

# Appendix-B LTE NB-IoT Band 12

## Effective (Isotropic) Radiated Power Output Data for NB

### Test Result

| Band   | OpMode      | SCS     | BW   | Modulation | Channel | Tones | Result (dBm) | ERP (dBm) | Limit | Verdict |
|--------|-------------|---------|------|------------|---------|-------|--------------|-----------|-------|---------|
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23012   | 1@0   | 21.07        | 22.87     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23012   | 1@0   | 21           | 22.8      | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23012   | 1@47  | 20.91        | 22.71     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23012   | 1@47  | 20.93        | 22.73     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23095   | 1@0   | 21.19        | 22.99     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23095   | 1@0   | 21.17        | 22.97     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23095   | 1@47  | 21.08        | 22.88     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23095   | 1@47  | 21.07        | 22.87     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23178   | 1@0   | 21.12        | 22.92     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23178   | 1@0   | 21.09        | 22.89     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23178   | 1@47  | 21.02        | 22.82     | 34.77 | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23178   | 1@47  | 21           | 22.8      | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23012   | 1@0   | 20.03        | 21.83     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23012   | 1@0   | 20.05        | 21.85     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23012   | 1@11  | 19.97        | 21.77     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23012   | 1@11  | 19.99        | 21.79     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23095   | 1@0   | 20.3         | 22.1      | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23095   | 1@0   | 20.32        | 22.12     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23095   | 1@11  | 20.23        | 22.03     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23095   | 1@11  | 20.23        | 22.03     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23178   | 1@0   | 20.2         | 22        | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23178   | 1@0   | 20.2         | 22        | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23178   | 1@11  | 20.11        | 21.91     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23178   | 1@11  | 20.13        | 21.93     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23012   | 3@3   | 20           | 21.8      | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23095   | 3@3   | 21.33        | 23.13     | 34.77 | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23178   | 3@3   | 20.35        | 22.15     | 34.77 | PASS    |

## Peak-to-Average Ratio(CCDF) for NB

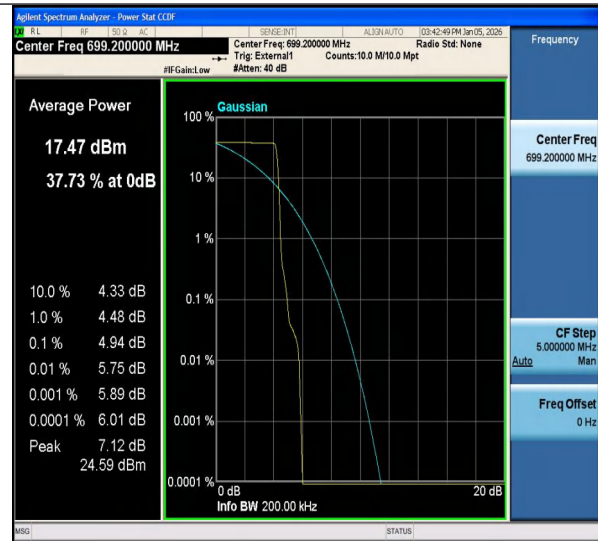
### Test Result

| Band   | OpMode      | SCS     | BW   | Modulation | Channel | Tones | Result (dBm) | Limit (dBm) | Verdict |
|--------|-------------|---------|------|------------|---------|-------|--------------|-------------|---------|
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23012   | 1@0   | 5.07         | <=13        | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23012   | 1@47  | 4.94         | <=13        | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23095   | 1@0   | 5.14         | <=13        | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23095   | 1@47  | 4.94         | <=13        | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23178   | 1@0   | 5.15         | <=13        | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23178   | 1@47  | 4.9          | <=13        | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23012   | 1@0   | 6.47         | <=13        | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23012   | 1@11  | 6.9          | <=13        | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23095   | 1@0   | 6.52         | <=13        | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23095   | 1@11  | 6.96         | <=13        | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23178   | 1@0   | 6.6          | <=13        | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23178   | 1@11  | 6.97         | <=13        | PASS    |

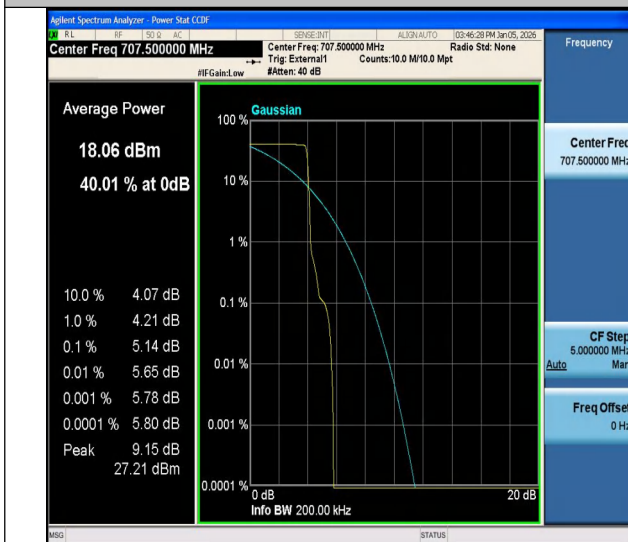
## Test Graphs



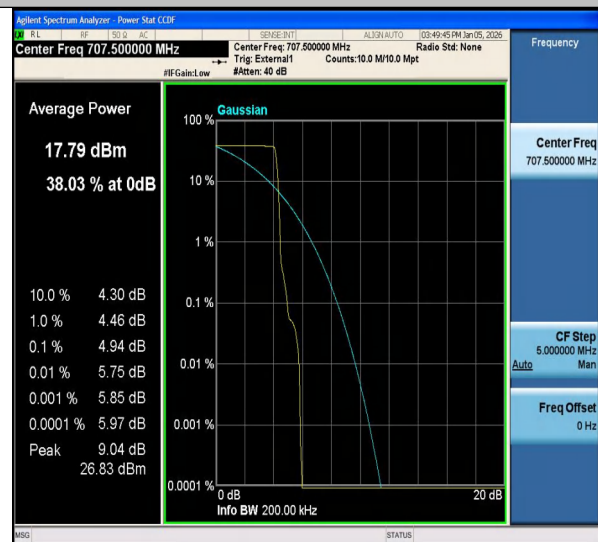
Band12-0.18-QPSK-23012-PASS



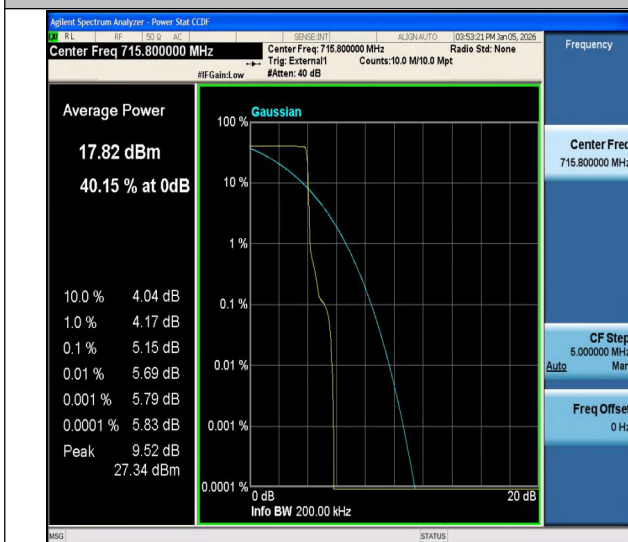
Band12-0.18-QPSK-23012-PASS



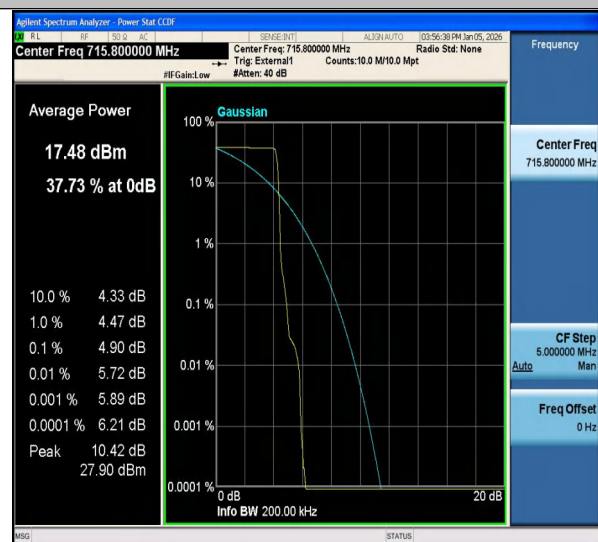
Band12-0.18-QPSK-23095-PASS



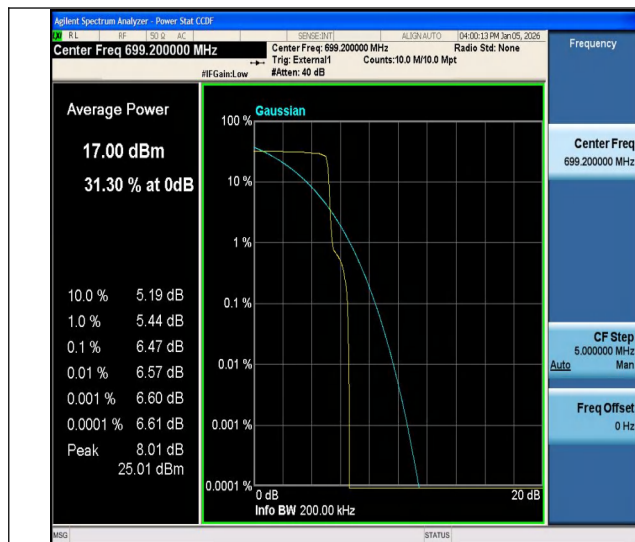
Band12-0.18-QPSK-23095-PASS



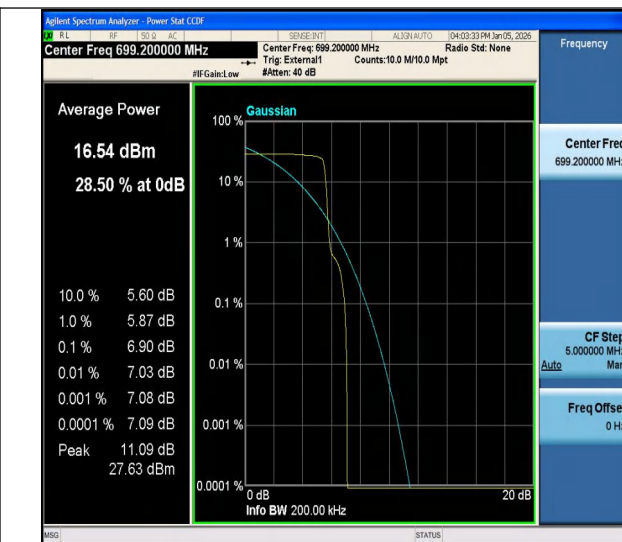
Band12-0.18-QPSK-23178-PASS



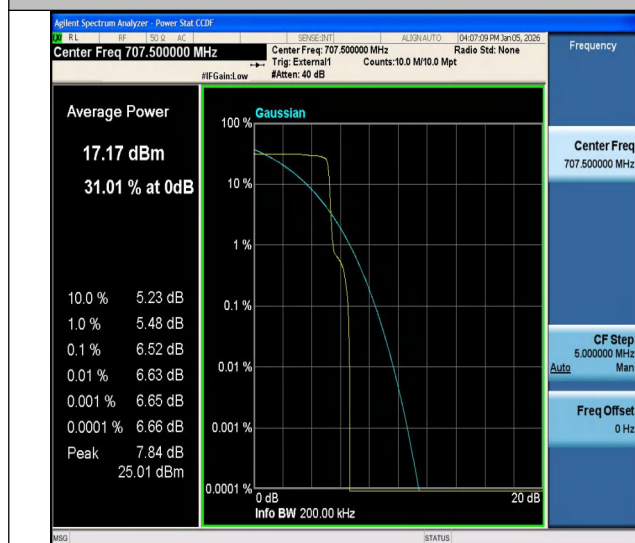
Band12-0.18-QPSK-23178-PASS



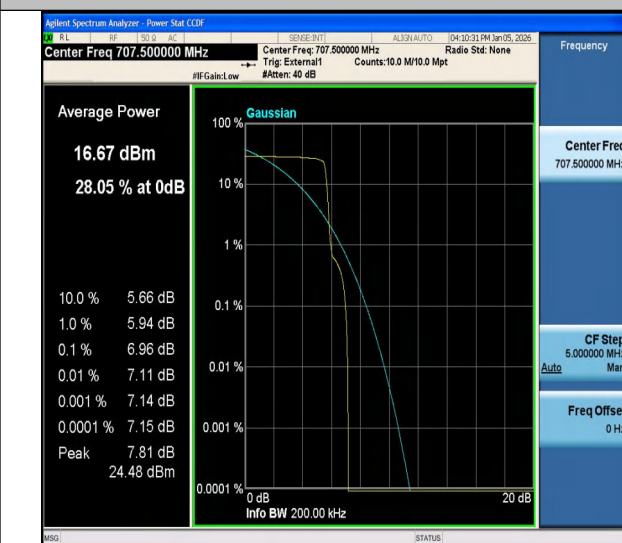
Band12-0.18-QPSK-23012-PASS



Band12-0.18-QPSK-23012-PASS



Band12-0.18-QPSK-23095-PASS



Band12-0.18-QPSK-23095-PASS



Band12-0.18-QPSK-23178-PASS



Band12-0.18-QPSK-23178-PASS

## Emission Bandwidth for NB

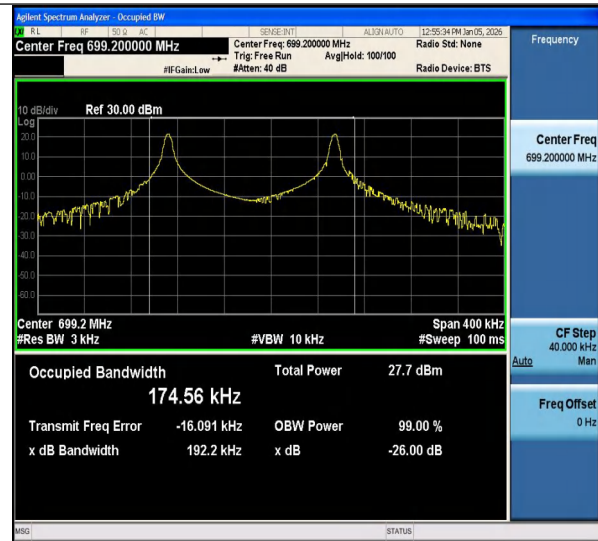
### Test Result

| Band   | OpMode      | SCS     | BW   | Modulation | Channel | Tones | OBW(MHz) | EBW(MHz) | Verdict |
|--------|-------------|---------|------|------------|---------|-------|----------|----------|---------|
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23012   | 1@0   | 0.17825  | 0.1948   | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23012   | 1@0   | 0.17456  | 0.1922   | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23095   | 1@0   | 0.17646  | 0.1914   | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23095   | 1@0   | 0.17679  | 0.1926   | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | BPSK       | 23178   | 1@0   | 0.17646  | 0.1926   | PASS    |
| Band12 | Stand-Alone | 3.75kHz | 0.18 | QPSK       | 23178   | 1@0   | 0.17754  | 0.1936   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23012   | 1@0   | 0.12141  | 0.1132   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23012   | 1@0   | 0.11567  | 0.1153   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23012   | 12@0  | 0.19500  | 0.2237   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23012   | 12@0  | 0.19288  | 0.2153   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23095   | 1@0   | 0.12136  | 0.1025   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23095   | 1@0   | 0.12544  | 0.1149   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23095   | 12@0  | 0.19410  | 0.2236   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23095   | 12@0  | 0.19249  | 0.2137   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23178   | 1@0   | 0.12399  | 0.1034   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23178   | 1@0   | 0.12504  | 0.1137   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | BPSK       | 23178   | 12@0  | 0.19393  | 0.2266   | PASS    |
| Band12 | Stand-Alone | 15kHz   | 0.18 | QPSK       | 23178   | 12@0  | 0.19298  | 0.2151   | PASS    |

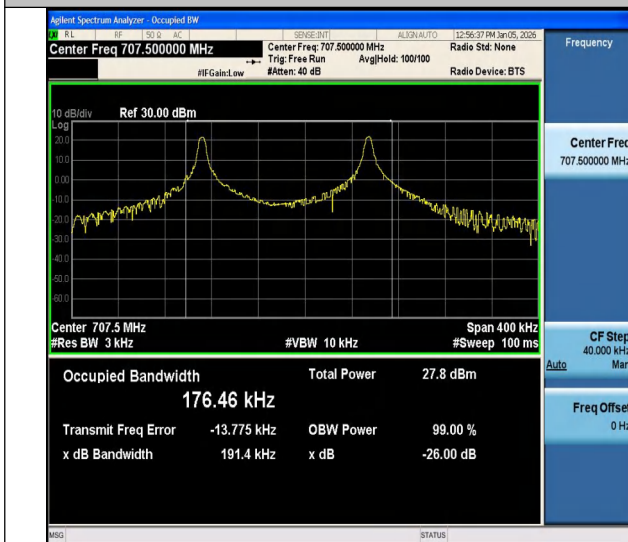
## Test Graphs



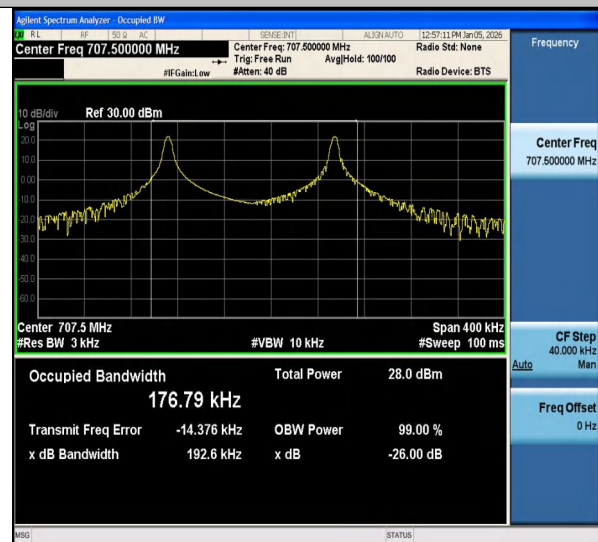
Band12-0.18-BPSK-23012-PASS



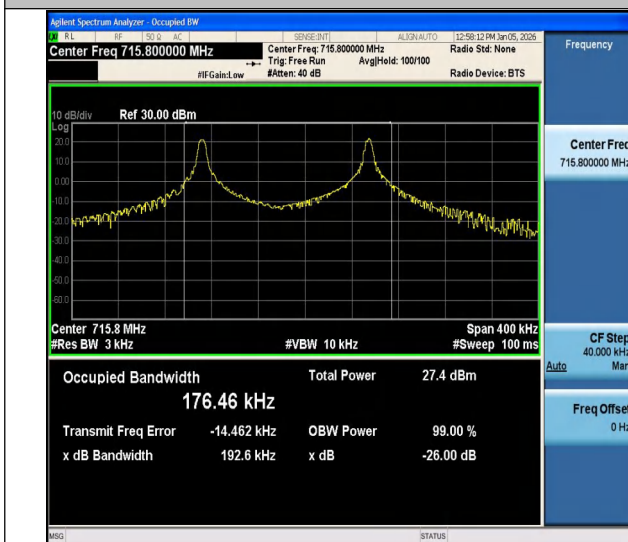
Band12-0.18-QPSK-23012-PASS



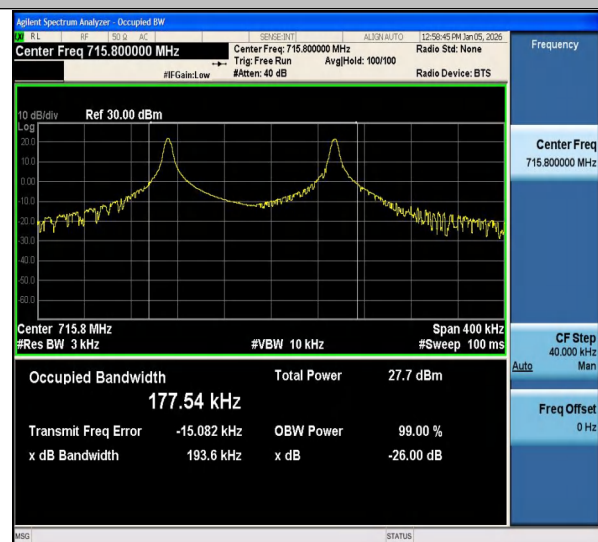
Band12-0.18-BPSK-23095-PASS



Band12-0.18-QPSK-23095-PASS



Band12-0.18-BPSK-23178-PASS



Band12-0.18-QPSK-23178-PASS



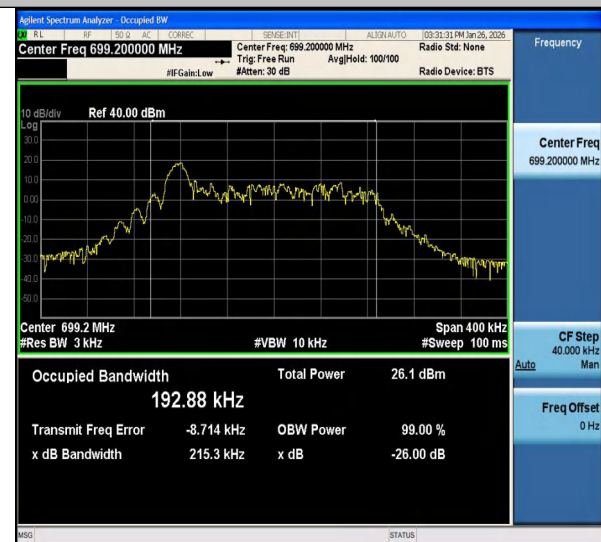
Band12-0.18-BPSK-23012-PASS



Band12-0.18-QPSK-23012-PASS



Band12-0.18-BPSK-23012-PASS



Band12-0.18-QPSK-23012-PASS



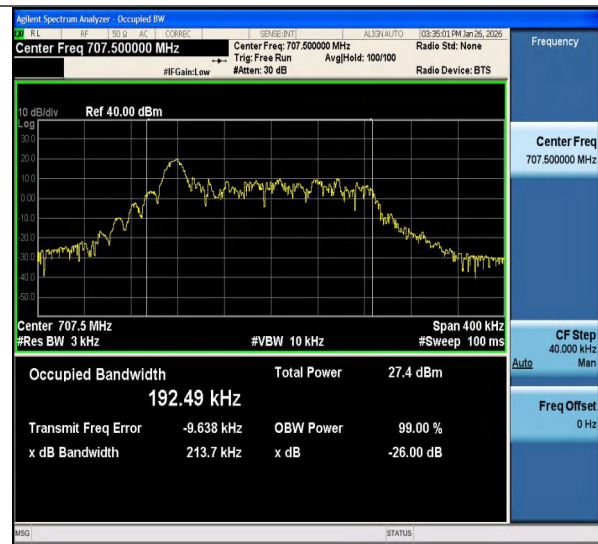
Band12-0.18-BPSK-23095-PASS



Band12-0.18-QPSK-23095-PASS



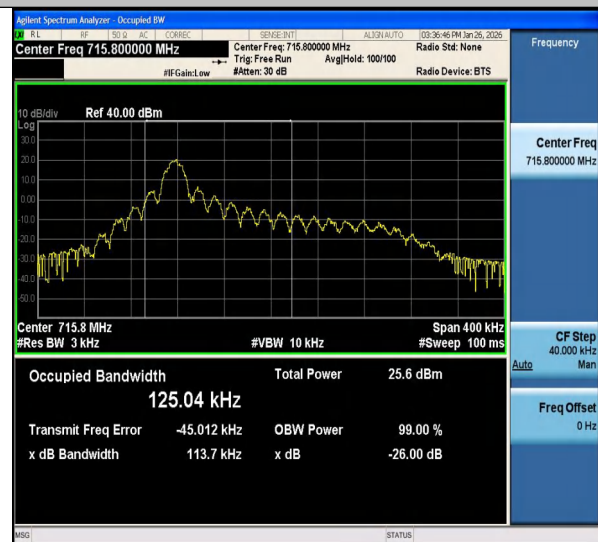
Band12-0.18-BPSK-23095-PASS



Band12-0.18-QPSK-23095-PASS



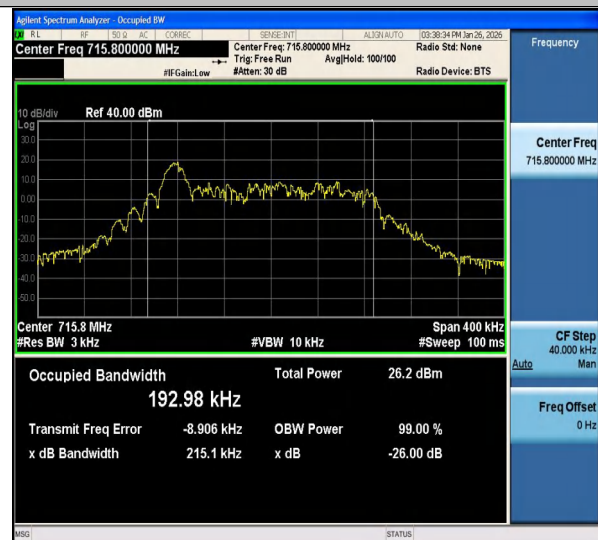
Band12-0.18-BPSK-23178-PASS



Band12-0.18-QPSK-23178-PASS



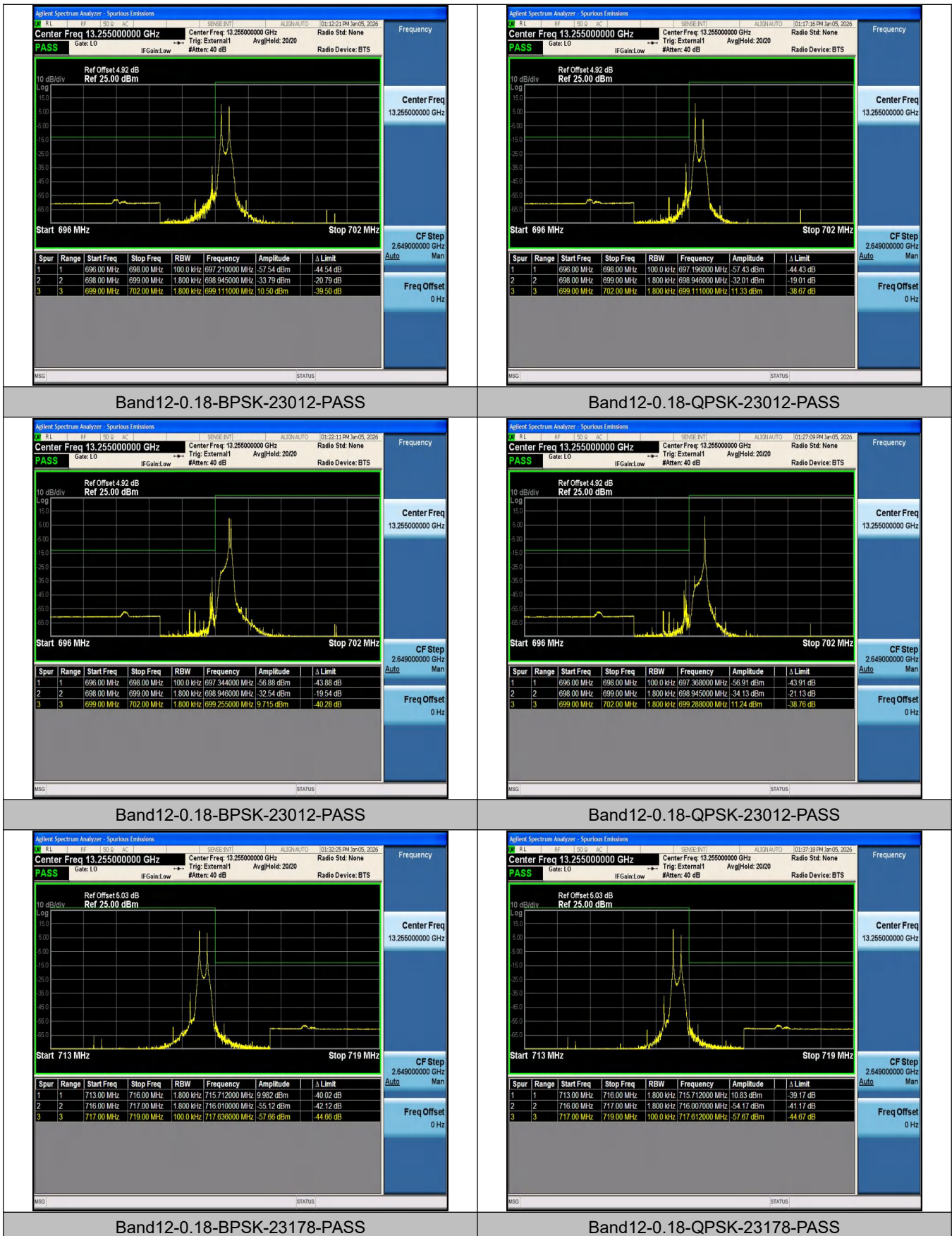
Band12-0.18-BPSK-23178-PASS

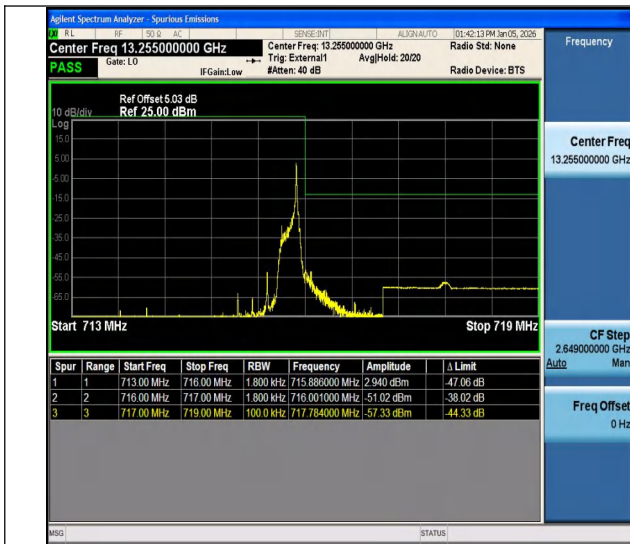


Band12-0.18-QPSK-23178-PASS

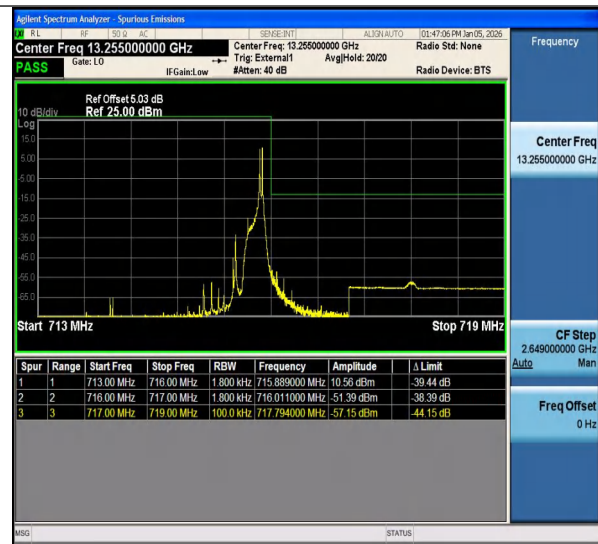
## Band Edge for NB

## Test Graphs

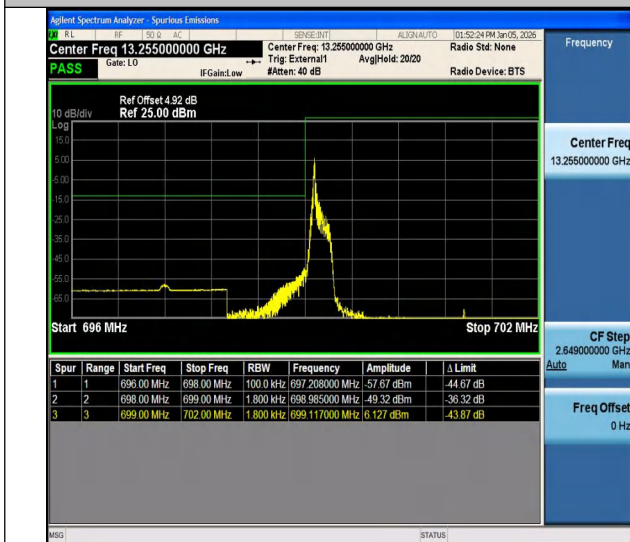




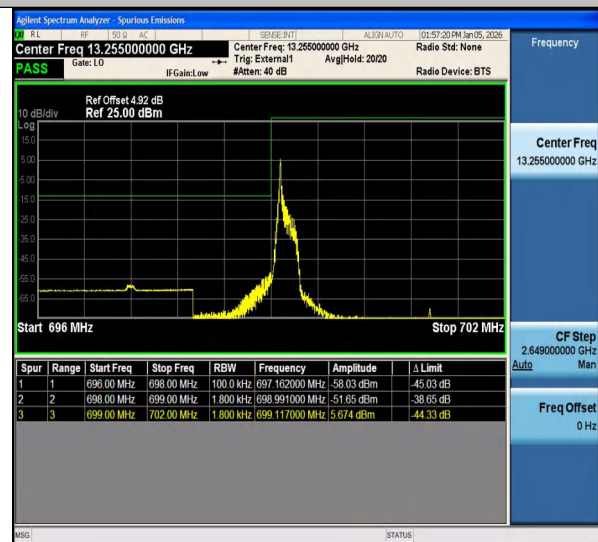
Band12-0.18-BPSK-23178-PASS



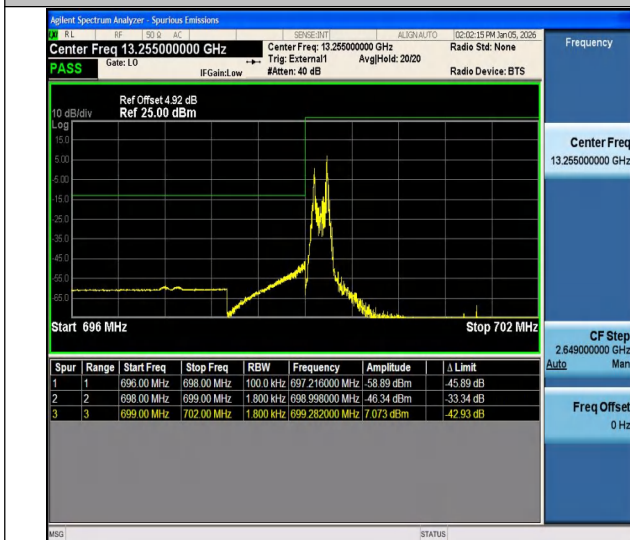
Band12-0.18-QPSK-23178-PASS



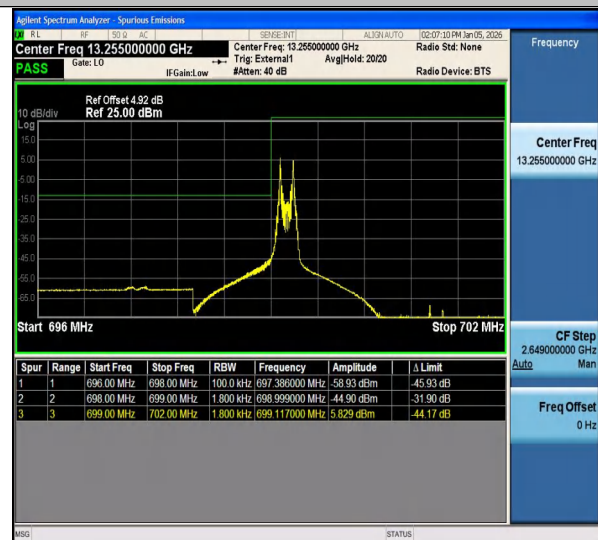
Band12-0.18-BPSK-23012-PASS



Band12-0.18-QPSK-23012-PASS



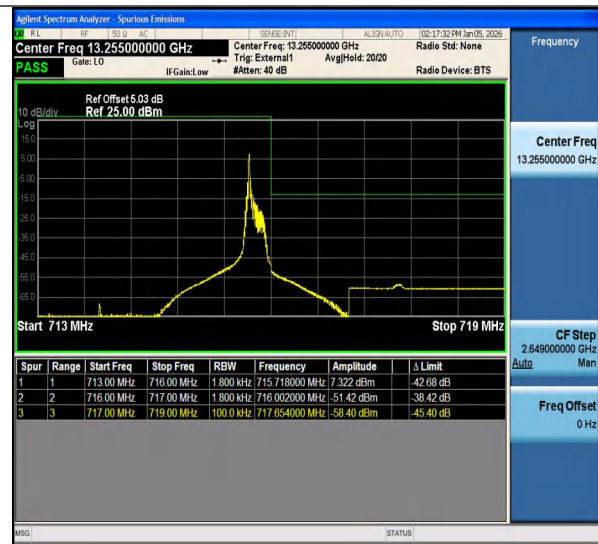
Band12-0.18-BPSK-23012-PASS



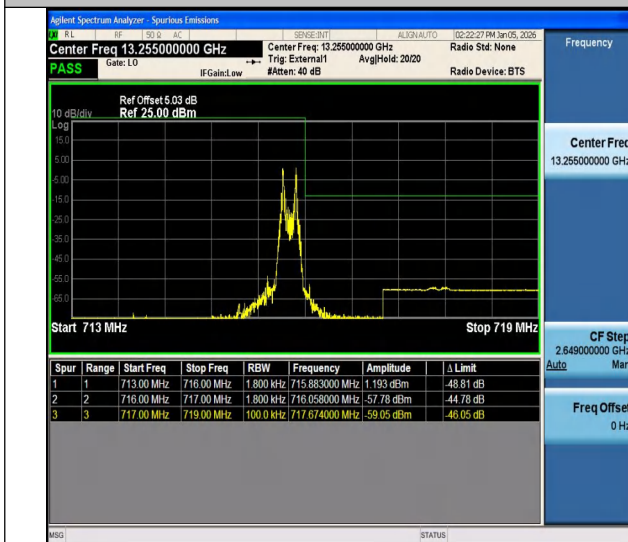
Band12-0.18-QPSK-23012-PASS



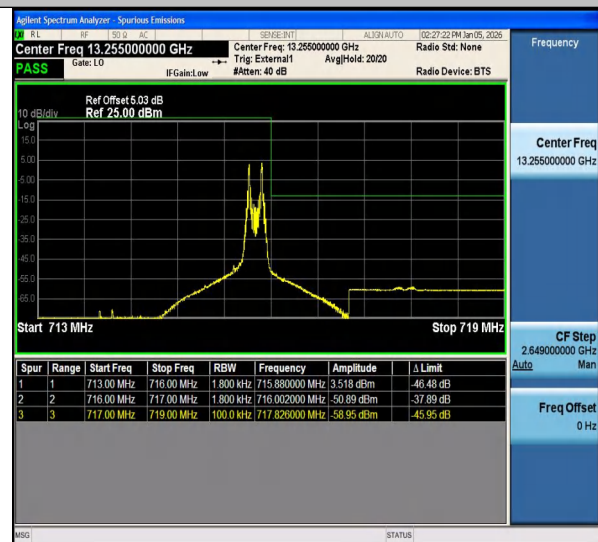
Band12-0.18-BPSK-23178-PASS



Band12-0.18-QPSK-23178-PASS



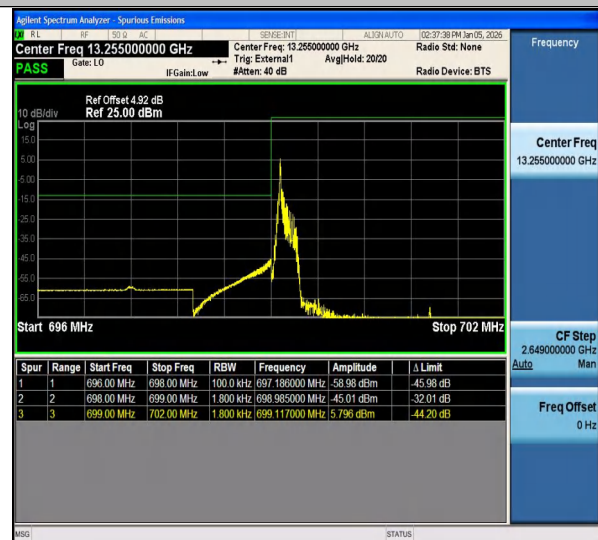
Band12-0.18-BPSK-23178-PASS



Band12-0.18-QPSK-23178-PASS



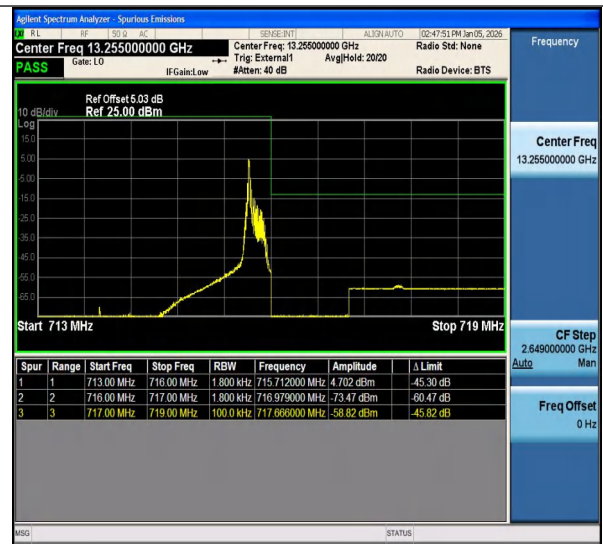
Band12-0.18-BPSK-23012-PASS



Band12-0.18-QPSK-23012-PASS



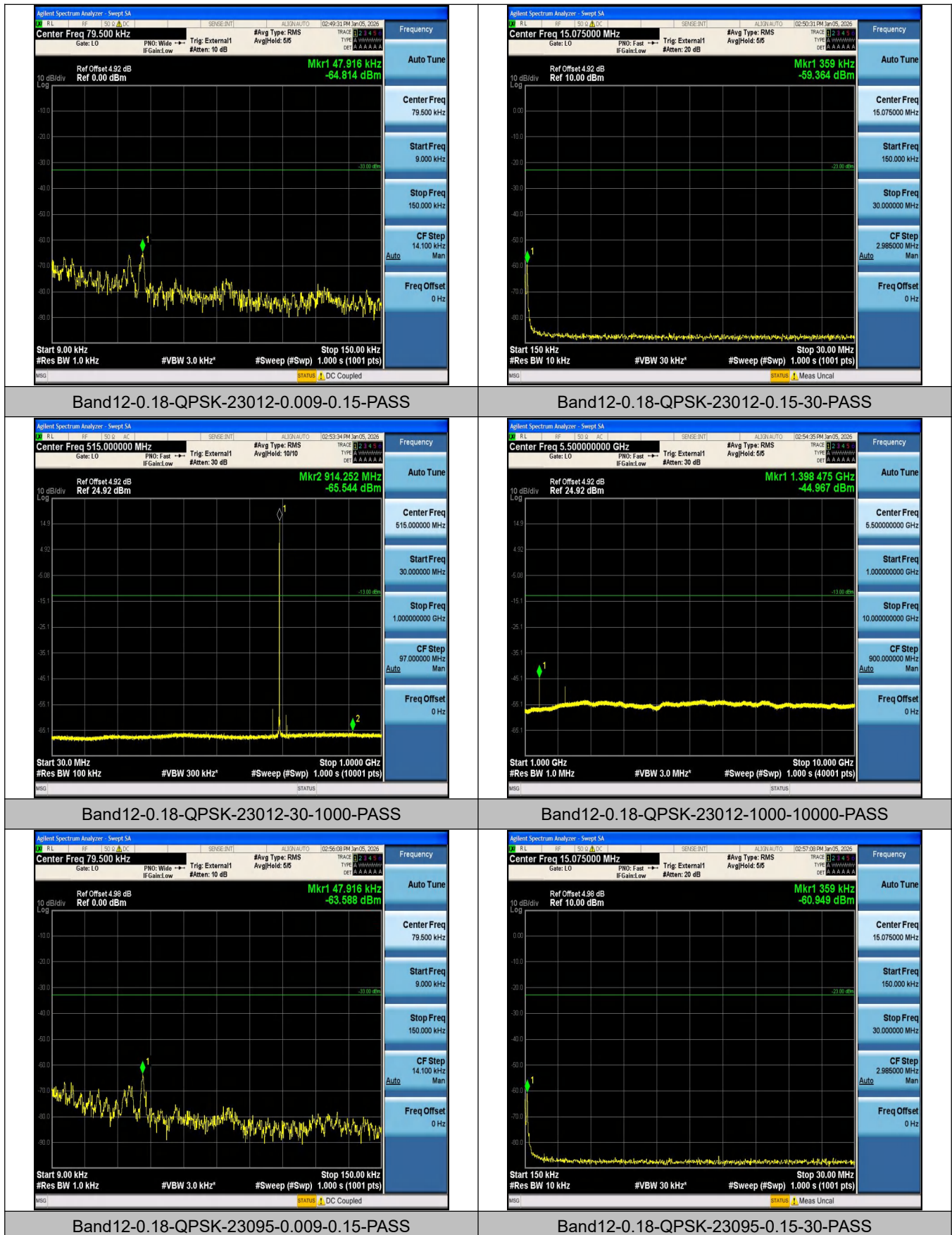
Band12-0.18-BPSK-23178-PASS

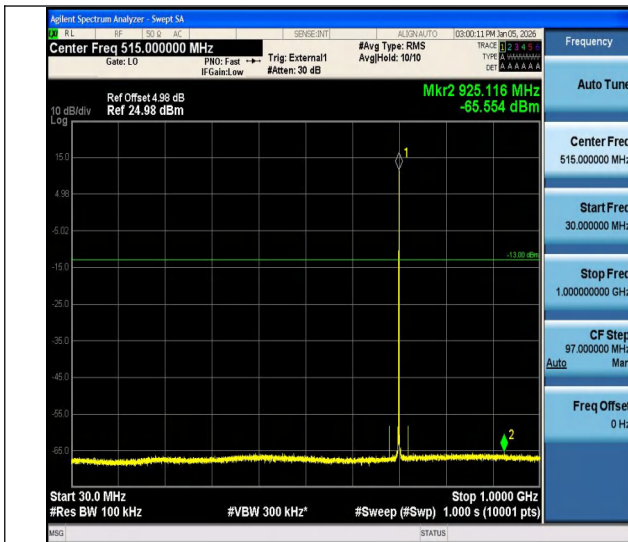


Band12-0.18-QPSK-23178-PASS

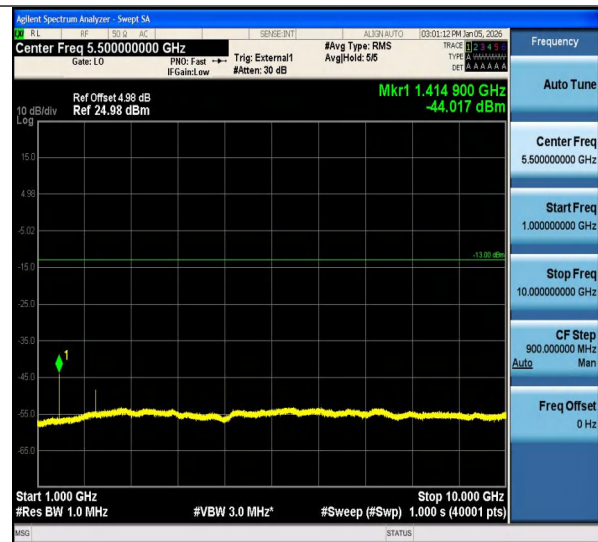
## Conducted Spurious Emission for NB

## Test Graphs

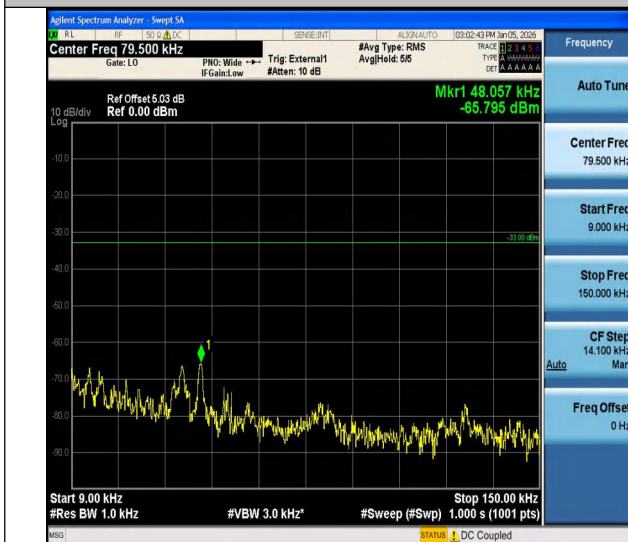




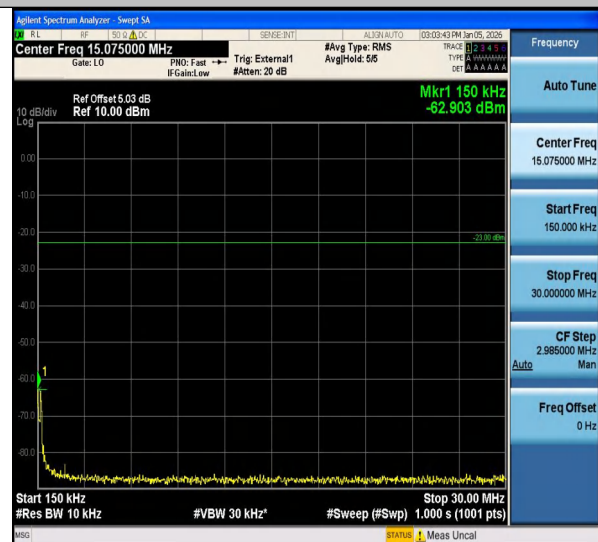
Band12-0.18-QPSK-23095-30-1000-PASS



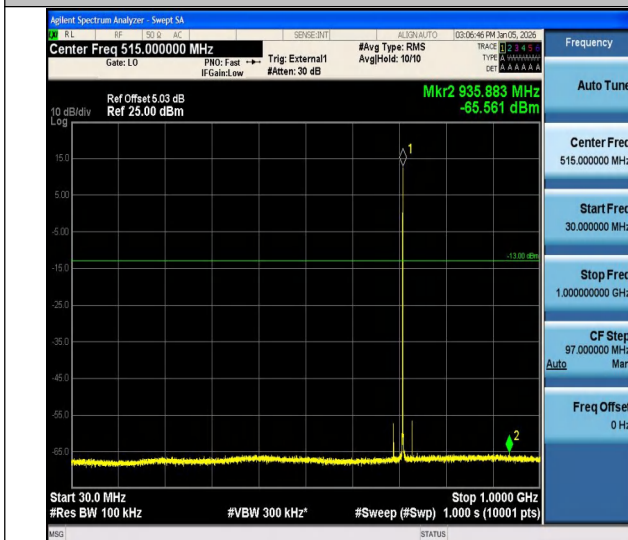
Band12-0.18-QPSK-23095-1000-10000-PASS



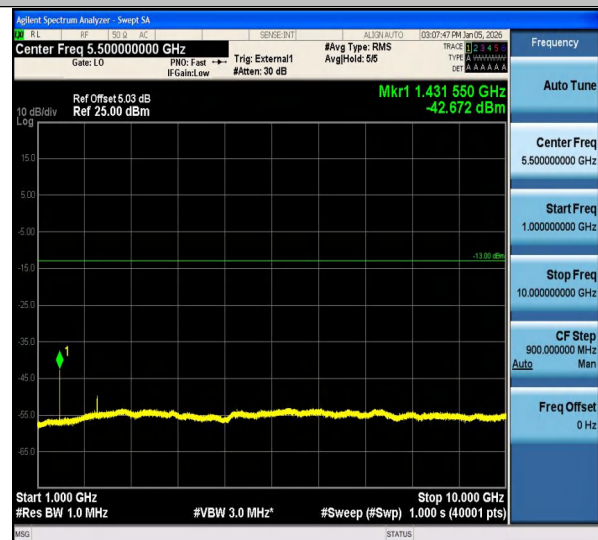
Band12-0.18-QPSK-23178-0.009-0.15-PASS



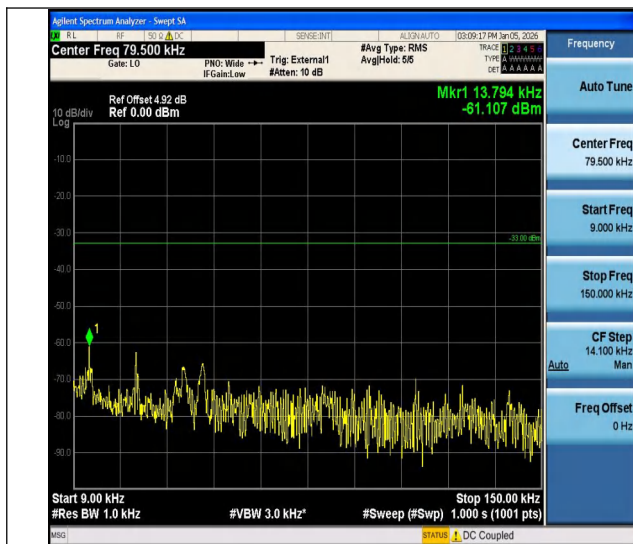
Band12-0.18-QPSK-23178-0.15-30-PASS



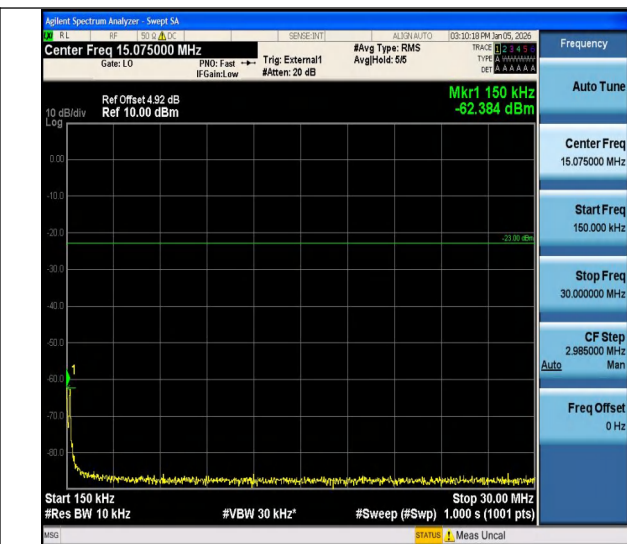
Band12-0.18-QPSK-23178-30-1000-PASS



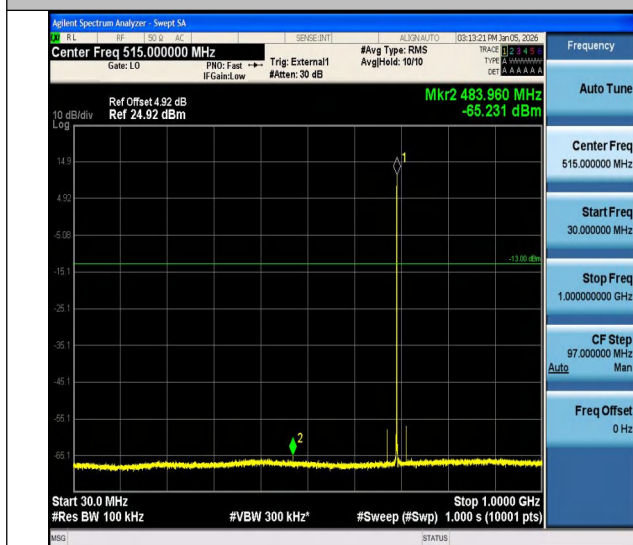
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Band12-0.18-BPSK-23012-0.009-0.15-PASS



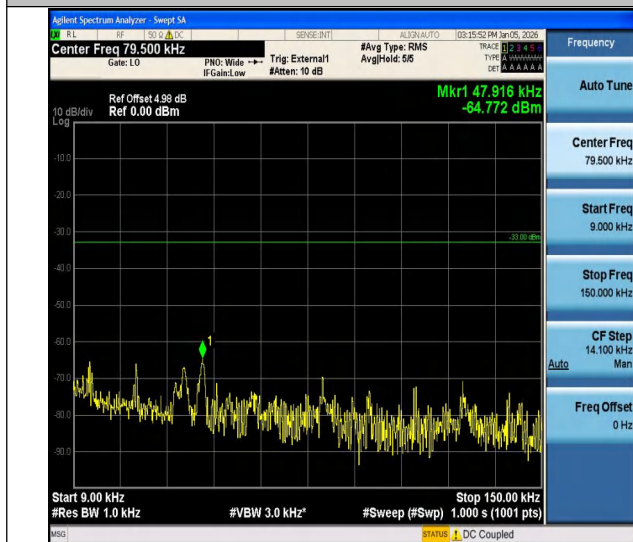
Band12-0.18-BPSK-23012-0.15-30-PASS



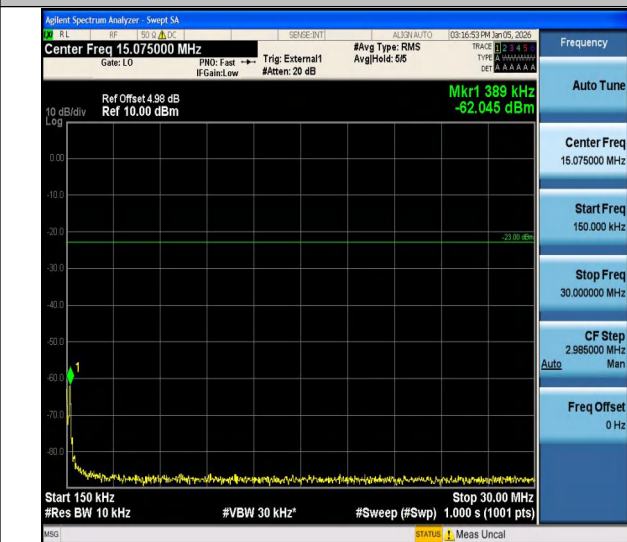
Band12-0.18-BPSK-23012-30-1000-PASS



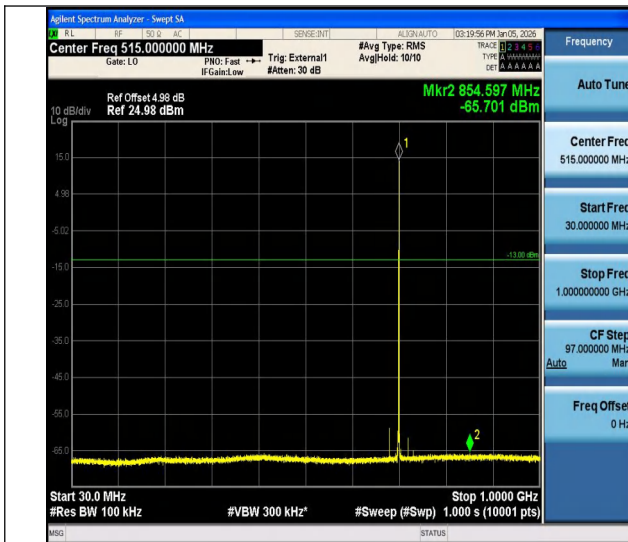
Band12-0.18-BPSK-23012-1000-10000-PASS



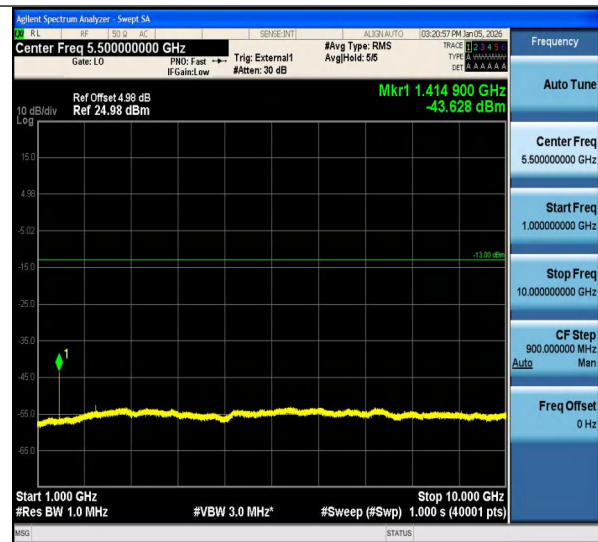
Band12-0.18-BPSK-23095-0.009-0.15-PASS



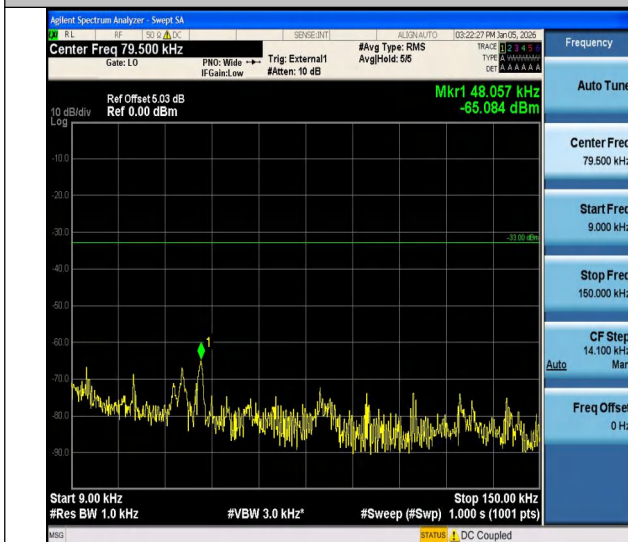
Band12-0.18-BPSK-23095-0.15-30-PASS



Band12-0.18-BPSK-23095-30-1000-PASS



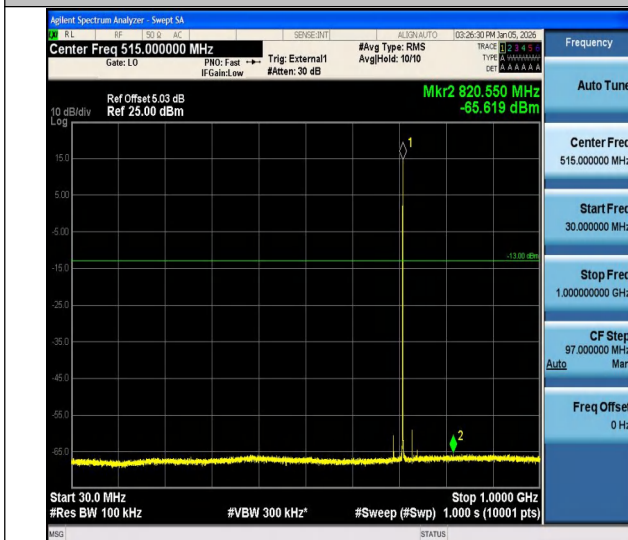
Band12-0.18-BPSK-23095-1000-10000-PASS



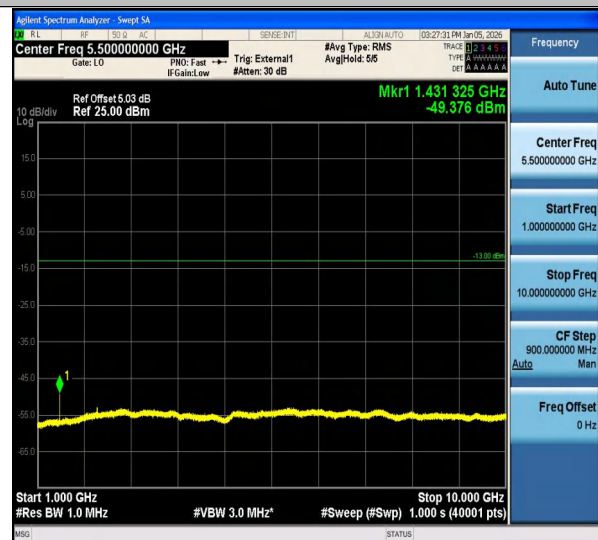
Band12-0.18-BPSK-23178-0.009-0.15-PASS



Band12-0.18-BPSK-23178-0.15-30-PASS



Band12-0.18-BPSK-23178-30-1000-PASS



Band12-0.18-BPSK-23178-1000-10000-PASS

## Frequency Stability for NB

### Test Result

| Voltage |             |         |           |            |         |       |               |                  |                |                 |         |
|---------|-------------|---------|-----------|------------|---------|-------|---------------|------------------|----------------|-----------------|---------|
| Band    | OpMode      | SCS     | Bandwidth | Modulation | Channel | Tones | Voltage [Vdc] | Temperature (°C) | Deviation (Hz) | Deviation (ppm) | Verdict |
| Band12  | Stand-Alone | 3.75kHz | 0.18      | QPSK       | 23095   | 1@0   | VN            | NT               | 0.60           | 0.000848        | PASS    |
| Band12  | Stand-Alone | 3.75kHz | 0.18      | QPSK       | 23095   | 1@0   | VL            | NT               | -1.10          | -0.001555       | PASS    |
| Band12  | Stand-Alone | 3.75kHz | 0.18      | QPSK       | 23095   | 1@0   | VH            | NT               | 1.80           | 0.002544        | PASS    |
| Band12  | Stand-Alone | 15kHz   | 0.18      | QPSK       | 23095   | 12@0  | VN            | NT               | 0.50           | 0.000707        | PASS    |
| Band12  | Stand-Alone | 15kHz   | 0.18      | QPSK       | 23095   | 12@0  | VL            | NT               | 1.10           | 0.001555        | PASS    |
| Band12  | Stand-Alone | 15kHz   | 0.18      | QPSK       | 23095   | 12@0  | VH            | NT               | 0.70           | 0.000989        | PASS    |

| Temperature |             |           |            |         |       |      |               |                  |                |                 |         |
|-------------|-------------|-----------|------------|---------|-------|------|---------------|------------------|----------------|-----------------|---------|
| Band        | OpMode      | Bandwidth | Modulation | Channel | Tones | SCS  | Voltage [Vdc] | Temperature (°C) | Deviation (Hz) | Deviation (ppm) | Verdict |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | -30              | -1.00          | -0.001413       | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | -20              | -2.10          | -0.002968       | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | -10              | -0.20          | -0.000283       | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | 0                | 0.70           | 0.000989        | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | 10               | 0.60           | 0.000848        | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | 20               | 0.50           | 0.000707        | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | 30               | -0.90          | -0.001272       | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | 40               | -0.40          | -0.000565       | PASS    |
| Band12      | Stand-Alone | 3.75kHz   | 0.18       | QPSK    | 23095 | 1@0  | NV            | 50               | -0.60          | -0.000848       | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | -30              | 1.00           | 0.001413        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | -20              | 1.60           | 0.002261        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | -10              | 0.70           | 0.000989        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | 0                | 1.60           | 0.002261        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | 10               | 0.70           | 0.000989        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | 20               | 2.10           | 0.002968        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | 30               | 1.10           | 0.001555        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | 40               | 1.80           | 0.002544        | PASS    |
| Band12      | Stand-Alone | 15kHz     | 0.18       | QPSK    | 23095 | 12@0 | NV            | 50               | 1.90           | 0.002686        | PASS    |

~The End~