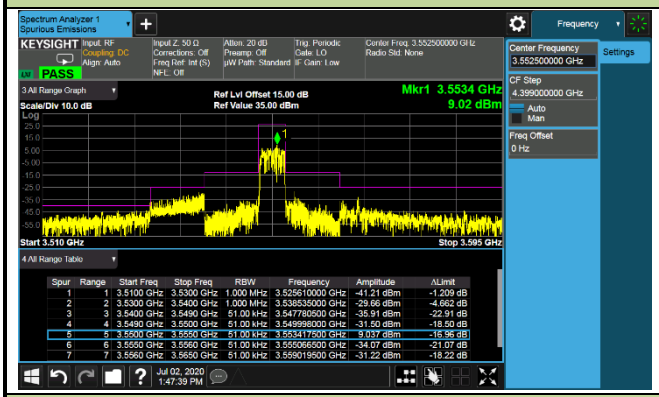
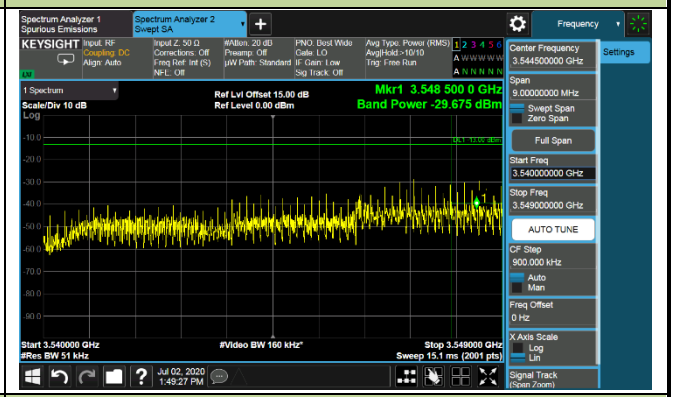
5MHz Channel Bandwidth – Full RB

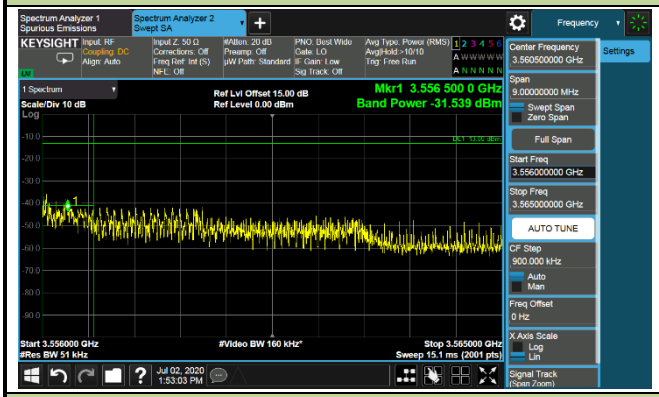
Low Channel ACP



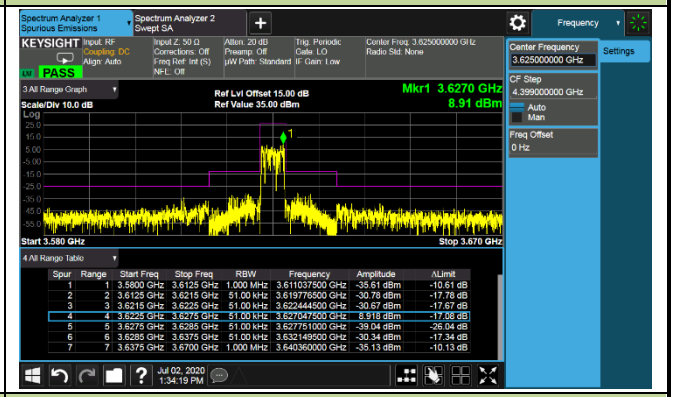
Extended Band Edge



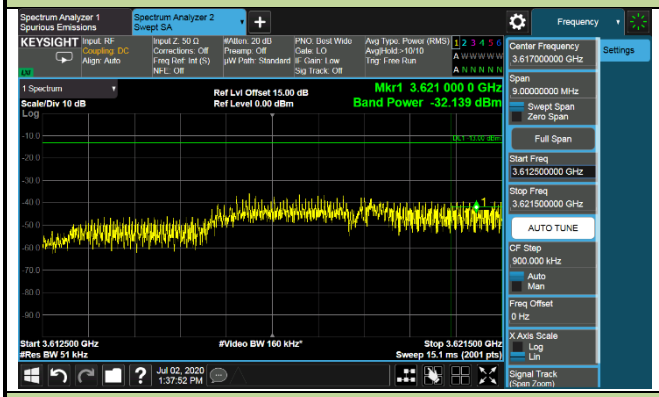
Extended Band Edge



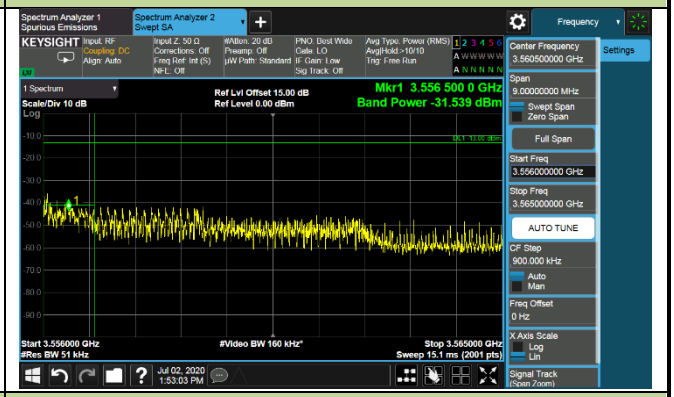
Middle Channel ACP



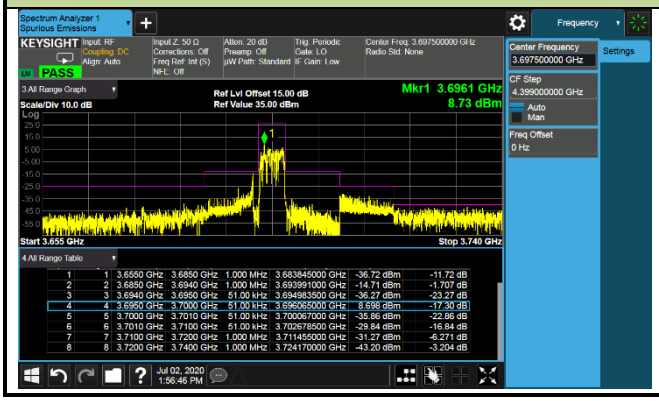
Extended Band Edge



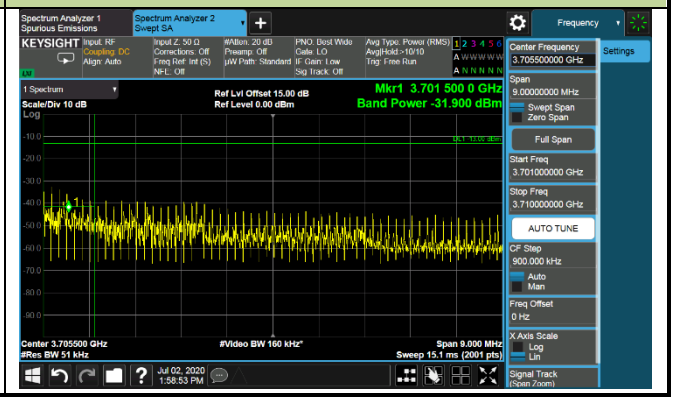
Extended Band Edge



High Channel ACP

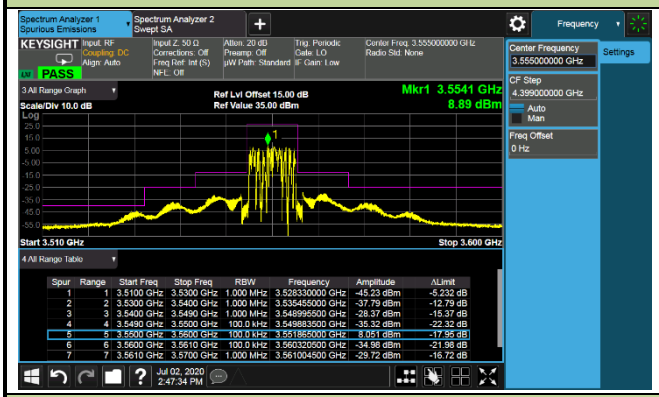


Extended Band Edge

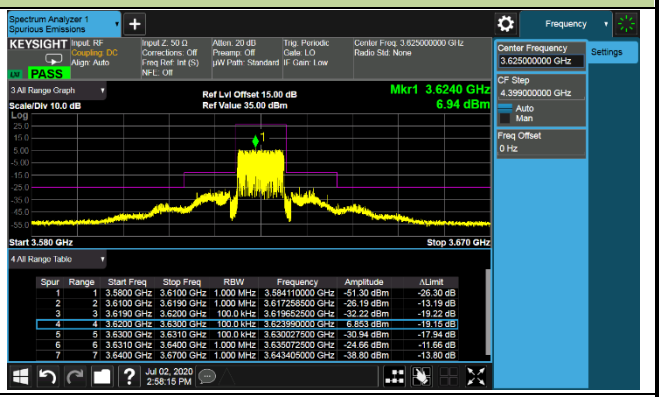


10MHz Channel Bandwidth – Full RB

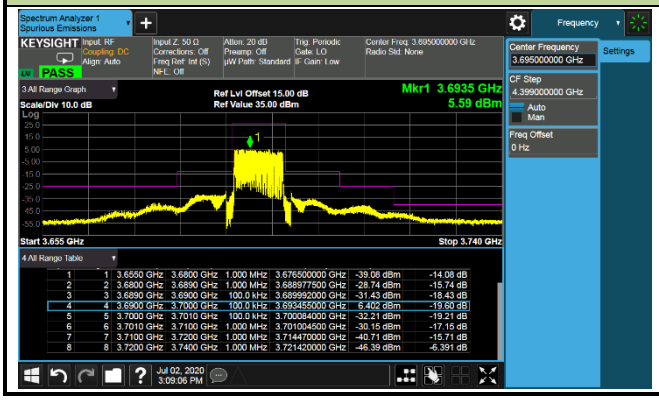
Low Channel ACP



Middle Channel ACP

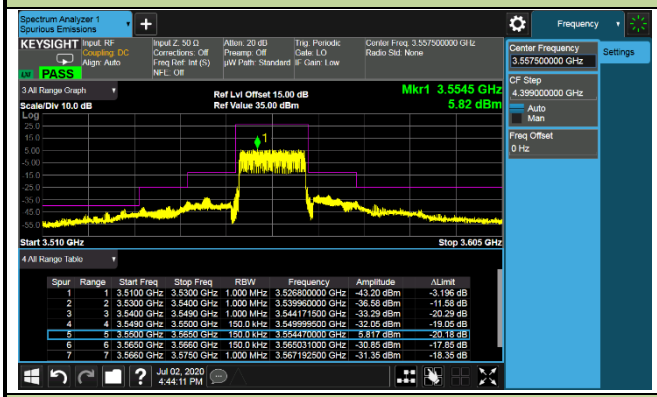


High Channel ACP

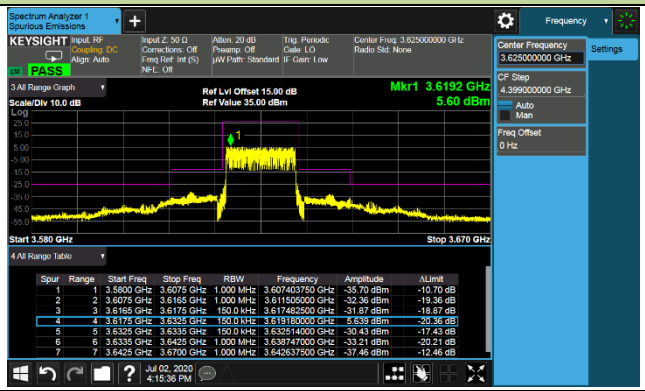


15MHz Channel Bandwidth – Full RB

Low Channel ACP



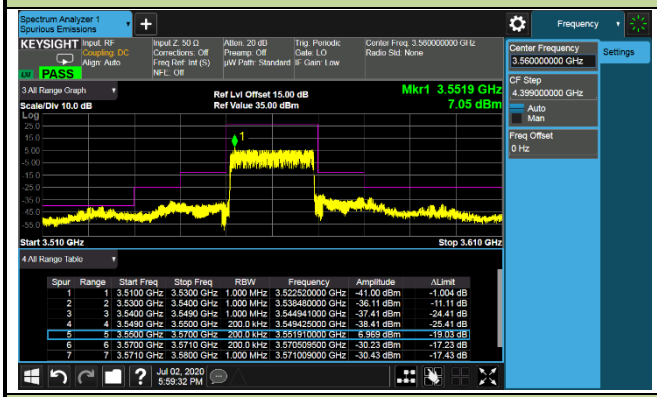
Middle Channel ACP



High Channel ACP

20MHz Channel Bandwidth – Full RB

Low Channel ACP



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	ΔLimit
1	1	3.5100 GHz	3.5300 GHz	1.000 MHz	3.522520000 GHz	-41.00 dBm	-1.004 dB
2	2	3.5300 GHz	3.5400 GHz	1.000 MHz	3.538480000 GHz	-36.11 dBm	-11.11 dB
3	3	3.5400 GHz	3.5490 GHz	1.000 MHz	3.544941000 GHz	-37.41 dBm	-24.41 dB
4	4	3.5490 GHz	3.5500 GHz	200.0 kHz	3.549425000 GHz	-38.41 dBm	-25.41 dB
5	5	3.5500 GHz	3.5700 GHz	200.0 kHz	3.551910000 GHz	6.969 dBm	-19.03 dB
6	6	3.5700 GHz	3.5710 GHz	200.0 kHz	3.570509500 GHz	-30.23 dBm	-17.23 dB
7	7	3.5710 GHz	3.5800 GHz	1.000 MHz	3.571009000 GHz	-30.43 dBm	-17.43 dB

Middle Channel ACP

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	ΔLimit
1	1	3.5800 GHz	3.6050 GHz	1.000 MHz	3.603262500 GHz	-46.38 dBm	-21.38 dB
2	2	3.6050 GHz	3.6140 GHz	1.000 MHz	3.609617000 GHz	-28.84 dBm	-15.84 dB
3	3	3.6140 GHz	3.6150 GHz	200.0 kHz	3.614966000 GHz	-19.68 dBm	-6.676 dB
4	4	3.6150 GHz	3.6350 GHz	200.0 kHz	3.616100000 GHz	22.57 dBm	-3.433 dB
5	5	3.6350 GHz	3.6360 GHz	200.0 kHz	3.635271000 GHz	-47.29 dBm	-34.29 dB
6	6	3.6360 GHz	3.6450 GHz	1.000 MHz	3.636391500 GHz	-51.33 dBm	-38.33 dB
7	7	3.6450 GHz	3.6700 GHz	1.000 MHz	3.669300000 GHz	-50.43 dBm	-25.43 dB

High Channel ACP

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	ΔLimit
1	1	3.6550 GHz	3.6700 GHz	1.000 MHz	3.668305000 GHz	-30.96 dBm	-5.964 dB
2	2	3.6700 GHz	3.6790 GHz	1.000 MHz	3.678829000 GHz	-29.62 dBm	-16.62 dB
3	3	3.6790 GHz	3.6800 GHz	200.0 kHz	3.679931500 GHz	-31.78 dBm	-18.78 dB
4	4	3.6800 GHz	3.7000 GHz	200.0 kHz	3.693610000 GHz	5.251 dBm	-20.75 dB
5	5	3.7000 GHz	3.7010 GHz	200.0 kHz	3.700416500 GHz	-34.67 dBm	-21.67 dB
6	6	3.7010 GHz	3.7100 GHz	1.000 MHz	3.701301500 GHz	-32.14 dBm	-19.14 dB
7	7	3.7100 GHz	3.7200 GHz	1.000 MHz	3.711735000 GHz	-35.43 dBm	-10.43 dB

5.6. Conducted Spurious Emissions

5.6.1. 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 10th 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 conducted power of any emissions below 3530MHz or above 3720MHz shall not exceed -40dBm/MHz.

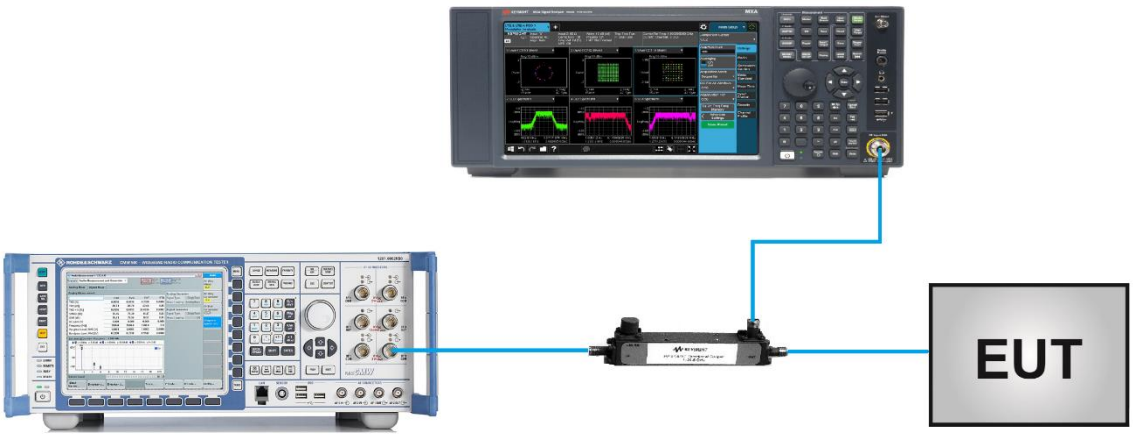
5.6.2. Test Procedure Used

ANSI C63.26-2015 - Section 5.7

5.6.3. Test Setting

1. Set the analyzer frequency to low, mid, high channel.
2. RBW = 1MHz
3. VBW ≥ 3*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.

5.6.4. Test Setup



5.6.5. Test Result

Product	LTE-A Cat 12 M.2 Module	Test Engineer	Candy Luo
Test Date	2020/07/13	Test Site	TR3

Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm/MHz)	Limit (dBm/ MHz)	Result
QPSK						
55265	3552.5	5	30 ~ 40000	-47.21	≤ -40.00	Pass
55900	3625.0	5	30 ~ 40000	-53.51	≤ -40.00	Pass
56715	3697.5	5	30 ~ 40000	-51.72	≤ -40.00	Pass
55290	3555.0	10	30 ~ 40000	-52.77	≤ -40.00	Pass
55900	3625.0	10	30 ~ 40000	-50.71	≤ -40.00	Pass
56690	3695.0	10	30 ~ 40000	-53.84	≤ -40.00	Pass
55315	3557.5	15	30 ~ 40000	-50.67	≤ -40.00	Pass
55900	3625.0	15	30 ~ 40000	-53.02	≤ -40.00	Pass
56665	3692.5	15	30 ~ 40000	-49.28	≤ -40.00	Pass
55340	3550.0	20	30 ~ 40000	-51.61	≤ -40.00	Pass
55900	3625.0	20	30 ~ 40000	-52.39	≤ -40.00	Pass
56640	3690.0	20	30 ~ 40000	-49.22	≤ -40.00	Pass

5MHz Channel Bandwidth

Channel 55265 (3552.5MHz)

Channel 55900 (3625.0MHz)

Channel 56715 (3697.5MHz)

10MHz Channel Bandwidth

Channel 55290 (3555.0MHz)

Channel 55900 (3625.0MHz)

Channel 56690 (3695.0Hz)

15MHz Channel Bandwidth

Channel 55315 (3557.5MHz)

Channel 55900 (3625.0MHz)

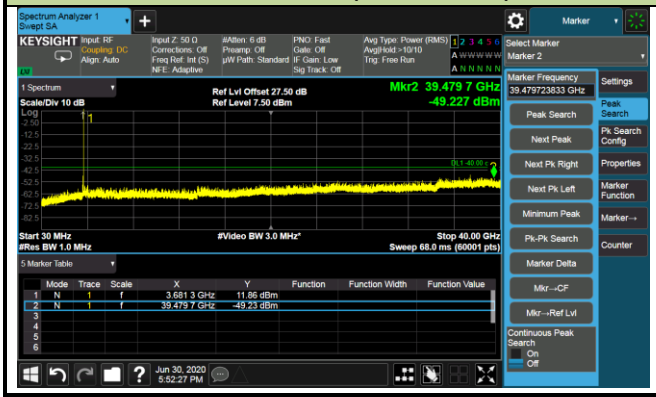
Channel 56665 (3692.5Hz)

20MHz Channel Bandwidth

Channel 55340 (3550.0MHz)

Channel 38000 (3625.0MHz)

Channel 56640(3690.0MHz)



5.7. Radiated Spurious Emissions Measurements

5.7.1. Test Limit

Out of band emissions: The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

E (dBμV/m) = EIRP (dBm) - 20 log D + 104.8; where D is the measurement distance in meters. The emission limit equal to 55.3dBμV/m.

5.7.2. Test Procedure Used

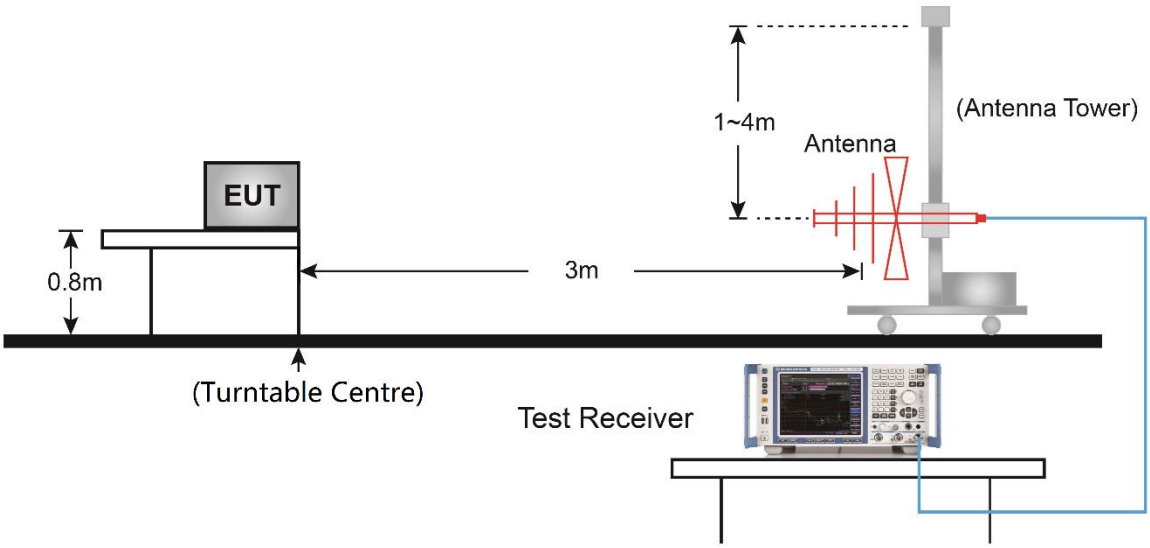
ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.7.3. Test Setting

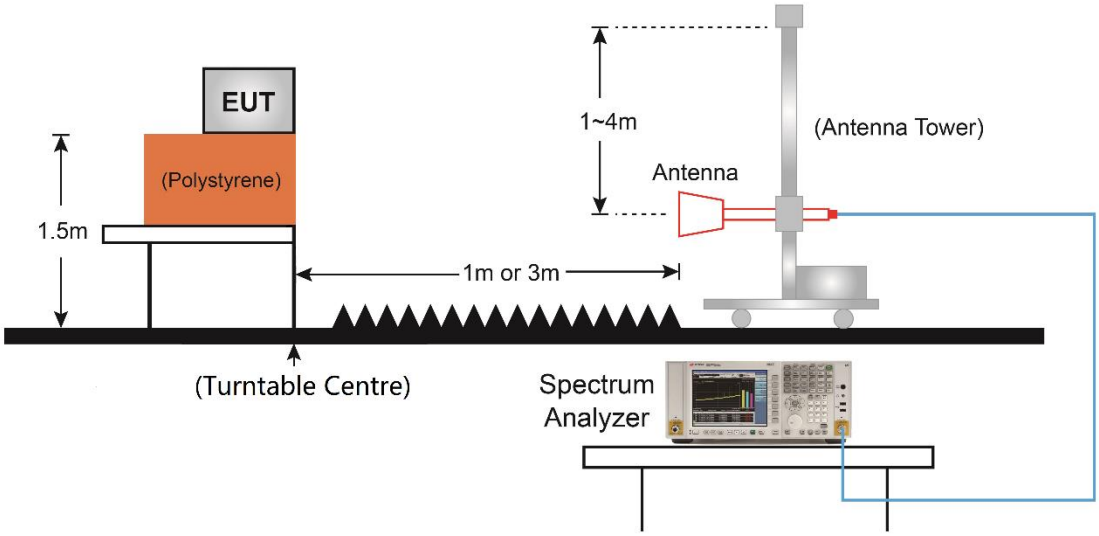
1. RBW = 1MHz
2. VBW ≥ 3*RBW
3. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

5.7.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



5.7.5. Test Result

Product	LTE-A Cat 12 M.2 Module	Test Engineer	Buter Shi
Test Date	2020/07/13	Test Site	AC1
Test Mode	LTE Band 48 - 5MHz Bandwidth, 1RB, QPSK		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Bottom CH 55265 (3552.5MHz)							
36.3	29.2	13.5	42.7	52.3	-9.6	Peak	Horizontal
409.3	24.4	17.4	41.9	52.3	-10.4	Peak	Horizontal
35.8	30.2	13.5	43.6	52.3	-8.7	Peak	Vertical
413.6	24.6	17.5	42.2	52.3	-10.1	Peak	Vertical
4000.5	37.0	3.4	40.4	52.3	-11.9	Peak	Horizontal
4663.5	35.4	5.2	40.6	52.3	-11.7	Peak	Horizontal
4561.5	36.0	5.1	41.1	52.3	-11.2	Peak	Vertical
4927.0	35.3	6.2	41.5	52.3	-10.8	Peak	Vertical
Middle CH 55900 (3625.0MHz)							
365.6	23.9	16.4	40.2	52.3	-12.1	Peak	Horizontal
407.3	24.3	17.4	41.8	52.3	-10.5	Peak	Horizontal
35.8	29.0	13.5	42.5	52.3	-9.8	Peak	Vertical
408.3	23.7	17.4	41.2	52.3	-11.1	Peak	Vertical
5088.5	36.6	6.5	43.1	52.3	-9.2	Peak	Horizontal
5479.5	35.8	6.5	42.3	52.3	-10.0	Peak	Horizontal
4187.5	37.2	3.7	40.9	52.3	-11.4	Peak	Vertical
4969.5	35.3	6.1	41.4	52.3	-10.9	Peak	Vertical
Top CH 56715 (3697.5MHz)							
407.3	24.7	17.4	42.1	52.3	-10.2	Peak	Horizontal
882.6	16.4	25.6	42.0	52.3	-10.3	Peak	Horizontal
365.6	23.6	16.4	40.0	52.3	-12.3	Peak	Vertical
406.4	23.8	17.4	41.2	52.3	-11.1	Peak	Vertical
5173.5	37.3	6.5	43.8	52.3	-8.5	Peak	Horizontal
5964.0	37.9	6.9	44.8	52.3	-7.5	Peak	Horizontal
5173.5	37.3	6.5	43.8	52.3	-8.5	Peak	Vertical
5964.0	37.9	6.9	44.8	52.3	-7.5	Peak	Vertical

5.8. End User Device Additional Requirement (CBSD Protocol)

5.8.1. Test Limit

End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.

An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD

5.8.2. Test Procedure Used

KDB 940660 D01 v02, WINNF-TS-0122 V1.0.0

5.8.3. Test Setting

The EUT was connected via an RF cable to a certified CBSD (Ruckus Wireless, Inc. FCC ID: S9GQ910US00) and spectrum analyzer. The following procedure is performed by applying WINNF-TS-0122 CBRS CBSD Test Specification.

Step 1:

a. Setup WINNF.PT.C.HBT.1 with 3570 ~ 3590MHz and power level at 13 dBm/MHz.

b. Enable AP service from Ruckus LTE Cloud management.

c. Check EUT Tx frequency and power.

d. Disable AP service from Ruckus LTE Cloud management and check EUT stop transmission within 10s.

Step 2:

a. Setup WINNF.PT.C.HBT.1 with 3670 ~ 3690MHz and power level at 8 dBm/MHz.

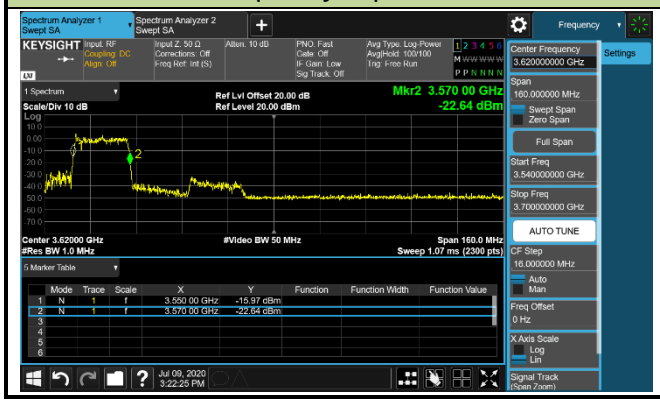
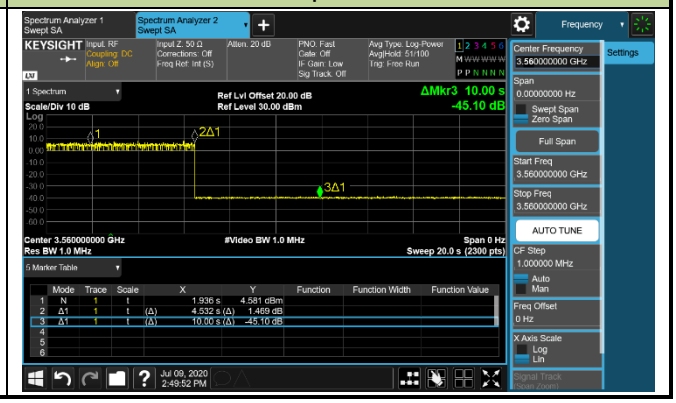
b. Enable AP service from Ruckus LTE Cloud management.

c. Check EUT Tx frequency and power.

d. Disable AP service from Ruckus LTE Cloud management and check EUT stop transmission within 10s.

5.8.4. Test Result

Product	LTE-A Cat 12 M.2 Module	Test Engineer	Larry Yan
Test Date	2020/07/09	Test Site	TR3
Test Mode	CBSD transmit at 3560MHz (20MHz BW), 13dBm/MHz		

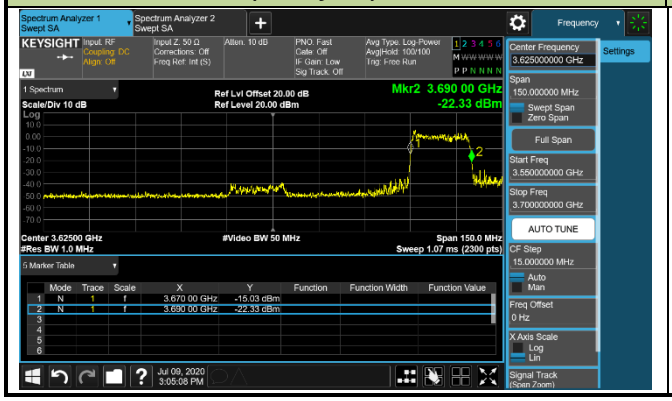
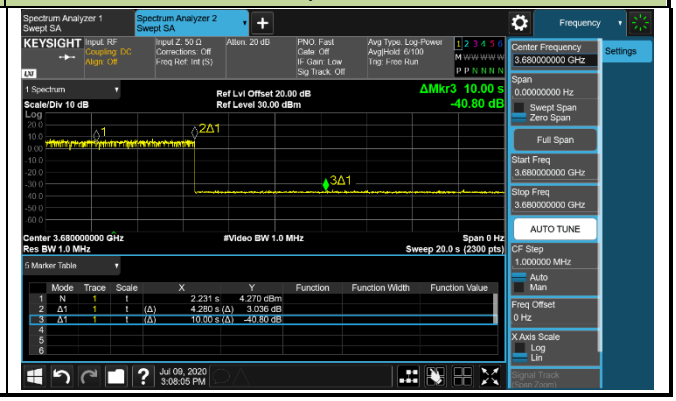
Frequency Operation	Discontinues Operations within 10s
	

Marker 1: CBSD sends instructions to discontinue LTE operations.

Marker 2: EUT discontinues operation.

Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

Product	LTE-A Cat 12 M.2 Module	Test Engineer	Larry Yan
Test Date	2020/07/09	Test Site	TR3
Test Mode	CBSD transmit at 3680MHz (20MHz BW), 8dBm/MHz		

Frequency Operation	Discontinues Operations within 10s
	

Marker 1: CBSD sends instructions to discontinue LTE operations.

Marker 2: EUT discontinues operation.

Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

6. CONCLUSION

The data collected relate only the item(s) tested and show that unit is compliance with FCC Rules.

The End

Appendix A - Test Setup Photograph

Refer to “2006RSU085-UT” file.

Appendix B - EUT Photograph

Refer to “2006RSU085-UE” file.