# BAND EDGE COMPLIANCE - BAND 66

XMit 2020.03.25.0

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 | Agilent | N9010A | AFL | 27-Feb-20 | 27-Feb-21 |
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |

**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(4)] dB to account for the device operation as a 4 port MIMO transmitter, as per FCC KDB 622911.

Per section 27.53(h)(1) the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -19 dBm [-13 dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

Per 27.53(h)(3) emissions seen up to 1 MHz outside of authorized operating frequency range band edges shell 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 1 MHz. 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 1 MHz.

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFIG) as the original certification test. The AHFIG antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original certification testing) and antenna port 4 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

Carrier bandwidths of 10, 15, & 20MHz were verified using NB IoT GB carriers under this effort. The LTE modulation type for this testing was set up according to 3GPP TS 36.141 E-UTRA Test Models and is “E-TM 1.1 (QPSK modulation type) with N-TM (narrow band IoT)”.

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element

TbtTx 2020.06.08.0 BETA XMit 2020.03.25.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | **AHFIG** | | | **Work Order:** | **NOKI0016** |
| **Serial Number:** | **K9191322351** | | | **Date:** | **23-Jun-20** |
| **Customer:** | **Nokia Solutions and Networks** | | | **Temperature:** | **22.2 °C** |
| **Attendees:** | **Mitchell Hill, John Rattanavong** | | | **Humidity:** | **53% RH** |
| **Project:** | **None** | | | **Barometric Pres.:** | **1015 mbar** |
| **Tested by:** | **Brandon Hobbs** | **Power:** | **54 VDC** | **Job Site:** | **TX05** |

| **TEST SPECIFICATIONS** | **Test Method** |
|---|---|
| **FCC 27:2020** | ANSI C63.26:2015 |
| | |

**COMMENTS**

**All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The carrier was set to maximum for all testing.**

**DEVIATIONS FROM TEST STANDARD**

**None**

| **Configuration #** | **6** | *Signature* |
|---|---|---|

| | | Frequency Range | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
|---|---|---|---|---|---|---|
| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz | | | | | | |
| | 10 MHz Bandwidth | | | | | |
| | QPSK Modulation | | | | | |
| | Low Channel 2115 MHz | 1 | 2110.0 | -24.94 | -19 | Pass |
| | Low Channel 2115 MHz | 2 | 2108.5 | -26.84 | -19 | Pass |
| | Low Channel 2115 MHz | 3 | 2106.3 | -25.52 | -19 | Pass |
| | High Channel 2195 MHz | 1 | 2200.0 | -24.44 | -19 | Pass |
| | High Channel 2195 MHz | 2 | 2201.5 | -25.18 | -19 | Pass |
| | High Channel 2195 MHz | 3 | 2202.0 | -25.85 | -19 | Pass |
| | 15 MHz Bandwidth | | | | | |
| | QPSK Modulation | | | | | |
| | Low Channel 2117.5 MHz | 1 | 2110.0 | -27.23 | -19 | Pass |
| | Low Channel 2117.5 MHz | 2 | 2108.5 | -27.99 | -19 | Pass |
| | Low Channel 2117.5 MHz | 3 | 2107.2 | -25.78 | -19 | Pass |
| | High Channel 2192.5 MHz | 1 | 2200.0 | -27.22 | -19 | Pass |
| | High Channel 2192.5 MHz | 2 | 2201.5 | -26.32 | -19 | Pass |
| | High Channel 2192.5 MHz | 3 | 2202.0 | -26.14 | -19 | Pass |
| | 20 MHz Bandwidth | | | | | |
| | QPSK Modulation | | | | | |
| | Low Channel 2120 MHz | 1 | 2110.0 | -27.74 | -19 | Pass |
| | Low Channel 2120 MHz | 2 | 2108.5 | -28.29 | -19 | Pass |
| | Low Channel 2120 MHz | 3 | 2107.7 | -24.99 | -19 | Pass |
| | High Channel 2190 MHz | 1 | 2200.0 | -27.01 | -19 | Pass |
| | High Channel 2190 MHz | 2 | 2201.5 | -26.58 | -19 | Pass |
| | High Channel 2190 MHz | 3 | 2202.1 | -27.34 | -19 | Pass |

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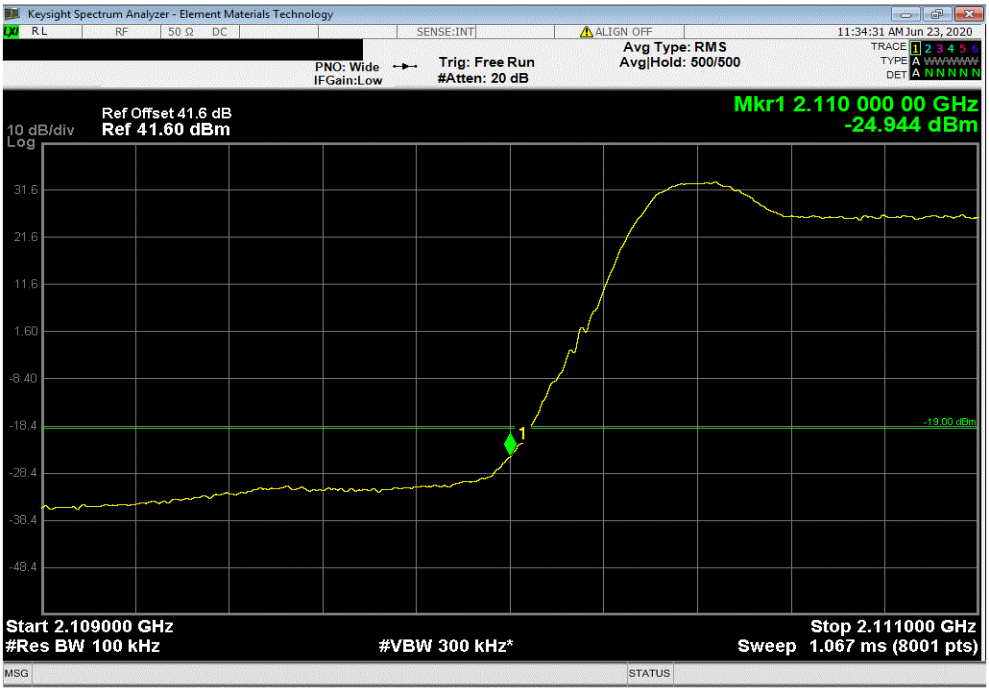
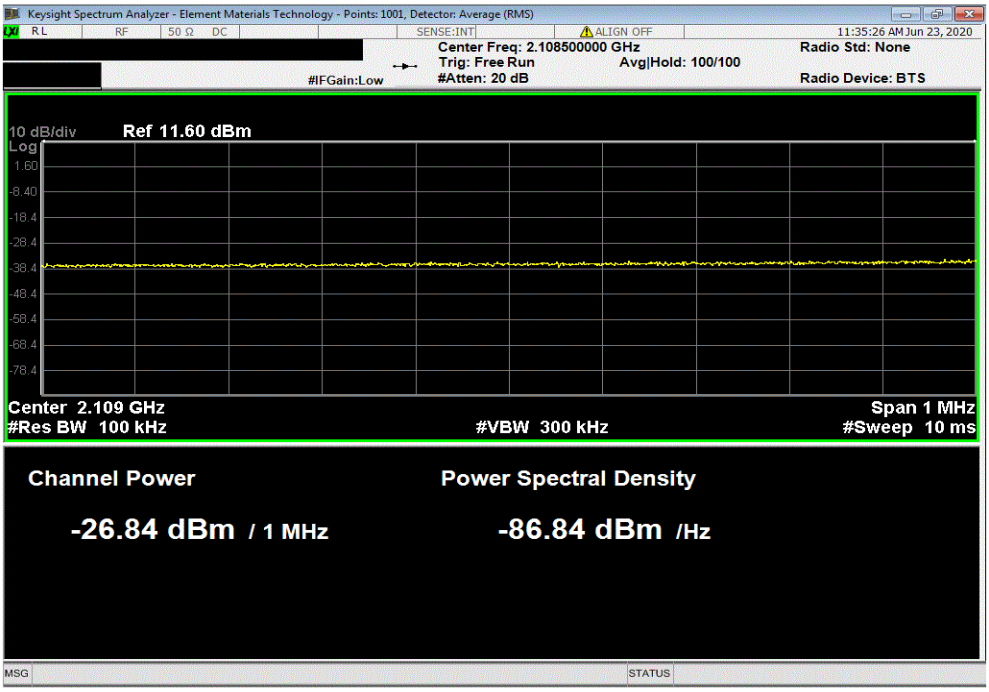
| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , QPSK Modulation, Low Channel 2115 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | 2110 | -24.94 | -19 | Pass |



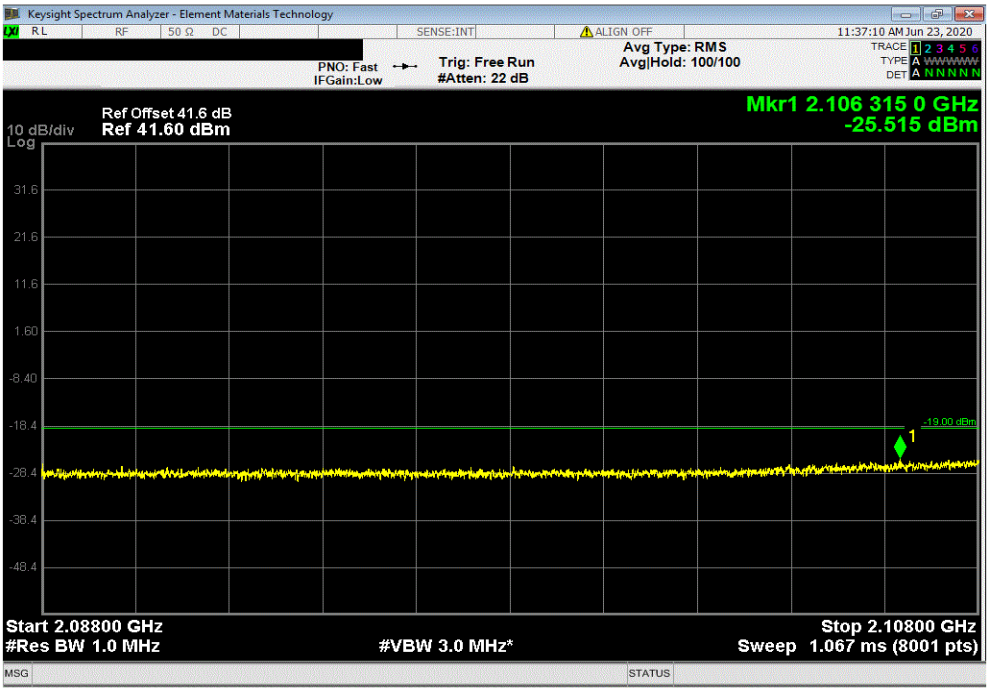

| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , QPSK Modulation, Low Channel 2115 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | 2108.5 | -26.84 | -19 | Pass |



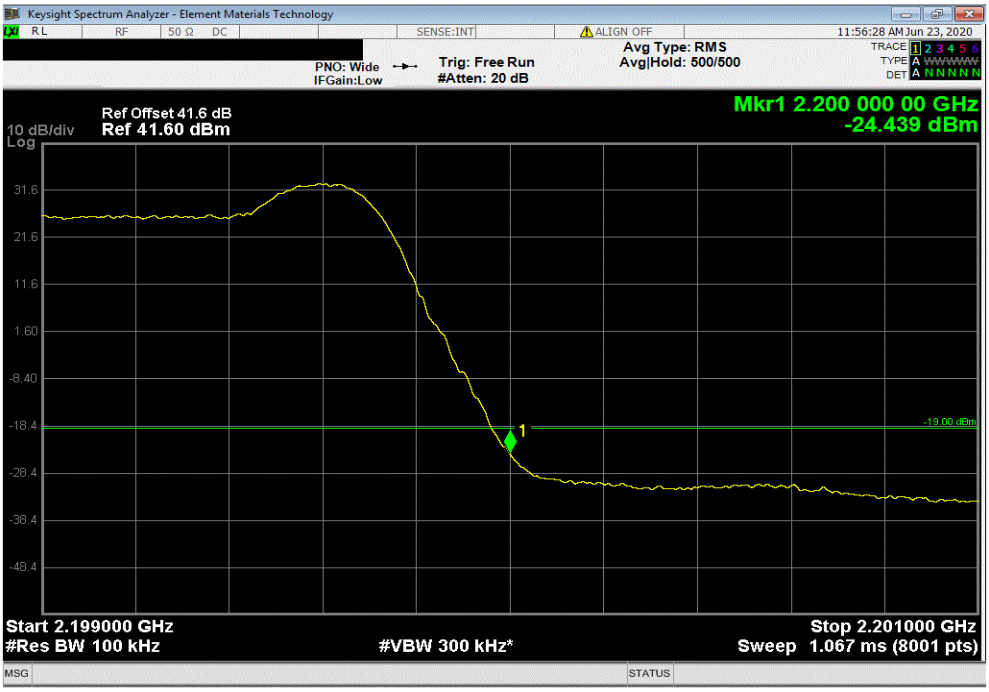
# BAND EDGE COMPLIANCE - BAND 66



| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , QPSK Modulation, Low Channel 2115 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | 2106.3 | -25.52 | -19 | Pass |



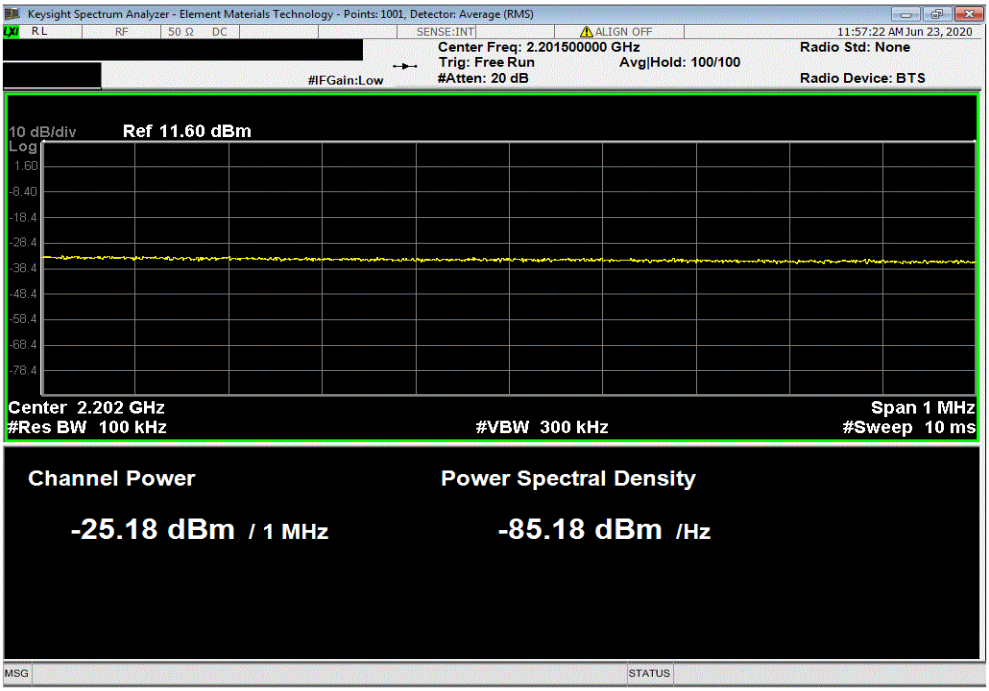

| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , QPSK Modulation, High Channel 2195 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | 2200.0 | -24.44 | -19 | Pass |



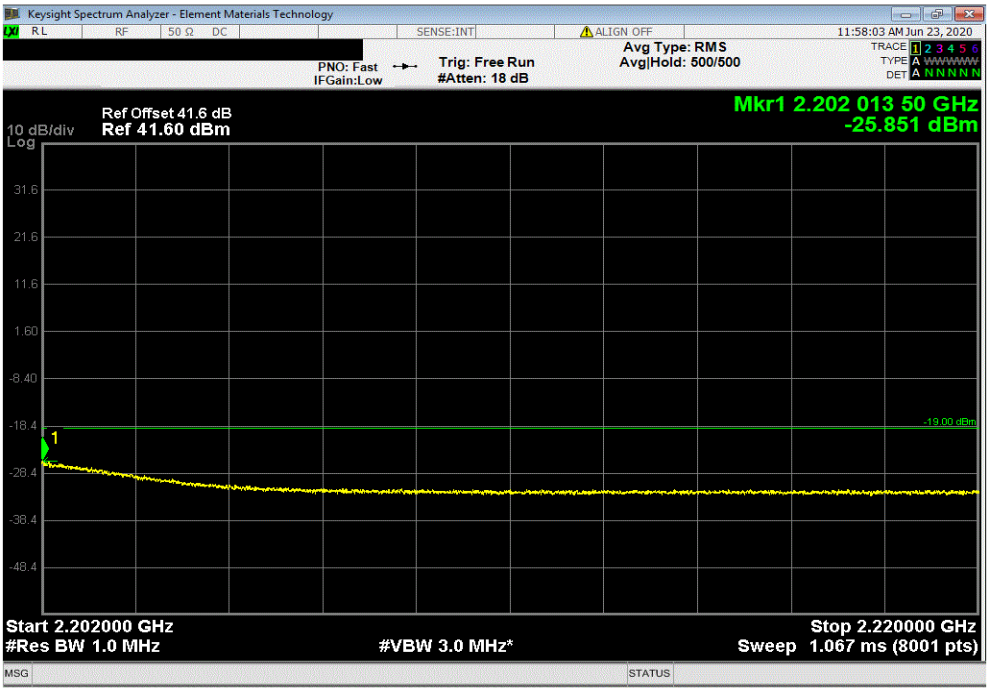
# BAND EDGE COMPLIANCE - BAND 66



| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , QPSK Modulation, High Channel 2195 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | 2201.5 | -25.18 | -19 | Pass |

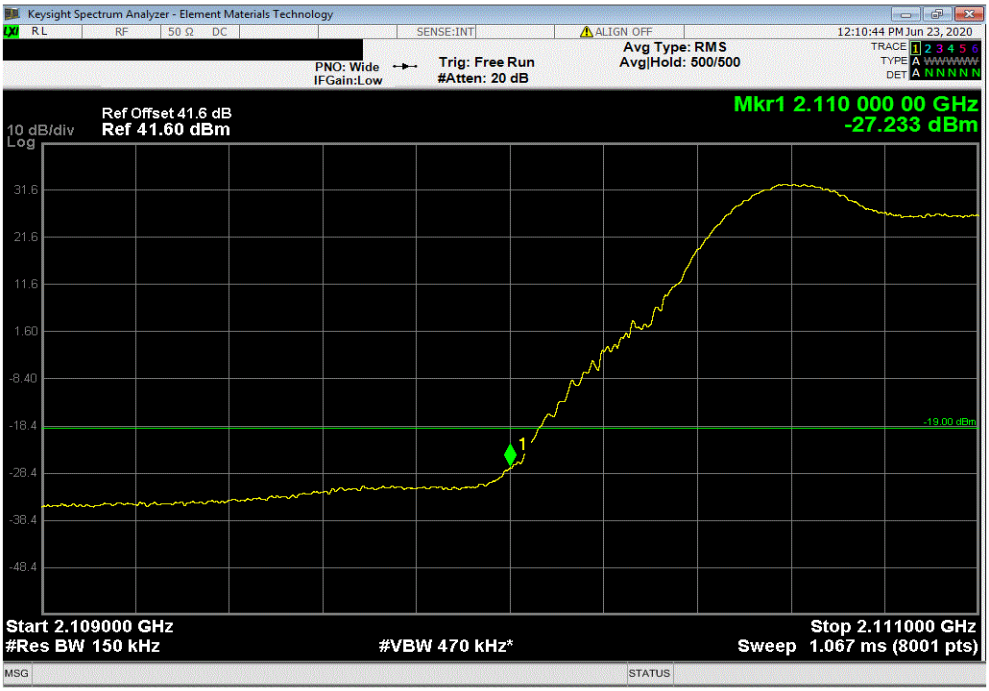



| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 10 MHz Bandwidth , QPSK Modulation, High Channel 2195 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | 2202.0 | -25.85 | -19 | Pass |

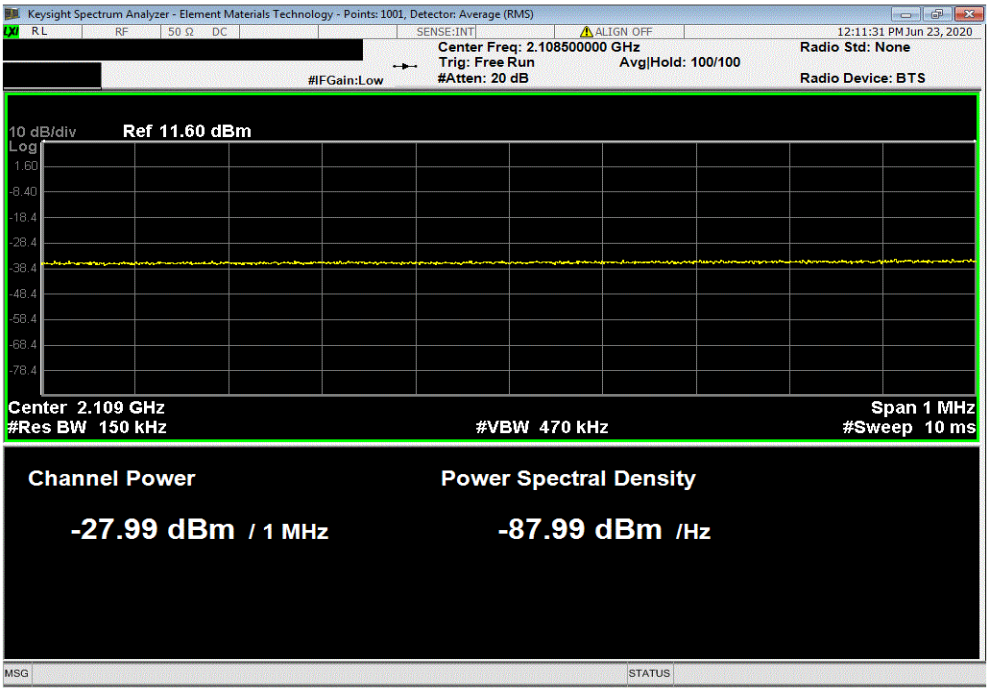


# BAND EDGE COMPLIANCE - BAND 66

| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , QPSK Modulation, Low Channel 2117.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | 2110.0 | -27.23 | -19 | Pass |



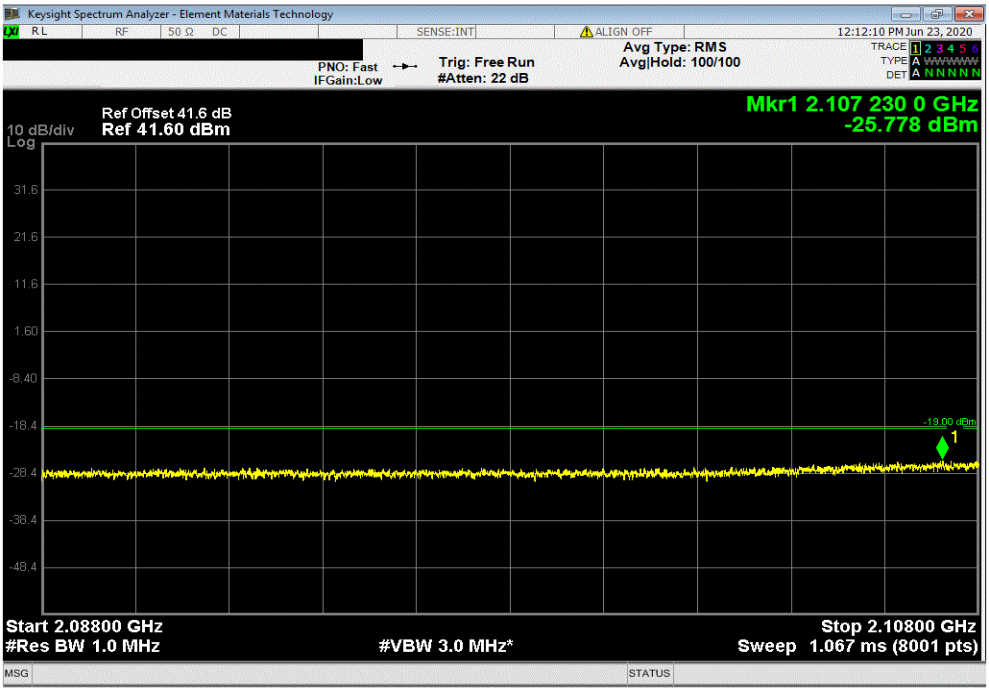

| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , QPSK Modulation, Low Channel 2117.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | 2108.5 | -27.99 | -19 | Pass |



# BAND EDGE COMPLIANCE - BAND 66



| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , QPSK Modulation, Low Channel 2117.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | 2107.2 | -25.78 | -19 | Pass |




| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , QPSK Modulation, High Channel 2192.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | 2200.0 | -27.22 | -19 | Pass |

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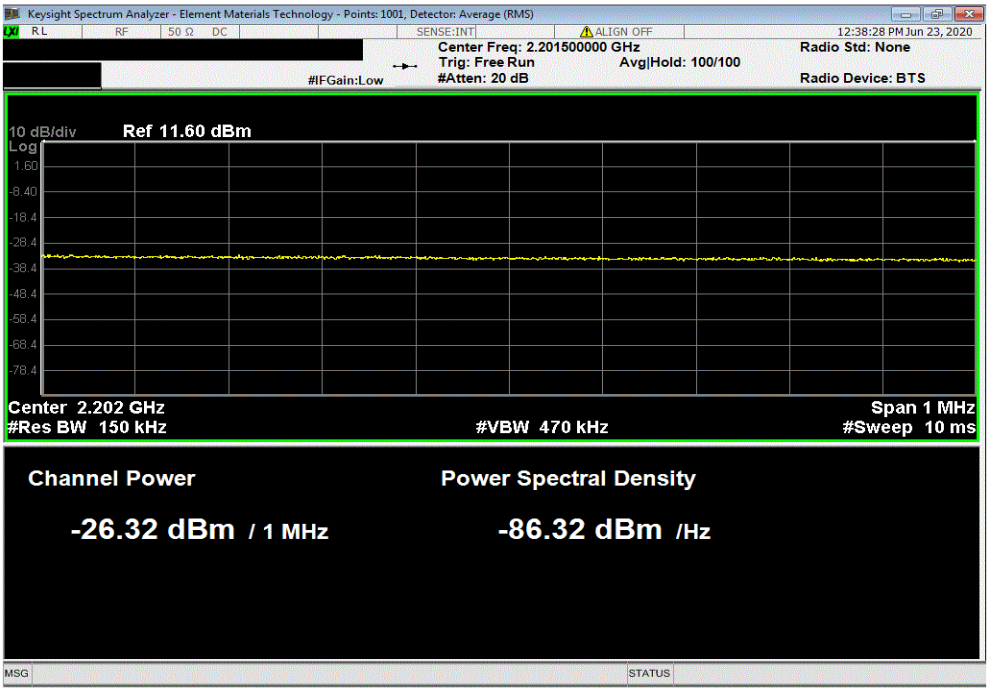
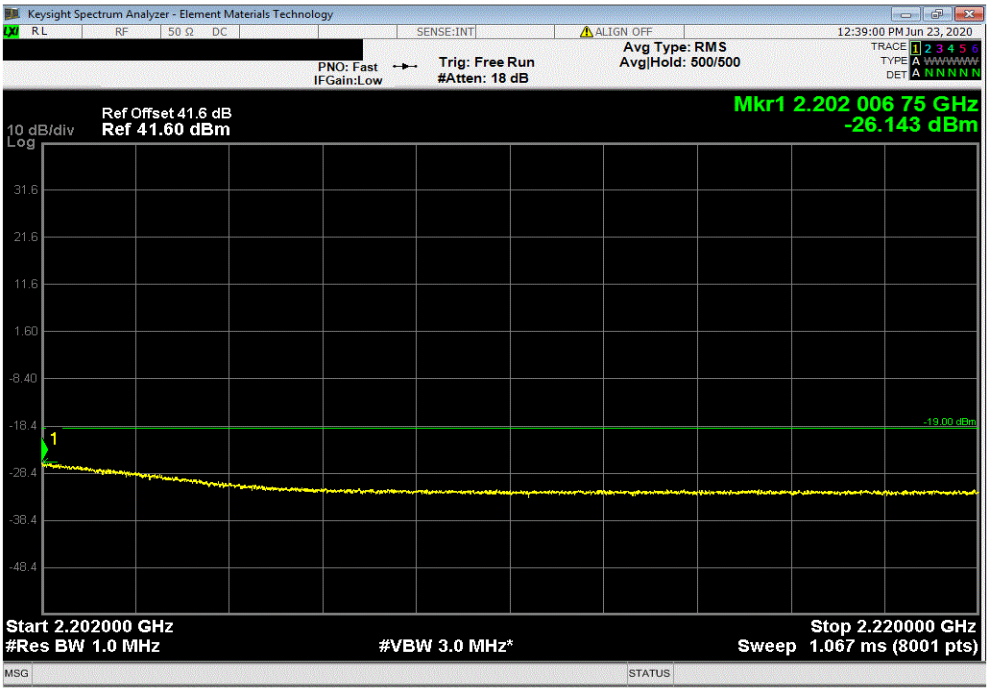
| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , QPSK Modulation, High Channel 2192.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | 2201.5 | -26.32 | -19 | Pass |



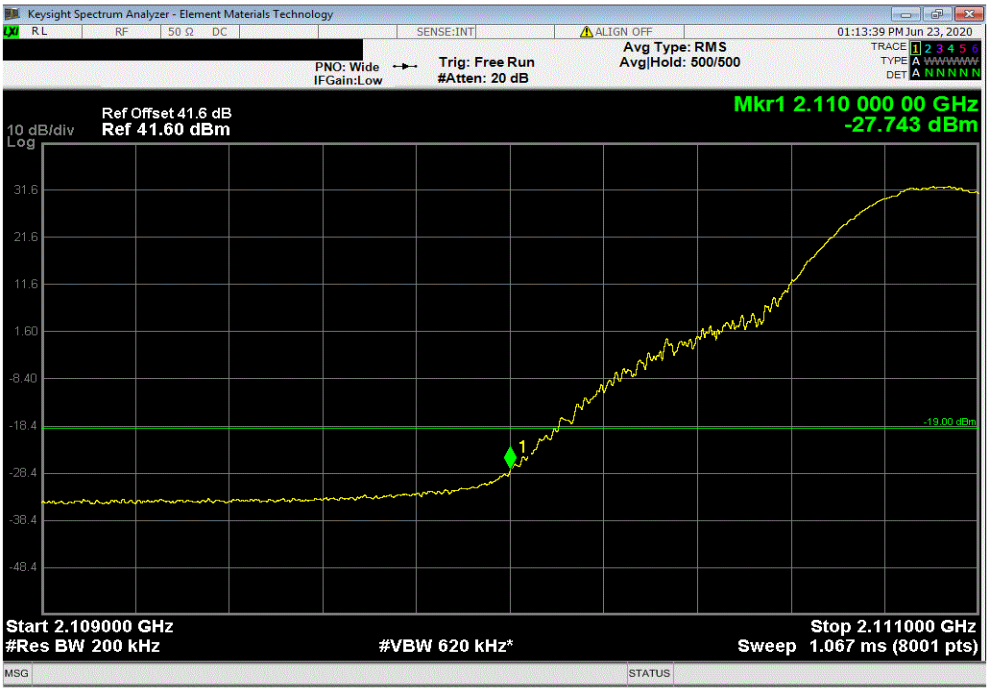

| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 15 MHz Bandwidth , QPSK Modulation, High Channel 2192.5 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | 2202.0 | -26.14 | -19 | Pass |



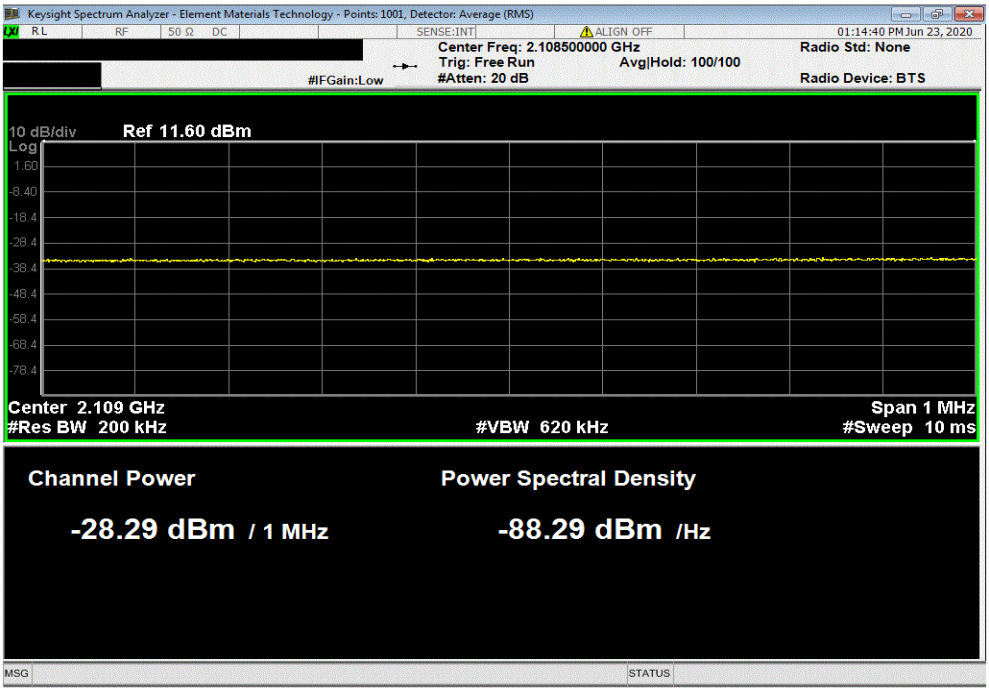
# BAND EDGE COMPLIANCE - BAND 66



| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, Low Channel 2120 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | 2110.0 | -27.74 | -19 | Pass |



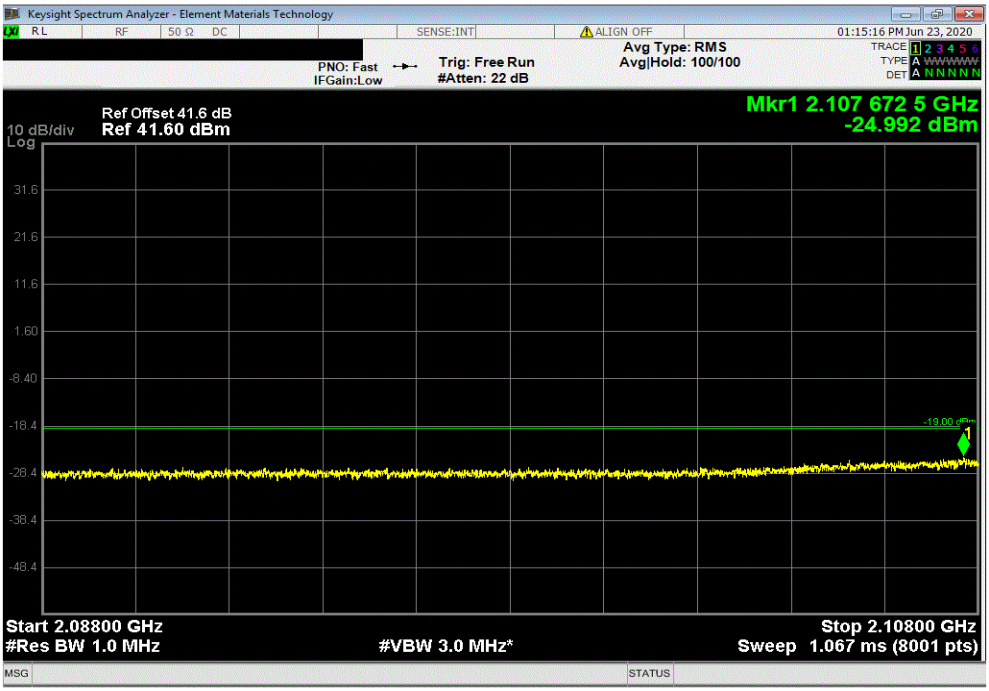

| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, Low Channel 2120 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | 2108.5 | -28.29 | -19 | Pass |



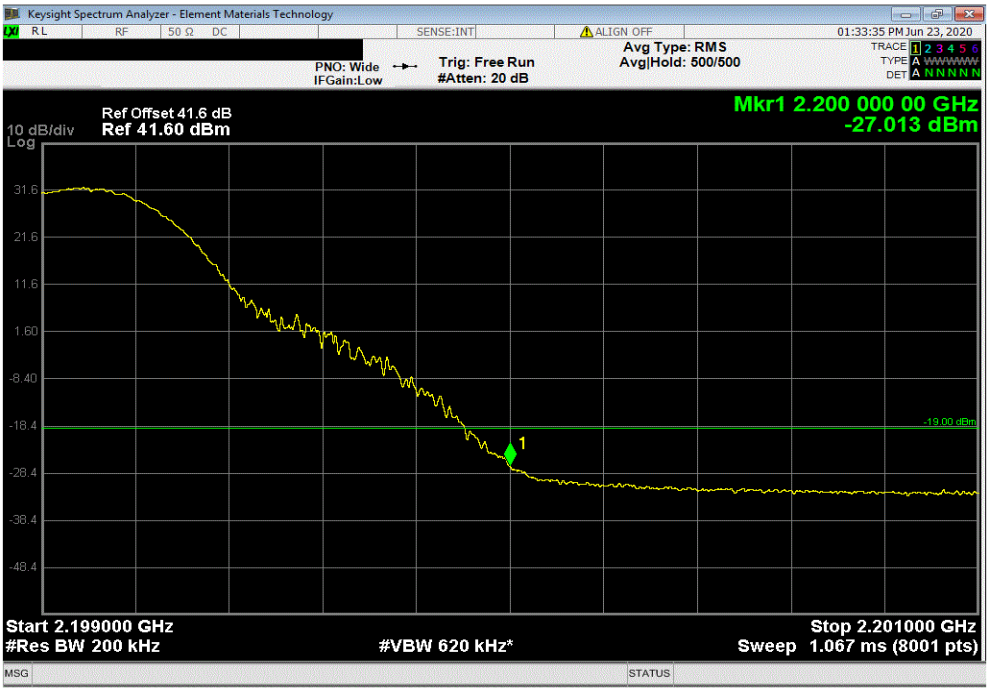
# BAND EDGE COMPLIANCE - BAND 66



| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, Low Channel 2120 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | 2107.7 | -24.99 | -19 | Pass |




| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, High Channel 2190 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 1 | | 2200.0 | -27.01 | -19 | Pass |



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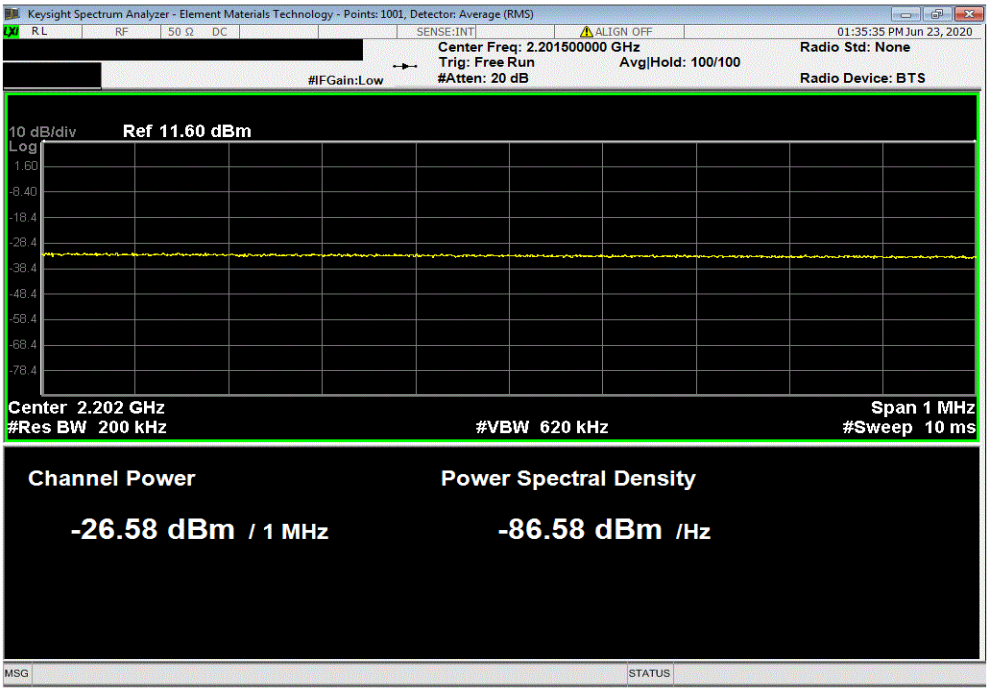
| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, High Channel 2190 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 2 | | 2201.5 | -26.58 | -19 | Pass |




| Port 4, Band 66 NB IoT, 2110 MHz - 2200 MHz, 20 MHz Bandwidth, QPSK Modulation, High Channel 2190 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Frequency Range | | Measured Freq (MHz) | Max Value (dBm) | Limit < (dBm) | Result |
| | 3 | | 2202.1 | -27.34 | -19 | Pass |