FCC Radio Test Report

FCC ID: 2APBP-CS20

Original Grant

Report No.	:	TB-FCC176393
Applicant	:	Ciontek Technology Corp.
Equipment Under Test (EUT)		
EUT Name	:	Mobile Smart POS
Model No.	:	CS20
Series Model No.	:	CS20A, CS20B, CS20C, CS21, CS20PRO, CS20LITE, CS20S, CS20V, CS20MINI
Brand Name	:	Ciontek
Sample ID	:	TBBJ-20200916-08_1-01& TBBJ-20200916-08_1-02
Receipt Date	:	2020-09-29
Test Date	:	2020-09-30 to 2020-12-14
Issue Date	:	2020-12-14
Standards	:	47 CFR Part 2, 22(H), 24(E), 27
Test Method	:	ANSI C63.26 2015
Conclusions	:	**PASS**

In the configuration tested, the EUT complied with the standards specified above,

The EUT technically complies with the FCC requirements

Test/Witness Engineer	:	Rebeca
Engineer Supervisor	:	Ivan Su
Engineer Manager	:	Ray Lai

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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Revision History

Report No.	Version	Description	Issued Date
TB-FCC176393	Rev.01	Initial issue of report	2020-12-14

1. General Information about EUT

1.1 Client Information

Applicant	:	Ciontek Technology Corp.
Address	:	B501, Chanxueyan Building Wuhan University, No.6 Of Yuexing 2nd Road, Yuehai Street, Nanshan District, Shenzhen, China
Manufacturer	:	Ciontek Technology Corp.
Address	:	B501, Chanxueyan Building Wuhan University, No.6 Of Yuexing 2nd Road, Yuehai Street, Nanshan District, Shenzhen, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Mobile Smart POS	
Models No.	:	CS20 , CS20A, CS20B, CS20C, CS21, CS20PRO, CS20LITE, CS20S, CS20V, CS20MINI	
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, The only difference is appearance color.	
Product Description	:	Frequency Bands: LTE Band 2:TX: 1850MHz-1910MHz, RX: 1930MHz-1990MHz LTE Band 4:TX: 1710MHz-1755MHz, RX: 2110MHz-2155MHz LTE Band 5:TX: 824MHz-849MHz, RX: 869MHz-894MHz LTE Band 12: TX: 699MHz -716MHz, RX: 729MHz-746MHz LTE Band 17: TX: 704MHz -716MHz, RX: 734MHz-746MHz	
		Antenna Type:	0.75dBi PIFA Antenna
		Modulation Type:	QPSK, 16QAM
		Bandwidth:	LTE Band 2 :1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz LTE Band 4 :1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz LTE Band 5 :1.4MHz/3MHz/5MHz/10MHz LTE Band 12 :1.4MHz/3MHz/5MHz/10MHz LTE Band 17 : 5MHz/10MHz
Power Rating	:	DC 5V from Adapter(XS12-050200U): Input: AC 100-240V, 50/60Hz 0.5A Output: DC 5V, 2A DC 3.80V by 3500mAh Li-ion Polymer Battery	
Software Version	:	A50_V0.07_20200922C	
Hardware Version	:	CS20HWV2.0	
Remark	:	The antenna gain and adapter provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.	

Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

(2) Channel List

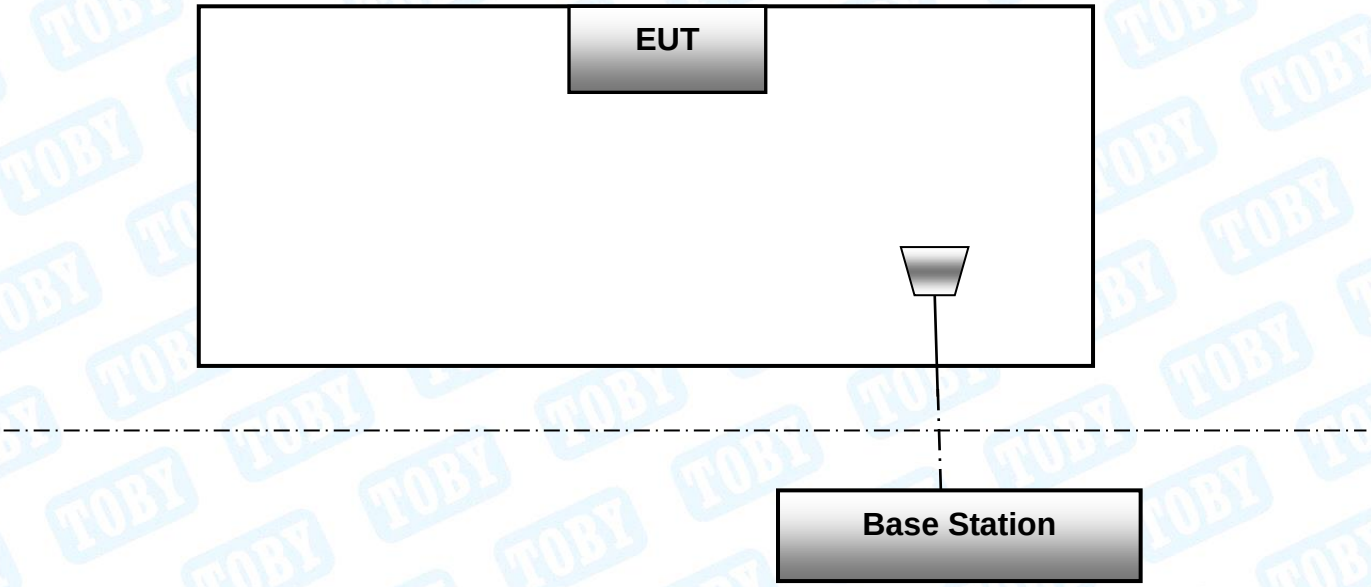
LTE Band 2(1.4MHz)		LTE Band 2(3MHz)	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
18607	**1850.70**	**18615**	**1851.50**
18608	1850.80	18616	1851.60
…...	……	…...	……
18899	1879.90	18899	1879.90
18900	**1880.00**	**18900**	**1880.00**
18901	1880.10	18901	1880.10
……	…..	……	…..
19192	1909.20	19184	1905.40
19193	**1909.30**	**19185**	**1908.50**
LTE Band 2(5MHz)		**LTE Band 2(10MHz)**	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
18625	**1852.50**	**18650**	**1855.00**
18616	1853.60	18626	1854.90
…...	……	…...	……
18899	1879.90	18899	1879.90
18900	**1880.00**	**18900**	**1880.00**
18901	1880.10	18901	1880.10
……	…..	……	…..
19174	1908.40	19149	1907.90
19175	**1907.50**	**19150**	**1905.00**
LTE Band 2(15MHz)		**LTE Band 2(20MHz)**	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
18675	**1857.50**	**18700**	**1860.00**
18676	1857.60	18701	1860.10
…...	……	…...	……
18899	1879.90	18899	1879.90
18900	**1880.00**	**18900**	**1880.00**
18901	1880.10	18901	1880.10
……	…..	……	…..
19124	1902.40	19099	1899.90
19125	**1902.50**	**19100**	**1900.00**
LTE Band 4(1.4MHz)		**LTE Band 4(3MHz)**	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
19957	**1710.70**	**19965**	**1711.50**
19958	1710.80	19966	1711.60
…...	……	…...	……

20174	1732.40	20174	1732.40
20175	**1732.50**	**20175**	**1732.50**
20176	1732.60	20176	1732.60
……	…..	……	…..
20392	1754.20	20384	1753.40
20393	**1754.30**	**20385**	**1753.50**
LTE Band 4(5MHz)		**LTE Band 4(10MHz)**	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
19975	**1712.50**	**20000**	**1715.00**
19976	1712.60	20001	1715.10
…...	……	…...	……
20174	1732.40	20174	1732.40
20175	**1732.50**	**20175**	**1732.50**
20176	1732.60	20176	1732.60
……	…..	……	…..
20374	1752.40	20349	1749.90
20375	**1752.50**	**20350**	**1750.00**
LTE Band 4(15MHz)		**LTE Band 4(20MHz)**	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
20025	**1717.50**	**20050**	**1720.00**
20026	1717.60	20051	1720.10
…...	……	…...	……
20174	1732.40	20174	1732.40
20175	**1732.50**	**20175**	**1732.50**
20176	1732.60	20176	1732.60
……	…..	……	…..
20324	1747.40	20299	1744.90
20325	**1747.50**	**20300**	**1745.00**

LTE Band 5(1.4MHz)		LTE Band 5(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20407	**824.70**	**20415**	**825.50**
20408	824.80	20416	825.60
…...	……	…...	……
20524	836.40	20524	836.40
20525	**836.50**	**20525**	**836.50**
20526	836.60	20526	836.60
……	…..	……	…..
20643	848.20	20634	847.40
20643	**848.30**	**20635**	**847.50**
LTE Band 5(5MHz)		LTE Band 5(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20425	**826.50**	**20450**	**829.00**
20426	826.60	20451	829.10
…...	……	…...	……
20524	836.40	20524	836.40
20525	**836.50**	**20525**	**836.50**
20526	836.60	20526	836.60
……	…..	……	…..
20624	846.40	20599	843.90
20625	**846.50**	**20600**	**844.00**
LTE Band 12(1.4MHz)		LTE Band 12(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
23017	**699.70**	**23025**	**700.50**
23018	699.80	23026	700.60
…...	……	…...	……
23094	707.40	23094	707.40
23095	**707.50**	**23095**	**707.50**
23096	707.60	23096	707.60
……	…..	……	…..
23172	715.20	23164	714.30
23173	**715.30**	**23165**	**714.40**
LTE Band 12(5MHz)		LTE Band 12(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
23035	**701.50**	**23060**	**704.00**
23036	701.40	23061	703.90
…...	……	…...	……
23094	707.40	23094	707.40
23095	**707.50**	**23095**	**707.50**
23096	707.60	23096	707.60
……	…..	……	…..

23156	713.40	23129	710.90
23155	**713.50**	**23130**	**711.00**
LTE Band 17(5MHz)		**LTE Band 17(10MHz)**	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
23755	**706.50**	**23780**	**709.00**
23756	706.60	23781	709.10
…...	……	…...	……
23789	709.90	23789	709.90
23790	**710.00**	**23790**	**710.00**
23791	710.10	23791	710.10
……	…..	……	…..
23524	713.40	23799	710.90
23825	**713.50**	**23800**	**711.00**

1.3 Block Diagram Showing the Configuration of System Tested



The above block diagram of setup is the normal mode. And more detail please refer to the test setup of each test item of bellow.

1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Description of Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 v03r01 and ANSI C63.26 2015 Power Meas. License Digital Systems with maximum output power. Radiated measurements are performed by rotating the EUT in three different ortho-gonal test planes to find the maximum emission.

Remark:

1. The mark “v “ means that this configuration is chosen for testing
2. The mark “--“ means that this bandwidth is not supported.
3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated

ITEMS	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
RF Output Power	2	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	4	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	5	V	V	V	V	--	--	V	V	V	V	V	V	V	V
	12	V	V	V	V	--	--	V	V	V	V	V	V	V	V
	17	--	--	V	V	--	--	V	V	V	V	V	V	V	V
Peak-to-Average Ratio	2	--	--	--	--	--	V	V	V			V	V	V	V
	4	--	--	--	--	--	V	V	V			V	V	V	V
	5	--	--	--	V	--	--	V	V			V	V	V	V
	12	--	--	--	V	--	--	V	V			V	V	V	V
	17	--	--	--	V	--	--	V	V			V	V	V	V
99% & -26 dB Occupied Bandwidth	2	V	V	V	V	V	V	V	V	V			V	V	V
	4	V	V	V	V	V	V	V	V	V			V	V	V
	5	V	V	V	V	--	--	V	V	V			V	V	V
	12	V	V	V	V	--	--	V	V	V			V	V	V
	17	--	--	V	V	--	--	V	V	V			V	V	V
Spurious Emissions at Antenna Terminal	2	V	V	V	V	V	V	V	V	V		V	V	V	V
	4	V	V	V	V	V	V	V	V	V		V	V	V	V
	5	V	V	V	V	--	--	V	V	V		V	V	V	V
	12	V	V	V	V	--	--	V	V	V		V	V	V	V
	17	--	--	V	V	--	--	V	V	V		V	V	V	V
Field Strength of Spurious Radiation	2	--	--	--	--	--	V	V	--	V				V	
	4	--	--	--	--	--	V	V	--	V				V	
	5	--	--	--	V	--	--	V	--	V				V	
	12	--	--	--	V	--	--	V	--	V				V	
	17	--	--	--	V	--	--	V	--	V				V	

Out of band emission Band Edge	2	V	V	V	V	V	V	V	V	V		V	V		V
	4	V	V	V	V	V	V	V	V	V		V	V		V
	5	V	V	V	V	--	--	V	V	V		V	V		V
	12	V	V	V	V	--	--	V	V	V		V	V		V
	17	--	--	V	V	--	--	V	V	V		V	V		V
Frequency stability	2	--	--	--	--	--	V	V	V	V				V	
	4	--	--	--	--	--	V	V	V	V				V	
	5	--	--	--	V	--	--	V	V	V				V	
	12	--	--	--	V	--	--	V	V	V				V	
	17	--	--	--	V	--	--	V	V	V				V	

Note: (1) During the testing procedure, the EUT is in link mode with base station emulator at maximum power level in each test mode.

(2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on Z-plane as the normal use. Therefore only the test data of this Z-plane was used for radiated emission measurement test.

1.6 Measurement Uncertainty

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
RF Power, conducted	/	±0.82 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB

1.7 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025：2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A.

2. Test Summary

Test Item	Section in CFR 47	Result
RF Output Power	Part 2.1046 Part 22.913(a)(2) Part 24.232(c) Part 27.50 (b)(10) Part 27.50 (d)(4) Part 27.50 (h)(2)	**PASS**
Peak-to-Average Ratio	Part 24.232(d) Part 27.50(d)(5)	**PASS**
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917(a) Part 24.238(b) Part 27.53(h) Part 27.53(m)	**PASS**
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 24.238(a) Part 27.53 (h) Part 27.53(m)	**PASS**
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917(a) Part 24.238(a) Part 27.53 (h) Part 27.53(m)	**PASS**
Out of band emission, Band Edge	Part 24.238(a) Part 22.917(a) Part 27.53 (h) Part 27.53(m)	**PASS**
Frequency stability vs. temperature	Part 27.54 Part 24.235 Part 22.355 Part 2.1055(a)(1)(b)	**PASS**
Frequency stability vs. voltage	Part 27.54 Part 24.235 Part 22.355 Part 2.1055(d)(2)	**PASS**
Pass: The EUT complies with the essential requirements in the standard.		

3. Test Equipment

Radiation Emission Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal. Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 06, 2020	Jul. 05, 2021
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 06, 2020	Jul. 05, 2021
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 06, 2020	Jul. 05, 2021
Wideband Radio Comunication Tester	Rohde & Schwarz	CMW500	144382	Sep. 11, 2020	Sep. 10, 2021
Universal Radio Communication Tester	Rohde&Schwarz	CMU200	103903	Jul. 06, 2020	Jul. 05, 2021
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	BBHA 9170	BBHA9170582	Mar.01, 2020	Feb. 28, 2022
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 07, 2020	Jul. 06, 2021
Pre-amplifier	Sonoma	310N	185903	Mar.01, 2020	Feb. 28, 2021
Pre-amplifier	HP	8449B	3008A00849	Mar.01, 2020	Feb. 28, 2021
Pre-amplifier	SKET	LNPA_1840G-50	SK201904032	Mar.01, 2020	Feb. 28, 2021
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.01, 2020	Feb. 28, 2021
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted Emission					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal. Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 06, 2020	Jul. 05, 2021
Wideband Radio Comunication Tester	Rohde & Schwarz	CMW500	144382	Sep. 11, 2020	Sep. 10, 2021
Universal Radio Communication Tester	Rohde&Schwarz	CMU200	103903	Jul. 06, 2020	Jul. 05, 2021
Spectrum Analyzer	Rohde & Schwarz	ESPI	100010/007	Jul. 06, 2020	Jul. 05, 2021
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 11, 2020	Sep. 10, 2021
Vector Signal Generator	Agilent	N5182A	MY50141294	Sep. 11, 2020	Sep. 10, 2021
Analog Signal Generator	Agilent	N5181A	MY50141953	Sep. 11, 2020	Sep. 10, 2021
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO26	Sep. 11, 2020	Sep. 10, 2021
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO29	Sep. 11, 2020	Sep. 10, 2021
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Sep. 11, 2020	Sep. 10, 2021
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO33	Sep. 11, 2020	Sep. 10, 2021

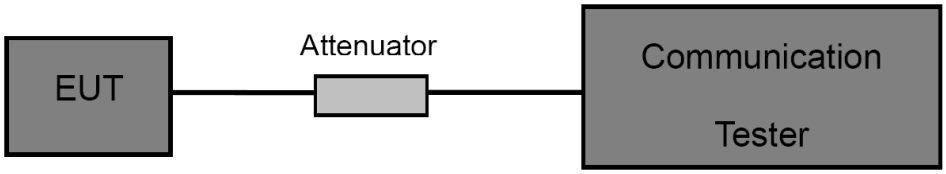
4. Conducted RF Output Power

4.1 Test Standard and Limit

4.1.1 Test Standard

FCC part 2.1046, FCC part 22.913(a)(2),
FCC part 24.232(c), FCC Part 27.50(b)&(d),
FCC Part 27.50 (h)

4.2 Test Setup



4.3 Test Procedure

(1) The EUT is coupled to the Base Station with the suitable Attenuator, the path loss is calibrated to correct the reading.
(2) A call is set up by the Base Station to the generic call set up procedure.
(3) Set EUT at maximum power level through base station by power level command.
(4) Then read record the power value from the Base Station in dBm.

4.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

4.5 Deviation From Test Standard

No deviation

4.6 Test Data

Please refer to the Attachment A.

5. Peak-Average Ratio

5.1 Test Standard and Limit

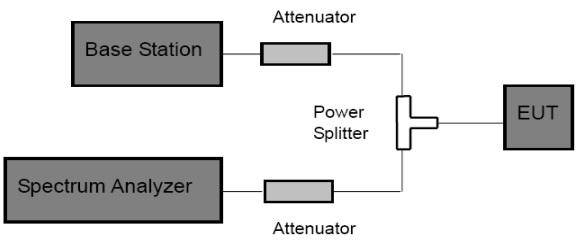
5.1.1 Test Standard

FCC part 24.232(d)
FCC Part 27.50(d), FCC Part 27.50 (h)

5.1.2 Test Limit

Peak-to-Average Ratio
The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

5.2 Test Setup



5.3 Test Procedure

According with KDB 971168
(1) The signal analyzer's CCDF measurement profile is enabled.
(2) Frequency = carrier center frequency.
(3) Measurement BW>Emission bandwidth of signal.
(4) The signal analyzer was set to collect one million samples to generate the CCDF curve.
(5) Set the EUT working in highest power level, measured and recorded the 0.1% as PAPR level.
(6) The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which of the transmitter is operating at maximum power.

5.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

5.5 Deviation From Test Standard

No deviation

5.6 Test Data

Please refer to the Attachment B.

6. Occupied Bandwidth

6.1 Test Standard and Limit

6.1.1 Test Standard

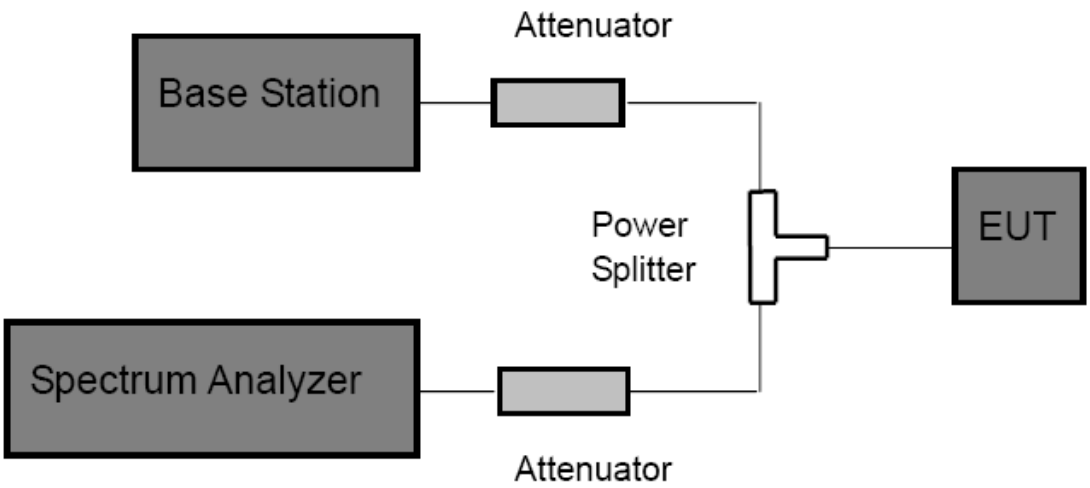
FCC Part 2: 2.1049, FCC Part 22.917(a),
FCC part 24.238(b)
FCC Part 27.53(h)
FCC Part 27.53(m)

6.1.2 Test Requirement

According to FCC section 2.1049, the occupied bandwidth 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.

Occupied bandwidth is also known as 99% power and -26dBC occupied bandwidths.

6.2 Test Setup



6.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) The resolution bandwidth of the Spectrum Analyzer is set to at least 1% of the occupied bandwidth. VBW= 3 times RBW.
(3) The low, middle and the high channels are selected to perform tests respectively.
(4) Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.
(5) Set the Spectrum Analyzer Occupied bandwidth function to measure the 99% occupied bandwidth.

6.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

6.5 Deviation From Test Standard

No deviation

6.6 Test Data

Please refer to the Attachment C.

7. Out of Band Emission at Antenna Terminals

7.1 Test Standard and Limit

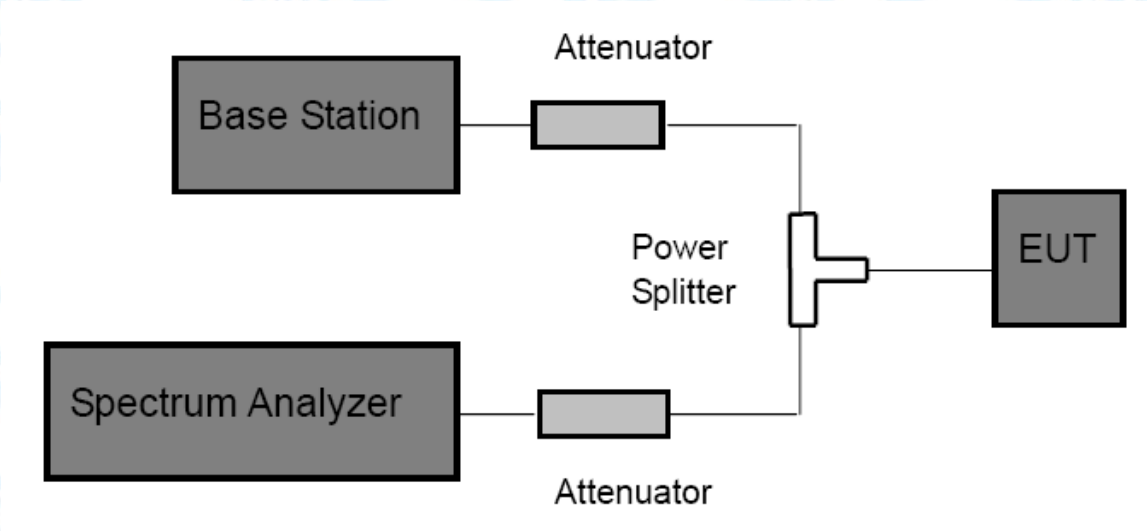
7.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057
FCC Part 22.917(a), FCC part 24.238(a)
FCC Part 27.53 (h),FCC Part 27.53(m)

7.1.2 Test Limit

Band 7: For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.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+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

7.2 Test Setup



7.3 Test Procedure

1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

2 The resolution bandwidth of the spectrum analyzer was set at 100 kHz when below 1GHz, 1MHz when above 1 GHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

3 For the out of band: Set the RBW=100 kHz, VBW=300 kHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic.

4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter.

7.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

7.5 Deviation From Test Standard

No deviation

7.6 Test Data

Please refer to the Attachment D.

8. Band Edge Test

8.1 Test Standard and Limit

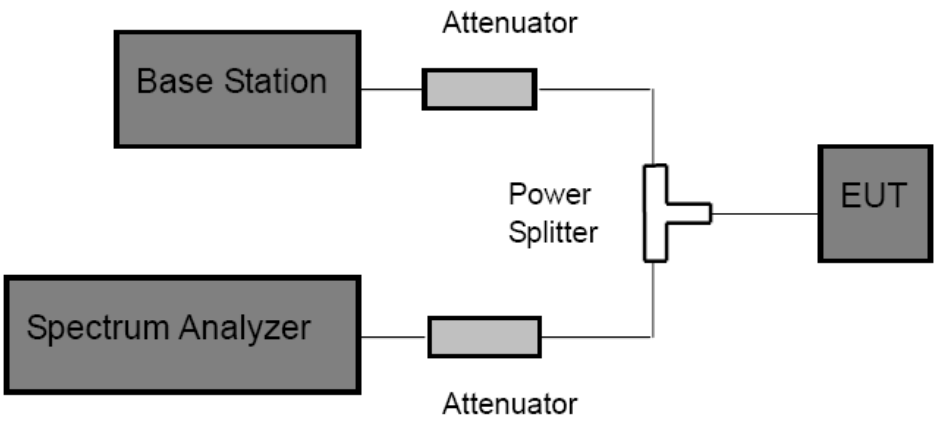
8.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057
FCC Part 22.917(a), FCC part 24.238(a)
FCC Part 27.53 (h),FCC Part 27.53(m)

8.1.2 Test Limit

Band 7: For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.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+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

8.2 Test Setup



8.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter.

8.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

8.5 Deviation From Test Standard

No deviation

8.6 Test Data

Please refer to the Attachment E.

9. Radiated Output Power

9.1 Test Standard and Limit

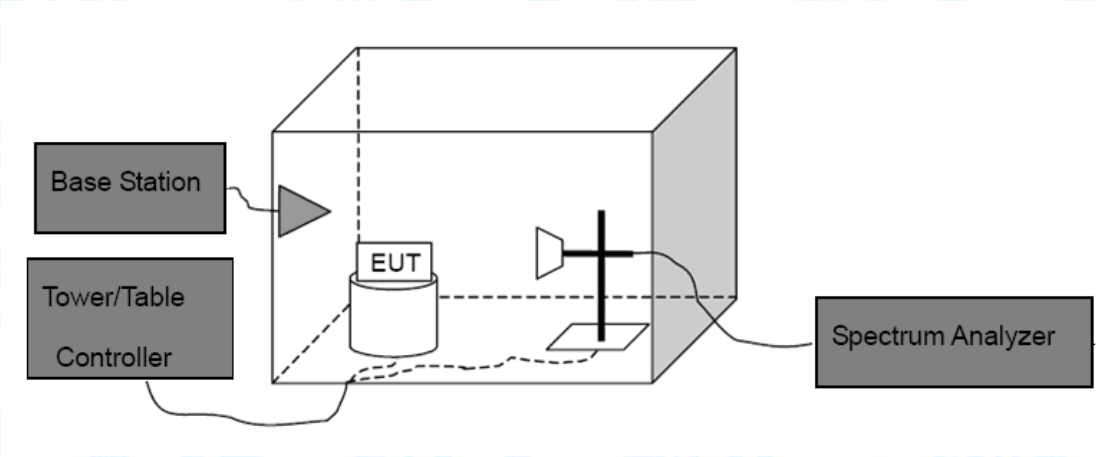
9.1.1 Test Standard

FCC Part 2.1046, FCC Part 22.913(a)(2),
FCC part 24.232(c)
FCC part 27.50(c), FCC part 27.50(d)

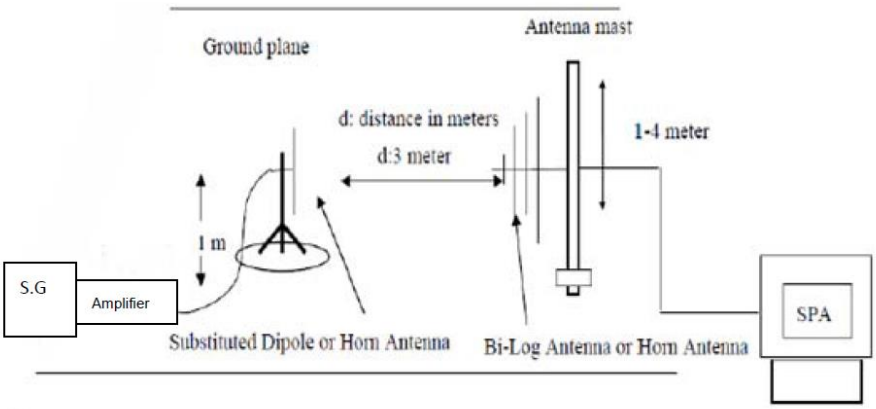
9.1.2 Test Limit

E.I.R.P	E.I.R.P	E.R.P	E.I.R.P
LTE Band 2	**LTE Band 4**	**LTE Band 5**	**LTE Band 7**
2W(33 dBm)	1W(30 dBm)	7W(38.45dBm)	2W(33 dBm)
E.R.P	**E.R.P**	**E.I.R.P**	**E.R.P**
LTE Band 12	**LTE Band 17**	**LTE Band 25**	**LTE Band 26**
3W(34.77dBm)	3W(34.77dBm)	2W(33 dBm)	7W(38.45dBm)

9.2 Test Setup



Above 1G



Substituted Method

9.3 Test Procedure

(1) The EUT was placed on an non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW=3 MHz, VBW=3 MHz and peak detector settings.

(2) During the measurement, the EUT was enforced in maximum power and linked with the Base Station. The highest was recorded from analyzer power level (LVT) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.

(3) Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to C63.26. The EUT was replaced by dipole antenna (for frequency below 1 GHz) or Horn antenna (for frequency above 1 GHz) at same location with same polarize of receiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a TX cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna.

Note: In test, the S.G Connect the Pre-amplifier(Sonoma 310N Pre-amplifier for frequency below 1 GHz, HP 8449B Pre-amplifier for frequency above 1 GHz)

Then the EUT's EIRP and ERP was calculated with the correction factor:

ERP=S.G.Level +Antenna Gain Cord.(dBd)-Cable Loss(dB)

EIRP=S.G.Level+Antenna Gain Cord.(dBi)-Cable Loss(dB)

9.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

9.5 Deviation From Test Standard

No deviation

9.6 Test Data

Please refer to the Attachment F.
Measurement Data (worst case)

10. Radiated Out Band of Emissions

10.1 Test Standard and Limit

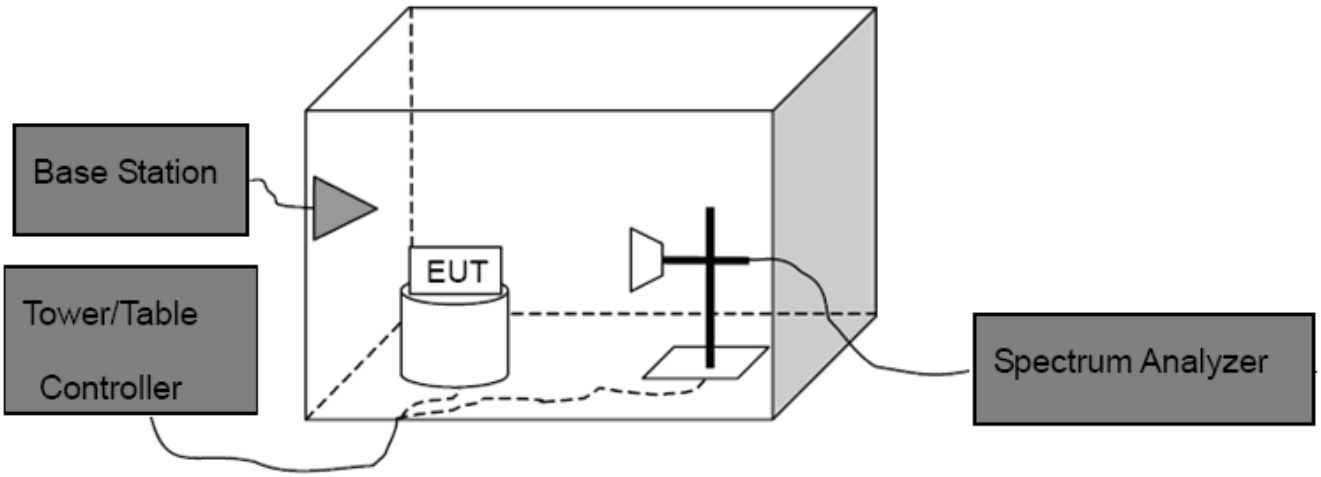
10.1.1 Test Standard

FCC Part 2: 2.1053, FCC Part 22.917(a)
FCC part 24.238(a)
FCC Part 27.53 (h),FCC Part 27.53(m)

10.1.2 Test Limit

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+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

10.2 Test Setup



10.3 Test Procedure

(1) The test system setup as show in the block diagram above.
(2) The EUT was placed on an non-conductive rotating platform in an anechoic chamber. The radiated spurious emissions from 30MHz to 10th harmonious of fundamental frequency were measured at 3 m with a test antenna and a spectrum analyzer with RBW=1 MHz, VBW=1 MHz, peak detector settings.
(3) During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
(4) When found the maximum level of emissions from the EUT. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB=10 log(TX power in Watts/0.001)-the absolute level
Spurious attenuation limit in dB=43+10 log(power out in Watts)

10.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

10.5 Deviation From Test Standard

No deviation

10.6 Test Data

Please refer to the Attachment G.
Measurement Data (worst case)

11. Frequency Stability

11.1 Test Standard and Limit

11.1.1 Test Standard

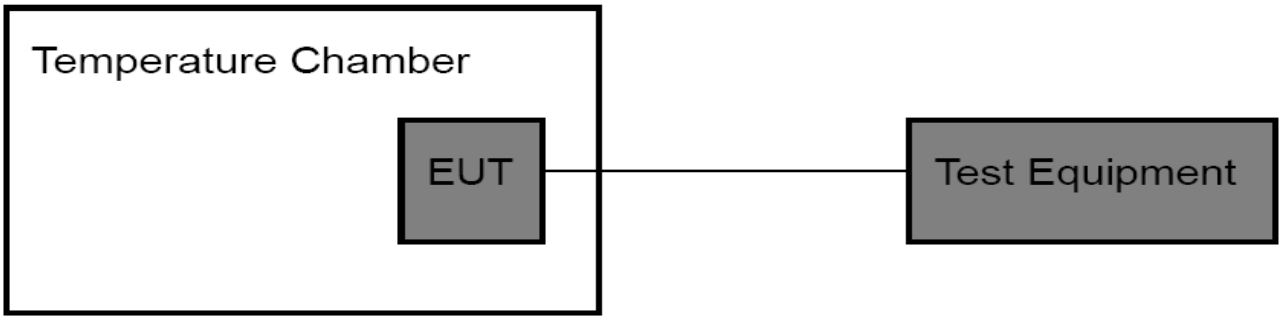
FCC Part 2.1055(a)(1)(b) FCC Part 22.355
FCC Part 24.235, Part 27.54

11.1.2 Limit

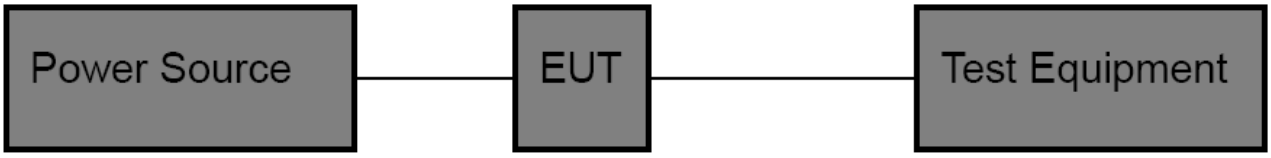
Limit
±2.5ppm

11.2 Test Setup

For Temperature Test:



For Voltage Test:



11.3 Test Procedure

Test Procedures for Temperature Variation:

(1) The EUT was set up in the thermal chamber and connected with the base station.

(2) With power off, the temperature was decreased to -30℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.

(3) With power off, the temperature was raised in 10℃ set up to 50℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.

(4) If the EUT cannot be turned on at -30℃, the testing lowest temperature will be raised in 10℃ step until the EUT can be turned on.

Test Procedures for Voltage Variation:

(1) The EUT was placed in a temperature chamber at 25±5℃ and connected with the base station.

(2) Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

(3) The variation in frequency was measured for the worst case.

11.4 EUT Operating Condition

The Equipment Under Test was set to Communication with the Base Station.

11.5 Deviation From Test Standard

No deviation

11.6 Test Data

Please refer to the Attachment H.

ATTACHMENT A--CONDUCTED RF OUTPUT POWER

FDD-LTE Band 2						
Channel Bandwidth: 1.4 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.38	23.72	23.83	PASS
	1	3	24.51	23.76	24.15	PASS
	1	5	24.23	23.90	23.94	PASS
	3	0	24.13	23.88	23.96	PASS
	3	1	24.06	23.93	24.03	PASS
	3	3	24.01	23.98	23.88	PASS
	6	0	23.13	22.68	23.10	PASS
16QAM	1	0	22.61	22.99	23.04	PASS
	1	3	22.58	23.08	23.04	PASS
	1	5	22.60	22.94	23.02	PASS
	3	0	22.87	22.50	22.82	PASS
	3	1	22.81	22.44	22.98	PASS
	3	3	22.88	22.34	22.84	PASS
	6	0	21.70	21.70	21.86	PASS
Channel Bandwidth: 3 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.95	23.84	23.83	PASS
	1	7	23.94	23.85	23.70	PASS
	1	14	23.82	23.81	23.72	PASS
	8	0	23.03	23.07	22.87	PASS
	8	4	23.10	22.92	22.85	PASS
	8	7	23.11	22.96	22.85	PASS
	15	0	22.97	22.84	22.87	PASS
16QAM	1	0	22.60	22.43	22.83	PASS
	1	7	22.70	22.76	22.78	PASS
	1	14	22.70	22.25	22.40	PASS
	8	0	21.67	21.70	21.73	PASS
	8	4	21.63	21.94	21.82	PASS
	8	7	21.66	22.03	21.84	PASS
	15	0	21.97	21.72	21.87	PASS

FDD-LTE Band 2						
Channel Bandwidth: 5 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.83	23.62	23.95	PASS
	1	12	24.59	24.08	24.10	PASS
	1	24	23.77	23.57	23.79	PASS
	12	0	22.86	22.73	22.91	PASS
	12	6	22.96	22.83	22.91	PASS
	12	11	22.86	22.77	22.79	PASS
	25	0	22.86	22.74	22.87	PASS
16QAM	1	0	22.05	22.10	22.43	PASS
	1	12	22.63	22.25	22.73	PASS
	1	24	21.91	22.03	22.07	PASS
	12	0	21.80	21.48	21.66	PASS
	12	6	21.83	21.58	21.67	PASS
	12	11	21.80	21.49	21.32	PASS
	25	0	21.69	21.64	21.78	PASS
Channel Bandwidth: 10 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.21	23.67	23.75	PASS
	1	24	24.12	24.19	24.16	PASS
	1	49	24.03	23.81	23.67	PASS
	25	0	22.94	22.75	22.79	PASS
	25	12	22.90	22.87	22.90	PASS
	25	24	22.90	22.88	22.85	PASS
	50	0	22.94	22.92	22.90	PASS
16QAM	1	0	22.65	22.87	22.97	PASS
	1	24	22.68	22.23	22.98	PASS
	1	49	22.43	21.68	22.83	PASS
	25	0	21.82	21.68	22.01	PASS
	25	12	21.86	21.63	22.22	PASS
	25	24	21.96	21.74	21.72	PASS
	50	0	21.68	22.23	21.85	PASS

FDD-LTE Band 2						
Channel Bandwidth: 15 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.11	23.71	23.69	PASS
	1	37	24.19	24.02	24.09	PASS
	1	74	24.00	23.76	23.79	PASS
	36	0	22.98	22.84	22.93	PASS
	36	16	22.92	22.82	22.83	PASS
	36	35	22.94	22.79	22.80	PASS
	75	0	22.90	22.82	22.79	PASS
16QAM	1	0	22.81	22.90	22.79	PASS
	1	37	22.89	22.65	23.11	PASS
	1	74	22.26	22.07	22.37	PASS
	36	0	21.82	21.73	21.95	PASS
	36	16	22.02	21.80	21.83	PASS
	36	35	21.81	21.73	21.73	PASS
	75	0	21.86	21.64	21.65	PASS
Channel Bandwidth: 20 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.87	24.21	23.59	PASS
	1	49	24.20	24.41	24.08	PASS
	1	99	23.63	23.72	23.94	PASS
	50	0	22.89	22.79	22.86	PASS
	50	24	22.97	22.86	22.94	PASS
	50	49	22.84	22.91	22.86	PASS
	100	0	22.96	22.84	22.79	PASS
16QAM	1	0	22.33	22.89	22.73	PASS
	1	49	22.45	23.52	22.98	PASS
	1	99	22.24	22.83	22.56	PASS
	50	0	21.91	21.76	21.72	PASS
	50	24	21.85	21.83	21.89	PASS
	50	49	21.74	21.87	21.73	PASS
	100	0	21.93	21.86	21.79	PASS

FDD-LTE Band 4						
Channel Bandwidth: 1.4 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.25	24.11	24.01	PASS
	1	2	24.28	24.37	24.12	PASS
	1	5	24.31	24.18	24.07	PASS
	3	0	24.23	24.11	24.15	PASS
	3	1	24.32	24.17	24.12	PASS
	3	2	24.36	24.22	24.20	PASS
	6	0	23.32	23.32	23.10	PASS
16QAM	1	0	22.80	22.98	23.05	PASS
	1	2	23.00	23.21	22.95	PASS
	1	5	22.85	23.06	23.00	PASS
	3	0	23.07	22.49	23.13	PASS
	3	1	23.02	22.50	23.18	PASS
	3	2	23.09	22.42	23.12	PASS
	6	0	22.23	22.08	22.15	PASS
Channel Bandwidth: 3 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.19	24.26	24.01	PASS
	1	7	24.40	24.31	24.02	PASS
	1	14	24.24	24.28	24.00	PASS
	8	0	23.28	23.33	23.22	PASS
	8	4	23.43	23.31	23.17	PASS
	8	7	23.47	23.25	23.16	PASS
	15	0	23.31	23.27	23.17	PASS
16QAM	1	0	22.89	23.12	23.00	PASS
	1	7	22.75	23.14	23.17	PASS
	1	14	22.54	23.19	23.22	PASS
	8	0	22.10	22.29	22.14	PASS
	8	4	22.06	22.18	22.20	PASS
	8	7	22.13	22.23	22.20	PASS
	15	0	22.18	21.93	22.14	PASS

FDD-LTE Band 4						
Channel Bandwidth: 5 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.15	24.07	24.23	PASS
	1	12	24.82	24.40	24.70	PASS
	1	24	24.32	24.13	24.24	PASS
	12	0	23.27	23.22	23.34	PASS
	12	6	23.31	23.25	23.25	PASS
	12	11	23.30	23.30	23.23	PASS
	25	0	23.30	23.24	23.26	PASS
16QAM	1	0	22.65	22.63	22.73	PASS
	1	12	23.07	23.38	23.21	PASS
	1	24	22.37	22.61	22.78	PASS
	12	0	22.12	21.94	21.94	PASS
	12	6	22.17	22.07	22.02	PASS
	12	11	22.18	22.01	21.95	PASS
	25	0	22.16	21.95	22.22	PASS
Channel Bandwidth: 10 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.26	24.19	24.10	PASS
	1	24	24.41	24.62	24.68	PASS
	1	49	24.36	24.23	24.23	PASS
	25	0	23.38	23.24	23.37	PASS
	25	12	23.43	23.23	23.32	PASS
	25	24	23.34	23.26	23.32	PASS
	50	0	23.38	23.29	23.35	PASS
16QAM	1	0	23.01	23.07	23.44	PASS
	1	24	23.26	23.23	23.50	PASS
	1	49	22.85	22.79	23.30	PASS
	25	0	22.23	22.16	22.52	PASS
	25	12	22.30	22.31	22.59	PASS
	25	24	22.24	22.32	22.39	PASS
	50	0	22.16	22.05	22.20	PASS

FDD-LTE Band 4						
Channel Bandwidth: 15 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.30	24.26	24.24	PASS
	1	37	24.68	24.55	24.40	PASS
	1	74	24.30	24.27	24.21	PASS
	36	0	23.34	23.26	23.48	PASS
	36	16	23.40	23.31	23.39	PASS
	36	35	23.29	23.33	23.28	PASS
	75	0	23.34	23.29	23.31	PASS
16QAM	1	0	23.23	23.14	23.39	PASS
	1	37	23.31	23.19	23.51	PASS
	1	74	22.75	22.50	22.81	PASS
	36	0	22.44	22.04	22.33	PASS
	36	16	22.45	22.23	22.27	PASS
	36	35	22.29	22.17	22.01	PASS
	75	0	22.16	22.25	22.00	PASS
Channel Bandwidth: 20 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.05	24.14	24.28	PASS
	1	49	24.58	24.61	24.60	PASS
	1	99	24.05	24.50	24.17	PASS
	50	0	23.41	23.26	23.44	PASS
	50	24	23.29	23.32	23.46	PASS
	50	49	23.30	23.33	23.33	PASS
	100	0	23.34	23.30	23.49	PASS
16QAM	1	0	22.69	23.63	23.19	PASS
	1	49	22.78	24.07	23.26	PASS
	1	99	22.73	23.56	23.04	PASS
	50	0	22.23	22.18	22.11	PASS
	50	24	22.20	22.21	22.25	PASS
	50	49	22.04	22.17	22.13	PASS
	100	0	22.16	22.19	22.26	PASS

FDD-LTE Band 5						
Channel Bandwidth: 1.4 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.12	23.93	23.77	PASS
	1	2	24.09	23.96	23.89	PASS
	1	5	24.12	23.97	23.74	PASS
	3	0	24.03	24.00	24.00	PASS
	3	1	24.22	24.19	24.10	PASS
	3	2	24.11	24.12	24.01	PASS
	6	0	23.10	23.11	22.91	PASS
16QAM	1	0	22.55	22.80	22.77	PASS
	1	2	22.79	23.13	22.71	PASS
	1	5	22.57	22.86	22.61	PASS
	3	0	22.82	22.86	22.95	PASS
	3	1	22.90	22.81	23.10	PASS
	3	2	22.85	22.72	23.00	PASS
	6	0	22.09	21.89	22.10	PASS
Channel Bandwidth: 3 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.94	24.16	23.83	PASS
	1	7	24.04	24.12	23.84	PASS
	1	14	24.00	24.02	23.73	PASS
	8	0	23.23	23.13	23.06	PASS
	8	4	23.19	23.15	23.04	PASS
	8	7	23.12	23.19	22.99	PASS
	15	0	23.14	23.13	23.09	PASS
16QAM	1	0	22.54	22.88	23.05	PASS
	1	7	22.80	22.89	23.02	PASS
	1	14	22.66	22.95	22.82	PASS
	8	0	22.04	22.25	21.93	PASS
	8	4	22.00	22.36	21.90	PASS
	8	7	22.04	22.41	21.64	PASS
	15	0	22.15	21.94	21.80	PASS

FDD-LTE Band 5						
Channel Bandwidth: 5 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.89	23.87	24.01	PASS
	1	12	24.69	24.24	24.33	PASS
	1	24	23.85	23.95	23.85	PASS
	12	0	23.08	23.15	23.05	PASS
	12	6	23.09	23.12	23.05	PASS
	12	11	23.07	23.08	22.95	PASS
	25	0	23.10	23.06	23.04	PASS
16QAM	1	0	22.49	22.46	22.51	PASS
	1	12	22.90	23.28	22.58	PASS
	1	24	22.07	22.91	22.42	PASS
	12	0	21.97	21.95	21.71	PASS
	12	6	22.02	22.09	21.69	PASS
	12	11	21.98	21.89	21.43	PASS
	25	0	21.91	21.94	21.83	PASS
Channel Bandwidth: 10 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.00	24.06	23.90	PASS
	1	24	24.17	24.56	24.23	PASS
	1	49	24.02	24.29	23.73	PASS
	25	0	23.21	23.10	23.07	PASS
	25	12	23.11	23.14	23.14	PASS
	25	24	23.13	23.14	23.04	PASS
	50	0	23.10	23.17	23.06	PASS
16QAM	1	0	22.81	22.92	23.27	PASS
	1	24	22.89	23.11	23.25	PASS
	1	49	22.53	22.99	22.95	PASS
	25	0	22.18	22.15	22.15	PASS
	25	12	22.04	22.28	22.04	PASS
	25	24	22.08	22.26	22.12	PASS
	50	0	22.05	22.06	22.15	PASS

FDD-LTE Band 12						
Channel Bandwidth: 1.4 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.15	24.20	24.07	PASS
	1	2	24.22	24.31	24.13	PASS
	1	5	24.28	24.24	24.06	PASS
	3	0	24.20	24.15	24.30	PASS
	3	1	24.22	24.12	24.31	PASS
	3	2	24.21	24.19	24.29	PASS
	6	0	23.15	23.22	23.21	PASS
16QAM	1	0	23.03	22.67	23.47	PASS
	1	2	23.13	22.89	23.49	PASS
	1	5	23.06	22.77	23.41	PASS
	3	0	22.94	23.00	23.20	PASS
	3	1	22.98	22.95	23.23	PASS
	3	2	22.98	22.89	23.17	PASS
	6	0	22.22	22.39	22.21	PASS
Channel Bandwidth: 3 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.02	24.31	24.18	PASS
	1	7	24.19	24.34	24.12	PASS
	1	14	24.10	24.31	24.03	PASS
	8	0	23.21	23.40	23.25	PASS
	8	4	23.24	23.35	23.28	PASS
	8	7	23.25	23.31	23.21	PASS
	15	0	23.17	23.23	23.22	PASS
16QAM	1	0	22.84	23.02	23.26	PASS
	1	7	22.90	23.12	23.29	PASS
	1	14	22.88	22.87	23.02	PASS
	8	0	22.00	22.31	22.31	PASS
	8	4	21.95	22.34	22.36	PASS
	8	7	21.98	22.30	21.83	PASS
	15	0	22.15	22.22	21.99	PASS

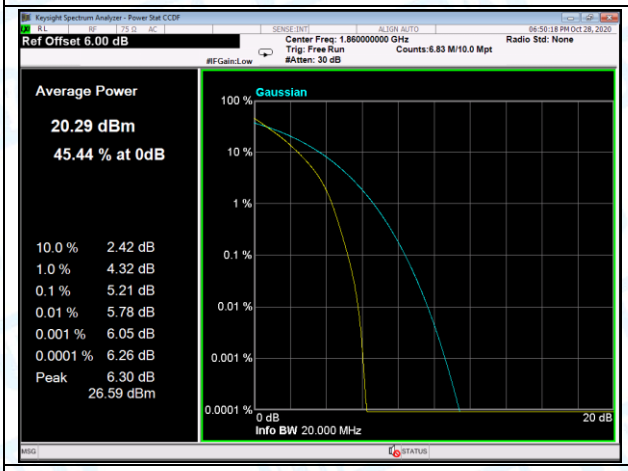
FDD-LTE Band 12						
Channel Bandwidth: 5 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.92	24.06	24.10	PASS
	1	12	24.72	24.31	24.84	PASS
	1	24	24.10	24.10	23.92	PASS
	12	0	23.21	23.24	23.31	PASS
	12	6	23.20	23.26	23.24	PASS
	12	11	23.12	23.23	23.10	PASS
	25	0	23.11	23.22	23.21	PASS
16QAM	1	0	22.63	22.84	22.80	PASS
	1	12	22.89	23.45	23.12	PASS
	1	24	22.23	22.69	22.53	PASS
	12	0	22.13	22.12	22.07	PASS
	12	6	21.95	22.13	22.01	PASS
	12	11	21.82	22.08	21.54	PASS
	25	0	22.05	21.99	22.10	PASS
Channel Bandwidth: 10 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.97	23.95	24.12	PASS
	1	24	24.24	24.40	24.59	PASS
	1	49	24.19	24.32	23.90	PASS
	25	0	23.12	23.18	23.26	PASS
	25	12	23.19	23.24	23.38	PASS
	25	24	23.24	23.21	23.30	PASS
	50	0	23.27	23.28	23.30	PASS
16QAM	1	0	22.82	22.76	23.35	PASS
	1	24	22.99	23.19	23.52	PASS
	1	49	22.64	23.07	22.90	PASS
	25	0	22.11	22.13	22.45	PASS
	25	12	22.13	22.14	22.59	PASS
	25	24	22.06	22.21	22.52	PASS
	50	0	22.09	22.03	22.16	PASS

FDD-LTE Band 17						
Channel Bandwidth: 5 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	23.89	23.87	23.96	PASS
	1	12	24.66	24.23	24.58	PASS
	1	24	23.84	23.87	23.83	PASS
	12	0	23.08	23.02	23.01	PASS
	12	6	23.07	23.09	23.04	PASS
	12	11	22.91	23.03	22.97	PASS
	25	0	22.98	22.94	22.96	PASS
16QAM	1	0	22.47	22.45	22.64	PASS
	1	12	22.68	23.18	22.88	PASS
	1	24	22.02	22.80	22.28	PASS
	12	0	22.04	21.85	21.81	PASS
	12	6	22.12	21.89	21.84	PASS
	12	11	22.03	21.87	21.39	PASS
	25	0	22.01	21.81	21.84	PASS
Channel Bandwidth: 10 MHz						
Modulation	RB Size	RB Offset	Conducted Power (dBm)			Result
			Low CH	Middle CH	High CH	
QPSK	1	0	24.14	24.02	23.76	PASS
	1	24	24.27	24.51	24.31	PASS
	1	49	23.99	23.75	23.69	PASS
	25	0	23.09	22.96	23.09	PASS
	25	12	23.20	23.13	23.11	PASS
	25	24	23.21	23.13	22.95	PASS
	50	0	23.08	23.10	23.08	PASS
16QAM	1	0	22.90	22.93	23.14	PASS
	1	24	22.88	23.02	23.26	PASS
	1	49	22.49	22.19	22.91	PASS
	25	0	22.04	22.04	21.96	PASS
	25	12	22.23	22.27	22.26	PASS
	25	24	22.24	22.26	22.12	PASS
	50	0	21.97	22.01	21.96	PASS

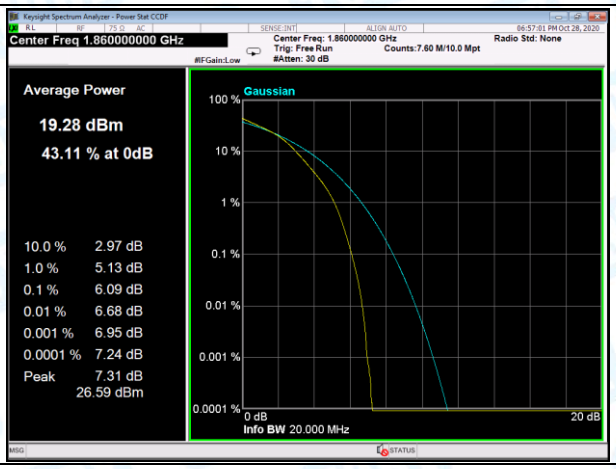
ATTACHMENT B--PEAK-AVERAGE RATIO

Test Mode	Modulation	RB Size	RB Offset	PAPR with 0.1% probability (dB)	Limit (dB)	Result
LTE BAND 2 20MHz (Low Channel)	QPSK	100	0	**5.21**	≤13	PASS
	16QAM	100	0	**6.09**	≤13	PASS
LTE BAND 2 20MHz (Middle Channel)	QPSK	100	0	**5.04**	≤13	PASS
	16QAM	100	0	**5.94**	≤13	PASS
LTE BAND 2 20MHz (High Channel)	QPSK	100	0	**5.14**	≤13	PASS
	16QAM	100	0	**6.00**	≤13	PASS
LTE BAND 4 20MHz (Low Channel)	QPSK	100	0	**5.44**	≤13	PASS
	16QAM	100	0	**6.32**	≤13	PASS
LTE BAND 4 20MHz (Middle Channel)	QPSK	100	0	**5.49**	≤13	PASS
	16QAM	100	0	**6.42**	≤13	PASS
LTE BAND 4 20MHz (High Channel)	QPSK	100	0	**5.37**	≤13	PASS
	16QAM	100	0	**6.32**	≤13	PASS
LTE BAND 5 10MHz (Low Channel)	QPSK	50	0	**5.49**	≤13	PASS
	16QAM	50	0	**6.40**	≤13	PASS
LTE BAND 5 10MHz (Middle Channel)	QPSK	50	0	**5.53**	≤13	PASS
	16QAM	50	0	**6.35**	≤13	PASS
LTE BAND 5 10MHz (High Channel)	QPSK	50	0	**5.38**	≤13	PASS
	16QAM	50	0	**6.27**	≤13	PASS
LTE BAND 12 10MHz (Low Channel)	QPSK	50	0	**5.44**	≤13	PASS
	16QAM	50	0	**6.33**	≤13	PASS
LTE BAND 12 10MHz (Middle Channel)	QPSK	50	0	**5.43**	≤13	PASS
	16QAM	50	0	**6.33**	≤13	PASS
LTE BAND 12 10MHz (High Channel)	QPSK	50	0	**5.28**	≤13	PASS
	16QAM	50	0	**6.17**	≤13	PASS
LTE BAND 17 10MHz (Low Channel)	QPSK	50	0	**5.38**	≤13	PASS
	16QAM	50	0	**6.29**	≤13	PASS
LTE BAND 17 10MHz (Middle Channel)	QPSK	50	0	**5.35**	≤13	PASS
	16QAM	50	0	**6.25**	≤13	PASS
LTE BAND 17 10MHz (High Channel)	QPSK	50	0	**5.29**	≤13	PASS
	16QAM	50	0	**6.19**	≤13	PASS
Note: Only show the worst case data.						

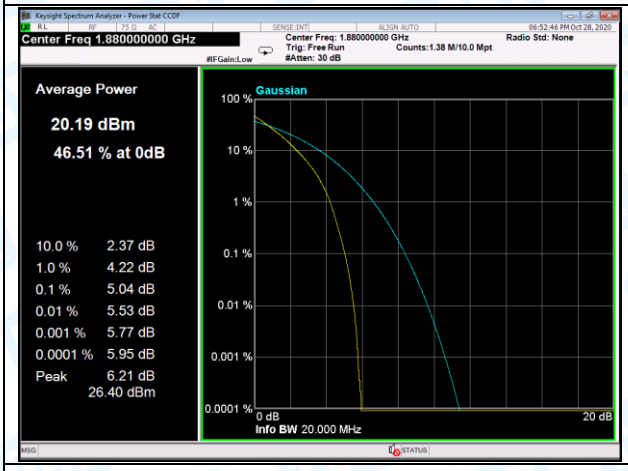
LTE Band 2 20MHz (Low Channel)-QPSK



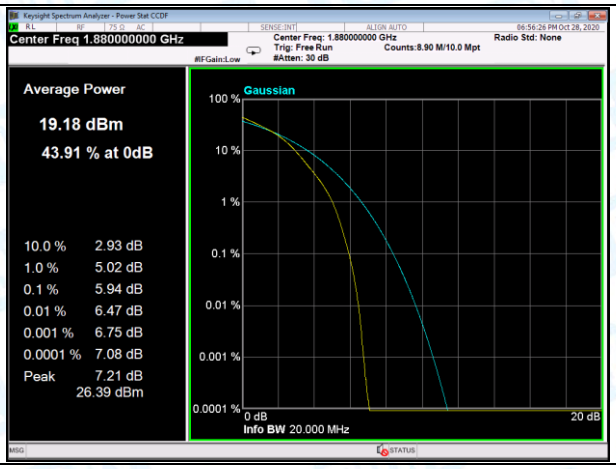
LTE Band 2 20MHz (Low Channel)-16QAM



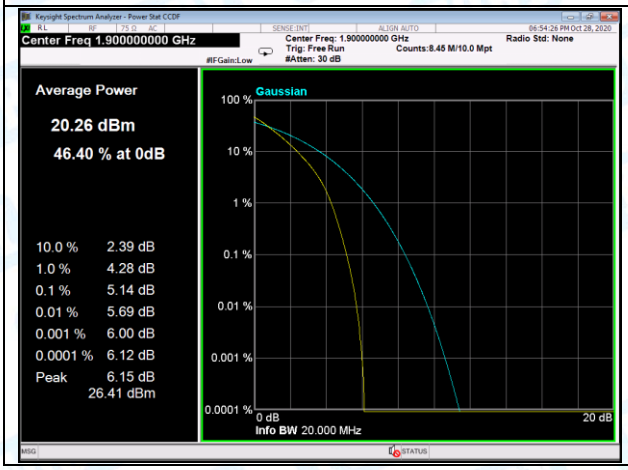
LTE Band 2 20MHz (Middle Channel)-QPSK



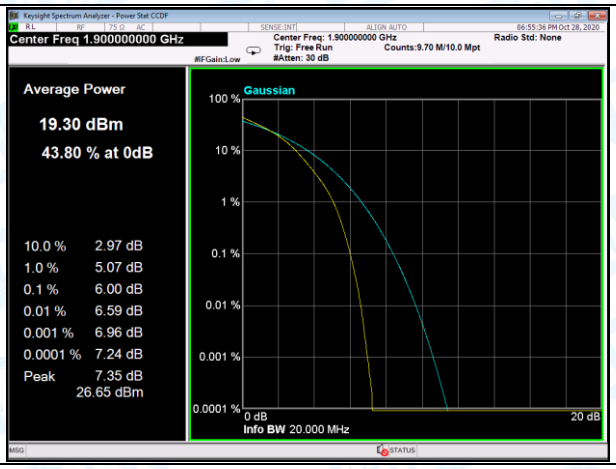
LTE Band 2 20MHz (Middle Channel)-16QAM



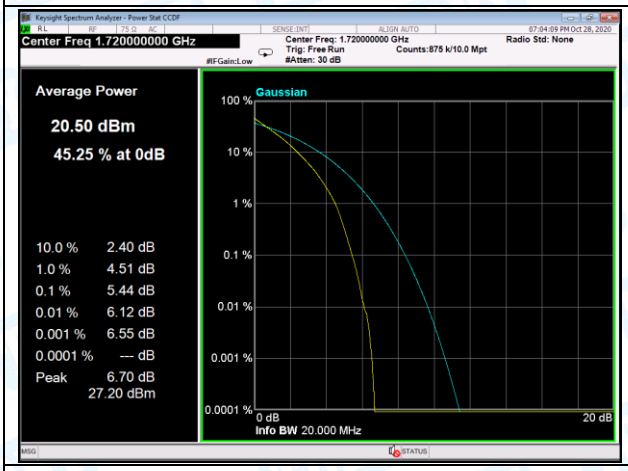
LTE Band 2 20MHz (High Channel)-QPSK



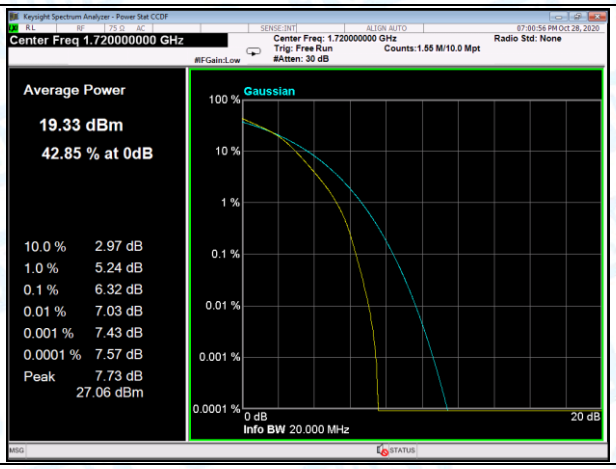
LTE Band 2 20MHz (High Channel)-16QAM



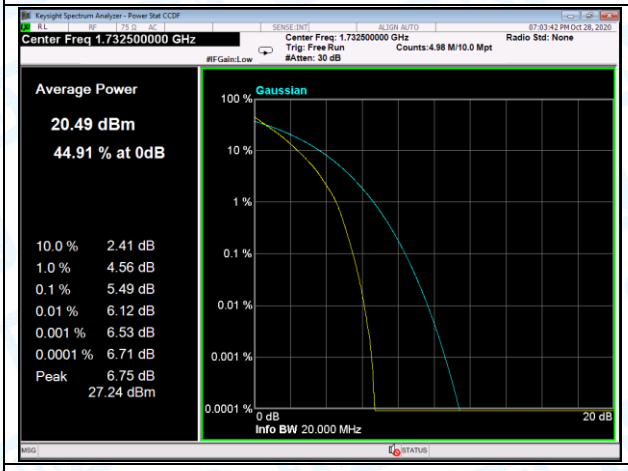
LTE Band 4 20MHz (Low Channel)-QPSK



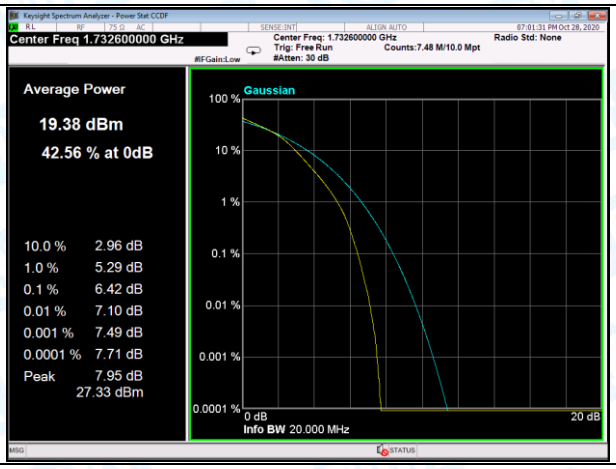
LTE Band 4 20MHz (Low Channel)-16QAM



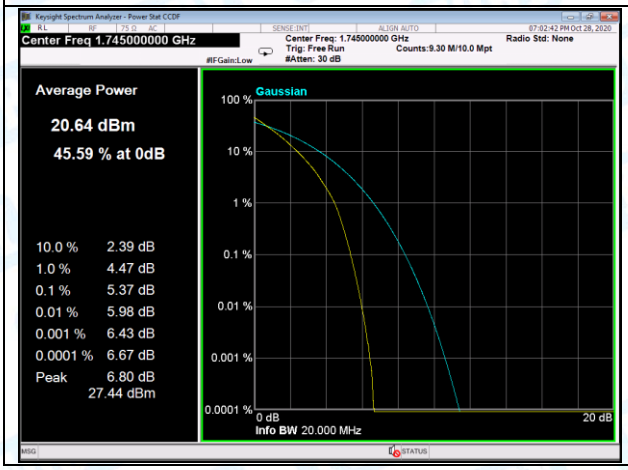
LTE Band 4 20MHz (Middle Channel)-QPSK



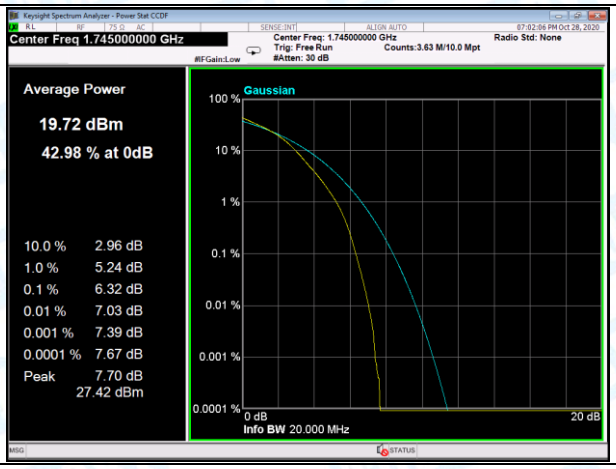
LTE Band 4 20MHz (Middle Channel)-16QAM



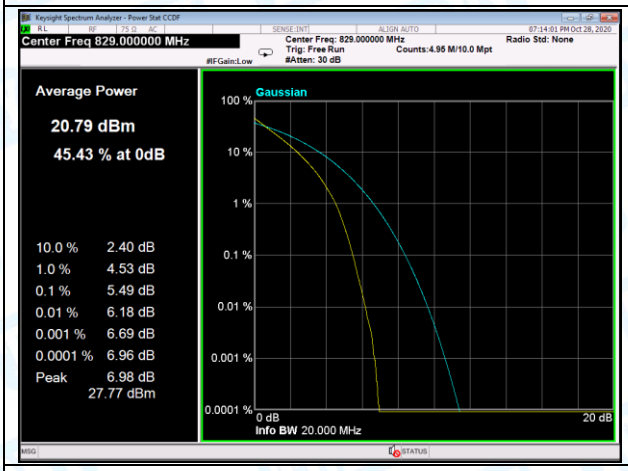
LTE Band 4 20MHz (High Channel)-QPSK



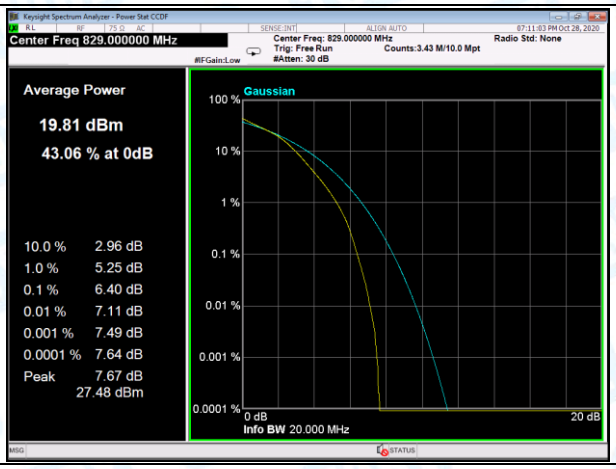
LTE Band 4 20MHz (High Channel)-16QAM



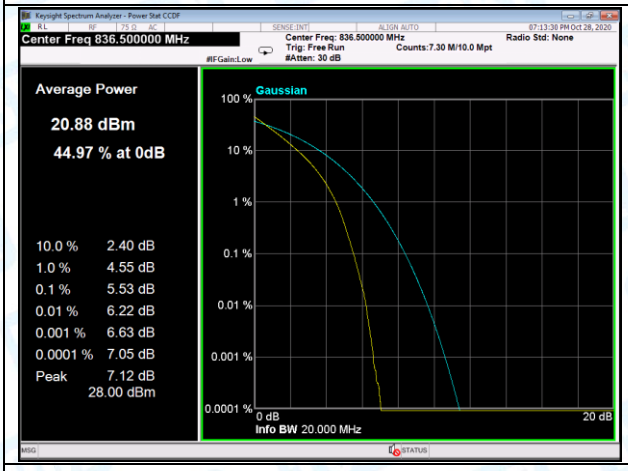
LTE Band 5 10MHz (Low Channel)-QPSK



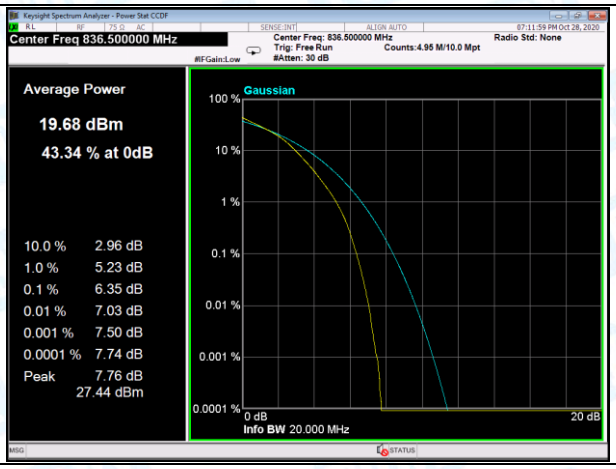
LTE Band 5 10MHz (Low Channel)-16QAM



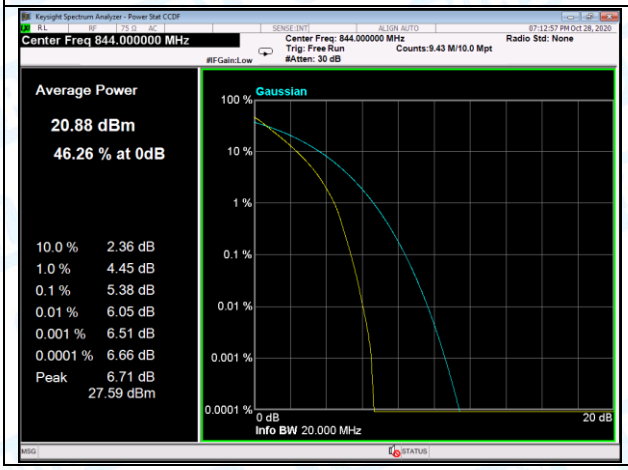
LTE Band 5 10MHz (Middle Channel)-QPSK



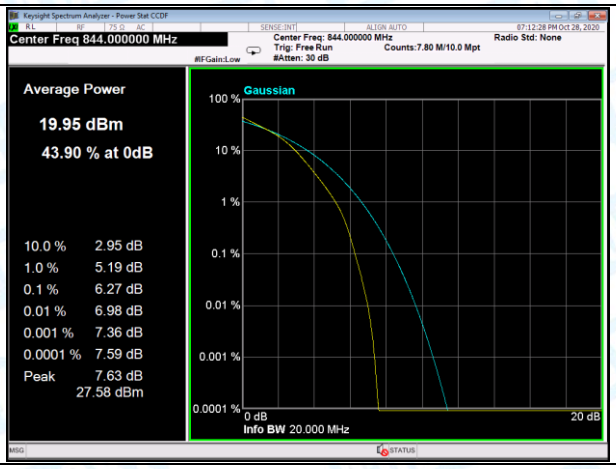
LTE Band 5 10MHz (Middle Channel)-16QAM



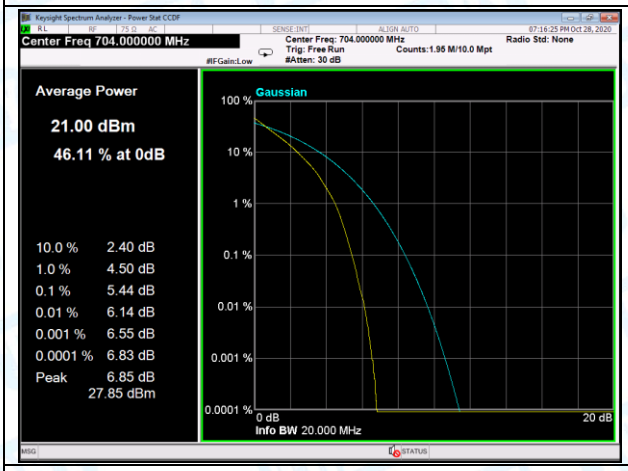
LTE Band 5 10MHz (High Channel)-QPSK



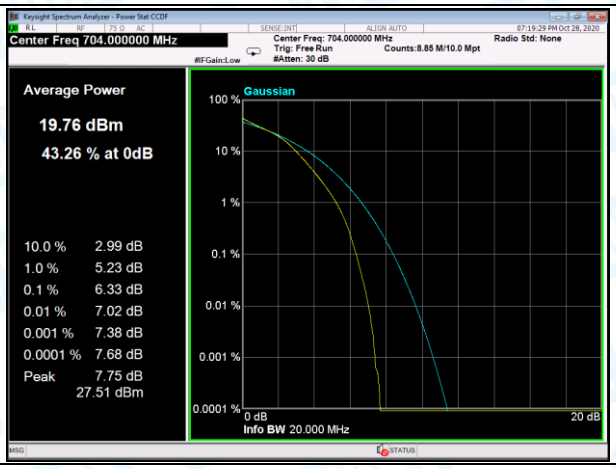
LTE Band 5 10MHz (High Channel)-16QAM



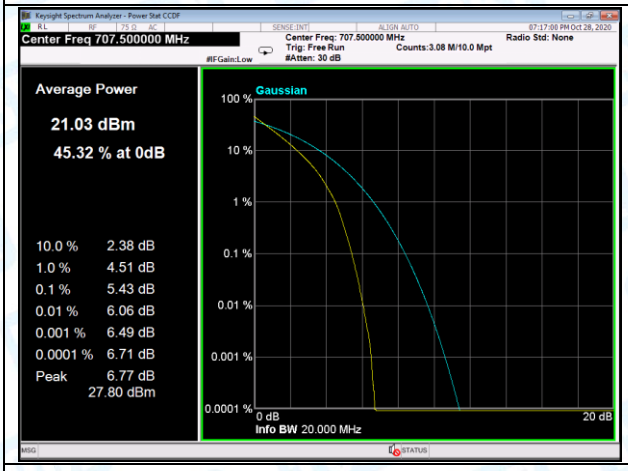
LTE Band 12 10MHz (Low Channel)-QPSK



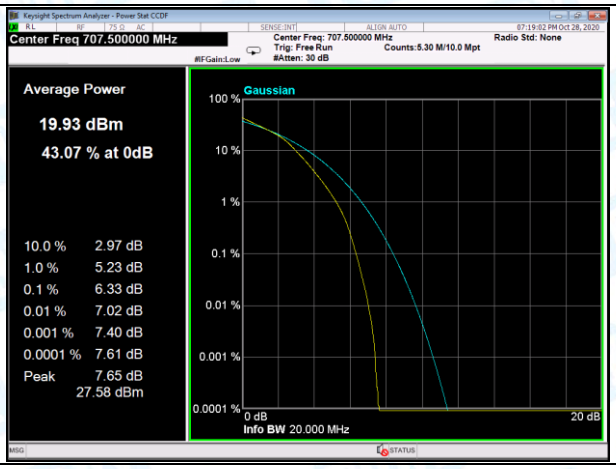
LTE Band 12 10MHz (Low Channel)-16QAM



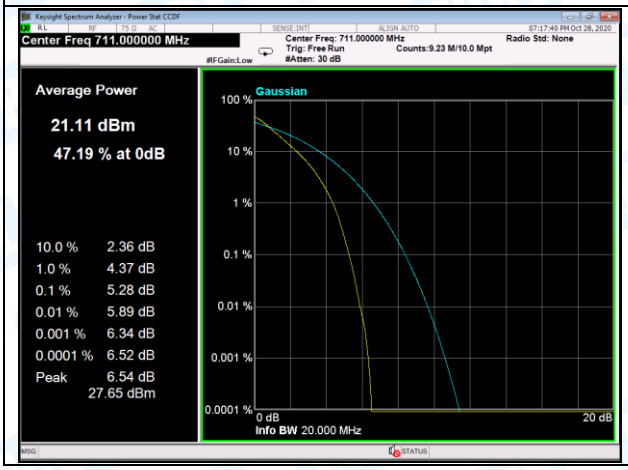
LTE Band 12 10MHz (Middle Channel)-QPSK



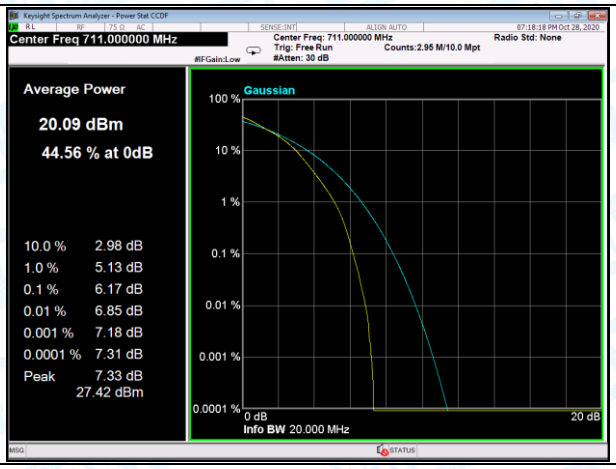
LTE Band 12 10MHz (Middle Channel)-16QAM



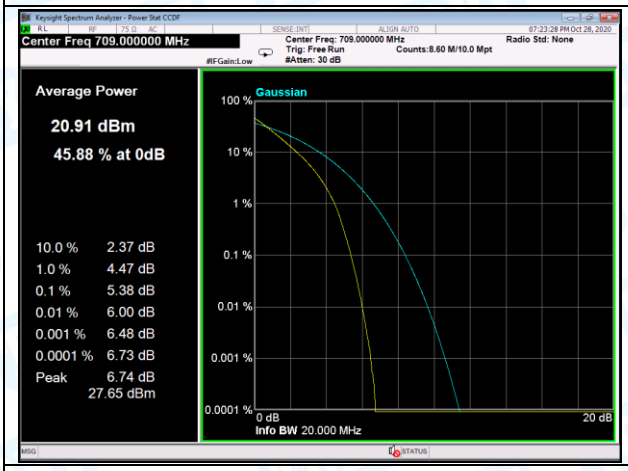
LTE Band 12 10MHz (High Channel)-QPSK



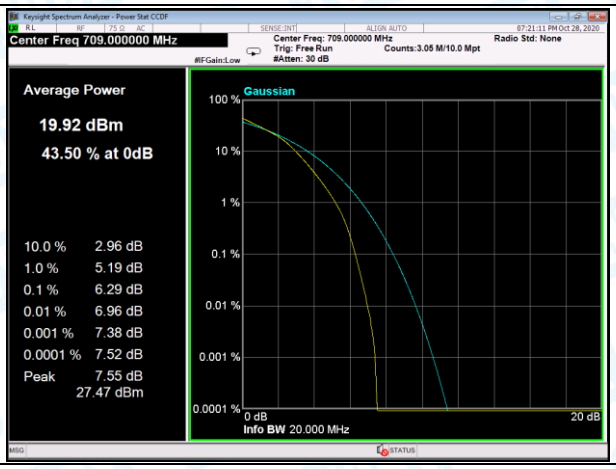
LTE Band 12 10MHz (High Channel)-16QAM



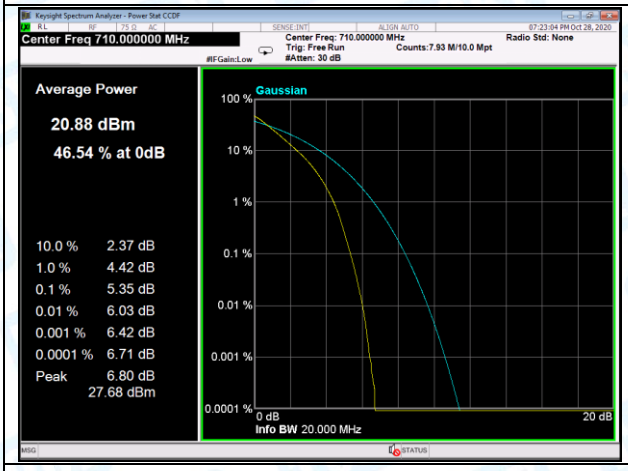
LTE Band 17 10MHz (Low Channel)-QPSK



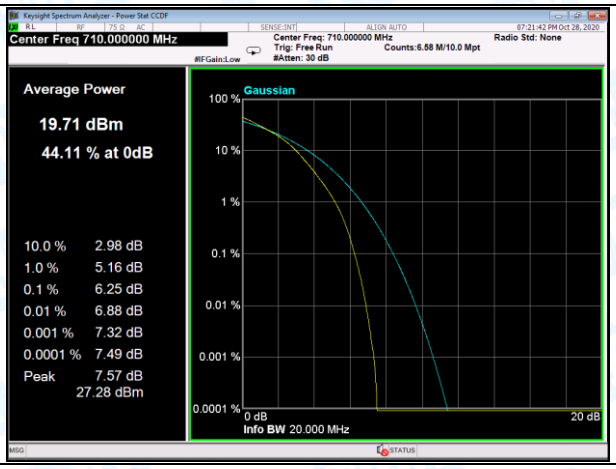
LTE Band 17 10MHz (Low Channel)-16QAM



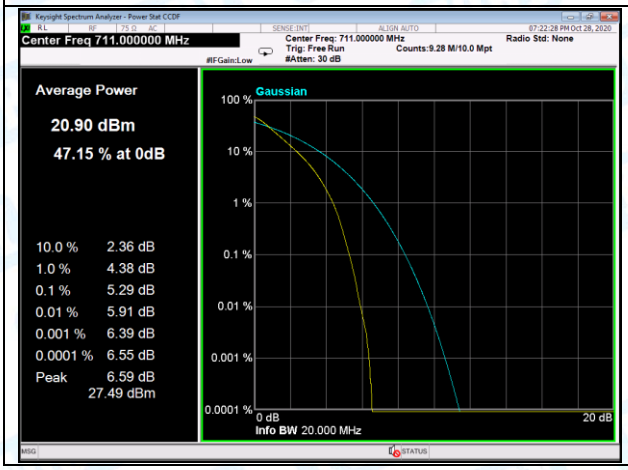
LTE Band 17 10MHz (Middle Channel)-QPSK



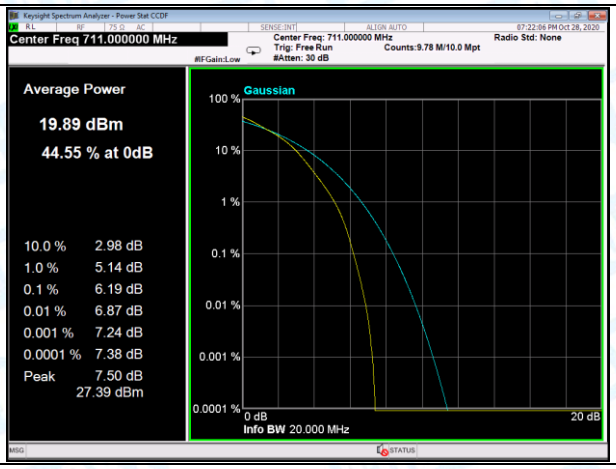
LTE Band 17 10MHz (Middle Channel)-16QAM



LTE Band 17 10MHz (High Channel)-QPSK



LTE Band 17 10MHz (High Channel)-16QAM



ATTACHMENT C--OCCUPY BANDWIDTH

LTE Band 2					
Mode	Channel	Frequency (MHz)	Modulation	99% OBW (MHz)	-26dB Bandwidth (MHz)
1.4MHz	18607	1850.70	QPSK	1.1024	1.325
			16QAM	1.0981	1.294
	18900	1880.00	QPSK	1.1072	1.335
			16QAM	1.0862	1.300
	19193	1909.30	QPSK	1.1002	1.267
			16QAM	1.1024	1.275
3MHz	18615	1851.50	QPSK	2.6715	2.904
			16QAM	2.6874	2.936
	18900	1880.00	QPSK	2.6805	2.901
			16QAM	2.6901	2.910
	19185	1908.50	QPSK	2.6875	2.941
			16QAM	2.6793	2.896
5MHz	18625	1852.50	QPSK	4.5060	5.007
			16QAM	4.4948	5.000
	18900	1880.00	QPSK	4.4943	5.036
			16QAM	4.5022	4.982
	19175	1907.50	QPSK	4.4848	5.018
			16QAM	4.4946	5.007
10MHz	18650	1855.00	QPSK	8.9383	9.622
			16QAM	8.9316	9.658
	18900	1880.00	QPSK	8.9273	9.785
			16QAM	8.9235	9.661
	19150	1905.00	QPSK	8.9173	9.609
			16QAM	8.9175	9.609
15MHz	18675	1857.50	QPSK	13.4178	14.682
			16QAM	13.4200	14.874
	18900	1880.00	QPSK	13.4240	14.719
			16QAM	13.4114	14.771
	19125	1902.50	QPSK	13.4050	14.819
			16QAM	13.3915	14.706
20MHz	18700	1860.00	QPSK	17.8120	19.287
			16QAM	17.8469	19.300
	18900	1880.00	QPSK	17.8157	19.114
			16QAM	17.8242	19.115
	19100	1900.00	QPSK	17.8096	19.222
			16QAM	17.8618	19.388

LTE Band 4					
Mode	Channel	Frequency (MHz)	Modulation	99% OBW (MHz)	-26dB Bandwidth (MHz)
1.4MHz	19957	1710.70	QPSK	1.0959	1.283
			16QAM	1.1035	1.325
	20175	1732.50	QPSK	1.1041	1.302
			16QAM	1.0931	1.299
	20393	1754.30	QPSK	1.1000	1.330
			16QAM	1.1002	1.300
3MHz	19965	1711.50	QPSK	2.6879	2.942
			16QAM	2.6827	2.931
	20175	1732.50	QPSK	2.6849	2.921
			16QAM	2.6926	2.958
	20385	1753.50	QPSK	2.6825	2.914
			16QAM	2.6809	2.934
5MHz	19975	1712.50	QPSK	4.5193	5.019
			16QAM	4.5080	5.055
	20175	1732.50	QPSK	4.5077	5.029
			16QAM	4.4950	4.989
	20375	1752.50	QPSK	4.5054	5.033
			16QAM	4.5276	4.991
10MHz	20000	1715.00	QPSK	8.9159	9.552
			16QAM	8.9274	9.647
	20175	1732.50	QPSK	8.9139	9.673
			16QAM	8.9072	9.566
	20350	1750.00	QPSK	8.9313	9.717
			16QAM	8.9390	9.579
15MHz	20025	1717.50	QPSK	13.3997	14.734
			16QAM	13.4313	14.697
	20175	1732.50	QPSK	13.4529	14.867
			16QAM	13.4229	14.776
	20325	1747.50	QPSK	13.3875	14.714
			16QAM	13.3952	14.695
20MHz	20050	1720.00	QPSK	17.8249	19.306
			16QAM	17.8304	19.560
	20175	1732.50	QPSK	17.8104	19.215
			16QAM	17.8215	19.364
	20300	1745.00	QPSK	17.8767	19.348
			16QAM	17.8723	19.373

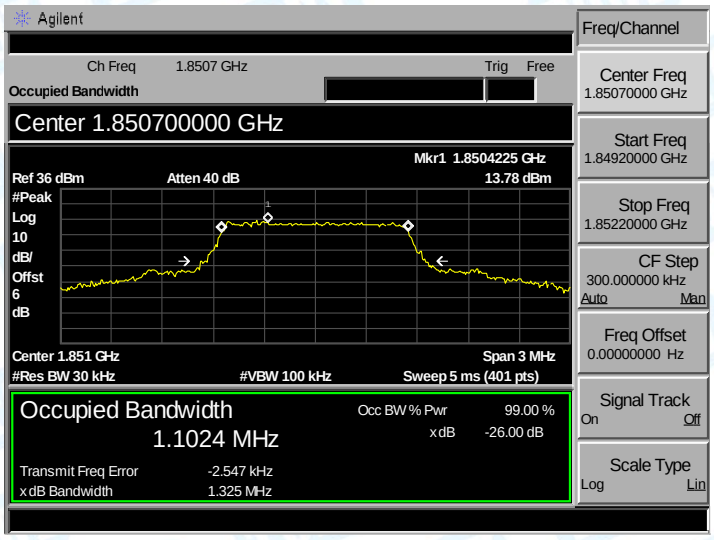
LTE Band 5					
Mode	Channel	Frequency (MHz)	Modulation	99% OBW (MHz)	-26dB Bandwidth (MHz)
1.4MHz	20407	824.70	QPSK	1.0978	1.284
			16QAM	1.0962	1.309
	20525	836.50	QPSK	1.0933	1.290
			16QAM	1.0895	1.257
	20643	848.30	QPSK	1.0946	1.294
			16QAM	1.1113	1.290
3MHz	20415	825.50	QPSK	2.6861	2.917
			16QAM	2.6763	2.923
	20525	836.50	QPSK	2.6819	2.908
			16QAM	2.6773	2.941
	20635	847.50	QPSK	2.6816	2.923
			16QAM	2.6745	2.955
5MHz	20425	826.50	QPSK	4.4968	5.009
			16QAM	4.4865	4.955
	20525	836.50	QPSK	4.5015	4.999
			16QAM	4.4954	5.023
	20625	846.50	QPSK	4.5282	5.026
			16QAM	4.5217	5.033
10MHz	20450	829.00	QPSK	8.9228	9.604
			16QAM	8.9332	9.657
	20525	836.50	QPSK	8.9383	9.798
			16QAM	8.9544	9.617
	20600	844.00	QPSK	8.9383	9.652
			16QAM	8.9245	9.703

LTE Band 12					
Mode	Channel	Frequency (MHz)	Modulation	99% OBW (MHz)	-26dB Bandwidth (MHz)
1.4MHz	23017	699.70	QPSK	1.1068	1.286
			16QAM	1.0989	1.286
	23095	707.50	QPSK	1.1006	1.281
			16QAM	1.0926	1.275
	23173	715.30	QPSK	1.0881	1.275
			16QAM	1.0962	1.278
3MHz	23025	700.50	QPSK	2.6880	2.920
			16QAM	2.6810	2.915
	23095	707.50	QPSK	2.6865	2.907
			16QAM	2.6775	2.944
	23165	714.50	QPSK	2.6789	2.912
			16QAM	2.6844	2.902
5MHz	23035	701.50	QPSK	4.4957	5.029
			16QAM	4.5000	4.964
	23095	707.50	QPSK	4.4962	4.965
			16QAM	4.5129	5.058
	23155	713.50	QPSK	4.4922	5.013
			16QAM	4.4858	4.993
10MHz	23060	704.00	QPSK	8.9378	9.619
			16QAM	8.9096	9.620
	23095	707.50	QPSK	8.9210	9.631
			16QAM	8.9458	9.735
	23130	711.00	QPSK	8.8968	9.660
			16QAM	8.9107	9.596

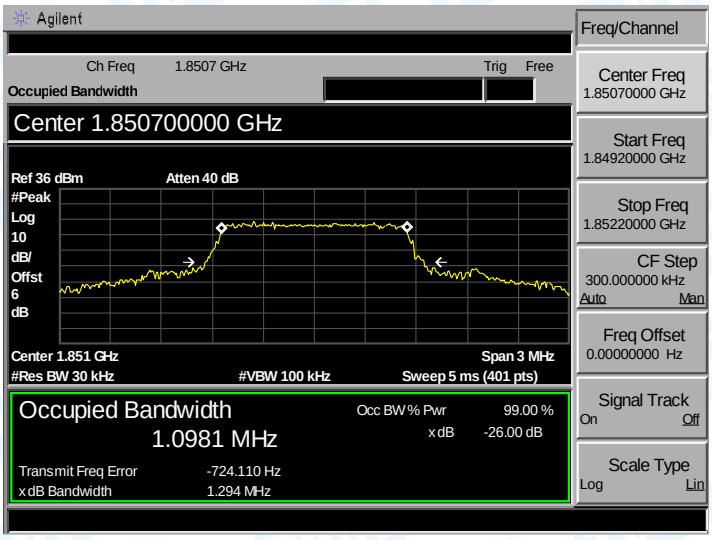
LTE Band 17					
Mode	Channel	Frequency (MHz)	Modulation	99% OBW (MHz)	-26dB Bandwidth (MHz)
5MHz	23755	706.50	QPSK	4.5217	5.017
			16QAM	4.5008	5.023
	23790	710.00	QPSK	4.4965	4.967
			16QAM	4.4985	4.990
	23825	713.50	QPSK	4.4822	4.916
			16QAM	4.4921	4.984
10MHz	23780	709.00	QPSK	8.9247	9.559
			16QAM	8.9279	9.630
	23790	710.00	QPSK	8.9172	9.664
			16QAM	8.9077	9.543
	23800	711.00	QPSK	8.9325	9.571
			16QAM	8.9154	9.608

Occupy Bandwidth Test Plot

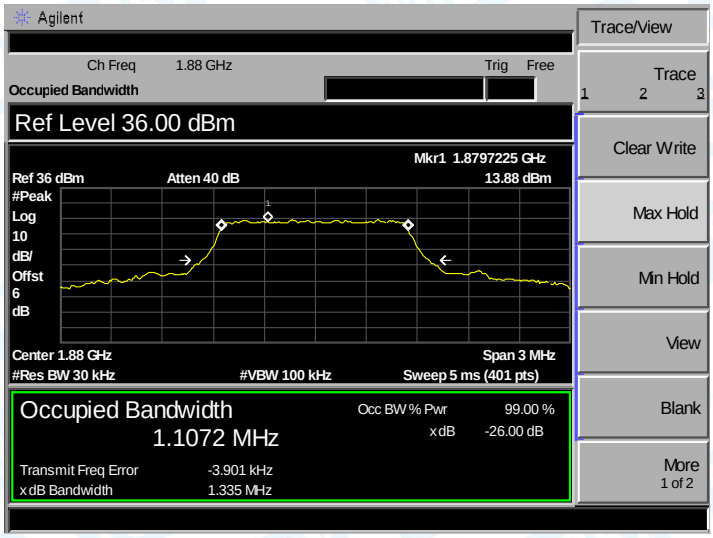
LTE BAND 2 (1.4MHz QPSK-Low CH)



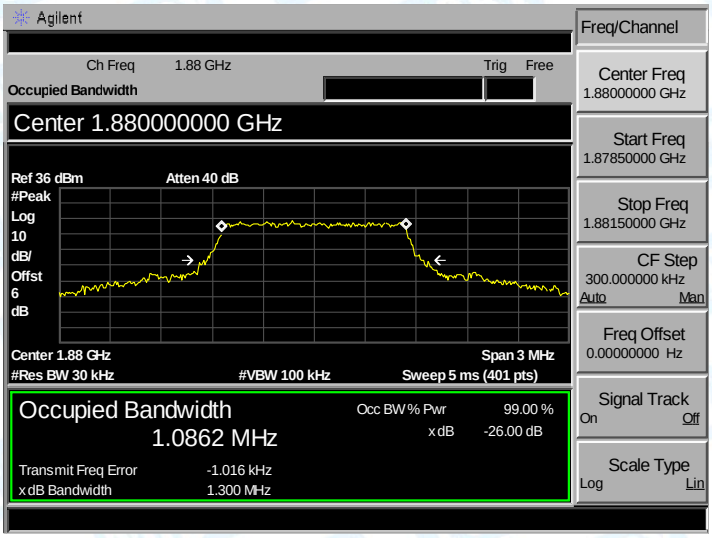
LTE BAND 2 (1.4MHz 16QAM-Low CH)



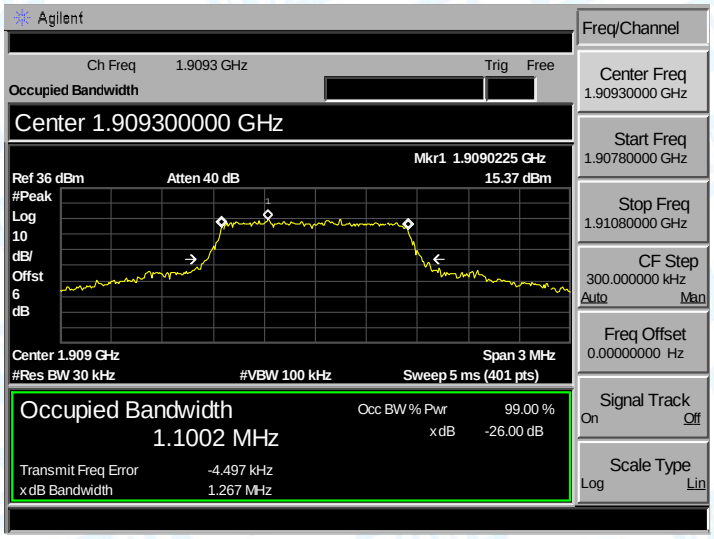
LTE BAND 2 (1.4MHz QPSK-Middle CH)



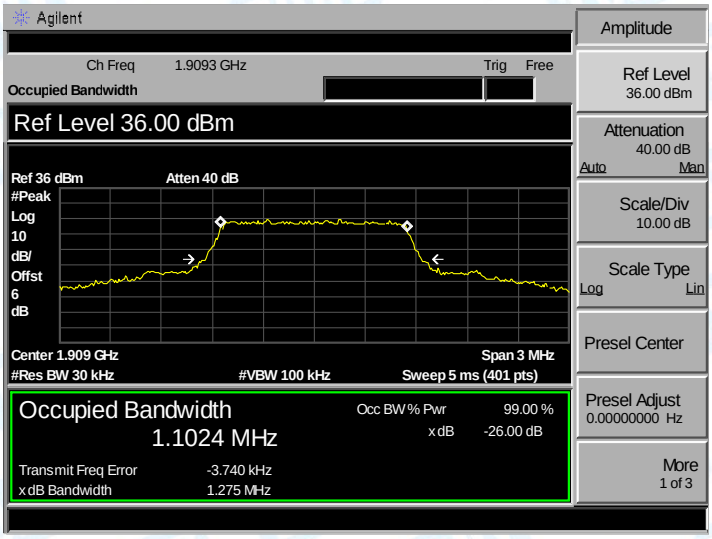
LTE BAND 2 (1.4MHz 16QAM- Middle CH)



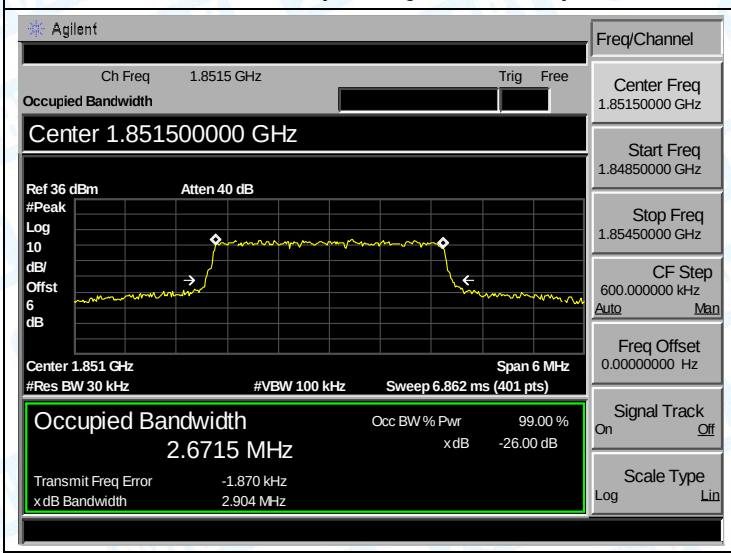
LTE BAND 2 (1.4MHz QPSK-High CH)



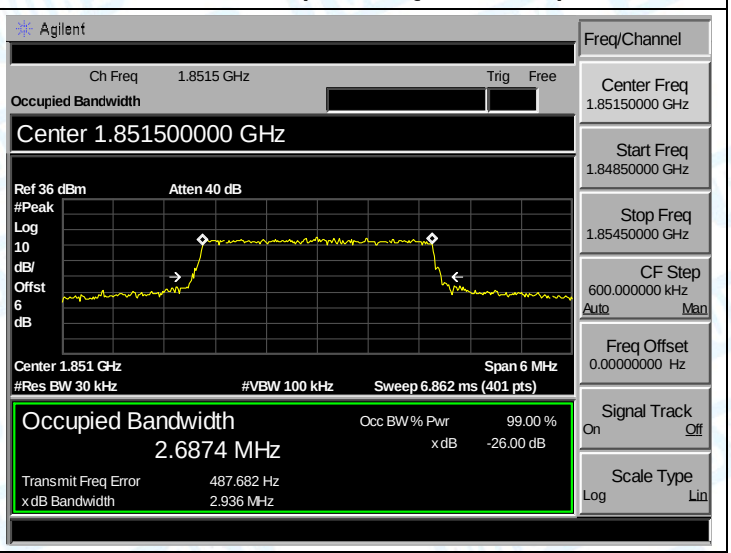
LTE BAND 2 (1.4MHz 16QAM-High CH)



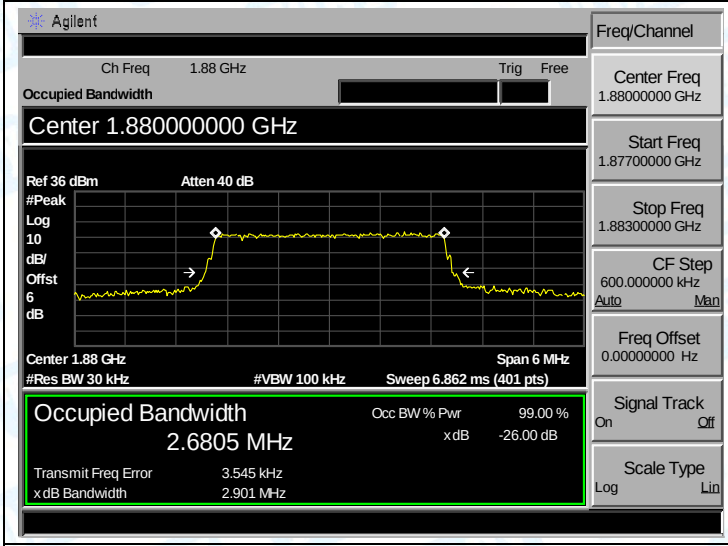
LTE BAND 2 (3MHz QPSK-Low CH)



LTE BAND 2 (3MHz 16QAM-Low CH)



LTE BAND 2 (3MHz QPSK-Middle CH)



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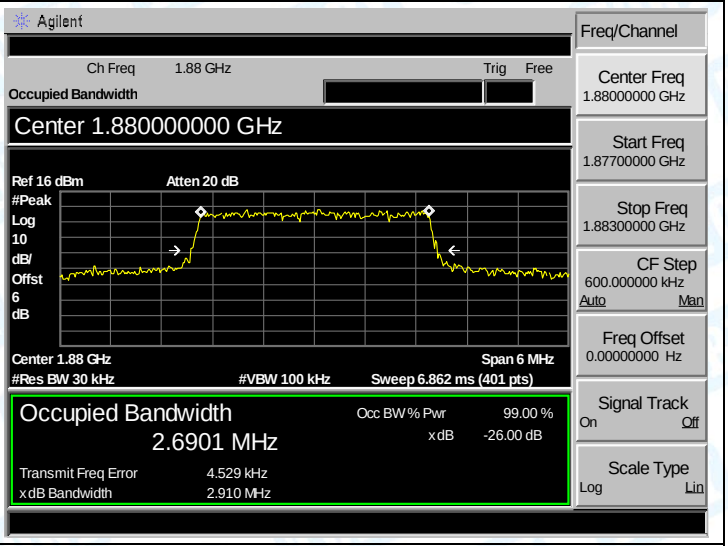
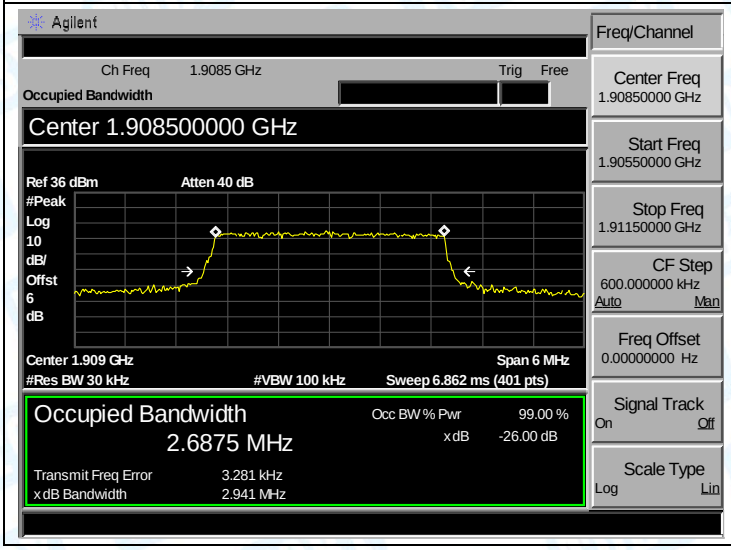
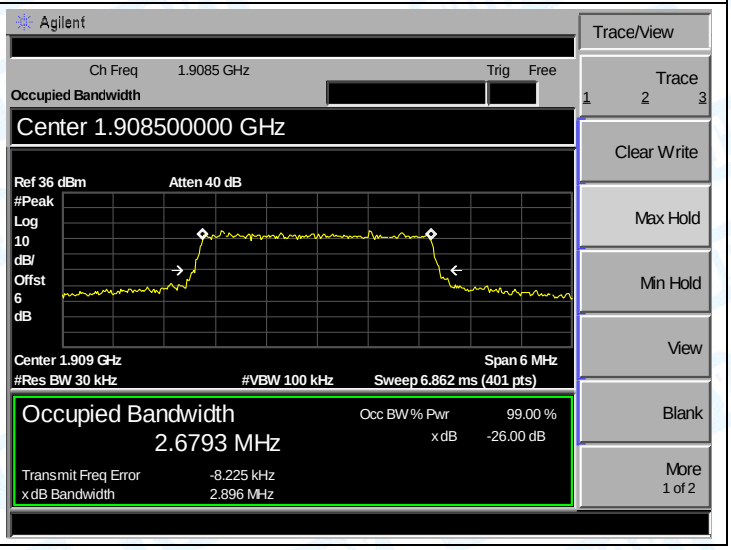


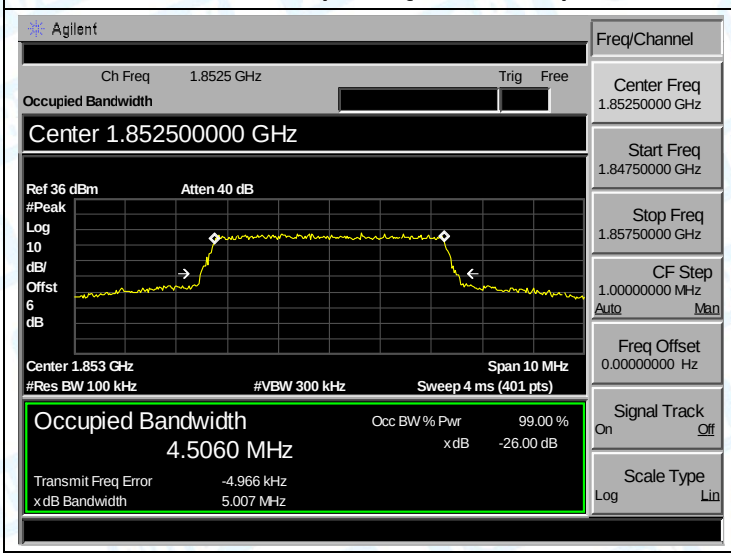
LTE BAND 2 (3MHz QPSK-High CH)



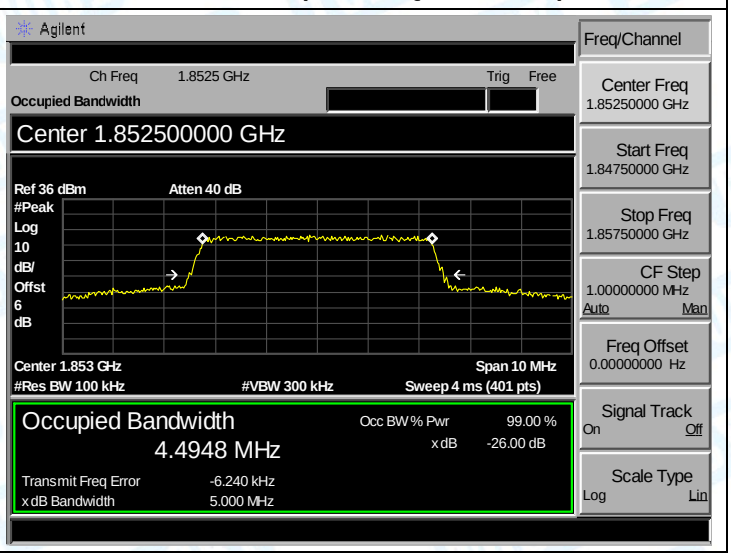
LTE BAND 2 (3MHz 16QAM-High CH)



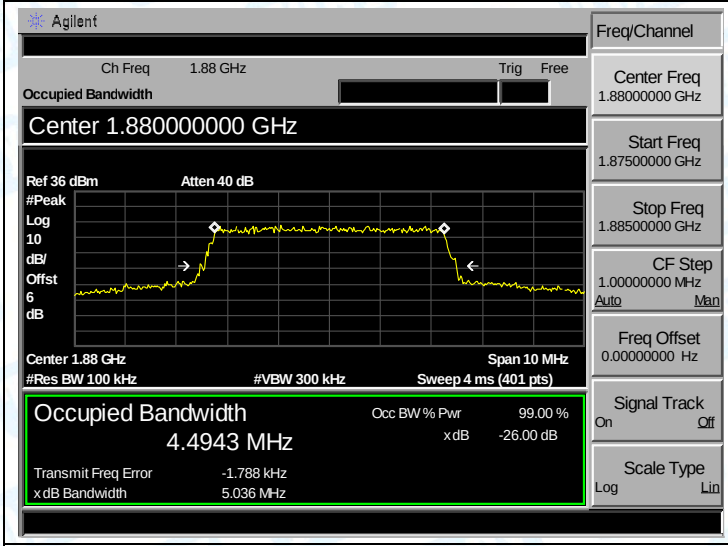
LTE BAND 2 (5MHz QPSK-Low CH)



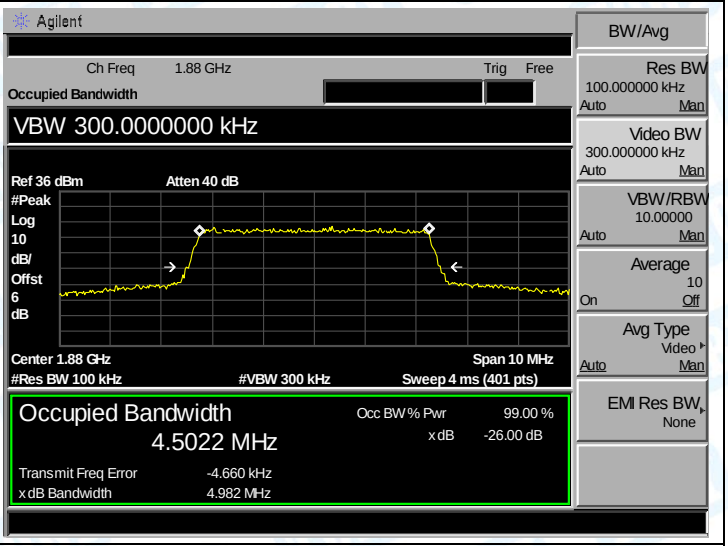
LTE BAND 2 (5MHz 16QAM-Low CH)



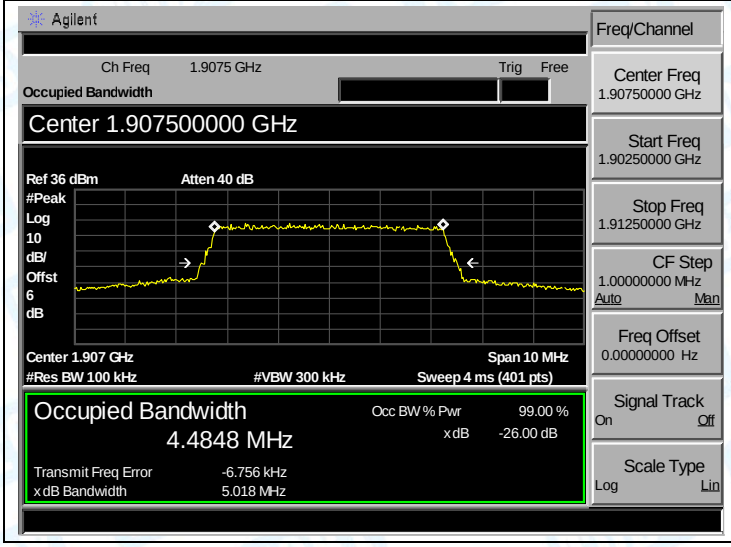
LTE BAND 2 (5MHz QPSK-Middle CH)



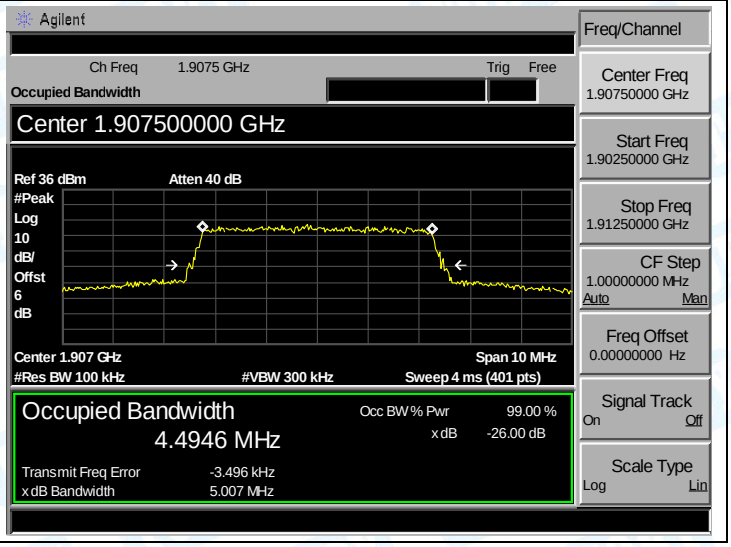
LTE BAND 2 (5MHz 16QAM- Middle CH)



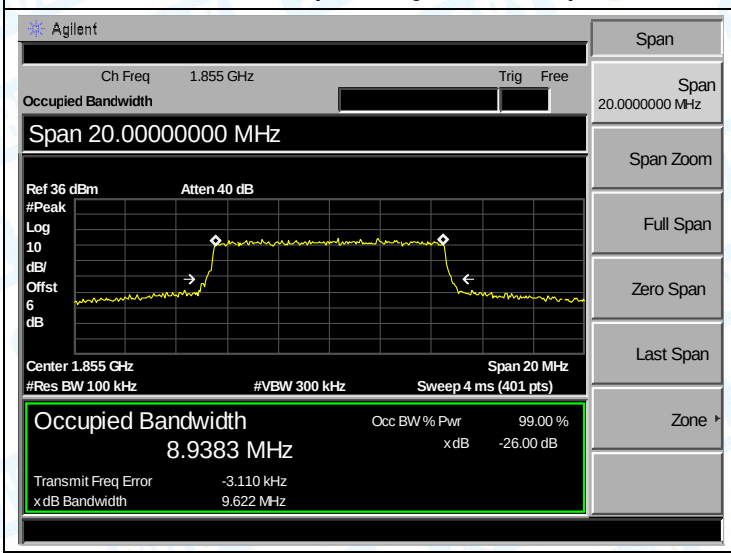
LTE BAND 2 (5MHz QPSK-High CH)



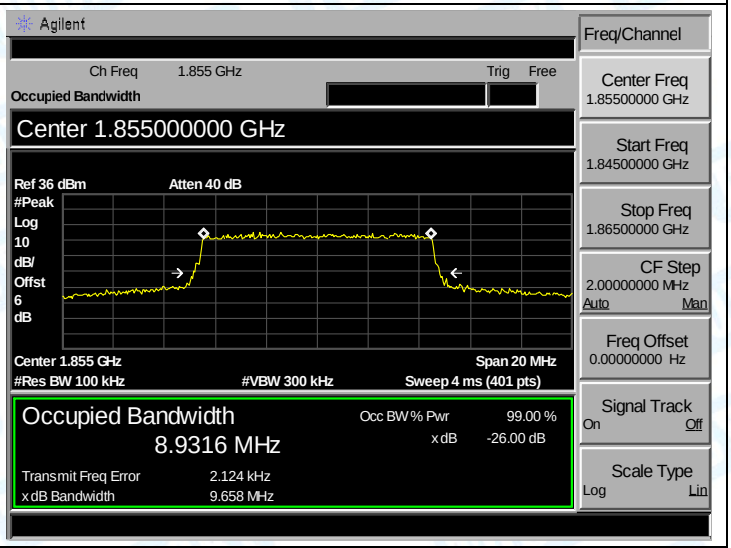
LTE BAND 2 (5MHz 16QAM-High CH)



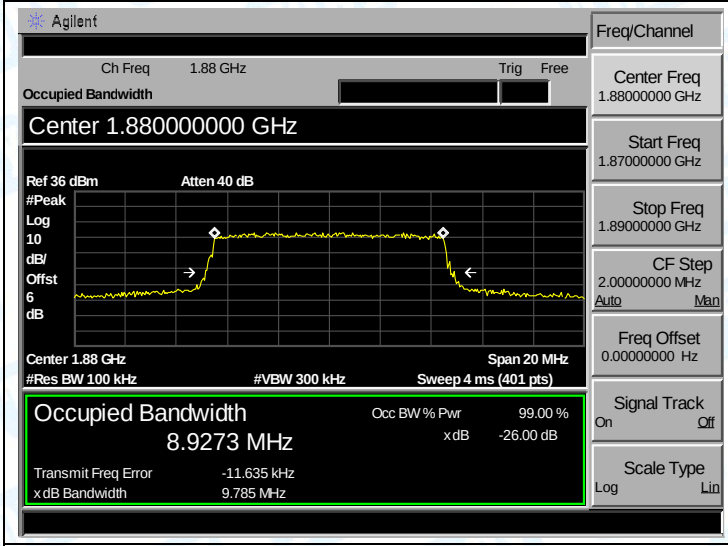
LTE BAND 2 (10MHz QPSK-Low CH)



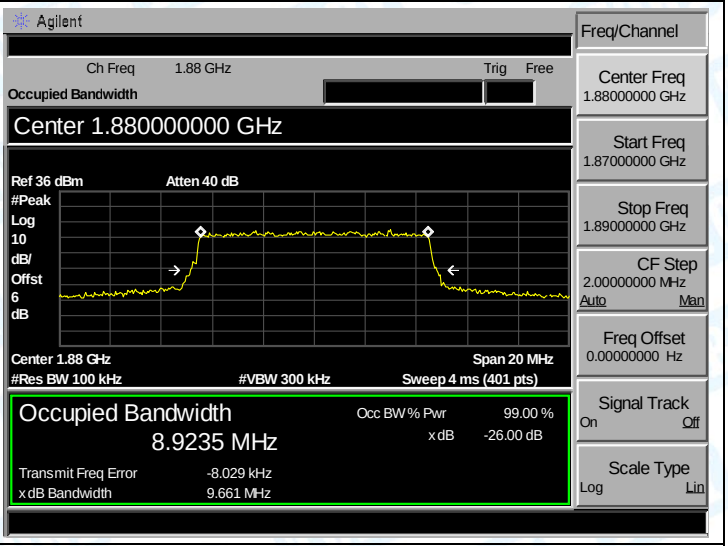
LTE BAND 2 (10MHz 16QAM-Low CH)



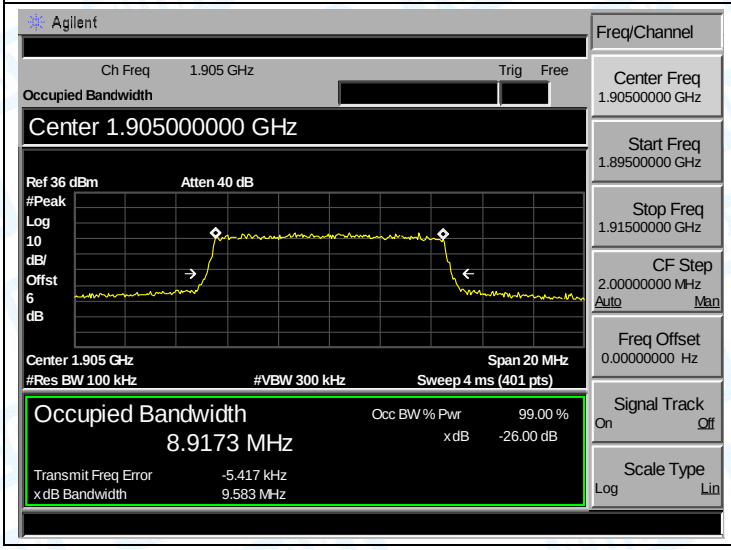
LTE BAND 2 (10MHz QPSK-Middle CH)



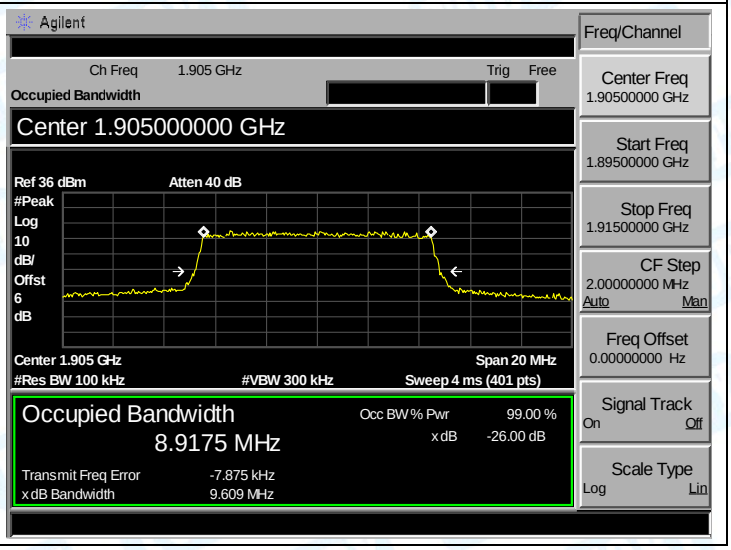
LTE BAND 2 (10MHz 16QAM- Middle CH)



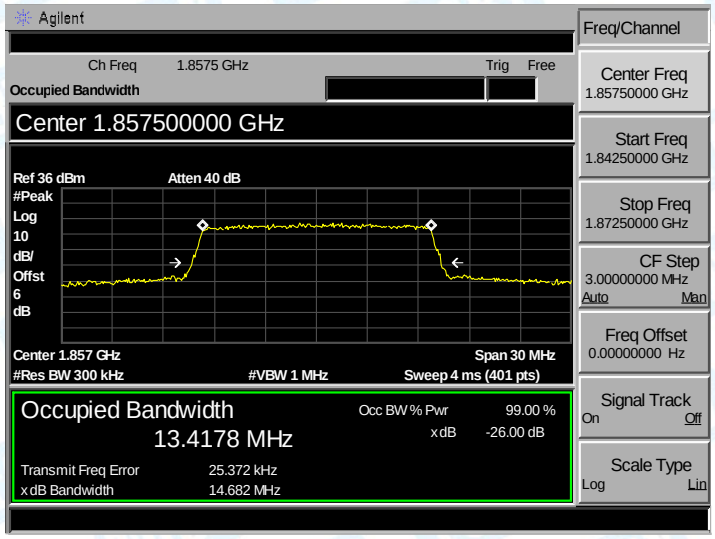
LTE BAND 2 (10MHz QPSK-High CH)



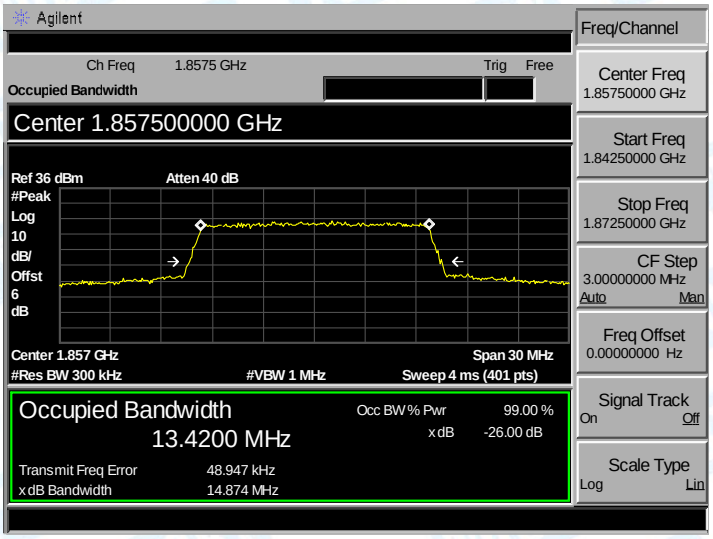
LTE BAND 2 (10MHz 16QAM-High CH)



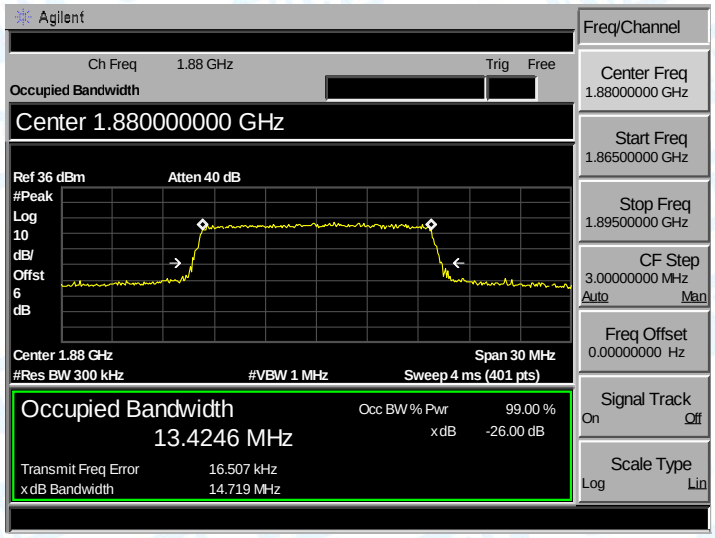
LTE BAND 2 (15MHz QPSK-Low CH)



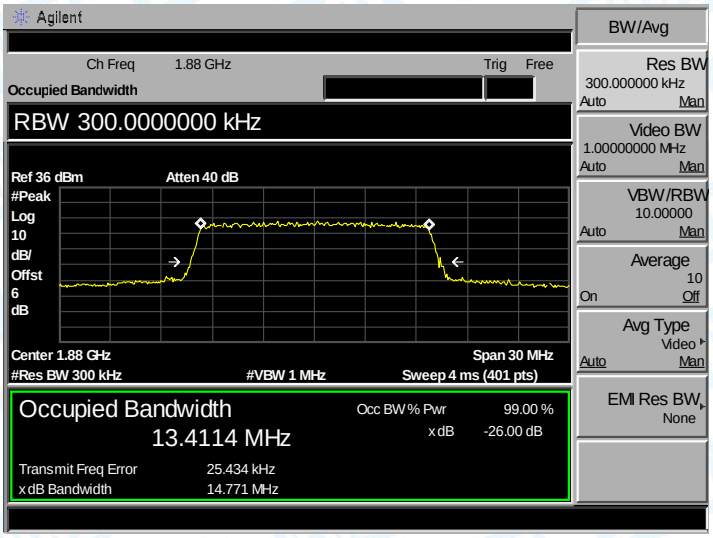
LTE BAND 2 (15MHz 16QAM-Low CH)



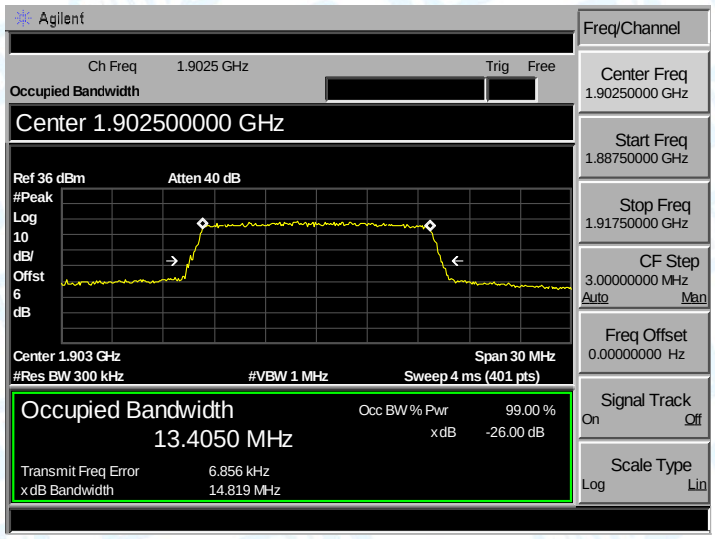
LTE BAND 2 (15MHz QPSK-Middle CH)



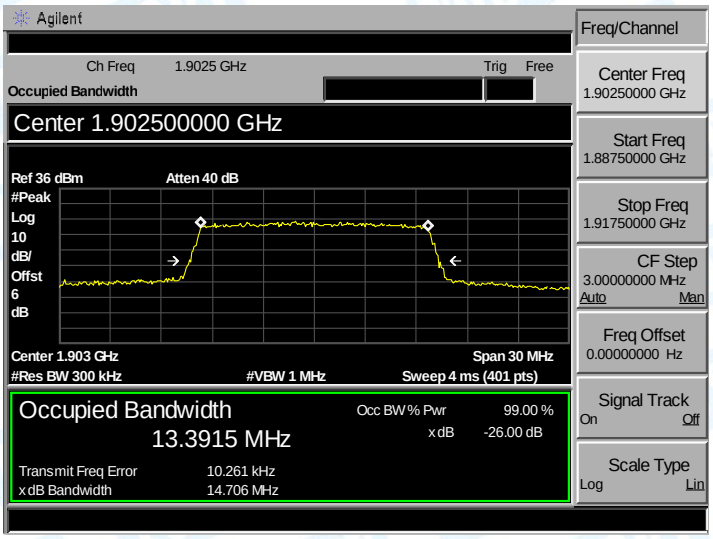
LTE BAND 2 (15MHz 16QAM- Middle CH)



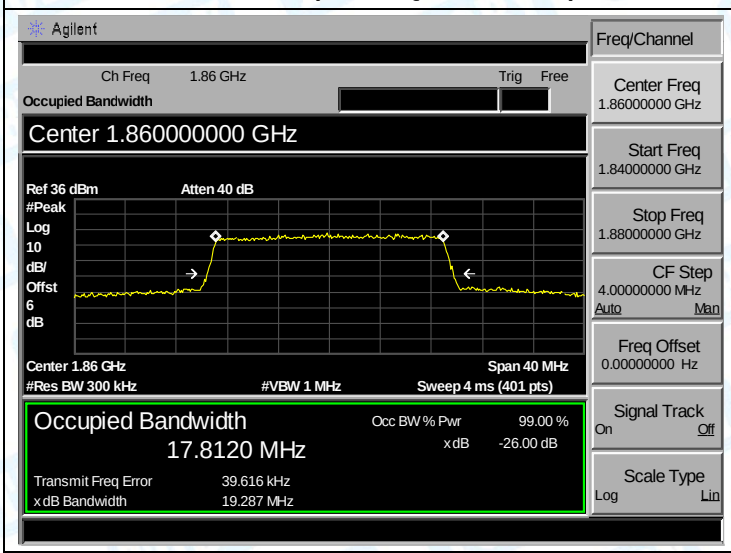
LTE BAND 2 (15MHz QPSK-High CH)



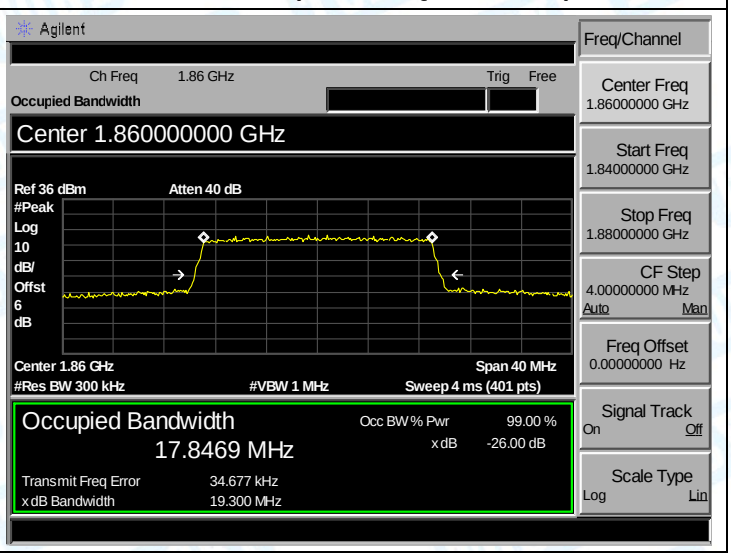
LTE BAND 2 (15MHz 16QAM-High CH)



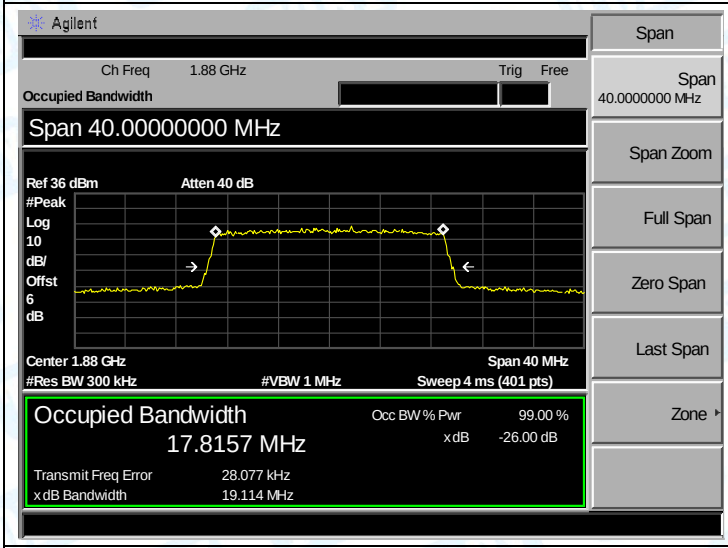
LTE BAND 2 (20MHz QPSK-Low CH)



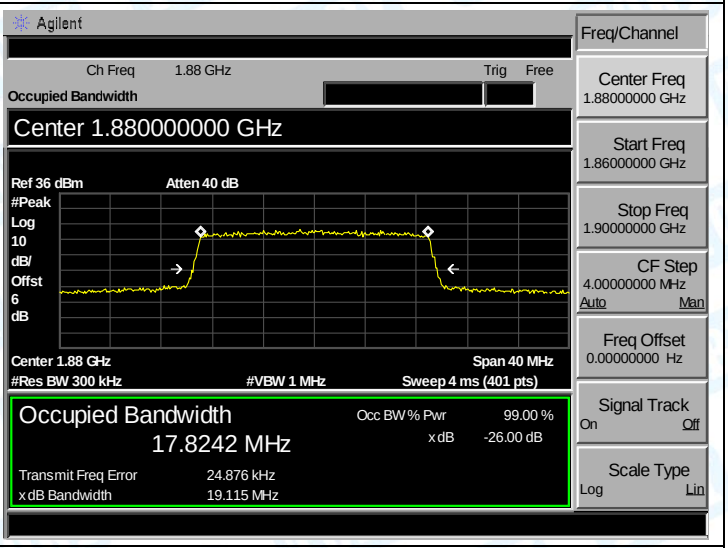
LTE BAND 2 (20MHz 16QAM-Low CH)



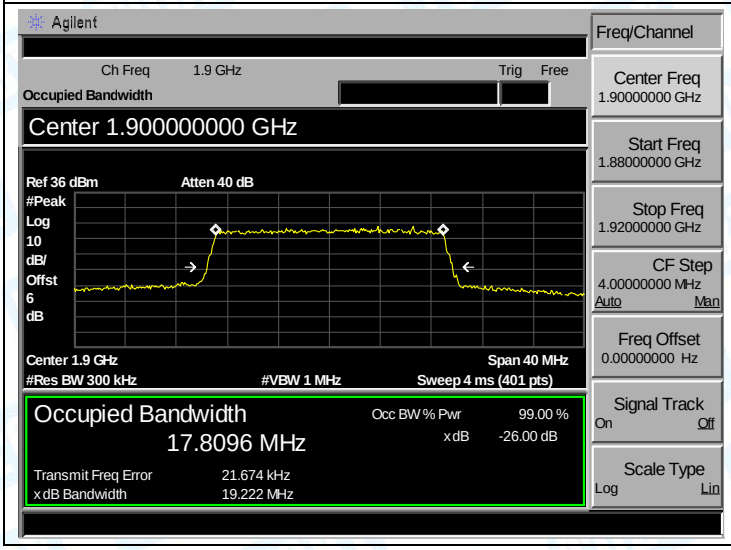
LTE BAND 2 (20MHz QPSK-Middle CH)



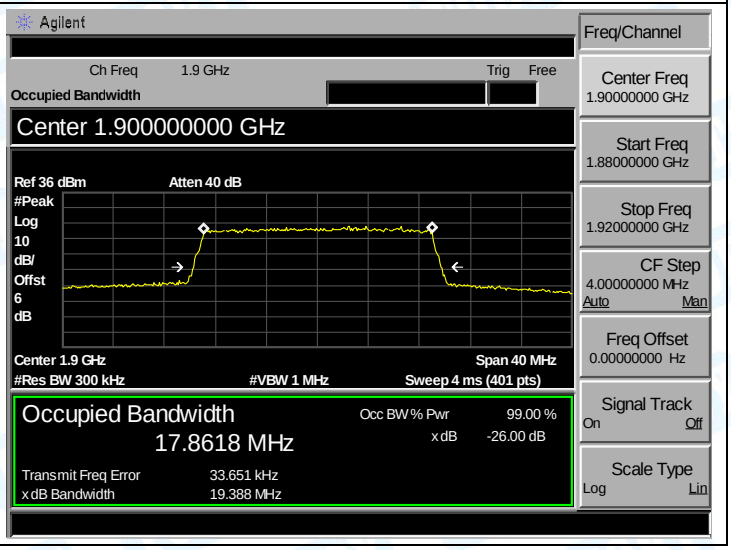
LTE BAND 2 (20MHz 16QAM- Middle CH)



LTE BAND 2 (20MHz QPSK-High CH)

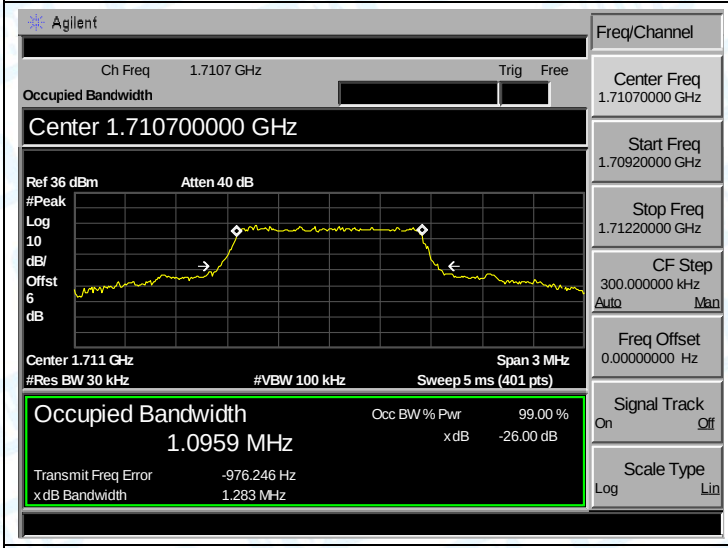


LTE BAND 2 (20MHz 16QAM-High CH)

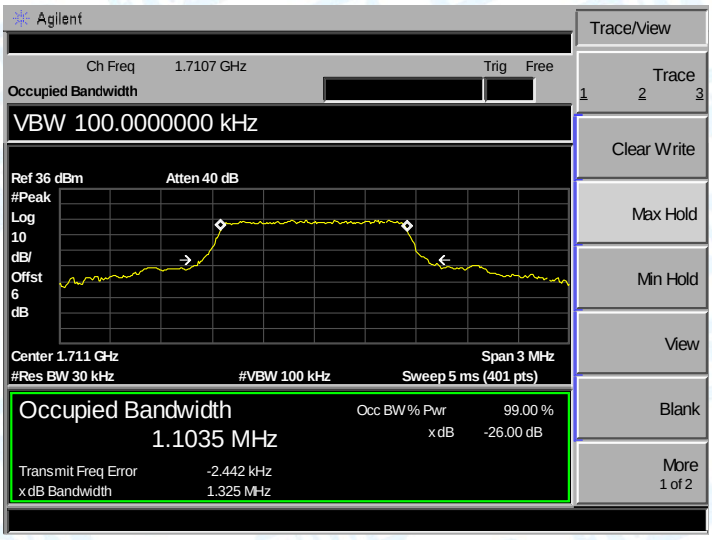


Occupy Bandwidth Test Plot

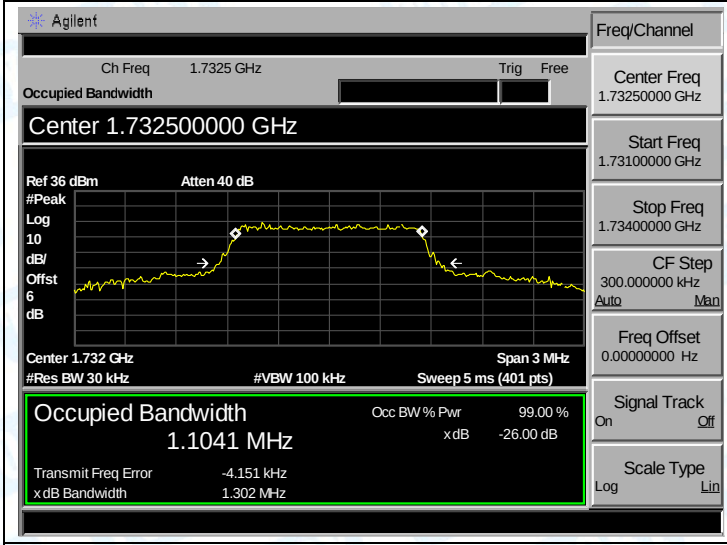
LTE BAND 4 (1.4MHz QPSK-Low CH)



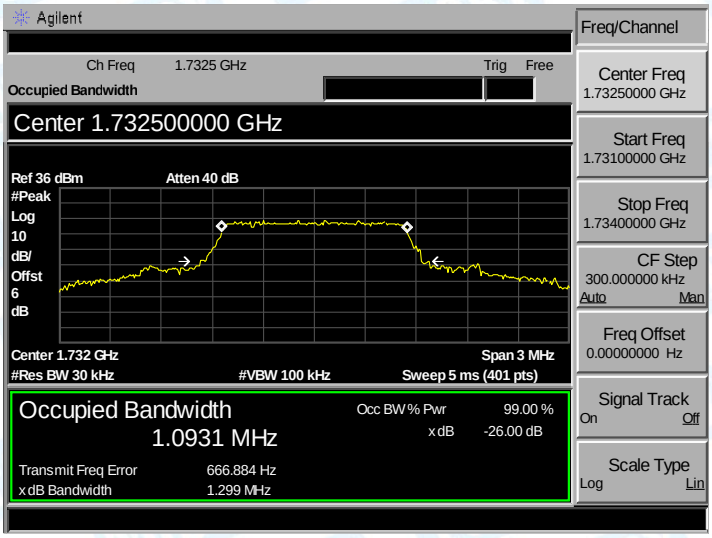
LTE BAND 4 (1.4MHz 16QAM-Low CH)



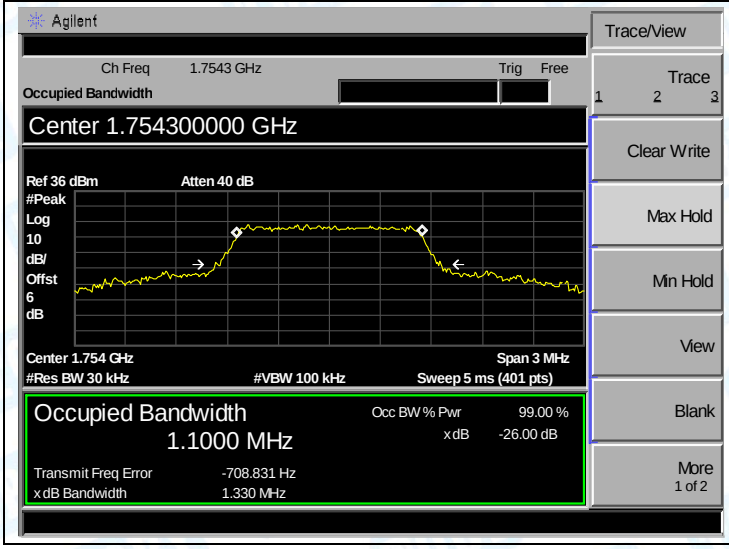
LTE BAND 4 (1.4MHz QPSK-Middle CH)



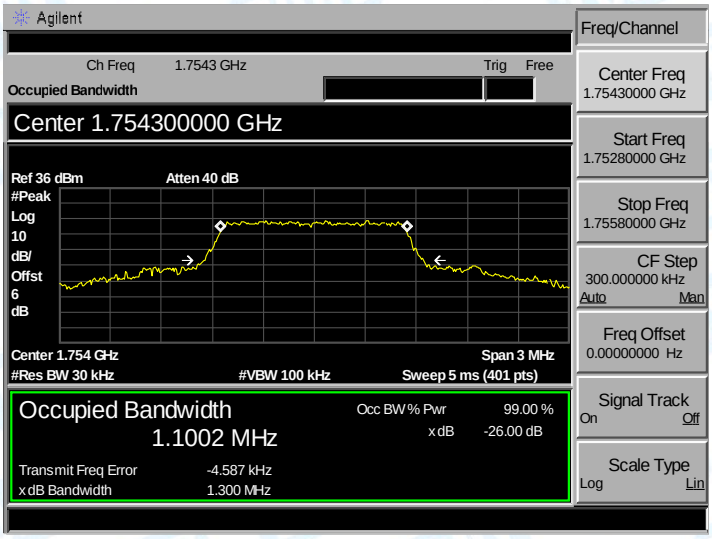
LTE BAND 4 (1.4MHz 16QAM- Middle CH)



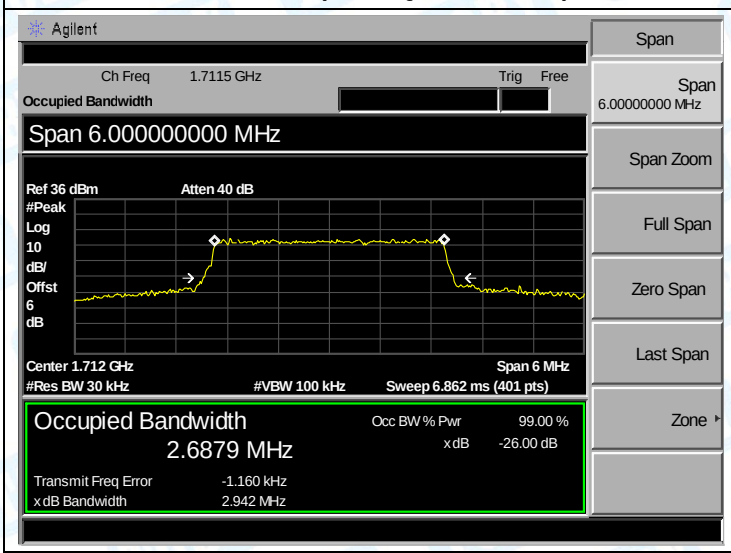
LTE BAND 4 (1.4MHz QPSK-High CH)



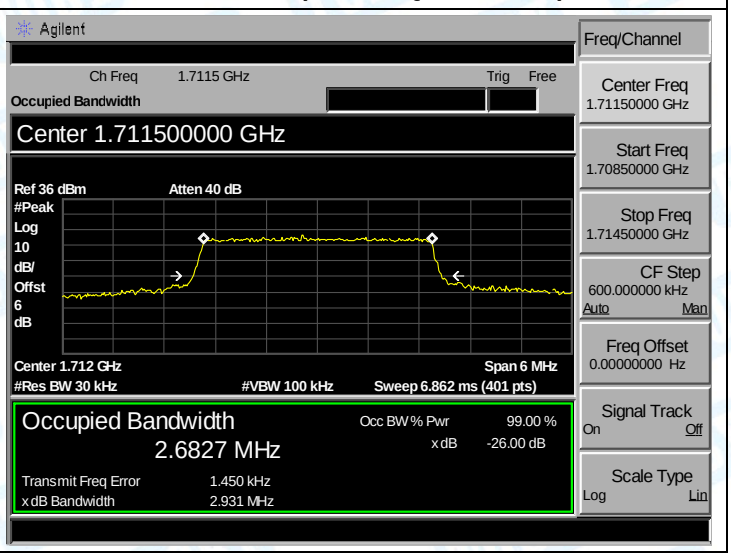
LTE BAND 4 (1.4MHz 16QAM-High CH)



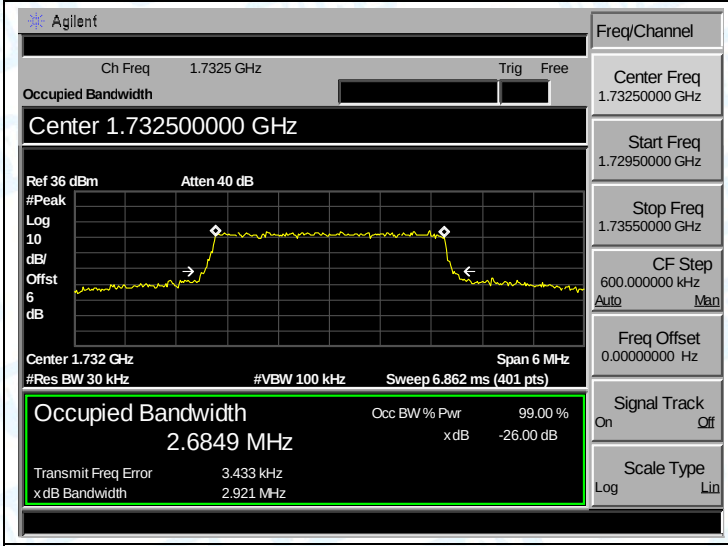
LTE BAND 4 (3MHz QPSK-Low CH)



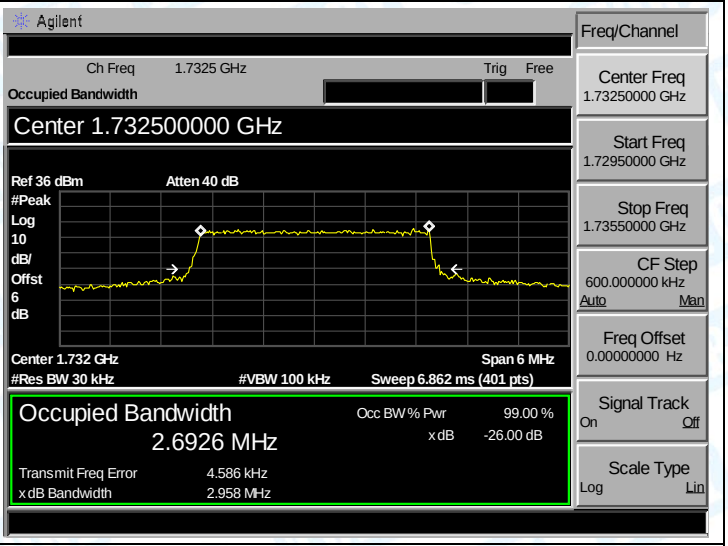
LTE BAND 4 (3MHz 16QAM-Low CH)



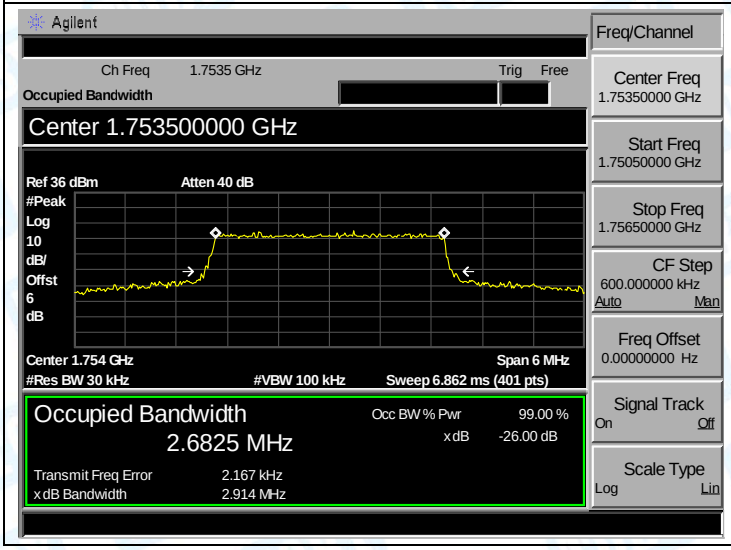
LTE BAND 4 (3MHz QPSK-Middle CH)



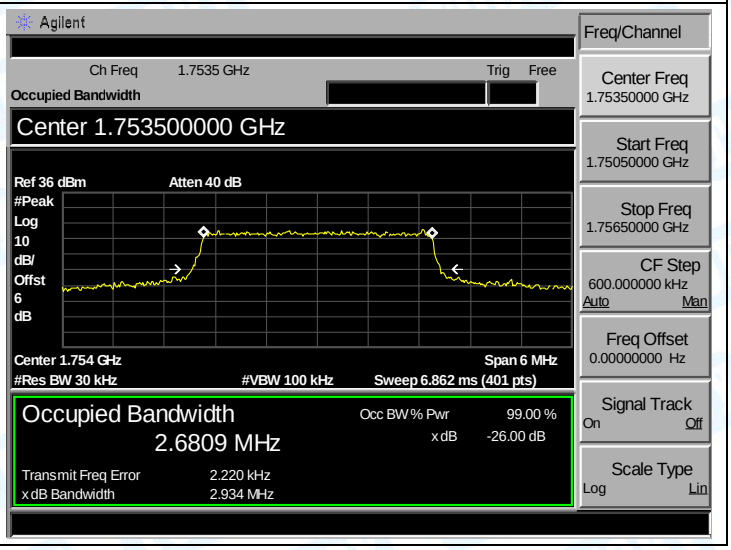
LTE BAND 4 (3MHz 16QAM- Middle CH)



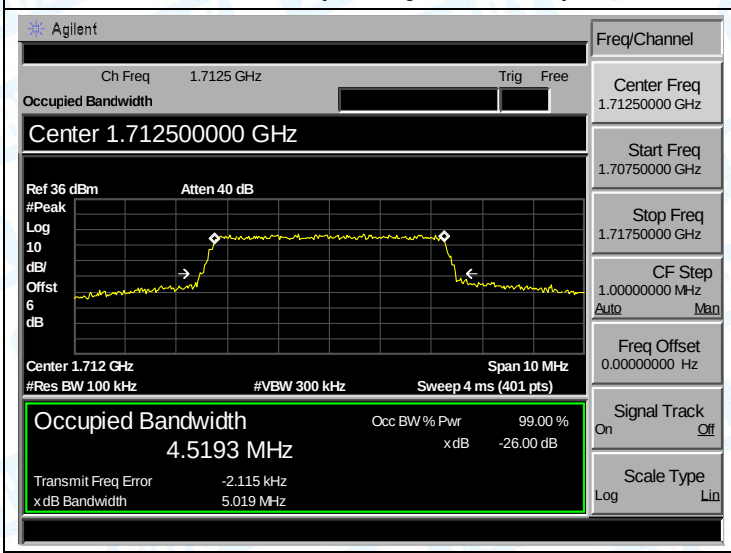
LTE BAND 4 (3MHz QPSK-High CH)



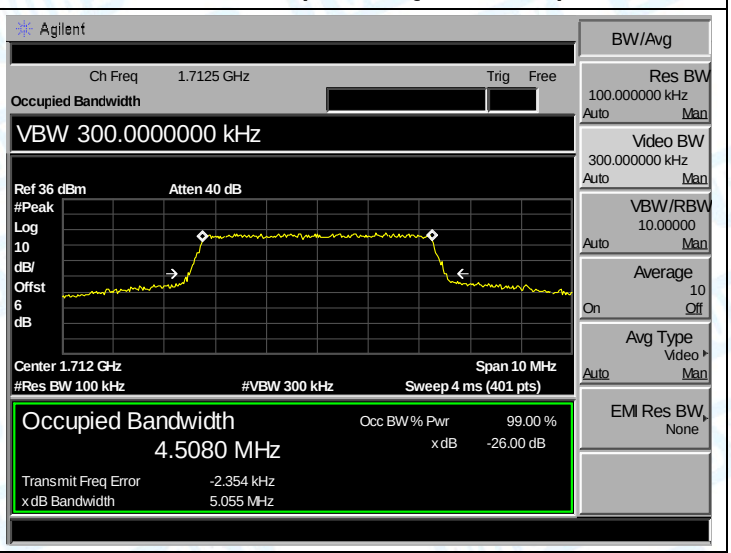
LTE BAND 4 (3MHz 16QAM-High CH)



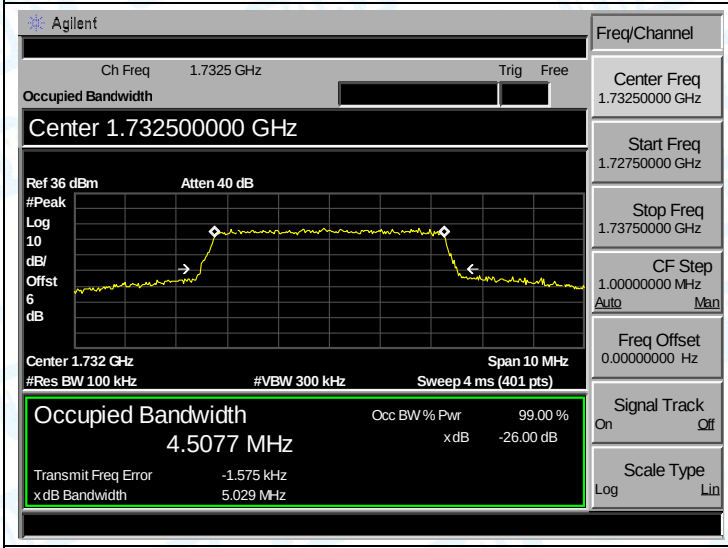
LTE BAND 4 (5MHz QPSK-Low CH)



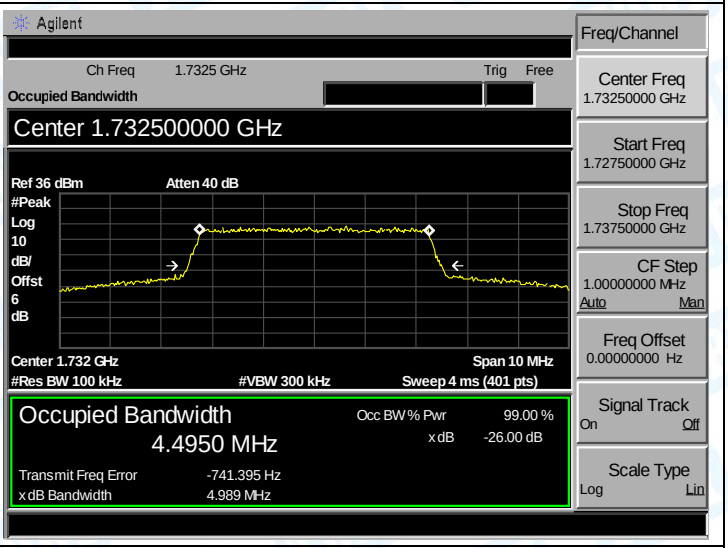
LTE BAND 4 (5MHz 16QAM-Low CH)



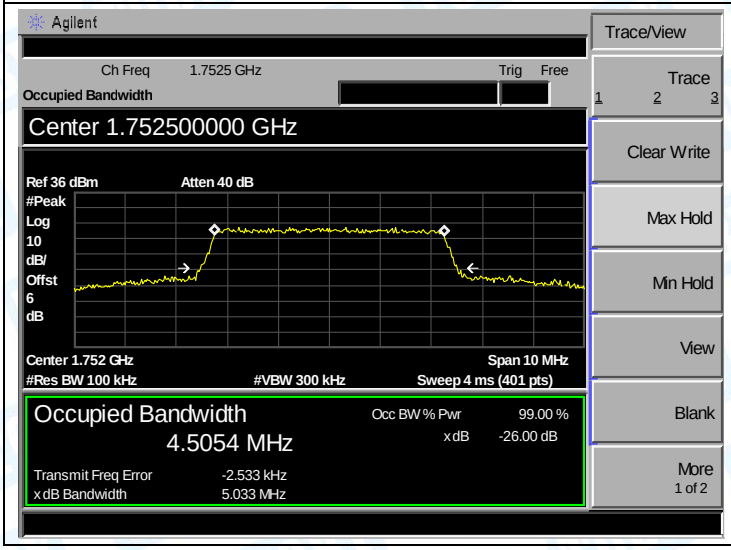
LTE BAND 4 (5MHz QPSK-Middle CH)



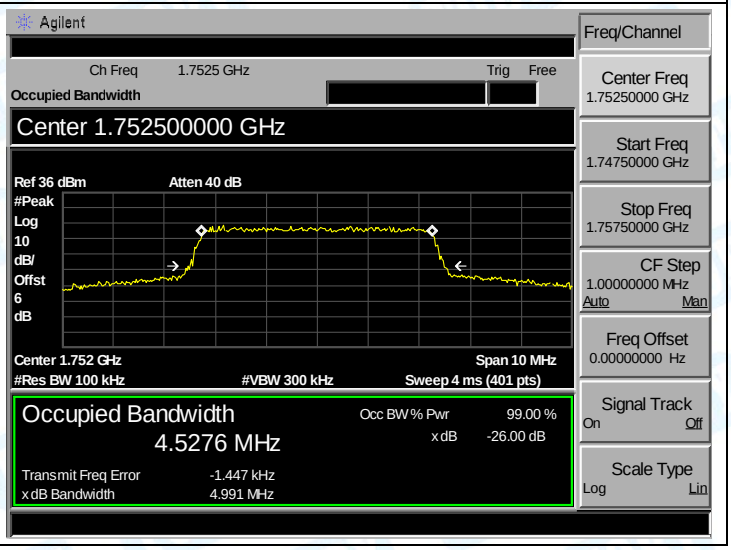
LTE BAND 4 (5MHz 16QAM- Middle CH)



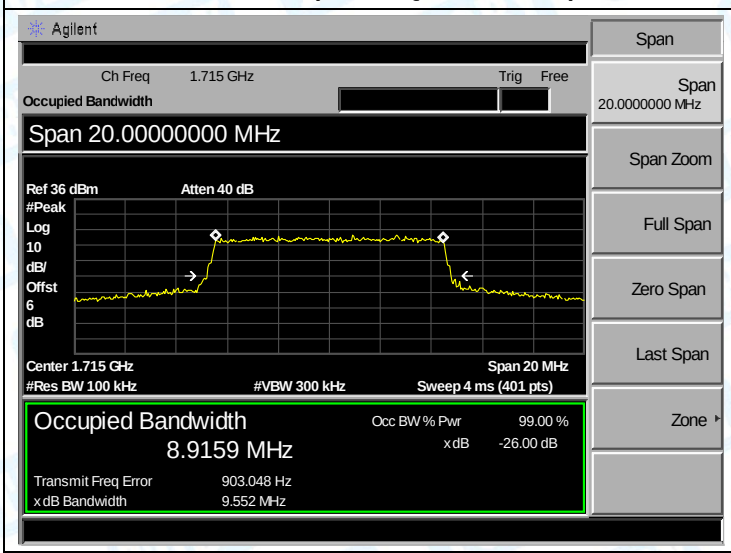
LTE BAND 4 (5MHz QPSK-High CH)



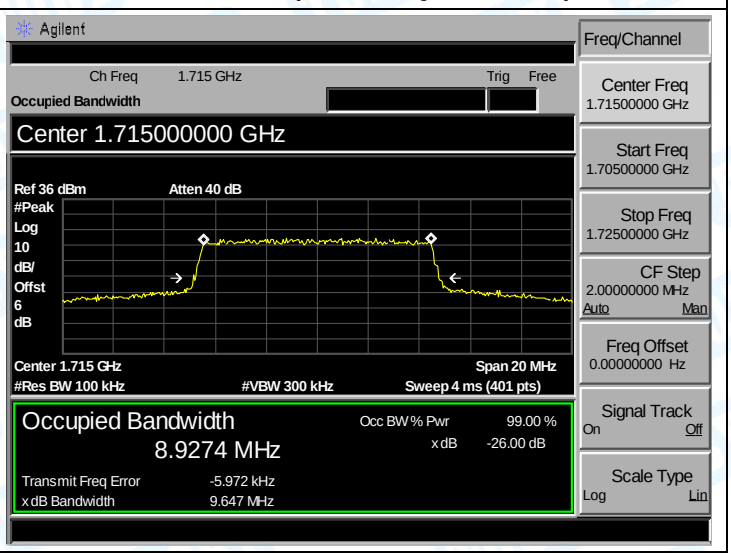
LTE BAND 4 (5MHz 16QAM-High CH)



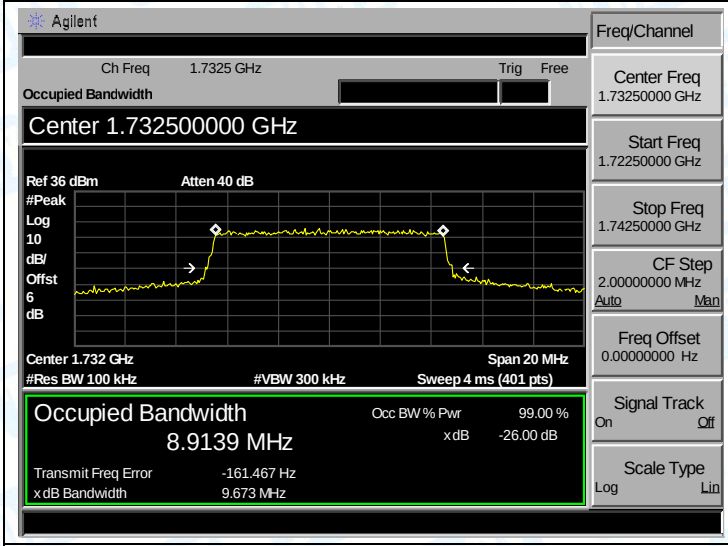
LTE BAND 4 (10MHz QPSK-Low CH)



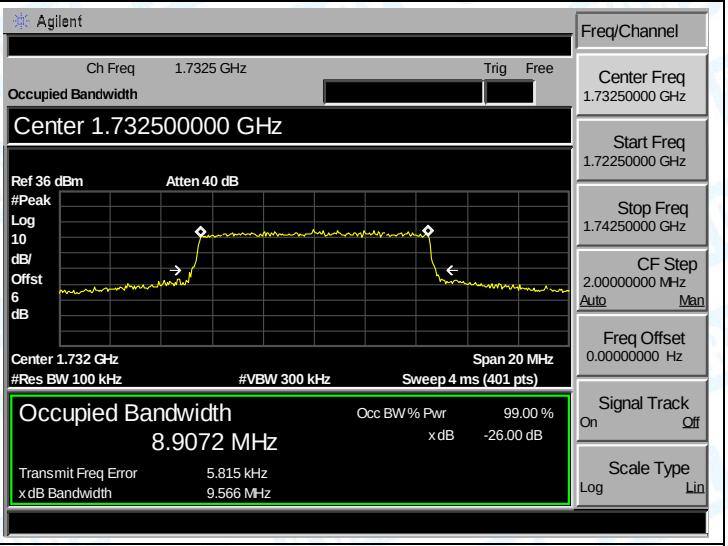
LTE BAND 4 (10MHz 16QAM-Low CH)



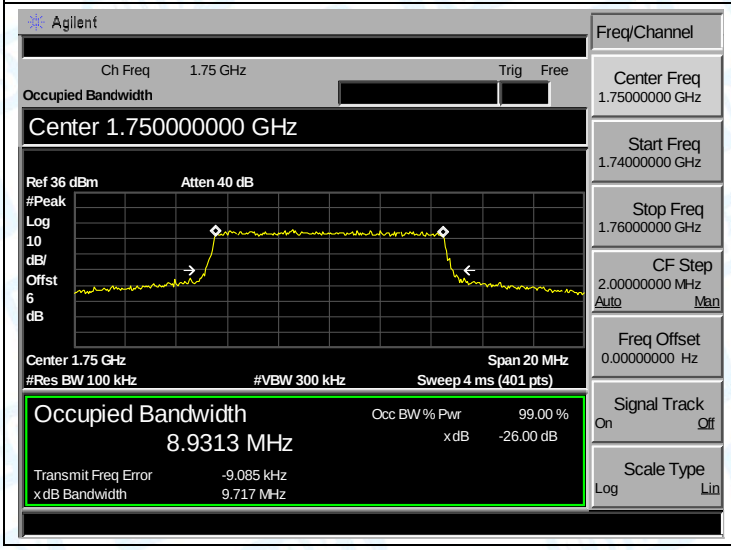
LTE BAND 4 (10MHz QPSK-Middle CH)



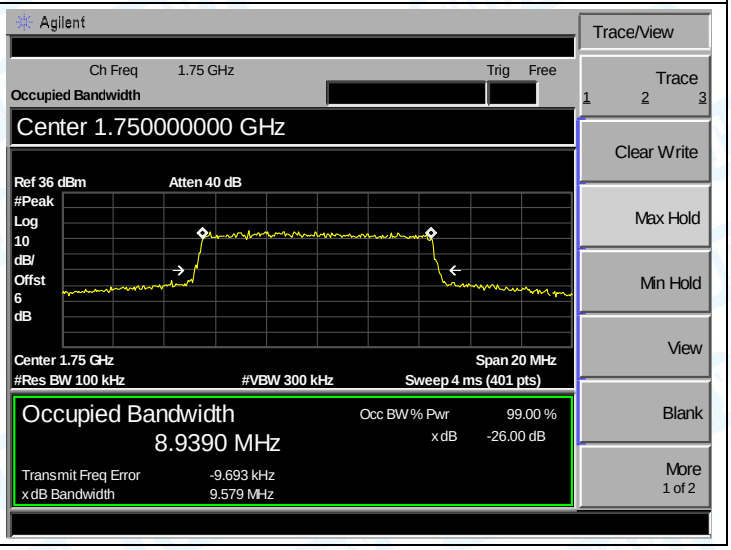
LTE BAND 4 (10MHz 16QAM- Middle CH)



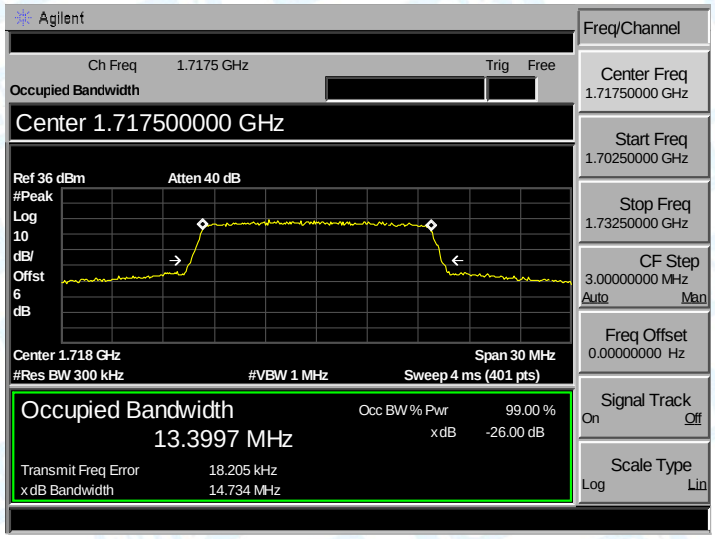
LTE BAND 4 (10MHz QPSK-High CH)



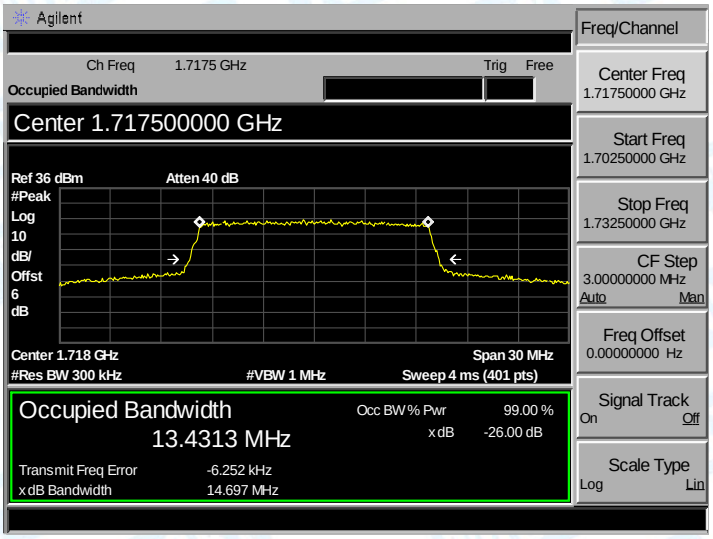
LTE BAND 4 (10MHz 16QAM-High CH)



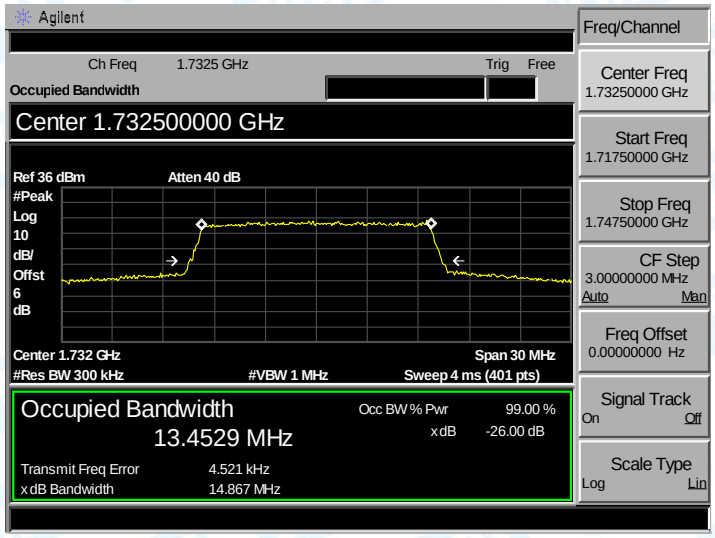
LTE BAND 4 (15MHz QPSK-Low CH)



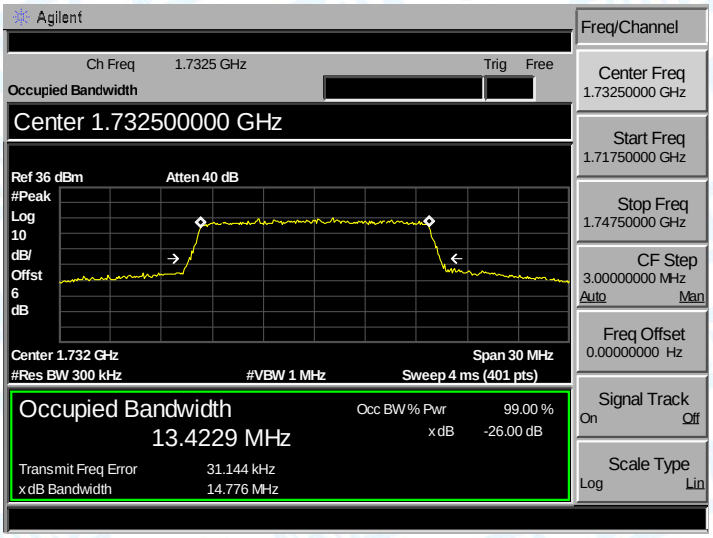
LTE BAND 4 (15MHz 16QAM-Low CH)



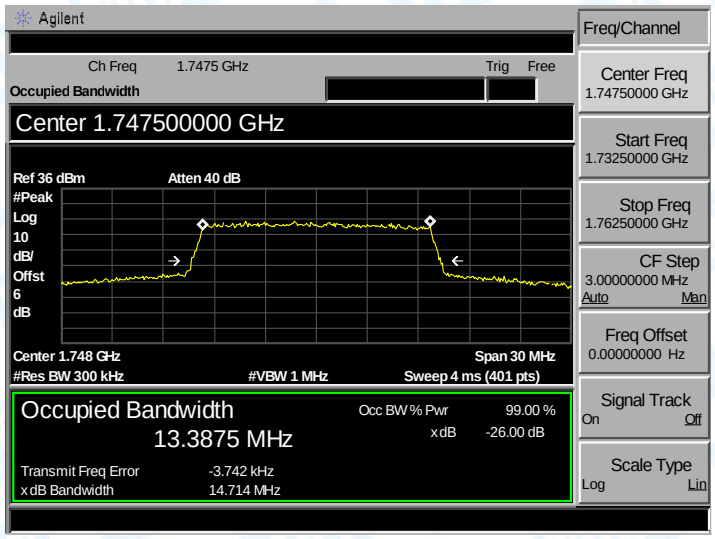
LTE BAND 4 (15MHz QPSK-Middle CH)



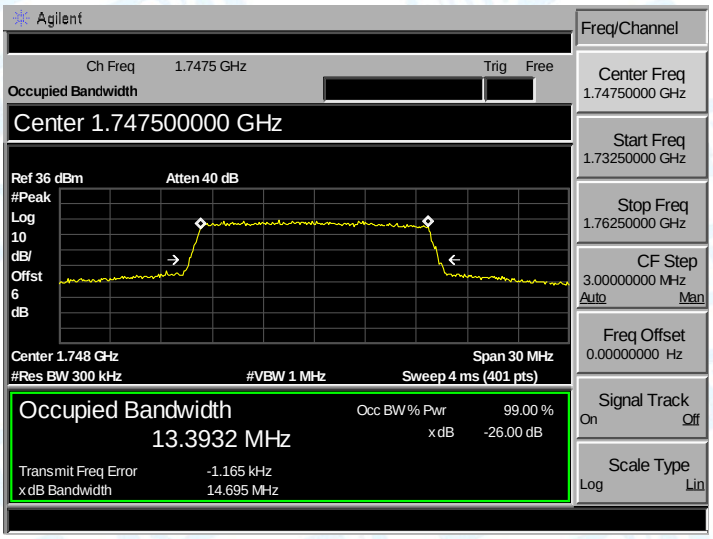
LTE BAND 4 (15MHz 16QAM- Middle CH)



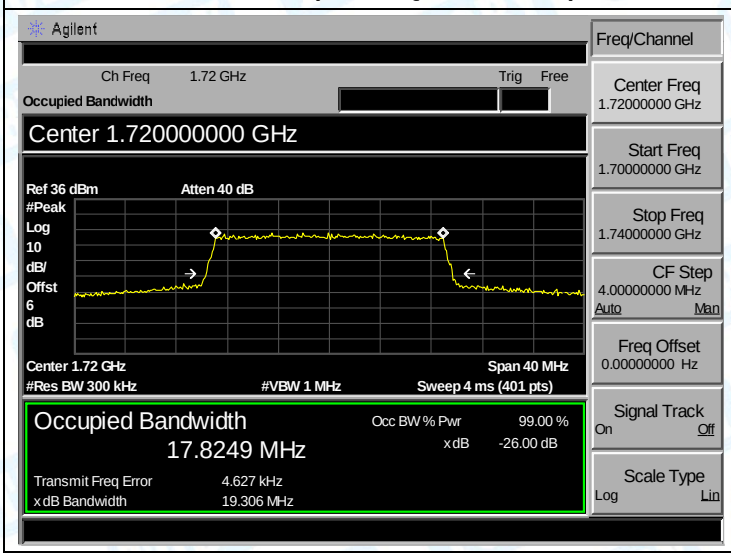
LTE BAND 4 (15MHz QPSK-High CH)



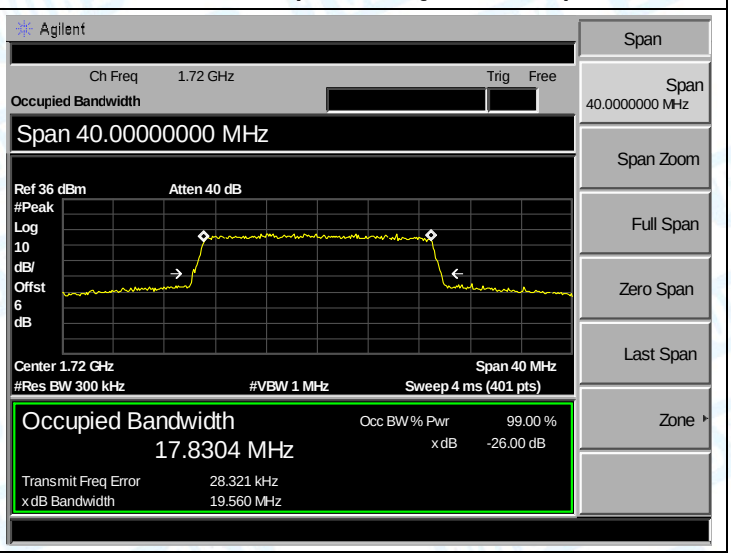
LTE BAND 4 (15MHz 16QAM-High CH)



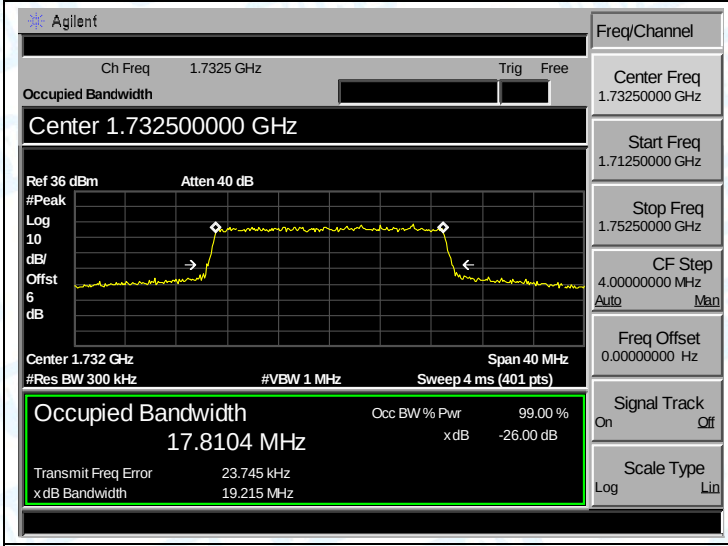
LTE BAND 4 (20MHz QPSK-Low CH)



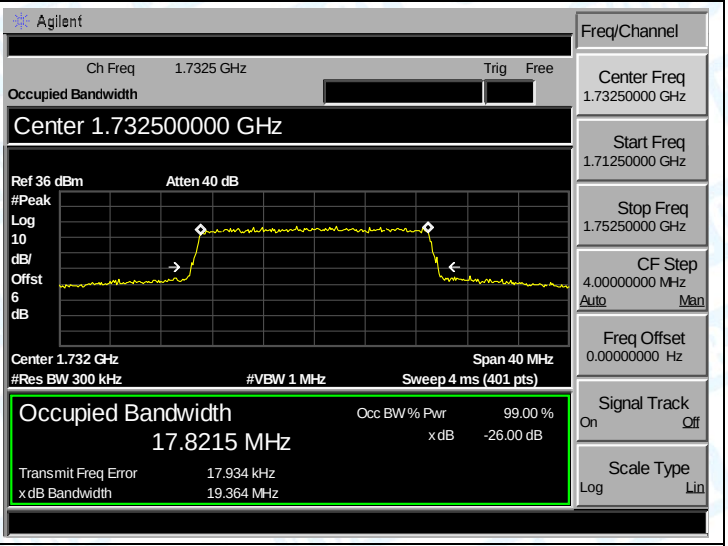
LTE BAND 4 (20MHz 16QAM-Low CH)



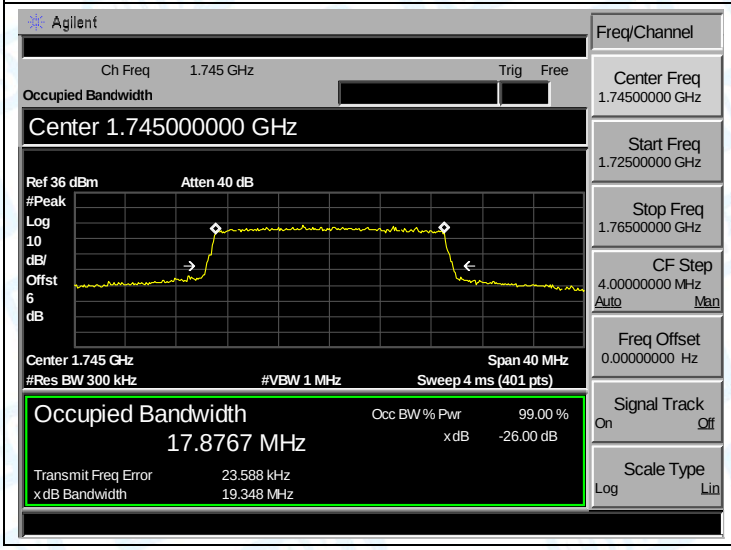
LTE BAND 4 (20MHz QPSK-Middle CH)



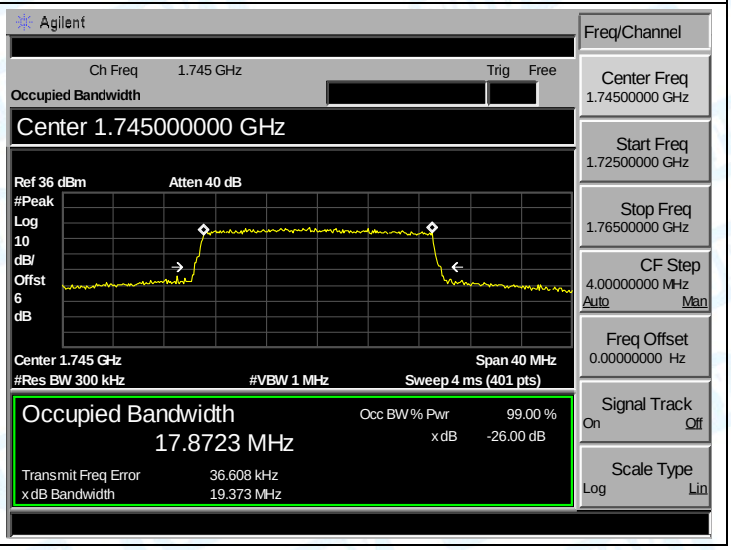
LTE BAND 4 (20MHz 16QAM- Middle CH)



LTE BAND 4 (20MHz QPSK-High CH)



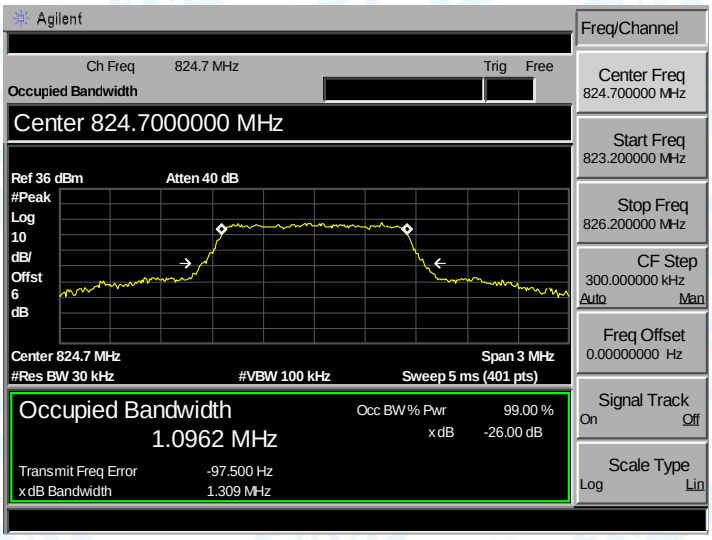
LTE BAND 4 (20MHz 16QAM-High CH)



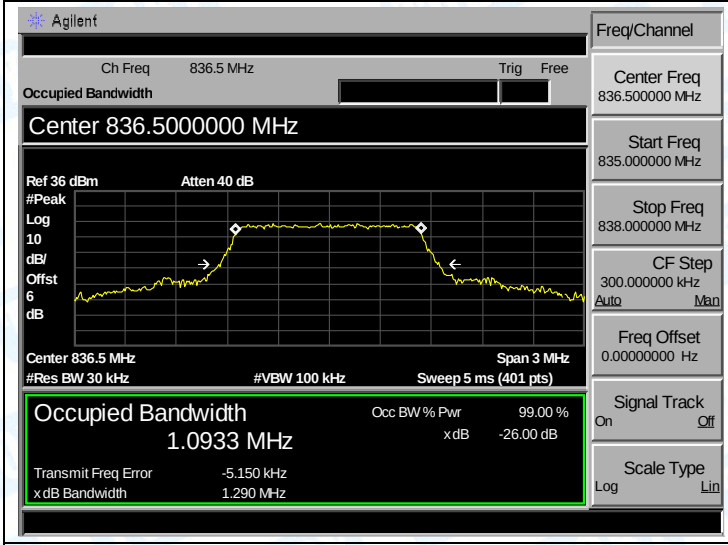
Occupy Bandwidth Test Plot

LTE BAND 5 (1.4MHz QPSK-Low CH)

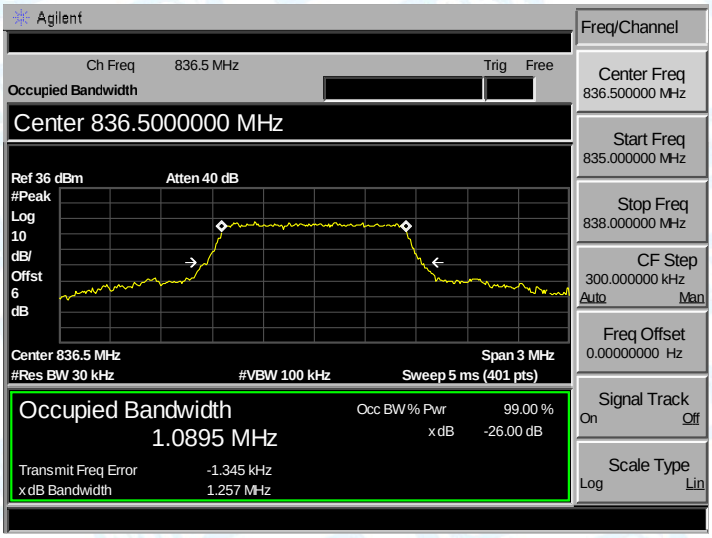
LTE BAND 5 (1.4MHz 16QAM-Low CH)



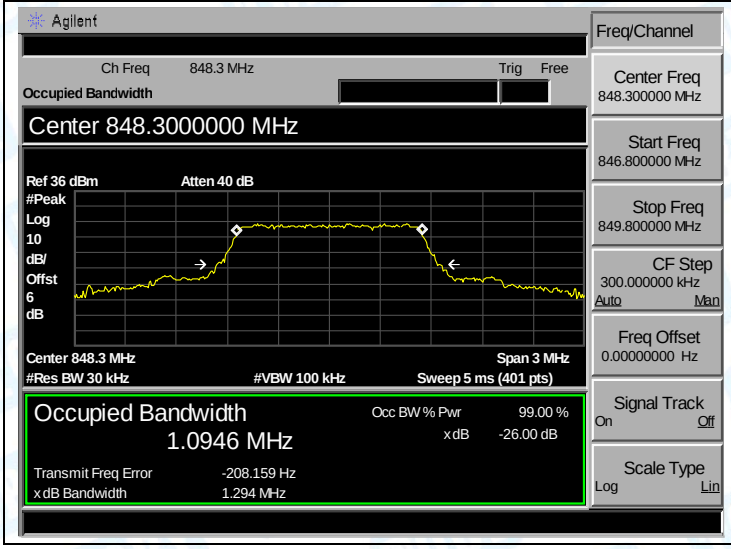
LTE BAND 5 (1.4MHz QPSK-Middle CH)



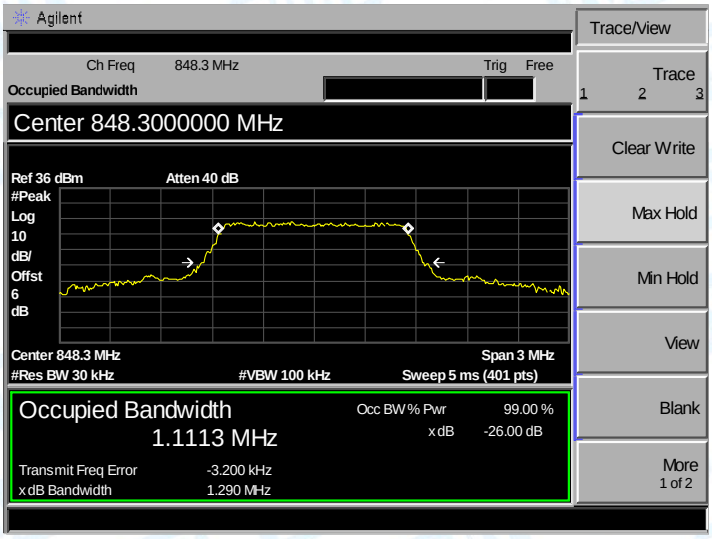
LTE BAND 5 (1.4MHz 16QAM- Middle CH)



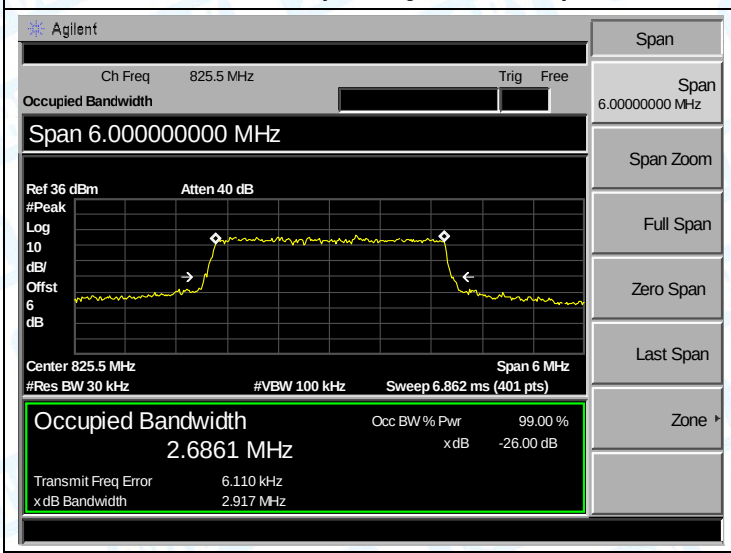
LTE BAND 5 (1.4MHz QPSK-High CH)



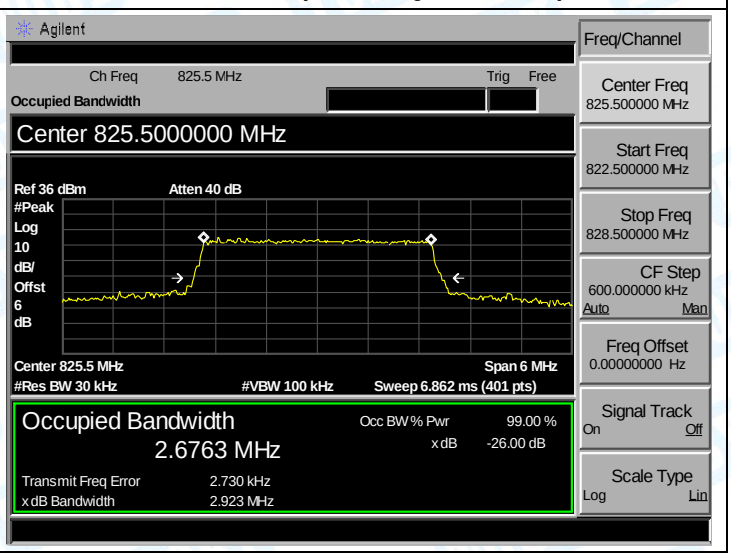
LTE BAND 5 (1.4MHz 16QAM-High CH)



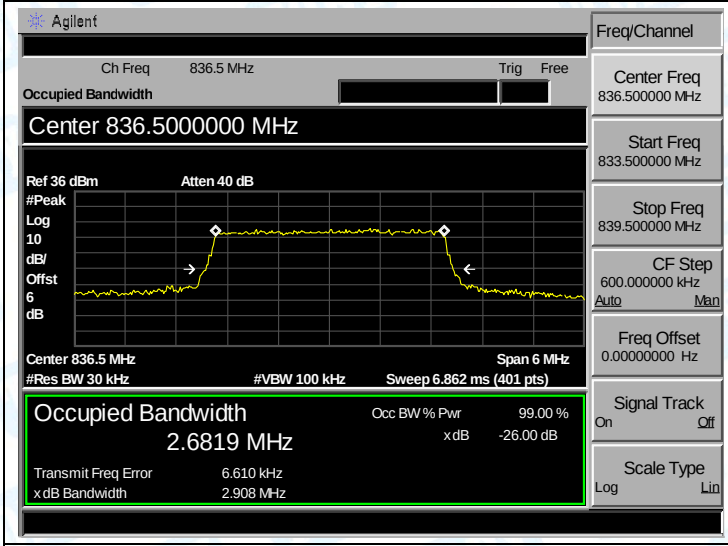
LTE BAND 5 (3MHz QPSK-Low CH)



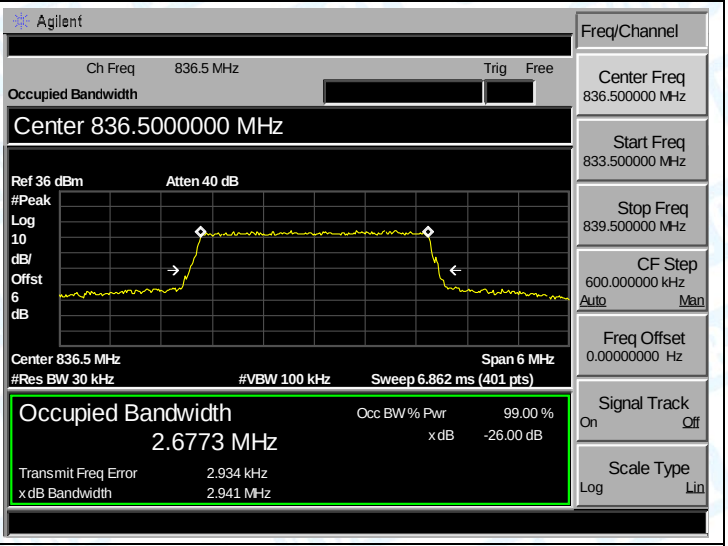
LTE BAND 5 (3MHz 16QAM-Low CH)



LTE BAND 5 (3MHz QPSK-Middle CH)



LTE BAND 5 (3MHz 16QAM- Middle CH)



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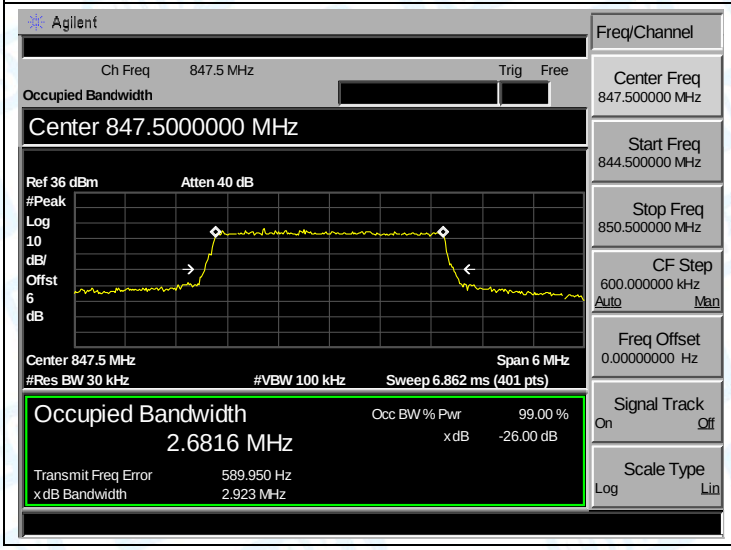
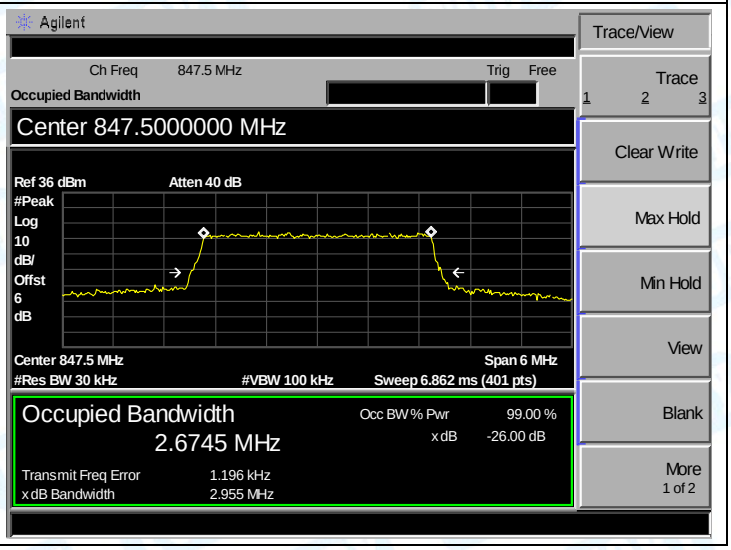
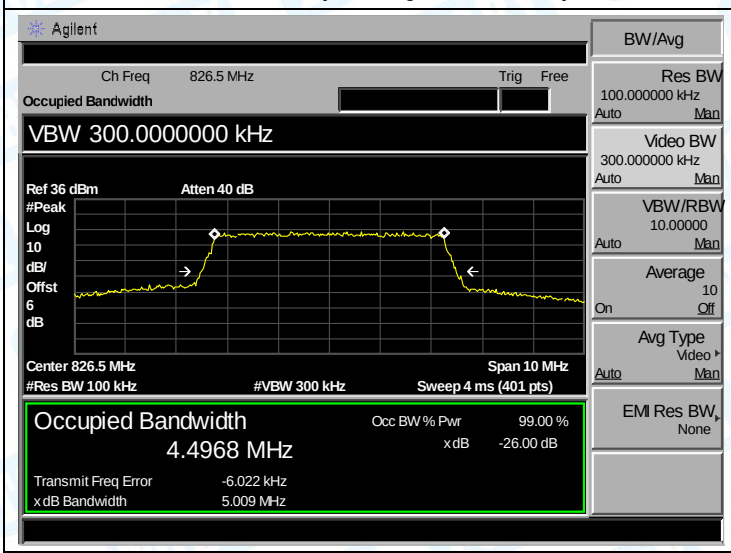


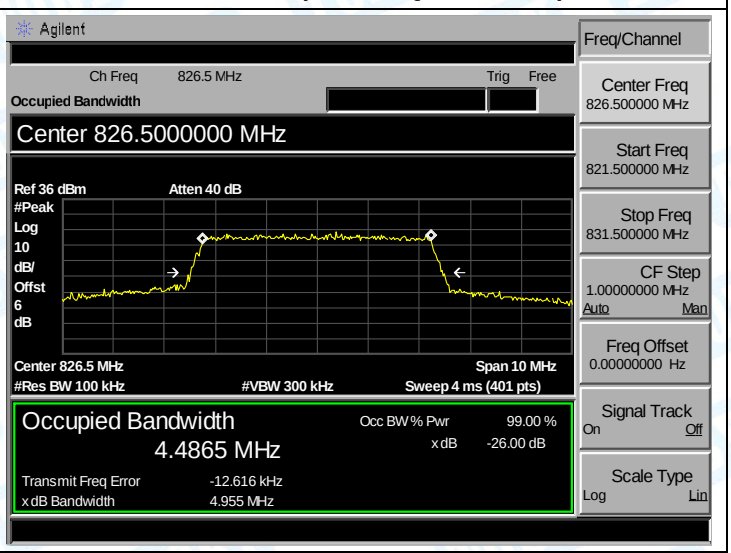
LTE BAND 5 (3MHz 16QAM-High CH)



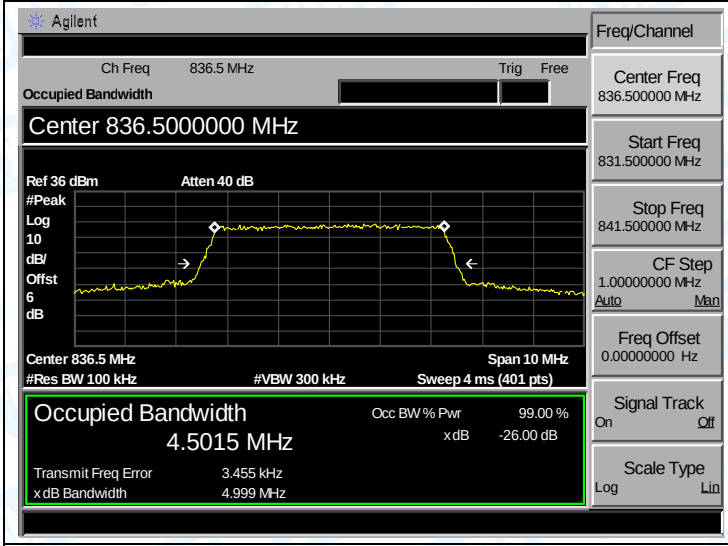
LTE BAND 5 (5MHz QPSK-Low CH)



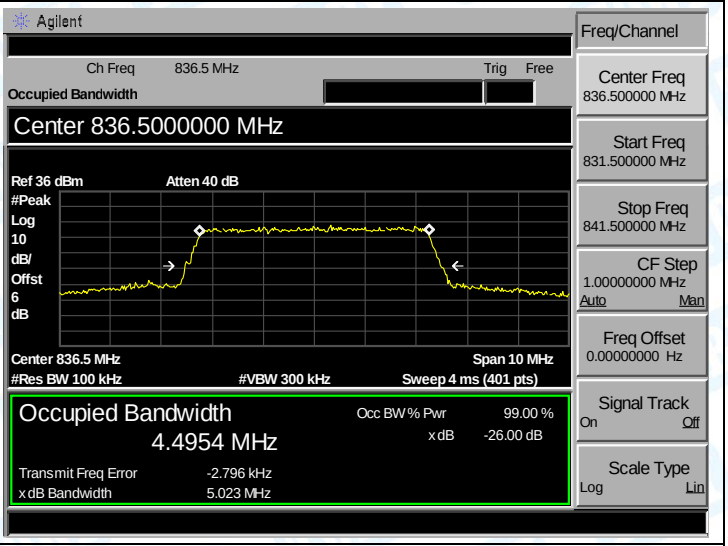
LTE BAND 5 (5MHz 16QAM-Low CH)



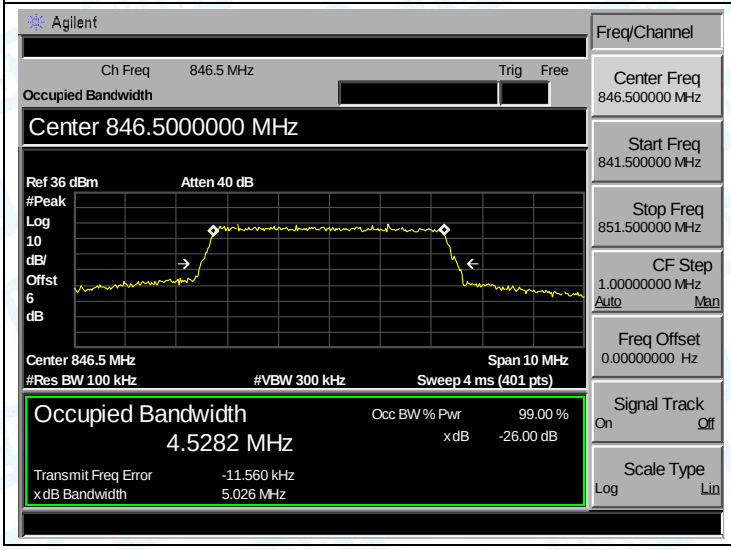
LTE BAND 5 (5MHz QPSK-Middle CH)



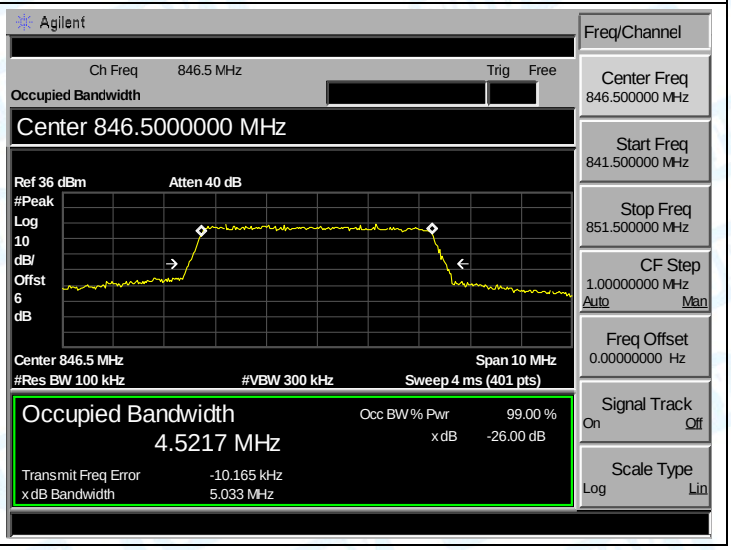
LTE BAND 5 (5MHz 16QAM- Middle CH)



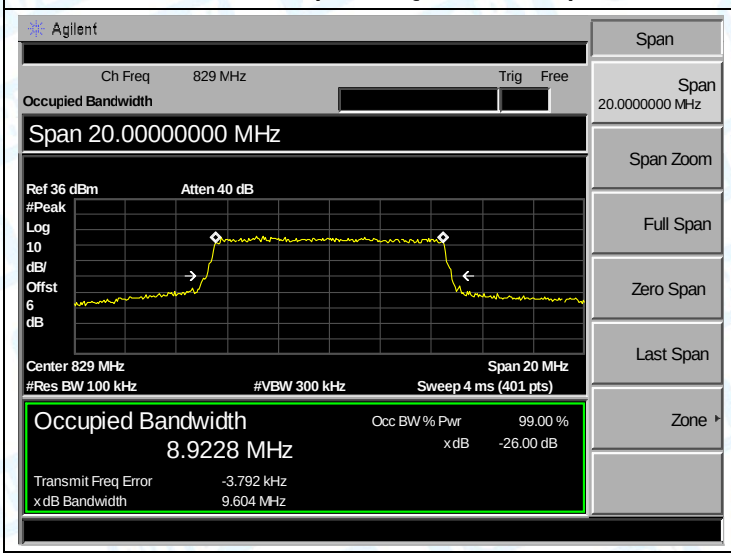
LTE BAND 5 (5MHz QPSK-High CH)



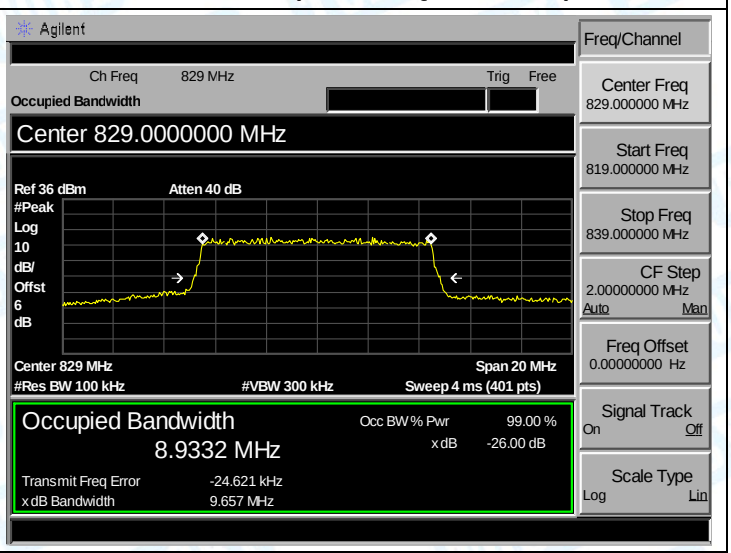
LTE BAND 5 (5MHz 16QAM-High CH)



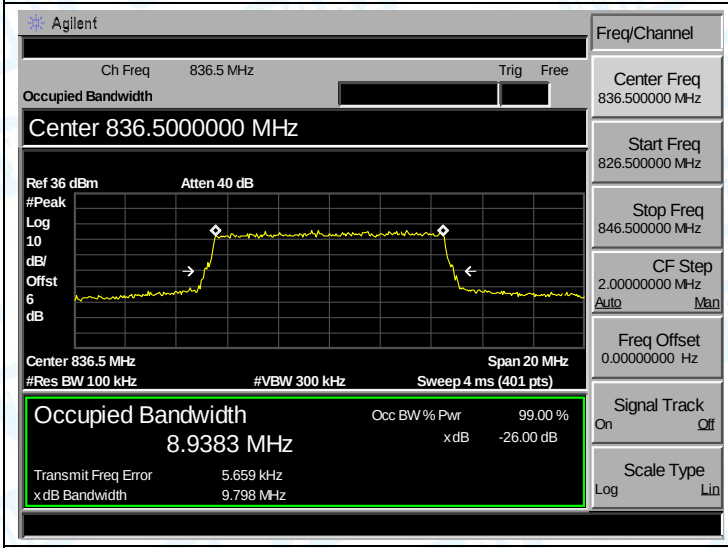
LTE BAND 5 (10MHz QPSK-Low CH)



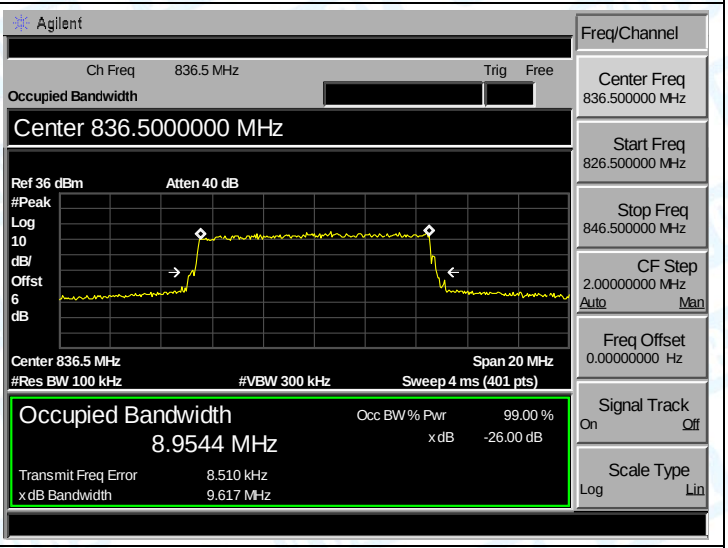
LTE BAND 5 (10MHz 16QAM-Low CH)



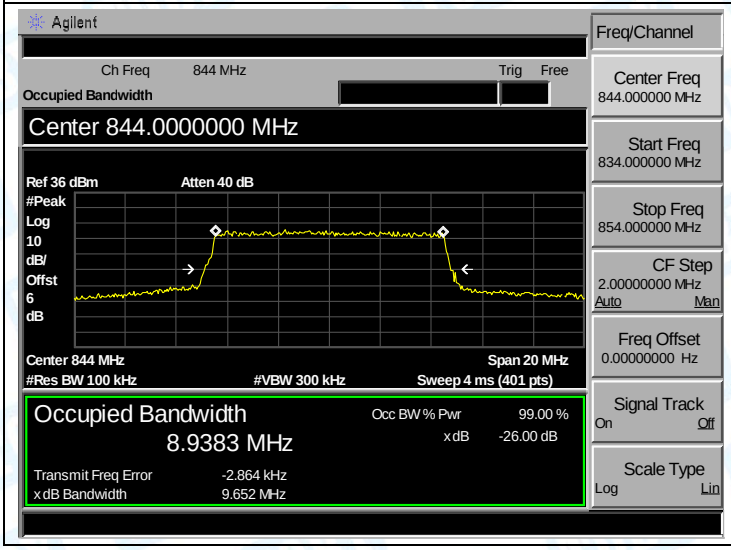
LTE BAND 5 (10MHz QPSK-Middle CH)



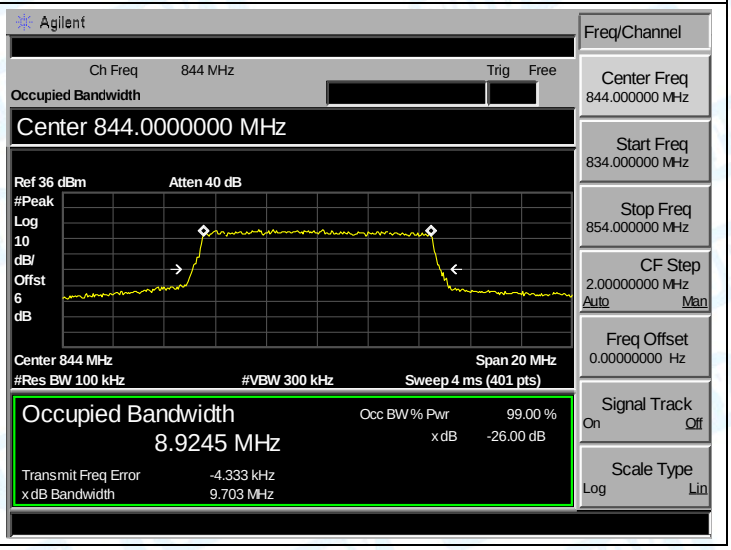
LTE BAND 5 (10MHz 16QAM- Middle CH)



LTE BAND 5 (10MHz QPSK-High CH)

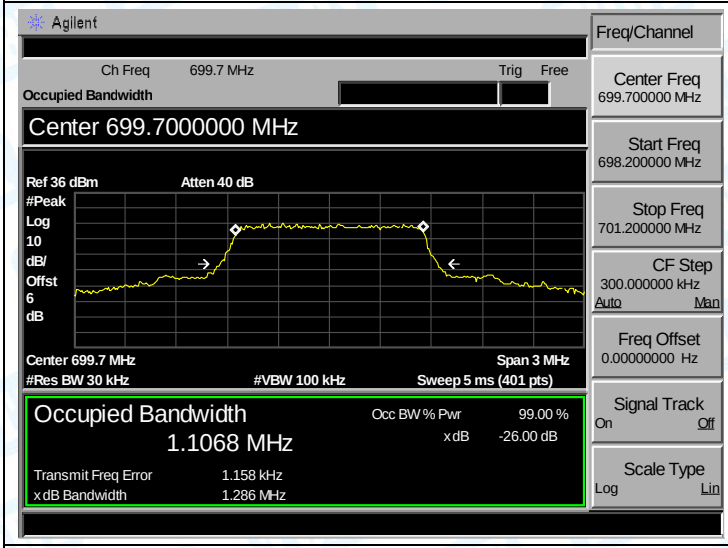


LTE BAND 5 (10MHz 16QAM-High CH)

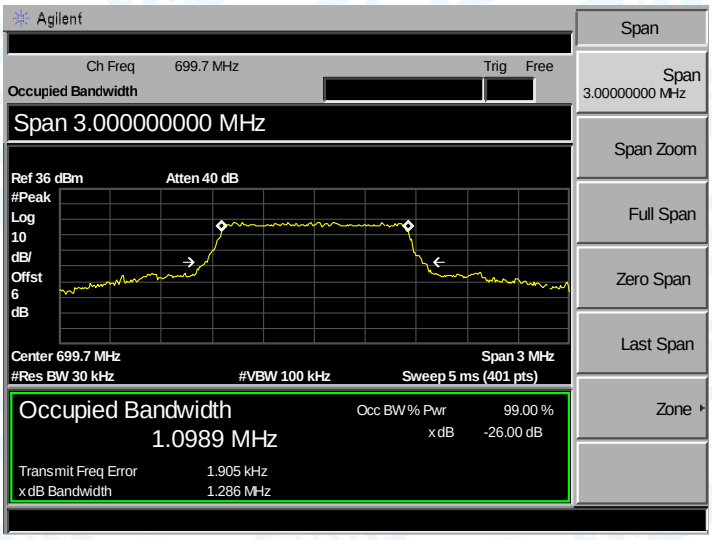


Occupy Bandwidth Test Plot

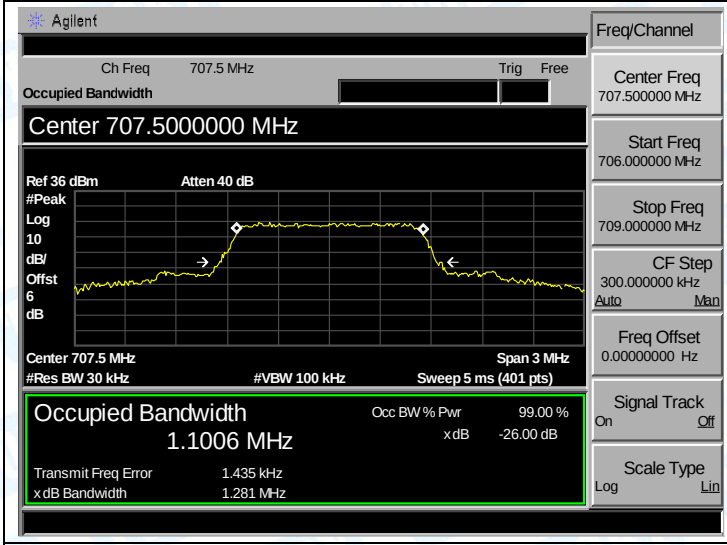
LTE BAND 12 (1.4MHz QPSK-Low CH)



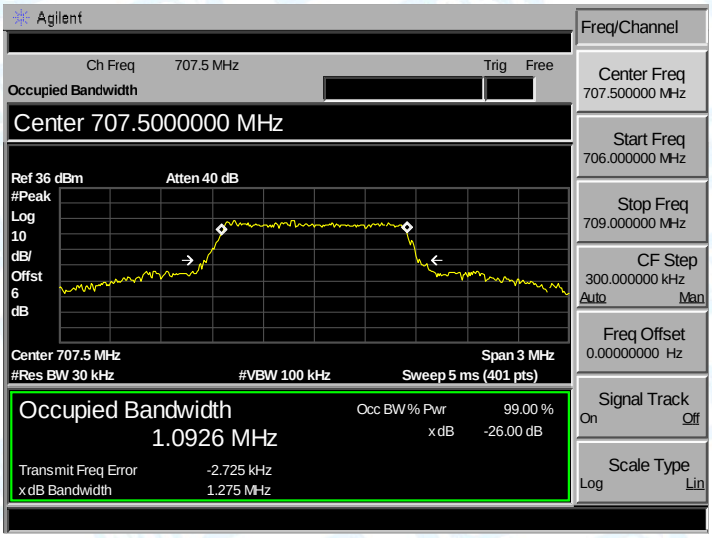
LTE BAND 12 (1.4MHz 16QAM-Low CH)



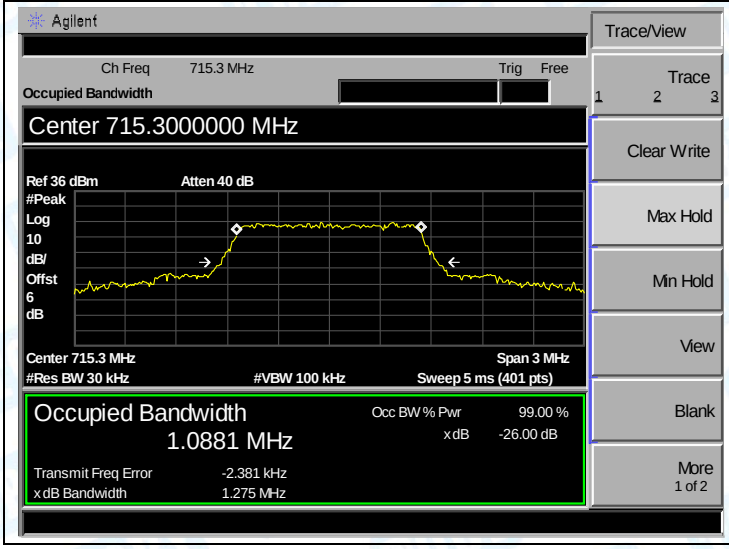
LTE BAND 12 (1.4MHz QPSK-Middle CH)



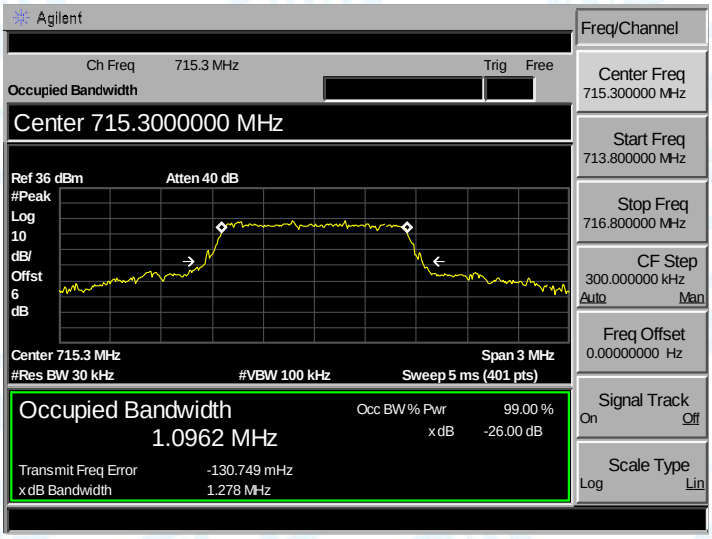
LTE BAND 12 (1.4MHz 16QAM- Middle CH)



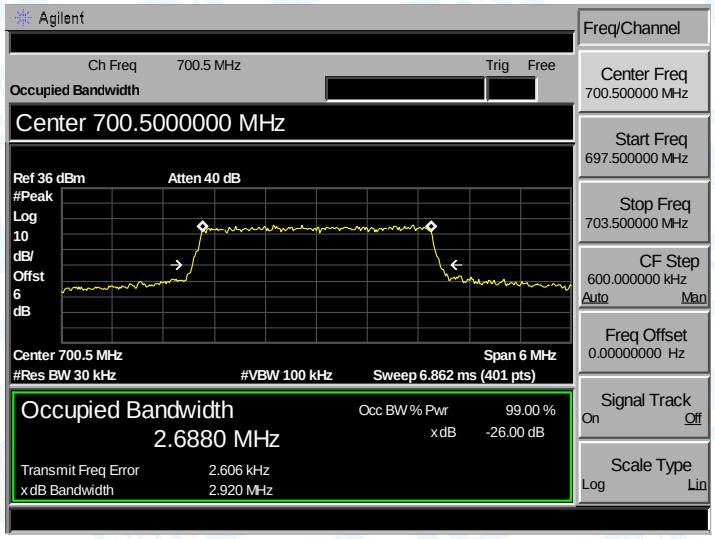
LTE BAND 12 (1.4MHz QPSK-High CH)



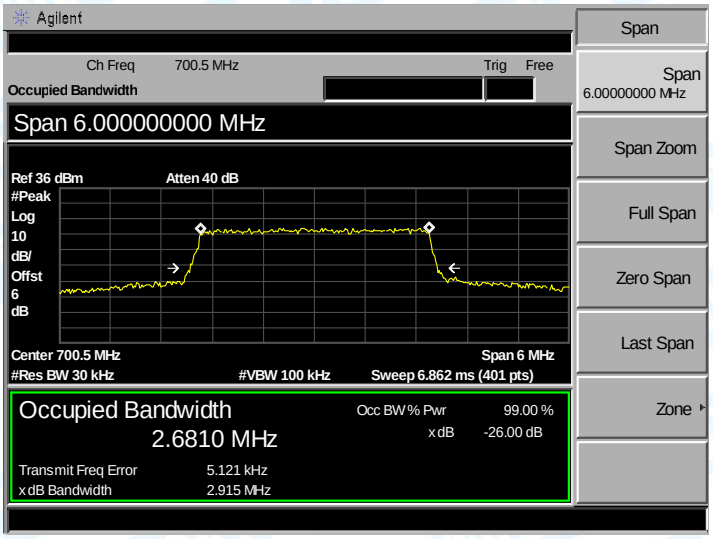
LTE BAND 12 (1.4MHz 16QAM-High CH)



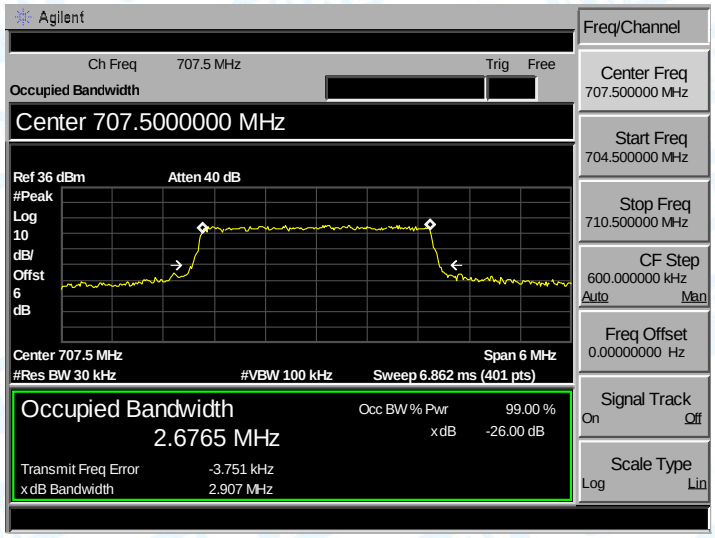
LTE BAND 12 (3MHz QPSK-Low CH)



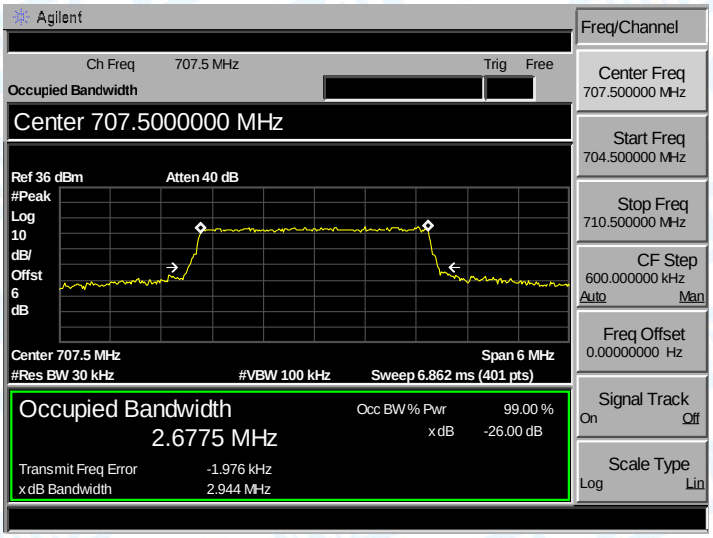
LTE BAND 12 (3MHz 16QAM-Low CH)



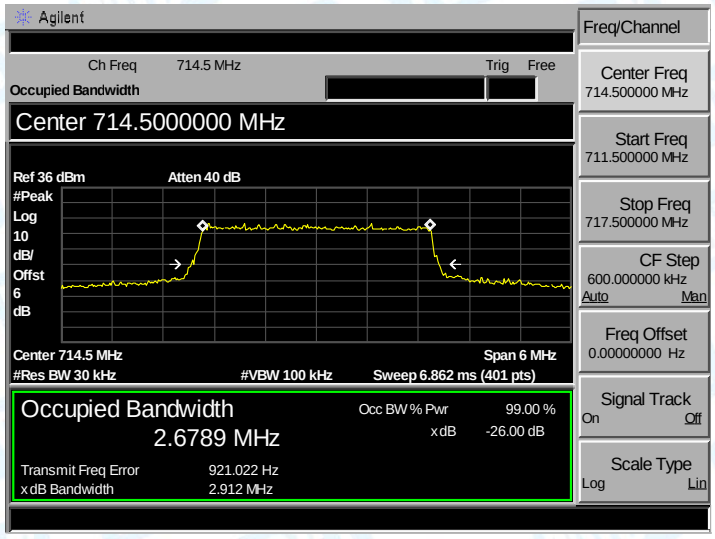
LTE BAND 12 (3MHz QPSK-Middle CH)



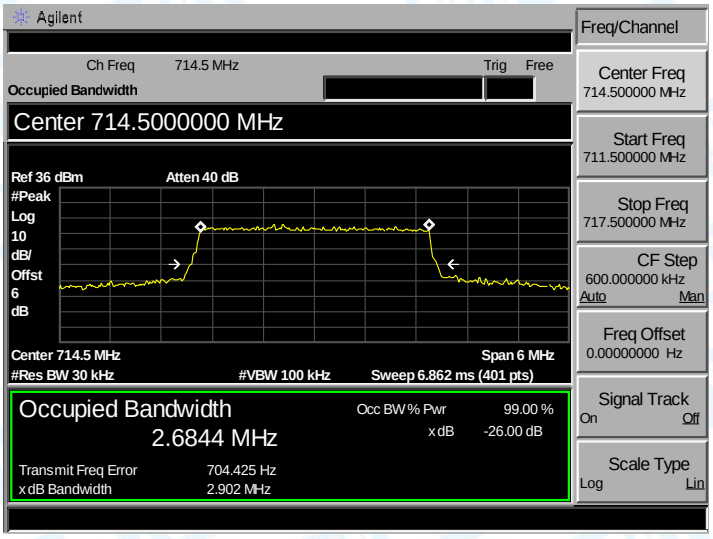
LTE BAND 12 (3MHz 16QAM- Middle CH)



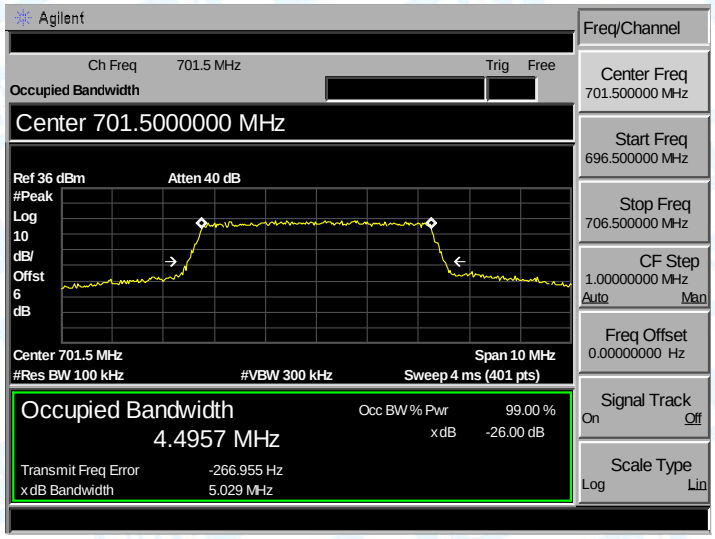
LTE BAND 12 (3MHz QPSK-High CH)



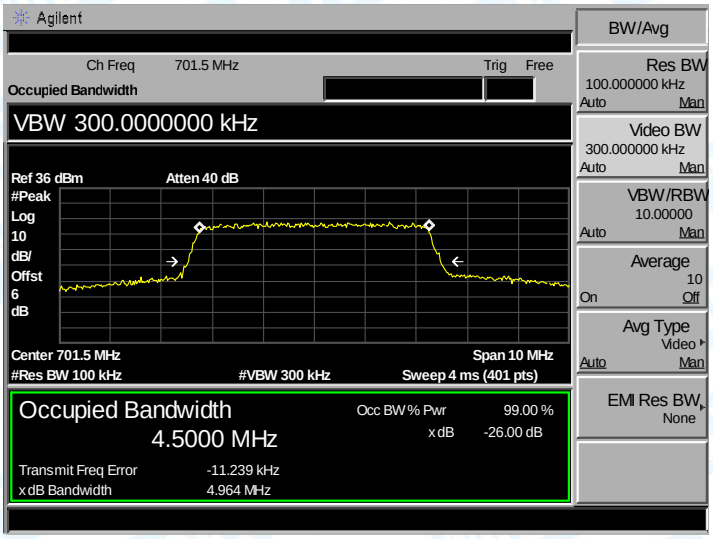
LTE BAND 12 (3MHz 16QAM-High CH)



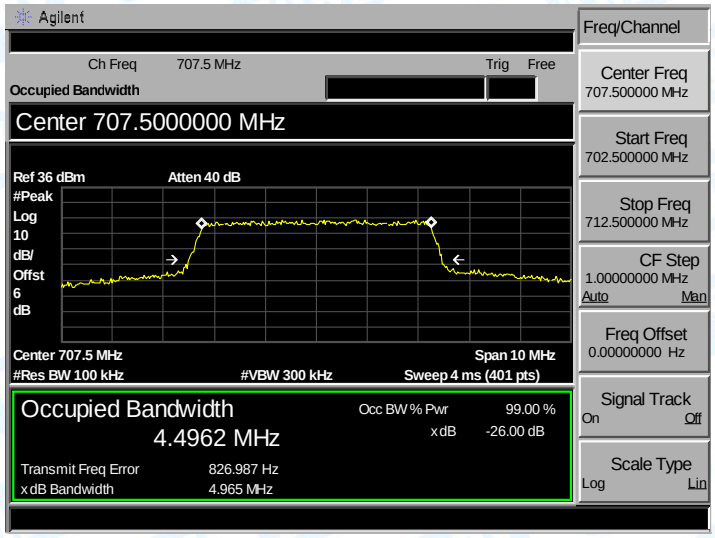
LTE BAND 12 (5MHz QPSK-Low CH)



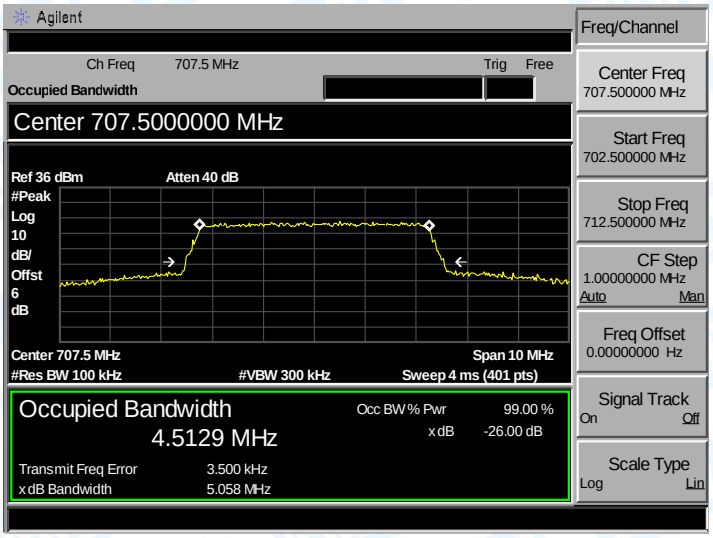
LTE BAND 12 (5MHz 16QAM-Low CH)



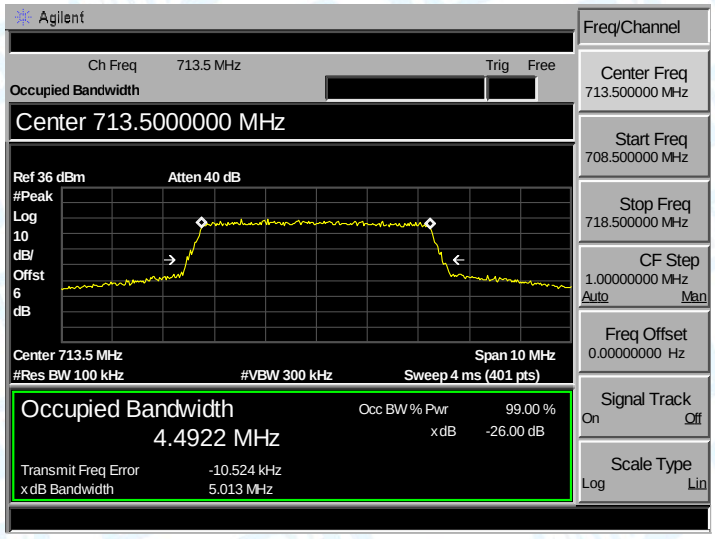
LTE BAND 12 (5MHz QPSK-Middle CH)



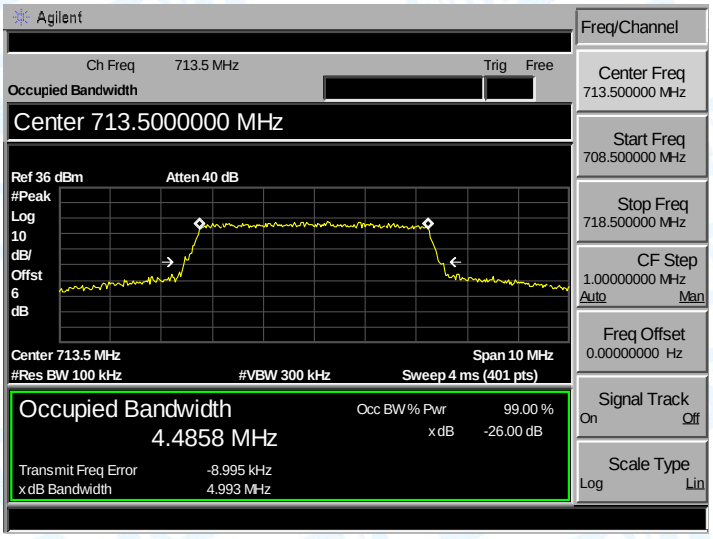
LTE BAND 12 (5MHz 16QAM- Middle CH)



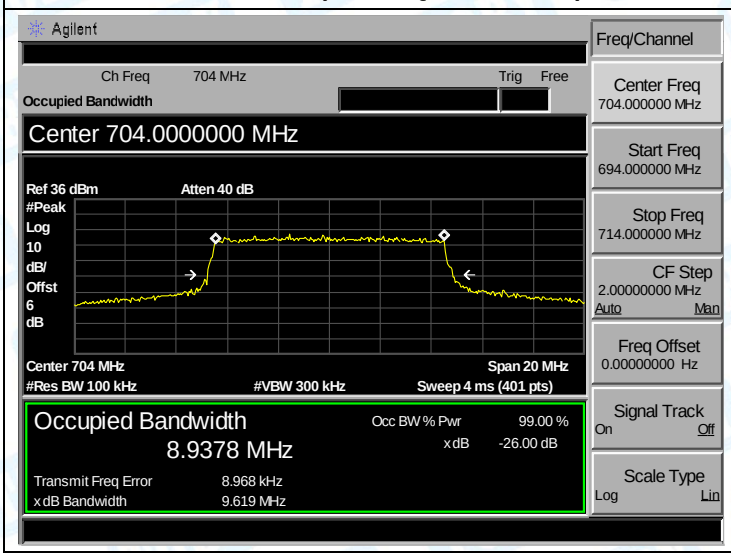
LTE BAND 12 (5MHz QPSK-High CH)



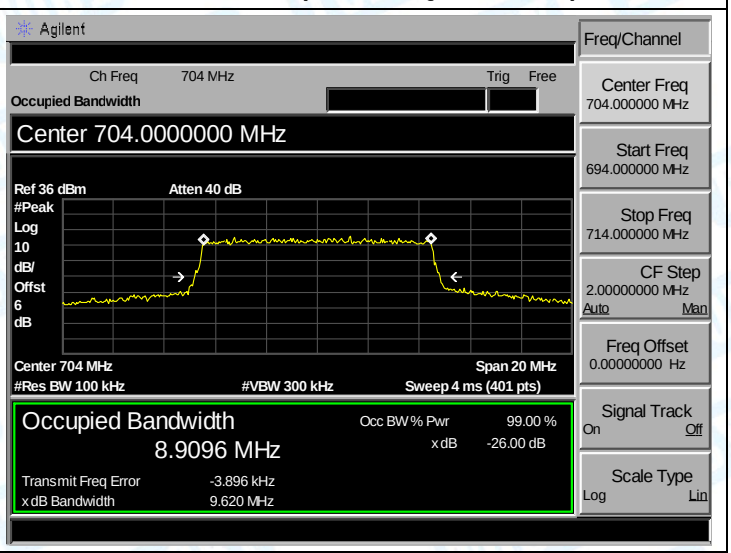
LTE BAND 12 (5MHz 16QAM-High CH)



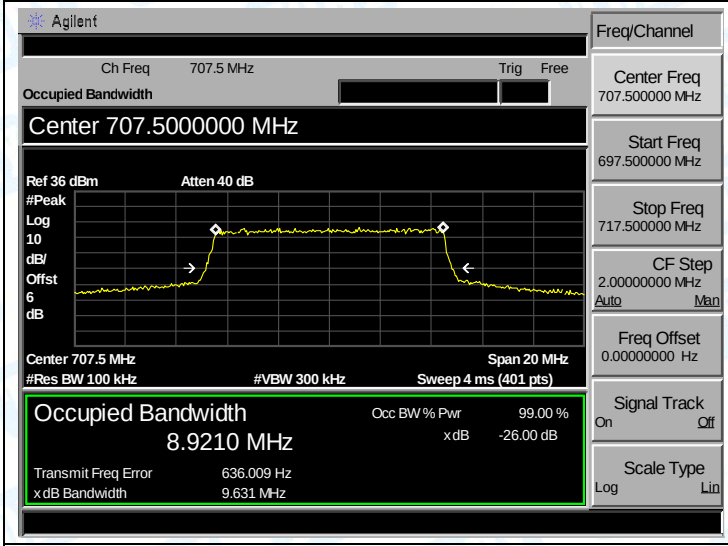
LTE BAND 12 (10MHz QPSK-Low CH)



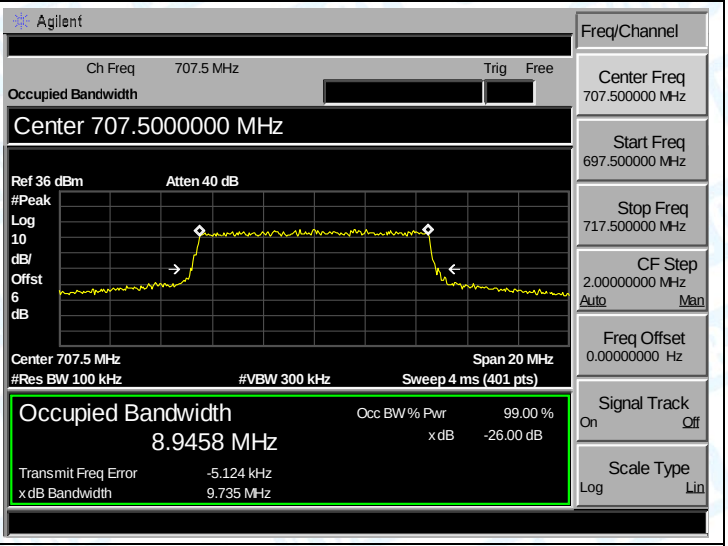
LTE BAND 12 (10MHz 16QAM-Low CH)



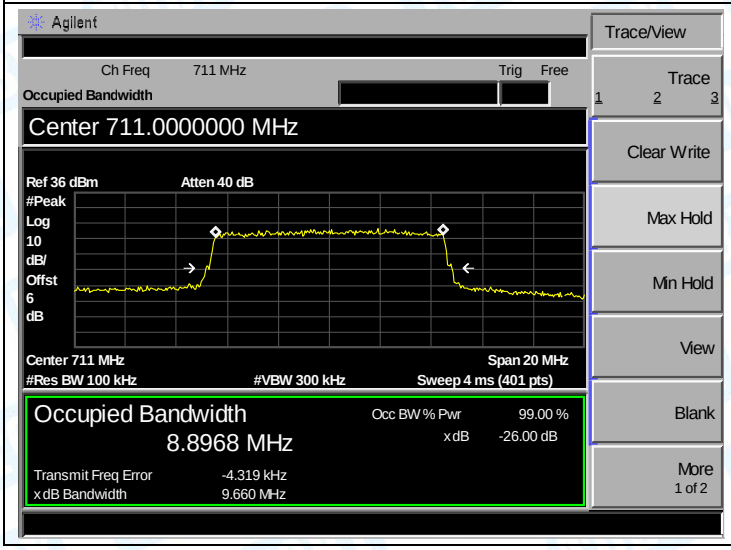
LTE BAND 12 (10MHz QPSK-Middle CH)



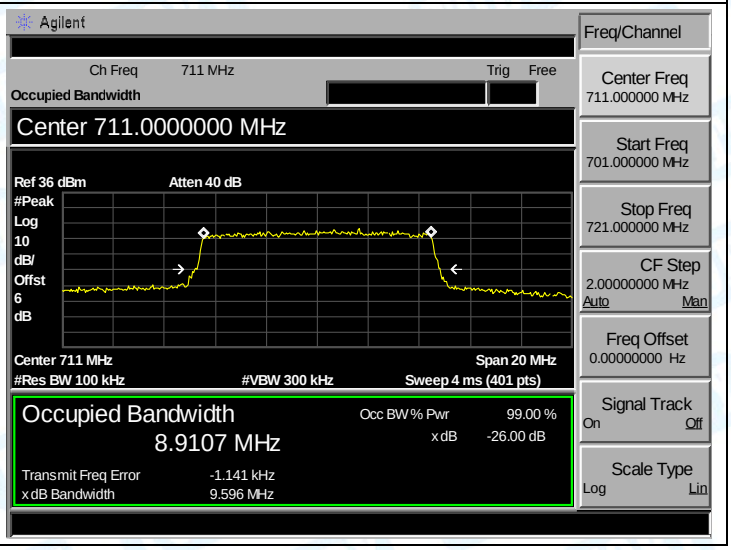
LTE BAND 12 (10MHz 16QAM- Middle CH)



LTE BAND 12 (10MHz QPSK-High CH)

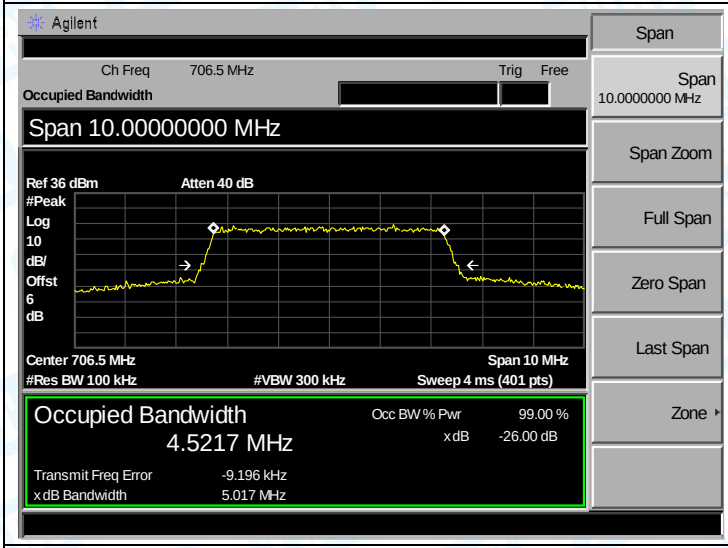


LTE BAND 12 (10MHz 16QAM-High CH)

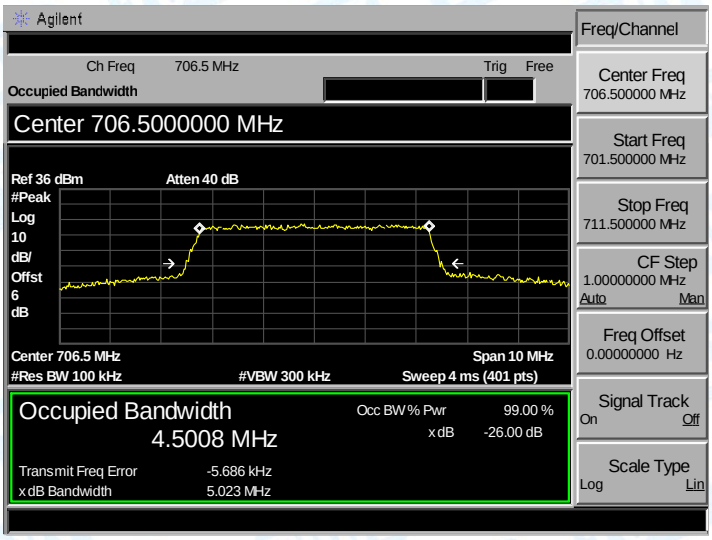


Occupy Bandwidth Test Plot

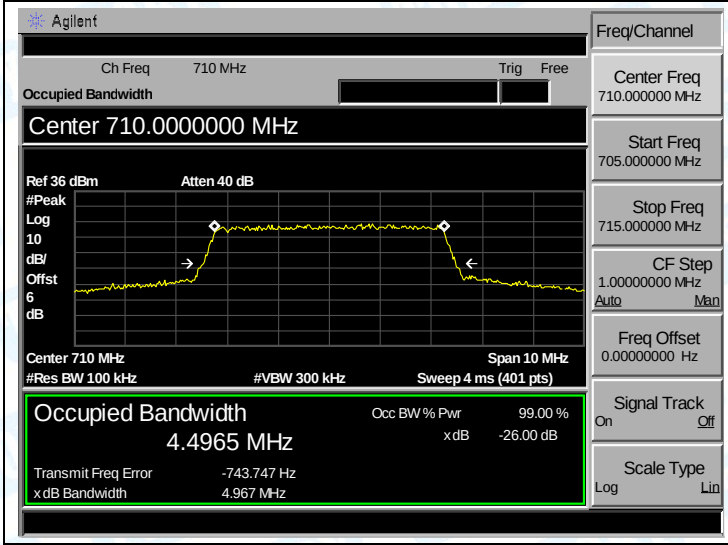
LTE BAND 17 (5MHz QPSK-Low CH)



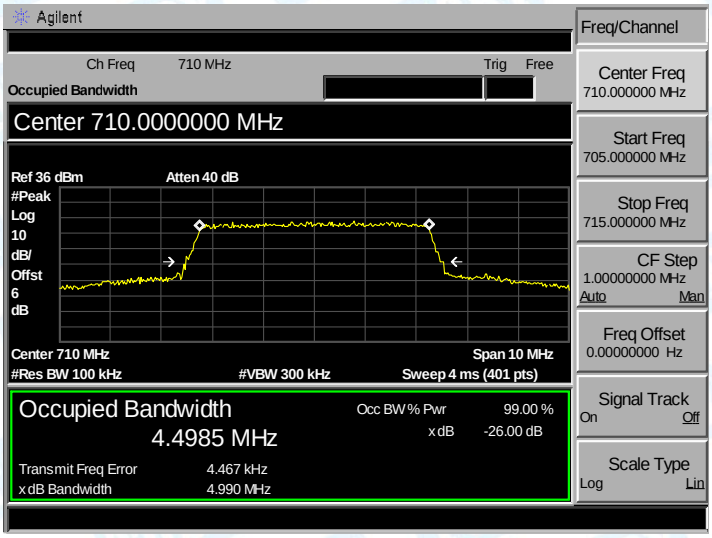
LTE BAND 17 (5MHz 16QAM-Low CH)



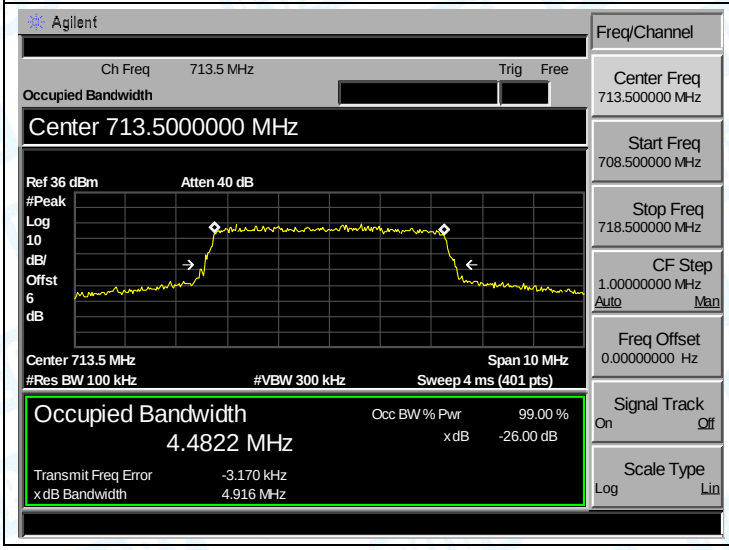
LTE BAND 17 (5MHz QPSK-Middle CH)



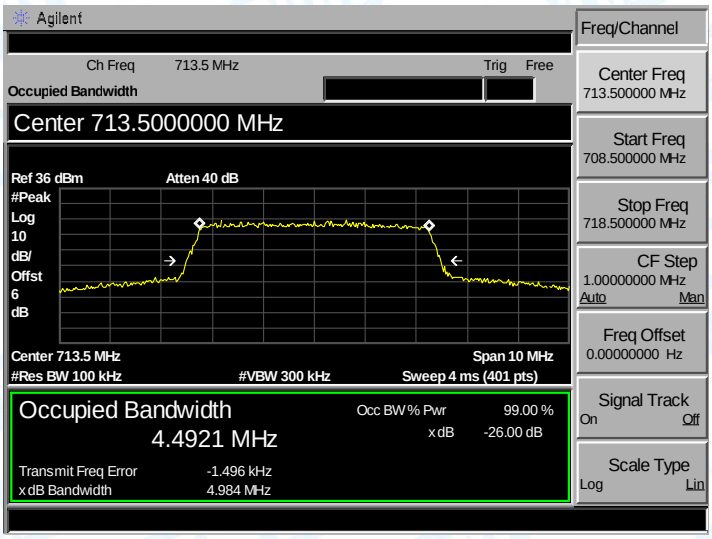
LTE BAND 17 (5MHz 16QAM- Middle CH)



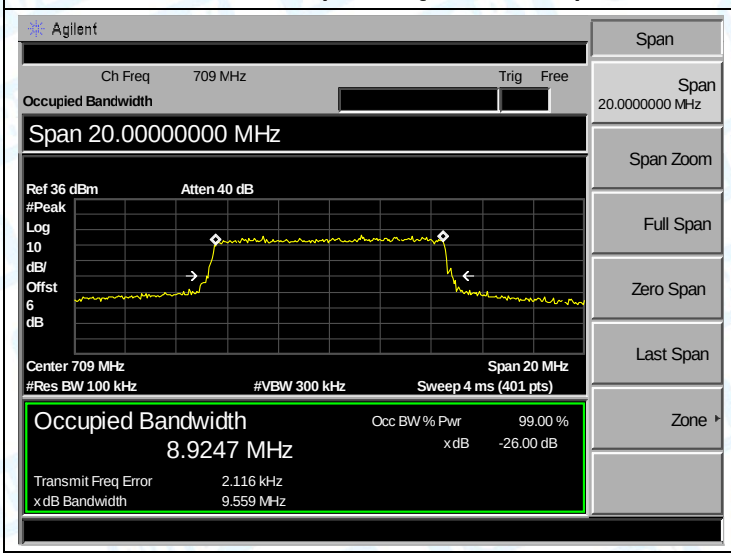
LTE BAND 17 (5MHz QPSK-High CH)



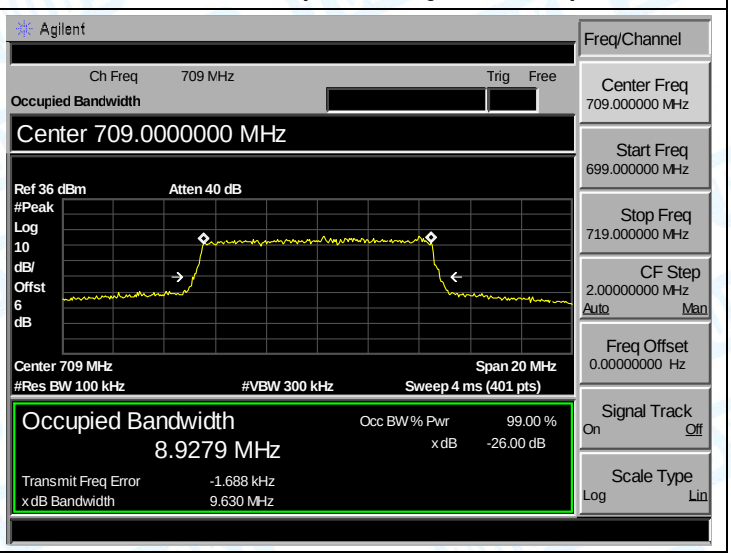
LTE BAND 17 (5MHz 16QAM-High CH)



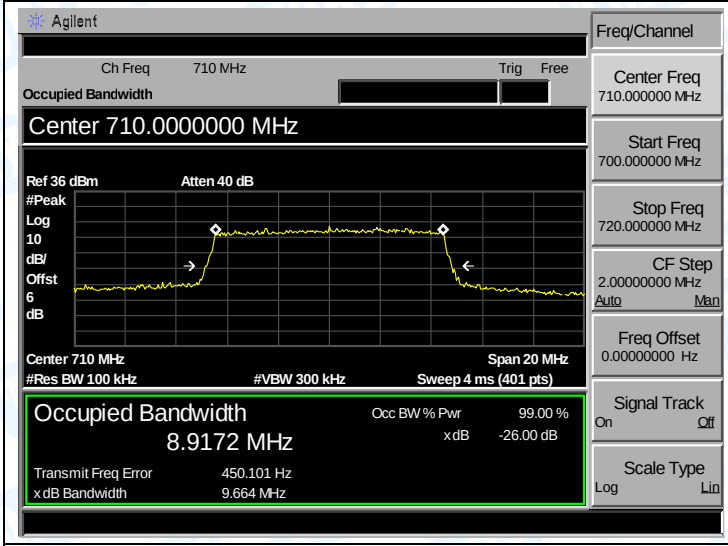
LTE BAND 17 (10MHz QPSK-Low CH)



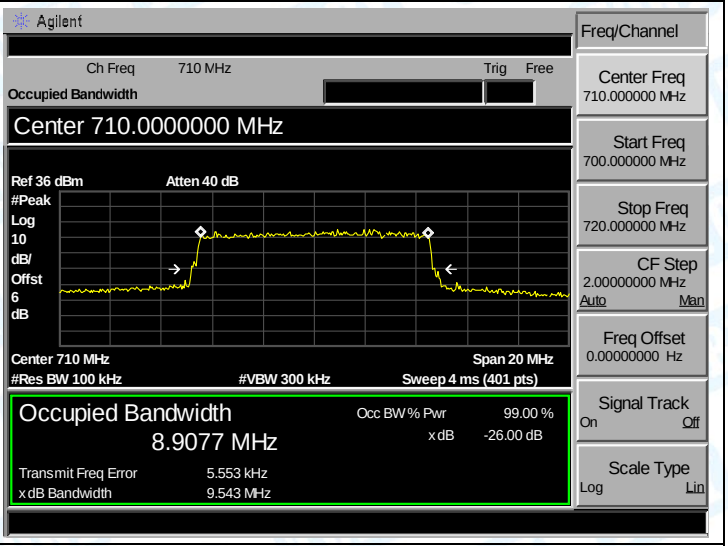
LTE BAND 17 (10MHz 16QAM-Low CH)



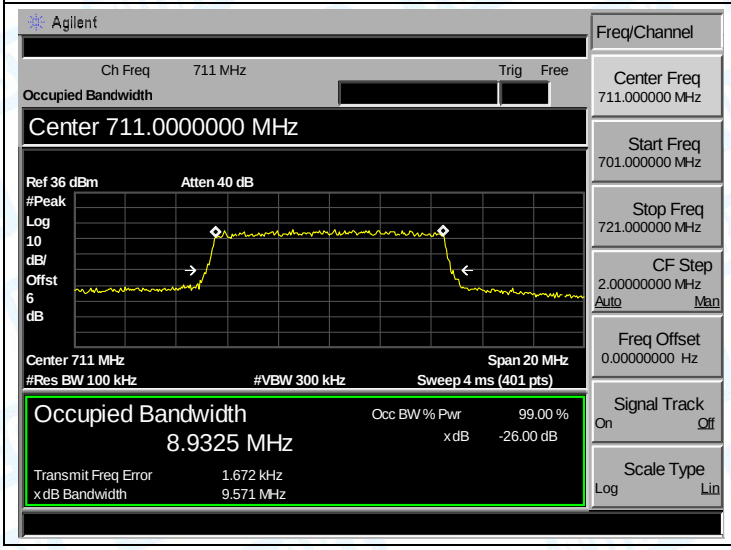
LTE BAND 17 (10MHz QPSK-Middle CH)



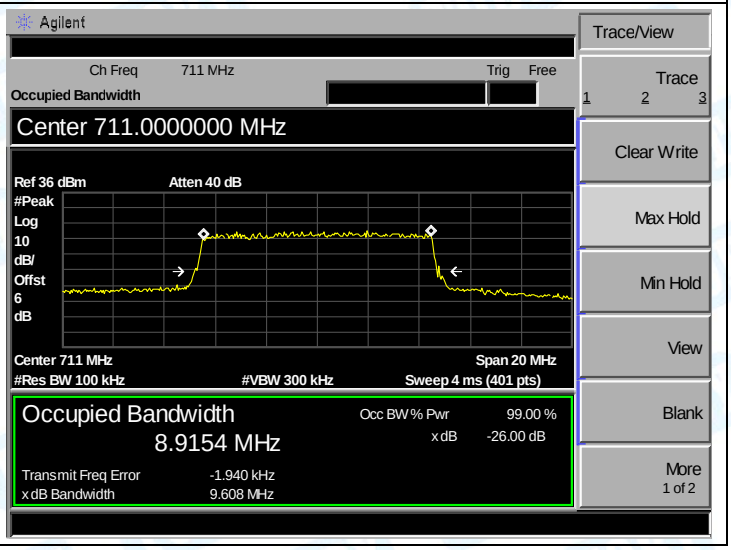
LTE BAND 17 (10MHz 16QAM- Middle CH)



LTE BAND 17 (10MHz QPSK-High CH)

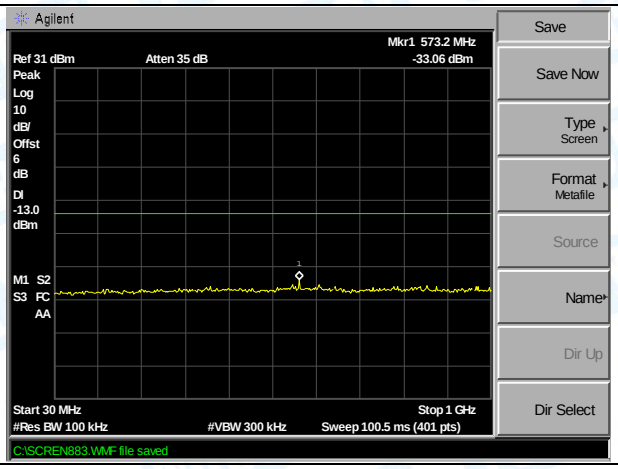
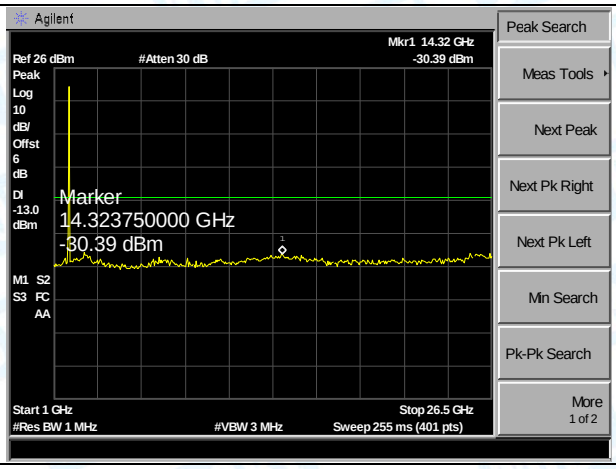
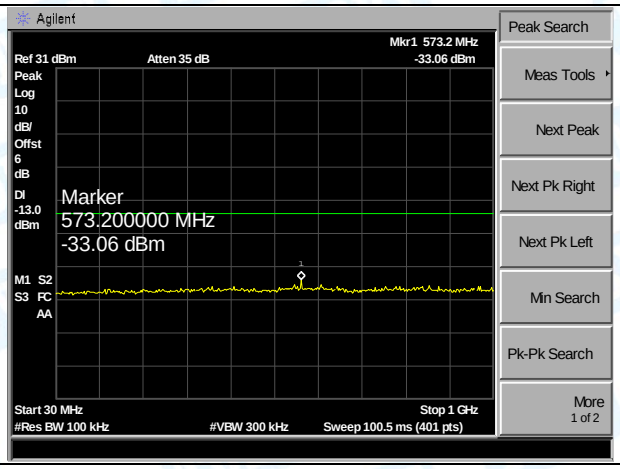
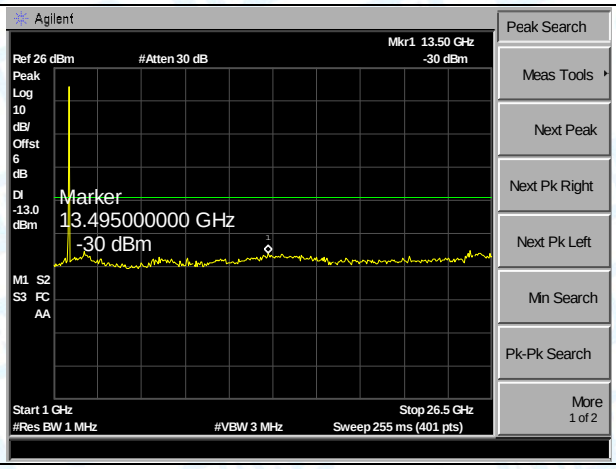
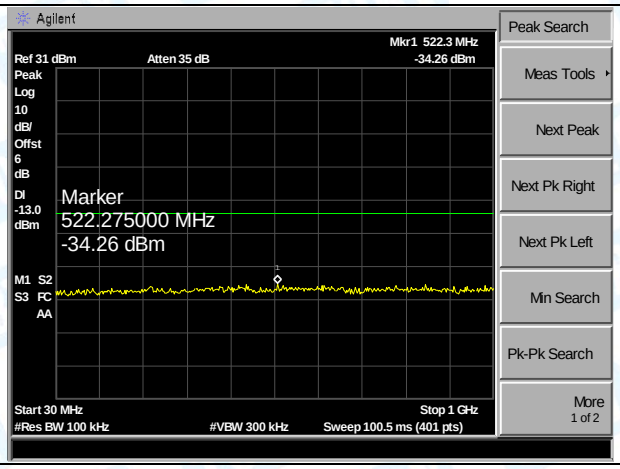
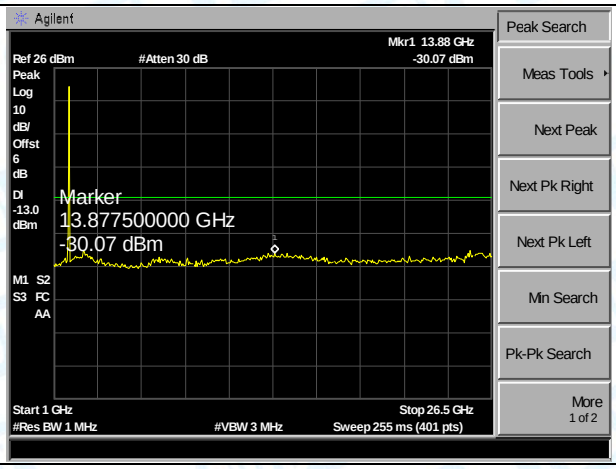


LTE BAND 17 (10MHz 16QAM-High CH)



ATTACHMENT D--OUT OF BAND EMISSION AT ANTENNA TERMINALS

Only show the worst case(LTE BAND 2/4/5/12/17 QPSK Mode)

30MHz-1GHz	1GHz-26.5GHz
LTE BAND 2 (1.4MHz RB Size 6& RB Offset 0 QPSK-Low CH)	
	
LTE BAND 2 (1.4MHz RB Size 6& RB Offset 0 QPSK-Middle CH)	
	
LTE BAND 2 (1.4MHz RB Size 6& RB Offset 0 QPSK-High CH)