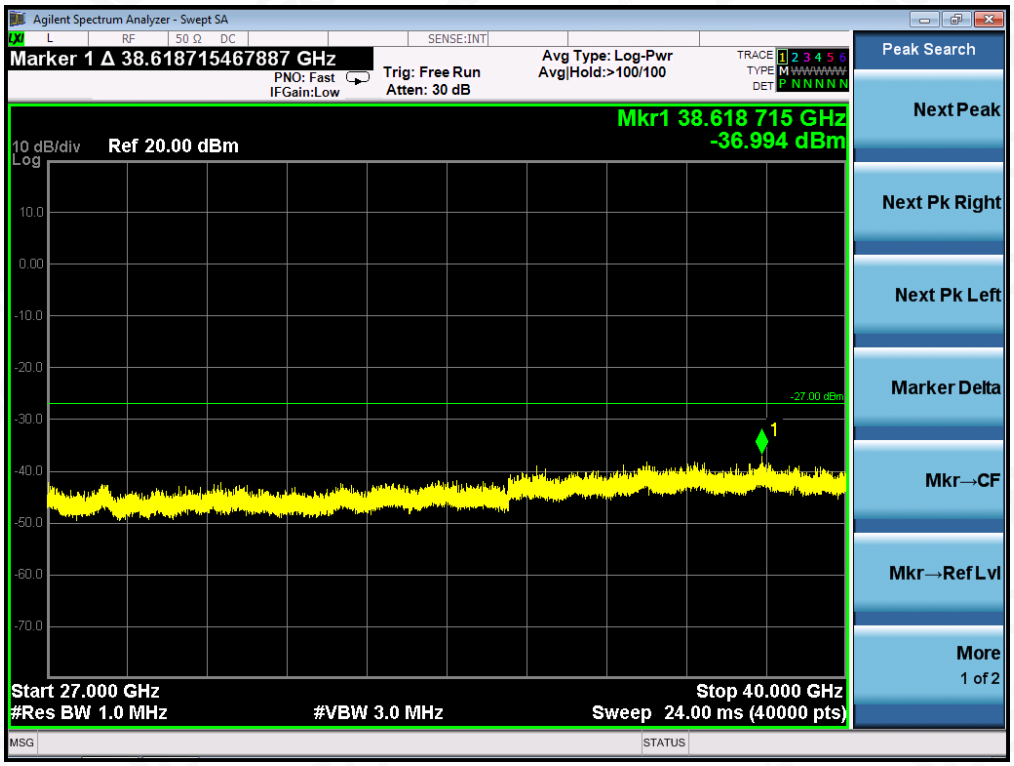
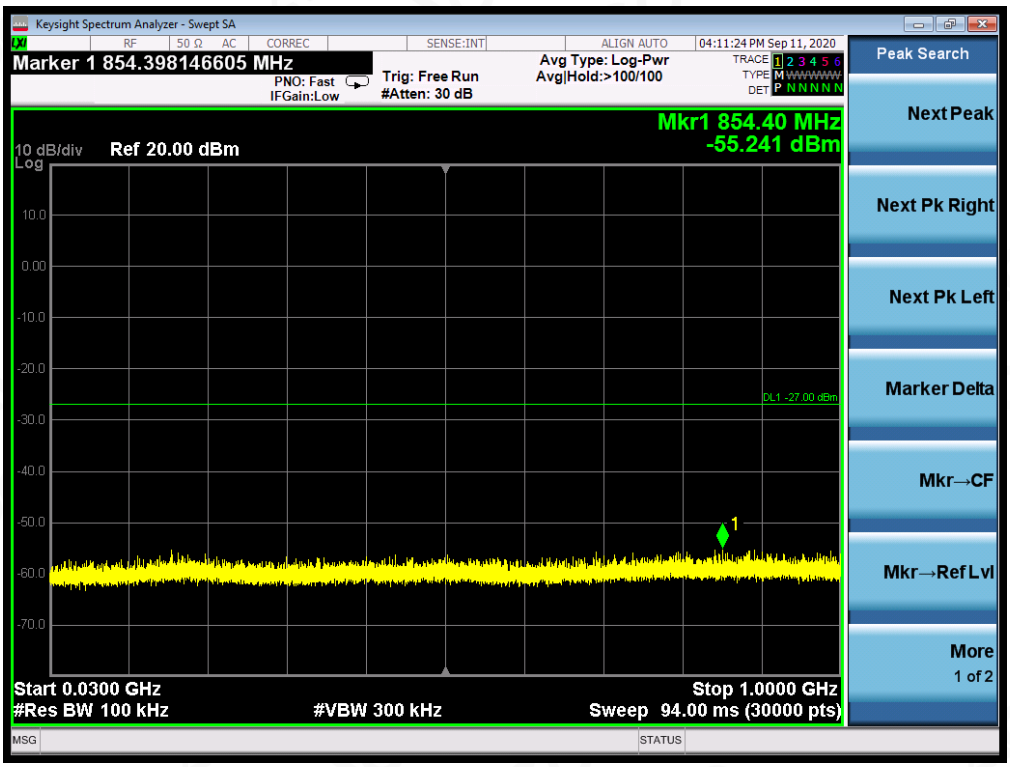


TEST PLOT OF OUT OF BAND EMISSIONS FOR MODULATION IN 5320MHz



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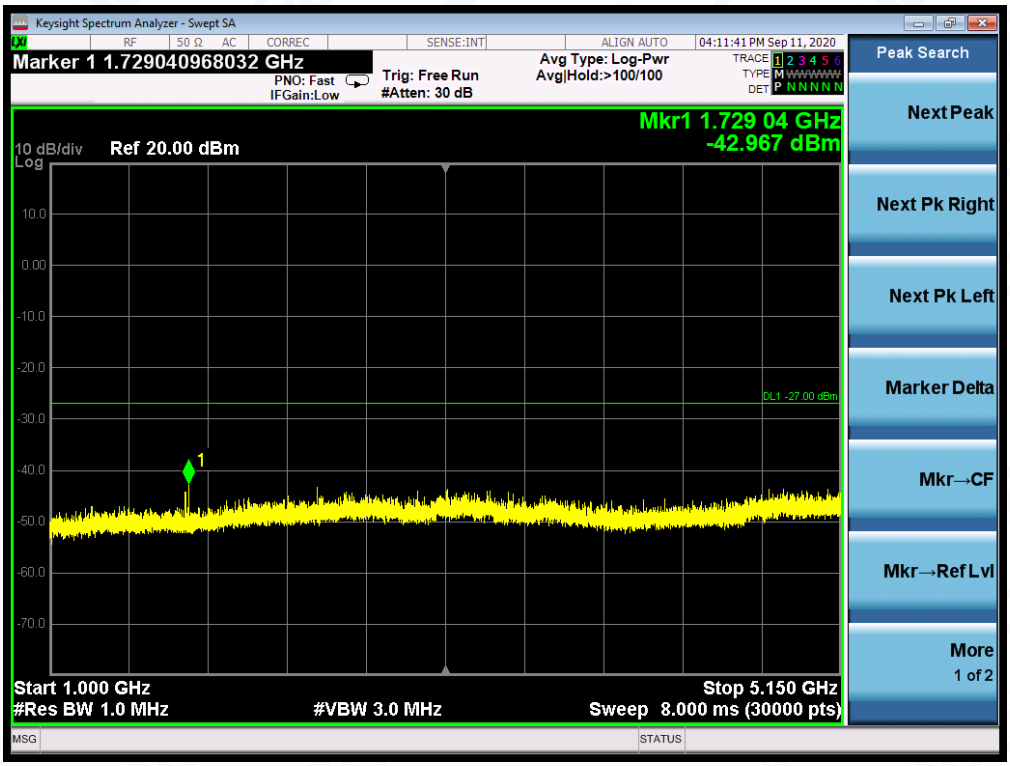

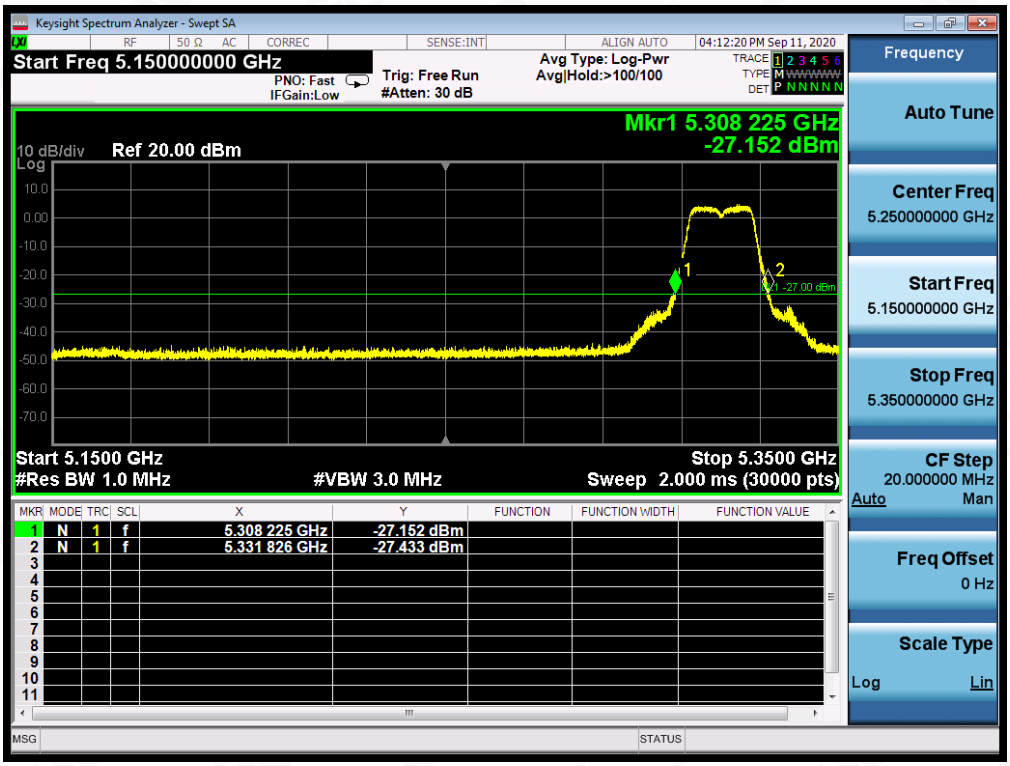

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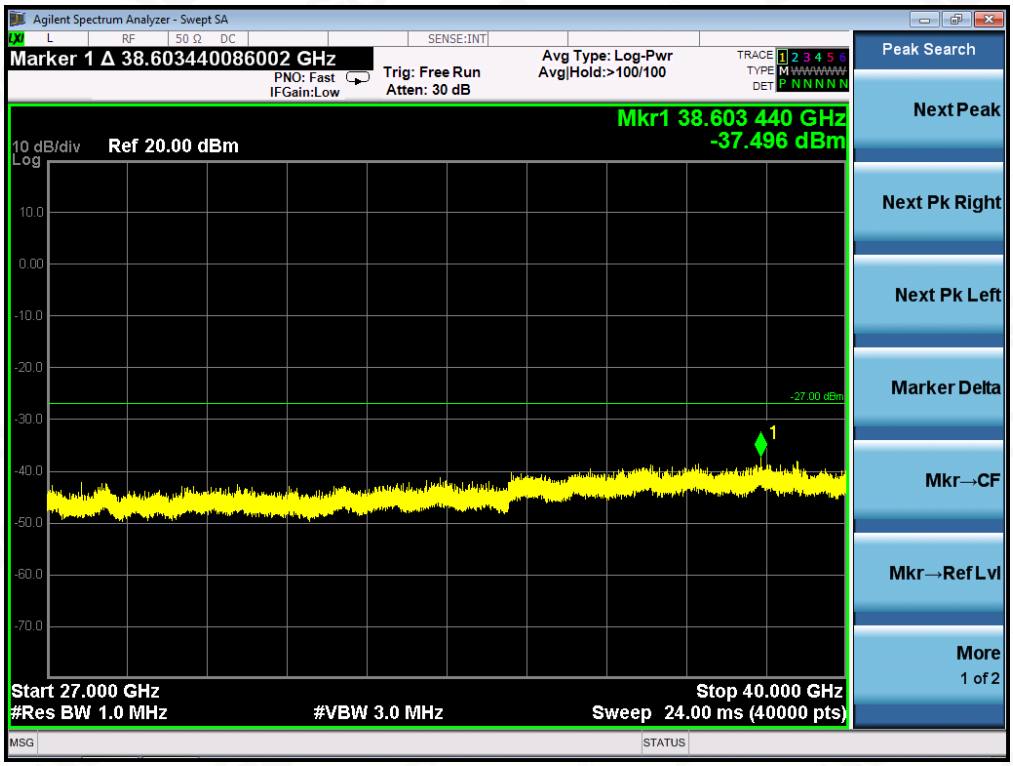

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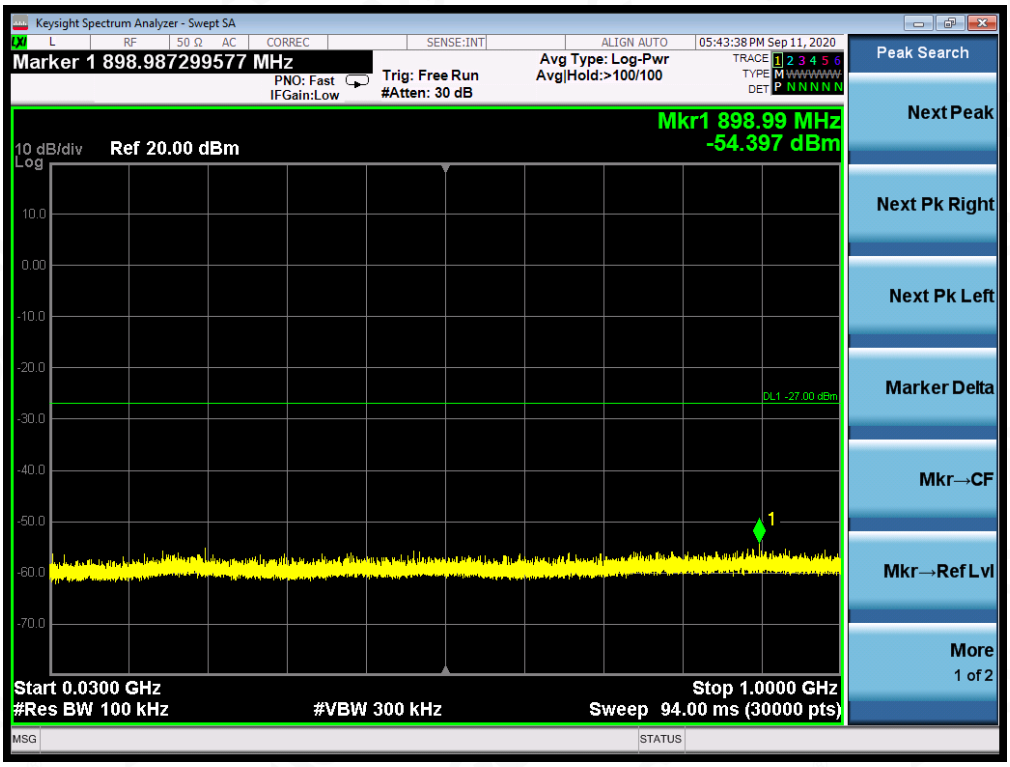
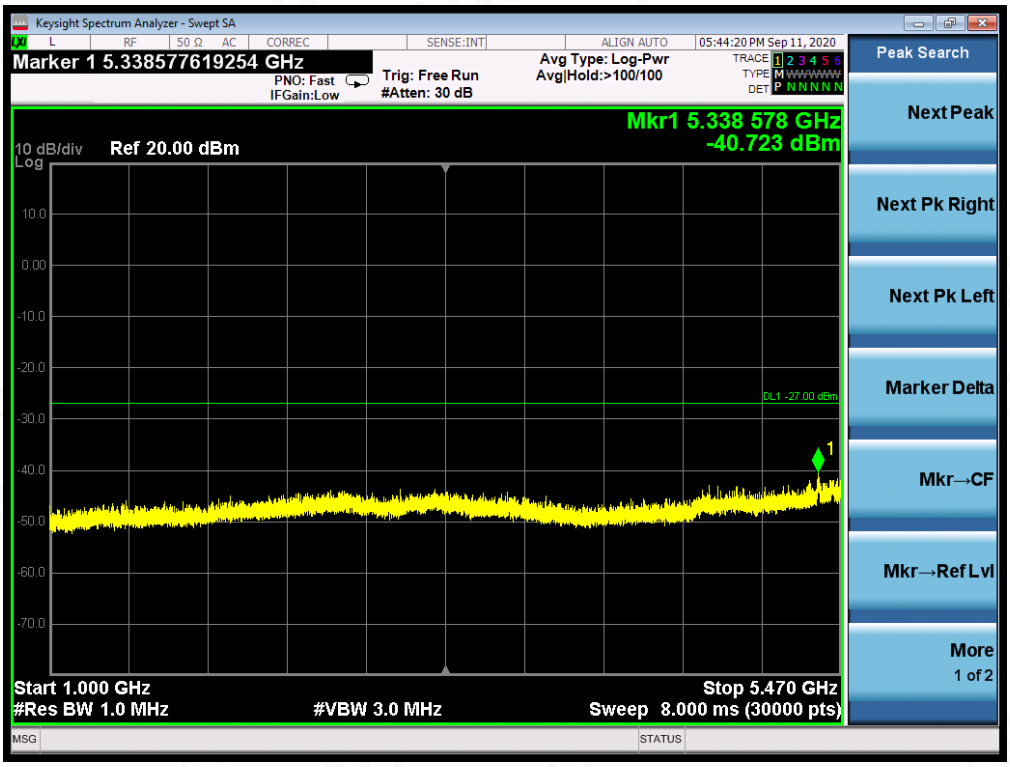
TEST PLOT OF OUT OF BAND EMISSIONS FOR MODULATION IN 5500MHz





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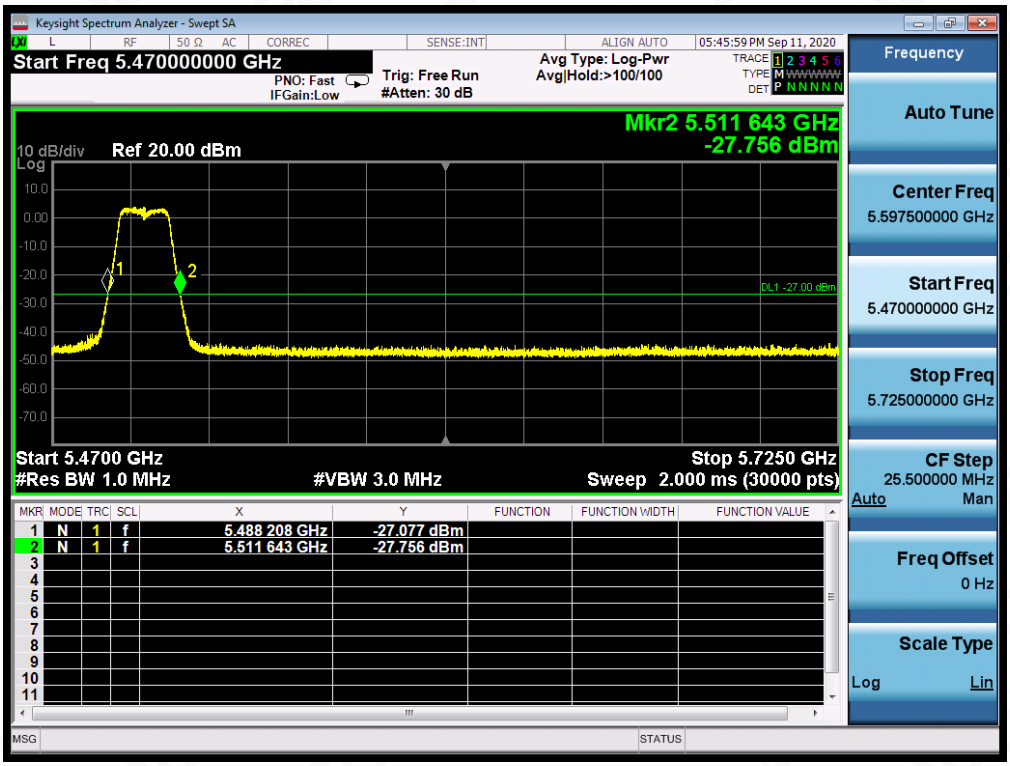

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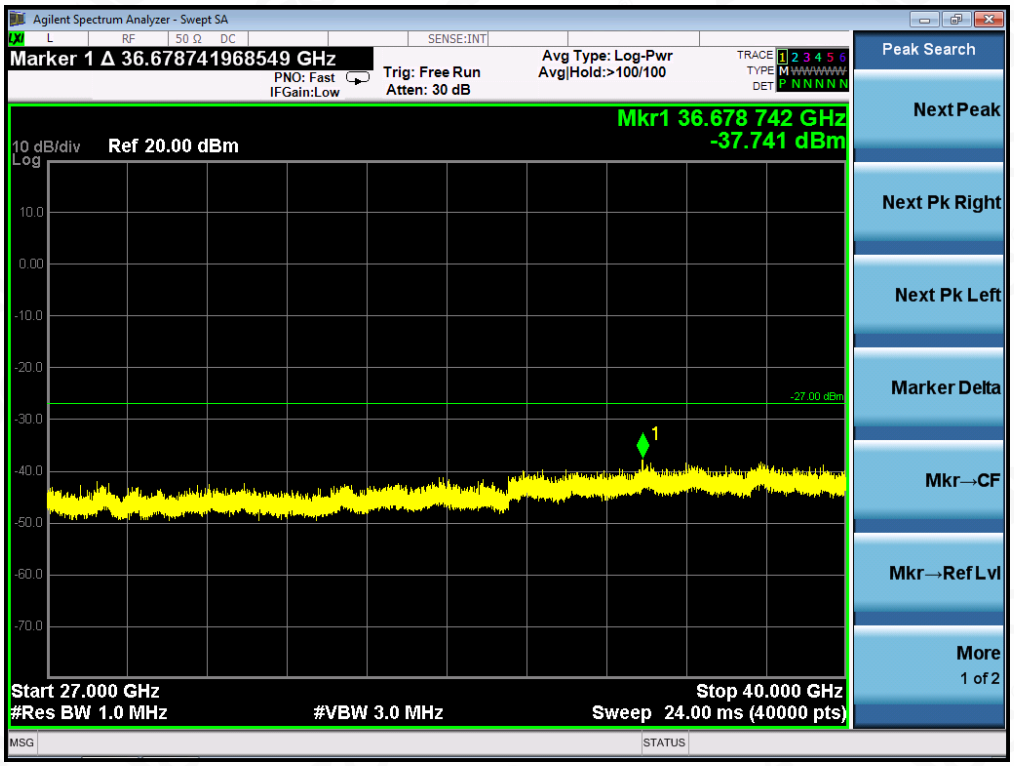
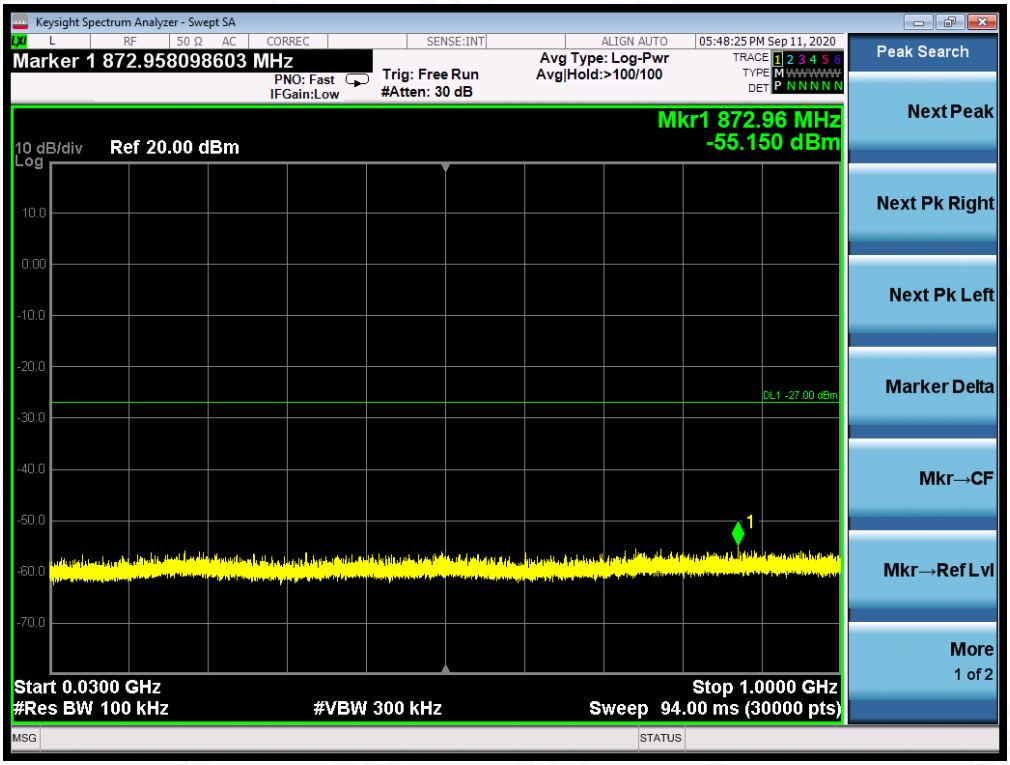


TEST PLOT OF OUT OF BAND EMISSIONS FOR MODULATION IN 5700MHz



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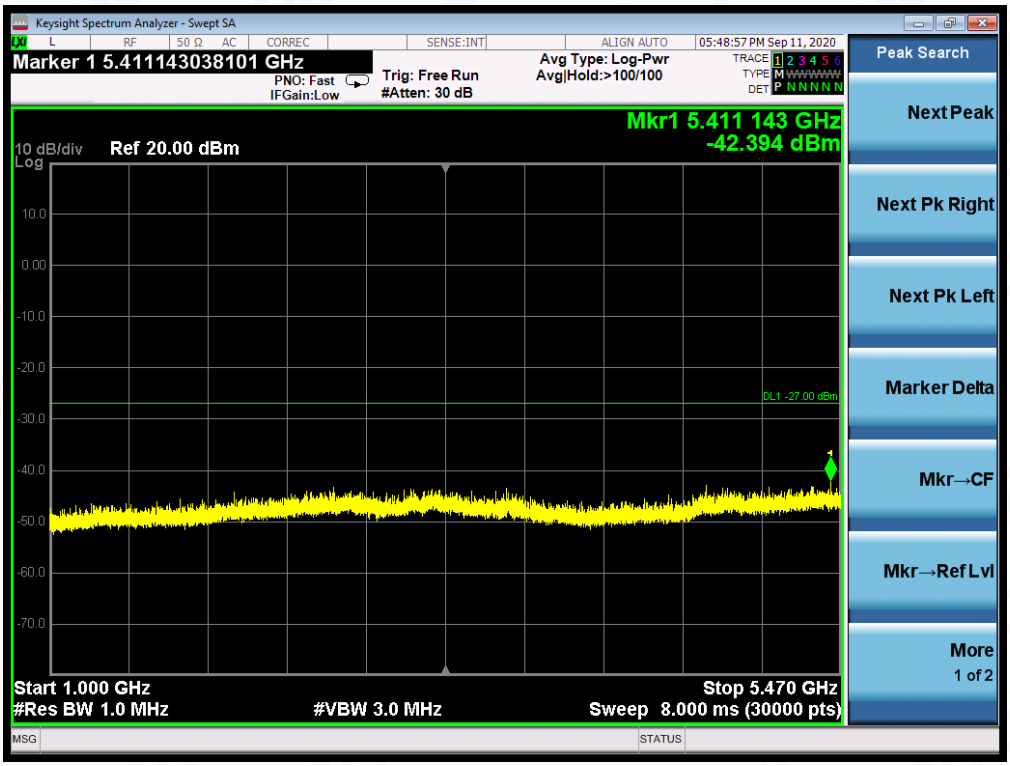

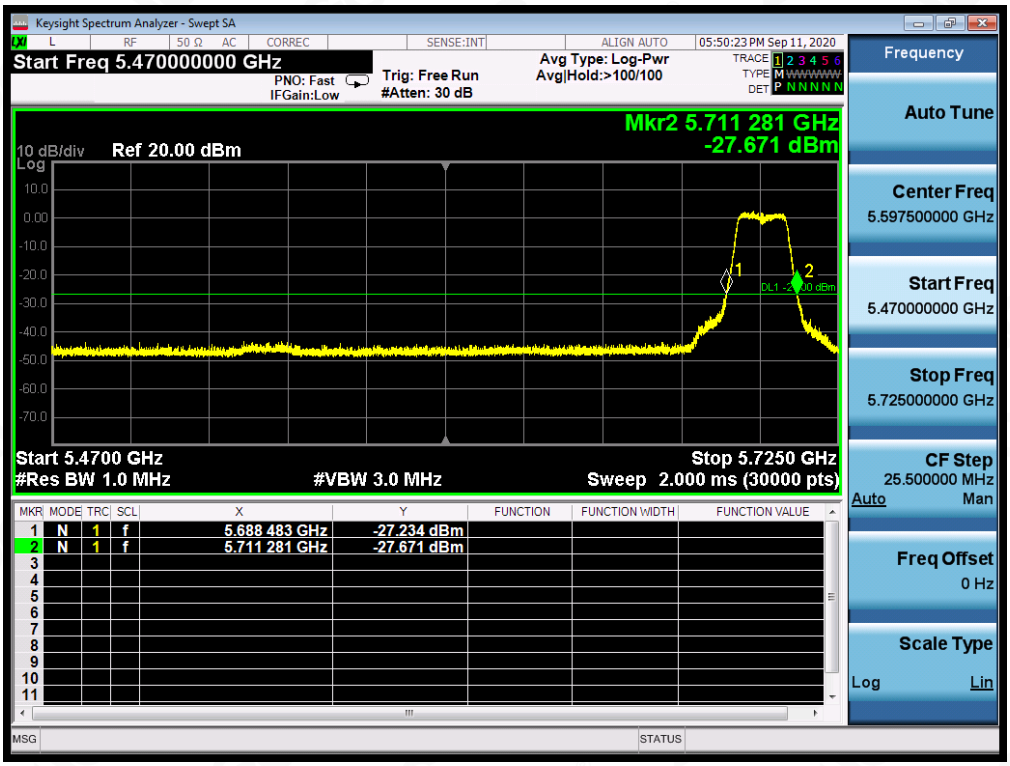

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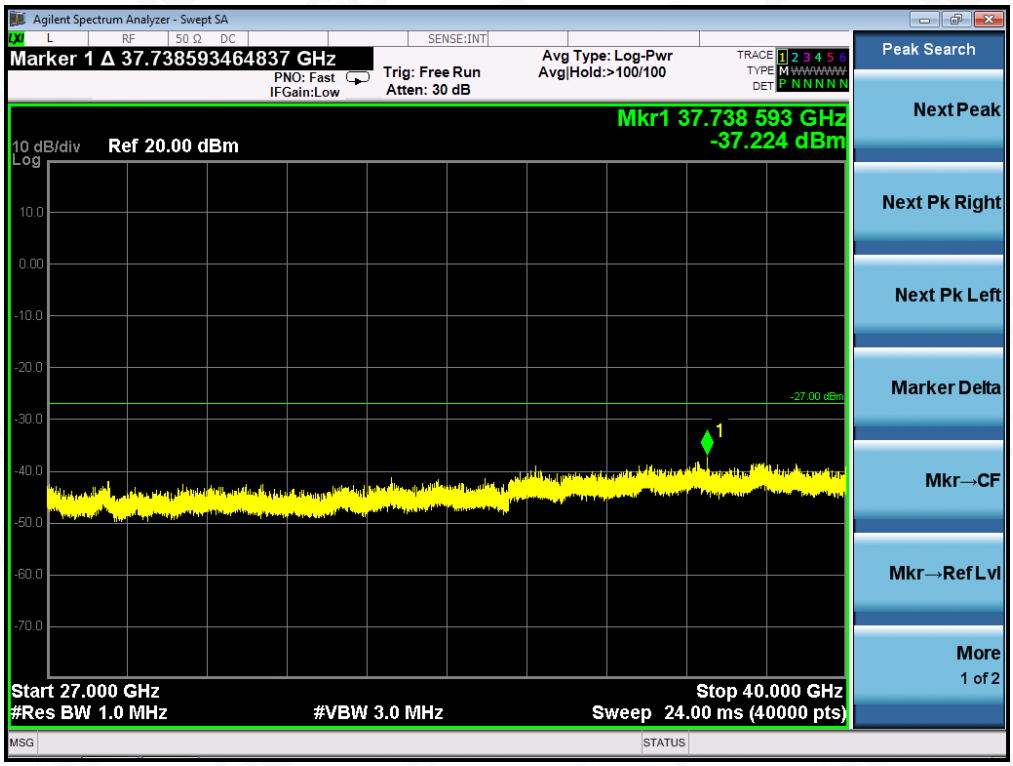

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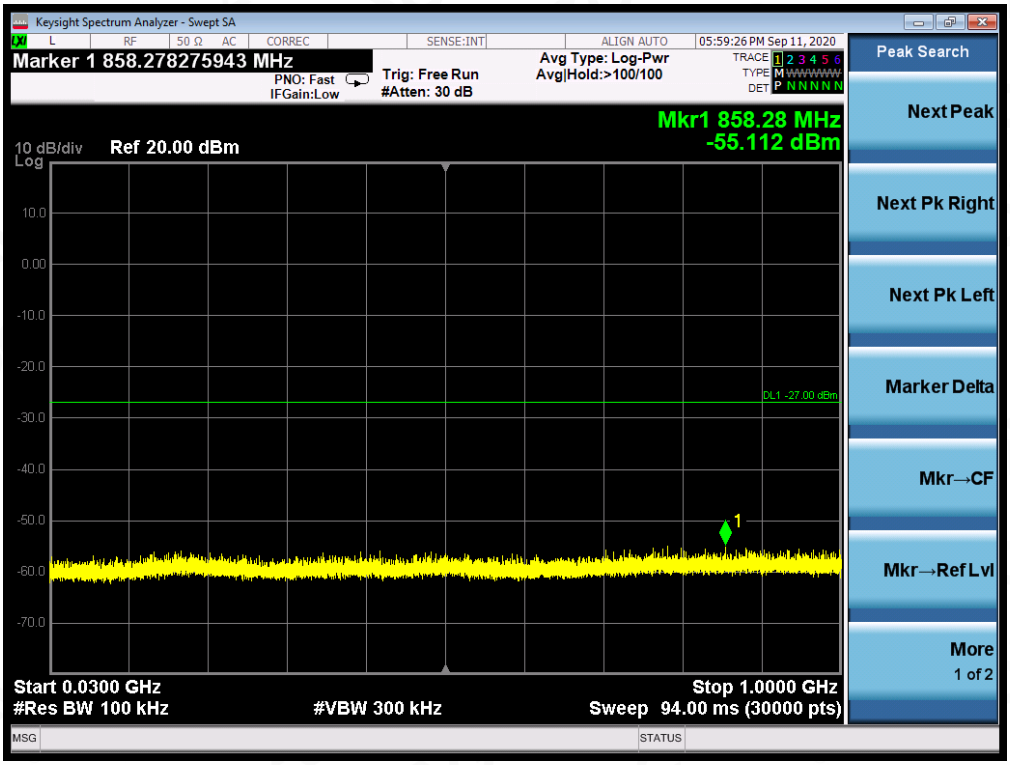
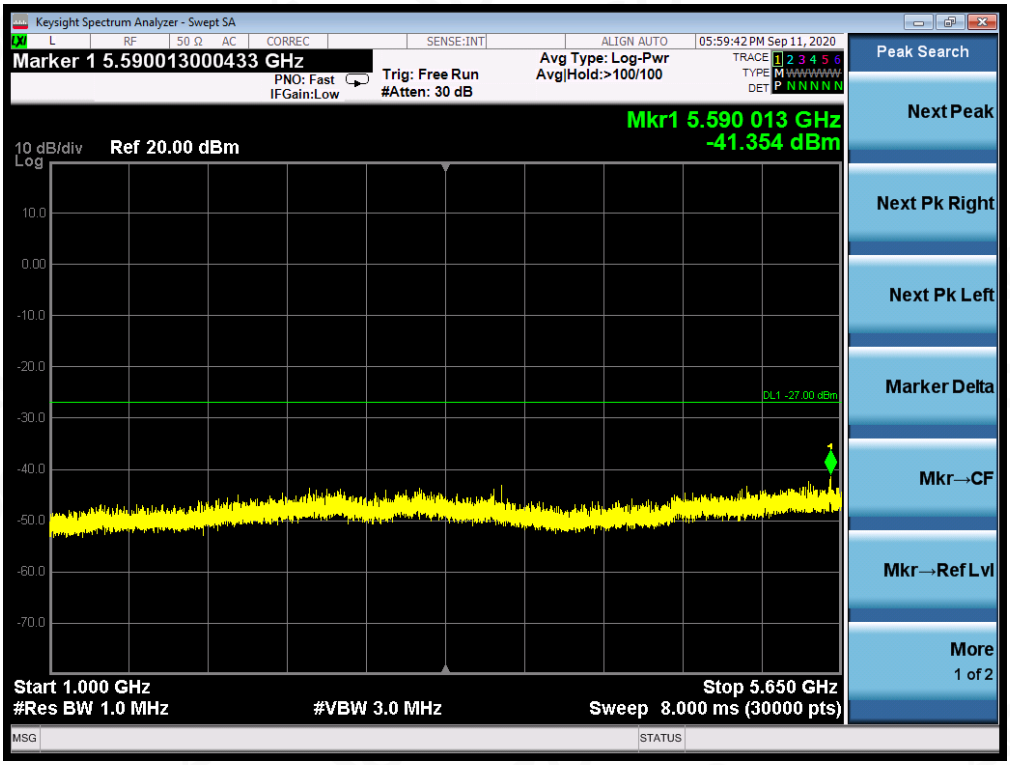
TEST PLOT OF OUT OF BAND EMISSIONS FOR MODULATION IN 5745MHz





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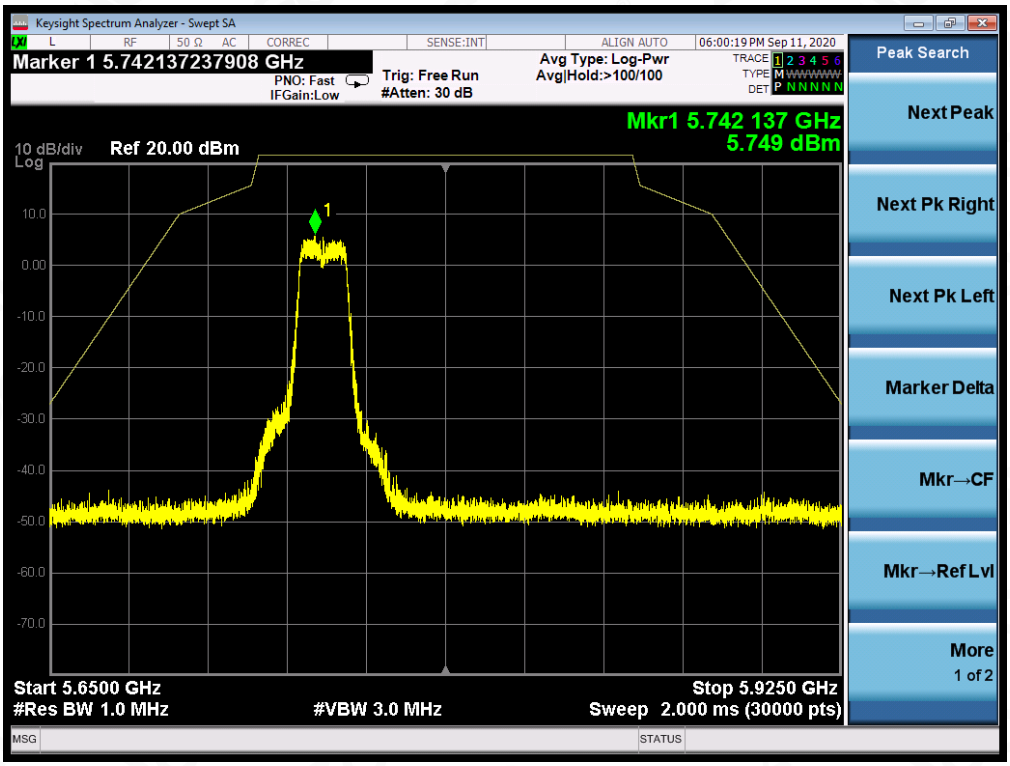

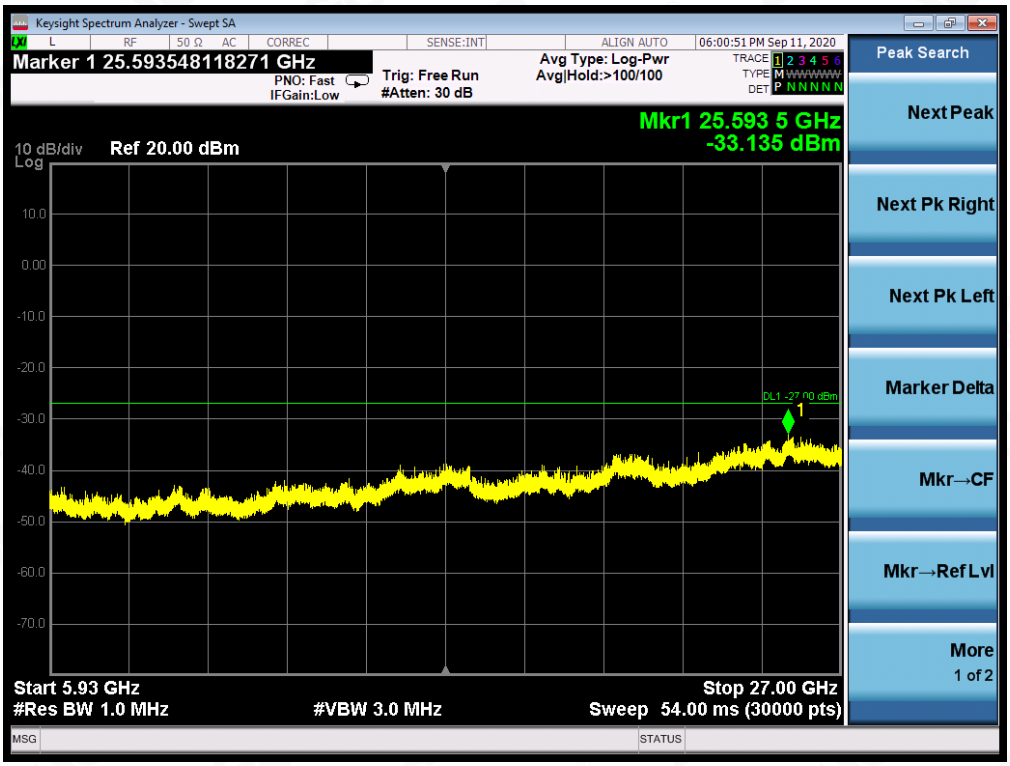

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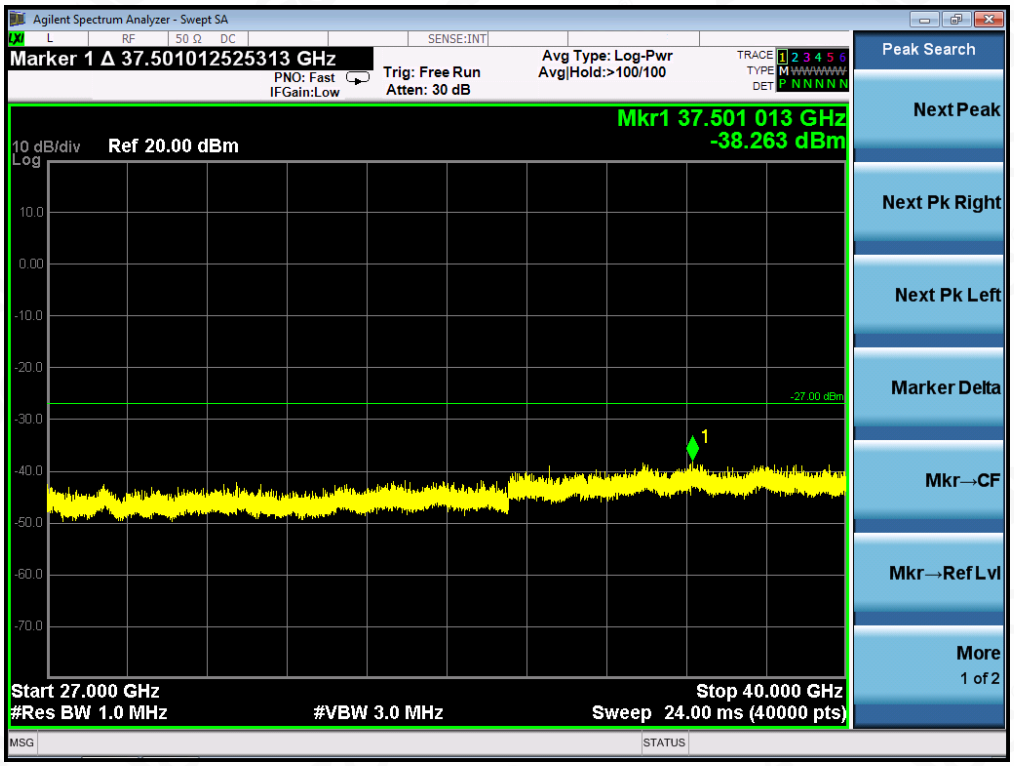
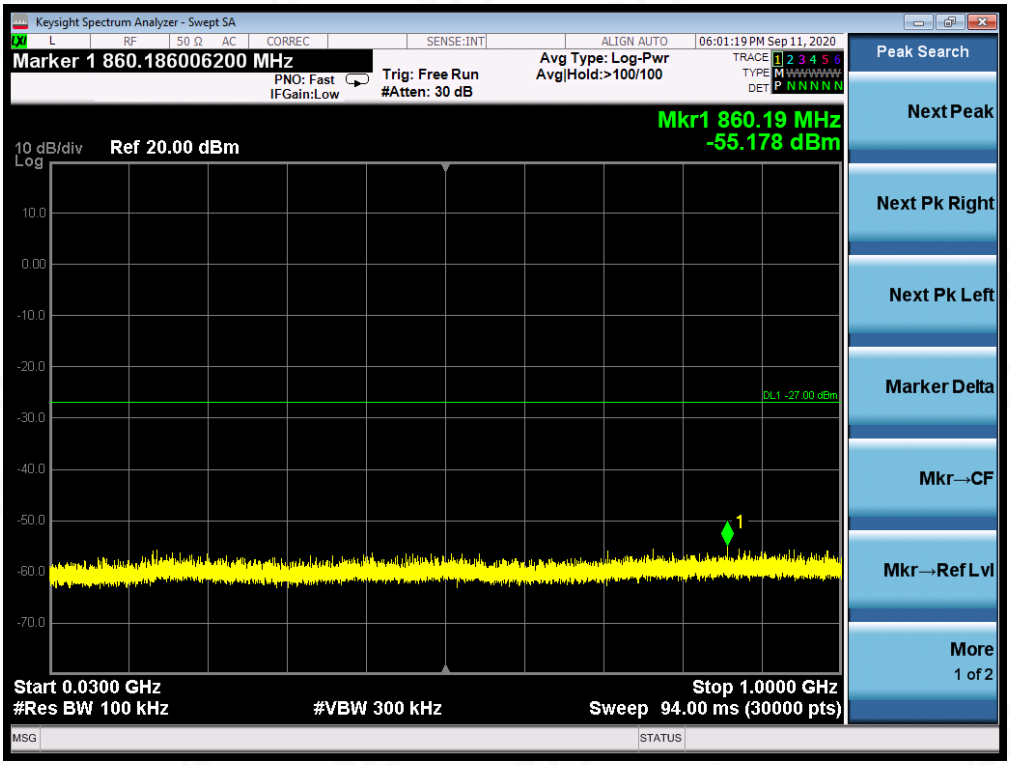


TEST PLOT OF OUT OF BAND EMISSIONS FOR MODULATION IN 5825MHz



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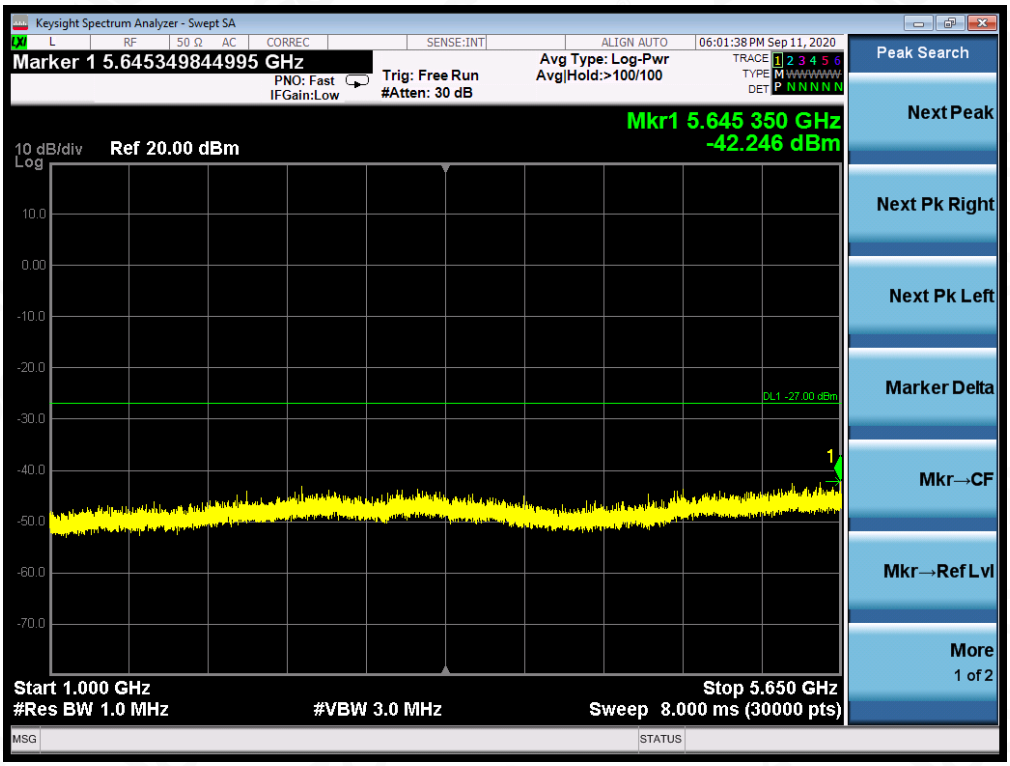

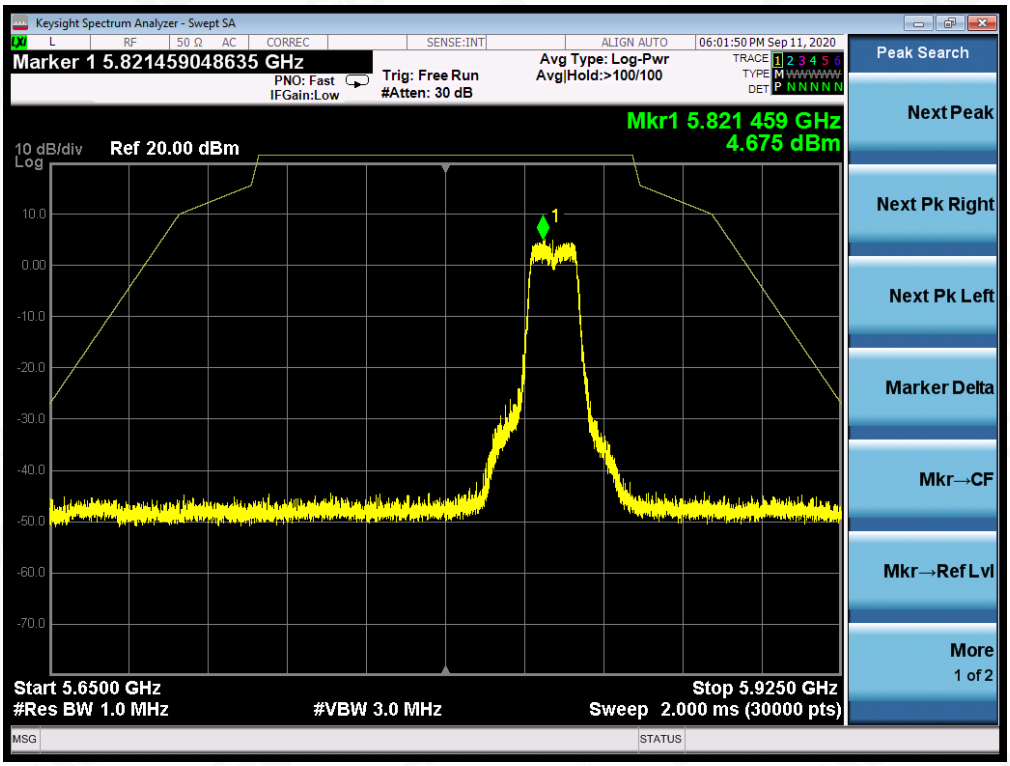

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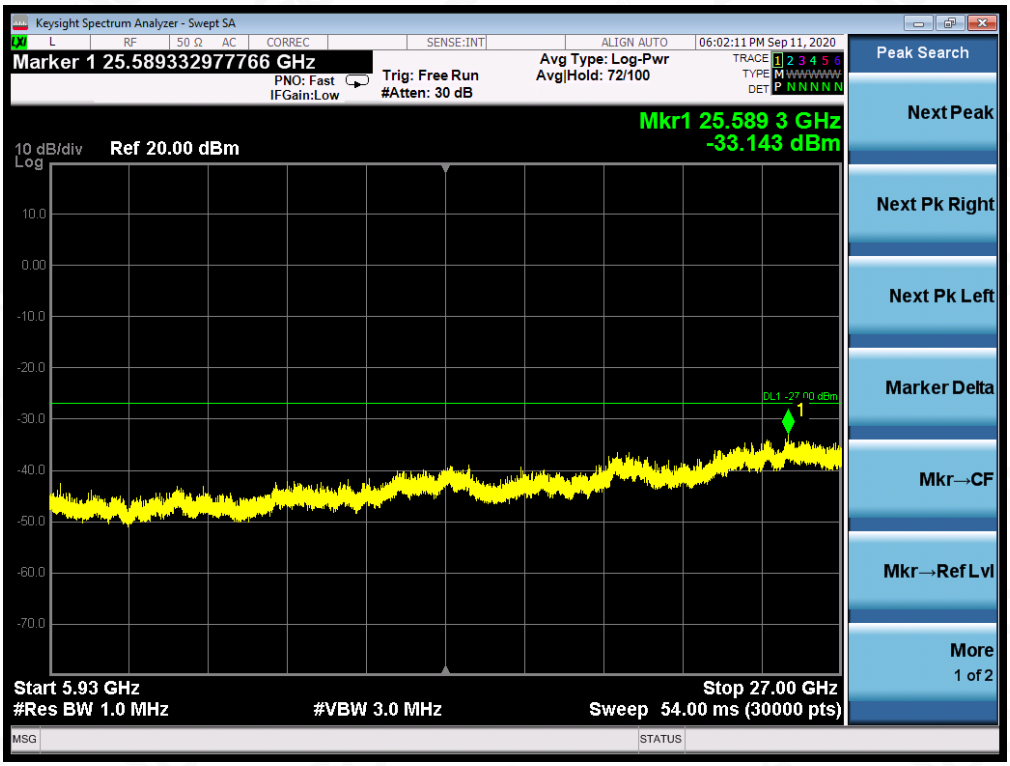

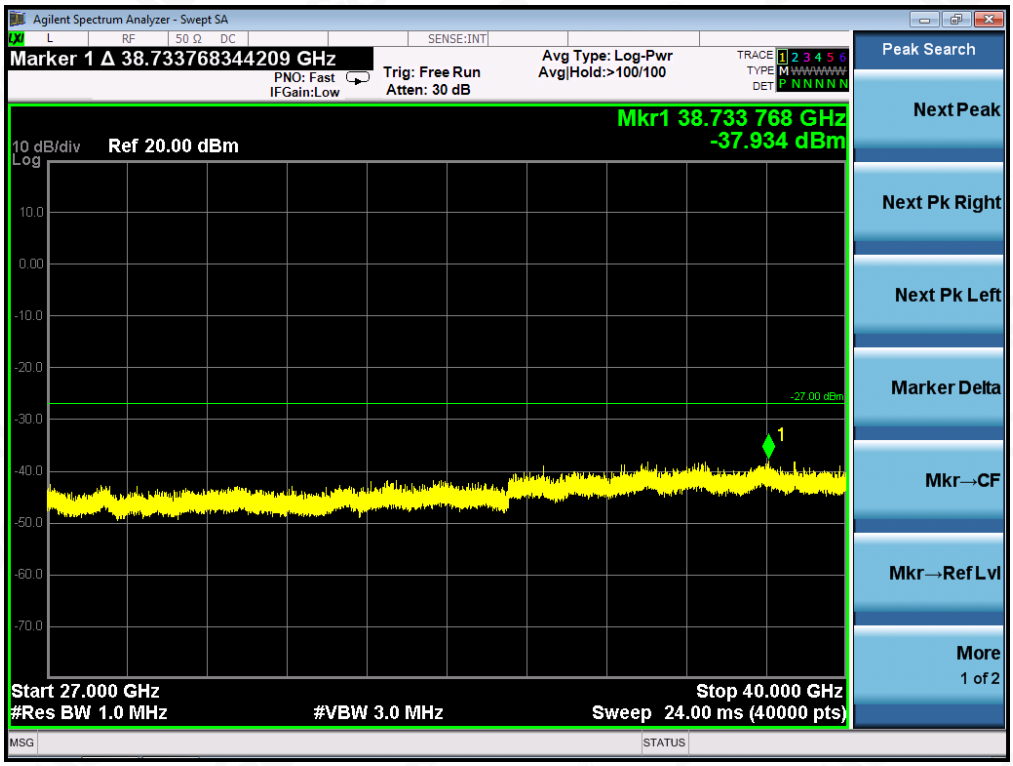

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12. RADIATED EMISSION

12.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3M VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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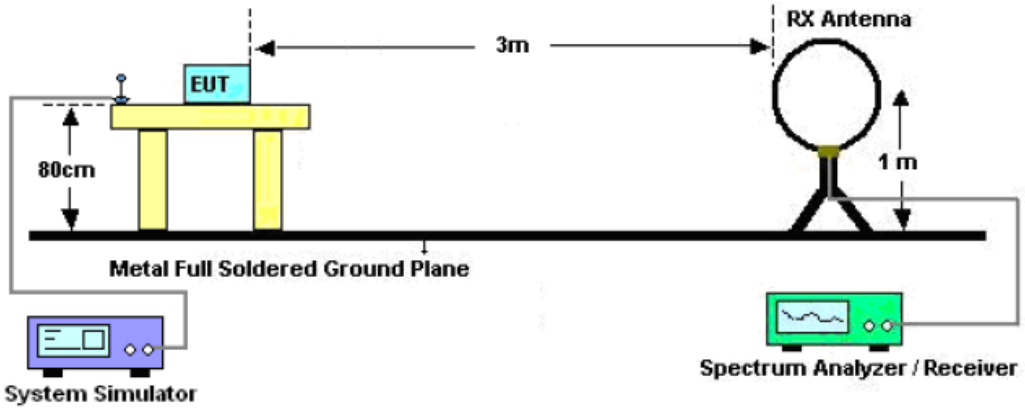
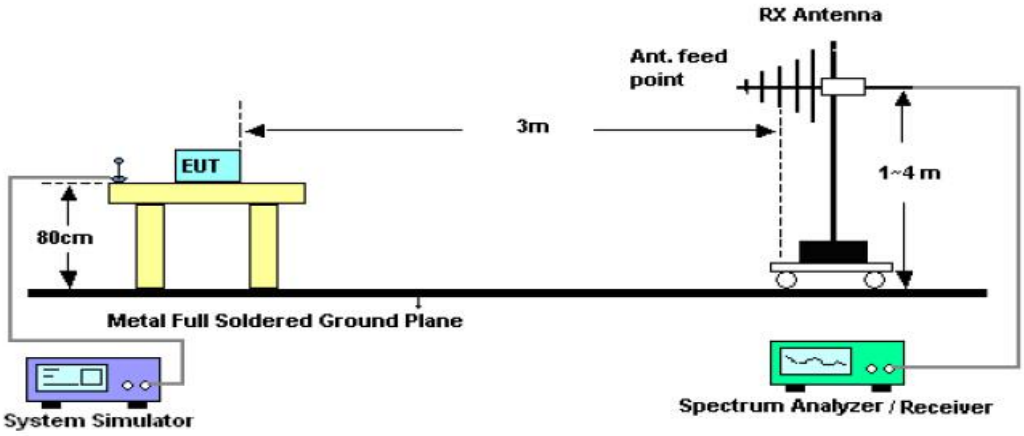
12.2. TEST SETUP

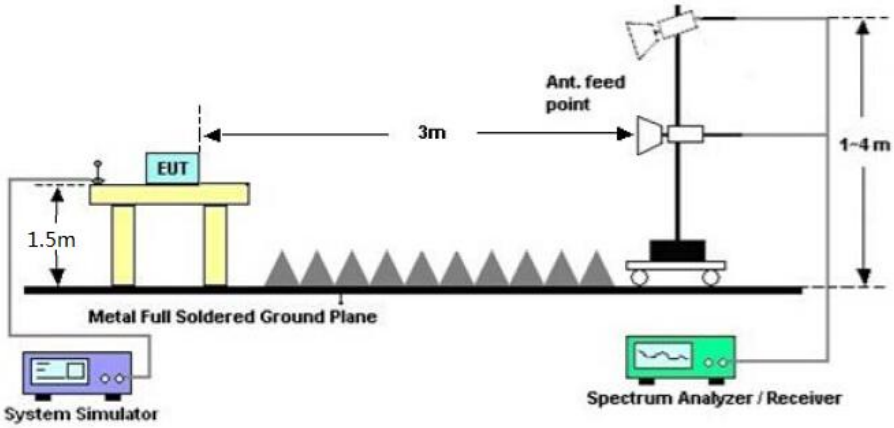
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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12.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

12.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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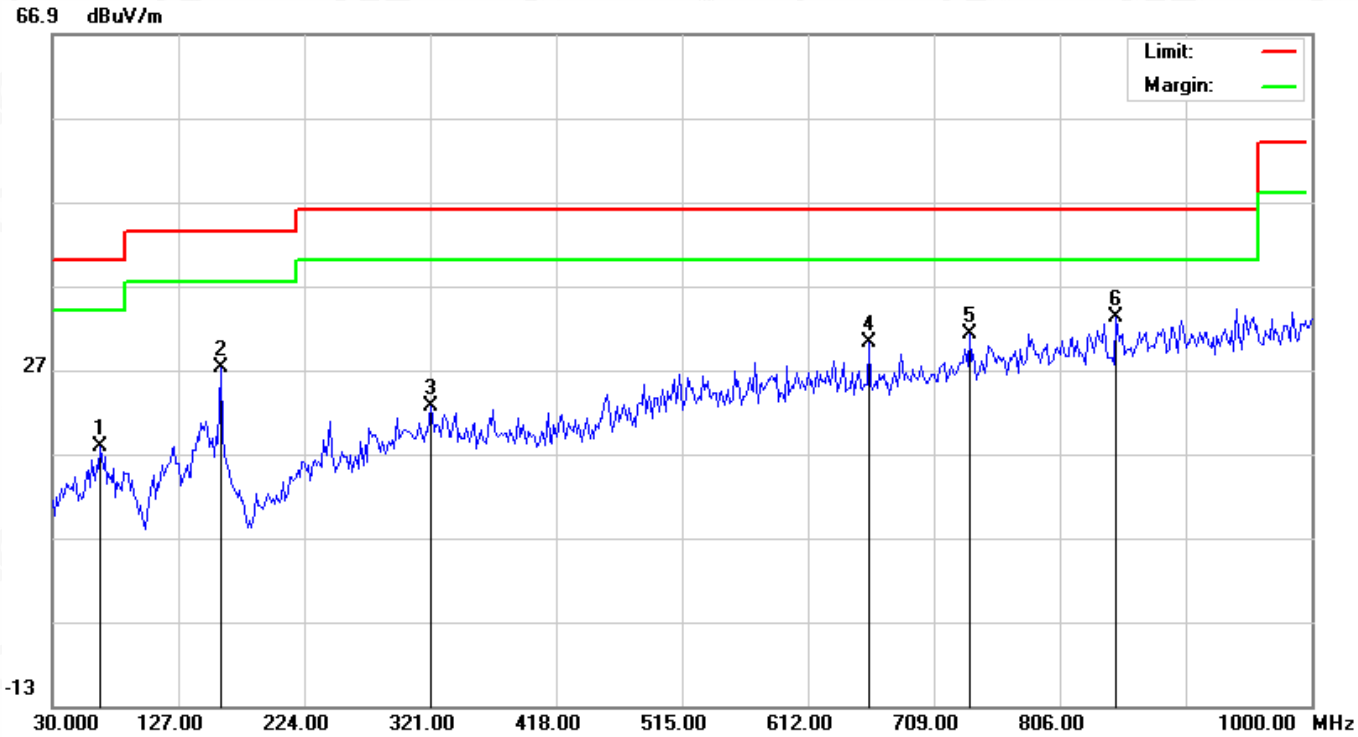
RADIATED EMISSION BELOW 1GHZ

EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5180MHz	**Antenna**	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		67.1833	1.09	16.76	17.85	40.00	-22.15	peak
2		159.3333	8.11	19.02	27.13	43.50	-16.37	peak
3		321.0000	1.29	21.37	22.66	46.00	-23.34	peak
4		658.8832	2.55	27.66	30.21	46.00	-15.79	peak
5		736.4833	2.31	28.97	31.28	46.00	-14.72	peak
6	*	849.6500	2.15	31.05	33.20	46.00	-12.80	peak

RESULT: PASS

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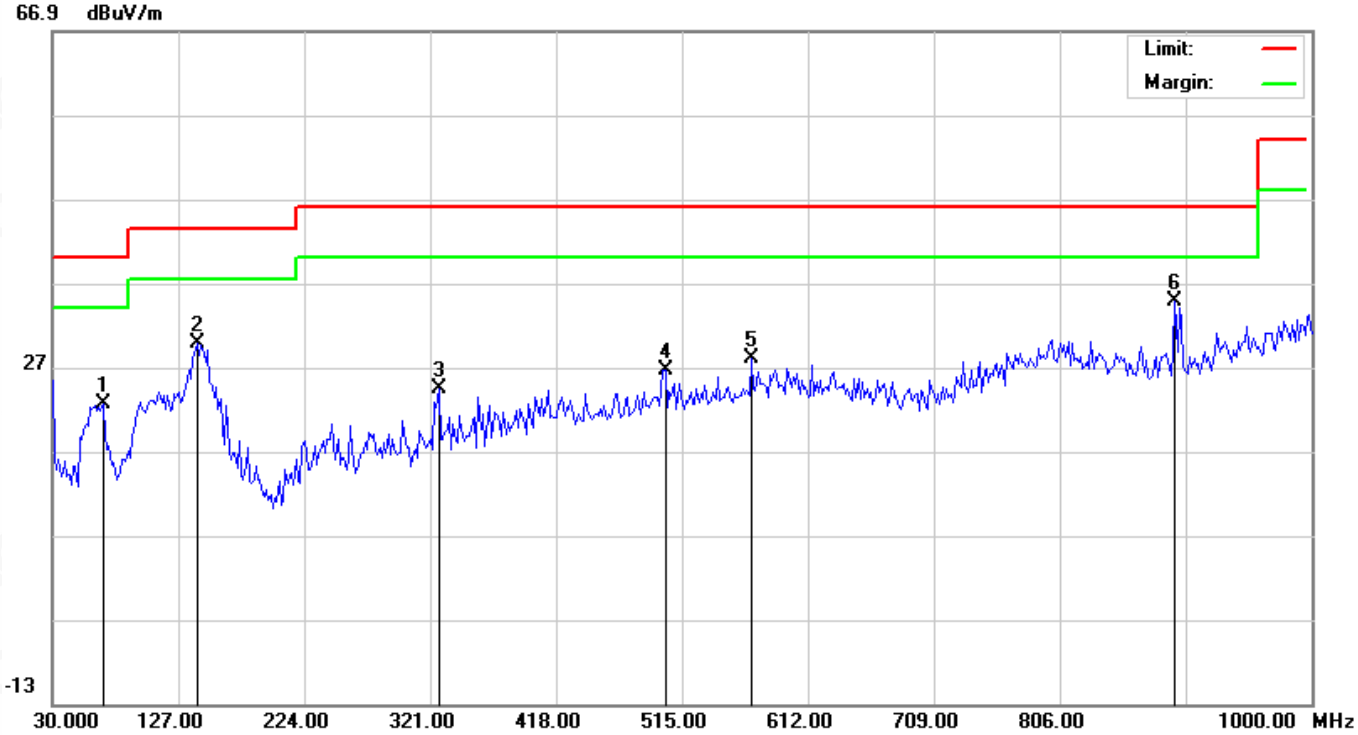
Attestation of Global Compliance(Shenzhen)Co., Ltd
Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd
Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/

EUT	Altro Smart Lock	Model Name	ModelX
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		68.8000	5.71	16.96	22.67	40.00	-17.33	peak
2		141.5500	10.51	19.23	29.74	43.50	-13.76	peak
3		327.4667	3.99	20.43	24.42	46.00	-21.58	peak
4		502.0667	1.59	25.03	26.62	46.00	-19.38	peak
5		568.3500	1.65	26.33	27.98	46.00	-18.02	peak
6	*	894.9167	6.91	27.84	34.75	46.00	-11.25	peak

RESULT: PASS

Note: 1. Factor = Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Level.

The "Factor" value can be calculated automatically by software of measurement system.

2. All the 20MHz bandwidth modulation had been tested, the 802.11a20 in 5180MHz was the worst case and record in his test report.

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RADIATED EMISSION ABOVE 1GHZ

EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5180MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10360.044	39.45	9.14	48.59	68.20	-19.61	peak
15540.066	40.59	10.22	50.81	74.00	-23.19	peak
15540.066	32.01	10.22	42.23	54.00	-11.77	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10360.044	39.37	9.14	48.51	68.20	-19.69	peak
15540.066	42.18	10.22	52.40	74.00	-21.60	peak
15540.066	33.62	10.22	43.84	54.00	-10.16	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5240MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10480.044	36.14	9.27	45.41	68.20	-22.79	peak
15720.066	40.27	10.38	50.65	74.00	-23.35	peak
15720.066	30.94	10.38	41.32	54.00	-12.68	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10480.044	36.23	9.27	45.50	68.20	-22.70	peak
15720.066	39.47	10.38	49.85	74.00	-24.15	peak
15720.066	31.04	10.38	41.42	54.00	-12.58	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5260MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10520.044	38.49	9.29	47.78	68.20	-20.42	peak
15780.066	41.02	10.42	51.44	74.00	-22.56	peak
15780.066	31.49	10.42	41.91	54.00	-12.09	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10520.044	36.49	9.29	45.78	68.20	-22.42	peak
15780.066	42.57	10.42	52.99	74.00	-21.01	peak
15780.066	34.15	10.42	44.57	54.00	-9.43	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5320MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10640.044	46.59	9.35	55.94	74.00	-18.06	peak
10640.044	37.22	9.35	46.57	54.00	-7.43	AVG
15960.066	40.18	10.46	50.64	74.00	-23.36	peak
15960.066	30.53	10.46	40.99	54.00	-13.01	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10640.044	47.16	9.35	56.51	74.00	-17.49	peak
10640.044	38.17	9.35	47.52	54.00	-6.48	AVG
15960.066	41.59	10.46	52.05	74.00	-21.95	peak
15960.066	32.47	10.46	42.93	54.00	-11.07	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5500MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11000.044	48.23	9.37	57.60	74.00	-16.40	peak
11000.044	40.17	9.37	49.54	54.00	-4.46	AVG
16500.066	32.15	10.48	42.63	68.20	-25.57	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11000.044	48.26	9.37	57.63	74.00	-16.37	peak
11000.044	42.37	9.37	51.74	54.00	-2.26	AVG
16500.066	33.84	10.48	44.32	68.20	-23.88	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5700MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11400.044	47.19	9.39	56.58	74.00	-17.42	peak
11400.044	37.12	9.39	46.51	54.00	-7.49	AVG
17100.066	30.46	10.49	40.95	68.20	-27.25	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11400.044	46.18	9.39	55.57	74.00	-18.43	peak
11400.044	38.47	9.39	47.86	54.00	-6.14	AVG
17100.066	42.15	10.49	52.64	68.20	-15.56	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5745MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11490.042	47.29	9.42	56.71	74.00	-17.29	peak
11490.042	37.15	9.42	46.57	54.00	-7.43	AVG
17235.063	41.58	10.51	52.09	68.20	-16.11	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11490.042	47.26	9.42	56.68	74.00	-17.32	peak
11490.042	38.07	9.42	47.49	54.00	-6.51	AVG
17235.063	40.16	10.51	50.67	68.20	-17.53	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Altro Smart Lock	**Model Name**	ModelX
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11a20 5825MHz	**Antenna**	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11650.042	48.16	9.62	57.78	74.00	-16.22	peak
11650.042	37.44	9.62	47.06	54.00	-6.94	AVG
17475.063	42.18	10.75	52.93	68.20	-15.27	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11650.042	46.29	9.62	55.91	74.00	-18.09	peak
11650.042	35.12	9.62	44.74	54.00	-9.26	AVG
17475.063	39.43	10.75	50.18	68.20	-18.02	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Note: Other frequencies radiation emission from 1GHz to 40GHz at least have 20dB margin and not recorded in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Level.

The “Factor” value can be calculated automatically by software of measurement system.

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13. BAND EDGE EMISSION

13.1. MEASUREMENT PROCEDURE

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO

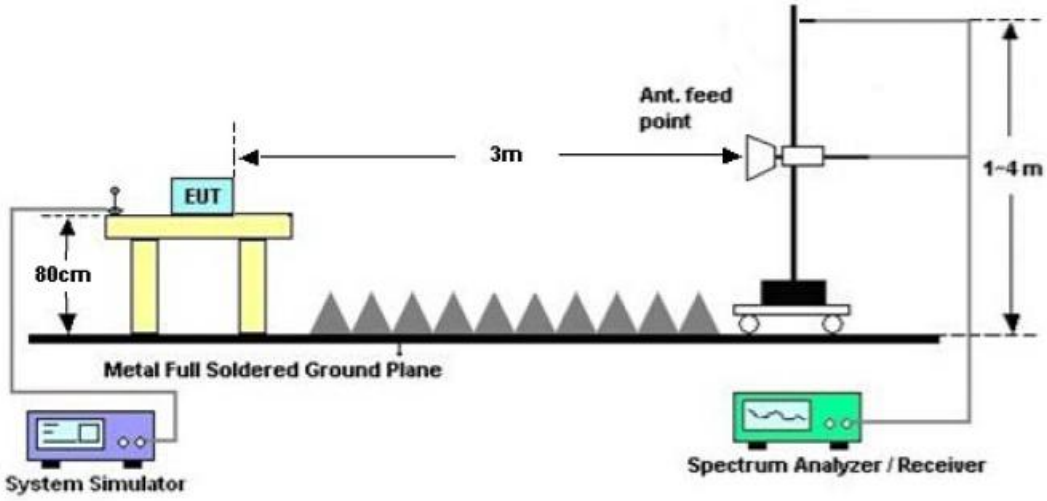
(b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

3. Other procedures refer to clause 11.2.

Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.
3. Only the data of band edge emission at the restricted band 4.5GHz-5.15GHz and 5.35GHz-5.46GHz record in the report. Other restricted band 7.25GHz-7.77GHz were considered as ambient noise. No recording in the test report.

13.2. TEST SET-UP



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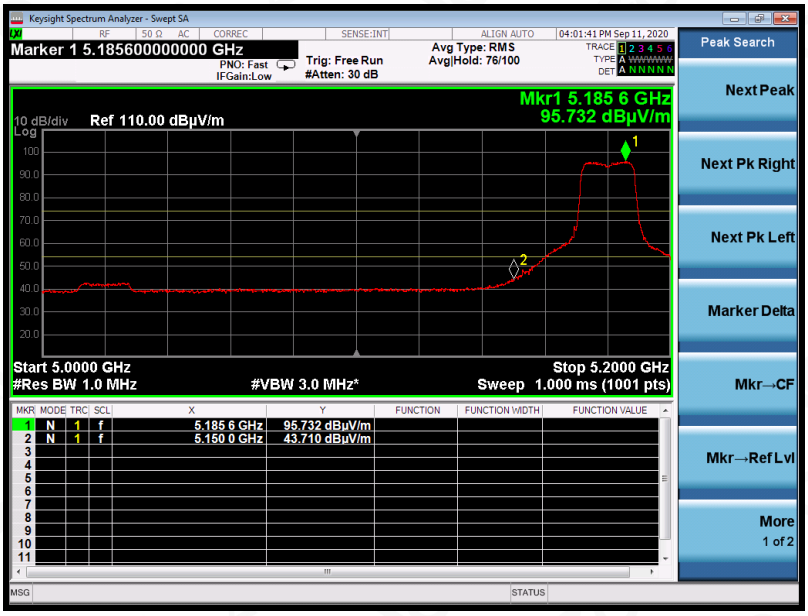
13.3. TEST RESULT

EUT	Altro Smart Lock	Model Name	ModelX
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Horizontal

PK Value

AV Value



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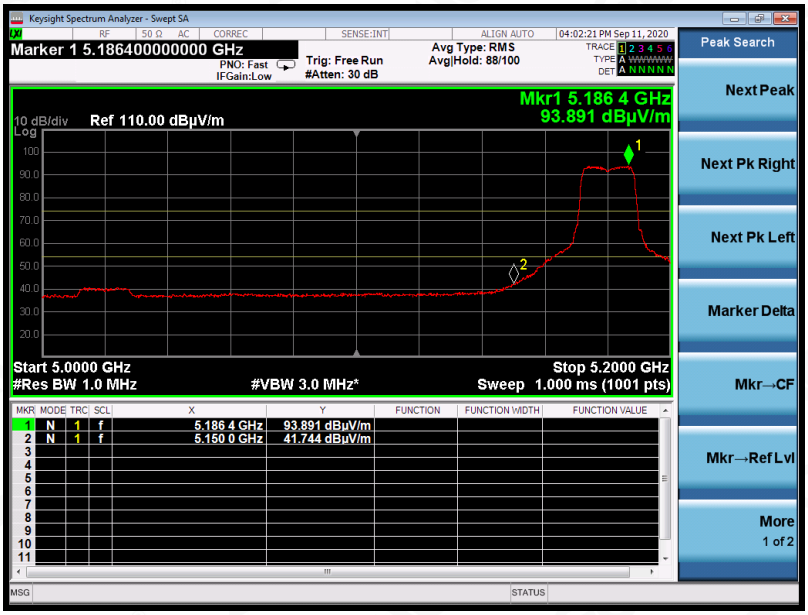
EUT	Altro Smart Lock	Model Name	ModelX
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Vertical

PK Value

AV Value



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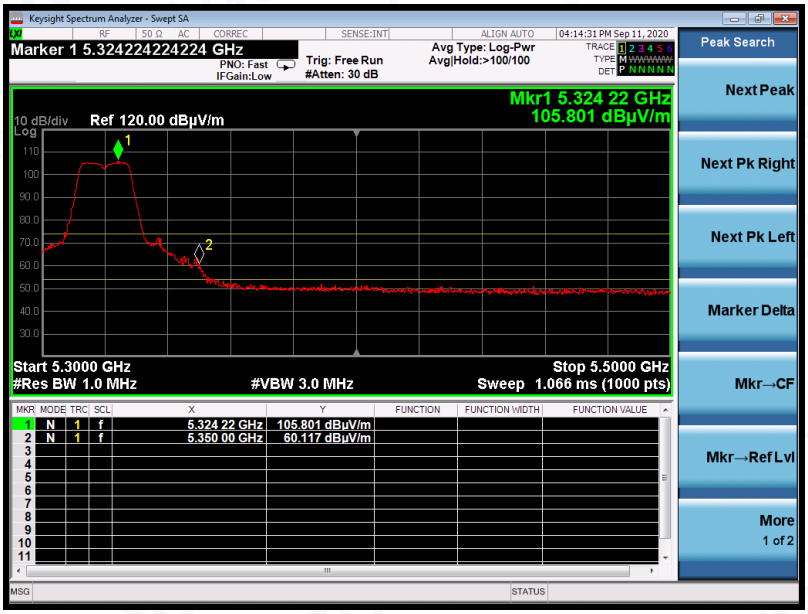
EUT	Altro Smart Lock	Model Name	ModelX
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5320MHz	Antenna	Horizontal

PK Value



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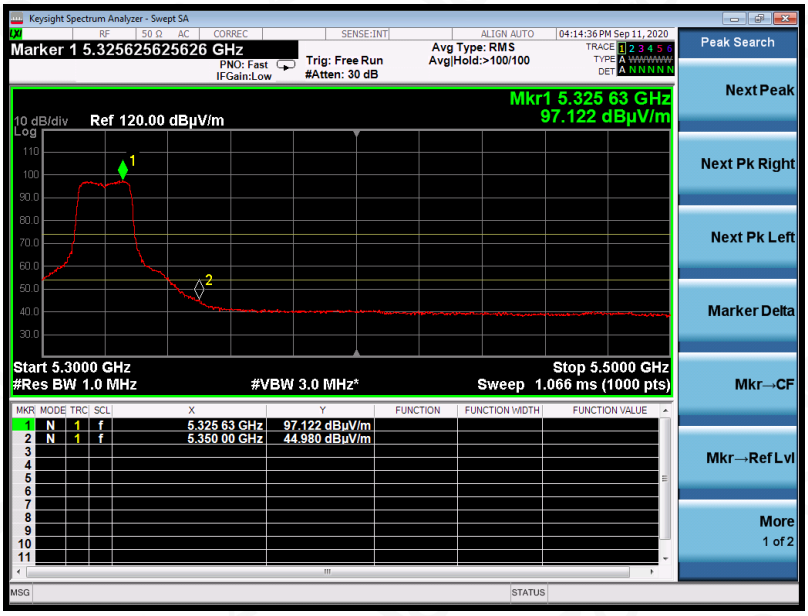

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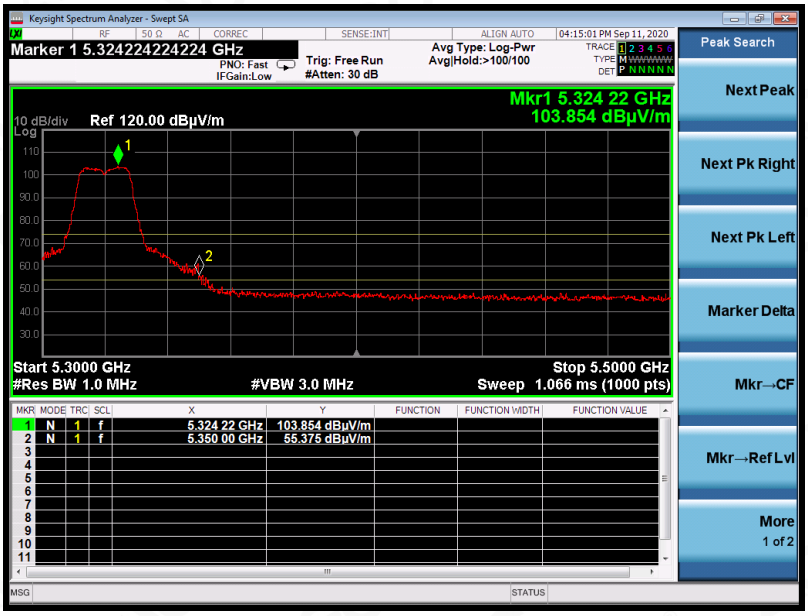
EUT	Altro Smart Lock	Model Name	ModelX
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5320MHz	Antenna	Vertical

PK Value



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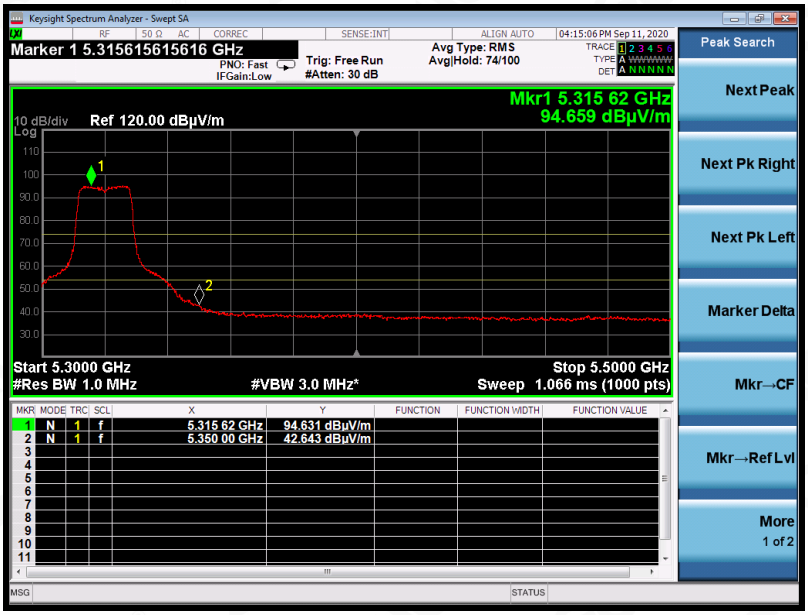

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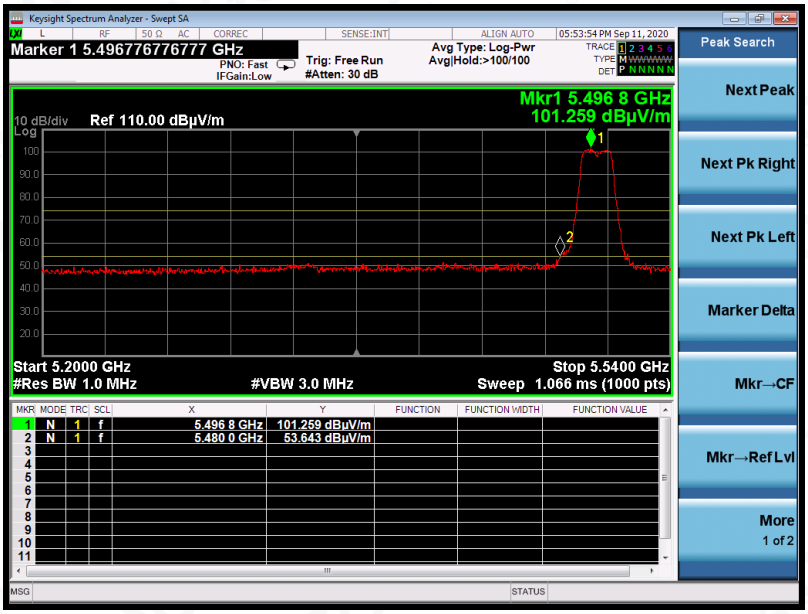
EUT	Altro Smart Lock	Model Name	ModelX
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5500MHz	Antenna	Horizontal

PK Value



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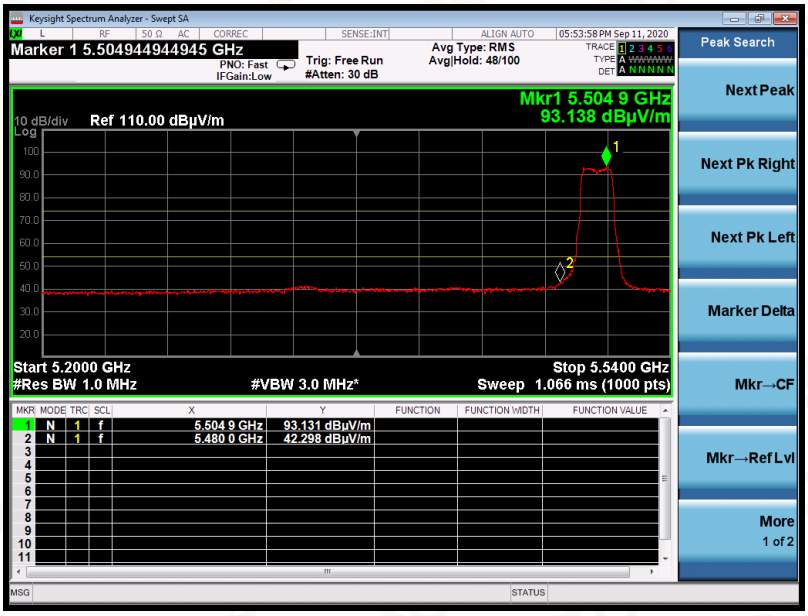

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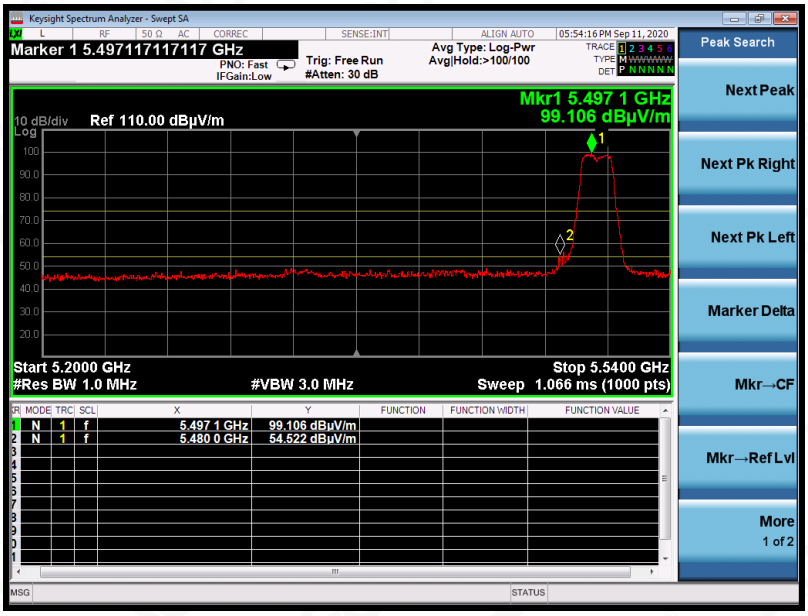
EUT	Altro Smart Lock	Model Name	ModelX
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5500MHz	Antenna	Vertical

PK Value



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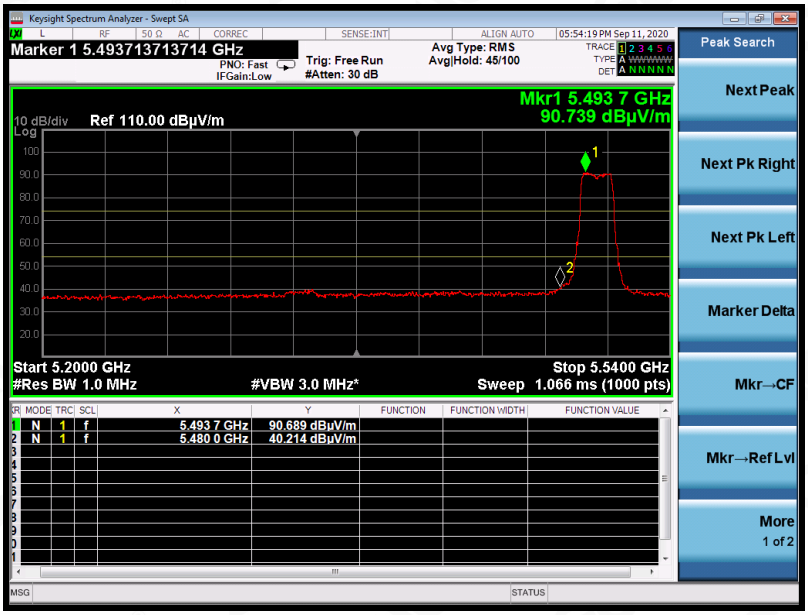

RESULT: PASS

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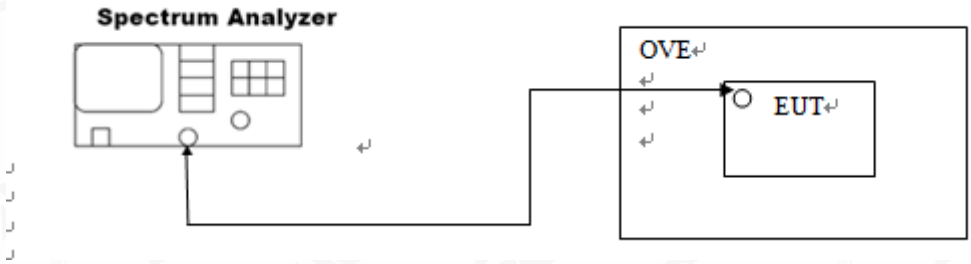
14. FREQUENCY STABILITY

14.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the operation frequency.
3. Set SPA Centre Frequency = Operation Frequency. SPAN=enough to measure the emission is maintained within the band
4. Set SPA Trace 1 Max hold, then View.
5. Extreme temperature rule is -10°C~60°C.

14.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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14.3. MEASUREMENT RESULTS

Test Mode	Temperature	Measurement Frequency (MHz)	Result	Conclusion
802.11a	- 10℃	5180	5180.029	PASS
	0℃	5180	5180.027	PASS
	10℃	5180	5180.025	PASS
	20℃	5180	5180.024	PASS
	30℃	5180	5180.027	PASS
	40℃	5180	5180.025	PASS
	50℃	5180	5180.026	PASS
	60℃	5180	5180.028	PASS
	- 10℃	5240	5240.057	PASS
	0℃	5240	5240.057	PASS
	10℃	5240	5240.055	PASS
	20℃	5240	5240.056	PASS
	30℃	5240	5240.0556	PASS
	40℃	5240	5240.0565	PASS
	50℃	5240	5240.055	PASS
	60℃	5240	5240.051	PASS
	- 10℃	5260	5260.029	PASS
	0℃	5260	5260.032	PASS
	10℃	5260	5260.035	PASS
	20℃	5260	5260.036	PASS
	30℃	5260	5260.032	PASS
	40℃	5260	5260.034	PASS
	50℃	5260	5260.035	PASS
	60℃	5260	5260.036	PASS
	- 10℃	5320	5320.042	PASS
	0℃	5320	5320.023	PASS
	10℃	5320	5320.045	PASS
	20℃	5320	5320.047	PASS
	30℃	5320	5320.043	PASS
	40℃	5320	5320.044	PASS
	50℃	5320	5320.047	PASS
	60℃	5320	5320.046	PASS
	- 10℃	5500	5500.065	PASS
	0℃	5500	5500.069	PASS
	10℃	5500	5500.068	PASS
	20℃	5500	5500.062	PASS
	30℃	5500	5500.066	PASS
	40℃	5500	5500.069	PASS
	50℃	5500	5500.068	PASS
	60℃	5500	5500.066	PASS
	- 10℃	5700	5700.052	PASS
	0℃	5700	5700.056	PASS

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	10℃	5700	5700.057	PASS
	20℃	5700	5700.054	PASS
	30℃	5700	5700.052	PASS
	40℃	5700	5700.056	PASS
	50℃	5700	5700.056	PASS
	60℃	5700	5700.055	PASS
	- 10℃	5745	5745.049	PASS
	0℃	5745	5745.044	PASS
	10℃	5745	5745.043	PASS
	20℃	5745	5745.045	PASS
	30℃	5745	5745.046	PASS
	40℃	5745	5745.047	PASS
	50℃	5745	5745.046	PASS
	60℃	5745	5745.048	PASS
	- 10℃	5825	5825.055	PASS
	0℃	5825	5825.057	PASS
	10℃	5825	5825.052	PASS
	20℃	5825	5825.053	PASS
	30℃	5825	5825.055	PASS
	40℃	5825	5825.056	PASS
	50℃	5825	5825.057	PASS
	60℃	5825	5825.056	PASS

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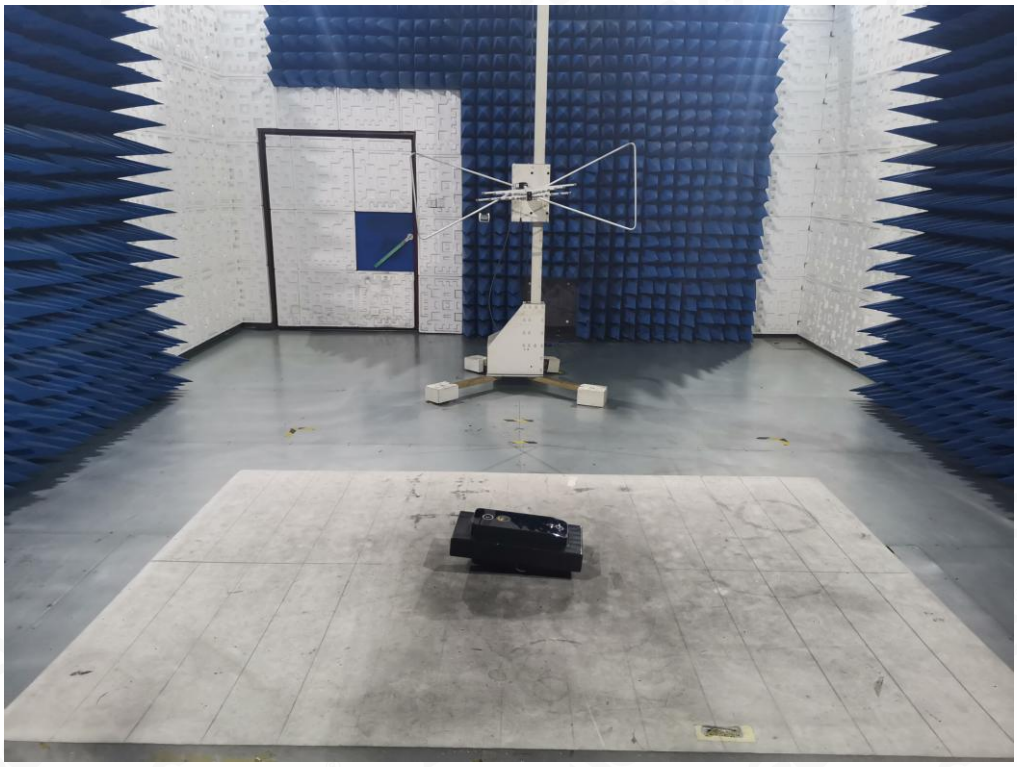
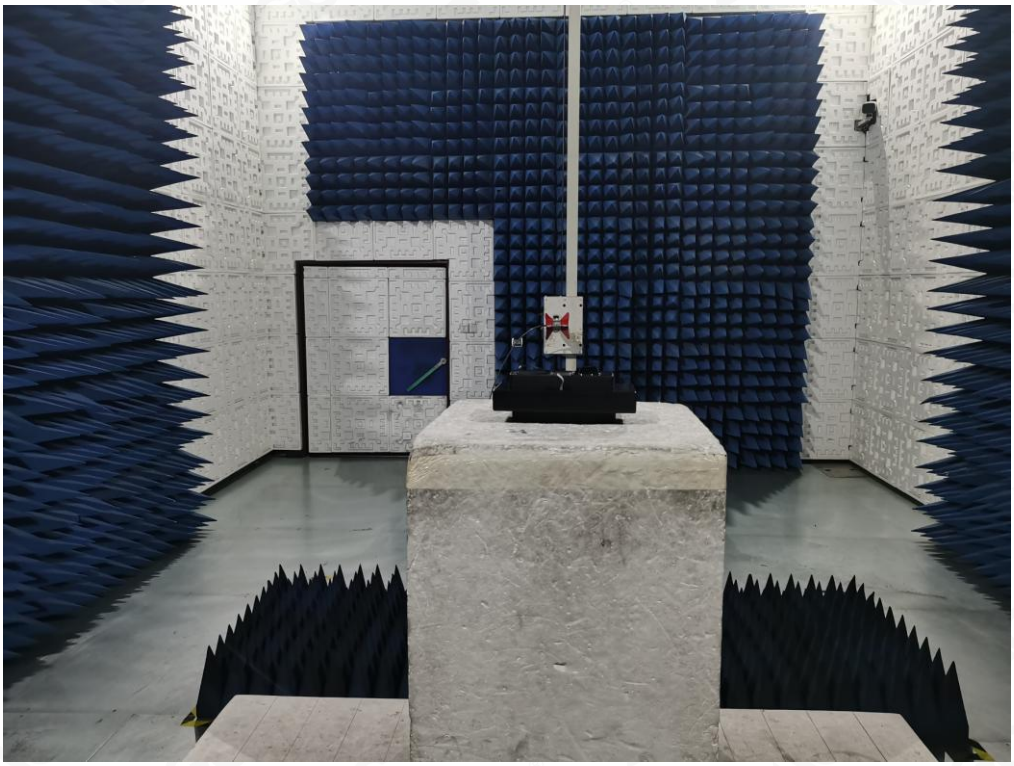
Attestation of Global Compliance(Shenzhen)Co., Ltd
Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd
Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP BELOW 1GHZ



FCC RADIATED EMISSION TEST SETUP ABOVE 1GHZ



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CONDUCTED TEST SETUP

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APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC04983200901AP01

----END OF REPORT----

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