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Annex for BLE

Test Report No.: CTL2312127041-WR02

TABLE OF CONTENTS

1. RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization

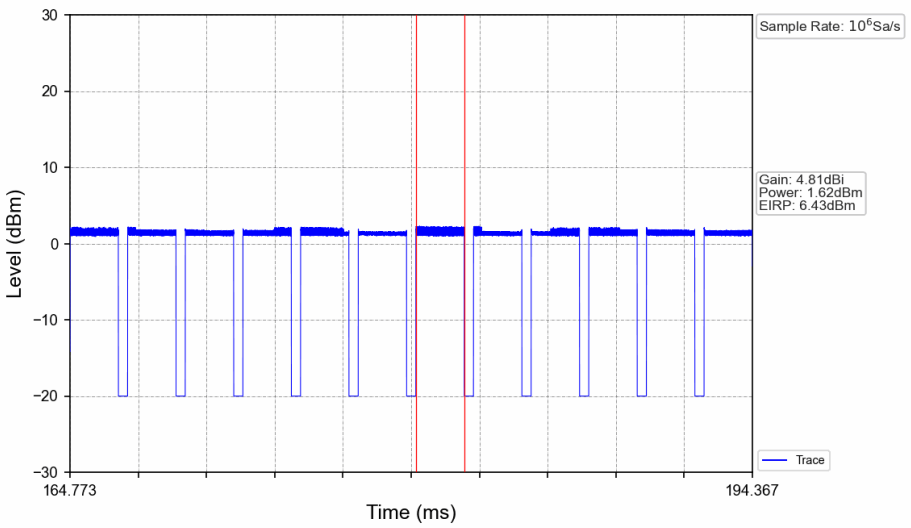
1.1 Power

1.1.1 Test Result

ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NTNV	1M	SISO	2402	1	4.81	1.62	6.43	<=20	Pass
			2440	1	4.81	0.94	5.75	<=20	Pass
			2480	1	4.81	1.17	5.98	<=20	Pass
	2M	SISO	2402	1	4.81	1.77	6.58	<=20	Pass
			2440	1	4.81	0.91	5.72	<=20	Pass
			2480	1	4.81	1.23	6.04	<=20	Pass
HTNV	1M	SISO	2402	1	4.81	1.58	6.39	<=20	Pass
			2440	1	4.81	0.91	5.72	<=20	Pass
			2480	1	4.81	1.15	5.96	<=20	Pass
	2M	SISO	2402	1	4.81	1.81	6.62	<=20	Pass
			2440	1	4.81	0.91	5.72	<=20	Pass
			2480	1	4.81	1.24	6.05	<=20	Pass
LTNV	1M	SISO	2402	1	4.81	1.54	6.35	<=20	Pass
			2440	1	4.81	0.90	5.71	<=20	Pass
			2480	1	4.81	1.14	5.95	<=20	Pass
	2M	SISO	2402	1	4.81	1.80	6.61	<=20	Pass
			2440	1	4.81	0.91	5.72	<=20	Pass
			2480	1	4.81	1.22	6.03	<=20	Pass
Note1: E.I.R.P = Measured Power + Antenna Gain									

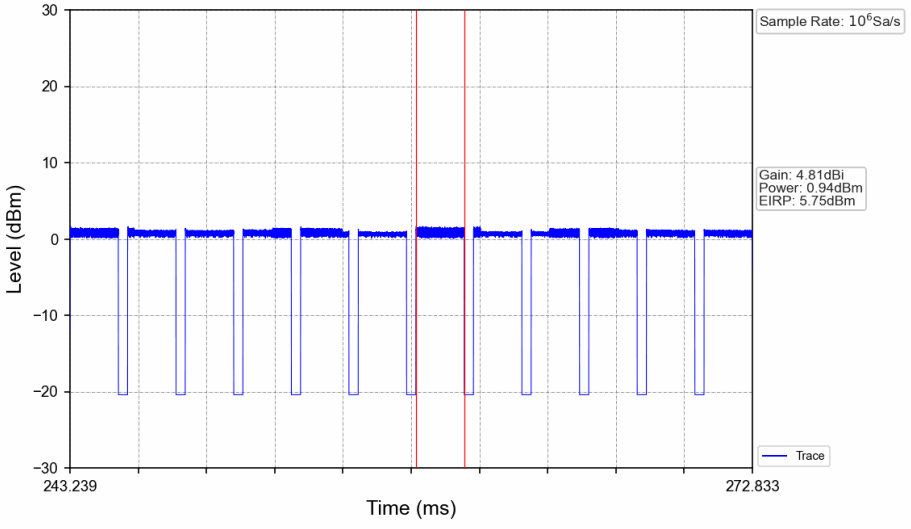
1.1.2 Test Graph

1M_2402MHz_Ant1_NTNV



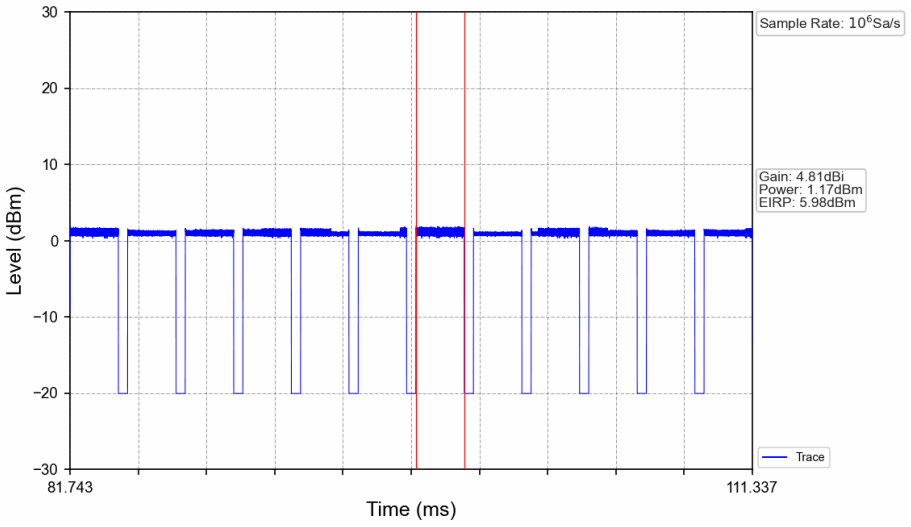
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.098	2.098	2.098	2.097	2.097	2.097	**2.098**	2.097	2.097	2.098	2.098	2.097
Power (dBm)	1.54	1.46	1.40	1.47	1.53	1.33	**1.62**	1.38	1.45	1.51	1.43	1.40
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2440MHz_Ant1_NTNV



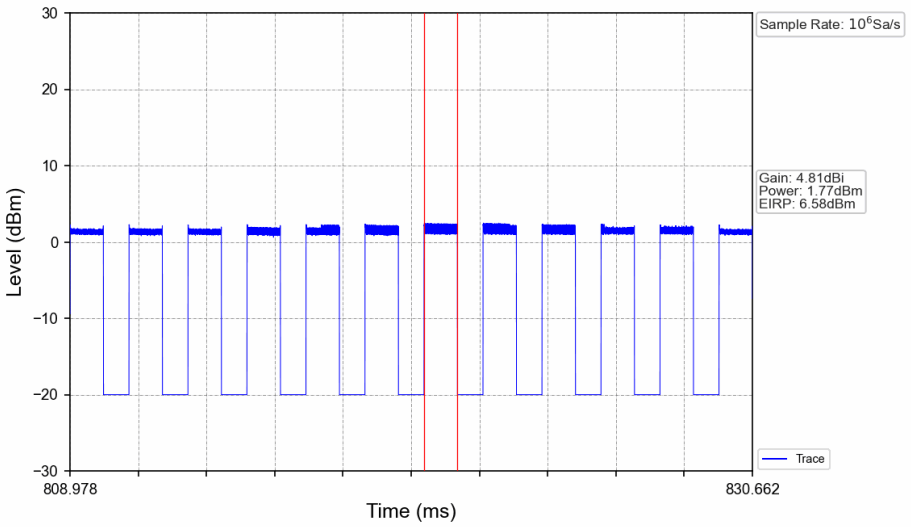
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.098	2.097	2.098	2.097	2.098	2.097	**2.098**	2.097	2.097	2.097	2.098	2.098
Power (dBm)	0.89	0.79	0.76	0.83	0.85	0.65	**0.94**	0.71	0.80	0.84	0.77	0.77
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2480MHz_Ant1_NTNV



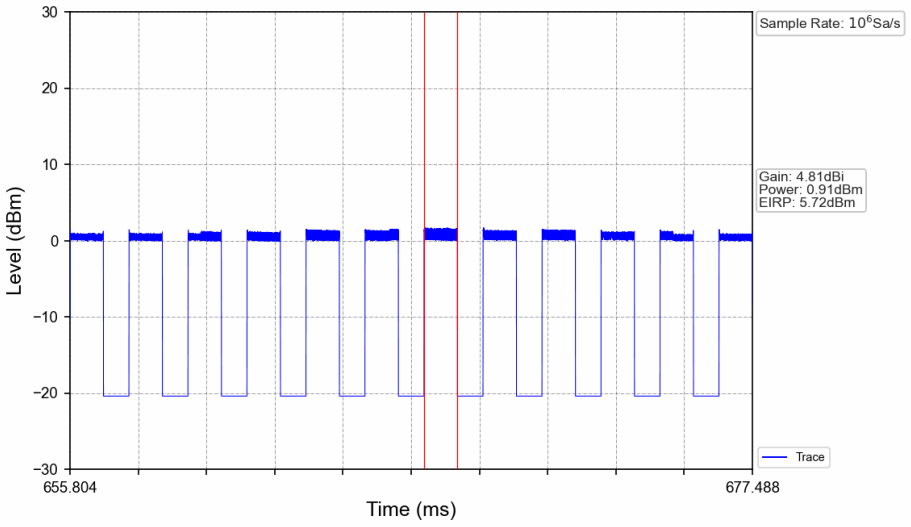
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.098	2.098	2.098	2.098	2.098	2.097	**2.098**	2.098	2.098	2.097	2.098	2.097
Power (dBm)	1.14	0.97	1.01	1.07	1.02	0.94	**1.17**	0.88	1.09	1.05	0.98	1.03
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2402MHz_Ant1_NTNV



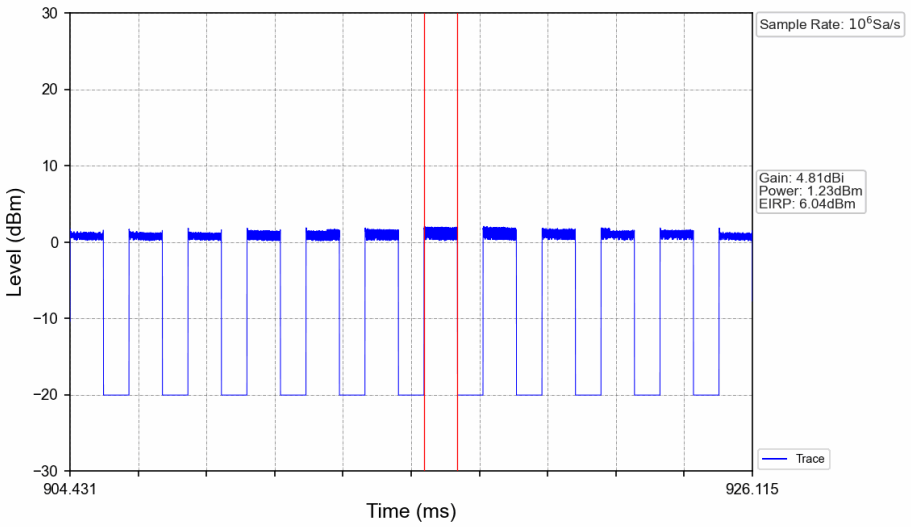
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.062	1.061	1.061	1.062	1.062	1.062	**1.061**	1.061	1.062	1.061	1.061	1.062
Power (dBm)	1.37	1.36	1.35	1.43	1.52	1.57	**1.77**	1.74	1.65	1.53	1.55	1.35
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2440MHz_Ant1_NTNV



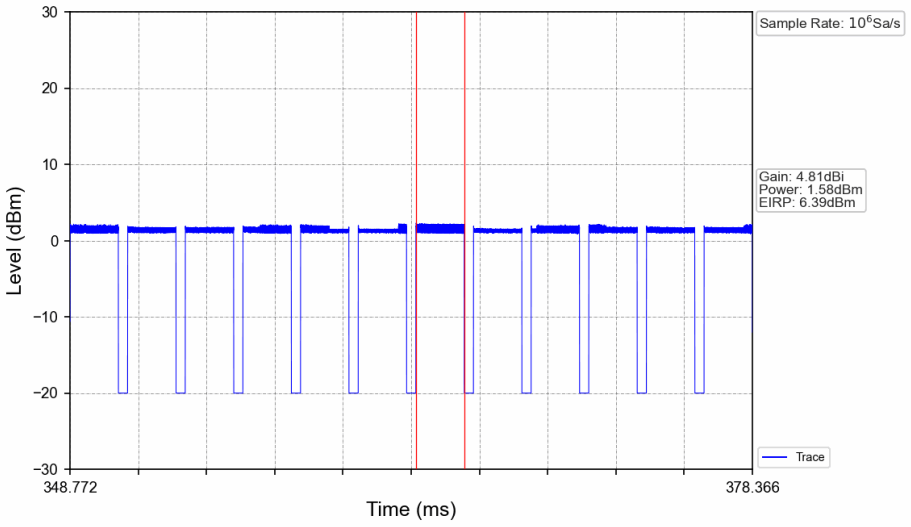
Burst No.	1	2	3	4	5	6	**7**	8	9	10	11	12
Length (ms)	1.062	1.062	1.062	1.062	1.062	1.062	**1.061**	1.061	1.062	1.061	1.061	1.062
Power (dBm)	0.55	0.50	0.58	0.58	0.76	0.77	**0.91**	0.79	0.81	0.72	0.58	0.51
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2480MHz_Ant1_NTNV



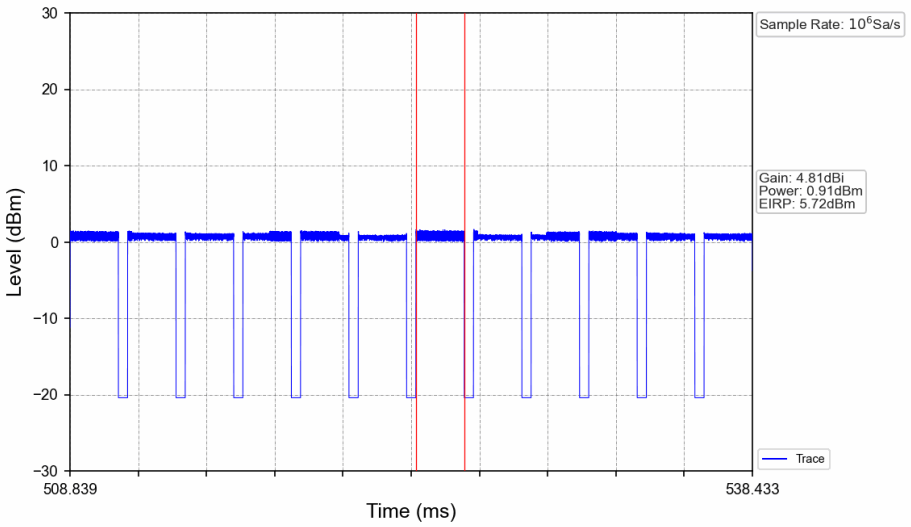
Burst No.	1	2	3	4	5	6	**7**	8	9	10	11	12
Length (ms)	1.062	1.061	1.062	1.062	1.062	1.063	**1.061**	1.061	1.062	1.061	1.061	1.062
Power (dBm)	0.85	0.83	0.83	0.93	0.95	1.04	**1.23**	1.21	1.11	1.05	1.07	0.82
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2402MHz_Ant1_HTNV



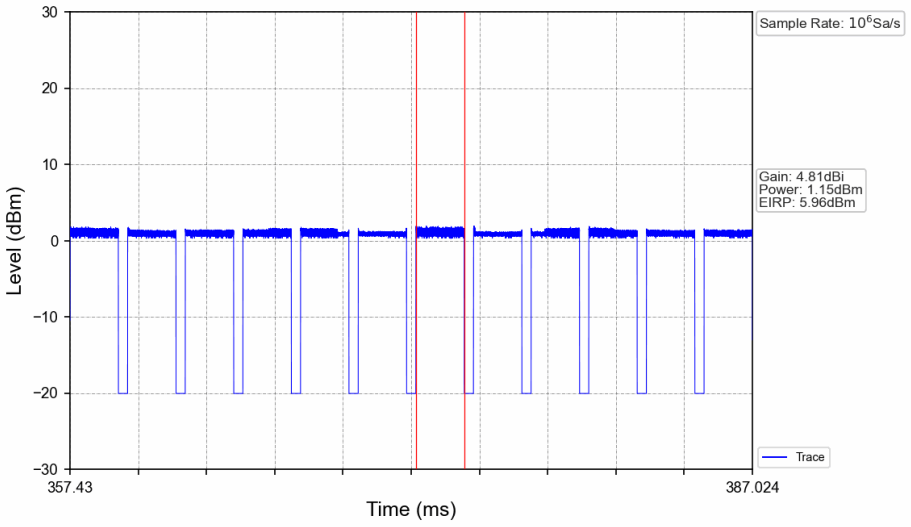
Burst No.	1	2	3	4	5	6	**7**	8	9	10	11	12
Length (ms)	2.098	2.099	2.098	2.098	2.098	2.097	**2.098**	2.098	2.097	2.098	2.098	2.097
Power (dBm)	1.51	1.40	1.40	1.48	1.41	1.34	**1.58**	1.30	1.47	1.45	1.39	1.42
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2440MHz_Ant1_HTNV



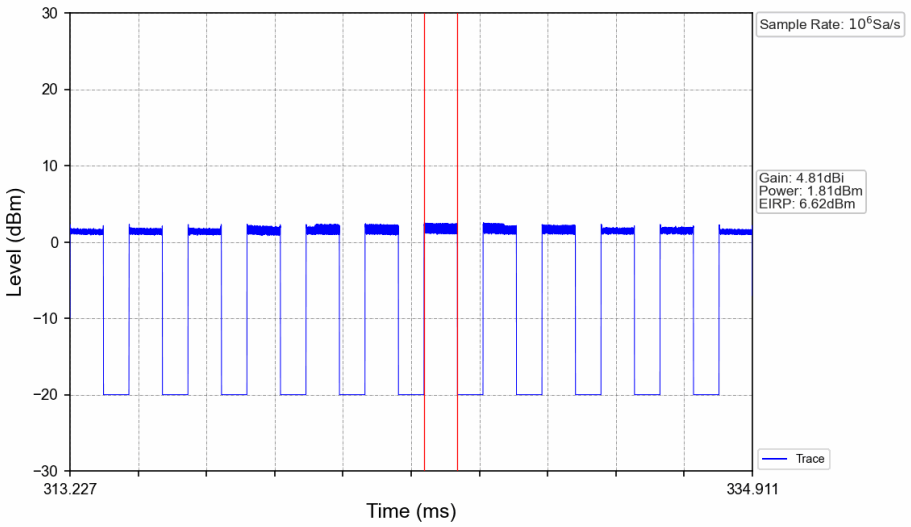
Burst No.	1	2	3	4	5	6	**7**	8	9	10	11	12
Length (ms)	2.098	2.098	2.098	2.098	2.098	2.097	**2.098**	2.097	2.098	2.097	2.098	2.097
Power (dBm)	0.85	0.77	0.74	0.80	0.81	0.62	**0.91**	0.67	0.77	0.81	0.75	0.74
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2480MHz_Ant1_HTNV



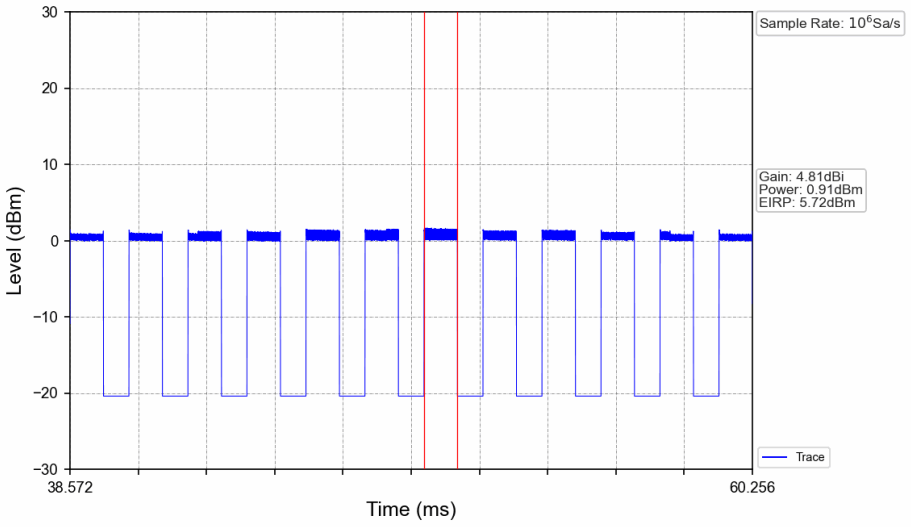
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.098	2.097	2.098	2.098	2.098	2.097	**2.098**	2.098	2.098	2.097	2.098	2.097
Power (dBm)	1.11	0.96	0.96	1.04	1.02	0.88	**1.15**	0.87	1.03	1.04	0.96	0.97
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2402MHz_Ant1_HTNV



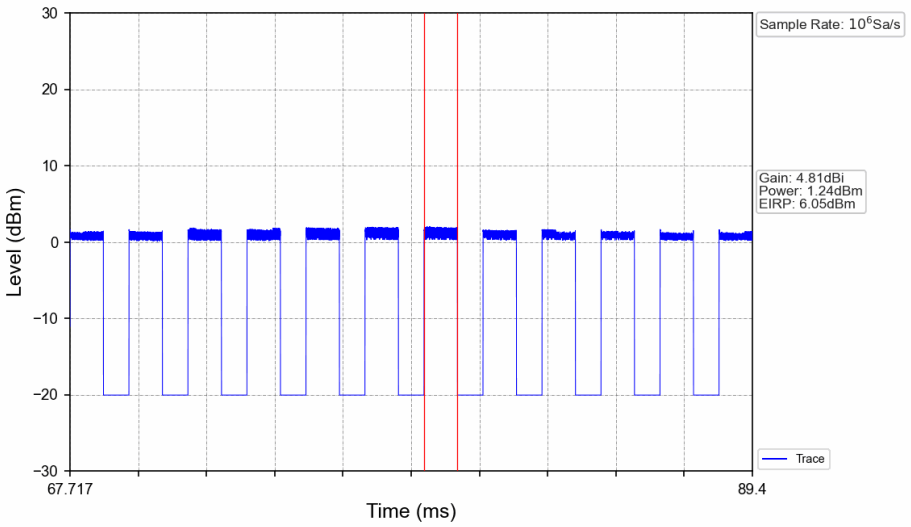
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.062	1.062	1.061	1.062	1.062	1.062	**1.061**	1.061	1.062	1.061	1.061	1.062
Power (dBm)	1.38	1.40	1.39	1.53	1.63	1.66	**1.81**	1.73	1.64	1.49	1.52	1.35
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2440MHz_Ant1_HTNV



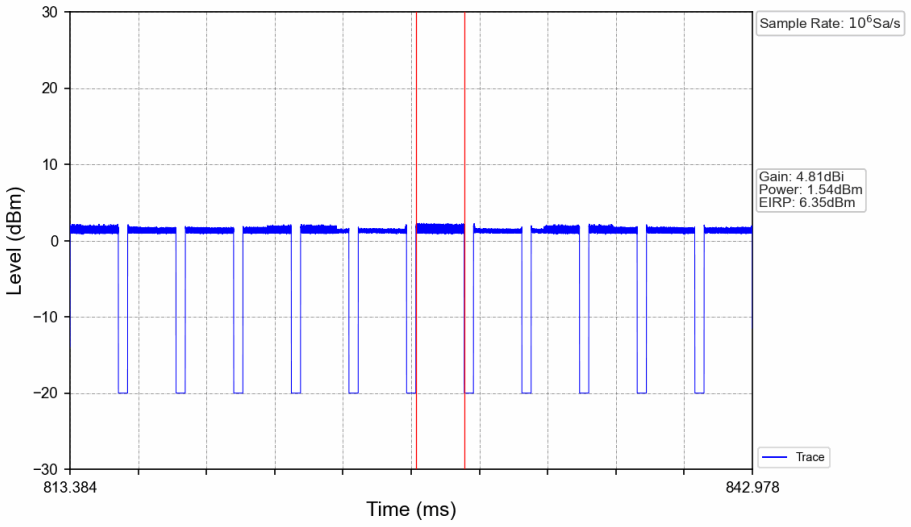
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.062	1.062	1.062	1.062	1.062	1.062	**1.061**	1.062	1.062	1.061	1.061	1.062
Power (dBm)	0.52	0.49	0.60	0.60	0.77	0.80	**0.91**	0.76	0.79	0.68	0.53	0.49
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2480MHz_Ant1_HTNV



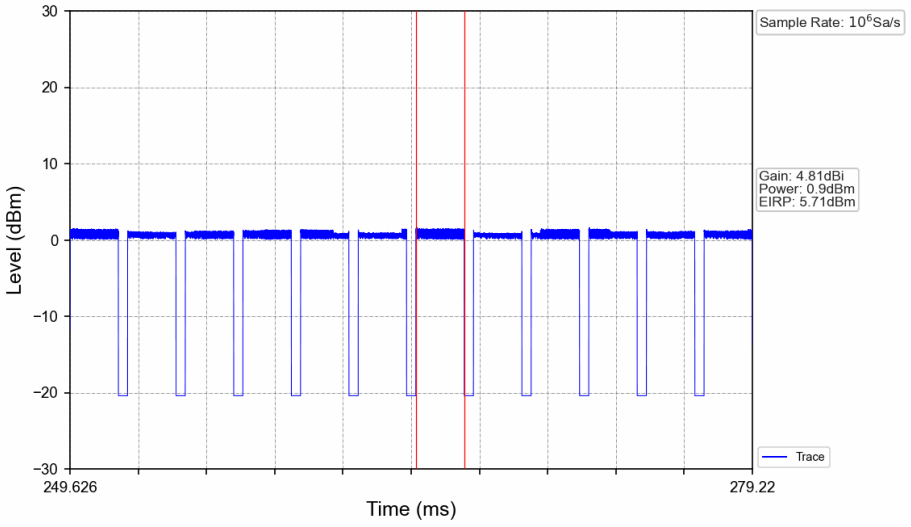
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.061	1.062	1.062	1.062	1.062	1.062	**1.061**	1.062	1.061	1.061	1.062	1.061
Power (dBm)	0.86	0.86	1.05	1.04	1.13	1.21	**1.24**	1.03	0.96	0.93	0.79	0.82
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2402MHz_Ant1_LTNV



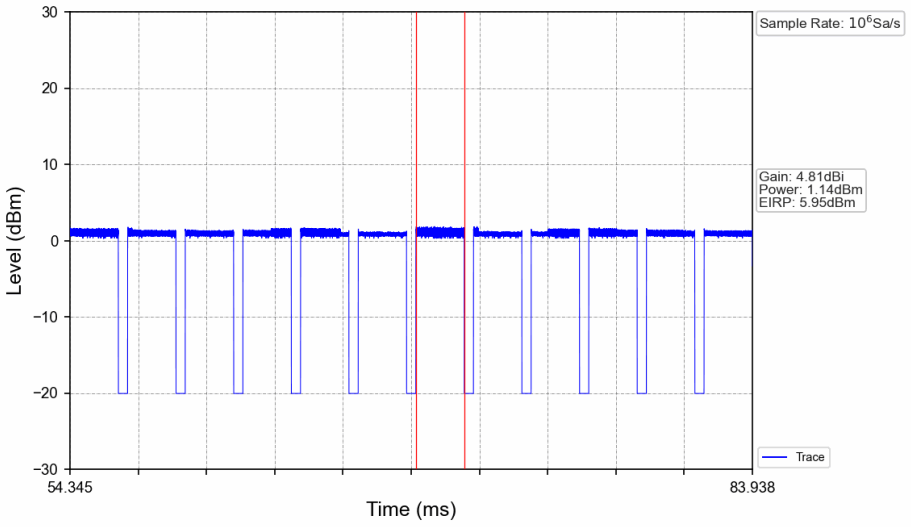
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.098	2.097	2.098	2.097	2.098	2.097	**2.098**	2.097	2.097	2.098	2.098	2.098
Power (dBm)	1.48	1.37	1.35	1.42	1.42	1.29	**1.54**	1.28	1.43	1.43	1.35	1.35
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2440MHz_Ant1_LTNV



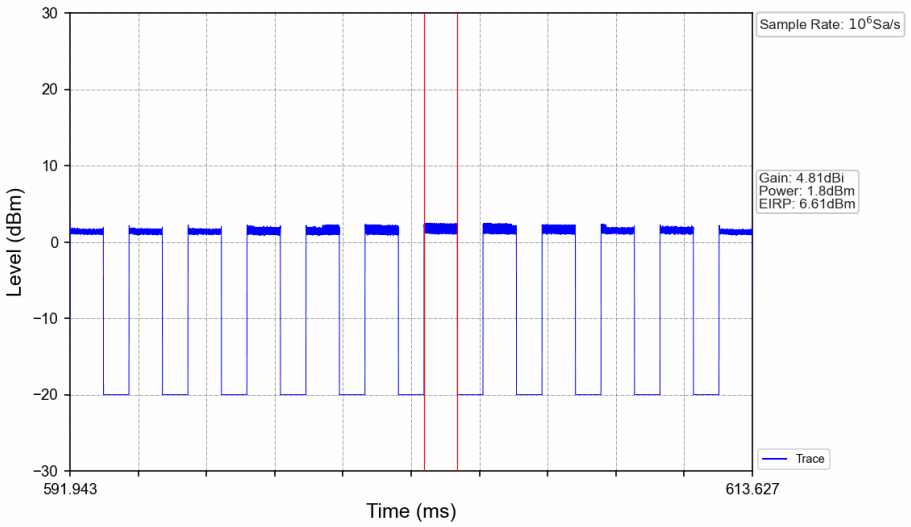
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.098	2.098	2.098	2.098	2.098	2.097	**2.098**	2.097	2.097	2.097	2.098	2.097
Power (dBm)	0.86	0.69	0.74	0.80	0.74	0.66	**0.90**	0.63	0.81	0.78	0.71	0.77
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

1M_2480MHz_Ant1_LTNV



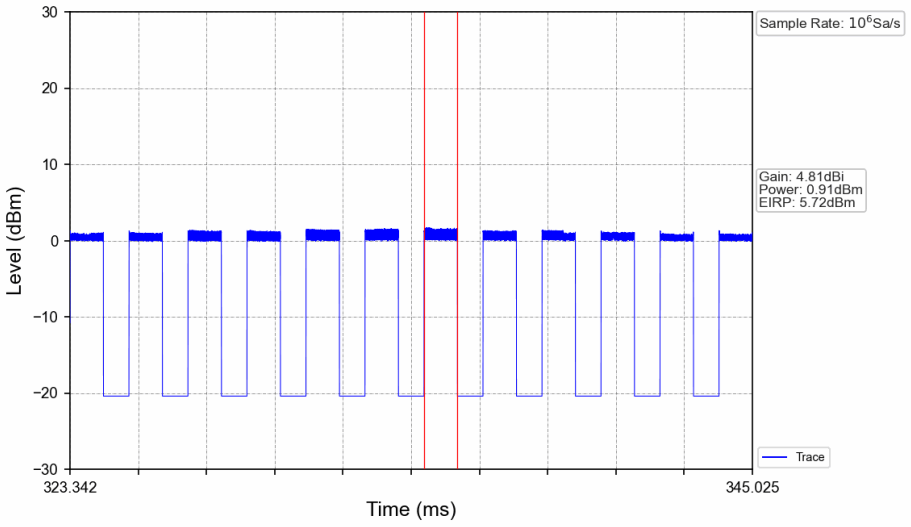
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.097	2.097	2.098	2.097	2.098	2.097	**2.098**	2.097	2.097	2.098	2.098	2.098
Power (dBm)	1.07	0.98	0.95	1.02	1.04	0.84	**1.14**	0.89	0.99	1.04	0.97	0.94
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2402MHz_Ant1_LTNV



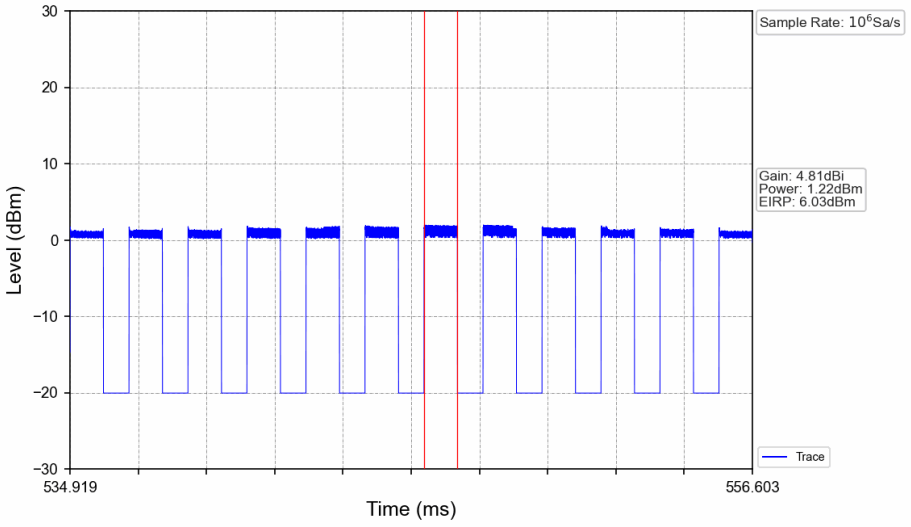
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.062	1.061	1.061	1.062	1.062	1.062	**1.061**	1.061	1.062	1.061	1.061	1.062
Power (dBm)	1.39	1.38	1.38	1.48	1.53	1.61	**1.80**	1.76	1.66	1.54	1.56	1.35
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2440MHz_Ant1_LTNV



Burst No.	1	2	3	4	5	6	**7**	8	9	10	11	12
Length (ms)	1.061	1.062	1.062	1.062	1.062	1.061	**1.061**	1.062	1.061	1.061	1.062	1.061
Power (dBm)	0.51	0.50	0.68	0.64	0.79	0.86	**0.91**	0.73	0.71	0.65	0.44	0.47
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2M_2480MHz_Ant1_LTNV



Burst No.	1	2	3	4	5	6	**7**	8	9	10	11	12
Length (ms)	1.062	1.061	1.062	1.062	1.062	1.061	**1.062**	1.061	1.061	1.061	1.062	1.062
Power (dBm)	0.80	0.85	0.83	0.98	1.03	1.11	**1.22**	1.21	1.07	0.96	0.96	0.79
Remark	/	/	/	/	/	/	**Max**	/	/	/	/	/

2. Power Spectral Density

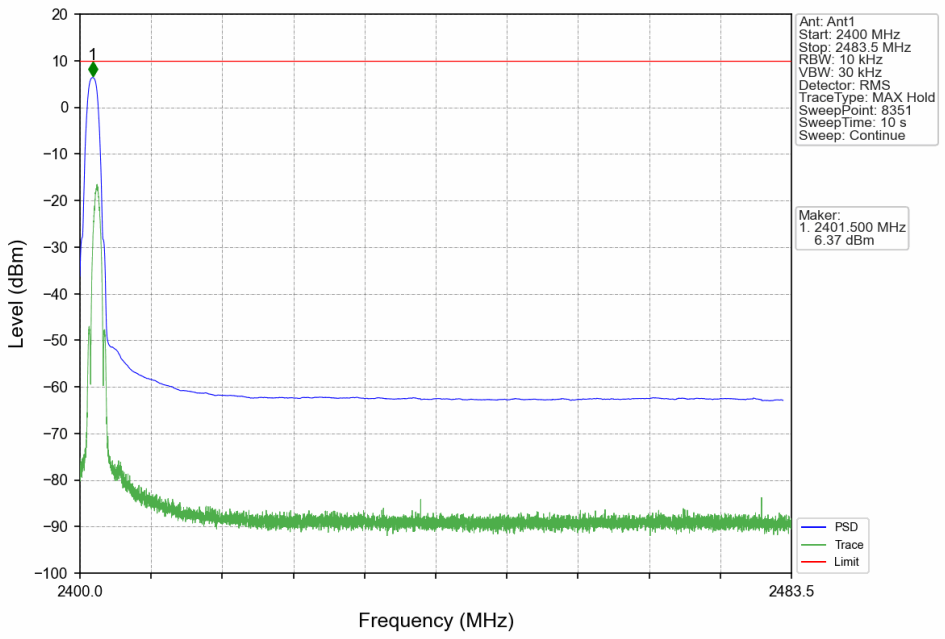
2.1 PSD

2.1.1 Test Result

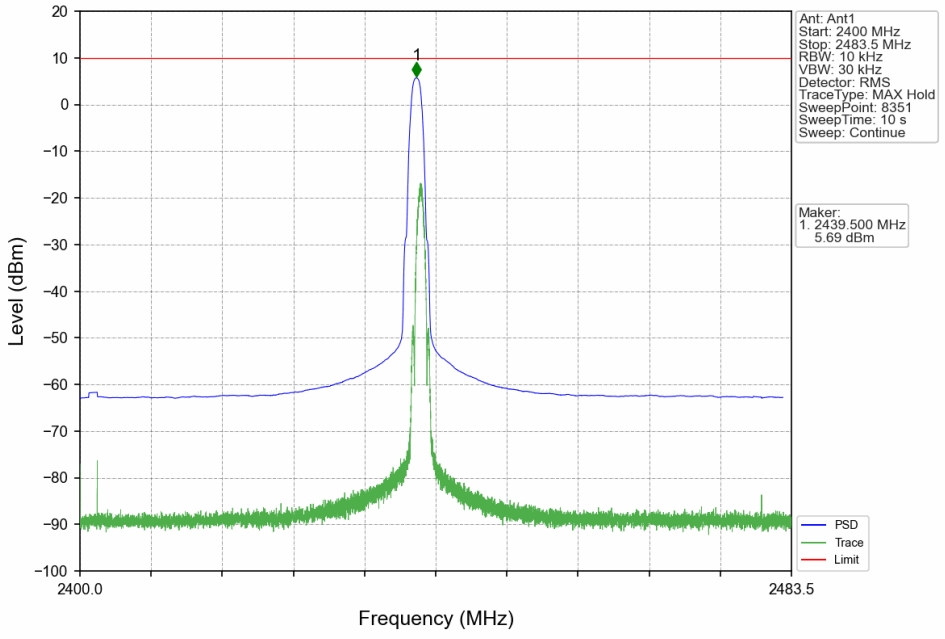
ENV	Mode	TX Type	Frequency (MHz)	ANT	E.I.R.PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NTNV	1M	SISO	2402	1	6.37	<=10	Pass
			2440	1	5.69	<=10	Pass
			2480	1	5.92	<=10	Pass
	2M	SISO	2402	1	5.52	<=10	Pass
			2440	1	4.67	<=10	Pass
			2480	1	4.99	<=10	Pass

2.1.2 Test Graph

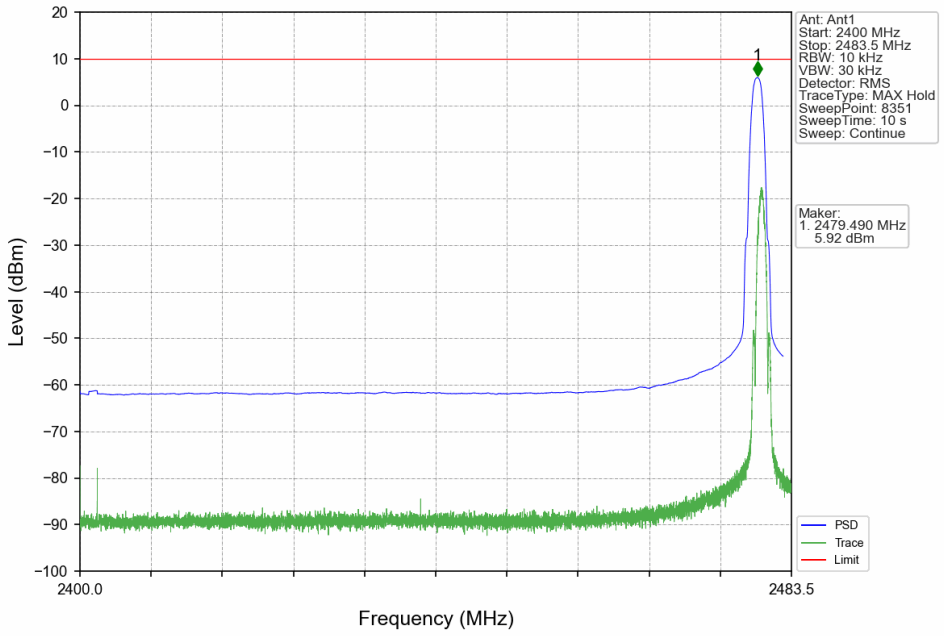
1M_2402MHz_Ant1_NTNV



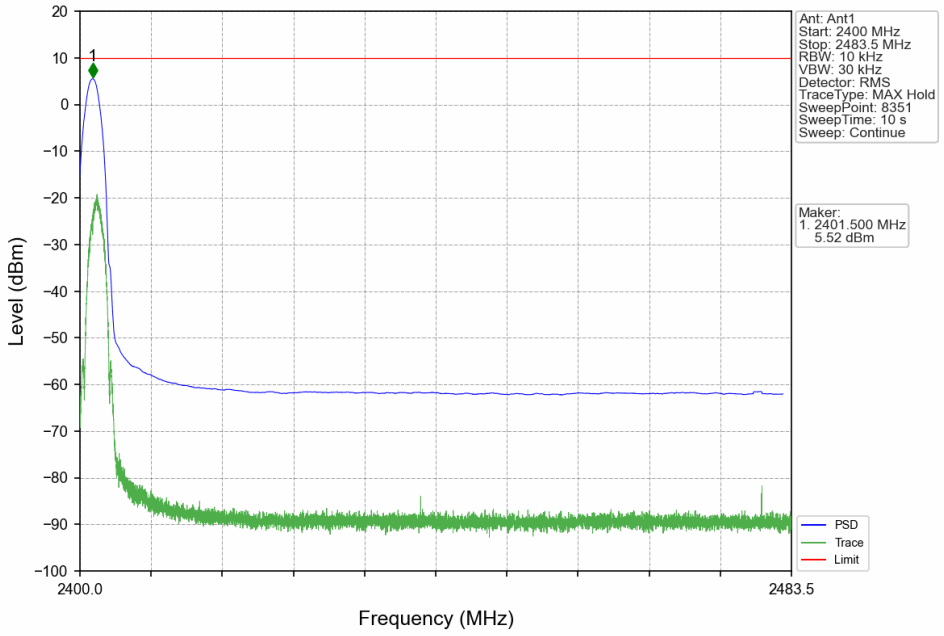
1M_2440MHz_Ant1_NTNV



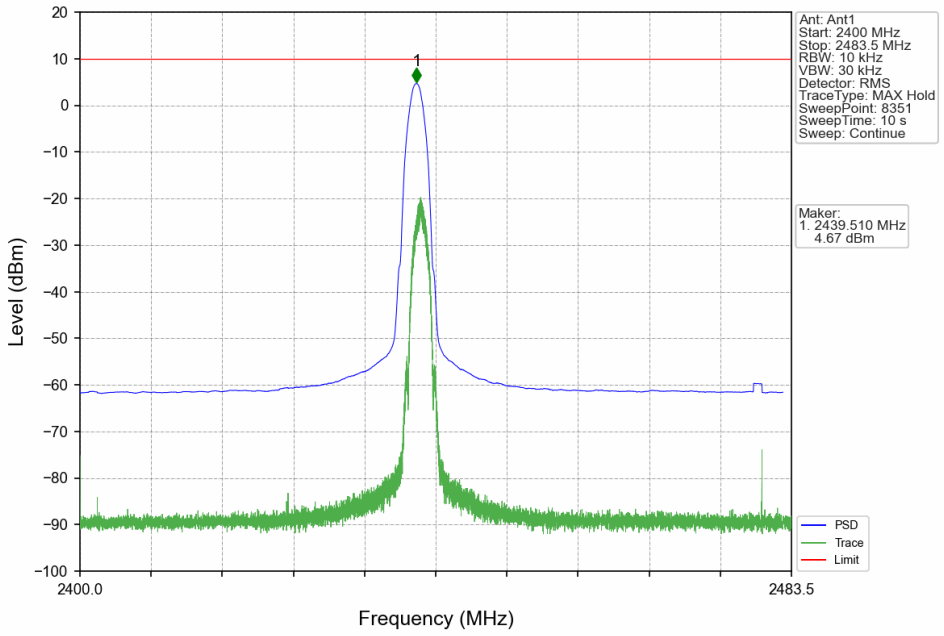
1M_2480MHz_Ant1_NTNV



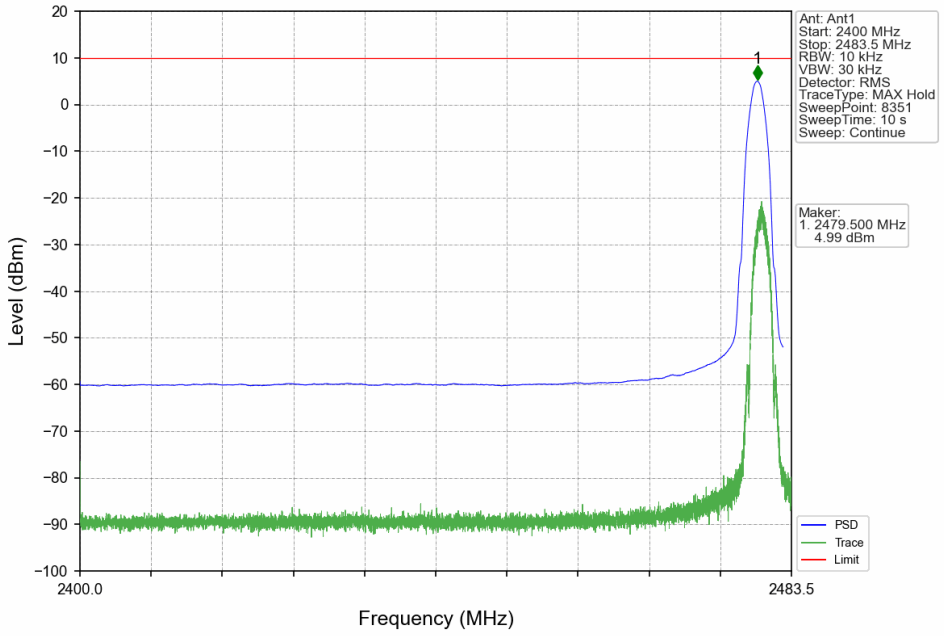
2M_2402MHz_Ant1_NTNV



2M_2440MHz_Ant1_NTNV



2M_2480MHz_Ant1_NTNV



3. Occupied Channel Bandwidth

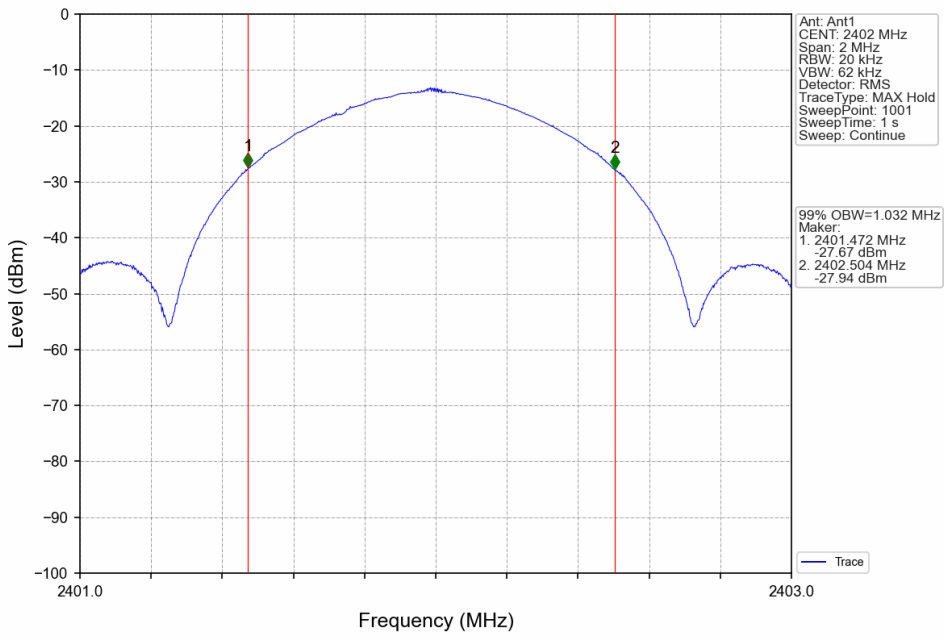
3.1 OBW_Ant1

3.1.1 Test Result

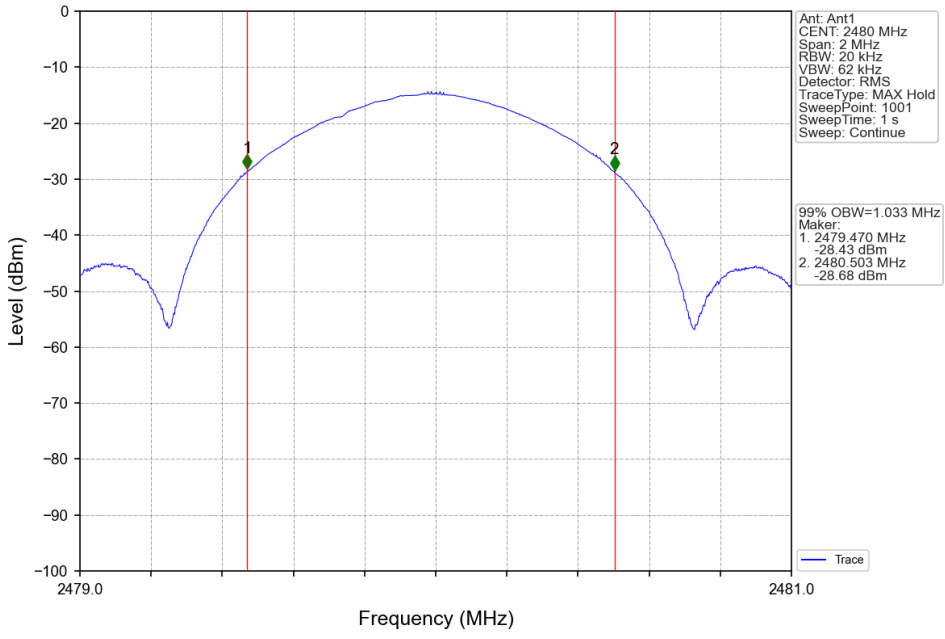
Ant1								
ENV	Mode	TX Type	Frequency (MHz)	OBW (MHz)	Frequency Range (MHz)			Verdict
				Result	FL	FH	Limit	
NTNV	1M	SISO	2402	1.032	2401.472	/	>=2400	Pass
			2480	1.033	/	2480.503	<=2483.5	Pass
	2M	SISO	2402	2.049	2400.960	/	>=2400	Pass
			2480	2.049	/	2481.008	<=2483.5	Pass

3.1.2 Test Graph

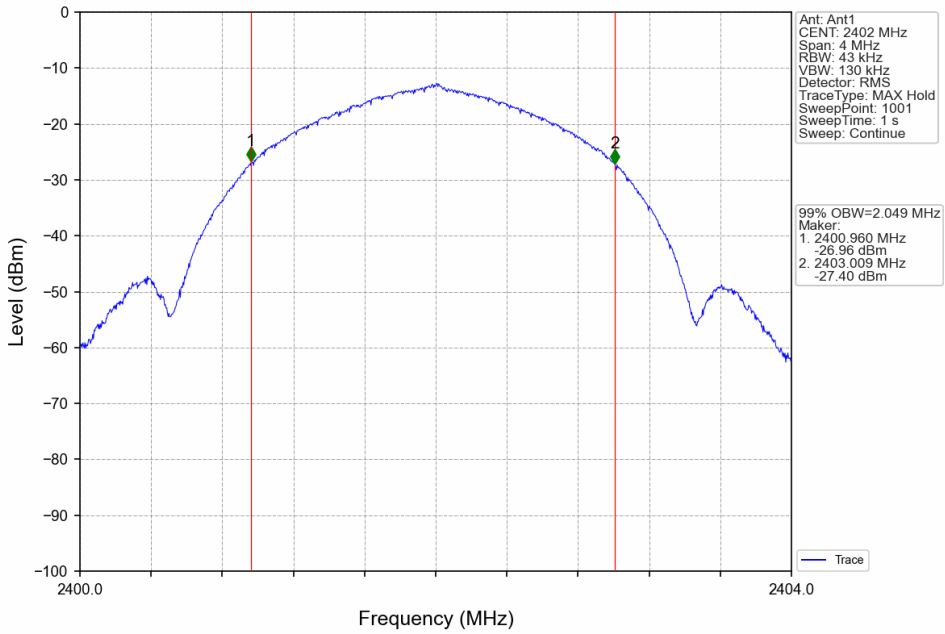
1M_2402MHz_Ant1_NTNV



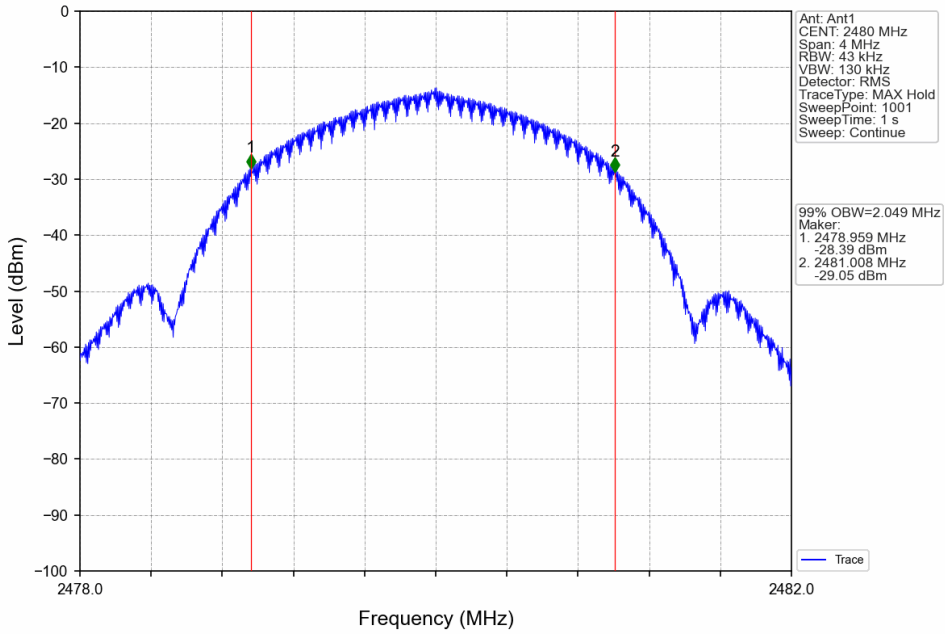
1M_2480MHz_Ant1_NTNV



2M_2402MHz_Ant1_NTNV



2M_2480MHz_Ant1_NTNV



4. Transmitter Unwanted Emissions In The Out-Of-Band Domain

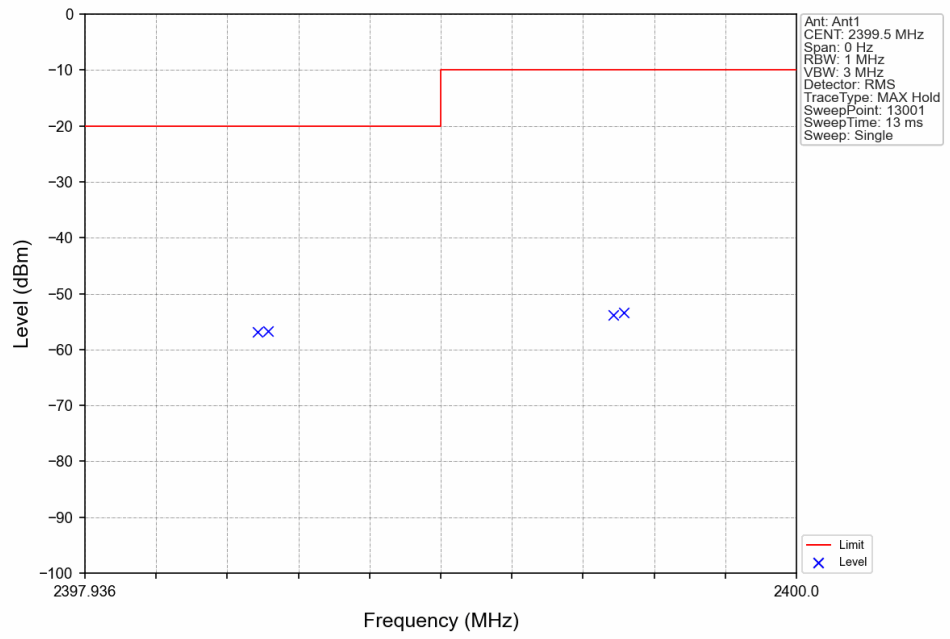
4.1 1M-Ant1

4.1.1 Test Result

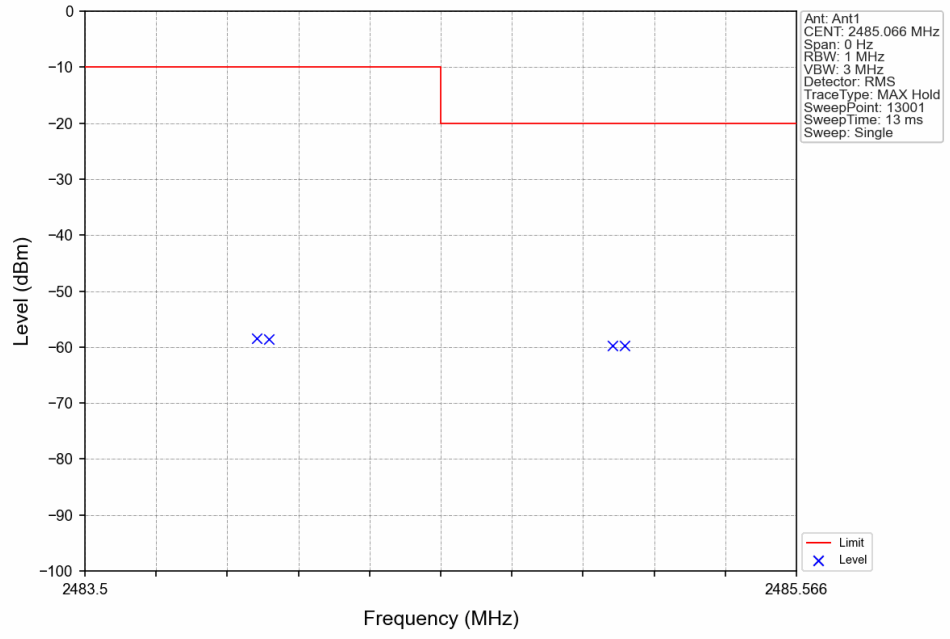
Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
1M	SISO	2402	1	2398.436	-56.86	<=-20	Pass
				2398.468	-56.78	<=-20	Pass
				2399.468	-53.80	<=-10	Pass
				2399.500	-53.41	<=-10	Pass
		2480	1	2484.000	-58.50	<=-10	Pass
				2484.033	-58.63	<=-10	Pass
				2485.033	-59.76	<=-20	Pass
				2485.066	-59.78	<=-20	Pass

4.1.2 Test Graph

1M_2402MHz_Ant1_NTNV



1M_2480MHz_Ant1_NTNV



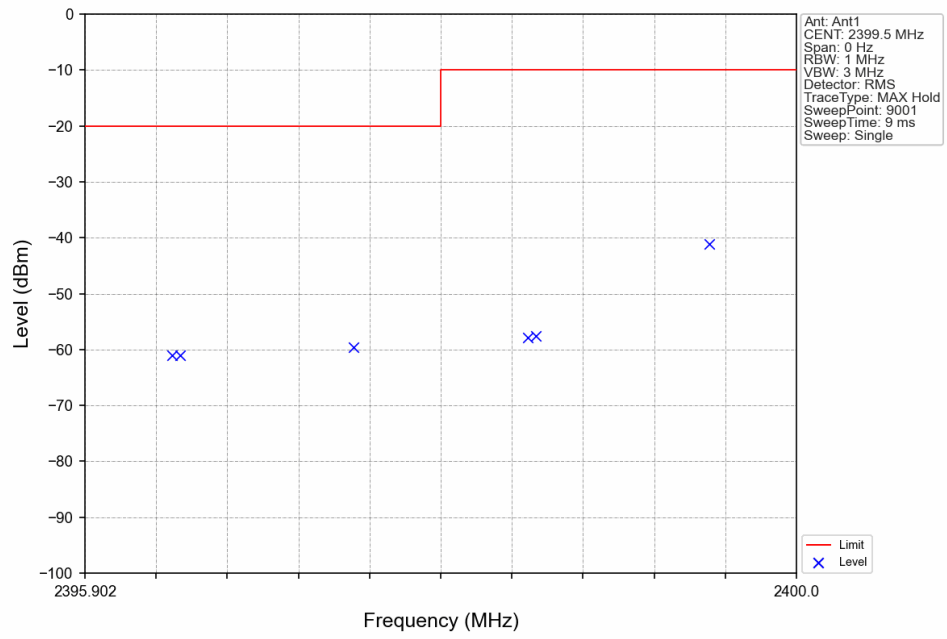
4.2 2M-Ant1

4.2.1 Test Result

Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
2M	SISO	2402	1	2396.402	-60.99	<=-20	Pass
				2396.451	-61.03	<=-20	Pass
				2397.451	-59.55	<=-20	Pass
				2398.451	-57.88	<=-10	Pass
				2398.500	-57.52	<=-10	Pass
				2399.500	-41.14	<=-10	Pass
		2480	1	2484.000	-59.36	<=-10	Pass
				2485.000	-60.89	<=-10	Pass
				2485.049	-60.89	<=-10	Pass
				2486.049	-61.58	<=-20	Pass
				2487.049	-62.41	<=-20	Pass
				2487.098	-62.44	<=-20	Pass

4.2.2 Test Graph

2M_2402MHz_Ant1_NTNV



2M_2480MHz_Ant1_NTNV