

# Appendix -

## Test Data and Result for report

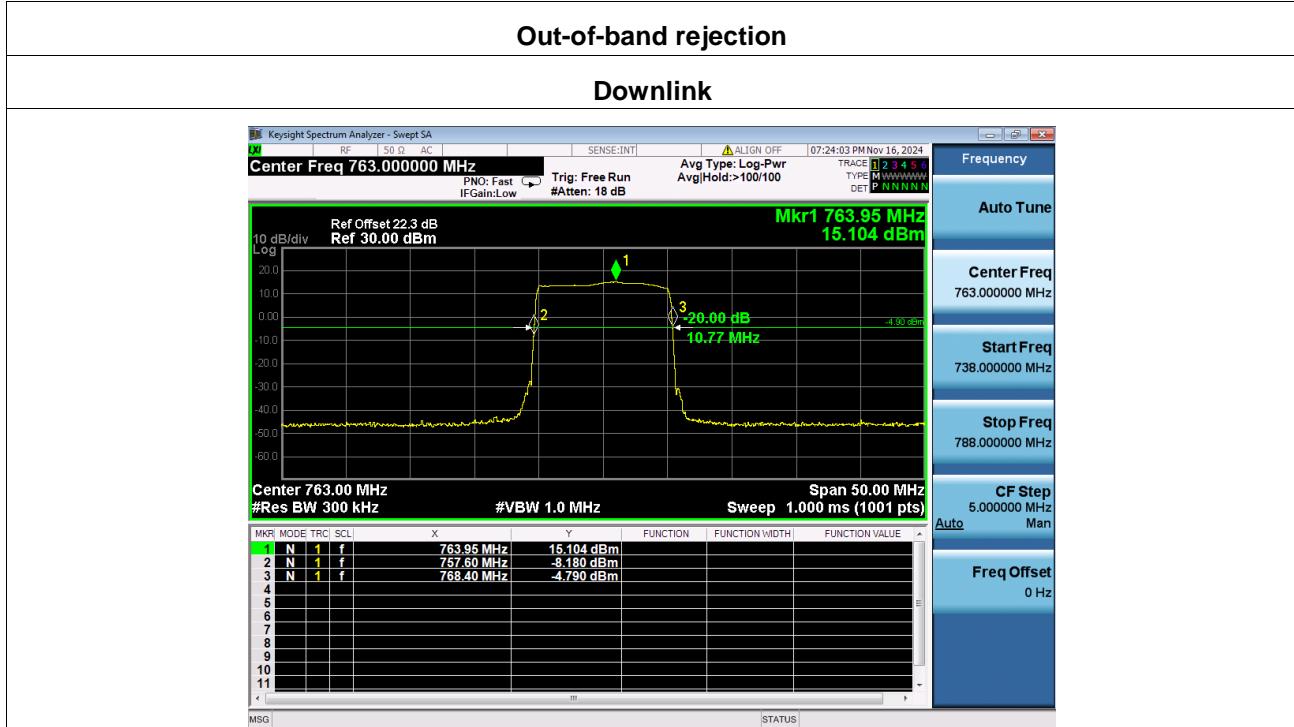
**GZCR241100131302**



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## 1 Out-of-band rejection



Remark:

1. The peak of the frequency response  $f_0$  is 763.95MHz.
2. The frequency point  $f_0$  with the highest power level fall in the CMRS band, EUT is compiled the KDB 935210 D05 Signal Booster Measurements v01r04 Out-of-band rejection verification test requirement.
3. AGC threshold level was measured as below:

| Test Path | Test Signal | Test Channel | AGC threshold level |
|-----------|-------------|--------------|---------------------|
| DL        | 4.1MHz AWGN | MCH          | -61.8dBm            |
|           | 100MHz AWGN | MCH          | -61.6dBm            |
| UL        | 4.1MHz AWGN | MCH          | -64.8dBm            |
|           | 100MHz AWGN | MCH          | -64.7dBm            |

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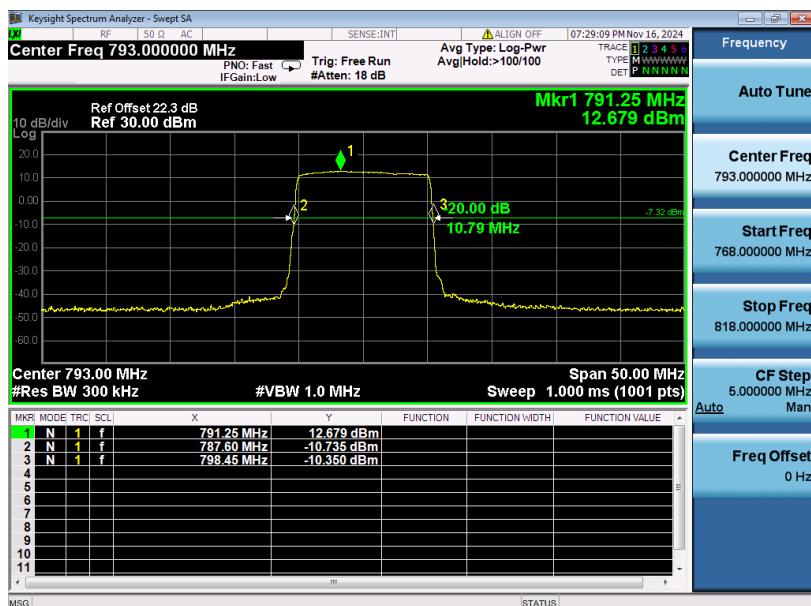
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## Out-of-band rejection

## Uplink



The peak of the frequency response  $f_0$  is 791.25MHz.

The frequency point  $f_0$  with the highest power level fall in the CMRS band, EUT is compiled the KDB 935210 D05 Signal Booster Measurements v01r04 Out-of-band rejection verification test requirement.

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## 2 Input versus Output comparison

| Occupied Bandwidth |             |              |               |         |
|--------------------|-------------|--------------|---------------|---------|
| Test Path          | Test Signal | Test Channel | Signal Level  | Verdict |
| Downlink           | 4.1MHz AWGN | MCH          | Pre-AGC       | PASS    |
|                    |             |              | 3dB above AGC | PASS    |
|                    | 100MHz AWGN | MCH          | Pre-AGC       | PASS*   |
|                    |             |              | 3dB above AGC | PASS*   |
| Uplink             | 4.1MHz AWGN | MCH          | Pre-AGC       | PASS    |
|                    |             |              | 3dB above AGC | PASS    |
|                    | 100MHz AWGN | MCH          | Pre-AGC       | PASS*   |
|                    |             |              | 3dB above AGC | PASS*   |

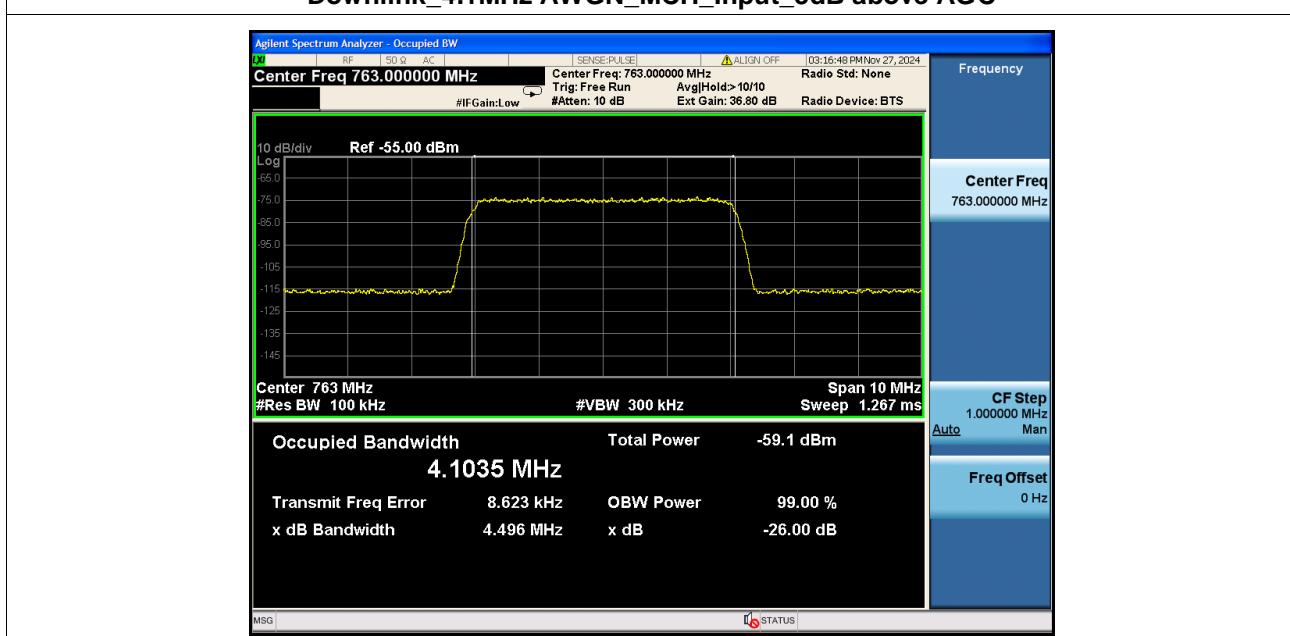
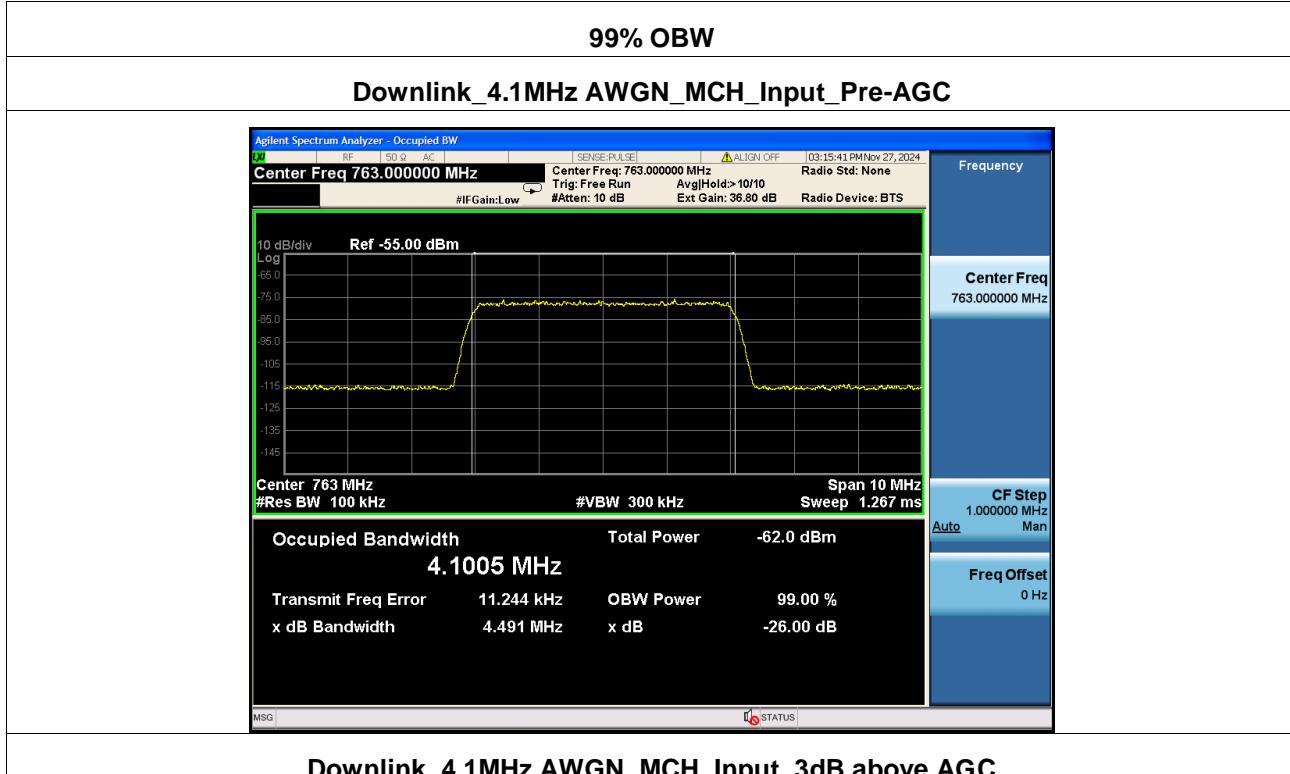
Remark:

- \* The band supports maximum channel BW is 10MHz for NR, so the output signal OBW was less than the input when 100MHz AWGN was as stimulus signal.
- Compare the spectral plot of the input signal to the output signal affirm that they are similar (in passband and roll off characteristic features and relative spectral locations). The test result complies with the requirement.



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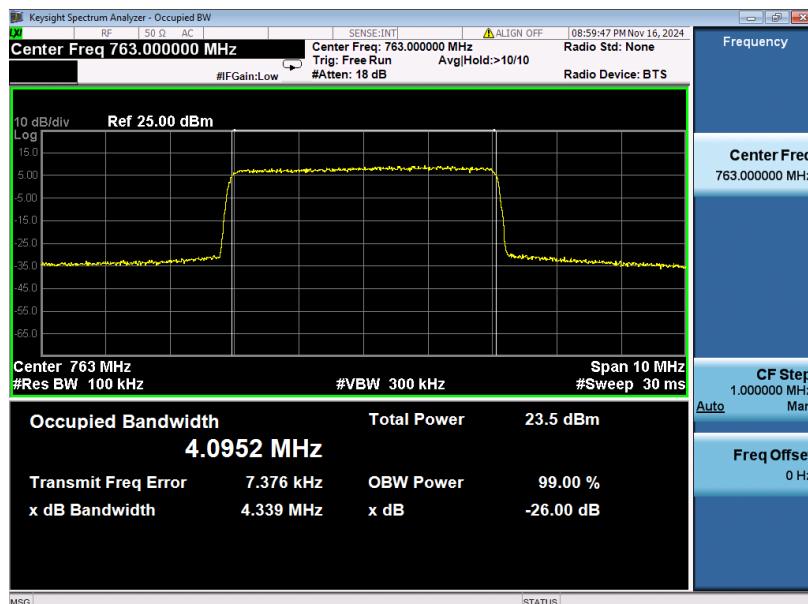
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99% OBW

## Downlink\_4.1MHz AWGN\_MCH\_Output\_Pre-AGC



## Downlink\_4.1MHz AWGN\_MCH\_Output\_3dB above AGC



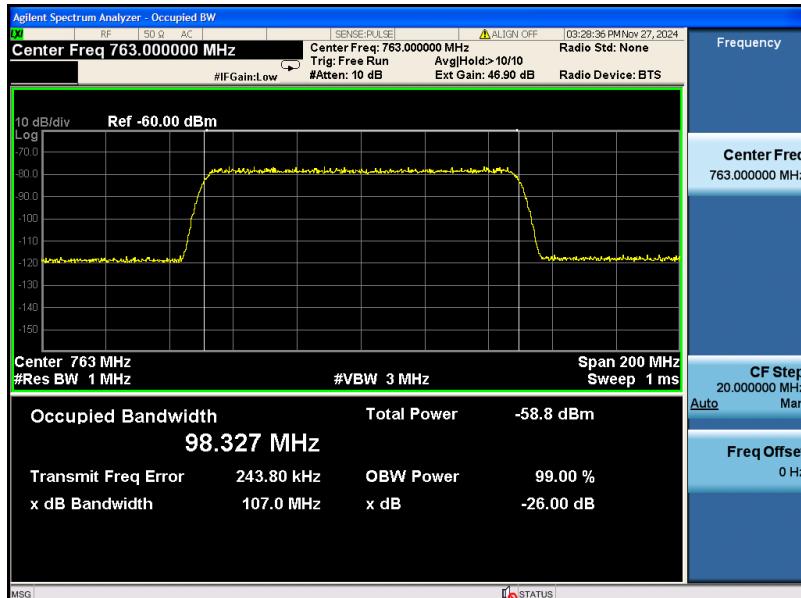
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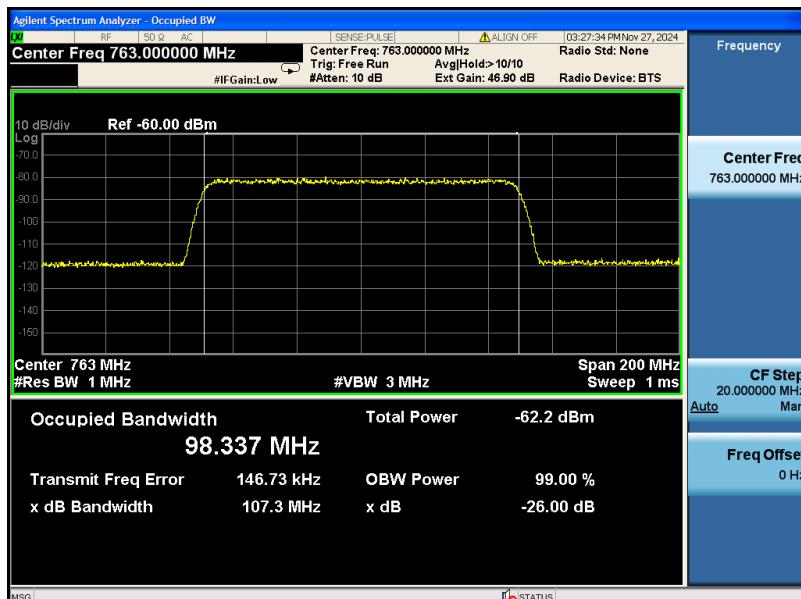


99% OBW

## Downlink\_100MHz AWGN\_MCH\_Input\_Pre-AGC



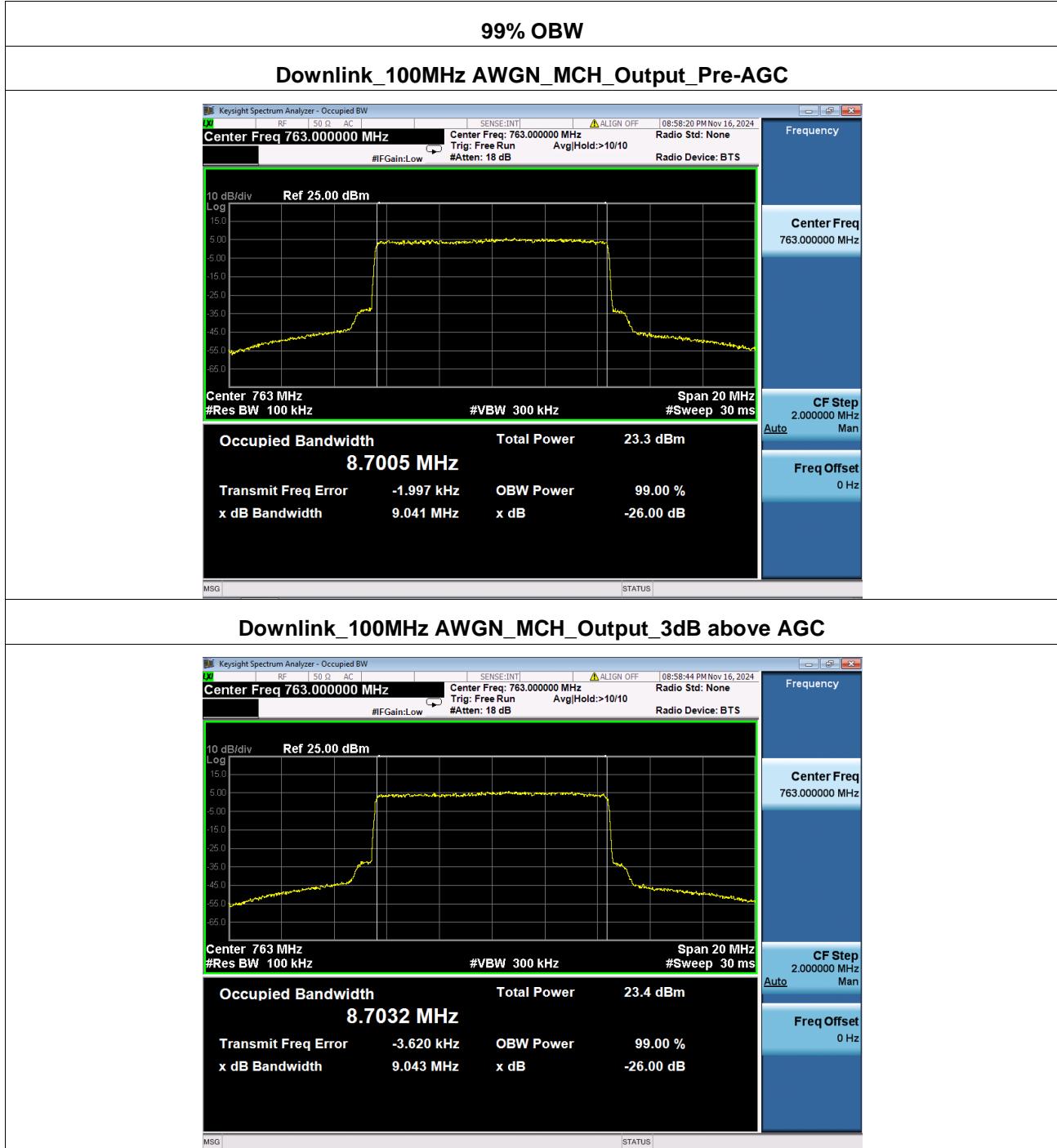
## Downlink\_100MHz AWGN\_MCH\_Input\_3dB above AGC



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99% OBW

## Uplink\_4.1MHz AWGN\_MCH\_Input\_Pre-AGC





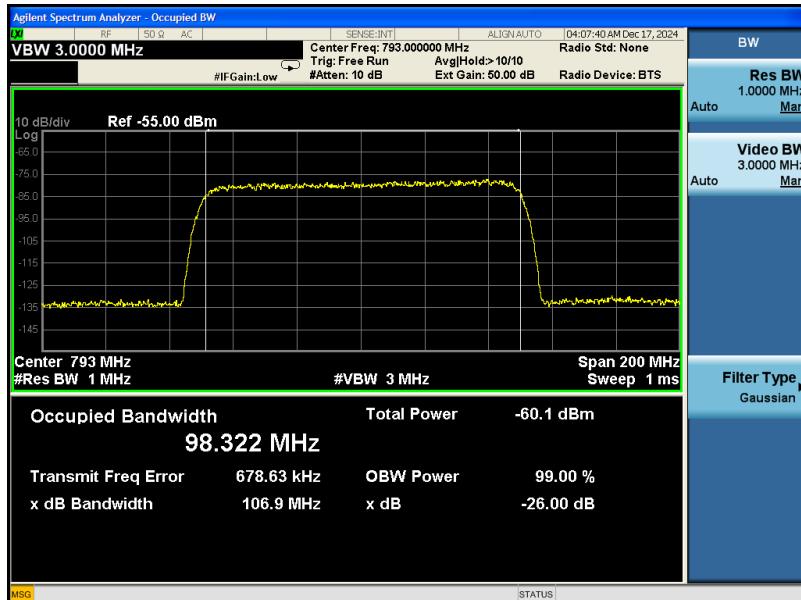
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99% OBW

## Uplink\_100MHz AWGN\_MCH\_Input\_Pre-AGC



## Uplink\_100MHz AWGN\_MCH\_Input\_3dB above AGC



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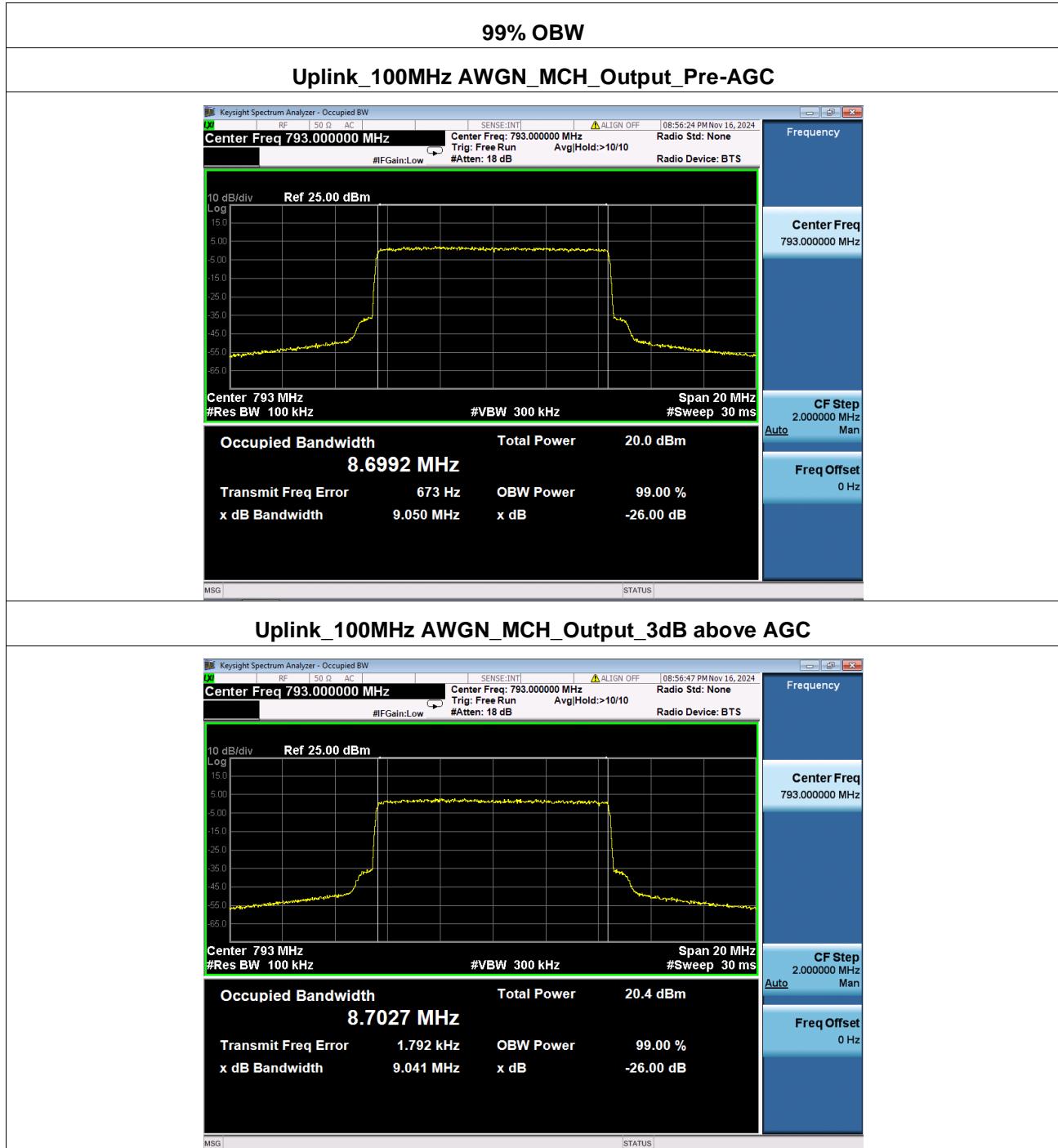
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**3 Emission Mask**

| Emission Masks |             |              |               |               |         |
|----------------|-------------|--------------|---------------|---------------|---------|
| Test path      | Test signal | Test channel | Signal level  | Emission mask | Verdict |
| Downlink       | 4.1MHz AWGN | MCH          | Pre-AGC       | Mask B        | PASS    |
|                |             |              | 3dB above AGC |               | PASS    |
|                | 100MHz AWGN | MCH          | Pre-AGC       | Mask B        | PASS*   |
|                |             |              | 3dB above AGC |               | PASS*   |
| Uplink         | 4.1MHz AWGN | MCH          | Pre-AGC       | Mask B        | PASS    |
|                |             |              | 3dB above AGC |               | PASS    |
|                | 100MHz AWGN | MCH          | Pre-AGC       | Mask B        | PASS*   |
|                |             |              | 3dB above AGC |               | PASS*   |

Remark:  
The band supports maximum channel BW is 10MHz for NR, so the output signal OBW was less than the input when 100MHz AWGN was as stimulus signal.

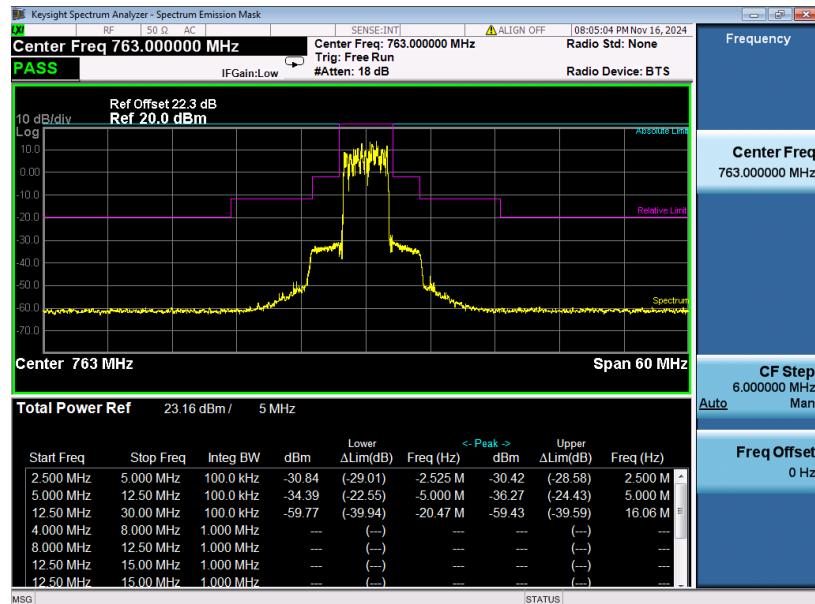


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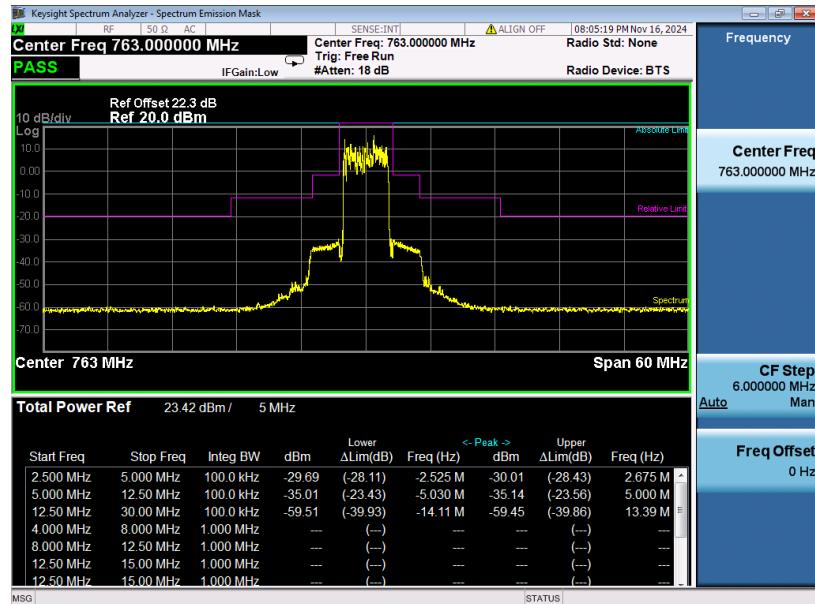
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## Emission Mask B

## Downlink\_4.1MHz AWGN\_MCH\_Output\_Pre-AGC



## Downlink\_4.1MHz AWGN\_MCH\_Output\_3dB above AGC



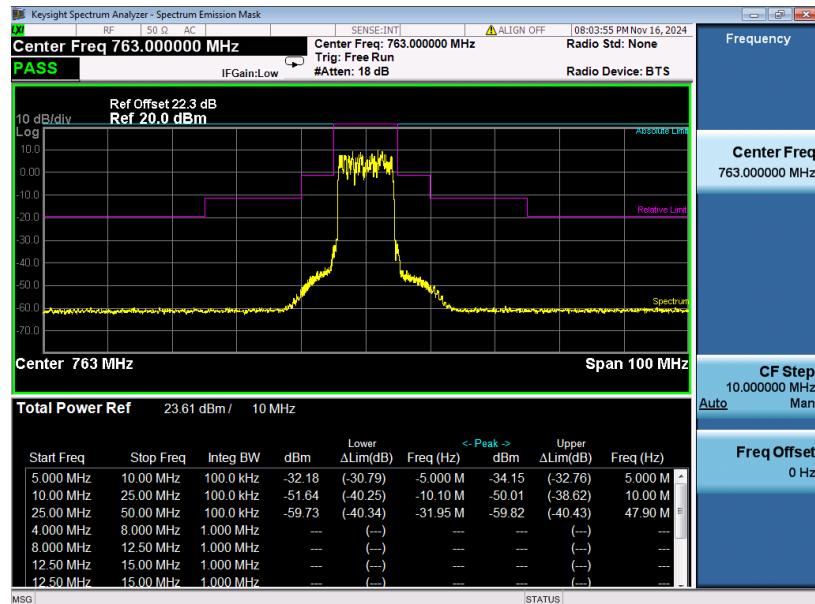
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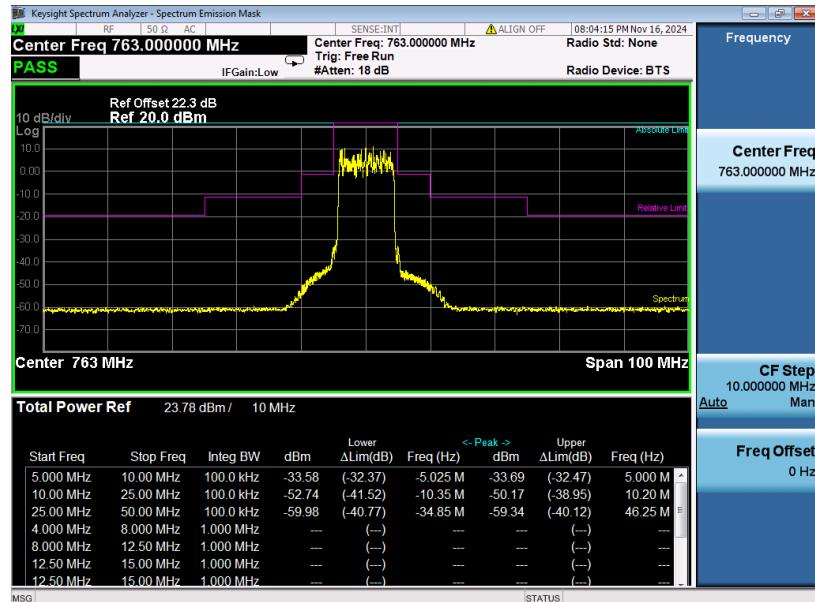


## Emission Mask B

## Downlink\_100MHz AWGN\_MCH\_Output\_Pre-AGC



## Downlink\_100MHz AWGN\_MCH\_Output\_3dB above AGC



## Remark:

The band supports maximum channel BW is 10MHz for NR, so the output signal OBW was less than the input when 100MHz AWGN was as stimulus signal.

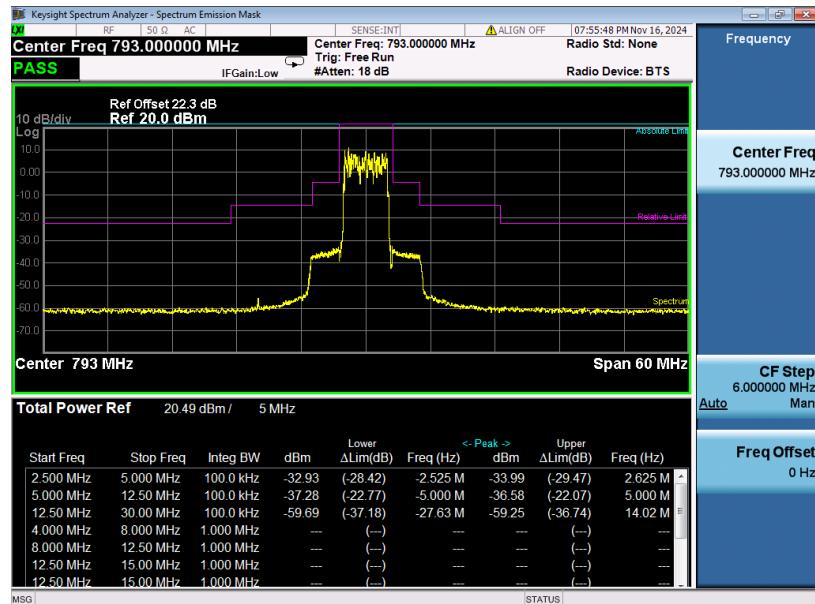
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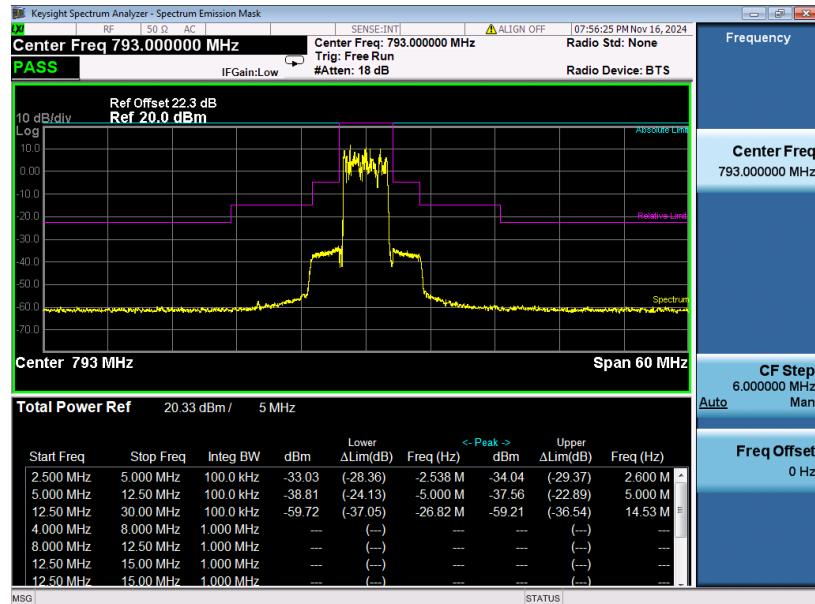


## Emission Mask B

## Uplink\_4.1MHz AWGN\_MCH\_Output\_Pre-AGC



## Uplink\_4.1MHz AWGN\_MCH\_Output\_3dB above AGC



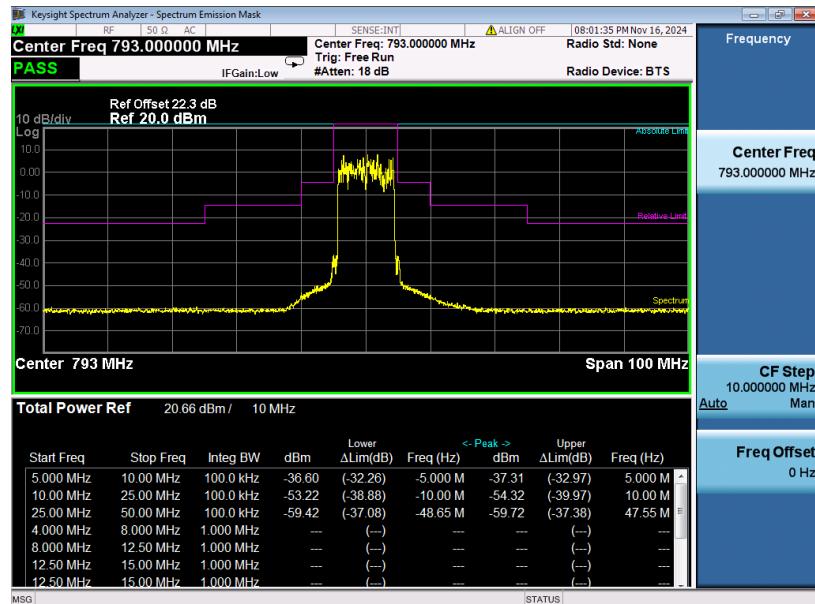
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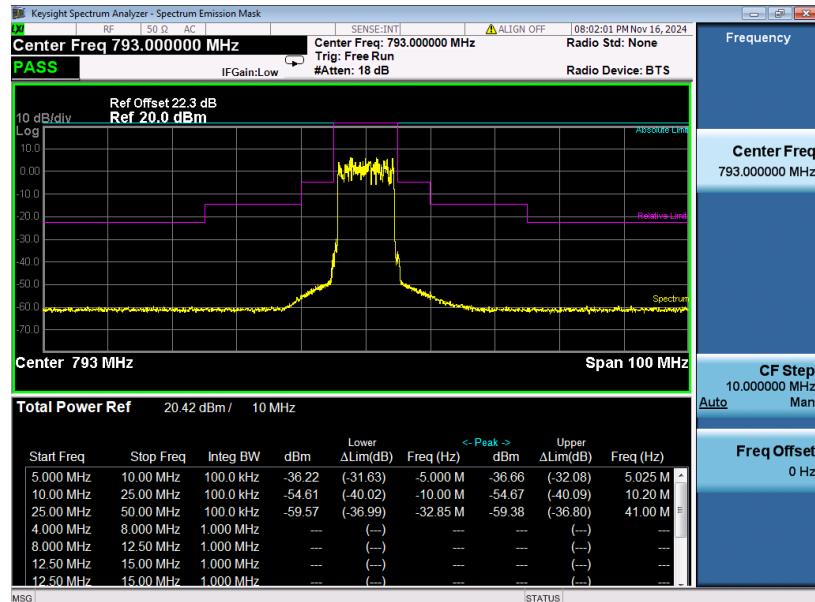


## Emission Mask B

## Uplink\_100MHz AWGN\_MCH\_Output\_Pre-AGC



## Uplink\_100MHz AWGN\_MCH\_Output\_3dB above AGC



Remark:

The band

supports maximum channel BW is 10MHz for NR, so the output signal OBW was less than the input when 100MHz AWGN was as stimulus signal.

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#### 4 Input/output power and amplifier/booster gain

| Mean output power and gain |                     |             |               |                   |                    |                |         |           |
|----------------------------|---------------------|-------------|---------------|-------------------|--------------------|----------------|---------|-----------|
| Test Path                  | Test Freq. f0 (MHz) | Test Signal | Signal Level  | Input power (dBm) | Output Power (dBm) | ANT Gain (dBi) | ERP (W) | Gain (dB) |
| Downlink                   | 763.95              | 4.1MHz AWGN | Pre-AGC       | -62               | 23.59              | 6.5            | 0.622   | 85.59     |
|                            |                     |             | 3dB above AGC | -59               | 23.67              | 6.5            | 0.634   | /         |
|                            |                     | 100MHz AWGN | Pre-AGC       | -52               | 23.17              | 6.5            | 0.565   | 75.17     |
|                            |                     |             | 3dB above AGC | -49               | 23.29              | 6.5            | 0.581   | /         |
| Uplink                     | 791.25              | 4.1MHz AWGN | Pre-AGC       | -65               | 20.33              | 7.5            | 0.370   | 85.33     |
|                            |                     |             | 3dB above AGC | -62               | 20.73              | 7.5            | 0.406   | /         |
|                            |                     | 100MHz AWGN | Pre-AGC       | -55               | 20.00              | 7.5            | 0.343   | 75.00     |
|                            |                     |             | 3dB above AGC | -52               | 20.19              | 7.5            | 0.358   | /         |

Remark:

1. f0 is from Out-of-band Rejection test in the report.
2. ERP= output power (dBm)+ antenna gain (dBi)-2.15, the service antenna gain is 6.5dBi and the donor antenna gain is 7.5dBi declared by the manufacturer.

| Mean output power |                     |             |               |                        |                |             |         |
|-------------------|---------------------|-------------|---------------|------------------------|----------------|-------------|---------|
| Test Path         | Test Freq. f0 (MHz) | Test Signal | Signal Level  | Output Power (dBm/MHz) | ANT Gain (dBi) | ERP (W/MHz) | Verdict |
| Downlink          | 763.95              | 4.1MHz AWGN | Pre-AGC       | 16.55                  | 6.5            | 0.123       | PASS    |
|                   |                     |             | 3dB above AGC | 16.76                  | 6.5            | 0.129       | PASS    |
|                   |                     | 100MHz AWGN | Pre-AGC       | 12.71                  | 6.5            | 0.051       | PASS    |
|                   |                     |             | 3dB above AGC | 12.91                  | 6.5            | 0.053       | PASS    |
| Uplink            | 791.25              | 4.1MHz AWGN | Pre-AGC       | 13.26                  | 7.5            | 0.073       | PASS    |
|                   |                     |             | 3dB above AGC | 13.81                  | 7.5            | 0.082       | PASS    |
|                   |                     | 100MHz AWGN | Pre-AGC       | 9.34                   | 7.5            | 0.029       | PASS    |
|                   |                     |             | 3dB above AGC | 9.61                   | 7.5            | 0.031       | PASS    |

Remark:

1. f0 is from Out-of-band Rejection test in the report.
2. ERP= output power (dBm)+ antenna gain (dBi)- 2.15, the service antenna gain is 6.5dBi and the donor antenna gain is 7.5dBi declared by the manufacturer.
3. The output power is limited to an ERP of 1000W/MHz.

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**5 Noise Figure**

| Noise Figure |                           |            |         |
|--------------|---------------------------|------------|---------|
| Test Path    | Maximum Noise Figure (dB) | Limit (dB) | Verdict |
| Downlink     | 3.20                      | ≤9         | PASS    |
| Uplink       | 3.28                      | ≤9         | PASS    |



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## 6 Intermodulation emissions

| Intermodulation emissions |                     |                          |               |                                  |        |
|---------------------------|---------------------|--------------------------|---------------|----------------------------------|--------|
| Test Path                 | Test Freq. f0 (MHz) | CW signals spacing (kHz) | Signal Level  | Worst conducted test level (dBm) |        |
|                           |                     |                          |               | /300Hz                           | /10kHz |
| Downlink                  | 763.95              | 6.25                     | Pre-AGC       | -36.07                           | -31.72 |
|                           |                     |                          | 3dB above AGC | -35.96                           | -31.61 |
|                           |                     | 12.5                     | Pre-AGC       | -34.10                           | -29.75 |
|                           |                     |                          | 3dB above AGC | -33.95                           | -29.60 |
|                           |                     | 25                       | Pre-AGC       | -33.73                           | -29.38 |
|                           |                     |                          | 3dB above AGC | -34.88                           | -30.53 |
| Uplink                    | 791.25              | 6.25                     | Pre-AGC       | -42.44                           | -37.09 |
|                           |                     |                          | 3dB above AGC | -42.53                           | -37.18 |
|                           |                     | 12.5                     | Pre-AGC       | -36.86                           | -31.51 |
|                           |                     |                          | 3dB above AGC | -37.17                           | -31.82 |
|                           |                     | 25                       | Pre-AGC       | -36.42                           | -31.07 |
|                           |                     |                          | 3dB above AGC | -36.80                           | -31.45 |

## Remark:

1. f0 is from Out-of-band Rejection test in the report.
2. The level in 10kHz measurement bandwidth= the level in 300Hz measurement bandwidth+  $10\lg(10000/300)$ .
3. ERP= output power (dBm)+ antenna gain (dBi)- 2.15, the service antenna gain is 6.5dBi and the donor antenna gain is 7.5dBi declared by the manufacturer.
4. For downlink, the maximum ERP of intermodulation product is  $-33.73\text{dBm}/10\text{kHz} + 6.5 - 2.15 = -29.38\text{dBm}/10\text{kHz}$ , which exceeded the limit  $-30\text{dBm}/10\text{kHz}$ , the applicant must use good engineering practice to eliminate the intermodulation products interference.
5. For Uplink, the maximum ERP of intermodulation product is  $-36.42\text{dBm}/10\text{kHz} + 7.5 - 2.15 = -31.07\text{dBm}/10\text{kHz}$ , which less than the limit  $-30\text{dBm}/10\text{kHz}$ .

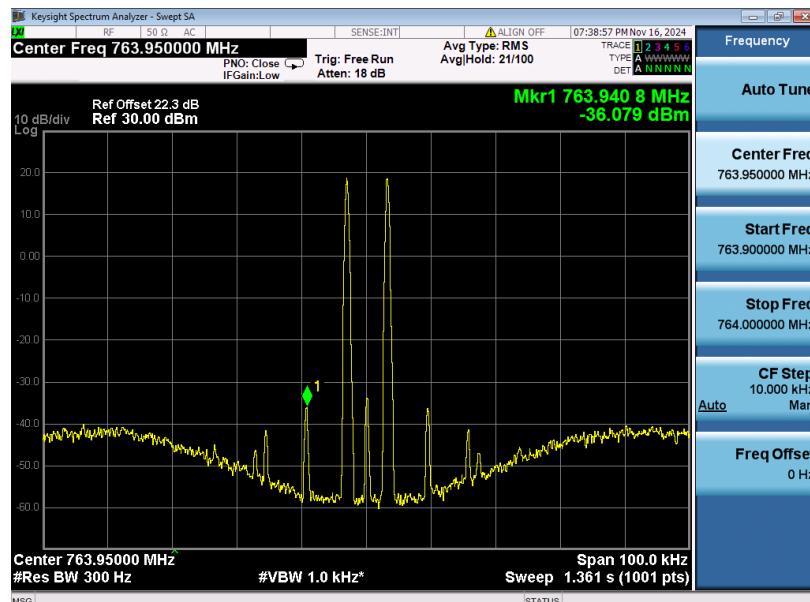


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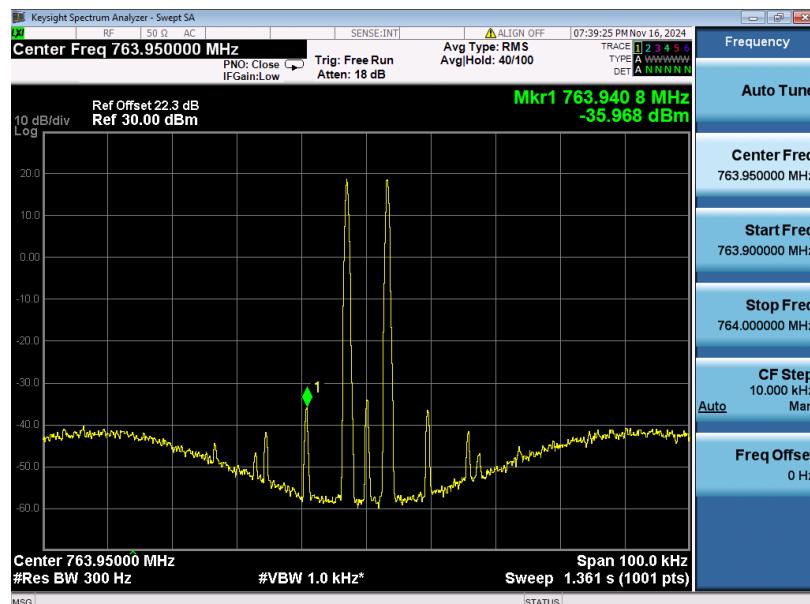
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## Intermodulation emissions

## Downlink\_6.25kHz spacing\_Pre-AGC



## Downlink\_6.25kHz spacing\_3dB above AGC



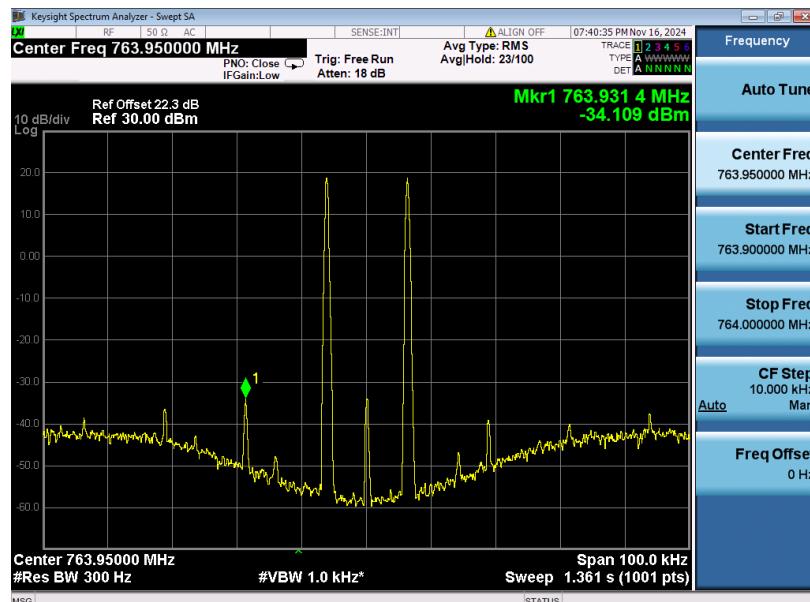
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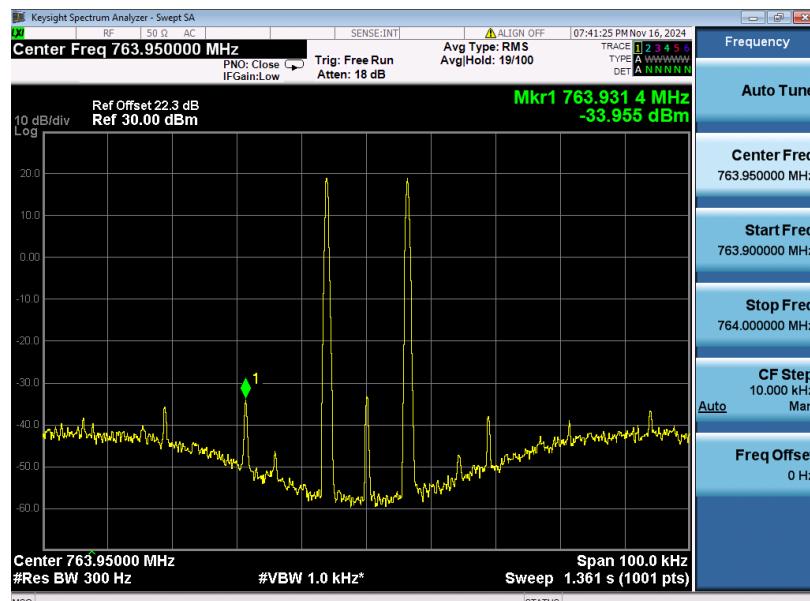


## Intermodulation emissions

## Downlink\_12.5kHz spacing\_Pre-AGC



## Downlink\_12.5kHz spacing\_3dB above AGC



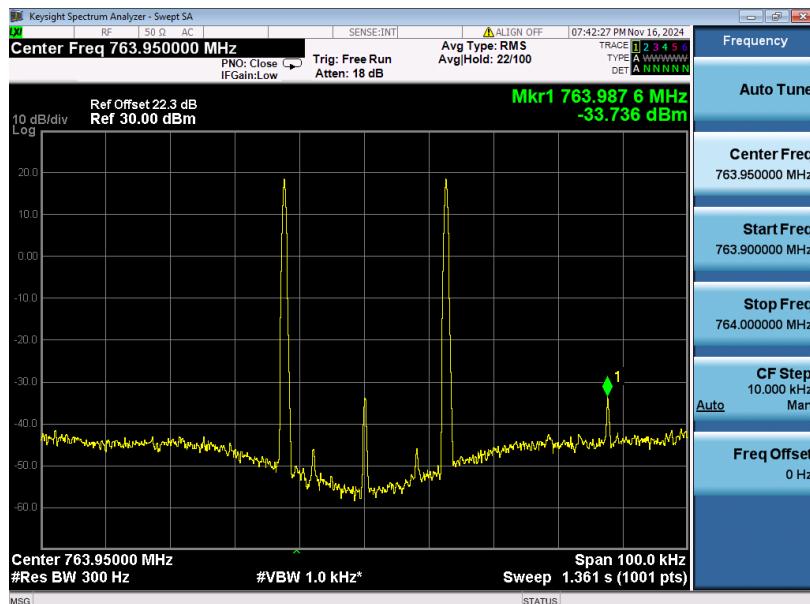
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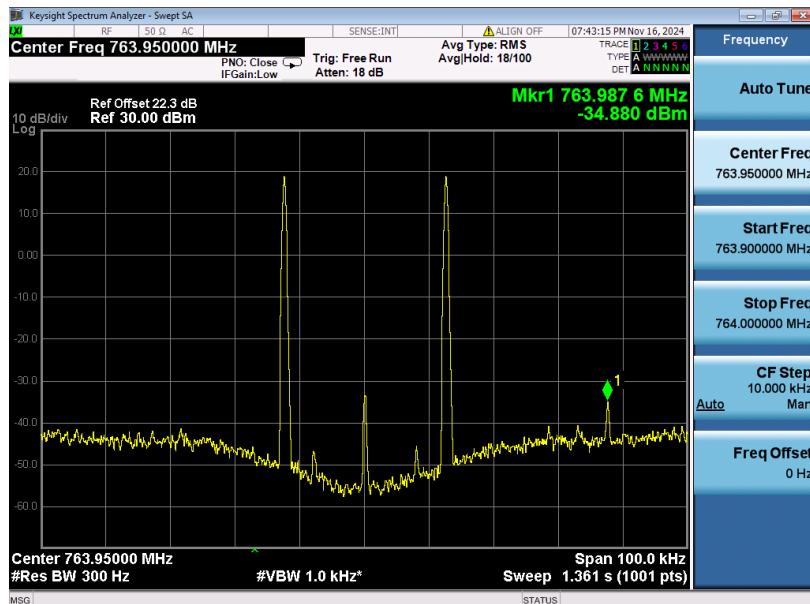


## Intermodulation emissions

## Downlink\_25kHz spacing\_Pre-AGC



## Downlink\_25kHz spacing\_3dB above AGC



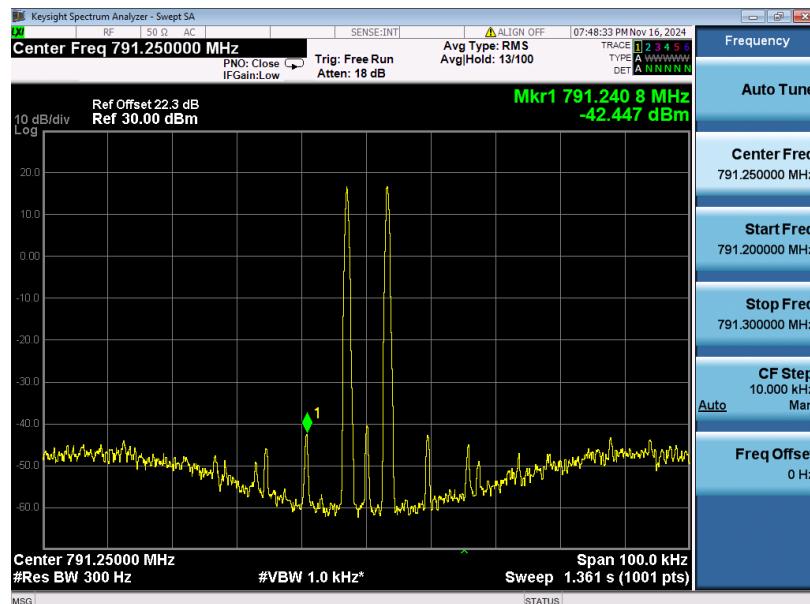
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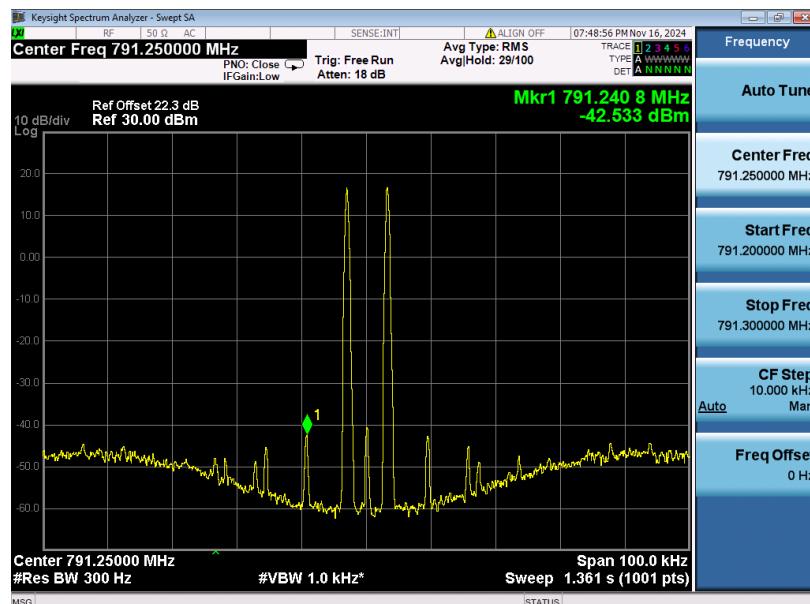


## Intermodulation emissions

## Uplink\_6.25kHz spacing\_Pre-AGC



## Uplink\_6.25kHz spacing\_3dB above AGC



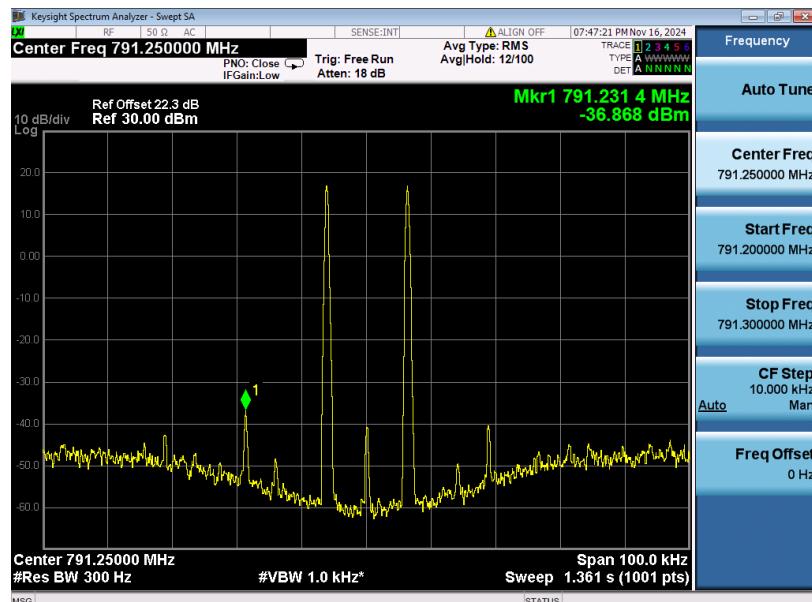
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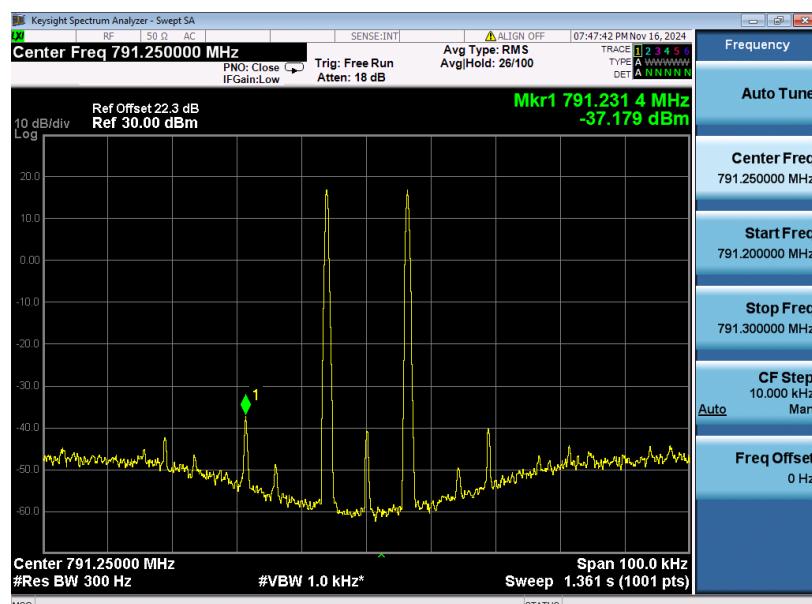


## Intermodulation emissions

## Uplink\_12.5kHz spacing\_Pre-AGC



## Uplink\_12.5kHz spacing\_3dB above AGC



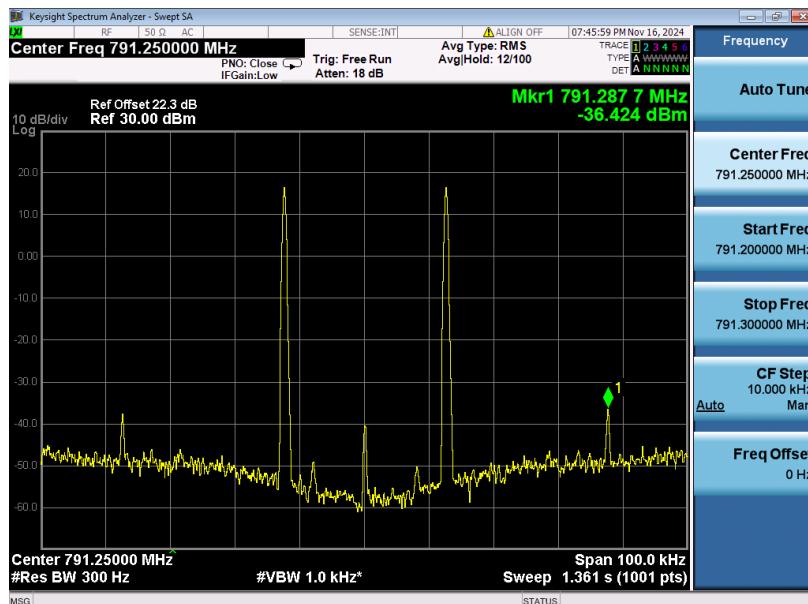
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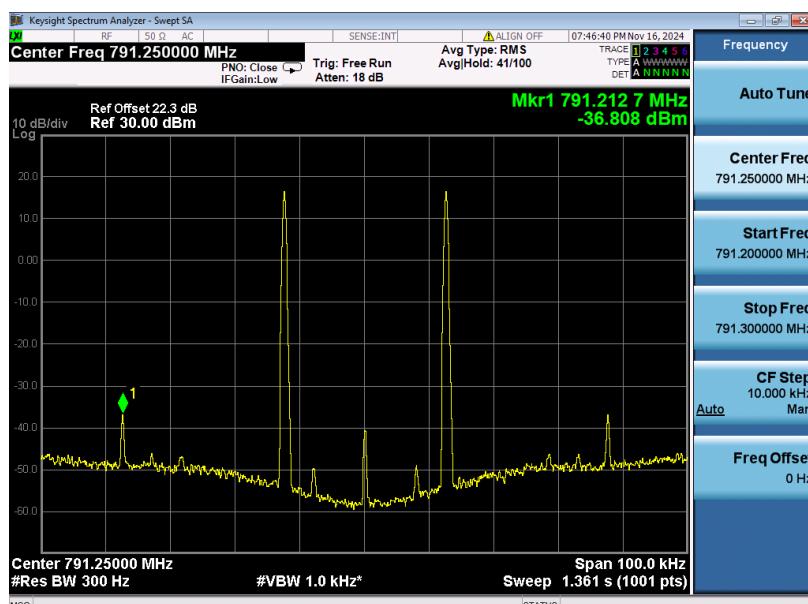


## Intermodulation emissions

## Uplink\_25kHz spacing\_Pre-AGC



## Uplink\_25kHz spacing\_3dB above AGC



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**7 Conducted Spurious emissions**

| Conducted Spurious emissions |             |              |                       |                        |             |         |
|------------------------------|-------------|--------------|-----------------------|------------------------|-------------|---------|
| Test path                    | Test signal | Test channel | Frequency range (MHz) | Worst test level (dBm) | Limit (dBm) | Verdict |
| Downlink                     | 4.1MHz AWGN | LCH          | 0.09-30               | -68.22                 | ≤-13        | PASS    |
|                              |             |              | 30-758                | -27.00                 | ≤-13        | PASS    |
|                              |             | HCH          | 768-1000              | -27.48                 | ≤-13        | PASS    |
|                              |             |              | 1000-7680             | -36.89                 | ≤-13        | PASS    |
|                              |             |              | 769-775               | -63.78                 | ≤-46        | PASS    |
|                              |             | LCH          | 0.09-30               | -71.10                 | ≤-13        | PASS    |
|                              |             |              | 30-788                | -28.37                 | ≤-13        | PASS    |
| Uplink                       | 4.1MHz AWGN | HCH          | 798-1000              | -29.40                 | ≤-13        | PASS    |
|                              |             |              | 1000-7980             | -36.94                 | ≤-13        | PASS    |
|                              |             |              | 799-805               | -63.71                 | ≤-46        | PASS    |

## Remark:

1. For downlink, on all frequencies between 769–775 MHz, by a factor not less than  $76 + 10 \log (P)$  dB in a 6.25 kHz band segment, for base and fixed stations, here,  
 $P = 23\text{dBm} = 0.2\text{W}$ ,  
the limit =  $23\text{dBm} - [76 + 10 \log_{10} (0.2\text{W})]$  dB = -46dBm
2. For downlink, on all frequencies between 769–775 MHz, by a factor not less than  $76 + 10 \log (P)$  dB in a 6.25 kHz band segment, for base and fixed stations, here,  
 $P = 23\text{dBm} = 0.2\text{W}$ ,  
the limit =  $23\text{dBm} - [76 + 10 \log_{10} (0.2\text{W})]$  dB = -46dBm
3. The conducted spurious emissions 9kHz to 30MHz were very low and not displayed test plots in this report.
4. All modes (LCH/MCH/HCH, with 4.1MHz AWGN signal/ with 100MHz AWGN signal) had been tested, only show the worst-case in this report.

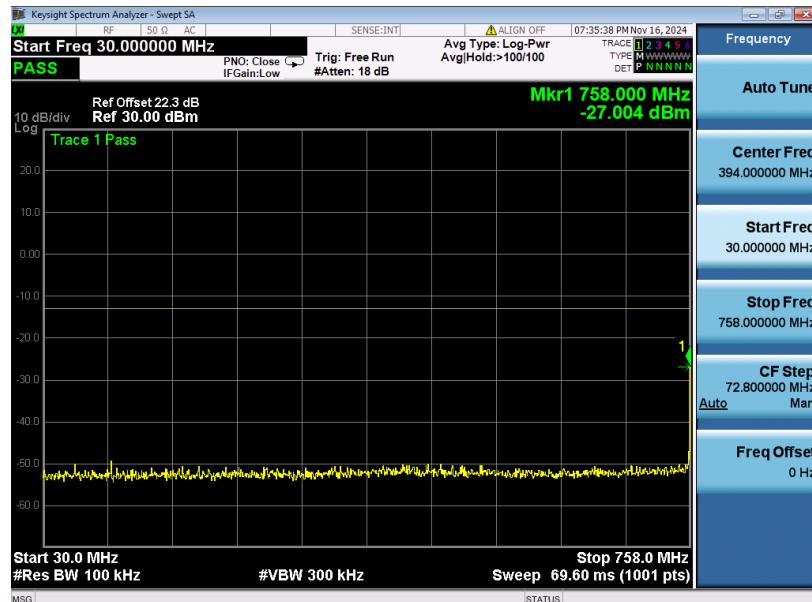


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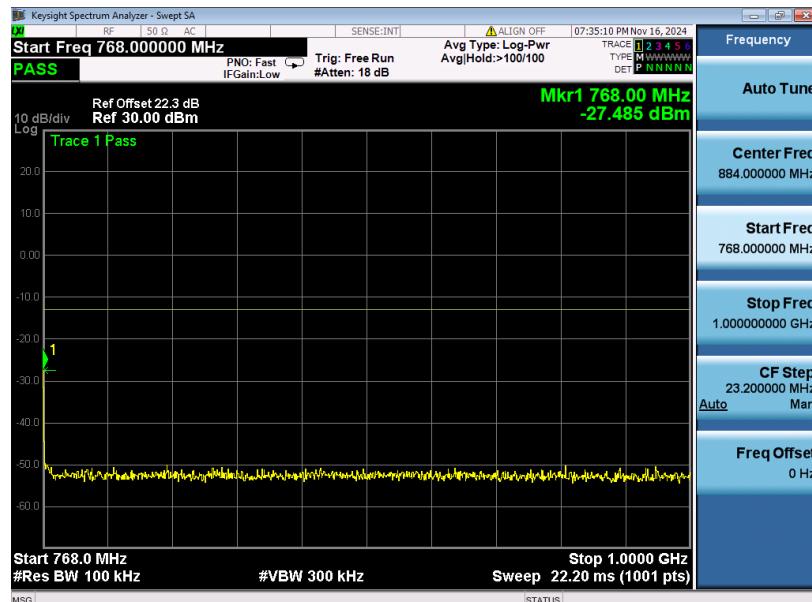
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## Conducted spurious emissions

## Downlink\_4.1MHz AWGN\_LCH\_Pre-AGC



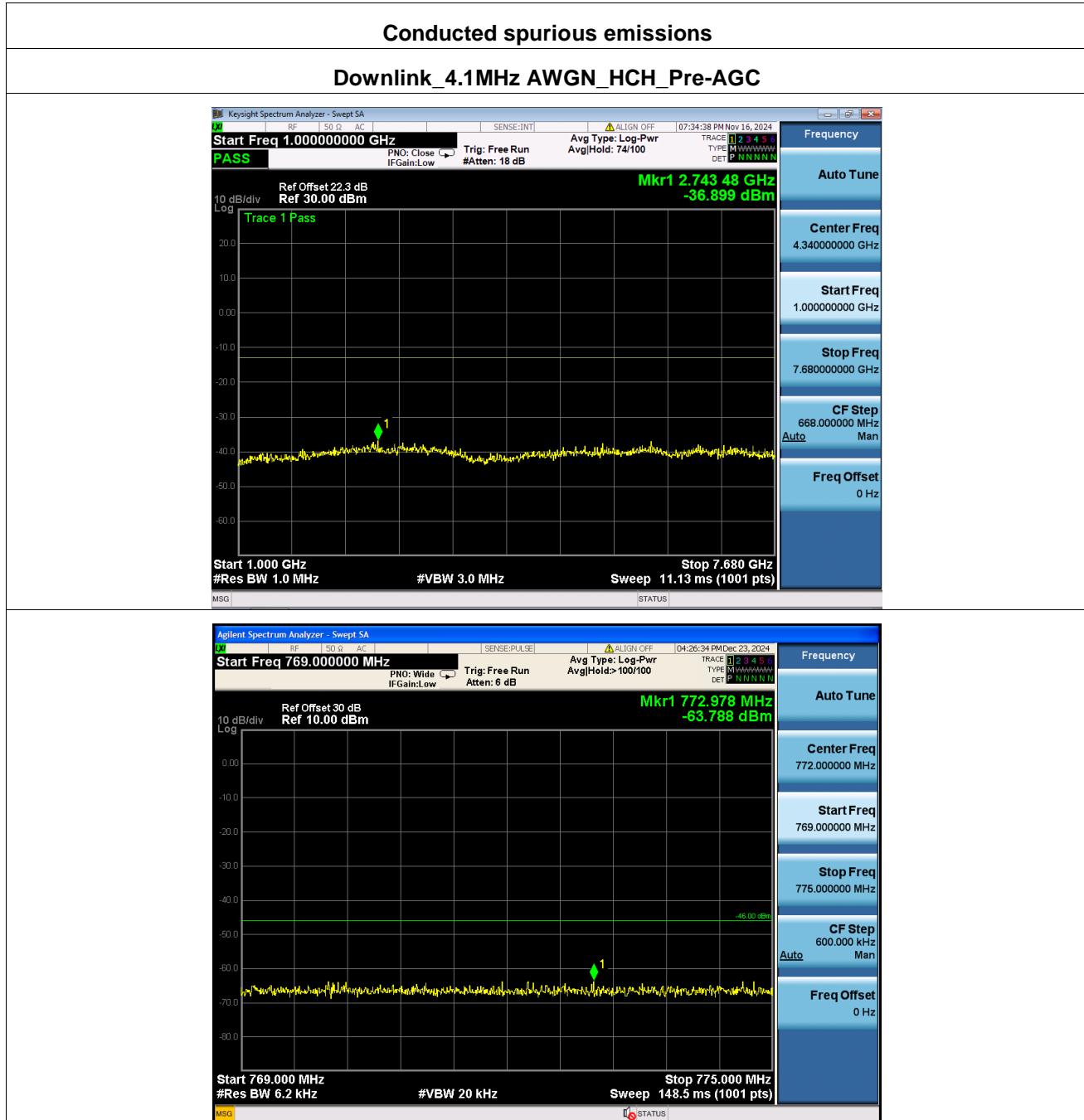
## Downlink\_4.1MHz AWGN\_HCH\_Pre-AGC



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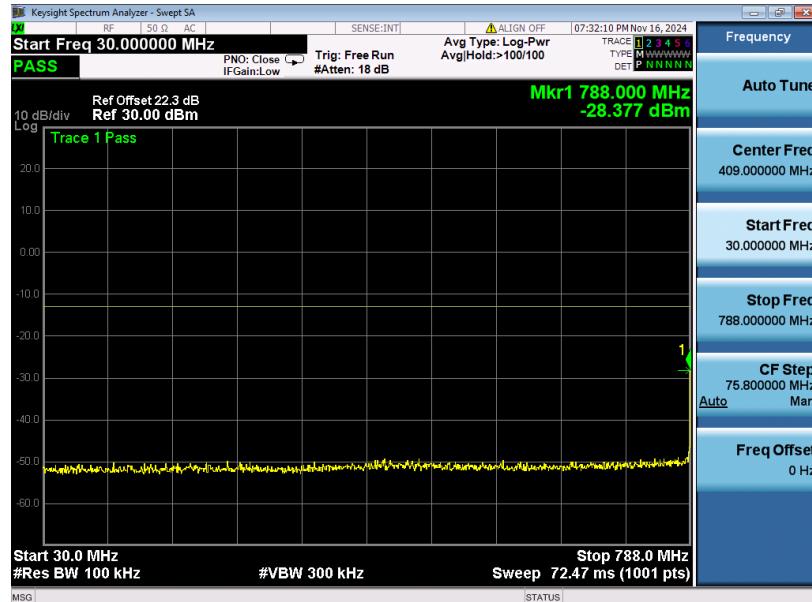


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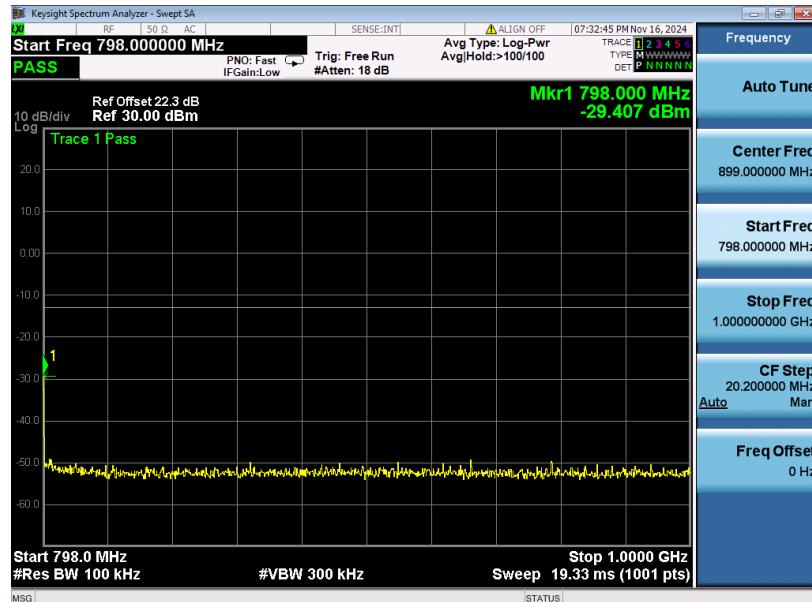
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## Conducted spurious emissions

## Uplink\_4.1MHz AWGN\_LCH\_Pre-AGC



## Uplink\_4.1MHz AWGN\_HCH\_Pre-AGC



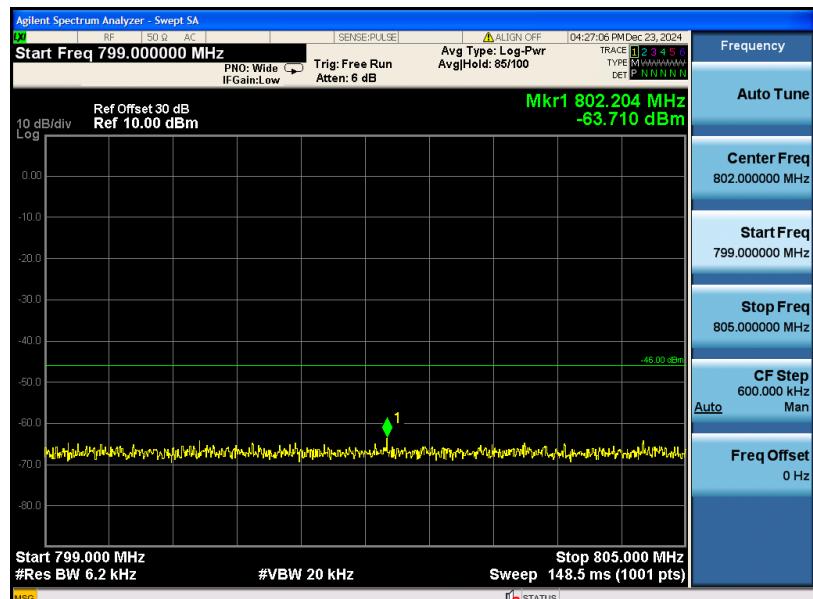
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## Conducted spurious emissions

## Uplink\_4.1MHz AWGN\_HCH\_Pre-AGC



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## 8 Noise

| Noise within the passband     |                       |                                  |
|-------------------------------|-----------------------|----------------------------------|
| Test path                     | Frequency range (MHz) | Worst conducted test level (dBm) |
| Downlink                      | 758-768               | -32.72                           |
| Uplink                        | 788-798               | -38.14                           |
| Noise outside of the passband |                       |                                  |
| Test path                     | Frequency range (MHz) | Worst conducted test level (dBm) |
| Downlink                      | 0.009-757             | -59.03                           |
|                               | 769-7680              | -36.13                           |
| Uplink                        | 0.009-787             | -56.22                           |
|                               | 799-7980              | -40.45                           |

Remark:

1. ERP= conducted test level (dBm)+ antenna gain (dBi)- 2.15dB, the service antenna gain is 6.5dBi and the donor antenna gain is 7.5dBi declared by the manufacturer.
2. For downlink, the ERP of worst noise within the passband is  $-32.72/10\text{kHz} + 6.5\text{dBi} - 2.15\text{dB} = -28.37\text{dBm}$ , the applicant must use good engineering practice to make sure that the ERP of noise within the passband should not exceed  $-43\text{dBm}$  in  $10\text{kHz}$  measurement bandwidth. The ERP of worst noise outside of the passband is  $-36.13/10\text{kHz} + 6.25\text{dBi} - 2.15\text{dB} = -32.03\text{dBm}$ , the applicant must use good engineering practice to make sure that the ERP of noise outside the passband should not exceed  $-70\text{dBm}$  in  $10\text{kHz}$  measurement bandwidth.
3. For uplink, the ERP of worst noise within the passband is  $-38.14/10\text{kHz} + 6.5\text{dBi} - 2.15\text{dB} = -34.04\text{dBm}$ , the applicant must use good engineering practice to make sure that the ERP of noise within the passband should not exceed  $-43\text{dBm}$  in  $10\text{kHz}$  measurement bandwidth. The ERP of worst noise outside of the passband is  $-40.45/10\text{kHz} + 6.25\text{dBi} - 2.15\text{dB} = -36.35\text{dBm}$ , the applicant must use good engineering practice to make sure that the ERP of noise outside the passband should not exceed  $-70\text{dBm}$  in  $10\text{kHz}$  measurement bandwidth.
4. The noise  $9\text{kHz}$  to  $30\text{MHz}$  were very low and not displayed test plots in this report.

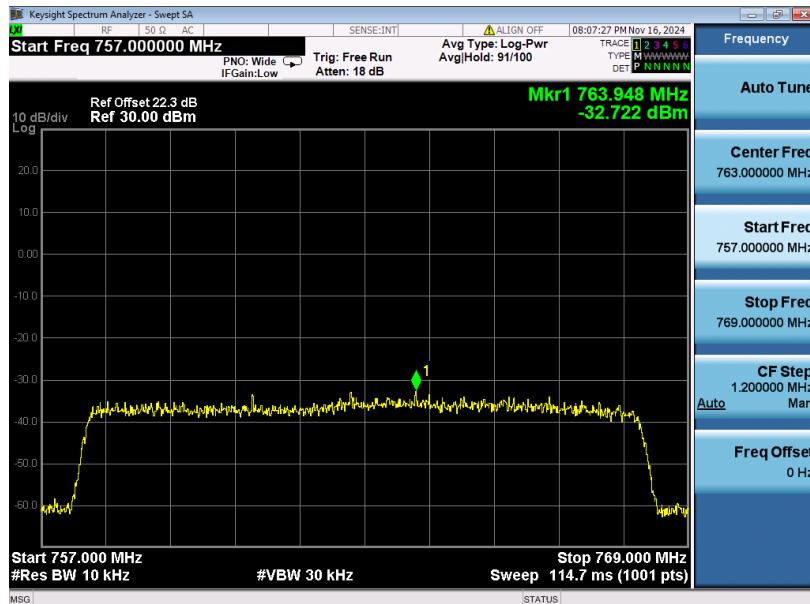


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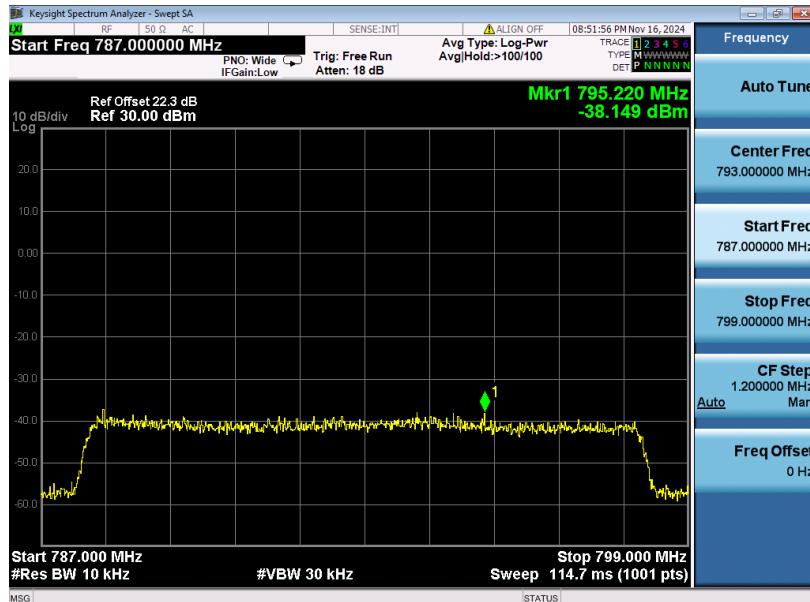
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## Noise\_ Within the passband

## Downlink



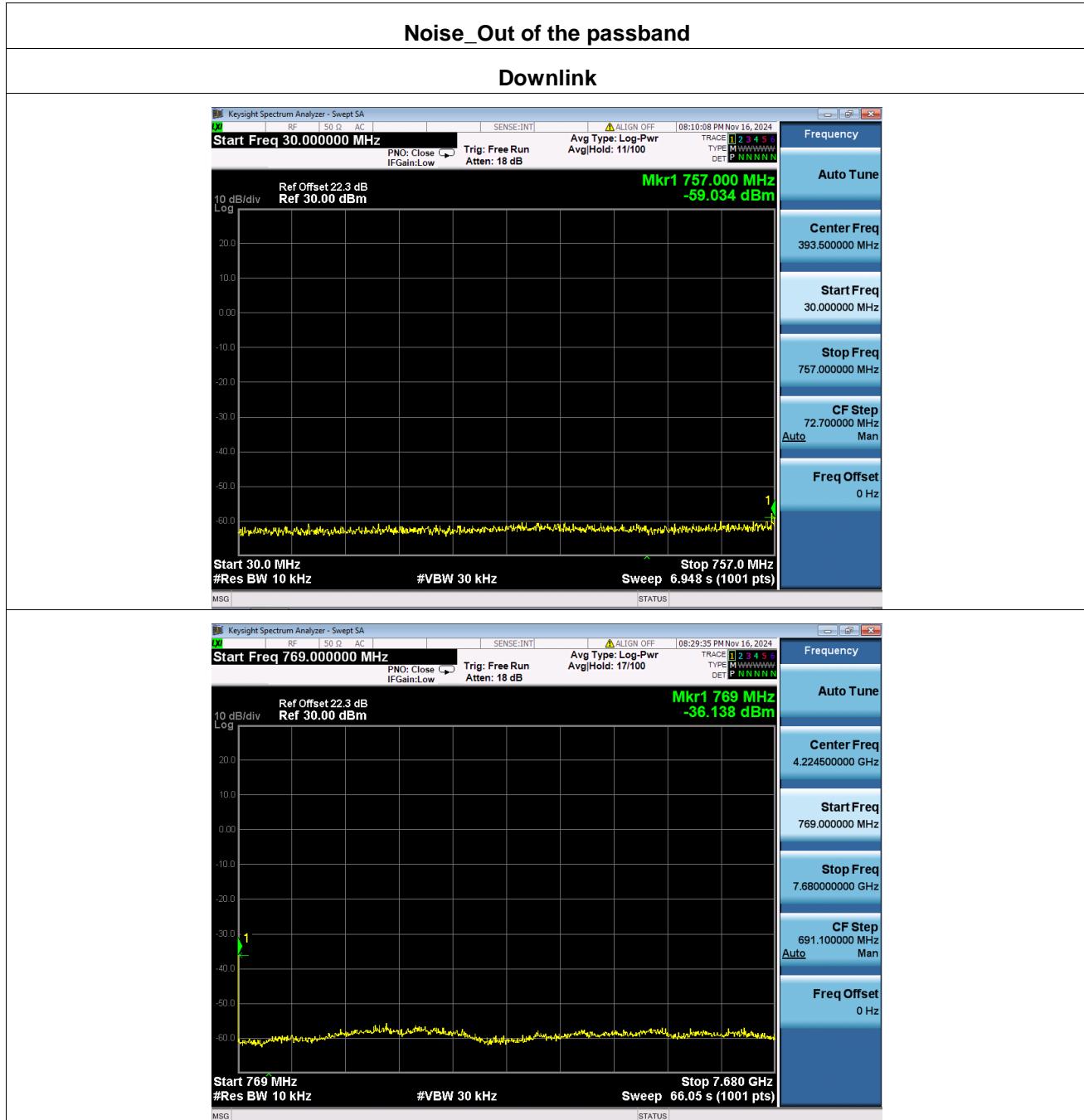
## Uplink



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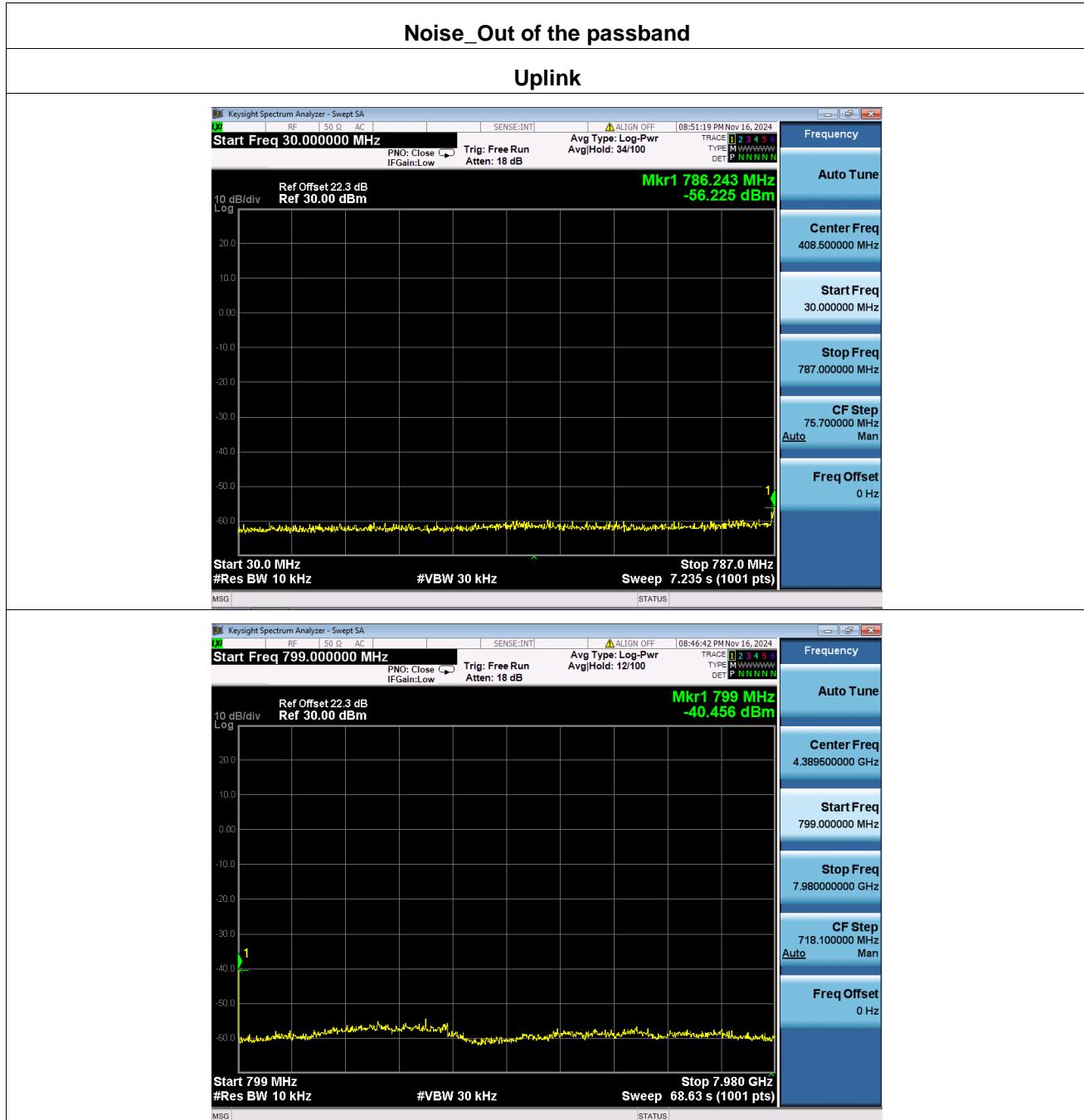
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## 9 Frequency Stability

| Frequency stability vs voltage |              |             |             |         |                  |                 |         |
|--------------------------------|--------------|-------------|-------------|---------|------------------|-----------------|---------|
| Test path                      | Test Channel | Test Signal | Temperature | Voltage | Freq. error (Hz) | Tolerance (ppm) | Verdict |
| Downlink                       | MCH          | 4.1MHz AWGN | TN          | VL      | 12.63            | 0.0166          | PASS    |
|                                |              |             | TN          | VH      | 10.14            | 0.0133          | PASS    |
|                                |              | 100MHz AWGN | TN          | VL      | 10.97            | 0.0144          | PASS    |
|                                |              |             | TN          | VH      | 9.89             | 0.0130          | PASS    |
| Uplink                         | MCH          | 4.1MHz AWGN | TN          | VL      | 12.78            | 0.0161          | PASS    |
|                                |              |             | TN          | VH      | 12.23            | 0.0154          | PASS    |
|                                |              | 100MHz AWGN | TN          | VL      | 12.26            | 0.0155          | PASS    |
|                                |              |             | TN          | VH      | 9.36             | 0.0118          | PASS    |



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| Frequency stability vs temperature |              |             |         |                  |                  |                 |         |
|------------------------------------|--------------|-------------|---------|------------------|------------------|-----------------|---------|
| Test Path                          | Test Channel | Test Signal | Voltage | Temperature (°C) | Freq. error (Hz) | Tolerance (ppm) | Verdict |
| Downlink                           | MCH          | 4.1MHz AWGN | VN      | +50              | 11.15            | 0.0146          | PASS    |
|                                    |              |             | VN      | +40              | 11.70            | 0.0153          | PASS    |
|                                    |              |             | VN      | +30              | 10.98            | 0.0144          | PASS    |
|                                    |              |             | VN      | +20              | 10.19            | 0.0134          | PASS    |
|                                    |              |             | VN      | +10              | 13.11            | 0.0172          | PASS    |
|                                    |              |             | VN      | 0                | 11.14            | 0.0146          | PASS    |
|                                    |              |             | VN      | -10              | 13.02            | 0.0171          | PASS    |
|                                    |              |             | VN      | -20              | 9.54             | 0.0125          | PASS    |
|                                    |              |             | VN      | -30              | 11.44            | 0.0150          | PASS    |
|                                    | MCH          | 100MHz AWGN | VN      | +50              | 12.73            | 0.0167          | PASS    |
|                                    |              |             | VN      | +40              | 11.29            | 0.0148          | PASS    |
|                                    |              |             | VN      | +30              | 9.79             | 0.0128          | PASS    |
|                                    |              |             | VN      | +20              | 10.05            | 0.0132          | PASS    |
|                                    |              |             | VN      | +10              | 9.80             | 0.0128          | PASS    |
|                                    |              |             | VN      | 0                | 11.90            | 0.0156          | PASS    |
|                                    |              |             | VN      | -10              | 9.81             | 0.0129          | PASS    |
|                                    |              |             | VN      | -20              | 11.07            | 0.0145          | PASS    |
|                                    |              |             | VN      | -30              | 12.17            | 0.0160          | PASS    |

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| Frequency stability vs temperature |              |             |         |                  |                  |                 |         |
|------------------------------------|--------------|-------------|---------|------------------|------------------|-----------------|---------|
| Test Path                          | Test Channel | Test Signal | Voltage | Temperature (°C) | Freq. error (Hz) | Tolerance (ppm) | Verdict |
| Uplink                             | MCH          | 4.1MHz AWGN | VN      | +50              | 10.80            | 0.0136          | PASS    |
|                                    |              |             | VN      | +40              | 9.38             | 0.0118          | PASS    |
|                                    |              |             | VN      | +30              | 12.75            | 0.0161          | PASS    |
|                                    |              |             | VN      | +20              | 9.36             | 0.0118          | PASS    |
|                                    |              |             | VN      | +10              | 11.04            | 0.0139          | PASS    |
|                                    |              |             | VN      | 0                | 9.66             | 0.0122          | PASS    |
|                                    |              |             | VN      | -10              | 11.71            | 0.0148          | PASS    |
|                                    |              |             | VN      | -20              | 12.30            | 0.0155          | PASS    |
|                                    |              |             | VN      | -30              | 13.39            | 0.0169          | PASS    |
|                                    | MCH          | 100MHz AWGN | VN      | +50              | 11.50            | 0.0145          | PASS    |
|                                    |              |             | VN      | +40              | 10.85            | 0.0137          | PASS    |
|                                    |              |             | VN      | +30              | 9.47             | 0.0119          | PASS    |
|                                    |              |             | VN      | +20              | 9.15             | 0.0115          | PASS    |
|                                    |              |             | VN      | +10              | 10.61            | 0.0134          | PASS    |
|                                    |              |             | VN      | 0                | 11.02            | 0.0139          | PASS    |
|                                    |              |             | VN      | -10              | 13.39            | 0.0169          | PASS    |
|                                    |              |             | VN      | -20              | 10.92            | 0.0138          | PASS    |
|                                    |              |             | VN      | -30              | 11.26            | 0.0142          | PASS    |

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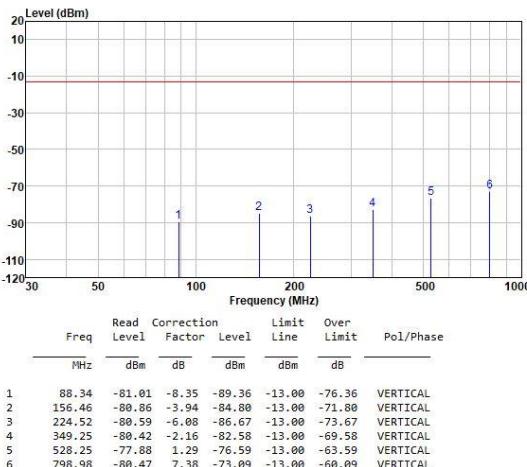
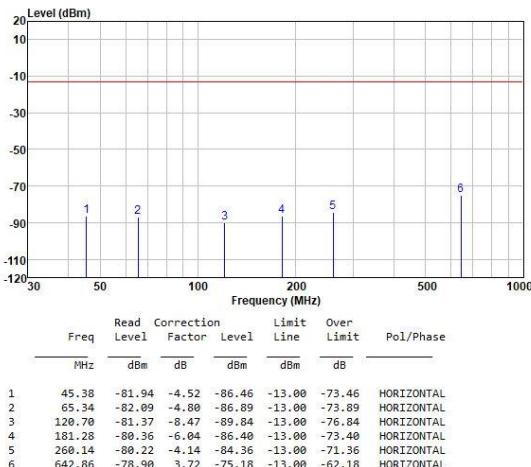
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## 10 Radiated Spurious emissions

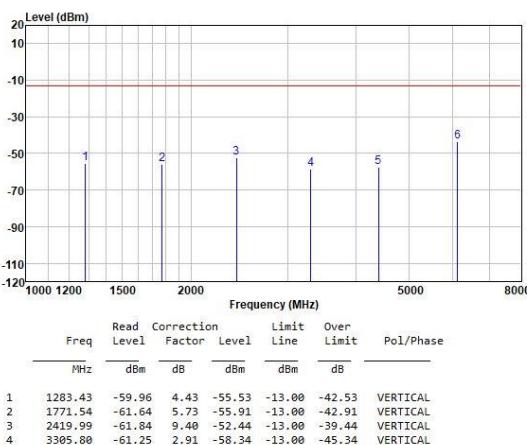
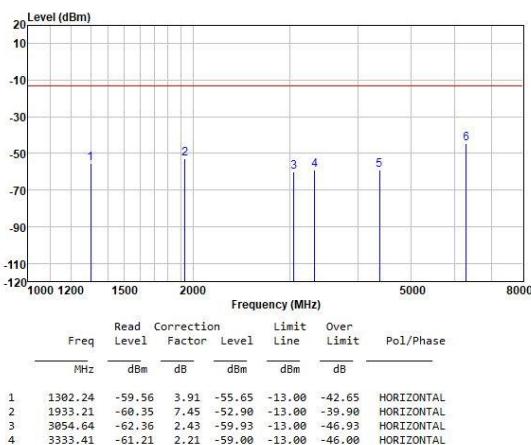
## Radiated Spurious emissions

## Downlink\_4.1MHz AWGN\_MCH\_30MHz-1GHz



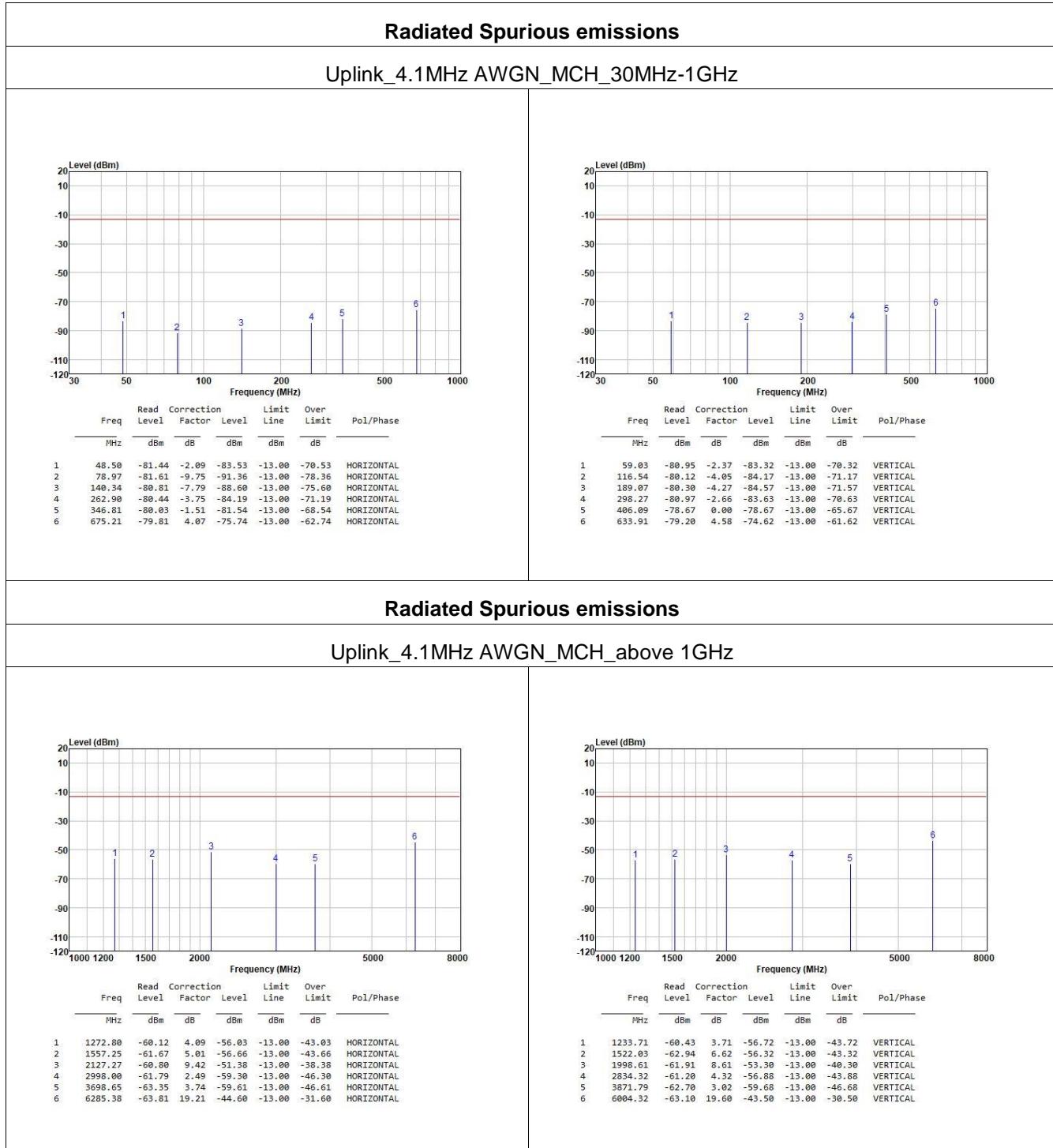
## Radiated Spurious emissions

## Downlink\_4.1MHz AWGN\_MCH\_above 1GHz



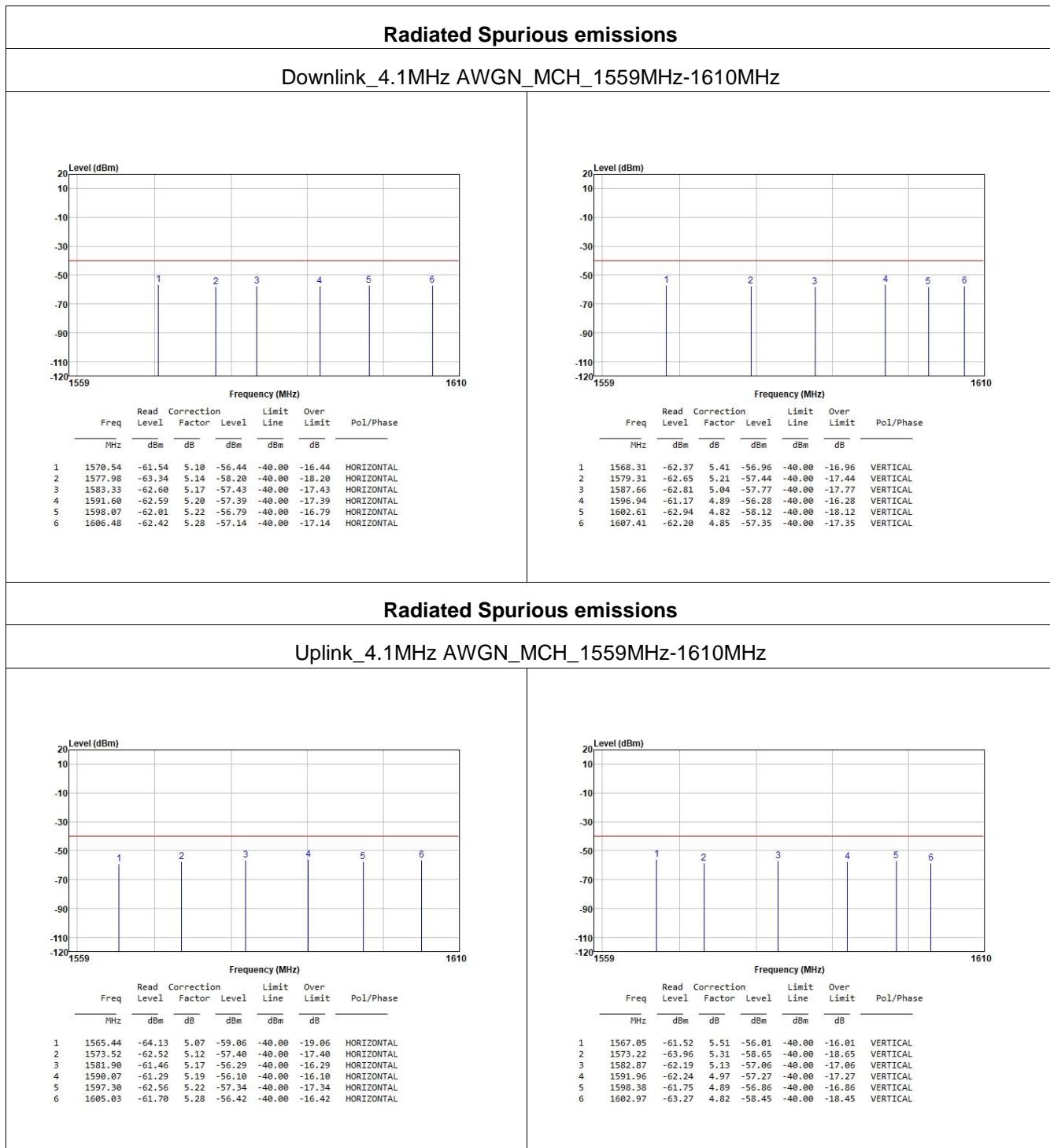
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**Remark:**

Pre-test was performed for all modes (LCH/MCH/HCH, with 4.1MHz AWGN signals/ with 100MHz AWGN signals), the test result always keeps more than 20dB margin, the spurious emissions 9kHz to 30MHz were very low and not displayed in this report. Therefore, only show the worst-case in this report.

**--End of Appendix--**

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