# BAND EDGE COMPLIANCE - MULTIBAND

XMit 2022.02.07.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |

**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*log(2)] dB to account for the device operation as a 2 port MIMO transmitter, as per FCC KDB 622911.

Multicarrier test cases are as shown below:
a) PCS Multicarrier Multiband Test Case: In the PCS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (1932.4 & 1937.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1987.6MHz) at the upper band edge. In the AWS band _ Two WCDMA carriers at the band middle (2137.5 & 2142.5MHz). The carriers are operated at maximum power (~26.6W/PCS carrier and 20W/AWS carrier) with a total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carriers).
b) AWS Multicarrier Multiband Test Case: In the AWS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (2112.4 & 2117.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (2167.6MHz) at the upper band edge. In the PCS band: Two WCDMA carriers at band middle (1957.5 & 1962.5MHz). The carriers are operated at maximum power (~26.6W/AWS carrier and 20W/PCS carrier) with a total port power of 120 watts (80W for AWS band carriers + 40W for PCS band carriers).

Per section 27.53(h)(1), RSS-139 6.6 and 24.238(a), RSS-133 6.5 (i), the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -16 dBm [-13 dBm -10 log (2)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 2 port MIMO transmitter.

The RBW to be used for these measurements are per 27.53(h)(3), RSS-139 6.6, 24.238(b), and RSS-133 6.5. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified).

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

# BAND EDGE COMPLIANCE - MULTIBAND

element

TbiTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | **AHFII (FCC/ISED C2PC)** | | | **Work Order:** | **NOKI0040** |
| **Serial Number:** | **YK214000036** | | | **Date:** | **16-May-22** |
| **Customer:** | **Nokia Solutions and Networks** | | | **Temperature:** | **22.9 °C** |
| **Attendees:** | **David Le, John Rattanavong** | | | **Humidity:** | **48.5% RH** |
| **Project:** | **None** | | | **Barometric Pres.:** | **1019 mbar** |
| **Tested by:** | **Brandon Hobbs** | **Power:** | **54 VDC** | **Job Site:** | **TX05** |

| **TEST SPECIFICATIONS** | **Test Method** |
|---|---|
| **FCC 24E:2022** | ANSI C63.26:2015 |
| **RSS-133 Issue 6:2013+A1:2018** | RSS-133 Issue 6:2013+A1:2018 |
| **FCC 27:2022** | ANSI C63.26:2015 |
| **RSS-139 Issue 3:2015** | RSS-139 Issue 3:2015 |

**COMMENTS**

**All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. PCS Band II / AWS Band X carriers were enabled at maximum power (30 watts/carrier).**

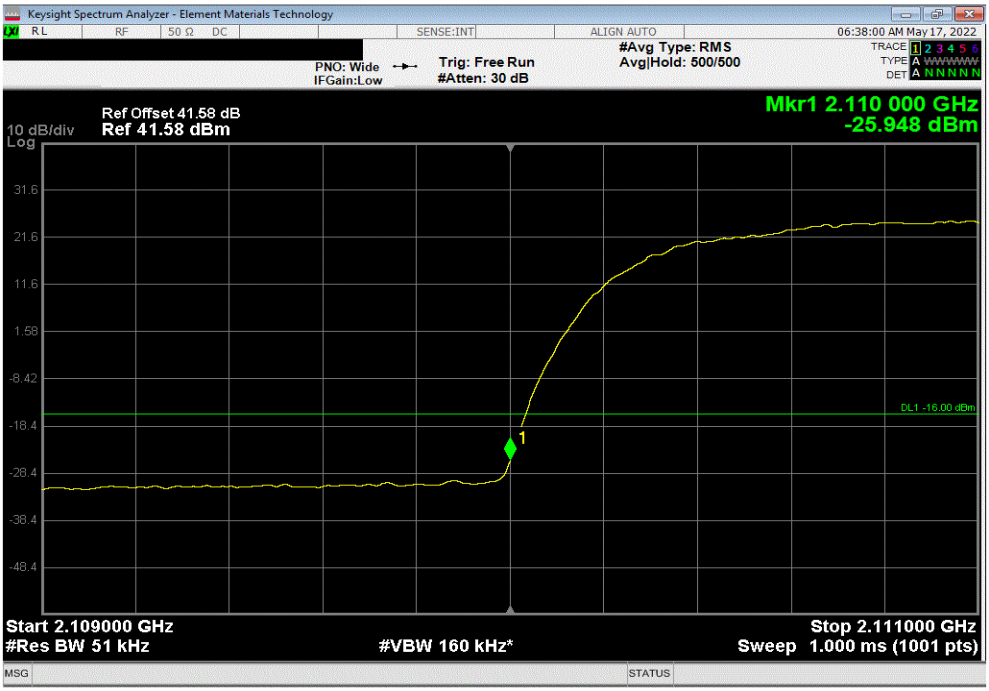
**DEVIATIONS FROM TEST STANDARD**

**None**

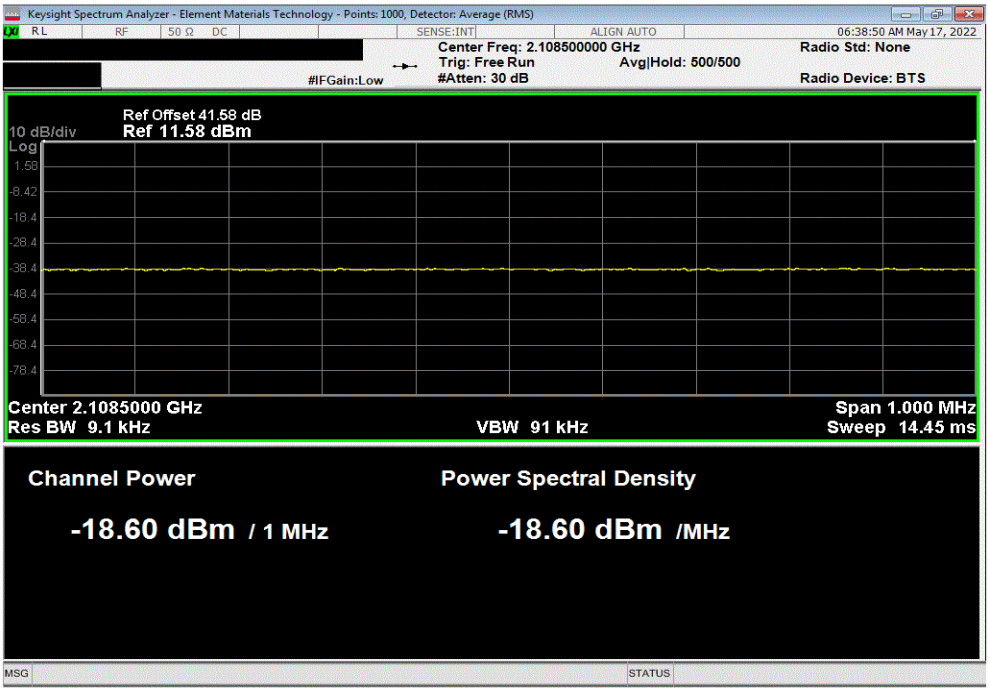
| **Configuration #** | **2** | *Signature* |
|---|---|---|

| | | Frequency Range | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|---|
| AWS WCDMA, 2110 MHz - 2170 MHz | | | | | |
| Port 1 | | | | | |
| 5 MHz Bandwdith | | | | | |
| QPSK Modulation | | | | | |
| | Low Channel, 2112.4 MHz | 1 | -26.0 | -16 | Pass |
| | Low Channel, 2112.4 MHz | 2 | -18.6 | -16 | Pass |
| | Low Channel, 2112.4 MHz | 3 | -21.2 | -16 | Pass |
| | High Channel, 2167.6 MHz | 1 | -25.3 | -16 | Pass |
| | High Channel, 2167.6 MHz | 2 | -19.3 | -16 | Pass |
| | High Channel, 2167.6 MHz | 3 | -24.4 | -16 | Pass |
| 16-QAM Modulation | | | | | |
| | Low Channel, 2112.4 MHz | 1 | -25.8 | -16 | Pass |
| | Low Channel, 2112.4 MHz | 2 | -18.6 | -16 | Pass |
| | Low Channel, 2112.4 MHz | 3 | -21.5 | -16 | Pass |
| | High Channel, 2167.6 MHz | 1 | -24.8 | -16 | Pass |
| | High Channel, 2167.6 MHz | 2 | -19.2 | -16 | Pass |
| | High Channel, 2167.6 MHz | 3 | -24.2 | -16 | Pass |
| 64-QAM Modulation | | | | | |
| | Low Channel, 2112.4 MHz | 1 | -25.8 | -16 | Pass |
| | Low Channel, 2112.4 MHz | 2 | -18.7 | -16 | Pass |
| | Low Channel, 2112.4 MHz | 3 | -21.7 | -16 | Pass |
| | High Channel, 2167.6 MHz | 1 | -24.9 | -16 | Pass |
| | High Channel, 2167.6 MHz | 2 | -19.4 | -16 | Pass |
| | High Channel, 2167.6 MHz | 3 | -23.9 | -16 | Pass |
| PCS WCDMA, 1930 MHz - 1990 MHz | | | | | |
| Port 1 | | | | | |
| 5 MHz Bandwdith | | | | | |
| QPSK Modulation | | | | | |
| | Low Channel, 1932.4 MHz | 1 | -26.2 | -16 | Pass |
| | Low Channel, 1932.4 MHz | 2 | -18.6 | -16 | Pass |
| | Low Channel, 1932.4 MHz | 3 | -20.7 | -16 | Pass |
| | High Channel, 1987.6 MHz | 1 | -24.8 | -16 | Pass |
| | High Channel, 1987.6 MHz | 2 | -18.9 | -16 | Pass |
| | High Channel, 1987.6 MHz | 3 | -21.5 | -16 | Pass |
| 16-QAM Modulation | | | | | |
| | Low Channel, 1932.4 MHz | 1 | -25.7 | -16 | Pass |
| | Low Channel, 1932.4 MHz | 2 | -18.7 | -16 | Pass |
| | Low Channel, 1932.4 MHz | 3 | -21.4 | -16 | Pass |
| | High Channel, 1987.6 MHz | 1 | -24.8 | -16 | Pass |
| | High Channel, 1987.6 MHz | 2 | -18.9 | -16 | Pass |
| | High Channel, 1987.6 MHz | 3 | -21.8 | -16 | Pass |
| 64-QAM Modulation | | | | | |
| | Low Channel, 1932.4 MHz | 1 | -25.5 | -16 | Pass |
| | Low Channel, 1932.4 MHz | 2 | -18.3 | -16 | Pass |
| | Low Channel, 1932.4 MHz | 3 | -20.9 | -16 | Pass |
| | High Channel, 1987.6 MHz | 1 | -25.2 | -16 | Pass |
| | High Channel, 1987.6 MHz | 2 | -18.8 | -16 | Pass |
| | High Channel, 1987.6 MHz | 3 | -21.1 | -16 | Pass |

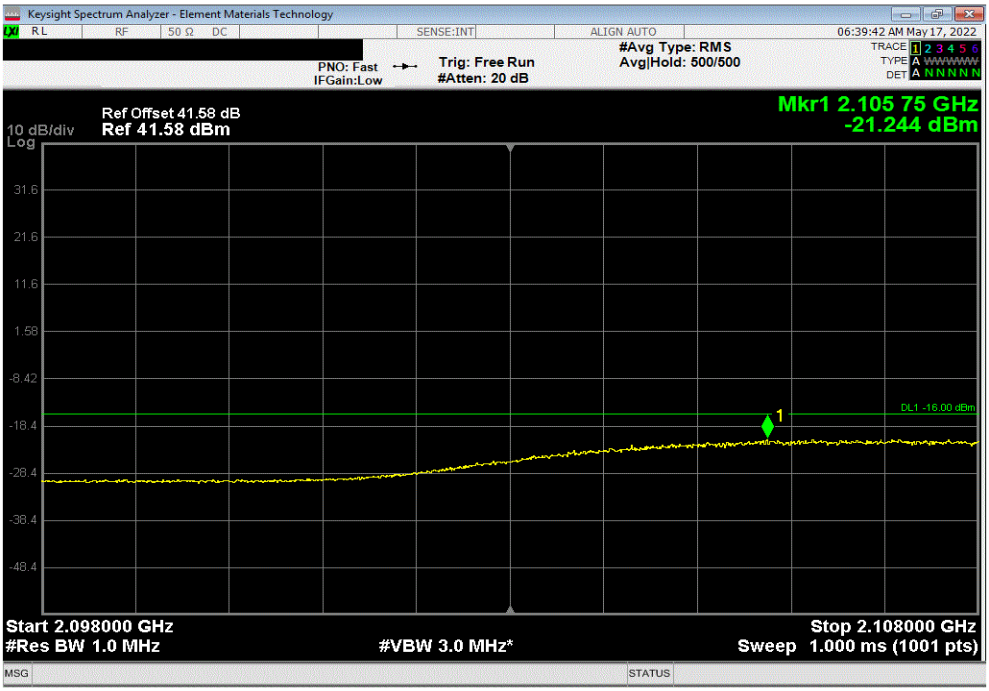
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -26.0 | -16 | Pass |



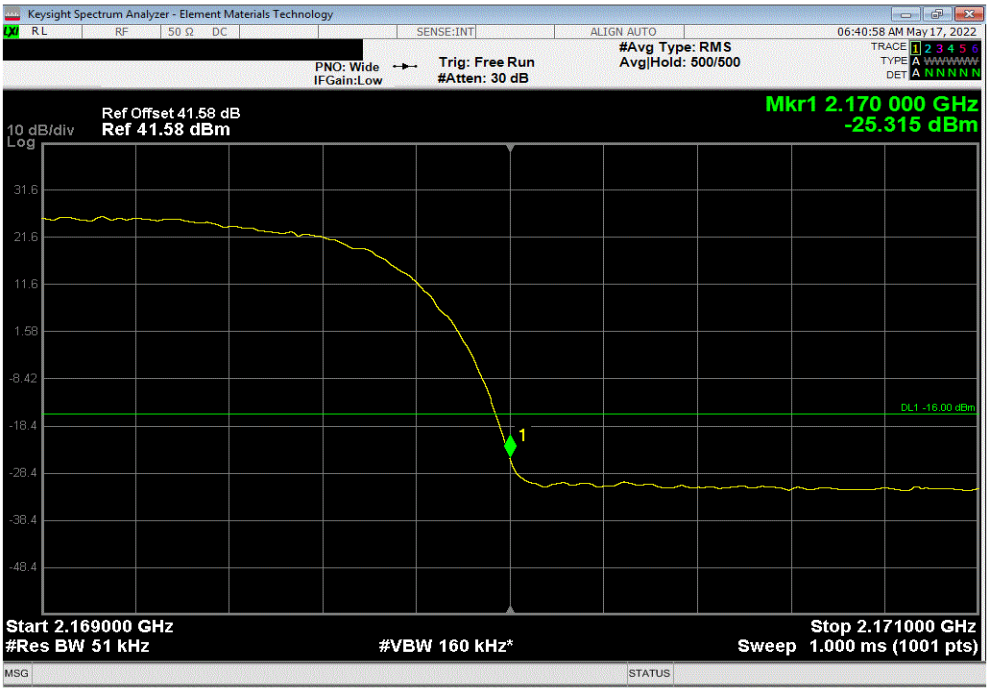

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.6 | -16 | Pass |



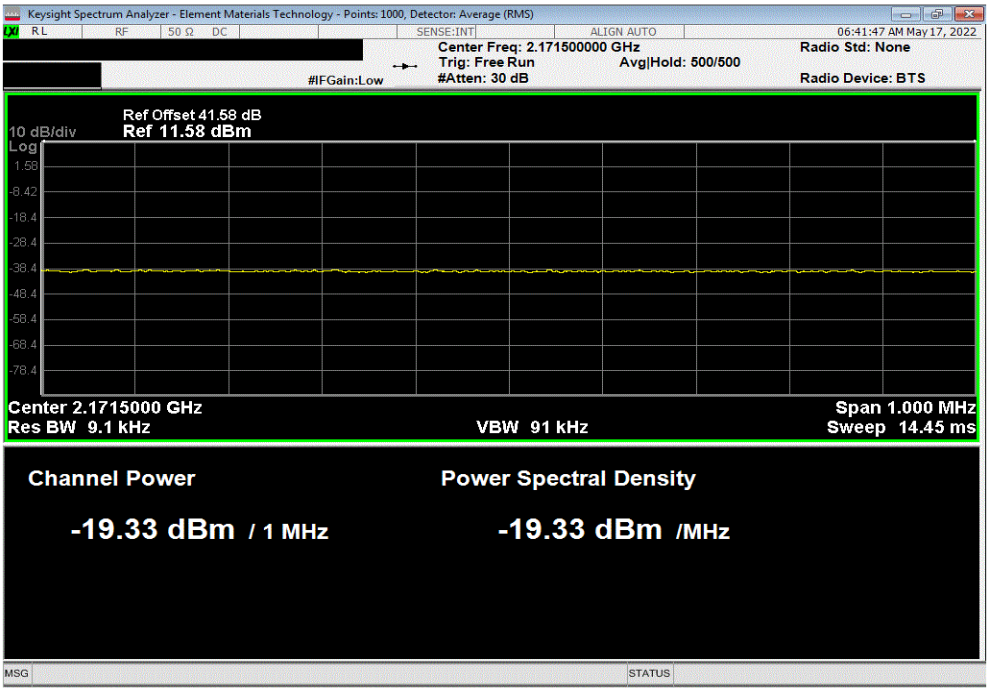
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -21.2 | -16 | Pass |



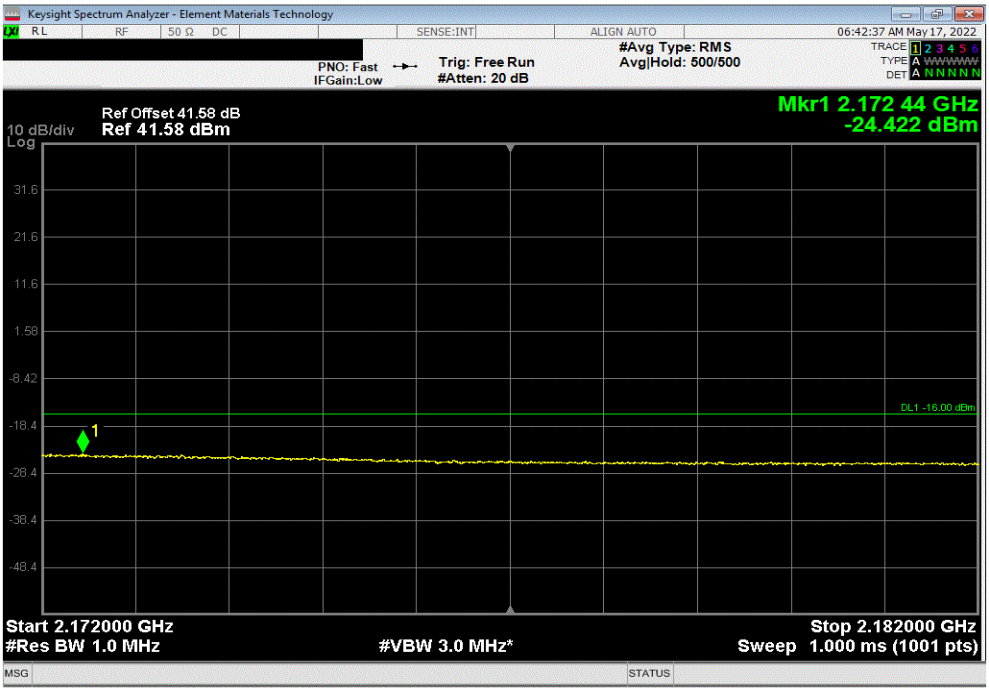

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -25.3 | -16 | Pass |



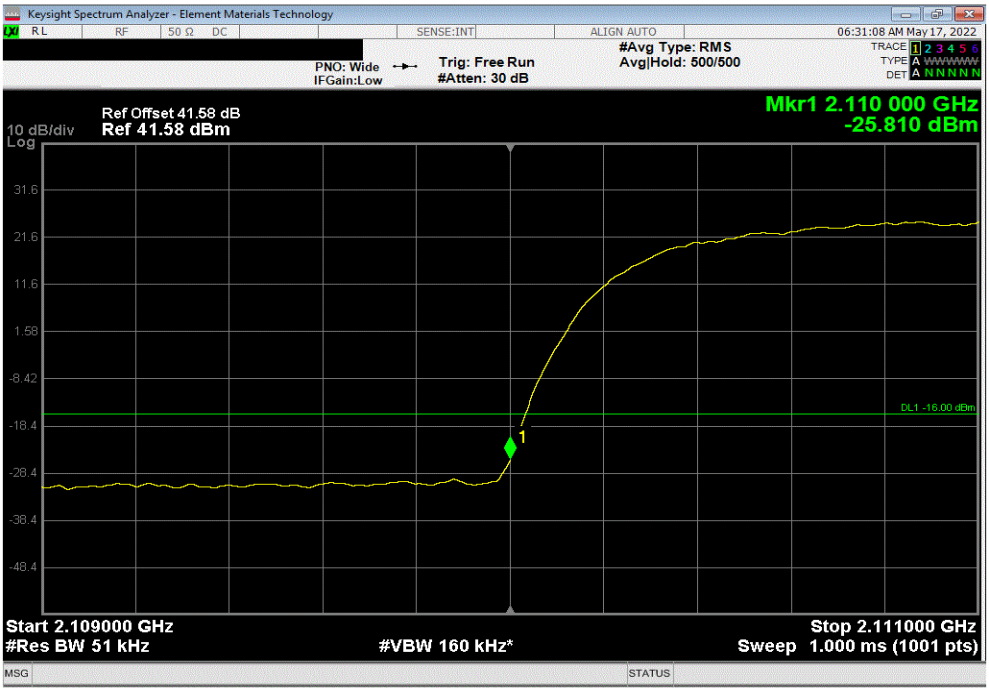
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -19.3 | -16 | Pass |



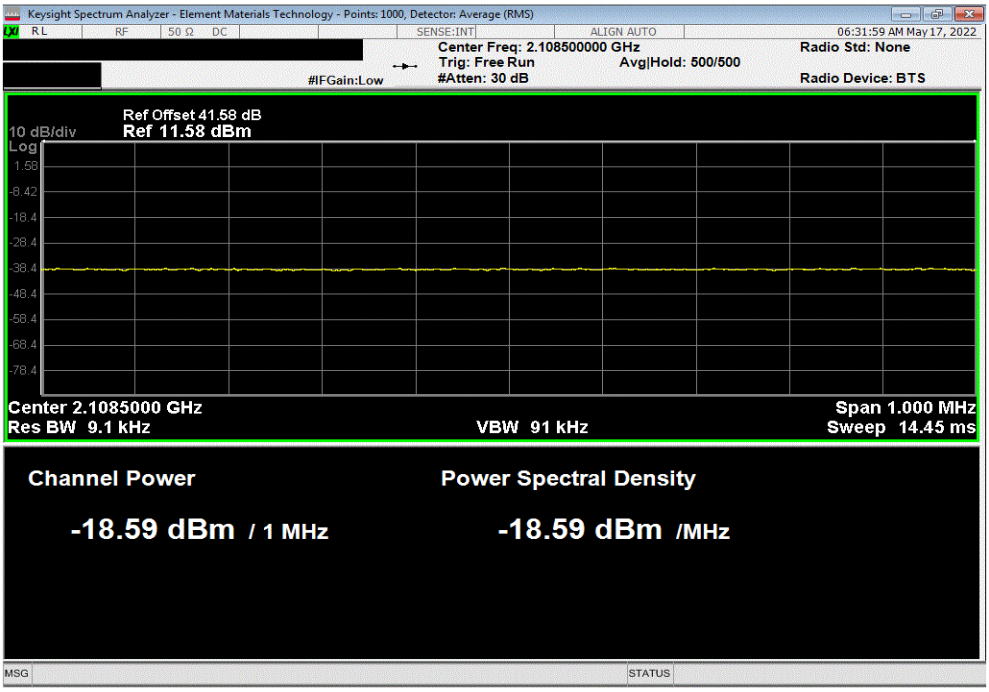

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -24.4 | -16 | Pass |



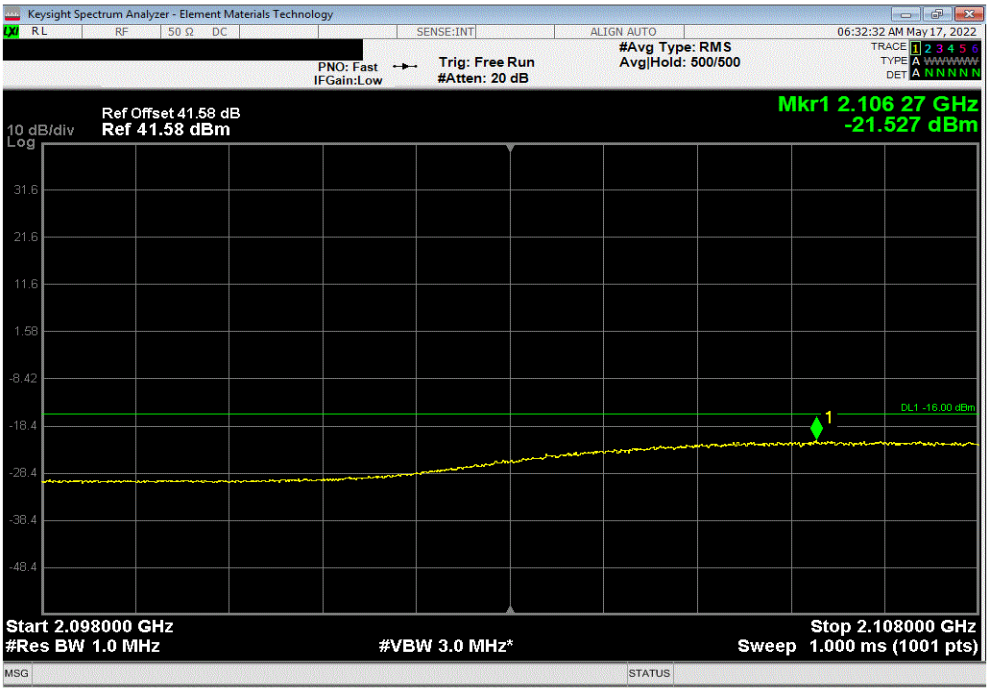
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -25.8 | -16 | Pass |



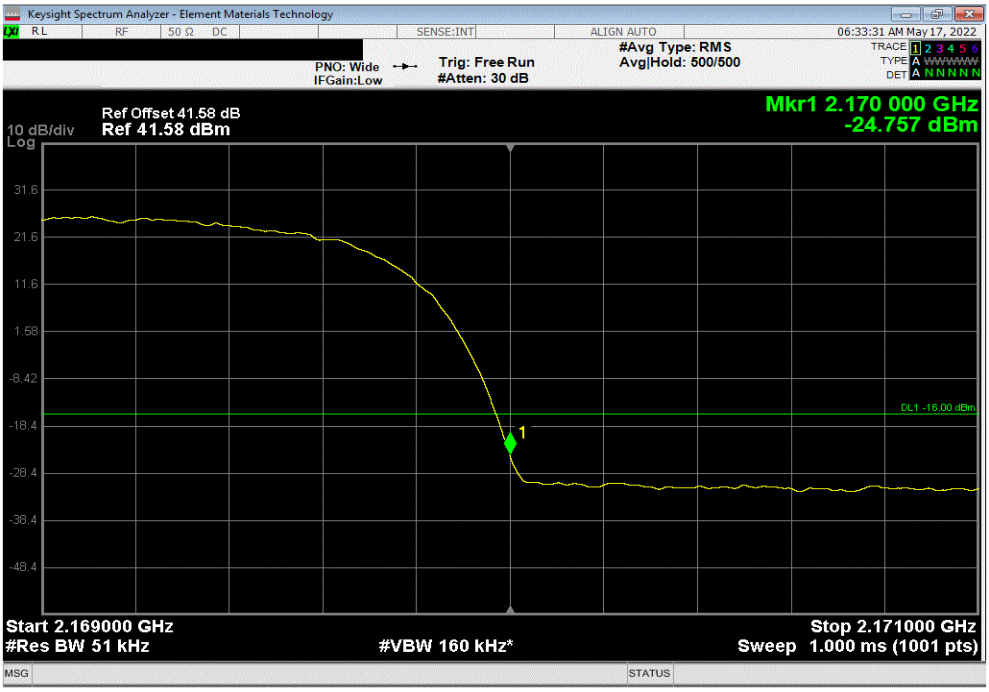

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.6 | -16 | Pass |



| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -21.5 | -16 | Pass |



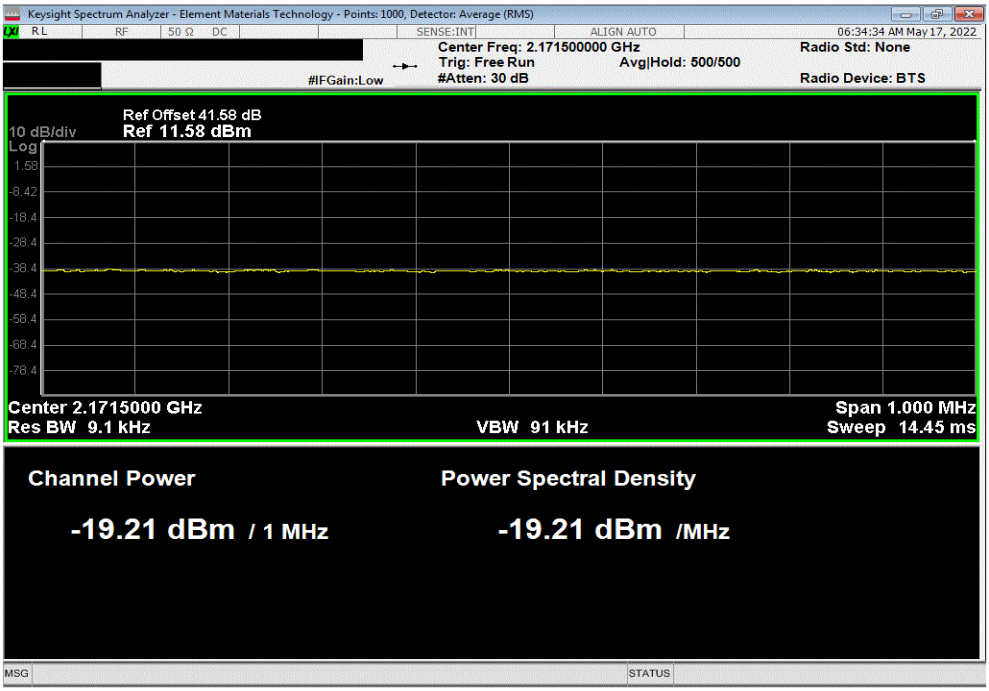

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -24.8 | -16 | Pass |



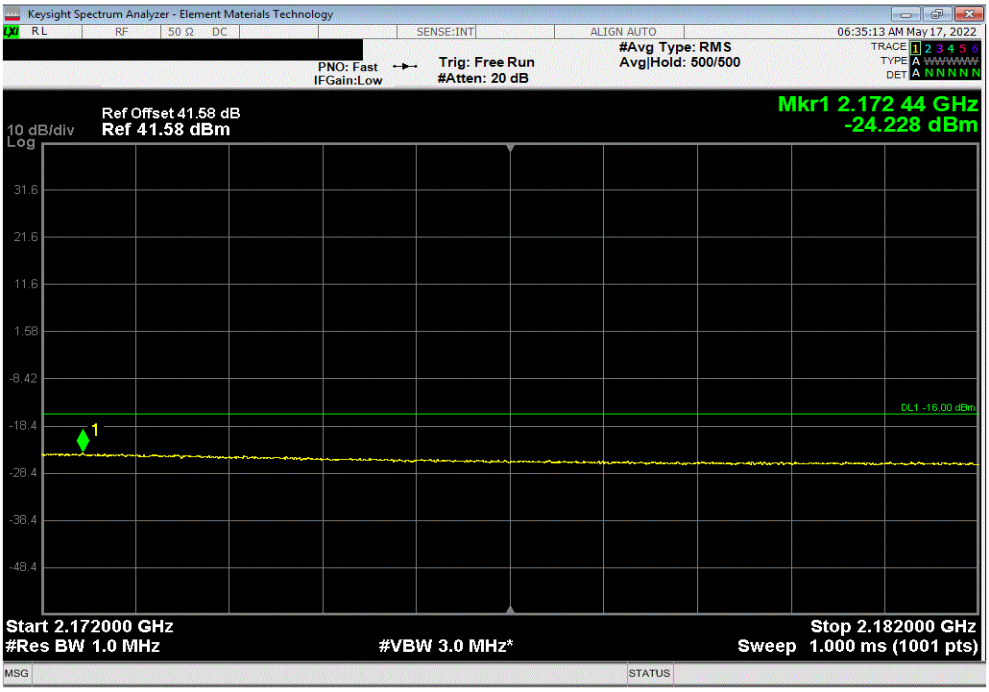
# BAND EDGE COMPLIANCE - MULTIBAND



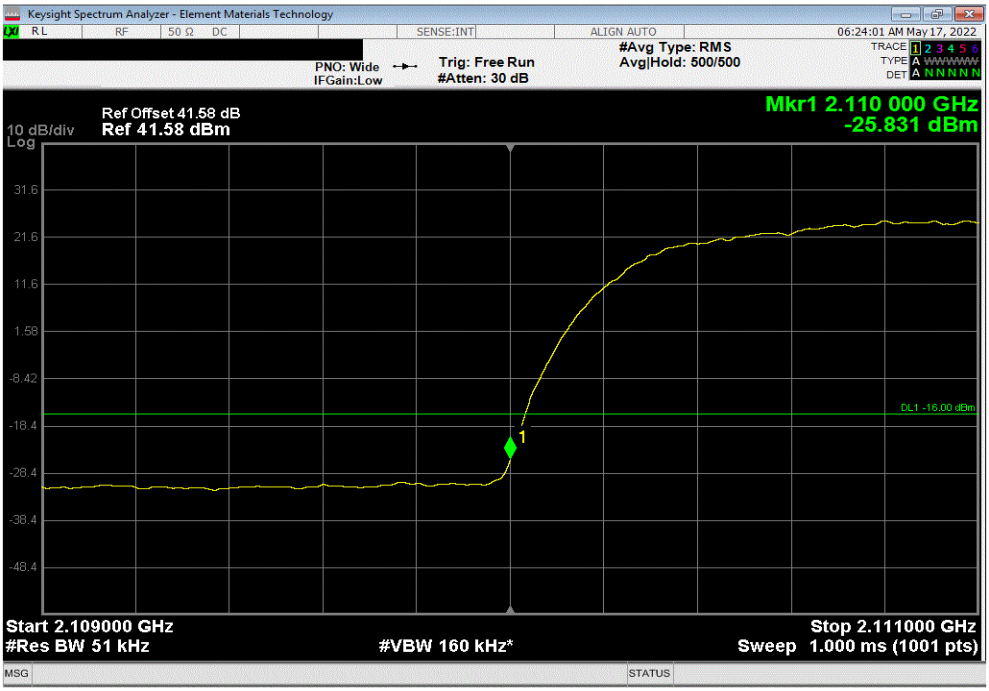
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -19.2 | -16 | Pass |



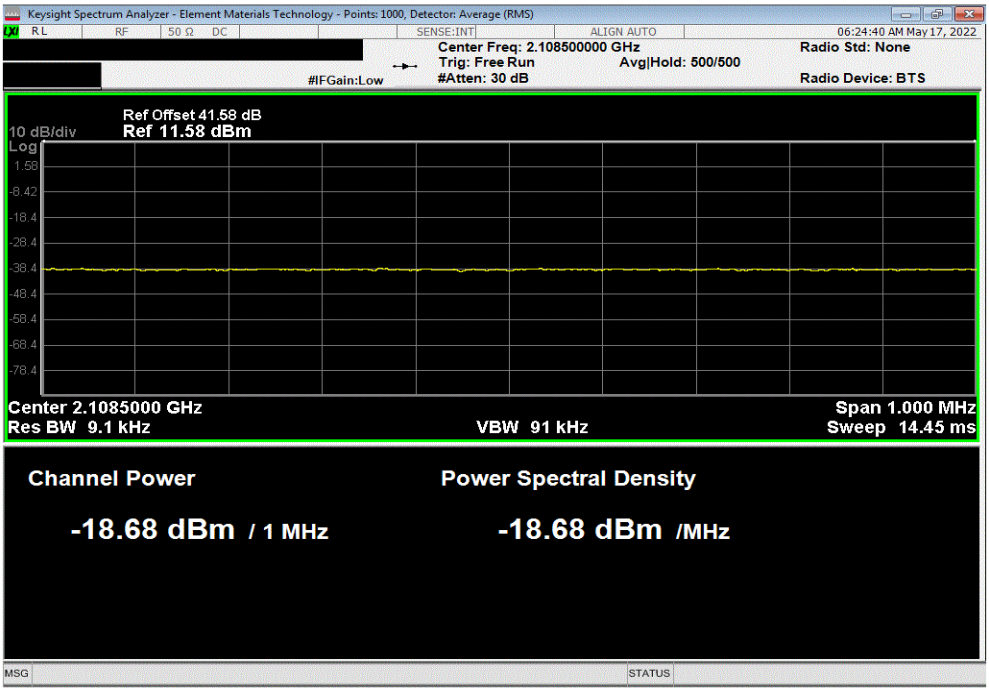

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -24.2 | -16 | Pass |



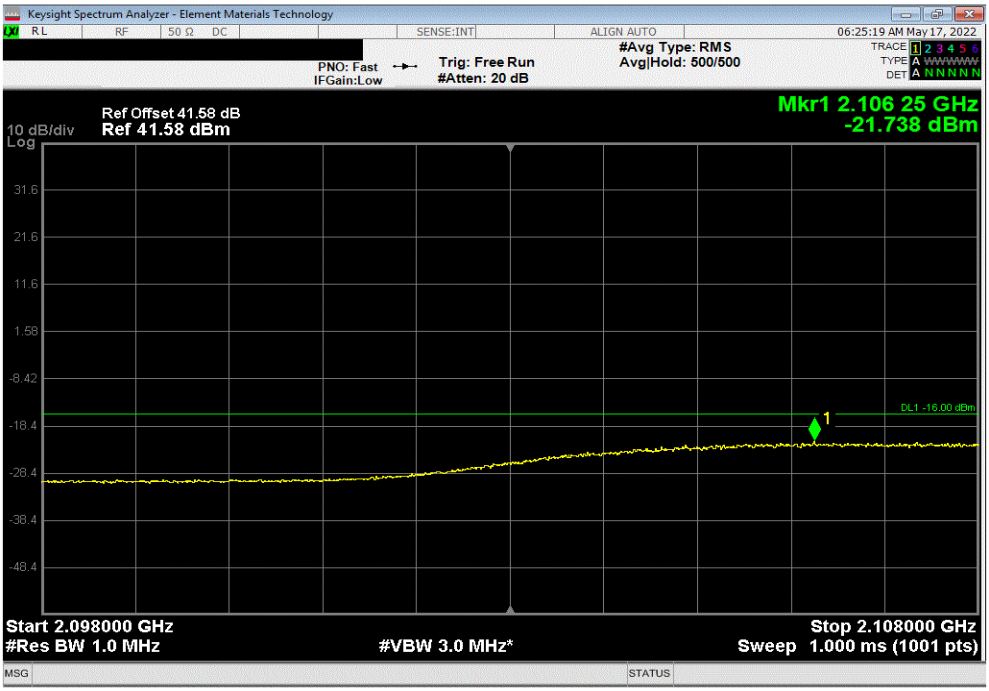
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -25.8 | -16 | Pass |



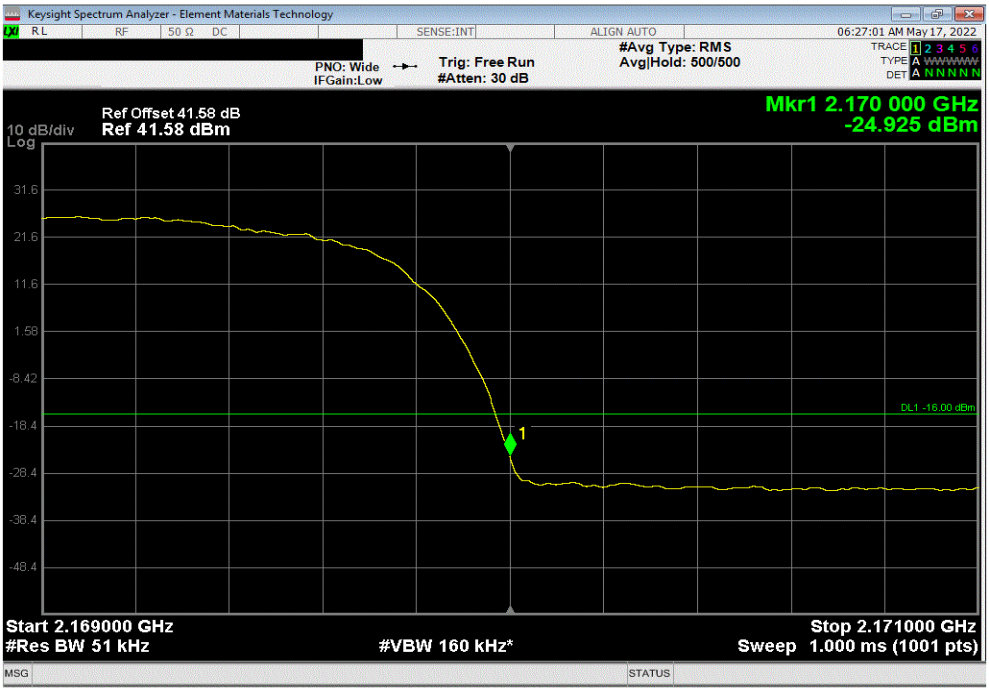

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.7 | -16 | Pass |



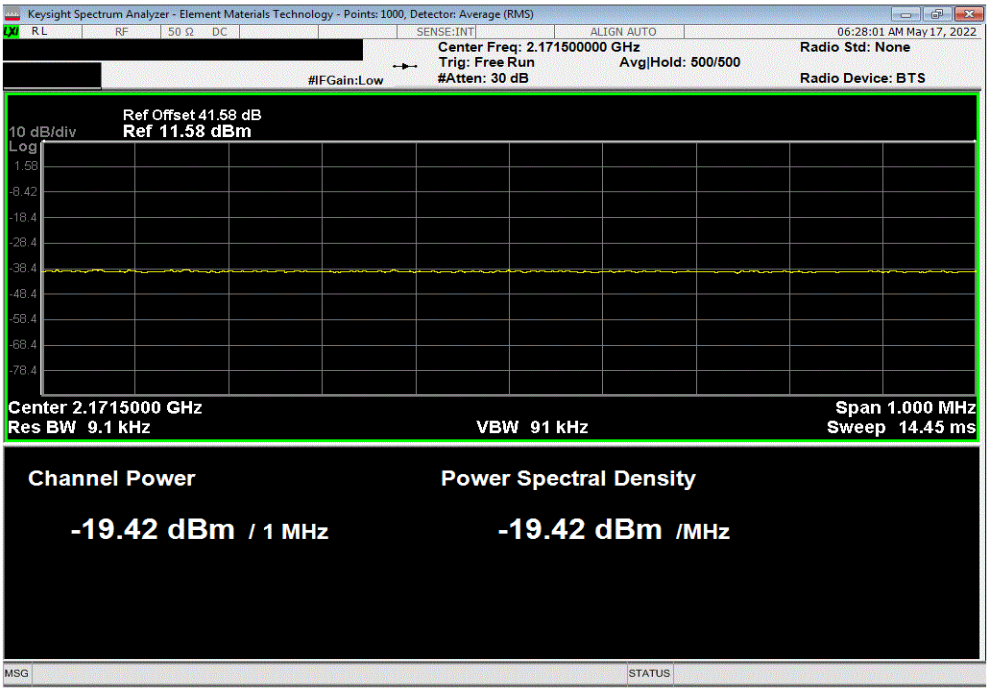
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 2112.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -21.7 | -16 | Pass |



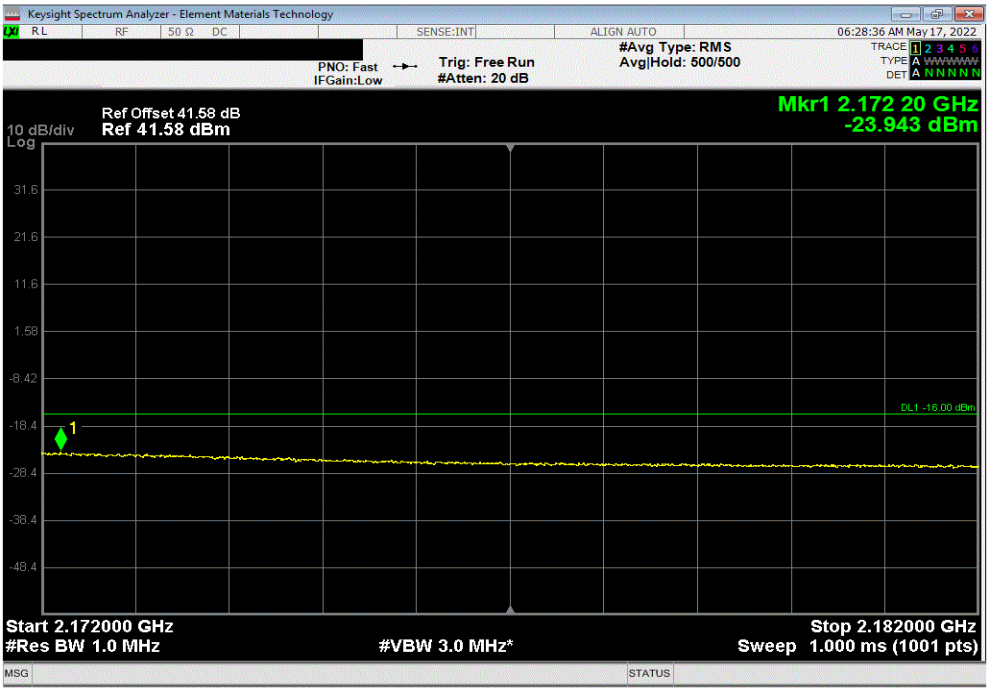

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -24.9 | -16 | Pass |



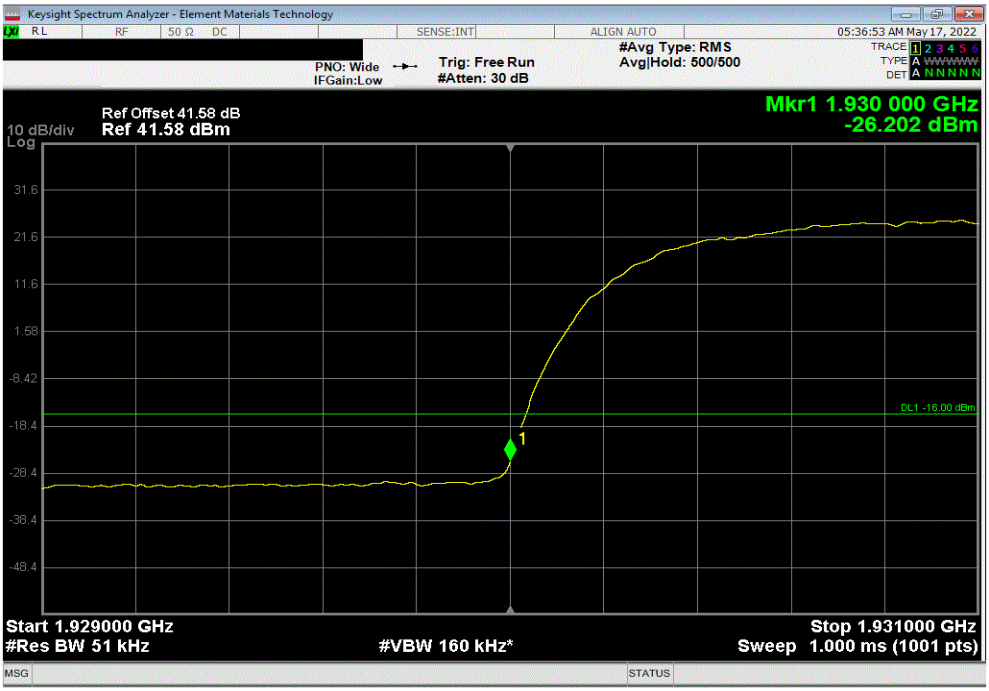
| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -19.4 | -16 | Pass |



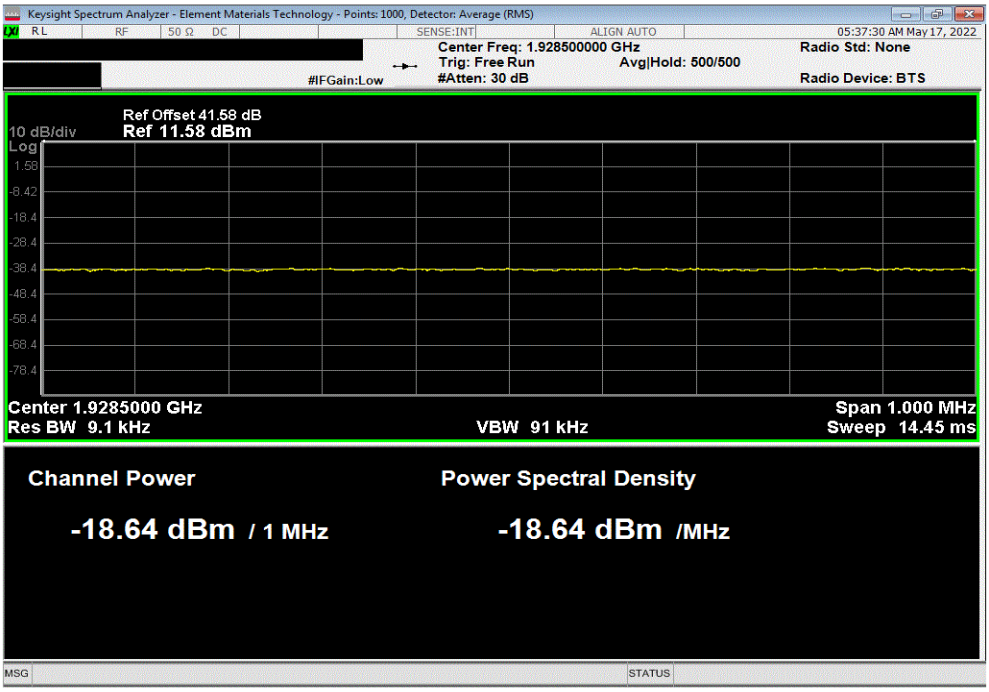

| AWS WCDMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 2167.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -23.9 | -16 | Pass |



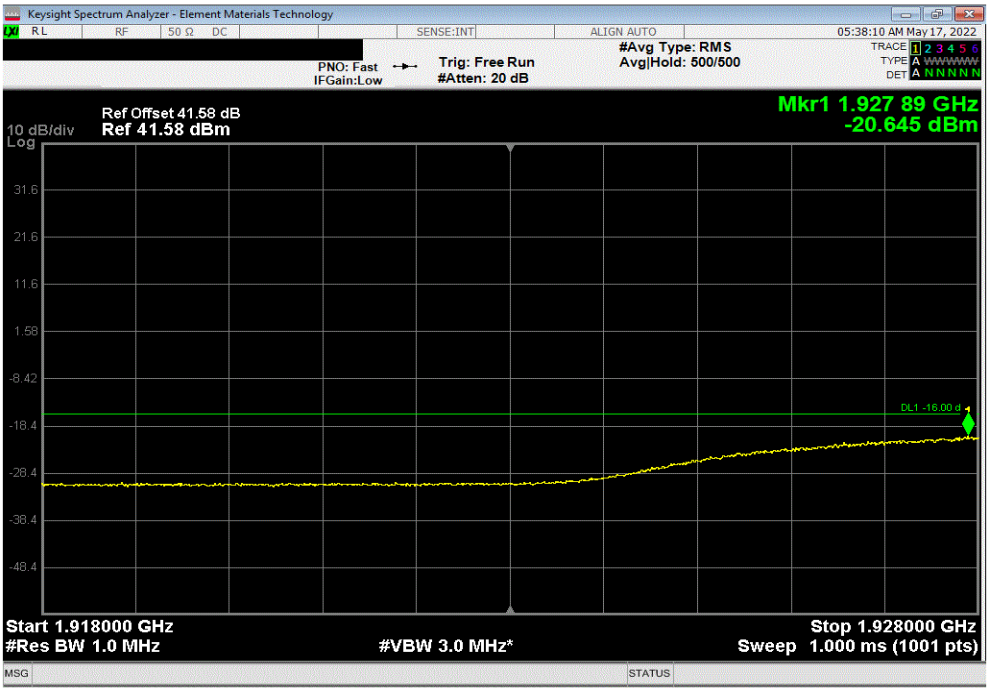
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -26.2 | -16 | Pass |



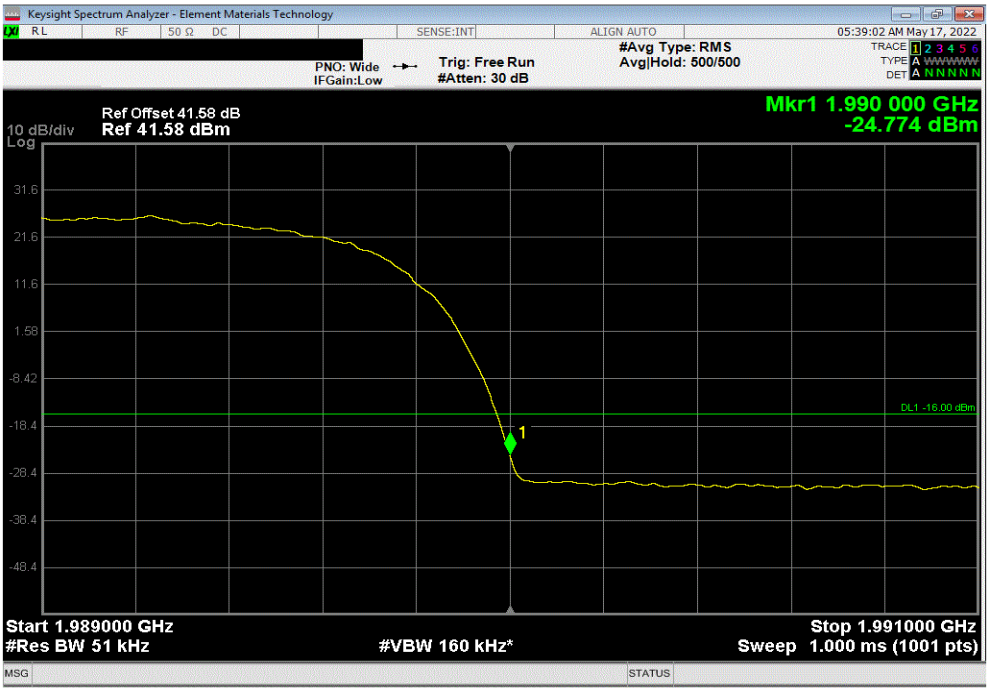

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.6 | -16 | Pass |



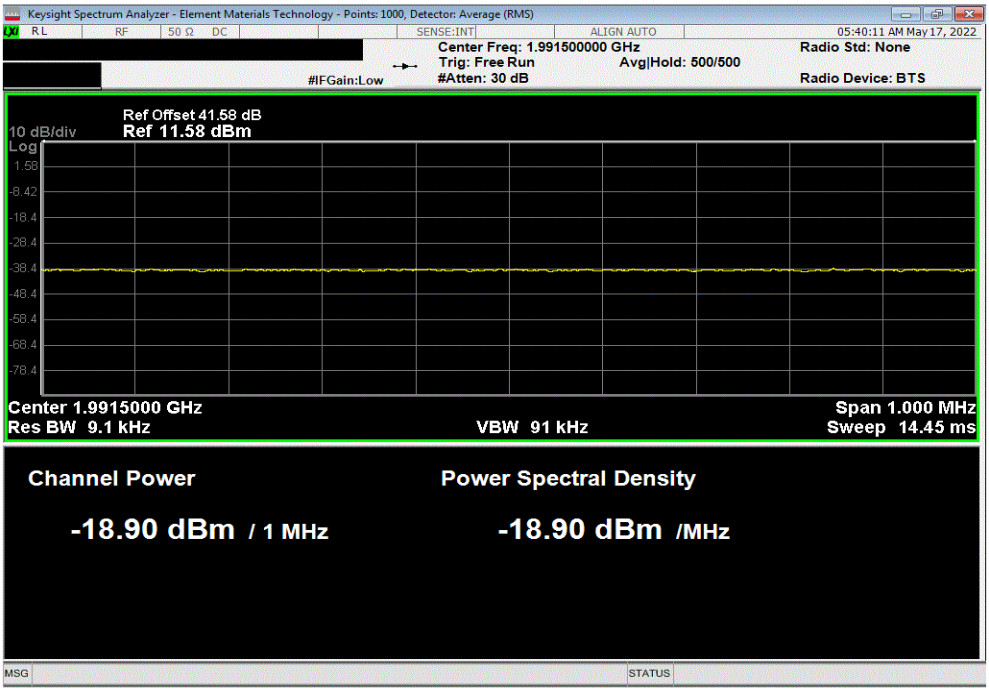
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -20.7 | -16 | Pass |



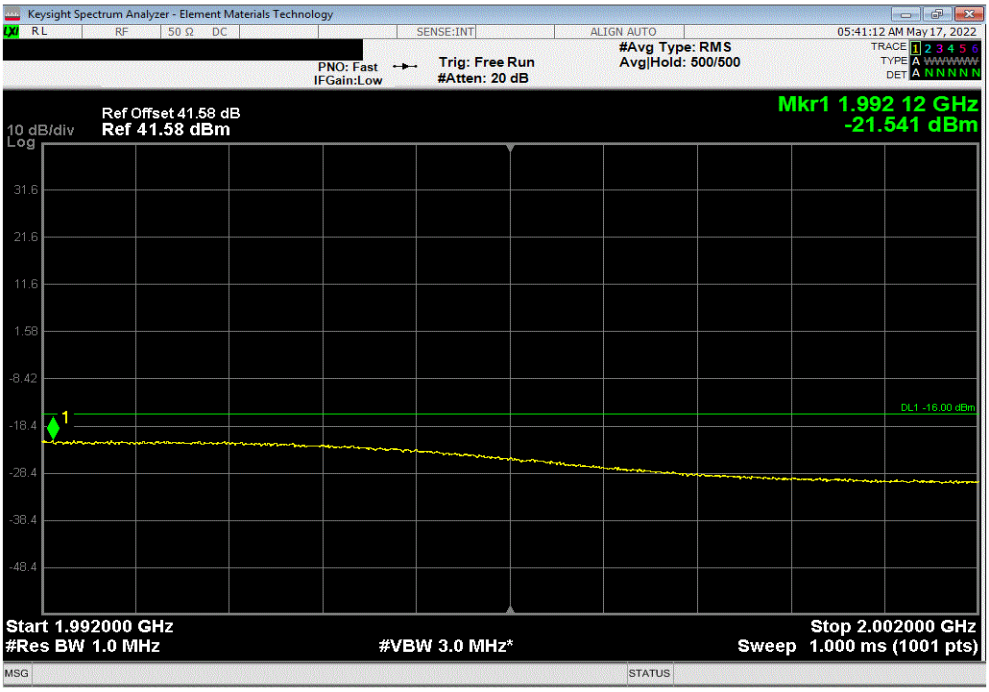

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -24.8 | -16 | Pass |



| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.9 | -16 | Pass |

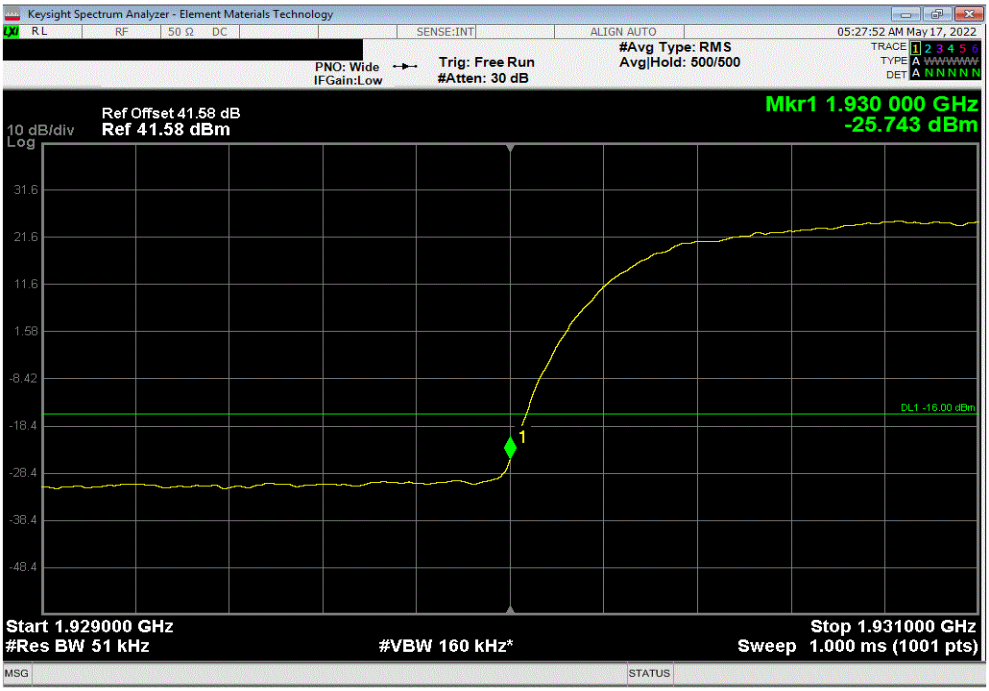



| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -21.5 | -16 | Pass |



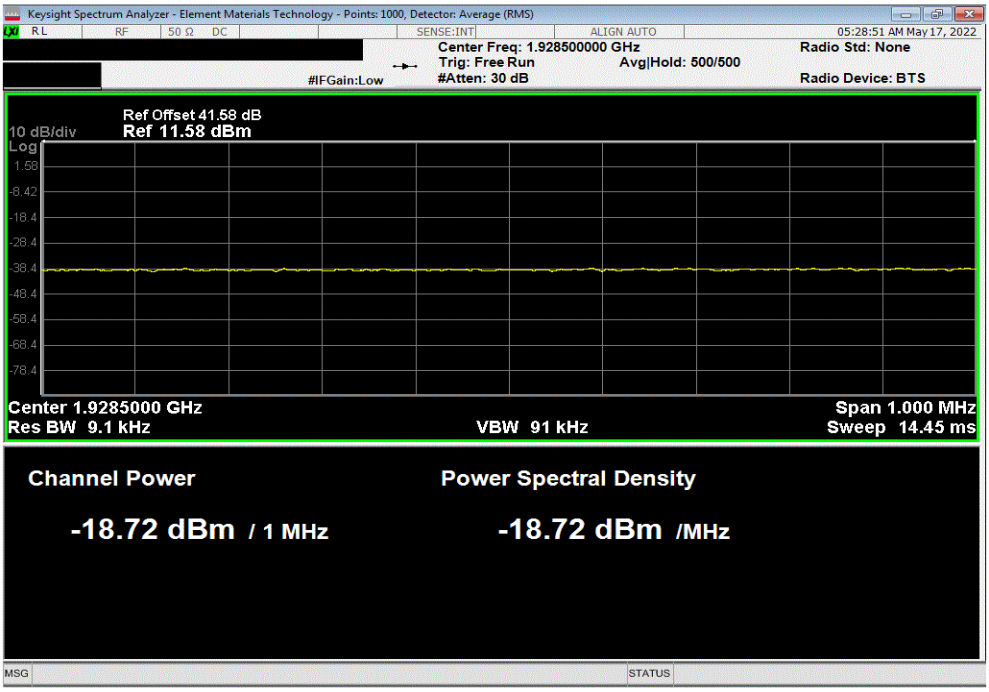
PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 1932.4 MHz

| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|---|---|
| | 1 | | | -25.7 | -16 | Pass |




PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 1932.4 MHz

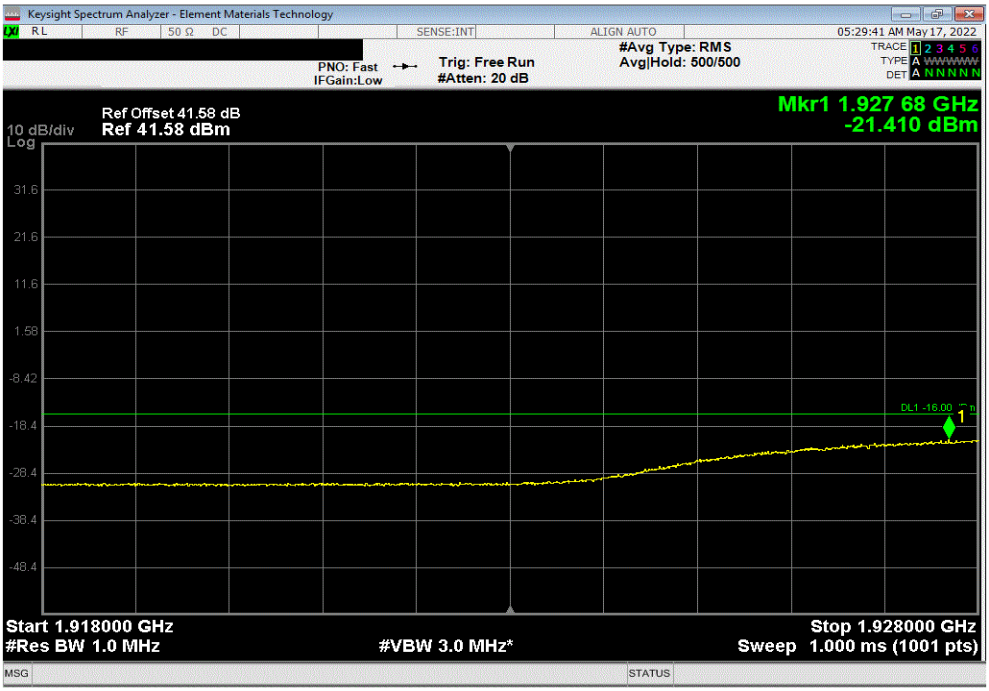
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|---|---|
| | 2 | | | -18.7 | -16 | Pass |



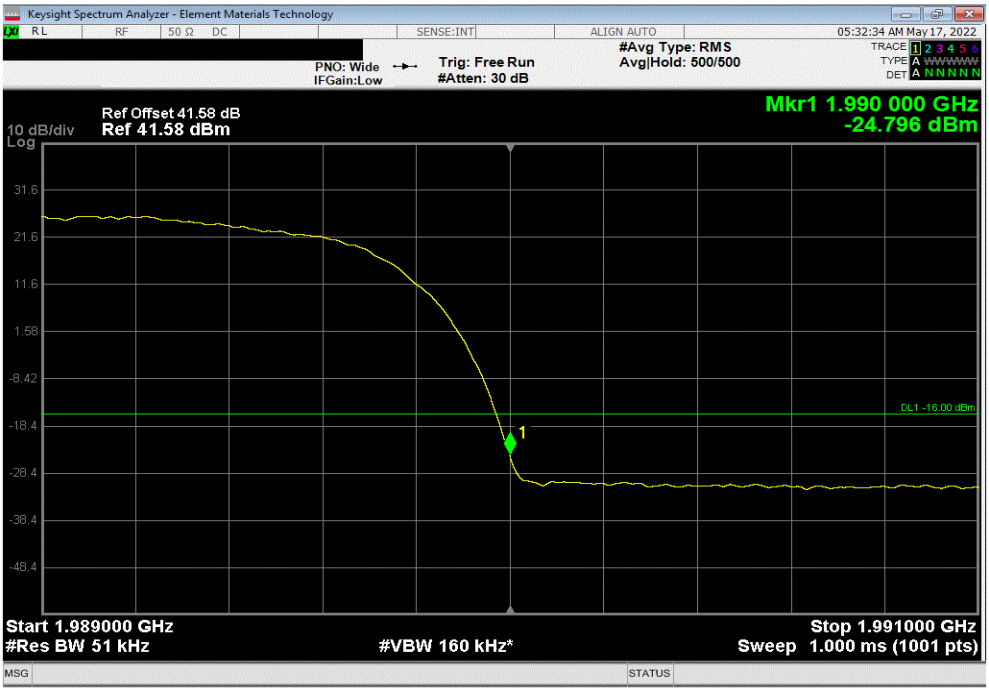
# BAND EDGE COMPLIANCE - MULTIBAND



| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -21.4 | -16 | Pass |



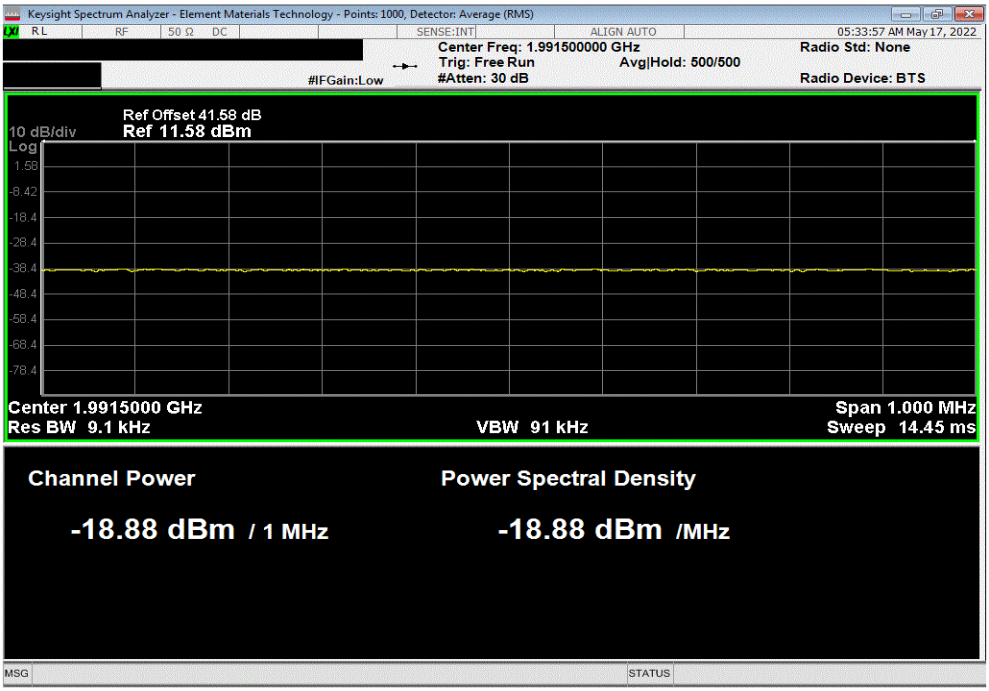

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -24.8 | -16 | Pass |



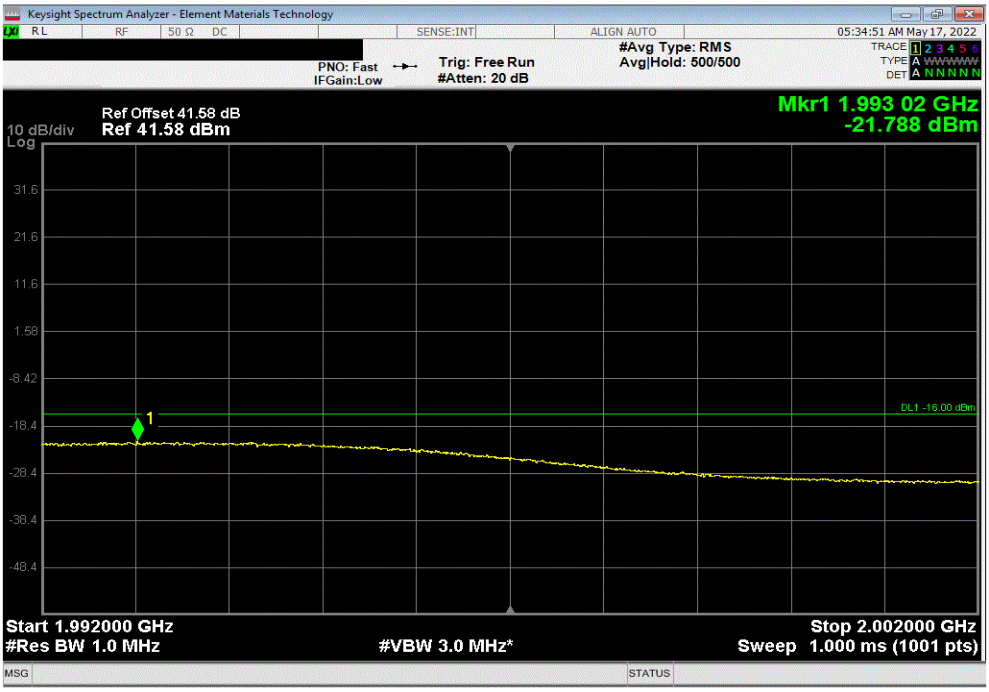
# BAND EDGE COMPLIANCE - MULTIBAND



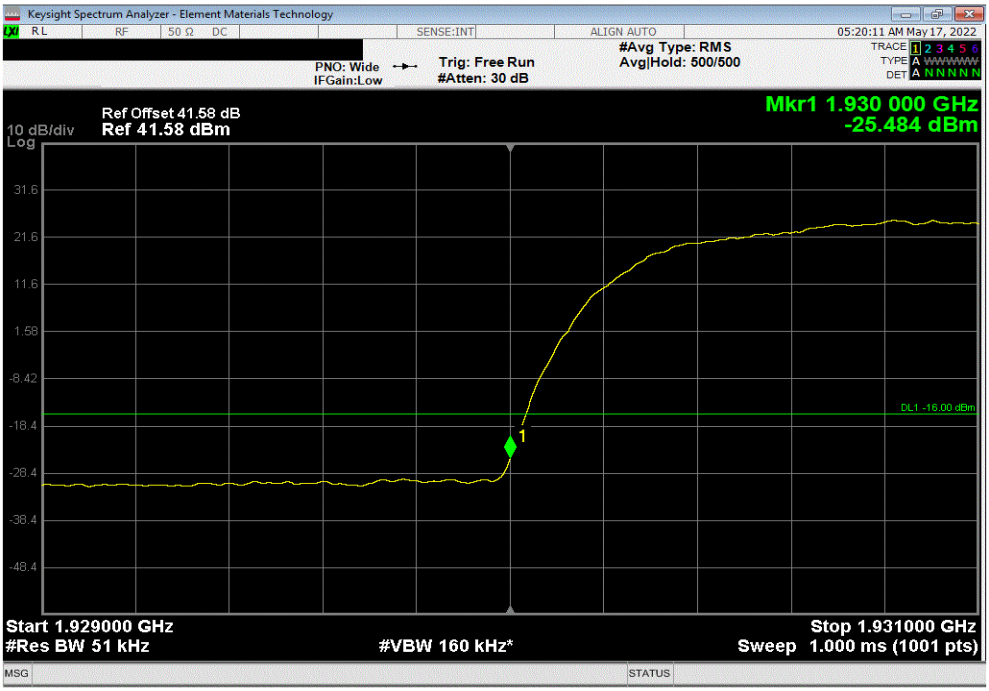
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.9 | -16 | Pass |



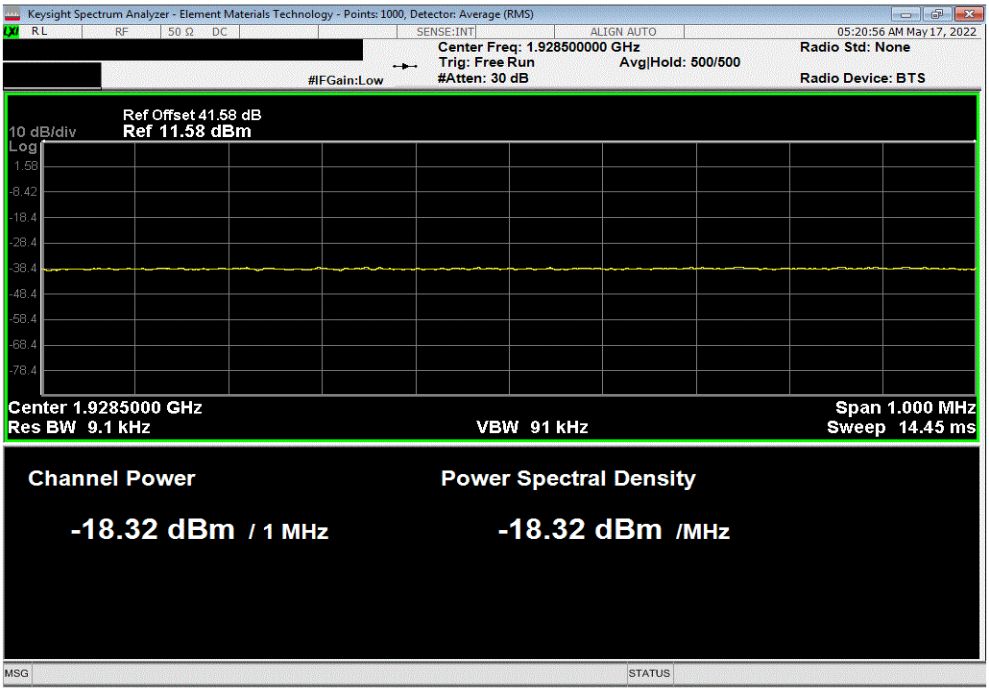

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -21.8 | -16 | Pass |



| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -25.5 | -16 | Pass |



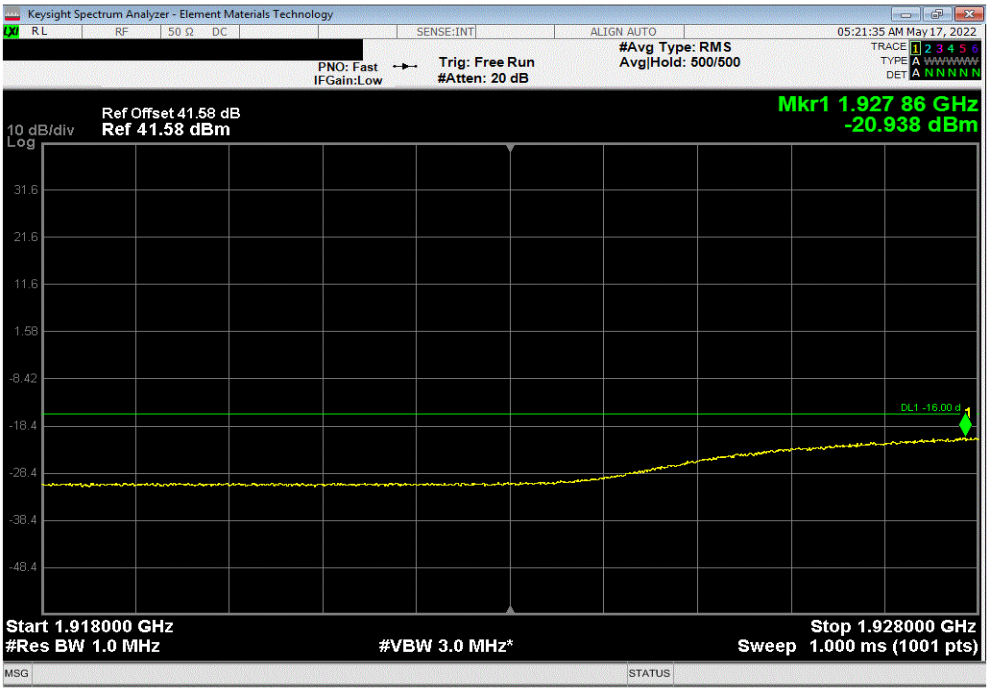

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.3 | -16 | Pass |



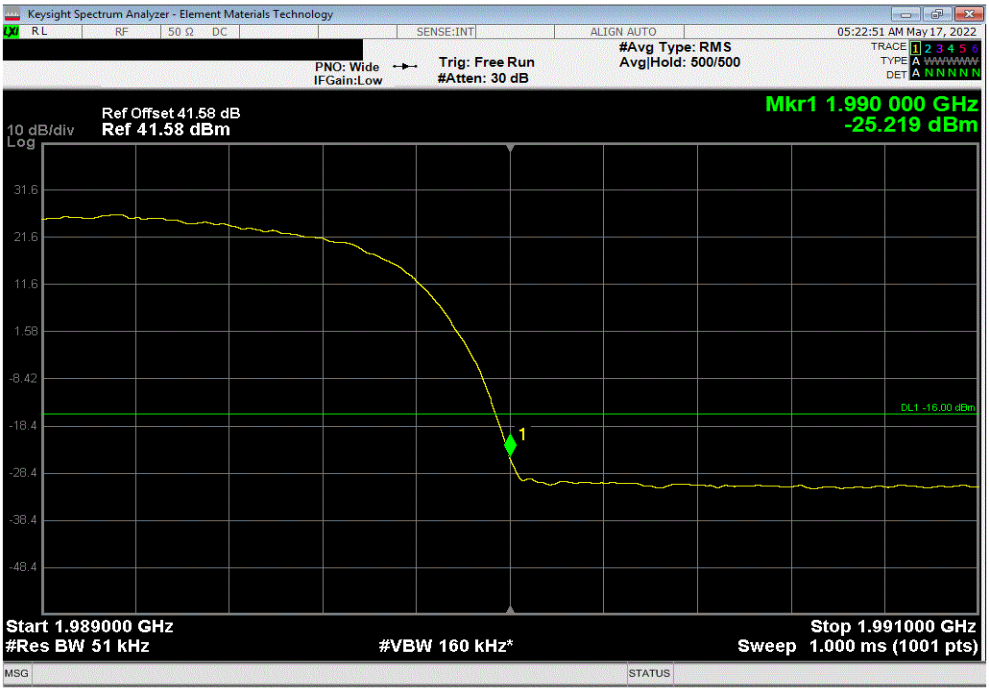
# BAND EDGE COMPLIANCE - MULTIBAND



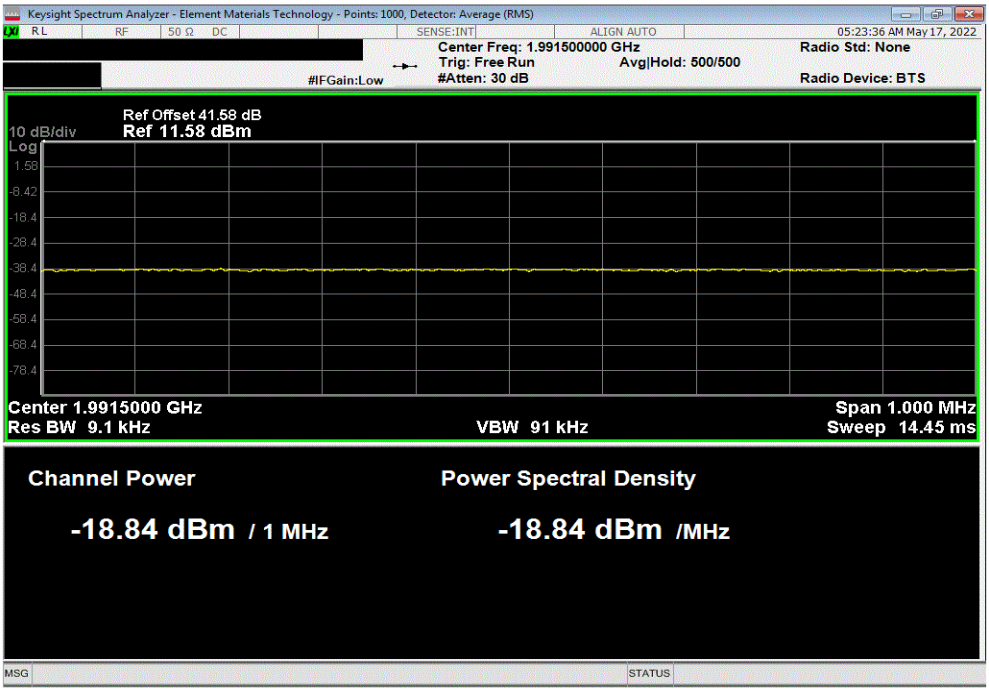
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Low Channel, 1932.4 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -20.9 | -16 | Pass |



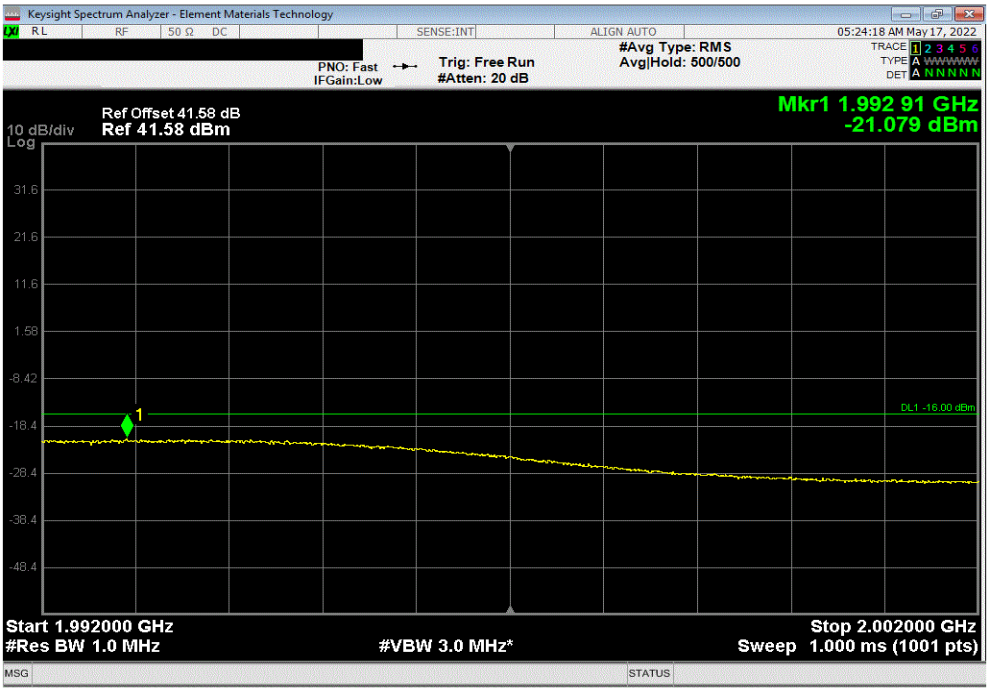

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | | -25.2 | -16 | Pass |



| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | | -18.8 | -16 | Pass |




| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, High Channel, 1987.6 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | | -21.1 | -16 | Pass |



# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

XMit 2022.02.07.0

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 |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| Block - DC | Fairview Microwave | SD3379 | AMT | 2021-09-14 | 2022-09-14 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |

**TEST DESCRIPTION**

The antenna port spurious emissions were measured at the RF output terminal of the EUT through 4 different attenuation configurations which continues through to the RF input of the spectrum analyzer. Analyzer plots utilizing a resolution bandwidth called out by the client's test plan were made for each modulation type from 9 KHz to 22 GHz. The conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, were investigated to ensure they were less than the limits also called out by the client's test plan shown below.

The measurement methods are detailed in KDB 971168 D01v03 section 6 and ANSI C63.26-2015.

Per FCC 2.1057(a)(1) and RSS Gen 6.13, the upper level of measurement is the 10th harmonic of the highest fundamental frequency.

These measurements are for the frequency band after the first 1.0 MHz bands immediately outside and adjacent to the frequency block.

RF conducted emissions testing was performed only on one port. The AHFll antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in output power testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

Per section FCC 24.238(a), FCC 27.53(h)(1), RSS 133 6.5 (ii), and RSS-139 6.6 - the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -16 dBm [-13 dBm -10 log (2)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 2 port MIMO transmitter.

The limit for the 9kHz to 150kHz frequency range was adjusted to -46dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 1MHz [i.e.: -46dBm = -16dBm -10log(1MHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to -36dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 1MHz [i.e.: -36dBm = -16dBm -10log(1MHz/10kHz)]. The required limit of -16dBm with a RBW of $\geq$ 1MHz was used for all other frequency ranges. (See ANSI C63.26-2015 paragraph 5.7.2a for details on the Limit/RBW scaling method)

# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | **AHFII (FCC/ISED C2PC)** | | | **Work Order:** | **NOKI0040** |
| **Serial Number:** | **YK214000036** | | | **Date:** | **16-May-22** |
| **Customer:** | **Nokia Solutions and Networks** | | | **Temperature:** | **23.3 °C** |
| **Attendees:** | **David Le, John Rattanavong** | | | **Humidity:** | **49.4% RH** |
| **Project:** | **None** | | | **Barometric Pres.:** | **1018 mbar** |
| **Tested by:** | **Brandon Hobbs** | **Power:** | **54 VDC** | **Job Site:** | **TX05** |

| **TEST SPECIFICATIONS** | **Test Method** |
|---|---|
| **FCC 24E:2022** | ANSI C63.26:2015 |
| **RSS-133 Issue 6:2013+A1:2018** | RSS-133 Issue 6:2013+A1:2018 |
| **FCC 27:2022** | ANSI C63.26:2015 |
| **RSS-139 Issue 3:2015** | RSS-139 Issue 3:2015 |

**COMMENTS**

**All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. PCS Band II / AWS Band X carriers were simultaneously enabled at maximum power (30 watts/carrier).**

**DEVIATIONS FROM TEST STANDARD**

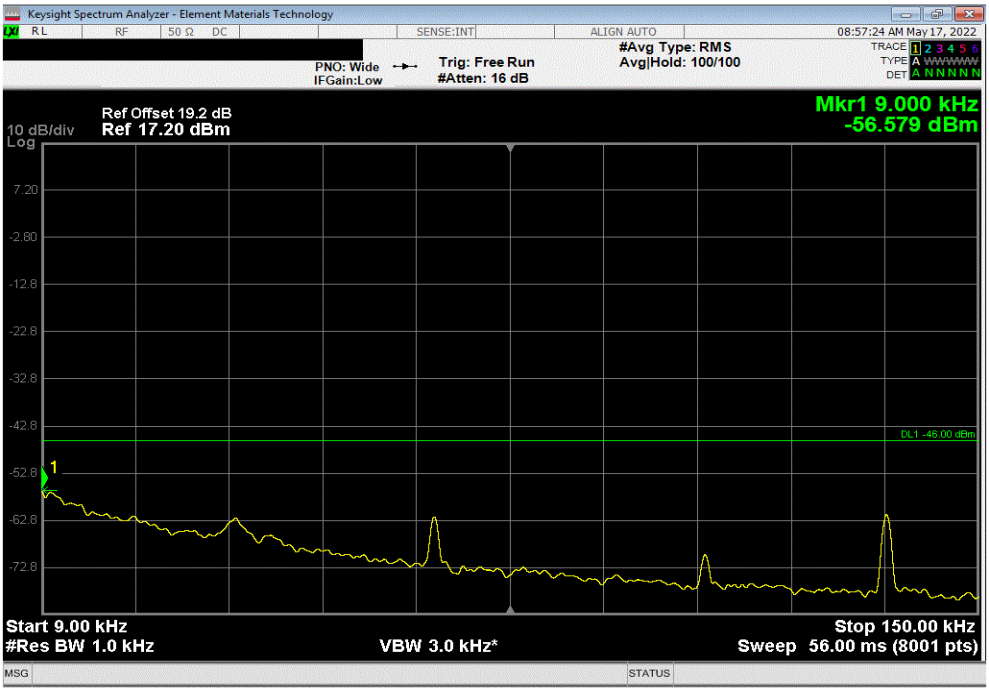
**None**

| **Configuration #** | **1,2,3,4** | *Signature* |
|---|---|---|

| | | Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|---|---|
| PCS WCDMA, 1930 MHz - 1990 MHz | | | | | | |
| Port 1 | | | | | | |
| 5 MHz Bandwdith | | | | | | |
| QPSK Modulation | | | | | | |
| | Mid Channel, 1960 MHz | 9 kHz - 150 kHz | 0.01 | -56.58 | -46 | Pass |
| | Mid Channel, 1960 MHz | 150 kHz - 20 MHz | 0.15 | -58.49 | -36 | Pass |
| | Mid Channel, 1960 MHz | 20 MHz - 3.5 GHz | 3155.05 | -22.39 | -16 | Pass |
| | Mid Channel, 1960 MHz | 1.9 GHz - 2.2 GHz | 1996.19 | -25.34 | -16 | Pass |
| | Mid Channel, 1960 MHz | 2.2 GHz - 13 GHz | 4027.25 | -42.64 | -16 | Pass |
| | Mid Channel, 1960 MHz | 13 GHz - 22 GHz | 20132.05 | -23.9 | -16 | Pass |
| 16-QAM Modulation | | | | | | |
| | Mid Channel, 1960 MHz | 9 kHz - 150 kHz | 0.01 | -56.9 | -46 | Pass |
| | Mid Channel, 1960 MHz | 150 kHz - 20 MHz | 0.15 | -57.76 | -36 | Pass |
| | Mid Channel, 1960 MHz | 20 MHz - 3.5 GHz | 3223.78 | -22.3 | -16 | Pass |
| | Mid Channel, 1960 MHz | 1.9 GHz - 2.2 GHz | 1996.98 | -26 | -16 | Pass |
| | Mid Channel, 1960 MHz | 2.2 GHz - 13 GHz | 4031.05 | -42.41 | -16 | Pass |
| | Mid Channel, 1960 MHz | 13 GHz - 22 GHz | 20094.7 | -23.85 | -16 | Pass |
| 64-QAM Modulation | | | | | | |
| | Mid Channel, 1960 MHz | 9 kHz - 150 kHz | 0.01 | -56.63 | -46 | Pass |
| | Mid Channel, 1960 MHz | 150 kHz - 20 MHz | 0.15 | -56.95 | -36 | Pass |
| | Mid Channel, 1960 MHz | 20 MHz - 3.5 GHz | 3145.48 | -22.75 | -16 | Pass |
| | Mid Channel, 1960 MHz | 1.9 GHz - 2.2 GHz | 1998.59 | -26.53 | -16 | Pass |
| | Mid Channel, 1960 MHz | 2.2 GHz - 13 GHz | 4002.55 | -42.64 | -16 | Pass |
| | Mid Channel, 1960 MHz | 13 GHz - 22 GHz | 20117.2 | -23.82 | -16 | Pass |
| AWS WCMA, 2110 MHz - 2170 MHz | | | | | | |
| Port 1 | | | | | | |
| 5 MHz Bandwdith | | | | | | |
| QPSK Modulation | | | | | | |
| | Mid Channel, 2140 MHz | 9 kHz - 150 kHz | 0.01 | -57.08 | -46 | Pass |
| | Mid Channel, 2140 MHz | 150 kHz - 20 MHz | 0.15 | -57.97 | -36 | Pass |
| | Mid Channel, 2140 MHz | 20 MHz - 3.5 GHz | 3250.31 | -22.28 | -16 | Pass |
| | Mid Channel, 2140 MHz | 1.9 GHz - 2.2 GHz | 1997.01 | -26.14 | -16 | Pass |
| | Mid Channel, 2140 MHz | 2.2 GHz - 13 GHz | 3982.6 | -43.27 | -16 | Pass |
| | Mid Channel, 2140 MHz | 13 GHz - 22 GHz | 21961.75 | -24.49 | -16 | Pass |
| 16-QAM Modulation | | | | | | |
| | Mid Channel, 2140 MHz | 9 kHz - 150 kHz | 0.01 | -57.82 | -46 | Pass |
| | Mid Channel, 2140 MHz | 150 kHz - 20 MHz | 0.15 | -57.63 | -36 | Pass |
| | Mid Channel, 2140 MHz | 20 MHz - 3.5 GHz | 3187.24 | -22.63 | -16 | Pass |
| | Mid Channel, 2140 MHz | 1.9 GHz - 2.2 GHz | 1995.14 | -26.37 | -16 | Pass |
| | Mid Channel, 2140 MHz | 2.2 GHz - 13 GHz | 4019.18 | -43.17 | -16 | Pass |
| | Mid Channel, 2140 MHz | 13 GHz - 22 GHz | 21545.05 | -23.96 | -16 | Pass |
| 64-QAM Modulation | | | | | | |
| | Mid Channel, 2140 MHz | 9 kHz - 150 kHz | 0.01 | -56.94 | -46 | Pass |
| | Mid Channel, 2140 MHz | 150 kHz - 20 MHz | 0.15 | -57.79 | -36 | Pass |
| | Mid Channel, 2140 MHz | 20 MHz - 3.5 GHz | 3254.23 | -22.16 | -16 | Pass |
| | Mid Channel, 2140 MHz | 1.9 GHz - 2.2 GHz | 1996.71 | -25.68 | -16 | Pass |
| | Mid Channel, 2140 MHz | 2.2 GHz - 13 GHz | 4016.33 | -42.44 | -16 | Pass |
| | Mid Channel, 2140 MHz | 13 GHz - 22 GHz | 19963.3 | -23.92 | -16 | Pass |

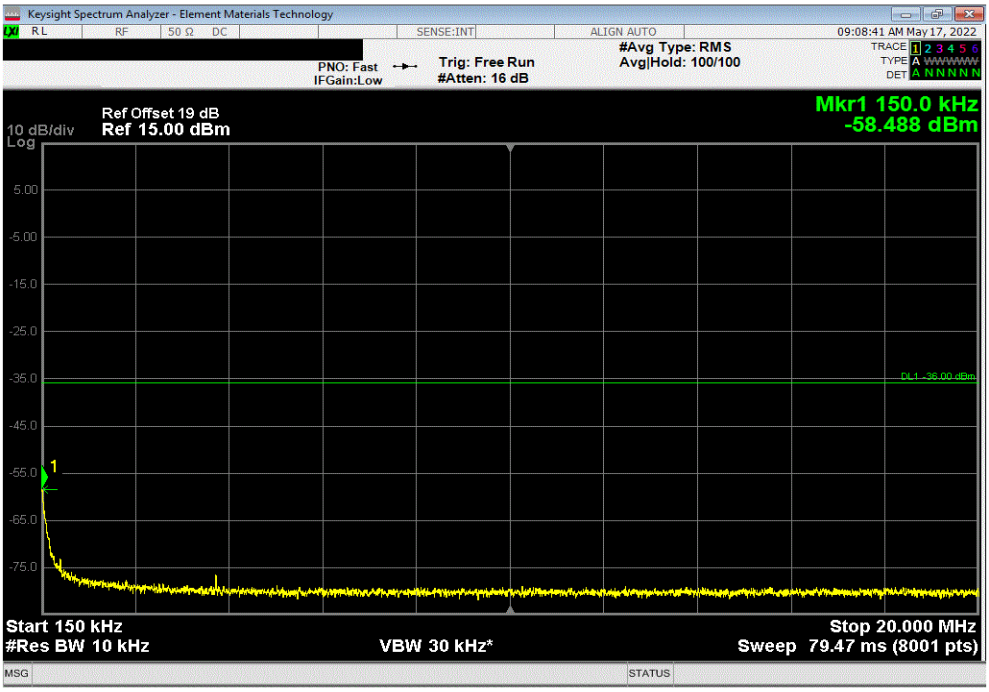
PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz

| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|
| 9 kHz - 150 kHz | 0.01 | -56.58 | -46 | Pass |

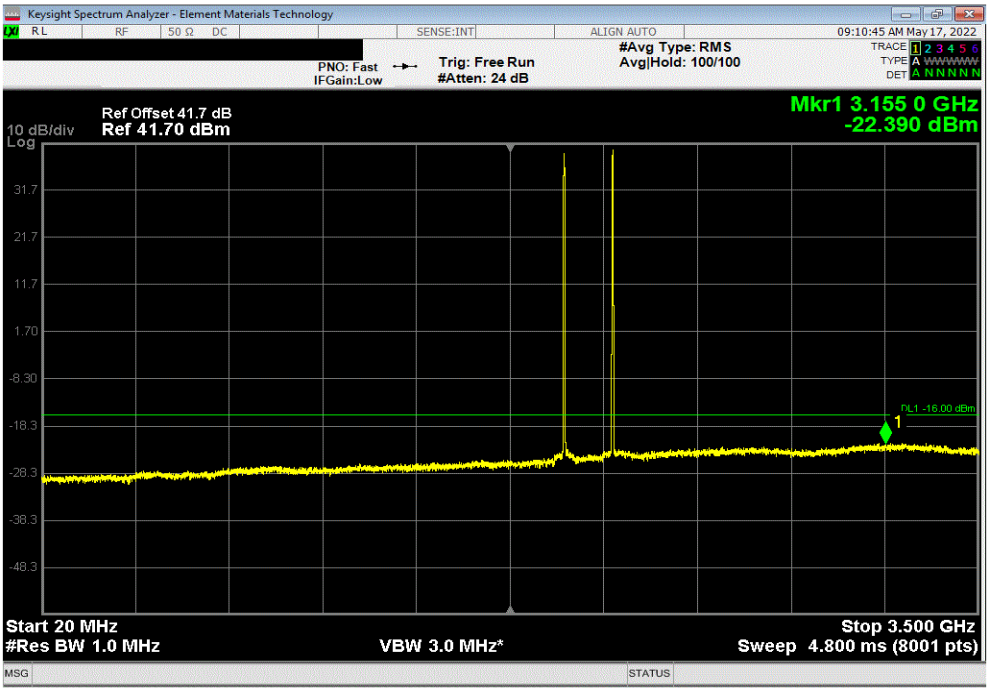



PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz

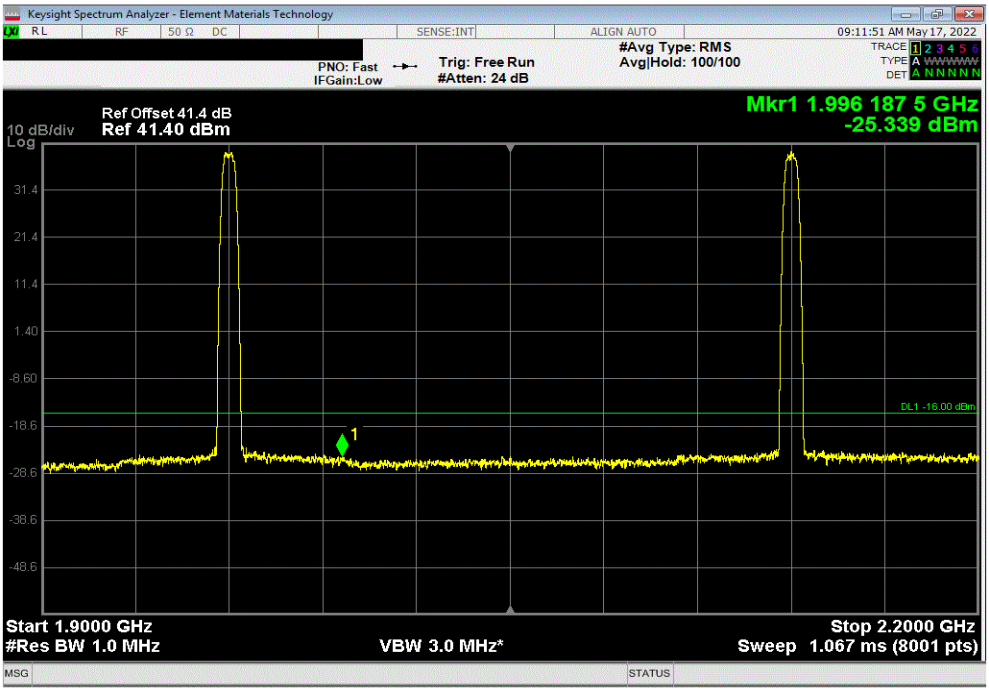
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|
| 150 kHz - 20 MHz | 0.15 | -58.49 | -36 | Pass |



| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | 3155.05 | -22.39 | -16 | Pass |

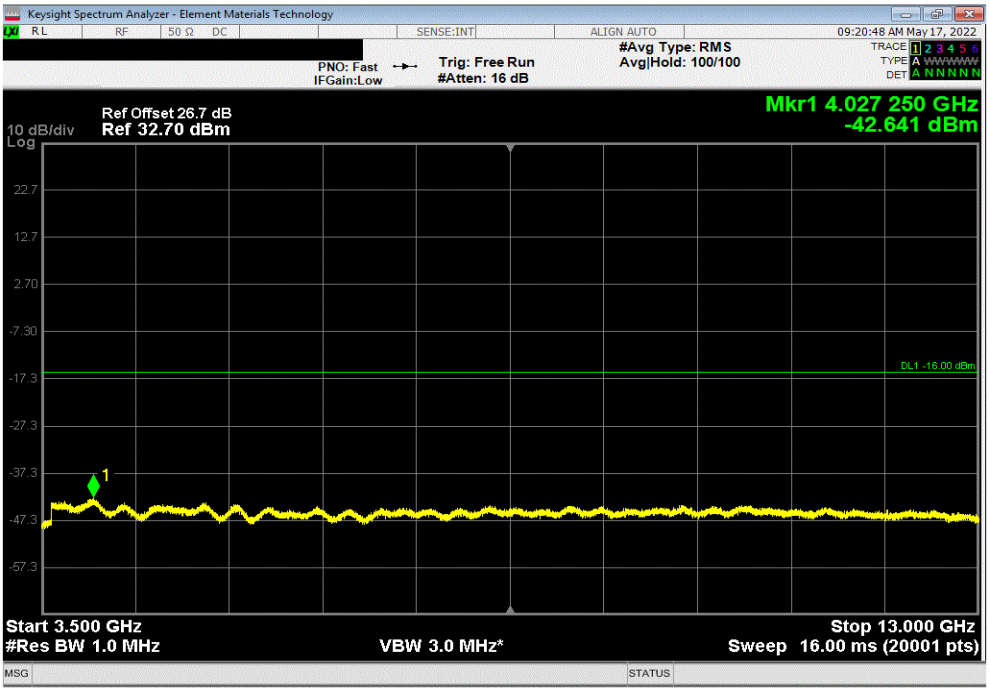



| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | 1996.19 | -25.34 | -16 | Pass |



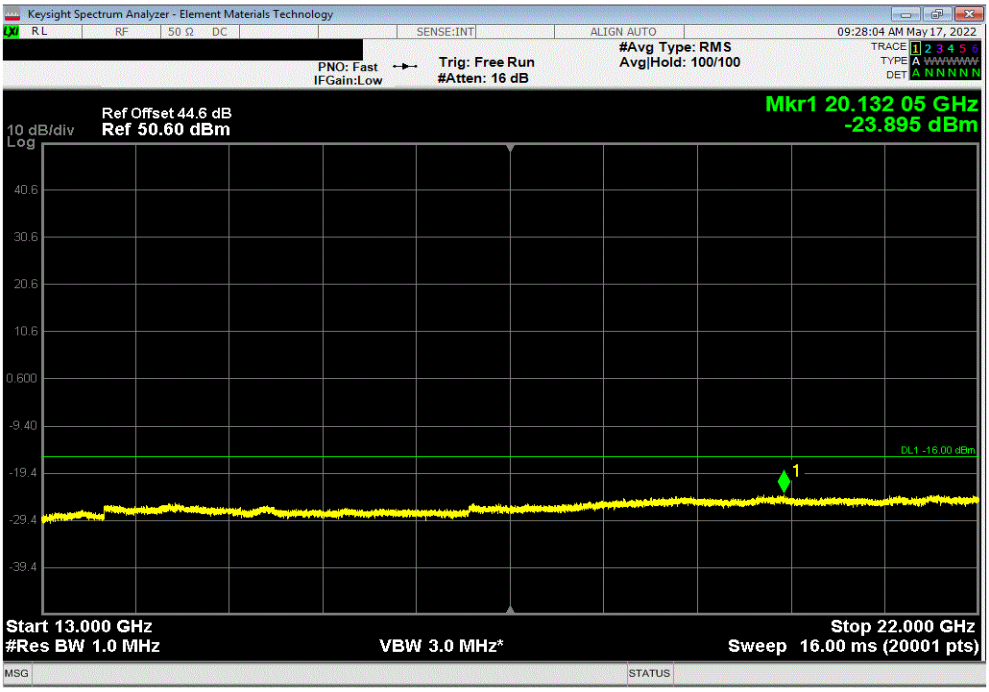
PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz

| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|
| 2.2 GHz - 13 GHz | 4027.25 | -42.64 | -16 | Pass |

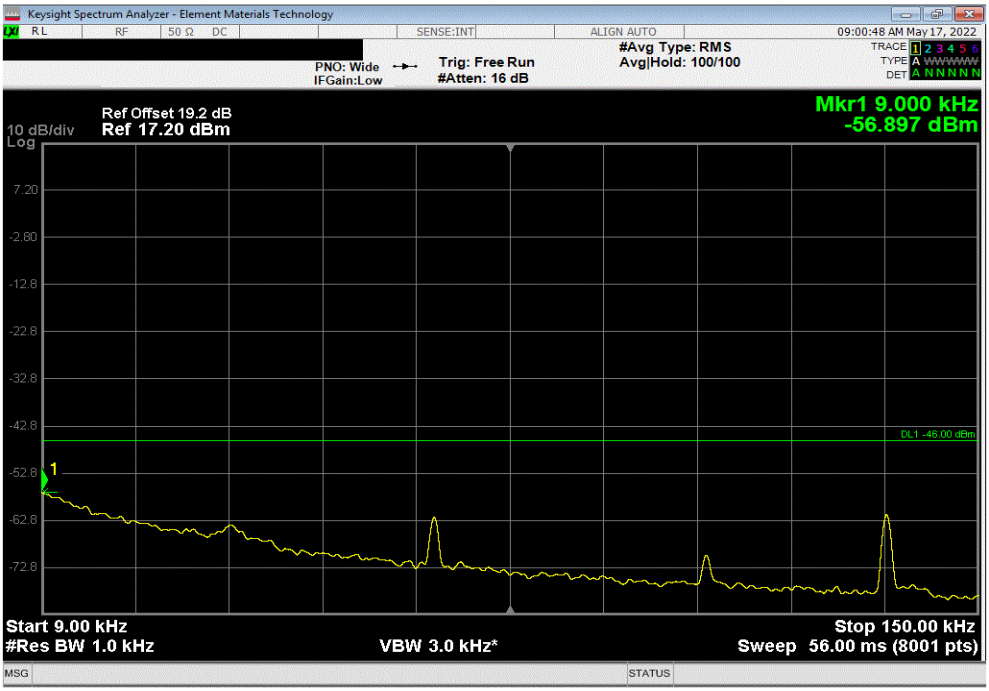



PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 1960 MHz

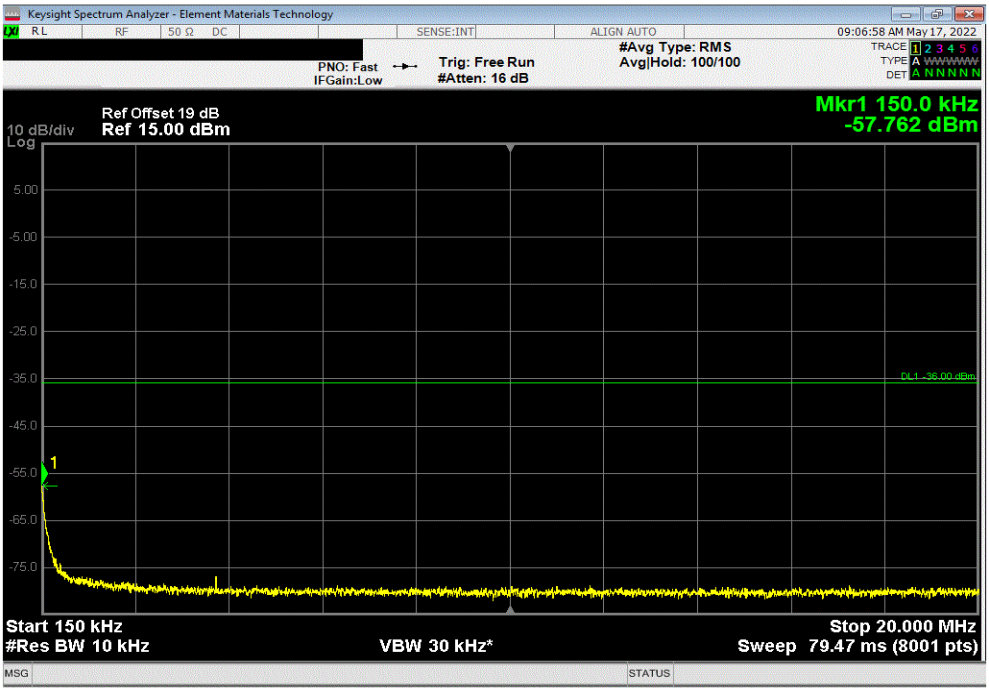
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|
| 13 GHz - 22 GHz | 20132.05 | -23.9 | -16 | Pass |



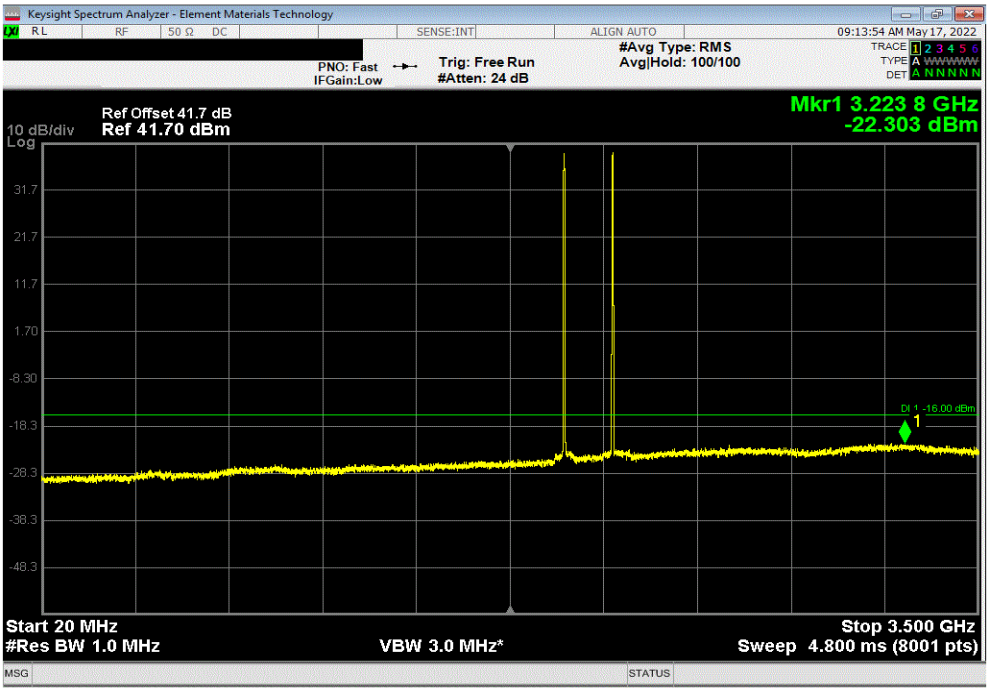
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 9 kHz - 150 kHz | | 0.01 | -56.9 | -46 | Pass |



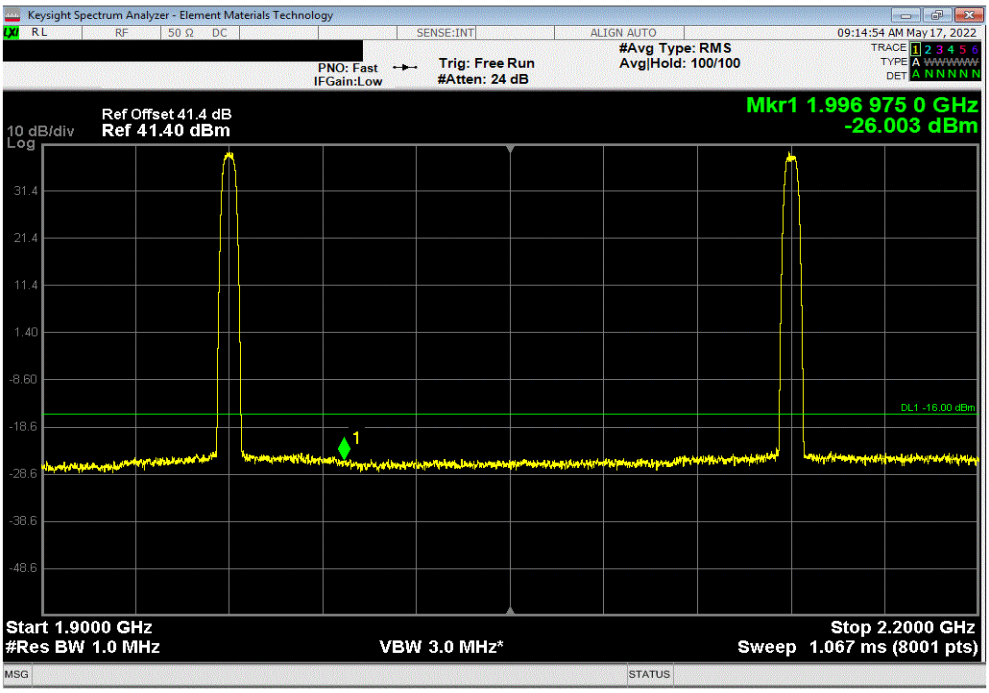

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 150 kHz - 20 MHz | 0.15 | -57.76 | -36 | Pass |



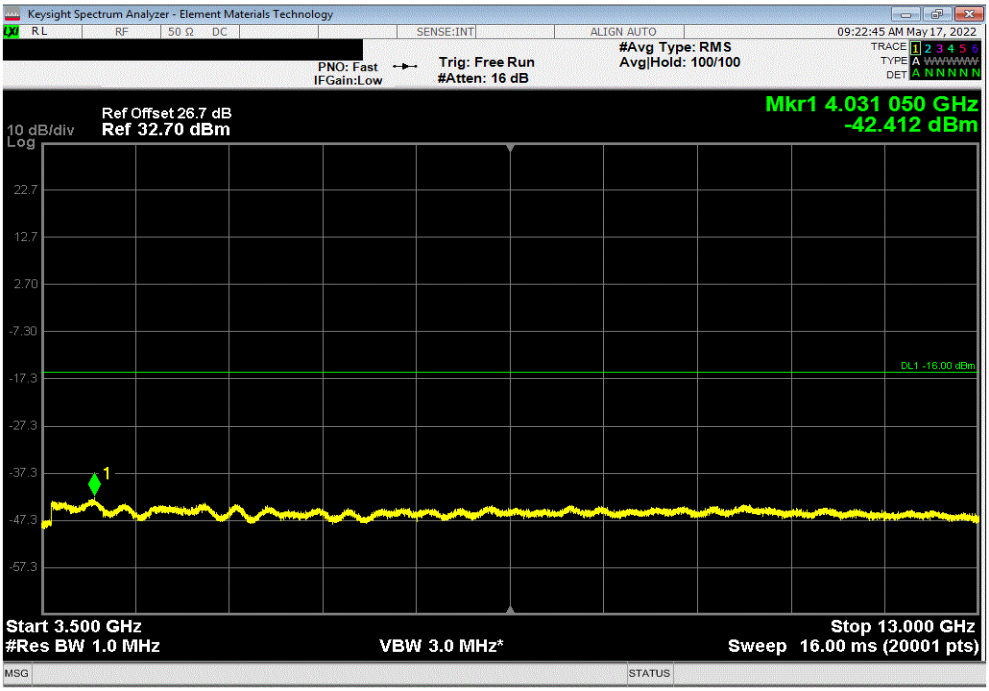
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | | 3223.78 | -22.3 | -16 | Pass |



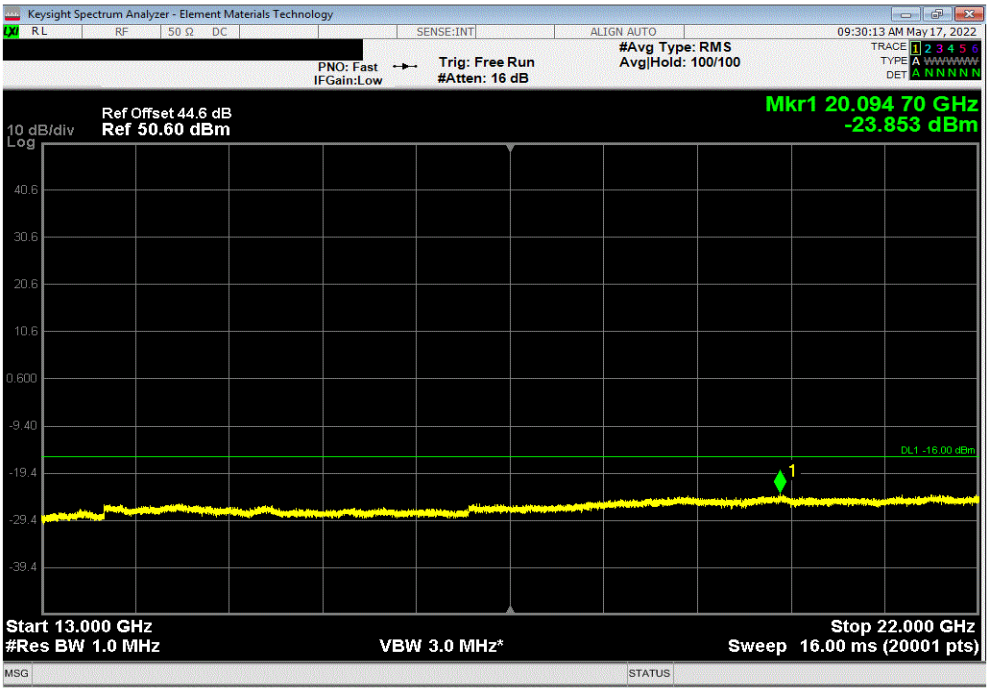

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | | 1996.98 | -26 | -16 | Pass |



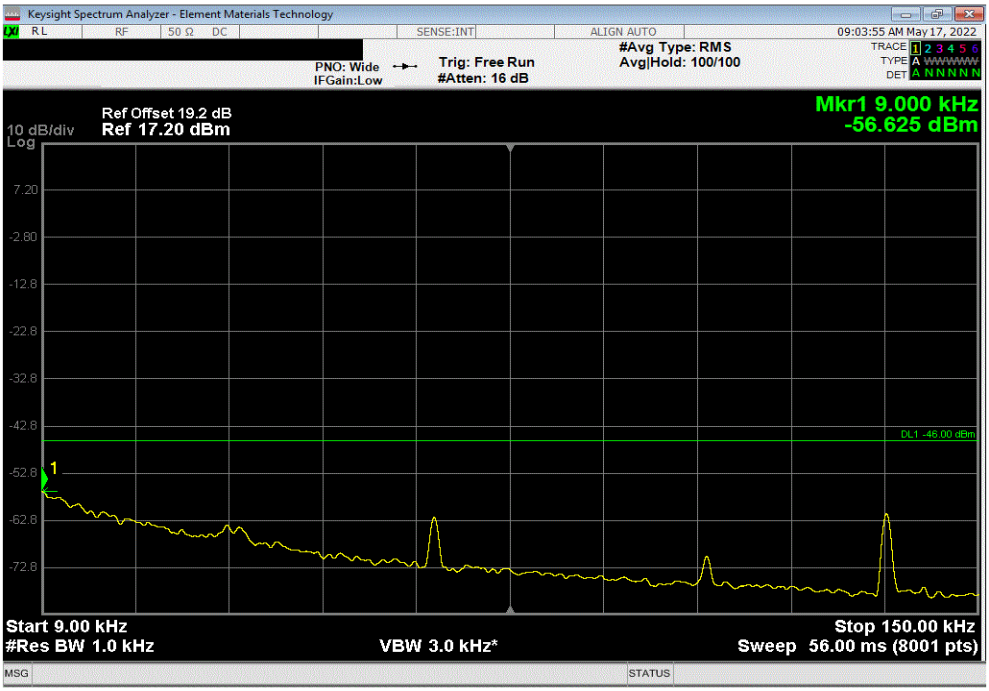
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 2.2 GHz - 13 GHz | 4031.05 | -42.41 | -16 | Pass |



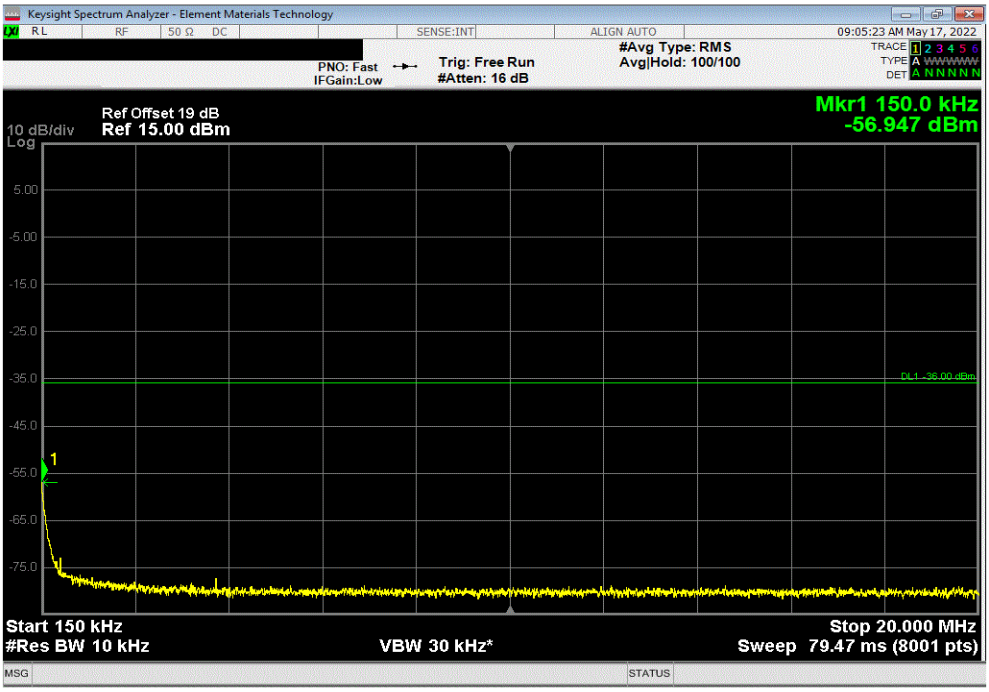

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 13 GHz - 22 GHz | 20094.7 | -23.85 | -16 | Pass |



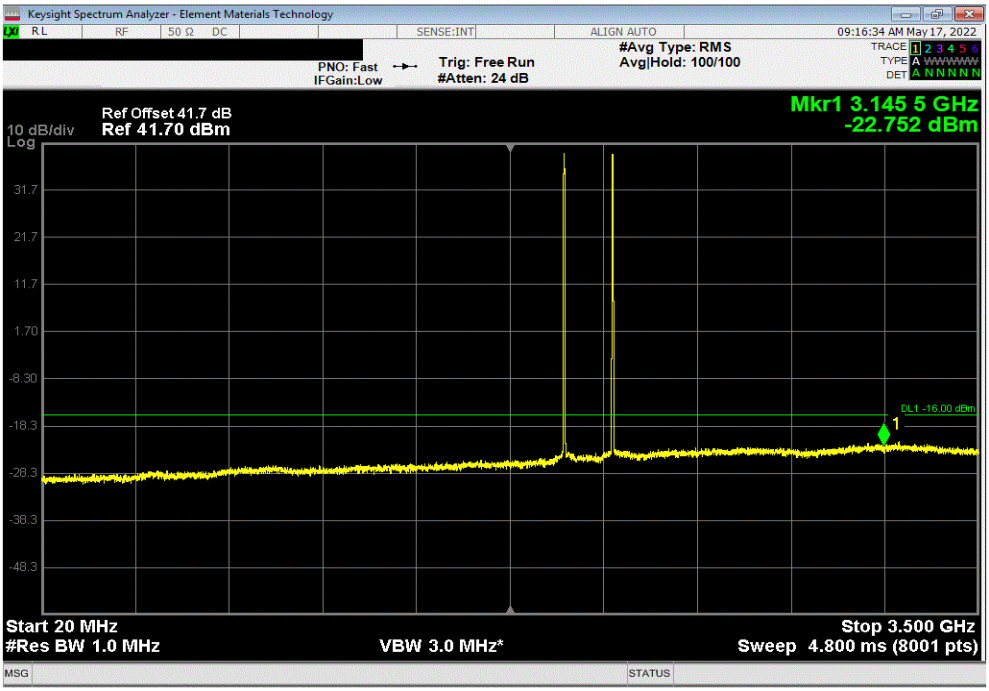
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 9 kHz - 150 kHz | | 0.01 | -56.63 | -46 | Pass |



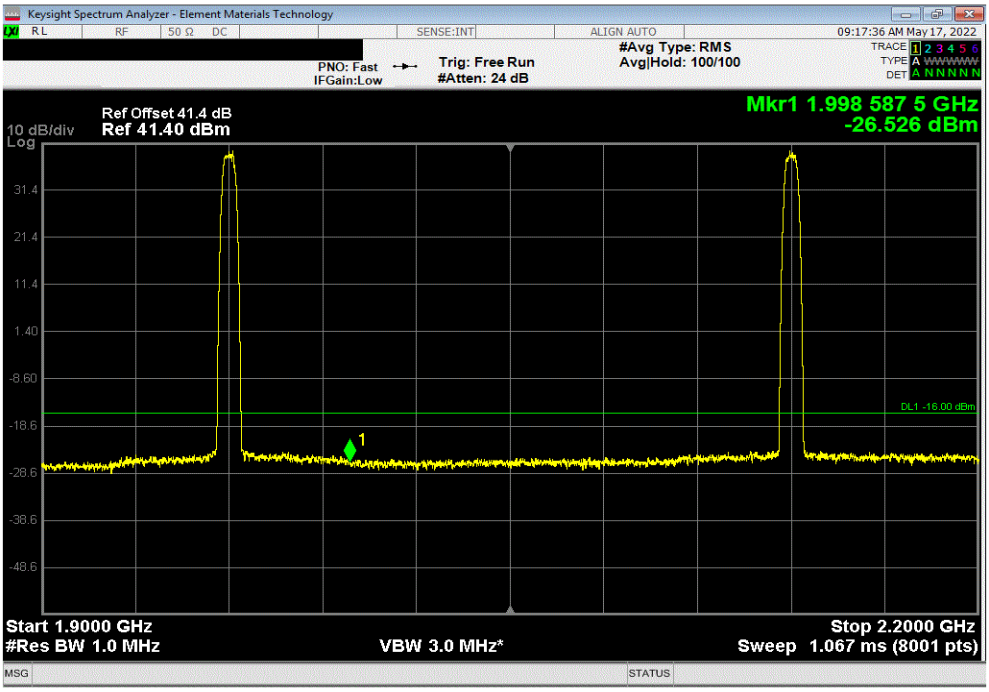

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 150 kHz - 20 MHz | 0.15 | -56.95 | -36 | Pass |



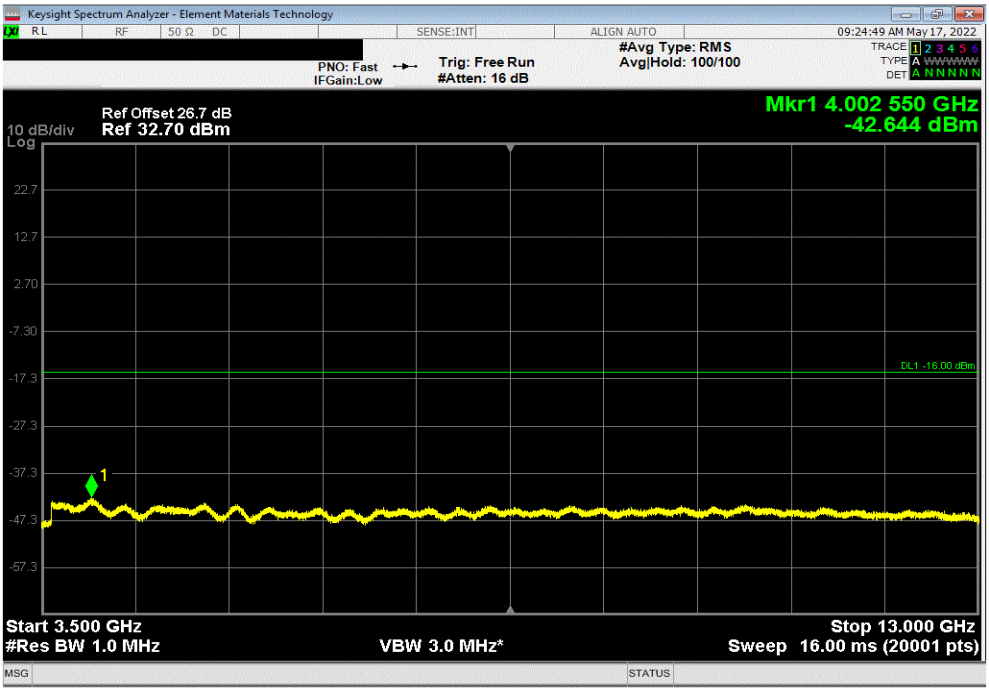
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | | 3145.48 | -22.75 | -16 | Pass |



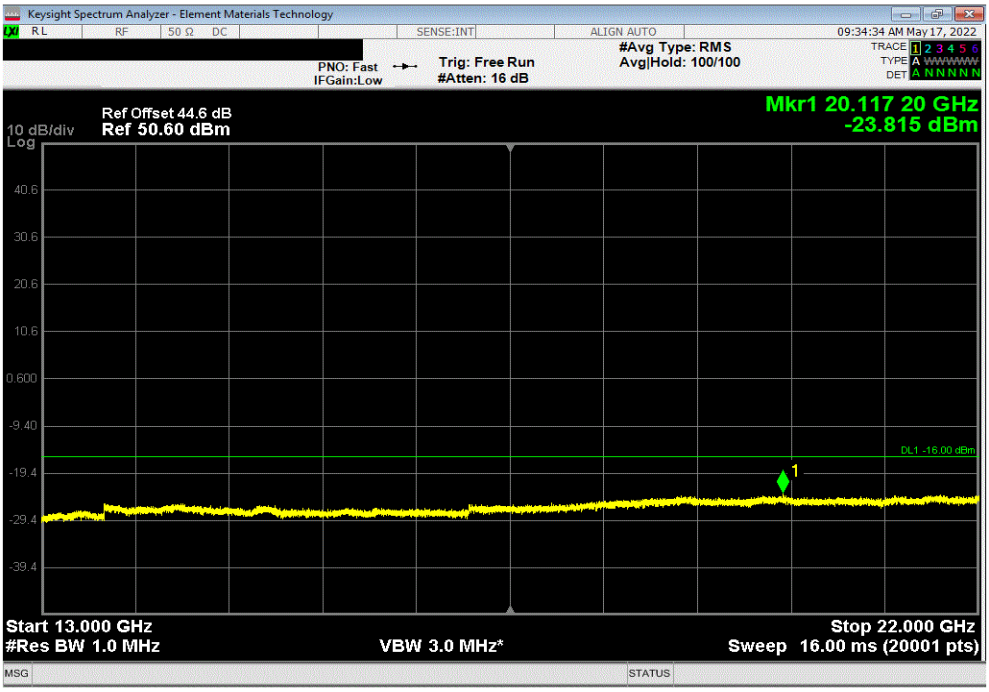

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | | 1998.59 | -26.53 | -16 | Pass |



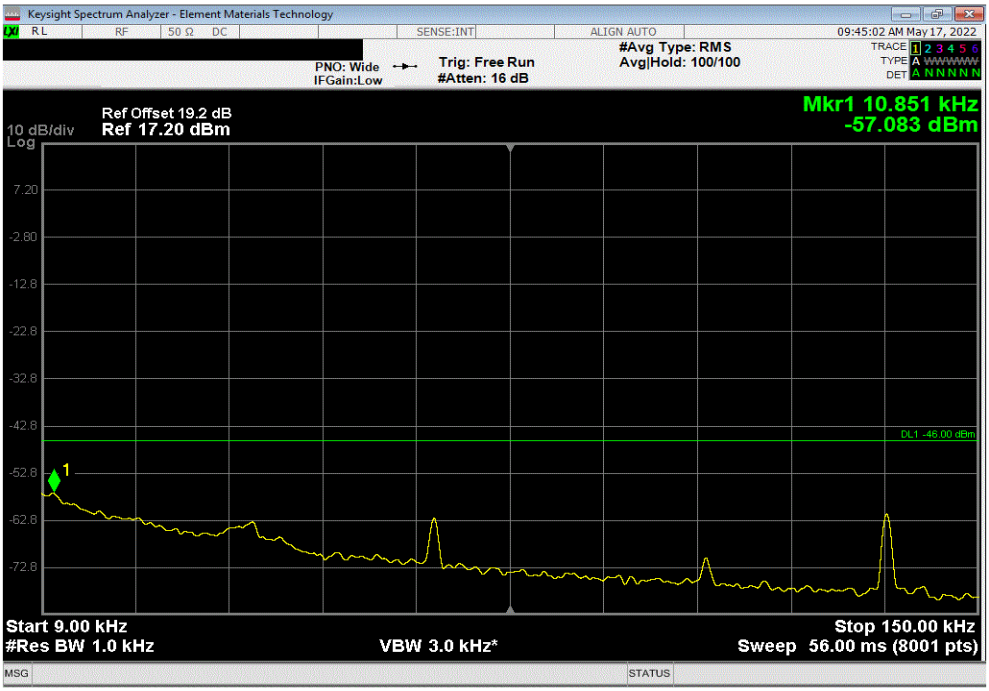
| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 2.2 GHz - 13 GHz | 4002.55 | -42.64 | -16 | Pass |



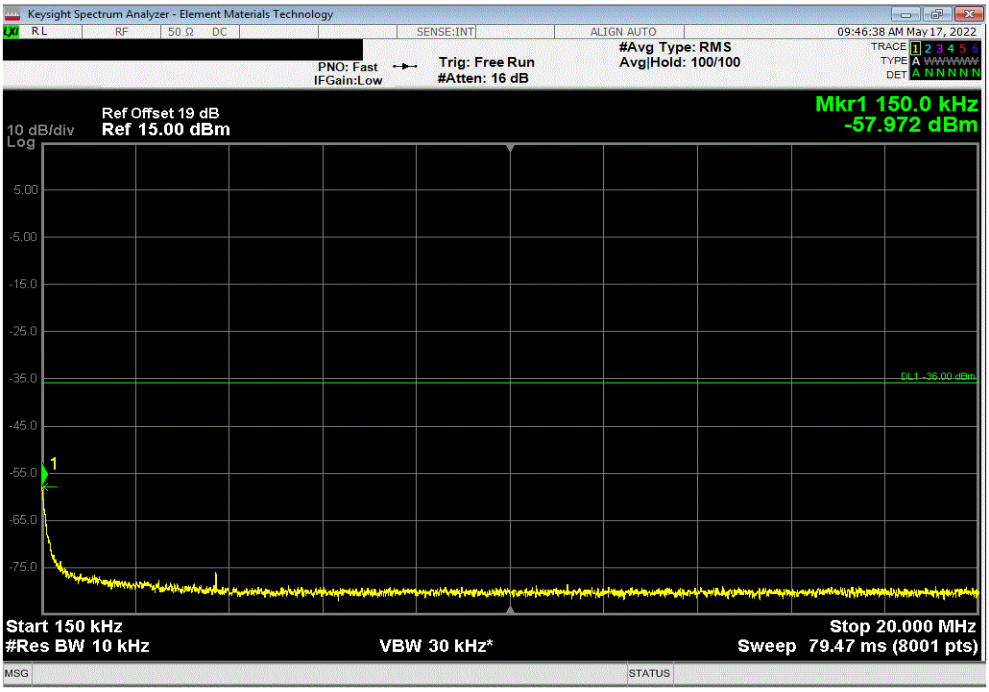

| PCS WCDMA, 1930 MHz - 1990 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 1960 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 13 GHz - 22 GHz | 20117.2 | -23.82 | -16 | Pass |



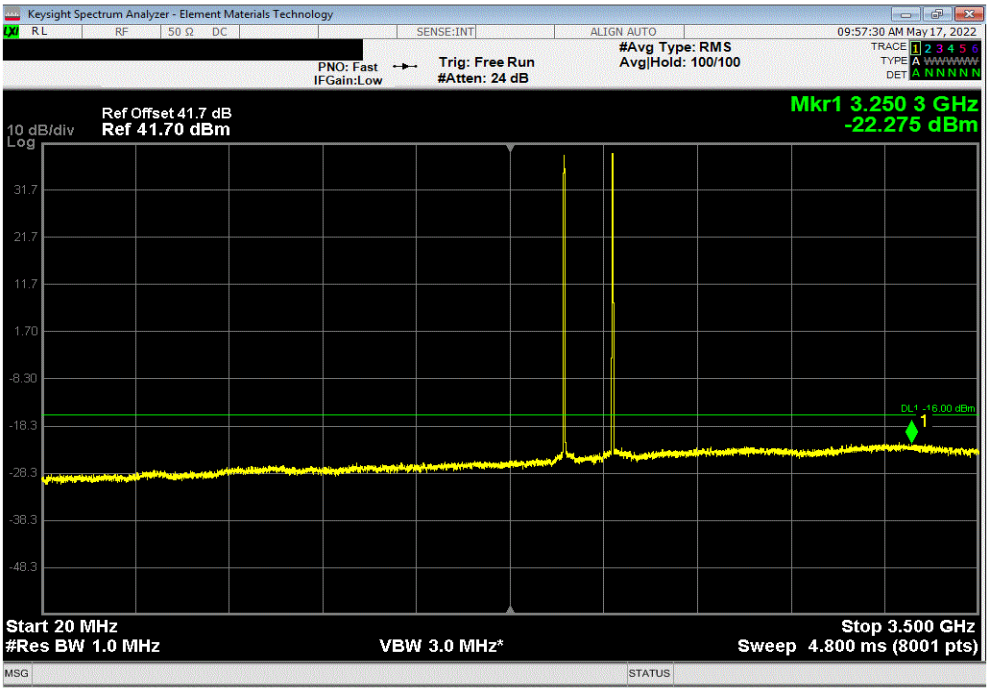
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 9 kHz - 150 kHz | | 0.01 | -57.08 | -46 | N/A |



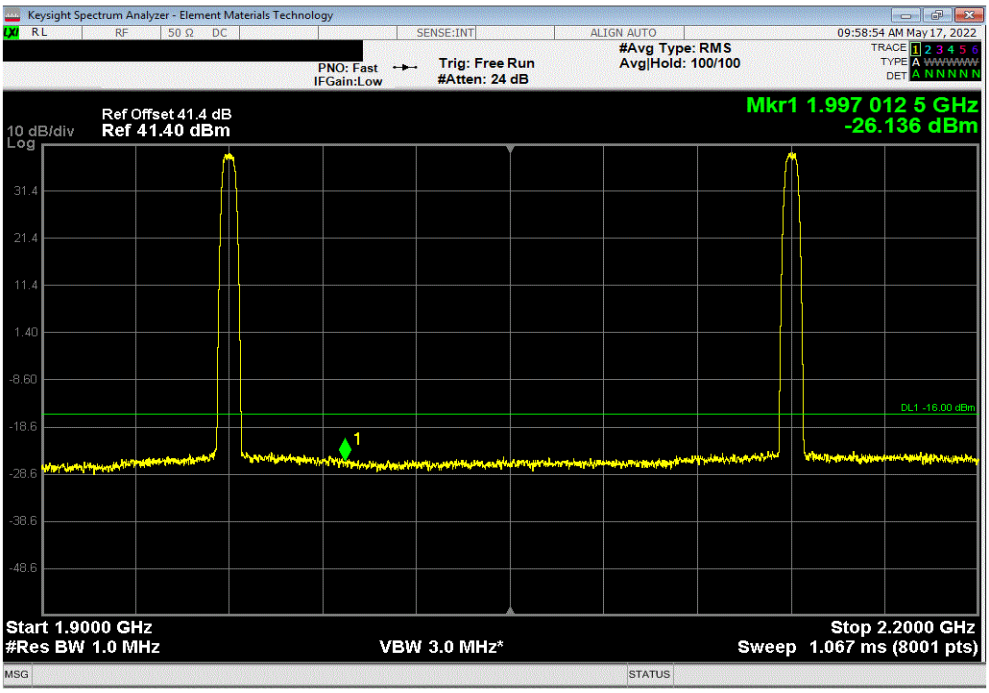

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 150 kHz - 20 MHz | 0.15 | -57.97 | -36 | N/A |



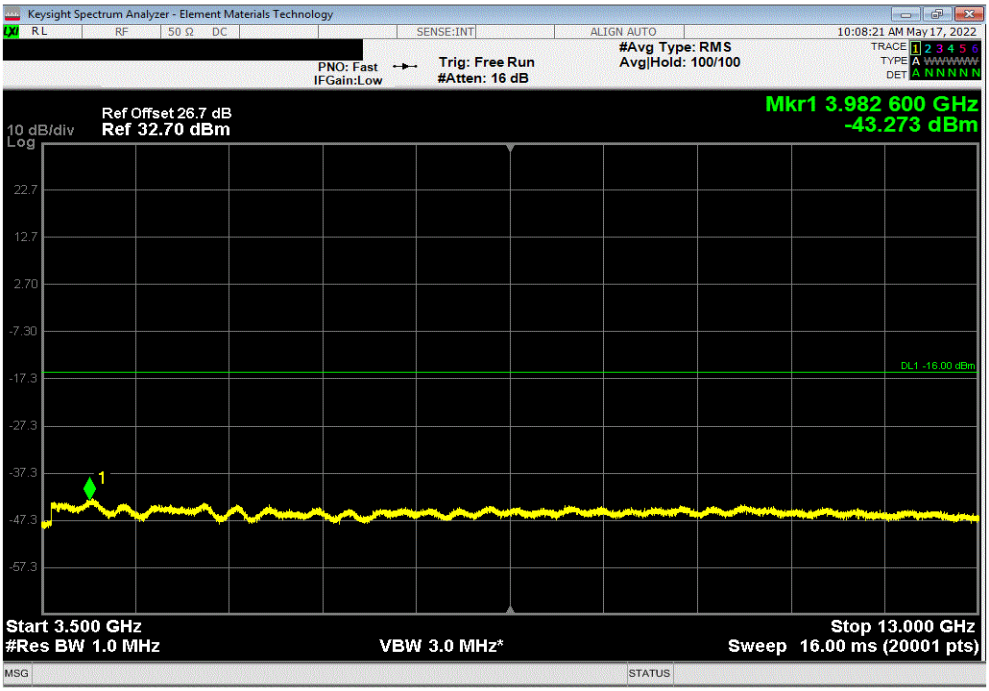
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | | 3250.31 | -22.28 | -16 | Pass |



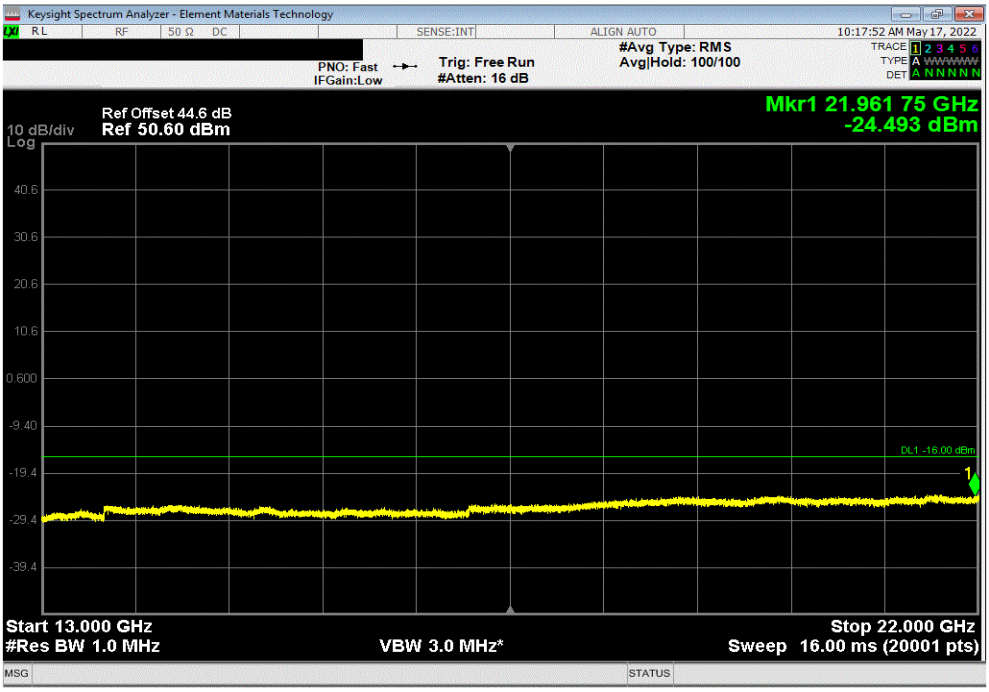

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | | 1997.01 | -26.14 | -16 | Pass |



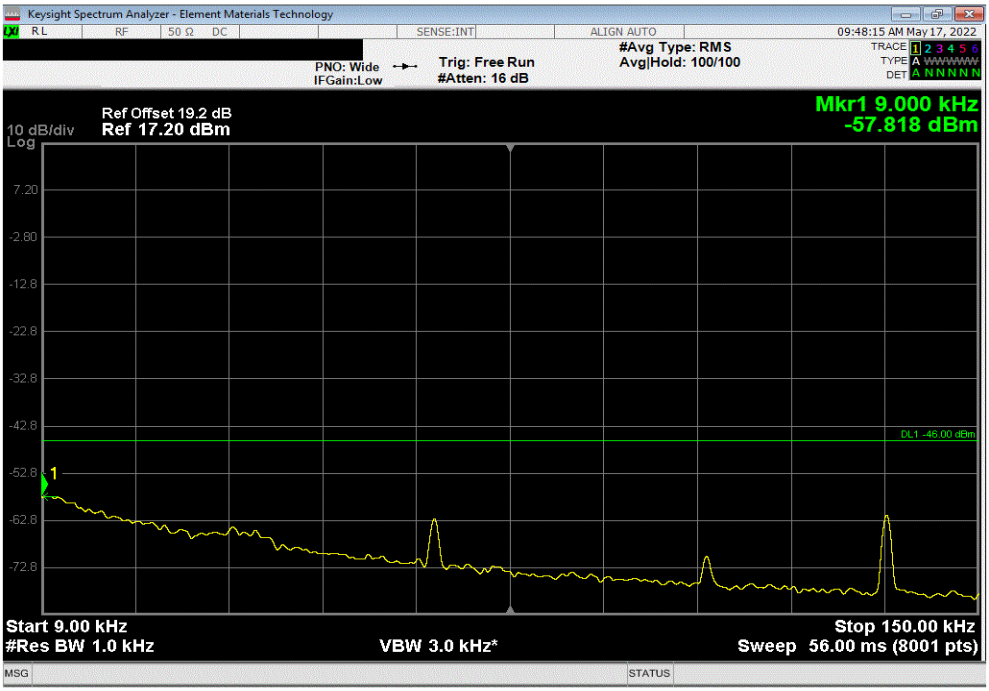
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 2.2 GHz - 13 GHz | 3982.6 | -43.27 | -16 | Pass |



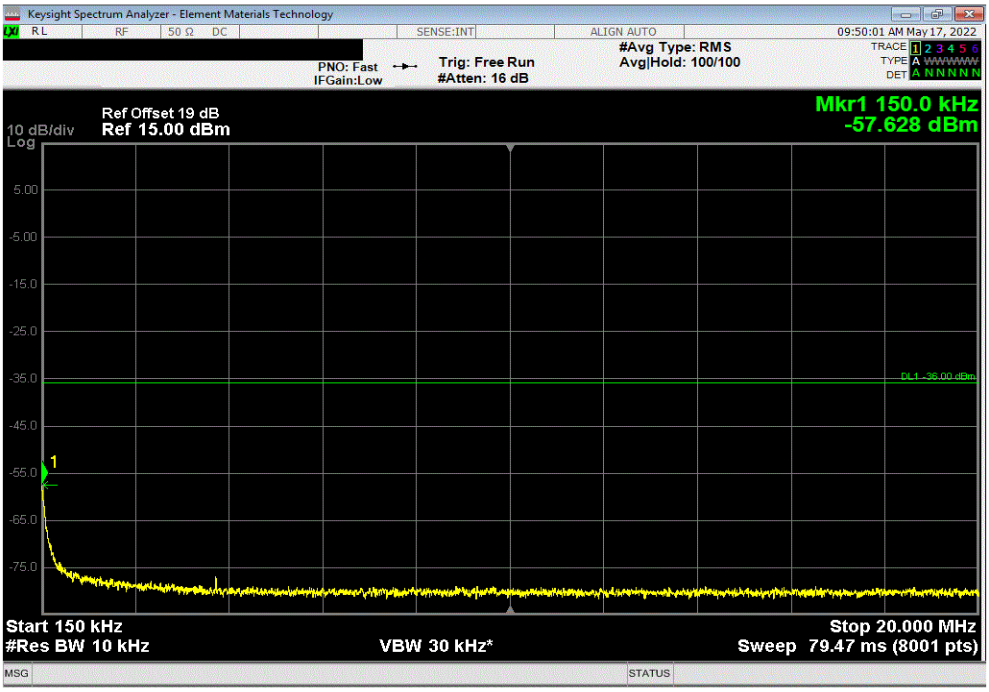

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, QPSK Modulation , Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 13 GHz - 22 GHz | 21961.75 | -24.49 | -16 | Pass |



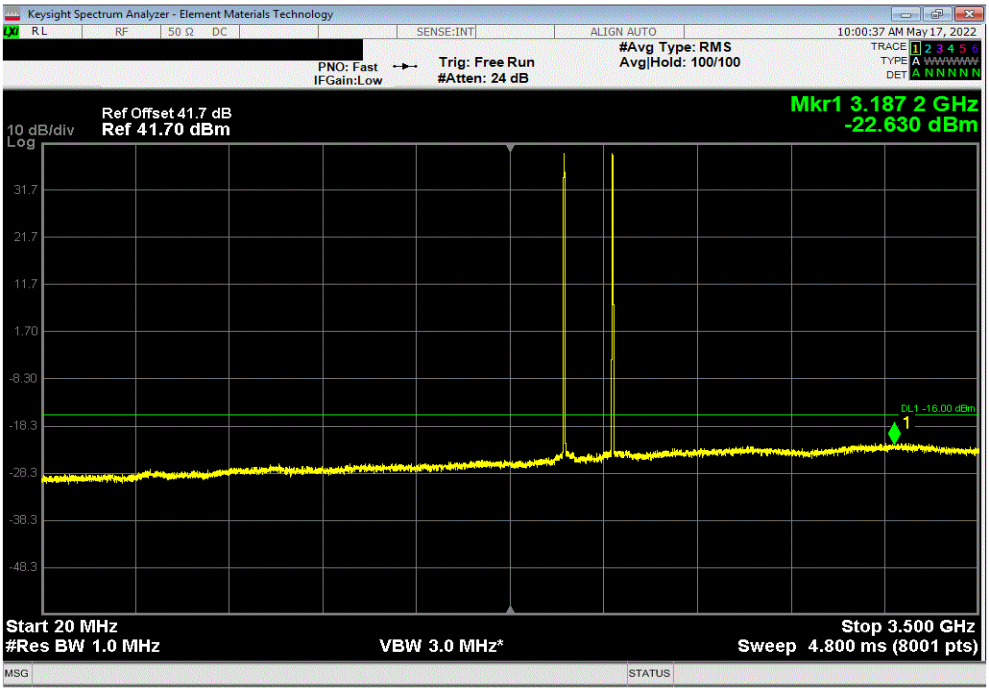
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 9 kHz - 150 kHz | | 0.01 | -57.82 | -46 | N/A |



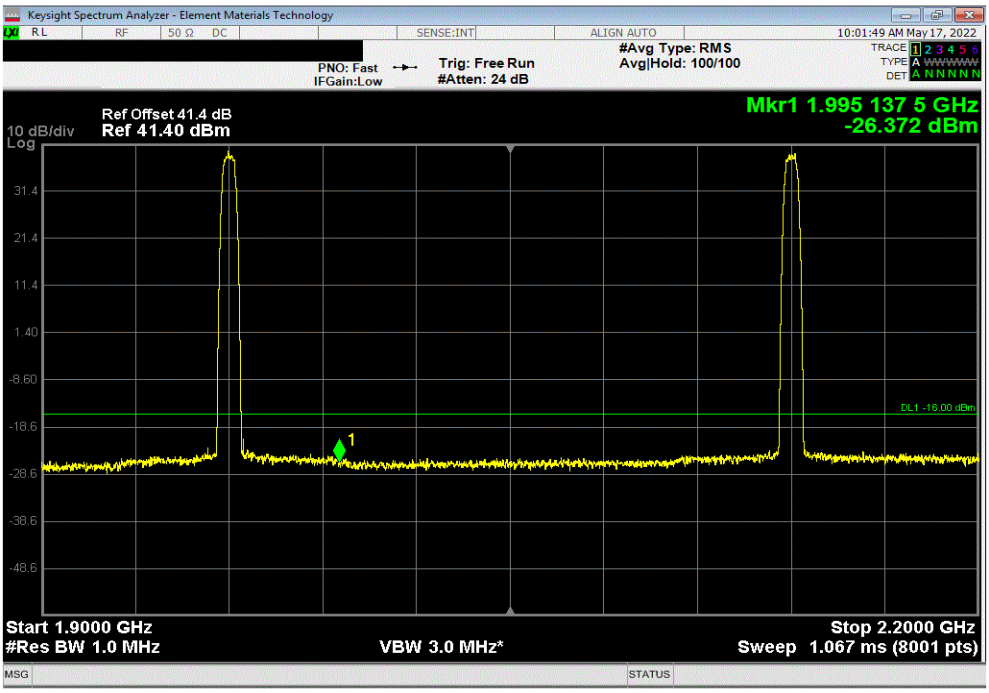

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 150 kHz - 20 MHz | 0.15 | -57.63 | -36 | N/A |



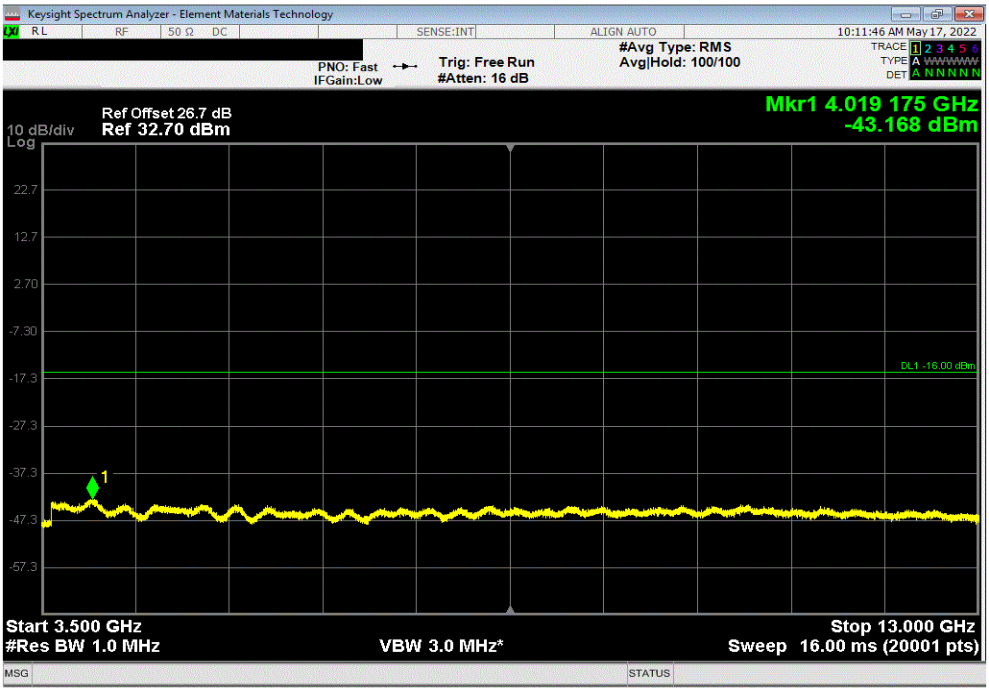
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | | 3187.24 | -22.63 | -16 | Pass |



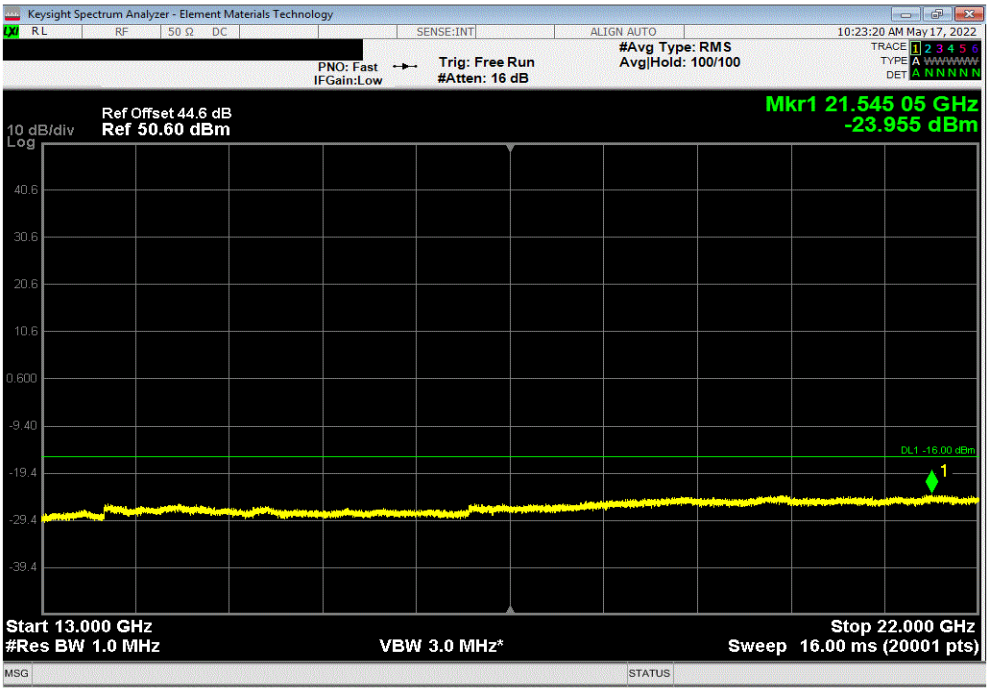

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | | 1995.14 | -26.37 | -16 | Pass |



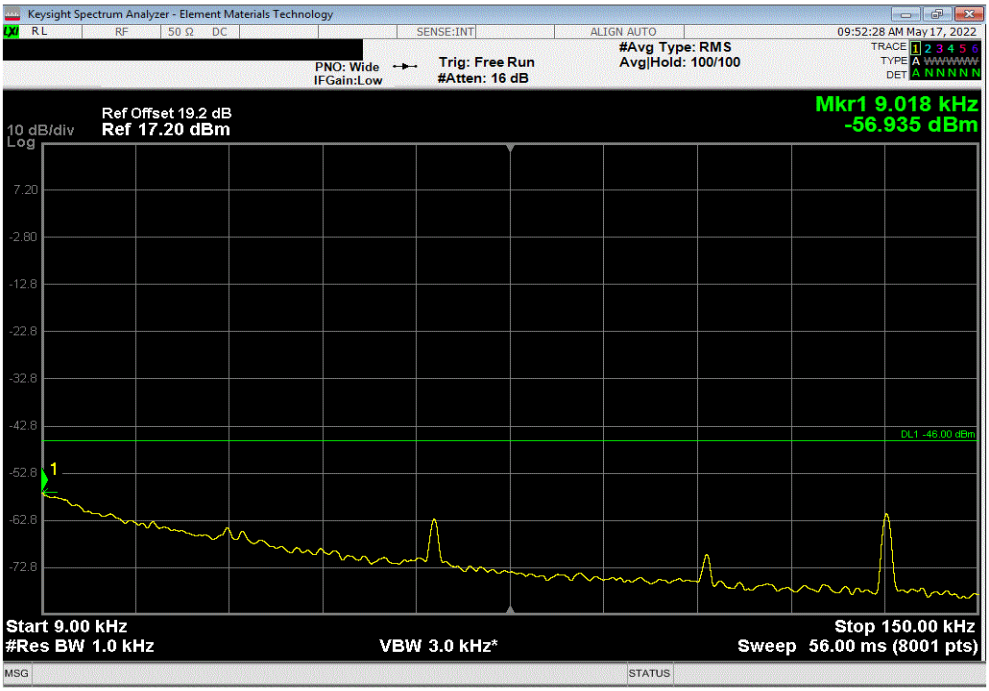
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 2.2 GHz - 13 GHz | 4019.18 | -43.17 | -16 | Pass |



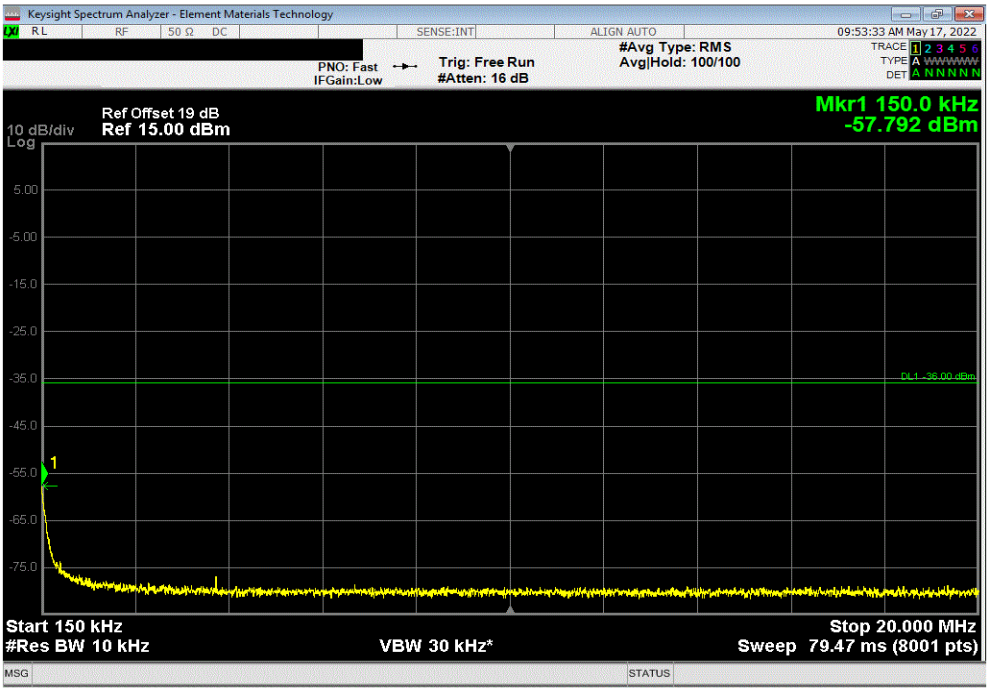

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 16-QAM Modulation, Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 13 GHz - 22 GHz | 21545.05 | -23.96 | -16 | Pass |



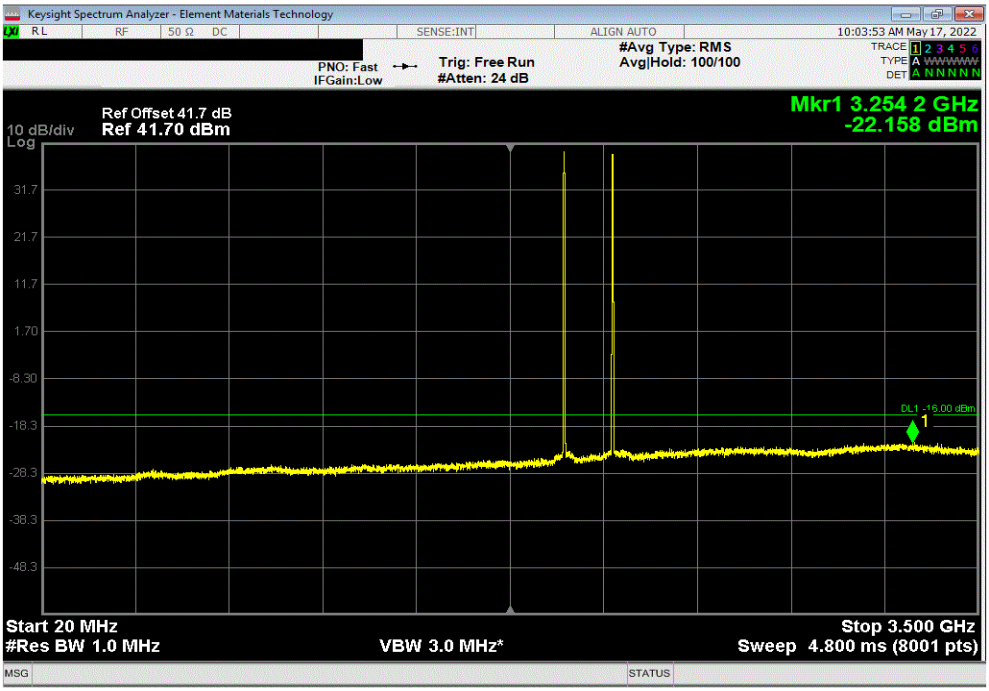
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 9 kHz - 150 kHz | | 0.01 | -56.94 | -46 | N/A |



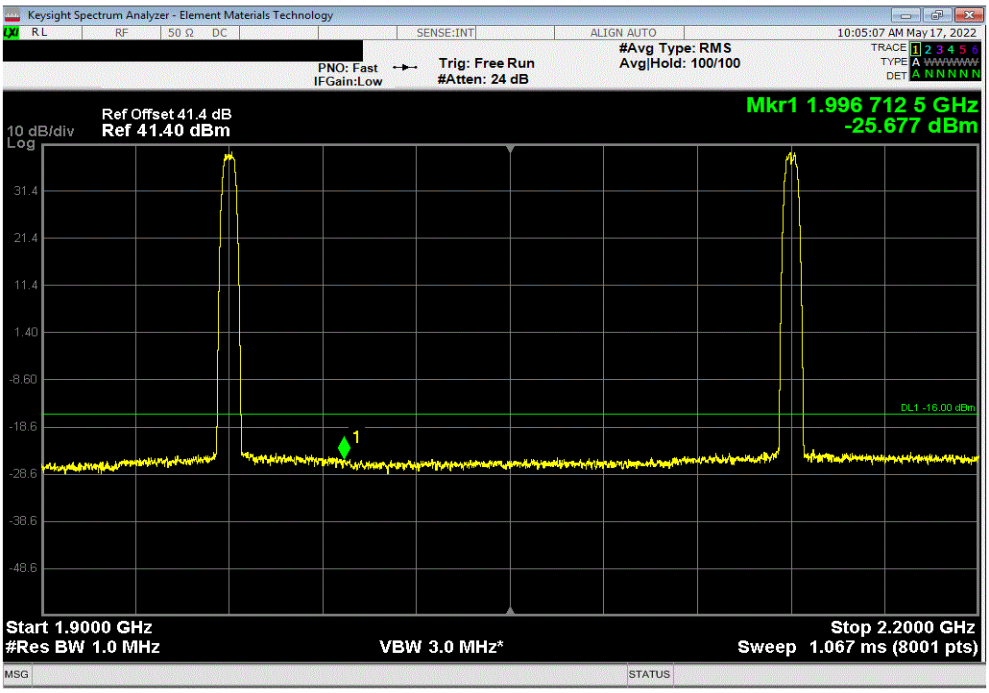

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 150 kHz - 20 MHz | 0.15 | -57.79 | -36 | N/A |



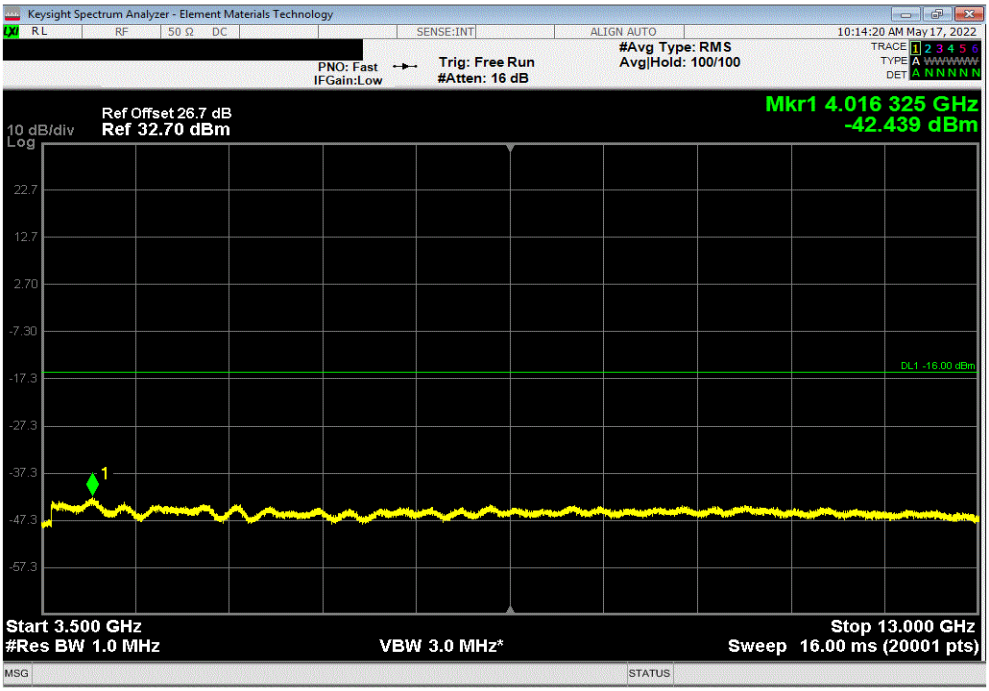
| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | | 3254.23 | -22.16 | -16 | Pass |



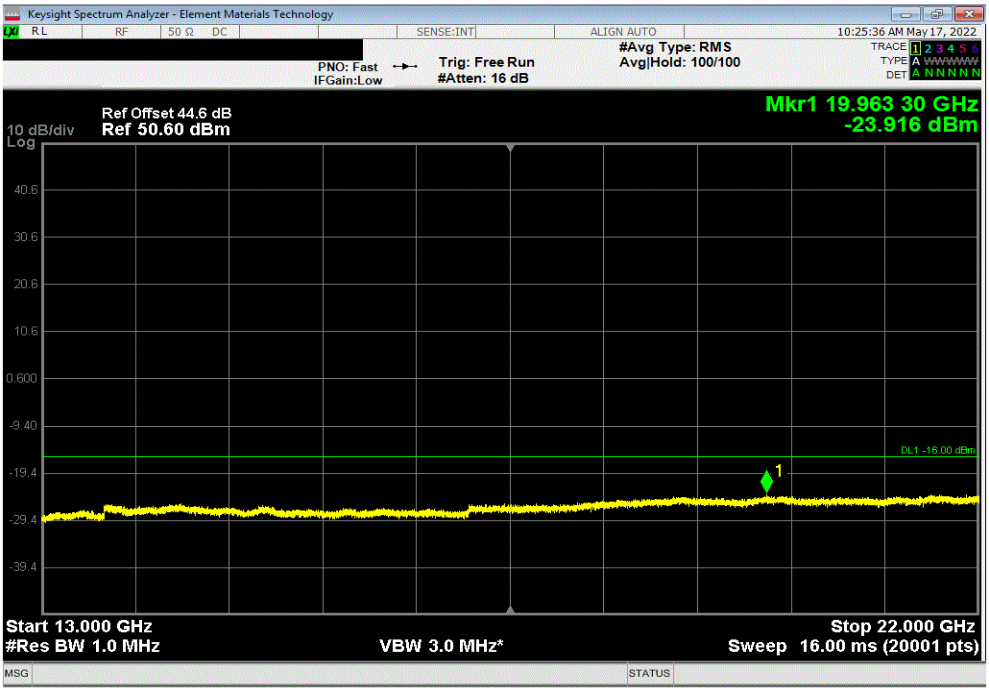

| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | | 1996.71 | -25.68 | -16 | Pass |



| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 2.2 GHz - 13 GHz | 4016.33 | -42.44 | -16 | Pass |




| AWS WCMA, 2110 MHz - 2170 MHz, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Mid Channel, 2140 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | **Measured Freq (MHz)** | **Max Value (dBm)** | **Limit < (dBm)** | **Result** |
| 13 GHz - 22 GHz | 19963.3 | -23.92 | -16 | Pass |



# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS - MULTIBAND

XMit 2022.02.07.0

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 |
|---|---|---|---|---|---|
| Block - DC | Fairview Microwave | SD3379 | AMT | 2021-09-14 | 2022-09-14 |
| Block - DC | Fairview Microwave | SD3239 | ANC | 2022-03-02 | 2023-03-02 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFQ | 2022-01-17 | 2023-01-17 |
| Generator - Signal | Agilent | N5173B | TIW | 2020-07-17 | 2023-07-17 |

**TEST DESCRIPTION**

The antenna port spurious emissions were measured at the RF output terminal of the EUT through 4 different attenuation configurations which continues through to the RF input of the spectrum analyzer. Analyzer plots utilizing a resolution bandwidth called out by the client's test plan were made for each modulation type from 9 KHz to 22 GHz. The conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, were investigated to ensure they were less than the limits also called out by the client's test plan shown below.

The measurement methods are detailed in KDB 971168 D01v03 section 6 and ANSI C63.26-2015.

Per FCC 2.1057(a)(1) and RSS Gen 6.13, the upper level of measurement is the 10th harmonic of the highest fundamental frequency.

These measurements are for the frequency band after the first 1.0 MHz bands immediately outside and adjacent to the frequency block.

RF conducted emissions testing was performed only on one port. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in output power testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

Multicarrier test cases were developed and tested as shown below:
a) PCS Multicarrier Multiband Test Case: In the PCS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (1932.4 & 1937.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1987.6MHz) at the upper band edge. In the AWS band _ Two WCDMA carriers at the band middle (2137.5 & 2142.5MHz). The carriers are operated at maximum power (~26.6W/PCS carrier and 20W/AWS carrier) with a total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carriers).
b) AWS Multicarrier Multiband Test Case: In the AWS band _Three WCDMA carriers using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (2112.4 & 2117.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (2167.6MHz) at the upper band edge. In the PCS band: Two WCDMA carriers at band middle (1957.5 & 1962.5MHz). The carriers are operated at maximum power (~26.6W/AWS carrier and 20W/PCS carrier) with a total port power of 120 watts (80W for AWS band carriers + 40W for PCS band carriers).

Per section FCC 24.238(a), FCC 27.53(h)(1), RSS 133 6.5 (ii), and RSS-139 6.6 - the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -16 dBm [-13 dBm -10 log (2)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 2 port MIMO transmitter.

The limit for the 9kHz to 150kHz frequency range was adjusted to -46dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 1MHz [i.e.: -46dBm = -16dBm -10log(1MHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to -36dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 1MHz [i.e.: -36dBm = -16dBm -10log(1MHz/10kHz)]. The required limit of -16dBm with a RBW of $\geq$ 1MHz was used for all other frequency ranges. (See ANSI C63.26-2015 paragraph 5.7.2a for details on the Limit/RBW scaling method)

# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS - MULTIBAND

element

TbtTx 2022.05.02.0 XMit 2022.02.07.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | AHFII (FCC/ISED C2PC) | | | **Work Order:** | NOKI0040 |
| **Serial Number:** | YK214000036 | | | **Date:** | 16-May-22 |
| **Customer:** | Nokia Solutions and Networks | | | **Temperature:** | 23.4 °C |
| **Attendees:** | David Le, John Rattanavong | | | **Humidity:** | 48.9% RH |
| **Project:** | None | | -46 | **Barometric Pres.:** | 1018 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 54 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 24E:2022 | ANSI C63.26:2015 |
| RSS-133 Issue 6:2013+A1:2018 | RSS-133 Issue 6:2013+A1:2018 |
| FCC 27:2022 | ANSI C63.26:2015 |
| RSS-139 Issue 3:2015 | RSS-139 Issue 3:2015 |

**COMMENTS**

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. PCS Band II / AWS Band X carriers were enabled at maximum power.

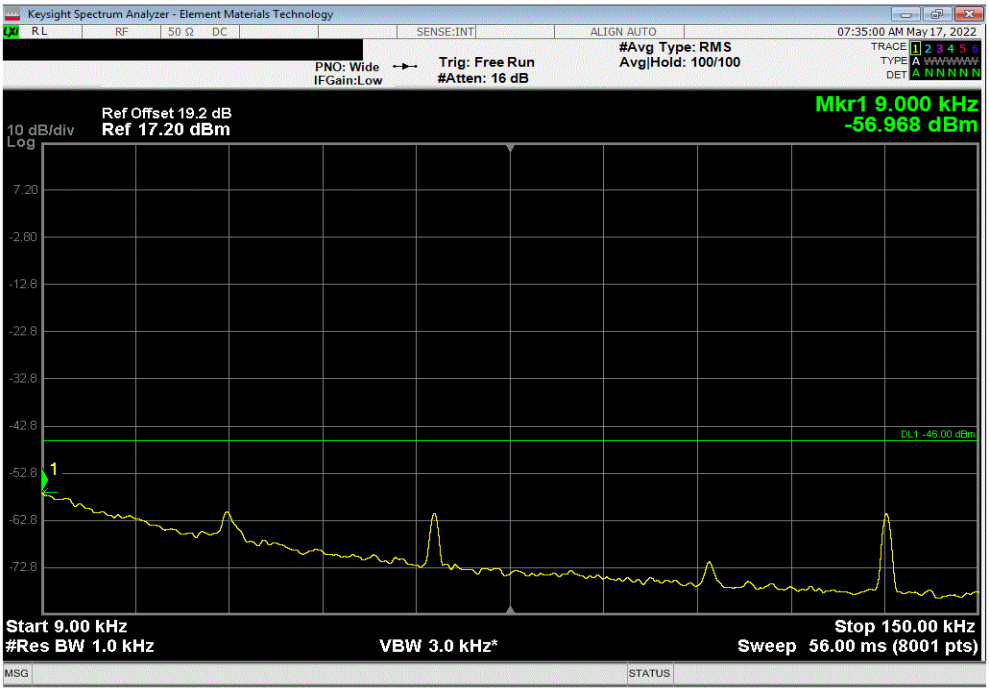
**DEVIATIONS FROM TEST STANDARD**

None

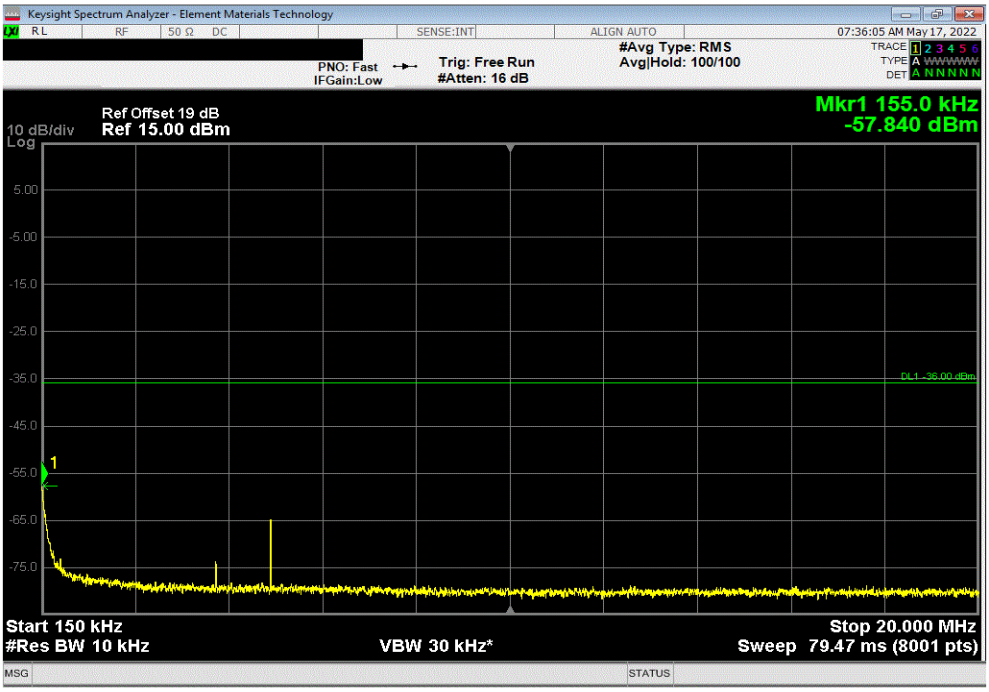
| Configuration # | 1,2,3,4 | Signature |
|---|---|---|

| | | Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|---|---|
| AWS and PCS BANDS | | | | | | |
| | Port 1 | | | | | |
| | | 5 MHz Bandwdith | | | | |
| | | | 64-QAM Modulation | | | |
| | | | Multicarrier Multband Test Case 2 | 9 kHz - 150 kHz | 0.01 | -57.0 | -46 | Pass |
| | | | Multicarrier Multband Test Case 2 | 150 kHz - 20 MHz | 0.15 | -57.8 | -36 | Pass |
| | | | Multicarrier Multband Test Case 2 | 20 MHz - 3.5 GHz | 3171.58 | -21.9 | -16 | Pass |
| | | | Multicarrier Multband Test Case 2 | 1.9 GHz - 2.2 GHz | 1996.19 | -24.7 | -16 | Pass |
| | | | Multicarrier Multband Test Case 2 | 2.2 GHz - 13 GHz | 4011.58 | -42.5 | -16 | Pass |
| | | | Multicarrier Multband Test Case 2 | 1.9 GHz - 2.2 GHz | 21534.7 | -23.9 | -16 | Pass |
| | | | Multicarrier Multband Test Case 1 | 9 kHz - 150 kHz | 0.01 | -56.7 | -46 | Pass |
| | | | Multicarrier Multband Test Case 1 | 150 kHz - 20 MHz | 0.15 | -56.7 | -36 | Pass |
| | | | Multicarrier Multband Test Case 1 | 20 MHz - 3.5 GHz | 3209.86 | -22.4 | -16 | Pass |
| | | | Multicarrier Multband Test Case 1 | 1.9 GHz - 2.2 GHz | 2177.24 | -24.3 | -16 | Pass |
| | | | Multicarrier Multband Test Case 1 | 2.2 GHz - 13 GHz | 3987.83 | -43.0 | -16 | Pass |
| | | | Multicarrier Multband Test Case 1 | 1.9 GHz - 2.2 GHz | 21591.4 | -23.9 | -16 | Pass |

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 2 | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 9 kHz - 150 kHz | | 0.01 | -56.97 | -46 | Pass |



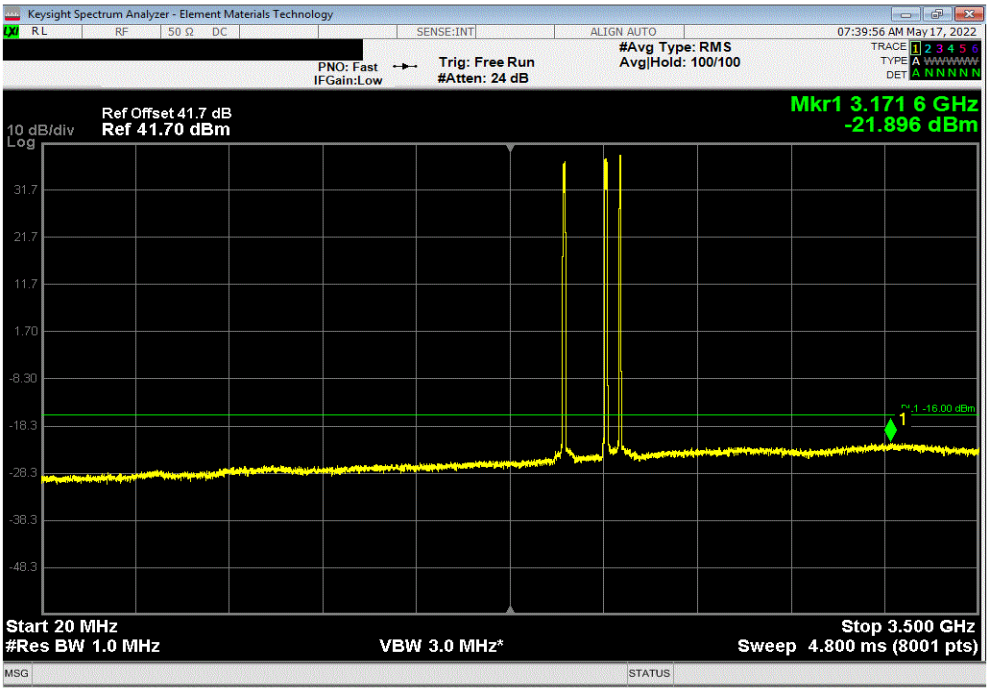

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 2 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 150 kHz - 20 MHz | 0.15 | -57.84 | -36 | Pass |



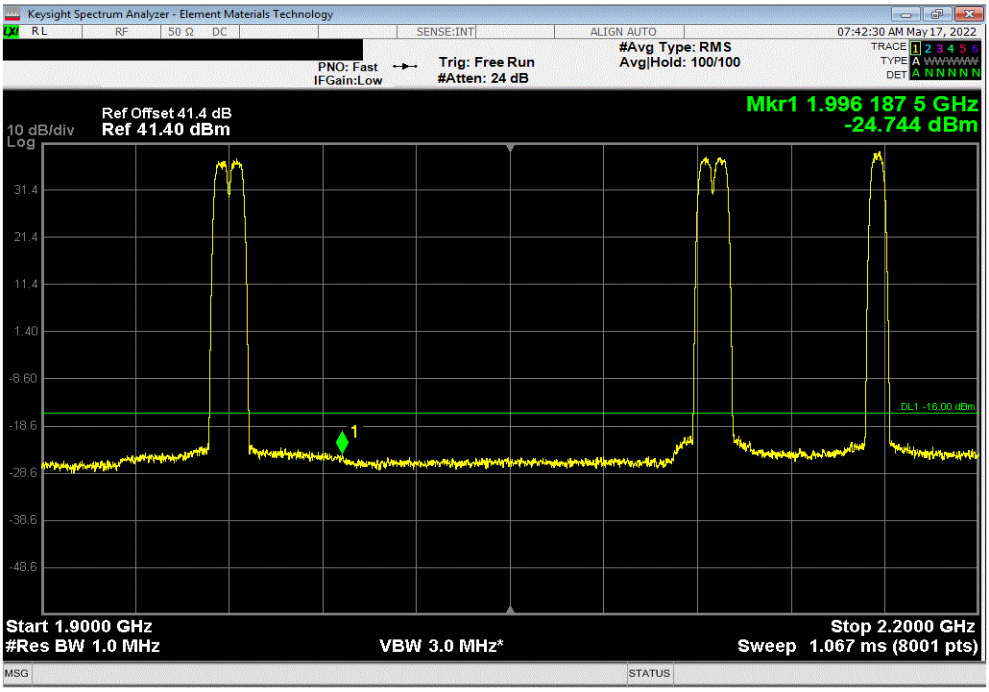
# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS - MULTIBAND



| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 2 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | 3171.58 | -21.9 | -16 | Pass |



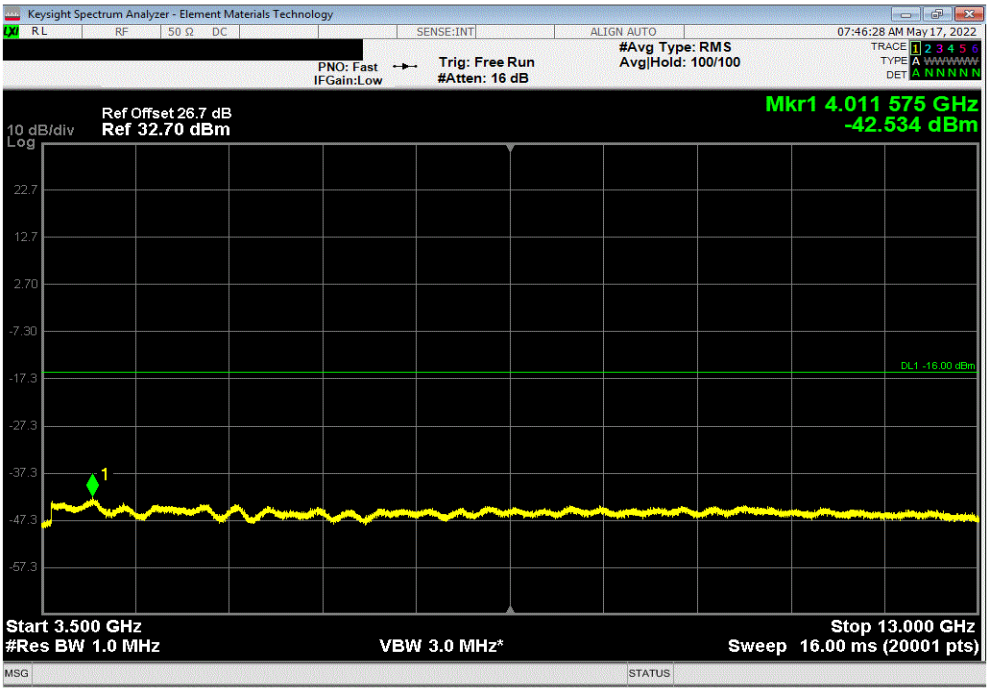

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 2 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | 1996.19 | -24.74 | -16 | Pass |



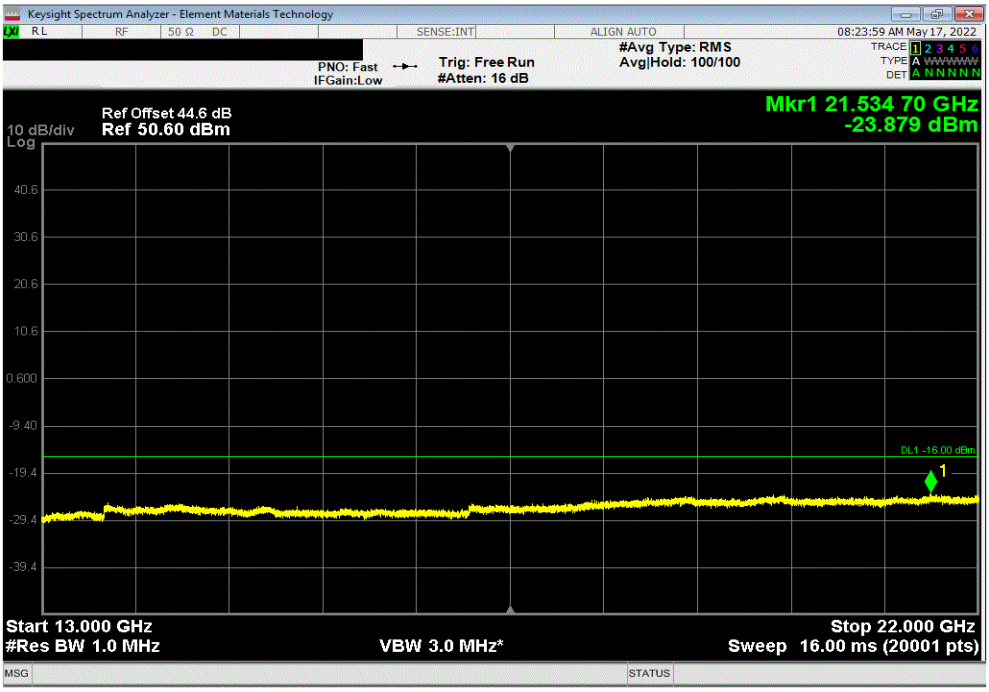
# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS - MULTIBAND



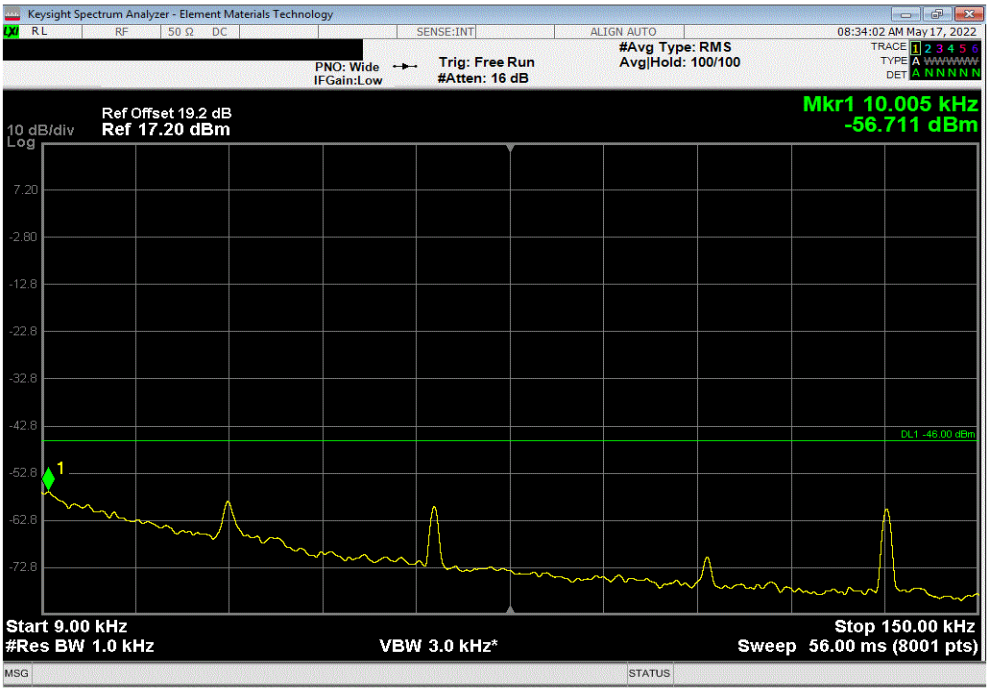
| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 2 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 2.2 GHz - 13 GHz | 4011.58 | -42.53 | -16 | Pass |



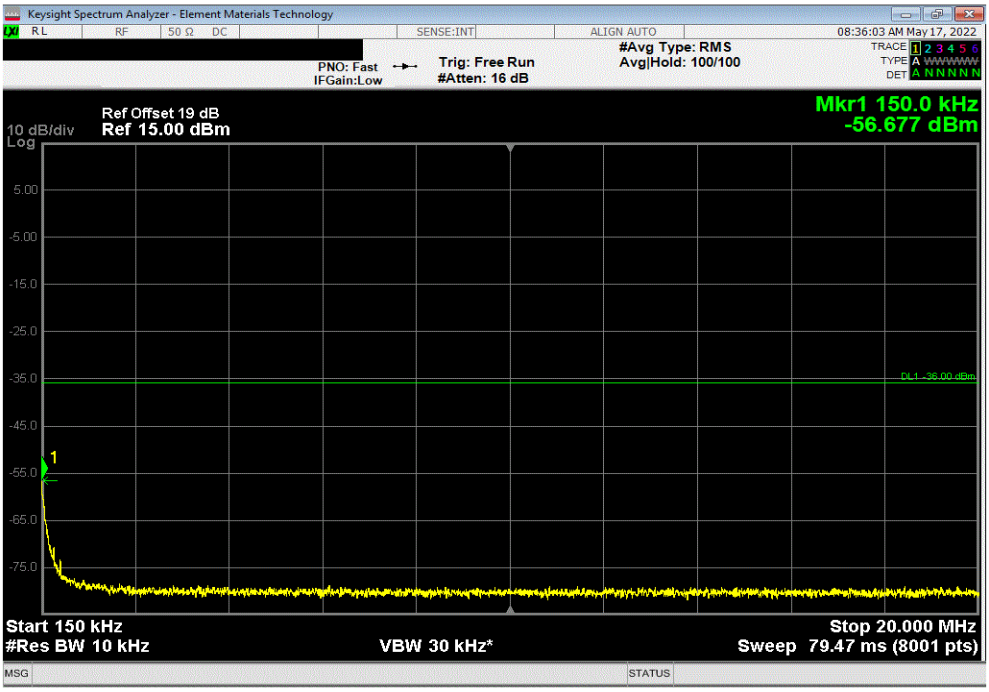

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 2 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | 21534.7 | -23.88 | -16 | Pass |



| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 1 | | | | | |
|---|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result | |
| 9 kHz - 150 kHz | 0.01 | -56.71 | -46 | Pass | |



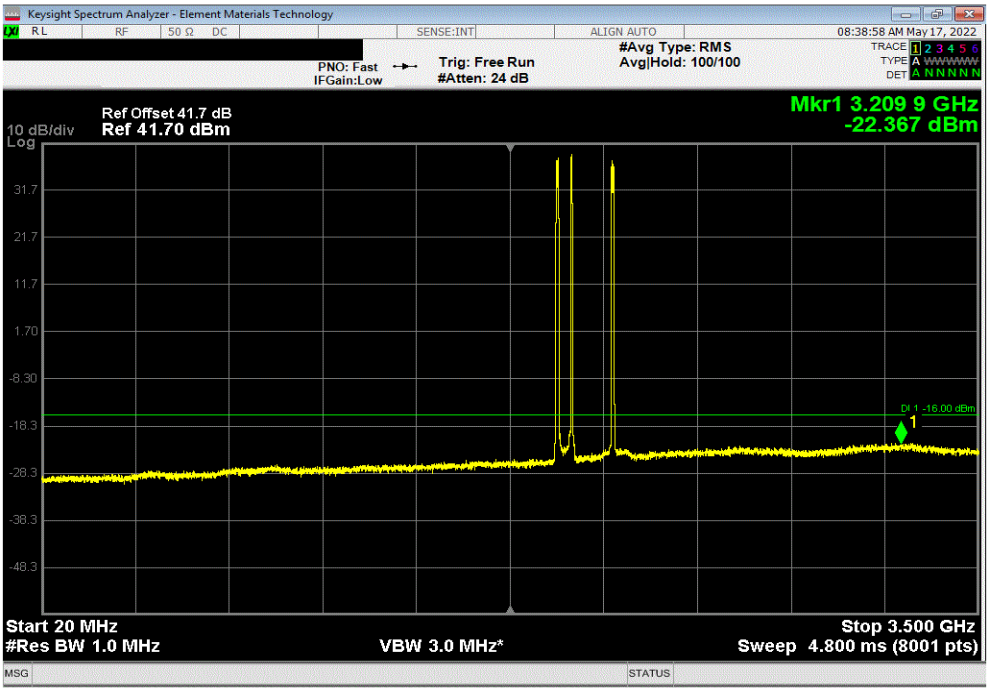

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 1 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 150 kHz - 20 MHz | 0.15 | -56.68 | -36 | Pass |



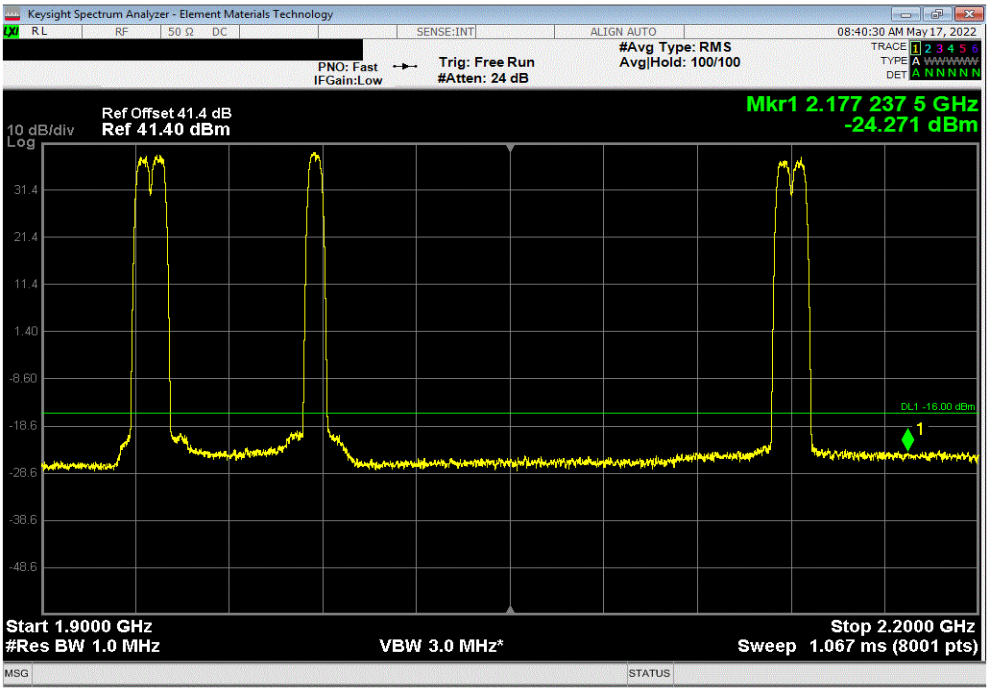
# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS - MULTIBAND



| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 1 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 20 MHz - 3.5 GHz | 3209.86 | -22.37 | -16 | Pass |



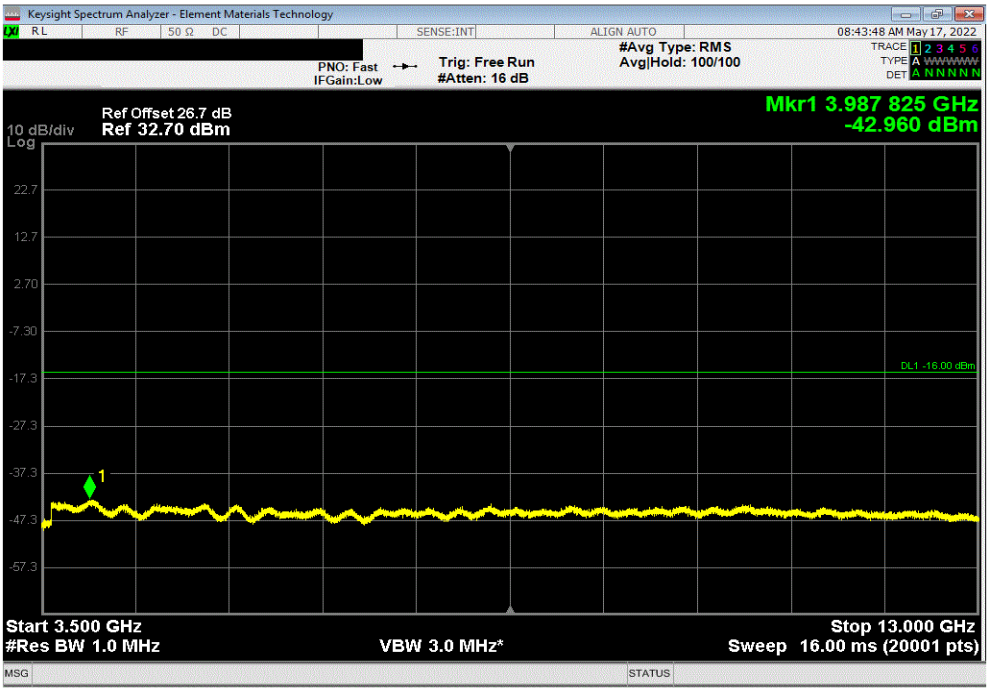

| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 1 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | 2177.24 | -24.27 | -16 | Pass |



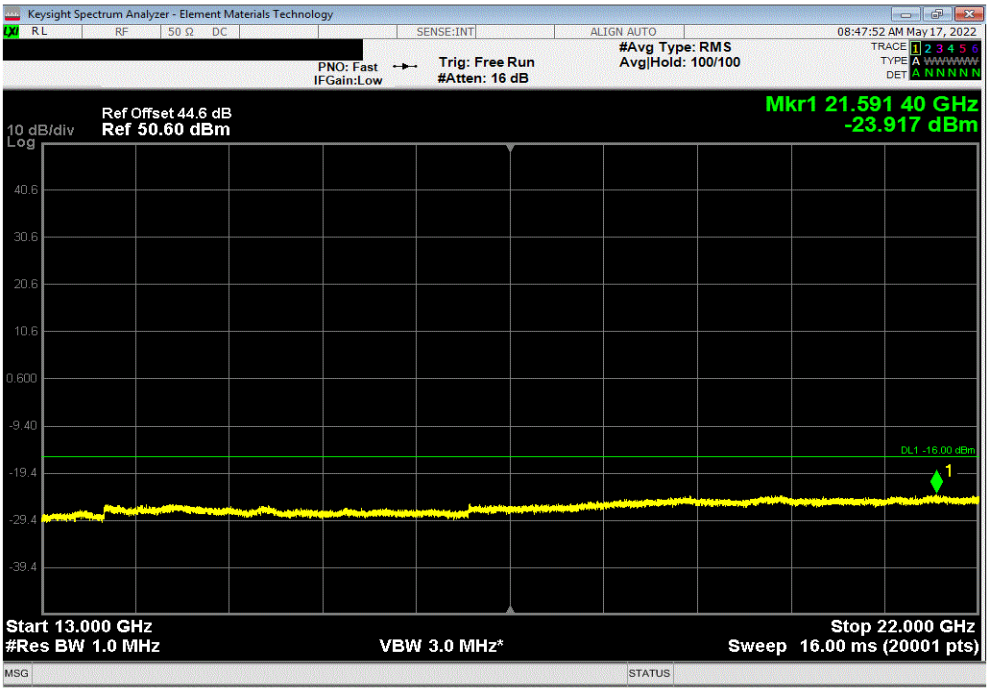
# SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS - MULTIBAND



| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 1 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 2.2 GHz - 13 GHz | 3987.83 | -42.96 | -16 | Pass |




| AWS and PCS BANDS, Port 1, 5 MHz Bandwdith, 64-QAM Modulation, Multicarrier Multband Test Case 1 | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| 1.9 GHz - 2.2 GHz | 21591.4 | -23.92 | -16 | Pass |



End of Test Report