Class II Change Application for Grant of Equipment Authorization

CERTIFICATE #: 0214.19

Nokia Solutions and Networks
Airscale Base Transceiver Station AHLOA Remote Radio Head

FCC ID: VBNAHLOA-01

Test Sites: Nokia Solutions and Networks
6000 Connection Drive
Irving, TX 75039
And
National Technical Systems – Plano
1701 E Plano Pkwy #150
Plano, TX 75074

NTS Plano FCC Laboratory Designation No.: US1077
NTS Plano ISED Laboratory Assigned Code: 4319A

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Prepared By:

BreAnna Cheatham

Technical Writer

Approved By:

Chelsie Morrow

Quality Assurance

Reviewed By:

Alex Mathews
EMI Project Manager

Revision History

Revision Number	Date	Comments	Modified By
Rev. 0	12/20/2018	Initial Report	BreAnna Cheatham

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1 SCOPE/OBJECTIVE

A class II permissive change on the original filing is being pursued to add a single Narrow band IoT Guard Band (NB IoT GB here after) carrier to the AirScale AHLOA Base Station Remote Radio Head Federal Communication Commission certification. Please refer to the test report on the original certification (NTS Report for FCC ID: VBNAHLOA-01 Rev 0 dated April 25, 2018) for details on all required testing.

All conducted RF testing performed for the original certification testing has been repeated using NB IoT GB for this class II permissive change per correspondence/guidance from Nemko TCB. The same test methodology used in the original certification testing was used in this class II permissive change test effort. Tests performed under the class II change effort include RF power, peak to average power ratio, emission bandwidth (99% and 26 dB down), band edge spurious emissions, and conducted spurious emissions.

Antenna port conducted RF measurements were taken with NTS personnel (Christian Booker) at Nokia premises located at 6000 Connection Drive; Irving, Texas, on November 13-19, 2018. The base station and remote radio head software for this testing is an updated release that includes the single carrier NB IoT GB support. The LTE and guard band modulation types were both QPSK for all testing herein. The test sample was selected and prepared by John Lopresti of Nokia Solutions and Networks.

Conducted Emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards:

ANSI C63.26-2015

FCC KDB 971168 DO1 v03r01

FCC KDB 662911 DO1 v02r01

STATEMENT OF COMPLIANCE

The tested sample of Nokia Solutions and Networks product AHLOA AirScale Base Station Remote Radio Head complied with the requirements of the standards and frequency bands declared in the scope of this test report.

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

MEASUREMENT UNCERTAINTIES

Measurement uncertainties of the test facility based on a 95% confidence level are as follows:

Table 1. Measurement Uncertainties

Test	**Uncertainty**
Radio frequency	± 0.2ppm
RF power conducted	±1.2 dB
RF power radiated	±3.3 dB
RF power density conducted	±1.2 dB
Spurious emissions conducted	±1.2 dB
Adjacent channel power	±0.4 dB
Spurious emissions radiated	±4 dB
Temperature	±1°C
Humidity	±1.6 %
Voltage (DC)	±0.2 %
Voltage (AC)	±0.3 %

2 TEST RESULTS SUMMARY FOR THE CLASS II TESTING

2.1 FCC Part 27 Subpart C (Base Stations Operating in the 617 to 652MHz Band)

The following tables provide a summary (Class II testing only) of the test results:

AHLOA Operating in 617-652MHz Band (B 71) - LTE plus single NB IoT Guard Band carrier				
FCC	Description	Measured	Limit	Result(s)
§27.5	Frequency Ranges	LTE10: 619.5-649.5 MHz LTE15: 624.5-644.5 MHz LTE20: 627.0-642.0 MHz	617.0 – 652.0 MHz	Pass
§2.1033(c)(4)	Modulation Type	NB IoT Guard band (QPSK) with LTE10, LTE15 & LTE20	Digital	Pass
§27.50	Output Power	Highest Conducted Power Output RMS: 47.61dBm EIRP depends on antenna gain which is unknown	1000W EIRP	Pass
Informational	Peak to Average Ratio	Highest Measured PAPR: 8.07dB	13dB	Pass
§2.1049	99% Emission Bandwidth	LTE10: 9.24 MHz LTE15: 13.83 MHz LTE20: 18.31 MHz	Remain in Block	Pass
	26dB down Emission Bandwidth	LTE10: 9.82 MHz LTE15: 14.78 MHz LTE20: 19.72 MHz FCC Emission Designators: **9M82F9W** **14M8F9W** **19M7F9W**	Remain in Block	Pass
§27.53(g)	Transmitter Spurious Emissions at the Antenna Terminal	< -19 dBm	-19 dBm per Transmit Chain	Pass[1]
Note 1: Based on 100kHz RBW. In the 100kHz immediately outside and adjacent to the frequency block a RBW of 30kHz was used. The measurement bandwidth is 100kHz for measurements more than 100kHz from the band edge. See Section 27.53(g) for details.				

2.2 FCC Part 27 Subpart C (Base Stations Operating in the 728 to 746MHz Band)

The following tables provide a summary (Class II testing only) of the test results:

AHLOA Operating in 728-746MHz Band (B 12) - LTE plus single NB IoT Guard Band carrier				
FCC	Description	Measured	Limit	Result(s)
27.5	Frequency Ranges	LTE10: 734.0-741.0 MHz	728.0 – 746.0 MHz	Pass
2.1033(c)(4)	Modulation Type	NB IoT Guard band (QPSK) with LTE10	Digital	Pass
27.50	Output Power	Highest Conducted Power Output RMS: 47.35dBm EIRP depends on antenna gain which is unknown	1000W EIRP	Pass
Informational	Peak to Average Ratio	Highest Measured PAPR: 8.09dB	13dB	Pass
2.1049	99% Emission Bandwidth	LTE10: 9.24 MHz	Remain in Block	Pass
	26dB down Emission Bandwidth	LTE10: 9.81 MHz FCC Emission Designator: **9M81F9W**	Remain in Block	Pass
27.53(g)	Transmitter Spurious Emissions at the Antenna Terminal	< -19 dBm	-19 dBm per Transmit Chain	Pass[1]
Note 1: Based on 100kHz RBW. In the 100kHz immediately outside and adjacent to the frequency block a RBW of 30kHz was used. The measurement bandwidth is 100kHz for measurements more than 100kHz from the band edge. See Section 27.53(g) for details.				

3 EUT HARDWARE

Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia Solutions and Networks	AHLOA	AirScale BTS RRH	Part Number: 474331A.101 Serial Number: K9180540675	FCC ID: VBNAHLOA-01

4 TEST MEASUREMENT EQUIPMENT

Company	Type	Model	Serial Number	Last Cal	Cal Due
Keysight	Spectrum Analyzer	MXA N2090A	US46220313	02/16/17	02/16/19
Keysight	Spectrum Analyzer	PSA E4440A	MY44303970	10/18/17	10/18/19
R&S	Network Analyzer	ZVL	102098	02/11/18	02/11/19

5 AUXILLARY EQUIPMENT

Company	Description	Part/Serial Number	Serial Number
Narda	Attenuator, 30 dB, 150 W	769-30	06709
Aeroflex/Weinschel	Attenuator, 20 dB, 100 W	48-20-33	BT3184
Weinschel	Attenuator, 20 dB, 150 W	57-20-33-LM	MC060
Mini-Circuits	Low Pass Filt. DC-550MHz	NLP-550	10016
Aeroflex/Weinschel	Attenuator, 6 dB, 50 W	24-6-24	BF7065

6 SUPPORT EQUIPMENT

Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia	ASIA + ABIA	AirScale System Module	ASIA Part Number: 473095A.101 ASIA Serial Number: 473095A ABIA Part Number: 473096A.102 ABIA Serial Number: L1162906771	N/A

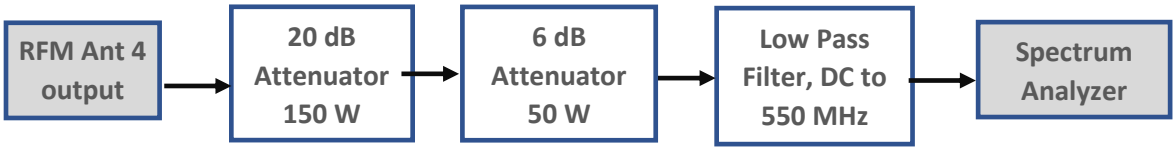
7 EUT SOFTWARE

The base station and RF module software for this testing is an updated release that includes the NB IoT GB type as defined below.

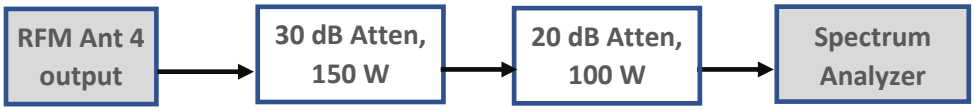
(1) RFM Unit Software: FRM58.11.R09
(2) System Module Software: FL18SP_ENB_0000_200022_0000 (LTE10)
(3) System Module Software: FL18A_ENB_0000_000623_0000 (LTE15 and LTE20)

8 RF TEST SETUP DIAGRAMS

The following are the setups used in the RF conducted emissions testing.

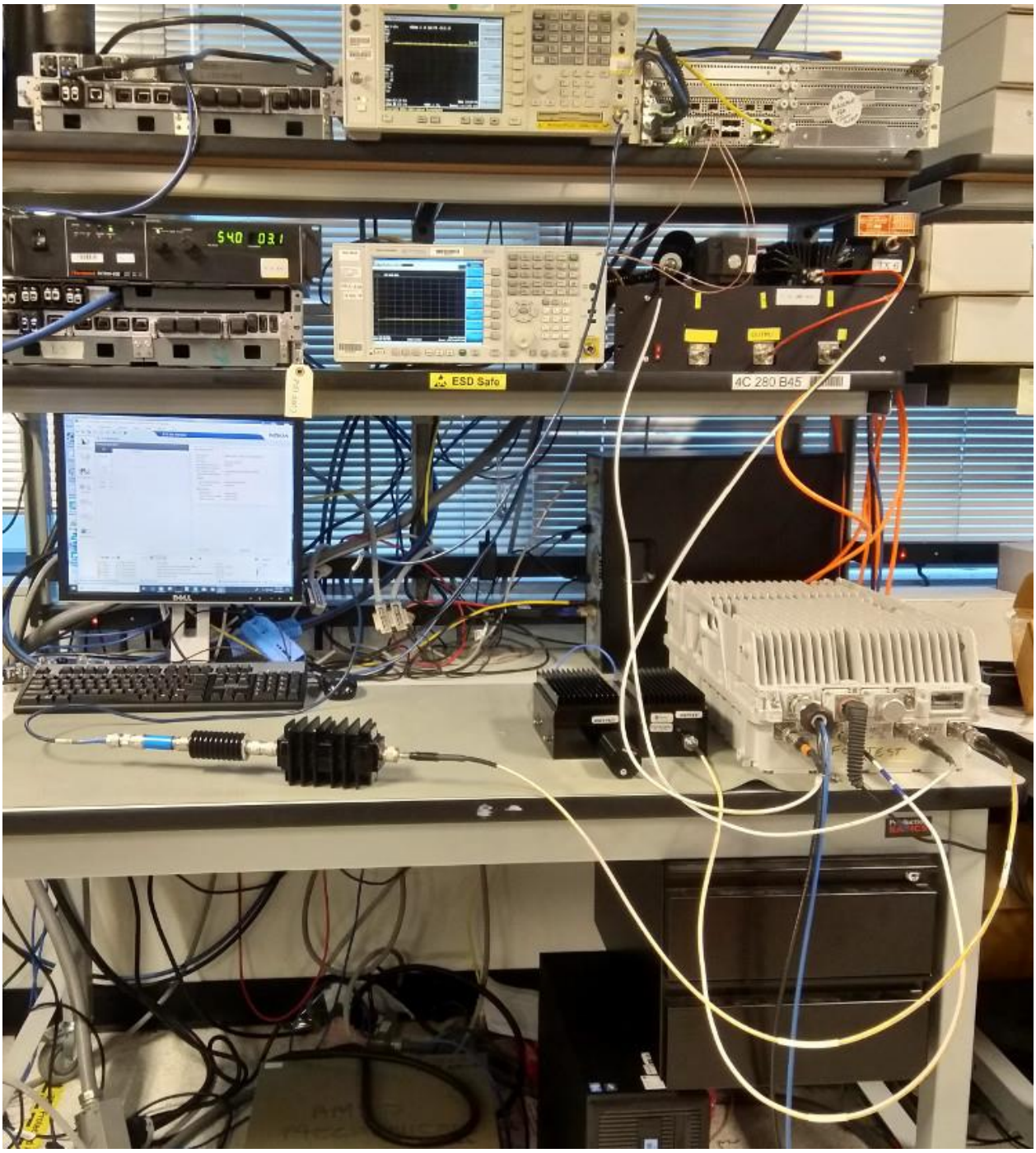


Setup for 9 kHz to 10MHz Measurements

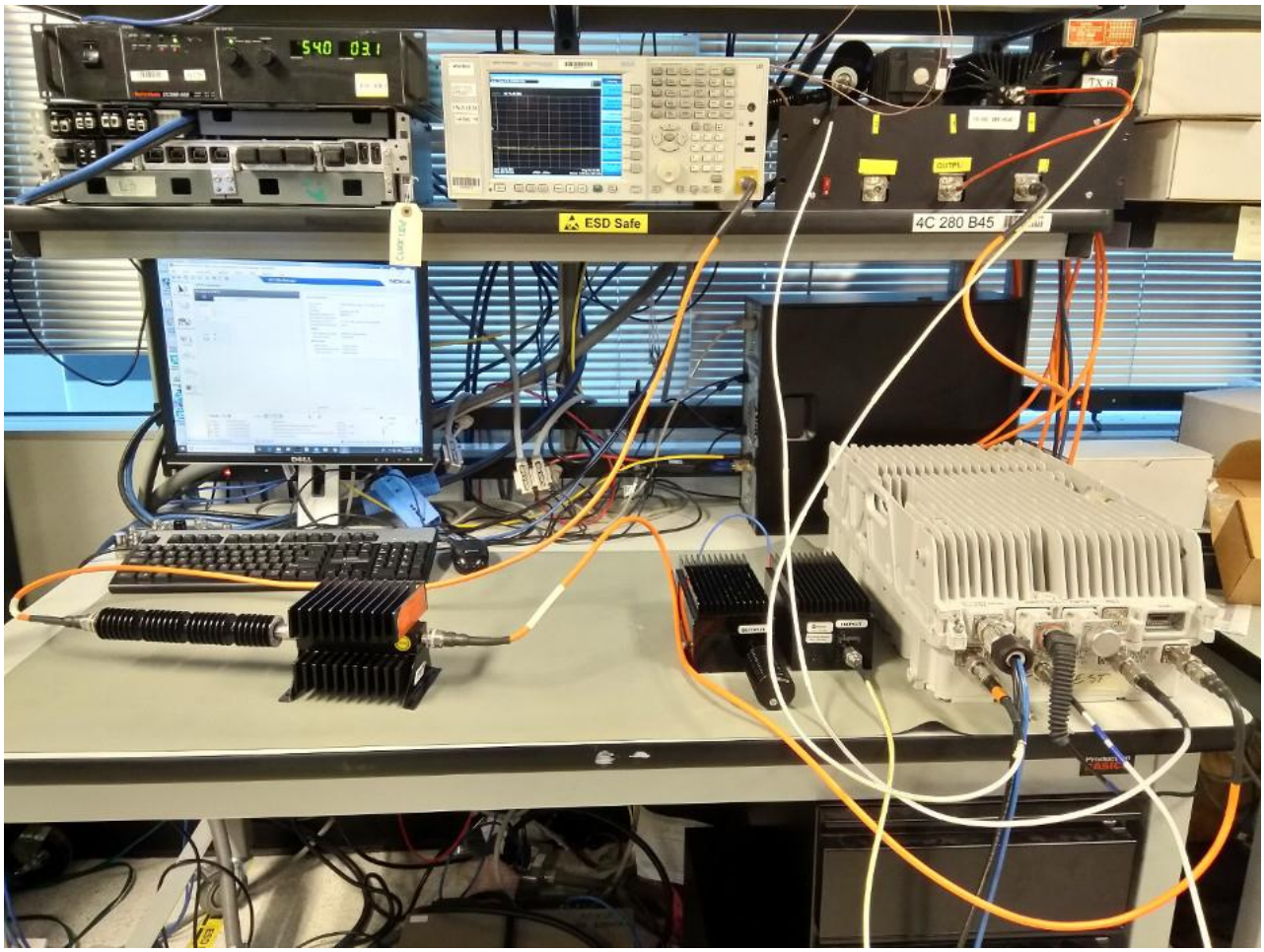


Setup for 10MHz to 10GHz Measurements

9 TEST SETUP PHOTOGRAPHS



9kHz to 10MHz Setup Photo



10 MHz to 10GHz Setup Photo

10 AHLOA LTE DOWNLINK BAND EDGE EARFCNS

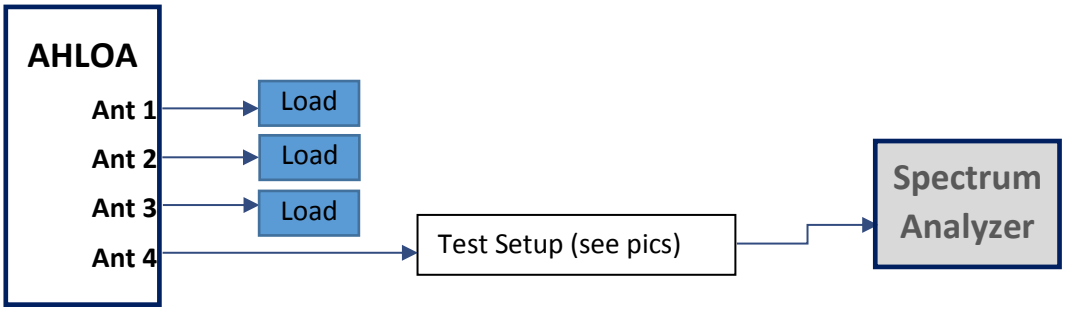
Band 71 (BTS Rx: 663 to 698 MHz/BTS Tx: 617 to 652 MHz) band edge downlink (BTS Transmit) EARFCNs for LTE channel bandwidths (5, 10, 15 and 20 MHz) are provided in following table. The EARFCN is defined as E-UTRA Absolute Radio Frequency Channel Number. The channel spacing is 100 kHz between channel numbers.

Band 71 Frequencies and Channels (Ant 1,2,3,4)					
Downlink EARFCN	**Downlink Frequency (MHz)**	**LTE Channel Bandwidth**			
		5 MHz	**10 MHz**	**15 MHz**	**20 MHz**
68586	617.0	Band Edge	Band Edge	Band Edge	Band Edge
…					
68611	619.5	Bottom Ch			
…					
68636	622.0		Bottom Ch		
…					
68661	624.5			Bottom Ch	
…					
68686	627.0				Bottom Ch
…					
68761	634.5	Middle Ch	Middle Ch	Middle Ch	Middle Ch
…					
68836	642.0				Top Ch
…					
68861	644.5			Top Ch	
…					
68886	647.0		Top Ch		
…					
68911	649.5	Top Ch			
…					
68936	652.0	Band Edge	Band Edge	Band Edge	Band Edge

Band 12 Frequencies and Channels (Ant 1,2,3,4)					
Downlink EARFCN	**Downlink Frequency (MHz)**	**LTE Channel Bandwidth**			
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**
5000	728.0	Band Edge	Band Edge	Band Edge	Band Edge
	1 MHz Offset				
5010	729.0				
…					
5017	729.7	Bottom Ch			
…					
5025	730.5		Bottom Ch		
…					
5035	731.5			Bottom Ch	
…					
5060	734.0				Bottom Ch
…					
5090	737.0	Middle Ch	Middle Ch	Middle Ch	Middle Ch
…					
5130	741.0				Top Ch
…					
5155	743.5			Top Ch	
…					
5165	744.5		Top Ch		
…					
5173	745.3	Top Ch			
…					
5180	746.0	Band Edge	Band Edge	Band Edge	Band Edge

11 Testing

All conducted RF measurements for this test effort in this section were made at AHLOA antenna port 4 (same as the original filing and the port with the highest power). The general test setup used is provided below.



11.1 General Test Setup Used for AHLOA Testing

The output power, emission bandwidth, conducted spurious and conducted band edge measurements were performed with a spectrum analyzer. Measurements were made on the bottom, middle and top channels placing the NB IoT Guard Band carrier at the lower end of the carrier and then the upper end of the carrier for the LTE bandwidths of 10MHz, 15MHz, and 20MHz. FL18SP and FL18A only support NBIOT guard band signals for LTE10, LTE15 and LTE20 bandwidths. Therefore, these bandwidths were the only ones tested for this feature. As required in 3GPP TS 36.141 §6.1.4, the IOT carrier configured was given Cell ID 103. The AHLOA does not support LTE15 or LTE20 MHz bandwidths on band 12 (728-746 MHz transmit frequencies), so the ALOHA was tested for LTE10 only for 728MHz-746MHz. Band 71 was tested for 10MHz, 15MHz and 20MHz bandwidths.

12 TEST DATA FOR AHLOA Band 71 (617-652 MHz)

12.1 RF Output Power

Peak and average output power were measured (in accordance with KDB 971168 D01v03r01 and ANSI C63.26-2015) on AHLOA antenna port 4 on bottom, middle and top frequencies. Peak to average power ratio (PAPR) has been calculated as described in section 5.7.2 of KDB971168 D01 v03r01. The results of the power measurements and PAPR calculations are provided in the tables below.

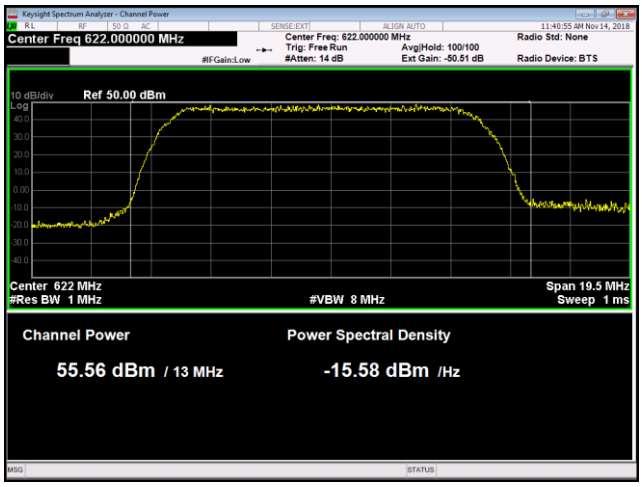
RF Output Power Band 71 NB IoT Lower Guard Band Carrier				
AHLOA Ant port 4	**LTE Bandwidth**	**LTE - Aggregate w/NB IoT GB**		
		Peak (dBm)	**Average (dBm)**	**PAPR (dB)**
Bottom Channel	LTE10	55.56	47.55	8.01
	LTE15	55.55	47.51	8.04
	LTE20	55.43	47.47	7.96
Middle Channel	LTE10	55.49	47.42	8.07
	LTE15	55.38	47.41	7.97
	LTE20	55.44	47.36	8.08
Top Channel	LTE10	55.48	47.54	7.94
	LTE15	55.43	47.47	7.96
	LTE20	55.53	47.51	8.02

RF Output Power Band 71 NB IoT Upper Guard Band Carrier				
AHLOA Ant port 4	**LTE Bandwidth**	**LTE - Aggregate w/NB IoT GB**		
		Peak (dBm)	**Average (dBm)**	**PAPR (dB)**
Bottom Channel	LTE10	55.59	47.61	7.98
	LTE15	55.56	47.59	7.97
	LTE20	55.56	47.50	8.06
Middle Channel	LTE10	55.45	47.47	7.98
	LTE15	55.32	47.33	7.99
	LTE20	55.45	47.33	8.12
Top Channel	LTE10	55.44	47.42	8.02
	LTE15	55.49	47.47	8.02
	LTE20	55.49	47.44	8.05

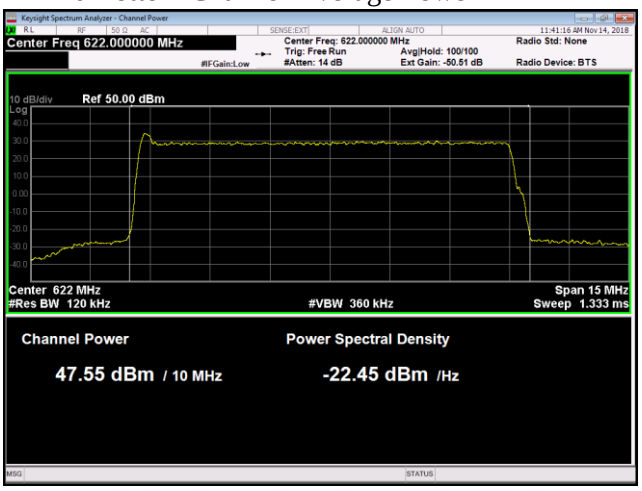
All measurement results are provided in the following pages. The total measurement RF path loss of the test setup (attenuator and test cables) was 50.51 dB and is accounted for by the spectrum analyzer external gain offset.

Channel Power Plots, NB IoT Lower GB Carrier (10MHz):

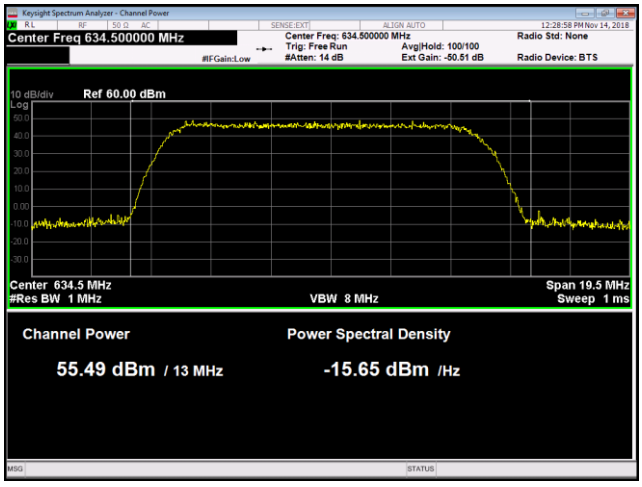
LTE10 Bottom Channel Peak Power



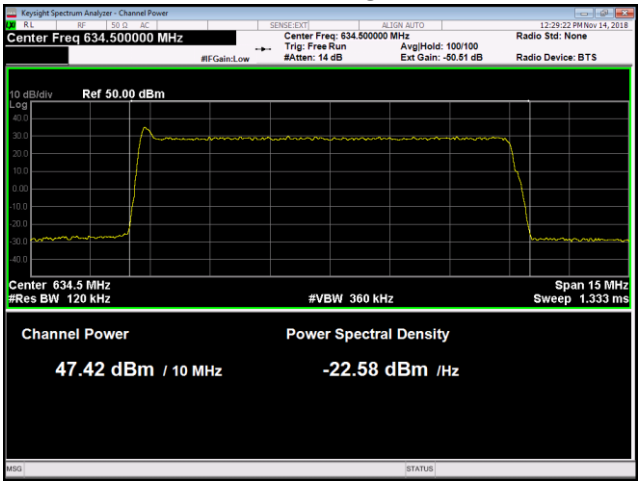
LTE10 Bottom Channel Average Power



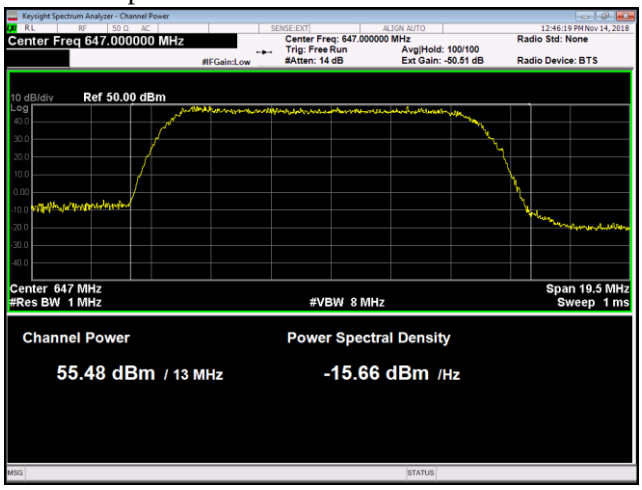
LTE10 Middle Channel Peak Power



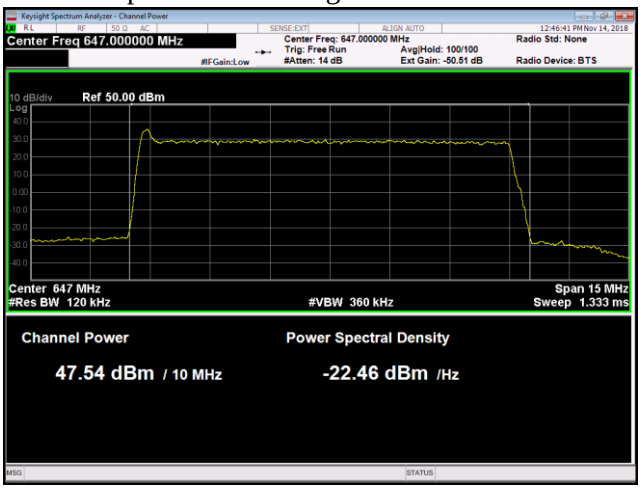
LTE10 Middle Channel Average Power



LTE10 Top Channel Peak Power

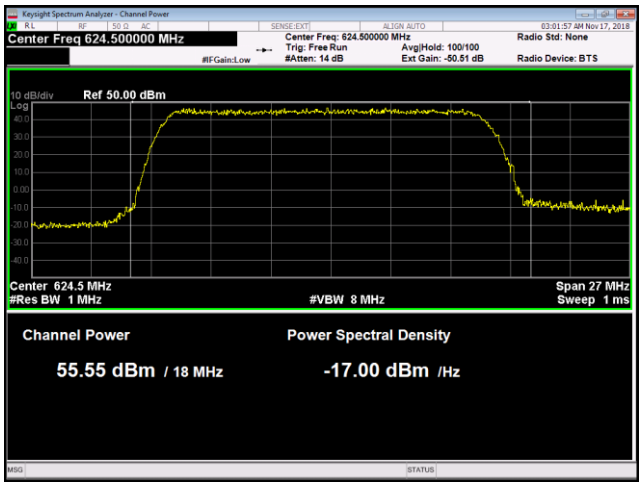


LTE10 Top Channel Average Power

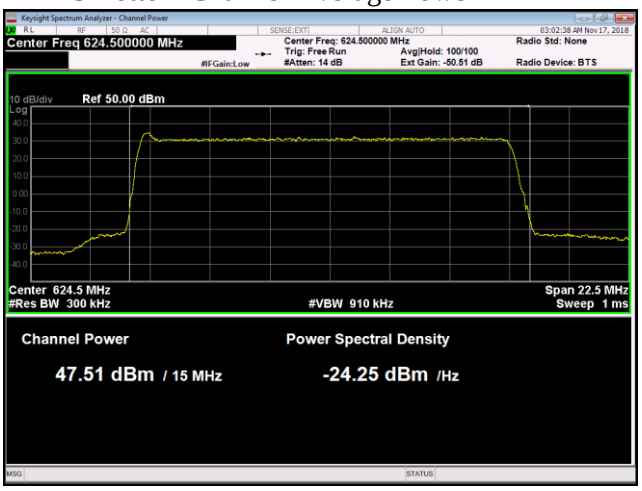


Channel Power Plots, NB IoT Lower GB Carrier (15MHz):

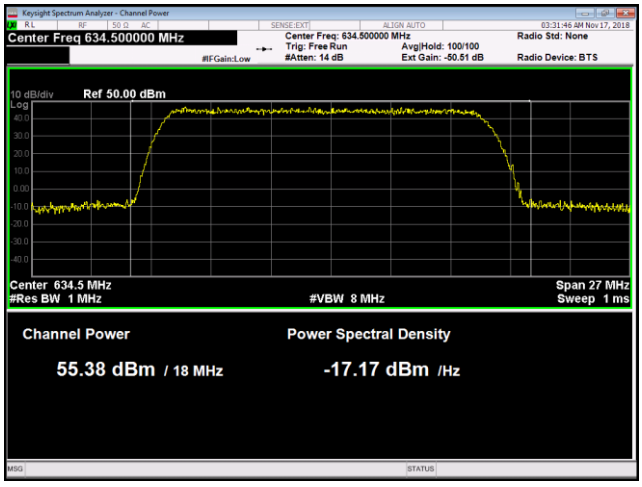
LTE15 Bottom Channel Peak Power



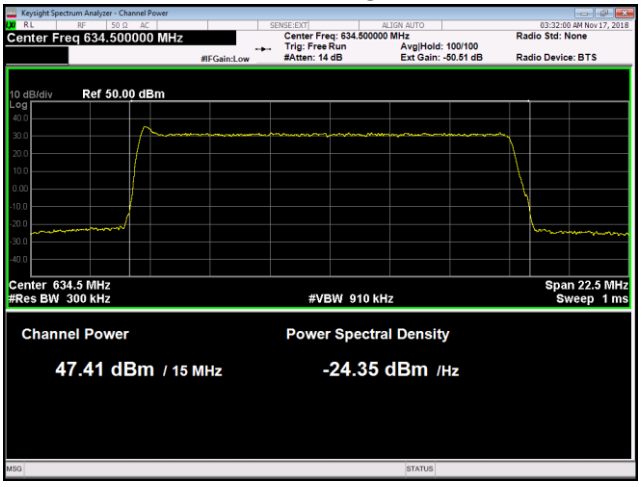
LTE15 Bottom Channel Average Power



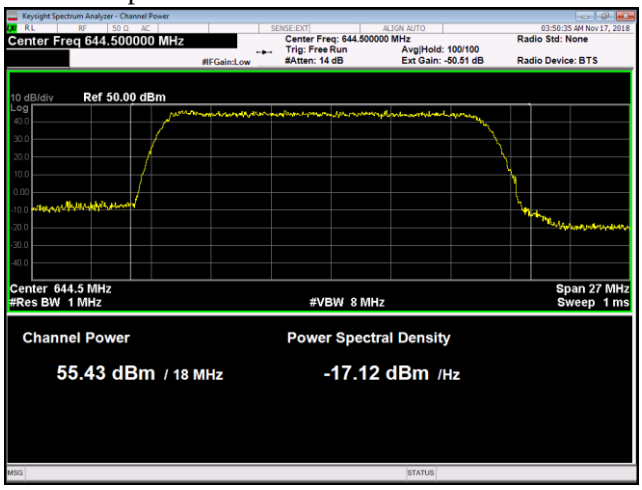
LTE15 Middle Channel Peak Power



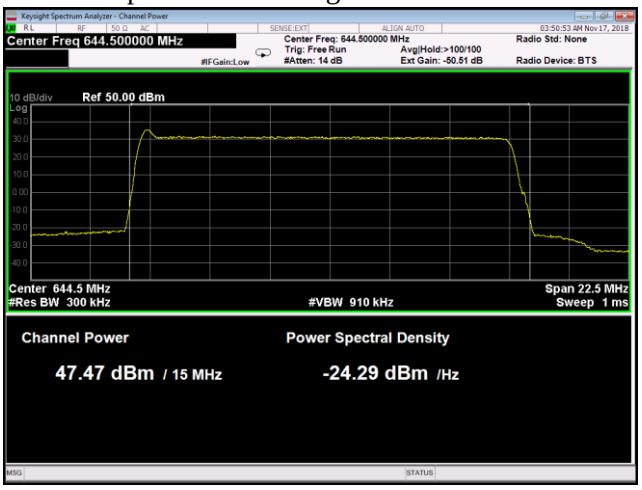
LTE15 Middle Channel Average Power



LTE15 Top Channel Peak Power

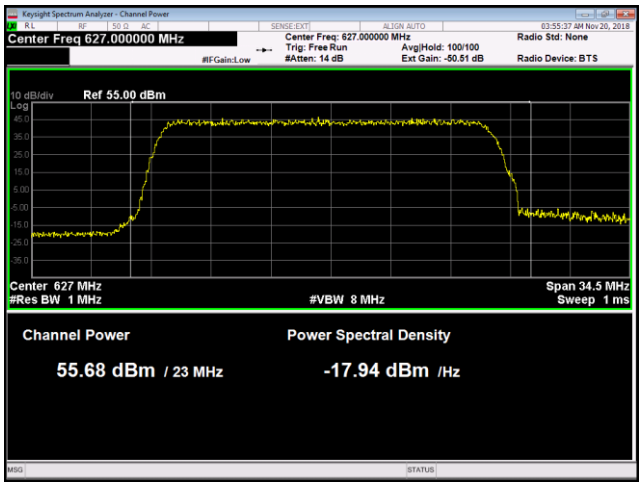


LTE15 Top Channel Average Power

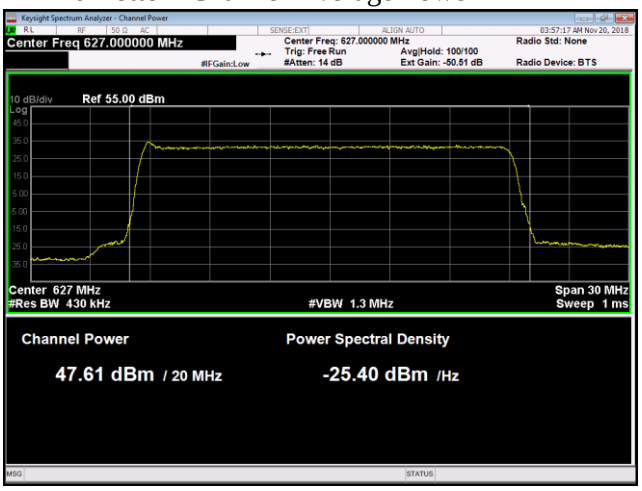


Channel Power Plots, NB IoT Lower GB Carrier (20MHz):

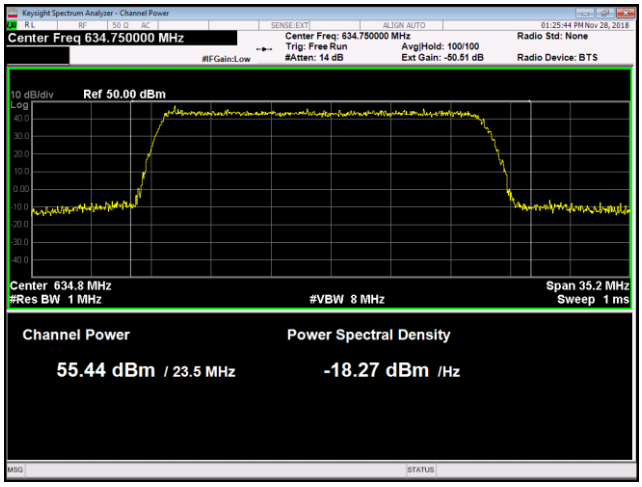
LTE20 Bottom Channel Peak Power



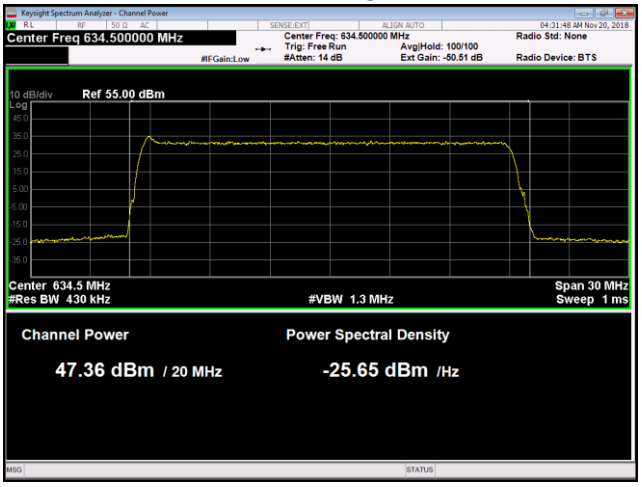
LTE20 Bottom Channel Average Power



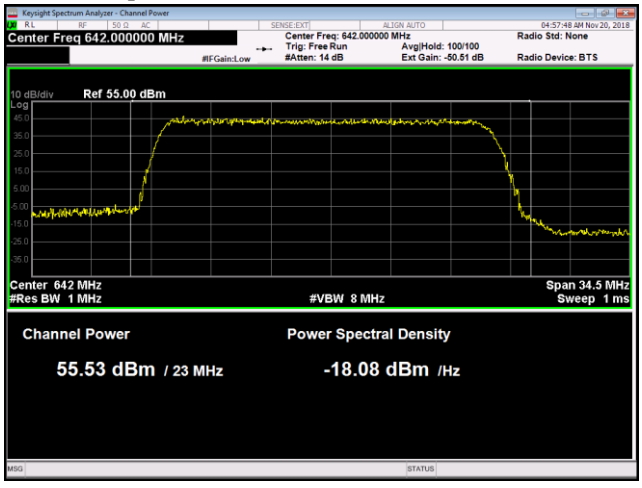
LTE20 Middle Channel Peak Power



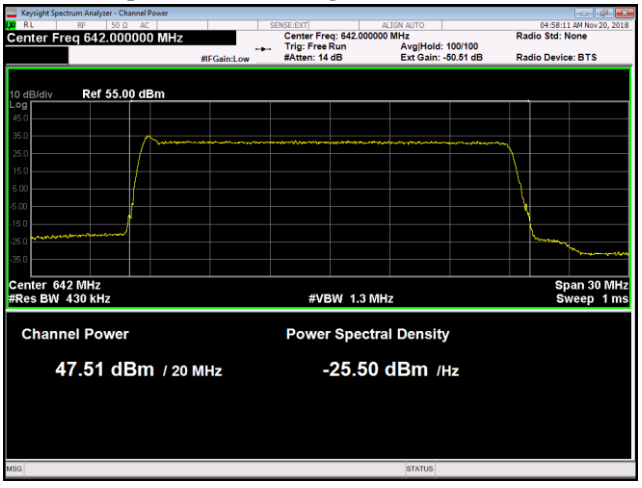
LTE20 Middle Channel Average Power



LTE20 Top Channel Peak Power

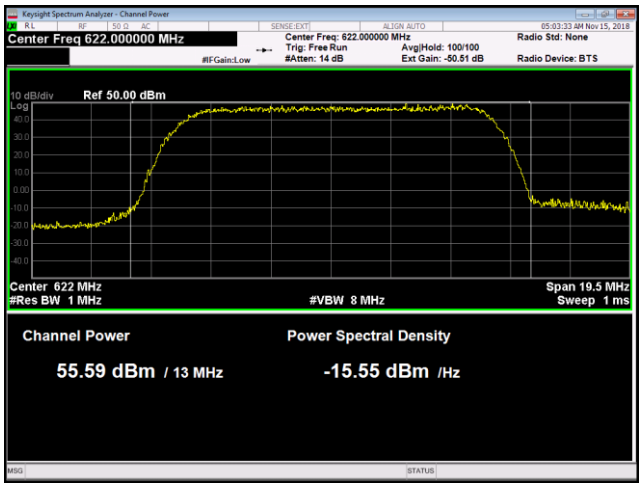


LTE20 Top Channel Average Power

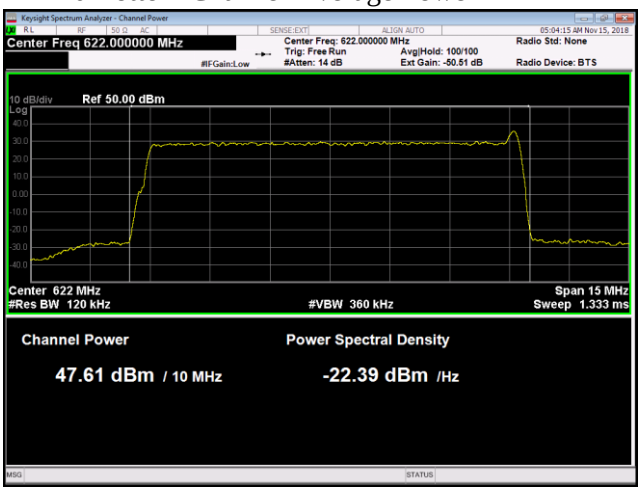


Channel Power Plots, NB IoT Upper GB Carrier (10MHz):

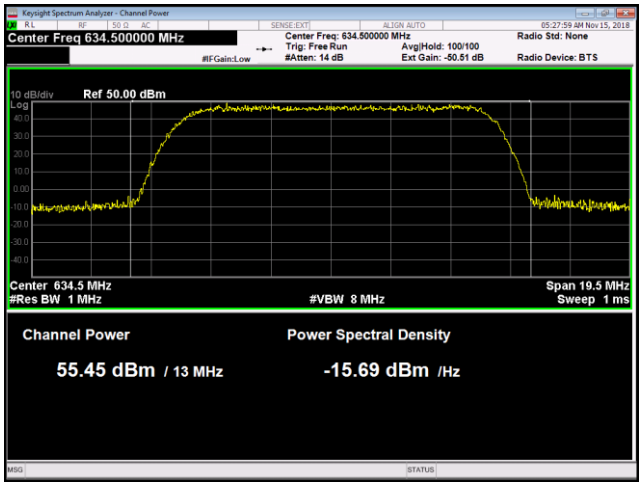
LTE10 Bottom Channel Peak Power



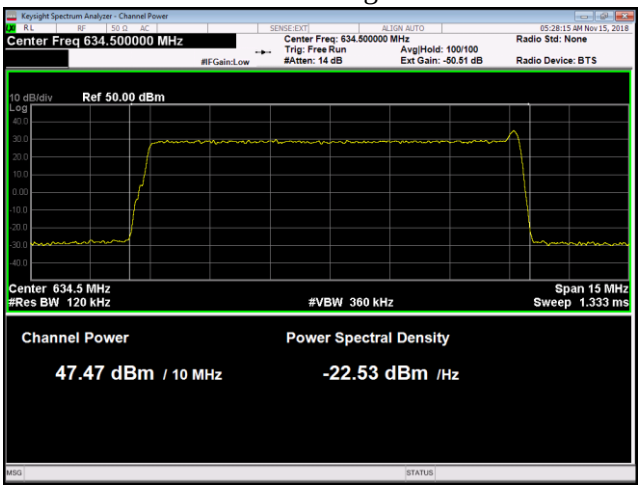
LTE10 Bottom Channel Average Power



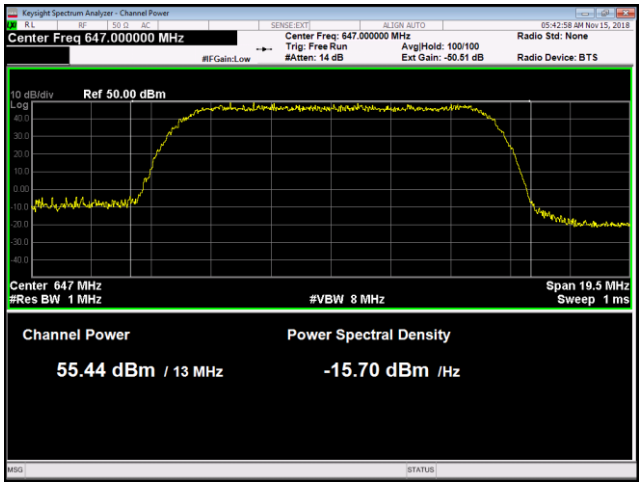
LTE10 Middle Channel Peak Power



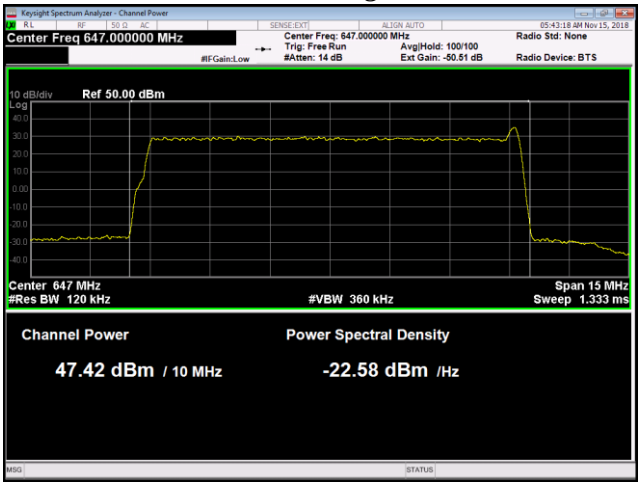
LTE10 Middle Channel Average Power



LTE10 Middle Channel Peak Power

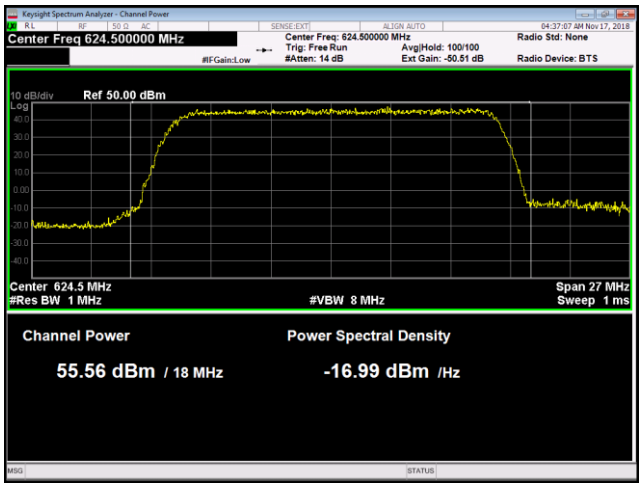


LTE10 Middle Channel Average Power

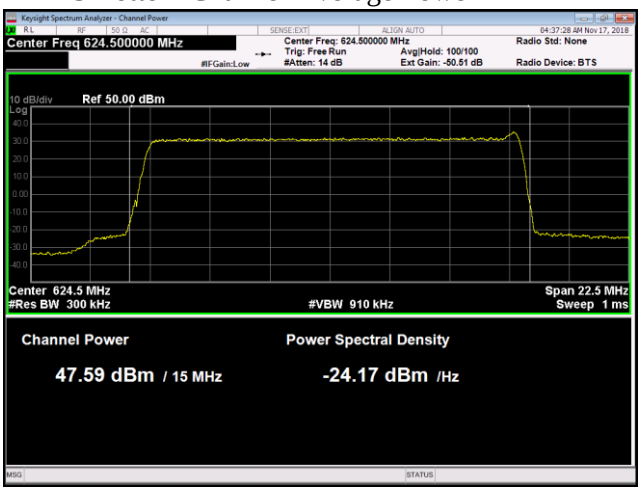


Channel Power Plots, NB IoT Upper GB Carrier (15MHz):

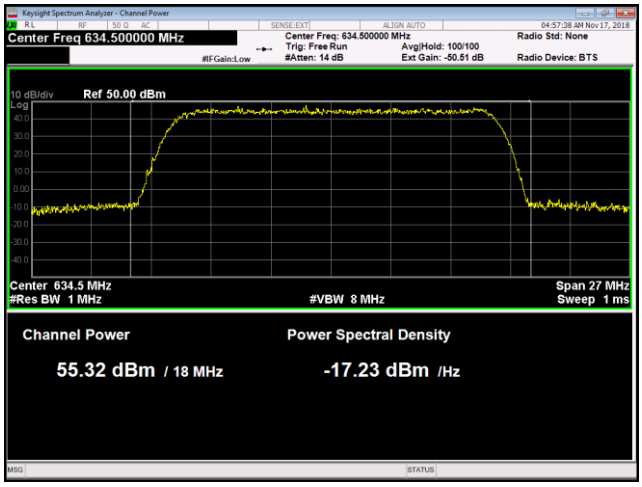
LTE15 Bottom Channel Peak Power



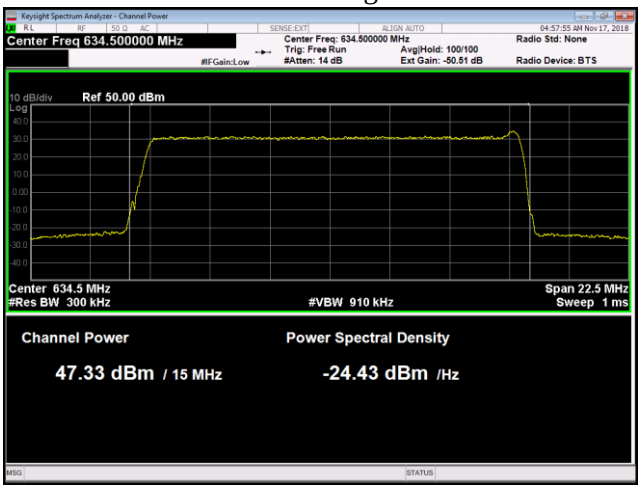
LTE15 Bottom Channel Average Power



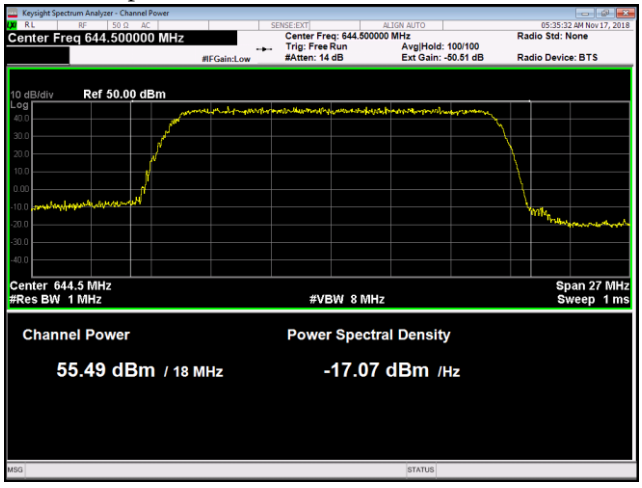
LTE15 Middle Channel Peak Power



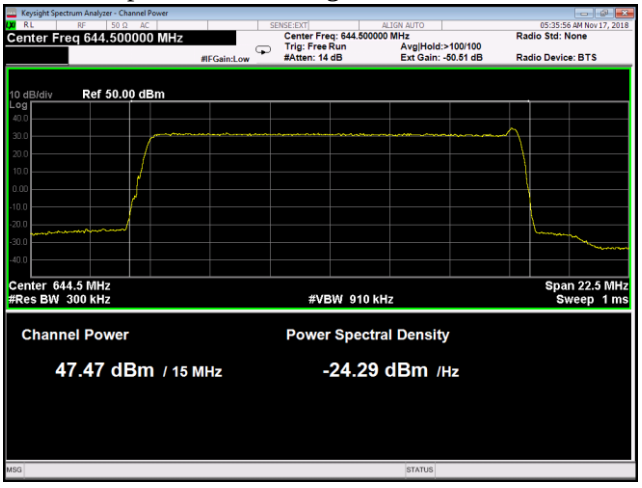
LTE15 Middle Channel Average Power



LTE15 Top Channel Peak Power

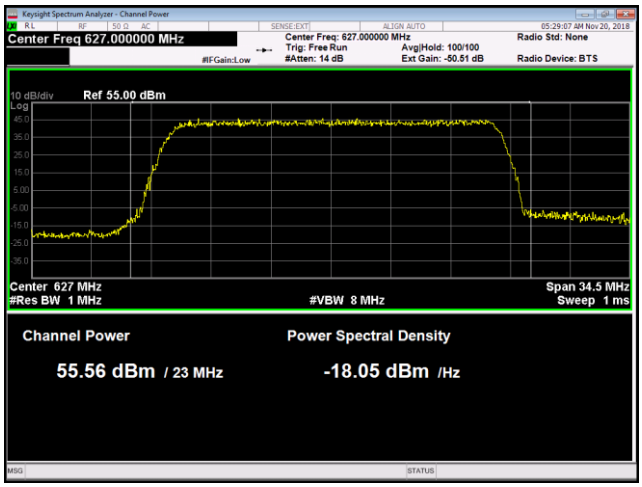


LTE15 Top Channel Average Power

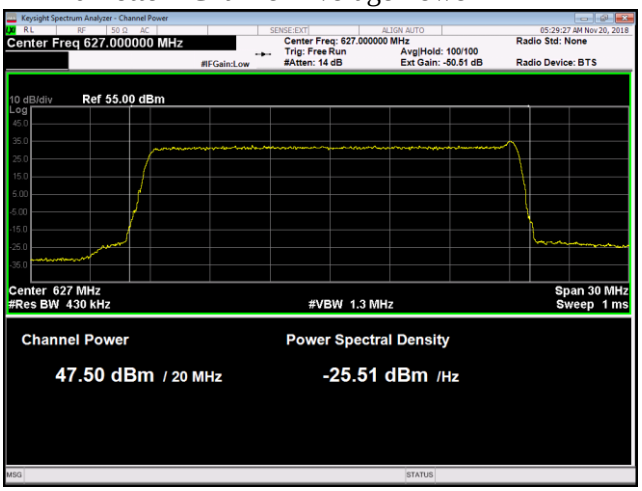


Channel Power Plots, NB IoT Upper GB Carrier (20MHz):

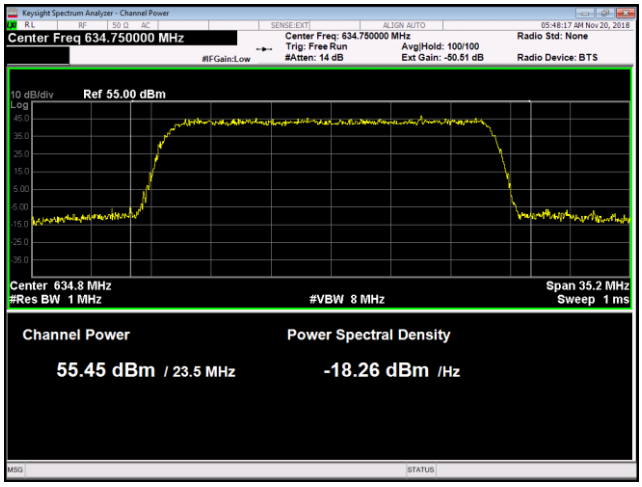
LTE20 Bottom Channel Peak Power



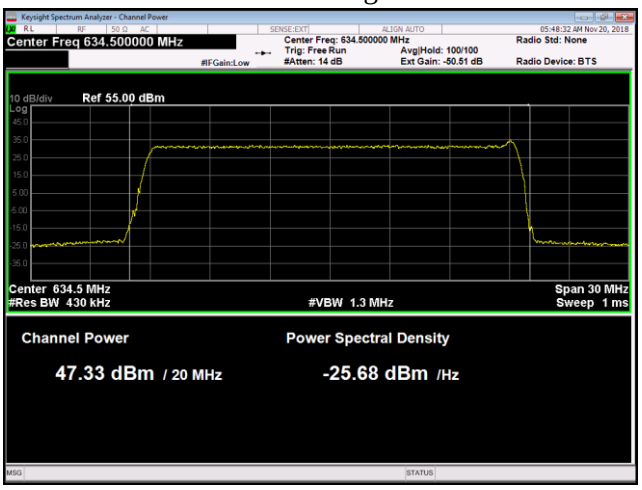
LTE20 Bottom Channel Average Power



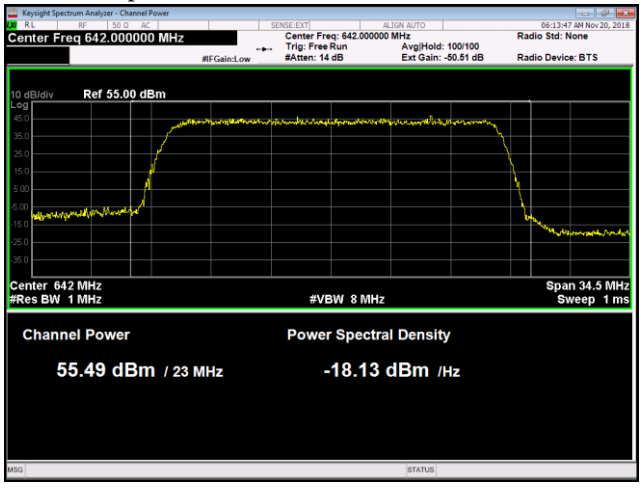
LTE20 Middle Channel Peak Power



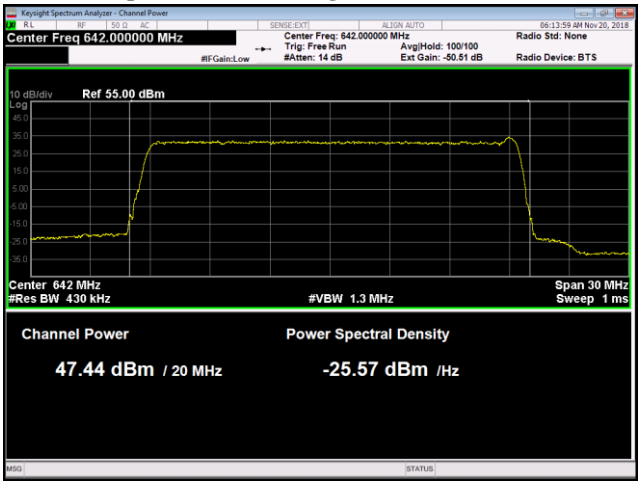
LTE20 Middle Channel Average Power



LTE20 Top Channel Peak Power



LTE20 Top Channel Average Power



12.2 Emission Bandwidth (26 dB down and 99%)

Emission bandwidth measurements were made at antenna port 4 on the bottom, middle and top channels with maximum RF output power. All available LTE channel bandwidths (10MHz, 15MHz and 20MHz) were used. The results are provided in the following table.

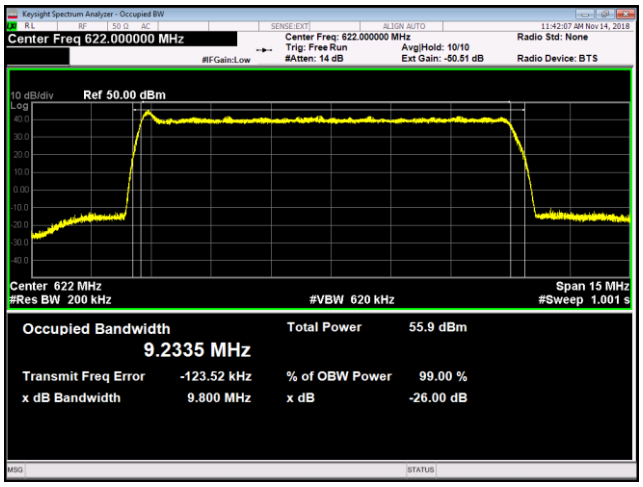
LTE Bandwidth	Emission Bandwidth Band 71 NB IoT GB (Lower)					
	Bottom Channel		Middle Channel		Top Channel	
	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)
10MHz	9.80	9.23	9.79	9.24	9.79	9.23
15MHz	14.78	13.80	14.77	13.81	14.75	13.80
20MHz	19.72	18.30	19.70	18.31	19.65	18.29

LTE Bandwidth	Emission Bandwidth Band 71 NB IoT GB (Upper)					
	Bottom Channel		Middle Channel		Top Channel	
	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)
10MHz	9.79	9.23	9.79	9.24	9.82	9.24
15MHz	14.73	13.81	14.77	13.83	14.76	13.82
20MHz	19.68	18.30	19.72	18.30	19.69	18.30

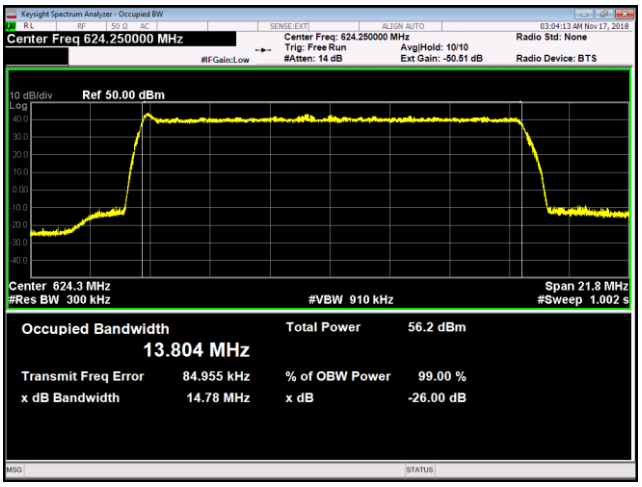
Emission bandwidth measurement data are provided in the following pages.

Plots for LTE10 and LTE15 Bandwidths + NB-IoT-GB in the Lower Guard Band:

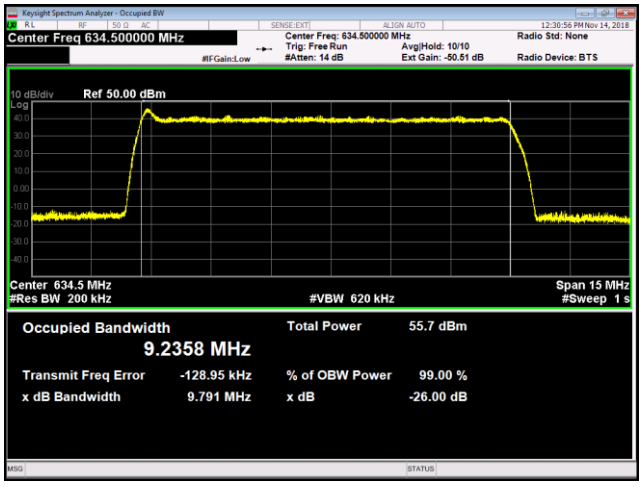
LTE10 Bottom Channel



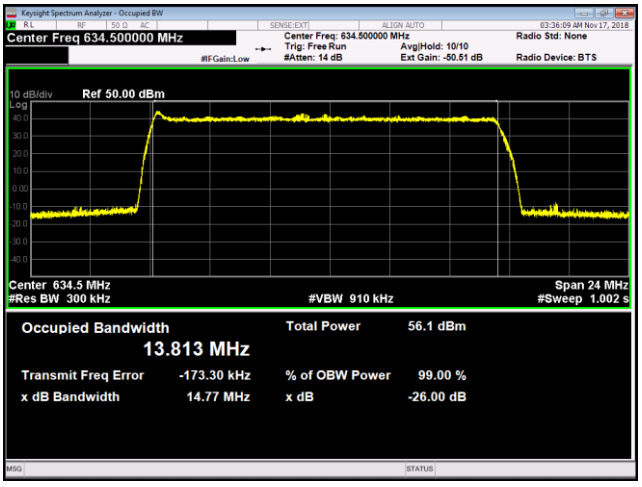
LTE15 Bottom Channel



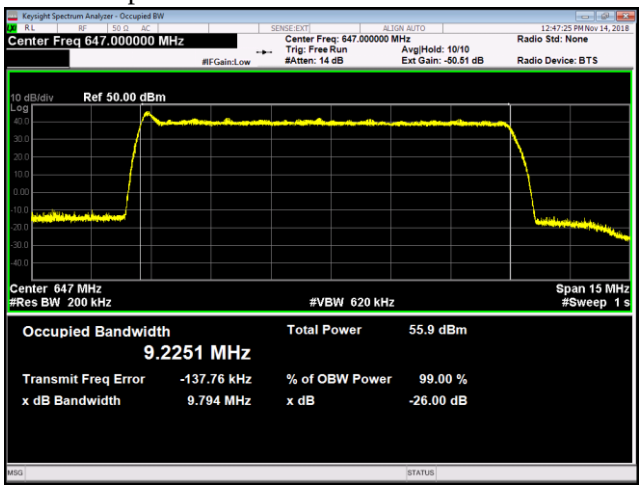
LTE10 Middle Channel



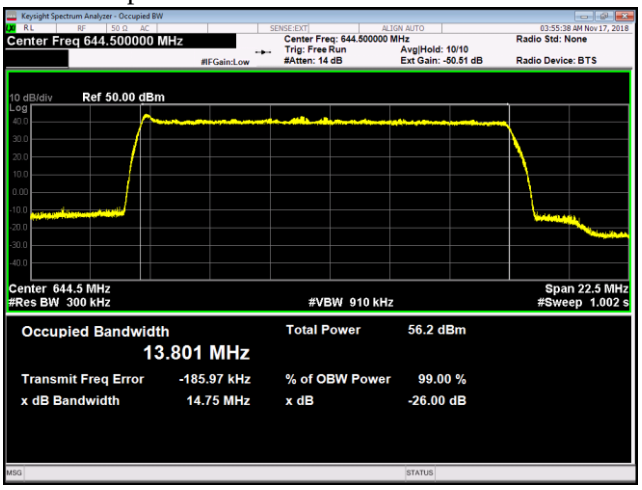
LTE15 Middle Channel



LTE10 Top Channel

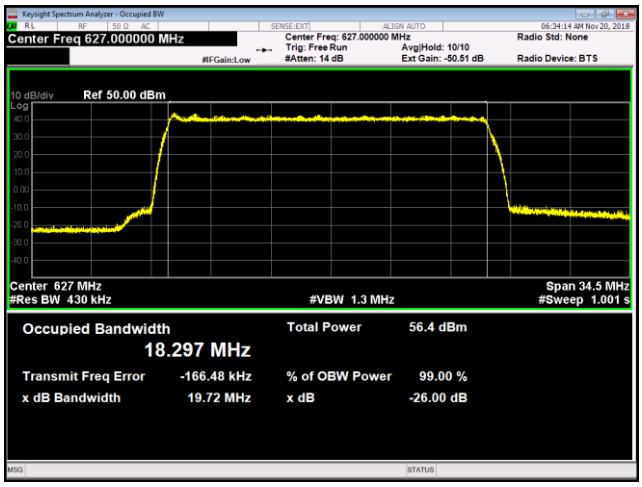


LTE15 Top Channel

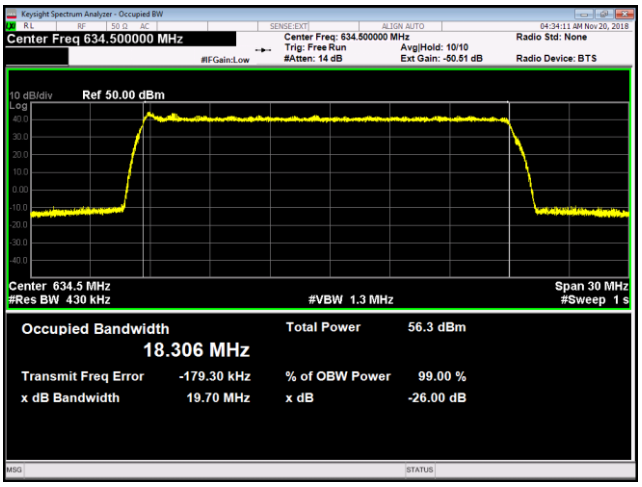


Plots for LTE20 Bandwidth + NB-IoT-GB in the Lower Guard Band:

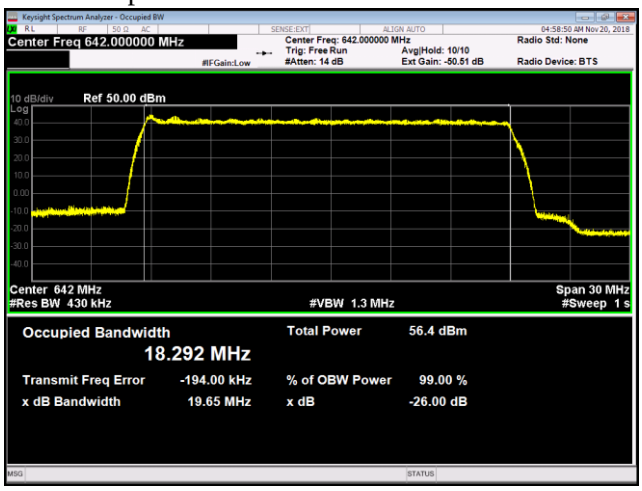
LTE20 Bottom Channel



LTE20 Middle Channel

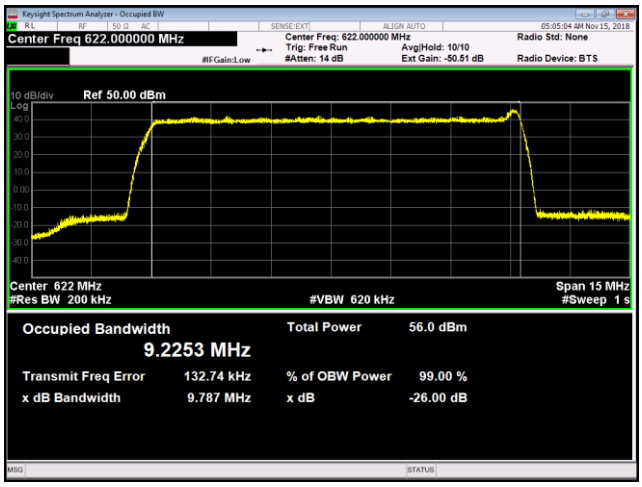


LTE20 Top Channel

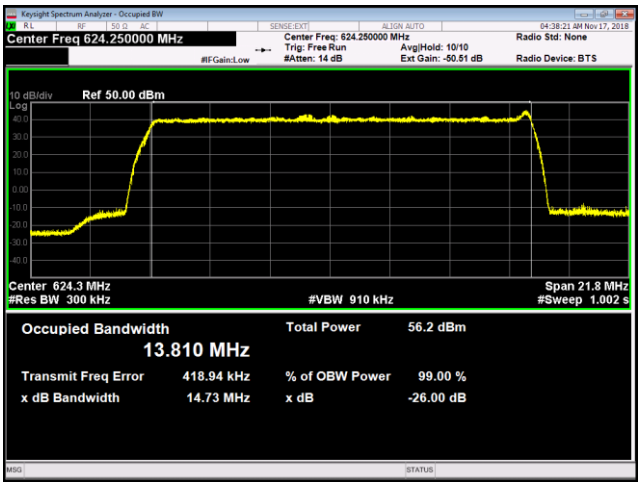


Plots for LTE 10 and 15 MHz Bandwidths + NB-IoT-GB in the Upper Guard Band:

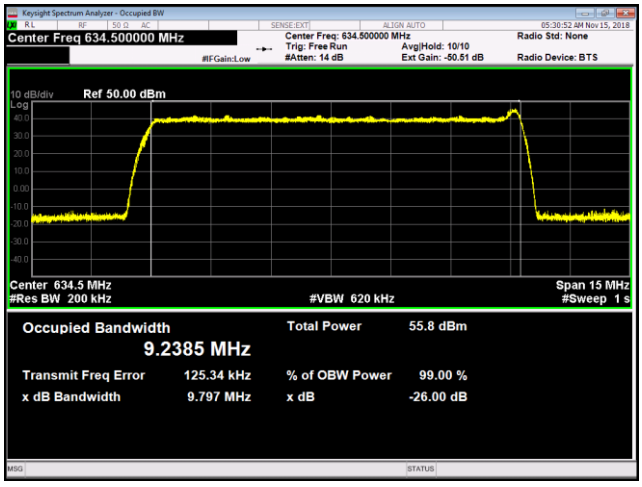
LTE10 Bottom Channel



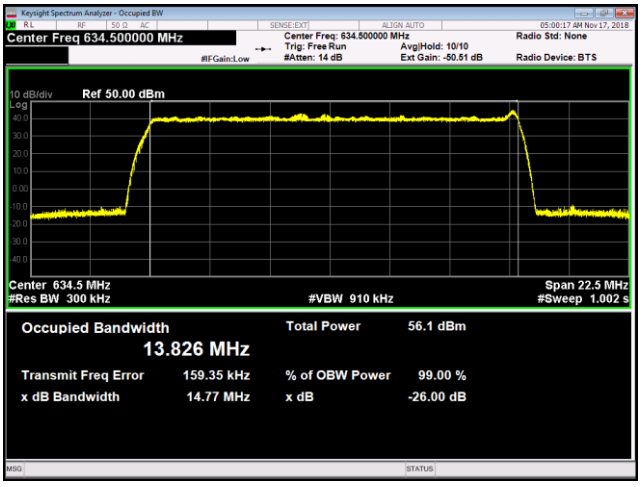
LTE15 Bottom Channel



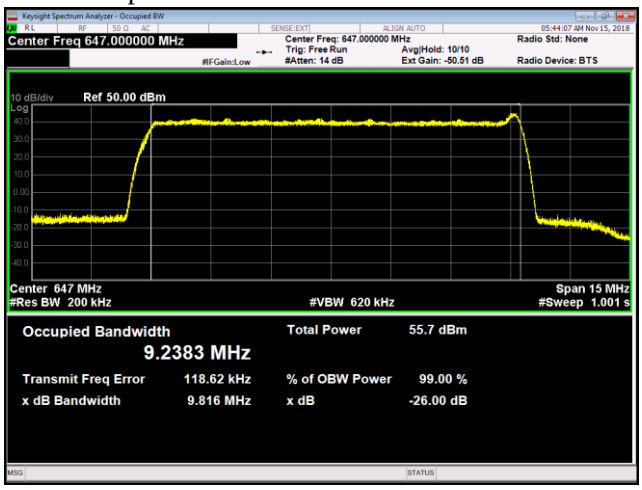
LTE10 Middle Channel



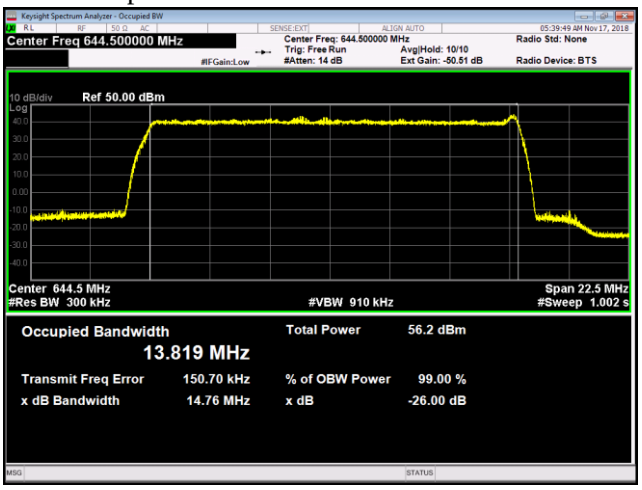
LTE15 Middle Channel



LTE10 Top Channel

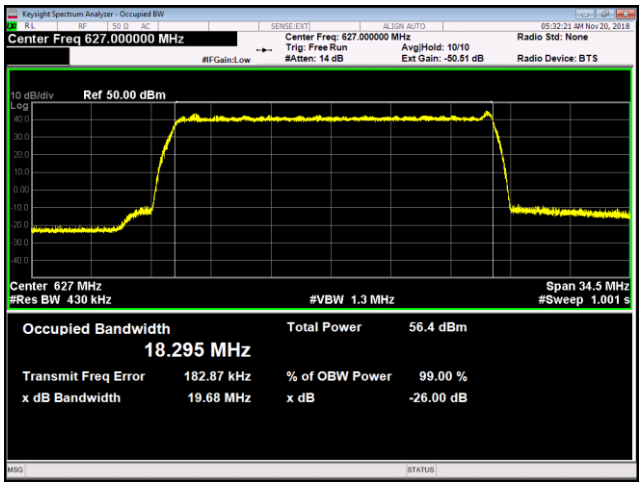


LTE15 Top Channel

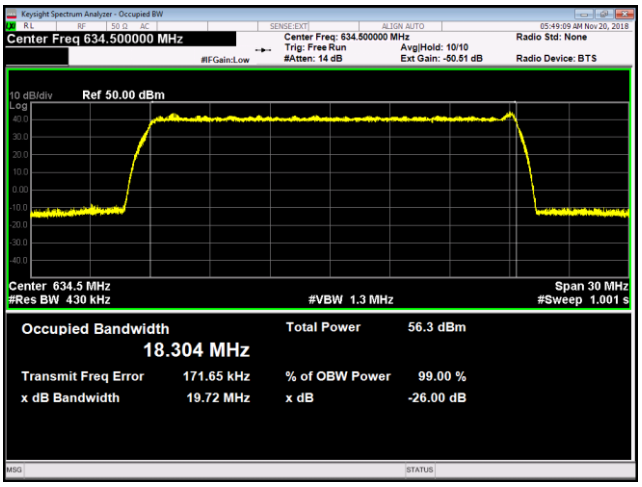


Plots for LTE20 Bandwidth + NB-IoT-GB in the Upper Guard Band:

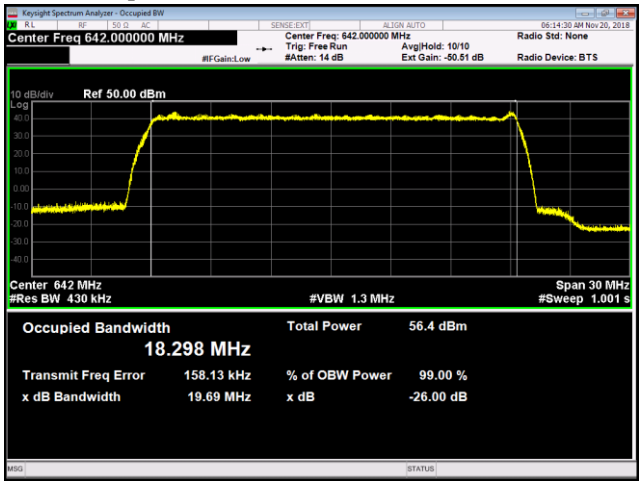
LTE20 Bottom Channel



LTE20 Middle Channel



LTE20 Top Channel



12.3 Antenna Port Conducted Band Edge

Conducted band edge measurements were made at AHLOA RRH antenna port 4. The AHLOA was operated at the band edge frequencies with a single NB IoT GB carrier for 10MHz, 15MHz and 20MHz LTE bandwidths.

The same limit of -19dBm used in the original certification testing is used for this testing. The limit of -13dBm is adjusted to -19dBm [-13dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

Measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces. In the 100kHz bands outside and adjacent to the frequency block, a resolution bandwidth of 30kHz as allowed by FCC 27.53(g) was used. Outside the 100kHz band edge noted above, a 100kHz RBW and 300kHz VBW was used. Measurements were performed in the frequency range from the band edge to 20 MHz outside the band edge (i.e.: 597 to 617MHz and 652 to 672MHz bands).

The total measurement RF path loss of the test setup (attenuator and test cables) was 50.51 dB and is accounted for by the spectrum analyzer external gain offset.

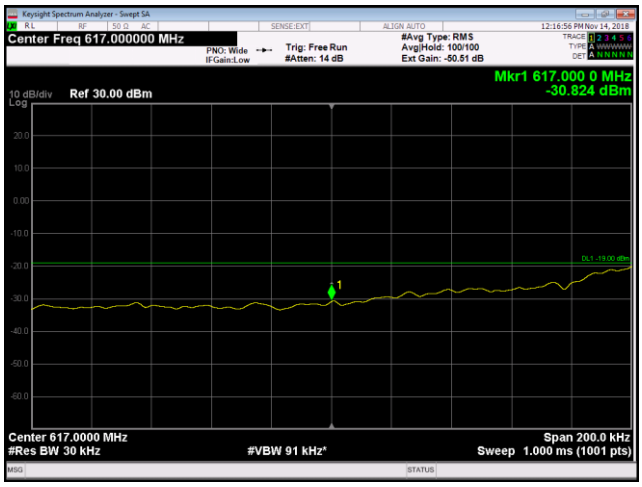
The results are summarized in the following table. The highest (worst case) emissions from the measurement data are provided.

LTE BW	NB IoT Guardband Placement	Bottom Channel (dBm)	Top Channel (dBm)
10 MHz	Lower	-26.5	-28.86
10 MHz	Upper	-27.67	-28.60
15 MHz	Lower	-26.67	-28.18
15 MHz	Upper	-27.69	-28.30
20 MHz	Lower	-27.80	-28.64
20 MHz	Upper	-28.12	-28.47

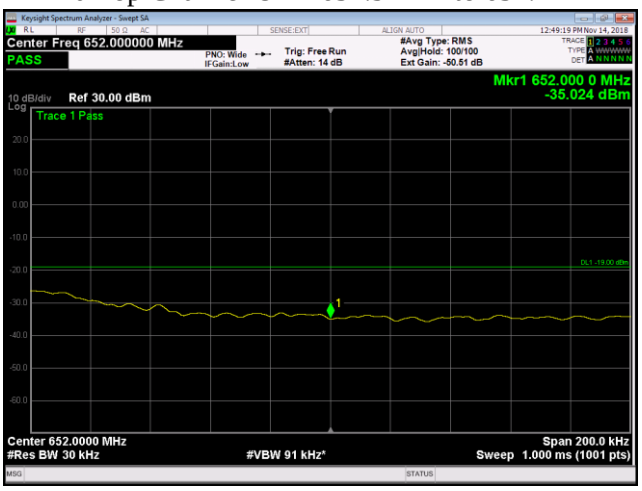
Conducted band edge measurements are provided in the following pages. Captions are marked with LBE for lower band edge and UBE for upper band edge.

LTE10, 15, 20 + Lower NB IoT GB Carrier Band Edge Plots:

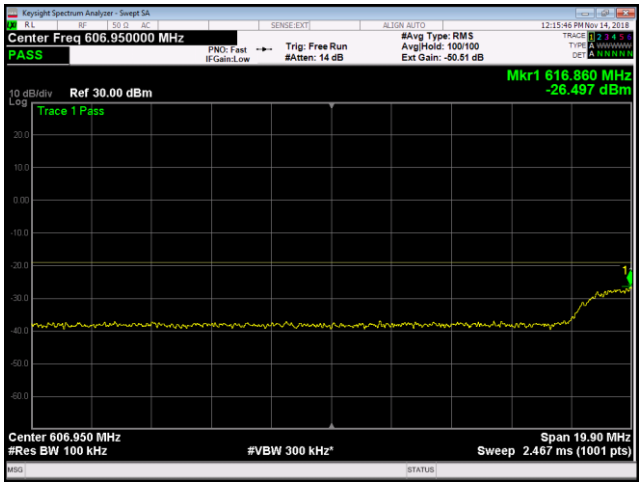
LTE10 Bottom Channel LBE 616.9MHz to 617.1MHz



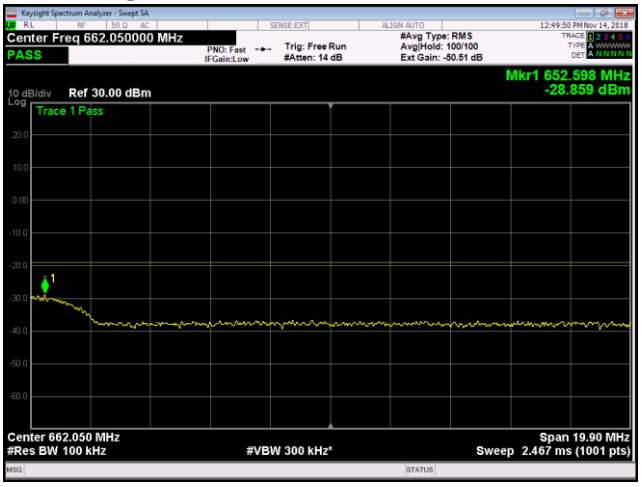
LTE10 Top Channel UBE 651.9MHz to 652.1MHz



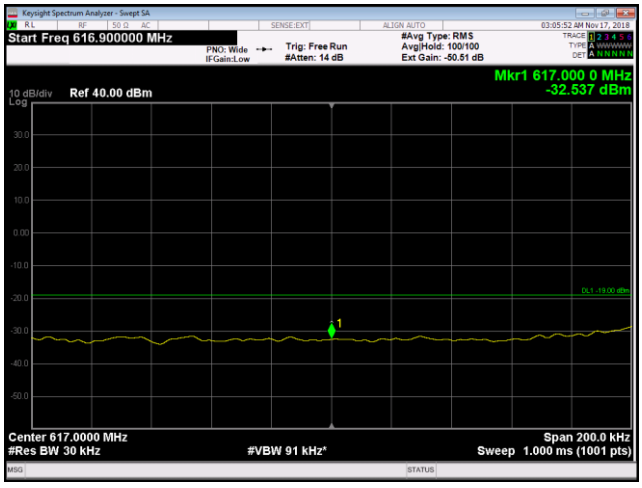
LTE10 Bottom Channel LBE 597MHz to 616.9MHz



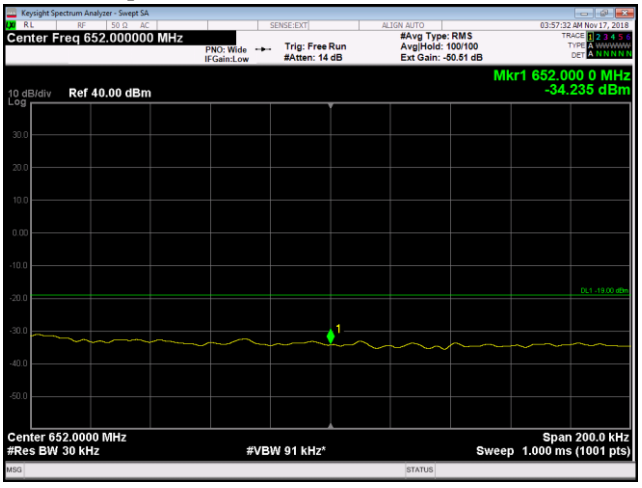
LTE10 Top Channel UBE 652.1MHz to 672MHz



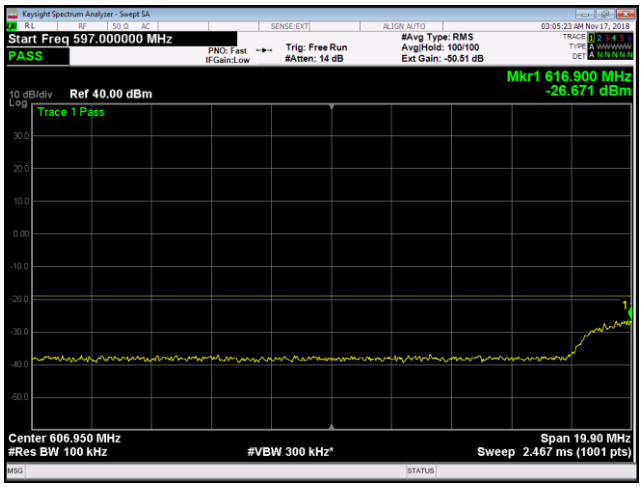
LTE15 Bottom Channel LBE 616.9MHz to 617.1MHz



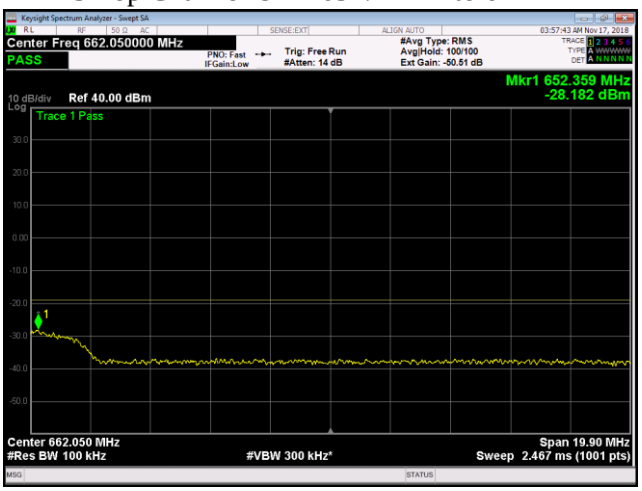
LTE15 Top Channel UBE 651.9MHz to 652.1MHz



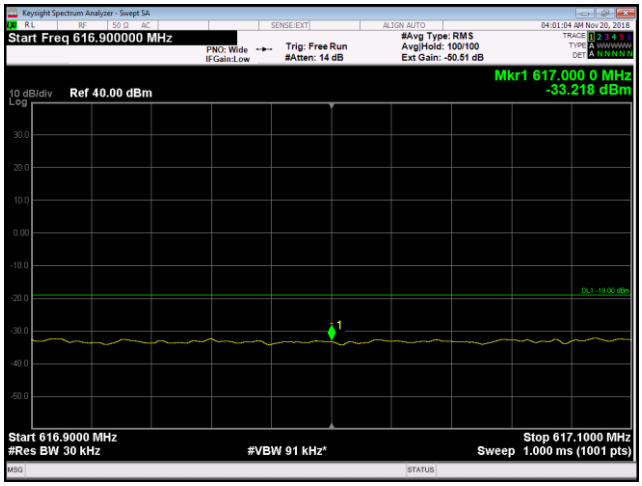
LTE15 Bottom Channel LBE 597MHz to 616.9MHz



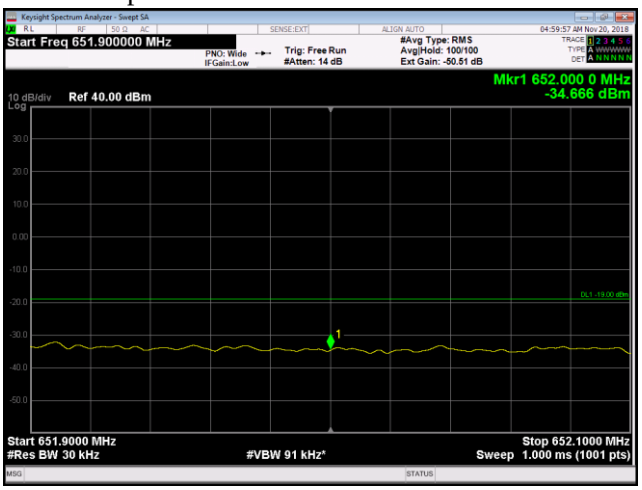
LTE15 Top Channel UBE 652.1MHz to 672MHz



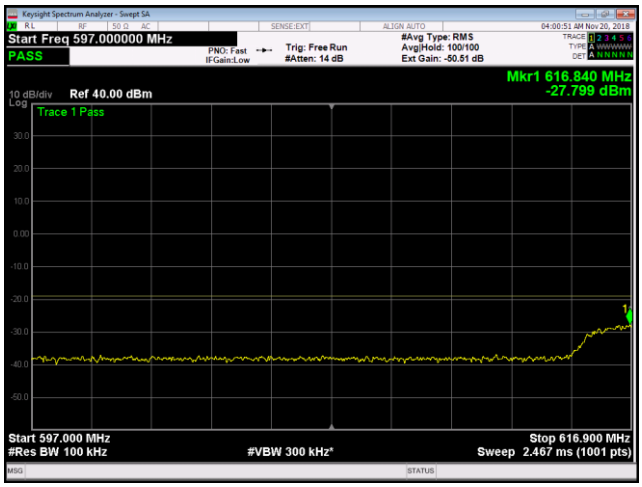
LTE20 Bottom Channel LBE 616.9MHz to 617.1MHz



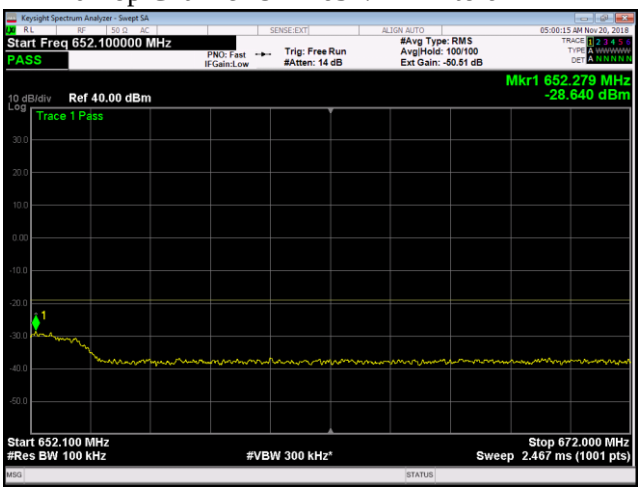
LTE20 Top Channel UBE 651.9MHz to 652.1MHz



LTE20 Bottom Channel LBE 597MHz to 616.9MHz

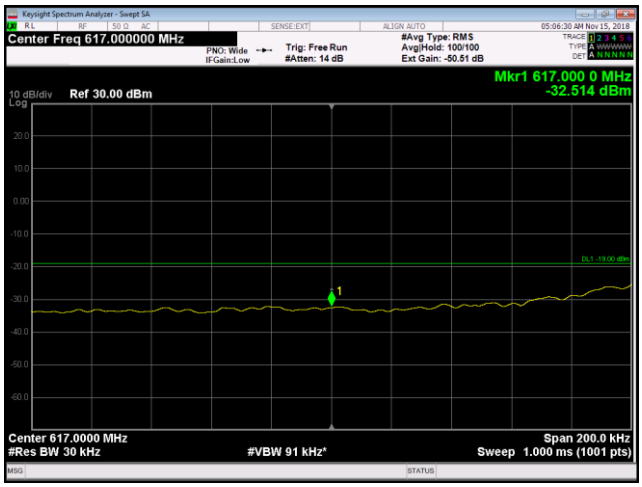


LTE20 Top Channel UBE 652.1MHz to 672MHz

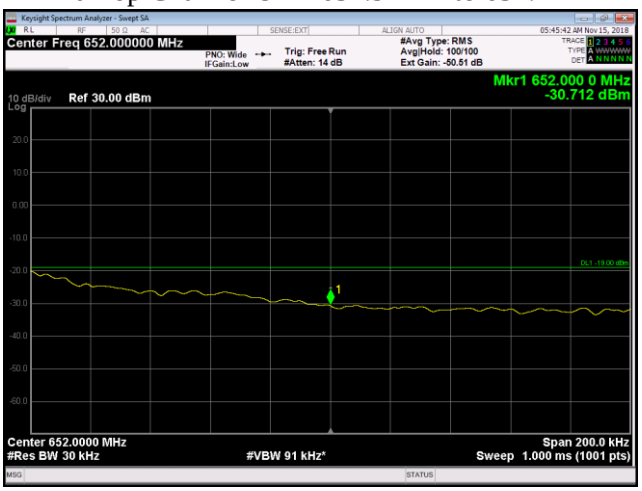


LTE10, 15, 20 + Upper NB IoT GB Carrier Band Edge Plots:

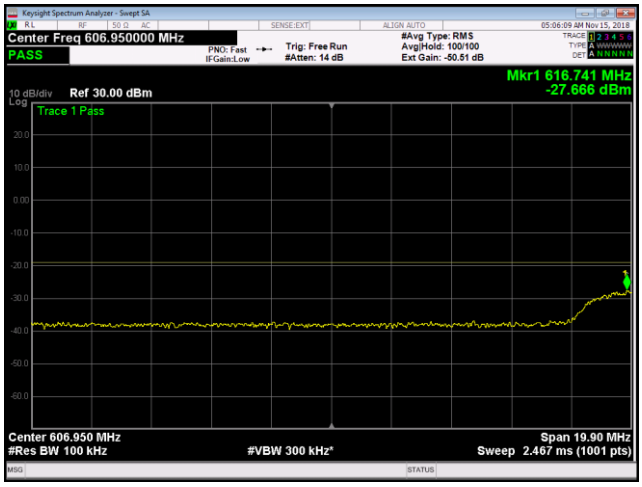
LTE10 Bottom Channel LBE 616.9MHz to 617.1MHz



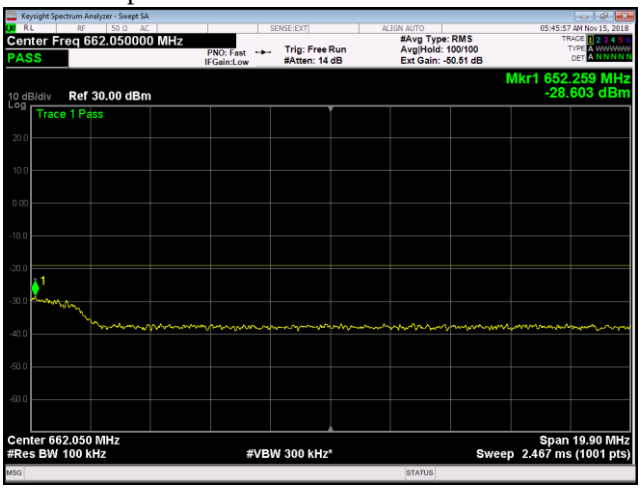
LTE10 Top Channel UBE 651.9MHz to 652.1MHz



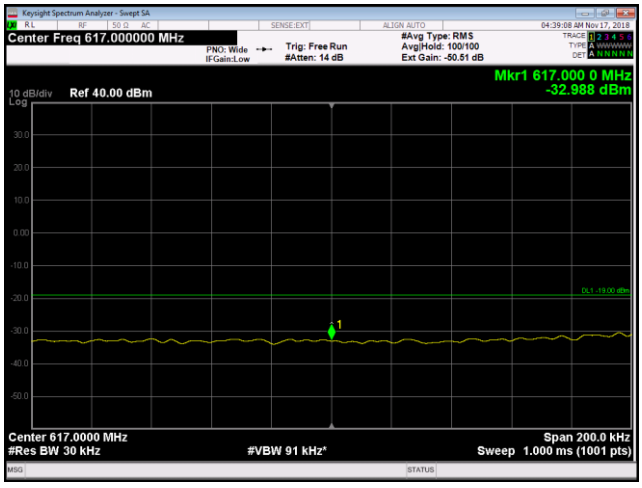
LTE10 Bottom Channel LBE 597MHz to 616.9MHz



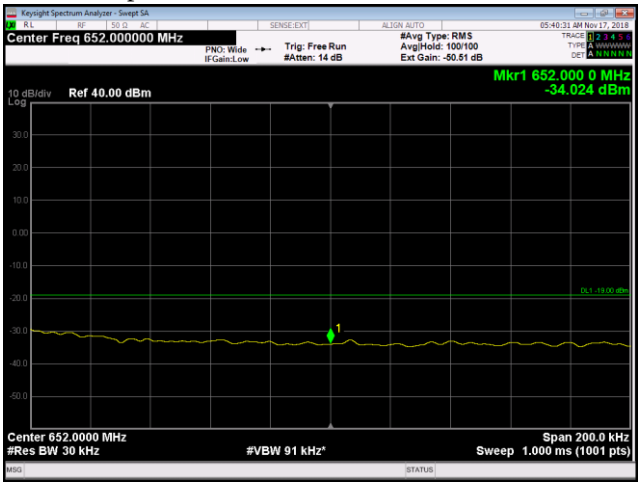
LTE10 Top Channel UBE 652.1MHz to 672MHz



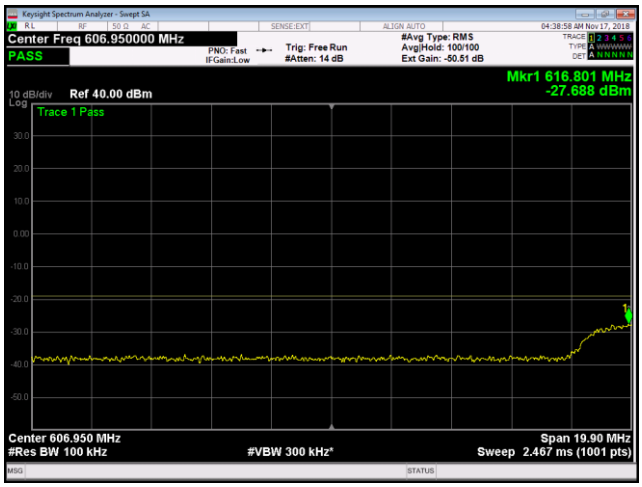
LTE15 Bottom Channel LBE 616.9MHz to 617.1MHz



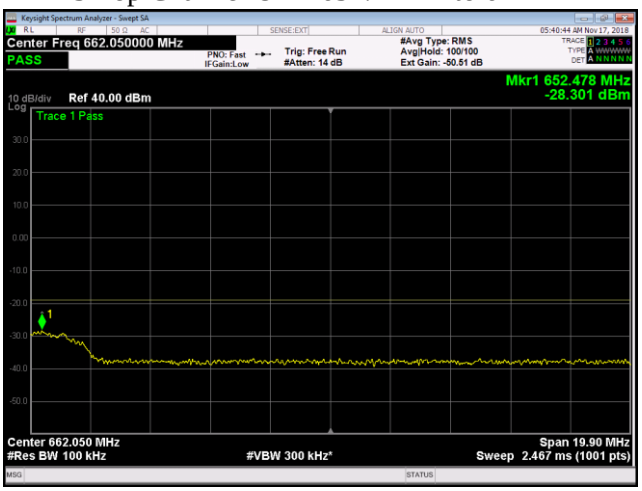
LTE15 Top Channel UBE 651.9MHz to 652.1MHz



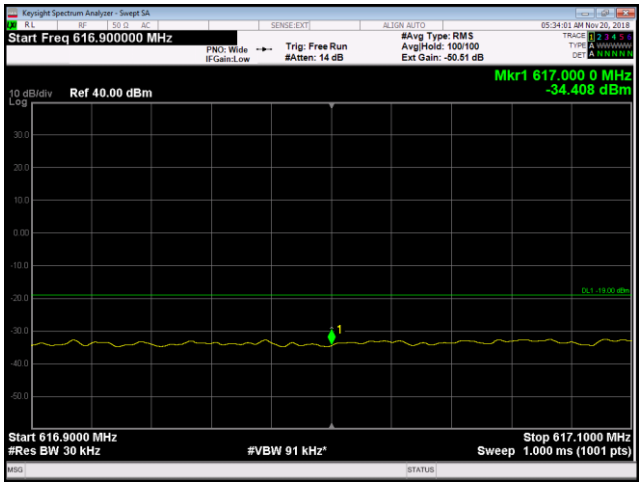
LTE15 Bottom Channel LBE 597MHz to 616.9MHz



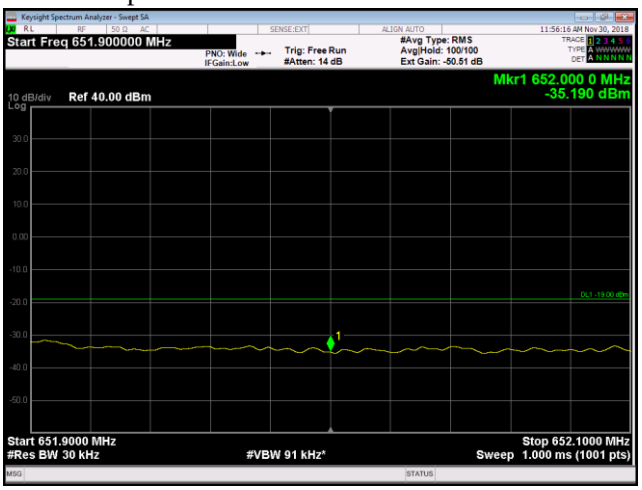
LTE15 Top Channel UBE 652.1MHz to 672MHz



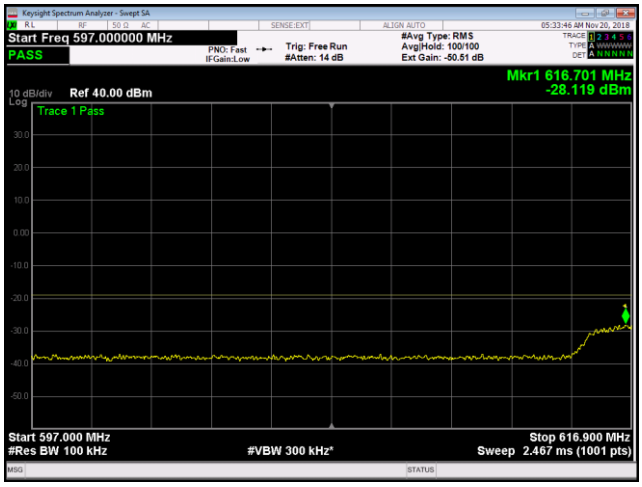
LTE20 Bottom Channel LBE 616.9MHz to 617.1MHz



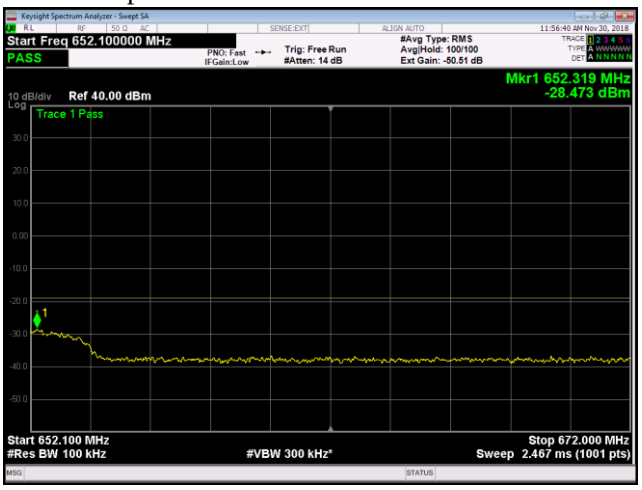
LTE20 Top Channel UBE 651.9MHz to 652.1MHz



LTE20 Bottom Channel LBE 597MHz to 616.9MHz



LTE20 Top Channel UBE 652.1MHz to 672MHz



12.4 Transmitter Antenna Port Conducted Emissions

Transmitter conducted spurious emissions measurement were made at AHLOA RRH antenna port 4 across the range 9kHz-10GHz. The AHLOA was operated on bottom, middle and top channels with a single NB IoT GB carrier with LTE bandwidths of 10MHz, 15MHz and 20MHz at maximum port power. The Keysight PSA E4440A was used to measure frequencies below 10MHz because of the lower noise floor in that frequency range, and the MXA N2090A was used to measure from 10MHz to 10GHz. The total measurement RF path loss of the test setup (attenuators, high pass filter and test cables) was accounted for by the spectrum analyzer reference level offset (see table below).

The same limit of -19 dBm used in the original certification testing is used for this testing. The limit is adjusted to -19dBm [-13dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

Frequency Range	RBW (KHz)	VBW (KHz)	Detector/Avg Type	Sweep Time	Path Loss (dB)
9KHz to 150KHz	1	3	RMS Avg	Auto	24.52
150KHz to 10MHz	100	300	RMS Avg	Auto	24.74
10-597 MHz	100	300	RMS Avg	Auto	49.43
597-766 MHz	100	300	RMS Avg	Auto	50.51
766-2000 MHz	100	300	RMS Avg	Auto	50.66
2GHz to 6GHz	100	300	RMS Avg	Auto	51.63
6GHz to 10GHz	100	300	RMS Avg	Auto	53.39

Conducted spurious emission plots/measurements are provided in the following pages.