

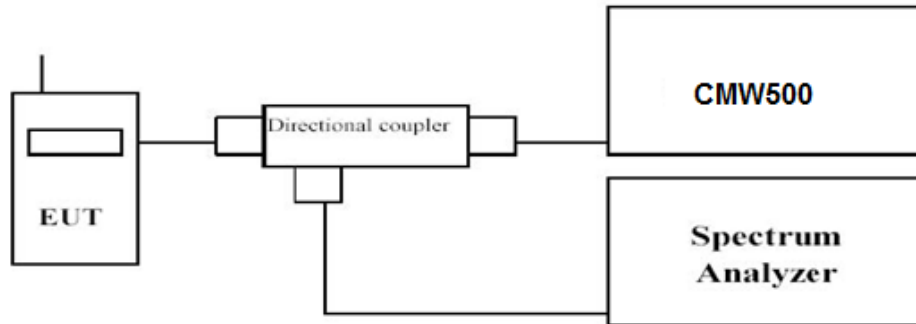


4.3 Occupied Bandwidth and Emission Bandwidth

LIMIT

N/A

TEST CONFIGURATION



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 low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded. Set RBW was set to about 1% of emission BW, VBW ≥ 3 times RBW. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

EUT :	4G module	Test Date:	May. 20, 2022
Temperature:	25°C	Tested by:	Gary Qian
Humidity:	55 % RH	Test Voltage	Normal Voltage
Operation Mode:	Normal Voltage- Tx Mode		

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 7; recorded worst case for each Channel Bandwidth of LTE Band 7.

LTE Band 7						
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	99% Occupied bandwidth (MHz)		-26dBc Emission bandwidth (MHz)	
			QPSK	16QAM	QPSK	16QAM
5 MHz	25RB#0	2502.5	4.5185	4.5089	4.983	4.971
		2535	4.5057	4.5402	4.974	5.039
		2567.5	4.5201	4.5061	4.975	4.971
10 MHz	50RB#0	2505	9.0019	8.9885	9.900	9.924
		2535	8.9975	9.0144	9.919	9.933
		2565	8.9842	8.9781	9.841	9.887
15 MHz	75RB#0	2507.5	13.520	13.512	15.02	14.98
		2535	13.491	13.511	15.00	14.91
		2562.5	13.511	13.500	14.92	14.93
20 MHz	100RB#0	2510	18.020	18.077	19.69	19.70
		2535	18.019	17.981	19.72	19.71
		2560	18.039	18.046	19.66	19.70

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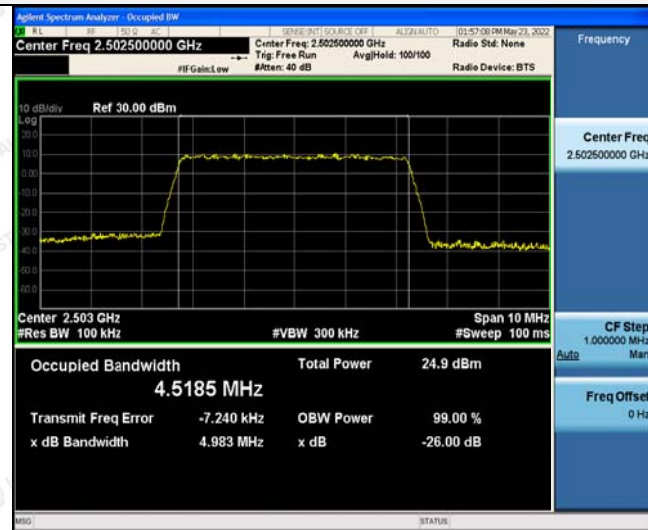


LTE Band 7-5MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

QPSK

16QAM

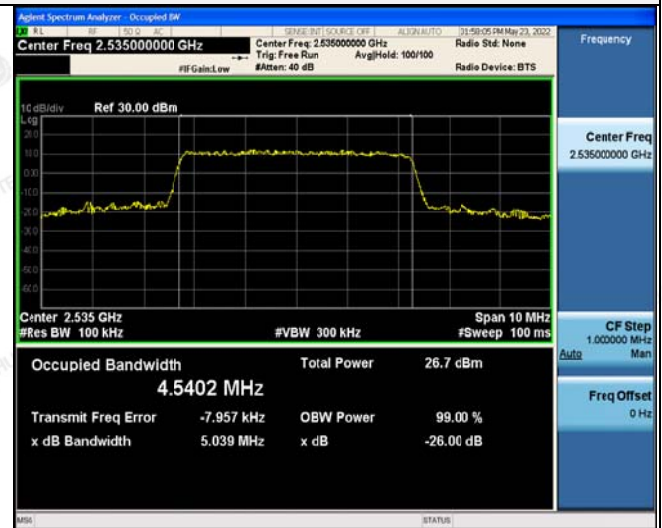
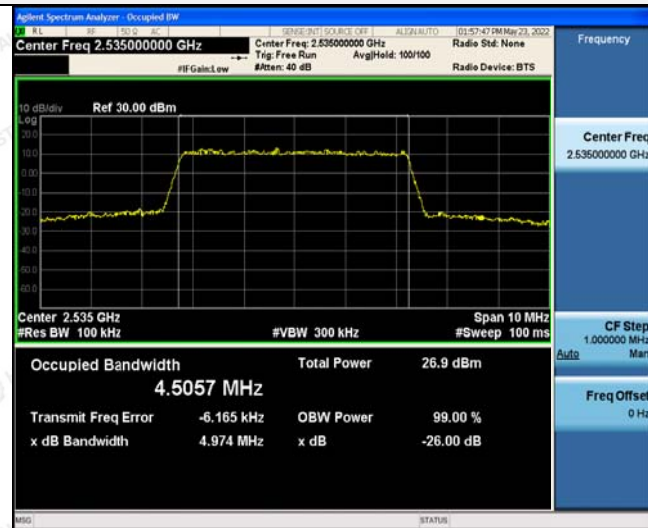
Low Channel



25RB#0

25RB#0

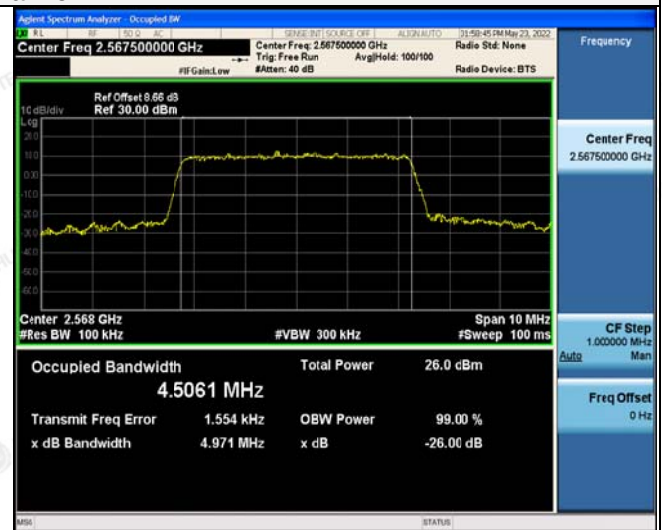
Middle Channel



25RB#0

25RB#0

High Channel



25RB#0

25RB#0

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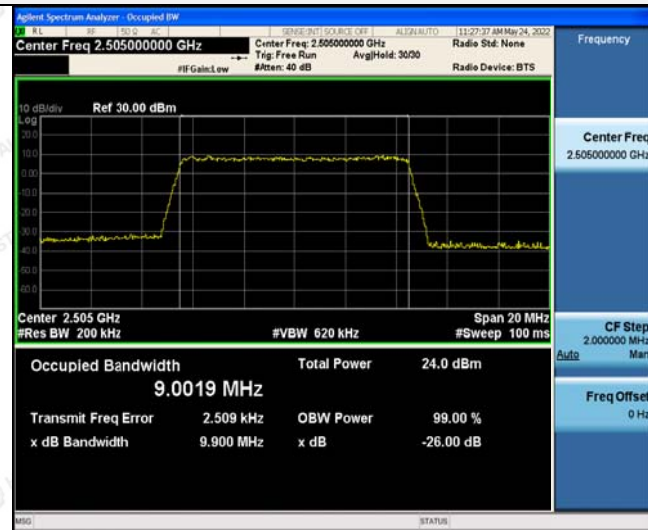


LTE Band 7-10MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

QPSK

16QAM

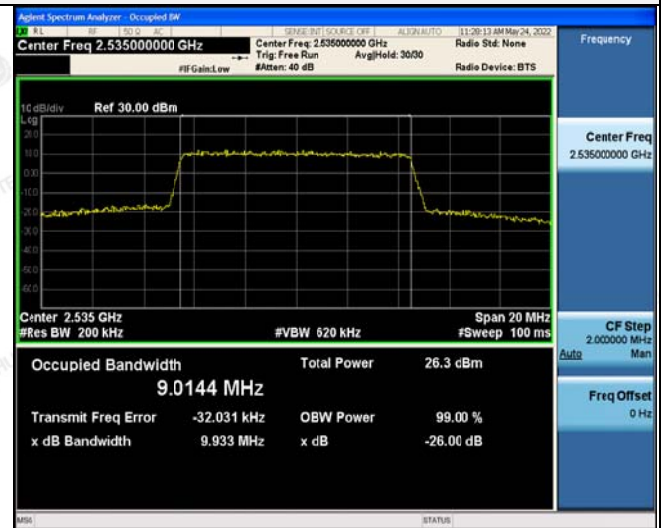
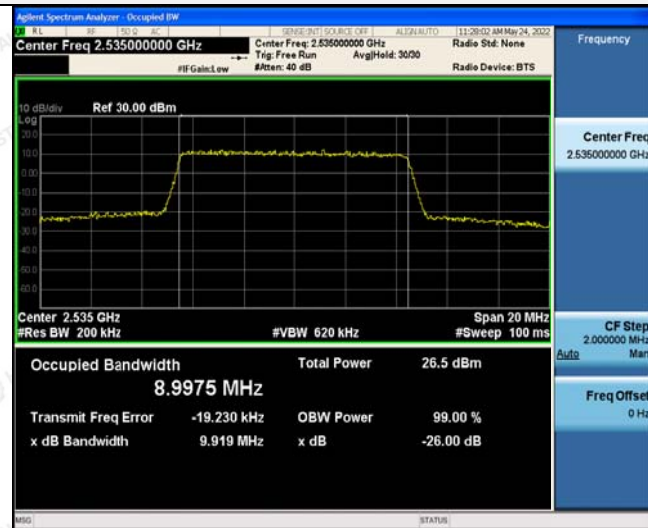
Low Channel



50RB#0

50RB#0

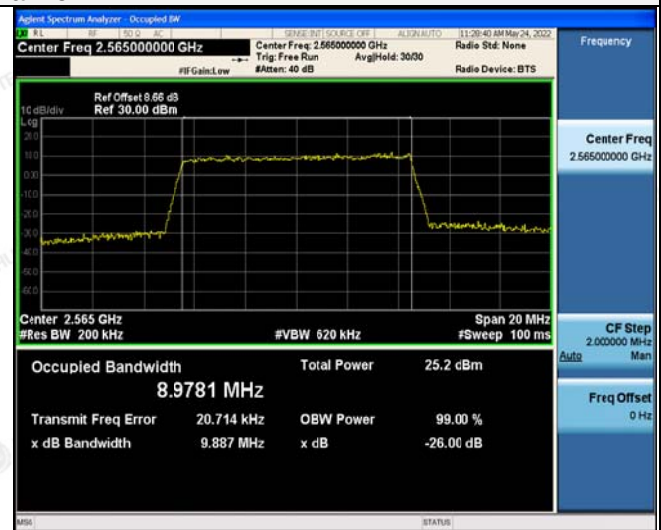
Middle Channel



50RB#0

50RB#0

High Channel



50RB#0

50RB#0

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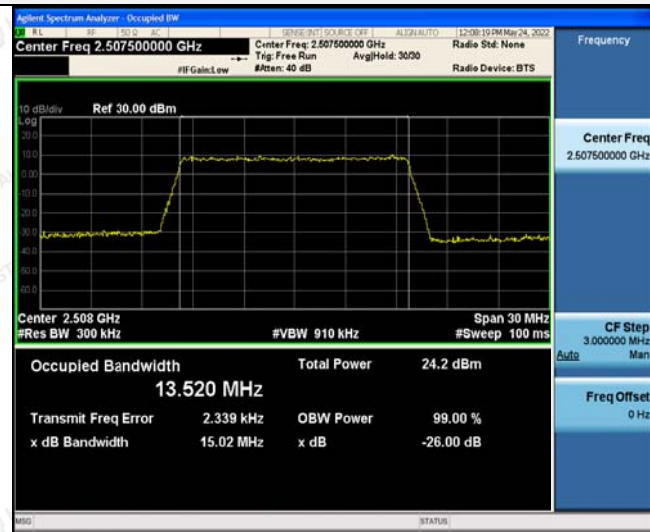


LTE Band 7-15MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

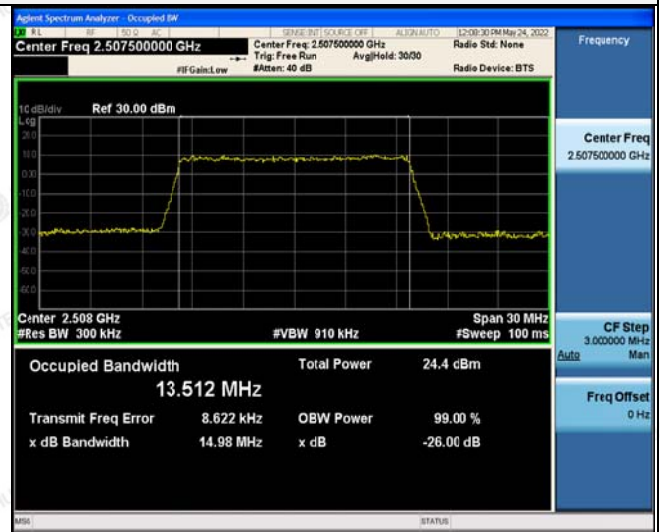
QPSK

16QAM

Low Channel

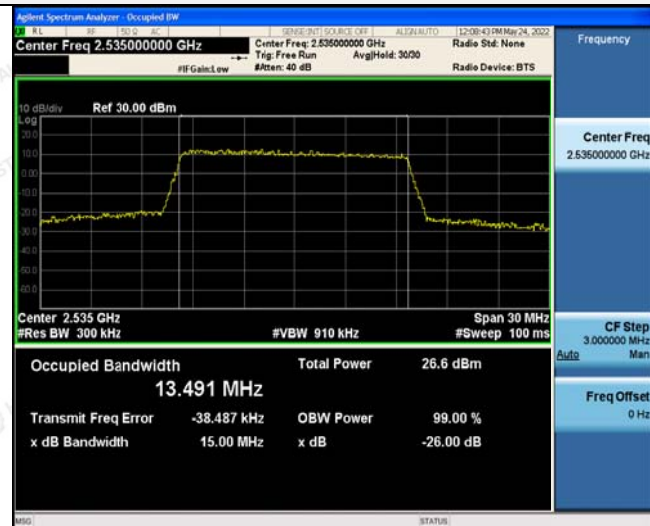


75RB#0

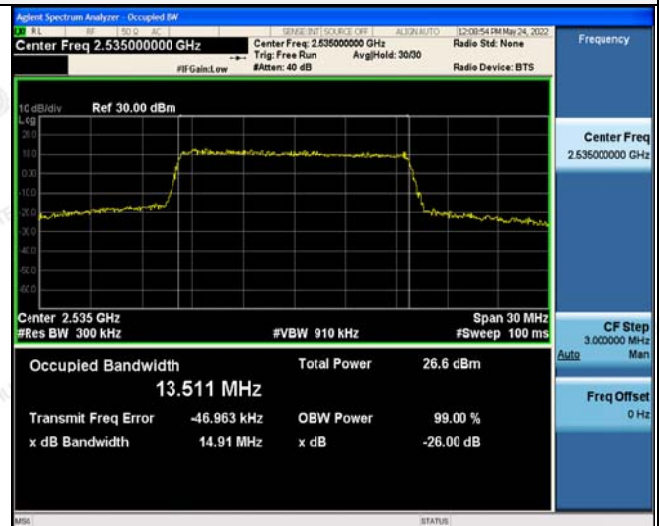


75RB#0

Middle Channel

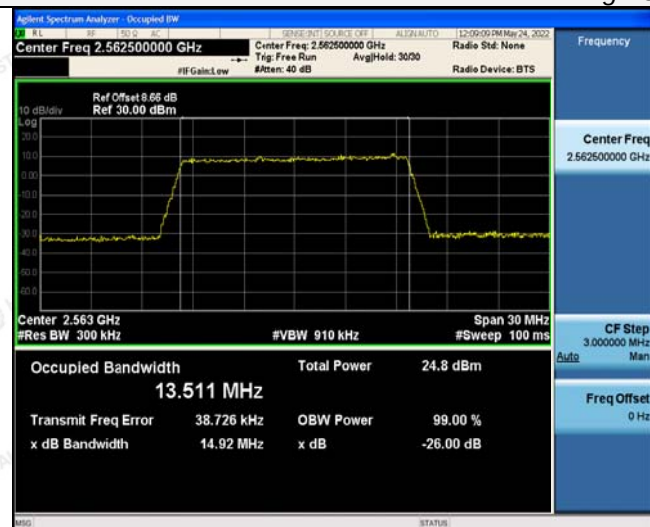


75RB#0



75RB#0

High Channel



75RB#0



75RB#0

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LTE Band 7-20MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth

QPSK

16QAM

Low Channel



100RB#0

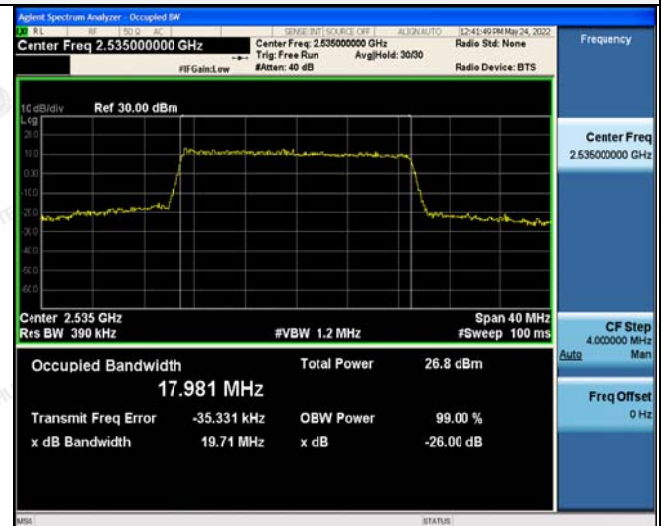


100RB#0

Middle Channel



100RB#0

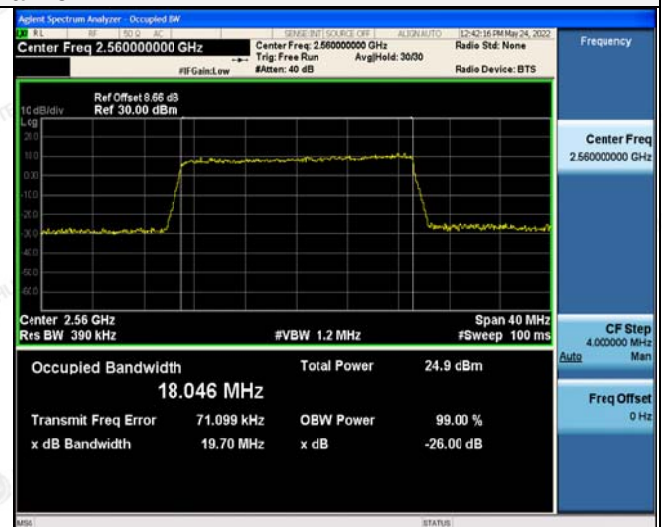


100RB#0

High Channel



100RB#0



100RB#0

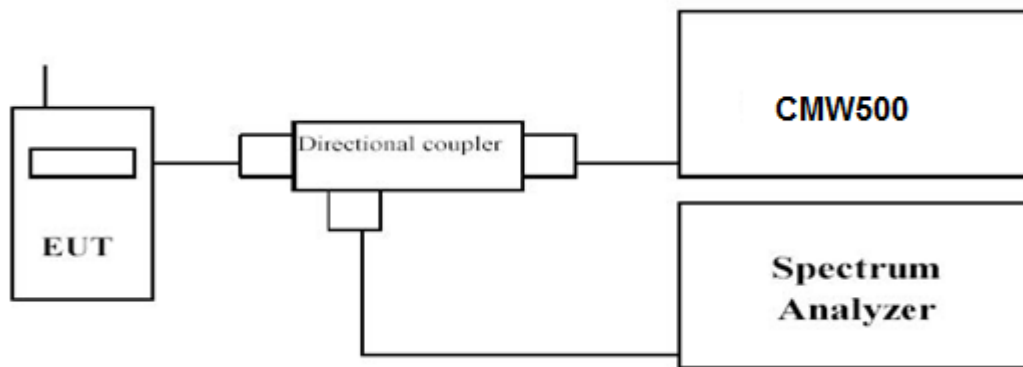


4.4 Band Edge compliance

LIMIT

the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $40 + 10 \log P$ dB (-10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log P$ dB (-13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log P$ dB (-25 dBm, 3 nW) on all frequencies more than 20 MHz from the channel edge, where X MHz is the greater of 6 MHz or the actual emission bandwidth (26 dB).

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest and highest channels for each band and different modulation.
5. Measure Band edge using RMS (Average) detector by spectrum
6. Set RBW = 100 kHz, VBW= 300 kHz, Span= 50 MHz Peak Detector.

TEST RESULTS

EUT :	4G module	Test Date:	May. 20, 2022
Temperature:	25°C	Tested by:	Gary Qian
Humidity:	55% RH	Test Voltage	Normal Voltage
Operation Mode:	Normal Voltage- Tx Mode		

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 7; recorded worst case for each Channel Bandwidth of LTE Band 7.

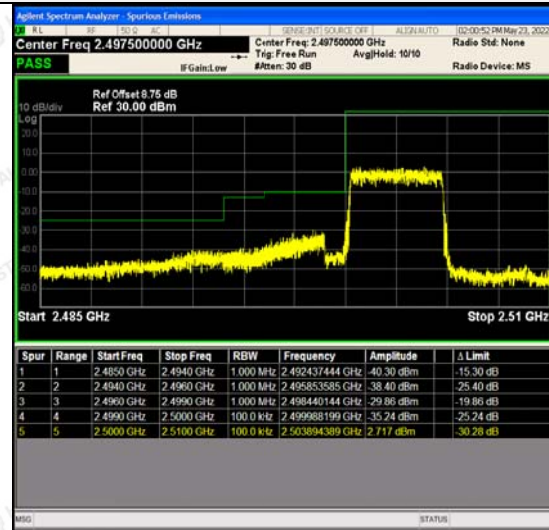


LTE Band 7-5MHz Channel Bandwidth Band Edge Compliance

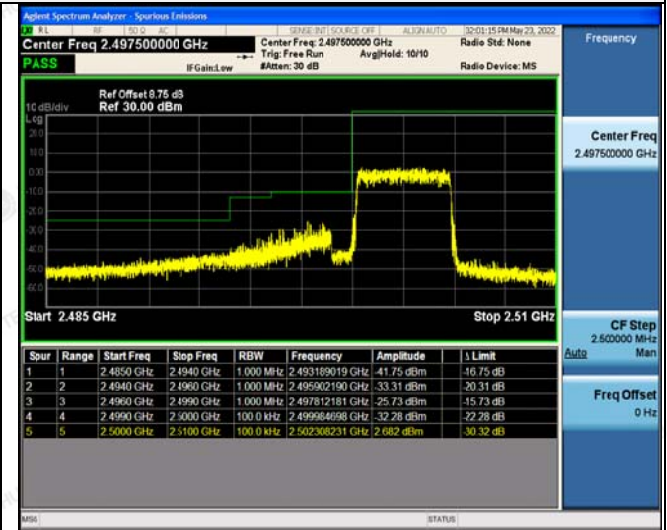
QPSK

16QAM

Low Channel

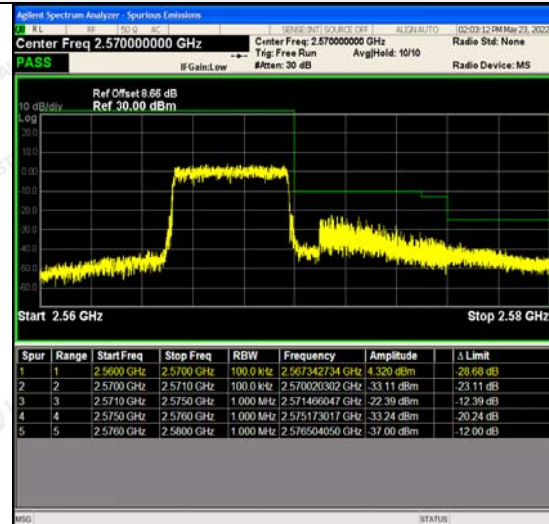


25RB#0

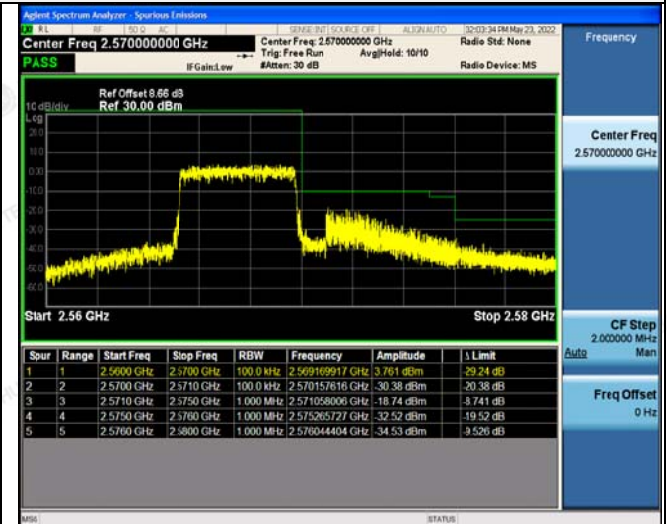


25RB#0

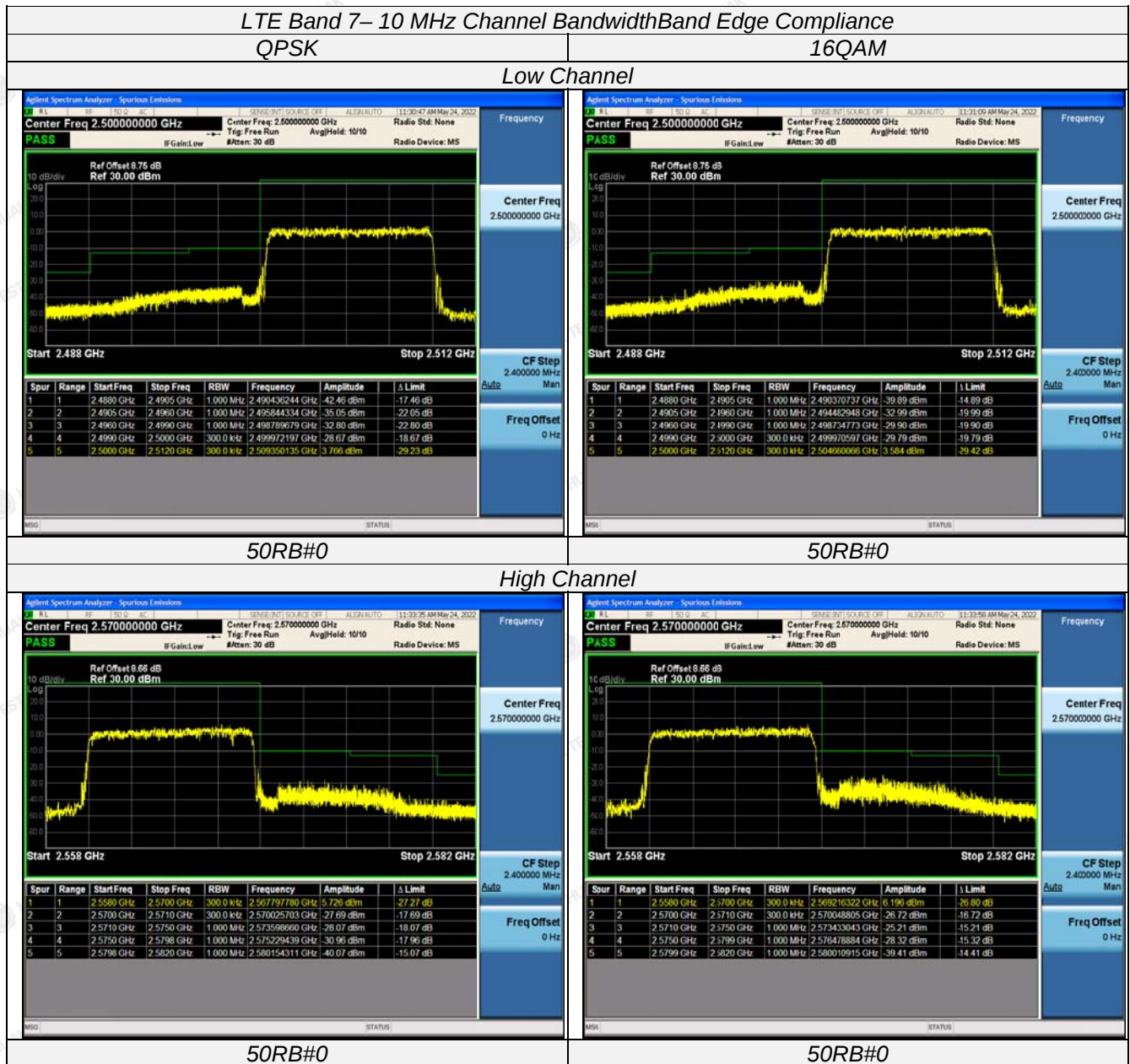
High Channel



25RB#0



25RB#0



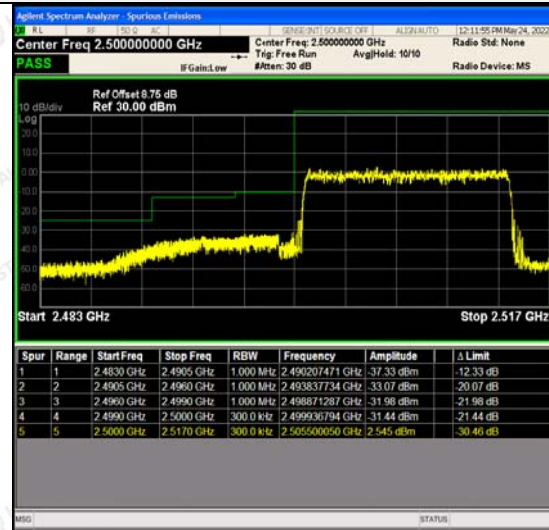


LTE Band 7-15MHz Channel Bandwidth Band Edge Compliance

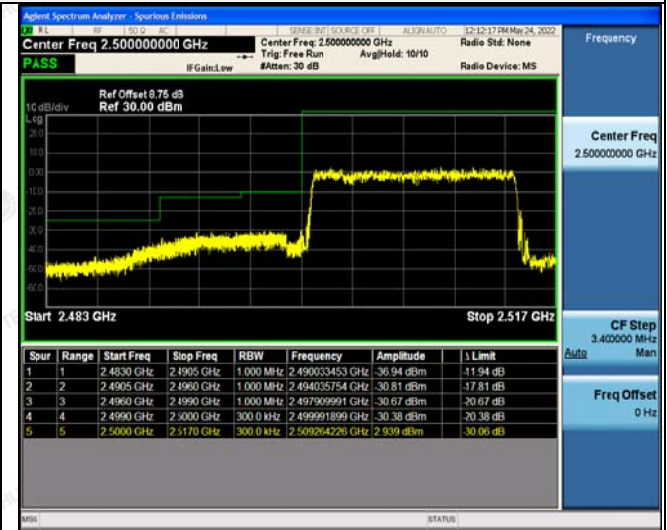
QPSK

16QAM

Low Channel

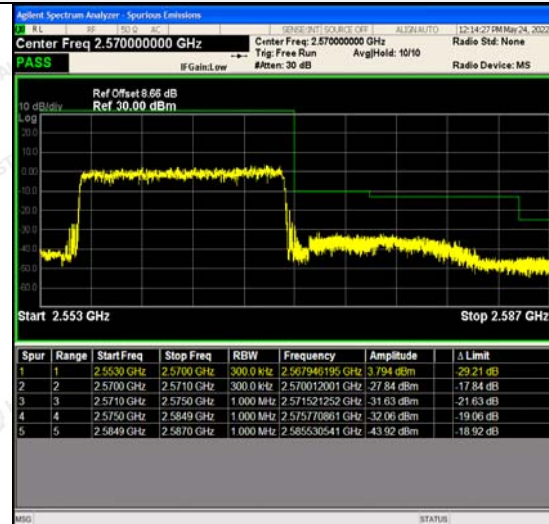


75RB#0

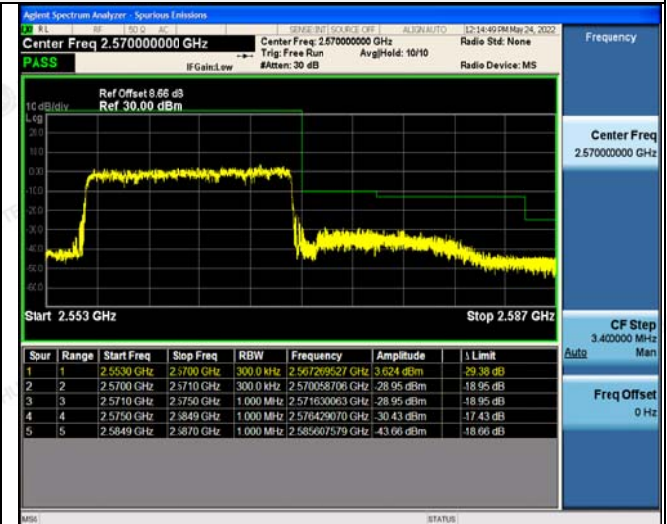


75RB#0

High Channel



75RB#0



75RB#0

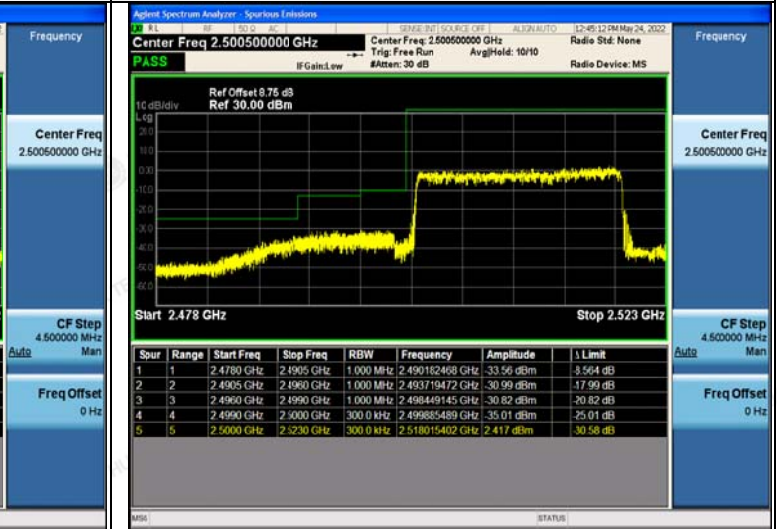
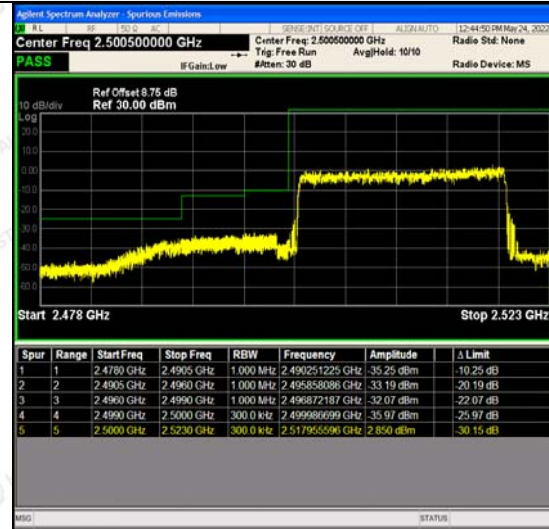


LTE Band 7-20MHz Channel Bandwidth Band Edge Compliance

QPSK

16QAM

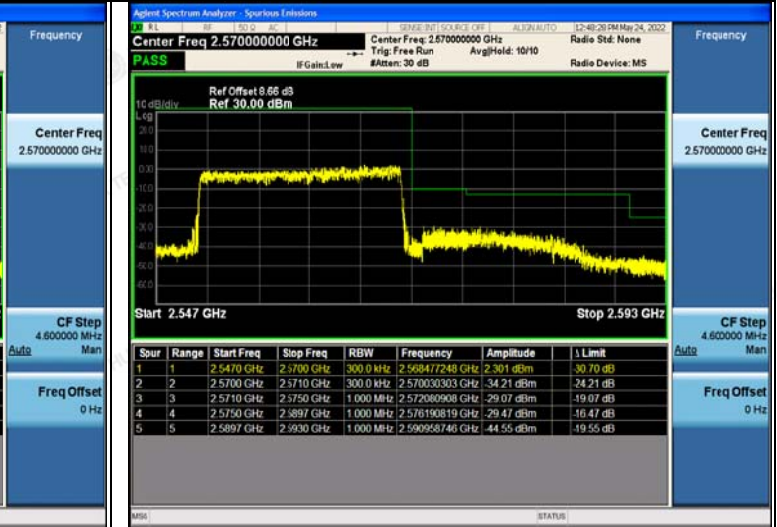
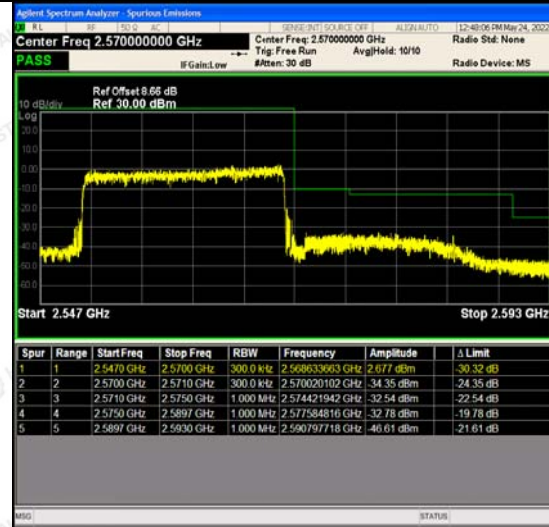
Low Channel



100RB#0

100RB#0

High Channel



100RB#0

100RB#0

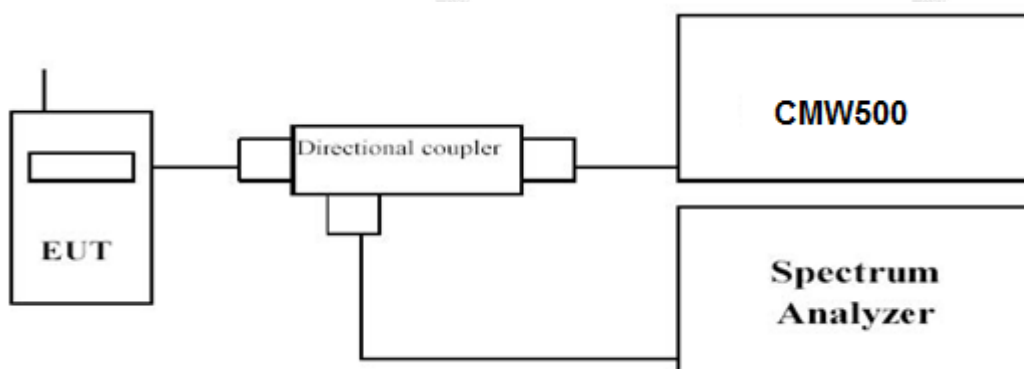


4.5 Spurious Emission on Antenna Port

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $40 + 10 \log P$ dB (−10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log P$ dB (−13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log P$ dB (−25 dBm, 3 nW) on all frequencies more than 20 MHz from the channel edge, where X MHz is the greater of 6 MHz or the actual emission bandwidth (26 dB).

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Coupler.
- EUT Communicate with CMW500, then select a channel for testing.
- Add a correction factor to the display of spectrum, and then test.
- The resolution bandwidth of the spectrum analyzer was set sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.
- Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE Band 7	0.03~26.5	1 MHz	3 MHz	Auto

TEST RESULTS

EUT :	4G module	Test Date:	May. 20, 2022
Temperature:	25°C	Tested by:	Gary Qian
Humidity:	55 % RH	Test Voltage	Normal Voltage
Operation Mode:	Normal Voltage- Tx Mode		

Remark:

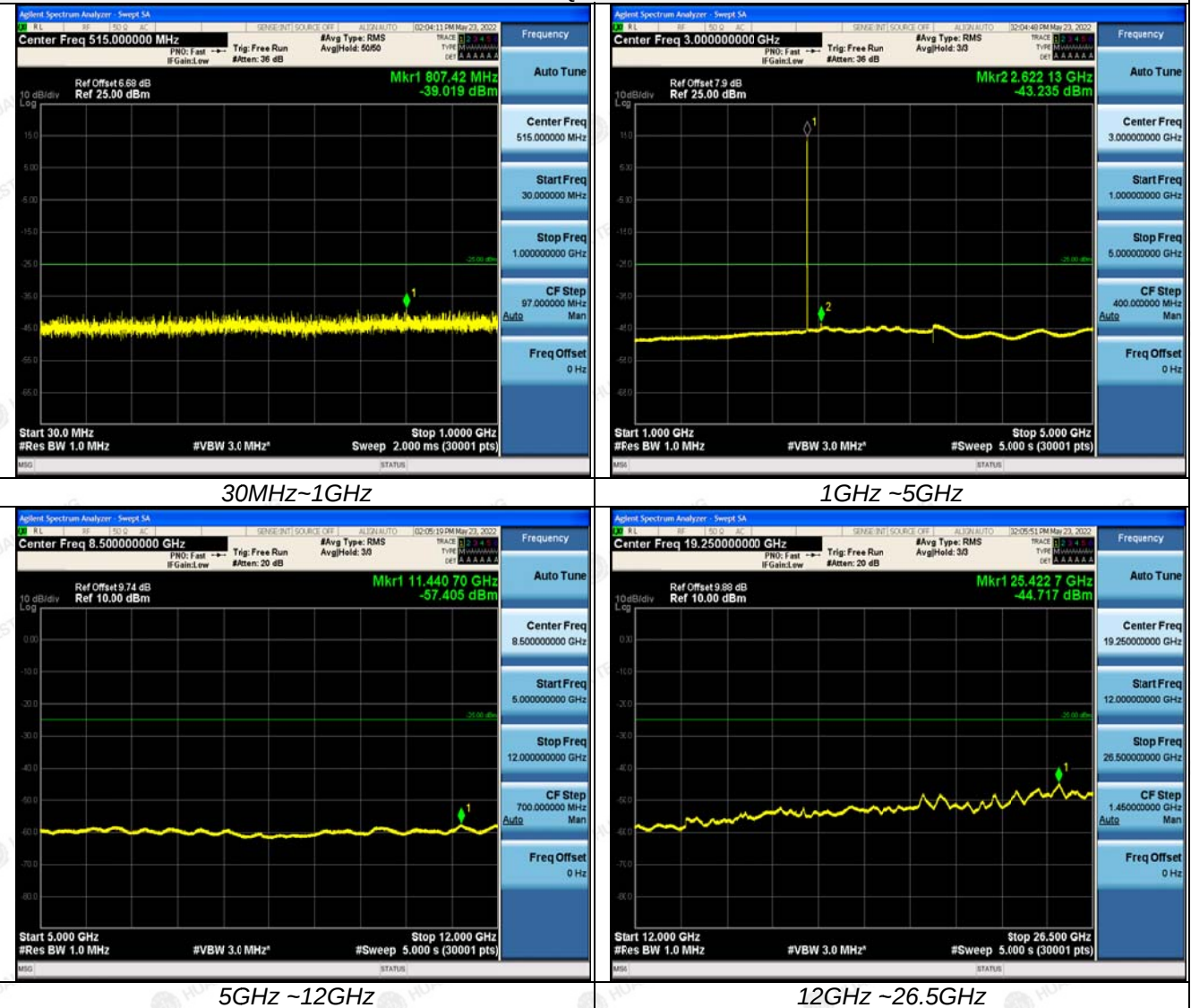
- We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 7; recorded worst case at the QPSK Mode for each Channel Bandwidth of LTE Band 7



LTE Band 7-5 MHz Channel Bandwidth

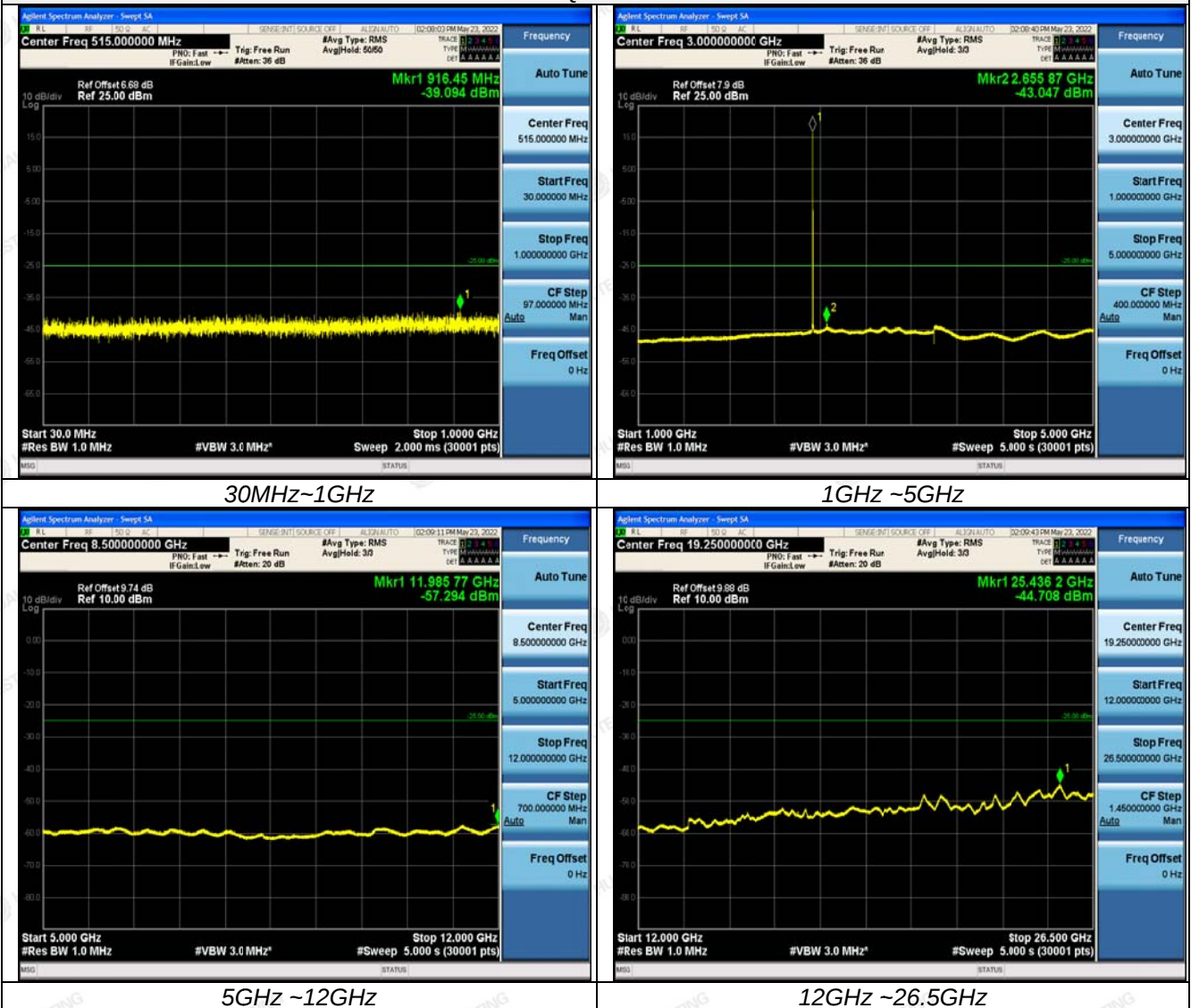
Low Channel

QPSK





LTE Band 7-5 MHz Channel Bandwidth
Middle Channel
QPSK

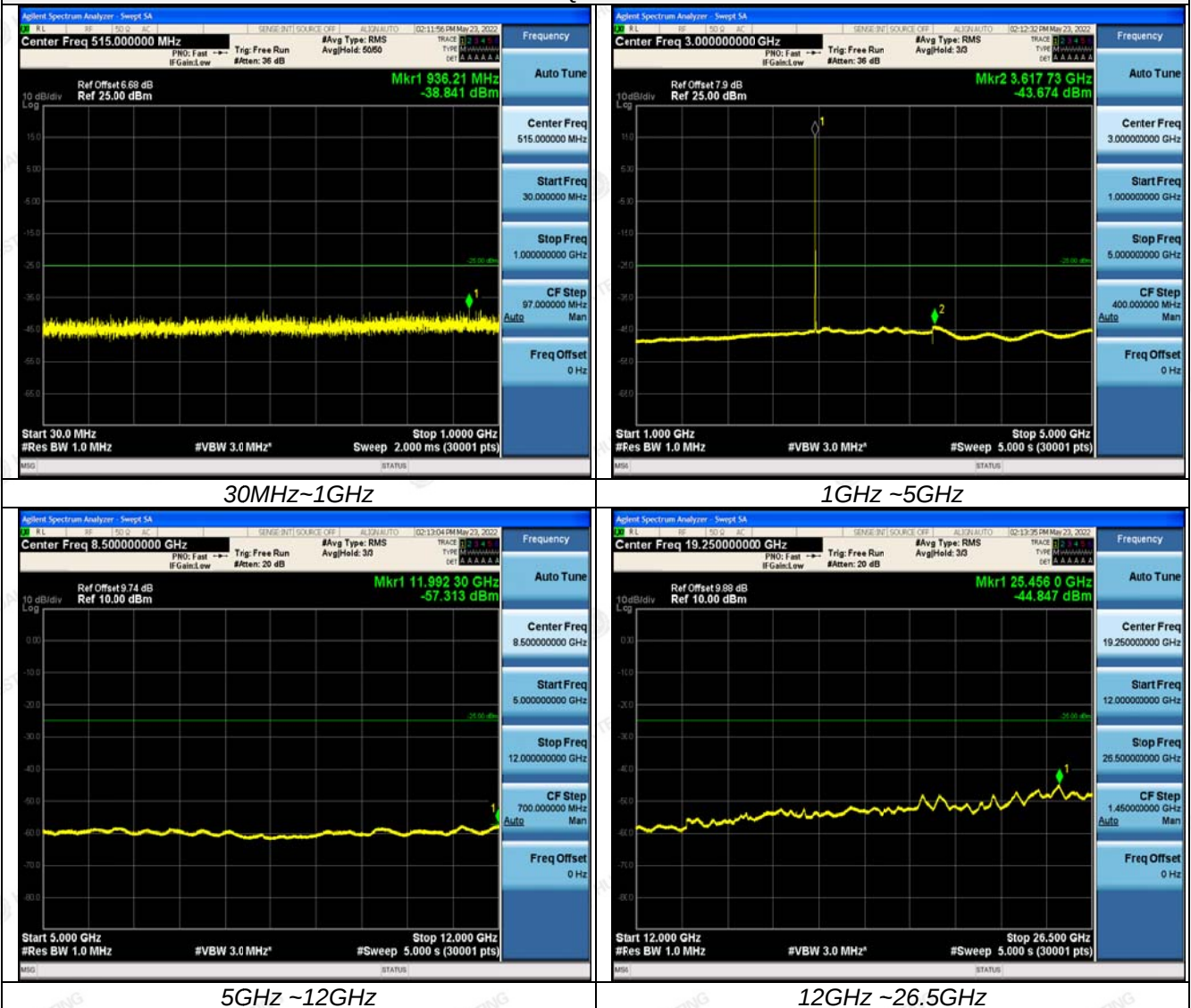




LTE Band 7-5 MHz Channel Bandwidth

High Channel

QPSK

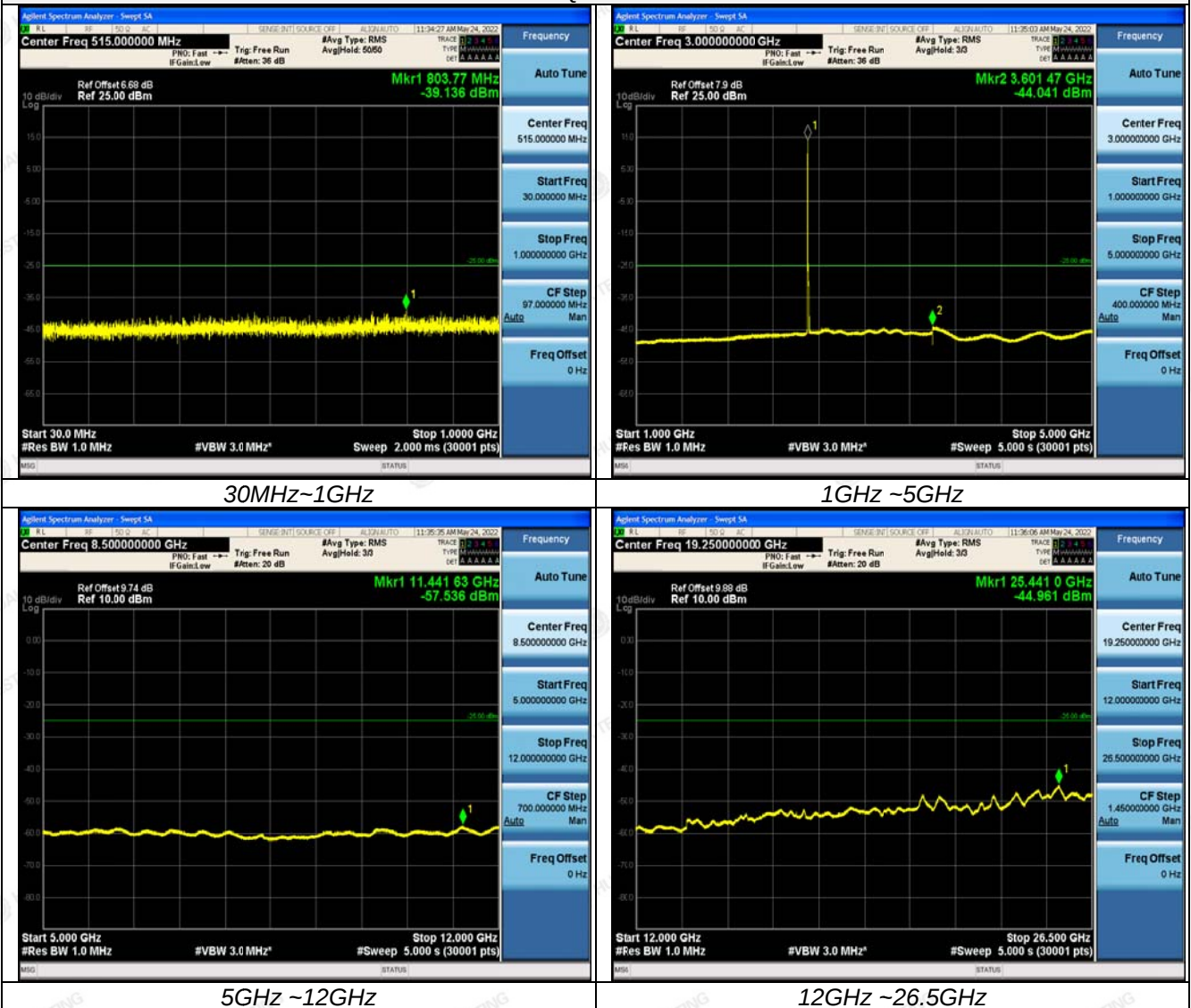




LTE Band 7-10 MHz Channel Bandwidth

Low Channel

QPSK

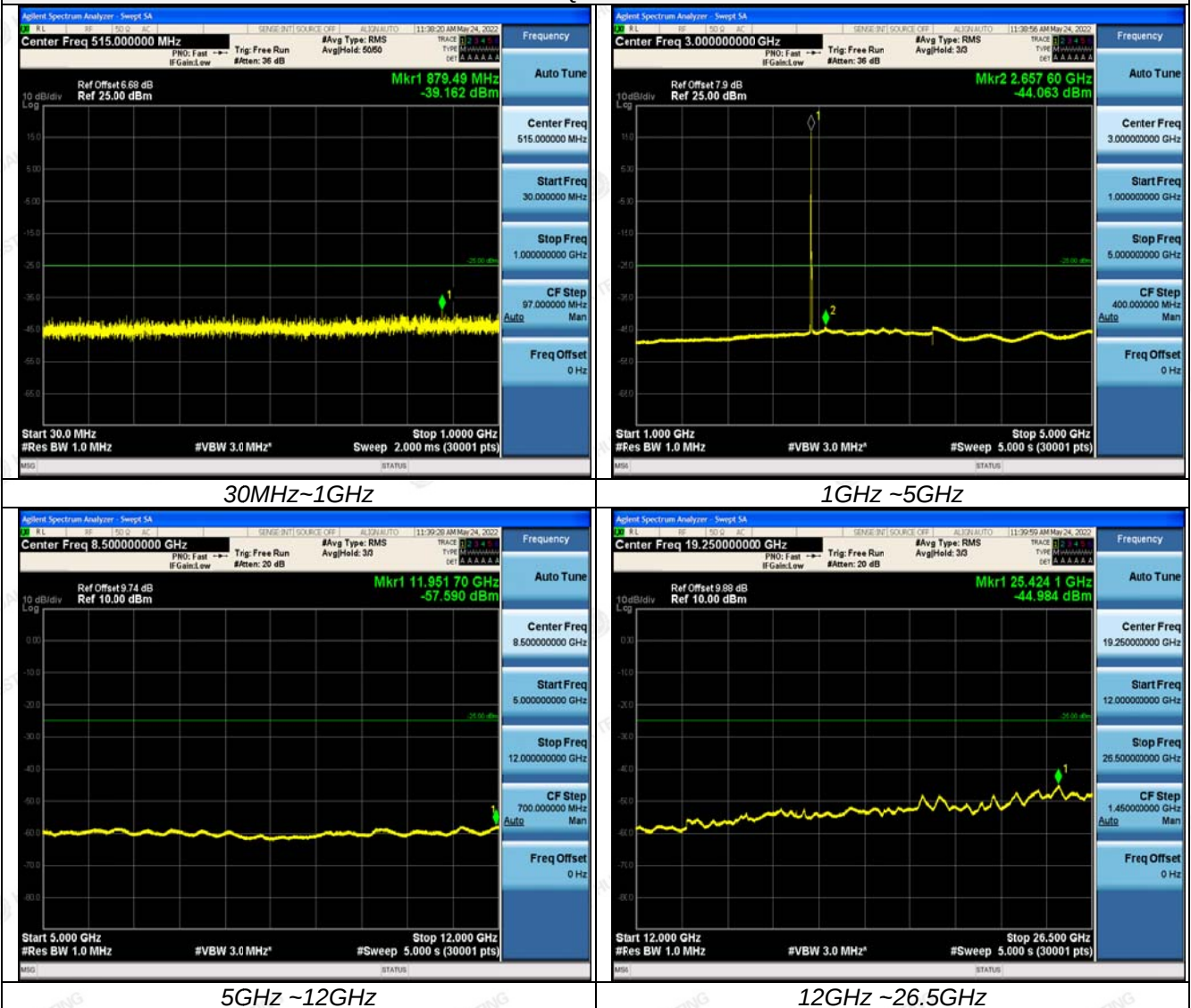




LTE Band 7-10 MHz Channel Bandwidth

Middle Channel

QPSK

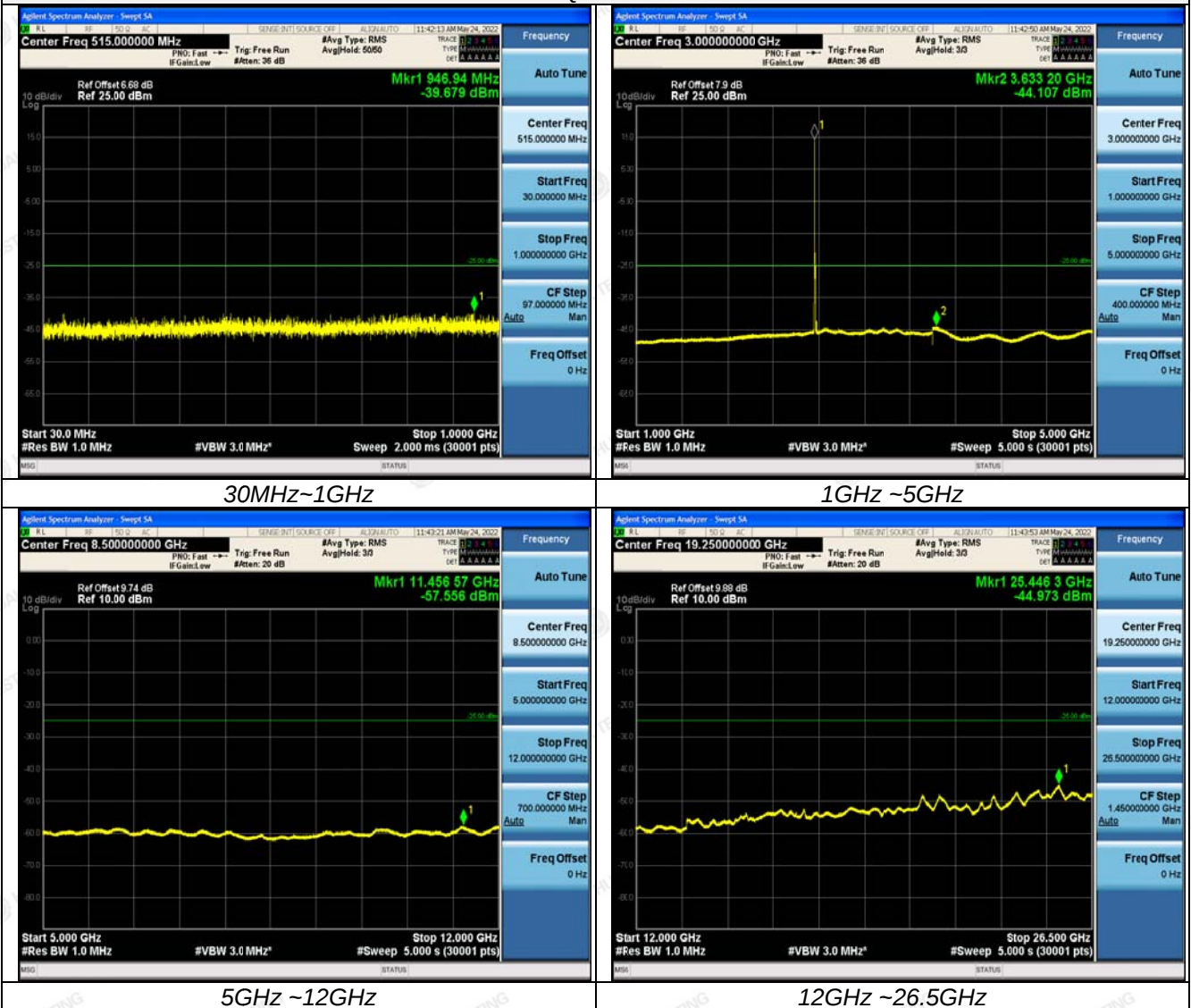




LTE Band 7-10 MHz Channel Bandwidth

High Channel

QPSK

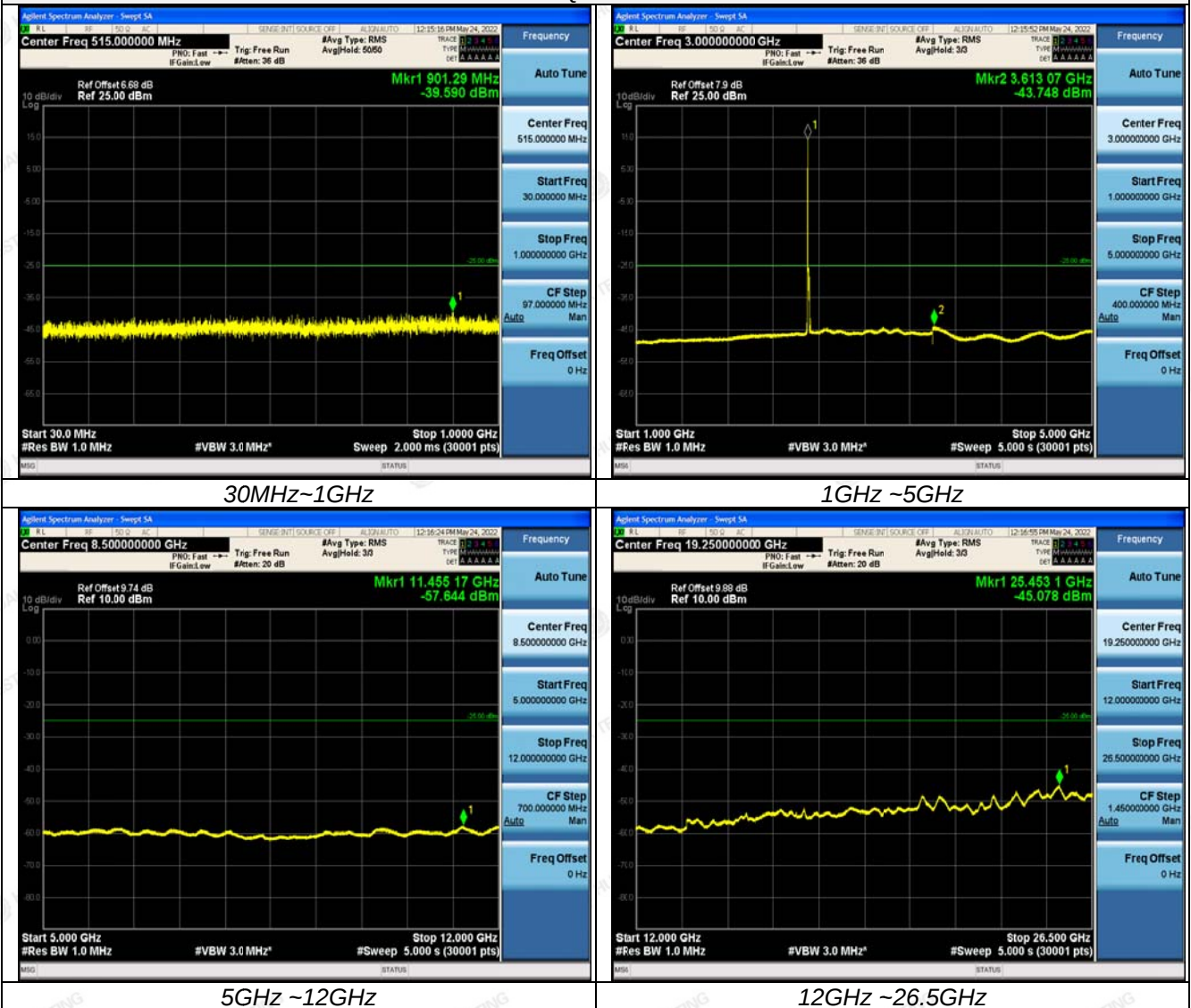




LTE Band 7-15 MHz Channel Bandwidth

Low Channel

QPSK

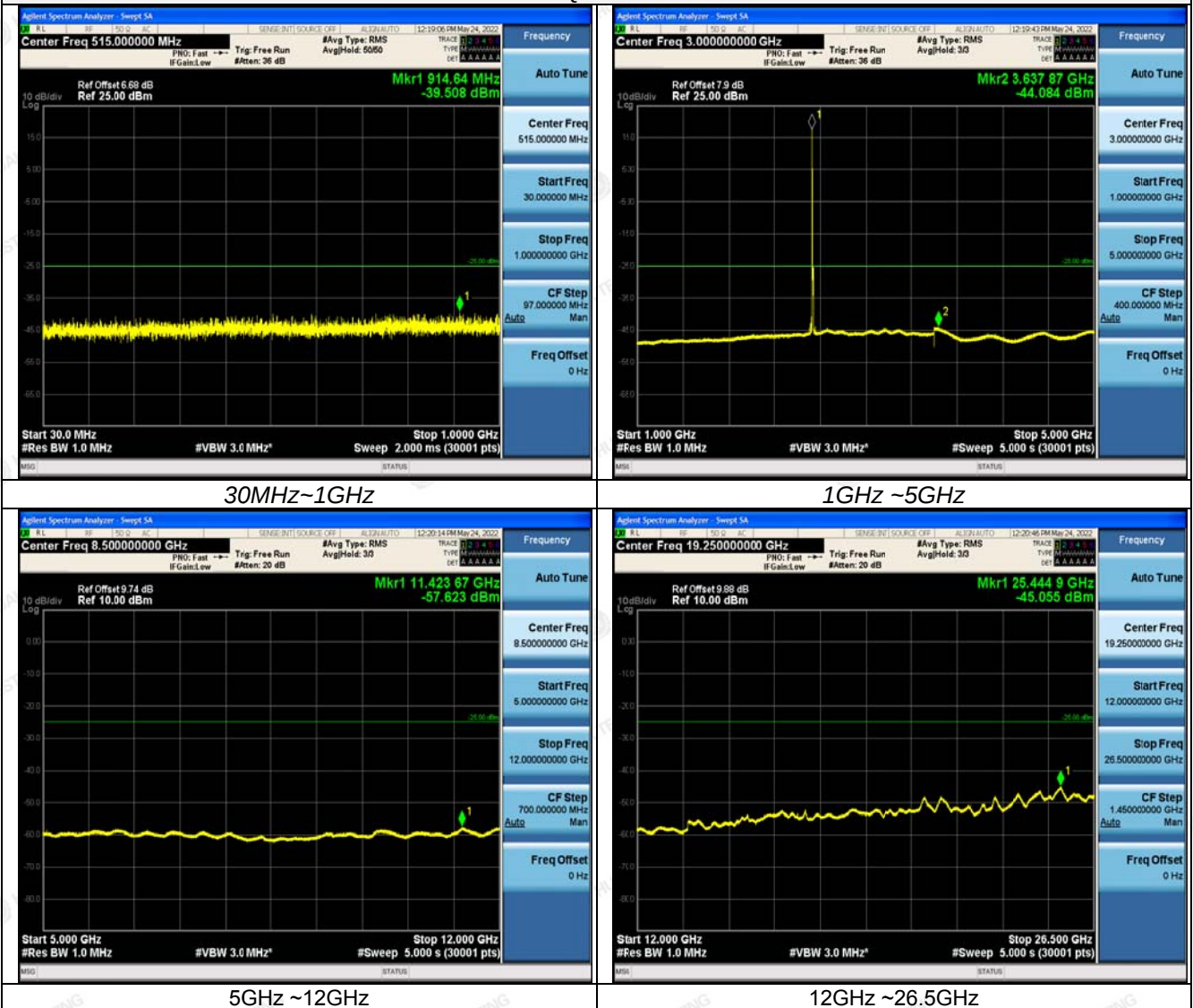




LTE Band 7-15 MHz Channel Bandwidth

Middle Channel

QPSK

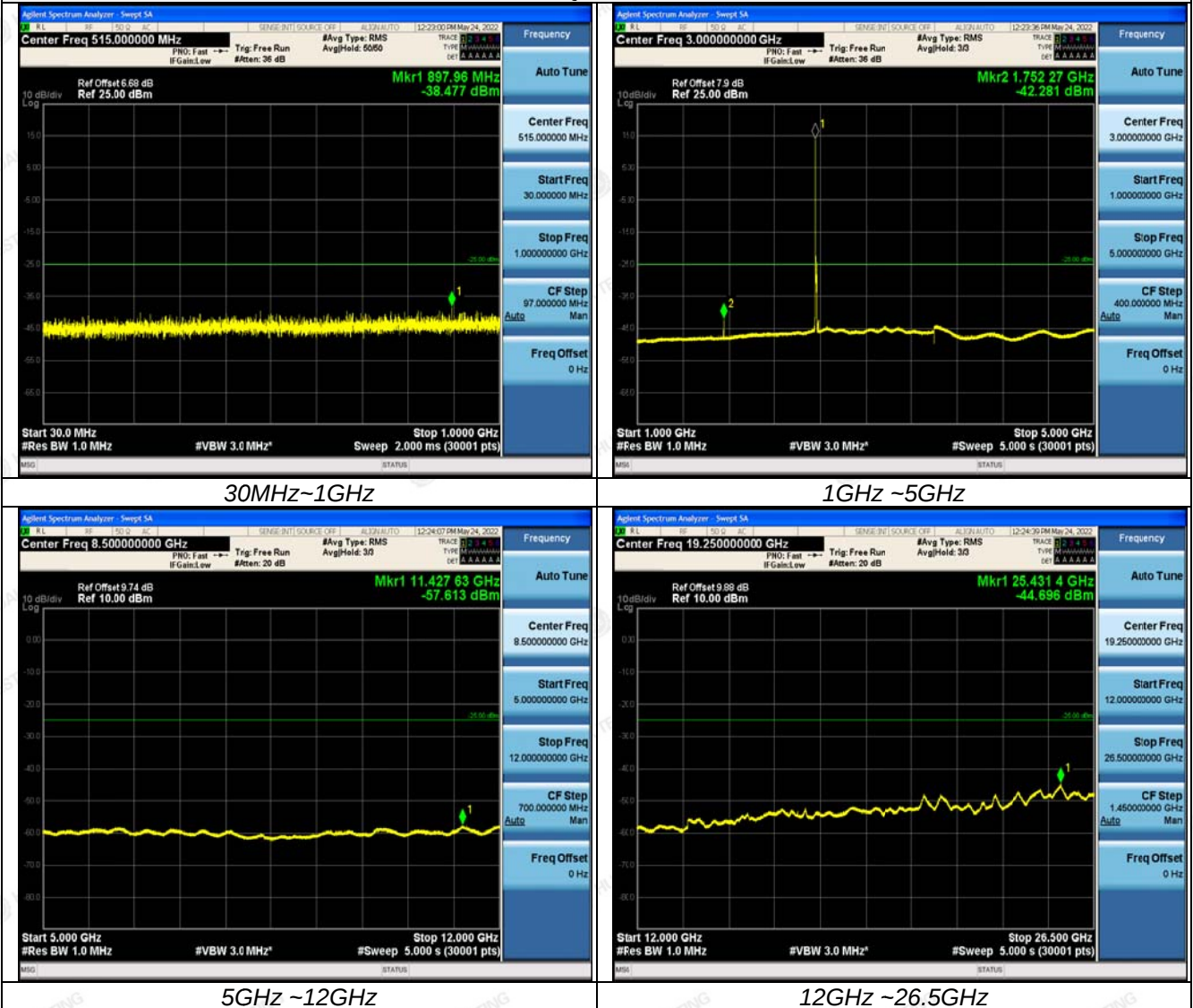




LTE Band 7-15 MHz Channel Bandwidth

High Channel

QPSK

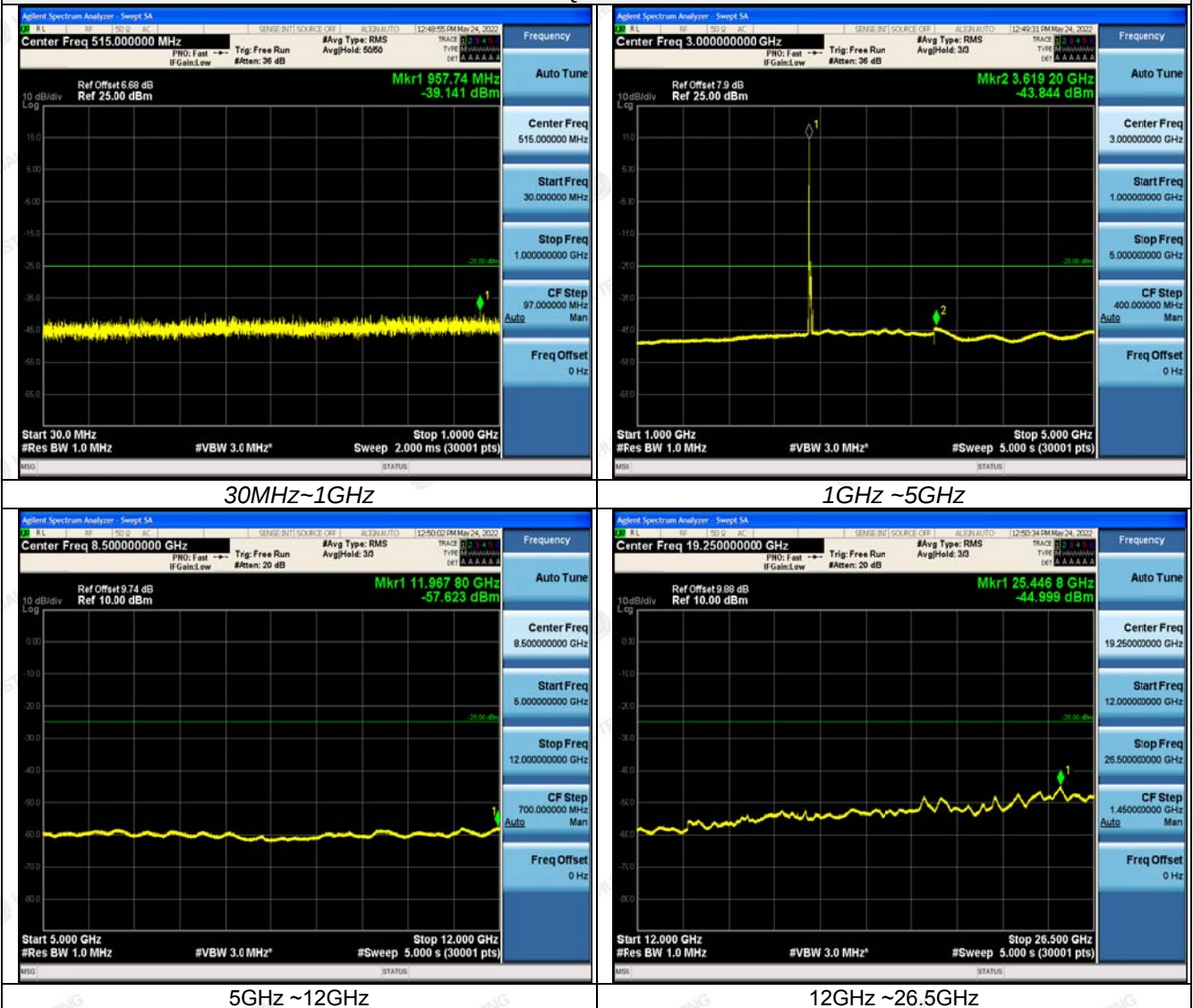




LTE Band 7-20 MHz Channel Bandwidth

Low Channel

QPSK

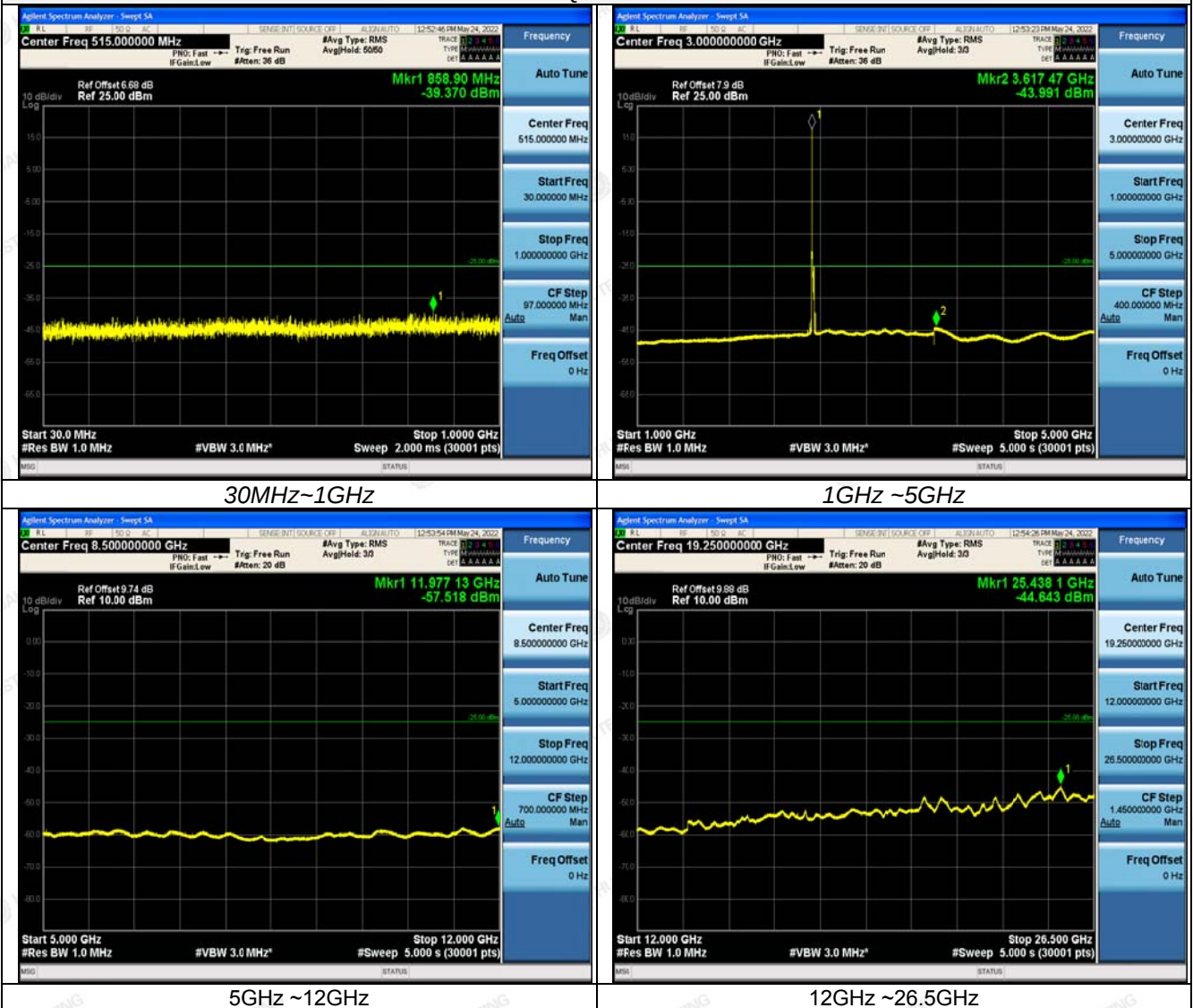




LTE Band 7-20 MHz Channel Bandwidth

Middle Channel

QPSK

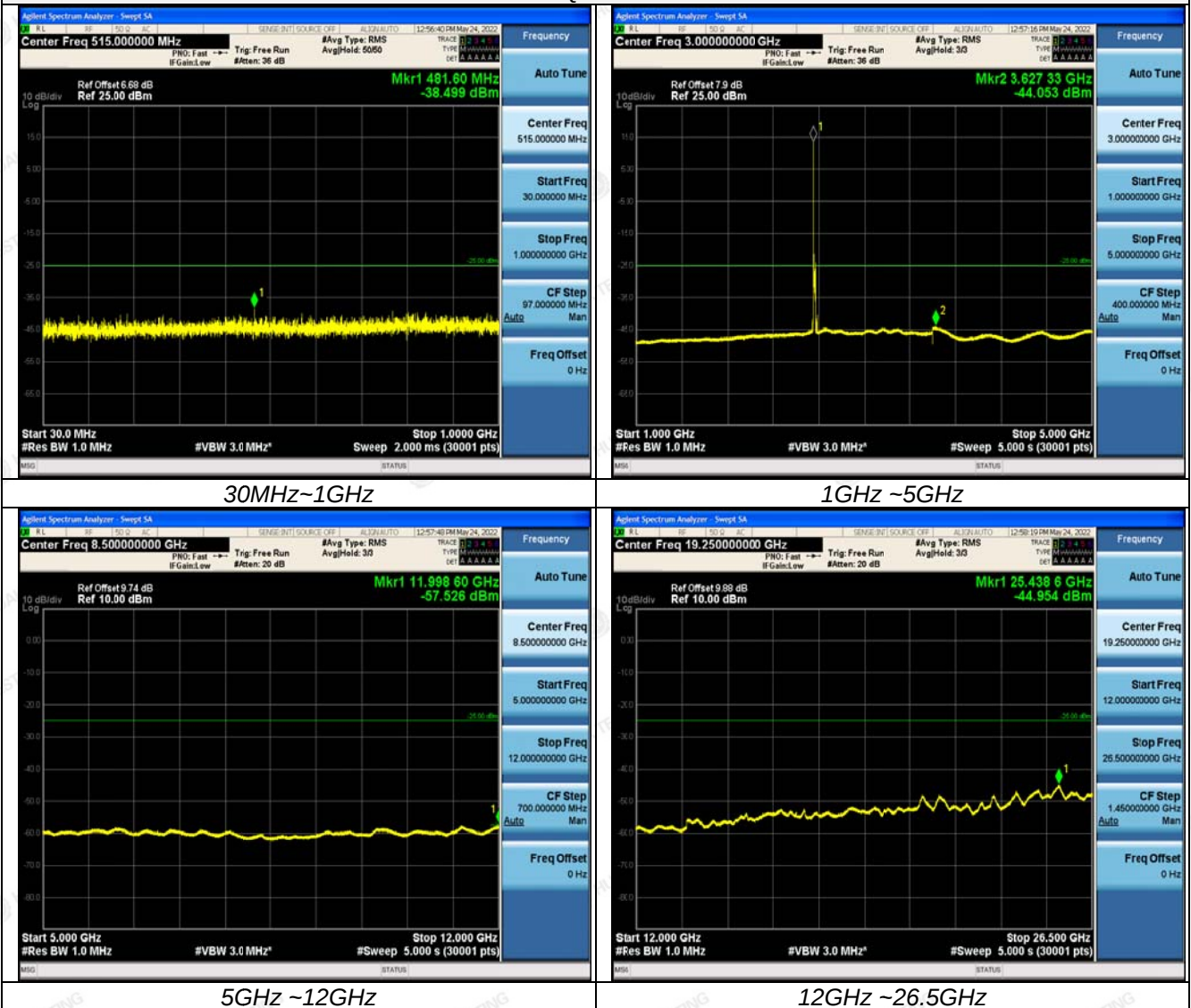




LTE Band 7-20 MHz Channel Bandwidth

High Channel

QPSK

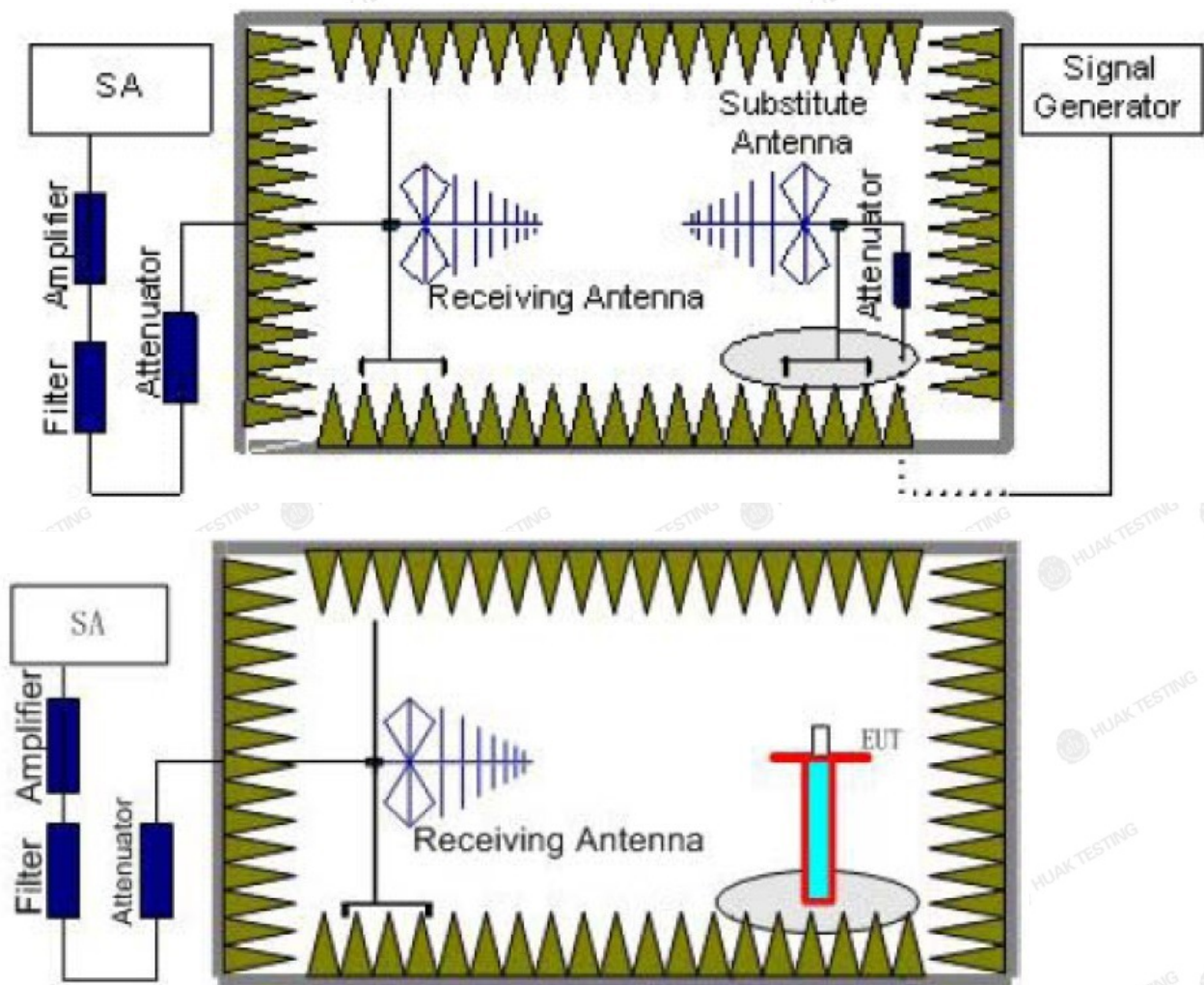


4.6 Radiated Spurious Emission

TEST APPLICABLE

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 $40 + 10 \log P$ dB (-10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log P$ dB (-13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log P$ dB (-25 dBm, 3 nW) on all frequencies more than 20 MHz from the channel edge, where X MHz is the greater of 6 MHz or the actual emission bandwidth (26 dB).

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

- The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- The output of the test antenna shall be connected to the measuring receiver.
- The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.



- e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h. The maximum signal level detected by the measuring receiver shall be noted.
- i. The transmitter shall be replaced by a substitution antenna.
- j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k. The substitution antenna shall be connected to a calibrated signal generator.
- l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q. Test site anechoic chamber refer to ANSI C63.4:2014.

Frequency	Channel	Frequency Range	Verdict
LTE Band 7	Low	30MHz -26.5GHz	PASS
	Middle	30MHz -26.5GHz	PASS
	High	30MHz -26.5GHz	PASS

Radiated Measurement:

EUT :	4G module	Test Date:	May. 20, 2022
Temperature:	25°C	Tested by:	Gary Qian
Humidity:	55 % RH	Test Voltage	Normal Voltage
Operation Mode:	Normal Voltage- Tx Mode		

Remark:

1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 7; recorded worst case for each Channel Bandwidth of LTE Band 7.
2. $EIRP = P_s(dBm) - P_{cl}(dB) + G_a(dBi)$
3. Not recorded other points means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. $Margin = Limit - EIRP$

LTE Band 7_Channel Bandwidth 5MHz_QPSK_1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	Distance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5005	-40.61	4.39	3.00	12.34	-32.66	-25.00	7.66	H
7507.5	-49.51	5.31	3.00	13.52	-41.3	-25.00	16.3	H
5005	-44.74	4.39	3.00	12.34	-36.79	-25.00	11.79	V
7507.5	-51.11	5.31	3.00	13.52	-42.9	-25.00	17.9	V



LTE Band 7 Channel Bandwidth 5MHz QPSK 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-45.64	4.41	3.00	12.34	-37.71	-25.00	12.71	H
7605	-49.09	5.38	3.00	13.58	-40.89	-25.00	15.89	H
5070	-44.03	4.41	3.00	12.34	-36.1	-25.00	11.1	V
7605	-53.1	5.38	3.00	13.58	-44.9	-25.00	19.9	V

LTE Band 7 Channel Bandwidth 5MHz QPSK 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5135	-41.56	4.45	3.00	12.45	-33.56	-25.00	8.56	H
7702.5	-50.65	5.47	3.00	13.66	-42.46	-25.00	17.46	H
5135	-43.26	4.45	3.00	12.45	-35.26	-25.00	10.26	V
7702.5	-54.94	5.48	3.00	13.66	-46.76	-25.00	21.76	V

LTE Band 7 Channel Bandwidth 10MHz QPSK 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5010	-41.89	4.39	3.00	12.34	-33.94	-25.00	8.94	H
7515	-49.78	5.31	3.00	13.52	-41.57	-25.00	16.57	H
5010	-44.24	4.39	3.00	12.34	-36.29	-25.00	11.29	V
7515	-51.5	5.31	3.00	13.52	-43.29	-25.00	18.29	V

LTE Band 7 Channel Bandwidth 10MHz QPSK 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-45.75	4.41	3.00	12.34	-37.82	-25.00	12.82	H
7605	-48.97	5.38	3.00	13.58	-40.77	-25.00	15.77	H
5070	-43.17	4.41	3.00	12.34	-35.24	-25.00	10.24	V
7605	-52.28	5.38	3.00	13.58	-44.08	-25.00	19.08	V

LTE Band 7 Channel Bandwidth 10MHz QPSK 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5130	-42.16	4.45	3.00	12.45	-34.16	-25.00	9.16	H
7695	-52.27	5.47	3.00	13.66	-44.08	-25.00	19.08	H
5130	-42.9	4.45	3.00	12.45	-34.9	-25.00	9.9	V
7695	-54.56	5.48	3.00	13.66	-46.38	-25.00	21.38	V

LTE Band 7 Channel Bandwidth 15MHz QPSK 1RB#0

Frequency (MHz)	P _s (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5015	-41.66	4.39	3.00	12.34	-33.71	-25.00	8.71	H
7522.5	-49.02	5.31	3.00	13.52	-40.81	-25.00	15.81	H
5015	-44.43	4.39	3.00	12.34	-36.48	-25.00	11.48	V
7522.5	-51.74	5.31	3.00	13.52	-43.53	-25.00	18.53	V



LTE Band 7 Channel Bandwidth 15MHz_QPSK_1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-45.75	4.41	3.00	12.34	-37.82	-25.00	12.82	H
7605	-49.25	5.38	3.00	13.58	-41.05	-25.00	16.05	H
5070	-44.02	4.41	3.00	12.34	-36.09	-25.00	11.09	V
7605	-52.82	5.38	3.00	13.58	-44.62	-25.00	19.62	V

LTE Band 7 Channel Bandwidth 15MHz_QPSK_1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5125.0	-41.37	4.45	3.00	12.45	-33.37	-25.00	8.37	H
7687.5	-51.79	5.47	3.00	13.66	-43.6	-25.00	18.6	H
5125.0	-43.14	4.45	3.00	12.45	-35.14	-25.00	10.14	V
7687.5	-55.08	5.48	3.00	13.66	-46.9	-25.00	21.9	V

LTE Band 7 Channel Bandwidth 20MHz_QPSK_1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5020	-41.69	4.39	3.00	12.34	-33.74	-25.00	8.74	H
7530	-49.25	5.31	3.00	13.52	-41.04	-25.00	16.04	H
5020	-44.32	4.39	3.00	12.34	-36.37	-25.00	11.37	V
7530	-51.04	5.31	3.00	13.52	-42.83	-25.00	17.83	V

LTE Band 7 Channel Bandwidth 20MHz_QPSK_1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-43.92	4.41	3.00	12.34	-35.99	-25.00	10.99	H
7605	-48.65	5.38	3.00	13.58	-40.45	-25.00	15.45	H
5070	-43.12	4.41	3.00	12.34	-35.19	-25.00	10.19	V
7605	-51.97	5.38	3.00	13.58	-43.77	-25.00	18.77	V

LTE Band 7 Channel Bandwidth 20MHz_QPSK_1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5120	-41.6	4.45	3.00	12.45	-33.6	-25.00	8.6	H
7680	-50.74	5.47	3.00	13.66	-42.55	-25.00	17.55	H
5120	-43.16	4.45	3.00	12.45	-35.16	-25.00	10.16	V
7680	-55.07	5.48	3.00	13.66	-46.89	-25.00	21.89	V

LTE Band 7 Channel Bandwidth 5MHz_16QAM_1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5005	-41.77	4.39	3.00	12.34	-33.82	-25.00	8.82	H
7507.5	-50.31	5.31	3.00	13.52	-42.1	-25.00	17.1	H
5005	-44.47	4.39	3.00	12.34	-36.52	-25.00	11.52	V
7507.5	-51.93	5.31	3.00	13.52	-43.72	-25.00	18.72	V



LTE Band 7 Channel Bandwidth 5MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-45.66	4.41	3.00	12.34	-37.73	-25.00	12.73	H
7605	-48.77	5.38	3.00	13.58	-40.57	-25.00	15.57	H
5070	-43.74	4.41	3.00	12.34	-35.81	-25.00	10.81	V
7605	-51.91	5.38	3.00	13.58	-43.71	-25.00	18.71	V

LTE Band 7 Channel Bandwidth 5MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5135	-41.68	4.45	3.00	12.45	-33.68	-25.00	8.68	H
7702.5	-51.21	5.47	3.00	13.66	-43.02	-25.00	18.02	H
5135	-42.63	4.45	3.00	12.45	-34.63	-25.00	9.63	V
7702.5	-54.5	5.48	3.00	13.66	-46.32	-25.00	21.32	V

LTE Band 7 Channel Bandwidth 10MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5010	-41.71	4.39	3.00	12.34	-33.76	-25.00	8.76	H
7515	-50.22	5.31	3.00	13.52	-42.01	-25.00	17.01	H
5010	-44.45	4.39	3.00	12.34	-36.5	-25.00	11.5	V
7515	-51.43	5.31	3.00	13.52	-43.22	-25.00	18.22	V

LTE Band 7 Channel Bandwidth 10MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-45.86	4.41	3.00	12.34	-37.93	-25.00	12.93	H
7605	-49.26	5.38	3.00	13.58	-41.06	-25.00	16.06	H
5070	-43.4	4.41	3.00	12.34	-35.47	-25.00	10.47	V
7605	-51.88	5.38	3.00	13.58	-43.68	-25.00	18.68	V

LTE Band 7 Channel Bandwidth 10MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5130	-41.68	4.45	3.00	12.45	-33.68	-25.00	8.68	H
7695	-51.18	5.47	3.00	13.66	-42.99	-25.00	17.99	H
5130	-43.63	4.45	3.00	12.45	-35.63	-25.00	10.63	V
7695	-54.16	5.48	3.00	13.66	-45.98	-25.00	20.98	V

LTE Band 7 Channel Bandwidth 15MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5015	-41.95	4.39	3.00	12.34	-34	-25.00	9	H
7522.5	-49.78	5.31	3.00	13.52	-41.57	-25.00	16.57	H
5015	-44.43	4.39	3.00	12.34	-36.48	-25.00	11.48	V
7522.5	-50.93	5.31	3.00	13.52	-42.72	-25.00	17.72	V



LTE Band 7 Channel Bandwidth 15MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-44.49	4.41	3.00	12.34	-36.56	-25.00	11.56	H
7605	-49.11	5.38	3.00	13.58	-40.91	-25.00	15.91	H
5070	-43.21	4.41	3.00	12.34	-35.28	-25.00	10.28	V
7605	-53.02	5.38	3.00	13.58	-44.82	-25.00	19.82	V

LTE Band 7 Channel Bandwidth 15MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5125.0	-42.3	4.45	3.00	12.45	-34.3	-25.00	9.3	H
7687.5	-51.71	5.47	3.00	13.66	-43.52	-25.00	18.52	H
5125.0	-44.52	4.45	3.00	12.45	-36.52	-25.00	11.52	V
7687.5	-53.66	5.48	3.00	13.66	-45.48	-25.00	20.48	V

LTE Band 7 Channel Bandwidth 20MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5020	-41.49	4.39	3.00	12.34	-33.54	-25.00	8.54	H
7530	-49.64	5.31	3.00	13.52	-41.43	-25.00	16.43	H
5020	-43.95	4.39	3.00	12.34	-36	-25.00	11	V
7530	-51.5	5.31	3.00	13.52	-43.29	-25.00	18.29	V

LTE Band 7 Channel Bandwidth 20MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5070	-44.97	4.41	3.00	12.34	-37.04	-25.00	12.04	H
7605	-48.82	5.38	3.00	13.58	-40.62	-25.00	15.62	H
5070	-43.88	4.41	3.00	12.34	-35.95	-25.00	10.95	V
7605	-51.71	5.38	3.00	13.58	-43.51	-25.00	18.51	V

LTE Band 7 Channel Bandwidth 20MHz 16QAM 1RB#0

Frequency (MHz)	Ps (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5120	-41.77	4.45	3.00	12.45	-33.77	-25.00	8.77	H
7680	-51.24	5.47	3.00	13.66	-43.05	-25.00	18.05	H
5120	-43.66	4.45	3.00	12.45	-35.66	-25.00	10.66	V
7680	-54.65	5.48	3.00	13.66	-46.47	-25.00	21.47	V

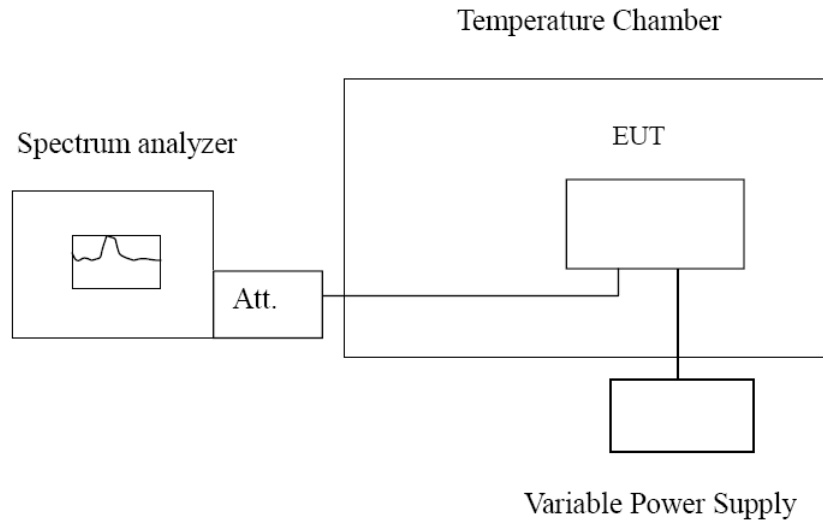


4.7 Frequency Stability

LIMIT

According to §2.1055 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

Frequency Stability Under Temperature Variations:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 41, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

**TEST RESULTS**

EUT :	4G module	Test Date:	May. 20, 2022
Temperature:	25 ⁰ C	Tested by:	Gary Qian
Humidity:	55 % RH	Test Voltage	Normal Voltage
Operation Mode:	Normal Voltage- Tx Mode		

Remark:

1. We tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 7; recorded worst case.

LTE Band 7_5MHz bandwidth_QPSK_1RB#0 (worst case of all bandwidths)

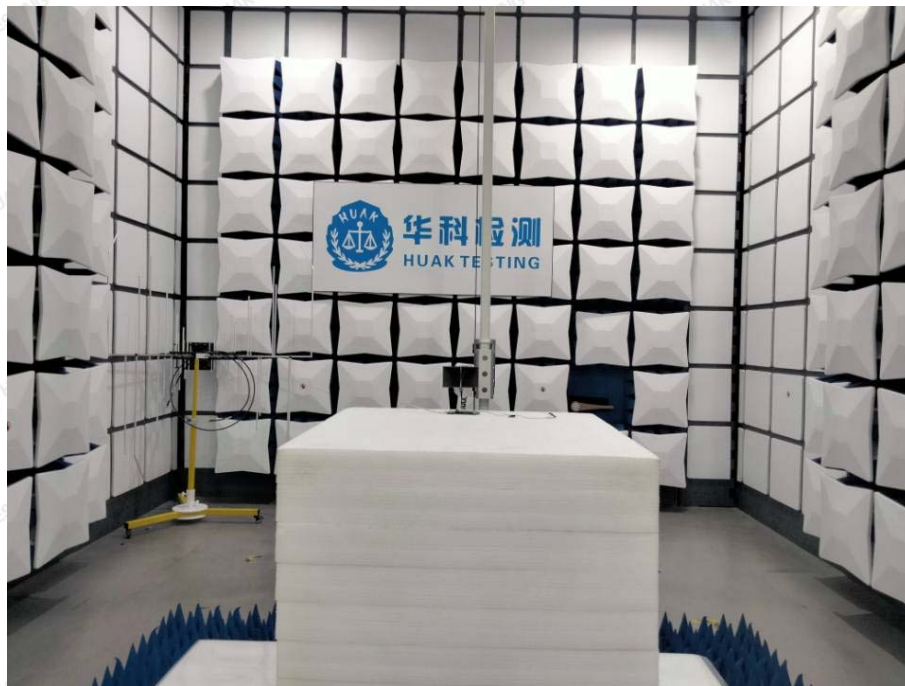
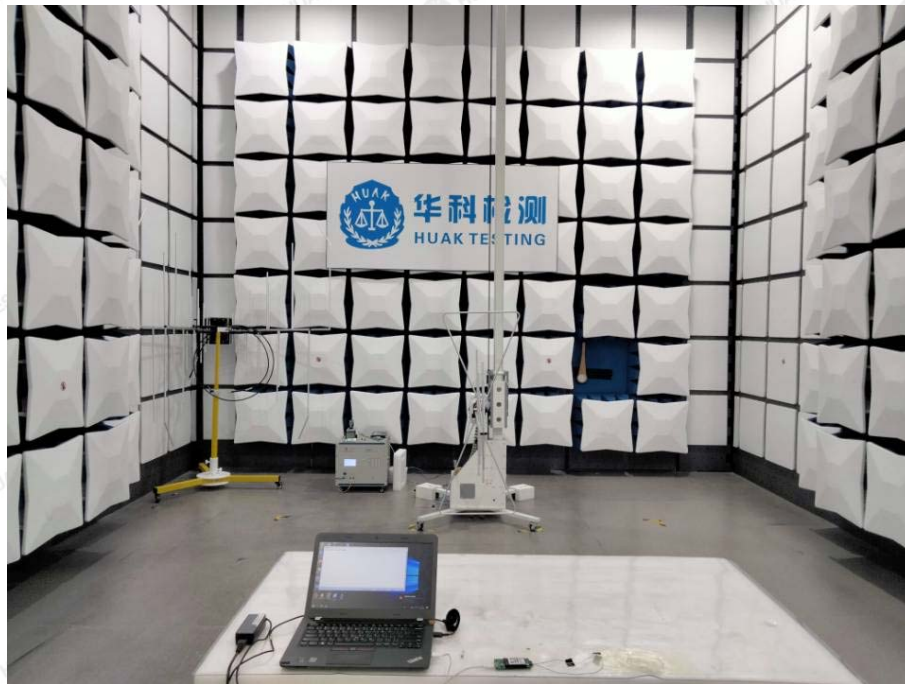
LTE Band 7					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
4.25	20	-50.13	-0.020032	2.50	PASS
5.0	20	-23.27	-0.009299	2.50	PASS
5.75	20	-5.22	-0.002086	2.50	PASS
5.0	-30	-55.25	-0.022078	2.50	PASS
5.0	-20	-18.41	-0.007357	2.50	PASS
5.0	-10	15.89	0.006350	2.50	PASS
5.0	0	-33.29	-0.013303	2.50	PASS
5.0	10	-50.71	-0.020264	2.50	PASS
5.0	20	-51.11	-0.020424	2.50	PASS
5.0	30	-28.11	-0.011089	2.50	PASS
5.0	40	-18.57	-0.007325	2.50	PASS
5.0	50	-29.30	-0.011558	2.50	PASS

LTE Band 7_5MHz bandwidth_16QAM_1RB#0 (worst case of all bandwidths)

LTE Band 7					
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
4.25	20	22.29	0.008907	2.50	PASS
5.0	20	-12.03	-0.004807	2.50	PASS
5.75	20	-47.82	-0.019109	2.50	PASS
5.0	-30	-28.80	-0.011508	2.50	PASS
5.0	-20	-59.34	-0.023712	2.50	PASS
5.0	-10	-40.33	-0.016116	2.50	PASS
5.0	0	6.97	0.002785	2.50	PASS
5.0	10	-42.06	-0.016807	2.50	PASS
5.0	20	-25.51	-0.010194	2.50	PASS
5.0	30	-49.10	-0.019369	2.50	PASS
5.0	40	-45.93	-0.018118	2.50	PASS
5.0	50	-62.37	-0.024604	2.50	PASS



5 TEST SETUP PHOTOS OF THE EUT



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

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6 EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Reference to the report :ANNEX A of external photos and ANNEX B of internal photos

.....End of Report.....