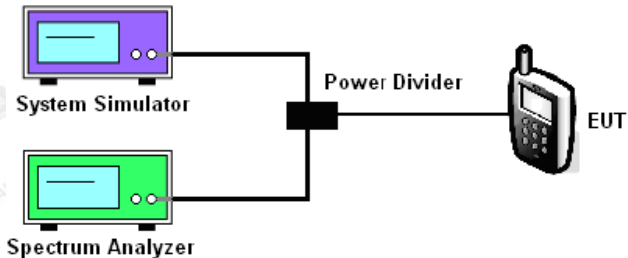




5.5. Band Edge and Conducted Spurious Emission Measurement

5.5.1. Test Specification

Test Requirement:	FCC part 90.691
Test Method:	FCC part 2.1051
Limit:	For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
Test Setup:	 The diagram shows a System Simulator (top) and a Spectrum Analyzer (bottom) connected to a central Power Divider. The Power Divider is also connected to the EUT (Equipment Under Test) on the right.
Test Procedure:	1. The testing follows FCC KDB 971168 D01v03 Section 6.0. 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider. 3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement. 4. The band edges of low and high channels for the highest RF powers were measured. 5. The conducted spurious emission for the whole frequency range was taken. 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Test Result:	PASS

TEST RESULTS

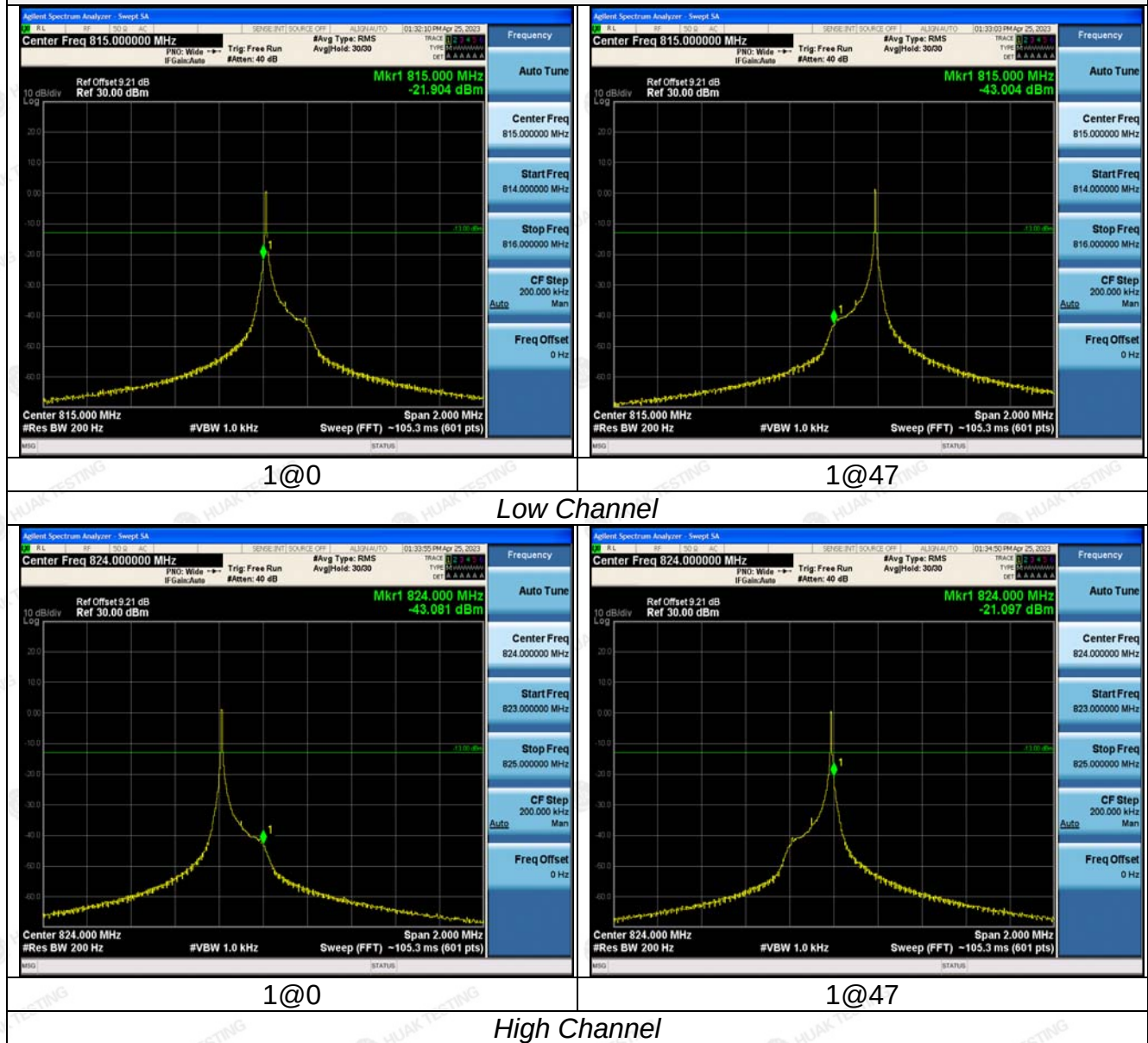
Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 18; recorded worst case for each Channel Bandwidth of LTE FDD Band 18.



Mode A:

LTE FDD Band 18-BPSK- 3.75KHz



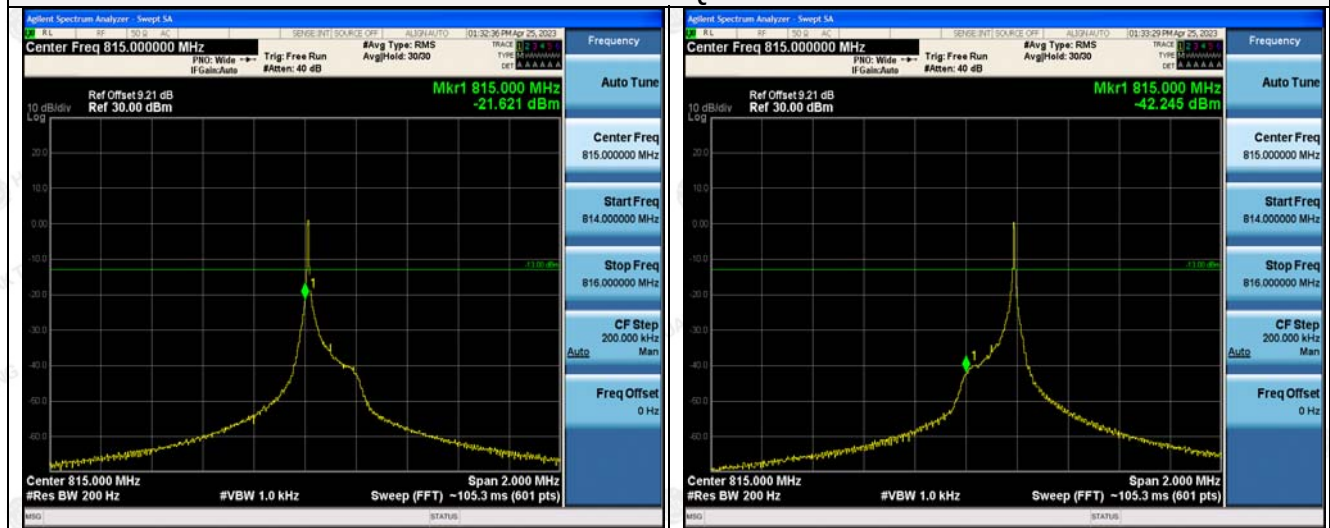
The results shown in this test report refer only to the sample(s) tested and otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of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

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LTE FDD Band 18-QPSK- 3.75KHz



Low Channel



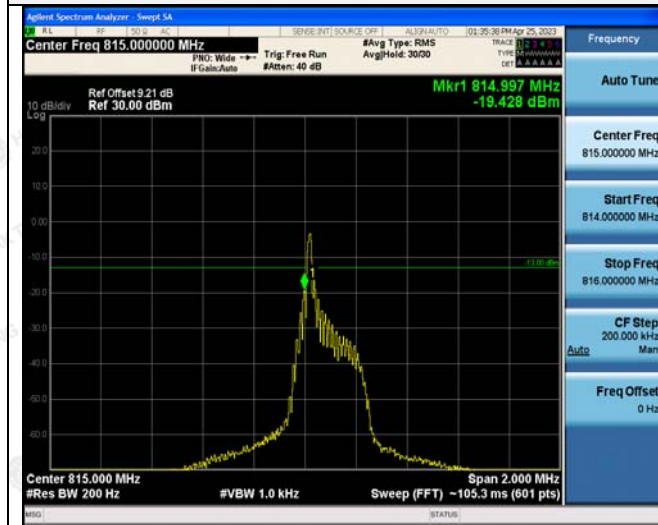
High Channel



LTE FDD Band 18-BPSK- 15KHz

Low Channel

High Channel



1@0



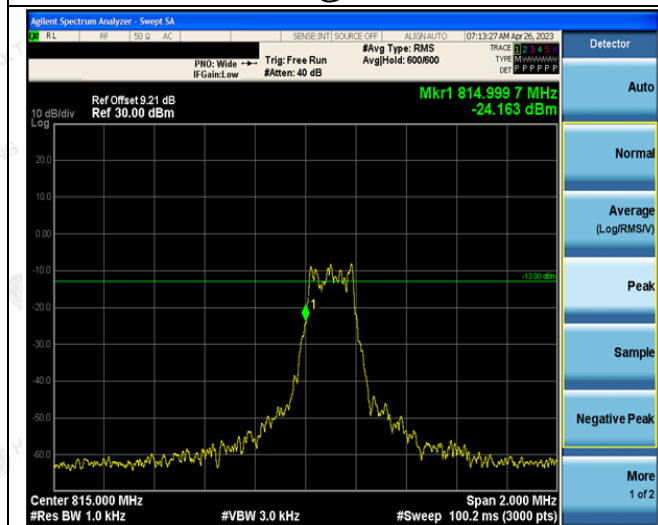
1@0



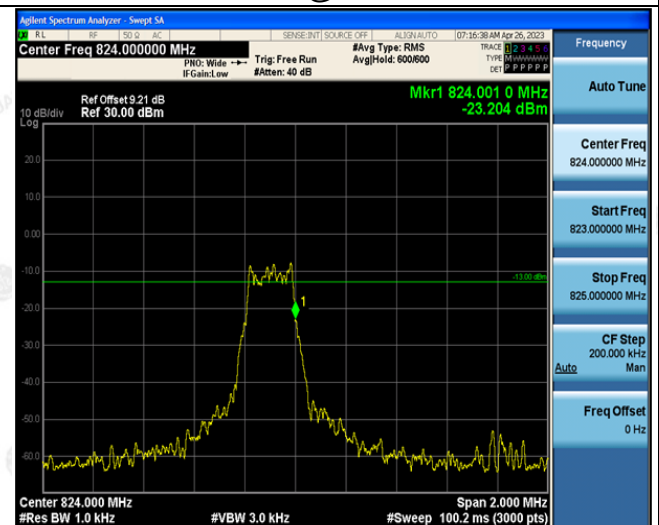
1@11



1@11



12@0



12@0

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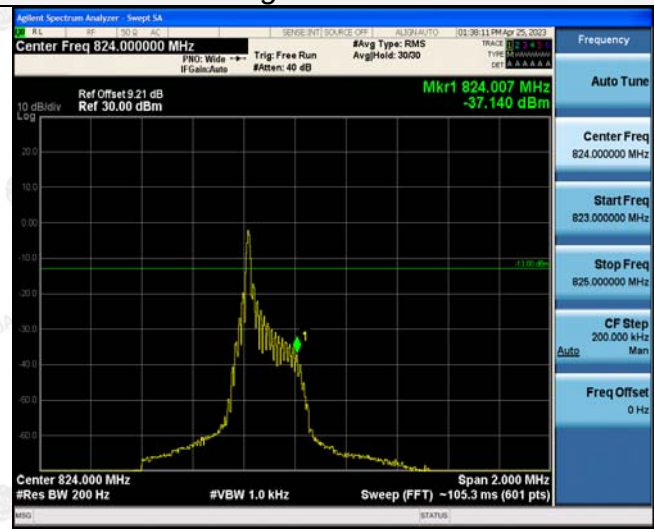
LTE FDD Band 18-QPSK- 15KHz

Low Channel



1@0

High Channel



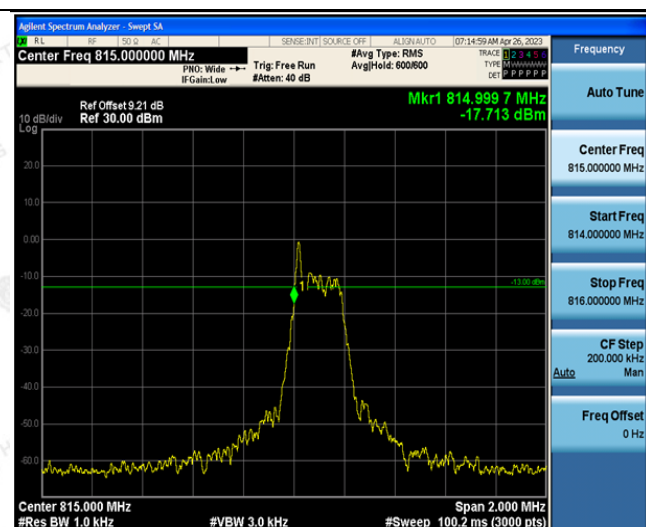
1@0



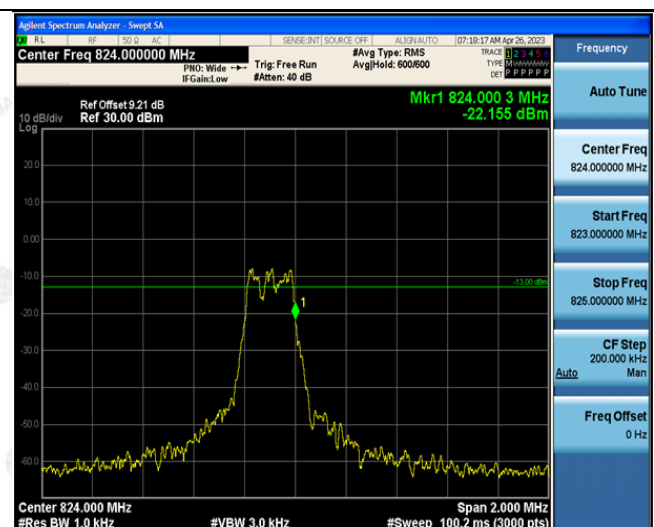
1@11



1@11



12@0

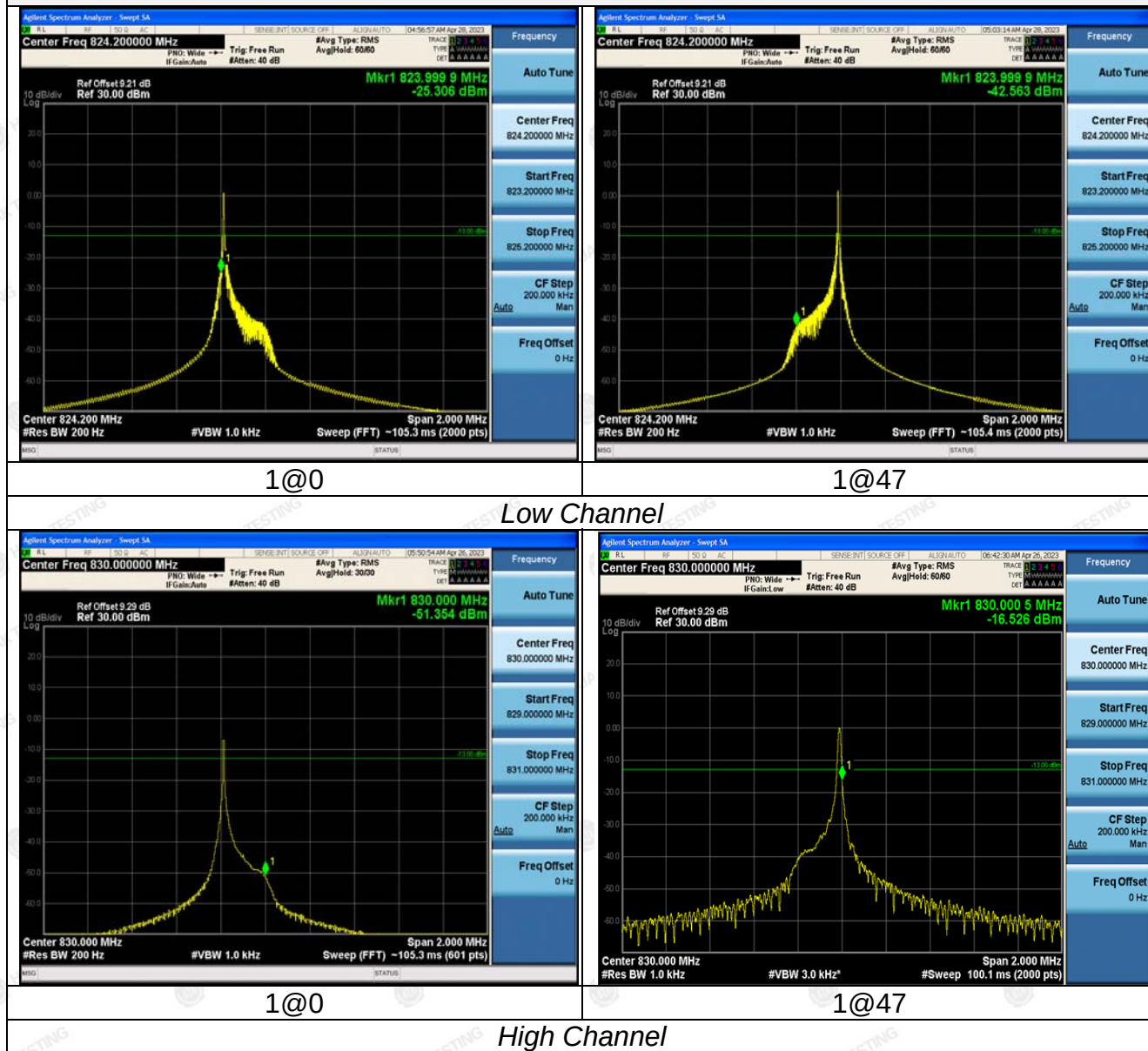


12@0



Mode B:

LTE FDD Band 18-BPSK- 3.75KHz

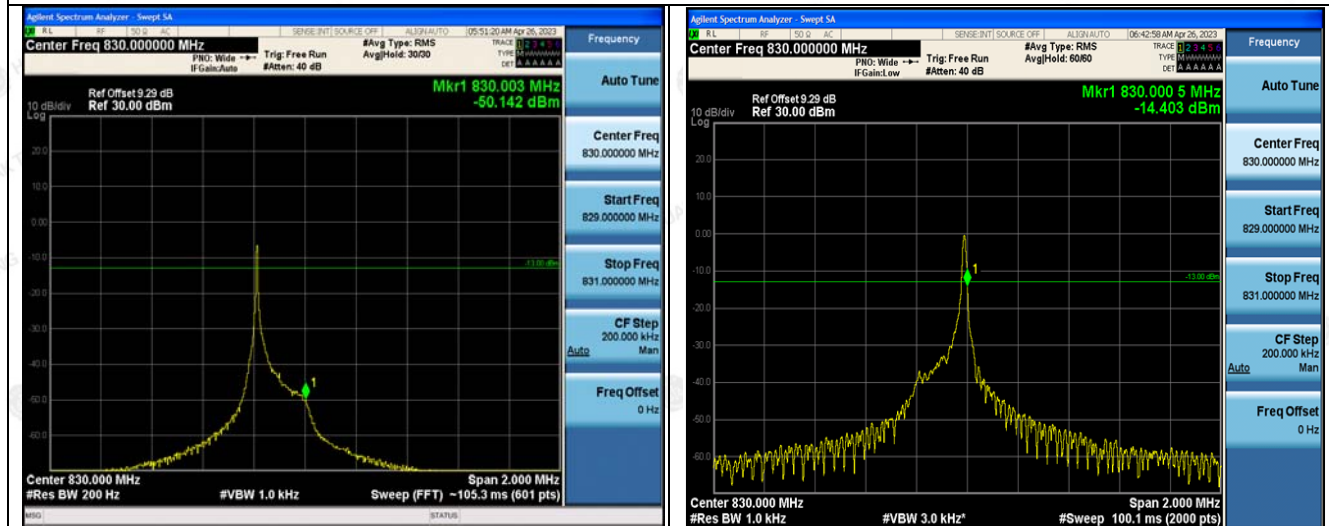




LTE FDD Band 18-QPSK- 3.75KHz



Low Channel

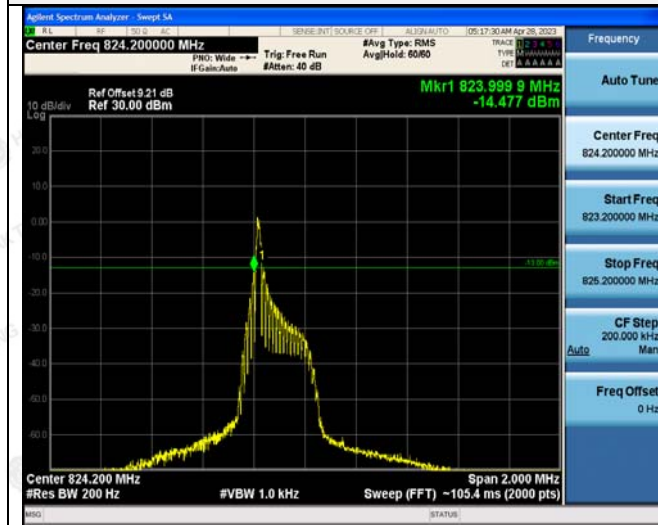


High Channel



LTE FDD Band 18-BPSK- 15KHz

Low Channel

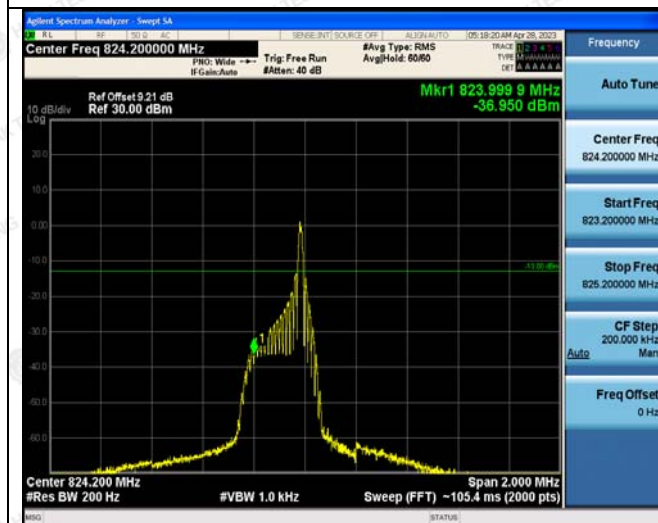


1@0

High Channel



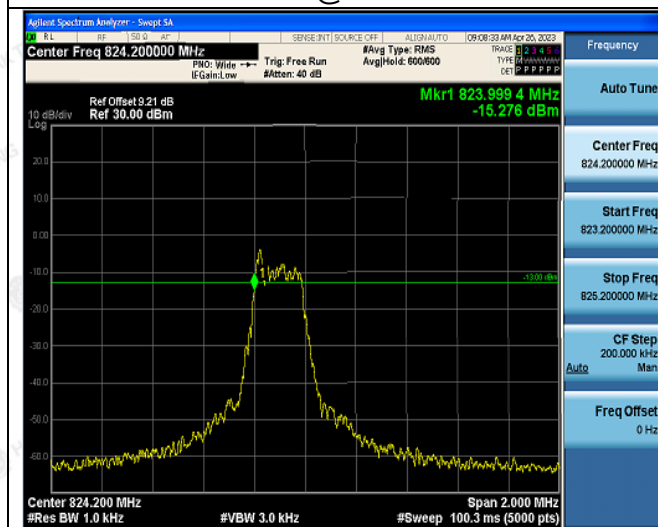
1@0



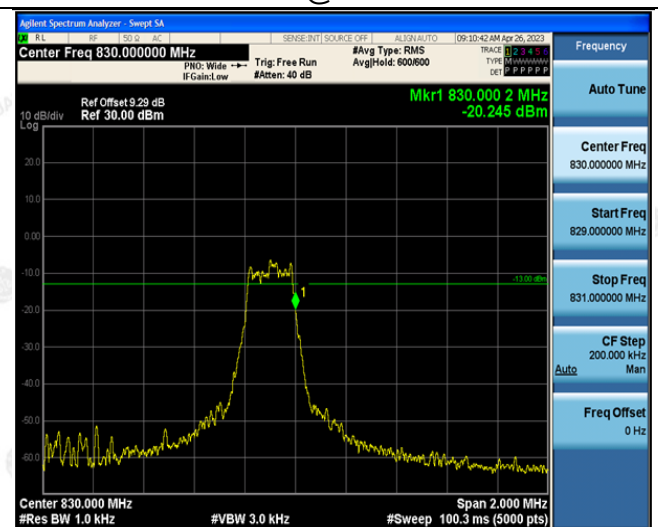
1@11



1@11



12@0



12@0

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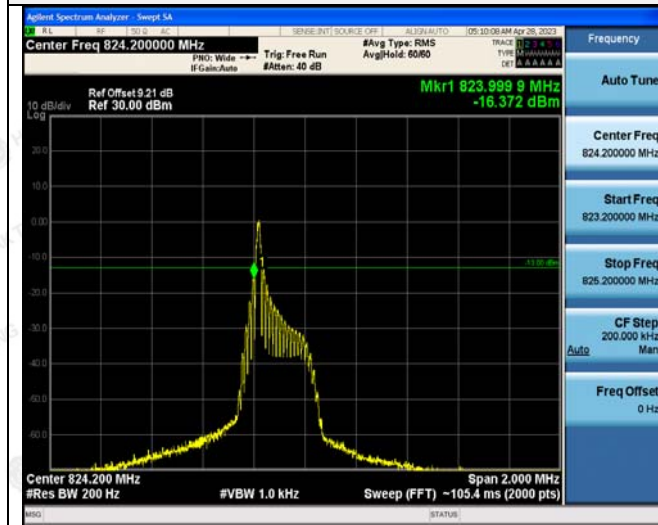
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LTE FDD Band 18-QPSK- 15KHz

Low Channel

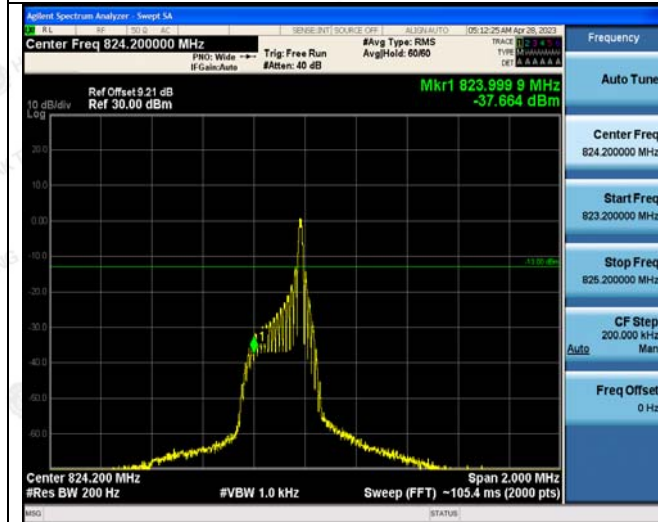


1@0

High Channel



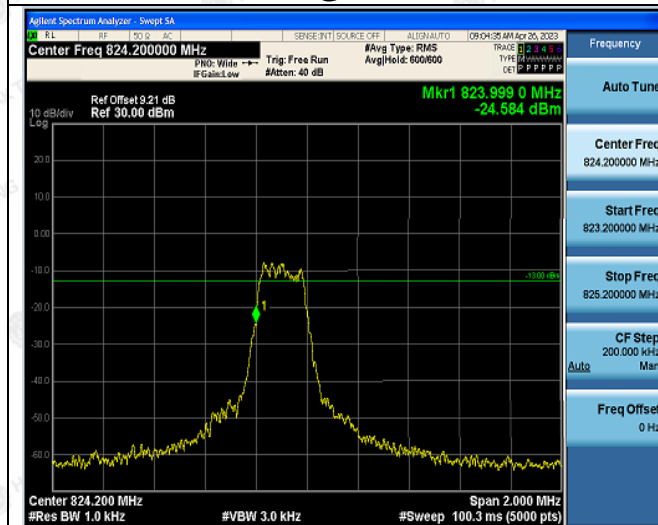
1@0



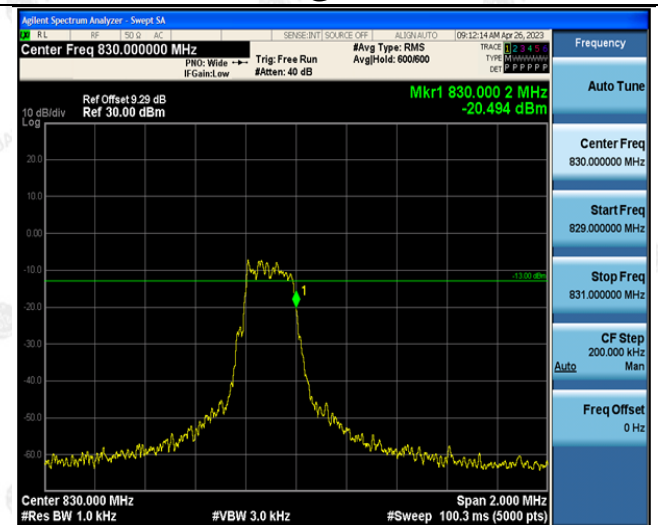
1@11



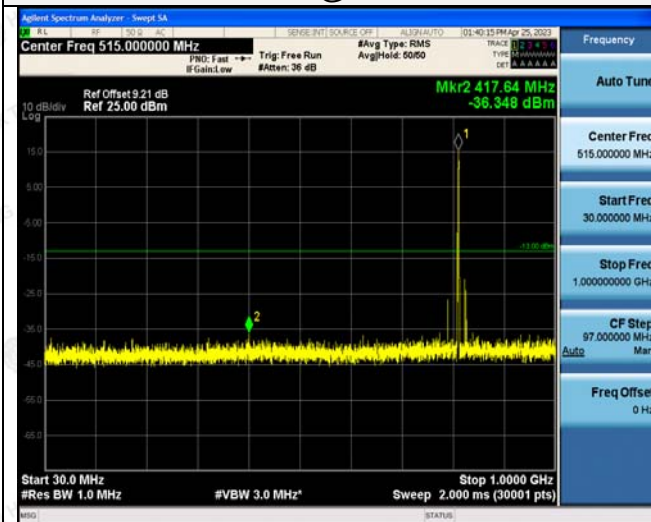
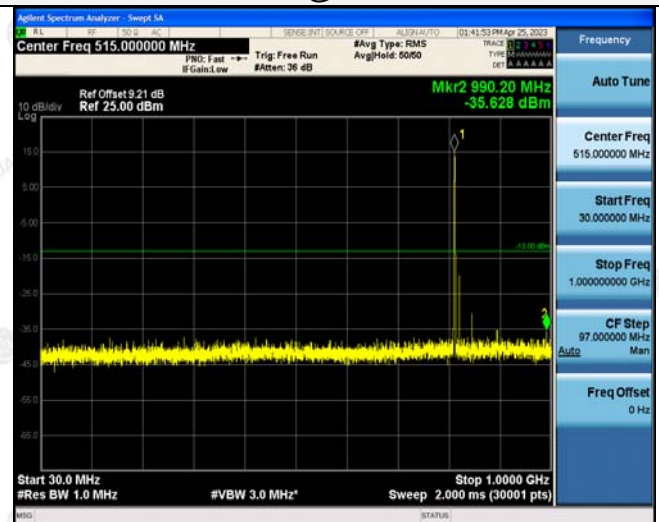
1@11

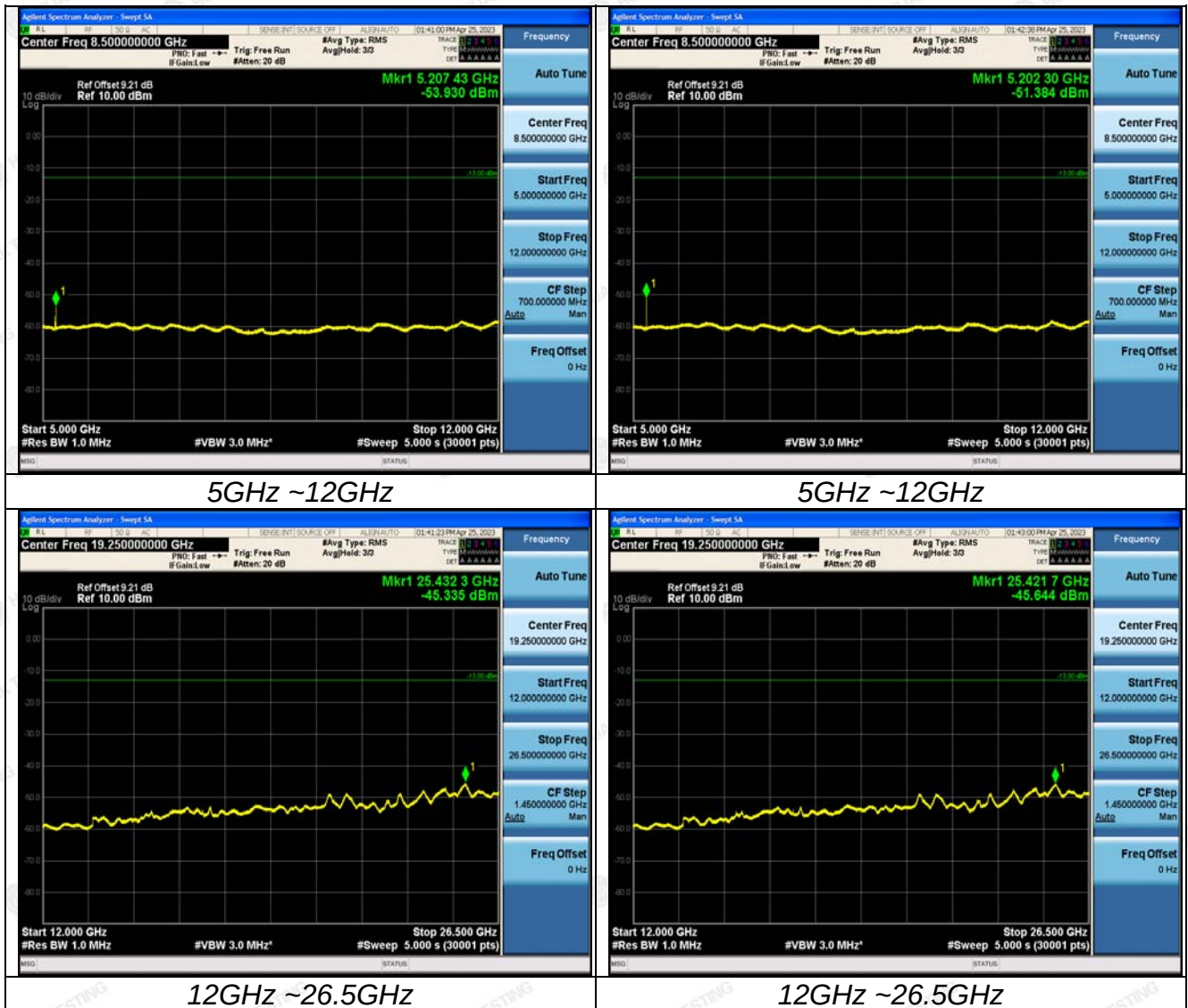


12@0



12@0

**Conducted Measurement:**
Mode A:**LTE FDD Band 18-QPSK-3.75KHz****Low Channel****1@0****1@47****30MHz~1GHz****30MHz~1GHz****1GHz ~5GHz****1GHz ~5GHz**

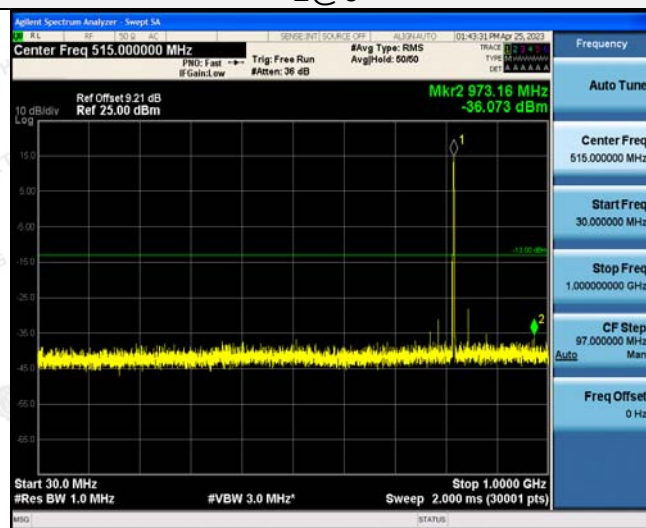




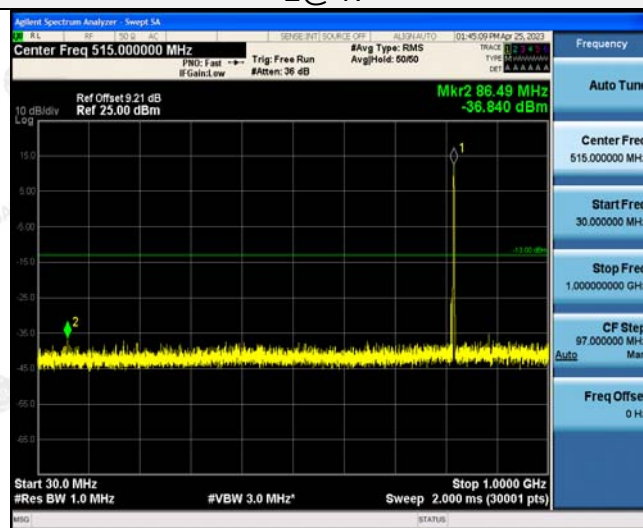
LTE FDD Band 18-QPSK-3.75KHz

Middle Channel

1@0



1@47



30MHz~1GHz



30MHz~1GHz

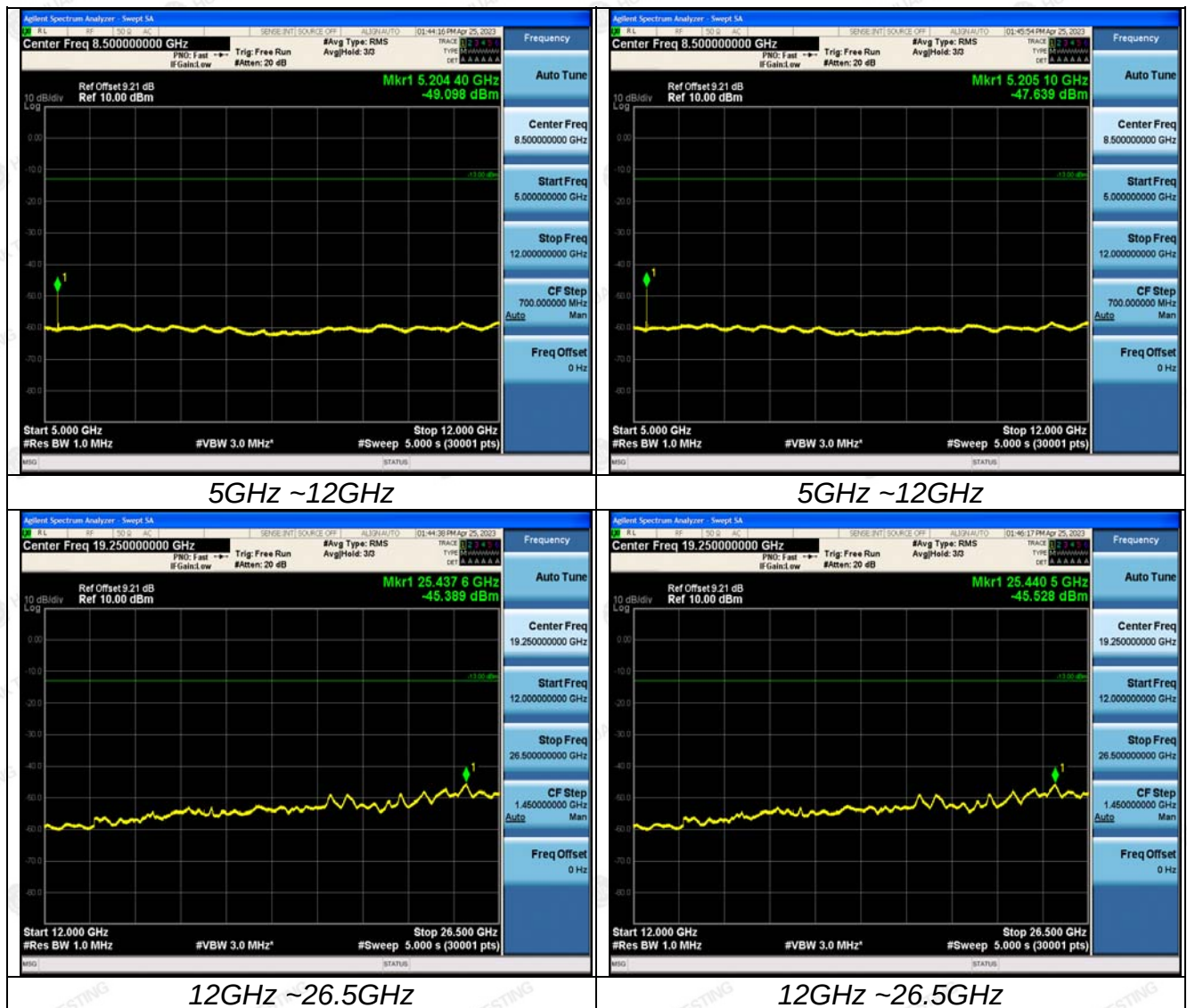


1GHz ~5GHz



1GHz ~5GHz

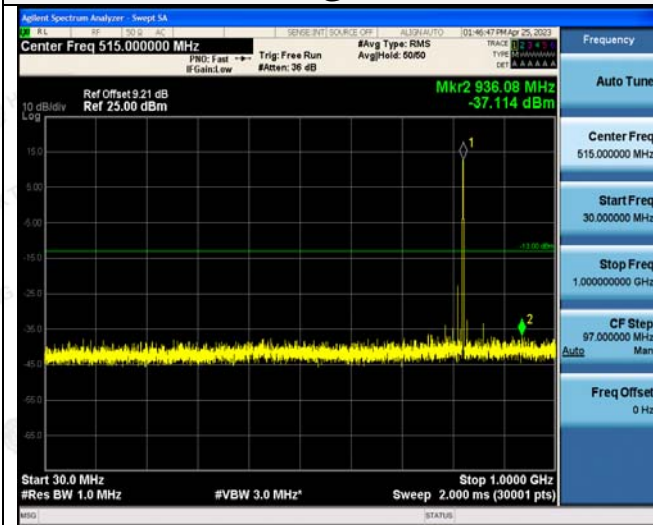




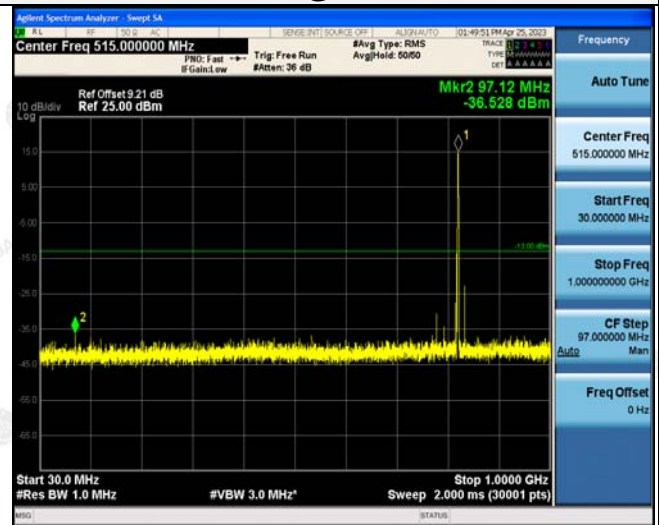


LTE FDD Band 18-QPSK-3.75KHz High Channel

1@0



1@47



30MHz~1GHz



30MHz~1GHz

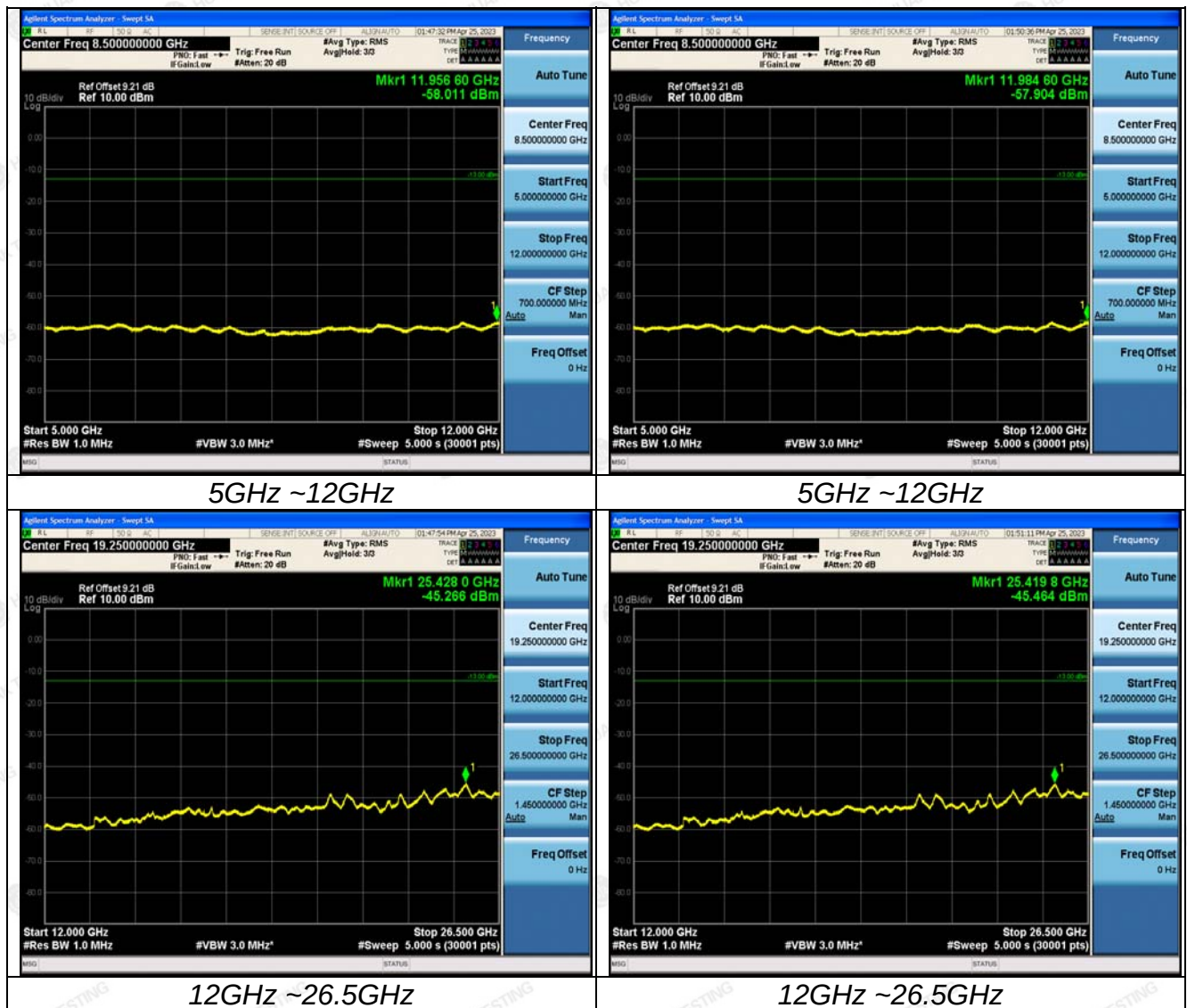


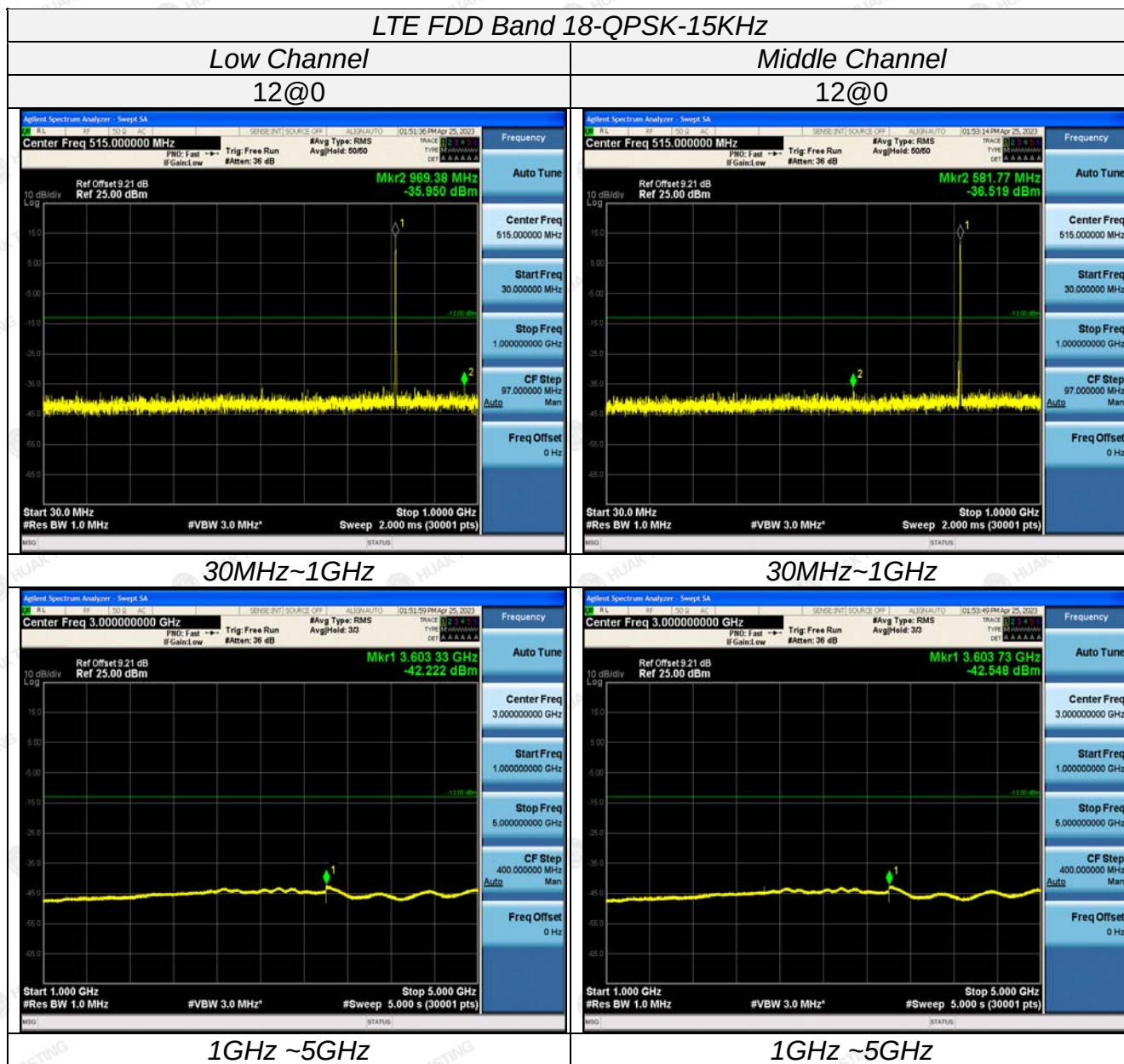
1GHz ~5GHz

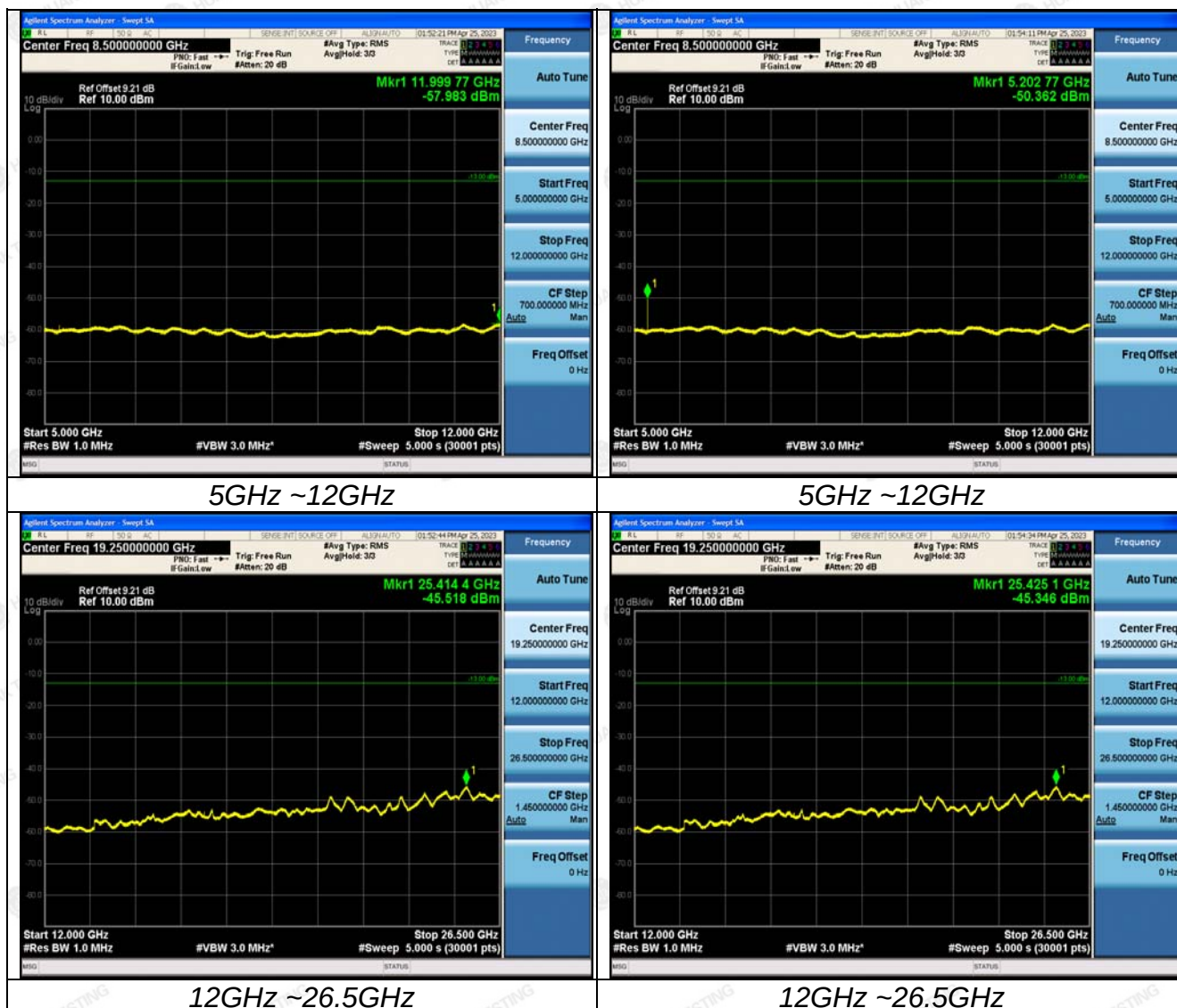


1GHz ~5GHz







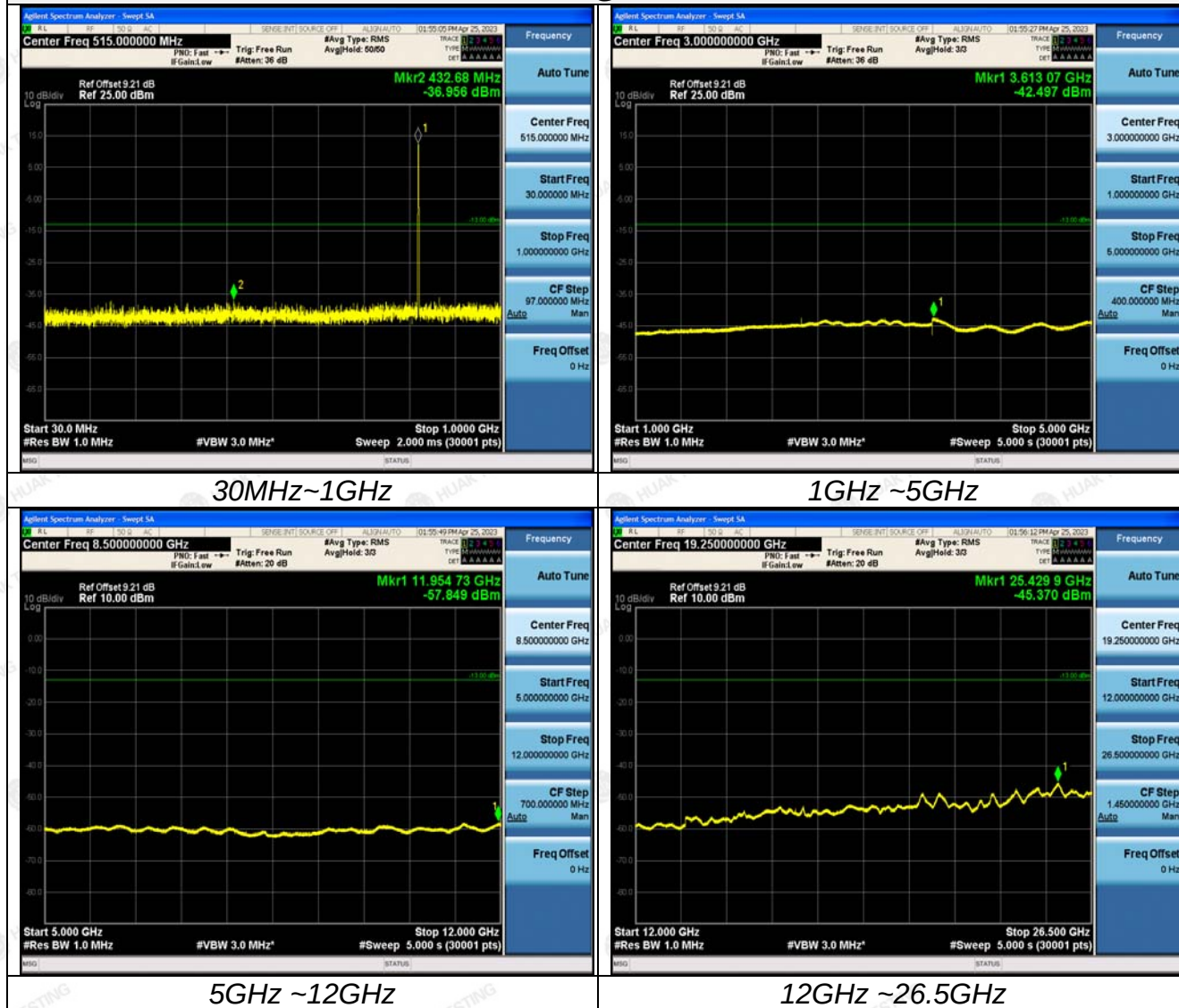




LTE FDD Band 18-QPSK-15KHz

High Channel

12@0



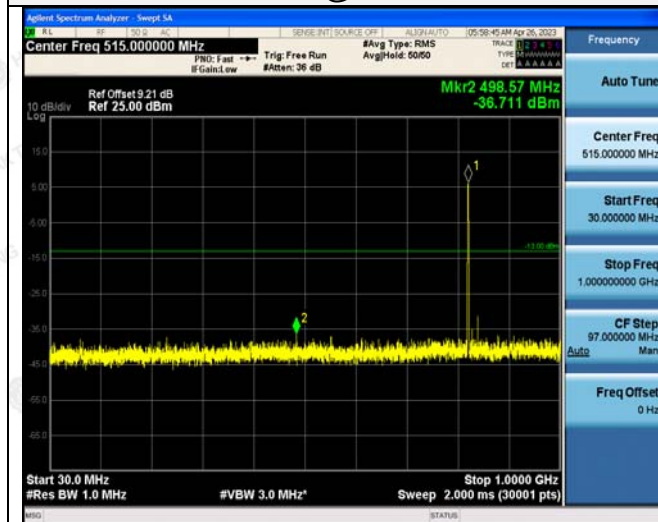


Mode B:

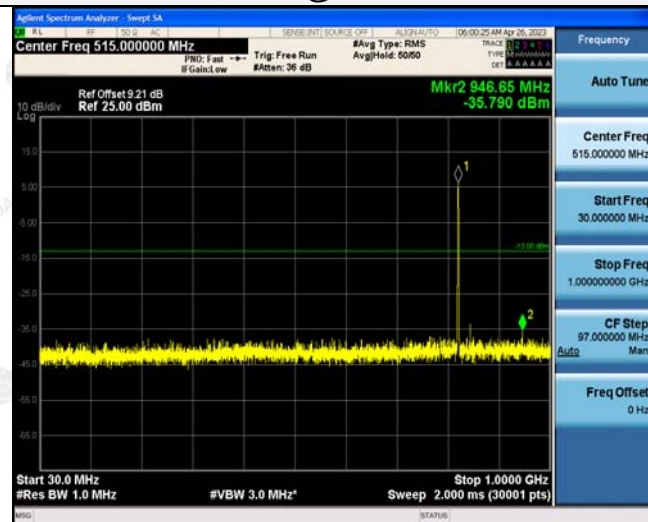
LTE FDD Band 18-QPSK-3.75KHz

Low Channel

1@0



1@47



30MHz~1GHz



30MHz~1GHz

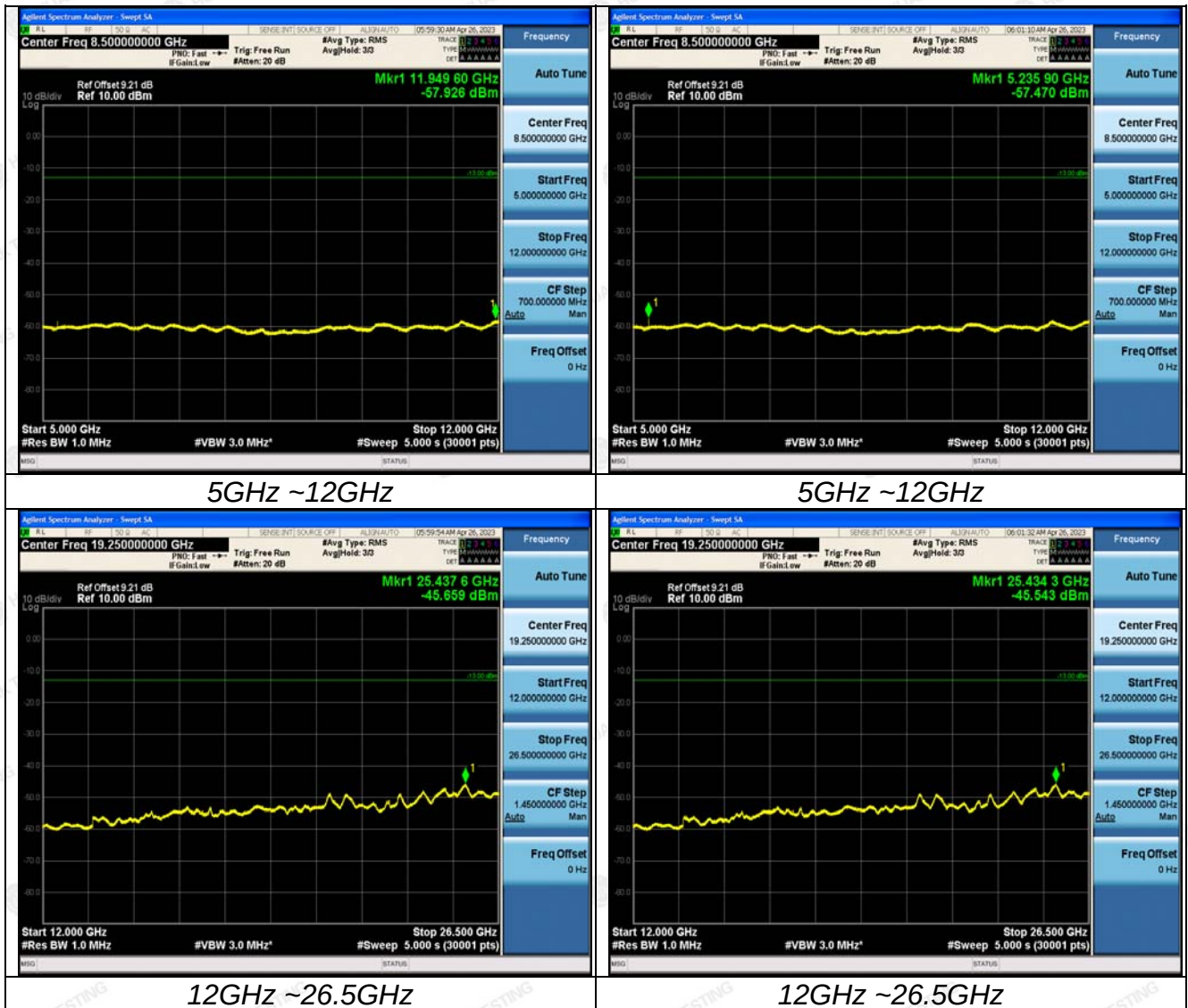


1GHz ~5GHz



1GHz ~5GHz

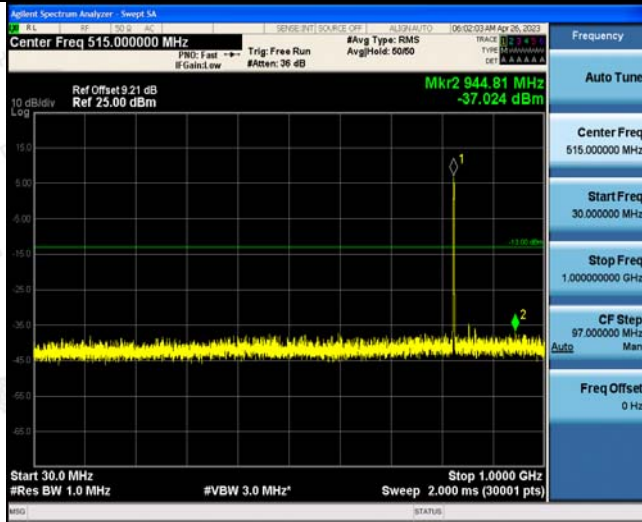




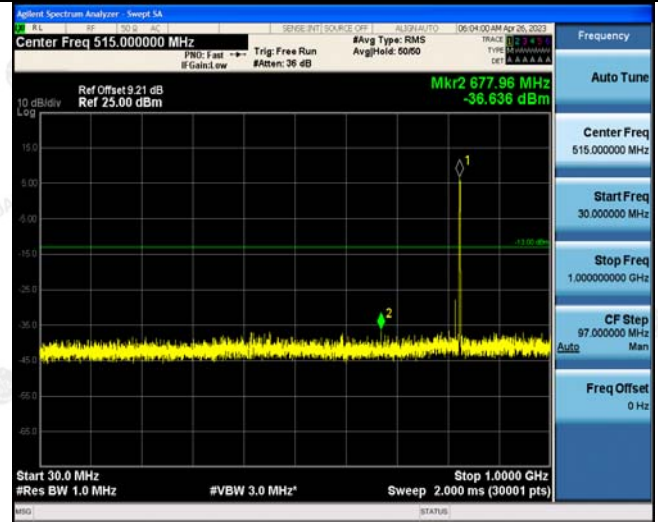


LTE FDD Band 18-QPSK-3.75KHz Middle Channel

1@0



1@47



30MHz~1GHz

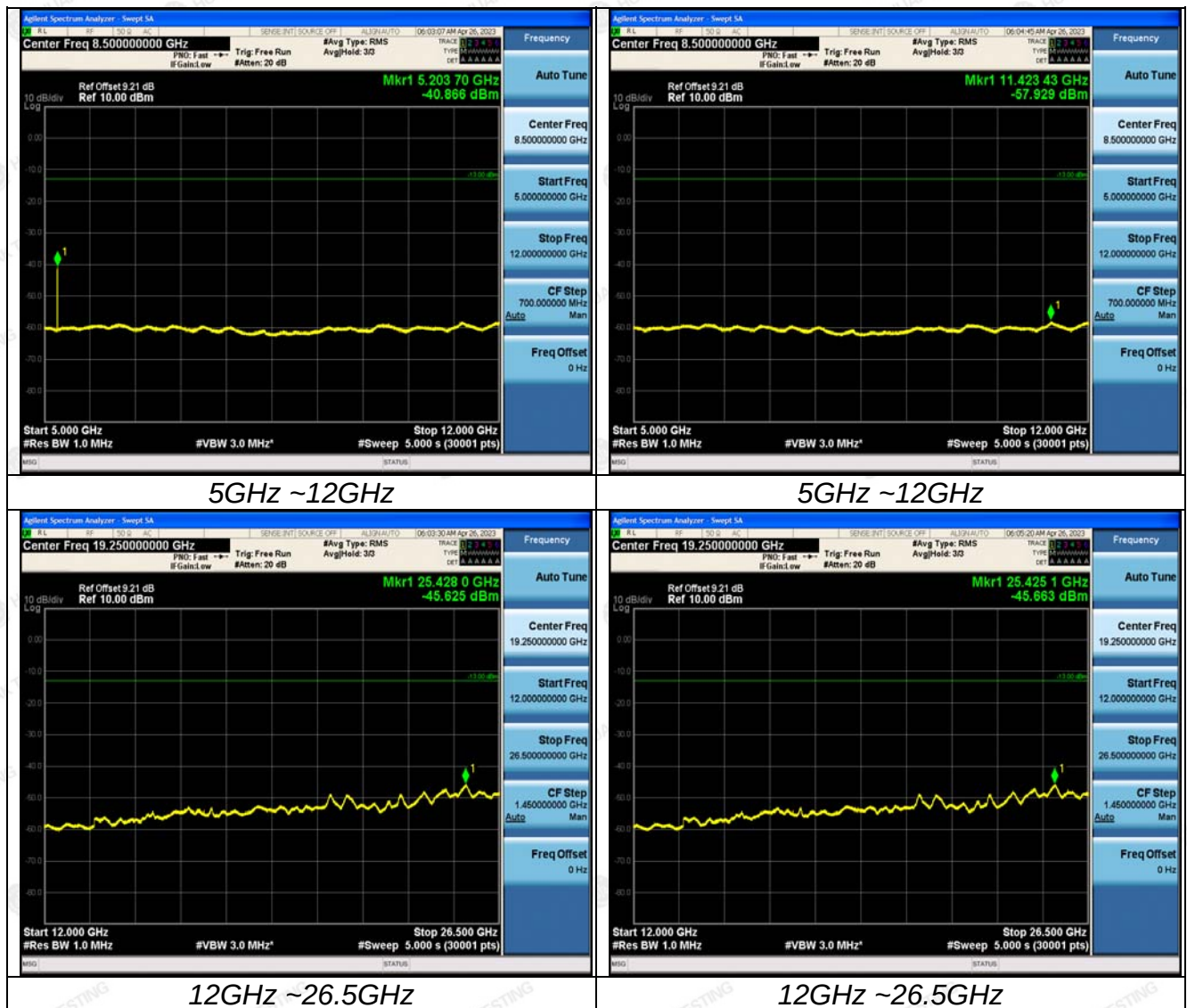


30MHz~1GHz



1GHz ~5GHz

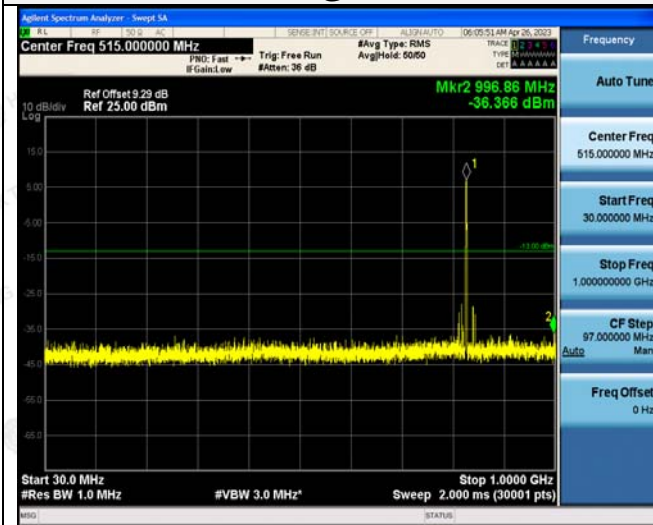
1GHz ~5GHz



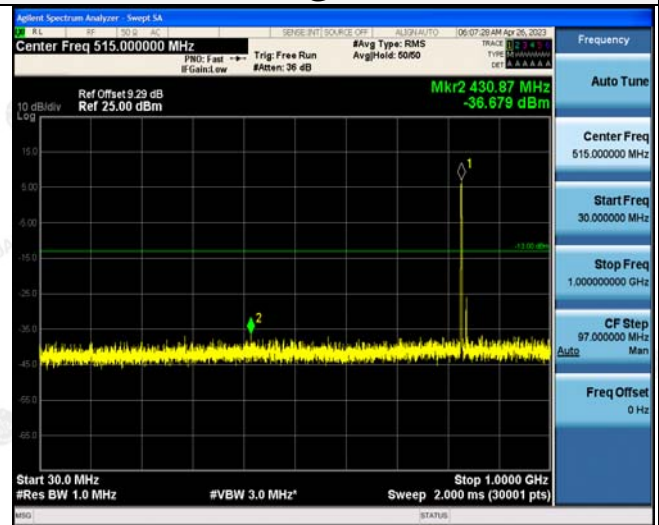


LTE FDD Band 18-QPSK-3.75KHz High Channel

1@0



1@47



30MHz~1GHz

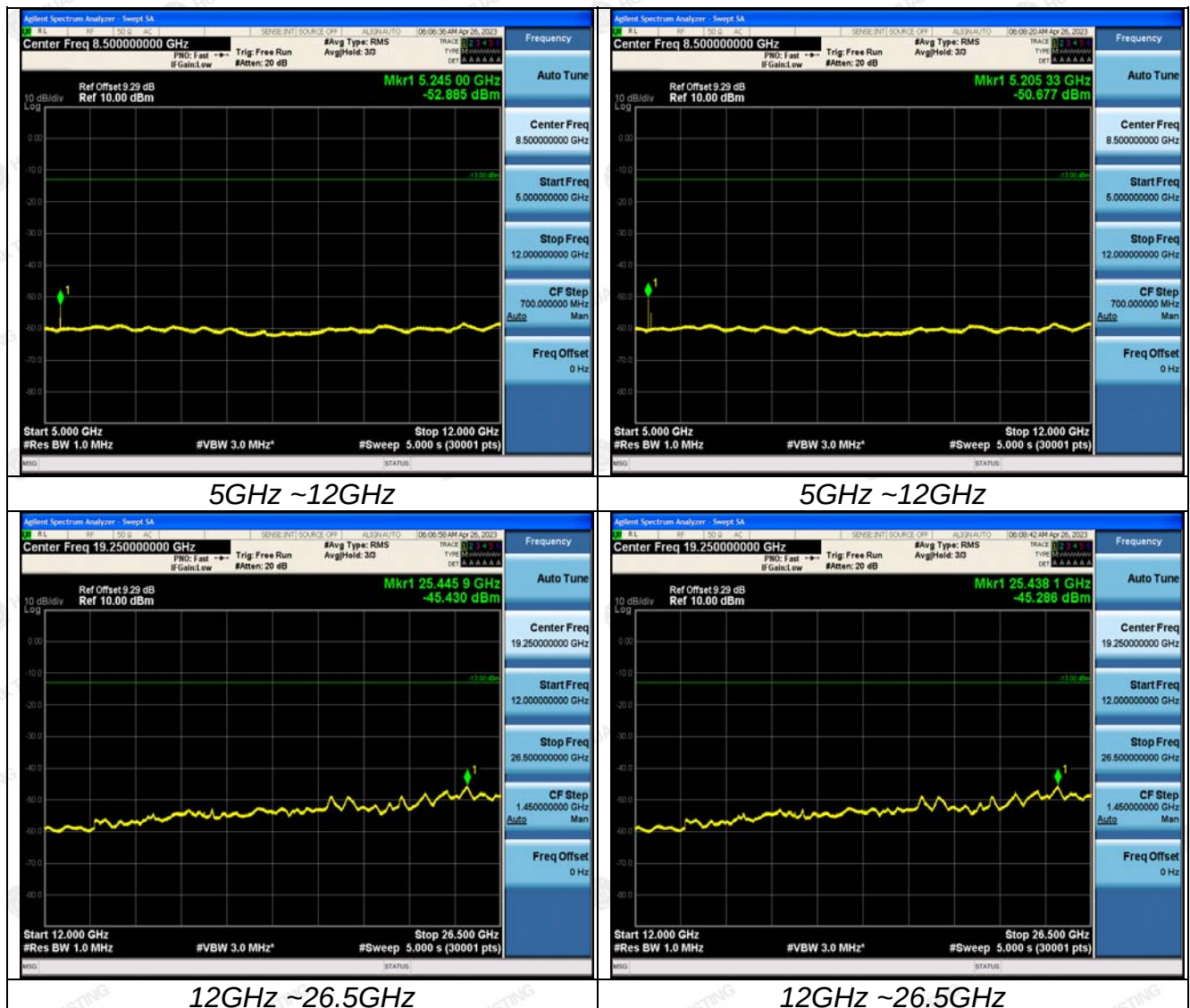


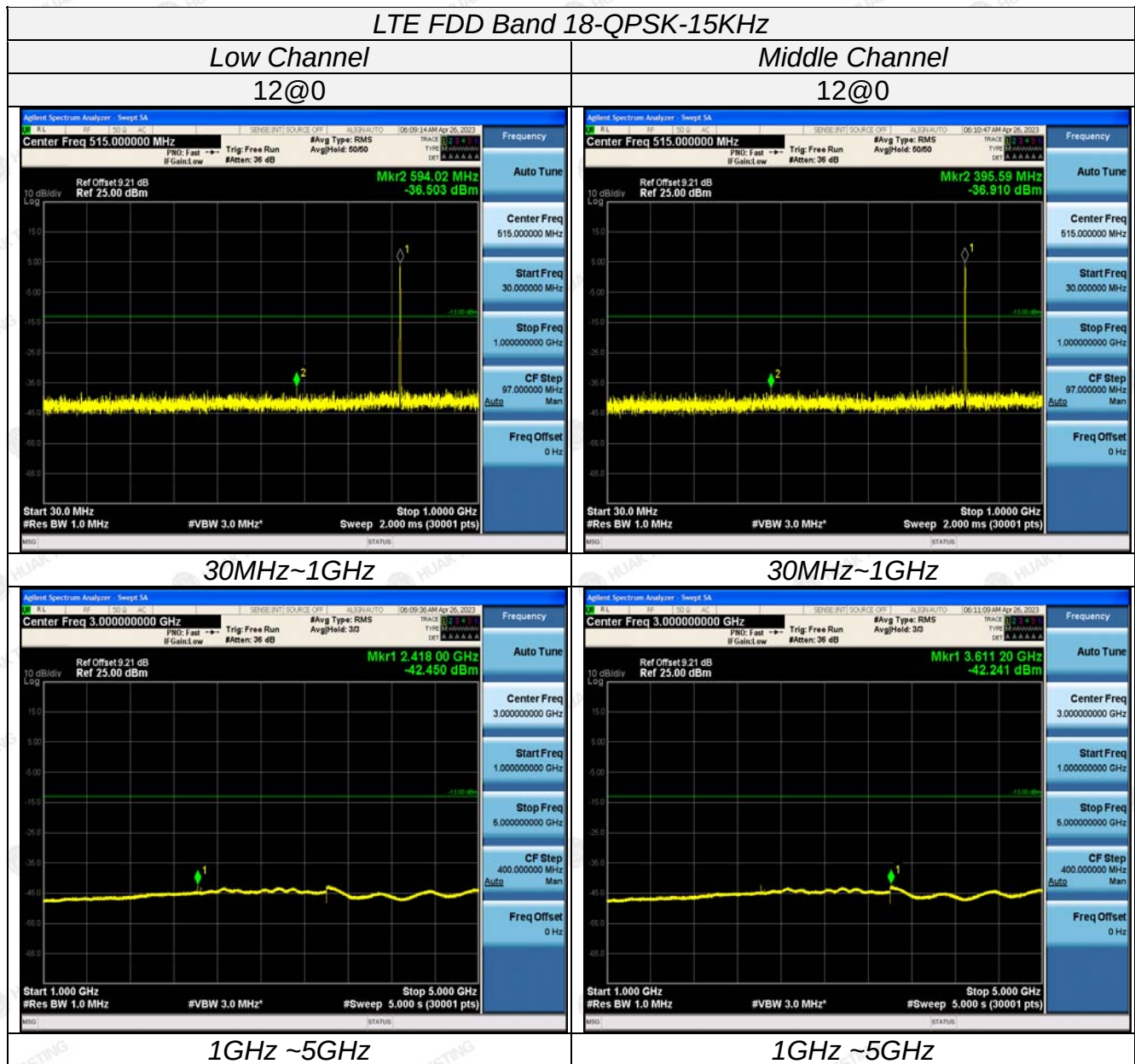
30MHz~1GHz

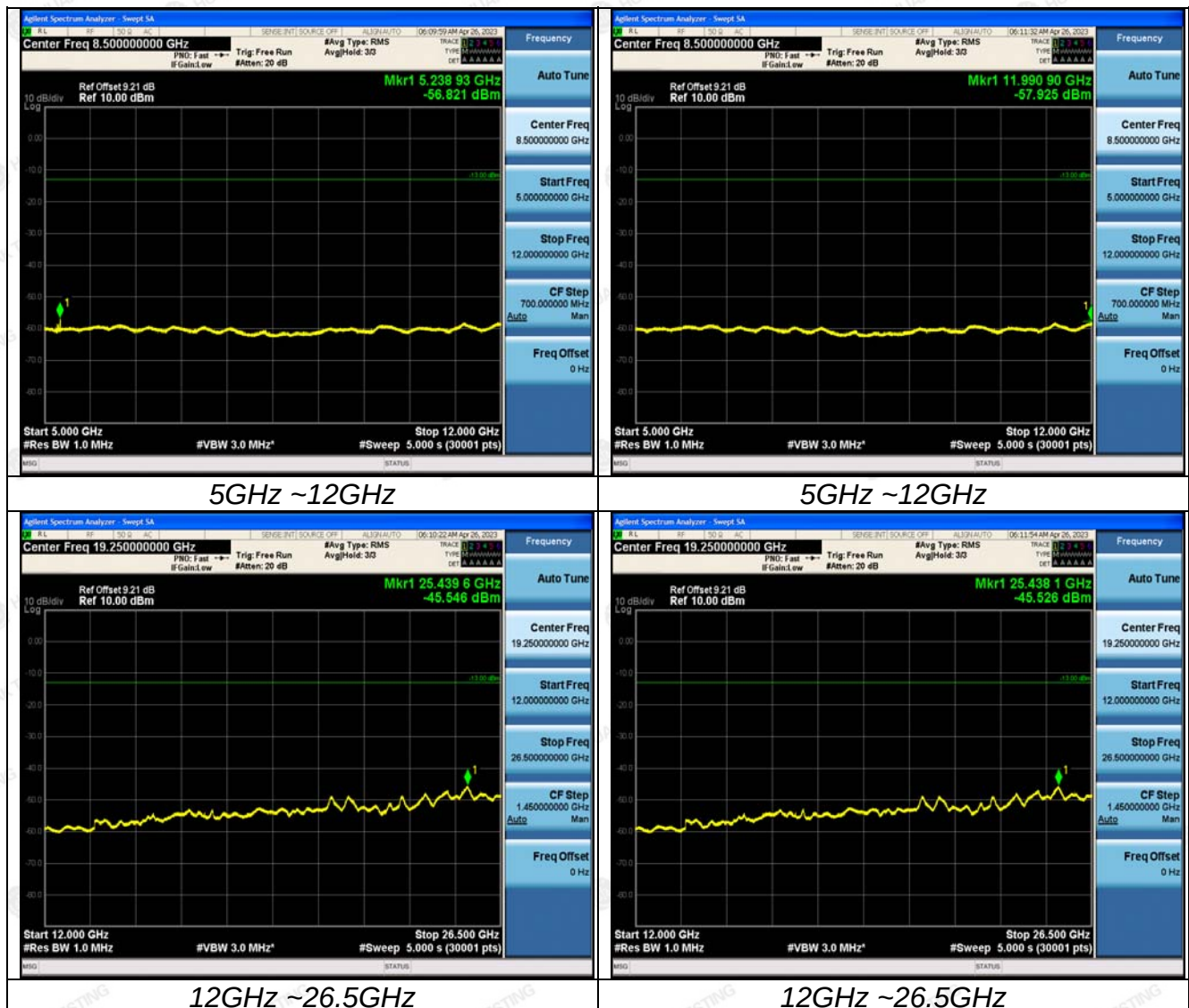


1GHz~5GHz

1GHz~5GHz





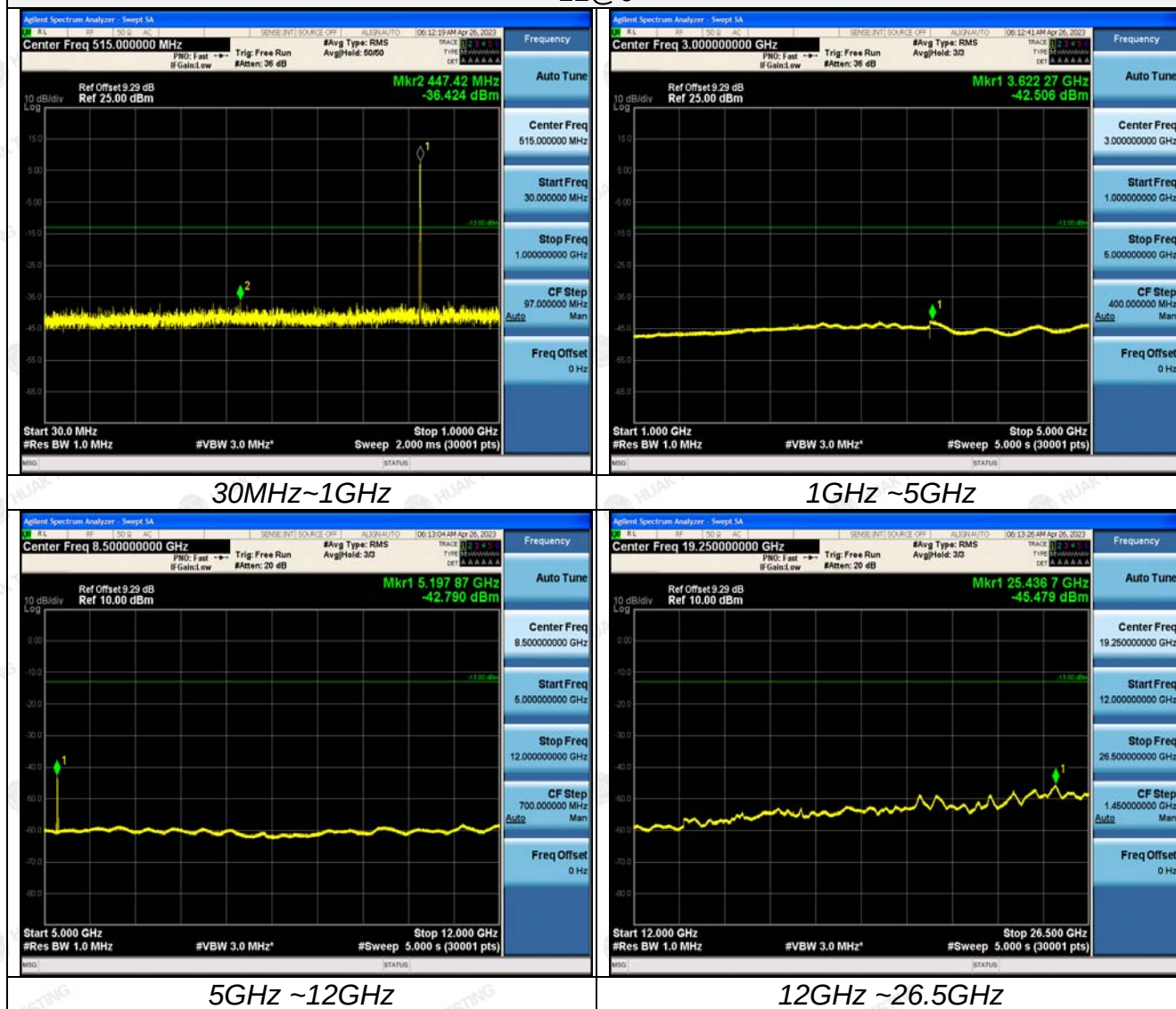




LTE FDD Band 18-QPSK-15KHz

High Channel

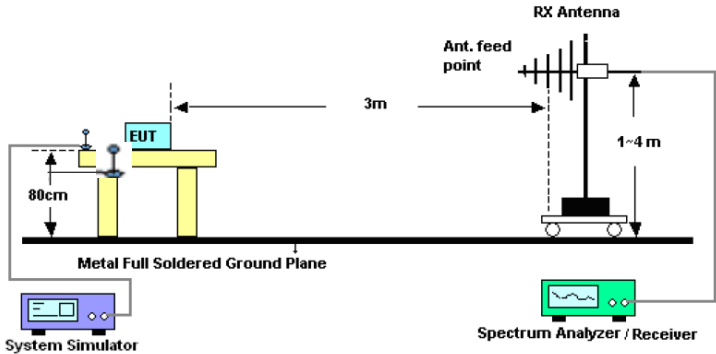
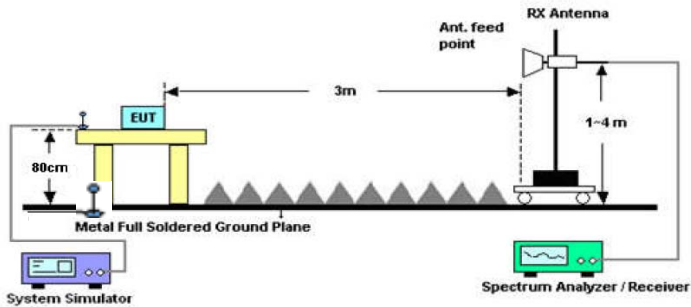
12@0





Field Strength of Spurious Radiation Measurement

5.5.2. Test Specification

Test Requirement:	FCC part90.691
Test Method:	FCC part 2.1053
Limit:	30MHz~20GHz -13dBm
Test setup:	From 30MHz to 1GHz  Above 1GHz 
Test Procedure:	1. The testing follows FCC KDB 971168 D01v03 Section 5.8 and ANSI / TIA-603-D-2010Section 2.2.12. 2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground. 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower. 4. The table was rotated 360 degrees to determine the position of the highest spurious emission. 5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.



	6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission. 7. A horn antenna was substituted in place of the EUT and was driven by a signal generator. 8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission. 9. Taking the record of output power at antenna port. 10. Repeat step 7 to step 8 for another polarization. 11. $EIRP(dBm) = S.G. Power - Tx Cable Loss + Tx Antenna Gain$ 12. $ERP(dBm) = EIRP - 2.15$ 13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Test results:	PASS

Radiated Measurement:

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 18; recorded worst case for each Channel Bandwidth of LTE FDD Band 18.
2. $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + G_a(dBi)$
3. We were not recorded other points as values lower than limits.
4. $Margin = Limit - EIRP$

Mode A:

LTE FDDBand 18-15KHz-BPSK-Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1630.2	-41.91	3.00	3.00	9.58	-35.33	-13.00	22.33	H
2445.3	-43.86	3.03	3.00	10.72	-36.17	-13.00	23.17	H
1630.2	-41.9	3.00	3.00	9.68	-35.22	-13.00	22.22	V
2445.3	-40.56	3.03	3.00	10.72	-32.87	-13.00	19.87	V

LTE FDDBand 18-15KHz-BPSK-Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1639.0	-42.91	3.00	3.00	9.58	-36.33	-13.00	23.33	H
2458.5	-42	3.03	3.00	10.72	-34.31	-13.00	21.31	H
1639.0	-42.4	3.00	3.00	9.68	-35.72	-13.00	22.72	V
2458.5	-42.49	3.03	3.00	10.72	-34.8	-13.00	21.8	V

*LTE FDDBand 18-15KHz-BPSK-High Channel*

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1647.8	-42.89	3.00	3.00	9.58	-36.31	-13.00	23.31	H
2471.7	-41.9	3.03	3.00	10.72	-34.21	-13.00	21.21	H
1647.8	-42.7	3.00	3.00	9.68	-36.02	-13.00	23.02	V
2471.7	-42.55	3.03	3.00	10.72	-34.86	-13.00	21.86	V

LTE FDDBand 18-15KHz-QPSK-Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1630.2	-43.08	3.00	3.00	9.58	-36.5	-13.00	23.5	H
2445.3	-43.01	3.03	3.00	10.72	-35.32	-13.00	22.32	H
1630.2	-42.71	3.00	3.00	9.68	-36.03	-13.00	23.03	V
2445.3	-40.47	3.03	3.00	10.72	-32.78	-13.00	19.78	V

LTE FDDBand 18-15KHz-QPSK-Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1639.0	-42.96	3.00	3.00	9.58	-36.38	-13.00	23.38	H
2458.5	-42.33	3.03	3.00	10.72	-34.64	-13.00	21.64	H
1639.0	-44.13	3.00	3.00	9.68	-37.45	-13.00	24.45	V
2458.5	-40.74	3.03	3.00	10.72	-33.05	-13.00	20.05	V

LTE FDDBand 18-15KHz-QPSK-High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1647.8	-43.14	3.00	3.00	9.58	-36.56	-13.00	23.56	H
2471.7	-43.87	3.03	3.00	10.72	-36.18	-13.00	23.18	H
1647.8	-42.38	3.00	3.00	9.68	-35.7	-13.00	22.7	V
2471.7	-41.35	3.03	3.00	10.72	-33.66	-13.00	20.66	V



Mode B:

LTE FDDBand 18-15KHz-BPSK-Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1648.2	-42.49	3.00	3.00	9.58	-35.91	-13.00	22.91	H
2472.3	-44.2	3.03	3.00	10.72	-36.51	-13.00	23.51	H
1648.2	-42.38	3.00	3.00	9.68	-35.7	-13.00	22.7	V
2472.3	-40.61	3.03	3.00	10.72	-32.92	-13.00	19.92	V

LTE FDDBand 18-15KHz-BPSK-Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1654.0	-43.1	3.00	3.00	9.58	-36.52	-13.00	23.52	H
2481.0	-41.57	3.03	3.00	10.72	-33.88	-13.00	20.88	H
1654.0	-43.17	3.00	3.00	9.68	-36.49	-13.00	23.49	V
2481.0	-42.74	3.03	3.00	10.72	-35.05	-13.00	22.05	V

LTE FDDBand 18-15KHz-BPSK-High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1659.8	-42.69	3.00	3.00	9.58	-36.11	-13.00	23.11	H
2489.7	-42.07	3.03	3.00	10.72	-34.38	-13.00	21.38	H
1659.8	-42.56	3.00	3.00	9.68	-35.88	-13.00	22.88	V
2489.7	-42.03	3.03	3.00	10.72	-34.34	-13.00	21.34	V

LTE FDDBand 18-15KHz-QPSK-Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1648.2	-42.92	3.00	3.00	9.58	-36.34	-13.00	23.34	H
2472.3	-43.16	3.03	3.00	10.72	-35.47	-13.00	22.47	H
1648.2	-43.19	3.00	3.00	9.68	-36.51	-13.00	23.51	V
2472.3	-40.45	3.03	3.00	10.72	-32.76	-13.00	19.76	V

LTE FDDBand 18-15KHz-QPSK-Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1654.0	-43.05	3.00	3.00	9.58	-36.47	-13.00	23.47	H
2481.0	-42.38	3.03	3.00	10.72	-34.69	-13.00	21.69	H
1654.0	-43.46	3.00	3.00	9.68	-36.78	-13.00	23.78	V
2481.0	-40.9	3.03	3.00	10.72	-33.21	-13.00	20.21	V

*LTE FDD Band 18-15KHz-QPSK-High Channel*

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Distance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1659.8	-43.36	3.00	3.00	9.58	-36.78	-13.00	23.78	H
2489.7	-43.5	3.03	3.00	10.72	-35.81	-13.00	22.81	H
1659.8	-42.77	3.00	3.00	9.68	-36.09	-13.00	23.09	V
2489.7	-41.19	3.03	3.00	10.72	-33.5	-13.00	20.5	V



5.6. Frequency Stability Measurement

5.6.1. Test Specification

Test Requirement:	FCC part 90.213
Test Method:	FCC Part 2.1055
Limit:	±2.5 ppm
Test Setup:	 The diagram shows a 'System Simulator' connected by a line to a 'Thermal Chamber'. Inside the 'Thermal Chamber' is a device labeled 'EUT'.
Test Procedure:	Test Procedures for Temperature Variation 1. The testing follows FCC KDB 971168 D01v03 Section 9.0. 2. The EUT was set up in the thermal chamber and connected with the system simulator. 3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute. 4. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute. Test Procedures for Voltage Variation 1. The testing follows FCC KDB 971168 D01v03 Section 9.0. 2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator. 3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT. 4. The variation in frequency was measured for the worst case.
Test Result:	PASS

**TEST RESULTS**

Remark:

1. We tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 18; recorded worst case.

LTE Band 18, 15KHz bandwidth (worst case of all bandwidths)

Mode A:

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	BPSK	QPSK	BPSK	QPSK	
3.15	-21.30	-18.26	-0.026132	-0.022402	2.50
3.70	-20.26	-18.56	-0.024856	-0.022770	2.50
4.26	-21.10	-19.62	-0.025886	-0.024071	2.50

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	BPSK	QPSK	BPSK	QPSK	
-30°	-21.08	-18.48	-0.025862	-0.022672	2.50
-20°	-21.81	-19.80	-0.026757	-0.024291	2.50
-10°	-19.84	-18.82	-0.024341	-0.023089	2.50
0°	-19.20	-14.93	-0.023429	-0.018218	2.50
10°	-19.96	-16.51	-0.024356	-0.020146	2.50
20°	-18.82	-17.22	-0.022965	-0.021013	2.50
30°	-19.47	-14.37	-0.023758	-0.017535	2.50
40°	-17.49	-15.97	-0.021342	-0.019487	2.50
50°	-20.21	-14.27	-0.024661	-0.017413	2.50



Mode B:

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	BPSK	QPSK	BPSK	QPSK	
3.15	-25.43	-18.09	-0.030858	-0.021951	2.50
3.70	-23.66	-19.00	-0.028710	-0.023055	2.50
4.26	-24.83	-19.24	-0.030130	-0.023347	2.50

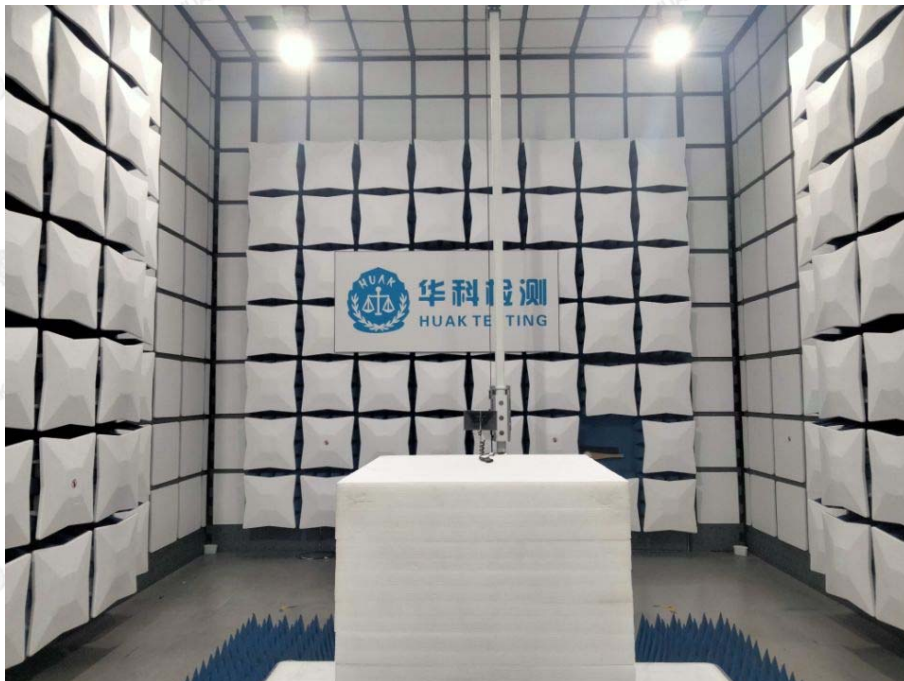
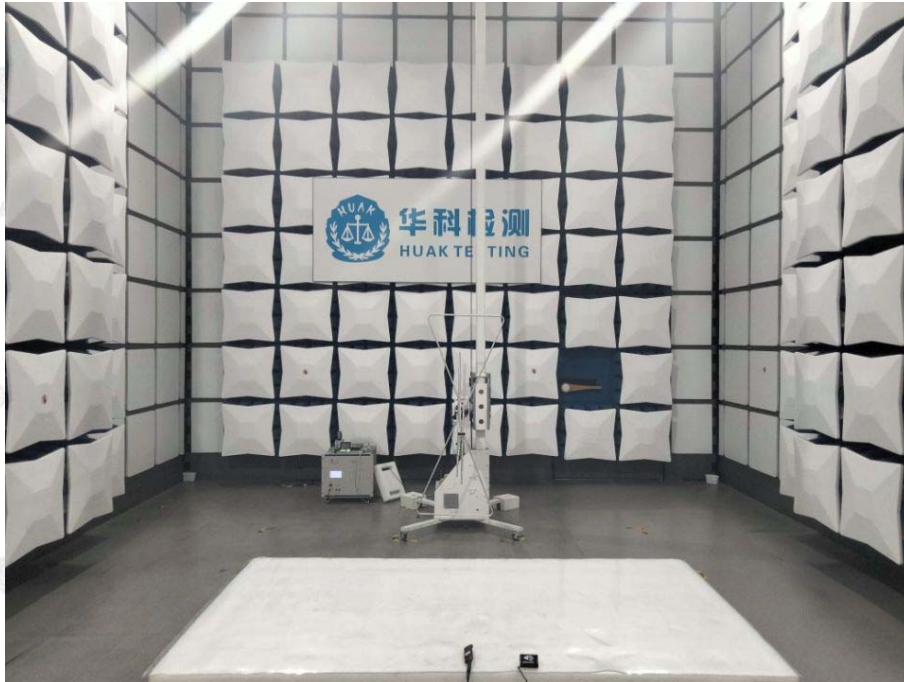
Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	BPSK	QPSK	BPSK	QPSK	
-30°	-18.55	-23.73	-0.022509	-0.028795	2.50
-20°	-18.91	-22.76	-0.022946	-0.027618	2.50
-10°	-19.95	-24.36	-0.024208	-0.029560	2.50
0°	-20.02	-19.22	-0.024208	-0.023241	2.50
10°	-20.09	-20.31	-0.024293	-0.024559	2.50
20°	-20.33	-20.07	-0.024583	-0.024268	2.50
30°	-17.89	-20.95	-0.021632	-0.025333	2.50
40°	-19.58	-19.88	-0.023676	-0.024039	2.50
50°	-19.75	-21.35	-0.023881	-0.025816	2.50



6. Photographs of Test Setup

Radiated Emission



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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7. Photographs of EUT

Refer to test report ANNEX A of external photos and ANNEX B of internal photos

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