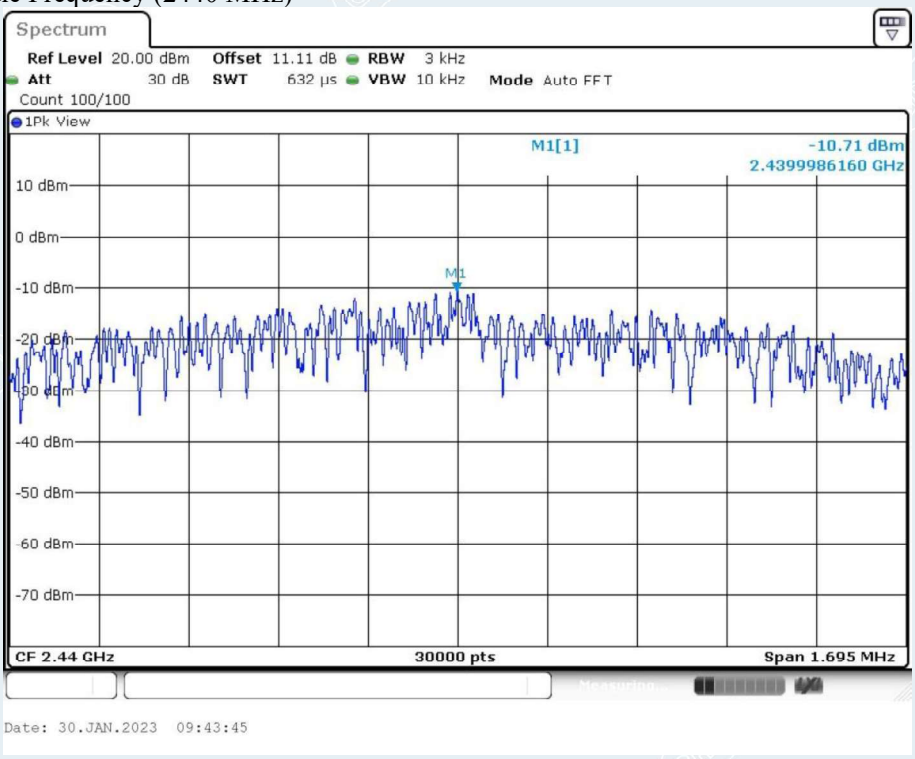
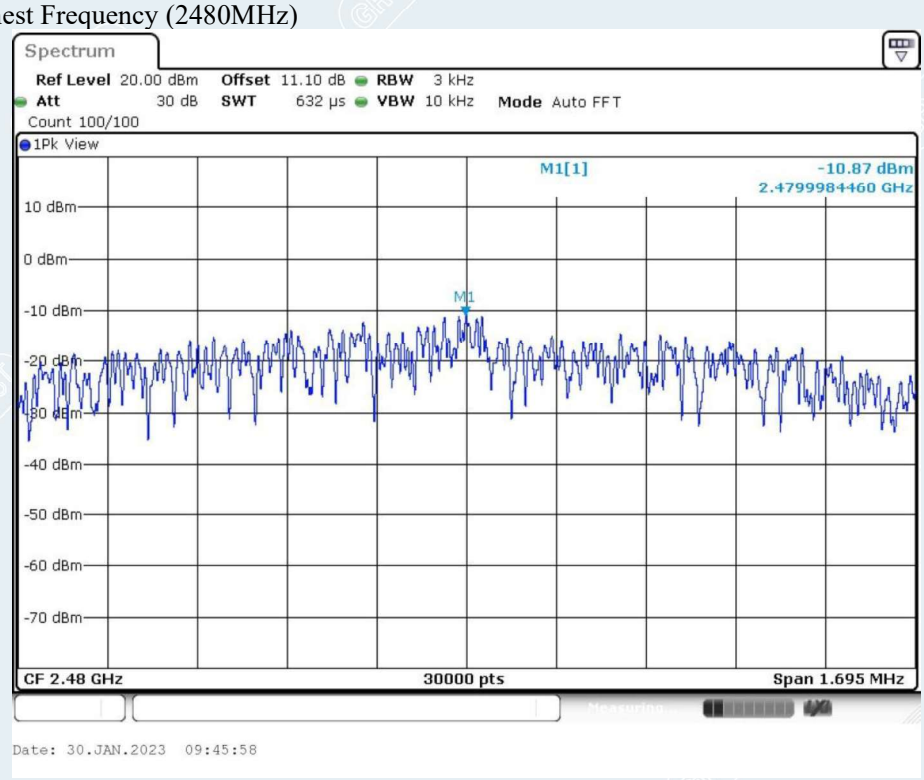
Middle Frequency (2440 MHz)



Highest Frequency (2480MHz)



11. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

11.1 LIMITS

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB.

11.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 15.247 Measurement Guidance v05r02.

Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.

1) Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
2) Set the spectrum analyzer: RBW =100kHz; VBW =300kHz, Frequency range = 30MHz to 26.5GHz; Sweep = auto; Detector Function = Peak. Trace = Max, hold.
3) Measure and record the results in the test report.
4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

11.3 TEST SETUP

---------- The following blanks ----------

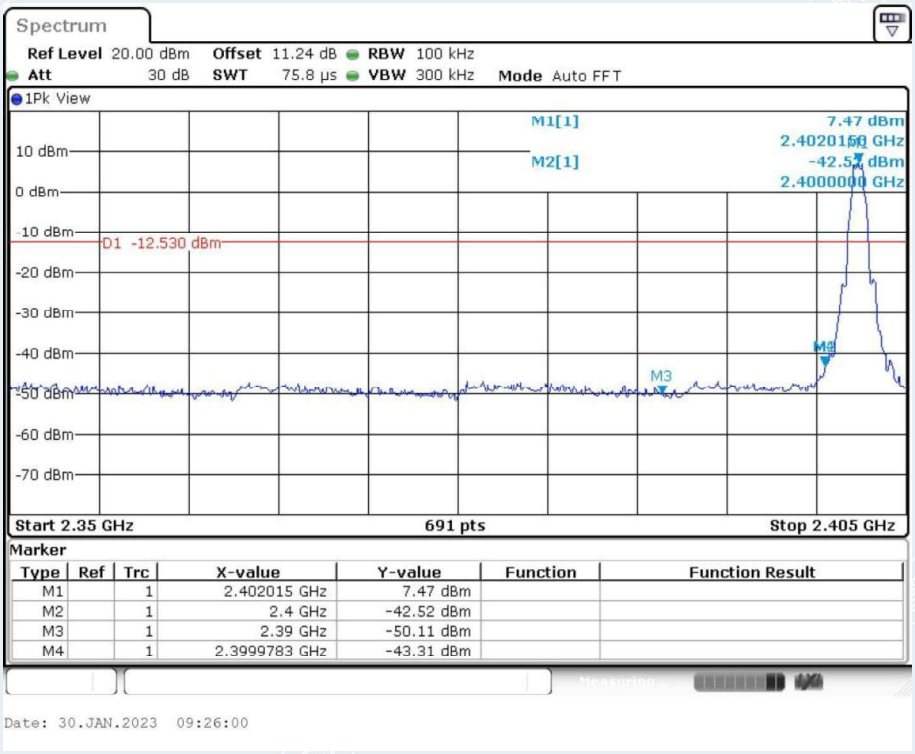
11.4 TEST RESULTS

Environment: 21.3℃/59%RH/101.0kPa Voltage: DC 6V
Tested By: Yang Zhaoyun Date: 2023-01-30

Band edge measurements

BLE_1M

Lowest Frequency (2402MHz)
2.35GHz-2.405GHz



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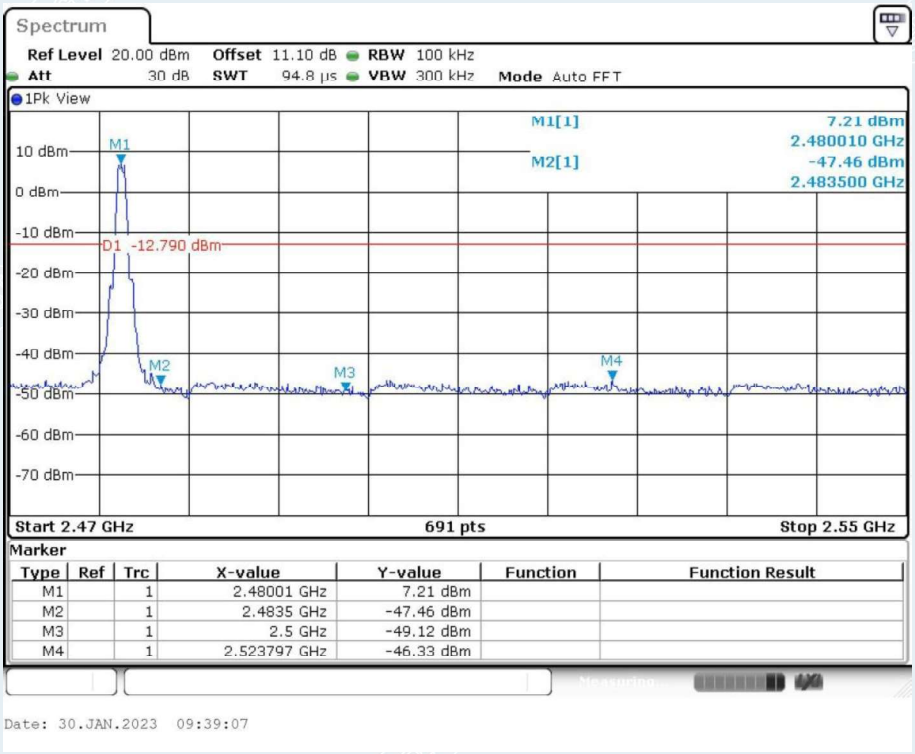
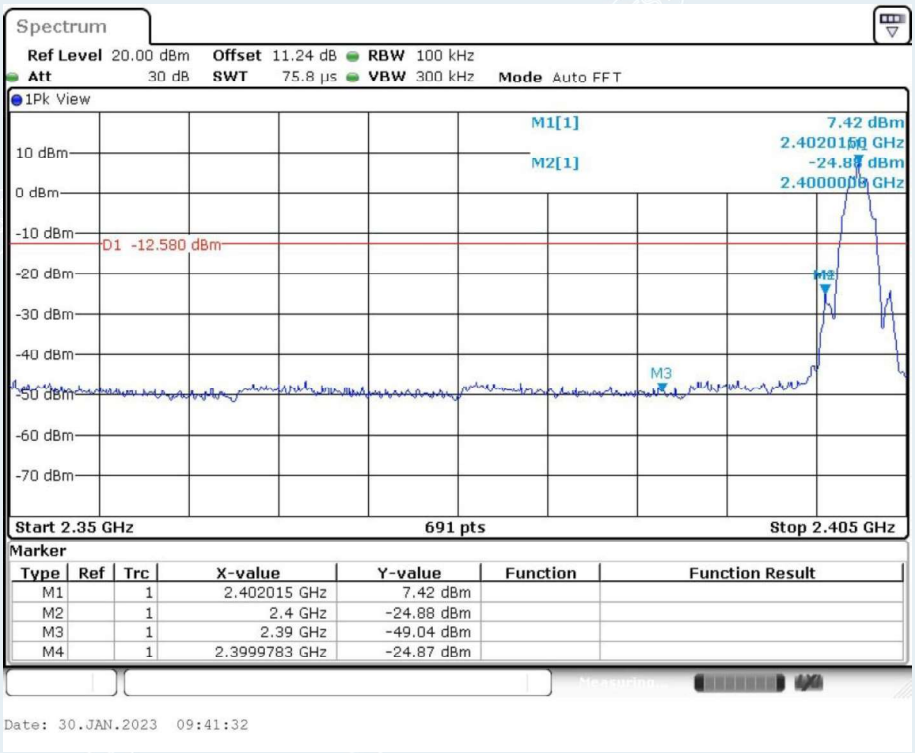
Highest Frequency (2480MHz)
2.47GHz-2.55GHz

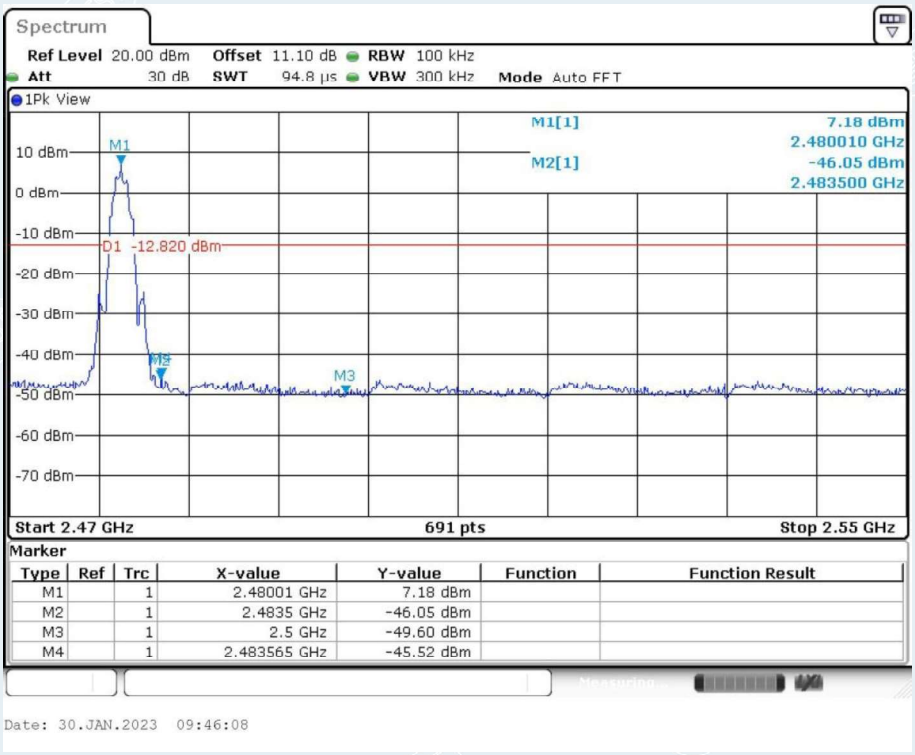


BLE_2M

Lowest Frequency (2402MHz)
2.35GHz-2.405GHz

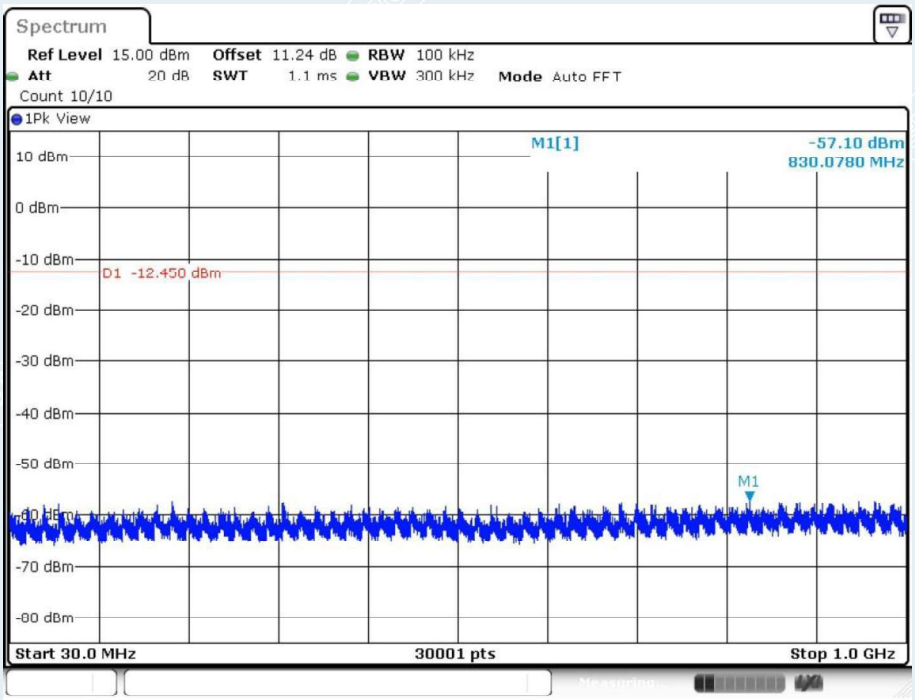


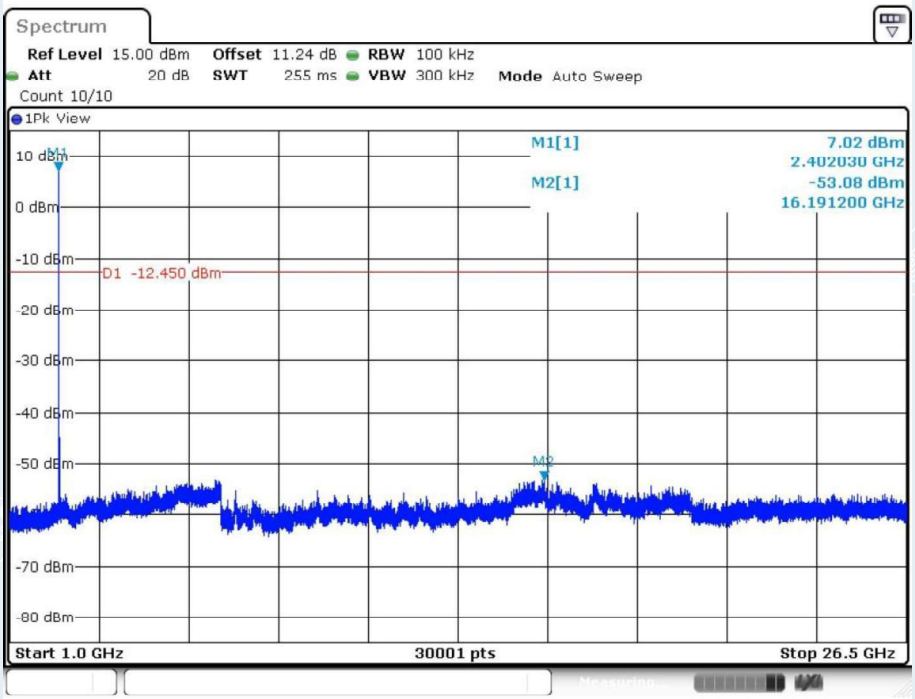
Highest Frequency (2480MHz)
2.47GHz-2.55GHz



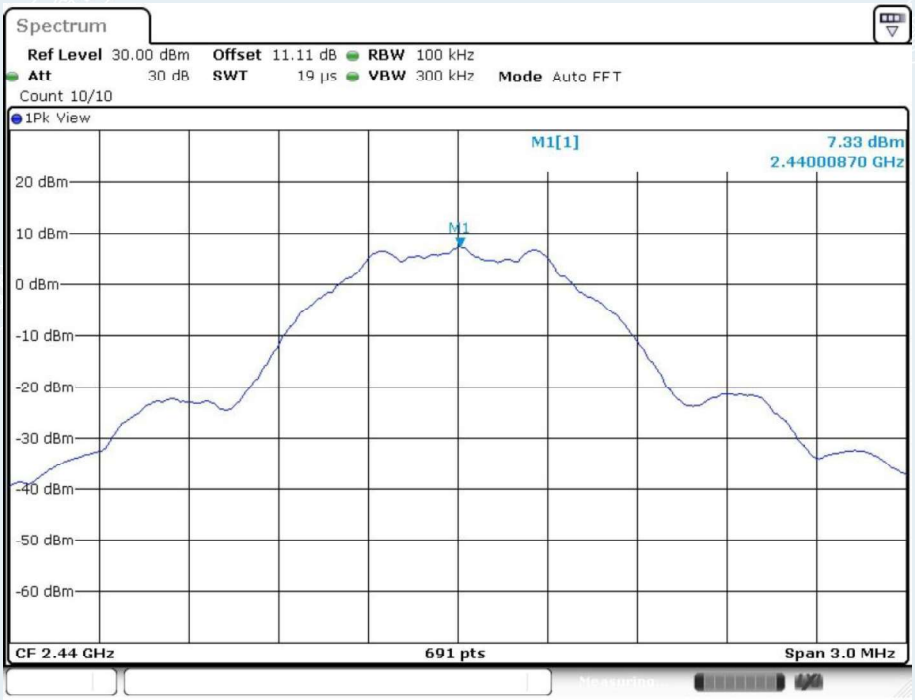
Conducted Spurious Emission
BLE_1M

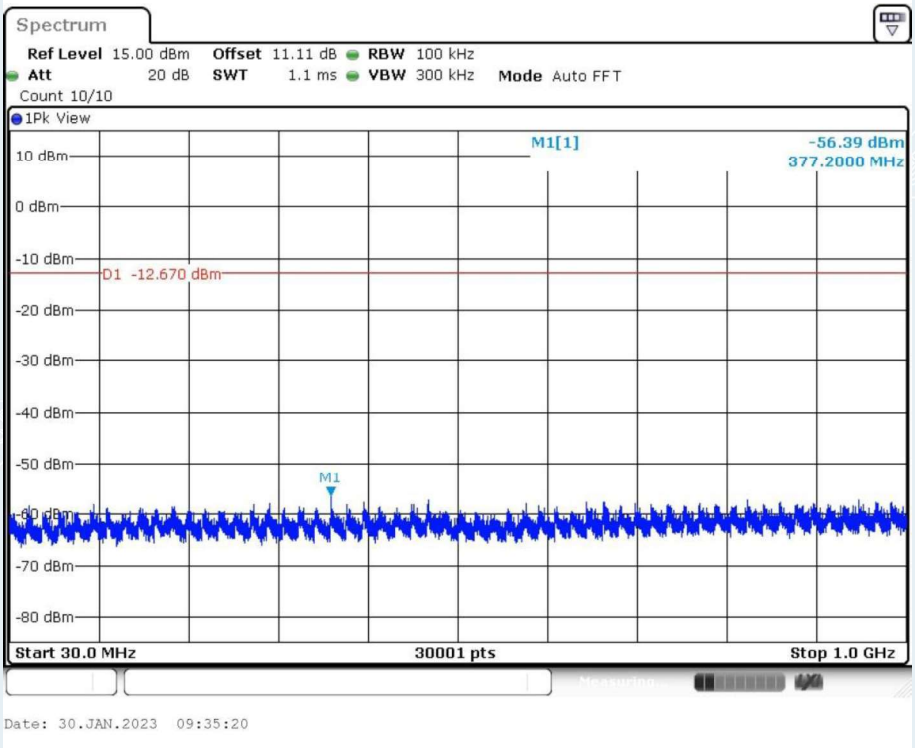
Lowest Frequency (2402MHz)

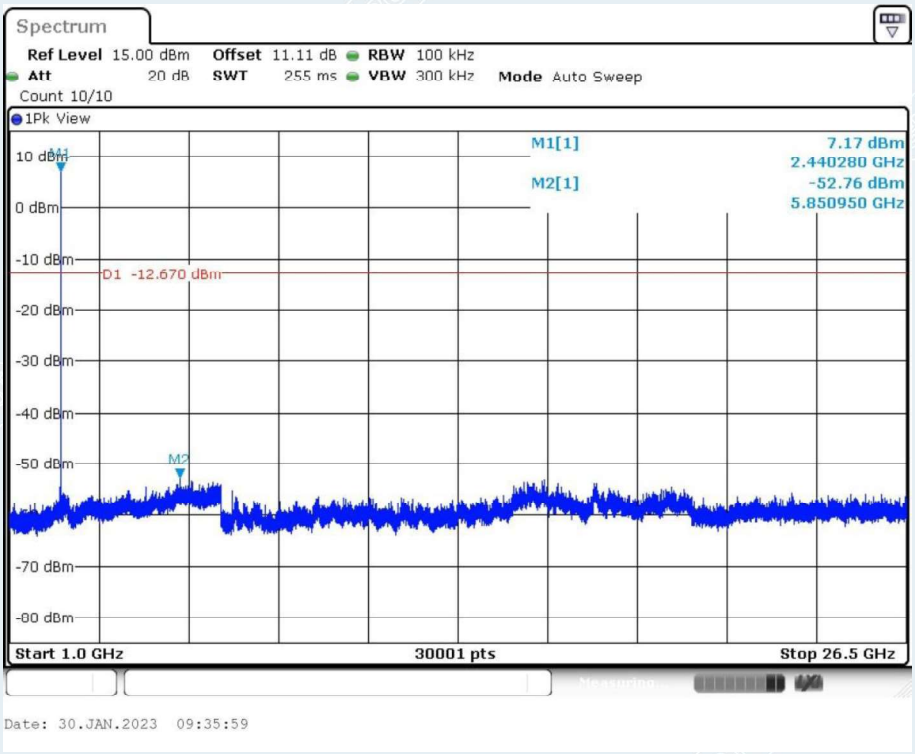

Spectrum
Ref Level 15.00 dBm Offset 11.24 dB RBW 100 kHz
Att 20 dB SWT 1.1 ms VBW 300 kHz Mode Auto FFT
Count 10/10
1Pk View
M1[1] -57.10 dBm
830.0780 MHz
D1 -12.450 dBm
M1
Start 30.0 MHz 30001 pts Stop 1.0 GHz
Date: 30.JAN.2023 09:26:21


Spectrum
Ref Level 15.00 dBm Offset 11.24 dB RBW 100 kHz
Att 20 dB SWT 255 ms VBW 300 kHz Mode Auto Sweep
Count 10/10
1Pk View
M1[1] 7.02 dBm
2.402030 GHz
M2[1] -53.08 dBm
16.191200 GHz
D1 -12.450 dBm
M1
M2
Start 1.0 GHz 30001 pts Stop 26.5 GHz
Date: 30.JAN.2023 09:27:00

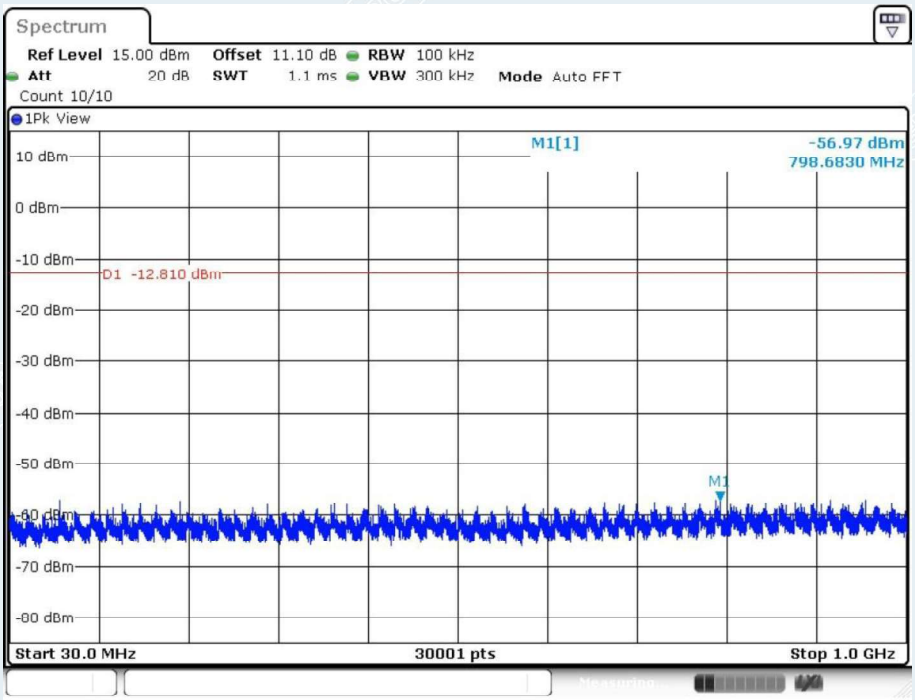
Middle Frequency (2440MHz)

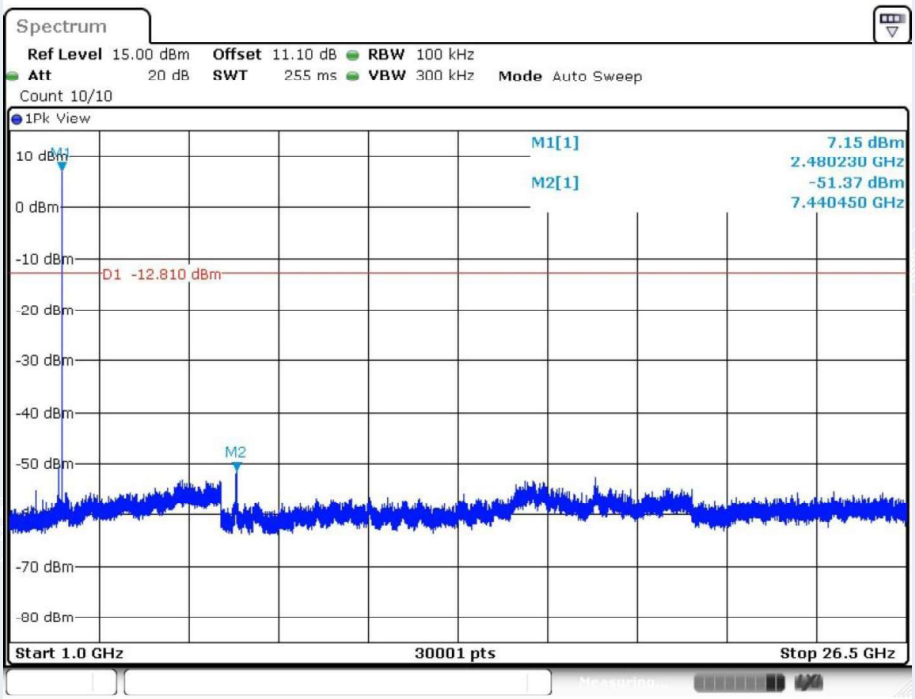






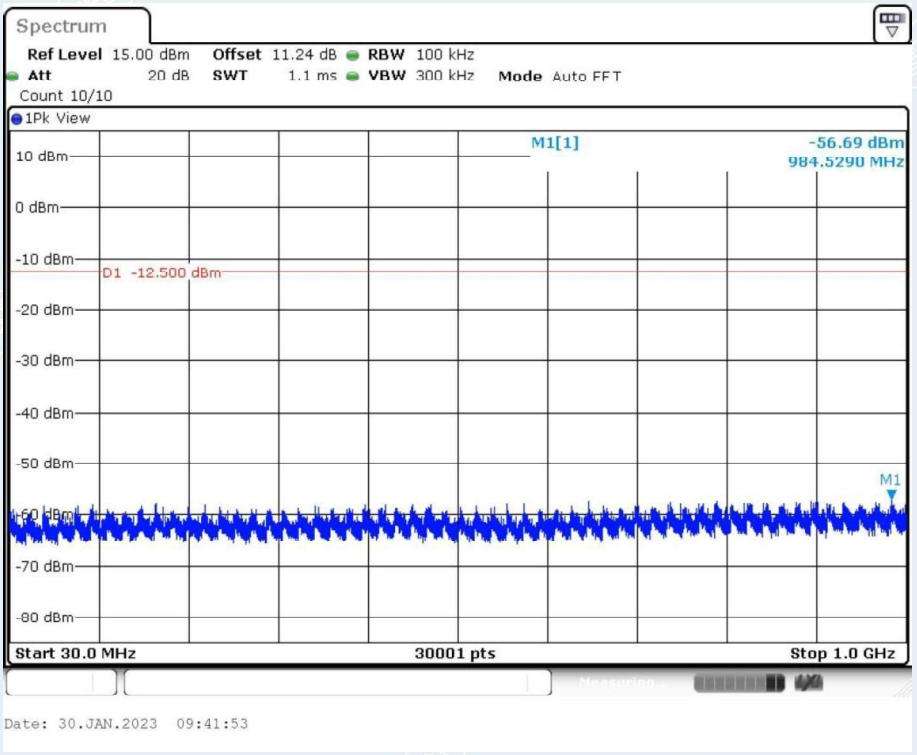
Highest Frequency (2480MHz)

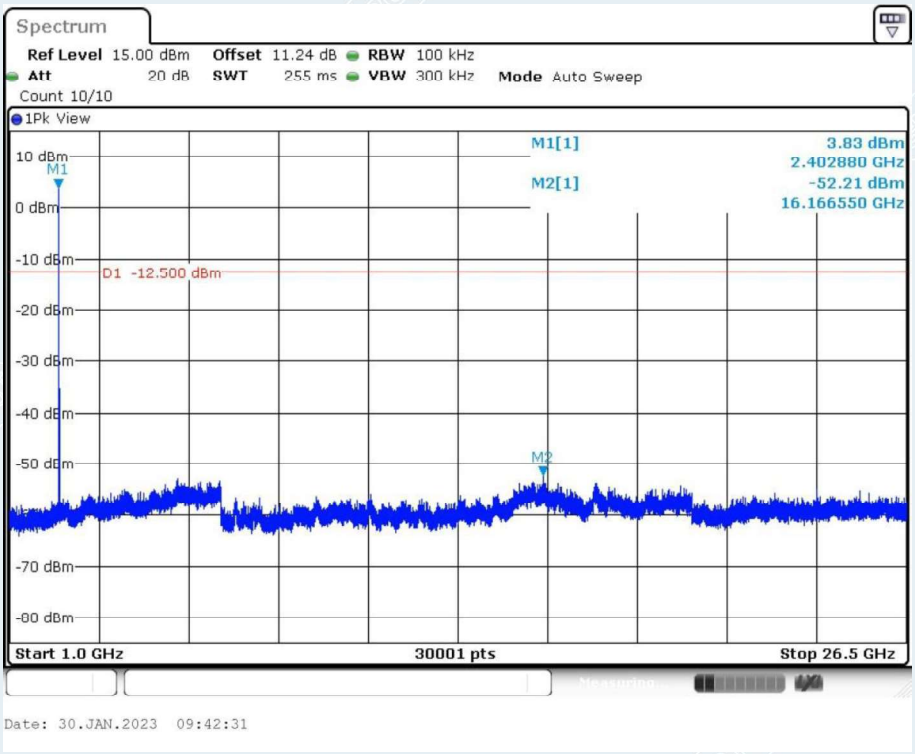

Spectrum
Ref Level 15.00 dBm Offset 11.10 dB RBW 100 kHz
Att 20 dB SWT 1.1 ms VBW 300 kHz Mode Auto FFT
Count 10/10
1Pk View
M1[1] -56.97 dBm
798.6830 MHz
D1 -12.810 dBm
M1
Start 30.0 MHz 30001 pts Stop 1.0 GHz
Date: 30.JAN.2023 09:39:27


Spectrum
Ref Level 15.00 dBm Offset 11.10 dB RBW 100 kHz
Att 20 dB SWT 255 ms VBW 300 kHz Mode Auto Sweep
Count 10/10
1Pk View
M1[1] 7.15 dBm
2.480230 GHz
M2[1] -51.37 dBm
7.440450 GHz
D1 -12.810 dBm
M1
M2
Start 1.0 GHz 30001 pts Stop 26.5 GHz
Date: 30.JAN.2023 09:40:06

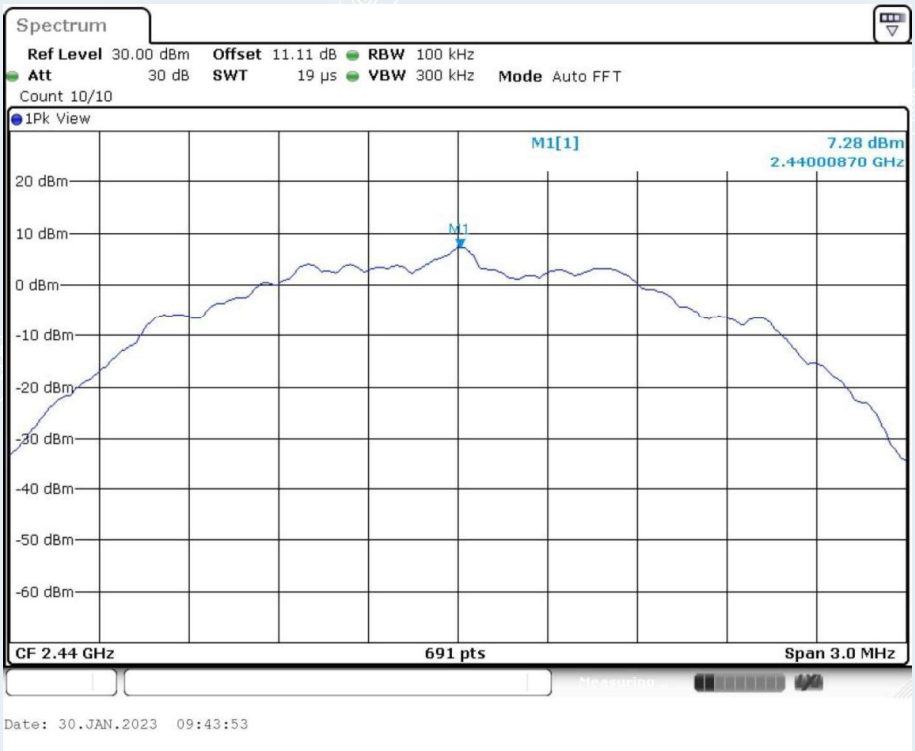
BLE_2M

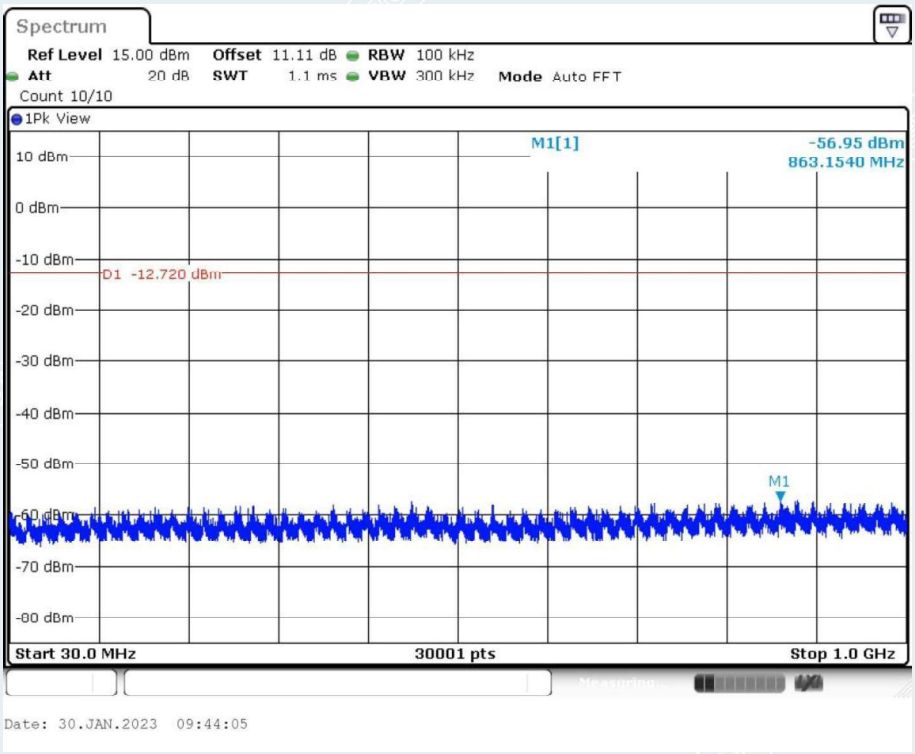
Lowest Frequency (2402MHz)

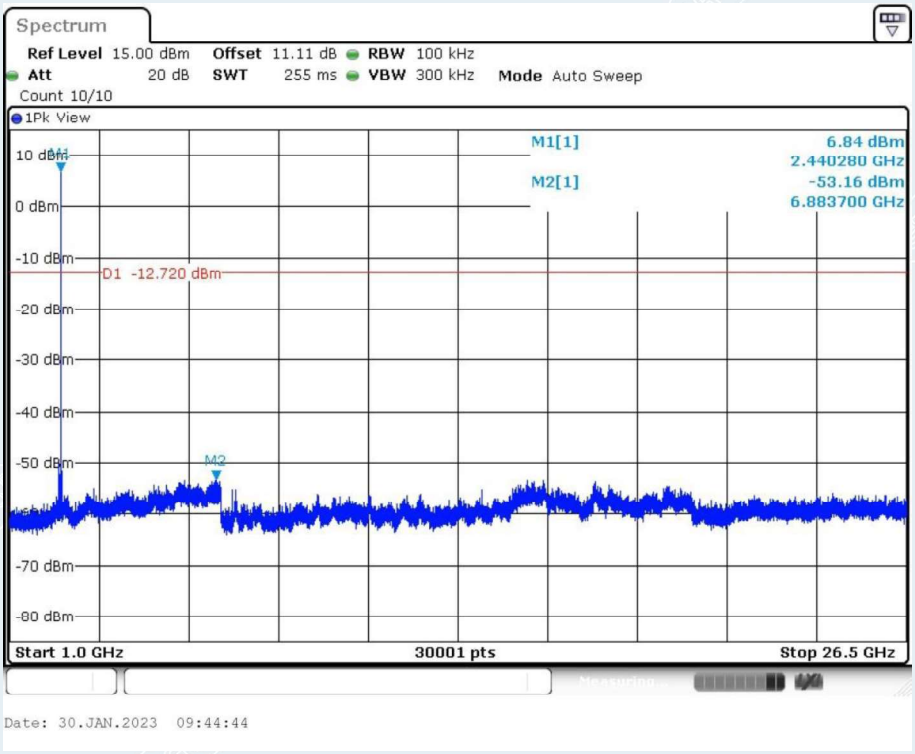




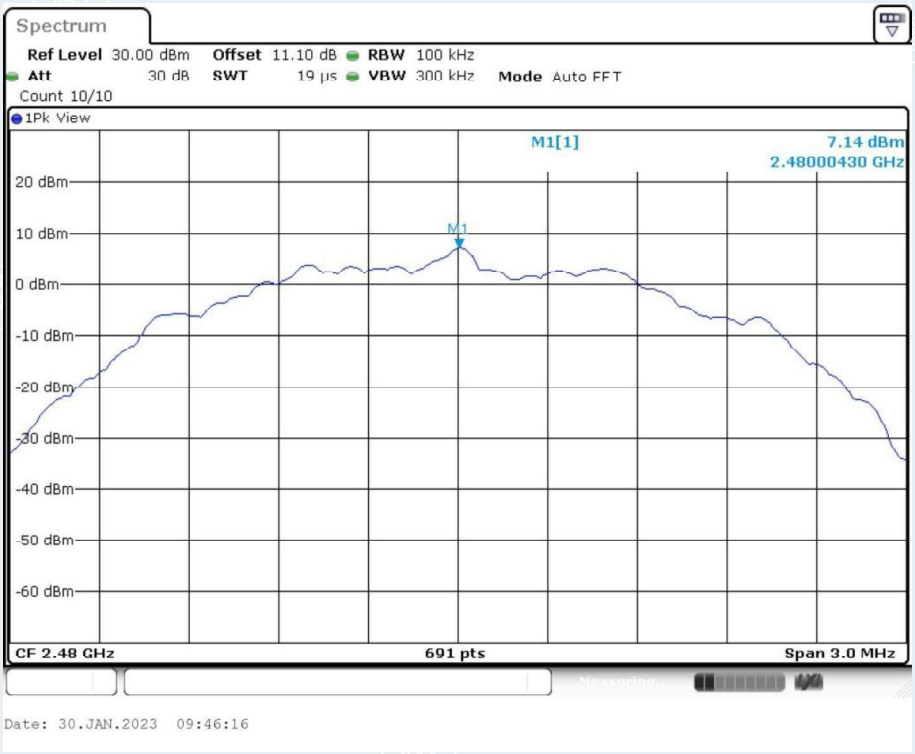
Middle Frequency (2440MHz)

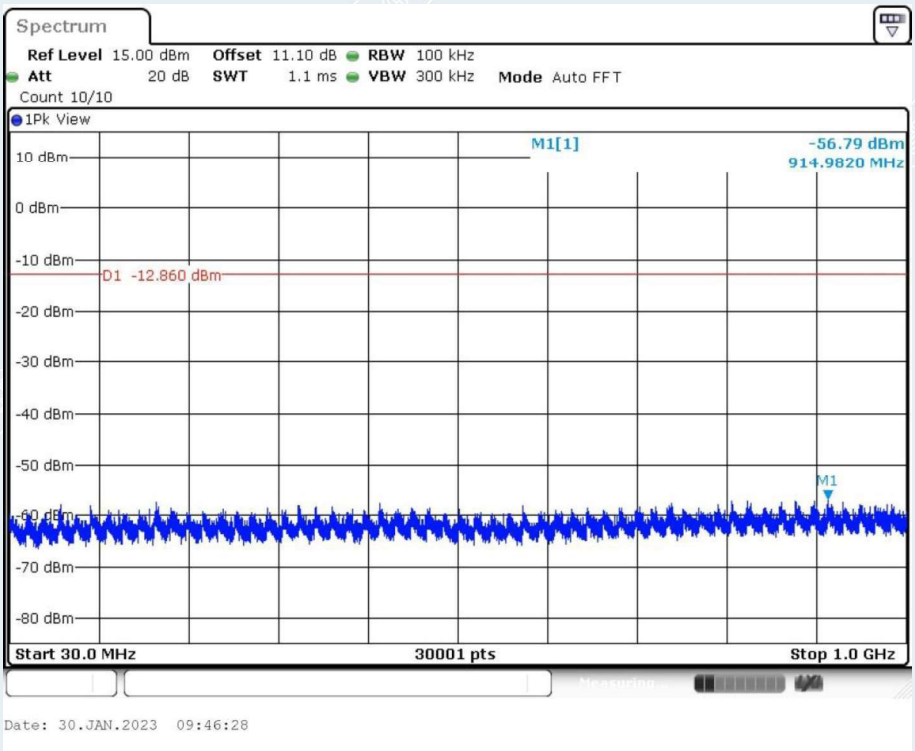


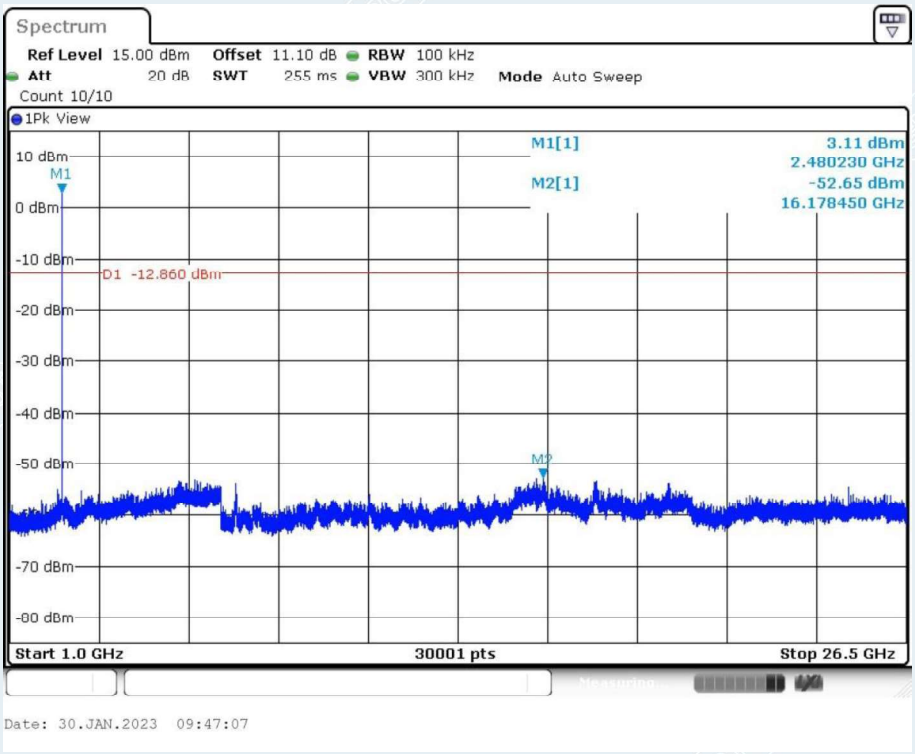

Spectrum
Ref Level 15.00 dBm Offset 11.11 dB RBW 100 kHz
Att 20 dB SWT 1.1 ms VBW 300 kHz Mode Auto FFT
Count 10/10
1Pk View
M1[1] -56.95 dBm
863.1540 MHz
D1 -12.720 dBm
M1
Start 30.0 MHz 30001 pts Stop 1.0 GHz
Date: 30.JAN.2023 09:44:05


Spectrum
Ref Level 15.00 dBm Offset 11.11 dB RBW 100 kHz
Att 20 dB SWT 255 ms VBW 300 kHz Mode Auto Sweep
Count 10/10
1Pk View
M1[1] 6.84 dBm
2.440280 GHz
M2[1] -53.16 dBm
6.883700 GHz
D1 -12.720 dBm
M2
Start 1.0 GHz 30001 pts Stop 26.5 GHz
Date: 30.JAN.2023 09:44:44

Highest Frequency (2480MHz)







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12. RESTRICTED BANDS OF OPERATION

12.1 LIMITS

Section 15.247(d) In addition, Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

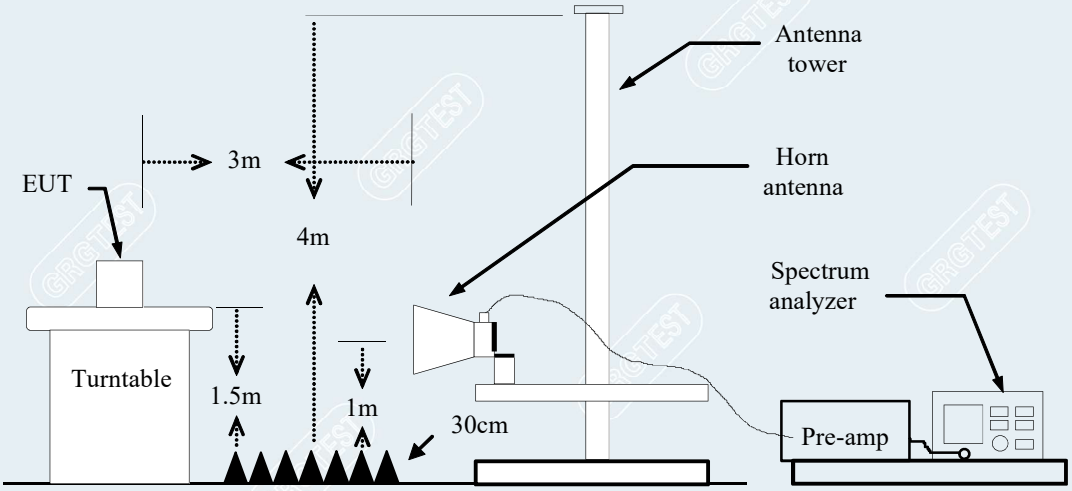
Frequency (MHz)	Quasi-peak(μV/m)	Measurement distance(m)	Quasi-peak(dBμV/m)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

12.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 15.247 Meas Guidance v05r02.

1) The EUT is placed on a turntable, which is 1.5m above the ground plane.
2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4) Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
   a) PEAK: RBW=1MHz / VBW=1MHz / Sweep=AUTO.
   b) AVERAGE: RBW=1MHz / VBW=1/T / Sweep=AUTO.
   If the EUT is configured to transmit with duty cycle ≥98%，set VBW≤RBW/100 (i.e.,10kHz) but not less than 10 Hz. If the EUT duty cycle is ＜98%，set VBW≥1/T, Where T is defined in section 2.8.
5) Repeat the procedures until all the PEAK and AVERAGE versus polarization are measured.

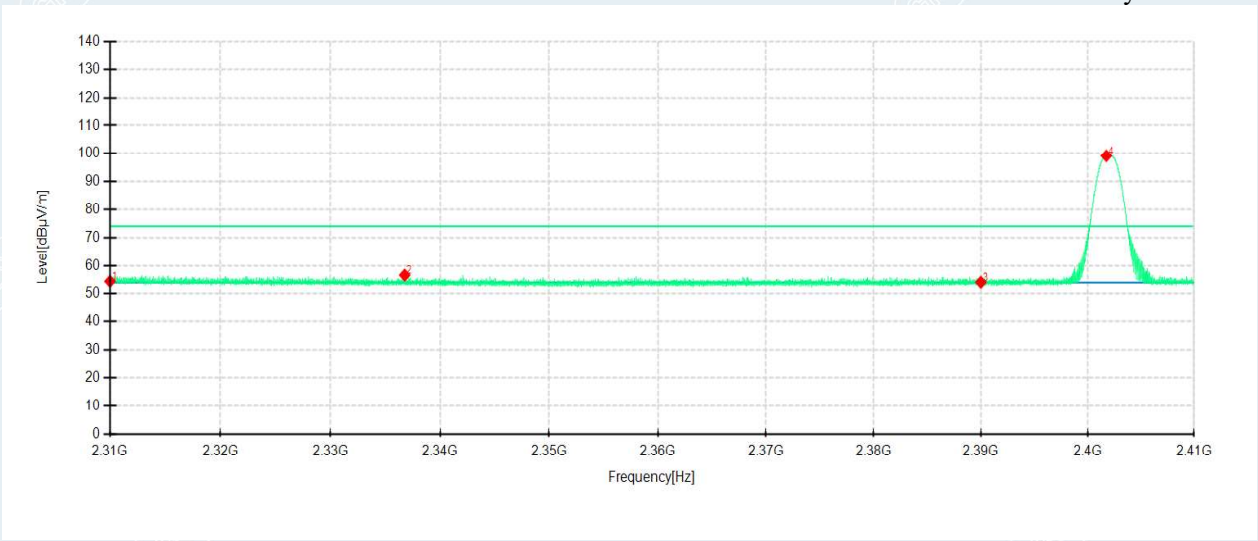
12.3 TEST SETUP



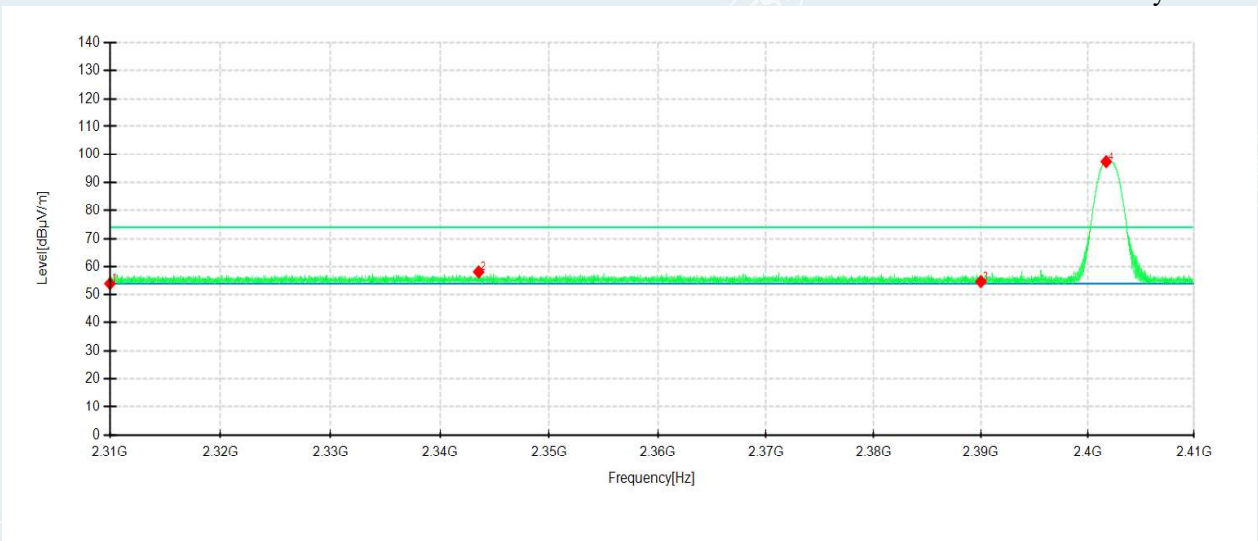
12.4 TEST RESULTS

Equipment:	Smart Lock U100	Test Date	2023-01-30
Model No.:	SDL-D01	Test Engineer:	Huang Lifang
Test Voltage:	DC 6V	Environmental Conditions	25.0℃/60%RH/101.0kPa

BLE 1M
Lowest Frequency
Frequency 2402MHz
Detector mode: Peak Polarity: Horizontal



Detector mode: Peak Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310	45.08	54.43	9.35	74.00	19.57	200	44	Horizontal	/
2	2336.7685	47.82	56.61	8.79	74.00	17.39	200	212	Horizontal	/
3	2390	45.16	54.09	8.93	74.00	19.91	200	344	Horizontal	/
4	2401.7528	90.14	99.17	9.03	74.00	-25.17	100	59	Horizontal	No limit
1	2310	44.03	53.96	9.93	74.00	20.04	200	44	Vertical	/
2	2343.5356	47.87	58.04	10.17	74.00	15.96	100	227	Vertical	/
3	2390	44.61	54.68	10.07	74.00	19.32	100	172	Vertical	/
4	2401.7394	87.31	97.31	10.00	74.00	-23.31	100	48	Vertical	No limit

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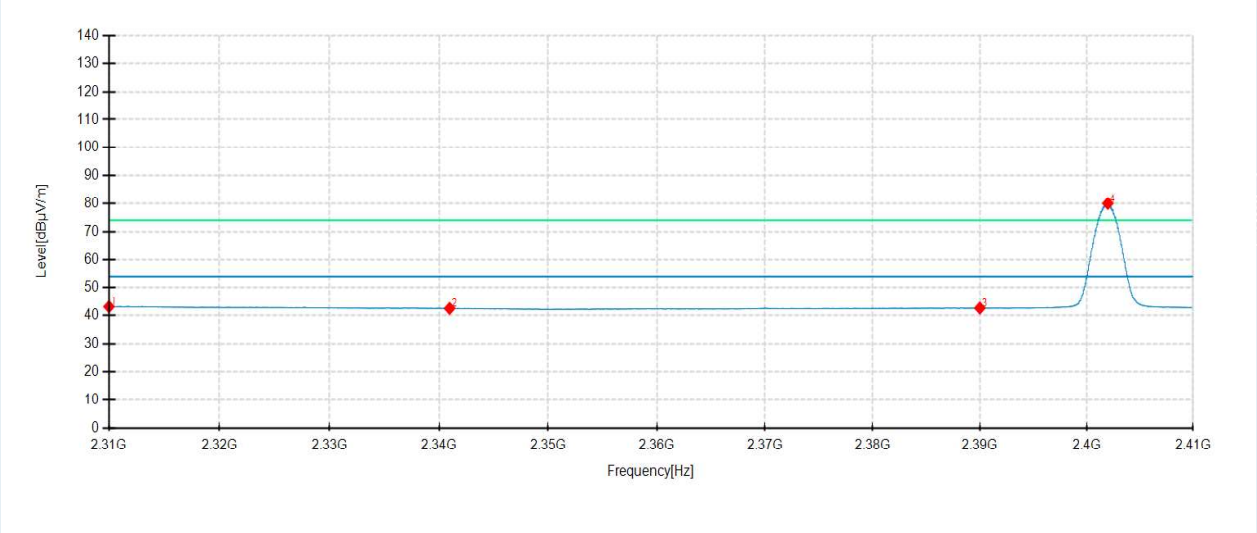
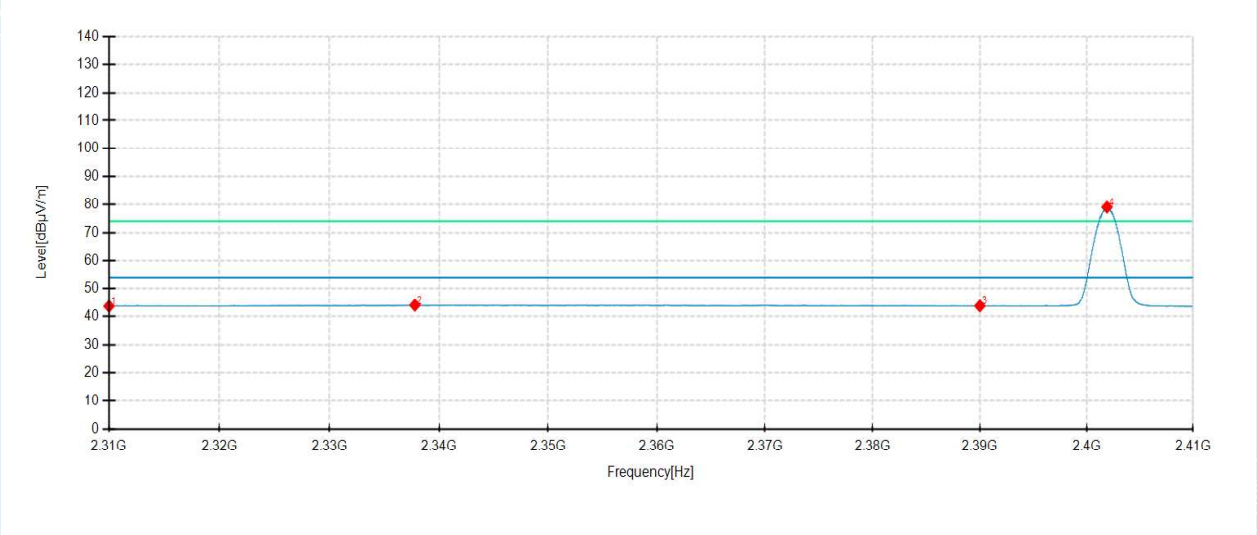
Lowest Frequency
Frequency 2402MHz
Detector mode: Average Polarity: Horizontal

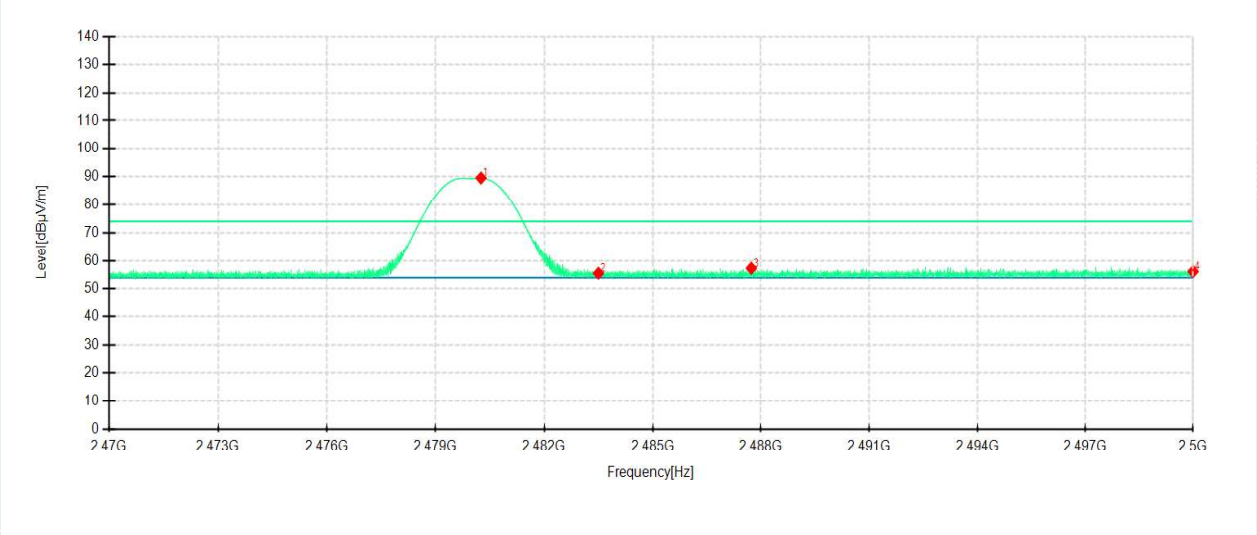


Detector mode: Average Polarity: Vertical

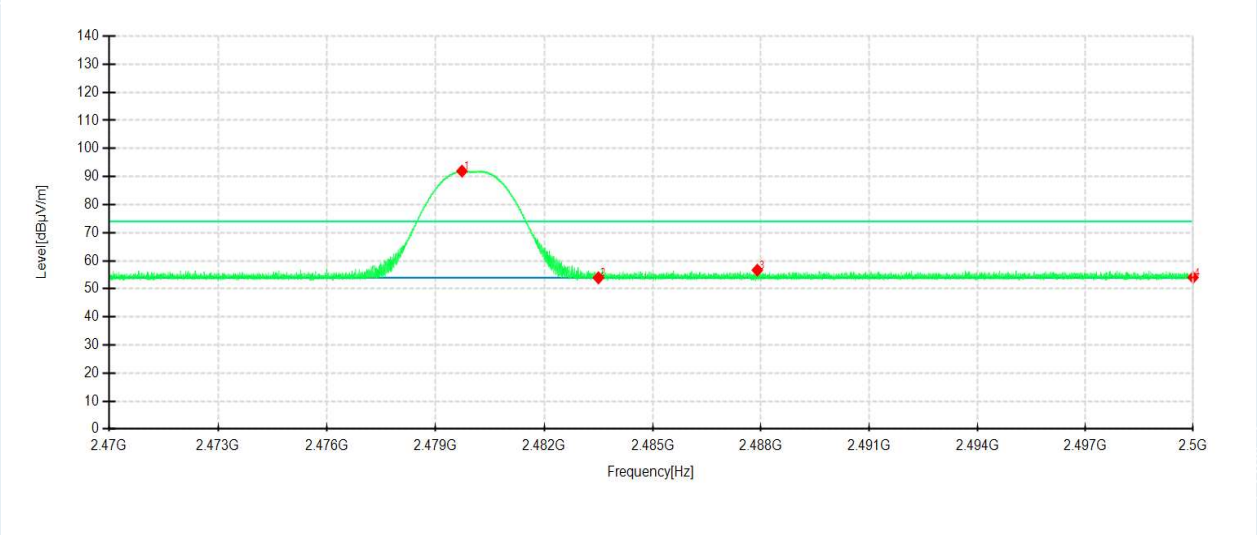


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310	33.78	43.13	9.35	54.00	10.87	100	14	Horizontal	/
2	2340.9687	33.80	42.51	8.71	54.00	11.49	200	47	Horizontal	/
3	2390	33.69	42.62	8.93	54.00	11.38	100	26	Horizontal	/
4	2401.9861	70.95	79.99	9.04	54.00	-25.99	100	59	Horizontal	No limit
1	2310	33.73	43.66	9.93	54.00	10.34	100	159	Vertical	/
2	2337.7885	33.89	44.03	10.14	54.00	9.97	200	333	Vertical	/
3	2390	33.70	43.77	10.07	54.00	10.23	100	16	Vertical	/
4	2401.9061	69.03	79.02	9.99	54.00	-25.02	100	49	Vertical	No limit

Highest Frequency
Frequency 2480MHz
Detector mode: Peak Polarity: Horizontal

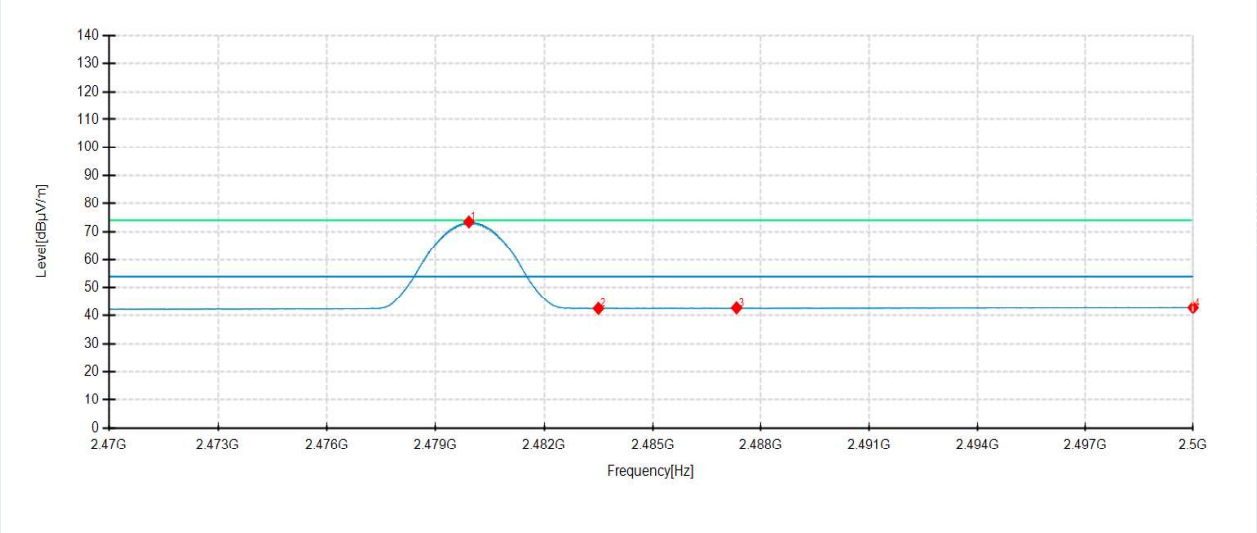


Detector mode: Peak Polarity: Vertical

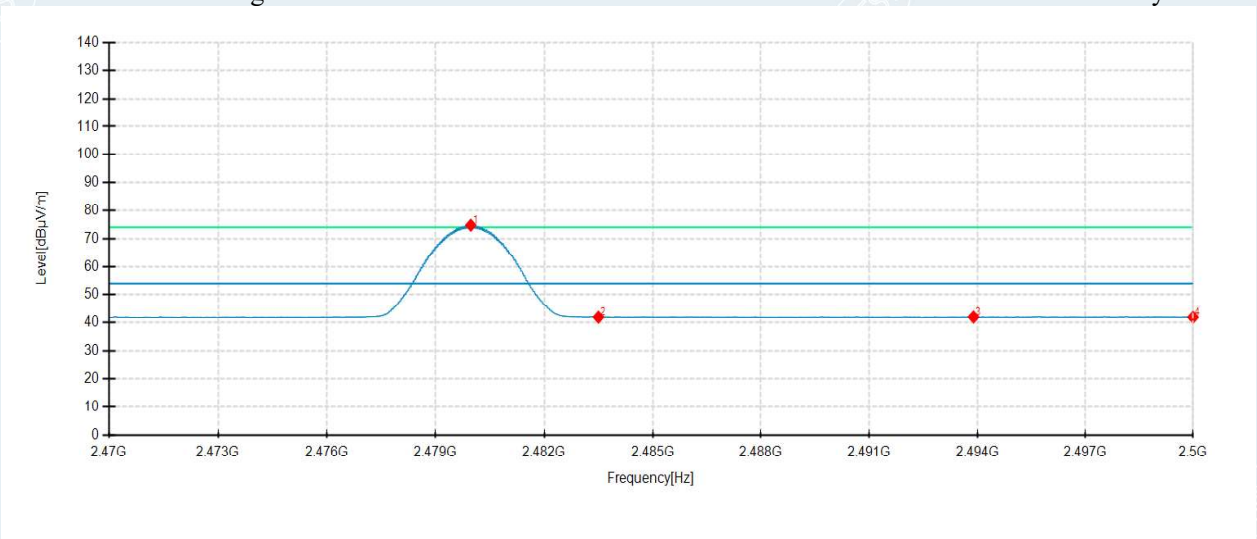


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2480.2547	79.68	89.53	9.85	74.00	-15.53	200	4	Horizontal	No limit
2	2483.5	45.63	55.55	9.92	74.00	18.45	100	224	Horizontal	/
3	2487.7332	47.27	57.27	10.00	74.00	16.73	100	159	Horizontal	/
4	2500	45.87	56.12	10.25	74.00	17.88	200	0	Horizontal	/
1	2479.7286	82.68	91.94	9.26	74.00	-17.94	100	326	Vertical	No limit
2	2483.5	44.67	53.95	9.28	74.00	20.05	100	126	Vertical	/
3	2487.8992	47.38	56.68	9.30	74.00	17.32	100	16	Vertical	/
4	2500	44.72	54.07	9.35	74.00	19.93	200	267	Vertical	/

Highest Frequency
Frequency 2480MHz
Detector mode: Average Polarity: Horizontal



Detector mode: Average Polarity: Vertical



No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2479.9207	63.60	73.45	9.85	54.00	-19.45	200	3	Horizontal	No limit
2	2483.5	32.58	42.50	9.92	54.00	11.50	100	70	Horizontal	/
3	2487.3252	32.69	42.69	10.00	54.00	11.31	100	37	Horizontal	/
4	2500	32.51	42.76	10.25	54.00	11.24	100	258	Horizontal	/
1	2479.9727	65.49	74.76	9.27	54.00	-20.76	100	325	Vertical	No limit
2	2483.5	32.64	41.92	9.28	54.00	12.08	100	336	Vertical	/
3	2493.8956	32.65	41.97	9.32	54.00	12.03	100	238	Vertical	/
4	2500	32.52	41.87	9.35	54.00	12.13	200	89	Vertical	/

Remark: Max field strength in 3m distance. No any other emission which falls in restricted bands can be detected and be reported.

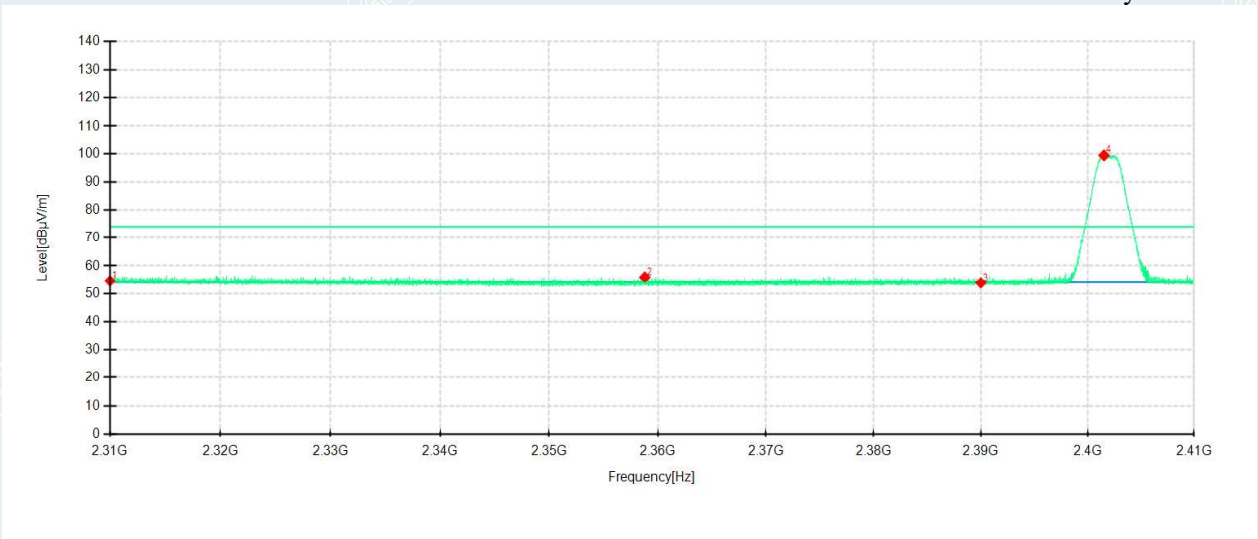
Equipment:	Smart Lock U100	Test Date	2023-01-30
Model No.:	SDL-D01	Test Engineer:	Huang Lifang
Test Voltage:	DC 6V	Environmental Conditions	25.0℃/60%RH/101.0kPa

BLE 2M

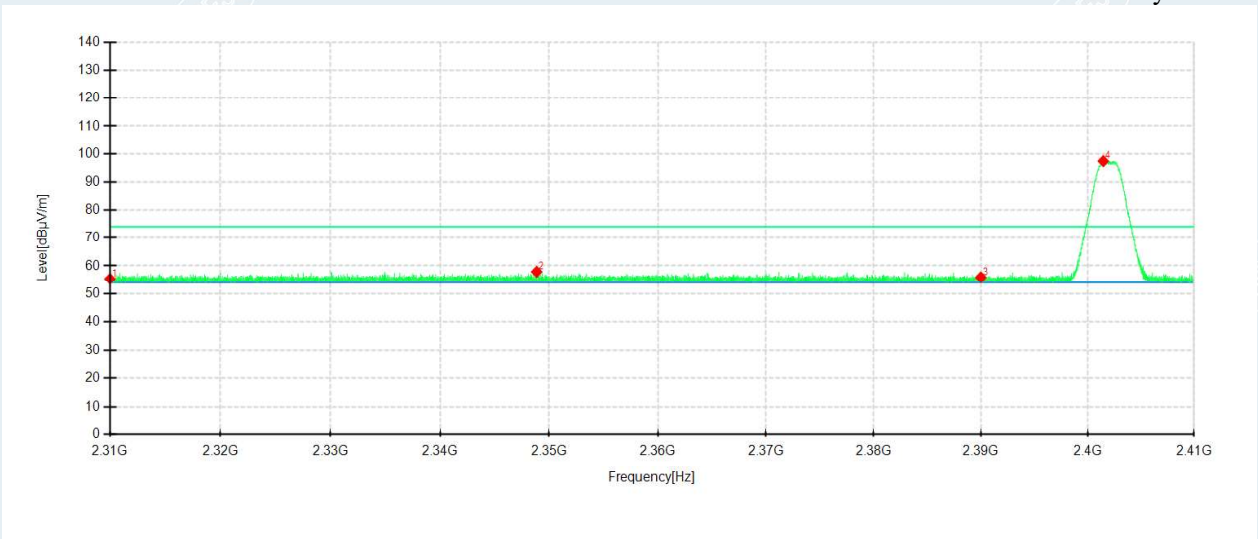
Lowest Frequency

Frequency 2402MHz

Detector mode: Peak Polarity: Horizontal



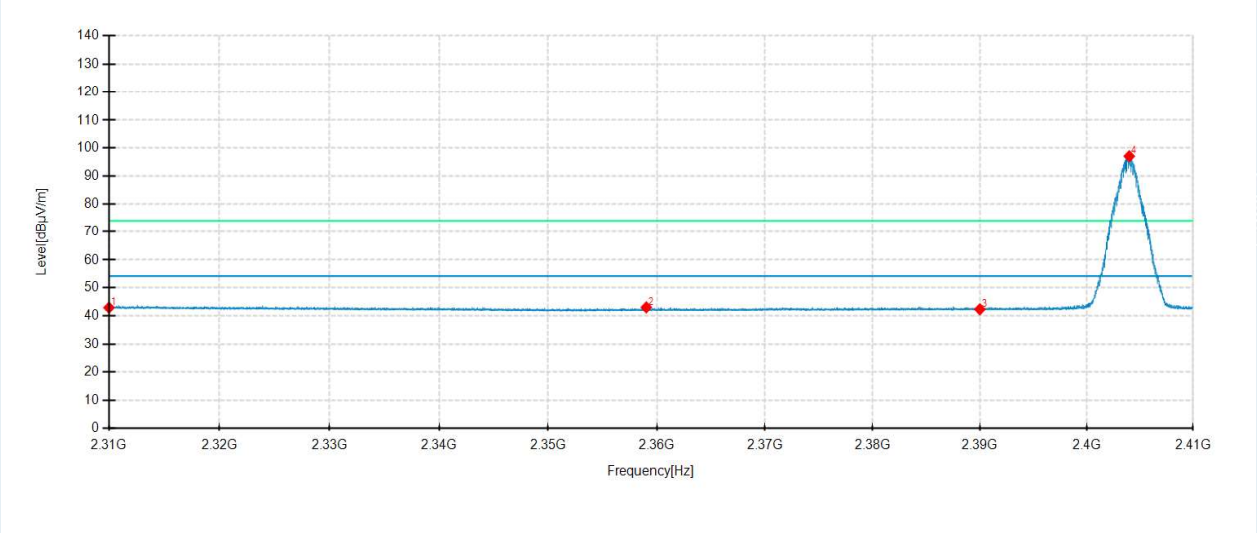
Detector mode: Peak Polarity: Vertical



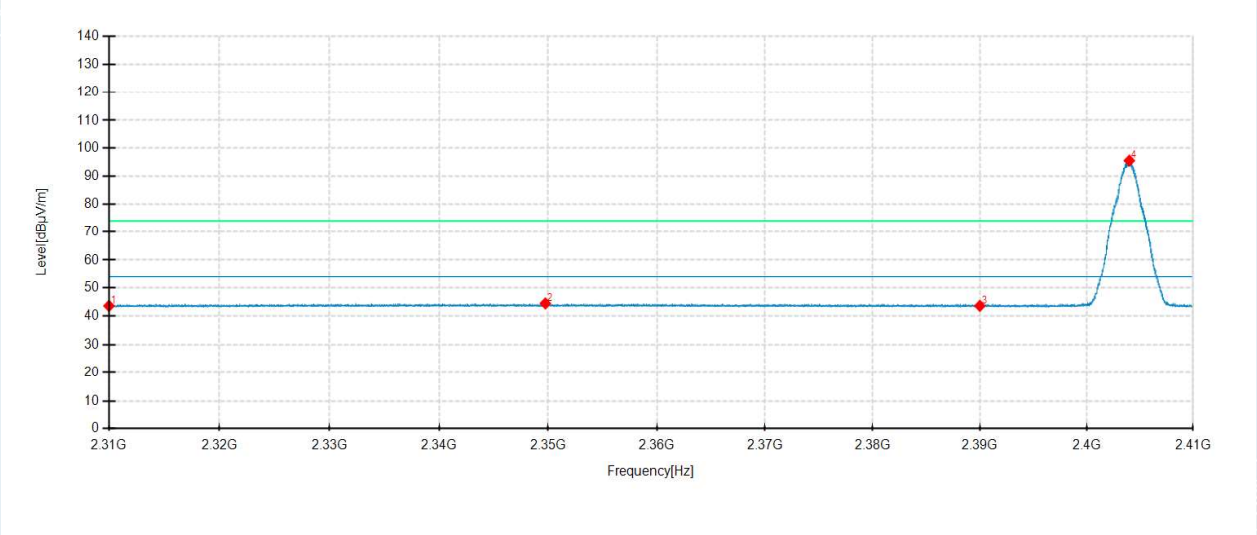
No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310	45.24	54.59	9.35	74.00	19.41	100	15	Horizontal	/
2	2358.8033	47.35	55.96	8.61	74.00	18.04	100	148	Horizontal	/
3	2390	44.94	53.87	8.93	74.00	20.13	200	278	Horizontal	/
4	2401.5328	90.37	99.40	9.03	74.00	-25.40	100	60	Horizontal	No limit
1	2310	45.42	55.35	9.93	74.00	18.65	100	326	Vertical	/
2	2348.8559	47.69	57.90	10.21	74.00	16.10	100	61	Vertical	/
3	2390	45.83	55.90	10.07	74.00	18.10	100	236	Vertical	/
4	2401.4661	87.41	97.41	10.00	74.00	-23.41	100	48	Vertical	No limit

---------- The following blanks ----------

Lowest Frequency
Frequency 2402MHz
Detector mode: Average Polarity: Horizontal

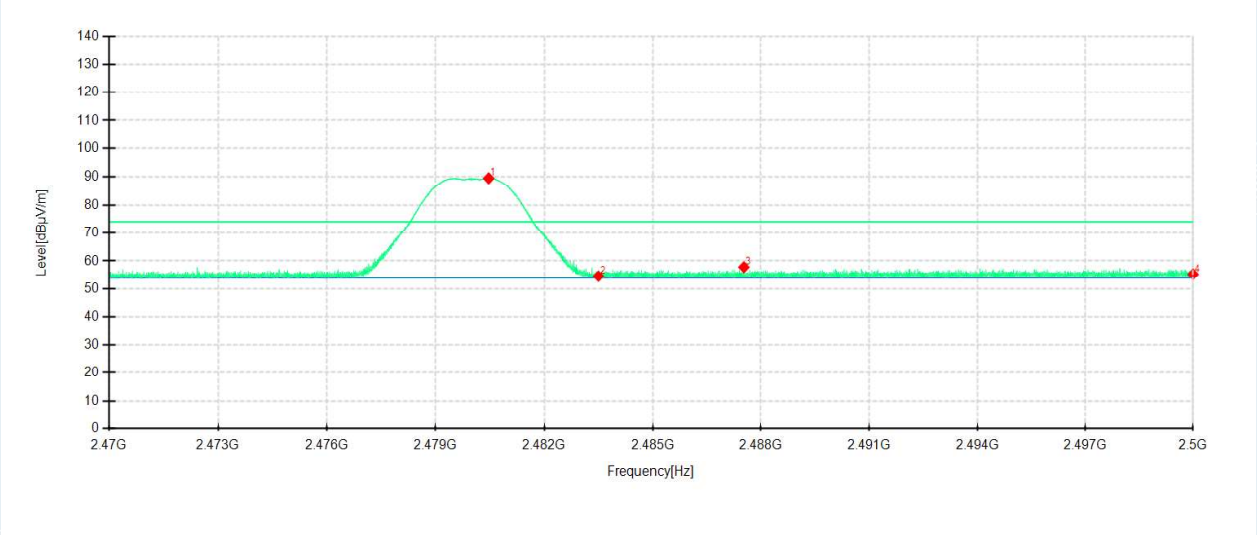


Detector mode: Average Polarity: Vertical

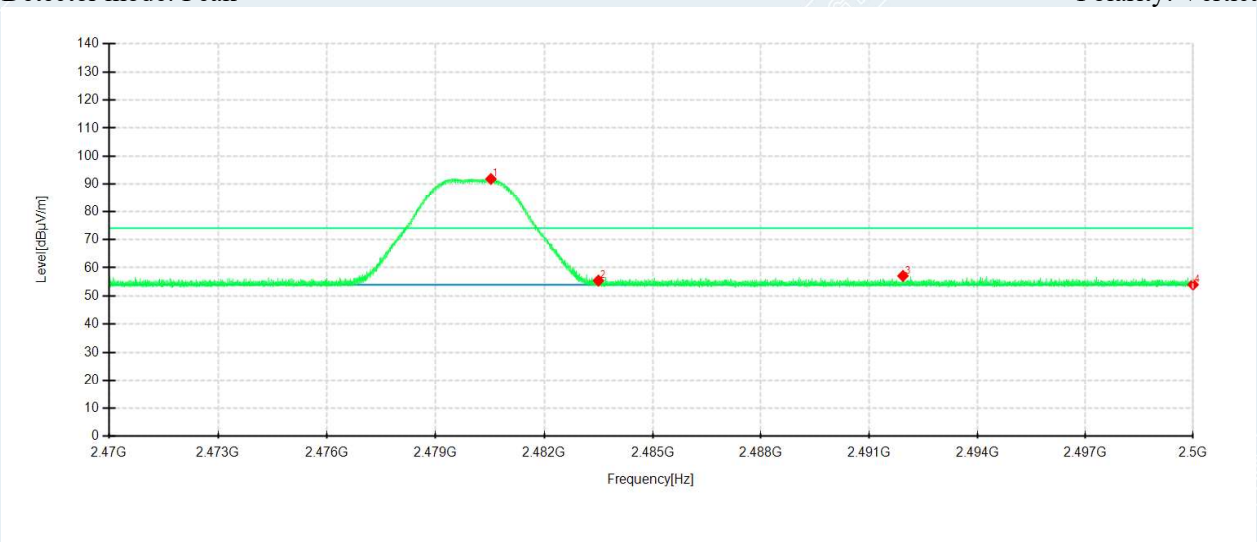


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310	33.60	42.95	9.35	54.00	11.05	100	116	Horizontal	/
2	2359.0366	34.42	43.04	8.62	54.00	10.96	100	226	Horizontal	/
3	2390	33.44	42.37	8.93	54.00	11.63	100	93	Horizontal	/
4	2403.9996	87.98	97.02	9.04	54.00	-43.02	100	104	Horizontal	No limit
1	2310	33.68	43.61	9.93	54.00	10.39	100	292	Vertical	/
2	2349.7426	34.25	44.47	10.22	54.00	9.53	100	360	Vertical	/
3	2390	33.55	43.62	10.07	54.00	10.38	200	122	Vertical	/
4	2404.0063	85.58	95.53	9.95	54.00	-41.53	100	303	Vertical	No limit

Highest Frequency
Frequency 2480MHz
Detector mode: Peak Polarity: Horizontal

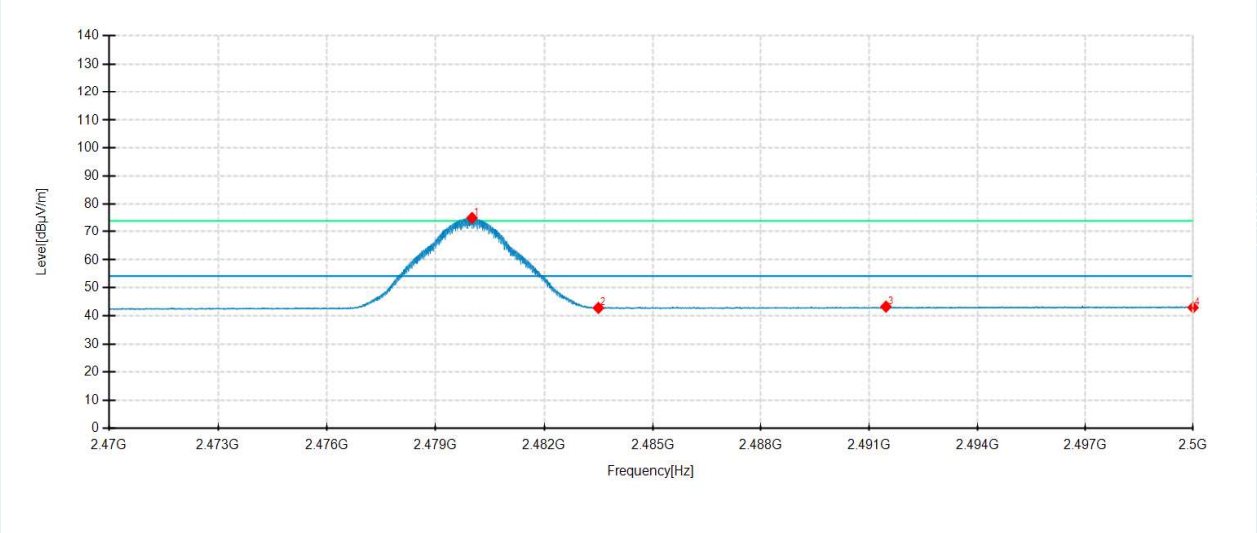


Detector mode: Peak Polarity: Vertical

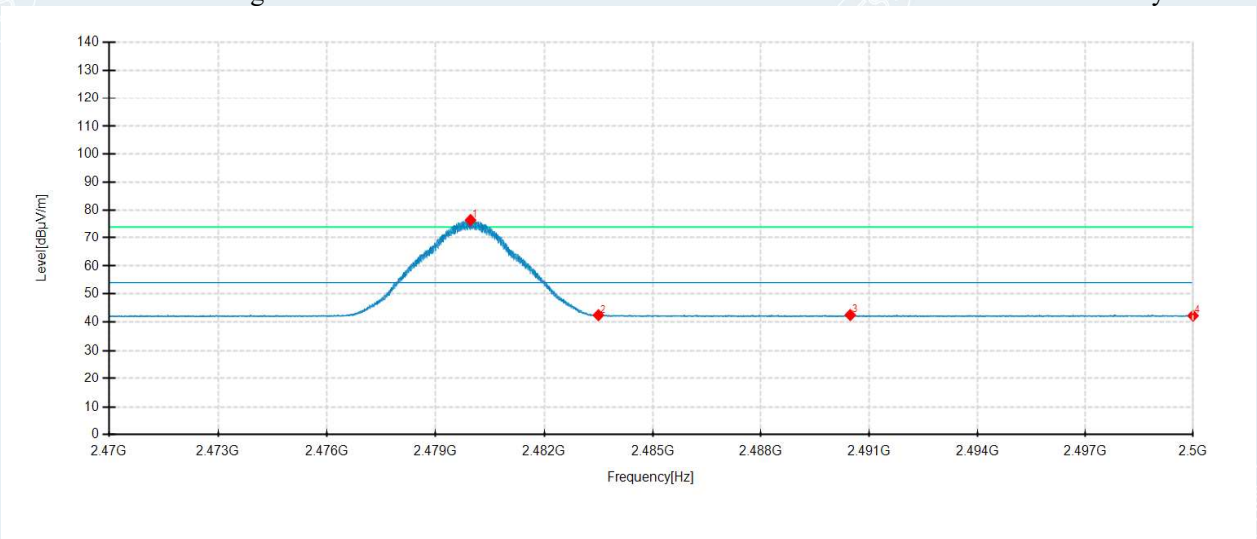


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2480.4667	79.71	89.57	9.86	74.00	-15.57	200	2	Horizontal	No limit
2	2483.5	44.62	54.54	9.92	74.00	19.46	100	14	Horizontal	/
3	2487.5272	47.82	57.82	10.00	74.00	16.18	200	146	Horizontal	/
4	2500	45.01	55.26	10.25	74.00	18.74	200	201	Horizontal	/
1	2480.5287	82.64	91.91	9.27	74.00	-17.91	100	325	Vertical	No limit
2	2483.5	46.18	55.46	9.28	74.00	18.54	200	300	Vertical	/
3	2491.9375	47.80	57.12	9.32	74.00	16.88	200	344	Vertical	/
4	2500	44.66	54.01	9.35	74.00	19.99	200	333	Vertical	/

Highest Frequency
Frequency 2480MHz
Detector mode: Average Polarity: Horizontal



Detector mode: Average Polarity: Vertical



No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2480.0067	65.23	75.08	9.85	54.00	-21.08	200	344	Horizontal	No limit
2	2483.5	32.92	42.84	9.92	54.00	11.16	100	303	Horizontal	/
3	2491.4654	33.23	43.30	10.07	54.00	10.70	100	325	Horizontal	/
4	2500	32.72	42.97	10.25	54.00	11.03	200	344	Horizontal	/
1	2479.9647	67.20	76.47	9.27	54.00	-22.47	100	323	Vertical	No limit
2	2483.5	33.18	42.46	9.28	54.00	11.54	200	334	Vertical	/
3	2490.4754	33.19	42.50	9.31	54.00	11.50	100	126	Vertical	/
4	2500	32.92	42.27	9.35	54.00	11.73	200	102	Vertical	/

Remark: Max field strength in 3m distance. No any other emission which falls in restricted bands can be detected and be reported.

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM

Please refer to the attached document E20230117700901-11-Test Photo.

APPENDIX B. PHOTOGRAPH OF THE EUT

Please refer to the attached document E20230117700901-12-EUT Photo.

---------- End of Report ----------