

802.11ac(VHT40)

U-NII 3



CH151

802.11ac(VHT80)

U-NII 3



CH155



CH159

4.5 Emission Bandwidth (26dB Bandwidth)

Limit

N/A

Test Procedure

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW / EBW ratio is approximately 1 %.

Test Configuration



Test Results

Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	23.72	N/A	Pass
		40	24.92		
		48	24.96		
802.11n(HT20)	U-NII 1	36	24.80		
		40	24.40		
		48	25.20		
802.11n(HT40)	U-NII 1	38	50.28		
		46	51.76		
802.11ac(VHT20)	U-NII 1	36	24.04		
		40	23.92		
		48	25.36		
802.11ac(VHT40)	U-NII 1	38	48.88		
		46	49.68		
802.11ac(VHT40)	U-NII 1	42	81.84		

Test plot as follows:



802.11n(HT40)



802.11ac(VHT20)



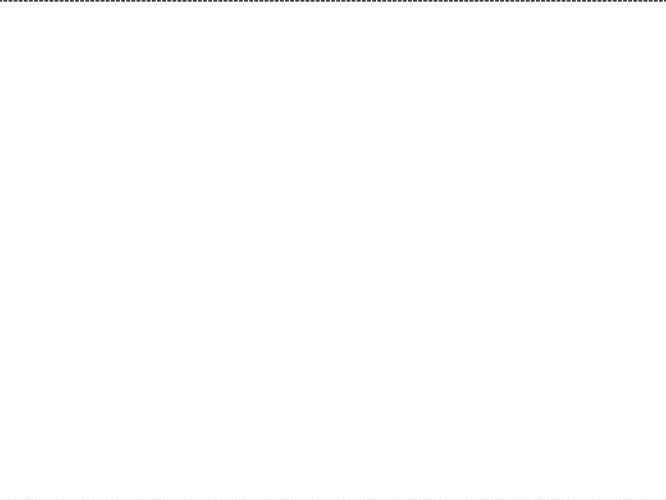
CH38



CH36



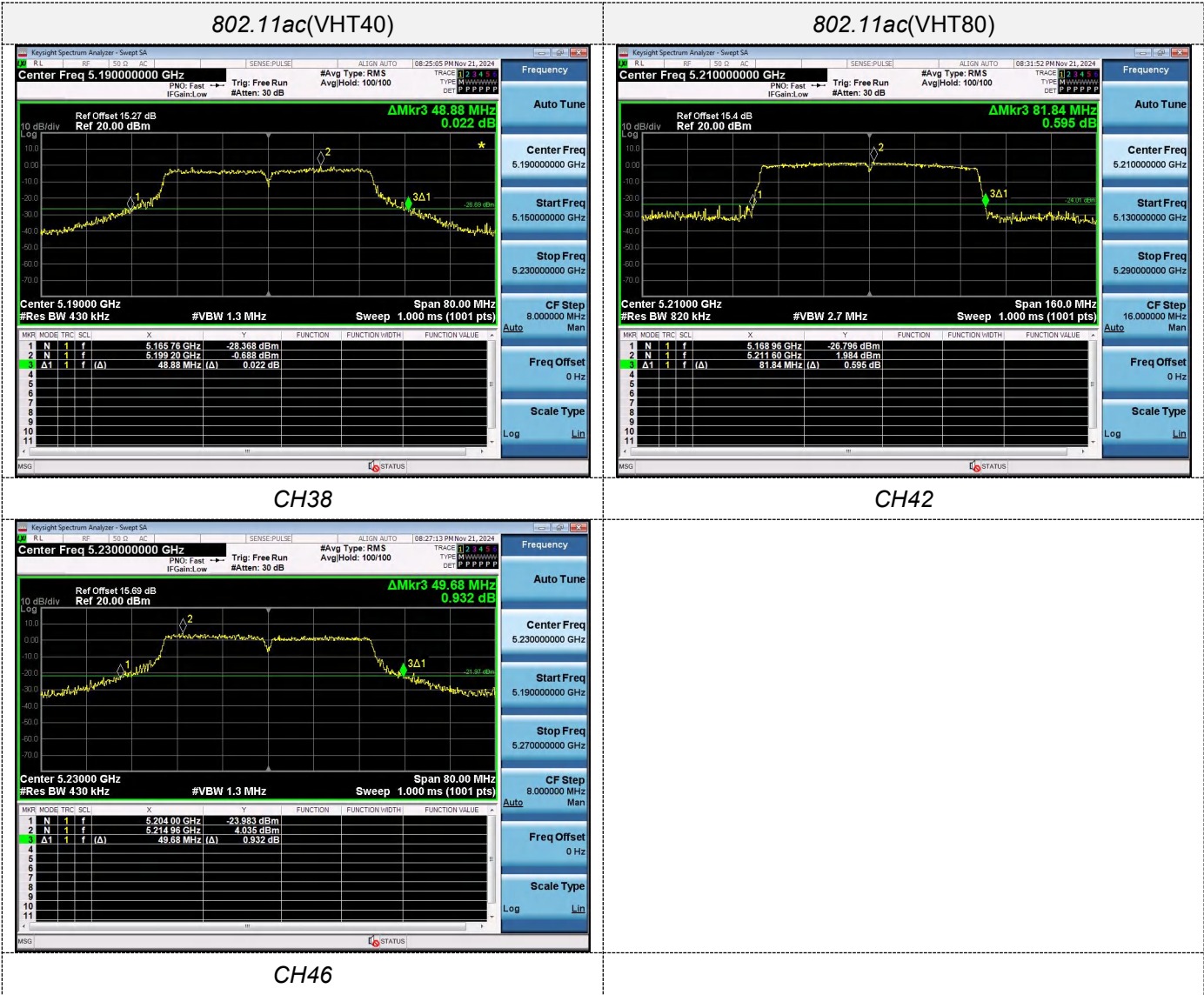
CH46



CH40



CH48



4.6 Minimum Emission Bandwidth (6dB Bandwidth)

Limit

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Configuration

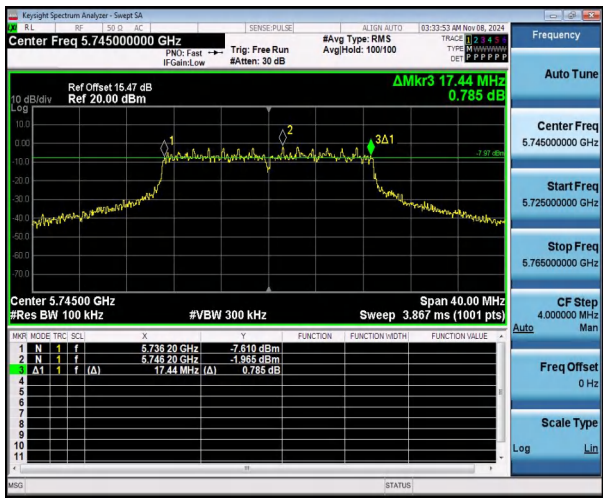


Test Results

Type	Bands	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	U-NII 3	149	17.440	≥500KHz	Pass
		157	17.640		
		165	17.600		
802.11n(HT20)	U-NII 3	149	17.560		
		157	17.560		
		165	17.560		
802.11n(HT40)	U-NII 3	151	36.320		
		159	36.400		
802.11ac(VHT20)	U-NII 3	149	17.640		
		157	17.600		
		165	17.600		
802.11ac(VHT40)	U-NII 3	151	36.400		
		159	36.320		
802.11ac(VHT80)	U-NII 3	155	76.320		

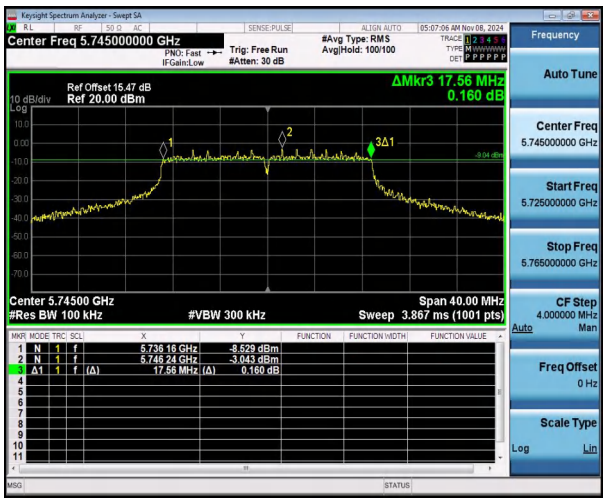
Test plot as follows:

802.11a



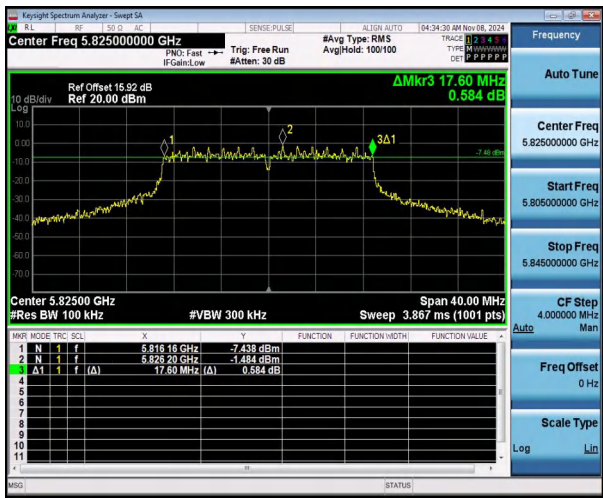
CH149

802.11n(HT20)



CH149

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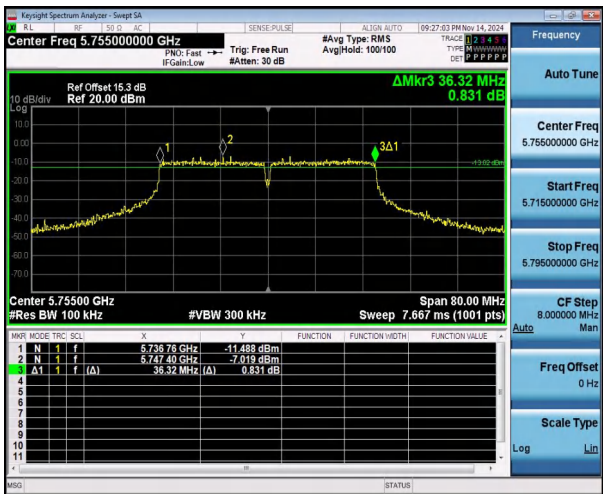
CH165

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CH165

802.11n(HT40)

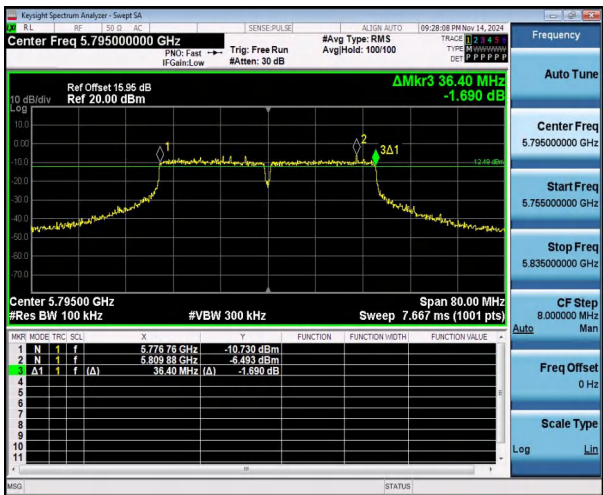


CH151

802.11ac(VHT20)



CH149



CH159

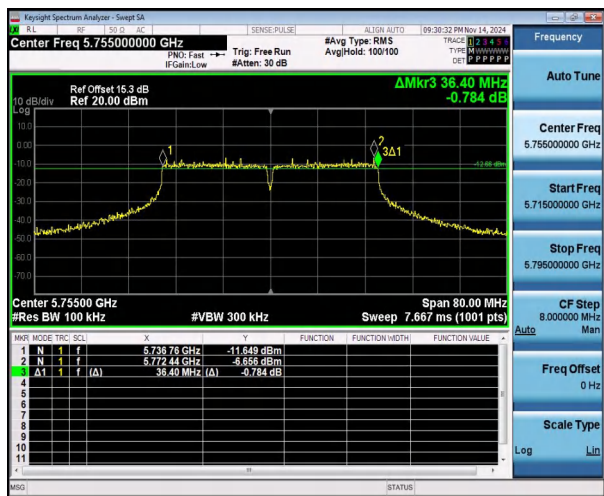


CH157



CH165

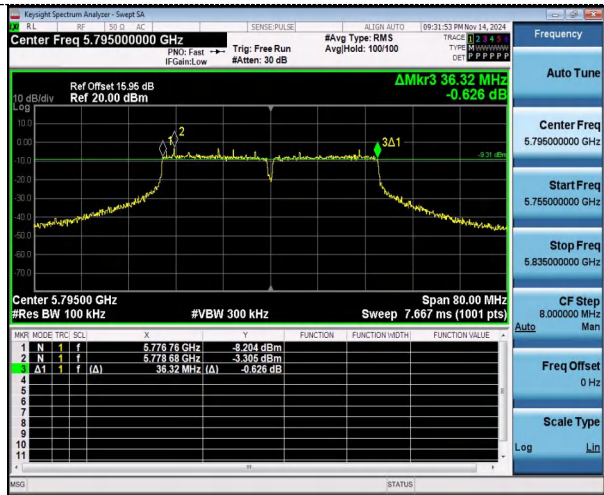
802.11ac(VHT40)



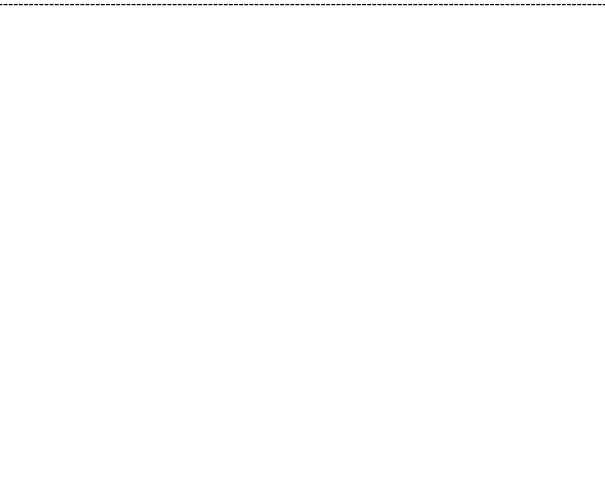
802.11ac(VHT80)



CH151



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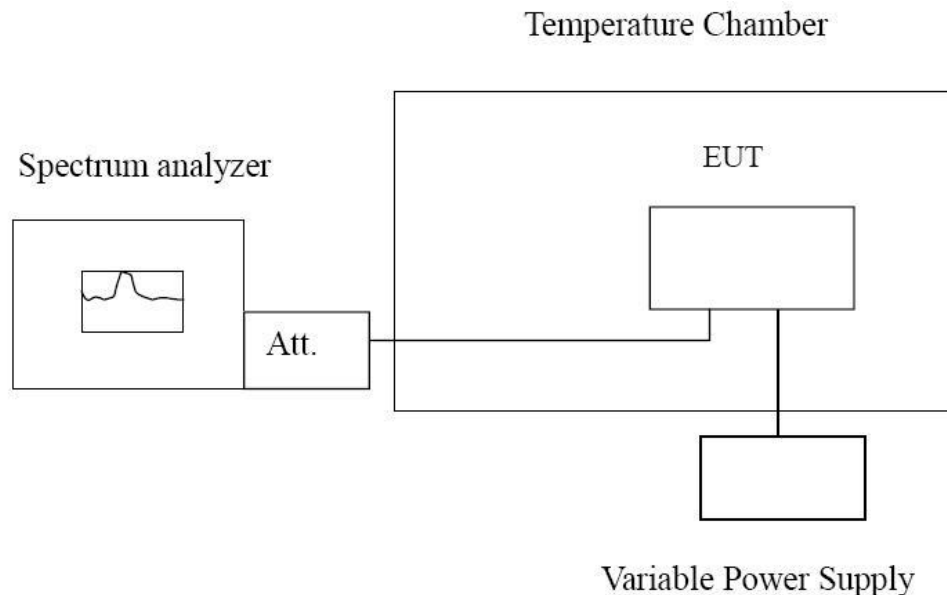
CH159

4.7 Frequency Stability

LIMIT

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

TEST CONFIGURATION



TEST PROCEDURE

Frequency Stability under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

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

Record worst case as below:

Reference Frequency: 802.11ac channel=36 frequency=5180MHz					
Voltage (V)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	156.56	0.03022	Within the band of operation	Pass
	-20	165.05	0.03186		
	-10	129.84	0.02507		
	0	132.68	0.02561		
	10	135.69	0.02619		
	20	129.51	0.02500		
	30	124.26	0.02399		
	40	149.32	0.02883		
	50	131.24	0.02534		
13.2	20	135.84	0.02622	Within the band of operation	Pass
10.8	20	126.12	0.02435		

Reference Frequency: 802.11ac channel=149 frequency=5745MHz					
Voltage (V)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	134.15	0.02335	Within the band of operation	Pass
	-20	143.29	0.02494		
	-10	128.26	0.02233		
	0	135.25	0.02354		
	10	125.65	0.02187		
	20	116.28	0.02024		
	30	123.04	0.02142		
	40	131.51	0.02289		
	50	153.62	0.02674		
13.2	20	146.27	0.02546	Within the band of operation	Pass
10.8	20	138.28	0.02407		

4.8 Automatically Discontinue Transmission

Standard Applicable

FCC CFR Title 47 Part 15 Subpart C Section 15.407(c):

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

Test Result:

Declared by applicants that the device will automatically discontinue transmission in case of either absence of information to transmit or operational failure.

4.9 Band edge for RF Conducted Emissions

Limit

1) For transmitters operating in the 5.15 – 5.25 GHz band: All emissions outside of the 5.15 – 5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

2) For transmitters operating solely in the 5.725 – 5.850 GHz band.

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold.

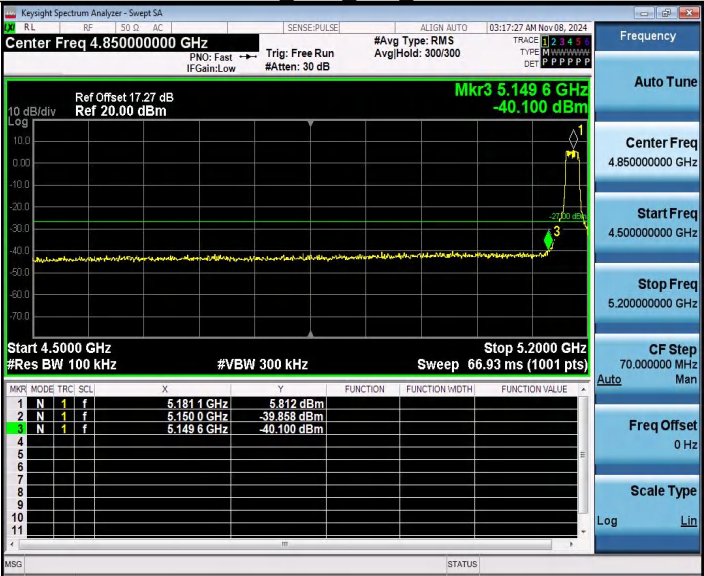
Test Configuration



Test Results

Test plot as follows:

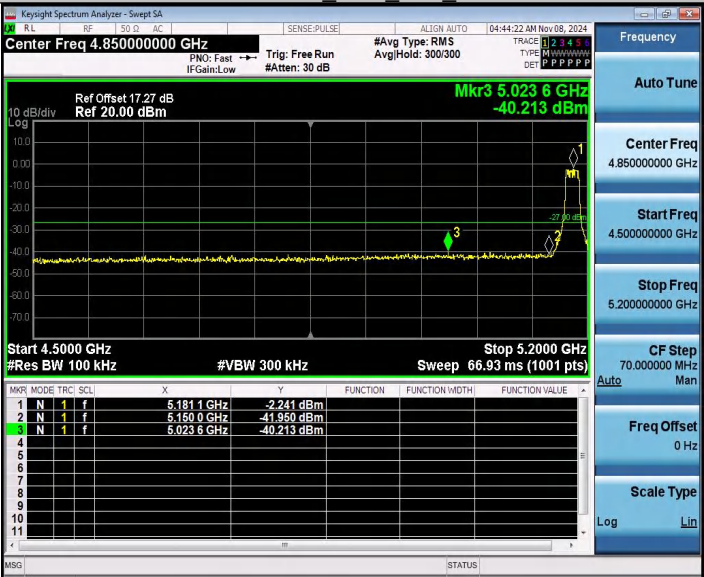
11A Ant1 Low 5180



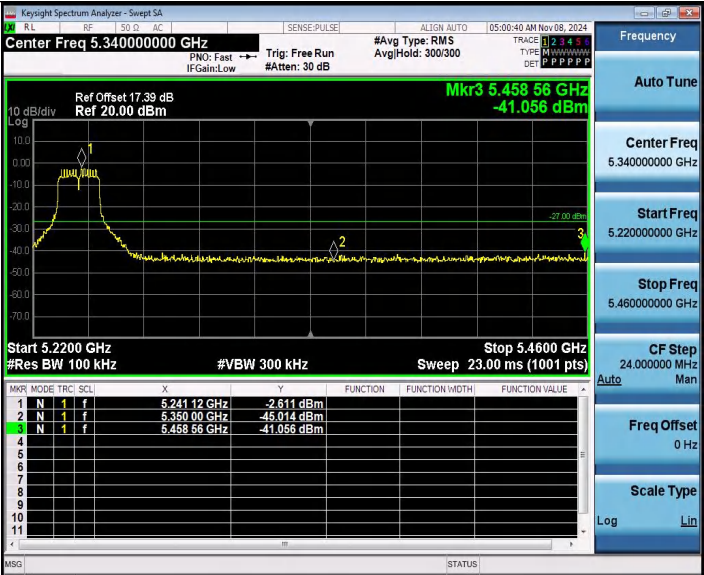
11A Ant1 High 5240



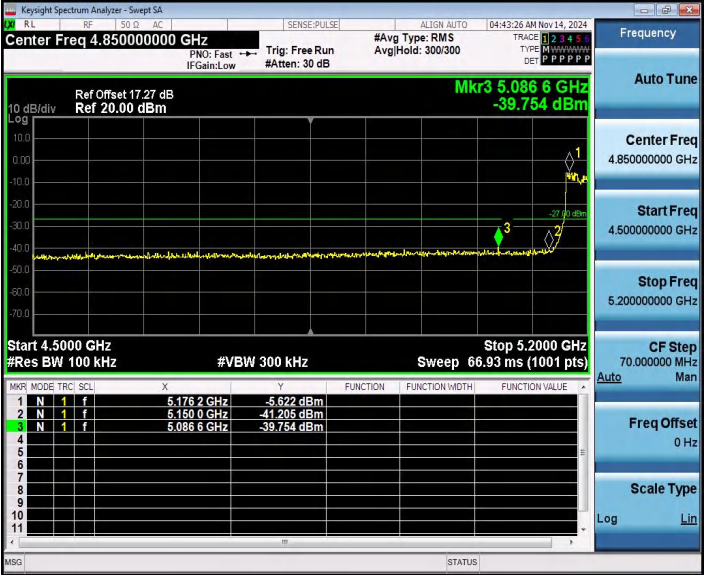
11N20SISO Ant1 Low 5180



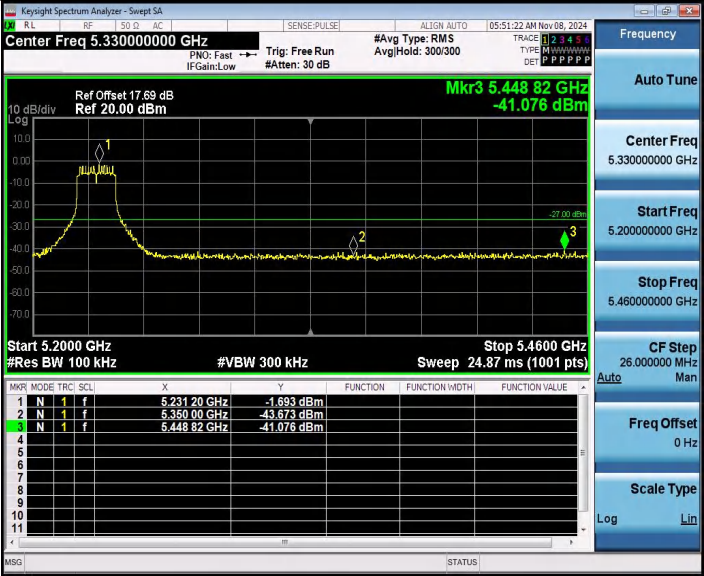
11N20SISO Ant1 High 5240



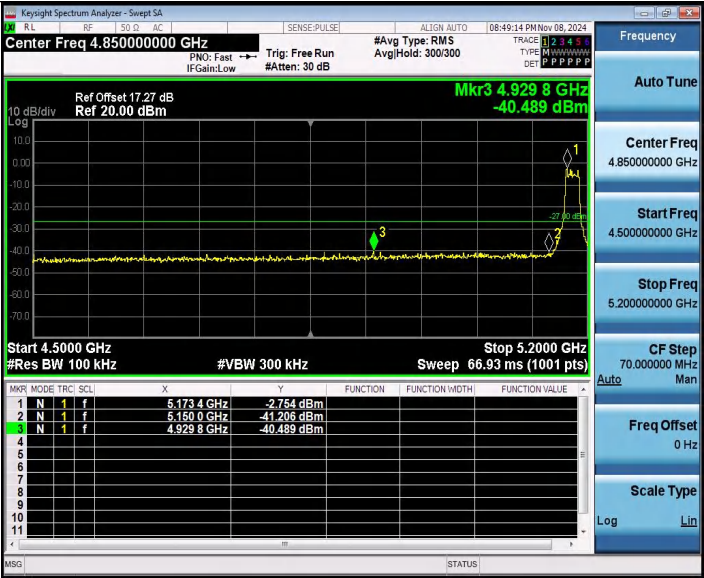
11N40SISO Ant1 Low 5190



11N40SISO Ant1 High 5230



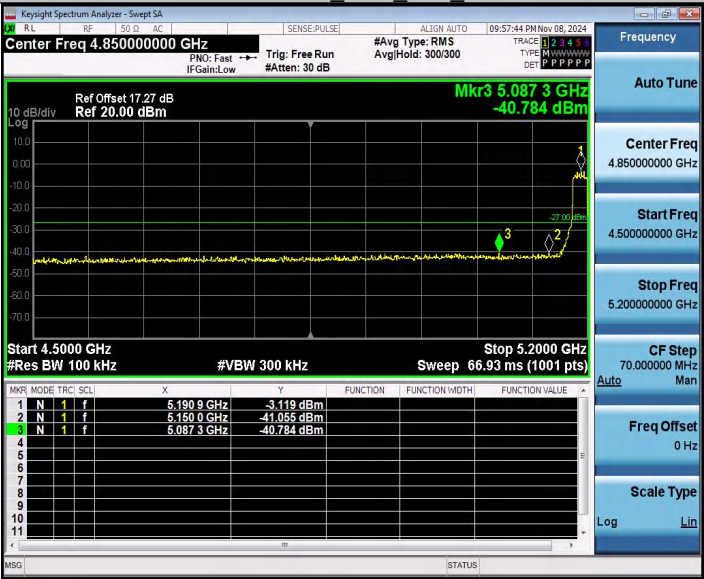
11AC20SISO Ant1 Low 5180



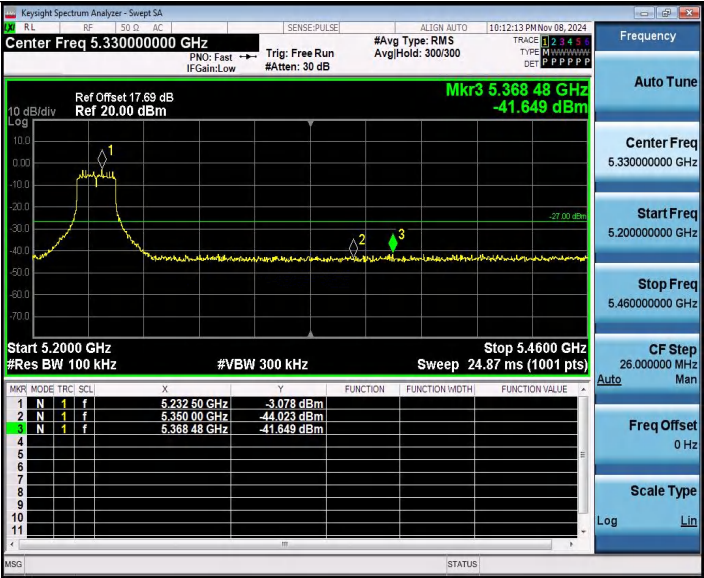
11AC20SISO Ant1 High 5240



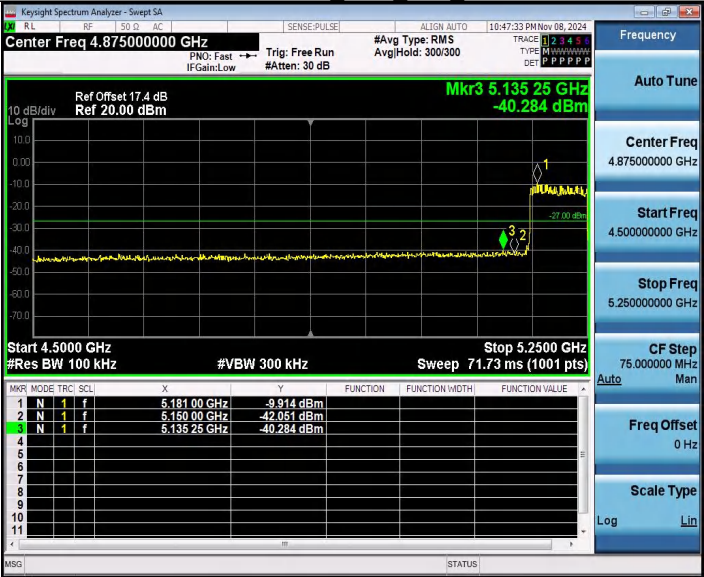
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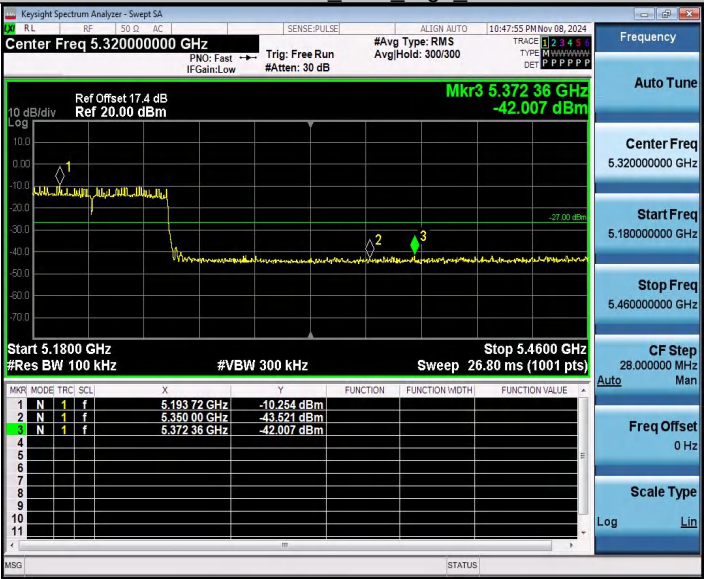
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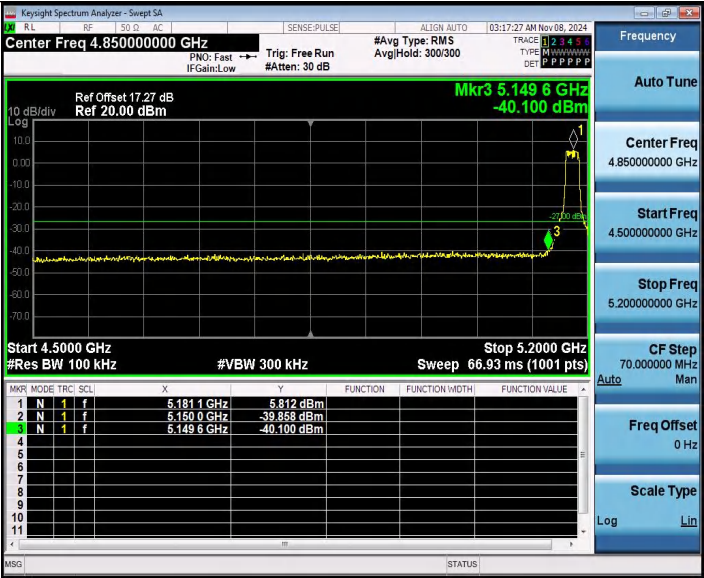


11AC80SISO Ant1 Low 5210

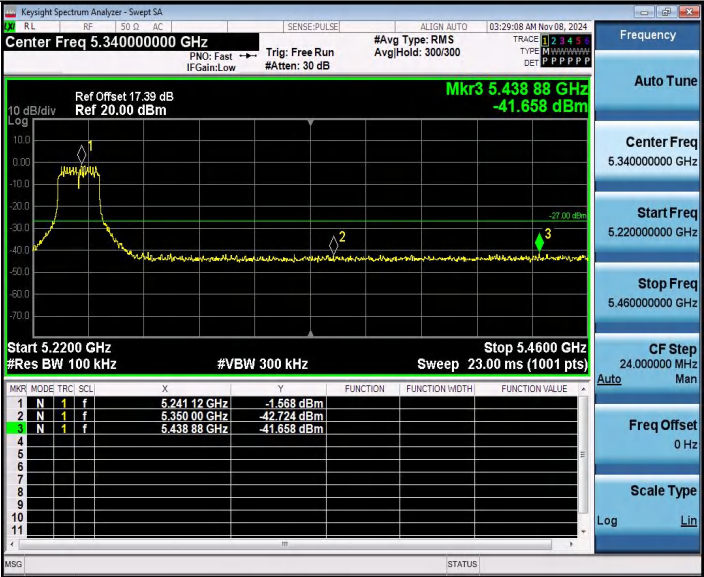


11AC80SISO Ant1 High 5210

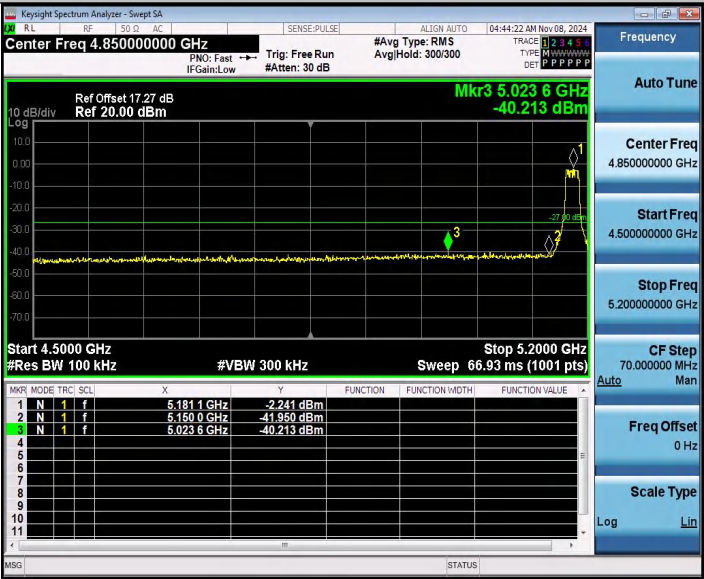




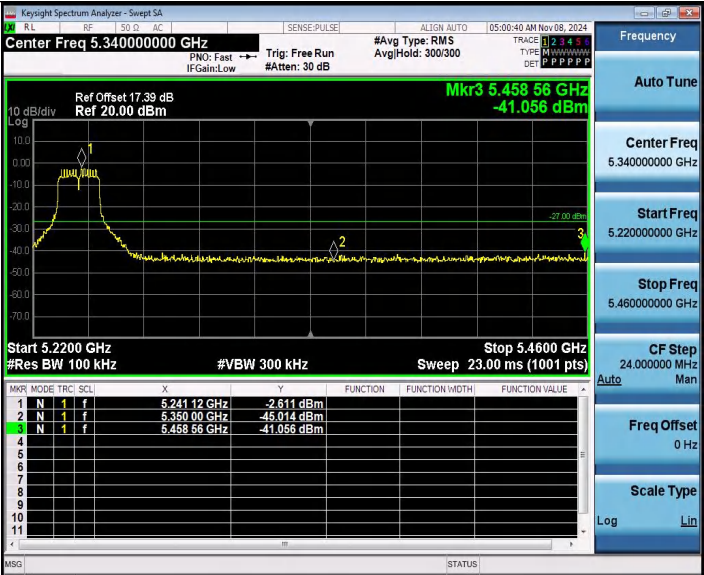
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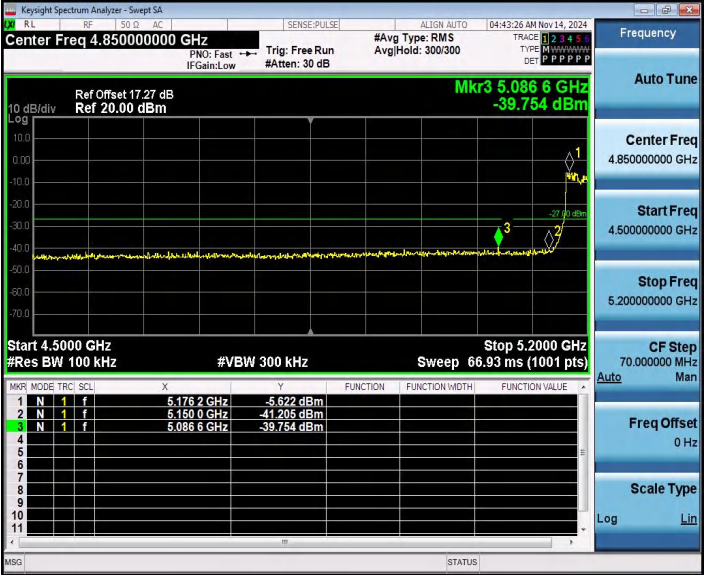
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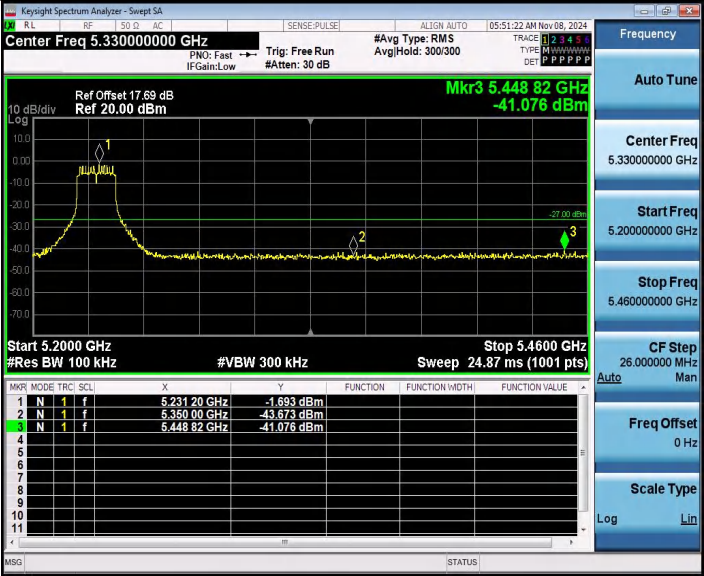
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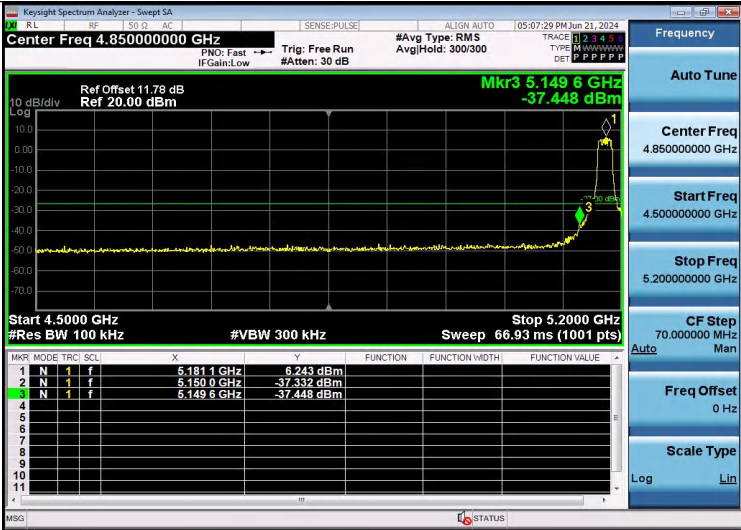
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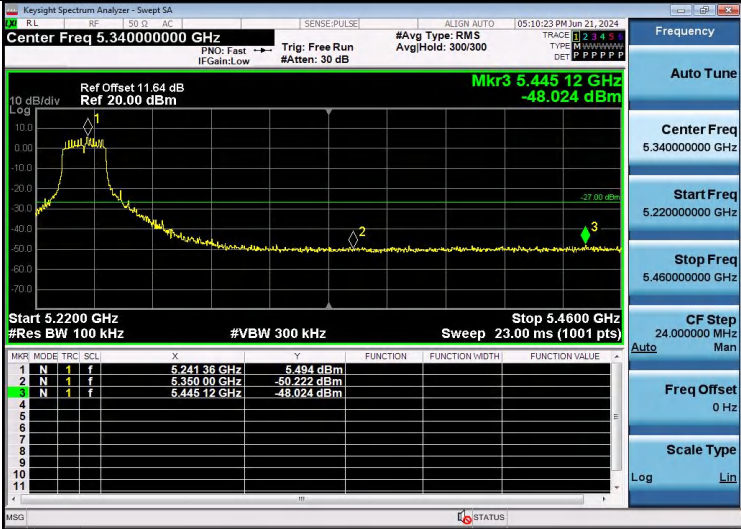
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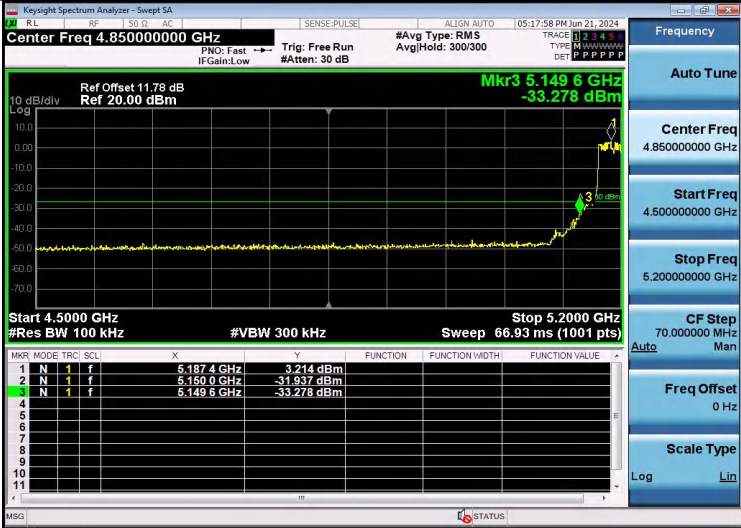
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11AC20SISO-Ant1-5180-PASS



11AC20SISO-Ant1-5240-PASS



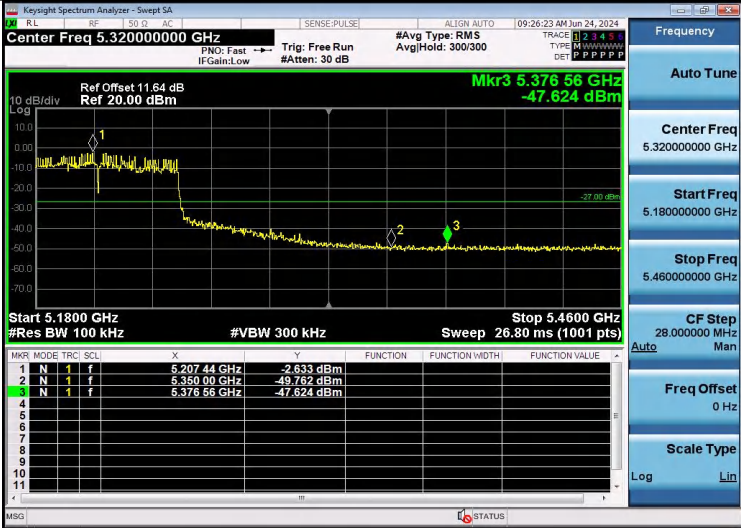
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11AC40SISO-Ant1-5230-PASS



11AC80SISO-Ant1-5210-PASS



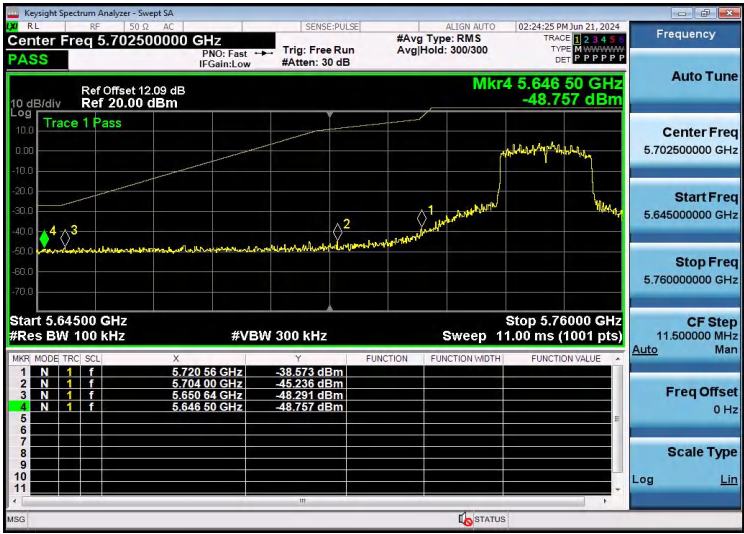
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11A-Ant1-5745-PASS



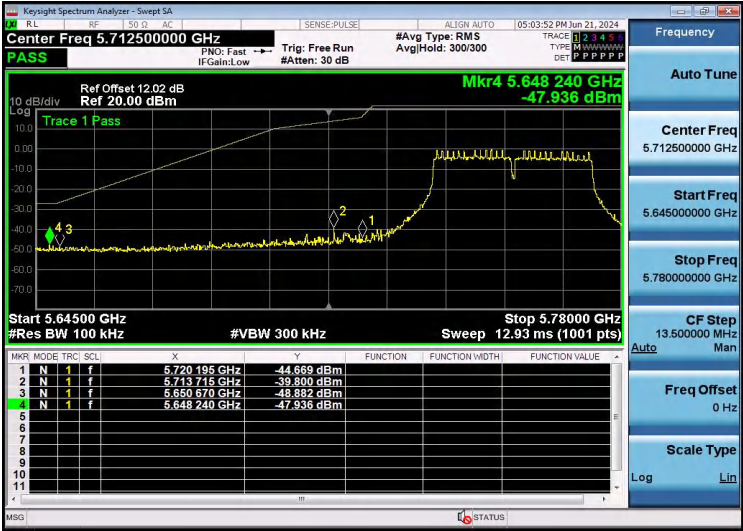
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11N20SISO-Ant1-5745-PASS



11N20SISO-Ant1-5825-PASS



11N40SISO-Ant1-5755-PASS



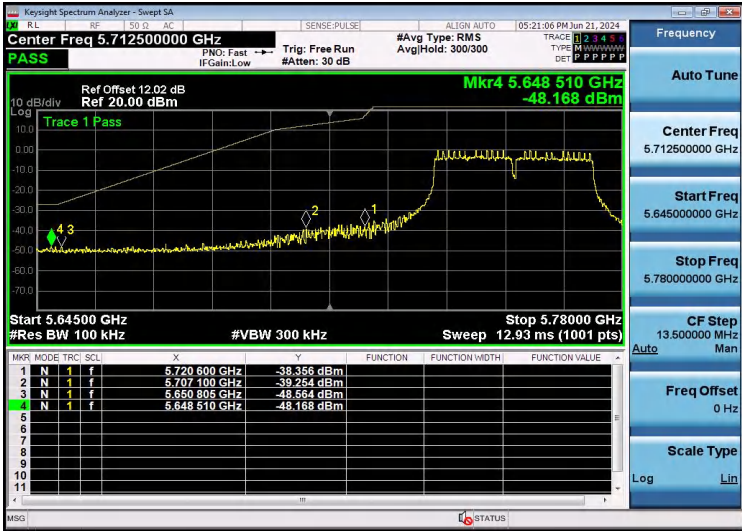
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11AC20SISO-Ant1-5745-PASS



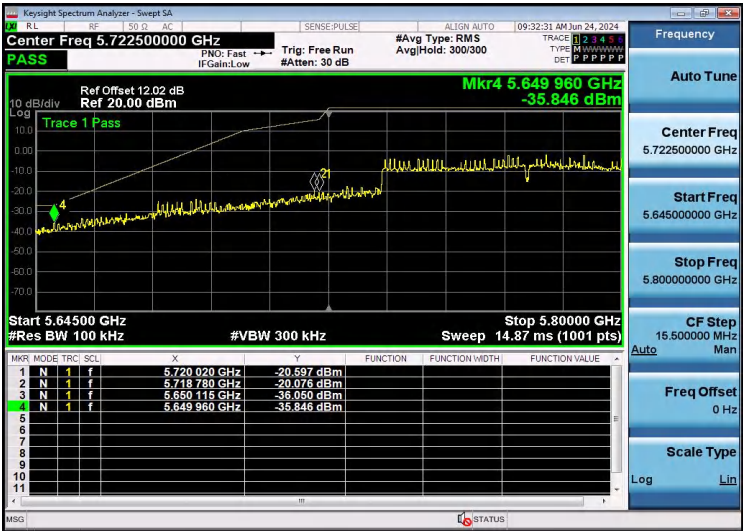
11AC20SISO-Ant1-5825-PASS



11AC40SISO-Ant1-5755-PASS



11AC40SISO-Ant1-5795-PASS

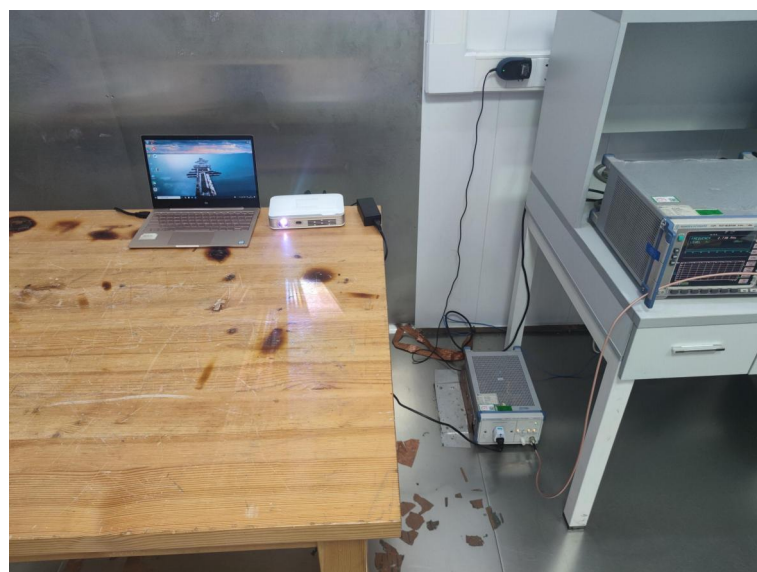
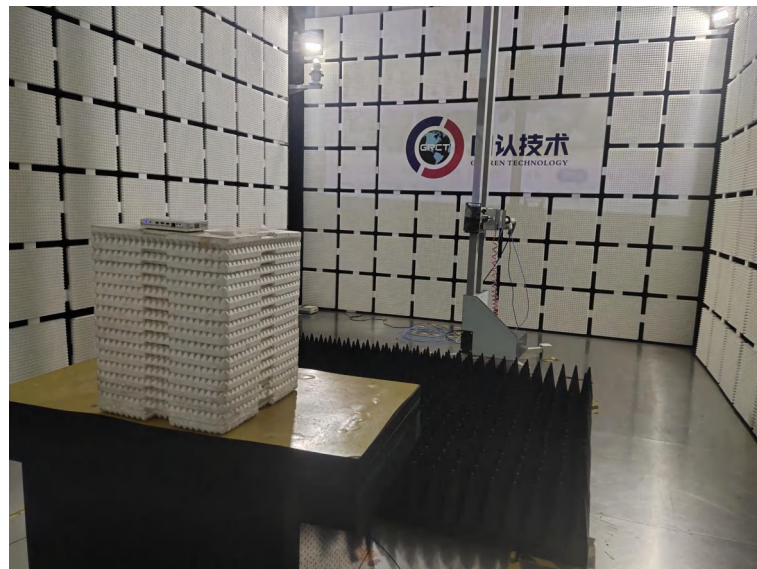
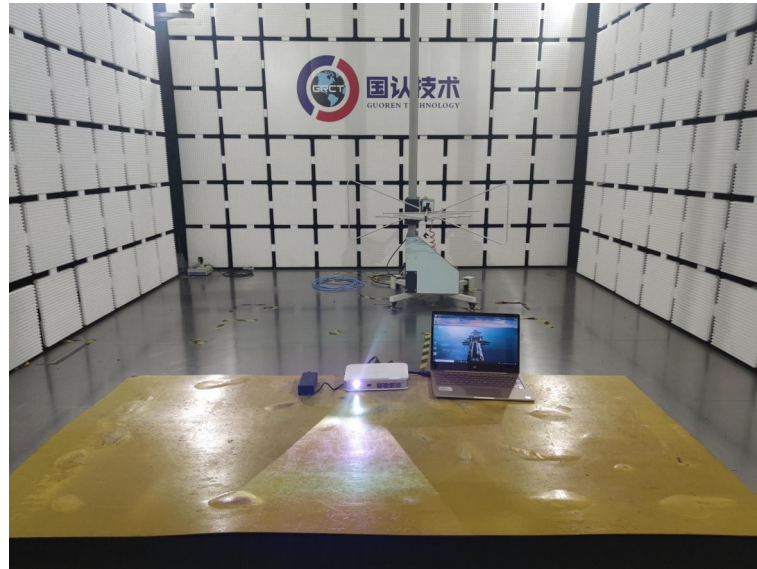


11AC80SISO-Ant1-5775-PASS



11AC80SISO-Ant1-5775-PASS

5 Test Setup Photos of the EUT



6 Photos of the EUT

Reference to the test report No. GRCTR241102020-01.

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