

BAND EDGE COMPLIANCE - BAND 66



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 $[-10 \cdot \log(4)]$ 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 $[-13 \text{ dBm} - 10 \log(4)]$ 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 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 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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TstTx 2020.06.06.0 BETA XMIR 2020.03.25.0

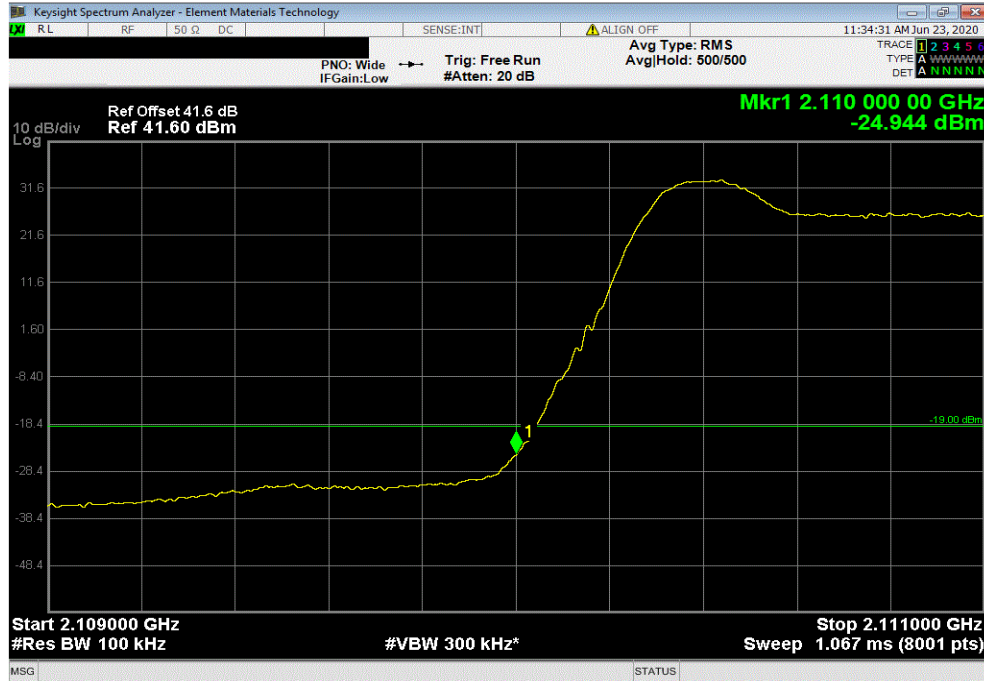
EUT: AHFIG		Work Order: NOKI0016	
Serial Number: K9191322351		Date: 23-Jun-20	
Customer: Nokia Solutions and Networks		Temperature: 22.2 °C	
Attendees: Mitchell Hill, John Rattanavong		Humidity: 53% RH	
Project: None		Barometric Pres.: 1015 mbar	
Tested by: Brandon Hobbs		Power: 54 VDC	
Job Site: TX05			
TEST SPECIFICATIONS		Test Method	
FCC 27:2020		ANSI C63.26:2015	
COMMENTS			
All measurement path losses were accounted for in the reference level offset 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
	Low Channel 2115 MHz	2	2108.5
	Low Channel 2115 MHz	3	2106.3
	High Channel 2195 MHz	1	2200.0
	High Channel 2195 MHz	2	2201.5
	High Channel 2195 MHz	3	2202.0
15 MHz Bandwidth			
QPSK Modulation			
	Low Channel 2117.5 MHz	1	2110.0
	Low Channel 2117.5 MHz	2	2108.5
	Low Channel 2117.5 MHz	3	2107.2
	High Channel 2192.5 MHz	1	2200.0
	High Channel 2192.5 MHz	2	2201.5
	High Channel 2192.5 MHz	3	2202.0
20 MHz Bandwidth			
QPSK Modulation			
	Low Channel 2120 MHz	1	2110.0
	Low Channel 2120 MHz	2	2108.5
	Low Channel 2120 MHz	3	2107.7
	High Channel 2190 MHz	1	2200.0
	High Channel 2190 MHz	2	2201.5
	High Channel 2190 MHz	3	2202.1

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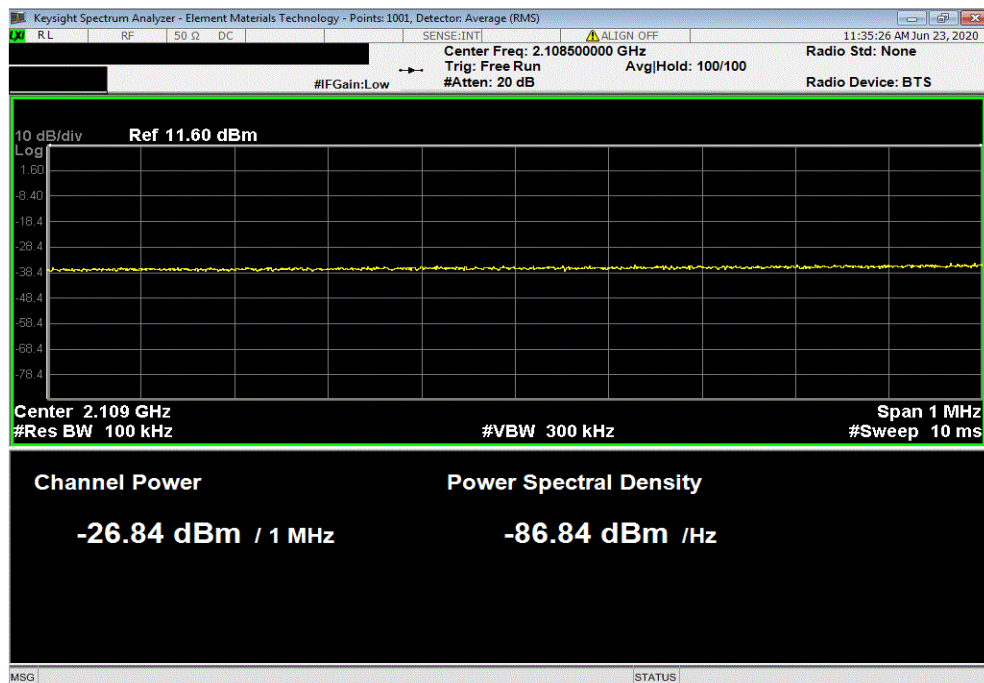


TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

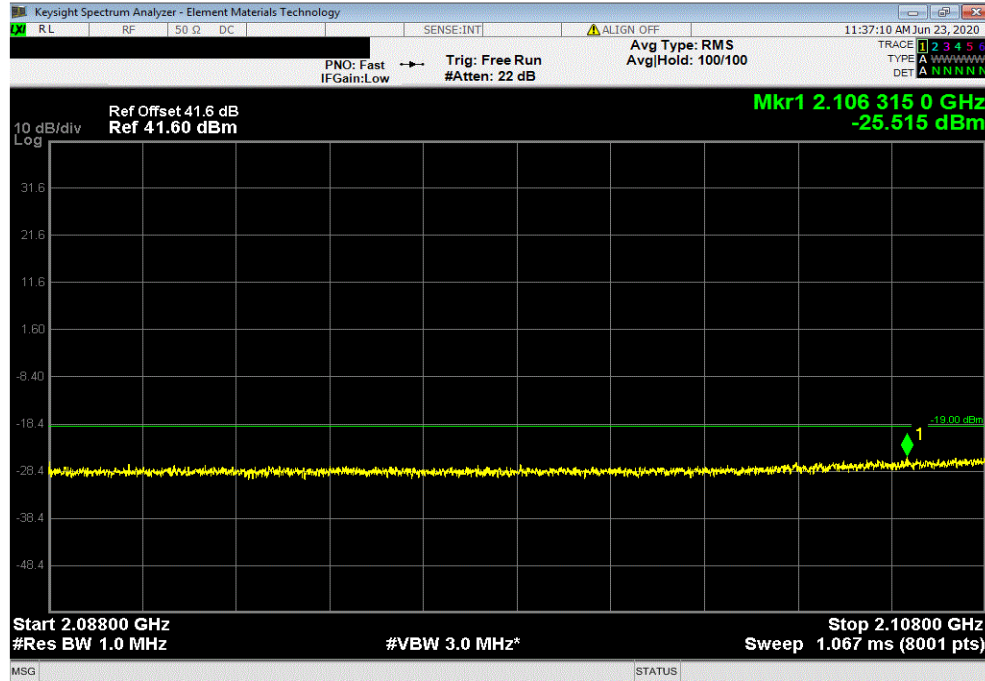


BAND EDGE COMPLIANCE - BAND 66

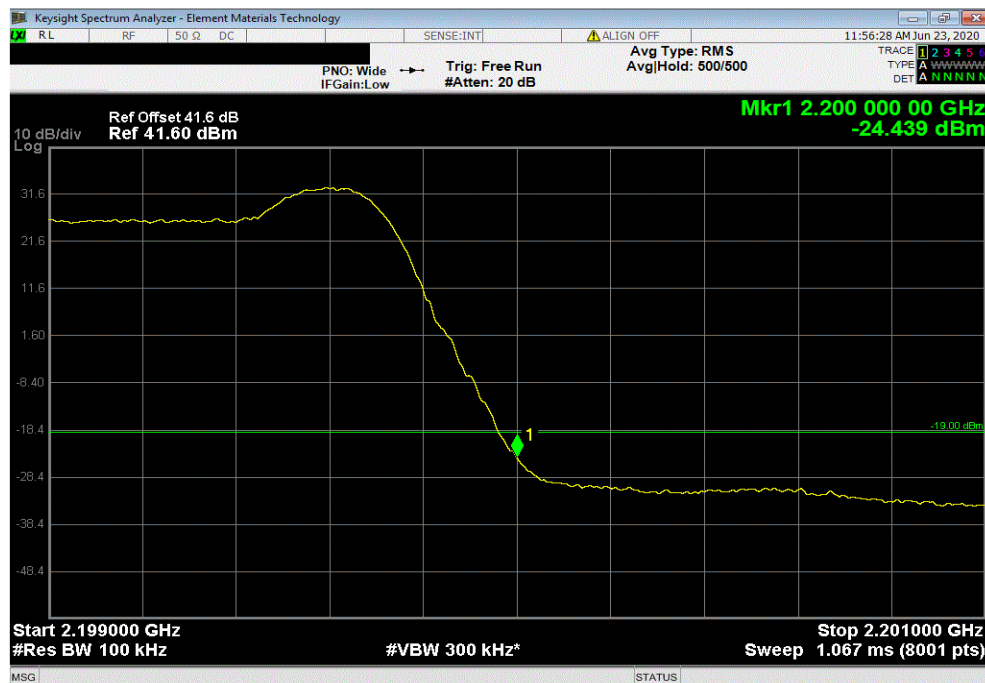


TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

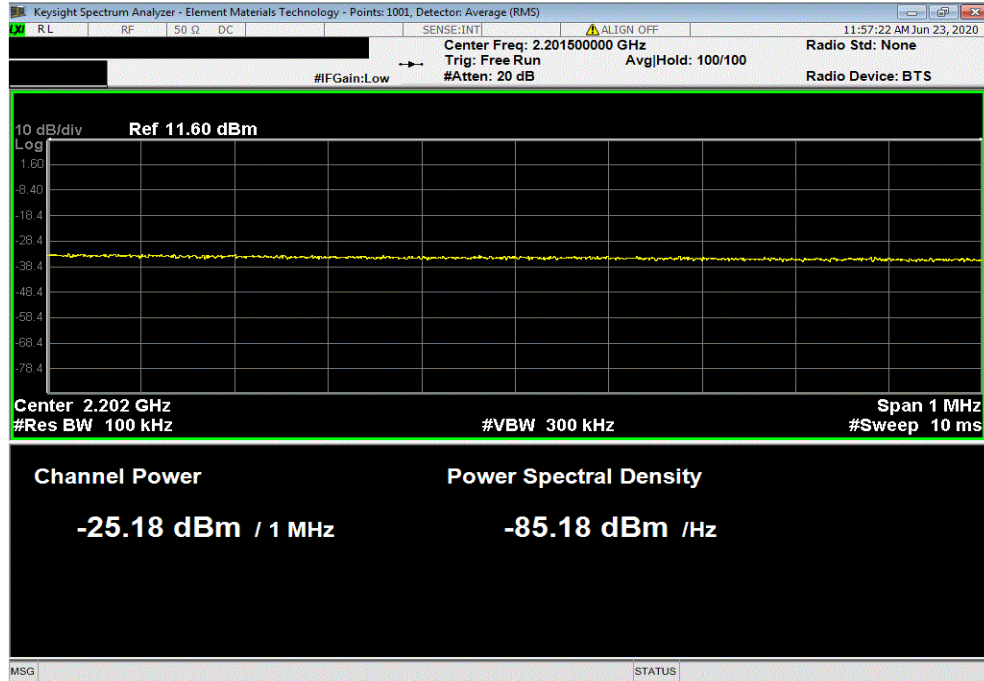


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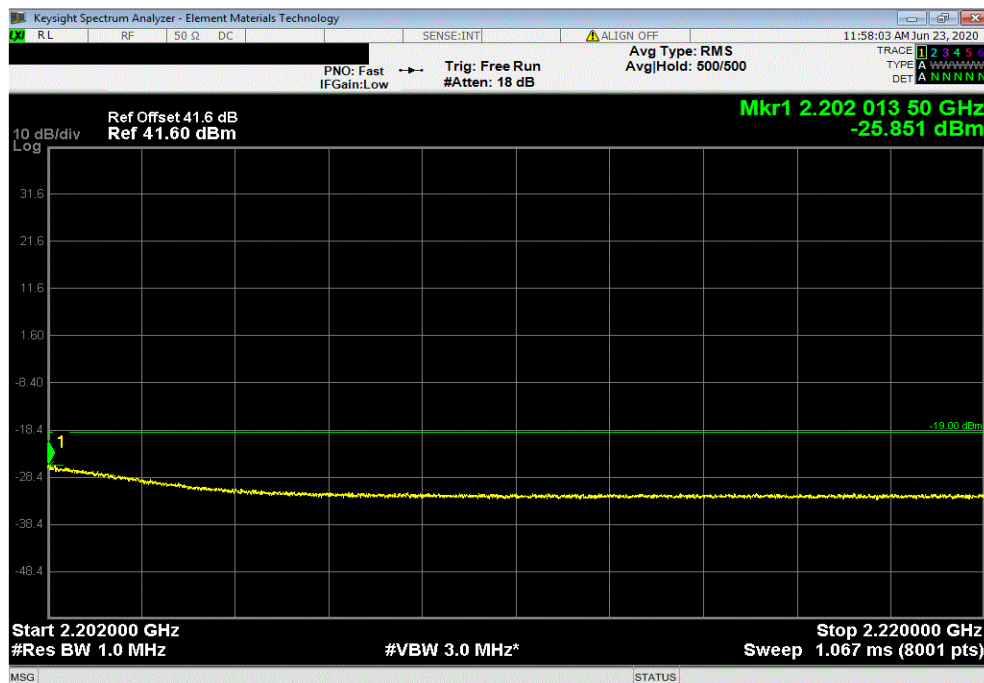


TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

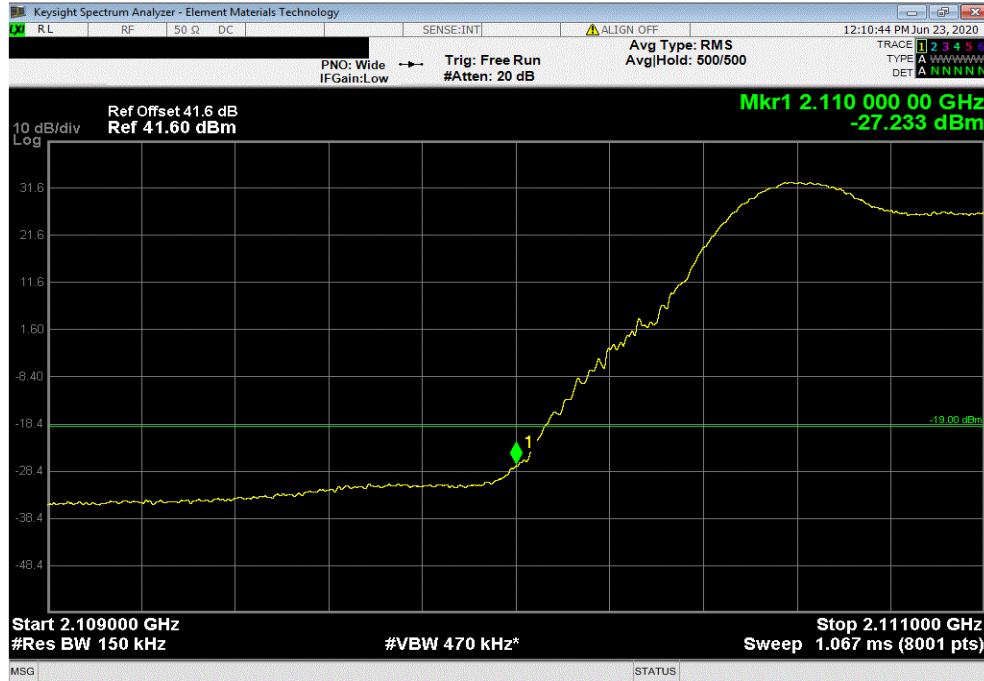


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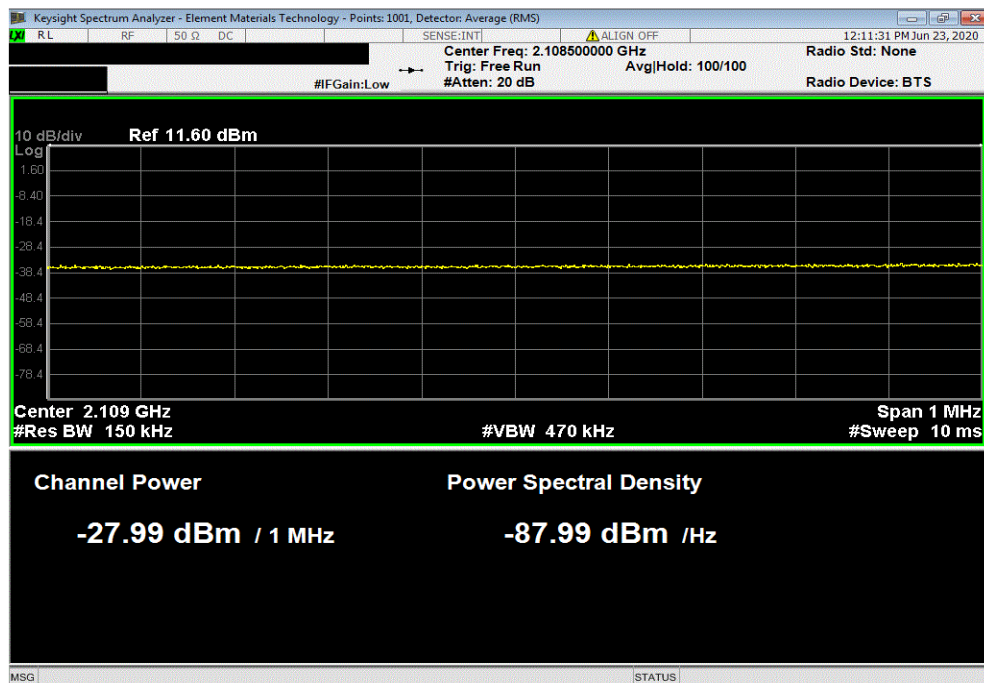


TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

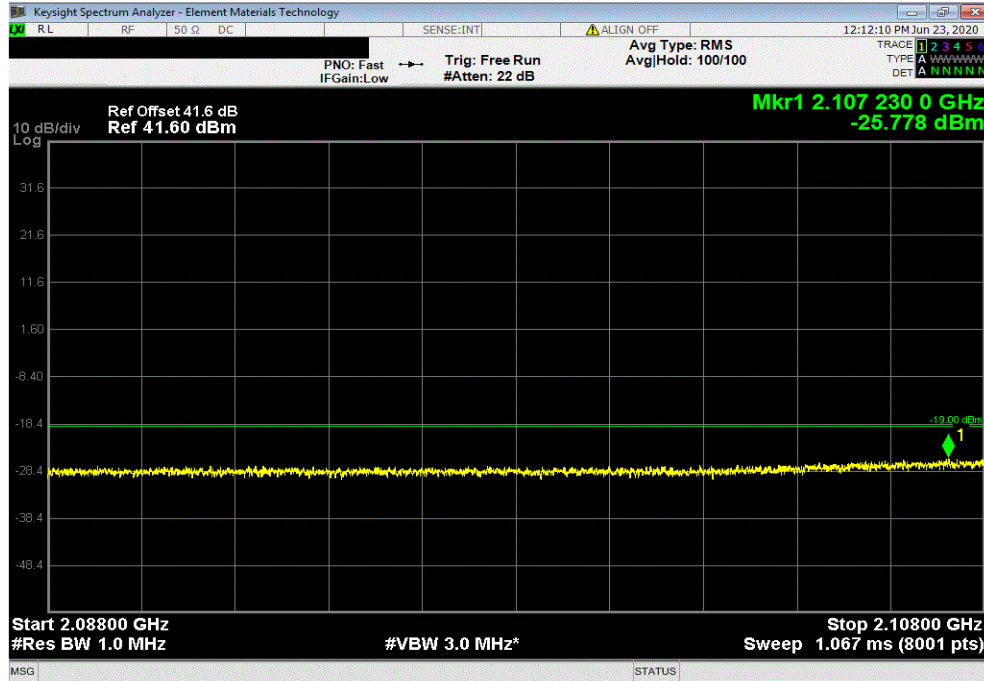


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TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

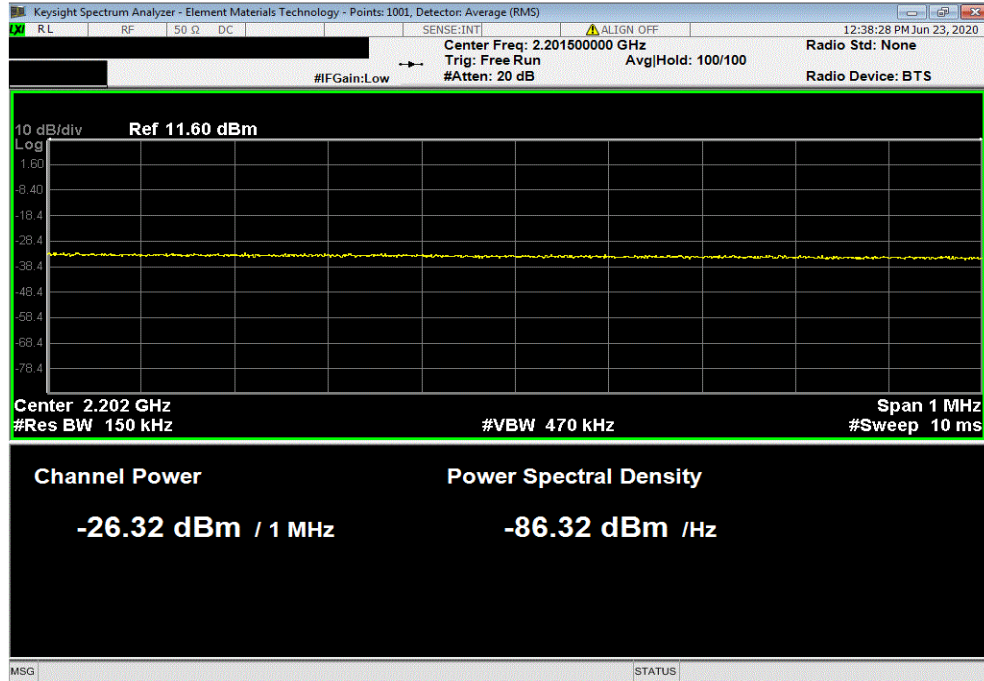


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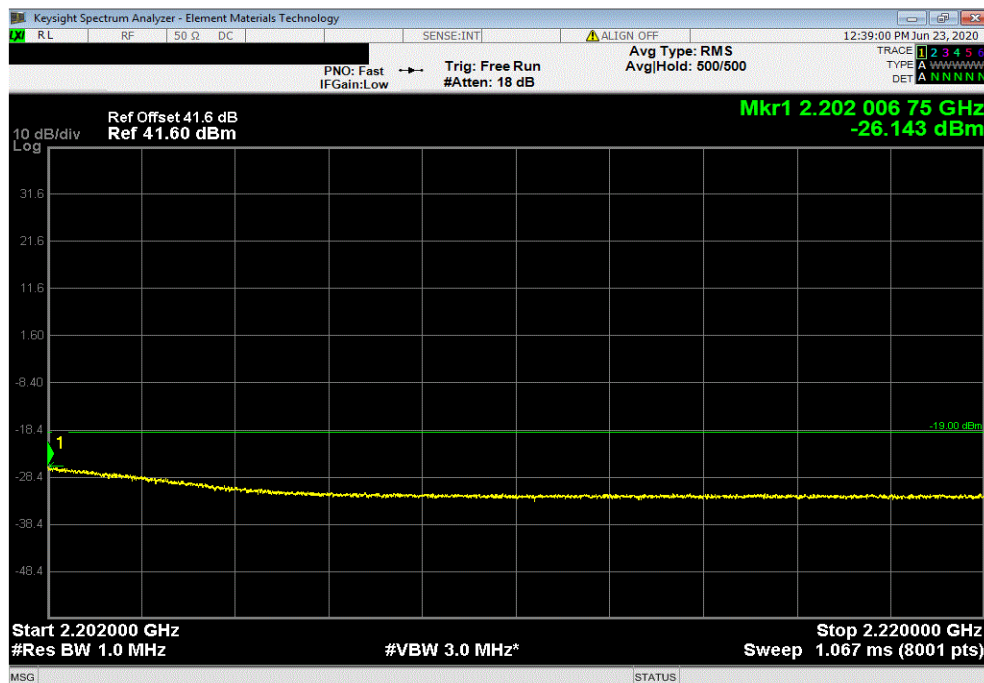


TbTx 2020.06.08.0 BETA XMit 2020.03.25.0

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		

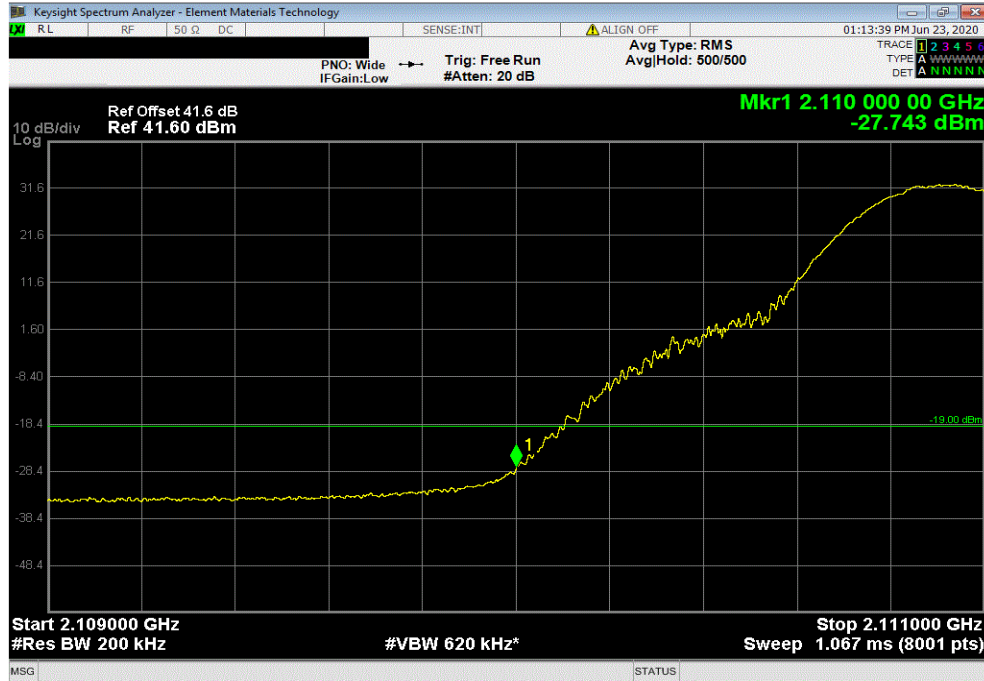


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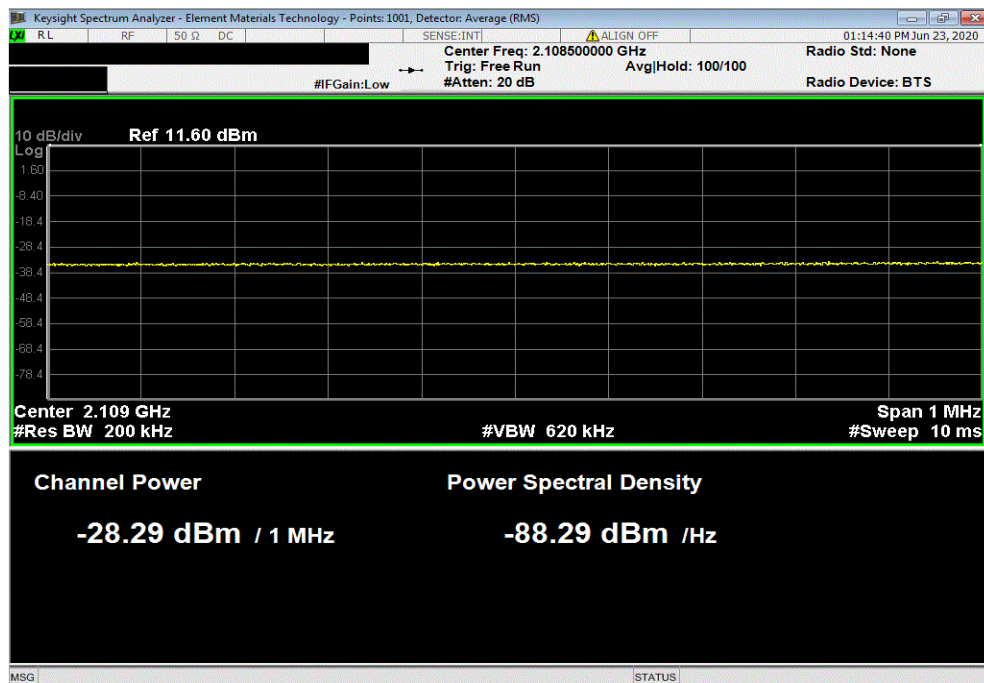


TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

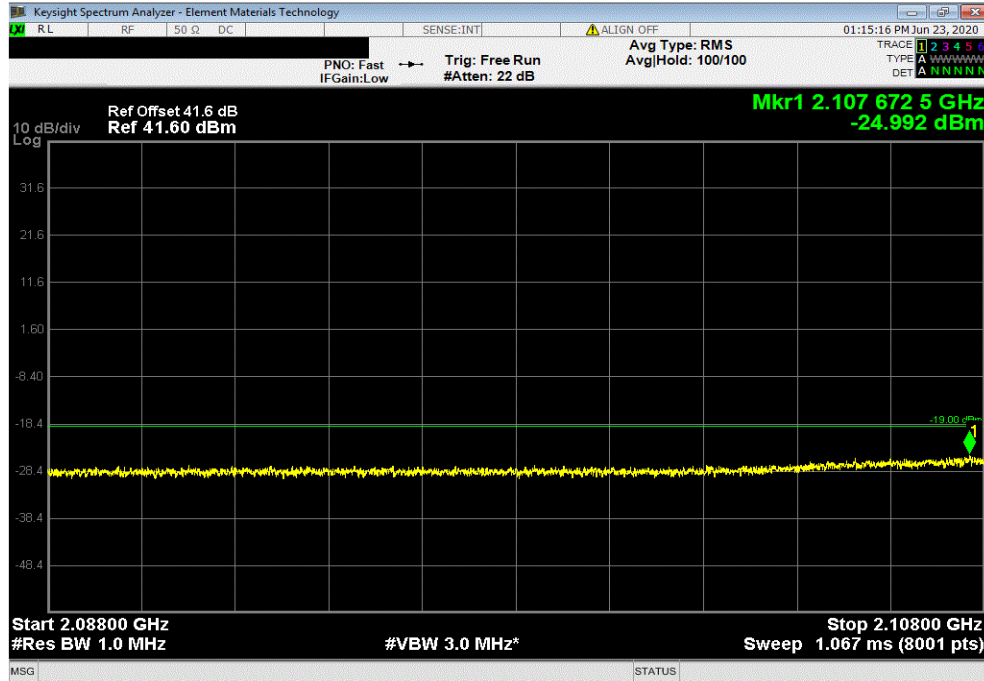


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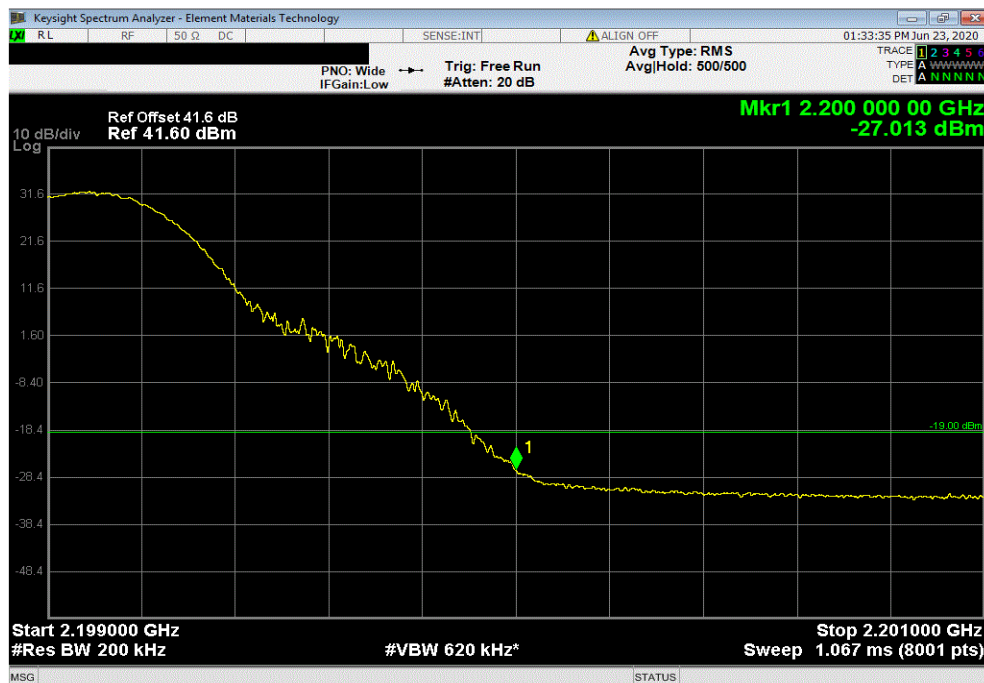


TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

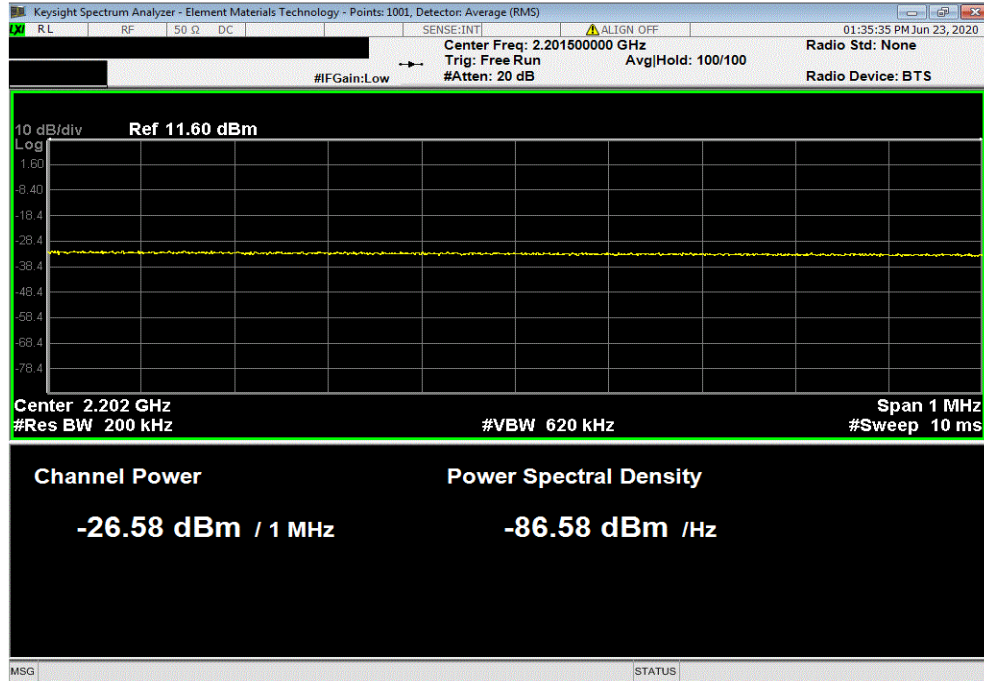


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TbTx 2020.06.08.0 BETA XMt 2020.03.25.0

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		

