RF Test Data for Bluetooth LE (Conducted Measurements)

General Description of EUT	
Product Name:	Heltec Indoor Hotspot
Test Model:	HT-M2808
Sample ID:	20210603-15-2#
Environmental Conditions	
Temperature:	24.3℃
Relative Humidity:	52%
Test Voltage:	DC 12V
Test Engineer:	Huang jianping
Note: For a more detailed features description, please refer to the report TB-RF183067.	

Contents

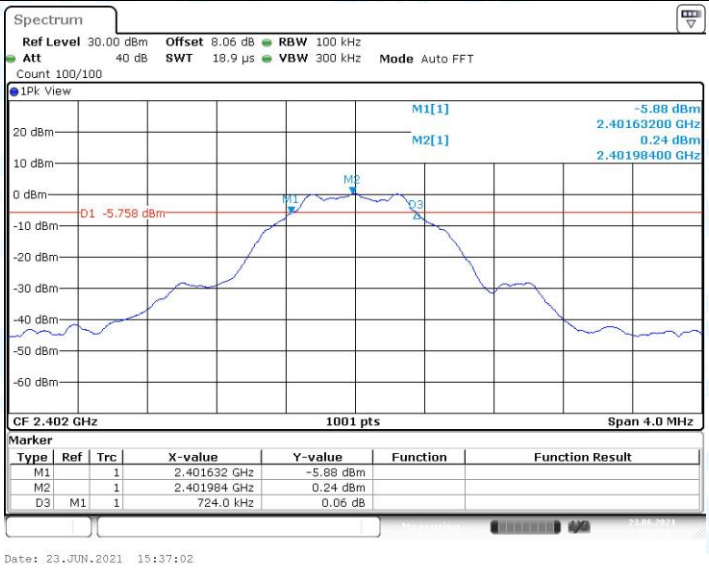
1. DTS Bandwidth

1.1.Test Result

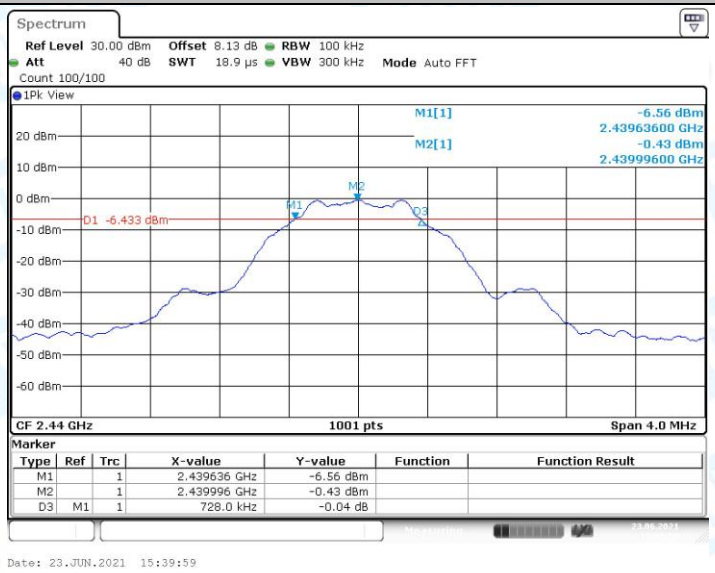
Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.724	2401.632	2402.356	0.5	PASS
		2440	0.728	2439.636	2440.364	0.5	PASS
		2480	0.724	2479.644	2480.368	0.5	PASS
BLE_2M	Ant1	2402	1.108	2401.448	2402.556	0.5	PASS
		2440	1.100	2439.456	2440.556	0.5	PASS
		2480	1.108	2479.456	2480.564	0.5	PASS

1.2.Test Graphs

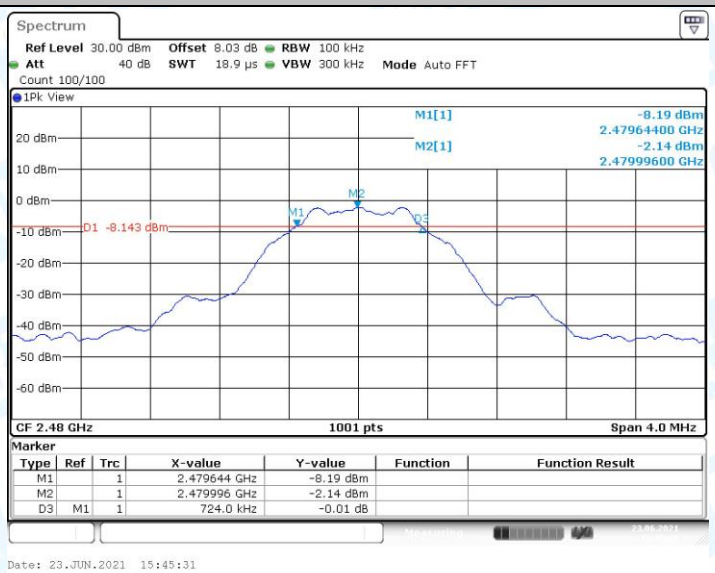
BLE_1M_Ant1_2402



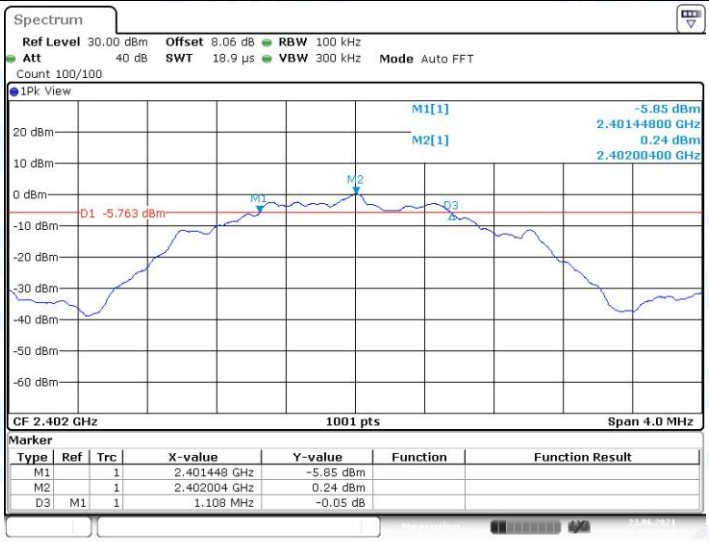
BLE_1M_Ant1_2440



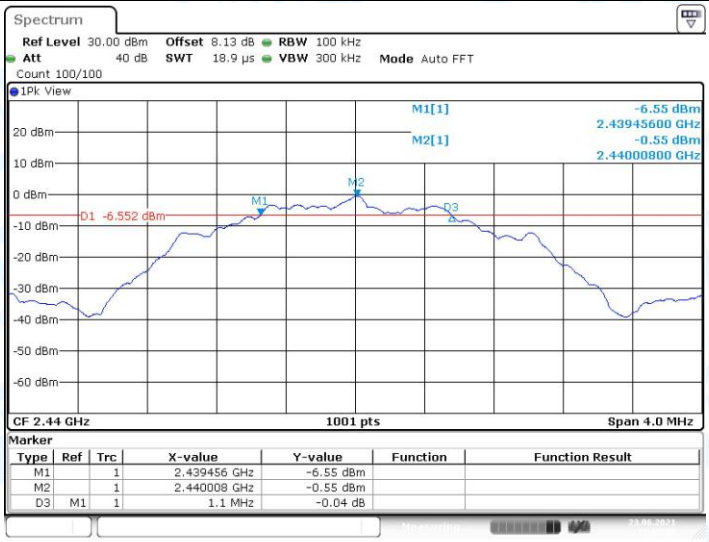
BLE_1M_Ant1_2480



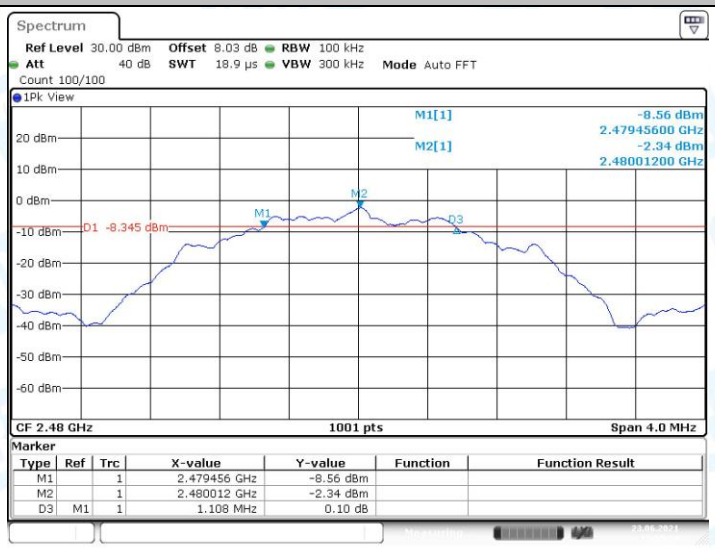
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



2. Occupied Channel Bandwidth

2.1.Test Result

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.063	2401.473	2402.535	---	PASS
		2440	1.067	2439.477	2440.543	---	PASS
		2480	1.067	2479.481	2480.547	---	PASS
BLE_2M	Ant1	2402	2.074	2400.977	2403.051	---	PASS
		2440	2.078	2438.977	2441.055	---	PASS
		2480	2.082	2478.981	2481.063	---	PASS

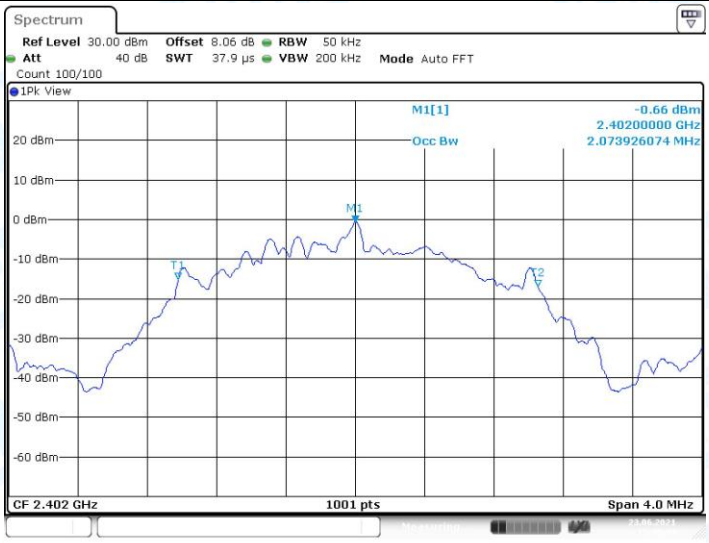
2.2.Test Graphs

BLE_1M_Ant1_2402

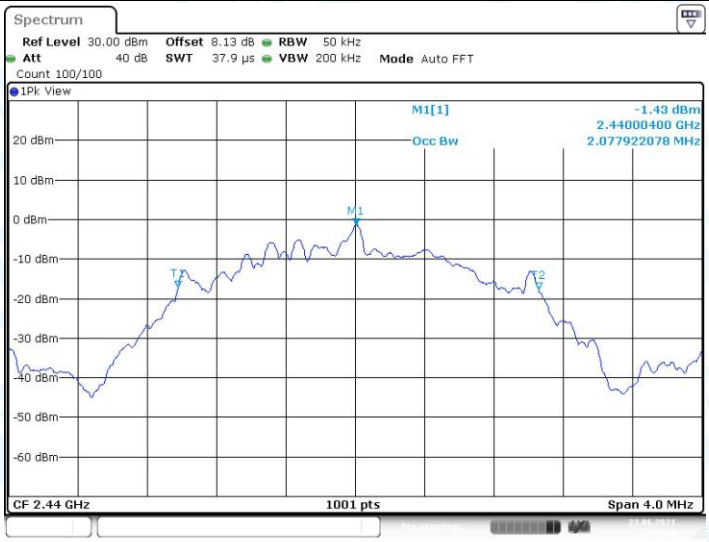
BLE_1M_Ant1_2440

BLE_1M_Ant1_2480

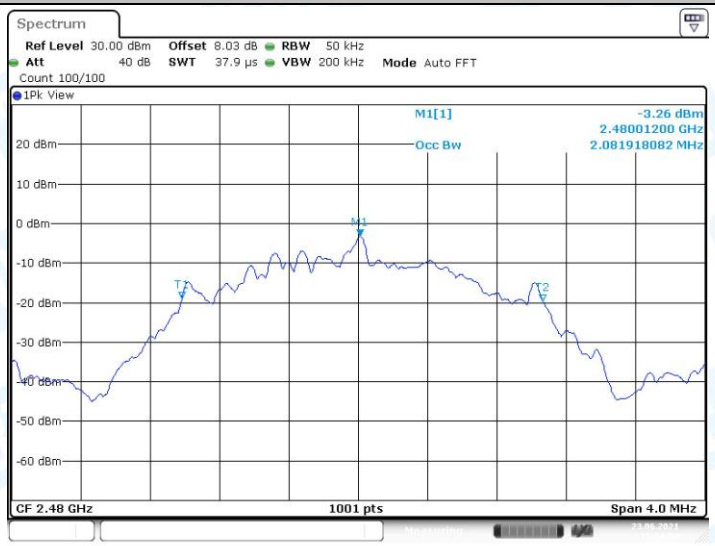
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



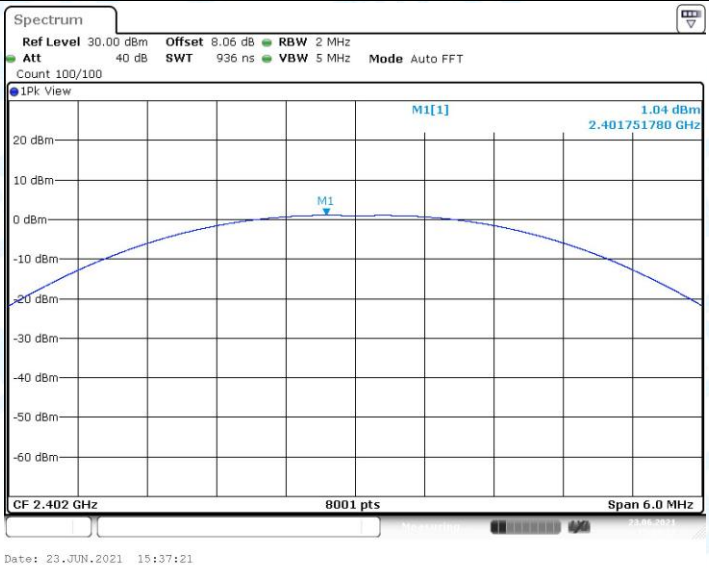
3. Maximum conducted output power

3.1.Test Result

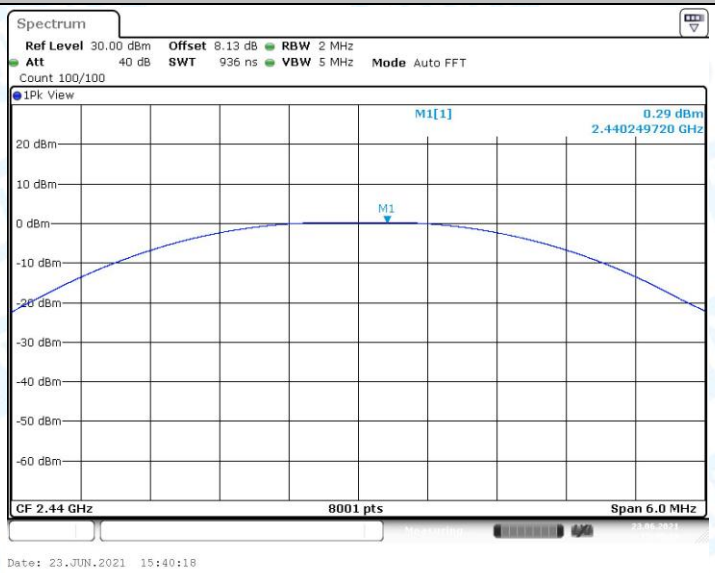
Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	1.04	<=30	PASS
		2440	0.29	<=30	PASS
		2480	-1.43	<=30	PASS
BLE_2M	Ant1	2402	1.11	<=30	PASS
		2440	0.36	<=30	PASS
		2480	-1.4	<=30	PASS

3.2.Test Graphs

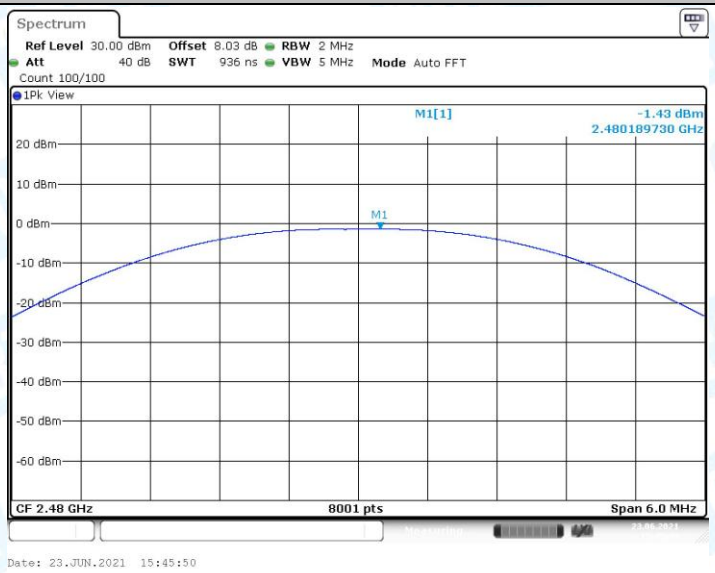
BLE_1M_Ant1_2402



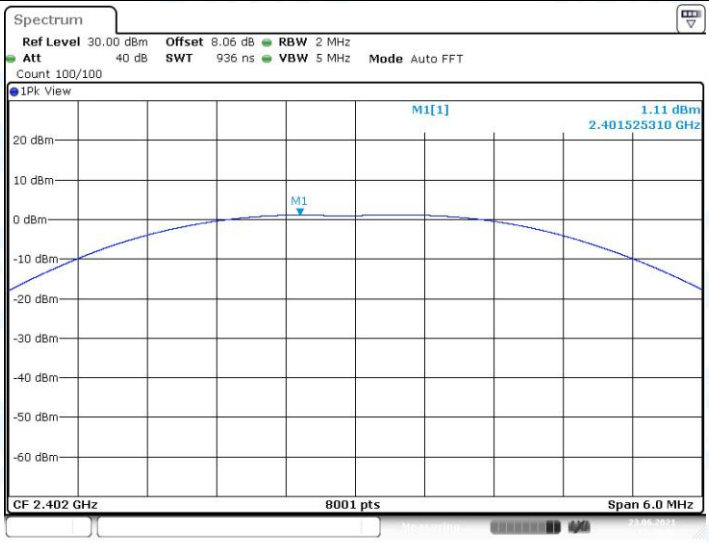
BLE_1M_Ant1_2440



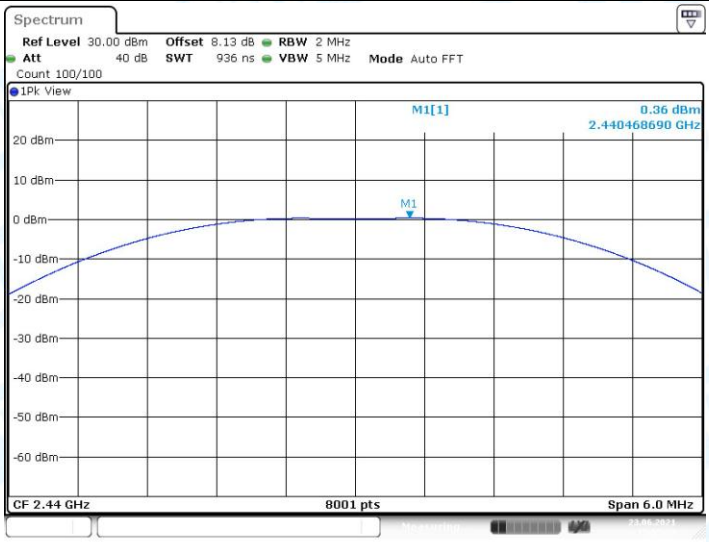
BLE_1M_Ant1_2480



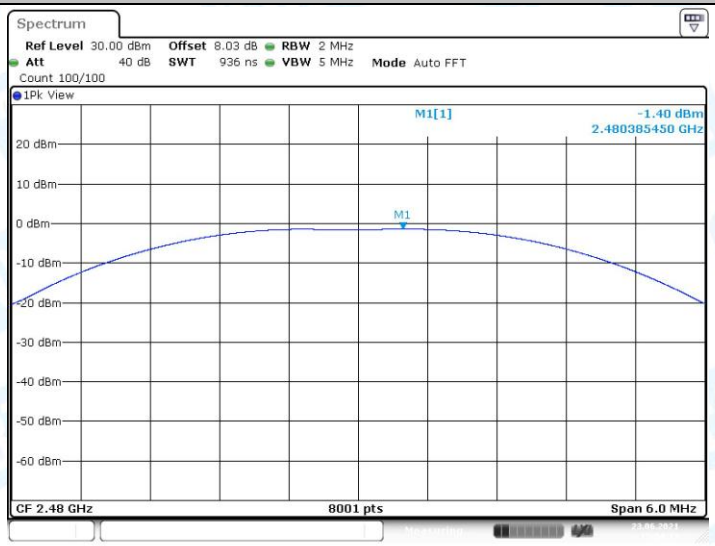
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



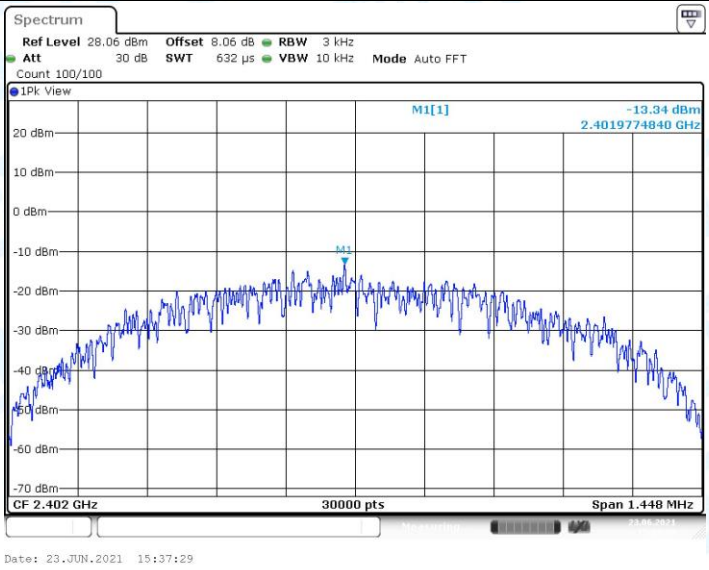
4. Maximum power spectral density

4.1.Test Result

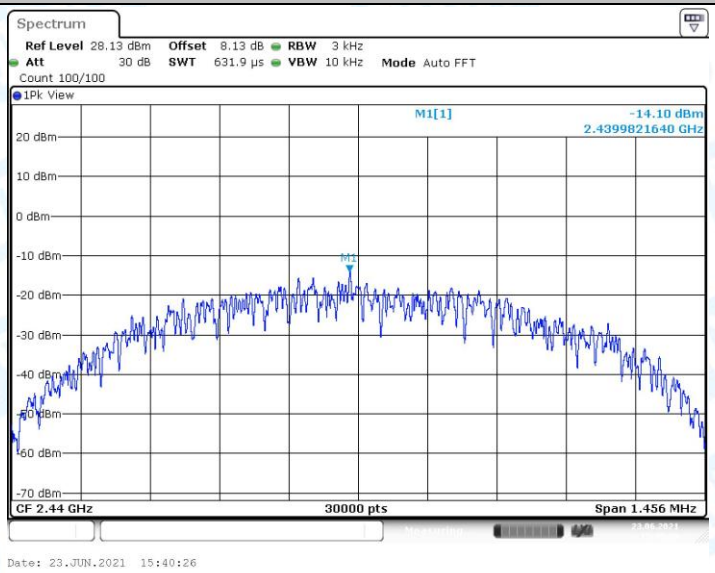
Test Mode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-13.34	<=8	PASS
		2440	-14.1	<=8	PASS
		2480	-15.97	<=8	PASS
BLE_2M	Ant1	2402	-16.47	<=8	PASS
		2440	-17.21	<=8	PASS
		2480	-18.95	<=8	PASS

4.2.Test Graphs

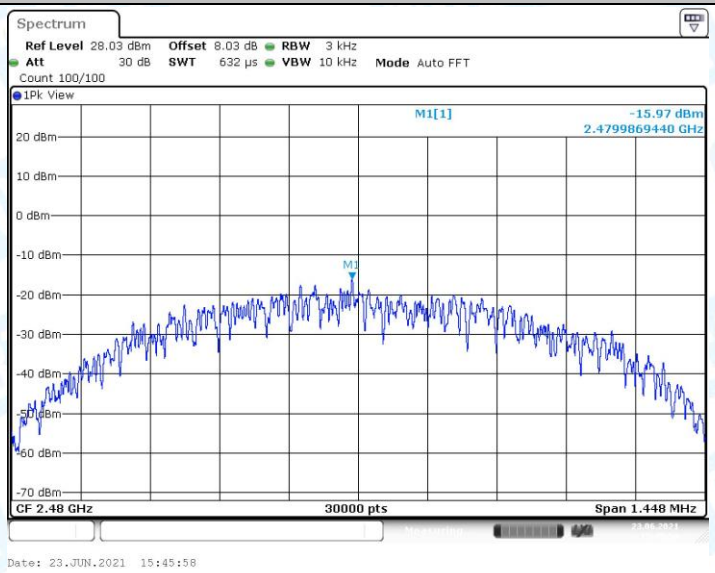
BLE_1M_Ant1_2402



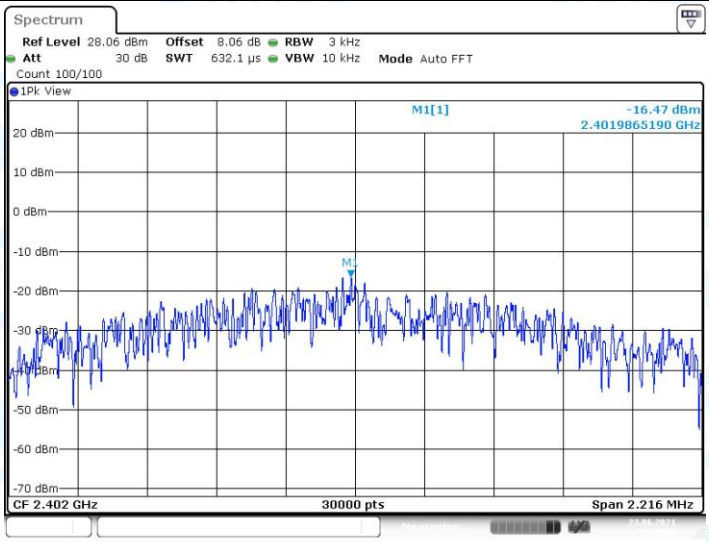
BLE_1M_Ant1_2440



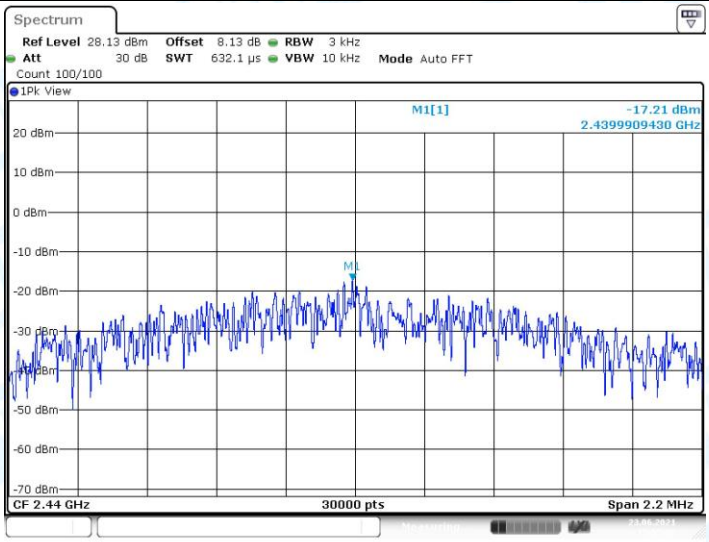
BLE_1M_Ant1_2480



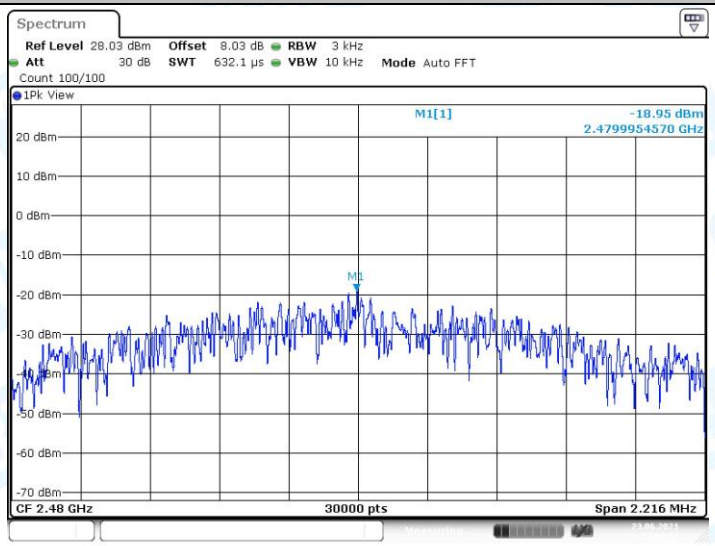
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



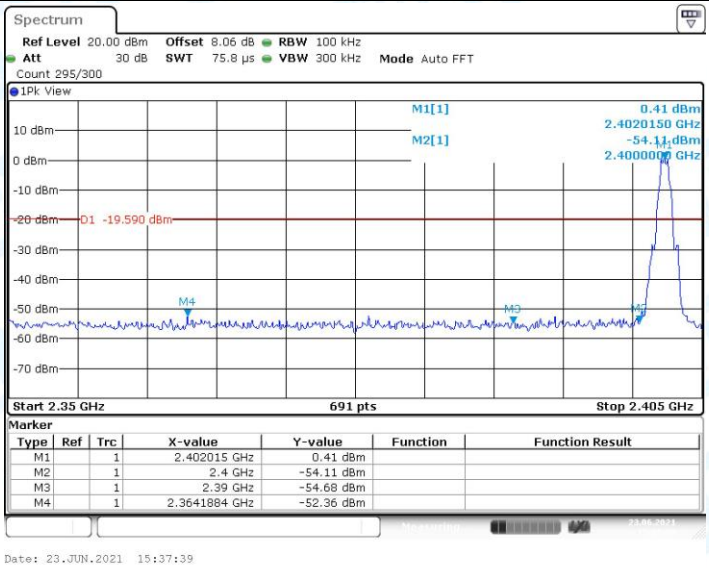
5. Band edge measurements

5.1.Test Result

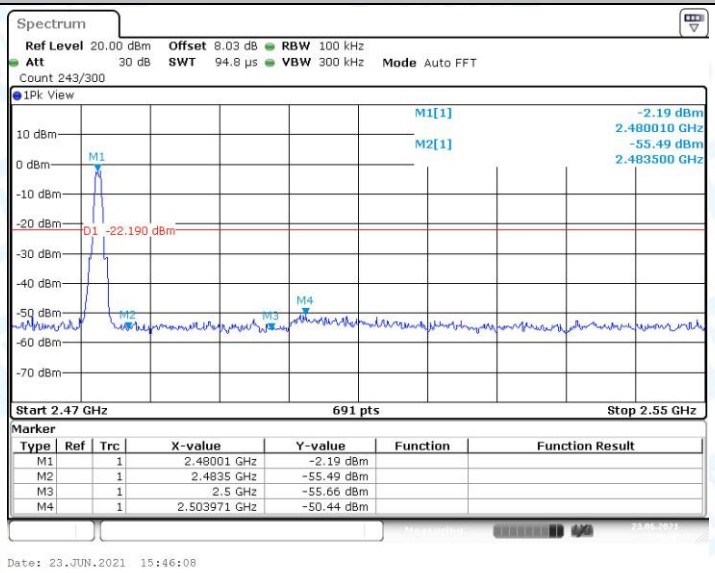
Test Mode	Antenna	ChName	Channel	Ref.Level[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	0.41	-52.36	<=-19.59	PASS
		High	2480	-2.19	-50.44	<=-22.19	PASS
BLE_2M	Ant1	Low	2402	0.33	-31.6	<=-19.67	PASS
		High	2480	-2.39	-50.19	<=-22.39	PASS

5.2.Test Graphs

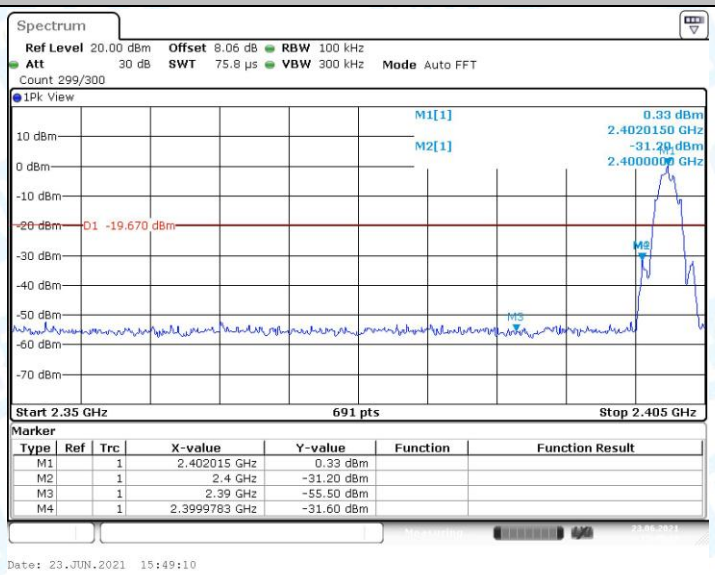
BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



BLE_2M_Ant1_Low_2402



BLE_2M_Ant1_High_2480

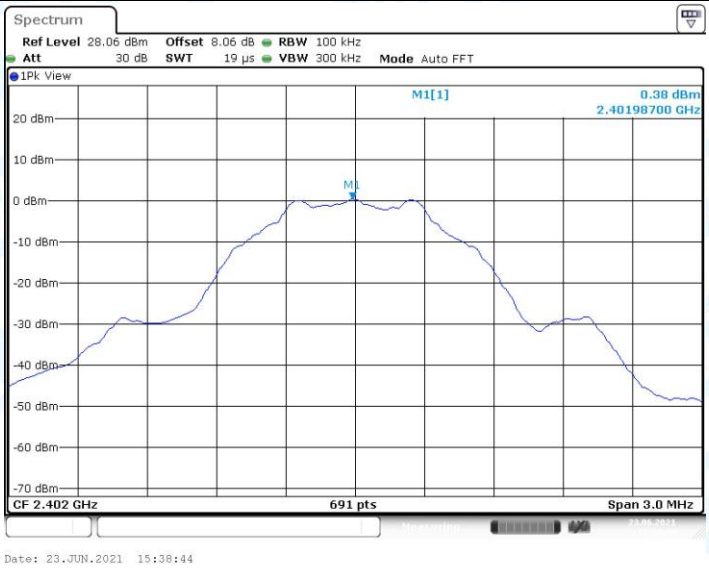
6. Conducted Spurious Emission

6.1.Test Result

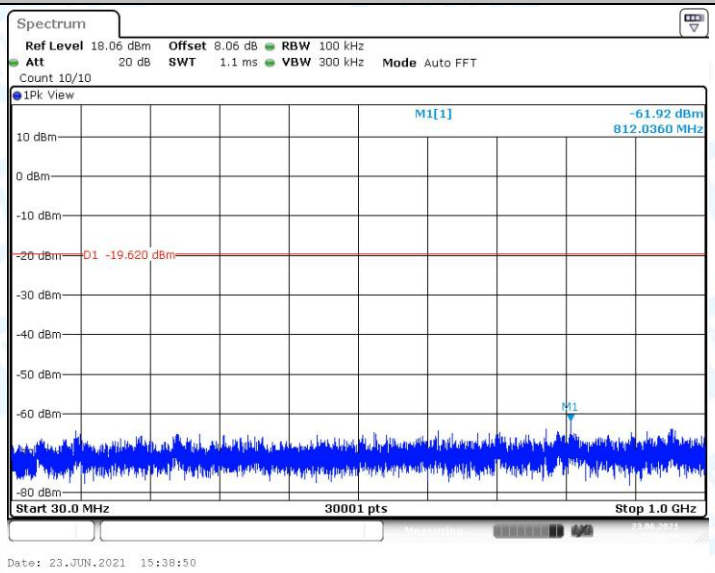
Test Mode	Antenna	Channel	Freq. Range [MHz]	Ref. Level [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	0.38	0.38	---	PASS
			30~1000	0.38	-61.92	<=-19.62	PASS
			1000~26500	0.38	-53.96	<=-19.62	PASS
		2440	Reference	-0.41	-0.41	---	PASS
			30~1000	-0.41	-63.09	<=-20.41	PASS
			1000~26500	-0.41	-53.39	<=-20.41	PASS
		2480	Reference	-2.20	-2.20	---	PASS
			30~1000	-2.20	-63.36	<=-22.2	PASS
			1000~26500	-2.20	-53.32	<=-22.2	PASS
BLE_2M	Ant1	2402	Reference	0.28	0.28	---	PASS
			30~1000	0.28	-63.2	<=-19.72	PASS
			1000~26500	0.28	-53.96	<=-19.72	PASS
		2440	Reference	-0.57	-0.57	---	PASS
			30~1000	-0.57	-63.74	<=-20.57	PASS
			1000~26500	-0.57	-53.7	<=-20.57	PASS
		2480	Reference	-2.35	-2.35	---	PASS
			30~1000	-2.35	-62.95	<=-22.35	PASS
			1000~26500	-2.35	-52.82	<=-22.35	PASS

6.2.Test Graphs

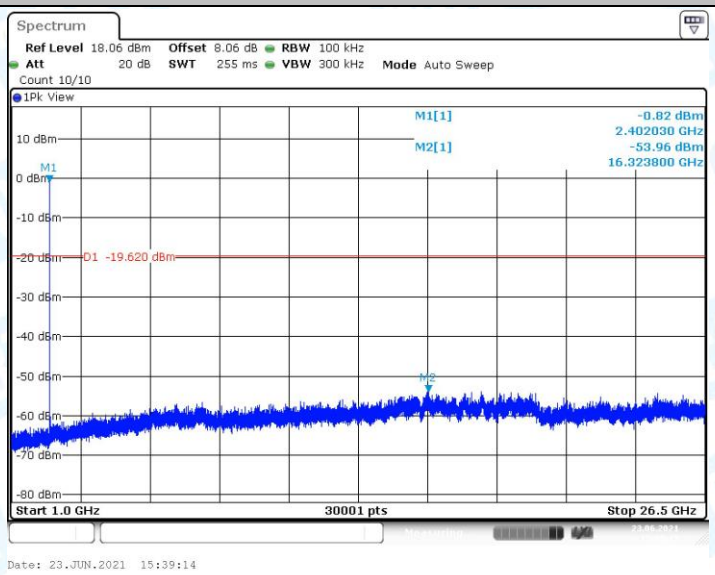
BLE_1M_Ant1_2402_0~Reference



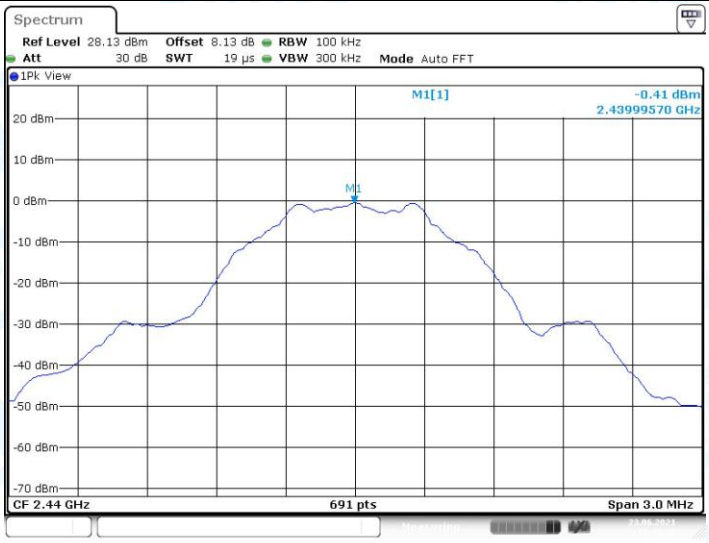
BLE_1M_Ant1_2402_30~1000



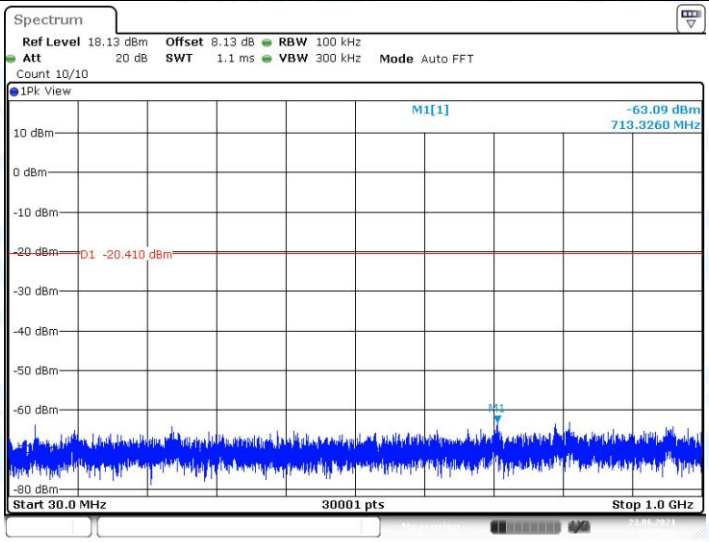
BLE_1M_Ant1_2402_1000~26500



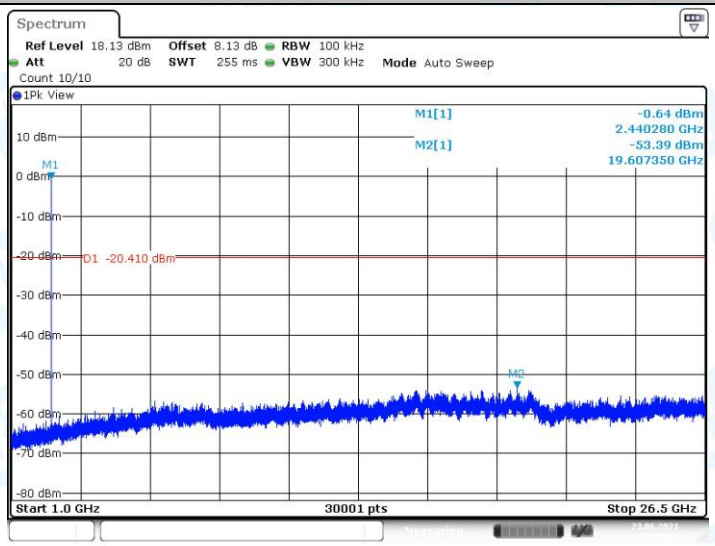
BLE_1M_Ant1_2440_0~Reference



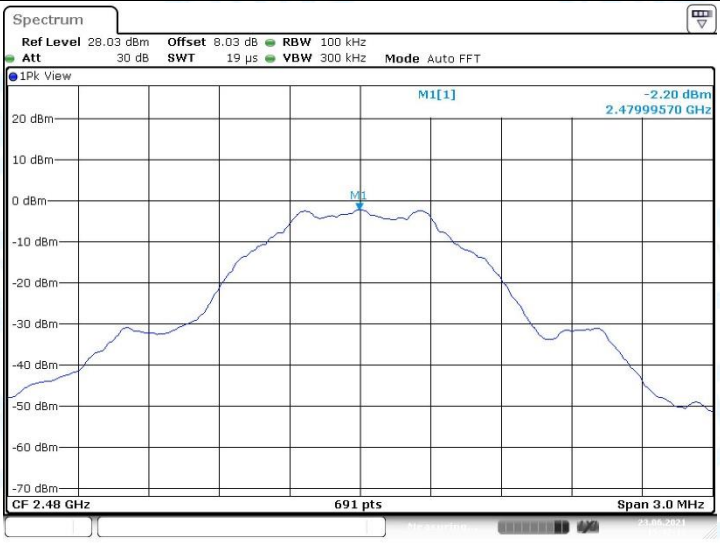
BLE_1M_Ant1_2440_30~1000



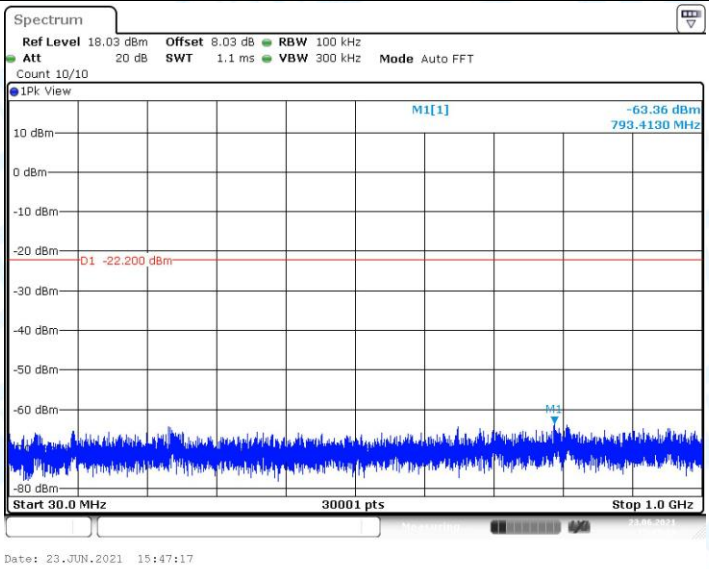
BLE_1M_Ant1_2440_1000~26500



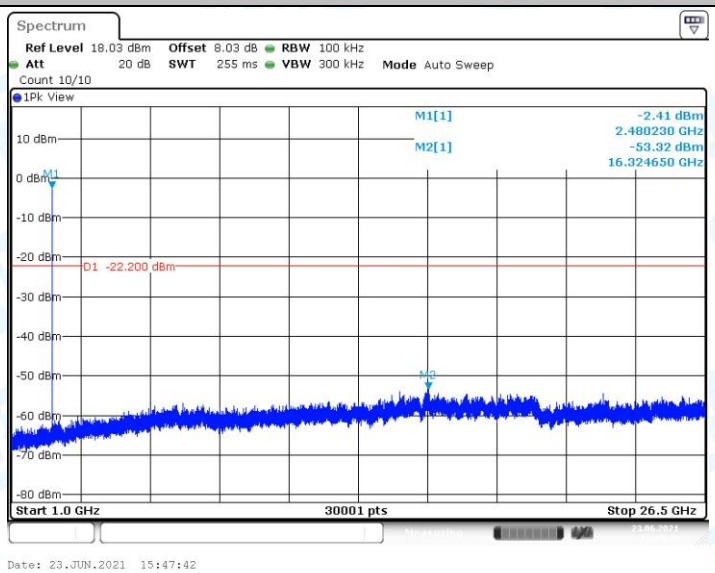
BLE_1M_Ant1_2480_0~Reference



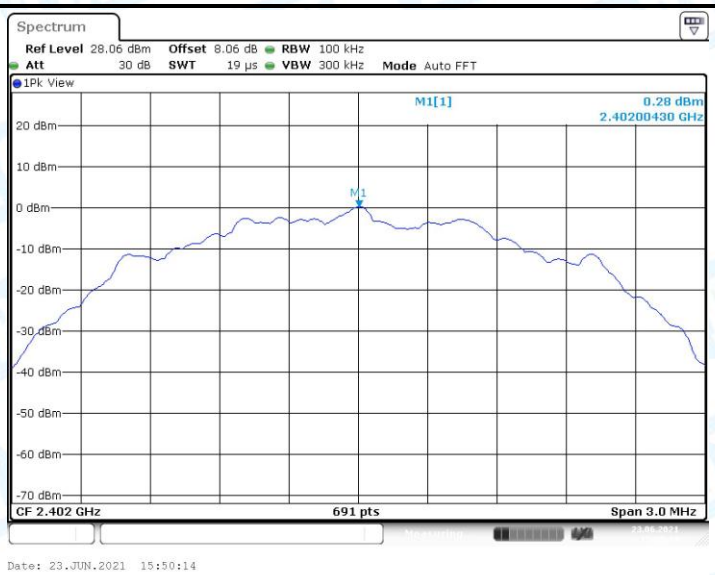
BLE_1M_Ant1_2480_30~1000



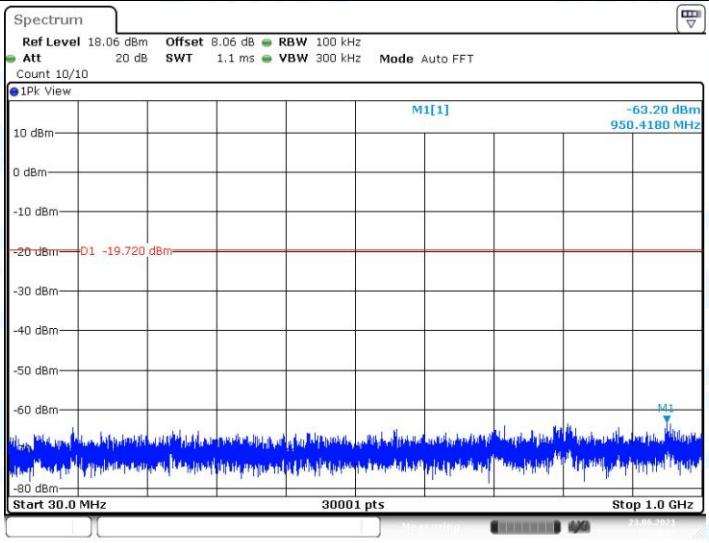
BLE_1M_Ant1_2480_1000~26500



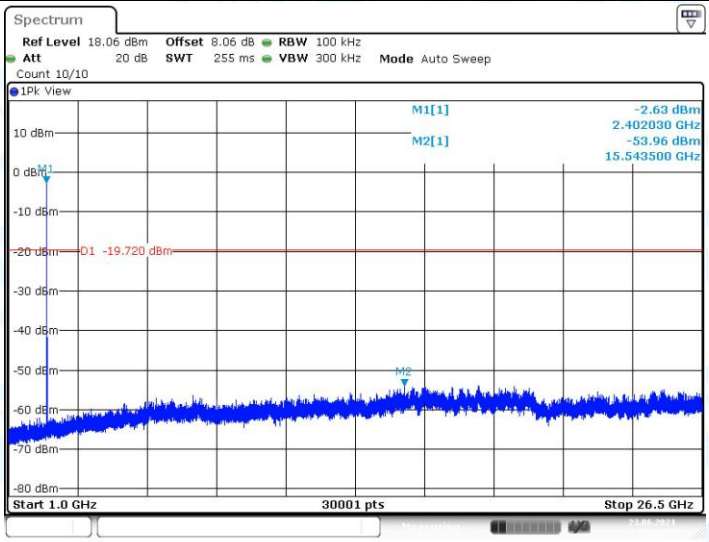
BLE_2M_Ant1_2402_0~Reference


Spectrum
Ref Level 28.06 dBm Offset 8.06 dB RBW 100 kHz
Att 30 dB SWT 19 µs VBW 300 kHz Mode Auto FFT
1Pk View
M1[1]
0.28 dBm
2.40200430 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.402 GHz
691 pts
Span 3.0 MHz
Date: 23.JUN.2021 15:50:14

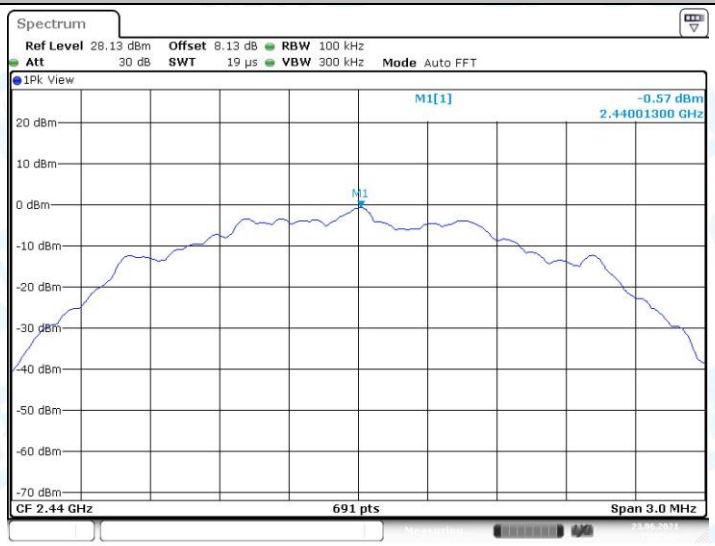
BLE_2M_Ant1_2402_30~1000



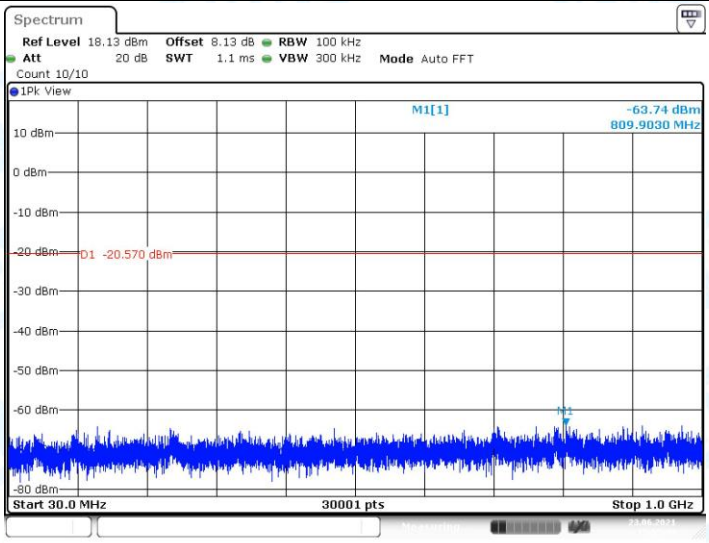
BLE_2M_Ant1_2402_1000~26500



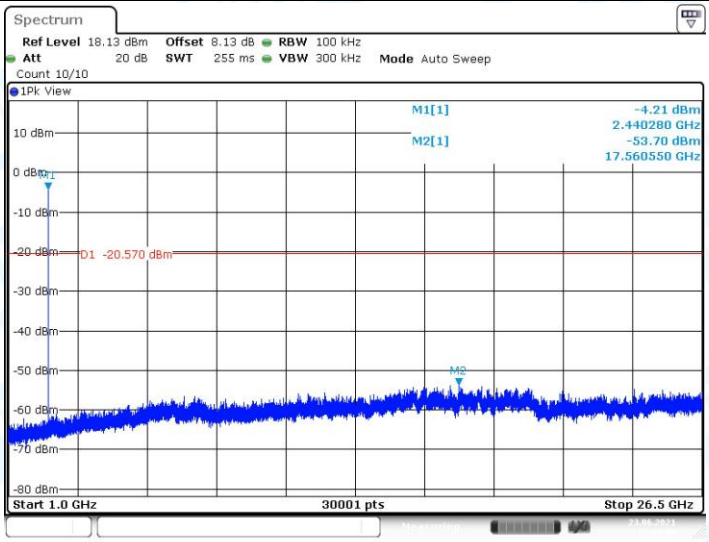
BLE_2M_Ant1_2440_0~Reference



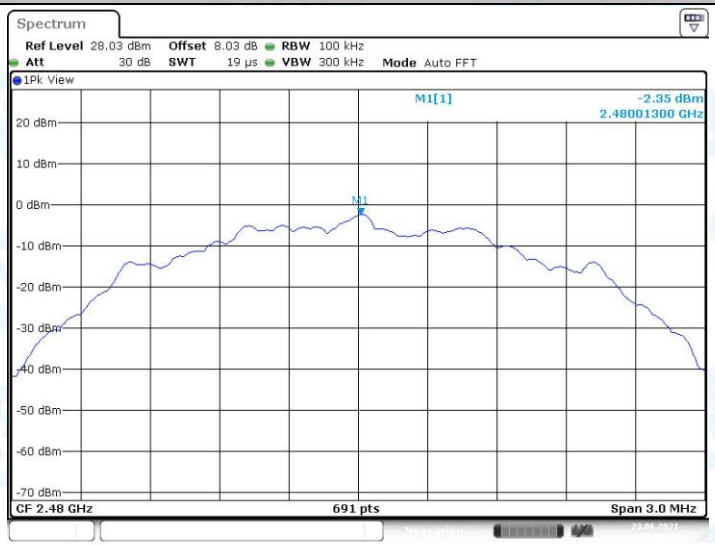
BLE_2M_Ant1_2440_30~1000



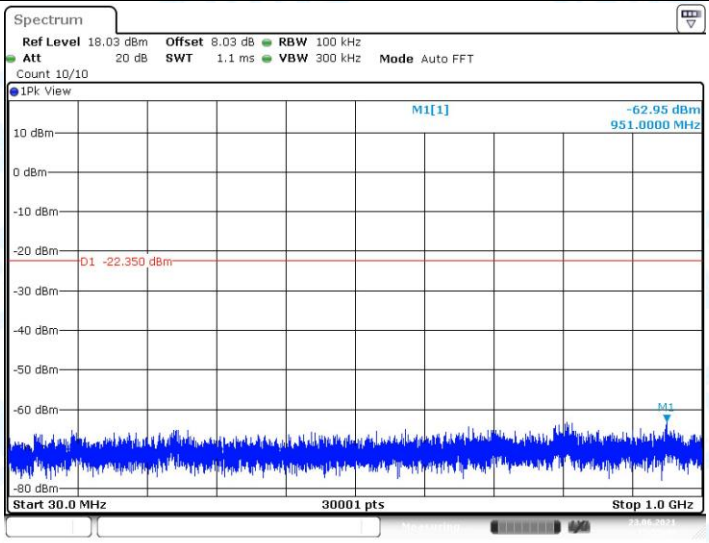
BLE_2M_Ant1_2440_1000~26500



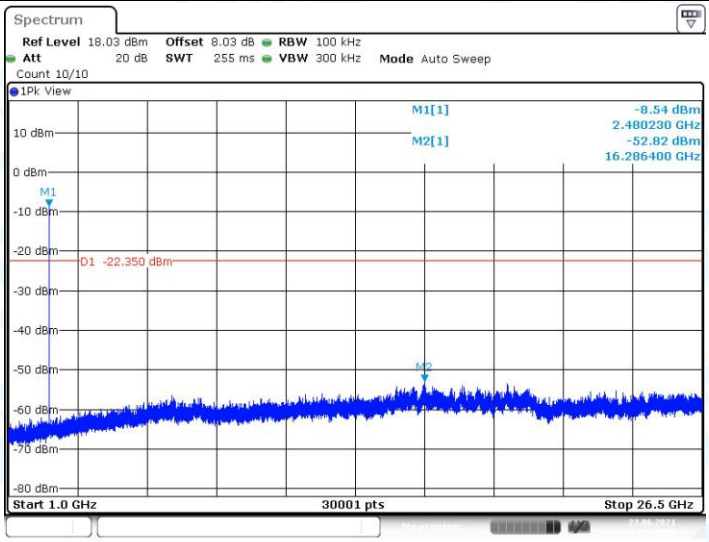
BLE_2M_Ant1_2480_0~Reference



BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500



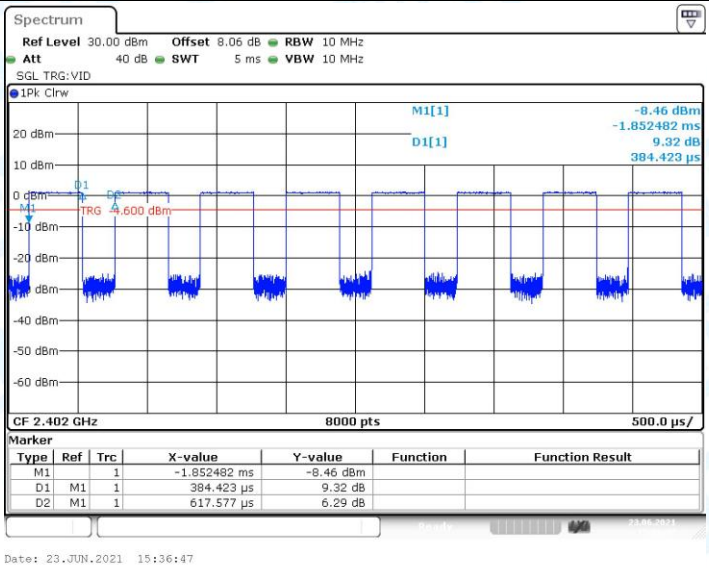
7. Duty Cycle

7.1.Test Result

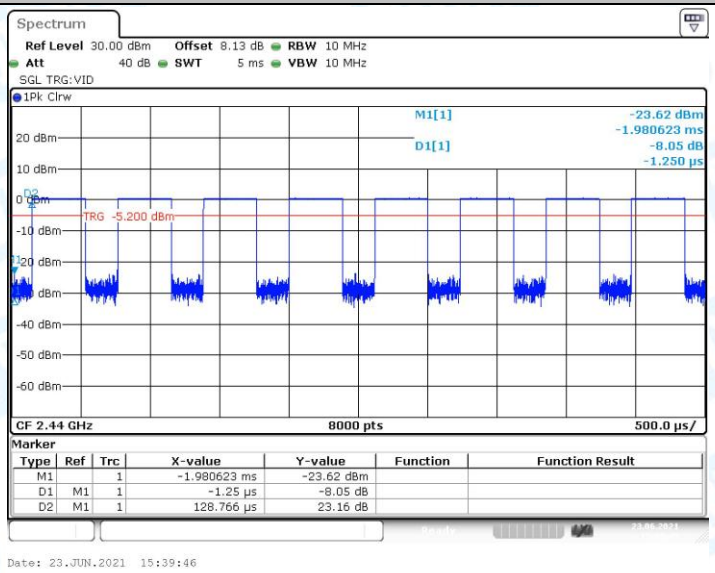
Test Mode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
BLE_1M	Ant1	2402	0.38	0.62	61.29	---	PASS
		2440	0.00	0.13	0.00	---	PASS
		2480	0.00	0.04	0.00	---	PASS
BLE_2M	Ant1	2402	0.00	0.00	100	---	PASS
		2440	0.00	0.00	100	---	PASS
		2480	0.00	0.00	100	---	PASS

7.2.Test Graphs

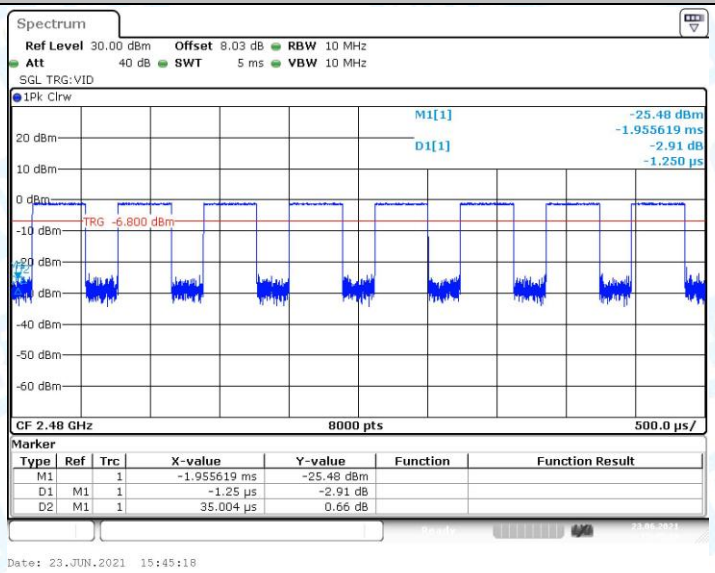
BLE_1M_Ant1_2402



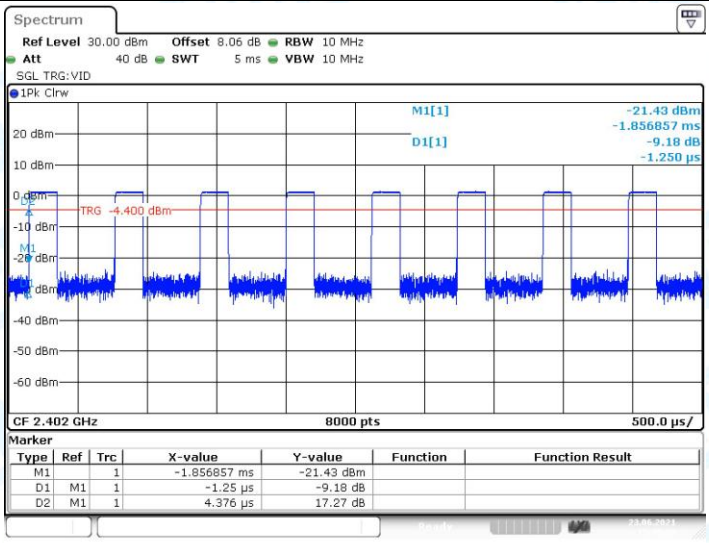
BLE_1M_Ant1_2440



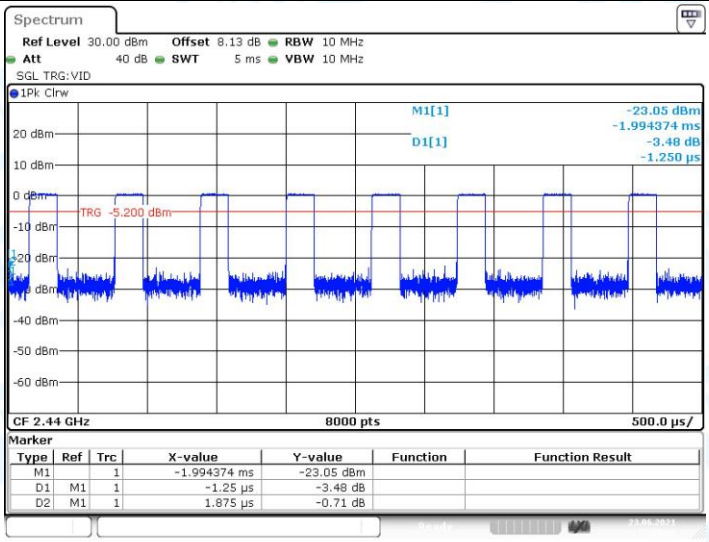
BLE_1M_Ant1_2480



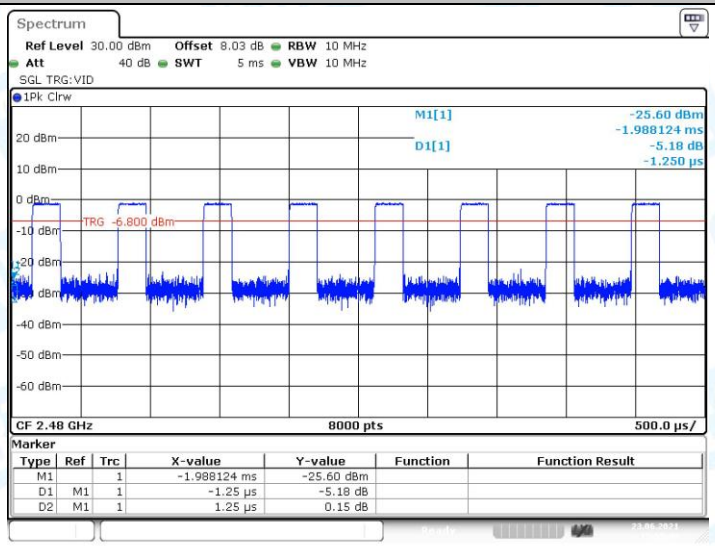
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



8. Emissions in Restricted Bands

8.1.Test Result

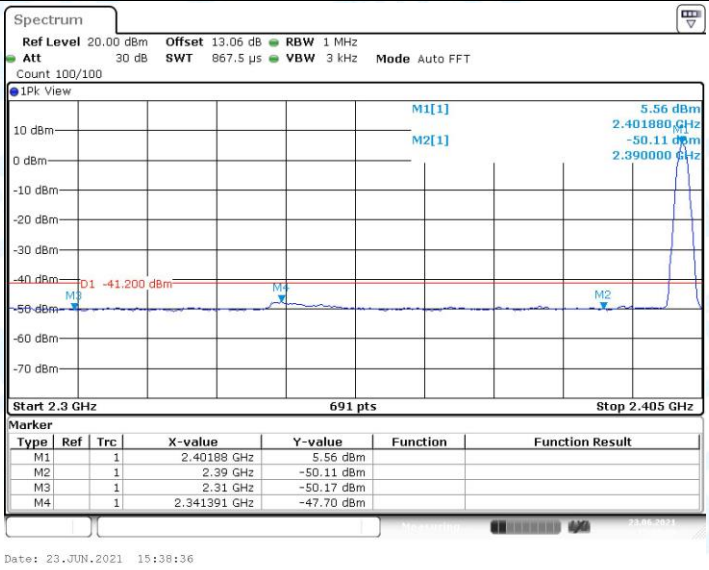
Test Mode	Antenna	ChName	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-50.17	<=-41.20	PASS
				AV	2341.391	-47.7	<=-41.20	PASS
				AV	2390.000	-50.11	<=-41.20	PASS
				Peak	2310.000	-39.48	<=-21.20	PASS
				Peak	2340.022	-37.2	<=-21.20	PASS
				Peak	2390.000	-40.03	<=-21.20	PASS
		High	2480	AV	2483.500	-50.41	<=-41.20	PASS
				AV	2483.913	-50.27	<=-41.20	PASS
				AV	2500.000	-50.59	<=-41.20	PASS
				Peak	2483.500	-40.07	<=-21.20	PASS
				Peak	2488.087	-37.09	<=-21.20	PASS
				Peak	2500.000	-39.02	<=-21.20	PASS
BLE_2M	Ant1	Low	2402	AV	2310.000	-51.5	<=-41.20	PASS
				AV	2340.935	-49.14	<=-41.20	PASS
				AV	2390.000	-51.38	<=-41.20	PASS
				Peak	2310.000	-40.35	<=-21.20	PASS
				Peak	2341.087	-35.38	<=-21.20	PASS
				Peak	2390.000	-39.96	<=-21.20	PASS
		High	2480	AV	2483.500	-50.33	<=-41.20	PASS
				AV	2483.913	-50.29	<=-41.20	PASS
				AV	2500.000	-50.53	<=-41.20	PASS
				Peak	2483.500	-40.49	<=-21.20	PASS
				Peak	2497.710	-38.36	<=-21.20	PASS
				Peak	2500.000	-39.59	<=-21.20	PASS

Note：

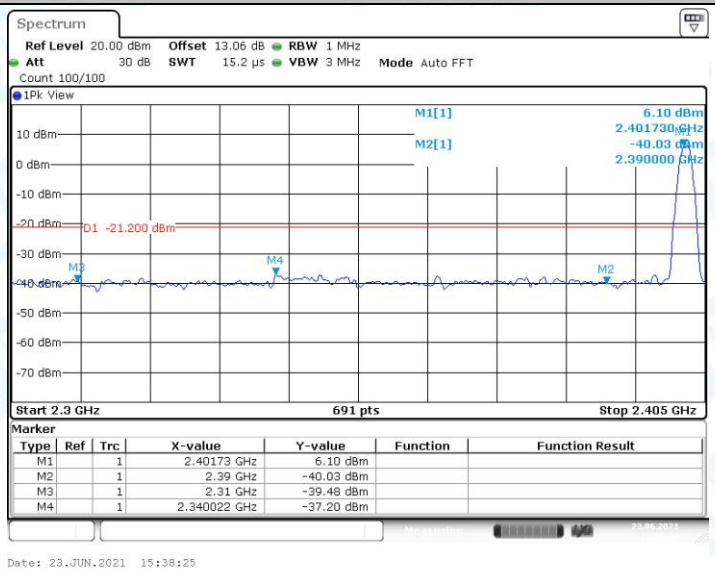
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

8.2.Test Graphs

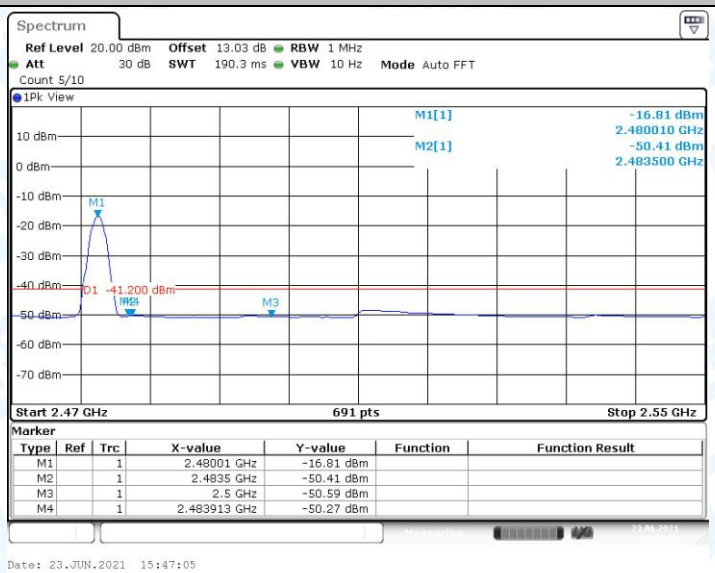
BLE_1M_Ant1_Low_2402_AV



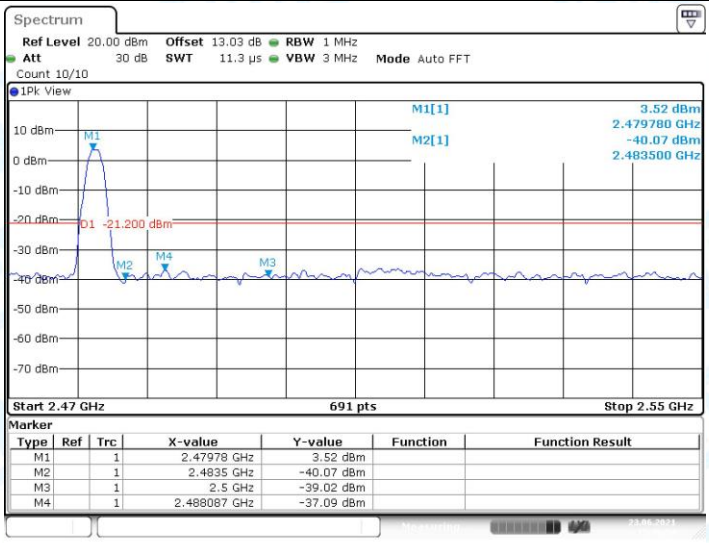
BLE_1M_Ant1_Low_2402_Peak



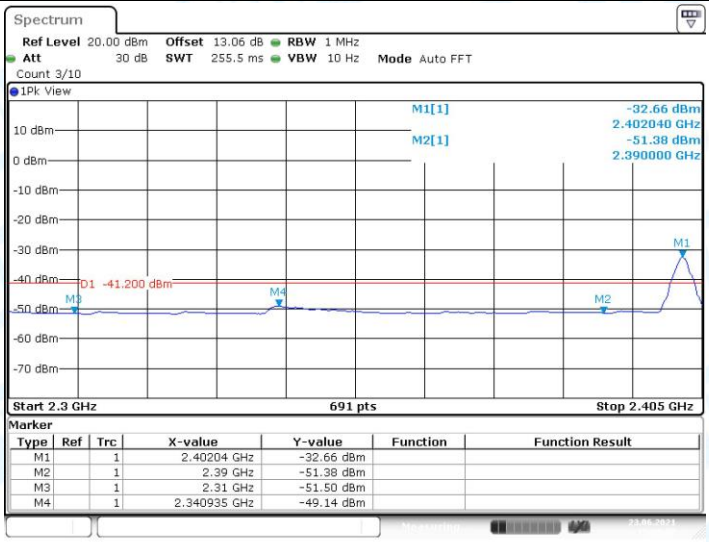
BLE_1M_Ant1_High_2480_AV



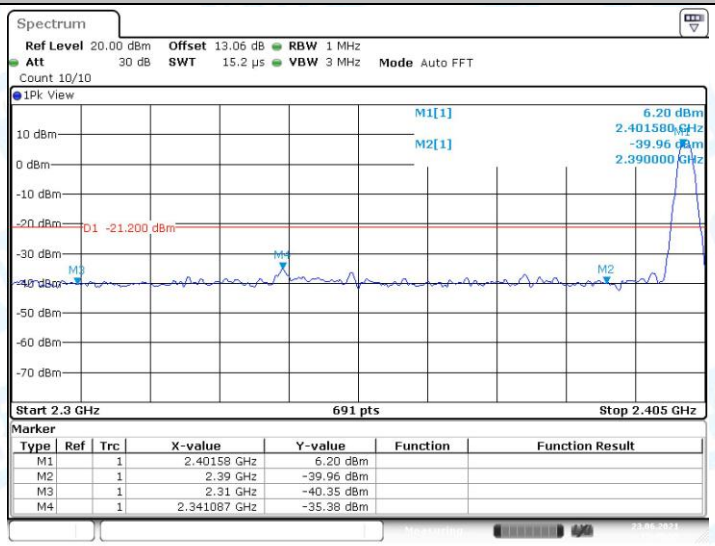
BLE_1M_Ant1_High_2480_Peak



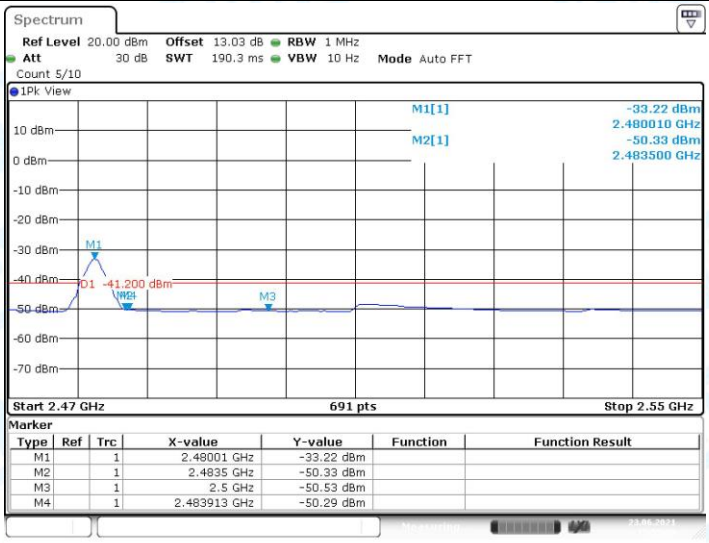
BLE_2M_Ant1_Low_2402_AV



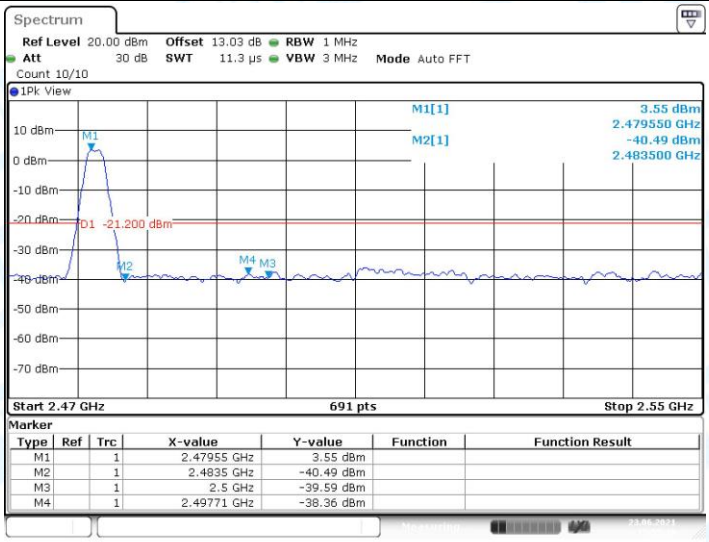
BLE_2M_Ant1_Low_2402_Peak



BLE_2M_Ant1_High_2480_AV



BLE_2M_Ant1_High_2480_Peak



-----End of the report-----