

## 5MHz Channel Bandwidth - Full RB

## Lower Band Edge



## Upper Band Edge



## 10MHz Channel Bandwidth - Full RB

## Lower Band Edge

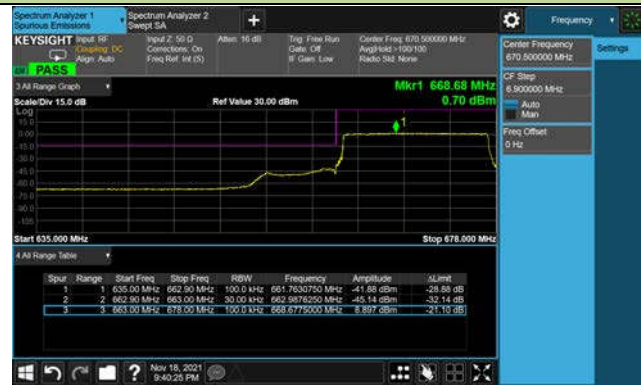


## Upper Band Edge



15MHz Channel Bandwidth - Full RB

Lower Band Edge

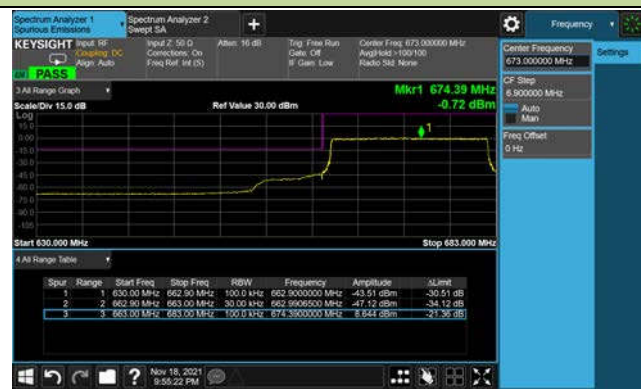


Upper Band Edge



20MHz Channel Bandwidth - Full RB

Lower Band Edge



Upper Band Edge



## 5.6. Peak to Average Ratio Measurement

### 5.6.1. Test Limit

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

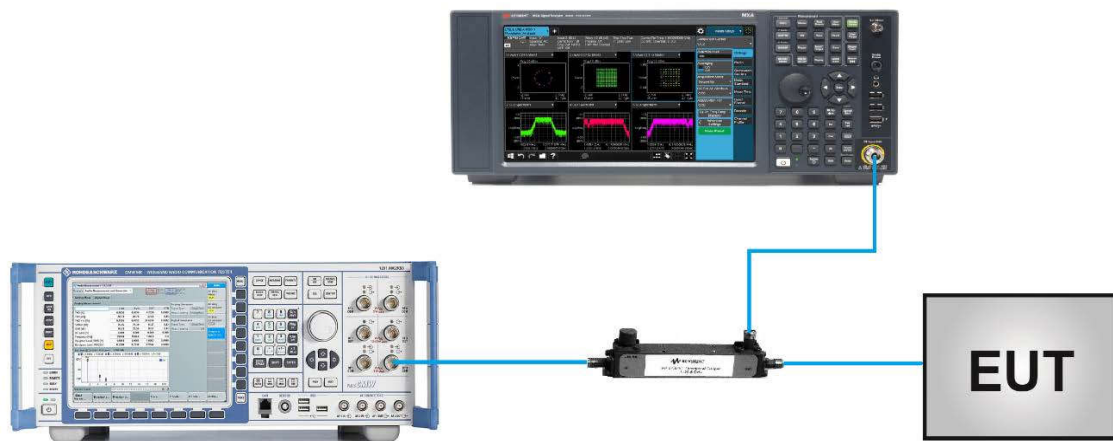
### 5.6.2. Test Procedure

ANSI C63.26-2015 - Section 5.2.3.4 (CCDF).

### 5.6.3. Test Setting

1. Set the resolution / measurement bandwidth  $\geq$  signal's occupied bandwidth
2. Set the number of counts to a value that stabilizes the measured CCDF curve
3. Record the maximum PARR level associated with a probability of 0.1%

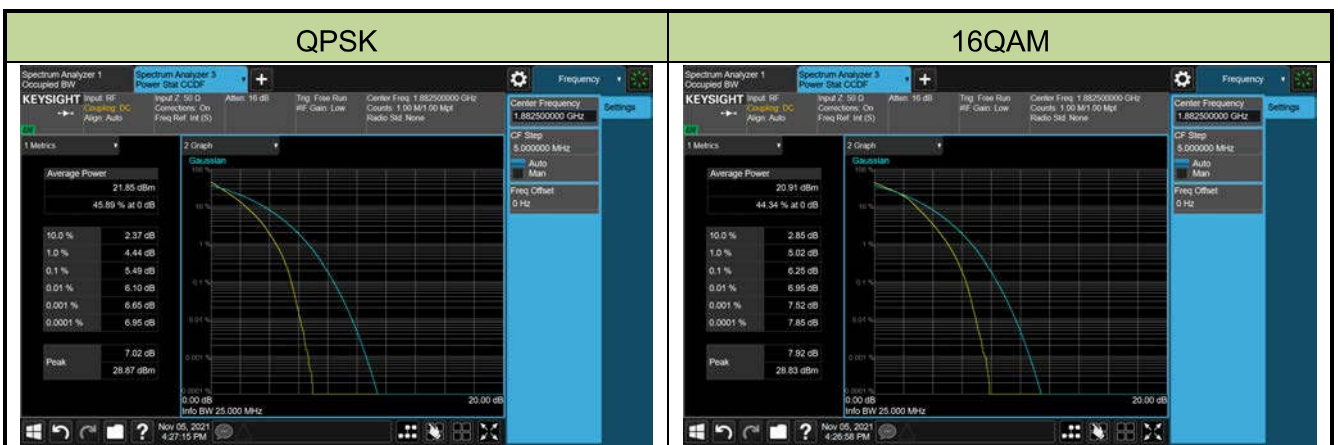
### 5.6.4. Test Setup



**5.6.5. Test Result**

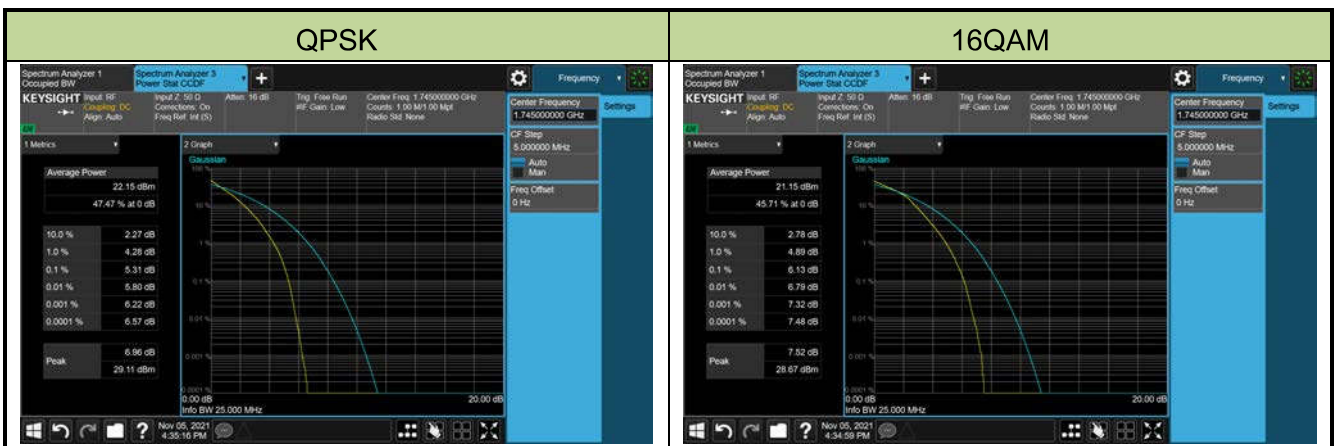
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	Band 2/25		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
26365	1882.5	20	5.49	≤ 13.00	Pass
<b>16QAM</b>					
26365	1882.5	20	6.25	≤ 13.00	Pass



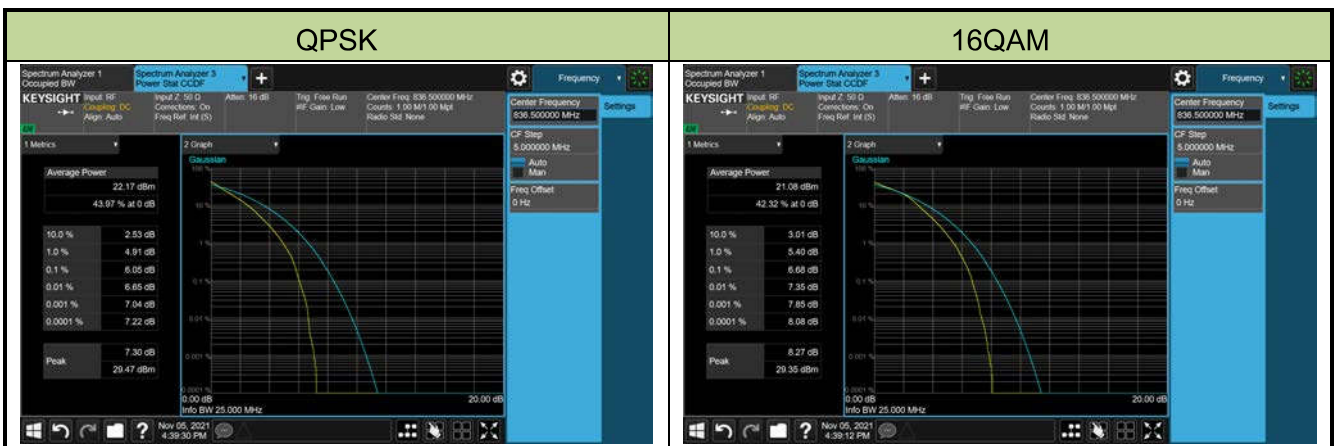
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	Band 4/66		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
132322	1745.0	20	5.31	≤ 13.00	Pass
<b>16QAM</b>					
132322	1745.0	20	6.13	≤ 13.00	Pass



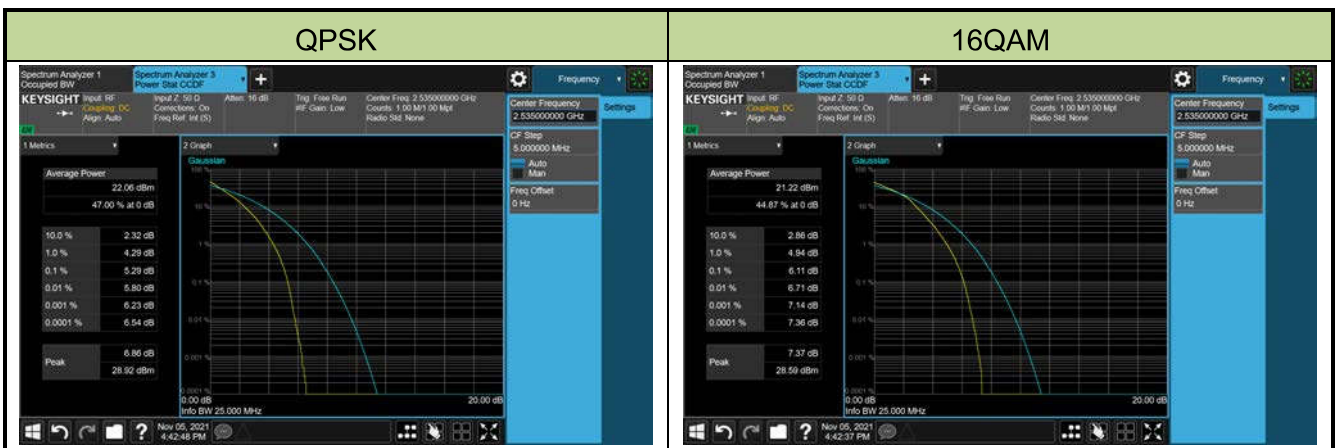
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	Band 5/26		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
20525	836.5	10	6.05	≤ 13.00	Pass
<b>16QAM</b>					
20525	836.5	10	6.68	≤ 13.00	Pass



Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	LTE Band 7		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
21100	2535.0	20	5.29	≤ 13.00	Pass
<b>16QAM</b>					
21100	2535.0	20	6.11	≤ 13.00	Pass



Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	LTE Band 12		

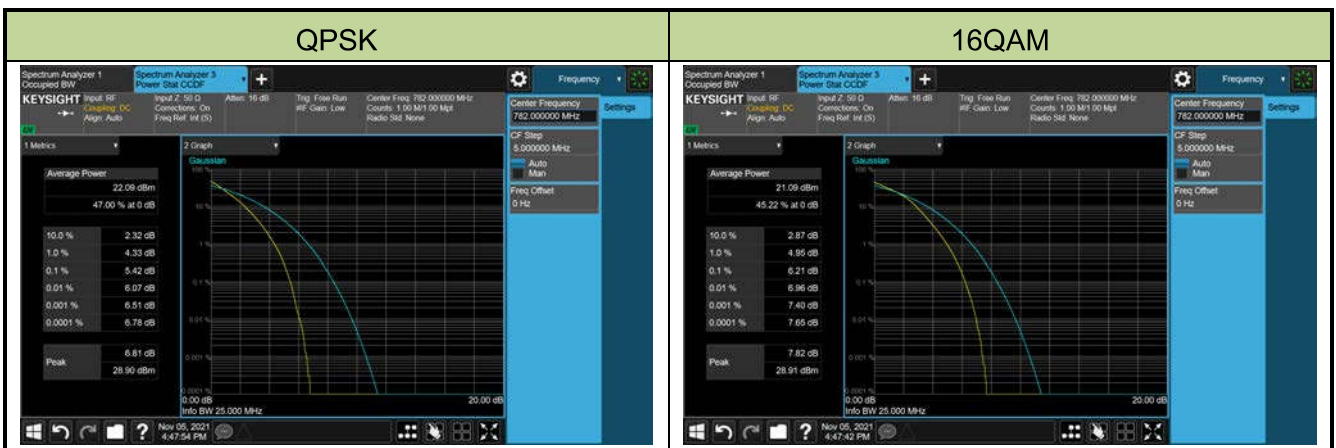
Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
26365	707.5	10	5.67	≤ 13.00	Pass
<b>16QAM</b>					
26365	707.5	10	6.39	≤ 13.00	Pass





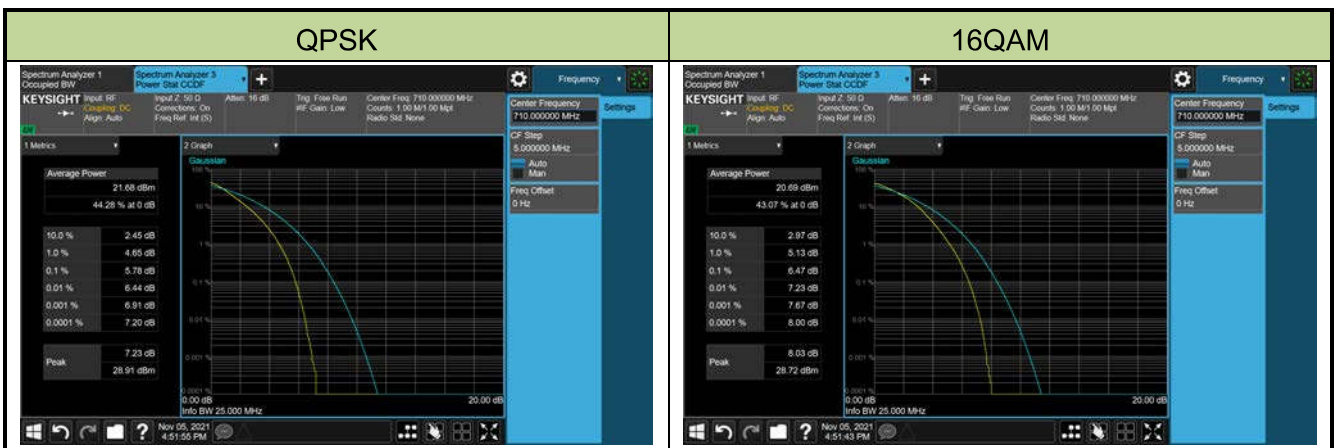
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	LTE Band 13		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
132322	782	10	5.42	≤ 13.00	Pass
<b>16QAM</b>					
132322	782	10	6.21	≤ 13.00	Pass



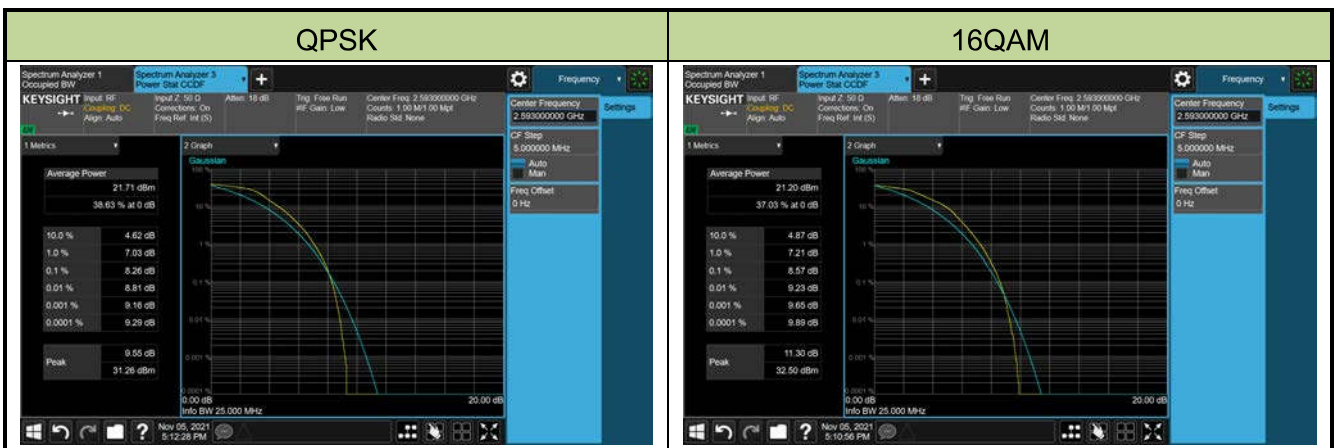
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	LTE Band 17		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
23790	710.0	10	5.78	≤ 13.00	Pass
<b>16QAM</b>					
23790	710.0	10	6.47	≤ 13.00	Pass



Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	LTE Band 41		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
40620	2593.0	20	8.26	≤ 13.00	Pass
<b>16QAM</b>					
40620	2593.0	20	8.57	≤ 13.00	Pass



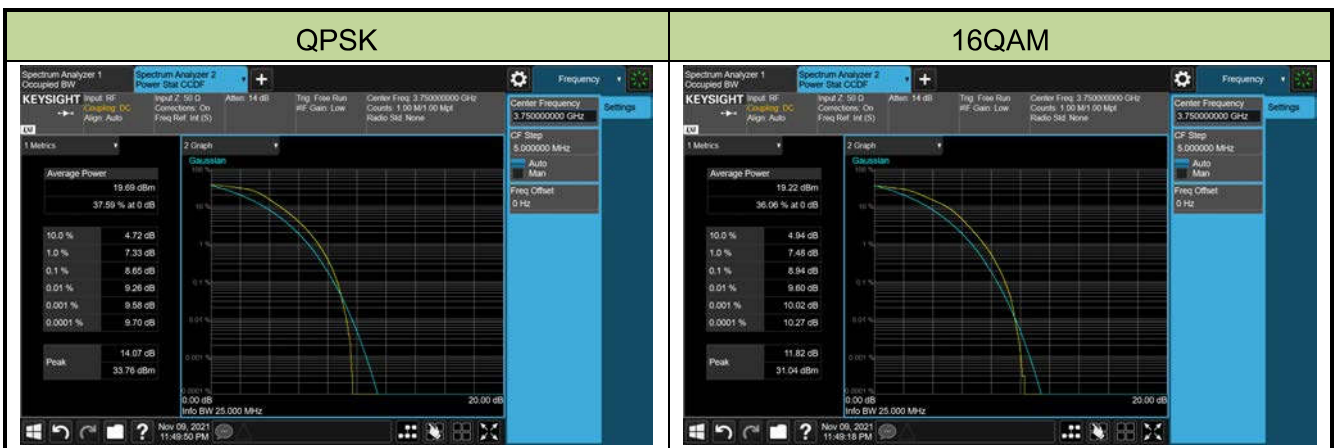
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/09
Test Band	LTE Band 42		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
42590	3500.0	20	8.28	≤ 13.00	Pass
<b>16QAM</b>					
42590	3500.0	20	8.64	≤ 13.00	Pass



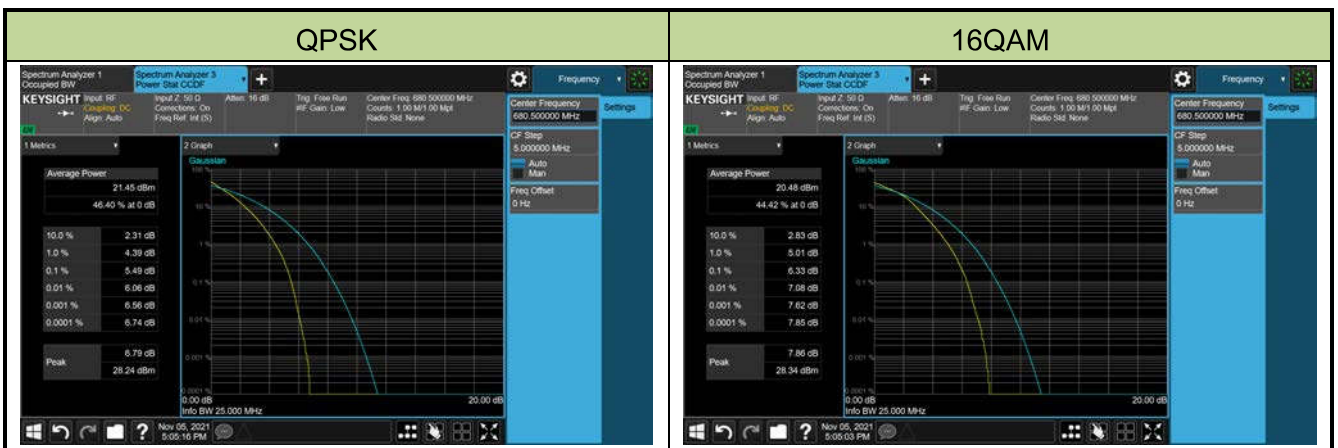
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/09
Test Band	LTE Band 43		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
45090	3750.0	20	6.65	≤ 13.00	Pass
<b>16QAM</b>					
45090	3750.0	20	8.94	≤ 13.00	Pass



Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/05
Test Band	LTE Band 71		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
<b>QPSK</b>					
133297	680.5	20	5.49	≤ 13.00	Pass
<b>16QAM</b>					
133297	680.5	20	6.33	≤ 13.00	Pass



## **5.7. Conducted Spurious Emission Measurement**

### **5.7.1. Test Limit**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

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.

For Band 7, 41 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  $55 + 10 \log(P)$  dB.

### **5.7.2. Test Procedure**

ANSI C63.26-2015 - Section 5.7

### **5.7.3. Test Setting**

1. Set the analyzer frequency to low, mid, high channel.
2. RBW = 1MHz
3. VBW  $\geq 3 \cdot$ RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to "free run."
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power.
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple.  
To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

### 5.7.4. Test Setup





### 5.7.5. Test Result

Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/15
Test Band	LTE Band 2/25_1RB_QPSK		

Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
26047	1850.7	1.4	30 ~ 20000	-35.38	≤ -13.00	Pass
26365	1882.5	1.4	30 ~ 20000	-35.13	≤ -13.00	Pass
26683	1914.3	1.4	30 ~ 20000	-35.93	≤ -13.00	Pass
26055	1851.5	3	30 ~ 20000	-35.14	≤ -13.00	Pass
26365	1882.5	3	30 ~ 20000	-35.73	≤ -13.00	Pass
26675	1913.5	3	30 ~ 20000	-35.51	≤ -13.00	Pass
26065	1852.5	5	30 ~ 20000	-35.07	≤ -13.00	Pass
26365	1882.5	5	30 ~ 20000	-35.72	≤ -13.00	Pass
26665	1912.5	5	30 ~ 20000	-34.86	≤ -13.00	Pass
16390	1855.0	10	30 ~ 20000	-36.04	≤ -13.00	Pass
26365	1882.5	10	30 ~ 20000	-35.85	≤ -13.00	Pass
26640	1910.0	10	30 ~ 20000	-34.78	≤ -13.00	Pass
26115	1857.5	15	30 ~ 20000	-28.13	≤ -13.00	Pass
26365	1882.5	15	30 ~ 20000	-34.16	≤ -13.00	Pass
26615	1907.5	15	30 ~ 20000	-35.96	≤ -13.00	Pass
26140	1860.0	20	30 ~ 20000	-34.12	≤ -13.00	Pass
26365	1882.5	20	30 ~ 20000	-32.67	≤ -13.00	Pass
26590	1905.0	20	30 ~ 20000	-35.87	≤ -13.00	Pass

Note: Spurious emissions within 9kHz – 30MHz were found more than 20dB below limit line.

## 1.4MHz Channel Bandwidth

Channel 26047 (1850.7MHz)



Channel 26365 (1882.5MHz)



Channel 26683 (1914.3MHz)



## 3MHz Channel Bandwidth

Channel 26055 (1851.5MHz)



Channel 26365 (1882.5MHz)

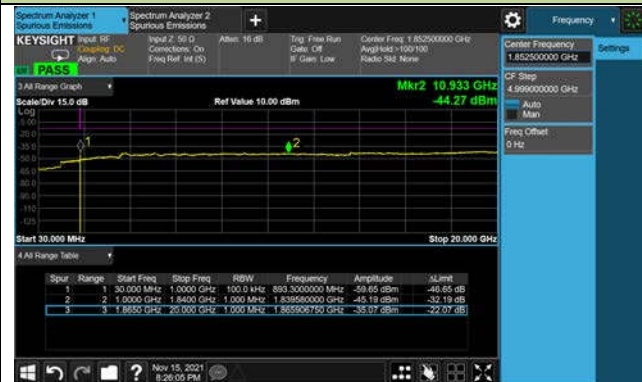


Channel 26675 (1913.5MHz)



## 5MHz Channel Bandwidth

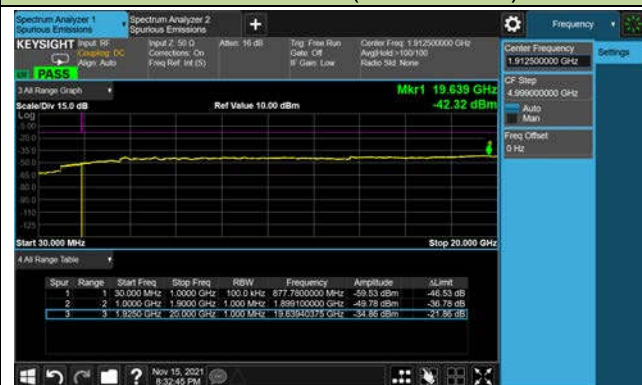
Channel 26065 (1852.5MHz)



Channel 26365 (1882.5MHz)

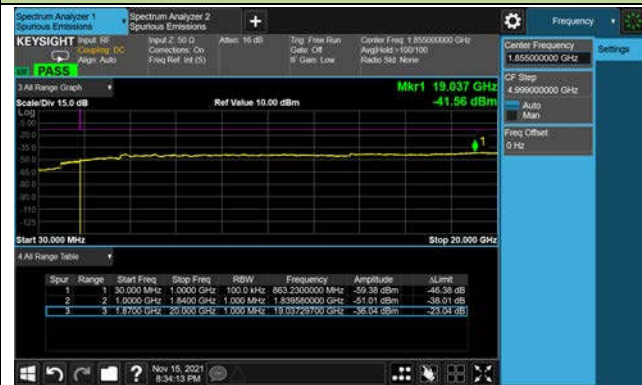


Channel 26665 (1912.5MHz)



## 10MHz Channel Bandwidth

Channel 16390 (1855MHz)



Channel 26365 (1882.5MHz)



Channel 26640 (1910MHz)

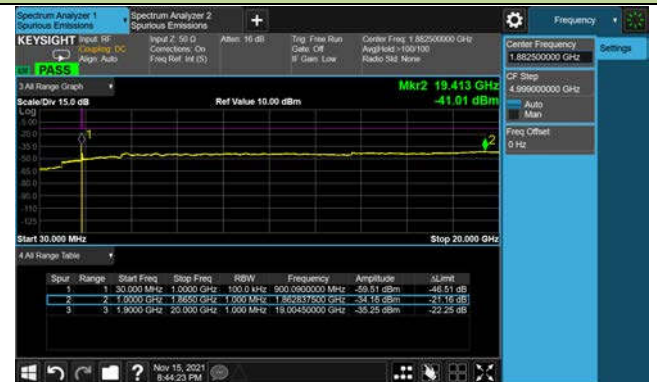


## 15MHz Channel Bandwidth

### Channel 26115 (1857MHz)



### Channel 26365 (1882.5MHz)

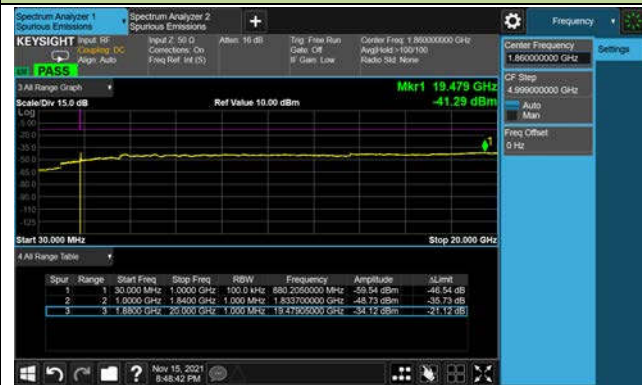


### Channel 26615 (1907.5MHz)

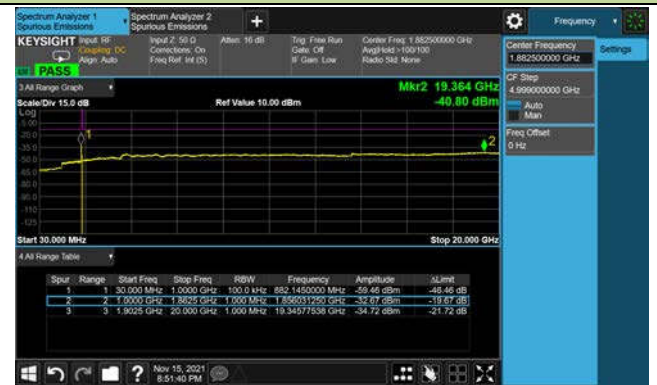


## 20MHz Channel Bandwidth

### Channel 26140 (1860MHz)



### Channel 26365 (1882.5MHz)



### Channel 26590 (1905MHz)



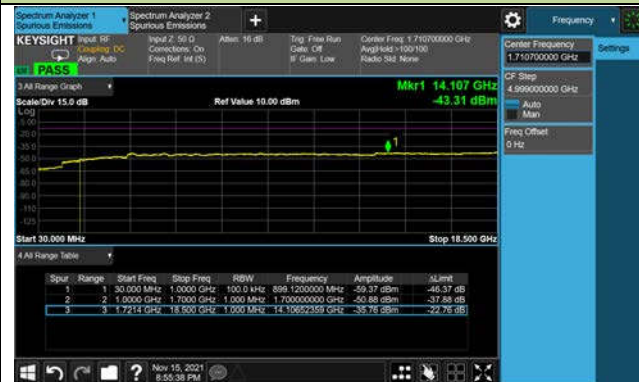
Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/15
Test Band	LTE Band 4/66_1RB_QPSK		

Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
131979	1710.7	1.4	30 ~ 20000	-35.76	≤ -13.00	Pass
132322	1745.0	1.4	30 ~ 20000	-36.55	≤ -13.00	Pass
132665	1779.3	1.4	30 ~ 20000	-36.92	≤ -13.00	Pass
131987	1711.5	3	30 ~ 20000	-35.83	≤ -13.00	Pass
132322	1745.0	3	30 ~ 20000	-36.46	≤ -13.00	Pass
132657	1778.5	3	30 ~ 20000	-35.18	≤ -13.00	Pass
131997	1712.5	5	30 ~ 20000	-37.02	≤ -13.00	Pass
132322	1745.0	5	30 ~ 20000	-36.61	≤ -13.00	Pass
132647	1777.5	5	30 ~ 20000	-37.34	≤ -13.00	Pass
132022	1715.0	10	30 ~ 20000	-36.53	≤ -13.00	Pass
132322	1745.0	10	30 ~ 20000	-36.21	≤ -13.00	Pass
132622	1775.0	10	30 ~ 20000	-36.11	≤ -13.00	Pass
132047	1717.5	15	30 ~ 20000	-34.61	≤ -13.00	Pass
132322	1745.0	15	30 ~ 20000	-34.93	≤ -13.00	Pass
132597	1772.5	15	30 ~ 20000	-35.79	≤ -13.00	Pass
132072	1720.0	20	30 ~ 20000	-32.62	≤ -13.00	Pass
132322	1745.0	20	30 ~ 20000	-33.62	≤ -13.00	Pass
132572	1770.0	20	30 ~ 20000	-36.38	≤ -13.00	Pass

Note: Spurious emissions within 9kHz – 30MHz were found more than 20dB below limit line.

## 1.4MHz Channel Bandwidth

Channel 131979 (1710.7MHz)



Channel 132322 (1745MHz)



Channel 132665 (1779.3MHz)

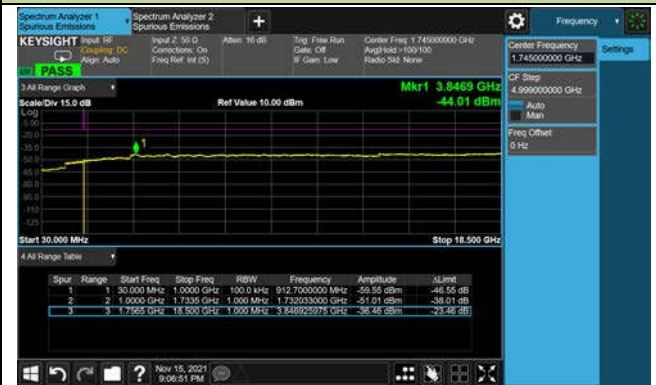


## 3MHz Channel Bandwidth

Channel 131987 (1711.5MHz)



Channel 132322 (1745MHz)

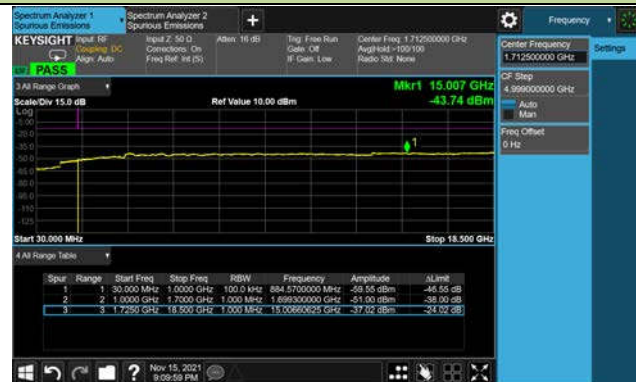


Channel 132657 (1778.5MHz)

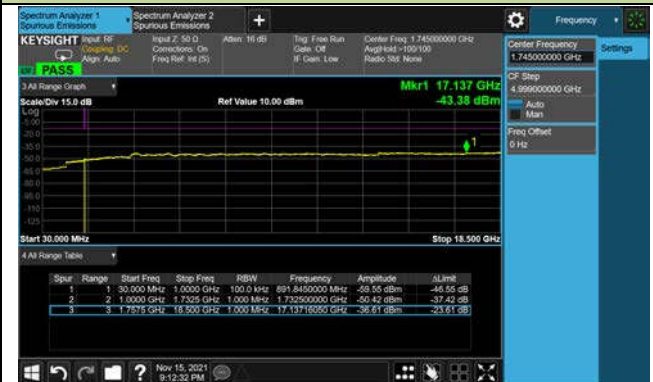


## 5MHz Channel Bandwidth

Channel 131997 (1712.5MHz)



Channel 132322 (1745MHz)



Channel 132647 (1777.5MHz)

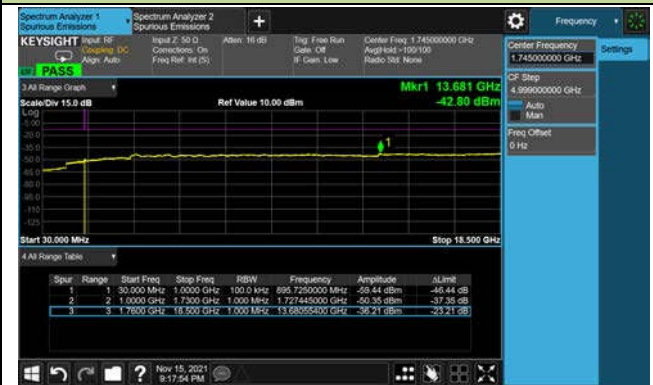


## 10MHz Channel Bandwidth

Channel 132022 (1715MHz)



Channel 132322 (1745MHz)



Channel 132622 (1775MHz)




**20MHz Channel Bandwidth**

**Channel 132072 (1720MHz)**

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	ALimit
1		30.000 MHz	1.0000 GHz	100.0 kHz	878.7500000 MHz	-48.96 dBm	-48.96 dB
2		1.0000 GHz	1.7000 GHz	1.000 MHz	1.699350000 GHz	-45.29 dBm	-32.29 dB
3		1.7000 GHz	18.5000 GHz	1.000 MHz	1.748704000 GHz	-32.82 dBm	-19.82 dB

**Channel 132322 (1745MHz)**

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	ALimit
1		30.000 MHz	1.0000 GHz	100.0 kHz	933.9700000 MHz	-48.09 dBm	-48.09 dB
2		1.0000 GHz	1.7000 GHz	1.000 MHz	1.718270000 GHz	-33.76 dBm	-21.92 dB
3		1.7000 GHz	18.5000 GHz	1.000 MHz	18.08162500 GHz	-37.07 dBm	-24.07 dB

**Channel 132572 (1770Hz)**

**Channel 132572 (1770Hz)**

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	ALimit
1		30.000 MHz	1.0000 GHz	100.0 kHz	923.3700000 MHz	-48.01 dBm	-48.01 dB
2		1.0000 GHz	1.7000 GHz	1.000 MHz	1.743250000 GHz	-42.91 dBm	-28.91 dB
3		1.7000 GHz	18.5000 GHz	1.000 MHz	18.37868800 GHz	-38.58 dBm	-23.58 dB



Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/15
Test Band	LTE Band 5/26_1RB_QPSK		

Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
26797	824.7	1.4	30 ~ 10000	-36.83	≤ -13.00	Pass
26915	836.5	1.4	30 ~ 10000	-37.20	≤ -13.00	Pass
27033	848.3	1.4	30 ~ 10000	-37.16	≤ -13.00	Pass
26805	825.5	3	30 ~ 10000	-37.37	≤ -13.00	Pass
26915	836.5	3	30 ~ 10000	-37.11	≤ -13.00	Pass
27025	847.5	3	30 ~ 10000	-37.24	≤ -13.00	Pass
26815	826.5	5	30 ~ 10000	-37.80	≤ -13.00	Pass
26915	836.5	5	30 ~ 10000	-37.53	≤ -13.00	Pass
27015	846.5	5	30 ~ 10000	-37.69	≤ -13.00	Pass
26840	829.0	10	30 ~ 10000	-37.79	≤ -13.00	Pass
26915	836.5	10	30 ~ 10000	-37.34	≤ -13.00	Pass
26990	844.0	10	30 ~ 10000	-38.06	≤ -13.00	Pass
26865	831.5	15	30 ~ 10000	-37.66	≤ -13.00	Pass
26915	836.5	15	30 ~ 10000	-37.24	≤ -13.00	Pass
26965	841.5	15	30 ~ 10000	-37.77	≤ -13.00	Pass

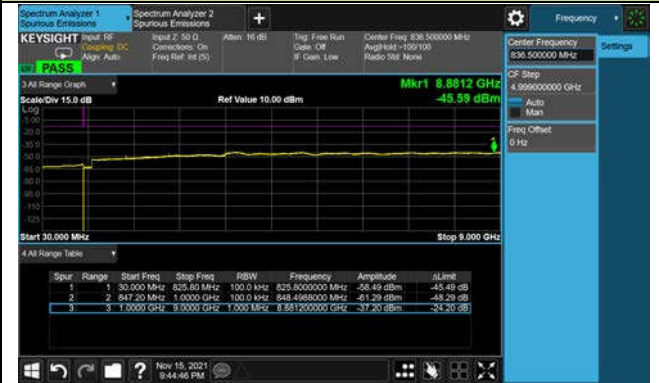
Note: Spurious emissions within 9kHz – 30MHz were found more than 20dB below limit line.

## 1.4MHz Channel Bandwidth

## Channel 26697 (814.7MHz)



## Channel 25865 (831.5MHz)



## Channel 27033 (848.3MHz)



## 3MHz Channel Bandwidth

## Channel 26705 (815.5MHz)



## Channel 26865 (831.5MHz)



## Channel 27025 (847.5MHz)



## 5MHz Channel Bandwidth

Channel 26715 (816.5MHz)



Channel 26865 (831.5MHz)



Channel 27015 (846.5MHz)



## 10MHz Channel Bandwidth

Channel 26740 (819MHz)

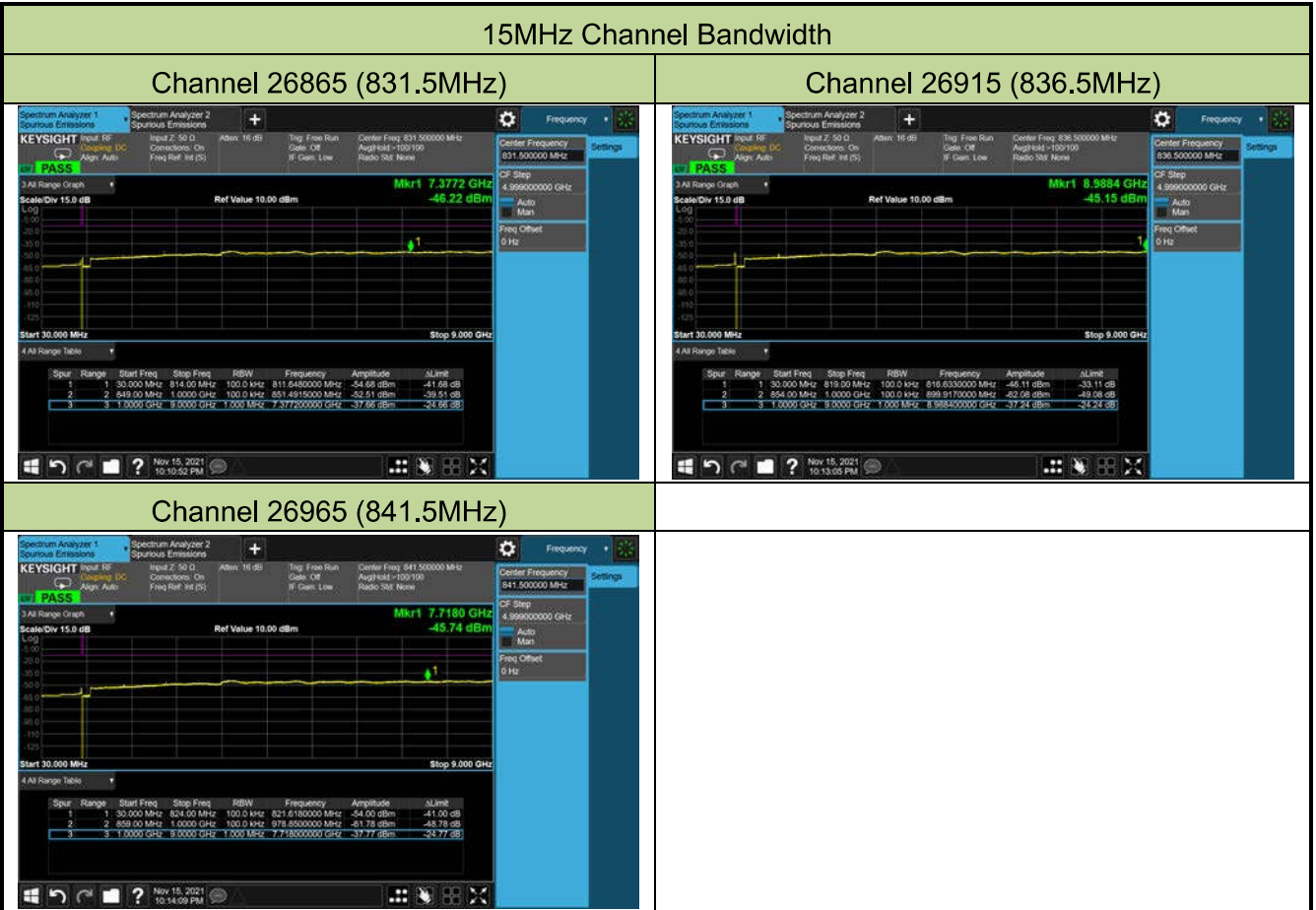


Channel 26865 (831.5MHz)



Channel 26990 (844MHz)





Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/15
Test Band	LTE Band 7_1RB_QPSK		

Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
20775	2502.5	5	30 ~ 26000	-31.60	≤ -25.00	Pass
21100	2535.0	5	30 ~ 26000	-31.91	≤ -25.00	Pass
21425	2567.5	5	30 ~ 26000	-32.36	≤ -25.00	Pass
20800	2505.0	10	30 ~ 26000	-33.26	≤ -25.00	Pass
21100	2535.0	10	30 ~ 26000	-33.19	≤ -25.00	Pass
21400	2565.0	10	30 ~ 26000	-33.40	≤ -25.00	Pass
20825	2507.5	15	30 ~ 26000	-32.71	≤ -25.00	Pass
21100	2535.0	15	30 ~ 26000	-32.94	≤ -25.00	Pass
21375	2562.5	15	30 ~ 26000	-33.28	≤ -25.00	Pass
20850	2510.0	20	30 ~ 26000	-33.40	≤ -25.00	Pass
21100	2535.0	20	30 ~ 26000	-33.03	≤ -25.00	Pass
21350	2560.0	20	30 ~ 26000	-32.78	≤ -25.00	Pass

Note: Spurious emissions within 9kHz – 30MHz were found more than 20dB below limit line.

## 5MHz Channel Bandwidth

## Channel 20775 (2502.5MHz)/



## Channel 21100 (2535MHz)

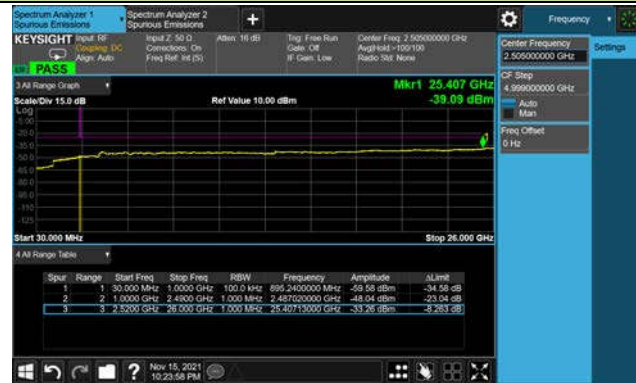


## Channel 21425 (2567.5MHz)

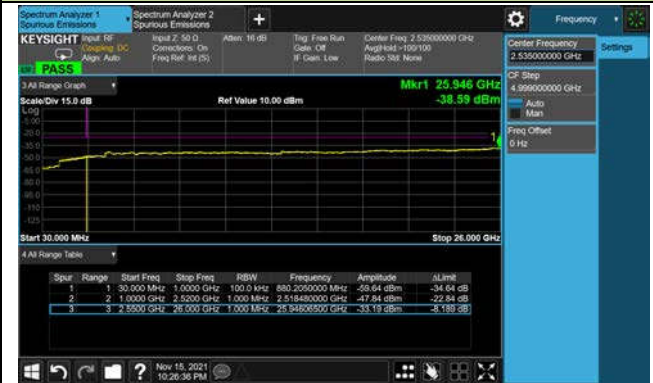


## 10MHz Channel Bandwidth

## Channel 20800 (2505MHz)



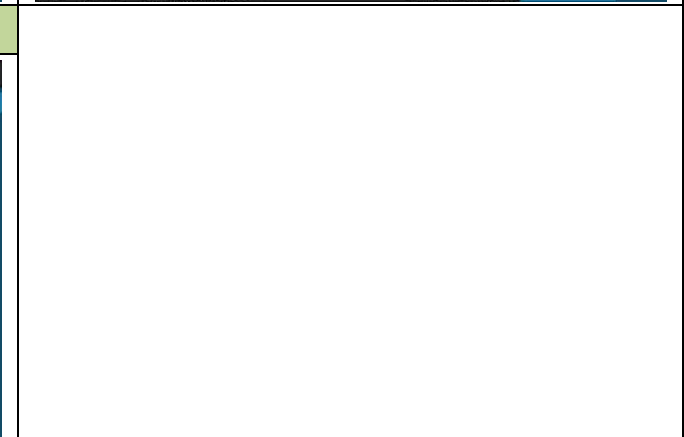
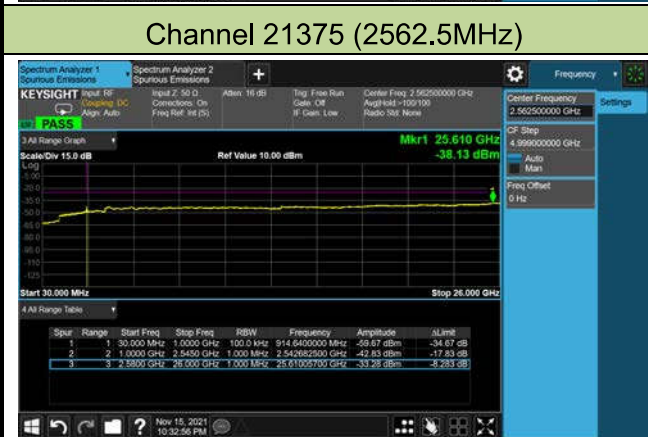
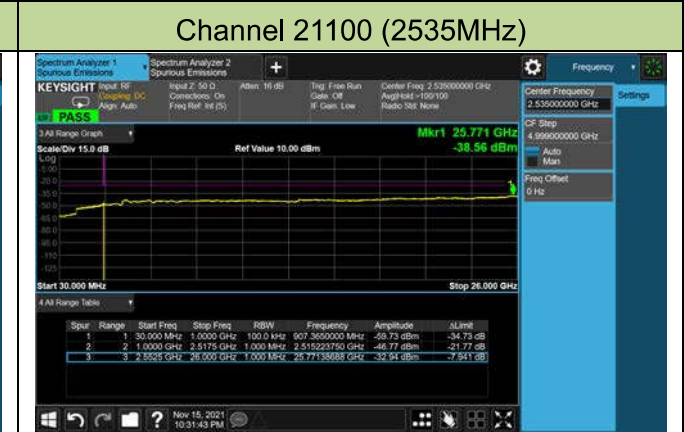
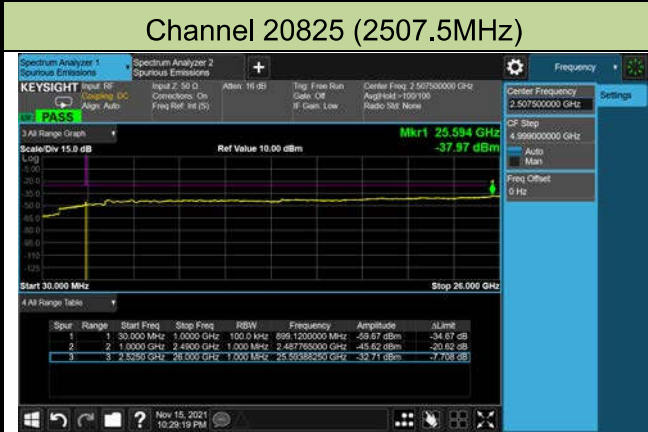
## Channel 21100 (2535MHz)



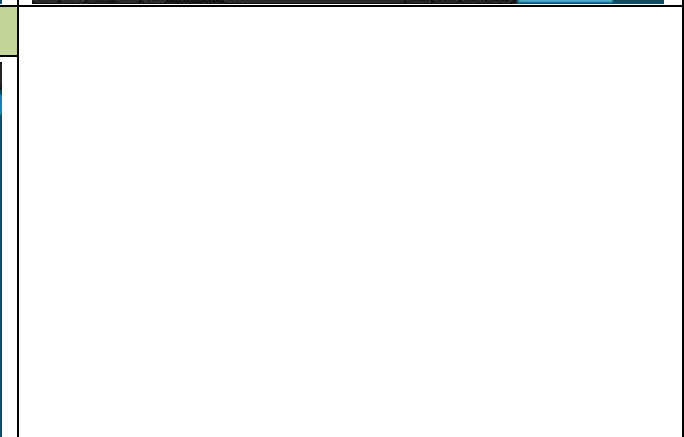
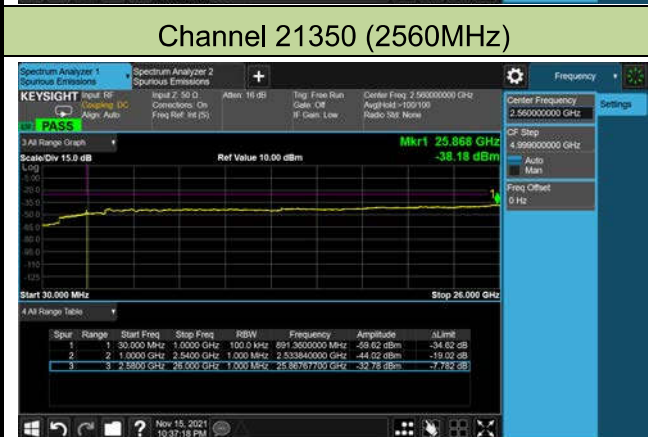
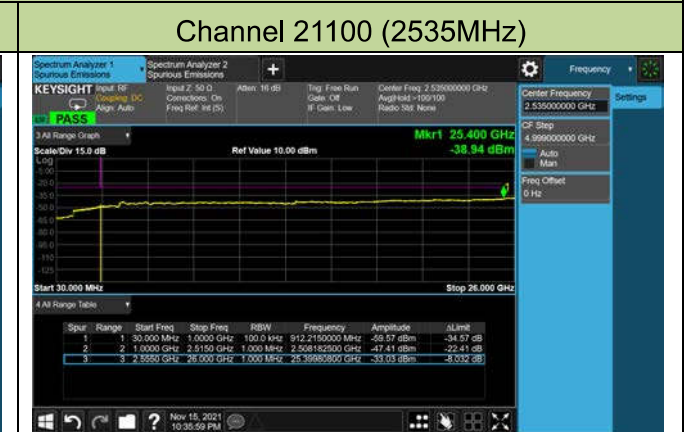
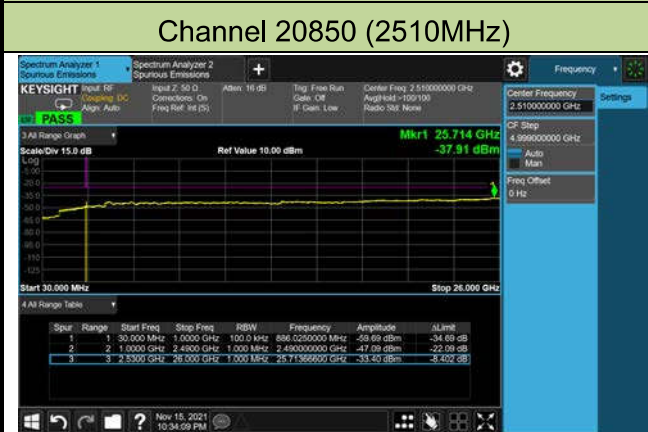
## Channel 21400 (2565MHz)



**15MHz Channel Bandwidth**



**20MHz Channel Bandwidth**



Product	LTE Module	Test Site	SIP-SR1
Test Engineer	Candy Luo	Test Date	2021/11/15
Test Band	LTE Band 12_1RB_QPSK		

Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
23017	699.7	1.4	30 ~ 10000	-38.56	≤ -13.00	Pass
23095	707.5	1.4	30 ~ 10000	-37.26	≤ -13.00	Pass
23173	715.3	1.4	30 ~ 10000	-37.94	≤ -13.00	Pass
23025	700.5	3	30 ~ 10000	-37.65	≤ -13.00	Pass
23095	707.5	3	30 ~ 10000	-37.40	≤ -13.00	Pass
23165	714.5	3	30 ~ 10000	-37.98	≤ -13.00	Pass
23035	701.5	5	30 ~ 10000	-37.91	≤ -13.00	Pass
23095	707.5	5	30 ~ 10000	-38.08	≤ -13.00	Pass
23155	713.5	5	30 ~ 10000	-37.70	≤ -13.00	Pass
23060	704.0	10	30 ~ 10000	-38.28	≤ -13.00	Pass
23095	707.5	10	30 ~ 10000	-36.96	≤ -13.00	Pass
23130	711.0	10	30 ~ 10000	-38.50	≤ -13.00	Pass

Note: Spurious emissions within 9kHz – 30MHz were found more than 20dB below limit line.



## 1.4MHz Channel Bandwidth

Channel 23017 (699.7MHz)



Channel 23095 (707.5MHz)



Channel 23173 (715.3MHz)



## 3MHz Channel Bandwidth

Channel 23025 (700.5MHz)



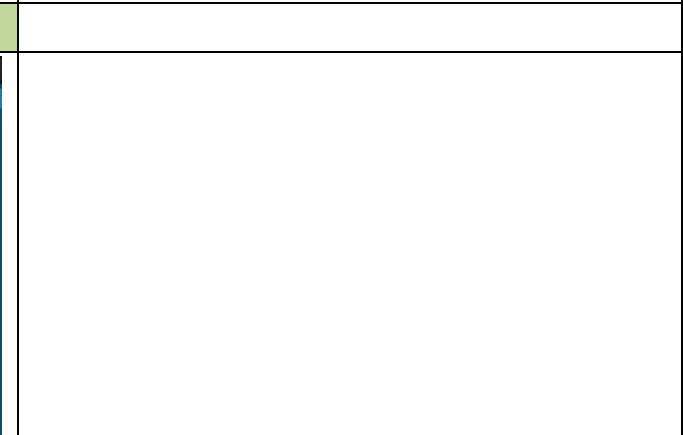
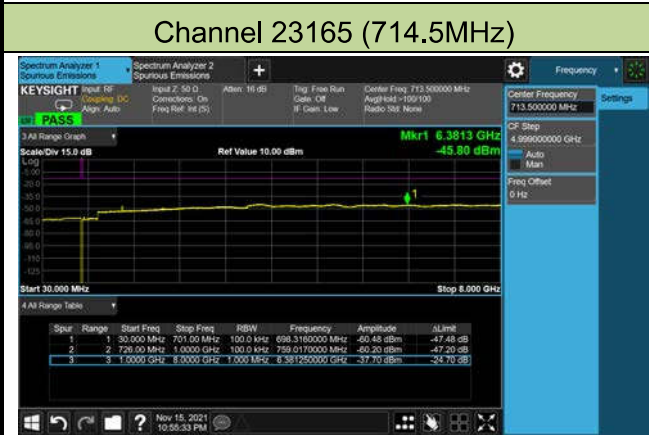
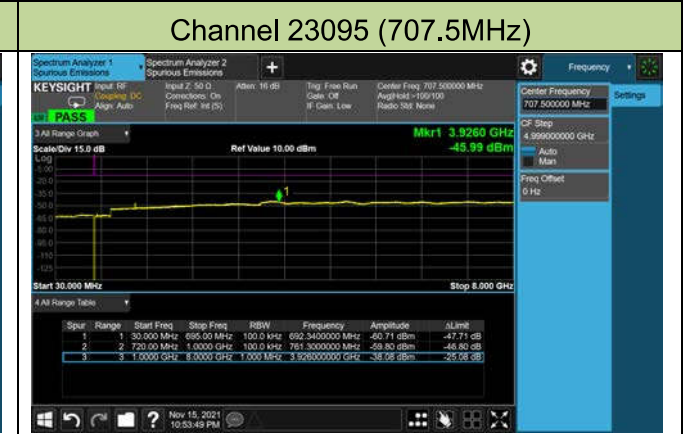
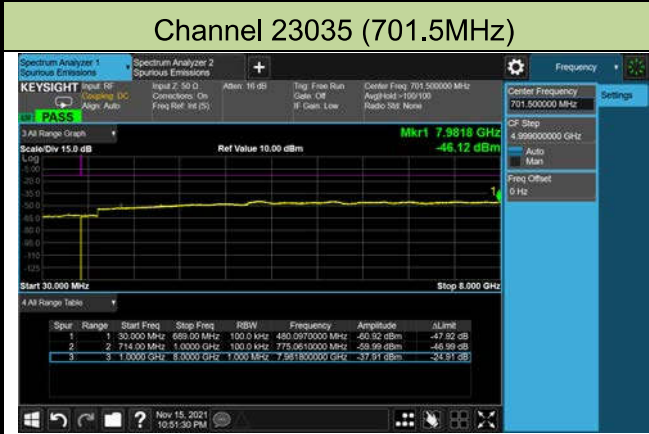
Channel 23095 (707.5MHz)



Channel 23165 (714.5MHz)



**5MHz Channel Bandwidth**



**10MHz Channel Bandwidth**

