

TxBF

TxBF Protocol	Unwanted Emissions Within the RLAN Band	
	Margin (dB)	Frequency (MHz)
802.11ax HE40 SU	1.54	6327
802.11ax HE80 SU	1.54	6995

Table 378 - Unwanted Emissions Within the RLAN Band Summary Results - MIMO TxBF

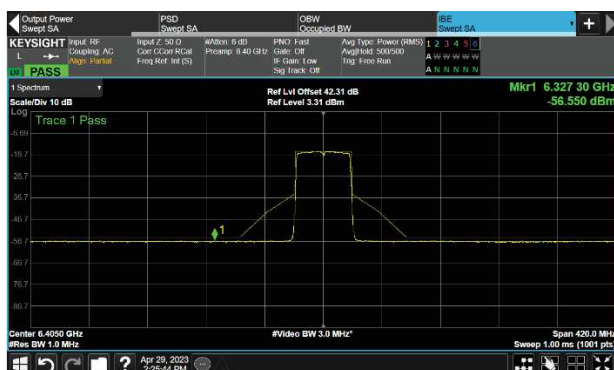


Figure 163 - A (Core 0) 802.11ax HE40 SU - 6405 MHz (CH43)



Figure 164 - A (Core 0) 802.11ax HE80 SU - 6865 MHz (CH183)



Test Configuration			
Frequency Range:	5.925 - 7.125 GHz	Band:	U-NII-5, U-NII-6, U-NII-8
Limit Clause(s):	15.407(b)	Test Method(s):	KDB 987594 clause j

DUT Configuration			
Mode:	802.11ax HE40 SU	Duty Cycle (%):	-
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	TxBF	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain Id(s):	0+1

Test Frequency (MHz)	Unwanted Emissions Within the RLAN Band Margin (dB)			
	A	B	C	D
6125	2.34	2.81		
6285	3.78	2.58	-	-
6405	1.54	2.12	-	-
6445	3.48	2.89	-	-
6485	2.34	3.46	-	-
6925	1.78	3.02	-	-
7005	2.47	2.76	-	-
7085	3.34	0.50	-	-

Table 379 - Unwanted Emissions Within the Band Results



Test Configuration			
Frequency Range:	5.925-7.125 GHz	Band:	U-NII-5, U-NII-6, U-NII-7, U-NII-8
Limit Clause(s):	15.407(b)	Test Method(s):	KDB 987594 clause j

DUT Configuration			
Mode:	802.11ax HE80 SU	Duty Cycle (%):	-
Modulation Coding Scheme:	MCS2x1	DCCF (dB):	-
Antenna Configuration:	TxBF	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Core 0 + Core 1)	Active Chain Id(s):	0+1

Test Frequency (MHz)	Unwanted Emissions Within the RLAN Band Margin (dB)			
	A	B	C	D
5985	2.27	2.27	-	-
6145	2.84	3.44	-	-
6385	2.88	3.03	-	-
6465	3.27	3.73	-	-
6545	2.42	2.35	-	-
6625	2.63	2.17	-	-
6705	2.13	1.59	-	-
6785	2.46	2.02	-	-
6865	1.54	2.03	-	-
6945	2.19	2.62	-	-
7025	2.38	2.71	-	-

Table 380 - Unwanted Emissions Within the Band Results



FCC 47 CFR Part 15, Limit Clause 15.407(b)(6)

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.

ISED RSS-248, Limit Clause 4.6.2(b)

e.i.r.p. spectral density of unwanted emissions falling into the 5925-7125 MHz band shall be attenuated (in dB) below the reference power spectral density by:

- i. 20 dB at 1 MHz away from the channel edge; and
- ii. a linearly interpolated value between 20 dB and 28 dB at frequencies between 1 MHz outside of channel edge and one (1) channel bandwidth from the operating channel centre, respectively; and
- iii. 28 dB at one (1) channel bandwidth away from the operating channel centre; and
- iv. a linearly interpolated value between 28 dB and 40 dB at frequencies between one (1) channel bandwidth from the channel centre and one- and one-half (1.5) times the channel bandwidth away from the operating channel centre, respectively; and
- v. 40 dB at one- and one-half (1.5) times the channel bandwidth away from the channel centre; and
- vi. a minimum of 40 dB at frequencies that are further away than one and one-half (1.5) times the channel bandwidth from the channel centre.



2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 14.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Hygrometer	Rotronic	I-1000	3068	12	21-Sep-2023
1800-6000 MHz Power Splitter	Mini-Circuits	ZN2PD-63-S+	4055	-	O/P Mon
Multi-GNSS Simulator (GPS)	Spirent	GSS6700	4596	12	22-Aug-2023
Power splitter - 2 port	Mini-Circuits	ZN2PD-63-S+	4743	12	30-Nov-2023
Network Analyser	Keysight Technologies	E5063A	5018	12	29-Sep-2023
Cable (18 GHz)	Rosenberger	LU7-071-1000	5096	12	23-Oct-2023
Cable (18 GHz)	Rosenberger	LU7-071-1000	5100	12	23-Oct-2023
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	09-Sep-2023
Directional Coupler 2-8GHz	RF-Lambda	RFDC2G8G10	5765	-	O/P Mon
Directional Coupler 2-8GHz	RF-Lambda	RFDC2G8G10	5766	-	O/P Mon
1500VA AC Power Supply	iTech	IT7324	5907	-	O/P Mon
MXA Signal Analyser	Keysight Technologies	N9020B	5919	24	13-Mar-2024
Signal Conditioning Unit	TUV SUD	SPECTRUM_SCU001	5932	12	10-May-2023
Digital Multimeter	Fluke	115	6145	12	17-Jun-2023
Coaxial Fixed Attenuator DC-18GHz 5W 10dB	RF-Lambda	RFS5G18B10SMP	6176	12	17-Jul-2023

Table 381

O/P Mon - Output Monitored using calibrated equipment



2.7 Contention Based Protocol

2.7.1 Specification Reference

FCC 47 CFR Part 15E, Clause 15.407 (d)(6)
ISED RSS-248, Clause 4.7

2.7.2 Equipment Under Test and Modification State

A2918, S/N: KJ69CYVW1C - Modification State 0

2.7.3 Date of Test

26-April-2023

2.7.4 Test Method

This test was performed in accordance with KDB 987594 D02, clause I.

The AWGN signal level was initially set at a level much less than the required threshold level (< -62 dBm) it was verified at this point that transmissions from the device under test (DUT) were present. The signal level was gradually increased until it was observed that the DUT continuously ceased transmissions with the AWGN signal present, i.e., no partial transmissions other than short control signalling transmissions.

The AWGN Signal level recorded is the level in to the DUT's receiver, corrected for all cable losses. The minimum antenna gain value was then used to correct the level as described in KDB 987594 D04.

Timing plots showing verification that transmissions from the DUT responded to the interferer have been included in the test results below.

2.7.5 Test Setup Diagram

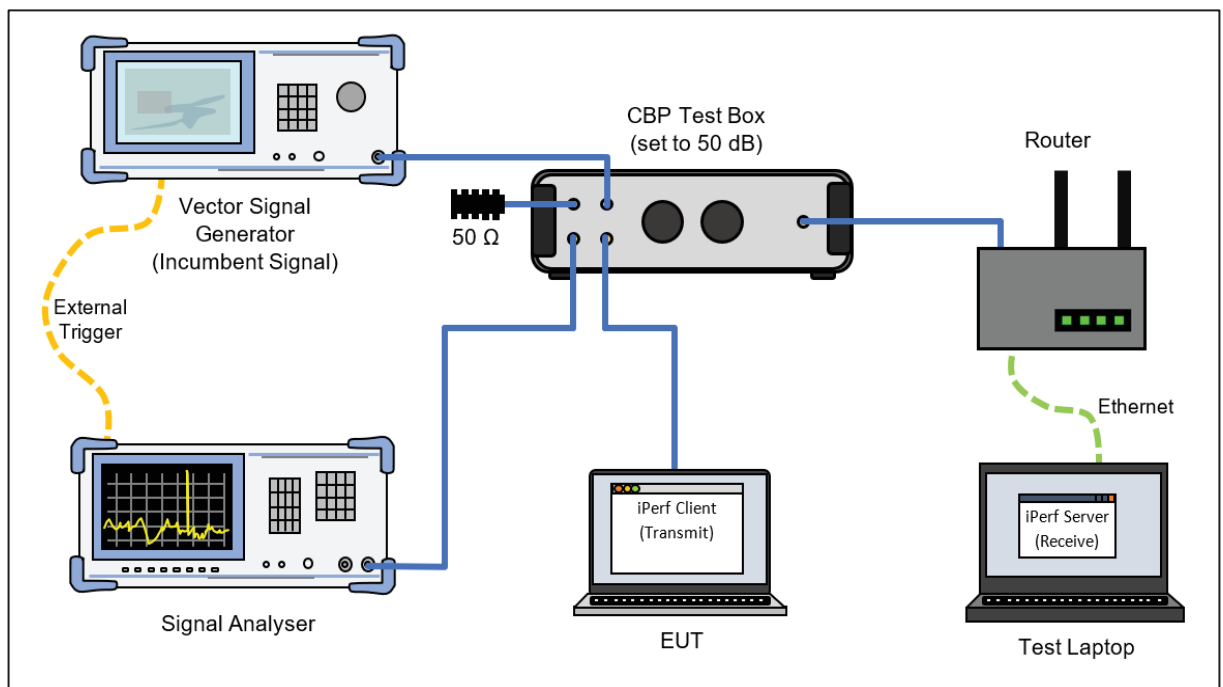


Figure 165 - Test Equipment Setup Diagram

2.7.6 Environmental Conditions

Ambient Temperature	24.4 °C
Relative Humidity	36.3 %



2.7.7 Test Results

6 GHz WLAN

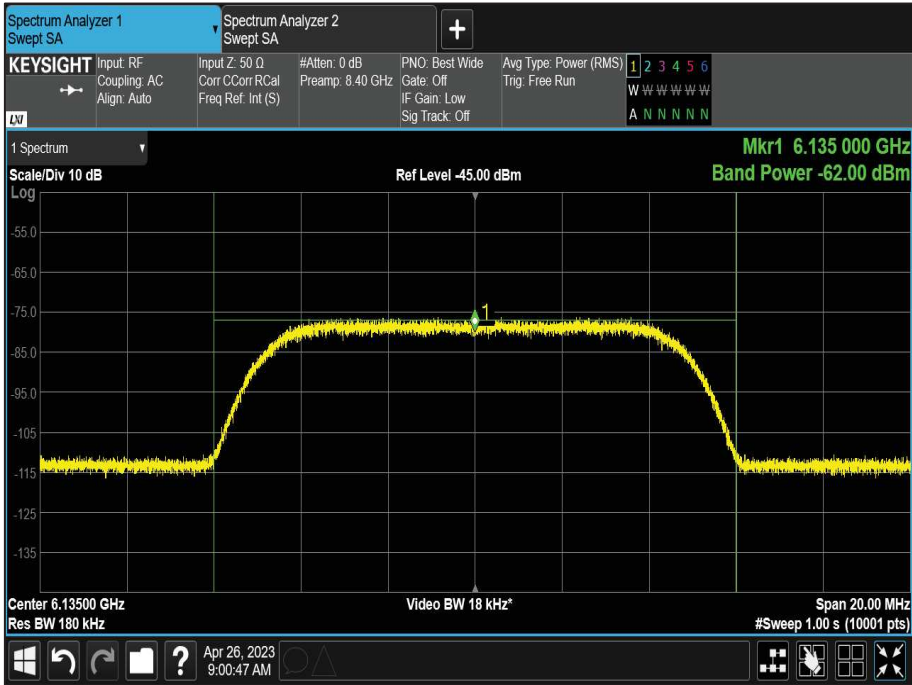


Figure 166 - Example of AWGN Signal



Parameter	Results		
U-NII Band	5	5	5
Channel Number	37	37	37
Bandwidth (MHz)	20	20	20
DUT Centre Frequency (MHz)	6135	6135	6135
AWGN Centre Frequency (MHz)	6135	6135	6135
AWGN Signal Power (dBm)	-70.07	-69.55	-69.26
Antenna Gain (dBi)	2.66	2.66	2.66
Adjusted Power (dBm)	-72.73	-72.21	-71.92
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 382 - U-NII-5, Minimum Bandwidth

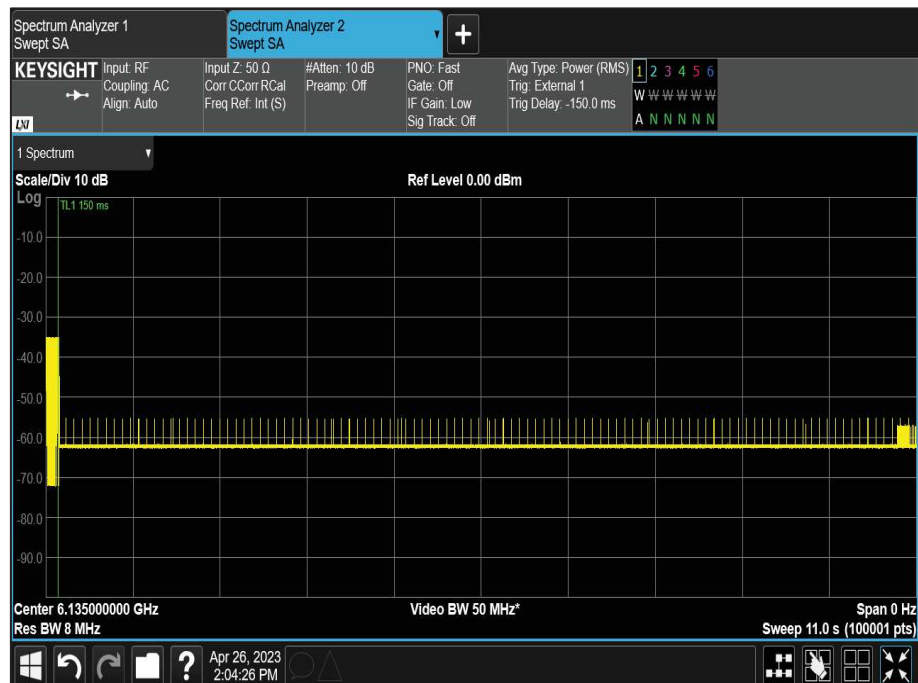


Figure 167 - U-NII-5, Minimum Bandwidth



Parameter	Results		
U-NII Band	5	5	5
Channel Number	47	47	47
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6185	6185	6185
AWGN Centre Frequency (MHz)	6110	6110	6110
AWGN Signal Power (dBm)	-66.26	-64.58	-64.07
Antenna Gain (dBi)	2.66	2.66	2.66
Adjusted Power (dBm)	-68.92	-67.24	-66.73
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 383 - U-NII-5, Maximum Bandwidth (AWGN Low)



Figure 168 - U-NII-5, Minimum Bandwidth (AWGN Low)



Parameter	Results		
U-NII Band	5	5	5
Channel Number	47	47	47
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6185	6185	6185
AWGN Centre Frequency (MHz)	6185	6185	6185
AWGN Signal Power (dBm)	-68.26	-67.27	-66.30
Antenna Gain (dBi)	2.66	2.66	2.66
Adjusted Power (dBm)	-70.92	-69.93	-68.96
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 384 - U-NII-5, Maximum Bandwidth (AWGN Mid)

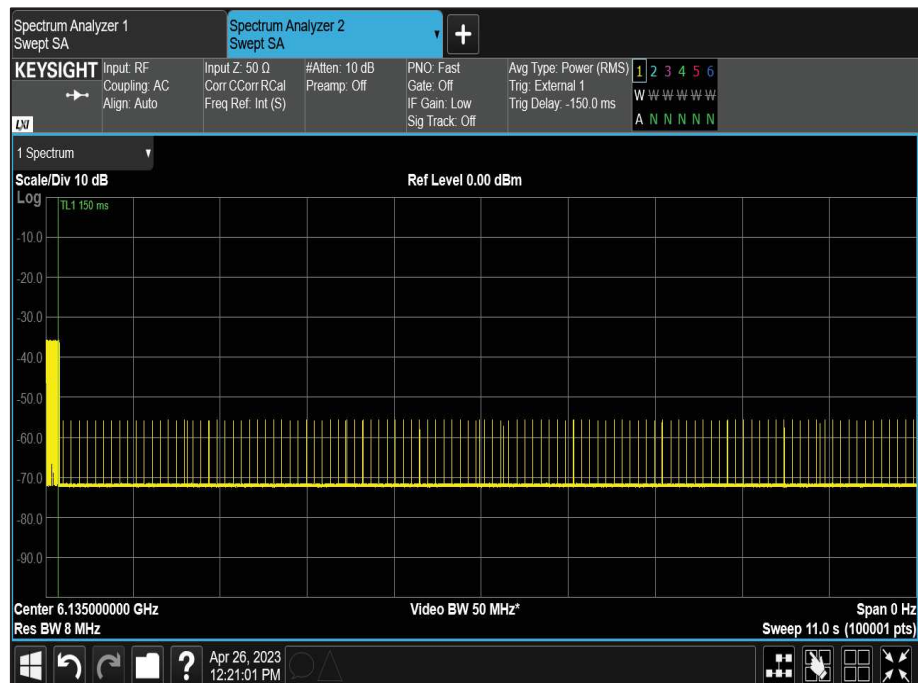


Figure 169 - U-NII-5, Minimum Bandwidth (AWGN Mid)



Parameter	Results		
U-NII Band	6	6	6
Channel Number	111	111	111
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6505	6505	6505
AWGN Centre Frequency (MHz)	6430	6430	6430
AWGN Signal Power (dBm)	-67.80	-65.59	-65.29
Antenna Gain (dBi)	2.31	2.31	2.31
Adjusted Power (dBm)	-70.11	-67.90	-67.60
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 385 - U-NII-5, Maximum Bandwidth (AWGN High)

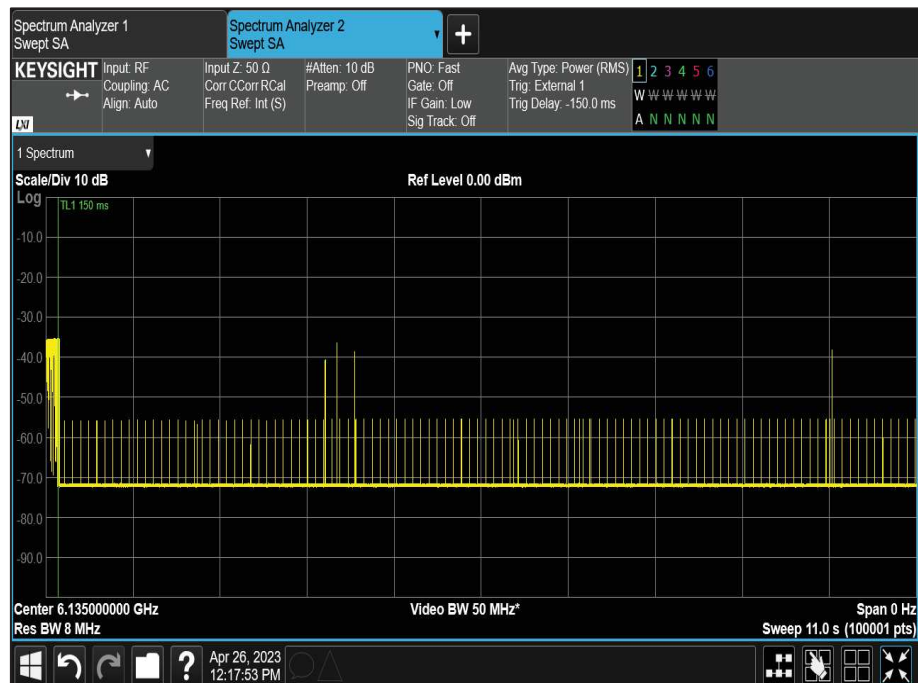


Figure 170 - U-NII-5, Minimum Bandwidth (AWGN High)



Parameter	Results		
U-NII Band	6	6	6
Channel Number	101	101	101
Bandwidth (MHz)	20	20	20
DUT Centre Frequency (MHz)	6455	6455	6455
AWGN Centre Frequency (MHz)	6455	6455	6455
AWGN Signal Power (dBm)	-69.95	-69.69	-69.47
Antenna Gain (dBi)	2.31	2.31	2.31
Adjusted Power (dBm)	-72.26	-72.00	-71.78
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 386 - U-NII-6, Minimum Bandwidth

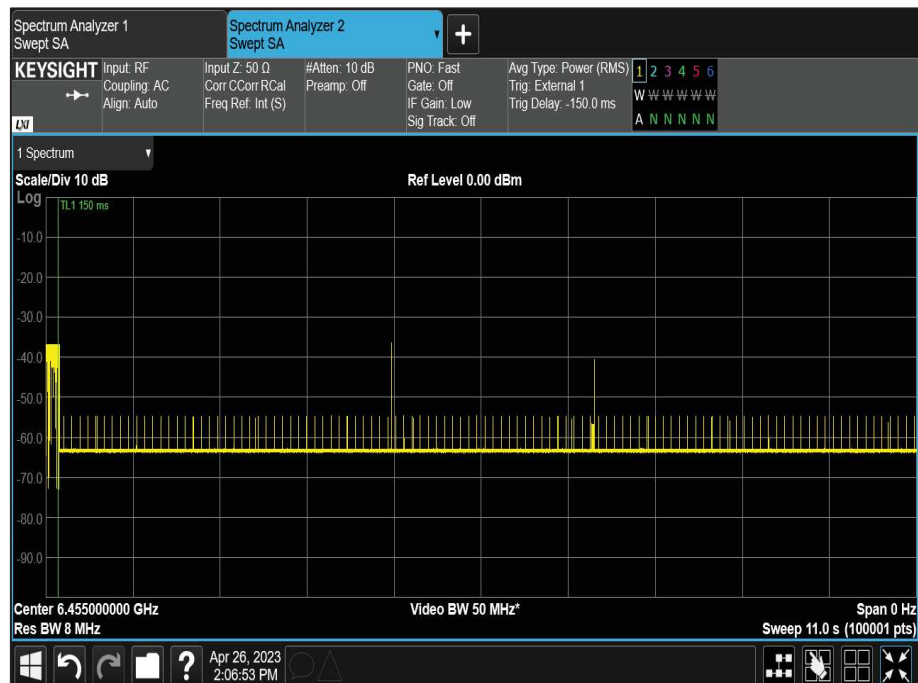


Figure 171 - U-NII-6, Minimum Bandwidth



Parameter	Results		
U-NII Band	6	6	6
Channel Number	111	111	111
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6505	6505	6505
AWGN Centre Frequency (MHz)	6430	6430	6430
AWGN Signal Power (dBm)	-67.80	-65.59	-65.29
Antenna Gain (dBi)	2.31	2.31	2.31
Adjusted Power (dBm)	-70.11	-67.90	-67.60
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 387 - U-NII-6, Maximum Bandwidth (AWGN Low)

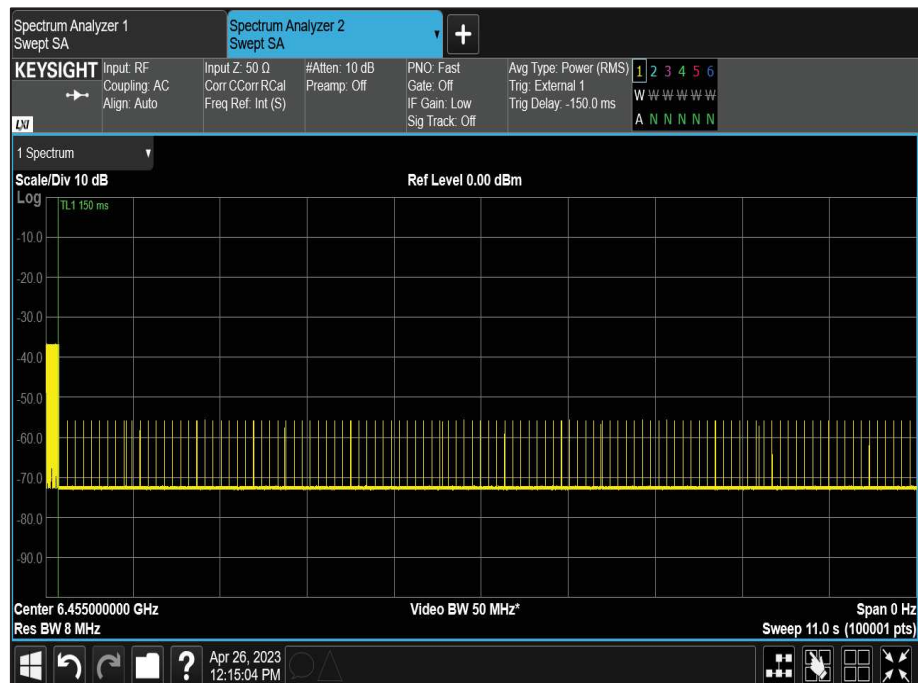


Figure 172 - U-NII-6, Minimum Bandwidth (AWGN Low)



Parameter	Results		
U-NII Band	6	6	6
Channel Number	111	111	111
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6505	6505	6505
AWGN Centre Frequency (MHz)	6505	6505	6505
AWGN Signal Power (dBm)	-67.89	-67.26	-66.36
Antenna Gain (dBi)	2.31	2.31	2.31
Adjusted Power (dBm)	-70.20	-69.57	-68.67
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 388 - U-NII-6, Maximum Bandwidth (AWGN Mid)



Figure 173 - U-NII-6, Minimum Bandwidth (AWGN Mid)



Parameter	Results		
U-NII Band	6	6	6
Channel Number	111	111	111
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6505	6505	6505
AWGN Centre Frequency (MHz)	6580	6580	6580
AWGN Signal Power (dBm)	-63.48	-61.77	-61.59
Antenna Gain (dBi)	2.31	2.31	2.31
Adjusted Power (dBm)	-65.79	-64.08	-63.90
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 389 - U-NII-6, Maximum Bandwidth (AWGN High)

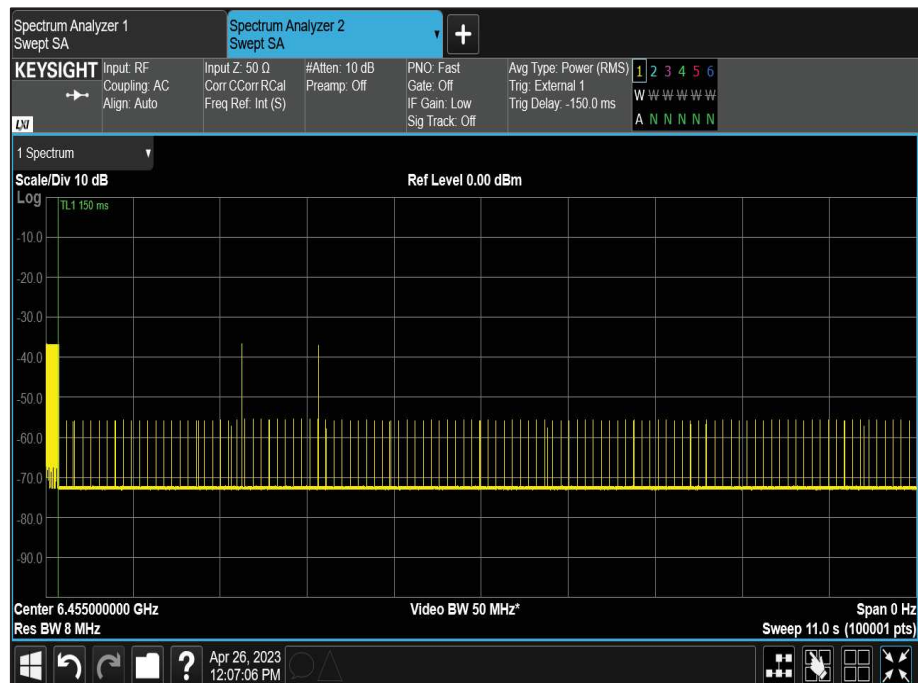


Figure 174 - U-NII-6, Minimum Bandwidth (AWGN High)



Parameter	Results		
U-NII Band	7	7	7
Channel Number	133	133	133
Bandwidth (MHz)	20	20	20
DUT Centre Frequency (MHz)	6615	6615	6615
AWGN Centre Frequency (MHz)	6615	6615	6615
AWGN Signal Power (dBm)	-69.39	-69.05	-68.80
Antenna Gain (dBi)	3.05	3.05	3.05
Adjusted Power (dBm)	-72.44	-72.10	-71.85
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 390 - U-NII-7, Minimum Bandwidth



Figure 175 - U-NII-7, Minimum Bandwidth



Parameter	Results		
U-NII Band	7	7	7
Channel Number	143	143	143
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6665	6665	6665
AWGN Centre Frequency (MHz)	6590	6590	6590
AWGN Signal Power (dBm)	-63.77	-63.69	-61.75
Antenna Gain (dBi)	3.05	3.05	3.05
Adjusted Power (dBm)	-66.82	-66.74	-64.80
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 391 - U-NII-7, Maximum Bandwidth (AWGN Low)

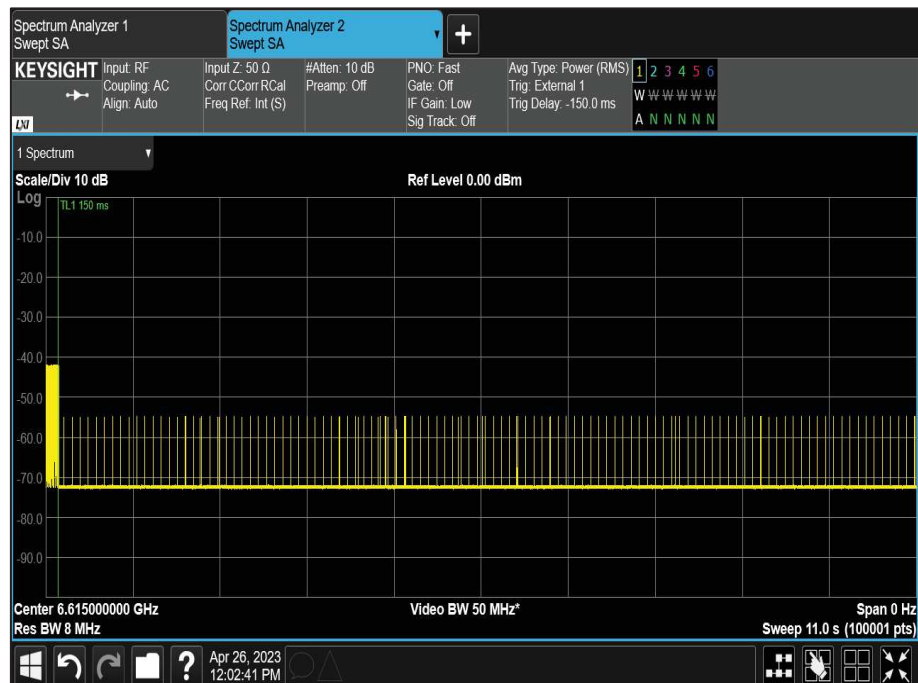


Figure 176 - U-NII-7, Minimum Bandwidth (AWGN Low)



Parameter	Results		
U-NII Band	7	7	7
Channel Number	143	143	143
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6665	6665	6665
AWGN Centre Frequency (MHz)	6665	6665	6665
AWGN Signal Power (dBm)	-66.76	-66.00	-65.67
Antenna Gain (dBi)	3.05	3.05	3.05
Adjusted Power (dBm)	-69.81	-69.05	-68.72
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 392 - U-NII-7, Maximum Bandwidth (AWGN Mid)



Figure 177 - U-NII-7, Minimum Bandwidth (AWGN Mid)



Parameter	Results		
U-NII Band	7	7	7
Channel Number	143	143	143
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6665	6665	6665
AWGN Centre Frequency (MHz)	6740	6740	6740
AWGN Signal Power (dBm)	-62.49	-61.86	-61.05
Antenna Gain (dBi)	3.05	3.05	3.05
Adjusted Power (dBm)	-65.54	-64.91	-64.10
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 393 - U-NII-7, Maximum Bandwidth (AWGN High)



Figure 178 - U-NII-7, Minimum Bandwidth (AWGN High)



Parameter	Results		
U-NII Band	8	8	8
Channel Number	197	197	197
Bandwidth (MHz)	20	20	20
DUT Centre Frequency (MHz)	6935	6935	6935
AWGN Centre Frequency (MHz)	6935	6935	6935
AWGN Signal Power (dBm)	-69.16	-68.77	-68.59
Antenna Gain (dBi)	1.70	1.70	1.70
Adjusted Power (dBm)	-70.86	-70.47	-70.29
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 394 - U-NII-8, Minimum Bandwidth



Figure 179 - U-NII-8, Minimum Bandwidth



Parameter	Results		
U-NII Band	7	7	7
Channel Number	143	143	143
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6665	6665	6665
AWGN Centre Frequency (MHz)	6590	6590	6590
AWGN Signal Power (dBm)	-63.77	-63.69	-61.75
Antenna Gain (dBi)	3.05	3.05	3.05
Adjusted Power (dBm)	-66.82	-66.74	-64.80
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 395 - U-NII-8, Maximum Bandwidth (AWGN Low)

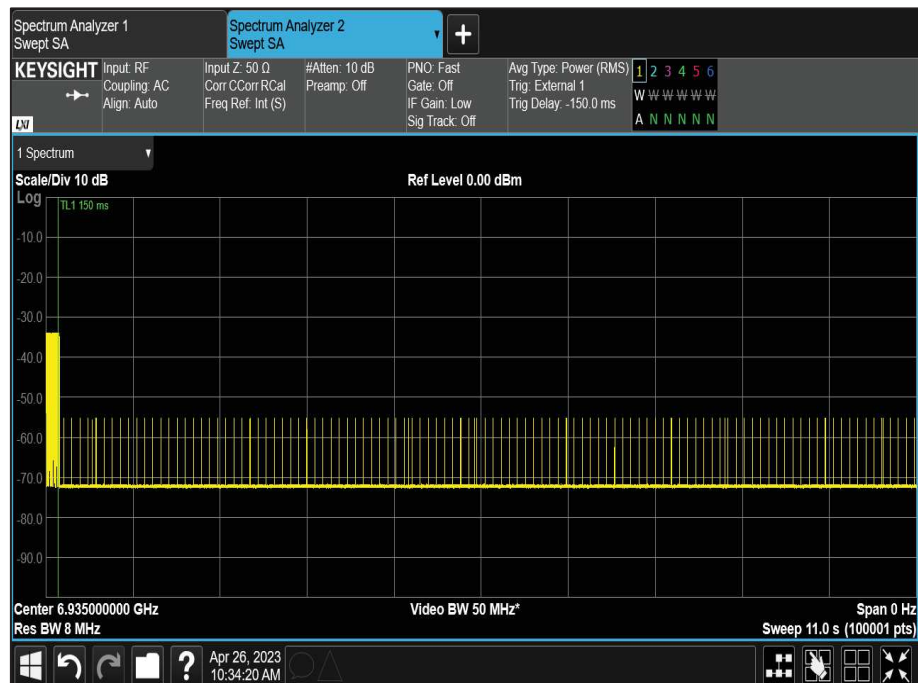


Figure 180 - U-NII-8, Minimum Bandwidth (AWGN Low)



Parameter	Results		
U-NII Band	8	8	8
Channel Number	207	207	207
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6985	6985	6985
AWGN Centre Frequency (MHz)	6985	6985	6985
AWGN Signal Power (dBm)	-65.56	-64.57	-64.35
Antenna Gain (dBi)	1.70	1.70	1.70
Adjusted Power (dBm)	-67.26	-66.27	-66.05
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 396 - U-NII-8, Maximum Bandwidth (AWGN Mid)

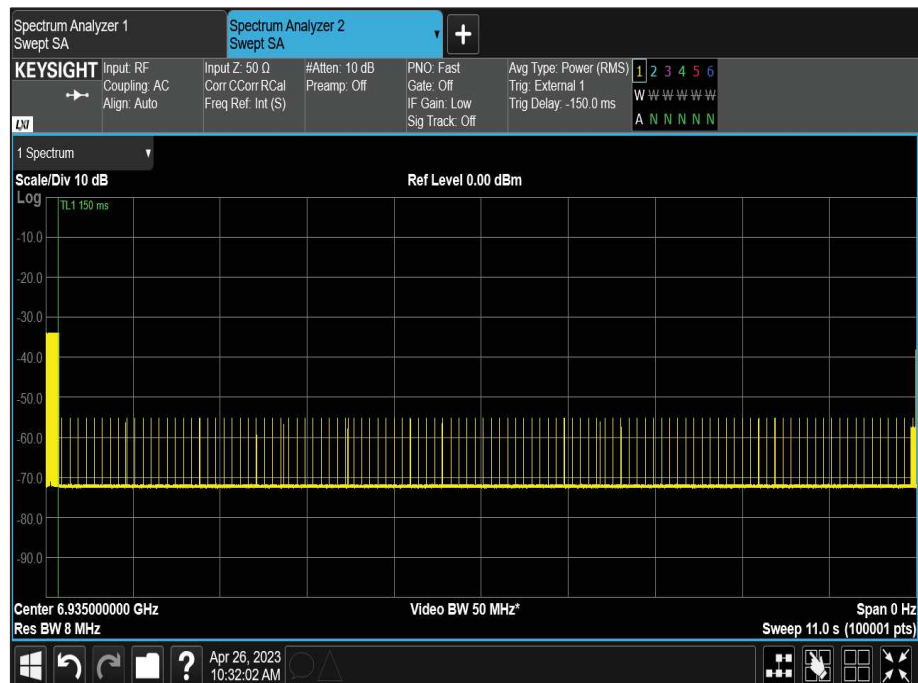


Figure 181 - U-NII-8, Minimum Bandwidth (AWGN Mid)



Parameter	Results		
U-NII Band	8	8	8
Channel Number	207	207	207
Bandwidth (MHz)	160	160	160
DUT Centre Frequency (MHz)	6985	6985	6985
AWGN Centre Frequency (MHz)	7060	7060	7060
AWGN Signal Power (dBm)	-61.57	-61.30	-60.55
Antenna Gain (dBi)	1.70	1.70	1.70
Adjusted Power (dBm)	-63.27	-63.00	-62.25
Detection Limit (dBm)	-62.0	-62.0	-62.0
EUT Tx Status (OFF/Minimal/ON)	ON	Minimal	OFF

Table 397 - U-NII-8, Maximum Bandwidth (AWGN High)

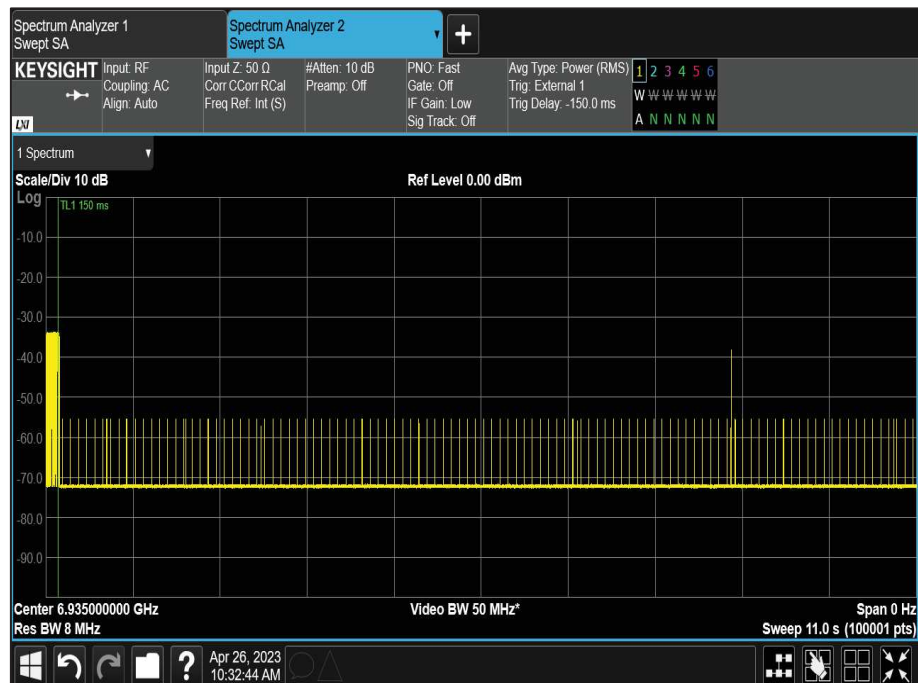


Figure 182 - U-NII-8, Minimum Bandwidth (AWGN High)



FCC 47 CFR Part 15.407 (d)(6)

Indoor access points, subordinate devices and client devices operating in the 5.925–7.125 GHz band must employ a contention-based protocol.

KDB 987594, Limit Clause I

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band (herein referred to as unlicensed devices) are required to use technologies that include a contention-based protocol to avoid co-channel interference with incumbent devices sharing the band. To ensure incumbent co-channel operations are detected in a technology-agnostic manner, unlicensed devices are required to detect co-channel radio frequency energy (energy detect) and avoid simultaneous transmission.

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel (in which incumbent signal is transmitted) and stay off the incumbent channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain.

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

ISED RSS-248, Limit Clause 4.6.2(b)

e.i.r.p. spectral density of unwanted emissions falling into the 5925-7125 MHz band shall be attenuated (in dB) below the reference power spectral density by:

- i. 20 dB at 1 MHz away from the channel edge; and
- ii. a linearly interpolated value between 20 dB and 28 dB at frequencies between 1 MHz outside of channel edge and one (1) channel bandwidth from the operating channel centre, respectively; and
- iii. 28 dB at one (1) channel bandwidth away from the operating channel centre; and
- iv. a linearly interpolated value between 28 dB and 40 dB at frequencies between one (1) channel bandwidth from the channel centre and one- and one-half (1.5) times the channel bandwidth away from the operating channel centre, respectively; and
- v. 40 dB at one- and one-half (1.5) times the channel bandwidth away from the channel centre; and
- vi. a minimum of 40 dB at frequencies that are further away than one and one-half (1.5) times the channel bandwidth from the channel centre.



2.7.8 Test Location and Test Equipment Used

This test was carried out in RF Chamber 18.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Cable (18 GHz)	Rosenberger	LU7-071-1000	5103	12	18-Dec-2023
Cable (18 GHz)	Rosenberger	LU7-071-2000	5106	12	18-Dec-2023
2.92mm 1m cable	Junkosha	MWX211/B	5415	12	24-Jul-2023
3.5 mm 1m Cable	Junkosha	MWX221-01000DMS	5416	12	06-Mar-2024
Vector Signal Generator	Rohde & Schwarz	SMM100A	5915	36	01-Mar-2026
WiFi 6E Tri-Band Gaming Router	Asus	GT-AXE110000	5926	-	TU
Humidity & Temperature meter	R.S Components	1364	6148	12	17-Jun-2023
MXA Signal Analyzer	Keysight Technologies	N9020B	6415	24	22-Mar-2025
Test Coupling Network	TUV SUD	TUV_RxTest_001	6441	12	24-Apr-2024

Table 398

TU - Traceability Unscheduled



3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Emission Bandwidth	± 3.91 MHz
Maximum Conducted Output Power	± 1.38 dB
Maximum Conducted Power Spectral Density	± 1.49 dB
Authorised Band Edges	± 6.3 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
Unwanted Emissions within the 5925-7125 MHz band	± 3.45 dB
Contention Based Protocol	Time: 0.30% Interferer BW: 267.98 kHz Interferer Level: 0.80 dB

Table 399

Measurement Uncertainty Decision Rule – Accuracy Method

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.