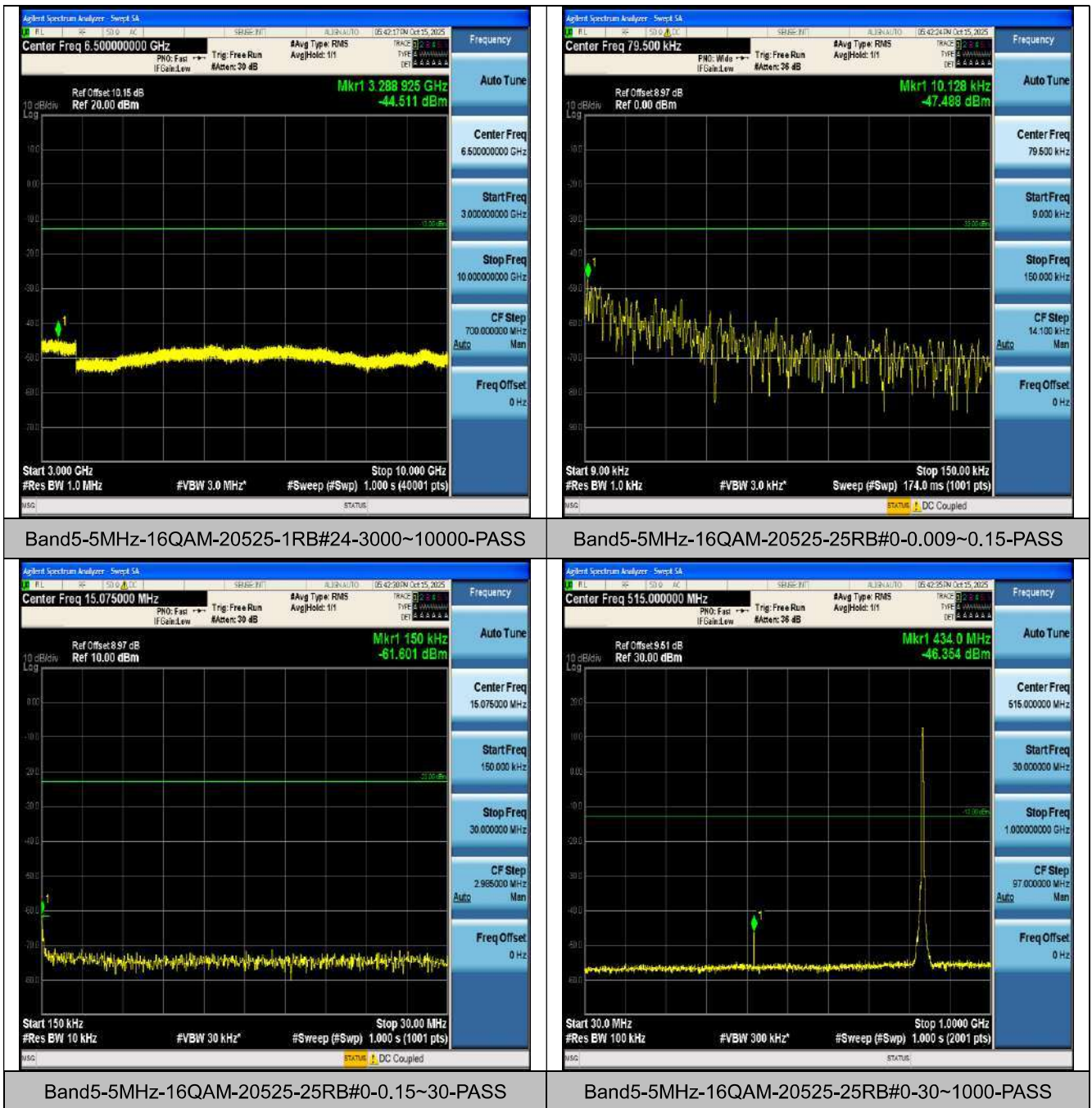
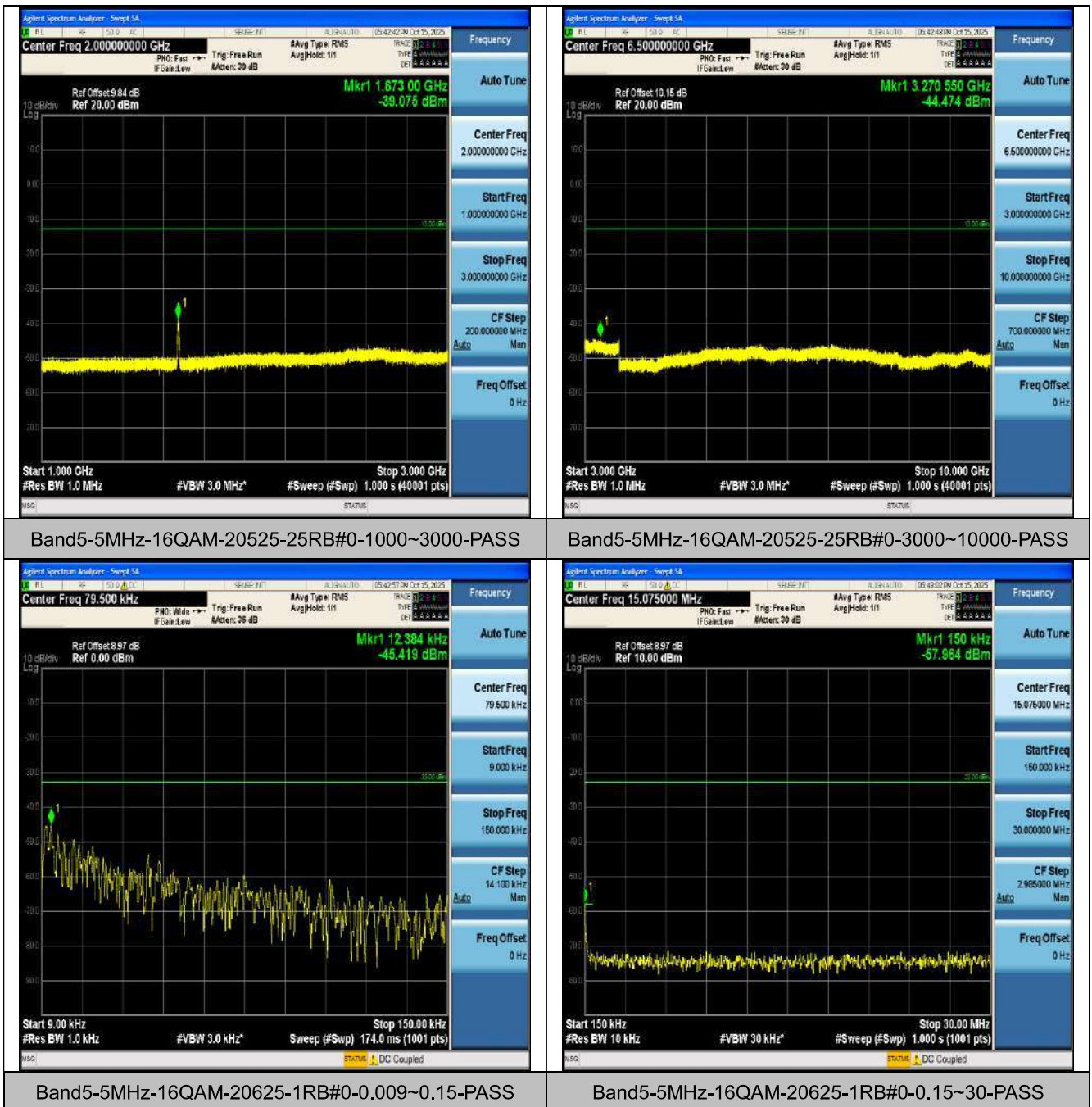
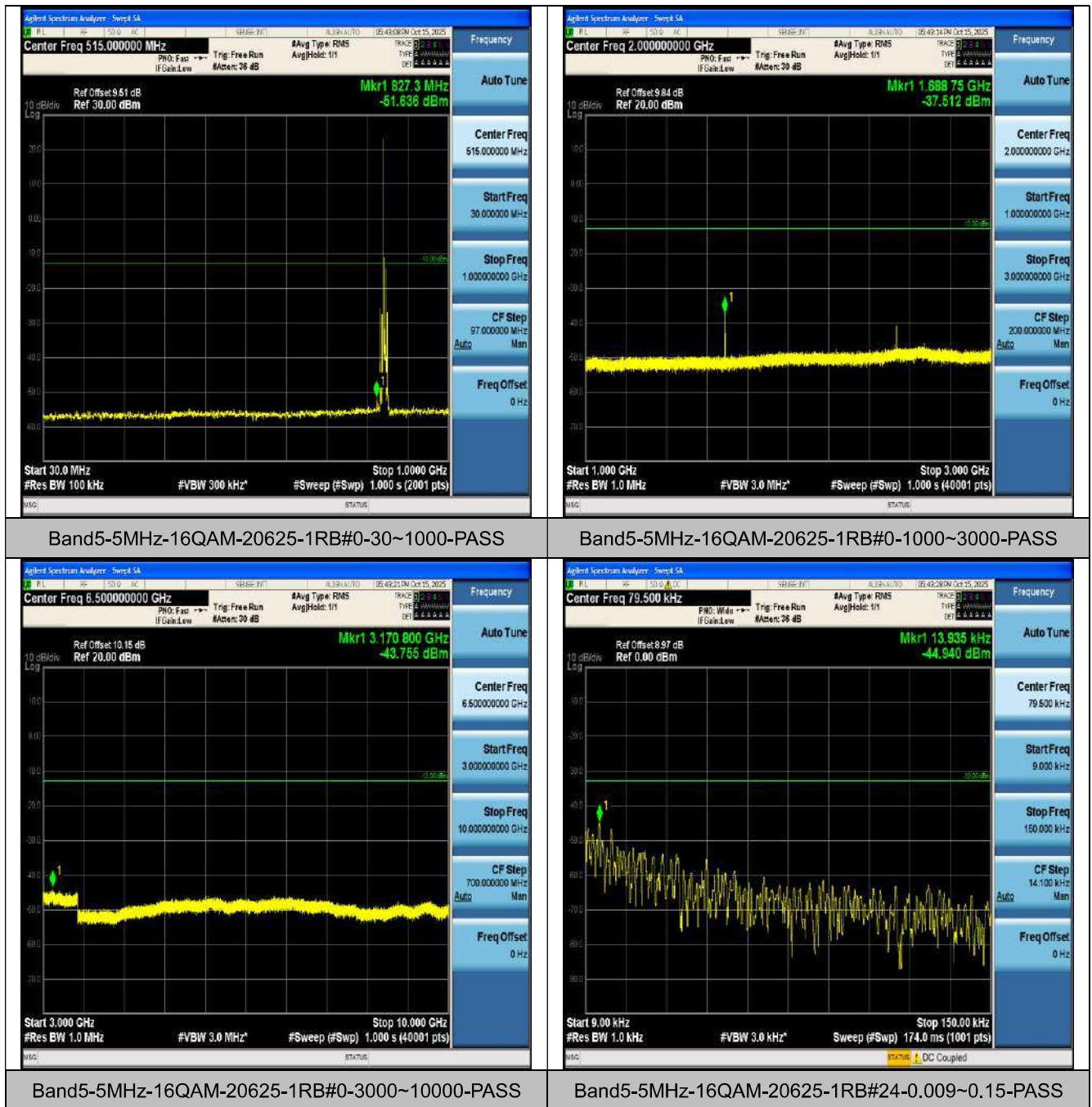
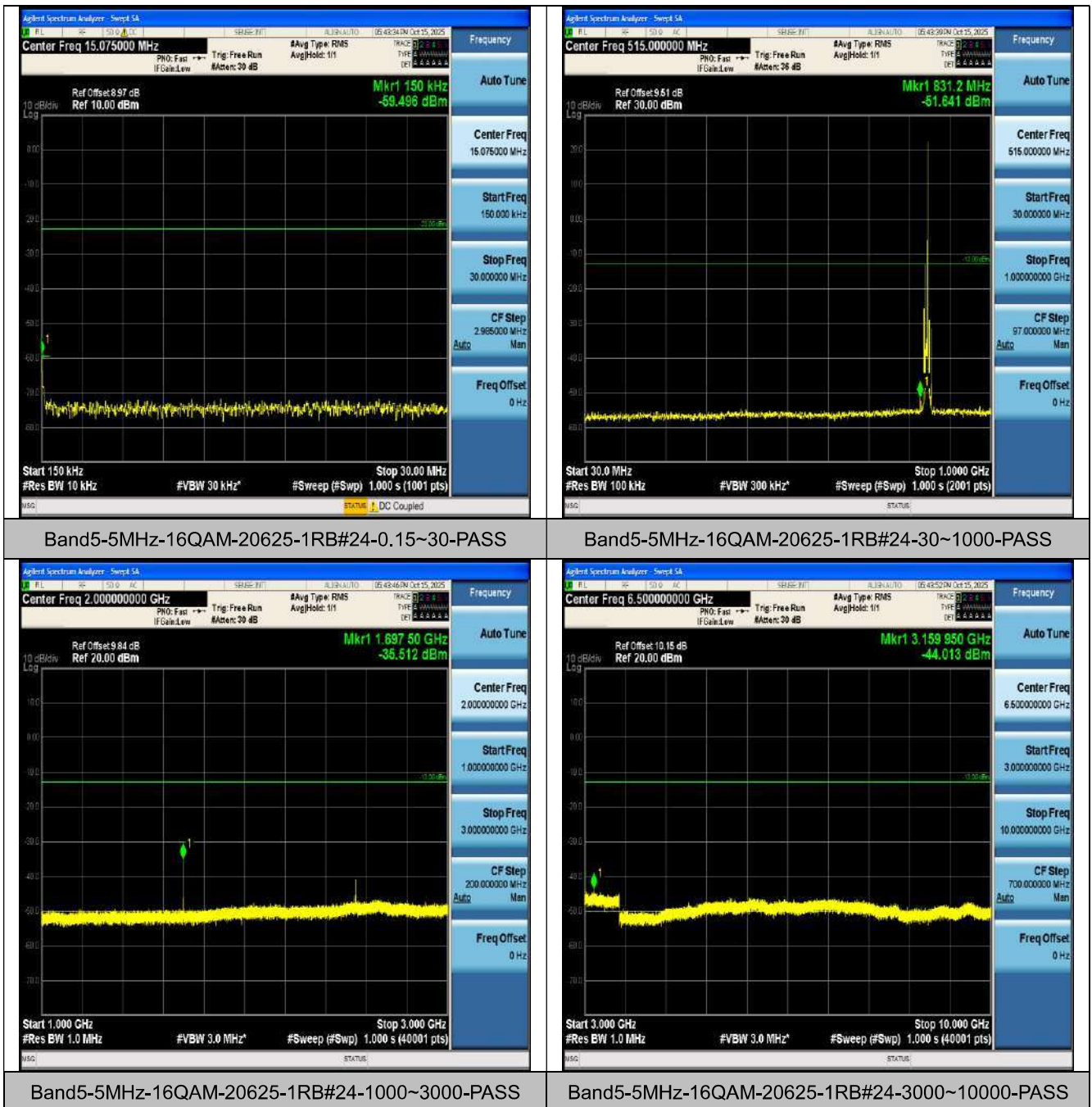
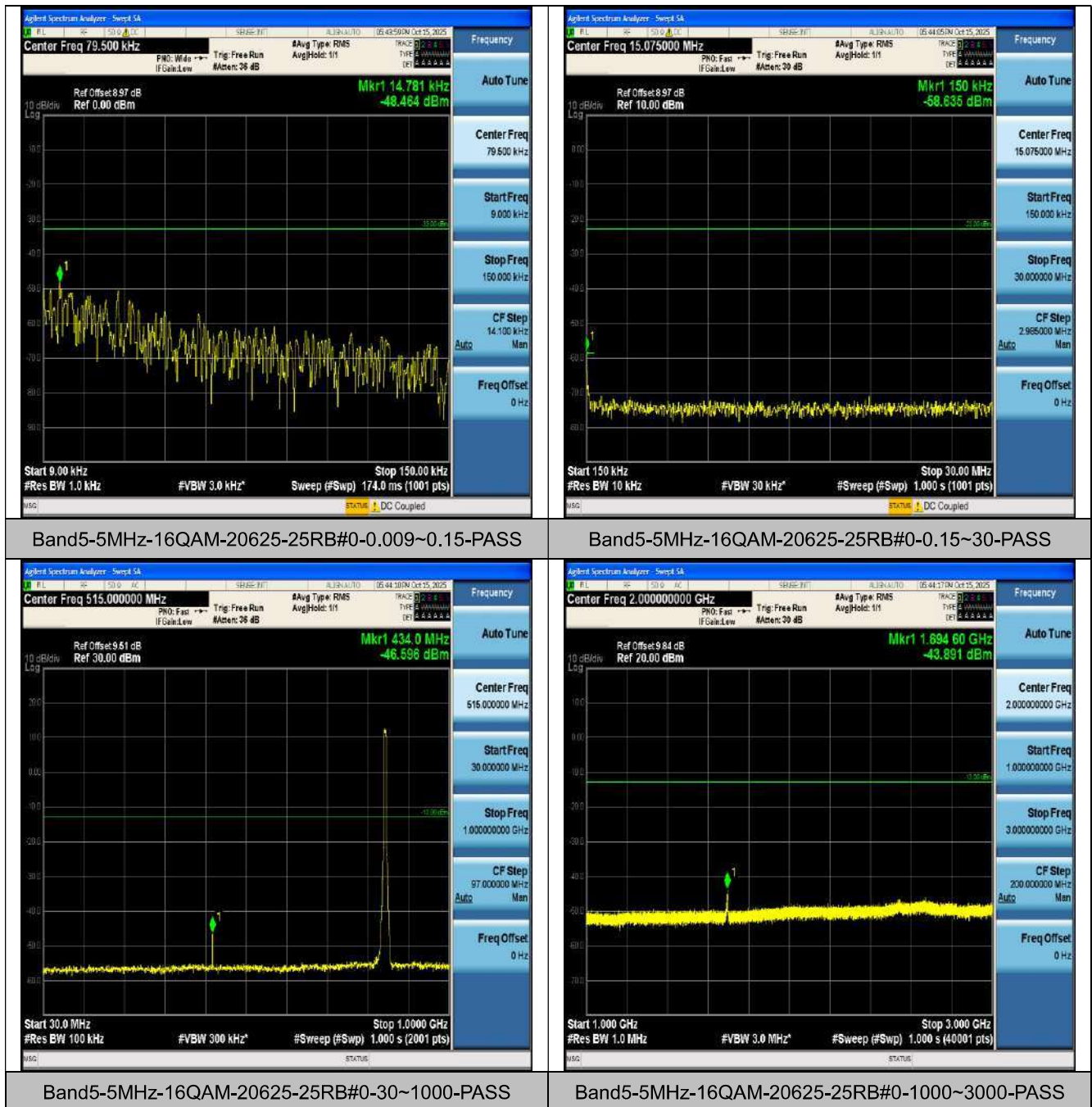


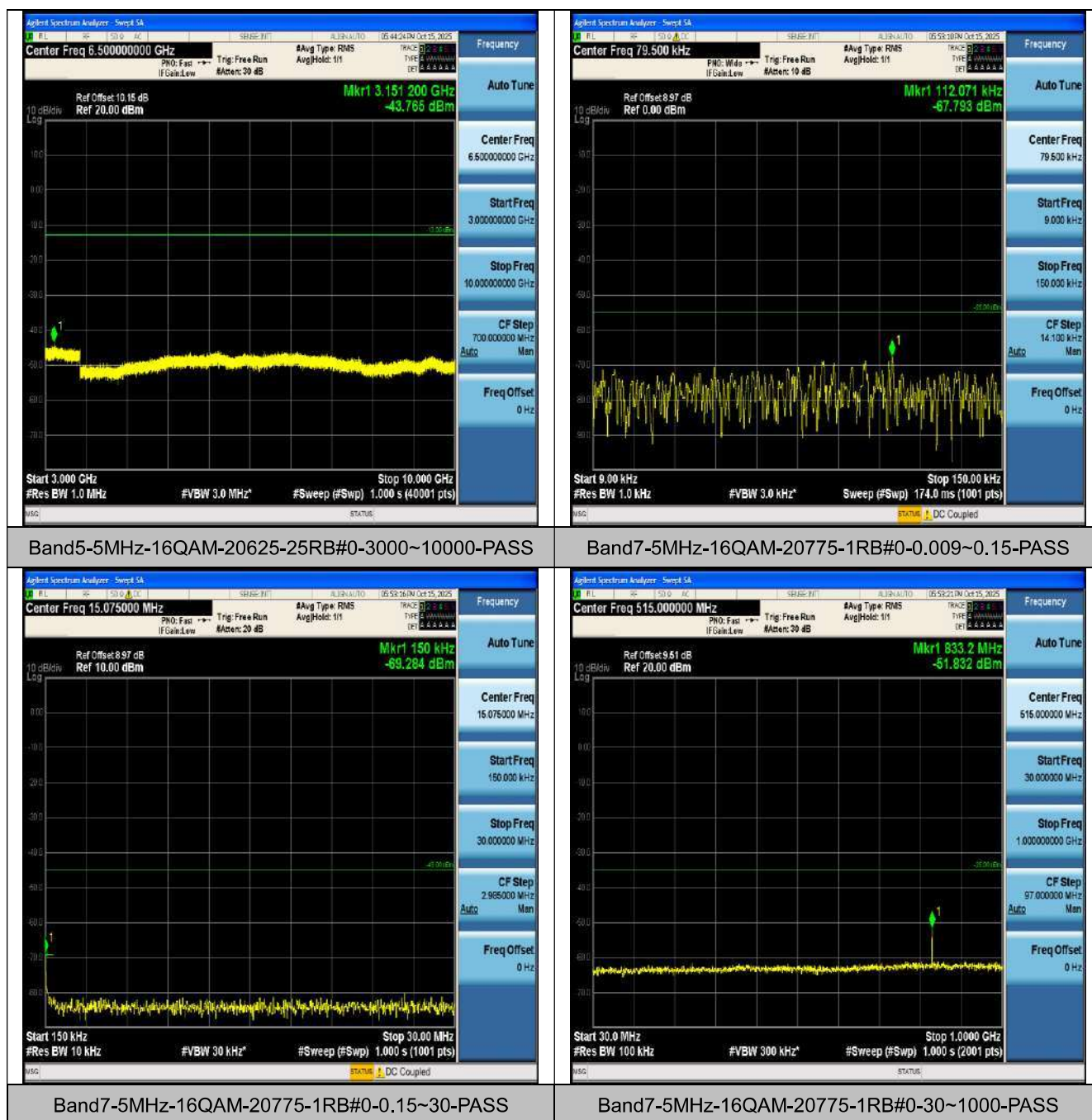


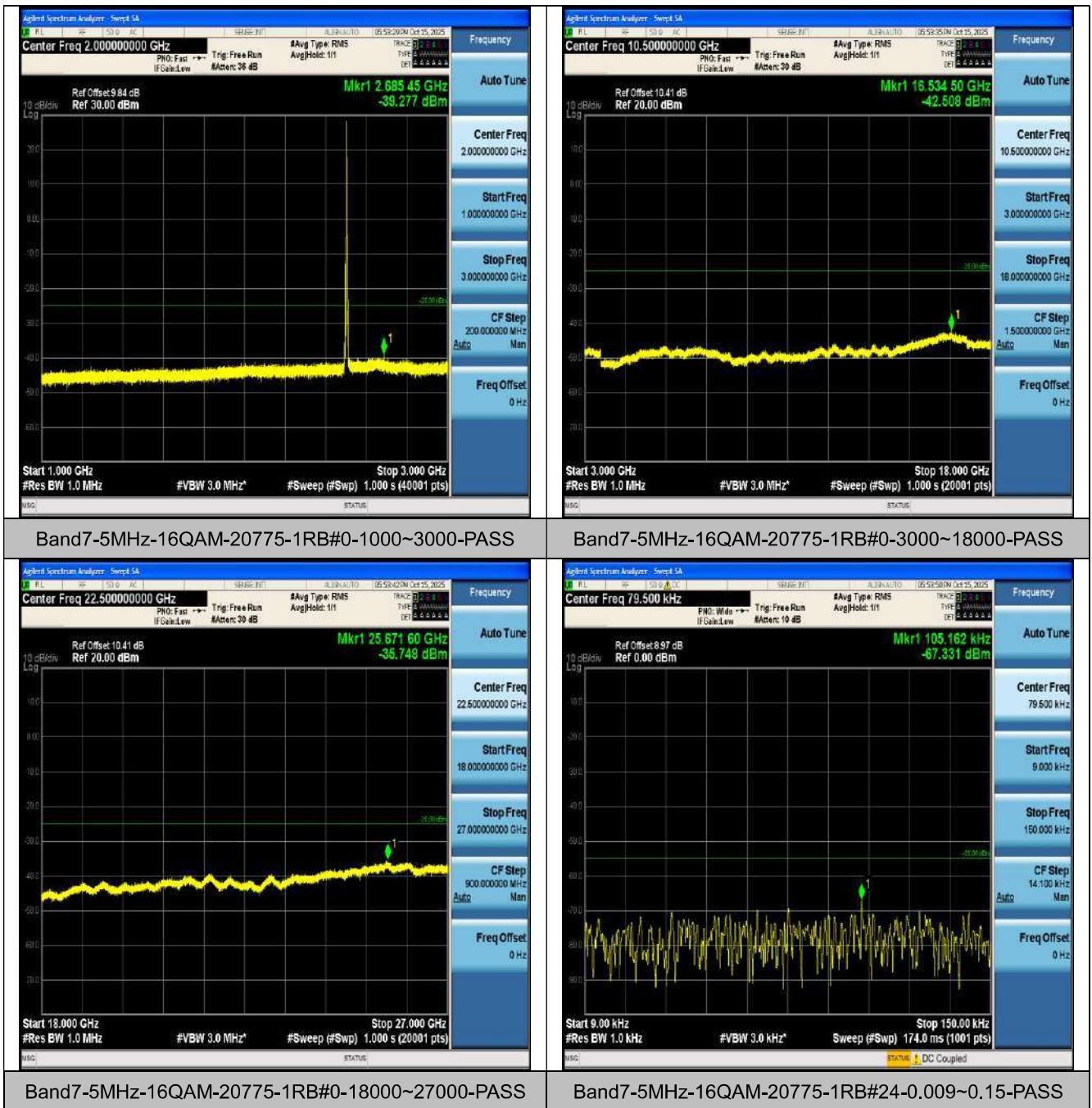


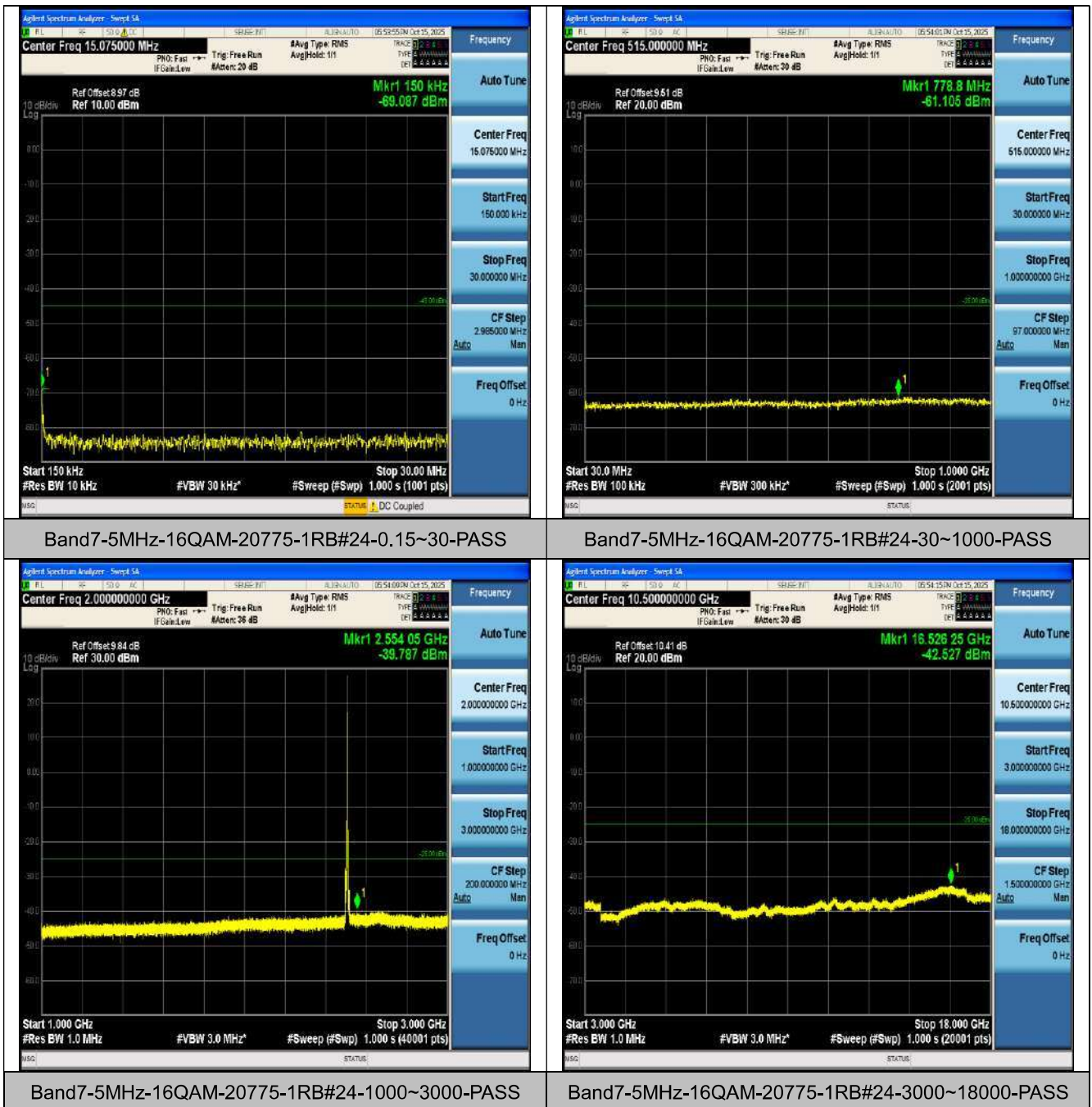


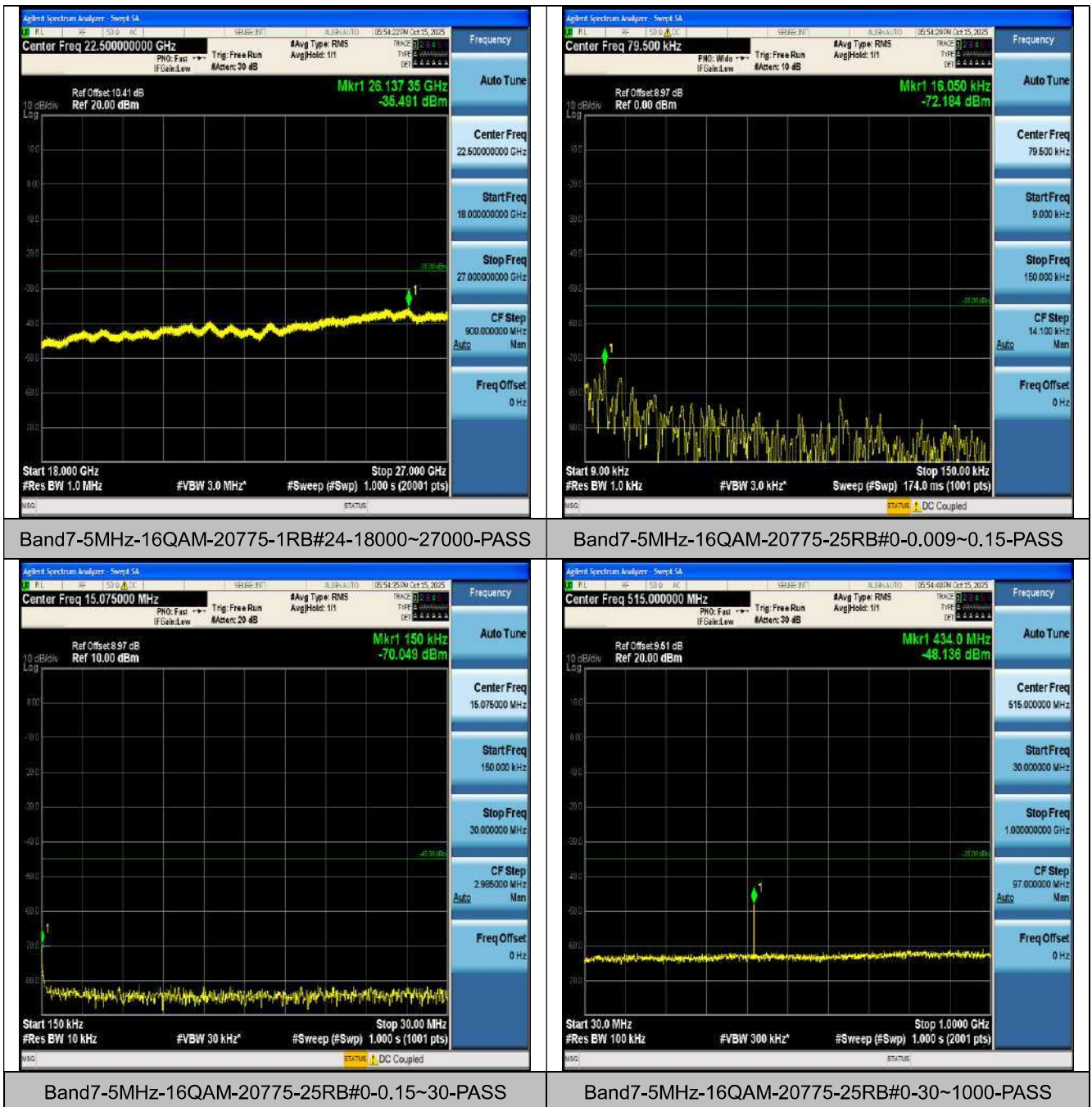


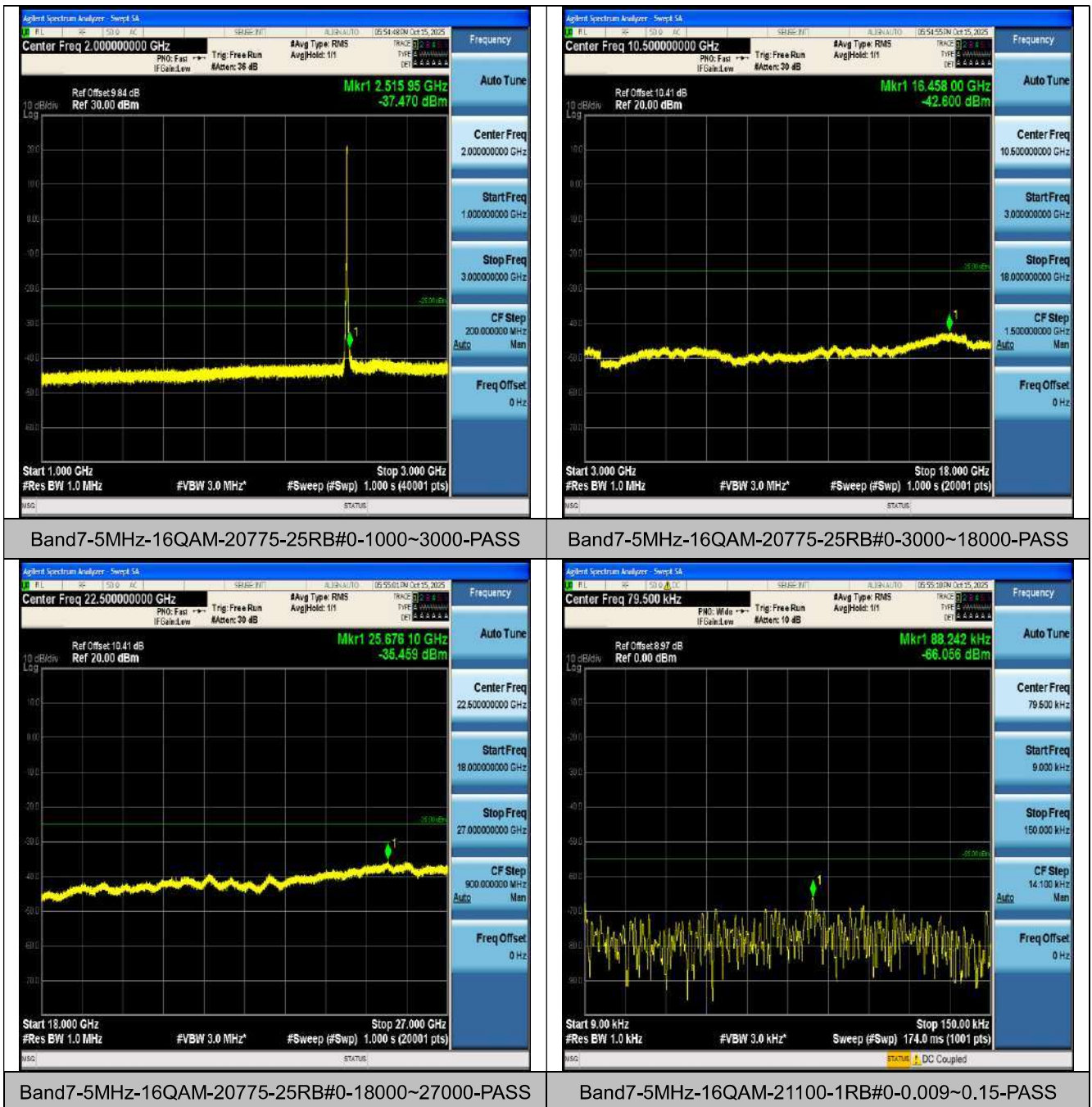


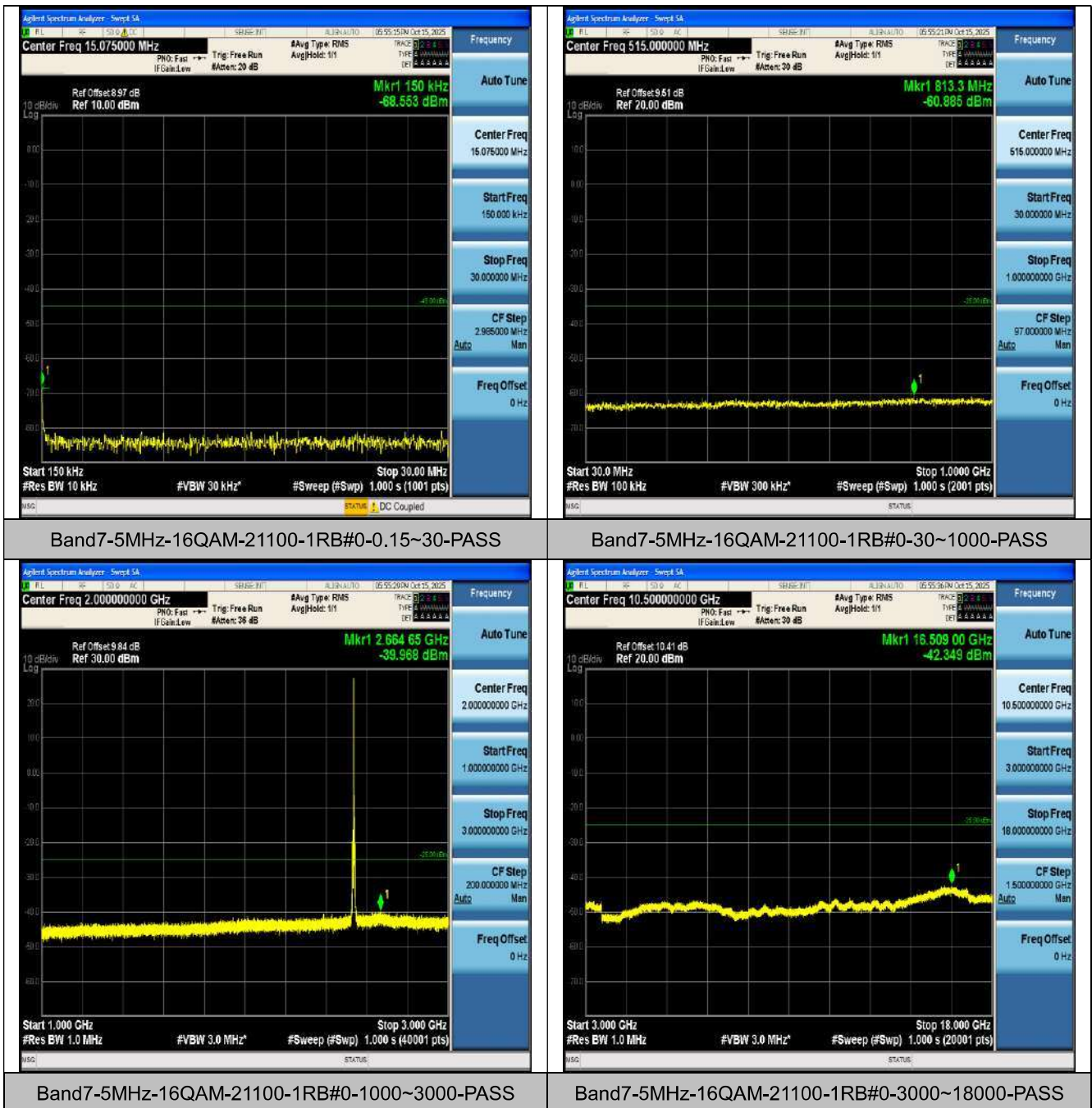


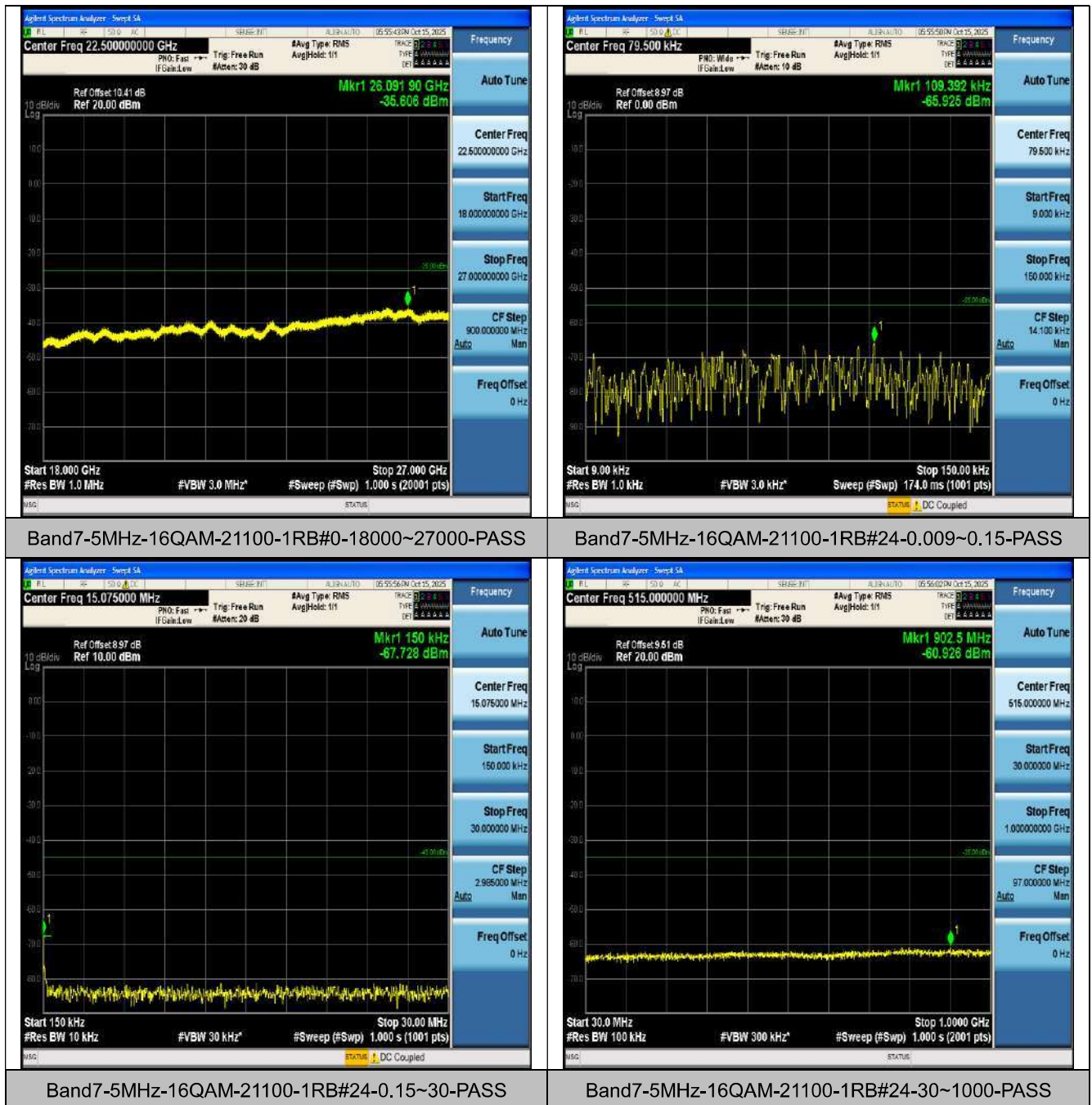


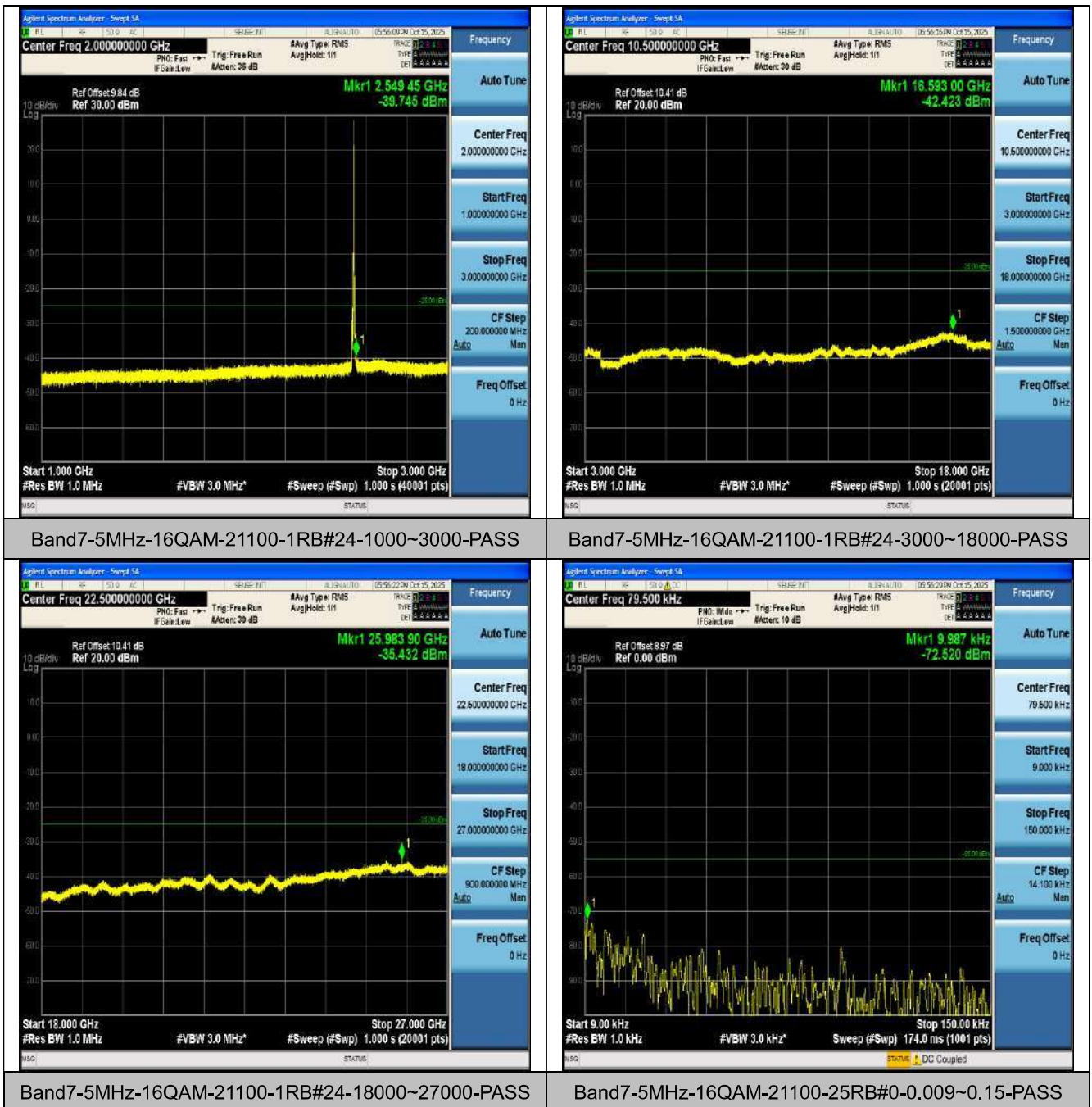


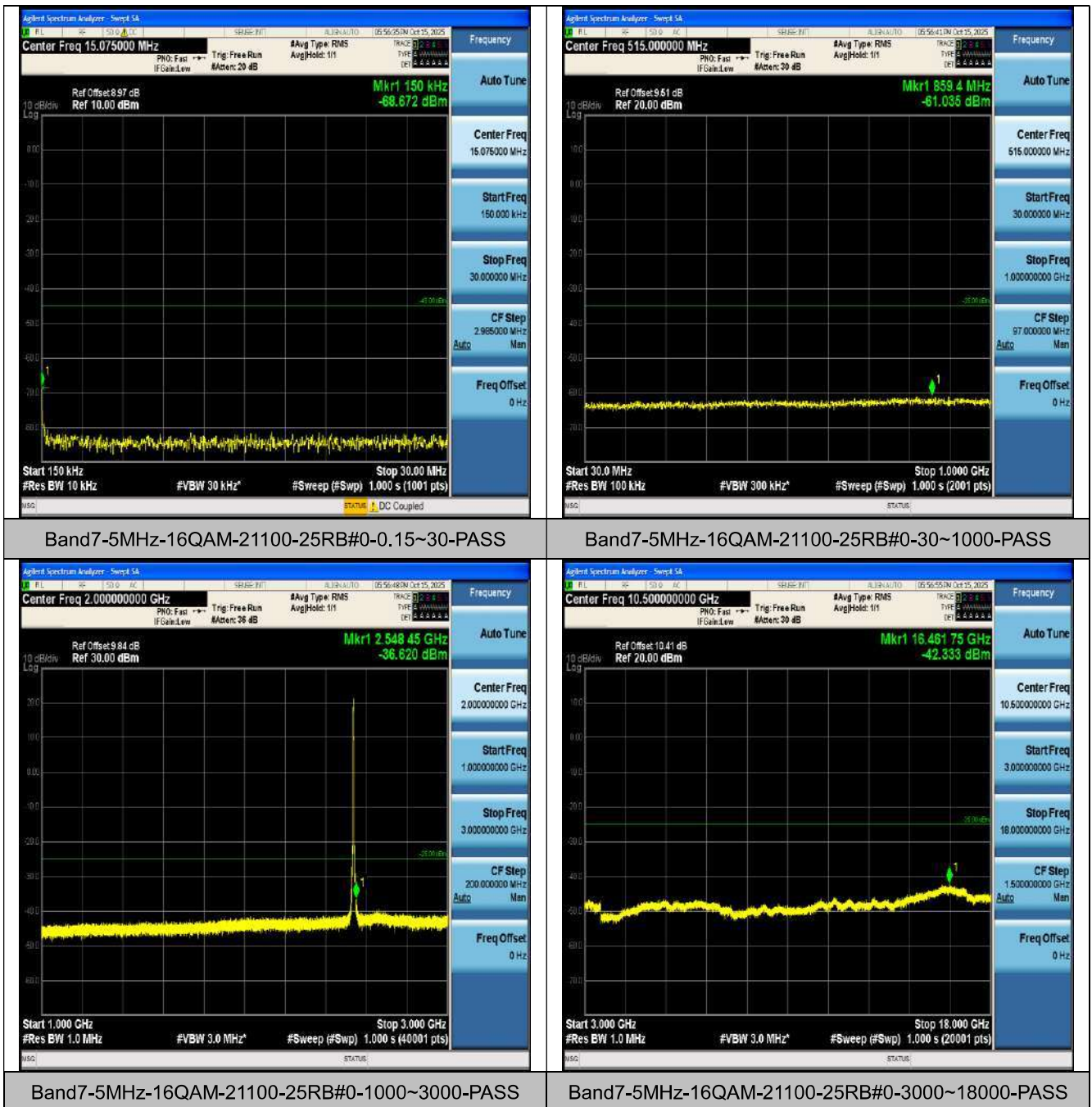


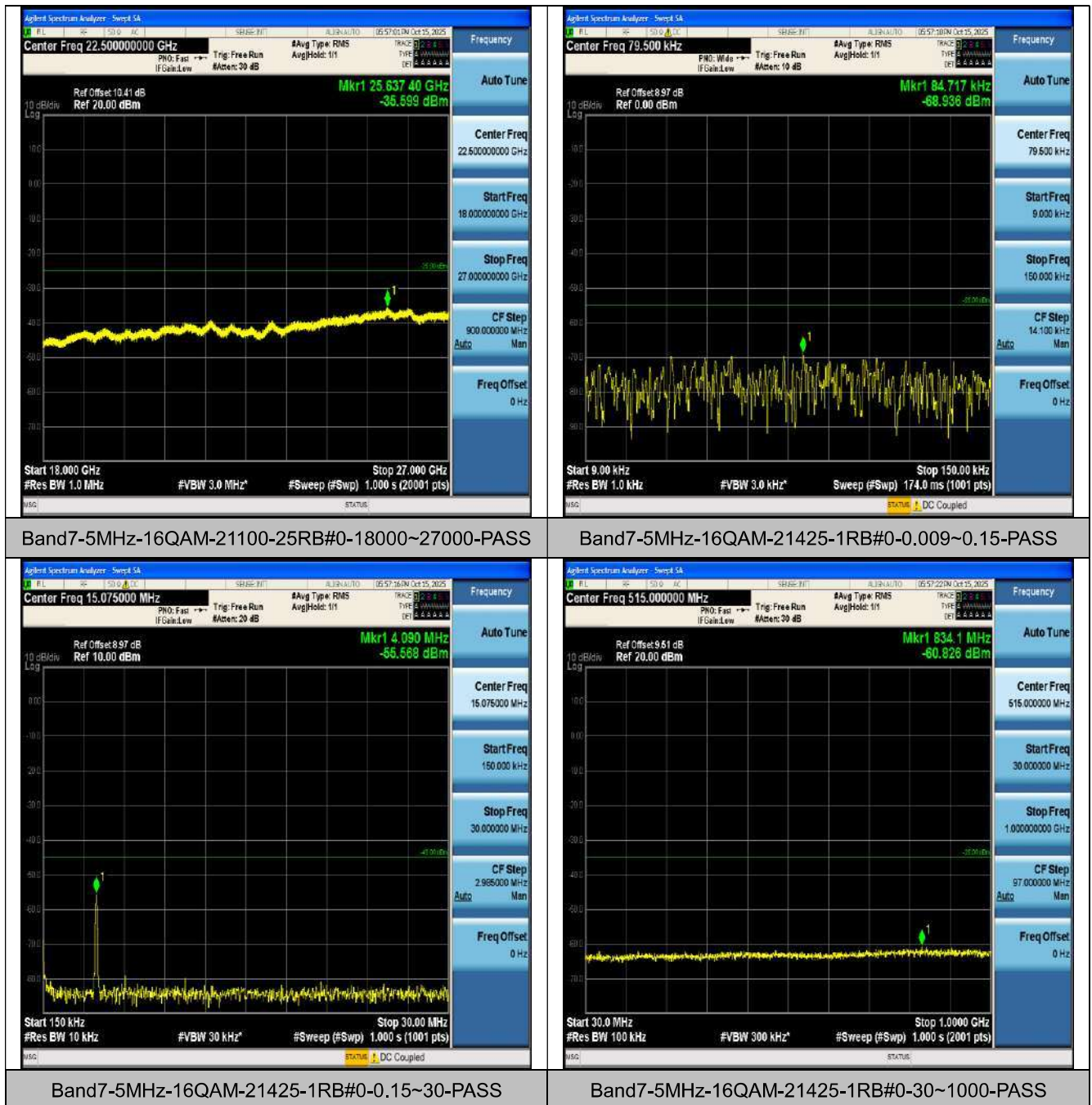


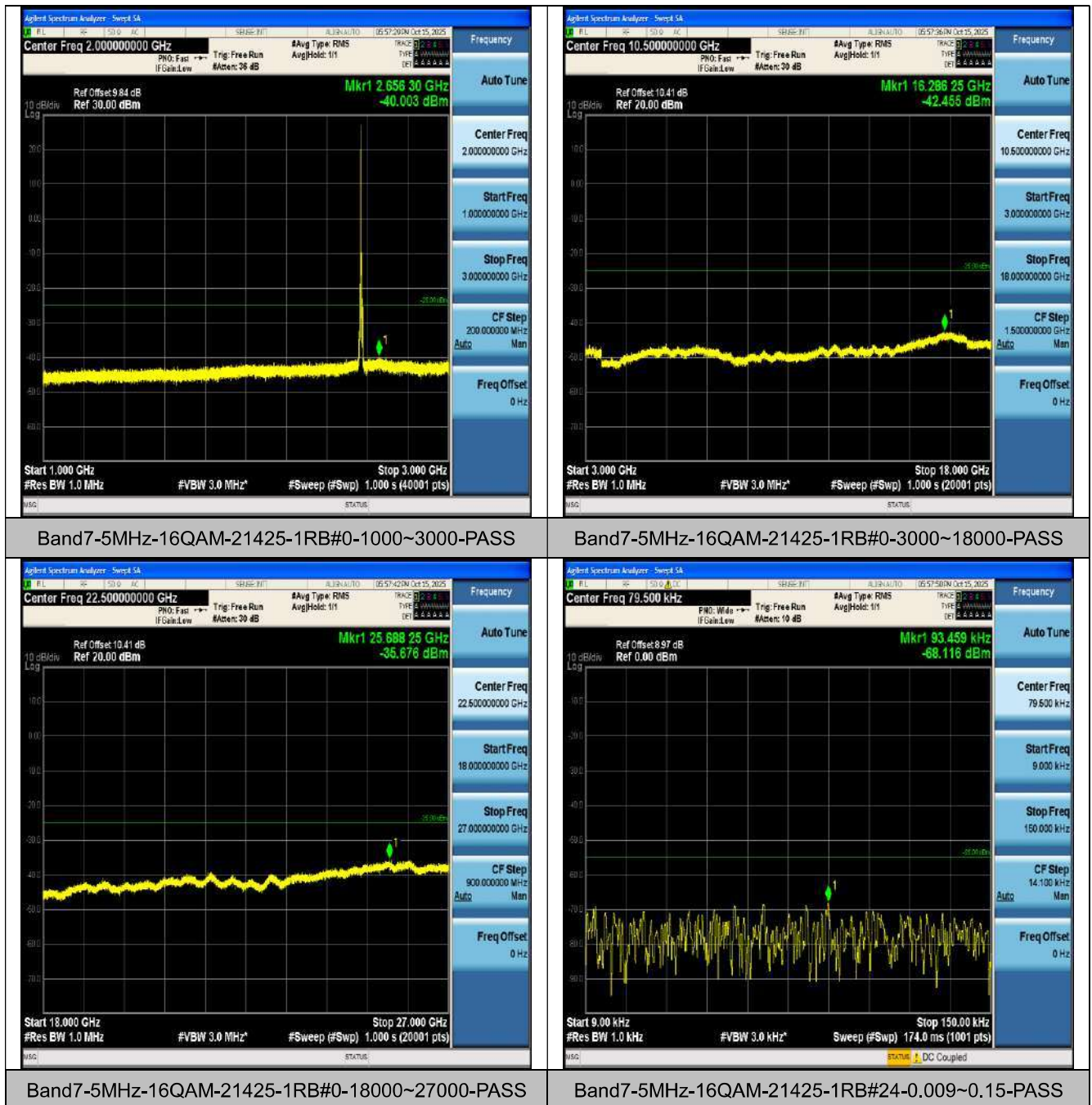


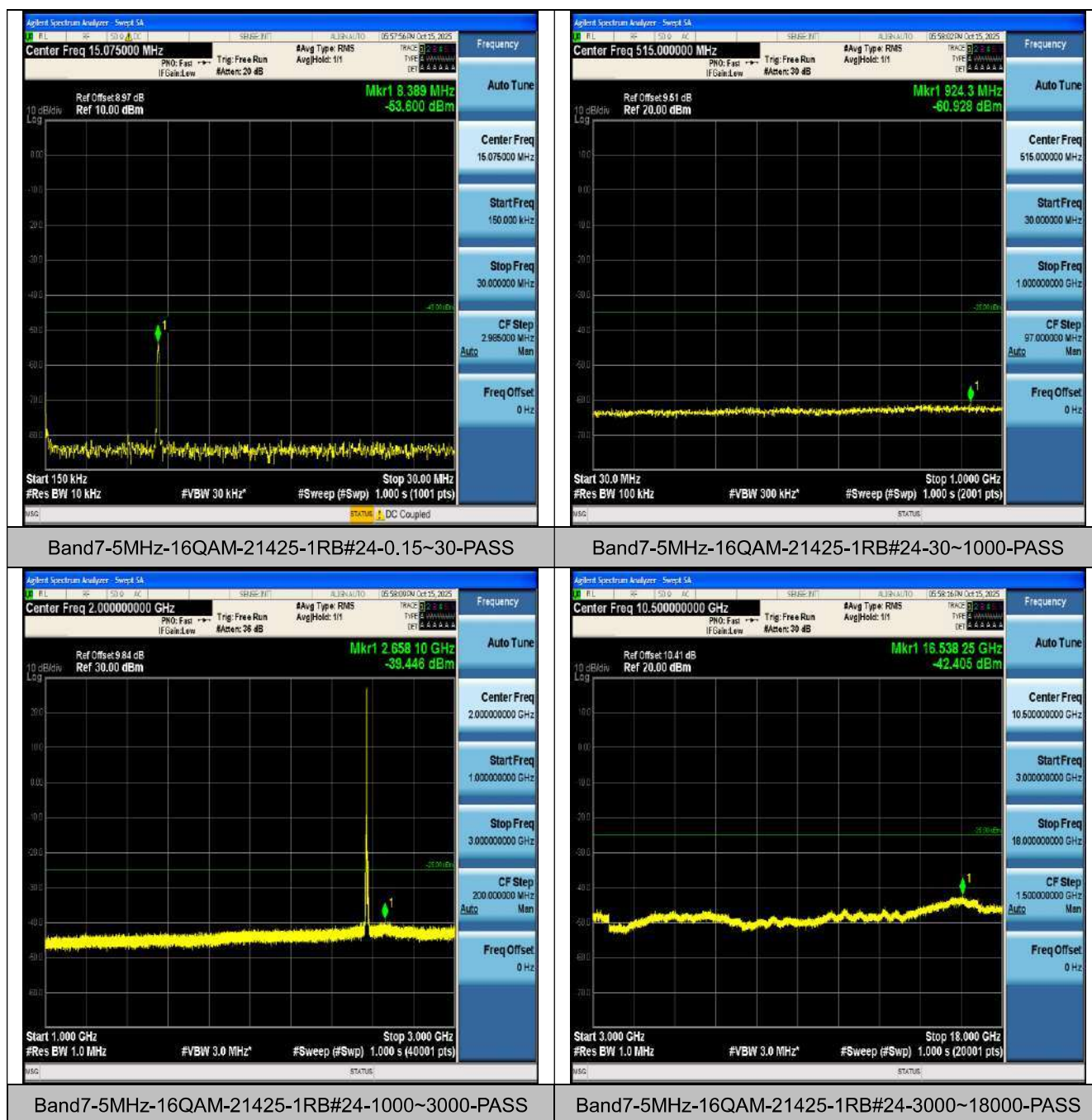


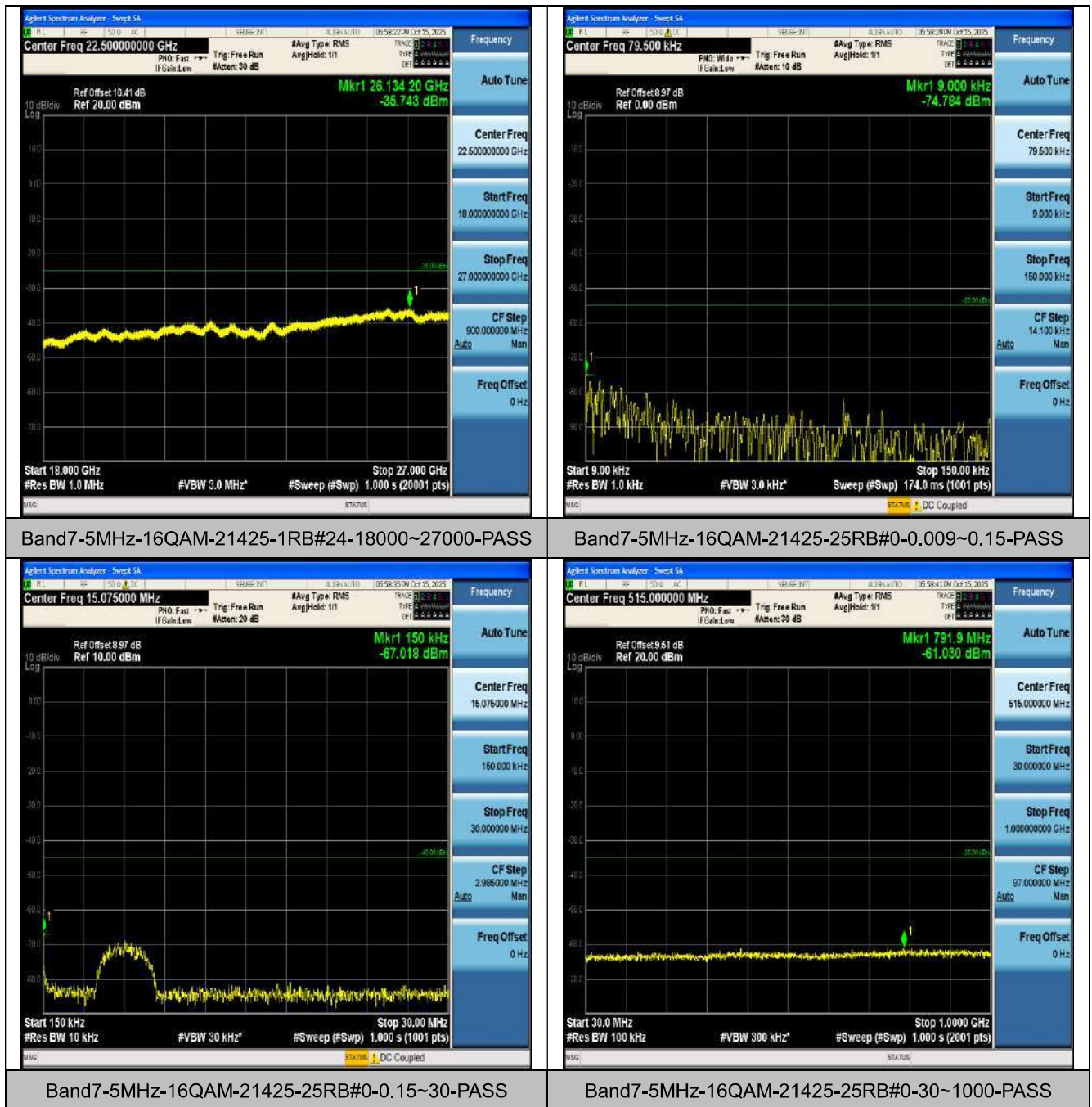


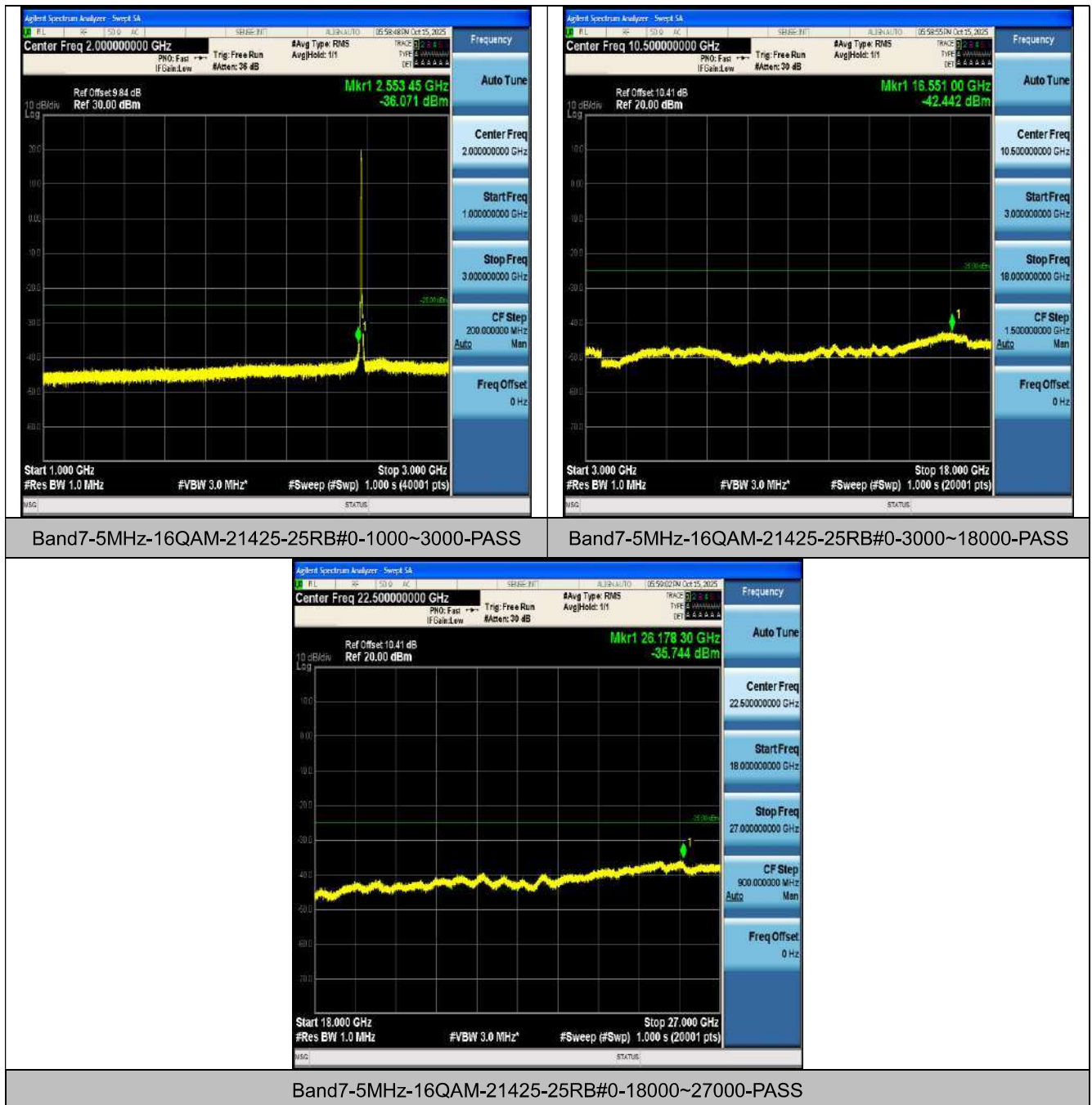












13. Frequency Stability

13.1. Limit

FCC § 2.1055, §22.355, §24.235, §27.54

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

13.2. TEST PROCEDURES

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 9

Frequency stability over variations in temperature

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power off, temperature was decreased to -30°C and EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power off, the temperature was risen in -30°C step up to 50°C. The EUT was stabilizes at each step for at least half an hour at. Power was applied the maximum frequency change was recorded within one minute.

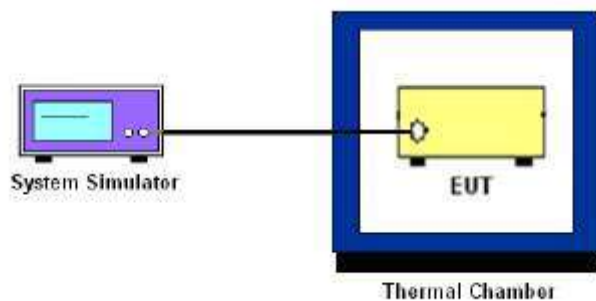
Frequency stability when varying supply voltage

1. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
3. For hand carried battery powered equipment, reduce the primary AC or DC supply voltage to the battery operating end point, which shall be specified by the manufacturer.
4. In the worst case, frequency changes are measured.

Test Settings

N/A

13.3. TEST SETUP



13.4. Test Results

EUT Name	GPS Tracker	Model	GL33CG
Test Date	2025.09.25 to 2025.11.17	Test Mode	GPRS/EGPRS 850/1900
Test Engineer	Stone Zhang	Environmental Conditions	Temp:23.0 ~ 31.8°C;Humi:25 ~ 63%RH

GSM 850

GPRS Mode, Middle Channel, fc =836.6 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	15	0.0179	2.5
-20		20	0.0239	2.5
-10		15	0.0179	2.5
0		10	0.0120	2.5
10		16	0.0191	2.5
20		15	0.0179	2.5
30		10	0.0120	2.5
40		14	0.0167	2.5
50		14	0.0167	2.5
20	V min.= 3.33	18	0.0215	2.5
20	V max.= 4.07	16	0.0191	2.5

EGPRS Mode, Middle Channel, fc =836.6 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	11	0.0131	2.5
-20		12	0.0143	2.5
-10		19	0.0227	2.5
0		20	0.0239	2.5
10		14	0.0167	2.5
20		14	0.0167	2.5
30		14	0.0167	2.5
40		19	0.0227	2.5
50		15	0.0179	2.5

20	V min.= 3.33	19	0.0227	2.5
20	V max.= 4.07	16	0.0191	2.5

PCS 1900 Band:

GPRS Mode, Middle Channel, fc =1880 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-12	-0.0064	Pass
-20		-10	-0.0120	Pass
-10		-11	-0.0131	Pass
0		-15	-0.0179	Pass
10		-12	-0.0143	Pass
20		-17	-0.0203	Pass
30		-12	-0.0143	Pass
40		-14	-0.0167	Pass
50		-14	-0.0167	Pass
20	V min.= 3.33	-15	-0.0179	Pass
20	V max.= 4.07	-14	-0.0167	Pass

EGPRS Mode, Middle Channel, fc =1880 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-10	-0.0053	Pass
-20		-19	-0.0227	Pass
-10		-11	-0.0131	Pass
0		-16	-0.0191	Pass
10		-14	-0.0167	Pass
20		-12	-0.0143	Pass
30		-19	-0.0227	Pass
40		-10	-0.0120	Pass
50		-17	-0.0203	Pass
20	V min.= 3.33	-13	-0.0155	Pass
20	V max.= 4.07	-13	-0.0155	Pass

EUT Name	GPS Tracker	Model	GL33CG
Test Date	2025.09.25 to 2025.11.17	Test Mode	LTE
Test Engineer	Stone Zhang	Environmental Conditions	Temp:23.0 ~ 31.8°C;Humi:25 ~ 63%RH

LTE Band2:

fc =1880 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	13	0.0069	Pass
-20		14	0.0167	Pass
-10		19	0.0227	Pass
0		17	0.0203	Pass
10		18	0.0215	Pass
20		12	0.0143	Pass
30		16	0.0191	Pass
40		10	0.0120	Pass
50		14	0.0167	Pass
20	V min.= 3.33	12	0.0143	Pass
20	V max.= 4.07	14	0.0167	Pass

fc =1880 MHz (16QAM)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	20	0.0106	Pass
-20		11	0.0131	Pass
-10		13	0.0155	Pass
0		13	0.0155	Pass
10		16	0.0191	Pass
20		12	0.0143	Pass
30		12	0.0143	Pass
40		16	0.0191	Pass
50		17	0.0203	Pass
20	V min.= 3.33	16	0.0191	Pass
20	V max.= 4.07	19	0.0227	Pass

LTE Band4:

fc =1732.5 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	20	0.0115	Pass
-20		15	0.0087	Pass
-10		10	0.0058	Pass
0		18	0.0104	Pass
10		15	0.0087	Pass
20		16	0.0092	Pass
30		16	0.0092	Pass
40		15	0.0087	Pass
50		20	0.0115	Pass
20	V min.= 3.33	16	0.0092	Pass
20	V max.= 4.07	13	0.0075	Pass

fc =1732.5 MHz (16QAM)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	16	0.0092	Pass
-20		19	0.0110	Pass
-10		17	0.0098	Pass
0		19	0.0110	Pass
10		11	0.0063	Pass
20		14	0.0081	Pass
30		20	0.0115	Pass
40		13	0.0075	Pass
50		14	0.0081	Pass
20	V min.= 3.33	13	0.0075	Pass
20	V max.= 4.07	16	0.0092	Pass

LTE Band5:

fc =836.6 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	16	0.0191	2.5
-20		18	0.0215	2.5
-10		13	0.0155	2.5
0		15	0.0179	2.5
10		16	0.0191	2.5
20		19	0.0227	2.5
30		16	0.0191	2.5
40		15	0.0179	2.5
50		16	0.0191	2.5
20	V min.= 3.33	13	0.0155	2.5
20	V max.= 4.07	12	0.0143	2.5

fc =836.6 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	14	0.0167	2.5
-20		12	0.0143	2.5
-10		11	0.0131	2.5
0		15	0.0179	2.5
10		16	0.0191	2.5
20		13	0.0155	2.5
30		17	0.0203	2.5
40		12	0.0143	2.5
50		10	0.0120	2.5
20	V min.= 3.33	8	0.0096	2.5
20	V max.= 4.07	11	0.0131	2.5

LTE Band7:

fc =2535 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	19	0.0075	Pass
-20		16	0.0063	Pass
-10		13	0.0051	Pass
0		16	0.0063	Pass
10		16	0.0063	Pass
20		20	0.0079	Pass
30		17	0.0067	Pass
40		14	0.0055	Pass
50		17	0.0067	Pass
20	V min.= 3.33	14	0.0055	Pass
20	V max.= 4.07	13	0.0051	Pass

fc =2535 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	11	0.0043	Pass
-20		14	0.0055	Pass
-10		10	0.0039	Pass
0		13	0.0051	Pass
10		15	0.0059	Pass
20		17	0.0067	Pass
30		15	0.0059	Pass
40		13	0.0051	Pass
50		17	0.0067	Pass
20	V min.= 3.33	13	0.0051	Pass
20	V max.= 4.07	17	0.0067	Pass

14. Field Strength of Spurious Radiation

14.1. Limit

According to FCC section 22.917(a), 24.238(a), 27.53(h)(1), 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.

According to FCC section 27.53(m)(4), $55 + 10 \log (P)$ 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 as defined in paragraph (m)(6) of this section. and $55 + 10\log(P)$ dB at or below 2490.5 MHz.

14.2. Test Procedures

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 7

Below 1GHz test procedure as below:

- 1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.
- 2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 4). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
- 5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.
- 6). The output power into the substitution antenna was then measured.
- 7). Steps 5) and 6) were repeated with both antennas polarized.
- 8) Calculate power in dBm by the following formula:
$$\text{ERP(dBm)} = \text{Pg(dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

Where:

P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to P_g [dBm] – cable loss [dB]. The calculated

Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power [Watts]})$.

Above 1GHz test procedure as below:

1. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber

2. Calculate power in dBm by the following formula:

$$\text{EIRP(dBm)} = \text{Pg(dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$\text{EIRP} = \text{ERP} + 2.15\text{dB}$$

Where:

Pg is the generator output power into the substitution antenna.

3. Test the EUT in the lowest channel, the middle channel the Highest channel

4. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

5. Repeat above procedures until all frequencies measured was complete

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10*the fundamental frequency (separated into at least two plots per channel)

2. RBW=100kHz for emission below 1GHz and 1MHz for emission above 1GHz.

3. Number of sweep point $\geq 2 * \text{span} / \text{RBW}$

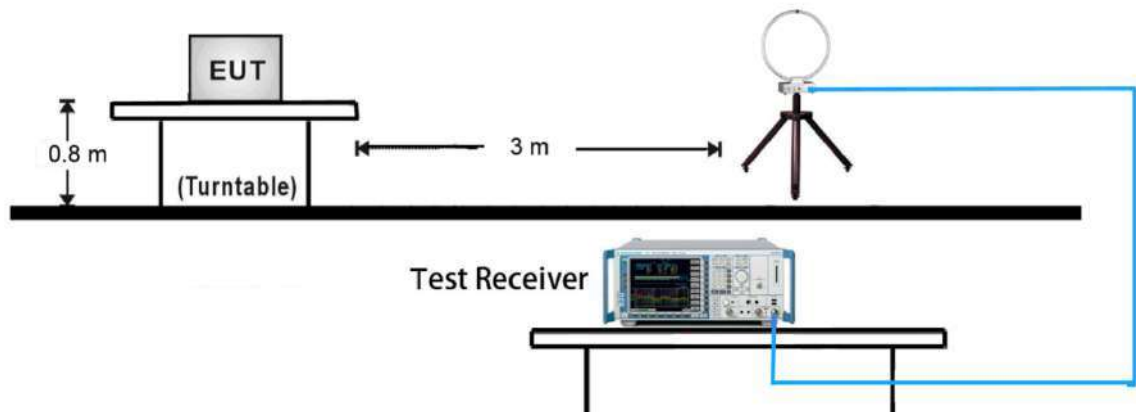
4. Detector=RMS

5. Trace mode = trace average for continuous emissions, max hold for pulse emissions

6. The trace was allowed to stabilize

14.3. TEST SETUP

9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:

