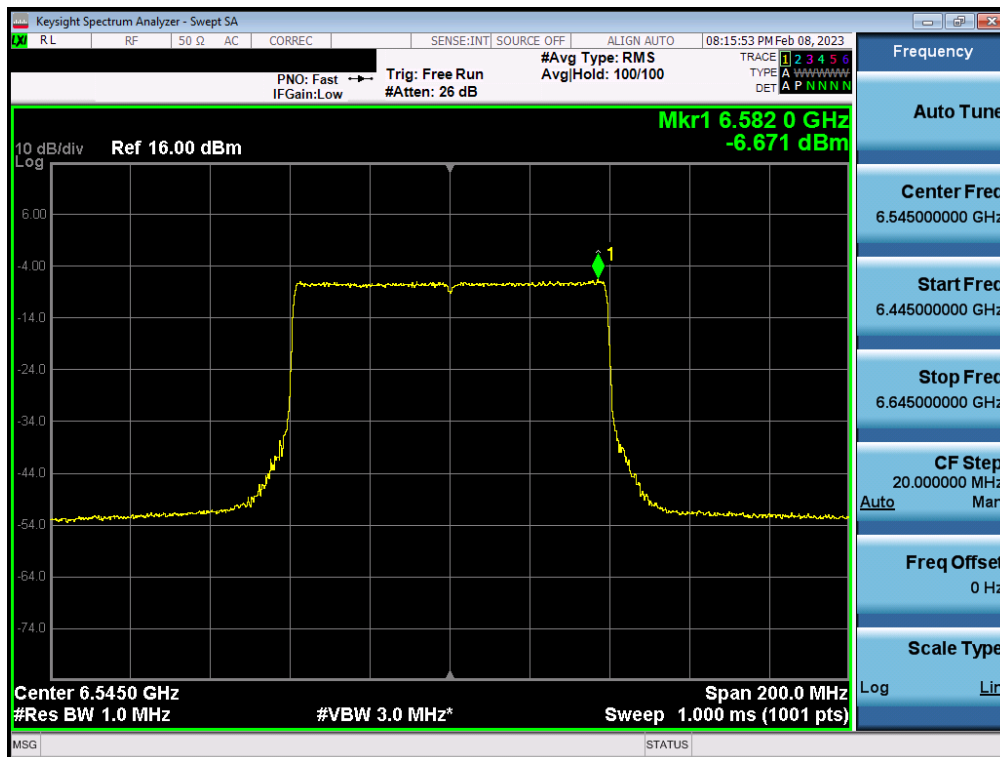


Plot 7-138. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 7) – Ch. 155)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 94 of 237

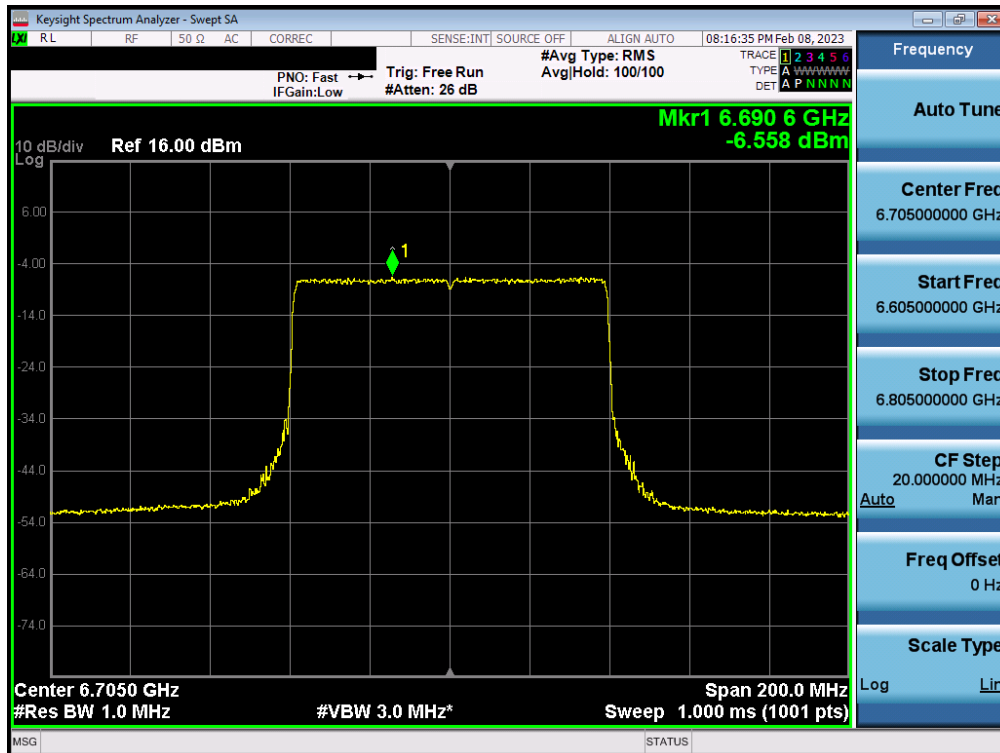


Plot 7-139. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 7) – Ch. 179)

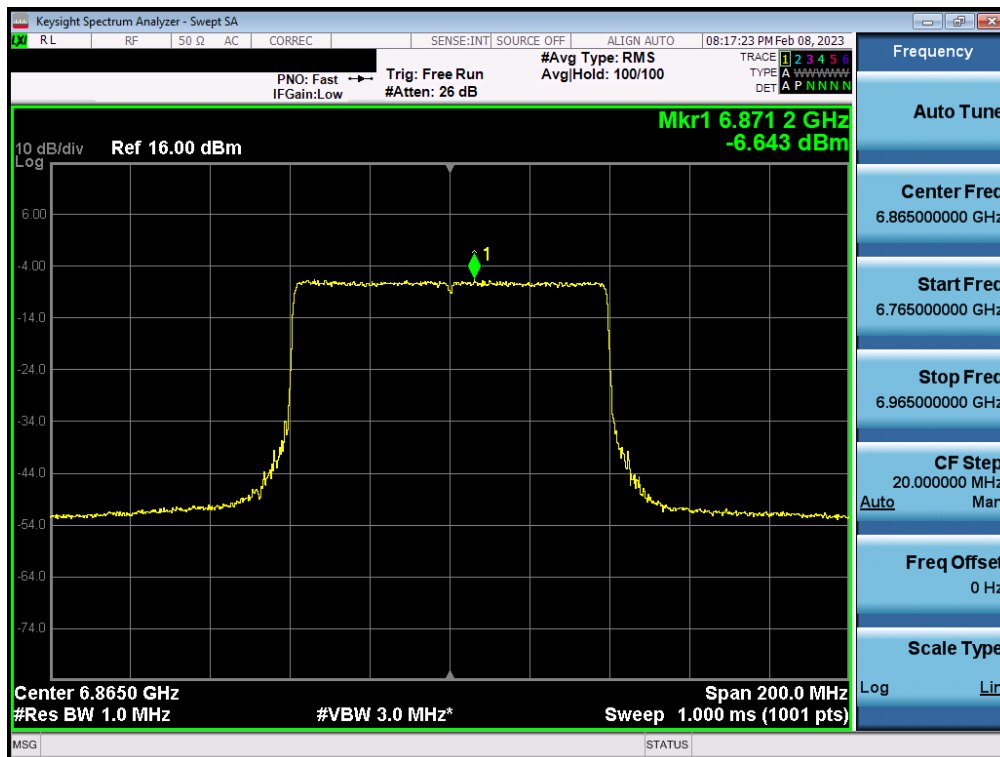


Plot 7-140. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 7) – Ch. 119)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 95 of 237



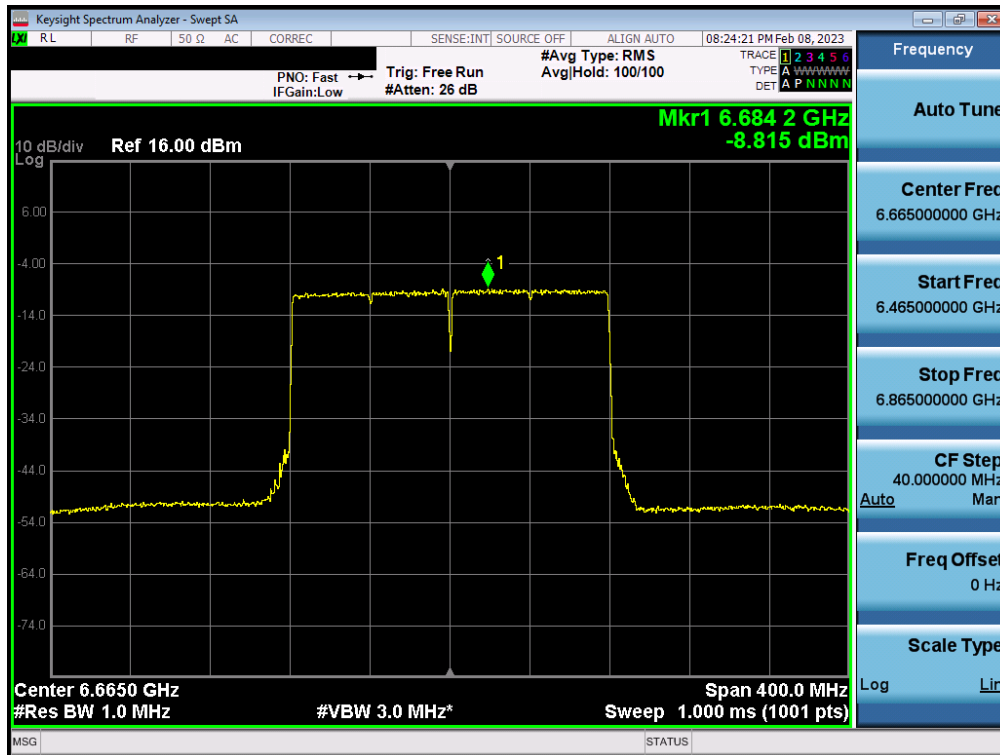
Plot 7-141. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 7) – Ch. 151)



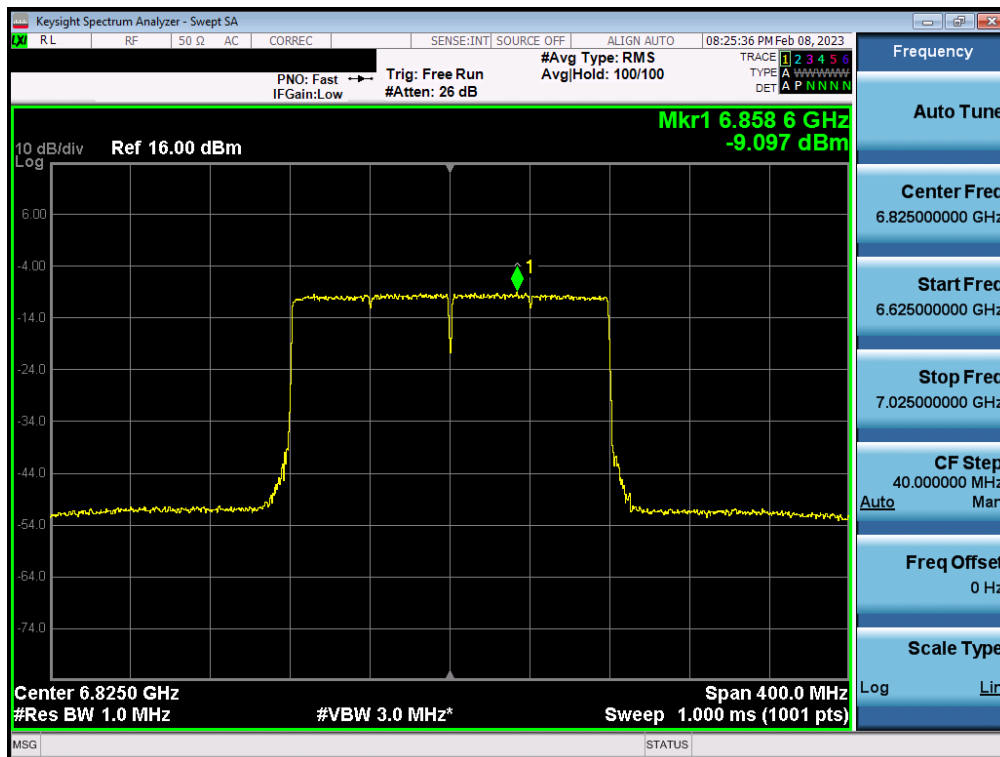
Plot 7-142. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 7) – Ch. 183)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 96 of 237





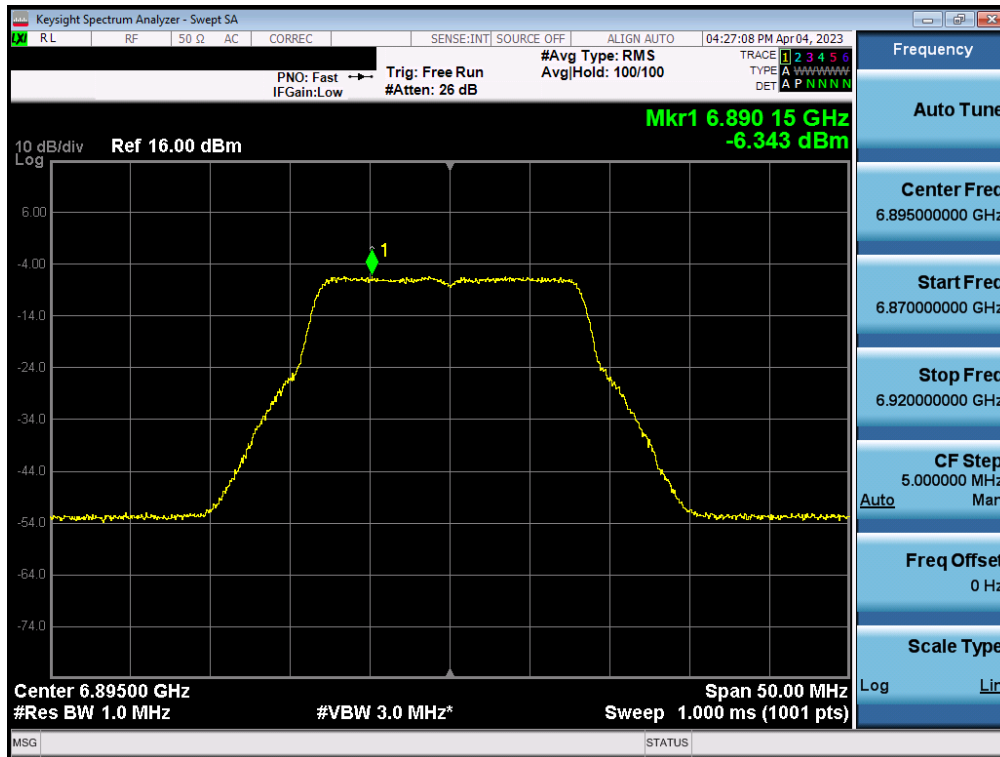
Plot 7-143. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 7) – Ch. 143)



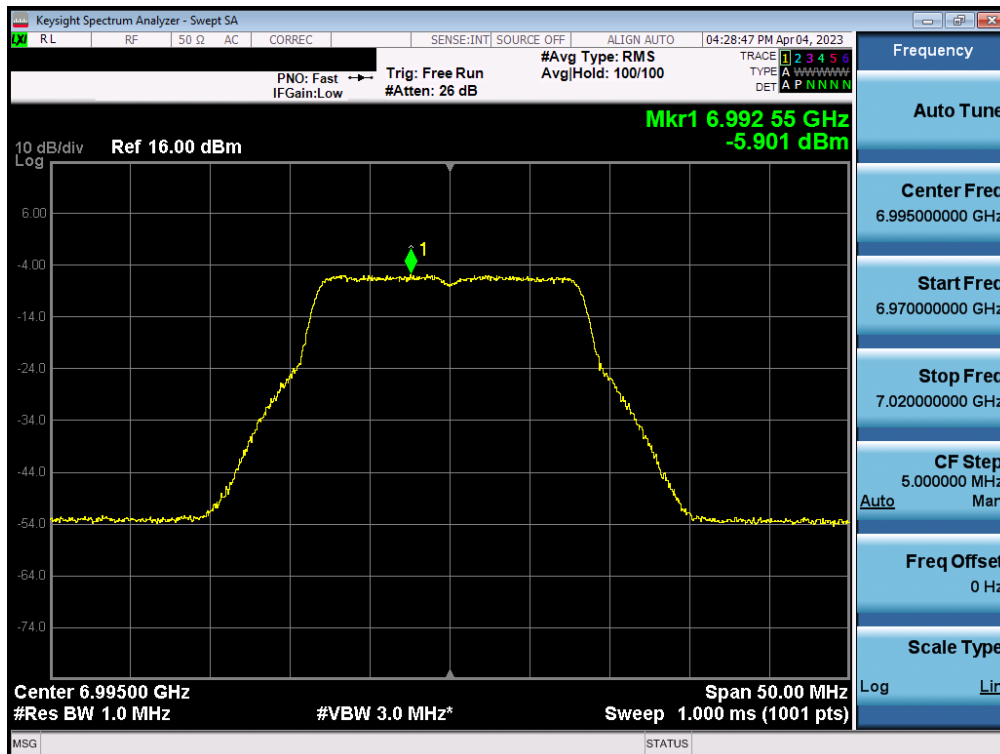
Plot 7-144. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 7) – Ch. 175)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 97 of 237

### 7.4.4 MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 8)

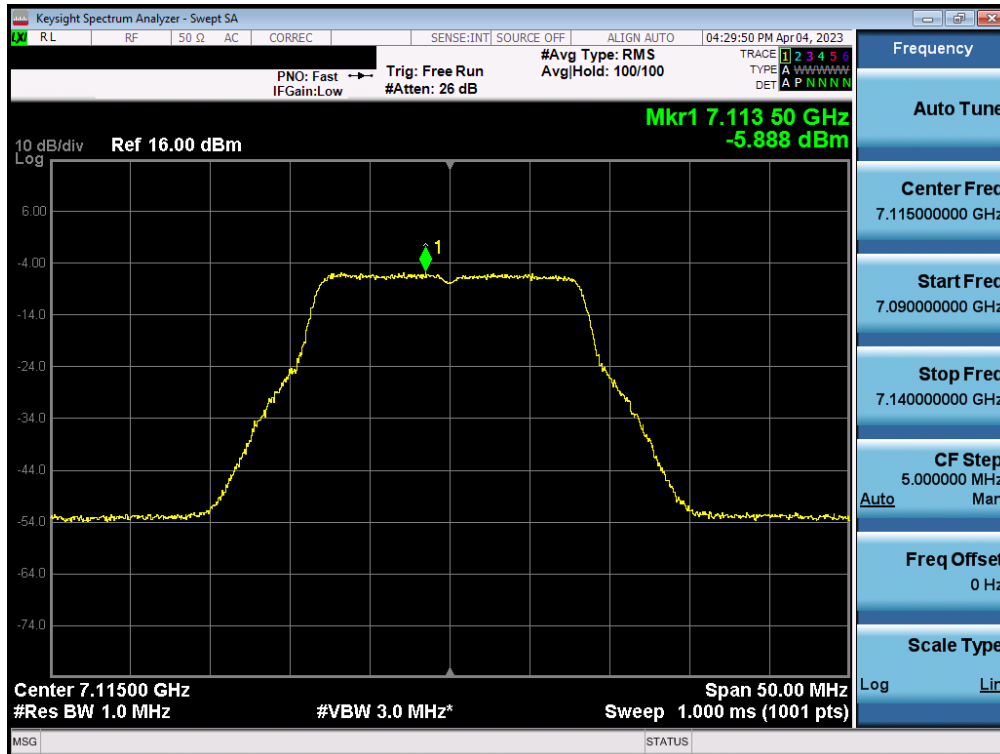


Plot 7-145. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 8) – Ch. 189)



Plot 7-146. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 8) – Ch. 209)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 98 of 237

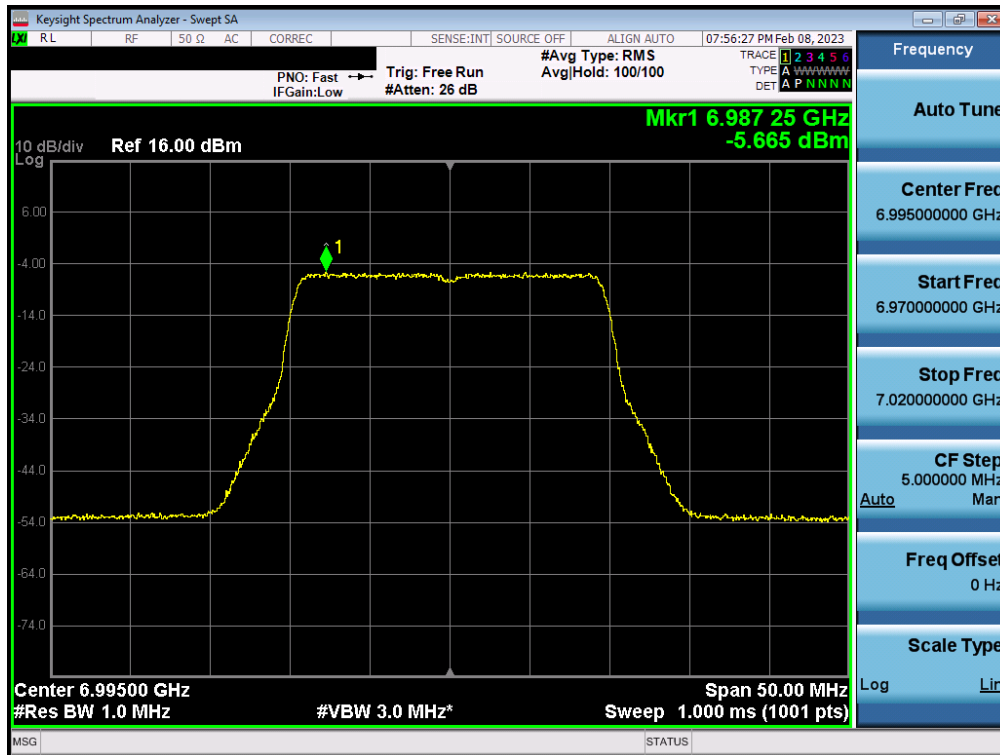


Plot 7-147. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 8) – Ch. 233)

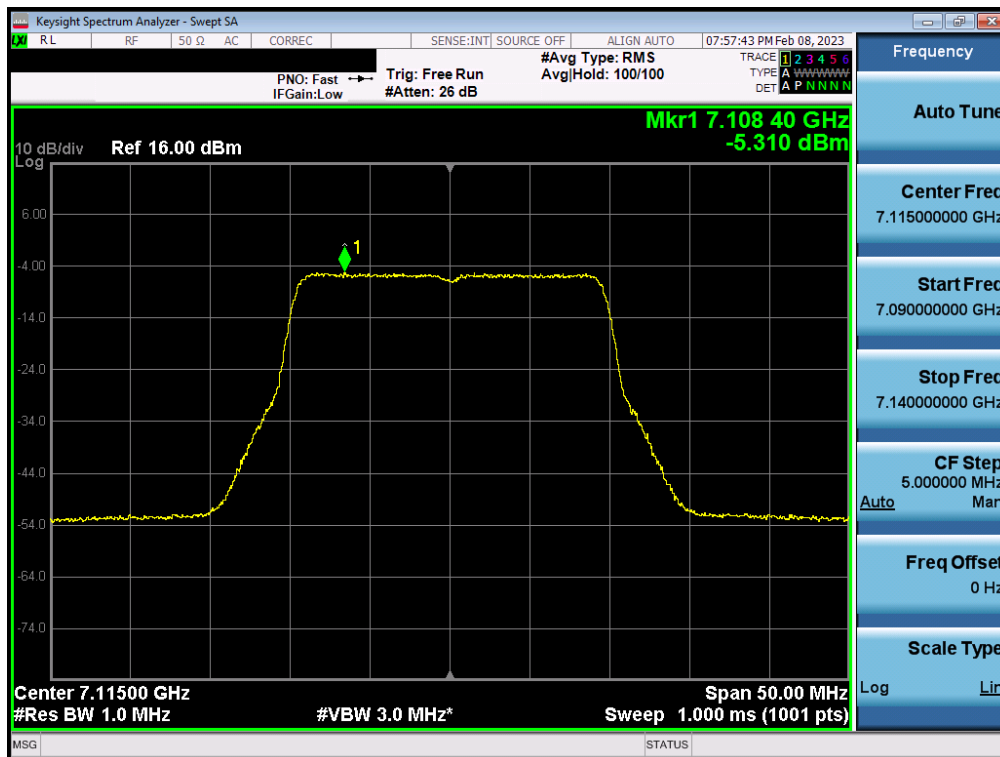


Plot 7-148. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 8) – Ch. 189)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 99 of 237

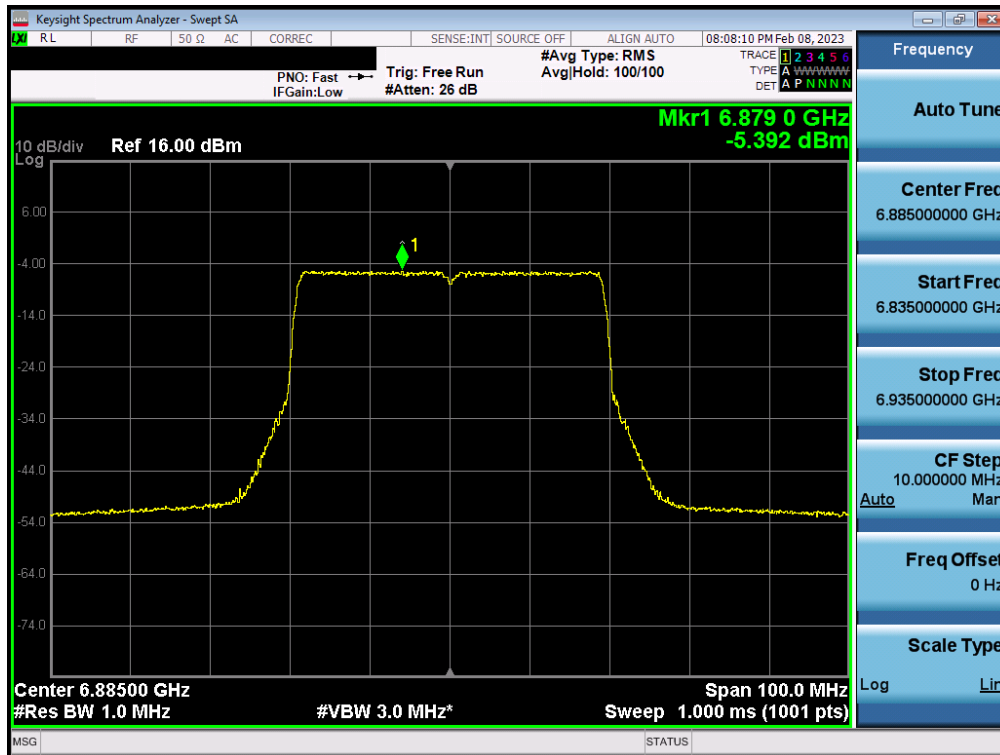


Plot 7-149. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 8) – Ch. 209)

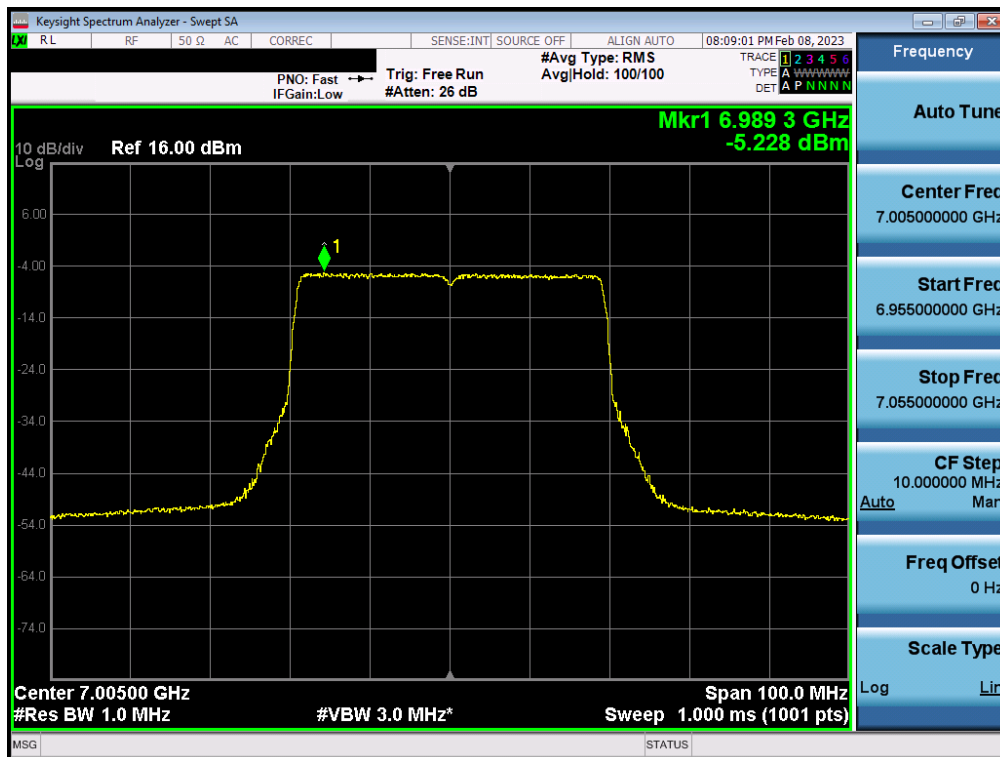


Plot 7-150. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 8) – Ch. 233)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 100 of 237

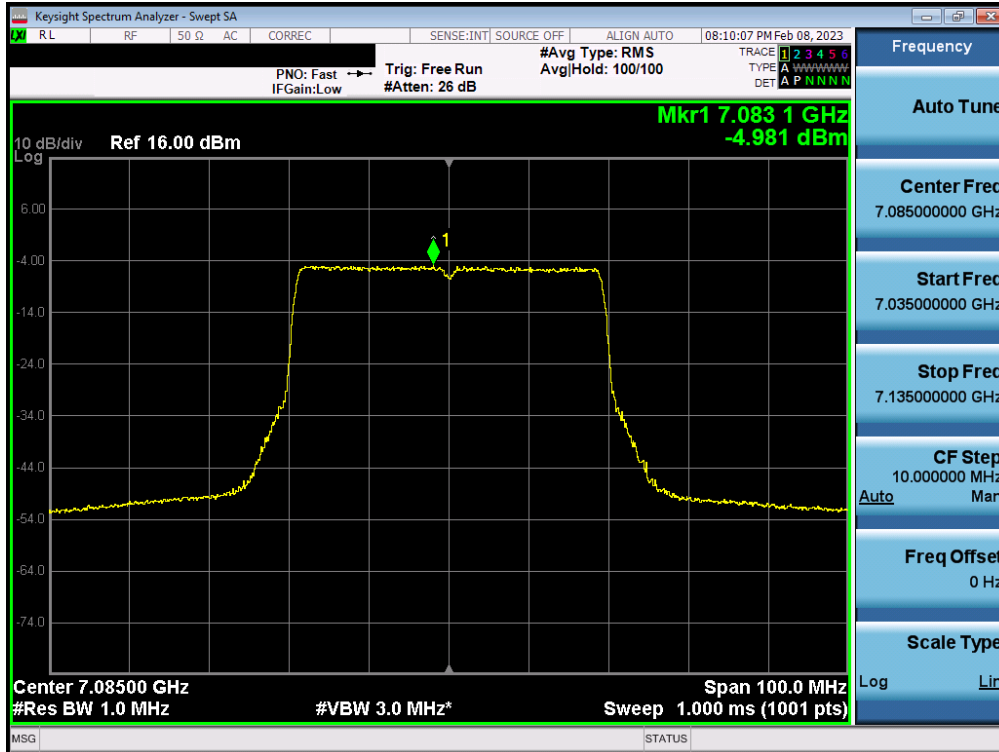


Plot 7-151. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 8) – Ch. 187)

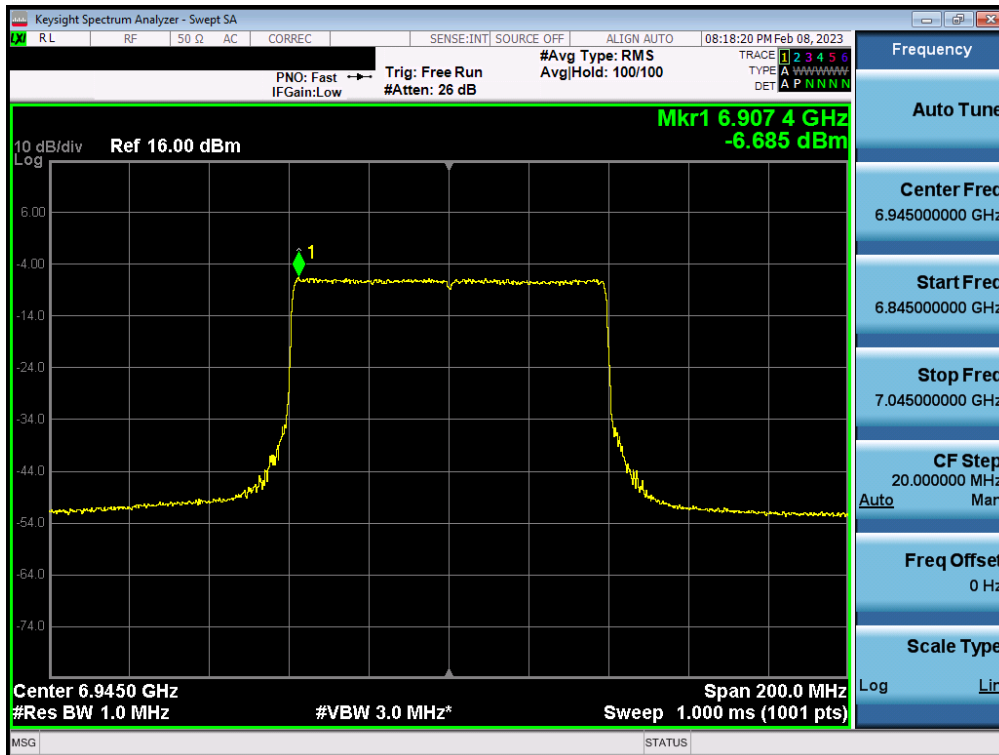


Plot 7-152. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 8) – Ch. 211)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 101 of 237

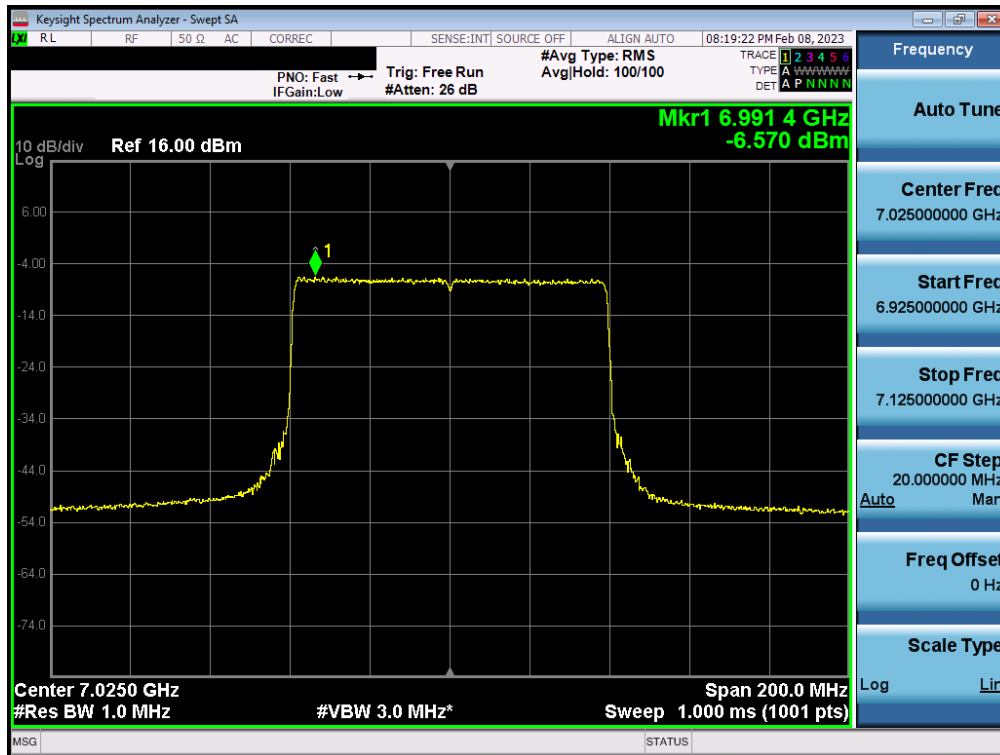


Plot 7-153. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 8) – Ch. 227)



Plot 7-154. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 8) – Ch. 199)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 102 of 237



Plot 7-155. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 8) – Ch. 215)

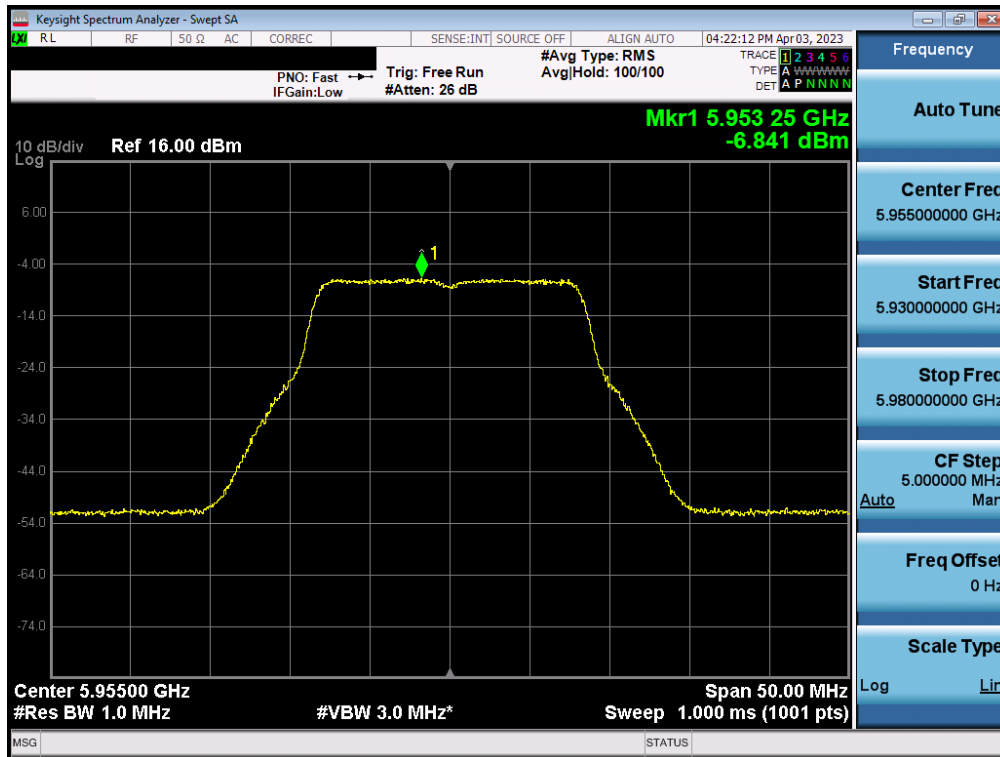


Plot 7-156. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 8) – Ch. 207)

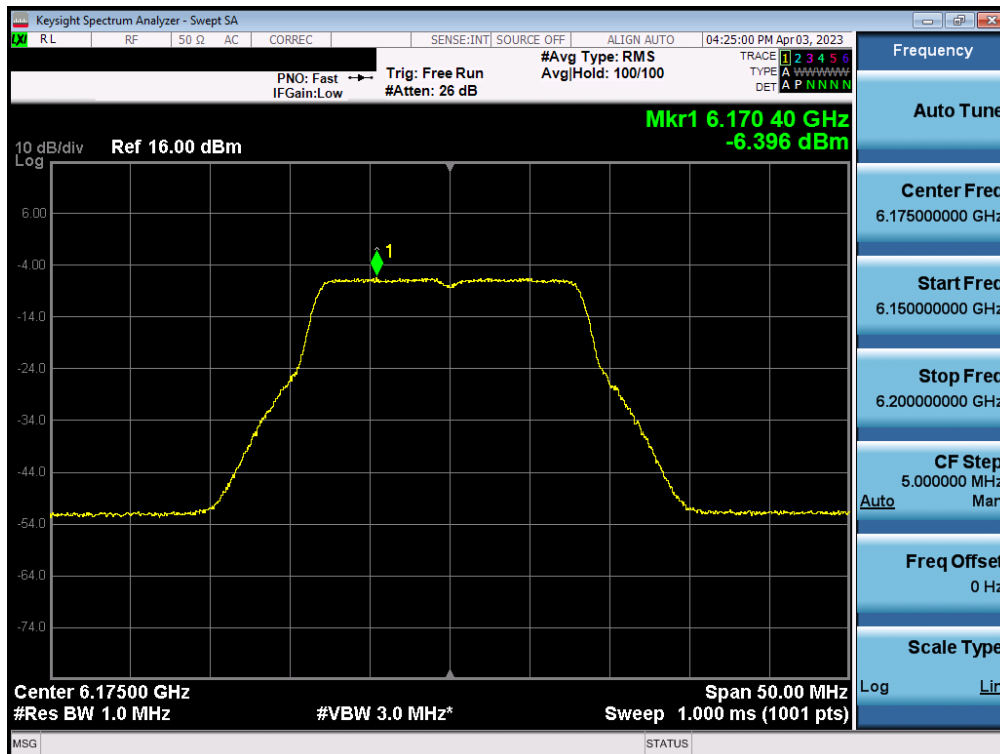
FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 103 of 237



### 7.4.5 MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 5)



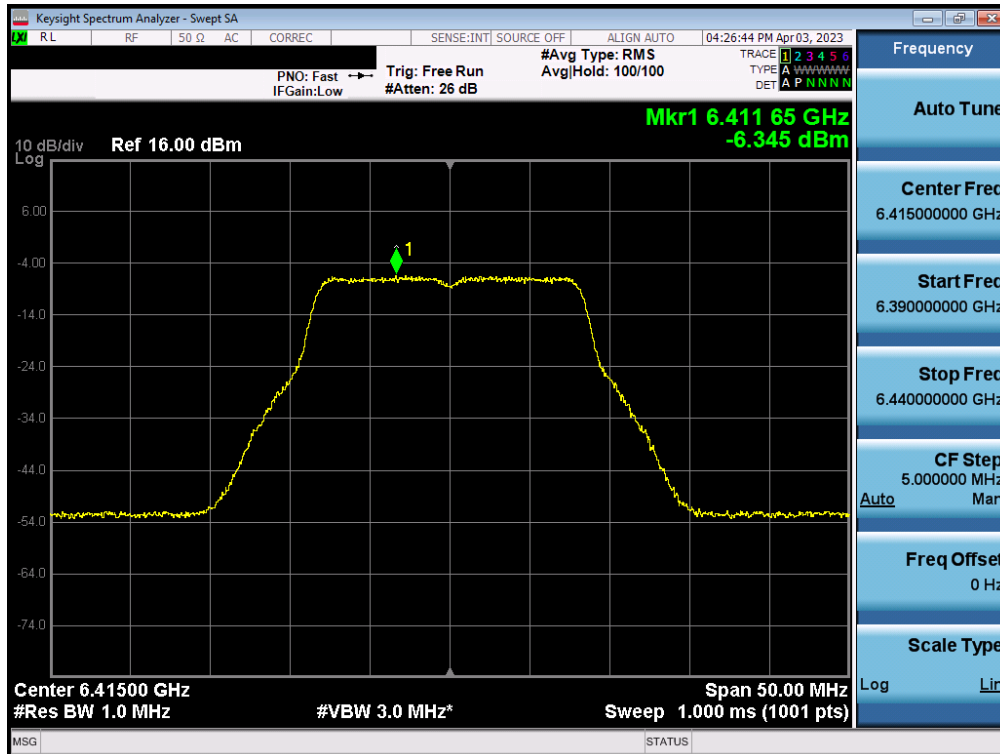
Plot 7-157. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 5) – Ch. 1)



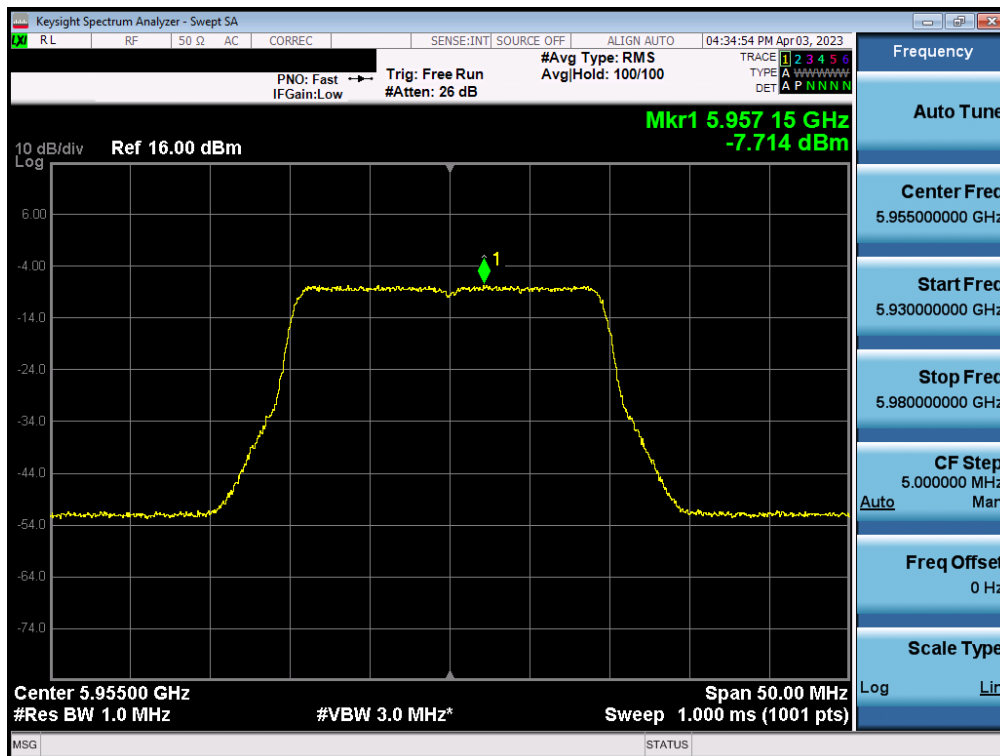
Plot 7-158. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 5) – Ch. 45)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 104 of 237



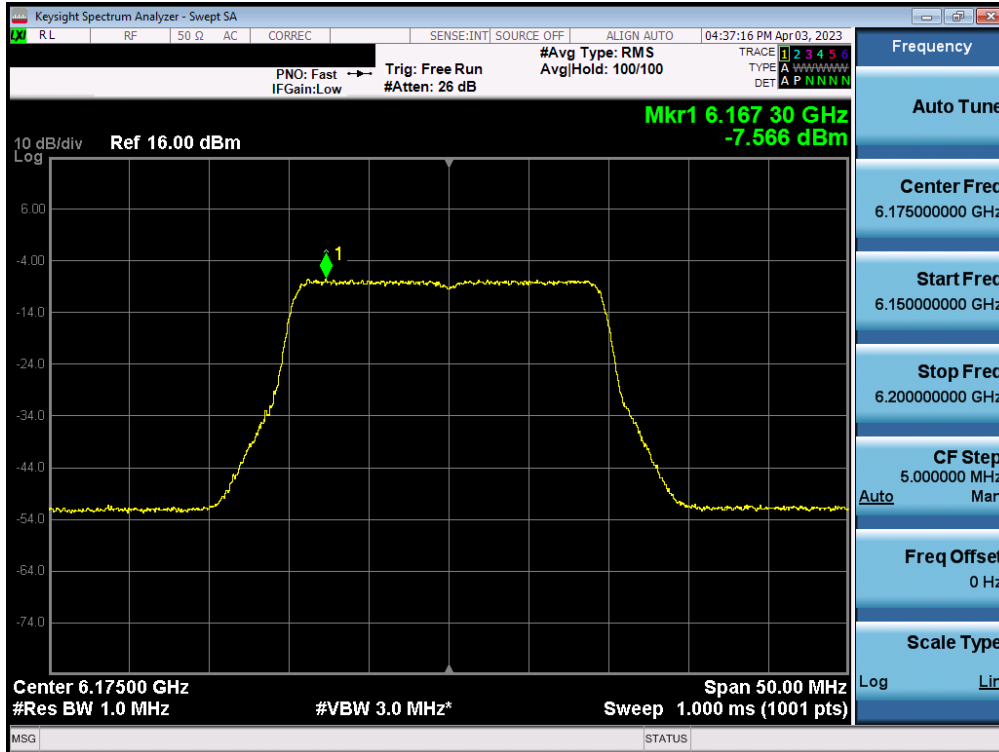


Plot 7-159. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 5) – Ch. 93)

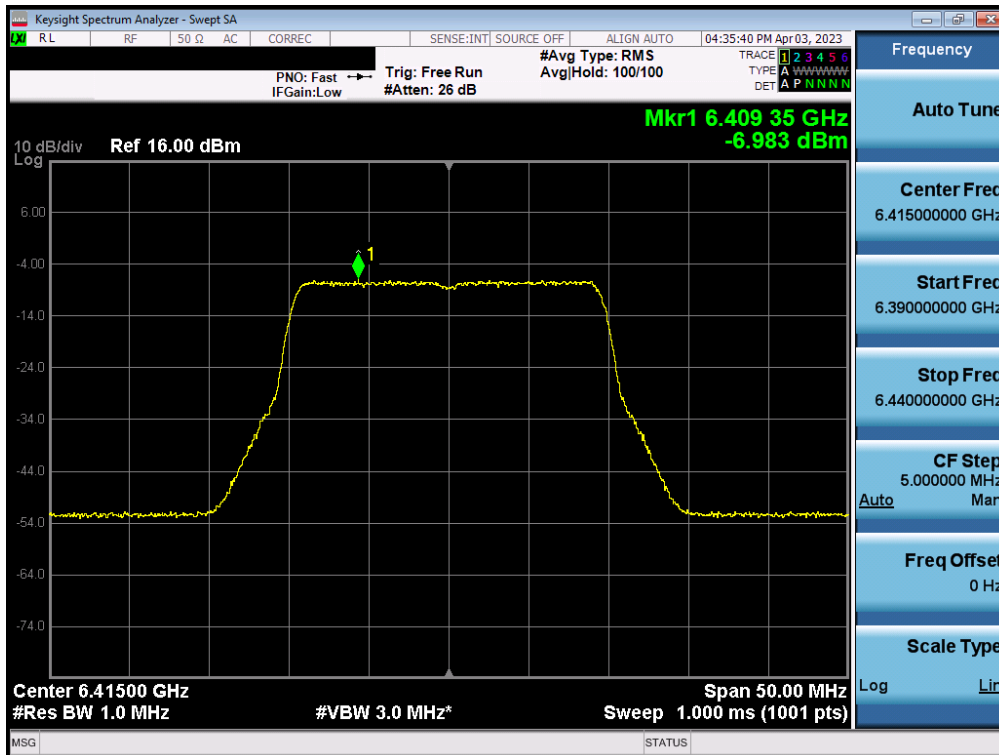


Plot 7-160. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 5) – Ch. 1)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 105 of 237

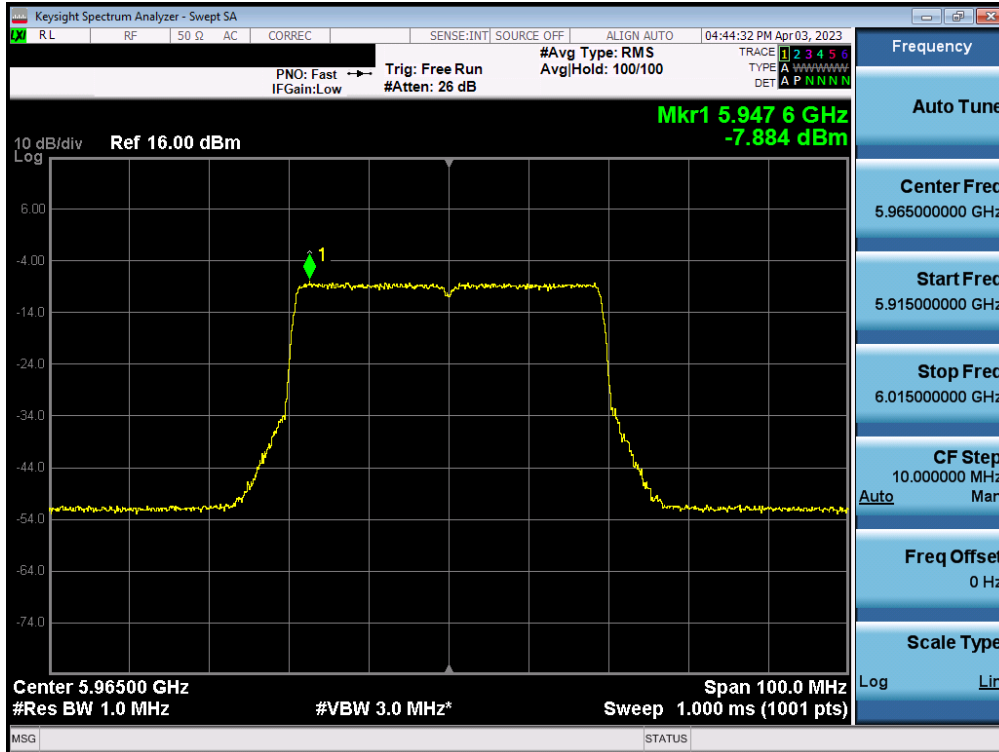


Plot 7-161. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 5) – Ch. 45)

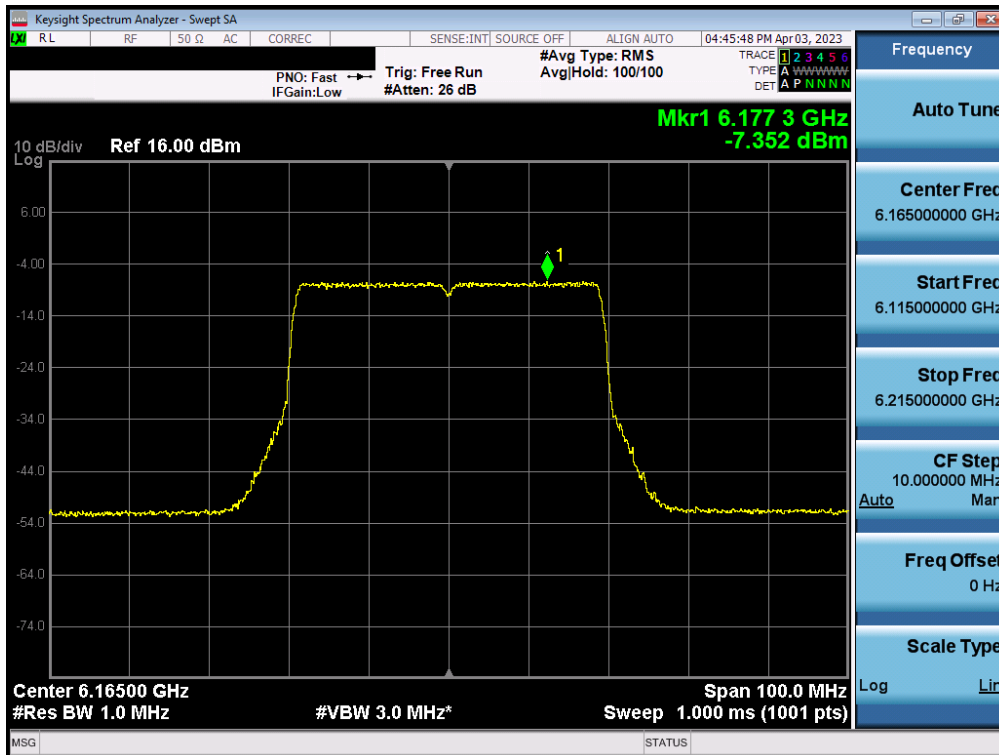


Plot 7-162. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 5) – Ch. 93)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 106 of 237

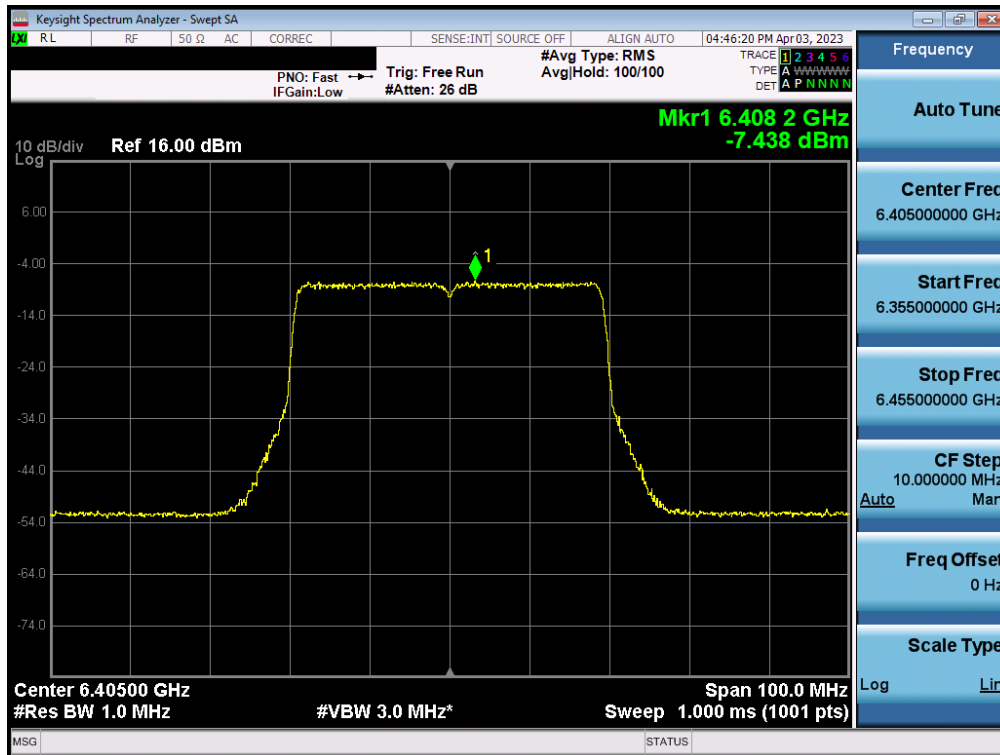


Plot 7-163. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 5) – Ch. 3)

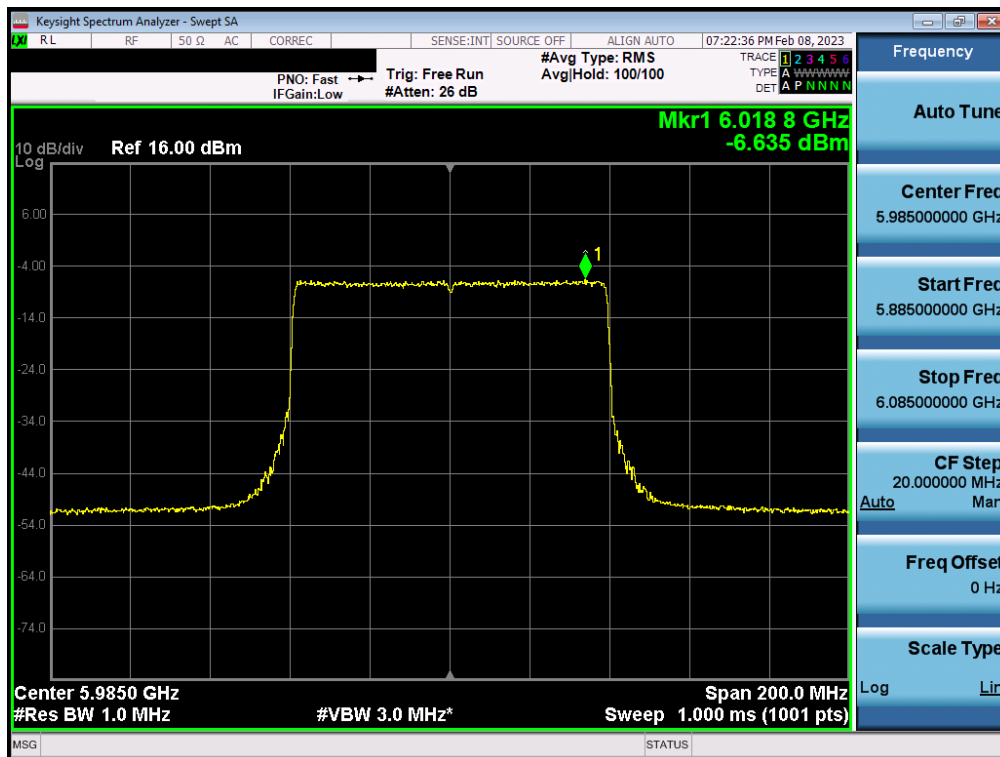


Plot 7-164. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 5) – Ch. 43)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 107 of 237

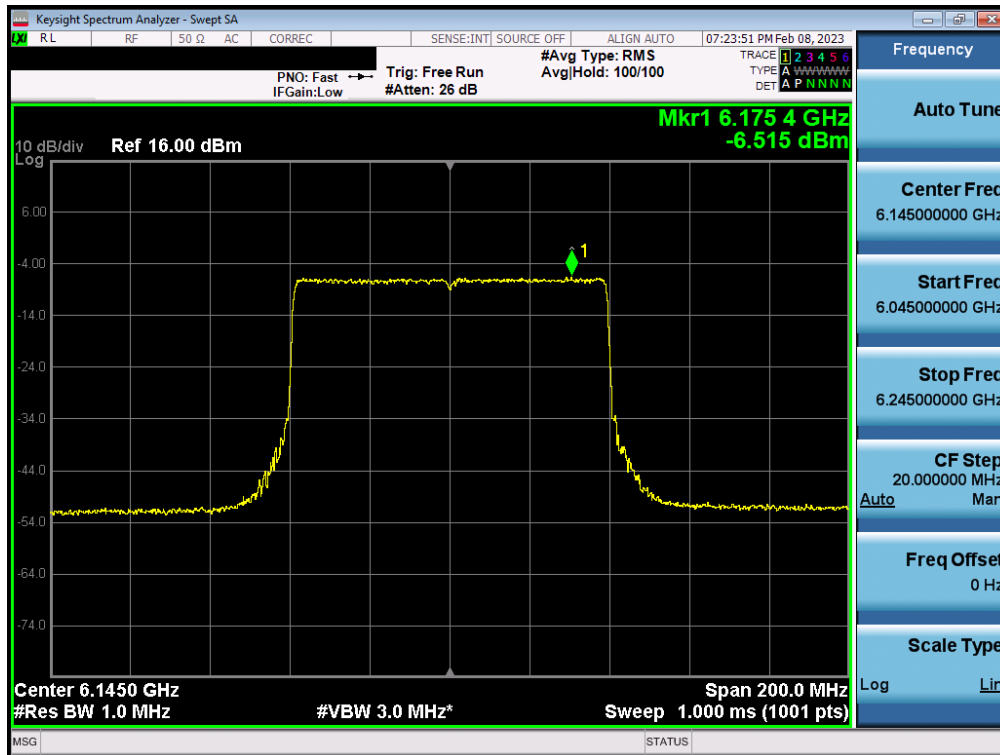


Plot 7-165. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 5) – Ch. 91)

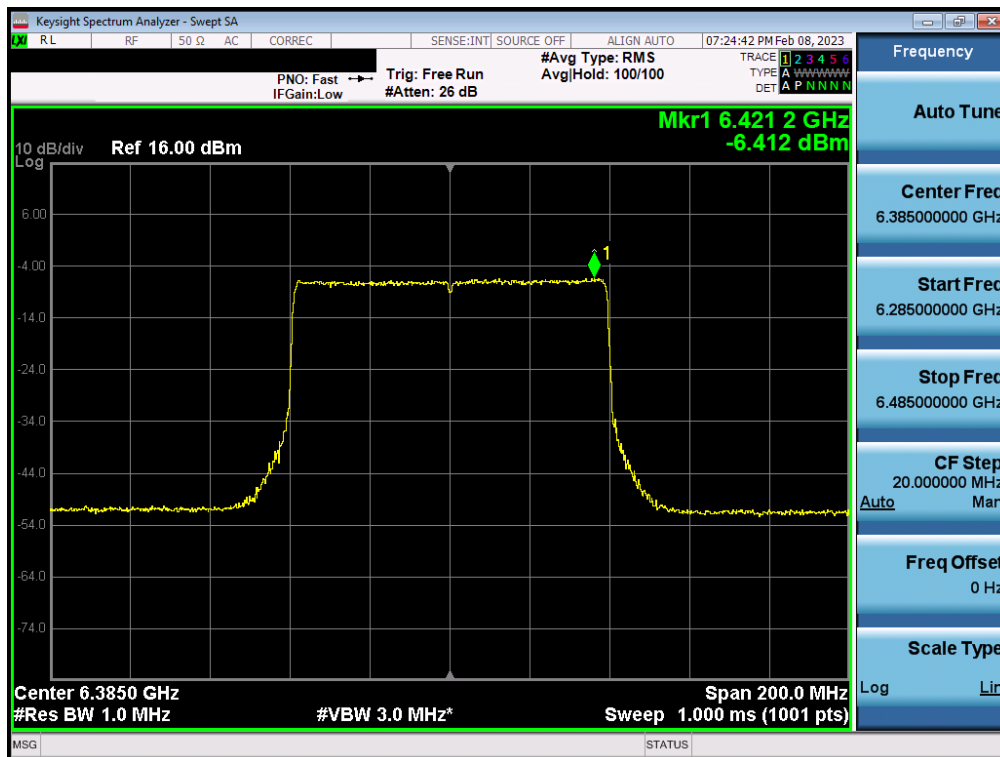


Plot 7-166. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 5) – Ch. 7)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 108 of 237

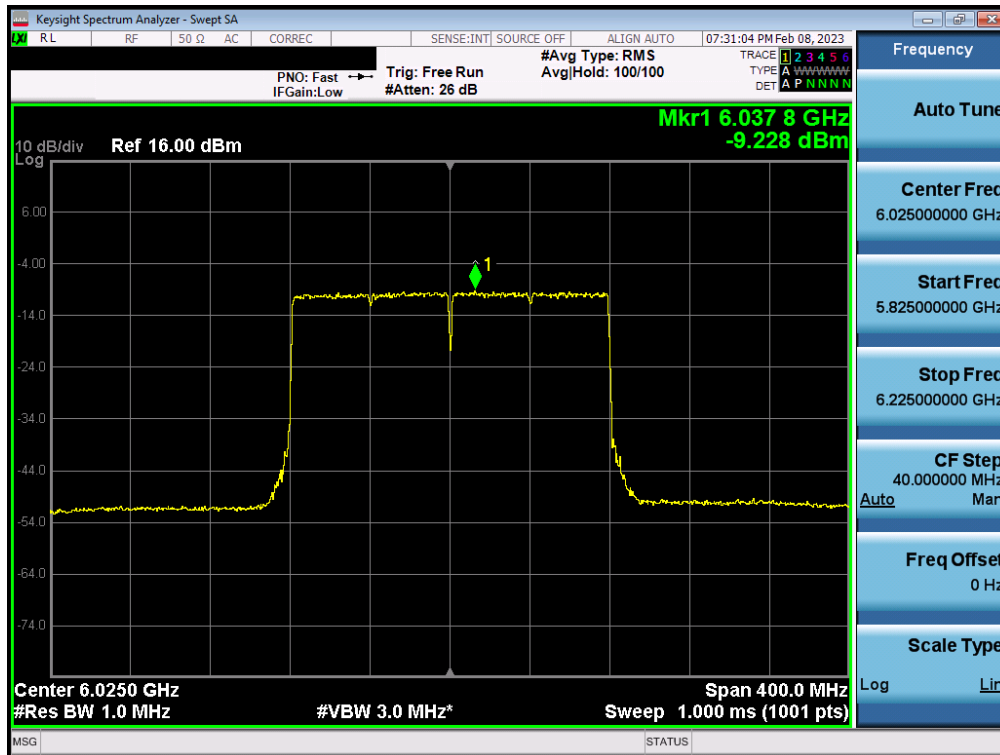


Plot 7-167. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 5) – Ch. 39)

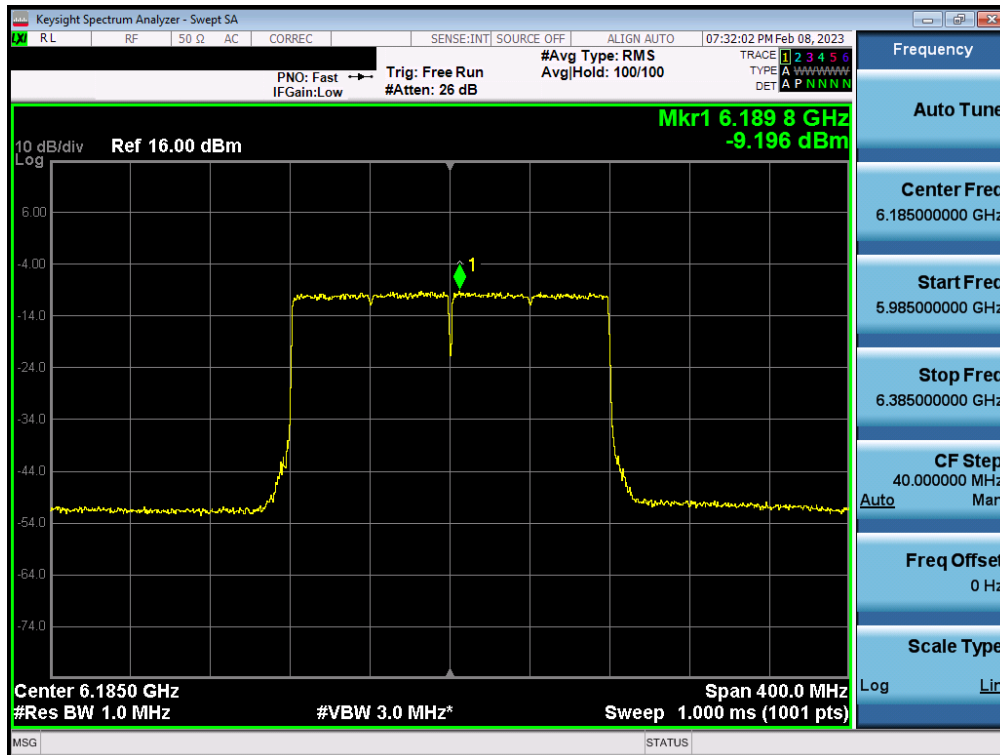


Plot 7-168. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 5) – Ch. 87)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 109 of 237

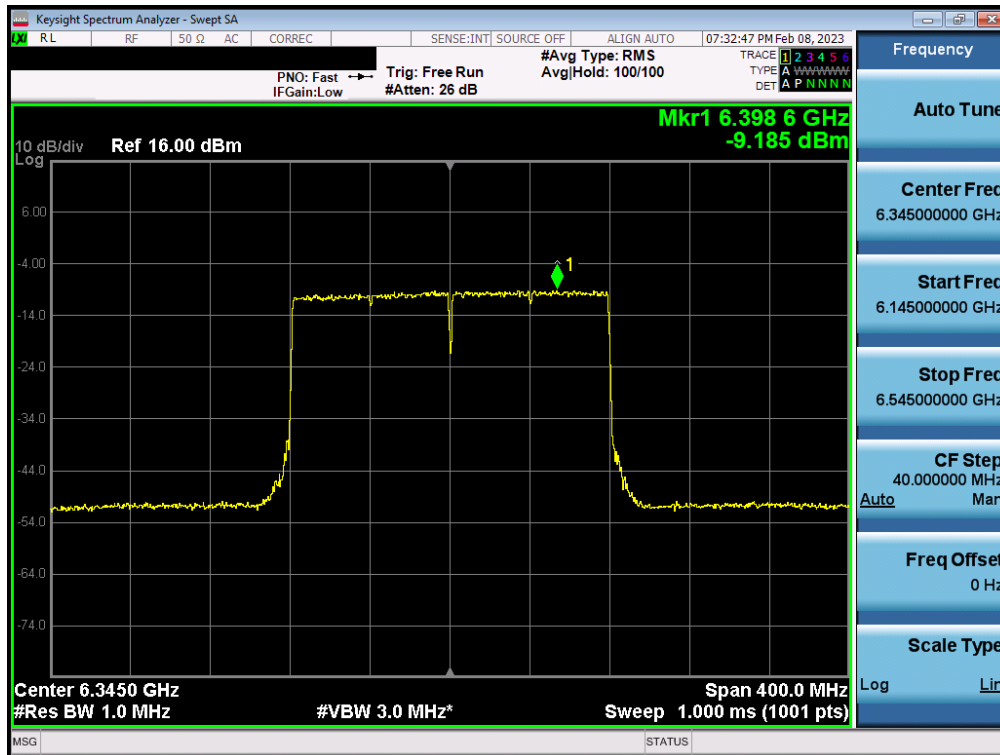


Plot 7-169. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 5) – Ch. 15)



Plot 7-170. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 5) – Ch. 47)

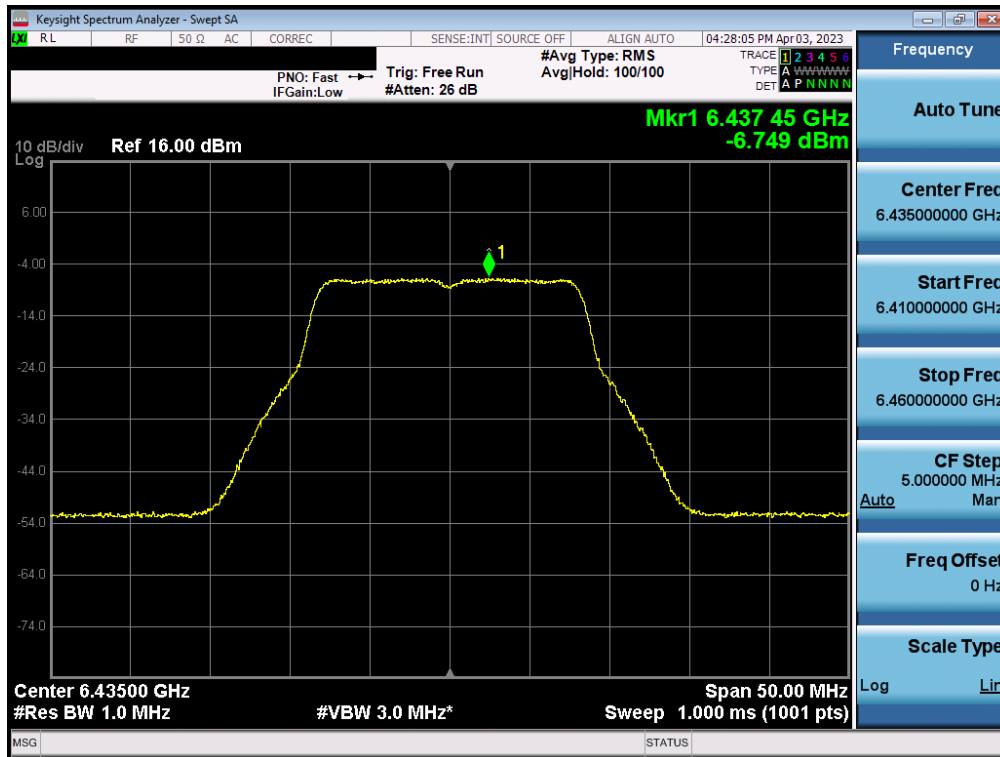
FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 110 of 237



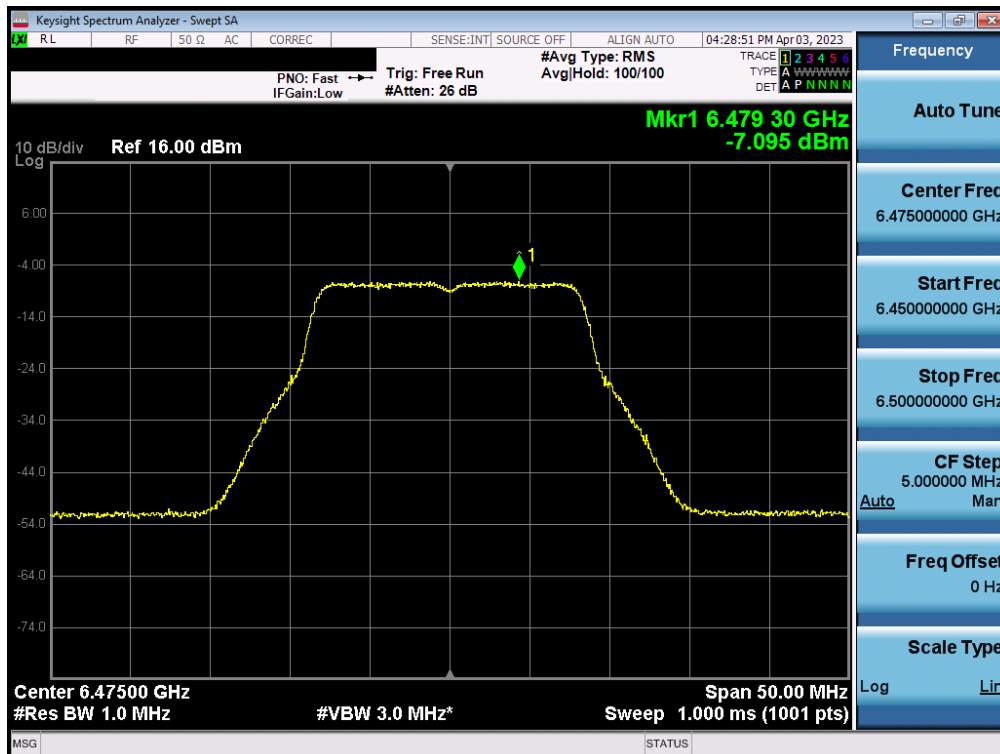
Plot 7-171. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 5) – Ch. 79)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2302060006-08-R3.PY7	Test Dates: 01/30/2023 - 04/18/2023	EUT Type: Portable Handset	Page 111 of 237

### 7.4.6 MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 6)



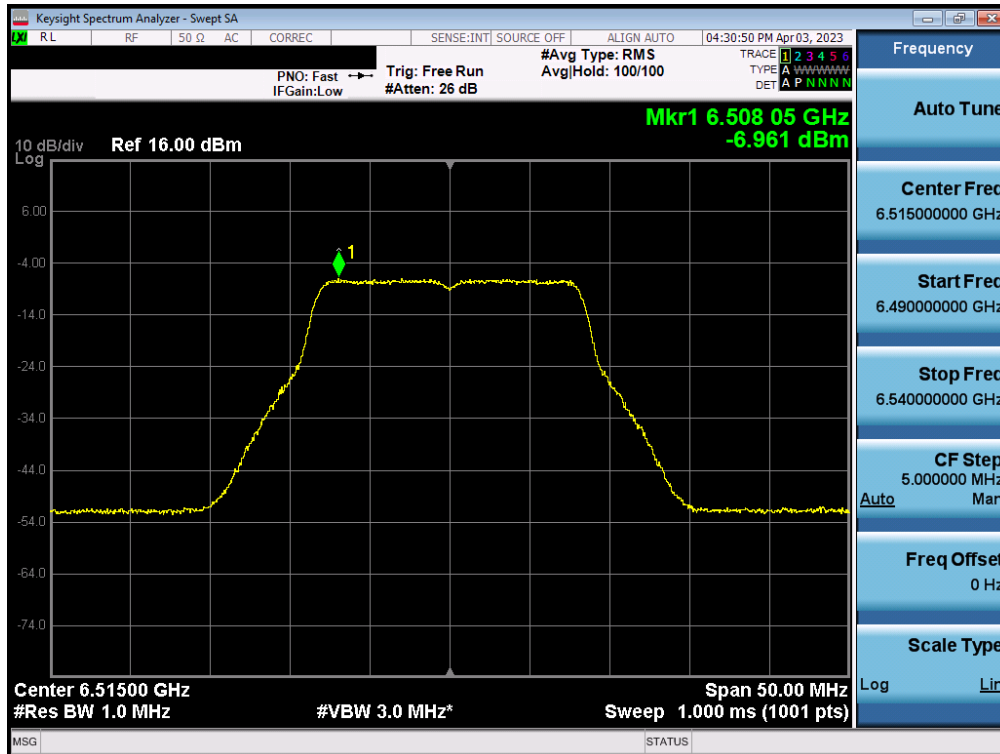
Plot 7-172. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 6) – Ch. 97)



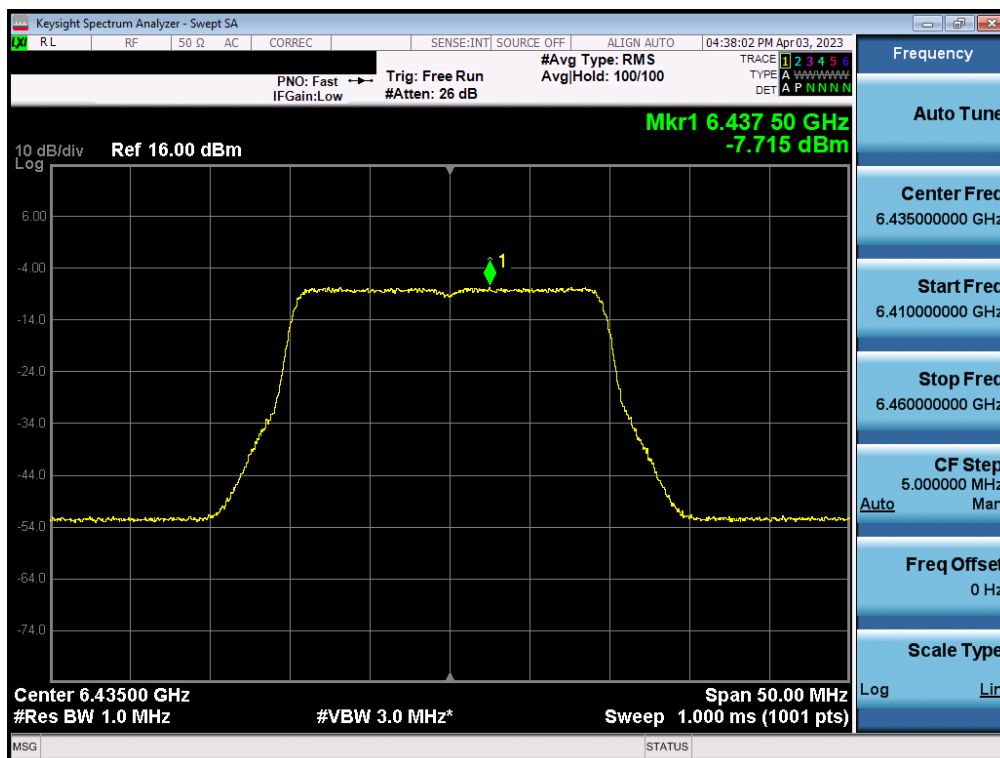
Plot 7-173. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 6) – Ch. 105)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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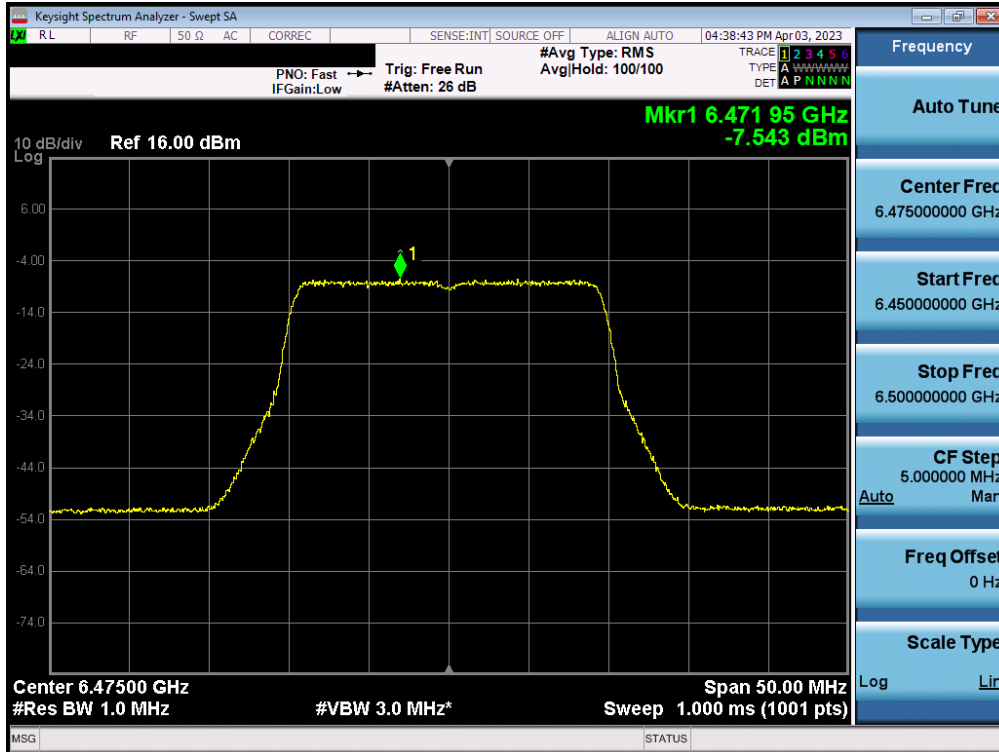


Plot 7-174. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 6) – Ch. 113)

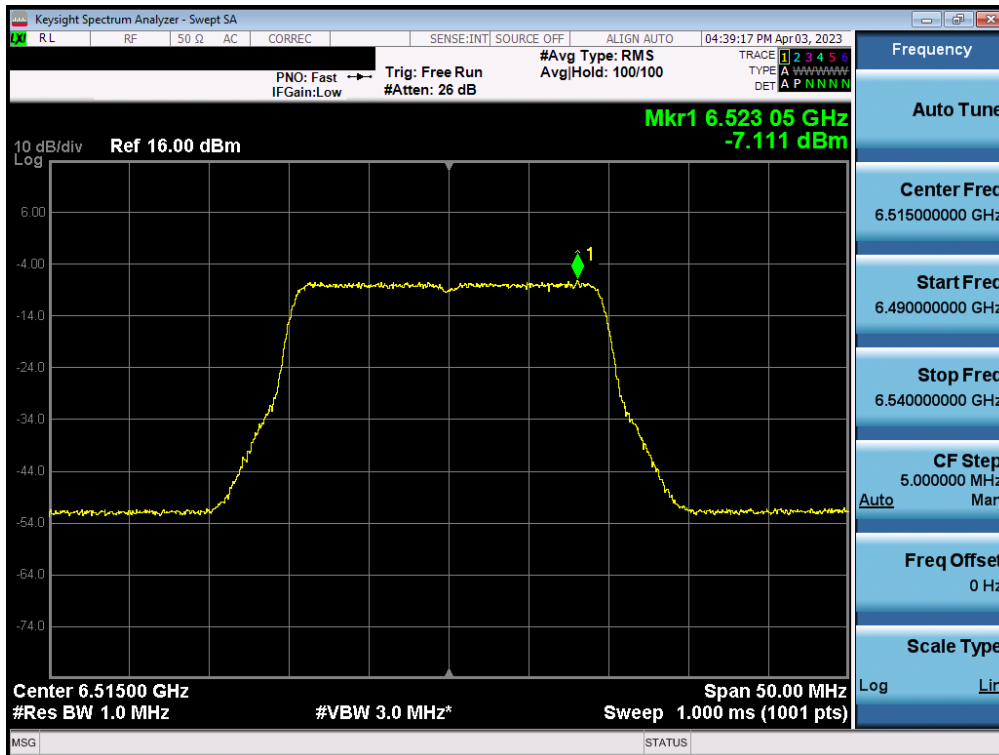


Plot 7-175. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 6) – Ch. 97)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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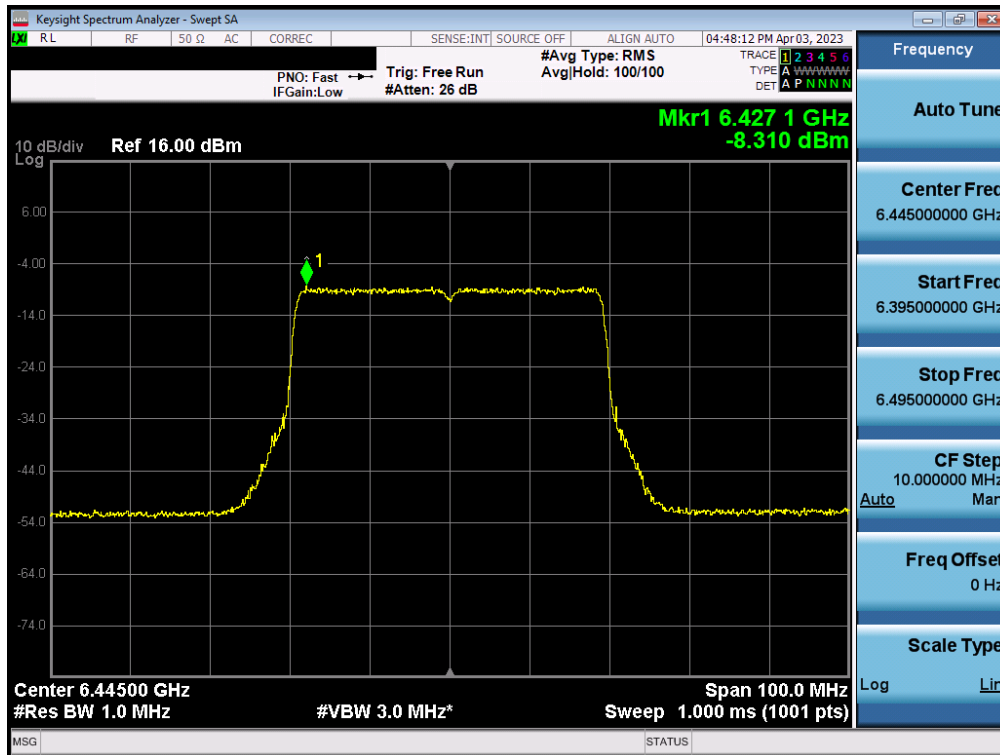


Plot 7-176. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 6) – Ch. 105)

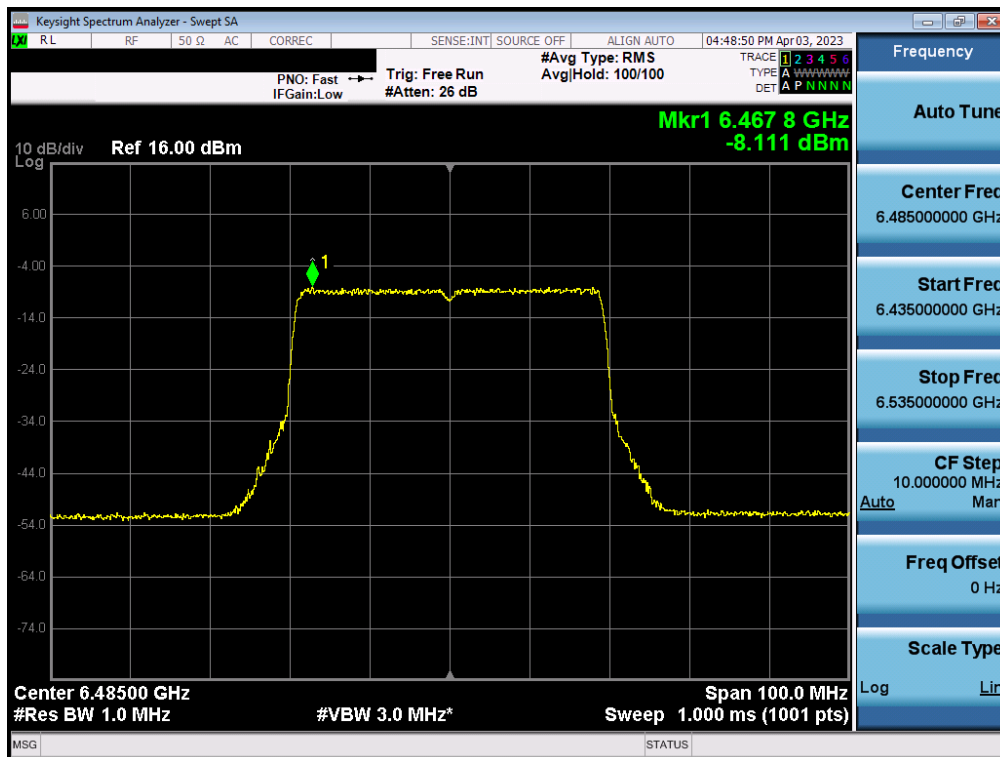


Plot 7-177. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 6) – Ch. 113)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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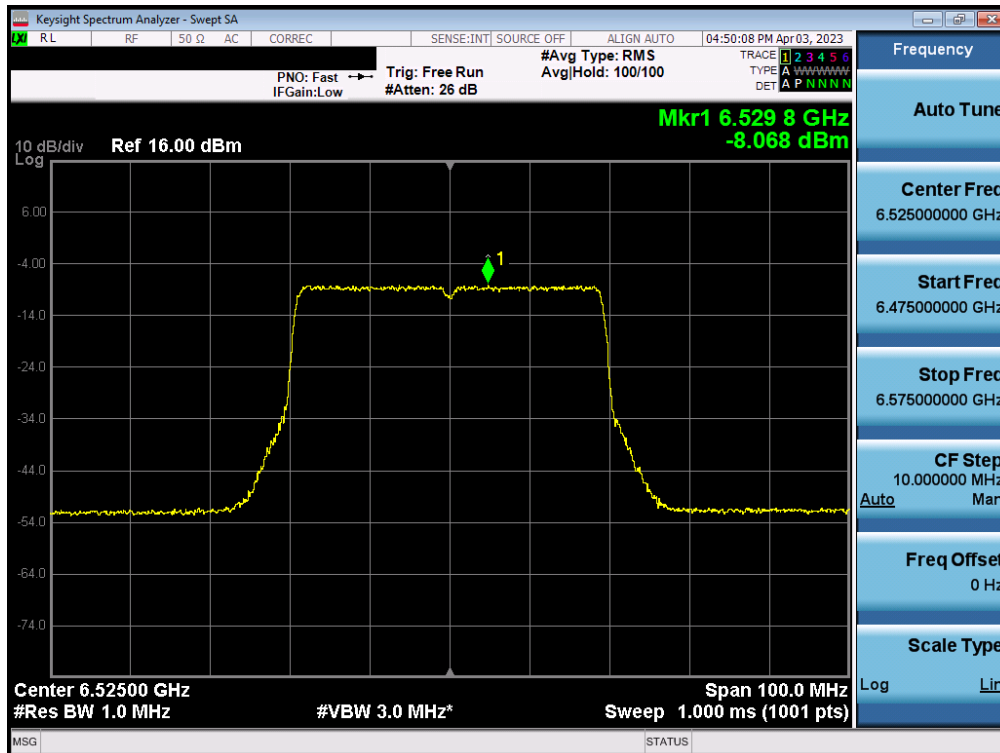


Plot 7-178. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 6) – Ch. 99)

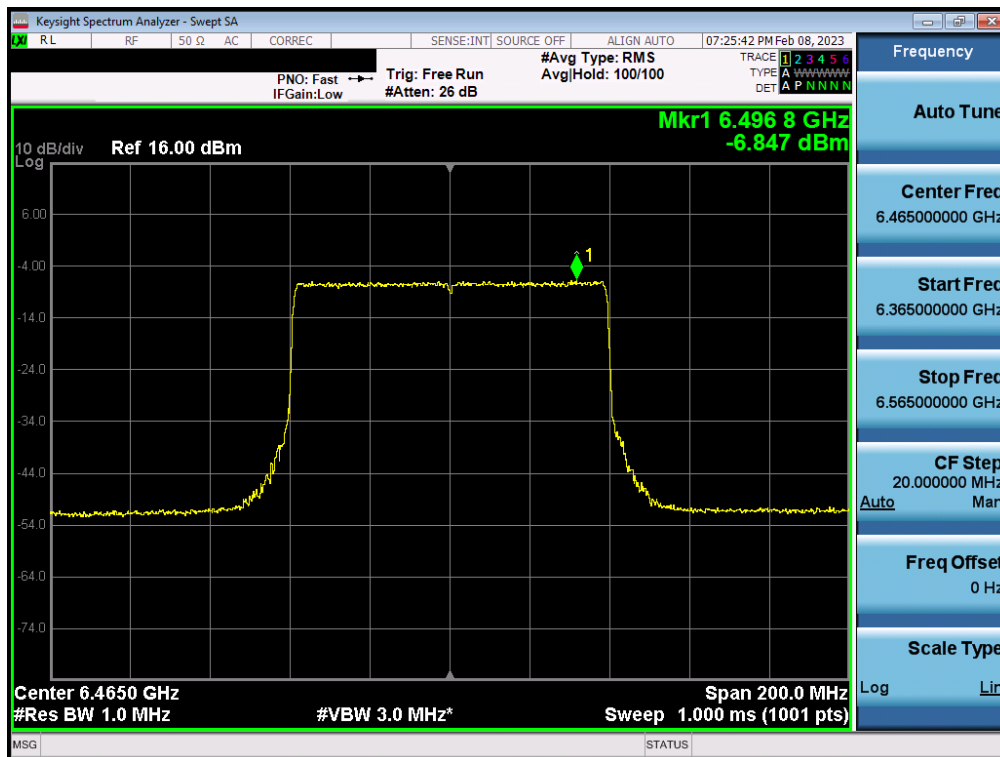


Plot 7-179. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 6) – Ch. 107)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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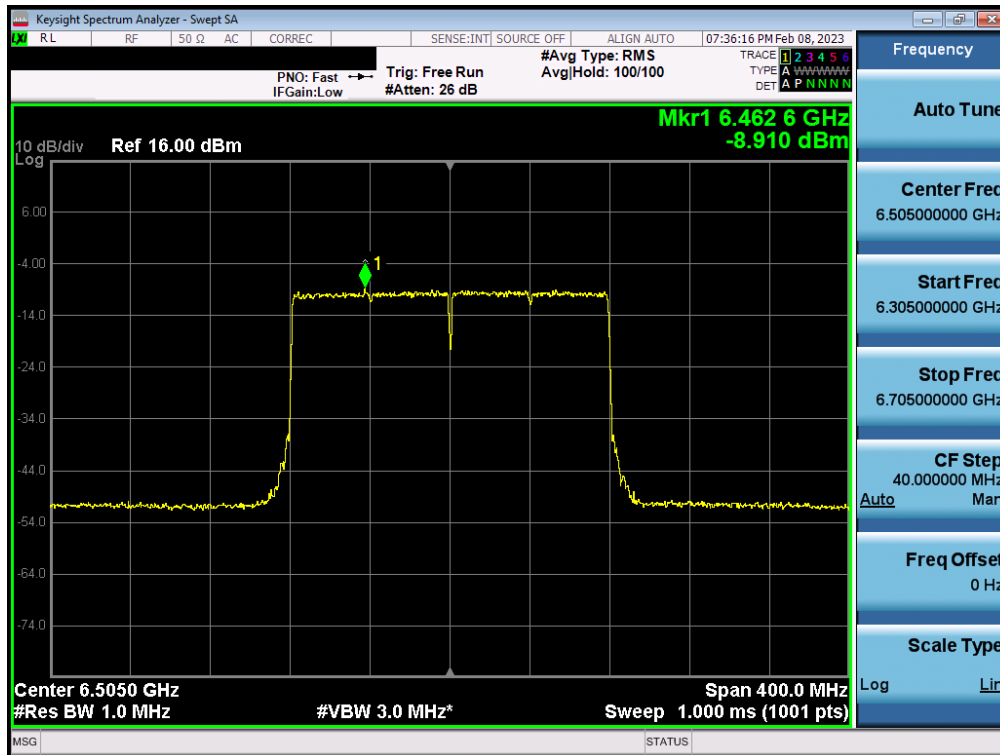


Plot 7-180. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 6) – Ch. 115)



Plot 7-181. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 6) – Ch. 103)

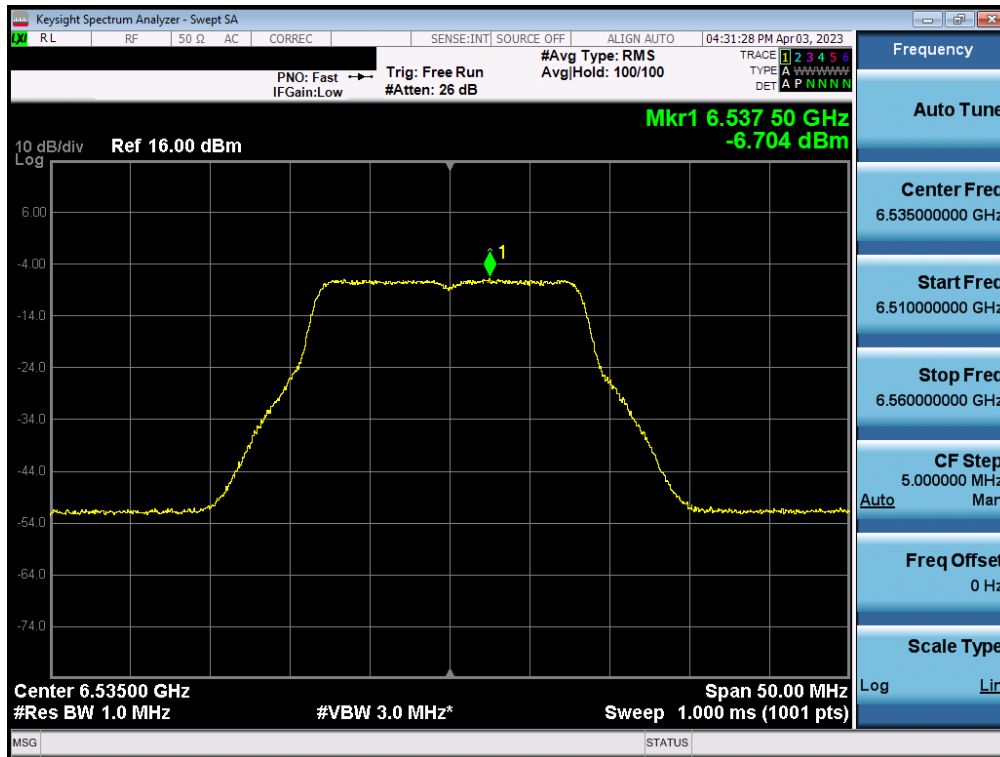
FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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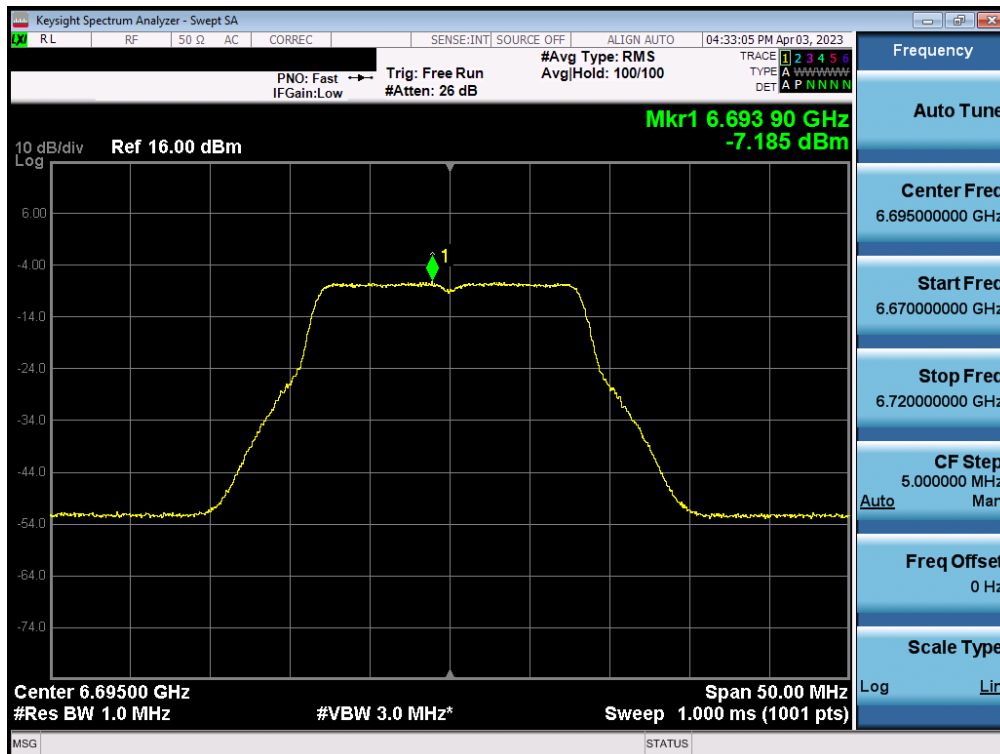
Plot 7-182. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 6) – Ch. 111)

FCC ID: PY7-84558E	<b>MEASUREMENT REPORT</b>		Approved by: Technical Manager
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### 7.4.7 MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 7)

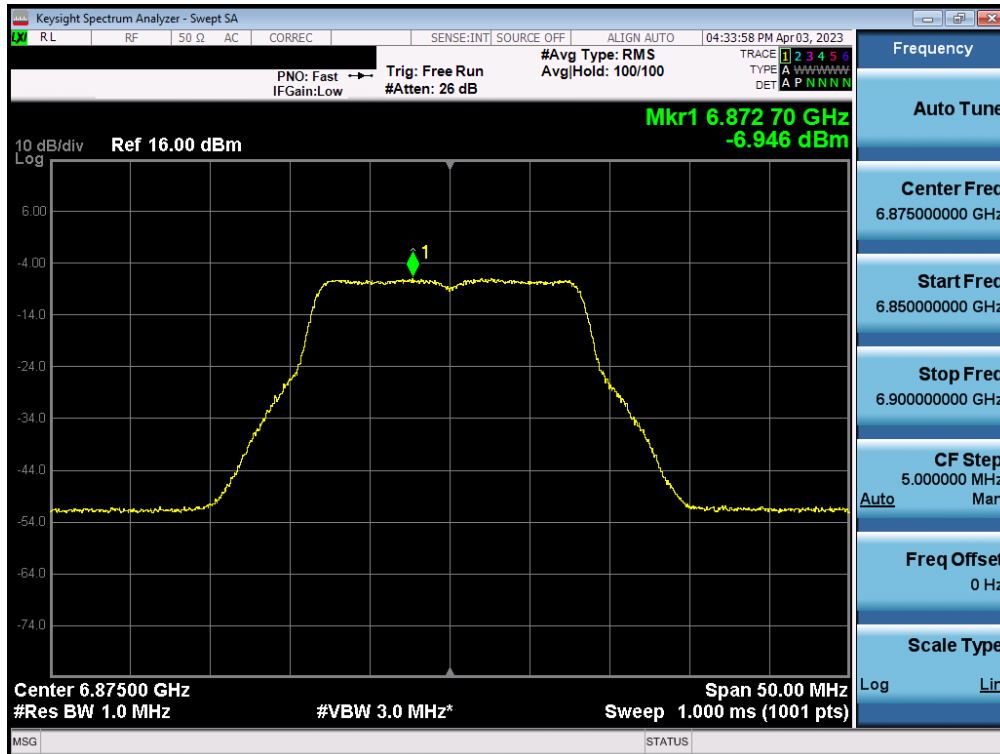


Plot 7-183. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 7) – Ch. 117)

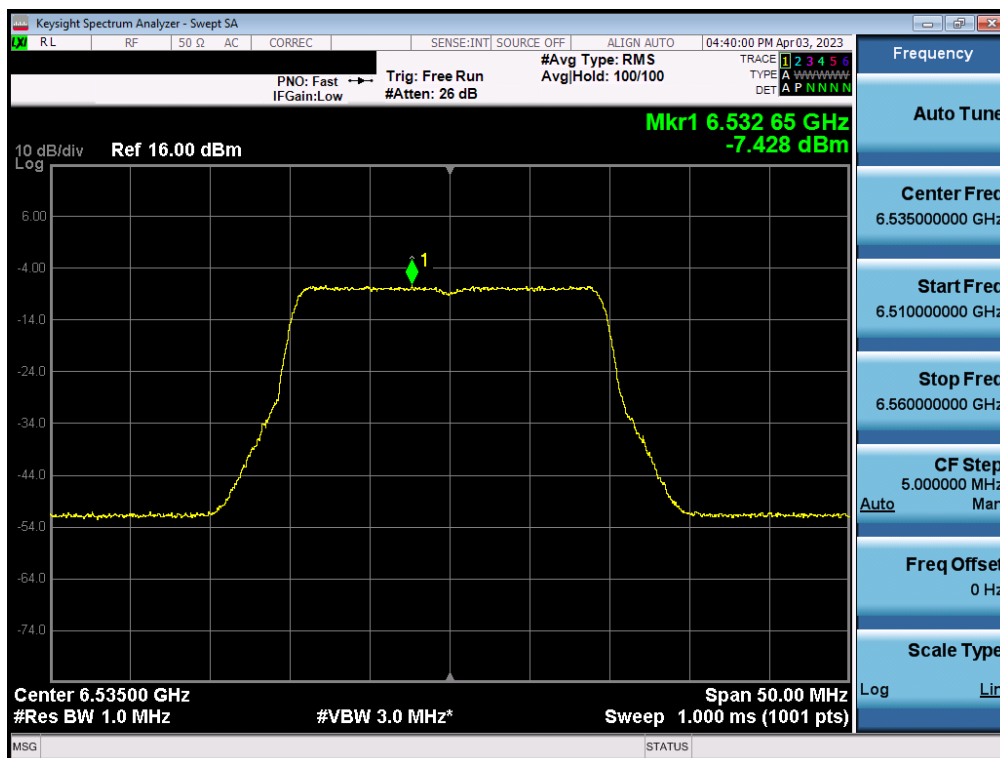


Plot 7-184. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 7) – Ch. 149)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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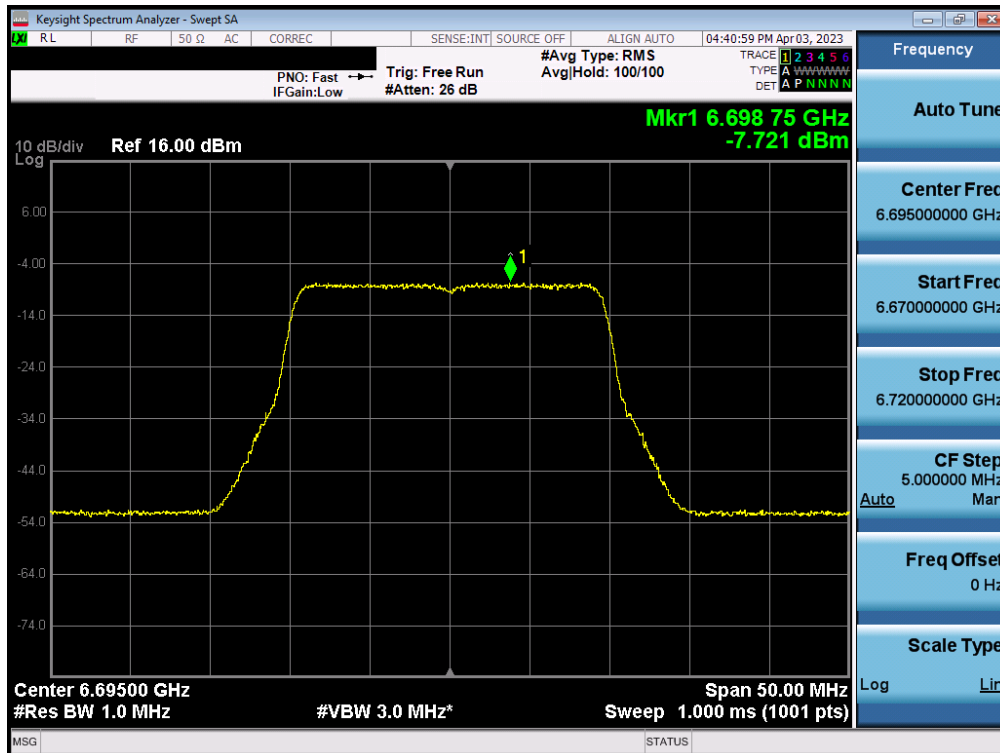


Plot 7-185. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 7) – Ch. 185)

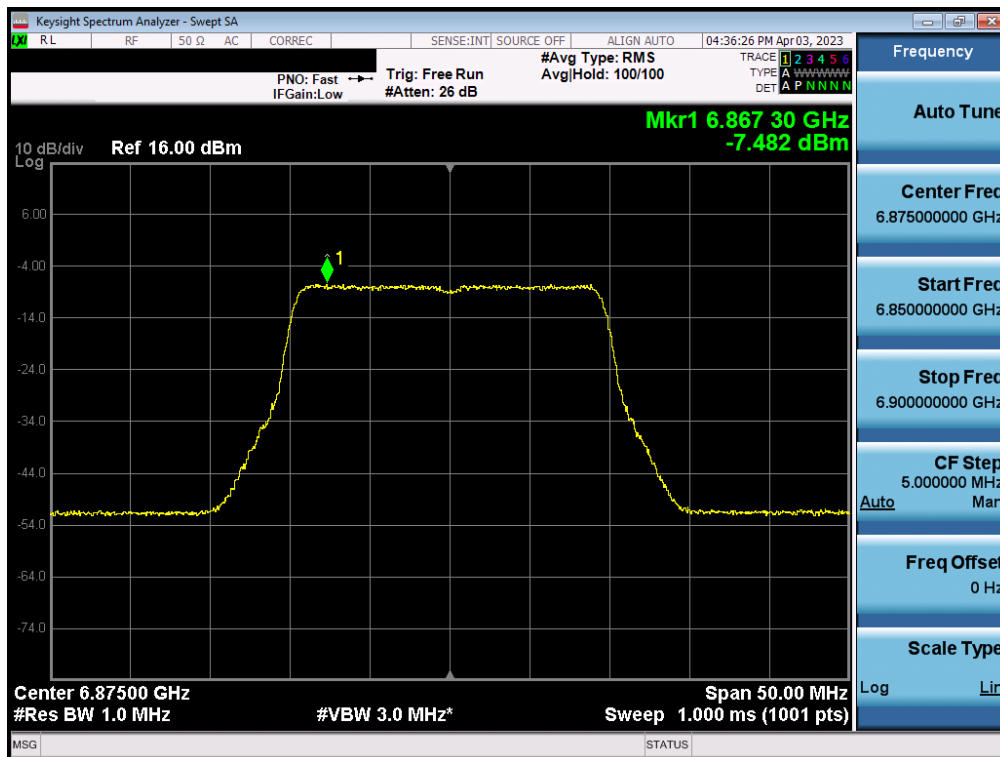


Plot 7-186. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 7) – Ch. 117)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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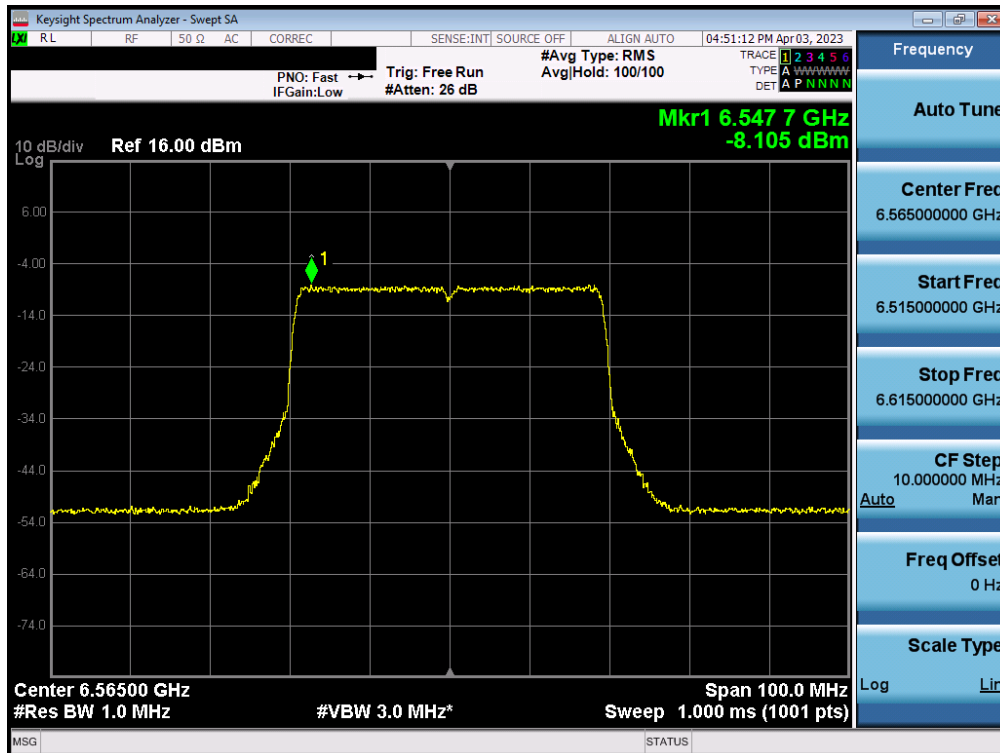
Plot 7-187. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 7) – Ch. 149)



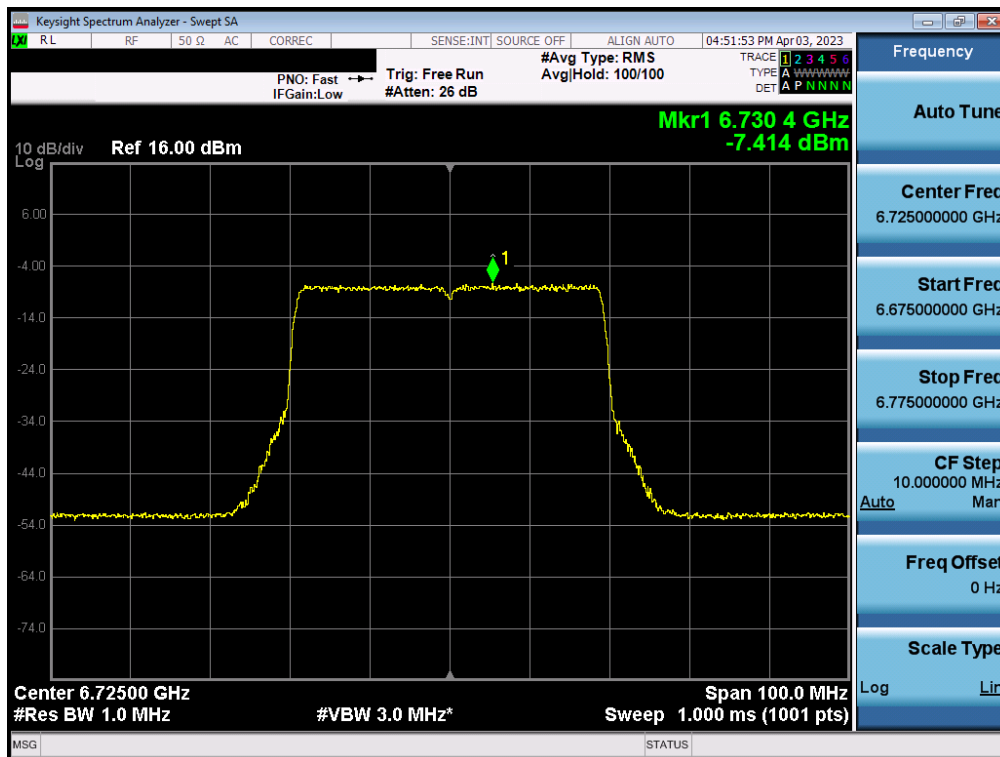
Plot 7-188. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 7) – Ch. 185)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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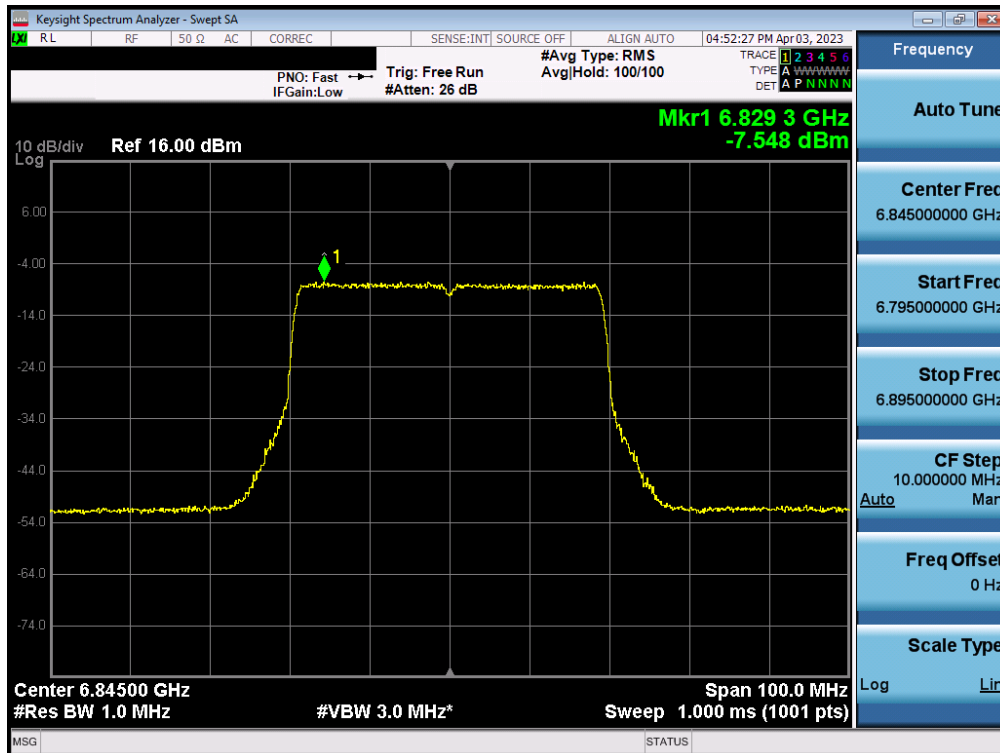


Plot 7-189. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 7) – Ch. 123)

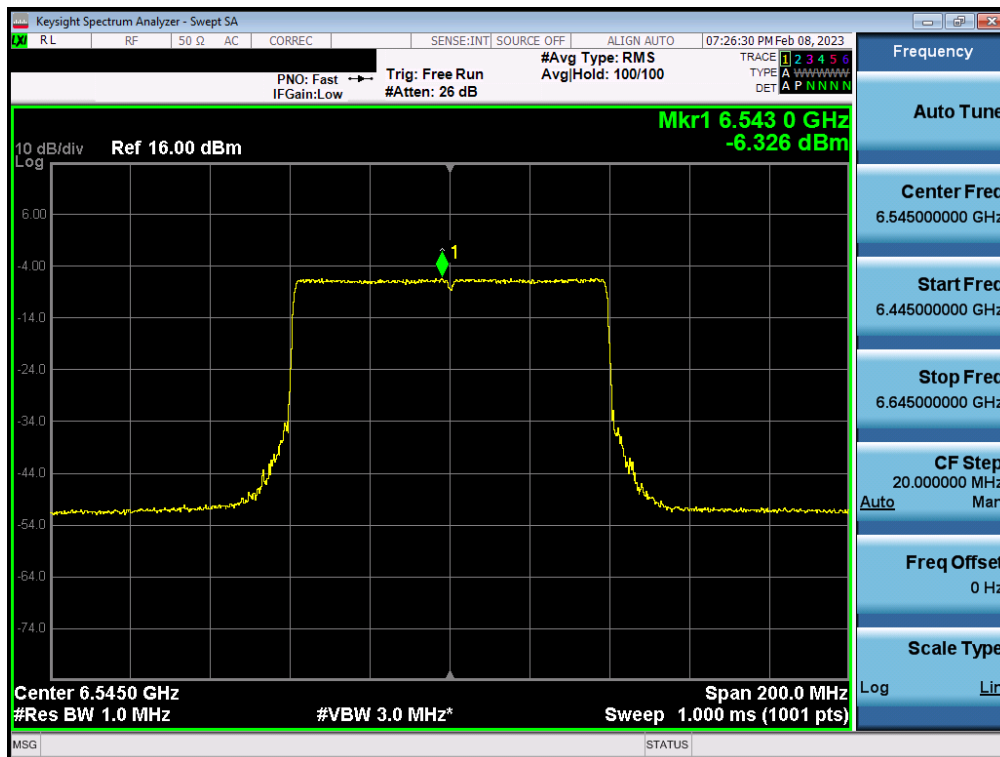


Plot 7-190. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 7) – Ch. 155)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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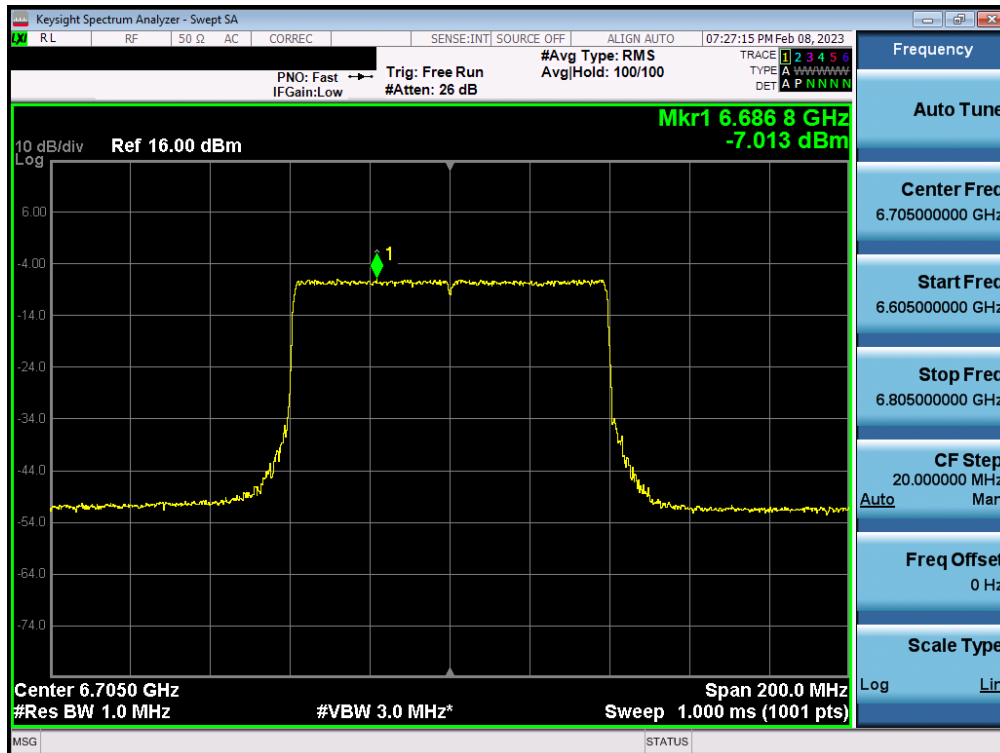


Plot 7-191. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 7) – Ch. 179)

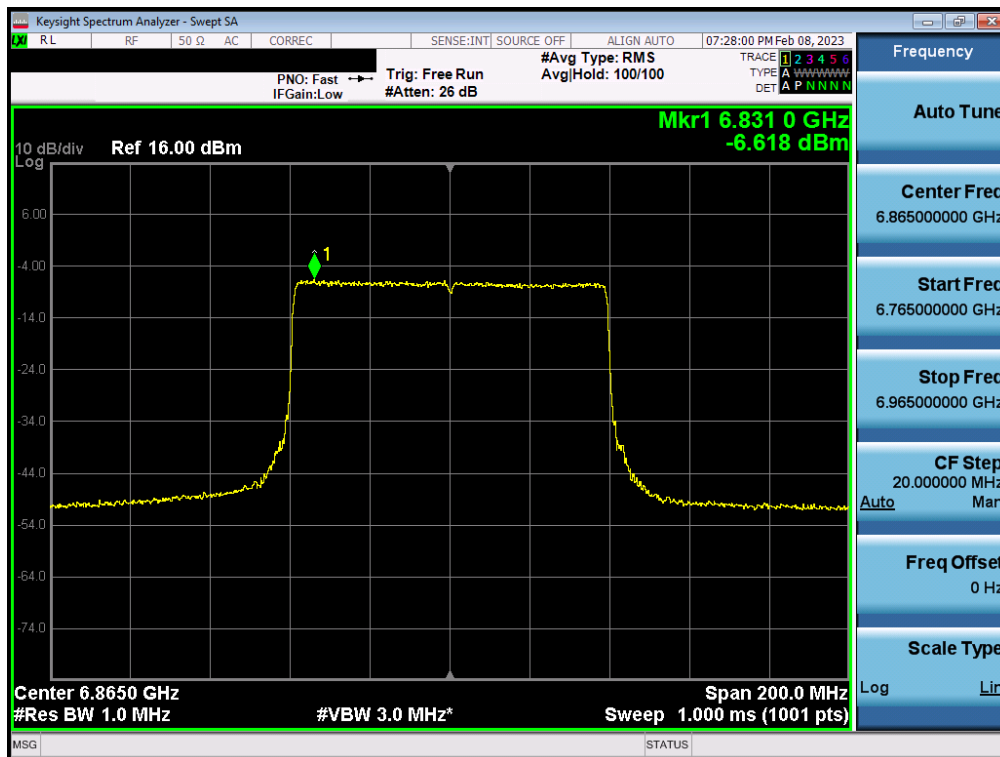


Plot 7-192. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 7) – Ch. 119)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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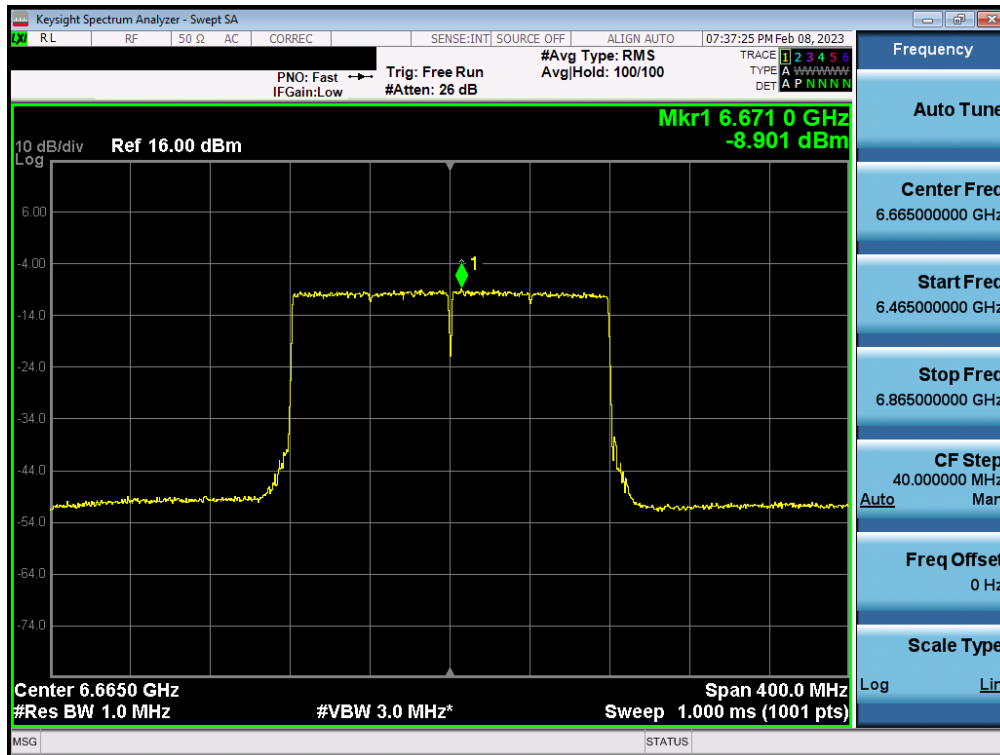


Plot 7-193. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 7) – Ch. 151)

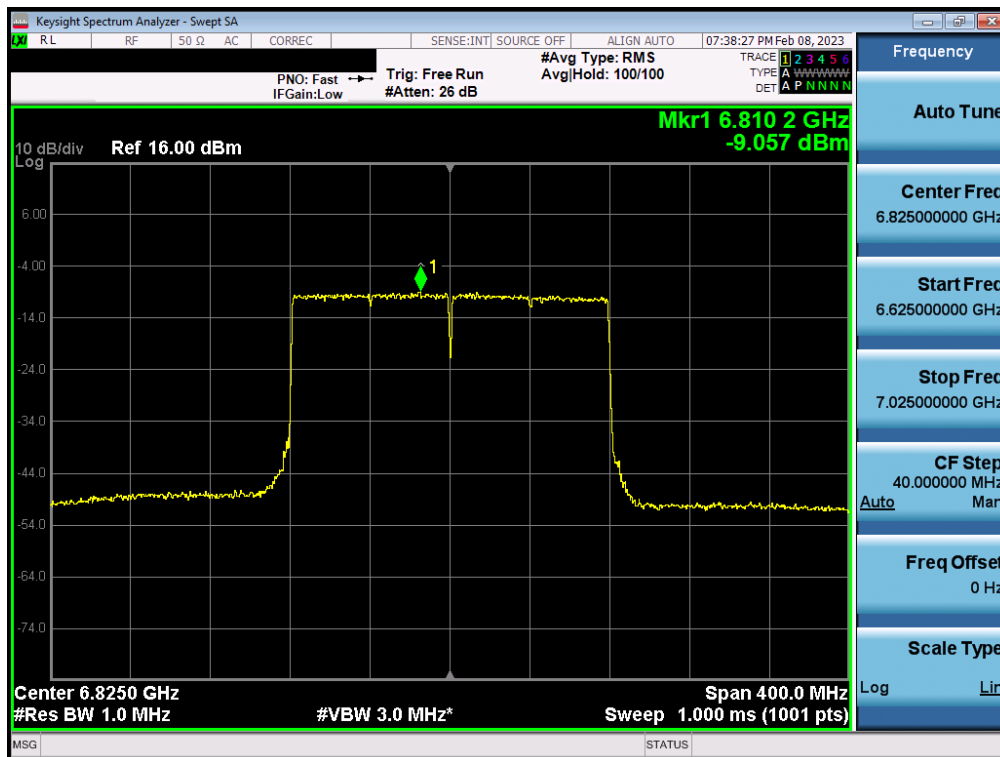


Plot 7-194. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 7) – Ch. 183)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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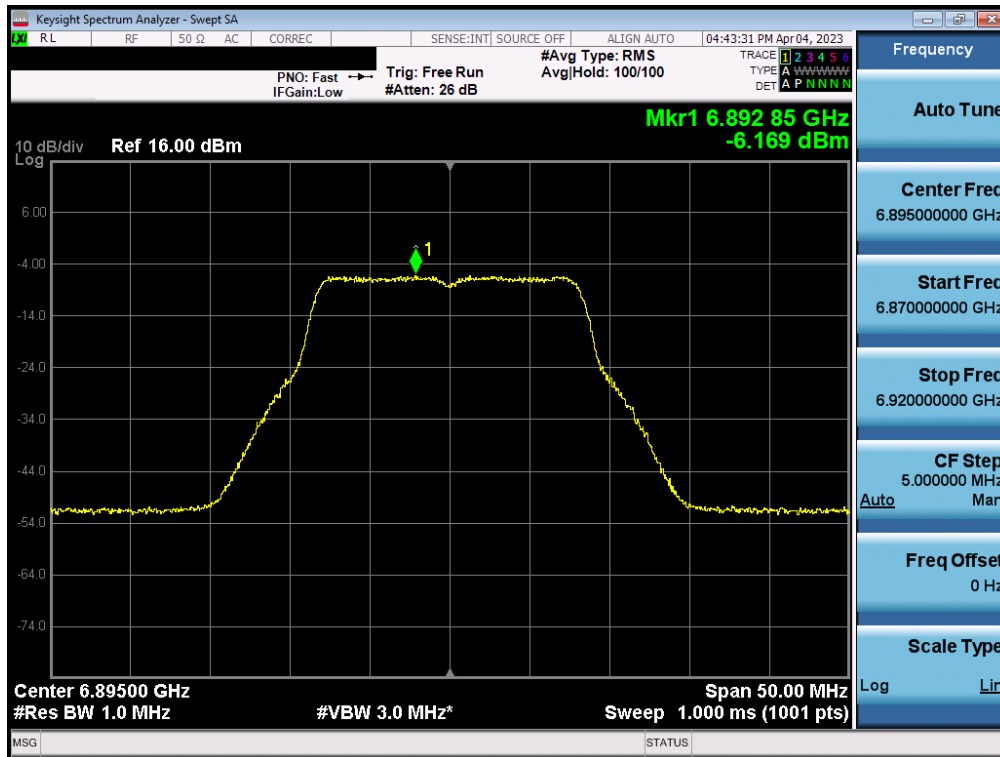
Plot 7-195. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 7) – Ch. 143)



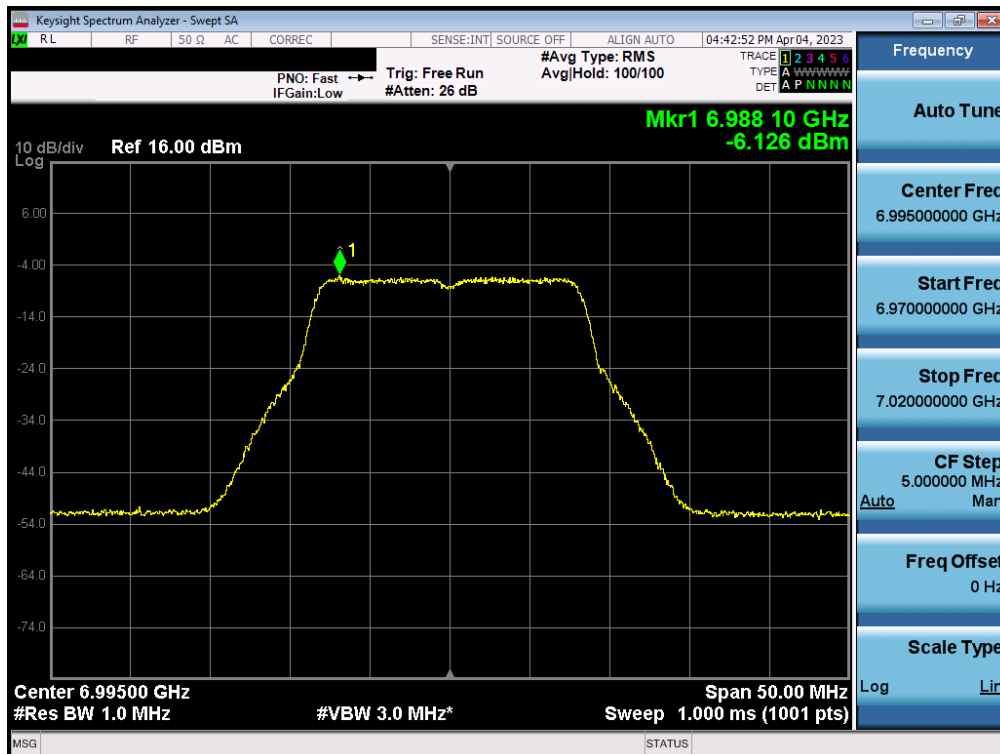
Plot 7-196. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 7) – Ch. 175)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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### 7.4.8 MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 8)

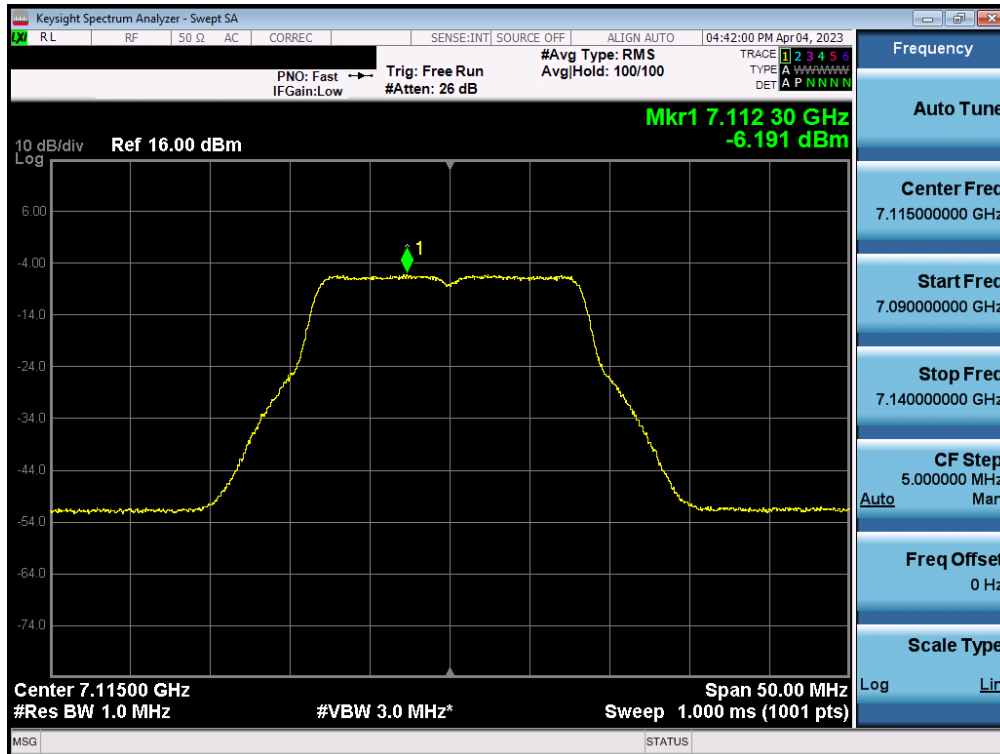


Plot 7-197. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 8) – Ch. 189)

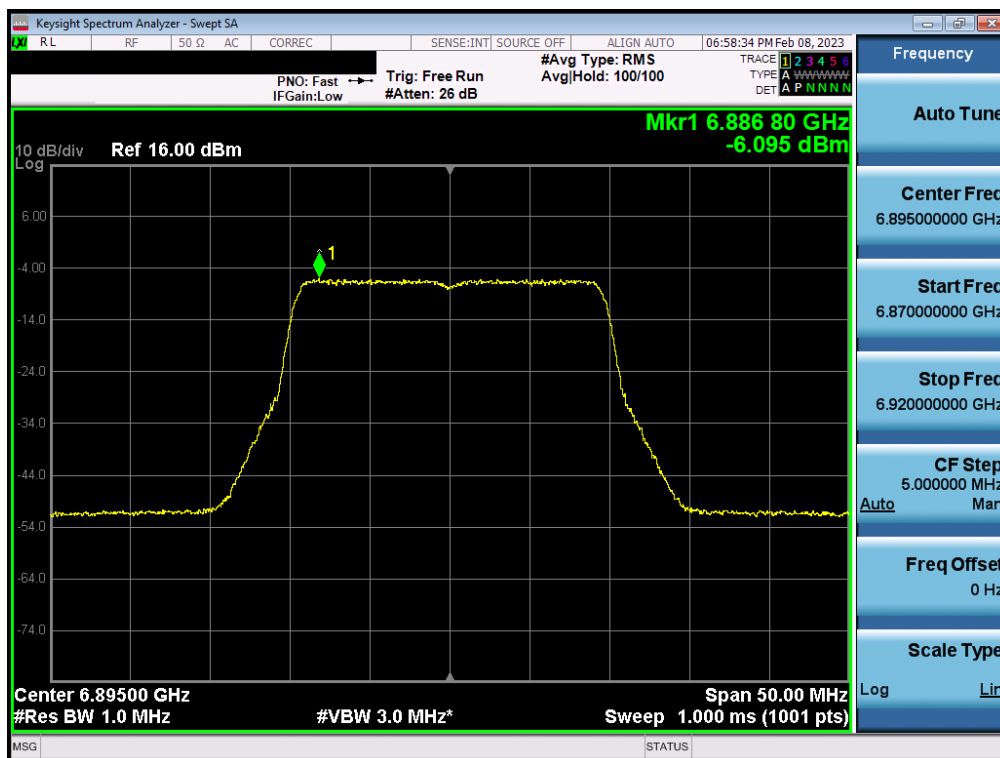


Plot 7-198. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 8) – Ch. 209)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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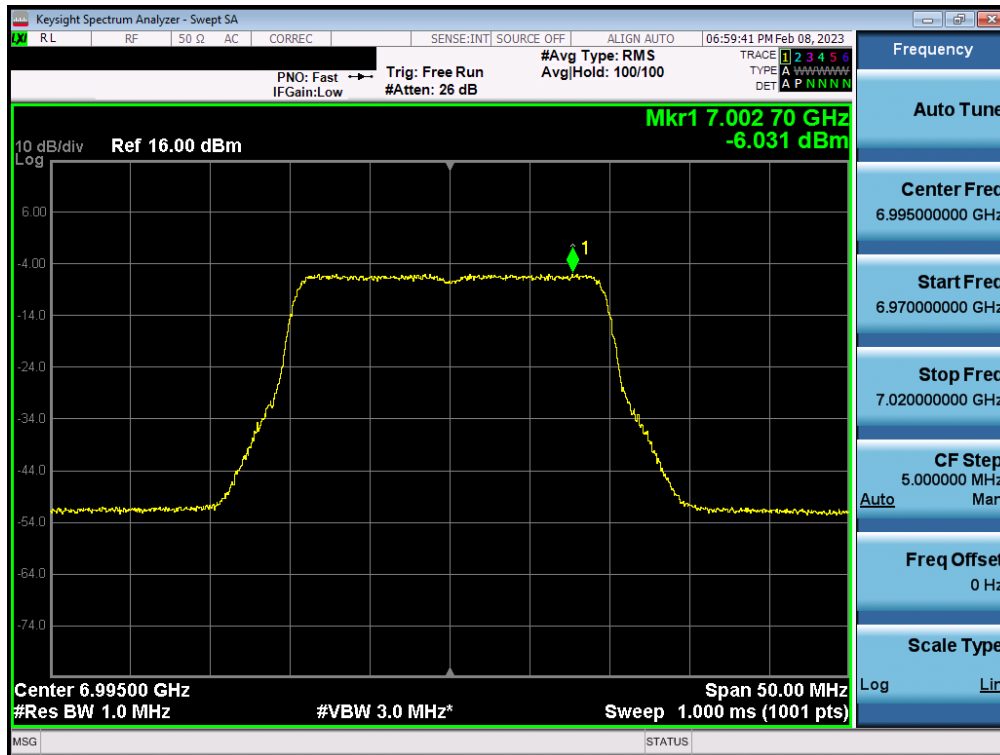


Plot 7-199. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 8) – Ch. 233)

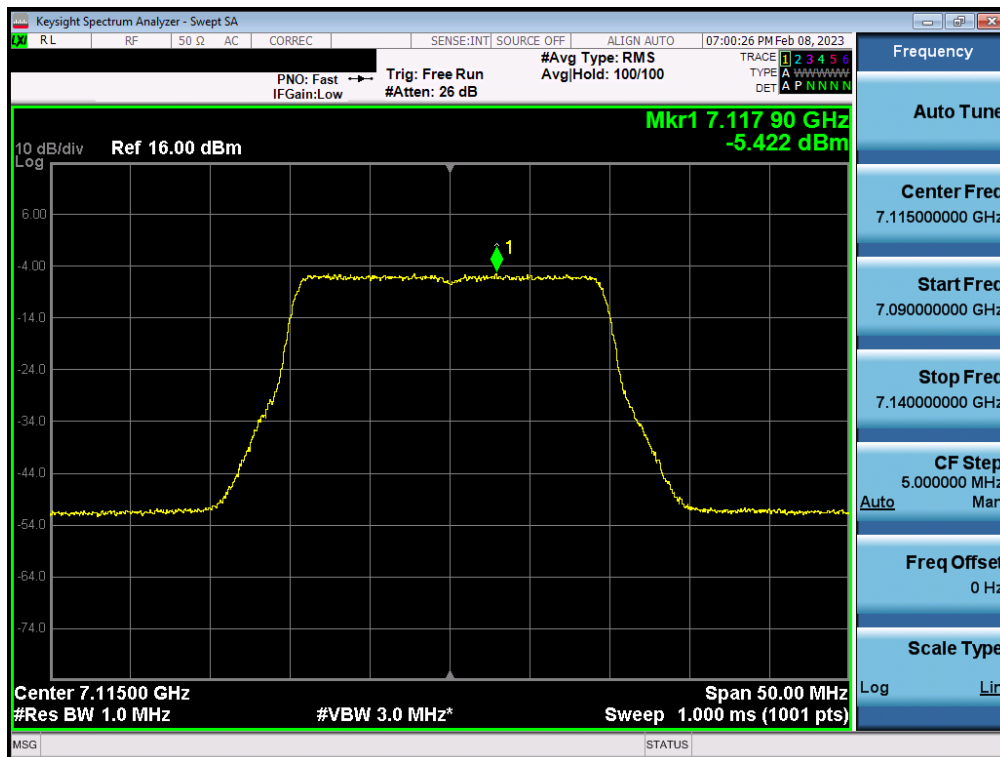


Plot 7-200. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 8) – Ch. 189)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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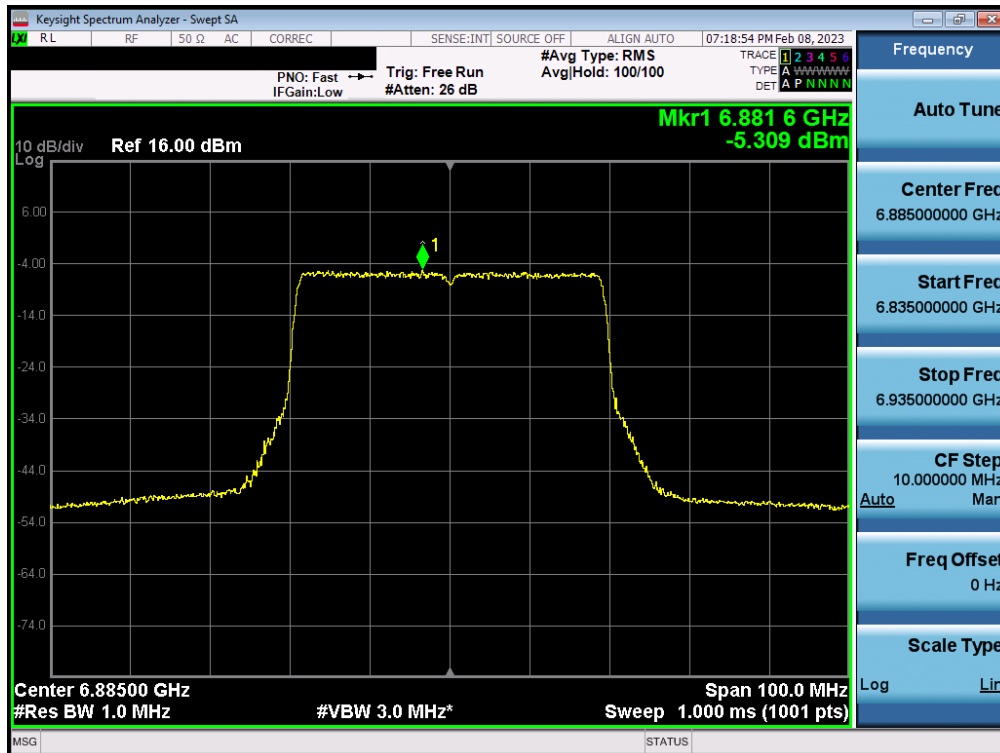
Plot 7-201. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 8) – Ch. 209)



Plot 7-202. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 8) – Ch. 233)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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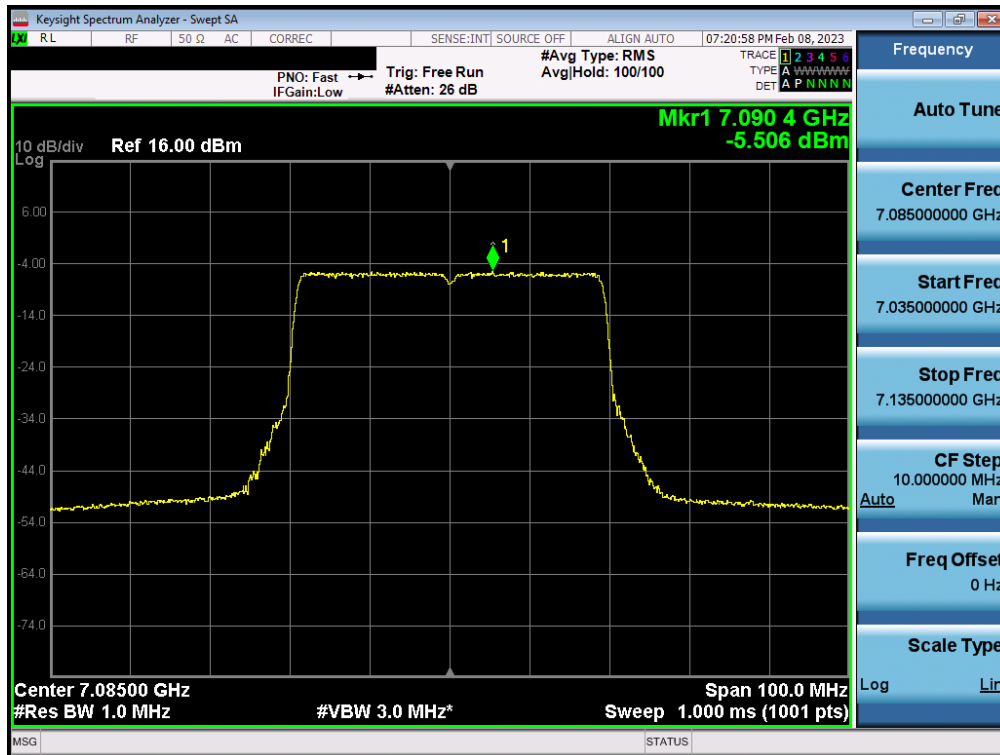
Plot 7-203. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 8) – Ch. 187)



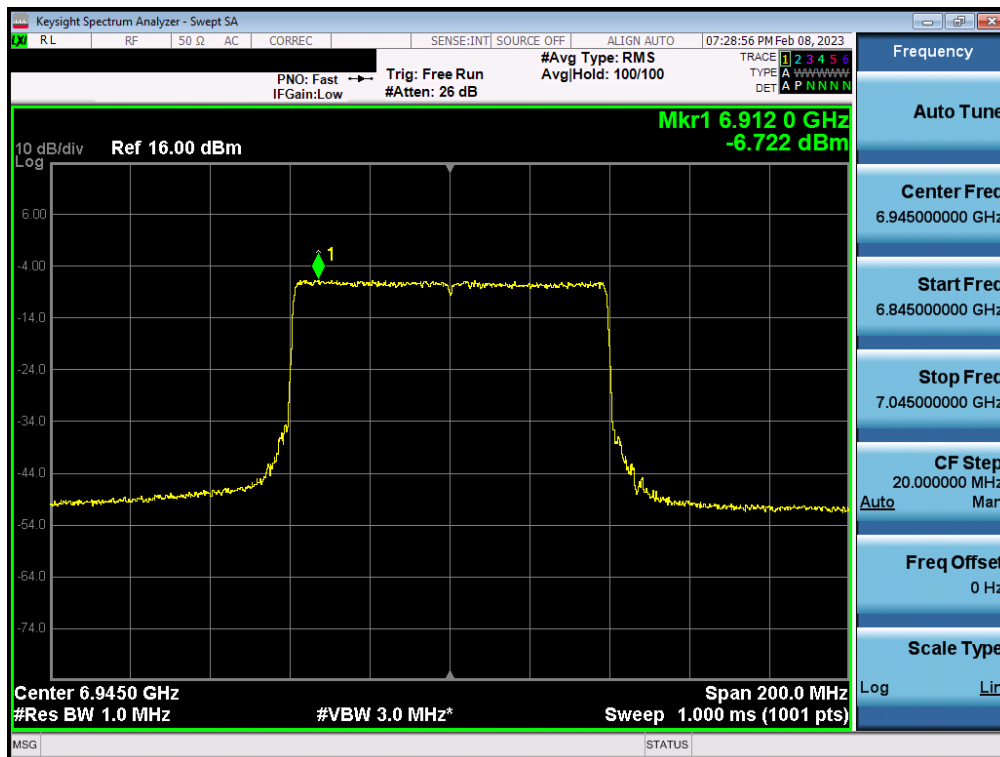
Plot 7-204. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 8) – Ch. 211)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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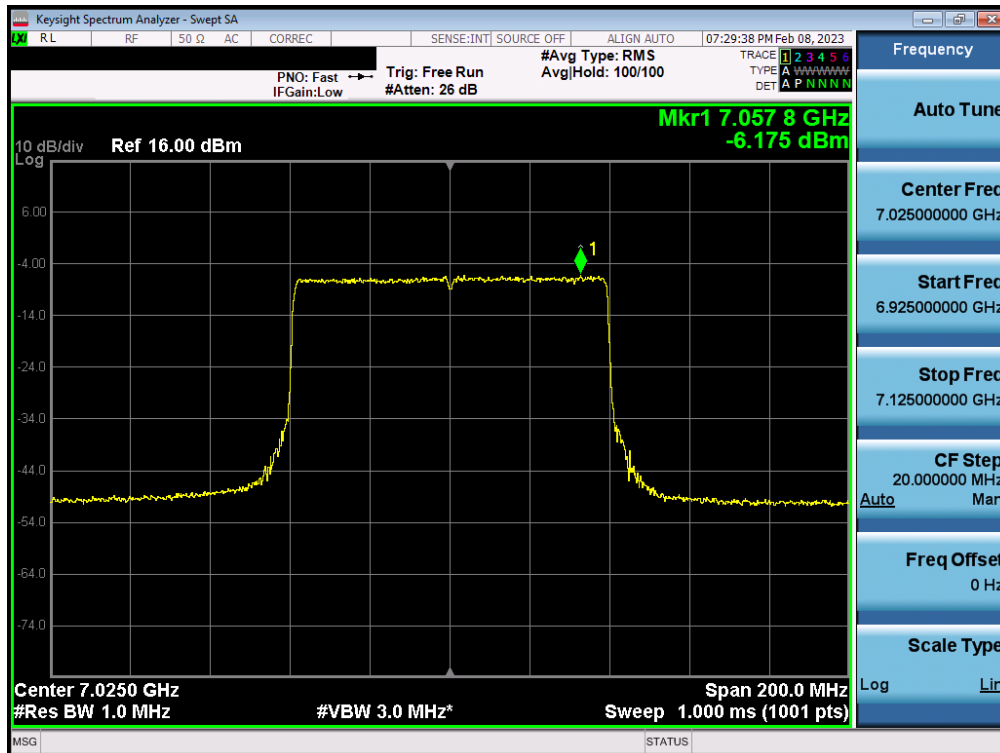


Plot 7-205. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 8) – Ch. 227)



Plot 7-206. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 8) – Ch. 199)

FCC ID: PY7-84558E	MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-207. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 8) – Ch. 215)



Plot 7-208. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 8) – Ch. 207)

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**Note:**

Per ANSI C63.10-2013 Section 14.3.2.2 and KDB 662911 v02r01 Section E)2), the power spectral density at Antenna 1 and Antenna 2 were first measured separately as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Per ANSI C63.10-2013 Section 14.4.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used.

$$\text{Directional gain} = 10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] \text{ dBi}$$

**Sample MIMO Calculation:**

At 5955MHz in 802.11a (20MHz BW) mode, the average conducted power spectral density was measured to be -4.99 dBm for Antenna-1 and -5.11 dBm for Antenna-2.

$$\text{Antenna 1} + \text{Antenna 2} = \text{MIMO}$$

$$(-4.99 \text{ dBm} + -5.11 \text{ dBm}) = (0.32 \text{ mW} + 0.31 \text{ mW}) = 0.63 \text{ mW} = -2.04 \text{ dBm}$$

**Sample e.i.r.p Power Spectral Density Calculation:**

At 5955 MHz in 802.11a (20MHz BW) mode, the average MIMO power density was calculated to be -2.04 dBm with directional gain of 0.47 dBi.

$$\text{e.i.r.p. Power Spectral Density(dBm)} = \text{Power Spectral Density (dBm)} + \text{Ant gain (dBi)}$$

$$-2.04 \text{ dBm} + 0.47 \text{ dBi} = -1.57 \text{ dBm}$$

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## 7.5 In-Band Emissions

### Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies.

**For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.**

### Test Procedure Used

KDB 987594 D02 v01r01

### Test Settings

1. Connect output of the antenna port to a spectrum analyzer or EMI receiver, with appropriate attenuation, as to not damage the instrumentation.
2. Set the reference level of the measuring equipment in accordance with procedure 4.1.5.2 of ANSI C63.10- 2013.
3. Measure the 26 dB EBW using the test procedure 12.4.1 of ANSI C63.10-2013. (This will be used to determine the channel edge.)
4. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:
  - a) Set the span to encompass the entire 26 dB EBW of the signal.
  - b) Set RBW = same RBW used for 26 dB EBW measurement.
  - c) Set VBW  $\geq 3 \times$  RBW
  - d) Number of points in sweep  $\geq [2 \times \text{span} / \text{RBW}]$ .
  - e) Sweep time = auto.
  - f) Detector = RMS (i.e., power averaging)
  - g) Trace average at least 100 traces in power averaging (rms) mode.
  - h) Use the peak search function on the instrument to find the peak of the spectrum.
5. For the purposes of developing the emission mask, the channel bandwidth is defined as the 26 dB EBW.
6. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
  - i) Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
  - j) Suppressed by 28 dB at one channel bandwidth from the channel center.
  - k) Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.
7. Adjust the span to encompass the entire mask as necessary.
8. Clear trace.
9. Trace average at least 100 traces in power averaging (rms) mode.
10. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.

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**Test Setup**

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-4. Test Instrument & Measurement Setup**

**Test Notes**

None.

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