Radio Test Report

Application for Grant of Equipment Authorization

FCC Part 27 Subpart C
617MHz – 652MHz

FCC ID:	**VBNFHOA-01**
Model:	**FHOA**
Product Name:	**Flexi Multiradio/Airscale BTS**
APPLICANT:	**Nokia Solutions and Networks** **6000 Connection Drive** **Irving, TX 75039**
TEST SITE(S):	**National Technical Systems - Plano** **1701 E Plano Pkwy #150** **Plano, TX 75074**
REPORT DATE:	**July 30th, 2017**
FINAL TEST DATES:	**July 10th – July**

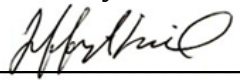
TOTAL NUMBER OF PAGES: **72**

Prepared By: **Approved By:**

Armando Del Angel
EMI Project Engineer

Kimberly Zavala
Quality Assurance Manager

Reviewed By:



Jeffrey Viel
General Manager

REVISION HISTORY

Rev#	Date	Comments	Modified By
0	July 30, 2017	1st release	Armando Del Angel
1	August 2, 2017	1st Revision per customer comments	Armando Del Angel

TABLE OF CONTENTS

SCOPE

Tests have been performed on Nokia Solutions and Networks product Flexi Multiradio/Airscale BTS RRH Model FHOA, pursuant to the relevant requirements of the following standard(s) in order to obtain device certification against the regulatory requirements of the Federal Communications Commission.

- Code of Federal Regulations (CFR) Title 47 Part 2
- CFR Title 47 Part 27 Subpart C

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

ANSI C63.4-2009
ANSI TIA-603-C
FCC KDB 971168 D01 v02r02

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC requirements.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of Nokia Solutions and Networks product Flexi Multiradio/Airscale BTS RRH Model FHOA and therefore apply only to the tested sample. The sample was selected and prepared by Hobert Smith of Nokia Solutions and Networks.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, the device requires certification.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

Testing was performed only on Model FHOA. No additional models were described or supplied for testing.

STATEMENT OF COMPLIANCE

The tested sample of Nokia Solutions and Networks product Flexi Multiradio/Airscale BTS RRH Model FHOA 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.

TEST RESULTS

FCC Part 27 Subpart C and RSS-195 Issue 2 (Base Stations Operating in 617MHz-652MHz band)

FCC	Description	Measured	Limit	Result
Transmitter Modulation, output power and other characteristics				
§27.5	Frequency range(s)	619.5MHz – 649.5MHz (5M LTE) 622MHz – 647MHz (10M LTE) 624.5MHz – 644.5MHz (15MHz LTE) 627MHz – 642MHz (20MHz)	617MHz – 652MHz	Pass
§2.1033(c)(4)	Modulation Type	QPSK, 16QAM, 64QAM, 256QAM (5M, 10M, 15M, and 20M for each)	Digital	Pass
§27.50(c)(3)	Output Power	Conducted Output Power (Highest on Port 2) RMS: 46.19dBm EIRP will depend on antenna gain (unknown)	1000W EIRP	Pass
N/A Informational	Peak to Average Ratio	8.17dB highest	13dB	Pass
§2.1049	Emission Bandwidth (99%)	4.5MHz (5M LTE) 8.99MHz (10M LTE) 13.48MHz (15M LTE) 17.97MHz (20MHz LTE)	Remain in Block	Pass
N/A Informational	Emission Bandwidth (26dB)	4.87MHz (5M LTE) 9.72MHz (10M LTE) 14.61MHz (15M LTE) 19.49MHz (20M LTE)	Remain in Block	Pass
§27.53(g)	At the antenna terminals	< -19.03dBm	-19.03 dBm (per TX chain)	Pass
	Field strength	48.137dBuV/m at 3m Eq. to -47.063dBm EIRP	-13 dBm EIRP	Pass
§27.54	Frequency stability	Low = -27.735dBm High = -28.752dBm	Remain in Block (-19.03dBm)	Pass
§1.1310	RF Exposure	N/A		Pass[2]
Notes				
Note 1 – Based on 100kHz RBW. In 100kHz bands immediately outside and adjacent to the frequency block an RBW of at least 30kHz has been used. Note 2 – Applicant's declaration on a separate exhibit based on hypothetical antenna gains.				

	Emission Designators			
	LTE-QPSK	**LTE-16QAM**	**LTE-64QAM**	**LTE-256QAM**
5M	4M85F9W	4M86F9W	4M85F9W	4M87F9W
10M	9M72F9W	9M71F9W	9M71F9W	9M70F9W
15M	14M54F9W	14M49F9W	14M60F9W	14M59F9W
20M	19M40F9W	19M35F9W	19M44F9W	19M49F9W

Note: Based on 26dB emission bandwidth for worst case representation.

EXTREME CONDITIONS

Frequency stability is determined over extremes of temperature and voltage. The extremes of voltage were 85 to 115 percent of the nominal value.

The extremes of temperature were -30°C to +50°C as specified in FCC §2.1055(a)(1).

MEASUREMENT UNCERTAINTIES

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

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 %

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The equipment under test (EUT) is a Nokia Solutions and Networks Flexi Multiradio/Airscale/Airscale Base Transceiver Station (BTS) Remote Radio Head (RRH) module, model FHOA which operates over 3GPP frequency band 71 (BTS Rx: 663 to 698 MHz/BTS Tx: 617 to 652 MHz). The FHOA RRH has four transmit/receive pipes. Each transmit pipe has a maximum power output of 40 watts. The FHOA can be operated as a 4x4 MIMO, 2x2 MIMO or as non-MIMO. Multi-carrier operation is supported.
The FHOA is multi-standard capable (GSM/EDGE/WCDMA/LTE), but for this effort only the LTE mode is tested. The FHOA supports four downlink modulation types for LTE (QPSK, 16QAM, 64QAM and 256QAM). The FHOA supports four LTE channel bandwidths (5MHz, 10MHz, 15MHz, and 20MHz).
The FHOA has external interfaces including DC power, ground, TX/RX (Ant), external alarm (EAC), optical OBSAI (OPT) and remote electrical tilt (RET). The RRH with applicable installation kit may be pole or wall mounted. The weight of the FHOA is approximately 23kg. The overall physical dimensions of the FHOA without solar shield is approximately 320x583x160mm.

The FHOA LTE channel numbers and frequencies are as follows:

	Downlink EARFCN	**Downlink Frequency (MHz)**	**LTE Channel Bandwidth**			
			5 MHz	**10 MHz**	**15 MHz**	**20 MHz**
Band 71 (Ant 1, 2, 3, 4)	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 Channel
	……					
	68861	644.5			Top Channel	
	……					
	68886	647.0		Top Channel		
	……					
	68911	649.5	Top Channel			
	……					
	68936	652.0	Band edge	Band edge	Band edge	Band edge

FHOA Downlink LTE Frequency Channels

The sample was received on July 7th, 2017 and tested on July 10th – July 13th, 2017. The EUT consisted of the following component(s):

Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia Solutions and Networks	FHOA	Flexi Multiradio/Airscale/Airscale BTS RRH	Part#: 474088A.Y01 Serial#: K9171629068	FCC ID: VBNFHOA-01 IC ID: N/A

ENCLOSURE

The EUT enclosure is made of heavy duty aluminum and measures approximately 320x583x160mm.

AUXILLARY EQUIPMENT

Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia	FOSH	OBSAI SFP Module (Plugs into FHOA Opt Ports 1, 2 & 3)	Part#: 472579A.101 Serial#: FR151400266, FR151400272, and FR151400275	N/A

SUPPORT EQUIPMENT

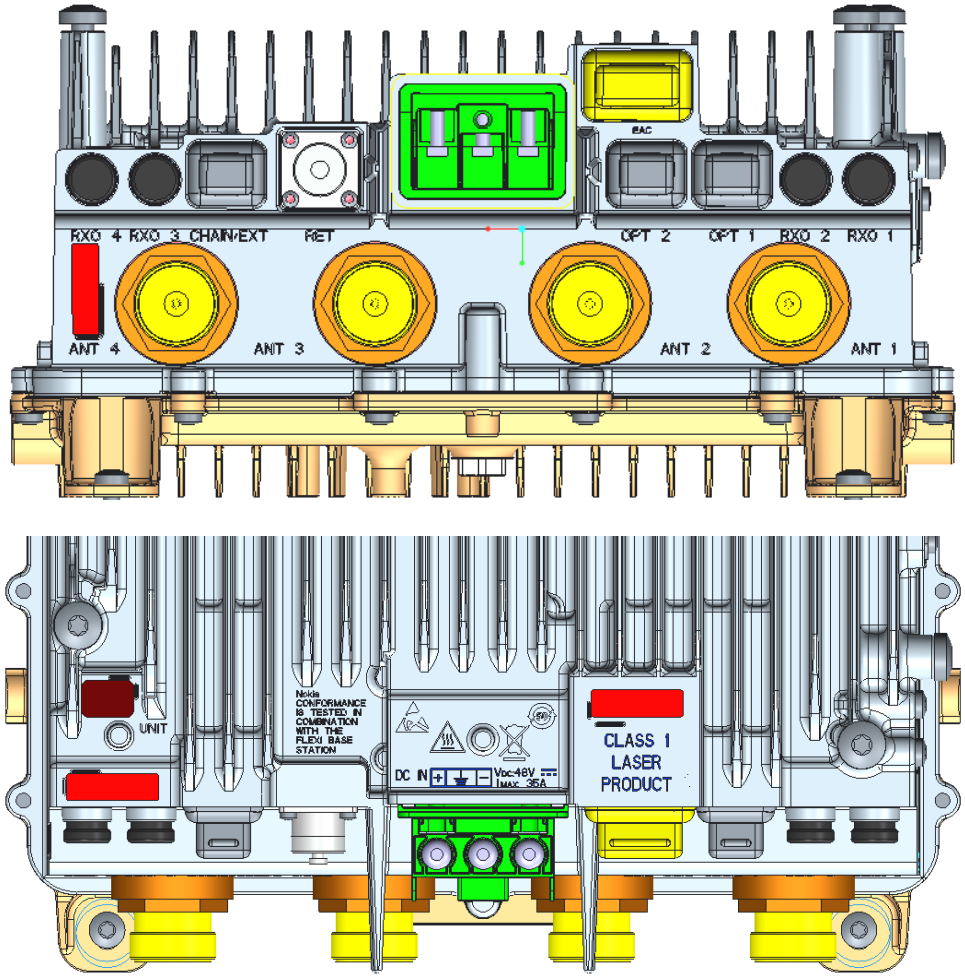
Company	Model	Description	Part/Serial Number	FCC ID/IC Number
Nokia Solutions and Networks	FSMF	Flexi System Module	Part#: 472181A.103	N/A
HP	Elite Book 6930p	Laptop PC	N/A	N/A

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Cable	Type	Shield	Length	Used in Test	Quantity	Termination
Power Input	Power	No	~ 3 m	Yes	1	Power Supply
Earth	Earth	No	~ 1 m	Yes	1	Lab earth ground
Antenna	RF	Yes	~ 3 m	Yes	4	50Ω Load
External Alarm	Signal	Yes	~ 3 m	Yes	1	Un-terminated
Remote Electrical Tilt	Signal	Yes	~ 3 m	Yes	1	Un-terminated
Multimode Optical	Optical	No	>6 m	Yes	1	System Module

The connector layout for FHOA is provided below:



FHOA EXTERNAL INTERFACES

Name	Qty	Connector Type	Purpose (and Description)
DC In	1	Screw Terminal	3-pole Power Input Terminal, up to AWG 4 cable
GND	1	Screw lug (2xM5/1xM8)	Ground
ANT	4	4.3-10	RF signal for Transmitter/Receiver (50 Ohm)
EAC	1	MDR14	External Alarm Interface (4 alarms)
OPT	3	SFP+ cage	Optical, OBSAI RP3-01 (6.144/3.072 Gbps)
RET	1	8-pin circular connector conforming to IEC 60130-9 – Ed.3.0	AISG 2.0 to external devices

EUT OPERATION

During testing, the EUT was transmitting continuously with 100% duty-cycle at full power on all chains.

EUT FIRMWARE/SOFTWARE

The laptop PC connects to the FSMF System Module over the LMP (Ethernet) port. The system module controls the FHOA RRH via the optical (OBSAI) interface. The laptop is used for changing configuration settings, monitoring tests and controlling the BTS. The following software versions are used for the FHOA testing:

(1) RRH Unit Software: FRC37.02.R16D

(2) System Module Software: FL17SP_ENB_0000_000910_000000

MODIFICATIONS

No modifications were made to the EUT during testing.

TESTING

GENERAL INFORMATION

Antenna port measurements were taken at NTS Plano branch located at 1701 E Plano Pkwy #150 Plano, TX 75074.

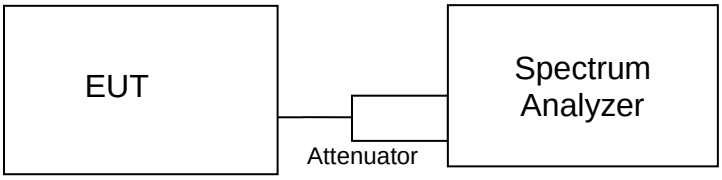
Radiated spurious emissions measurements were taken at the NTS Plano Anechoic Chamber listed below. The sites conform to the requirements of ANSI C63.4-2009 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are on file with the FCC and Industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 1	A2LA Accredited Designation Number US1077	IC 4319A	1701 E Plano Pkwy #150 Plano, TX 75074.

Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements.

MEASUREMENT PROCEDURES

Output power, emission bandwidth, conducted spurious, conducted bandedge and carrier frequency stability measurements were all performed via a spectrum analyzer connected to the individual RF chains via a 40dB attenuator and an RF cable. The EUT was operating in 4x4 MIMO configuration at full power for all tests. While measuring one transmit chain, others were terminated with termination blocks. All measurements were corrected for the insertion loss of the attenuator and cable inserted between the RF port of the EUT and the spectrum analyzer. Simple test diagram is shown below.



Test Configuration for Antenna Port Measurements

26dB emission bandwidth was measured in accordance with Section 4.1 of FCC KDB 971168 D01 v02r02. 99% occupied bandwidth was measured in accordance with Section 6.6 of RSS-Gen Issue 4. For both measurements an occupied bandwidth built-in function in the spectrum analyzer was used and Keysight Benchvue Software was used to capture the spectrum analyzer screenshots. Spectrum analyzer settings are shown on their corresponding plots in test results section.

Emissions at the band-edges were also captured with an Keysight Benchvue Software with settings described in the corresponding sections of the FCC and IC rules. Spectrum analyzer settings are shown on their corresponding plots in test results section.

Peak and average output power measurements were performed in accordance with FCC KDB 971168 D01 v02r02. Measurements were performed with the built in power meter function found in the Spectrum analyzer and the screenshots were captured using Keysight Benchvue Software.

Peak to average power ratio was calculated in accordance with Section 5.7.2 of FCC KDB 971168 D01 v02r02.

Conducted spurious emissions were captured with TILE6 software which corrected the readings for cable loss and attenuator loss across the 9kHz-7GHz frequency span. Settings of the spectrum analyzer are described in the corresponding test result section.

For frequency stability, the EUT was placed inside a temperature chamber with all support and test equipment located outside of the chamber. Temperature was varied across the specified range in 10 degree increments and EUT was allowed enough time to stabilize at each temperature step. Bandedge measurements were performed at the lowest and highest channels to verify that the carrier stayed within the authorized frequency block.

Transmitter radiated spurious emissions measurements were made in accordance with ANSI C63.4-2009 by measuring the field strength of the emissions from the device at 3m test distance. The eirp limit as specified in the relevant rule part(s) is converted to a field strength at the test distance and the emissions from the EUT are then compared to that limit. Only emissions within 20dB of this limit are subjected to a substitution measurement in accordance with TIA-603-C-2004. Both preliminary and final measurements were performed at the same FCC listed test chamber. Preliminary scans were performed with TILE6 software. This software corrected the measurements for antenna factors, cable losses and pre-amplifier gains. Both polarizations of the receiving antenna were scanned from 30MHz to 7GHz with a peak detector (RBW=100kHz, VBW=300kHz, with trace max hold over multiple sweeps). Based on the preliminary scan results, frequencies of interest have been maximized via rotating the EUT 360 degrees and varying the height of the test antenna (1m to 4m). Final measurements were also taken with the peak detector as described above. A biconilog antenna was used for 30MHz-1GHz range. A double ridged waveguide horn antenna was used for 1-7GHz range. The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. EUT was placed on a non-conductive RF transparent structure to provide 80cm height from the ground floor. A motorized turntable allowed it to be rotated during testing to determine the angle with the highest level of emissions.

Test Equipment

NTS Equipment #	Description	Manufacturer	Model	Calibration Duration	Calibration Due Date
E1529P	PSA	Agilent	E4446A	12 Months	4/26/2019
E1009P	PreAmp	HP	8449B	12 Months	2/14/2018

	(1GHz-26.5GHz)				
E1279P	PreAmp (30MHz-1GHz)	MITEQ	AM-1431-N-1179SC	12 Months	9/26/2017
E1524P	Biconilog Antenna (30MHz-1GHz)	ETS Lindgren	3142D	12 Months	12/22/2017
E1149P	Horn Antenna (1GHz-18GHz)	EMCO	3115	12 Months	1/30/2018
E1562P	AC/DC Multimeter	Fluke	375	12 Months	12/15/17
ENV1195P	Climatic Chamber	Thermotron	SE-300-2-2	N/A	NCR

Appendix A Test Data

RF Output Power

RF output power has been measured in both Peak and RMS Average terms for each transmit chain at the center channel for all modulations and bandwidth modes.. Peak to average ratio (PAR) has been calculated as described in Section 5.7.2 of KDB971168 D01 v02r02 and all results are presented in tabular form below.

Results on center channel:

		LTE - QPSK			LTE - 16QAM			LTE - 64QAM			LTE - 256QAM		
		Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)
Port 1 Center Channel	**5M**	53.99	46.13	7.86	53.91	46.07	7.84	53.93	46.08	7.85	53.89	46.04	7.85
	10M	54.17	46.09	8.08	54.14	46.09	8.05	54.07	46.08	7.99	54.12	46.09	8.03
	15M	54.16	46.1	8.06	54.2	46.13	8.07	54.1	46.05	8.05	54.1	46.03	8.07
	20M	54.18	46.07	8.11	54.19	46.08	8.11	54.12	46.06	8.06	54.12	46.05	8.07
Port 2 Center Channel	**5M**	53.9	46.06	7.84	53.85	46.01	7.84	53.89	46.03	7.86	53.84	46	7.84
	10M	54.19	46.13	8.06	54.17	**46.16**	8.01	54.08	46.08	8	54.14	46.09	8.05
	15M	54.13	46.05	8.08	54.19	46.02	8.17	54.1	46.08	8.02	54.1	46.01	8.09
	20M	54.14	46.01	8.13	54.13	46	8.13	54.09	46.02	8.07	54.08	46	8.08
Port 3 Center Channel	**5M**	53.9	46.07	7.83	53.81	46.1	7.71	53.9	46.01	7.89	53.84	46.02	7.82
	10M	54.12	46.09	8.03	54.13	46.05	8.08	54.05	46.07	7.98	54.1	46.05	8.05
	15M	54.12	46.05	8.07	54.17	46.02	8.15	54.11	46.01	8.1	54.1	46.05	8.05
	20M	54.14	46.03	8.11	54.12	46.02	8.1	54.1	45.99	8.11	54.09	46	8.09
Port 4 Center Channel	**5M**	53.91	46.05	7.86	53.8	45.95	7.85	53.85	45.96	7.89	53.79	45.92	7.87
	10M	54.08	46.06	8.02	54.09	46.01	8.08	54.02	46.06	7.96	54.08	46.05	8.03
	15M	54.06	45.99	8.07	54.11	45.99	8.12	54.04	46	8.04	54.05	46	8.05
	20M	54.16	46.06	8.1	54.12	46.05	8.07	54.08	46.01	8.07	54.08	45.92	8.16
Combined Center Channel	**5M**	59.9458	52.0982	7.8476	59.8633	52.0535	7.8098	59.9132	52.0408	7.8724	59.8607	52.0158	7.8449
	10M	60.1608	52.1132	8.0476	60.1532	52.0985	8.0547	60.0757	52.0931	7.9826	60.1307	52.0906	8.0401
	15M	60.1383	52.0683	8.07	60.1882	52.0609	8.1273	60.1082	52.0557	8.0525	60.1082	52.0431	8.0651
	20M	60.1756	52.0632	8.1124	60.1607	52.0582	8.1025	60.1181	52.0407	8.0774	60.1131	52.0133	8.0998

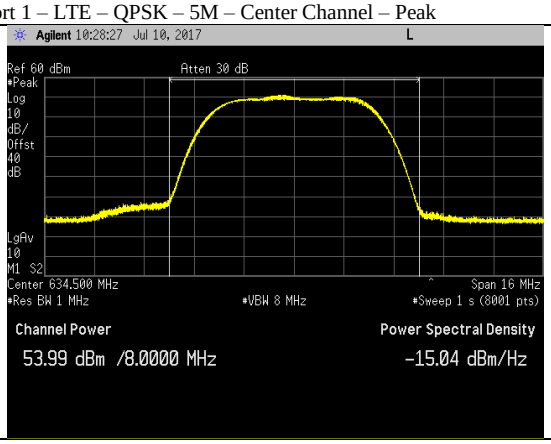
Based on the results above, Port 2 had the highest RMS average power and therefore it was selected for all the remaining antenna port tests on the product.

Subsequently output power levels on lowest and highest channels in 5MHz, 10MHz, 15MHz, and 20MHz channel bandwidth modes were tested only at Port 2 and results presented below.

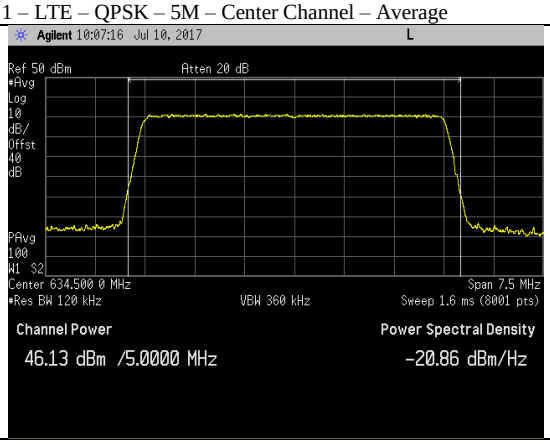
		LTE - QPSK			LTE - 16QAM			LTE - 64QAM			LTE - 256QAM		
		Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)	Peak (dBm)	Average (dBm)	PAR (dB)
Port 2 Bottom Channel	5M	53.84	45.97	7.87	53.79	45.94	7.85	53.86	46.01	7.85	53.84	45.98	7.86
	10M	54.18	46.12	8.06	54.19	46.19	8	54.13	46.15	7.98	54.21	46.16	8.05
	15M	54.24	46.18	8.06	54.3	46.18	8.12	54.22	46.17	8.05	54.24	46.17	8.07
	20M	54.28	46.15	8.13	54.25	46.15	8.1	54.2	46.14	8.06	54.22	46.15	8.07
Port 2 Top Channel	5M	53.71	45.66	8.05	53.45	45.63	7.82	53.55	45.67	7.88	53.5	45.65	7.85
	10M	54.15	46.02	8.13	54.06	46.02	8.04	53.99	46.01	7.98	54.05	46.05	8
	15M	54.23	46.1	8.13	54.25	46.18	8.07	54.16	46.08	8.08	54.16	46.05	8.11
	20M	54.26	46.12	8.14	54.22	46.1	8.12	54.17	46.14	8.03	54.19	46.15	8.04

All corresponding plots included on the following pages. Total path loss of 40dB (Attenuator & RF cable) accounted in via reference level offset to the spectrum analyzer.

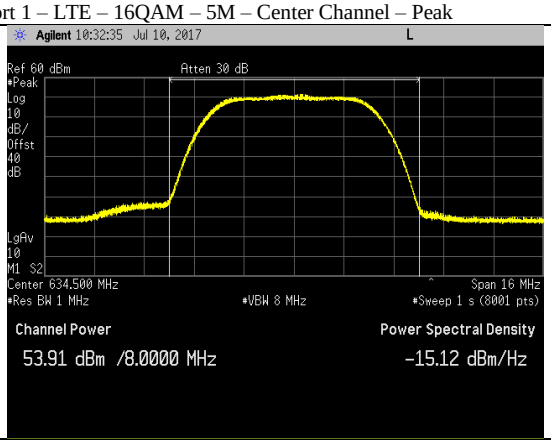
Port 1 – LTE – QPSK – 5M – Center Channel – Peak



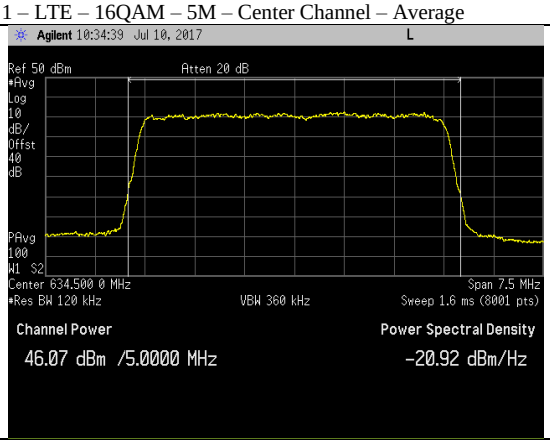
Port 1 – LTE – QPSK – 5M – Center Channel – Average



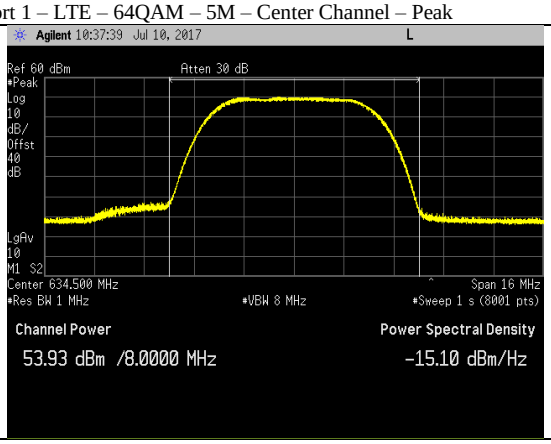
Port 1 – LTE – 16QAM – 5M – Center Channel – Peak



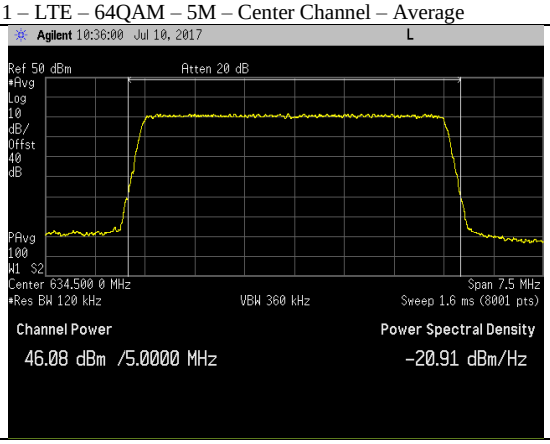
Port 1 – LTE – 16QAM – 5M – Center Channel – Average



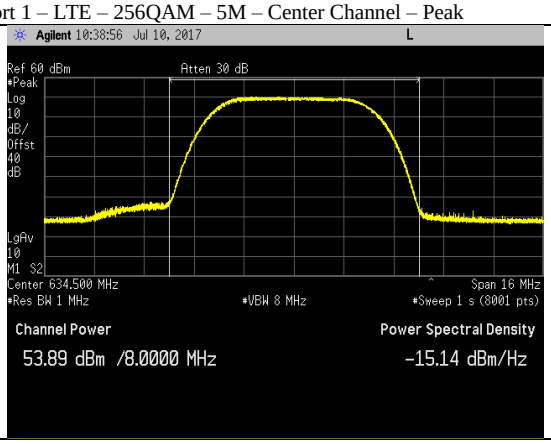
Port 1 – LTE – 64QAM – 5M – Center Channel – Peak



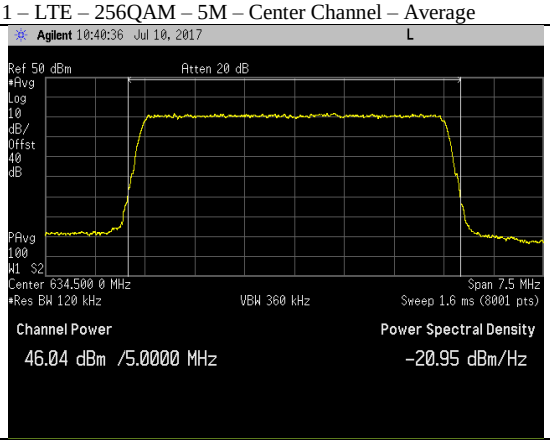
Port 1 – LTE – 64QAM – 5M – Center Channel – Average



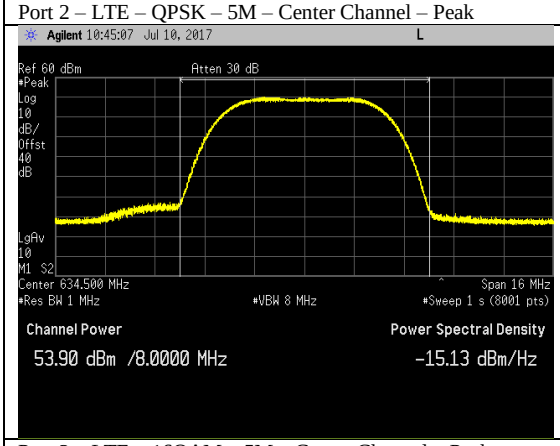
Port 1 – LTE – 256QAM – 5M – Center Channel – Peak



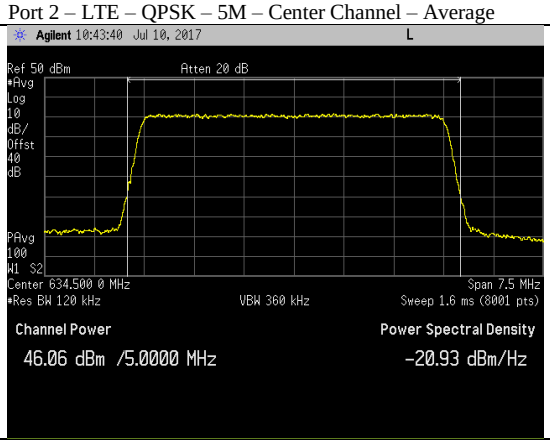
Port 1 – LTE – 256QAM – 5M – Center Channel – Average



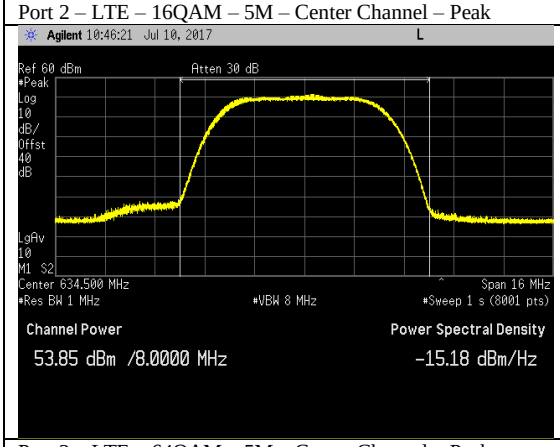
Port 2 – LTE – QPSK – 5M – Center Channel – Peak



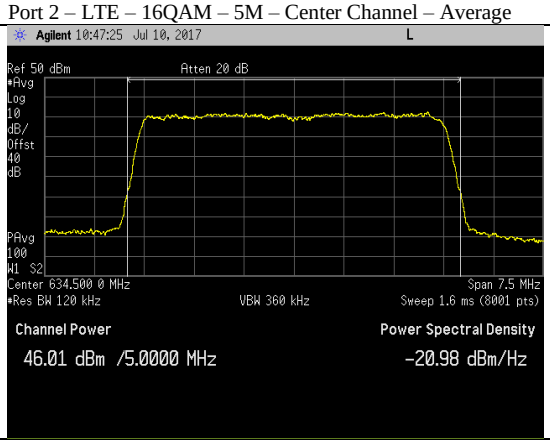
Port 2 – LTE – QPSK – 5M – Center Channel – Average



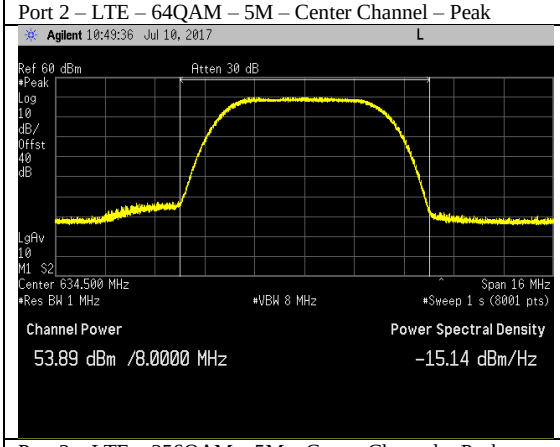
Port 2 – LTE – 16QAM – 5M – Center Channel – Peak



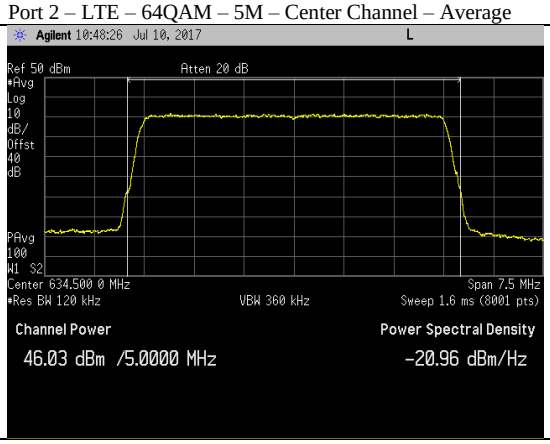
Port 2 – LTE – 16QAM – 5M – Center Channel – Average



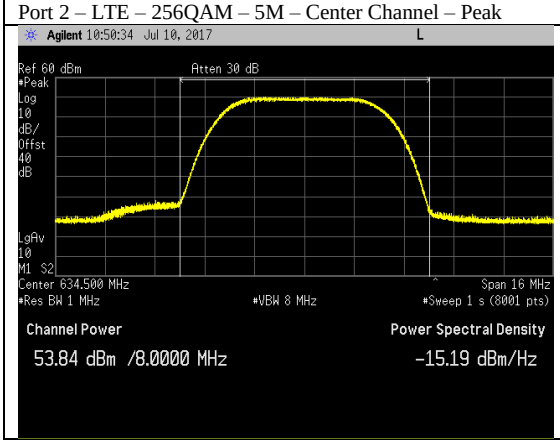
Port 2 – LTE – 64QAM – 5M – Center Channel – Peak



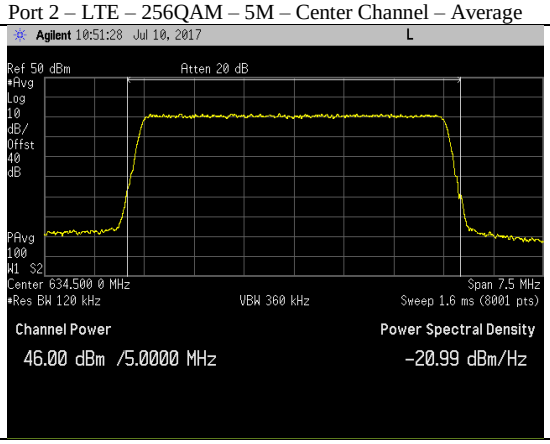
Port 2 – LTE – 64QAM – 5M – Center Channel – Average



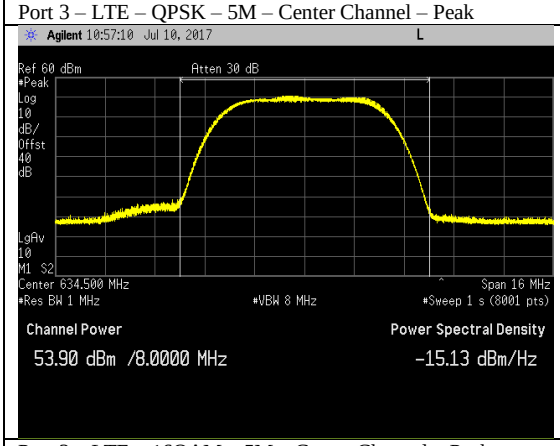
Port 2 – LTE – 256QAM – 5M – Center Channel – Peak



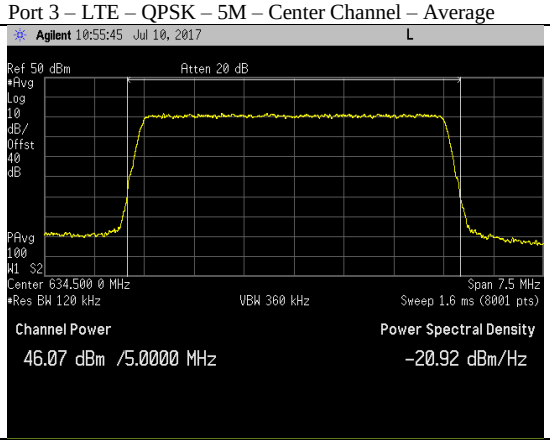
Port 2 – LTE – 256QAM – 5M – Center Channel – Average



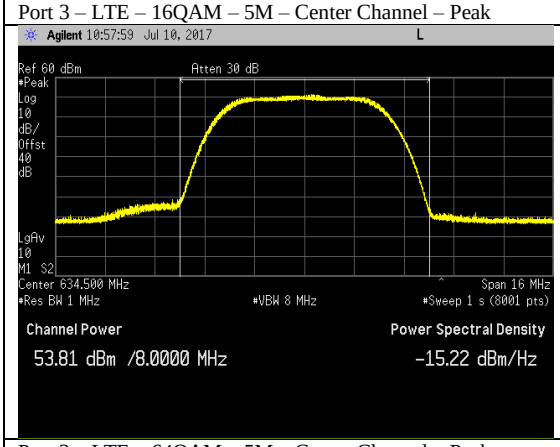
Port 3 – LTE – QPSK – 5M – Center Channel – Peak



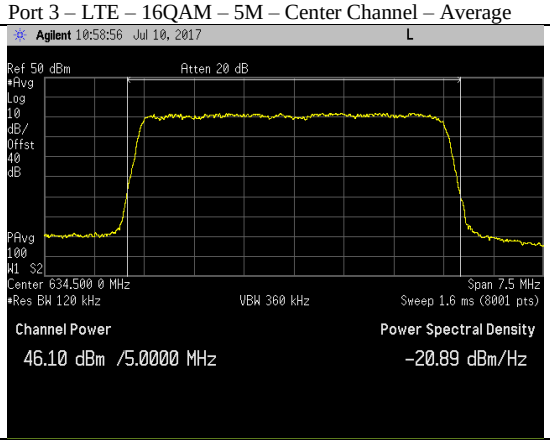
Port 3 – LTE – QPSK – 5M – Center Channel – Average



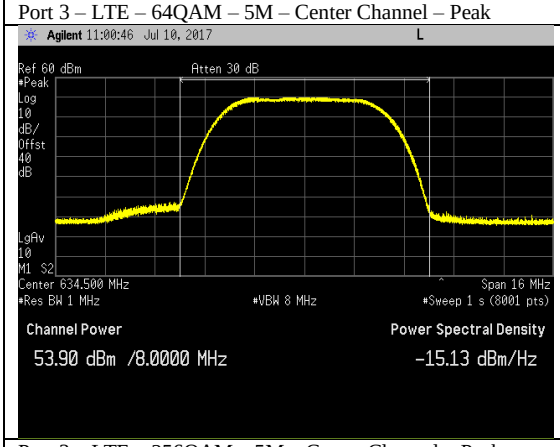
Port 3 – LTE – 16QAM – 5M – Center Channel – Peak



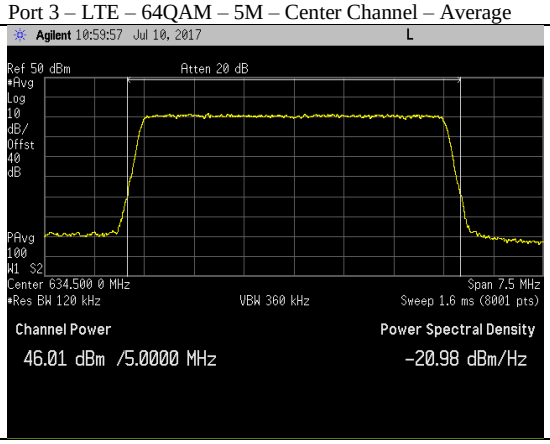
Port 3 – LTE – 16QAM – 5M – Center Channel – Average



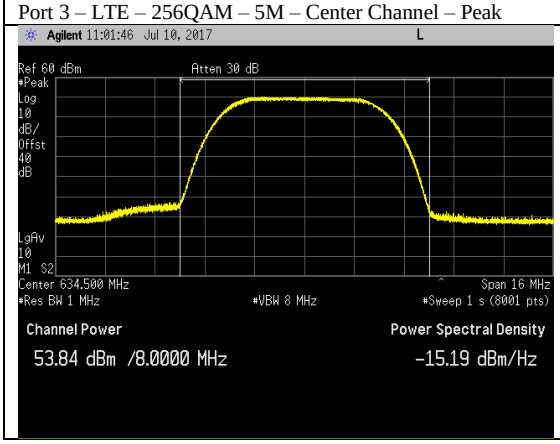
Port 3 – LTE – 64QAM – 5M – Center Channel – Peak



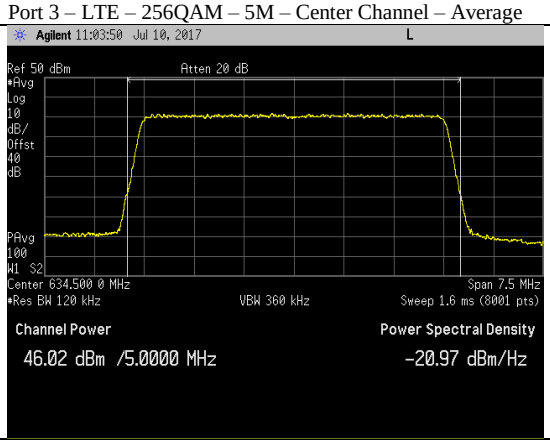
Port 3 – LTE – 64QAM – 5M – Center Channel – Average



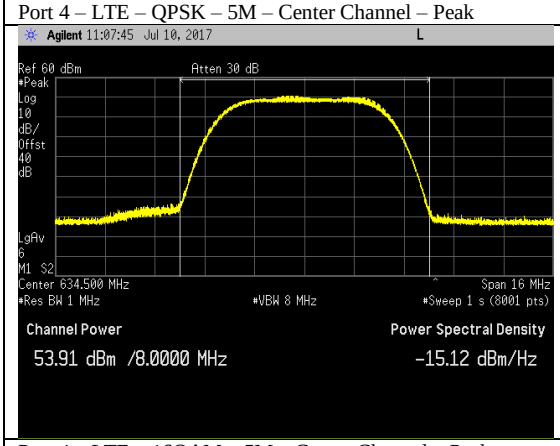
Port 3 – LTE – 256QAM – 5M – Center Channel – Peak



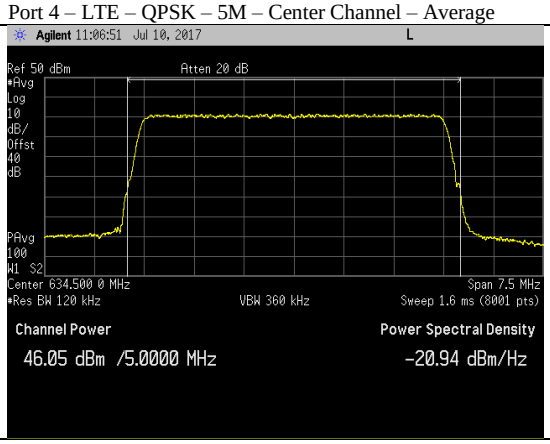
Port 3 – LTE – 256QAM – 5M – Center Channel – Average



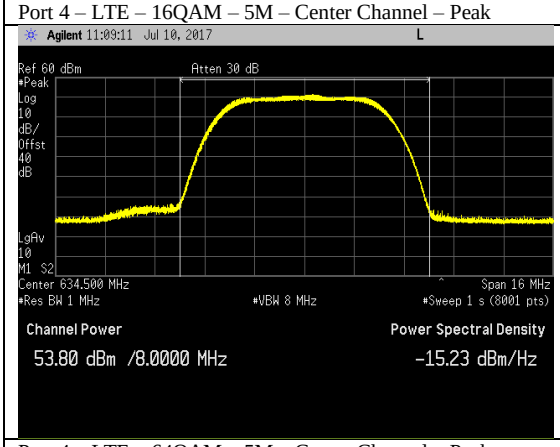
Port 4 – LTE – QPSK – 5M – Center Channel – Peak



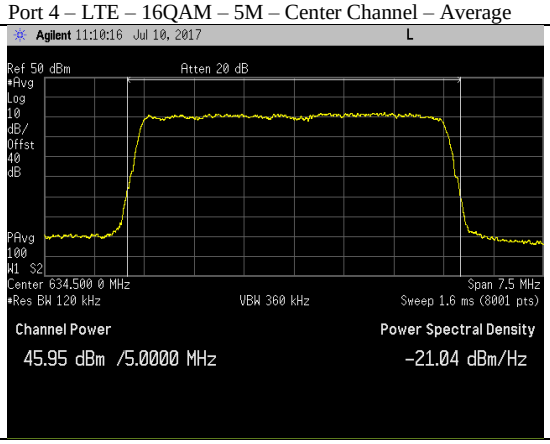
Port 4 – LTE – QPSK – 5M – Center Channel – Average



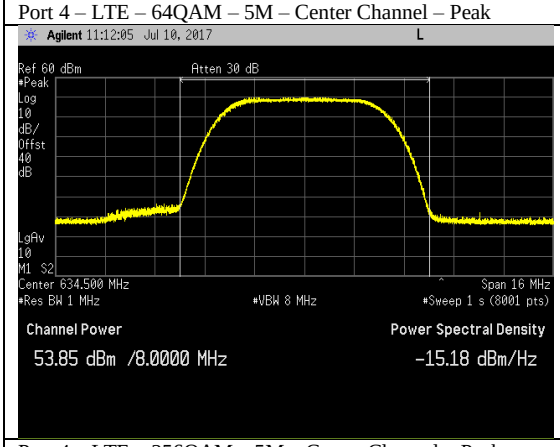
Port 4 – LTE – 16QAM – 5M – Center Channel – Peak



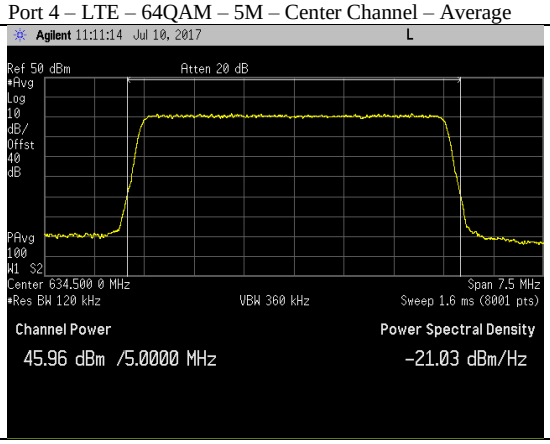
Port 4 – LTE – 16QAM – 5M – Center Channel – Average



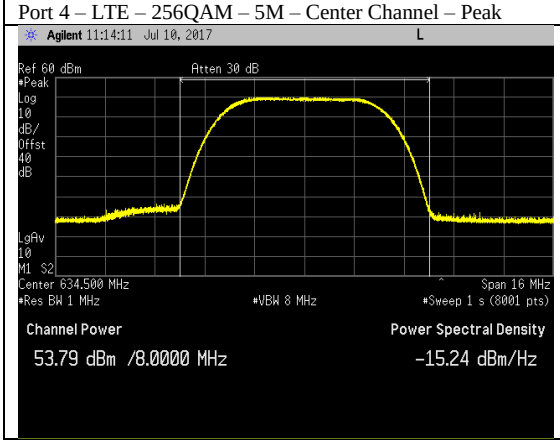
Port 4 – LTE – 64QAM – 5M – Center Channel – Peak



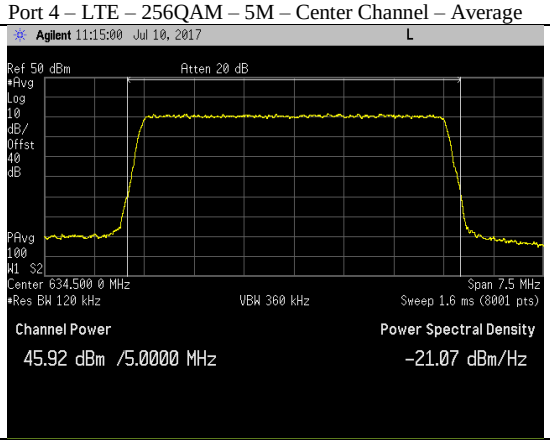
Port 4 – LTE – 64QAM – 5M – Center Channel – Average



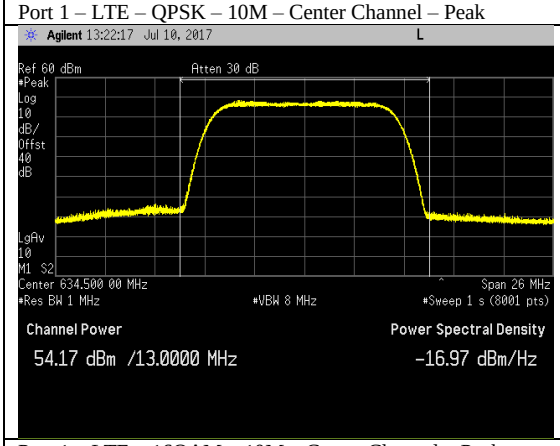
Port 4 – LTE – 256QAM – 5M – Center Channel – Peak



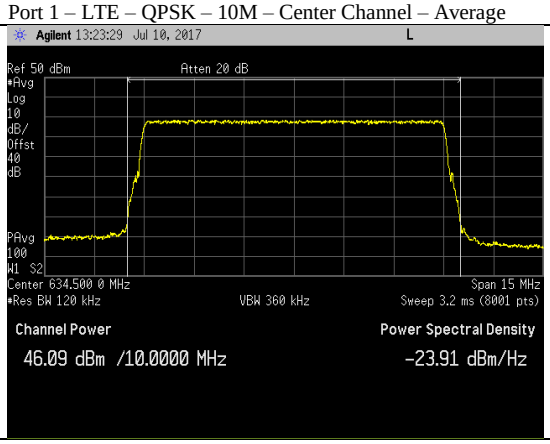
Port 4 – LTE – 256QAM – 5M – Center Channel – Average



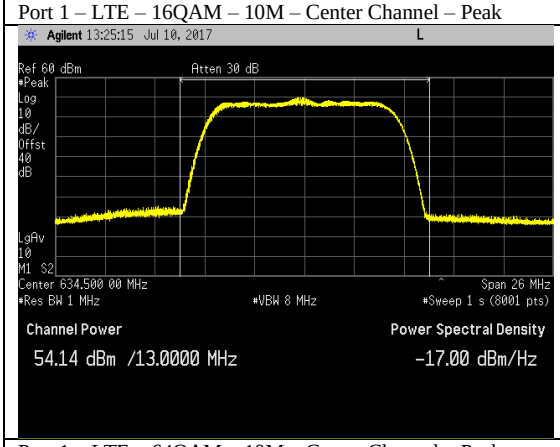
Port 1 – LTE – QPSK – 10M – Center Channel – Peak



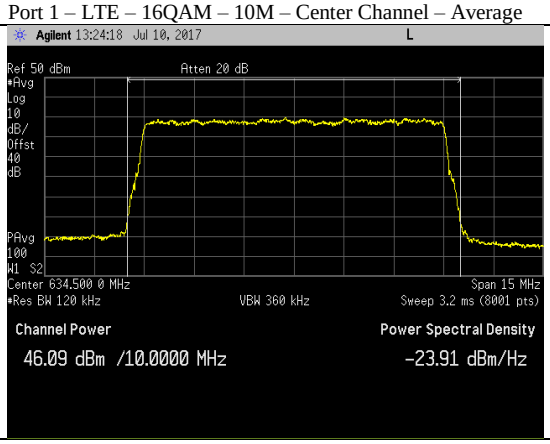
Port 1 – LTE – QPSK – 10M – Center Channel – Average



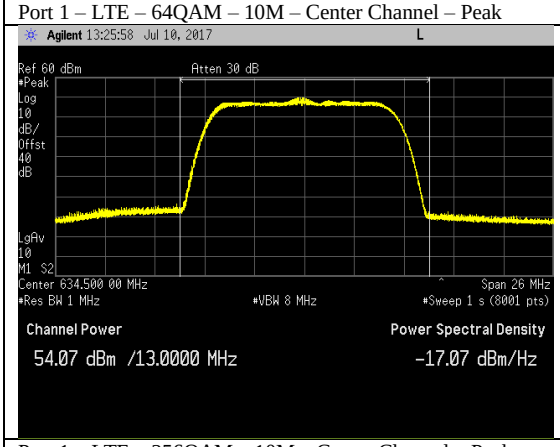
Port 1 – LTE – 16QAM – 10M – Center Channel – Peak



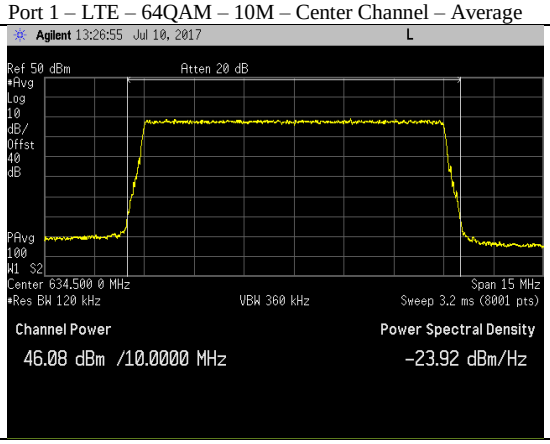
Port 1 – LTE – 16QAM – 10M – Center Channel – Average



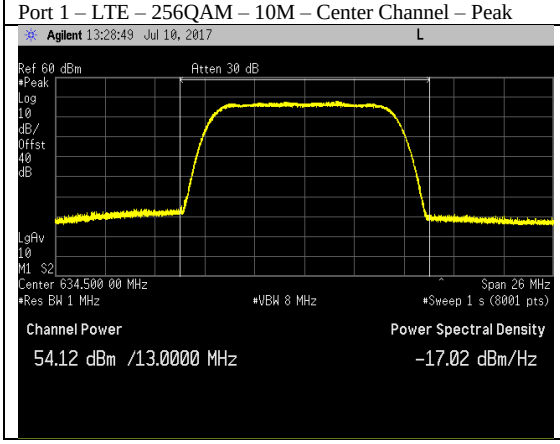
Port 1 – LTE – 64QAM – 10M – Center Channel – Peak



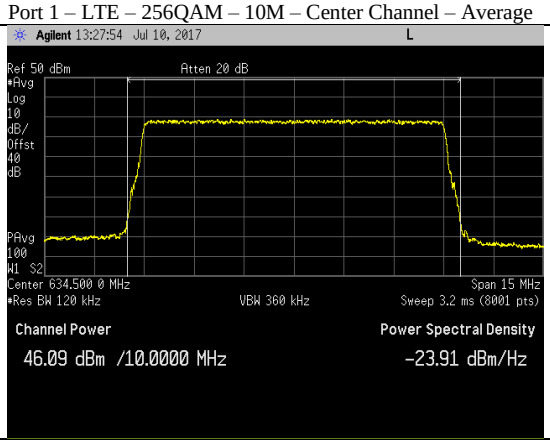
Port 1 – LTE – 64QAM – 10M – Center Channel – Average



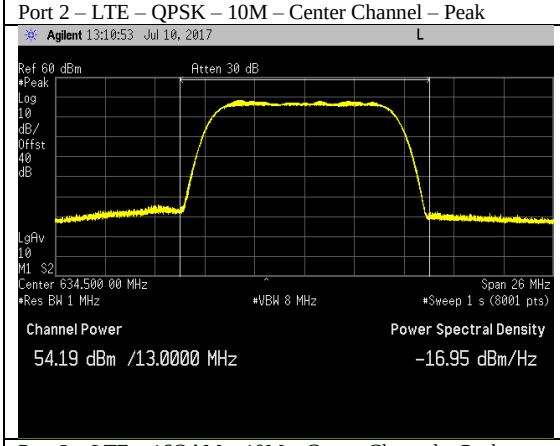
Port 1 – LTE – 256QAM – 10M – Center Channel – Peak



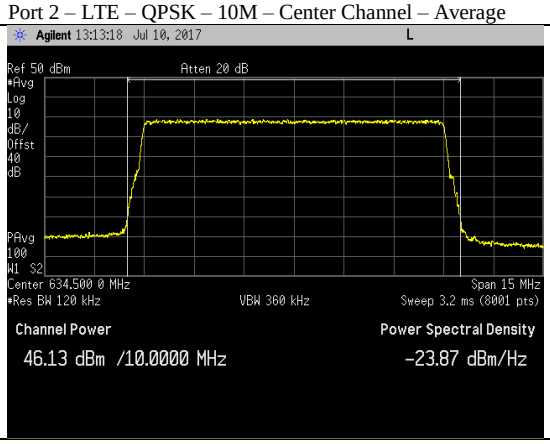
Port 1 – LTE – 256QAM – 10M – Center Channel – Average



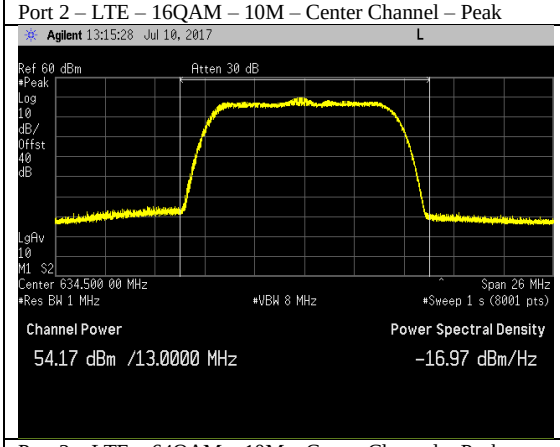
Port 2 – LTE – QPSK – 10M – Center Channel – Peak



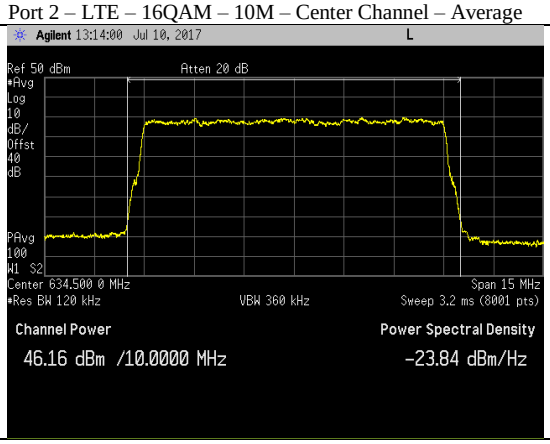
Port 2 – LTE – QPSK – 10M – Center Channel – Average



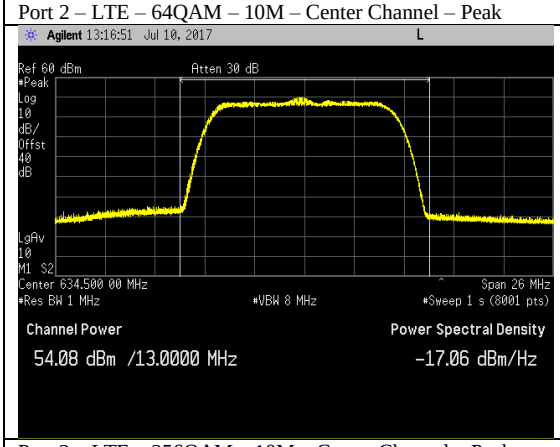
Port 2 – LTE – 16QAM – 10M – Center Channel – Peak



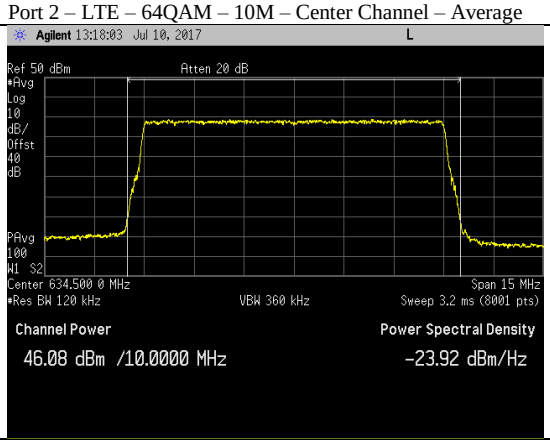
Port 2 – LTE – 16QAM – 10M – Center Channel – Average



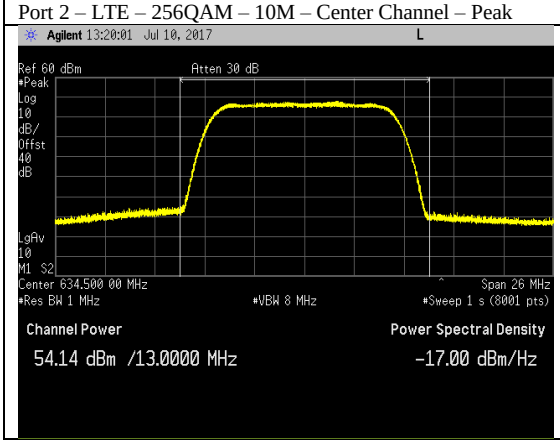
Port 2 – LTE – 64QAM – 10M – Center Channel – Peak



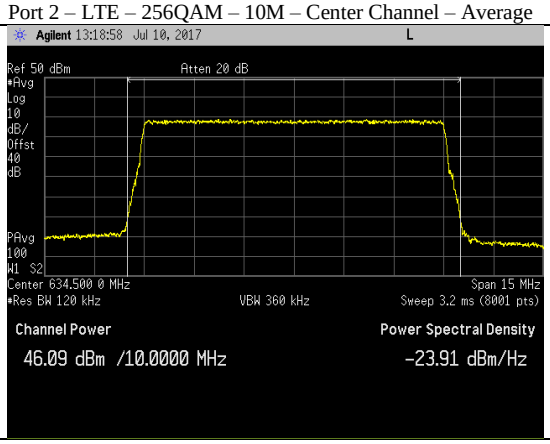
Port 2 – LTE – 64QAM – 10M – Center Channel – Average



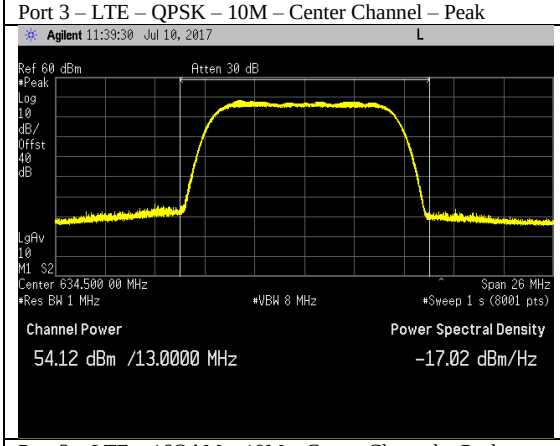
Port 2 – LTE – 256QAM – 10M – Center Channel – Peak



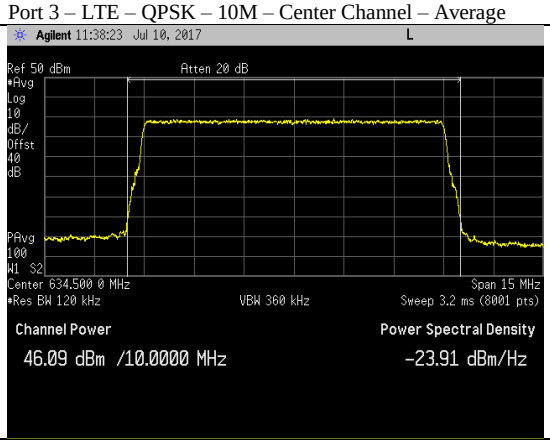
Port 2 – LTE – 256QAM – 10M – Center Channel – Average



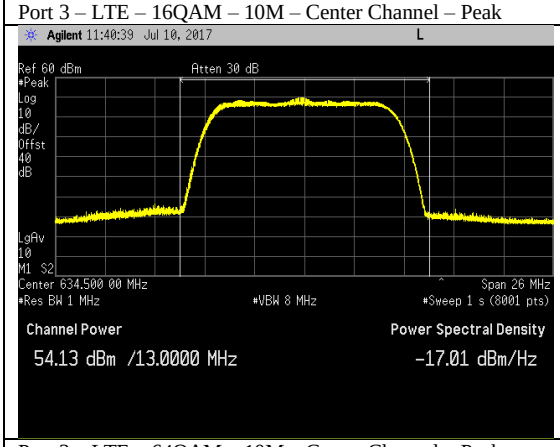
Port 3 – LTE – QPSK – 10M – Center Channel – Peak



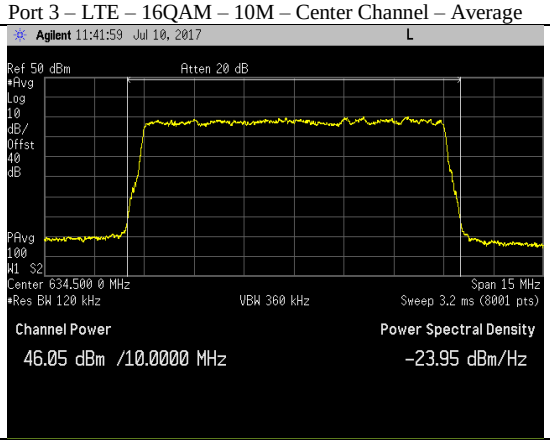
Port 3 – LTE – QPSK – 10M – Center Channel – Average



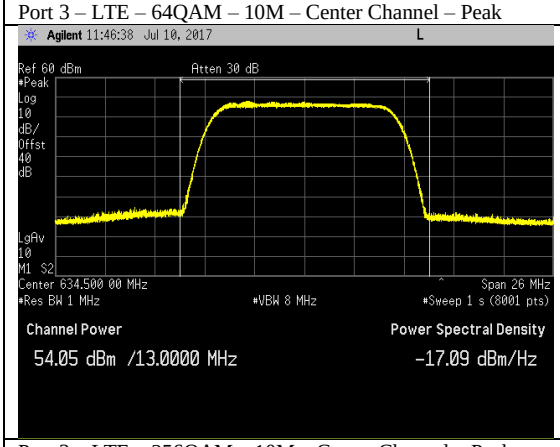
Port 3 – LTE – 16QAM – 10M – Center Channel – Peak



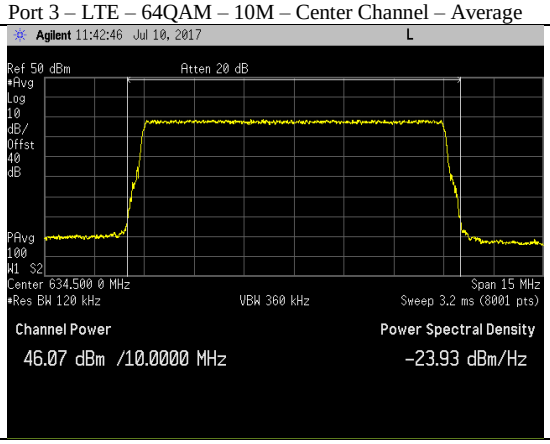
Port 3 – LTE – 16QAM – 10M – Center Channel – Average



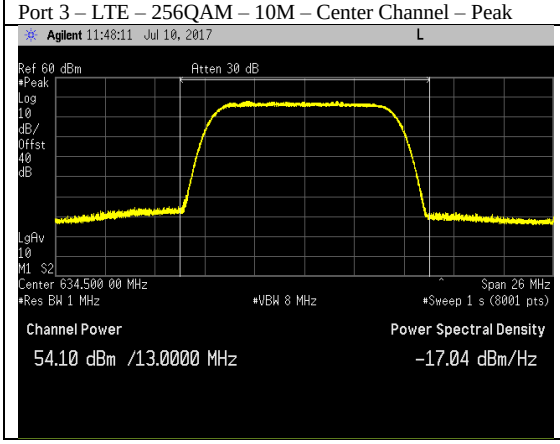
Port 3 – LTE – 64QAM – 10M – Center Channel – Peak



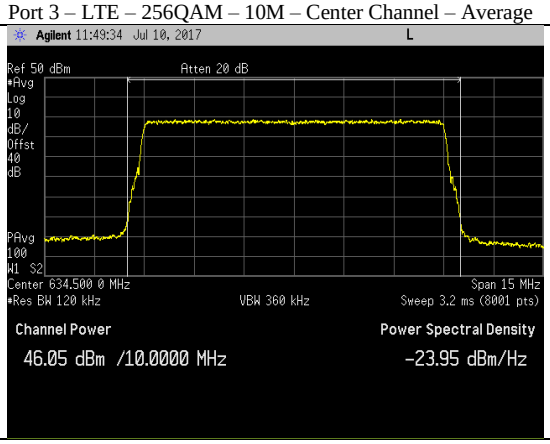
Port 3 – LTE – 64QAM – 10M – Center Channel – Average



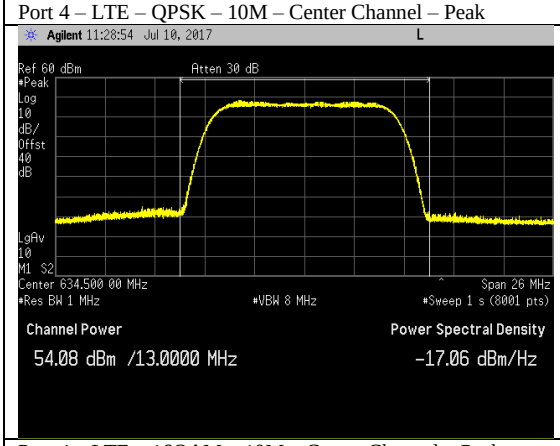
Port 3 – LTE – 256QAM – 10M – Center Channel – Peak



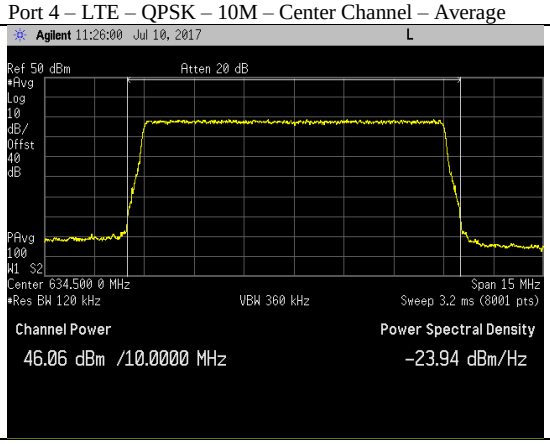
Port 3 – LTE – 256QAM – 10M – Center Channel – Average



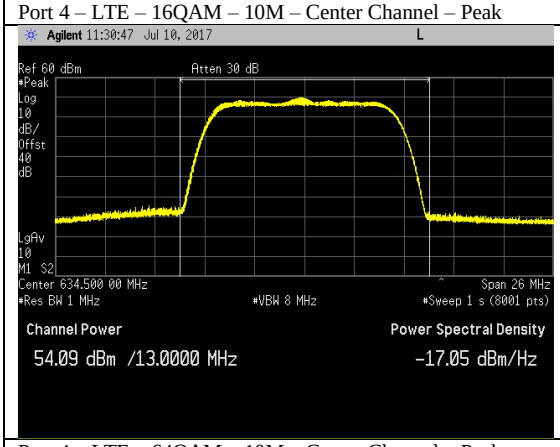
Port 4 – LTE – QPSK – 10M – Center Channel – Peak



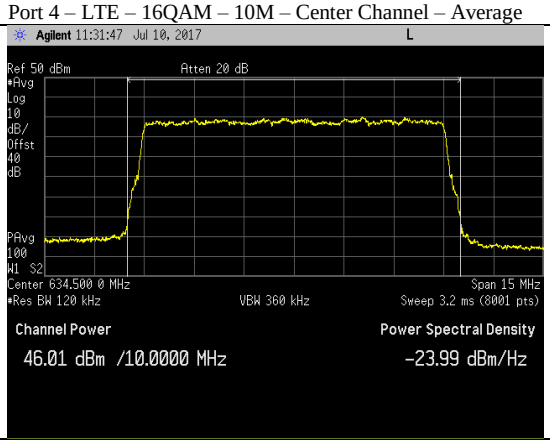
Port 4 – LTE – QPSK – 10M – Center Channel – Average



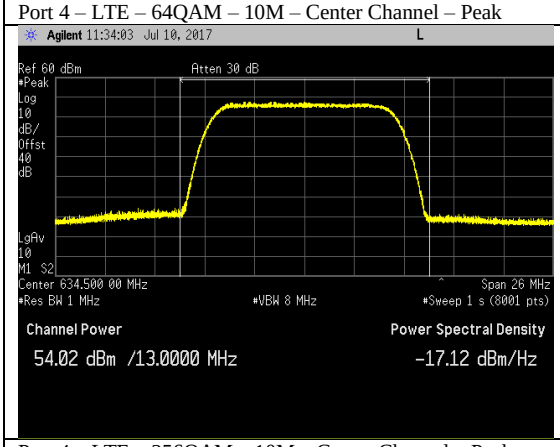
Port 4 – LTE – 16QAM – 10M – Center Channel – Peak



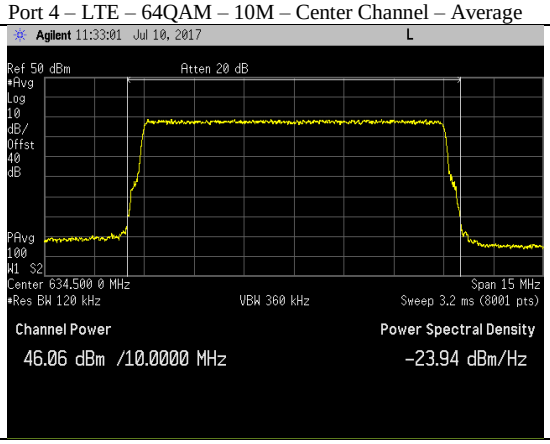
Port 4 – LTE – 16QAM – 10M – Center Channel – Average



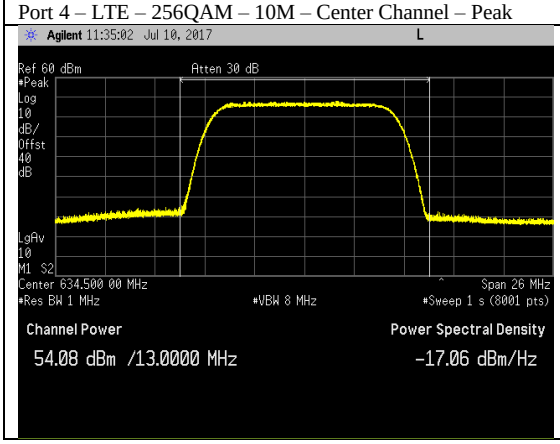
Port 4 – LTE – 64QAM – 10M – Center Channel – Peak



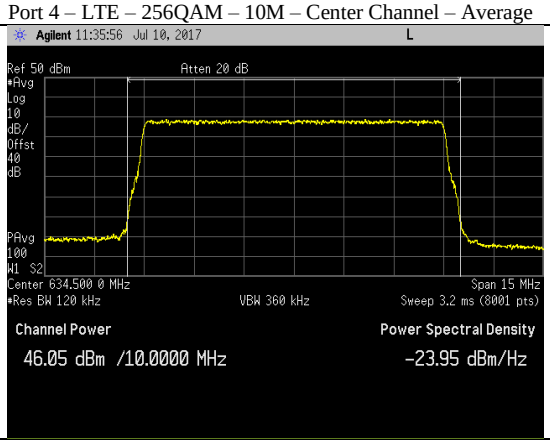
Port 4 – LTE – 64QAM – 10M – Center Channel – Average



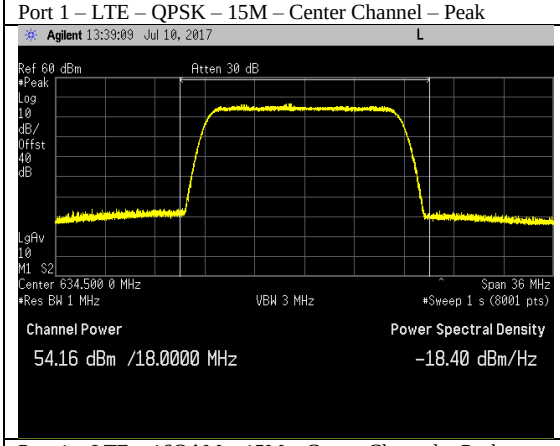
Port 4 – LTE – 256QAM – 10M – Center Channel – Peak



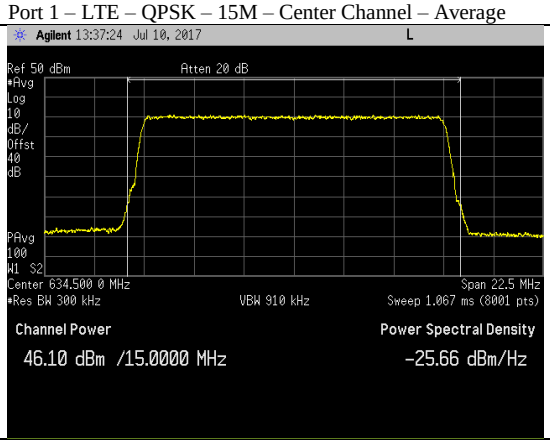
Port 4 – LTE – 256QAM – 10M – Center Channel – Average



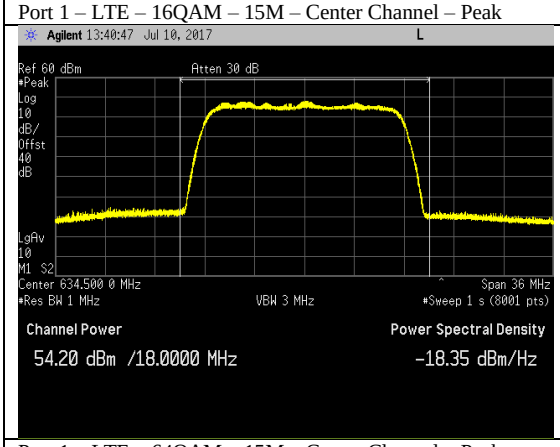
Port 1 – LTE – QPSK – 15M – Center Channel – Peak



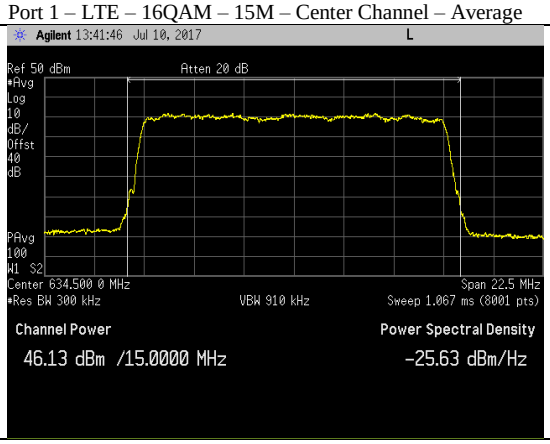
Port 1 – LTE – QPSK – 15M – Center Channel – Average



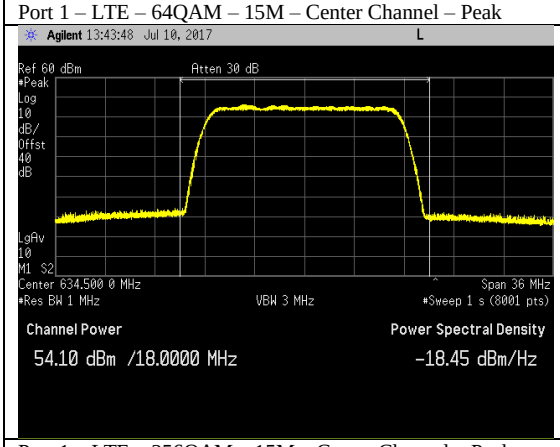
Port 1 – LTE – 16QAM – 15M – Center Channel – Peak



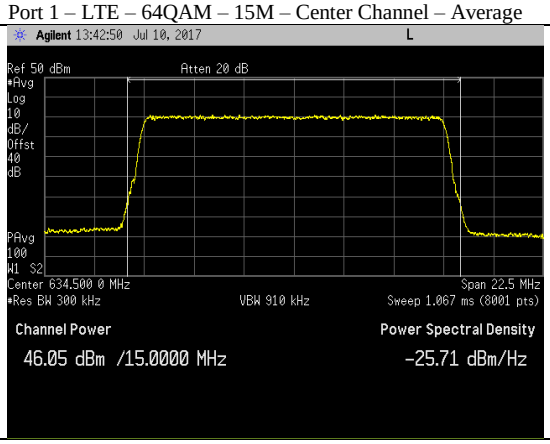
Port 1 – LTE – 16QAM – 15M – Center Channel – Average



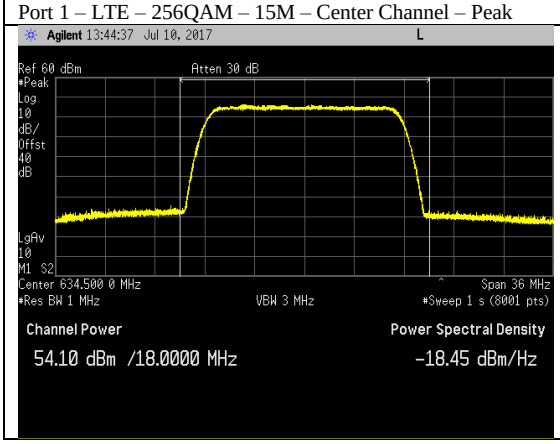
Port 1 – LTE – 64QAM – 15M – Center Channel – Peak



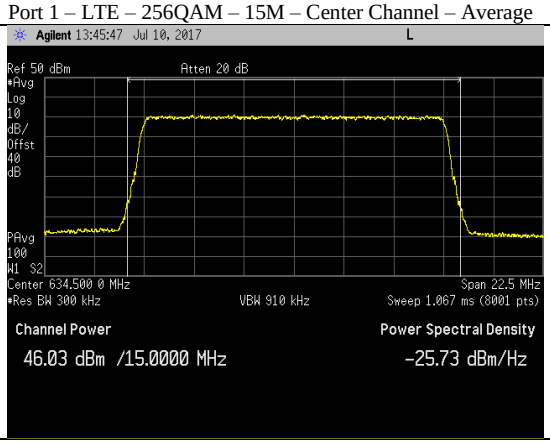
Port 1 – LTE – 64QAM – 15M – Center Channel – Average



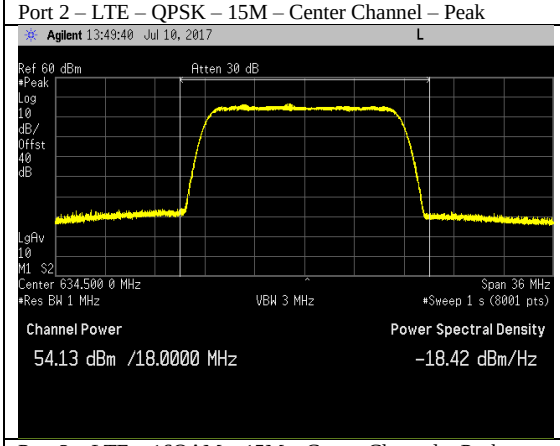
Port 1 – LTE – 256QAM – 15M – Center Channel – Peak



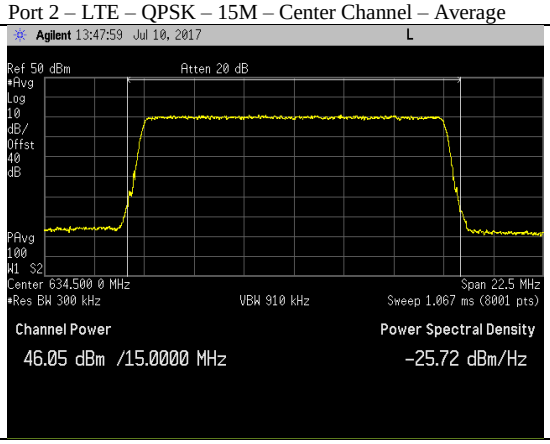
Port 1 – LTE – 256QAM – 15M – Center Channel – Average



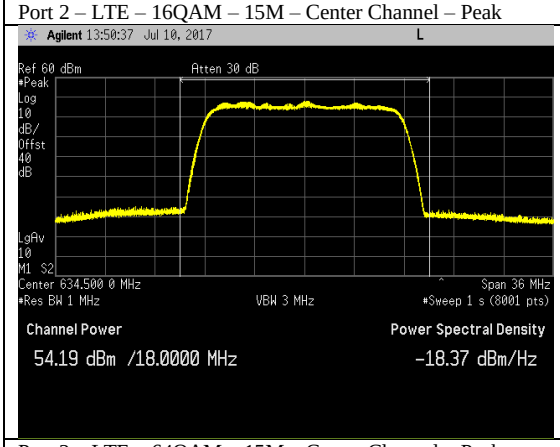
Port 2 – LTE – QPSK – 15M – Center Channel – Peak



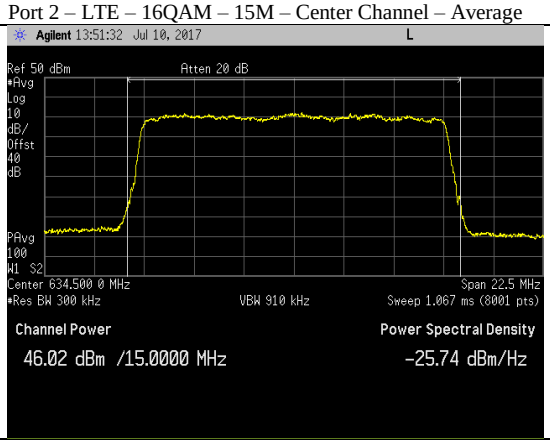
Port 2 – LTE – QPSK – 15M – Center Channel – Average



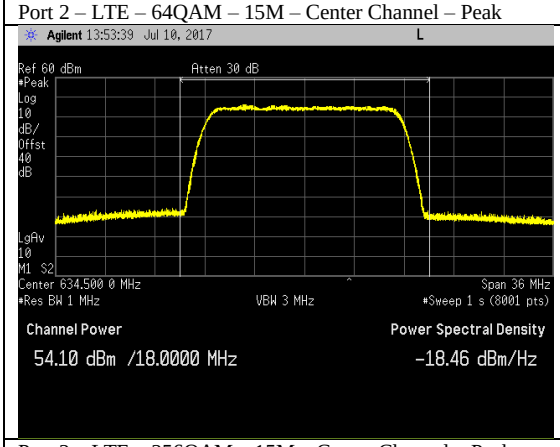
Port 2 – LTE – 16QAM – 15M – Center Channel – Peak



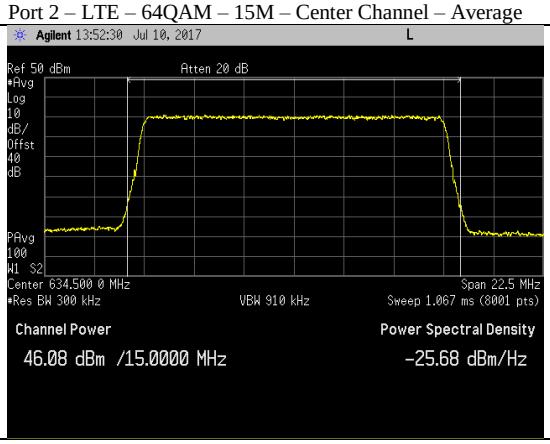
Port 2 – LTE – 16QAM – 15M – Center Channel – Average



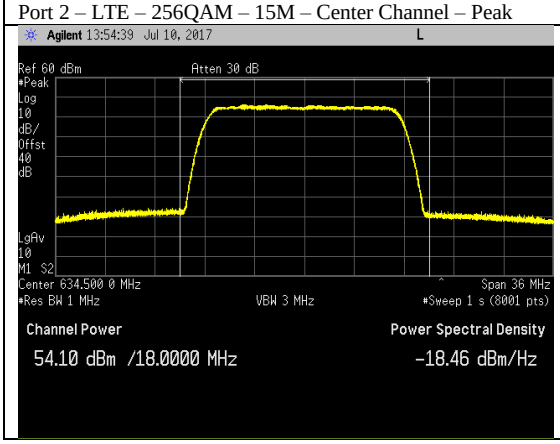
Port 2 – LTE – 64QAM – 15M – Center Channel – Peak



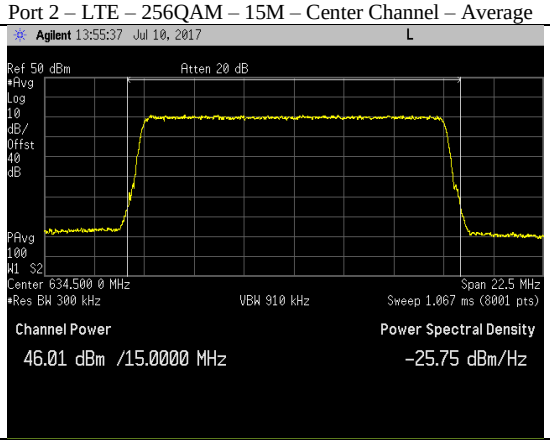
Port 2 – LTE – 64QAM – 15M – Center Channel – Average



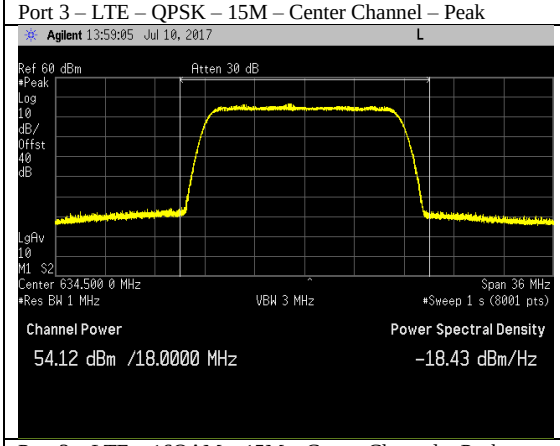
Port 2 – LTE – 256QAM – 15M – Center Channel – Peak



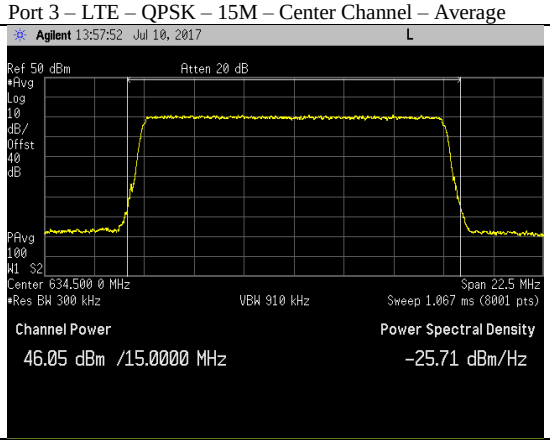
Port 2 – LTE – 256QAM – 15M – Center Channel – Average



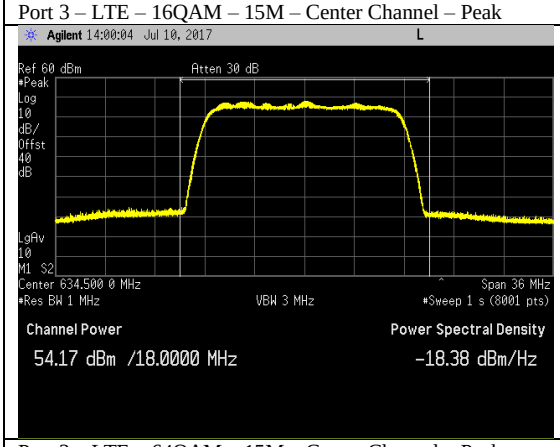
Port 3 – LTE – QPSK – 15M – Center Channel – Peak



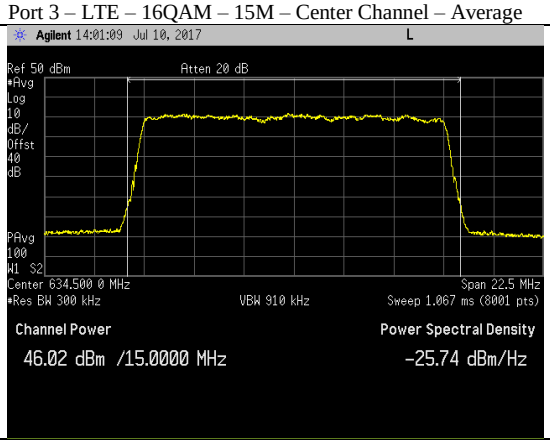
Port 3 – LTE – QPSK – 15M – Center Channel – Average



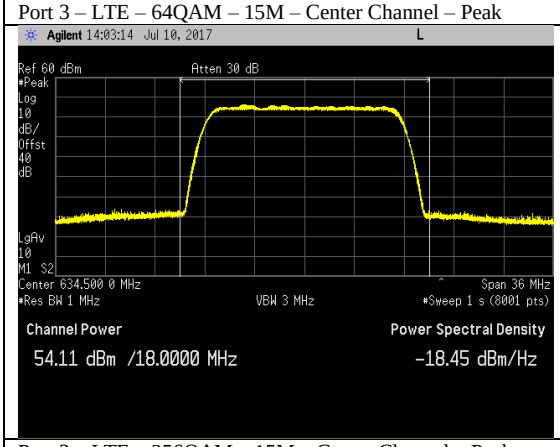
Port 3 – LTE – 16QAM – 15M – Center Channel – Peak



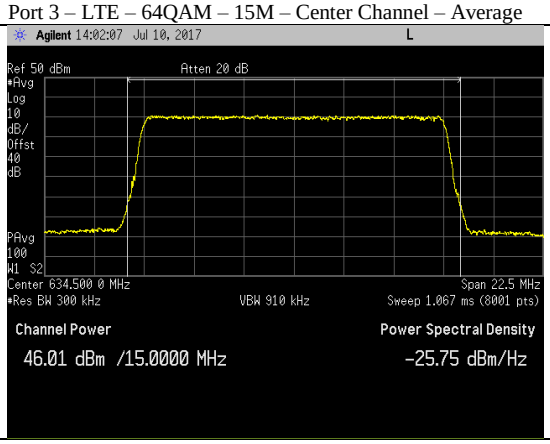
Port 3 – LTE – 16QAM – 15M – Center Channel – Average



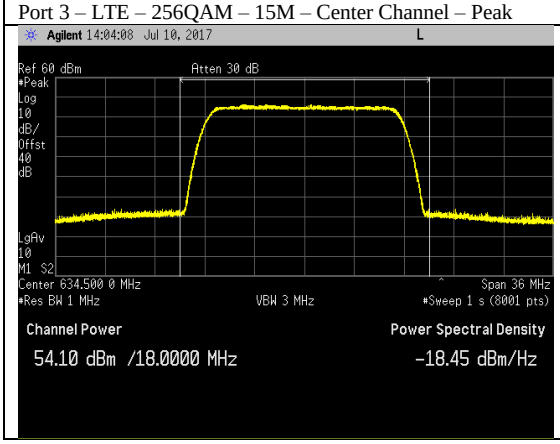
Port 3 – LTE – 64QAM – 15M – Center Channel – Peak



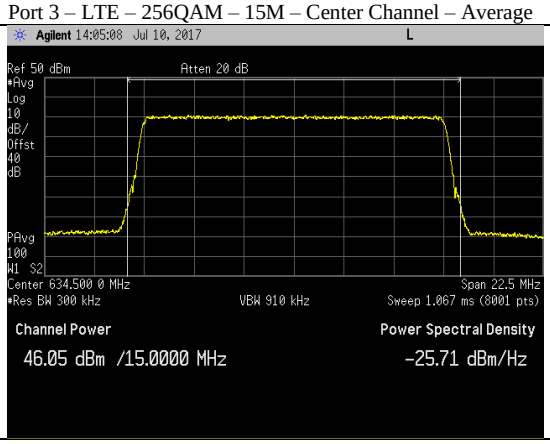
Port 3 – LTE – 64QAM – 15M – Center Channel – Average



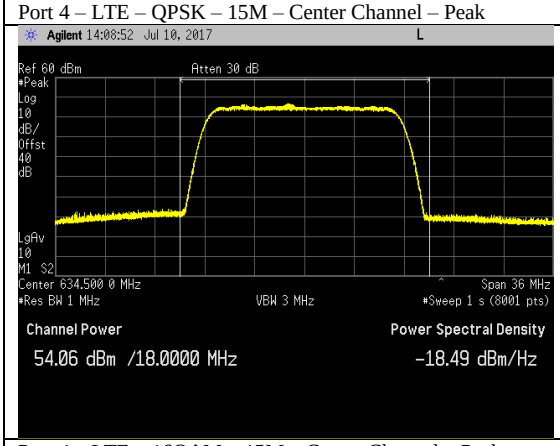
Port 3 – LTE – 256QAM – 15M – Center Channel – Peak



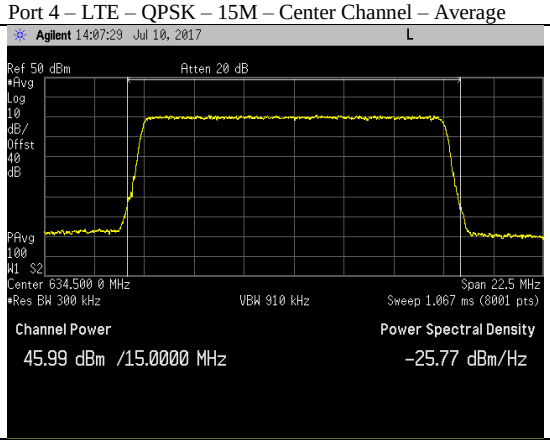
Port 3 – LTE – 256QAM – 15M – Center Channel – Average



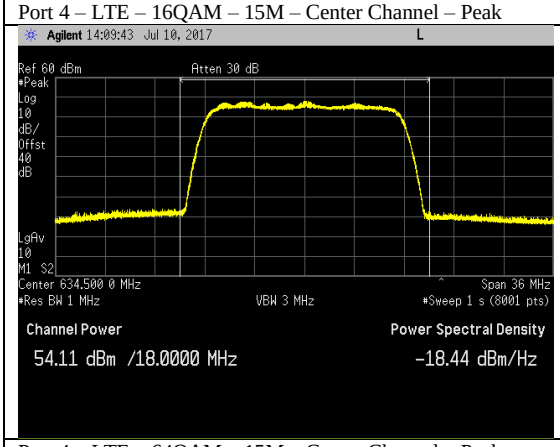
Port 4 – LTE – QPSK – 15M – Center Channel – Peak



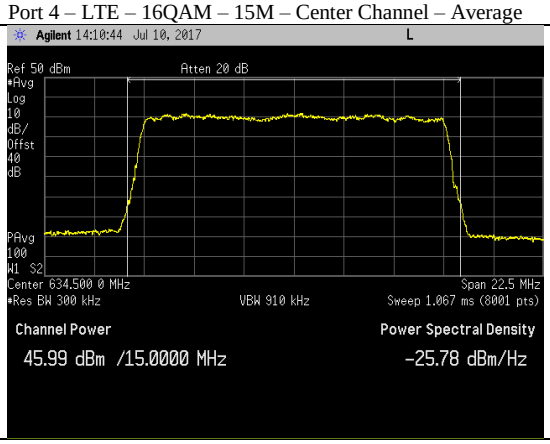
Port 4 – LTE – QPSK – 15M – Center Channel – Average



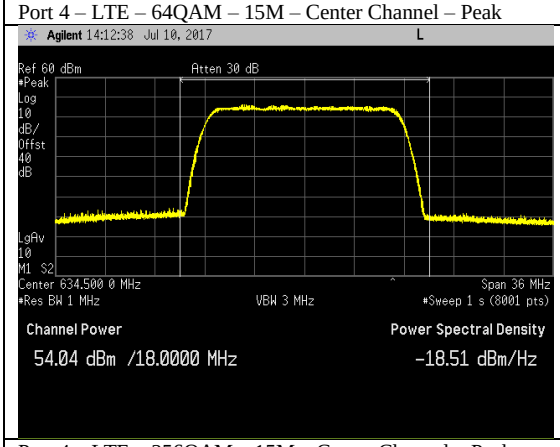
Port 4 – LTE – 16QAM – 15M – Center Channel – Peak



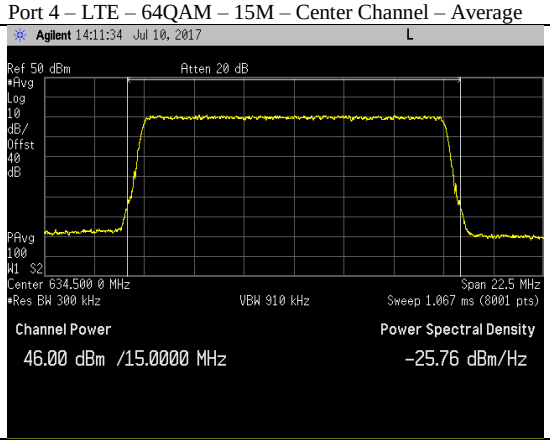
Port 4 – LTE – 16QAM – 15M – Center Channel – Average



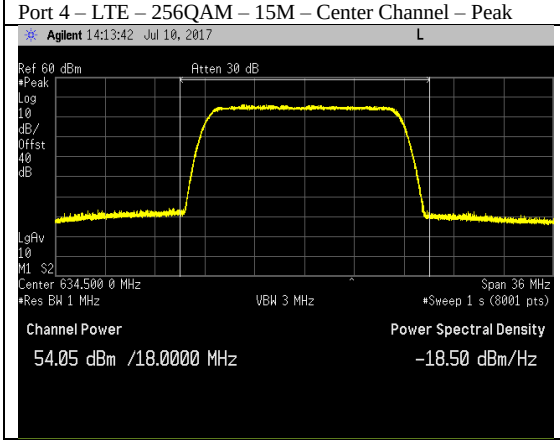
Port 4 – LTE – 64QAM – 15M – Center Channel – Peak



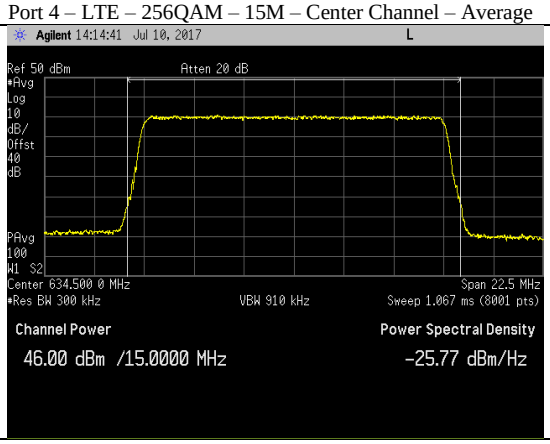
Port 4 – LTE – 64QAM – 15M – Center Channel – Average



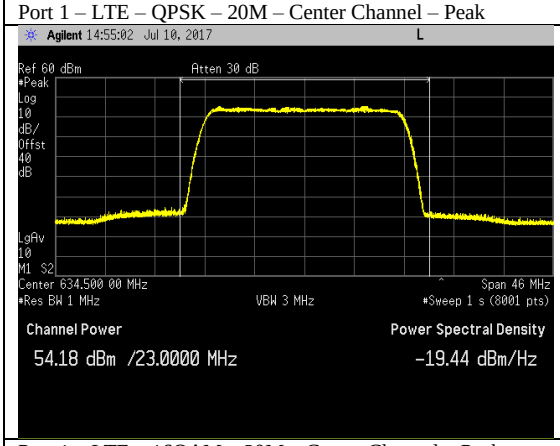
Port 4 – LTE – 256QAM – 15M – Center Channel – Peak



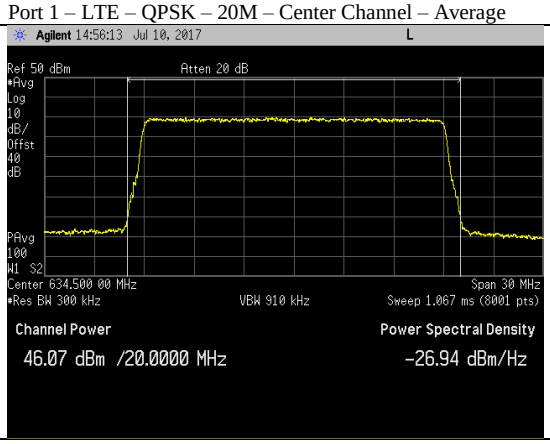
Port 4 – LTE – 256QAM – 15M – Center Channel – Average



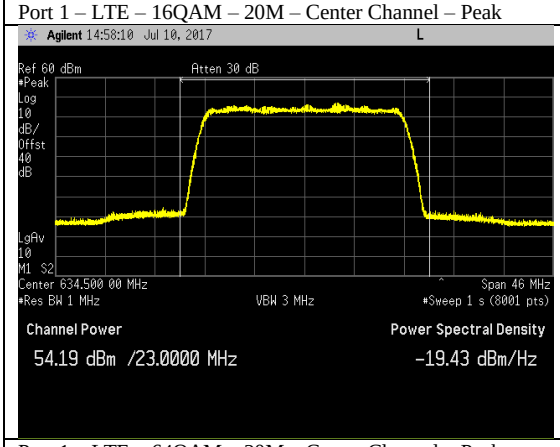
Port 1 – LTE – QPSK – 20M – Center Channel – Peak



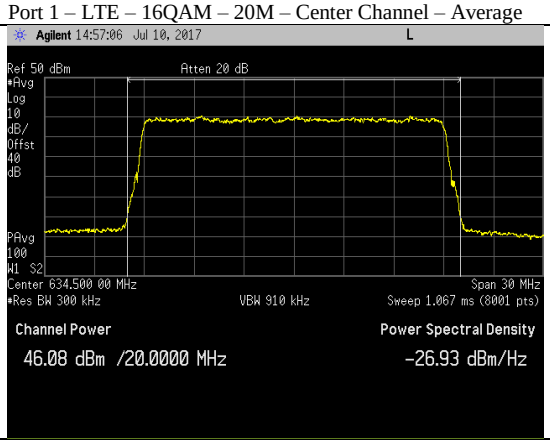
Port 1 – LTE – QPSK – 20M – Center Channel – Average



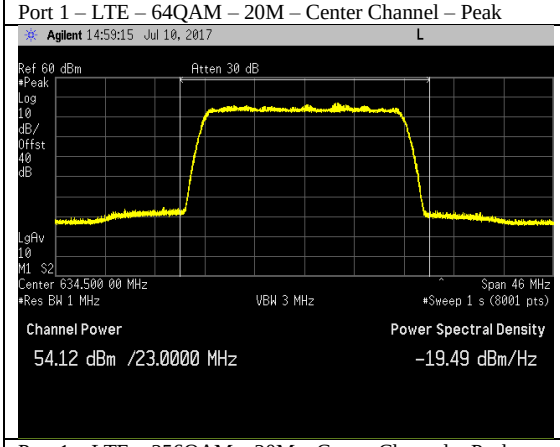
Port 1 – LTE – 16QAM – 20M – Center Channel – Peak



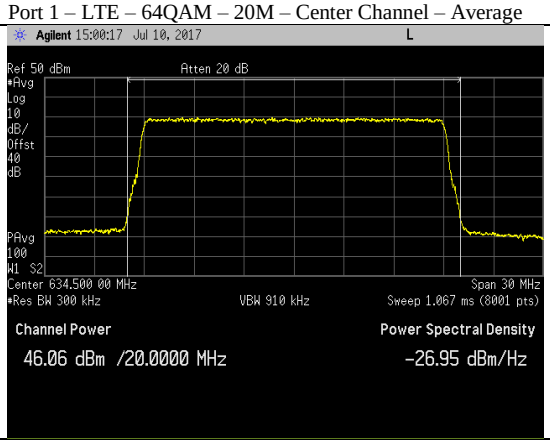
Port 1 – LTE – 16QAM – 20M – Center Channel – Average



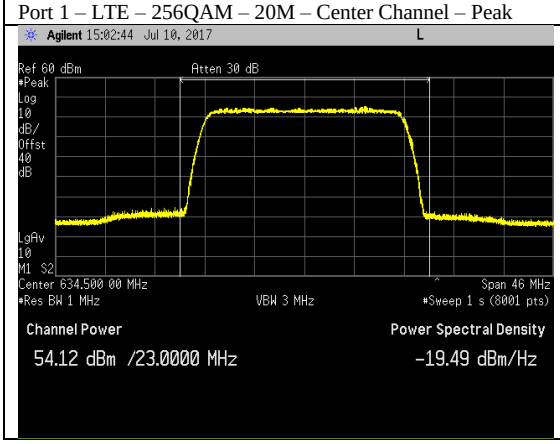
Port 1 – LTE – 64QAM – 20M – Center Channel – Peak



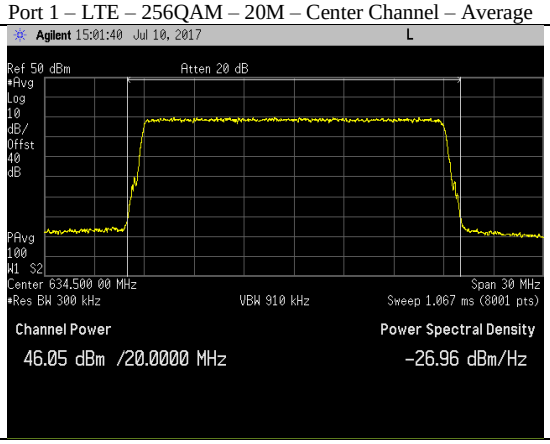
Port 1 – LTE – 64QAM – 20M – Center Channel – Average



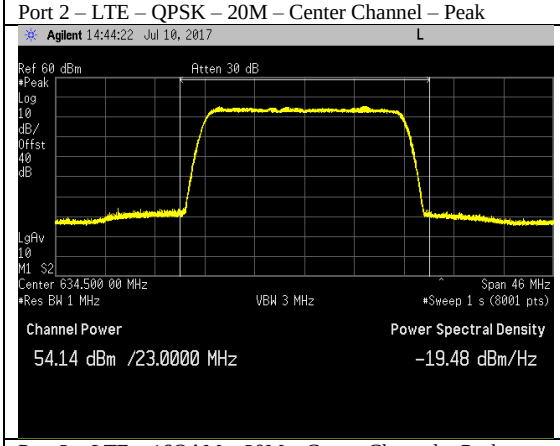
Port 1 – LTE – 256QAM – 20M – Center Channel – Peak



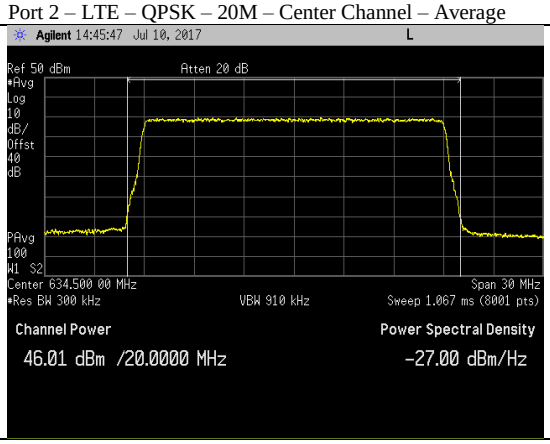
Port 1 – LTE – 256QAM – 20M – Center Channel – Average



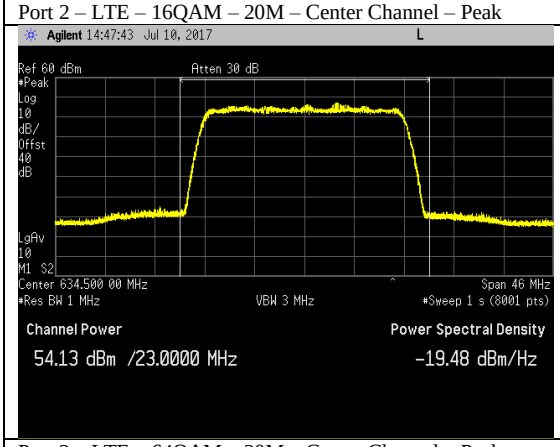
Port 2 – LTE – QPSK – 20M – Center Channel – Peak



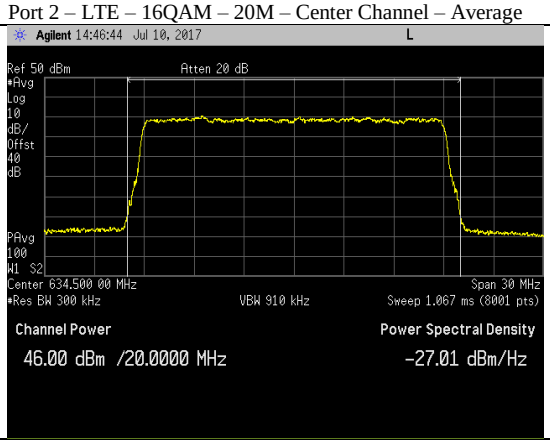
Port 2 – LTE – QPSK – 20M – Center Channel – Average



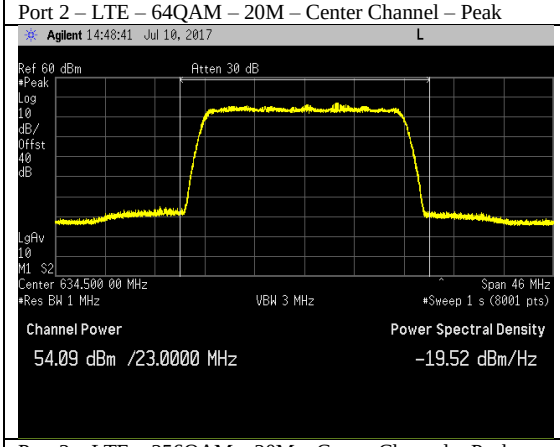
Port 2 – LTE – 16QAM – 20M – Center Channel – Peak



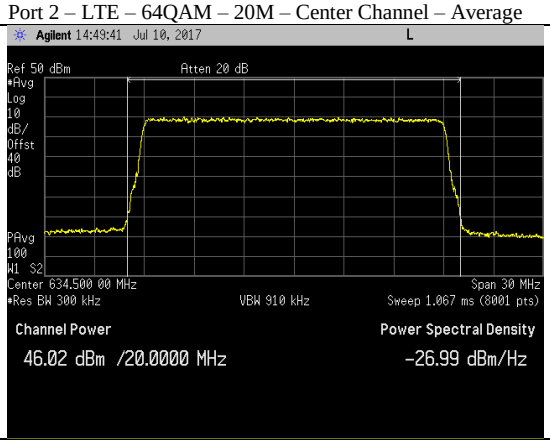
Port 2 – LTE – 16QAM – 20M – Center Channel – Average



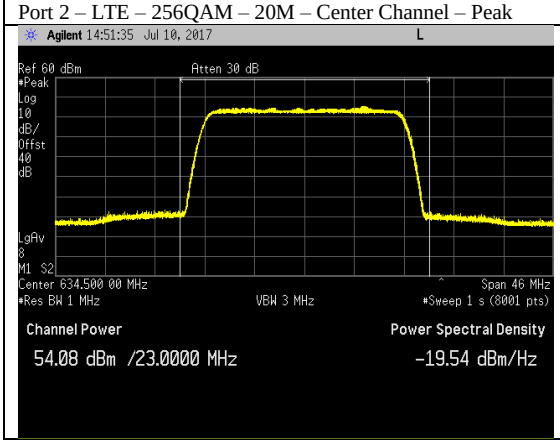
Port 2 – LTE – 64QAM – 20M – Center Channel – Peak



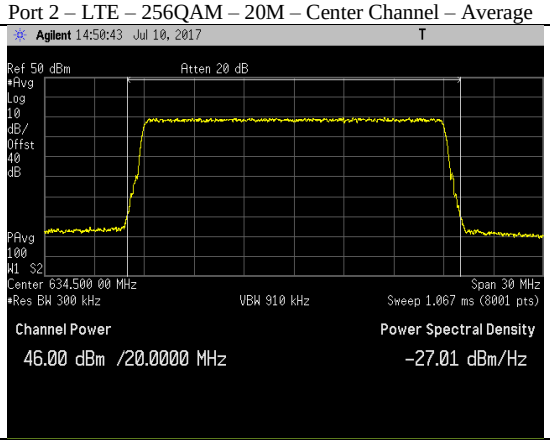
Port 2 – LTE – 64QAM – 20M – Center Channel – Average



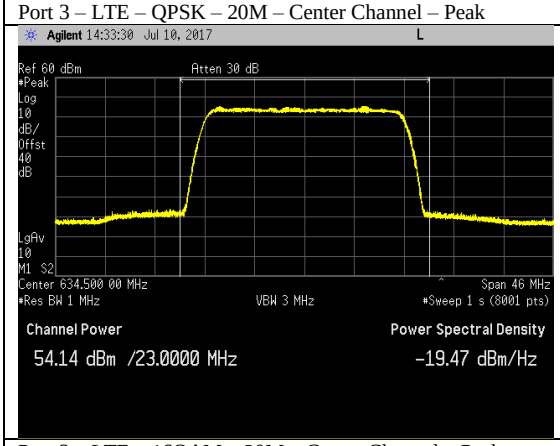
Port 2 – LTE – 256QAM – 20M – Center Channel – Peak



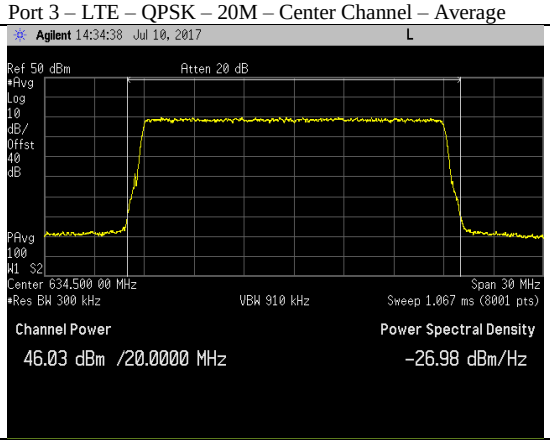
Port 2 – LTE – 256QAM – 20M – Center Channel – Average



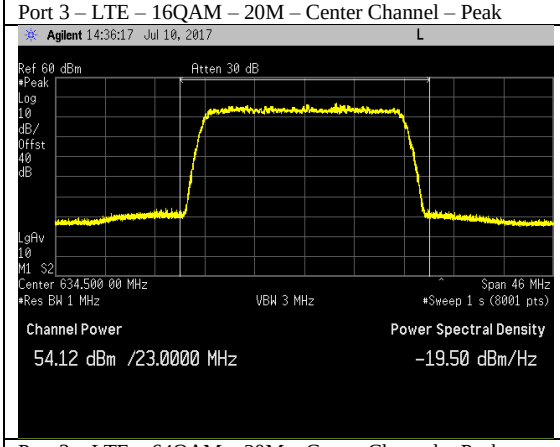
Port 3 – LTE – QPSK – 20M – Center Channel – Peak



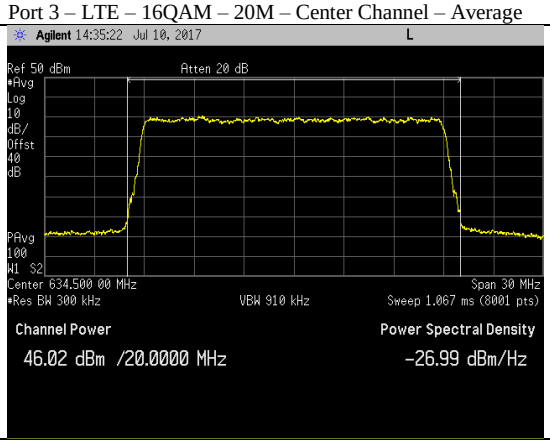
Port 3 – LTE – QPSK – 20M – Center Channel – Average



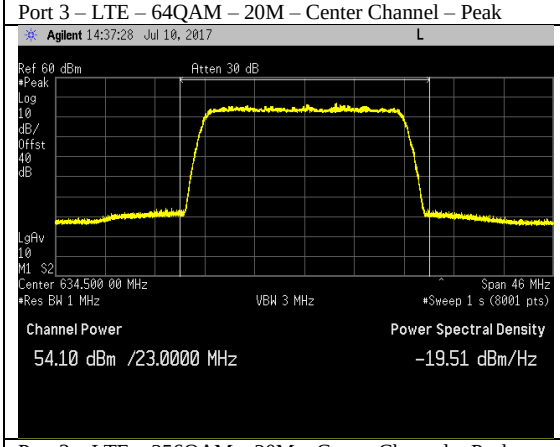
Port 3 – LTE – 16QAM – 20M – Center Channel – Peak



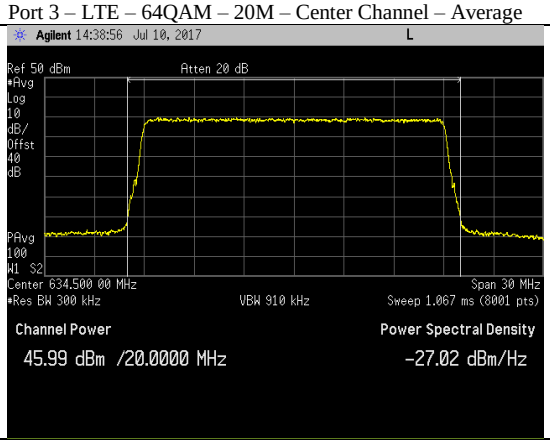
Port 3 – LTE – 16QAM – 20M – Center Channel – Average



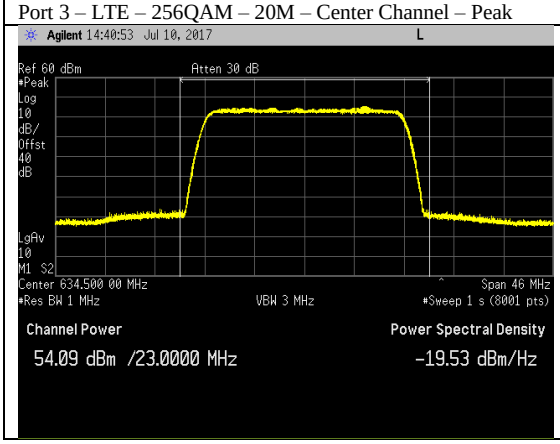
Port 3 – LTE – 64QAM – 20M – Center Channel – Peak



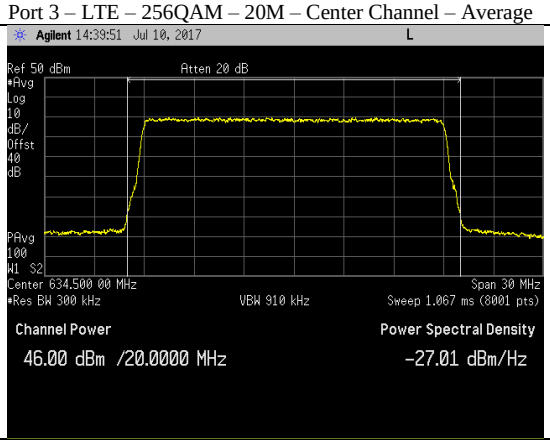
Port 3 – LTE – 64QAM – 20M – Center Channel – Average



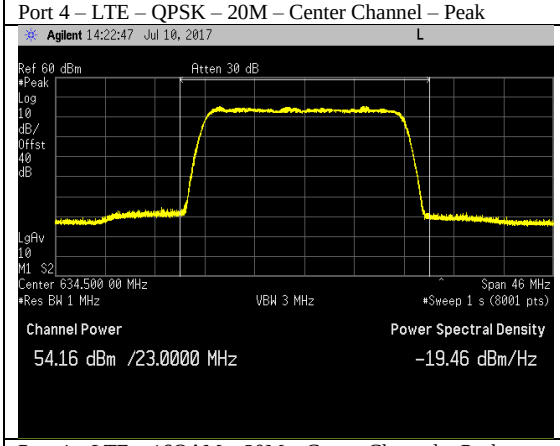
Port 3 – LTE – 256QAM – 20M – Center Channel – Peak



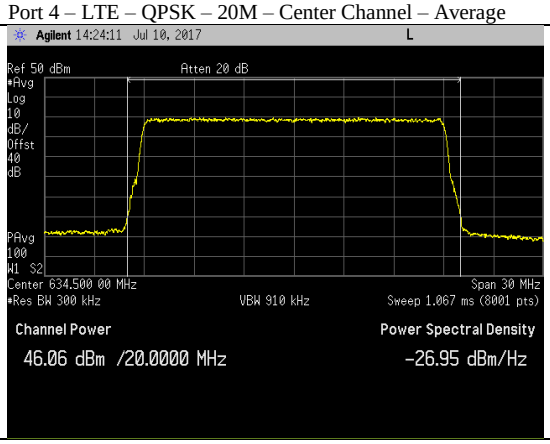
Port 3 – LTE – 256QAM – 20M – Center Channel – Average



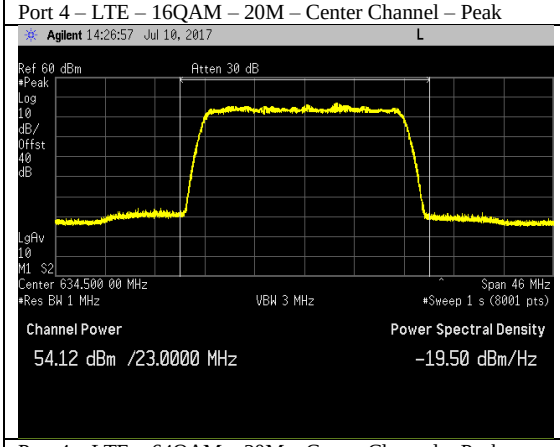
Port 4 – LTE – QPSK – 20M – Center Channel – Peak



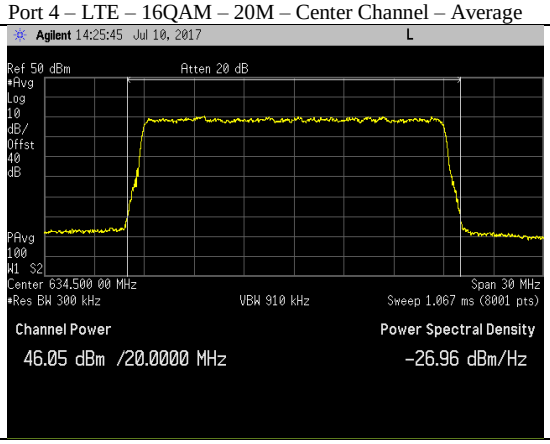
Port 4 – LTE – QPSK – 20M – Center Channel – Average



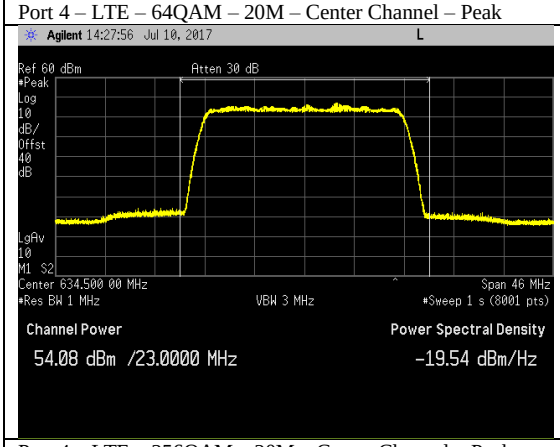
Port 4 – LTE – 16QAM – 20M – Center Channel – Peak



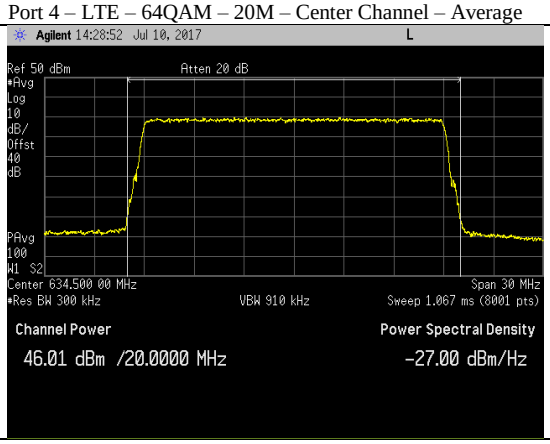
Port 4 – LTE – 16QAM – 20M – Center Channel – Average



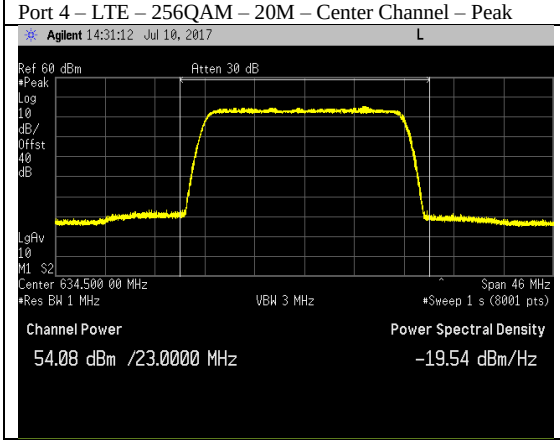
Port 4 – LTE – 64QAM – 20M – Center Channel – Peak



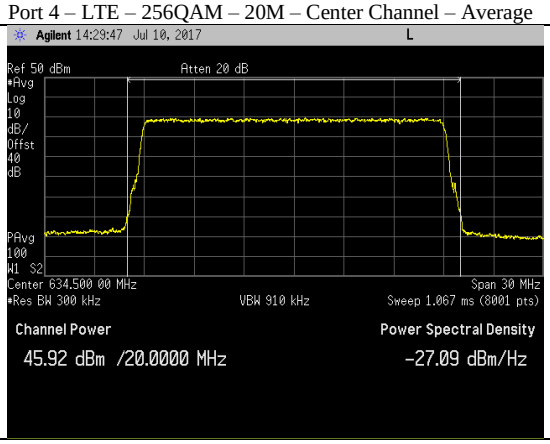
Port 4 – LTE – 64QAM – 20M – Center Channel – Average



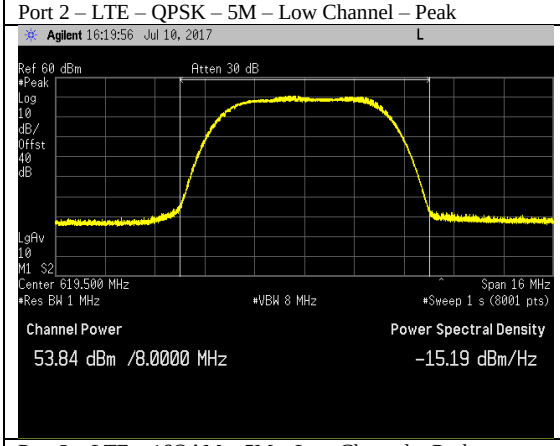
Port 4 – LTE – 256QAM – 20M – Center Channel – Peak



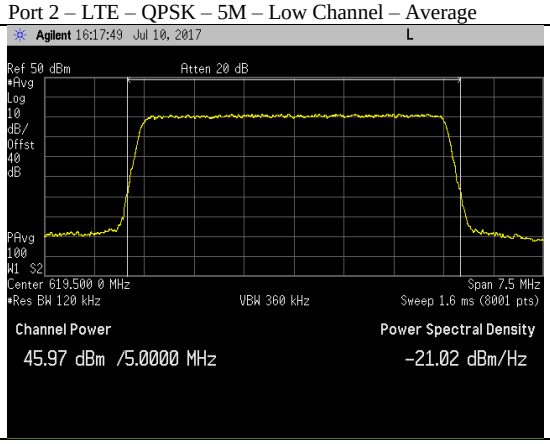
Port 4 – LTE – 256QAM – 20M – Center Channel – Average



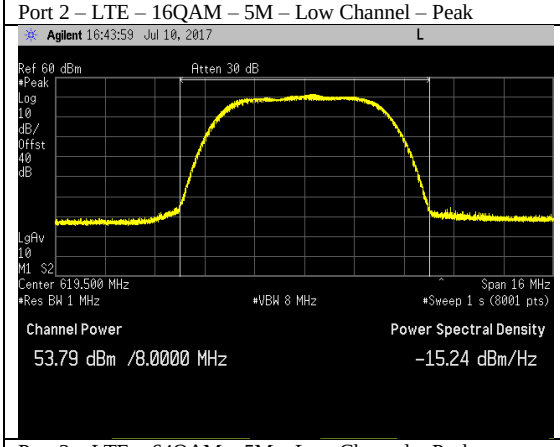
Port 2 – LTE – QPSK – 5M – Low Channel – Peak



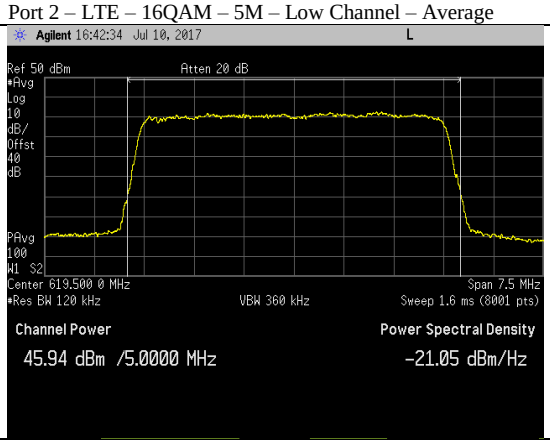
Port 2 – LTE – QPSK – 5M – Low Channel – Average



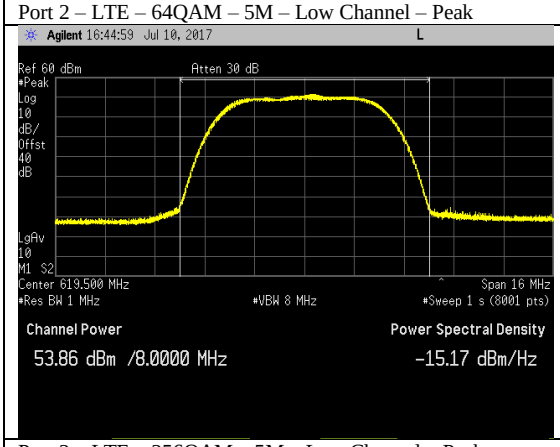
Port 2 – LTE – 16QAM – 5M – Low Channel – Peak



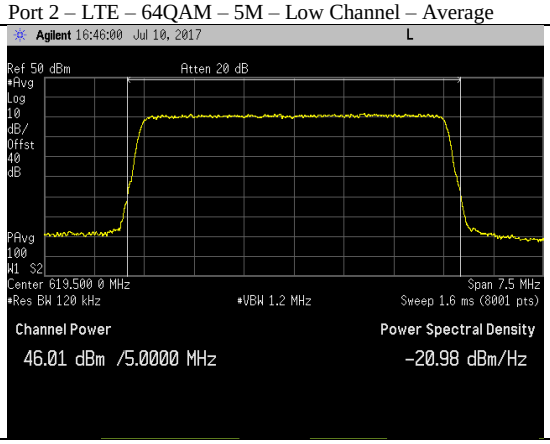
Port 2 – LTE – 16QAM – 5M – Low Channel – Average



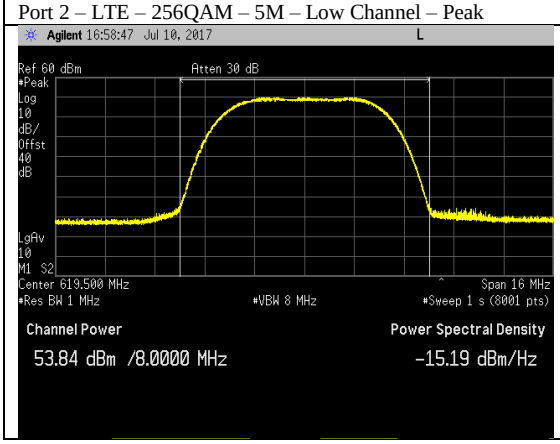
Port 2 – LTE – 64QAM – 5M – Low Channel – Peak



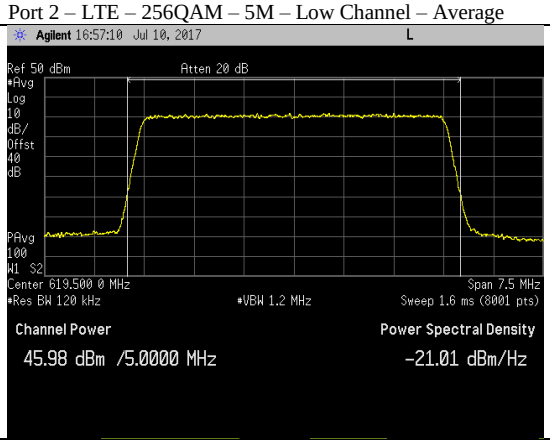
Port 2 – LTE – 64QAM – 5M – Low Channel – Average



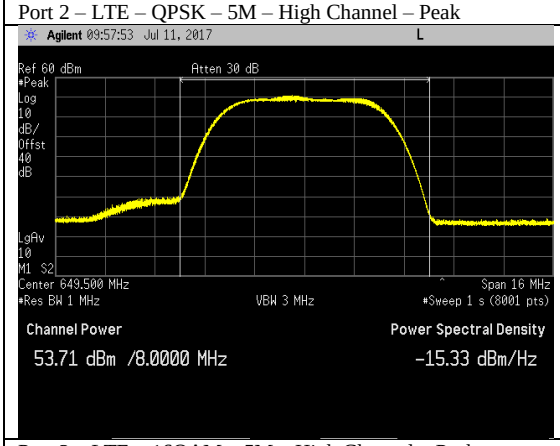
Port 2 – LTE – 256QAM – 5M – Low Channel – Peak



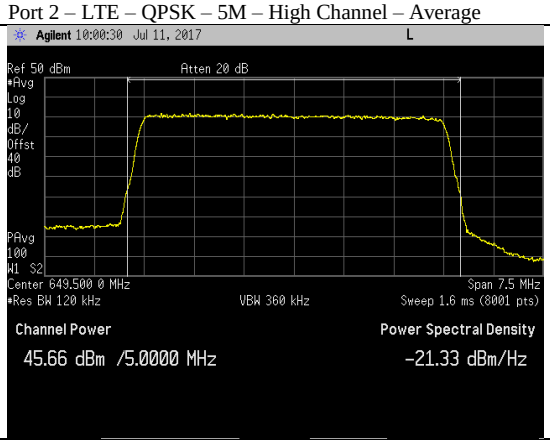
Port 2 – LTE – 256QAM – 5M – Low Channel – Average



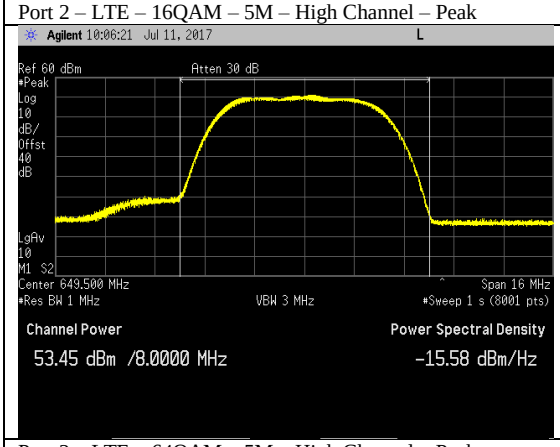
Port 2 – LTE – QPSK – 5M – High Channel – Peak



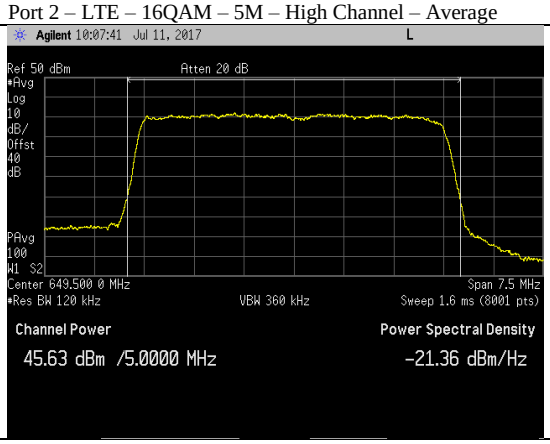
Port 2 – LTE – QPSK – 5M – High Channel – Average



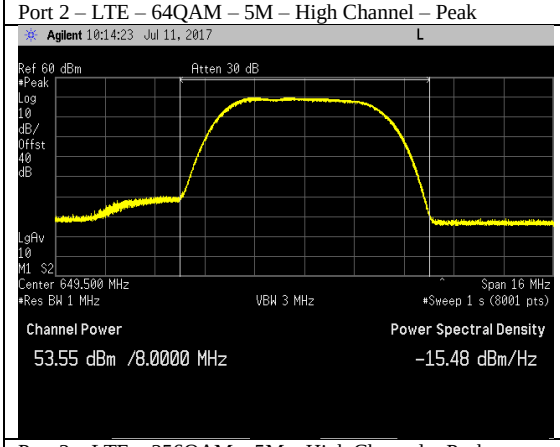
Port 2 – LTE – 16QAM – 5M – High Channel – Peak



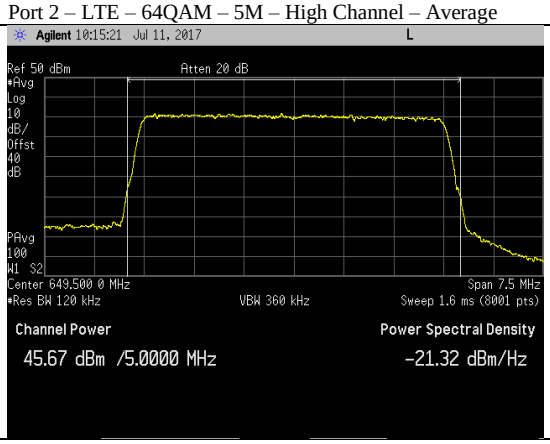
Port 2 – LTE – 16QAM – 5M – High Channel – Average



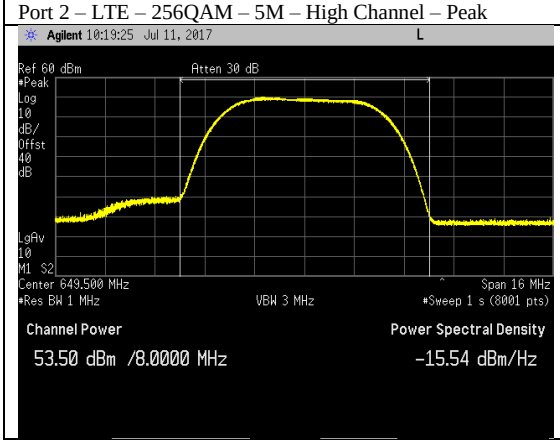
Port 2 – LTE – 64QAM – 5M – High Channel – Peak



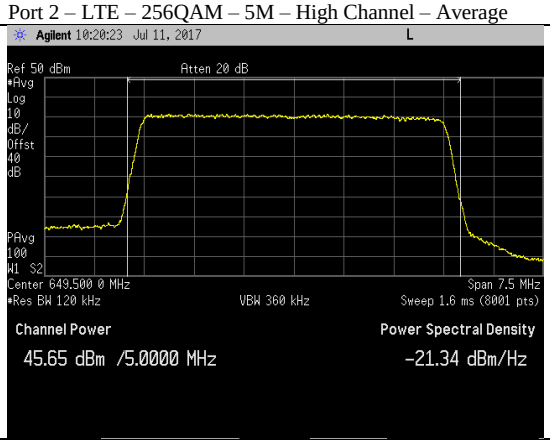
Port 2 – LTE – 64QAM – 5M – High Channel – Average



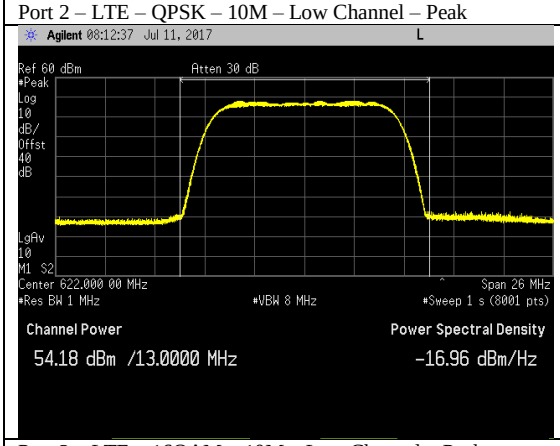
Port 2 – LTE – 256QAM – 5M – High Channel – Peak



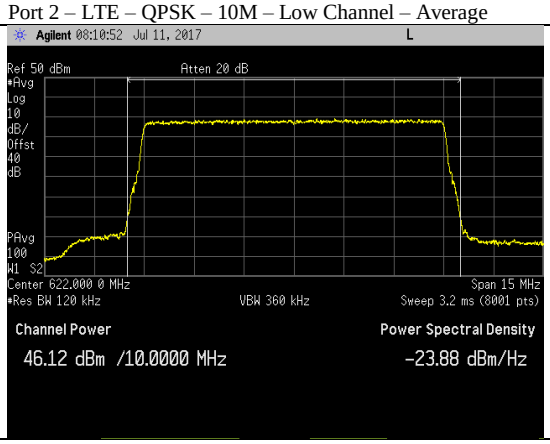
Port 2 – LTE – 256QAM – 5M – High Channel – Average



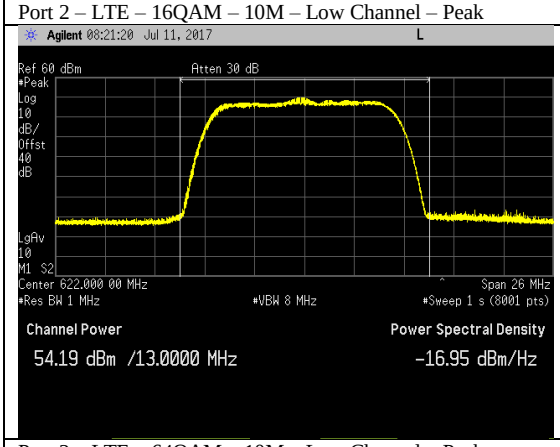
Port 2 – LTE – QPSK – 10M – Low Channel – Peak



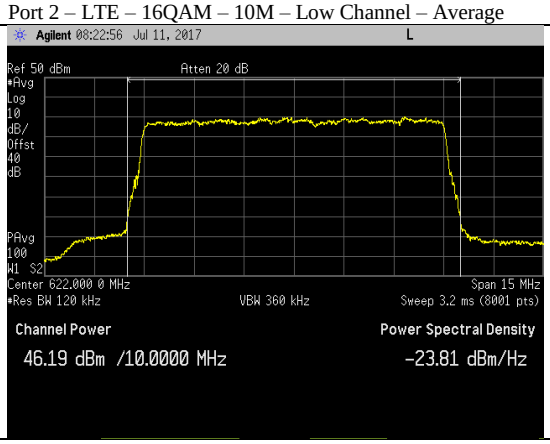
Port 2 – LTE – QPSK – 10M – Low Channel – Average



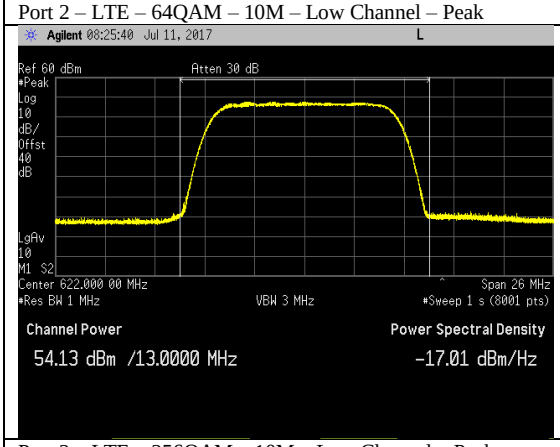
Port 2 – LTE – 16QAM – 10M – Low Channel – Peak



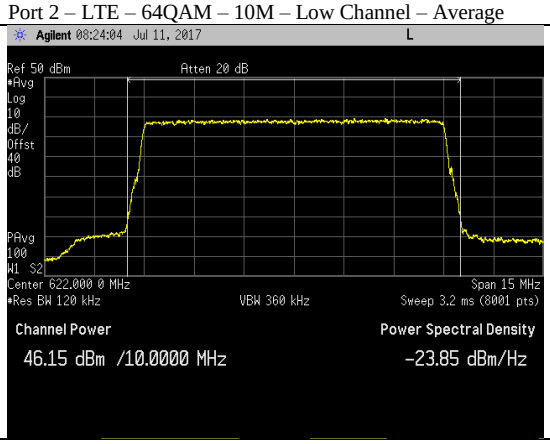
Port 2 – LTE – 16QAM – 10M – Low Channel – Average



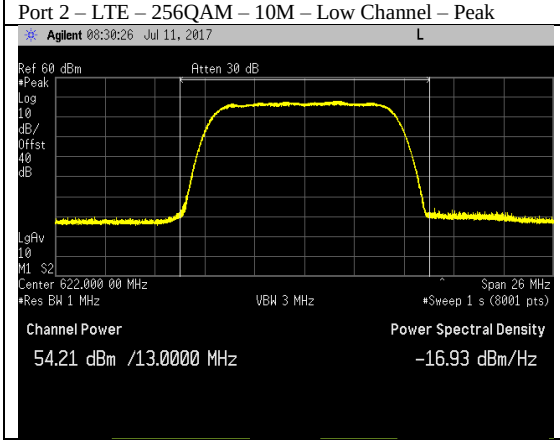
Port 2 – LTE – 64QAM – 10M – Low Channel – Peak



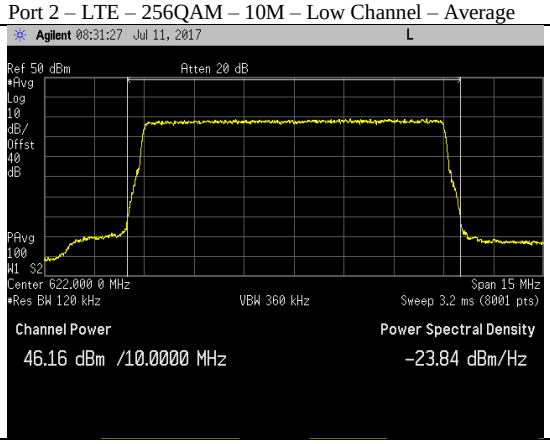
Port 2 – LTE – 64QAM – 10M – Low Channel – Average



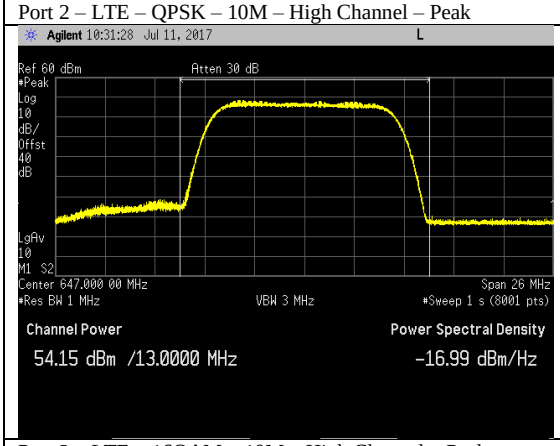
Port 2 – LTE – 256QAM – 10M – Low Channel – Peak



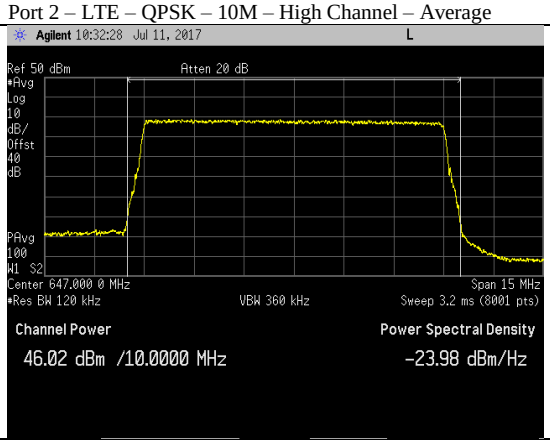
Port 2 – LTE – 256QAM – 10M – Low Channel – Average



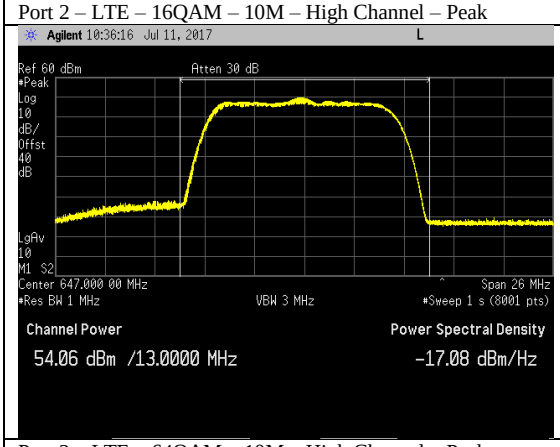
Port 2 – LTE – QPSK – 10M – High Channel – Peak



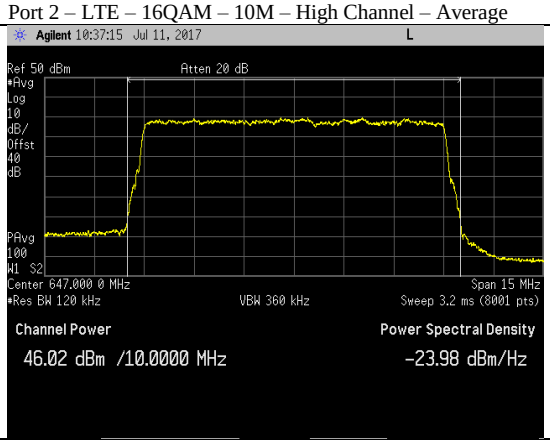
Port 2 – LTE – QPSK – 10M – High Channel – Average



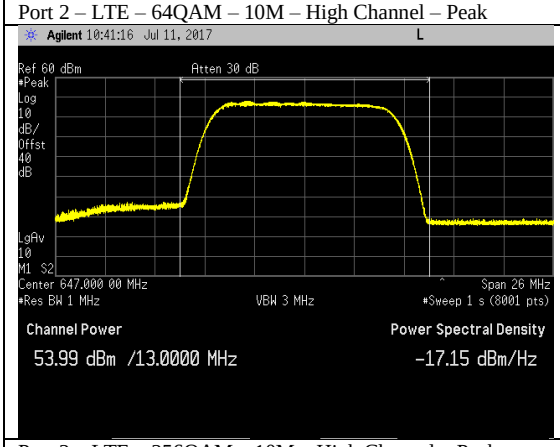
Port 2 – LTE – 16QAM – 10M – High Channel – Peak



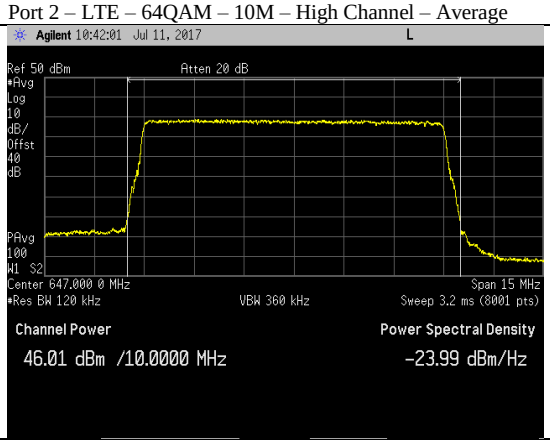
Port 2 – LTE – 16QAM – 10M – High Channel – Average



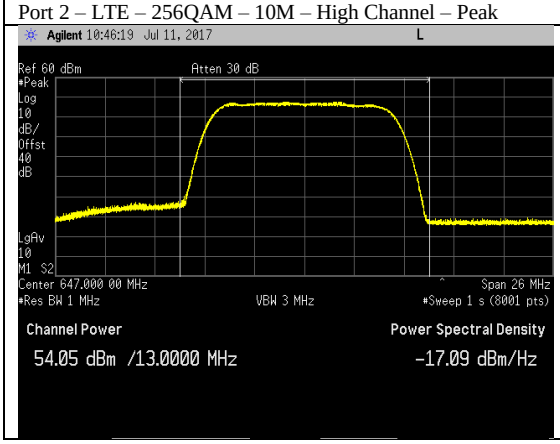
Port 2 – LTE – 64QAM – 10M – High Channel – Peak



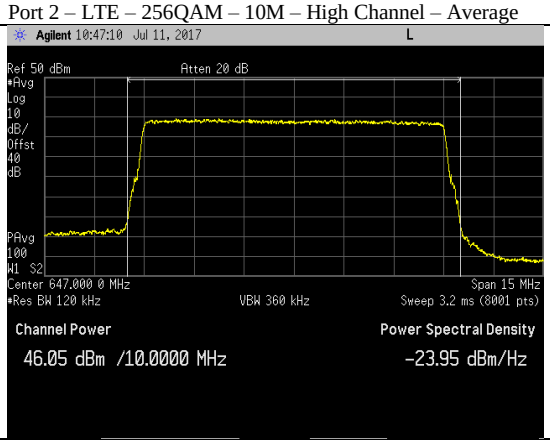
Port 2 – LTE – 64QAM – 10M – High Channel – Average



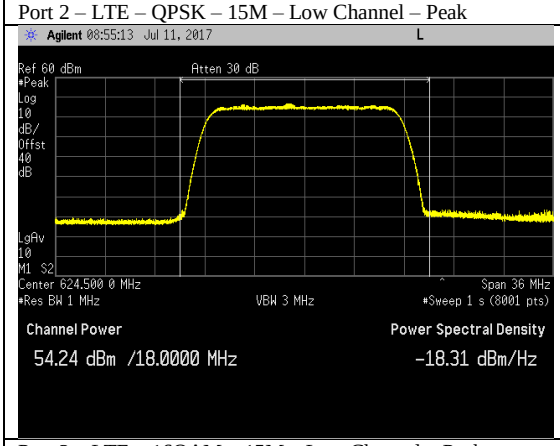
Port 2 – LTE – 256QAM – 10M – High Channel – Peak



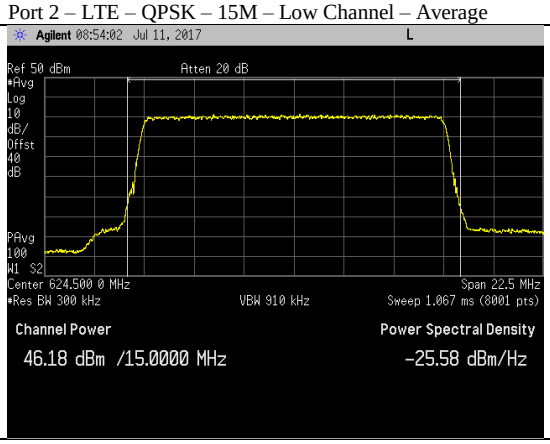
Port 2 – LTE – 256QAM – 10M – High Channel – Average



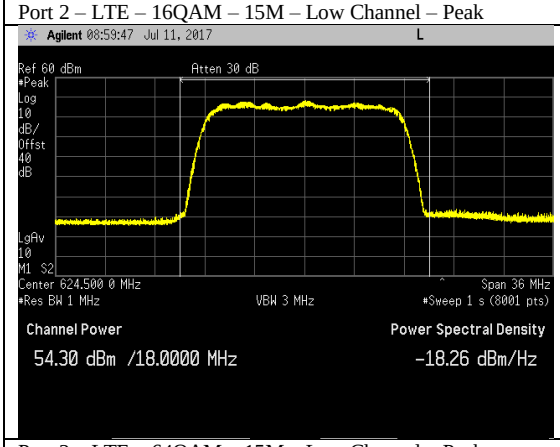
Port 2 – LTE – QPSK – 15M – Low Channel – Peak



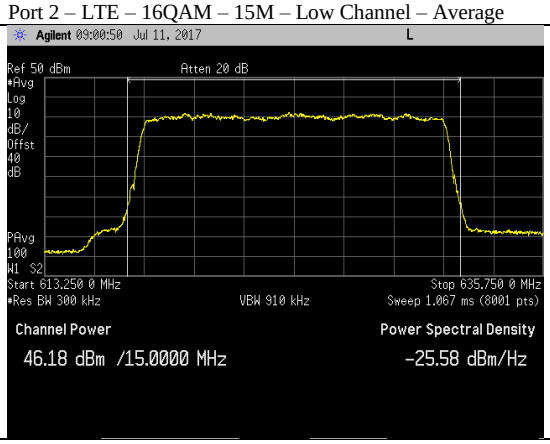
Port 2 – LTE – QPSK – 15M – Low Channel – Average



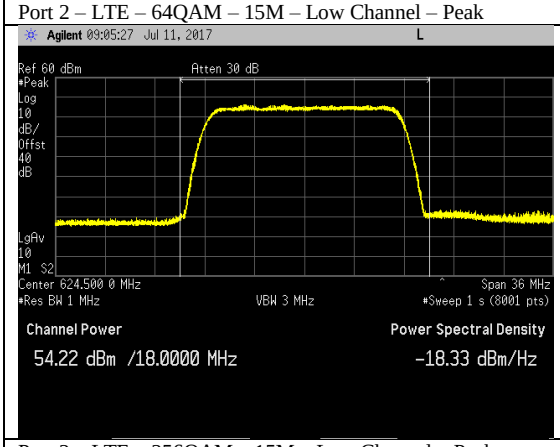
Port 2 – LTE – 16QAM – 15M – Low Channel – Peak



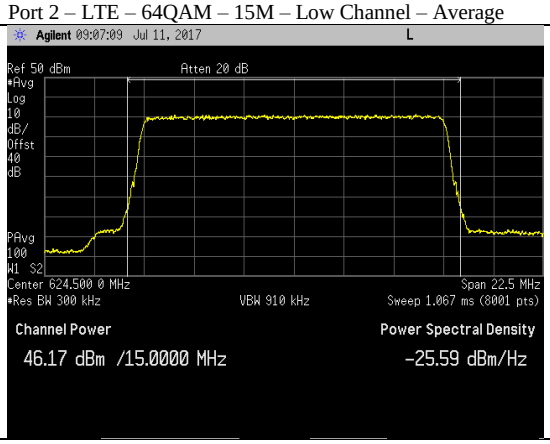
Port 2 – LTE – 16QAM – 15M – Low Channel – Average



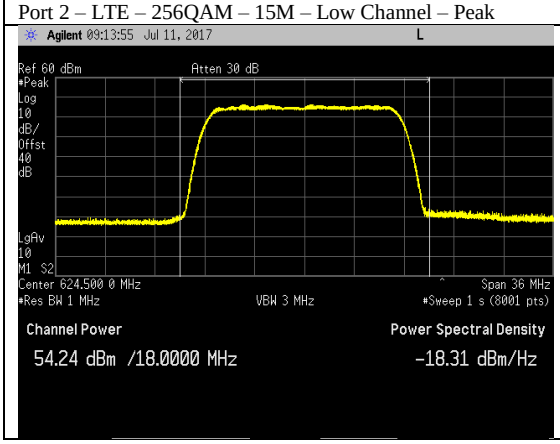
Port 2 – LTE – 64QAM – 15M – Low Channel – Peak



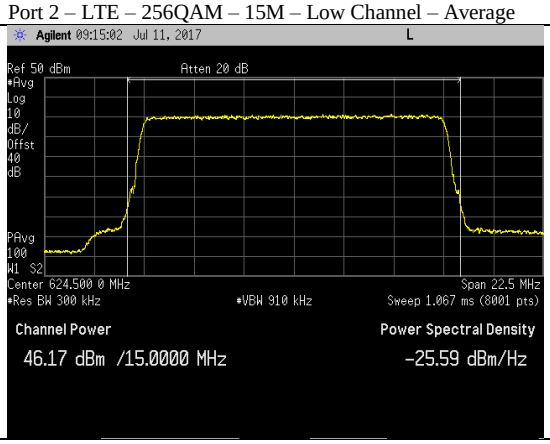
Port 2 – LTE – 64QAM – 15M – Low Channel – Average



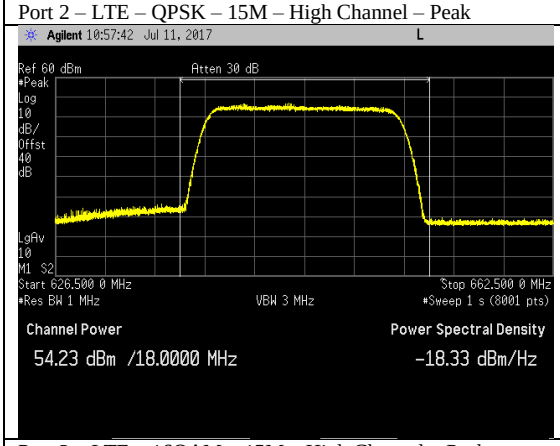
Port 2 – LTE – 256QAM – 15M – Low Channel – Peak



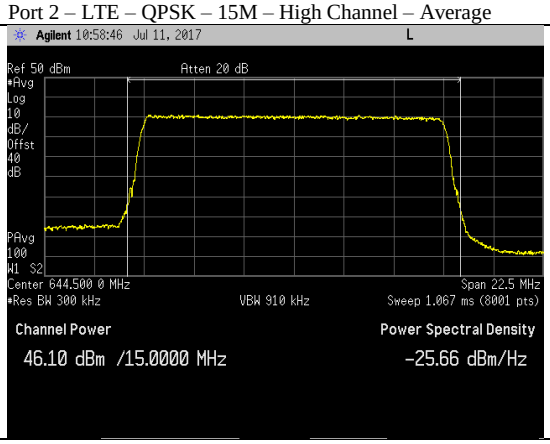
Port 2 – LTE – 256QAM – 15M – Low Channel – Average



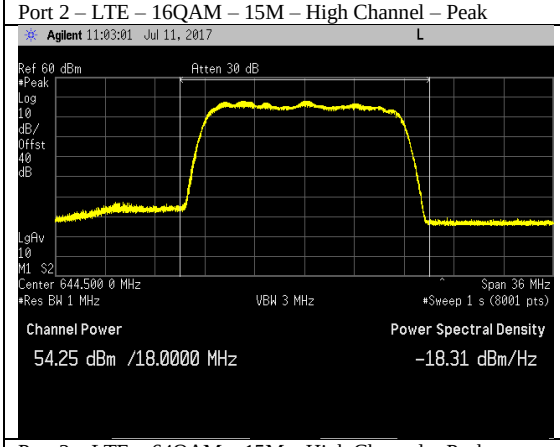
Port 2 – LTE – QPSK – 15M – High Channel – Peak



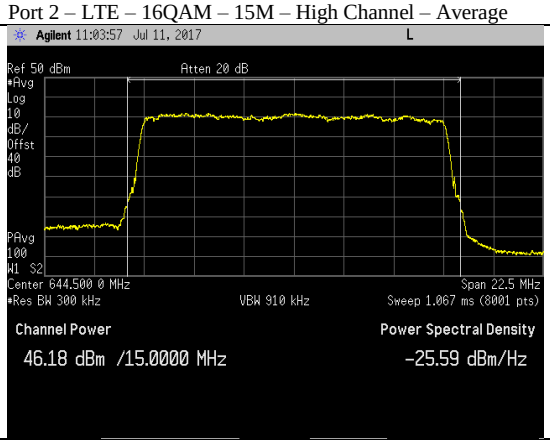
Port 2 – LTE – QPSK – 15M – High Channel – Average



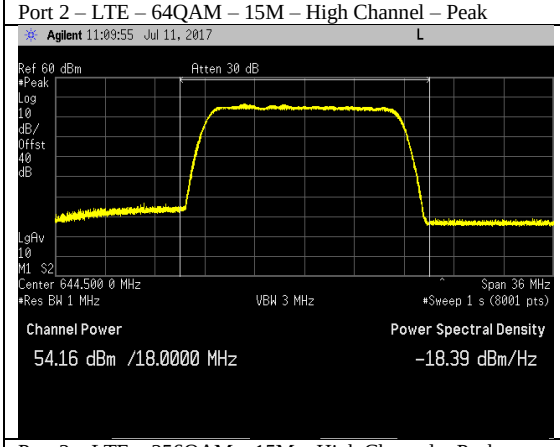
Port 2 – LTE – 16QAM – 15M – High Channel – Peak



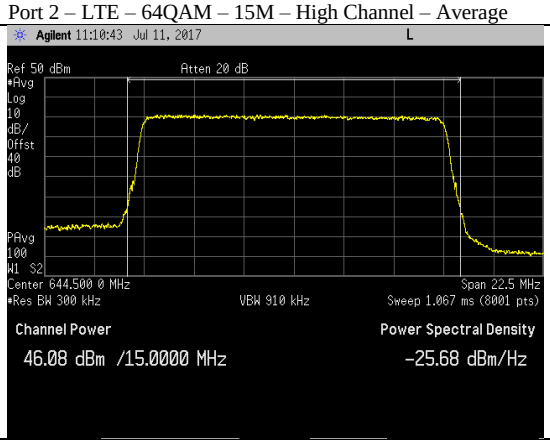
Port 2 – LTE – 16QAM – 15M – High Channel – Average



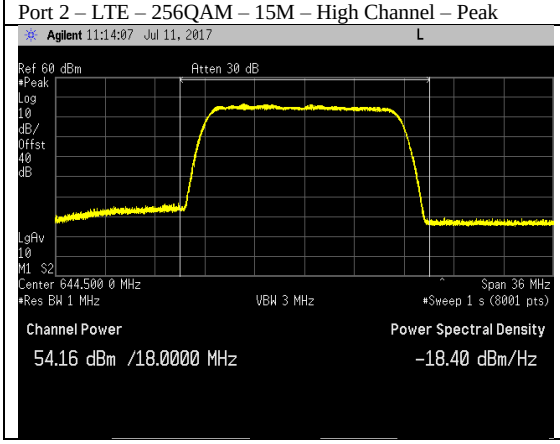
Port 2 – LTE – 64QAM – 15M – High Channel – Peak



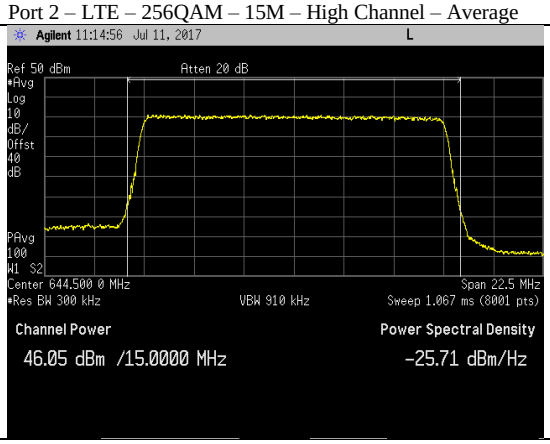
Port 2 – LTE – 64QAM – 15M – High Channel – Average



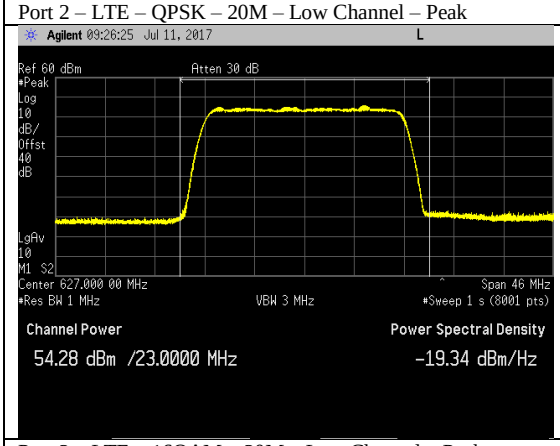
Port 2 – LTE – 256QAM – 15M – High Channel – Peak



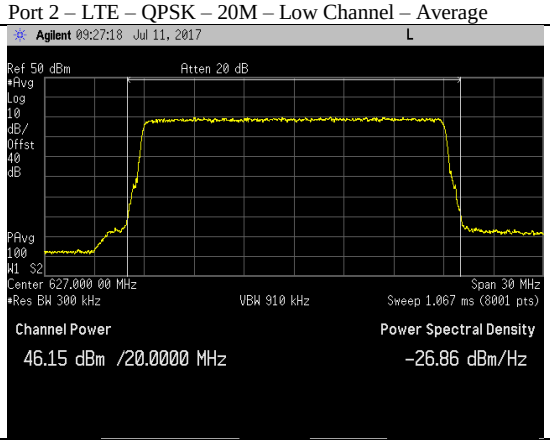
Port 2 – LTE – 256QAM – 15M – High Channel – Average



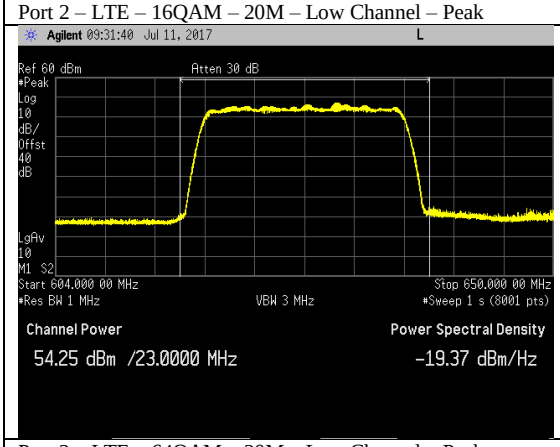
Port 2 – LTE – QPSK – 20M – Low Channel – Peak



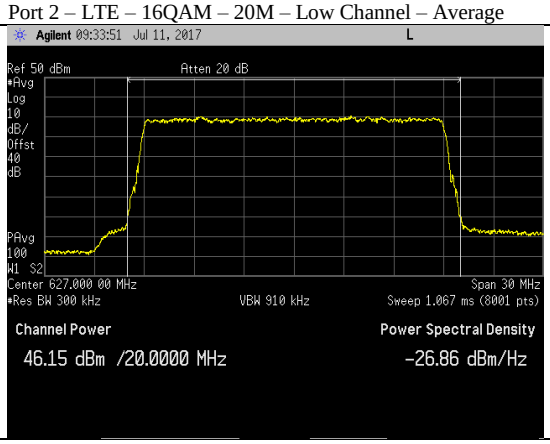
Port 2 – LTE – QPSK – 20M – Low Channel – Average



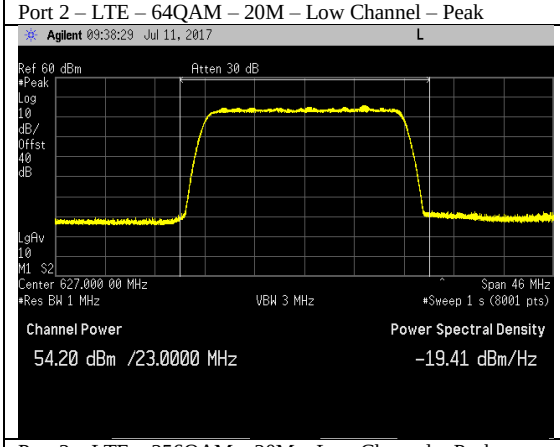
Port 2 – LTE – 16QAM – 20M – Low Channel – Peak



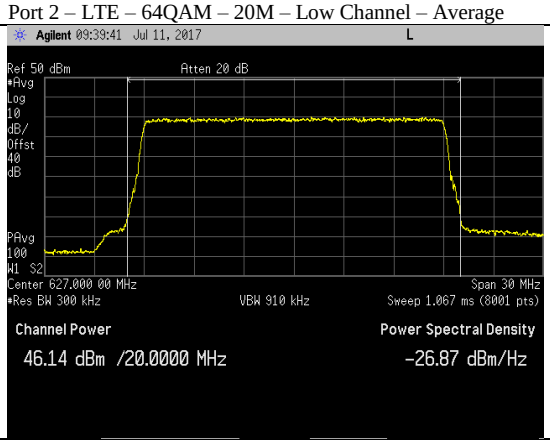
Port 2 – LTE – 16QAM – 20M – Low Channel – Average



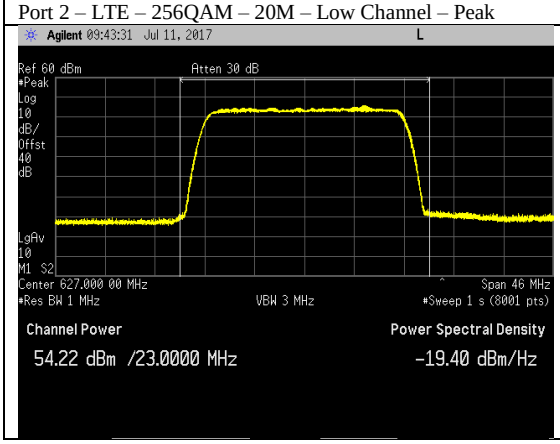
Port 2 – LTE – 64QAM – 20M – Low Channel – Peak



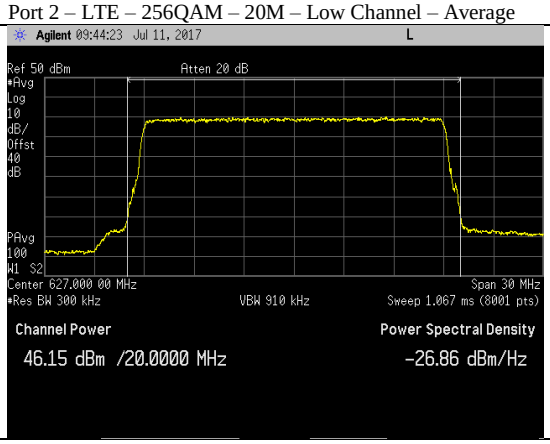
Port 2 – LTE – 64QAM – 20M – Low Channel – Average



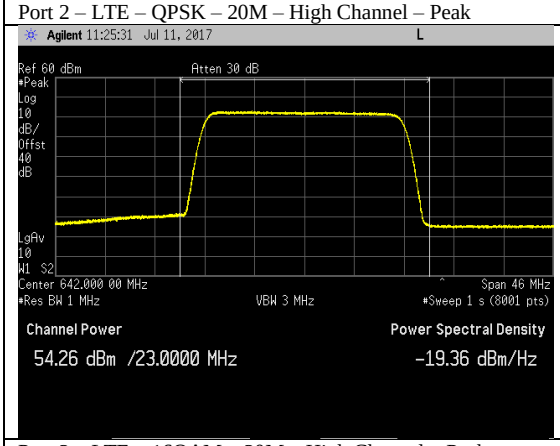
Port 2 – LTE – 256QAM – 20M – Low Channel – Peak



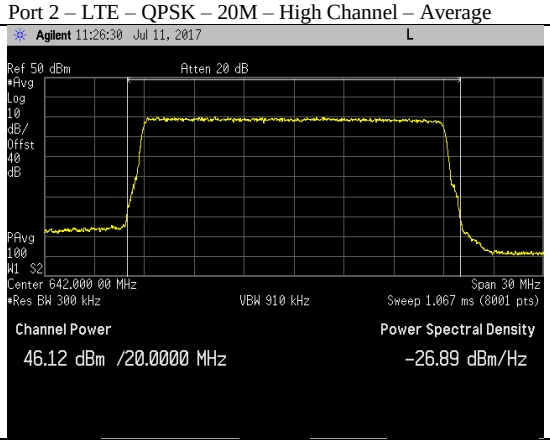
Port 2 – LTE – 256QAM – 20M – Low Channel – Average



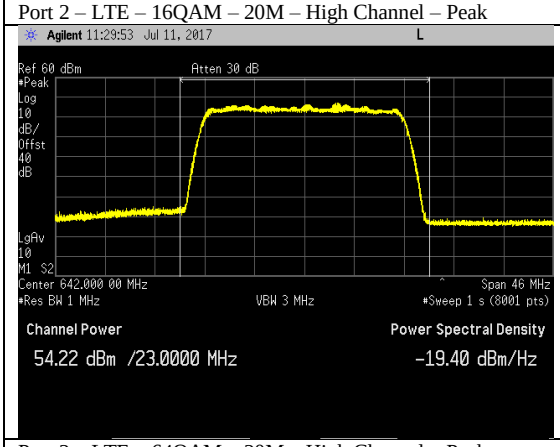
Port 2 – LTE – QPSK – 20M – High Channel – Peak



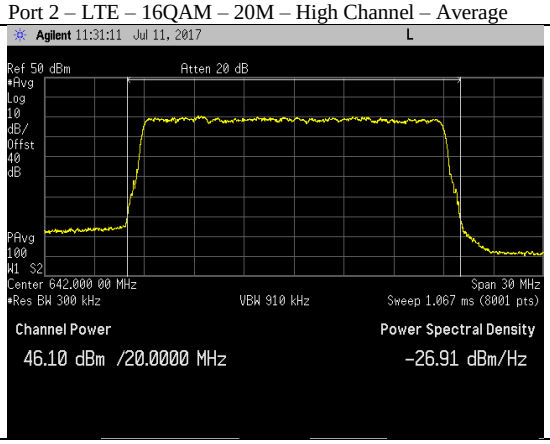
Port 2 – LTE – QPSK – 20M – High Channel – Average



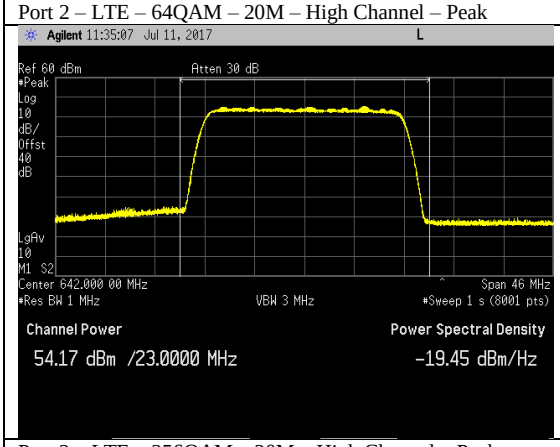
Port 2 – LTE – 16QAM – 20M – High Channel – Peak



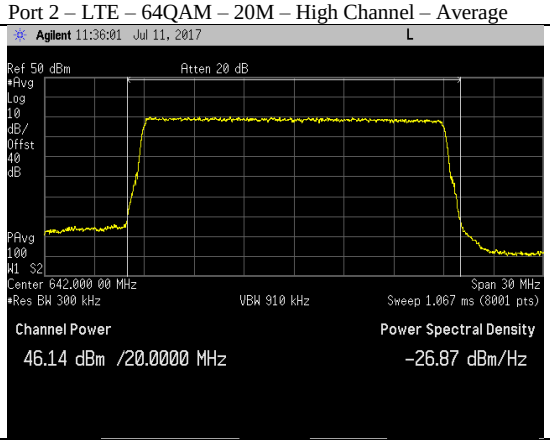
Port 2 – LTE – 16QAM – 20M – High Channel – Average



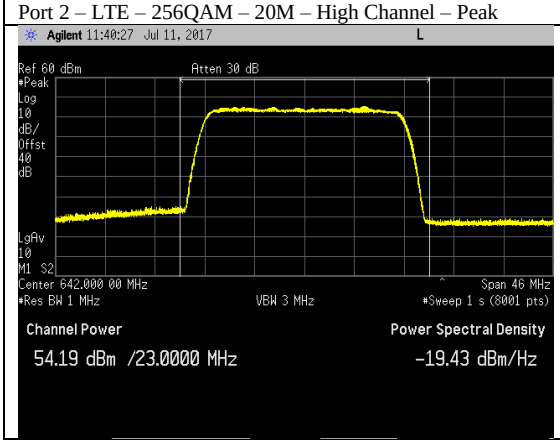
Port 2 – LTE – 64QAM – 20M – High Channel – Peak



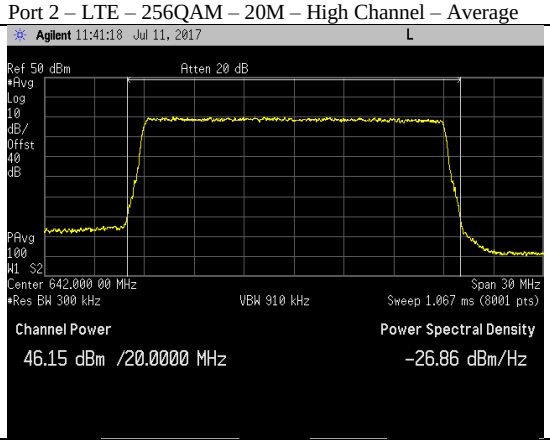
Port 2 – LTE – 64QAM – 20M – High Channel – Average



Port 2 – LTE – 256QAM – 20M – High Channel – Peak



Port 2 – LTE – 256QAM – 20M – High Channel – Average



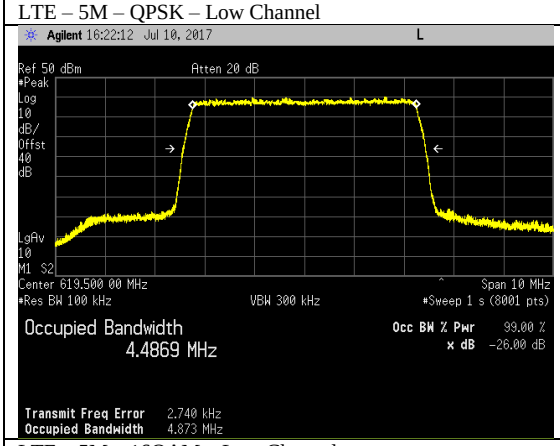
Emission Bandwidths (26dB and 99%)

Emissions bandwidths were measured at Port 2 on low and high channels in 5MHz, 10MHz, 15MHz, and 20MHz channel bandwidth modes for all modulations and results presented below.

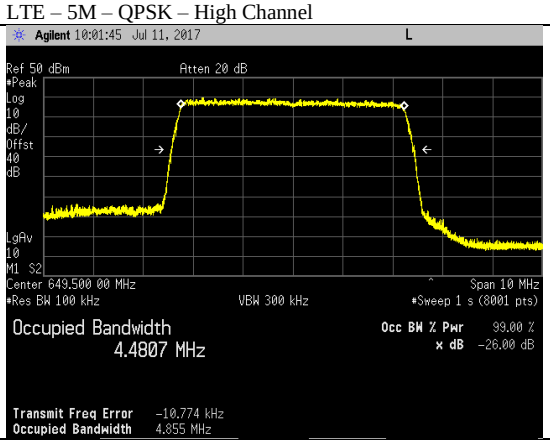
	LTE - QPSK				LTE - 16QAM				LTE - 64QAM				LTE - 256QAM			
	Low		High		Low		High		Low		High		Low		High	
	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)
5M	4.873	4.4869	4.855	4.4807	4.862	4.472	4.844	4.4687	4.501	4.4959	4.858	4.4863	4.874	4.494	4.868	4.488
10M	9.718	8.9769	9.724	8.9626	9.699	8.9705	9.694	8.9786	9.711	8.9895	9.716	8.9723	9.714	8.9914	9.697	8.9632
15M	14.525	13.4588	14.546	13.4647	14.48	13.4452	14.487	13.4855	14.607	13.4588	14.6	13.4664	14.588	13.4501	14.539	13.4594
20M	19.402	17.9179	19.37	17.9106	19.336	17.9697	19.349	17.9638	19.437	17.9271	19.406	17.9196	19.495	17.9425	19.492	17.931

Corresponding plots included on the following pages.

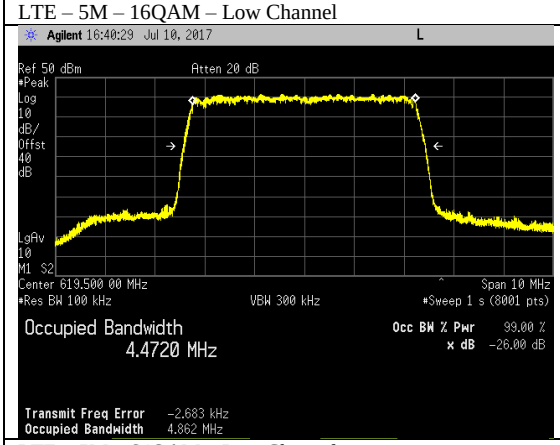
LTE – 5M – QPSK – Low Channel



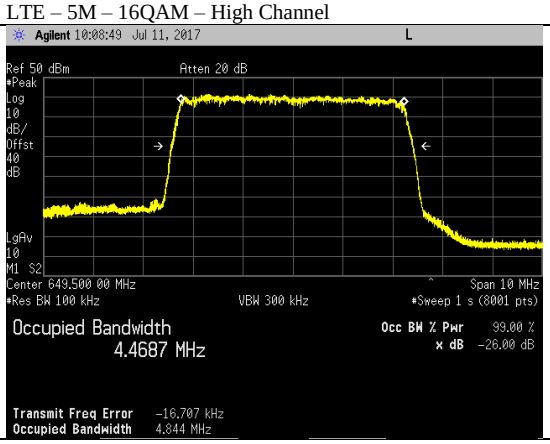
LTE – 5M – QPSK – High Channel



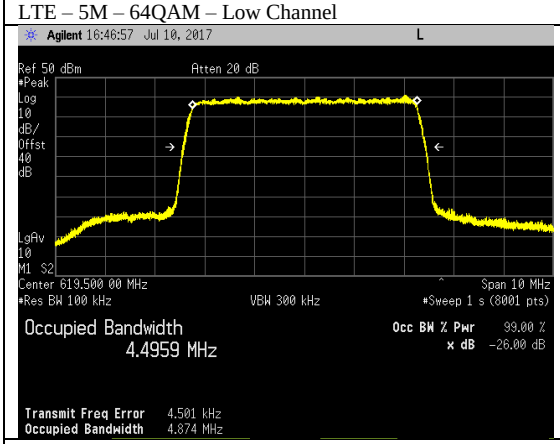
LTE – 5M – 16QAM – Low Channel



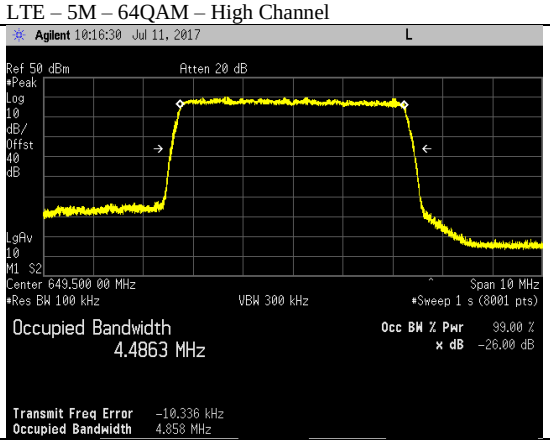
LTE – 5M – 16QAM – High Channel



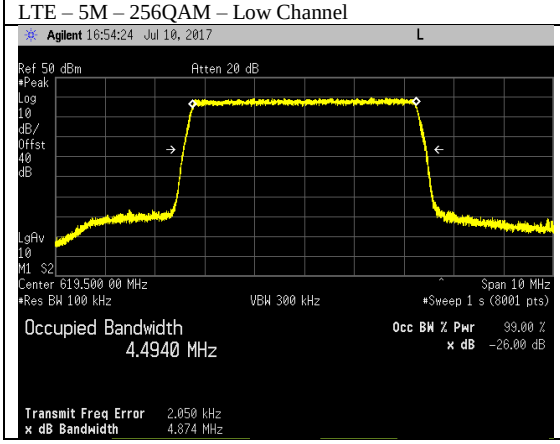
LTE – 5M – 64QAM – Low Channel



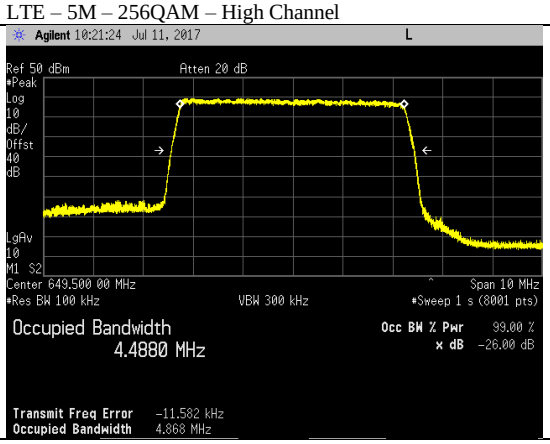
LTE – 5M – 64QAM – High Channel



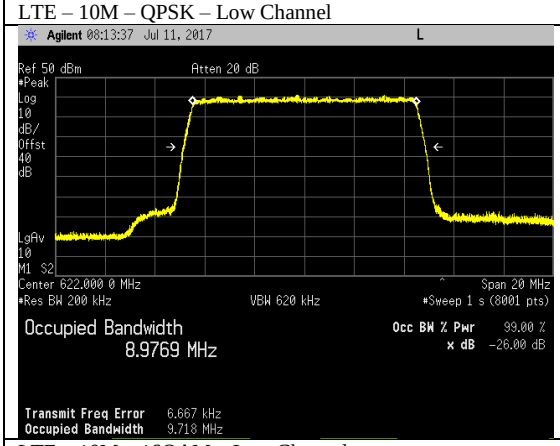
LTE – 5M – 256QAM – Low Channel



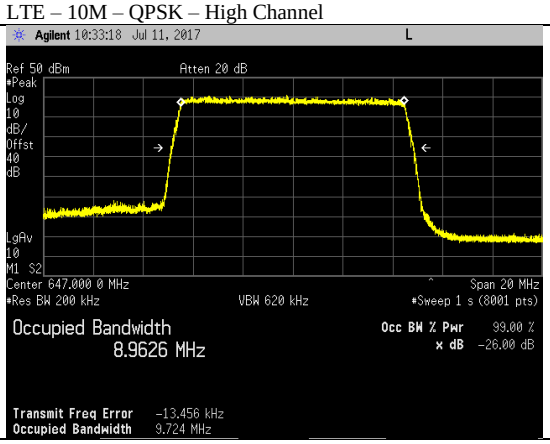
LTE – 5M – 256QAM – High Channel



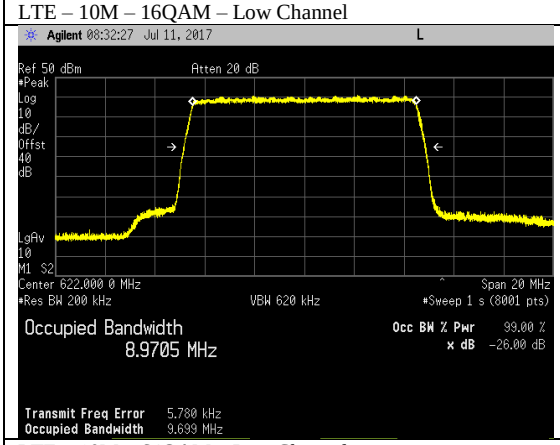
LTE – 10M – QPSK – Low Channel



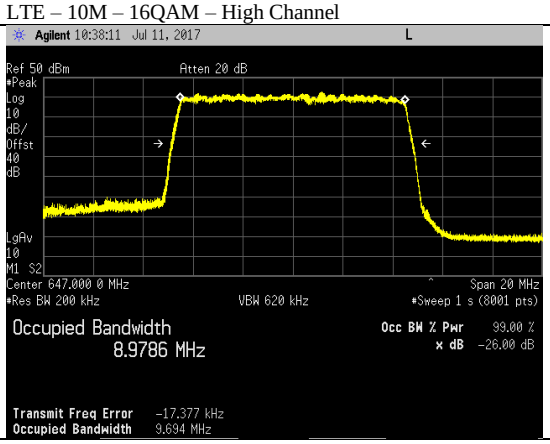
LTE – 10M – QPSK – High Channel



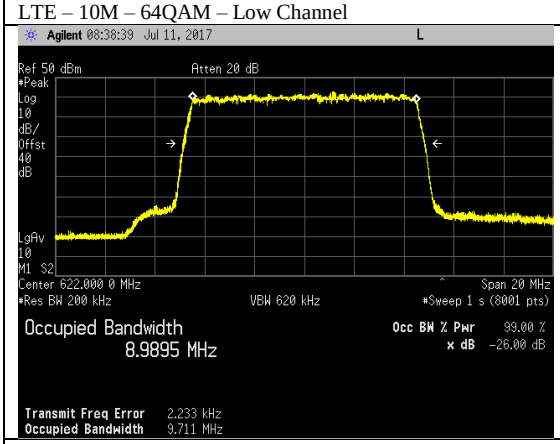
LTE – 10M – 16QAM – Low Channel



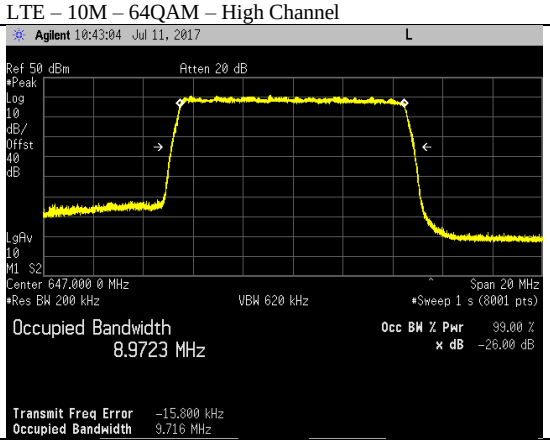
LTE – 10M – 16QAM – High Channel



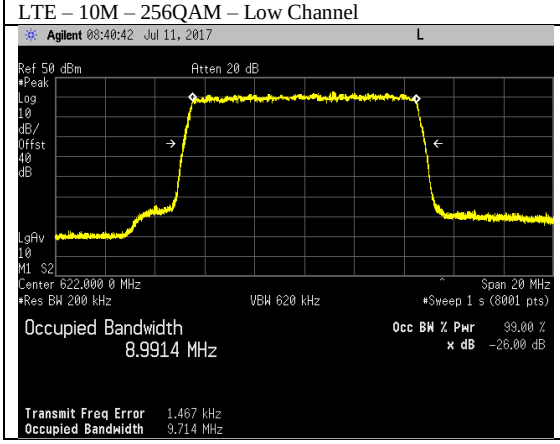
LTE – 10M – 64QAM – Low Channel



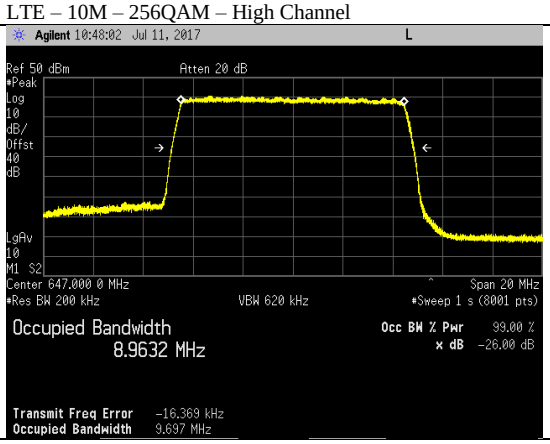
LTE – 10M – 64QAM – High Channel



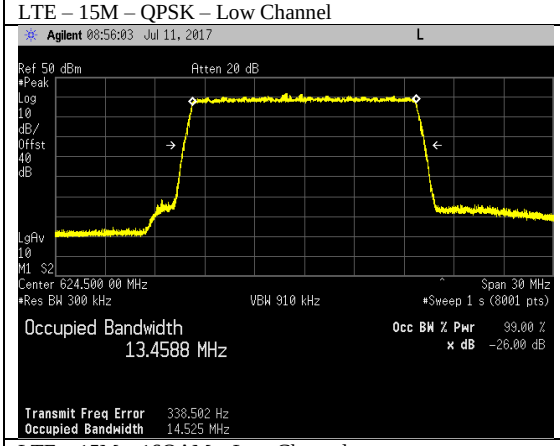
LTE – 10M – 256QAM – Low Channel



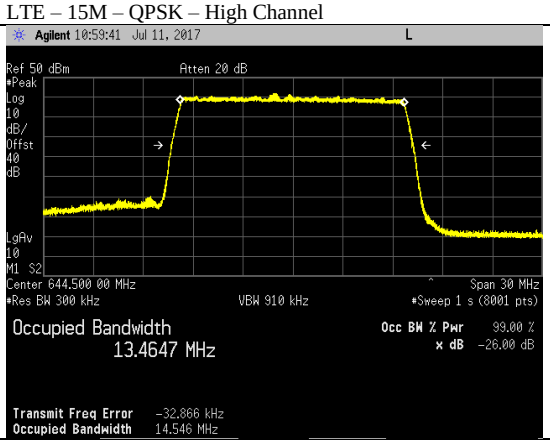
LTE – 10M – 256QAM – High Channel



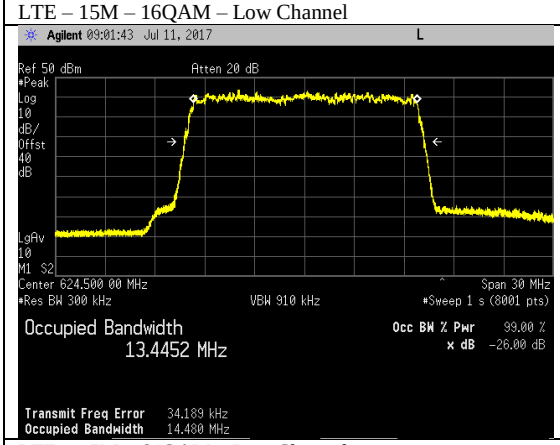
LTE – 15M – QPSK – Low Channel



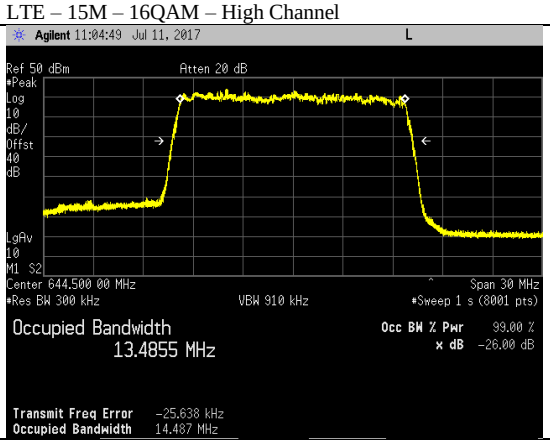
LTE – 15M – QPSK – High Channel



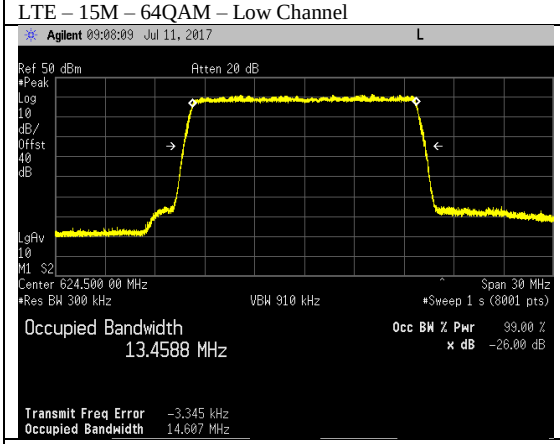
LTE – 15M – 16QAM – Low Channel



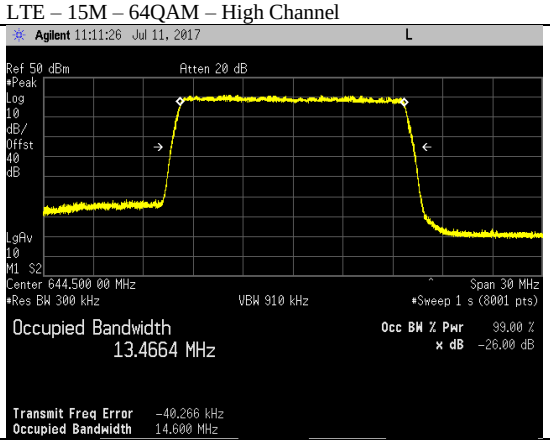
LTE – 15M – 16QAM – High Channel



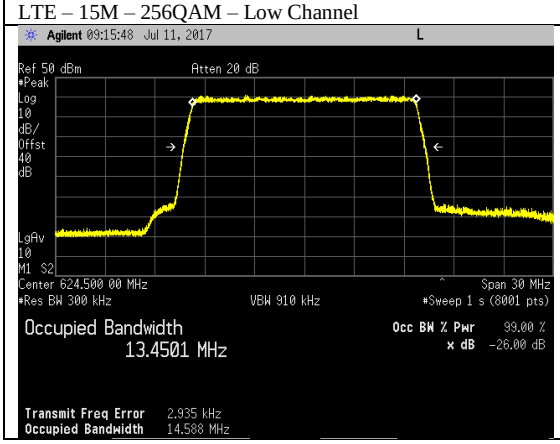
LTE – 15M – 64QAM – Low Channel



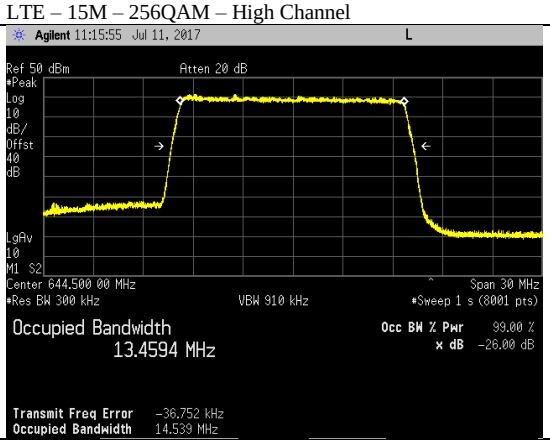
LTE – 15M – 64QAM – High Channel



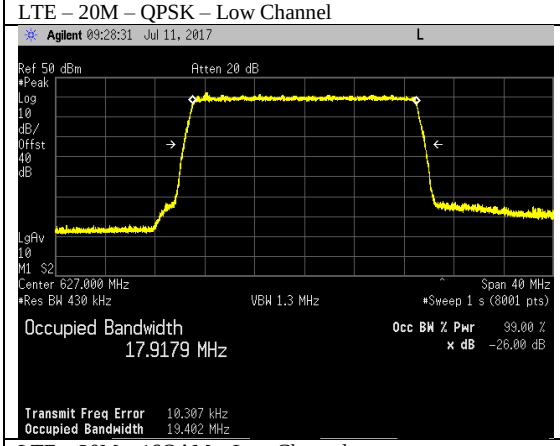
LTE – 15M – 256QAM – Low Channel



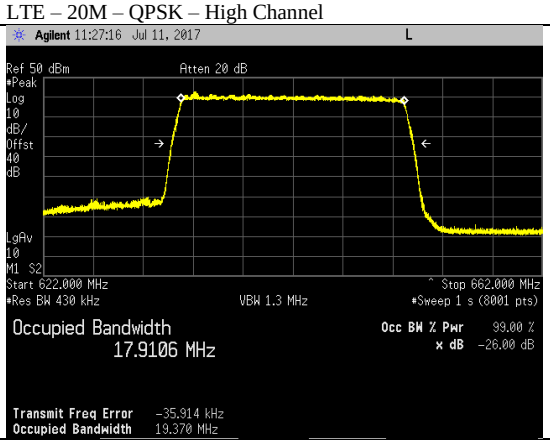
LTE – 15M – 256QAM – High Channel



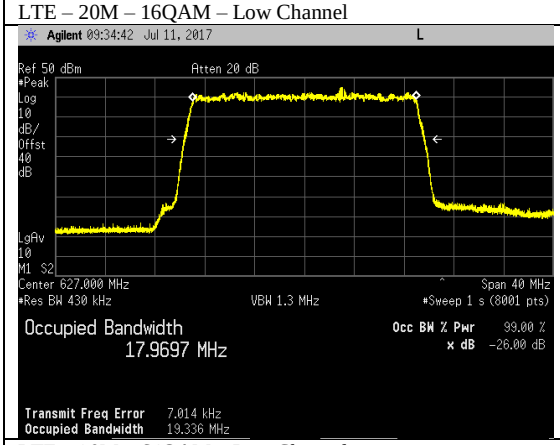
LTE – 20M – QPSK – Low Channel



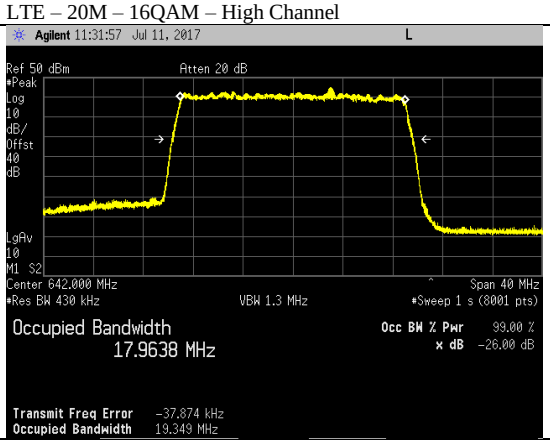
LTE – 20M – QPSK – High Channel



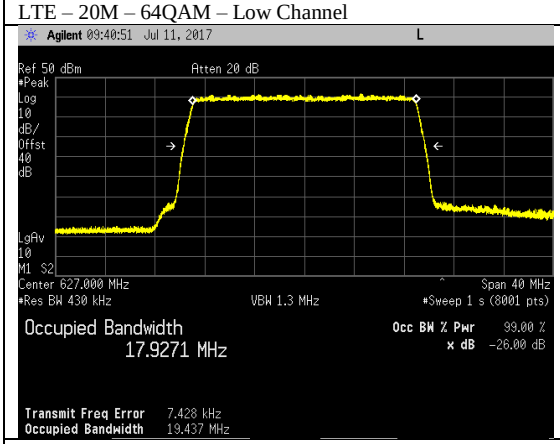
LTE – 20M – 16QAM – Low Channel



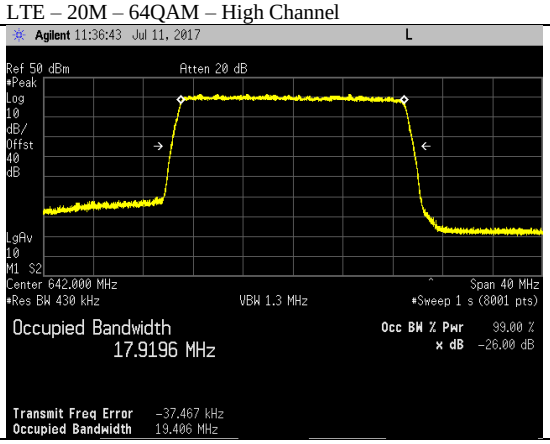
LTE – 20M – 16QAM – High Channel



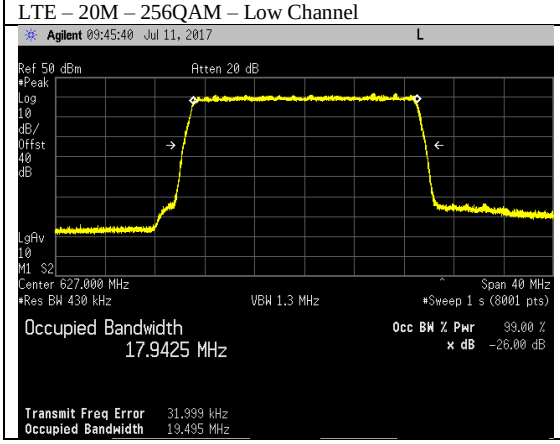
LTE – 20M – 64QAM – Low Channel



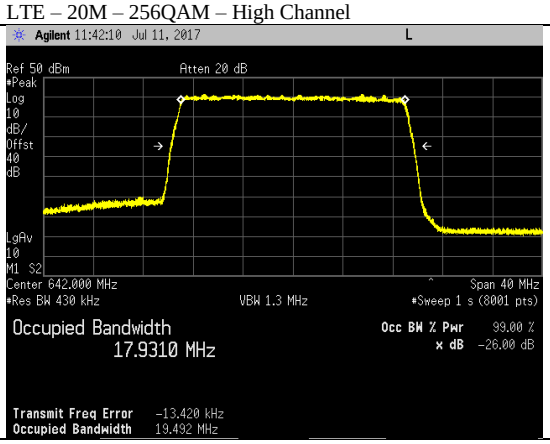
LTE – 20M – 64QAM – High Channel



LTE – 20M – 256QAM – Low Channel



LTE – 20M – 256QAM – High Channel



Antenna Port Conducted Bandedge

Per section 27.53(g), 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.
FCC 27.53(g) requires a ≥100 kHz measurement bandwidth for emissions 100 kHz outside of the RRH operating frequency range. FCC 27.53(g) requires a ≥30 kHz measurement bandwidth for emissions between 100 kHz outside of the RRH operating frequency range and band edge of the operating frequency range.

A narrower resolution bandwidth of at least 30 kHz is permitted to improve measurement accuracy in the transition regions provided that the measured power is integrated over the full required measurement bandwidth (i.e.: 100kHz).

In single carrier mode, all available LTE channel bandwidths (5MHz, 10MHz, 15MHz and 20MHz) were used at the lowest and highest frequency channels for the band edge measurements.

In 5MHz channel bandwidth mode, low and high channels as well as dual carrier mode (low channel + high channel) configurations were tested. All Measurements were performed on antenna Port 2.

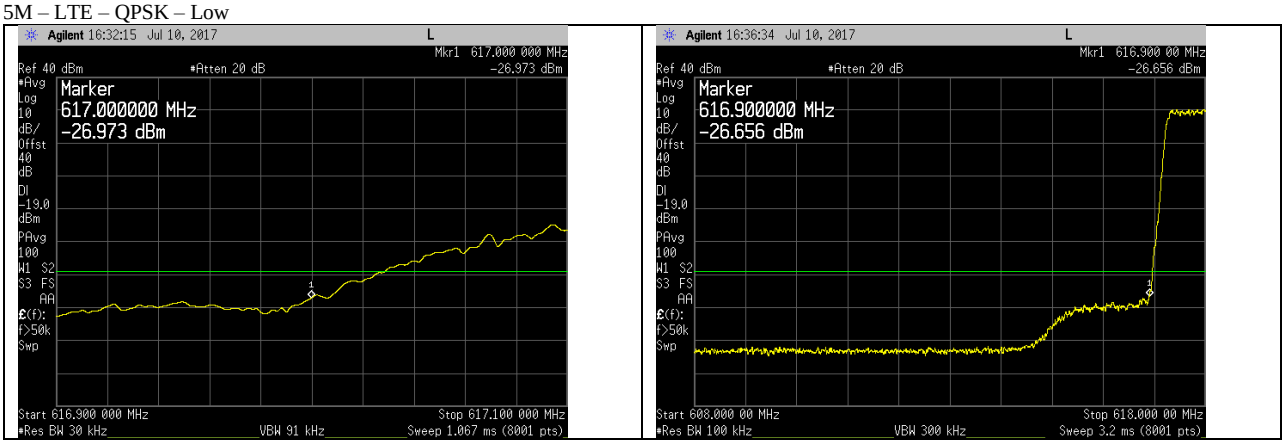
Results summary:

	LTE - QPSK (dBm)		LTE - 16QAM (dBm)		LTE - 64QAM (dBm)		LTE - 256QAM (dBm)	
	Low	High	Low	High	Low	High	Low	High
5M	-26.656	-27.258	-25.812	-28.369	-24.614	-28.357	-26.429	-28.392
10M	-29.252	-31.056	-28.879	-30.855	-27.943	-30.91	-28.236	-29.937
15M	-25.444	-29.044	-26.461	-29.935	-26.542	-30.502	-25.657	-29.347
20M	-31.332	-33.472	-30.652	-32.801	-31.402	-34.124	-31.854	-33.605
5M Dual	-24.416	-25.267	-24.056	-24.814	-23.571	-25.671	-25.209	-25.796

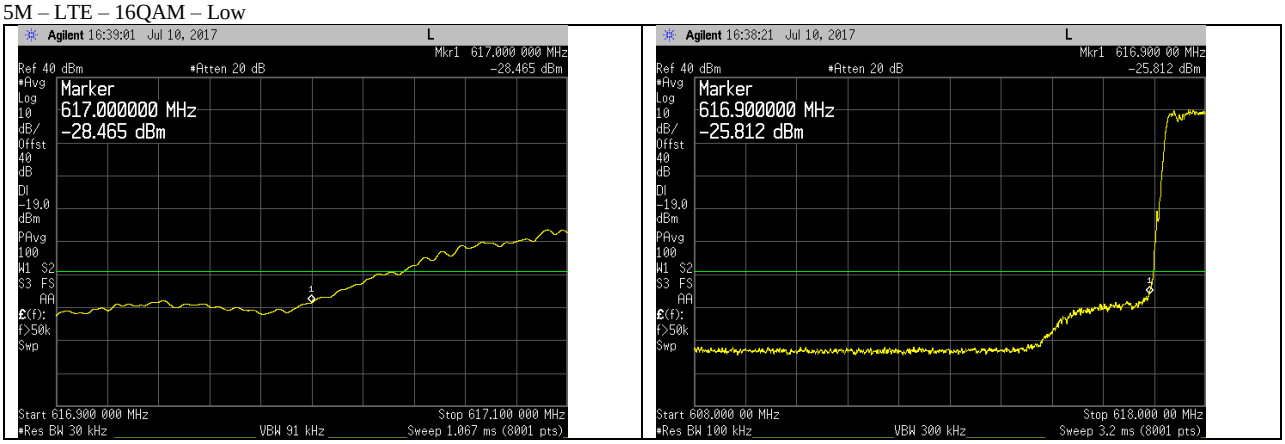
All corresponding plots are included on the following pages.

Total path loss of 40dB accounted in via reference level offset to the spectrum analyzer.

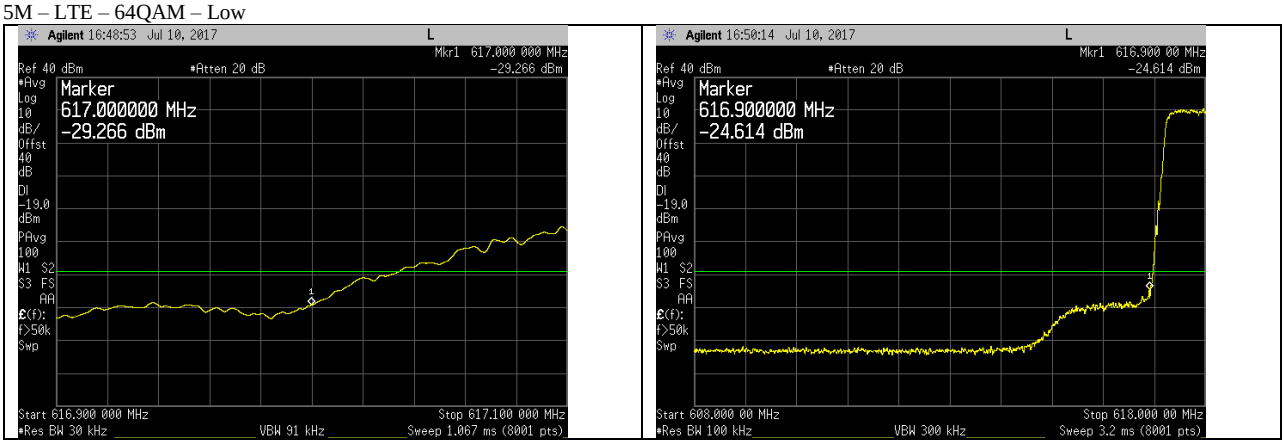
5M – LTE – QPSK – Low



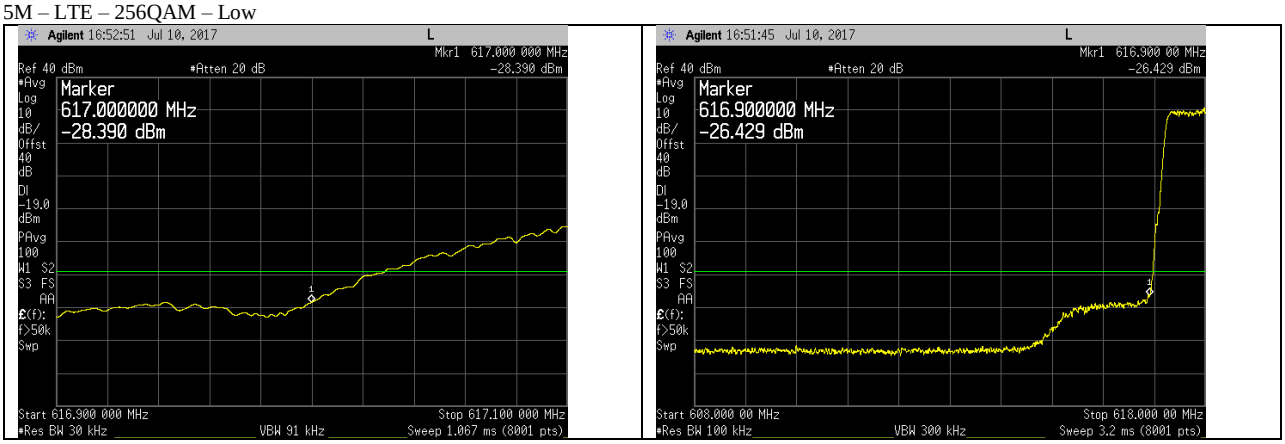
5M – LTE – 16QAM – Low



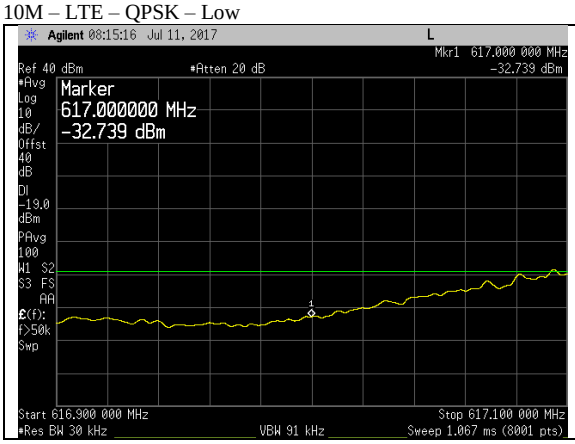
5M – LTE – 64QAM – Low

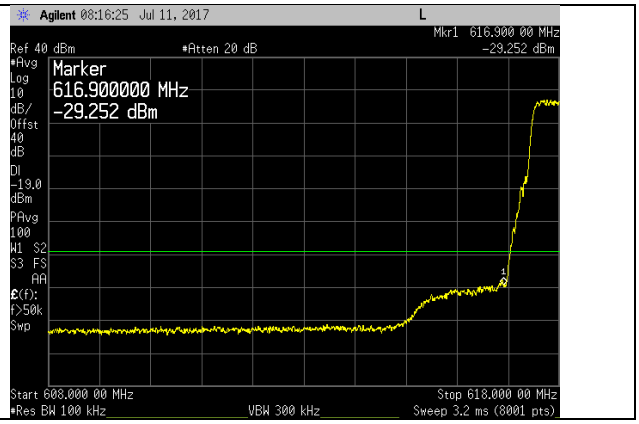


5M – LTE – 256QAM – Low

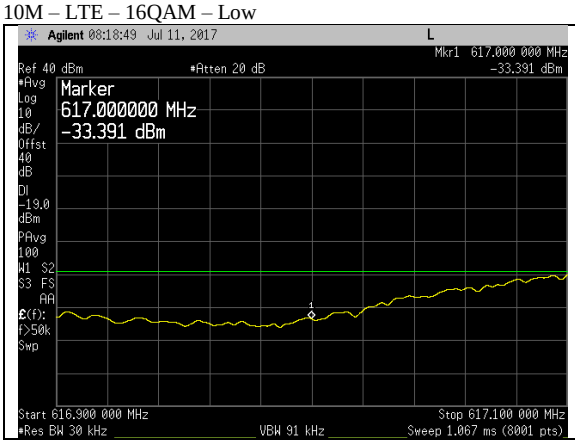


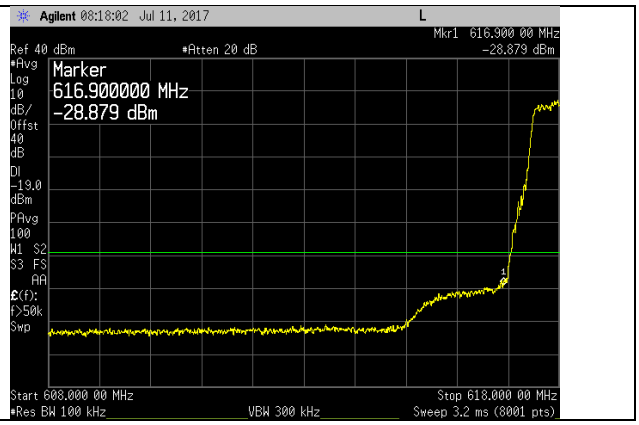
10M – LTE – QPSK – Low



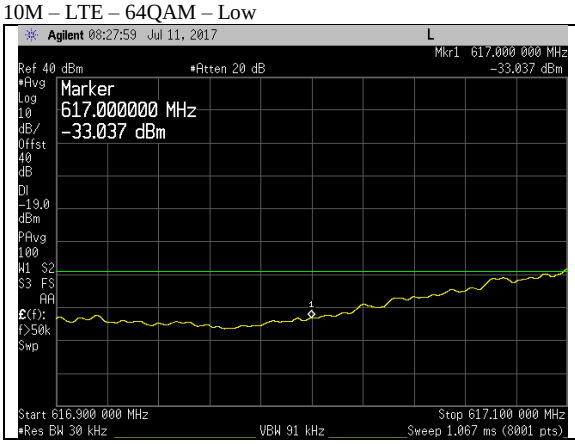


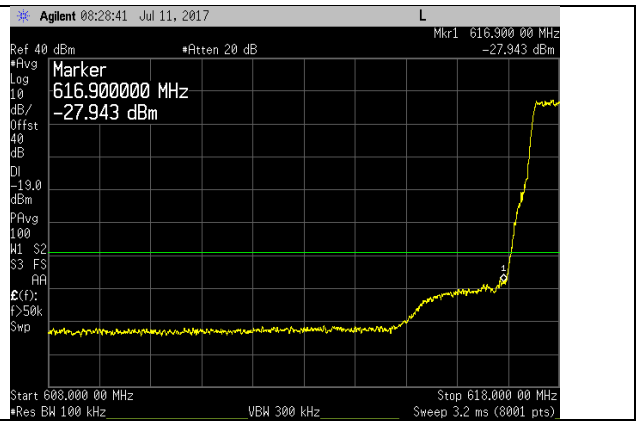
10M – LTE – 16QAM – Low



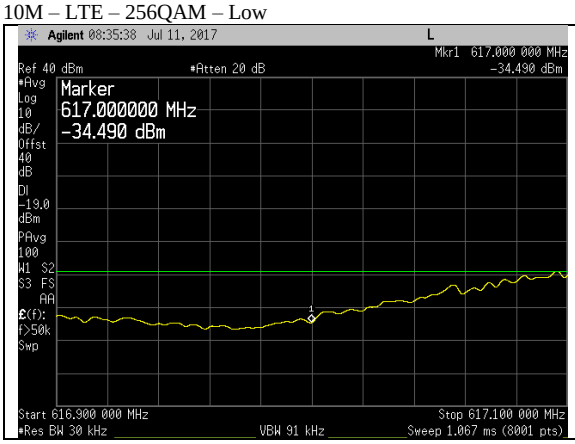


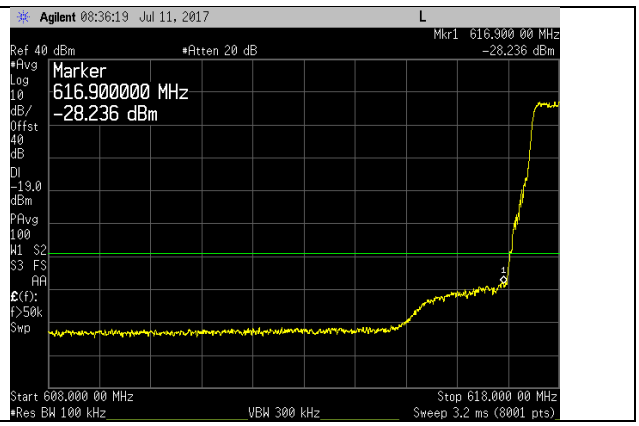
10M – LTE – 64QAM – Low



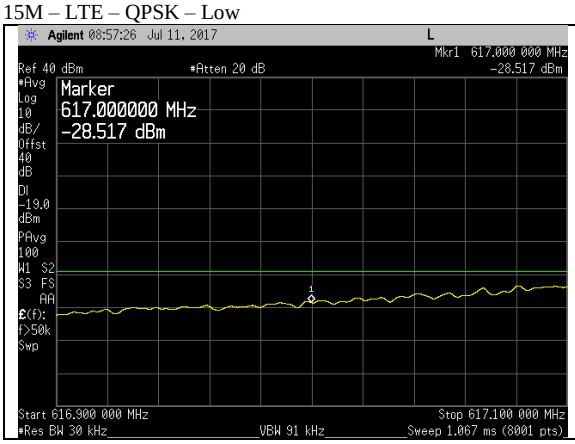


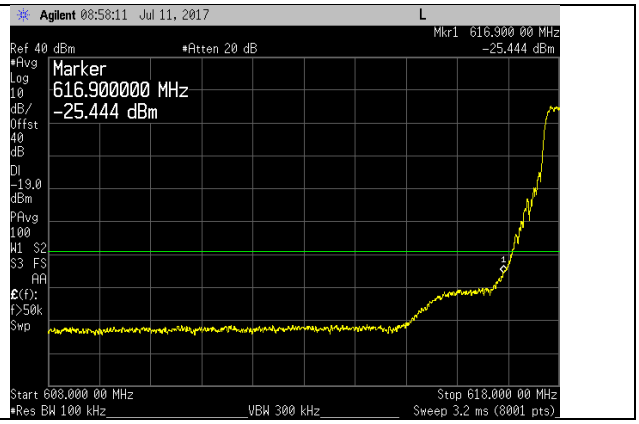
10M – LTE – 256QAM – Low



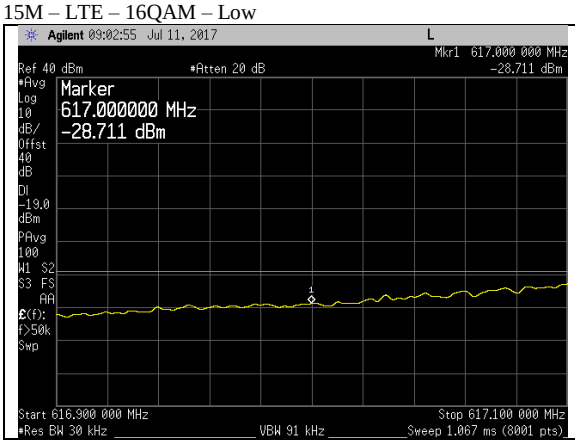


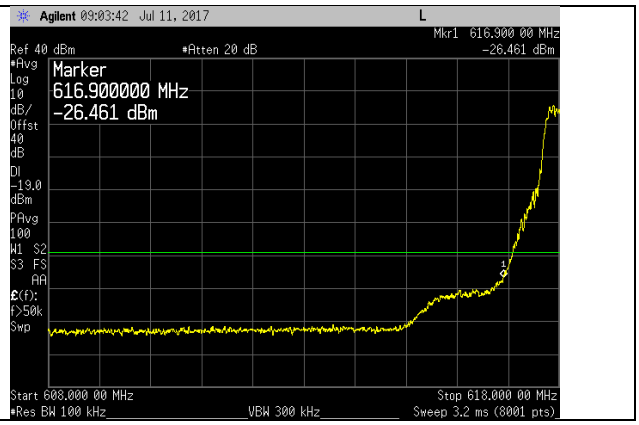
15M – LTE – QPSK – Low



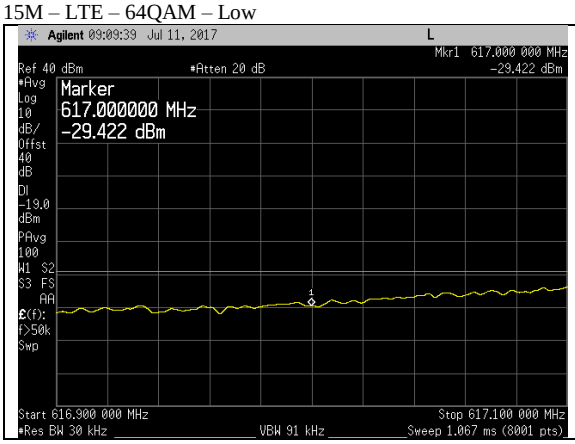


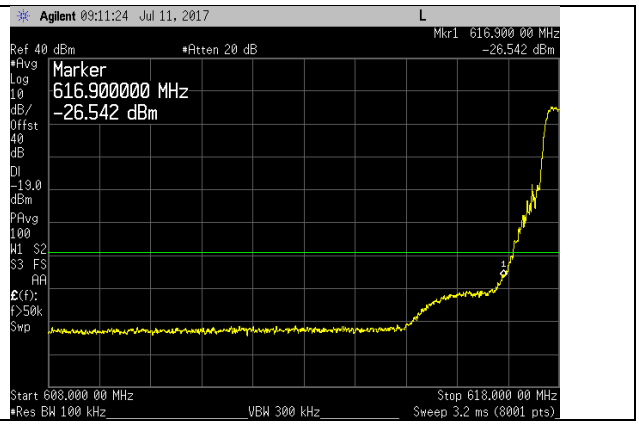
15M – LTE – 16QAM – Low



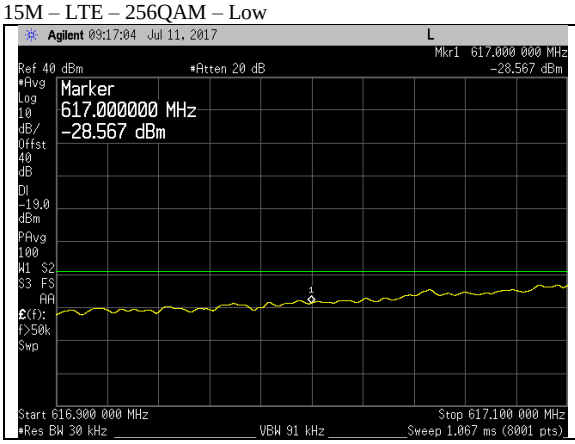


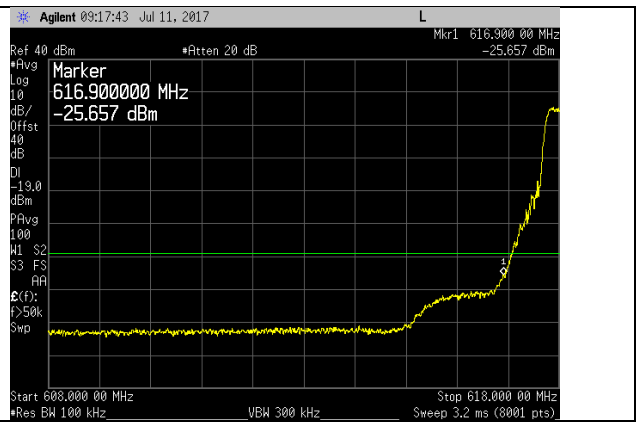
15M – LTE – 64QAM – Low



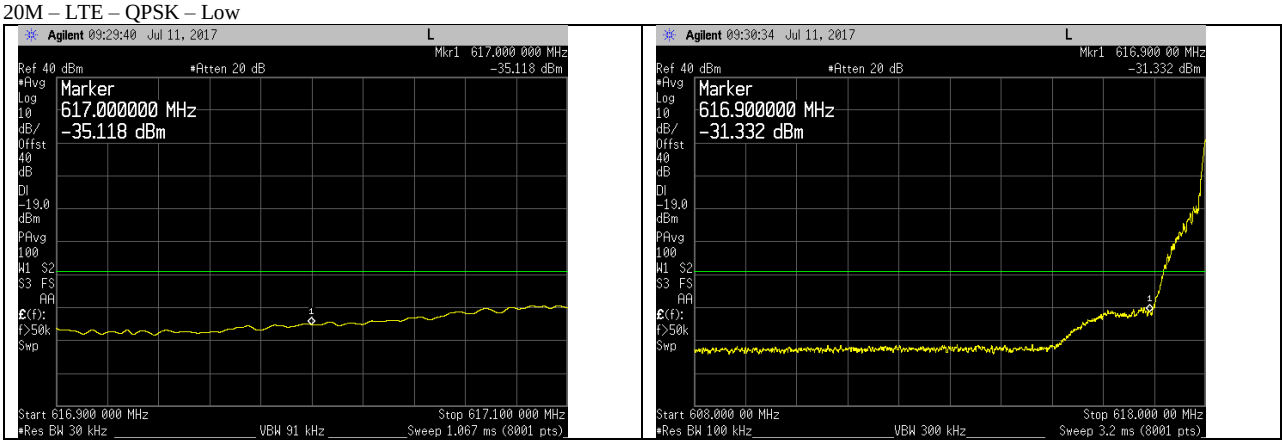


15M – LTE – 256QAM – Low

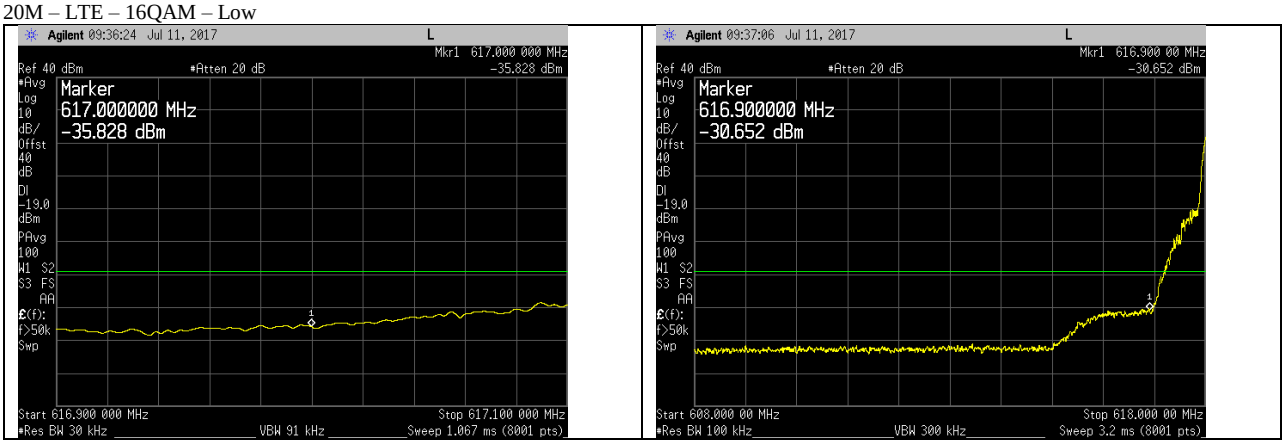




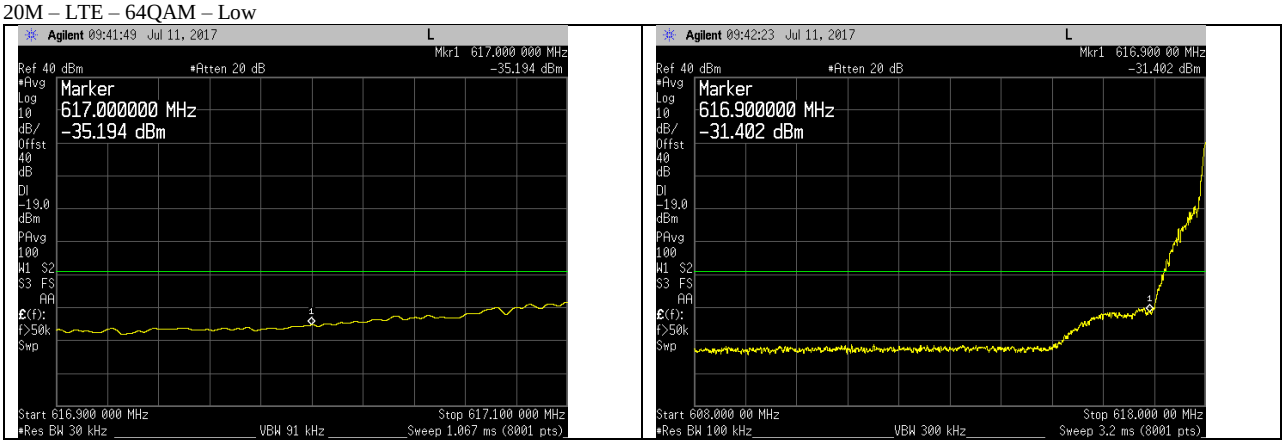
20M – LTE – QPSK – Low



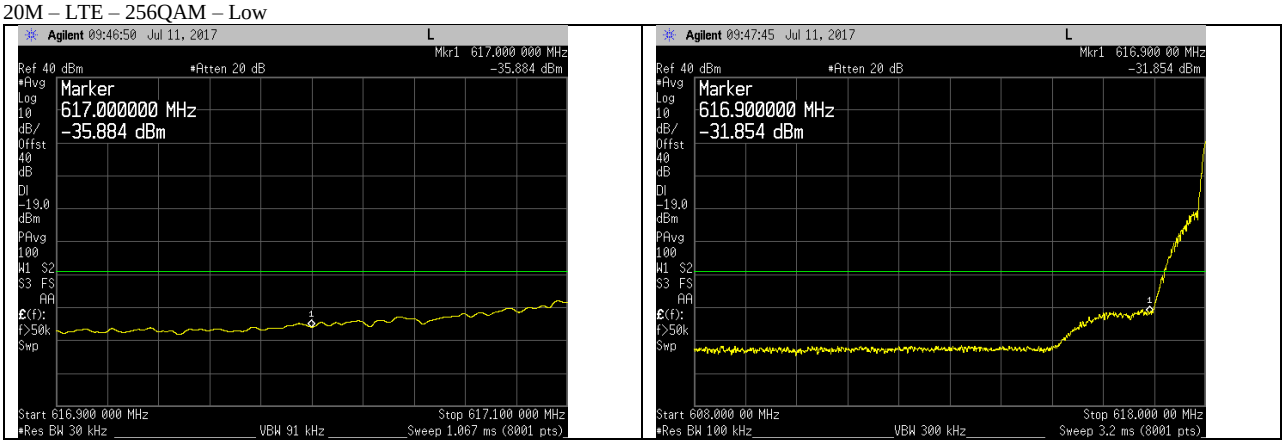
20M – LTE – 16QAM – Low



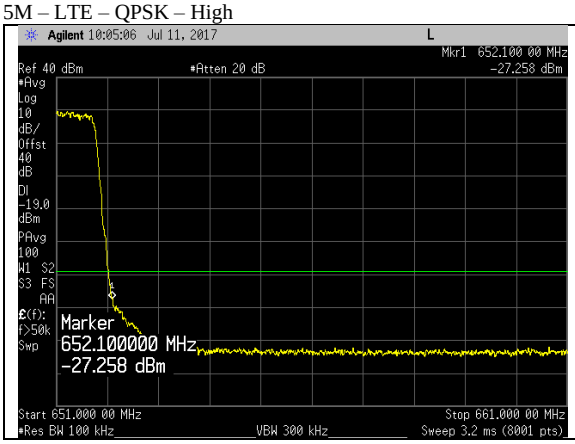
20M – LTE – 64QAM – Low

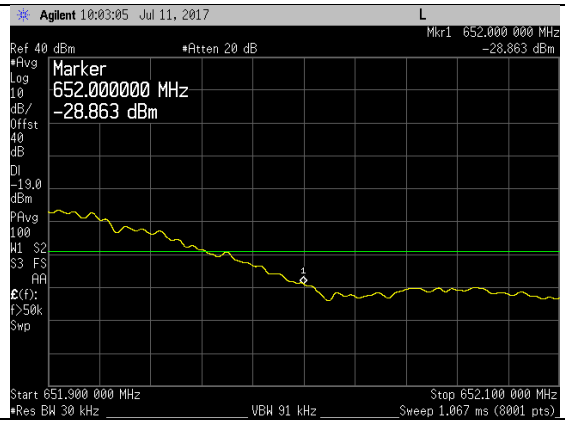


20M – LTE – 256QAM – Low

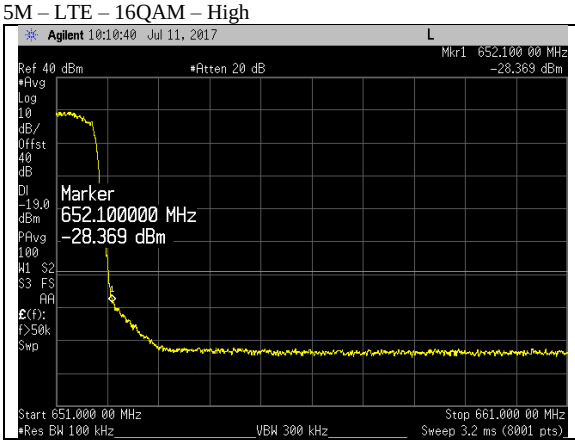


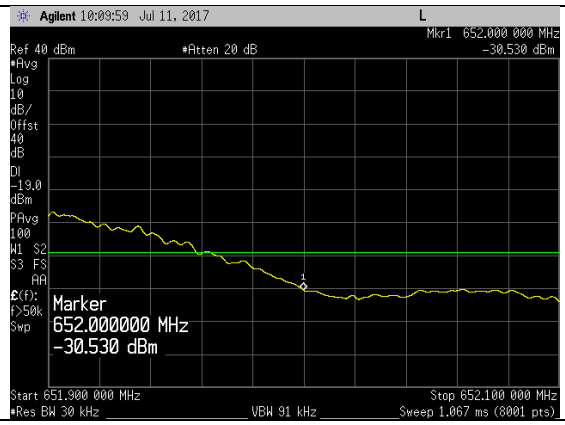
5M – LTE – QPSK – High



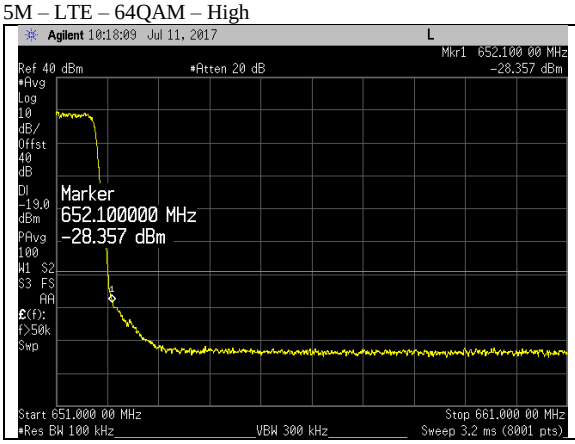


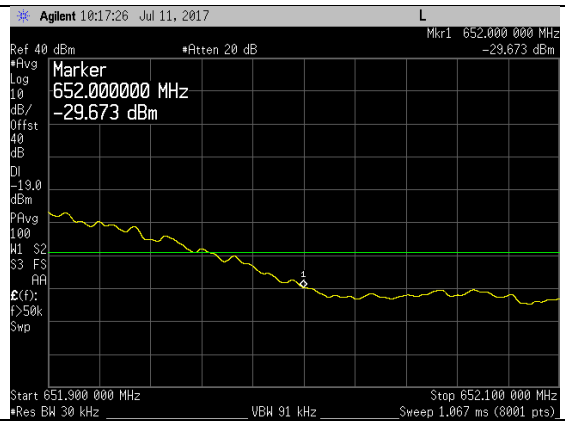
5M – LTE – 16QAM – High



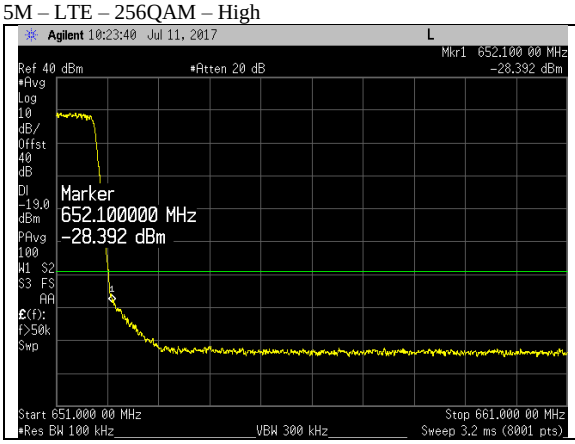


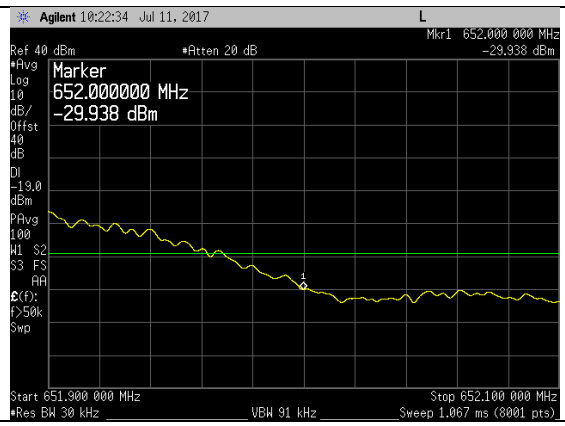
5M – LTE – 64QAM – High



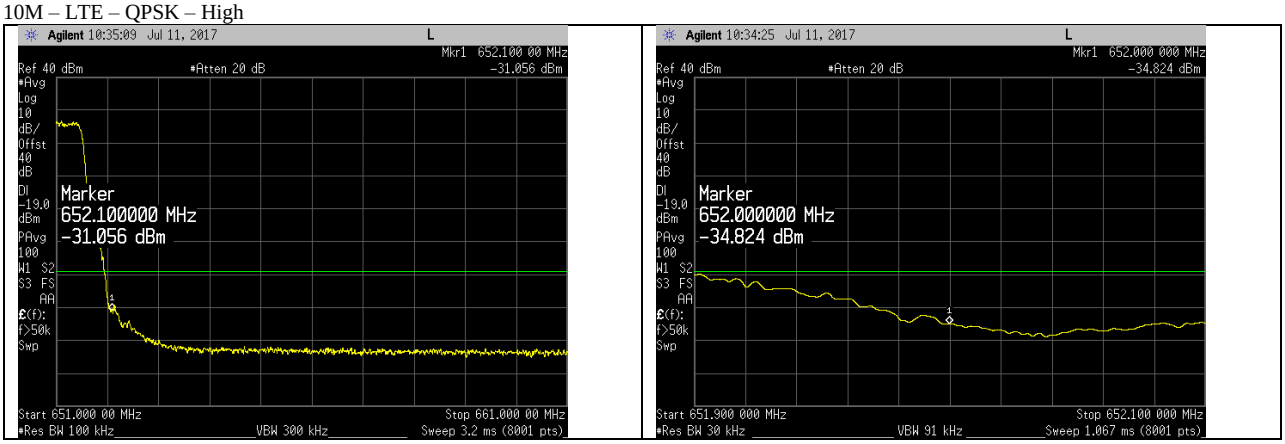


5M – LTE – 256QAM – High

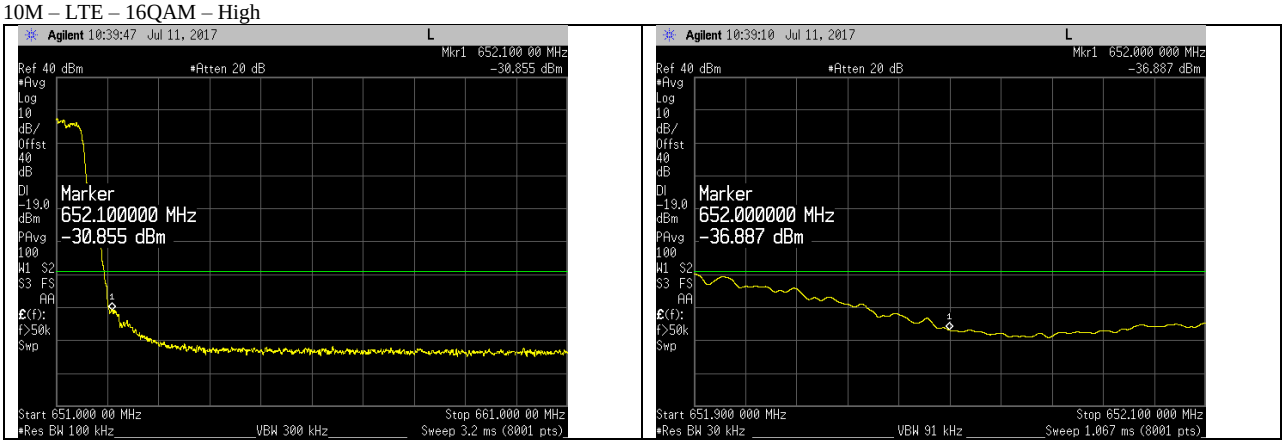




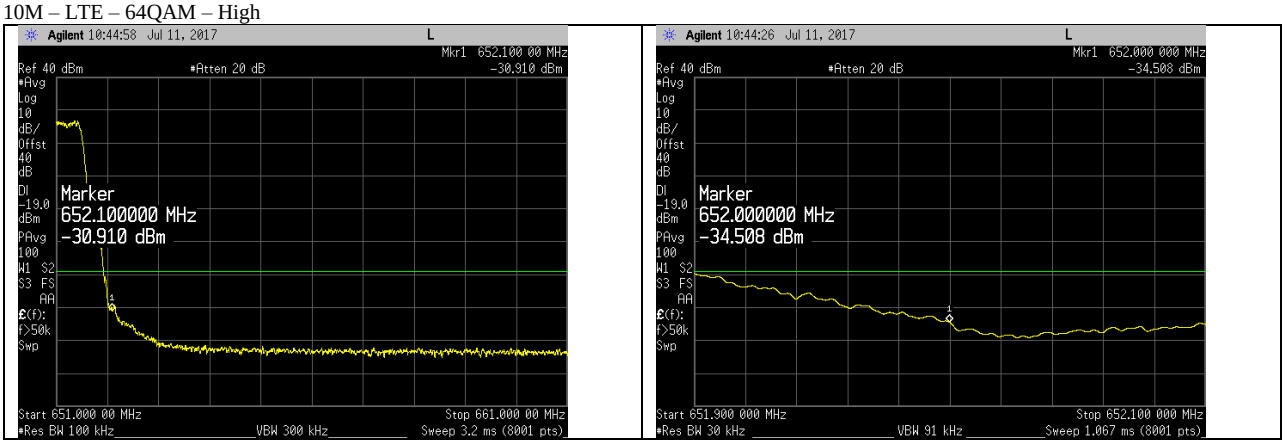
10M – LTE – QPSK – High



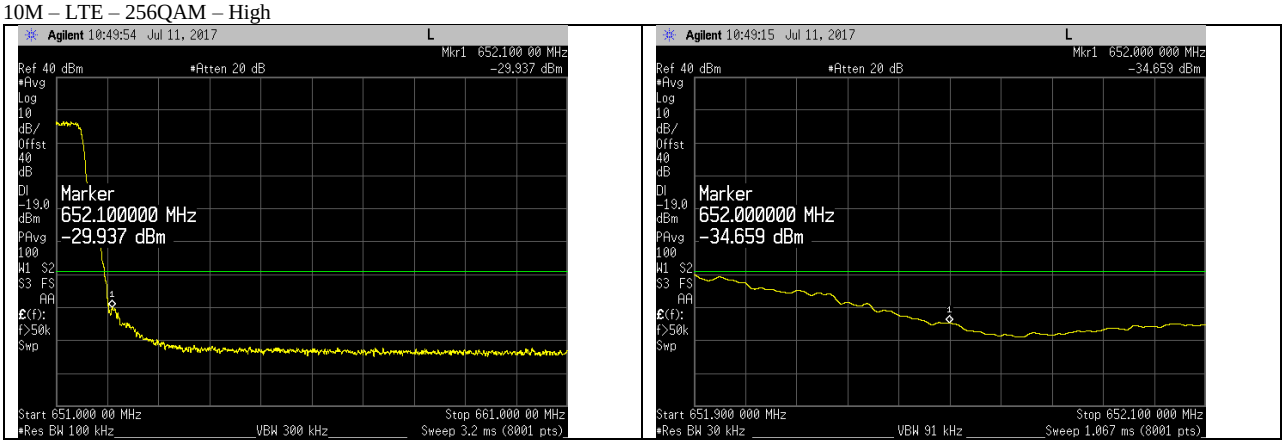
10M – LTE – 16QAM – High



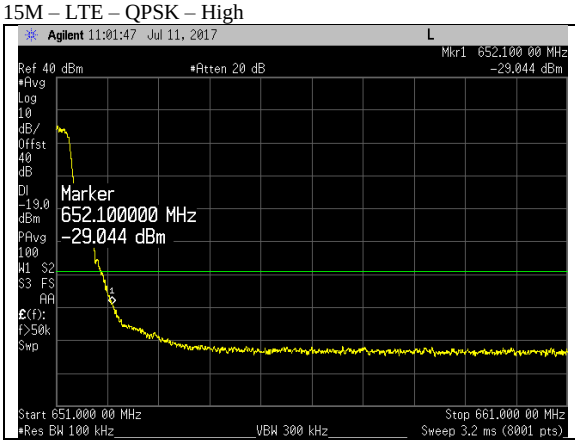
10M – LTE – 64QAM – High

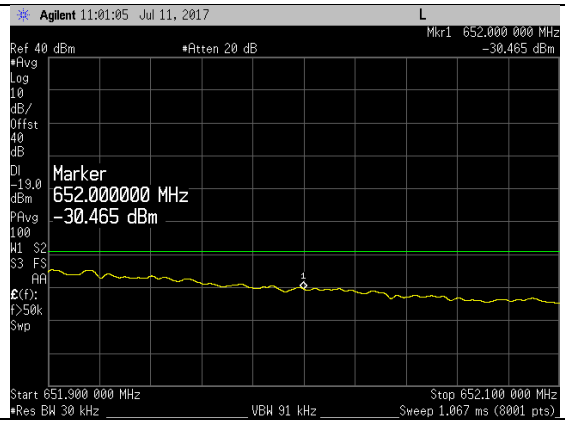


10M – LTE – 256QAM – High

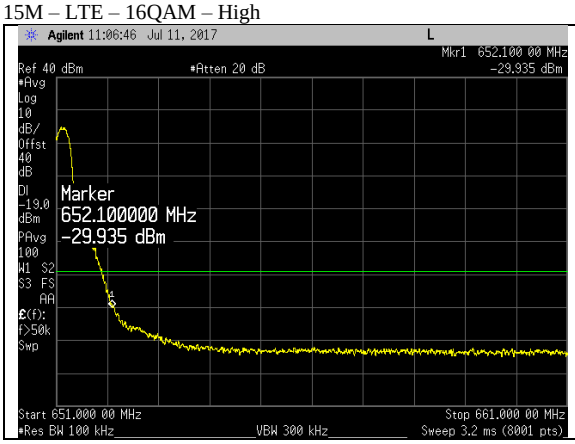


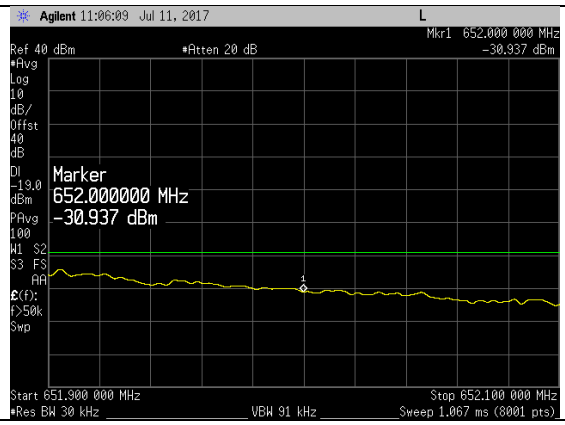
15M – LTE – QPSK – High



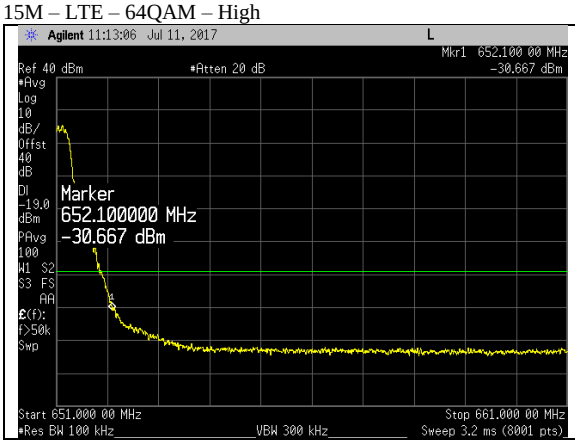


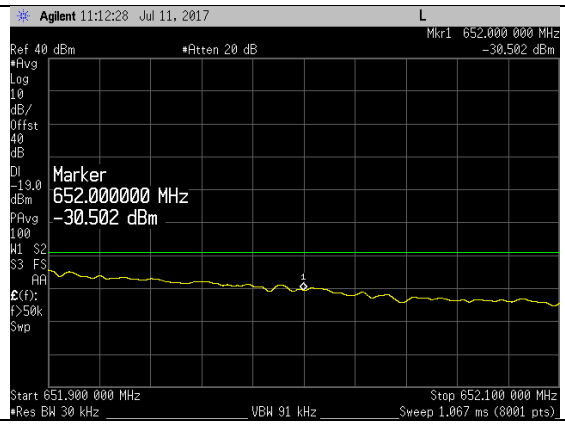
15M – LTE – 16QAM – High



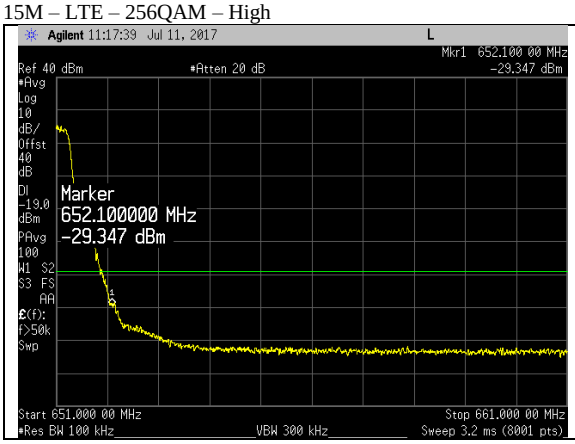


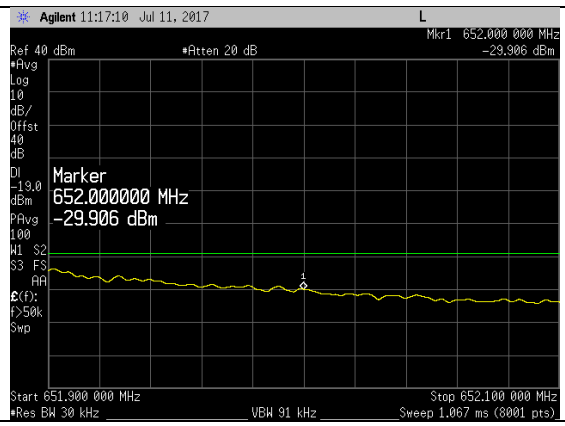
15M – LTE – 64QAM – High



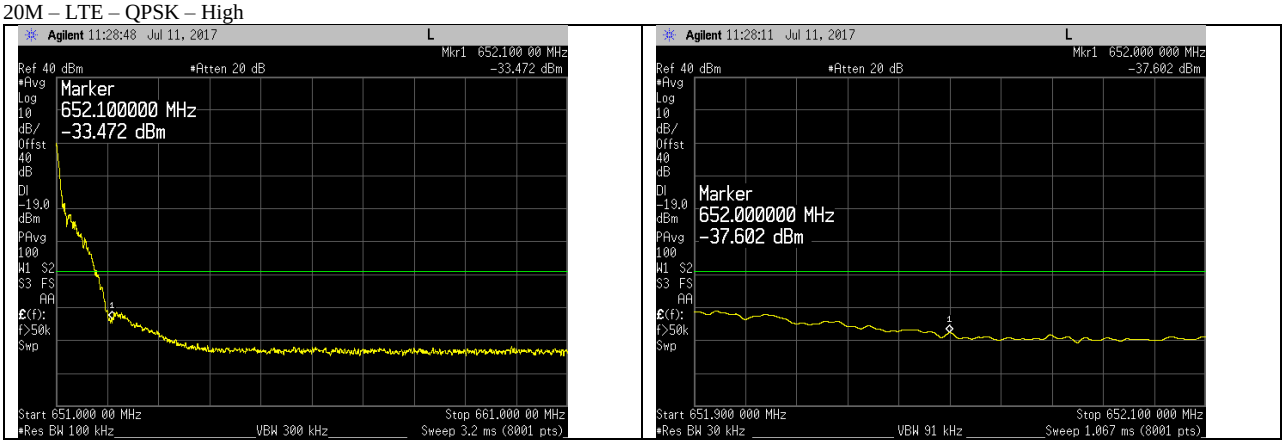


15M – LTE – 256QAM – High

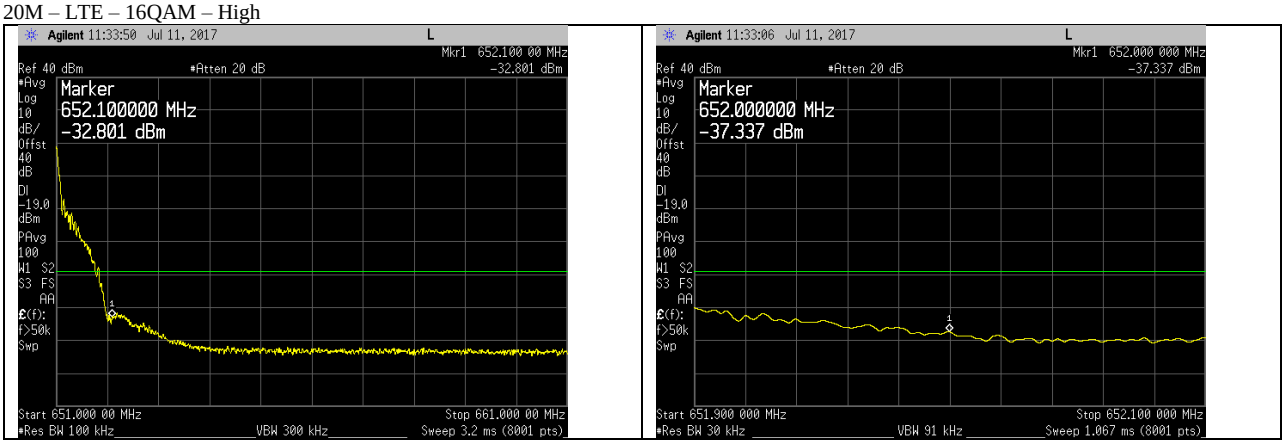




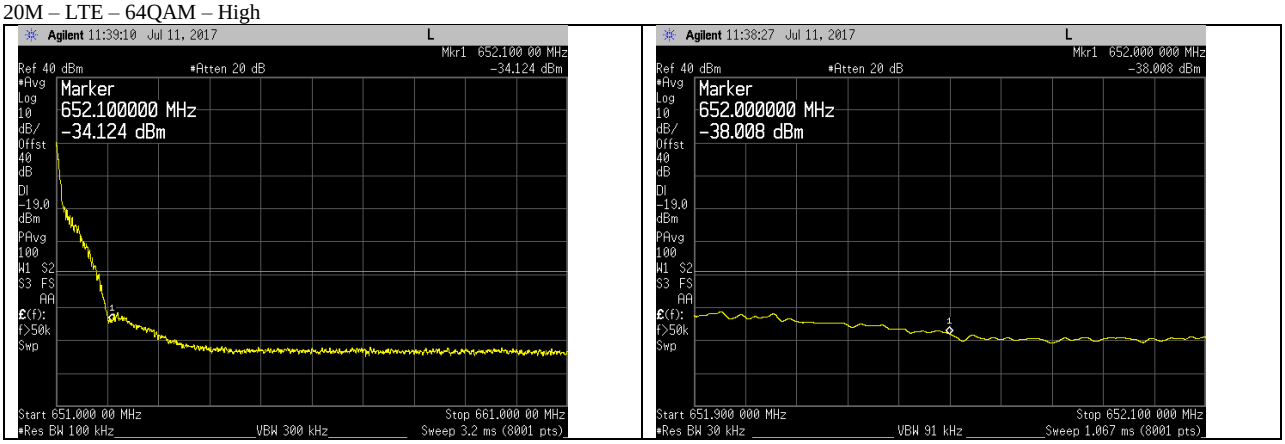
20M – LTE – QPSK – High



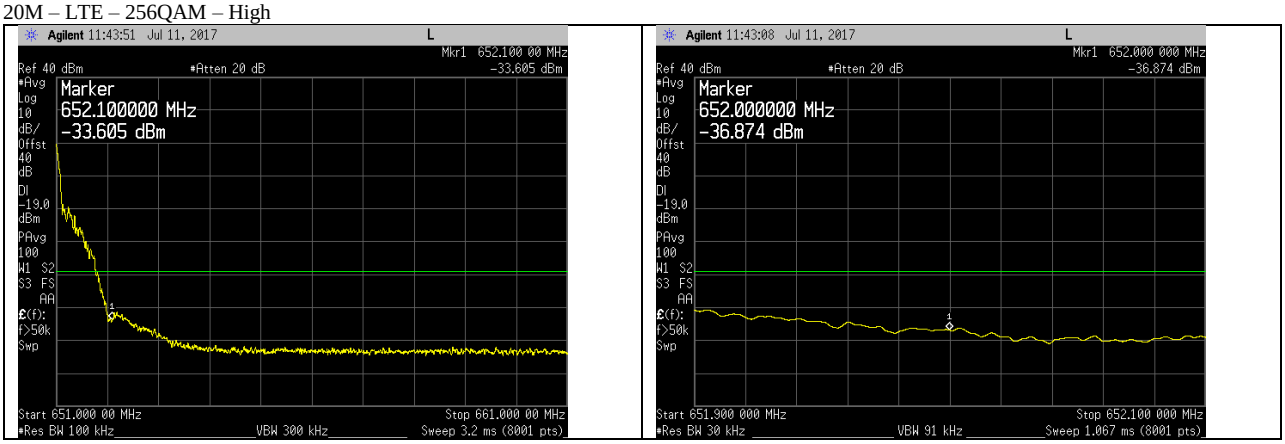
20M – LTE – 16QAM – High



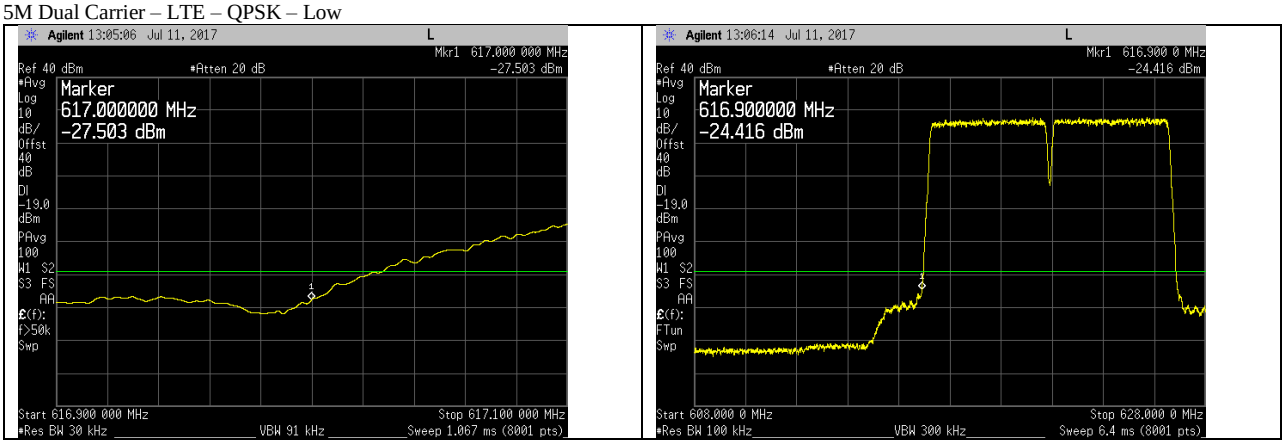
20M – LTE – 64QAM – High



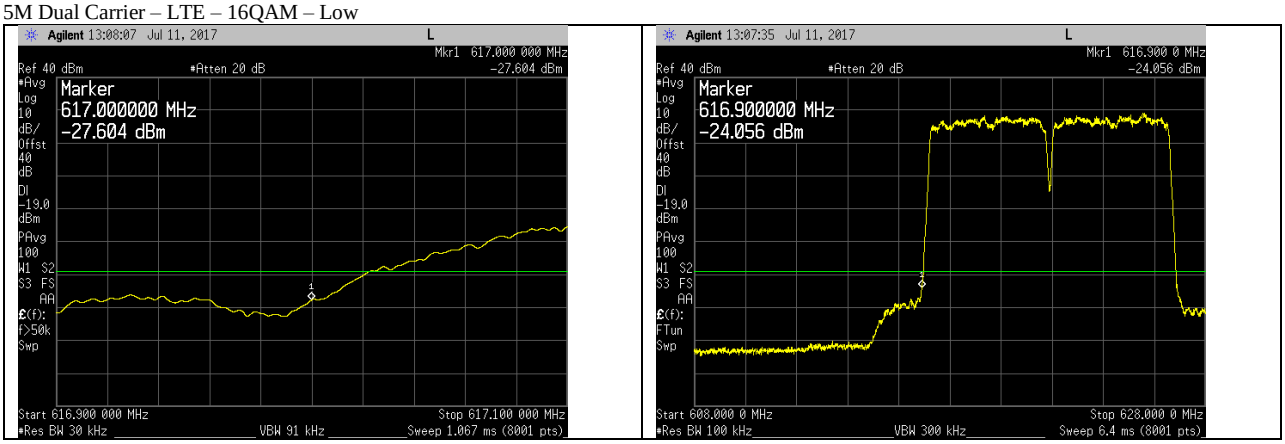
20M – LTE – 256QAM – High



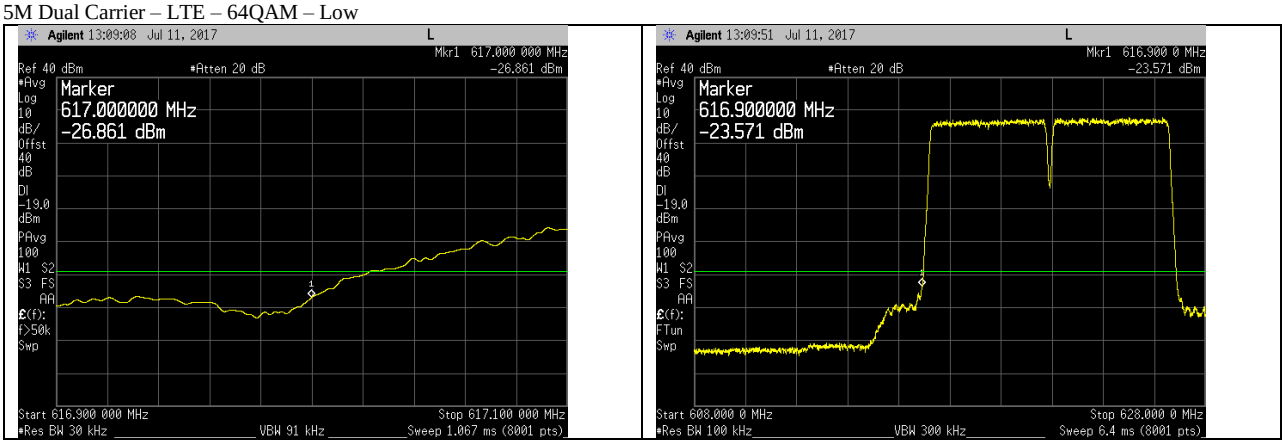
5M Dual Carrier – LTE – QPSK – Low



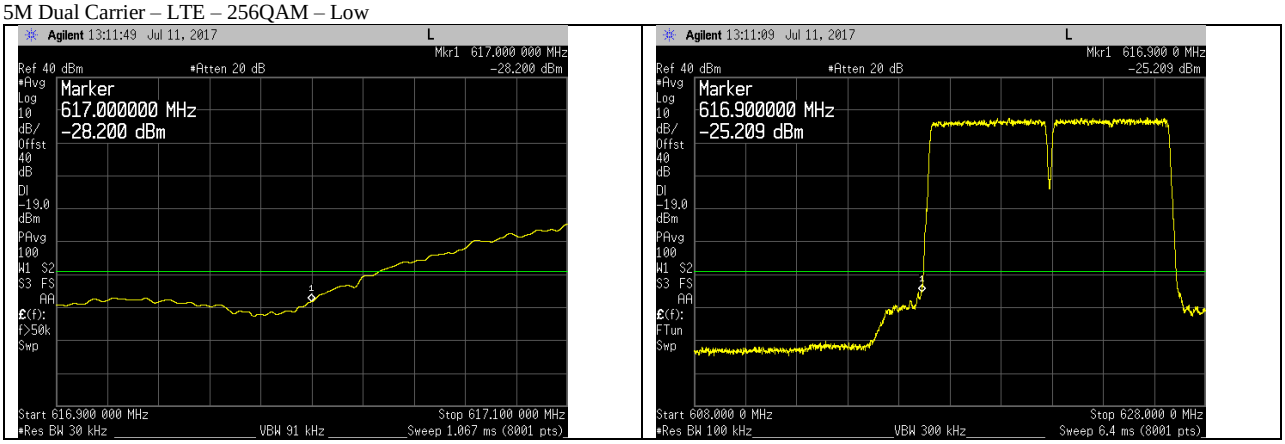
5M Dual Carrier – LTE – 16QAM – Low



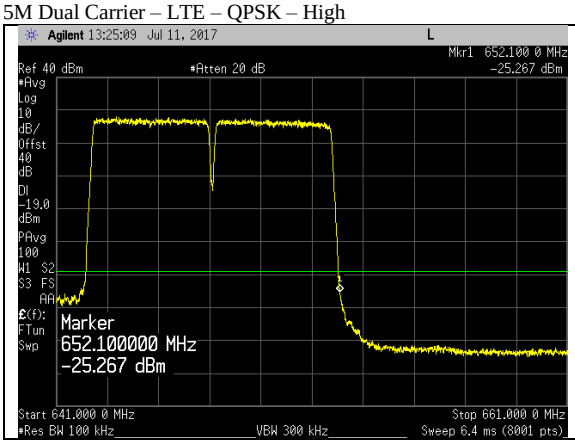
5M Dual Carrier – LTE – 64QAM – Low

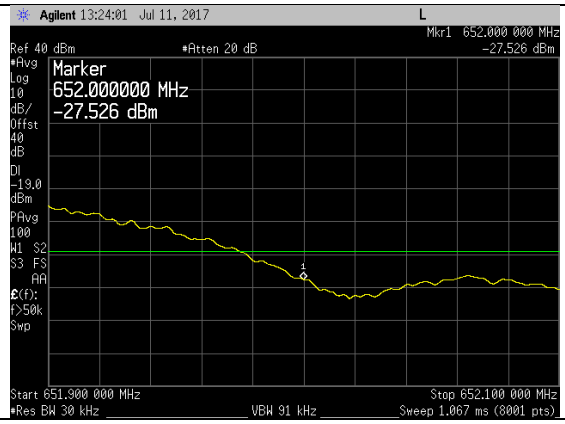


5M Dual Carrier – LTE – 256QAM – Low

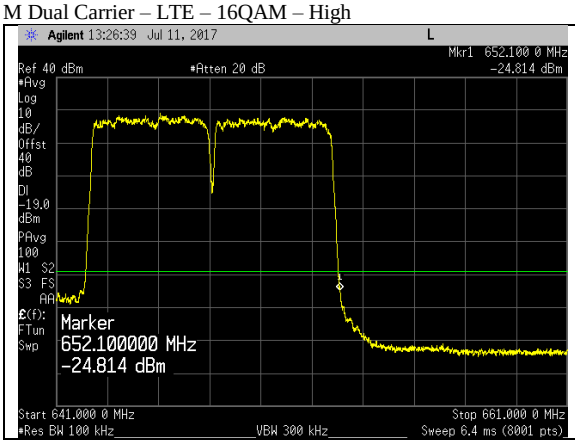


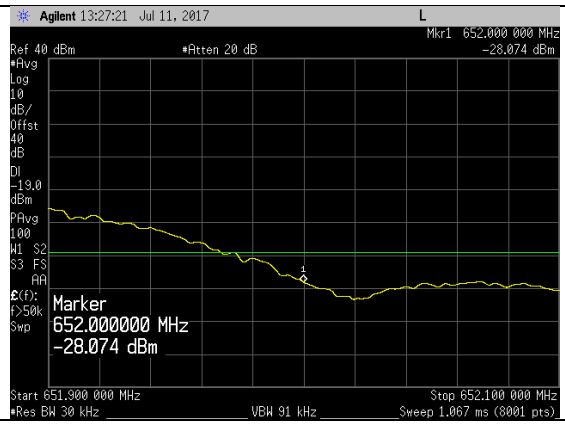
5M Dual Carrier – LTE – QPSK – High



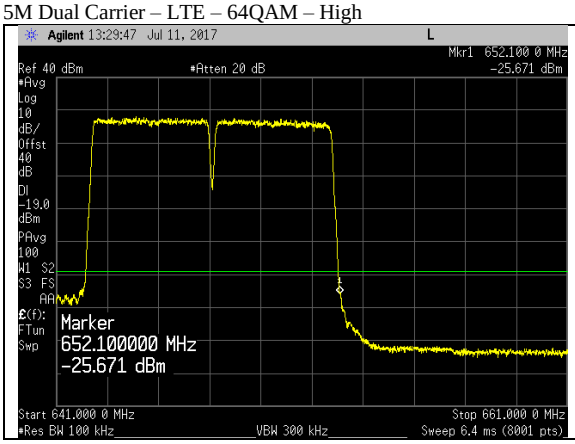


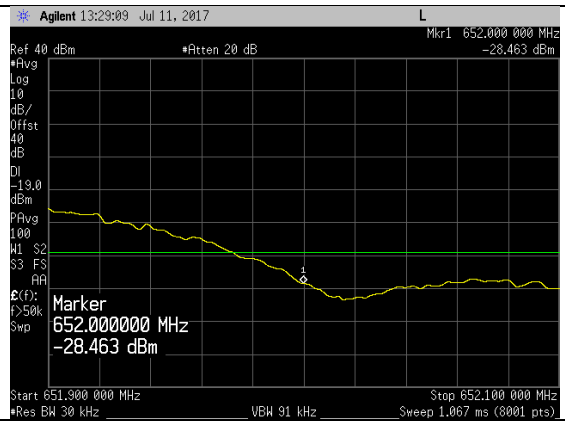
M Dual Carrier – LTE – 16QAM – High



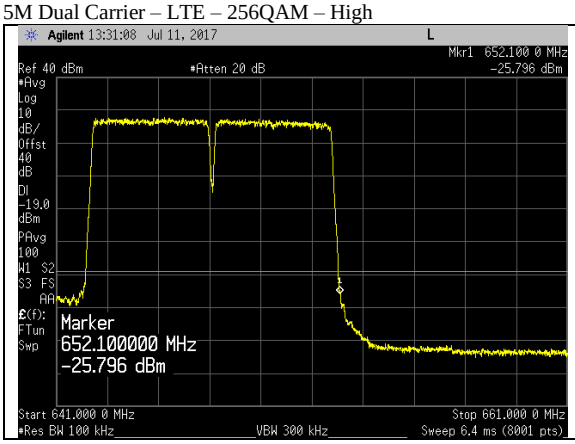


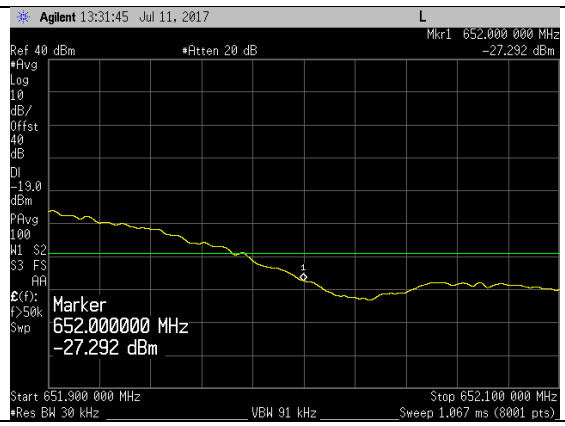
5M Dual Carrier – LTE – 64QAM – High





5M Dual Carrier – LTE – 256QAM – High





Transmitter Antenna Port Conducted Spurious Emissions

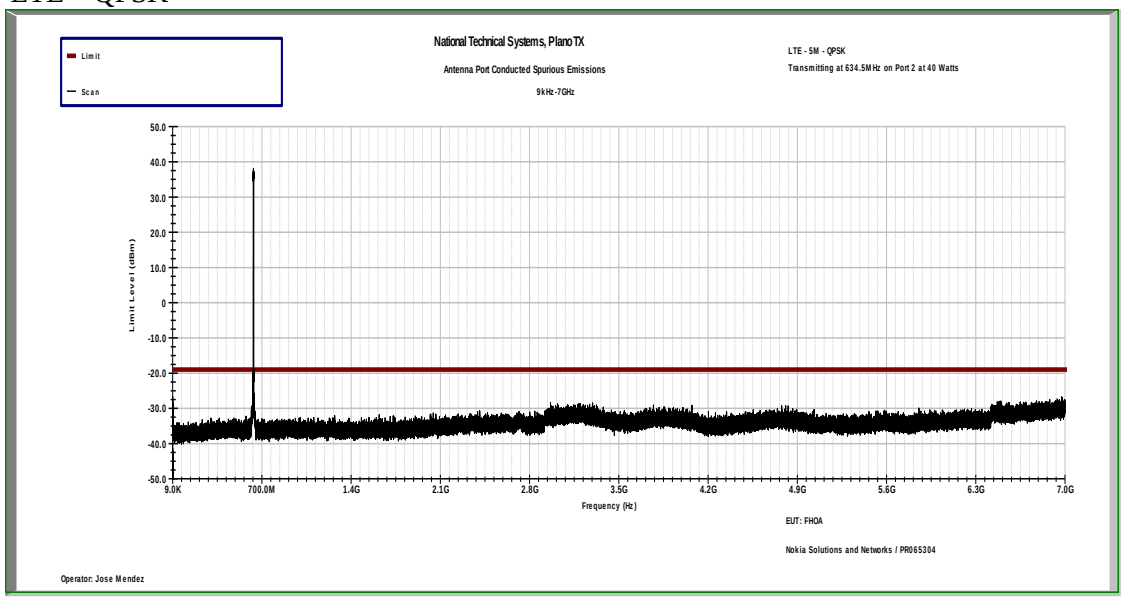
Tests performed at Port 2 on center channel for all modulations and bandwidth modes. Due to 4x4 MIMO operation, limit is -19.03dBm (-13dBm – 10*log(4)) per FCC KDB 662911D01 v02r01.

TILE6 measurement software was used during testing with the following settings:

Frequency Range	**RBW**	**VBW**	**Number of data points**	**Divided into**	**Detector**	**Sweep Time**	**Max hold over**
9kHz-150kHz	1kHz	3kHz	8000	1 segment	Peak	Auto	50 sweeps
150kHz-7GHz	100kHz	300kHz	8000	12 segments	Peak	Auto	50 sweeps

Corresponding plots are included on the following pages.

5M – LTE – QPSK



5M – LTE – 16QAM