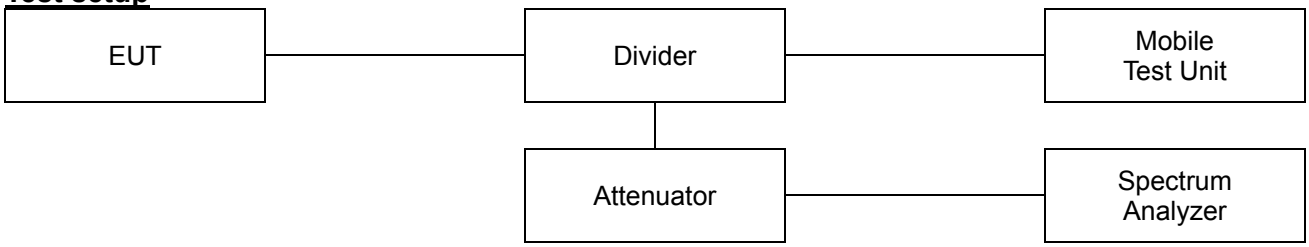
## 7.2. 99% Occupied Bandwidth & 26 dB Bandwidth

**Test setup**




**Limit**

According to §2.1049 ,the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

**Test procedure**

971168 D01 v03r01 – Section 4.2 and 4.3
ANSI C63.26-2015 – Section 5.4.3 and 5.4.4

**Test settings**

◆ **26dB Bandwidth**

c) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

d) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

e) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
See guidance provided in 4.2.3.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:
   1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize.
   Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
   2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

k) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

## ◆ 99% Occupied Bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

**Notes:**

1. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, Modulation.

## Test results

| Test Band | Bandwidth (㎒) | Frequency (㎒) | Test mode | 26㏈ bandwidth (㎒) | 99 % bandwidth (㎒) |
|---|---|---|---|---|---|
| LTE Band 26 (Part 90S) | 1.4 | 814.7 | QPSK | 1.35 | 1.10 |
| | | | 16QAM | 1.35 | 1.10 |
| | | 823.3 | QPSK | 1.36 | 1.10 |
| | | | 16QAM | 1.34 | 1.10 |
| | 3 | 815.5 | QPSK | 3.16 | 2.71 |
| | | | 16QAM | 3.14 | 2.71 |
| | | 822.5 | QPSK | 3.10 | 2.71 |
| | | | 16QAM | 3.15 | 2.71 |
| | 5 | 816.5 | QPSK | 5.46 | 4.51 |
| | | | 16QAM | 5.40 | 4.53 |
| | | 821.5 | QPSK | 5.46 | 4.52 |
| | | | 16QAM | 5.52 | 4.52 |
| | 10 | 819.0 | QPSK | 10.69 | 8.99 |
| | | | 16QAM | 10.37 | 8.99 |
| | 15 | 821.5 | QPSK | 15.21 | 13.45 |
| | | | 16QAM | 15.25 | 13.45 |

## Straddle channel

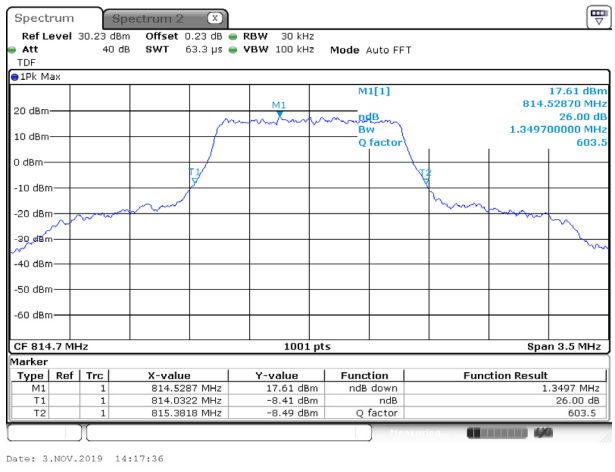
| Test Band | Bandwidth (㎒) | Frequency (㎒) | Test mode | 26㏈ bandwidth (㎒) | 99 % bandwidth (㎒) |
|---|---|---|---|---|---|
| LTE Band 26 (Part 90S) | 1.4 | 824 | QPSK | 1.36 | 1.10 |
| | | | 16QAM | 1.33 | 1.09 |
| | 3 | 824 | QPSK | 3.07 | 2.71 |
| | | | 16QAM | 3.13 | 2.72 |
| | 5 | 824 | QPSK | 5.59 | 4.55 |
| | | | 16QAM | 5.51 | 4.56 |
| | 10 | 824 | QPSK | 10.66 | 9.02 |
| | | | 16QAM | 10.34 | 9.07 |
| | 15 | 824 | QPSK | 15.36 | 13.49 |
| | | | 16QAM | 15.21 | 13.49 |

| Test Band | Bandwidth (㎒) | Frequency (㎒) | Test mode | 26㏈ bandwidth (㎒) | 99 % bandwidth (㎒) |
|---|---|---|---|---|---|
| LTE Band 26 (Part 22H) | 1.4 | 824.7 | QPSK | 1.36 | 1.11 |
| | | | 16QAM | 1.34 | 1.09 |
| | | 836.5 | QPSK | 1.35 | 1.10 |
| | | | 16QAM | 1.34 | 1.10 |
| | | 848.3 | QPSK | 1.34 | 1.09 |
| | | | 16QAM | 1.34 | 1.10 |
| | 3 | 825.5 | QPSK | 3.19 | 2.71 |
| | | | 16QAM | 3.12 | 2.71 |
| | | 836.5 | QPSK | 3.11 | 2.70 |
| | | | 16QAM | 3.15 | 2.70 |
| | | 847.5 | QPSK | 3.12 | 2.72 |
| | | | 16QAM | 3.12 | 2.71 |
| | 5 | 826.5 | QPSK | 5.45 | 4.54 |
| | | | 16QAM | 5.37 | 4.54 |
| | | 836.5 | QPSK | 5.37 | 4.53 |
| | | | 16QAM | 5.43 | 4.53 |
| | | 846.5 | QPSK | 5.51 | 4.55 |
| | | | 16QAM | 5.38 | 4.53 |
| | 10 | 829.0 | QPSK | 10.51 | 9.08 |
| | | | 16QAM | 10.37 | 9.04 |
| | | 836.5 | QPSK | 10.39 | 8.99 |
| | | | 16QAM | 10.34 | 8.99 |
| | | 844.0 | QPSK | 10.49 | 9.02 |
| | | | 16QAM | 10.39 | 9.04 |
| | 15 | 831.5 | QPSK | 15.40 | 13.49 |
| | | | 16QAM | 15.17 | 13.45 |
| | | 841.5 | QPSK | 15.32 | 13.56 |
| | | | 16QAM | 15.25 | 13.52 |

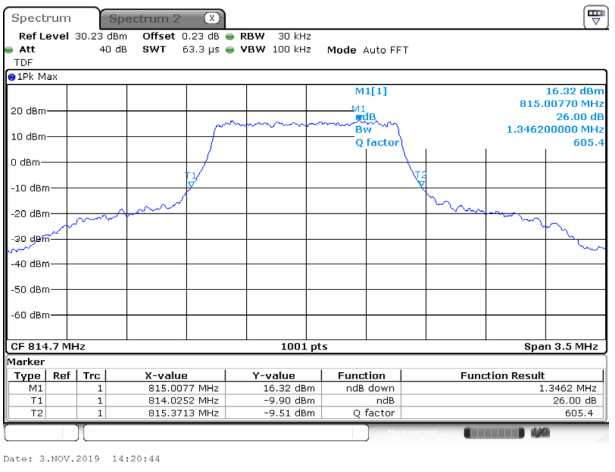
## 26dB Bandwidth

### Test mode: LTE Band 26 (Part 90S)

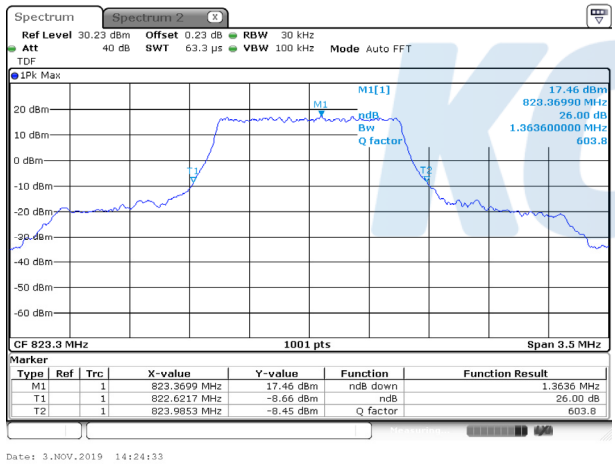
#### 1.4M BW / QPSK / Low ch.



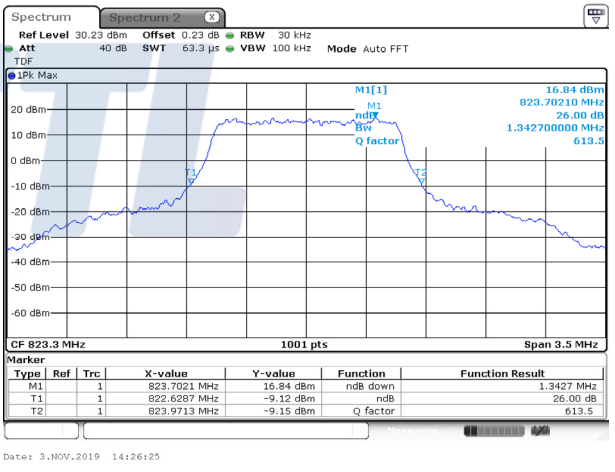

#### 1.4M BW / 16QAM / Low ch.



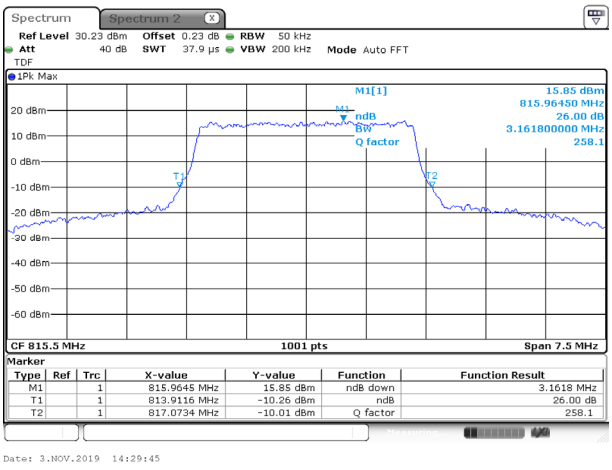

#### 1.4M BW / QPSK / High ch.



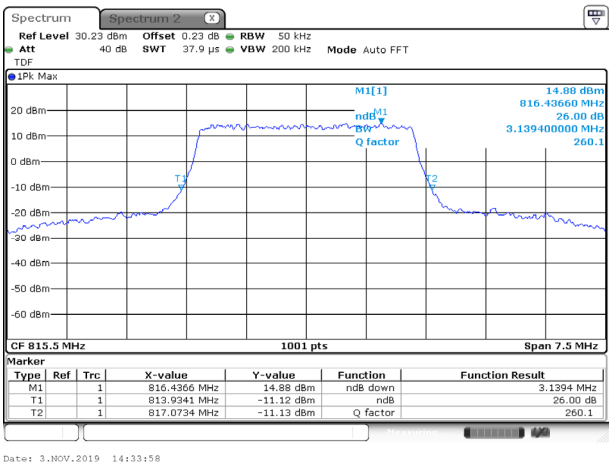

#### 1.4M BW / 16QAM / High ch.



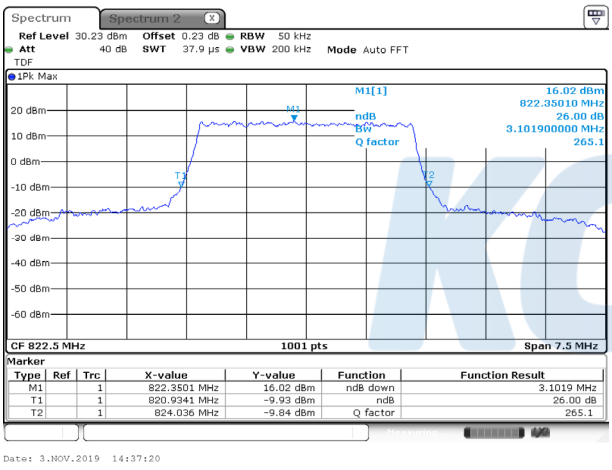
## 3M BW / QPSK / Low ch.



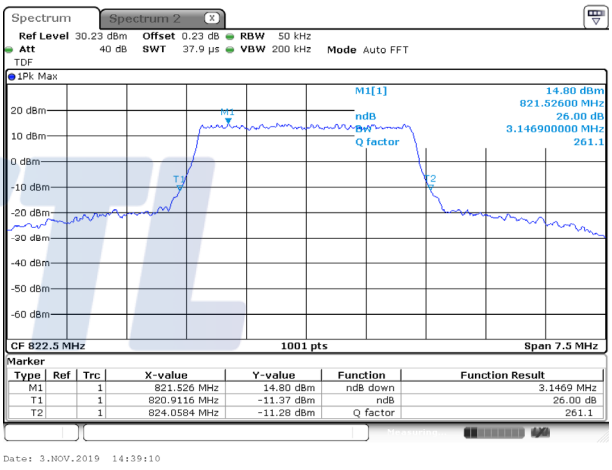

## 3M BW / 16QAM / Low ch.



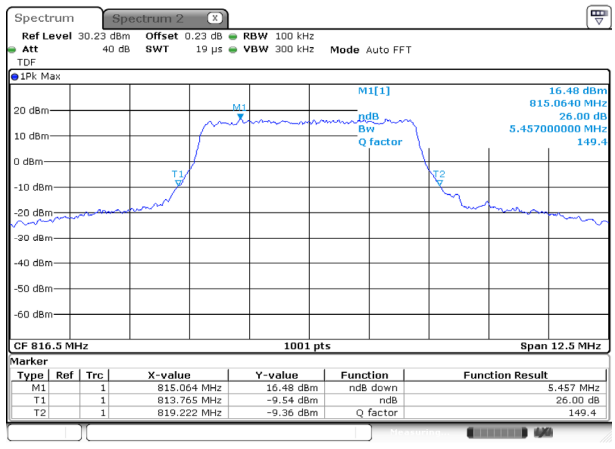

## 3M BW / QPSK / High ch.




## 3M BW / 16QAM / High ch.



## 5M BW / QPSK / Low ch.

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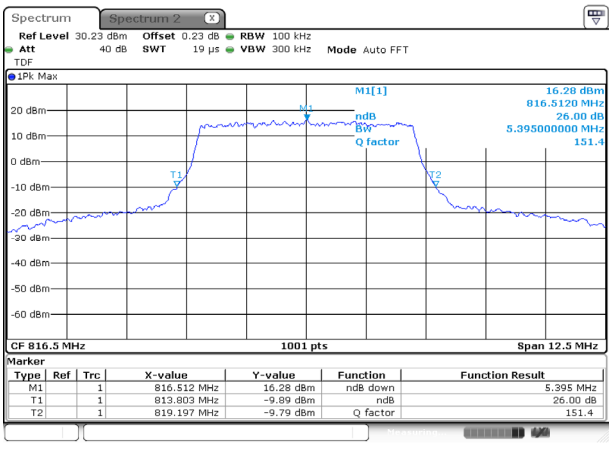
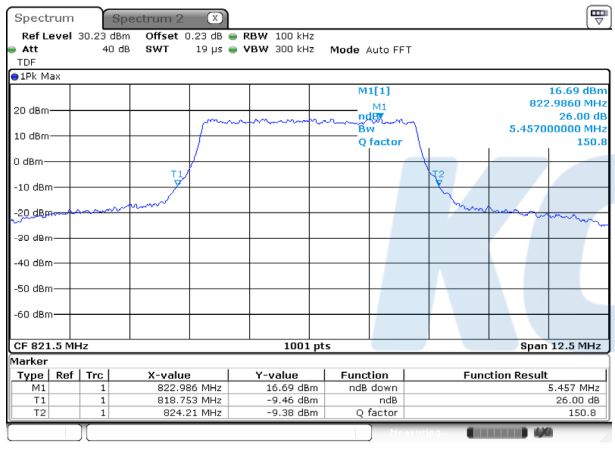
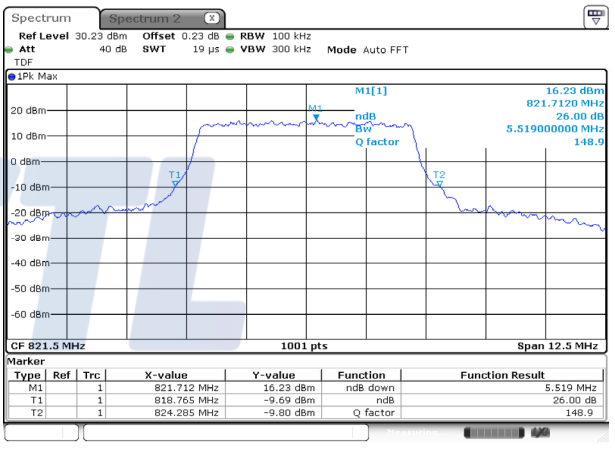


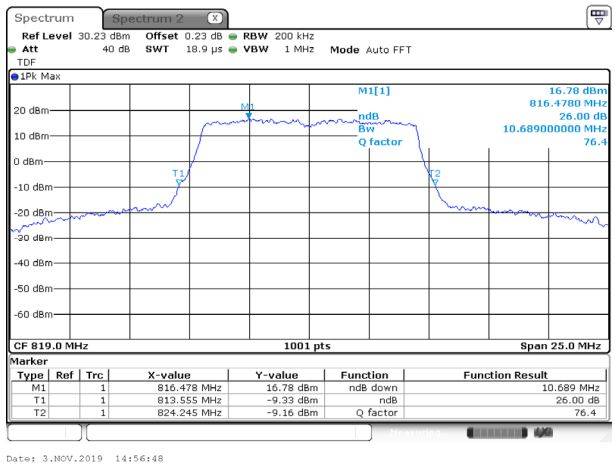

## 5M BW / QPSK / High ch.



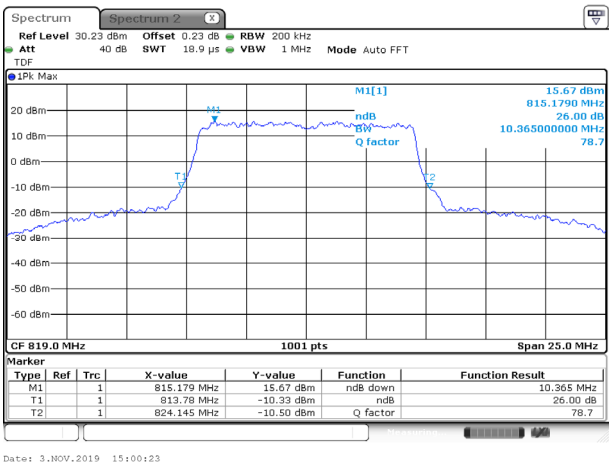

## 5M BW / 16QAM / High ch.



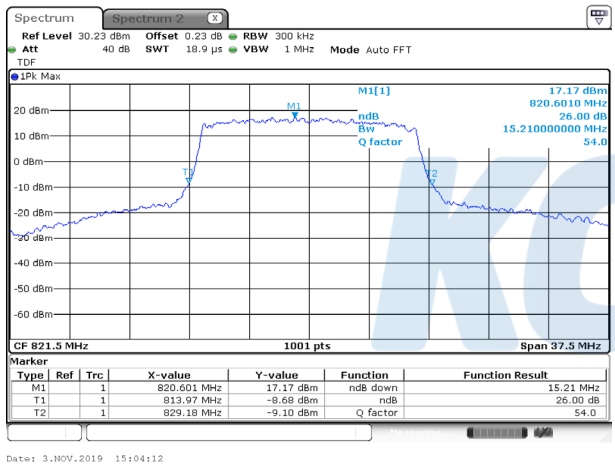
## 10M BW / QPSK / Mid ch.



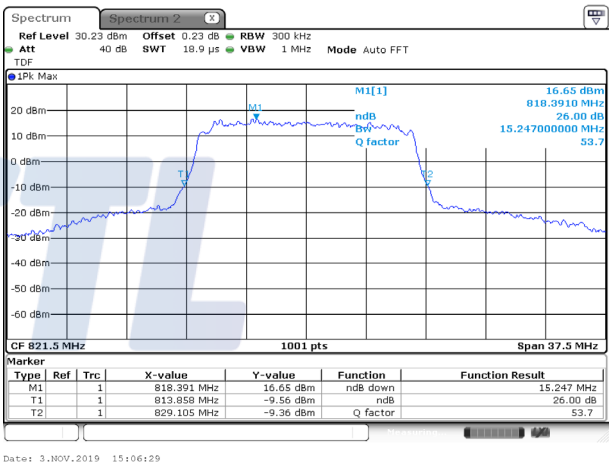

## 10M BW / 16QAM / Mid ch.




## 15M BW / QPSK / Mid ch.

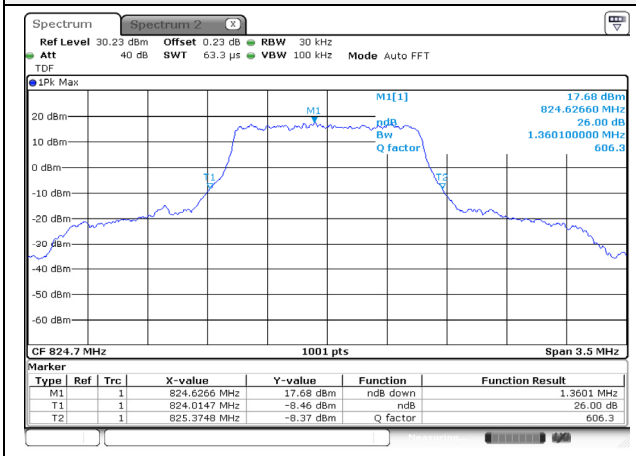



## 15M BW / 16QAM / Mid ch.

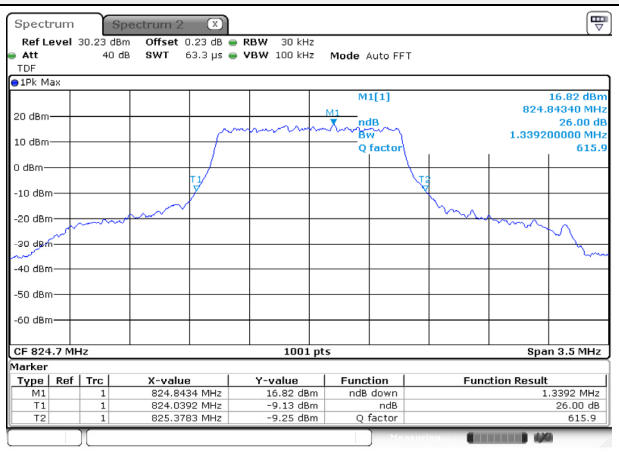


## Test mode: LTE Band 26 (Part 22H)

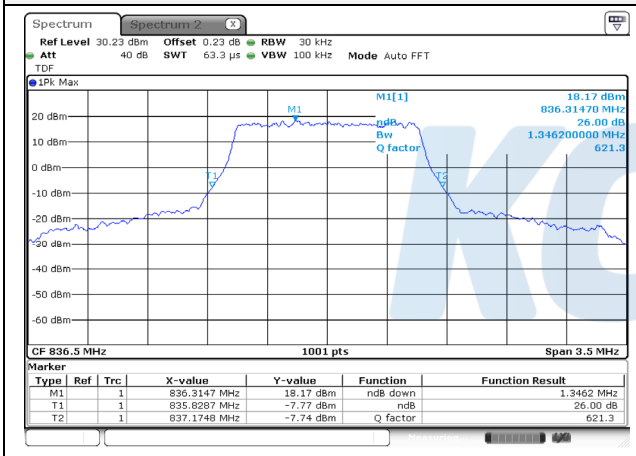
### 1.4M BW / QPSK / Low ch.



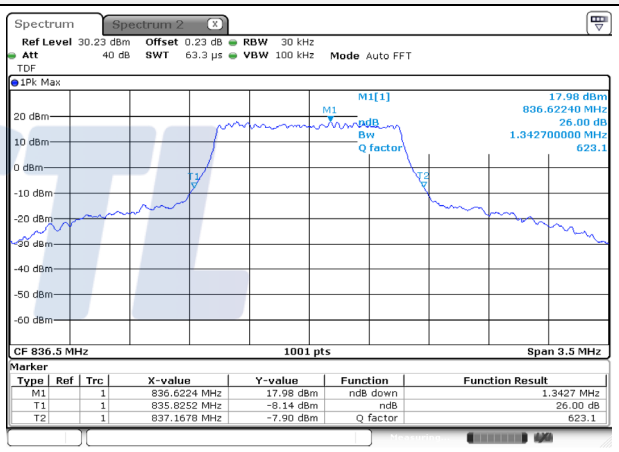

### 1.4M BW / 16QAM / Low ch.



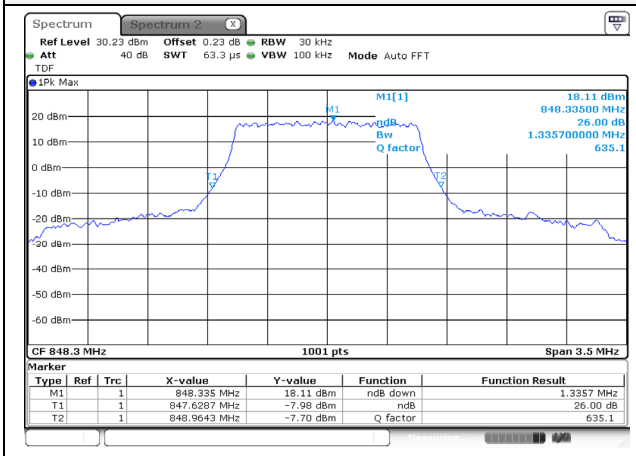

### 1.4M BW / QPSK / Mid ch.



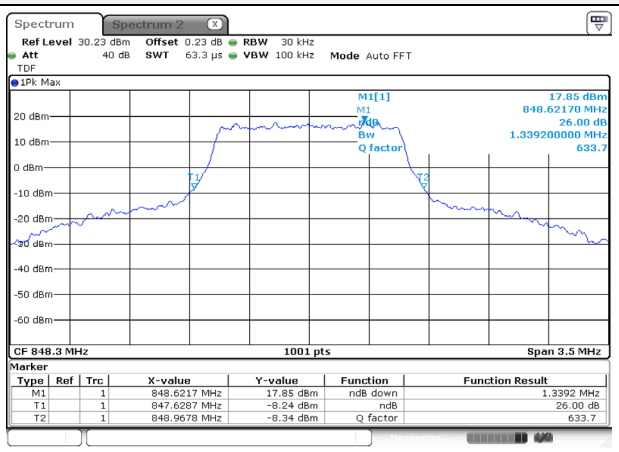

### 1.4M BW / 16QAM / Mid ch.



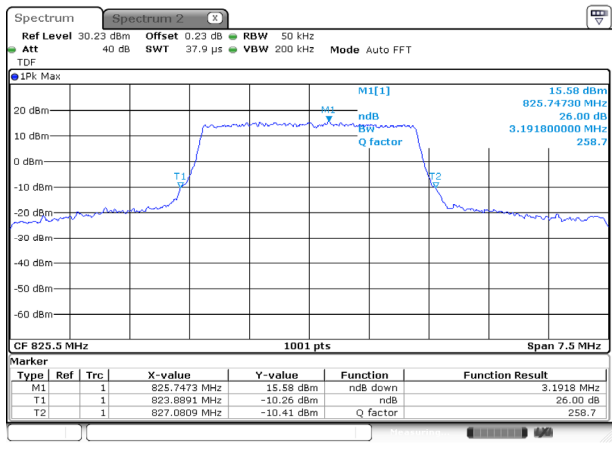

### 1.4M BW / QPSK / High ch.



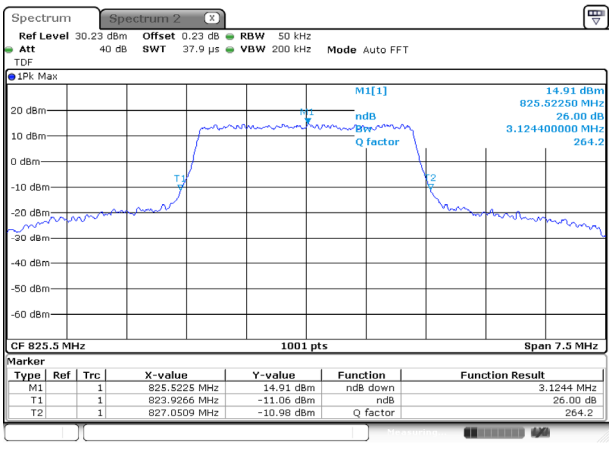

### 1.4M BW / 16QAM / High ch.



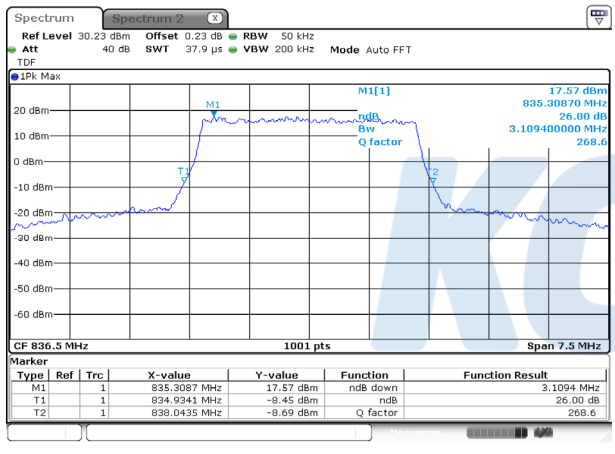
### 3M BW / QPSK / Low ch.




### 3M BW / 16QAM / Low ch.




### 3M BW / QPSK / Mid ch.

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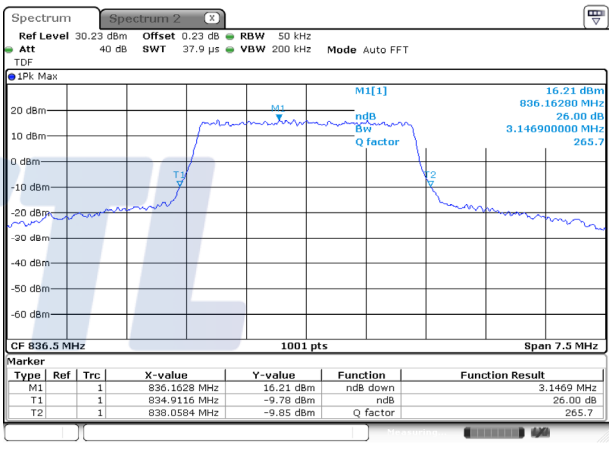
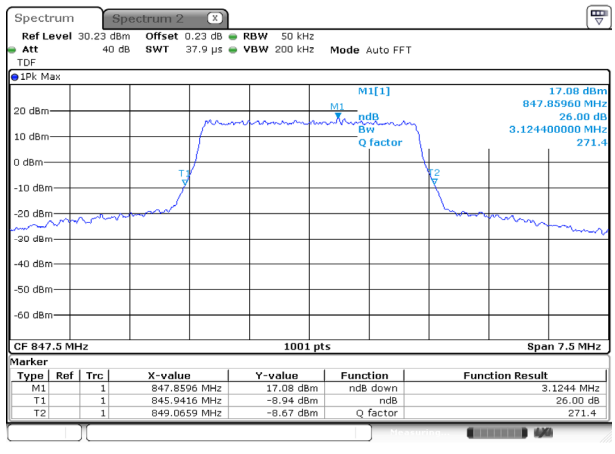
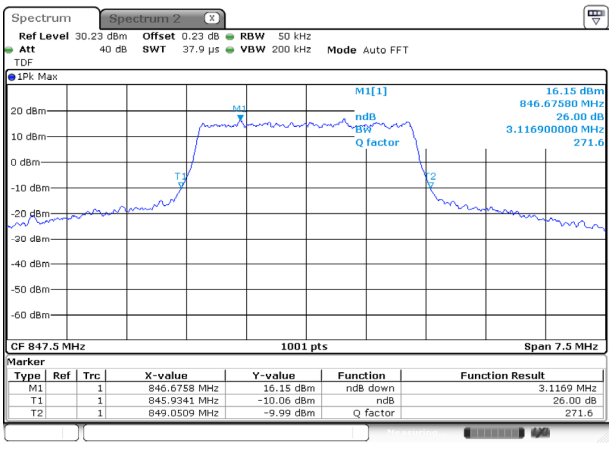


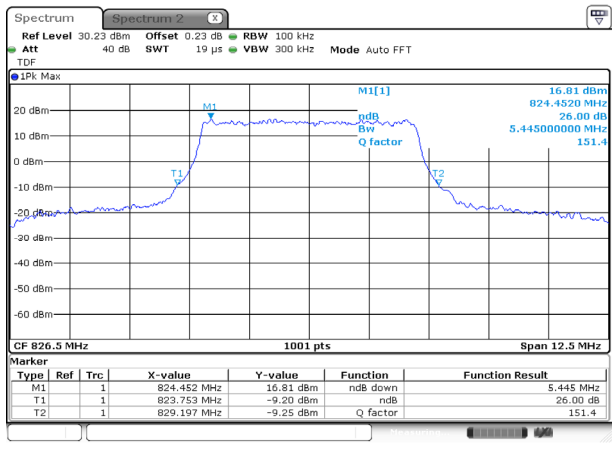

### 3M BW / QPSK / High ch.



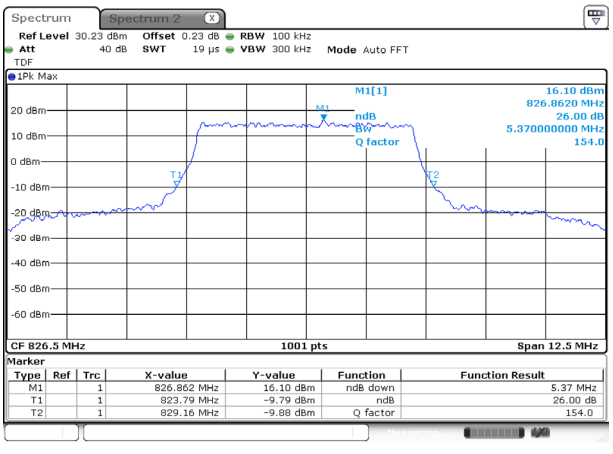

### 3M BW / 16QAM / High ch.



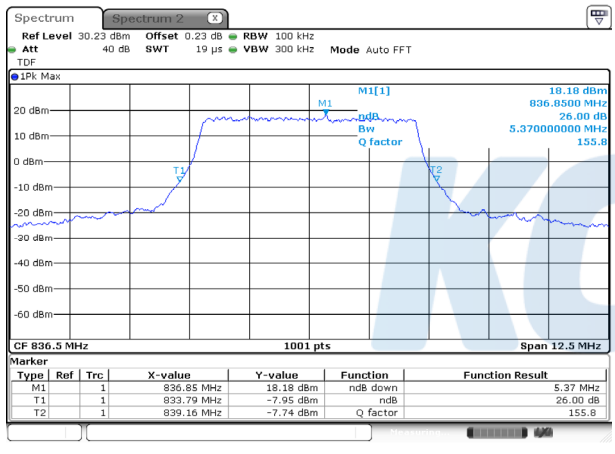
## 5M BW / QPSK / Low ch.



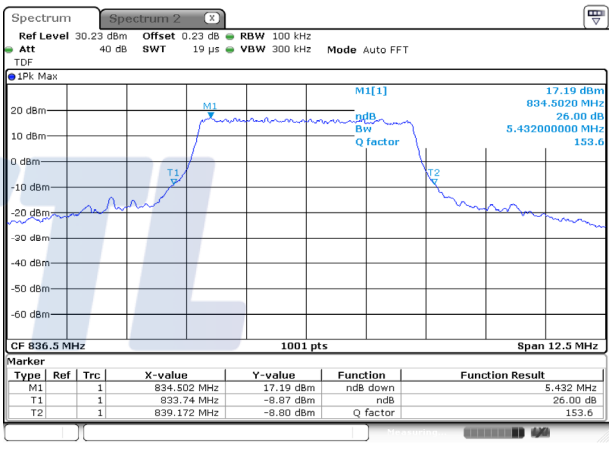

## 5M BW / 16QAM / Low ch.



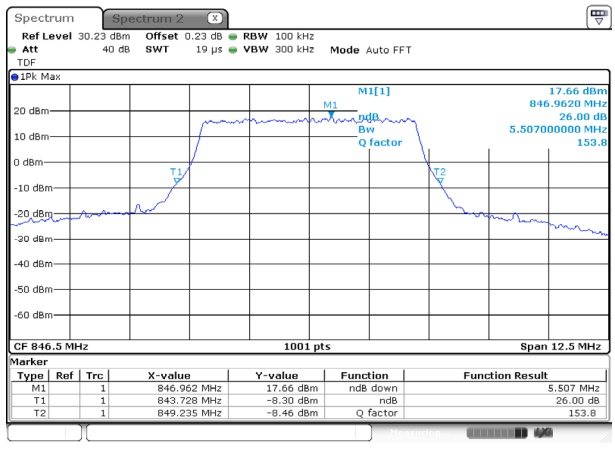

## 5M BW / QPSK / Mid ch.



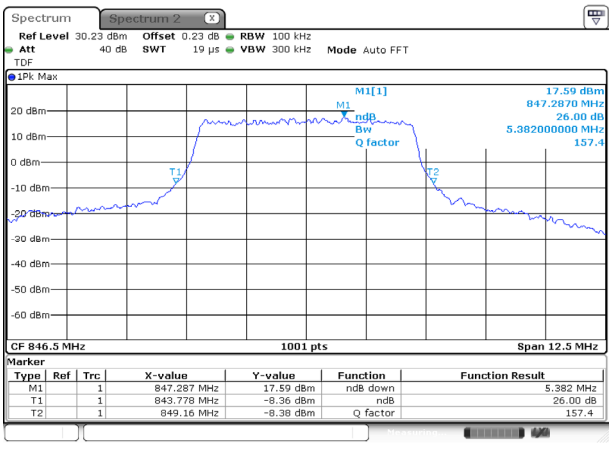

## 5M BW / 16QAM / Mid ch.



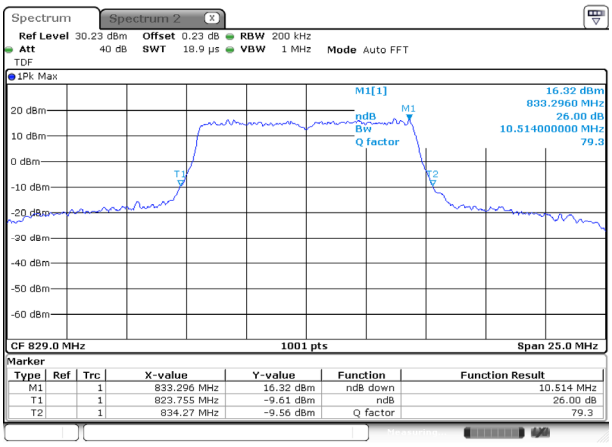

## 5M BW / QPSK / High ch.



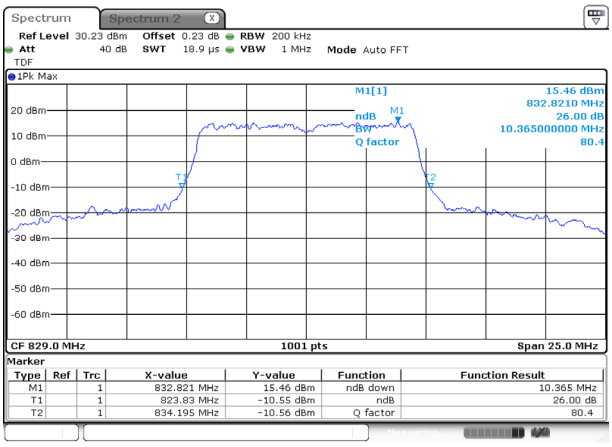

## 5M BW / 16QAM / High ch.



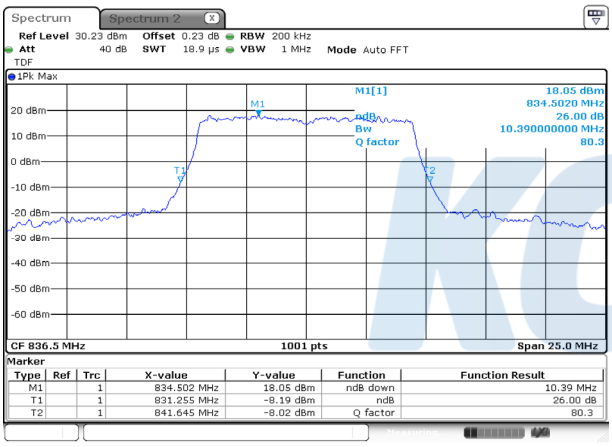
### 10M BW / QPSK / Low ch.



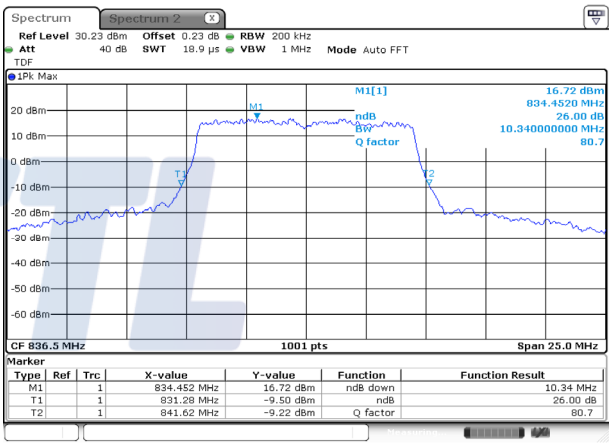

### 10M BW / 16QAM / Low ch.



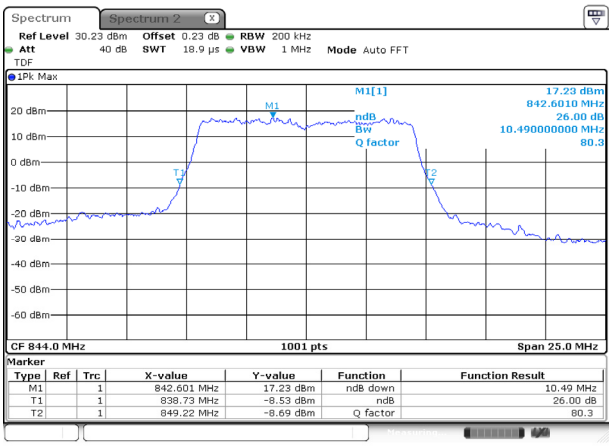

### 10M BW / QPSK / Mid ch.



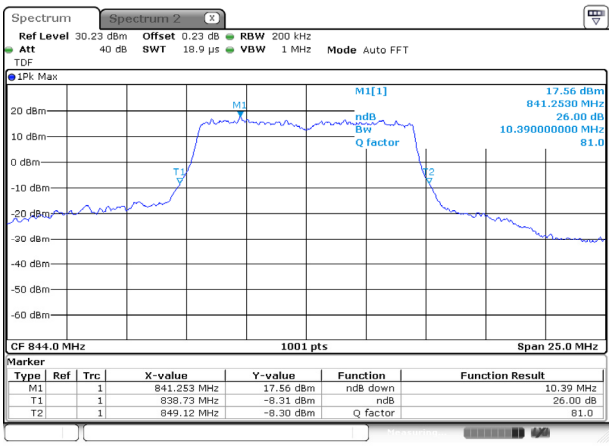

### 10M BW / 16QAM / Mid ch.



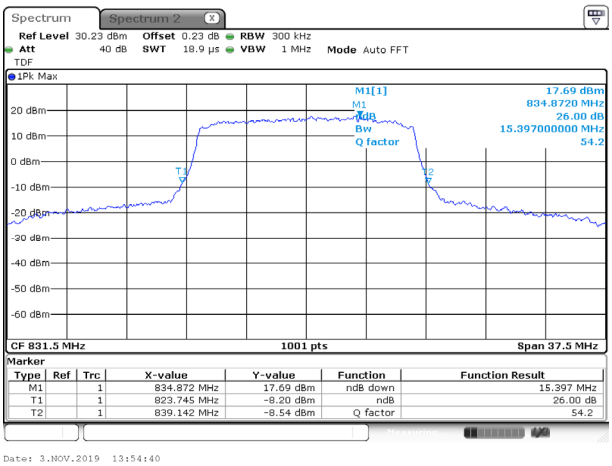

### 10M BW / QPSK / High ch.



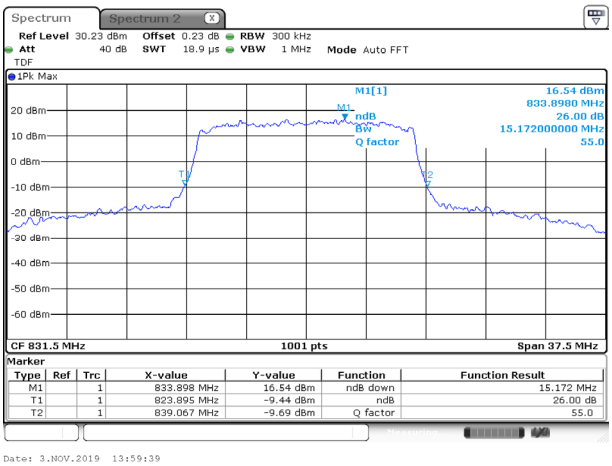

### 10M BW / 16QAM / High ch.



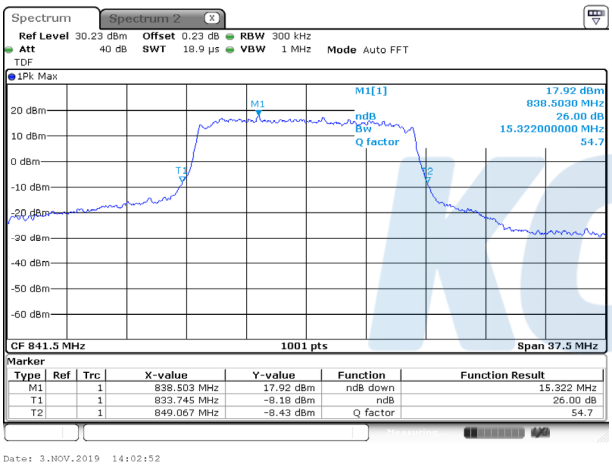
### 15M BW / QPSK / Low ch.



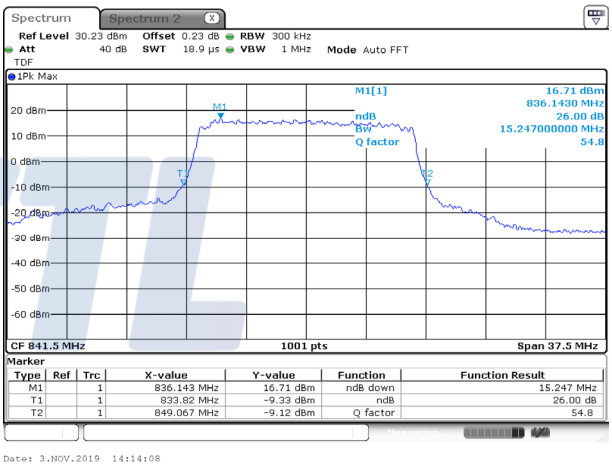

### 15M BW / 16QAM / Low ch.




### 15M BW / QPSK / High ch.

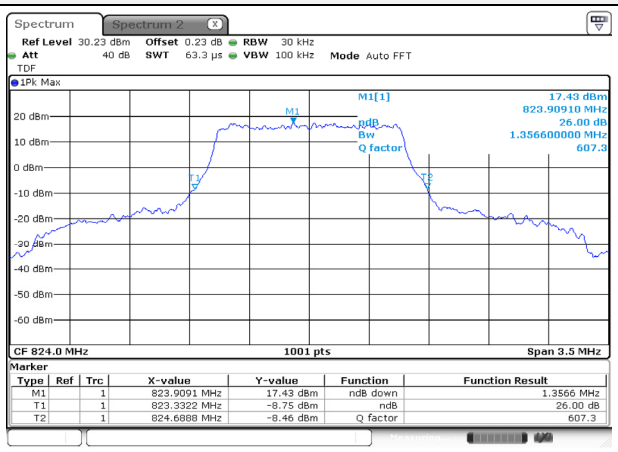



### 15M BW / 16QAM / High ch.

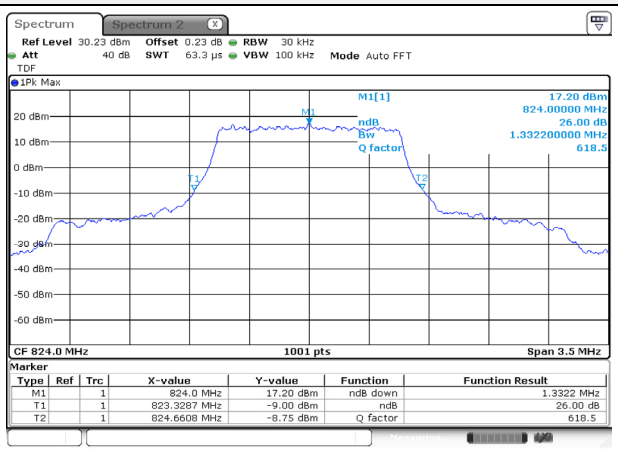


## Straddle channel

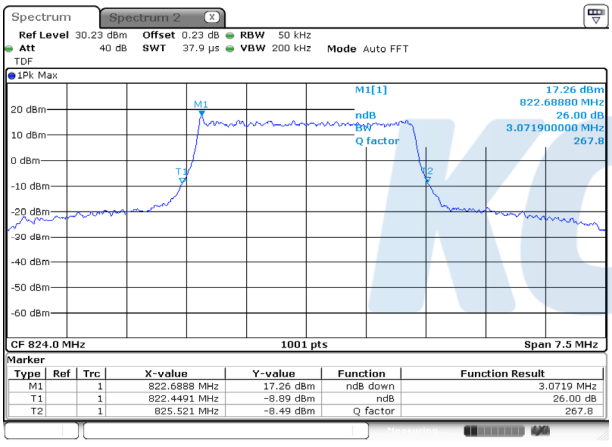
### 1.4M BW / QPSK



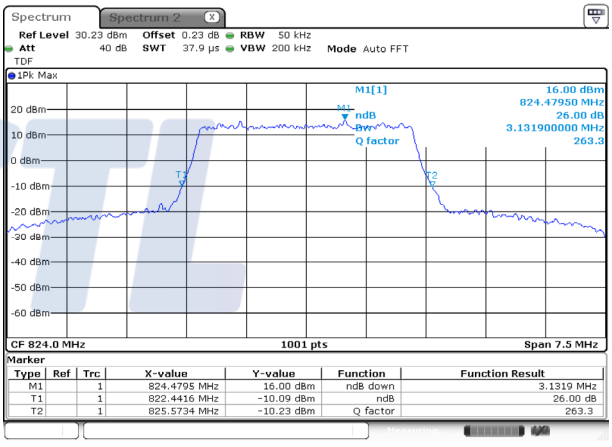

### 1.4M BW / 16QAM



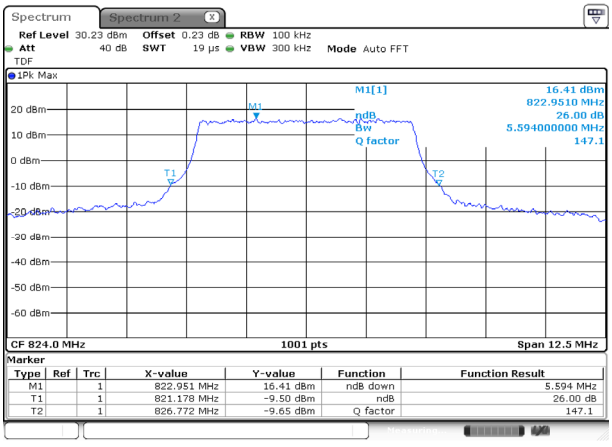

### 3M BW / QPSK



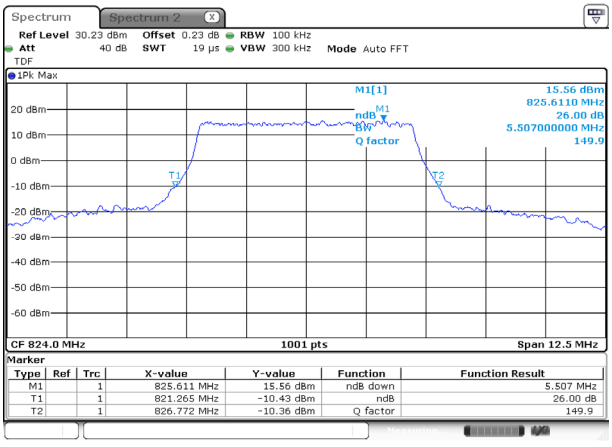

### 3M BW / 16QAM



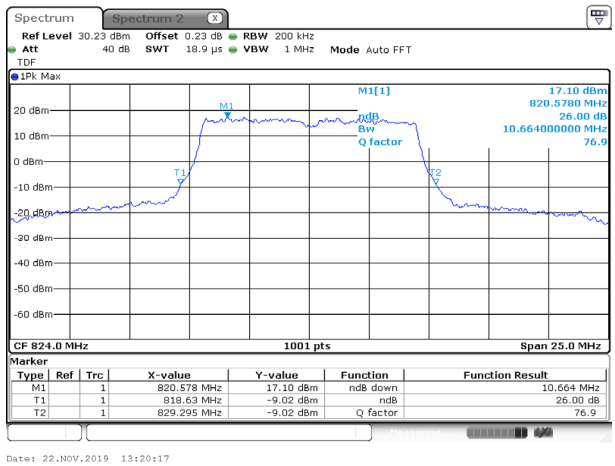

### 5M BW / QPSK



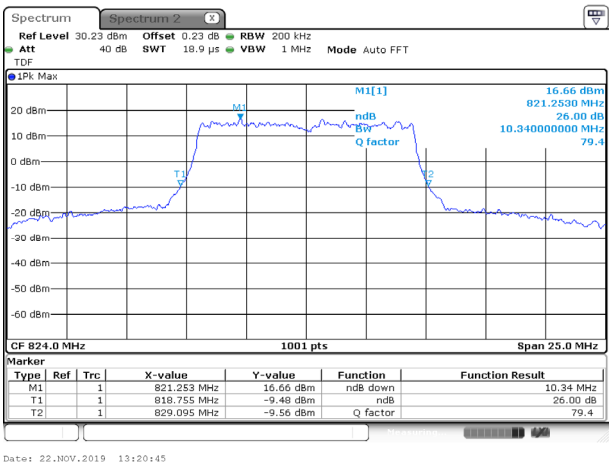

### 5M BW / 16QAM



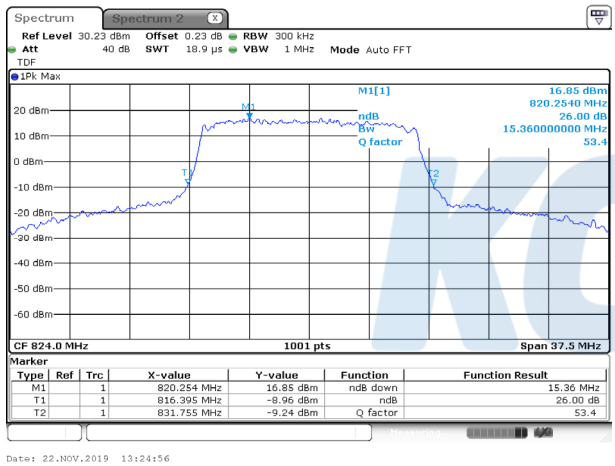
## 10M BW / QPSK




## 10M BW / 16QAM




## 15M BW / QPSK




## 15M BW / 16QAM