

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 700MHz 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 channels to be tested for 800MHz of device and Repeat steps (2) to (4);

10.7.4 Test results

Test Date (yy-mm-dd): 2021-06-22

Normal condition: Temp: 24.3℃, Humid: 47%, Atmospheric Pressure:101kpa

Supply Voltage: AC 110V, 60Hz

10.7.4.1 700MHz Band

Frequency(MHz)	Max. Limit (dB)	Noise figure data (dB)	Margin (dB)	Result
Downlink: 758~775	9	4.84	4.16	PASS
Uplink: 788~805	9	3.65	5.35	PASS
NOTE : Margin= specification limit - Noise figure data.				

10.7.4.2 800MHz Band

Frequency(MHz)	Max.Limit (dB)	Noise figure data (dB)	Margin (dB)	Result
Downlink: 851~861	9	4.32	4.68	PASS
Uplink: 806~816	9	4.02	4.98	PASS
NOTE : Margin= specification limit - Noise figure data.				

10.7.5 Test screenshot

10.7.5.1 700MHz Band

Fixed 31.0000 dB DUT: Amplifier

PREAMP LOSS Atten: 0 dB

CONTEXT: FREQ-RF
CAL STATE: CAL
ENR STATE: ENR

Frequency	Noise Figure	Gain
758.000000 MHz	4.3393 dB	79.619 dB
758.894737 MHz	4.2434 dB	79.868 dB
759.789474 MHz	4.2135 dB	79.985 dB
760.684211 MHz	4.0522 dB	80.233 dB
761.578947 MHz	4.0237 dB	80.512 dB
762.473684 MHz	3.9806 dB	80.852 dB
763.368421 MHz	3.9470 dB	81.212 dB
764.263158 MHz	3.9282 dB	81.486 dB
765.157895 MHz	3.9351 dB	81.642 dB
766.052632 MHz	3.9629 dB	81.657 dB
766.947368 MHz	4.0098 dB	81.480 dB
767.842105 MHz	4.0106 dB	81.307 dB
768.736842 MHz	4.1156 dB	81.042 dB
769.631579 MHz	4.1991 dB	80.710 dB
770.526316 MHz	4.2831 dB	80.307 dB
771.421053 MHz	4.3599 dB	79.878 dB
772.315789 MHz	4.4619 dB	79.307 dB
773.210526 MHz	4.6036 dB	78.599 dB
774.105263 MHz	4.6737 dB	77.740 dB
775.000000 MHz	4.8399 dB	76.627 dB

Start Freq 758.00000 MHz Stop Freq 775.00000 MHz

BW 4.0 MHz T cold 296.50 K (Default) Noise Source: Norm Points 20

Temperature 290.00 K

Downlink: 758MHz~775MHz

Fixed 30.8000 dB DUT: Amplifier

PREAMP LOSS Atten: 0 dB

CONTEXT: FREQ-RF
CAL STATE: CAL
ENR STATE: ENR

Frequency	Noise Figure	Gain
788.000000 MHz	3.6135 dB	75.461 dB
789.473684 MHz	3.6526 dB	77.105 dB
790.947368 MHz	3.6071 dB	78.242 dB
792.421053 MHz	3.6297 dB	79.157 dB
793.894737 MHz	3.5600 dB	79.834 dB
795.368421 MHz	3.5652 dB	80.169 dB
796.842105 MHz	3.5368 dB	80.270 dB
798.315789 MHz	3.5477 dB	80.325 dB
799.789474 MHz	3.5409 dB	80.356 dB
801.263158 MHz	3.5862 dB	80.405 dB
802.736842 MHz	3.5528 dB	80.401 dB
804.210526 MHz	3.5822 dB	80.273 dB
805.684211 MHz	3.5794 dB	79.972 dB
807.157895 MHz	3.5968 dB	79.514 dB
808.631579 MHz	3.6149 dB	78.854 dB
810.105263 MHz	3.6775 dB	78.077 dB
811.578947 MHz	3.7720 dB	77.388 dB
813.052632 MHz	3.8634 dB	76.581 dB
814.526316 MHz	3.9237 dB	75.393 dB
816.000000 MHz	4.0249 dB	73.426 dB

Start Freq 788.00000 MHz Stop Freq 816.00000 MHz

BW 4.0 MHz T cold 296.50 K (Default) Noise Source: Norm Points 20

Average Num 10

On Off

ENR ▶

Cal Setup ▶
User Cal

Calibrate Now

Loss Comp ▶

Limits ▶

More 1 of 2

Uplink: 788MHz~805MHz

10.7.5.2 800MHz Band

Fixed 31.0000 dB DUT: Amplifier Atten: 0 dB

Frequency	Noise Figure	Gain
851.000000 MHz	4.3228 dB	82.613 dB
851.526316 MHz	4.2431 dB	82.737 dB
852.052632 MHz	4.2200 dB	82.836 dB
852.578947 MHz	4.1384 dB	82.936 dB
853.105263 MHz	4.1057 dB	83.001 dB
853.631579 MHz	4.0449 dB	83.037 dB
854.157895 MHz	4.0095 dB	83.006 dB
854.684211 MHz	3.9907 dB	82.926 dB
855.210526 MHz	3.9793 dB	82.778 dB
855.736842 MHz	3.9596 dB	82.518 dB
856.263158 MHz	3.9135 dB	82.257 dB
856.789474 MHz	3.9311 dB	81.828 dB
857.315789 MHz	3.9867 dB	81.276 dB
857.842105 MHz	3.9410 dB	80.656 dB
858.368421 MHz	3.9895 dB	79.973 dB
858.894737 MHz	3.9762 dB	79.218 dB
859.421053 MHz	4.0451 dB	78.379 dB
859.947368 MHz	4.1382 dB	77.506 dB
860.473684 MHz	4.1487 dB	76.634 dB
861.000000 MHz	4.2454 dB	75.798 dB

Start Freq 851.00000 MHz Stop Freq 861.00000 MHz

Downlink: 851MHz~861MHz

Fixed 30.8000 dB DUT: Amplifier Atten: 0 dB

Frequency	Noise Figure	Gain
788.000000 MHz	3.6135 dB	75.461 dB
789.473684 MHz	3.6526 dB	77.105 dB
790.947368 MHz	3.6071 dB	78.242 dB
792.421053 MHz	3.6297 dB	79.157 dB
793.894737 MHz	3.5600 dB	79.834 dB
795.368421 MHz	3.5652 dB	80.169 dB
796.842105 MHz	3.5368 dB	80.270 dB
798.315789 MHz	3.5477 dB	80.325 dB
799.789474 MHz	3.5409 dB	80.356 dB
801.263158 MHz	3.5862 dB	80.405 dB
802.736842 MHz	3.5528 dB	80.401 dB
804.210526 MHz	3.5822 dB	80.273 dB
805.684211 MHz	3.5794 dB	79.972 dB
807.157895 MHz	3.5968 dB	79.514 dB
808.631579 MHz	3.6149 dB	78.854 dB
810.105263 MHz	3.6775 dB	78.077 dB
811.578947 MHz	3.7720 dB	77.388 dB
813.052632 MHz	3.8634 dB	76.581 dB
814.526316 MHz	3.9237 dB	75.393 dB
816.000000 MHz	4.0249 dB	73.426 dB

Start Freq 788.00000 MHz Stop Freq 816.00000 MHz

BW 4.0 MHz T cold 296.50 K (Default) Noise Source: Norm Points 20

Uplink: 806MHz~816MHz

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:

- two adjacent test signals sequentially tuned to the lower and upper frequency band/block edges;
- 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).

10.8.2 Test configuration

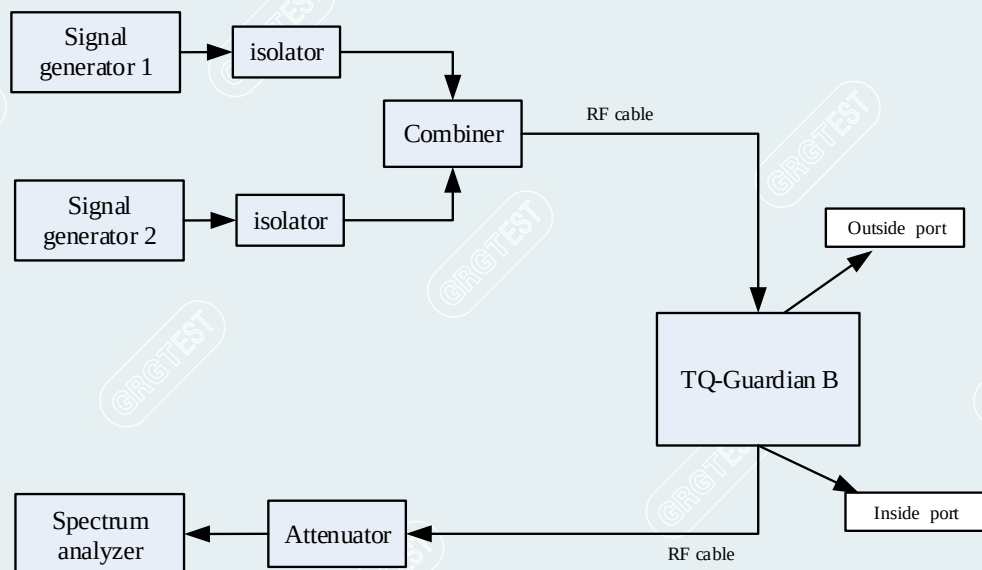


Figure 10.8-1 Downlink connection diagram

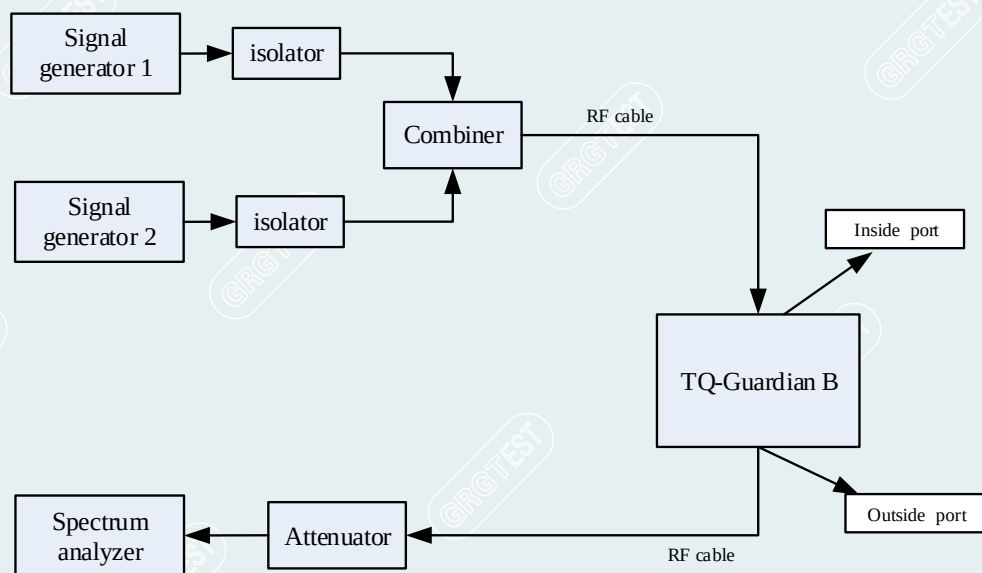


Figure 10.8-2 Uplink connection diagram

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 ($P_{(dBm)} - (43 + 10 \cdot \log(P_{(w)}))$).

10.8.4 Test results

Test Date (yy-mm-dd): 2021-06-25

Normal condition: Temp: 24.5°C, Humid:48%, Atmospheric Pressure:101kpa

Supply Voltage: AC 110V, 60Hz

10.8.4.1 700MHz Band

10.8.4.1.1 Downlink transmit mode

Test frequency	Intermodulation product Limit (dBm)	Max. intermodulation product (dBm)	Margin (dB)	Result	
(1) Frequency range: 768MHz~775MHz					
(1.1) With the ALC threshold level					
Channel Bandwidth: 12.5kHz	Low frequency: f1:768.00625MHz f2:768.01875MHz	-13	-19.1	6.1	PASS
	Mid frequency: f1:771.50MHz f2:771.5125MHz	-13	-18.4	5.4	PASS
	High frequency: f1:774.98125MHz f2:774.99375MHz	-13	-17.8	4.8	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:768.0125MHz f2:768.0375MHz	-13	-19.7	6.7	PASS
	Mid frequency: f1:771.5MHz f2:771.525MHz	-13	-20.2	7.2	PASS
	High frequency: f1:774.9625MHz f2:774.9875MHz	-13	-20.6	7.6	PASS
(1.2) With the input signal amplitude set 3 dB above the AGC threshold					
Channel Bandwidth: 12.5kHz	Low frequency: f1:768.00625MHz f2:768.01875MHz	-13	-18.8	5.8	PASS
	Mid frequency: f1:771.50MHz f2:771.5125MHz	-13	-18.9	5.9	PASS
	High frequency: f1:774.98125MHz f2:774.99375MHz	-13	-18.9	5.9	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:768.0125MHz f2:768.0375MHz	-13	-19.8	6.8	PASS
	Mid frequency: f1:771.5MHz f2:771.525MHz	-13	-20.8	7.8	PASS
	High frequency: f1:774.9625MHz f2:774.9875MHz	-13	-20.7	7.7	PASS
NOTE 1: Intermodulation products select the worst data record.					
NOTE 2: Margin= specification limit -Maximum mark level.					

10.8.4.1.2 Uplink transmit mode

Test frequency		Intermodulation product Limit (dBm)	Max. intermodulation product (dBm)	Margin (dB)	Result
(2) Frequency range: 798MHz~805MHz					
(2.1) With the ALC threshold level					
Channel Bandwidth: 12.5kHz	Low frequency: f1:798.00625MHz f2:798.01875MHz	-13	-22.7	9.7	PASS
	Mid frequency: f1:801.5MHz f2:801.5125MHz	-13	-22.5	9.5	PASS
	High frequency: f1:804.98125MHz f2:804.99375MHz	-13	-22.6	9.6	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:798.0125MHz f2:798.0375MHz	-13	-24.1	11.1	PASS
	Mid frequency: f1:801.5MHz f2:801.525MHz	-13	-24.8	11.8	PASS
	High frequency: f1:804.9625MHz f2:804.9875MHz	-13	-24.7	11.7	PASS
(2.2) With the input signal amplitude set 3 dB above the AGC threshold					
Channel Bandwidth: 12.5kHz	Low frequency: f1:798.00625MHz f2:798.01875MHz	-13	-22.8	9.8	PASS
	Mid frequency: f1:801.5MHz f2:801.5125MHz	-13	-22.8	9.8	PASS
	High frequency: f1:804.98125MHz f2:804.99375MHz	-13	-23.1	10.1	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:798.0125MHz f2:798.0375MHz	-13	-24.7	11.7	PASS
	Mid frequency: f1:801.5MHz f2:801.525MHz	-13	-25.0	12.0	PASS
	High frequency: f1:804.9625MHz f2:804.9875MHz	-13	-25.1	12.1	PASS
NOTE 1: Intermodulation products select the worst data record.					
NOTE 2: Margin= specification limit -Maximum mark level.					

10.8.4.2 800MHz Band

10.8.4.2.1 Downlink transmit mode

Frequency range		Intermodulation product Limit (dBm)	Max. intermodulation product (dBm)	Margin (dB)	Result
(1) Frequency range: 851MHz~861MHz					
(1.1) With the ALC threshold level					
Channel Bandwidth: 12.5kHz	Low frequency: f1:851.00625MHz f2:851.01875MHz	-13	-27.3	14.3	PASS
	Mid frequency: f1:856.0MHz f2:856.0125MHz	-13	-28.1	15.1	PASS
	High frequency: f1:860.98125MHz f2:860.99375MHz	-13	-30.0	17.0	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:861.0125MHz f2:851.0375MHz	-13	-28.4	15.4	PASS
	Mid frequency: f1:856.0MHz f2:856.025MHz	-13	-29.6	16.6	PASS
	High frequency: f1:860.9625MHz f2:860.9875MHz	-13	-36.2	23.2	PASS
(1.2) With the input signal amplitude set 3 dB above the AGC threshold					
Channel Bandwidth: 12.5kHz	Low frequency: f1:851.00625MHz f2:851.01875MHz	-13	-27.5	14.5	PASS
	Mid frequency: f1:856.0MHz f2:856.0125MHz	-13	-28.9	15.9	PASS
	High frequency: f1:860.98125MHz f2:860.99375MHz	-13	-33.9	20.9	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:861.0125MHz f2:851.0375MHz	-13	-29.1	16.1	PASS
	Mid frequency: f1:856.0MHz f2:856.025MHz	-13	-31.1	18.1	PASS
	High frequency: f1:860.9625MHz f2:860.9875MHz	-13	-36.0	23.0	PASS
NOTE 1: Intermodulation products select the worst data record.					
NOTE 2: Margin= specification limit -Maximum mark level.					

10.8.4.2.2 Uplink transmit mode

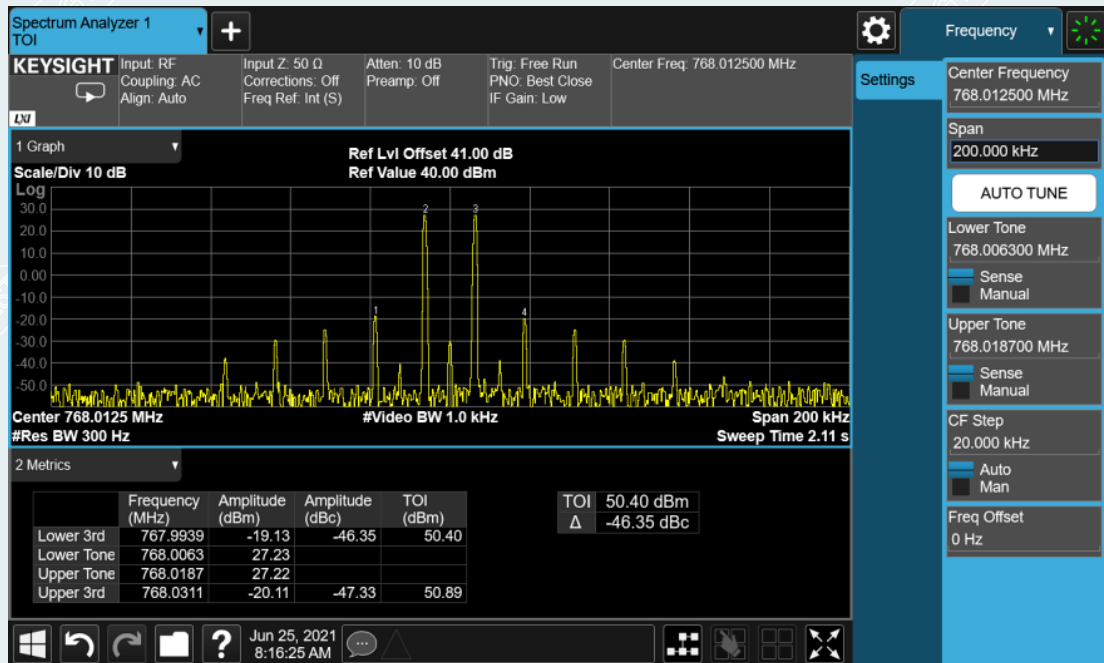
Frequency range		Intermodulation product Limit (dBm)	Max. intermodulation product (dBm)	Margin (dB)	Result
(2) Frequency range: 806MHz~816MHz					
(2.1) With the ALC threshold level					
Channel Bandwidth: 12.5kHz	Low frequency: f1:806.00625MHz f2:806.01875MHz	-13	-23.4	10.4	PASS
	Mid frequency: f1:811.0MHz f2:811.0125MHz	-13	-25.0	12.0	PASS
	High frequency: f1:815.98125MHz f2:815.99375MHz	-13	-32.1	19.1	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:806.0125MHz f2:806.0875MHz	-13	-25.3	12.3	PASS
	Mid frequency: f1:811.0MHz f2:811.025MHz	-13	-23.9	10.9	PASS
	High frequency: f1:815.9625MHz f2:815.9875MHz	-13	-34.0	21.0	PASS
(2.2)					
Channel Bandwidth: 12.5kHz	Low frequency: f1:806.00625MHz f2:806.01875MHz	-13	-23.3	10.3	PASS
	Mid frequency: f1:811.0MHz f2:811.0125MHz	-13	-25.1	12.1	PASS
	High frequency: f1:815.98125MHz f2:815.99375MHz	-13	-33.8	20.8	PASS
Channel Bandwidth: 25kHz	Low frequency: f1:806.0125MHz f2:806.0875MHz	-13	-25.1	12.1	PASS
	Mid frequency: f1:811.0MHz f2:811.025MHz	-13	-27.5	14.5	PASS
	High frequency: f1:815.9625MHz f2:815.9875MHz	-13	-35.6	22.6	PASS
NOTE 1: Intermodulation products select the worst data record.					
NOTE 2: Margin= specification limit -Maximum mark level.					

10.8.5 Test screenshot

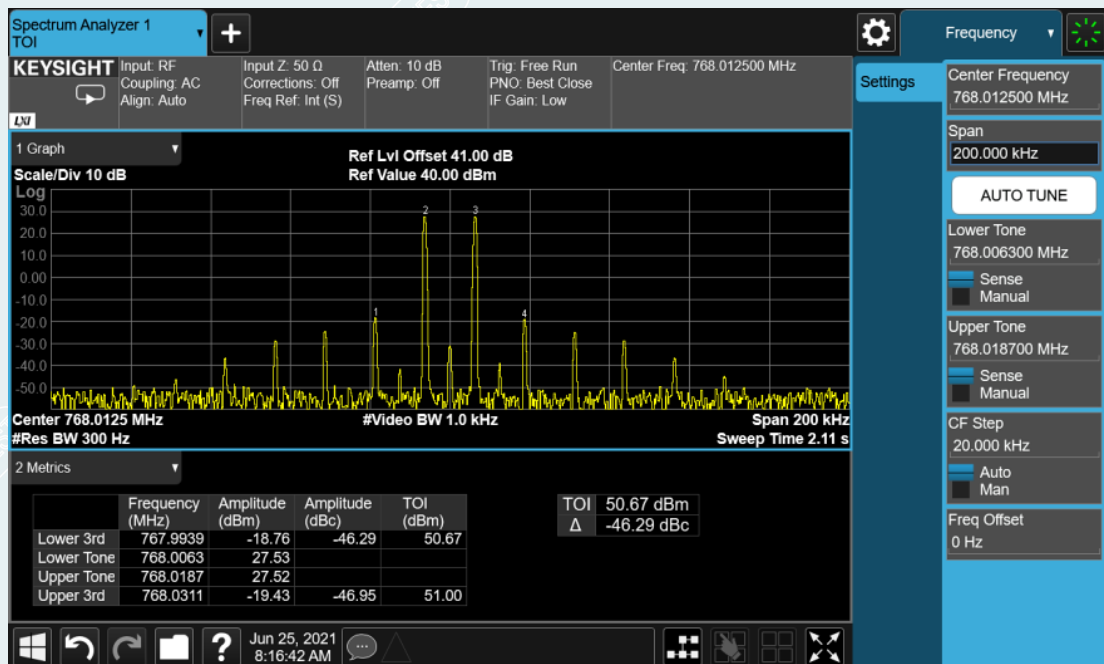
10.8.5.1 700MHz Band

10.8.5.1.1 Channel bandwidth 12.5kHz

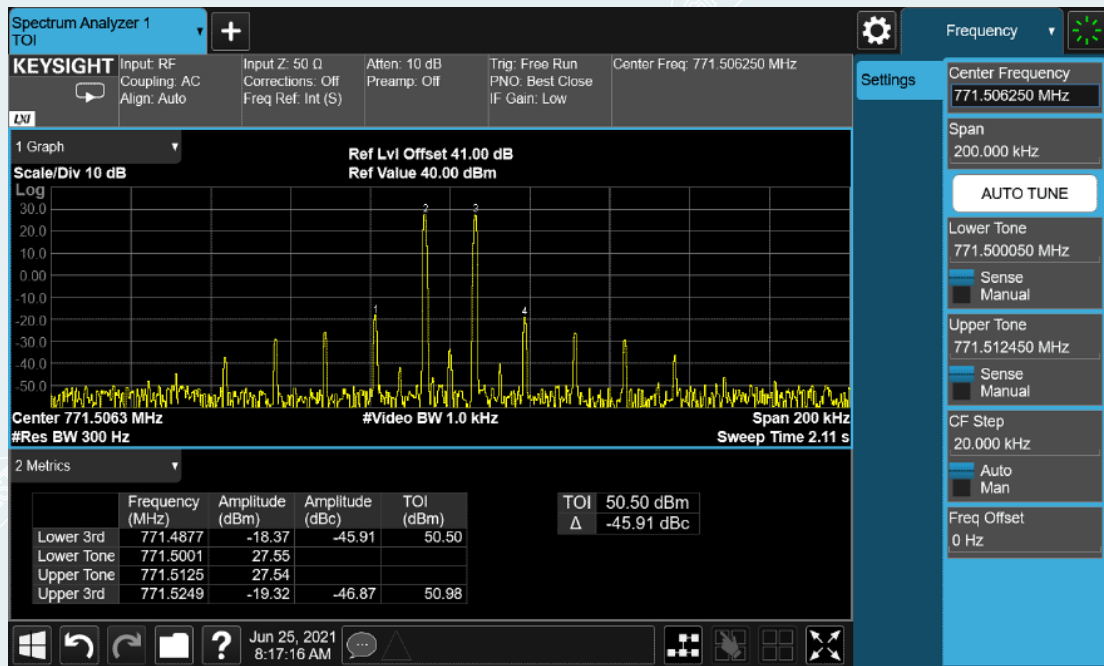
10.8.5.1.1.1 Downlink



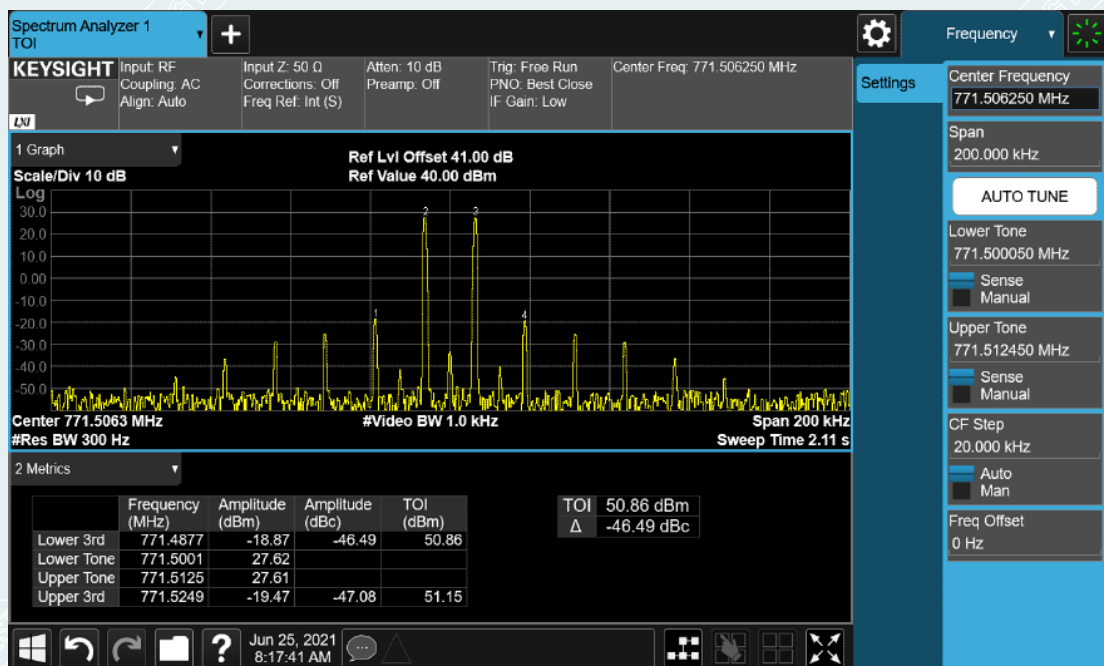
Low Frequency and With the ALC threshold level



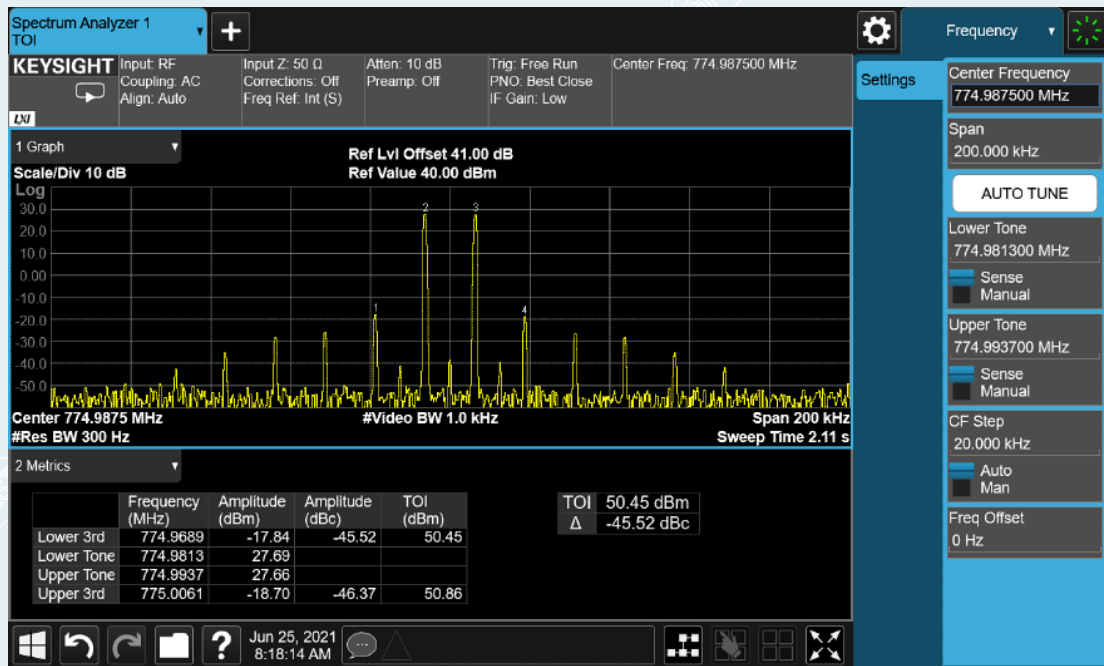
Low Frequency and With the input signal amplitude set 3 dB above the ALC threshold



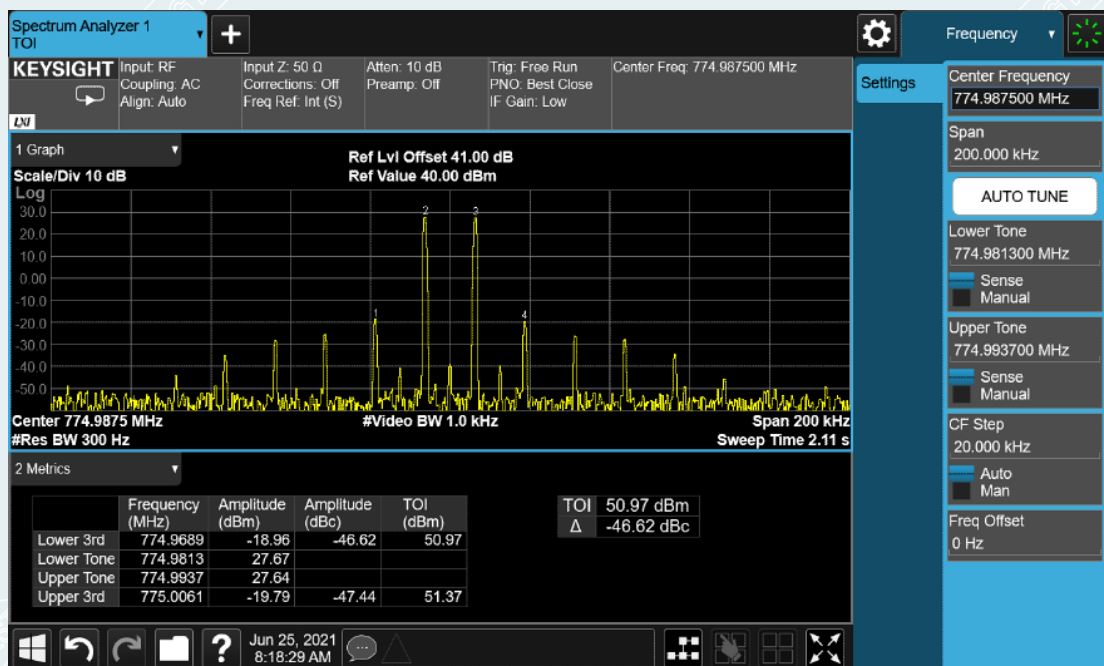
Mid Frequency and With the ALC threshold level



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

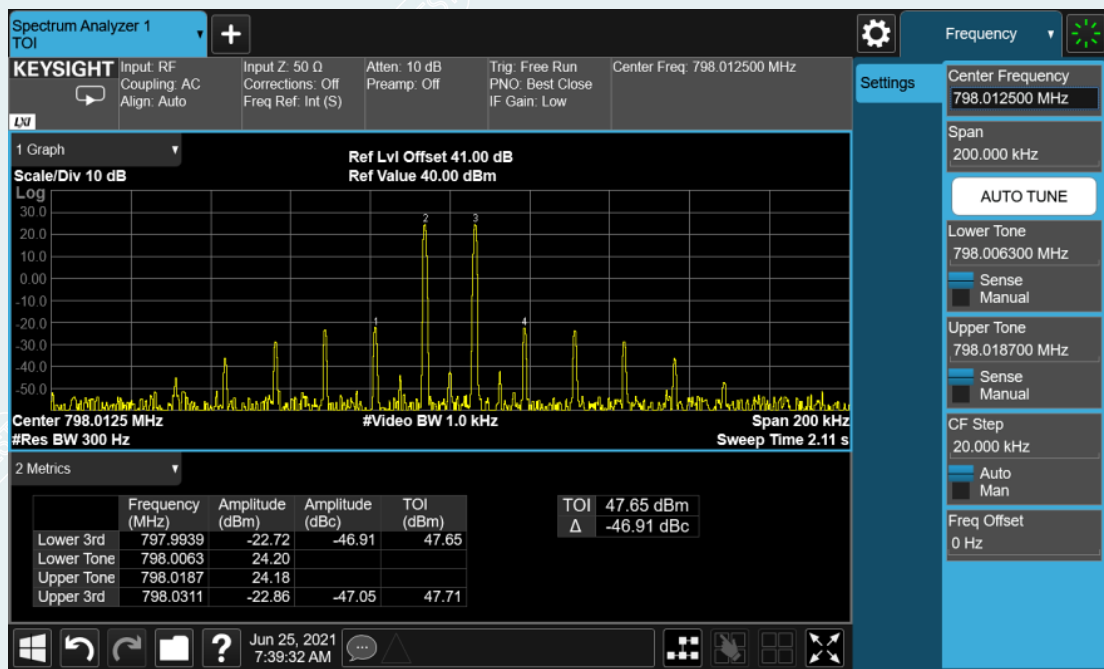


High Frequency and With the ALC threshold level

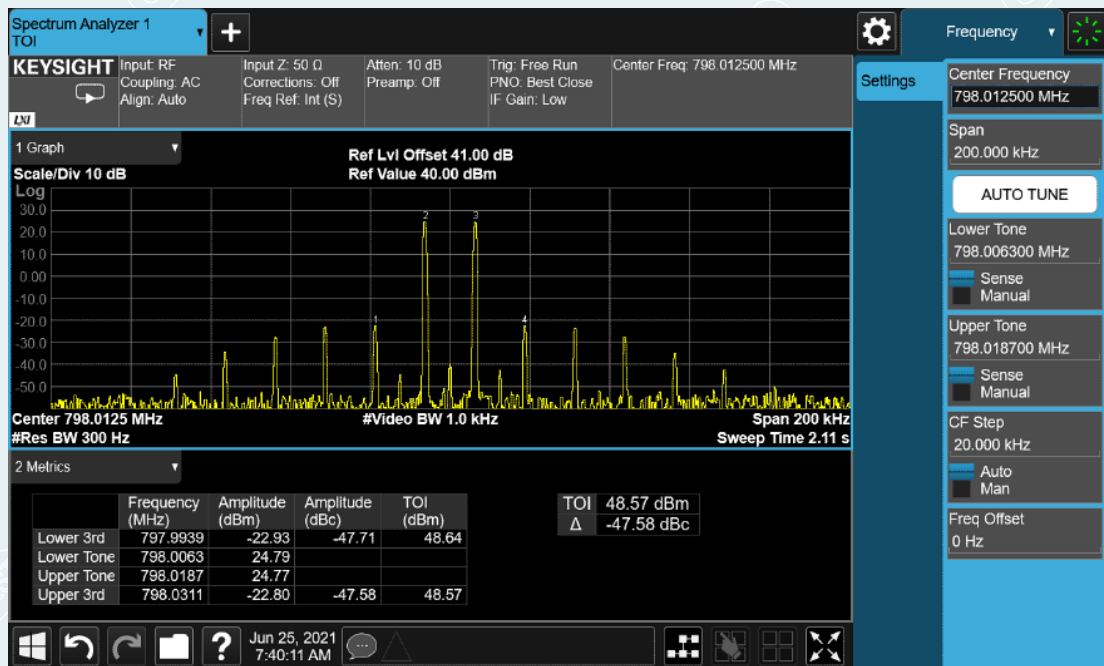


High Frequency and With the input signal amplitude set 3 dB above the ALC threshold

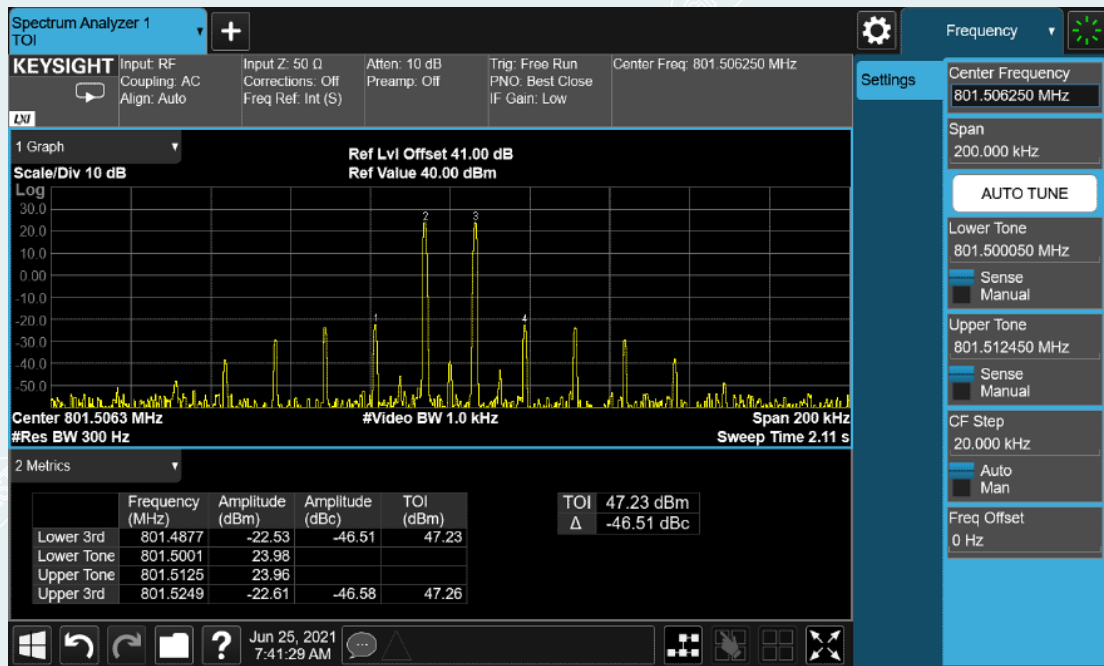
10.8.5.1.1.2 Uplink



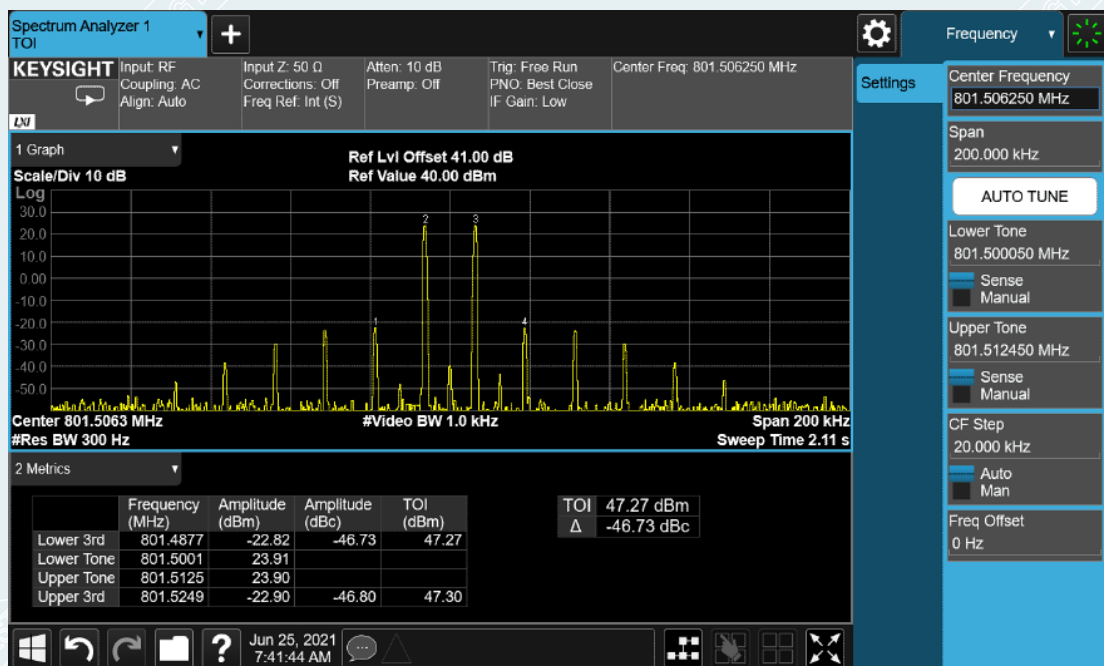
Low Frequency and With the ALC threshold level



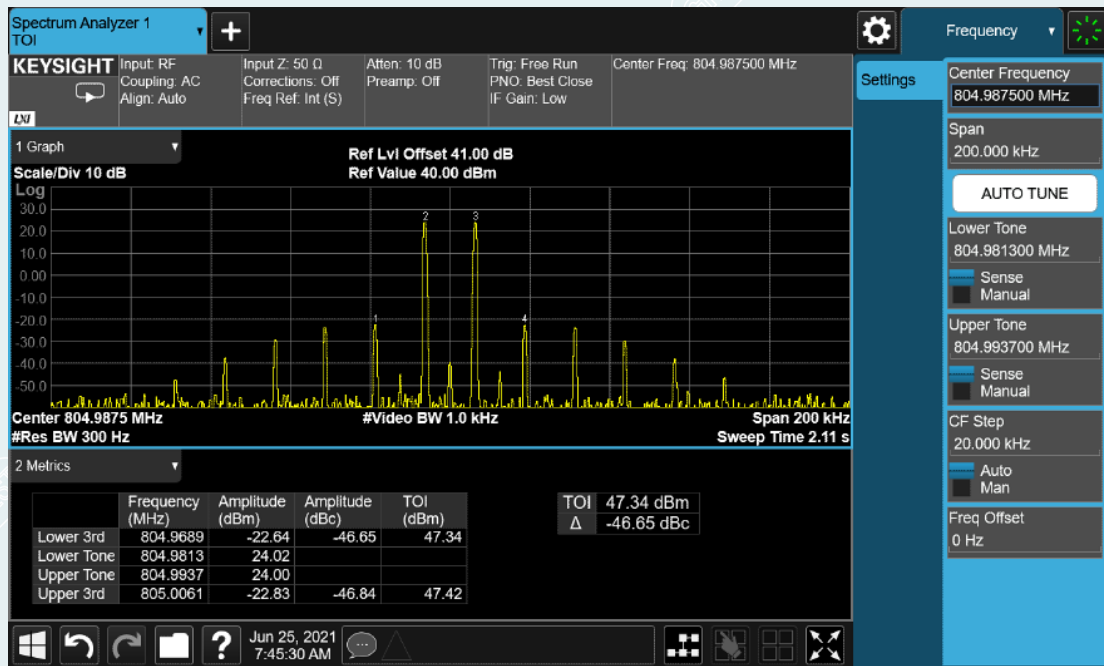
Low Frequency and With the input signal amplitude set 3 dB above the ALC threshold



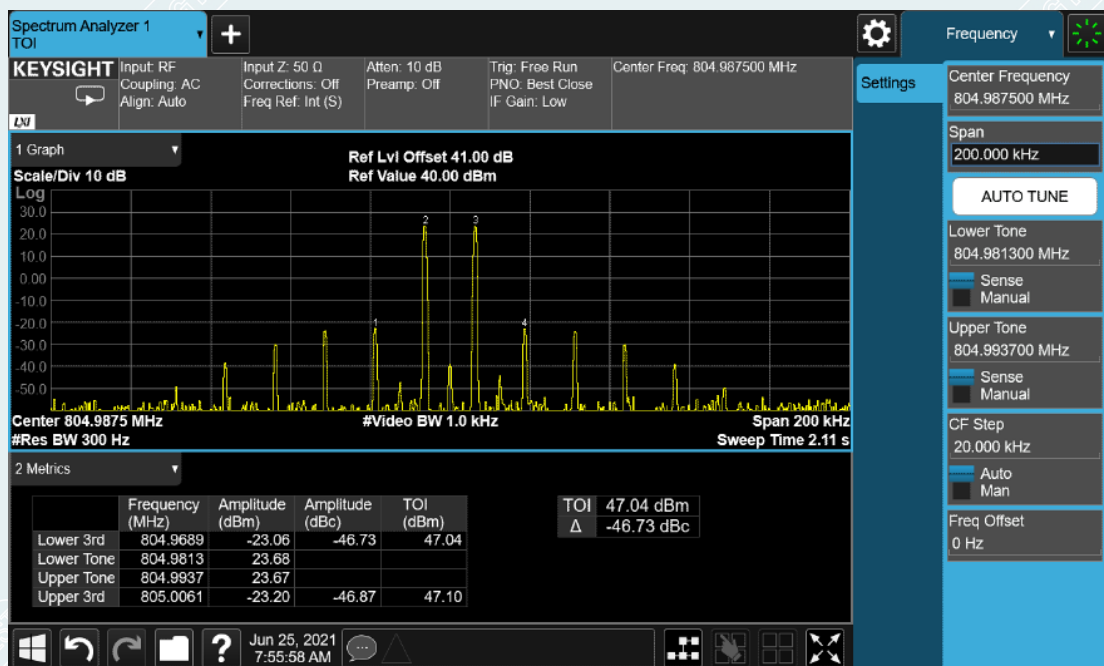
Mid Frequency and With the ALC threshold level



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



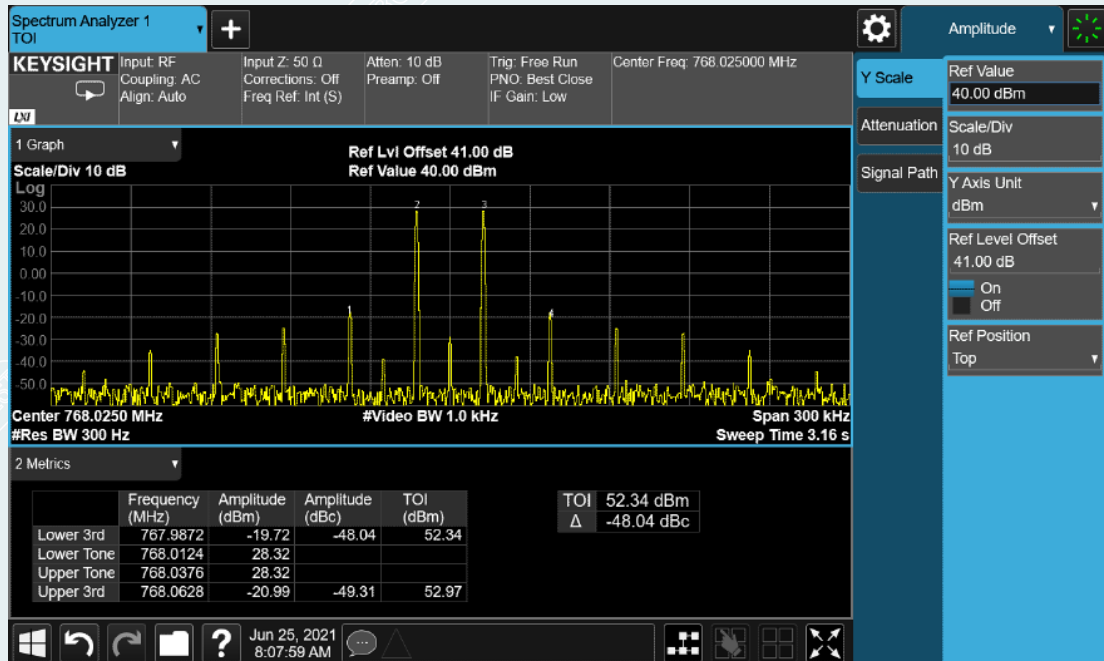
High Frequency and With the ALC threshold level



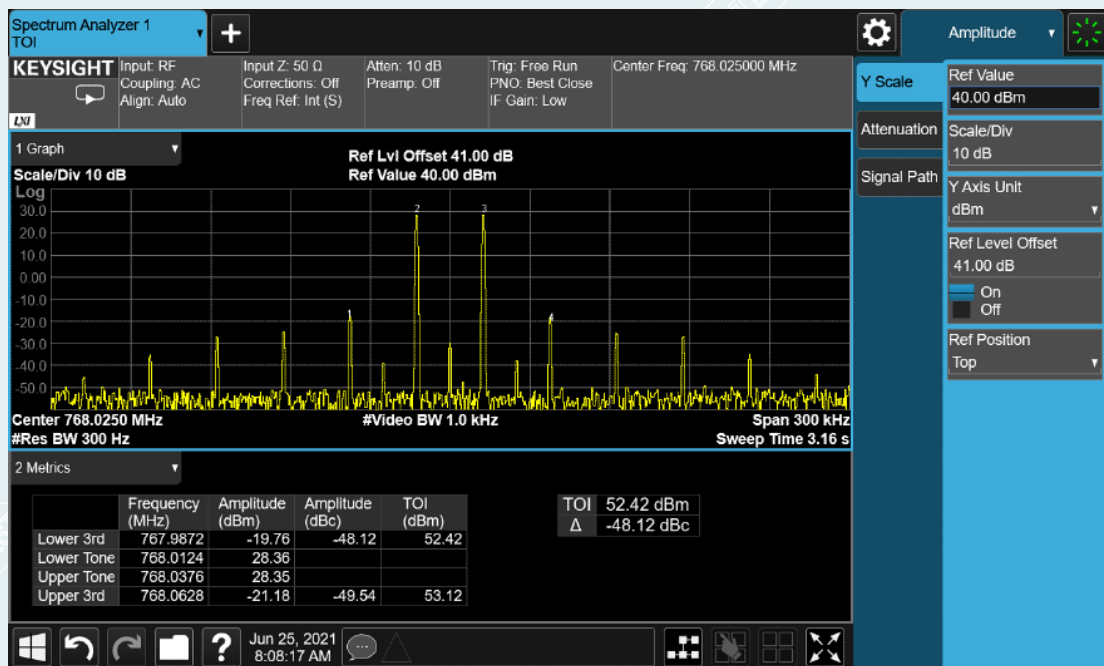
High Frequency and With the input signal amplitude set 3 dB above the ALC threshold

10.8.5.1.2 Channel bandwidth 25kHz

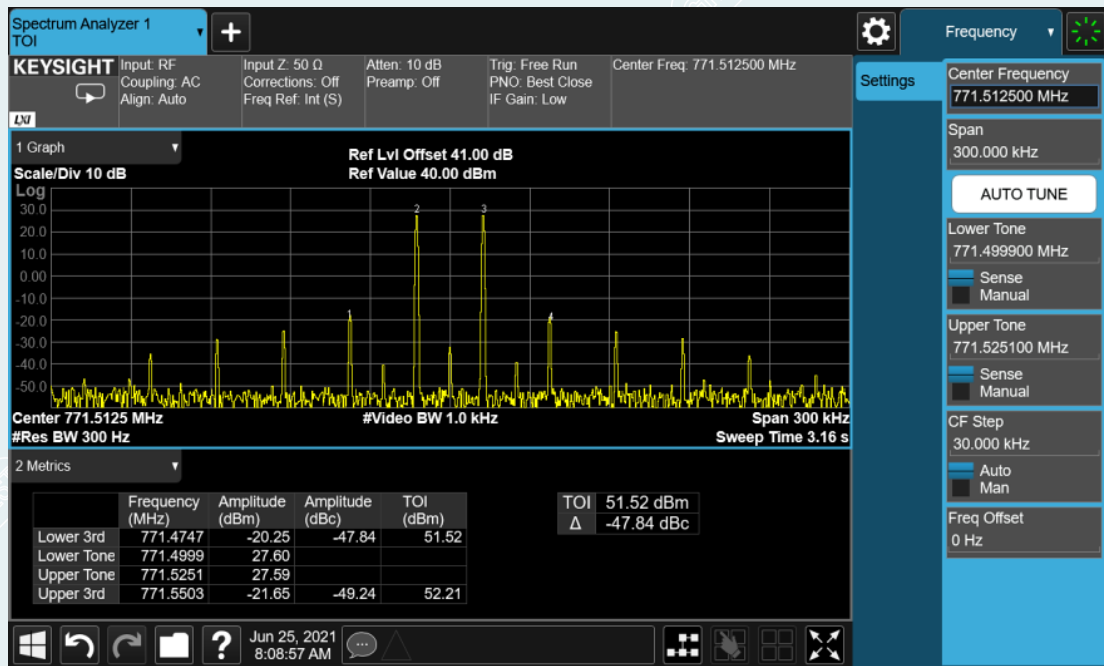
10.8.5.1.2.1 Downlink



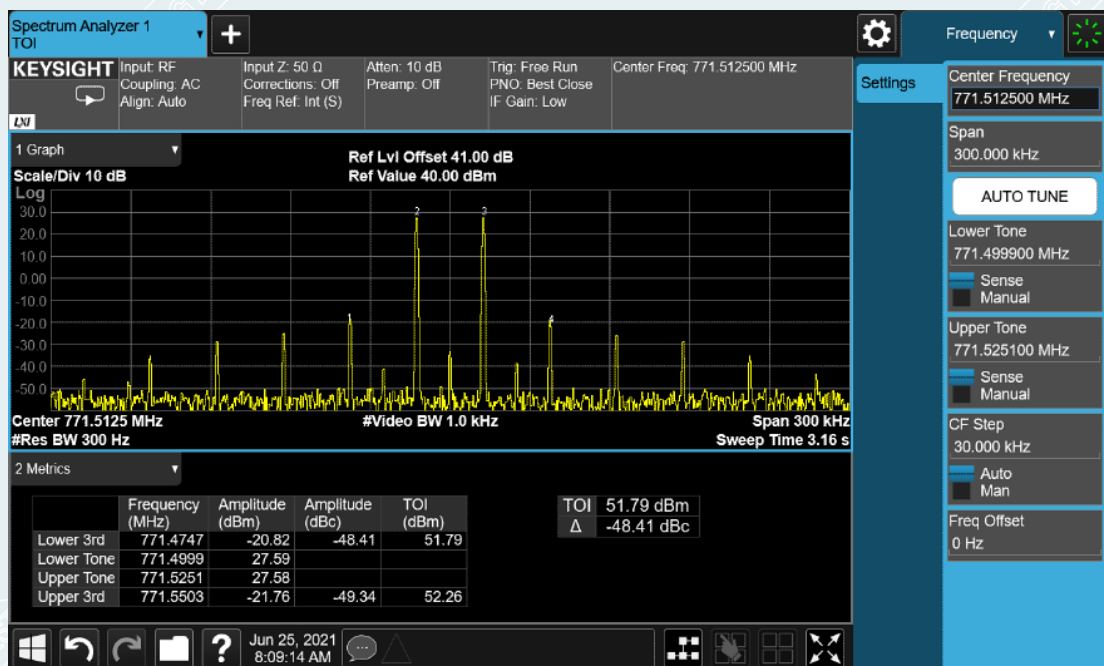
Low Frequency and With the ALC threshold level



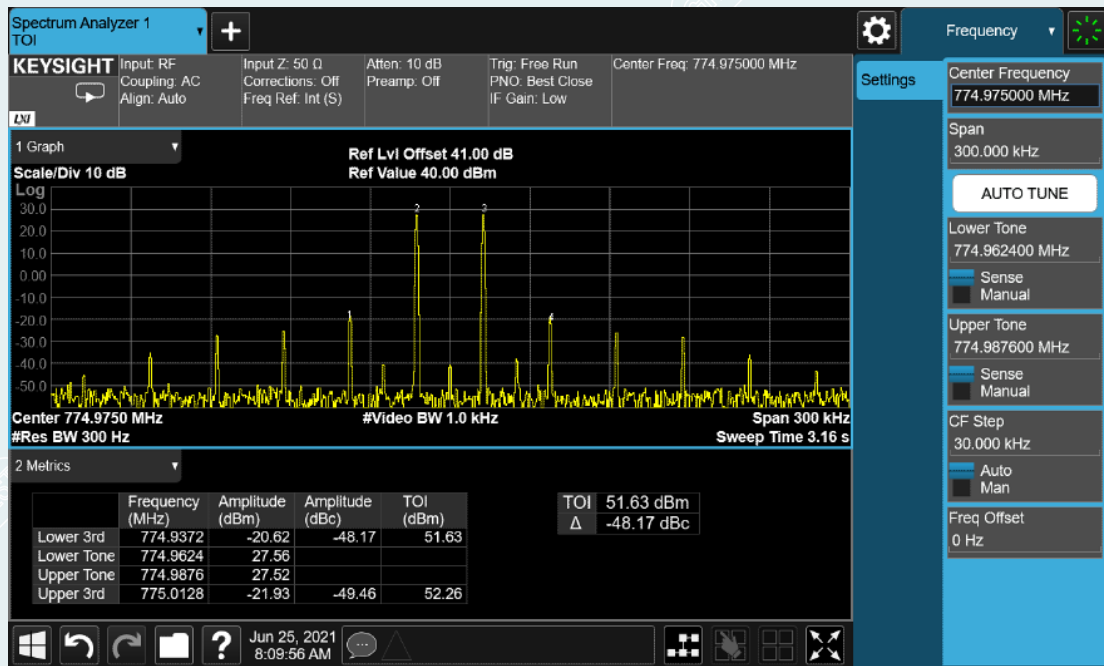
Low Frequency and With the input signal amplitude set 3 dB above the ALC threshold



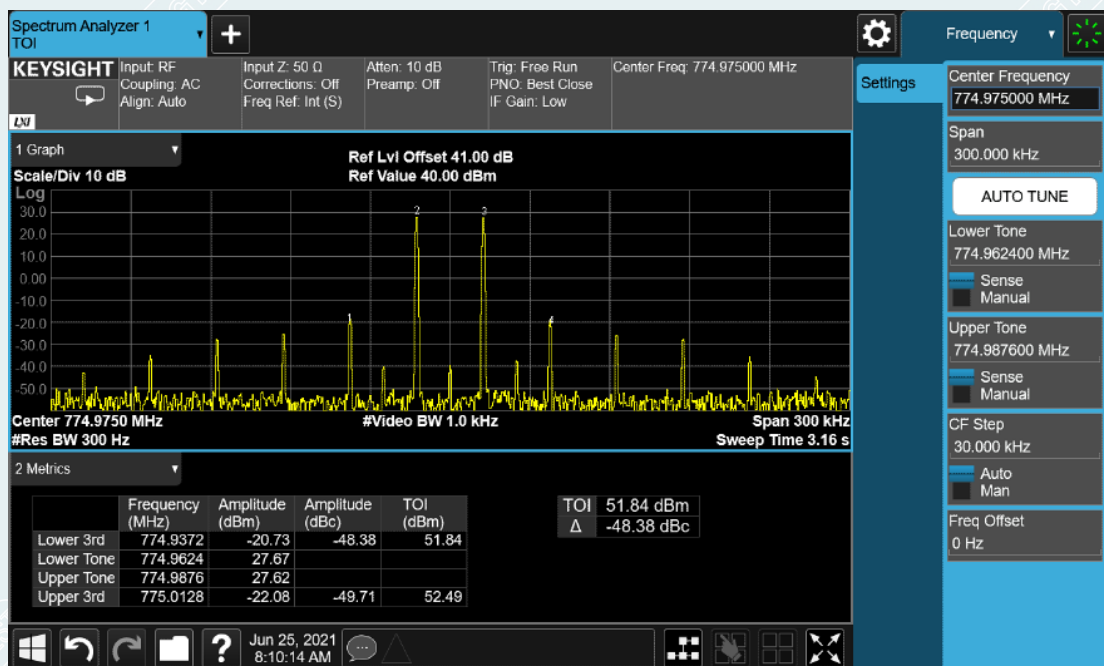
Mid Frequency and With the ALC threshold level



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

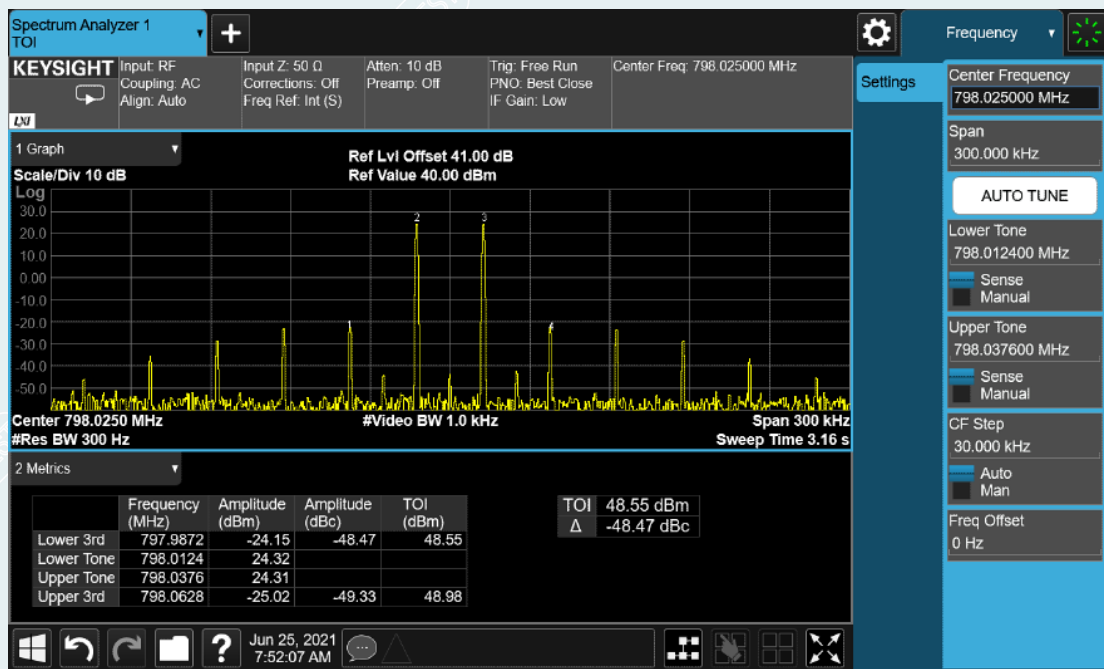


High Frequency and With the ALC threshold level

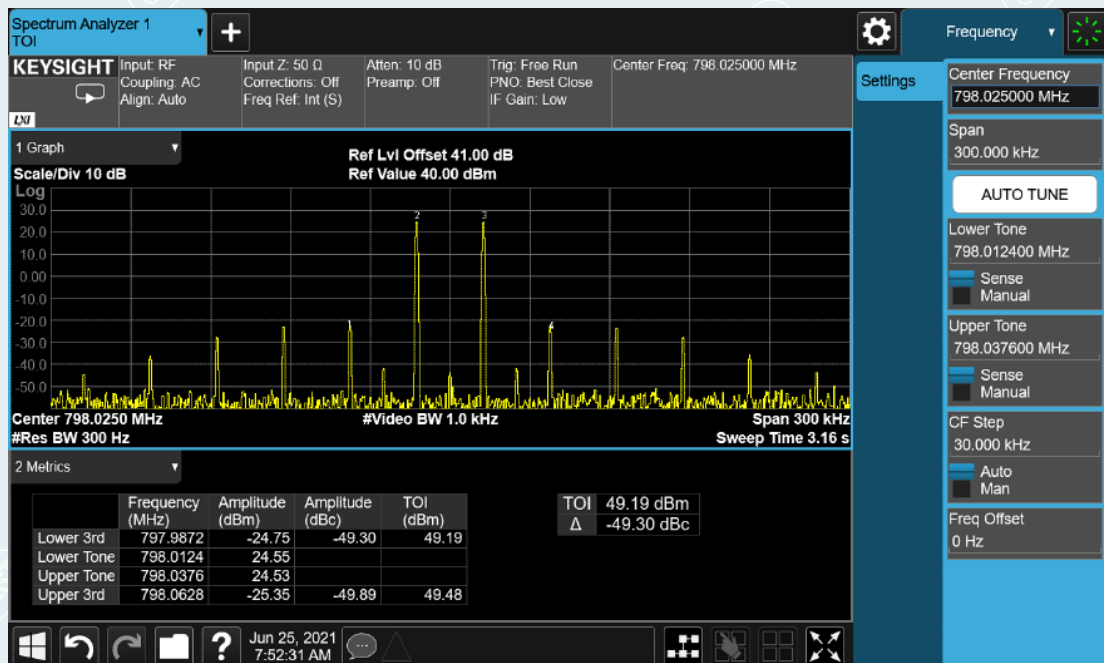


High Frequency and With the input signal amplitude set 3 dB above the ALC threshold

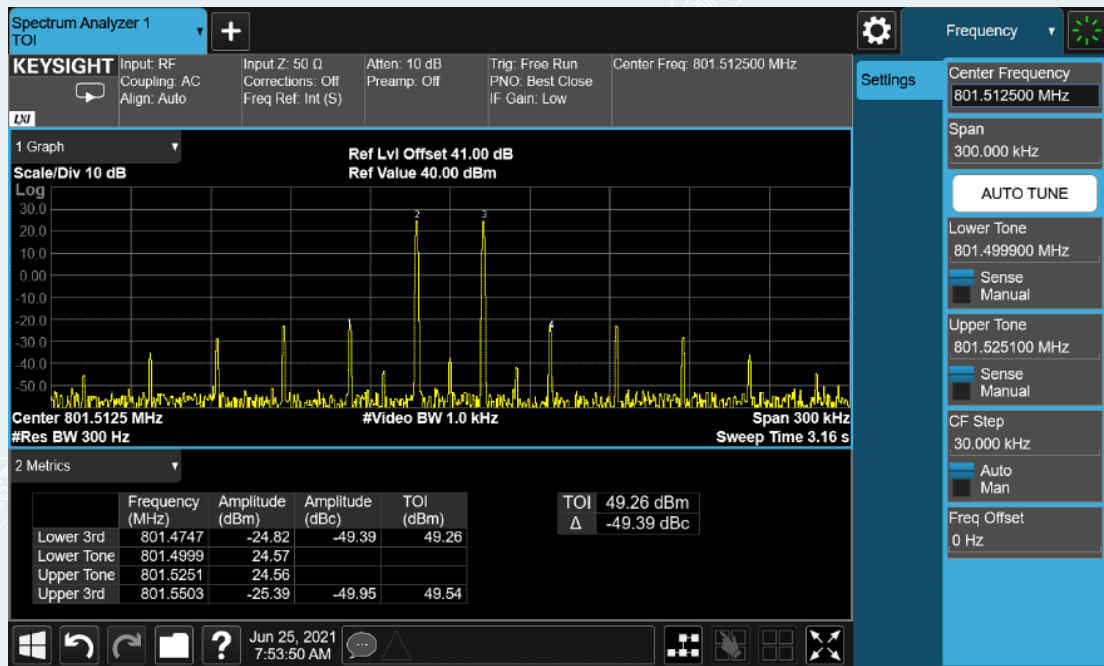
10.8.5.1.2.2 Uplink



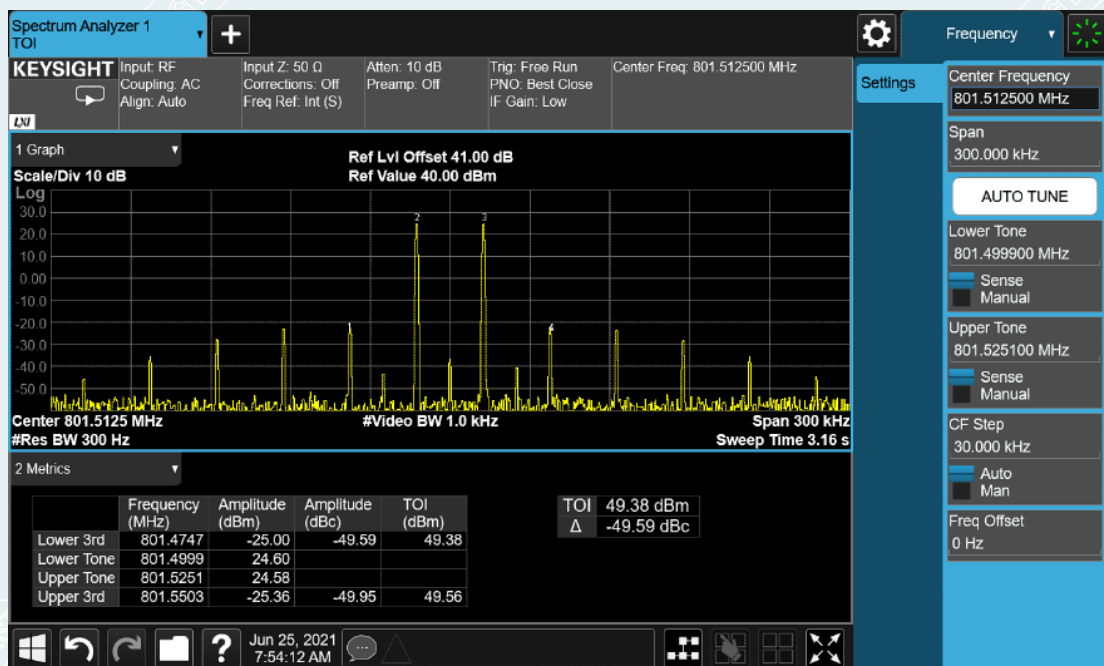
Low Frequency and With the ALC threshold level



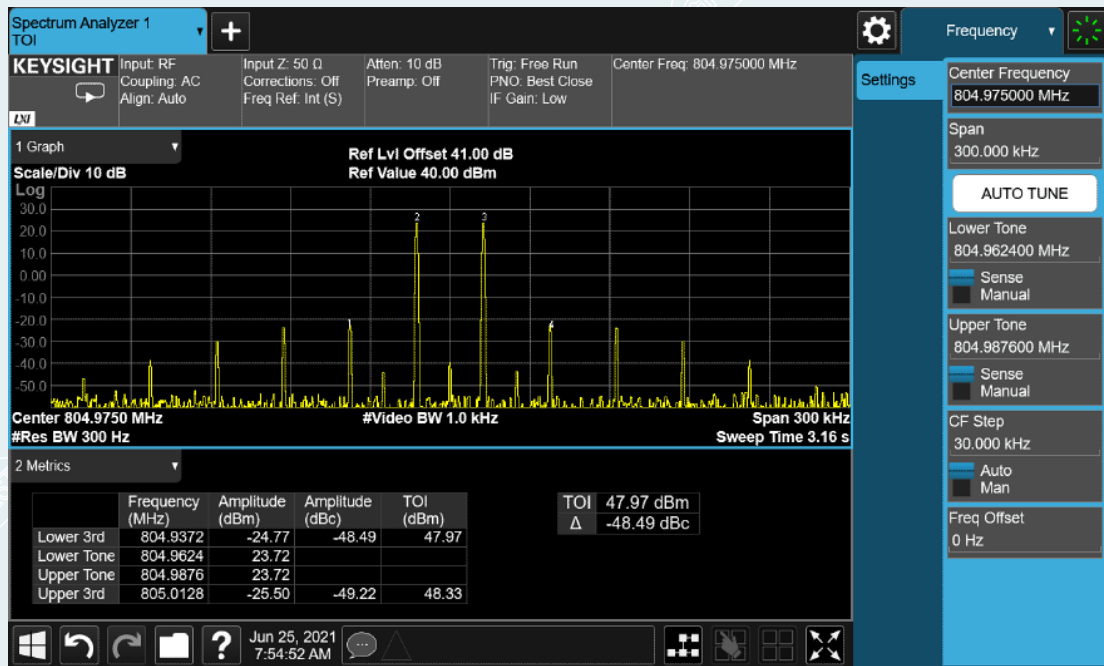
Low Frequency and With the input signal amplitude set 3 dB above the ALC threshold



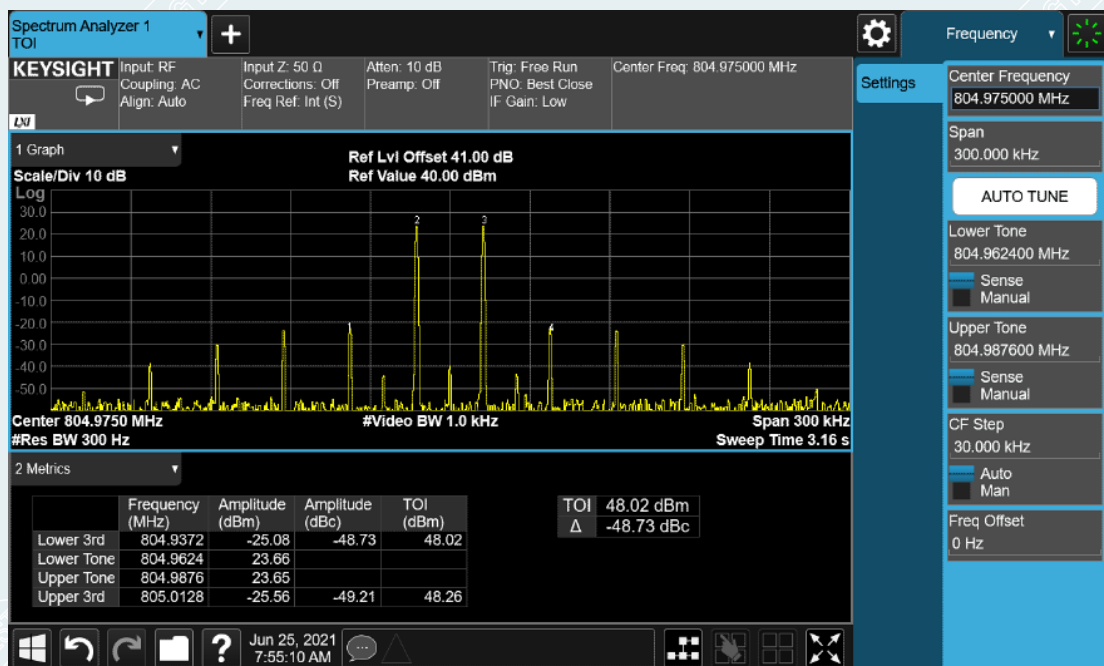
Mid Frequency and With the ALC threshold level



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



High Frequency and With the ALC threshold level

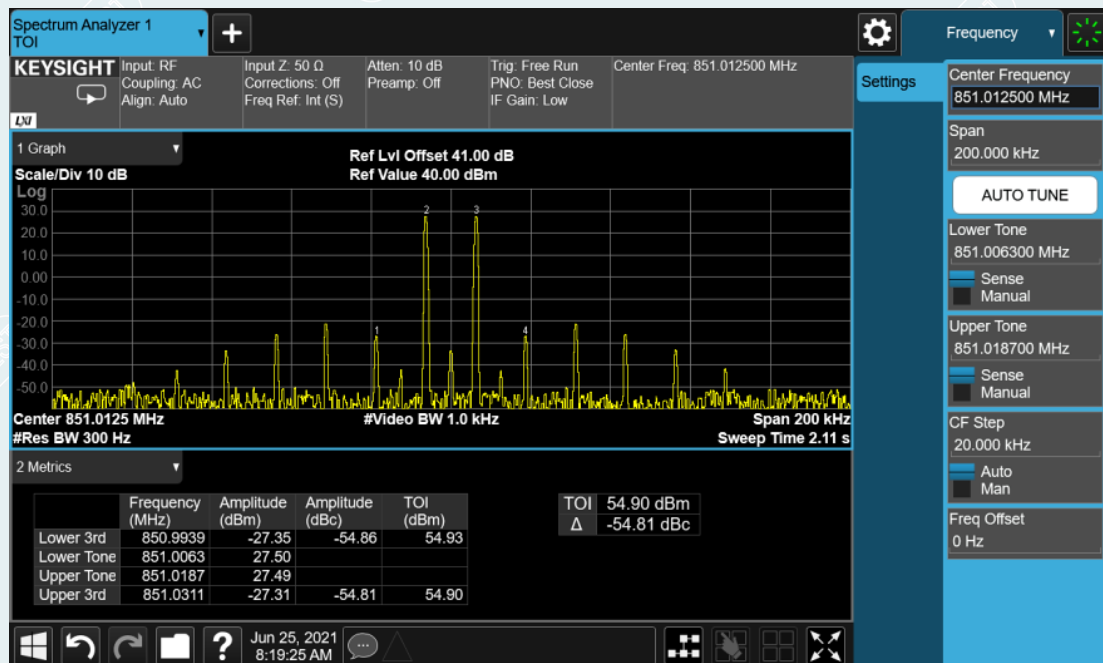


High Frequency and With the input signal amplitude set 3 dB above the ALC threshold

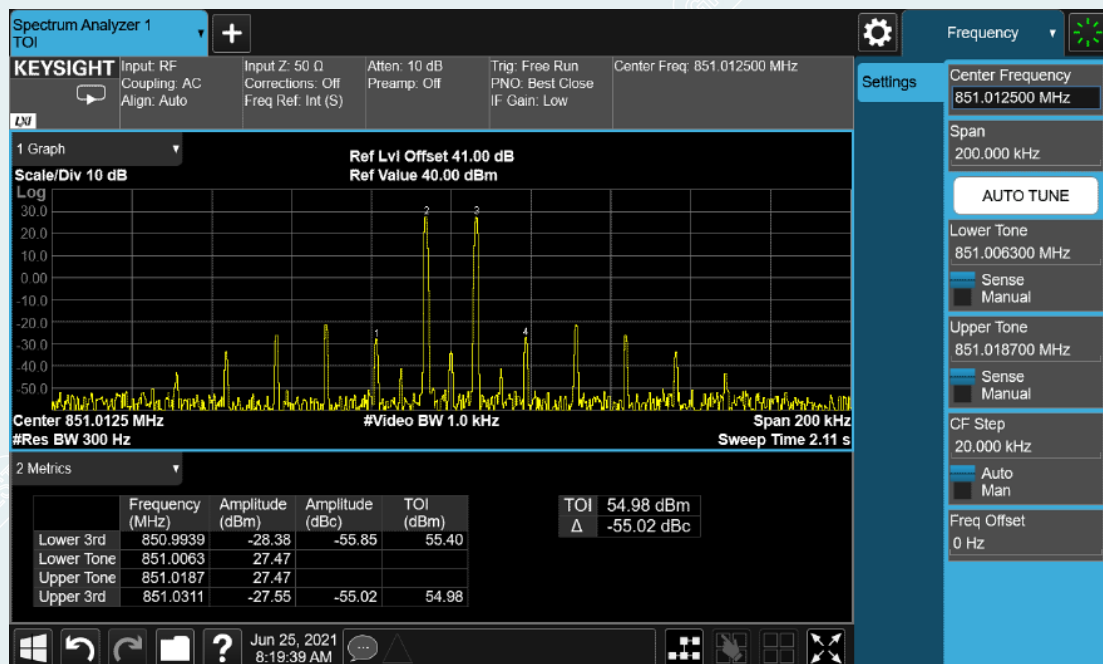
10.8.5.2 800MHz Band

10.8.5.2.1 Channel bandwidth 12.5kHz

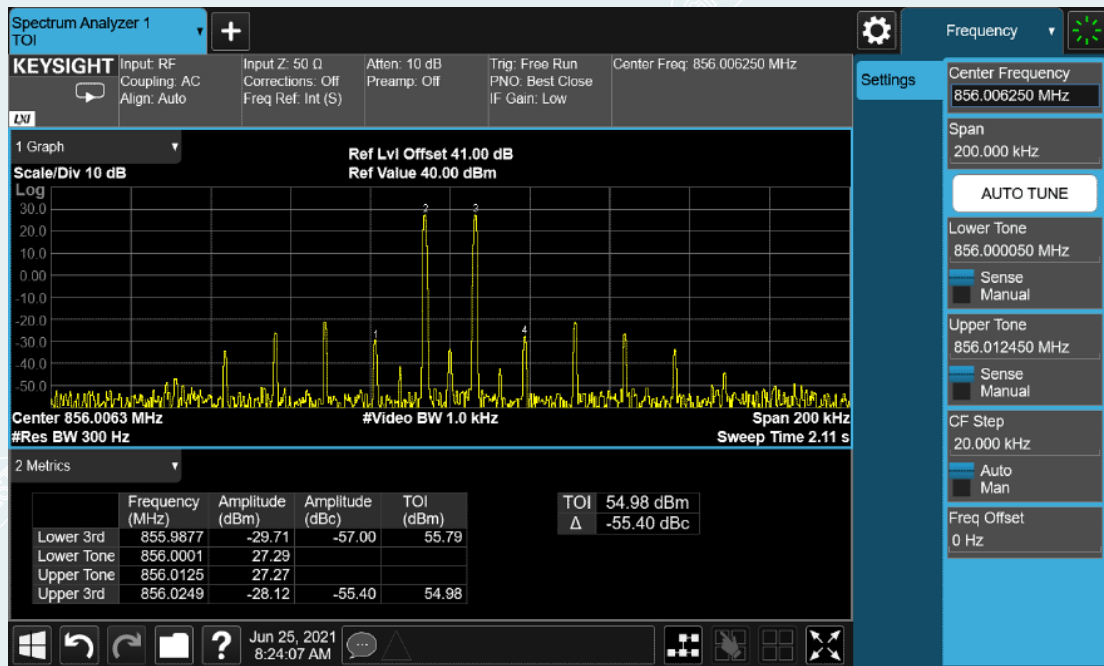
10.8.5.2.1.1 Downlink



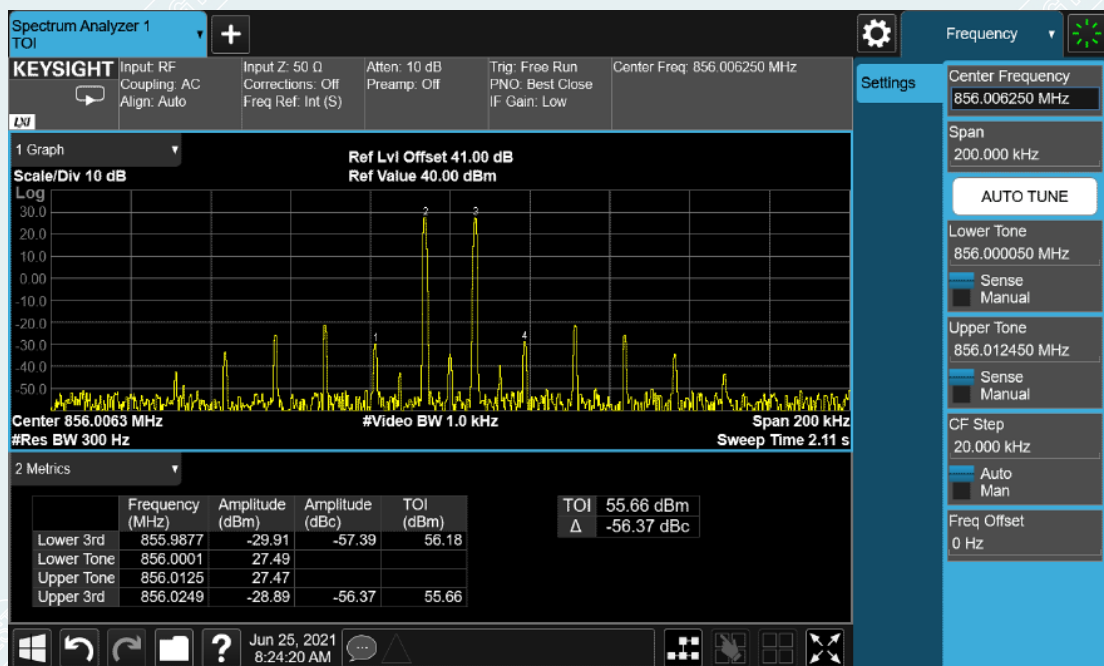
Low Frequency and With the ALC threshold level



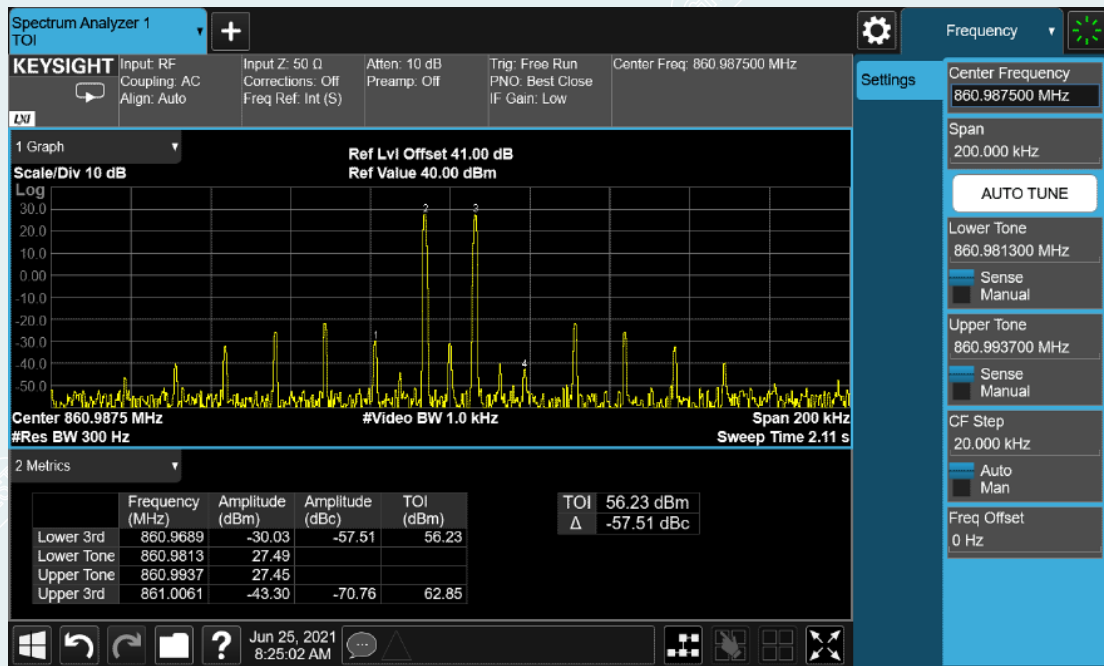
Low Frequency and With the input signal amplitude set 3 dB above the ALC threshold



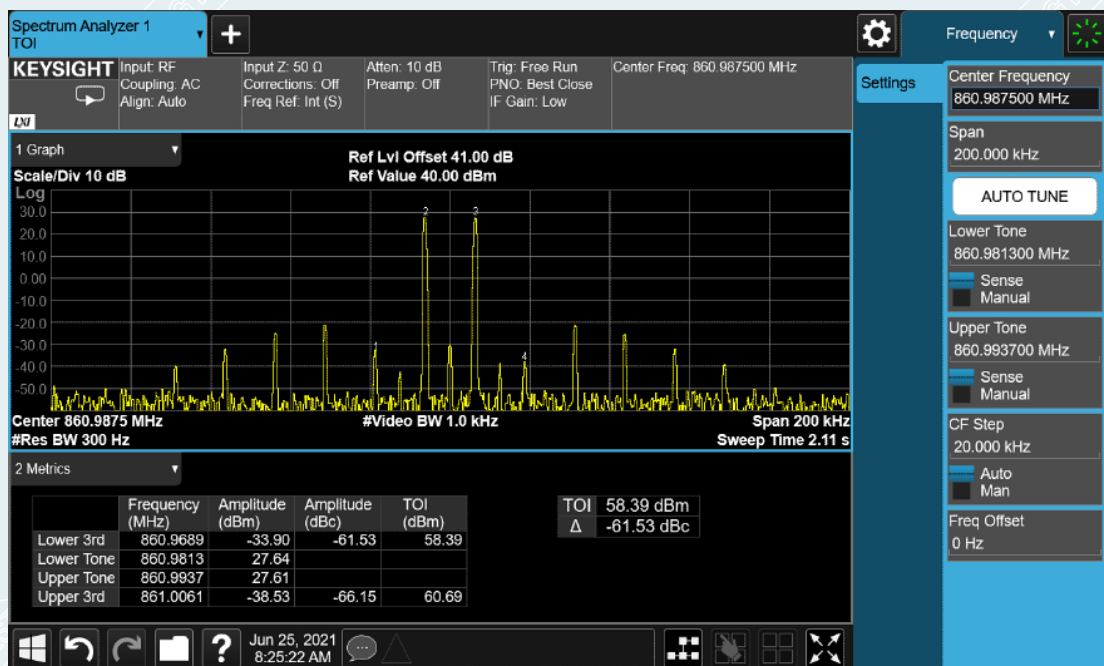
Mid Frequency and With the ALC threshold level



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

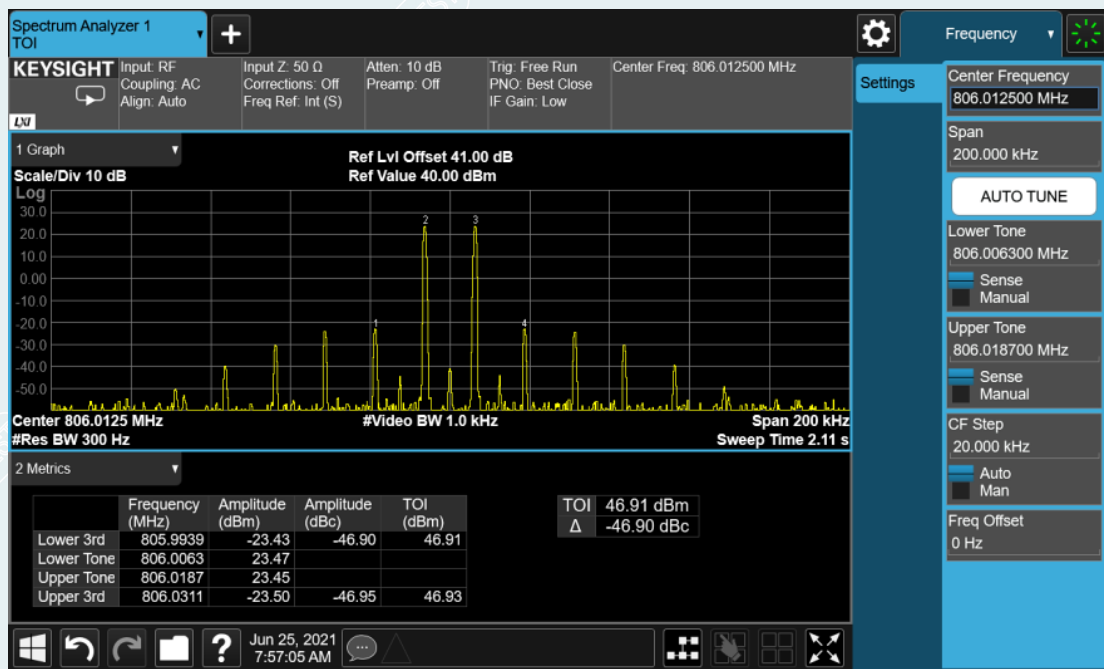


High Frequency and With the ALC threshold level



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

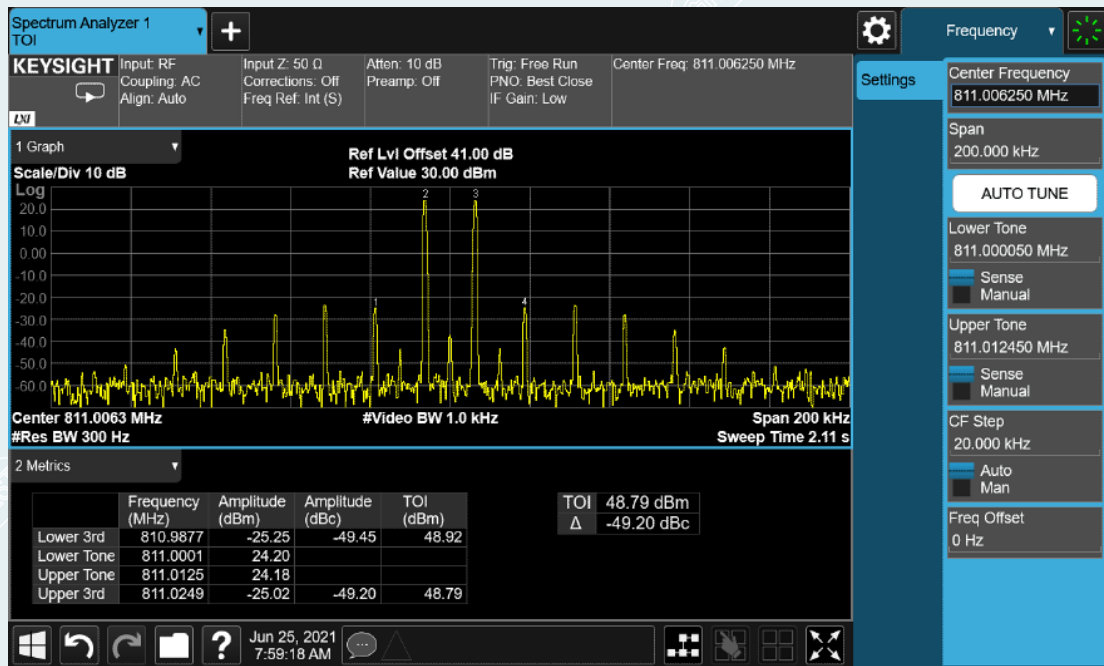
10.8.5.2.1.2 Uplink



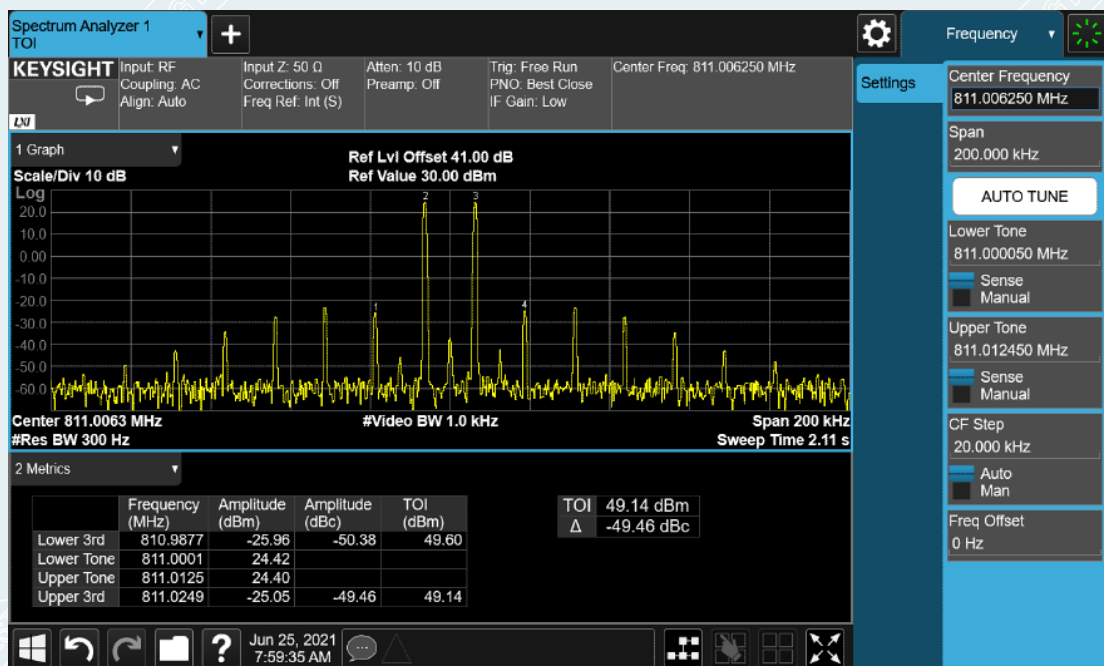
Low Frequency and With the ALC threshold level



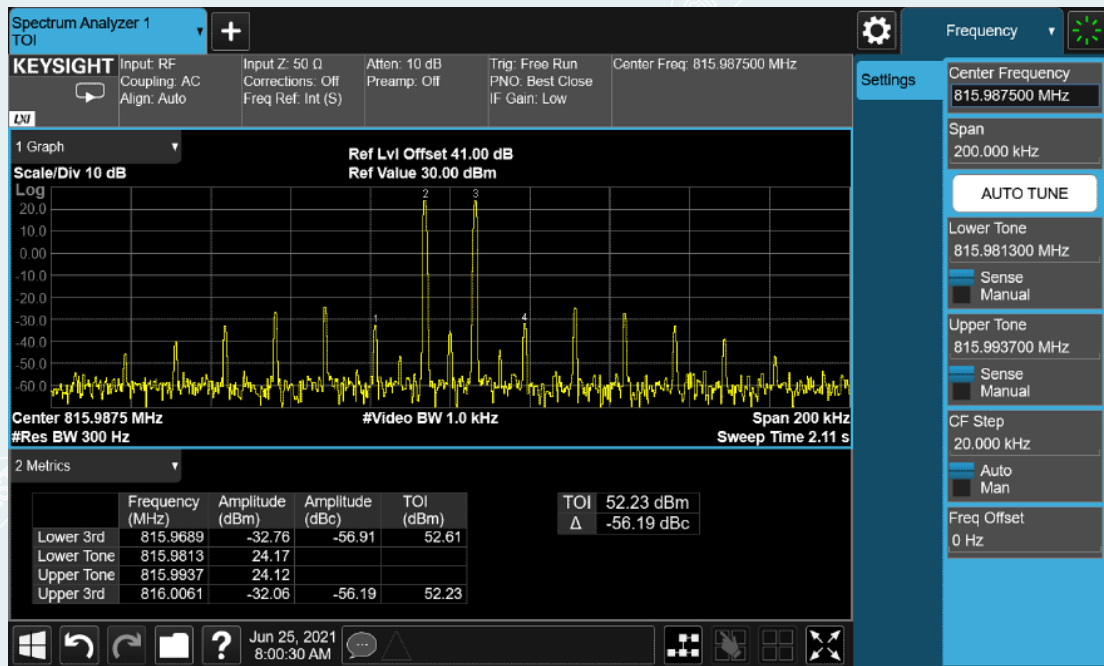
Low Frequency and With the input signal amplitude set 3 dB above the ALC threshold



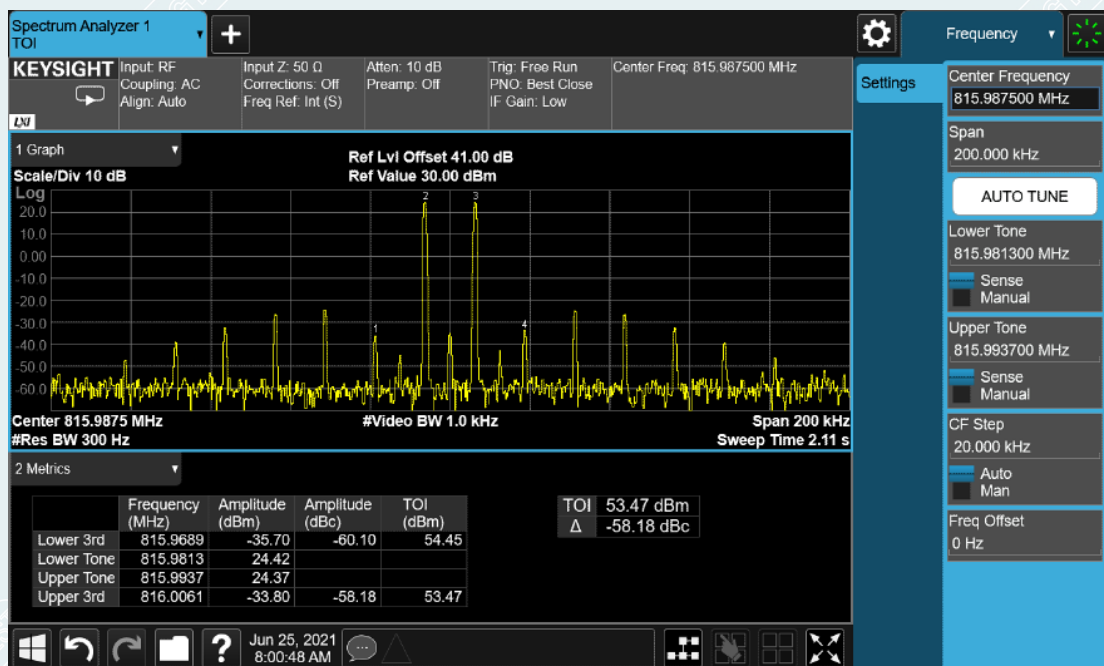
Mid Frequency and With the ALC threshold level



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



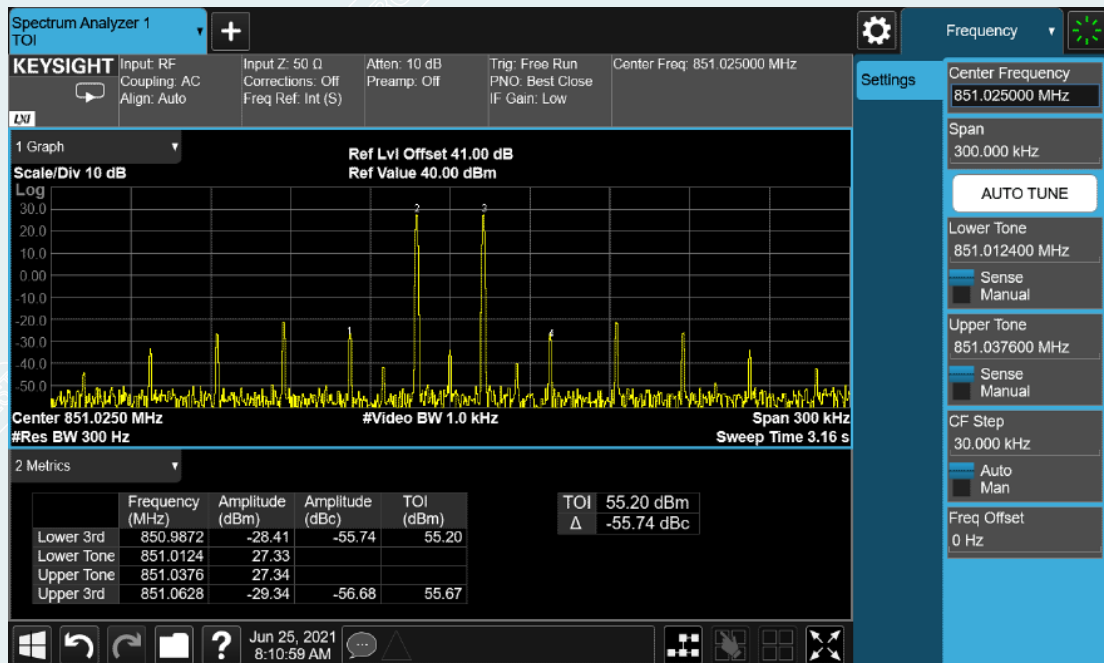
High Frequency and With the ALC threshold level



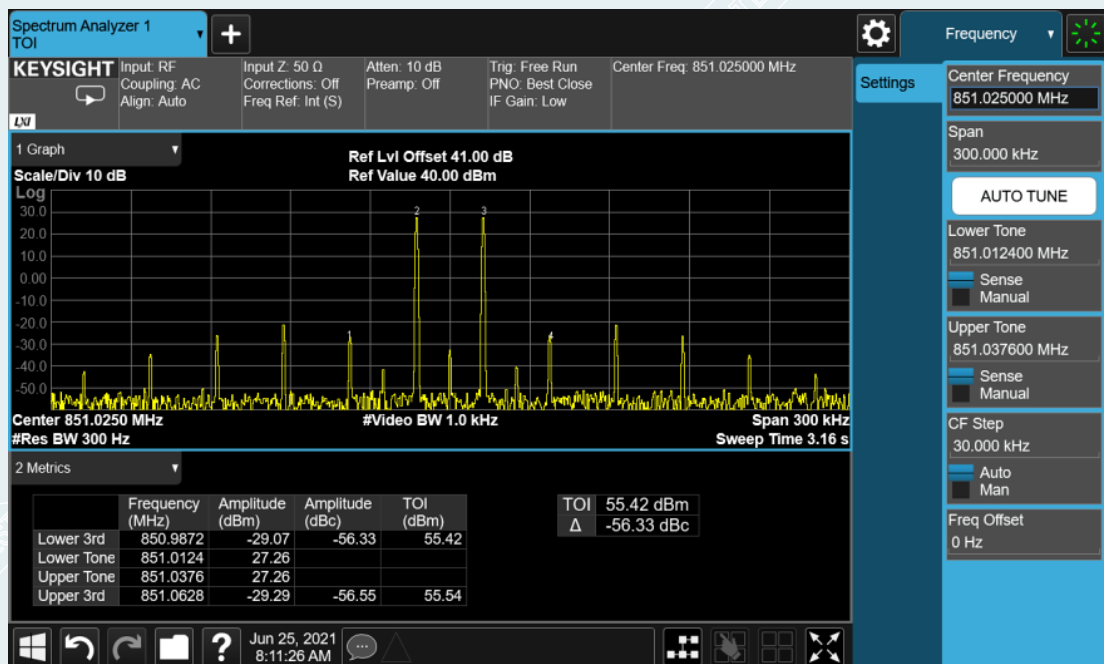
High Frequency and With the input signal amplitude set 3 dB above the ALC threshold

10.8.5.2.2 Channel bandwidth 25kHz

10.8.5.2.2.1 Downlink



Low Frequency and With the ALC threshold level



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