

TEST REPORT

FCC Test for RFV01U-D2A

Class II Permissive Change

APPLICANT

SAMSUNG Electronics Co., Ltd.

REPORT NO.

HCT-RF-2001-FC035

DATE OF ISSUE

January 17, 2020

HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 F ax. +82 31 645 6401



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FCC ID

A3LRFV01U-D2A

Applicant

SAMSUNG Electronics Co., Ltd.

129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Eut Type
Model Name

RRU(RFV01U)
RFV01U-D2A

Date of Test

December 09, 2019 ~ January 15, 2020

FCC Rule Parts:

CFR 47 Part 2, Part 22, Part 27

This test results were applied only to the test methods required by the standard.

Tested by

Kwang Il Yoon

(signature)

Technical Manager

Jong Seok Lee

(signature)

HCT CO., LTD.

Soo Chan Lee
SooChan Lee / CEO

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	January 17, 2020	Initial Release

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

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1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

Company Name	Samsung Electronics Co., Ltd.
Company Address	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

1.2. PRODUCT INFORMATION

EUT Type	RRU(RFV01U)					
Power Supply	DC -48 V					
Emission Designator	Mode	Tx	Emission Designator		Output Power [W]	
		Frequency (MHz)	QPSK (G7D)	16QAM/64QAM/256QAM (W7D)	QPSK	QAM
	Band 13: LTE 10 MHz	751.0	9M02G7D	9M04W7D	112.49	113.54
	Band 13: NB-IoT	746.2	201KG7D	-	19.15	-
	Band 13: NB-IoT + NB-IoT (2CC)	746.2 ~ 755.8	397KG7D	-	35.53	-
	Band 5: LTE 5 MHz	871.5 ~ 891.5	4M51G7D	4M52W7D	73.12	74.49
	Band 5: LTE 10 MHz	874.0 ~ 889.0	9M00G7D	9M01W7D	113.77	115.17
	Band 5: LTE 5 MHz + 5 MHz	871.5 ~ 891.5	9M47G7D	9M49W7D	133.54	136.75
	Band 5: LTE 10 MHz + 10 MHz	874.0 ~ 889.0	18M94G7D	19M02W7D	115.35	116.31
	Band 5: LTE 10 MHz + 5 MHz + 10 MHz	874.0 ~ 889.0	23M91G7D	23M93W7D	116.00	116.78
Frequency Range	746 ~ 756 MHz (Band 13) / 869 ~ 894 MHz (Band 5)					
Tx Output Power	Band 13			Band 5		
	LTE: 40 W x 4 Paths or 60 W x 2 Paths (Max output power :160W)			LTE: 40W x 4 Paths or 60W x 2 Paths (Max output power :160W)		
	NB-IoT: 8.3 W x 2 Paths (16.6 W) 5.5 W x 4 Paths (22 W)					
Channel Bandwidths	Band 13: LTE 10 MHz, NB-IoT 200 kHz Band 5: LTE 5 MHz, LTE 10 MHz					
Modulation Type	LTE: QPSK, 16QAM, 64QAM, 256QAM, NB-IoT: QPSK					
Antenna Specification	Manufacturer does not provide an antenna.					

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 22, Part 27
Measurement standards	ANSI C63.26-2015, KDB 662911 D01 v02r01, KDB 971168
Place of Test	HCT CO., LTD. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil,

Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 22, Part 27

Description	Reference	Results
RF Output Power	§ 2.1046, § 22.913, § 27.50(b)	Compliant
Occupied Bandwidth	§ 2.1049	Compliant
Unwanted Conducted Emissions	§ 2.1051, § 22.917, § 27.53(c), (f)	Compliant
Radiated Emissions	§ 2.1053, § 22.917, § 27.53	Compliant
Frequency Stability	§ 2.1055, § 22.355, § 27.54	Compliant

Note:

1. C2PC models are electrically identical to the Original models.

3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

- The EUT was operated in a manner representative of the typical usage of the equipment.
- During all testing, system components were manipulated within the confines of typical usage to maximize each emission.
- All LTE modulation types (QPSK, 16QAM, 64QAM, 256QAM) supported by the EUT have been tested.
- The dummy loads were connected to the RF output ports for radiated spurious emission testing.
- The tests results in plots are already including the actual value of loss for the attenuator and cable combination.

Please check correction factors below table.

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
50	28.821	8000	32.353
100	28.623	9000	31.770
200	29.255	-	-
300	29.078	-	-
400	29.230	-	-
500	29.625	-	-
600	29.345	-	-
700	29.452	-	-
750	29.560	-	-
800	29.481	-	-
850	29.629	-	-
900	29.788	-	-
950	29.802	-	-
1000	29.916	-	-
2000	31.327	-	-
3000	30.833	-	-
4000	30.849	-	-
5000	31.274	-	-
6000	31.371	-	-
7000	31.835	-	-

3.3. MAXIMUM MEASUREMENT UNCERTAINTY

The value of the measurement uncertainty for the measurement of each parameter.

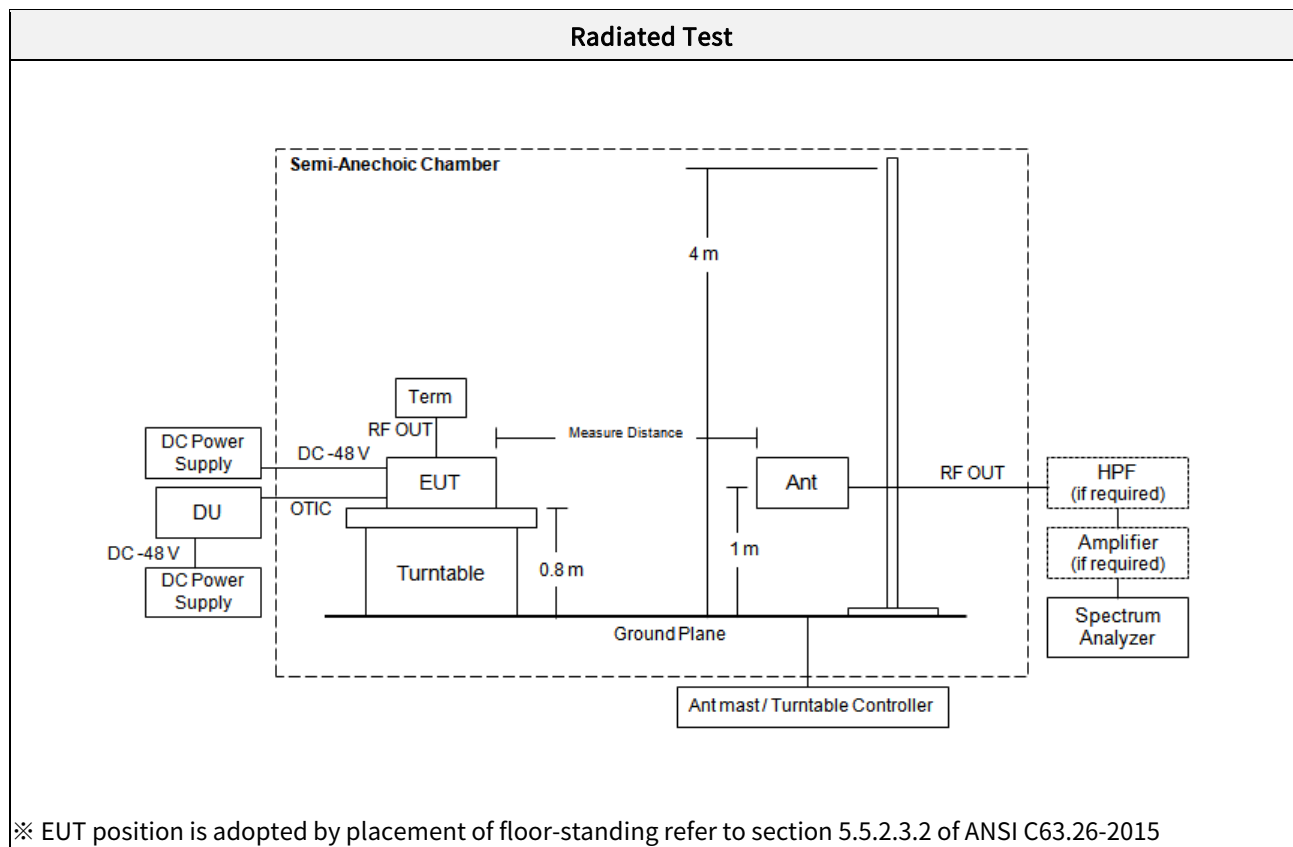
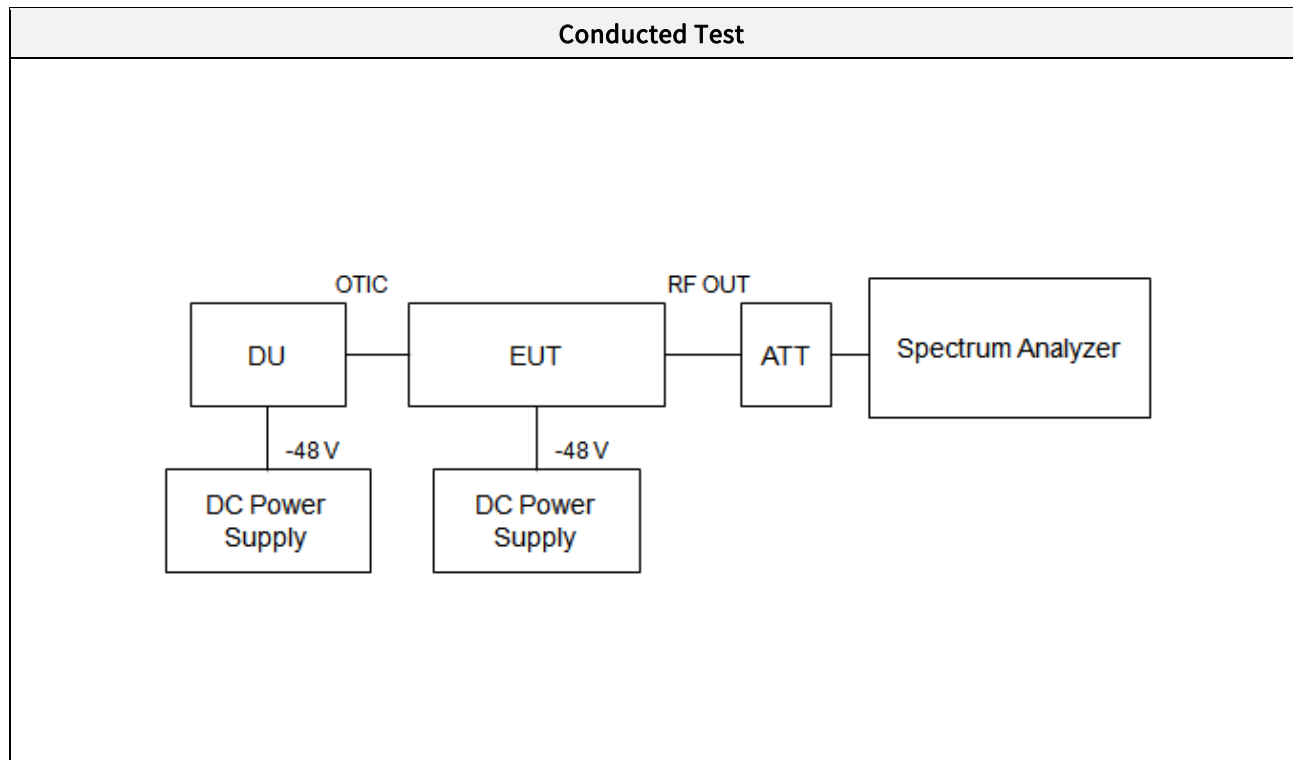
Coverage factor $k=2$, Confidence levels of 95 %

Description	Condition	Uncertainty
RF Output Power	-	± 0.72 dB
Occupied Bandwidth	$OBW \leq 20$ MHz	± 52 kHz
Unwanted Conducted Emissions	-	± 1.08 dB
Radiated Emissions	$f \leq 1$ GHz	± 4.80 dB
	$f > 1$ GHz	± 6.07 dB
Frequency Stability	-	$\pm 1.22 \times 10^{-6}$

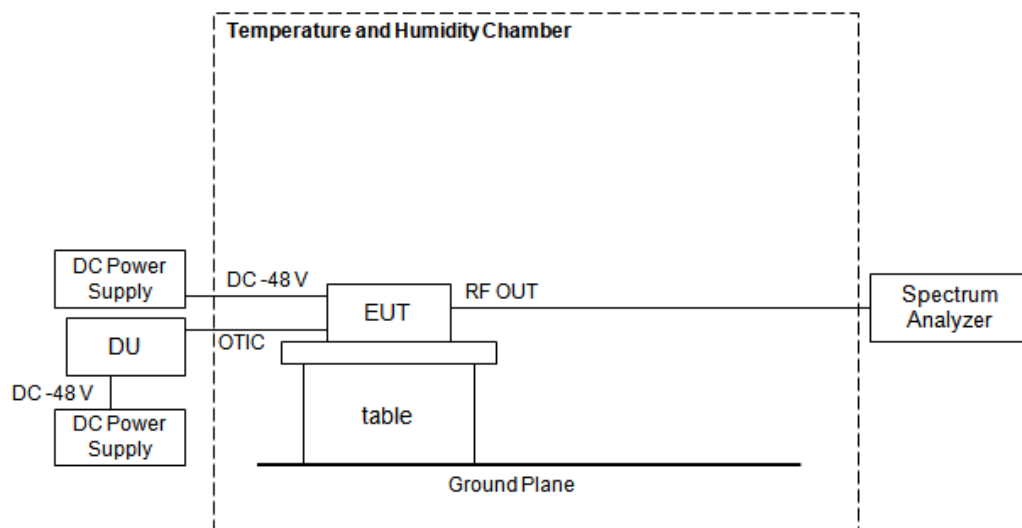
3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+15 °C to +35 °C
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

3.5. TEST DIAGRAMS



Frequency Stability



4. TEST EQUIPMENTS

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Agilent	N9020A / MXA Signal Analyzer	08/21/2019	Annual	MY46471250
Keysight	N9030B / PXA Signal Analyzer	03/27/2019	Annual	MY55480167
Weinschel	67-30-33 / Fixed Attenuator	02/11/2019	Annual	BU5347
Weinschel	67-30-33 / Fixed Attenuator	02/20/2019	Annual	CC7265
Weinschel	WA67-30-33 / Fixed Attenuator	08/28/2019	Annual	WA67-30-33-2
Weinschel	WA67-30-33 / Fixed Attenuator	08/28/2019	Annual	WA67-30-33-4
KIKUSUI	PWR800L / DC Power Supply	02/28/2019	Annual	RE001149
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	12/16/2019	Annual	NY-2009012201A
KEITHLEY	S46 / Switch	N/A	N/A	1088024
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Emco	2090 / Controller	N/A	N/A	060520
Ets	- / Turn Table	N/A	N/A	N/A
Rohde&Schwarz	- / Loop Antenna	04/26/2019	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	9120D-1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	01/28/2019	Biennial	BBHA9170124
Rohde&Schwarz	FSP / Spectrum Analyzer	09/11/2019	Annual	836650/016
Wainwright Instruments	WHKX10-900-1000-15000-40SS / High Pass Filter	07/15/2019	Annual	5
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	07/22/2019	Annual	3
CERNEX	CBLU1183540 / Power Amplifier	07/01/2019	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/01/2019	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	12/26/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/18/2019	Annual	25956

5. TEST RESULT

5.1. RF OUTPUT POWER

Test Requirements:

§ 2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 22.913 Effective radiated power limits.

Licensees in the Cellular Radiotelephone Service are subject to the effective radiated power (ERP) limits and other requirements in this Section. *See also* § 22.169.

(a) *Maximum ERP.* The ERP of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(1) Except as described in paragraphs (a)(2), (3), and (4) of this section, the ERP of base stations and repeaters must not exceed—

- (i) 500 watts per emission; or
- (ii) 400 watts/MHz (PSD) per sector.

(2) Except as described in paragraphs (a)(3) and (4) of this section, for systems operating in areas more than 72 kilometers (45 miles) from international borders that:

- (i) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or
- (ii) Extend coverage into Unserved Area on a secondary basis (*see* § 22.949), the ERP of base transmitters and repeaters must not exceed—

(A) 1000 watts per emission; or

(B) 800 watts/MHz (PSD) per sector.

(3) Provided that they also comply with paragraphs (b) and (c) of this section, licensees are permitted to operate their base transmitters and repeaters with an ERP greater than 400 watts/MHz (PSD) per sector, up to a maximum ERP of 1000 watts/MHz (PSD) per sector unless they meet the conditions in paragraph (a)(4) of this section.

(4) Provided that they also comply with paragraphs (b) and (c) of this section, licensees of systems operating in areas more than 72 kilometers (45 miles) from international borders that:

(i) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or

(ii) Extend coverage into Unserved Area on a secondary basis (*see* § 22.949), are permitted to operate base transmitters and repeaters with an ERP greater than 800 watts/MHz (PSD) per sector, up to a maximum of 2000 watts/MHz (PSD) per sector.

(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

(d) *Power measurement.* Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

§ 27.50 Power limits and duty cycle.

(b) The following power and antenna height limits apply to transmitters operating in the 746-758 MHz, 775-788 MHz and 805-806 MHz bands:

(1) Fixed and base stations transmitting a signal in the 757-758 and 775-776 MHz bands must not exceed an effective radiated power (ERP) of 1000 watts and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section.

(2) Fixed and base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth of 1 MHz or less must not exceed an ERP of 1000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section.

(3) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth of 1 MHz or less must not exceed an ERP of 2000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts ERP in accordance with Table 2 of this section.

(4) Fixed and base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section.

(5) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section.

Test Procedures:

The measurement is performed in accordance with Section 5.2.4.4.1 of ANSI C63.26.

- a) Set span to $2 \times$ to $3 \times$ the OBW.
- b) Set RBW = 1 % to 5 % of the OBW.
- c) Set VBW $\geq 3 \times$ RBW.
- d) Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
- e) Sweep time:
 - 1) Set = auto-couple, or
 - 2) Set $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ for single sweep (automation-compatible) measurement.
- f) Detector = power averaging (rms).
- g) If the EUT can be configured to transmit continuously, then set the trigger to free run.
- h) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
- i) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.
- j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

Note:

- 1) The conducted emission level is measured at each antenna port and then summed mathematically to determine the total emission level from the device.
- 2) Maximum ERP is sufficient level to pass the limit.
- 3) Sum data is in a tolerance of specification provided from manufacturer.

LTE

RF Output power tolerance: ± 1 dB (each port)

Maximum output power for one port: 45.71 W ($45.60 \text{ dBm} + 1 \text{ dB} = 46.60 \text{ dBm}$)

*Maximum output sum power: $45.71 \text{ W} * 4 = 182.84 \text{ W}$*

Measured sum maximum power: 136.75 W

NB-IoT

RF Output power tolerance: ± 1 dB (each port)

Maximum output power for one port: 11.94 W ($39.49 \text{ dBm} + 1 \text{ dB} = 40.49 \text{ dBm}$)

*Maximum output sum power: $11.94 \text{ W} * 4 = 47.76 \text{ W}$*

Measured sum maximum power: 35.53 W

The measured value is lower than the specification value.

Note:

The results of the RF output power test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:
Tabular Data of RF output power
LTE Band 13 10 MHz 1 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Middle	751.00	46.39	43.58
	16QAM	Middle	751.00	46.28	42.48
	64QAM	Middle	751.00	46.33	42.94
	256QAM	Middle	751.00	46.35	43.15
1	QPSK	Middle	751.00	46.79	47.74
	16QAM	Middle	751.00	47.02	50.35
	64QAM	Middle	751.00	46.94	49.40
	256QAM	Middle	751.00	46.91	49.08
2	QPSK	Middle	751.00	44.87	30.73
	16QAM	Middle	751.00	44.94	31.22
	64QAM	Middle	751.00	44.91	31.00
	256QAM	Middle	751.00	44.81	30.29
3	QPSK	Middle	751.00	44.07	25.52
	16QAM	Middle	751.00	44.07	25.55
	64QAM	Middle	751.00	43.98	24.99
	256QAM	Middle	751.00	43.92	24.66

Sum data of all port (60 W / parth x 2 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
751	91.32	92.83	92.34	92.23

Sum data of all port (40 W / parth x 4 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
751	112.49	113.54	111.96	109.90

LTE Band 5 5 MHz 1 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	PSD (dBm/MHz)	PAPR (dB)
0	QPSK	Low	871.50	45.53	35.69	40.13	8.22
		Middle	881.50	45.34	34.24	39.81	8.09
		High	891.50	45.56	35.95	40.16	8.14
	16QAM	Low	871.50	45.43	34.94	40.28	8.10
		Middle	881.50	45.30	33.90	40.46	8.04
		High	891.50	45.28	33.75	40.17	8.00
	64QAM	Low	871.50	45.53	35.70	40.05	8.03
		Middle	881.50	45.45	35.08	39.85	7.89
		High	891.50	45.41	34.72	40.23	8.07
	256QAM	Low	871.50	45.54	35.78	40.12	7.97
		Middle	881.50	45.39	34.57	39.82	8.15
		High	891.50	45.43	34.94	39.88	8.11
1	QPSK	Low	871.50	45.73	37.43	40.55	8.38
		Middle	881.50	45.70	37.15	40.09	8.08
		High	891.50	45.64	36.62	40.15	8.64
	16QAM	Low	871.50	45.76	37.66	40.92	8.00
		Middle	881.50	45.72	37.34	40.35	8.57
		High	891.50	45.77	37.74	40.65	7.94
	64QAM	Low	871.50	45.89	38.79	40.51	7.99
		Middle	881.50	45.66	36.84	40.10	8.22
		High	891.50	45.73	37.42	40.15	8.13
	256QAM	Low	871.50	45.79	37.95	40.27	8.09
		Middle	881.50	45.62	36.47	40.18	8.13
		High	891.50	45.67	36.88	40.34	8.17
2	QPSK	Low	871.50	41.42	13.85	35.99	8.33
		Middle	881.50	41.31	13.51	35.83	8.38
		High	891.50	41.22	13.24	35.97	8.69
	16QAM	Low	871.50	41.16	13.07	36.32	8.18
		Middle	881.50	41.57	14.34	36.36	8.56
		High	891.50	41.34	13.62	36.24	8.40
	64QAM	Low	871.50	41.42	13.88	36.01	8.03
		Middle	881.50	41.47	14.02	36.12	8.23
		High	891.50	41.34	13.61	36.00	8.63
	256QAM	Low	871.50	41.39	13.77	36.21	8.61
		Middle	881.50	41.50	14.12	36.20	8.63
		High	891.50	41.38	13.74	36.14	8.35
3	QPSK	Low	871.50	41.69	14.77	36.51	8.46

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	PSD (dBm/MHz)	PAPR (dB)
		Middle	881.50	41.68	14.72	36.12	8.32
		High	891.50	41.55	14.28	36.22	8.44
	16QAM	Low	871.50	41.83	15.24	36.74	8.71
		Middle	881.50	41.56	14.34	36.45	8.54
		High	891.50	41.78	15.08	36.61	8.59
	64QAM	Low	871.50	41.74	14.94	36.24	8.47
		Middle	881.50	41.73	14.88	36.24	8.51
		High	891.50	41.77	15.02	36.22	8.66
	256QAM	Low	871.50	41.68	14.73	36.36	8.30
		Middle	881.50	41.59	14.41	36.05	8.64
		High	891.50	41.64	14.59	36.10	8.97

Sum data of all port (60 W / parth x 2 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
871.5	73.12	72.60	74.49	73.73
881.5	71.39	71.24	71.92	71.04
891.5	72.57	71.49	72.14	71.82

Sum data of all port (40 W / parth x 4 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
871.5	57.25	56.62	57.64	57.00
881.5	56.47	57.36	57.80	57.06
891.5	55.05	57.41	57.25	56.67

LTE Band 5 10 MHz 1 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	PSD (dBm/MHz)	PAPR (dB)
0	QPSK	Low	874.00	47.16	51.96	38.73	8.39
		Middle	881.50	47.19	52.35	38.66	8.06
		High	889.00	47.14	51.81	38.77	8.20
	16QAM	Low	874.00	47.27	53.35	38.96	8.08
		Middle	881.50	47.27	53.30	39.08	7.86
		High	889.00	47.10	51.32	39.01	7.89
	64QAM	Low	874.00	47.29	53.55	38.77	7.97
		Middle	881.50	47.30	53.74	38.77	7.98
		High	889.00	47.22	52.75	38.64	7.95
	256QAM	Low	874.00	47.23	52.83	38.77	8.06
		Middle	881.50	47.22	52.78	38.79	8.05
		High	889.00	47.12	51.51	38.80	8.02
1	QPSK	Low	874.00	47.56	57.03	38.98	8.10
		Middle	881.50	47.56	57.07	39.11	8.66
		High	889.00	47.56	56.96	39.18	8.10
	16QAM	Low	874.00	47.55	56.83	39.58	7.89
		Middle	881.50	47.55	56.82	39.32	7.97
		High	889.00	47.47	55.82	39.21	8.11
	64QAM	Low	874.00	47.60	57.60	39.21	8.00
		Middle	881.50	47.60	57.54	39.31	8.00
		High	889.00	47.57	57.10	39.22	8.05
	256QAM	Low	874.00	47.58	57.28	39.09	8.12
		Middle	881.50	47.50	56.26	39.13	8.15
		High	889.00	47.51	56.35	39.17	8.11
2	QPSK	Low	874.00	44.38	27.43	36.20	8.20
		Middle	881.50	44.22	26.40	35.92	8.23
		High	889.00	44.22	26.44	35.71	8.08
	16QAM	Low	874.00	44.35	27.23	36.21	8.20
		Middle	881.50	44.30	26.92	35.93	8.34
		High	889.00	44.31	26.99	36.18	8.34
	64QAM	Low	874.00	44.36	27.31	36.12	8.33
		Middle	881.50	44.33	27.09	35.77	8.35
		High	889.00	44.36	27.30	35.78	8.34
	256QAM	Low	874.00	44.40	27.52	36.00	8.17

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	PSD (dBm/MHz)	PAPR (dB)
3		Middle	881.50	44.22	26.45	35.79	8.16
		High	889.00	44.30	26.89	35.87	8.19
		Low	874.00	44.69	29.46	36.31	8.50
	QPSK	Middle	881.50	44.63	29.03	36.30	8.40
		High	889.00	44.66	29.25	36.14	8.46
		Low	874.00	44.77	30.03	36.62	8.56
	16QAM	Middle	881.50	44.68	29.36	36.41	8.51
		High	889.00	44.77	29.96	36.47	8.35
		Low	874.00	44.81	30.26	36.15	8.26
	64QAM	Middle	881.50	44.71	29.56	36.21	8.48
		High	889.00	44.81	30.29	36.26	8.43
		Low	874.00	44.64	29.13	36.19	8.66
	256QAM	Middle	881.50	44.71	29.61	36.29	8.43
		High	889.00	44.72	29.63	36.49	8.16
		Low	874.00	44.69	29.46	36.31	8.50

Sum data of all port (60 W / parth x 2 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
871.5	108.99	110.18	111.15	110.11
881.5	109.42	110.12	111.28	109.04
891.5	108.77	107.14	109.84	107.86

Sum data of all port (40 W / parth x 4 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
871.5	113.77	114.51	115.15	113.31
881.5	110.85	112.54	113.30	112.14
891.5	111.37	113.89	115.17	113.05

LTE Band 5 5 MHz + 5 MHz 2 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	PSD (dBm/MHz)	PAPR (dB)
0	QPSK	Continuous	881.50	47.74	59.44	8.41	8.02
		Discontinuous	881.50	47.70	58.84	7.98	8.00
	16QAM	Continuous	881.50	47.70	58.95	8.43	8.02
		Discontinuous	881.50	47.71	58.97	8.59	7.98
	64QAM	Continuous	881.50	47.68	58.57	8.36	8.03
		Discontinuous	881.50	47.70	58.83	8.16	7.93
	256QAM	Continuous	881.50	47.67	58.45	8.14	8.02
		Discontinuous	881.50	47.65	58.21	8.19	7.84
1	QPSK	Continuous	881.50	47.47	55.80	7.88	8.12
		Discontinuous	881.50	47.57	57.16	8.00	8.46
	16QAM	Continuous	881.50	47.46	55.65	8.59	8.06
		Discontinuous	881.50	47.62	57.81	8.68	7.95
	64QAM	Continuous	881.50	47.52	56.56	7.97	8.12
		Discontinuous	881.50	47.63	57.89	8.18	7.95
	256QAM	Continuous	881.50	47.56	57.00	8.27	8.18
		Discontinuous	881.50	47.50	56.25	8.26	7.95
2	QPSK	Continuous	881.50	45.45	35.06	6.17	8.37
		Discontinuous	881.50	45.50	35.49	6.02	8.50
	16QAM	Continuous	881.50	45.57	36.02	6.36	8.39
		Discontinuous	881.50	45.60	36.28	6.23	8.54
	64QAM	Continuous	881.50	45.56	35.99	6.02	8.46
		Discontinuous	881.50	45.58	36.13	6.16	8.35
	256QAM	Continuous	881.50	45.50	35.51	5.96	8.42
		Discontinuous	881.50	45.50	35.52	6.06	8.21
3	QPSK	Continuous	881.50	44.99	31.57	5.79	8.37
		Discontinuous	881.50	44.95	31.28	5.52	8.46
	16QAM	Continuous	881.50	45.02	31.79	6.07	8.37
		Discontinuous	881.50	45.06	32.08	5.89	8.34
	64QAM	Continuous	881.50	44.92	31.08	5.61	8.41
		Discontinuous	881.50	45.08	32.24	5.69	8.44
	256QAM	Continuous	881.50	45.02	31.79	5.60	8.35
		Discontinuous	881.50	45.14	32.69	5.69	8.24

Sum data of all port (60 W / parth x 2 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
Continuous	115.24	114.61	115.13	115.46
Discontinuous	116.00	116.78	116.72	114.46

Sum data of all port (40 W / parth x 4 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
Continuous	133.26	135.63	134.15	134.59
Discontinuous	133.54	136.72	136.75	136.42

LTE Band 5 10 MHz + 10 MHz 2 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	PSD (dBm/MHz)	PAPR (dB)
0	QPSK	Continuous	881.50	46.53	45.01	36.08	8.00
		Discontinuous	881.50	46.29	42.55	36.13	8.04
	16QAM	Continuous	881.50	46.41	43.80	36.57	8.03
		Discontinuous	881.50	46.31	42.71	36.38	7.97
	64QAM	Continuous	881.50	46.43	43.93	36.34	7.93
		Discontinuous	881.50	46.33	42.94	36.11	7.99
	256QAM	Continuous	881.50	46.35	43.11	36.22	8.01
		Discontinuous	881.50	46.34	43.08	36.18	8.04
1	QPSK	Continuous	881.50	46.66	46.30	36.69	8.27
		Discontinuous	881.50	46.64	46.15	36.66	8.08
	16QAM	Continuous	881.50	46.69	46.69	36.76	8.05
		Discontinuous	881.50	46.62	45.91	36.65	8.01
	64QAM	Continuous	881.50	46.72	46.96	36.53	8.03
		Discontinuous	881.50	46.64	46.17	36.46	8.03
	256QAM	Continuous	881.50	46.72	46.99	36.55	8.07
		Discontinuous	881.50	46.63	45.98	36.44	8.07
2	QPSK	Continuous	881.50	44.68	29.36	34.57	8.01
		Discontinuous	881.50	44.36	27.31	34.16	8.27
	16QAM	Continuous	881.50	44.72	29.68	34.83	7.99
		Discontinuous	881.50	44.46	27.94	34.63	8.01
	64QAM	Continuous	881.50	44.70	29.55	34.53	8.03
		Discontinuous	881.50	44.50	28.16	34.37	8.01
	256QAM	Continuous	881.50	44.59	28.79	34.31	8.04
		Discontinuous	881.50	44.48	28.06	34.30	8.08
3	QPSK	Continuous	881.50	44.52	28.32	34.34	8.06
		Discontinuous	881.50	44.55	28.48	34.38	8.02
	16QAM	Continuous	881.50	44.55	28.48	34.63	8.04
		Discontinuous	881.50	44.58	28.71	34.77	8.03
	64QAM	Continuous	881.50	44.55	28.51	34.39	8.06
		Discontinuous	881.50	44.63	29.07	34.62	8.04
	256QAM	Continuous	881.50	44.45	27.84	34.23	8.01
		Discontinuous	881.50	44.59	28.77	34.77	8.03

Sum data of all port (60 W / parth x 2 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
Continuous	91.31	90.49	90.89	90.10
Discontinuous	88.70	88.62	89.12	89.07

Sum data of all port (40 W / parth x 4 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
Continuous	115.35	116.31	116.11	113.26
Discontinuous	111.59	113.31	114.48	113.66

LTE Band 5 10 MHz + 5 MHz + 10 MHz 3 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	PSD (dBm/MHz)	PAPR (dB)
0	QPSK	Middle	881.50	46.40	43.63	35.14	7.98
	16QAM	Middle	881.50	46.46	44.22	35.52	8.06
	64QAM	Middle	881.50	46.36	43.24	35.13	8.06
	256QAM	Middle	881.50	46.29	42.55	35.23	8.08
1	QPSK	Middle	881.50	46.61	45.85	35.63	8.18
	16QAM	Middle	881.50	46.66	46.30	35.76	8.01
	64QAM	Middle	881.50	46.59	45.57	35.74	8.03
	256QAM	Middle	881.50	46.59	45.64	36.09	8.02
2	QPSK	Middle	881.50	44.49	28.14	33.59	8.03
	16QAM	Middle	881.50	44.50	28.19	33.76	8.04
	64QAM	Middle	881.50	44.52	28.31	33.51	7.97
	256QAM	Middle	881.50	44.46	27.89	33.40	8.02
3	QPSK	Middle	881.50	44.75	29.86	33.59	8.04
	16QAM	Middle	881.50	44.76	29.90	33.91	8.04
	64QAM	Middle	881.50	44.78	30.07	33.74	8.08
	256QAM	Middle	881.50	44.58	28.71	33.83	7.95

Sum data of all port (60 W / parth x 2 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
751	89.48	90.52	88.81	88.19

Sum data of all port (40 W / parth x 4 Paths)

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
751	116.00	116.17	116.78	113.22

2 Paths 8.3W_NB-IoT_1 Carrier

Port Number	Mod.	Frequency (MHz)	Measured Value	
			(dBm)	W
0	QPSK	746.20	38.49	7.057
		755.80	38.53	7.120
1		746.20	37.39	5.476
		755.80	37.61	5.766
Frequency (MHz)		Sum Output Power		
		(dBm)	W	
746.20		40.97	12.496	
755.80		41.09	12.860	

2 Paths 8.3W_NB-IoT_2 Carrier

Port Number	Mod.	Frequency (MHz)	Measured Value		Sum Output Power	
			(dBm)	W	(dBm)	W
0	QPSK	746.20	40.84	12.134	44.18	26.19
		755.80				
1		746.20	41.49	14.086		
		755.80				

4 Paths 5.5W_NB-IoT_1 Carrier

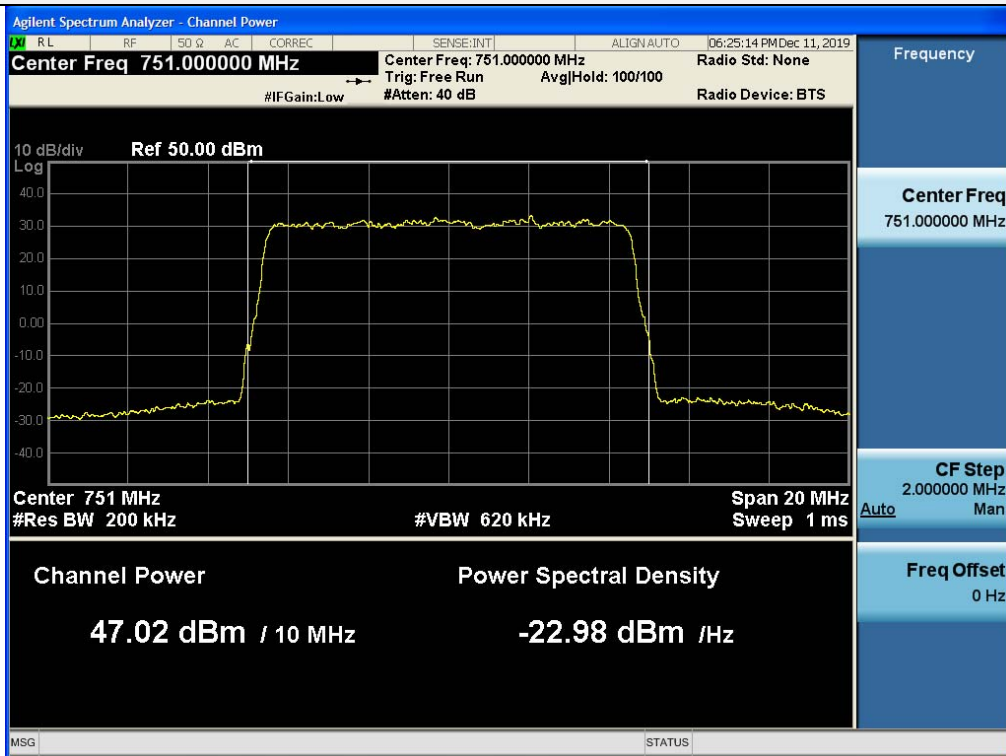
Port Number	Mod.	Frequency (MHz)	Measured Value	
			(dBm)	(W)
0	QPSK	746.20	36.93	4.929
		755.80	37.03	5.050
1		746.20	36.89	4.882
		755.80	36.90	4.898
2		746.20	36.50	4.466
		755.80	36.55	4.513
3		746.20	36.88	4.872
		755.80	36.56	4.531
Frequency (MHz)		Sum Output Power		
		(dBm)	W	
746.20		42.82	19.149	
755.80		42.79	18.992	

4 Paths 5.5W_NB-IoT_2 Carrier

Port Number	Mod.	Frequency (MHz)	Measured Value		Sum Output Power	
			(dBm)	W	(dBm)	W
0	QPSK	746.20	39.11	8.147	45.51	35.531
		755.80				
746.20		39.85	9.661			
755.80						
746.20		39.46	8.831			
755.80						
746.20		39.49	8.892			
755.80						

Plot Data for LTE Band 13 10 MHz 1 Carrier

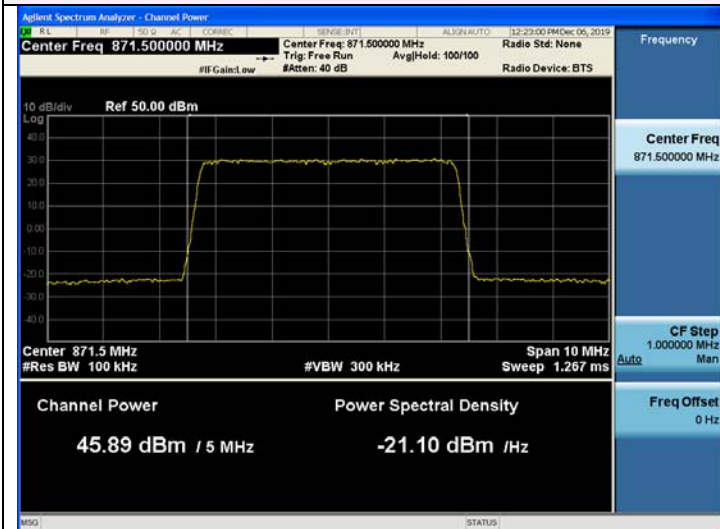
Port 1 16QAM Middle Channel



Plot Data for LTE Band 5 5 MHz 1 Carrier

Port 1 64QAM

Low Channel



Middle Channel



High Channel



Plot Data for LTE Band 5 10 MHz 1 Carrier

Port 1 64QAM

Low Channel



Middle Channel



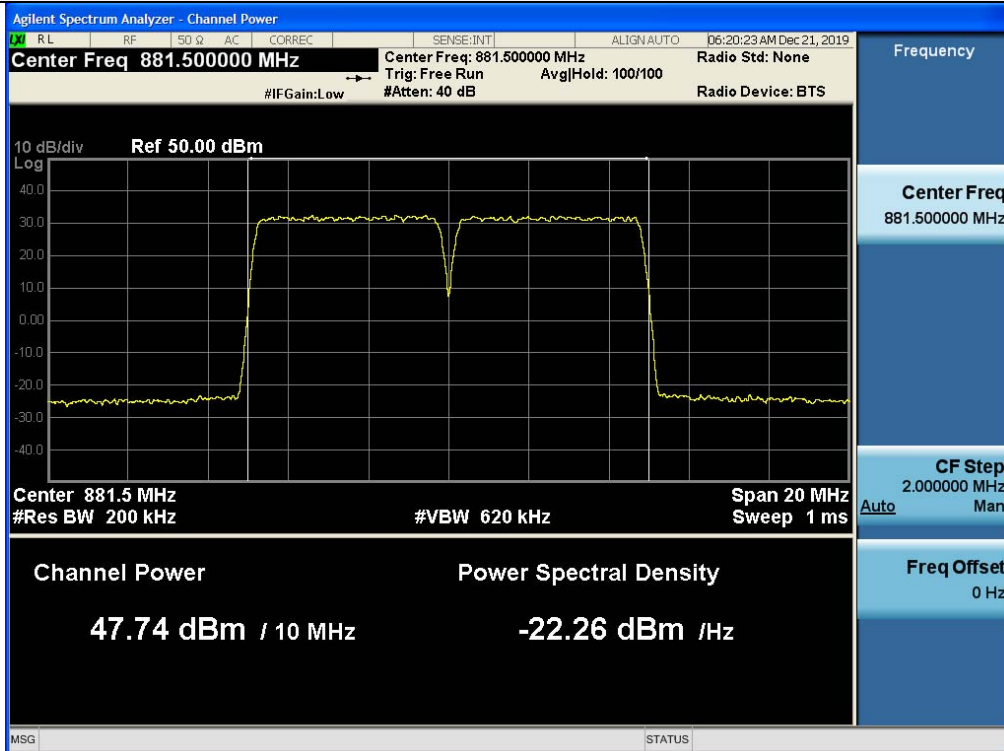
High Channel



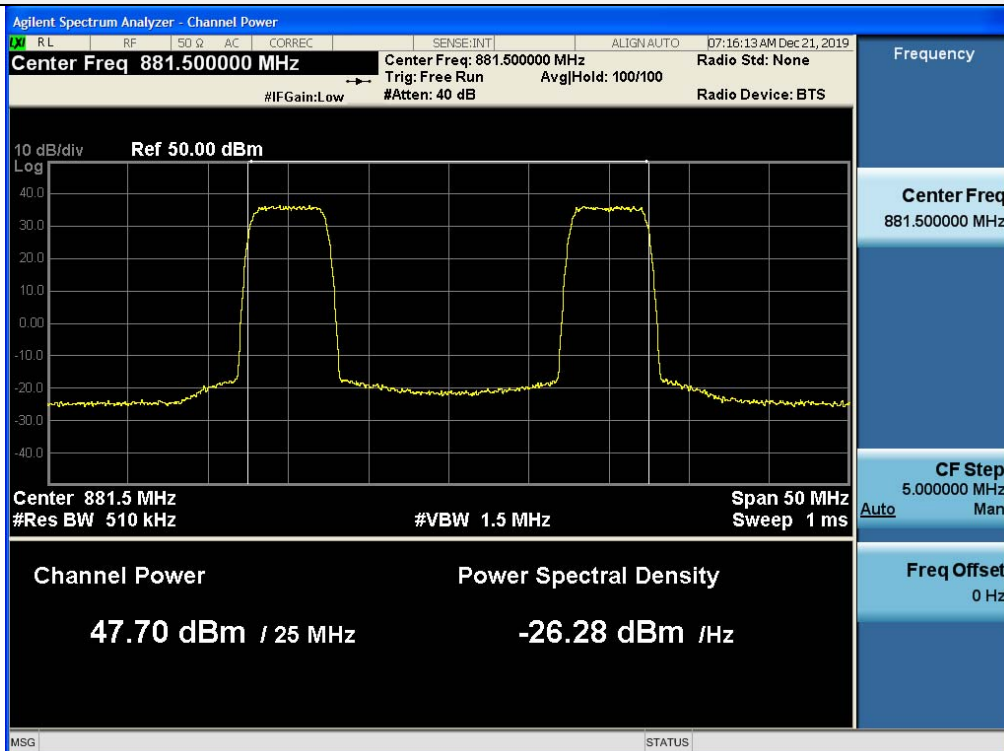
Plot Data for LTE Band 5 5 MHz + 5 MHz 2 Carrier

Port 0 QPSK

Continuous



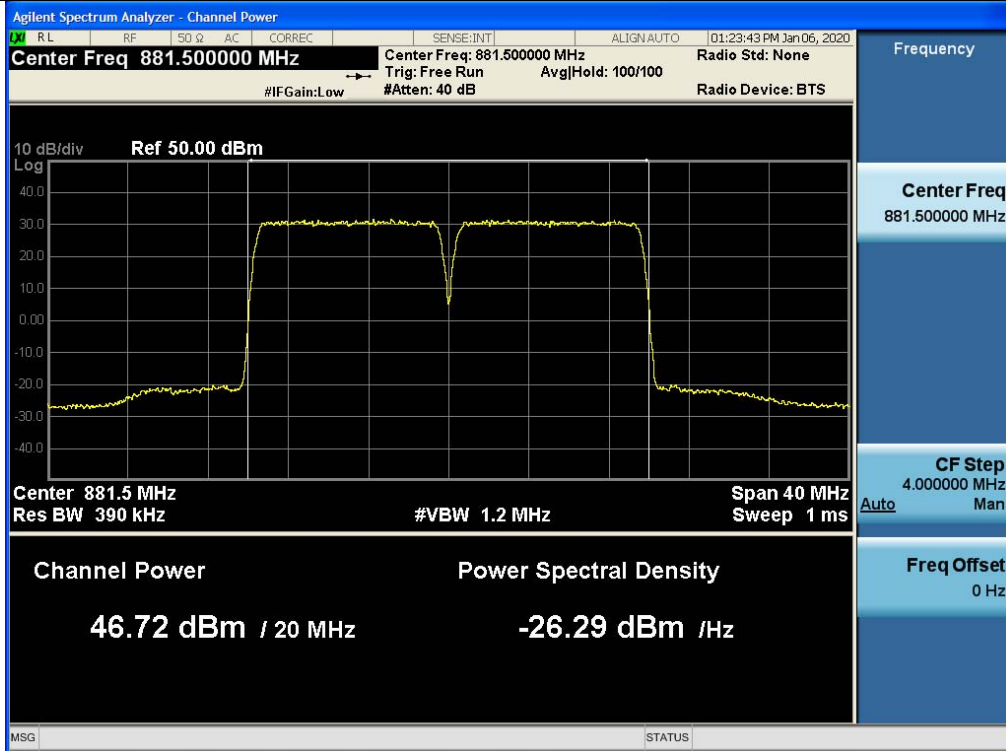
Discontinuous



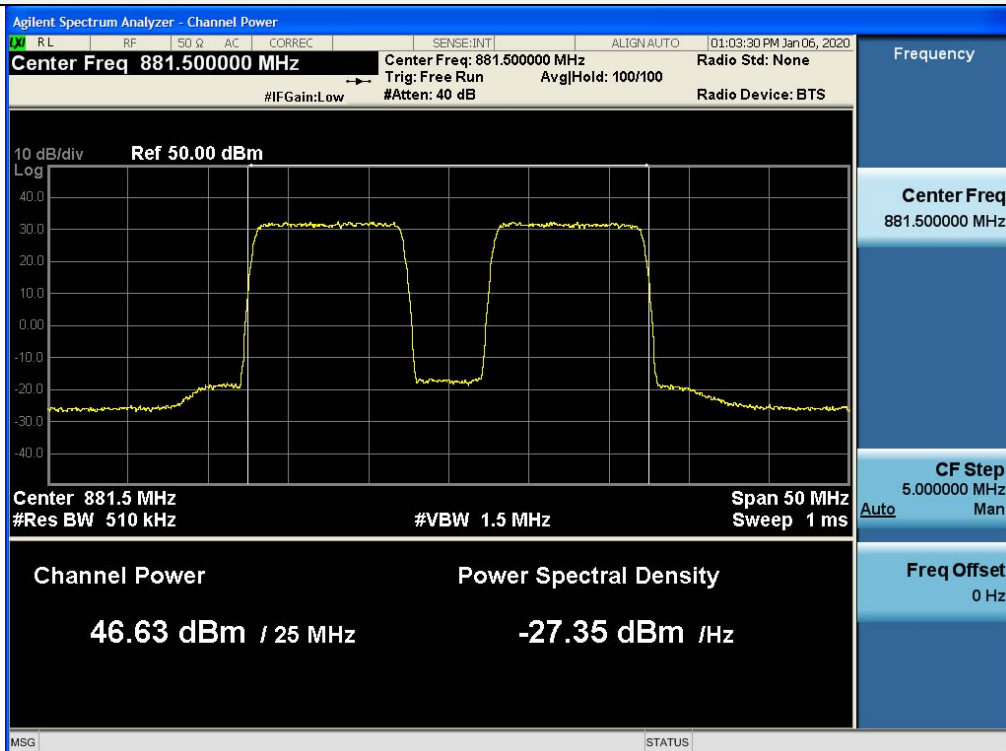
Plot Data for LTE Band 5 10 MHz + 10 MHz 2 Carrier

Port 1 256QAM

Continuous

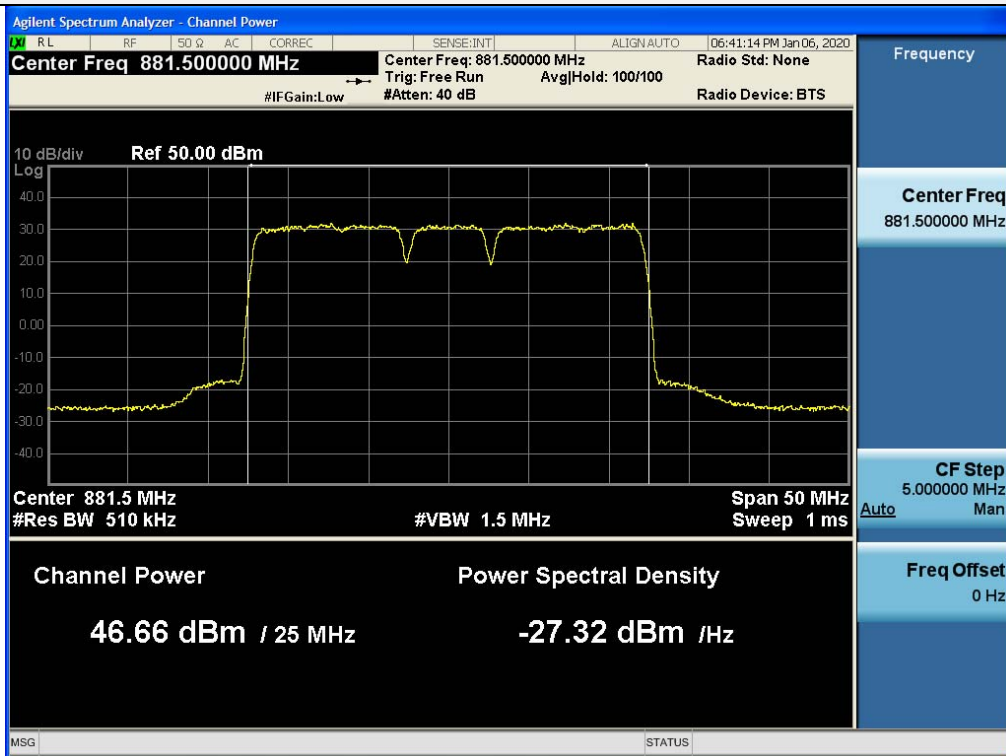


Discontinuous

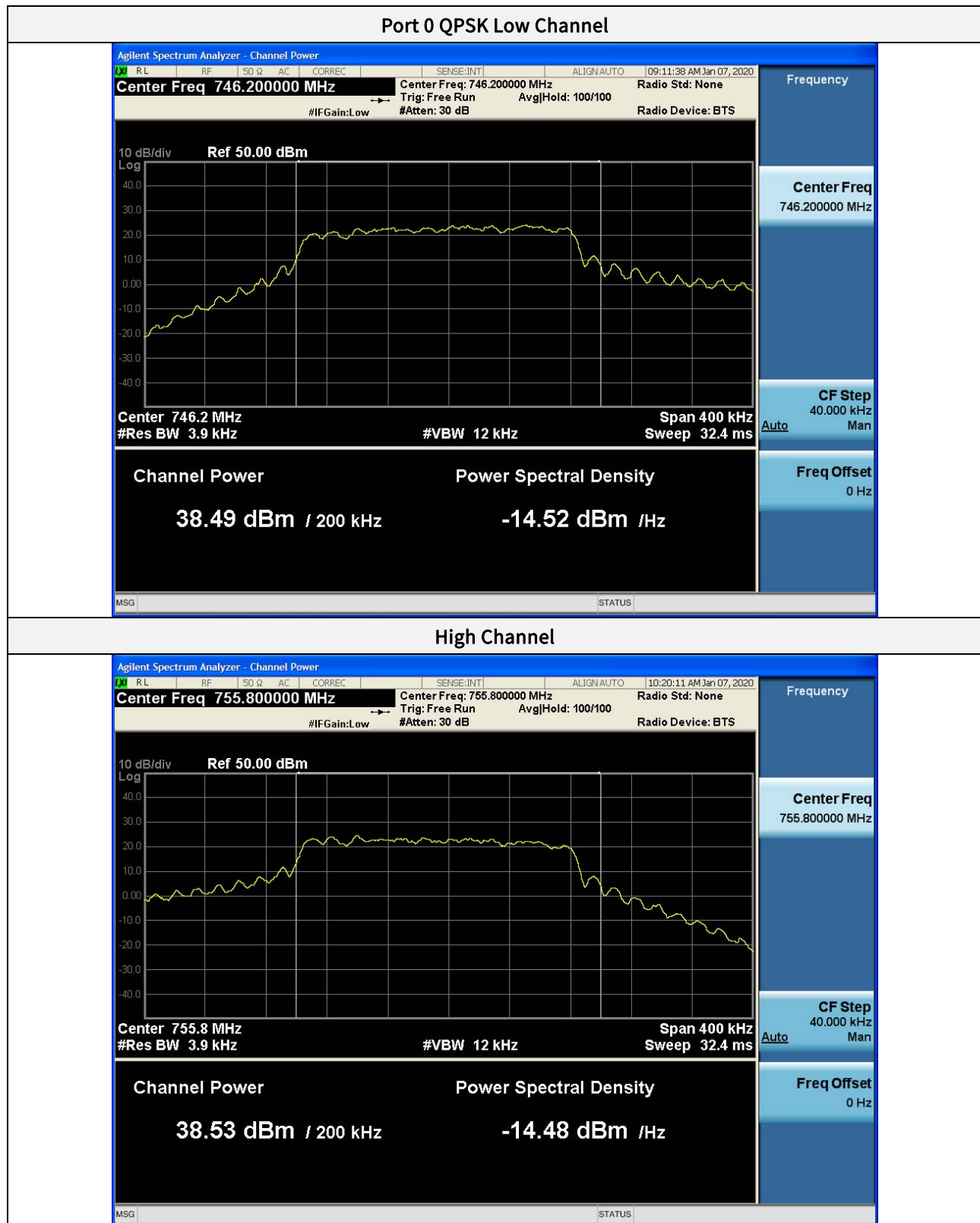


Plot Data for LTE Band 5 10 MHz + 5 MHz + 10 MHz 3 Carrier

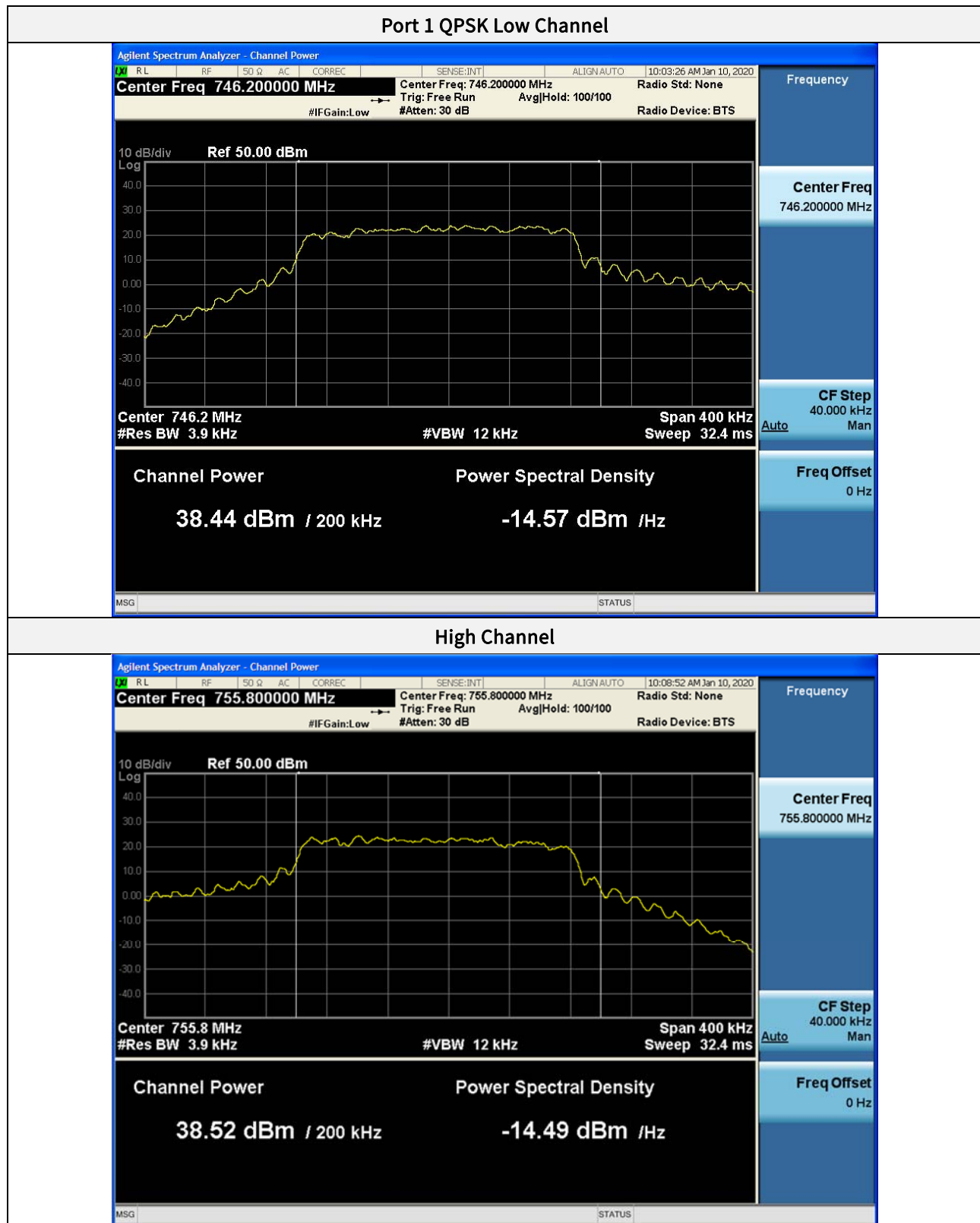
Port 1 16QAM Middle Channel



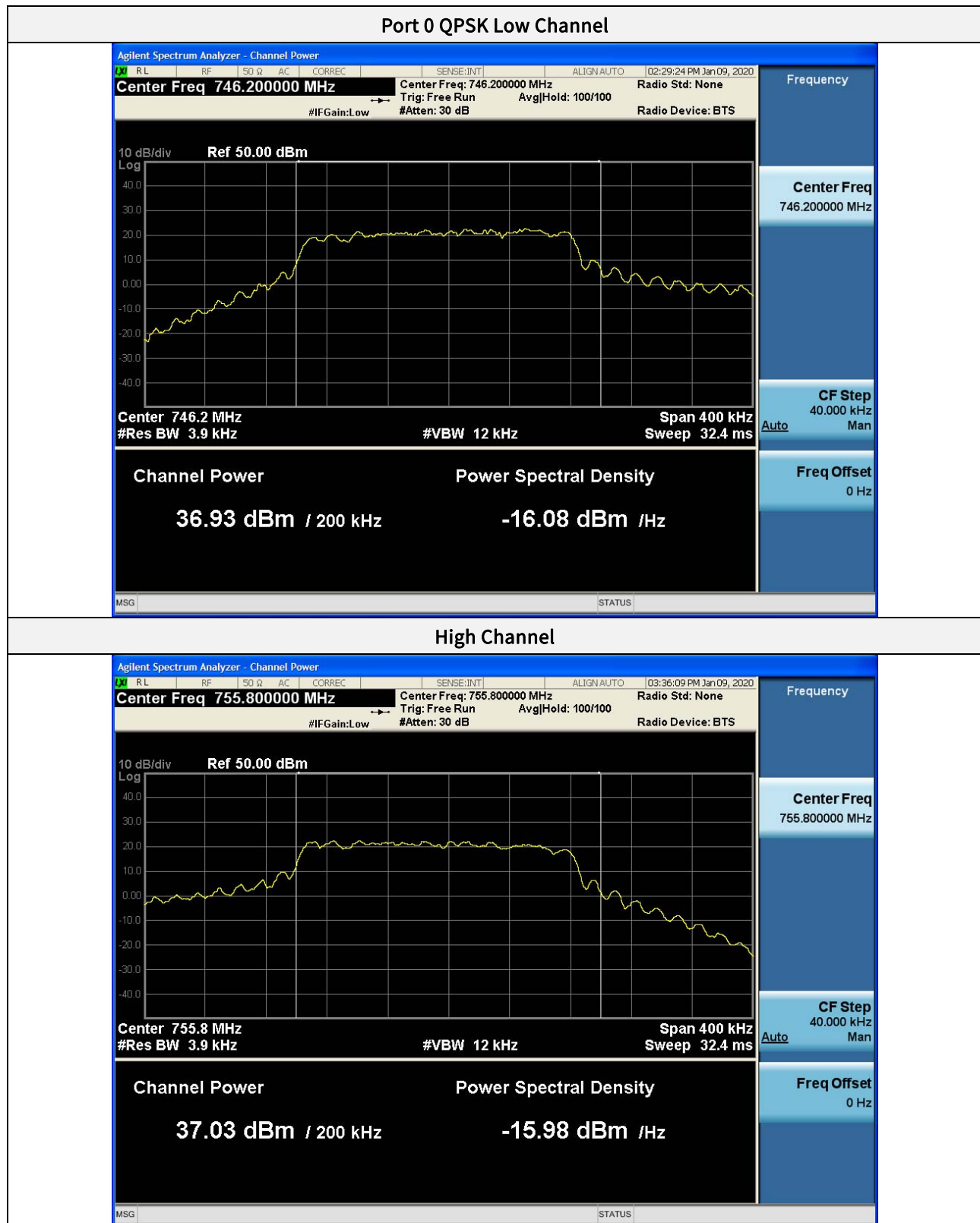
Plot Data for 2 Paths 8.3W_NB-IoT_1 Carrier



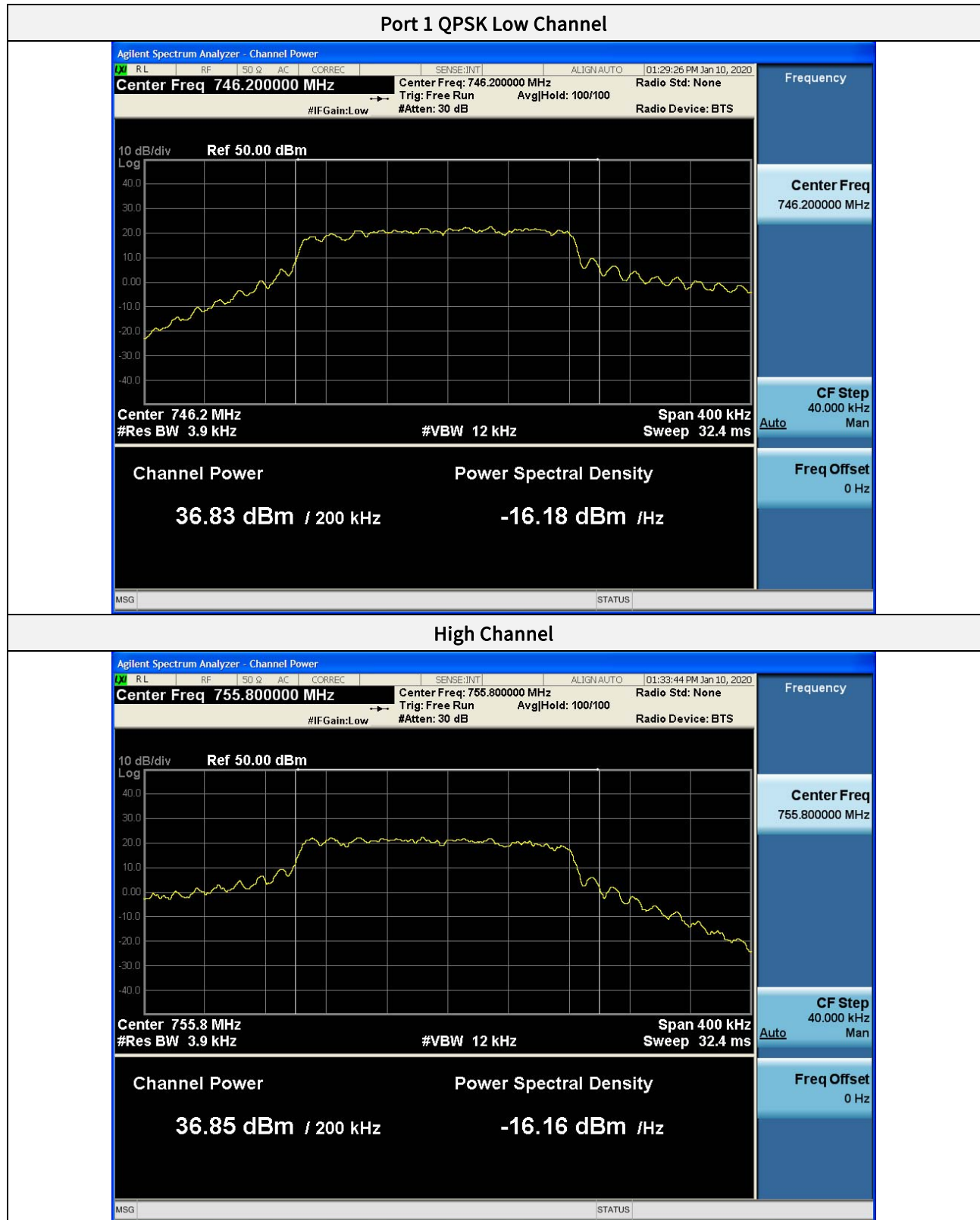
Plot Data for 2 Paths 8.3W_NB-IoT_2 Carrier



Plot Data for 4 Paths 5.5W_NB-IoT_1 Carrier



Plot Data for 4 Paths 5.5W_NB-IoT_2 Carrier



5.2. OCCUPIED BANDWIDTH

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

The measurement is performed in accordance with Section 5.4.3 and 5.4.4 of ANSI C63.26.

5.4.3 Occupied bandwidth—Relative measurement procedure

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times$ RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

- d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “–X dB” requirement, i.e., if the requirement calls for measuring the –26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f) Determine the reference value by either of the following:
 - 1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the Highest level of the displayed trace (this is the reference value).
 - 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- g) Determine the “–X dB amplitude” as equal to (Reference Value – X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).
- i) Place two markers, one at the lowest and the other at the Highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB amplitude” determined in step f). If a marker is below this “–X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the “–X dB amplitude” at multiple points. The lowest or Highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the “–X dB amplitude.”

j) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

5.4.4 Occupied bandwidth—Power bandwidth (99%) measurement procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Note:

The results of the Occupied Bandwidth test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:
Tabular Data of Occupied Bandwidth
LTE Band 13 10 MHz 1 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Middle	751.00	9.009
	16QAM	Middle	751.00	9.020
	64QAM	Middle	751.00	9.004
	256QAM	Middle	751.00	9.019
1	QPSK	Middle	751.00	9.024
	16QAM	Middle	751.00	9.023
	64QAM	Middle	751.00	9.000
	256QAM	Middle	751.00	9.011
2	QPSK	Middle	751.00	9.015
	16QAM	Middle	751.00	9.046
	64QAM	Middle	751.00	9.016
	256QAM	Middle	751.00	9.033
3	QPSK	Middle	751.00	9.002
	16QAM	Middle	751.00	9.029
	64QAM	Middle	751.00	9.038
	256QAM	Middle	751.00	9.008

LTE Band 5 5 MHz 1 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	871.50	4.500
		Middle	881.50	4.505
		High	891.50	4.504
	16QAM	Low	871.50	4.502
		Middle	881.50	4.500
		High	891.50	4.496
	64QAM	Low	871.50	4.514
		Middle	881.50	4.506
		High	891.50	4.507
	256QAM	Low	871.50	4.525
		Middle	881.50	4.523
		High	891.50	4.526
1	QPSK	Low	871.50	4.498
		Middle	881.50	4.502
		High	891.50	4.512
	16QAM	Low	871.50	4.494
		Middle	881.50	4.493
		High	891.50	4.499
	64QAM	Low	871.50	4.509
		Middle	881.50	4.514
		High	891.50	4.511
	256QAM	Low	871.50	4.524
		Middle	881.50	4.528
		High	891.50	4.524
2	QPSK	Low	871.50	4.507
		Middle	881.50	4.499
		High	891.50	4.504
	16QAM	Low	871.50	4.494
		Middle	881.50	4.512
		High	891.50	4.509
	64QAM	Low	871.50	4.514
		Middle	881.50	4.504
		High	891.50	4.521
	256QAM	Low	871.50	4.510
		Middle	881.50	4.513

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
		High	891.50	4.506
3	QPSK	Low	871.50	4.511
		Middle	881.50	4.506
		High	891.50	4.506
	16QAM	Low	871.50	4.496
		Middle	881.50	4.481
		High	891.50	4.499
	64QAM	Low	871.50	4.519
		Middle	881.50	4.501
		High	891.50	4.505
	256QAM	Low	871.50	4.523
		Middle	881.50	4.515
		High	891.50	4.516

LTE Band 5 10 MHz 1 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	874.00	8.997
		Middle	881.50	8.999
		High	889.00	9.006
	16QAM	Low	874.00	8.993
		Middle	881.50	8.992
		High	889.00	9.000
	64QAM	Low	874.00	9.012
		Middle	881.50	8.994
		High	889.00	8.988
	256QAM	Low	874.00	9.018
		Middle	881.50	9.020
		High	889.00	9.017
1	QPSK	Low	874.00	8.979
		Middle	881.50	9.007
		High	889.00	8.981
	16QAM	Low	874.00	9.011
		Middle	881.50	9.011
		High	889.00	9.012
	64QAM	Low	874.00	8.980
		Middle	881.50	9.001
		High	889.00	8.976
	256QAM	Low	874.00	8.993
		Middle	881.50	8.992
		High	889.00	8.988
2	QPSK	Low	874.00	8.991
		Middle	881.50	8.989
		High	889.00	8.987
	16QAM	Low	874.00	9.002
		Middle	881.50	8.988
		High	889.00	9.005
	64QAM	Low	874.00	8.982
		Middle	881.50	8.983
		High	889.00	8.985
	256QAM	Low	874.00	8.992
		Middle	881.50	9.003

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
		High	889.00	8.989
3	QPSK	Low	874.00	8.998
		Middle	881.50	8.999
		High	889.00	8.976
	16QAM	Low	874.00	8.993
		Middle	881.50	8.989
		High	889.00	9.013
	64QAM	Low	874.00	8.981
		Middle	881.50	8.992
		High	889.00	8.987
	256QAM	Low	874.00	9.002
		Middle	881.50	8.983
		High	889.00	8.990

LTE Band 5 5 MHz + 5 MHz 2 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Continuous	881.50	9.466
		Discontinuous	881.50	24.678
	16QAM	Continuous	881.50	9.472
		Discontinuous	881.50	24.717
	64QAM	Continuous	881.50	9.474
		Discontinuous	881.50	24.700
	256QAM	Continuous	881.50	9.468
		Discontinuous	881.50	24.724
1	QPSK	Continuous	881.50	9.458
		Discontinuous	881.50	24.670
	16QAM	Continuous	881.50	9.479
		Discontinuous	881.50	24.735
	64QAM	Continuous	881.50	9.459
		Discontinuous	881.50	24.699
	256QAM	Continuous	881.50	9.479
		Discontinuous	881.50	24.708
2	QPSK	Continuous	881.50	9.468
		Discontinuous	881.50	24.669
	16QAM	Continuous	881.50	9.464
		Discontinuous	881.50	24.647
	64QAM	Continuous	881.50	9.453
		Discontinuous	881.50	24.700
	256QAM	Continuous	881.50	9.472
		Discontinuous	881.50	24.711
3	QPSK	Continuous	881.50	9.457
		Discontinuous	881.50	24.694
	16QAM	Continuous	881.50	9.490
		Discontinuous	881.50	24.746
	64QAM	Continuous	881.50	9.475
		Discontinuous	881.50	24.681
	256QAM	Continuous	881.50	9.467
		Discontinuous	881.50	24.680

LTE Band 5 10 MHz + 10 MHz 2 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Continuous	881.50	18.929
		Discontinuous	881.50	23.987
	16QAM	Continuous	881.50	19.019
		Discontinuous	881.50	24.030
	64QAM	Continuous	881.50	18.912
		Discontinuous	881.50	23.979
	256QAM	Continuous	881.50	18.939
		Discontinuous	881.50	24.019
1	QPSK	Continuous	881.50	18.930
		Discontinuous	881.50	23.975
	16QAM	Continuous	881.50	18.967
		Discontinuous	881.50	24.006
	64QAM	Continuous	881.50	18.929
		Discontinuous	881.50	23.985
	256QAM	Continuous	881.50	18.973
		Discontinuous	881.50	23.980
2	QPSK	Continuous	881.50	18.905
		Discontinuous	881.50	23.975
	16QAM	Continuous	881.50	18.988
		Discontinuous	881.50	24.089
	64QAM	Continuous	881.50	18.930
		Discontinuous	881.50	23.940
	256QAM	Continuous	881.50	18.947
		Discontinuous	881.50	23.997
3	QPSK	Continuous	881.50	18.938
		Discontinuous	881.50	23.976
	16QAM	Continuous	881.50	18.964
		Discontinuous	881.50	24.071
	64QAM	Continuous	881.50	18.948
		Discontinuous	881.50	23.984
	256QAM	Continuous	881.50	18.939
		Discontinuous	881.50	24.030

LTE Band 5 10 MHz + 5 MHz + 10 MHz 3 Carrier

Port Number	Mod.	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Middle	881.50	23.892
	16QAM	Middle	881.50	23.897
	64QAM	Middle	881.50	23.903
	256QAM	Middle	881.50	23.896
1	QPSK	Middle	881.50	23.894
	16QAM	Middle	881.50	23.881
	64QAM	Middle	881.50	23.892
	256QAM	Middle	881.50	23.931
2	QPSK	Middle	881.50	23.911
	16QAM	Middle	881.50	23.913
	64QAM	Middle	881.50	23.861
	256QAM	Middle	881.50	23.893
3	QPSK	Middle	881.50	23.908
	16QAM	Middle	881.50	23.873
	64QAM	Middle	881.50	23.904
	256QAM	Middle	881.50	23.883

2 Paths 8.3W_NB-IoT_1 Carrier

Port Number	Mod.	Frequency (MHz)	Occupied Bandwidth (kHz)
0	QPSK	746.20	198.91
		755.80	194.69
1		746.20	198.17
		755.80	195.51

2 Paths 8.3W_NB-IoT_2 Carrier

Port Number	Mod.	Frequency (MHz)	Occupied Bandwidth (kHz)	Sum occupied bandwidth (kHz)
0	QPSK	746.20	200.03	395.67
		755.80	195.64	
1		746.20	201.21	397.05
		755.80	195.84	

4 Paths 5.5W_NB-IoT_1 Carrier

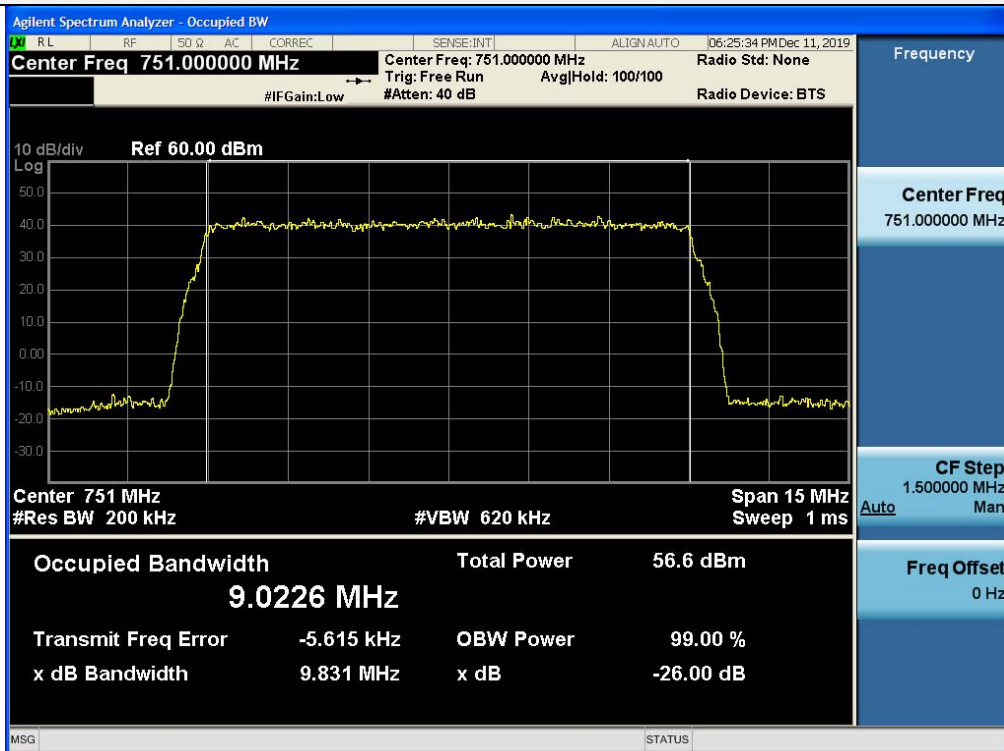
Port Number	Mod.	Frequency (MHz)	Occupied Bandwidth (kHz)
0	QPSK	746.20	197.33
		755.80	194.98
1		746.20	199.45
		755.80	195.70
3		746.20	200.19
		755.80	195.22
4		746.20	200.37
		755.80	195.34

4 Paths 5.5W_NB-IoT_2 Carrier

Port Number	Mod.	Frequency (MHz)	Occupied Bandwidth (kHz)	Sum occupied bandwidth (kHz)
0	QPSK	746.20	199.44	394.91
		755.80	195.47	
1		746.20	198.72	394.30
		755.80	195.58	
3		746.20	200.49	396.07
		755.80	195.58	
4		746.20	199.89	394.99
		755.80	195.10	

Plot Data for LTE Band 13 10 MHz 1 Carrier

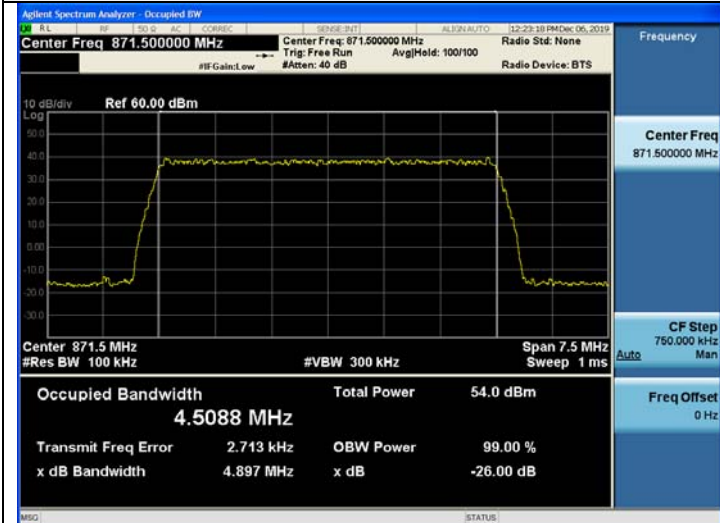
Port 1 16QAM Middle Channel



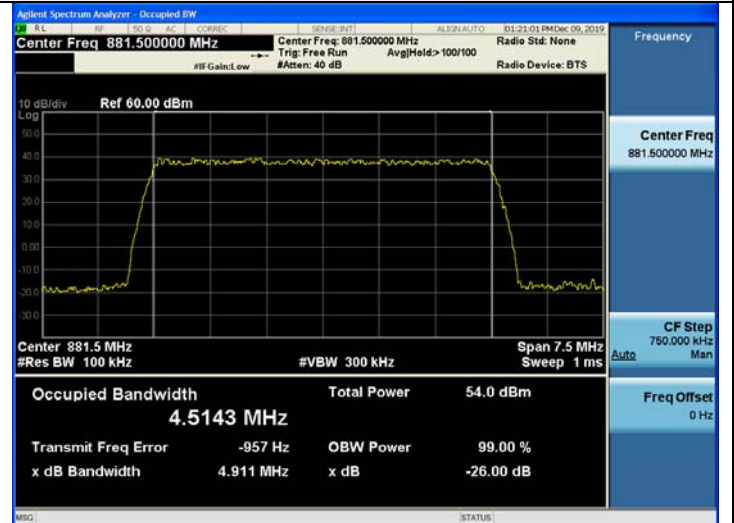
Plot Data for LTE Band 5 5 MHz 1 Carrier

Port 1 64QAM

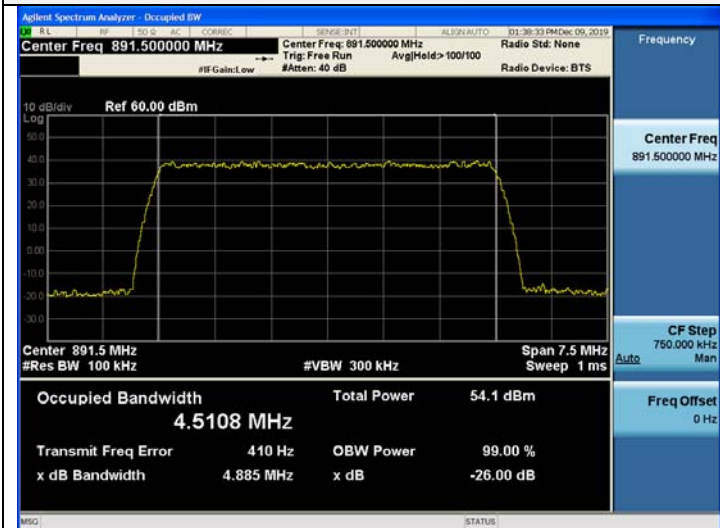
Low Channel



Middle Channel



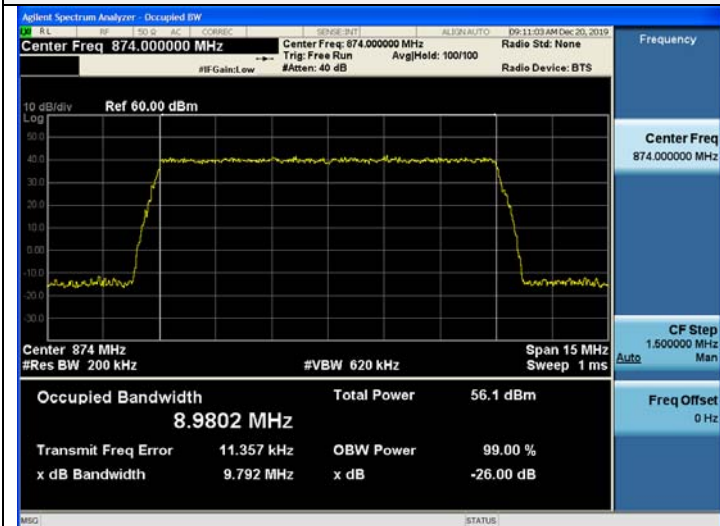
High Channel



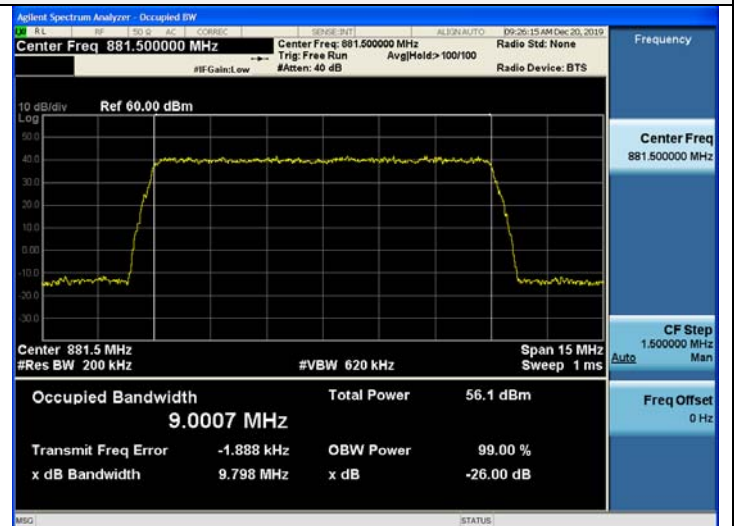
Plot Data for LTE Band 5 10 MHz 1 Carrier

Port 1 64QAM

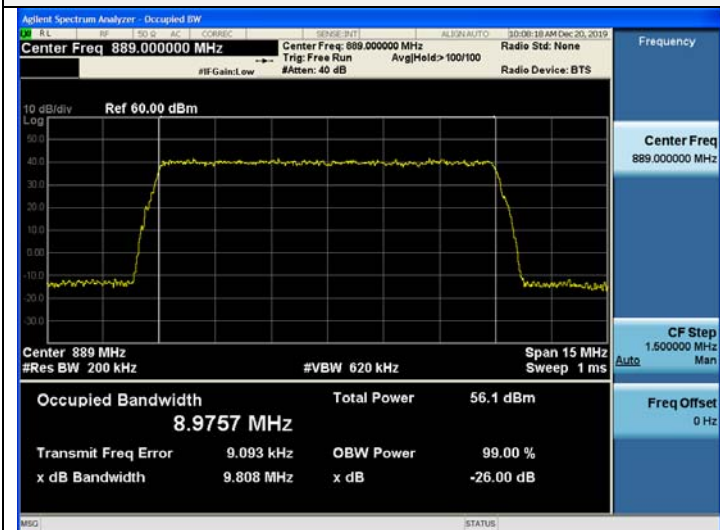
Low Channel



Middle Channel



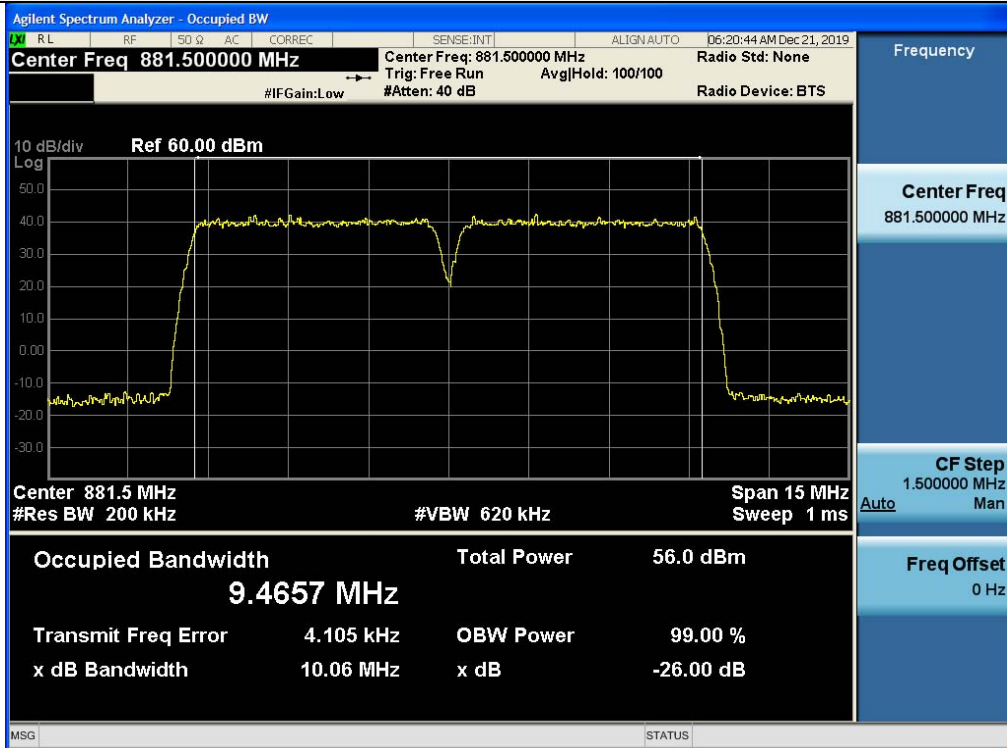
High Channel



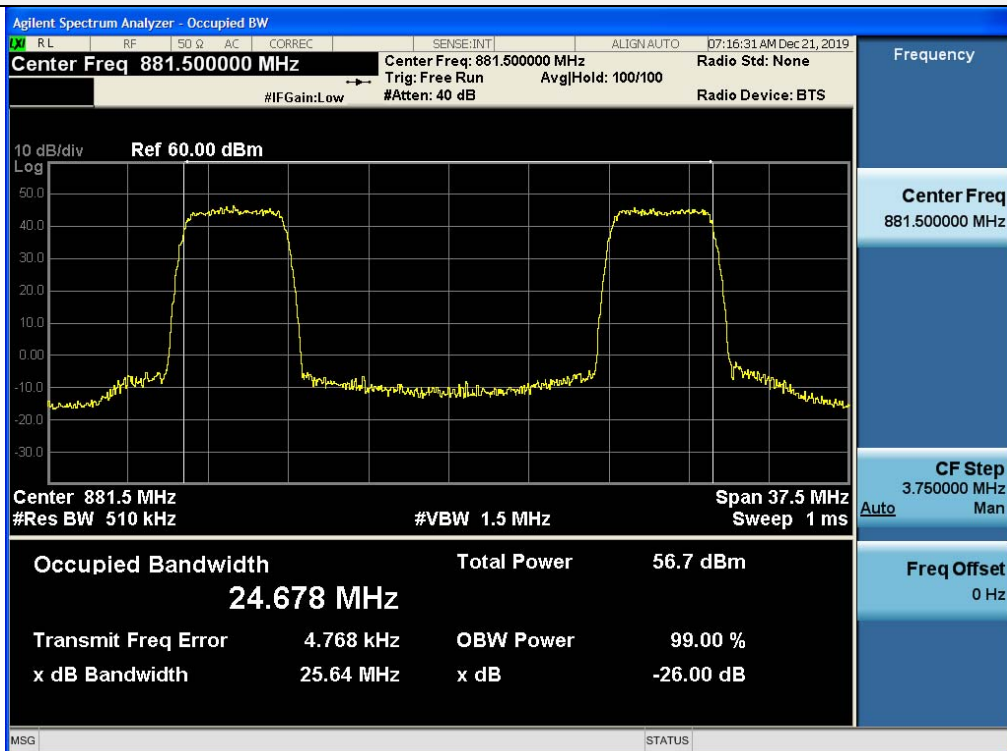
Plot Data for LTE Band 5 5 MHz + 5 MHz 2 Carrier

Port 0 QPSK

Continuous



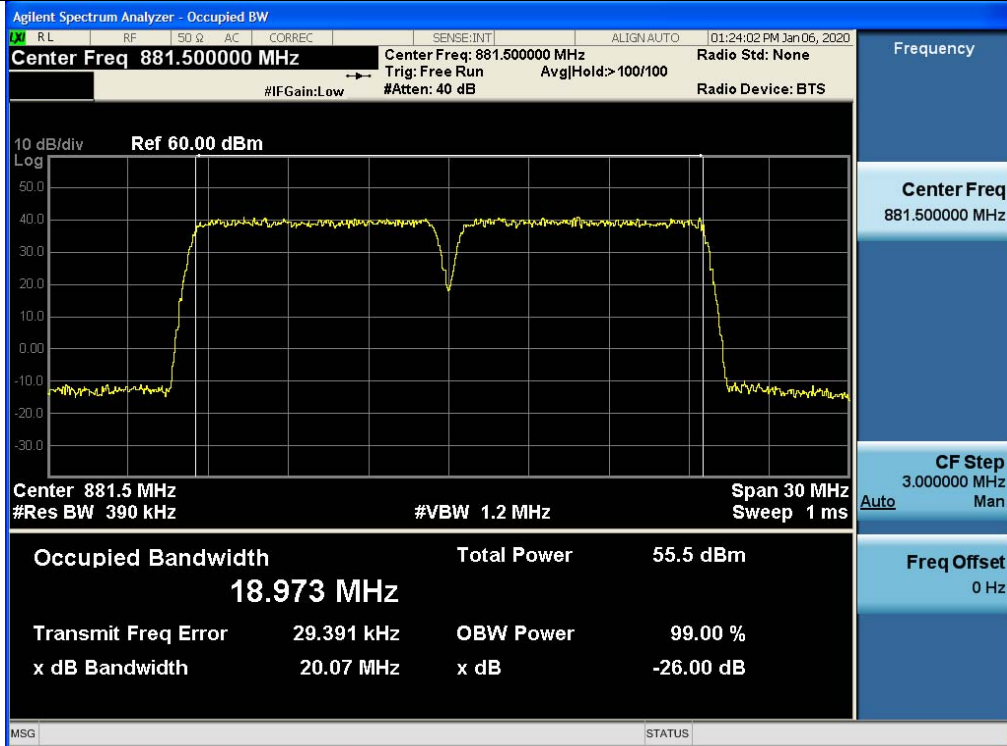
Discontinuous



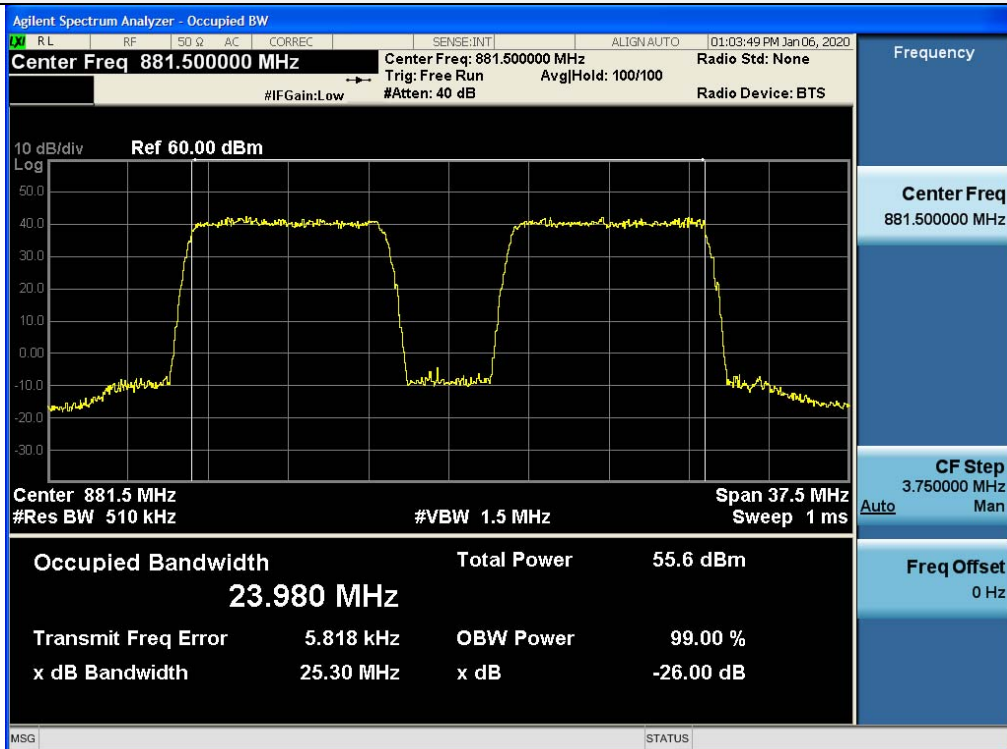
Plot Data for LTE Band 5 10 MHz + 10 MHz 2 Carrier

Port 1 256QAM

Continuous

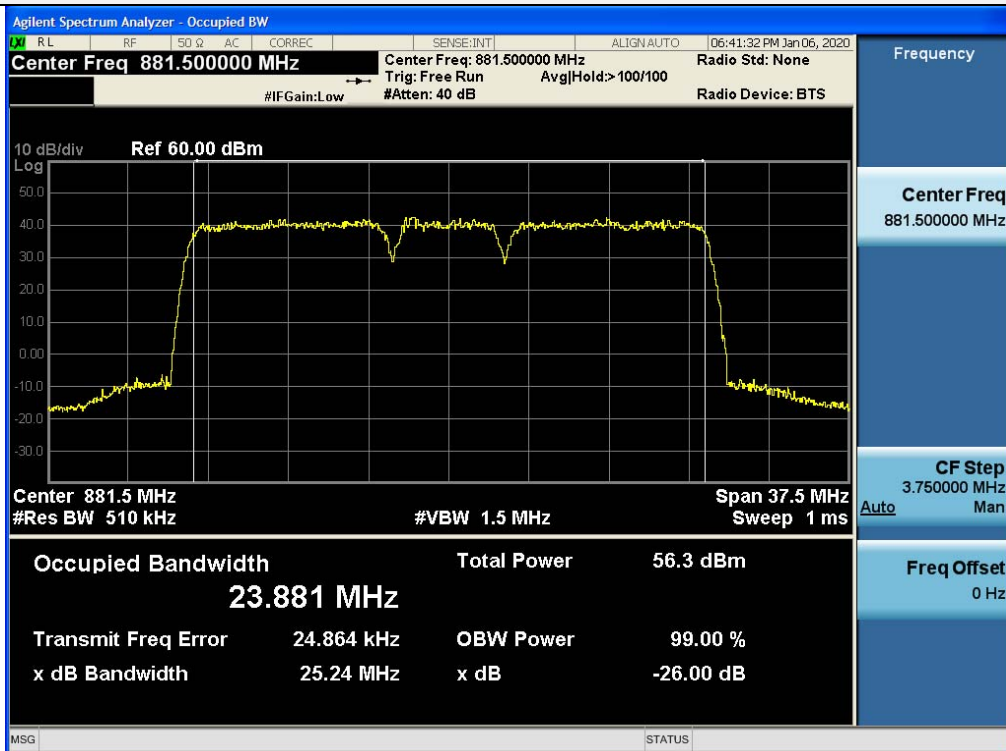


Discontinuous

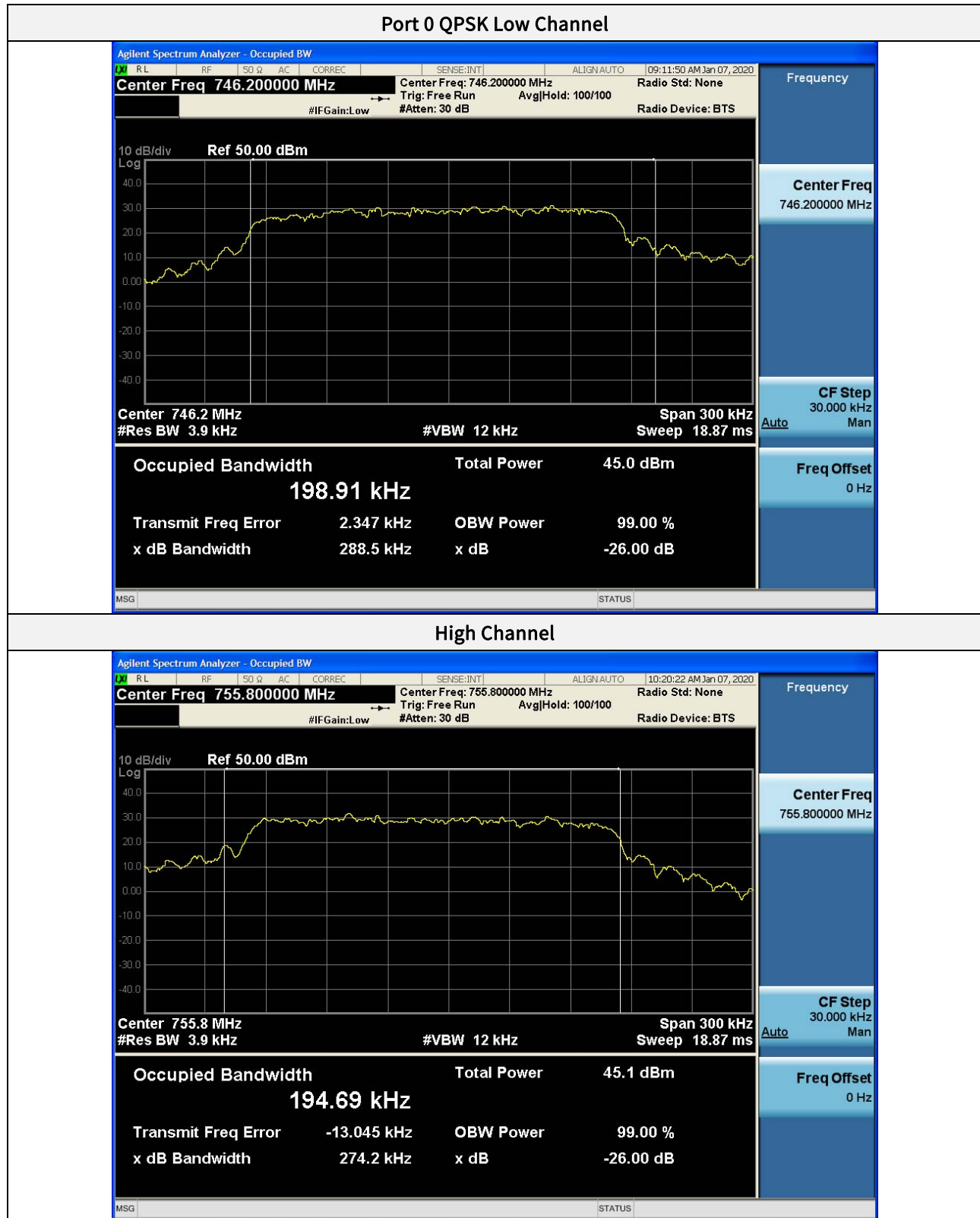


Plot Data for LTE Band 5 10 MHz + 5 MHz + 10 MHz 3 Carrier

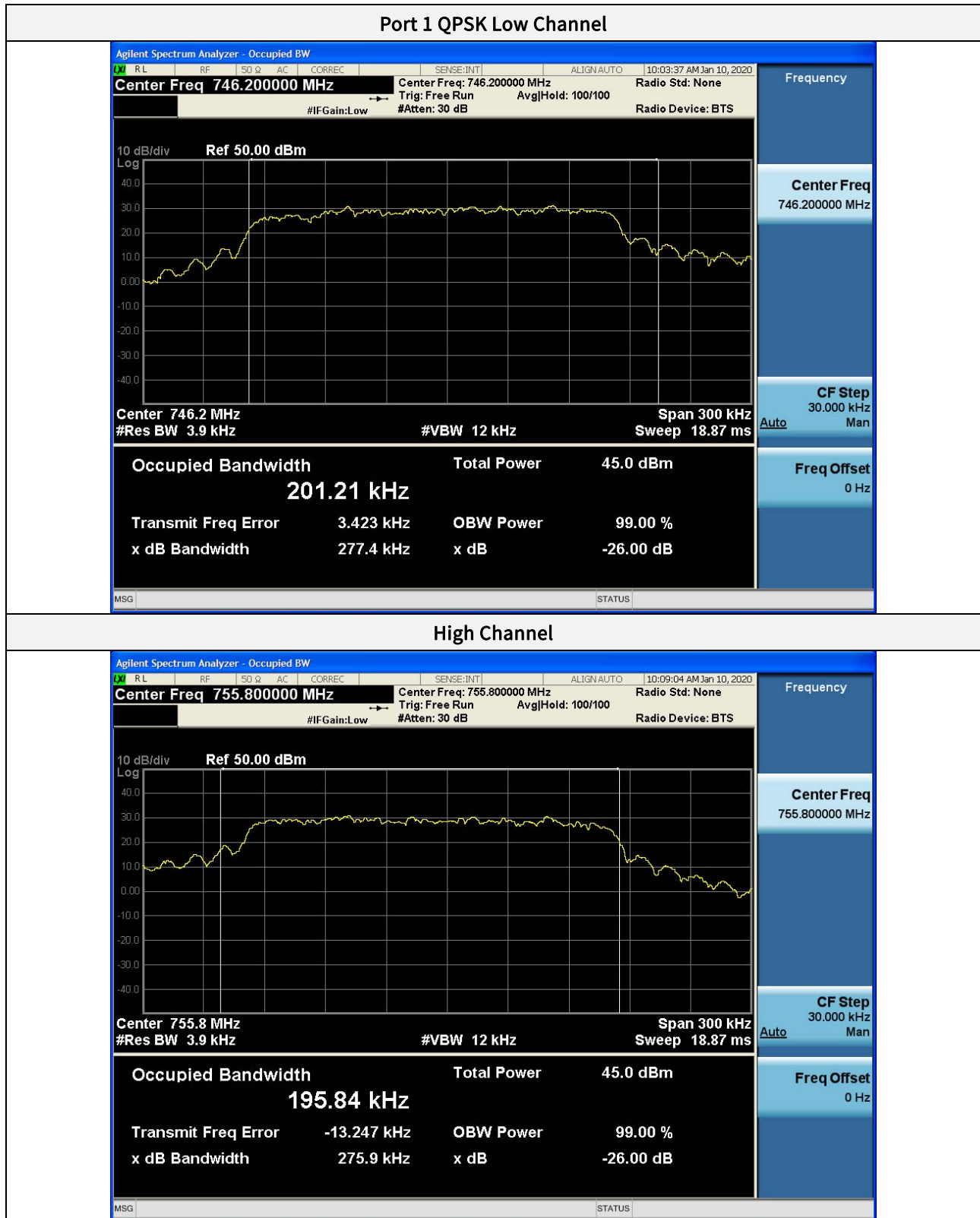
Port 1 16QAM Middle Channel



Plot Data for 2 Paths 8.3W_NB-IoT_1 Carrier



Plot Data for 2 Paths 8.3W_NB-IoT_2 Carrier


High Channel

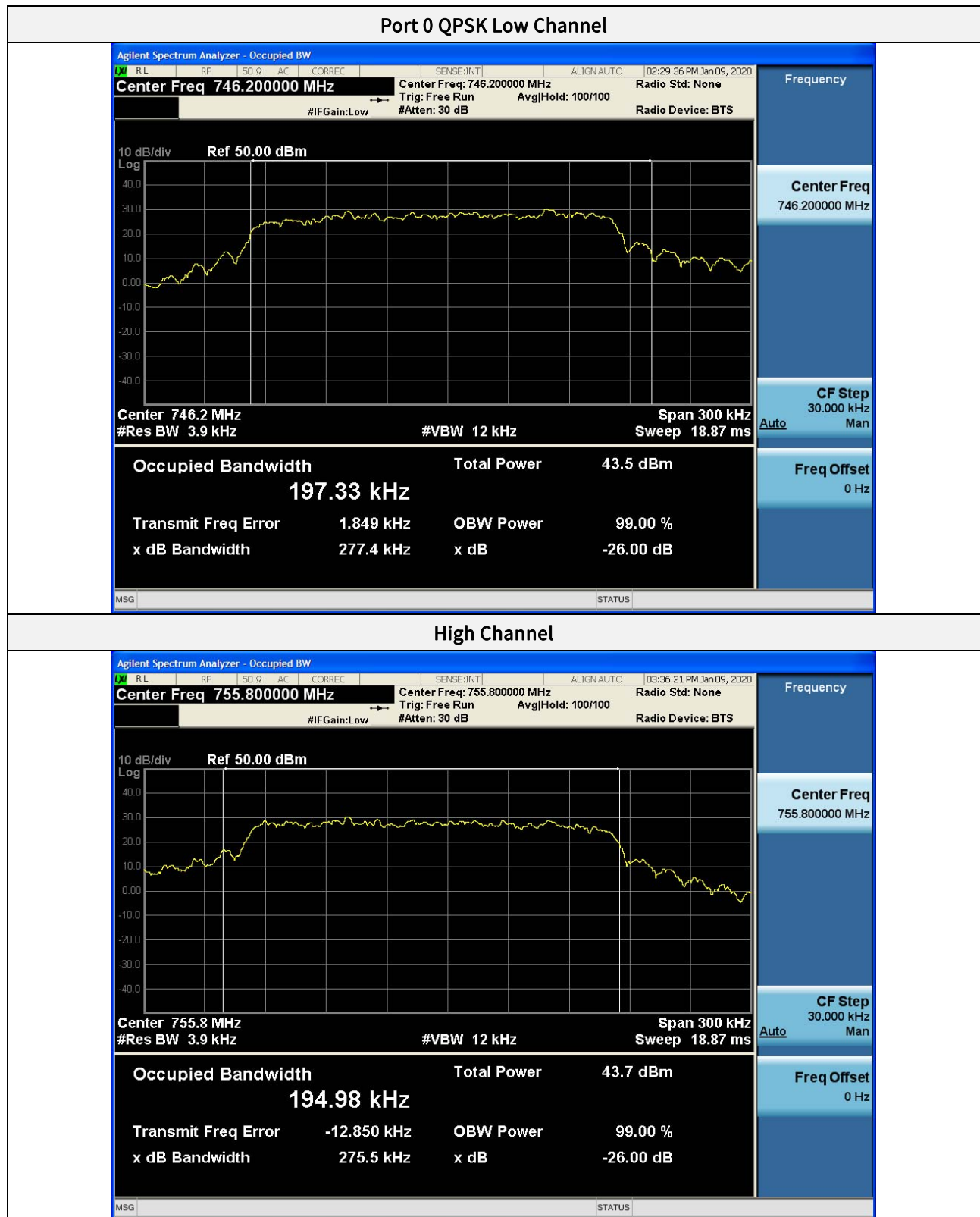
Frequency

Center Freq
755.800000 MHz

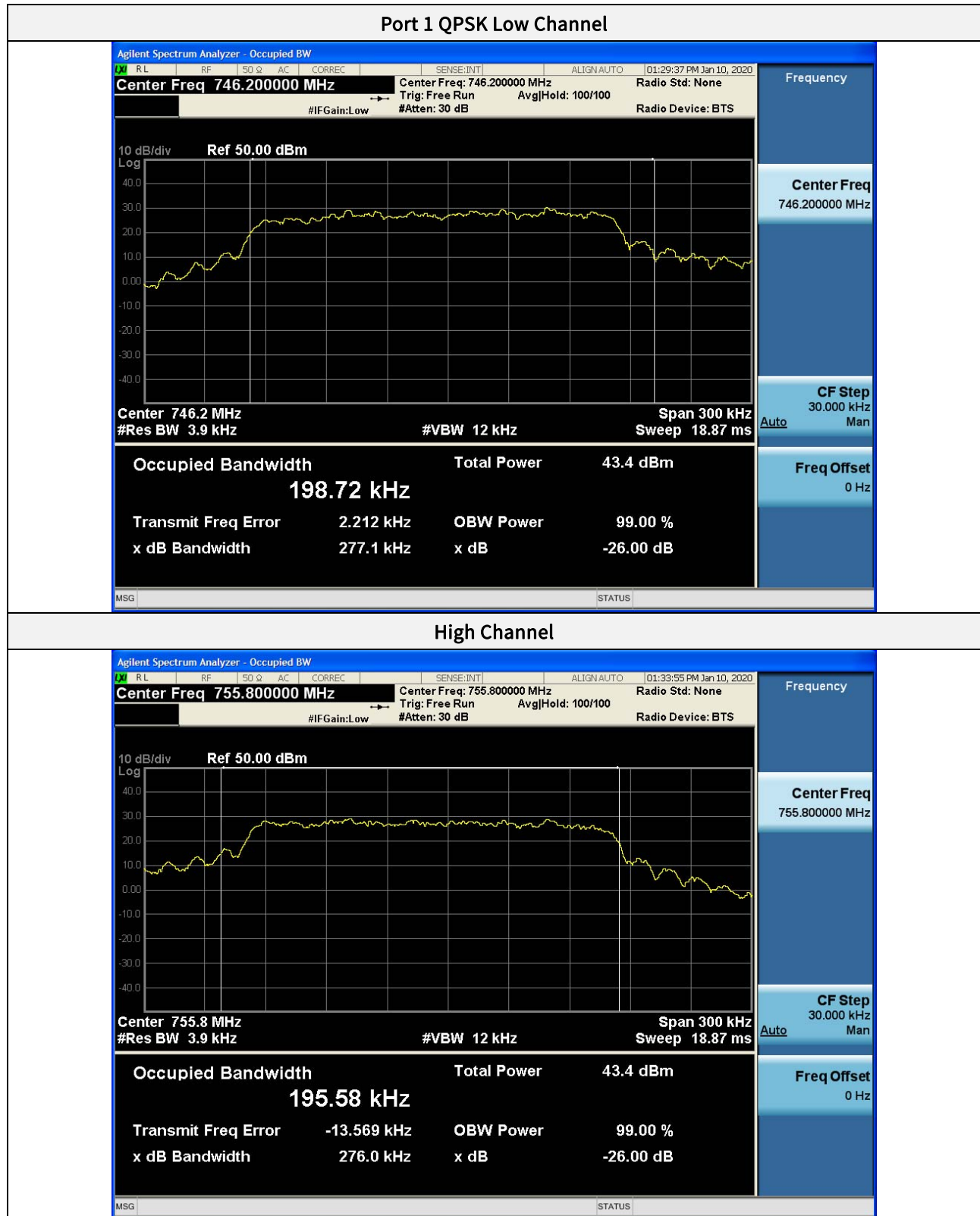
CF Step
30.000 kHz
Auto Man

Freq Offset
0 Hz

Plot Data for 4 Paths 5.5W_NB-IoT_1 Carrier



Plot Data for 4 Paths 5.5W_NB-IoT_2 Carrier



5.3. UNWANTED CONDUCTED EMISSIONS

Test Requirements:

§ 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $-43 + 10 \log(P)$ dB.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) *Alternative out of band emission limit.* Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) *Interference caused by out of band emissions.* If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

§ 27.53 Emission limits.

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the

- band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) Omitted
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
- (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Test Procedures:

The measurement is performed in accordance with Section 5.7.3 and 5.7.4 of ANSI C63.26.

5.7.3 Out-of-band unwanted emissions measurements

- a) Set the spectrum analyzer center frequency to the block, band, or channel edge frequency.
- b) Set the span wide enough to capture the fundamental emission closest to the authorized block or band edge, and to include all modulation products that spill into the immediately adjacent frequency band. In some cases, it may be possible to set the center frequency and span so as to encompass the fundamental emission and the unwanted out-of-band (band-edge) emissions on either side of the authorized block, band, or channel. This can be accomplished with a single (slow) sweep, if adequate overload protection and sufficient dynamic range can be maintained.
- c) Set the number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
- d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:
- 1) If the device can be configured to transmit continuously (duty cycle $\geq 98\%$), set the (sweep time) $>$ (number of points in sweep) $\times$ (symbol period) (e.g., by a factor of $10 \times \text{symbol period} \times \text{number of points}$). Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols
 - 2) If the device cannot be configured to transmit continuously (duty cycle $< 98\%$) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time $>$ (number of points in sweep) $\times$ (transmitter period) (i.e., the transmit on-time + the off-time). The

spectrum analyzer readings shall subsequently be corrected by $[10 \log (1/\text{duty cycle})]$. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation $\leq \pm 2\%$).

3) If the device cannot be configured to transmit continuously (duty cycle $< 98\%$) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time $> (\text{number of points in sweep}) \times (\text{transmitter period})$ (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by $[10 \log (1/\text{duty cycle})]$. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation $\leq \pm 2\%$).

4) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations $> \pm 2\%$), set the sweep time so that the averaging is performed over the on-period by setting the sweep time $> (\text{symbol period}) \times (\text{number of points})$, while also maintaining the sweep time $< (\text{transmitter on-time})$. The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold are necessary to ensure that the maximum power is measured.

e) The test report shall include the plots of the measuring instrument display and the measured data.

f) See Annex I for example emission mask plots.

5.7.4 Spurious unwanted emission measurements

a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.

b) When using an average power (rms) detector, ensure that the number of points in the sweep $\geq 2 \times (\text{span} / \text{RBW})$. This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.

c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

d) Identify and measure the Highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.

e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.

- f) Compare the results with the corresponding limit in the applicable regulation.
- g) The test report shall include the data plots of the measuring instrument display and the measured data.

Note:

- 1) In 9 kHz to 30 MHz band, RBW narrower than reference bandwidth is used. So following correction factor is applied.

$$- 10 \log [(reference\ bandwidth)/(resolution\ bandwidth)]$$

$$- 9\ kHz\ to\ 150\ kHz\ applied\ 1\ kHz\ RBW, 10 \log (1\ kHz / 100\ kHz) = - 20\ dB$$

$$10 \log (1\ kHz / 1\ MHz) = - 30\ dB$$

$$- 150\ kHz\ to\ 30\ MHz\ applied\ 10\ kHz\ RBW, 10 \log (10\ kHz / 100\ kHz) = - 10\ dB$$

$$10 \log (10\ kHz / 1\ MHz) = - 20\ dB$$

- 2) Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.

$$- 4Tx\ MIMO\ correction: 10 \log(N_{ANT}) = 10 \log(4) = 6.02\ dB / -19.02\ dBm (-13\ dBm - 10*\log(4))$$

$$- 2Tx\ MIMO\ correction: 10 \log(N_{ANT}) = 10 \log(2) = 3.01\ dB / -16.01\ dBm (-13\ dBm - 10*\log(2))$$

Note:

The results of the Band Edge test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results: Test Data of Band Edge
LTE Band 13 10 MHz 1 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Low	746.00	-22.417
		High	756.00	-25.987
	16QAM	Low	746.00	-21.951
		High	756.00	-27.640
	64QAM	Low	746.00	-22.008
		High	756.00	-26.298
	256QAM	Low	746.00	-22.033
		High	756.00	-26.718
1	QPSK	Low	746.00	-21.362
		High	756.00	-24.671
	16QAM	Low	746.00	-21.363
		High	756.00	-26.587
	64QAM	Low	746.00	-21.822
		High	756.00	-25.947
	256QAM	Low	746.00	-21.752
		High	756.00	-26.379
2	QPSK	Low	746.00	-23.433
		High	756.00	-28.644
	16QAM	Low	746.00	-22.387
		High	756.00	-27.715
	64QAM	Low	746.00	-23.733
		High	756.00	-26.459
	256QAM	Low	746.00	-23.604
		High	756.00	-27.303
3	QPSK	Low	746.00	-22.423
		High	756.00	-29.204
	16QAM	Low	746.00	-25.233
		High	756.00	-27.672
	64QAM	Low	746.00	-23.226
		High	756.00	-27.939
	256QAM	Low	746.00	-24.760
		High	756.00	-28.934

LTE Band 5 5 MHz 1 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Low	869.00	-20.522
		High	894.00	-17.057
	16QAM	Low	869.00	-18.653
		High	894.00	-18.075
	64QAM	Low	869.00	-17.377
		High	894.00	-17.944
	256QAM	Low	869.00	-21.321
		High	894.00	-17.673
1	QPSK	Low	869.00	-16.903
		High	894.00	-17.425
	16QAM	Low	869.00	-20.576
		High	894.00	-18.495
	64QAM	Low	869.00	-18.107
		High	894.00	-18.260
	256QAM	Low	869.00	-16.923
		High	894.00	-18.890
2	QPSK	Low	869.00	-21.363
		High	894.00	-20.892
	16QAM	Low	869.00	-23.723
		High	894.00	-21.821
	64QAM	Low	869.00	-23.080
		High	894.00	-21.384
	256QAM	Low	869.00	-21.992
		High	894.00	-23.042
3	QPSK	Low	869.00	-20.936
		High	894.00	-20.766
	16QAM	Low	869.00	-22.004
		High	894.00	-22.314
	64QAM	Low	869.00	-22.204
		High	894.00	-21.359
	256QAM	Low	869.00	-20.787
		High	894.00	-23.426

LTE Band 5 10 MHz 1 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Low	869.00	-20.338
		High	894.00	-18.735
	16QAM	Low	869.00	-20.942
		High	894.00	-17.782
	64QAM	Low	869.00	-20.232
		High	894.00	-18.508
	256QAM	Low	869.00	-18.005
		High	894.00	-19.180
1	QPSK	Low	869.00	-18.766
		High	894.00	-19.937
	16QAM	Low	869.00	-19.304
		High	894.00	-19.767
	64QAM	Low	869.00	-18.345
		High	894.00	-18.088
	256QAM	Low	869.00	-20.465
		High	894.00	-17.873
2	QPSK	Low	869.00	-21.398
		High	894.00	-20.927
	16QAM	Low	869.00	-19.791
		High	894.00	-21.112
	64QAM	Low	869.00	-21.598
		High	894.00	-20.433
	256QAM	Low	869.00	-22.628
		High	894.00	-23.052
3	QPSK	Low	869.00	-23.097
		High	894.00	-21.698
	16QAM	Low	869.00	-23.103
		High	894.00	-19.935
	64QAM	Low	869.00	-19.953
		High	894.00	-20.413
	256QAM	Low	869.00	-20.287
		High	894.00	-21.595

LTE Band 5 5 MHz + 5 MHz 2 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Low	869.00	-17.161
		High	894.00	-17.596
	16QAM	Low	869.00	-19.941
		High	894.00	-17.919
	64QAM	Low	869.00	-17.537
		High	894.00	-18.321
	256QAM	Low	869.00	-18.102
		High	894.00	-18.014
1	QPSK	Low	869.00	-18.802
		High	894.00	-18.755
	16QAM	Low	869.00	-20.069
		High	894.00	-19.017
	64QAM	Low	869.00	-18.502
		High	894.00	-17.465
	256QAM	Low	869.00	-18.359
		High	894.00	-19.248
2	QPSK	Low	869.00	-23.001
		High	894.00	-20.651
	16QAM	Low	869.00	-22.396
		High	894.00	-21.123
	64QAM	Low	869.00	-19.531
		High	894.00	-19.934
	256QAM	Low	869.00	-20.656
		High	894.00	-21.243
3	QPSK	Low	869.00	-19.853
		High	894.00	-21.663
	16QAM	Low	869.00	-22.492
		High	894.00	-21.161
	64QAM	Low	869.00	-22.887
		High	894.00	-21.021
	256QAM	Low	869.00	-22.119
		High	894.00	-21.856

LTE Band 5 10 MHz + 10 MHz 2 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Low	869.00	-22.058
		High	894.00	-22.179
	16QAM	Low	869.00	-24.870
		High	894.00	-22.453
	64QAM	Low	869.00	-23.315
		High	894.00	-21.485
	256QAM	Low	869.00	-24.341
		High	894.00	-23.168
1	QPSK	Low	869.00	-21.776
		High	894.00	-23.029
	16QAM	Low	869.00	-22.879
		High	894.00	-22.537
	64QAM	Low	869.00	-23.866
		High	894.00	-19.896
	256QAM	Low	869.00	-23.475
		High	894.00	-22.373
2	QPSK	Low	869.00	-22.693
		High	894.00	-21.798
	16QAM	Low	869.00	-23.937
		High	894.00	-23.202
	64QAM	Low	869.00	-23.129
		High	894.00	-23.726
	256QAM	Low	869.00	-24.358
		High	894.00	-22.990
3	QPSK	Low	869.00	-22.195
		High	894.00	-22.549
	16QAM	Low	869.00	-25.455
		High	894.00	-22.453
	64QAM	Low	869.00	-23.564
		High	894.00	-22.825
	256QAM	Low	869.00	-23.865
		High	894.00	-23.073

LTE Band 5 10 MHz + 5 MHz + 10 MHz 3 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Low	869.00	-22.939
		High	894.00	-21.706
	16QAM	Low	869.00	-23.241
		High	894.00	-23.675
	64QAM	Low	869.00	-25.790
		High	894.00	-22.384
	256QAM	Low	869.00	-25.161
		High	894.00	-22.947
1	QPSK	Low	869.00	-23.940
		High	894.00	-21.826
	16QAM	Low	869.00	-23.419
		High	894.00	-21.689
	64QAM	Low	869.00	-21.473
		High	894.00	-21.674
	256QAM	Low	869.00	-26.272
		High	894.00	-23.526
2	QPSK	Low	869.00	-23.115
		High	894.00	-24.530
	16QAM	Low	869.00	-23.072
		High	894.00	-27.024
	64QAM	Low	869.00	-24.635
		High	894.00	-23.235
	256QAM	Low	869.00	-25.061
		High	894.00	-25.186
3	QPSK	Low	869.00	-24.908
		High	894.00	-22.997
	16QAM	Low	869.00	-24.475
		High	894.00	-23.582
	64QAM	Low	869.00	-24.601
		High	894.00	-24.567
	256QAM	Low	869.00	-25.539
		High	894.00	-21.259

LTE Band 13_NB-IoT

Test Data of Band Edge

2 Paths 8.3W_NB-IoT_1 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Lower	746.20	-24.413
		Upper	755.80	-26.125
1		Lower	746.20	-25.118
		Upper	755.80	-26.837

2 Paths 8.3W_NB-IoT_2 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Lower	746.20	-24.919
		Upper	755.80	-26.636
1		Lower	746.20	-24.487
		Upper	755.80	-26.169

4 Paths 5.5W_NB-IoT_1 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Lower	746.20	-25.788
		Upper	755.80	-27.254
1		Lower	746.20	-25.592
		Upper	755.80	-27.655
3		Lower	746.20	-26.216
		Upper	755.80	-27.704
4		Lower	746.20	-26.226
		Upper	755.80	-27.830

4 Paths 5.5W_NB-IoT_2 Carrier

Port Number	Modulation	Channel	Frequency (MHz)	Measured band edge (dBm)
0	QPSK	Lower	746.20	-26.414
		Upper	755.80	-28.464
1		Lower	746.20	-25.894
		Upper	755.80	-27.791
3		Lower	746.20	-26.242
		Upper	755.80	-27.789
4		Lower	746.20	-26.377
		Upper	755.80	-28.014

Test Data of Suprious Emissions_Below Low Edge

LTE Band 13 10 MHz 1 Carrier

Port Number	Modulation	Channel	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 10 MHz	Low Edge – 10 MHz ~ Low Edge – 100 kHz
0	QPSK	Middle	-27.279	-34.432	-33.209	-27.910
	16QAM	Middle	-27.202	-32.830	-32.766	-27.653
	64QAM	Middle	-26.979	-33.843	-33.273	-27.845
	256QAM	Middle	-27.290	-33.438	-33.390	-27.435
1	QPSK	Middle	-26.149	-34.678	-33.231	-27.125
	16QAM	Middle	-27.459	-32.463	-33.125	-26.583
	64QAM	Middle	-27.877	-35.935	-33.289	-26.288
	256QAM	Middle	-27.330	-35.966	-33.045	-26.050
2	QPSK	Middle	-27.681	-33.522	-33.200	-26.705
	16QAM	Middle	-28.064	-34.347	-33.306	-27.416
	64QAM	Middle	-27.375	-34.248	-33.407	-27.281
	256QAM	Middle	-28.139	-33.562	-33.679	-26.658
3	QPSK	Middle	-26.712	-35.991	-33.058	-27.836
	16QAM	Middle	-27.063	-33.694	-33.526	-27.793
	64QAM	Middle	-28.547	-34.020	-33.251	-27.915
	256QAM	Middle	-27.678	-34.435	-33.492	-28.488

Test Data of Suprious Emissions_Above High Edge

Port Number	Modulation	Channel	Measured emission (dBm)		
			High Edge + 100 kHz ~ High Edge + 10 MHz	High Edge + 10 MHz ~ 4 GHz	4 GHz ~ 8 GHz
0	QPSK	Middle	-27.306	-27.994	-41.364
	16QAM	Middle	-27.187	-27.584	-41.260
	64QAM	Middle	-27.179	-27.917	-40.892
	256QAM	Middle	-26.654	-27.588	-41.101
1	QPSK	Middle	-25.751	-27.627	-41.474
	16QAM	Middle	-25.485	-27.364	-41.174
	64QAM	Middle	-25.876	-28.070	-41.453
	256QAM	Middle	-26.106	-28.173	-41.438
2	QPSK	Middle	-26.714	-27.304	-41.279
	16QAM	Middle	-26.722	-28.252	-41.703
	64QAM	Middle	-26.334	-28.161	-40.727
	256QAM	Middle	-25.967	-28.026	-41.264
3	QPSK	Middle	-26.968	-27.885	-40.936
	16QAM	Middle	-27.461	-27.885	-41.595
	64QAM	Middle	-27.588	-27.793	-41.250
	256QAM	Middle	-27.401	-27.428	-41.551

Test Data of Additional Suprious Emissions for 700 MHz Band

Port Number	Modulation	Channel	Measured emission (dBm)			
			763 MHz ~ 775 MHz	793 MHz ~ 805 MHz	1 559 MHz ~ 1 584 MHz	1 584 MHz ~ 1 610 MHz
0	QPSK	Middle	-51.169	-58.934	-67.181	-67.851
	16QAM	Middle	-51.128	-59.460	-64.913	-67.421
	64QAM	Middle	-51.288	-59.369	-67.964	-67.660
	256QAM	Middle	-50.929	-59.167	-67.769	-67.954
1	QPSK	Middle	-50.967	-59.476	-67.694	-67.598
	16QAM	Middle	-50.956	-59.354	-67.473	-67.306
	64QAM	Middle	-50.453	-59.199	-67.314	-67.231
	256QAM	Middle	-50.854	-59.391	-67.815	-67.530
2	QPSK	Middle	-59.791	-59.638	-67.205	-68.089
	16QAM	Middle	-59.290	-60.054	-68.432	-68.024
	64QAM	Middle	-59.707	-60.037	-68.147	-68.016
	256QAM	Middle	-58.939	-59.851	-68.322	-68.307
3	QPSK	Middle	-59.957	-60.164	-68.134	-68.042
	16QAM	Middle	-59.281	-60.028	-63.397	-68.282
	64QAM	Middle	-59.388	-60.275	-68.356	-68.169
	256QAM	Middle	-59.844	-60.307	-68.482	-68.707

LTE Band 5 5 MHz 1 Carrier

Port Number	Modulation	Channel	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 10 MHz	Low Edge – 10 MHz ~ Low Edge – 1 MHz
0	QPSK	Low	-26.547	-33.514	-33.026	-22.880
		Middle	-26.963	-33.158	-32.987	-32.140
		High	-27.371	-35.529	-33.041	-32.196
	16QAM	Low	-27.607	-34.074	-32.681	-24.101
		Middle	-27.070	-33.603	-32.881	-32.299
		High	-27.424	-33.048	-33.197	-32.812
	64QAM	Low	-26.838	-34.004	-31.827	-23.902
		Middle	-27.326	-32.714	-33.040	-30.913
		High	-27.506	-33.338	-32.603	-32.661
	256QAM	Low	-27.749	-34.509	-32.747	-22.913
		Middle	-26.318	-34.652	-33.106	-32.032
		High	-25.792	-35.671	-32.783	-32.590
1	QPSK	Low	-27.465	-33.378	-32.885	-19.437
		Middle	-25.570	-33.240	-32.788	-31.961
		High	-27.567	-33.483	-32.769	-32.106
	16QAM	Low	-27.234	-34.054	-32.728	-24.223
		Middle	-25.591	-34.137	-33.216	-27.352
		High	-27.058	-34.252	-32.795	-32.789
	64QAM	Low	-26.861	-34.712	-32.963	-23.420
		Middle	-24.992	-33.275	-32.826	-32.132
		High	-27.312	-33.354	-32.772	-31.819
	256QAM	Low	-27.373	-32.725	-32.667	-21.618
		Middle	-27.005	-31.778	-32.817	-30.928

		High	-25.979	-33.735	-32.907	-31.839
2	QPSK	Low	-28.480	-35.592	-32.616	-21.401
		Middle	-27.705	-33.790	-33.303	-27.329
		High	-25.933	-34.418	-33.147	-34.605
	16QAM	Low	-25.735	-33.041	-32.801	-25.249
		Middle	-26.212	-34.667	-32.515	-34.008
		High	-25.783	-35.493	-32.571	-33.824
	64QAM	Low	-28.312	-35.231	-33.156	-21.364
		Middle	-27.633	-34.732	-32.521	-32.323
		High	-27.968	-34.262	-32.534	-34.333
	256QAM	Low	-26.984	-33.991	-32.851	-20.758
		Middle	-27.067	-34.579	-26.404	-33.385
		High	-26.021	-35.322	-32.699	-34.318
3	QPSK	Low	-26.632	-35.473	-33.051	-28.503
		Middle	-24.870	-34.228	-32.827	-32.617
		High	-26.757	-35.254	-33.224	-34.755
	16QAM	Low	-26.154	-33.317	-32.759	-27.869
		Middle	-26.671	-34.099	-32.891	-33.025
		High	-26.974	-34.473	-33.362	-33.496
	64QAM	Low	-26.348	-34.811	-32.941	-28.639
		Middle	-26.794	-34.685	-33.415	-33.942
		High	-26.880	-33.096	-32.948	-33.820
	256QAM	Low	-26.836	-33.276	-32.750	-27.882
		Middle	-27.097	-34.272	-33.074	-33.155
		High	-28.260	-33.449	-32.451	-34.376

Test Data of Suprious Emissions_Above High Edge

Port Number	Mod.	Channel	Measured emission (dBm)		
			High Edge + 1 MHz ~ High Edge + 10 MHz	High Edge + 10 MHz ~ 1 GHz	1 GHz ~ 10 GHz
0	QPSK	Low	-32.351	-27.667	-17.783
		Middle	-29.702	-27.146	-19.046
		High	-23.129	-27.539	-19.420
	16QAM	Low	-31.150	-27.186	-17.944
		Middle	-28.692	-27.534	-18.692
		High	-21.203	-28.039	-18.181
	64QAM	Low	-32.904	-27.345	-17.899
		Middle	-27.982	-27.097	-17.833
		High	-24.290	-27.329	-19.096
	256QAM	Low	-31.239	-27.292	-18.566
		Middle	-29.904	-27.720	-18.370
		High	-23.420	-27.088	-18.950
1	QPSK	Low	-31.880	-28.033	-17.210
		Middle	-30.074	-27.961	-17.099
		High	-22.193	-27.772	-20.731
	16QAM	Low	-32.157	-27.528	-18.259
		Middle	-28.855	-27.221	-16.406
		High	-24.777	-27.462	-18.159
	64QAM	Low	-32.505	-27.955	-17.045
		Middle	-30.581	-27.972	-17.173
		High	-24.182	-27.926	-19.381
	256QAM	Low	-33.172	-27.398	-18.412
		Middle	-29.896	-27.534	-17.230
		High	-22.345	-27.570	-20.625
2	QPSK	Low	-34.496	-26.649	-21.581

		Middle	-30.253	-27.477	-21.920
		High	-26.658	-27.777	-22.269
	16QAM	Low	-35.800	-27.979	-21.684
		Middle	-33.545	-27.335	-22.003
		High	-26.941	-27.645	-21.617
	64QAM	Low	-34.972	-27.633	-21.963
		Middle	-34.453	-28.076	-21.892
		High	-27.205	-27.482	-21.997
	256QAM	Low	-35.400	-28.003	-21.577
		Middle	-34.168	-28.212	-21.339
		High	-27.934	-27.633	-21.943
3	QPSK	Low	-34.230	-27.769	-21.85
		Middle	-33.207	-27.728	-21.946
		High	-27.013	-27.828	-22.188
	16QAM	Low	-34.237	-27.935	-21.713
		Middle	-33.352	-27.565	-22.146
		High	-29.738	-27.444	-21.697
	64QAM	Low	-34.771	-27.936	-21.654
		Middle	-32.211	-28.090	-21.592
		High	-25.340	-27.780	-21.848
	256QAM	Low	-35.120	-27.344	-21.942
		Middle	-33.462	-27.883	-22.209
		High	-29.170	-27.659	-21.915

LTE Band 5 10 MHz 1 Carrier

Port Number	Modulation	Channel	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 10 MHz	Low Edge – 10 MHz ~ Low Edge – 1 MHz
0	QPSK	Low	-26.632	-34.301	-32.985	-26.207
		Middle	-27.434	-34.014	-32.910	-30.568
		High	-27.447	-34.436	-32.404	-31.263
	16QAM	Low	-27.519	-35.390	-33.049	-25.978
		Middle	-27.716	-34.659	-32.338	-29.832
		High	-28.081	-33.574	-32.880	-30.801
	64QAM	Low	-25.987	-34.483	-32.783	-26.421
		Middle	-26.256	-34.276	-31.927	-30.688
		High	-26.684	-34.814	-32.816	-31.257
	256QAM	Low	-26.713	-35.283	-33.283	-27.173
		Middle	-27.050	-35.351	-32.767	-29.143
		High	-26.589	-35.600	-32.635	-31.282
1	QPSK	Low	-26.762	-35.760	-32.751	-25.287
		Middle	-26.589	-33.655	-32.884	-25.349
		High	-26.027	-32.889	-32.136	-31.548
	16QAM	Low	-26.777	-35.971	-32.755	-24.060
		Middle	-27.845	-34.726	-32.516	-28.898
		High	-26.582	-35.293	-33.233	-30.738
	64QAM	Low	-26.046	-35.280	-32.577	-24.955
		Middle	-26.928	-35.257	-32.834	-29.699
		High	-27.769	-35.290	-33.529	-31.031
	256QAM	Low	-26.394	-34.546	-32.417	-25.670
		Middle	-26.921	-33.628	-32.654	-29.027

		High	-25.558	-33.885	-33.026	-30.877
2	QPSK	Low	-24.925	-34.517	-32.654	-26.115
		Middle	-26.316	-35.597	-32.331	-30.142
		High	-27.644	-35.968	-32.983	-30.518
	16QAM	Low	-26.820	-34.167	-33.287	-26.299
		Middle	-27.202	-35.265	-32.804	-31.005
		High	-27.094	-34.494	-33.193	-30.858
	64QAM	Low	-27.117	-34.319	-32.999	-25.635
		Middle	-26.658	-34.553	-32.803	-31.485
		High	-27.550	-34.511	-33.146	-32.002
	256QAM	Low	-27.349	-33.905	-32.794	-27.514
		Middle	-27.681	-33.731	-32.876	-30.848
		High	-25.847	-33.514	-32.622	-31.396
3	QPSK	Low	-27.668	-34.625	-32.987	-27.555
		Middle	-27.574	-34.310	-32.761	-31.025
		High	-27.655	-35.424	-26.474	-30.396
	16QAM	Low	-26.676	-33.967	-32.816	-26.674
		Middle	-26.568	-33.260	-33.025	-31.785
		High	-26.561	-33.555	-32.499	-30.391
	64QAM	Low	-27.671	-33.427	-32.656	-27.545
		Middle	-27.766	-34.173	-32.963	-30.197
		High	-27.163	-34.117	-32.383	-31.177
	256QAM	Low	-25.418	-34.229	-32.776	-26.915
		Middle	-27.699	-33.741	-32.621	-32.156
		High	-27.387	-34.828	-33.165	-29.714

Test Data of Suprious Emissions_Above High Edge

Port Number	Mod.	Channel	Measured emission (dBm)		
			High Edge + 1 MHz ~ High Edge + 10 MHz	High Edge + 10 MHz ~ 1 GHz	1 GHz ~ 10 GHz
0	QPSK	Low	-27.490	-28.280	-22.085
		Middle	-28.856	-27.521	-22.254
		High	-22.864	-27.571	-21.993
	16QAM	Low	-28.507	-27.409	-21.448
		Middle	-28.696	-27.904	-21.601
		High	-26.137	-27.461	-22.084
	64QAM	Low	-30.004	-27.835	-21.826
		Middle	-29.492	-27.038	-21.566
		High	-26.686	-27.380	-21.822
	256QAM	Low	-28.784	-26.698	-21.195
		Middle	-27.683	-27.425	-21.595
		High	-25.471	-27.330	-21.677
1	QPSK	Low	-27.464	-27.266	-21.897
		Middle	-28.604	-27.830	-22.09
		High	-26.056	-27.773	-22.039
	16QAM	Low	-28.113	-27.837	-21.855
		Middle	-30.297	-27.889	-21.592
		High	-25.386	-27.629	-22.001
	64QAM	Low	-27.927	-27.064	-21.8
		Middle	-28.113	-27.668	-22.023
		High	-25.459	-27.283	-21.838
	256QAM	Low	-28.187	-27.893	-22.192
		Middle	-27.944	-28.058	-21.64
		High	-24.115	-27.193	-21.677

2	QPSK	Low	-32.440	-27.864	-21.353
		Middle	-31.317	-27.447	-22.023
		High	-26.430	-27.424	-22.094
	16QAM	Low	-32.830	-27.741	-21.75
		Middle	-32.393	-27.571	-21.935
		High	-26.907	-27.988	-21.673
	64QAM	Low	-31.822	-27.882	-22.26
		Middle	-32.874	-27.925	-21.932
		High	-28.121	-27.706	-22.204
	256QAM	Low	-33.337	-27.568	-21.958
		Middle	-31.617	-27.825	-21.953
		High	-26.046	-26.860	-22.12
3	QPSK	Low	-30.831	-27.896	-21.872
		Middle	-30.899	-27.383	-21.646
		High	-28.059	-27.797	-21.884
	16QAM	Low	-29.656	-27.384	-21.786
		Middle	-31.237	-27.701	-21.991
		High	-28.226	-26.349	-21.358
	64QAM	Low	-31.930	-27.688	-21.218
		Middle	-30.254	-27.622	-21.92
		High	-26.499	-27.693	-21.996
	256QAM	Low	-31.098	-27.795	-21.774
		Middle	-31.821	-27.288	-21.583
		High	-28.050	-27.864	-21.824

LTE Band 5 5 MHz + 5 MHz 2 Carrier

Port Number	Modulation	Channel	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 10 MHz	Low Edge – 10 MHz ~ Low Edge – 1 MHz
0	QPSK	Continuous	-26.688	-34.789	-33.109	-29.199
		Discontinuous	-26.655	-35.314	-32.807	-22.737
	16QAM	Continuous	-27.804	-33.974	-32.582	-29.529
		Discontinuous	-27.388	-34.518	-33.096	-23.290
	64QAM	Continuous	-27.574	-35.279	-32.814	-30.766
		Discontinuous	-27.648	-35.448	-32.371	-23.544
	256QAM	Continuous	-27.374	-35.085	-32.915	-30.585
		Discontinuous	-28.188	-32.796	-32.620	-23.024
1	QPSK	Continuous	-28.503	-35.053	-32.987	-29.184
		Discontinuous	-27.318	-34.647	-32.849	-24.623
	16QAM	Continuous	-27.006	-35.811	-33.032	-29.166
		Discontinuous	-26.362	-33.758	-32.362	-23.796
	64QAM	Continuous	-28.029	-33.686	-32.527	-28.948
		Discontinuous	-25.218	-33.525	-33.038	-24.496
	256QAM	Continuous	-26.319	-34.590	-32.842	-27.879
		Discontinuous	-26.948	-36.412	-32.789	-22.881
2	QPSK	Continuous	-26.316	-34.427	-33.018	-31.058
		Discontinuous	-27.542	-35.071	-32.973	-28.017
	16QAM	Continuous	-27.401	-33.436	-32.710	-29.258
		Discontinuous	-28.596	-36.205	-32.660	-25.256
	64QAM	Continuous	-26.951	-35.685	-32.751	-28.491
		Discontinuous	-27.287	-34.264	-33.169	-23.652
	256QAM	Continuous	-27.701	-36.010	-32.531	-27.642
		Discontinuous	-27.457	-35.109	-32.635	-24.562
3	QPSK	Continuous	-26.288	-34.933	-33.148	-31.437
		Discontinuous	-24.443	-34.872	-26.720	-25.228
	16QAM	Continuous	-27.746	-34.683	-33.050	-30.134
		Discontinuous	-26.837	-34.465	-33.216	-26.112
	64QAM	Continuous	-27.078	-34.839	-33.202	-30.234
		Discontinuous	-26.129	-33.664	-32.776	-26.660
	256QAM	Continuous	-27.226	-33.527	-33.236	-31.445
		Discontinuous	-27.565	-33.691	-32.948	-24.911

Test Data of Suprious Emissions_Above High Edge

Port Number	Mod.	Channel	Measured emission (dBm)		
			High Edge + 1 MHz ~ High Edge + 10 MHz	High Edge + 10 MHz ~ 1 GHz	1 GHz ~ 10 GHz
0	QPSK	Continuous	-28.980	-28.175	-22.107
		Discontinuous	-23.436	-27.529	-21.834
	16QAM	Continuous	-28.816	-27.433	-22.099
		Discontinuous	-23.732	-27.941	-22.227
	64QAM	Continuous	-29.163	-27.809	-22.082
		Discontinuous	-23.605	-26.901	-21.885
	256QAM	Continuous	-29.399	-27.553	-22.262
		Discontinuous	-23.961	-27.934	-22.171
1	QPSK	Continuous	-29.742	-27.631	-21.896
		Discontinuous	-23.827	-27.301	-22.226
	16QAM	Continuous	-29.068	-27.653	-21.547
		Discontinuous	-23.489	-27.842	-21.923
	64QAM	Continuous	-28.902	-27.715	-21.605
		Discontinuous	-24.330	-27.828	-21.967
	256QAM	Continuous	-28.491	-27.345	-21.678
		Discontinuous	-23.941	-27.452	-22.005
2	QPSK	Continuous	-29.142	-27.503	-21.468
		Discontinuous	-28.403	-26.496	-22.029
	16QAM	Continuous	-28.560	-26.969	-21.146
		Discontinuous	-26.075	-27.896	-21.792
	64QAM	Continuous	-26.952	-27.909	-21.774
		Discontinuous	-23.097	-27.067	-21.427
	256QAM	Continuous	-27.050	-27.816	-22
		Discontinuous	-24.546	-26.930	-21.609
3	QPSK	Continuous	-32.263	-27.664	-21.011
		Discontinuous	-27.893	-27.212	-22.184
	16QAM	Continuous	-31.440	-28.128	-21.732
		Discontinuous	-26.383	-27.900	-22.113
	64QAM	Continuous	-30.648	-28.228	-21.339
		Discontinuous	-25.952	-27.622	-22.109
	256QAM	Continuous	-31.969	-28.321	-21.455
		Discontinuous	-27.425	-27.747	-20.914

LTE Band 5 10 MHz + 10 MHz 2 Carrier

Port Number	Modulation	Channel	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 10 MHz	Low Edge – 10 MHz ~ Low Edge – 1 MHz
0	QPSK	Continuous	-29.533	-42.256	-33.857	-27.613
		Discontinuous	-29.924	-40.287	-34.122	-26.401
	16QAM	Continuous	-30.001	-39.981	-33.857	-27.537
		Discontinuous	-28.244	-39.464	-33.761	-25.257
	64QAM	Continuous	-28.128	-40.280	-33.952	-26.177
		Discontinuous	-28.612	-39.283	-34.004	-24.604
	256QAM	Continuous	-29.119	-38.437	-33.838	-27.943
		Discontinuous	-29.016	-39.680	-33.824	-25.757
1	QPSK	Continuous	-30.407	-40.061	-34.384	-26.718
		Discontinuous	-28.059	-39.736	-34.144	-25.829
	16QAM	Continuous	-28.488	-37.877	-34.376	-27.557
		Discontinuous	-28.397	-38.194	-34.240	-24.177
	64QAM	Continuous	-30.426	-39.564	-33.405	-27.214
		Discontinuous	-29.641	-39.349	-34.041	-25.835
	256QAM	Continuous	-28.615	-39.891	-33.822	-27.514
		Discontinuous	-29.277	-39.650	-34.028	-26.980
2	QPSK	Continuous	-26.879	-38.511	-34.158	-27.809
		Discontinuous	-29.371	-39.097	-33.967	-24.266
	16QAM	Continuous	-29.114	-39.690	-33.954	-27.532
		Discontinuous	-28.608	-40.187	-33.959	-23.839
	64QAM	Continuous	-27.993	-38.234	-33.817	-26.008
		Discontinuous	-29.844	-39.295	-34.343	-24.323
	256QAM	Continuous	-28.506	-40.259	-33.841	-28.560
		Discontinuous	-28.486	-39.381	-34.127	-23.872
3	QPSK	Continuous	-28.173	-38.164	-34.146	-27.610
		Discontinuous	-29.036	-40.567	-34.468	-26.929
	16QAM	Continuous	-29.557	-39.375	-34.170	-28.265
		Discontinuous	-28.869	-38.740	-34.425	-28.369
	64QAM	Continuous	-28.168	-39.475	-33.951	-29.714
		Discontinuous	-28.298	-39.951	-34.028	-27.232
	256QAM	Continuous	-28.595	-38.904	-34.475	-28.123
		Discontinuous	-29.558	-39.978	-33.965	-28.037

Test Data of Suprious Emissions_Above High Edge

Port Number	Mod.	Channel	Measured emission (dBm)		
			High Edge + 1 MHz ~ High Edge + 10 MHz	High Edge + 10 MHz ~ 1 GHz	1 GHz ~ 10 GHz
0	QPSK	Continuous	-27.411	-29.256	-21.635
		Discontinuous	-27.044	-28.568	-21.984
	16QAM	Continuous	-27.539	-28.883	-21.907
		Discontinuous	-25.061	-29.067	-21.274
	64QAM	Continuous	-27.981	-28.415	-21.725
		Discontinuous	-25.765	-28.836	-21.569
	256QAM	Continuous	-29.362	-28.900	-21.94
		Discontinuous	-25.167	-29.001	-21.553
1	QPSK	Continuous	-27.157	-28.773	-22.043
		Discontinuous	-26.187	-29.144	-21.952
	16QAM	Continuous	-27.716	-28.777	-21.617
		Discontinuous	-24.245	-28.815	-21.868
	64QAM	Continuous	-27.728	-28.125	-21.164
		Discontinuous	-25.820	-29.773	-21.565
	256QAM	Continuous	-28.476	-28.994	-21.418
		Discontinuous	-26.349	-28.933	-21.81
2	QPSK	Continuous	-28.306	-28.705	-21.946
		Discontinuous	-26.432	-29.116	-21.815
	16QAM	Continuous	-28.754	-28.696	-21.142
		Discontinuous	-25.057	-29.037	-21.517
	64QAM	Continuous	-27.162	-29.013	-21.73
		Discontinuous	-25.511	-29.013	-21.534
	256QAM	Continuous	-27.450	-29.098	-21.799
		Discontinuous	-25.506	-28.928	-21.338
3	QPSK	Continuous	-28.246	-29.409	-20.631
		Discontinuous	-26.060	-29.132	-21.615
	16QAM	Continuous	-28.621	-29.118	-21.365
		Discontinuous	-28.606	-28.961	-21.321
	64QAM	Continuous	-29.216	-29.102	-21.557
		Discontinuous	-27.726	-28.635	-21.616
	256QAM	Continuous	-27.606	-28.651	-21.075
		Discontinuous	-27.954	-29.120	-21.162

LTE Band 5 10 MHz + 5 MHz + 10 MHz 3 Carrier

Port Number	Modulation	Channel	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 10 MHz	Low Edge – 10 MHz ~ Low Edge – 1 MHz
0	QPSK	Middle	-29.580	-40.879	-34.166	-26.560
	16QAM	Middle	-29.582	-39.419	-34.047	-27.032
	64QAM	Middle	-30.109	-39.971	-34.175	-25.309
	256QAM	Middle	-28.582	-38.672	-33.936	-26.383
1	QPSK	Middle	-28.915	-38.838	-33.711	-25.915
	16QAM	Middle	-28.797	-40.046	-34.430	-25.709
	64QAM	Middle	-27.641	-39.025	-34.097	-24.688
	256QAM	Middle	-28.637	-39.785	-33.729	-27.187
2	QPSK	Middle	-29.775	-38.816	-33.813	-24.480
	16QAM	Middle	-30.033	-40.225	-34.082	-24.341
	64QAM	Middle	-29.488	-39.070	-34.325	-26.245
	256QAM	Middle	-28.289	-38.919	-33.917	-25.564
3	QPSK	Middle	-29.801	-39.162	-34.368	-25.886
	16QAM	Middle	-27.794	-38.778	-34.181	-27.067
	64QAM	Middle	-28.201	-38.831	-33.994	-26.166
	256QAM	Middle	-29.027	-39.868	-34.472	-26.768

Test Data of Suprious Emissions_Above High Edge

Port Number	Modulation	Channel	Measured emission (dBm)		
			High Edge + 1 MHz ~ High Edge + 10 MHz	High Edge + 10 MHz ~ 1 GHz	1 GHz ~ 10 GHz
0	QPSK	Middle	-25.792	-28.882	-21.827
	16QAM	Middle	-27.094	-29.040	-21.333
	64QAM	Middle	-26.125	-28.367	-21.608
	256QAM	Middle	-26.852	-29.000	-21.215
1	QPSK	Middle	-25.027	-29.011	-21.817
	16QAM	Middle	-24.658	-28.443	-21.311
	64QAM	Middle	-26.210	-28.780	-21.249
	256QAM	Middle	-26.153	-28.605	-21.344
2	QPSK	Middle	-26.514	-29.008	-21.330
	16QAM	Middle	-25.924	-28.145	-21.954
	64QAM	Middle	-25.023	-28.590	-21.630
	256QAM	Middle	-26.087	-29.032	-21.253
3	QPSK	Middle	-27.111	-29.288	-21.630
	16QAM	Middle	-25.565	-28.778	-21.426
	64QAM	Middle	-25.876	-28.973	-21.829
	256QAM	Middle	-26.694	-28.910	-21.016

2 Paths 8.3W_NB-IoT_1 Carrier

Test Data of Suprious Emissions_Below Low Edge (2 Paths / QPSK)

Port Number	Channel	Frequency (MHz)	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 200 MHz	Low Edge – 200 MHz ~ Low Edge – 2 MHz
0	Lower	746.20	-38.294	-48.698	-39.326	-38.500
	Upper	755.80	-37.735	-47.842	-38.893	-38.861
1	Lower	746.20	-38.259	-47.799	-39.342	-40.656
	Upper	755.80	-36.085	-47.493	-39.017	-39.570

Test Data of Suprious Emissions_Above High Edge1 GHz (2 Paths / QPSK)

Port Number	Channel	Frequency (MHz)	Measured emission (dBm)	
			High Edge + 2 MHz ~ High Edge + 200 MHz	High Edge + 200 MHz ~ 10 GHz
0	Lower	746.20	-27.013	-34.092
	Upper	755.80	-27.404	-33.406
1	Lower	746.20	-27.275	-33.469
	Upper	755.80	-27.202	-33.191

Test Data of Additional Suprious Emissions for 700 MHz Band (2 Paths / QPSK)

Port Number	Channel	Frequency (MHz)	Measured emission (dBm)						
			763 MHz ~ 775 MHz	793 MHz ~ 805 MHz	1 559 MHz ~ 1 610 MHz	1 559 MHz ~ 1 573 MHz	1 573 MHz ~ 1 587 MHz	1 587 MHz ~ 1 601 MHz	1 601 MHz ~ 1 610 MHz
0	Lower	746.20	-60.497	-60.881	-43.714	-75.496	-75.948	-75.727	-75.775
	Upper	755.80	-59.691	-59.989	-44.254	-76.154	-75.927	-75.491	-75.312
1	Lower	746.20	-59.265	-60.113	-45.421	-76.039	-76.100	-75.299	-75.642
	Upper	755.80	-59.686	-61.123	-44.746	-75.984	-75.866	-75.534	-75.419

2 Paths 8.3W_NB-IoT_2 Carrier

Test Data of Suprious Emissions_Below Low Edge (2 Paths / QPSK)

Port Number	Channel (Discontinuous)	Frequency (MHz)	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 200 MHz	Low Edge – 200 MHz ~ Low Edge – 2 MHz
0	Middle	751.00	-37.695	-43.001	-36.104	-36.526
1	Middle	751.00	-38.107	-41.469	-35.184	-36.451

Test Data of Suprious Emissions_Above High Edge1 GHz (2 Paths / QPSK)

Port Number	Channel (Discontinuous)	Frequency (MHz)	Measured emission (dBm)	
			High Edge + 2 MHz ~ High Edge + 200 MHz	High Edge + 200 MHz ~ 10 GHz
0	Middle	751.00	-26.980	-33.836
1	Middle	751.00	-26.371	-33.910

Test Data of Additional Suprious Emissions for 700 MHz Band (2 Paths / QPSK)

Port Number	Channel (Discontinuous)	Frequency (MHz)	Measured emission (dBm)						
			763 MHz ~ 775 MHz	793 MHz ~ 805 MHz	1 559 MHz ~ 1 610 MHz	1 559 MHz ~ 1 573 MHz	1 573 MHz ~ 1 587 MHz	1 587 MHz ~ 1 601 MHz	1 601 MHz ~ 1 610 MHz
0	Middle	751.00	-47.037	-60.444	-43.926	-75.527	-75.063	-75.102	-74.493
1	Middle	751.00	-47.272	-59.865	-43.169	-74.928	-74.323	-74.925	-74.473

4 Paths 5.5W_NB-IoT_1 Carrier

Test Data of Suprious Emissions_Below Low Edge (4 Paths / QPSK)

Port Number	Channel	Frequency (MHz)	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 200 MHz	Low Edge – 200 MHz ~ Low Edge – 2 MHz
0	Lower	746.20	-38.252	-48.462	-39.597	-39.324
	Upper	755.80	-37.837	-48.673	-39.296	-38.739
1	Lower	746.20	-37.785	-49.343	-39.529	-39.958
	Upper	755.80	-40.072	-48.993	-39.142	-40.125
2	Lower	746.20	-39.897	-49.932	-39.499	-40.389
	Upper	755.80	-38.143	-50.037	-39.620	-40.681
3	Lower	746.20	-37.384	-49.002	-39.668	-39.906
	Upper	755.80	-38.476	-49.656	-39.334	-39.608

Test Data of Suprious Emissions_Above High Edge (4 Paths / QPSK)

Port Number	Channel	Frequency (MHz)	Measured emission (dBm)	
			High Edge + 2 MHz ~ High Edge + 200 MHz	High Edge + 200 MHz ~ 10 GHz
0	Lower	746.20	-27.423	-33.463
	Upper	755.80	-27.296	-33.683
1	Lower	746.20	-26.925	-33.849
	Upper	755.80	-26.909	-32.977
2	Lower	746.20	-27.439	-34.177
	Upper	755.80	-27.460	-34.069
3	Lower	746.20	-27.348	-33.805
	Upper	755.80	-26.867	-33.921

Test Data of Additional Suprious Emissions for 700 MHz Band (4 Paths / QPSK)

Port Number	Channel	Frequency (MHz)	Measured emission (dBm)						
			763 MHz ~ 775 MHz	793 MHz ~ 805 MHz	1 559 MHz ~ 1 610 MHz	1 559 MHz ~ 1 573 MHz	1 573 MHz ~ 1 587 MHz	1 587 MHz ~ 1 601 MHz	1 601 MHz ~ 1 610 MHz
0	Lower	746.20	-61.089	-61.131	-45.624	-76.973	-77.013	-76.579	-76.527
	Upper	755.80	-60.240	-60.705	-45.049	-76.865	-76.7	-76.74	-76.019
1	Lower	746.20	-60.637	-60.823	-45.397	-76.739	-76.42	-76.686	-76.066
	Upper	755.80	-60.454	-60.449	-44.974	-77.094	-76.675	-76.281	-76.485
2	Lower	746.20	-61.083	-60.808	-45.405	-75.800	-76.906	-76.502	-75.993
	Upper	755.80	-60.370	-61.020	-45.326	-76.663	-76.797	-76.467	-76.699
3	Lower	746.20	-60.726	-61.482	-45.702	-77.026	-76.573	-76.672	-76.745
	Upper	755.80	-60.685	-61.057	-45.990	-76.845	-76.636	-77.732	-79.476

4 Paths 5.5W_NB-IoT_2 Carrier

Test Data of Suprious Emissions_Below Low Edge (4 Paths / QPSK)

Port Number	Channel (Discontinuous)	Frequency (MHz)	Measured emission (dBm)			
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 200 MHz	Low Edge – 200 MHz ~ Low Edge – 2 MHz
0	Middle	751.00	-37.729	-45.392	-38.556	-38.730
1	Middle	751.00	-37.400	-43.733	-35.931	-37.840
2	Middle	751.00	-37.996	-44.330	-39.425	-40.045
3	Middle	751.00	-38.843	-45.129	-38.974	-37.955

Test Data of Suprious Emissions_Above High Edge1 GHz (4 Paths / QPSK)

Port Number	Channel (Discontinuous)	Frequency (MHz)	Measured emission (dBm)	
			High Edge + 2 MHz ~ High Edge + 200 MHz	High Edge + 200 MHz ~ 10 GHz
0	Middle	751.00	-27.277	-33.451
1	Middle	751.00	-27.235	-32.855
2	Middle	751.00	-27.024	-33.862
3	Middle	751.00	-27.186	-33.560

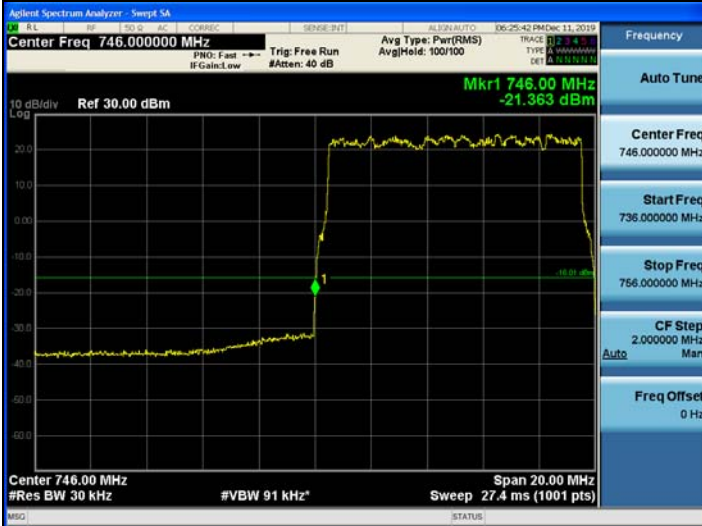
Test Data of Additional Suprious Emissions for 700 MHz Band (4 Paths / QPSK)

Port Number	Channel (Discontinuous)	Frequency (MHz)	Measured emission (dBm)						
			763 MHz ~ 775 MHz	793 MHz ~ 805 MHz	1 559 MHz ~ 1 610 MHz	1 559 MHz ~ 1 573 MHz	1 573 MHz ~ 1 587 MHz	1 587 MHz ~ 1 601 MHz	1 601 MHz ~ 1 610 MHz
0	Middle	751.00	-50.341	-60.497	-43.796	-76.435	-75.759	-76.159	-75.916
1	Middle	751.00	-47.465	-60.462	-44.372	-75.792	-75.512	-75.472	-75.350
2	Middle	751.00	-49.357	-60.600	-44.325	-75.547	-76.131	-75.407	-75.255
3	Middle	751.00	-47.992	-60.804	-44.743	-76.047	-75.765	-75.773	-76.667

LTE Band 13 10 MHz 1 Carrier
Band Edge Test Plots at Output Port 1

16QAM

Left band edge



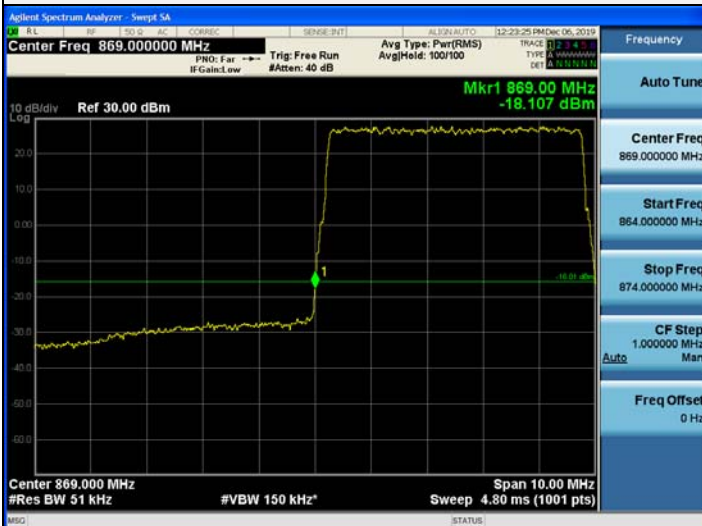
Right band edge



LTE Band 5 5 MHz 1 Carrier
Band Edge Test Plots at Output Port 1

64QAM

Left band edge



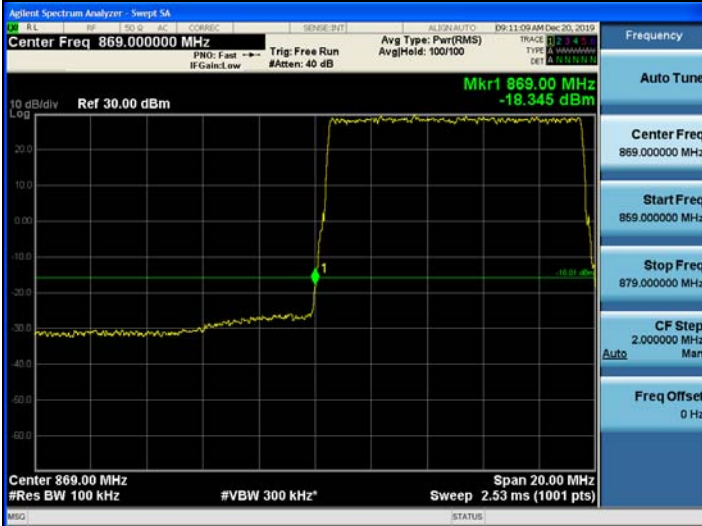
Right band edge



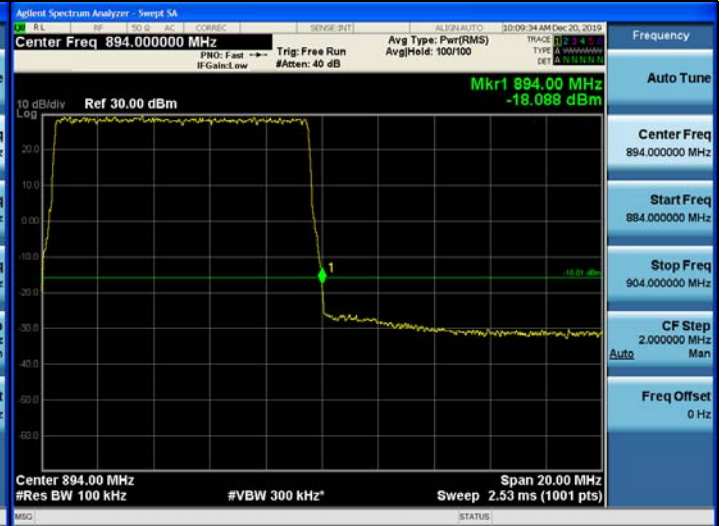
LTE Band 5 10 MHz 1 Carrier
Band Edge Test Plots at Output Port 1

64QAM

Left band edge



Right band edge



LTE Band 5 5 MHz + 5 MHz 2 Carrier
Band Edge Test Plots at Output Port 0

QPSK

Left band edge



Right band edge



LTE Band 5 10 MHz + 10 MHz 2 Carrier

Band Edge Test Plots at Output Port 1

256QAM

Left band edge



Right band edge

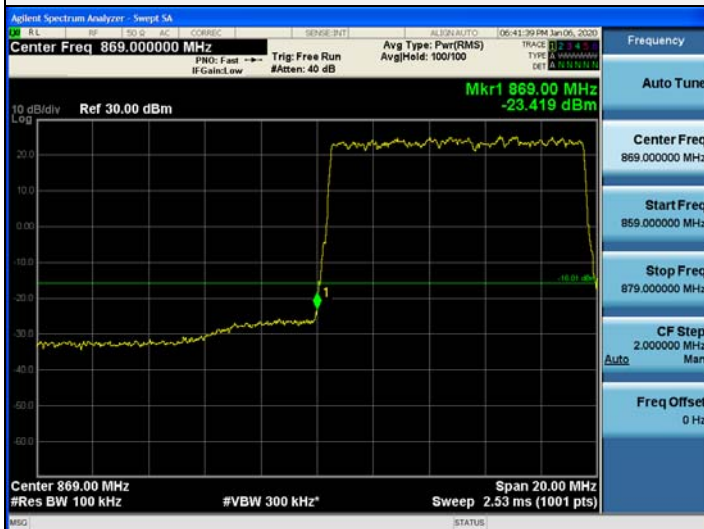


LTE Band 5 10 MHz + 5 MHz + 10 MHz 3 Carrier

Band Edge Test Plots at Output Port 1

16QAM

Left band edge



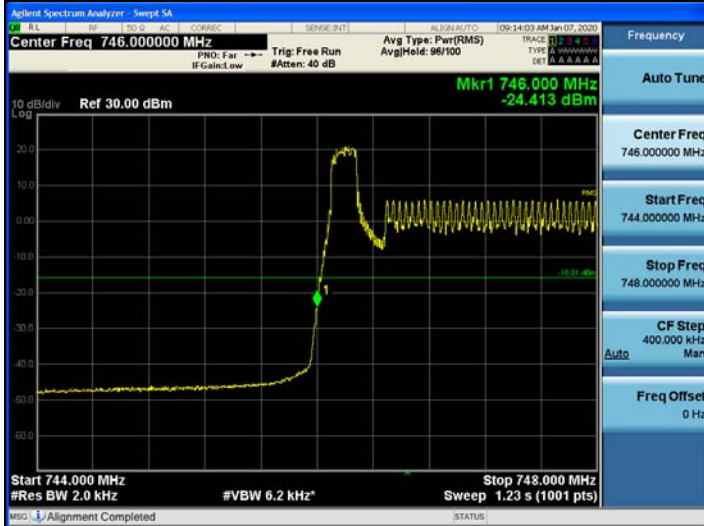
Right band edge



2 Paths 8.3W_NB-IoT_1 Carrier Band Edge Test Plots at Output Port 0

QPSK

Left band edge



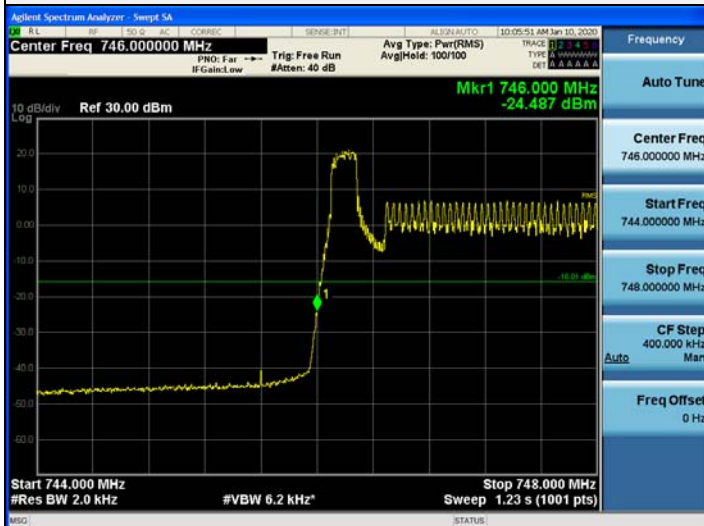
Right band edge



2 Paths 8.3W_NB-IoT_2 Carrier Band Edge Test Plots at Output Port 1

QPSK

Left band edge



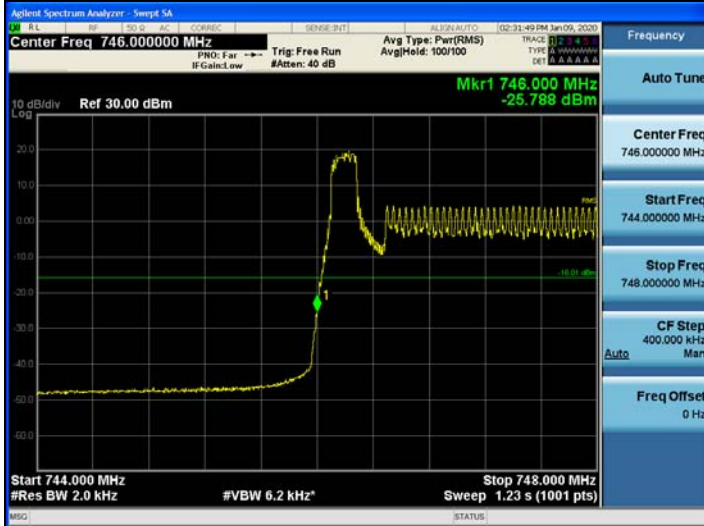
Right band edge



4 Paths 5.5W_NB-IoT_1 Carrier Band Edge Test Plots at Output Port 0

QPSK

Left band edge



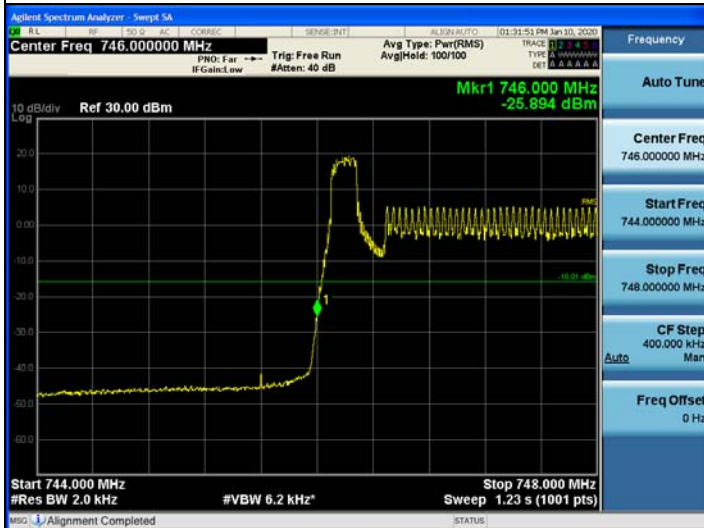
Left band edge



4 Paths 5.5W_NB-IoT_2 Carrier Band Edge Test Plots at Output Port 1

QPSK

Left band edge

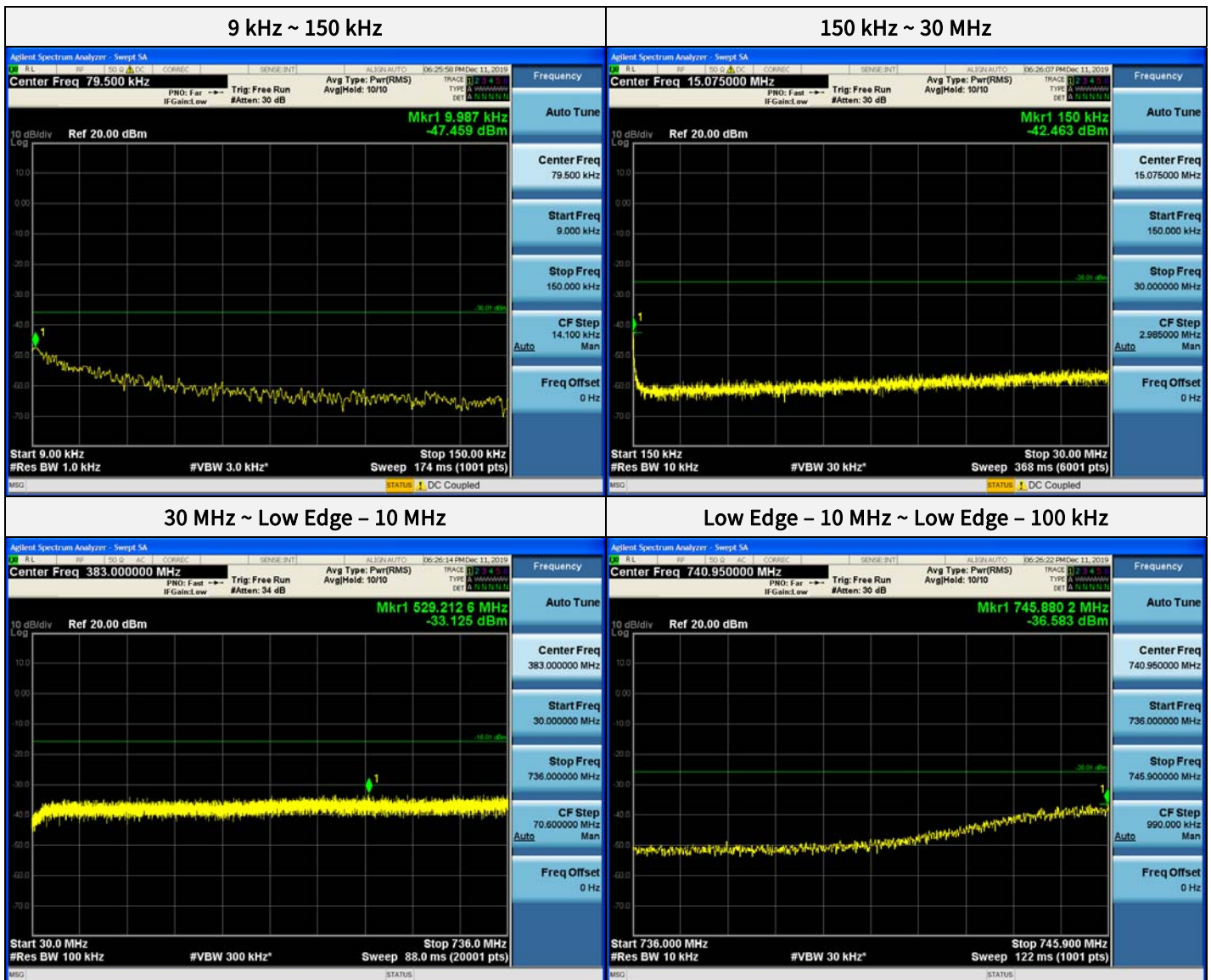


Right band edge



LTE Band 13 10 MHz 1 Carrier

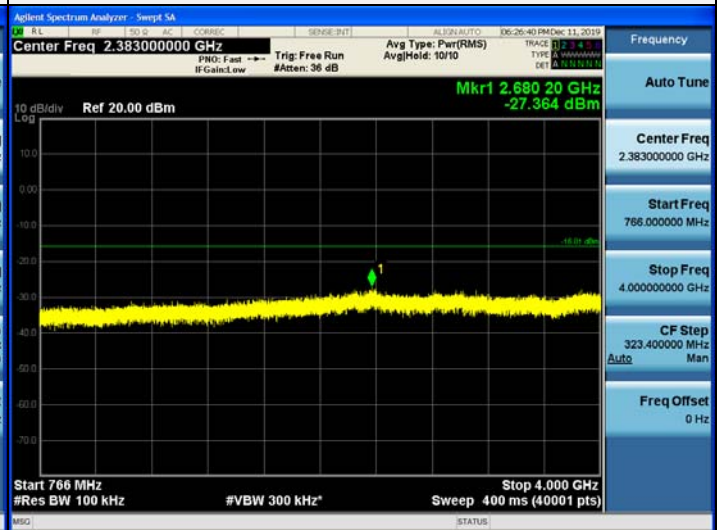
Spurious Emissions Test Plots at Output Port 1 (4 Paths / 16QAM / Middle)



High Edge + 100 kHz ~ High Edge + 10 MHz



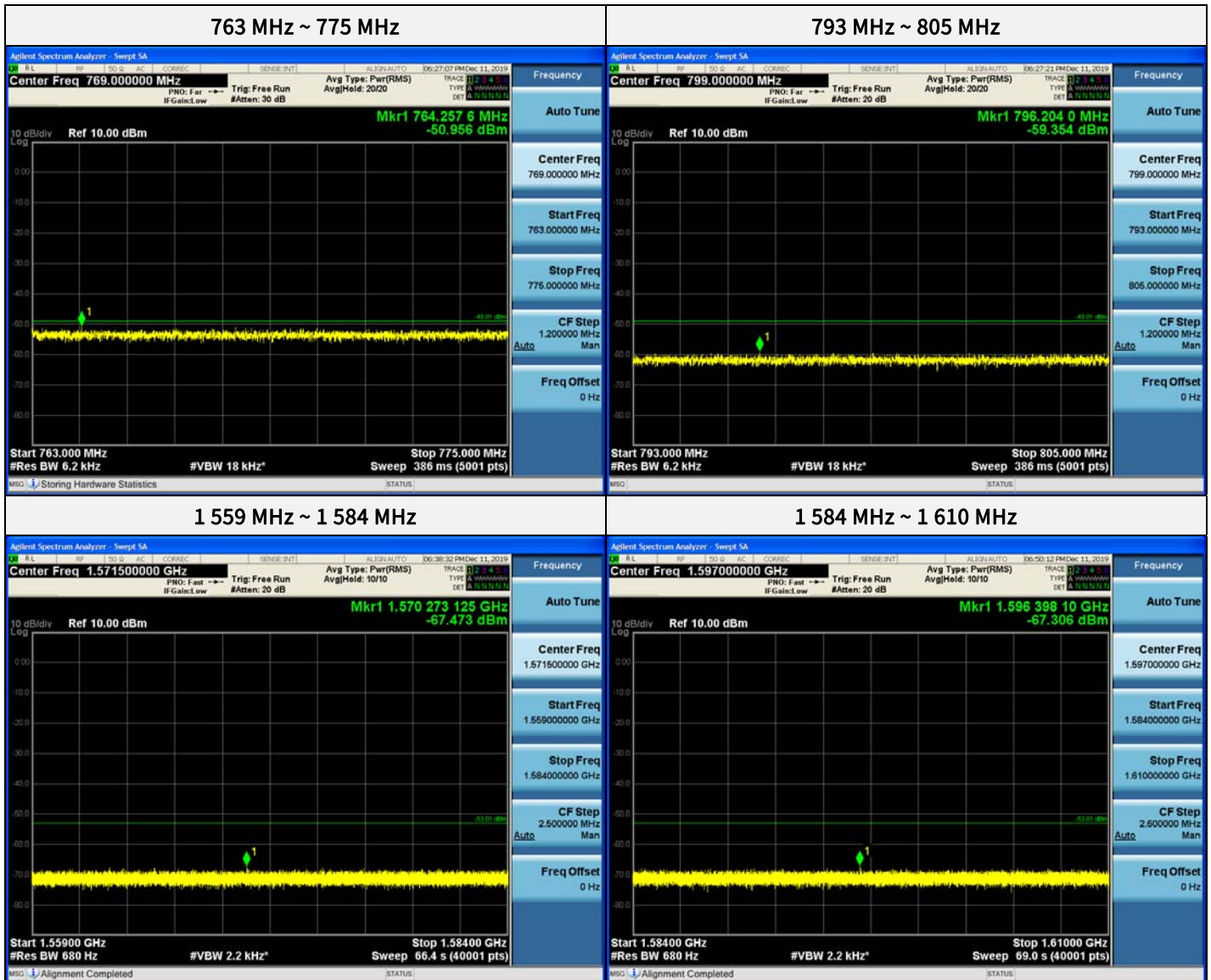
High Edge + 10 MHz ~ 4 GHz



4 GHz ~ 8 GHz

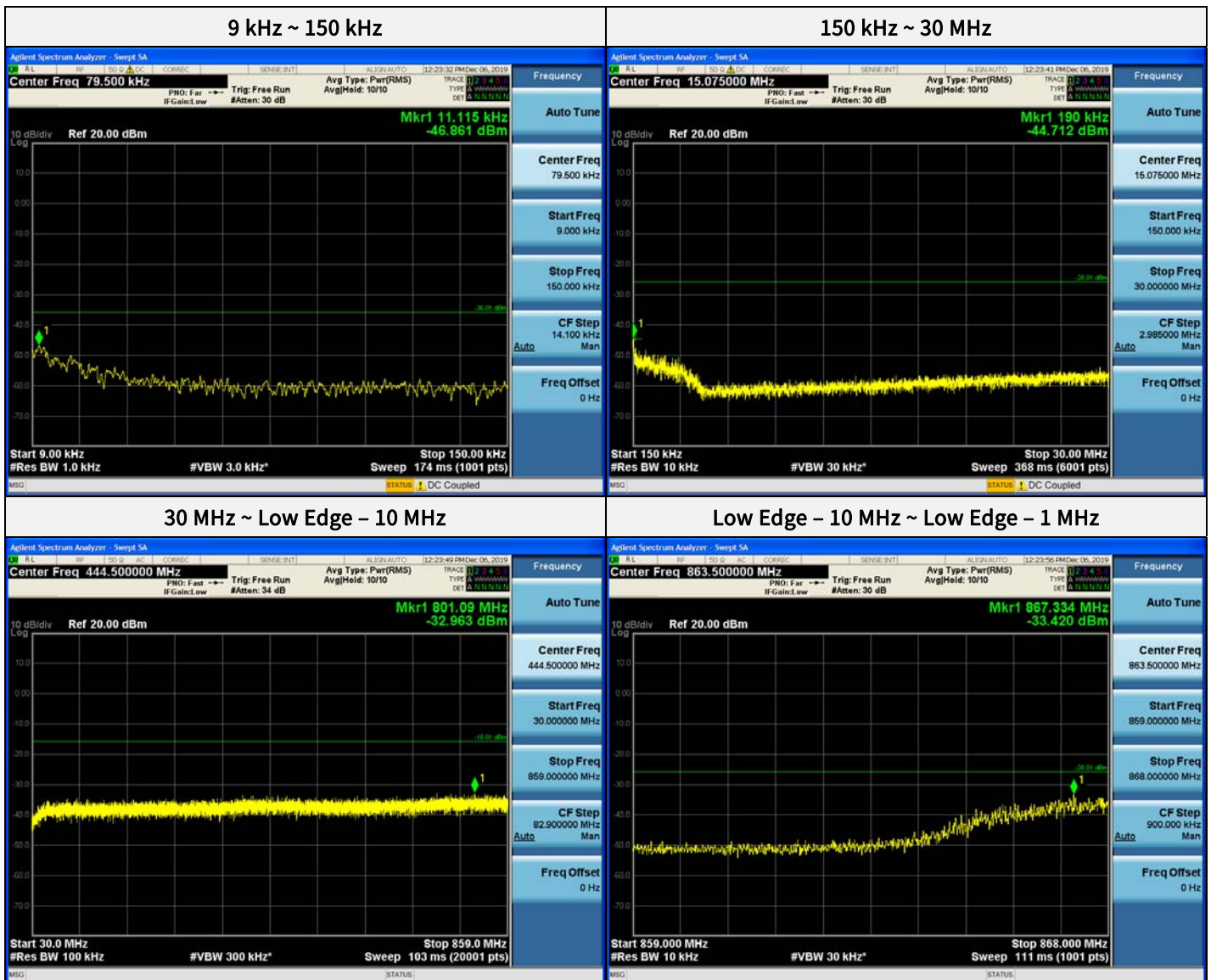


Additional Spurious Emissions Test Plots at Output Port 1 (4 Paths / 16QAM / Middle)

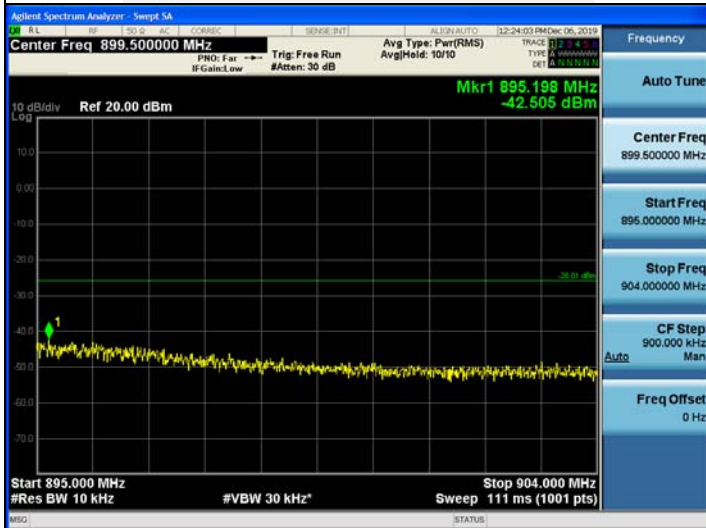


LTE Band 5 5 MHz 1 Carrier

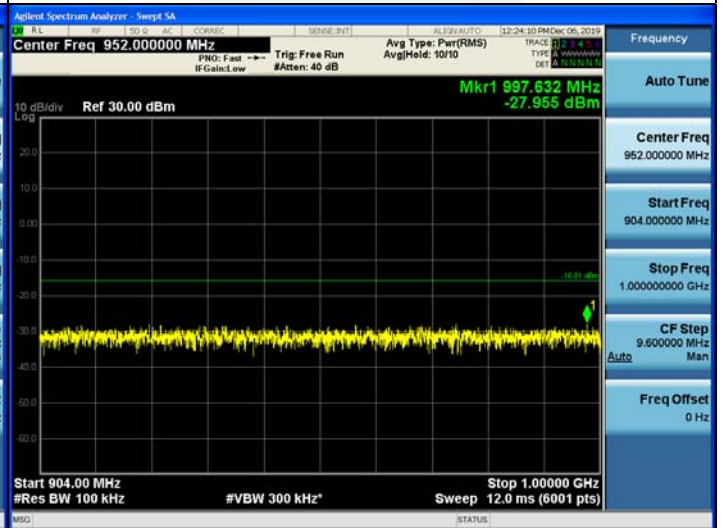
Spurious Emissions Test Plots at Output Port 1 (4 Paths / 64QAM / Low)



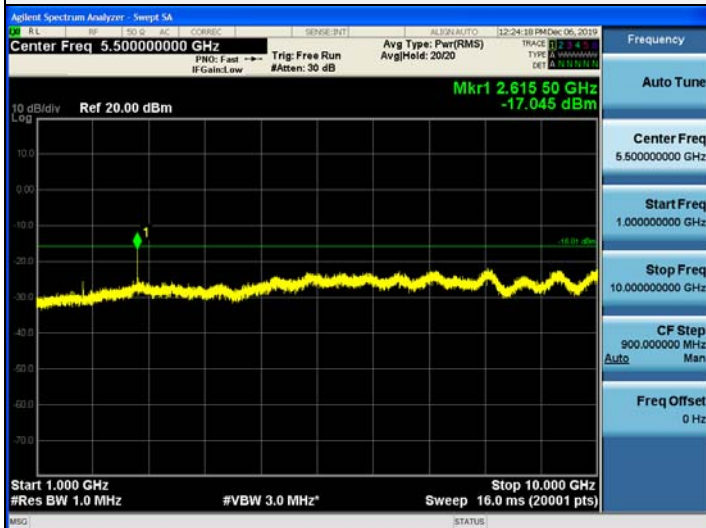
High Edge + 1 MHz ~ High Edge + 10 MHz



High Edge + 10 MHz ~ 1 GHz



1 GHz ~ 10 GHz



Spurious Emissions Test Plots at Output Port 1 (4 Paths / 64QAM / Middle)

