

10.6.4.2.5. 25kHz Analog FM mode

Test link	Freq. (MHz)	EUT Max. output power (dBm)	Max. Ant Gain(dBi)	Duty Cycle (%)	ERP (W)	ERP Limit (W)	AGC Mode
Down	450.0125	36.2	0	100	4.2	5.0	-0.5dB Below
	450.0125	36.2	0	100	4.2	5.0	+3.0dB above
	479.0	36.6	0	100	4.6	5.0	-0.5dB Below
	479.0	36.6	0	100	4.6	5.0	+3.0dB above
	508.9875	35.8	0	100	3.8	5.0	-0.5dB Below
	508.9875	35.8	0	100	3.8	5.0	+3.0dB above
Up	455.0125	27.3	9.0	100	4.3	5.0	-0.5dB Below
	455.0125	27.4	9.0	100	4.4	5.0	+3.0dB above
	484.0	27.0	9.0	100	4.0	5.0	-0.5dB Below
	484.0	27.1	9.0	100	4.1	5.0	+3.0dB above
	511.9875	26.9	9.0	100	3.9	5.0	-0.5dB Below
	511.9875	26.9	9.0	100	3.9	5.0	+3.0dB above

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10.7. Noise figure

Test requirement: KDB 935210 D05 clause 4.6
FCC PART 90.219 (e)(2)

Test Method: KDB 935210 D05/4.6

10.7.1. Requirements

According to FCC PART 90§90.219 (e) (2) requirement, the noise figure limit of a signal booster must is given in table 10.7-1.

Table 10.7-1 Noise figure limits	
frequency range(MHz)	Max. Noise figure limit(dB)
450~512	9

10.7.2. Test configuration

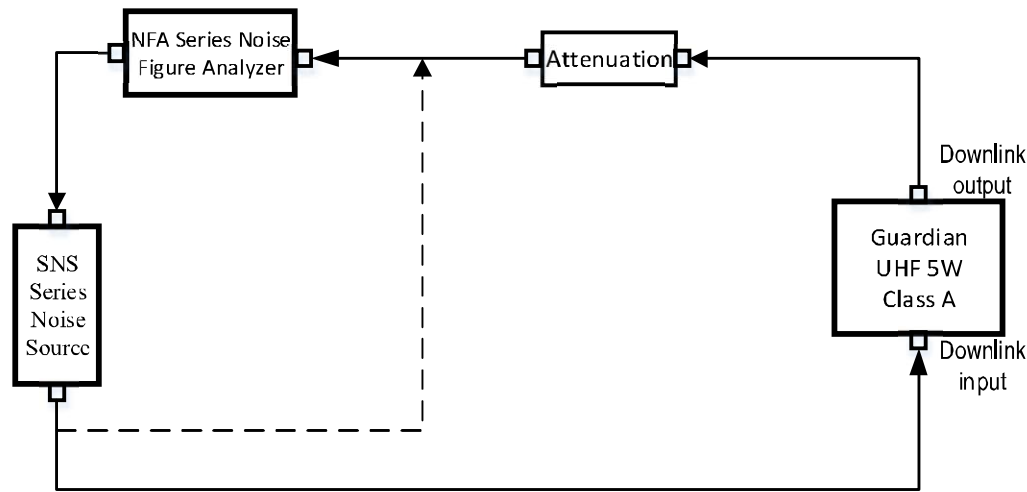


Figure 10.7-1 Downlink test connection diagram

NOTE: The green dotted line is the instrument calibration path.

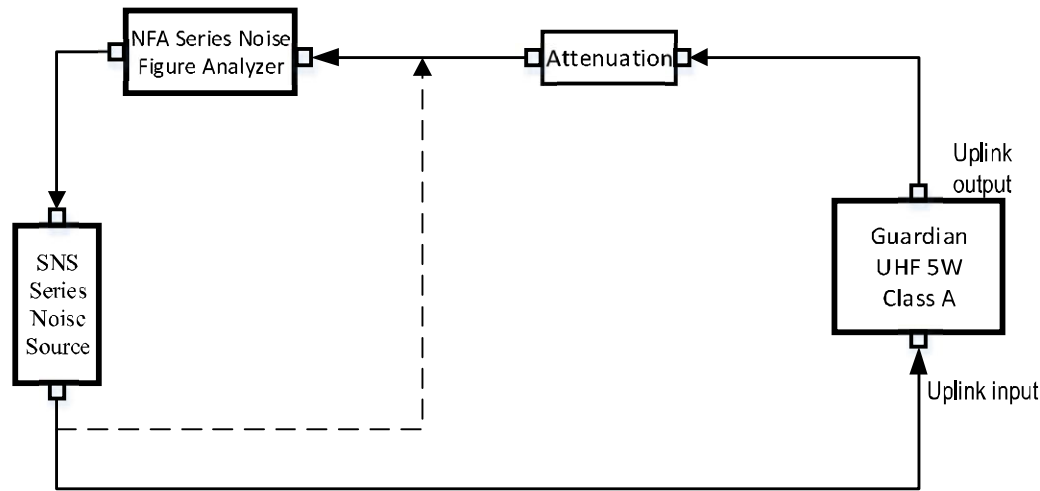


Figure 10.7-2 Uplink test diagram

NOTE: The green dotted line is the instrument calibration path.

10.7.3. Test procedures

- (1) Connect the device as illustrated Figure, when the output power is over the maximum value of the Noise meter, add the attenuator to avoid destroying;
- (2) Set the EUT operating band and maximum gain;
- (3) Set the relevant parameters for 400MHz of device and connect the dotted line to calibrate;
- (4) After calibrating, according to the solid line connecting and testing Noise figure and record data;
- (5) Repeat RF Low, middle and high frequency to be tested and Repeat steps (2) to (4);

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10.7.4. Test results

Test Date (yy-mm-dd): 2024-02-22

Normal condition: Temp: 24.4°C, Humid: 42%, Atmospheric Pressure:101kpa

Supply Voltage: DC +24V

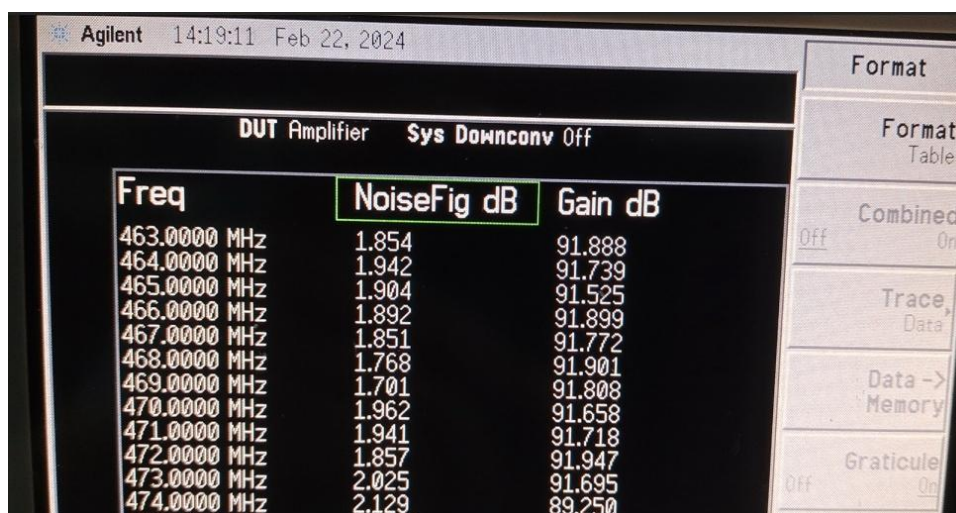
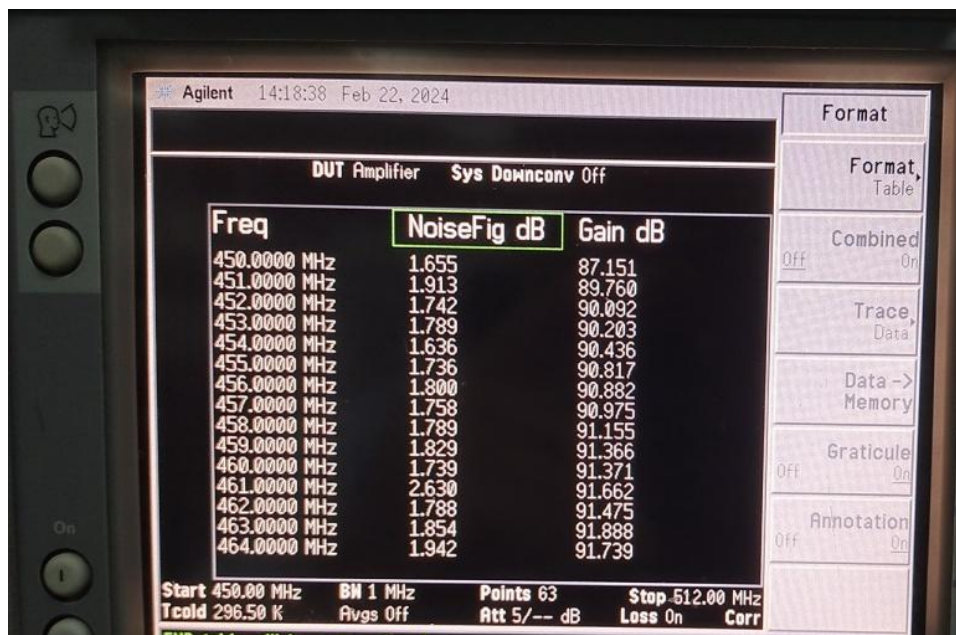
Test link	Test frequency range (MHz)	Max. Limit (dB)	Noise figure data(dB)	Margin (dB)	Result
Downlink	450~512	9.0	3.04	5.96	PASS
Uplink	450~512	9.0	2.19	6.81	PASS

NOTE: Margin= specification limit - Noise figure data.

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10.7.5. Test screenshot

10.7.5.1. Downlink



DUT Amplifier Sys Downconv Off			Format Table
Freq	NoiseFig dB	Gain dB	Combined Off On
484.0000 MHz	2.341	90.640	Trace Data
485.0000 MHz	2.099	90.580	
486.0000 MHz	2.312	90.577	Data -> Memory
487.0000 MHz	2.189	90.531	
488.0000 MHz	2.230	90.598	
489.0000 MHz	2.366	90.364	
490.0000 MHz	2.352	90.506	
491.0000 MHz	2.410	87.972	

490.0000 MHz	2.357	87.968	Data -> Memory
491.0000 MHz	2.319	90.247	
492.0000 MHz	2.444	90.363	Graticule Off On
493.0000 MHz	2.459	90.464	
494.0000 MHz	2.448	90.212	
495.0000 MHz	2.369	90.558	
496.0000 MHz	2.387	90.257	
497.0000 MHz	2.571	90.215	Annotation Off On
498.0000 MHz	2.515	90.201	

Freq	NoiseFig dB	Gain dB	Combined Off On
498.0000 MHz	2.515	90.201	Trace Data
499.0000 MHz	2.450	89.902	
500.0000 MHz	2.740	89.583	Data -> Memory
501.0000 MHz	2.532	89.505	
502.0000 MHz	2.575	89.323	
503.0000 MHz	2.692	89.168	
504.0000 MHz	2.534	89.188	
505.0000 MHz	2.802	88.839	
506.0000 MHz	2.772	88.927	
507.0000 MHz	3.033	88.322	
508.0000 MHz	2.722	88.431	Graticule Off On
509.0000 MHz	2.872	87.847	
510.0000 MHz	2.931	87.178	
511.0000 MHz	3.038	86.706	
512.0000 MHz	3.032	85.234	Annotation Off On

10.7.5.2. Uplink

Agilent 14:28:50 Feb 22, 2024			Format
DUT Amplifier Sys Downconv Off			Format, Table
Freq	NoiseFig dB	Gain dB	Combined Off On
450.0000 MHz	1.394	86.582	Trace Data
451.0000 MHz	1.249	89.146	
452.0000 MHz	1.217	89.203	Data -> Memory
453.0000 MHz	1.187	89.253	
454.0000 MHz	1.349	89.187	
455.0000 MHz	1.219	89.423	
456.0000 MHz	1.304	89.490	
457.0000 MHz	1.274	89.551	
458.0000 MHz	1.313	89.583	
459.0000 MHz	1.421	89.350	Graticule Off On
460.0000 MHz	1.325	89.729	
461.0000 MHz	1.337	89.738	
462.0000 MHz	1.207	89.850	
463.0000 MHz	2.190	90.016	
464.0000 MHz	1.253	90.218	Annotation Off On
Start 450.00 MHz BW 1 MHz Points 63 Stop 512.00 MHz			
Tcold 296.50 K Avgs Off Att 0/-- dB Loss On Corr			

472.0000 MHz	1.423	87.818
473.0000 MHz	1.389	90.070
474.0000 MHz	1.159	89.897
475.0000 MHz	1.596	89.888
476.0000 MHz	1.394	89.796
477.0000 MHz	1.418	90.152
478.0000 MHz	1.412	89.889
479.0000 MHz	1.422	90.050
480.0000 MHz	1.367	89.875
481.0000 MHz	1.445	89.757
482.0000 MHz	1.250	89.673
483.0000 MHz	1.331	89.451
484.0000 MHz	1.454	89.150

Start 450.00 MHz BW 1 MHz Points 63 Stop 512.00 MHz
Tcold 296.50 K Avg Off Att 0/-- dB Loss On Corr

Freq	NoiseFig dB	Gain dB
484.0000 MHz	1.454	89.150
485.0000 MHz	1.558	89.097
486.0000 MHz	1.417	88.927
487.0000 MHz	1.522	88.922
488.0000 MHz	1.495	88.617
489.0000 MHz	1.670	88.589
490.0000 MHz	1.474	88.538
491.0000 MHz	1.700	88.220
492.0000 MHz	1.451	88.462
493.0000 MHz	1.642	88.373
494.0000 MHz	1.265	88.457
495.0000 MHz	1.665	88.306
496.0000 MHz	1.740	85.480

490.0000 MHz	1.758	86.948
491.0000 MHz	1.495	89.313
492.0000 MHz	1.394	89.372
493.0000 MHz	1.701	89.162
494.0000 MHz	1.550	89.074
495.0000 MHz	1.741	88.997
496.0000 MHz	1.421	88.904
497.0000 MHz	1.703	88.899
498.0000 MHz	1.388	88.887

498.0000 MHz	1.388	88.887
499.0000 MHz	1.480	88.648
500.0000 MHz	1.649	88.395
501.0000 MHz	1.629	88.289
502.0000 MHz	1.678	88.096
503.0000 MHz	1.532	88.185
504.0000 MHz	1.734	87.939
505.0000 MHz	1.760	87.973
506.0000 MHz	1.584	87.975
507.0000 MHz	1.731	87.654
508.0000 MHz	1.784	87.576
509.0000 MHz	1.674	87.225
510.0000 MHz	2.036	85.536
511.0000 MHz	1.729	86.349
512.0000 MHz	1.930	85.552

10.8. Out-of-band/out-of-block emissions

Test requirement: KDB 935210 D05 clause 4.7.2
FCC PART 2.1051
FCC PART 90.219 (d)(6)(i)
FCC PART 90.219 (e)(3)

Test Method: KDB 935210 D05/4.7.1 and 4.7.2

10.8.1. Requirements

The EUT shall comply with sections 4.7.2 of KDB 935210 D05.

Refer to the applicable rule part(s) for specified limits on unwanted (out-of-band/out-of-block and spurious) emissions (e.g., Section 90.210).

Spurious emissions shall be measured using a single test signal sequentially tuned to the low, middle, and high channels or frequencies within each authorized frequency band of operation.

Intermodulation products shall be measured using two CW signals with all available channel spacings (e.g., 12.5 kHz and 6.25 kHz) with the center between these channels being equal to the center frequency f_0 as determined from 4.3.

NOTE—Intermodulation-product spurious emission measurements are not required for single-channel boosters that cannot accommodate two simultaneous signals within the passband.

For a multi-channel enhancer, any intermodulation product level must be attenuated, relative to P, by at least: $43 + 10 \cdot \log_{10} P$ is less stringent than 70dB, that limit was used.

Spurious emissions shall be measured using a single test signal sequentially tuned to the low, middle, and high channels or frequencies within each authorized frequency band of operation.

Out-of-band/out-of-block emissions (including intermodulation products) shall be measured under each of the following two stimulus conditions:

- a) two adjacent test signals sequentially tuned to the lower and upper frequency band/block edges;
- b) a single test signal, sequentially tuned to the lowest and highest frequencies or channels within the frequency band/block under examination.

NOTE—Single-channel boosters that cannot accommodate two simultaneous signals within the passband may be excluded from the test stipulated in step a).

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10.8.2. Test configuration

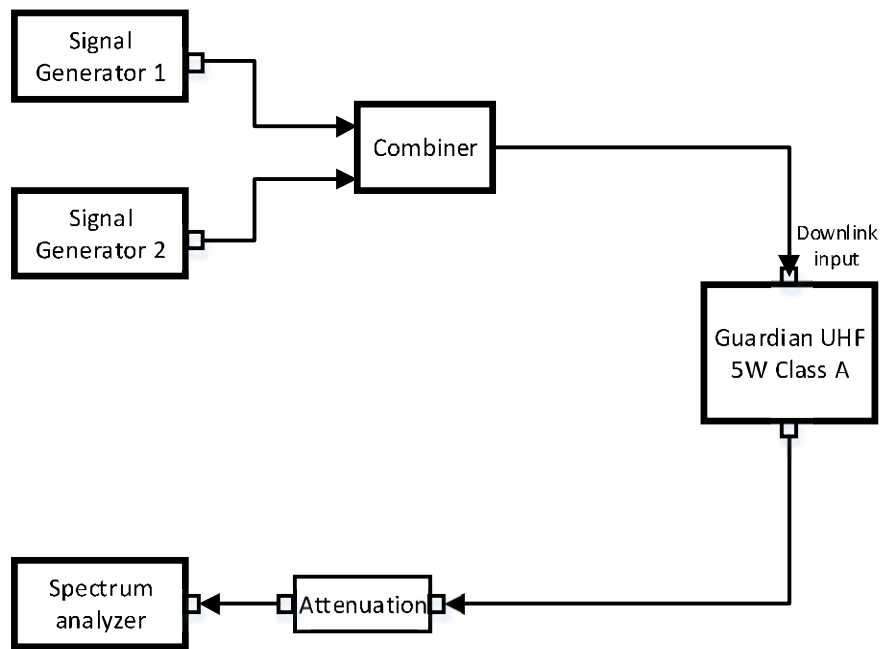


Figure 10.8-1 Downlink test connection diagram

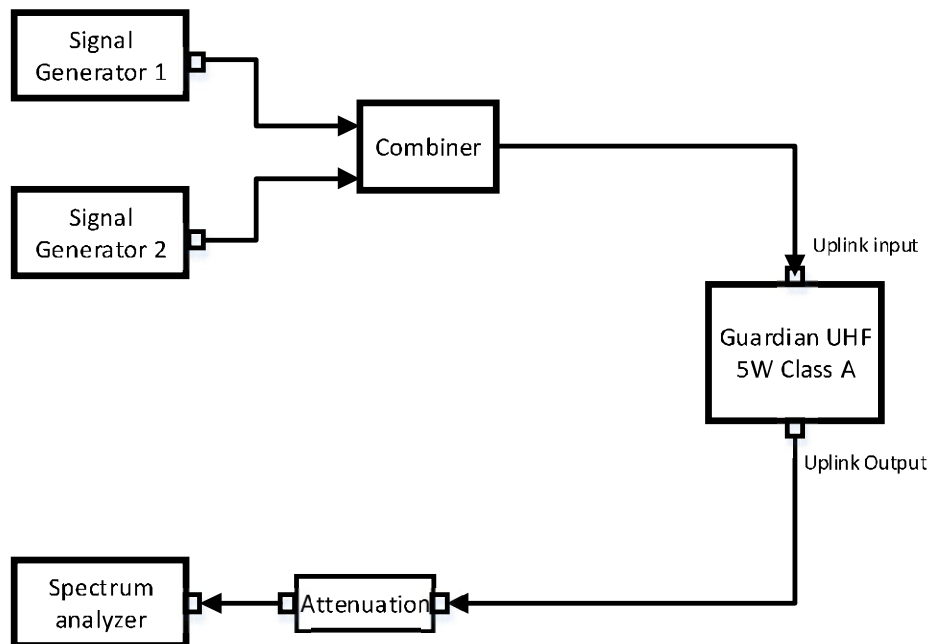


Figure 10.8-2 Uplink test connection diagram

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10.8.3. Test procedures

- a) Connect a signal generator to the input of the EUT.
If the signal generator is not capable of producing two independent modulated carriers simultaneously, then two discrete signal generators can be connected, with an appropriate combining network to support the two-signal test.
- b) Configure the two signal generators to produce CW on frequencies spaced consistent with 4.7.1, with amplitude levels set to just below the AGC threshold (see 4.2). Set the signal generator amplitudes so that the power from each into the EUT is equivalent.
- c) Connect a spectrum analyzer to the EUT output.
- d) Set the span to 100 kHz.
- e) Set RBW = 300 Hz with VBW $\geq 3 \times$ RBW.
- f) Set the detector to power averaging (rms).
- g) Place a marker on highest intermodulation product amplitude.
- h) Capture the plot for inclusion in the test report.
- i) Repeat steps c) to h) with the composite input power level set to 3 dB above the AGC threshold.
- j) Repeat steps b) to i) for all operational bands.

Any frequency outside the authorized bandwidth was attenuated by at least $43 + 10 \cdot \log(P)$ dB. This corresponds to an absolute level of -13 dBm ($P_{\text{dBm}} = -(43 + 10 \cdot \log(P_{\text{W}}))$).

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10.8.4. Test results

Test Date (yy-mm-dd): 2024-02-02

Normal condition: Temp: 22.8°C, Humid: 36%, Atmospheric Pressure:101kpa

Supply Voltage: DC +24V

10.8.4.1. Downlink transmit mode

Test frequency		Intermodulation product Limit (dBm)	Max. intermodulation product (dBm)	Margin (dB)	Result
(1) With the ALC threshold level					
Channel Bandwidth: 6.25kHz	Low frequency: f1:450.00313MHz f2:450.00938MHz	-13.0	-18.6	5.6	PASS
	Mid frequency: f1:479.0MHz f2:479.00625MHz	-13.0	-17.9	4.9	PASS
	High frequency: f1:508.99063MHz f2:508.99688MHz	-13.0	-21.4	8.4	PASS
Channel Bandwidth: 12.5kHz	Low frequency: f1:450.00625MHz f2:450.01875MHz	-13.0	-21.4	8.4	PASS
	Mid frequency: f1:479.0MHz f2:479.0125MHz	-13.0	-18.1	5.1	PASS
	High frequency: f1:508.98125MHz f2:508.99375MHz	-13.0	-19.3	6.3	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:450.0125MHz f2:450.0375MHz	-13.0	-22.3	9.3	PASS
	Mid frequency: f1:479.0MHz f2:479.025MHz	-13.0	-18.6	5.6	PASS
	High frequency: f1:508.9625MHz f2:508.9875MHz	-13.0	-25.7	12.7	PASS
(2) With the input signal amplitude set 3 dB above the AGC threshold					
Channel Bandwidth: 6.25kHz	Low frequency: f1:450.00313MHz f2:450.00938MHz	-13.0	-18.8	5.8	PASS
	Mid frequency: f1:479.0MHz f2:479.00625MHz	-13.0	-18.1	5.1	PASS
	High frequency: f1:508.99063MHz f2:508.99688MHz	-13.0	-20.9	7.9	PASS
Channel Bandwidth: 12.5kHz	Low frequency: f1:450.00625MHz f2:450.01875MHz	-13.0	-23.0	10.0	PASS
	Mid frequency: f1:479.0MHz f2:479.0125MHz	-13.0	-18.9	5.9	PASS
	High frequency: f1:508.98125MHz f2:508.99375MHz	-13.0	-20.5	7.5	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:450.0125MHz f2:450.0375MHz	-13.0	-23.7	10.7	PASS

	Mid frequency: f1:479.0MHz f2:479.025MHz	-13.0	-19.0	6.0	PASS
	High frequency: f1:508.9625MHz f2:508.9875MHz	-13.0	-18.6	5.6	PASS
NOTE 1: Intermodulation products select the worst data record. NOTE 2: Margin= specification limit -Maximum mark level.					

10.8.4.2. Uplink transmit mode

Test frequency	Intermodulation product Limit (dBm)	Max. intermodulation product (dBm)	Margin (dB)	Result	
(3) With the ALC threshold level					
Channel Bandwidth: 6.25kHz	Low frequency: f1:455.00313MHz f2:455.00938MHz	-13.0	-20.6	7.6	PASS
	Mid frequency: f1:484.0MHz f2:484.00625MHz	-13.0	-23.4	10.4	PASS
	High frequency: f1:511.99063MHz f2:511.99688MHz	-13.0	-21.8	8.8	PASS
Channel Bandwidth: 12.5kHz	Low frequency: f1:455.00625MHz f2:455.01875MHz	-13.0	-22.3	9.3	PASS
	Mid frequency: f1:484.0MHz f2:484.0125MHz	-13.0	-24.5	11.5	PASS
	High frequency: f1:511.98125MHz f2:511.99375MHz	-13.0	-24.7	11.7	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:455.0125MHz f2:455.0375MHz	-13.0	-21.9	8.9	PASS
	Mid frequency: f1:484.0MHz f2:484.025MHz	-13.0	-24.2	11.2	PASS
	High frequency: f1:511.9625MHz f2:511.9875MHz	-13.0	-24.1	11.1	PASS
(4) With the input signal amplitude set 3 dB above the AGC threshold					
Channel Bandwidth: 6.25kHz	Low frequency: f1:455.00313MHz f2:455.00938MHz	-13.0	-20.6	7.6	PASS
	Mid frequency: f1:484.0MHz f2:484.00625MHz	-13.0	-23.1	10.1	PASS
	High frequency: f1:511.99063MHz f2:511.99688MHz	-13.0	-24.1	11.1	PASS
Channel Bandwidth: 12.5kHz	Low frequency: f1:455.00625MHz f2:455.01875MHz	-13.0	-22.2	9.2	PASS
	Mid frequency: f1:484.0MHz f2:484.0125MHz	-13.0	-24.3	11.3	PASS
	High frequency: f1:511.98125MHz f2:511.99375MHz	-13.0	-34.7	21.7	PASS

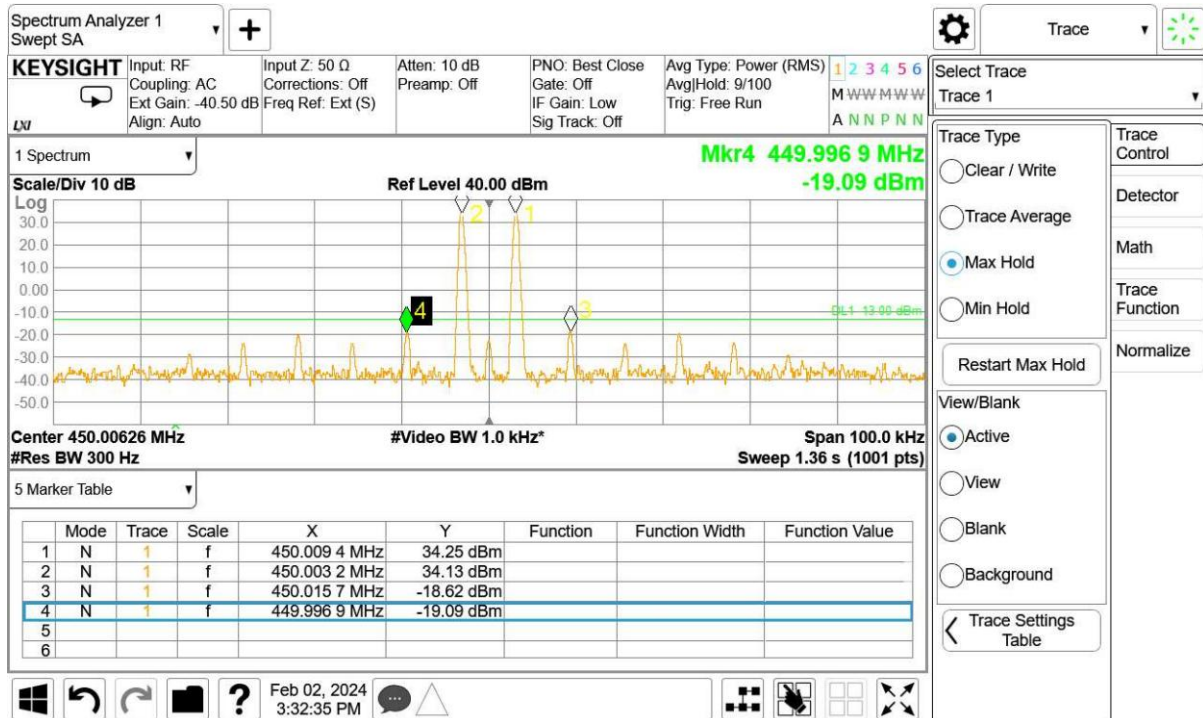
Channel Bandwidth: 25kHz	Low frequency: f1:455.0125MHz f2:455.0375MHz	-13.0	-22.3	9.3	PASS
	Mid frequency: f1:484.0MHz f2:484.025MHz	-13.0	-23.7	10.7	PASS
	High frequency: f1:511.9625MHz f2:511.9875MHz	-13.0	-24.3	11.3	PASS
NOTE 1: Intermodulation products select the worst data record. NOTE 2: Margin= specification limit -Maximum mark level.					

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10.8.5. Test screenshot

10.8.5.1. Downlink transmit mode

10.8.5.1.1. Channel Bandwidth:6.25kHz



Low Frequency and With the ALC threshold level



Low Frequency and With the input signal amplitude set 3 dB above the ALC threshold