

EMISSION BANDWIDTH



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|------------------------------|--------------|------------|-----|-----------|-----------|
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFM | 19-Mar-19 | 19-Mar-20 |

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The 99% bandwidth was measured utilizing the analyzer's peak detector and measuring the carrier's 26 dB occupied bandwidth based on the peak output power level measured. A plot was taken to show the occupied bandwidth is contained within the allowable transmit band. (within band is 5 or 10 MHz where applicable)

The method in section 5.4 of ANSI C63.26 was used to make the measurement.

The spectrum analyzer settings were as follows:

RBW = Approx. 1% of the emission bandwidth (B). This was an iterative process to determine the RBW based on the emissions bandwidth (B).

VBW = > RBW

A peak detector was used

Trace max hold.

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.

FCC 22.917(b)(1) defines the 26dB emission bandwidth requirement.

EMISSION BANDWIDTH



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| | | | |
|---|---|-----------------------------|------------|
| EUT: AHBCC Remote Radio Head (RRH) | | Work Order: NOKI0002 | |
| Serial Number: K9180332366 | | Date: 4-Dec-19 | |
| Customer: Nokia Solutions and Networks | | Temperature: 23.6 °C | |
| Attendees: Mitchell Hill, John Rattanaovong | | Humidity: 30.6% RH | |
| Project: None | | Barometric Pres.: 1021 mbar | |
| Tested by: Brandon Hobbs | | Power: 54VDC | |
| Job Site: TX09 | | | |
| TEST SPECIFICATIONS | | Test Method | |
| FCC 22H:2019 | | ANSI C63.26:2015 | |
| COMMENTS | | | |
| Testing was completed on the highest output power antenna port (Port 4). All conducted losses were accounted for between the radio and the spectrum analyzer. The EUT was operating at 100% duty cycle for all measurements made. | | | |
| DEVIATIONS FROM TEST STANDARD | | | |
| None | | | |
| Configuration # | 1 | Signature | |
| | | Value 99% | Value 26dB |
| | | Limit (<) | Result |

| | | | | | | | |
|--------|--------|------------------|------------------------|-----------|-----------|-------------|------|
| Band 5 | Port 4 | 5 MHz Bandwidth | | | | | |
| | | QPSK | Mid Channel, 881.5 MHz | 4.488 MHz | 4.861 MHz | Within Band | Pass |
| | | 16QAM | Mid Channel, 881.5 MHz | 4.468 MHz | 4.824 MHz | Within Band | Pass |
| | | 64QAM | Mid Channel, 881.5 MHz | 4.486 MHz | 4.862 MHz | Within Band | Pass |
| | | 256QAM | Mid Channel, 881.5 MHz | 4.486 MHz | 4.866 MHz | Within Band | Pass |
| | | 10 MHz Bandwidth | | | | | |
| | | QPSK | Mid Channel, 881.5 MHz | 9.328 MHz | 9.878 MHz | Within Band | Pass |
| | | 16QAM | Mid Channel, 881.5 MHz | 9.202 MHz | 9.841 MHz | Within Band | Pass |
| | | 64QAM | Mid Channel, 881.5 MHz | 9.313 MHz | 9.892 MHz | Within Band | Pass |
| | | 256QAM | Mid Channel, 881.5 MHz | 9.325 MHz | 9.935 MHz | Within Band | Pass |

Band n5 Emission Designators

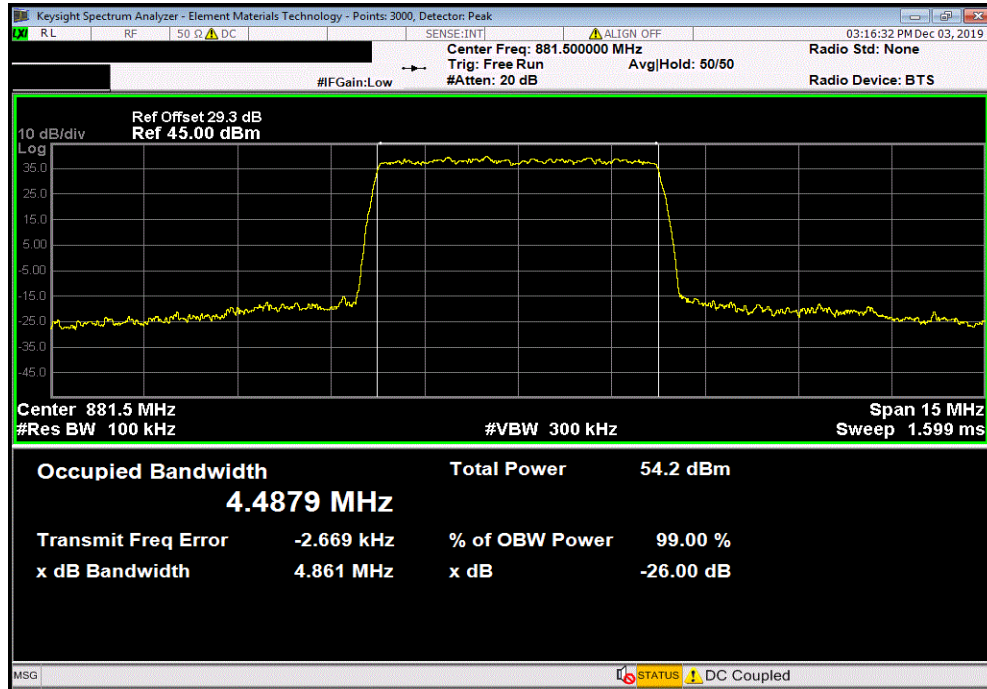
| Band n5 (869MHz to 894MHz) Emission Designators | | | | |
|--|-------------|--------------|--------------|---------------|
| Channel Bandwidth | 5G-NR: QPSK | 5G-NR: 16QAM | 5G-NR: 64QAM | 5G-NR: 256QAM |
| 5M | 4M86G7W | 4M82G7W | 4M86G7W | 4M87G7W |
| 10M | 9M88G7W | 9M84G7W | 9M89G7W | 9M94G7W |
| Note: Based on 26dB emission bandwidth | | | | |

EMISSION BANDWIDTH

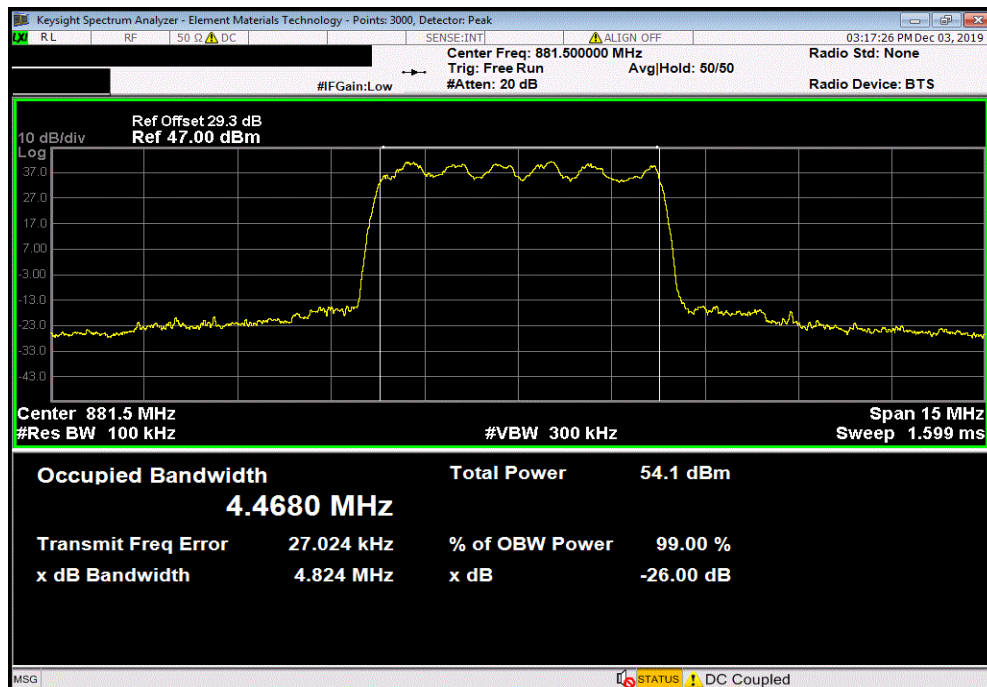


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| Band 5, Port 4, 5 MHz Bandwidth , QPSK, Mid Channel, 881.5 MHz | | | | | | |
|--|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | Result | | |
| | 99% | 26dB | (<) | | | |
| | 4.488 MHz | 4.861 MHz | Within Band | Pass | | |



| Band 5, Port 4, 5 MHz Bandwidth , 16QAM, Mid Channel, 881.5 MHz | | | | | | |
|---|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | Result | | |
| | 99% | 26dB | (<) | | | |
| | 4.468 MHz | 4.824 MHz | Within Band | Pass | | |

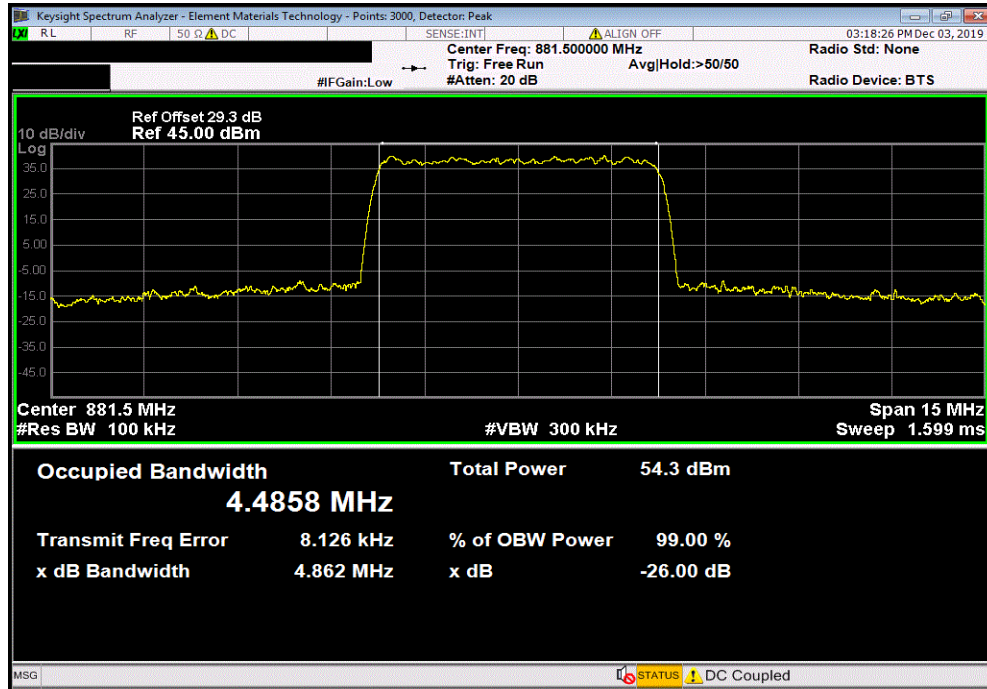


EMISSION BANDWIDTH

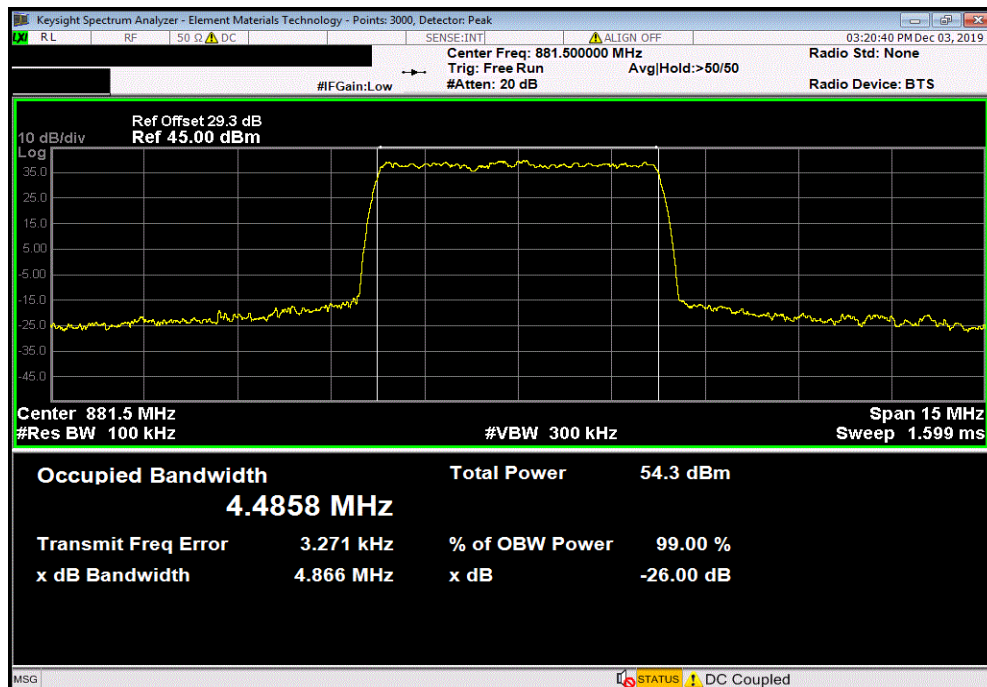


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| Band 5, Port 4, 5 MHz Bandwidth , 64QAM, Mid Channel, 881.5 MHz | | | | | | |
|---|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | | | |
| | 99% | 26dB | (<) | Result | | |
| | 4.486 MHz | 4.862 MHz | Within Band | Pass | | |



| Band 5, Port 4, 5 MHz Bandwidth , 256QAM, Mid Channel, 881.5 MHz | | | | | | |
|--|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | | | |
| | 99% | 26dB | (<) | Result | | |
| | 4.486 MHz | 4.866 MHz | Within Band | Pass | | |

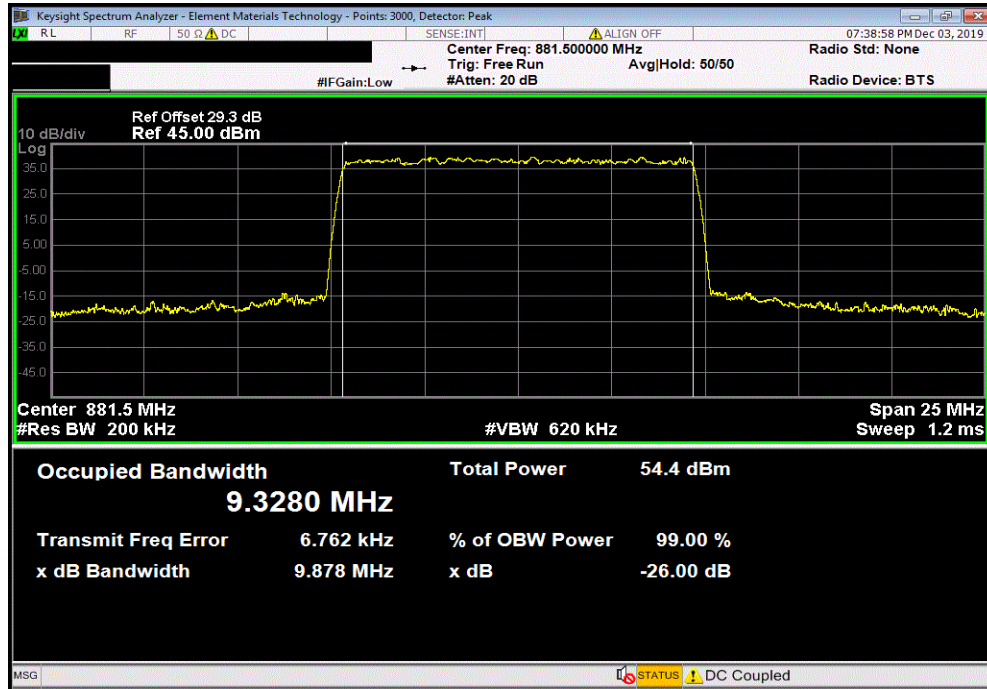


EMISSION BANDWIDTH

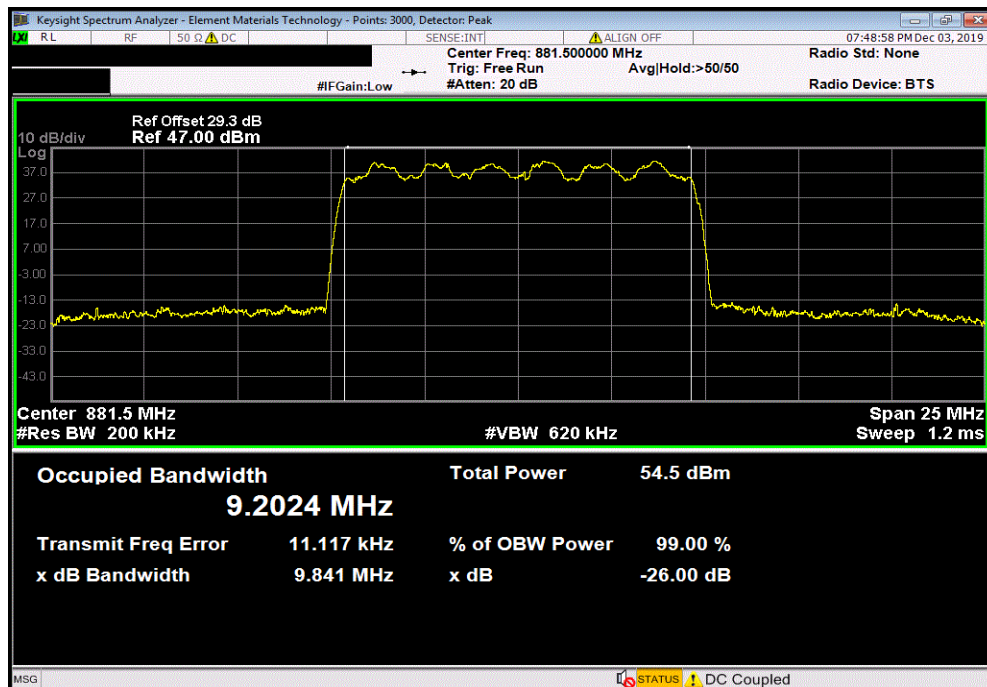


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| Band 5, Port 4, 10 MHz Bandwidth , QPSK, Mid Channel, 881.5 MHz | | | | | | |
|---|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | | | |
| | 99% | 26dB | (<) | Result | | |
| | 9.328 MHz | 9.878 MHz | Within Band | Pass | | |



| Band 5, Port 4, 10 MHz Bandwidth , 16QAM, Mid Channel, 881.5 MHz | | | | | | |
|--|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | | | |
| | 99% | 26dB | (<) | Result | | |
| | 9.202 MHz | 9.841 MHz | Within Band | Pass | | |

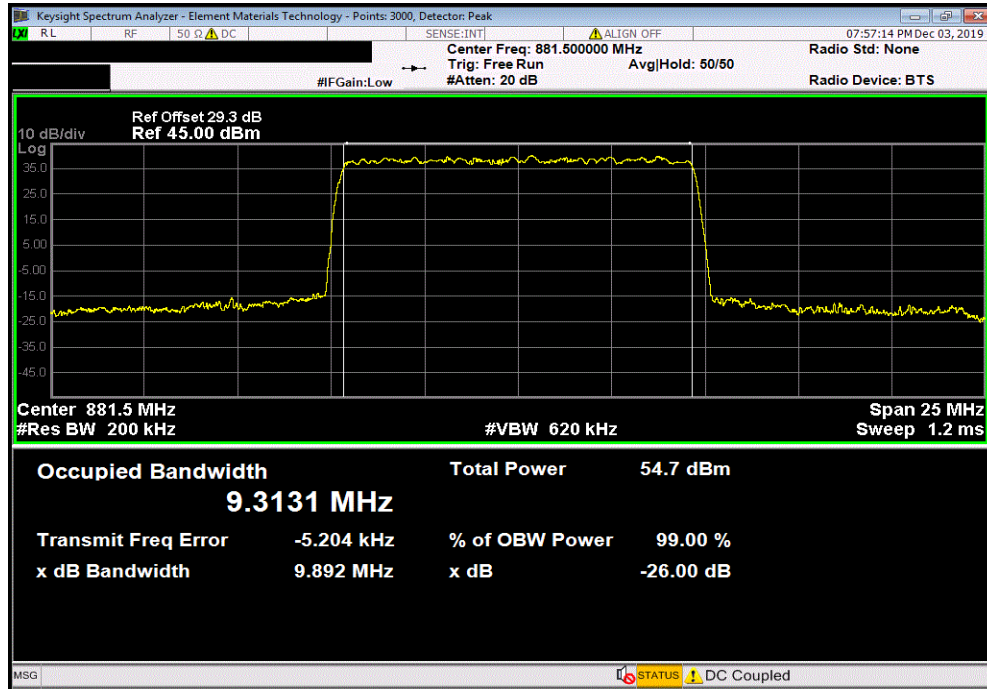


EMISSION BANDWIDTH

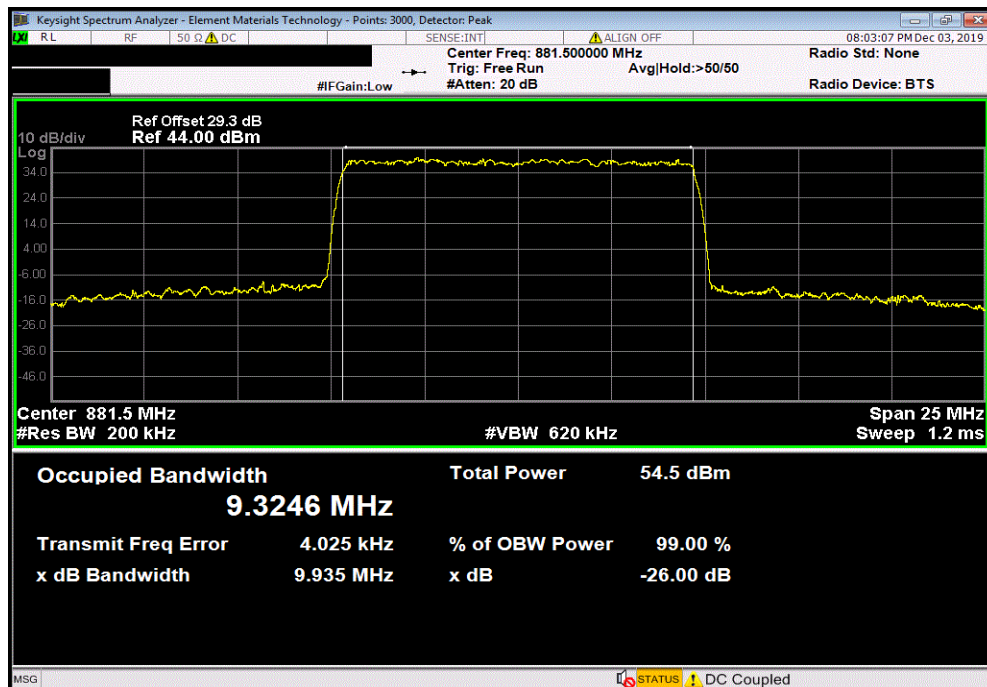


TbTx 2019.08.30.0 XMI 2019.09.05

| Band 5, Port 4, 10 MHz Bandwidth , 64QAM, Mid Channel, 881.5 MHz | | | | | | |
|--|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | Result | | |
| | 99% | 26dB | (<) | | | |
| | 9.313 MHz | 9.892 MHz | Within Band | Pass | | |



| Band 5, Port 4, 10 MHz Bandwidth , 256QAM, Mid Channel, 881.5 MHz | | | | | | |
|---|-----------|-----------|-------------|--------|--|--|
| | Value | Value | Limit | Result | | |
| | 99% | 26dB | (<) | | | |
| | 9.325 MHz | 9.935 MHz | Within Band | Pass | | |



BAND EDGE COMPLIANCE



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Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|------------------------------|--------------|------------|-----|-----------|-----------|
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFM | 19-Mar-19 | 19-Mar-20 |

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in the available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

All limits were adjusted by a factor of $[-10 \cdot \log(4)]$ dB to account for the device operation as a 4 port MIMO transmitter, as per FCC KDB 622911.

Per FCC 22.917(b), the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -19 dBm $[-13 \text{ dBm} - 10 \log(4)]$ per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

Per FCC 22.917(b)(1), emissions seen up to 1 MHz outside of authorized operating frequency range band edges shall be measured with a RBW of 1% of the measured emission bandwidth. Any emission seen to be > 1 MHz further outside the band edges shall be measured with a RBW of 100 kHz. However, a narrower RBW of at least 1% of the emission bandwidth is still allowed provided that the measured power is integrated over the full reference bandwidth of 100 kHz or 1% of the emission bandwidth.

BAND EDGE COMPLIANCE



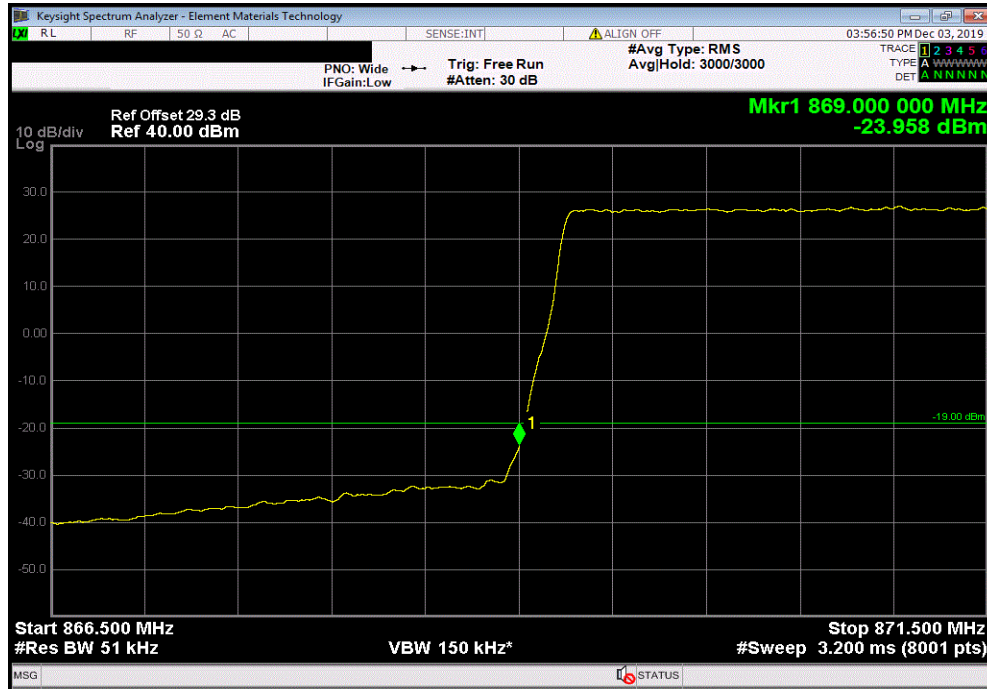
XMM 2019.09.06

| | | | |
|---|---|-----------------------------|-------------|
| EUT: AHBCC Remote Radio Head (RRH) | | Work Order: NOKI0002 | |
| Serial Number: K9180332366 | | Date: 5-Dec-19 | |
| Customer: Nokia Solutions and Networks | | Temperature: 23.1 °C | |
| Attendees: Mitchell Hill, John Rattavong | | Humidity: 31.1% RH | |
| Project: None | | Barometric Pres.: 1018 mbar | |
| Tested by: Brandon Hobbs | | Power: 54VDC | |
| Job Site: TX09 | | | |
| TEST SPECIFICATIONS | | Test Method | |
| FCC 22H:2019 | | ANSI C63.26:2015 | |
| COMMENTS | | | |
| Testing was completed on the highest output power antenna port (Port 4). All conducted losses were accounted for between the radio and the spectrum analyzer. The EUT was operating at 100% duty cycle for all measurements made. | | | |
| DEVIATIONS FROM TEST STANDARD | | | |
| None | | | |
| Configuration # | 1 | Signature | |
| | | Value (dBm) | Limit (dBm) |
| Result | | | |
| Port 4, Band 5 | | | |
| 5 MHz Bandwidth | | | |
| QPSK | | | |
| Low Channel, 871.5 MHz | | | |
| First Range Lower Band Edge | | -23.958 | -19 |
| Second Range Lower Band Edge | | -32.034 | -19 |
| High Channel, 891.5 MHz | | | |
| First Range Upper Band Edge | | -23.384 | -19 |
| Second Range Upper Band Edge | | -31.828 | -19 |
| 16QAM | | | |
| Low Channel, 871.5 MHz | | | |
| First Range Lower Band Edge | | -25.371 | -19 |
| Second Range Lower Band Edge | | -24.796 | -19 |
| High Channel, 891.5 MHz | | | |
| First Range Upper Band Edge | | -23.161 | -19 |
| Second Range Upper Band Edge | | -31.892 | -19 |
| 64QAM | | | |
| Low Channel, 871.5 MHz | | | |
| First Range Lower Band Edge | | -24.672 | -19 |
| Second Range Lower Band Edge | | -22.173 | -19 |
| High Channel, 891.5 MHz | | | |
| First Range Upper Band Edge | | -23.308 | -19 |
| Second Range Upper Band Edge | | -29.778 | -19 |
| 256QAM | | | |
| Low Channel, 871.5 MHz | | | |
| First Range Lower Band Edge | | -24.764 | -19 |
| Second Range Lower Band Edge | | -31 | -19 |
| High Channel, 891.5 MHz | | | |
| First Range Upper Band Edge | | -24.034 | -19 |
| Second Range Upper Band Edge | | -30.144 | -19 |
| 10 MHz Bandwidth | | | |
| QPSK | | | |
| Low Channel, 874 MHz | | | |
| First Range Lower Band Edge | | -27.051 | -19 |
| Second Range Lower Band Edge | | -33.93 | -19 |
| High Channel, 889 MHz | | | |
| First Range Upper Band Edge | | -25.958 | -19 |
| Second Range Upper Band Edge | | -32.187 | -19 |
| 16QAM | | | |
| Low Channel, 874 MHz | | | |
| First Range Lower Band Edge | | -27.823 | -19 |
| Second Range Lower Band Edge | | -34.206 | -19 |
| High Channel, 889 MHz | | | |
| First Range Upper Band Edge | | -25.389 | -19 |
| Second Range Upper Band Edge | | -32.296 | -19 |
| 64QAM | | | |
| Low Channel, 874 MHz | | | |
| First Range Lower Band Edge | | -27.552 | -19 |
| Second Range Lower Band Edge | | -34.297 | -19 |
| High Channel, 889 MHz | | | |
| First Range Upper Band Edge | | -26.256 | -19 |
| Second Range Upper Band Edge | | -33.014 | -19 |
| 256QAM | | | |
| Low Channel, 874 MHz | | | |
| First Range Lower Band Edge | | -26.389 | -19 |
| Second Range Lower Band Edge | | -33.418 | -19 |
| High Channel, 889 MHz | | | |
| First Range Upper Band Edge | | -25.681 | -19 |
| Second Range Upper Band Edge | | -31.807 | -19 |

BAND EDGE COMPLIANCE

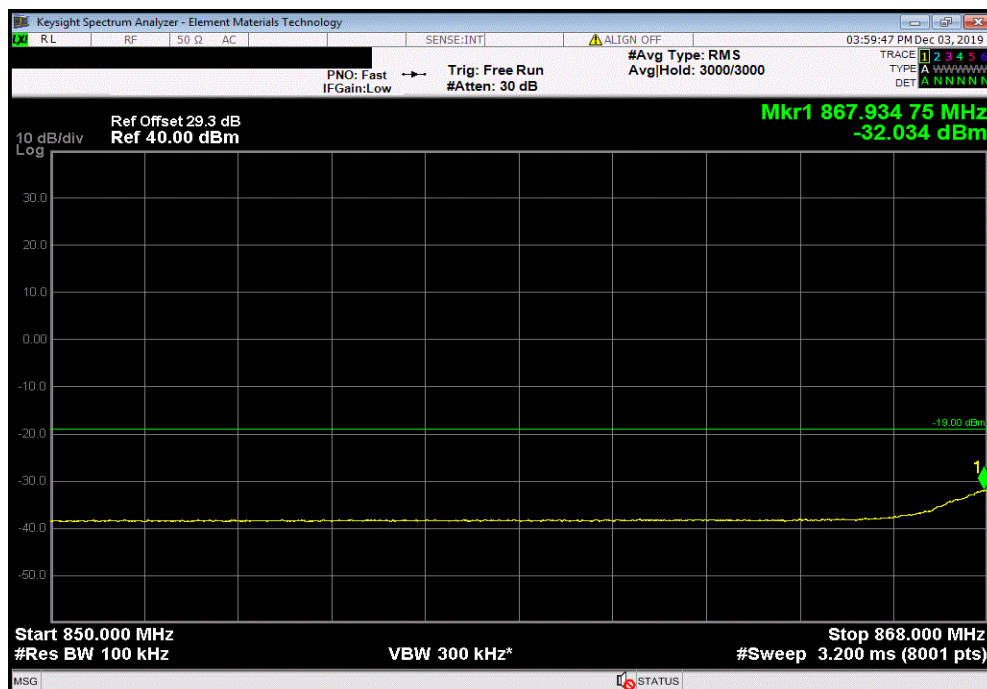
Port 4, Band 5, 5 MHz Bandwidth, QPSK, Low Channel, 871.5 MHz, First Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -23.958 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, QPSK, Low Channel, 871.5 MHz, Second Range Lower Band Edge

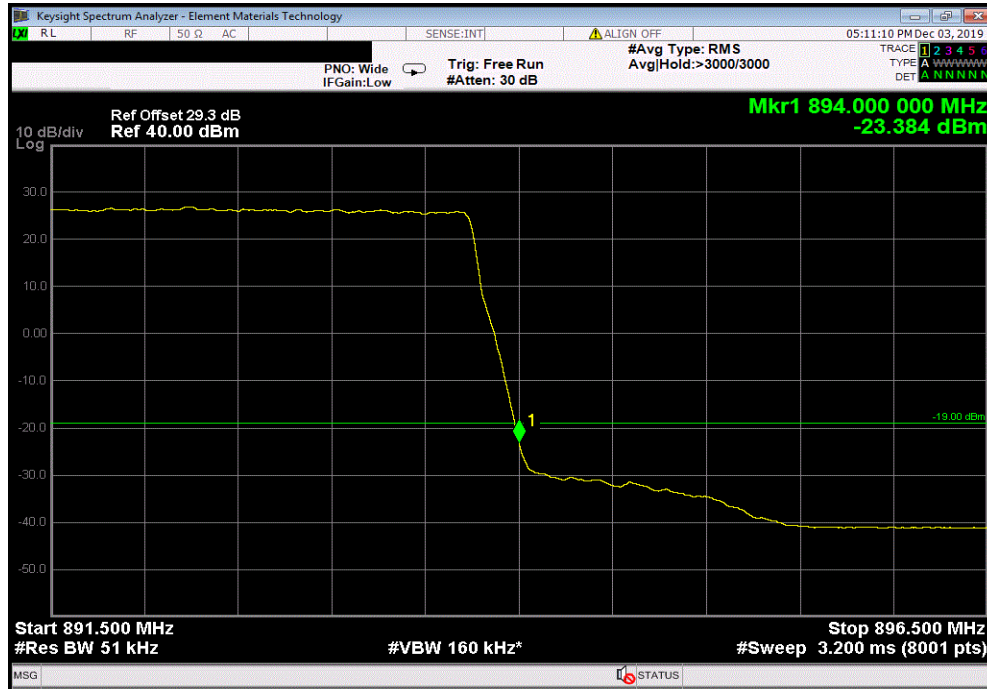
| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -32.034 | -19 | Pass |



BAND EDGE COMPLIANCE

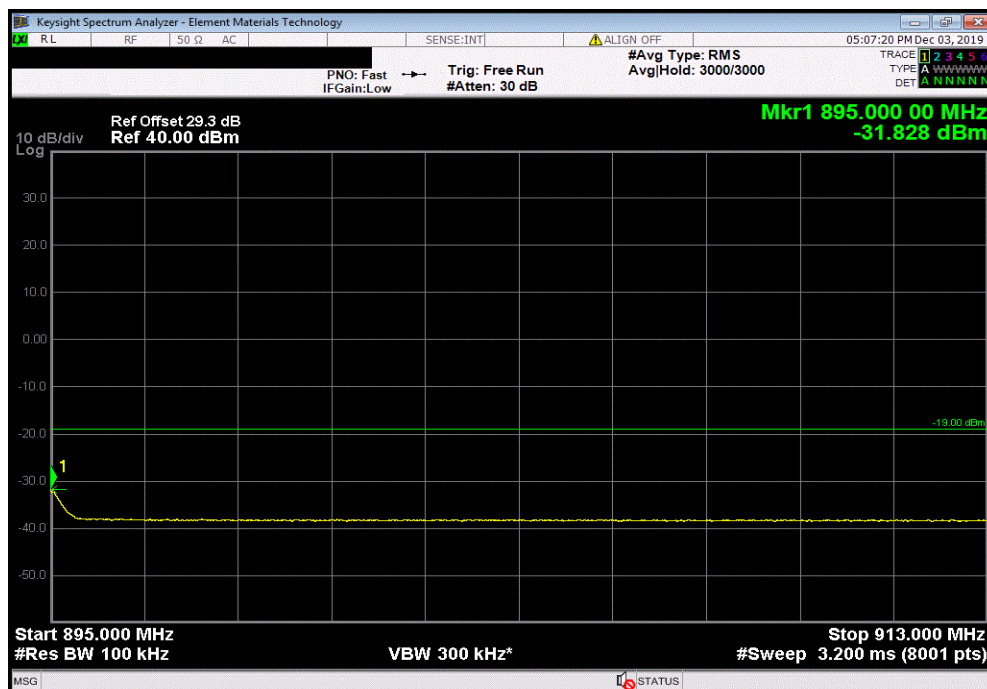
Port 4, Band 5, 5 MHz Bandwidth, QPSK, High Channel, 891.5 MHz, First Range Upper Band Edge

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -23.384 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, QPSK, High Channel, 891.5 MHz, Second Range Upper Band Edge

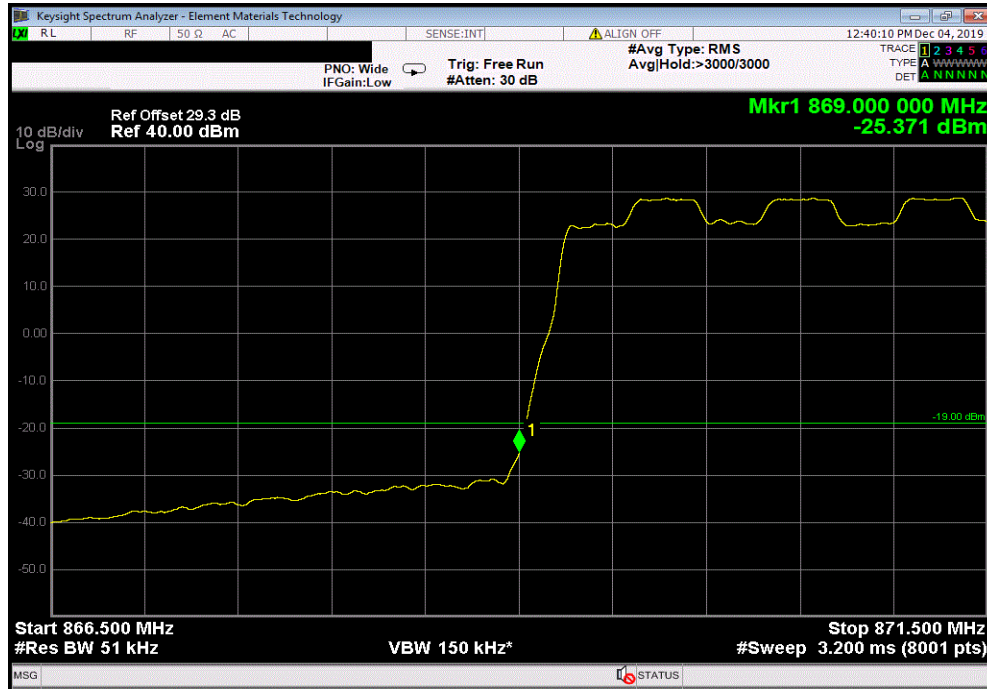
| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -31.828 | -19 | Pass |



BAND EDGE COMPLIANCE

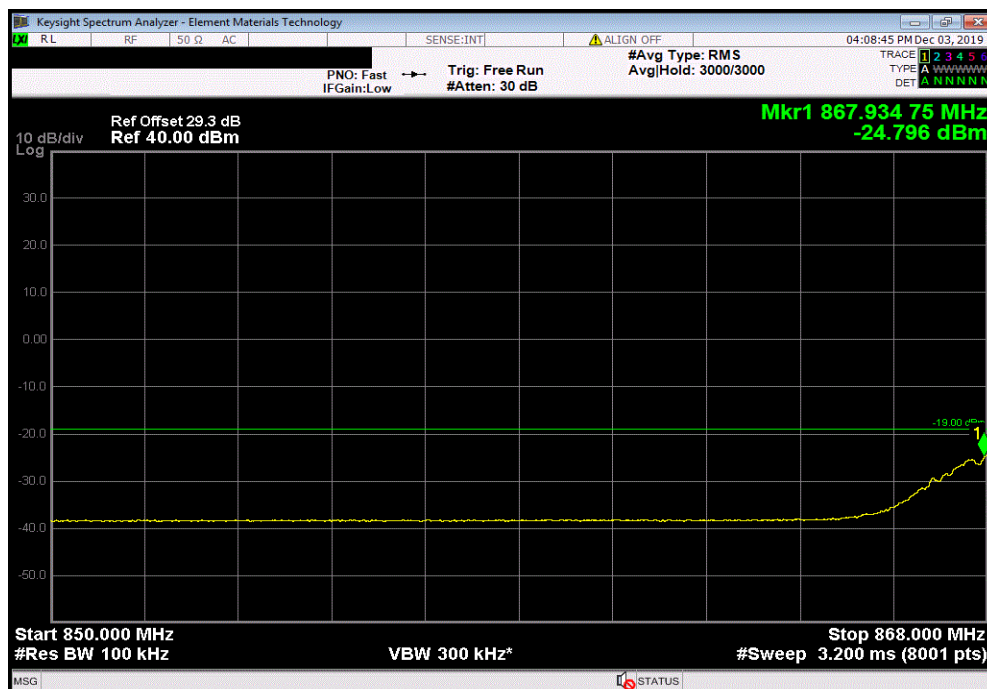
Port 4, Band 5, 5 MHz Bandwidth, 16QAM, Low Channel, 871.5 MHz, First Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -25.371 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 16QAM, Low Channel, 871.5 MHz, Second Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -24.796 | -19 | Pass |

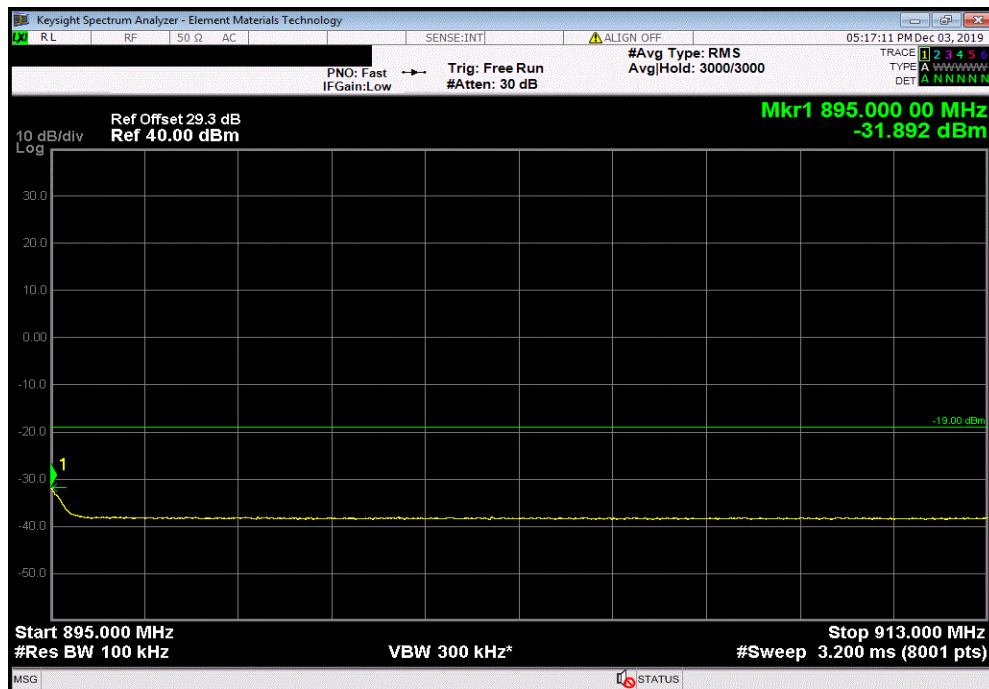


BAND EDGE COMPLIANCE

| Port 4, Band 5, 5 MHz Bandwidth, 16QAM, High Channel, 891.5 MHz, First Range Upper Band Edge | | | | | | |
|--|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -23.161 | -19 | Pass |

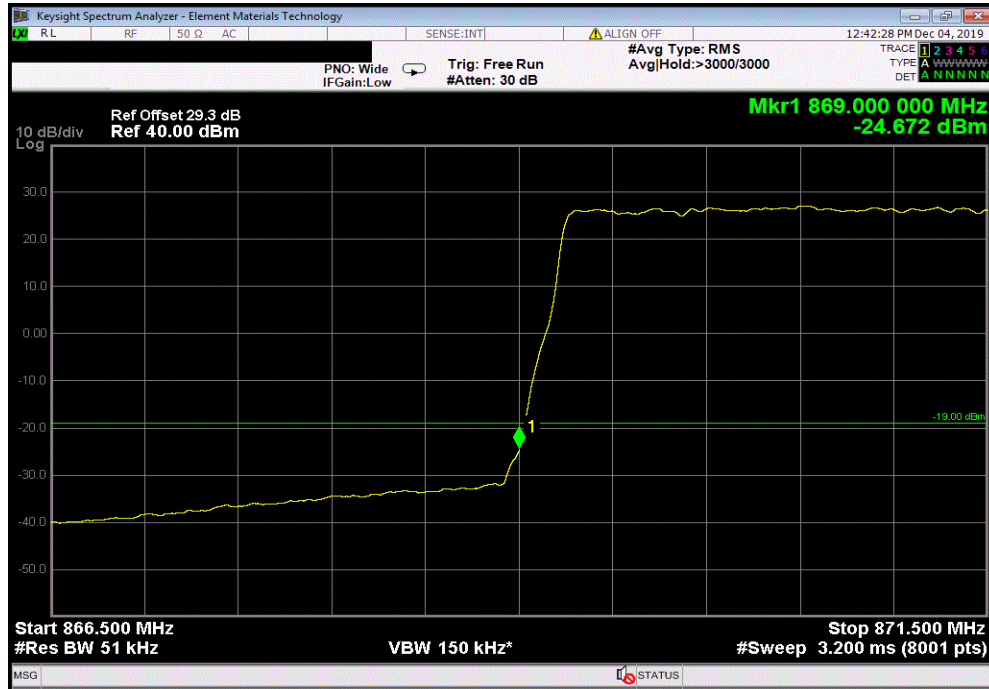


| Port 4, Band 5, 5 MHz Bandwidth, 16QAM, High Channel, 891.5 MHz, Second Range Upper Band Edge | | | | | | |
|---|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -31.892 | -19 | Pass |

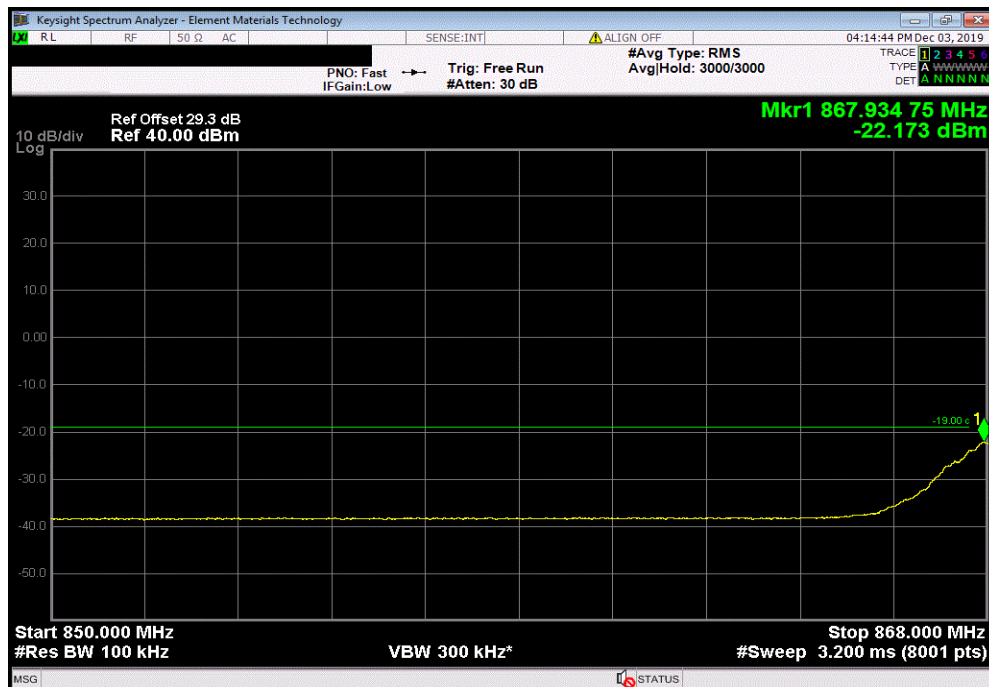


BAND EDGE COMPLIANCE

| Port 4, Band 5, 5 MHz Bandwidth, 64QAM, Low Channel, 871.5 MHz, First Range Lower Band Edge | | | | | | |
|---|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -24.672 | -19 | Pass |

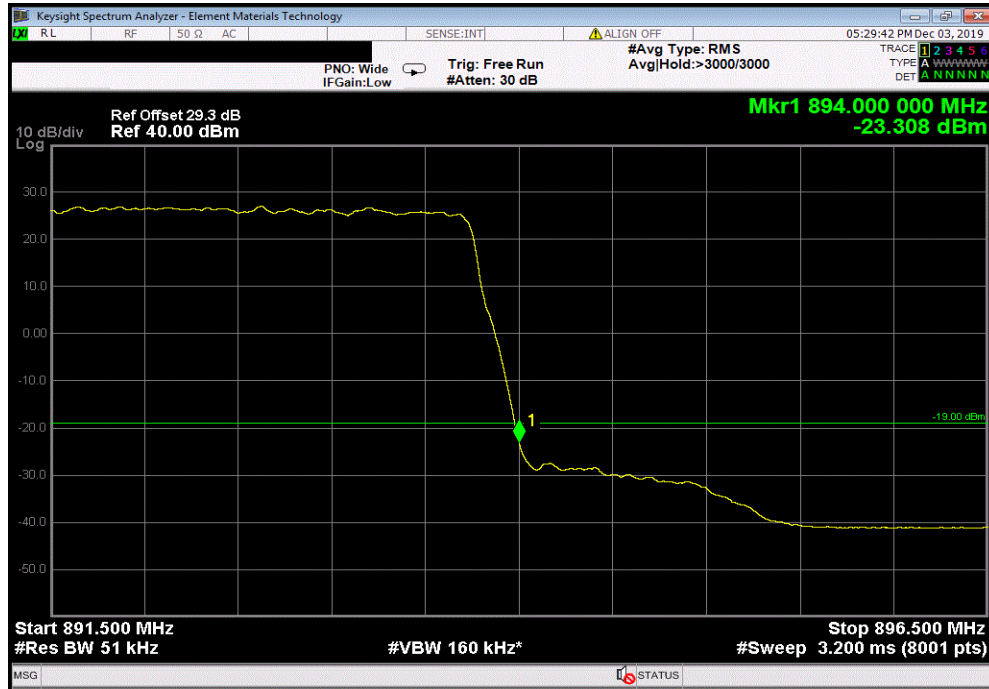


| Port 4, Band 5, 5 MHz Bandwidth, 64QAM, Low Channel, 871.5 MHz, Second Range Lower Band Edge | | | | | | |
|--|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -22.173 | -19 | Pass |

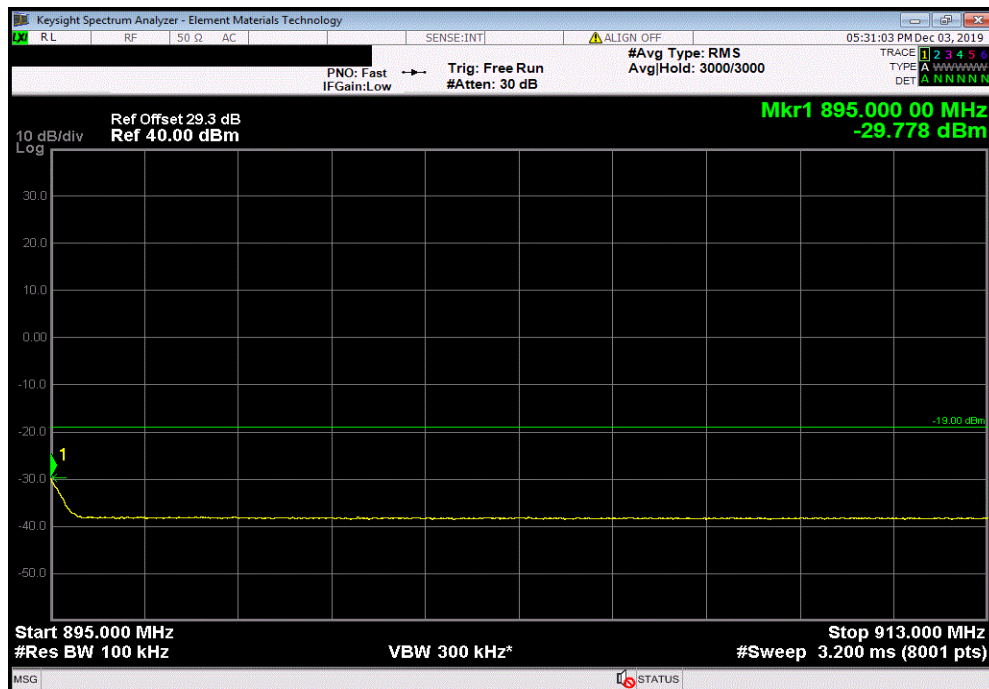


BAND EDGE COMPLIANCE

| Port 4, Band 5, 5 MHz Bandwidth, 64QAM, High Channel, 891.5 MHz, First Range Upper Band Edge | | | | | | |
|--|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -23.308 | -19 | Pass |



| Port 4, Band 5, 5 MHz Bandwidth, 64QAM, High Channel, 891.5 MHz, Second Range Upper Band Edge | | | | | | |
|---|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -29.778 | -19 | Pass |



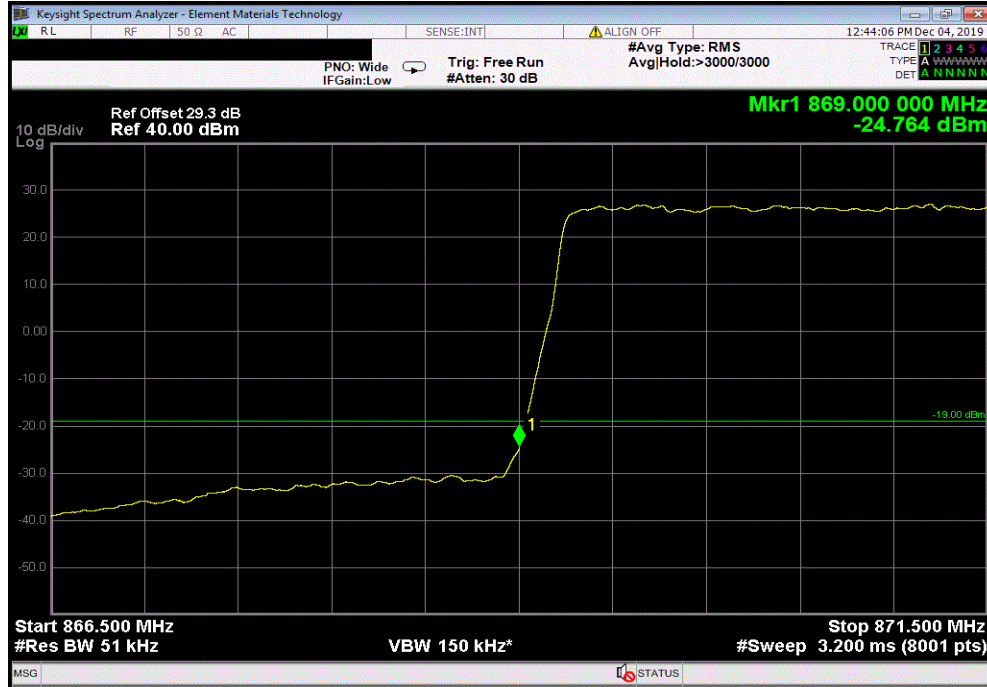
BAND EDGE COMPLIANCE



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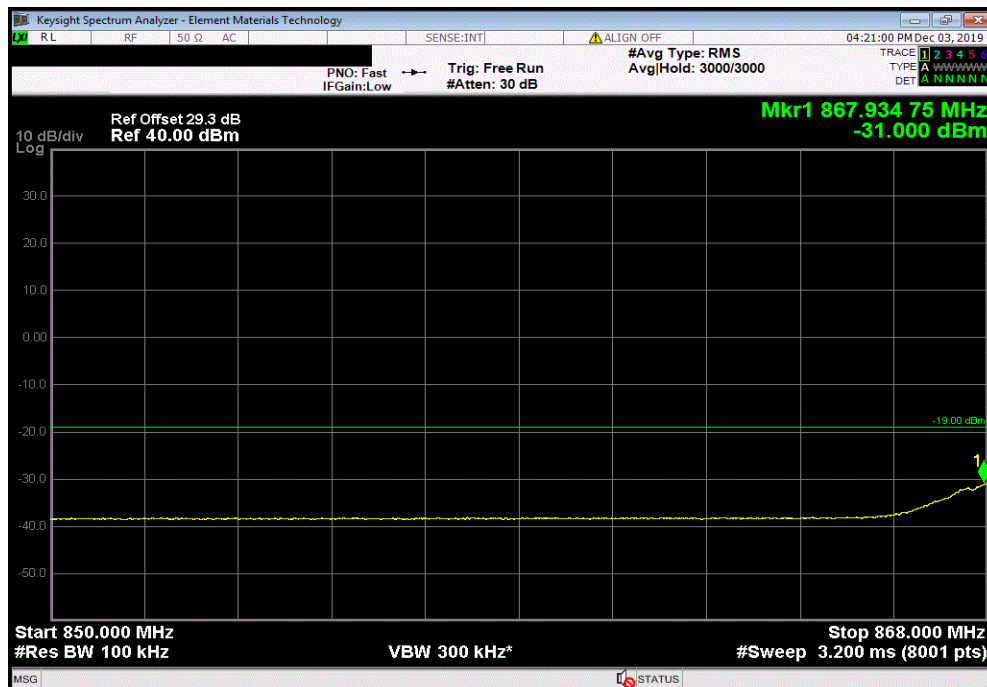
Port 4, Band 5, 5 MHz Bandwidth, 256QAM, Low Channel, 871.5 MHz, First Range Lower Band Edge

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -24.764 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 256QAM, Low Channel, 871.5 MHz, Second Range Lower Band Edge

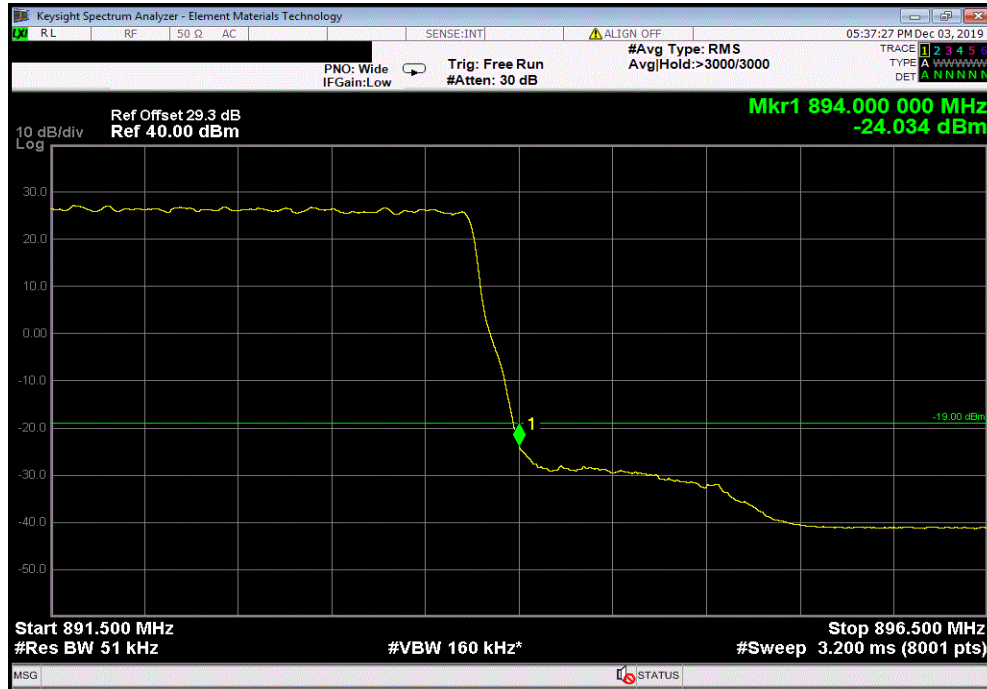
| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -31 | -19 | Pass |



BAND EDGE COMPLIANCE

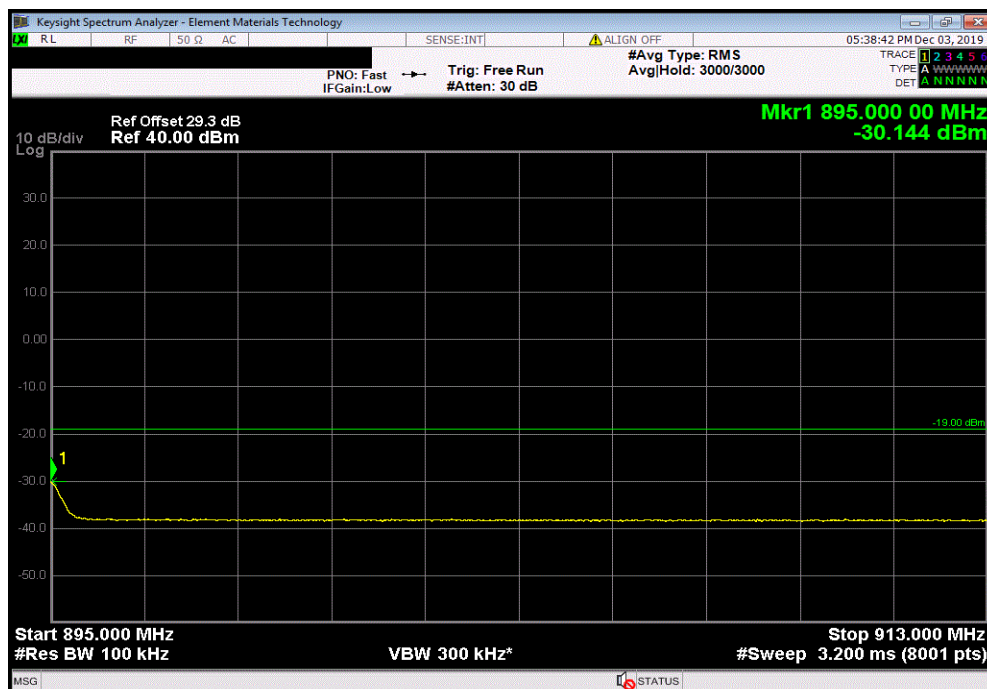
Port 4, Band 5, 5 MHz Bandwidth, 256QAM, High Channel, 891.5 MHz, First Range Upper Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -24.034 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 256QAM, High Channel, 891.5 MHz, Second Range Upper Band Edge

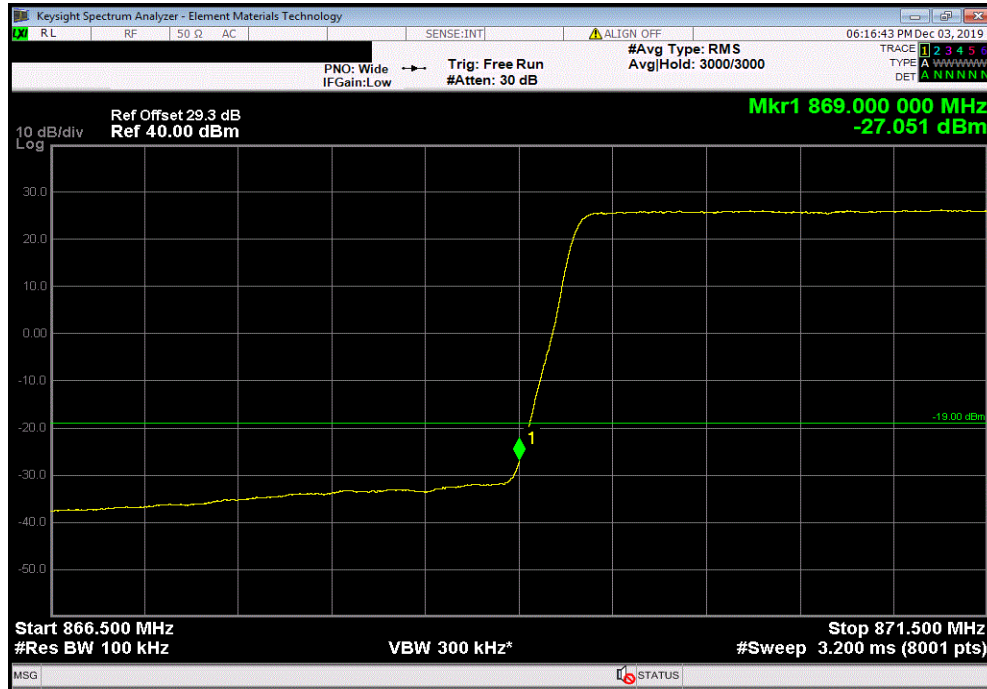
| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -30.144 | -19 | Pass |



BAND EDGE COMPLIANCE

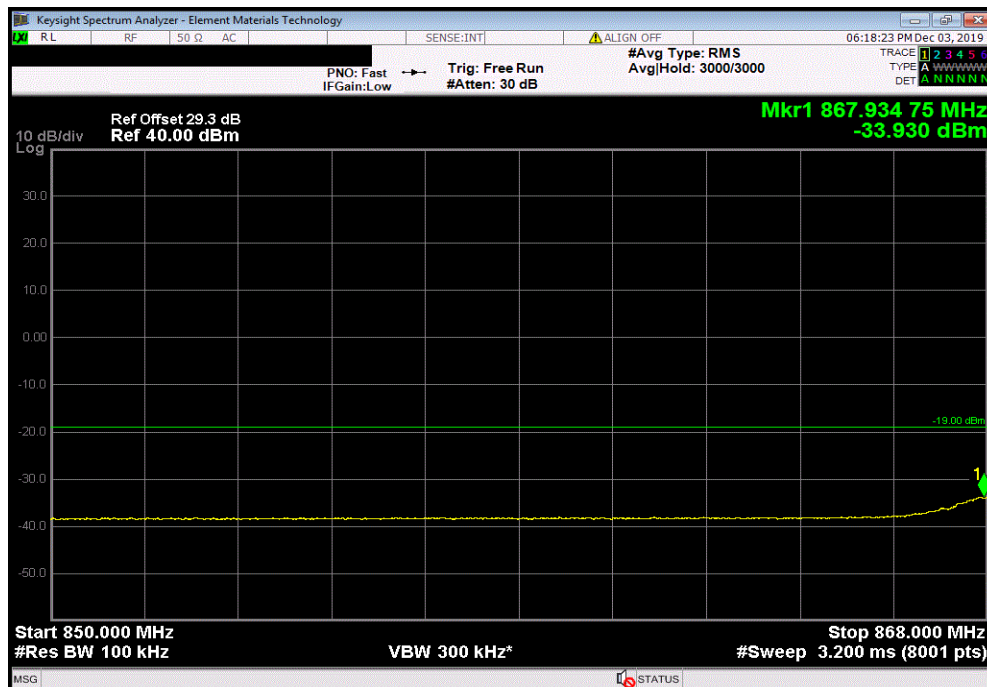
Port 4, Band 5, 10 MHz Bandwidth, QPSK, Low Channel, 874 MHz, First Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -27.051 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, QPSK, Low Channel, 874 MHz, Second Range Lower Band Edge

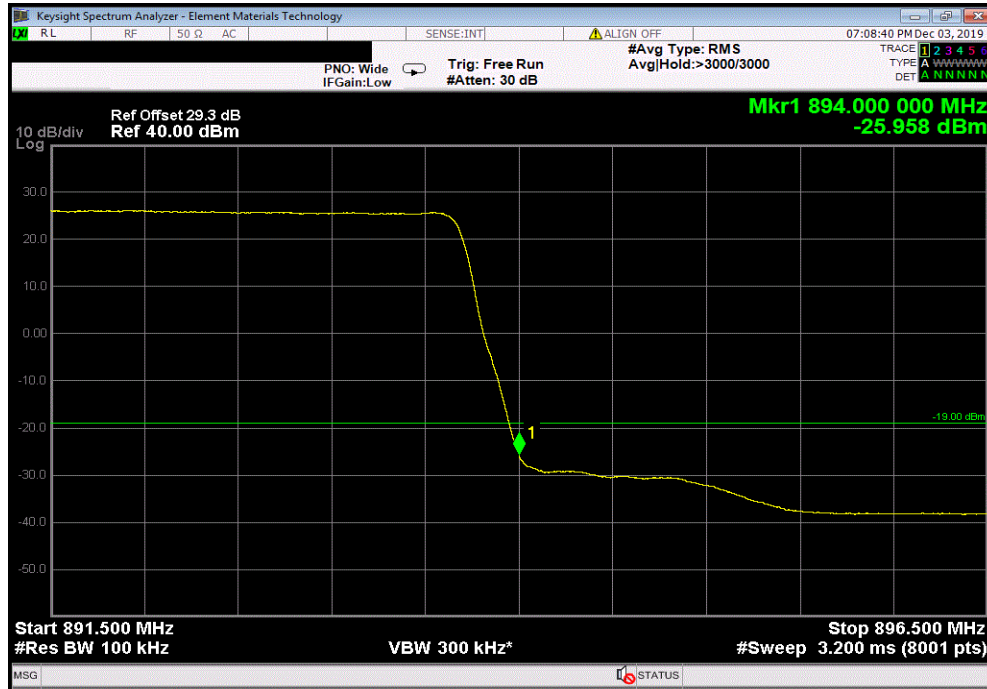
| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -33.93 | -19 | Pass |



BAND EDGE COMPLIANCE

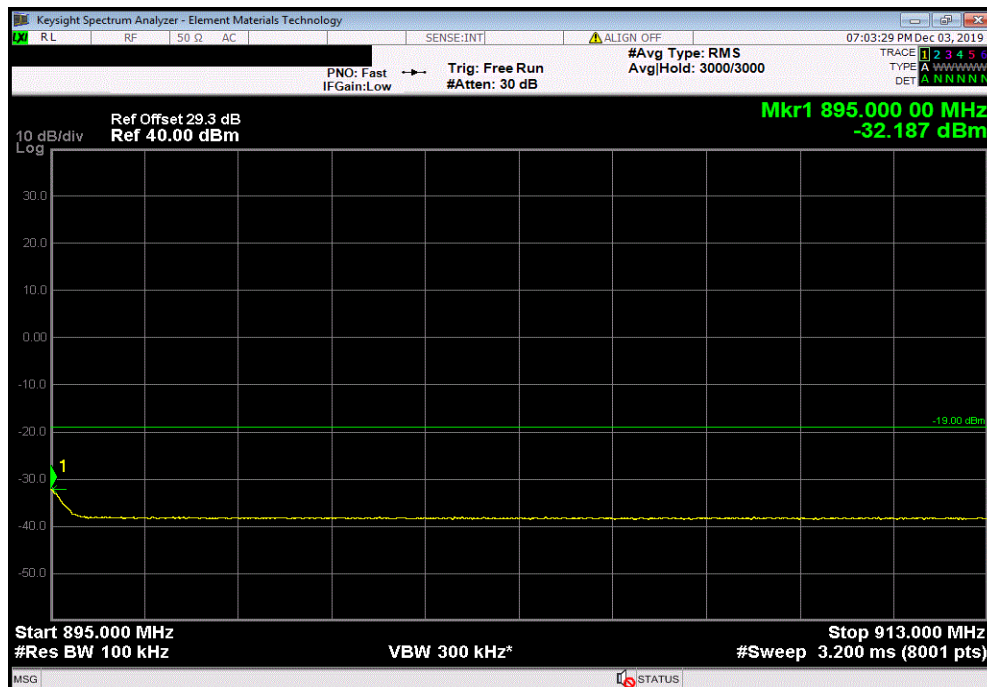
Port 4, Band 5, 10 MHz Bandwidth, QPSK, High Channel, 889 MHz, First Range Upper Band Edge

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -25.958 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, QPSK, High Channel, 889 MHz, Second Range Upper Band Edge

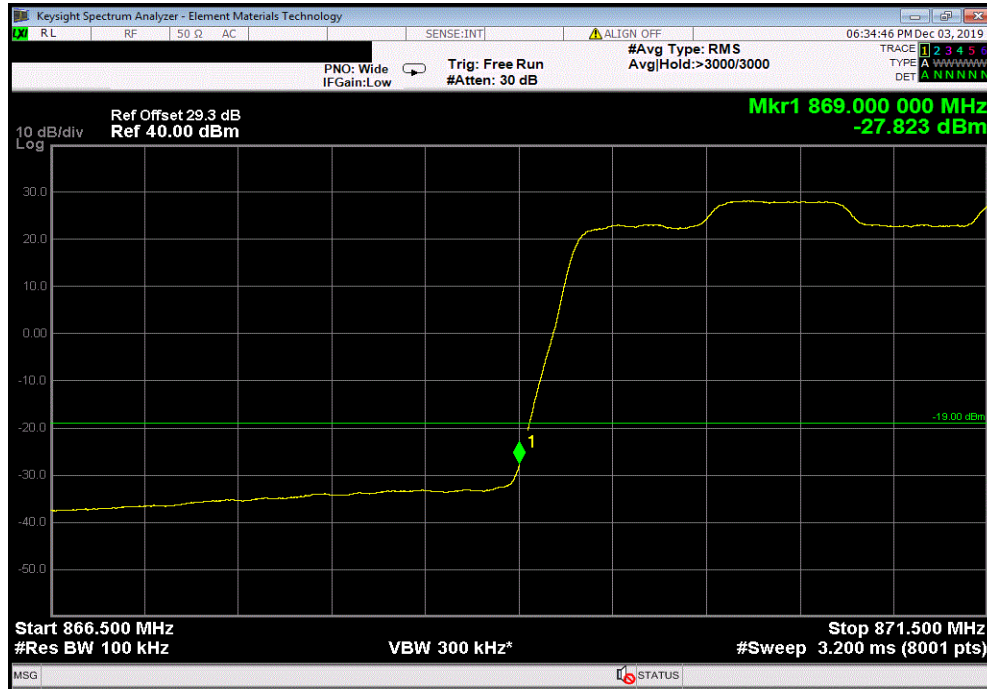
| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -32.187 | -19 | Pass |



BAND EDGE COMPLIANCE

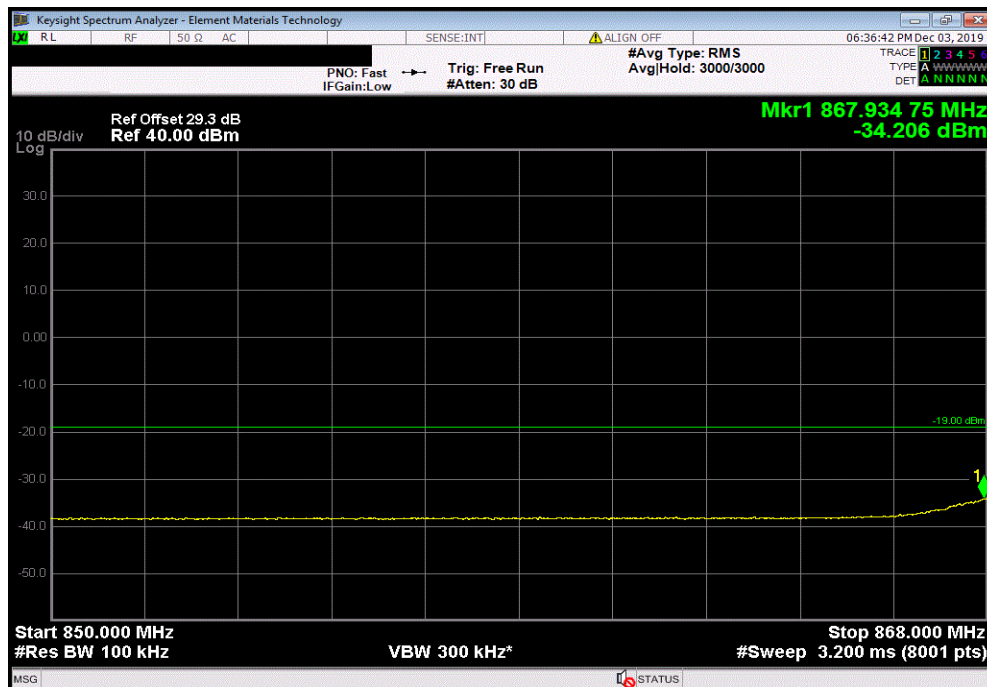
Port 4, Band 5, 10 MHz Bandwidth, 16QAM, Low Channel, 874 MHz, First Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -27.823 | -19 | Pass |



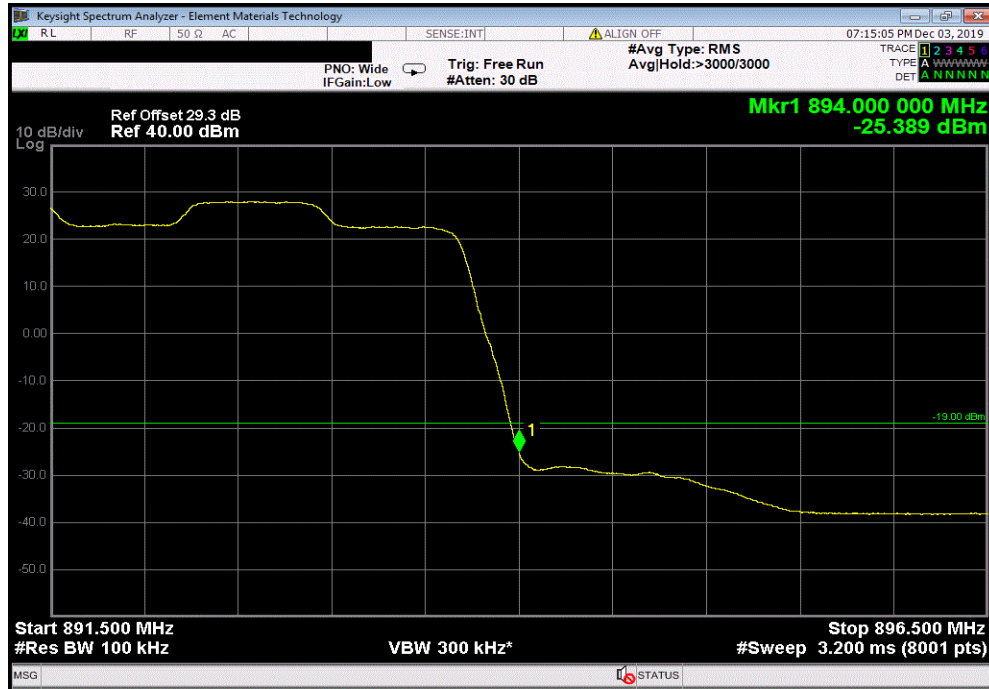
Port 4, Band 5, 10 MHz Bandwidth, 16QAM, Low Channel, 874 MHz, Second Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -34.206 | -19 | Pass |

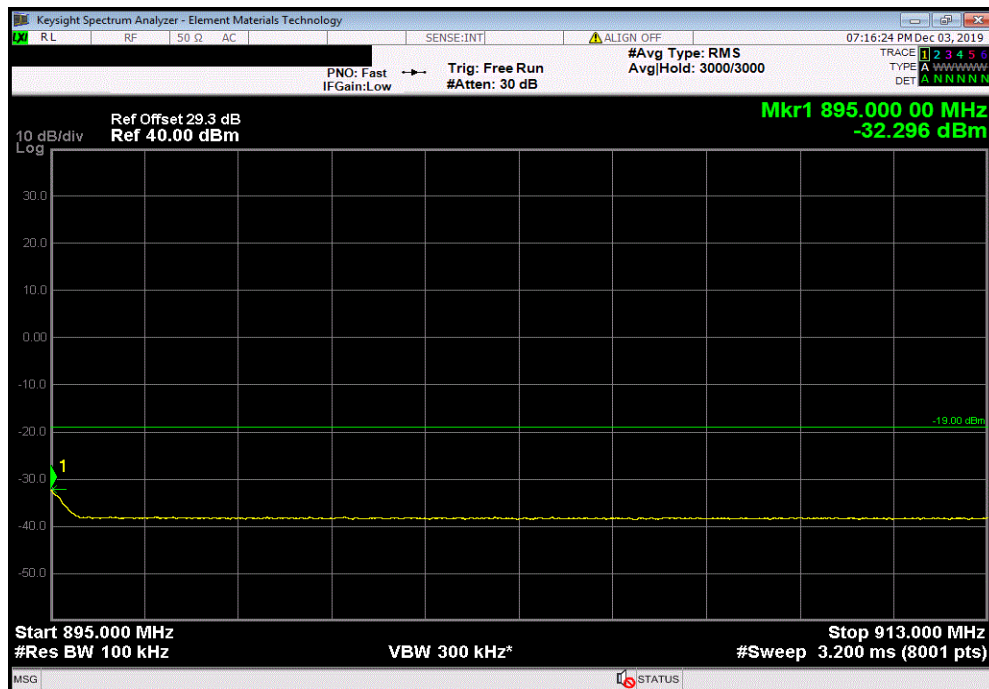


BAND EDGE COMPLIANCE

| Port 4, Band 5, 10 MHz Bandwidth, 16QAM, High Channel, 889 MHz, First Range Upper Band Edge | | | | | | |
|---|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -25.389 | -19 | Pass |



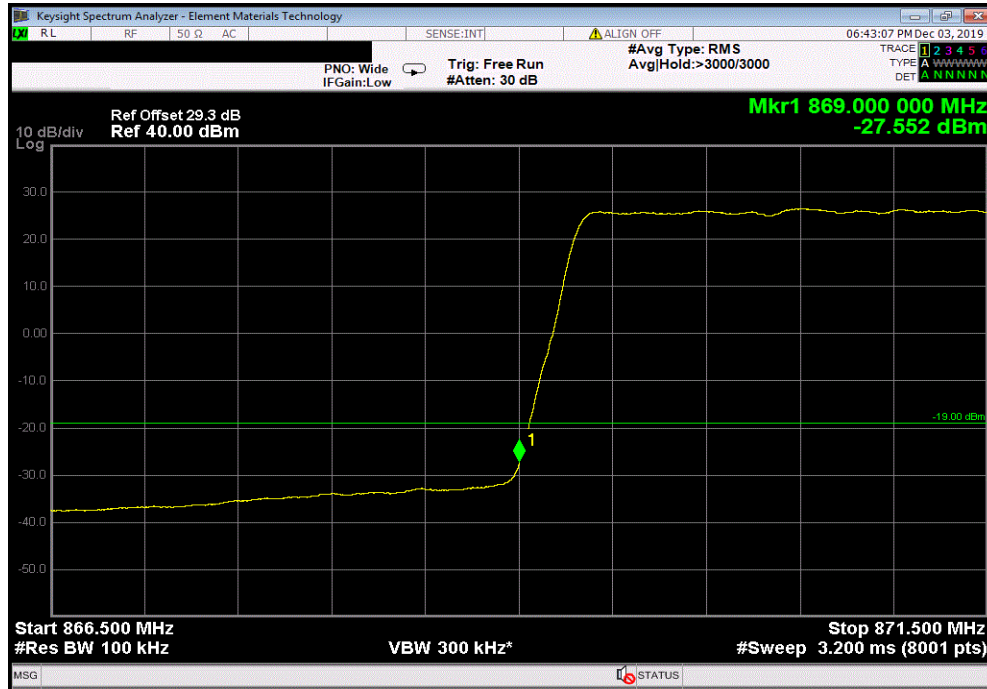
| Port 4, Band 5, 10 MHz Bandwidth, 16QAM, High Channel, 889 MHz, Second Range Upper Band Edge | | | | | | |
|--|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -32.296 | -19 | Pass |



BAND EDGE COMPLIANCE

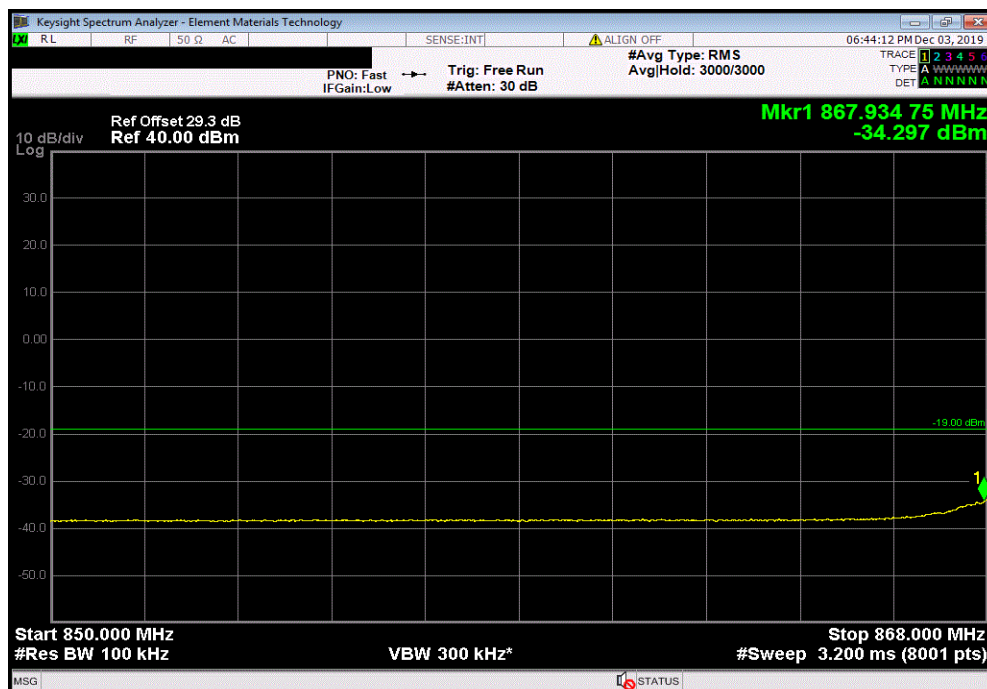
Port 4, Band 5, 10 MHz Bandwidth, 64QAM, Low Channel, 874 MHz, First Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -27.552 | -19 | Pass |



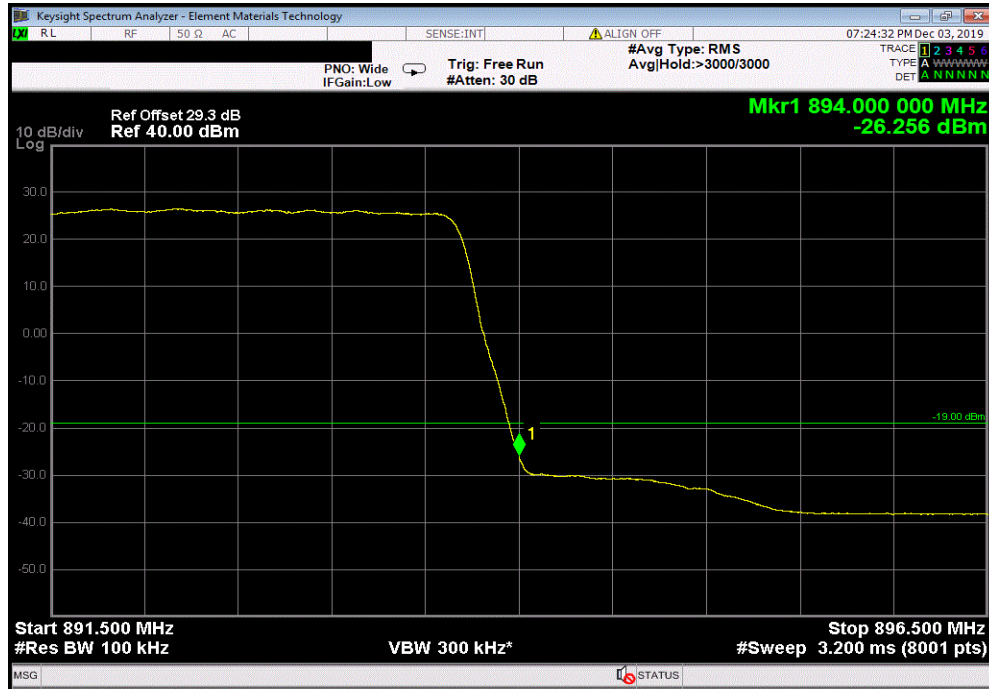
Port 4, Band 5, 10 MHz Bandwidth, 64QAM, Low Channel, 874 MHz, Second Range Lower Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -34.297 | -19 | Pass |

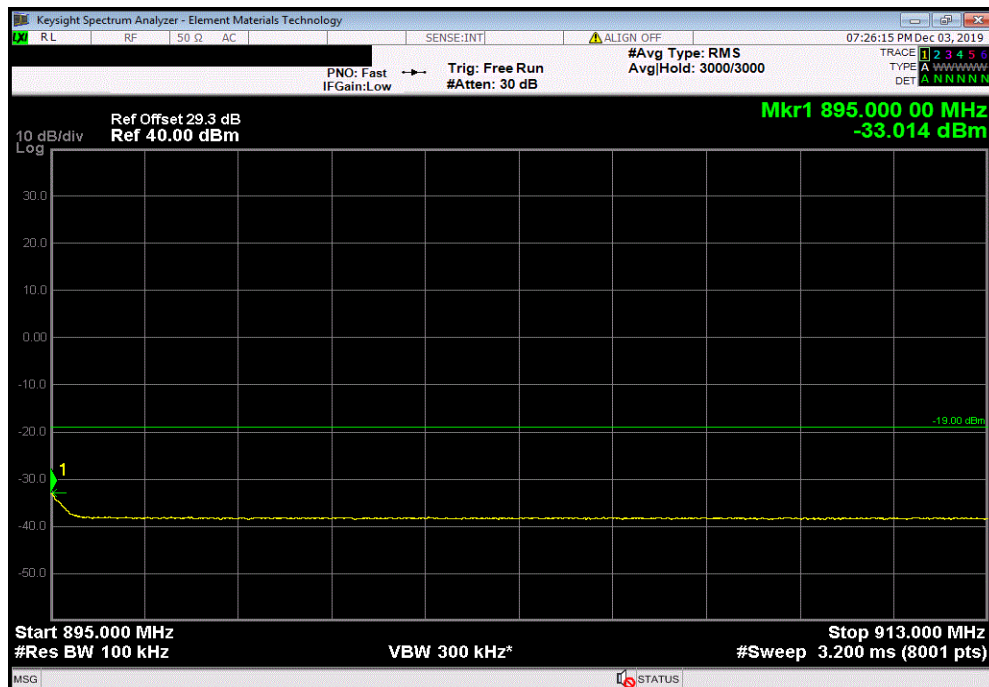


BAND EDGE COMPLIANCE

| Port 4, Band 5, 10 MHz Bandwidth, 64QAM, High Channel, 889 MHz, First Range Upper Band Edge | | | | | | |
|---|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -26.256 | -19 | Pass |



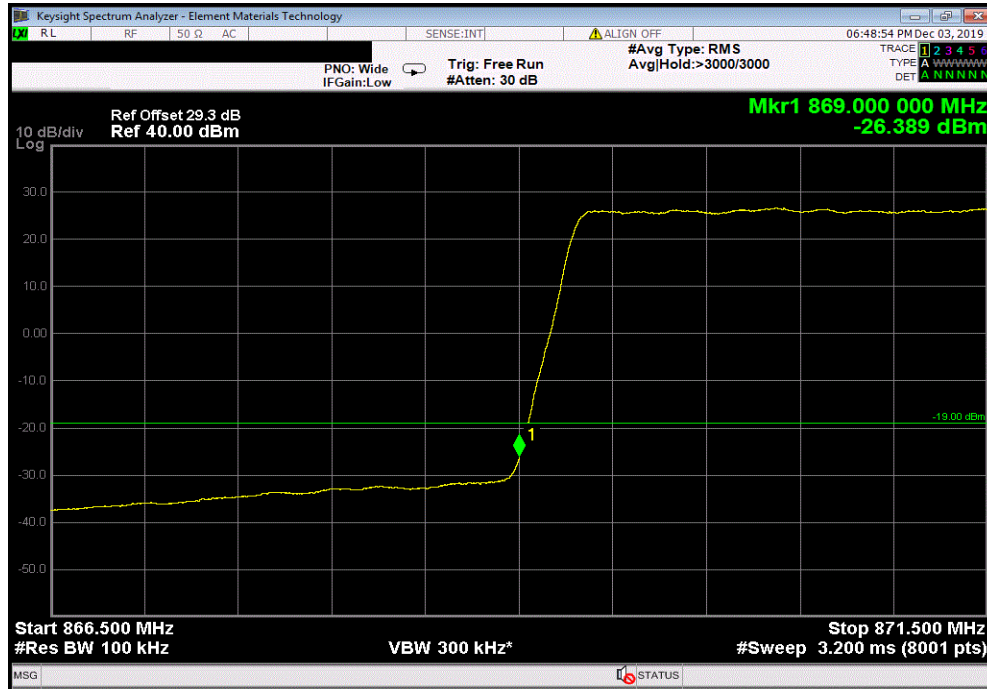
| Port 4, Band 5, 10 MHz Bandwidth, 64QAM, High Channel, 889 MHz, Second Range Upper Band Edge | | | | | | |
|--|--|--|--|----------------|----------------|--------|
| | | | | Value (dBm) | Limit (dBm) | Result |
| | | | | -33.014 | -19 | Pass |



BAND EDGE COMPLIANCE

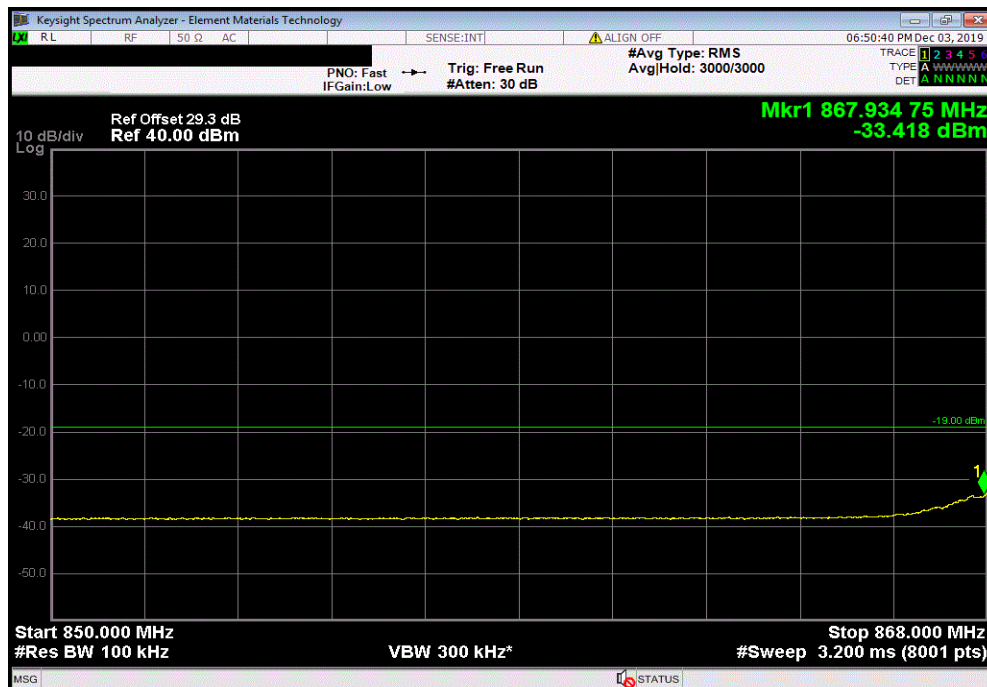
Port 4, Band 5, 10 MHz Bandwidth, 256QAM, Low Channel, 874 MHz, First Range Lower Band Edge

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -26.389 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 256QAM, Low Channel, 874 MHz, Second Range Lower Band Edge

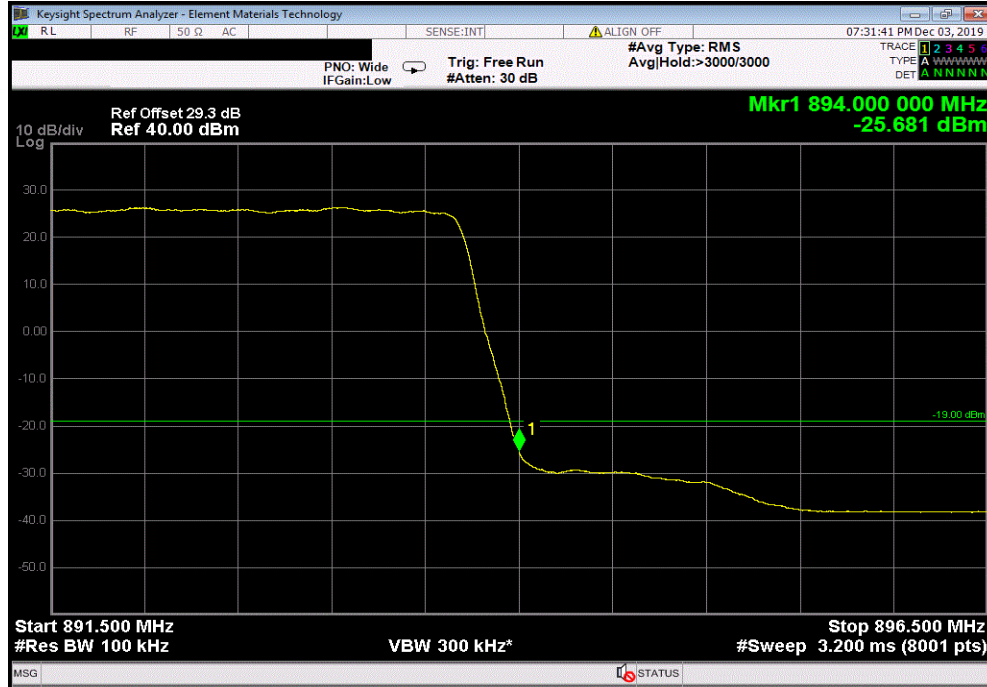
| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -33.418 | -19 | Pass |



BAND EDGE COMPLIANCE

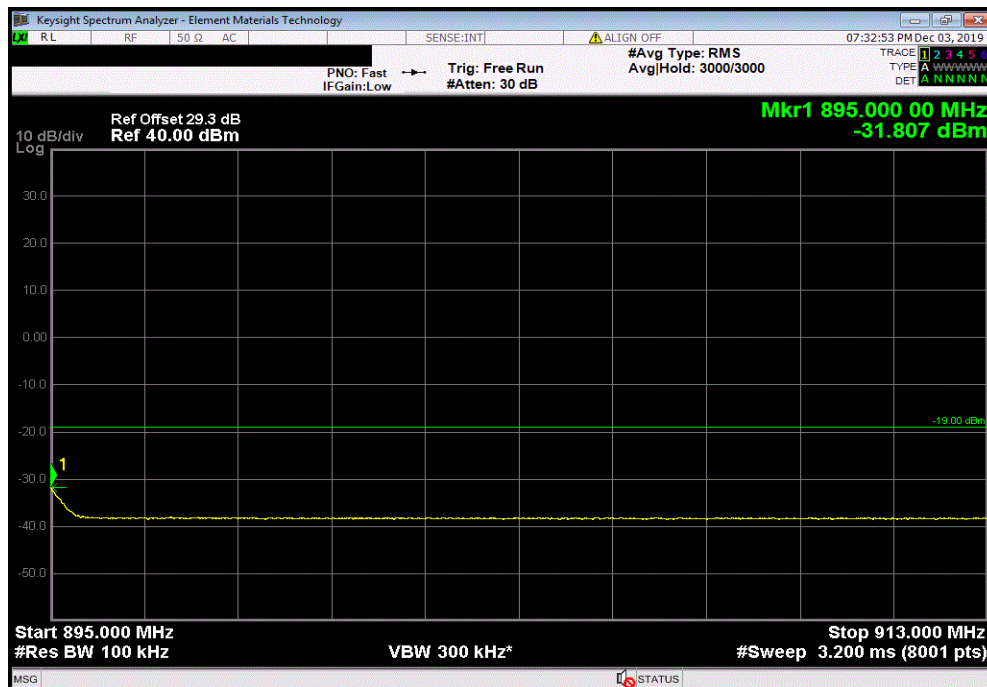
Port 4, Band 5, 10 MHz Bandwidth, 256QAM, High Channel, 889 MHz, First Range Upper Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -25.681 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 256QAM, High Channel, 889 MHz, Second Range Upper Band Edge

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -31.807 | -19 | Pass |



SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Cal. Due |
|------------------------------|--------------|------------|-----|-----------|-----------|
| Generator - Signal | Agilent | E8257D | TGU | 15-Feb-18 | 15-Feb-21 |
| Generator - Signal | Keysight | N5182B-506 | TEV | 23-Apr-18 | 23-Apr-21 |
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFM | 19-Mar-19 | 19-Mar-20 |

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to the middle channel. The EUT was transmitting at the data rate(s) and bandwidths listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

All limits were adjusted by a factor of $[-10 \cdot \log(4)]$ dB to account for the device operation as a 4 port MIMO transmitter, as per FCC KDB 662911.

Per FCC 22.917(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB which was given to be -13 dBm. The limit was then adjusted to -19 dBm $[-13 \text{ dBm} - 10 \log(4)]$ per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

Per FCC 22.917(b), Any emission seen to be > 1 MHz further outside the band edges shall be measured with a RBW of 100 kHz. However, a narrower RBW of at least 1% of the emission bandwidth is still allowed provided that the measured power is integrated over the full reference bandwidth of 100 kHz or 1% of the 26 dB emission bandwidth. For measurements made in the spectrum > 1 GHz a 1 MHz reference bandwidth should be used.

The limit for the 9kHz to 150kHz frequency range was adjusted to -39dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 100kHz [i.e.: $-39\text{dBm} = -19\text{dBm} - 10\log(100\text{kHz}/1\text{kHz})$]. The limit for the 150kHz to 20MHz frequency range was adjusted to -29dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 100kHz [i.e.: $-29\text{dBm} = -19\text{dBm} - 10\log(100\text{kHz}/10\text{kHz})$].

SPURIOUS CONDUCTED EMISSIONS



XMM 2019.09.05

EUT:AHBCC Remote Radio Head (RRH)

Serial Number:K9180332366

Customer:Nokia Solutions and Networks

Attendees:Mitchell Hill, John Rattanavong

Project:None

Tested by:Brandon Hobbs

Power:54VDC

Work Order:NOKI0002

Date:5-Dec-19

Temperature:23.3 °C

Humidity:32.8% RH

Barometric Pres.:1017 mbar

Job Site:TX09

TEST SPECIFICATIONS

FCC 22H:2019

Test MethodANSI C63.26:2015

COMMENTS

Testing was completed on the highest output power antenna port (Port 4). All conducted losses were accounted for between the radio and the spectrum analyzer. The EUT was operating at 100% duty cycle for all measurements made. Measurements were made using a RBW and limit defined per the client's written test approach document.

DEVIATIONS FROM TEST STANDARD

None

Configuration #

1,2,3

Signature

Port 4, Band 5

5 MHz Bandwidth

QPSK

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

16QAM

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

64QAM

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

256QAM

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

10 MHz Bandwidth

QPSK

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

16QAM

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

64QAM

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

256QAM

Mid Channel, 881.5 MHz

9kHz to 150kHz (Range1)

150kHz to 20MHz (Range2)

20MHz to 800MHz (Range3)

800MHz to 1.2GHz (Range4)

1.2GHz to 9GHz (Range5)

Value (dBm)

Limit (dBm)

Result

-49.018

-39

Pass

-52.922

-29

Pass

-32.323

-19

Pass

-38.239

-19

Pass

-36.019

-19

Pass

-47.958

-39

Pass

-51.840

-29

Pass

-32.285

-19

Pass

-38.284

-19

Pass

-36.172

-19

Pass

-47.595

-39

Pass

-51.151

-29

Pass

-31.499

-19

Pass

-38.082

-19

Pass

-36.663

-19

Pass

-49.674

-39

Pass

-51.151

-29

Pass

-32.515

-19

Pass

-37.575

-19

Pass

-36.548

-19

Pass

-50.017

-39

Pass

-50.347

-29

Pass

-31.630

-19

Pass

-38.240

-19

Pass

-36.499

-19

Pass

-49.373

-39

Pass

-51.307

-29

Pass

-32.691

-19

Pass

-38.560

-19

Pass

-35.948

-19

Pass

-49.540

-39

Pass

-50.454

-29

Pass

-31.348

-19

Pass

-38.039

-19

Pass

-36.078

-19

Pass

-47.991

-39

Pass

-50.014

-29

Pass

-32.476

-19

Pass

-37.675

-19

Pass

-36.144

-19

Pass

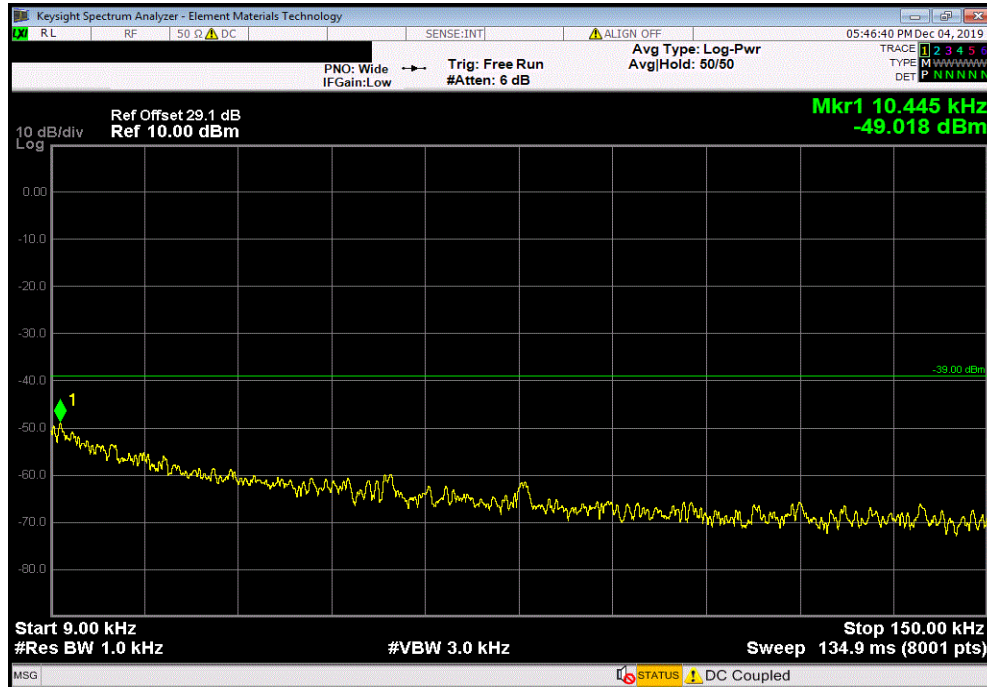
SPURIOUS CONDUCTED EMISSIONS



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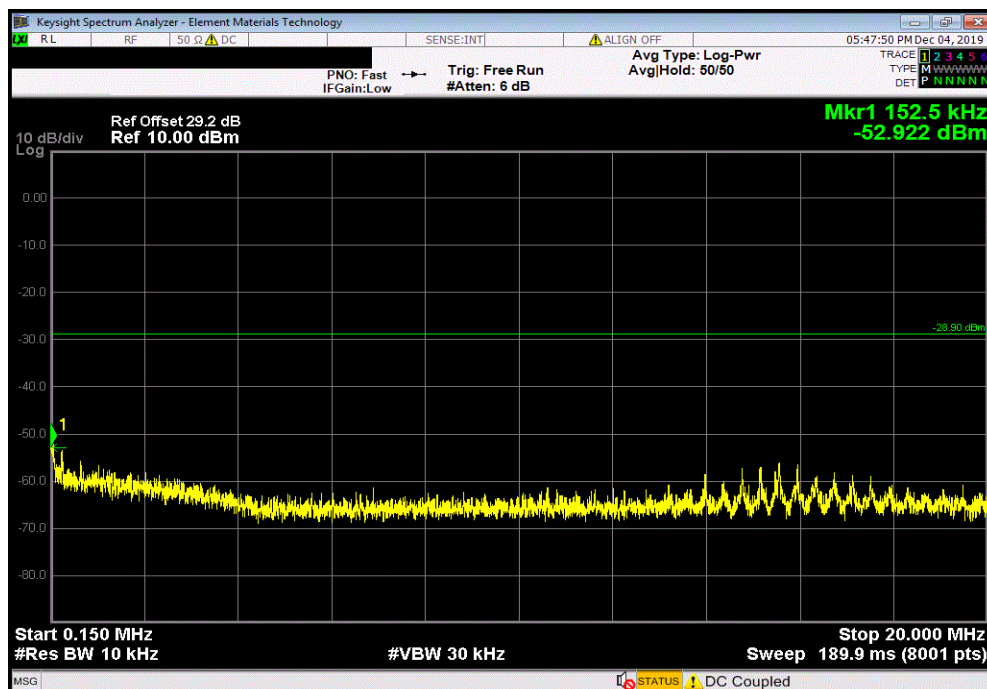
Port 4, Band 5, 5 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -49.018 | -39 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -52.922 | -29 | Pass |



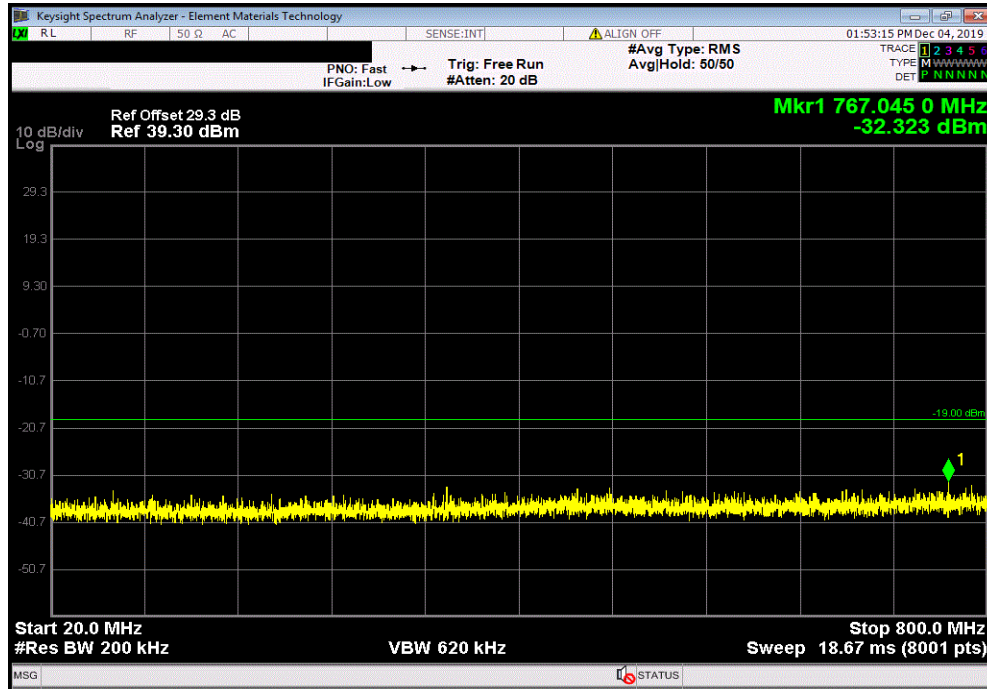
SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

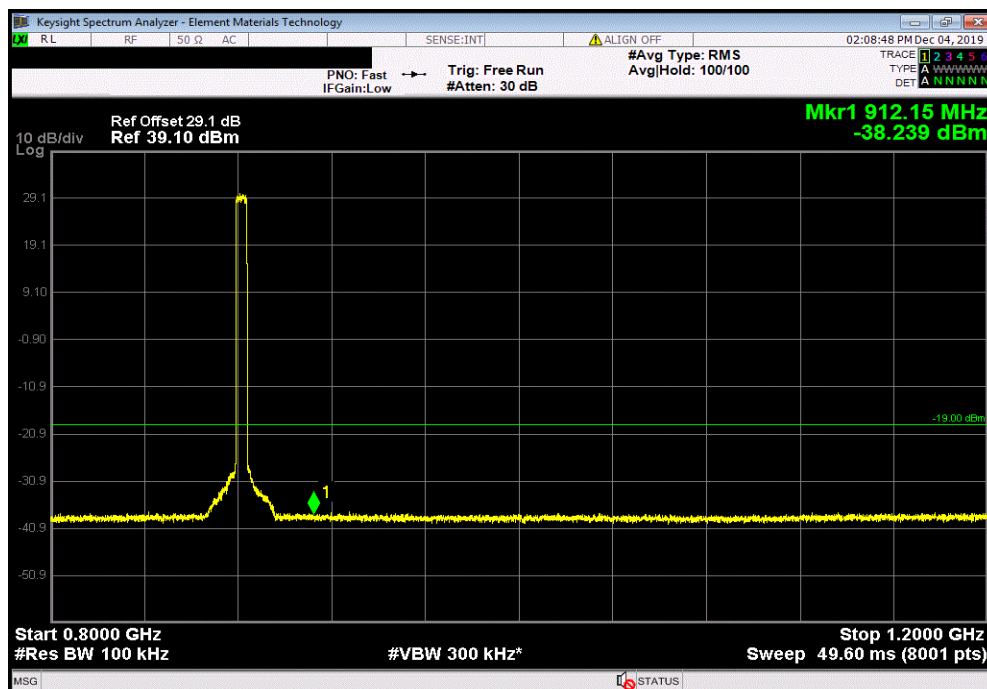
Port 4, Band 5, 5 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -32.323 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -38.239 | -19 | Pass |



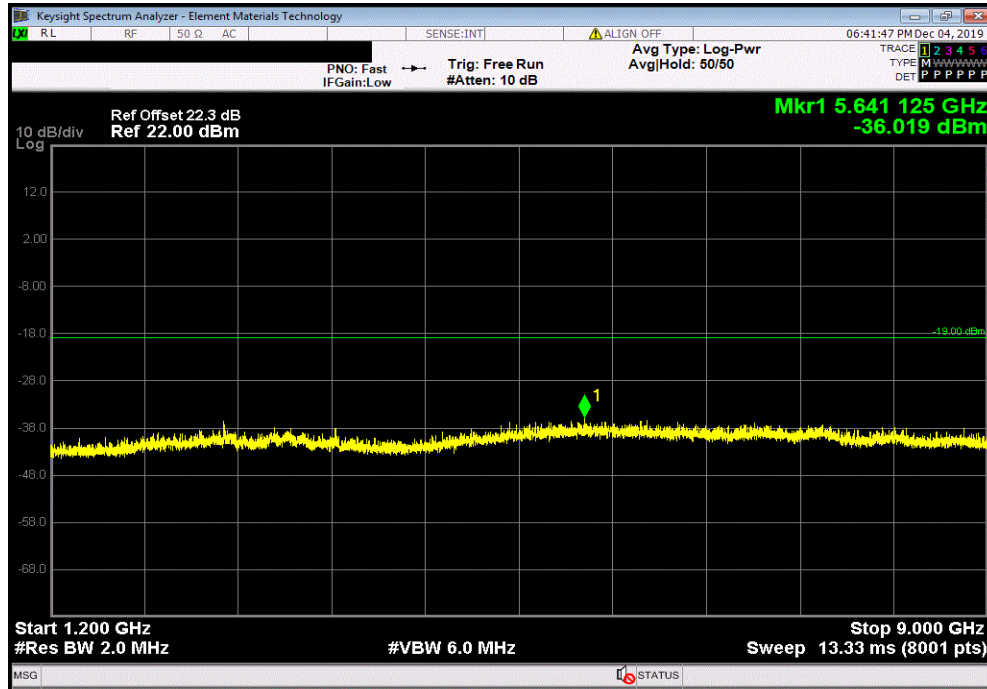
SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

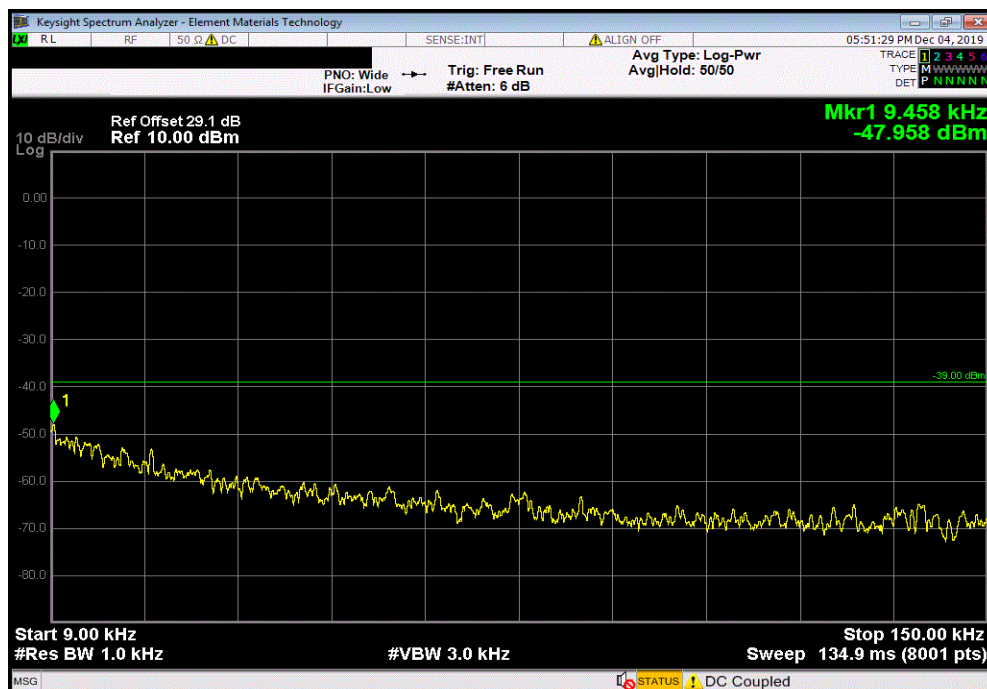
Port 4, Band 5, 5 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -36.019 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -47.958 | -39 | Pass |



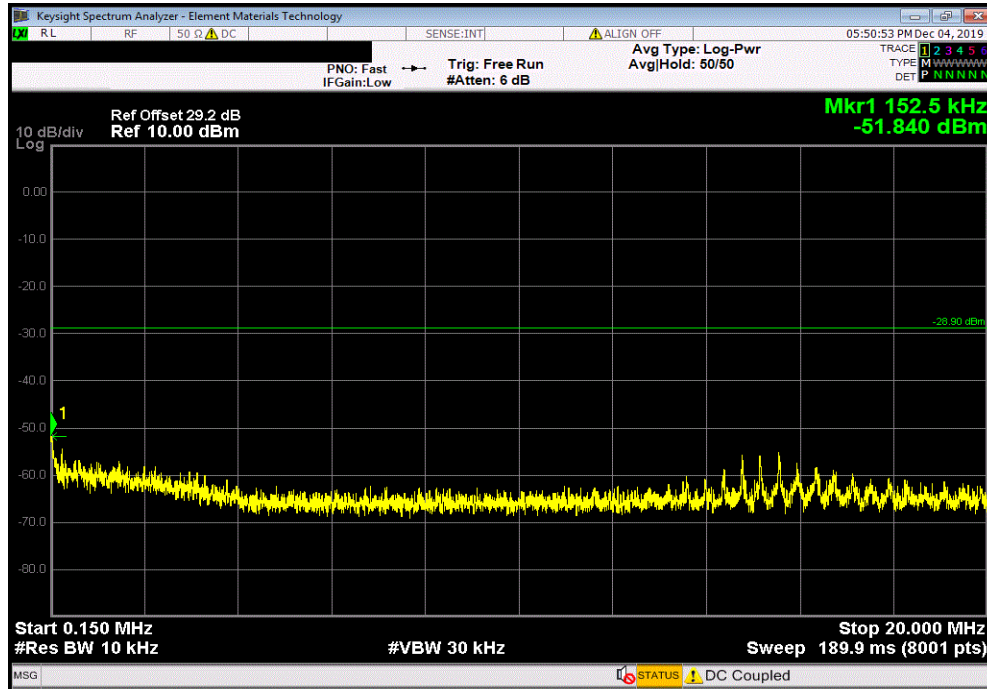
SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

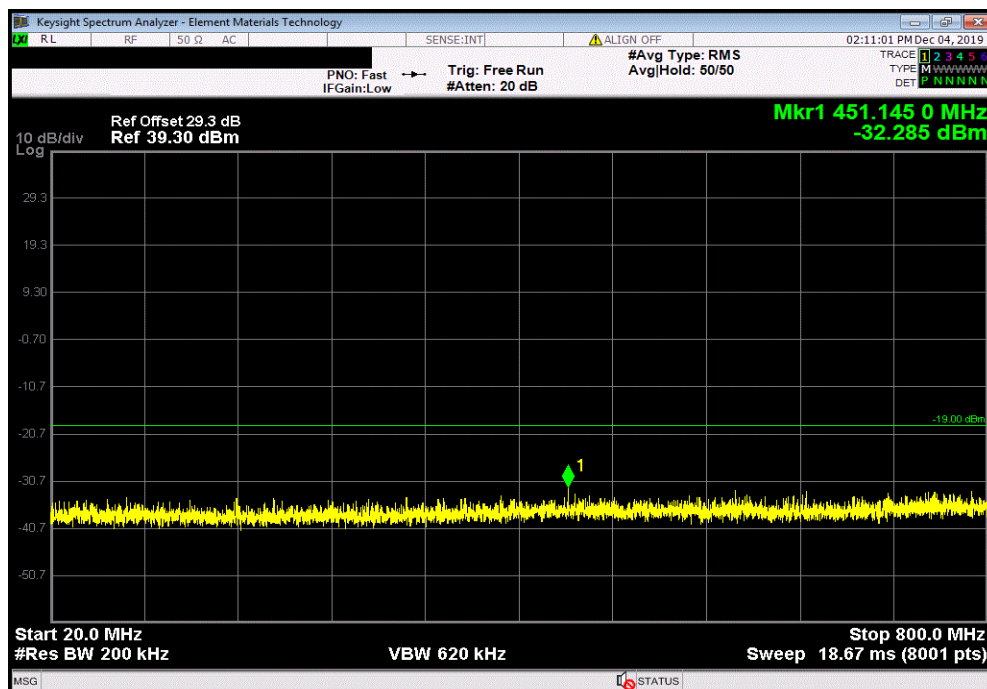
Port 4, Band 5, 5 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -51.84 | -29 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

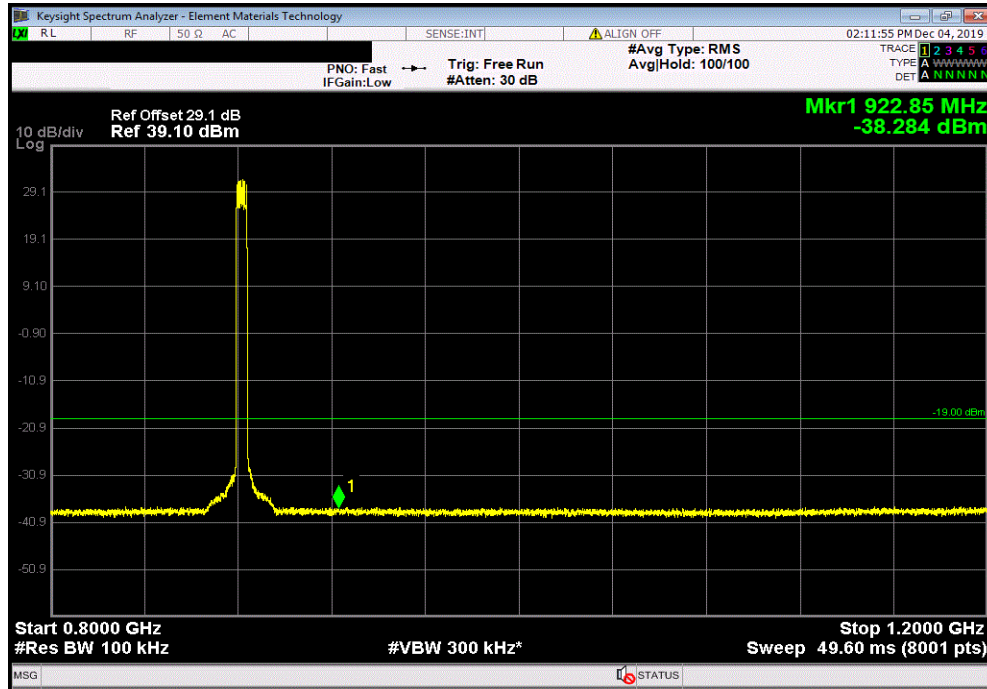
| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -32.285 | -19 | Pass |



SPURIOUS CONDUCTED EMISSIONS

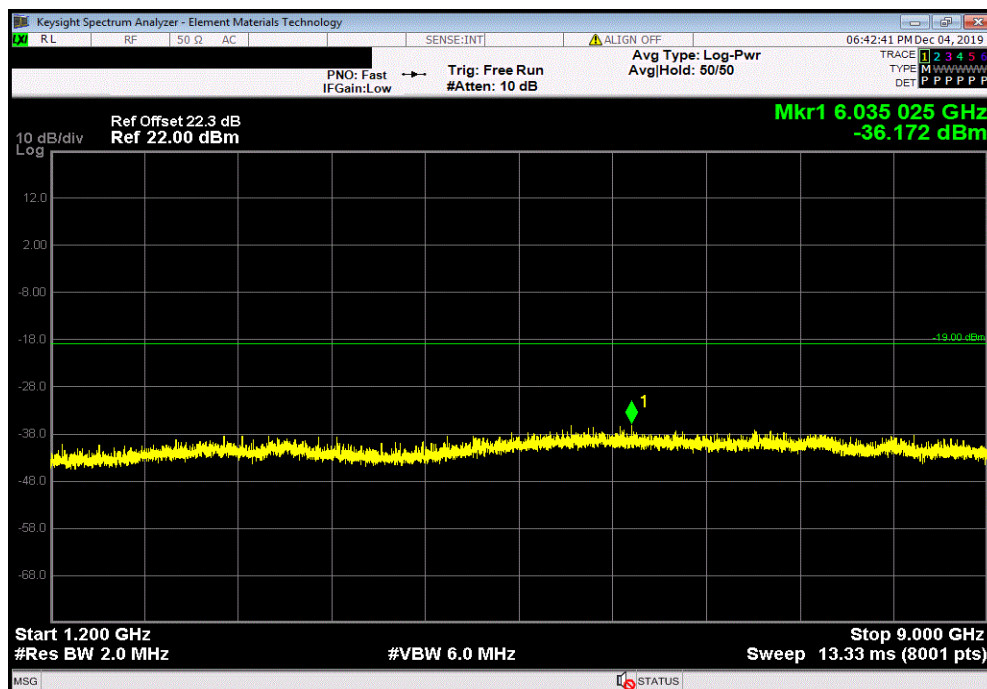
Port 4, Band 5, 5 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -38.284 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -36.172 | -19 | Pass |



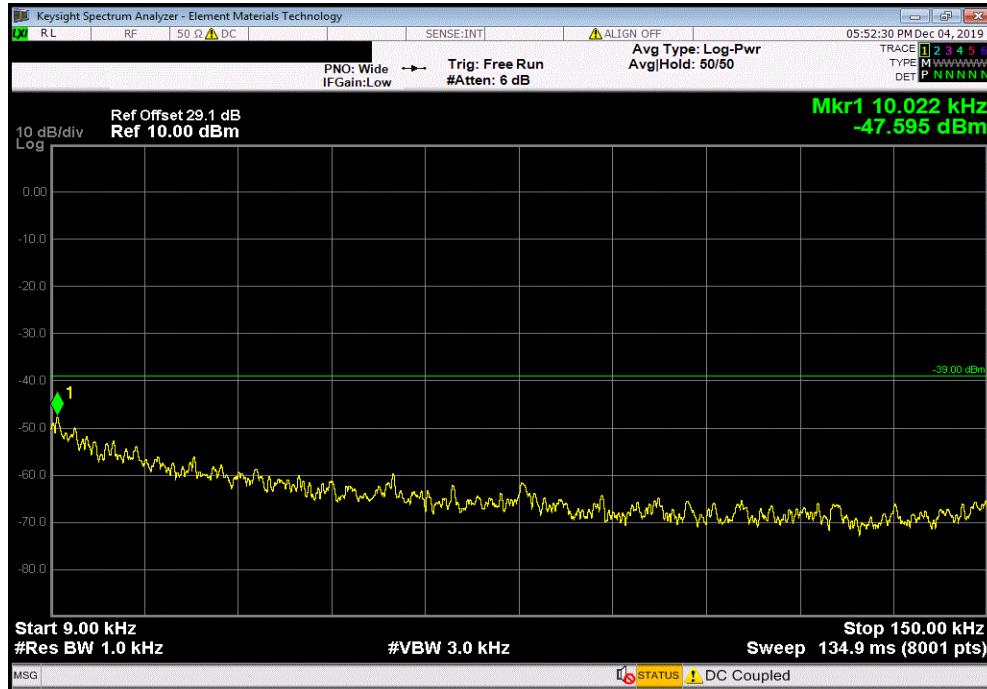
SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

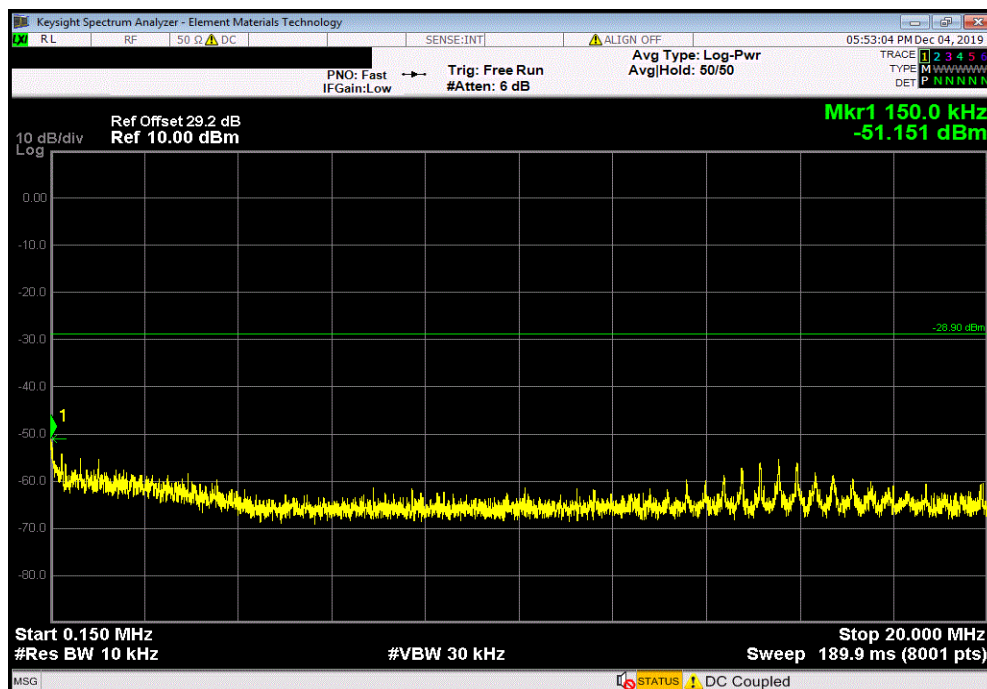
Port 4, Band 5, 5 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -47.595 | -39 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

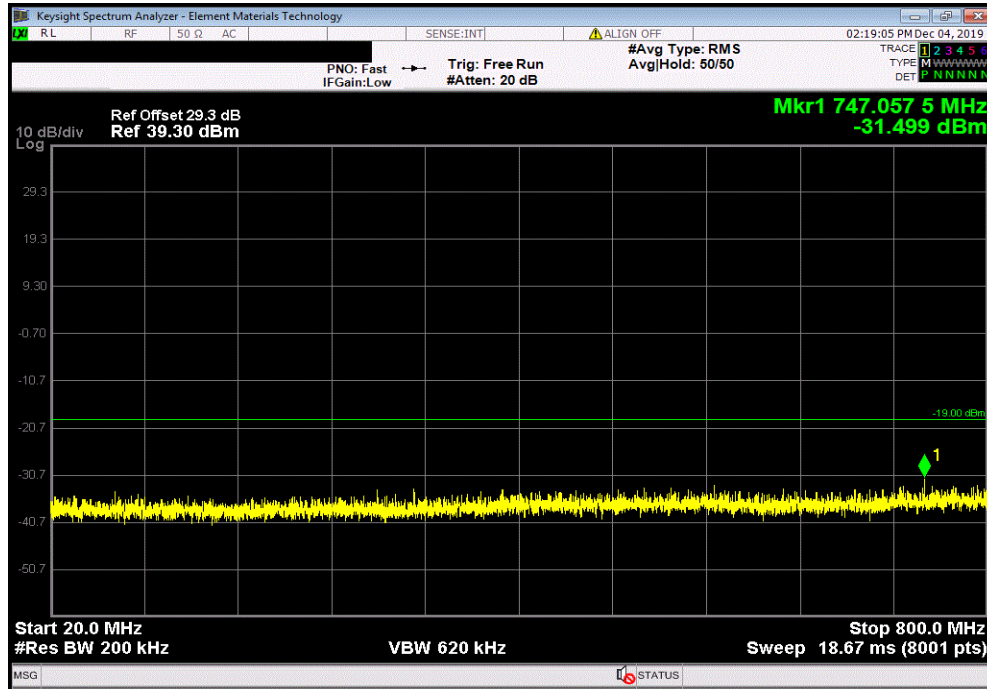
| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -51.151 | -29 | Pass |



SPURIOUS CONDUCTED EMISSIONS

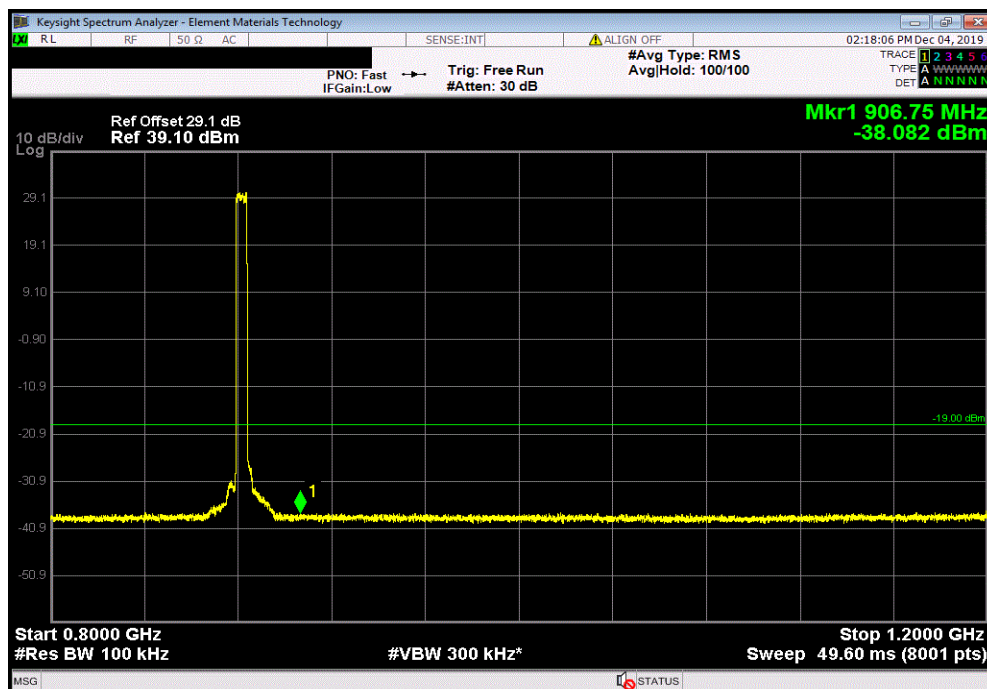
Port 4, Band 5, 5 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -31.499 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -38.082 | -19 | Pass |



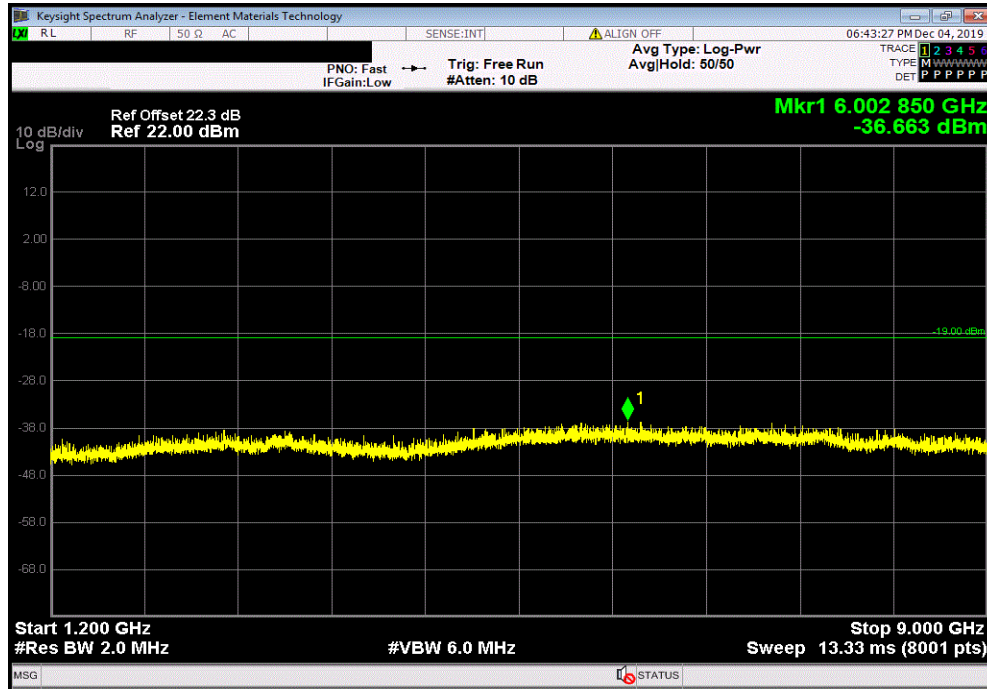
SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

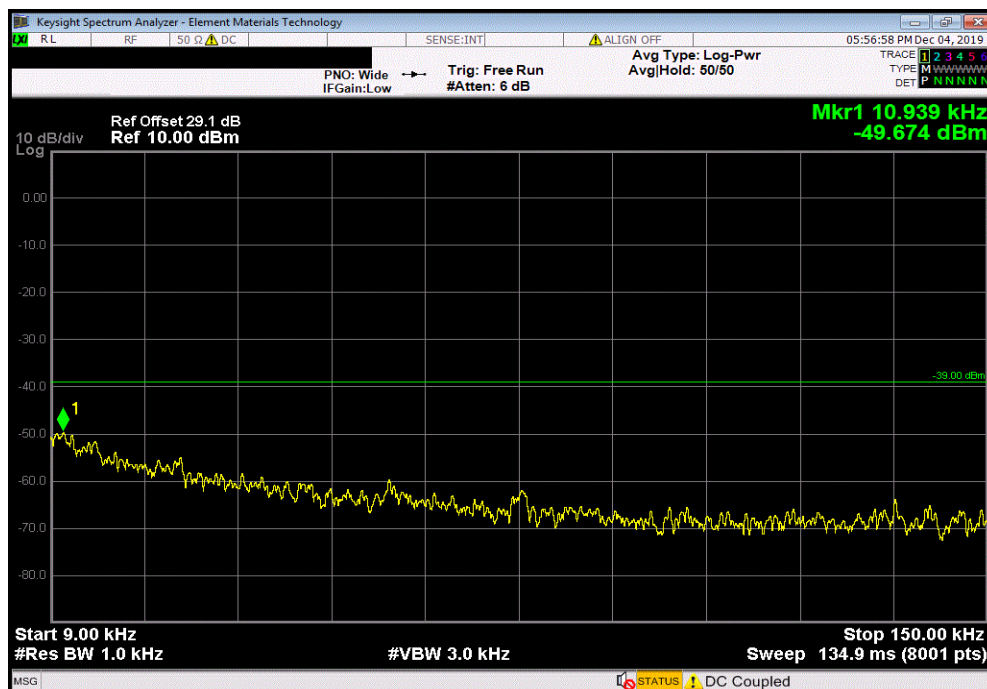
Port 4, Band 5, 5 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -36.663 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -49.674 | -39 | Pass |



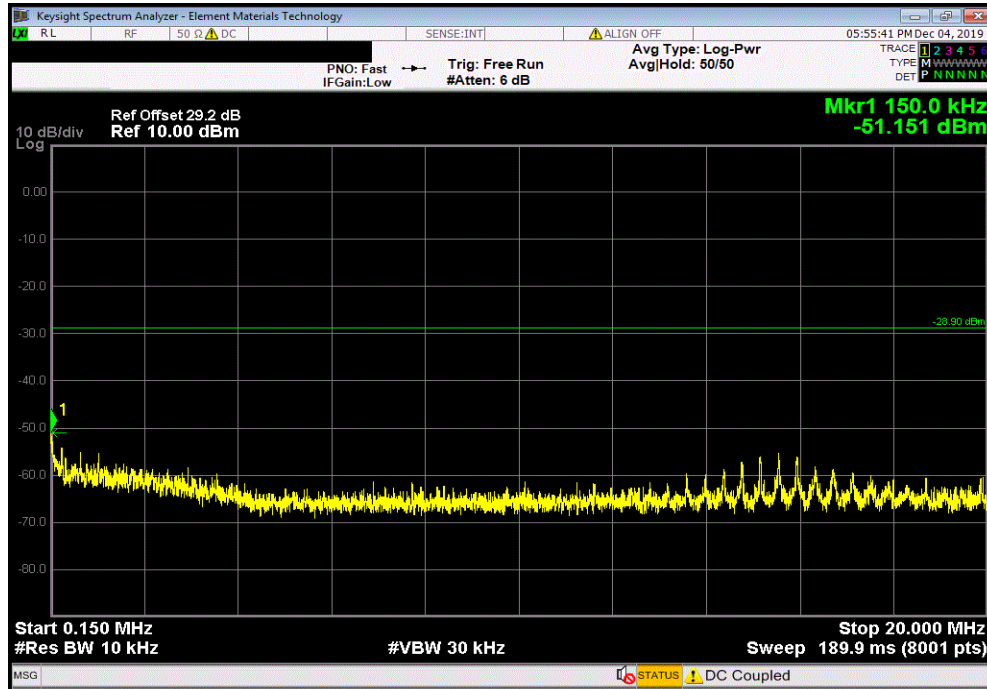
SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

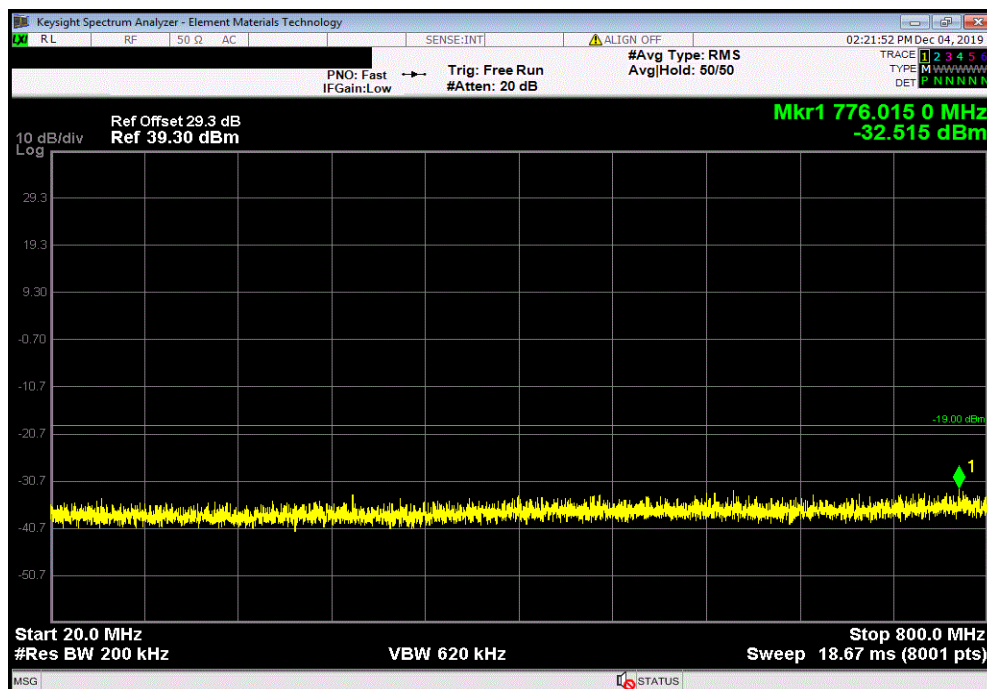
Port 4, Band 5, 5 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -51.151 | -29 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

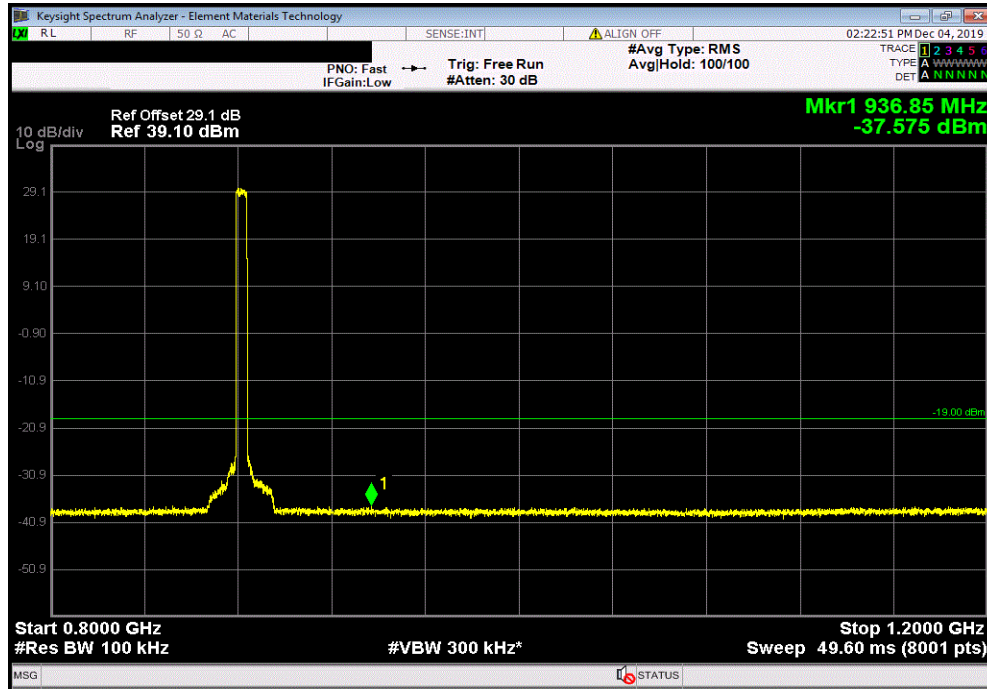
| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -32.515 | -19 | Pass |



SPURIOUS CONDUCTED EMISSIONS

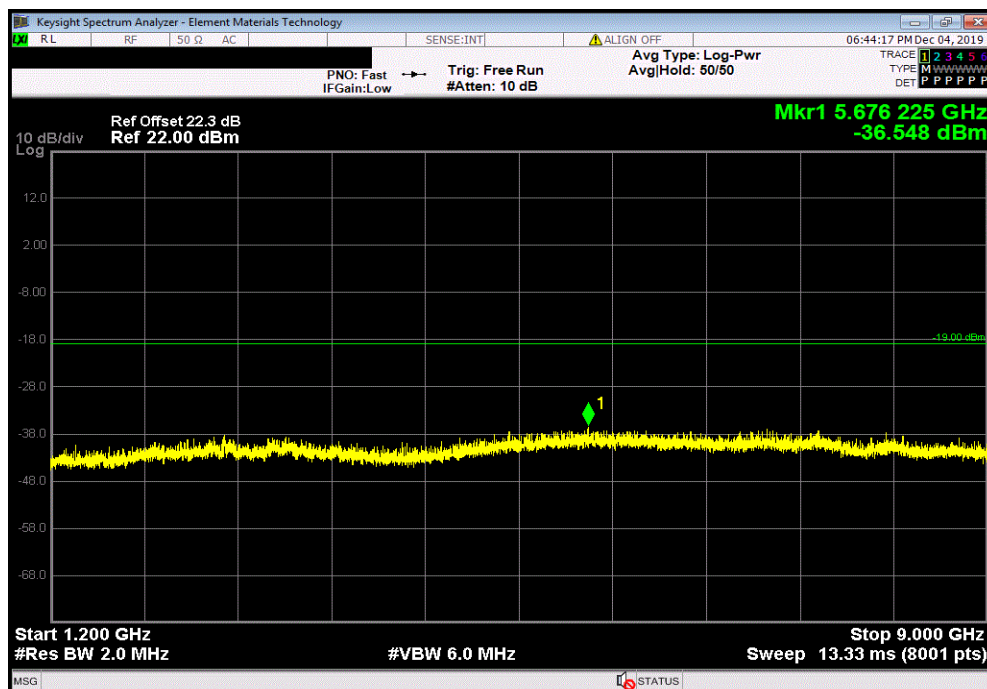
Port 4, Band 5, 5 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -37.575 | -19 | Pass |



Port 4, Band 5, 5 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -36.548 | -19 | Pass |



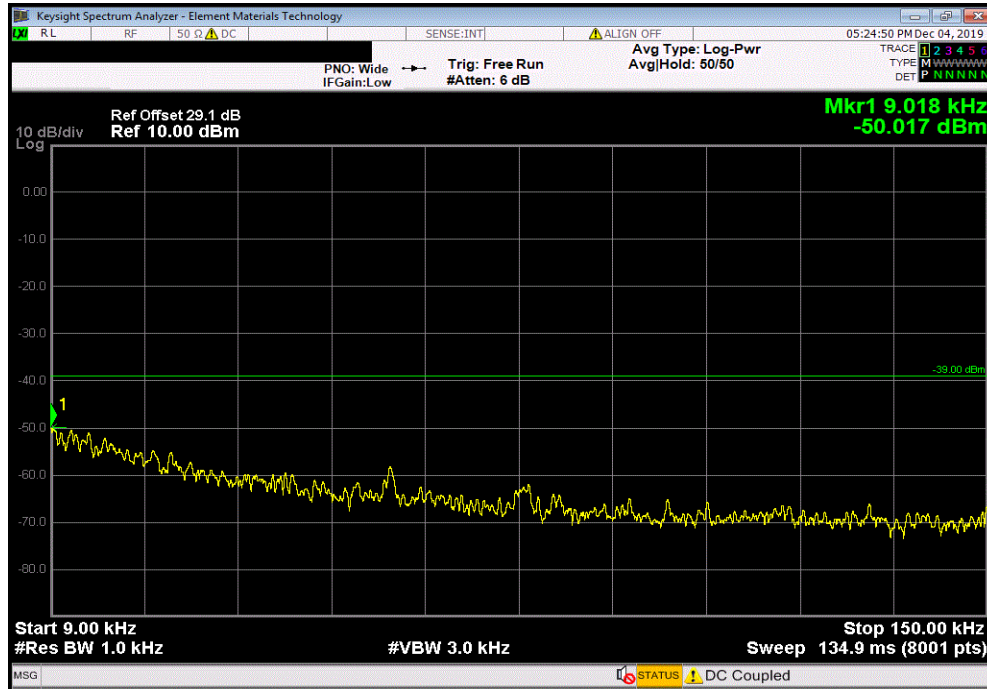
SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

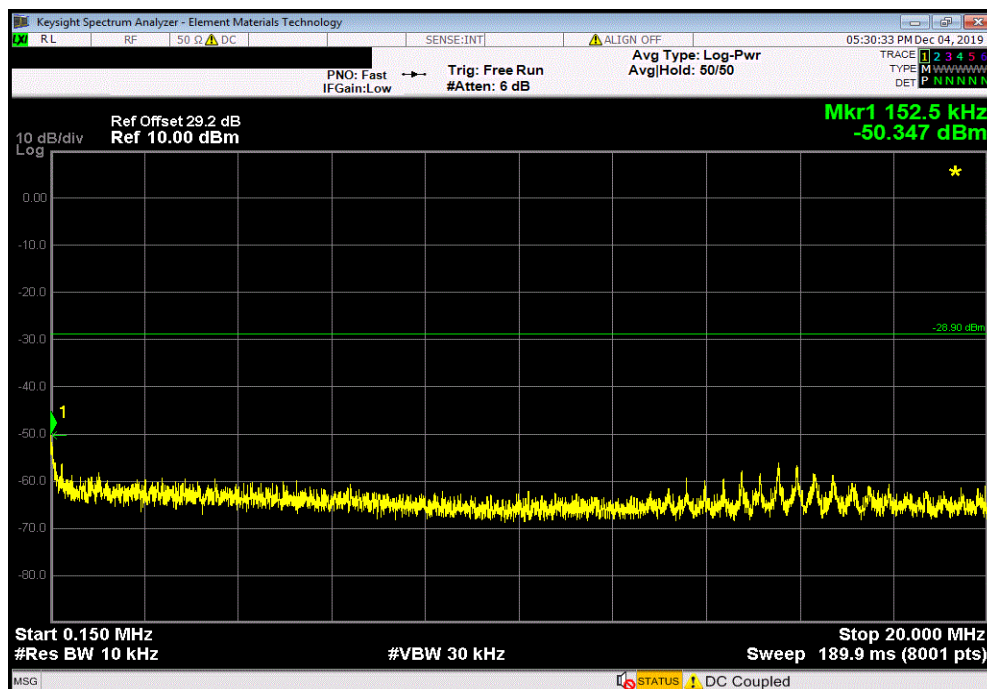
Port 4, Band 5, 10 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -50.017 | -39 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

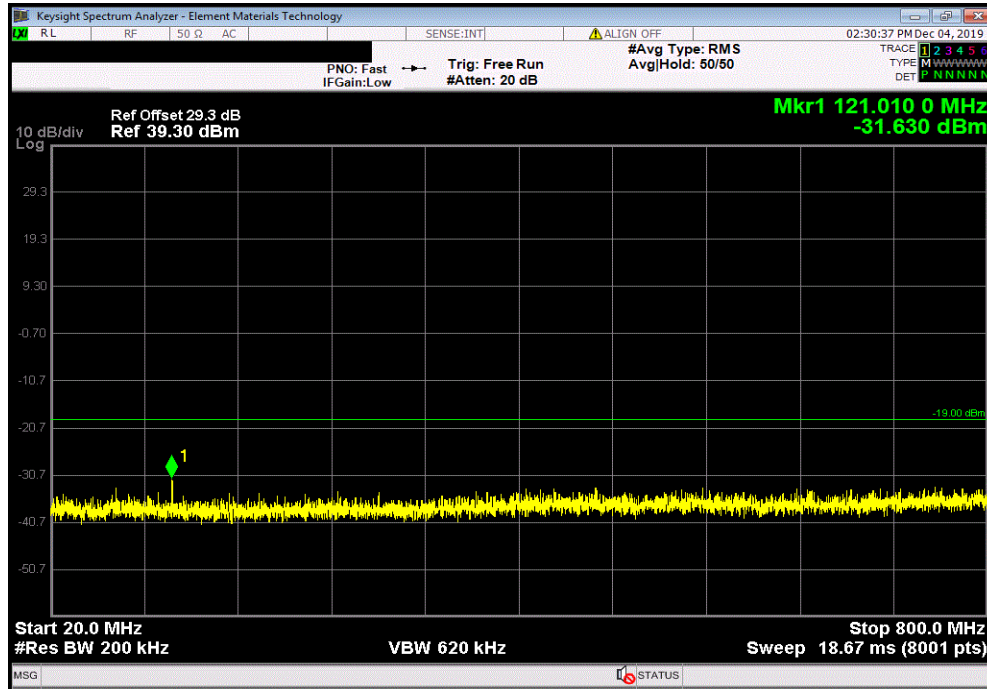
| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -50.347 | -29 | Pass |



SPURIOUS CONDUCTED EMISSIONS

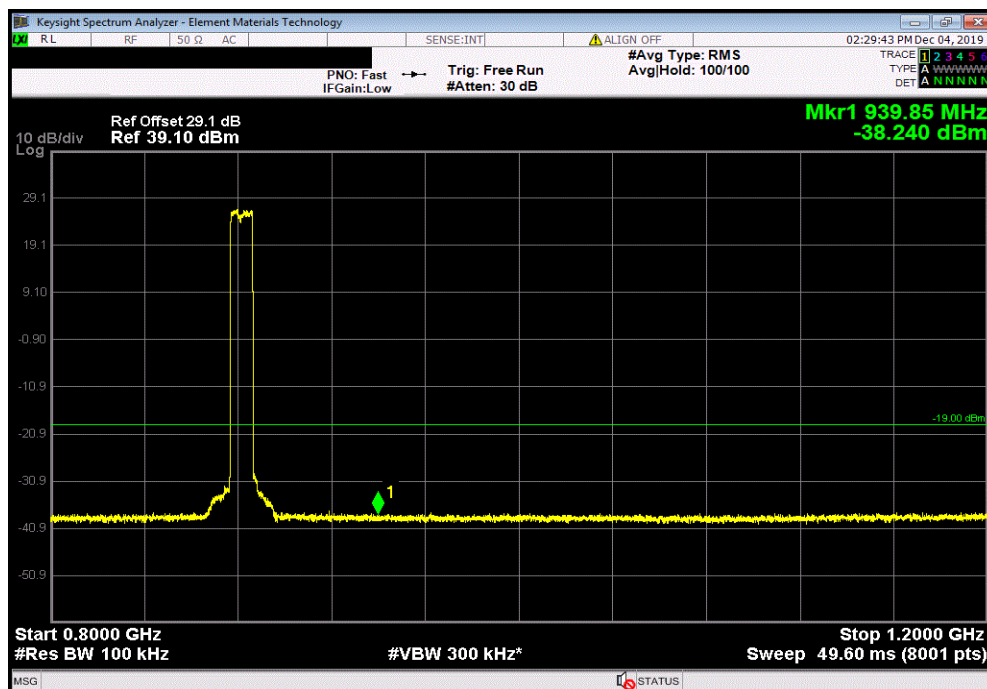
Port 4, Band 5, 10 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -31.63 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -38.24 | -19 | Pass |



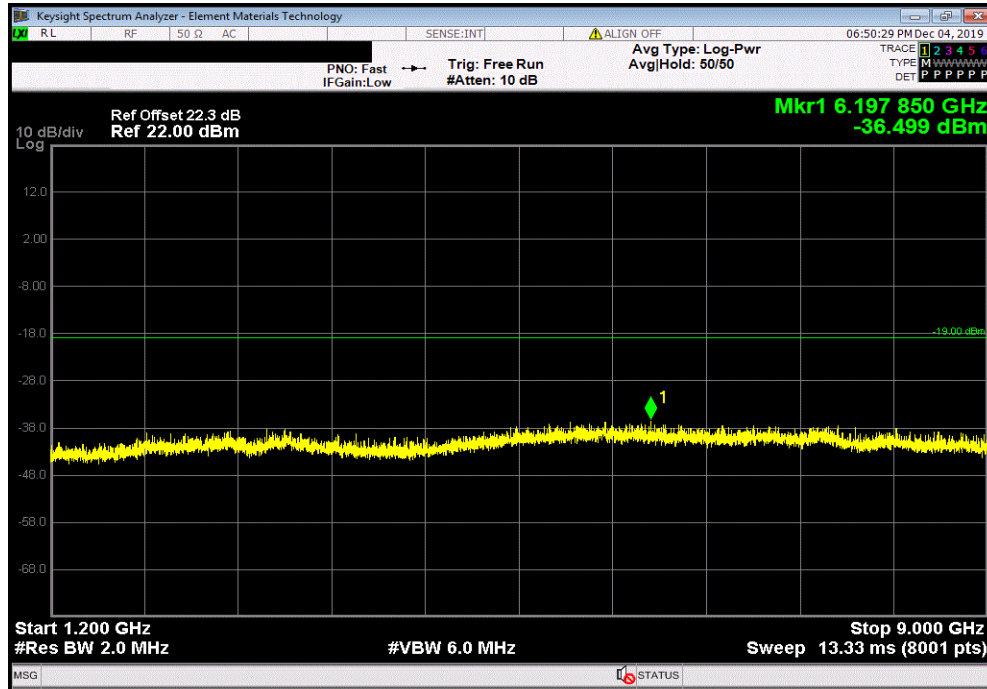
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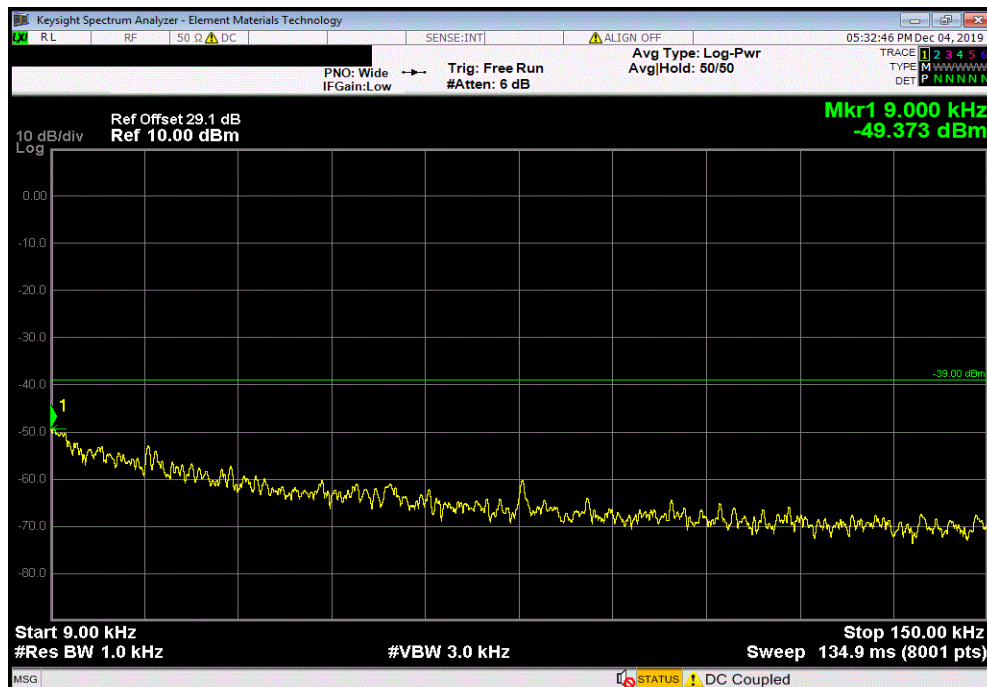
Port 4, Band 5, 10 MHz Bandwidth, QPSK, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -36.499 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -49.373 | -39 | Pass |



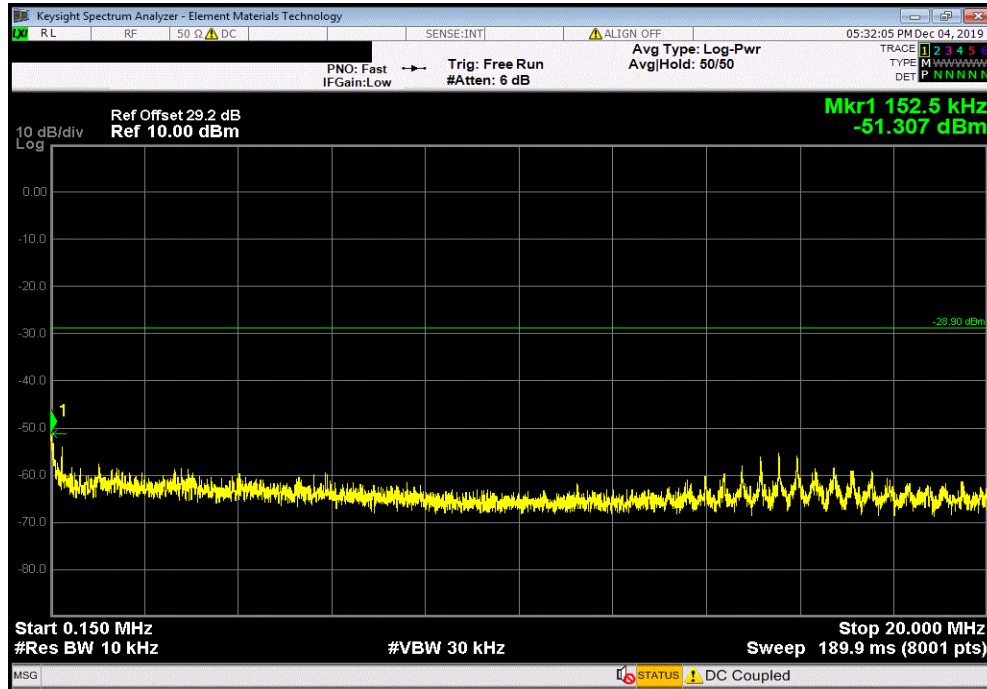
SPURIOUS CONDUCTED EMISSIONS



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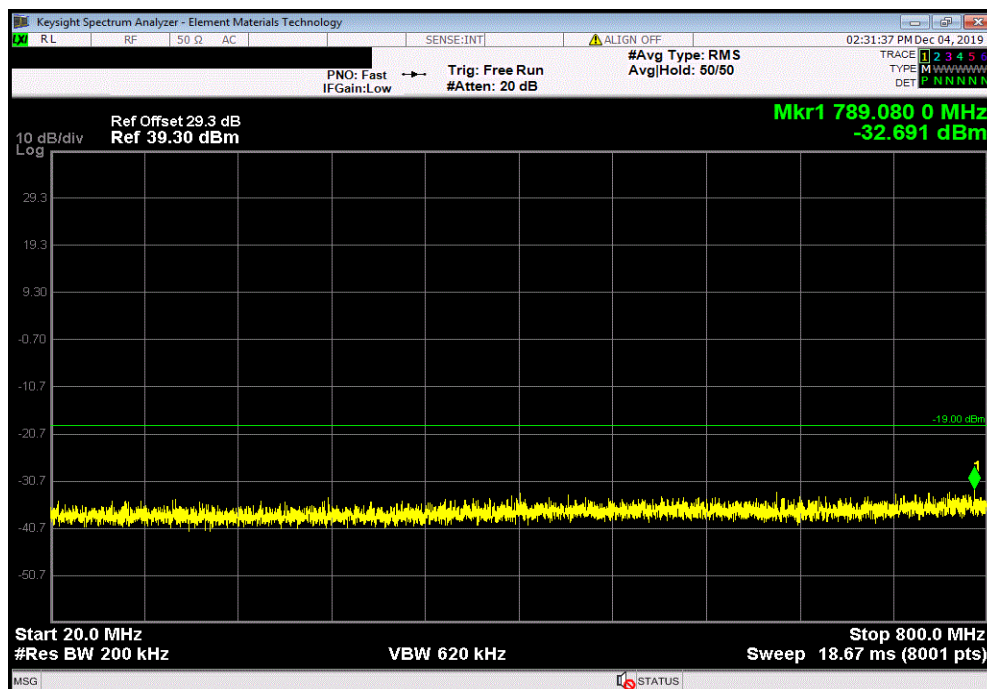
Port 4, Band 5, 10 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -51.307 | -29 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -32.691 | -19 | Pass |



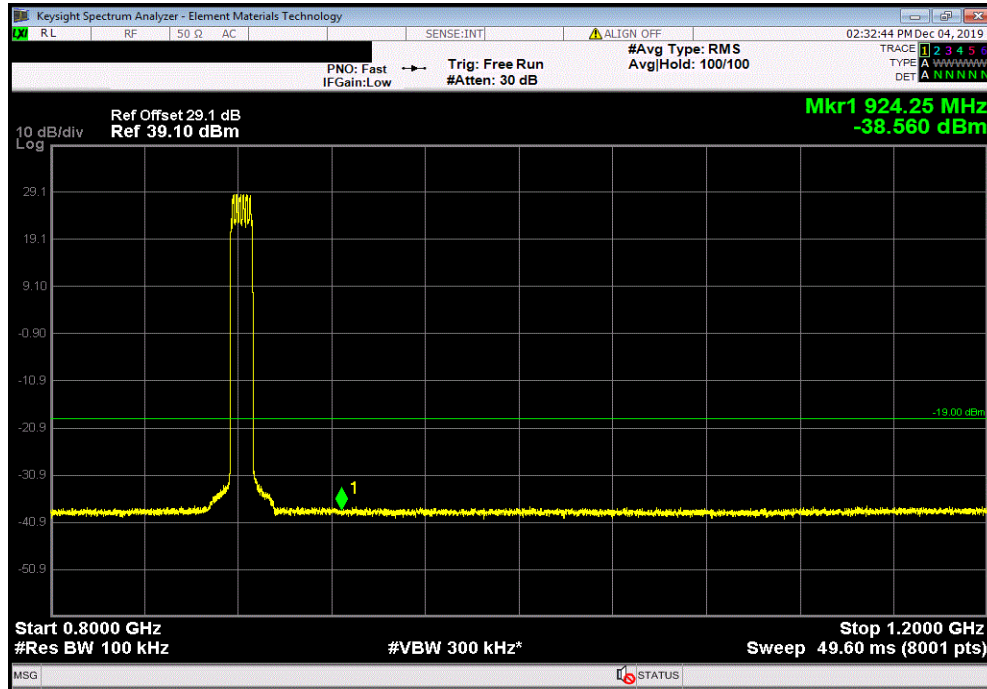
SPURIOUS CONDUCTED EMISSIONS



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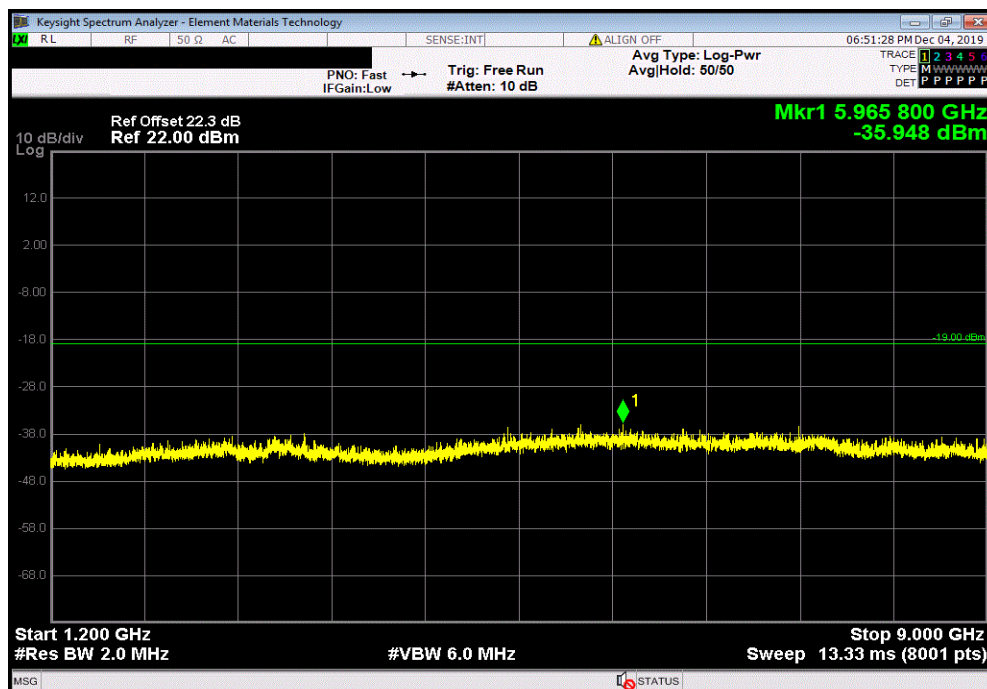
Port 4, Band 5, 10 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -38.56 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 16QAM, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -35.948 | -19 | Pass |



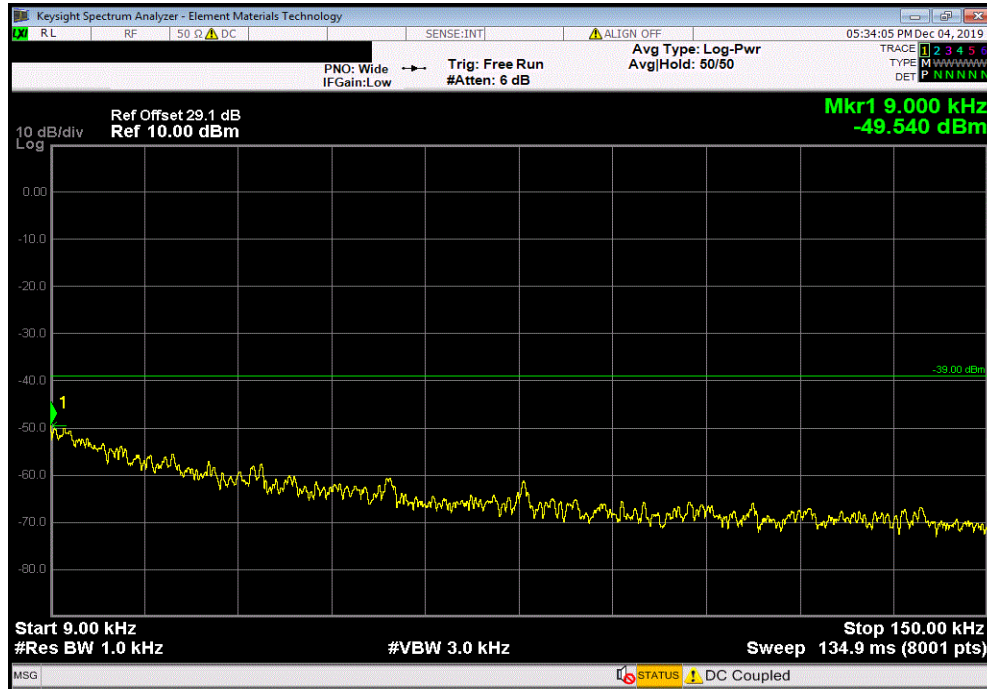
SPURIOUS CONDUCTED EMISSIONS



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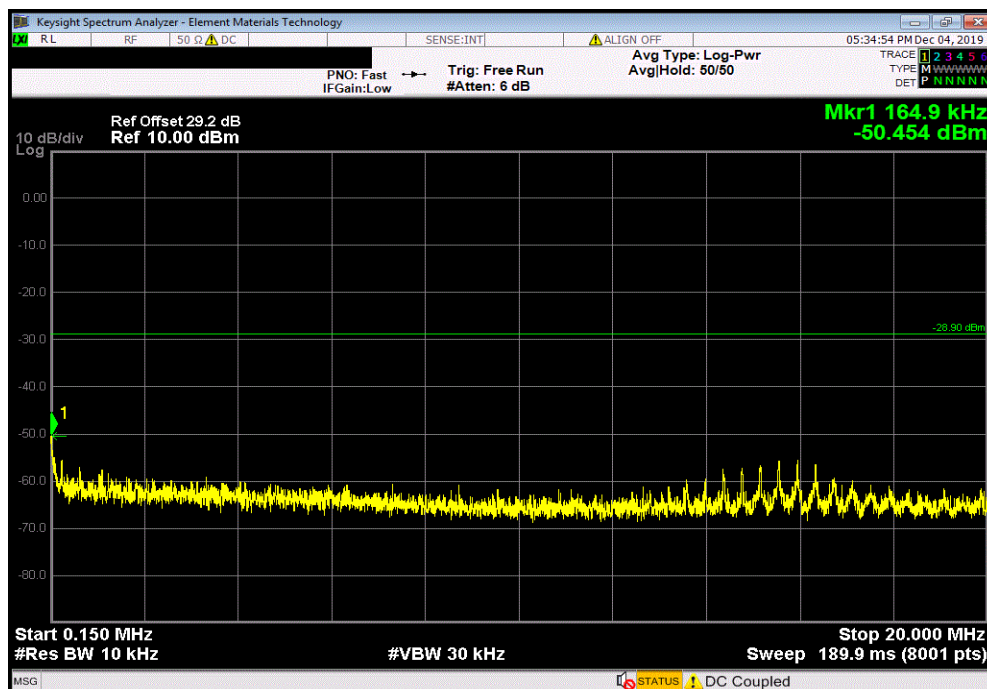
Port 4, Band 5, 10 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -49.54 | -39 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -50.454 | -29 | Pass |



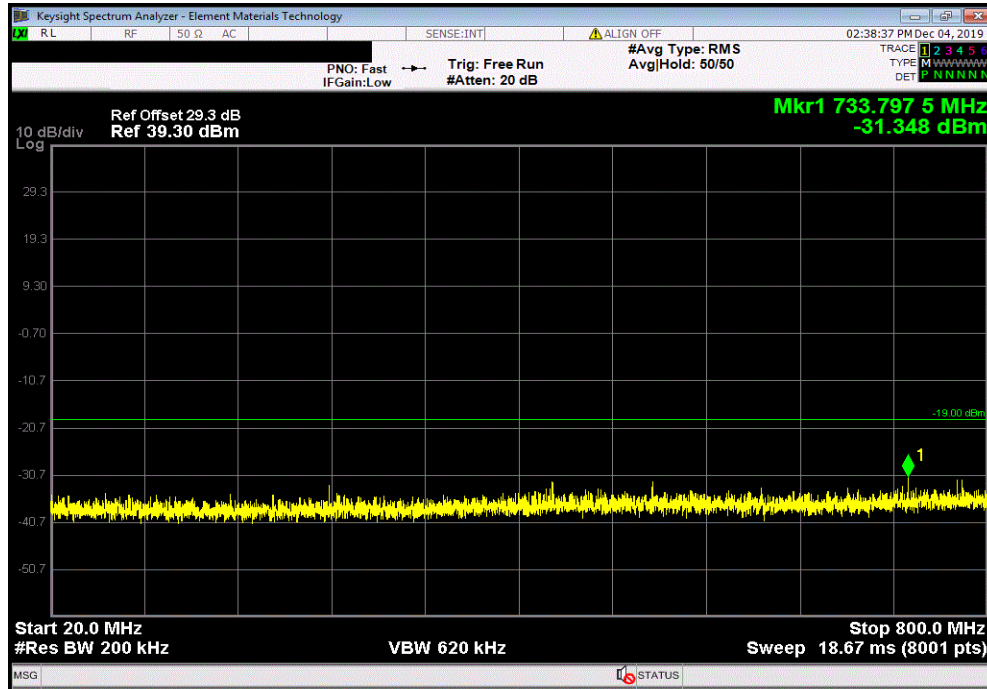
SPURIOUS CONDUCTED EMISSIONS



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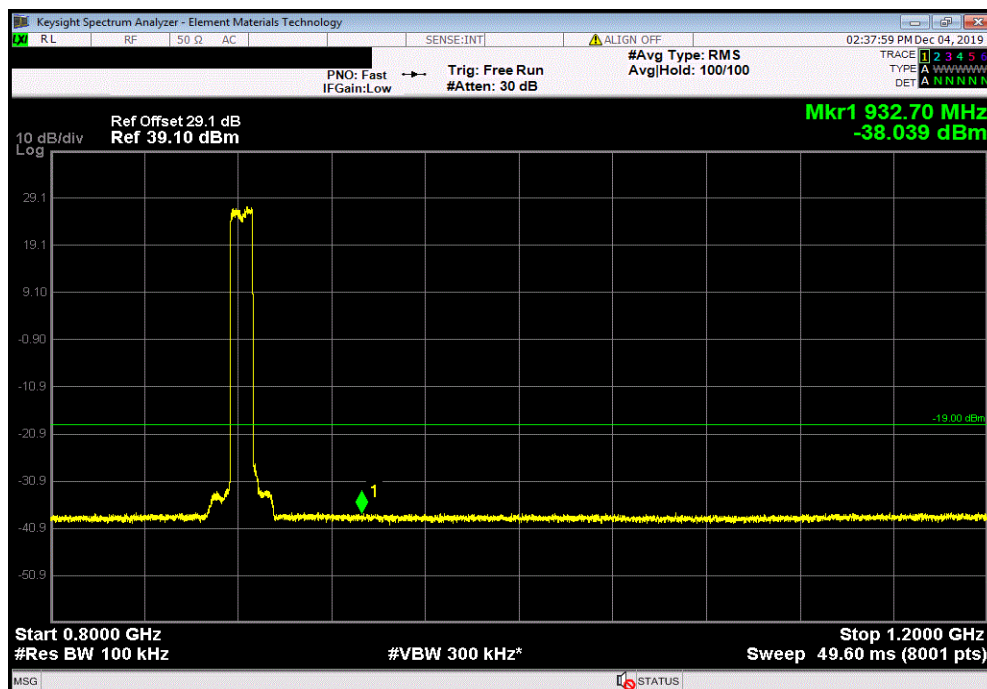
Port 4, Band 5, 10 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -31.348 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

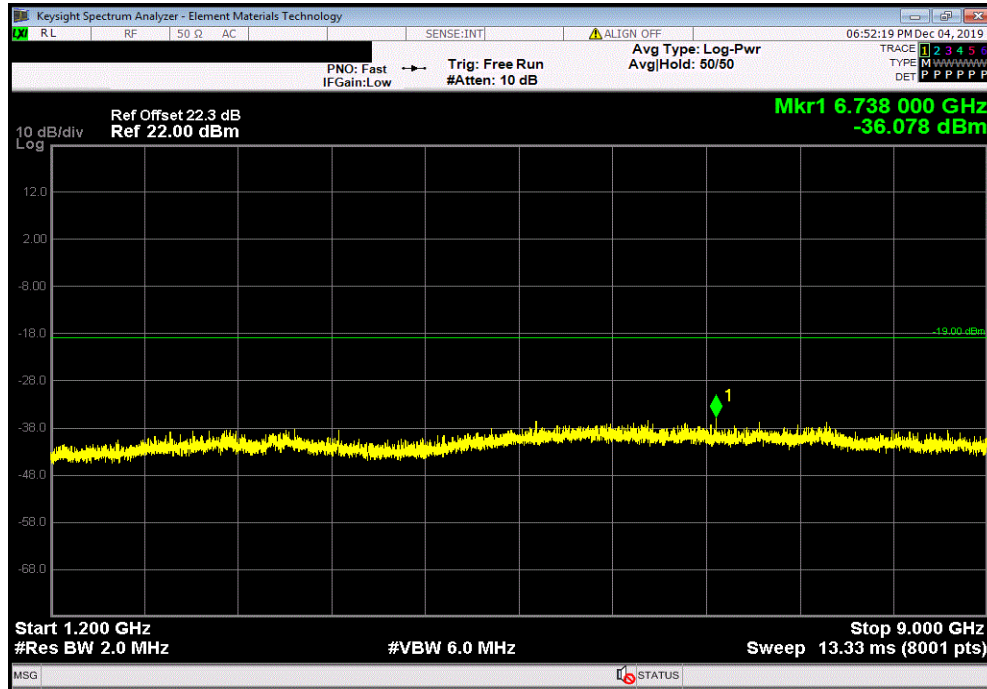
| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -38.039 | -19 | Pass |



SPURIOUS CONDUCTED EMISSIONS

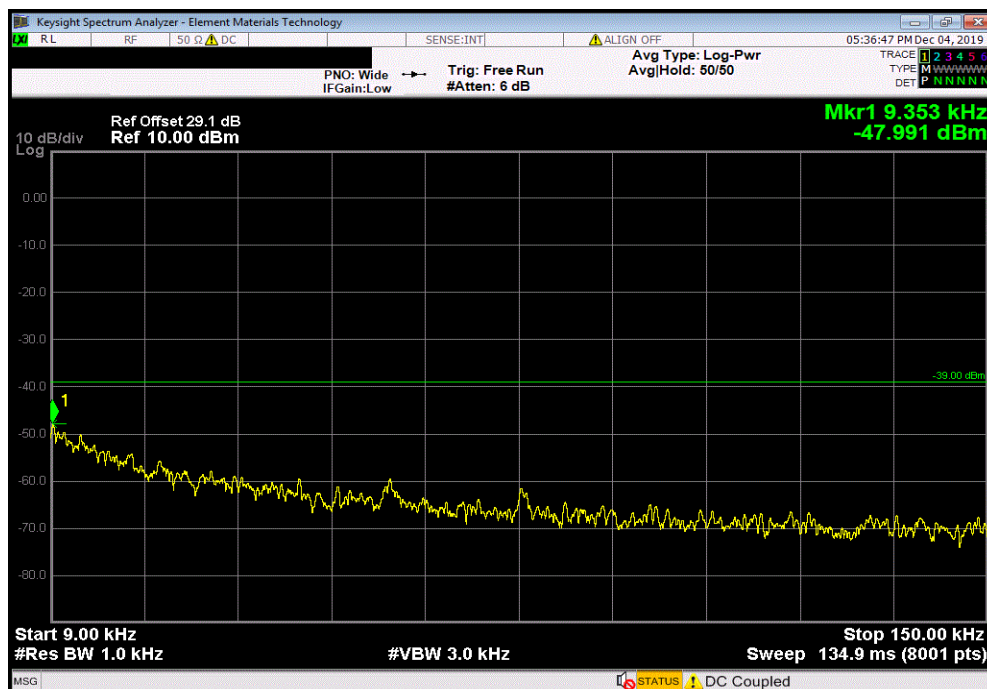
Port 4, Band 5, 10 MHz Bandwidth, 64QAM, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -36.078 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 9kHz to 150kHz (Range1)

| | | | | Value (dBm) | Limit (dBm) | Result |
|--|--|--|--|----------------|----------------|--------|
| | | | | -47.991 | -39 | Pass |



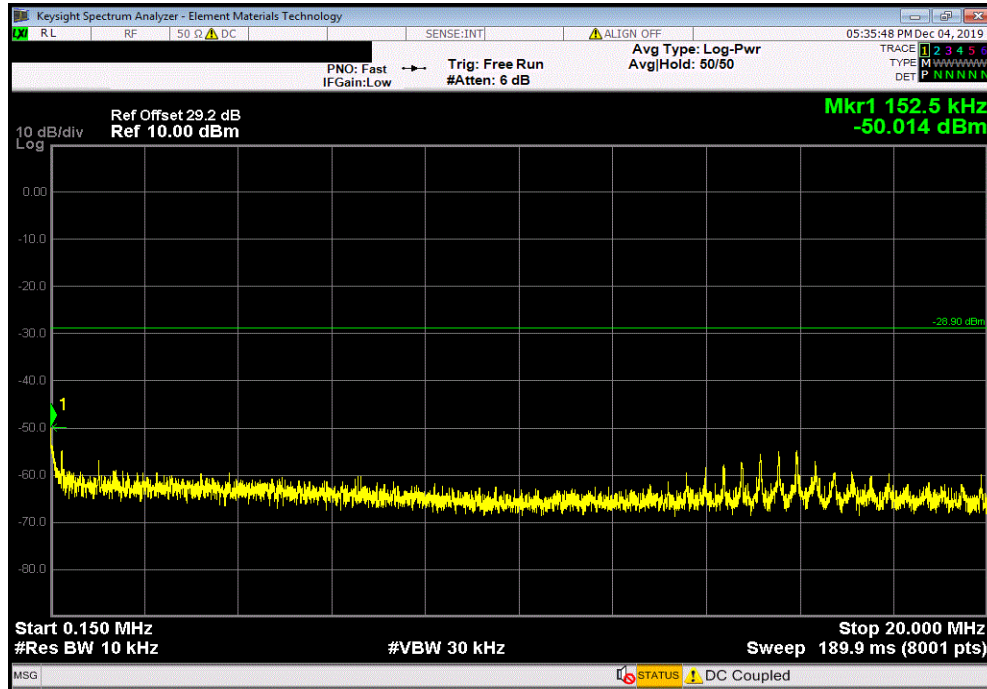
SPURIOUS CONDUCTED EMISSIONS



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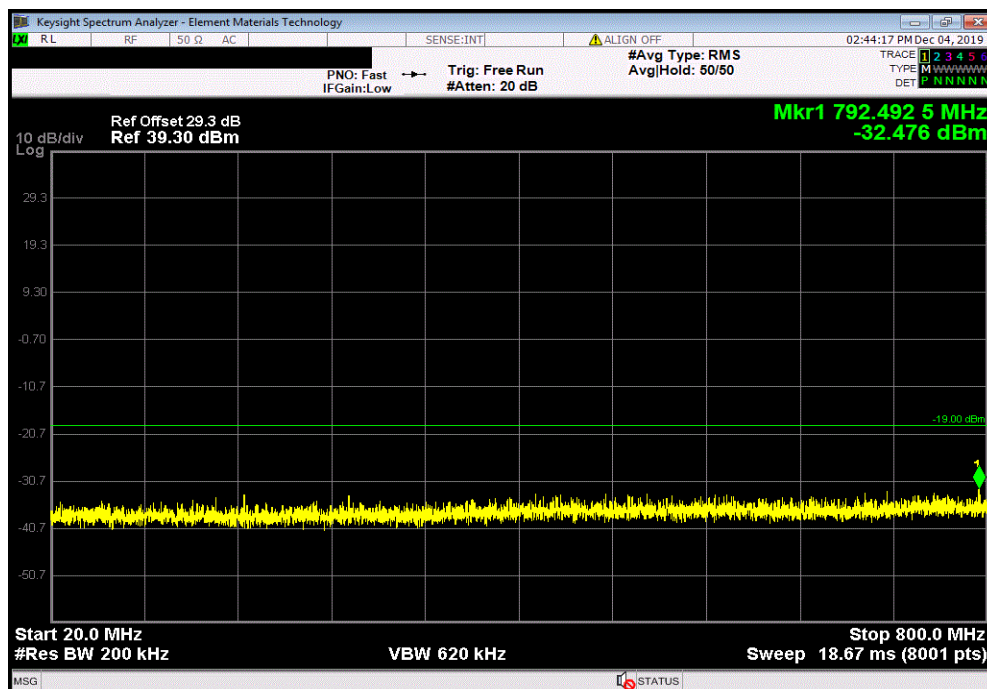
Port 4, Band 5, 10 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 150kHz to 20MHz (Range2)

| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -50.014 | -29 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 20MHz to 800MHz (Range3)

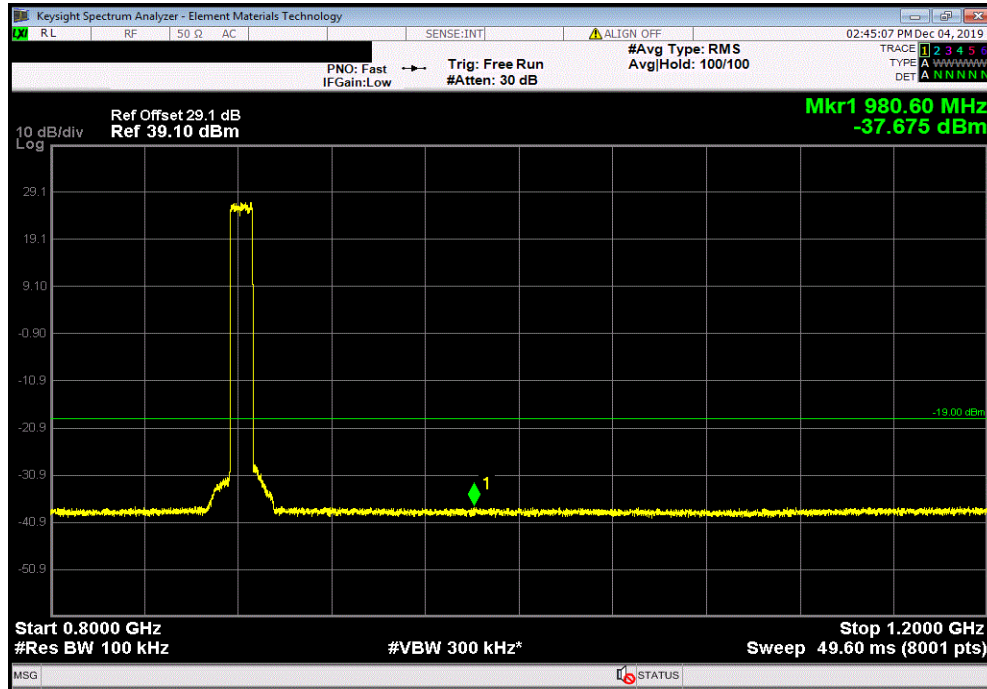
| Value (dBm) | Limit (dBm) | Result |
|----------------|----------------|--------|
| -32.476 | -19 | Pass |



SPURIOUS CONDUCTED EMISSIONS

Port 4, Band 5, 10 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 800MHz to 1.2GHz (Range4)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -37.675 | -19 | Pass |



Port 4, Band 5, 10 MHz Bandwidth, 256QAM, Mid Channel, 881.5 MHz, 1.2GHz to 9GHz (Range5)

| | Value (dBm) | Limit (dBm) | Result |
|--|----------------|----------------|--------|
| | -36.144 | -19 | Pass |

