



# FCC TEST REPORT

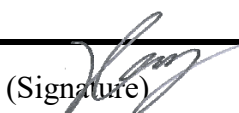
|              |                    |
|--------------|--------------------|
| Product Name | Repeater           |
| Model Name   | CS40-734834-00D-A0 |
| Applicant    | Westell, Inc.      |
| FCC ID       | NVRDPSA81090-78    |

## ESTECH CO., LTD

Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,  
Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204



## FCC Test Report

|                                                                                                                                                                             |                                  |                                                          |                   |                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------|
| Report Number                                                                                                                                                               | ESTRFC2012-005                   |                                                          |                   |                                                                                                   |
| Applicant                                                                                                                                                                   | Company Name                     | Westell, Inc.                                            |                   |                                                                                                   |
|                                                                                                                                                                             | Address                          | 750 North Commons Drive, Aurora, IL 60504, United States |                   |                                                                                                   |
| Product                                                                                                                                                                     | Product Name                     | Repeater                                                 |                   |                                                                                                   |
|                                                                                                                                                                             | Model No.                        | CS40-734834-00D-A0                                       | Manufacturer      | Innertron, Inc,                                                                                   |
|                                                                                                                                                                             | Serial No.                       | Non                                                      | Country of origin | Republic of Korea                                                                                 |
| Other                                                                                                                                                                       | Issued Date                      | 2020-12-18                                               | Tested Date       | 2020-10-19~<br>2020-11-13                                                                         |
| Test Result                                                                                                                                                                 | Pass                             |                                                          |                   |                                                                                                   |
| Standard                                                                                                                                                                    | FCC PART 90                      |                                                          |                   |                                                                                                   |
| Tested by                                                                                                                                                                   | Engineering Manager I.K. Hong    |                                                          |                   | (Signature)  |
| Approved by                                                                                                                                                                 | Engineering manager Keum-Bum Lee |                                                          |                   | (Signature)  |
| <div><b>ESTECH CO., LTD</b></div> <div>Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,<br/>Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204</div> |                                  |                                                          |                   |                                                                                                   |
| o This is certified that the above mentioned products have been tested for the sample provided by client.                                                                   |                                  |                                                          |                   |                                                                                                   |
| o No part of this document may not be duplicated or reproduced by any means without the express written permission of Estech Co., Ltd.                                      |                                  |                                                          |                   |                                                                                                   |



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## 1. General Information

### 1.1 EUT Description

|                        |                                                    |
|------------------------|----------------------------------------------------|
| FCC ID                 | NVRDPSA81090-78                                    |
| Product Name           | Repeater                                           |
| Model Name             | CS40-734834-00D-A0                                 |
| Frequency              | Downlink : 758 MHz ~ 775 MHz<br>851 MHz ~ 862 MHz  |
|                        | Uplink : 788 MHz ~ 805 MHz<br>806 MHz ~ 817 MHz    |
| Power Rating           | Input: 120VAC 60Hz                                 |
| conducted output power | Downlink : 34 dBm , Uplink : 27 dBm                |
| Gain                   | Downlink : 90 dB , Uplink : 80 dB                  |
| Antenna Gain           | 698 ~ 800 MHz : 7.5 dBi<br>800 ~ 960 MHz : 8.5 dBi |

### 1.2 EUT Operating mode

The following Modulations were used during the tests:

AWGN : Broadband modulation an occupied bandwidth (OBW) of 4.1 MHz. This is representative of a 5 MHz LTE channel

CW : No Modulation

FM 4 kHz : 4 kHz OBW, 6.25 kHz Channel Bandwidth, 1 kHz Audio Frequency.

FM 11 kHz : 11.3 kHz OBW, 12.5 kHz Channel Bandwidth, 1 kHz Audio Frequency.

FM 16 kHz : 16 kHz OBW, 25 kHz Channel Bandwidth, 1 kHz Audio Frequency.



## 2. Laboratory Information

**2.1 Laboratory Name** Estech Co., Ltd.

**2.2 Location**

**Head Office** Rm. 1015, World Venture Center II, 426-5 Gasan-dong  
Geumcheon-gu, Seoul, 153-803. Korea.

**EMC Lab(Yanggi)** 347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si,  
Gyeonggi-do 467-811, R. O. Korea

**2.3 Major Accredited Mark**



Industry Industrie  
Canada Canada



## 3. Summary of Test Results

| Test Item                                                       | Standard         | Result            |
|-----------------------------------------------------------------|------------------|-------------------|
| AGC threshold                                                   | 935210 D05 4.2   | PASS              |
| Out of Band Rejection                                           | 935210 D05 4.3   | PASS              |
| Input vs Output<br>Signal Comparison                            | 935210 D05 4.4   | PASS              |
| Input/output power<br>and amplifier gain                        | 935210 D05 4.5   | PASS              |
| Noise figure<br>measurements                                    | 935210 D05 4.6   | PASS              |
| Out-of-band/out-of-block<br>emissions conducted<br>measurements | 935210 D05 4.7.2 | PASS              |
| EUT spurious emissions<br>conducted measurements                | 935210 D05 4.7.3 | PASS              |
| Frequency stability<br>measurements                             | 935210 D05 4.7   | N/A* <sup>1</sup> |
| Spurious emissions<br>radiated measurements                     | 935210 D05 4.9   | PASS              |
| Spurious emissions<br>90.543 € & (f)                            | 935210 D05 4.7.3 | PASS              |

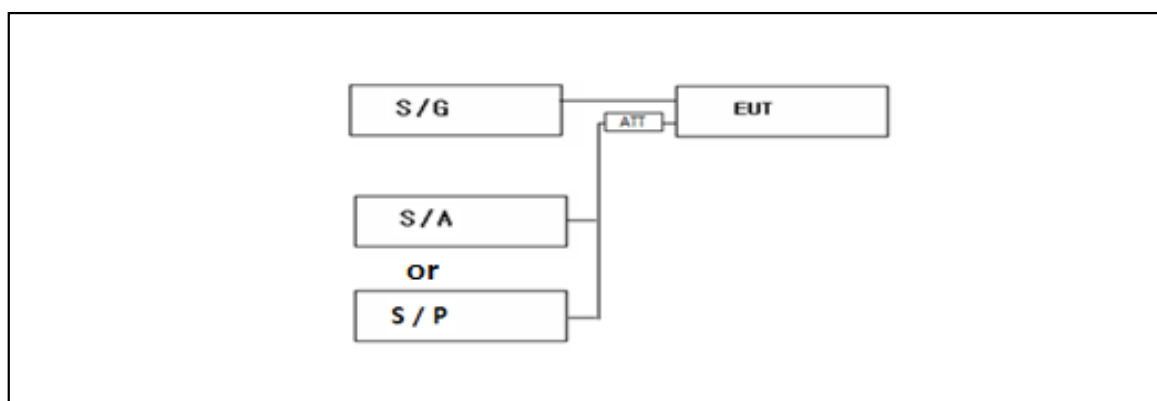
\*<sup>1</sup>: Test not required since the amplifier, repeater does not alter the input signal in any way

## 4. AGC threshold

### 4.1 Test Procedure according to KDB935210 D5 3.2

- Connect a signal generator to the input of the EUT.
- Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation as necessary.
- The signal generator should initially be configured to produce either of the required test signals (i.e., broadband or narrowband).
- Set the signal generator frequency to the center frequency of the EUT operating band.
- While monitoring the output power of the EUT, measured using the methods of 3.5.3 or 3.5.4, increase the input level until a 1 dB increase in the input signal power no longer causes a 1 dB increase in the output signal power.
- Record this level as the AGC threshold level.
- Repeat the procedure with the remaining test signal.

Test setup for RF Conducted measurement



### 4.2 Test Equipments

The following test equipments are used during tests

| Equipment         | Manufacturer         | Model         | Next Cal.  |
|-------------------|----------------------|---------------|------------|
| Spectrum Analyzer | Agilent              | E4440A        | 2020-12-02 |
| Signal Generator  | E4438C               | MY42081204    | 2020-12-03 |
| Signal Generator  | E4432B               | GB40050840    | 2020-12-03 |
| Attenuator        | SRT                  | F04-K1830-01  | 2020-12-03 |
| Attenuator        | Bird Electronic Corp | 100-SA-MFN-30 | 2020-12-03 |
| Power Meter       | Agilent              | N1912A        | 2020-12-02 |
| Power Sensor      | Agilent              | A1921A        | 2020-12-02 |

#### 4.3 Test Results : Pass

##### 788 MHz ~ 805 MHz

| Modulation | Freq (MHz) | Input Level (dBm) | Output (dBm) | Gain (dB) |
|------------|------------|-------------------|--------------|-----------|
| CW         | 796.5      | -55.0             | 25.1         | 80.1      |
| CW         | 796.5      | -54.0             | 25.0         | 79.0      |
| CW         | 796.5      | -53.0             | 27.0         | 80.0      |
| CW         | 796.5      | -52.0             | 26.9         | 78.9      |
| CW         | 796.5      | -51.0             | 27.0         | 78.0      |

##### 806 MHz ~ 817 MHz

| Modulation | Freq (MHz) | Output (dBm) | Gain (dB) | Gain (dB) |
|------------|------------|--------------|-----------|-----------|
| CW         | 815.3      | -55.0        | 25.1      | 80.1      |
| CW         | 815.3      | -54.0        | 24.9      | 78.9      |
| CW         | 815.3      | -53.0        | 27.0      | 80.0      |
| CW         | 815.3      | -52.0        | 27.0      | 79.0      |
| CW         | 815.3      | -51.0        | 26.9      | 77.9      |

##### 758 MHz ~ 775 MHz

| Modulation | Freq (MHz) | Input Level (dBm) | Output (dBm) | Gain (dB) |
|------------|------------|-------------------|--------------|-----------|
| CW         | 766.5      | -58.0             | 31.9         | 89.9      |
| CW         | 766.5      | -57.0             | 33.0         | 90.0      |
| CW         | 766.5      | -56.0             | 34.0         | 90.0      |
| CW         | 766.5      | -55.0             | 33.9         | 88.9      |
| CW         | 766.5      | -54.0             | 34.0         | 88.0      |
| AWGN       | 772.0      | -58.0             | 32.0         | 90.0      |
| AWGN       | 772.0      | -57.0             | 32.9         | 89.9      |
| AWGN       | 772.0      | -56.0             | 34.0         | 90.0      |
| AWGN       | 772.0      | -55.0             | 33.8         | 88.8      |
| AWGN       | 772.0      | -54.0             | 33.9         | 87.9      |

##### 851 MHz ~ 862 MHz

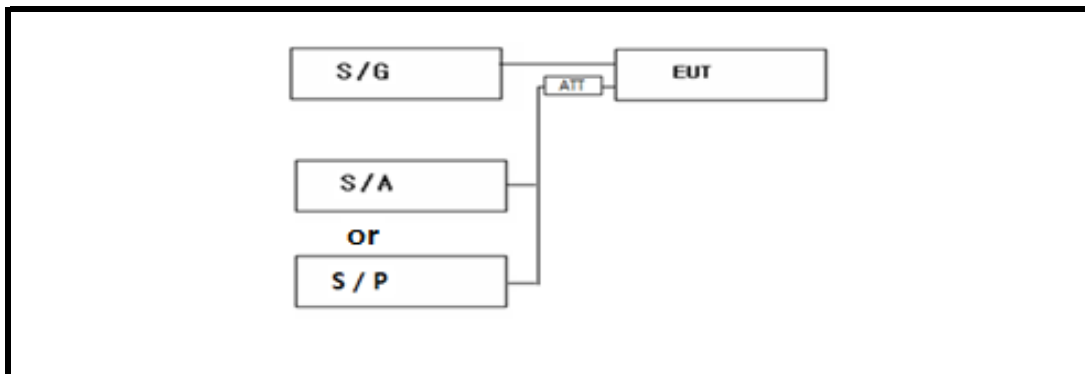
| Modulation | Freq (MHz) | Input Level (dBm) | Output (dBm) | Gain (dB) |
|------------|------------|-------------------|--------------|-----------|
| CW         | 860.3      | -58.0             | 32.0         | 90.0      |
| CW         | 860.3      | -57.0             | 32.9         | 89.9      |
| CW         | 860.3      | -56.0             | 34.0         | 90.0      |
| CW         | 860.3      | -55.0             | 33.9         | 88.9      |
| CW         | 860.3      | -54.0             | 33.8         | 87.8      |
| AWGN       | 802.0      | -58.0             | 32.0         | 90.0      |
| AWGN       | 802.0      | -57.0             | 32.9         | 89.9      |
| AWGN       | 802.0      | -56.0             | 34.0         | 90.0      |
| AWGN       | 802.0      | -55.0             | 33.9         | 88.9      |
| AWGN       | 802.0      | -54.0             | 33.9         | 87.9      |

## 5. Out of Band Rejection

### 5.1 Test Procedure according to KDB935210 D5 4.2

- a) Connect a signal generator to the input of the EUT.
- b) Configure a swept CW signal with the following parameters:
  - 1) Frequency range =  $\pm 250$  % of the manufacturer's specified pass band.
  - 2) The CW amplitude shall be 3 dB below the AGC threshold, and shall not activate the AGC threshold throughout the test.
  - 3) Dwell time = approximately 10 ms.
  - 4) Frequency step = 50 kHz.
- c) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.
- d) Set the RBW of the spectrum analyzer to between 1 % and 5 % of the manufacturer's rated passband, and VBW =  $3 \times$  RBW.
- e) Set the detector to Peak and the trace to Max-Hold.
- f) After the trace is completely filled, place a marker at the peak amplitude, which is designated as  $f_0$ , and with two additional markers (use the marker-delta method) at the 20 dB bandwidth (i.e., at the points where the level has fallen by 20 dB).
- g) Capture the frequency response plot for inclusion in the test report.

Test setup for RF Conducted measurement



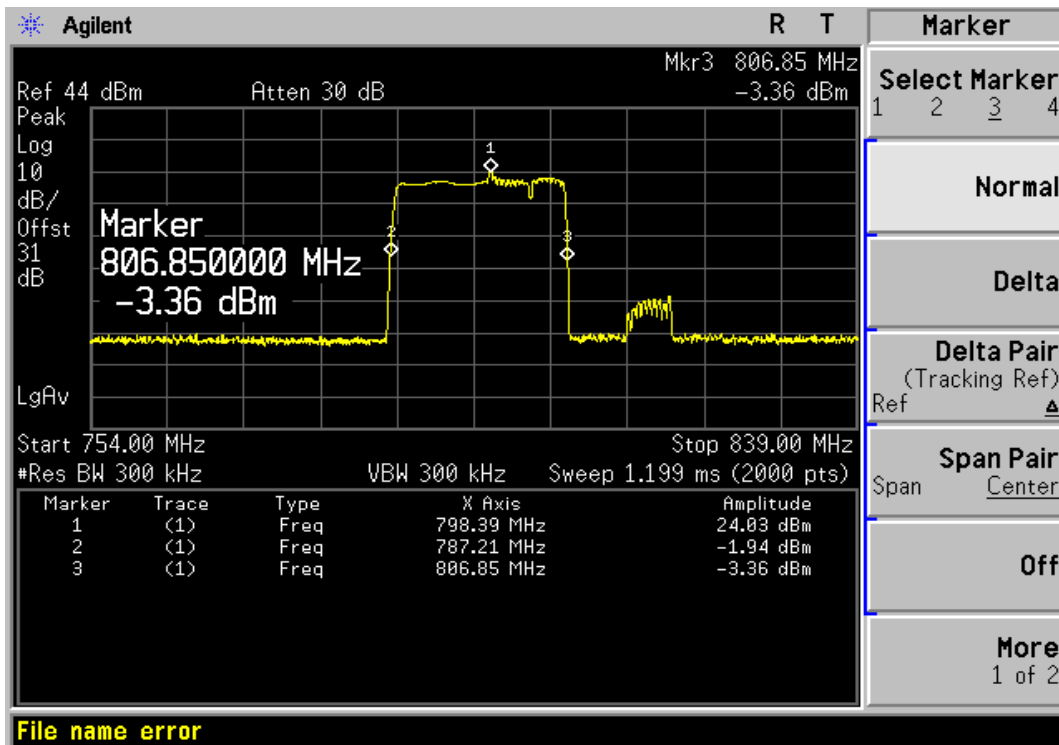
## 6.2 Test Equipments

The following test equipments are used during tests

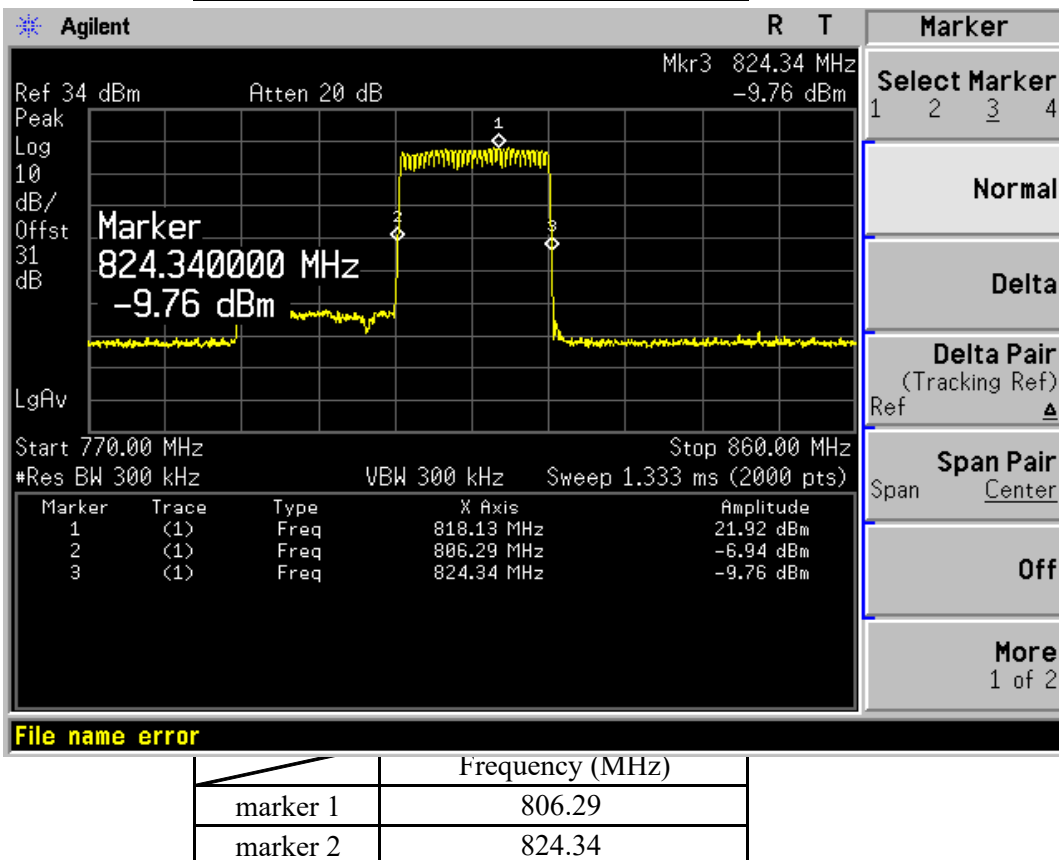
| Equipment         | Manufacturer         | Model         | Next Cal.  |
|-------------------|----------------------|---------------|------------|
| Spectrum Analyzer | Agilent              | E4440A        | 2020-12-02 |
| Signal Generator  | E4438C               | MY42081204    | 2020-12-03 |
| Signal Generator  | E4432B               | GB40050840    | 2020-12-03 |
| Attenuator        | SRT                  | F04-K1830-01  | 2020-12-03 |
| Attenuator        | Bird Electronic Corp | 100-SA-MFN-30 | 2020-12-03 |



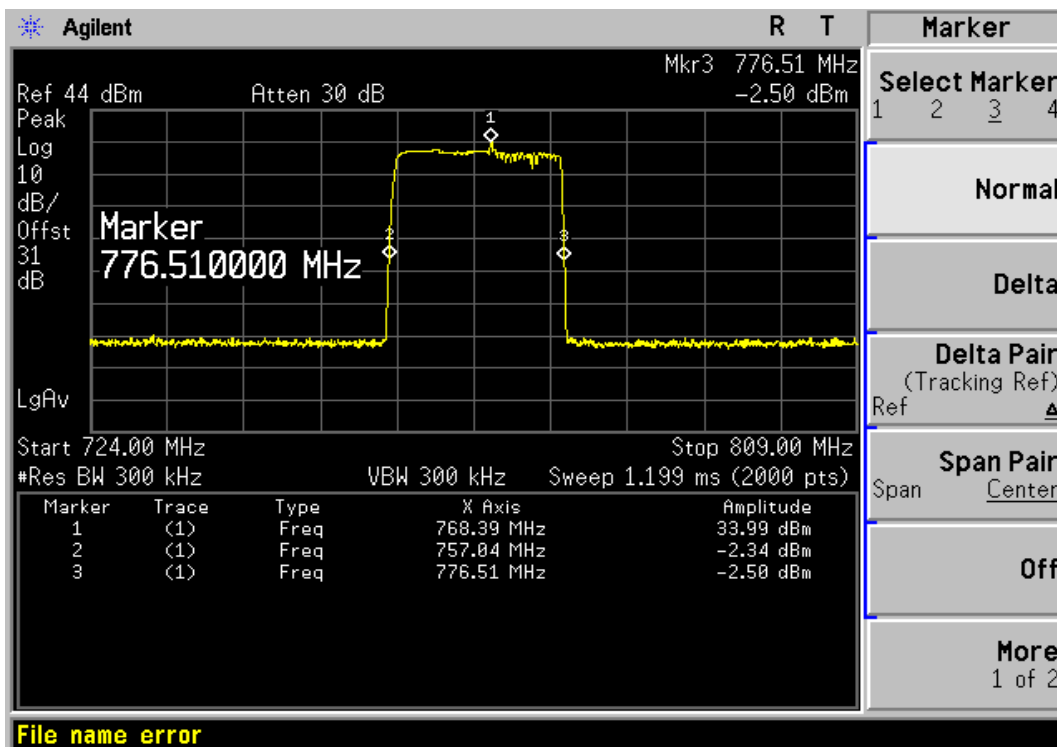
**6.3 Test Results : Pass**



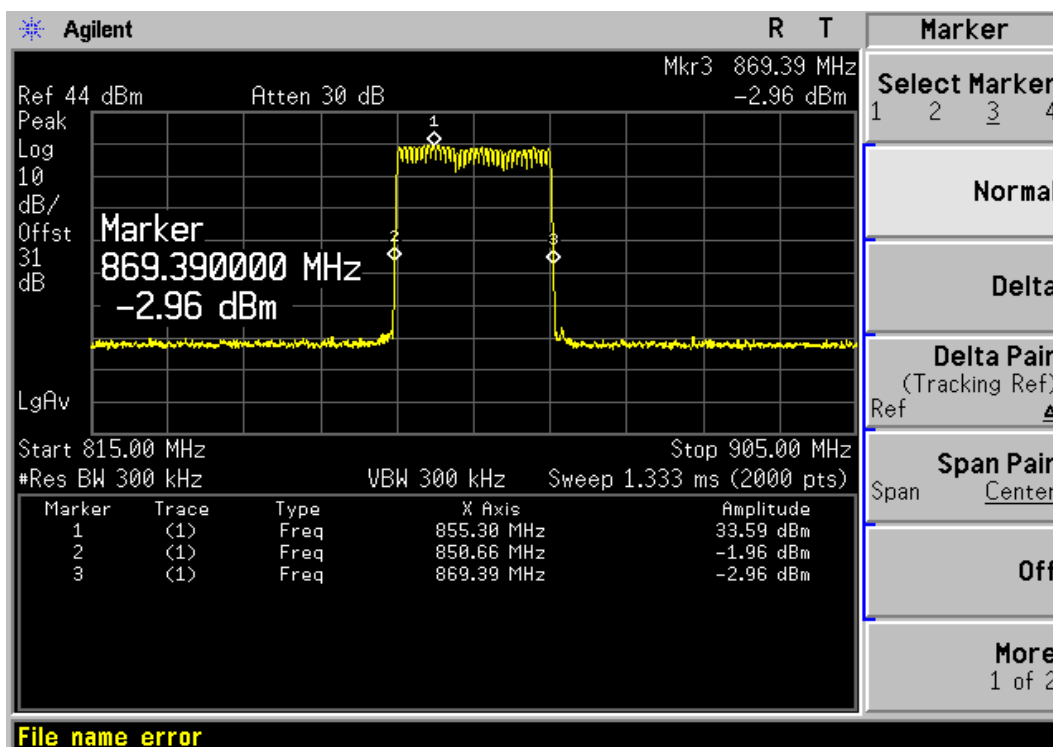
|          | Frequency (MHz) |
|----------|-----------------|
| marker 1 | 787.21          |
| marker 2 | 806.85          |



|          | Frequency (MHz) |
|----------|-----------------|
| marker 1 | 806.29          |
| marker 2 | 824.34          |



|          | Frequency (MHz) |
|----------|-----------------|
| marker 1 | 757.04          |
| marker 2 | 776.51          |



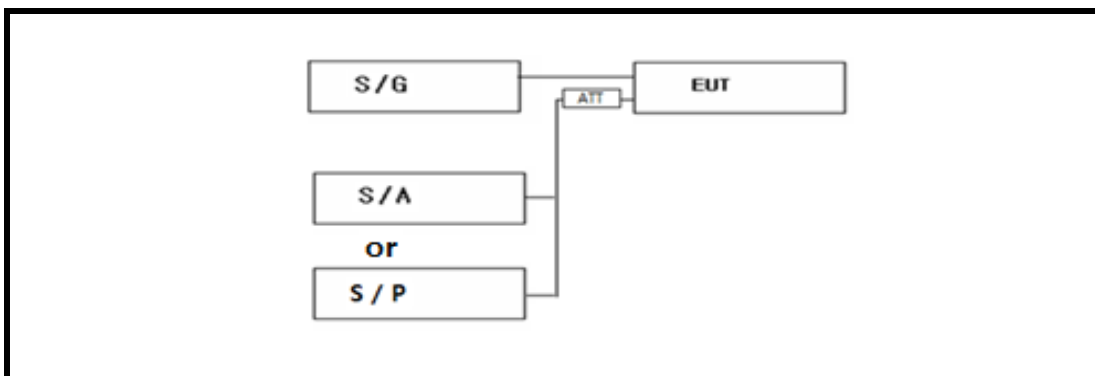
|          | Frequency (MHz) |
|----------|-----------------|
| marker 1 | 850.66          |
| marker 2 | 869.39          |

## 6. Input-versus-output signal comparison

### 6.1 Test Procedure according to KDB935210 D5 4.4

- a) Connect a signal generator to the input of the EUT.
- b) Configure the signal generator to transmit the appropriate test signal associated with the public safety emission designation (see Table 1)
- c) Configure the signal level to be just below the AGC threshold (see results from 4.2).
- d) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.
- e) Set the spectrum analyzer center frequency to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between  $2 \times$  to  $5 \times$  the EBW (or OBW).
- f) The nominal RBW shall be 300 Hz for 16K0F3E, and 100 Hz for all other emissions types.
- g) Set the reference level of the spectrum analyzer to accommodate the maximum input amplitude level, i.e., the level at f0 per 4.3.
- h) Set spectrum analyzer detection mode to peak, and trace mode to max hold.
- i) Allow the trace to fully stabilize.
- j) Confirm that the signal is contained within the appropriate emissions mask.
- k) Use the marker function to determine the maximum emission level and record the associated frequency.
- l) Capture the emissions mask plot for inclusion in the test report (output signal spectra).
- m) Measure the EUT input signal power (signal generator output signal) directly from the signal generator using power measurement guidance provided in KDB Publication 971168 [R8] (input signal spectra).
- n) Compare the spectral plot of the output signal (determined in step k), to the input signal (determined in step l) to affirm they are similar (in passband and rolloff characteristic features and relative spectral locations).
- o) Repeat steps d) to n) with the input signal amplitude set 3 dB above the AGC threshold.
- p) Repeat steps b) to o) for all authorized operational bands and emissions types (see applicable regulatory specifications, e.g., Section 90.210).
- q) all accumulated spectral plots depicting EUT input signal and EUT output signal in the test report, and note any observed dissimilarities.

Test setup for RF Conducted measurement





## 6.2 Test Equipments

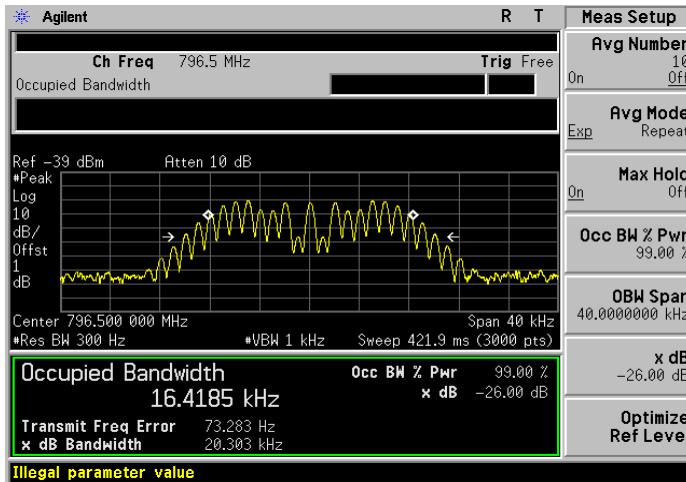
The following test equipments are used during tests

| Equipment         | Manufacturer         | Model         | Next Cal.  |
|-------------------|----------------------|---------------|------------|
| Spectrum Analyzer | Agilent              | E4440A        | 2020-12-02 |
| Signal Generator  | E4438C               | MY42081204    | 2020-12-03 |
| Signal Generator  | E4432B               | GB40050840    | 2020-12-03 |
| Attenuator        | SRT                  | F04-K1830-01  | 2020-12-03 |
| Attenuator        | Bird Electronic Corp | 100-SA-MFN-30 | 2020-12-03 |

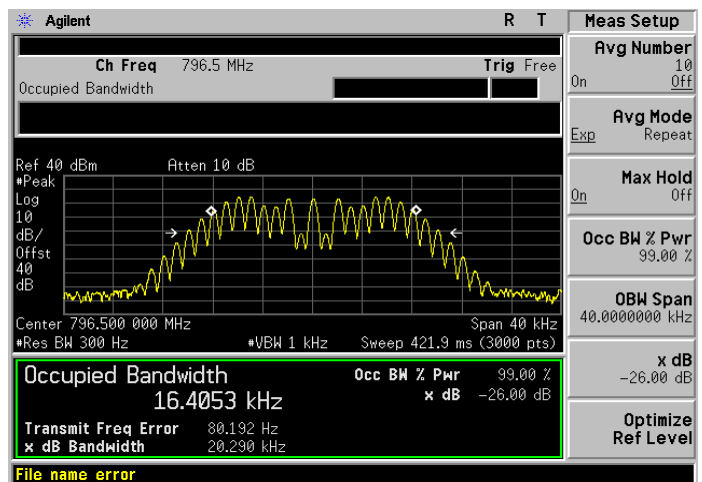


### 6.3 Test Results : Pass

796.500 MHz

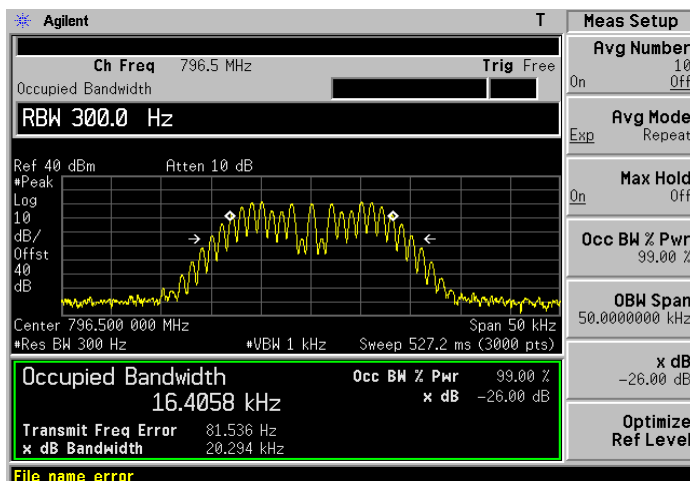


Input : FM 16K

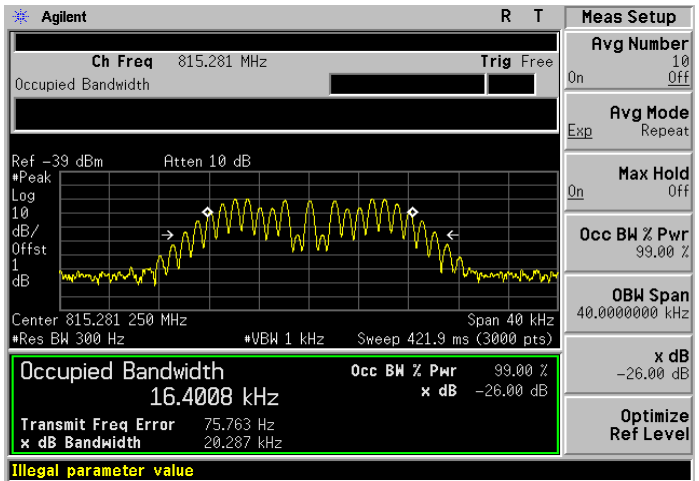


Output : FM 16K (Below AGC)

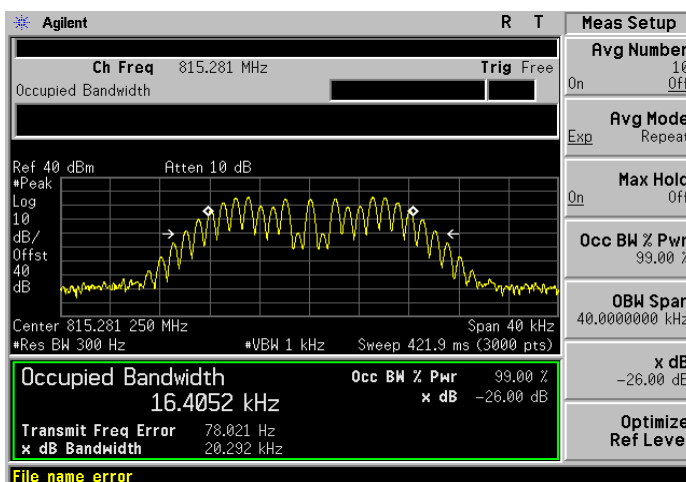
815.281 MHz



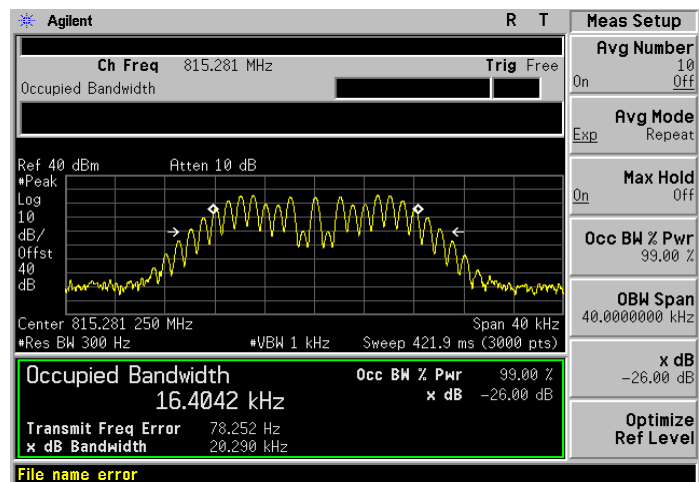
Output : FM 16K (Above AGC)



Input : FM 16K



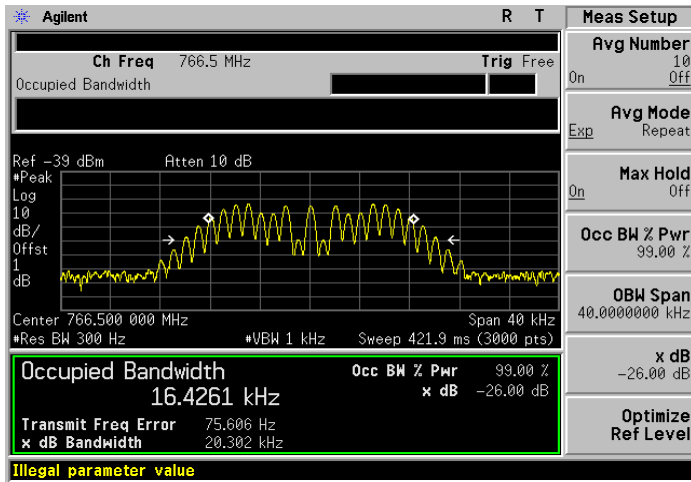
Output : FM 16K (Below AGC)



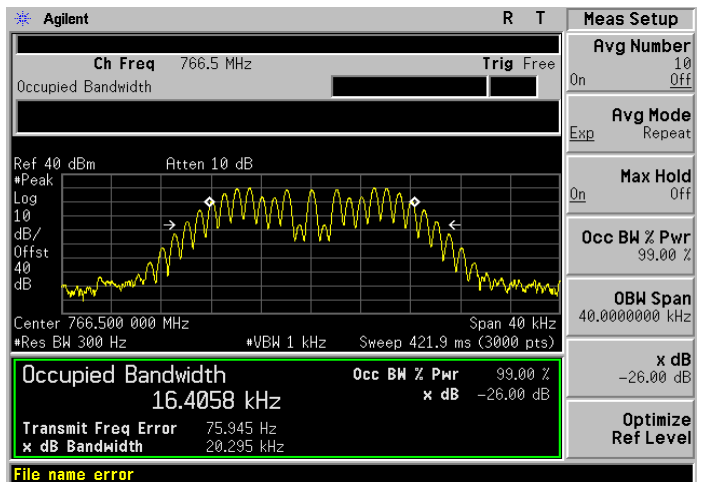
Output : FM 16K (Above AGC)



766.500 MHz

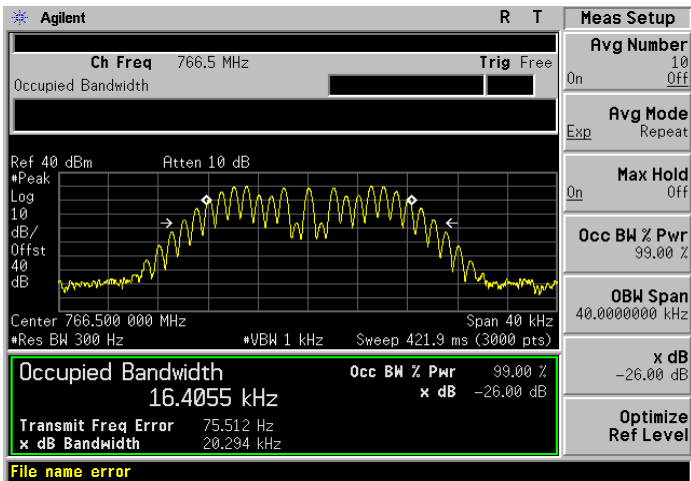


Input : FM 16K

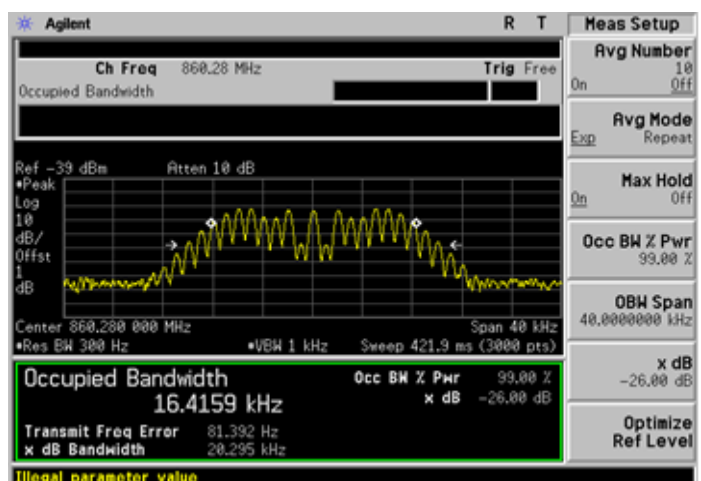


Output : FM 16K (Below AGC)

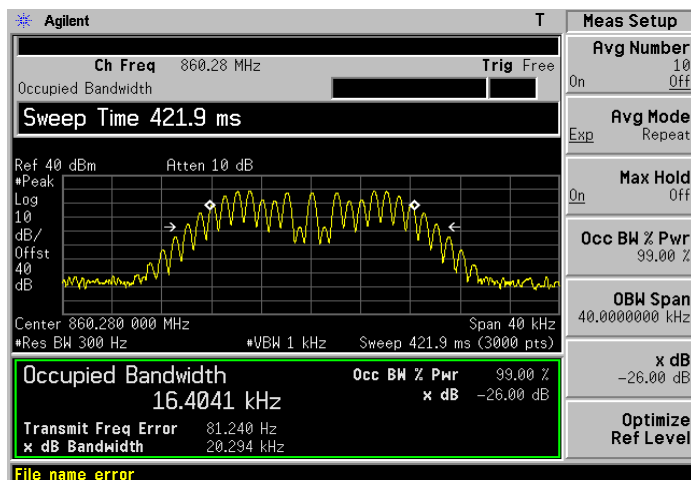
860.280 MHz



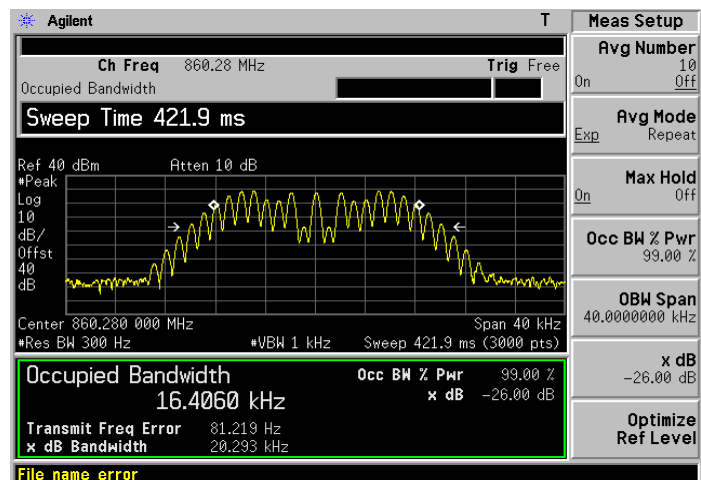
Output : FM 16K (Above AGC)



Input : FM 16K



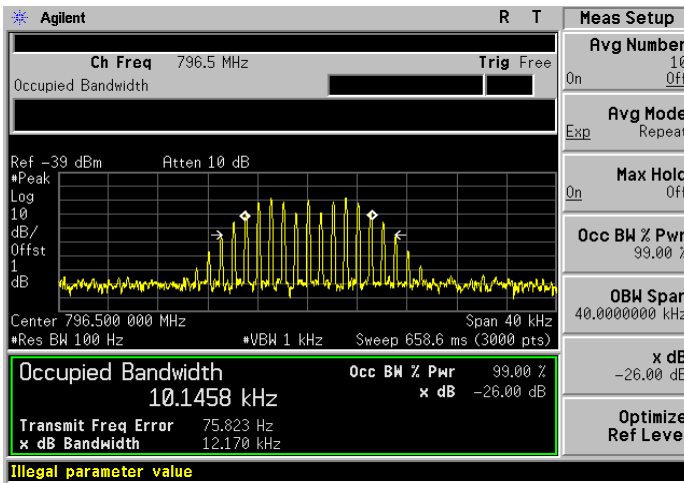
Output : FM 16K (Below AGC)



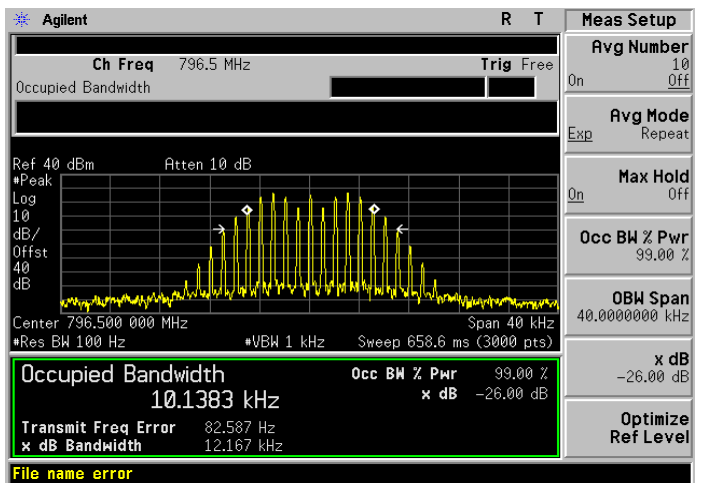
Output : FM 16K (Above AGC)



796.500 MHz

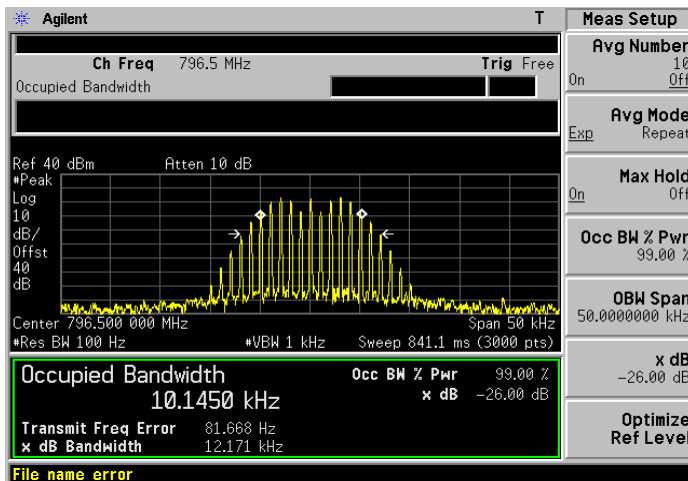


Input : FM 11K

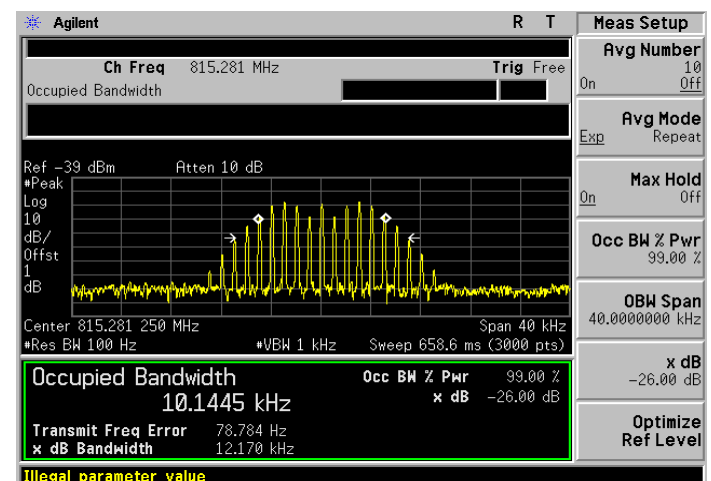


Output : FM 11K (Below AGC)

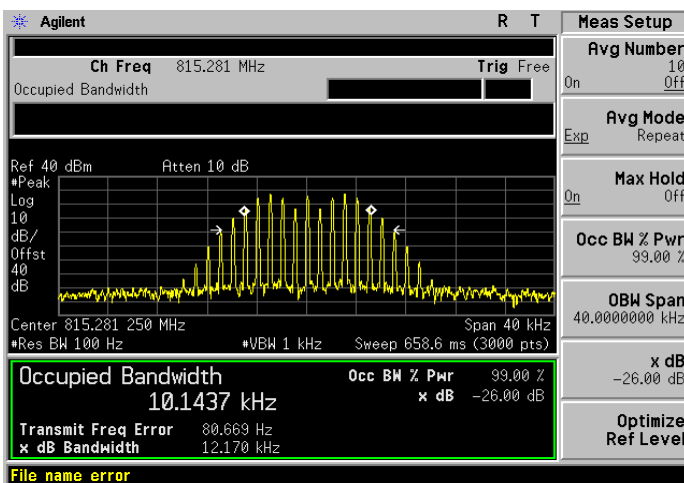
815.281 MHz



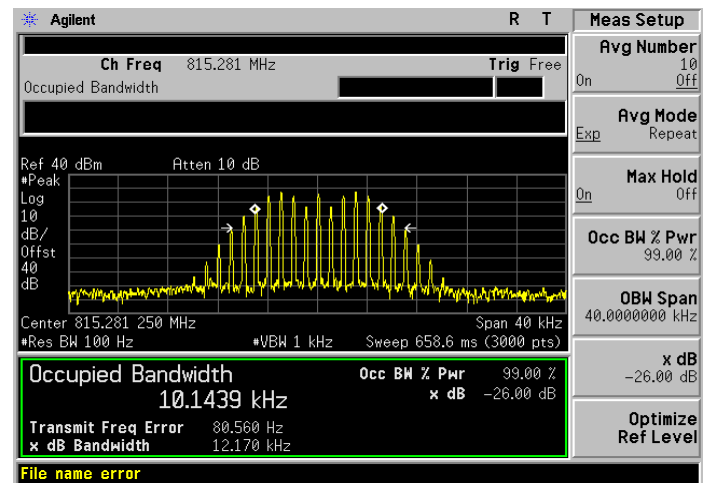
Output : FM 16K (Above AGC)



Input : FM 11K



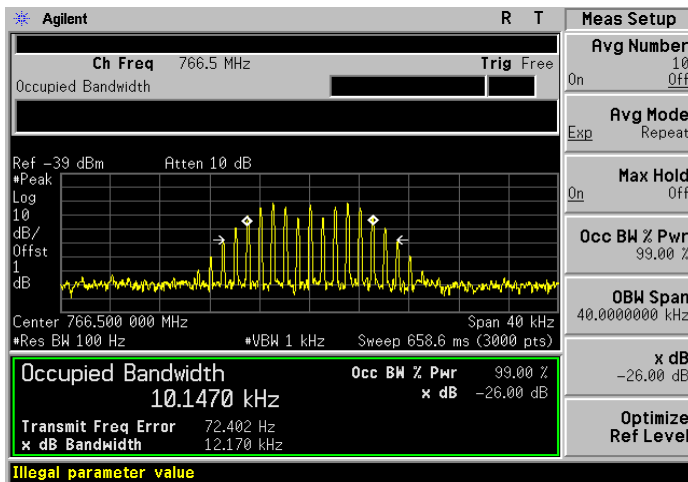
Output : FM 11K (Below AGC)



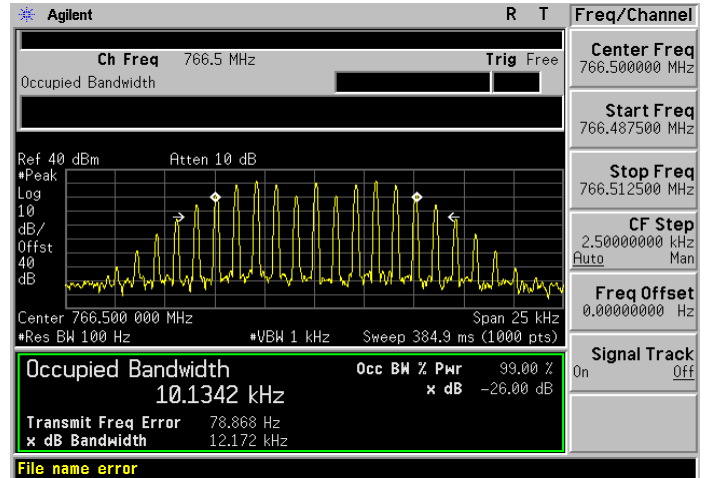
Output : FM 11K (Above AGC)



766.500 MHz

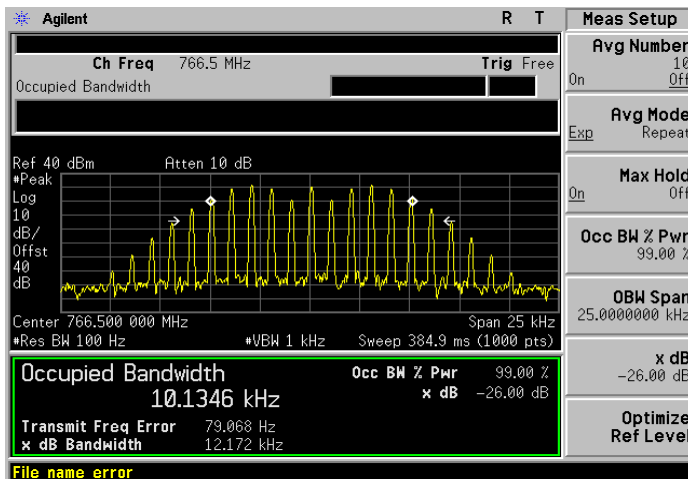


Input : FM 11K

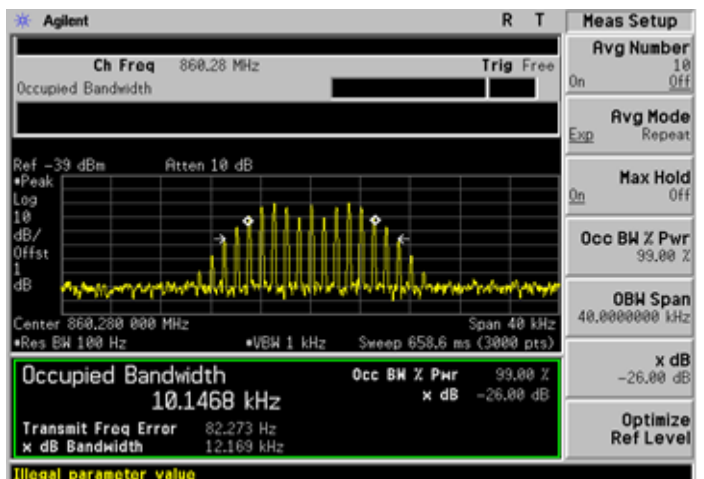


Output : FM 11K (Below AGC)

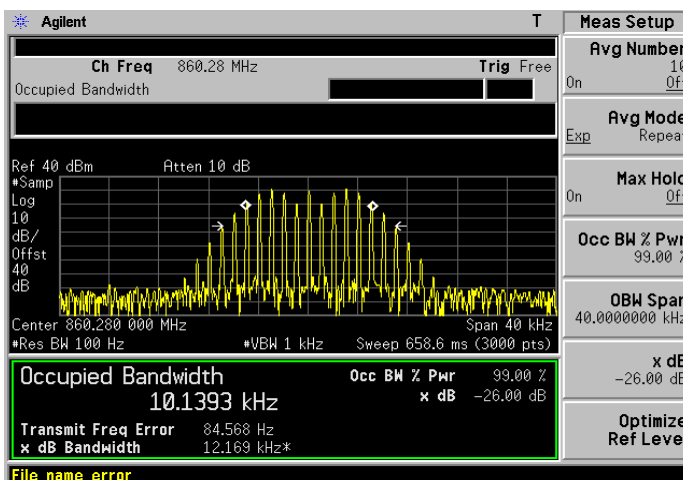
860.280 MHz



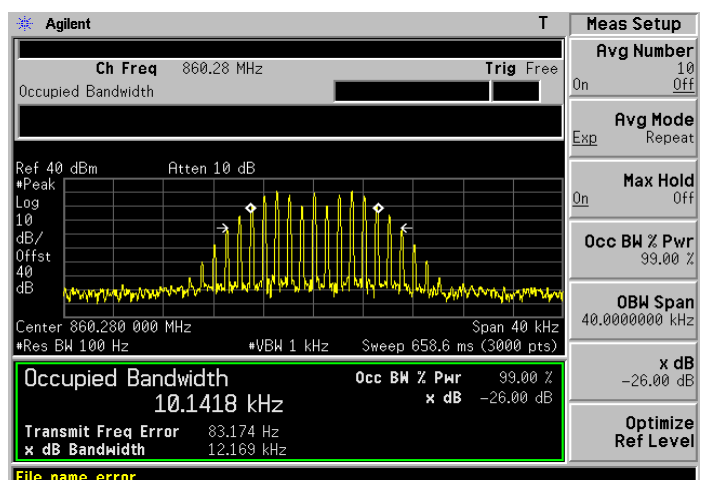
Output : FM 11K (Above AGC)



Input : FM 11K



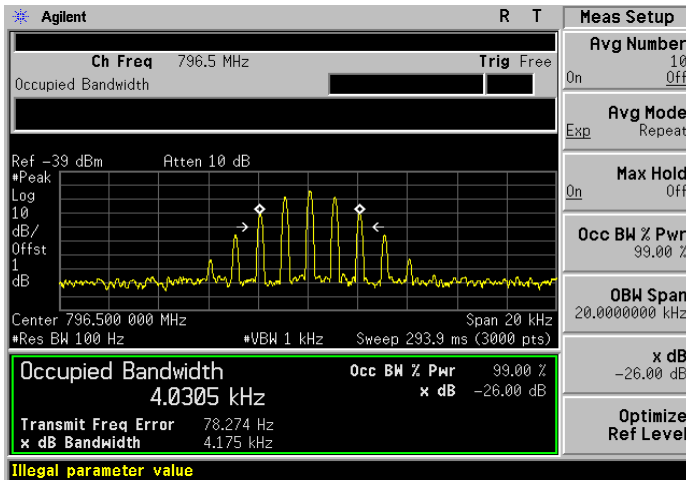
Output : FM 11K (Below AGC)



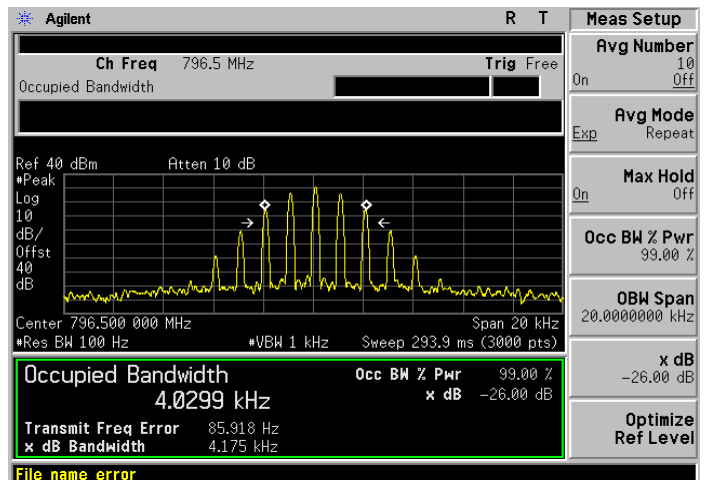
Output : FM 11K (Above AGC)



### 796.500 MHz

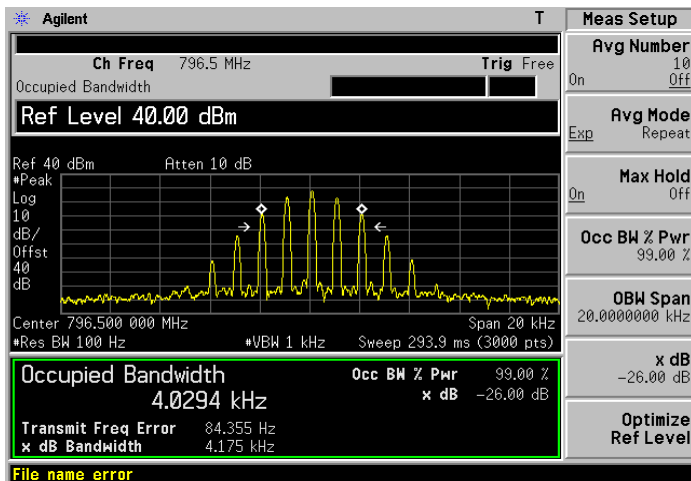


Input : FM 4K

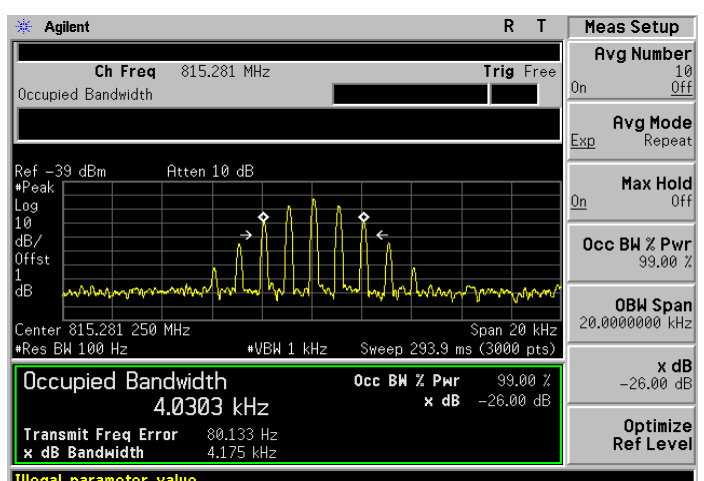


Output : FM 4K (Below AGC)

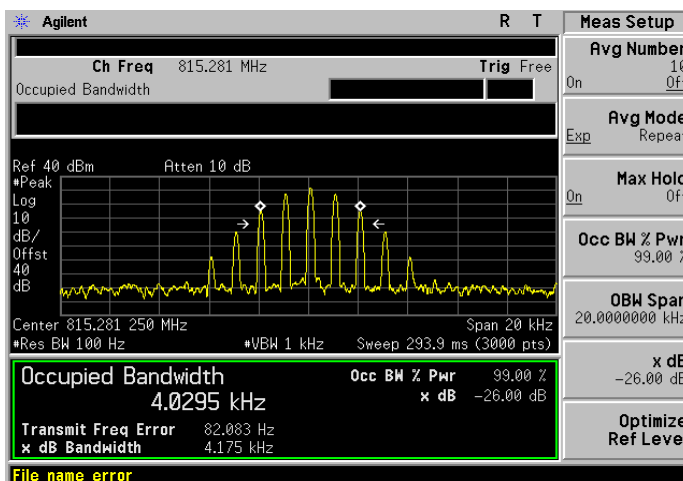
### 815.281 MHz



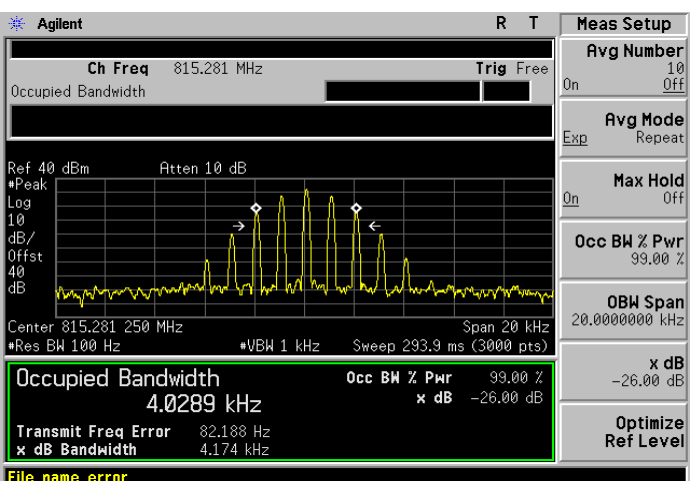
Output : FM 4K (Above AGC)



Input : FM 4K



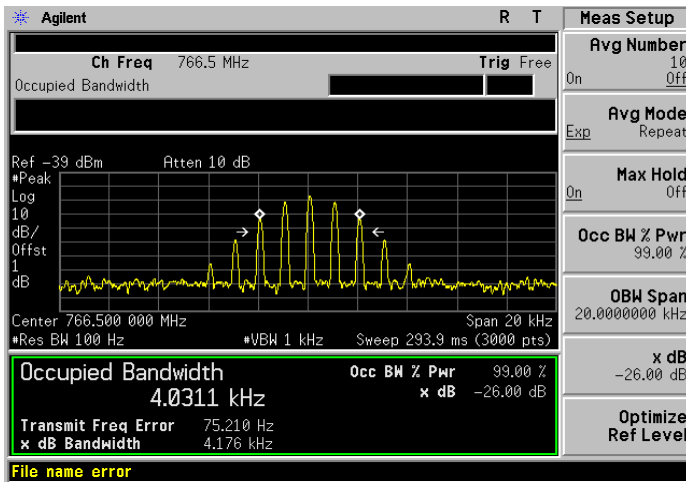
Output : FM 4K (Below AGC)



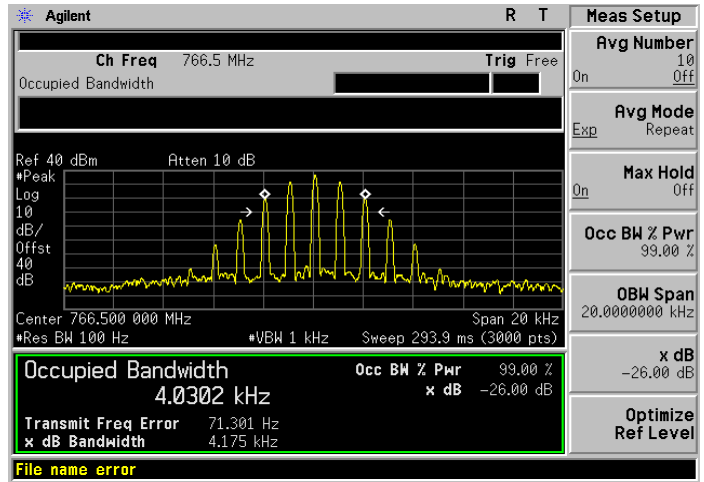
Output : FM 4K (Above AGC)



766.500 MHz

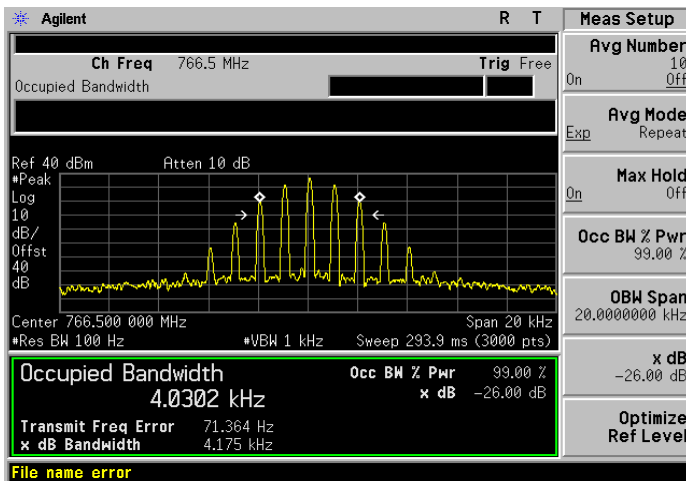


Input : FM 4K

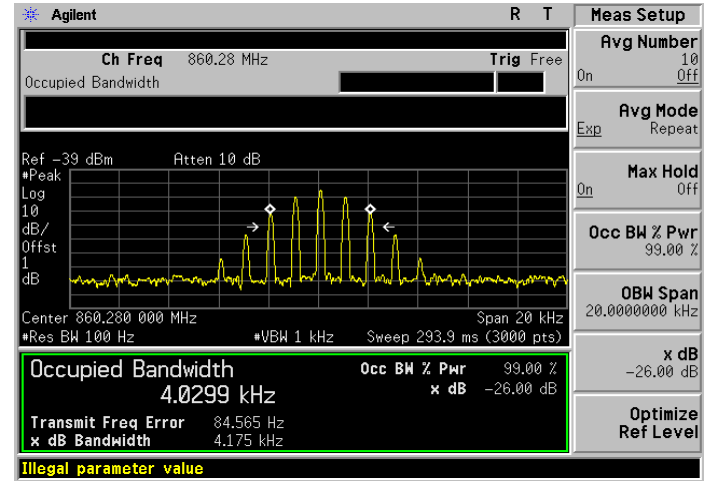


Output : FM 4K (Below AGC)

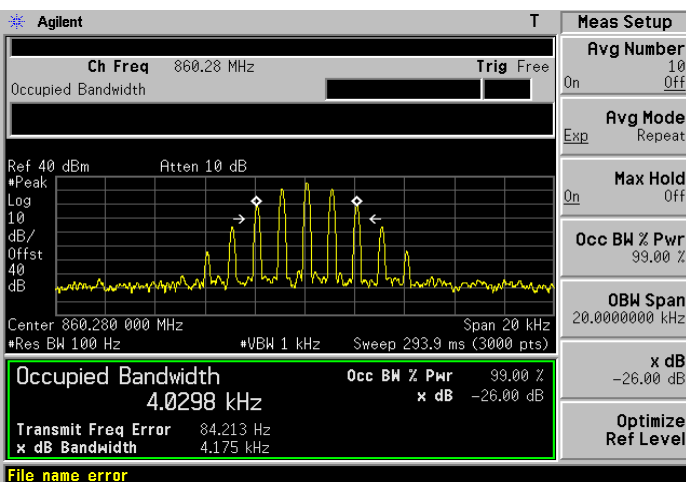
860.280 MHz



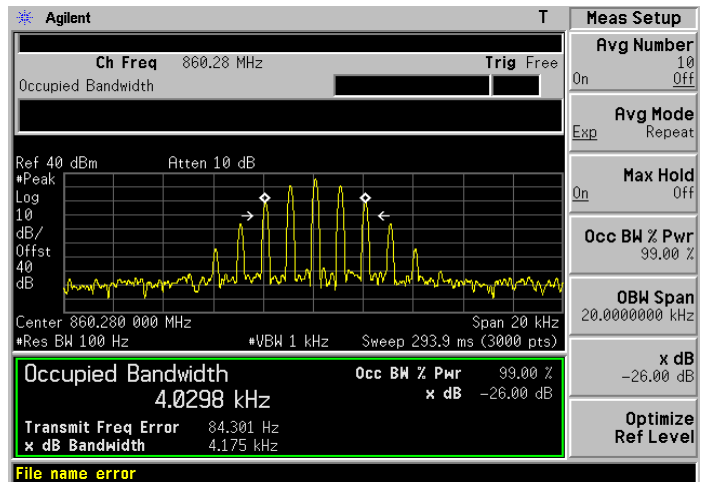
Output : FM 4K (Above AGC)



Input : FM 4K



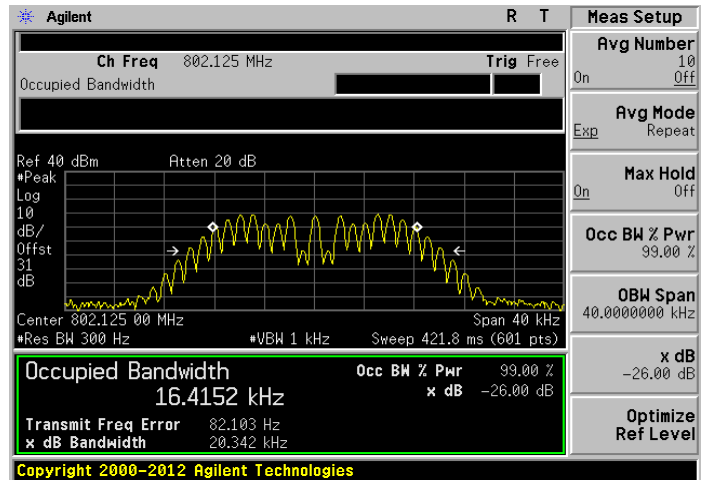
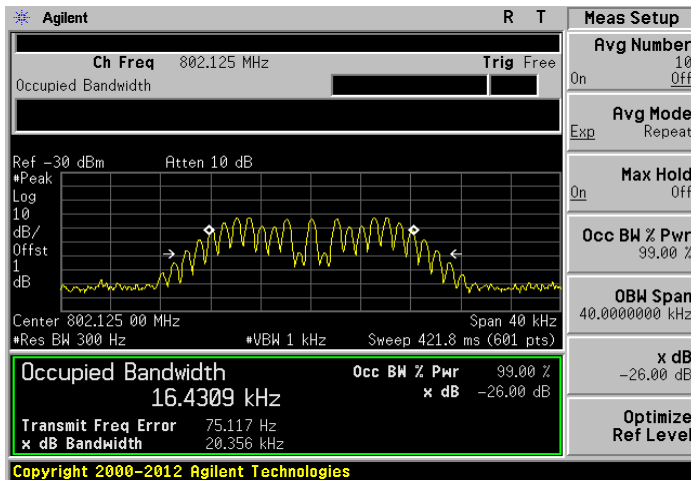
Output : FM 4K (Below AGC)



Output : FM 4K (Above AGC)



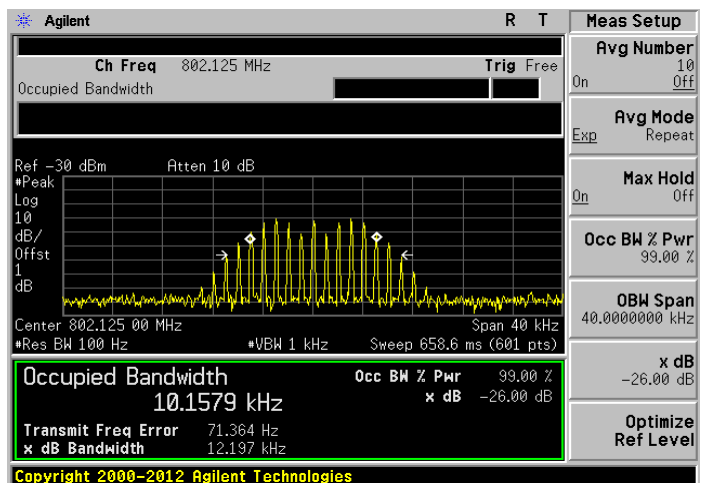
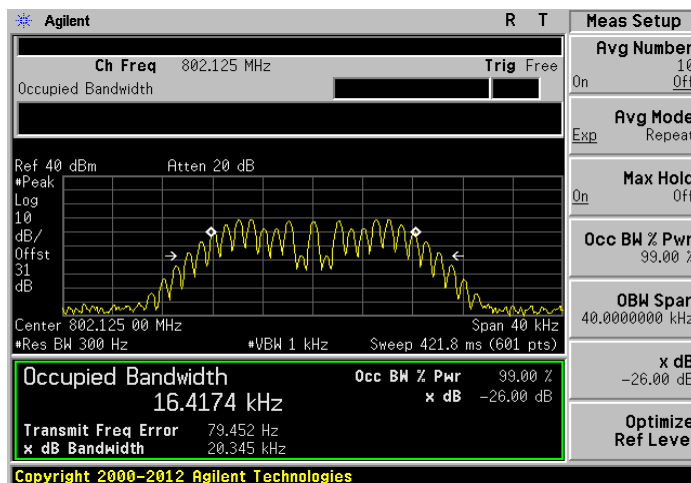
802.125 MHz



Input : FM 16K

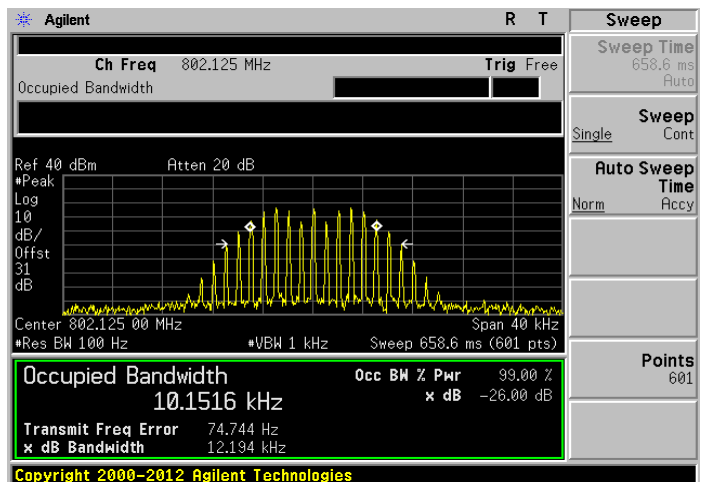
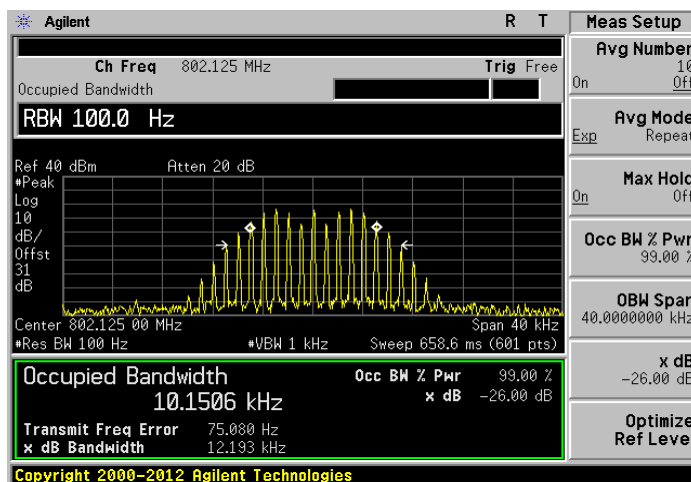
Output : FM 16K (Below AGC)

860.280 MHz



Output : FM 16K (Above AGC)

Input : FM 11K

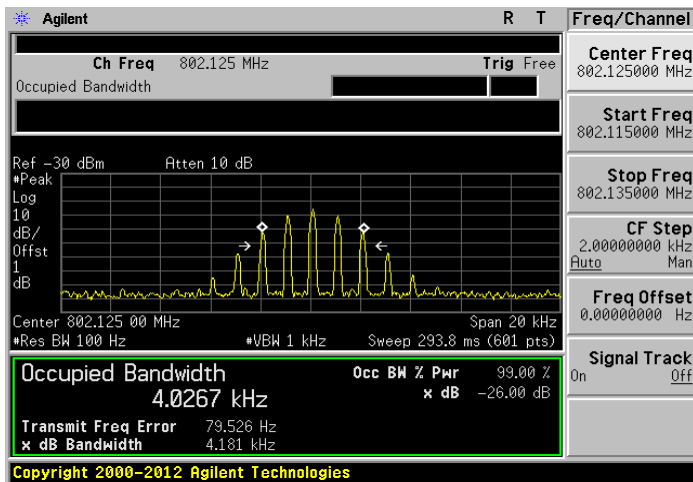


Output : FM 11K (Below AGC)

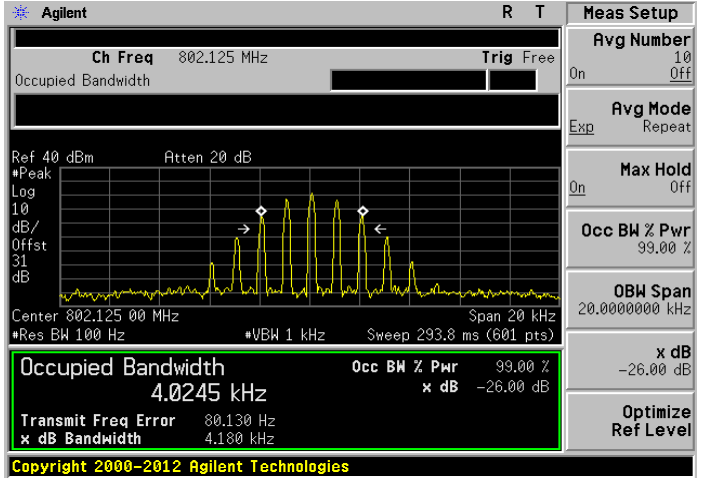
Output : FM 11K (Above AGC)



### 802.125 MHz

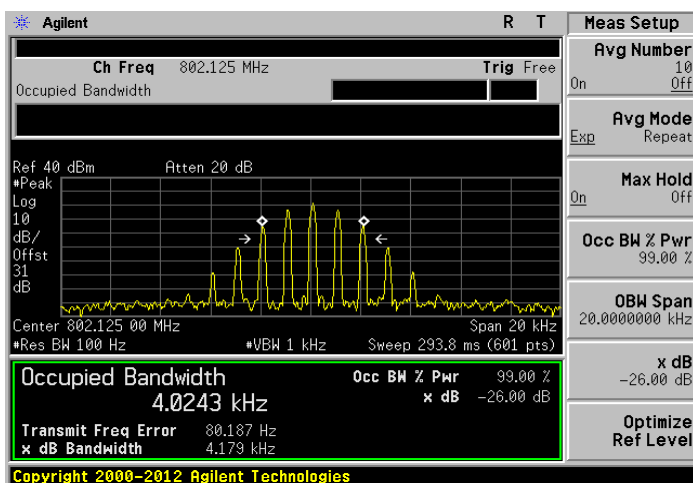


Input : FM 4K

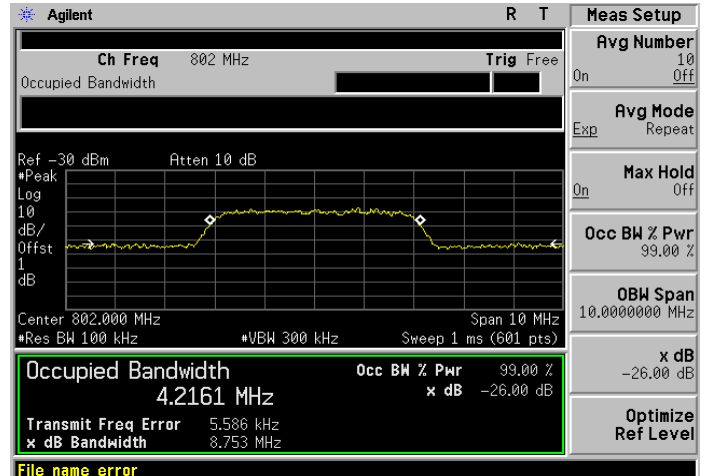


Output : FM 4K (Below AGC)

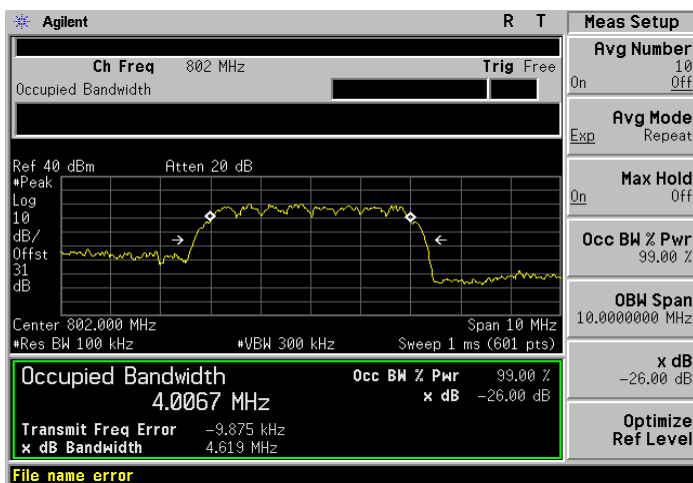
### 802.000 MHz



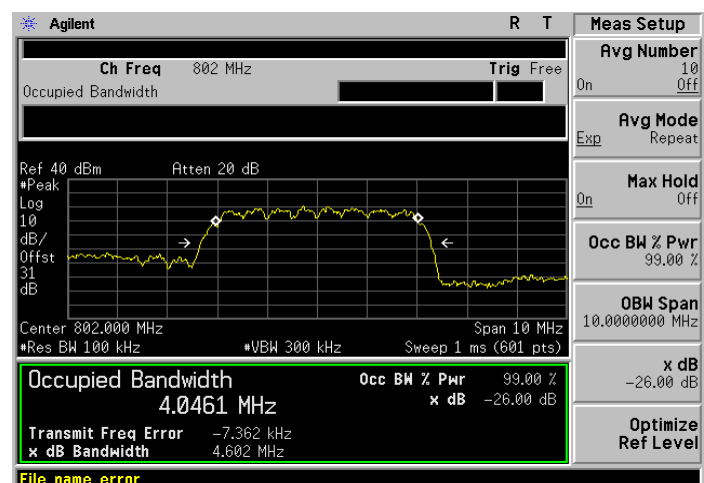
Output : FM 4K (Above AGC)



Input : AWGN



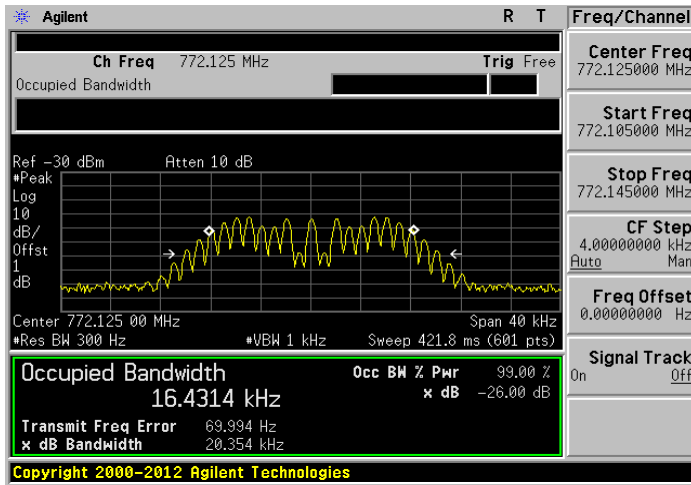
Output : AWGN (Below AGC)



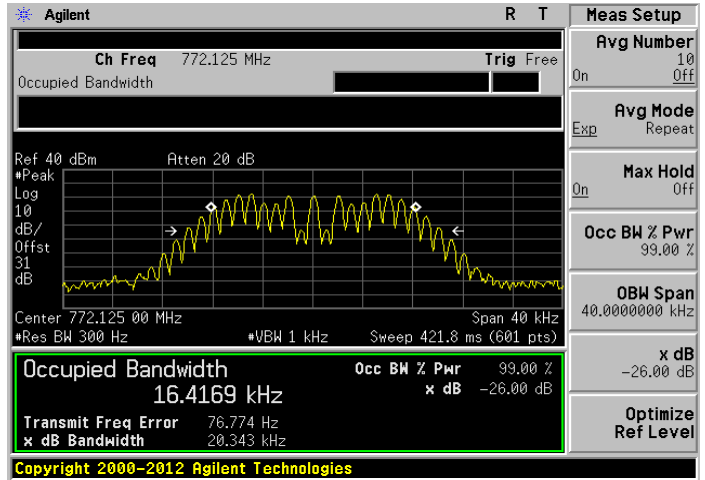
Output : AWGN (Above AGC)



772.125 MHz

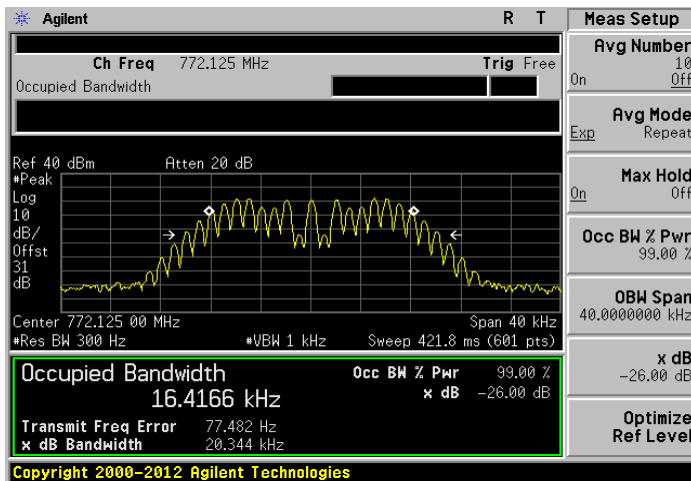


Input : FM 16K

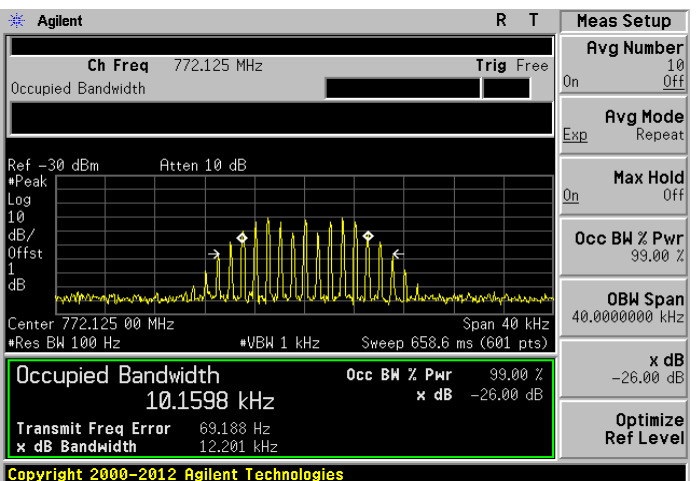


Output : FM 16K (Below AGC)

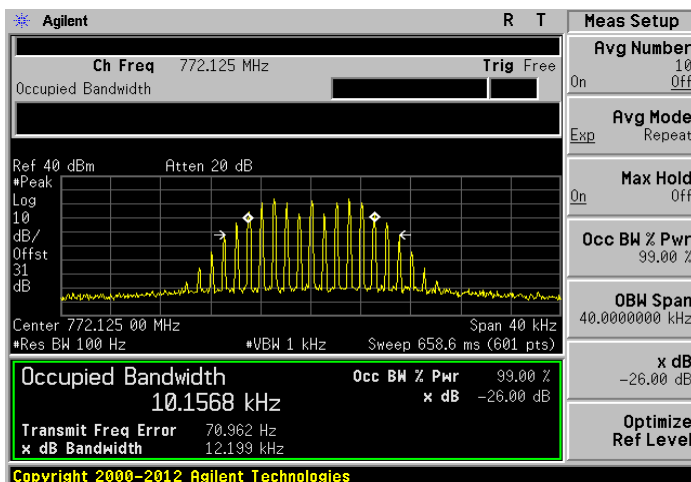
772.125 MHz



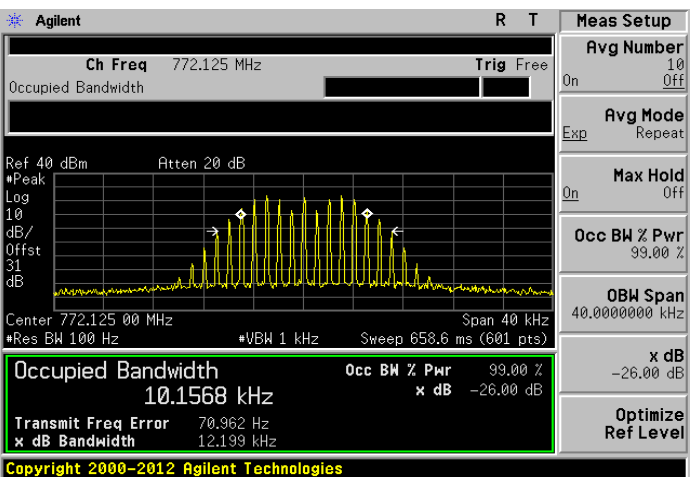
Output : FM 16K (Above AGC)



Input : FM 11K



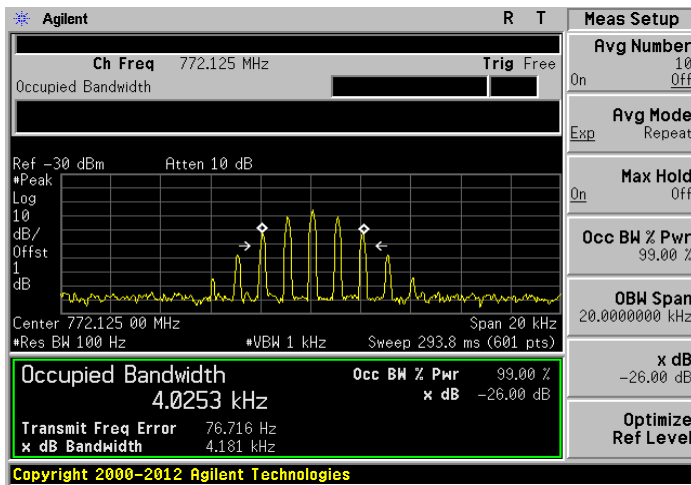
Output : Input : FM 11K (Below AGC)



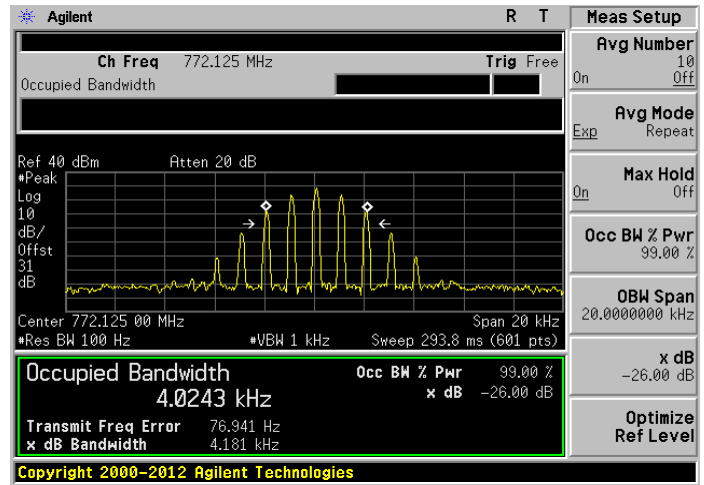
Output : FM 11K (Above AGC)



772.125 MHz

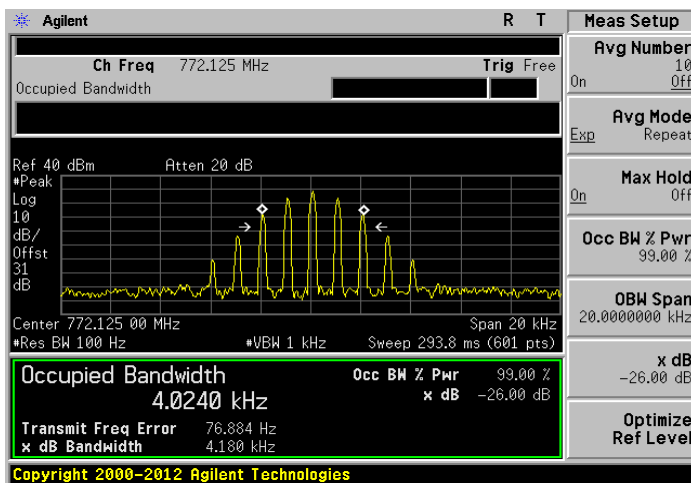


Input : FM 4K

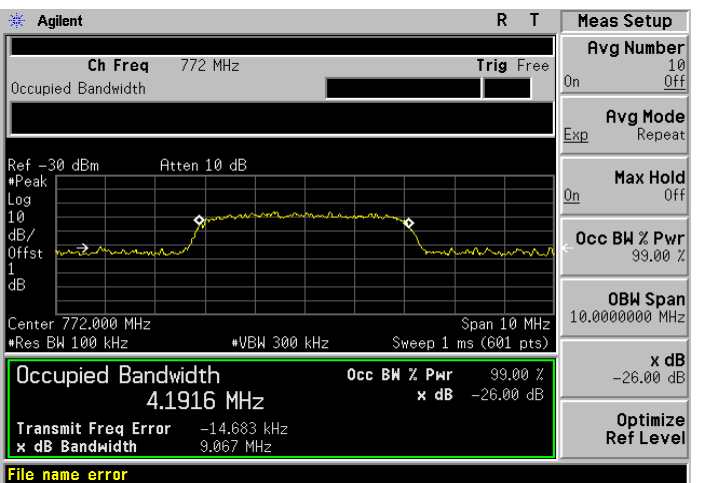


Output : FM 4k (Below AGC)

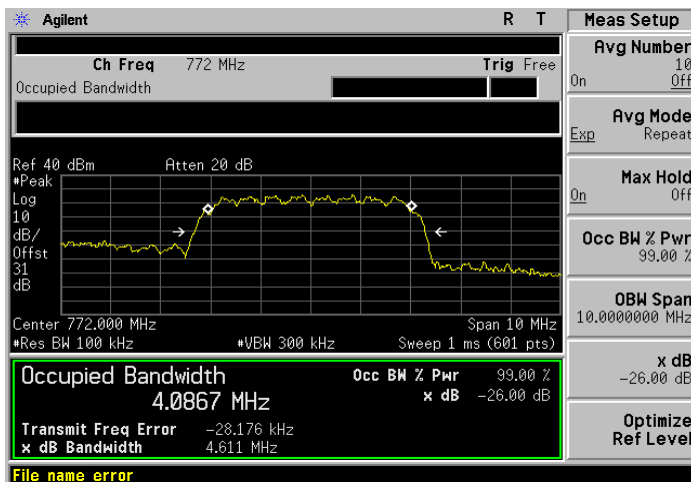
772.000 MHz



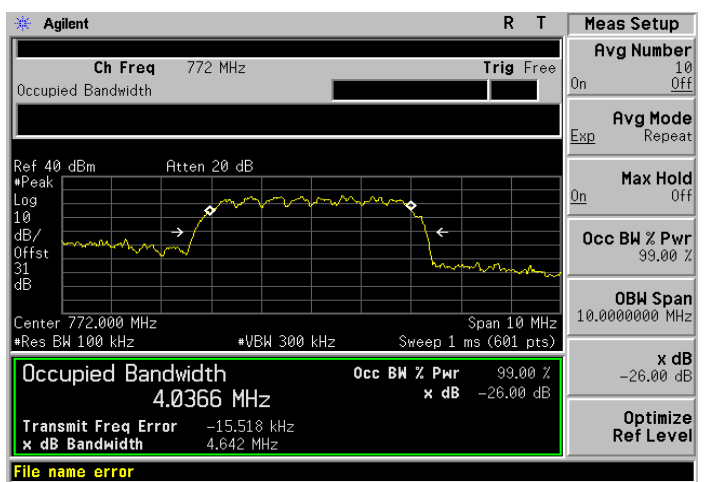
Output : FM 4k (Above AGC)



Input : AWGN



Output : AWGN (Below AGC)



Output : AWGN (Above AGC)



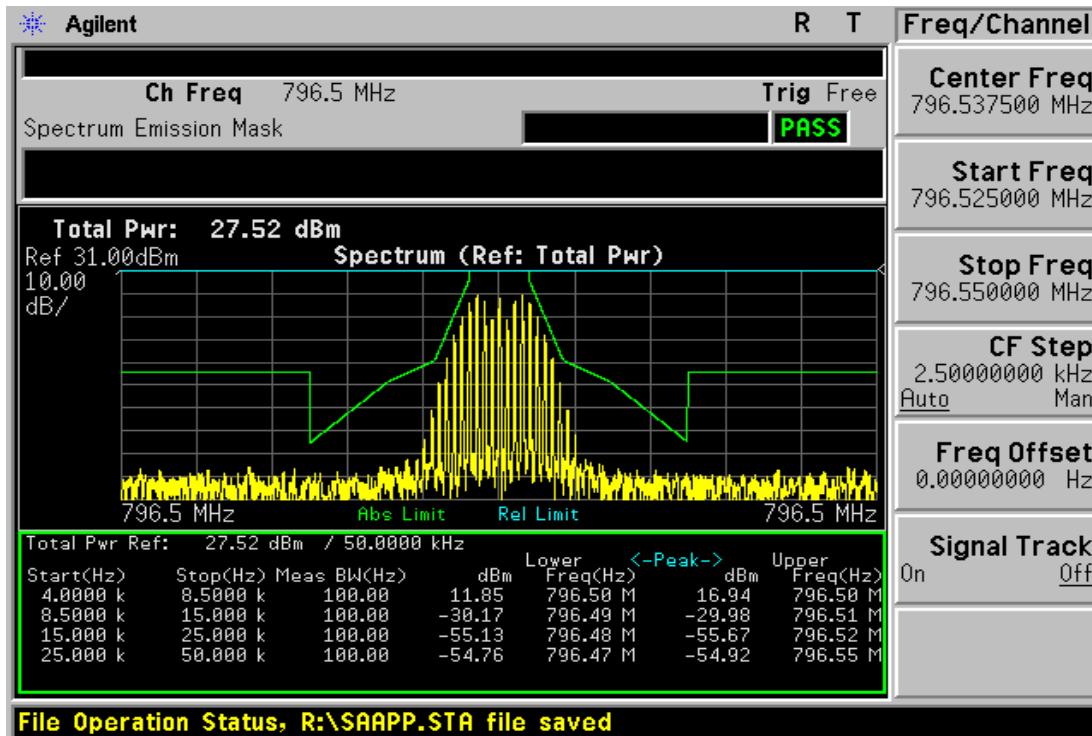
#### 6.4 Emissions Masks per 90.210

| Mode | Freq (MHz) | Type   | Mask | AGC   |
|------|------------|--------|------|-------|
| Up   | 796.5      | FM 11k | H    | Below |
| Up   | 796.5      | FM 11k | H    | Above |
| Up   | 796.5      | FM 16k | G    | Below |
| Up   | 796.5      | FM 16k | G    | Above |
| Up   | 815.3      | FM 11k | H    | Below |
| Up   | 815.3      | FM 11k | H    | Above |
| Up   | 815.3      | FM 16k | G    | Below |
| Up   | 815.3      | FM 16k | G    | Above |
| Down | 766.5      | FM 11k | H    | Below |
| Down | 766.5      | FM 11k | H    | Above |
| Down | 766.5      | FM 16k | G    | Below |
| Down | 766.5      | FM 16k | G    | Above |
| Down | 860.3      | FM 11k | H    | Below |
| Down | 860.3      | FM 11k | H    | Above |
| Down | 860.3      | FM 16k | G    | Below |
| Down | 860.3      | FM 16k | G    | Above |

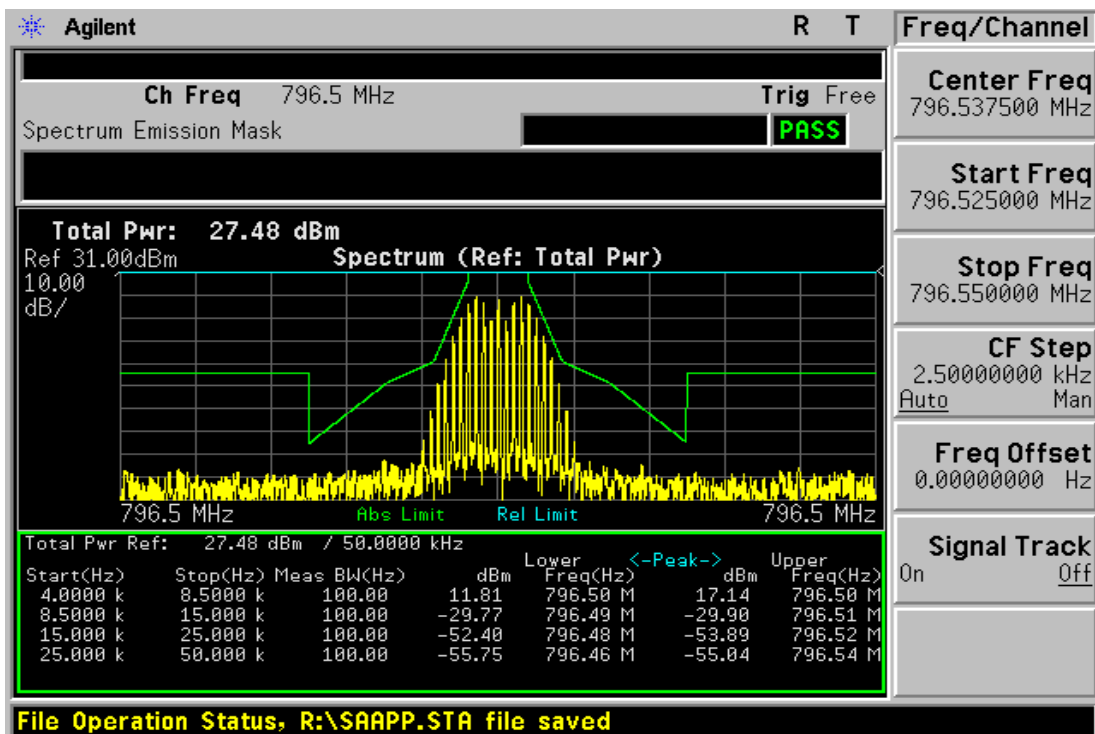


6.5 Test Results : Pass

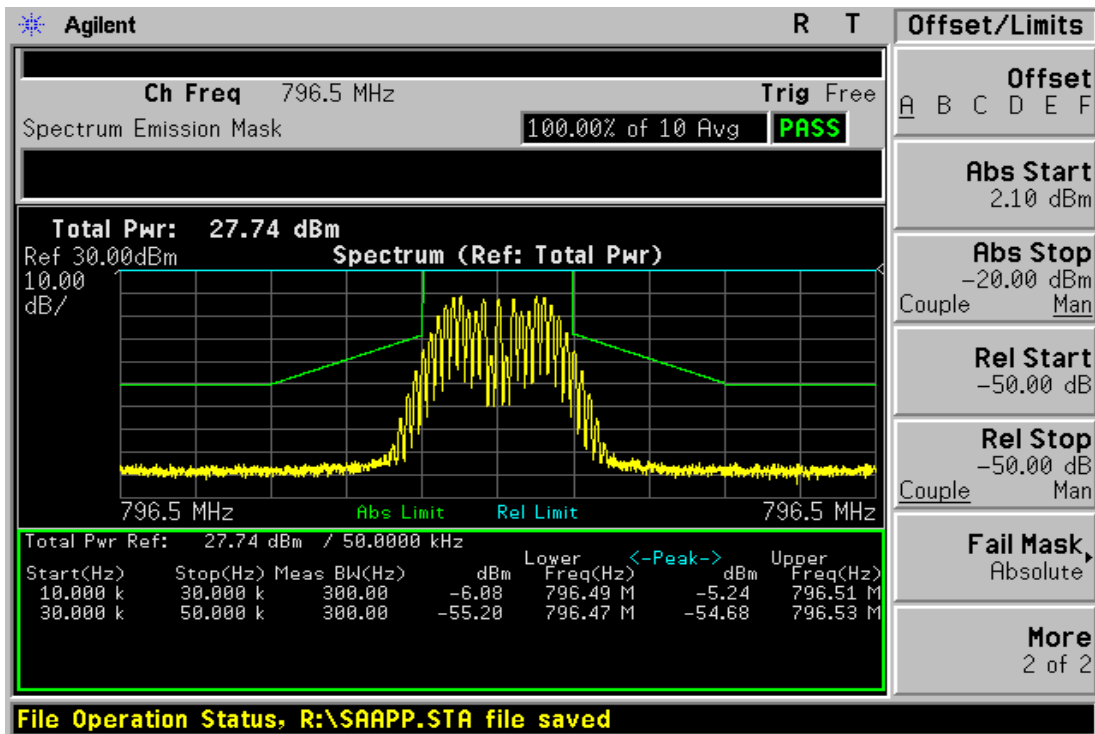
788 MHz ~ 805 MHz



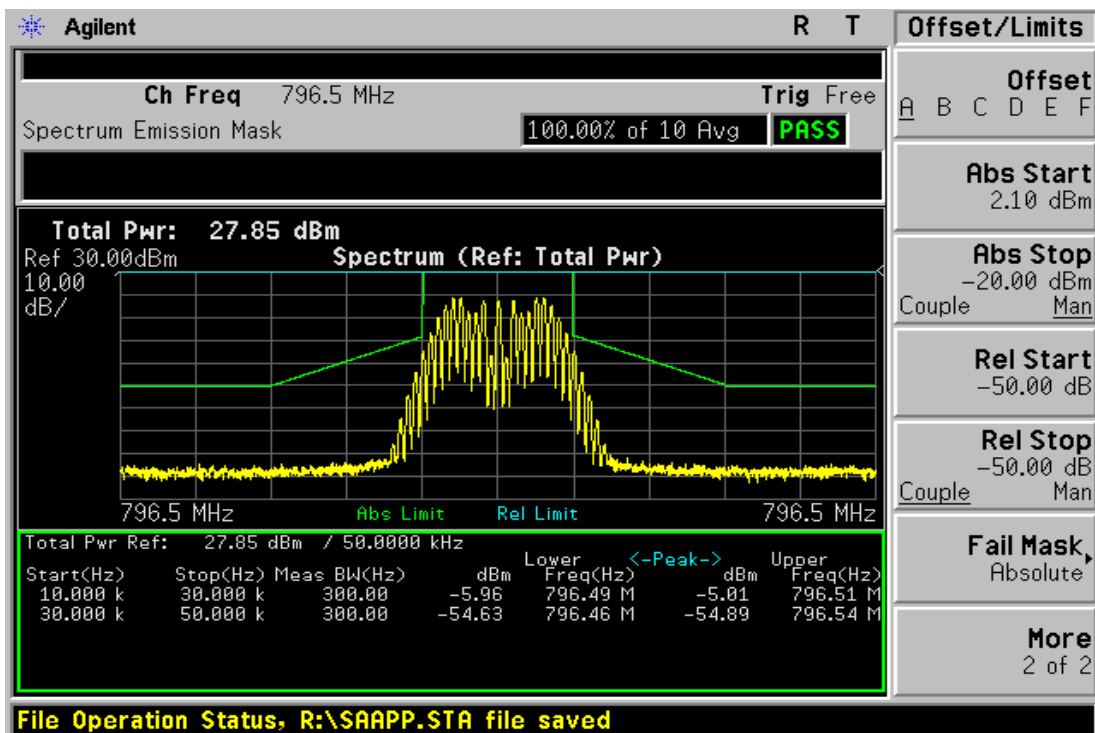
Bellow AGC : 11K



Above AGC : 11K



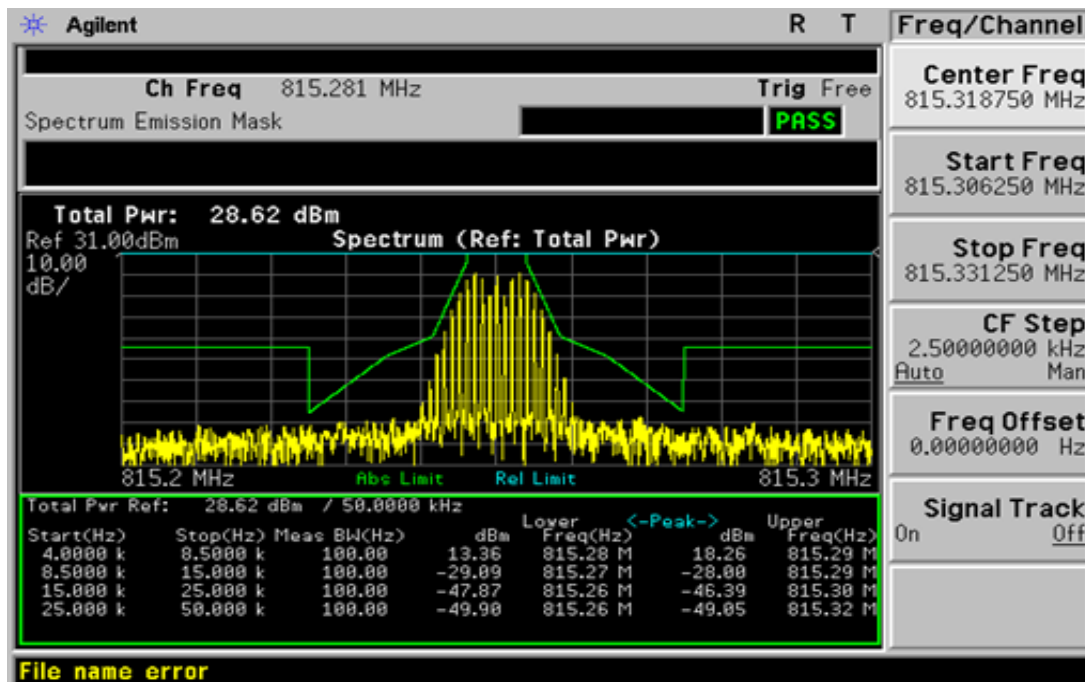
Bellow AGC : 16K



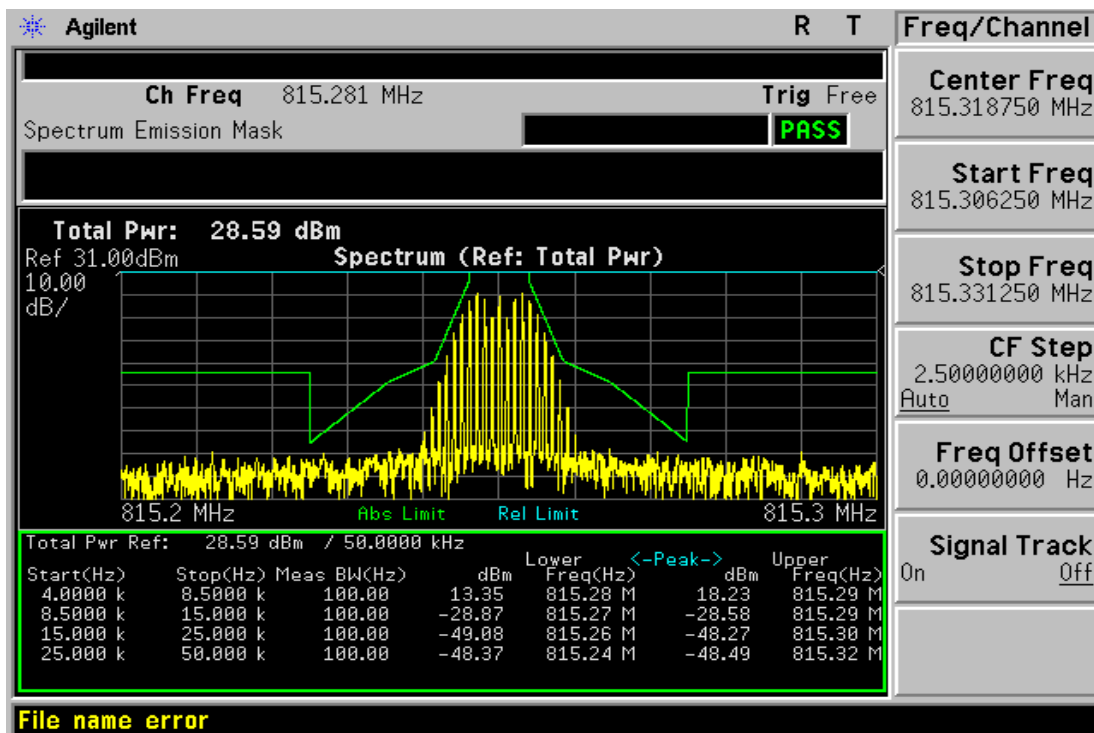
Above AGC : 16K



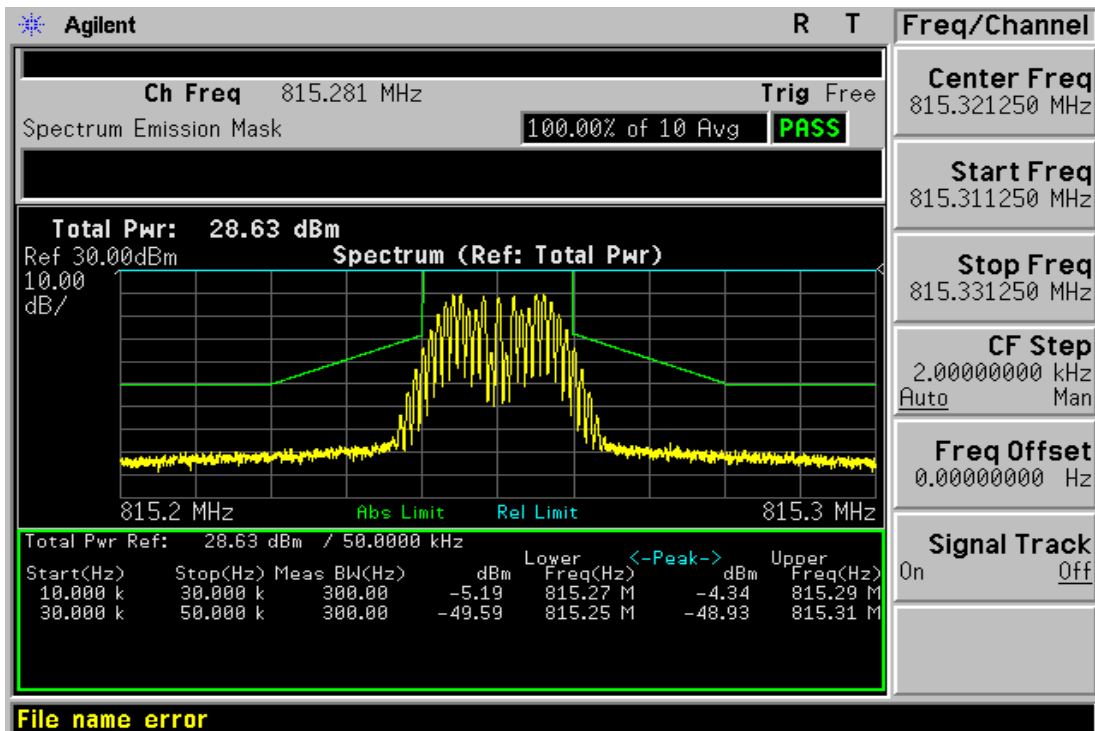
806 MHz ~ 817 MHz



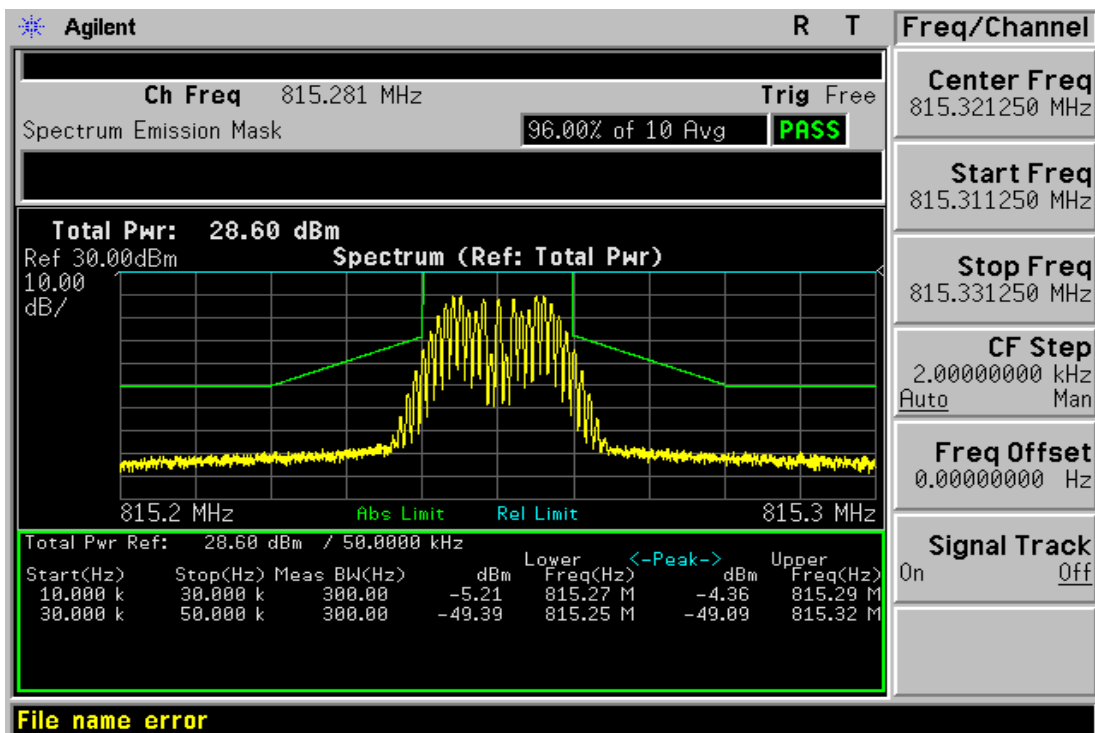
Bellow AGC : 11K



Above AGC : 11K



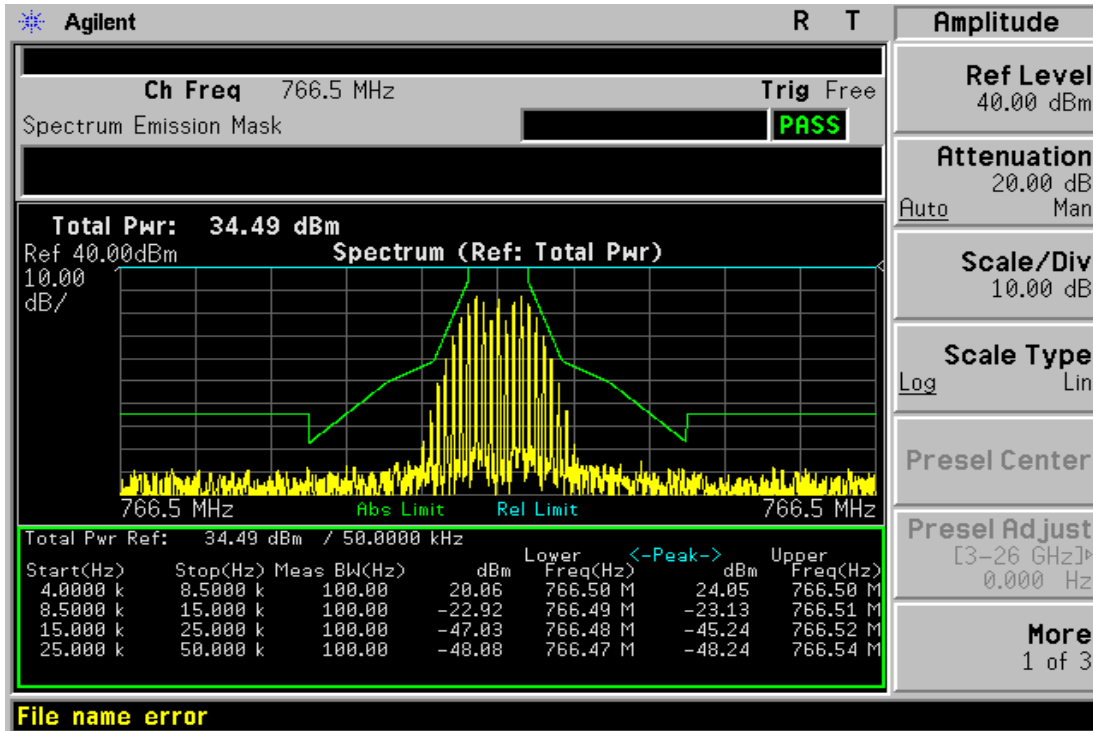
Bellow AGC : 16K



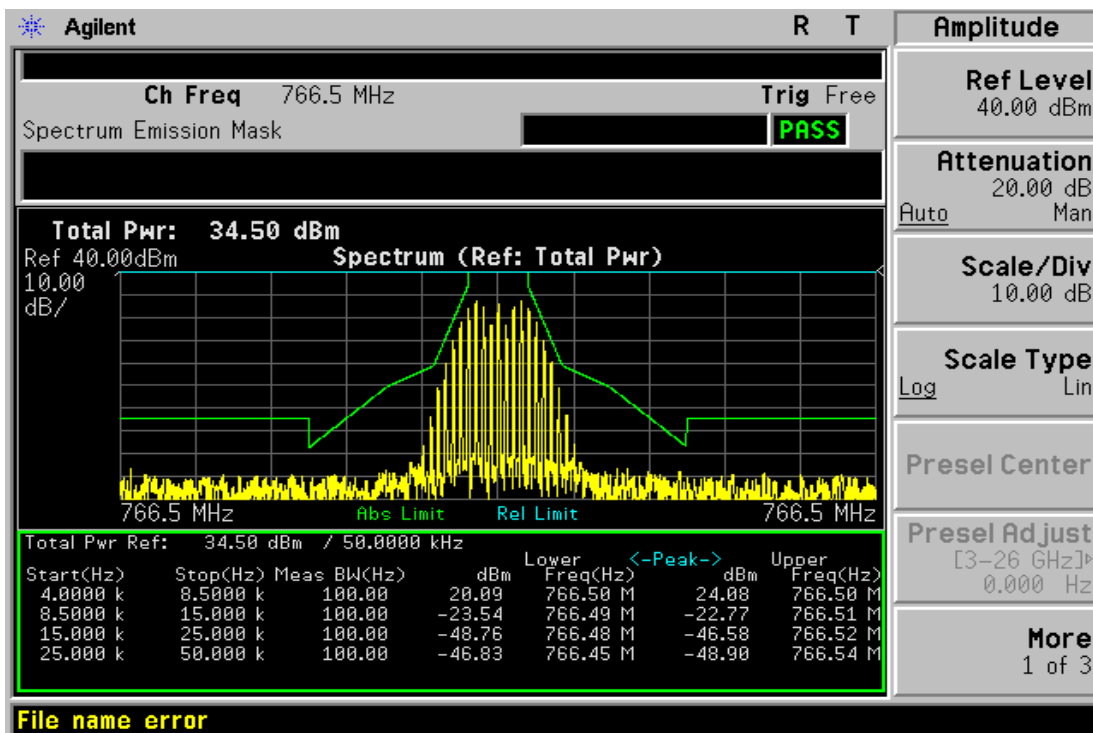
Above AGC : 16K



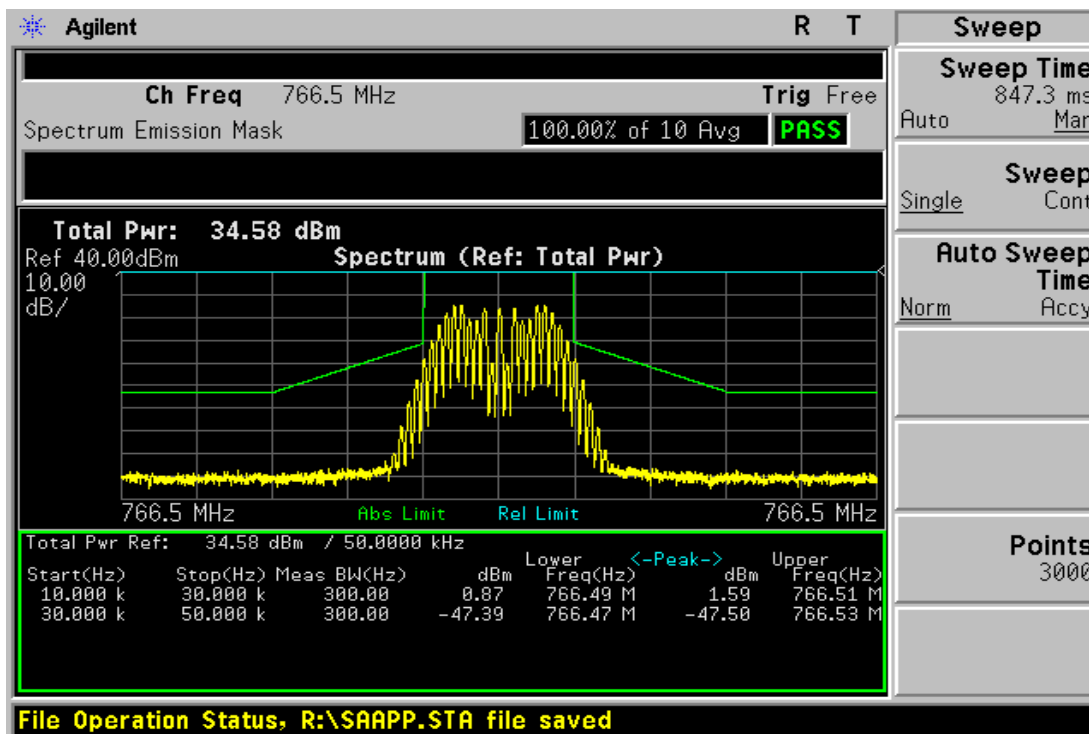
758 MHz ~ 775 MHz



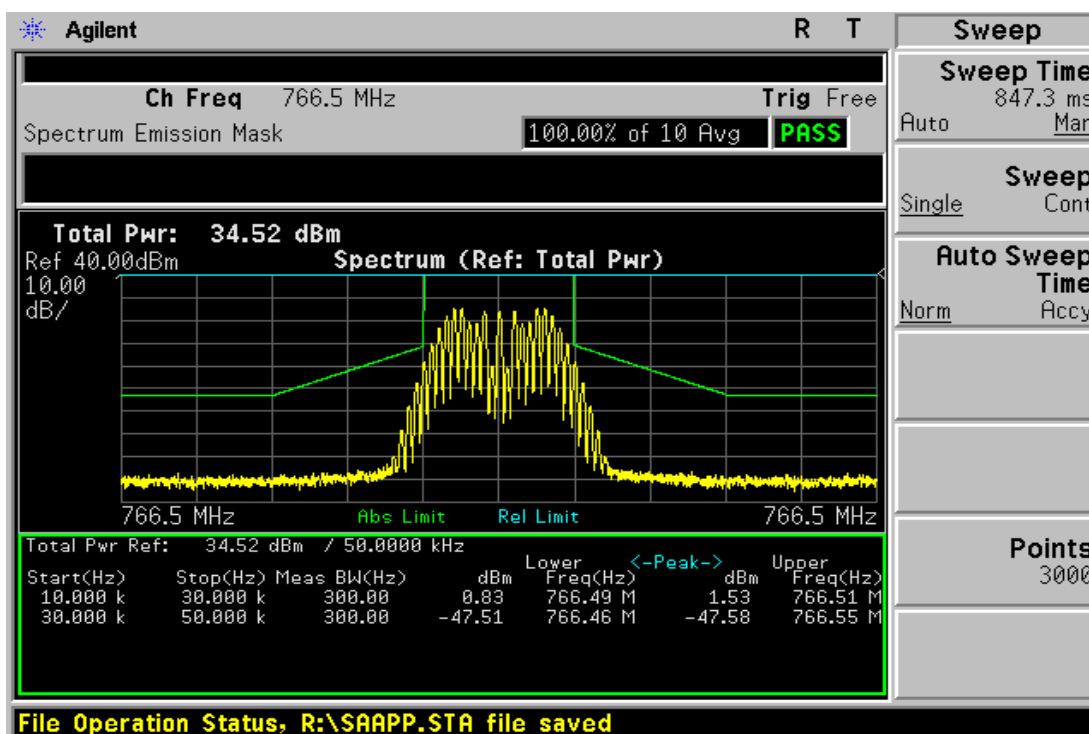
Bellow AGC : 11K



Above AGC : 11K



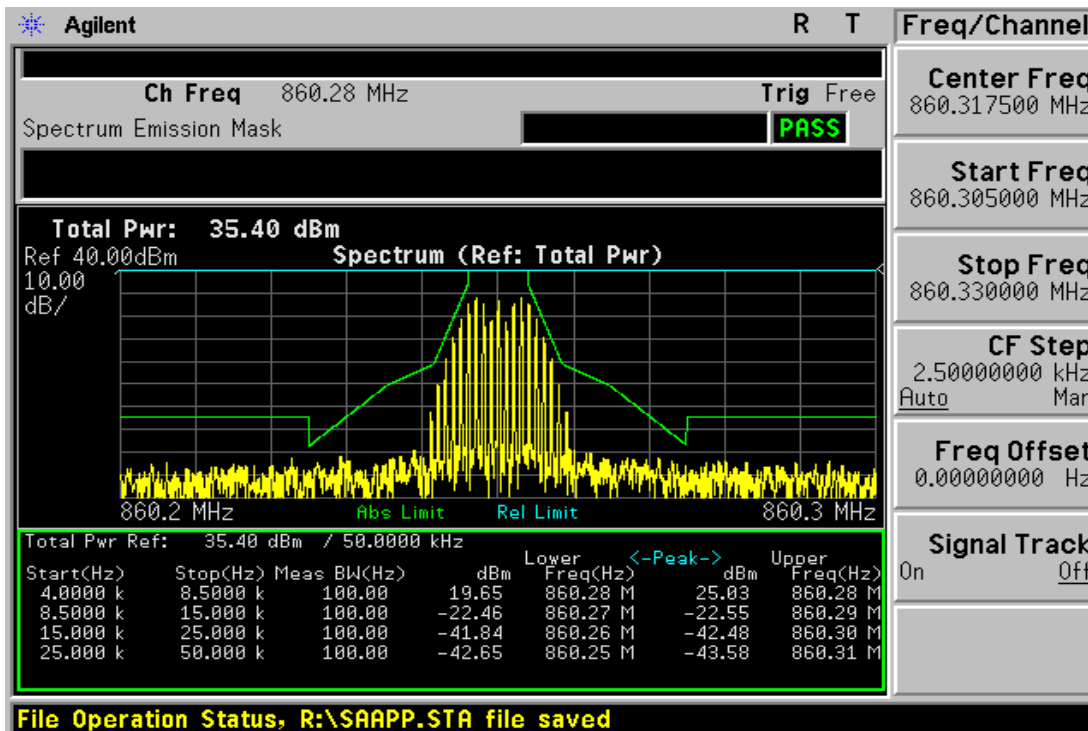
Bellow AGC : 16K



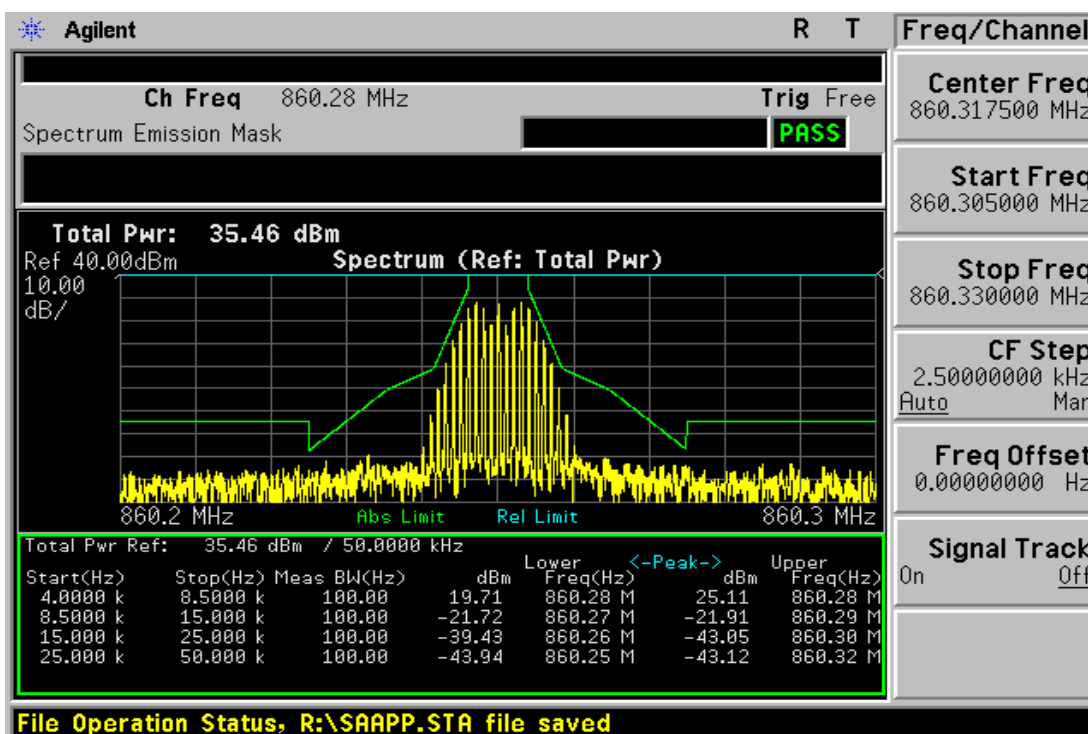
Above AGC : 16K



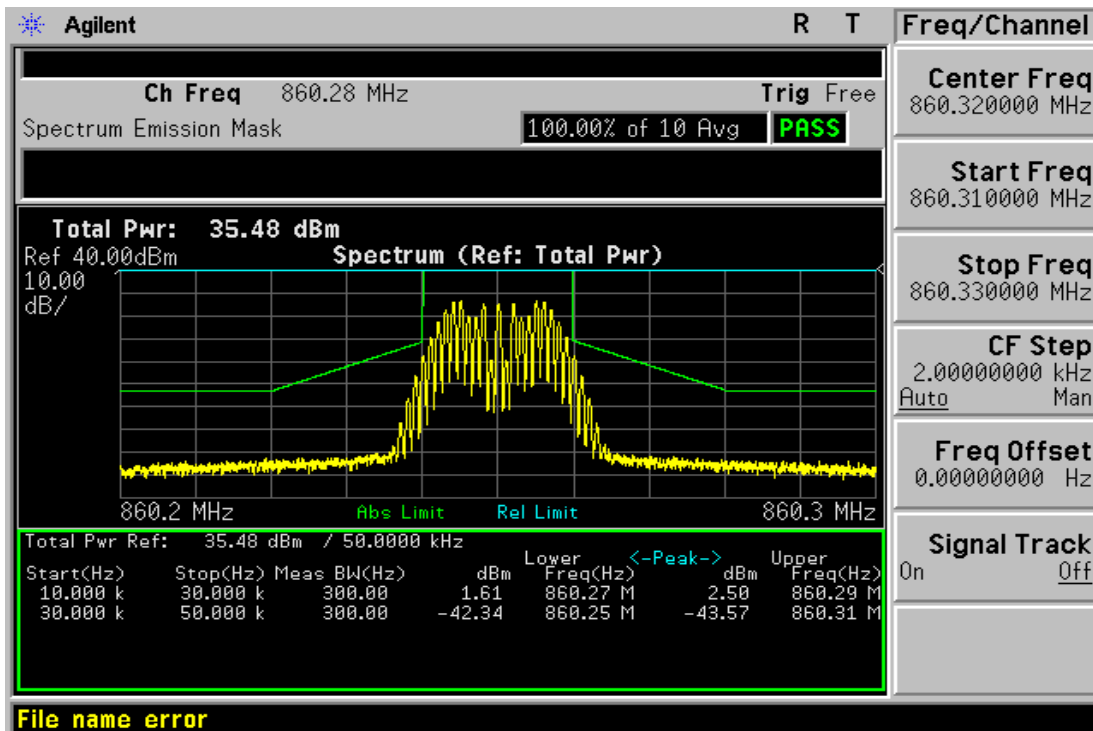
851 MHz ~ 862 MHz



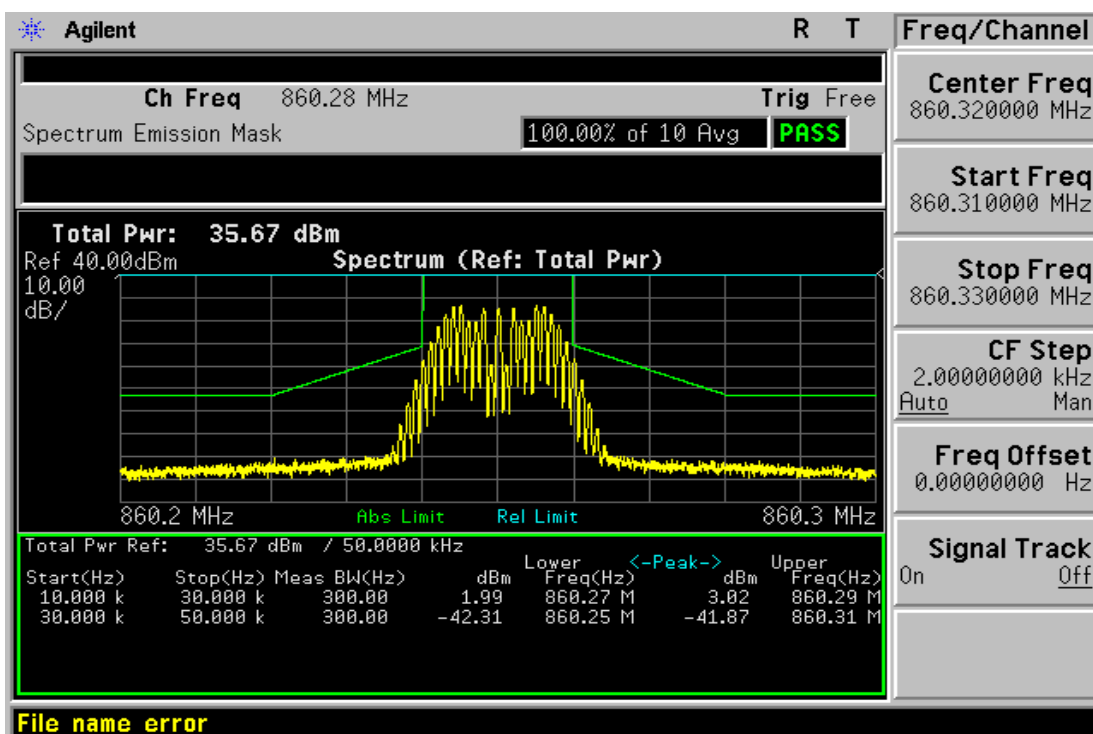
Bellow AGC : 11K



Above AGC : 11K



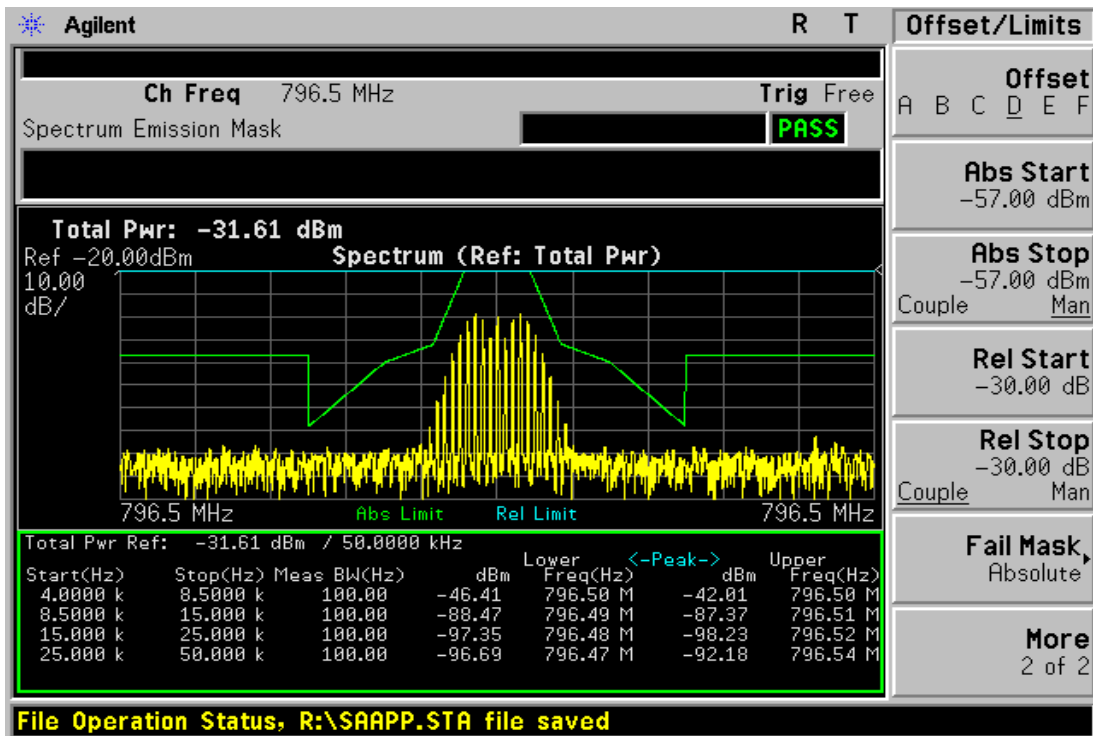
Bellow AGC : 16K



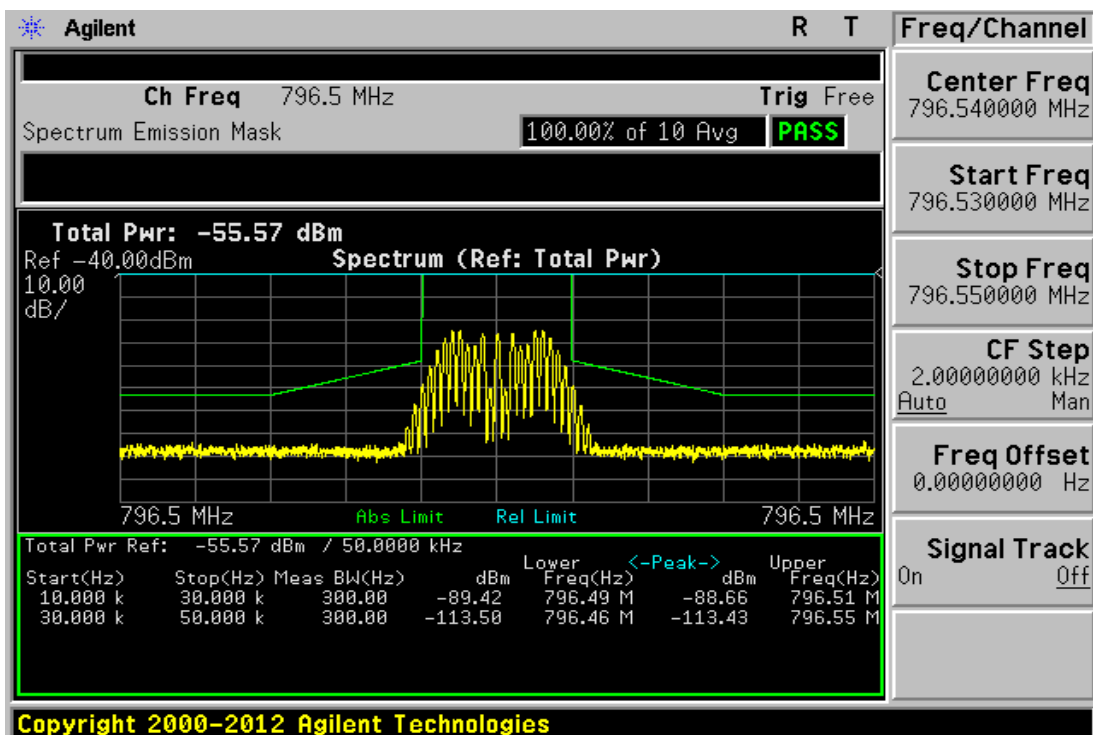
Above AGC : 16K



788 MHz ~ 805 MHz



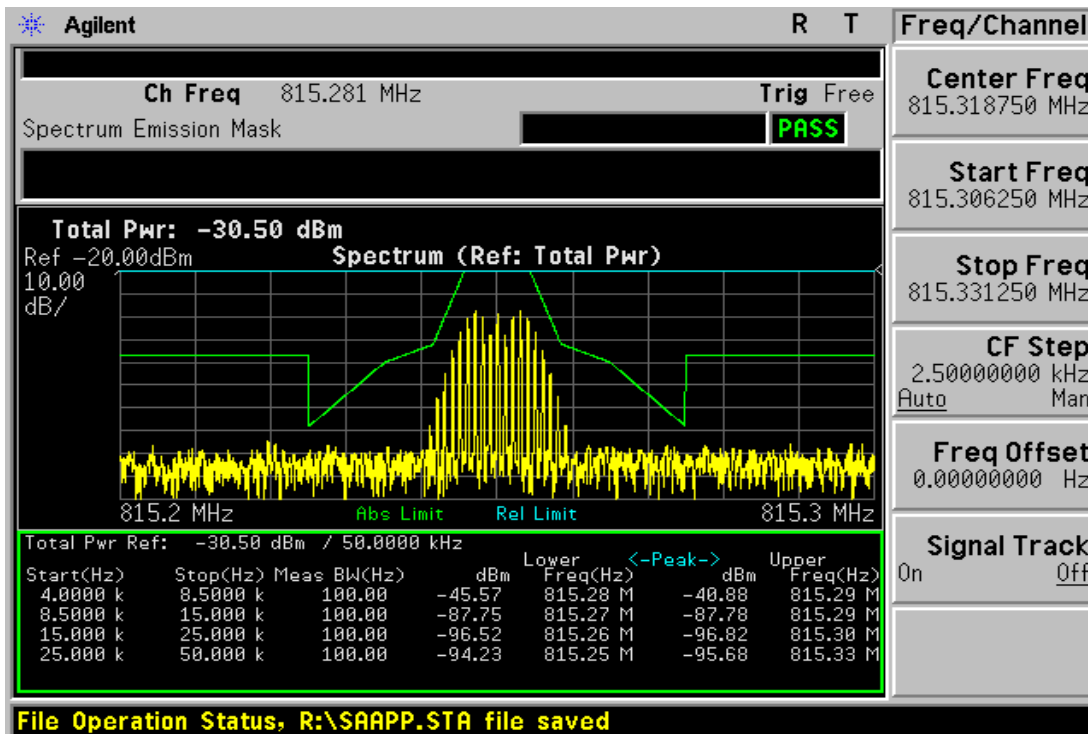
Input AGC : 11K



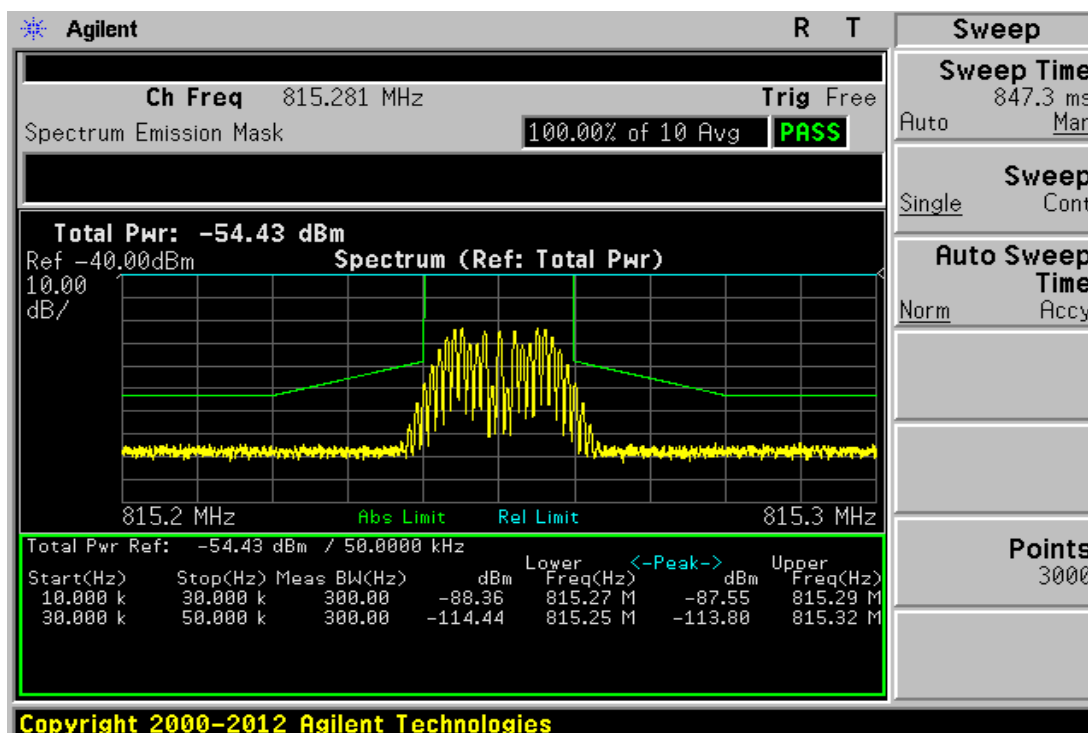
Input AGC : 16K



806 MHz ~ 817 MHz



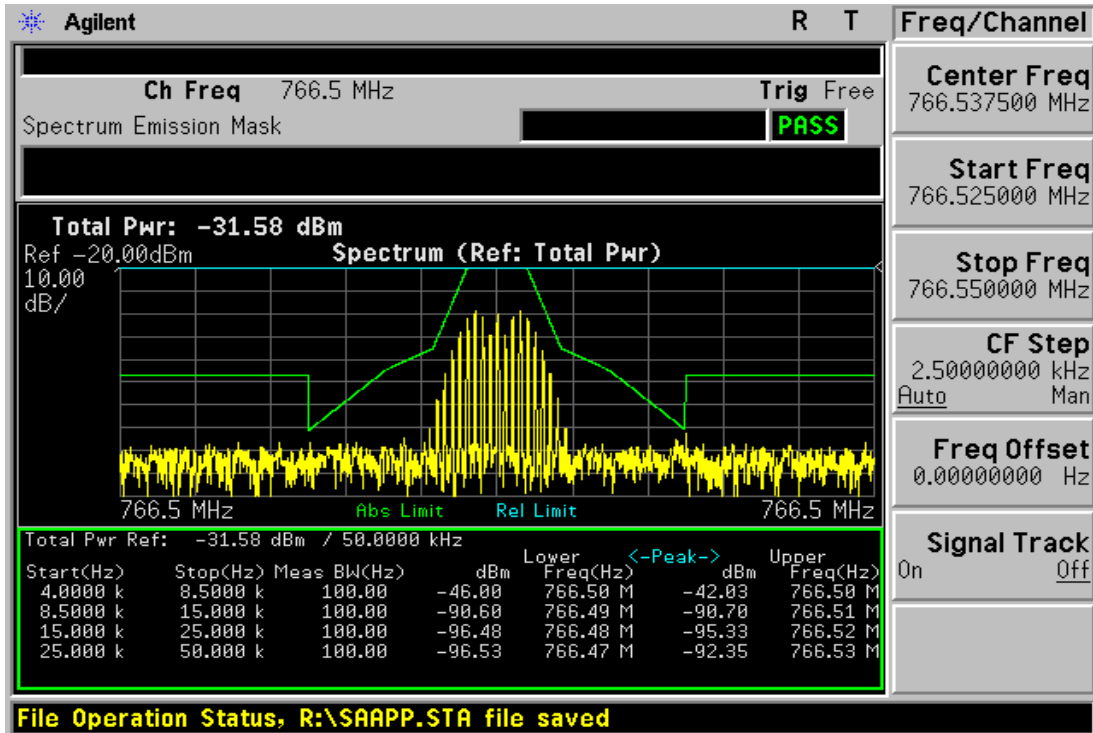
Input AGC : 11K



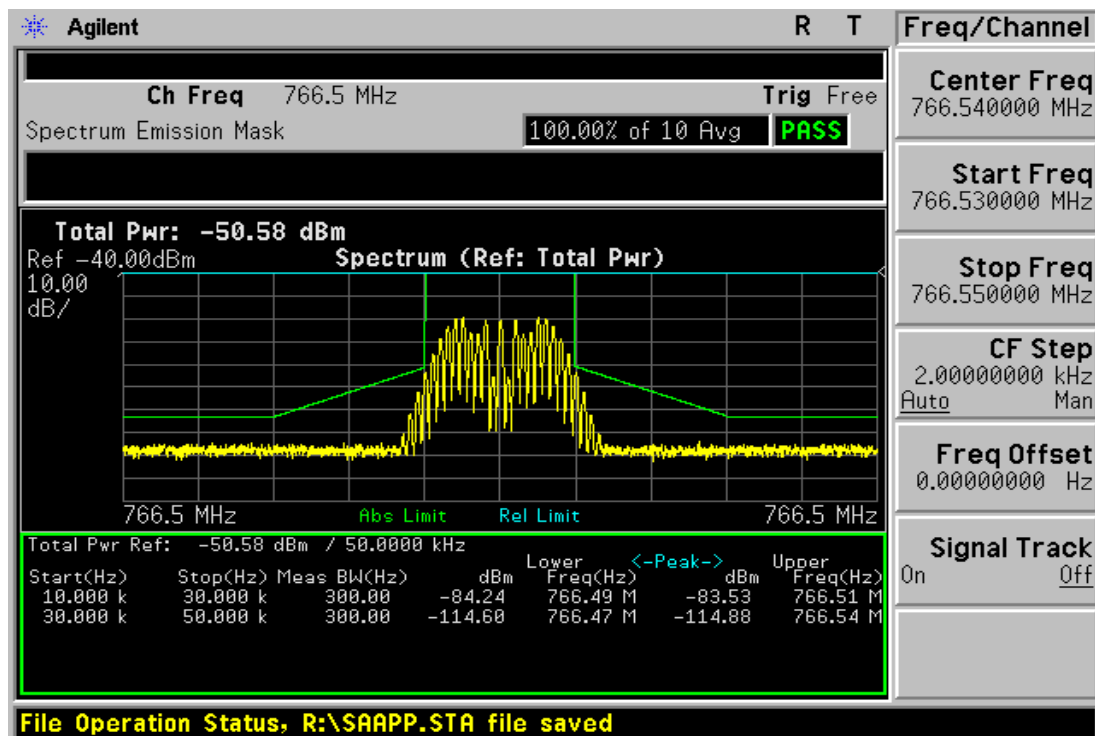
Input AGC : 16K



758 MHz ~ 775 MHz



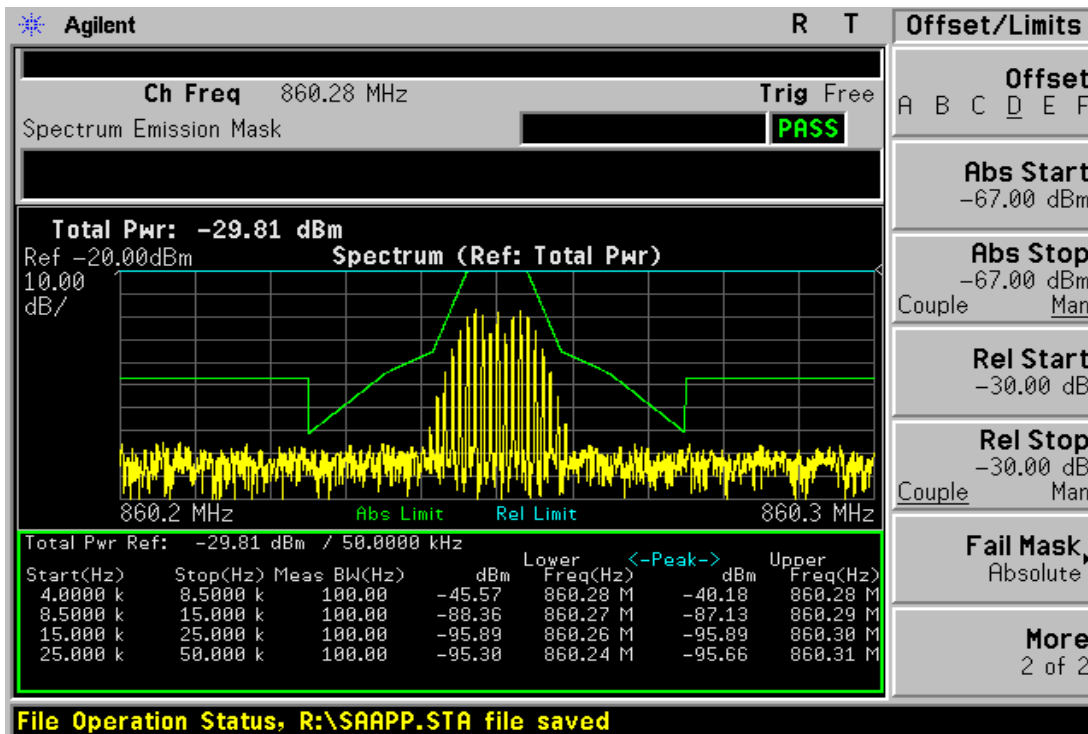
Input AGC : 11K



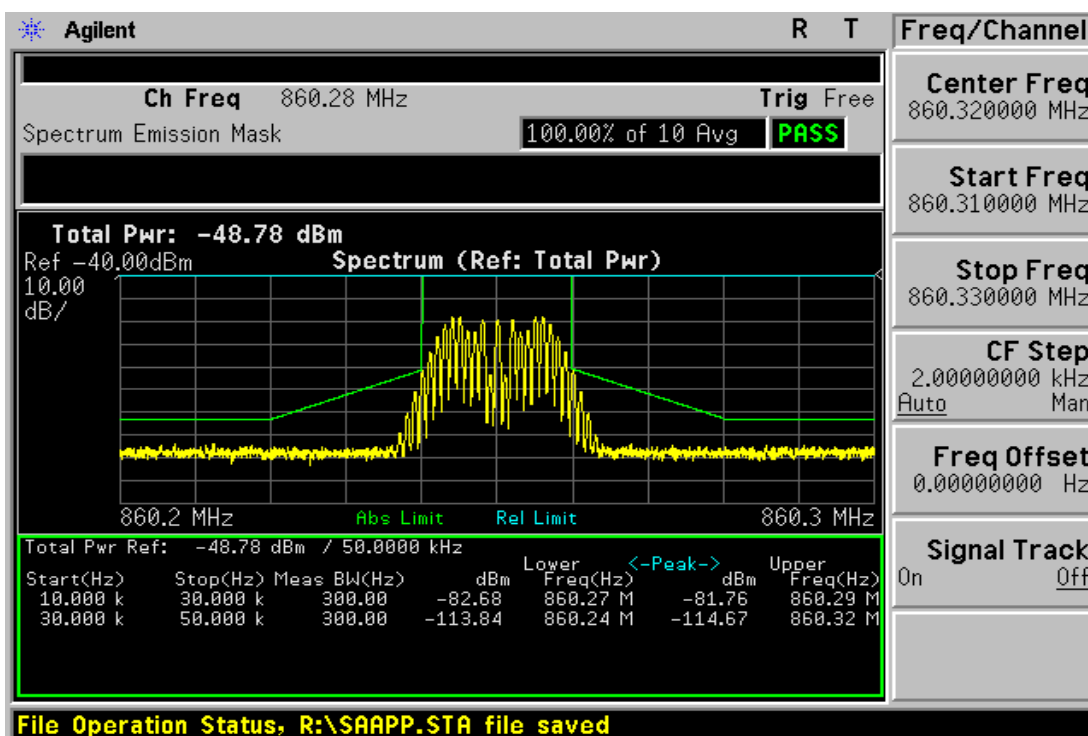
Input AGC : 16K



851 MHz ~ 862 MHz



Input AGC : 11K



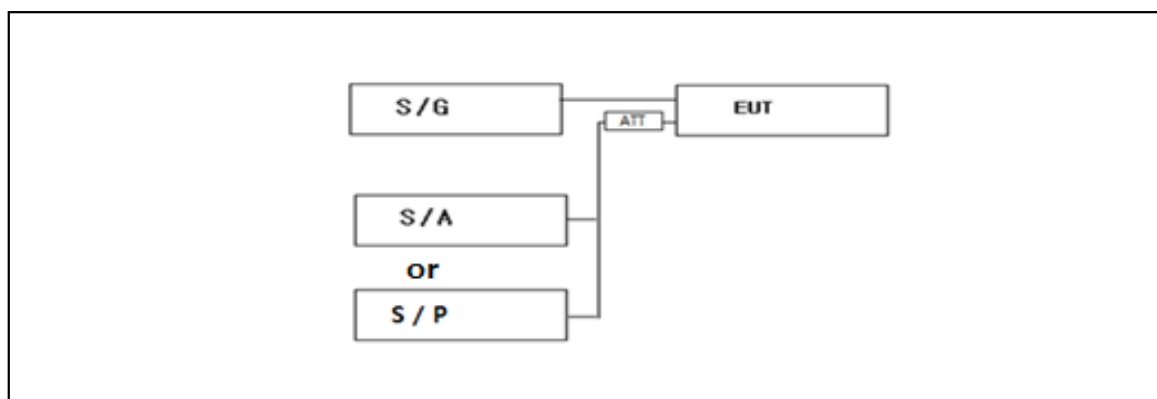
Input AGC : 16K

## 7. Input/output power and amplifier gain

### 7.1 Test Procedure according to KDB935210 D5 4.5

- Connect a signal generator to the input of the EUT.
- The frequency of the signal generator shall be set to the frequency  $f_0$  as determined from 3.3 of KDB 935210.
- Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation.
- 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 of KDB 935210), but not more than 0.5 dB below.
- Measure and record the output power of the EUT
- 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.
- Steps e) and f) were repeated with input signal amplitude set to 3 dB above the AGC threshold level.
- Steps d) and f) were repeated for all frequency bands authorized for use by the EUT

Test setup for RF Conducted measurement



### 7.2 Test Equipments

The following test equipments are used during tests

| Equipment         | Manufacturer         | Model         | Next Cal.  |
|-------------------|----------------------|---------------|------------|
| Spectrum Analyzer | Agilent              | E4440A        | 2020-12-02 |
| Signal Generator  | E4438C               | MY42081204    | 2020-12-03 |
| Signal Generator  | E4432B               | GB40050840    | 2020-12-03 |
| Attenuator        | SRT                  | F04-K1830-01  | 2020-12-03 |
| Attenuator        | Bird Electronic Corp | 100-SA-MFN-30 | 2020-12-03 |
| Power Meter       | Agilent              | N1912A        | 2020-12-02 |
| Power Sensor      | Agilent              | A1921A        | 2020-12-02 |



### 7.3 Test Results : Pass

#### 788 MHz ~ 805 MHz

| Freq (MHz) | Input Level (dBm) | Output (dBm) | Gain (dB) | AGC   |
|------------|-------------------|--------------|-----------|-------|
| 796.5      | -53.0             | 26.8         | 79.8      | Below |
| 796.5      | -50.0             | 27.0         | 77.0      | Above |

#### 806 MHz ~ 817 MHz

| Freq (MHz) | Input Level (dBm) | Output (dBm) | Gain (dB) | AGC   |
|------------|-------------------|--------------|-----------|-------|
| 815.3      | -53.0             | 26.9         | 79.9      | Below |
| 815.3      | -50.0             | 26.9         | 76.9      | Above |

#### 758 MHz ~ 775 MHz

| Freq (MHz) | Input Level (dBm) | Output (dBm) | Gain (dB) | AGC   |
|------------|-------------------|--------------|-----------|-------|
| 766.5      | -56.0             | 33.9         | 89.9      | Below |
| 766.5      | -53.0             | 33.9         | 86.9      | Above |

#### 851 MHz ~ 862 MHz

| Freq (MHz) | Input Level (dBm) | Output (dBm) | Gain (dB) | AGC   |
|------------|-------------------|--------------|-----------|-------|
| 860.3      | -56.0             | 34.0         | 90.0      | Below |
| 860.3      | -53.0             | 33.9         | 86.9      | Above |

### 7.3 ERP calculations

| Freq (MHz) | Max power (dBm) | Antenna Gain (dBi) | Duty Cycle (%) | EIRP (W) | AGC   |
|------------|-----------------|--------------------|----------------|----------|-------|
| 796.5      | 33.90           | 7.50               | 100.00         | 13.80    | Below |
| 796.5      | 33.90           | 7.50               | 100.00         | 13.80    | Above |
| 815.3      | 34.00           | 8.50               | 100.00         | 17.78    | Below |
| 815.3      | 33.90           | 8.50               | 100.00         | 17.38    | Above |
| 766.5      | 26.80           | 8.50               | 100.00         | 3.39     | Below |
| 766.5      | 27.00           | 8.50               | 100.00         | 3.55     | Above |
| 860.3      | 26.90           | 8.50               | 100.00         | 3.47     | Below |
| 860.3      | 26.90           | 8.50               | 100.00         | 3.47     | Above |

## 8. Noise figure measurements

### 8.1 Test Procedure according to KDB935210 D5 4.6

Section 90.219(e)(2) limits the noise figure of a signal booster to  $\leq 9$  dB in either direction.

- Aspectrum analyzer was connected to the downlink output of the amplifier.
- The uplink was unterminated.
- The spectrum analyzer was set to 200 trace average in the RMS average mode.
- A peak reding was recorded.
- The noise figure was calculated using the following fomula.

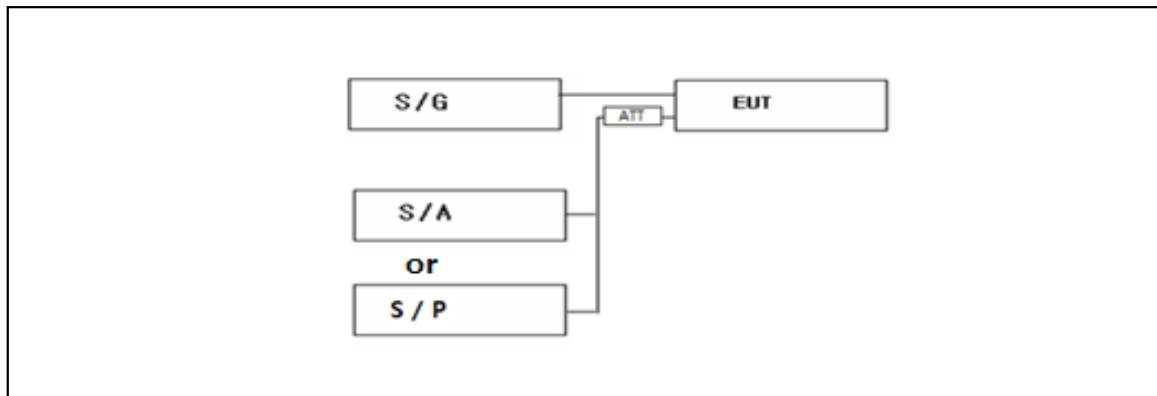
$$NF = P_{NOUT} - (-174 \text{ dBm/Hz} + 10 \cdot \text{LOG}_{10}(10^6))$$

RBW=Resolution Bandwidth of Spectrum analyzer connected to the uplink output of the amplifier.

Gain = Gain of amplifier in dB

f)steps a)to e)were repeat with the analyzer connected to the uplink output of the amplifier

Test setup for RF Conducted measurement



### 8.2 Test Equipments

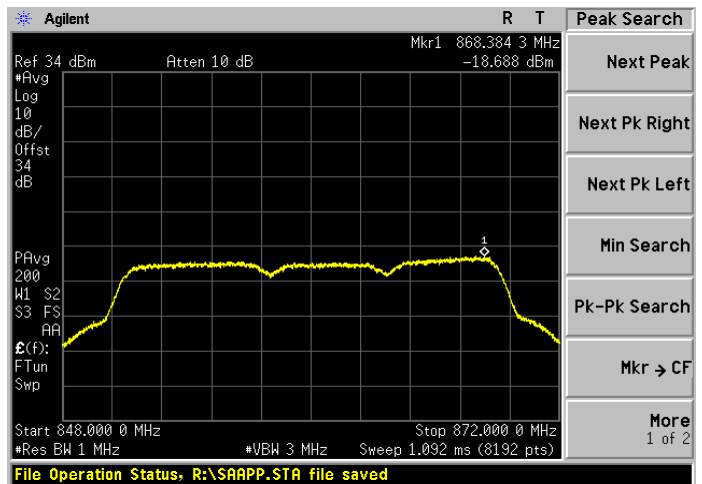
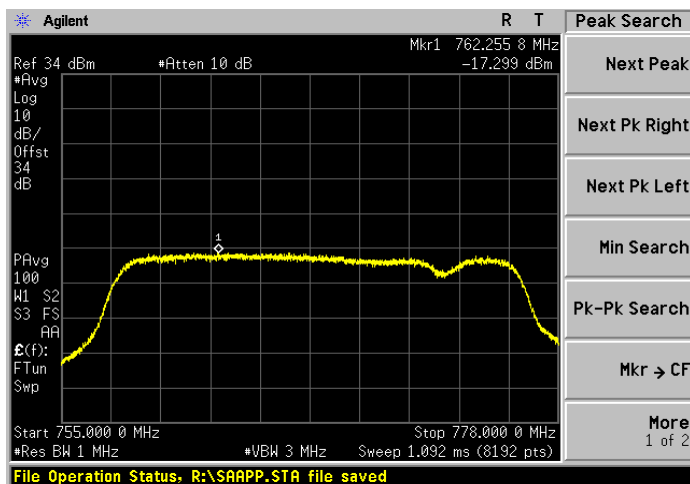
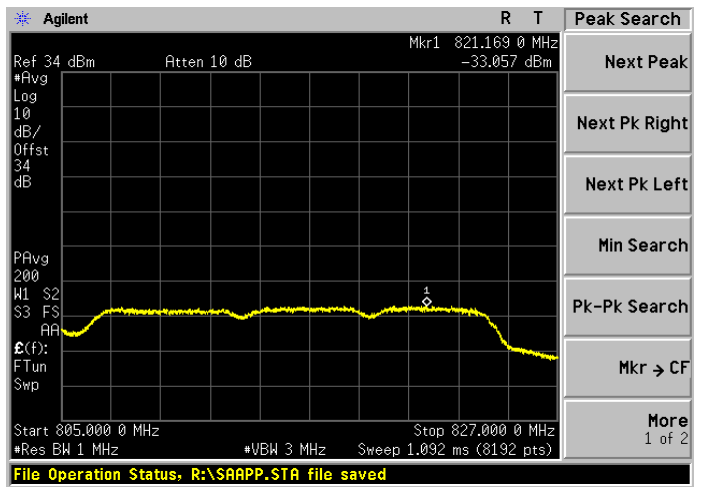
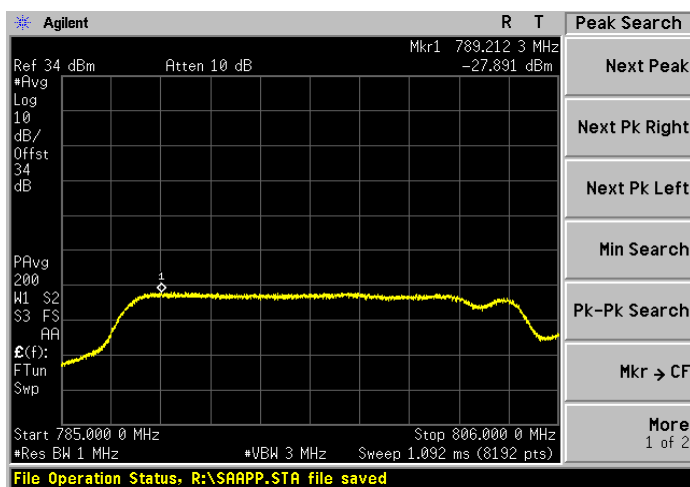
The following test equipments are used during tests

| Equipment         | Manufacturer         | Model         | Next Cal.  |
|-------------------|----------------------|---------------|------------|
| Spectrum Analyzer | Agilent              | E4440A        | 2020-12-02 |
| Signal Generator  | E4438C               | MY42081204    | 2020-12-03 |
| Signal Generator  | E4432B               | GB40050840    | 2020-12-03 |
| Attenuator        | SRT                  | F04-K1830-01  | 2020-12-03 |
| Attenuator        | Bird Electronic Corp | 100-SA-MFN-30 | 2020-12-03 |



### 8.3 Test Results : Pass

| Start      | Stop   | Reading | Gain  | Thermal    | Noise       | NF Limit |
|------------|--------|---------|-------|------------|-------------|----------|
| Freq (MHz) |        | (dBm)   | (dB)  | Noise (dB) | Figure (dB) | (dB)     |
| 785.00     | 806.00 | -27.89  | 79.80 | -114.00    | 6.31        | 9.00     |
| 805.00     | 827.00 | -33.06  | 79.90 | -114.00    | 1.04        | 9.00     |
| 755.00     | 778.00 | -17.30  | 89.90 | -114.00    | 6.80        | 9.00     |
| 848.00     | 872.00 | -18.69  | 90.00 | -114.00    | 5.31        | 9.00     |



## 9. Out-of-band/out-of-block emissions

### 9.1 Test Procedure according to KDB935210 D5 4.7

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).

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).

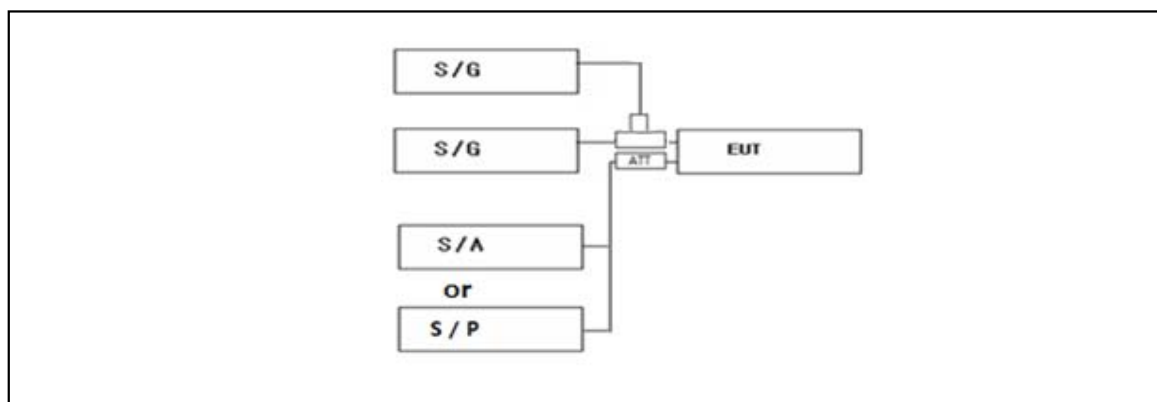
g) Place a marker on highest intermodulation product amplitude.

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.

Test setup for RF Conducted measurement



### 9.2 Test Equipments

The following test equipments are used during tests

| Equipment         | Manufacturer         | Model         | Next Cal.  |
|-------------------|----------------------|---------------|------------|
| Spectrum Analyzer | Agilent              | E4440A        | 2020-12-02 |
| Signal Generator  | E4438C               | MY42081204    | 2020-12-03 |
| Signal Generator  | E4432B               | GB40050840    | 2020-12-03 |
| Attenuator        | SRT                  | F04-K1830-01  | 2020-12-03 |
| Attenuator        | Bird Electronic Corp | 100-SA-MFN-30 | 2020-12-03 |

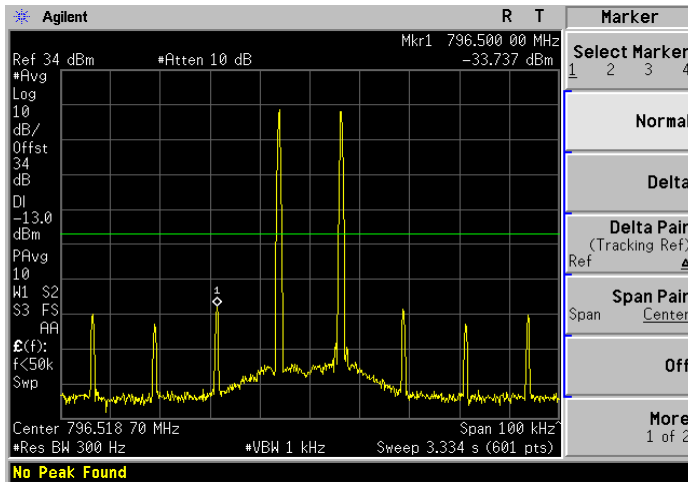


**9.3 Test Results : Pass**

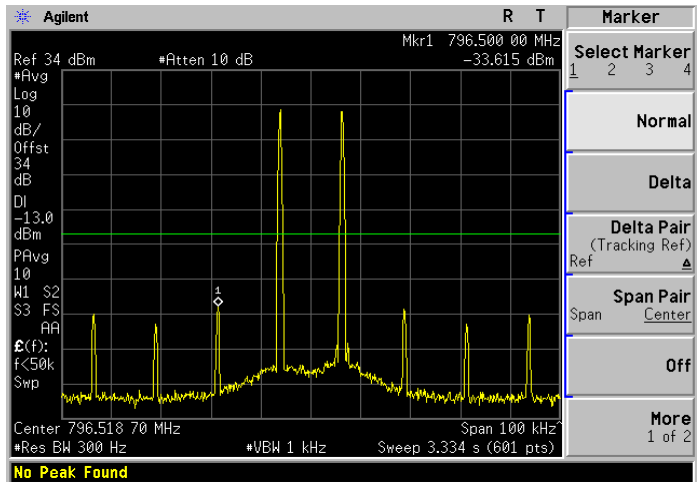
| Freq (MHz) | Modul Type (kHz) | Signal 1 | Signal 2 | AGC | Max Reading (dBm) |
|------------|------------------|----------|----------|-----|-------------------|
| 796.519    | 12.50            | 796.512  | 796.525  | Off | -37.74            |
| 796.519    | 12.50            | 796.512  | 796.525  | On  | -33.62            |
| 815.294    | 12.50            | 815.288  | 815.300  | Off | -26.80            |
| 815.294    | 12.50            | 815.288  | 815.300  | On  | -26.81            |
| 796.519    | 25.00            | 796.506  | 796.531  | Off | -34.49            |
| 796.519    | 25.00            | 796.506  | 796.531  | On  | -34.63            |
| 815.294    | 25.00            | 815.281  | 815.306  | Off | -28.32            |
| 815.294    | 25.00            | 815.281  | 815.306  | On  | -28.42            |
| 766.519    | 12.50            | 766.512  | 766.525  | Off | -23.93            |
| 766.519    | 12.50            | 766.512  | 766.525  | On  | -23.22            |
| 860.286    | 12.50            | 860.280  | 860.293  | Off | -22.23            |
| 860.286    | 12.50            | 860.280  | 860.293  | On  | -22.30            |
| 766.519    | 25.00            | 766.506  | 766.531  | Off | -25.13            |
| 766.519    | 25.00            | 766.506  | 766.531  | On  | -25.61            |
| 860.286    | 25.00            | 860.274  | 860.299  | Off | -22.67            |
| 860.286    | 25.00            | 860.274  | 860.299  | On  | -22.71            |
| 796.519    | 6.25             | 796.516  | 796.522  | Off | -33.87            |
| 796.519    | 6.25             | 796.516  | 796.522  | On  | -33.86            |
| 803.625    | 6.25             | 803.622  | 803.628  | Off | -29.45            |
| 803.625    | 6.25             | 803.622  | 803.628  | Off | -29.99            |
| 815.294    | 6.25             | 815.291  | 815.297  | On  | -27.10            |
| 815.294    | 6.25             | 815.291  | 815.297  | Off | -27.23            |
| 766.519    | 6.25             | 766.516  | 766.522  | On  | -24.98            |
| 766.519    | 6.25             | 766.516  | 766.522  | Off | -25.06            |
| 773.125    | 6.25             | 773.122  | 773.128  | On  | -25.12            |
| 773.125    | 6.25             | 773.122  | 773.128  | Off | -24.93            |
| 860.286    | 6.25             | 860.283  | 860.289  | On  | -22.20            |
| 860.286    | 6.25             | 860.283  | 860.289  | Off | -22.42            |



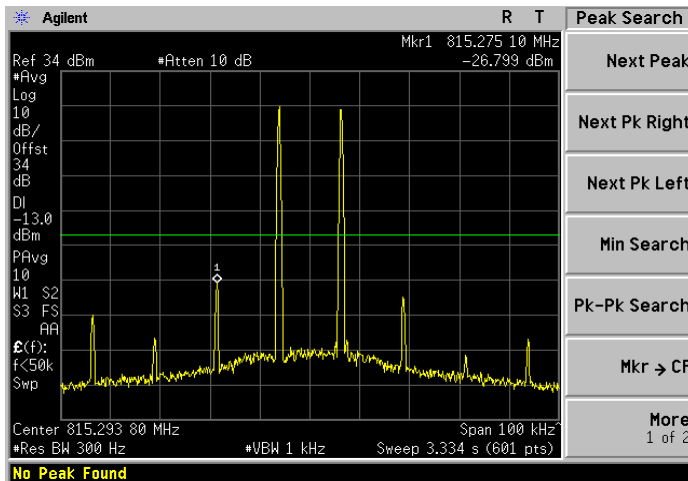
9.3 Test Results : Pass



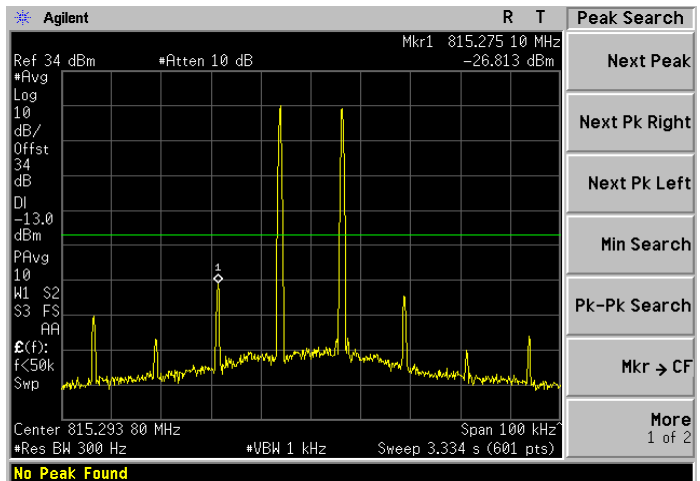
12.5K



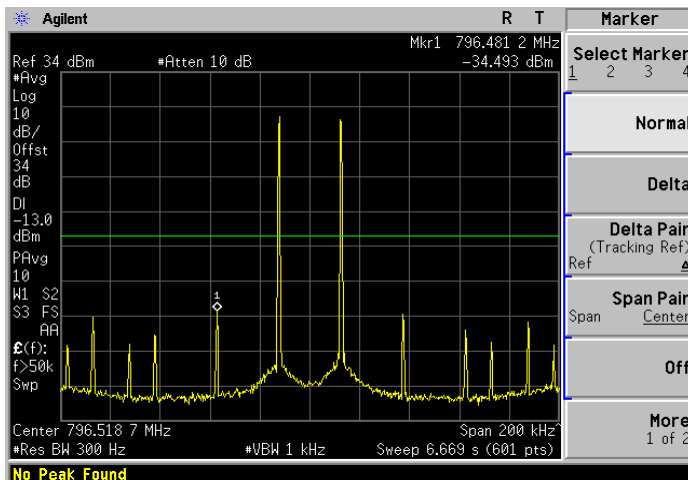
12.5K



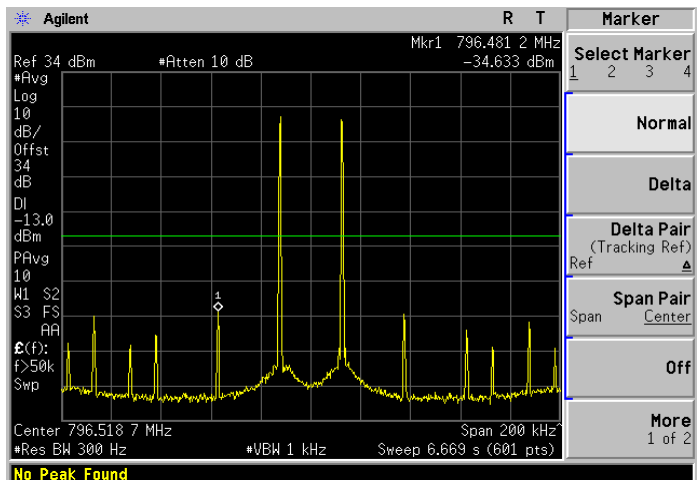
12.5K



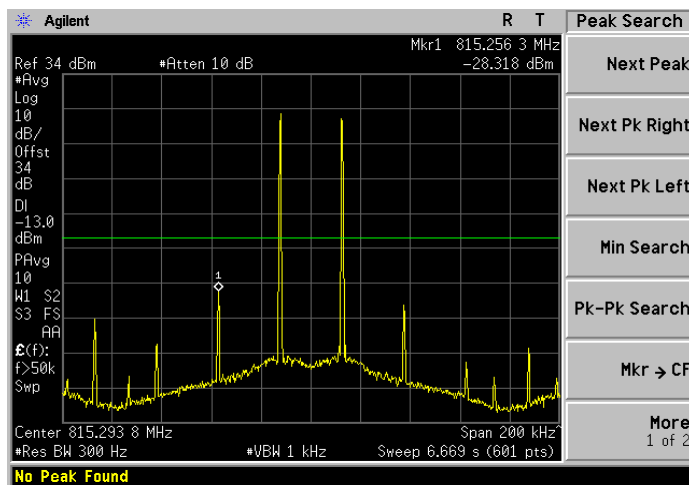
12.5K



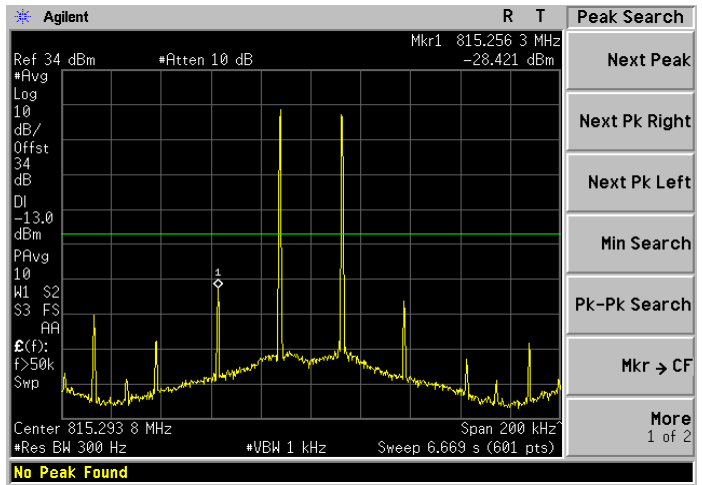
25K



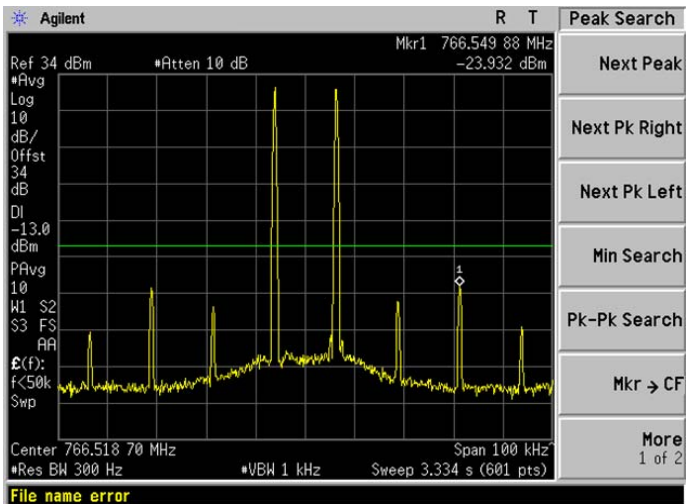
25K



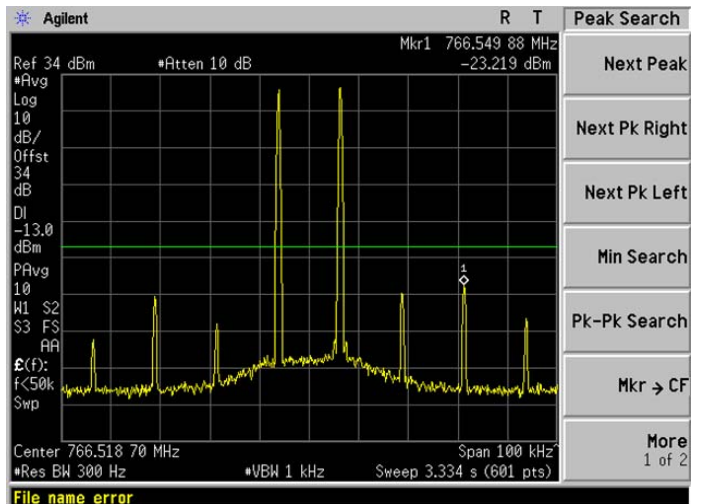
25K



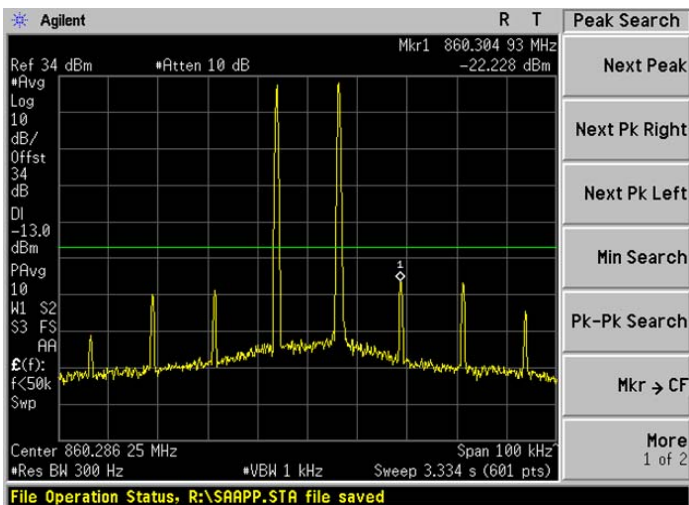
25K



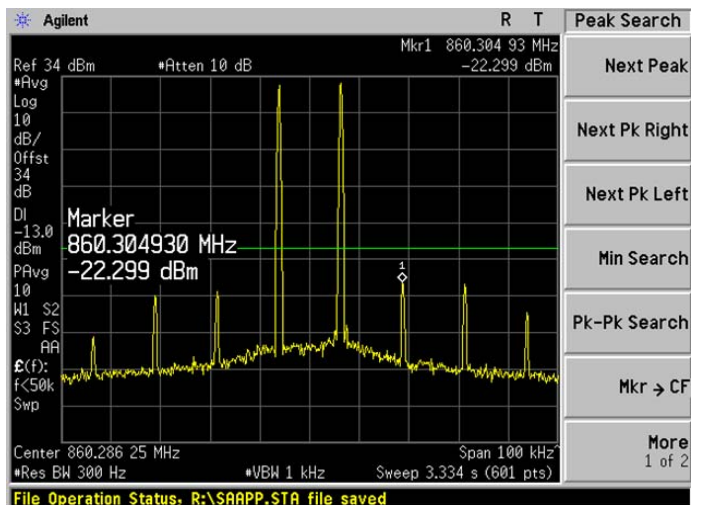
12.5K



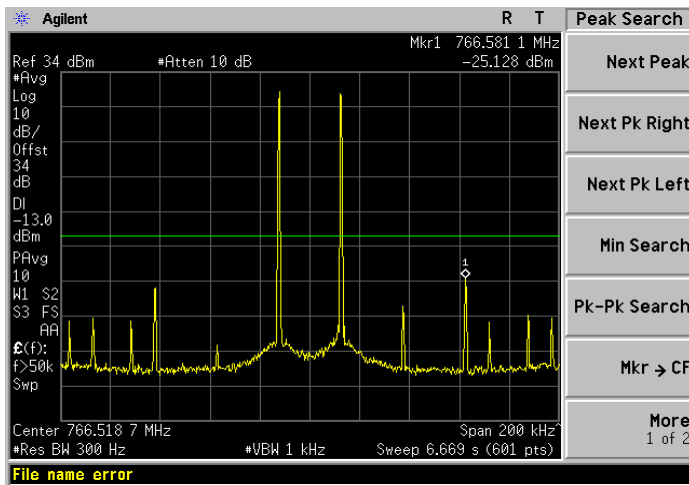
12.5K



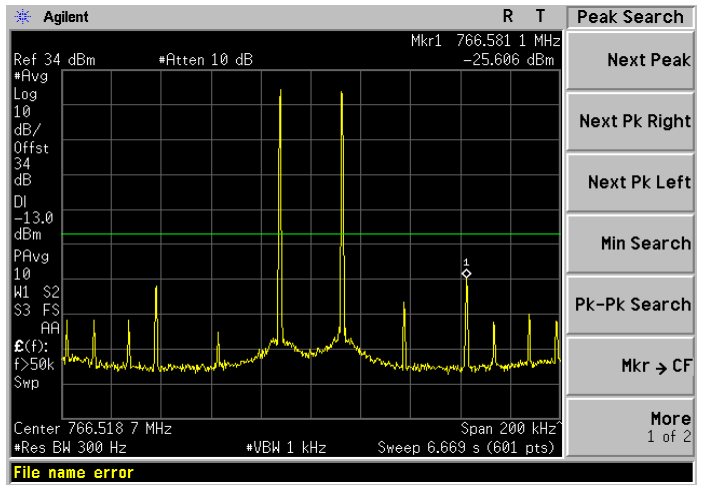
12.5K



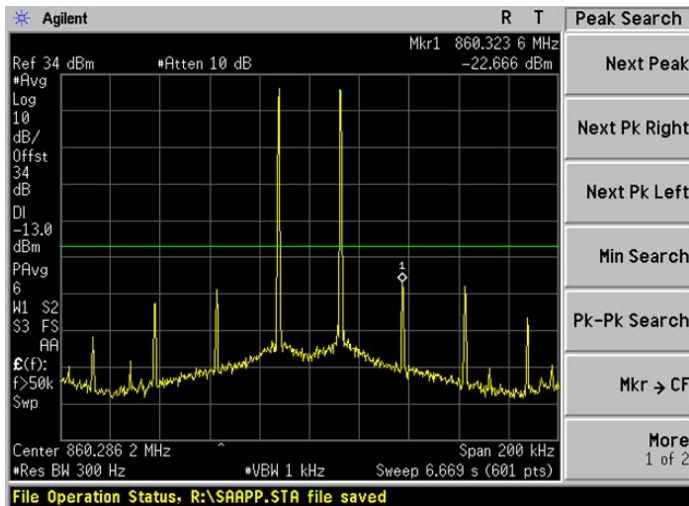
12.5K



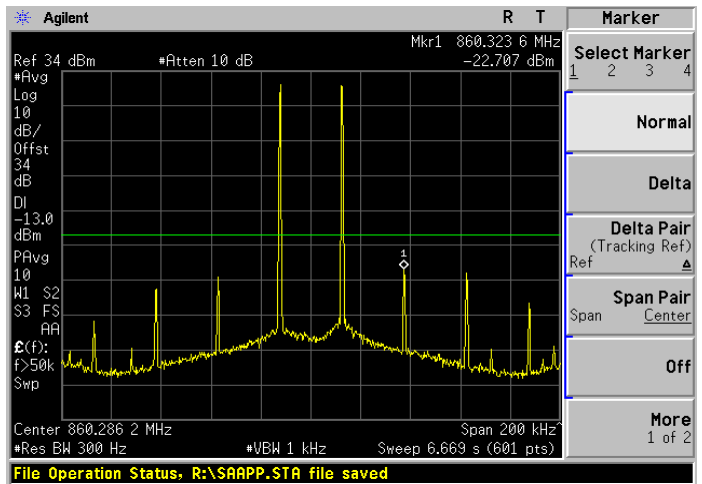
25K



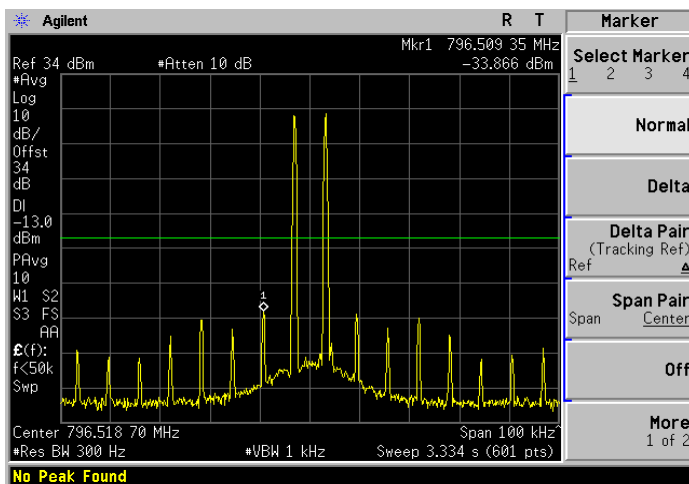
25K



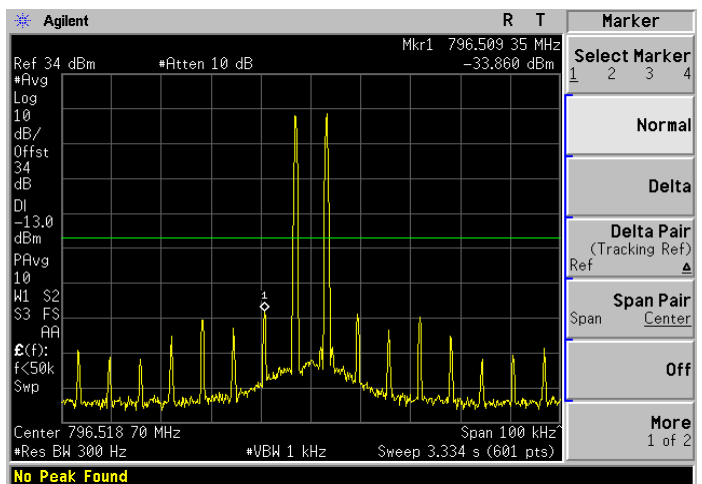
25K



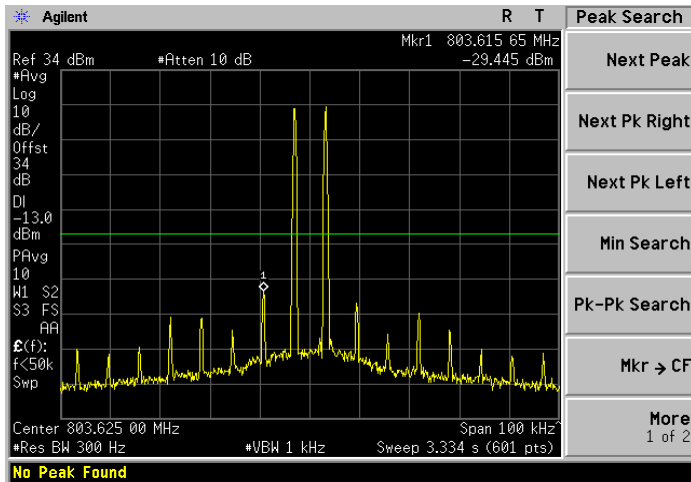
25K



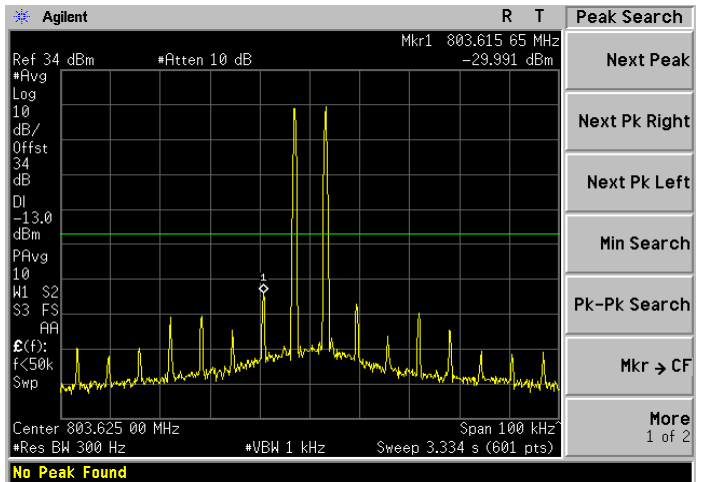
6.25K



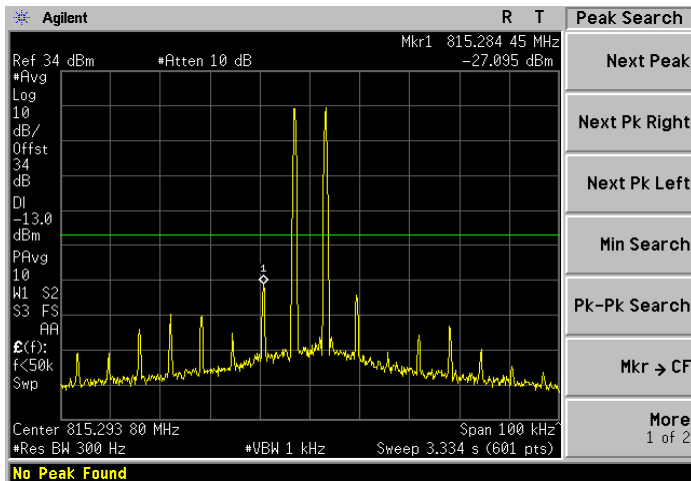
6.25K



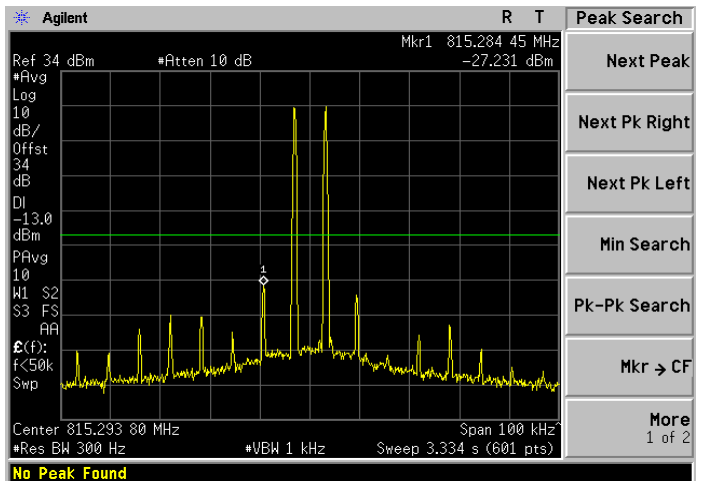
6.25K



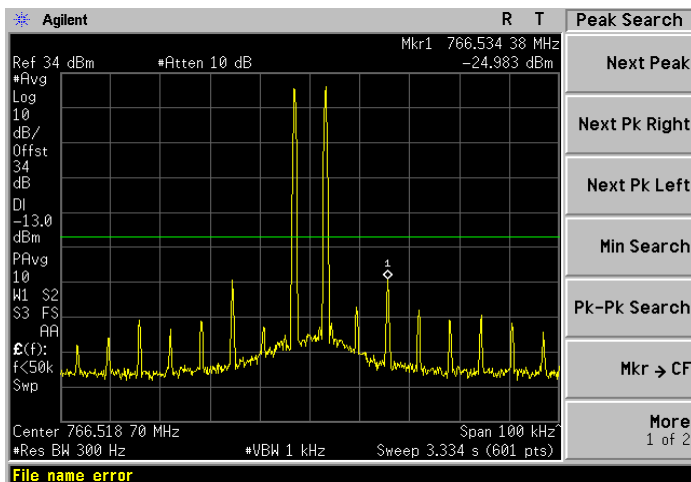
6.25K



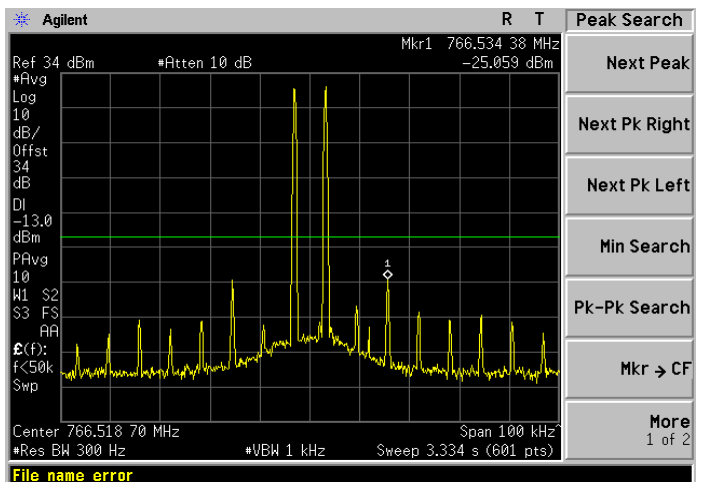
6.25K



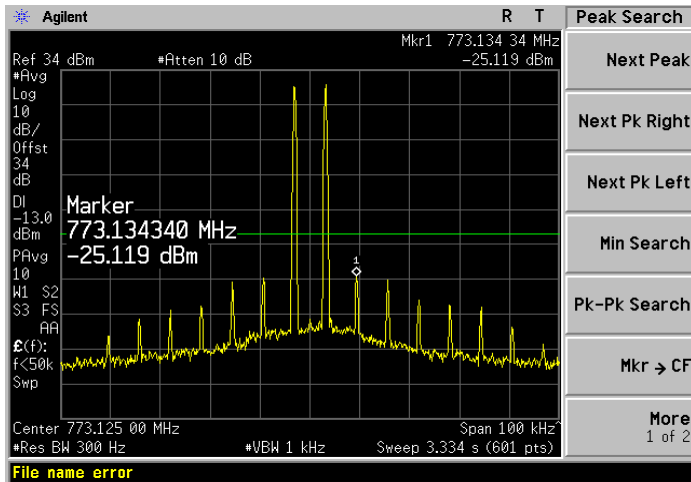
6.25K



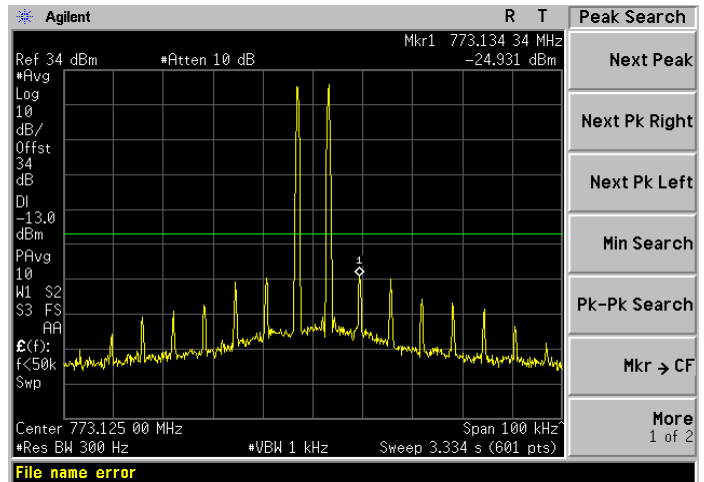
6.25K



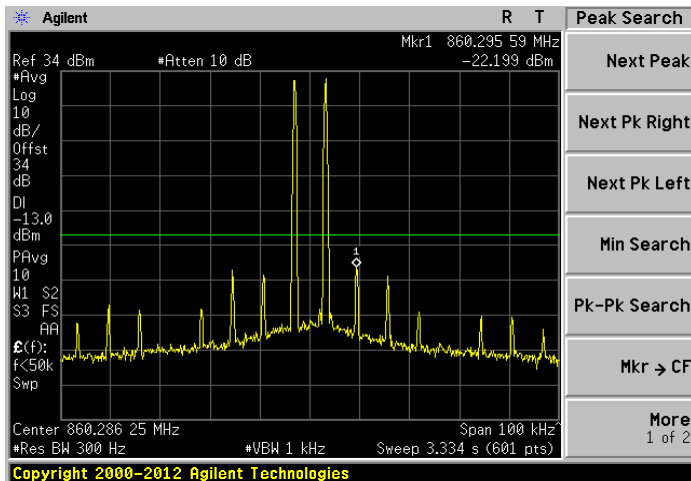
6.25K



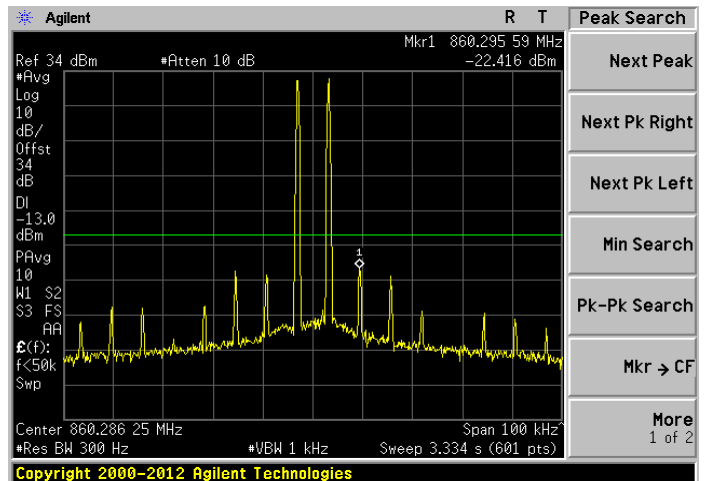
6.25K



6.25K



6.25K



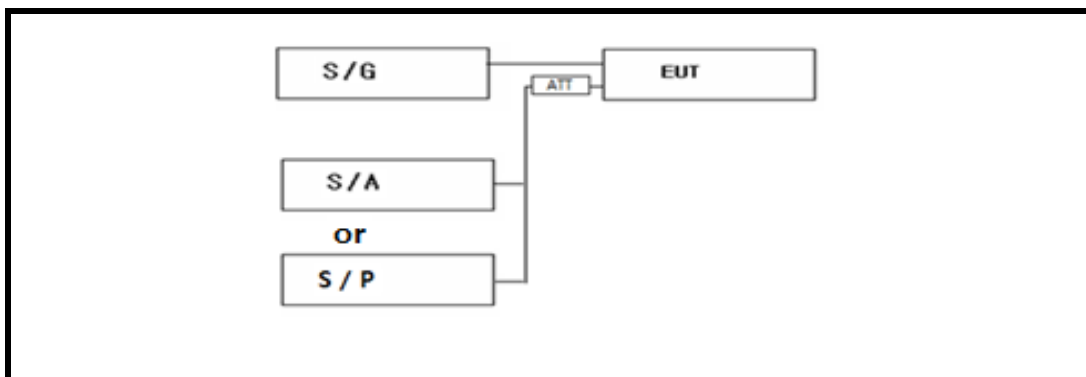
6.25K

## 10. Spurious Emission at Antenna Terminal

### 10.1 Test Procedure

- Connect a signal generator to the input of the EUT.
- Configure the signal generator to produce a CW signal.
- Set the frequency of the CW signal to the center channel of the EUT passband.
- Set the output power level so that the resultant signal is just below the AGC threshold (see 4.2).
- Connect a spectrum analyzer to the output of the EUT, using appropriate attenuation as necessary.
- Set the RBW = 100 kHz. (i.e., for 30 MHz to 1 GHz PLMRS and/or PSRS booster devices)
- Set the VBW =  $3 \times \text{RBW}$ .
- Set the Sweep time = auto-couple.
- Set the detector to PEAK.
- Set the spectrum analyzer start frequency to 30 MHz (or the lowest radio frequency signal generated in the EUT, without going below 9 kHz if the EUT has additional internal clock frequencies), and the stop frequency to  $10 \times$  the highest allowable frequency of the EUT passband.
- Select MAX HOLD, and use the marker peak function to find the highest emission(s) outside the passband. (This could be either at a frequency lesser or greater than the passband frequencies.)
- Capture a plot for inclusion in the test report.
- Repeat steps c) to l) for each authorized frequency band/block of operation.

Test setup for RF Conducted measurement



### 10.2 Test Equipments

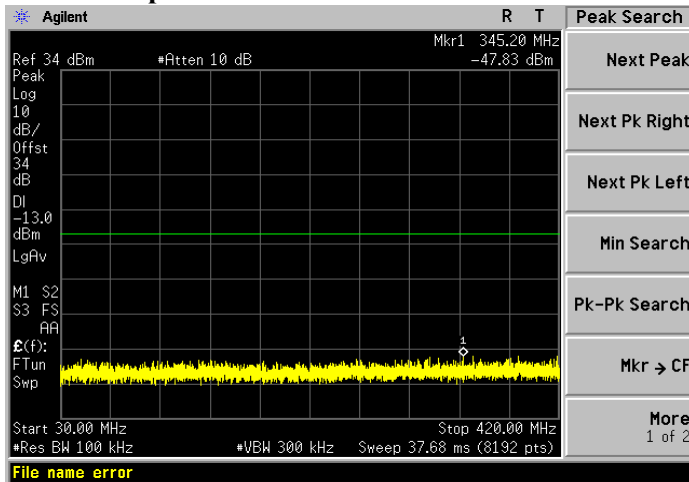
The following test equipments are used during tests

| Equipment         | Manufacturer         | Model         | Next Cal.  |
|-------------------|----------------------|---------------|------------|
| Spectrum Analyzer | Agilent              | E4440A        | 2020-12-02 |
| Signal Generator  | E4438C               | MY42081204    | 2020-12-03 |
| Signal Generator  | E4432B               | GB40050840    | 2020-12-03 |
| Attenuator        | SRT                  | F04-K1830-01  | 2020-12-03 |
| Attenuator        | Bird Electronic Corp | 100-SA-MFN-30 | 2020-12-03 |

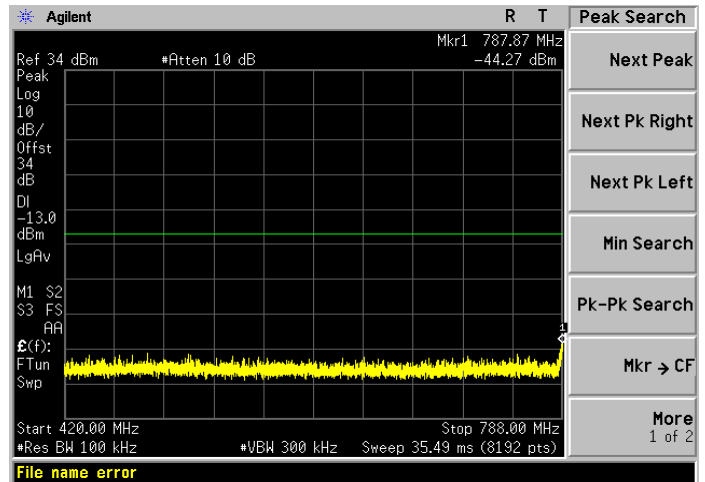


### 10.3 Test Results : Pass

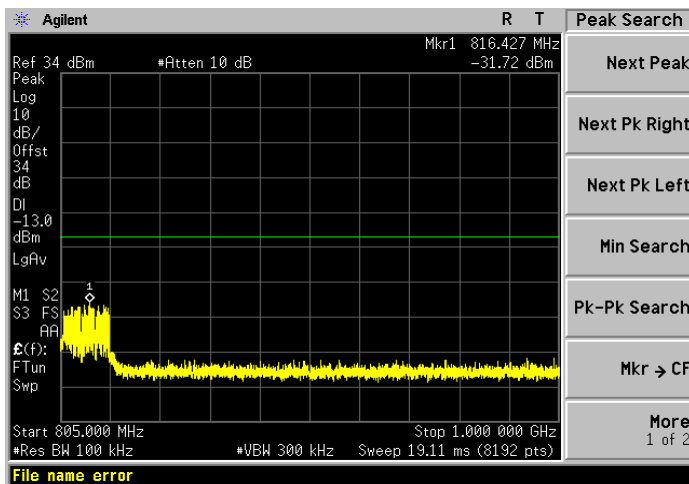
#### Uplink



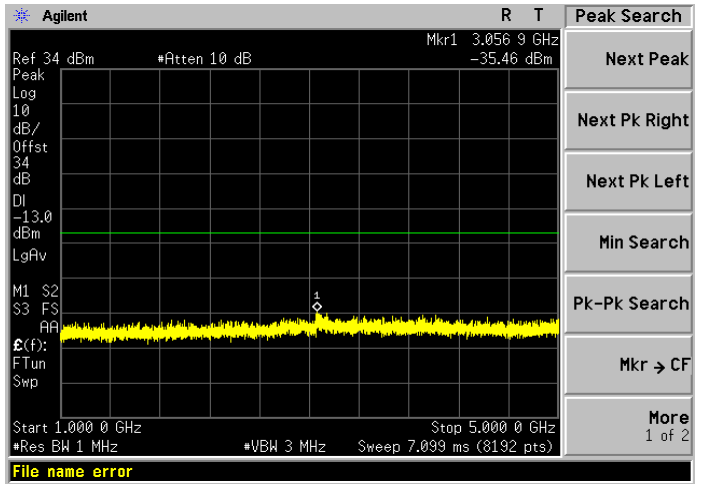
30 MHz ~ 420 MHz



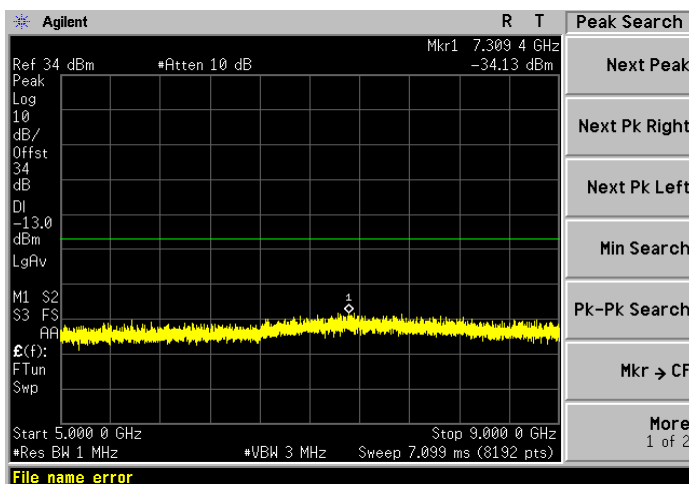
420 MHz ~ 788 MHz



805 MHz ~ 1000 MHz



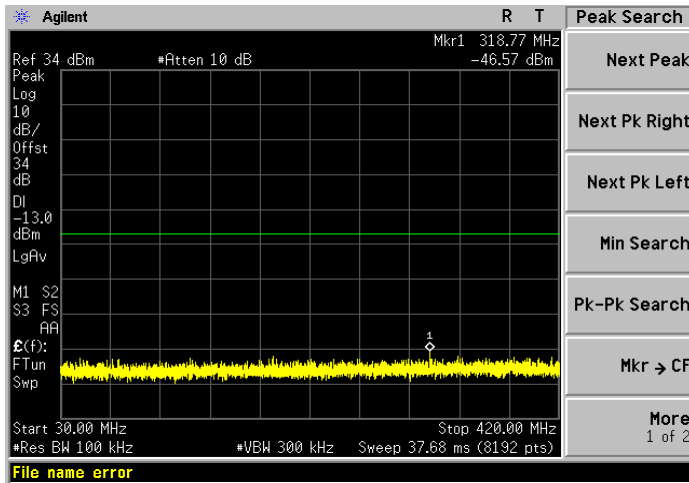
1000 MHz ~ 5000 MHz



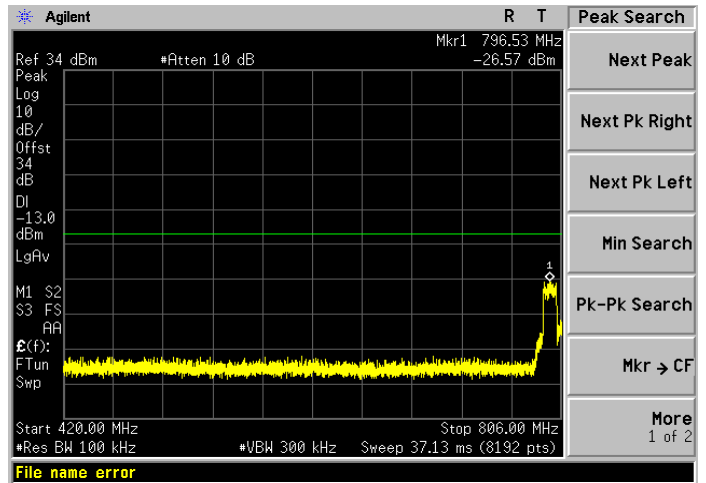
5000 MHz ~ 9000 MHz



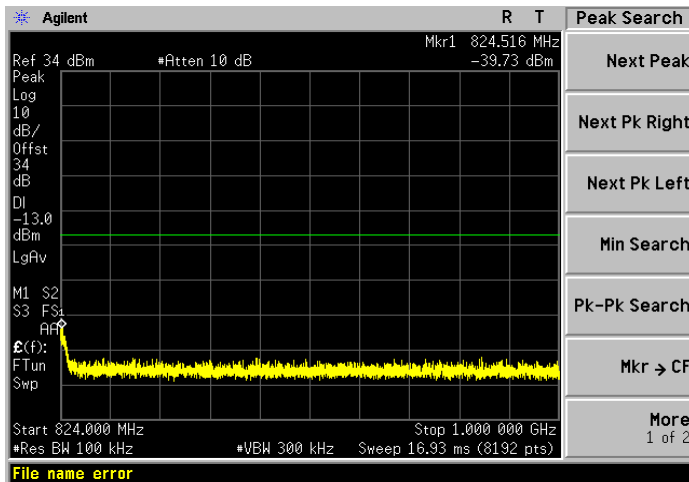
## Uplink



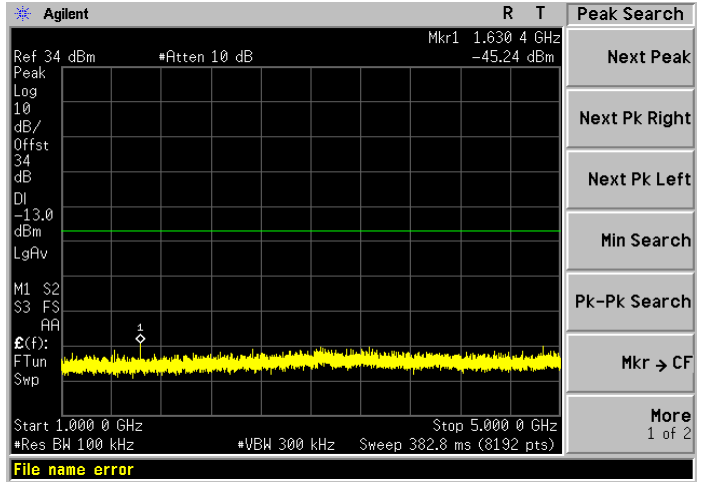
30 MHz ~ 420 MHz



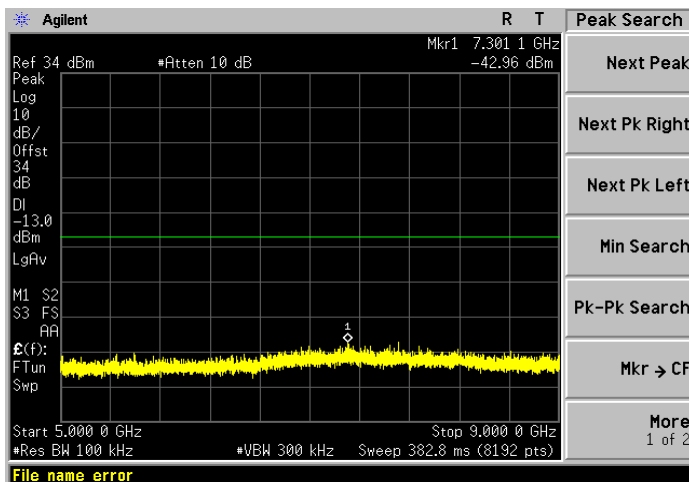
420 MHz ~ 806 MHz



824 MHz ~ 1000 MHz



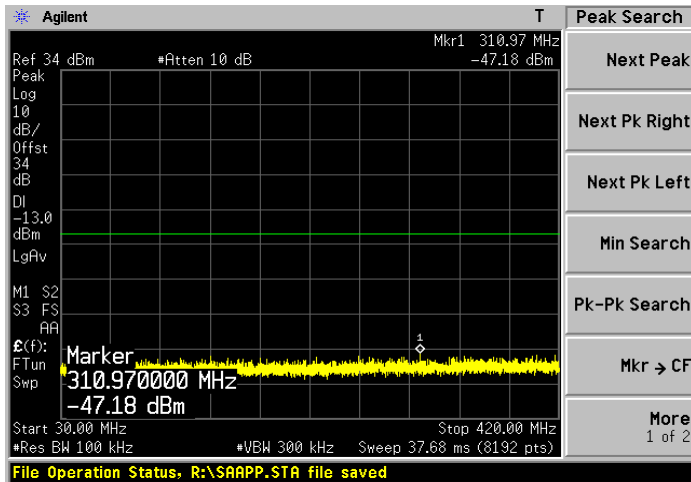
1000 MHz ~ 5000 MHz



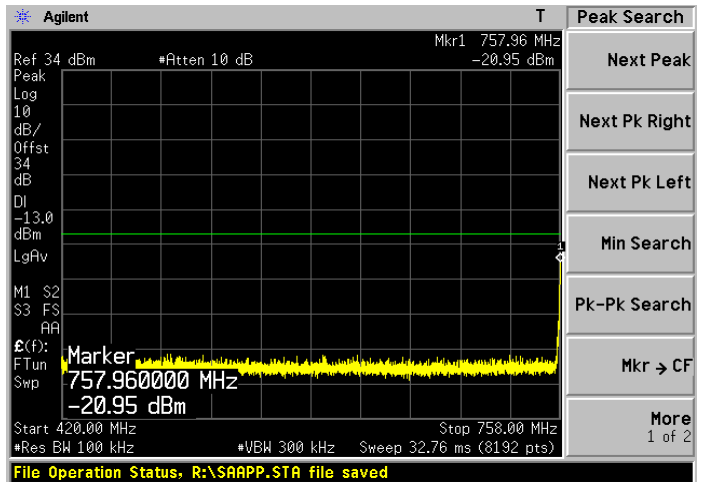
5000 MHz ~ 9000 MHz



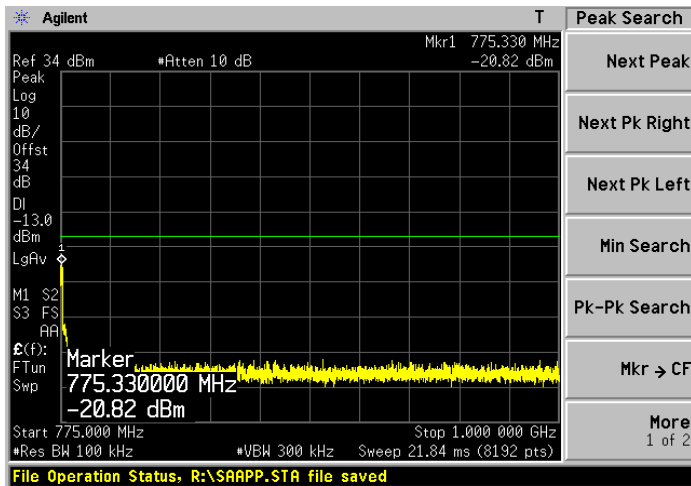
## Downlink



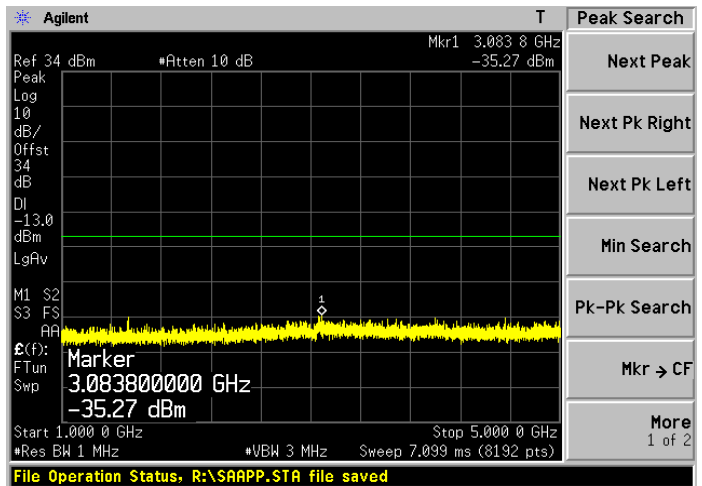
30 MHz ~ 420 MHz



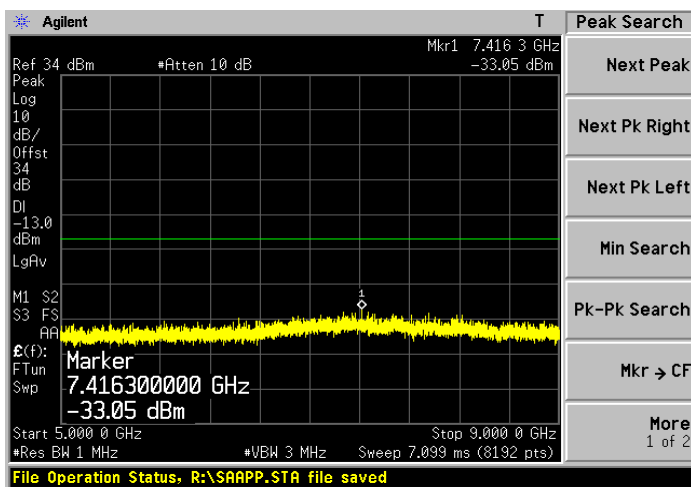
420 MHz ~ 758 MHz



775 MHz ~ 1000 MHz



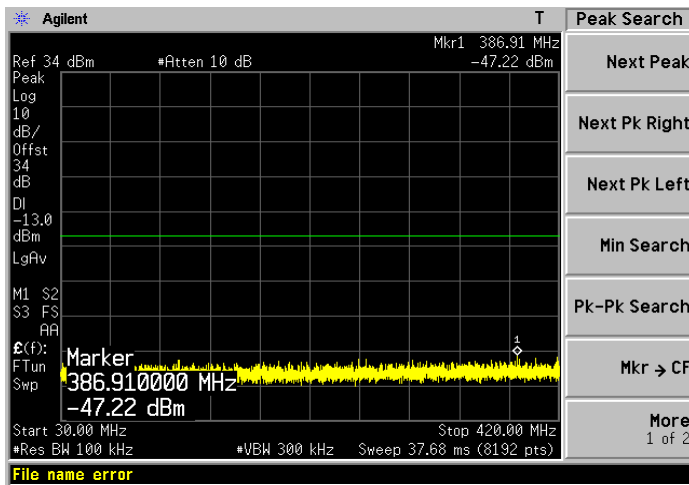
1000 MHz ~ 5000 MHz



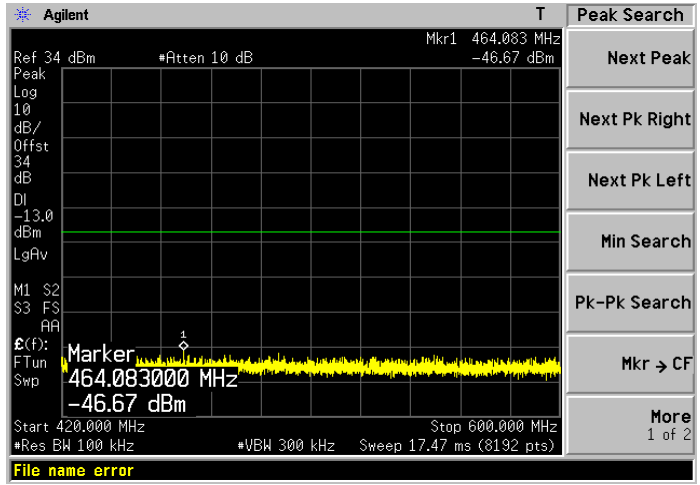
5000 MHz ~ 9000 MHz



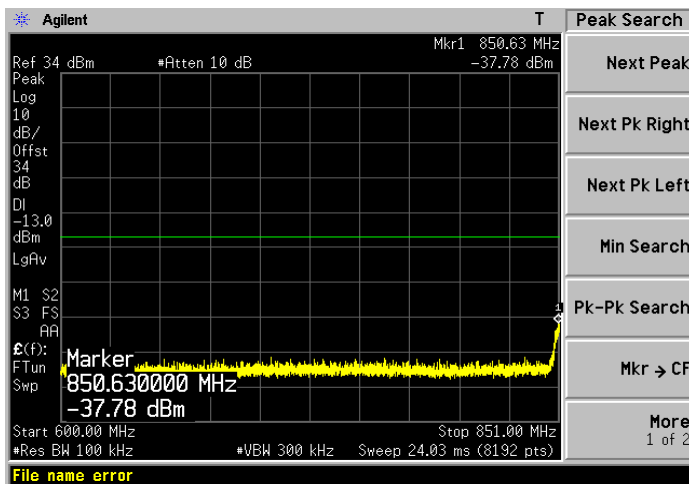
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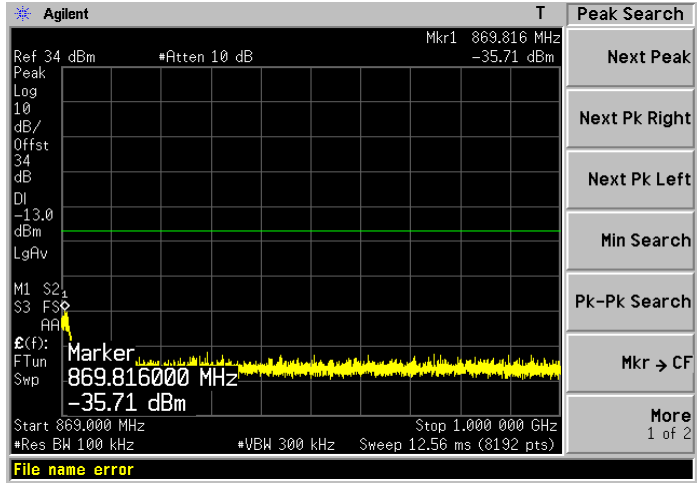
30 MHz ~ 420 MHz



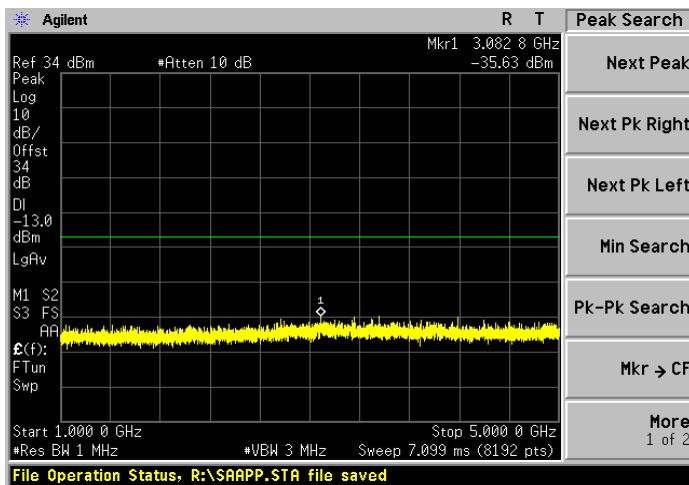
420 MHz ~ 600 MHz



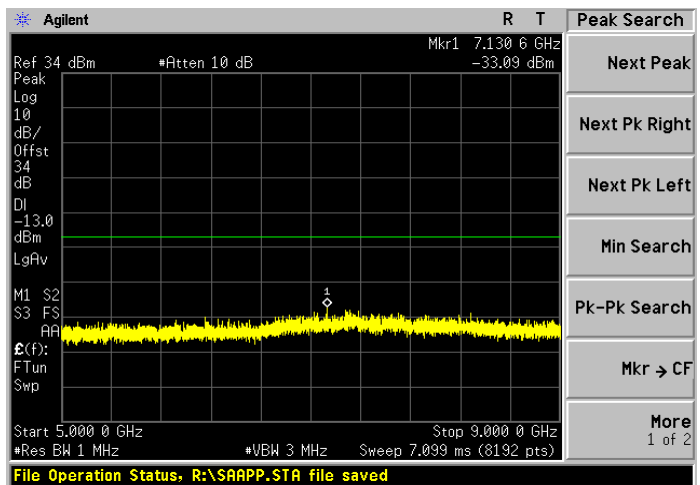
600 MHz ~ 851 MHz



869 MHz ~ 1000 MHz



1000 MHz ~ 5000 MHz



5000 MHz ~ 9000 MHz



## 10.5 Result for Section 90.543 (e)

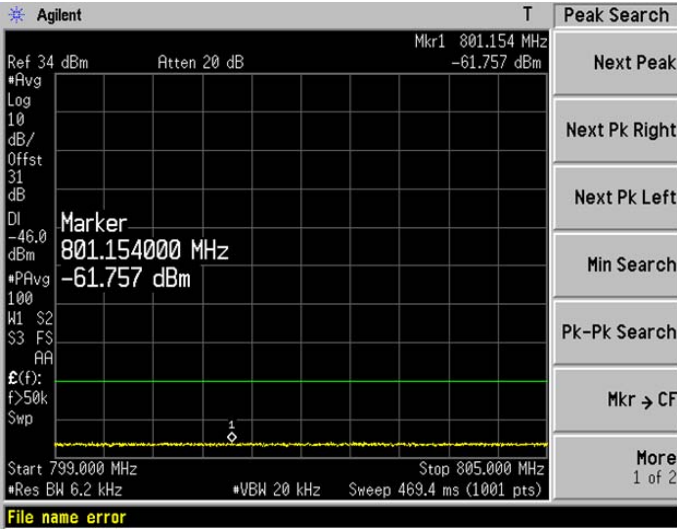
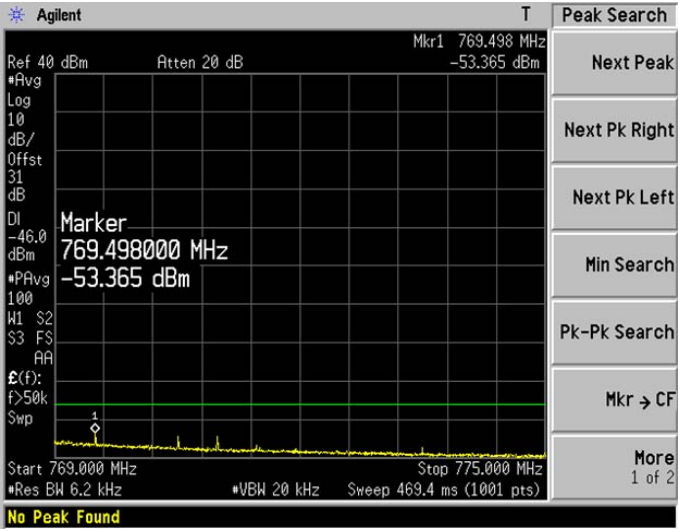
## 10.6 Test Procedure according to FCC 90.543

(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than  $76 + 10 \log (P)$  dB in a 6.25 kHz band segment, for base and fixed stations.
- (2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations.
- (3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least  $43 + 10 \log (P)$  dB.



10.7 Test Results : Pass



## 11. Radiated Spurious Emission

### 11.1 Test Procedure according to KDB935210 D5 3.4

This measurement is intended to produce test data necessary to demonstrate compliance to the radiated spurious emission requirements specified in Section 2.1053 of the FCC rules. This test is intended to capture any emissions that radiate directly from the case, cabinet, control circuits, etc., instead of via the antenna output port, and thus would not be captured in conducted spurious emission measurements.

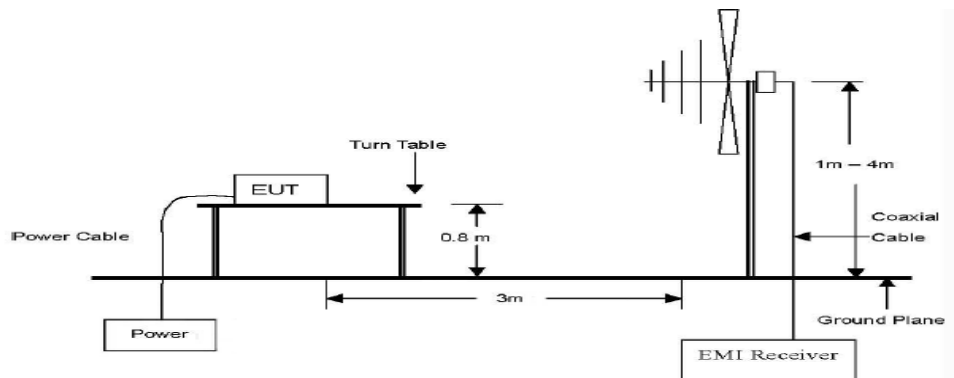
### 11.2 Test Equipments

The following test equipments are used during tests

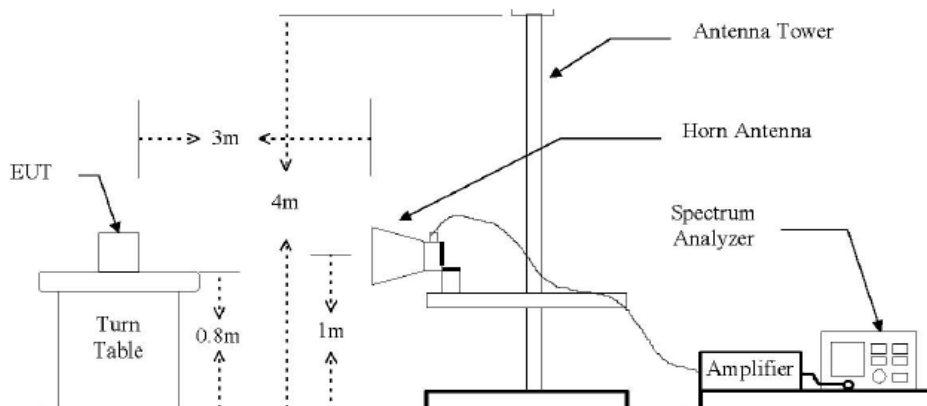
| Equipment         | Manufacturer    | Model       | Next Cal.  |
|-------------------|-----------------|-------------|------------|
| Spectrum Analyzer | ROHDE&SCHWARZ   | FSV40       | 100939     |
| Signal Generator  | ROHDE&SCHWARZ   | SMBV100A    | 2566633    |
| TEST Receiver     | ROHDE & SCHWARZ | ESCI7       | 100185     |
| Logbicon Antenna  | SCHWARZBECK     | VULB 9168   | 237        |
| PREAMPLIFIER      | AGILENT         | 8449B       | 3008A00595 |
| Signal Generator  | HP              | E4432B      | GB40050840 |
| Signal Generator  | ROHDE & SCHWARZ | SMB 100A    | 177653     |
| Horn Antenna      | SCHWARZBECK     | BBHA 9120 D | 469        |

### 11.3 Test Setup

Test setup for 30 MHz to 1 GHz



Test setup for above 1 GHz





**11.4 Test Results : Pass**

**Downlink (758 ~ 775 MHz)**

| Ant. Po | Frequency (MHz) | Det mode | Reading (dBm) | A/F (dB) | C/L (dB) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|----------|---------------|----------|----------|--------------|-------------|-------------|
| H       | 91.40           | Peak     | -71.70        | 7.83     | 1.46     | -62.41       | -13.00      | 49.41       |
| H       | 137.20          | Peak     | -80.66        | 12.13    | 1.79     | -66.74       | -13.00      | 53.74       |
| H       | 210.00          | Peak     | -78.52        | 10.00    | 2.27     | -66.25       | -13.00      | 53.25       |
| H       | 243.24          | Peak     | -78.37        | 11.37    | 2.46     | -64.54       | -13.00      | 51.54       |
| H       | 375.00          | Peak     | -77.67        | 15.09    | 3.09     | -59.48       | -13.00      | 46.48       |
| H       | 560.00          | Peak     | -76.78        | 18.60    | 3.81     | -54.37       | -13.00      | 41.37       |
| H       | 1533.00         | Peak     | -46.41        | 25.27    | -30.55   | -51.69       | -13.00      | 38.69       |
| H       | 1840.00         | Peak     | -55.02        | 25.46    | -30.18   | -59.74       | -13.00      | 46.74       |
| H       | 2400.00         | Peak     | -60.74        | 27.90    | -29.81   | -62.65       | -13.00      | 49.65       |
| H       | 3450.50         | Peak     | -61.89        | 28.55    | -28.76   | -62.10       | -13.00      | 49.10       |
| H       | 7801.25         | Peak     | -61.56        | 36.40    | -25.42   | -50.58       | -13.00      | 37.58       |
| V       | 30.64           | Peak     | -79.49        | 12.01    | 0.80     | -66.68       | -13.00      | 53.68       |
| V       | 35.48           | Peak     | -78.94        | 12.11    | 0.87     | -65.96       | -13.00      | 52.96       |
| V       | 39.44           | Peak     | -71.42        | 12.15    | 0.90     | -58.37       | -13.00      | 45.37       |
| V       | 91.68           | Peak     | -68.31        | 7.84     | 1.46     | -59.01       | -13.00      | 46.01       |
| V       | 180.48          | Peak     | -75.14        | 11.61    | 2.08     | -61.45       | -13.00      | 48.45       |
| V       | 560.00          | Peak     | -74.86        | 18.60    | 3.81     | -52.45       | -13.00      | 39.45       |
| V       | 1533.00         | Peak     | -22.57        | 25.27    | -30.55   | -27.85       | -13.00      | 14.85       |
| V       | 1839.75         | Peak     | -57.91        | 25.46    | -30.18   | -62.63       | -13.00      | 49.63       |
| V       | 2299.50         | Peak     | -35.75        | 27.80    | -29.88   | -37.83       | -13.00      | 24.83       |
| V       | 2395.50         | Peak     | -55.66        | 27.90    | -29.82   | -57.58       | -13.00      | 44.58       |
| V       | 3066.00         | Peak     | -44.30        | 28.63    | -29.50   | -45.17       | -13.00      | 32.17       |
| V       | 3832.50         | Peak     | -57.39        | 29.57    | -27.90   | -55.72       | -13.00      | 42.72       |

\*A/F : Antenna factor

C/L : Cable loss



**Downlink(851 ~ 862 MHz)**

| Ant.<br>Po | Frequency<br>(MHz) | Dect mode | Reading<br>(dBm) | A/F<br>(dB) | C/L<br>(dB) | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|------------|--------------------|-----------|------------------|-------------|-------------|-----------------|----------------|----------------|
| H          | 32.72              | Peak      | -77.51           | 12.03       | 0.82        | -64.66          | -13.00         | 51.66          |
| H          | 82.60              | Peak      | -73.47           | 9.15        | 1.38        | -62.94          | -13.00         | 49.94          |
| H          | 125.00             | Peak      | -61.04           | 10.80       | 1.71        | -48.53          | -13.00         | 35.53          |
| H          | 201.40             | Peak      | -77.47           | 9.93        | 2.22        | -65.32          | -13.00         | 52.32          |
| H          | 215.32             | Peak      | -70.56           | 10.11       | 2.30        | -58.15          | -13.00         | 45.15          |
| H          | 269.08             | Peak      | -77.12           | 12.10       | 2.59        | -62.43          | -13.00         | 49.43          |
| H          | 1125.25            | Peak      | -59.37           | 24.63       | -31.36      | -66.10          | -13.00         | 53.10          |
| H          | 1533.00            | Peak      | -51.34           | 25.27       | -30.55      | -56.62          | -13.00         | 43.62          |
| H          | 1840.00            | Peak      | -56.32           | 25.46       | -30.18      | -61.04          | -13.00         | 48.04          |
| H          | 2400.00            | Peak      | -60.56           | 27.90       | -29.81      | -62.47          | -13.00         | 49.47          |
| H          | 7806.00            | Peak      | -61.65           | 36.40       | -25.42      | -50.67          | -13.00         | 37.67          |
| V          | 31.52              | Peak      | -65.12           | 12.02       | 0.81        | -52.29          | -13.00         | 39.29          |
| V          | 33.68              | Peak      | -69.20           | 12.04       | 0.82        | -56.33          | -13.00         | 43.33          |
| V          | 37.48              | Peak      | -71.72           | 12.13       | 0.88        | -58.71          | -13.00         | 45.71          |
| V          | 62.64              | Peak      | -67.05           | 13.23       | 1.19        | -52.63          | -13.00         | 39.63          |
| V          | 77.84              | Peak      | -67.84           | 10.65       | 1.34        | -55.85          | -13.00         | 42.85          |
| V          | 124.96             | Peak      | -68.44           | 10.49       | 1.70        | -56.24          | -13.00         | 43.24          |
| V          | 1533.00            | Peak      | -25.22           | 25.27       | -30.55      | -30.50          | -13.00         | 17.50          |
| V          | 1839.00            | Peak      | -57.75           | 25.46       | -30.18      | -62.47          | -13.00         | 49.47          |
| V          | 2299.50            | Peak      | -39.37           | 27.80       | -29.88      | -41.45          | -13.00         | 28.45          |
| V          | 3066.00            | Peak      | -49.07           | 28.63       | -29.50      | -49.94          | -13.00         | 36.94          |
| V          | 3619.50            | Peak      | -62.22           | 29.12       | -28.40      | -61.50          | -13.00         | 48.50          |
| V          | 6728.25            | Peak      | -62.22           | 34.60       | -26.00      | -53.62          | -13.00         | 40.62          |

\*A/F : Antenna factor

C/L : Cable loss



**Uplink (788 ~ 805 MHz)**

| Ant. Po | Frequency (MHz) | Dect mode | Reading (dBm) | A/F (dB) | C/L (dB) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|-----------|---------------|----------|----------|--------------|-------------|-------------|
| H       | 32.84           | Peak      | -78.45        | 12.03    | 0.82     | -65.60       | -13.00      | 52.60       |
| H       | 81.16           | Peak      | -73.16        | 9.12     | 1.38     | -62.66       | -13.00      | 49.66       |
| H       | 125.00          | Peak      | -65.25        | 10.80    | 1.71     | -52.74       | -13.00      | 39.74       |
| H       | 210.00          | Peak      | -71.32        | 10.00    | 2.27     | -59.05       | -13.00      | 46.05       |
| H       | 280.00          | Peak      | -78.03        | 13.00    | 2.65     | -62.38       | -13.00      | 49.38       |
| H       | 350.00          | Peak      | -77.67        | 14.20    | 2.98     | -60.49       | -13.00      | 47.49       |
| H       | 1400.00         | Peak      | -60.33        | 25.70    | -30.79   | -65.42       | -13.00      | 52.42       |
| H       | 1610.00         | Peak      | -60.30        | 25.01    | -30.42   | -65.71       | -13.00      | 52.71       |
| H       | 1840.00         | Peak      | -56.81        | 25.46    | -30.18   | -61.53       | -13.00      | 48.53       |
| H       | 2100.00         | Peak      | -60.43        | 27.30    | -30.00   | -63.13       | -13.00      | 50.13       |
| H       | 2432.50         | Peak      | -60.80        | 27.74    | -29.79   | -62.85       | -13.00      | 49.85       |
| H       | 3951.75         | Peak      | -62.15        | 29.75    | -27.60   | -60.00       | -13.00      | 47.00       |
| V       | 32.28           | Peak      | -63.41        | 12.03    | 0.81     | -50.57       | -13.00      | 37.57       |
| V       | 62.96           | Peak      | -65.29        | 13.23    | 1.20     | -50.86       | -13.00      | 37.86       |
| V       | 78.92           | Peak      | -63.85        | 10.66    | 1.35     | -51.84       | -13.00      | 38.84       |
| V       | 125.00          | Peak      | -63.00        | 10.80    | 1.71     | -50.49       | -13.00      | 37.49       |
| V       | 199.68          | Peak      | -68.79        | 10.31    | 2.20     | -56.28       | -13.00      | 43.28       |
| V       | 204.88          | Peak      | -72.00        | 10.02    | 2.23     | -59.75       | -13.00      | 46.75       |
| V       | 1125.00         | Peak      | -57.39        | 24.63    | -31.36   | -64.13       | -13.00      | 51.13       |
| V       | 1610.00         | Peak      | -57.87        | 25.01    | -30.42   | -63.28       | -13.00      | 50.28       |
| V       | 1840.25         | Peak      | -55.35        | 25.46    | -30.18   | -60.07       | -13.00      | 47.07       |
| V       | 2250.00         | Peak      | -57.77        | 27.95    | -29.90   | -59.72       | -13.00      | 46.72       |
| V       | 2400.00         | Peak      | -57.02        | 27.90    | -29.81   | -58.93       | -13.00      | 45.93       |
| V       | 2700.00         | Peak      | -56.68        | 28.00    | -29.71   | -58.39       | -13.00      | 45.39       |

\*A/F : Antenna factor

C/L : Cable loss



**Uplink (806 ~ 817 MHz)**

| Ant. Po | Frequency (MHz) | Dect mode | Reading (dBm) | A/F (dB) | C/L (dB) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---------|-----------------|-----------|---------------|----------|----------|--------------|-------------|-------------|
| H       | 32.24           | Peak      | -77.92        | 12.03    | 0.81     | -65.08       | -13.00      | 52.08       |
| H       | 83.40           | Peak      | -76.76        | 9.17     | 1.39     | -66.21       | -13.00      | 53.21       |
| H       | 125.00          | Peak      | -68.82        | 10.80    | 1.71     | -56.31       | -13.00      | 43.31       |
| H       | 197.92          | Peak      | -77.14        | 10.27    | 2.19     | -64.68       | -13.00      | 51.68       |
| H       | 210.00          | Peak      | -74.58        | 10.00    | 2.27     | -62.31       | -13.00      | 49.31       |
| H       | 350.00          | Peak      | -79.27        | 14.20    | 2.98     | -62.09       | -13.00      | 49.09       |
| H       | 1533.00         | Peak      | -45.41        | 25.27    | -30.55   | -50.69       | -13.00      | 37.69       |
| H       | 1840.00         | Peak      | -54.02        | 25.46    | -30.18   | -58.74       | -13.00      | 45.74       |
| H       | 2400.00         | Peak      | -58.74        | 27.90    | -29.81   | -60.65       | -13.00      | 47.65       |
| H       | 3450.50         | Peak      | -61.89        | 28.55    | -28.76   | -62.10       | -13.00      | 49.10       |
| H       | 7801.25         | Peak      | -61.56        | 36.41    | -25.41   | -50.57       | -13.00      | 37.57       |
| V       | 32.20           | Peak      | -66.09        | 12.03    | 0.81     | -53.25       | -13.00      | 40.25       |
| V       | 36.60           | Peak      | -69.63        | 12.12    | 0.88     | -56.63       | -13.00      | 43.63       |
| V       | 64.76           | Peak      | -66.78        | 13.25    | 1.21     | -52.33       | -13.00      | 39.33       |
| V       | 79.32           | Peak      | -66.01        | 10.67    | 1.35     | -53.99       | -13.00      | 40.99       |
| V       | 95.88           | Peak      | -67.76        | 7.82     | 1.49     | -58.45       | -13.00      | 45.45       |
| V       | 125.00          | Peak      | -64.31        | 10.80    | 1.71     | -51.80       | -13.00      | 38.80       |
| V       | 1125.00         | Peak      | -54.47        | 24.63    | -31.36   | -61.21       | -13.00      | 48.21       |
| V       | 1610.00         | Peak      | -57.54        | 25.01    | -30.42   | -62.95       | -13.00      | 49.95       |
| V       | 1839.50         | Peak      | -55.65        | 25.46    | -30.18   | -60.37       | -13.00      | 47.37       |
| V       | 2395.75         | Peak      | -56.96        | 27.90    | -29.82   | -58.88       | -13.00      | 45.88       |
| V       | 2700.00         | Peak      | -55.17        | 28.00    | -29.71   | -56.88       | -13.00      | 43.88       |
| V       | 5748.75         | Peak      | -60.17        | 32.35    | -26.78   | -54.60       | -13.00      | 41.60       |

\*A/F : Antenna factor

C/L : Cable loss



## 11.5 Result for Section 90.543 (f)

## 11.6 FCC 90.543

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and  $-80$  dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

## 11.7 Test Results : Pass

| Input      |      | Measured |        |        |       |
|------------|------|----------|--------|--------|-------|
|            | Freq | Freq     | Ver    | Hor    | Limit |
| Modulation | MHz  | MHz      | dBm    | dBm    | dBm   |
| AWGN       | 802  | 1604     | -43.78 | -43.66 | -40   |
| CW         | 802  | 1604     | -53.22 | -52.74 | -50   |



## Appendix 1. Uncertainty

| Description                                | Frequency Range                     | Uncertainty                  |
|--------------------------------------------|-------------------------------------|------------------------------|
| Conducted RF Output Power                  | 25 to 7000 MHz                      | $\pm 0.45$ dB                |
| Occupied Bandwidth                         | 25 to 7000 MHz                      | $\pm 41$ kHz                 |
| Out of Band Rejection                      | 25 to 7000 MHz                      | $\pm 0.48$ MHz               |
| Spurious Emissions at Antenna<br>Terminals | -                                   | $\pm 1.31$ dB                |
| Radiated Spurious Emissions                | 25 to 1000 MHz<br>1000 to 40000 MHz | $\pm 3.5$ dB<br>$\pm 5.2$ dB |