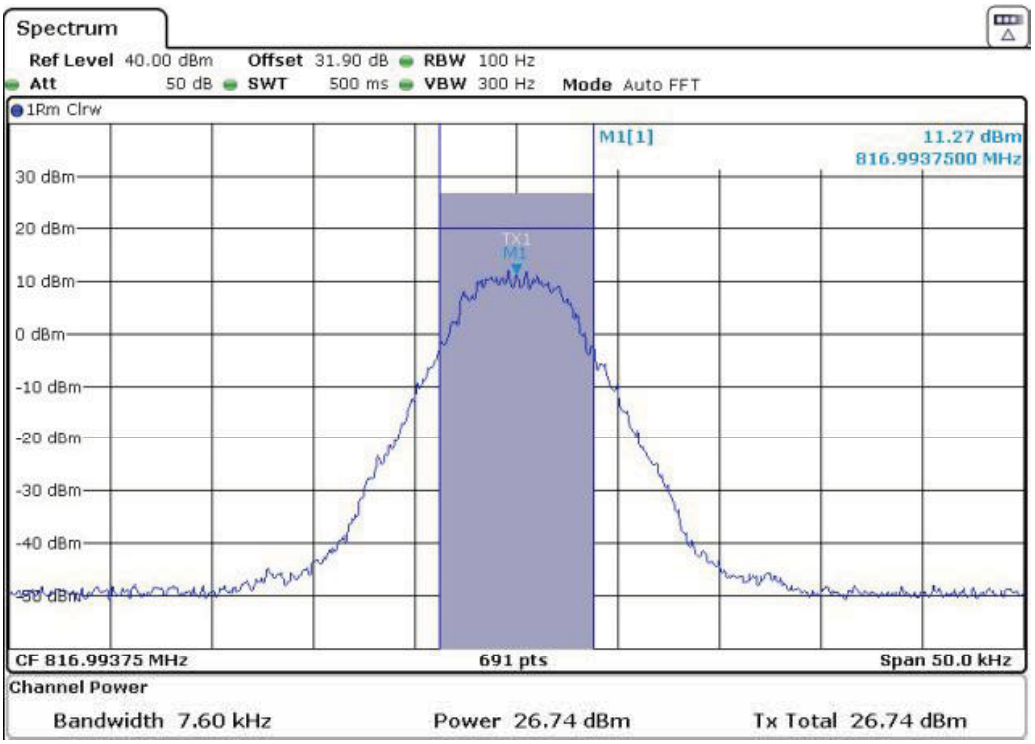
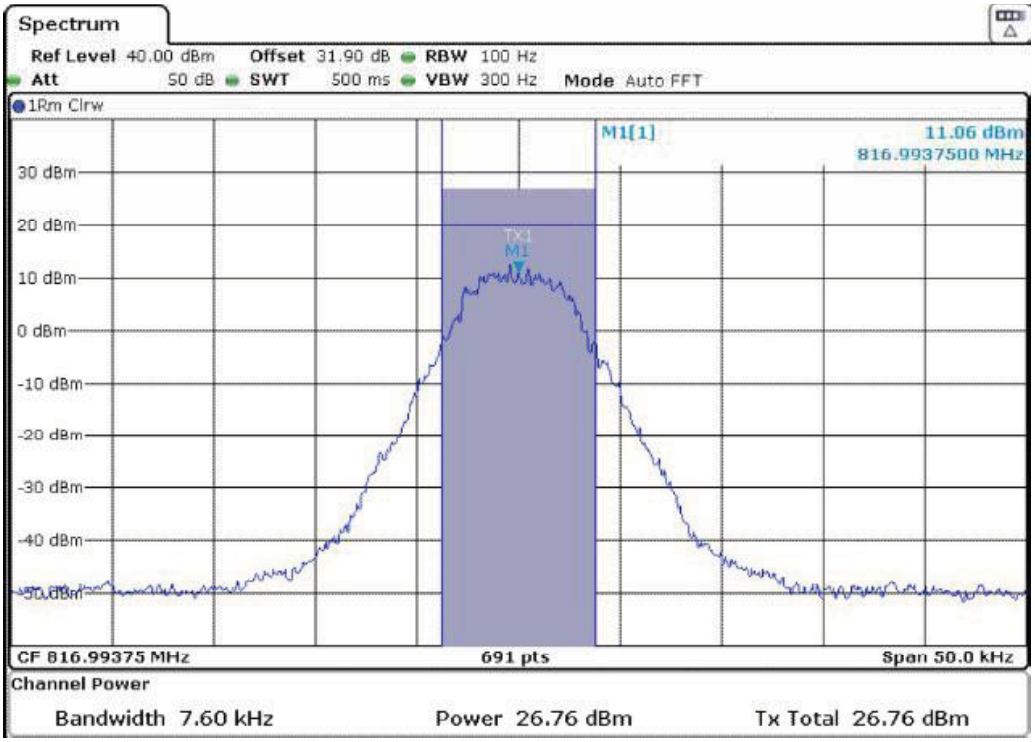


Highest Frequency: 816.99375MHz, Output occupied BW(AGC)



Highest Frequency: 816.99375MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)

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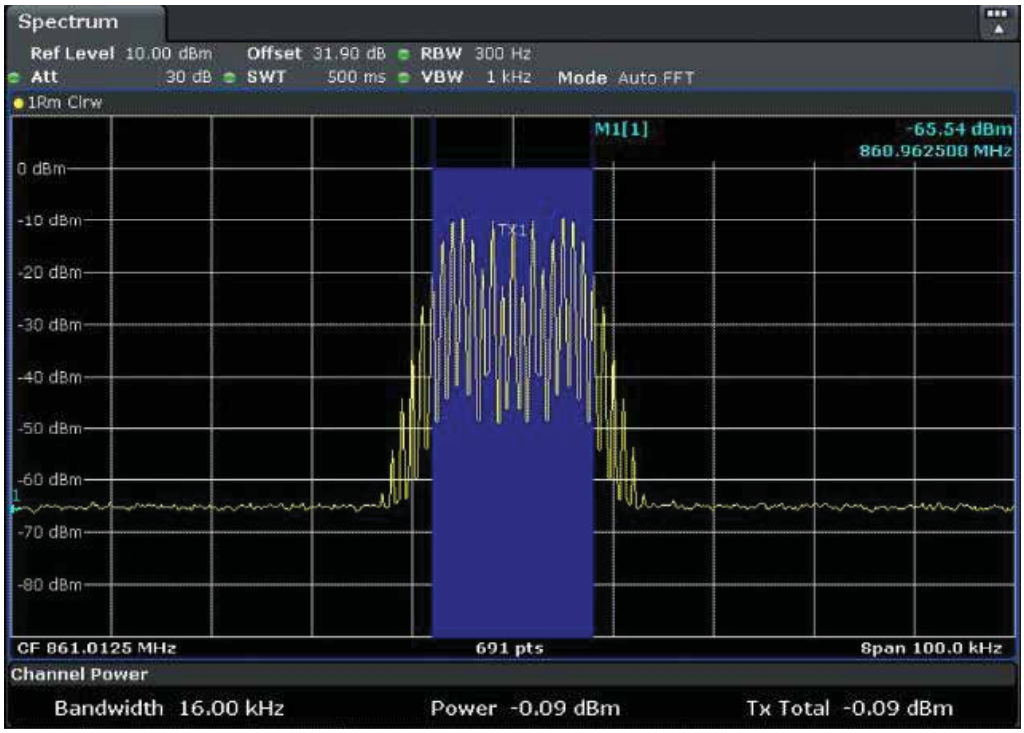
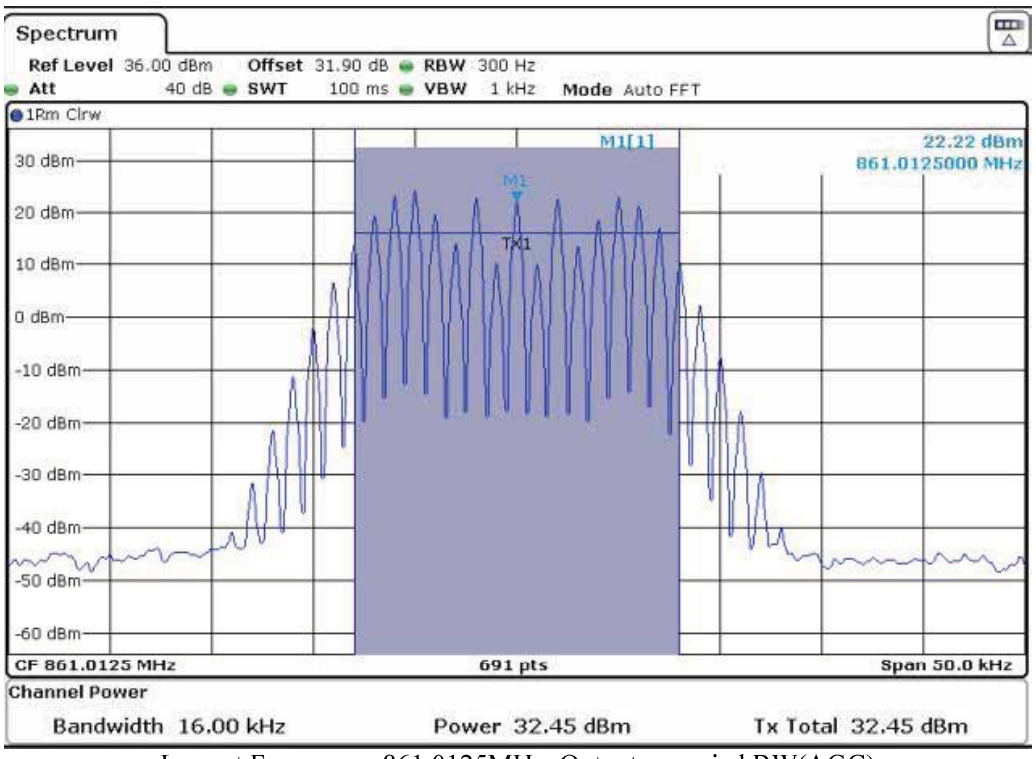
11.5.5.3.1.4. Analog FM

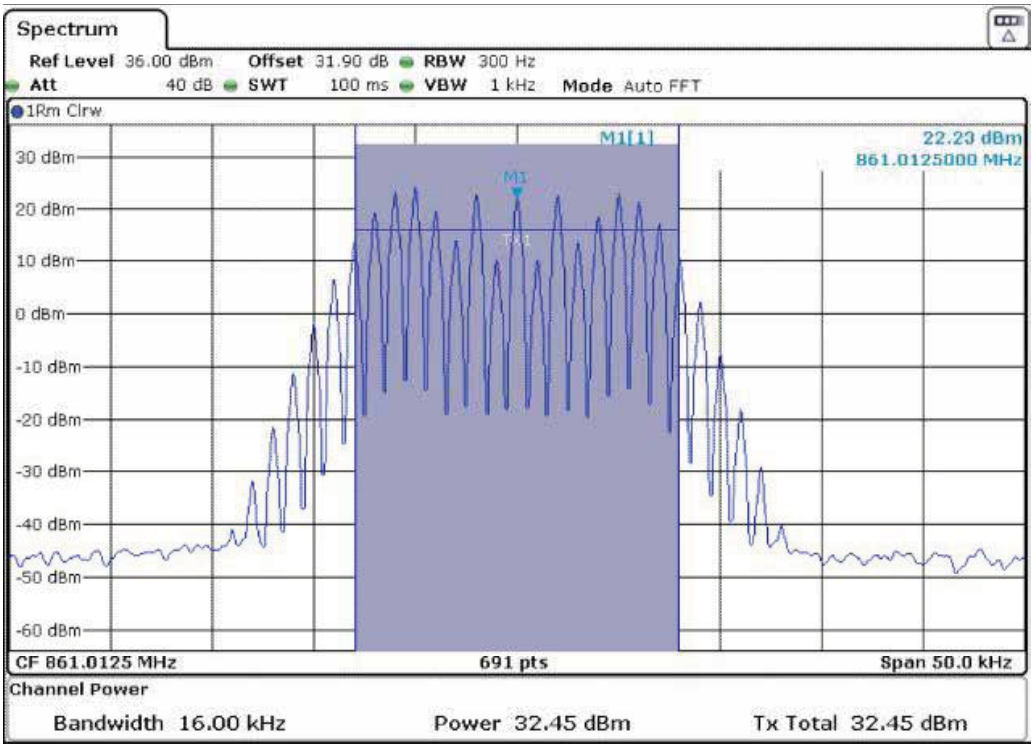
11.5.5.3.1.4.1. Downlink



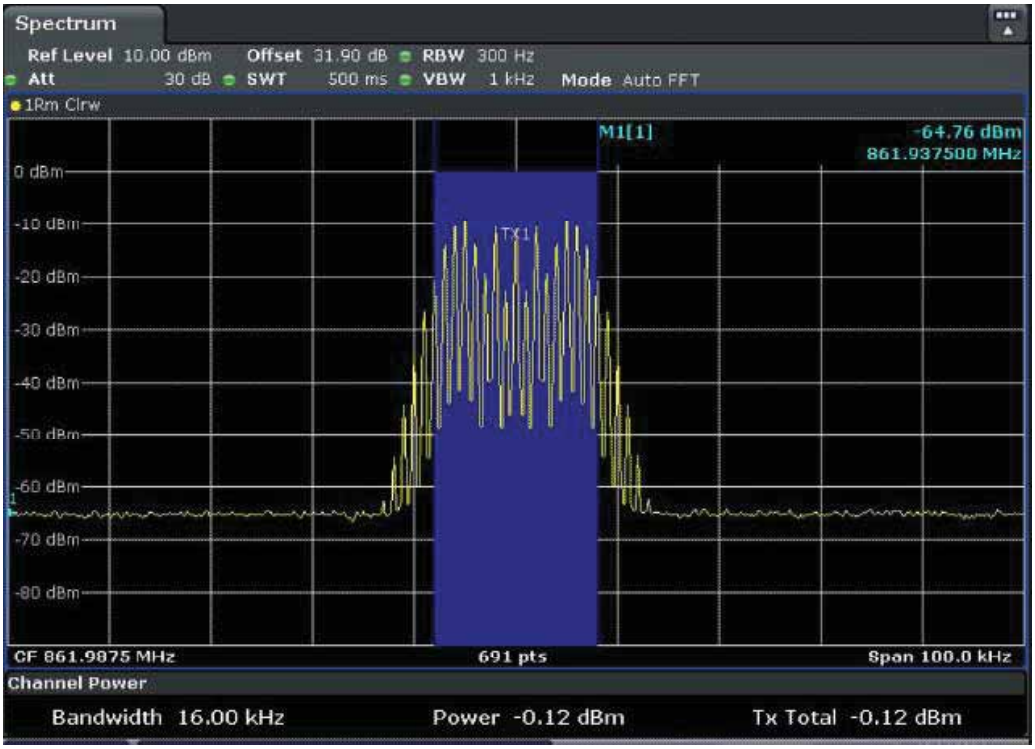
Lowest Frequency: 861.0125MHz, Input occupied BW



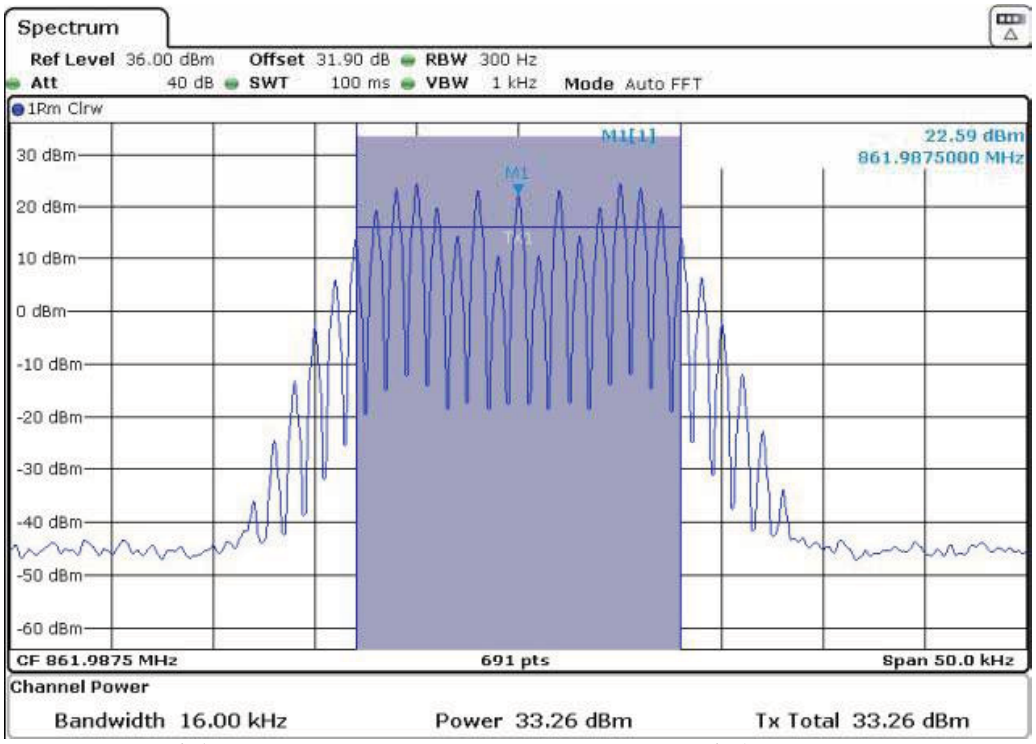
Lowest Frequency: 861.0125MHz, Output occupied BW(AGC)



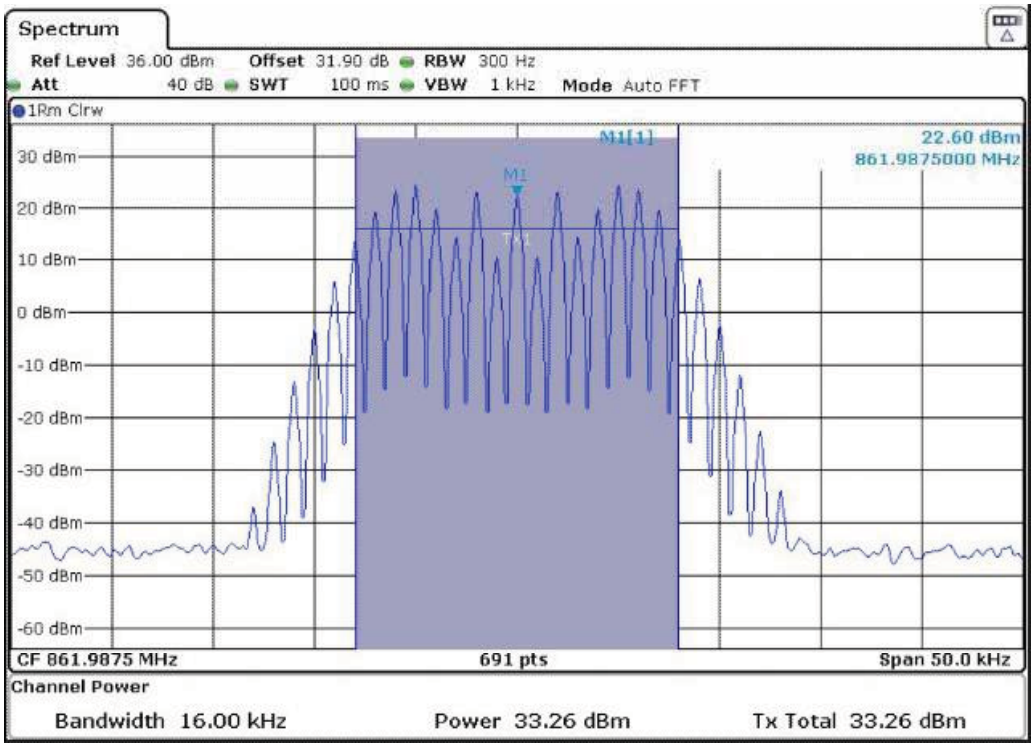
Lowest Frequency: 861.0125MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)



Highest Frequency: 861.9875MHz, Input occupied BW



Highest Frequency: 861.9875MHz, Output occupied BW(AGC)



Highest Frequency: 861.9875MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)

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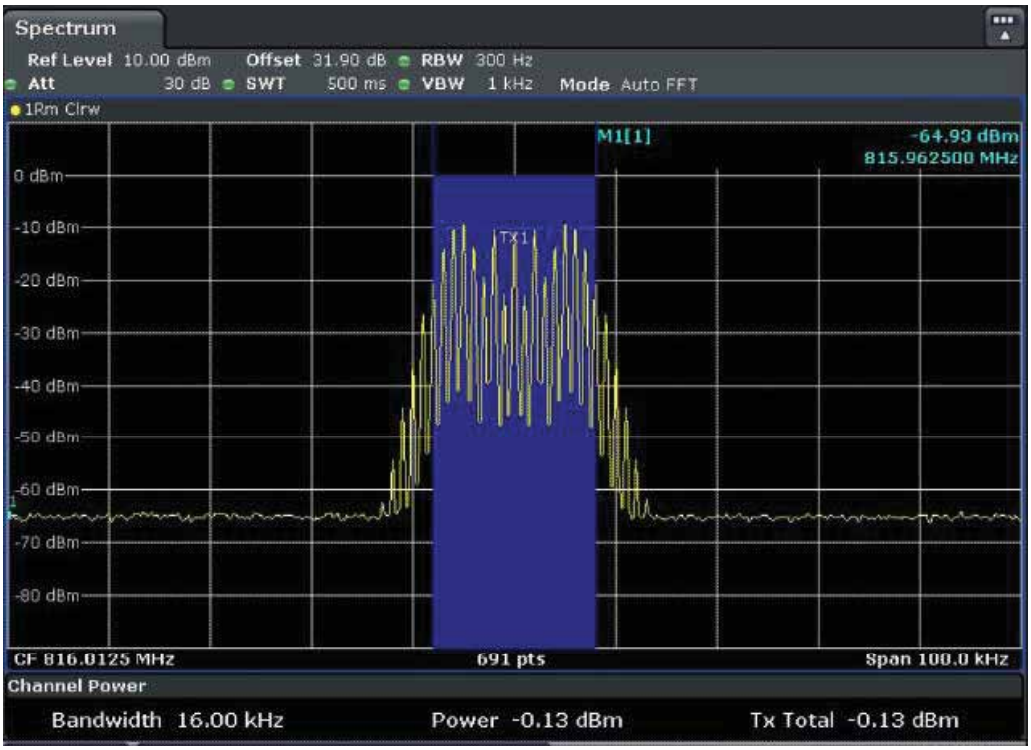
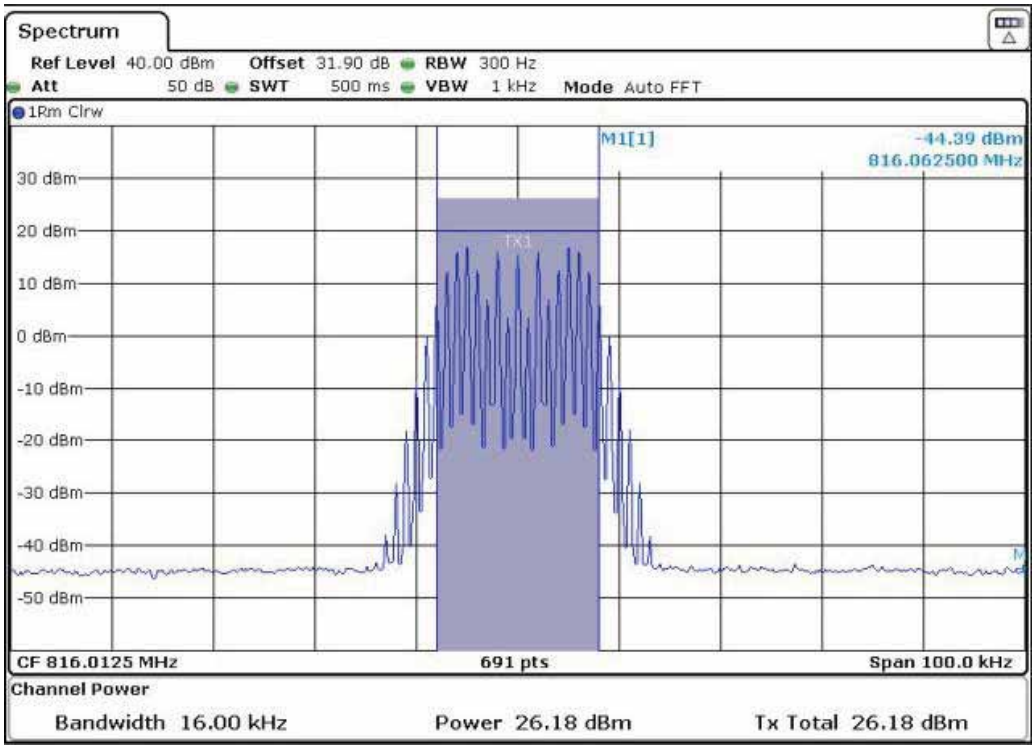
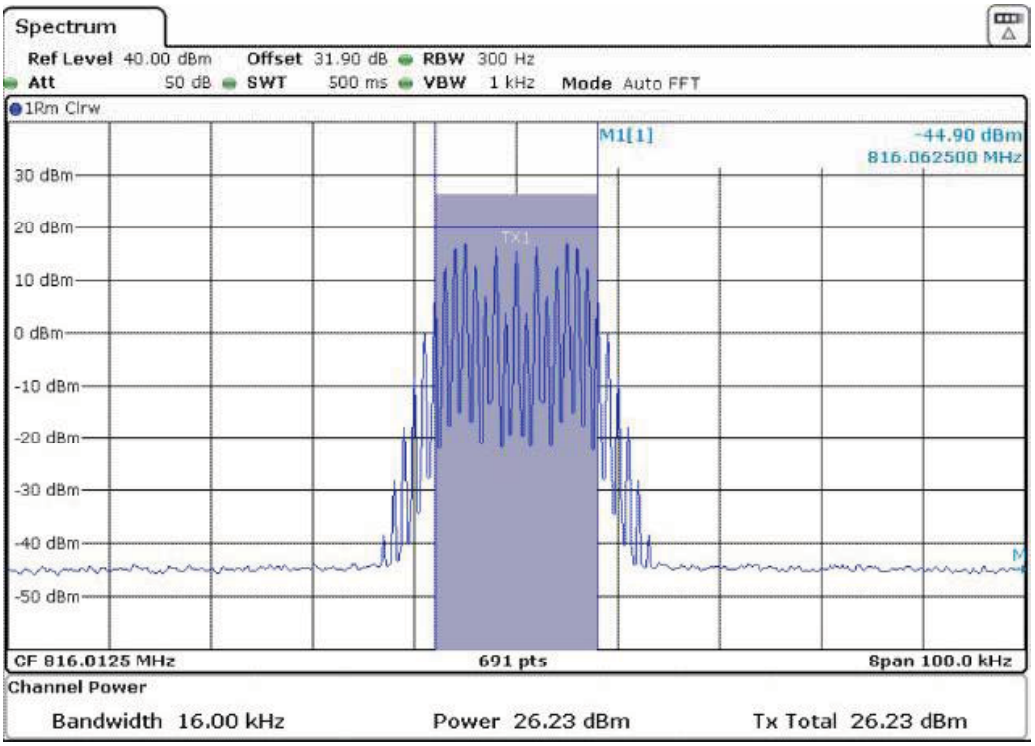
11.5.5.3.1.4.2. Uplink



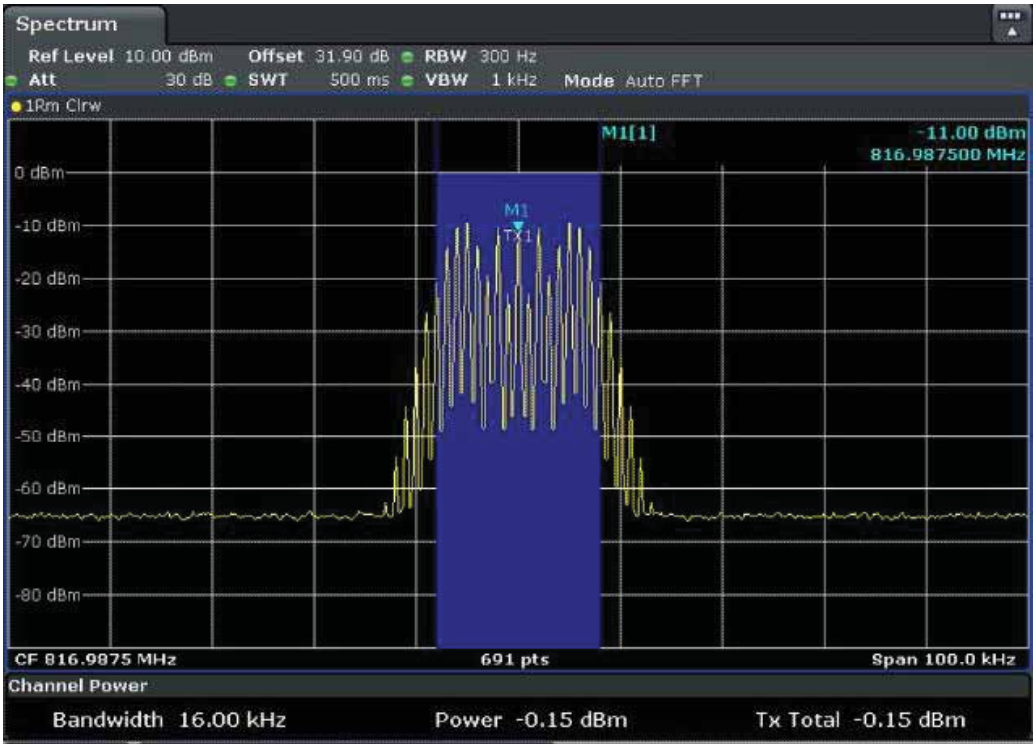
Lowest Frequency: 816.0125MHz, Input occupied BW



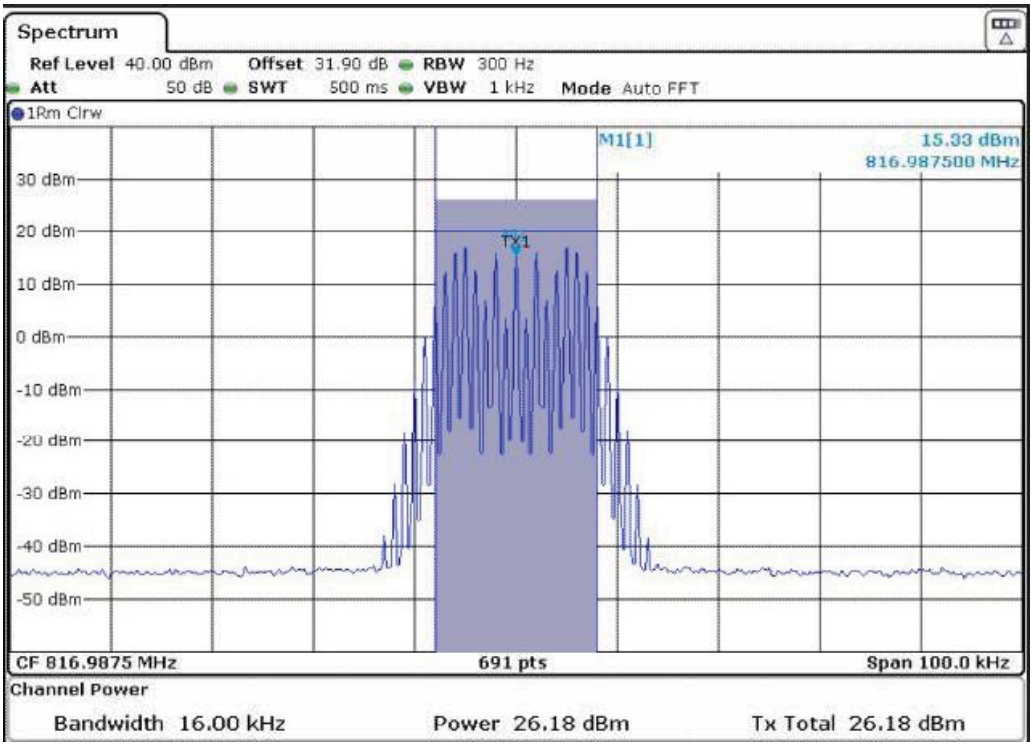
Lowest Frequency: 816.0125MHz, Output occupied BW(AGC)



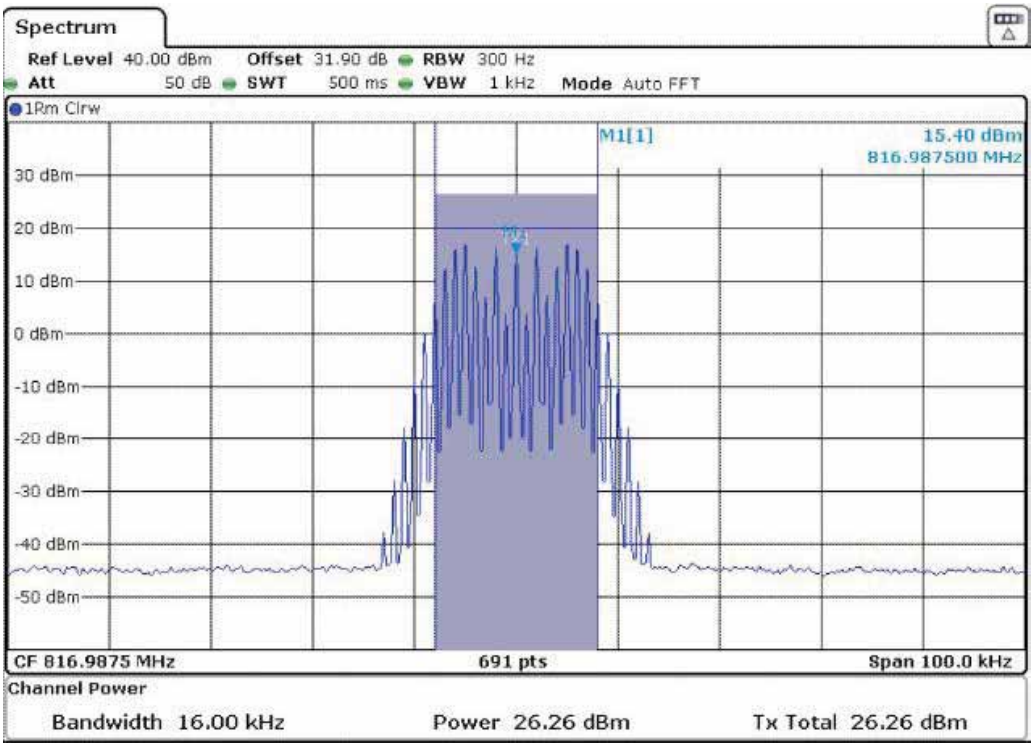
Lowest Frequency: 816.0125MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)



Highest Frequency: 816.9875MHz, Input occupied BW



Highest Frequency: 816.9875MHz, Output occupied BW(AGC)

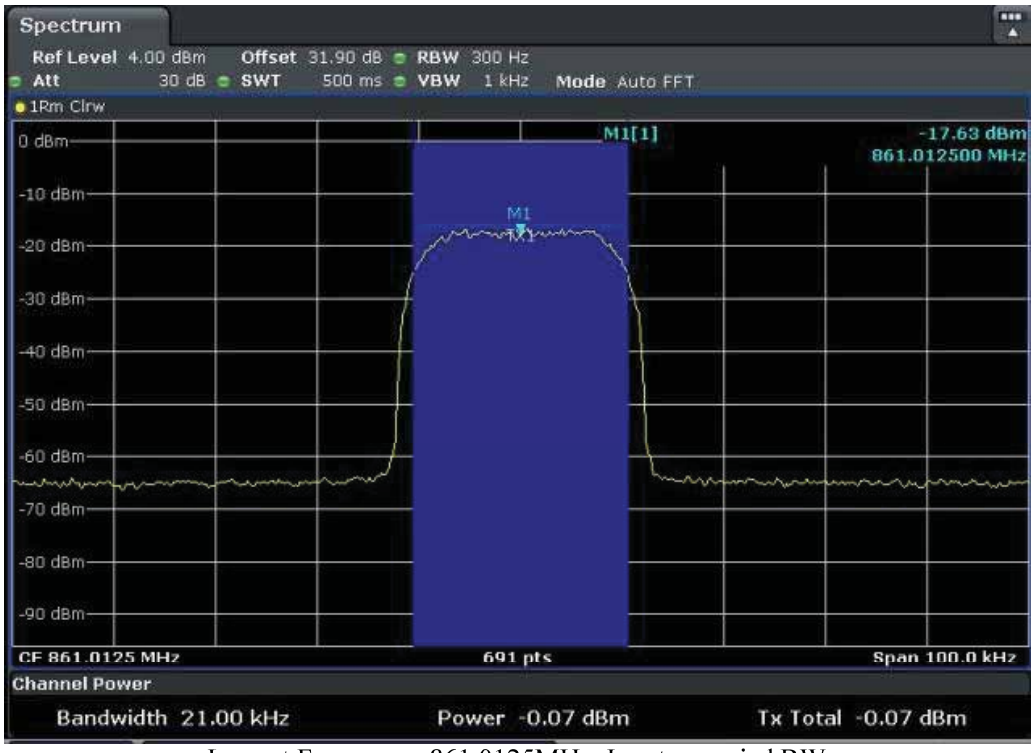


Highest Frequency: 816.9875MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)

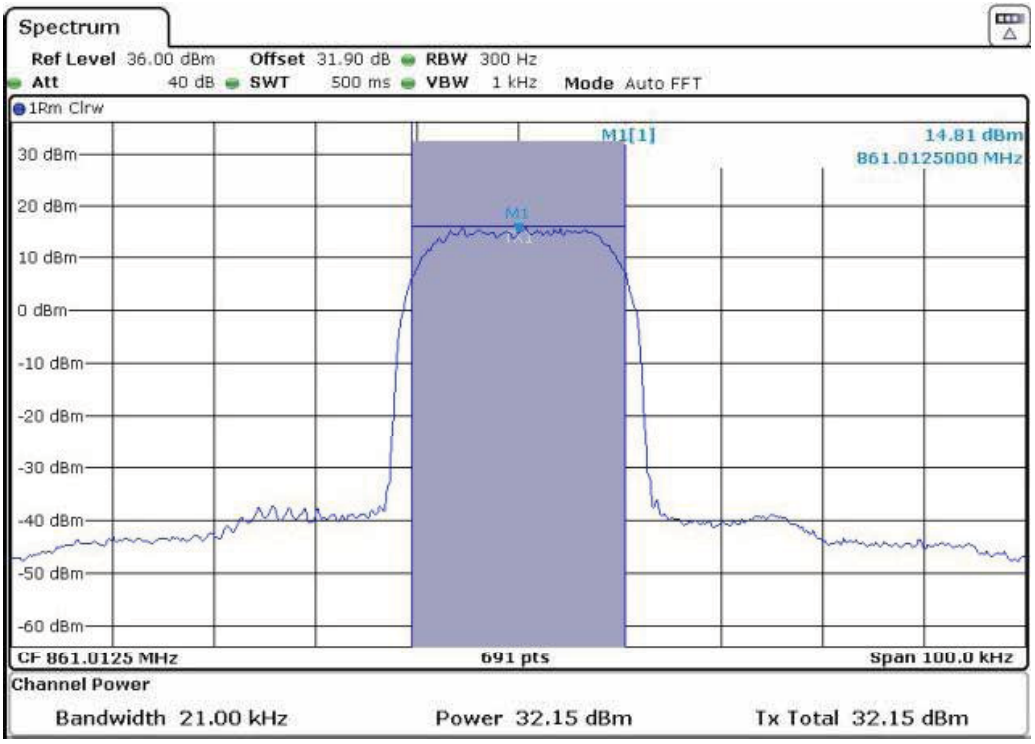
———— The following blanks ————

11.5.5.3.1.5. Tetra

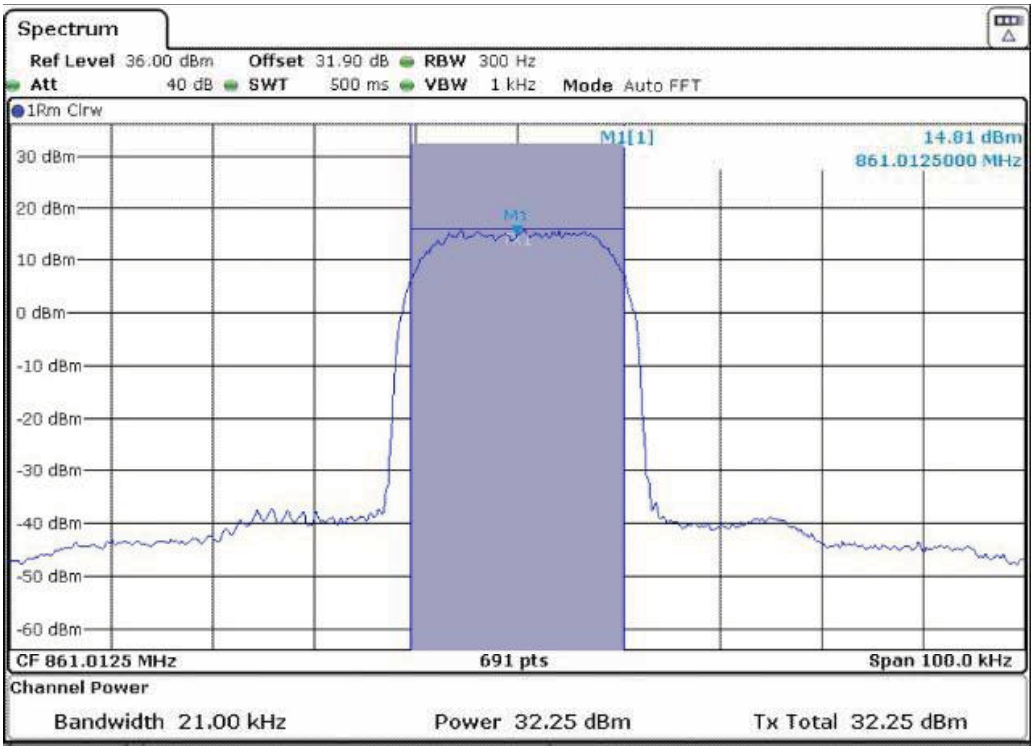
11.5.5.3.1.5.1. Downlink



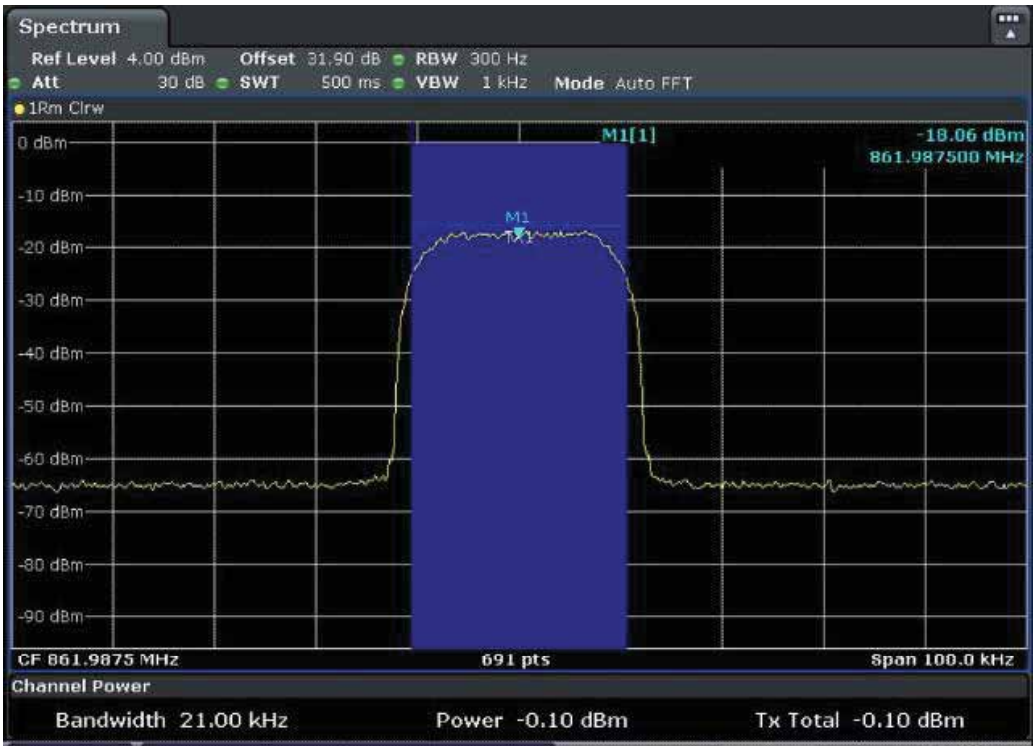
Lowest Frequency: 861.0125MHz, Input occupied BW



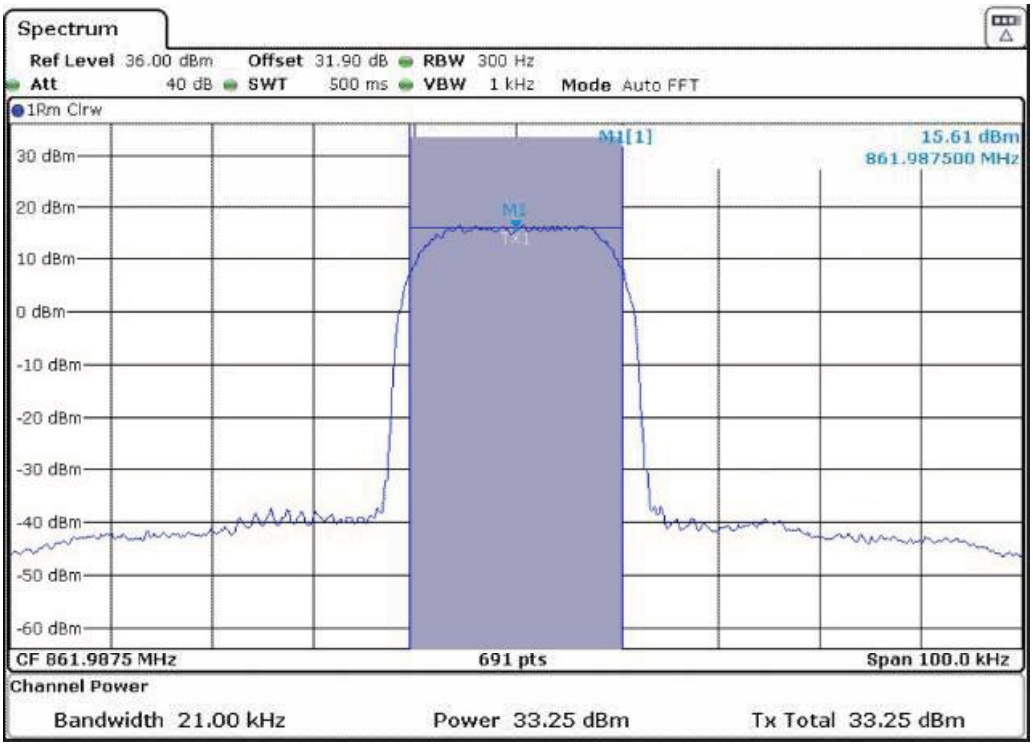
Lowest Frequency: 861.0125MHz, Output occupied BW(AGC)



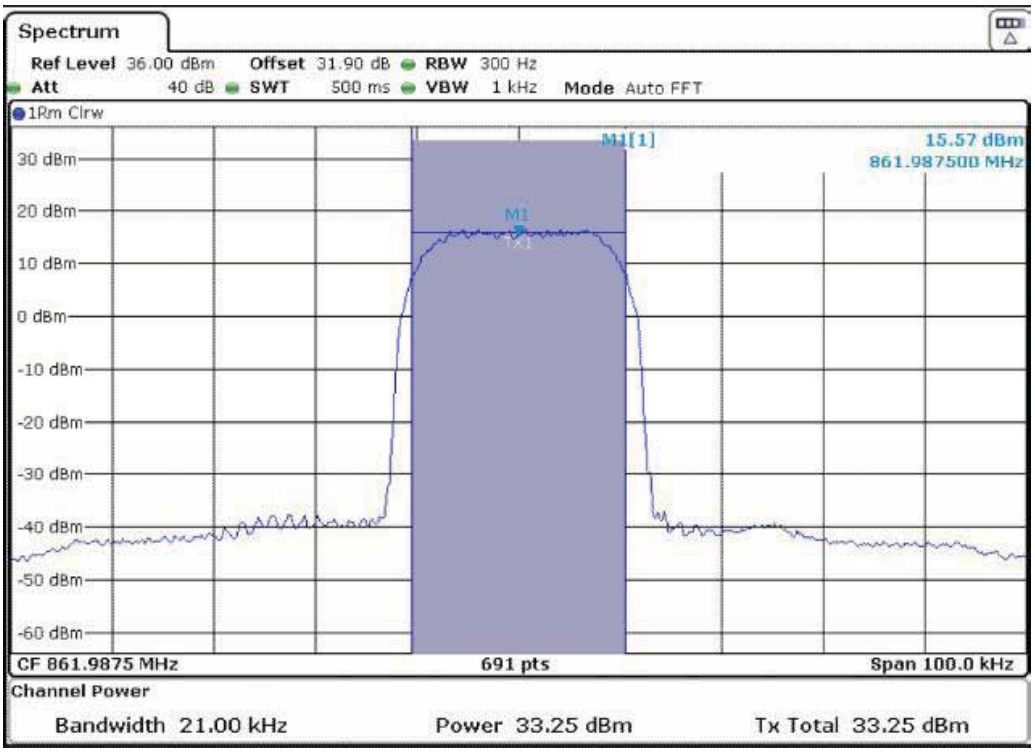
Lowest Frequency: 861.0125MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)



Highest Frequency: 861.9875MHz, Input occupied BW



Highest Frequency: 861.9875MHz, Output occupied BW(AGC)



Highest Frequency: 861.9875MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)

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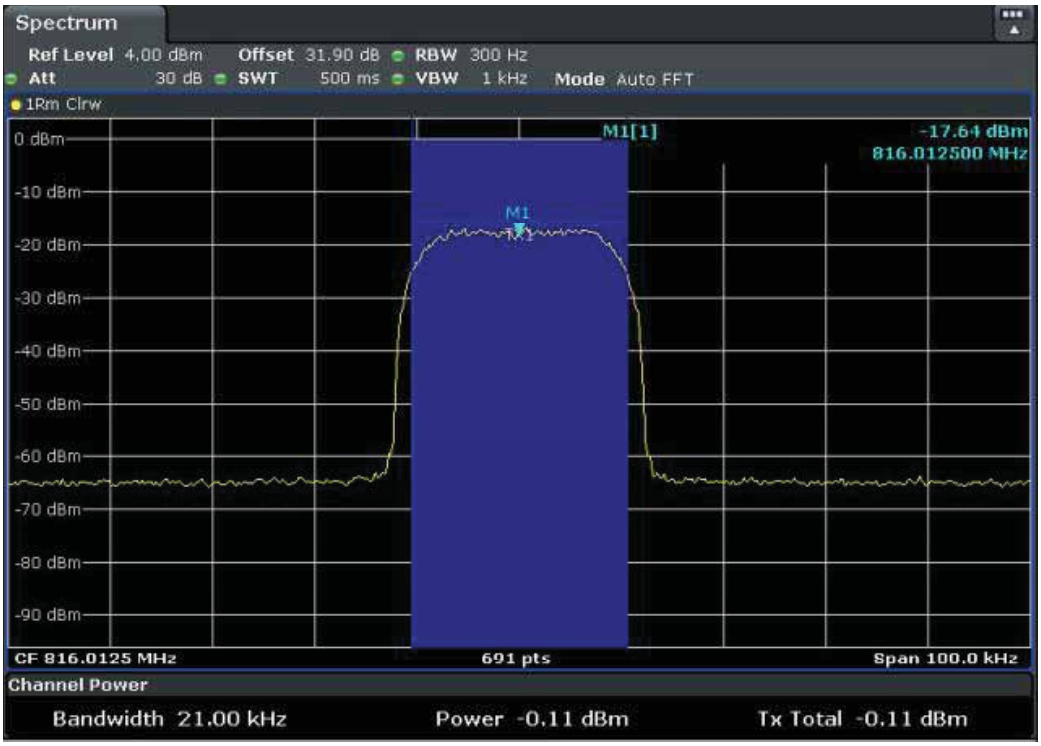
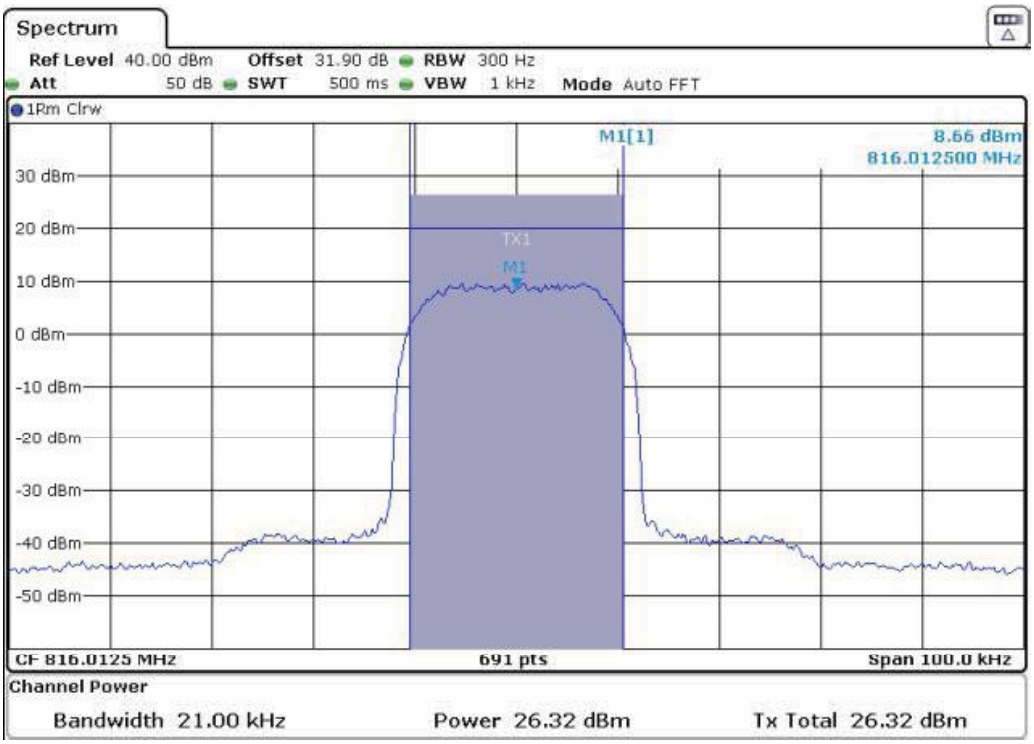
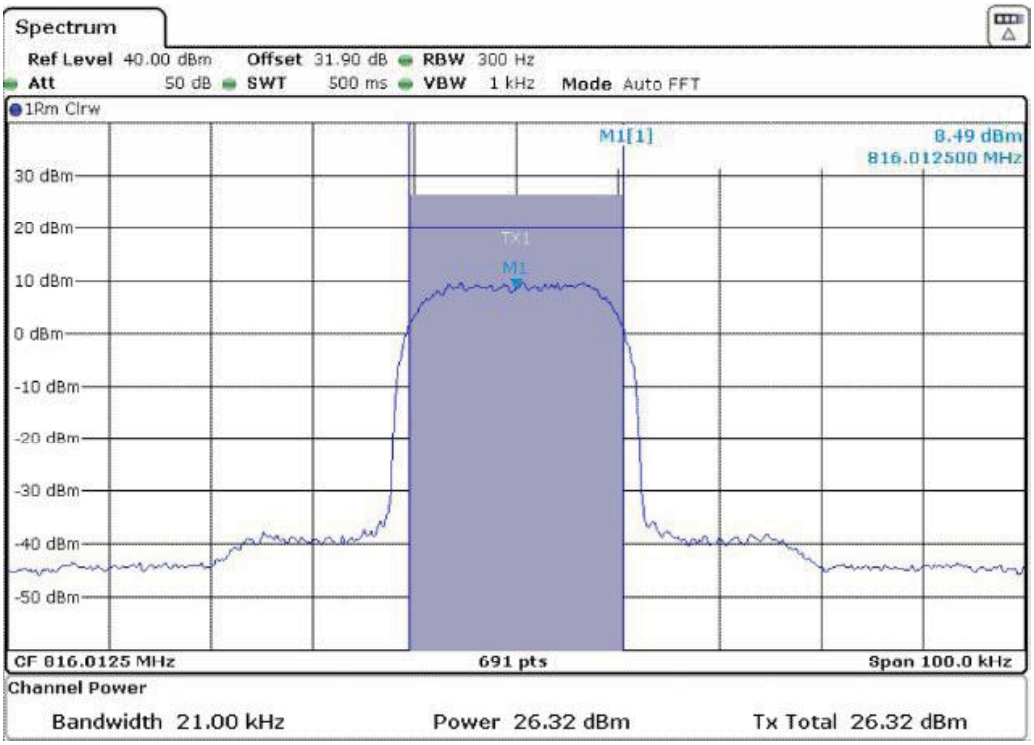
11.5.5.3.1.5.2. Uplink



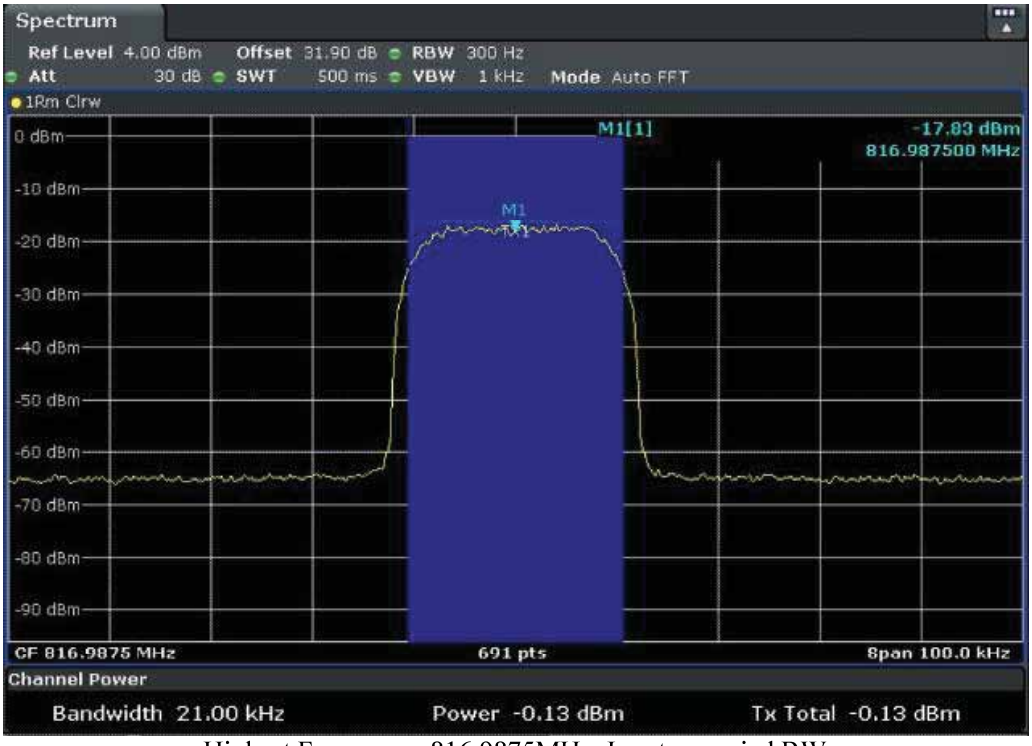
Lowest Frequency: 816.0125MHz, Input occupied BW



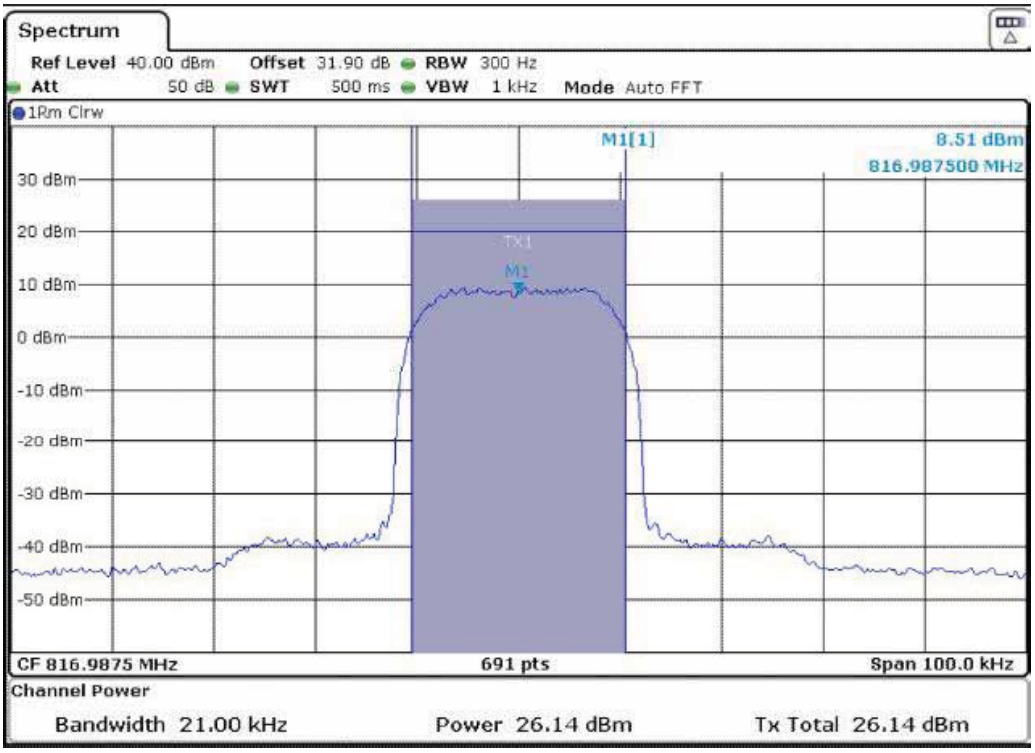
Lowest Frequency: 816.0125MHz, Output occupied BW(AGC)



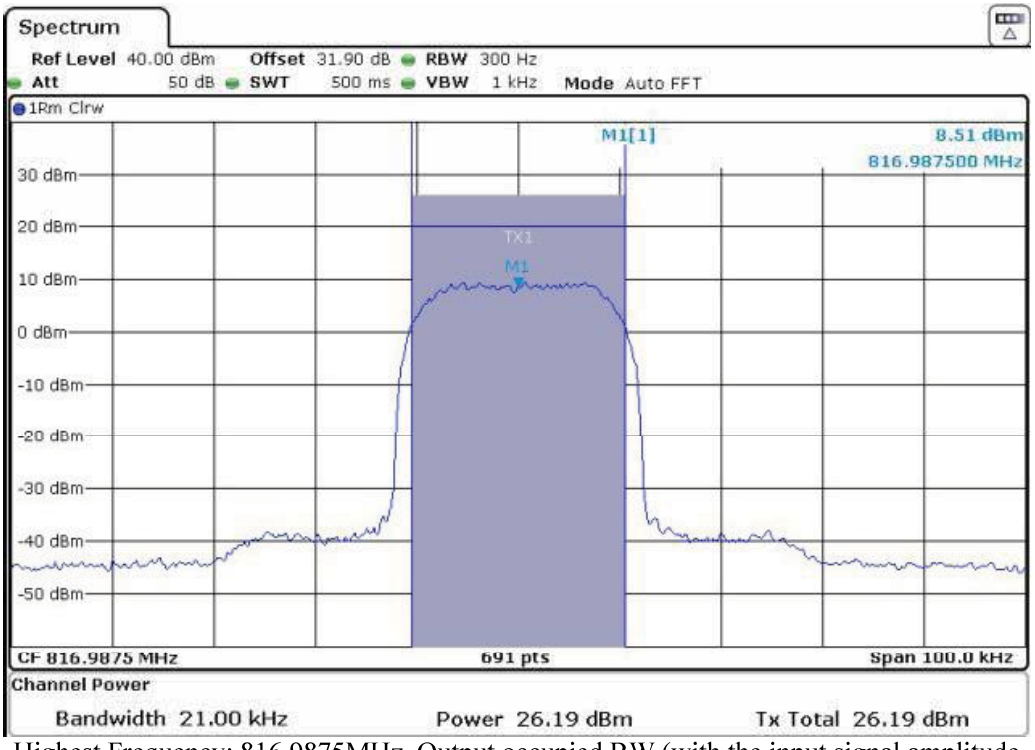
Lowest Frequency: 816.0125MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)



Highest Frequency: 816.9875MHz, Input occupied BW



Highest Frequency: 816.9875MHz, Output occupied BW(AGC)



Highest Frequency: 816.9875MHz, Output occupied BW (with the input signal amplitude set 3 dB above the AGC threshold)

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11.6. Mean power and amplifier/booster gain

Test requirement:	KDB 935210 D05 clause 4.5 FCC PART 90.219 (e)(1)
Test Method:	KDB 935210 D05 clause 4.5

11.6.1. Requirements

According to KDB 935210 D05 clause 4.5, the mean input and output power and the amplifier gain was measured by adjusting the internal gain control of the EUT to the maximum gain for which equipment certification is sought. Any EUT attenuation settings were set to their minimum value.

Input power levels (Downlink and Uplink) were set to maximum input ratings while confirming that the device is not capable of operating in saturation (Non-linear mode) at the rated input levels, including during the performance of the input/output power measurements.

For FCC PART 90.219 (e)(1) requirement:

(e) *Device Specifications.* In addition to the general rules for equipment certification in §90.203(a)(2) and part 2, subpart J of this chapter, a signal booster must also meet the rules in this paragraph.

(1) The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.

11.6.2. Test configuration

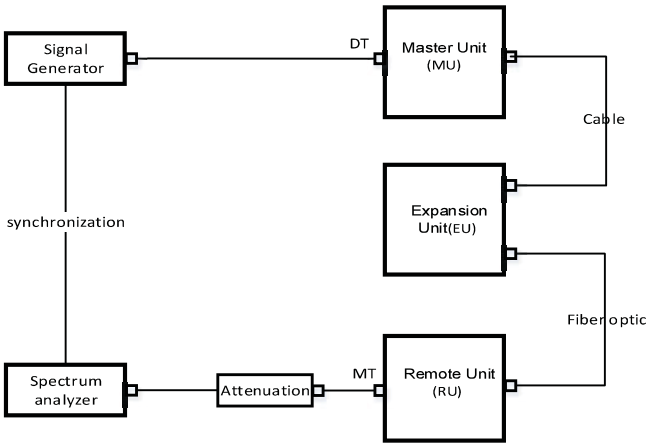

Figure 11.6-1 Downlink connection diagram

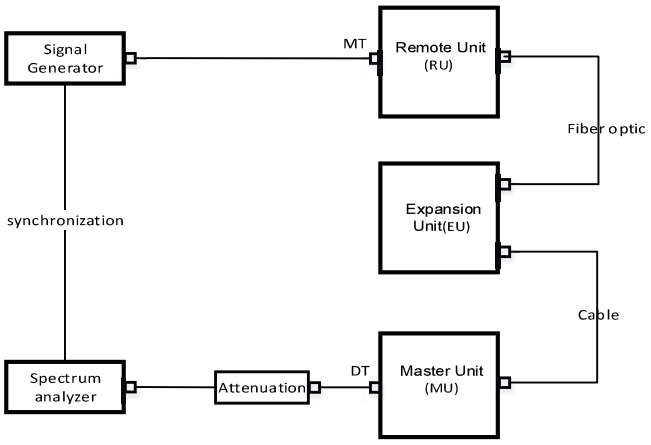

Figure 11.6-2 Uplink connection diagram

———— The following blanks ————

11.6.3. Test procedures

According to KDB 935210 D05 clause 3.5.2 and clause 4.5.2, test procedures are as follows:

a) Connect a signal generator to the input of the EUT.
b) Configure to generate the test signal.
c) The frequency of the signal generator shall be set to the frequency f0 as determined from 3.3.
d) Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation as necessary.
e) Set the signal generator output power to a level that produces an EUT output level that is just below the AGC threshold (see 3.2), but not more than 0.5 dB below.
f) Measure and record the output power of the EUT; use 3.5.3 or 3.5.4 for power measurement.
g) Remove the EUT from the measurement setup. Using the same signal generator settings, repeat the power measurement at the signal generator port, which was used as the input signal to the EUT, and record as the input power. EUT gain may be calculated as described in 3.5.5.
h) Repeat steps f) and g) with input signal amplitude set to 3 dB above the AGC threshold level.
i) Repeat steps e) to h) with the narrowband test signal.
j) Repeat steps e) to i) for all frequency bands authorized for use by the EUT.

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11.6.4. Test results

Test Date (yy-mm-dd): 2024-05-17

Normal condition: Temp:26.4℃, Humid: 44%, Atmospheric Pressure:101kpa

Supply Voltage: AC 110V, 50Hz

11.6.4.1. Mean power and gain

11.6.4.1.1. 800MHz Band (Downlink: 861MHz ~862MHz, Uplink: 816MHz ~ 817MHz)

11.6.4.1.1.1. Downlink

Test link	Frequency (MHz)	Sig output power (dBm)	Input Cable Loss (dB)	Peak power (dBm)	Output Atten +Output Cable Loss(dB)	Output power (dBm)	Output power (W)	Gain (dB)
1. P25 Phase I(C4FM)								
Down(1)	861.00625	-55.8	1.8	0.3	31.9	32.2	1.7	89.8
Down(2)	861.00625	-52.8	1.8	0.3	31.9	32.2	1.7	86.8
Down(1)	861.99375	-55.8	1.8	1.4	31.9	33.3	2.1	90.9
Down(2)	861.99375	-52.8	1.8	1.4	31.9	33.3	2.1	87.9
2. P25 Phase II(H-DQPSK)								
Down(1)	861.00625	-55.8	1.8	0.3	31.9	32.2	1.7	89.8
Down(2)	861.00625	-52.8	1.8	0.3	31.9	32.2	1.7	86.8
Down(1)	861.99375	-55.8	1.8	1.1	31.9	33.0	2.0	90.6
Down(2)	861.99375	-52.8	1.8	1.1	31.9	33.0	2.0	87.6
3. DMR								
Down(1)	861.00625	-55.8	1.8	0.3	31.9	32.2	1.7	89.8
Down(2)	861.00625	-52.8	1.8	0.3	31.9	32.2	1.7	86.8
Down(1)	861.99375	-55.8	1.8	1.4	31.9	33.3	2.1	90.9
Down(2)	861.99375	-52.8	1.8	1.4	31.9	33.3	2.1	87.9
4. Analog FM mode								
Down(1)	861.0125	-55.8	1.8	0.6	31.9	32.5	1.8	90.1
Down(2)	861.0125	-52.8	1.8	0.6	31.9	32.5	1.8	87.1
Down(1)	861.9875	-55.8	1.8	1.4	31.9	33.3	2.1	90.9
Down(2)	861.9875	-52.8	1.8	1.4	31.9	33.3	2.1	87.9
5. Tetra								
Down(1)	861.0125	-55.8	1.8	0.4	31.9	32.3	1.7	89.9
Down(2)	861.0125	-52.8	1.8	0.4	31.9	32.3	1.7	86.9
Down(1)	861.9875	-55.8	1.8	1.4	31.9	33.3	2.1	90.9
Down(2)	861.9875	-52.8	1.8	1.4	31.9	33.3	2.1	87.9

NOTE: (1) Level is 0.5 dB below AGC threshold; (2) Level is 3dB above AGC threshold.

11.6.4.1.1.2. Uplink

Test link	Frequency (MHz)	Sig output power (dBm)	Input Cable Loss (dB)	Peak power (dBm)	Output Atten +Output Cable Loss(dB)	Output power (dBm)	Output power (W)	Gain (dB)
1. P25 Phase I(C4FM)								
Up(1)	816.00625	-62.3	1.0	-5.2	31.9	26.7	0.5	90.0
Up (2)	816.00625	-59.3	1.0	-5.2	31.9	26.7	0.5	87.0
Up(1)	816.99375	-62.3	1.0	-5.1	31.9	26.8	0.5	90.1
Up (2)	816.99375	-59.3	1.0	-5.1	31.9	26.8	0.5	87.1
2. P25 Phase II(H-DQPSK)								
Up(1)	816.00625	-62.3	1.0	-4.8	31.9	27.1	0.5	90.4
Up (2)	816.00625	-59.3	1.0	-4.8	31.9	27.1	0.5	87.4
Up(1)	816.99375	-62.3	1.0	-4.7	31.9	27.2	0.5	90.5
Up (2)	816.99375	-59.3	1.0	-4.7	31.9	27.2	0.5	87.5
3. DMR								
Up(1)	816.00625	-62.3	1.0	-5.6	31.9	26.3	0.4	89.6
Up (2)	816.00625	-59.3	1.0	-5.6	31.9	26.3	0.4	86.6
Up(1)	816.99375	-62.3	1.0	-5.2	31.9	26.7	0.5	90.0
Up (2)	816.99375	-59.3	1.0	-5.2	31.9	26.7	0.5	87.0
4. Analog FM mode								
Up(1)	816.0125	-62.3	1.0	-5.7	31.9	26.2	0.4	89.5
Up (2)	816.0125	-59.3	1.0	-5.7	31.9	26.2	0.4	86.5
Up(1)	816.9875	-62.3	1.0	-5.7	31.9	26.2	0.4	89.5
Up (2)	816.9875	-59.3	1.0	-5.7	31.9	26.2	0.4	86.5
5. Tetra								
Up(1)	816.0125	-62.3	1.0	-5.6	31.9	26.3	0.4	89.6
Up (2)	816.0125	-59.3	1.0	-5.6	31.9	26.3	0.4	86.6
Up(1)	816.9875	-62.3	1.0	-5.8	31.9	26.1	0.4	89.4
Up (2)	816.9875	-59.3	1.0	-5.8	31.9	26.1	0.4	86.4

NOTE: (1) Level is 0.5 dB below AGC threshold; (2) Level is 3dB above AGC threshold.

———— The following blanks ————

11.6.4.2. ERP Calculations

11.6.4.2.1. 800MHz Band (Downlink: 861MHz ~862MHz, Uplink: 816MHz ~ 817MHz)

11.6.4.2.1.1. Downlink

Test link	Frequency (MHz)	EUT Max. output power (dBm)	Max. Ant Gain(dBi)	ERP (W)	ERP Limit (W)	AGC Mode
1. P25 Phase I(C4FM)						
Down	861.00625	32.2	3.0	3.3	5.0	-0.5dB Below
Down	861.00625	32.2	3.0	3.3	5.0	+3.0dB above
Down	861.99375	33.3	3.0	4.3	5.0	-0.5dB Below
Down	861.99375	33.3	3.0	4.3	5.0	+3.0dB above
2. P25 Phase II(H-DQPSK)						
Down	861.00625	32.2	3.0	3.3	5.0	-0.5dB Below
Down	861.00625	32.2	3.0	3.3	5.0	+3.0dB above
Down	861.99375	33.0	3.0	4.0	5.0	-0.5dB Below
Down	861.99375	33.0	3.0	4.0	5.0	+3.0dB above
3. DMR						
Down	861.00625	32.2	3.0	3.3	5.0	-0.5dB Below
Down	861.00625	32.2	3.0	3.3	5.0	+3.0dB above
Down	861.99375	33.3	3.0	4.3	5.0	-0.5dB Below
Down	861.99375	33.3	3.0	4.3	5.0	+3.0dB above
4. Analog FM						
Down	861.0125	32.5	3.0	3.5	5.0	-0.5dB Below
Down	861.0125	32.5	3.0	3.5	5.0	+3.0dB above
Down	861.9875	33.3	3.0	4.3	5.0	-0.5dB Below
Down	861.9875	33.3	3.0	4.3	5.0	+3.0dB above
5. Tetra						
Down	861.0125	32.3	3.0	3.4	5.0	-0.5dB Below
Down	861.0125	32.3	3.0	3.4	5.0	+3.0dB above
Down	861.9875	33.3	3.0	4.3	5.0	-0.5dB Below
Down	861.9875	33.3	3.0	4.3	5.0	+3.0dB above

11.6.4.2.1.2. Uplink

Test link	Frequency (MHz)	EUT Max. output power (dBm)	Max. Ant Gain(dBi)	ERP (W)	ERP Limit (W)	AGC Mode
1. P25 Phase I(C4FM)						
Up	816.00625	26.7	9.0	3.7	5.0	-0.5dB Below
Up	816.00625	26.7	9.0	3.7	5.0	+3.0dB above
Up	816.99375	26.8	9.0	3.8	5.0	-0.5dB Below
Up	816.99375	26.8	9.0	3.8	5.0	+3.0dB above
2. P25 Phase II(H-DQPSK)						
Up	816.00625	27.1	9.0	4.1	5.0	-0.5dB Below
Up	816.00625	27.1	9.0	4.1	5.0	+3.0dB above
Up	816.99375	27.2	9.0	4.2	5.0	-0.5dB Below
Up	816.99375	27.2	9.0	4.2	5.0	+3.0dB above
3. DMR						
Up	816.00625	26.3	9.0	3.4	5.0	-0.5dB Below
Up	816.00625	26.3	9.0	3.4	5.0	+3.0dB above
Up	816.99375	26.7	9.0	3.7	5.0	-0.5dB Below
Up	816.99375	26.7	9.0	3.7	5.0	+3.0dB above
4. Analog FM						
Up	816.0125	26.2	9.0	3.3	5.0	-0.5dB Below
Up	816.0125	26.2	9.0	3.3	5.0	+3.0dB above
Up	816.9875	26.2	9.0	3.3	5.0	-0.5dB Below
Up	816.9875	26.2	9.0	3.3	5.0	+3.0dB above
5. Tetra						
Up	816.0125	26.3	9.0	3.4	5.0	-0.5dB Below
Up	816.0125	26.3	9.0	3.4	5.0	+3.0dB above
Up	816.9875	26.1	9.0	3.2	5.0	-0.5dB Below
Up	816.9875	26.1	9.0	3.2	5.0	+3.0dB above

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11.7. Noise figure

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

Test Method: KDB 935210 D05/4.6

11.7.1. Requirements

According to FCC PART 90 § 90.219 (e) (2) requirement, the noise figure limit of a signal booster must are given in table 11.7-1 in either direction.

Table 11.7-1Noise figure limits

frequency range(MHz)	Max. Noise figure limit(dB)
861-862/816-817	9

11.7.2. Test configuration

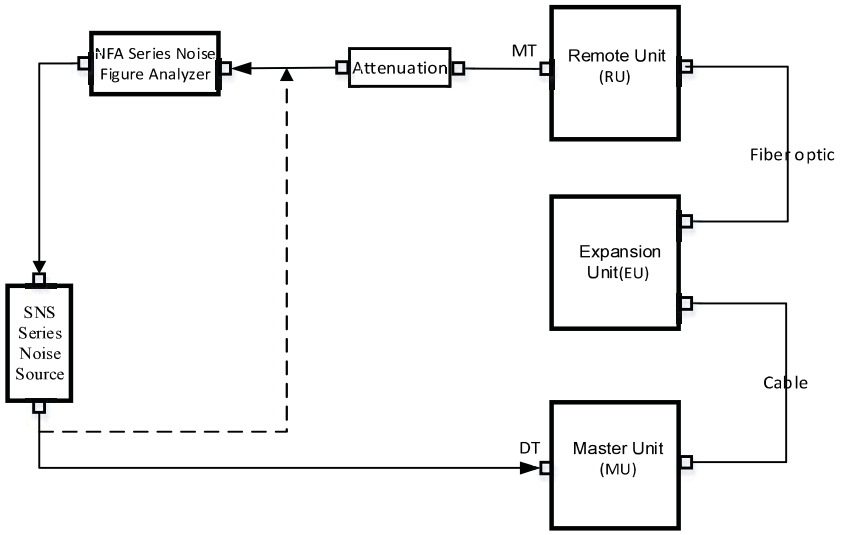

Figure 11.7-1 Downlink connection diagram

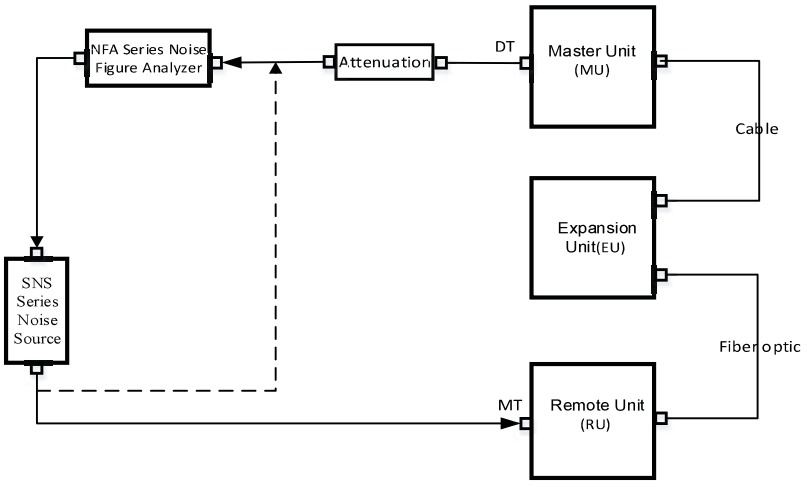

Figure 11.7-2 Uplink connection diagram

11.7.3. 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 800MHz 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;

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11.7.4. Test results

Test Date (yy-mm-dd): 2024-05-18

Normal condition: Temp:25.8℃, Humid: 51%, Atmospheric Pressure:101kpa

Supply Voltage: AC 110V, 50Hz

11.7.4.1. 800MHz Band (Downlink: 861MHz ~862MHz, Uplink: 816MHz ~ 817MHz)

Frequency(MHz)	Max. Limit (dB)	Noise figure data (dB)	Margin (dB)	Result
Downlink: 861~862	9.0	4.82	4.18	PASS
Uplink: 816~817	9.0	4.54	4.46	PASS
NOTE: Margin= specification limit - Noise figure data.				

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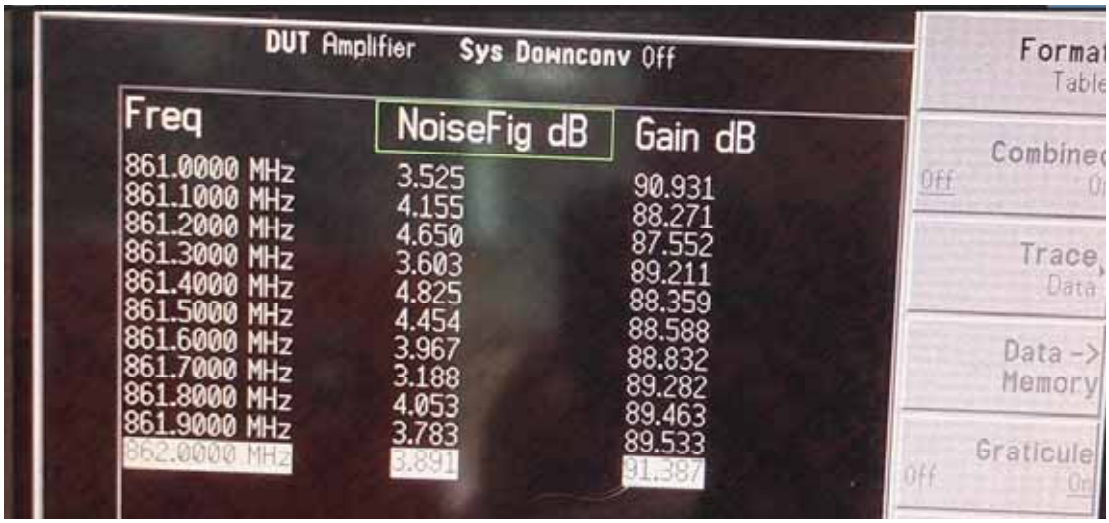
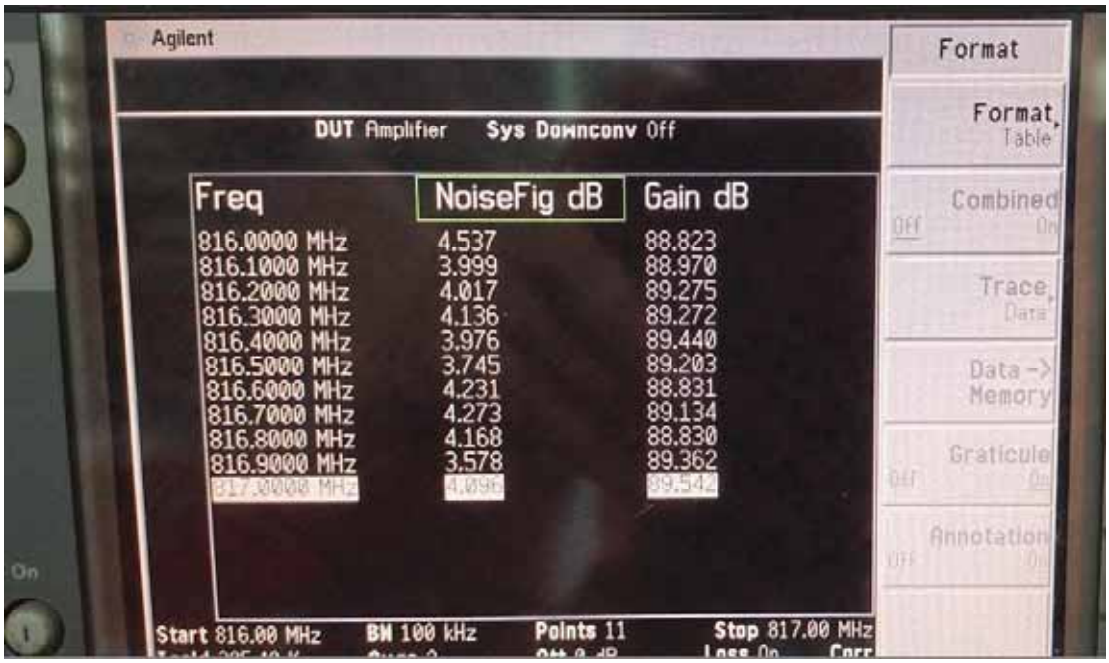
11.7.5. Test screenshot



Downlink: 861MHz~862MHz



Uplink: 816MHz~817MHz

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

Test requirement:	KDB 935210 D05 clause 4.7.2 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

11.8.1. Requirements

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:$43+10*\log_{10}$ 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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11.8.2. Test configuration

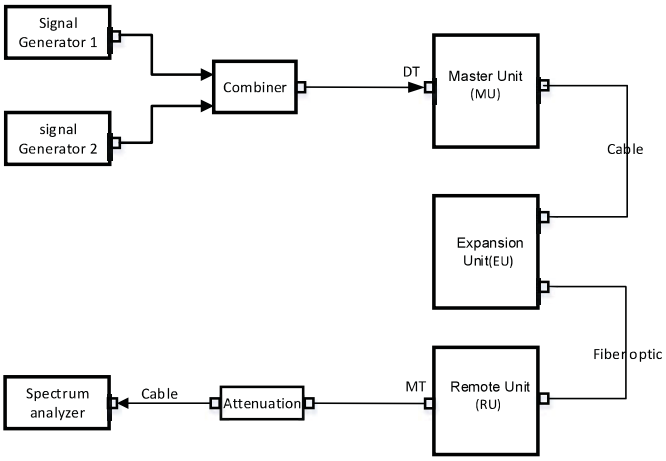

Figure 11.8-1 Downlink connection diagram

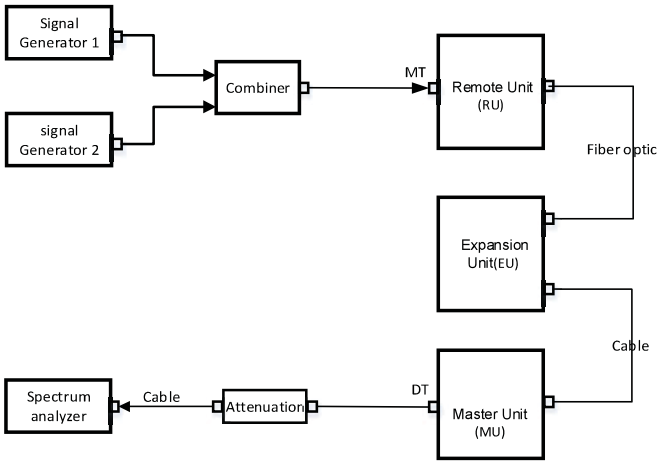

Figure 11.8-2 Uplink connection diagram

11.8.3. 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 ≥ 3 × 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*log(P)dB. This corresponds to an absolute level of -13dBm ($P_{(dBm)}$-(43+10*log($P_{(W)}$)).

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