

## 5.8 Antenna Requirement

### Standard Applicable

**For intentional device, according to FCC 47 CFR Section 15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

**FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):**

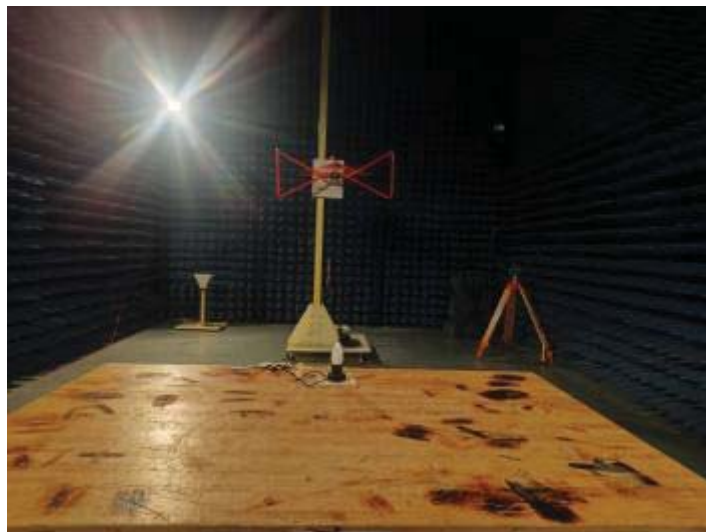
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

### Test Result:

The directional gains of antenna used for transmitting is -0.35dBi, and the antenna is an Internal monopole antenna and no consideration of replacement. Please see EUT photo for details.

Results: Compliance.

## 6 Test Setup Photos of the EUT



## **7 Photos of the EUT**

See related photo report.

**APPENDIX I. Conducted Peak Output Power****Test Result**

Conducted peak output power

Mode	Channel	Ant. 0 (dBm)	Ant. 1 (dBm)	Ant. 2 (dBm)	Ant. 3 (dBm)	Total (dBm)	Limit (dBm)	Result
IEEE 802.11b	1	19.05	N/A	N/A	N/A	N/A	30	PASS
	6	18.54	N/A	N/A	N/A	N/A	30	PASS
	11	17.91	N/A	N/A	N/A	N/A	30	PASS
IEEE 802.11g	1	15.04	N/A	N/A	N/A	N/A	30	PASS
	6	14.69	N/A	N/A	N/A	N/A	30	PASS
	11	14.08	N/A	N/A	N/A	N/A	30	PASS
IEEE 802.11n_20	1	13.48	N/A	N/A	N/A	N/A	30	PASS
	6	14.42	N/A	N/A	N/A	N/A	30	PASS
	11	13.80	N/A	N/A	N/A	N/A	30	PASS
IEEE 802.11n_40	3	14.07	N/A	N/A	N/A	N/A	30	PASS
	6	13.65	N/A	N/A	N/A	N/A	30	PASS
	9	13.40	N/A	N/A	N/A	N/A	30	PASS

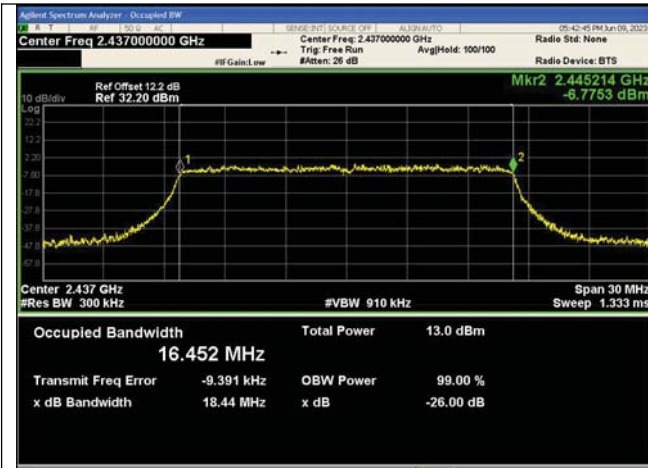
**APPENDIX II.99% Bandwidth**

**Test Result**

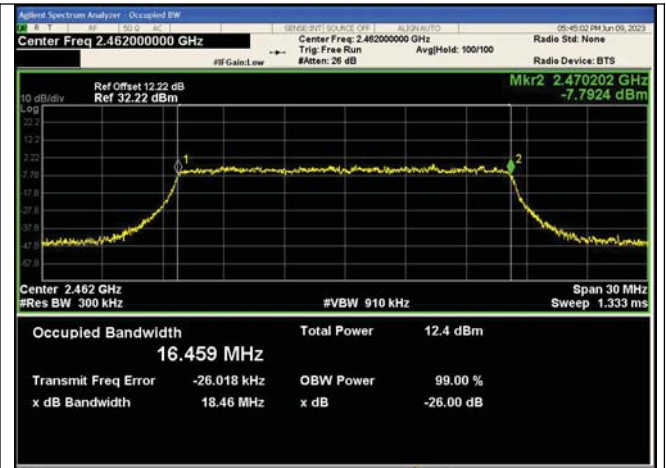
Mode	Channel	Ant.	99% BW (MHz)
IEEE 802.11b	1	0	13.062
	6		13.087
	11		13.072
IEEE 802.11g	1		16.442
	6		16.452
	11		16.459
IEEE 802.11n_20	1		17.251
	6		17.275
	11		17.291
IEEE 802.11n_40	3		34.342
	6		34.294
	9		34.291

**Test Graphs**

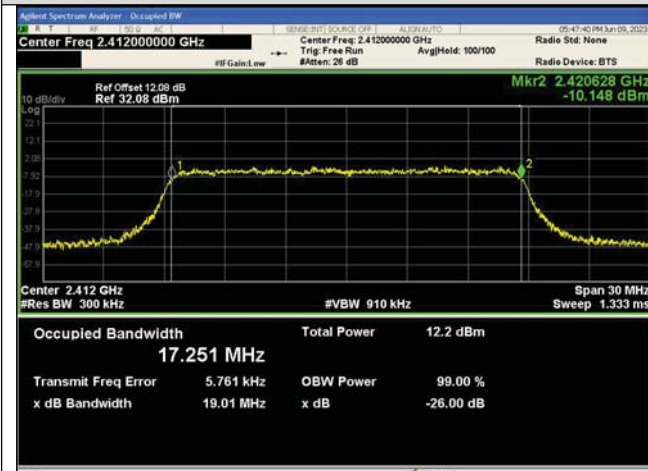




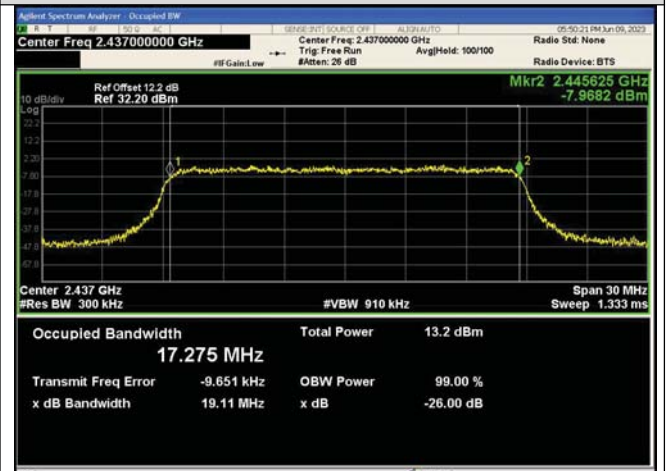
IEEE 802.11g\_Channel 6\_20MHz\_Antenna 0



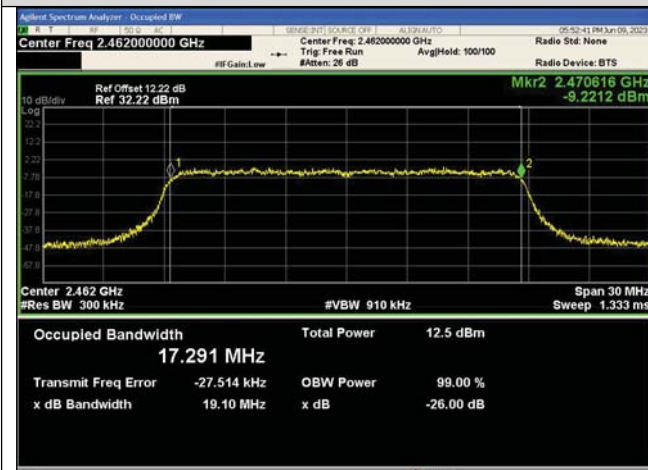
IEEE 802.11g\_Channel 11\_20MHz\_Antenna 0



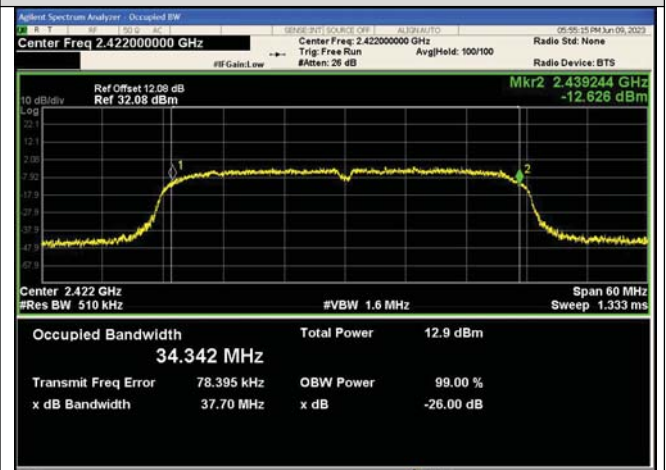
IEEE 802.11n\_Channel 1\_20MHz\_Antenna 0



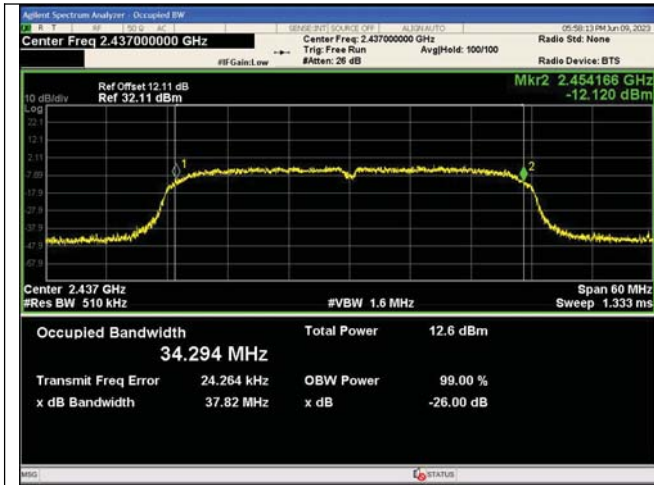
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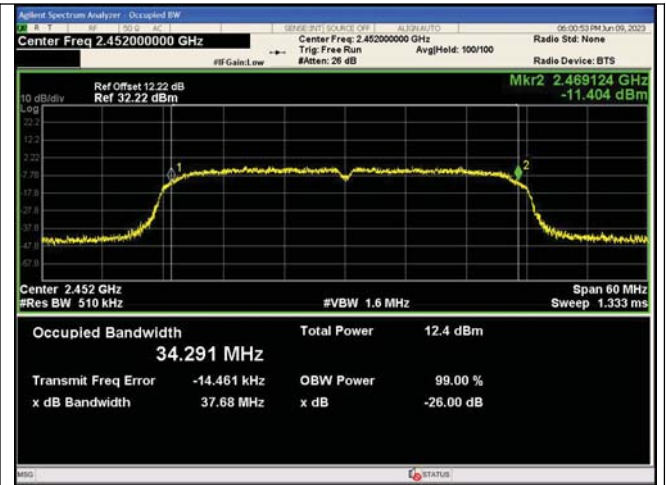
IEEE 802.11n\_Channel 11\_20MHz\_Antenna 0



IEEE 802.11n\_Channel 3\_40MHz\_Antenna 0



IEEE 802.11n\_Channel 6\_40MHz\_Antenna 0



IEEE 802.11n\_Channel 9\_40MHz\_Antenna 0

### APPENDIX III.6dB Bandwidth

#### Test Result

Mode	Channel	Ant.	Center Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
IEEE 802.11b	1	0	2412	9.370	0.5	PASS
	6		2437	9.384		PASS
	11		2462	9.376		PASS
IEEE 802.11g	1		2412	16.48		PASS
	6		2437	16.49		PASS
	11		2462	16.49		PASS
IEEE 802.11n_20	1		2412	17.01		PASS
	6		2437	17.03		PASS
	11		2462	17.05		PASS
IEEE 802.11n_40	3		2422	32.34		PASS
	6		2437	32.30		PASS
	9		2452	32.63		PASS

#### Test Graphs

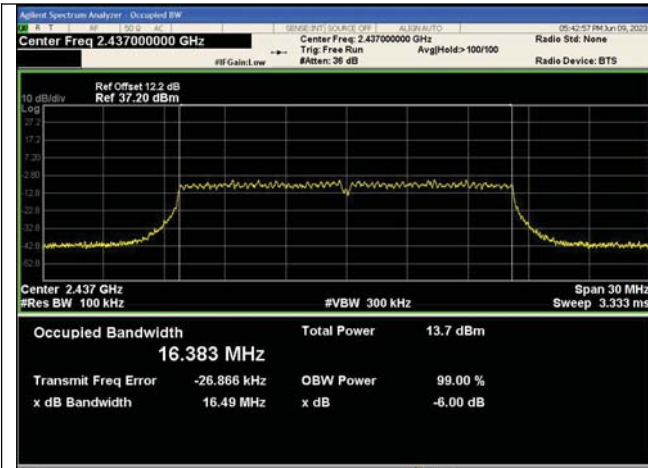
**IEEE 802.11b\_Channel 1\_20MHz\_Antenna 0**

**IEEE 802.11b\_Channel 6\_20MHz\_Antenna 0**

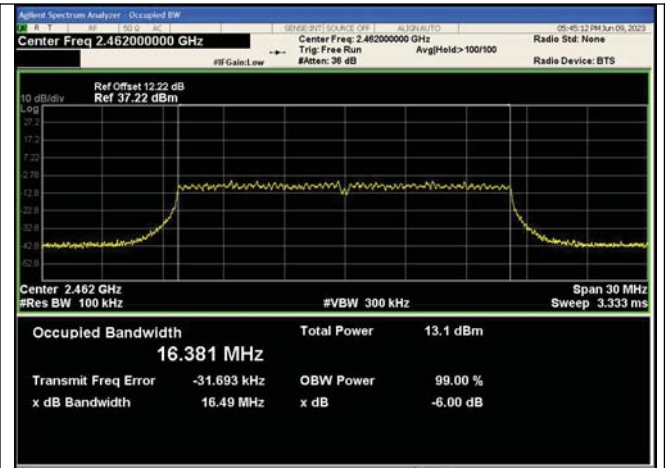
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**IEEE 802.11g\_Channel 1\_20MHz\_Antenna 0**

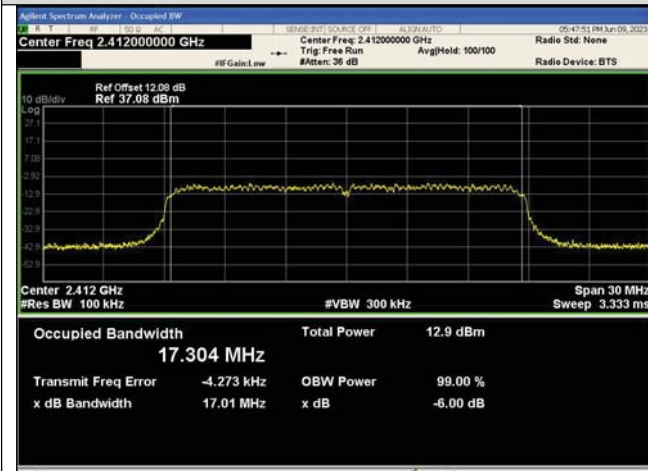




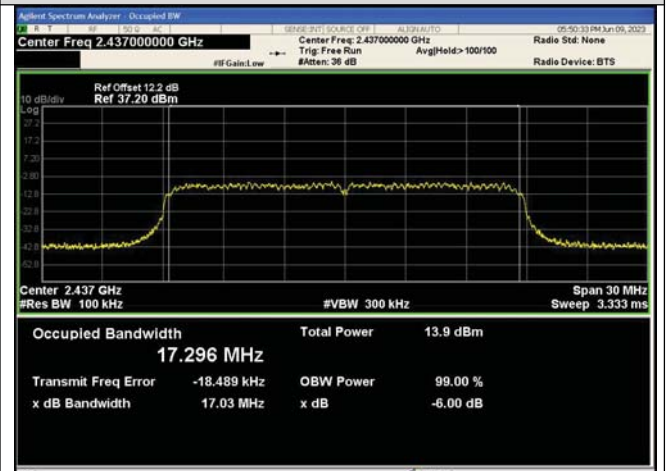
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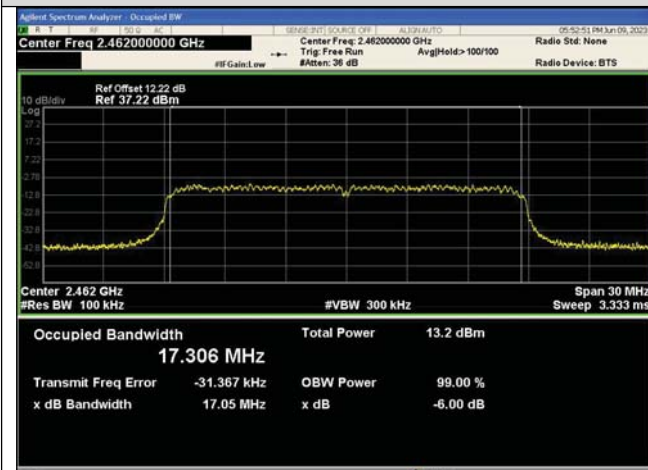
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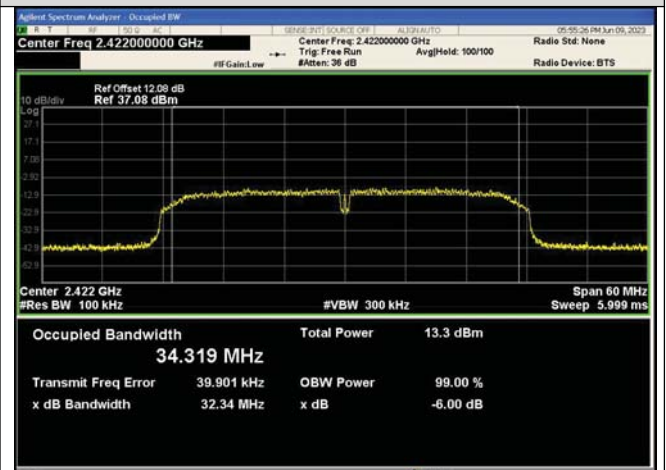
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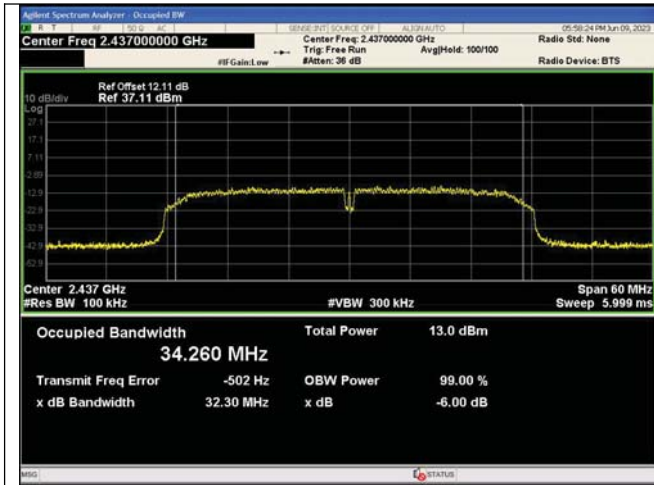
IEEE 802.11n\_Channel 6\_20MHz\_Antenna 0



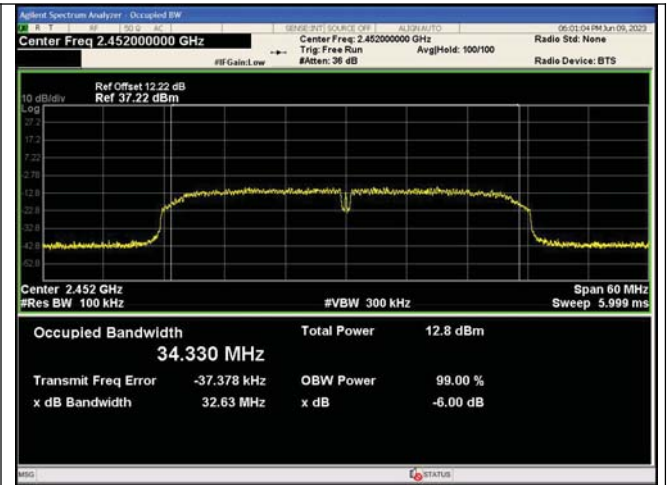
IEEE 802.11n\_Channel 11\_20MHz\_Antenna 0



IEEE 802.11n\_Channel 3\_40MHz\_Antenna 0



IEEE 802.11n\_Channel 6\_40MHz\_Antenna 0



IEEE 802.11n\_Channel 9\_40MHz\_Antenna 0

### APPENDIX IV. Conducted Out Of Band Emission

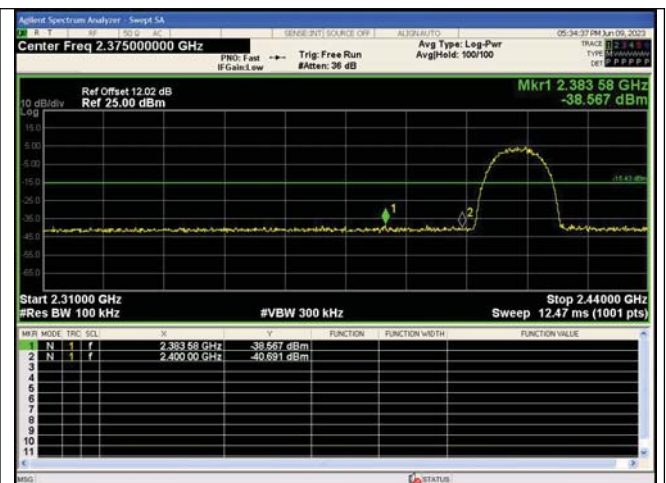
#### Test Result

Mode	Channel	Ant.	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	
IEEE 802.11b	1	0	2400.00	-40.691	-15.43	-25.261	PASS	
			2383.58	-38.567	-15.43	-23.137	PASS	
			3216.30	-37.766	-15.43	-22.336	PASS	
	6		3249.34	-37.857	-15.86	-21.997	PASS	
			11	2483.50	-38.396	-16.46	-22	PASS
				24895.1	-37.383	-16.46	-20.923	PASS
IEEE 802.11g	1		2400.00	-40.752	-25.04	-15.712	PASS	
			2398.53	-38.740	-25.04	-13.700	PASS	
			3216.30	-36.774	-25.04	-11.734	PASS	
	6		3249.34	-37.318	-25.25	-12.068	PASS	
			11	2483.50	-40.882	-25.78	-15	PASS
				3282.42	-38.246	-25.78	-12.466	PASS
IEEE 802.11n_20	1	2400.00	-38.726	-26.96	-11.766	PASS		
		2343.28	-38.676	-26.96	-11.716	PASS		
		3216.30	-36.376	-26.96	-9.416	PASS		
	6	3249.34	-36.892	-25.81	-11.082	PASS		
		11	2483.50	-38.970	-26.23	-13	PASS	
			24978.2	-38.375	-26.23	-12.145	PASS	
IEEE 802.11n_40	3	2400.00	-40.154	-28.32	-11.834	PASS		
		2324.95	-38.497	-28.32	-10.177	PASS		
		3229.40	-36.520	-28.32	-8.200	PASS		
	6	3249.34	-36.917	-28.82	-8.097	PASS		
		9	2483.50	-41.325	-29.09	-12	PASS	
			24935.1	-37.581	-29.09	-8.491	PASS	

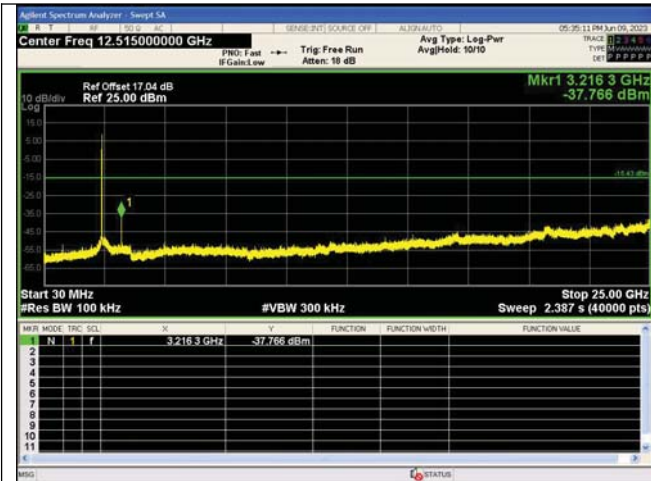
#### Test Graphs



**In-Band Reference Level**  
 IEEE 802.11b\_Channel 1\_20MHz\_Antenna 0



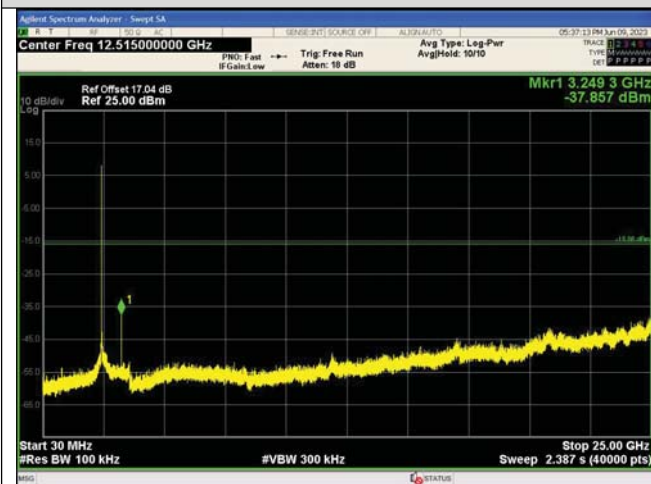
**Out Of Band Emission**  
 IEEE 802.11b\_Channel 1\_20MHz\_Antenna 0



**Spurious Emission**  
IEEE 802.11b\_Channel 1\_20MHz\_Antenna 0



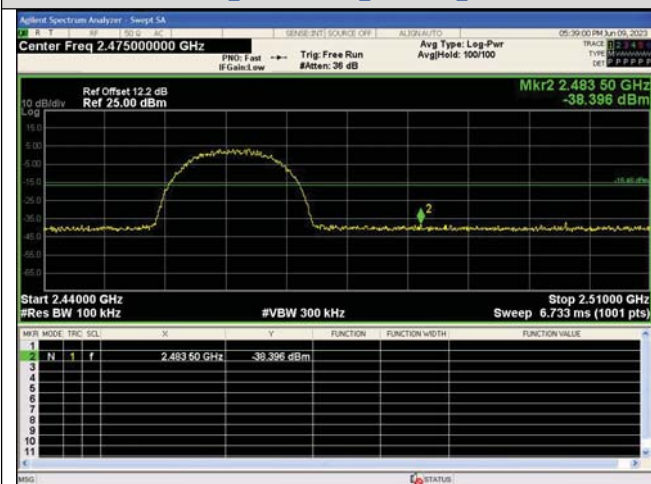
**In-Band Reference Level**  
IEEE 802.11b\_Channel 6\_20MHz\_Antenna 0



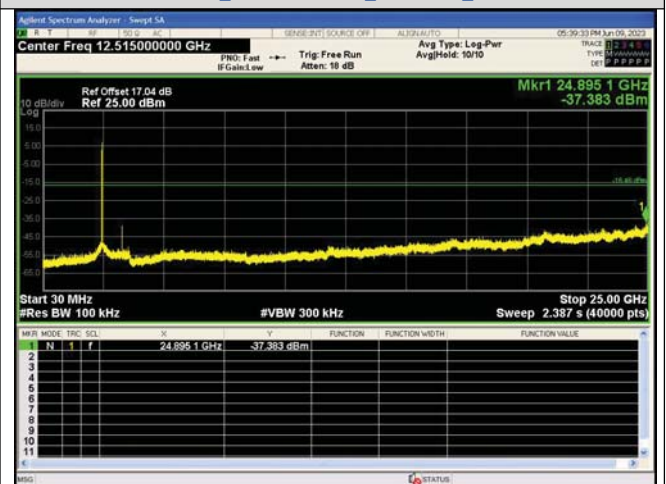
**Spurious Emissions**  
IEEE 802.11b\_Channel 6\_20MHz\_Antenna 0



**In-Band Reference Level**  
IEEE 802.11b\_Channel 11\_20MHz\_Antenna 0



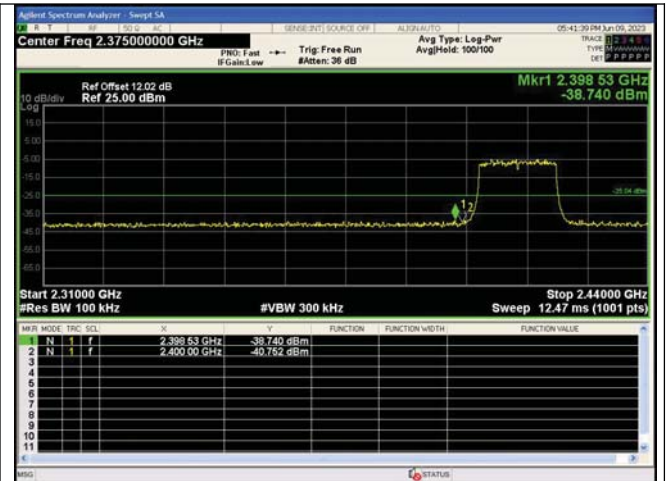
**Out Of Band Emission**  
IEEE 802.11b\_Channel 11\_20MHz\_Antenna 0



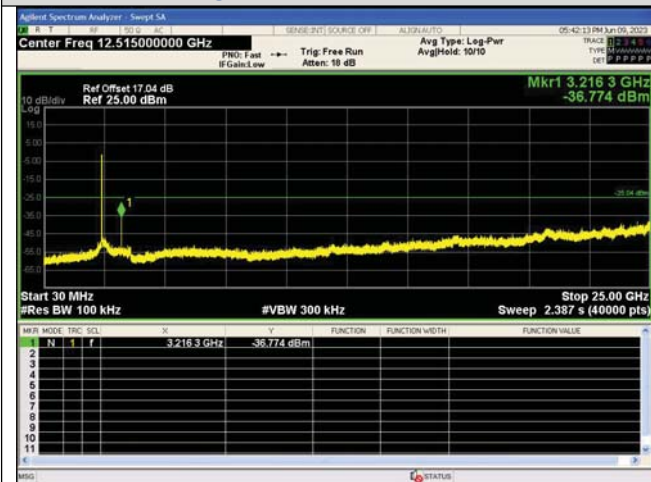
**Spurious Emission**  
IEEE 802.11b\_Channel 11\_20MHz\_Antenna 0



**In-Band Reference Level**  
 IEEE 802.11g\_Channel 1\_20MHz\_Antenna 0



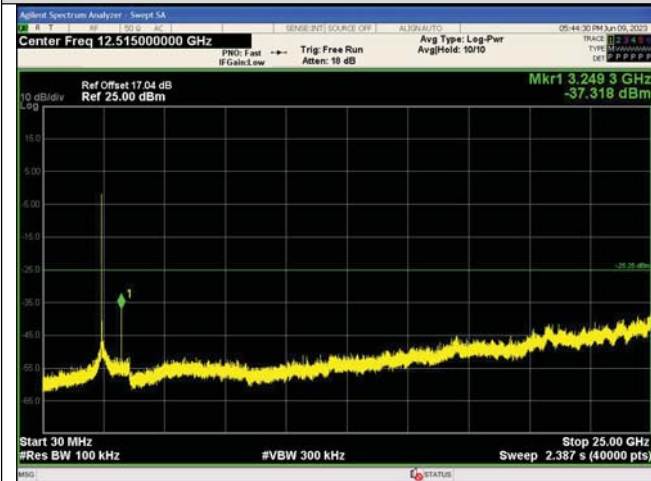
**Out Of Band Emission**  
 IEEE 802.11g\_Channel 1\_20MHz\_Antenna 0



**Spurious Emission**  
 IEEE 802.11g\_Channel 1\_20MHz\_Antenna 0



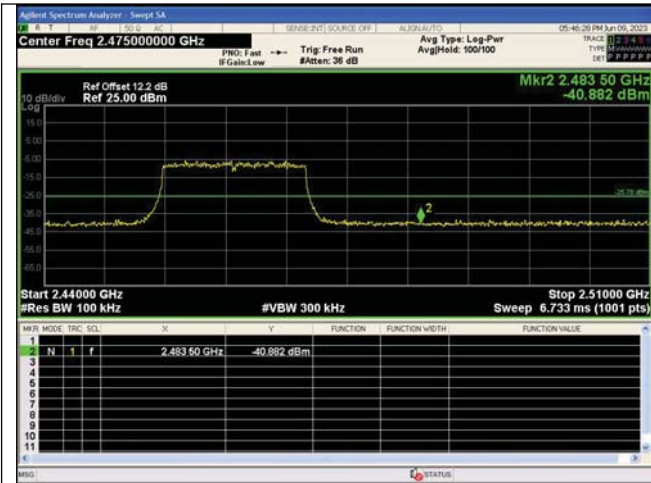
**In-Band Reference Level**  
 IEEE 802.11g\_Channel 6\_20MHz\_Antenna 0



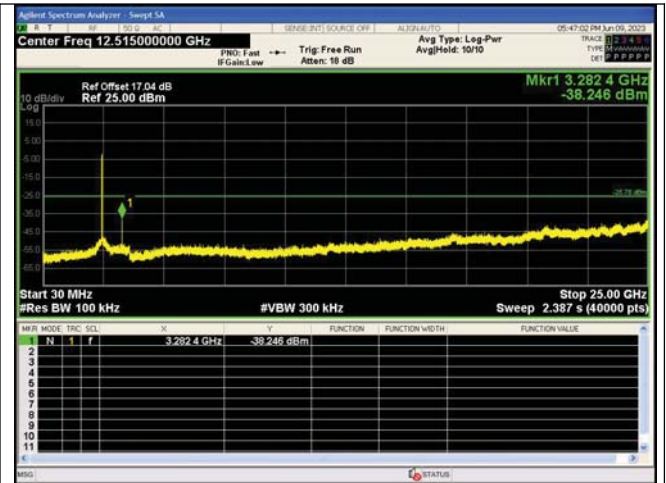
**Spurious Emissions**  
 IEEE 802.11g\_Channel 6\_20MHz\_Antenna 0



**In-Band Reference Level**  
 IEEE 802.11g\_Channel 11\_20MHz\_Antenna 0



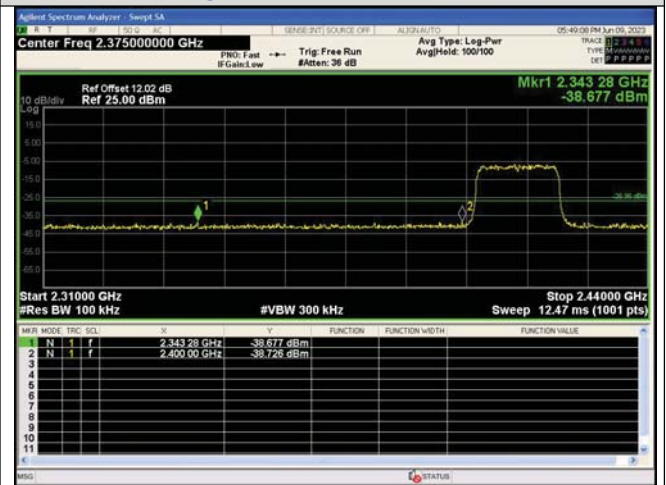
**Out Of Band Emission**  
IEEE 802.11g\_Channel 11\_20MHz\_Antenna 0



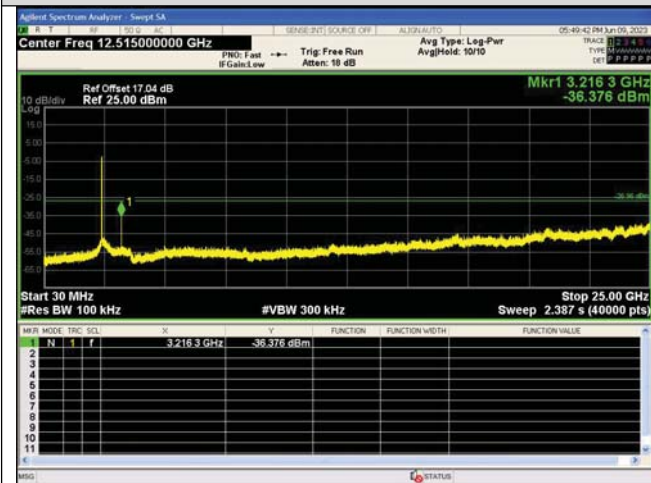
**Spurious Emission**  
IEEE 802.11g\_Channel 11\_20MHz\_Antenna 0



**In-Band Reference Level**  
IEEE 802.11n\_Channel 1\_20MHz\_Antenna 0



**Out Of Band Emission**  
IEEE 802.11n\_Channel 1\_20MHz\_Antenna 0



**Spurious Emission**  
IEEE 802.11n\_Channel 1\_20MHz\_Antenna 0



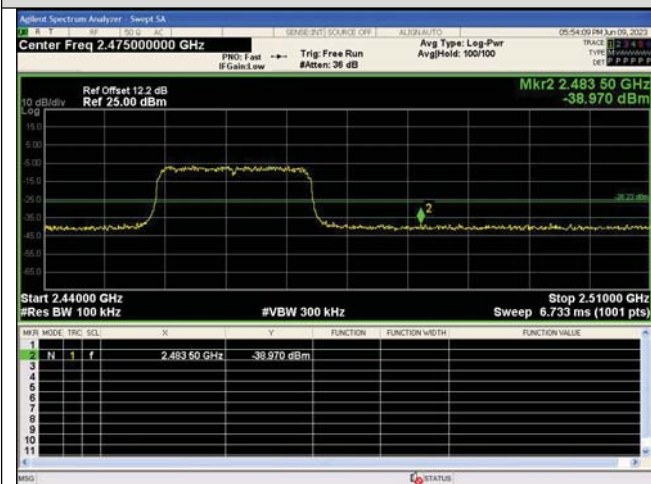
**In-Band Reference Level**  
IEEE 802.11n\_Channel 6\_20MHz\_Antenna 0



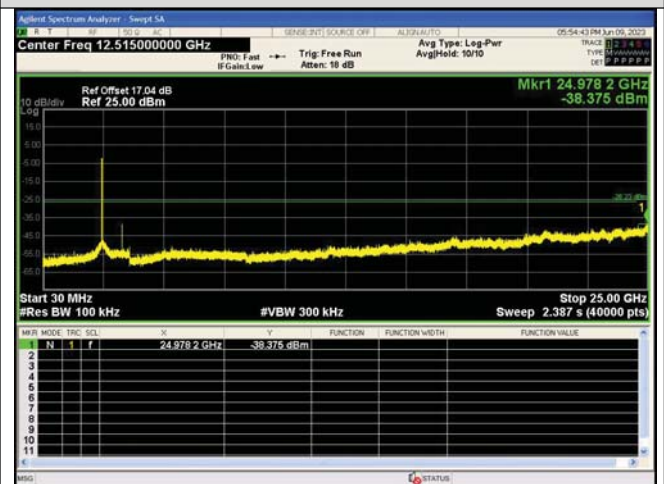
**Spurious Emissions**  
 IEEE 802.11n\_Channel 6\_20MHz\_Antenna 0



**In-Band Reference Level**  
 IEEE 802.11n\_Channel 11\_20MHz\_Antenna 0



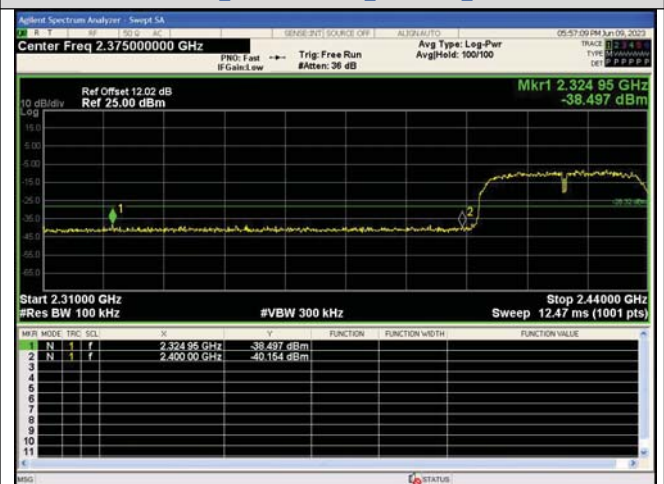
**Out Of Band Emission**  
 IEEE 802.11n\_Channel 11\_20MHz\_Antenna 0



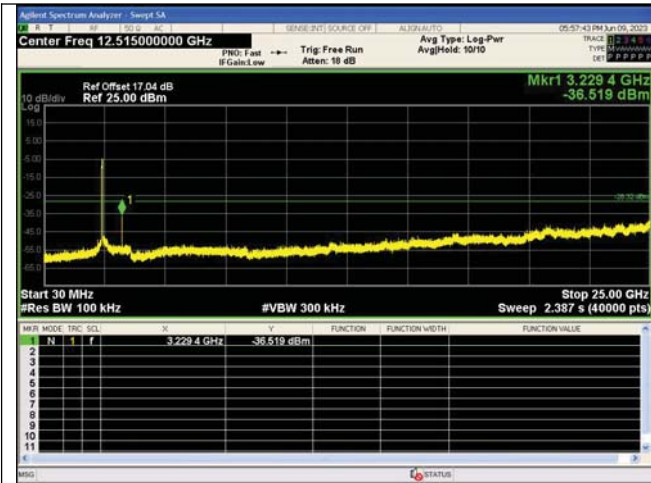
**Spurious Emission**  
 IEEE 802.11n\_Channel 11\_20MHz\_Antenna 0



**In-Band Reference Level**  
 IEEE 802.11n\_Channel 3\_40MHz\_Antenna 0



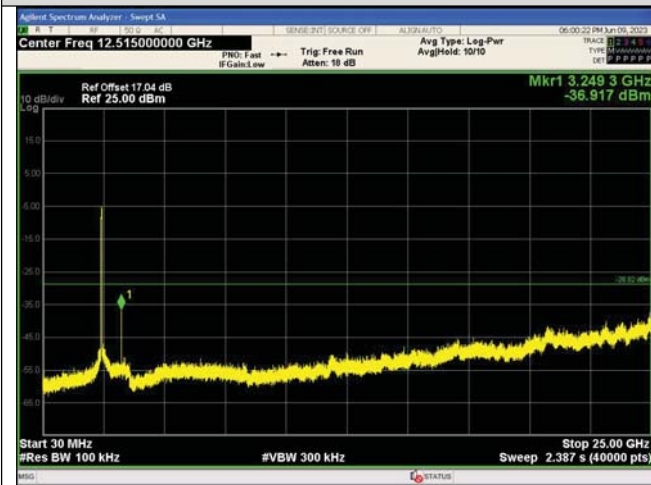
**Out Of Band Emission**  
 IEEE 802.11n\_Channel 3\_40MHz\_Antenna 0



**Spurious Emission**  
IEEE 802.11n\_Channel 3\_40MHz\_Antenna 0



**In-Band Reference Level**  
IEEE 802.11n\_Channel 6\_40MHz\_Antenna 0



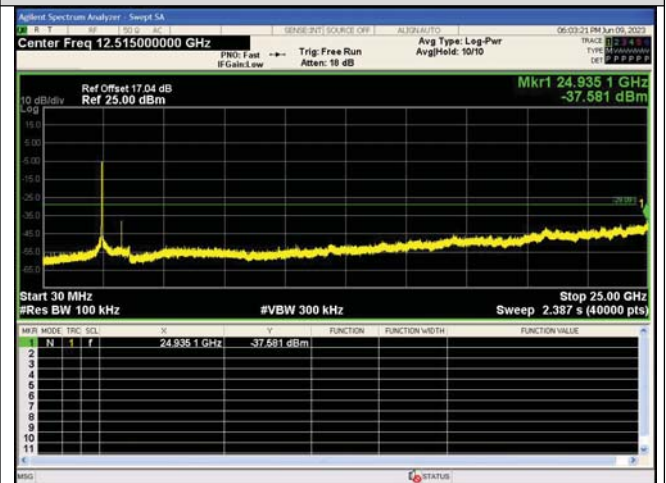
**Spurious Emissions**  
IEEE 802.11n\_Channel 6\_40MHz\_Antenna 0



**In-Band Reference Level**  
IEEE 802.11n\_Channel 9\_40MHz\_Antenna 0



**Out Of Band Emission**  
IEEE 802.11n\_Channel 9\_40MHz\_Antenna 0



**Spurious Emission**  
IEEE 802.11n\_Channel 9\_40MHz\_Antenna 0

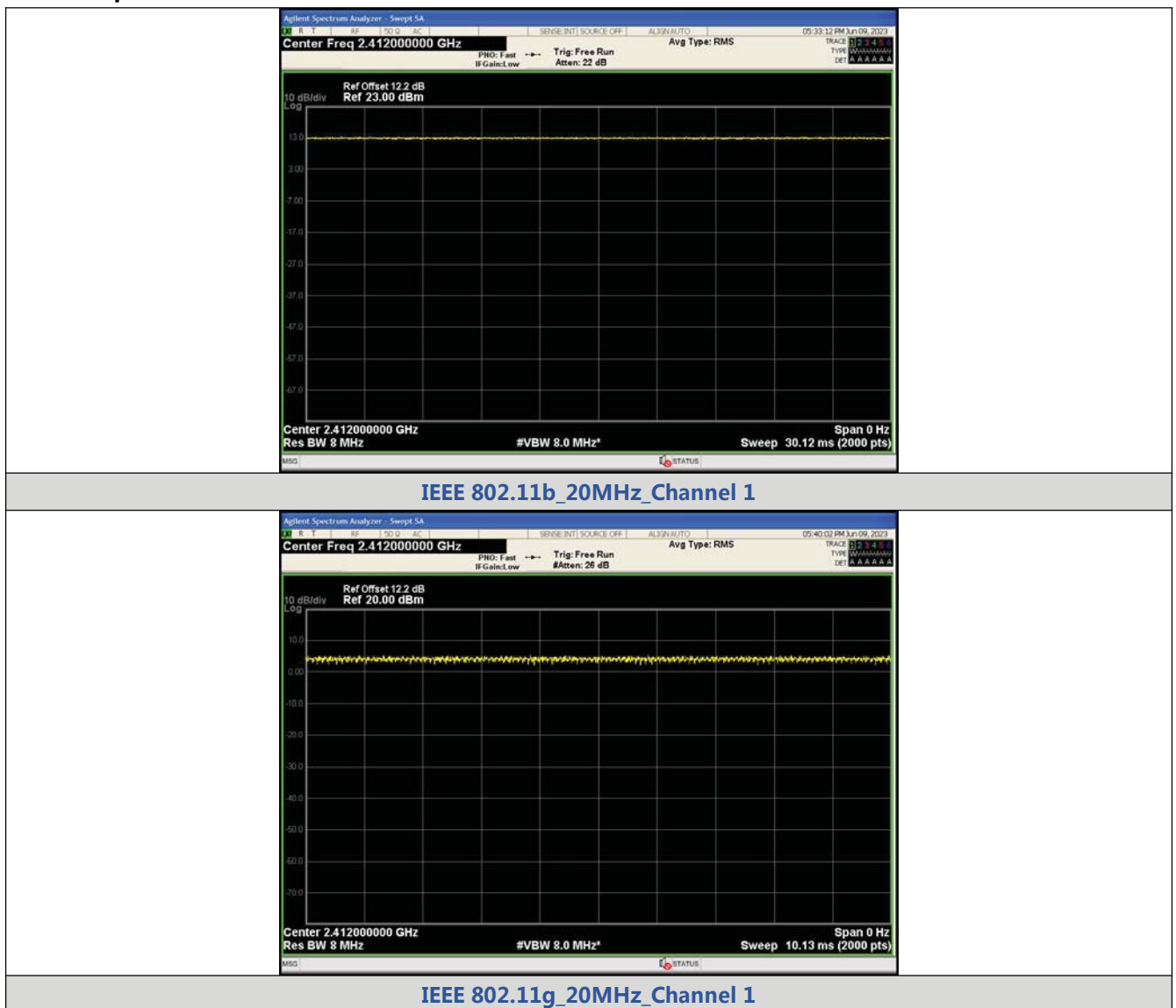


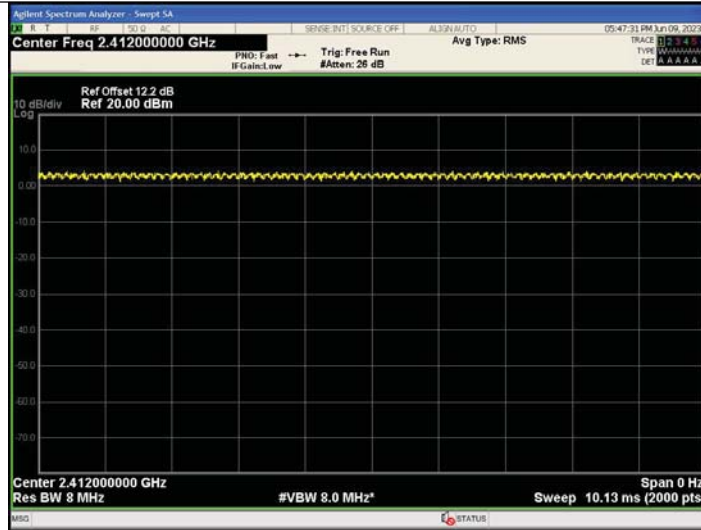
### APPENDIX V.Duty Cycle

#### Test Result

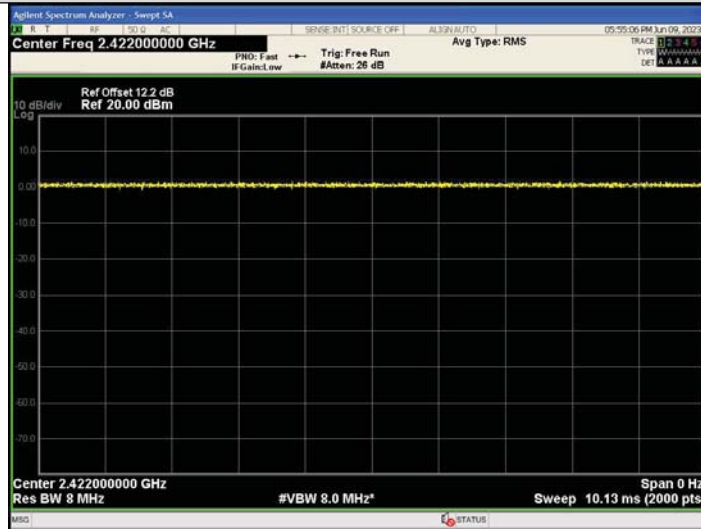
Mode	Data rates	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)
IEEE 802.11b	11	1	30.120	30.120	100	1	0.0
IEEE 802.11g	54	1	10.130	10.130	100	1	0.0
IEEE 802.11n_20	MCS 7	1	10.130	10.130	100	1	0.0
IEEE 802.11n_40		3	10.130	10.130	100	1	0.0

#### Test Graphs





IEEE 802.11n\_20MHz\_Channel 1



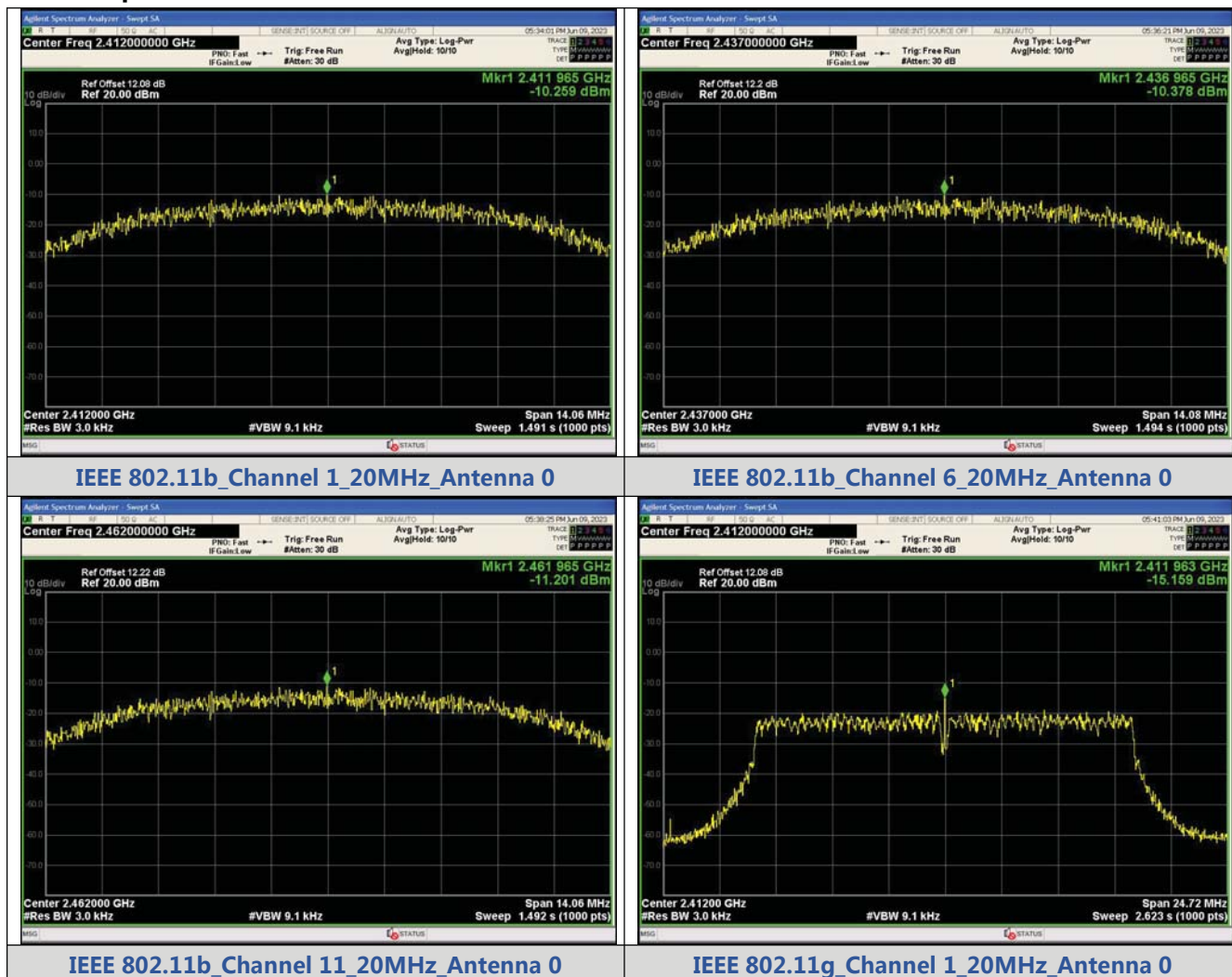
IEEE 802.11n\_40MHz\_Channel 3

### APPENDIX VI. Power Spectral Density

#### Test Result

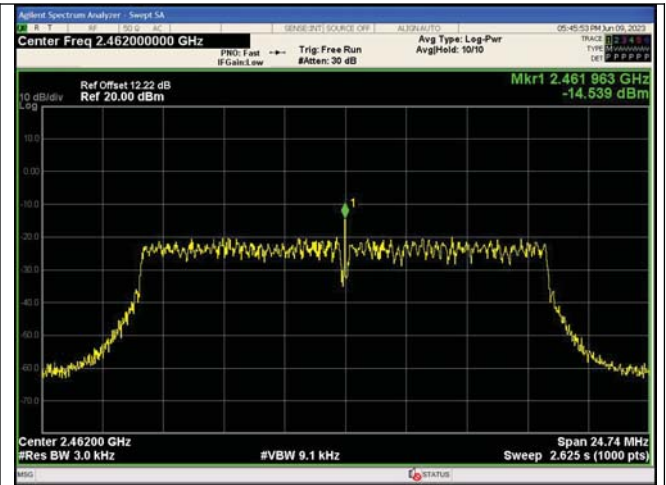
Mode	Channel	PSD (dBm/3kHz) Ant. 0	Limit (dBm/3kHz)	Result
IEEE 802.11b	1	-10.259	8	PASS
	6	-10.378		PASS
	11	-11.201		PASS
IEEE 802.11g	1	-15.159		PASS
	6	-14.129		PASS
	11	-14.539		PASS
IEEE 802.11n_20	1	-14.835		PASS
	6	-14.636		PASS
	11	-15.342		PASS
IEEE 802.11n_40	3	-14.852		PASS
	6	-14.670		PASS
	9	-14.166		PASS

#### Test Graphs

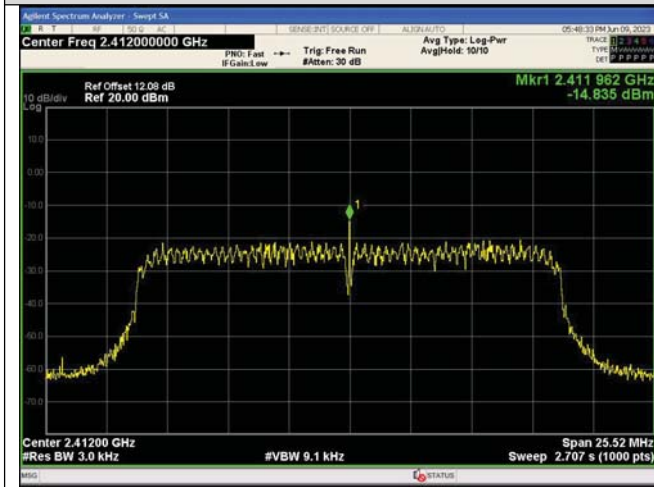




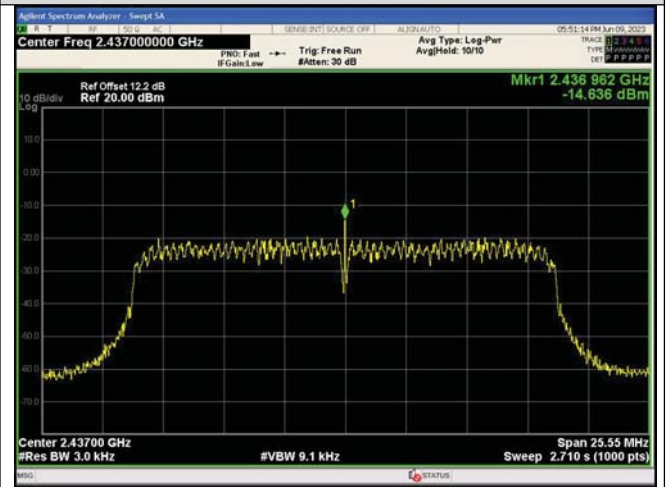
IEEE 802.11g\_Channel 6\_20MHz\_Antenna 0



IEEE 802.11g\_Channel 11\_20MHz\_Antenna 0



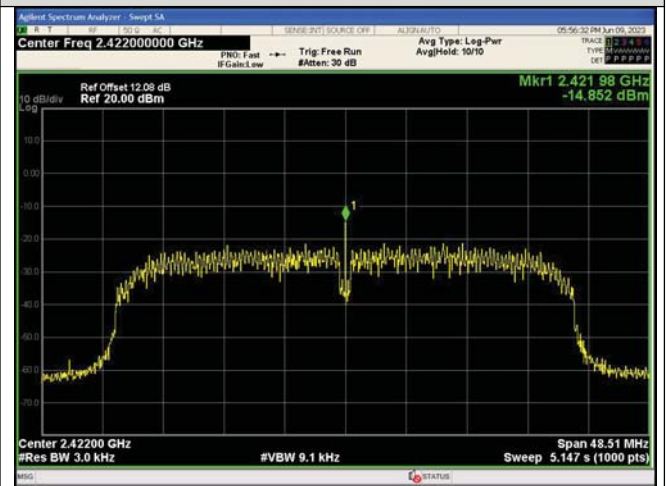
IEEE 802.11n\_Channel 1\_20MHz\_Antenna 0



IEEE 802.11n\_Channel 6\_20MHz\_Antenna 0



IEEE 802.11n\_Channel 11\_20MHz\_Antenna 0



IEEE 802.11n\_Channel 3\_40MHz\_Antenna 0



IEEE 802.11n\_Channel 6\_40MHz\_Antenna 0



IEEE 802.11n\_Channel 9\_40MHz\_Antenna 0

\*\*\*\*\* End of Report \*\*\*\*\*