

Appendix B.8

E-UTRA Band 13

1. Main Test Instruments

| RE in Chamber | | | | | |
|--|--|-------------------|---------------|--------------|---------------|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date | Cal. Due date |
| | | | | (yyyy-mm-dd) | (yyyy-mm-dd) |
| 3m Semi-Anechoic Chamber | AUDIX | N/A | SEM001-02 | 2018/3/13 | 2021/3/12 |
| Spectrum Analyzer (20Hz-43GHz) | Rohde & Schwarz | FSU43 | SEM004-08 | 2019/3/2 | 2020/3/1 |
| BiConiLog Antenna (26-3000MHz) | ETS-Lindgren | 3142C | SEM003-01 | 2017/6/27 | 2020/6/26 |
| Horn Antenna (800MHz-18GHz) | Rohde & Schwarz | HF907 | SEM003-07 | 2018/4/13 | 2021/4/12 |
| Horn Antenna (15-40GHz) | Schwarzbeck | BBHA 9170 | SEM003-15 | 2017/10/17 | 2020/10/16 |
| Amplifier (0.1-1300MHz) | HP | 8447D | SEM005-02 | 2018/9/2 | 2019/9/2 |
| Low Noise Amplifier (100MHz-18GHz) | Black Diamond Series | BDLNA-0118-352810 | SEM005-05 | 2018/9/2 | 2019/9/2 |
| Pre-Amplifier (0.1-26.5GHz) | Compliance Directions Systems Inc. | PAP-0126 | EMC2063 | 2018/10/20 | 2019/10/19 |
| Pre-amplifier (26-40GHz) | Compliance Directions Systems Inc. | PAP-2640-50 | SEM005-08 | 2019/3/2 | 2020/3/1 |
| Band filter | N/A | N/A | N/A | N/A | N/A |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM026-01 | 2019/6/12 | 2020/6/11 |
| Wideband Radio Communication Tester | Anristu | MT8821C | 6201462742 | 2019/4/3 | 2020/4/3 |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | W005-02 | 2019/1/13 | 2020/1/12 |
| RF conducted test | | | | | |
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date | Cal. Due date |
| | | | | (yyyy-mm-dd) | (yyyy-mm-dd) |
| Dual Output Mobile Communication DC Source | Agilent Technologies Inc | 66311B | W009-09 | 2018/11/2 | 2019/11/1 |
| Signal Analyzer | Rohde & Schwarz | FSV | W005-02 | 2019/3/2 | 2020/3/1 |
| Coaxial Cable | SGS | N/A | SEM031-01 | 2019/6/12 | 2020/6/11 |
| Attenuator | Weinschel Associates | WA41 | SEM021-09 | N/A | N/A |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2018/11/2 | 2019/11/1 |
| Humidity/ Temperature Indicator | Shanghai Meteorological Industry Factory | HTC-1 | W006-17 | 2018/11/2 | 2019/11/1 |
| Temperature Chamber | GIANT FORCE | ICT-150-40-CP-AR | W027-03 | 2018/11/2 | 2019/11/1 |
| Wideband Radio Communication Tester | Anristu | MT8821C | 6201462742 | 2019/3/2 | 2020/3/1 |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | W005-02 | 2018/11/2 | 2019/11/1 |

2. Measurement Uncertainty

For a 95% confidence level ($k = 2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

| Test Item | Extended Uncertainty | Data |
|-------------------------------|--------------------------|--------------------|
| Transmit Output Power Data | Power [dBm] | $U = \pm 0.37$ dB |
| Bandwidth | Magnitude [%] | $U = \pm 0.2\%$ |
| Band Edge Compliance | Disturbance Power [dBm] | $U = \pm 2.0$ dB |
| Spurious Emissions, Conducted | Disturbance Power [dBm] | $U = \pm 2.0$ dB |
| Frequency Stability | Frequency Accuracy [ppm] | $U = \pm 0.24$ ppm |

3. Effective (Isotropic) Radiated Power

3.1. Test Result

| Band | Bandwidth | Modulation | Channel | RB Configuration | Conducted Power(dBm) | ERP (dBm) | Limit (dBm) | Verdict |
|--------|-----------|------------|---------|------------------|----------------------|-----------|-------------|---------|
| Band13 | 5MHz | QPSK | 23205 | 1RB#0 | 23.69 | 18.54 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23205 | 1RB#12 | 23.97 | 18.82 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23205 | 1RB#24 | 23.69 | 18.54 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23205 | 12RB#0 | 22.76 | 17.61 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23205 | 12RB#6 | 22.87 | 17.72 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23205 | 12RB#13 | 22.84 | 17.69 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23205 | 25RB#0 | 22.82 | 17.67 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 1RB#0 | 23.75 | 18.60 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 1RB#12 | 23.97 | 18.82 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 1RB#24 | 23.66 | 18.51 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 12RB#0 | 22.86 | 17.71 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 12RB#6 | 22.87 | 17.72 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 12RB#13 | 22.81 | 17.66 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 25RB#0 | 22.83 | 17.68 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 1RB#0 | 23.72 | 18.57 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 1RB#12 | 23.96 | 18.81 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 1RB#24 | 23.68 | 18.53 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 12RB#0 | 22.85 | 17.70 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 12RB#6 | 22.87 | 17.72 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 12RB#13 | 22.74 | 17.59 | 34.77 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 25RB#0 | 22.82 | 17.67 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 1RB#0 | 22.76 | 17.61 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 1RB#12 | 23.00 | 17.85 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 1RB#24 | 22.90 | 17.75 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 12RB#0 | 21.76 | 16.61 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 12RB#6 | 21.88 | 16.73 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 12RB#13 | 21.82 | 16.67 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 25RB#0 | 21.77 | 16.62 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 1RB#0 | 22.83 | 17.68 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 1RB#12 | 23.14 | 17.99 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 1RB#24 | 22.78 | 17.63 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 12RB#0 | 21.83 | 16.68 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 12RB#6 | 21.90 | 16.75 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 12RB#13 | 21.87 | 16.72 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 25RB#0 | 21.83 | 16.68 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23255 | 1RB#0 | 22.85 | 17.70 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23255 | 1RB#12 | 23.05 | 17.90 | 34.77 | PASS |

| | | | | | | | | |
|--------|-------|-------|-------|---------|-------|-------|-------|------|
| Band13 | 5MHz | 16QAM | 23255 | 1RB#24 | 22.94 | 17.79 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23255 | 12RB#0 | 21.88 | 16.73 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23255 | 12RB#6 | 21.92 | 16.77 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23255 | 12RB#13 | 21.76 | 16.61 | 34.77 | PASS |
| Band13 | 5MHz | 16QAM | 23255 | 25RB#0 | 21.83 | 16.68 | 34.77 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 1RB#0 | 23.85 | 18.70 | 34.77 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 1RB#24 | 23.93 | 18.78 | 34.77 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 1RB#49 | 23.78 | 18.63 | 34.77 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 25RB#0 | 22.90 | 17.75 | 34.77 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 25RB#12 | 22.94 | 17.79 | 34.77 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 25RB#25 | 22.89 | 17.74 | 34.77 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | 22.90 | 17.75 | 34.77 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 1RB#0 | 22.89 | 17.74 | 34.77 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 1RB#24 | 23.10 | 17.95 | 34.77 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 1RB#49 | 22.92 | 17.77 | 34.77 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 25RB#0 | 21.86 | 16.71 | 34.77 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 25RB#12 | 21.94 | 16.79 | 34.77 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 25RB#25 | 21.90 | 16.75 | 34.77 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | 21.87 | 16.72 | 34.77 | PASS |

Remark:

a: For getting the EIRP (Efficient Isotropic Radiated Power), the following formula should be taken to calculate it,

ERP [dBm] = Conducted Power [dBm] + Gain [dBd]

EIRP [dBm] = Conducted Power [dBm] + Gain [dBi]

4. Peak-to-Average Ratio (CCDF)

4.1. Test Result

| Band | Bandwidth | Modulation | Channel | RB Configuration | Result(dB) | Limit(dB) | Verdict |
|--------|-----------|------------|---------|------------------|------------|-----------|---------|
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | 4.81 | 13 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | 5.71 | 13 | PASS |

4.2. Test Plots

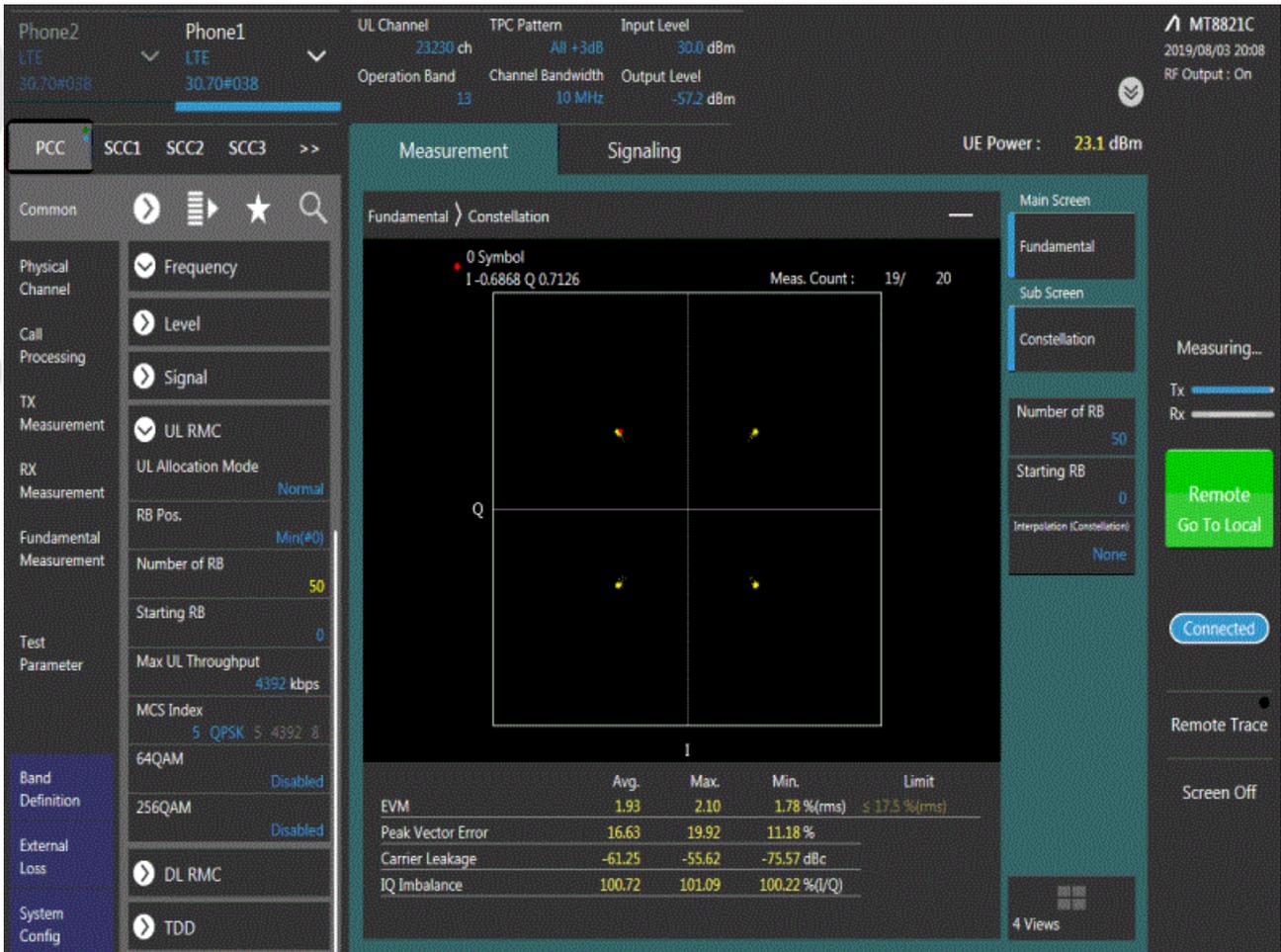


5. Modulation Characteristics

5.1. Test Band = LTE Band 13

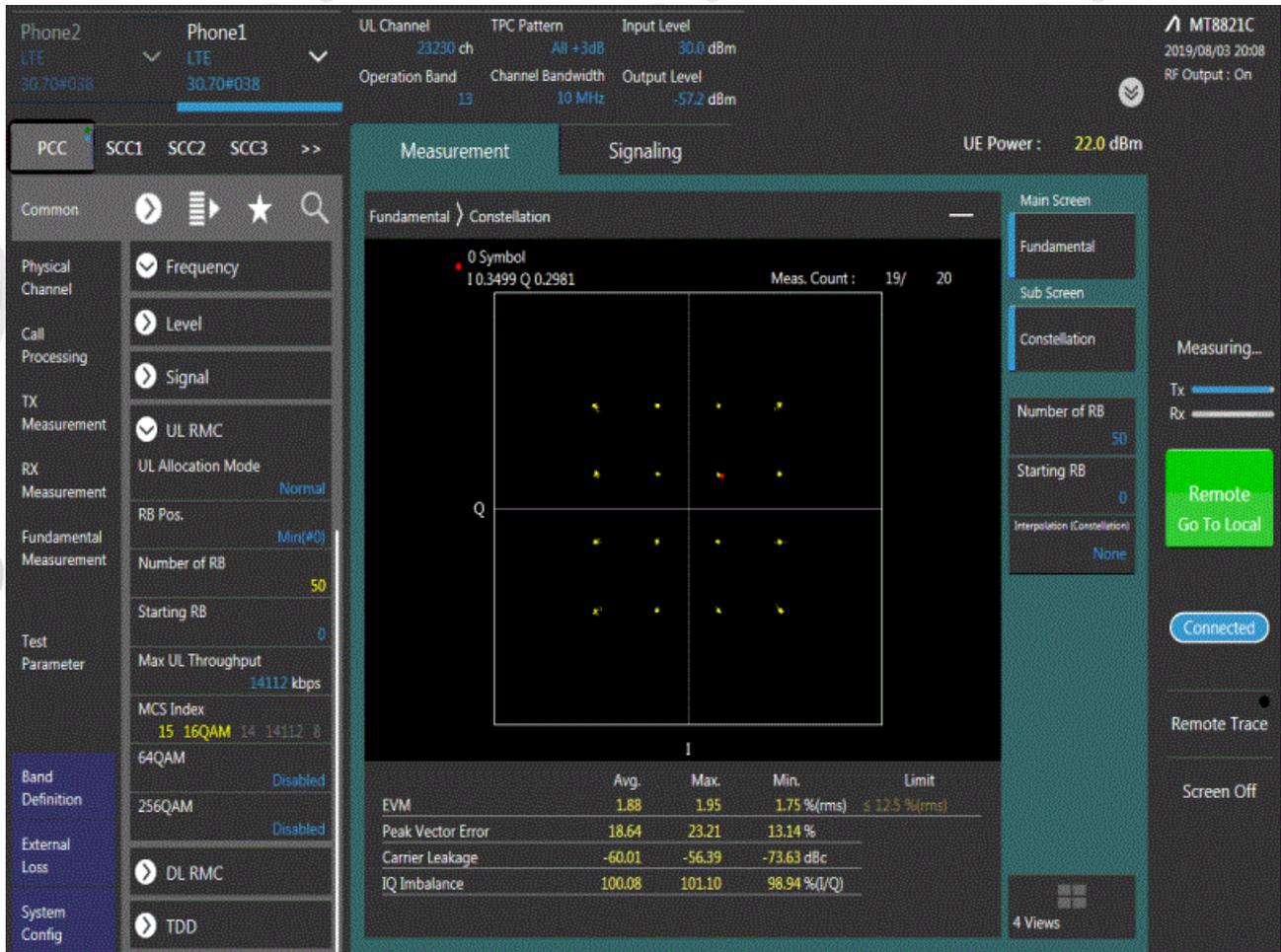
5.2. Test Mode = LTE /TM1 10MHz

5.2.1. Test Channel = MCH



5.3. Test Mode = LTE /TM2 10MHz

5.3.1. Test Channel = MCH

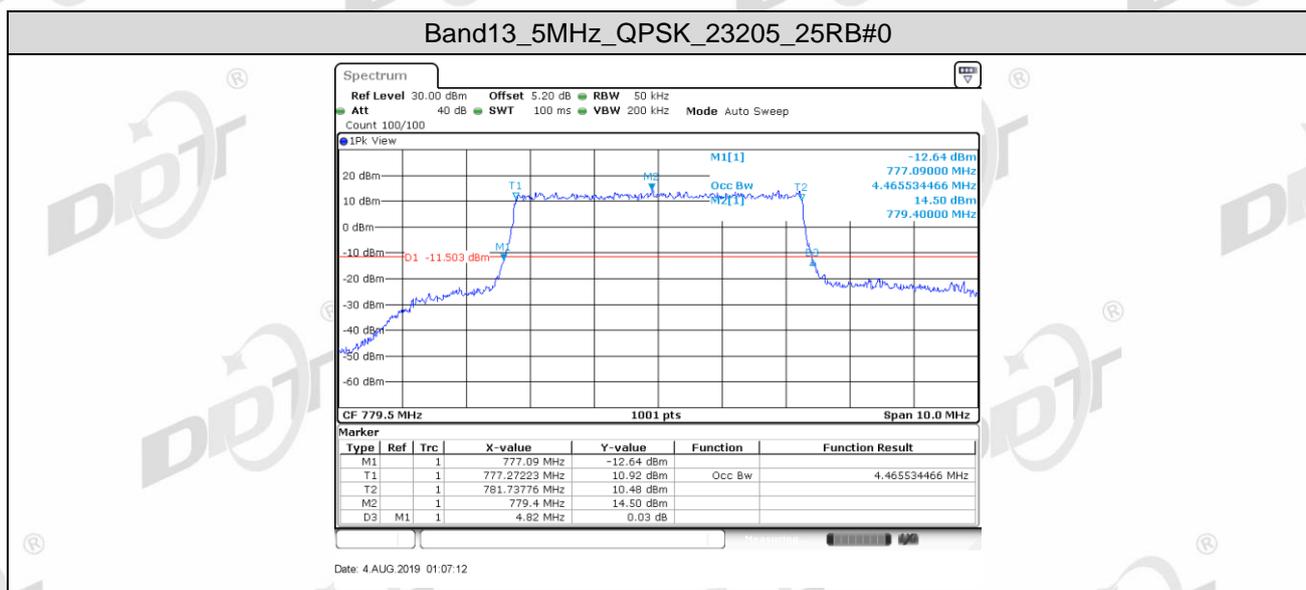


6. 26dB Bandwidth and Occupied Bandwidth

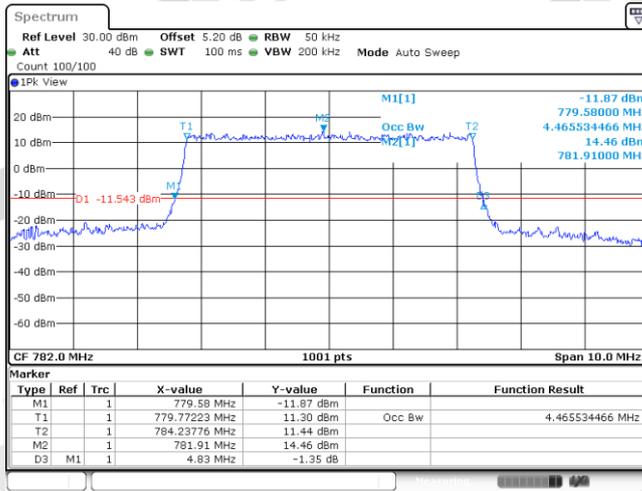
6.1. Test Result

| Band | Bandwidth | Modulation | Channel | RB Configuration | Occupied Bandwidth (MHz) | 26dB Bandwidth (MHz) | Verdict |
|--------|-----------|------------|---------|------------------|--------------------------|----------------------|---------|
| Band13 | 5MHz | QPSK | 23205 | 25RB#0 | 4.466 | 4.820 | PASS |
| Band13 | 5MHz | QPSK | 23230 | 25RB#0 | 4.466 | 4.830 | PASS |
| Band13 | 5MHz | QPSK | 23255 | 25RB#0 | 4.466 | 4.820 | PASS |
| Band13 | 5MHz | 16QAM | 23205 | 25RB#0 | 4.486 | 4.850 | PASS |
| Band13 | 5MHz | 16QAM | 23230 | 25RB#0 | 4.486 | 4.860 | PASS |
| Band13 | 5MHz | 16QAM | 23255 | 25RB#0 | 4.476 | 4.840 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | 8.931 | 9.580 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | 8.911 | 9.580 | PASS |

6.2. Test Plots

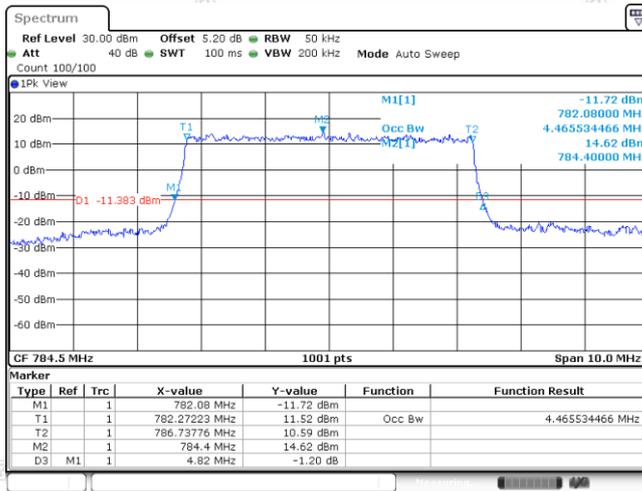


Band13_5MHz_QPSK_23230_25RB#0



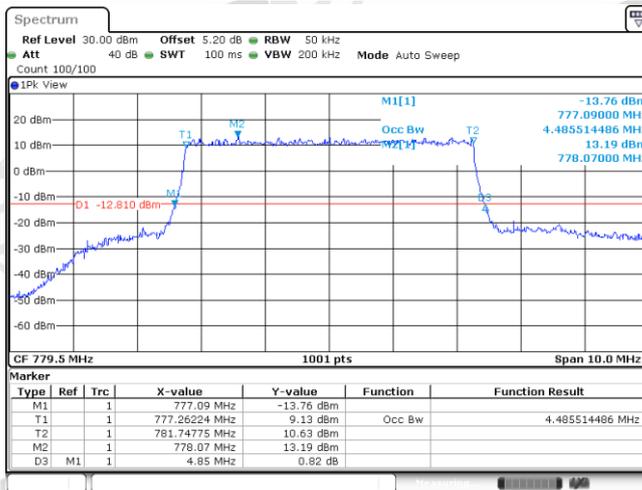
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Band13_5MHz_QPSK_23255_25RB#0



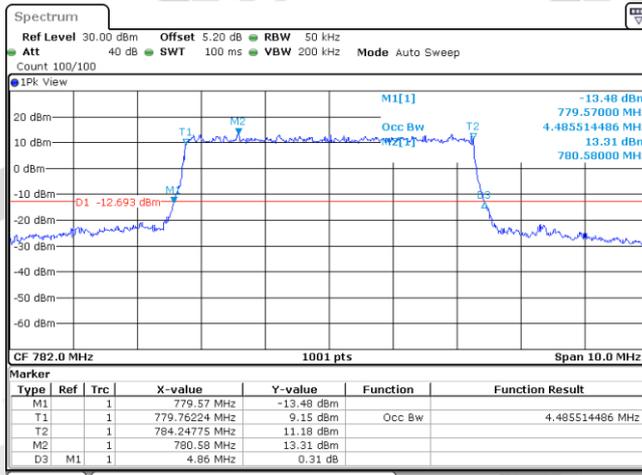
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Band13_5MHz_16QAM_23205_25RB#0



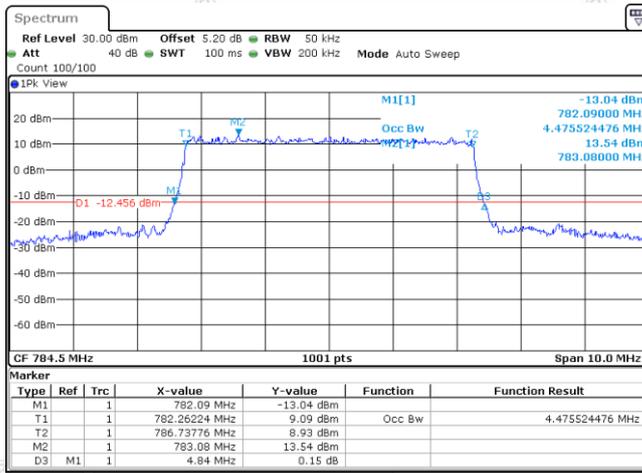
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Band13_5MHz_16QAM_23230_25RB#0



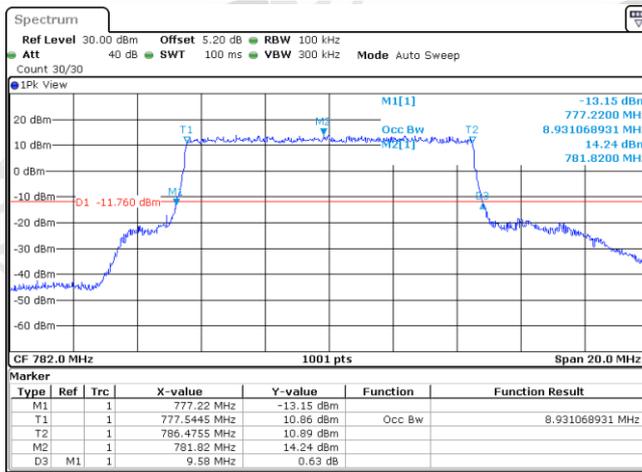
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Band13_5MHz_16QAM_23255_25RB#0

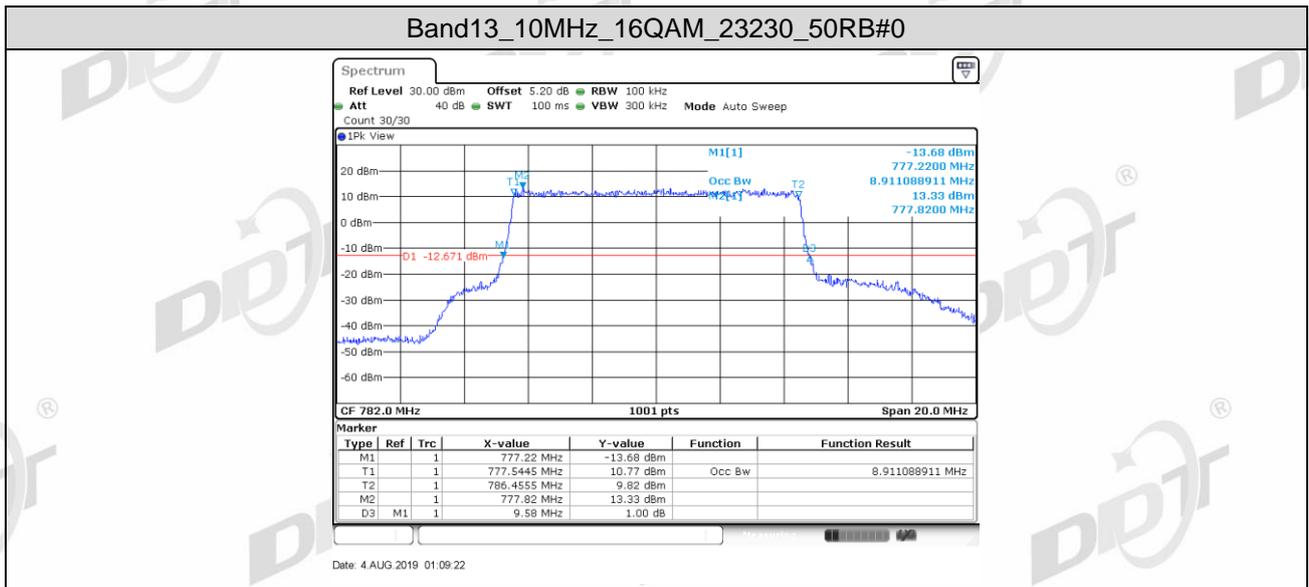


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Band13_10MHz_QPSK_23230_50RB#0

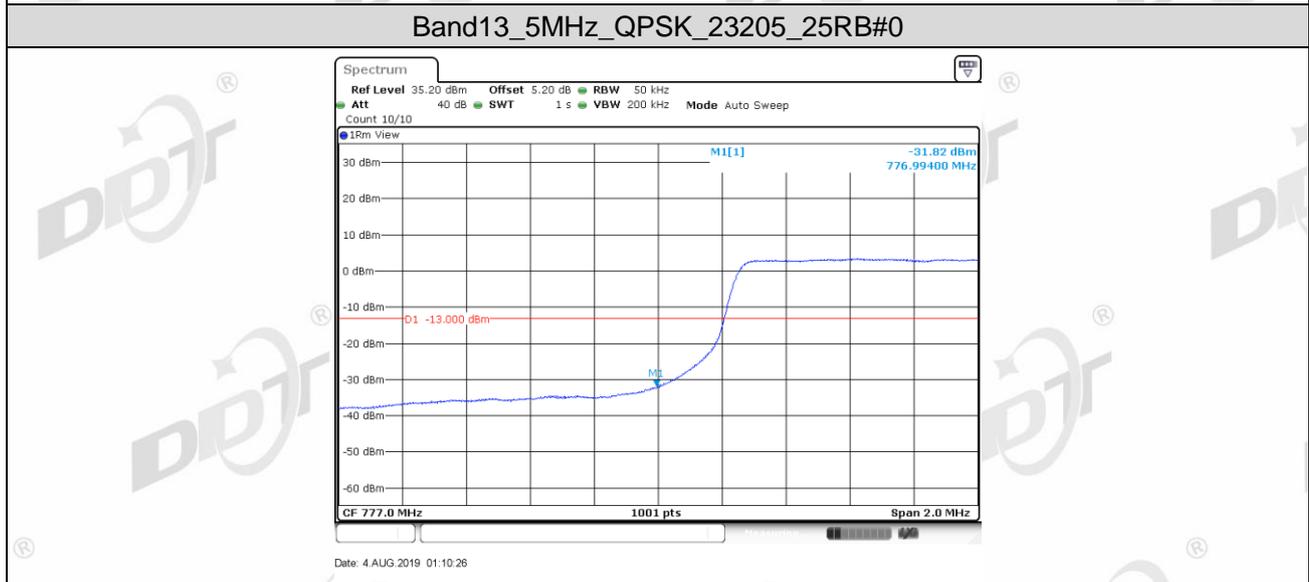
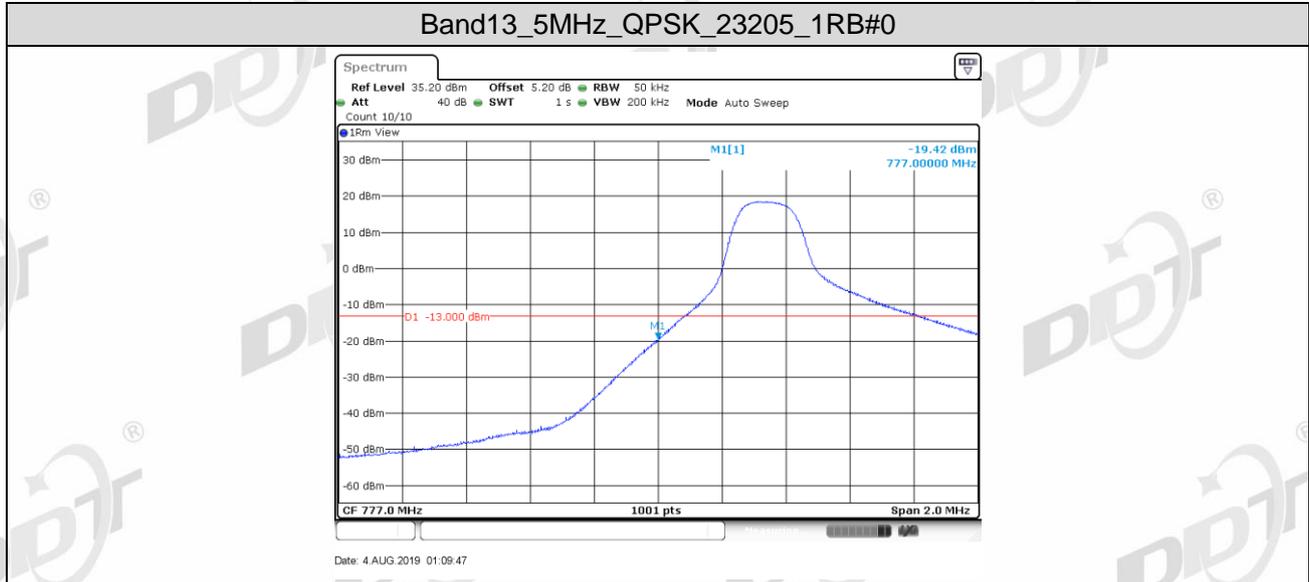


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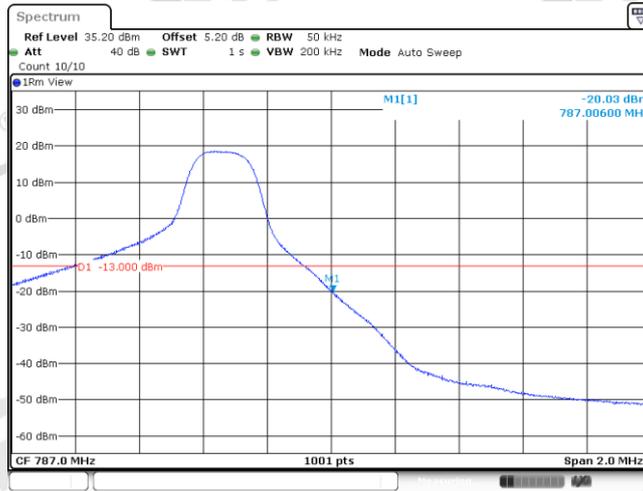


7. Band Edge Compliance

7.1. Test Plots

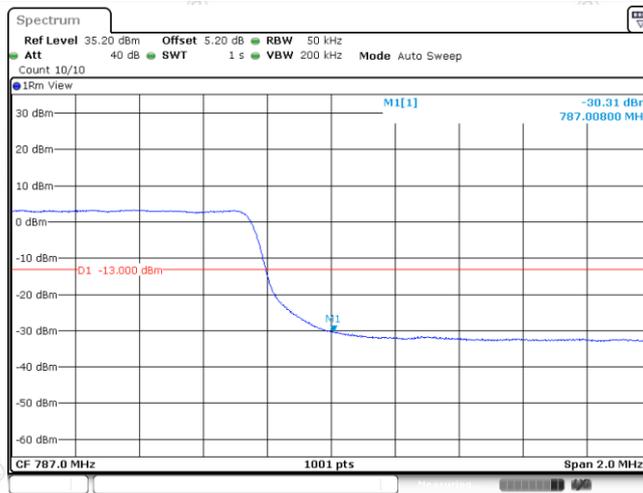


Band13_5MHz_QPSK_23255_1RB#24



Date: 4.AUG.2019 01:11:10

Band13_5MHz_QPSK_23255_25RB#0



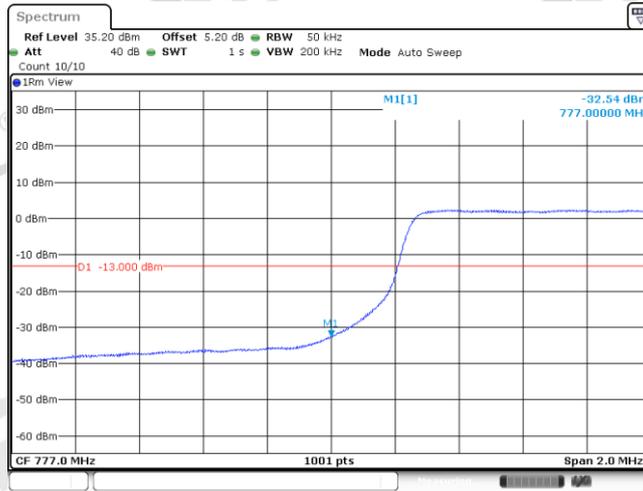
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Band13_5MHz_16QAM_23205_1RB#0



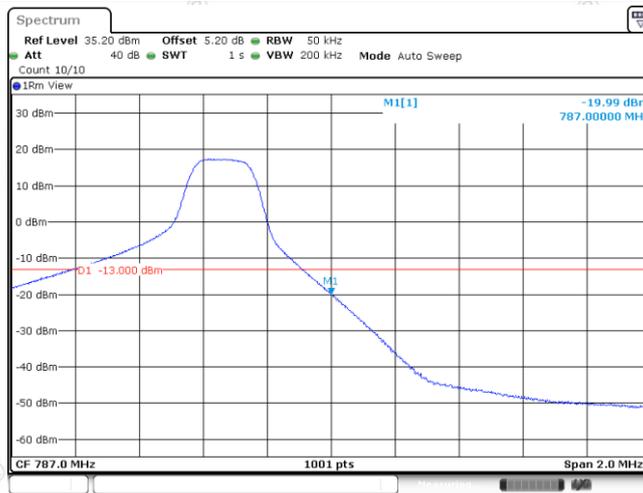
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Band13_5MHz_16QAM_23205_25RB#0



Date: 4 AUG 2019 01:10:46

Band13_5MHz_16QAM_23255_1RB#24



Date: 4 AUG 2019 01:11:29

Band13_5MHz_16QAM_23255_25RB#0



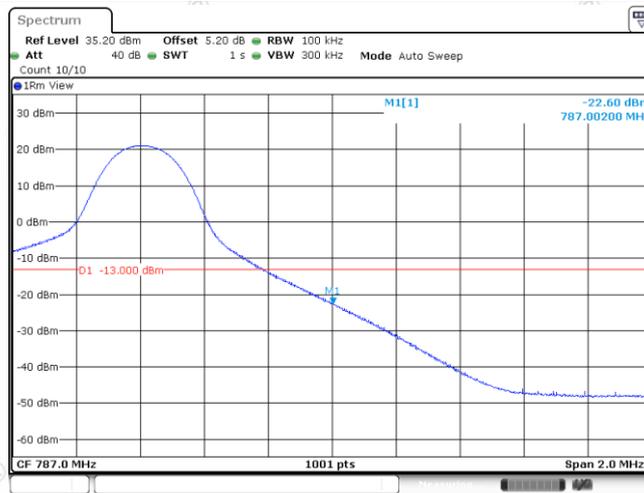
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Band13_10MHz_QPSK_23230_Left_1RB#0



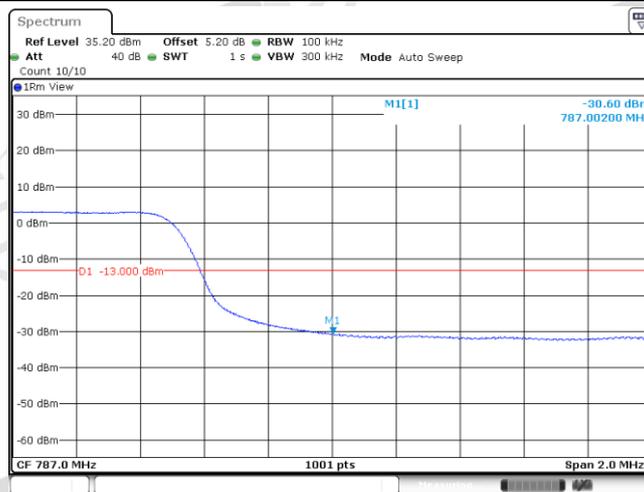
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Band13_10MHz_QPSK_23230_Right_1RB#49



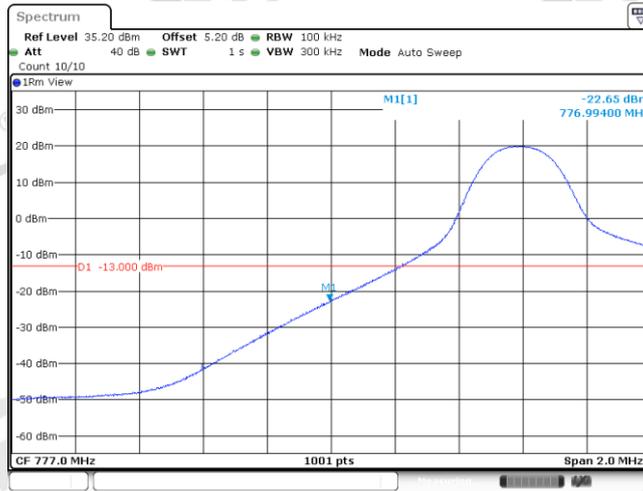
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Band13_10MHz_QPSK_23230_Right_50RB#0

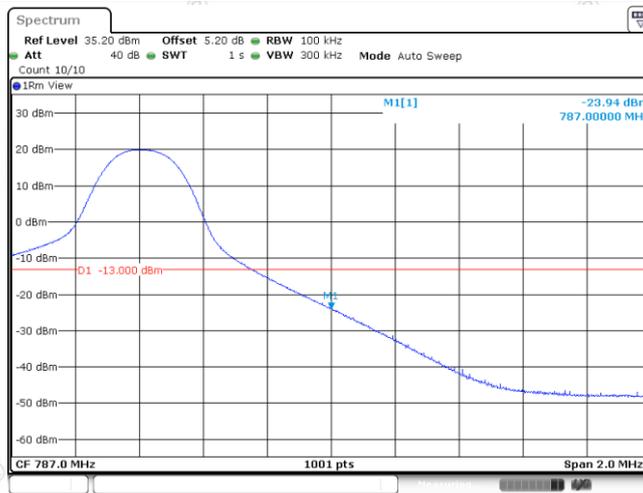


Date: 3.AUG.2019 01:28:19

Band13_10MHz_16QAM_23230_Left_1RB#0



Band13_10MHz_16QAM_23230_Right_1RB#49



Band13_10MHz_16QAM_23230_Right_50RB#0

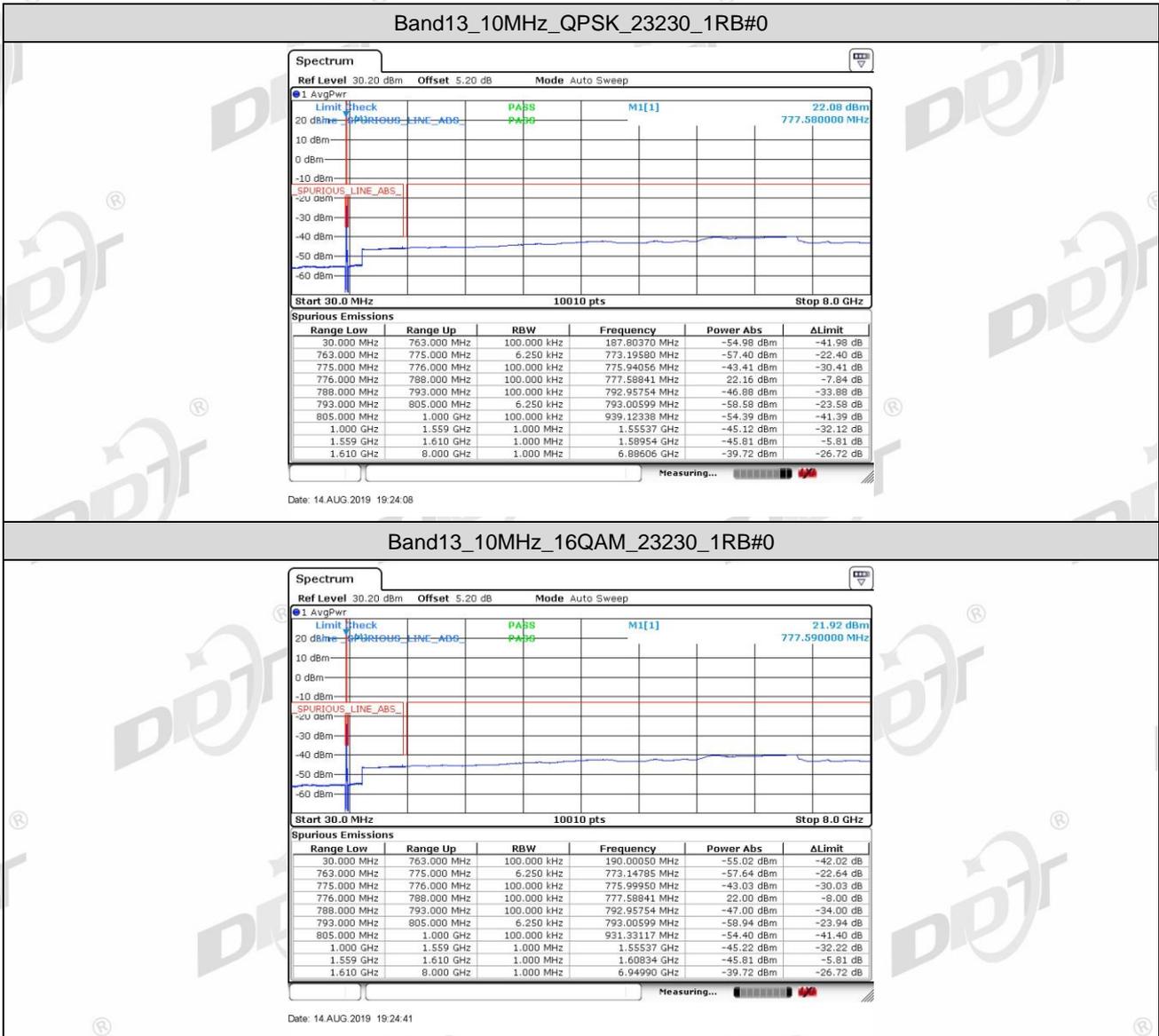


8. Spurious Emission at Antenna Terminal

Remark1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = k * (Span / RBW)" with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

Remark2: only the worst case data displayed in this report.

8.1. Test Plots



9. Frequency Stability

9.1. Frequency Vs Voltage

| Voltage | | | | | | | | | | |
|---------|-----------|------------|---------|--------------|---------------|------------------|----------------|-----------------|-------------|---------|
| Band | Bandwidth | Modulation | Channel | RB Configure | Voltage [Vdc] | Temperature (°C) | Deviation (Hz) | Deviation (ppm) | Limit (ppm) | Verdict |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | VL | NT | -3.30 | -0.004220 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | VN | NT | -5.10 | -0.006522 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | VH | NT | -8.60 | -0.010997 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | VL | NT | -6.40 | -0.008184 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | VN | NT | -5.70 | -0.007289 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | VH | NT | -6.30 | -0.008056 | ±2.5 | PASS |

9.2. Frequency Vs Temperature

| Temperature | | | | | | | | | | |
|-------------|-----------|------------|---------|--------------|---------------|------------------|----------------|-----------------|-------------|---------|
| Band | Bandwidth | Modulation | Channel | RB Configure | Voltage [Vdc] | Temperature (°C) | Deviation (Hz) | Deviation (ppm) | Limit (ppm) | Verdict |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | -30 | -4.50 | -0.005754 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | -20 | -5.80 | -0.007417 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | 0 | -5.30 | -0.006777 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | 10 | -5.70 | -0.007289 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | 20 | -4.80 | -0.006138 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | 30 | -6.30 | -0.008056 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | 40 | -3.00 | -0.003836 | ±2.5 | PASS |
| Band13 | 10MHz | QPSK | 23230 | 50RB#0 | NV | 50 | -1.40 | -0.001790 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | -30 | -5.50 | -0.007033 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | -20 | -10.60 | -0.013555 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | 0 | -6.40 | -0.008184 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | 10 | -6.60 | -0.008440 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | 20 | -6.50 | -0.008312 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | 30 | -4.80 | -0.006138 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | 40 | -8.30 | -0.010614 | ±2.5 | PASS |
| Band13 | 10MHz | 16QAM | 23230 | 50RB#0 | NV | 50 | -4.80 | -0.006138 | ±2.5 | PASS |

The End