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Test Report No.: W7L-P23010024RF02

ABOVE 1GHz TEST DATA

Note: 1. For radiated emissions testing , the full testing range of different modes have been scanned , only the worst case harmonic data is reported in the sheet.

2. All other emissions were greater than 20dB below the limit was not recorded

BT-LE _1M

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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
2390.000	52.47	60.51	74.00	-21.53	31.75	6.18	45.97	187	263	Peak
2390.000	43.69	51.73	54.00	-10.31	31.75	6.18	45.97	187	263	Average
2402.000	101.07	109.06	/	/	31.79	6.19	45.97	199	328	Peak
2402.000	100.92	108.91	/	/	31.79	6.19	45.97	199	328	Average
2483.500	52.05	59.62	74.00	-21.95	32.05	6.31	45.93	194	53	Peak
2483.500	43.66	51.23	54.00	-10.34	32.05	6.31	45.93	194	53	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
2390.000	51.59	59.24	74.00	-22.41	32.14	6.18	45.97	156	84	Peak
2390.000	44.24	51.89	54.00	-9.76	32.14	6.18	45.97	156	84	Average
2402.000	100.22	107.84	/	/	32.16	6.19	45.97	141	193	Peak
2402.000	100.18	107.80	/	/	32.16	6.19	45.97	141	193	Average
2483.500	50.99	58.25	74.00	-23.01	32.36	6.31	45.93	165	166	Peak
2483.500	44.15	51.41	54.00	-9.85	32.36	6.31	45.93	165	166	Average

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 2402MHz: Fundamental frequency.



**BUREAU
VERITAS**

Test Report No.: W7L-P23010024RF02

CHANNEL	TX Channel 19	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
2390.000	51.54	59.58	74.00	-22.46	31.75	6.18	45.97	145	145	Peak
2390.000	43.53	51.57	54.00	-10.47	31.75	6.18	45.97	145	145	Average
2440.000	102.81	110.60	/	/	31.91	6.25	45.95	157	351	Peak
2440.000	102.53	110.32	/	/	31.91	6.25	45.95	157	351	Average
2483.500	50.91	58.48	74.00	-23.09	32.05	6.31	45.93	145	115	Peak
2483.500	43.83	51.40	54.00	-10.17	32.05	6.31	45.93	145	115	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
2390.000	51.61	59.26	74.00	-22.39	32.14	6.18	45.97	101	68	Peak
2390.000	43.89	51.54	54.00	-10.11	32.14	6.18	45.97	101	68	Average
2440.000	99.56	107.00	/	/	32.26	6.25	45.95	145	250	Peak
2440.000	99.31	106.75	/	/	32.26	6.25	45.95	145	250	Average
2483.500	51.49	58.75	74.00	-22.51	32.36	6.31	45.93	118	238	Peak
2483.500	44.03	51.29	54.00	-9.97	32.36	6.31	45.93	118	238	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2440MHz: Fundamental frequency.



**BUREAU
VERITAS**

Test Report No.: W7L-P23010024RF02

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
2390.000	49.84	57.88	74.00	-24.16	31.75	6.18	45.97	118	274	Peak
2390.000	43.18	51.22	54.00	-10.82	31.75	6.18	45.97	118	274	Average
2480.000	100.35	107.94	/	/	32.04	6.30	45.93	159	70	Peak
2480.000	99.71	107.30	/	/	32.04	6.30	45.93	159	70	Average
2483.500	54.43	62.00	74.00	-19.57	32.05	6.31	45.93	130	43	Peak
2483.500	44.54	52.11	54.00	-9.46	32.05	6.31	45.93	130	43	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
2390.000	51.50	59.15	74.00	-22.50	32.14	6.18	45.97	149	122	Peak
2390.000	43.72	51.37	54.00	-10.28	32.14	6.18	45.97	149	122	Average
2480.000	98.84	106.12	/	/	32.35	6.30	45.93	119	97	Peak
2480.000	98.06	105.34	/	/	32.35	6.30	45.93	119	97	Average
2483.500	52.11	59.37	74.00	-21.89	32.36	6.31	45.93	146	179	Peak
2483.500	44.38	51.64	54.00	-9.62	32.36	6.31	45.93	146	179	Average

REMARKS:

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



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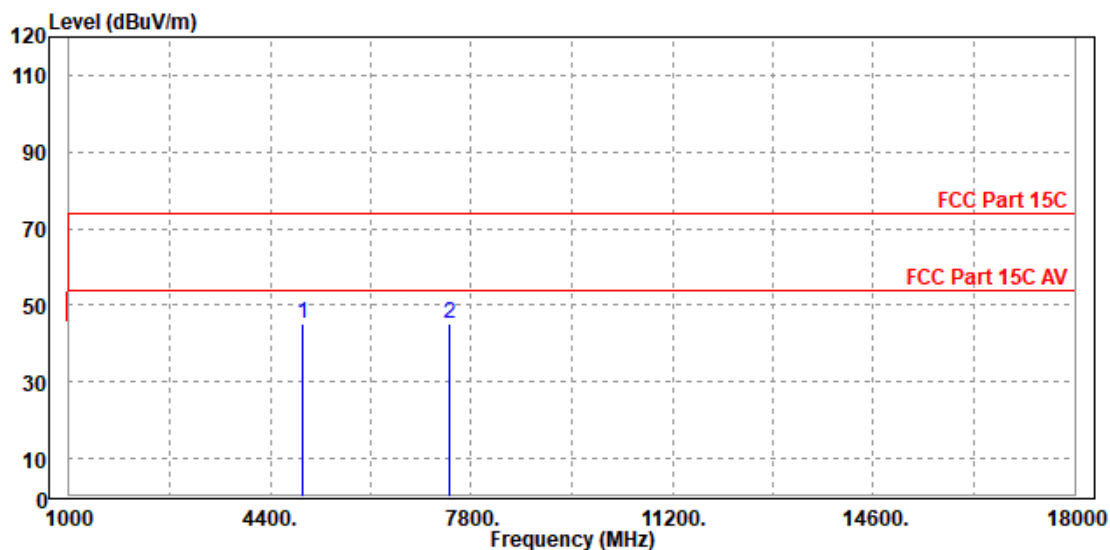
Test Report No.: W7L-P23010024RF02

Worst case harmonic:

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	4961.000	45.04	46.23	74.00	-28.96	-1.19	Peak	Horizontal
2 PP	7440.000	45.14	43.16	74.00	-28.86	1.98	Peak	Horizontal



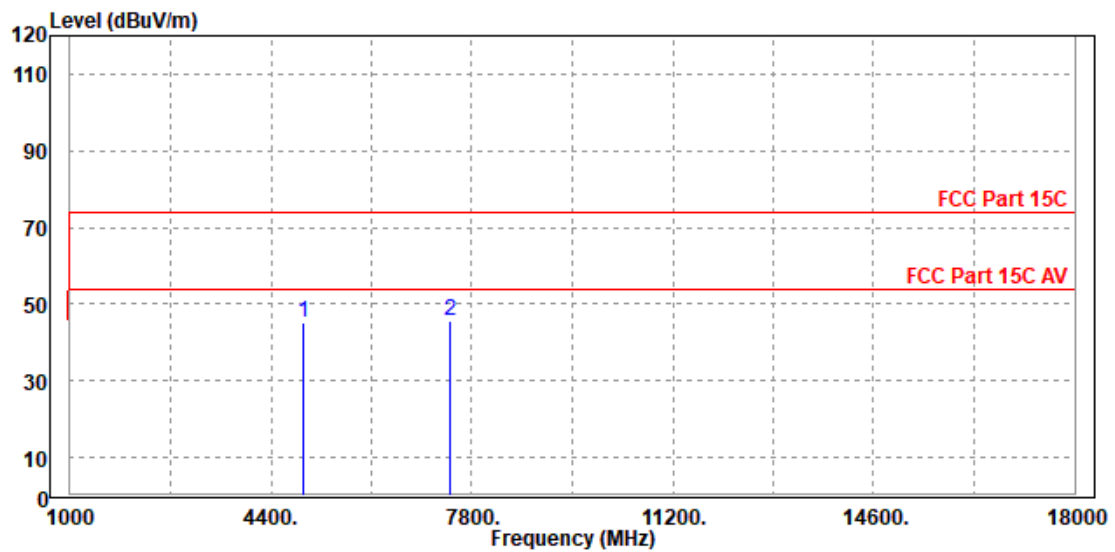


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VERITAS

Test Report No.: W7L-P23010024RF02

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	4960.000	45.19	46.18	74.00	-28.81	-0.99	Peak	Vertical
2 PP	7443.000	45.68	43.68	74.00	-28.32	2.00	Peak	Vertical



REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2480MHz: Fundamental frequency.
3. For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet.



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. 22,22	Feb. 21,23
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 18,22	Feb. 17,23
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.15,22	May.14,23
Power Sensor	ANRITSU	MA2411B	1339352	May. 06,22	May. 05,23

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

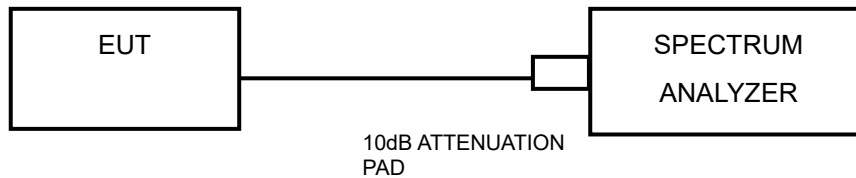
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points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



Test Report No.: W7L-P23010024RF02

3.3.7 TEST RESULTS

Please Refer to Appendix1/2 Of this test report.

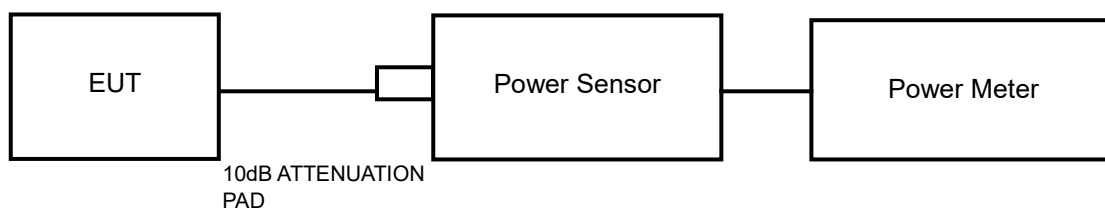


3.4 CONDUCTED OUTPUT POWER

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.



Test Report No.: W7L-P23010024RF02

3.4.7 TEST RESULTS

3.4.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix1/2 Of this test report.



Test Report No.: W7L-P23010024RF02

3.4.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

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

Please Refer to Appendix1/2 Of this test report.

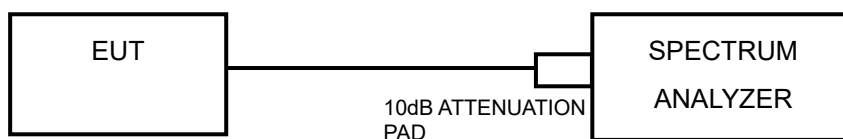


3.5 POWER SPECTRAL DENSITY MEASUREMENT

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.



Test Report No.: W7L-P23010024RF02

3.5.7 TEST RESULTS

Please Refer to Appendix1/2 Of this test report.

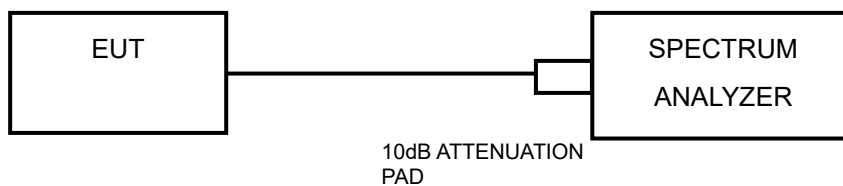


3.6 OUT OF BAND EMISSION MEASUREMENT

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 Appendix1/2 Of this test report.



Test Report No.: W7L-P23010024RF02

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: W7L-P23010024RF02

5 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.



6 Appendix 1 WLAN 2.4G

DTS BANDWIDTH

TEST RESULT

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.560	2407.960	2416.520	0.5	PASS
		2437	8.080	2432.960	2441.040	0.5	PASS
		2462	8.560	2457.480	2466.040	0.5	PASS
11G	Ant1	2412	15.960	2404.200	2420.160	0.5	PASS
		2437	15.480	2429.120	2444.600	0.5	PASS
		2462	16.320	2453.840	2470.160	0.5	PASS
11N20SISO	Ant1	2412	16.480	2404.040	2420.520	0.5	PASS
		2437	16.000	2429.120	2445.120	0.5	PASS
		2462	17.040	2453.480	2470.520	0.5	PASS



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Test Report No.: W7L-P23010024RF02

TEST GRAPHS

11B_Ant1_2412



11B_Ant1_2437



11B_Ant1_2462



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Test Report No.: W7L-P23010024RF02



11G_Ant1_2412



11G_Ant1_2437



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Test Report No.: W7L-P23010024RF02



11G_Ant1_2462



11N20SISO_Ant1_2412

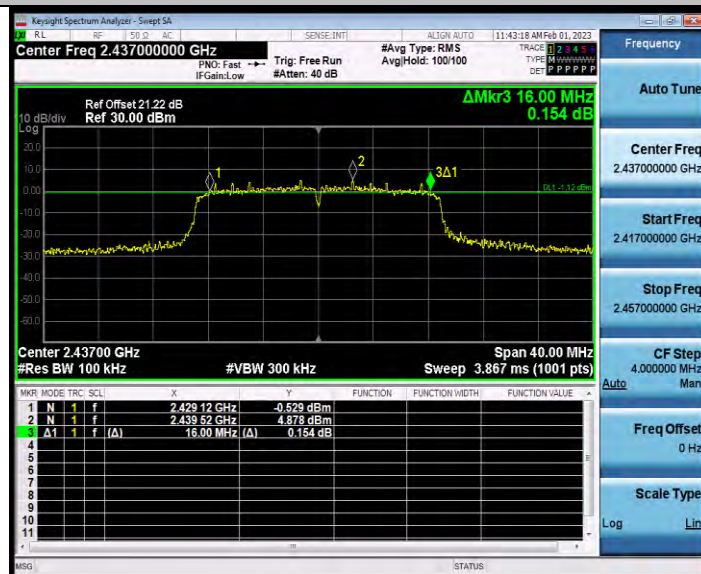


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Test Report No.: W7L-P23010024RF02



11N20SISO_Ant1_2437

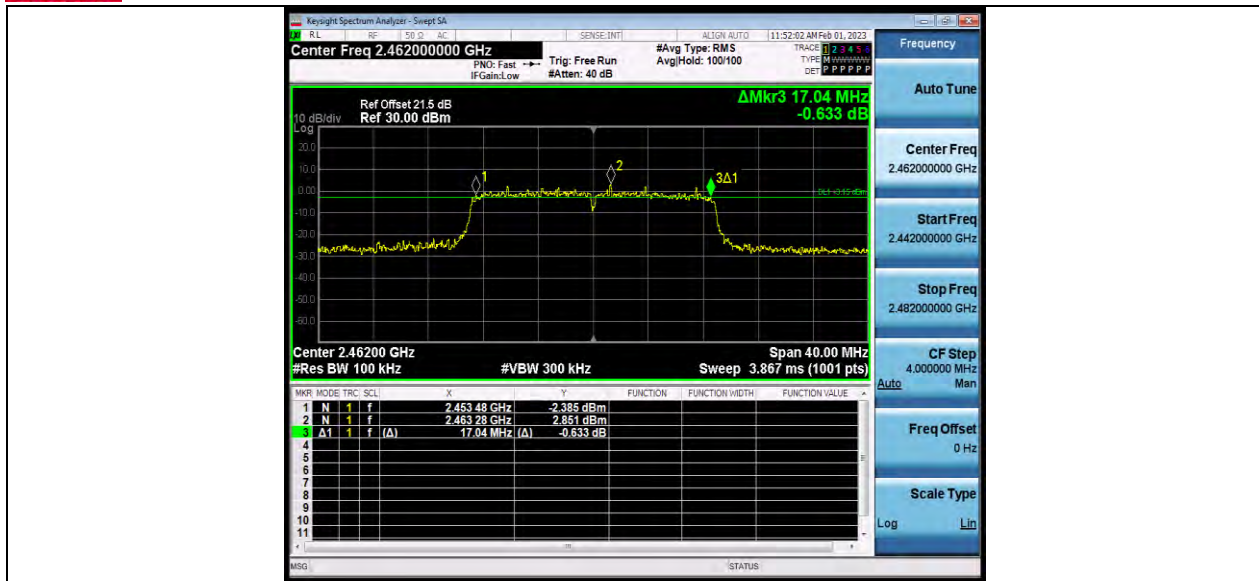


11N20SISO_Ant1_2462



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Test Report No.: W7L-P23010024RF02



**OCCUPIED CHANNEL BANDWIDTH****TEST RESULT**

TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	12.392	2405.8498	2418.2418	---	---
		2437	12.204	2430.9497	2443.1537	---	---
		2462	12.634	2455.6147	2468.2487	---	---
11G	Ant1	2412	16.965	2403.6101	2420.5751	---	---
		2437	16.847	2428.6031	2445.4501	---	---
		2462	17.091	2453.4183	2470.5093	---	---
11N20SISO	Ant1	2412	17.901	2403.1179	2421.0189	---	---
		2437	17.680	2428.1857	2445.8657	---	---
		2462	17.991	2452.9415	2470.9325	---	---

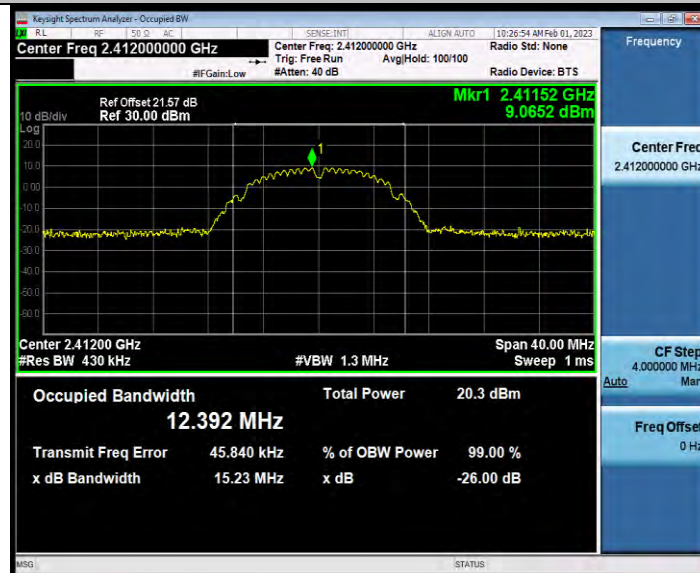


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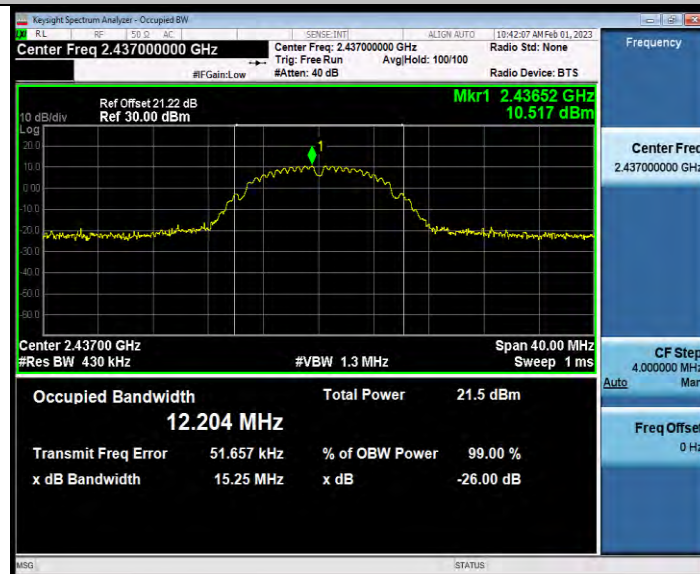
Test Report No.: W7L-P23010024RF02

TEST GRAPHS

11B_Ant1_2412



11B_Ant1_2437



11B_Ant1_2462

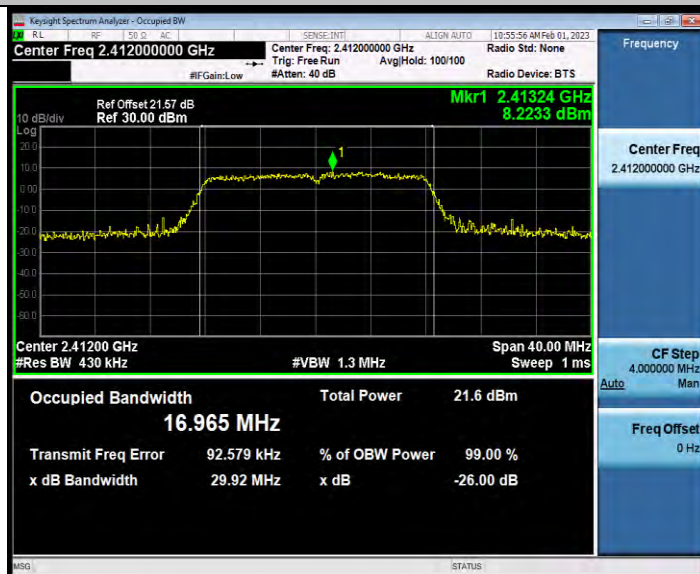


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Test Report No.: W7L-P23010024RF02



11G_Ant1_2412

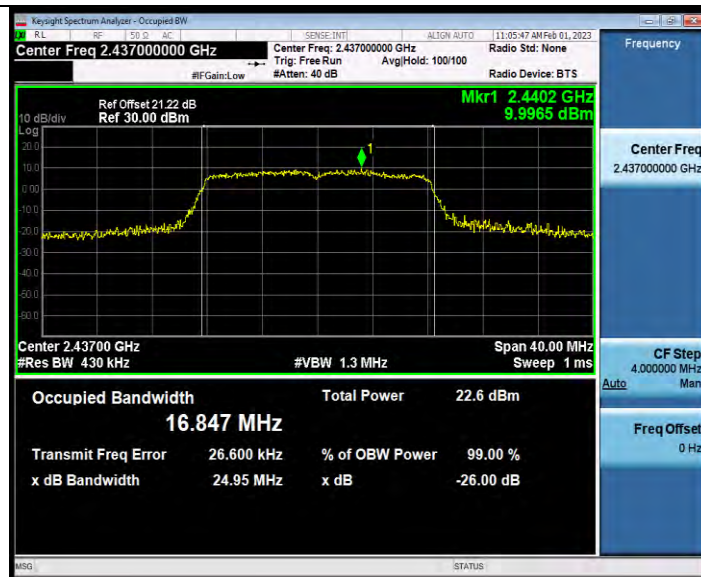


11G_Ant1_2437

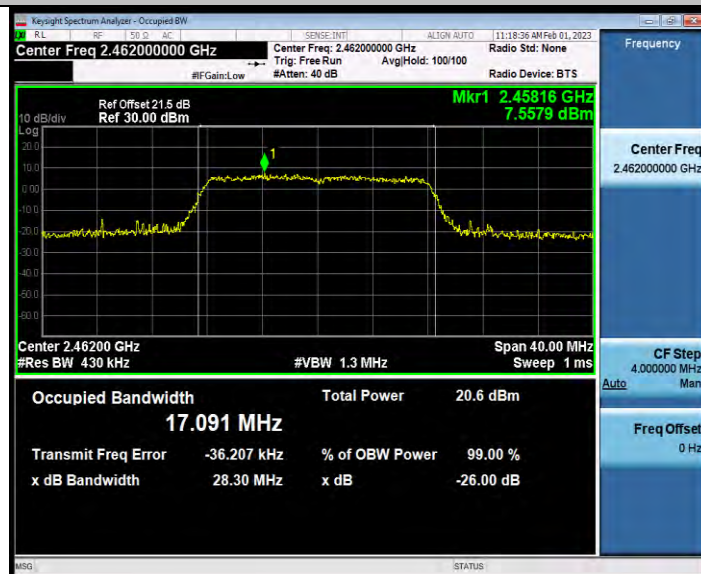


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Test Report No.: W7L-P23010024RF02



11G_Ant1_2462



11N20SISO_Ant1_2412

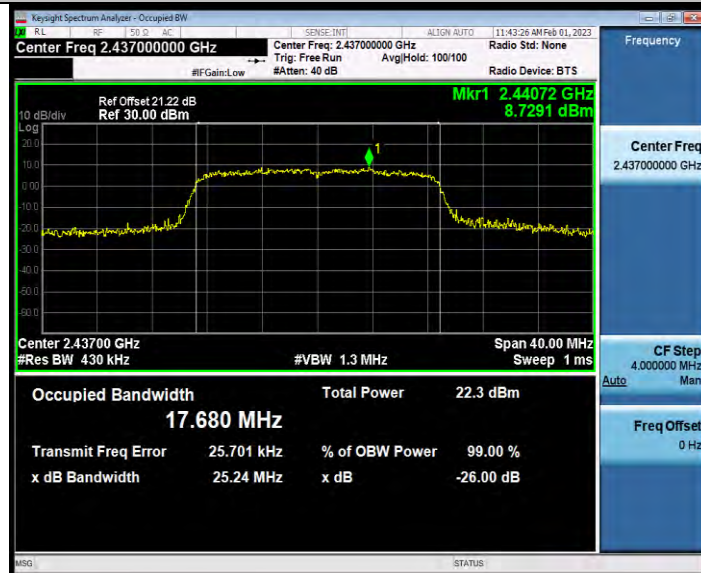


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Test Report No.: W7L-P23010024RF02



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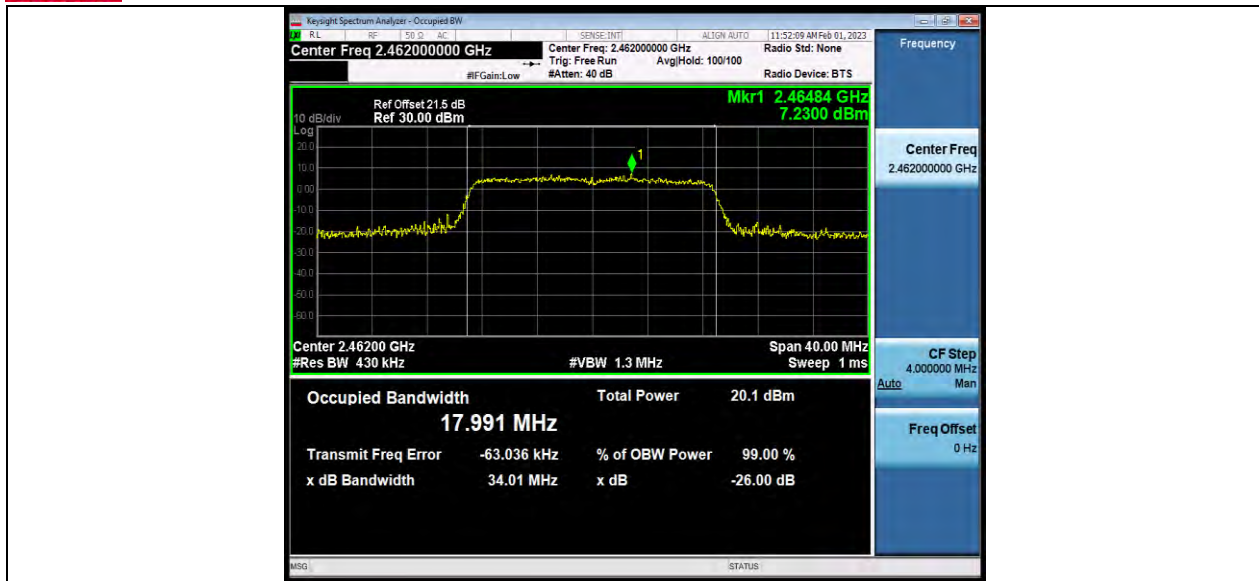


11N20SISO_Ant1_2462



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VERITAS

Test Report No.: W7L-P23010024RF02





MAXIMUM CONDUCTED OUTPUT POWER

TEST RESULT

TestMode	Antenna	Freq. [MHz]	Average power [dBm]	Peak Power [dBm]	Peak Power [mw]	Conducted Limit [dBm]	EIRP [dBm]	EIRP [mw]	EIRP Limit [dBm]	Verdict	Power Setting
11B	Ant1	2412	15.88	19.12	81.66	≤30.00	21.27	133.97	≤36.00	PASS	16
		2437	17.83	20.88	122.46	≤30.00	23.03	200.91	≤36.00	PASS	16
		2462	15.37	18.40	69.18	≤30.00	20.55	113.50	≤36.00	PASS	16
11G	Ant1	2412	12.68	20.88	122.46	≤30.00	23.03	200.91	≤36.00	PASS	14
		2437	15.93	22.68	185.35	≤30.00	24.83	304.09	≤36.00	PASS	16
		2462	11.60	19.10	81.28	≤30.00	21.25	133.35	≤36.00	PASS	13
11N20SISO	Ant1	2412	12.66	20.03	100.69	≤30.00	22.18	165.20	≤36.00	PASS	13
		2437	15.43	22.31	170.22	≤30.00	24.46	279.25	≤36.00	PASS	14
		2462	11.17	18.44	69.82	≤30.00	20.59	114.55	≤36.00	PASS	12



Test Report No.: W7L-P23010024RF02

MAXIMUM POWER SPECTRAL DENSITY

TEST RESULT

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-2.04	≤8.00	PASS
		2437	-0.76	≤8.00	PASS
		2462	-2.61	≤8.00	PASS
11G	Ant1	2412	-9.6	≤8.00	PASS
		2437	-8.28	≤8.00	PASS
		2462	-10.48	≤8.00	PASS
11N20SISO	Ant1	2412	-9.08	≤8.00	PASS
		2437	-7.76	≤8.00	PASS
		2462	-10.17	≤8.00	PASS



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VERITAS

Test Report No.: W7L-P23010024RF02

TEST GRAPHS

11B_Ant1_2412



11B_Ant1_2437



11B_Ant1_2462

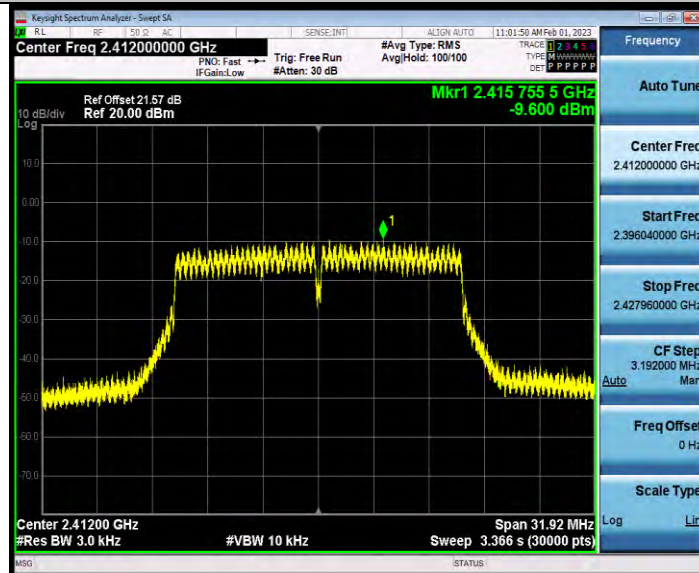


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Test Report No.: W7L-P23010024RF02



11G_Ant1_2412

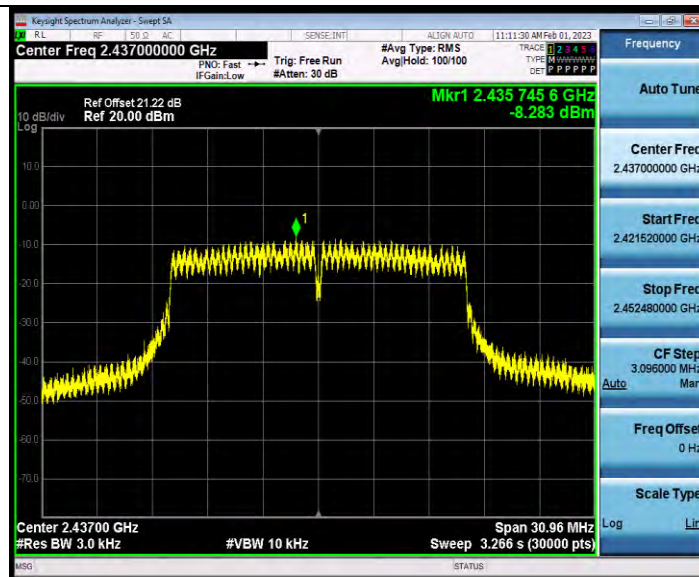


11G_Ant1_2437



BUREAU
VERITAS

Test Report No.: W7L-P23010024RF02



11G_Ant1_2462

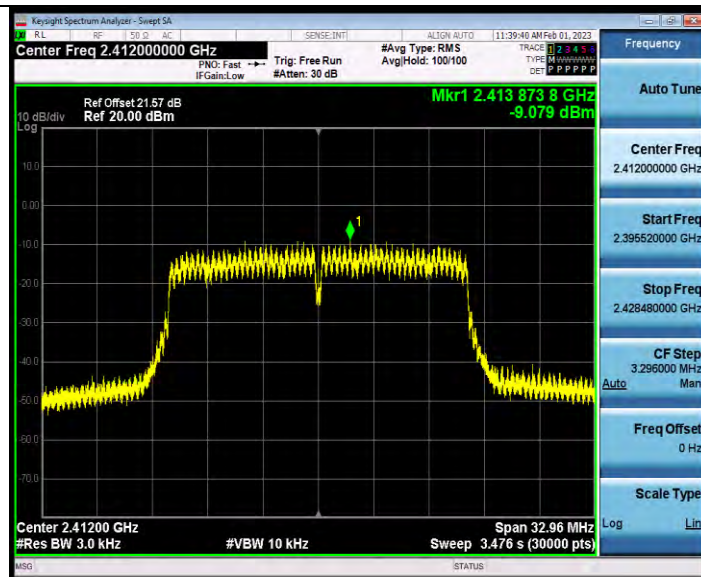


11N20SISO_Ant1_2412



BUREAU
VERITAS

Test Report No.: W7L-P23010024RF02



11N20SISO_Ant1_2437

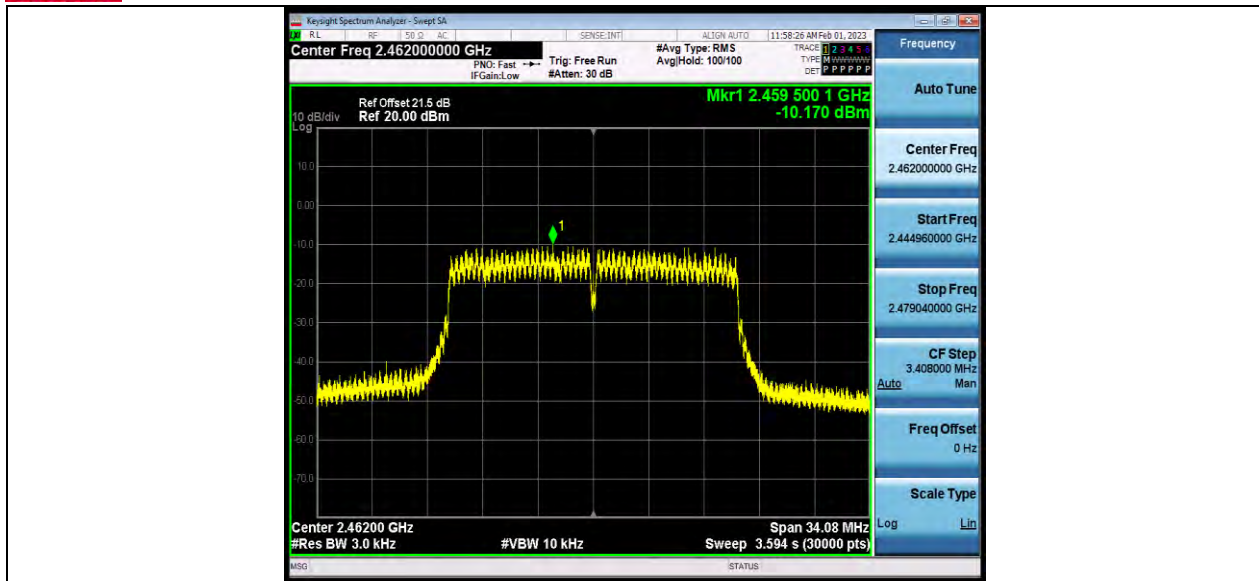


11N20SISO_Ant1_2462



BUREAU
VERITAS

Test Report No.: W7L-P23010024RF02





Test Report No.: W7L-P23010024RF02

BAND EDGE MEASUREMENTS

TEST RESULT

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	8.20	-34.17	≤ -11.8	PASS
		High	2462	7.78	-34.33	≤ -12.23	PASS
11G	Ant1	Low	2412	4.53	-26.16	≤ -15.47	PASS
		High	2462	3.55	-32.53	≤ -16.45	PASS
11N20SISO	Ant1	Low	2412	3.70	-27.88	≤ -16.3	PASS
		High	2462	2.81	-33.15	≤ -17.19	PASS

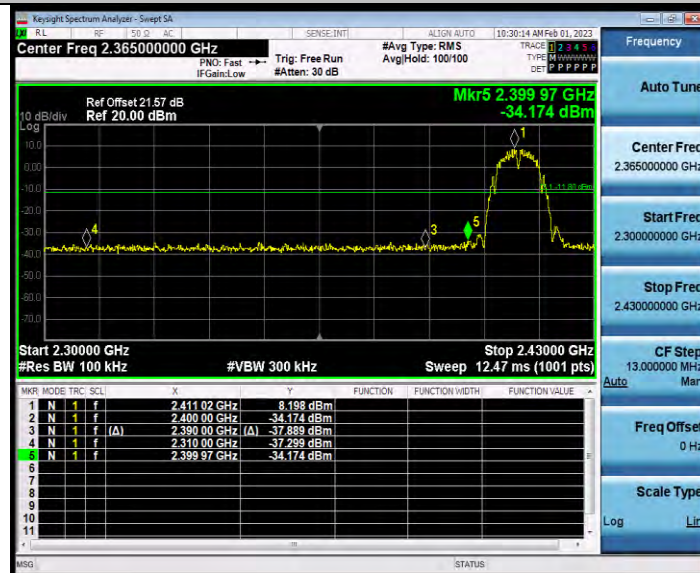


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VERITAS

Test Report No.: W7L-P23010024RF02

TEST GRAPHS

11B_Ant1_Low_2412



11B_Ant1_High_2462



11G_Ant1_Low_2412



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Test Report No.: W7L-P23010024RF02



11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412



BUREAU
VERITAS

Test Report No.: W7L-P23010024RF02



11N20SISO_Ant1_High_2462

