

LTE Band 66 (CA 66B), Channel Bandwidth 15MHz+5MHz

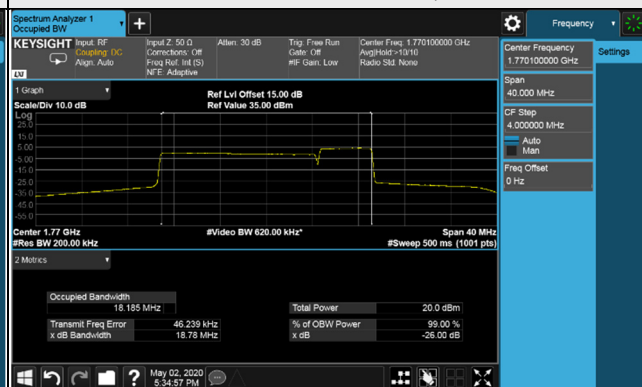
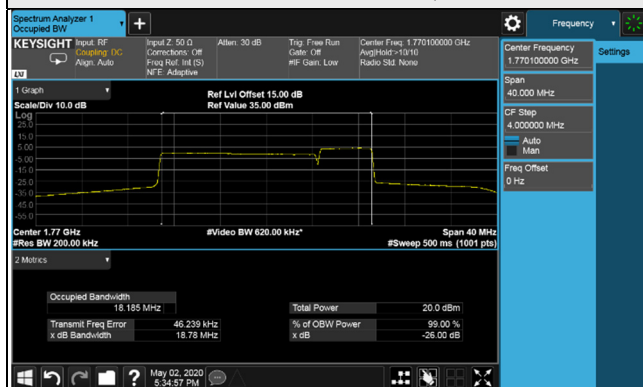
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
		256QAM_Full RB	256QAM_Full RB
132047+132140	1717.5+1726.8	18.09	18.75
132398+132491	1752.6+1761.9	18.08	18.75
132549+132642	1767.7+1777.0	18.19	18.78

99% Occupied Bandwidth
Spectrum Plot of Worst Value

26dB Bandwidth
Spectrum Plot of Worst Value

15MHz+5MHz / 256QAM

15MHz+5MHz / 256QAM



LTE Band 66 (CA 66B), Channel Bandwidth 5MHz+10MHz

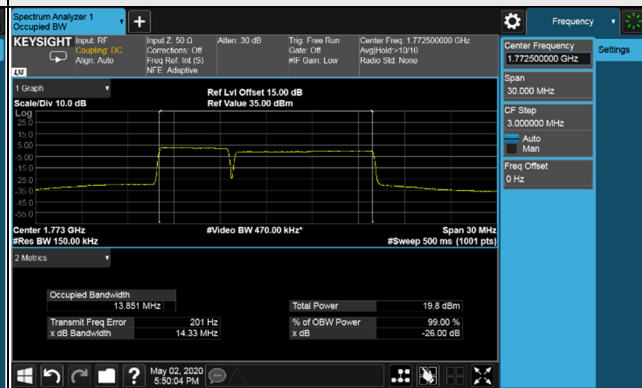
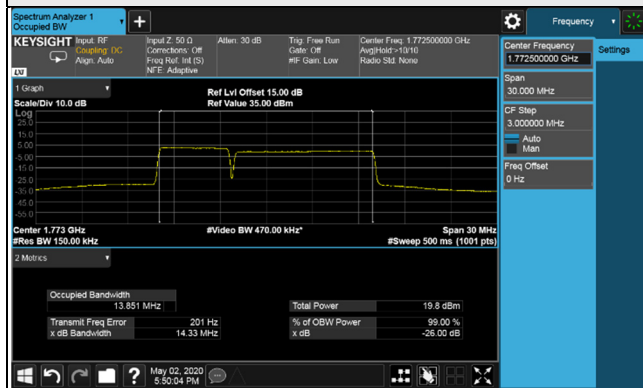
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
		256QAM_Full RB	256QAM_Full RB
132000+132072	1712.8+1720.0	13.84	14.32
132375+132447	1750.3+1757.5	13.82	14.31
132550+132622	1767.8+1775.0	13.85	14.33

99% Occupied Bandwidth
Spectrum Plot of Worst Value

26dB Bandwidth
Spectrum Plot of Worst Value

5MHz+10MHz / 256QAM

5MHz+10MHz / 256QAM



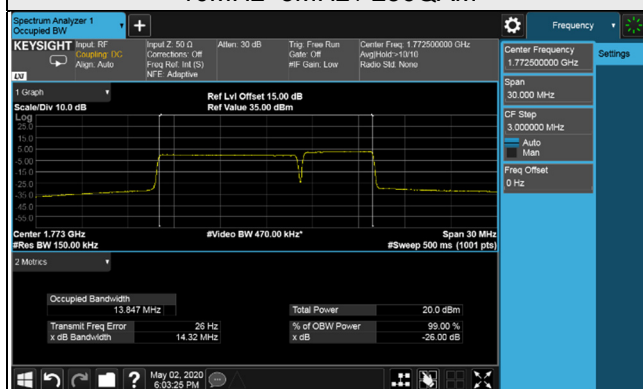
LTE Band 66 (CA 66B), Channel Bandwidth 10MHz+5MHz

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
		256QAM_Full RB	256QAM_Full RB
132022+132094	1715.0+1722.2	13.81	14.31
132397+132469	1752.5+1759.7	13.79	14.31
132572+132644	1770.0+1777.2	13.85	14.32

99% Occupied Bandwidth

Spectrum Plot of Worst Value

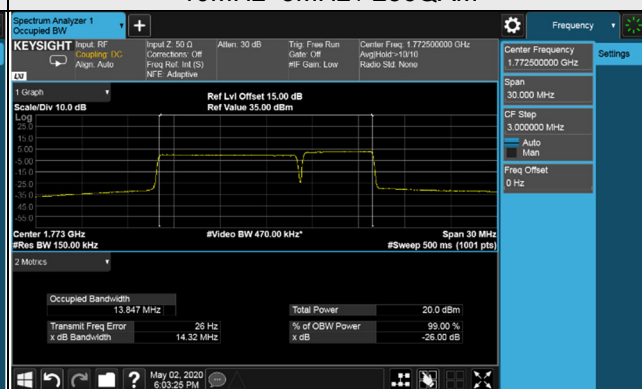
10MHz+5MHz / 256QAM



26dB Bandwidth

Spectrum Plot of Worst Value

10MHz+5MHz / 256QAM



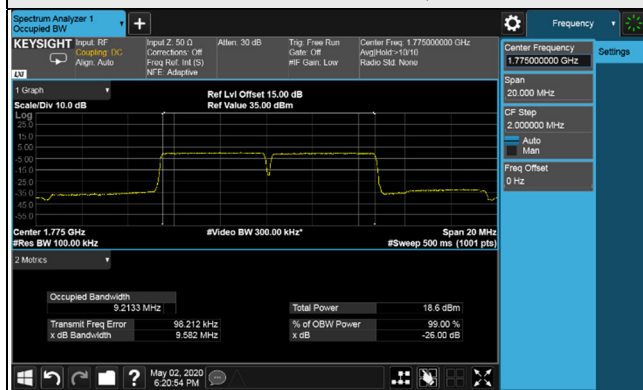
LTE Band 66 (CA 66B), Channel Bandwidth 5MHz+5MHz

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
		256QAM_Full RB	256QAM_Full RB
131997+132045	1712.5+1717.3	9.21	9.57
132398+132446	1752.6+1757.4	9.20	9.58
132599+132647	1772.7+1777.5	9.21	9.58

99% Occupied Bandwidth

Spectrum Plot of Worst Value

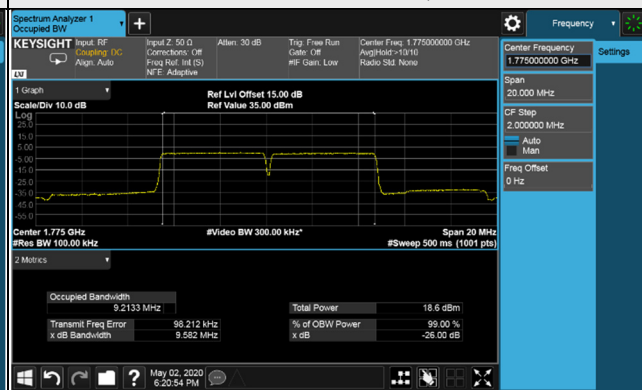
5MHz+5MHz / 256QAM



26dB Bandwidth

Spectrum Plot of Worst Value

5MHz+5MHz / 256QAM



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

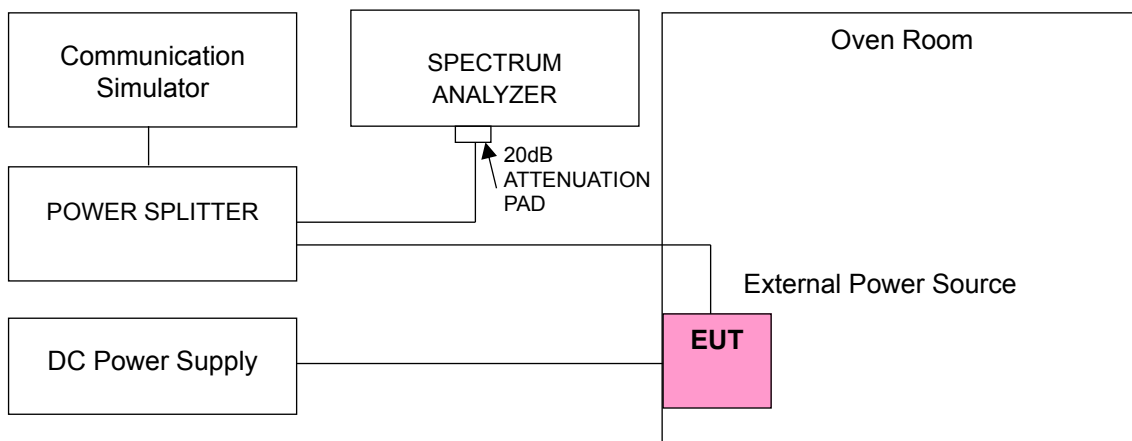
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that “The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.” The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$.

4.3.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7 (CA 7C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	2540.200001	0.001	2560.000003	0.001
5	2540.200003	0.001	2560.000002	0.001
5.75	2540.200002	0.001	2560.000004	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 7 (CA 7C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2540.200001	0.001	2560.000002	0.001
-20	2540.200002	0.001	2560.000002	0.001
-10	2540.200004	0.002	2560.000002	0.001
0	2540.200003	0.001	2560.000002	0.001
10	2540.200002	0.001	2560.000001	0.001
20	2540.199998	-0.001	2559.999997	-0.001
30	2540.199996	-0.001	2559.999999	-0.001
40	2540.199999	0.000	2559.999998	-0.001
50	2540.199998	-0.001	2559.999997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7 (CA 7C)			
	Channel Bandwidth: 15MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	2507.800003	0.001	2524.900001	0.000
5	2507.800003	0.001	2524.900004	0.002
5.75	2507.800003	0.001	2524.900004	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 7 (CA 7C)			
	Channel Bandwidth: 15MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2507.800003	0.001	2524.900001	0.000
-20	2507.800003	0.001	2524.900002	0.001
-10	2507.800004	0.002	2524.900002	0.001
0	2507.800002	0.001	2524.900001	0.000
10	2507.800002	0.001	2524.900002	0.001
20	2507.799998	-0.001	2524.899997	-0.001
30	2507.799997	-0.001	2524.899999	0.000
40	2507.799996	-0.002	2524.899997	-0.001
50	2507.799997	-0.001	2524.899997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38 (CA 38C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	2590.200002	0.001	2610.000003	0.001
5	2590.200003	0.001	2610.000003	0.001
5.75	2590.200001	0.000	2610.000002	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 38 (CA 38C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2590.200002	0.001	2610.000001	0.000
-20	2590.200003	0.001	2610.000002	0.001
-10	2590.200001	0.000	2610.000002	0.001
0	2590.200002	0.001	2610.000002	0.001
10	2590.200003	0.001	2610.000001	0.000
20	2590.199999	-0.001	2609.999998	-0.001
30	2590.199996	-0.001	2609.999997	-0.001
40	2590.199998	-0.001	2609.999996	-0.001
50	2590.199996	-0.001	2609.999998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 41 (CA 41C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	2660.200003	0.001	2680.000001	0.000
5	2660.200003	0.001	2680.000001	0.000
5.75	2660.200001	0.001	2680.000001	0.000

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 41 (CA 41C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2660.200002	0.001	2680.000003	0.001
-20	2660.200004	0.001	2680.000004	0.001
-10	2660.200003	0.001	2680.000003	0.001
0	2660.200003	0.001	2680.000004	0.001
10	2660.200001	0.000	2680.000003	0.001
20	2660.199999	-0.001	2679.999998	-0.001
30	2660.199999	-0.001	2679.999997	-0.001
40	2660.199998	-0.001	2679.999998	-0.001
50	2660.199998	-0.001	2679.999997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66 (CA 66C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	1745.100004	0.002	1764.900001	0.001
5	1745.100001	0.001	1764.900001	0.001
5.75	1745.100001	0.001	1764.900002	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66 (CA 66C)			
	Channel Bandwidth: 20MHz+20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1745.100001	0.001	1764.900003	0.002
-20	1745.100003	0.002	1764.900003	0.002
-10	1745.100004	0.002	1764.900003	0.002
0	1745.100004	0.002	1764.900002	0.001
10	1745.100002	0.001	1764.900004	0.002
20	1745.099998	-0.001	1764.899997	-0.002
30	1745.099996	-0.002	1764.899998	-0.001
40	1745.099996	-0.002	1764.899998	-0.001
50	1745.099997	-0.002	1764.899996	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66 (CA 66B)			
	Channel Bandwidth: 10MHz+10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	1715.000002	0.001	1724.900003	0.002
5	1715.000002	0.001	1724.900003	0.002
5.75	1715.000003	0.002	1724.900004	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66 (CA 66B)			
	Channel Bandwidth: 10MHz+10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1715.000001	0.001	1724.900003	0.002
-20	1715.000001	0.001	1724.900002	0.001
-10	1715.000003	0.002	1724.900002	0.001
0	1715.000001	0.001	1724.900003	0.002
10	1715.000004	0.002	1724.900003	0.001
20	1714.999996	-0.002	1724.899998	-0.001
30	1714.999998	-0.001	1724.899998	-0.001
40	1714.999999	-0.001	1724.899997	-0.002
50	1714.999998	-0.001	1724.899996	-0.002

4.4 Channel Edge Measurement

4.4.1 Limits of Band Edge Measurement

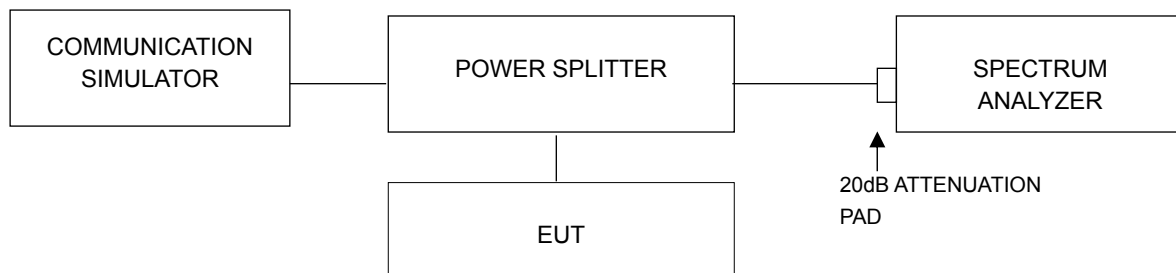
For LTE Band 66

According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log (P)$ dB.

For LTE Band 7, 38, 41

According to FCC 27.53(m)(4) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a 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. 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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed.

4.4.2 Test Setup



4.4.3 Test Procedures

- The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements of Emission Mask were done at 3 channels: low, middle and high operational frequency range. All measurements of Band Edge were done at 2 channels: low and high operational frequency range.(only for LTE Band 66 CA mode)
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 200kHz and VB of the spectrum is 620kHz (LTE Channel Bandwidth 10MHz+10MHz). (only for LTE Band 66 CA mode)
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 430kHz and VB of the spectrum is 1.3MHz (LTE Channel Bandwidth 20MHz+20MHz).(only for LTE Band 66 CA mode)
- For the measurement method of LTE Band 7C, 38C, Band 41C, please refer to 27.53(m)(4)(6).
- Record the max trace plot into the test report.

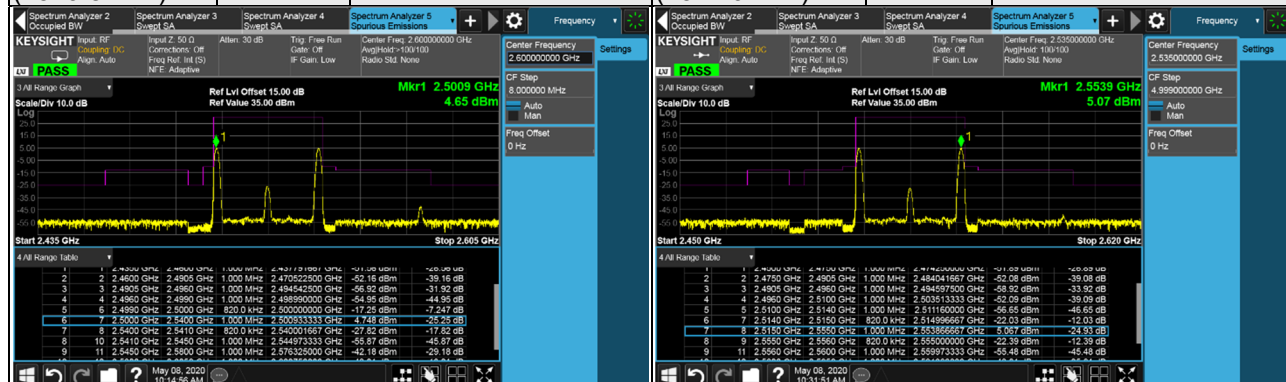
4.4.4 Test Results

LTE Band 7 (CA 7C)

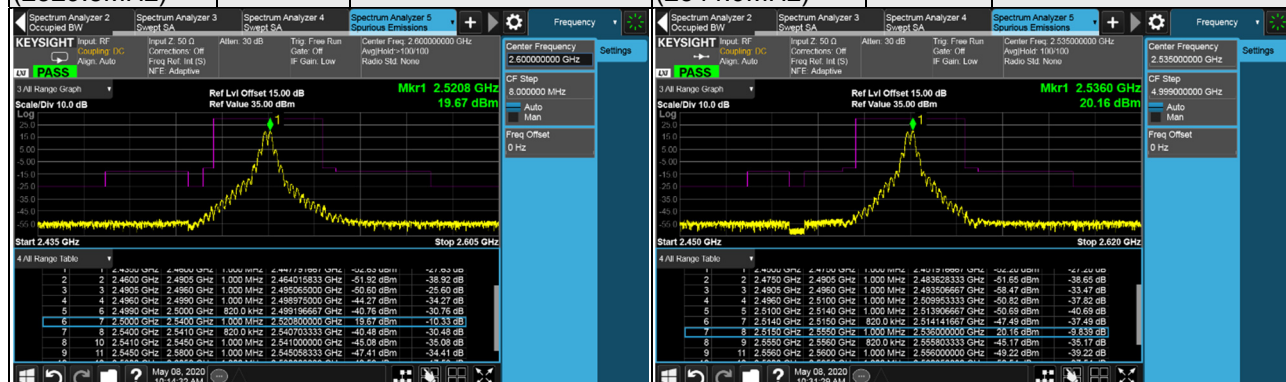
Emission Mask:

Channel Bandwidth: 20MHz+20MHz

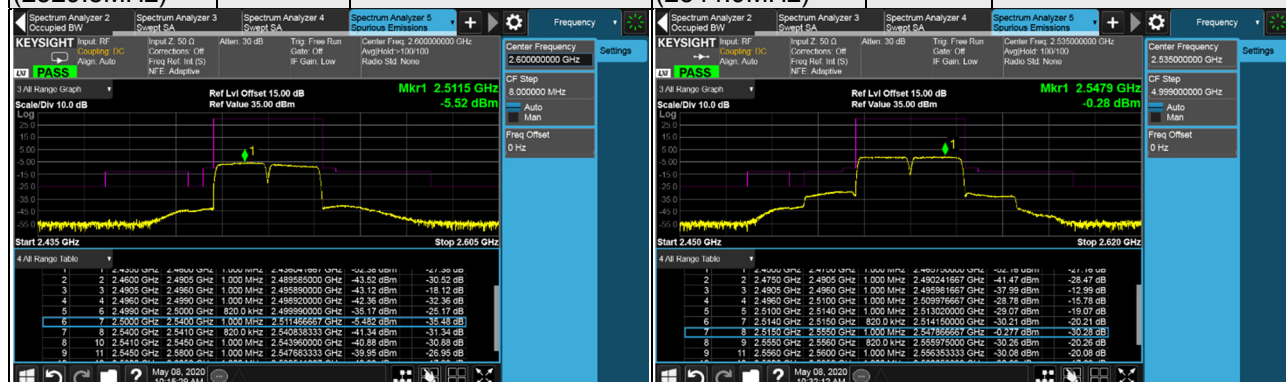
Channel 20850 (2510.0MHz)+ Channel 21048 (2529.8MHz)	QPSK	1 RB / 0 RB Offset+ 1 RB / 99 RB Offset	Channel 21001 (2525.1MHz)+ Channel 21199 (2544.9MHz)	QPSK	1 RB / 0 RB Offset+ 1 RB / 99 RB Offset
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Channel 20850 (2510.0MHz)+ Channel 21048 (2529.8MHz)	QPSK	1 RB / 99 RB Offset+ 1 RB / 0 RB Offset	Channel 21001 (2525.1MHz)+ Channel 21199 (2544.9MHz)	QPSK	1 RB / 99 RB Offset+ 1 RB / 0 RB Offset
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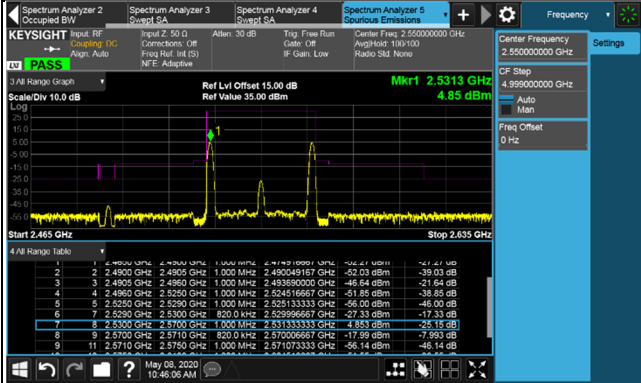


Channel 20850 (2510.0MHz)+ Channel 21048 (2529.8MHz)	QPSK	100 RB / 0 RB Offset	Channel 21001 (2525.1MHz)+ Channel 21199 (2544.9MHz)	QPSK	100 RB / 0 RB Offset
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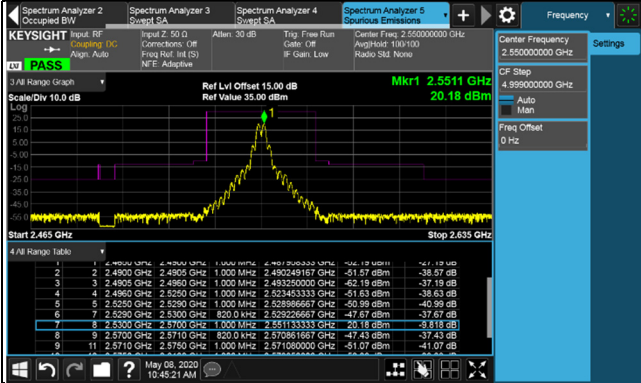


Channel Bandwidth: 20MHz+20MHz

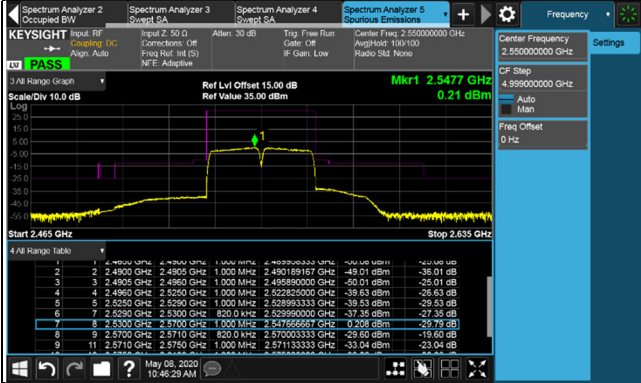
Channel 21152 (2540.2MHz)+
Channel 21350 (2560.0MHz) QPSK
1 RB / 0 RB Offset+
1 RB / 99 RB Offset



Channel 21152 (2540.2MHz)+
Channel 21350 (2560.0MHz) QPSK
1 RB / 99 RB Offset+
1 RB / 0 RB Offset



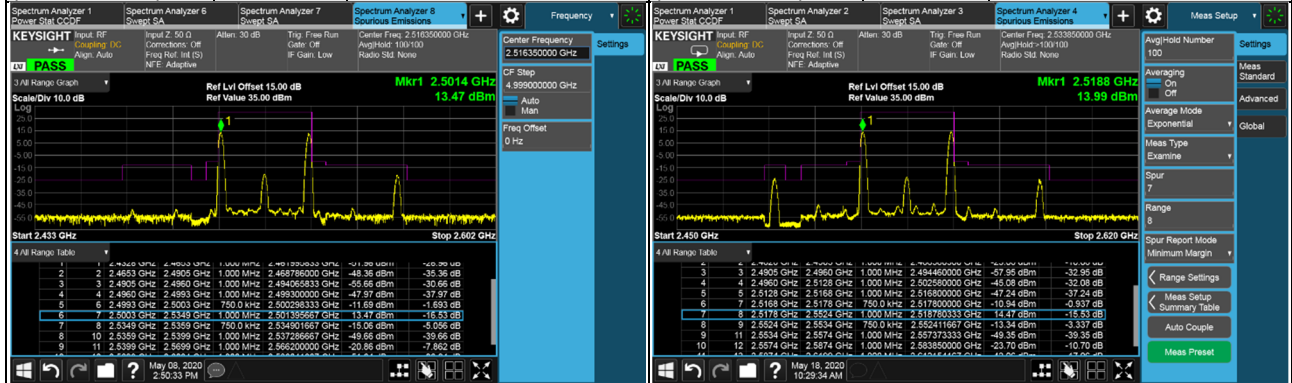
Channel 21152 (2540.2MHz)+
Channel 21350 (2560.0MHz) QPSK
100 RB / 0 RB Offset



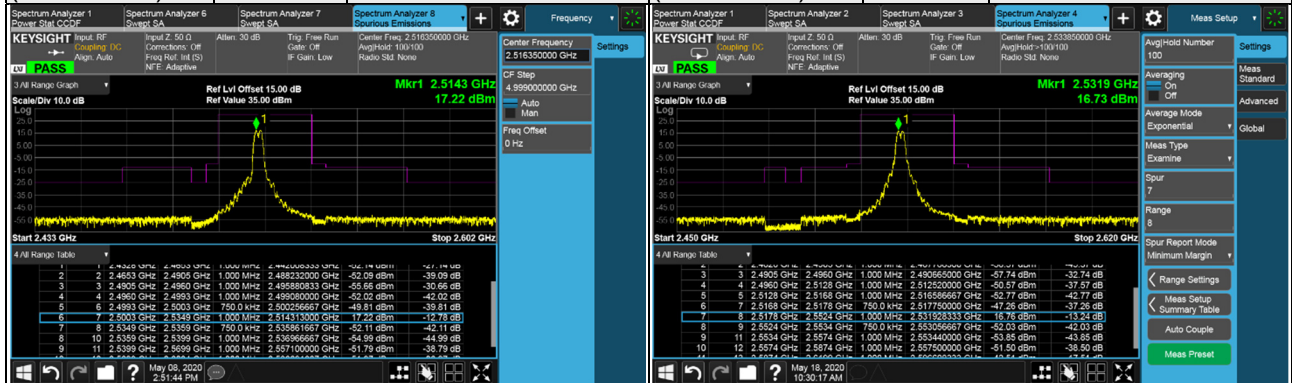
LTE Band 7 (CA 7C)
Emission Mask:

Channel Bandwidth: 15MHz+20MHz

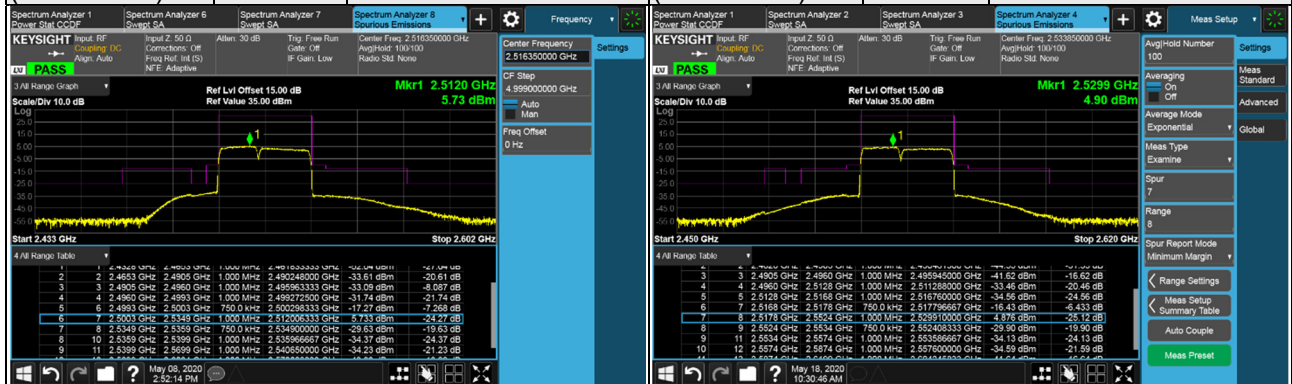
Channel 20828 (2507.8MHz)+ Channel 20999 (2524.9MHz)	256QAM	1 RB / 0 RB Offset+ 1 RB / 99 RB Offset	Channel 21003 (2525.3MHz)+ Channel 21174 (2542.4MHz)	256QAM	1 RB / 0 RB Offset+ 1 RB / 99 RB Offset
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Channel 20828 (2507.8MHz)+ Channel 20999 (2524.9MHz)	256QAM	1 RB / 74 RB Offset+ 1 RB / 0 RB Offset	Channel 21003 (2525.3MHz)+ Channel 21174 (2542.4MHz)	256QAM	1 RB / 74 RB Offset+ 1 RB / 0 RB Offset
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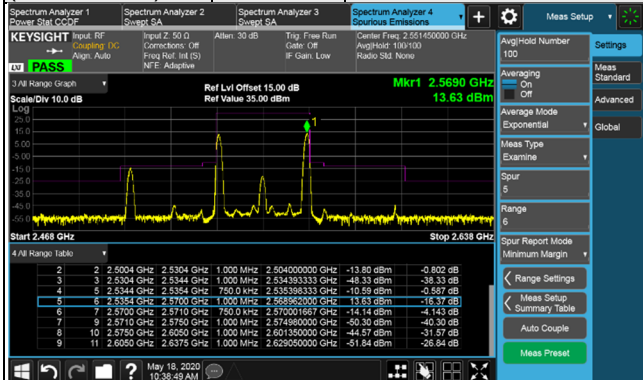


Channel 20828 (2507.8MHz)+ Channel 20999 (2524.9MHz)	256QAM	75 RB / 0 RB Offset 100 RB / 0 RB Offset	Channel 21003 (2525.3MHz)+ Channel 21174 (2542.4MHz)	256QAM	75 RB / 0 RB Offset 100 RB / 0 RB Offset
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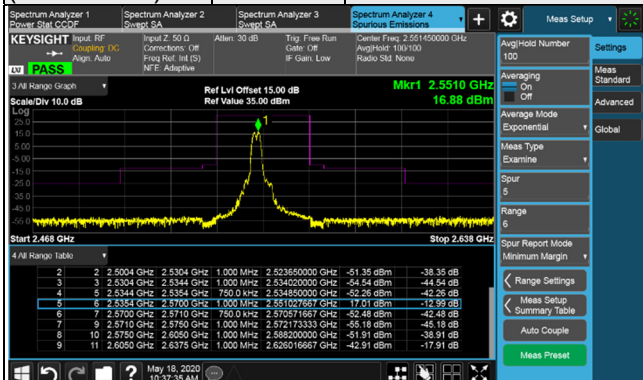


Channel Bandwidth: 15MHz+20MHz

Channel 21179 (2542.9MHz)+
Channel 21350 (2560.0MHz) 256QAM 1 RB / 0 RB Offset+
1 RB / 99 RB Offset



Channel 21179 (2542.9MHz)+
Channel 21350 (2560.0MHz) 256QAM 1 RB / 74 RB Offset+
1 RB / 0 RB Offset



Channel 21179 (2542.9MHz)+
Channel 21350 (2560.0MHz) 256QAM 75 RB / 0 RB Offset
100 RB / 0 RB Offset

