



Report No.: SER180612602002E

# FCC CFR47 PART 22H, 24E, 27 CERTIFICATION TEST REPORT

## FCC ID: 2AP79-0002L

**Product:** M2

**Trade Mark:** duubee

**Model Number:** D901L

**Serial Model:** N/A

**Report No.:** SER180612602003E

### Prepared for

Duubee Intelligent Technologies Inc

2420 Buelingo Lane, Fort Worth, TX, 76131, United States

### Prepared by

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### TEST RESULT CERTIFICATION

**Applicant's name** .....: Duubee Intelligent Technologies Inc  
**Address** .....: 2420 Buelingo Lane, Fort Worth, TX, 76131, United States  
**Manufacturer's Name** .....: Duubee Intelligent Technologies Inc  
**Address** .....: 2420 Buelingo Lane, Fort Worth, TX, 76131, United States  
**Product name**.....: M2  
**Model and/or type reference** ...: D901L  
**Serial Model:** N/A  
**Standards**.....: FCC CFR 47 Part 22H, Part 24E, Part 27  
**Test procedure** .....: ANSI C63.26:2015  
  ANSI/TIA-603-E-2016

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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**Date of Test** .....

Date (s) of performance of tests ..... 12 Jun. 2018 ~ 28 Jun. 2018

Date of Issue ..... 28 Jun. 2018

Test Result..... **Pass**

Testing Engineer         :  
  *Eileen Liu.*  
  \_\_\_\_\_

(Eileen Liu)

Technical Manager       :  
  *Jason chen*  
  \_\_\_\_\_

(Jason Chen)

Authorized Signatory   :  
  *Sam. chen*  
  \_\_\_\_\_

(Sam Chen)



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## 1. GENERAL INFORMATION

### 1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	M2
Trade Mark	duubee
Model Name	D901L
FCC ID:	2AP79-0002L
Frequency Bands:	U.S. Bands: <input checked="" type="checkbox"/> LTE FDD Band 5
Frequency Range:	LTE FDD Band 5 Uplink: 824MHz-849MHz, Downlink: 869MHz-894MHz;
Type of Modulation:	QPSK/16QAM
Antenna:	FPCB Antenna
Antenna gain:	-0.8 dBi
Power Supply:	DC 3.8V from Battery or DC 5V from USB port
Battery parameter:	DC 3.8V/2000mAh
Adapter:	N/A
Extreme Vol. Limits:	DC 3.4V to 4.4V (Nominal DC 3.8V)
Extreme Temp. Tolerance	-30°C to +50°C
HW Version	L519SV2
SW Version	VH519R02C01S54
<p>** Note: The High Voltage 4.4V and Low Voltage 3.4V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.</p>	



### 1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AP79-0002L** filing to comply with the FCC Part 22H&24E &27.

### 1.3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, ANSI C63.26:2015.

### 1.4 TEST FACILITY

The test site used to collect the radiated data is located at:

ShenZhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R.China.

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.26:2015& ANSI C63.4: 2014.

FCC Registration No.:463705

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

### MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2U_c(y)$ )	2.5dB

### 1.5 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

### 1.6 WORST-CASE CONFIGURATION AND MODE

The worst-case scenario for all measurements is based on the investigation results.

The device has LTE Bands of: Band 5

The RB Size was selected to measure for peak or average ERP and EIRP, which was based on the conducted power verification baseline data.

For the fundamental investigation of radiated emissions, the EUT is investigated for vertical and



horizontal antenna orientations and X Y and Z orientations of the EUT alone. After the investigations the worst case was determined to be at X orientation for all LTE bands.

## 2. SYSTEM TEST CONFIGURATION

### 2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission’s requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

### 2.3 CONFIGURATION OF EUT SYSTEM

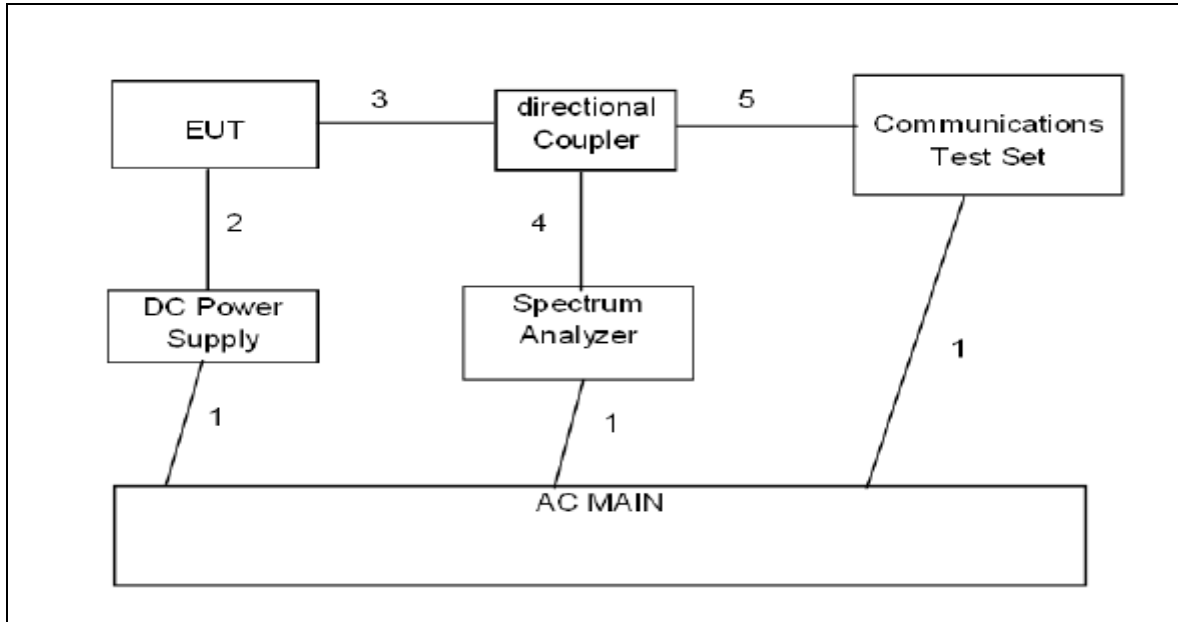
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	M2	D901L	FCC ID: 2AP79-0002L	EUT

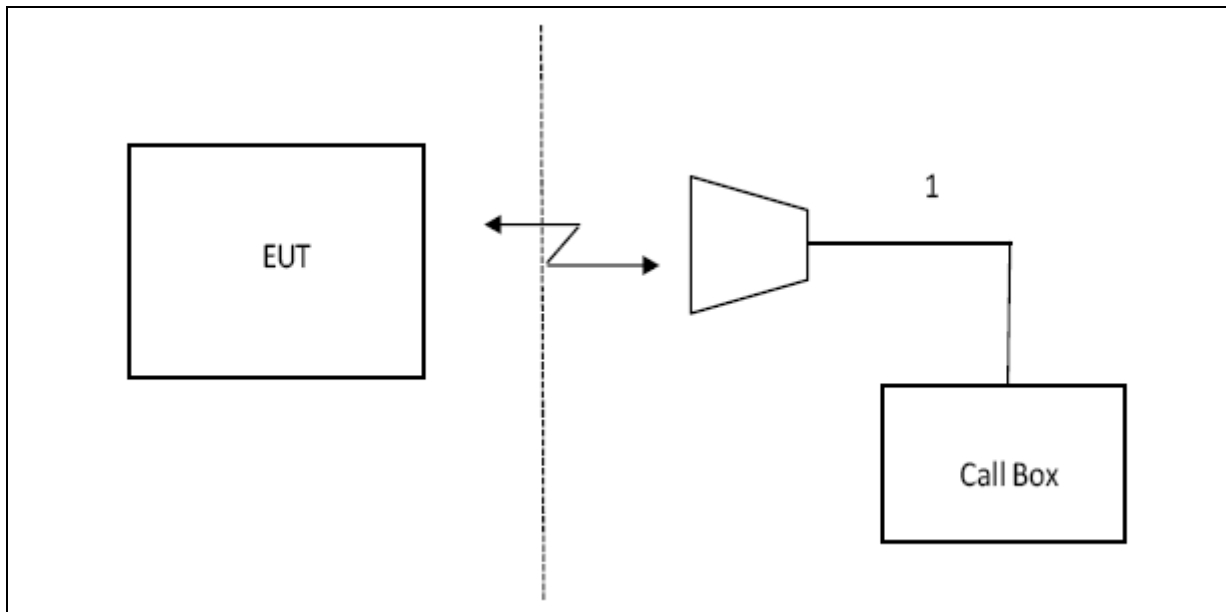
*Note: All the accessories have been used during the test. the following “EUT” in setup diagram means EUT system.*

## 2.4 TEST SETUP

### CONDUCTED SETUP DIAGRAM FOR TESTS



### RADIATED SETUP DIAGRAM FOR TESTS







### 3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	NEXT CAL. DATE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2018.6.26
TEST RECEIVER	R&S	ESCI	A0304218	2018.6.26
COMMUNICATION TESTER	R&S	CMU200	A0304247	2018.6.26
COMMUNICATION TESTER	R&S	CMW500	X	2018.6.26
TEST RECEIVER	R&S	FCKL1528	A0304230	2018.6.26
LISN	SCHWARZBECK	NSLK8127	A0304233	2018.6.26
CLIMATE CHAMBER	ALBATROSS	--	--	2018.6.26
Loop Antenna	Daze	ZN30900N	SEL0097	2018.6.26
Biological Antenna	A.H. Systems Inc.	SAS-521-4	N/A	2018.6.26
Horn Antenna	EM	EM-AH-10180	N/A	2018.6.26
DC Power Source	N/A	PS-6005D	20170402923	2020.6.05

## 4. OUTPUT POWER

### 4.1 OUTPUT POWER MEASUREMENT

#### LTE Measurement Procedure:

All LTE bands conducted power peak and average are obtained from the CMW500 telecommunication test set. The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS\_01".3

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks ( $N_{RB}$ )	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	$\leq 1$
			5	>6	$\leq 1$
			10	>6	$\leq 1$
			15	>8	$\leq 1$
			20	>10	$\leq 1$
NS_04	6.6.2.2.2	41	5	>6	$\leq 1$
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	$\geq 50$	$\leq 1$
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	$\leq 3$
NS_09	6.6.3.3.4	21	10, 15	> 40	$\leq 1$
				> 55	$\leq 2$
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 <sup>1</sup>	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

## 4.2 LTE BAND 5

**OUTPUT POWER FOR LTE BAND 5 (1.4MHZ)**

Band	Band Width	Channel	Frequency (MHz)	Modulation	RB Configuration		Average Power(dBm)	Peak Power(dBm)
					RB Size	RB Offset		
Band 5	1.4MHz	20407	824.7	QPSK	1	Low	22.14	26.93
					1	Mid	22.49	27.17
					1	High	22.46	27.26
					3	Low	22.30	27.29
					3	High	22.45	27.47
					6	Low	21.19	26.78
				16QAM	1	Low	21.63	27.00
					1	Mid	21.76	27.10
					1	High	21.70	27.11
					3	Low	22.34	27.40
					3	High	22.33	27.39
					6	Low	19.94	26.83
	1.4MHz	20525	836.5	QPSK	1	Low	22.30	26.03
					1	Mid	22.38	26.17
					1	High	22.32	26.35
					3	Low	22.11	26.26
					3	High	22.09	26.41
					6	Low	21.06	26.15
				16QAM	1	Low	21.30	25.91
					1	Mid	21.50	26.11
					1	High	21.08	26.13
					3	Low	22.00	26.35
					3	High	21.98	26.36
					6	Low	19.79	26.18
	1.4MHz	20643	848.3	QPSK	1	Low	22.31	26.47
					1	Mid	22.21	26.29
					1	High	22.27	26.39
3					Low	22.40	26.81	
3					High	22.36	26.71	
6					Low	21.29	26.46	
16QAM				1	Low	21.60	26.48	
				1	Mid	21.18	26.15	
				1	High	20.97	26.07	
				3	Low	22.30	26.65	
				3	High	22.29	26.64	
				6	Low	20.29	26.56	

**OUTPUT POWER FOR LTE BAND 5 (3.0MHZ)**

Band	Band Width	Channel	Frequency (MHz)	Modulation	RB Configuration		Average Power(dBm)	Peak Power(dBm)
					RB Size	RB Offset		
Band 5	3.0 MHz	20415	825.5	QPSK	1	Low	22.08	27.19
					1	Mid	22.05	26.88
					1	High	22.31	27.14
					8	Low	22.28	27.12
					8	High	22.15	27.04
					15	Low	21.15	26.72
				16QAM	1	Low	21.70	27.08
					1	Mid	21.98	27.42
					1	High	22.21	27.52
					8	Low	21.51	27.51
					8	High	22.37	27.55
					15	Low	20.17	26.76
	3.0 MHz	20525	836.5	QPSK	1	Low	22.03	25.77
					1	Mid	21.97	26.06
					1	High	22.03	26.34
					8	Low	22.00	26.33
					8	High	21.99	26.33
					15	Low	21.02	26.58
				16QAM	1	Low	21.07	25.69
					1	Mid	21.48	25.67
					1	High	21.29	26.36
					8	Low	21.30	26.33
					8	High	21.29	26.34
					15	Low	20.00	26.28
	3.0 MHz	20635	847.5	QPSK	1	Low	22.15	26.74
					1	Mid	22.10	26.33
					1	High	22.14	26.35
8					Low	22.23	26.49	
8					High	22.40	26.48	
15					Low	21.26	26.74	
16QAM				1	Low	21.46	26.63	
				1	Mid	21.11	25.98	
				1	High	21.44	26.25	
				8	Low	21.43	26.31	
				8	High	21.43	26.29	
				15	Low	20.36	26.66	

**OUTPUT POWER FOR LTE BAND 5 (5.0MHZ)**

Band	Band Width	Channel	Frequency (MHz)	Modulation	RB Configuration		Average Power(dBm)	Peak Power(dBm)
					RB Size	RB Offset		
Band 5	5.0 MHz	20425	826.5	QPSK	1	Low	22.27	26.99
					1	Mid	22.19	26.89
					1	High	21.99	26.60
					12	Low	21.20	26.76
					12	High	21.23	26.83
					25	Low	21.20	27.23
				16QAM	1	Low	21.52	27.01
					1	Mid	21.53	26.96
					1	High	21.44	26.83
					12	Low	21.23	26.78
					12	High	21.13	26.72
					25	Low	20.30	27.48
	5.0 MHz	20525	836.5	QPSK	1	Low	22.01	25.61
					1	Mid	21.77	26.03
					1	High	22.10	26.54
					12	Low	21.22	25.84
					12	High	20.94	26.01
					25	Low	21.12	26.47
				16QAM	1	Low	21.09	25.65
					1	Mid	20.61	25.66
					1	High	20.69	26.30
					12	Low	21.05	25.91
					12	High	21.04	26.03
					25	Low	20.08	26.36
	5.0 MHz	20625	846.5	QPSK	1	Low	21.95	26.82
					1	Mid	22.29	26.58
					1	High	22.26	26.43
12					Low	21.15	26.46	
12					High	21.28	26.25	
25					Low	21.18	26.80	
16QAM				1	Low	20.55	26.52	
				1	Mid	20.62	26.24	
				1	High	20.82	26.21	
				12	Low	21.30	26.28	
				12	High	21.19	26.22	
				25	Low	20.36	26.90	

**OUTPUT POWER FOR LTE BAND 5 (10.0MHZ)**

Band	Band Width	Channel	Frequency (MHz)	Modulation	RB Configuration		Average Power(dBm)	Peak Power(dBm)
					RB Size	RB Offset		
Band 5	10.0 MHz	20450	829.0	QPSK	1	Low	22.14	27.02
					1	Mid	22.27	26.59
					1	High	21.90	25.57
					25	Low	21.30	26.72
					25	High	21.34	25.83
					50	Low	21.30	26.72
				16QAM	1	Low	21.50	26.90
					1	Mid	21.84	26.66
					1	High	21.01	25.44
					25	Low	21.36	25.88
					25	High	21.36	25.89
					50	Low	20.16	26.78
	10.0 MHz	20525	836.5	QPSK	1	Low	22.11	25.73
					1	Mid	22.31	26.08
					1	High	22.49	27.30
					25	Low	21.22	25.87
					25	High	21.13	26.56
					50	Low	21.09	26.63
				16QAM	1	Low	21.86	25.85
					1	Mid	21.54	26.01
					1	High	21.75	27.33
					25	Low	21.26	26.56
					25	High	21.08	26.54
					50	Low	20.28	26.80
	10.0 MHz	20600	844.0	QPSK	1	Low	22.31	26.79
					1	Mid	22.22	27.02
					1	High	22.14	26.33
25					Low	21.21	26.96	
25					High	21.21	26.35	
50					Low	21.27	27.14	
16QAM				1	Low	20.92	26.28	
				1	Mid	21.49	26.86	
				1	High	21.18	26.10	
				25	Low	21.22	26.28	
				25	High	21.22	26.34	
				50	Low	20.34	27.13	



## 5. OCCUPIED BANDWIDTH

### RULE PART(S)

FCC: §2.1049

### LIMITS

For reporting purposes only

### TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

### MODES TESTED

- LTE Band 5

### RESULTS

PASS





**Test results:**

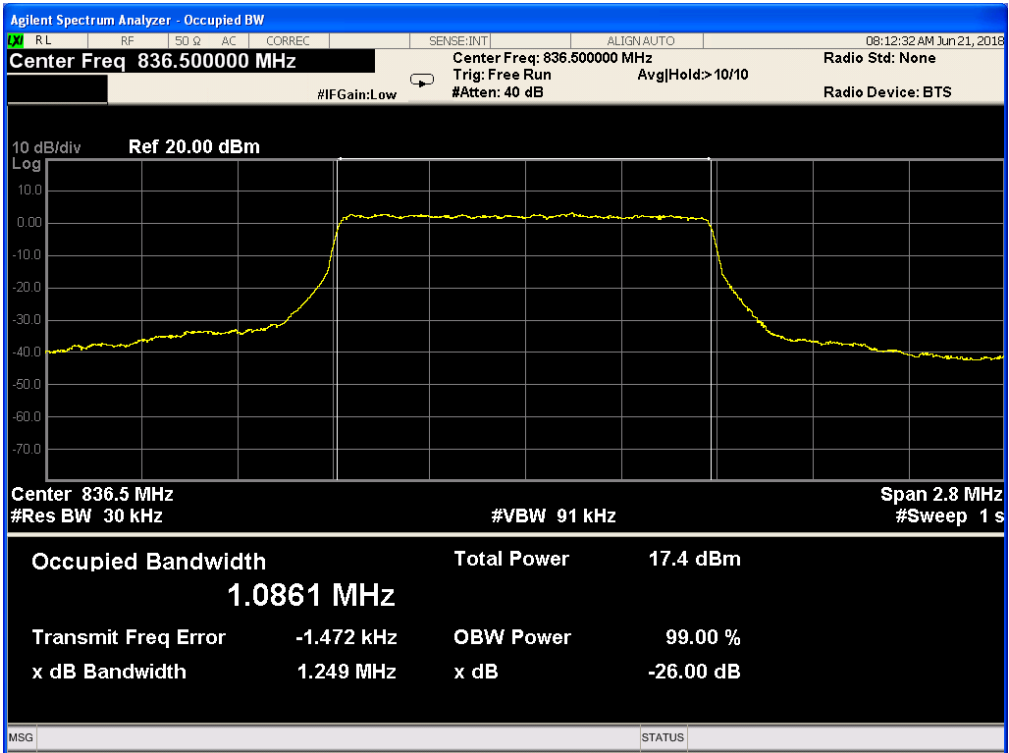
Band	Mode	RB Size/RB Offset	Frequency (MHz)	99% Occupied Bandwidth (MHz)	-26dBc Occupied Bandwidth (MHz)
LTE Band 5	1.4MHz BAND QPSK	6/0	836.5	1.09	1.25
	1.4MHz BAND 16QAM	6/0	836.5	1.09	1.25
	3.0MHz BAND QPSK	15/0	836.5	2.69	2.91
	3.0MHz BAND 16QAM	15/0	836.5	2.69	2.91
	5.0MHz BAND QPSK	25/0	836.5	4.49	4.84
	5.0MHz BAND 16QAM	25/0	836.5	4.49	4.81
	10.0MHz BAND QPSK	50/0	836.5	8.98	9.54
	10.0MHz BAND 16QAM	50/0	836.5	8.97	9.51

Note: This test was only measured at maximum RB allocation and at CENTER of band for each LTE BW

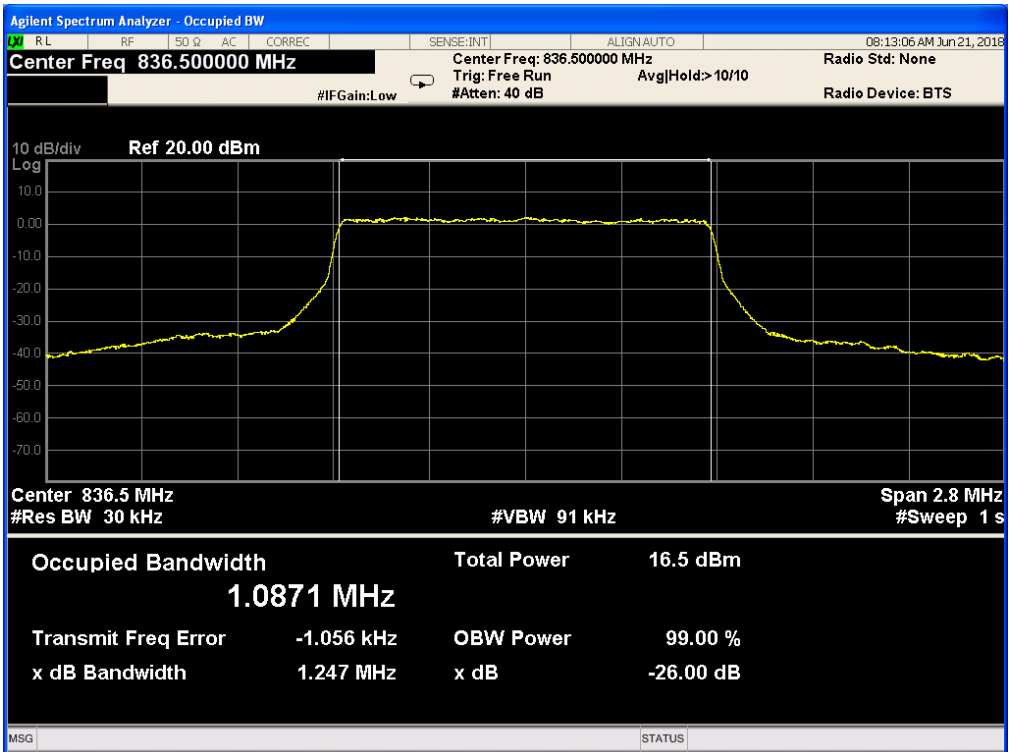


### 5.1 LTE BAND 5

Band 5, UL Channel 20525, UL Frequency 836.5, BW 1.4, NO. RB 6, RB POS. Low, QPSK

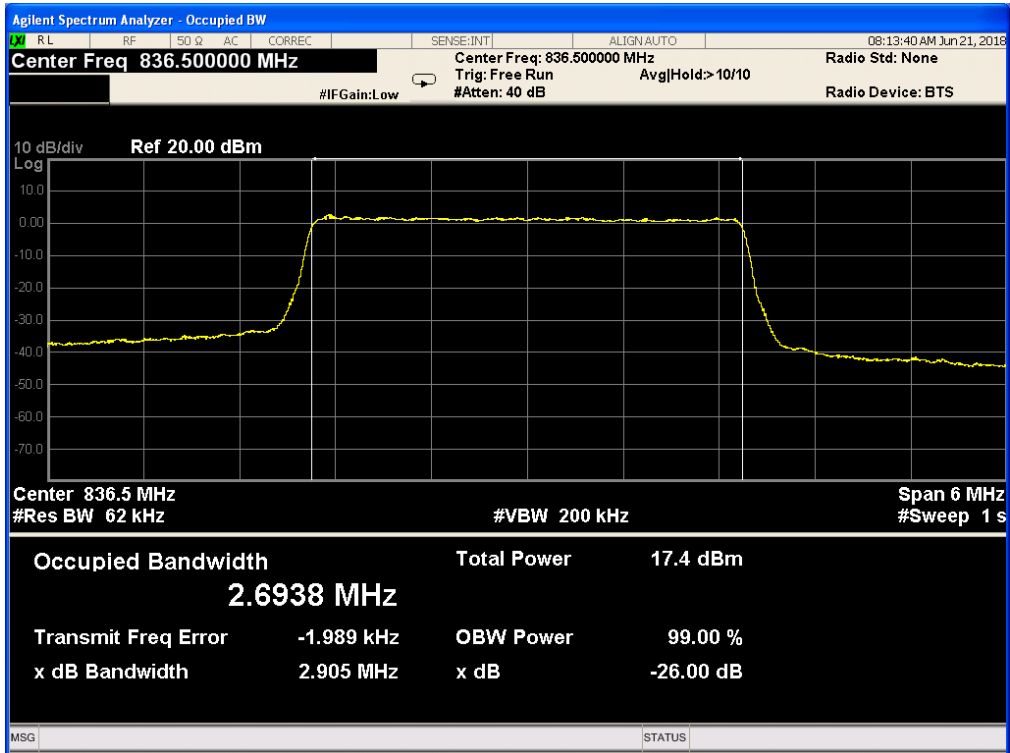


Band 5, UL Channel 20525, UL Frequency 836.5, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM

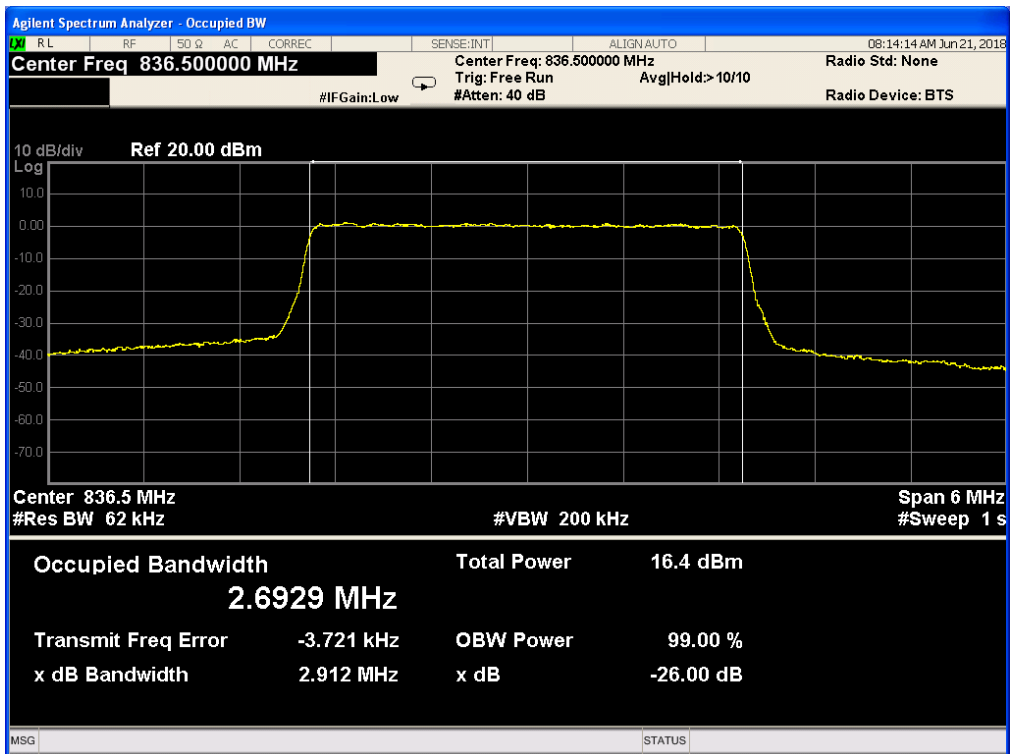




Band 5,UL Channel 20525,UL Frequency 836.5,BW 3.0,NO. RB 15,RB POS. Low,QPSK

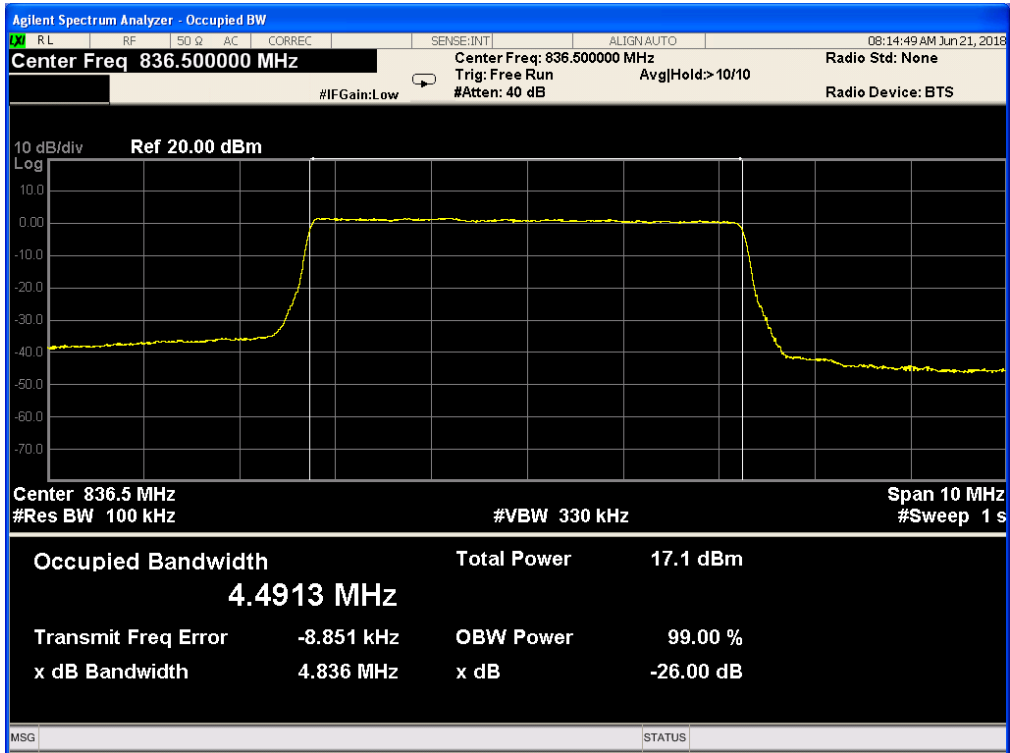


Band 5,UL Channel 20525,UL Frequency 836.5,BW 3.0,NO. RB 15,RB POS. Low,16-QAM

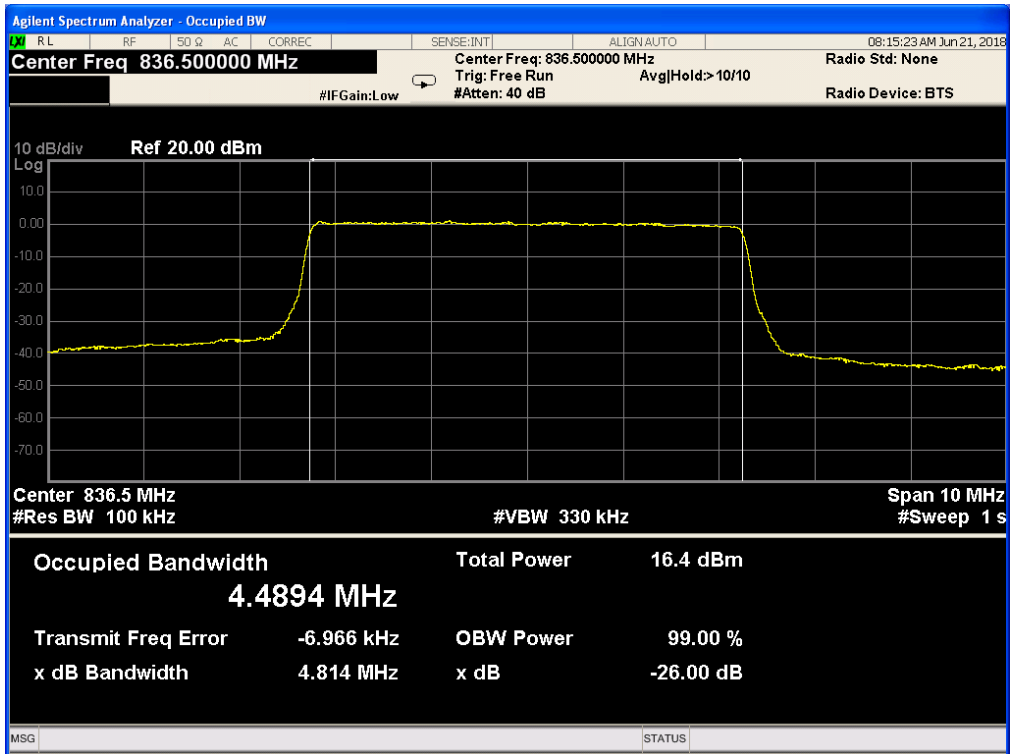




Band 5, UL Channel 20525, UL Frequency 836.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK

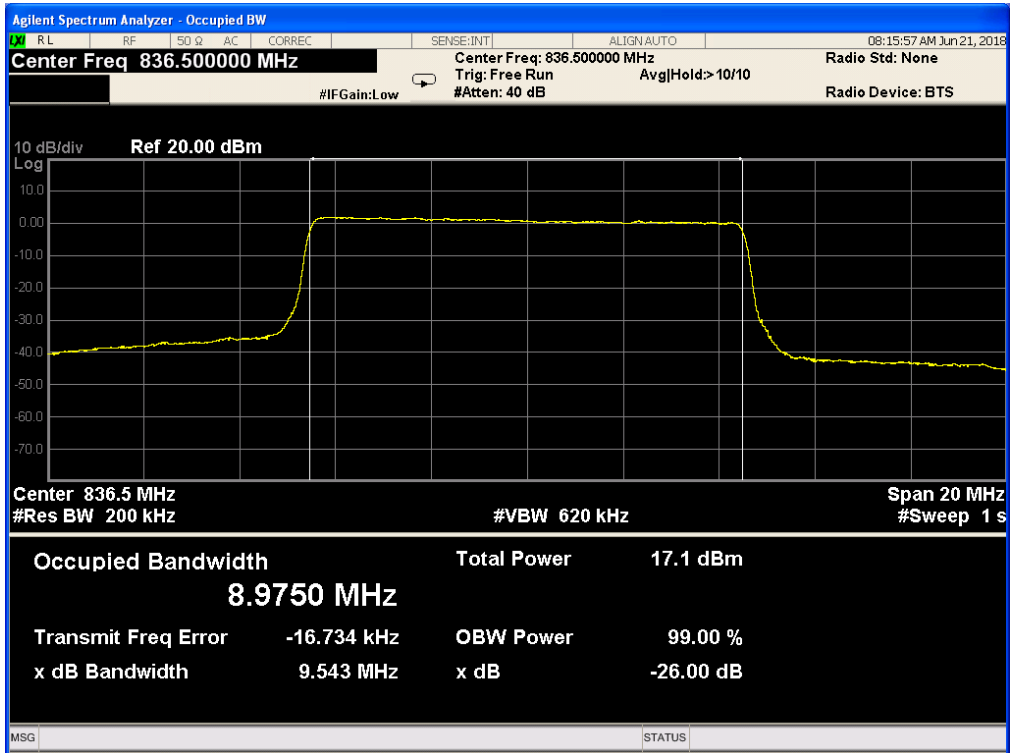


Band 5, UL Channel 20525, UL Frequency 836.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM

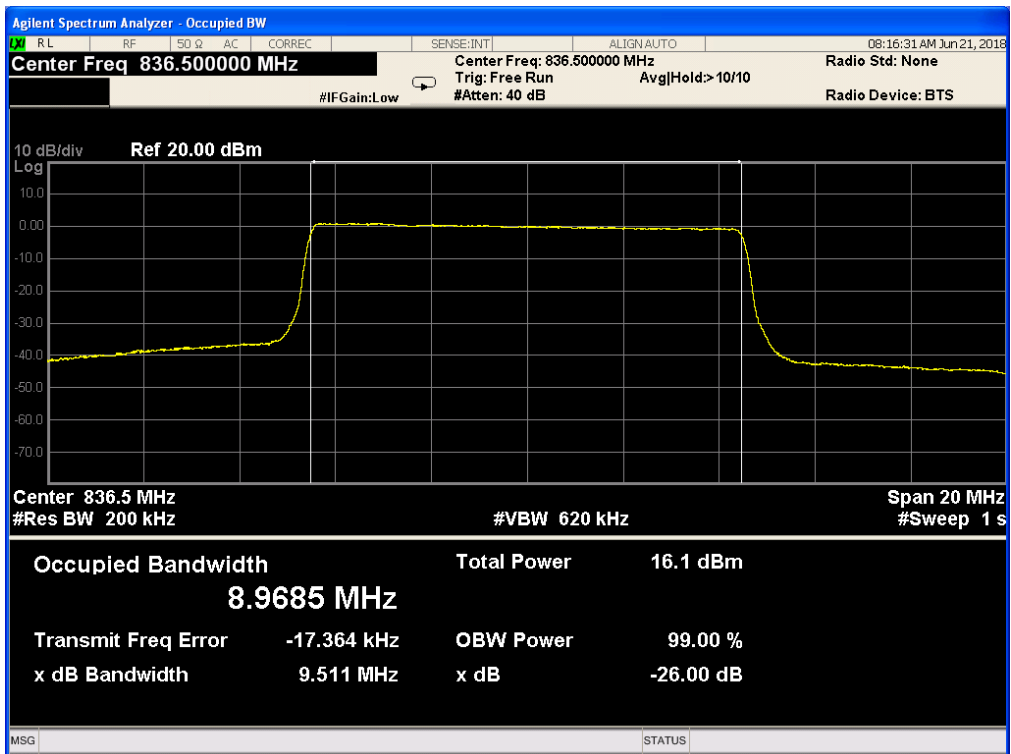




Band 5,UL Channel 20525,UL Frequency 836.5,BW 10.0,NO. RB 50,RB POS. Low,QPSK



Band 5,UL Channel 20525,UL Frequency 836.5,BW 10.0,NO. RB 50,RB POS. Low,16-QAM





## 6. BANDEDGE AND EMISSION MASK

### RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53, and §90.691

FCC: §22.359

### LIMITS

FCC: §22.359, §24.238,

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

(m)(4) 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. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Show citation box.

### TEST PROCEDURE

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

Set the spectrum analyzer span to include the block edge frequency (704, 716, 824, 849, 1710 and 1755, 1850 and 1910MHz)

Set a marker to point the corresponding band edge frequency in each test case.

Set display line at -13 dBm

Set resolution bandwidth to at least 1% of emission bandwidth.

### MODES TESTED

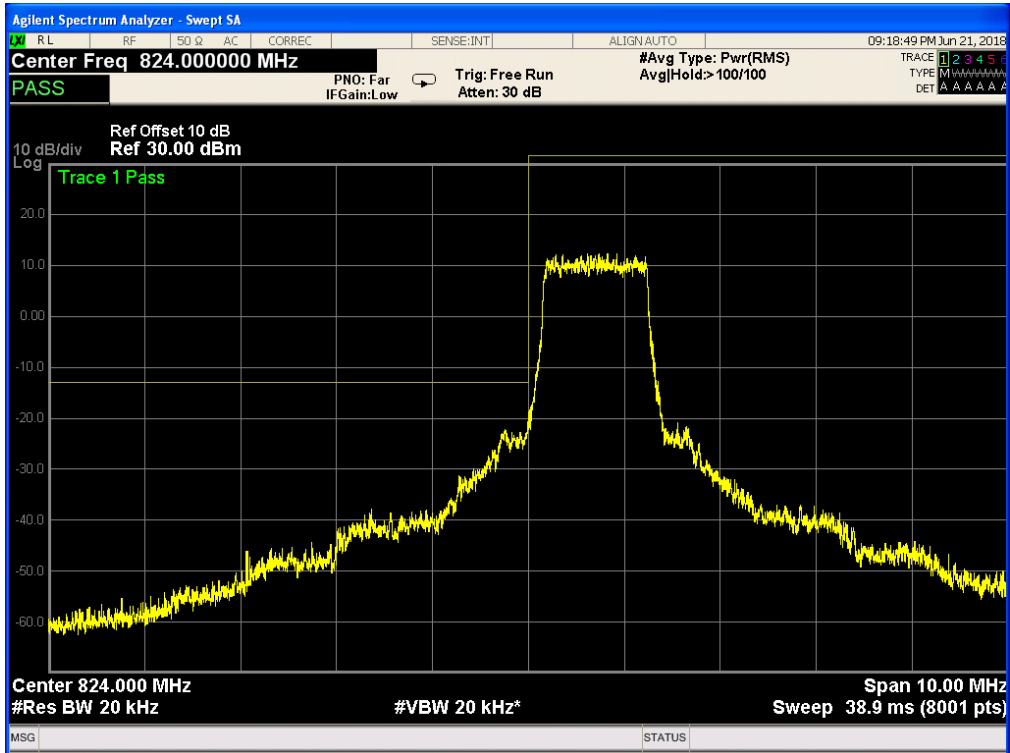
- LTE Band 5

### RESULTS

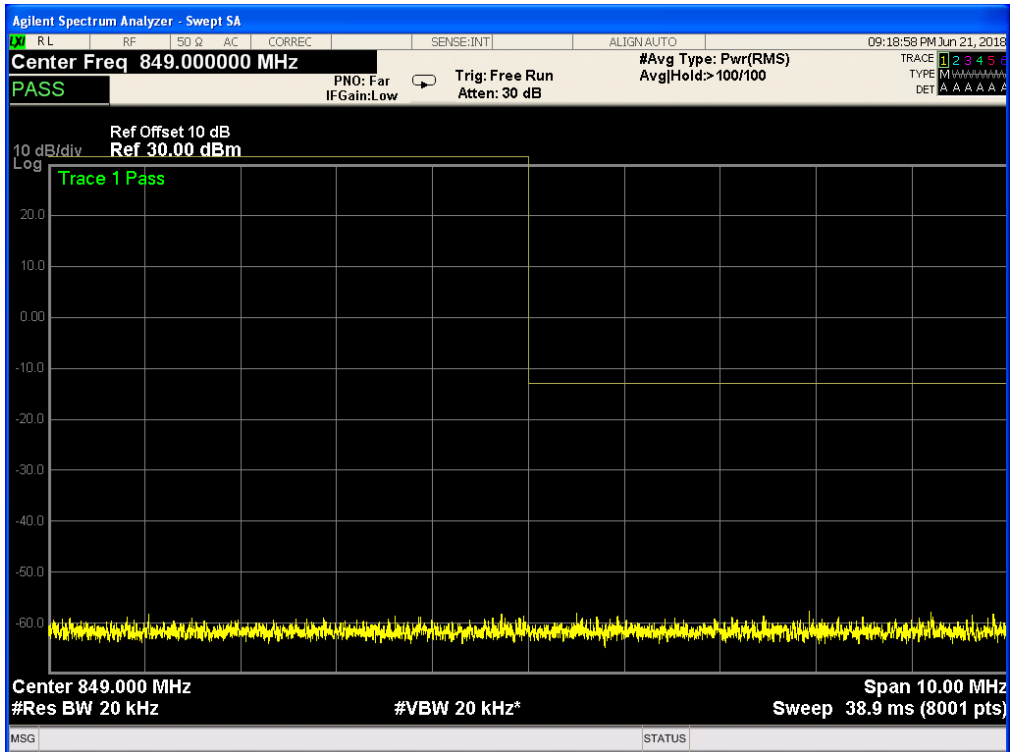


### 6.1 LTE BAND 5

*Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, QPSK*

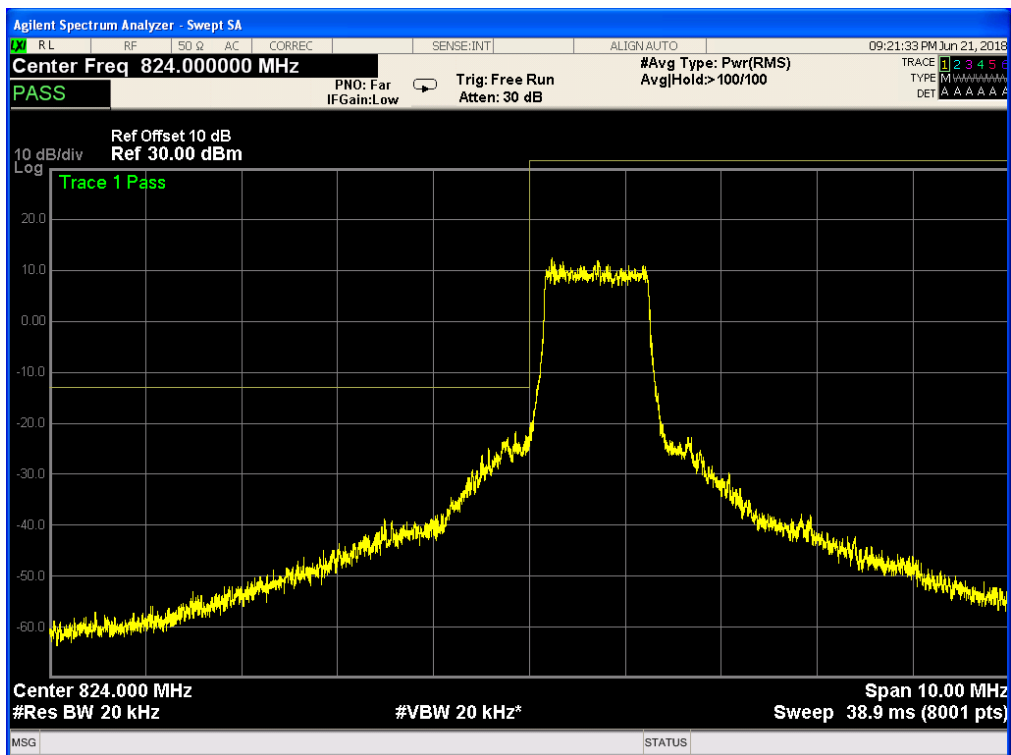


*Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, QPSK*

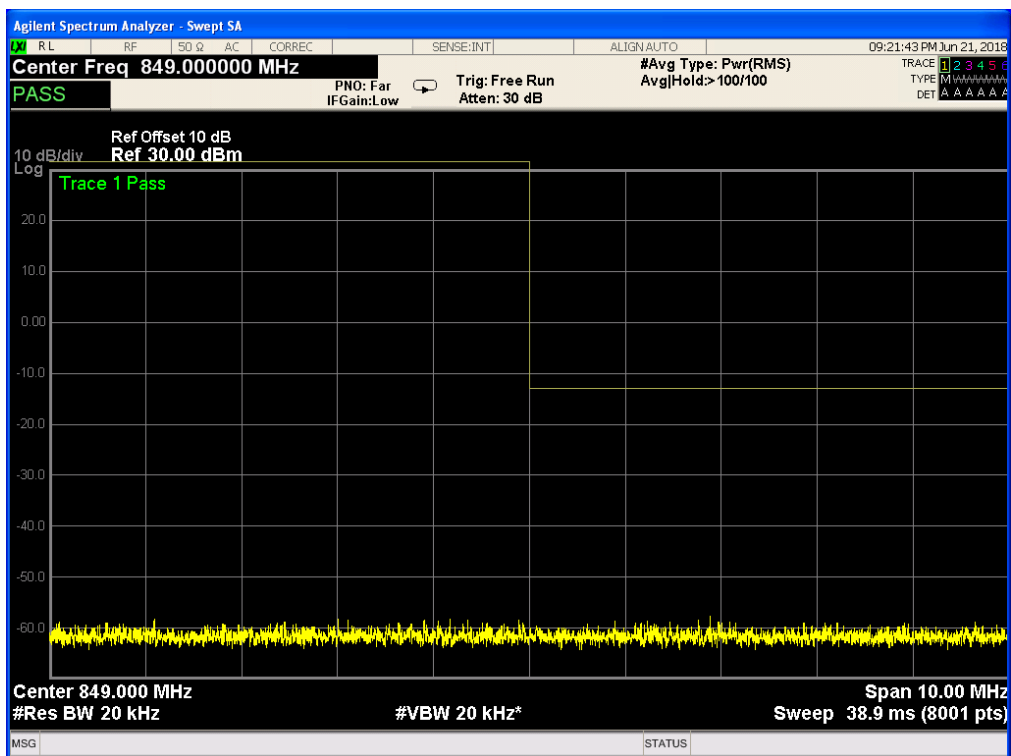




Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM



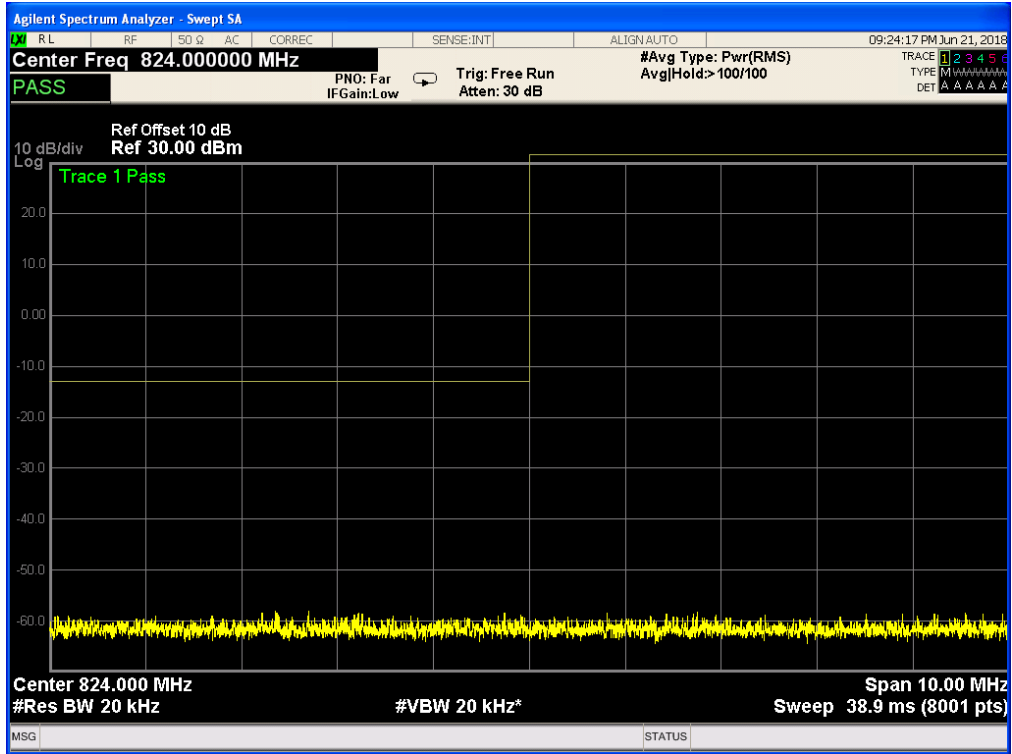
Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM



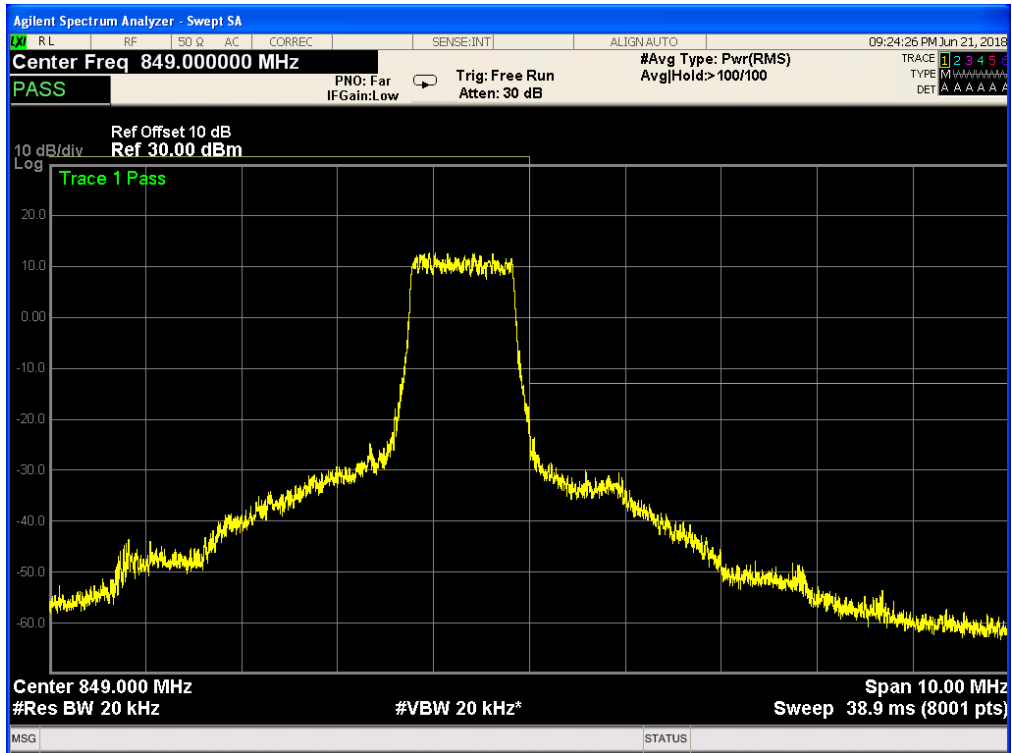




Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, QPSK

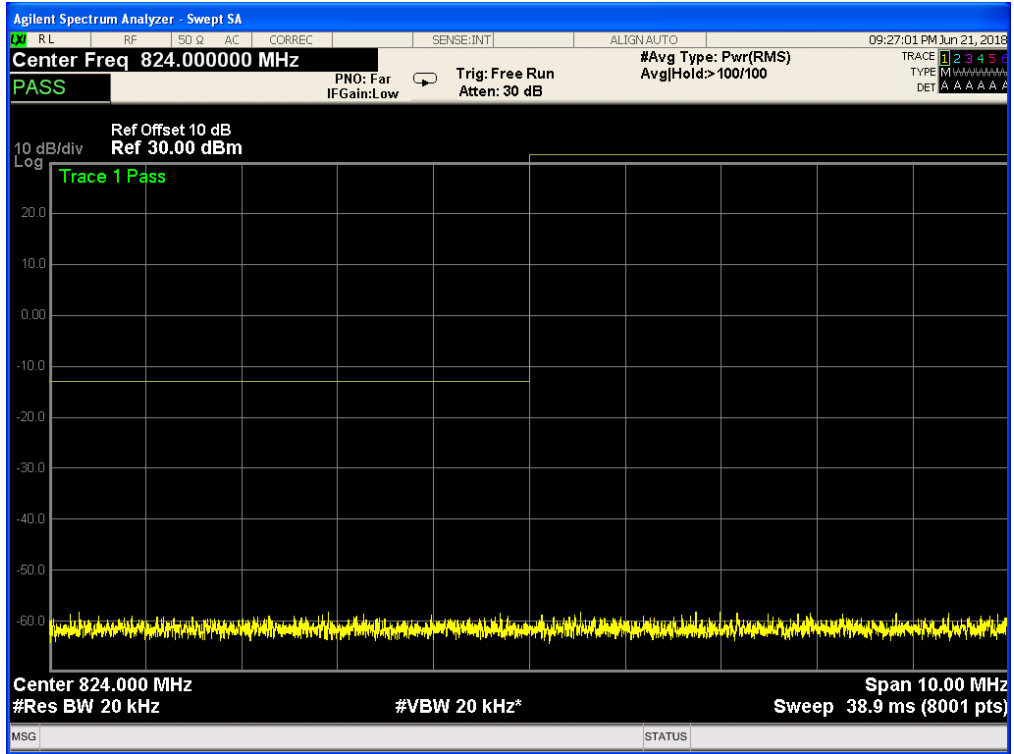


Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, QPSK

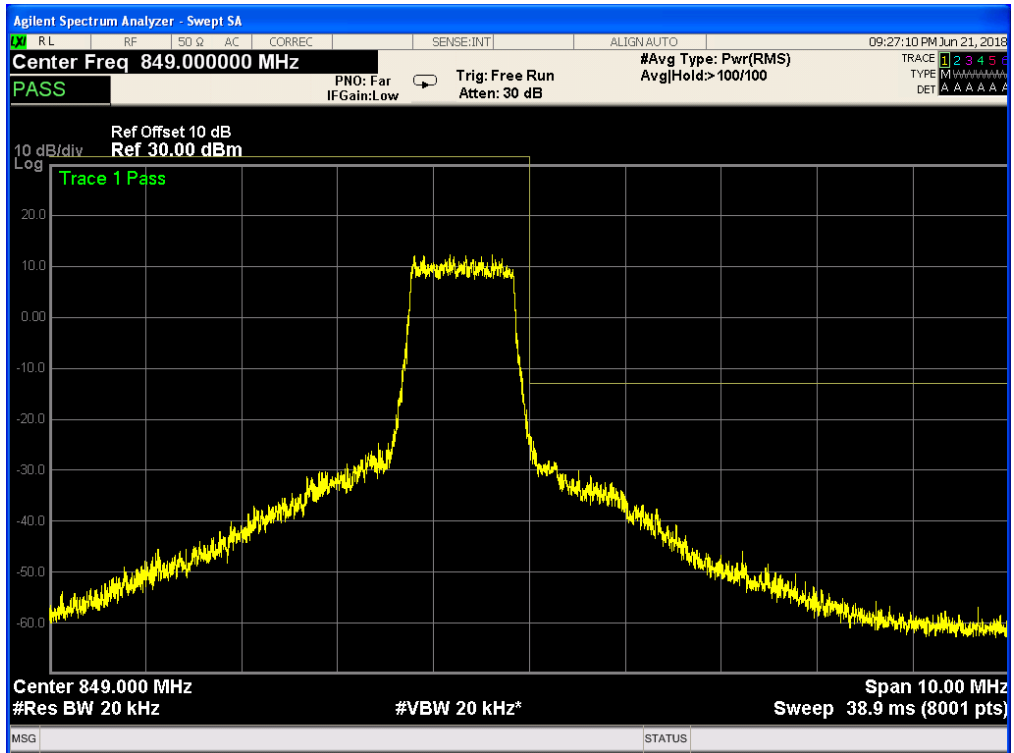




Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM

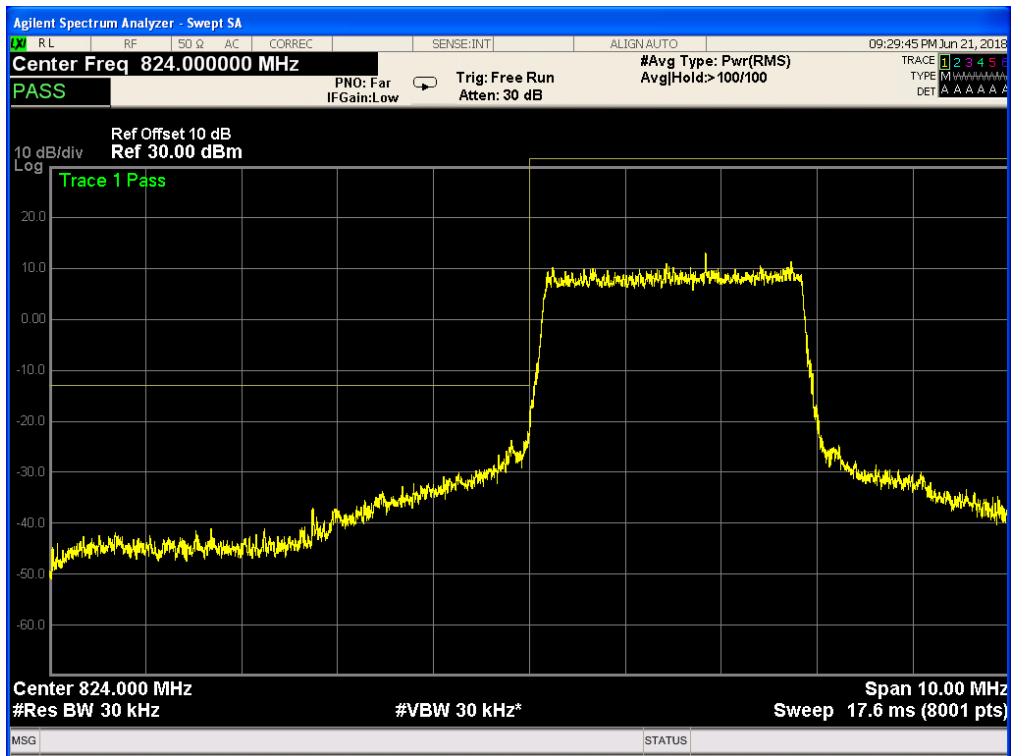


Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM

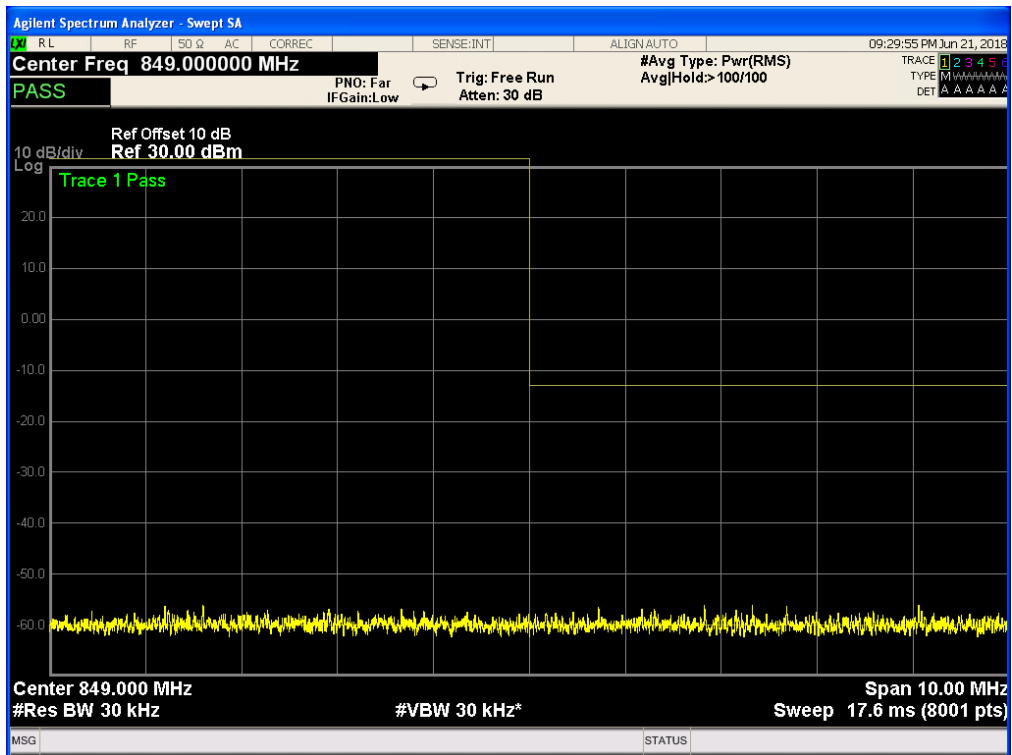




Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

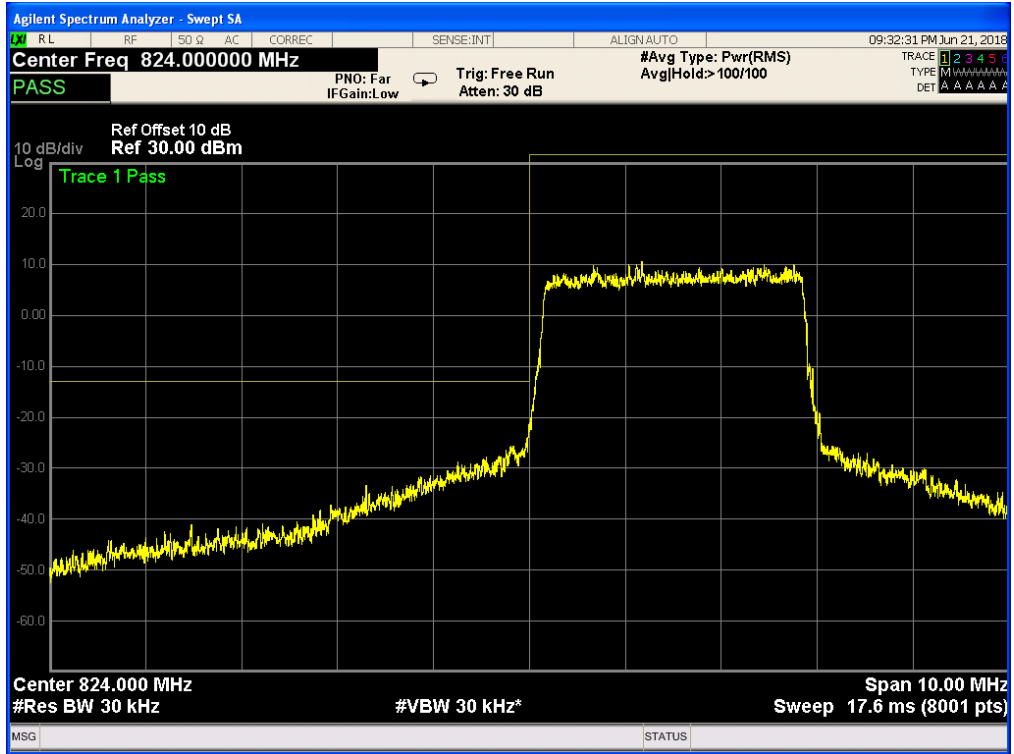


Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

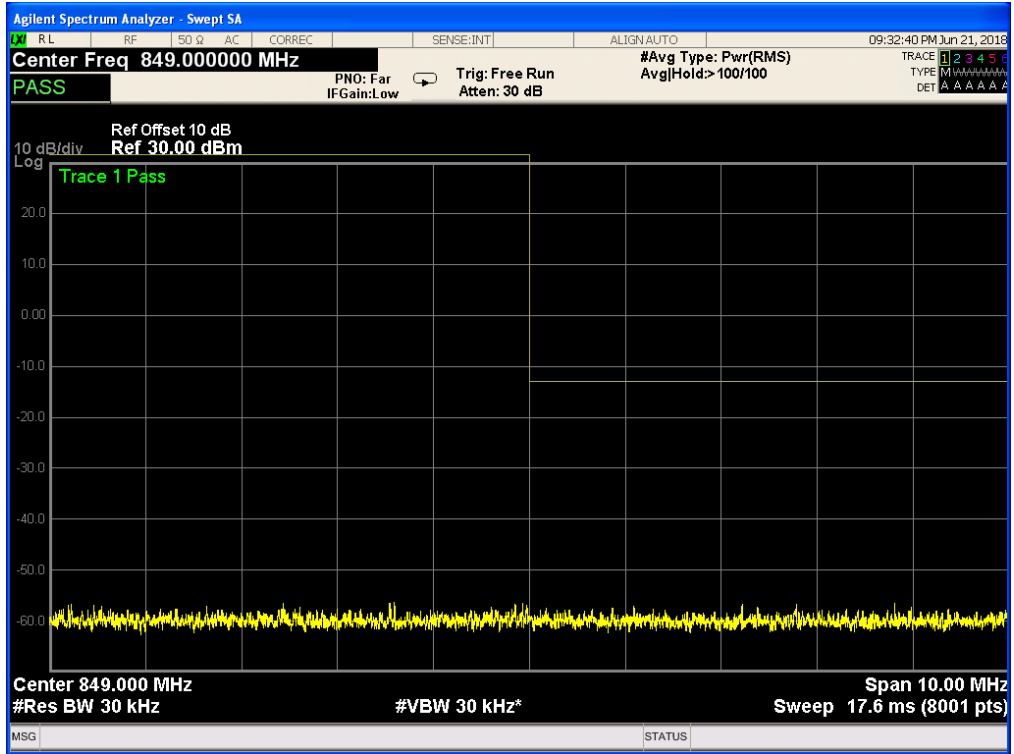




Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

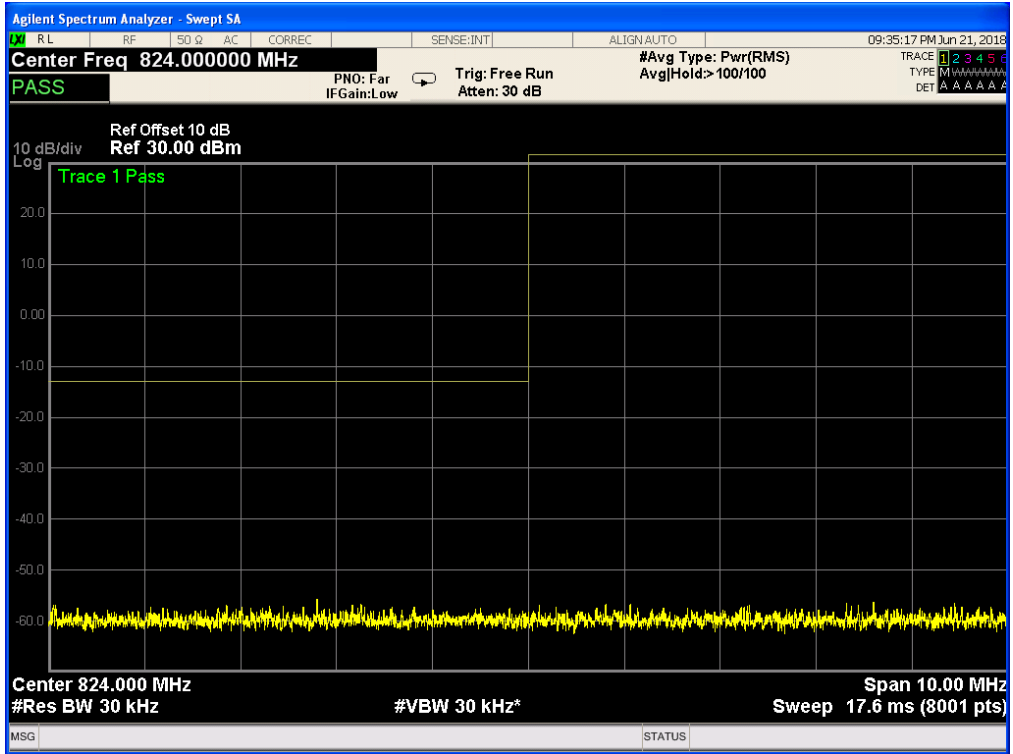


Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

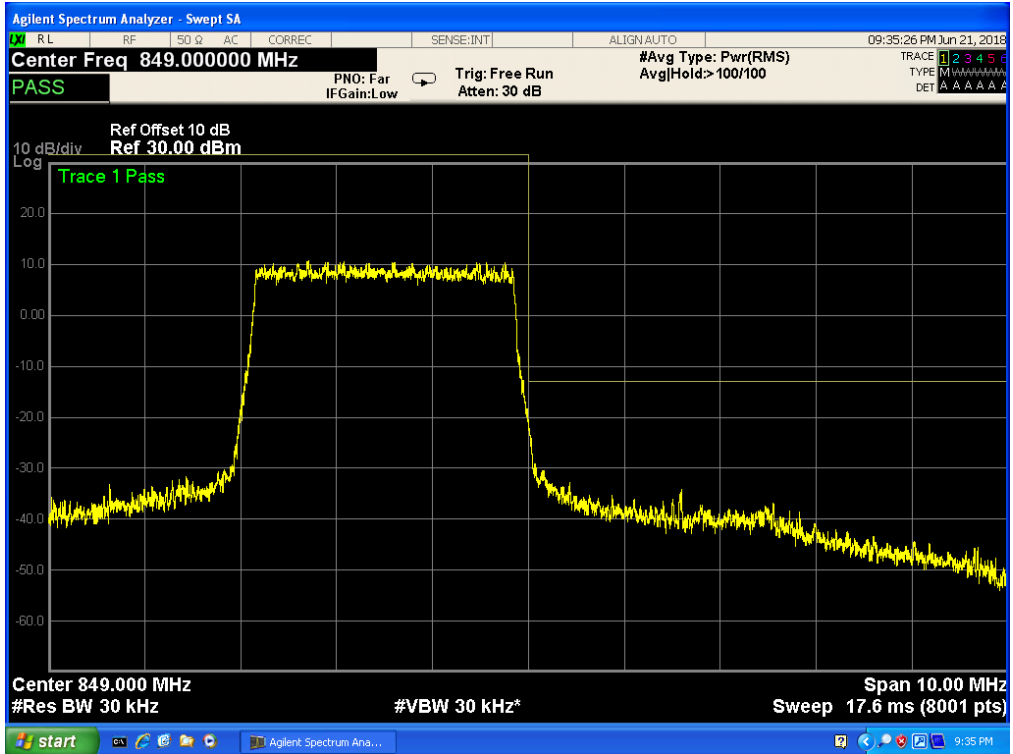




Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

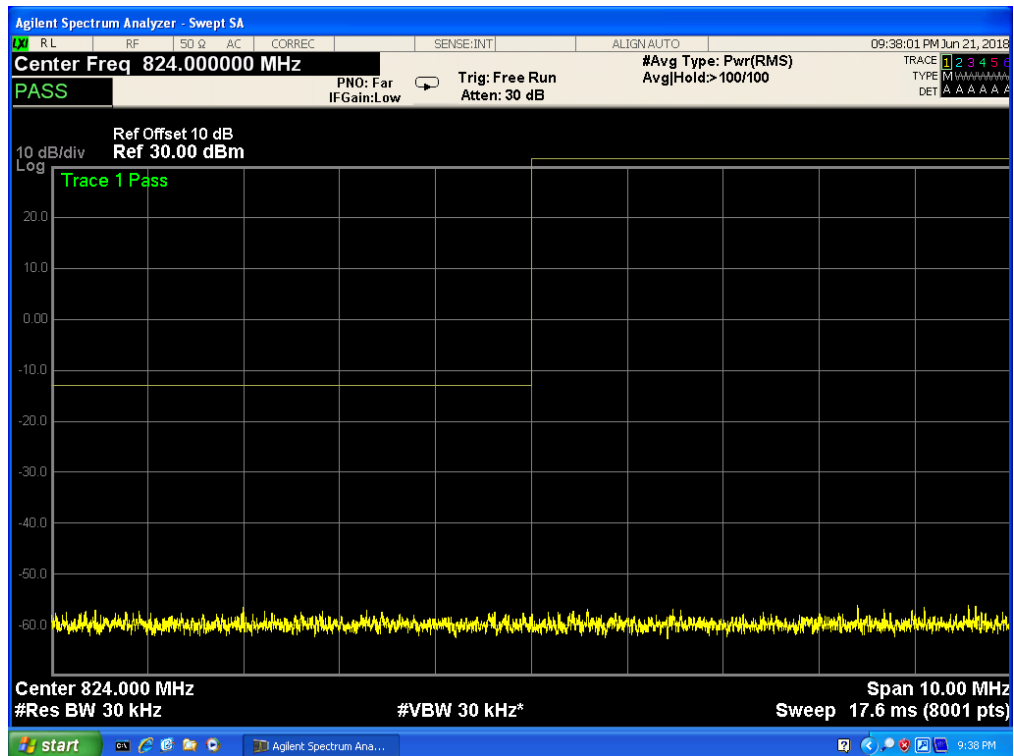


Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

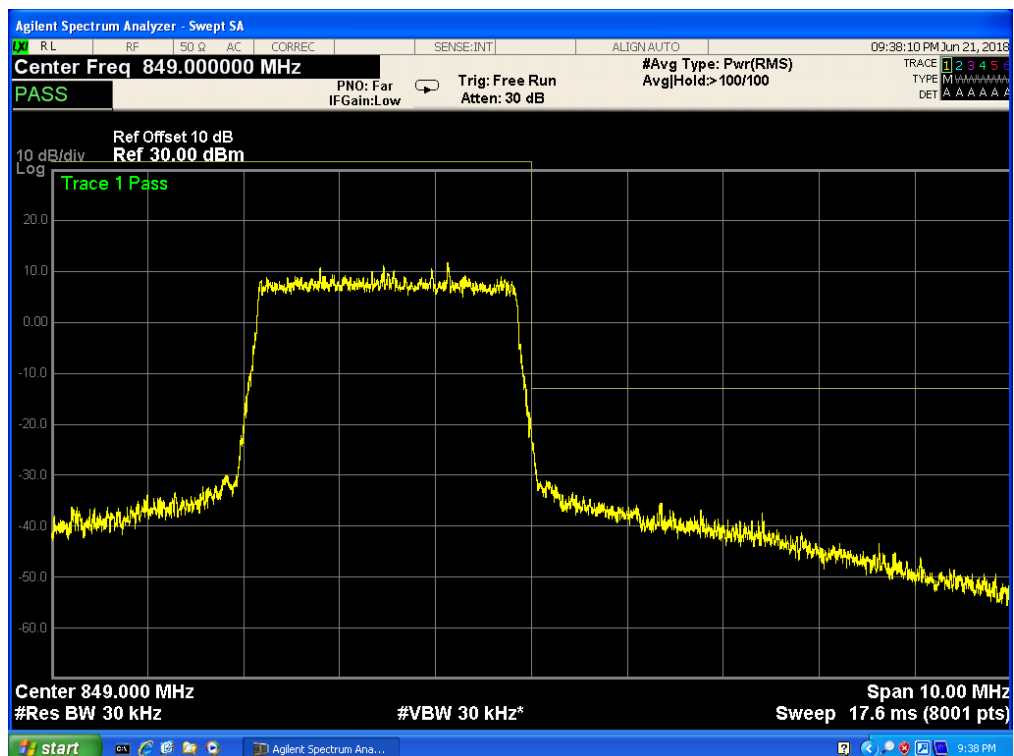




Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

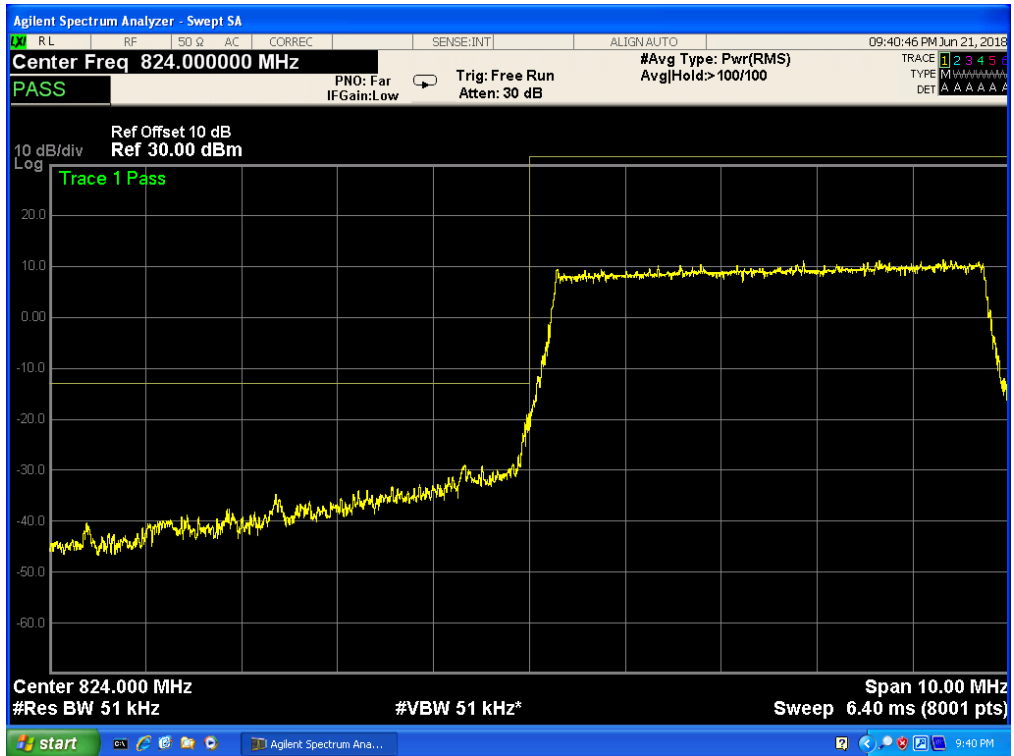


Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

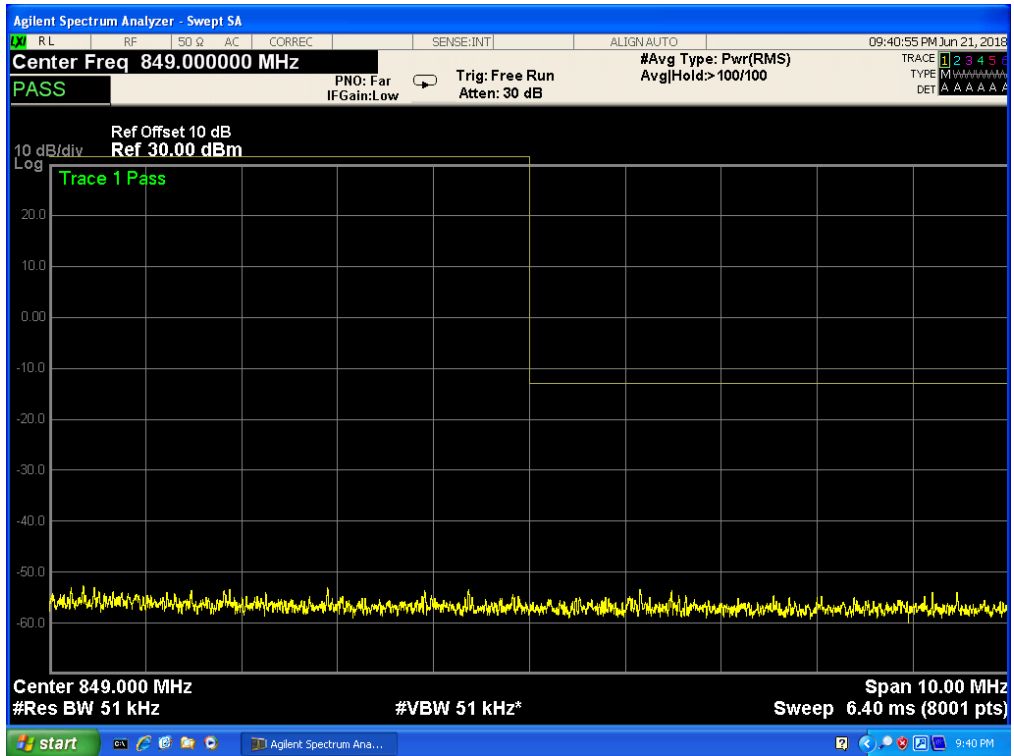




Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK

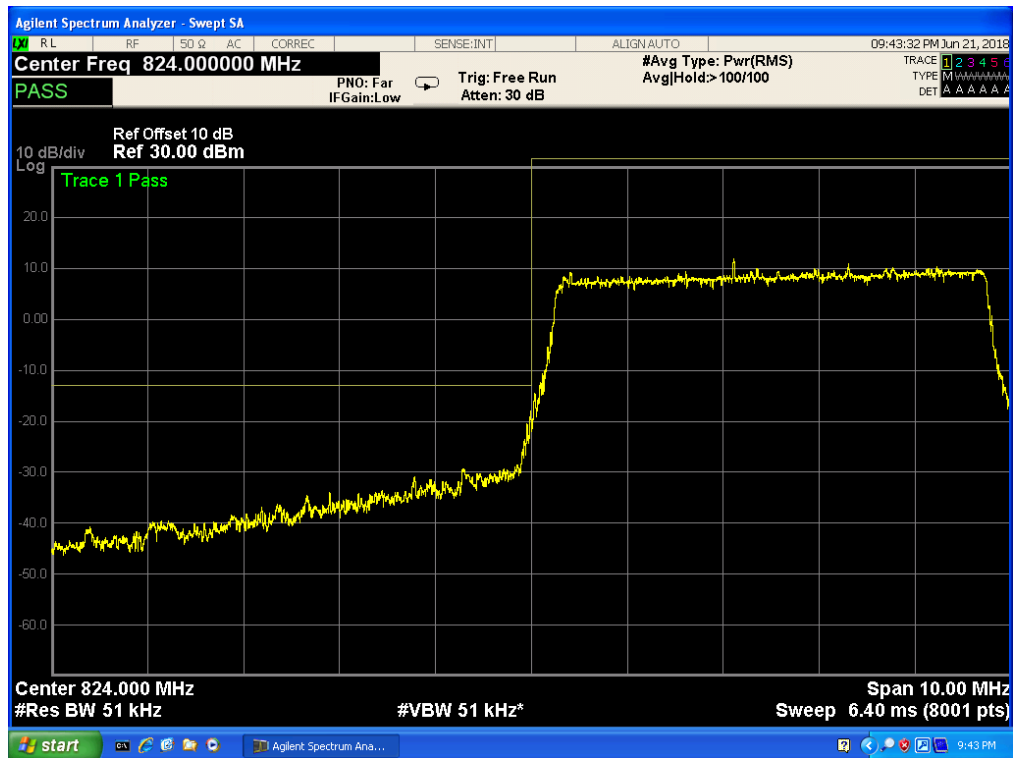


Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK

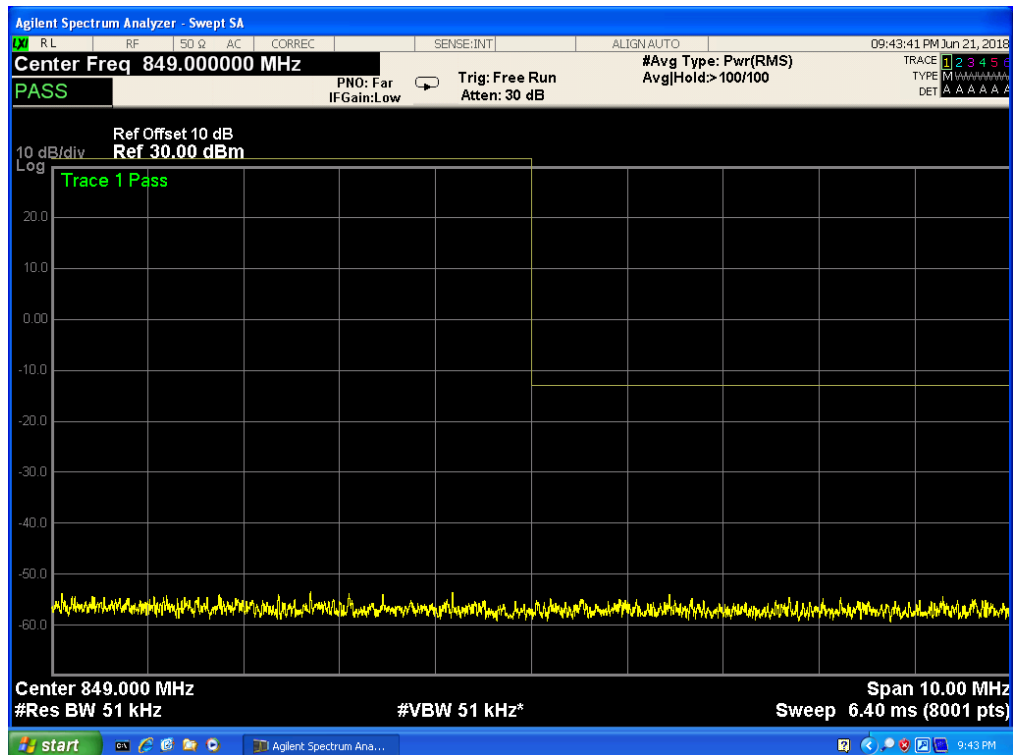




Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM



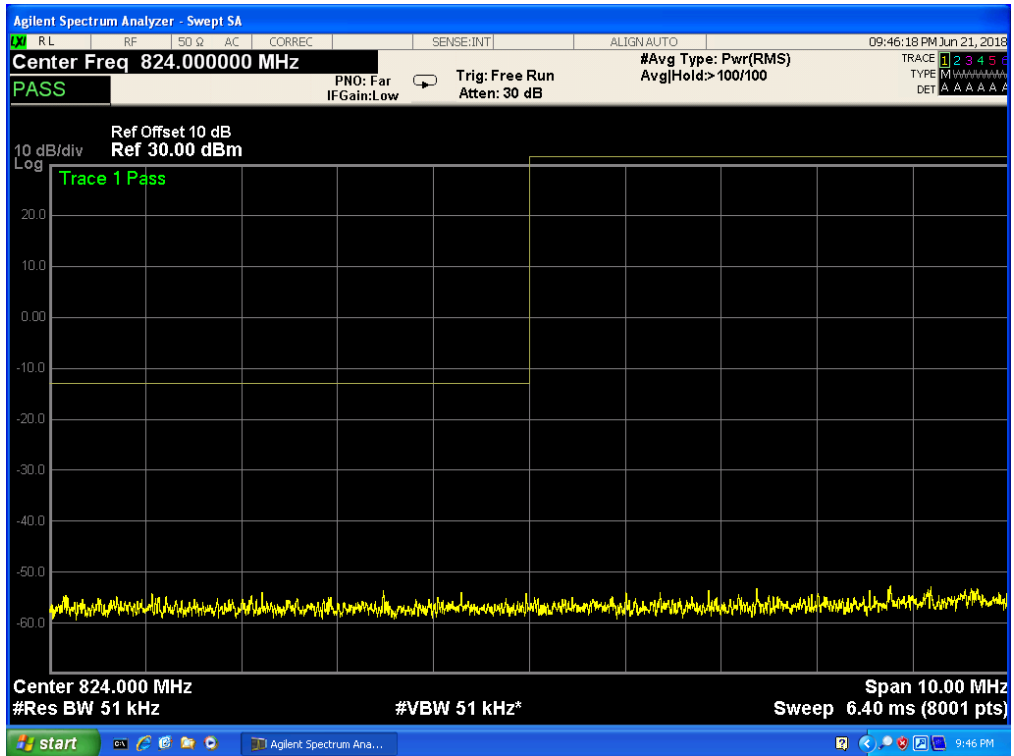
Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM







Band 5, UL Channel 20625, UL Frequency 846.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK

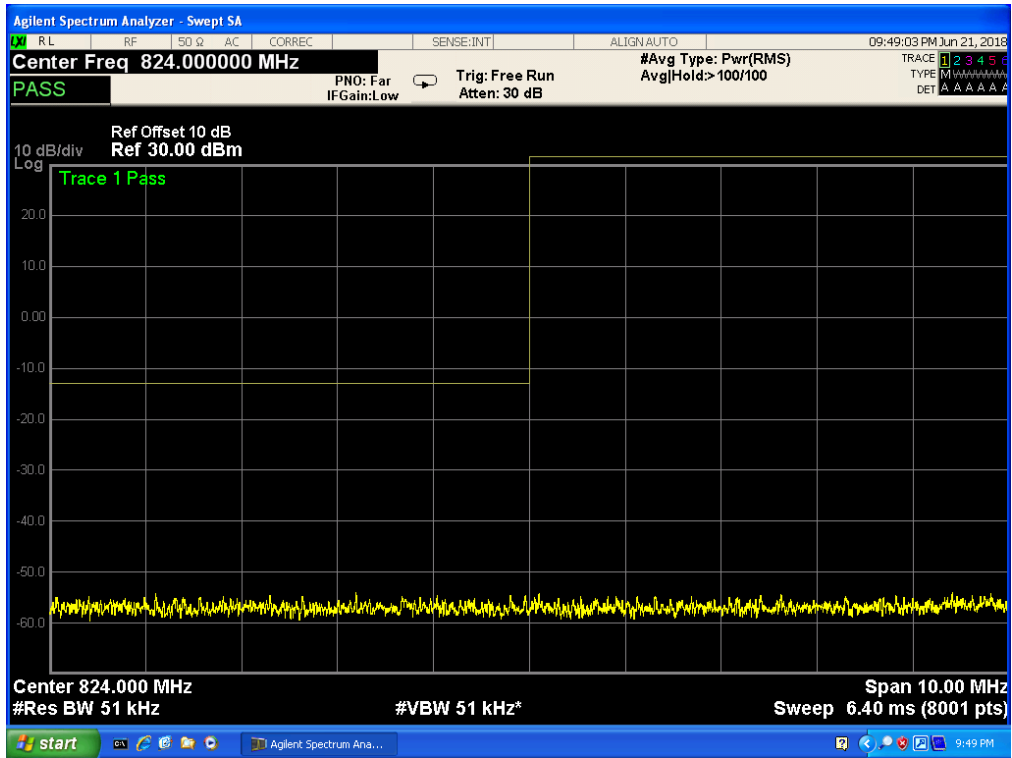


Band 5, UL Channel 20625, UL Frequency 846.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK

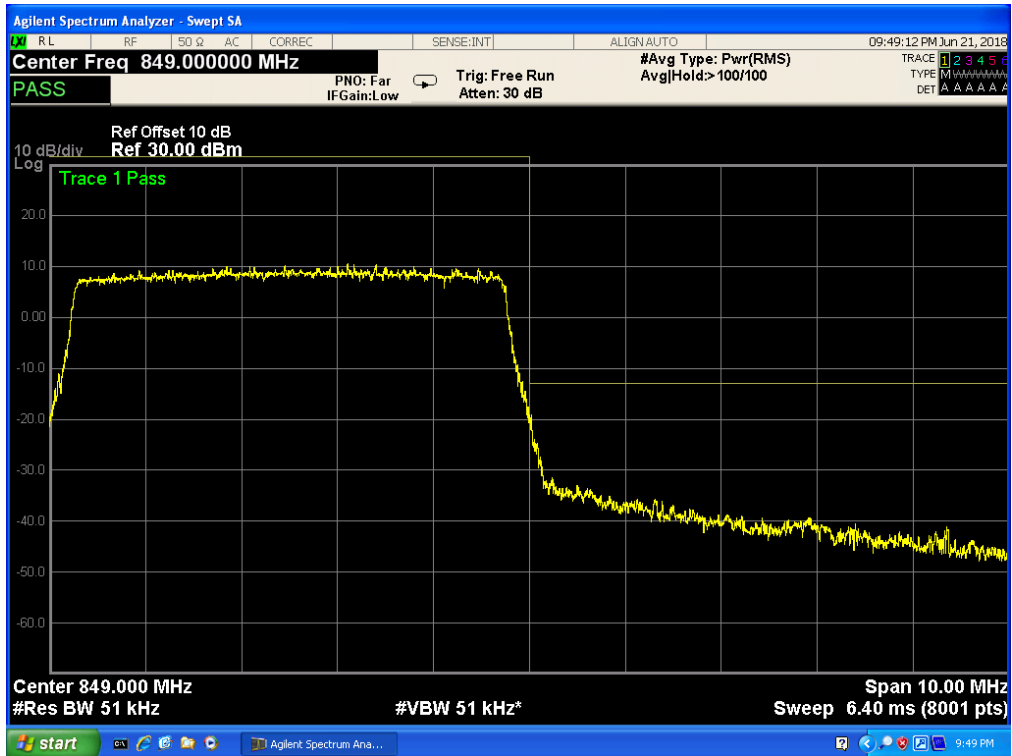




Band 5, UL Channel 20625, UL Frequency 846.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM

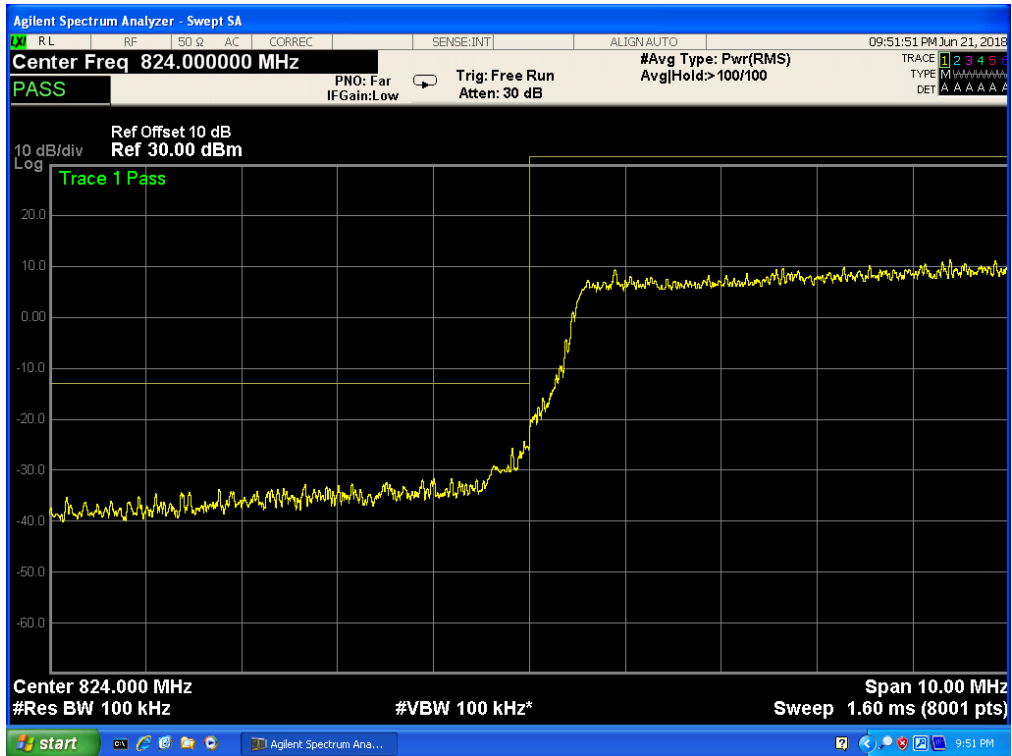


Band 5, UL Channel 20625, UL Frequency 846.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM

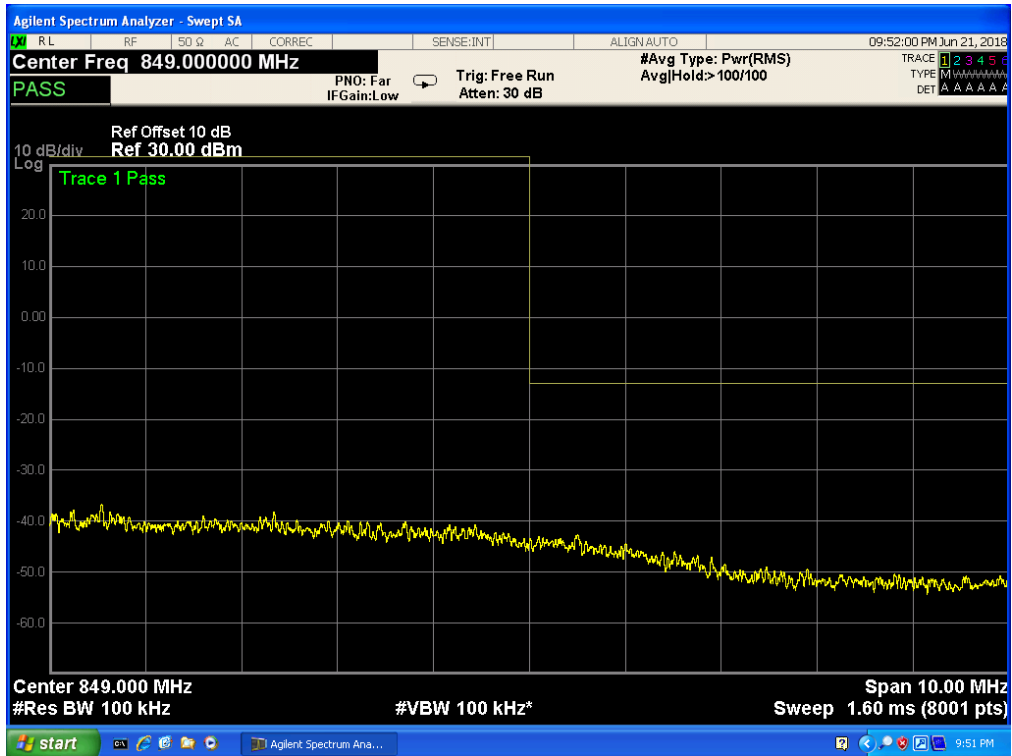




Band 5,UL Channel 20450,UL Frequency 829.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK

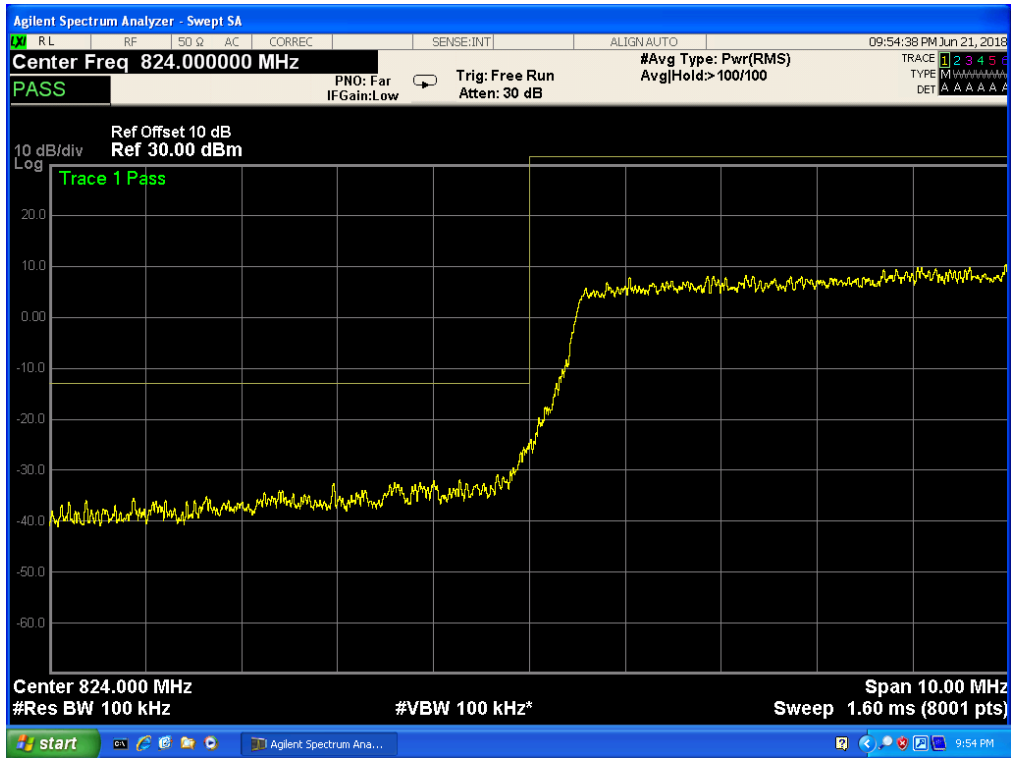


Band 5,UL Channel 20450,UL Frequency 829.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK

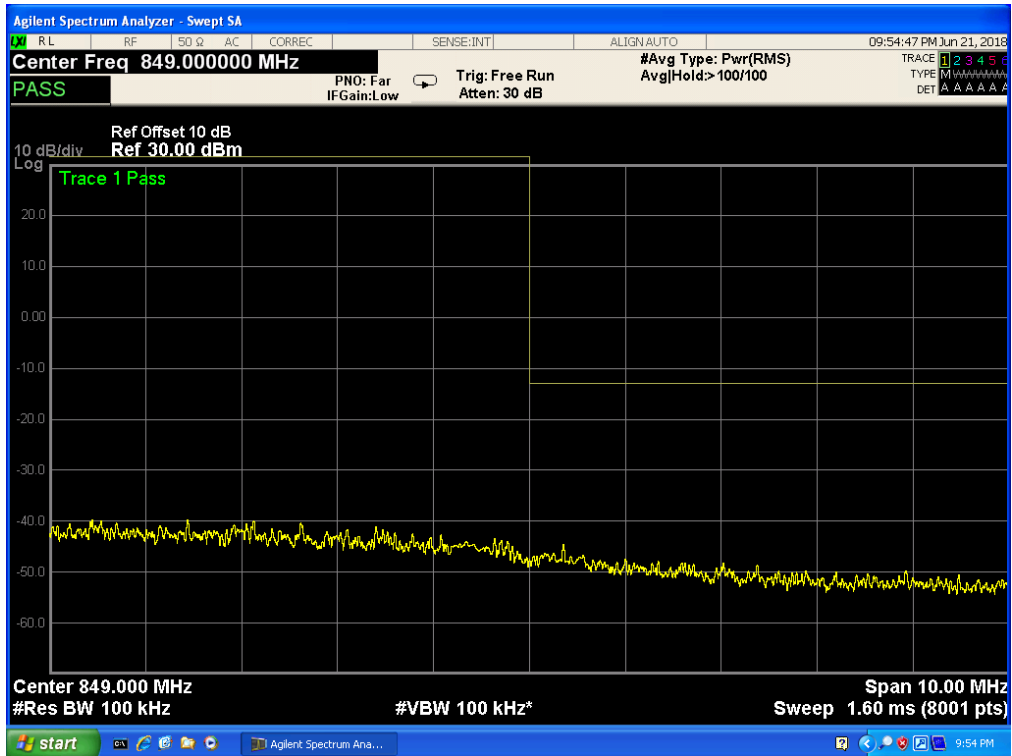




Band 5, UL Channel 20450, UL Frequency 829.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM

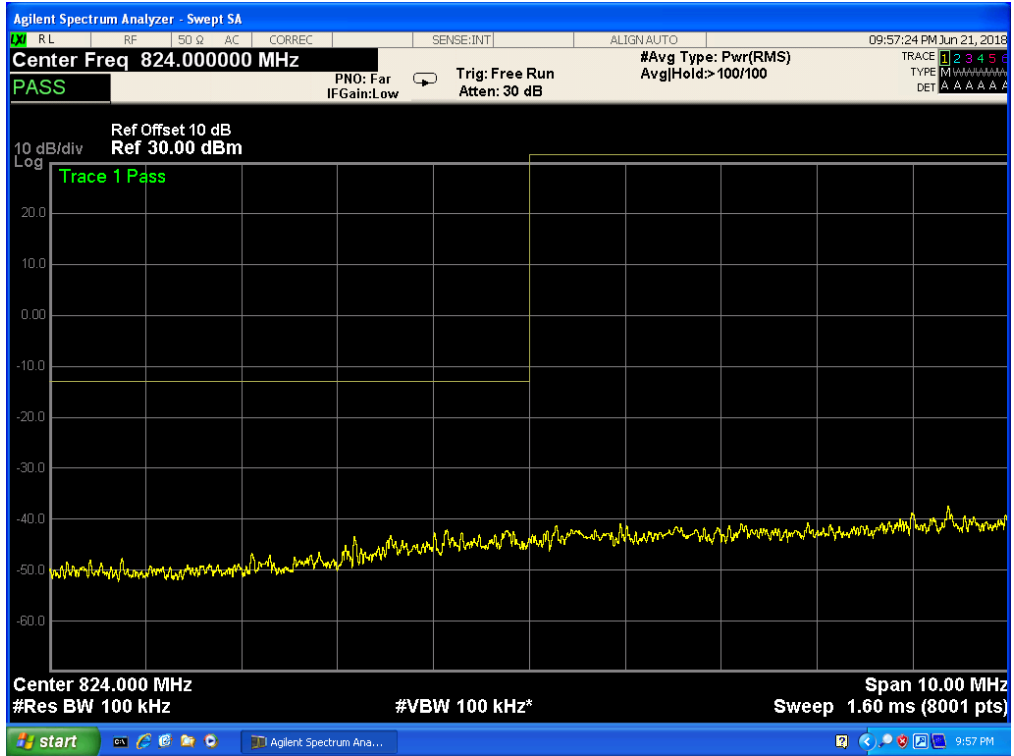


Band 5, UL Channel 20450, UL Frequency 829.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM

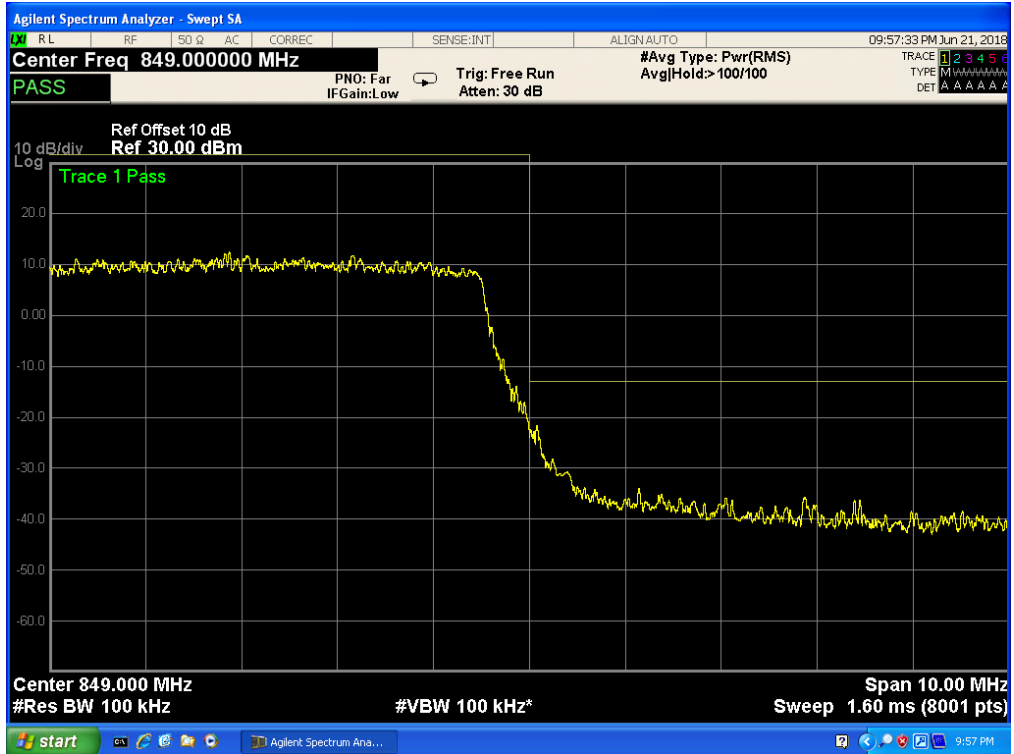




Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, QPSK

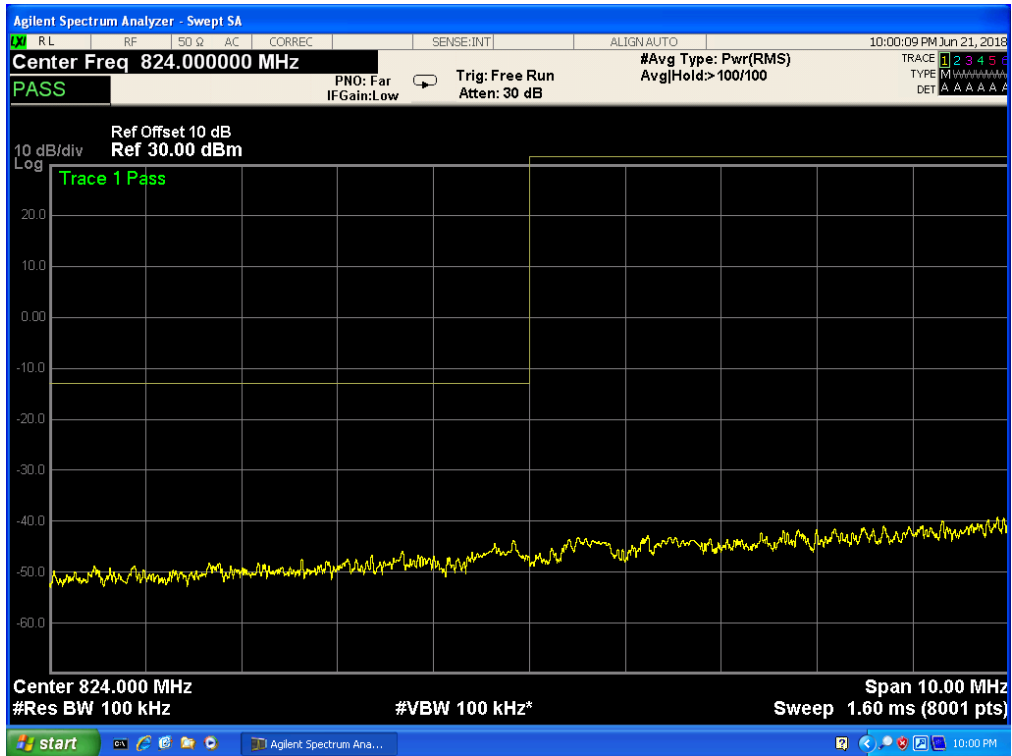


Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, QPSK

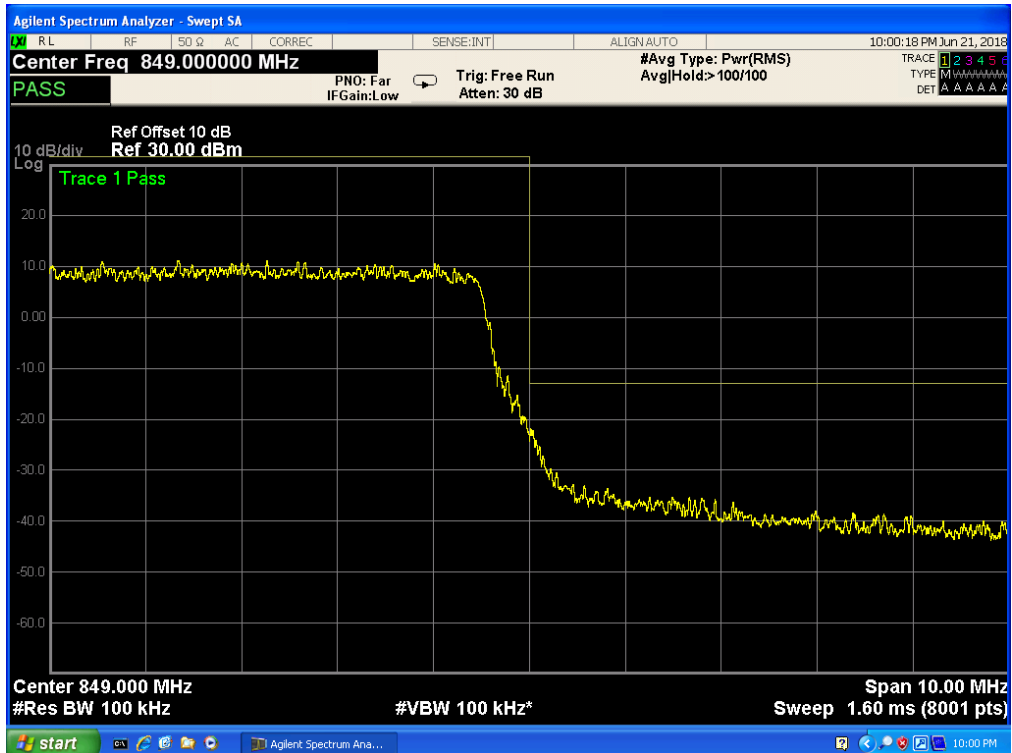




Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM



Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM





## 7. OUT OF BAND EMISSIONS

### RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27.53

### LIMITS

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

### TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

### **MODES TESTED**

- LTE Band 5

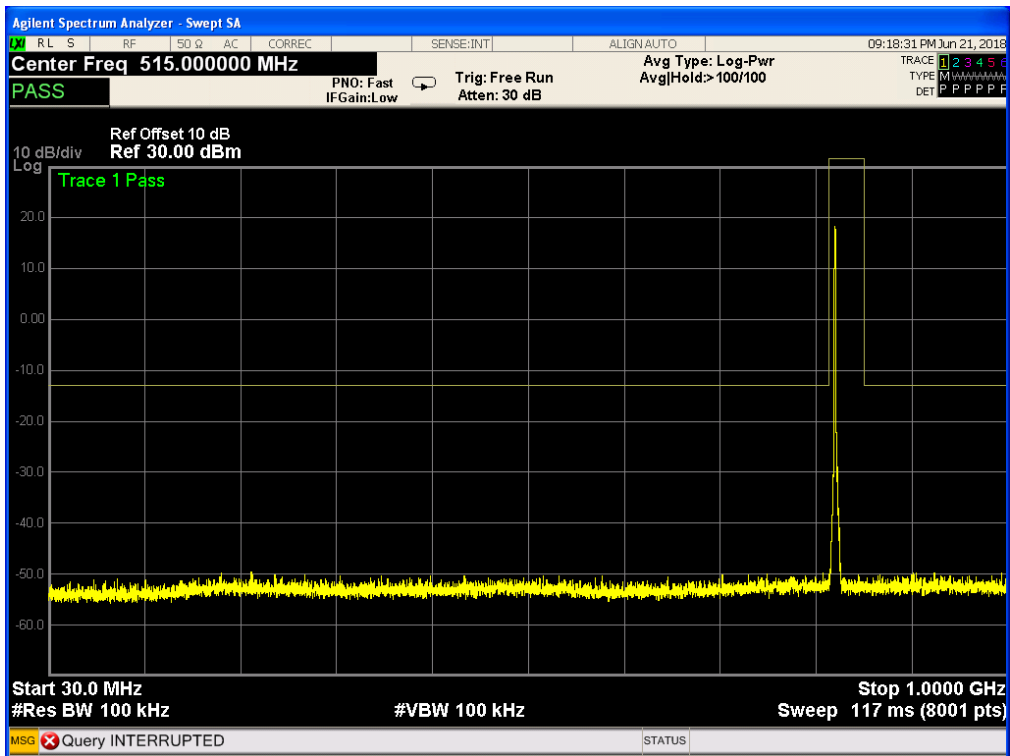
### 7.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

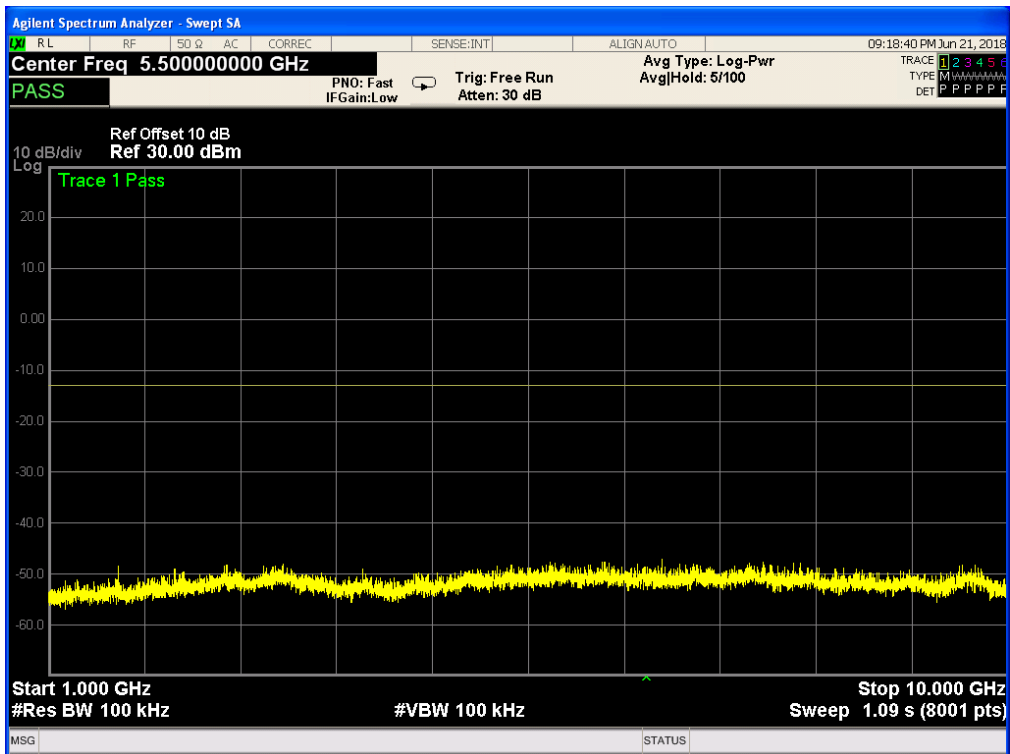


### 7.1 LTE BAND 5

*Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, QPSK*



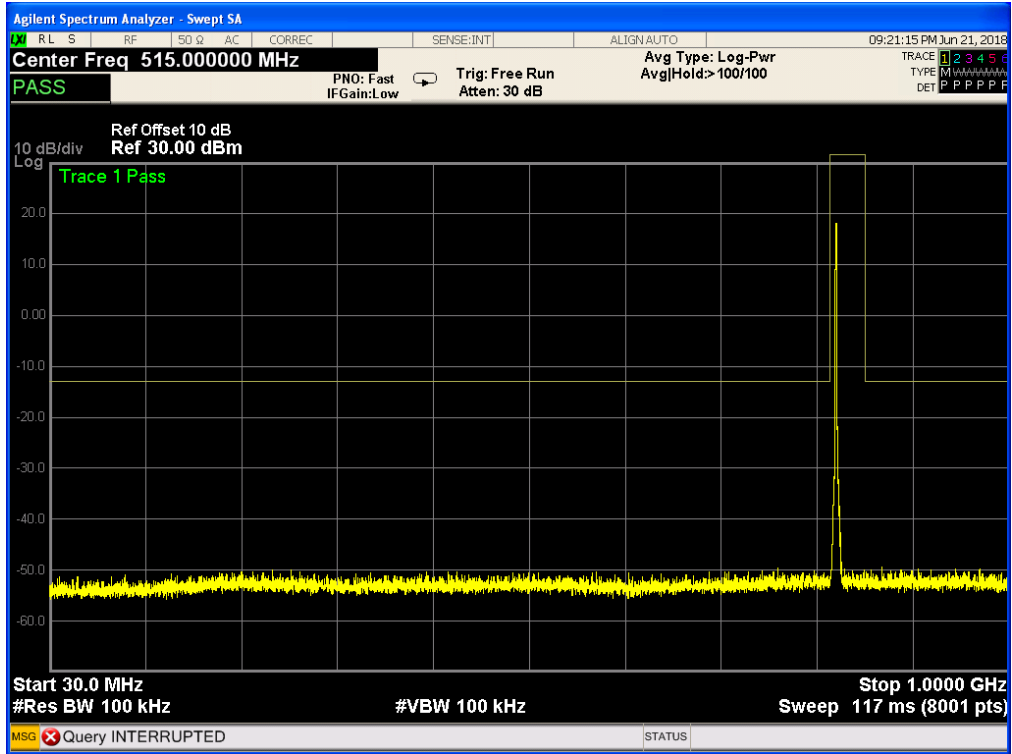
*Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, QPSK*



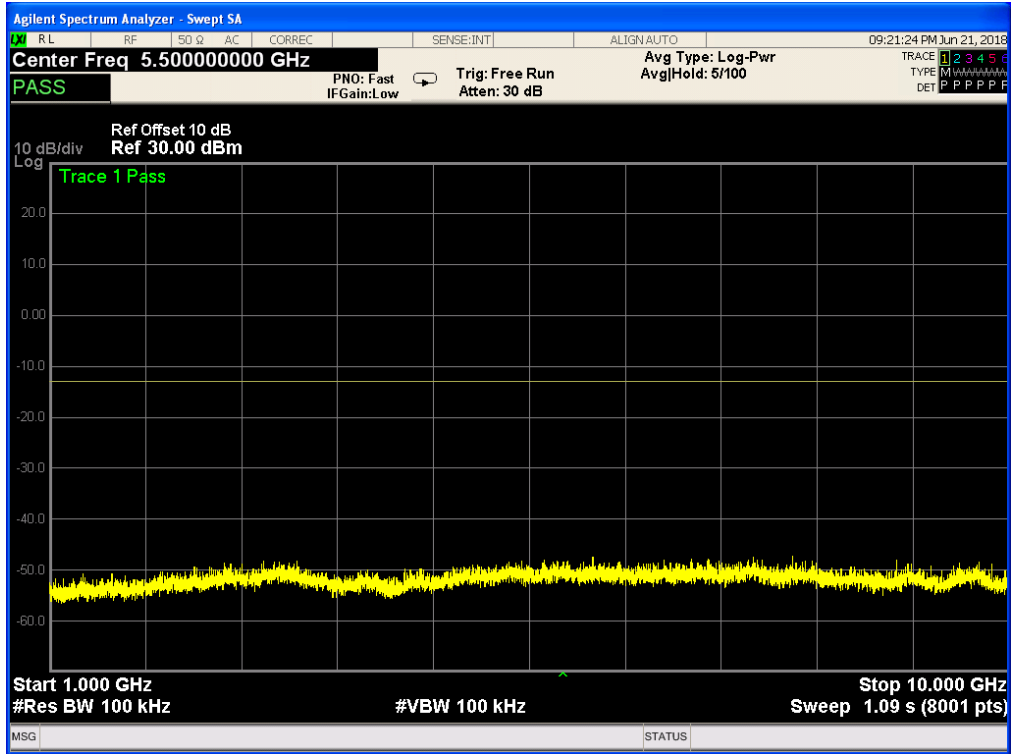




Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM

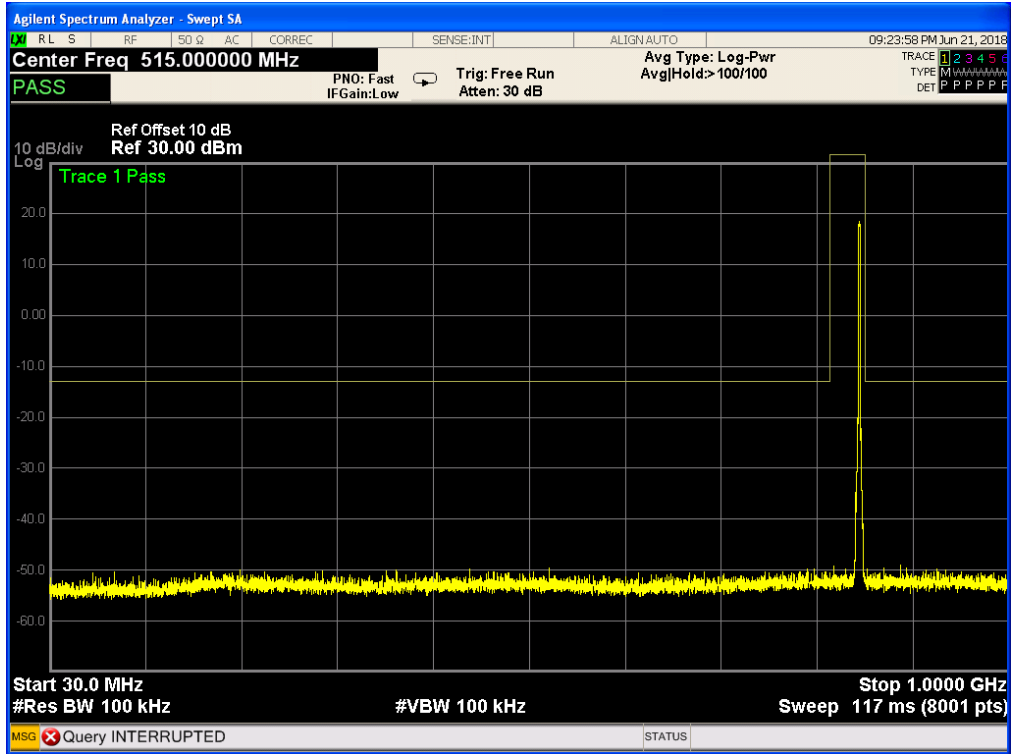


Band 5, UL Channel 20407, UL Frequency 824.7, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM

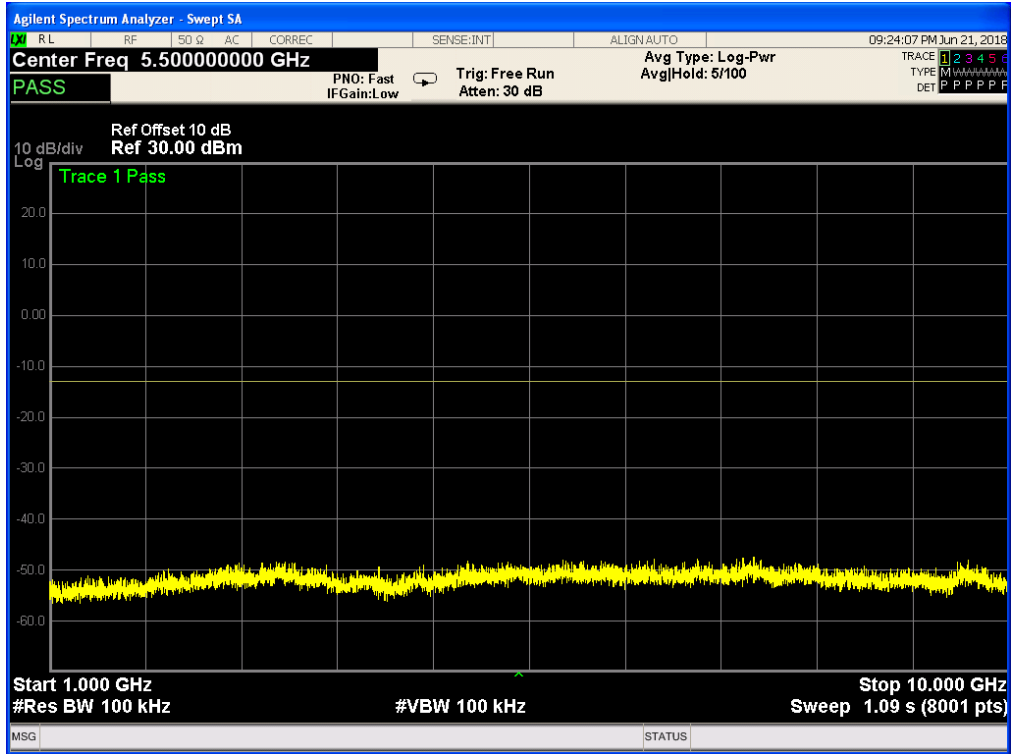




Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, QPSK

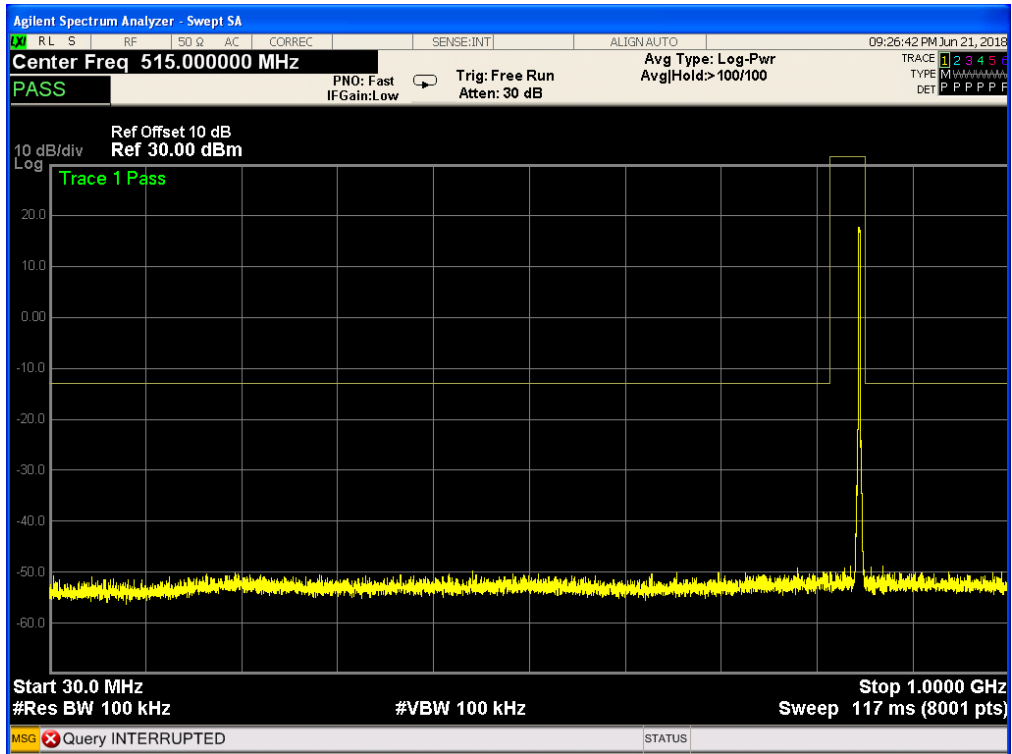


Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, QPSK

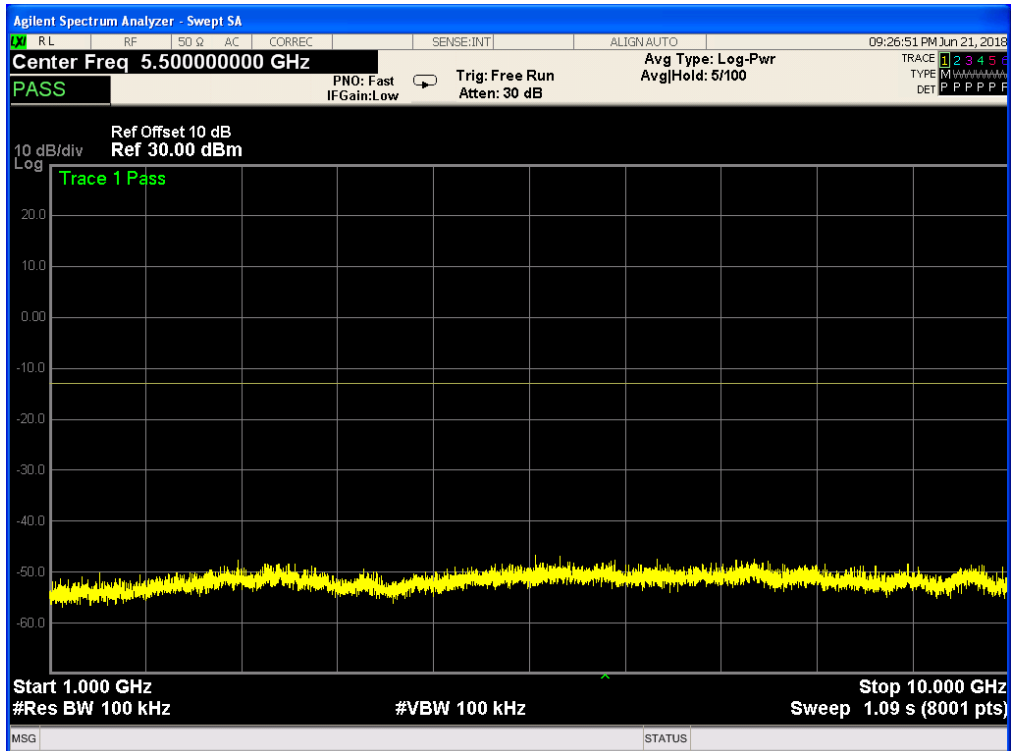




Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM

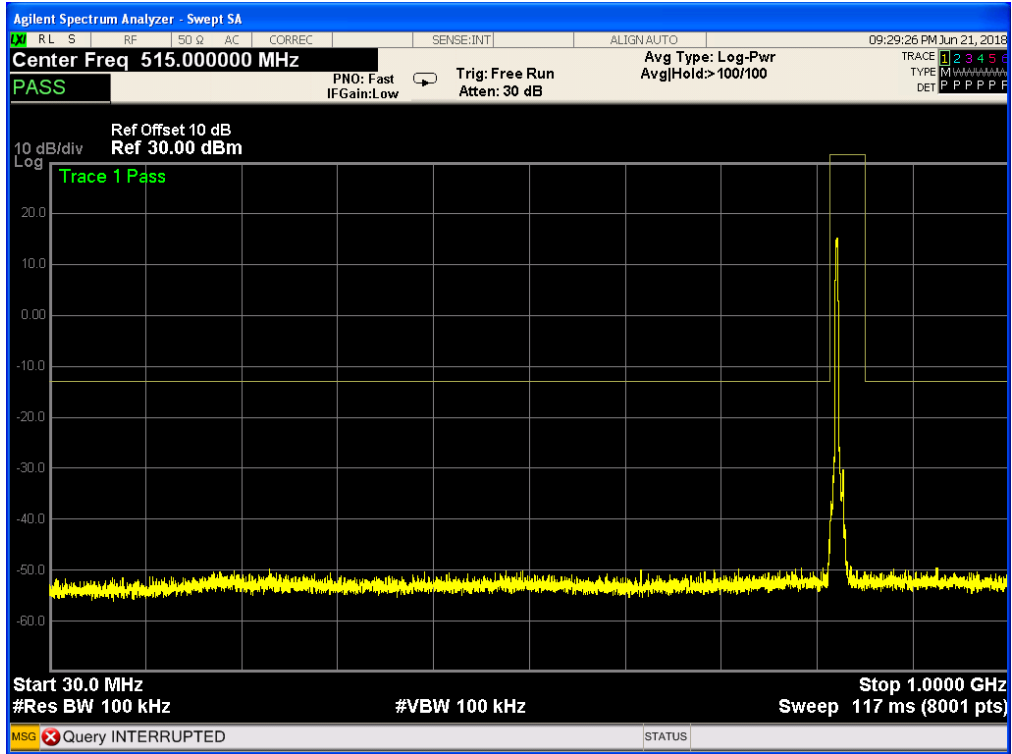


Band 5, UL Channel 20643, UL Frequency 848.3, BW 1.4, NO. RB 6, RB POS. Low, 16-QAM

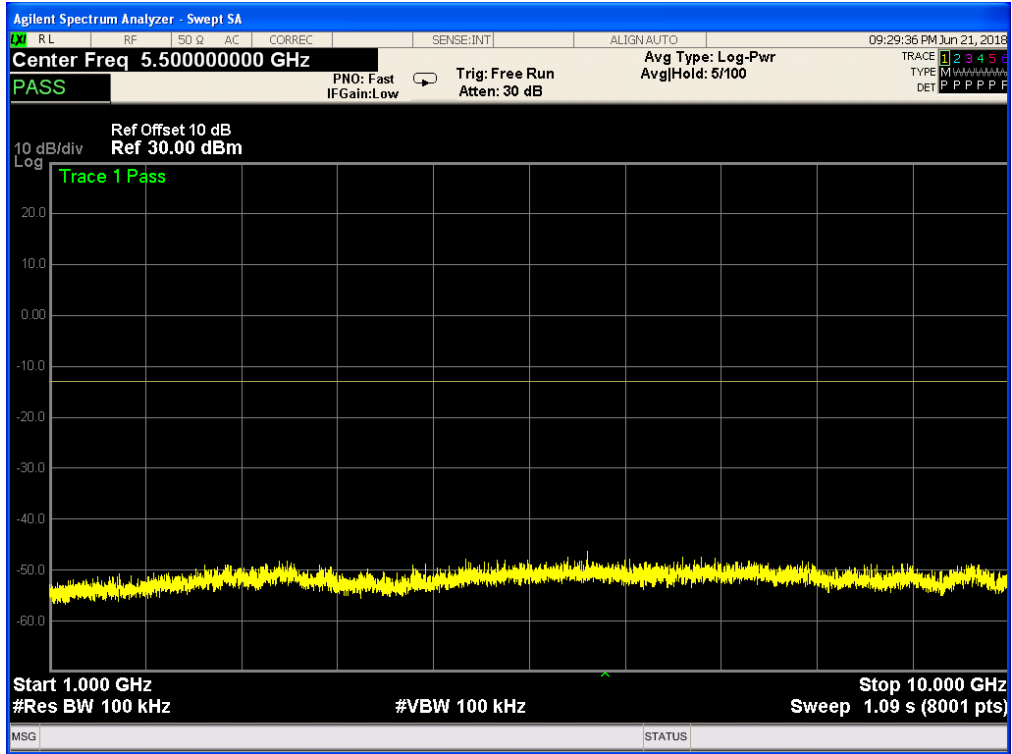




Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

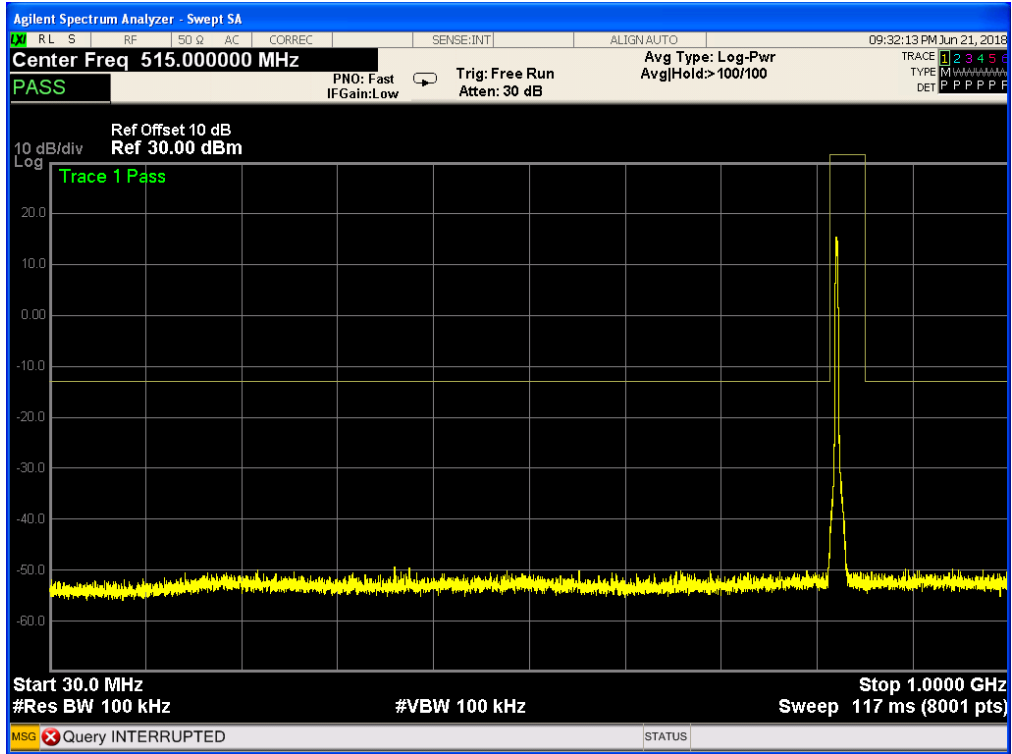


Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

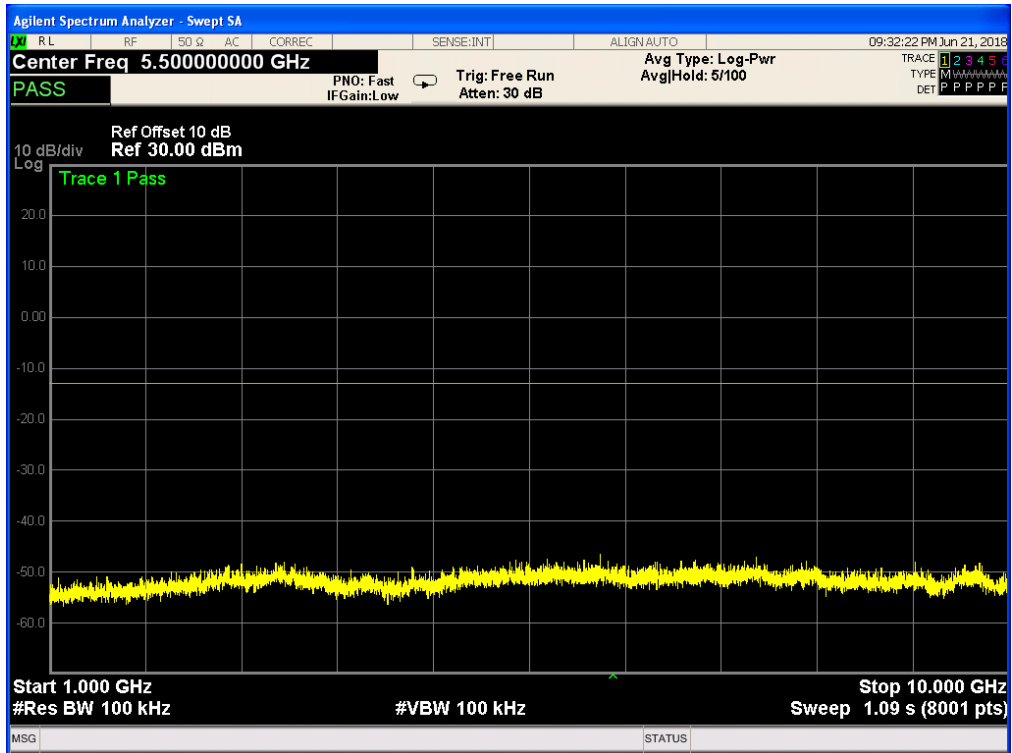




Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

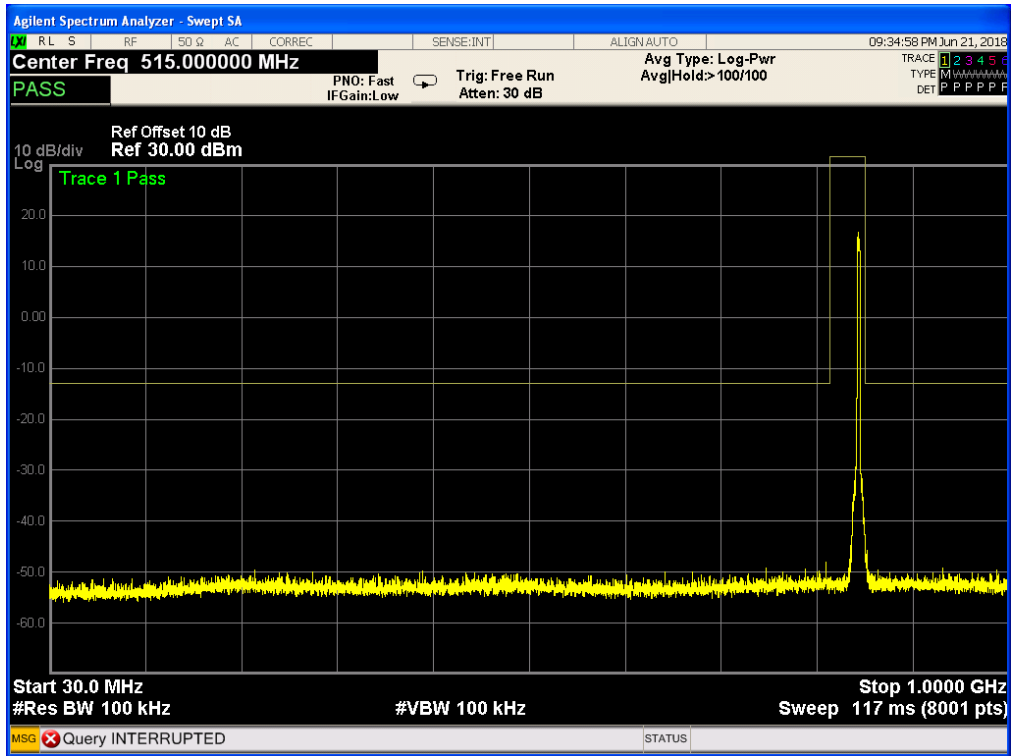


Band 5, UL Channel 20415, UL Frequency 825.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

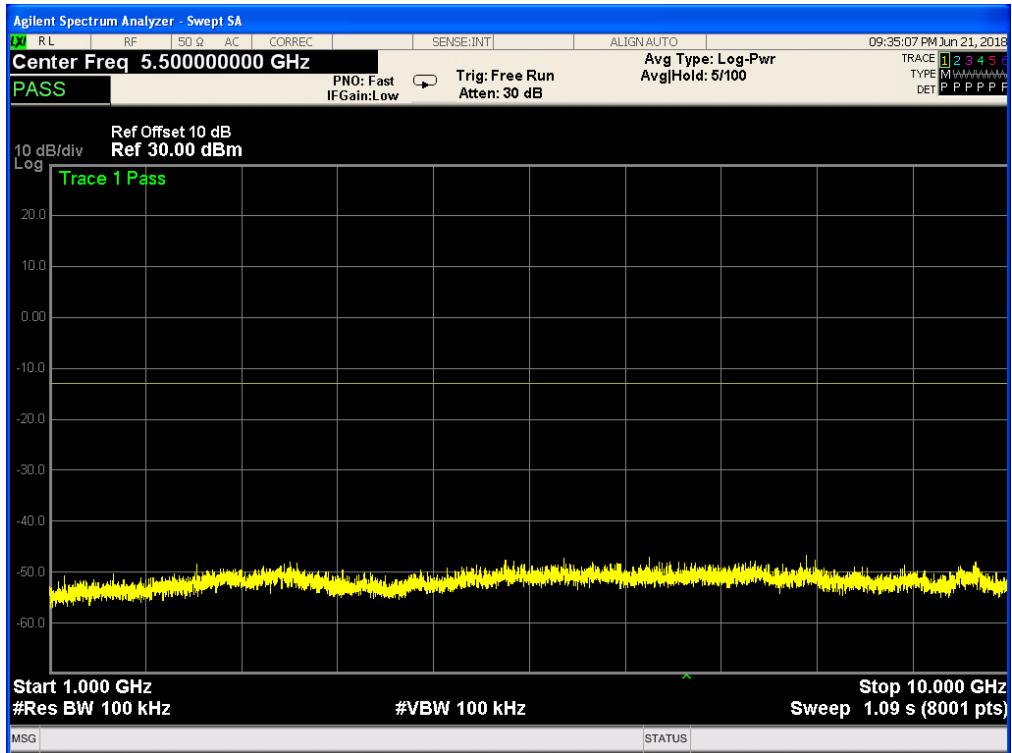




Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

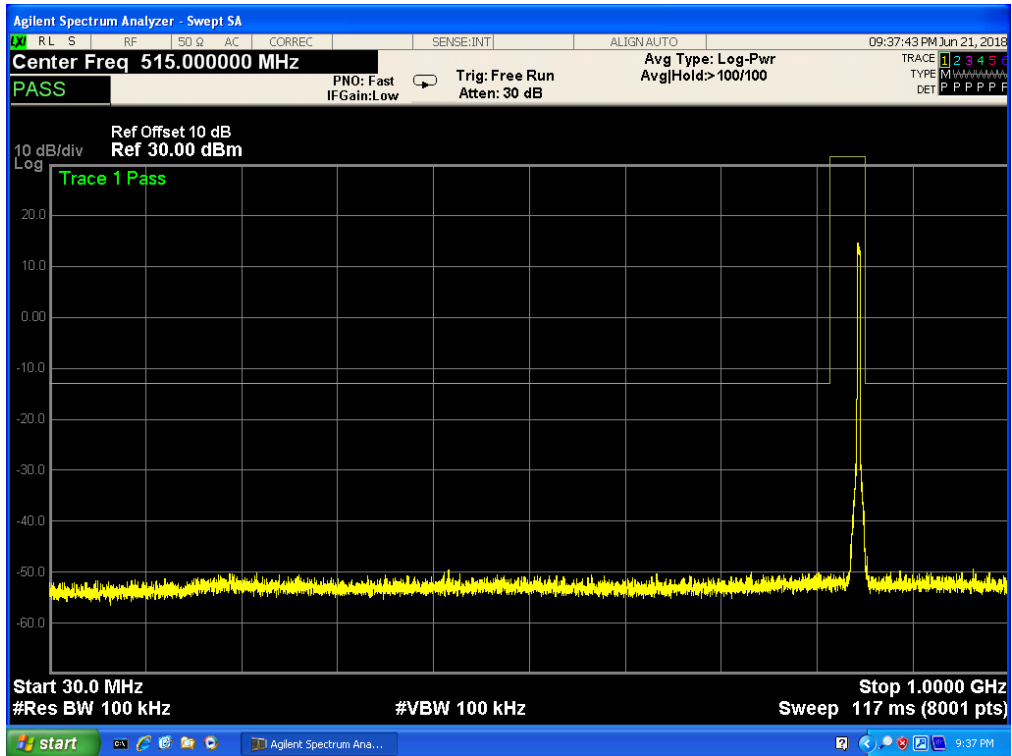


Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, QPSK

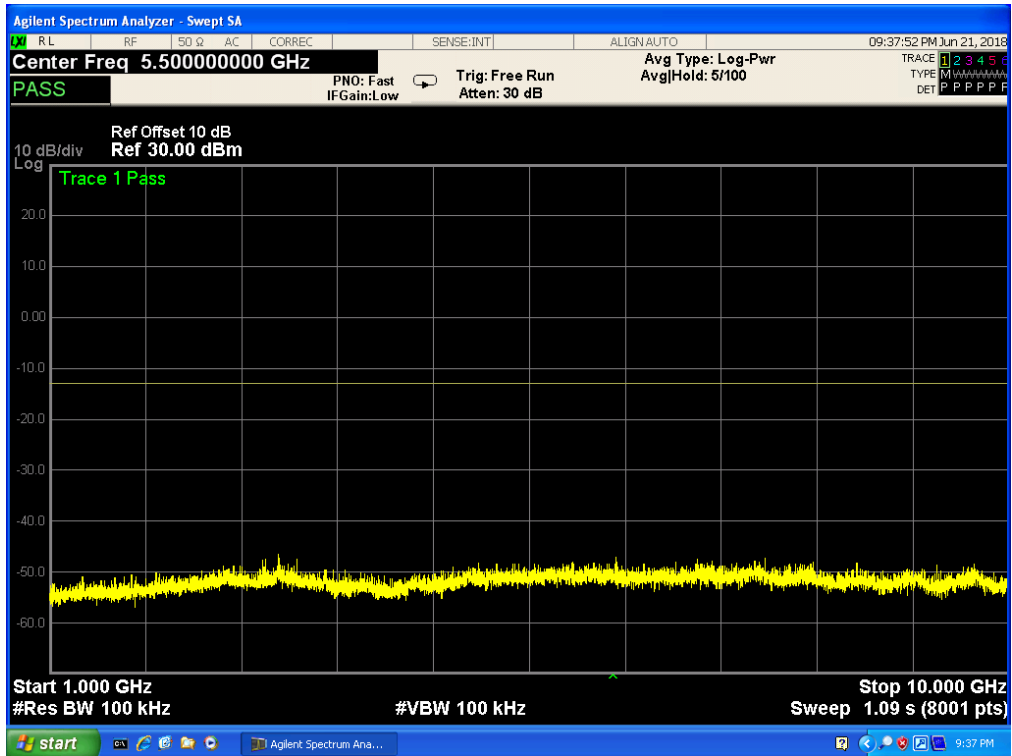




Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

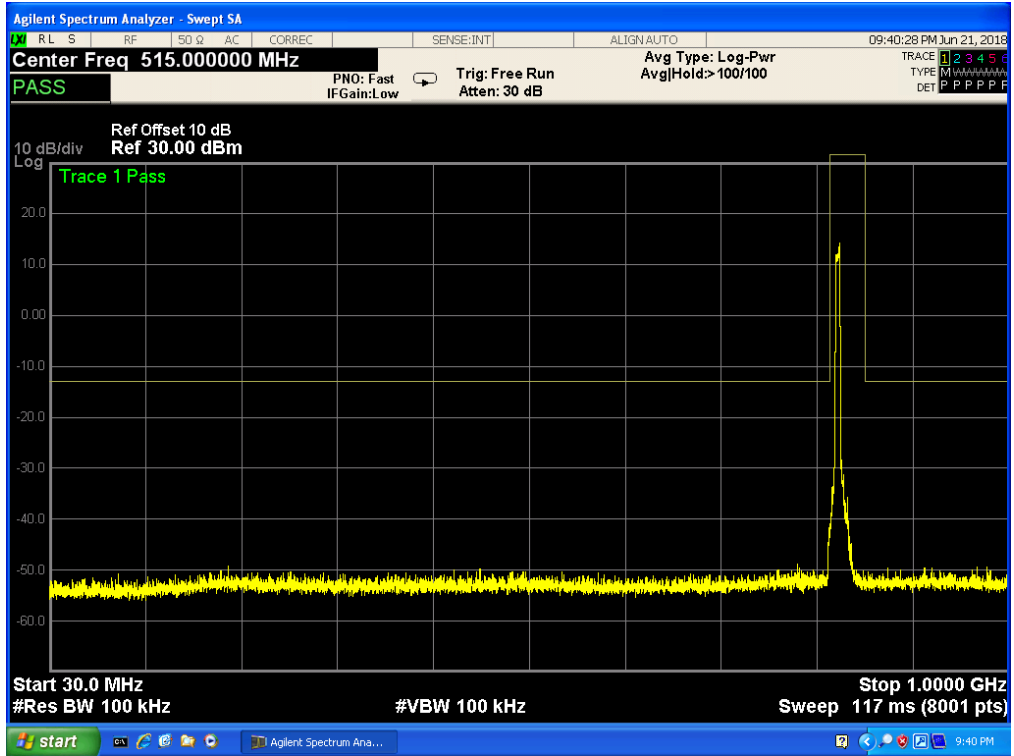


Band 5, UL Channel 20635, UL Frequency 847.5, BW 3.0, NO. RB 15, RB POS. Low, 16-QAM

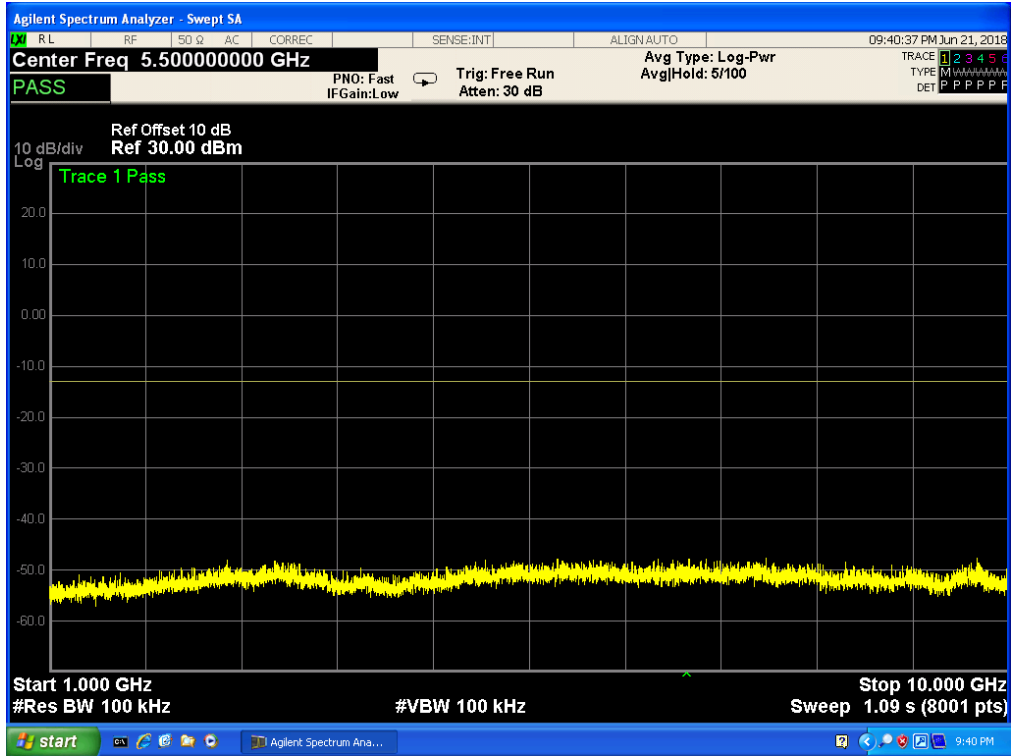




Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK



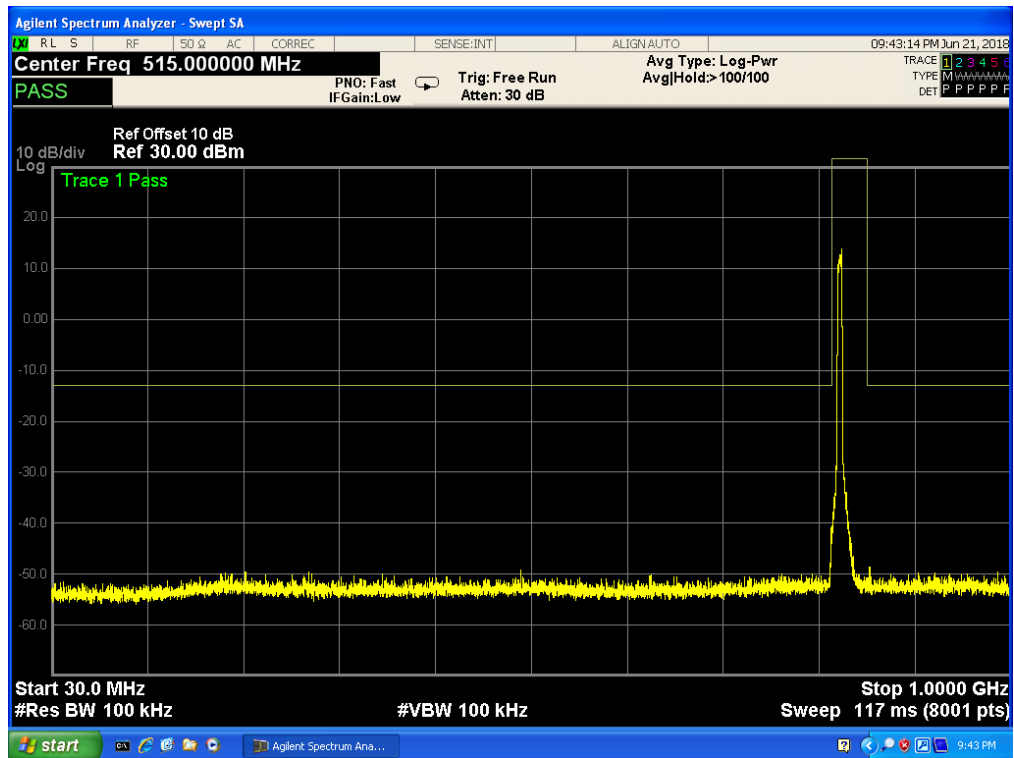
Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK



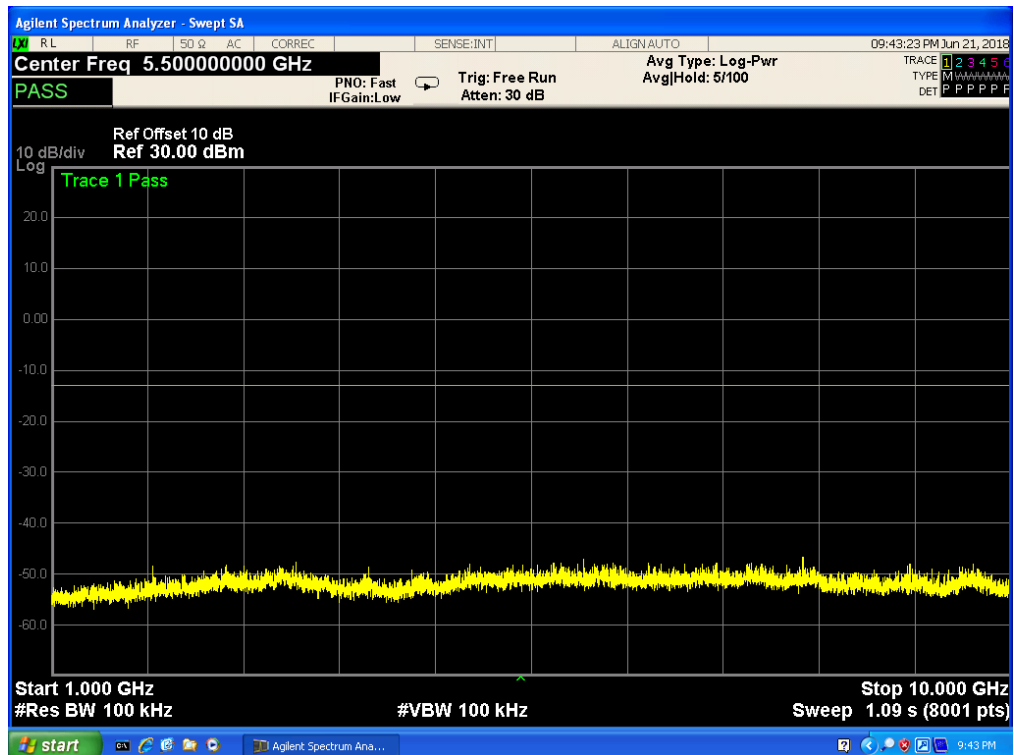




Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM

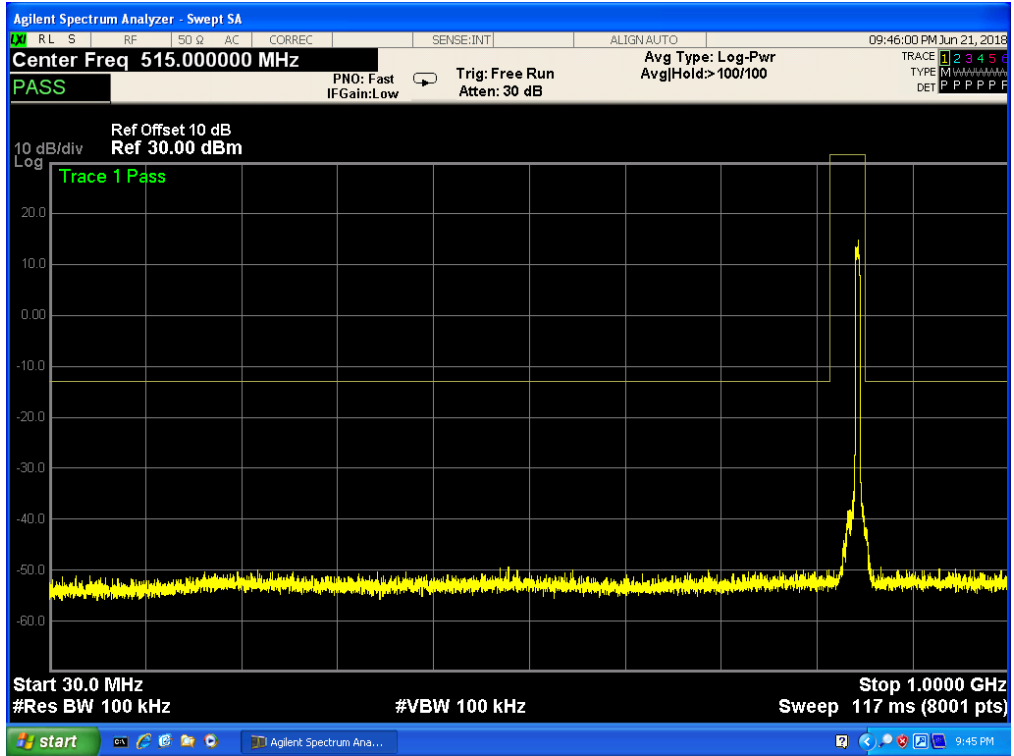


Band 5, UL Channel 20425, UL Frequency 826.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM

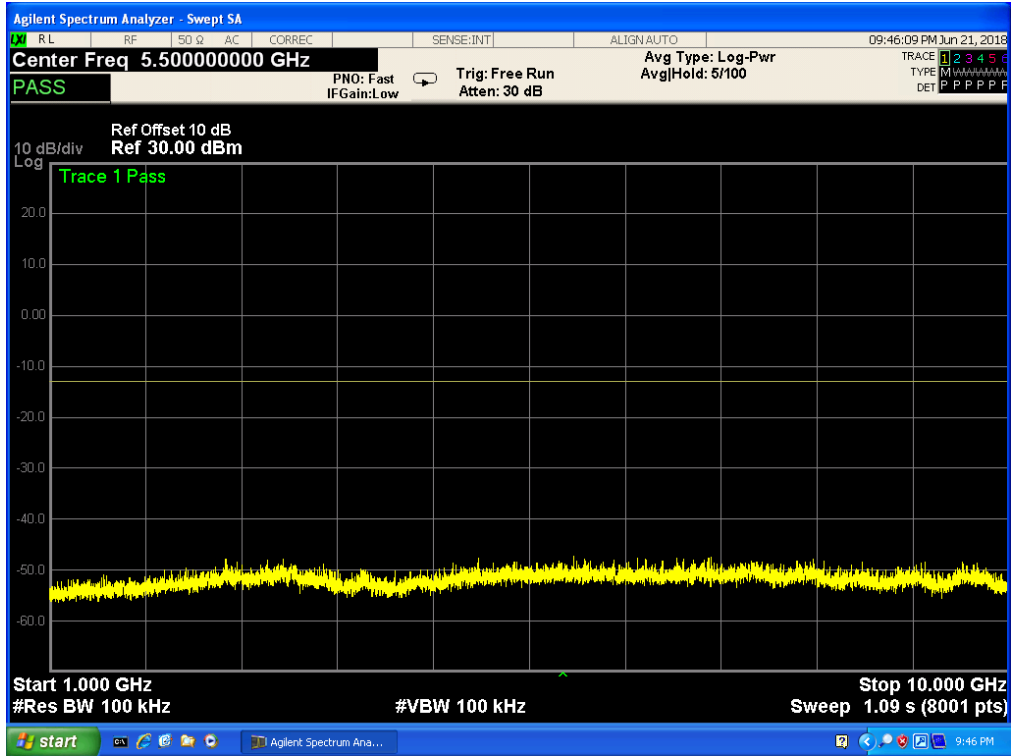




Band 5, UL Channel 20625, UL Frequency 846.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK

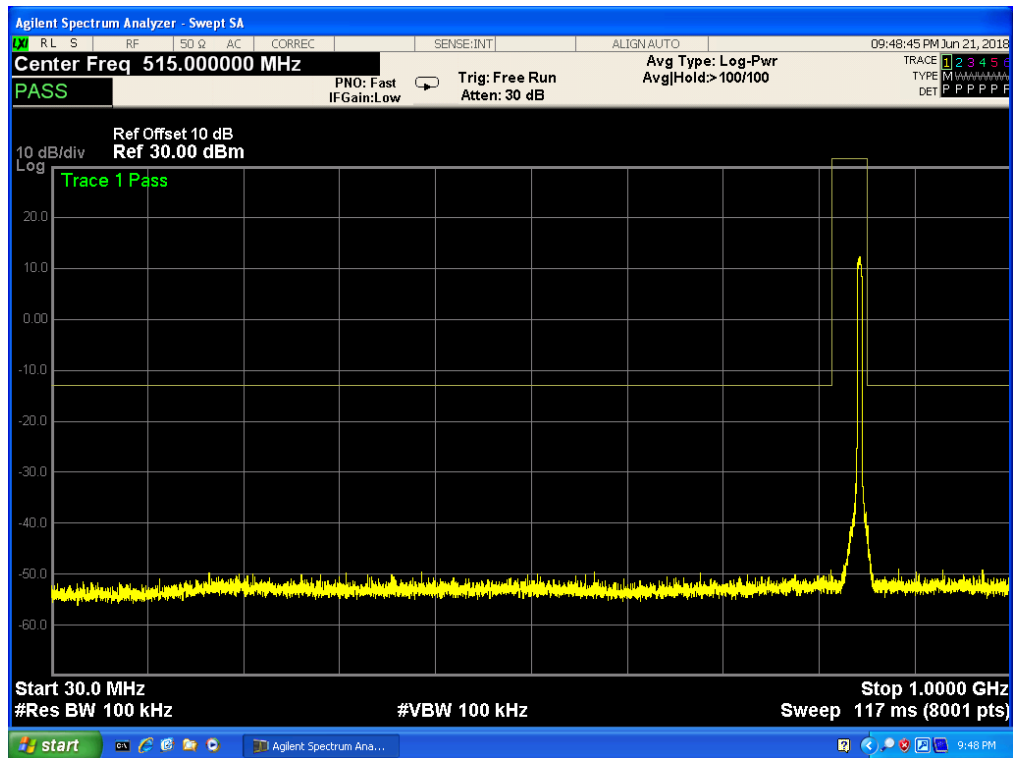


Band 5, UL Channel 20625, UL Frequency 846.5, BW 5.0, NO. RB 25, RB POS. Low, QPSK

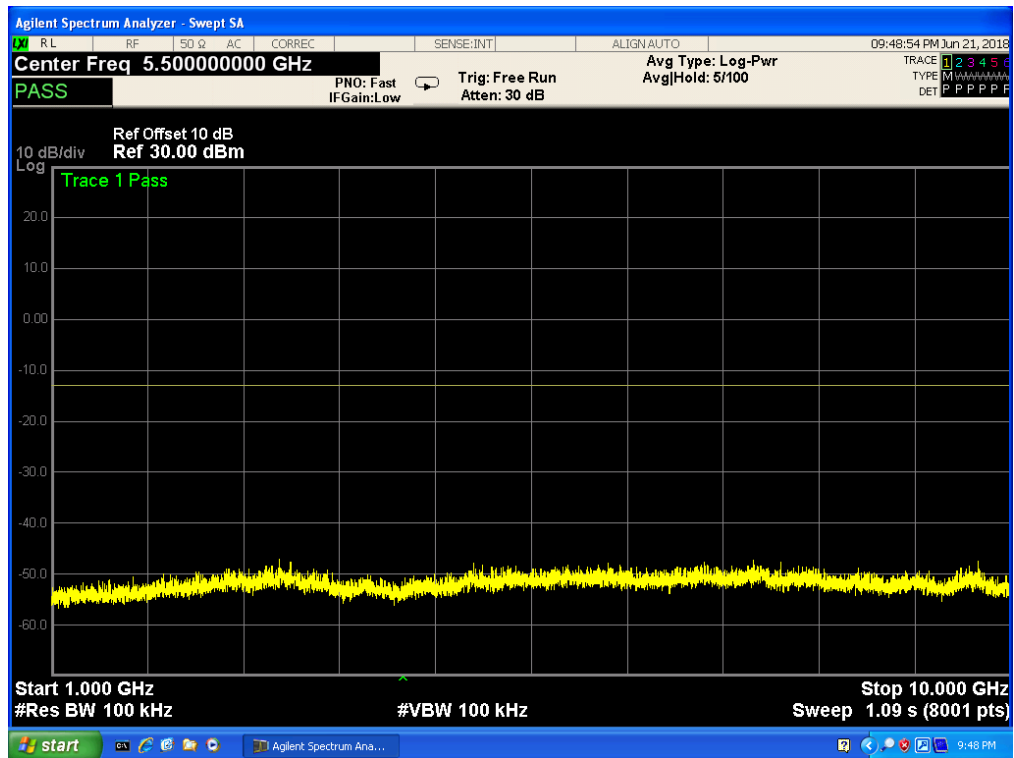




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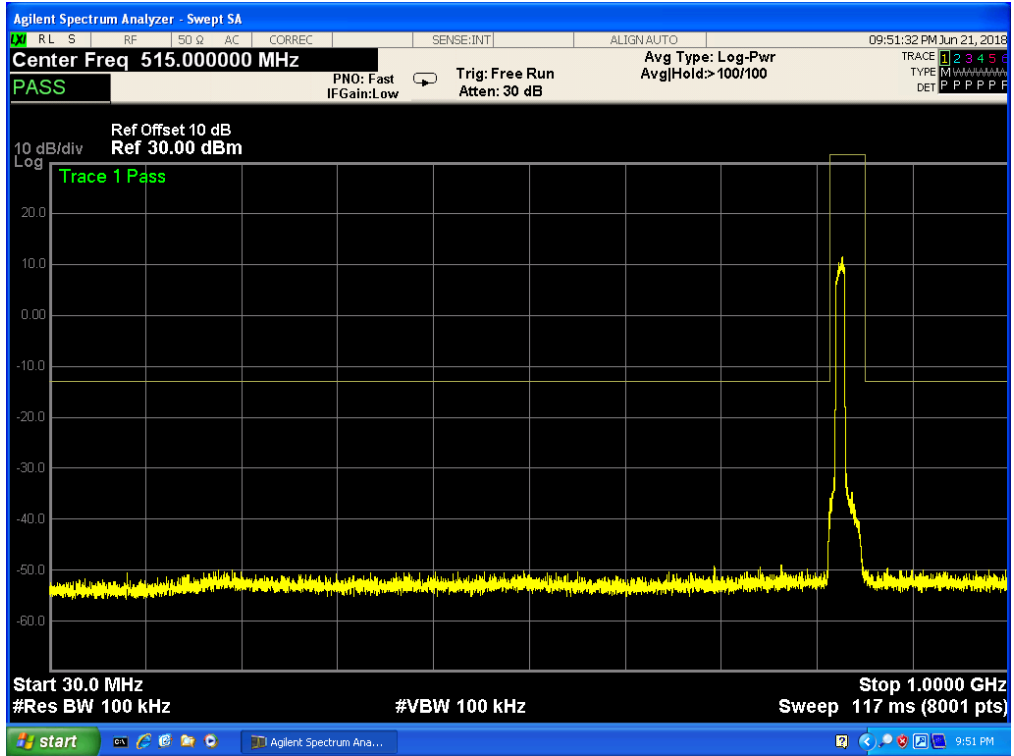


Band 5, UL Channel 20625, UL Frequency 846.5, BW 5.0, NO. RB 25, RB POS. Low, 16-QAM

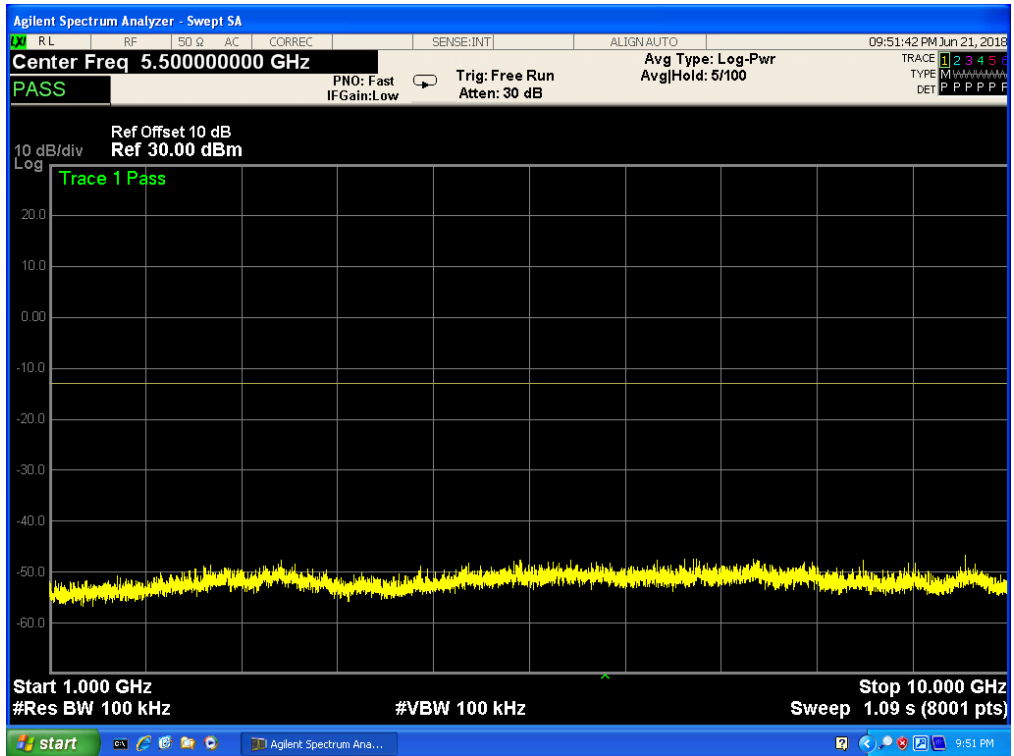




Band 5, UL Channel 20450, UL Frequency 829.0, BW 10.0, NO. RB 50, RB POS. Low, QPSK

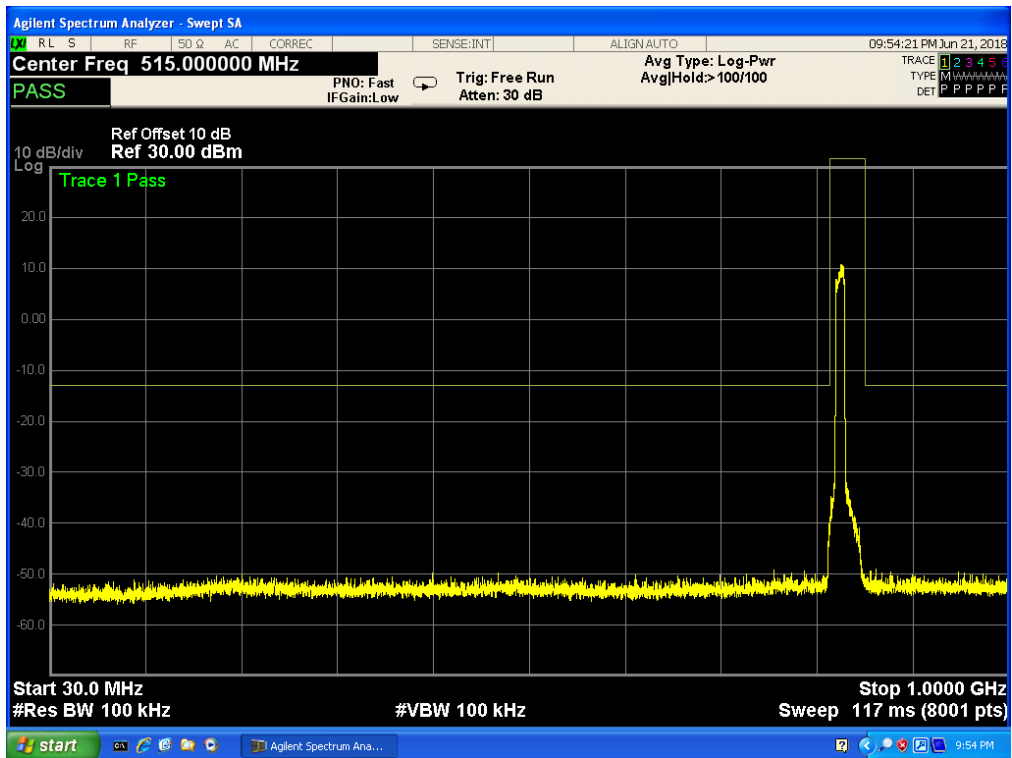


Band 5, UL Channel 20450, UL Frequency 829.0, BW 10.0, NO. RB 50, RB POS. Low, QPSK

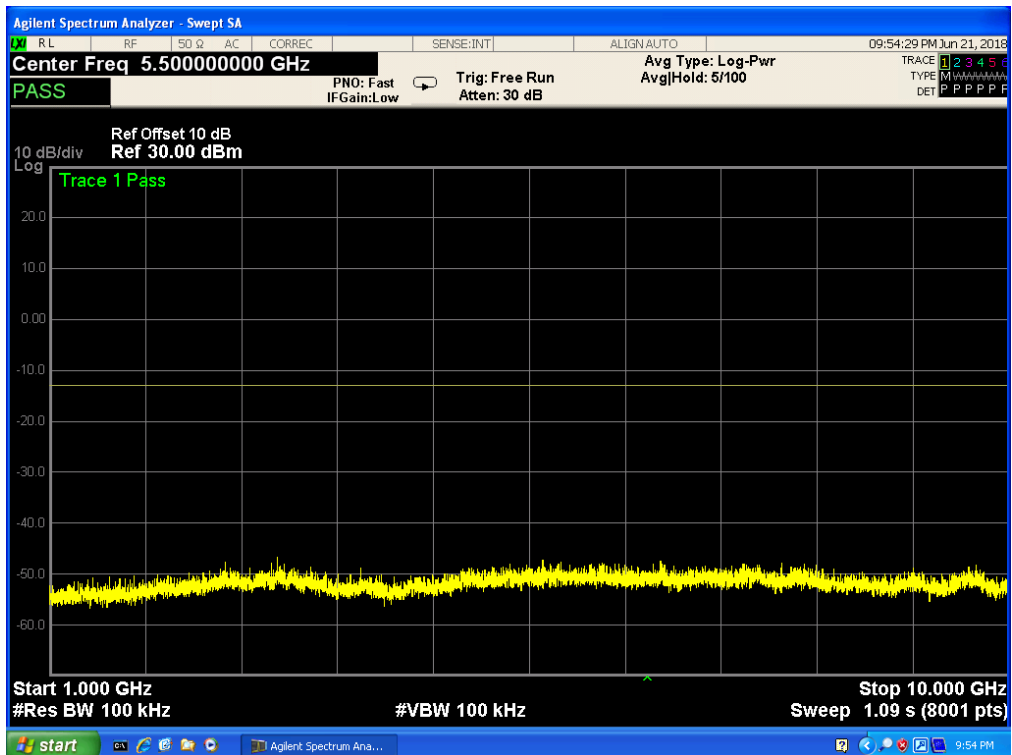




Band 5, UL Channel 20450, UL Frequency 829.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM

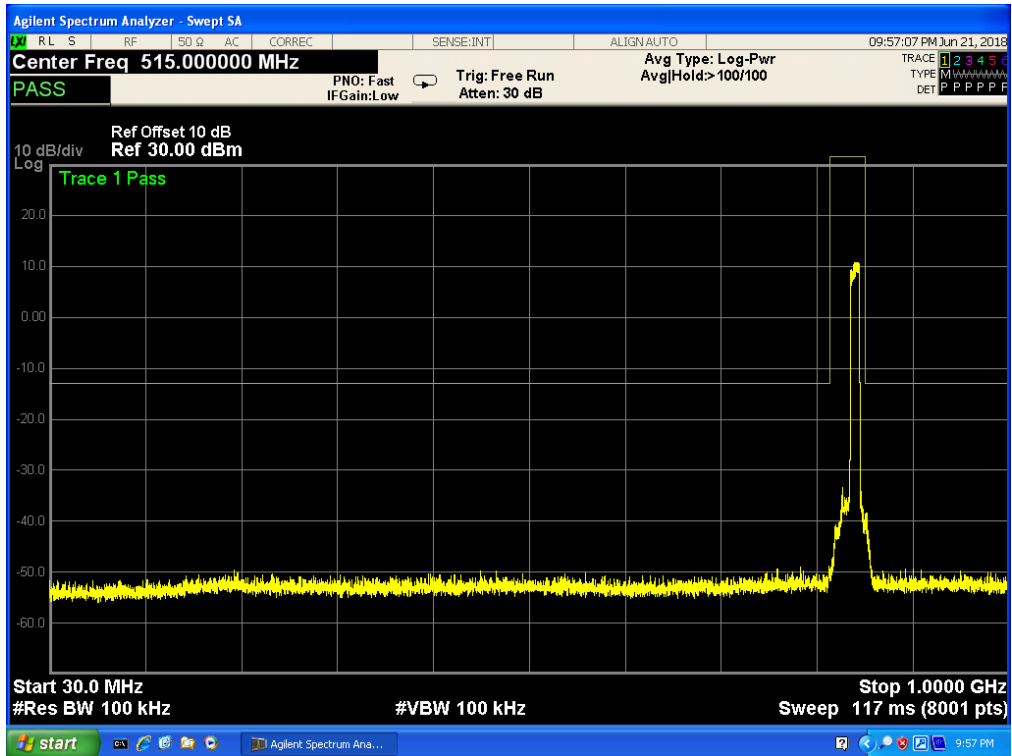


Band 5, UL Channel 20450, UL Frequency 829.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM

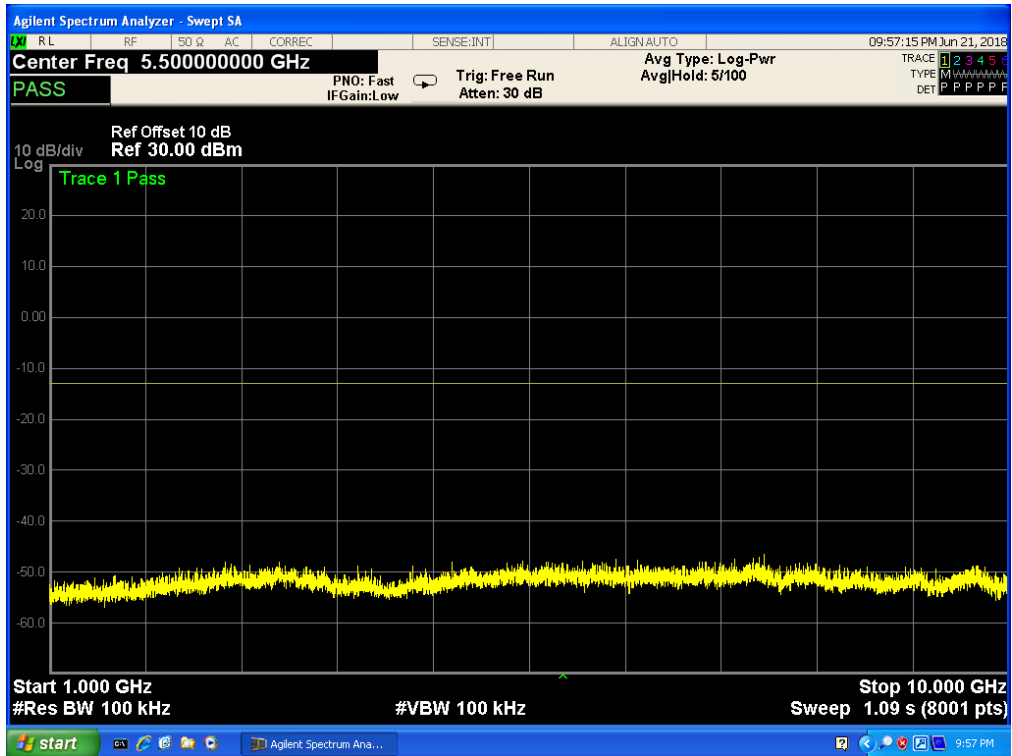




Band 5,UL Channel 20600,UL Frequency 844.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK

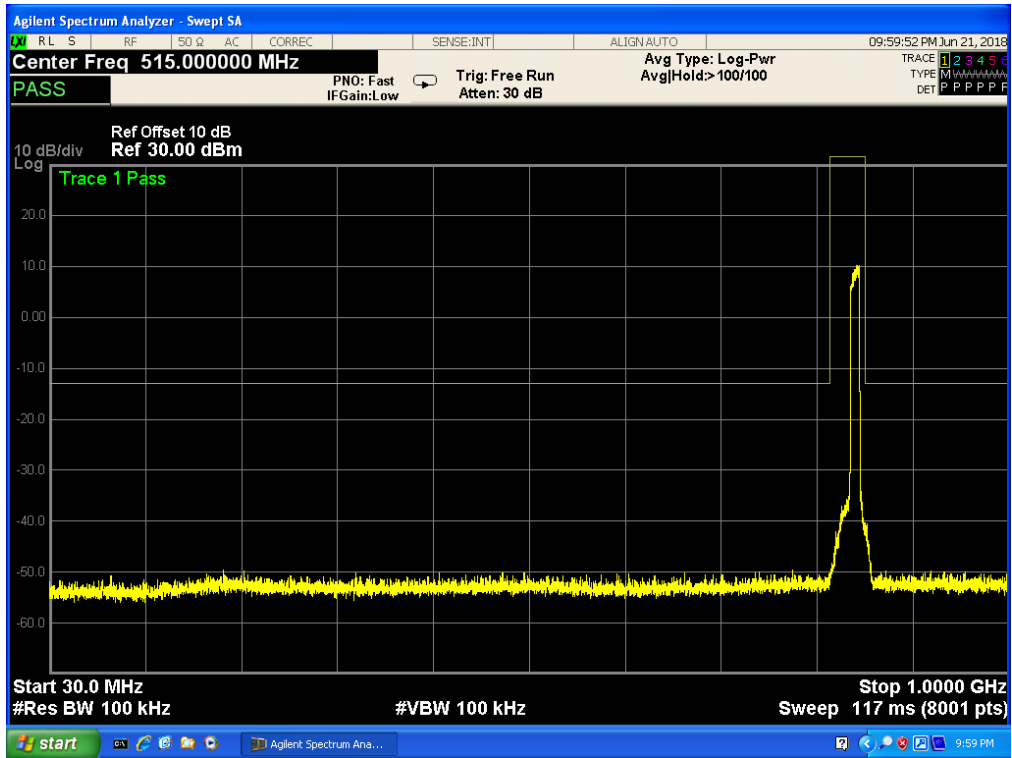


Band 5,UL Channel 20600,UL Frequency 844.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK

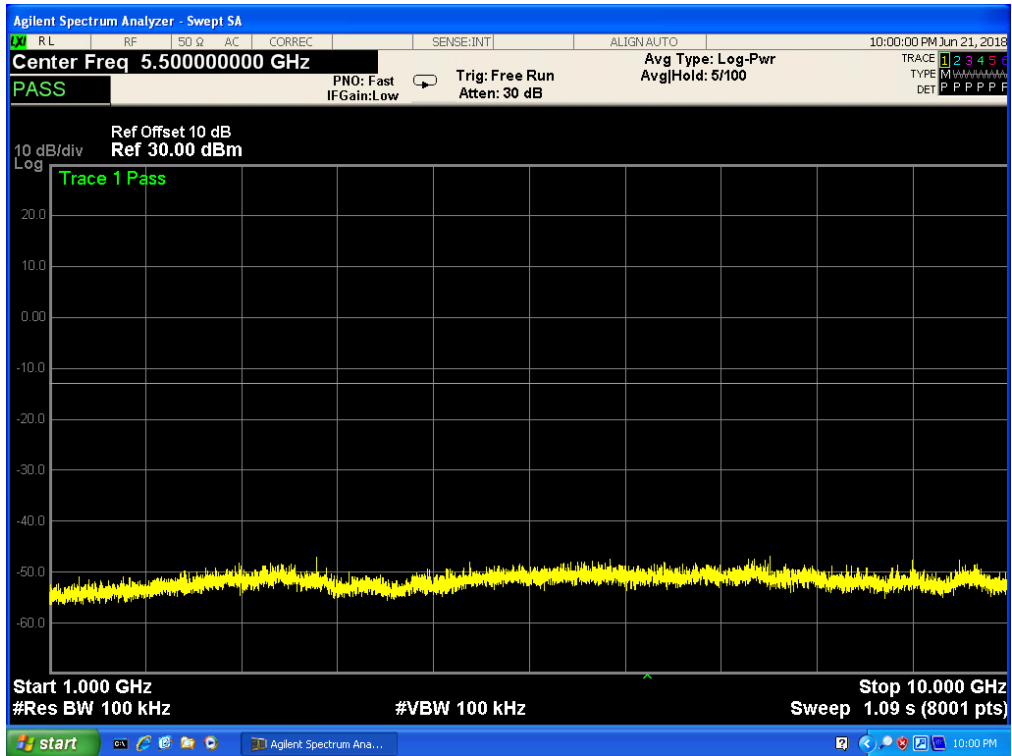




Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM



Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM





## 8. Radiated Spurious Emission

### 8.1. RADIATED POWER (ERP & EIRP)

#### **RULE PART(S)**

FCC: §2.1046, §22.913, §24.232 and §27.50

#### **LIMITS:**

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.

27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

#### **TEST PROCEDURE**

ANSI/TIA-603-E Clause 2.2.17

KDB 971168 v02r01 RF power output using broadband peak and average power meter method.

KDB 971168 D01 Power Meas License Digital Systems v02r01, “Measurement Guidance for Certification of Licensed Digital Transmitters”

#### **MODES TESTED**

- LTE Band 5

#### **RESULTS**



## 8.2 LTE BAND 5

Radiated Power (ERP) for Band 5											
Mode	RB/ RB SIZE	Frequ ncy	Result							Polarizati on Of Max. ERP	Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. ERP Averag e (dBm)	Max. ERP Averag e (mW)			
1.4MHz Band QPSK	6/0	824.7	5.09	2.01	19.68	2.15	20.61	115.080	Horizontal	Pass	
		836.5	4.53	2.01	19.77	2.15	20.14	103.276	Horizontal	Pass	
		848.3	4.33	2.02	19.82	2.15	19.98	99.541	Horizontal	Pass	
1.4MHz Band 16 QAM	6/0	824.7	6.32	2.01	19.68	2.15	21.84	152.757	Horizontal	Pass	
		836.5	4.95	2.01	19.77	2.15	20.56	113.763	Horizontal	Pass	
		848.3	4.72	2.02	19.82	2.15	20.37	108.893	Horizontal	Pass	
3.0MHz Band QPSK	15/0	825.5	4.55	2.01	19.7	2.15	20.09	102.094	Horizontal	Pass	
		836.5	6.02	2.01	19.77	2.15	21.63	145.546	Horizontal	Pass	
		847.5	4.91	2.02	19.81	2.15	20.55	113.501	Horizontal	Pass	
3.0MHz Band 16 QAM	15/0	825.5	5.15	2.01	19.7	2.15	20.69	117.220	Horizontal	Pass	
		836.5	4.36	2.01	19.77	2.15	19.97	99.312	Horizontal	Pass	
		847.5	4.22	2.02	19.81	2.15	19.86	96.828	Horizontal	Pass	
5.0MHz Band QPSK	25/0	826.5	4.79	2.01	19.71	2.15	20.34	108.143	Horizontal	Pass	
		836.5	5.43	2.01	19.77	2.15	21.04	127.057	Horizontal	Pass	
		846.5	5.45	2.02	19.79	2.15	21.07	127.938	Horizontal	Pass	
5.0MHz Band 16 QAM	25/0	826.5	5.56	2.01	19.71	2.15	21.11	129.122	Horizontal	Pass	
		836.5	5.04	2.01	19.77	2.15	20.65	116.145	Horizontal	Pass	
		846.5	5.23	2.02	19.79	2.15	20.85	121.619	Horizontal	Pass	
10.0MH z Band QPSK	50/0	829	4.96	2.01	19.73	2.15	20.53	112.980	Horizontal	Pass	
		836.5	4.54	2.01	19.77	2.15	20.15	103.514	Horizontal	Pass	
		844	5.24	2.02	19.78	2.15	20.85	121.619	Horizontal	Pass	
10.0MH z Band 16 QAM	50/0	829	4.77	2.01	19.73	2.15	20.34	108.143	Horizontal	Pass	
		836.5	4.50	2.01	19.77	2.15	20.11	102.565	Horizontal	Pass	
		844	5.03	2.02	19.78	2.15	20.64	115.878	Horizontal	Pass	

Note:

SG Level= Signal generator output;

$$\text{Max. EIRP Average (dBm)} = \text{Antenna Gain(dB)} + \text{SG Level (dBm)} - \text{Cable Loss(dBm)};$$

$$\text{ERP} = \text{EIRP} - 2.15.$$

Radiated Power (ERP) for Band 5										
Mode	RB/ RB SIZE	Freque ncy	Result							Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. ERP Averag e (dBm)	Max. ERP Averag e (mW)	Polarizati on Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	4.46	2.01	19.68	2.15	19.98	99.541	Vertical	Pass
		836.5	4.80	2.01	19.77	2.15	20.41	109.901	Vertical	Pass
		848.3	4.66	2.02	19.82	2.15	20.31	107.399	Vertical	Pass
1.4MHz Band 16 QAM	6/0	824.7	4.74	2.01	19.68	2.15	20.26	106.170	Vertical	Pass
		836.5	4.54	2.01	19.77	2.15	20.15	103.514	Vertical	Pass
		848.3	4.46	2.02	19.82	2.15	20.11	102.565	Vertical	Pass
3.0MHz Band QPSK	15/0	825.5	4.80	2.01	19.7	2.15	20.34	108.143	Vertical	Pass
		836.5	4.64	2.01	19.77	2.15	20.25	105.925	Vertical	Pass
		847.5	4.54	2.02	19.81	2.15	20.18	104.232	Vertical	Pass
3.0MHz Band 16 QAM	15/0	825.5	4.59	2.01	19.7	2.15	20.13	103.039	Vertical	Pass
		836.5	5.03	2.01	19.77	2.15	20.64	115.878	Vertical	Pass
		847.5	5.10	2.02	19.81	2.15	20.74	118.577	Vertical	Pass
5.0MHz Band QPSK	25/0	826.5	5.14	2.01	19.71	2.15	20.69	117.220	Vertical	Pass
		836.5	4.93	2.01	19.77	2.15	20.54	113.240	Vertical	Pass
		846.5	4.79	2.02	19.79	2.15	20.41	109.901	Vertical	Pass
5.0MHz Band 16 QAM	25/0	826.5	4.89	2.01	19.71	2.15	20.44	110.662	Vertical	Pass
		836.5	4.82	2.01	19.77	2.15	20.43	110.408	Vertical	Pass
		846.5	5.35	2.02	19.79	2.15	20.97	125.026	Vertical	Pass
10.0MH z Band QPSK	50/0	829	5.54	2.01	19.73	2.15	21.11	129.122	Vertical	Pass
		836.5	5.44	2.01	19.77	2.15	21.05	127.350	Vertical	Pass
		844	5.42	2.02	19.78	2.15	21.03	126.765	Vertical	Pass
10.0MH z Band 16 QAM	50/0	829	5.19	2.01	19.73	2.15	20.76	119.124	Vertical	Pass
		836.5	5.12	2.01	19.77	2.15	20.73	118.304	Vertical	Pass
		844	4.85	2.02	19.78	2.15	20.46	111.173	Vertical	Pass

**Note:**

SG Level= Signal generator output

$$\text{Max. EIRP Average (dBm)} = \text{Antenna Gain(dB)} + \text{SG Level (dBm)} - \text{Cable Loss(dBm)}$$

$$\text{ERP} = \text{EIRP} - 2.15.$$



## 9. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238 and §27.53

### LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

§27.53 (g) For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB.

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

### TEST PROCEDURE

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

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

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.



The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:

- a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than  $43 + 10 \text{ Log}_{10} (p)$ , dB; and
- b. for mobile subscriber equipment, the attenuation shall not be less than  $43 + 10 \text{ Log}_{10} (p)$ , dB at the channel edges and  $55 + 10 \text{ Log}_{10} (p)$  at 5.5 MHz away and beyond the channel edges where p in (a) and (b) is the transmitter power measured in watts.

**MODES TESTED**

- LTE Band 5

**RESULTS**

PASS



## 9.1 LTE BAND 5

**QPSK EIRP POWER FOR LTE BAND 5 (1.4MHZ BANDWIDTH)**

<b>Test Results for Low Channel 824.7MHz</b>							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1649.4	-53.29	2.78	27.5	-28.57	-13	-15.57	Horizontal
1649.4	-54.41	2.78	27.5	-29.69	-13	-16.69	Vertical
2474.1	-51.98	2.90	27.8	-27.08	-13	-14.08	Vertical
2474.1	-50.98	2.90	27.8	-26.08	-13	-13.08	Horizontal
<b>Test Results For Mid Channel 836.5MHz</b>							
1673	-55.47	2.80	27.48	-30.79	-13	-17.79	Horizontal
1673	-50.69	2.80	27.48	-26.01	-13	-13.01	Vertical
2509.5	-53.62	2.91	27.70	-28.83	-13	-15.83	Vertical
2509.5	-54.55	2.91	27.70	-29.76	-13	-16.76	Horizontal
<b>Test Results for High Channel 848.3MHz</b>							
1696.6	-54.41	2.82	27.43	-29.80	-13	-16.80	Horizontal
1696.6	-53.29	2.82	27.43	-28.68	-13	-15.68	Vertical
2544.9	-53.97	2.92	27.74	-29.15	-13	-16.15	Vertical
2544.9	-56.64	2.92	27.74	-31.82	-13	-18.82	Horizontal

**QPSK EIRP POWER FOR LTE BAND 5 (10MHZ BANDWIDTH)**

<b>Test Results for Low Channel 824.7MHz</b>							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1658	-56.57	2.78	27.5	-31.85	-13	-18.85	Horizontal
1658	-54.41	2.78	27.5	-29.69	-13	-16.69	Vertical
2487	-53.62	2.90	27.8	-28.72	-13	-15.72	Vertical
2487	-59.98	2.90	27.8	-35.08	-13	-22.08	Horizontal
<b>Test Results For Mid Channel 836.5MHz</b>							
1673	-54.18	2.80	27.48	-29.50	-13	-16.50	Horizontal
1673	-57.81	2.80	27.48	-33.13	-13	-20.13	Vertical
2509.5	-56.23	2.91	27.70	-31.44	-13	-18.44	Vertical
2509.5	-53.15	2.91	27.70	-28.36	-13	-15.36	Horizontal
<b>Test Results for High Channel 848.3MHz</b>							
1688	-55.69	2.82	27.43	-31.08	-13	-18.08	Horizontal
1688	-50.42	2.82	27.43	-25.81	-13	-12.81	Vertical
2532	-53.92	2.92	27.74	-29.10	-13	-16.10	Vertical
2532	-54.18	2.92	27.74	-29.36	-13	-16.36	Horizontal

**Note:**  $P_{Mea}(dBm) = Power(dBm) + ARpl (dBm)$

Over Limit =  $P_{Mea}(dBm) - Limit(dBm)$

We test both QPSK and 16QAM mode, but the QPSK mode is the worst mode, just reported the worst case.



## 10. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54

### LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
- Voltage = low voltage, DC 3.66V, Normal, DC 3.85V and High voltage, DC 4.43V.

### Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to  $-30^{\circ}\text{C}$  and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until  $+50^{\circ}\text{C}$  is reached.

### Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

### MODES TESTED

- LTE Band 5

## RESULTS

See the following pages.



## 10.1 LTE BAND 5

QPSK, (10MHz BANDWIDTH)

## Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
<b>BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)</b>				
3.4	836.5	-3.7	-0.004423	2.5
3.8	836.5	-6.6	-0.007890	2.5
4.4	836.5	-8.4	-0.010042	2.5

## Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
<b>BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)</b>				
Normal (25C)	836.5	-4.1	-0.004901	2.5
Extreme (50C)	836.5	5.0	0.005977	2.5
Extreme (40C)	836.5	2.0	0.002391	2.5
Extreme (30C)	836.5	3.8	0.004543	2.5
Extreme (10C)	836.5	-3.9	-0.004662	2.5
Extreme (0C)	836.5	-4.7	-0.005619	2.5
Extreme (-10C)	836.5	-7.8	-0.009325	2.5
Extreme (-20C)	836.5	-10.5	-0.012552	2.5
Extreme (-30C)	836.5	-6.4	-0.007651	2.5

16QAM, (10MHz BANDWIDTH)

## Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
<b>BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)</b>				
3.4	836.5	-4.4	-0.005260	2.5
3.8	836.5	-5.1	-0.006097	2.5
4.4	836.5	-6.3	-0.007531	2.5



**Frequency error vs. Temperature**

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
<b>BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)</b>				
Normal (25C)	836.5	-5.9	-0.007053	2.5
Extreme (50C)	836.5	-4.1	-0.004901	2.5
Extreme (40C)	836.5	-3.6	-0.004304	2.5
Extreme (30C)	836.5	-3.8	-0.004543	2.5
Extreme (10C)	836.5	-4.2	-0.005021	2.5
Extreme (0C)	836.5	-4.8	-0.005738	2.5
Extreme (-10C)	836.5	-5.2	-0.006216	2.5
Extreme (-20C)	836.5	-5.6	-0.006695	2.5
Extreme (-30C)	836.5	-5.7	-0.006814	2.5

**\*Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

## 11. Peak-to-Average Ratio

### 11.1 Description of the PAR Measurement

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

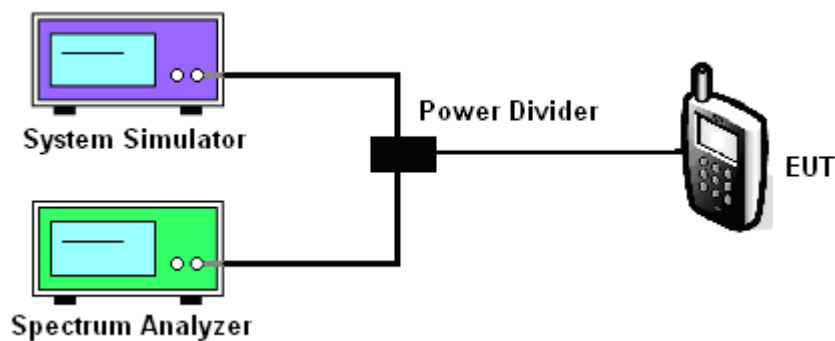
### 11.2 Measuring Instruments

See list of measuring instruments of this test report.

### 11.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. For GSM/EGPRS operating modes:
  - a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
  - b. Set EUT in maximum power output, and triggered the burst signal.
  - c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS operating modes:
  - a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
  - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

### 11.4 Test Setup



#### MODES TESTED

- LTE Band5

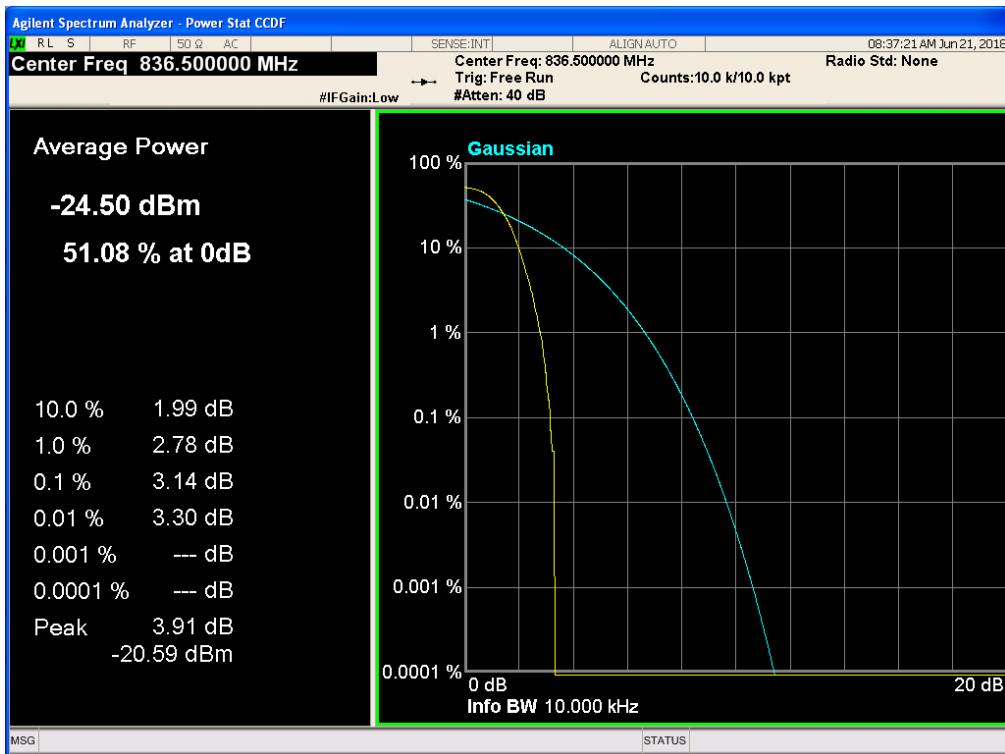


BAND	CHANNEL	Frequency [MHz]	BANDWIDTH	NO. RB	RB POS.	MODULATION	PAR [dB]
5	20525	836.5	1.4	1	Low	QPSK	3.14
5	20525	836.5	1.4	1	Low	16-QAM	1.47
5	20525	836.5	3.0	1	Low	QPSK	1.43
5	20525	836.5	3.0	1	Low	16-QAM	0.94
5	20525	836.5	5.0	1	Low	QPSK	3.85
5	20525	836.5	5.0	1	Low	16-QAM	0.49
5	20525	836.5	10.0	1	Low	QPSK	0.52
5	20525	836.5	10.0	1	Low	16-QAM	0.47

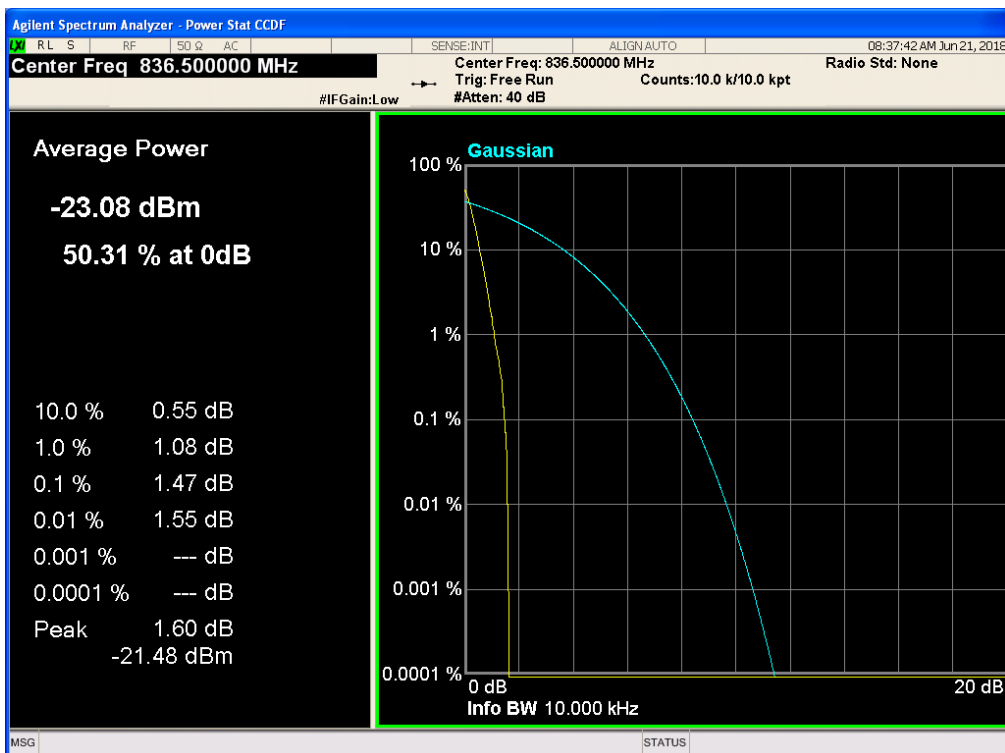


### 11.5 LTE BAND 5

Band 5, UL Channel 20525, UL Frequency 836.5, BW 1.4, NO. RB 1, RB POS. Low, QPSK

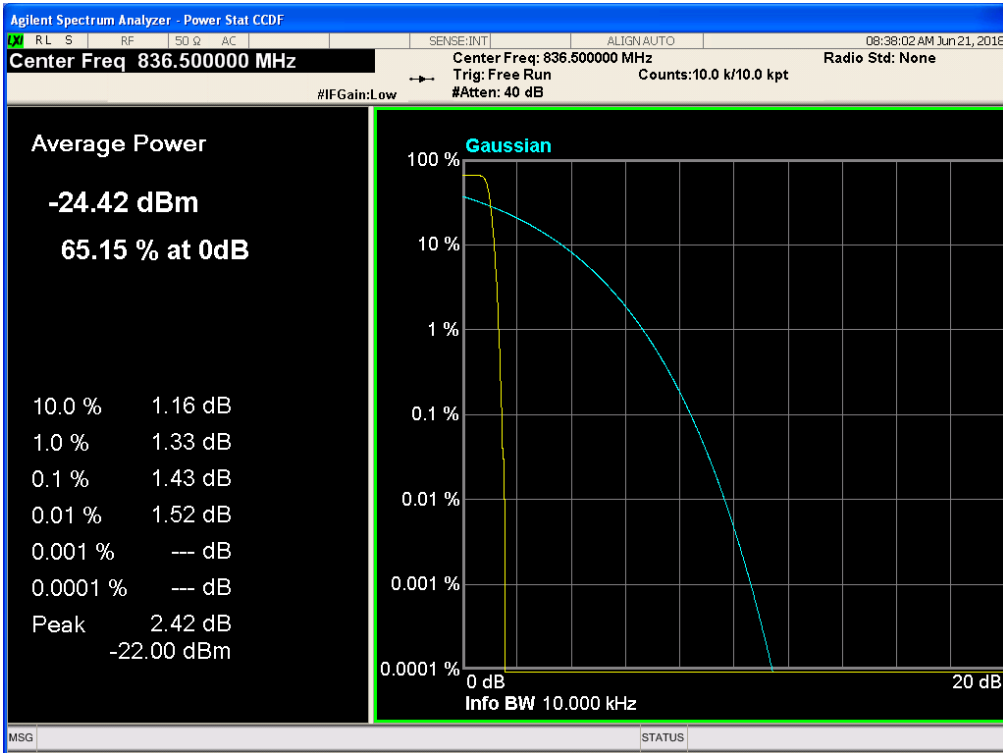


Band 5, UL Channel 20525, UL Frequency 836.5, BW 1.4, NO. RB 1, RB POS. Low, 16-QAM

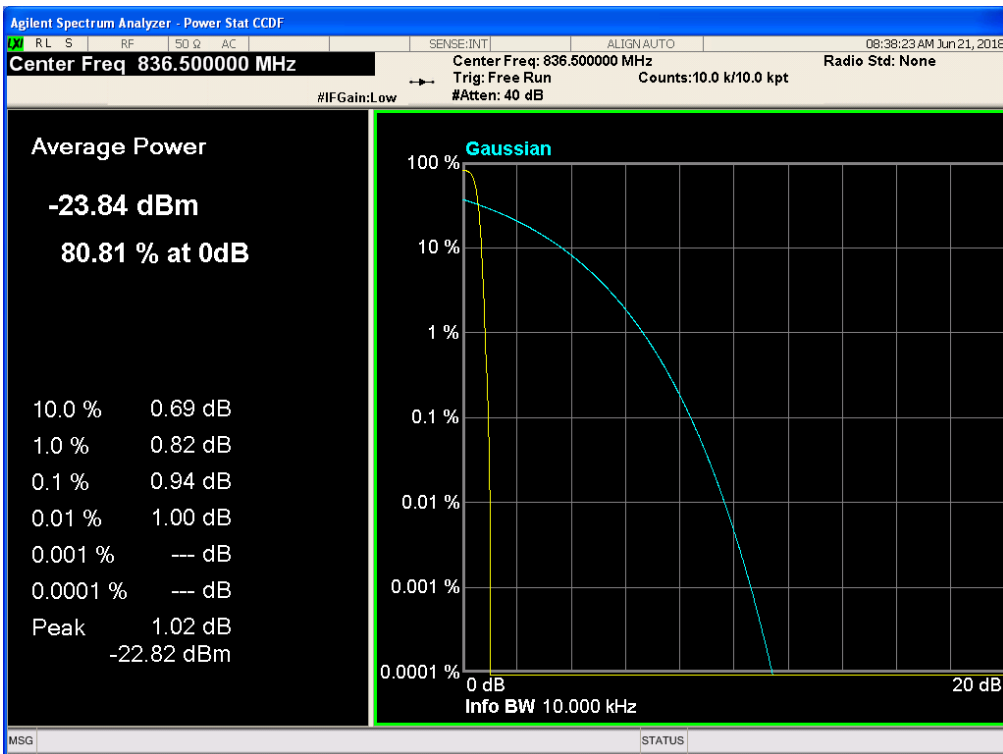




Band 5, UL Channel 20525, UL Frequency 836.5, BW 3.0, NO. RB 1, RB POS. Low, QPSK

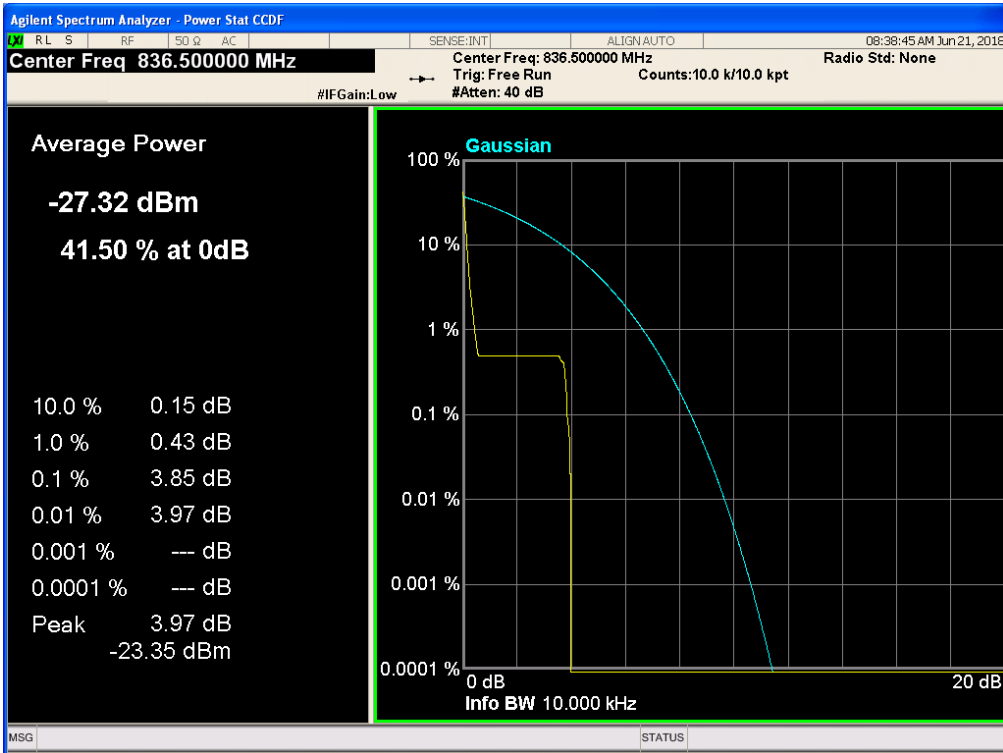


Band 5, UL Channel 20525, UL Frequency 836.5, BW 3.0, NO. RB 1, RB POS. Low, 16-QAM

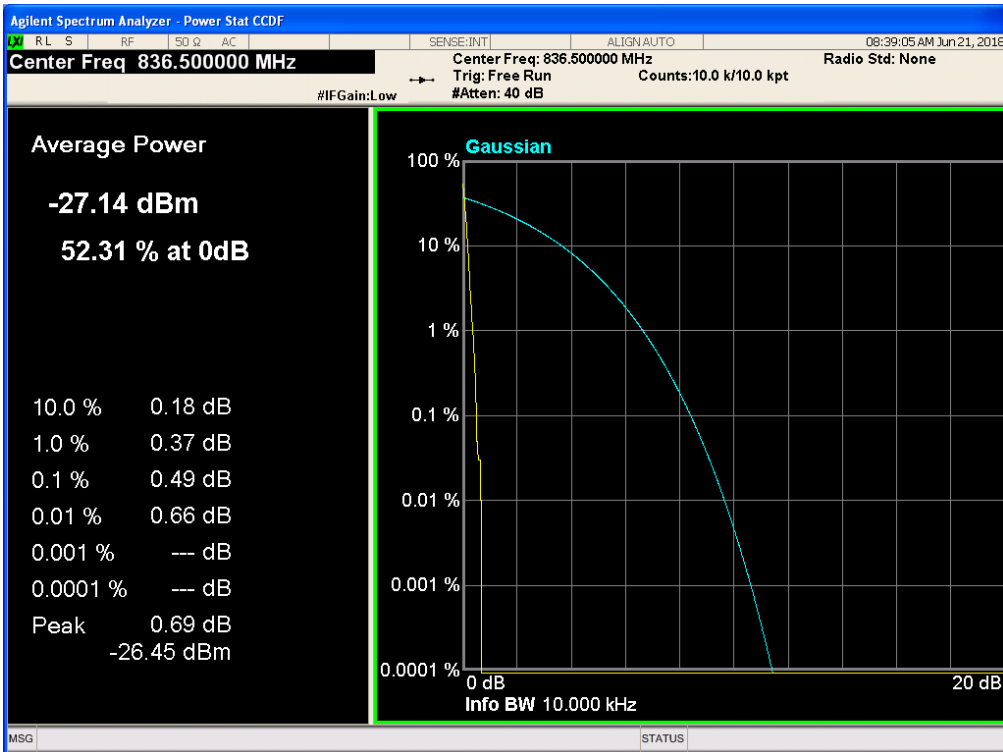




Band 5, UL Channel 20525, UL Frequency 836.5, BW 5.0, NO. RB 1, RB POS. Low, QPSK

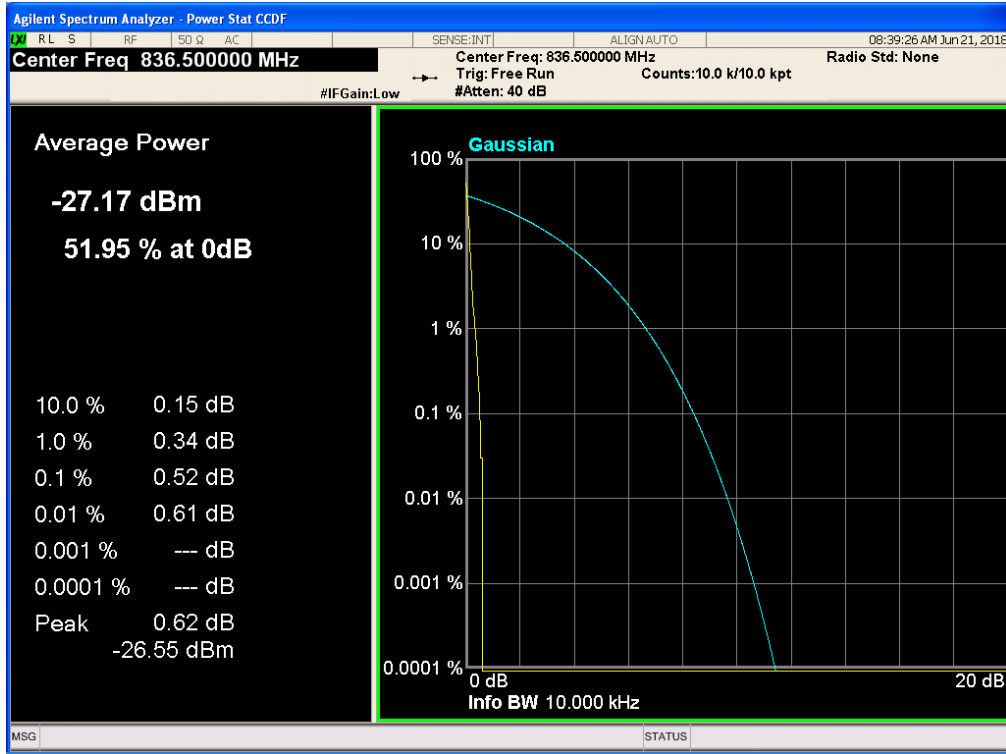


Band 5, UL Channel 20525, UL Frequency 836.5, BW 5.0, NO. RB 1, RB POS. Low, 16-QAM

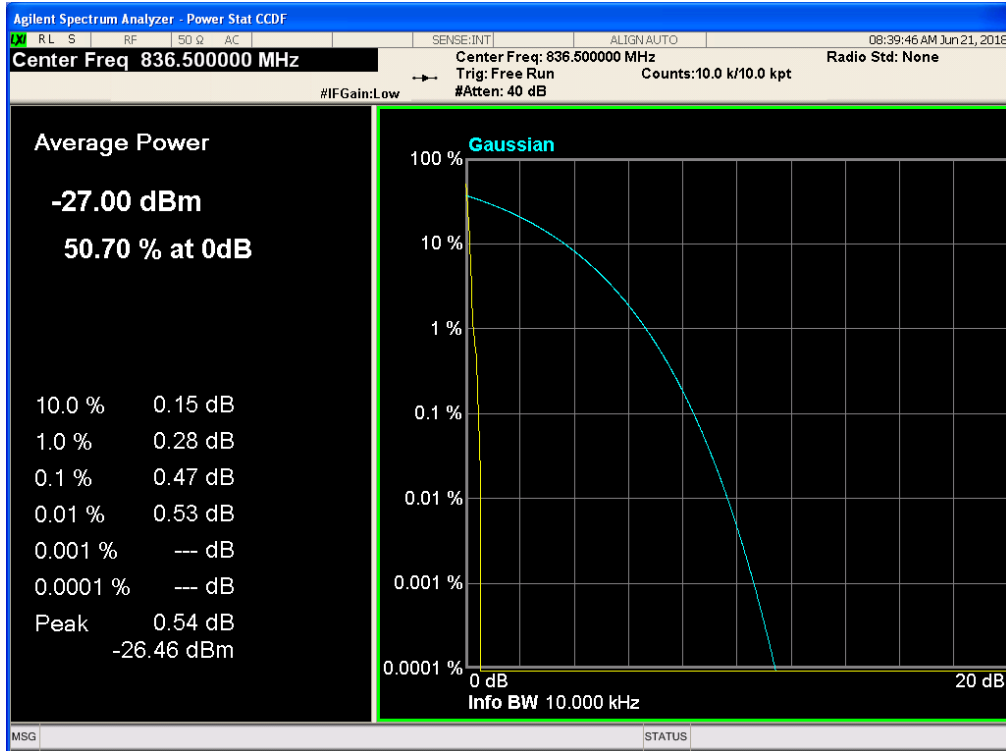




Band 5, UL Channel 20525, UL Frequency 836.5, BW 10.0, NO. RB 1, RB POS. Low, QPSK



Band 5, UL Channel 20525, UL Frequency 836.5, BW 10.0, NO. RB 1, RB POS. Low, 16-QAM



----END OF REPORT----