



**BUREAU
VERITAS**

Test Report No.: W7L-P23060012RF02

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.89	60.65	74	-22.11	31.75	5.86	46.37	100	45	Peak
2390	44.23	52.99	54	-9.77	31.75	5.86	46.37	100	45	Average
2480	104.82	113.17	-	-	32.04	5.98	46.37	100	45	Peak
2480	102.9	111.25	-	-	32.04	5.98	46.37	100	45	Average
2483.5	52.79	61.12	74	-21.21	32.05	5.99	46.37	100	45	Peak
2483.5	44.57	52.9	54	-9.43	32.05	5.99	46.37	100	45	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.68	60.05	74	-22.32	32.14	5.86	46.37	100	0	Peak
2390	45.31	53.68	54	-8.69	32.14	5.86	46.37	100	0	Average
2480	104.73	112.77	-	-	32.35	5.98	46.37	100	0	Peak
2480	100.23	108.27	-	-	32.35	5.98	46.37	100	0	Average
2483.5	53.04	61.06	74	-20.96	32.36	5.99	46.37	100	0	Peak
2483.5	45.14	53.16	54	-8.86	32.36	5.99	46.37	100	0	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2480MHz: Fundamental frequency.



3.3 6 DB BANDWIDTH MEASUREMENT

3.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Meter	ANRITSU	ML2495A	1506002	Feb. 22,21	Feb. 21,22
Power Meter	ANRITSU	ML2495A	1506002	Feb. 21,22	Feb. 20,23
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	Jun. 03,21	Jun. 02,22
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	Jun. 02,22	Jun. 01,23
Power Sensor	ANRITSU	MA2411B	1339352	Feb. 22,21	Feb. 21,22
Power Sensor	ANRITSU	MA2411B	1339352	Feb. 21,22	Feb. 20,23

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.

3.3.3 TEST PROCEDURE

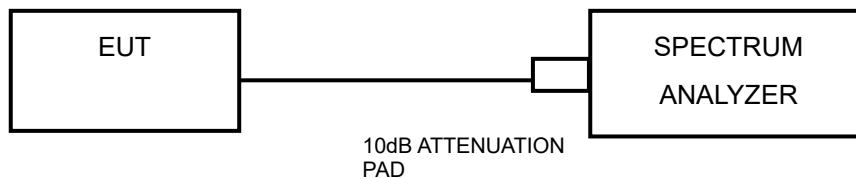
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



3.3.4 DEVIATION FROM TEST STANDARD

No deviation.

3.3.5 TEST SETUP



3.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



3.3.7 TEST RESULTS

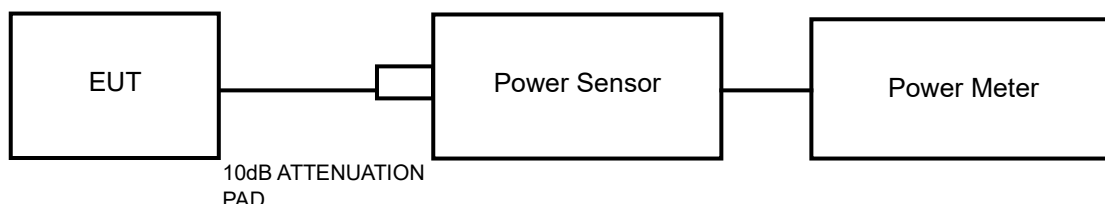
Please Refer to Appendix 1 of this test report.

3.4 CONDUCTED OUTPUT POWER

3.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

3.4.2 TEST SETUP



3.4.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.4.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

3.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



3.4.7 TEST RESULTS

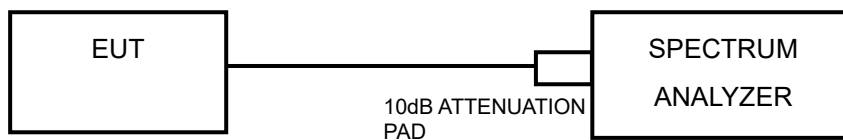
Please Refer to Appendix 1 of this test report.

3.5 POWER SPECTRAL DENSITY MEASUREMENT

3.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

3.5.2 TEST SETUP



3.5.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.5.4 TEST PROCEDURE

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW $\geq 3 \times$ RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

3.5.5 DEVIATION FROM TEST STANDARD

No deviation.



3.5.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.5.7 TEST RESULTS

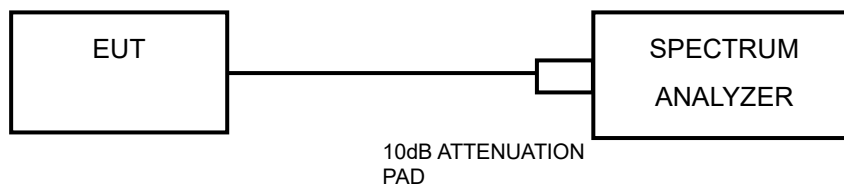
Please Refer to Appendix 1 of this test report.

3.6 OUT OF BAND EMISSION MEASUREMENT

3.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

3.6.2 TEST SETUP



3.6.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.



MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

3.6.5 DEVIATION FROM TEST STANDARD

No deviation.

3.6.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.6.7 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

Please Refer to Appendix 1 of this test report.



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4 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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5 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

**APPENDIX 1:****2.4G WLAN****DTS BANDWIDTH****TEST RESULT**

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.040	2407.560	2416.600	0.5	PASS
		2437	8.080	2433.040	2441.120	0.5	PASS
		2462	8.560	2458.040	2466.600	0.5	PASS
11G	Ant1	2412	16.280	2403.960	2420.240	0.5	PASS
		2437	13.880	2430.760	2444.640	0.5	PASS
		2462	16.280	2453.960	2470.240	0.5	PASS
11N20SISO	Ant1	2412	15.000	2404.640	2419.640	0.5	PASS
		2437	16.040	2429.200	2445.240	0.5	PASS
		2462	16.760	2453.720	2470.480	0.5	PASS



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TEST GRAPHS

11B_Ant1_2412



11B_Ant1_2437



11B_Ant1_2462



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11G_Ant1_2412



11G_Ant1_2437





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11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



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MAXIMUM CONDUCTED OUTPUT POWER

TEST RESULT PEAK

TestMode	Antenna	Channel	Peak Power[dBm]	Peak Power[mw]	Conducted Limit[W]	Verdict	Power setting
11B	Ant1	2412	17.57	57.15	≤1.00	PASS	15
		2437	17.02	50.35	≤1.00	PASS	15
		2462	17.29	53.58	≤1.00	PASS	15
11G	Ant1	2412	19.67	92.68	≤1.00	PASS	15
		2437	18.91	77.80	≤1.00	PASS	15
		2462	19.36	86.30	≤1.00	PASS	15
11N20SISO	Ant1	2412	19.72	93.76	≤1.00	PASS	15
		2437	18.90	77.62	≤1.00	PASS	15
		2462	19.32	85.51	≤1.00	PASS	15

TEST RESULT AVERAGE

TestMode	Antenna	Channel	Average Power	Conducted Limit[W]	Verdict	Power setting
11B	Ant1	2412	15.28	/	PASS	15
		2437	14.62	/	PASS	15
		2462	15.03	/	PASS	15
11G	Ant1	2412	14.96	/	PASS	15
		2437	14.21	/	PASS	15
		2462	14.71	/	PASS	15
11N20SISO	Ant1	2412	14.70	/	PASS	15
		2437	14.18	/	PASS	15
		2462	14.48	/	PASS	15



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MAXIMUM POWER SPECTRAL DENSITY

TEST RESULT

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-4.75	≤8	PASS
		2437	-7.15	≤8	PASS
		2462	-5.54	≤8	PASS
11G	Ant1	2412	-8.13	≤8	PASS
		2437	-9.14	≤8	PASS
		2462	-7.98	≤8	PASS
11N20SISO	Ant1	2412	-8.19	≤8	PASS
		2437	-9.17	≤8	PASS
		2462	-8.09	≤8	PASS



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TEST GRAPHS

11B_Ant1_2412



11B_Ant1_2437



11B_Ant1_2462

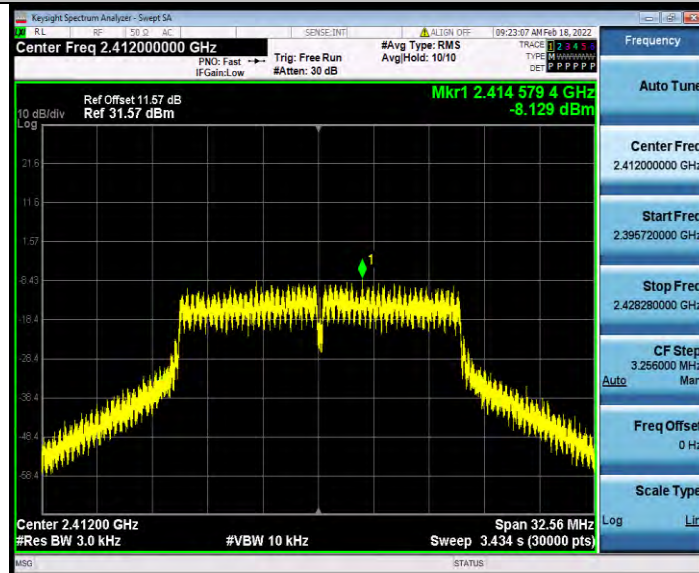


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11G_Ant1_2412

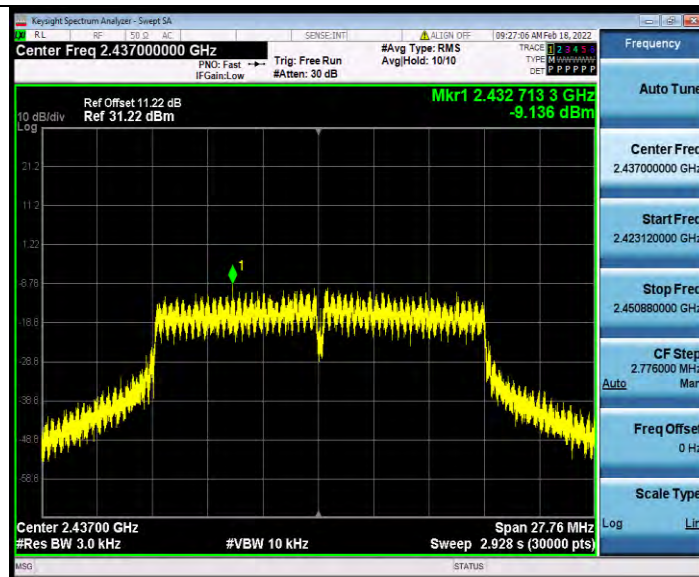


11G_Ant1_2437

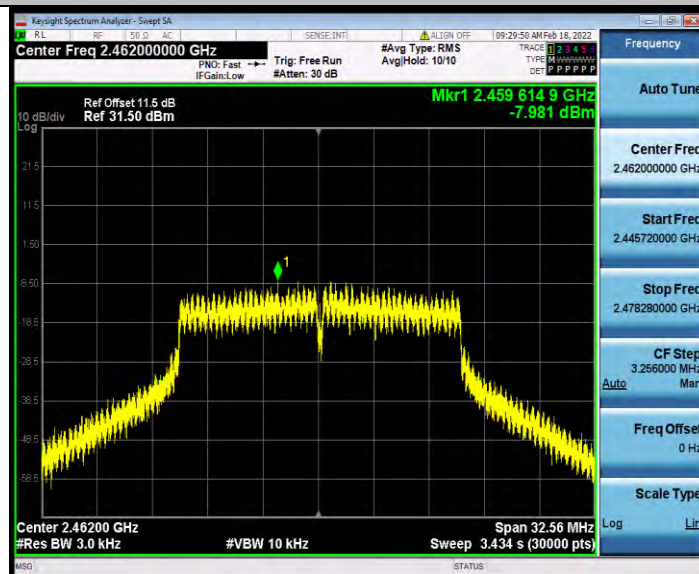


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11G_Ant1_2462

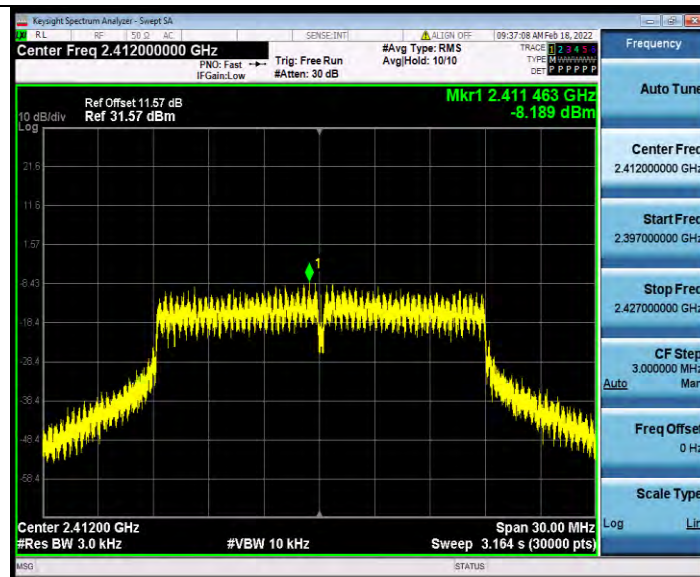


11N20SISO_Ant1_2412

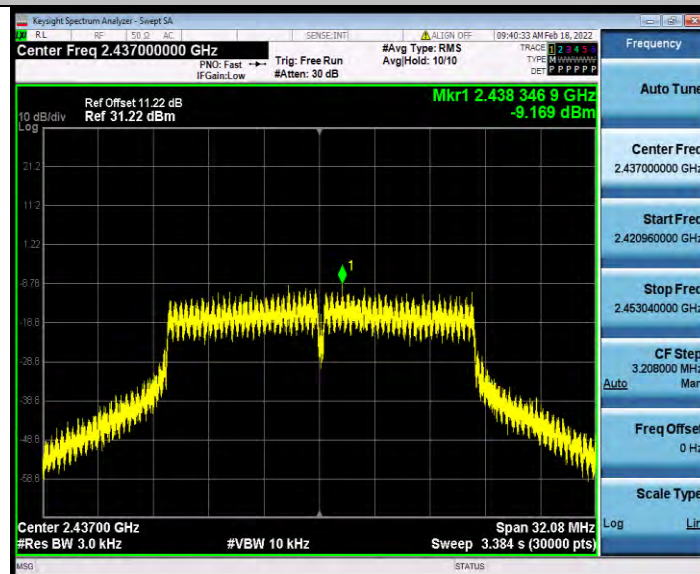


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11N20SISO_Ant1_2437

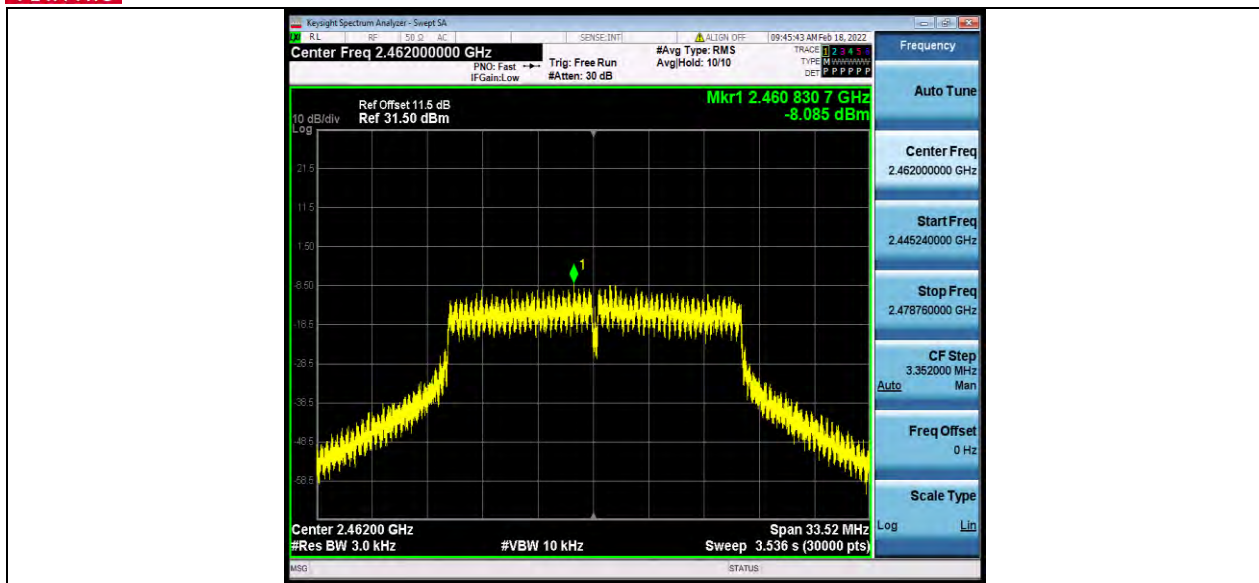


11N20SISO_Ant1_2462



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BAND EDGE MEASUREMENTS

TEST RESULT

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	8.47	-38.51	≤ -11.53	PASS
		High	2462	8.68	-44.05	≤ -11.32	PASS
11G	Ant1	Low	2412	6.75	-23.86	≤ -13.25	PASS
		High	2462	6.54	-43.59	≤ -13.46	PASS
11N20SISO	Ant1	Low	2412	6.81	-21.31	≤ -13.19	PASS
		High	2462	7.51	-42.69	≤ -12.49	PASS

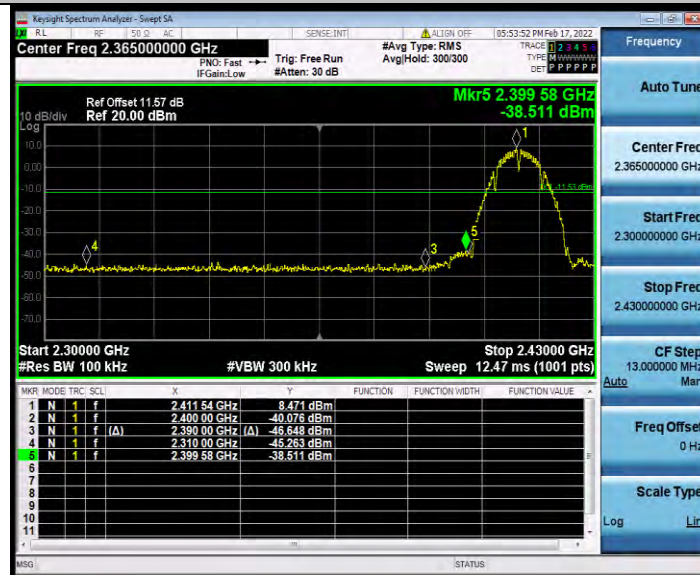


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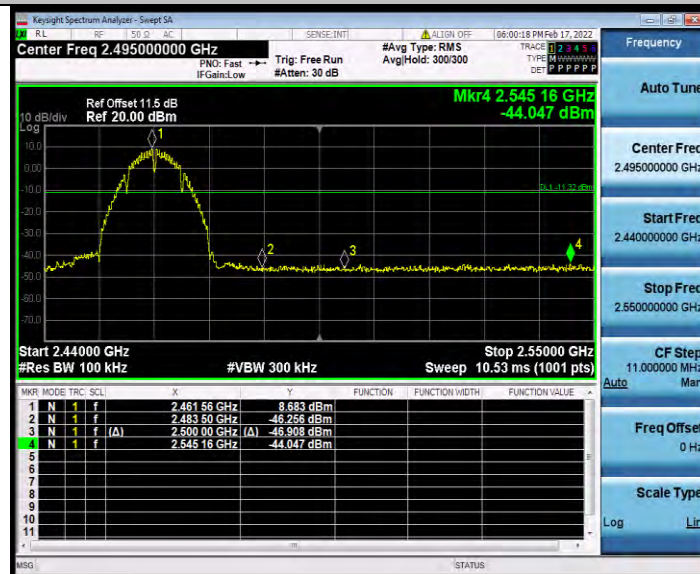
Test Report No.: W7L-P23060012RF02

TEST GRAPHS

11B_Ant1_Low_2412



11B_Ant1_High_2462



11G_Ant1_Low_2412

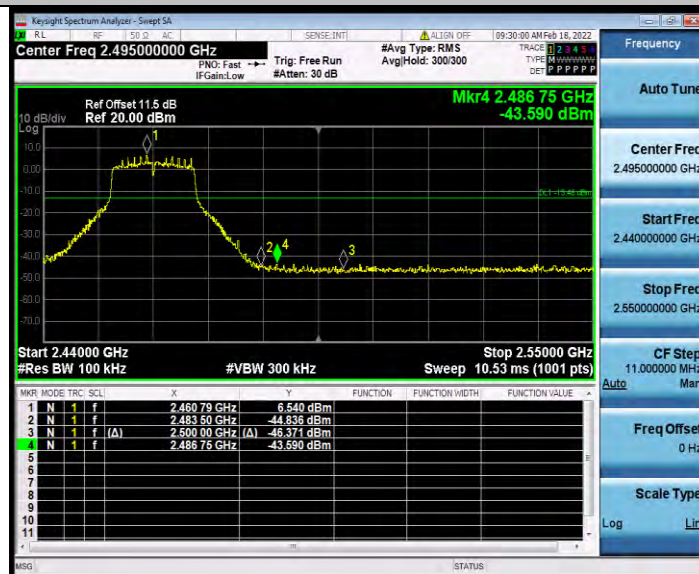


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11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412

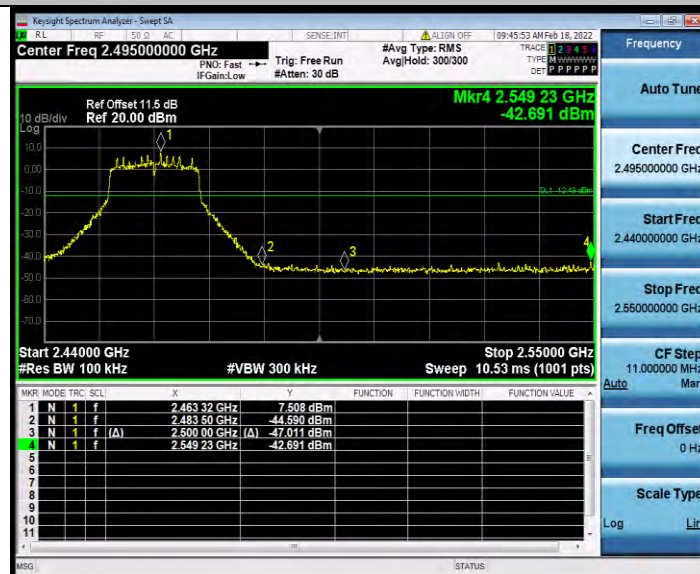


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11N20SISO_Ant1_High_2462



**CONDUCTED SPURIOUS EMISSION****TEST RESULT**

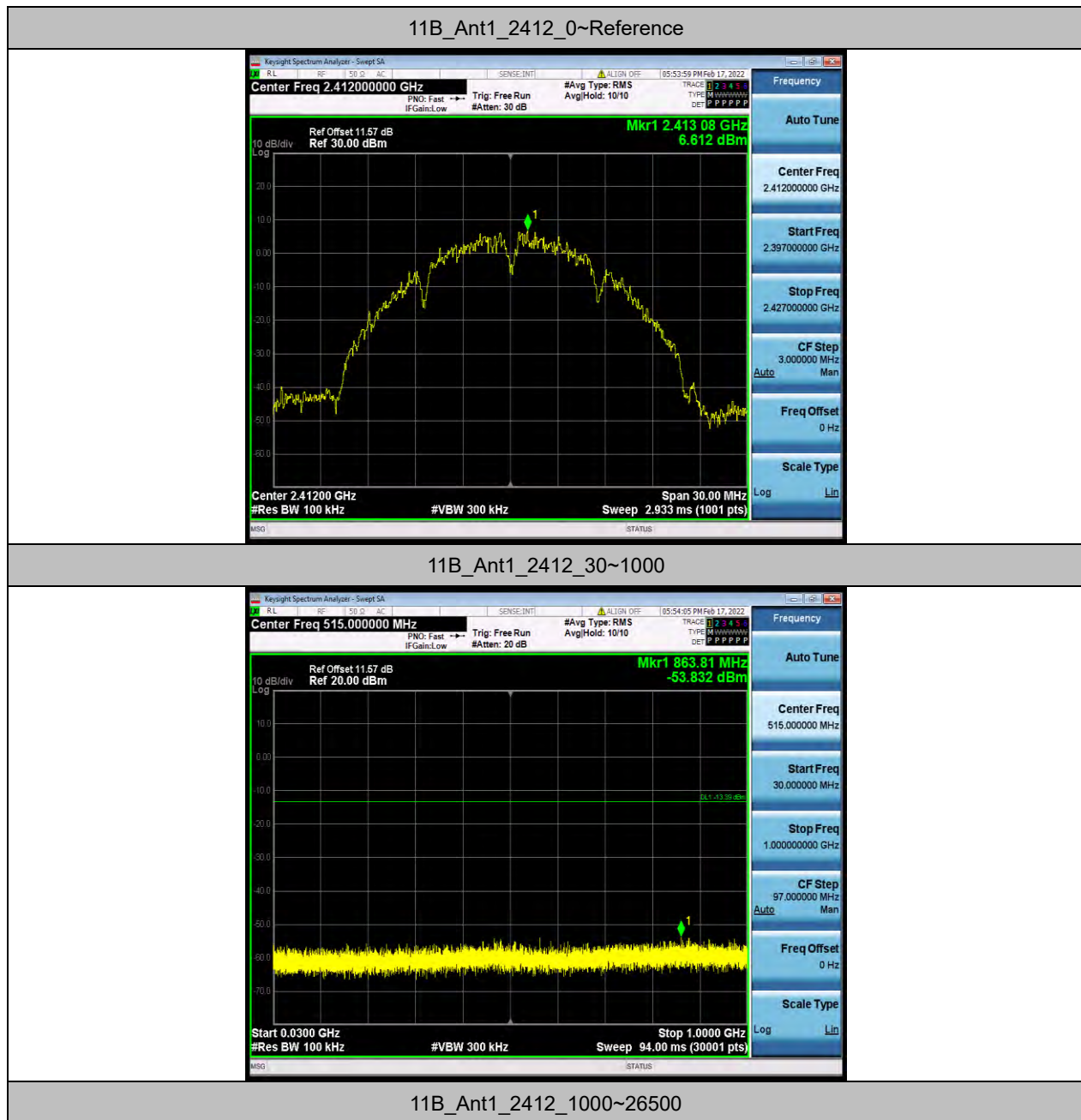
TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	6.61	6.61	---	PASS
			30~1000	6.61	-53.83	≤-13.39	PASS
			1000~26500	6.61	-38.11	≤-13.39	PASS
		2437	Reference	5.01	5.01	---	PASS
			30~1000	5.01	-53.89	≤-14.99	PASS
			1000~26500	5.01	-38.36	≤-14.99	PASS
		2462	Reference	7.72	7.72	---	PASS
			30~1000	7.72	-54.15	≤-12.28	PASS
			1000~26500	7.72	-38.37	≤-12.28	PASS
11G	Ant1	2412	Reference	6.07	6.07	---	PASS
			30~1000	6.07	-53.8	≤-13.93	PASS
			1000~26500	6.07	-37.78	≤-13.93	PASS
		2437	Reference	5.65	5.65	---	PASS
			30~1000	5.65	-53.79	≤-14.35	PASS
			1000~26500	5.65	-37.95	≤-14.35	PASS
		2462	Reference	3.23	3.23	---	PASS
			30~1000	3.23	-54.22	≤-16.77	PASS
			1000~26500	3.23	-37.67	≤-16.77	PASS
11N20SISO	Ant1	2412	Reference	3.82	3.82	---	PASS
			30~1000	3.82	-53.38	≤-16.18	PASS
			1000~26500	3.82	-37.88	≤-16.18	PASS
		2437	Reference	1.95	1.95	---	PASS
			30~1000	1.95	-53.75	≤-18.05	PASS
			1000~26500	1.95	-38.82	≤-18.05	PASS
		2462	Reference	3.19	3.19	---	PASS
			30~1000	3.19	-54.1	≤-16.81	PASS
			1000~26500	3.19	-38.34	≤-16.81	PASS



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TEST GRAPHS





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11B_Ant1_2437_0~Reference

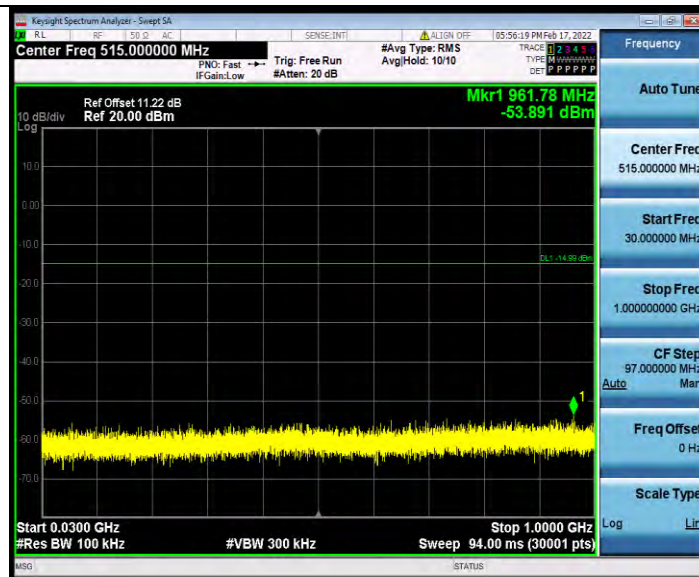


11B_Ant1_2437_30~1000



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11B_Ant1_2437_1000~26500



11B_Ant1_2462_0~Reference

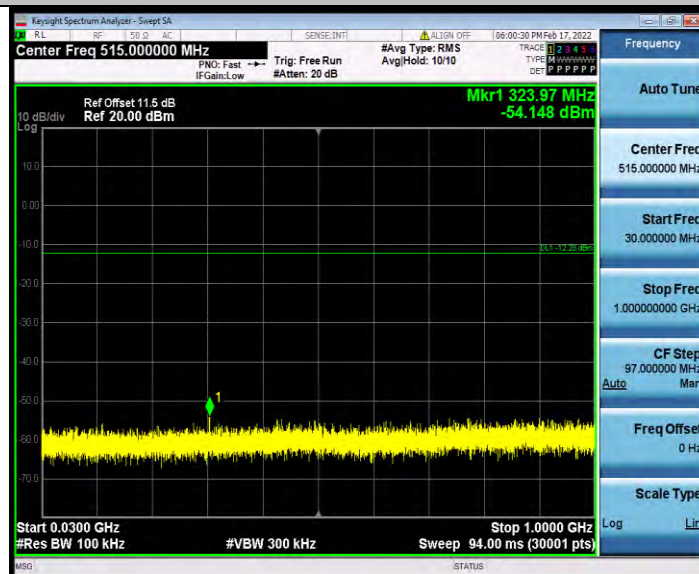


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11B_Ant1_2462_30~1000



11B_Ant1_2462_1000~26500



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11G_Ant1_2412_0~Reference

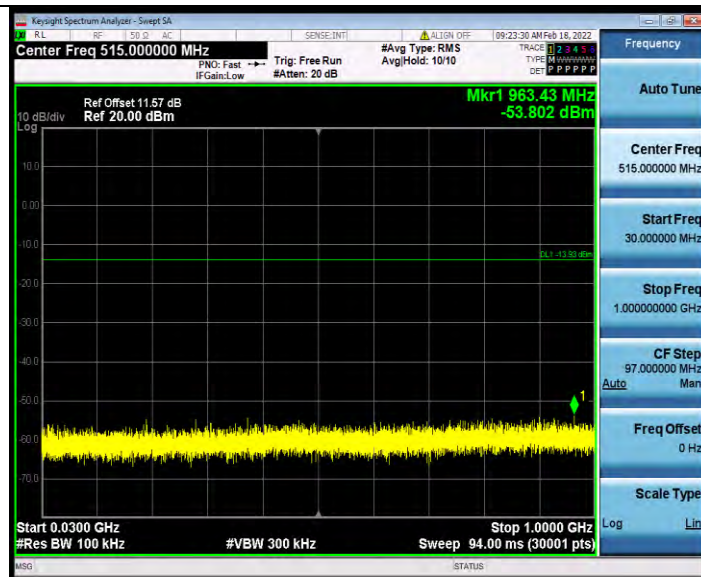


11G_Ant1_2412_30~1000

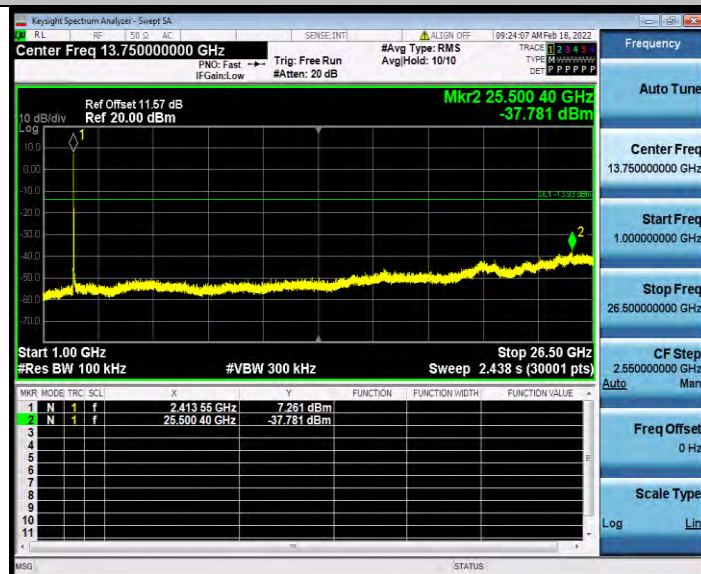


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11G_Ant1_2412_1000~26500



11G_Ant1_2437_0~Reference



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11G_Ant1_2437_30~1000

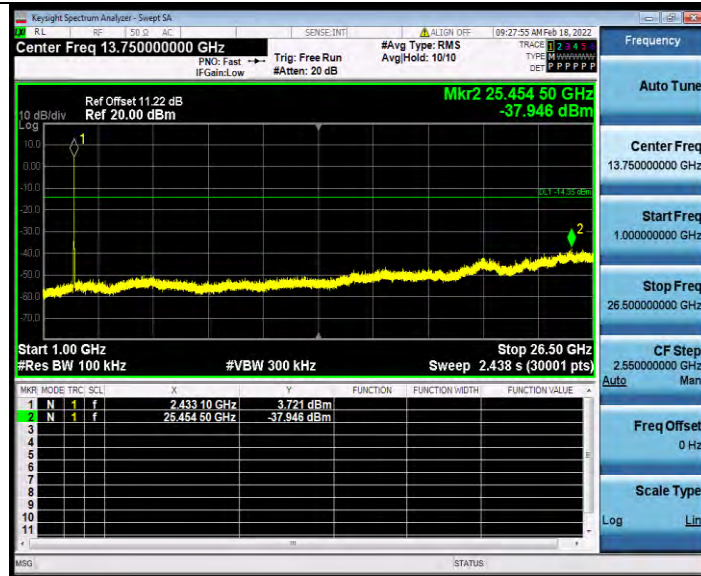


11G_Ant1_2437_1000~26500



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11G_Ant1_2462_0~Reference

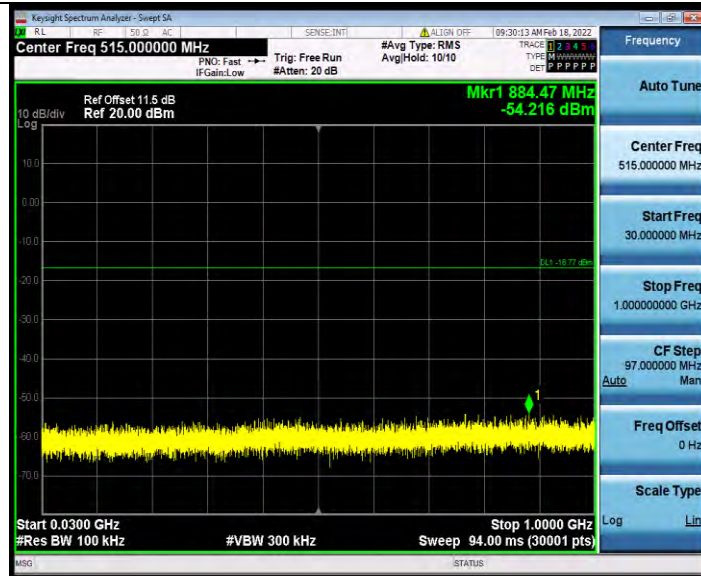


11G_Ant1_2462_30~1000



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11G_Ant1_2462_1000~26500



11N20SISO_Ant1_2412_0~Reference



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11N20SISO_Ant1_2412_30~1000



11N20SISO_Ant1_2412_1000~26500



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11N20SISO_Ant1_2437_0~Reference

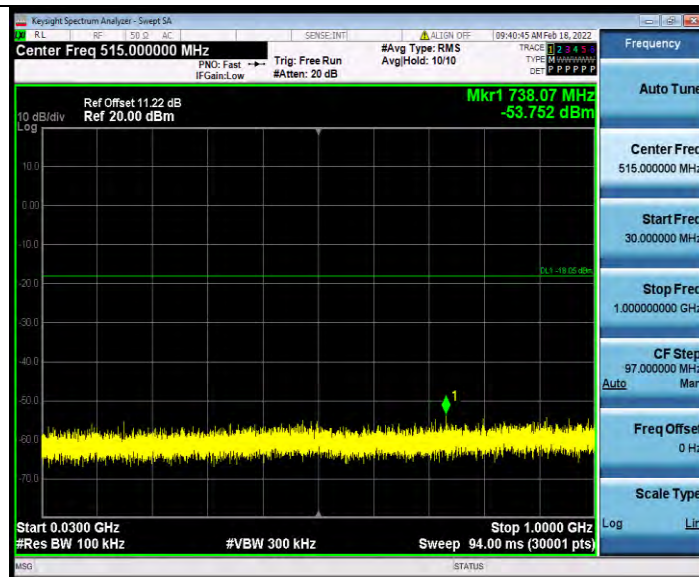


11N20SISO_Ant1_2437_30~1000



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11N20SISO_Ant1_2437_1000~26500



11N20SISO_Ant1_2462_0~Reference

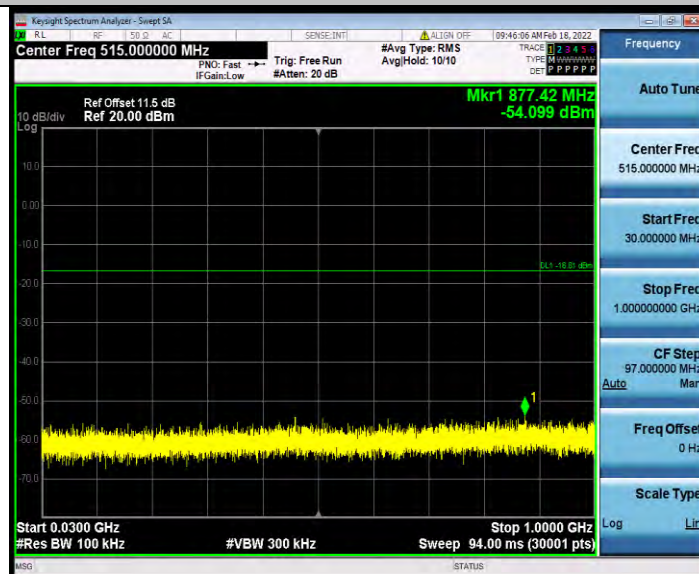


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11N20SISO_Ant1_2462_30~1000



11N20SISO_Ant1_2462_1000~26500



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**DUTY CYCLE****TEST RESULT**

TestMode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2412	12.20	12.30	99.19
		2437	12.20	12.30	99.19
		2462	12.20	12.30	99.19
11G	Ant1	2412	2.03	2.07	98.07
		2437	2.02	2.06	98.06
		2462	2.02	2.06	98.06
11N20SISO	Ant1	2412	1.89	1.93	97.93
		2437	1.89	1.93	97.93
		2462	1.89	1.93	97.93

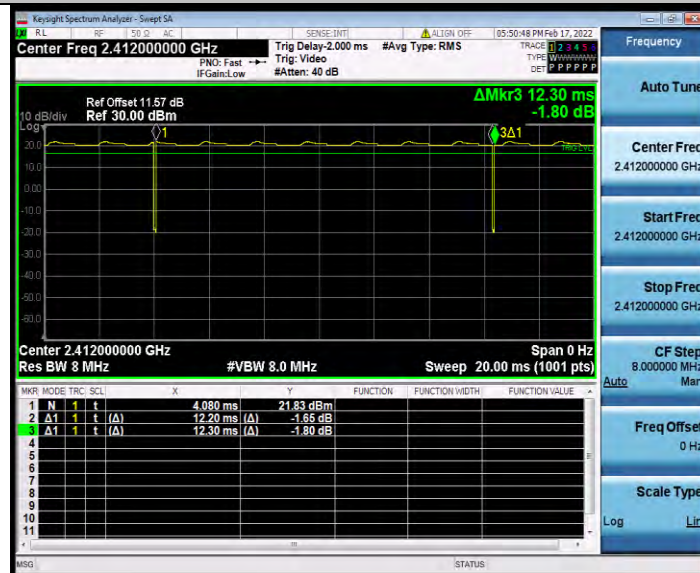


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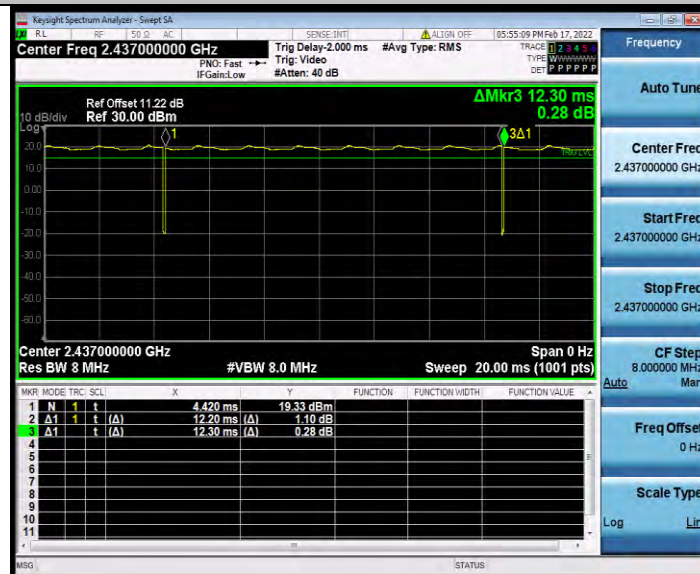
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TEST GRAPHS

11B_Ant1_2412



11B_Ant1_2437

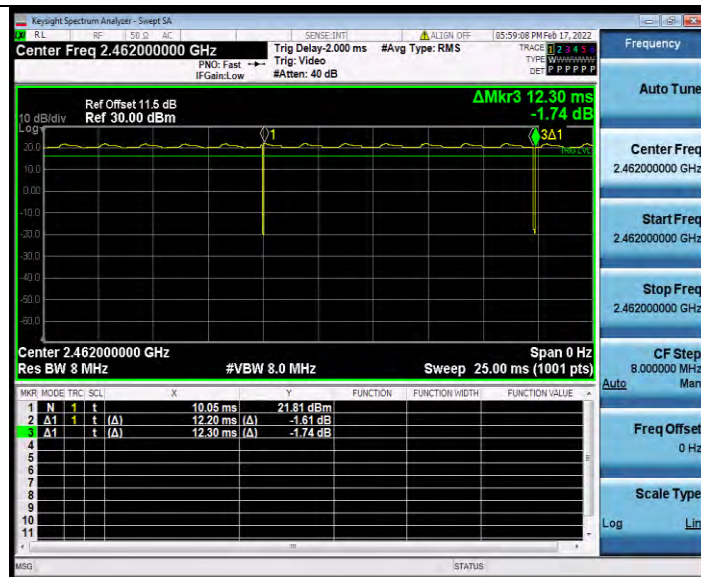


11B_Ant1_2462

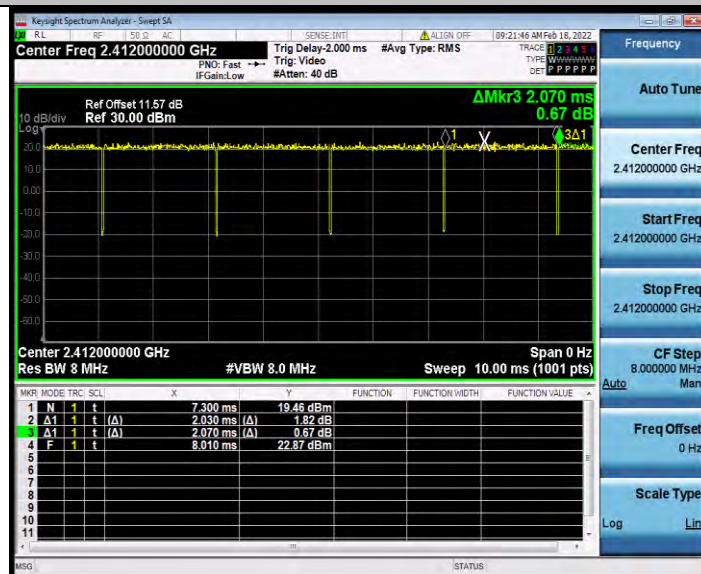


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11G_Ant1_2412

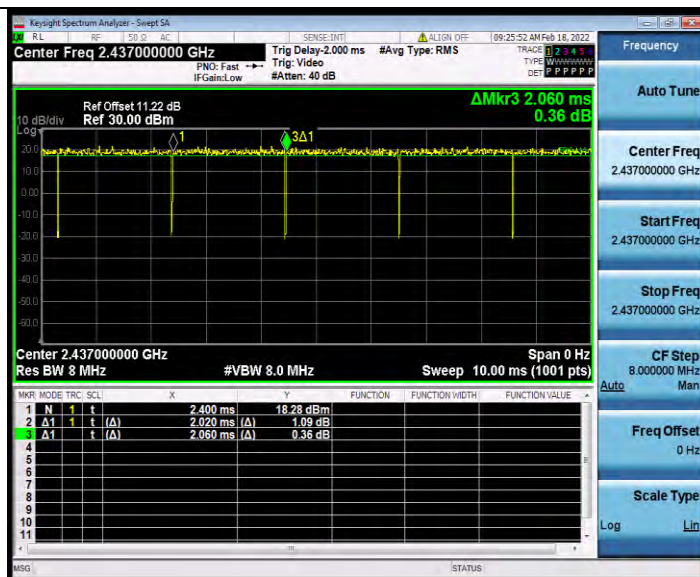


11G_Ant1_2437

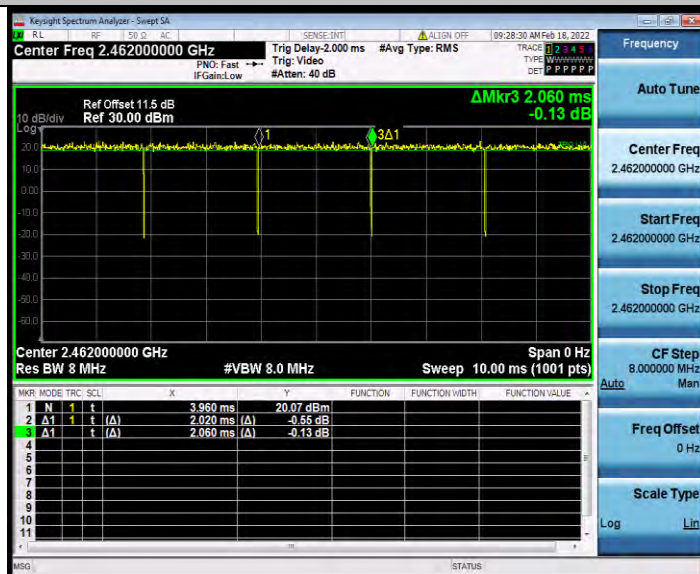


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11G_Ant1_2462



11N20SISO_Ant1_2412

