

## 11. MAXIMUM PEAK OUTPUT POWER

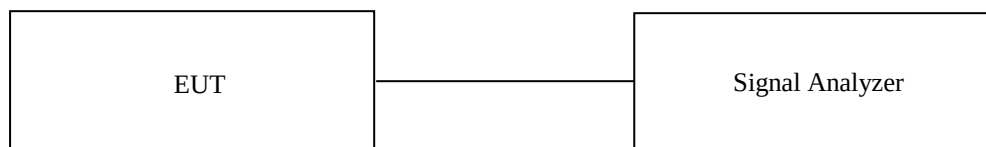
### 11.1 Operating environment

Temperature : 22 °C  
Relative humidity : 46 % R.H.

### 11.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to  $\geq$  DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.

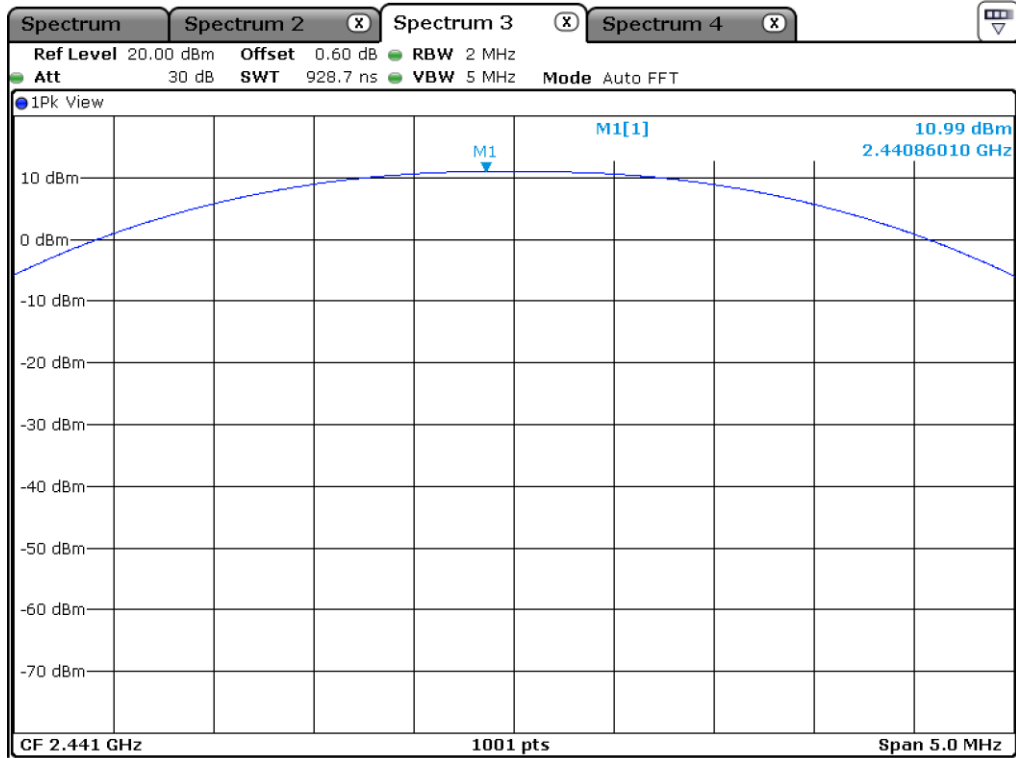


### 11.3 Test Date

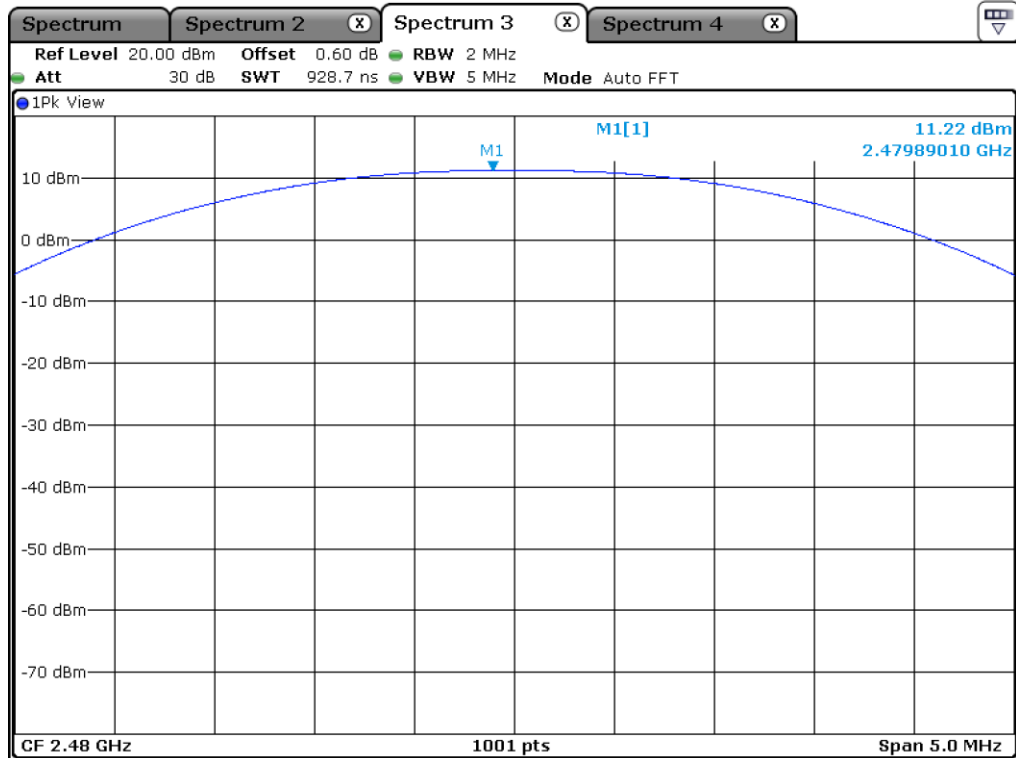
October 07, 2021 ~ October 20, 2021

-. Test Result : Pass

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)



Middle Channel



High Channel

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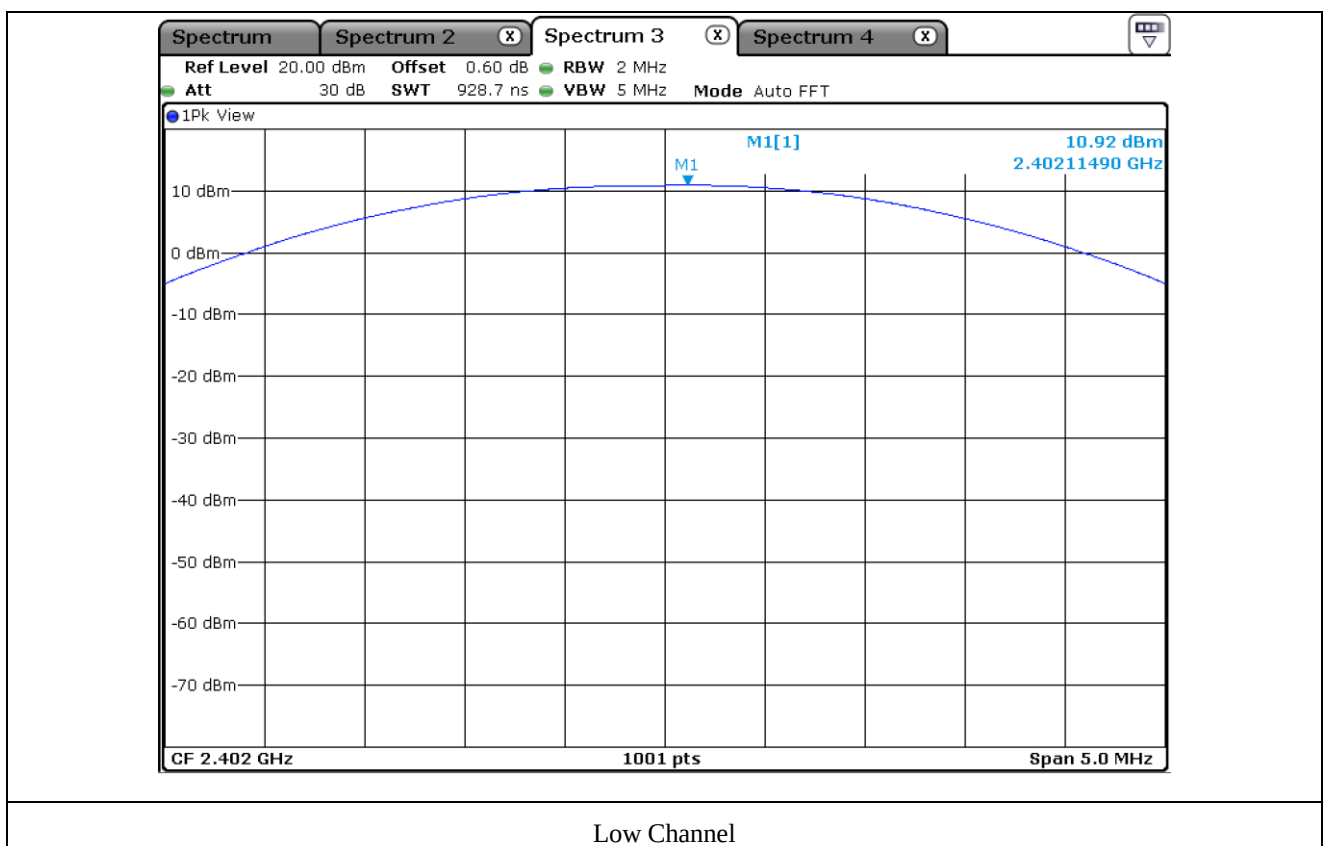
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

### 11.5 Test data for 2 Mbps

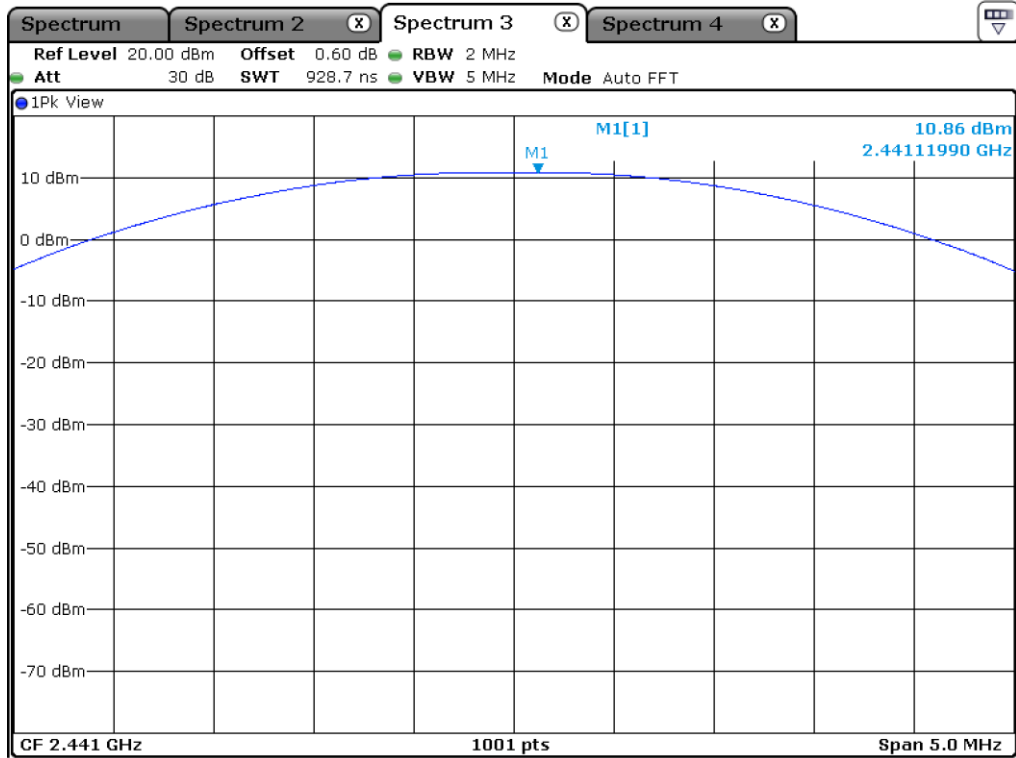
-. Test Result : Pass

| CHANNEL | FREQUENCY<br>(MHz) | MEASURED VLAUE<br>(dBm) | LIMIT<br>(dBm) | MARGIN<br>(dB) |
|---------|--------------------|-------------------------|----------------|----------------|
| LOW     | 2 402.00           | 10.92                   | 21.00          | 10.08          |
| MIDDLE  | 2 441.00           | 10.86                   | 21.00          | 10.14          |
| HIGH    | 2 480.00           | 11.05                   | 21.00          | 9.95           |

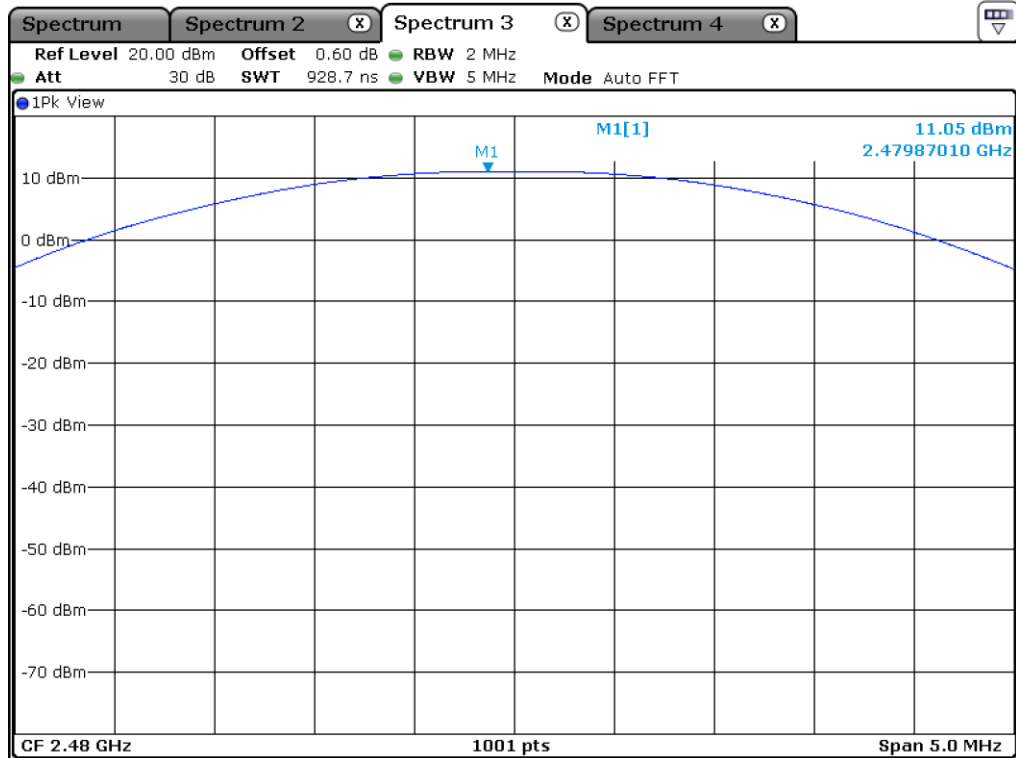
Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)



Low Channel



Middle Channel



High Channel

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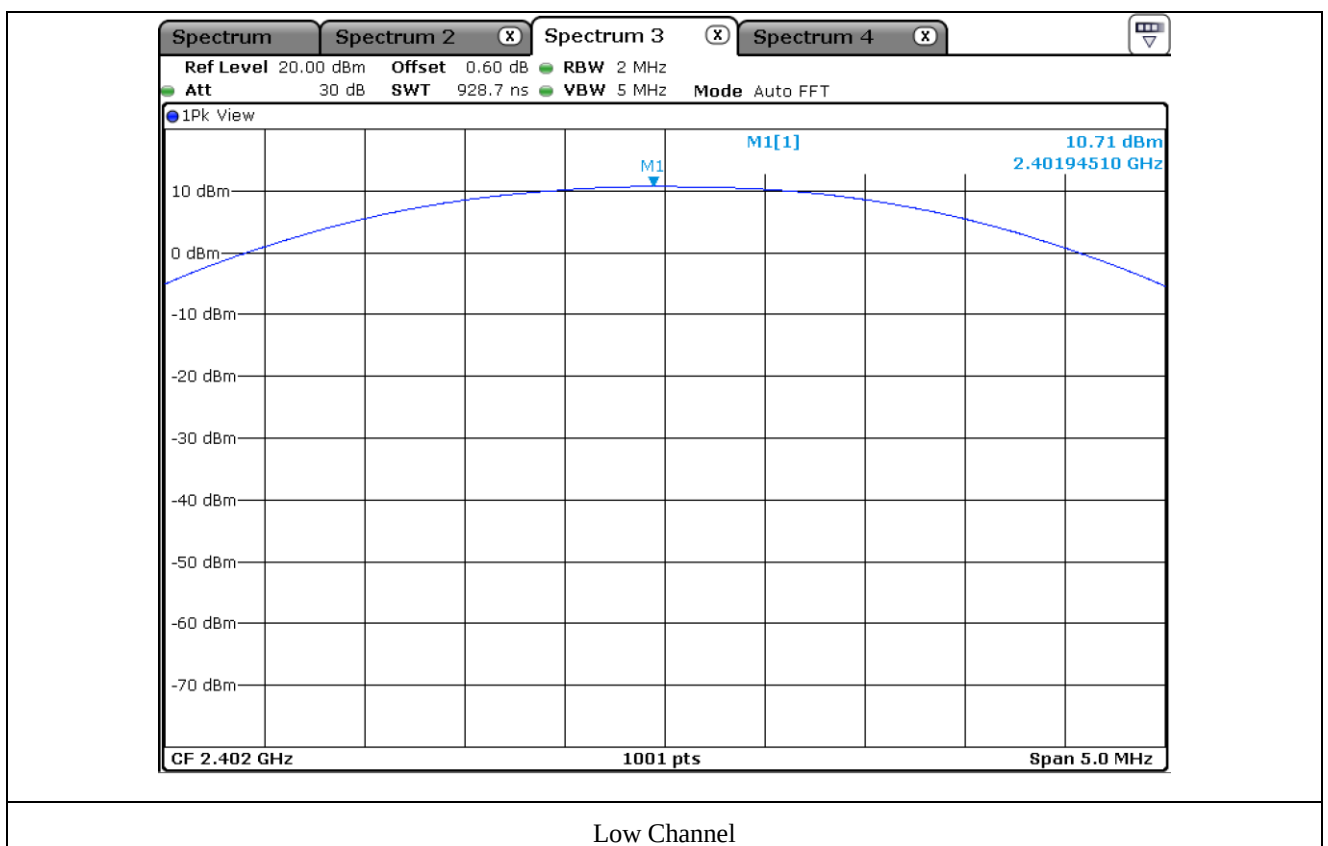
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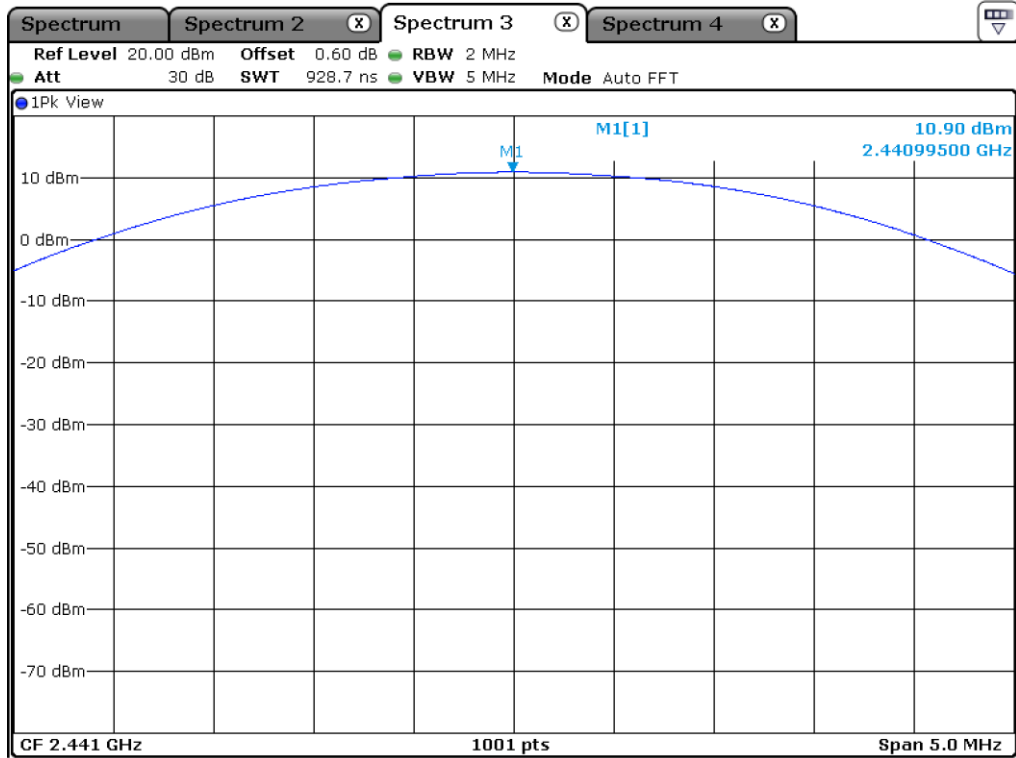
## 11.6 Test data for 3 Mbps

-. Test Result : Pass

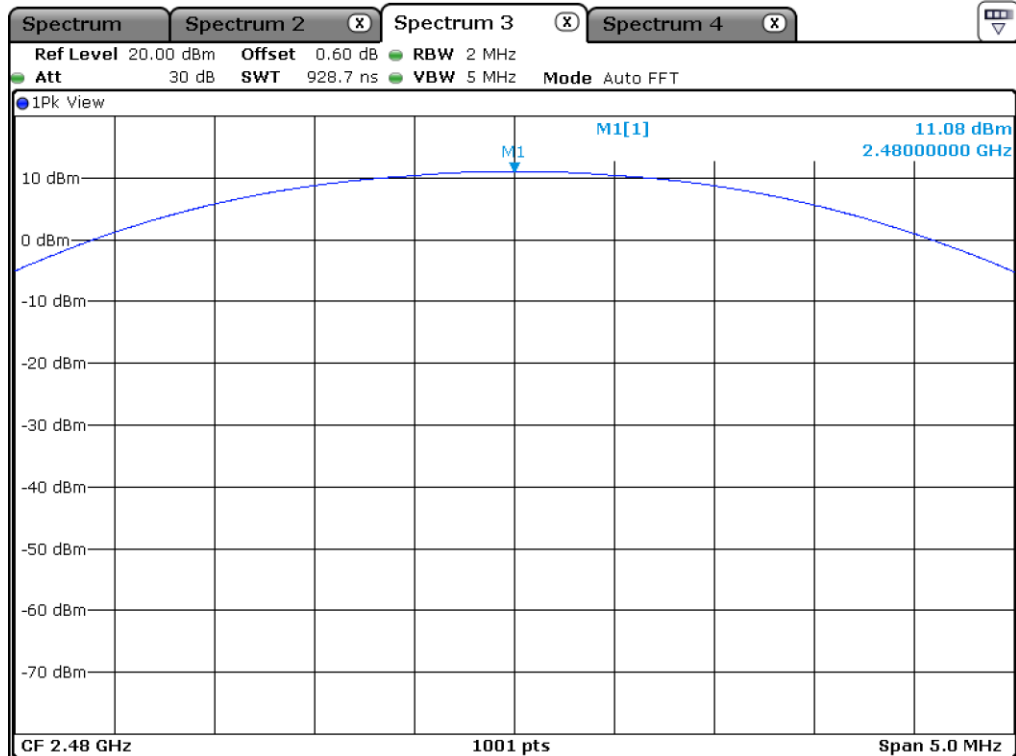
| CHANNEL | FREQUENCY<br>(MHz) | MEASURED VLAUE<br>(dBm) | LIMIT<br>(dBm) | MARGIN<br>(dB) |
|---------|--------------------|-------------------------|----------------|----------------|
| LOW     | 2 402.00           | 10.71                   | 21.00          | 10.29          |
| MIDDLE  | 2 441.00           | 10.90                   | 21.00          | 10.10          |
| HIGH    | 2 480.00           | 11.08                   | 21.00          | 9.92           |

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)





Middle Channel



High Channel

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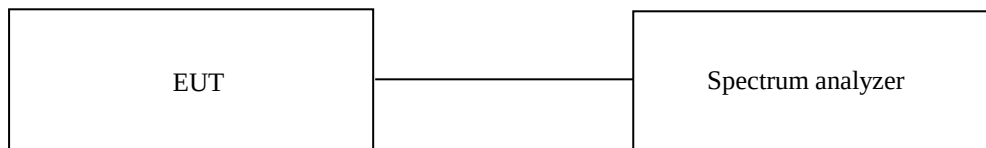
## 12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

### 12.1 Operating environment

Temperature : 22 °C  
Relative humidity : 46 % R.H.

### 12.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



### 12.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m semi anechoic chamber. The EUT was placed on turntable approximately 1.5 m above the ground plane.

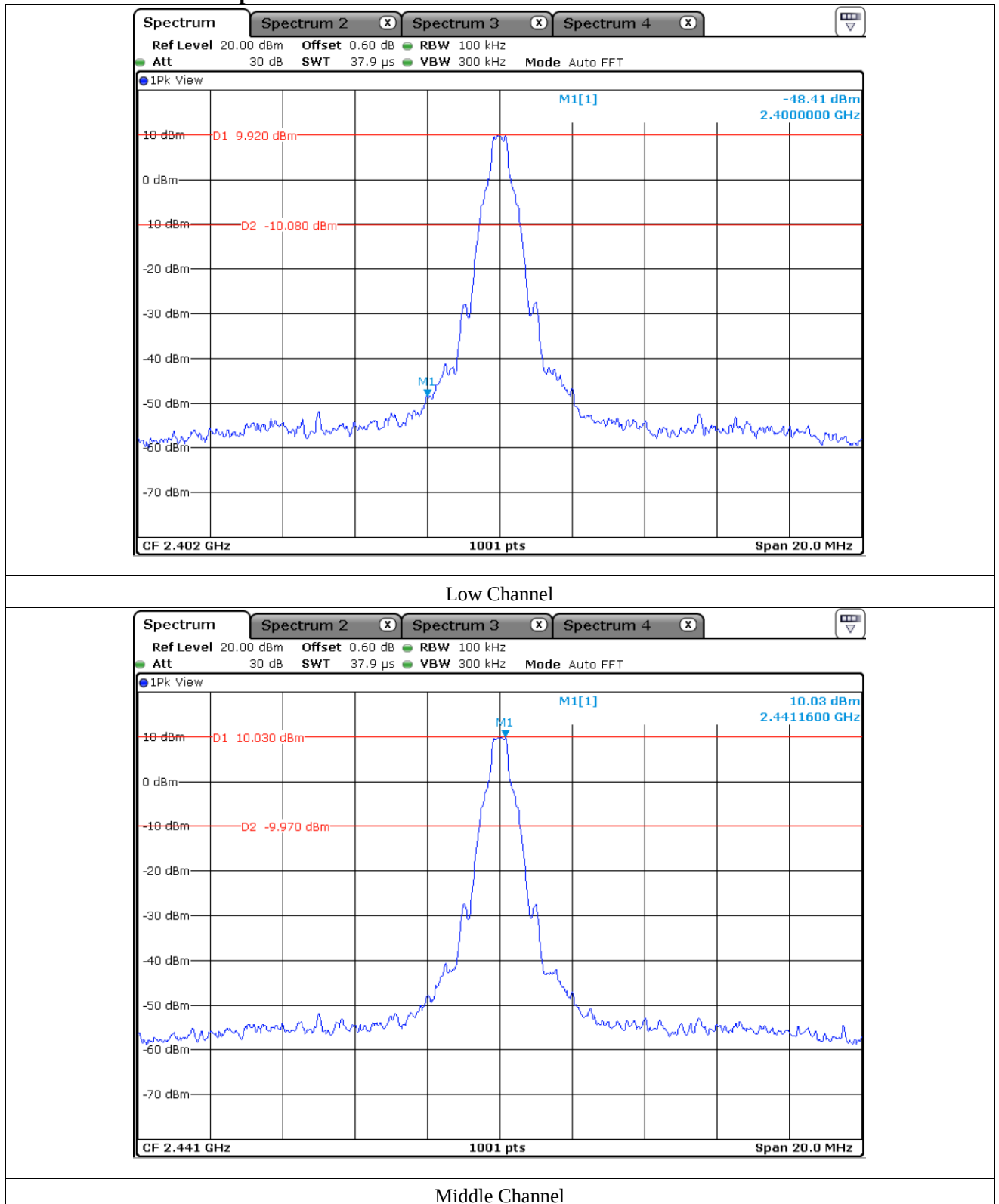
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

### 12.4 Test Date

October 07, 2021 ~ October 20, 2021

## 12.5 Test data for conducted emission

### 12.5.1 Test data for 1 Mbps

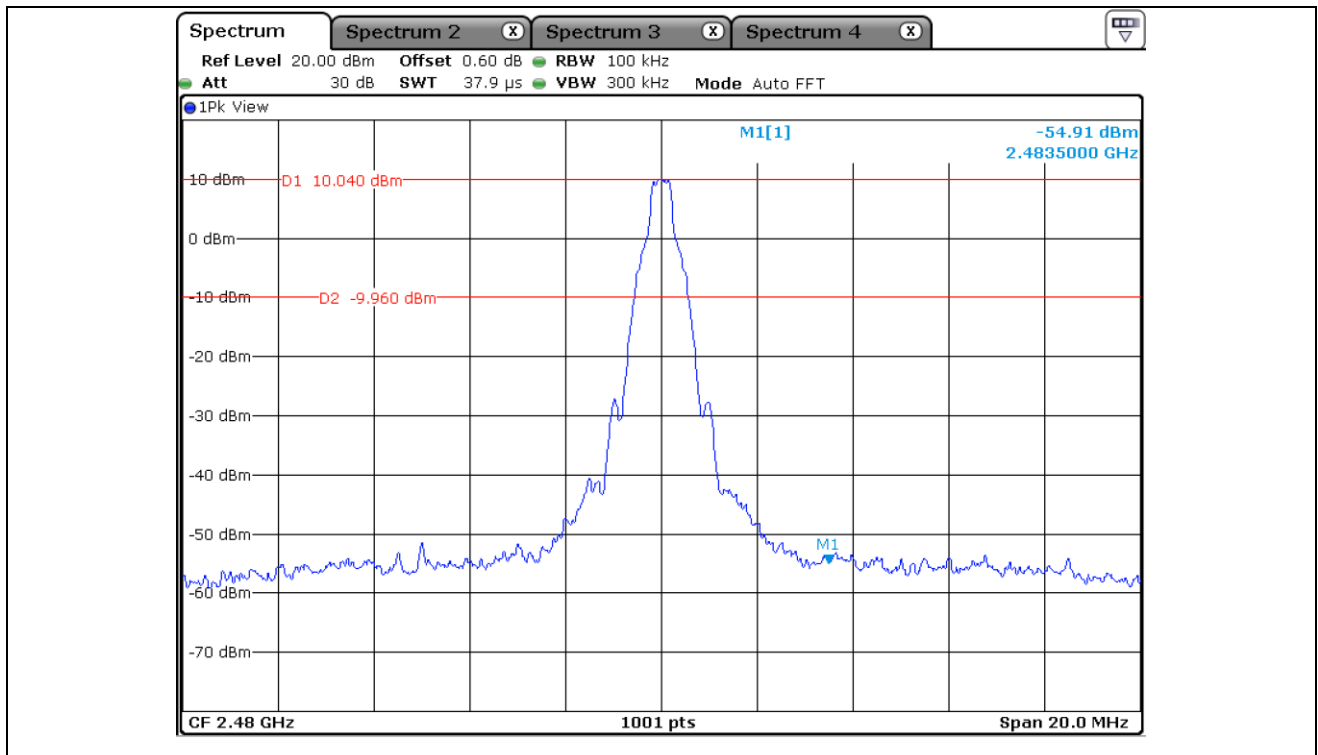


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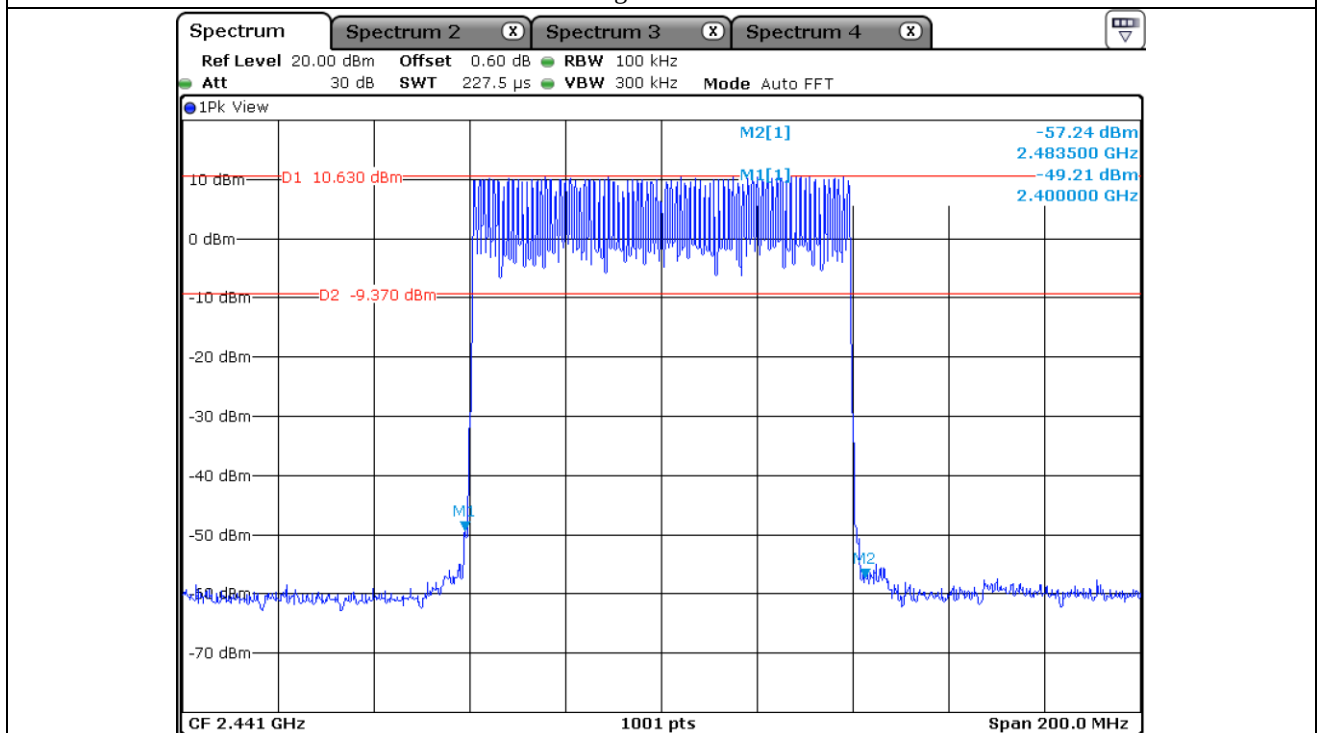
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### High Channel



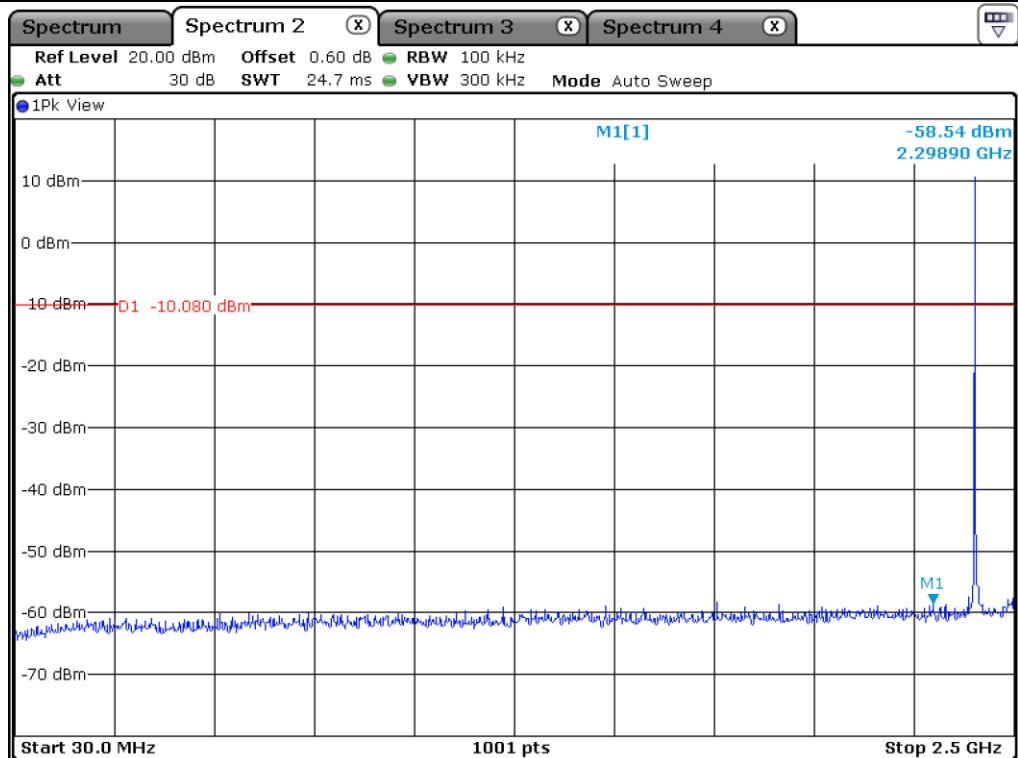
### Hopping Mode

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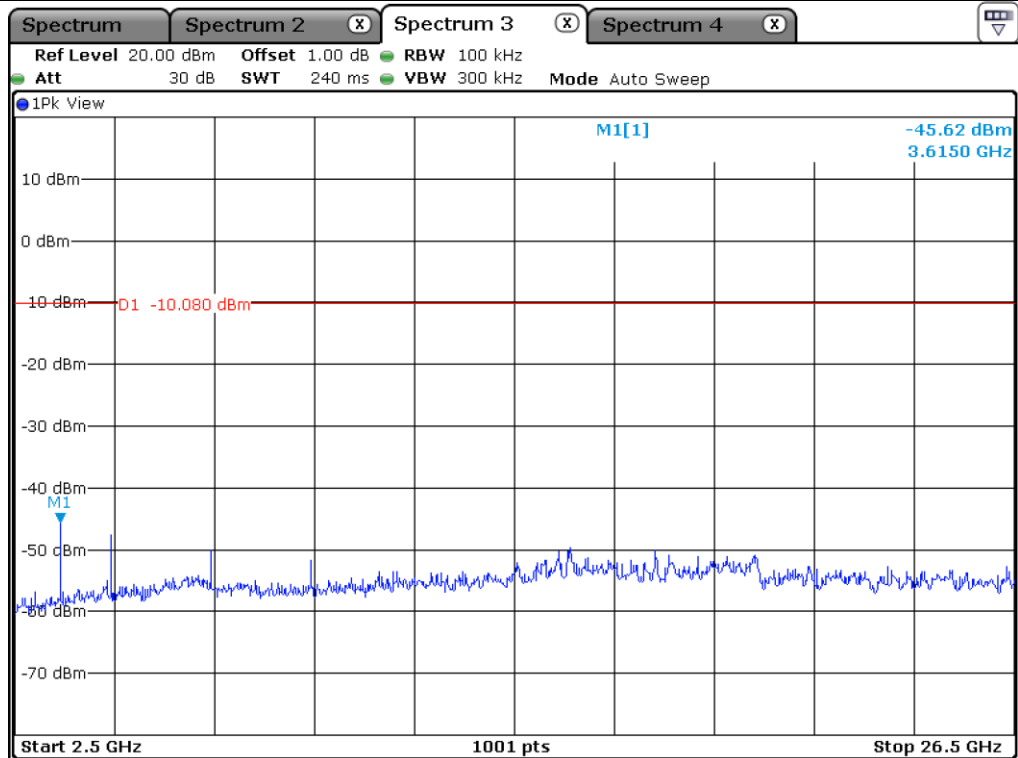
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Low Channel



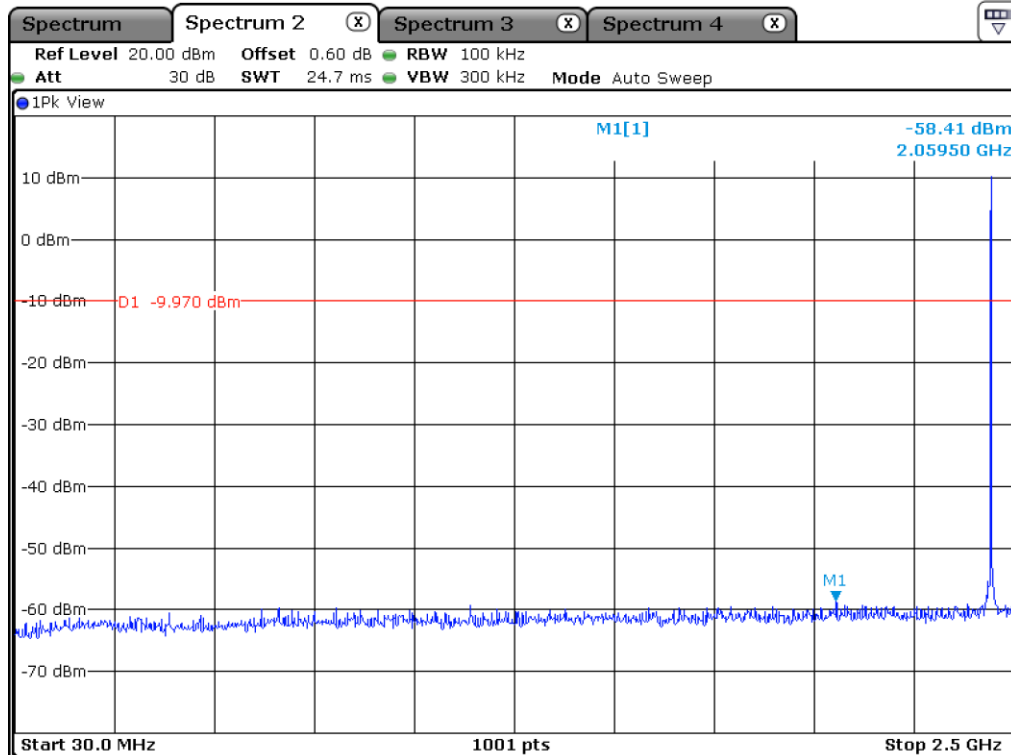
Low Channel

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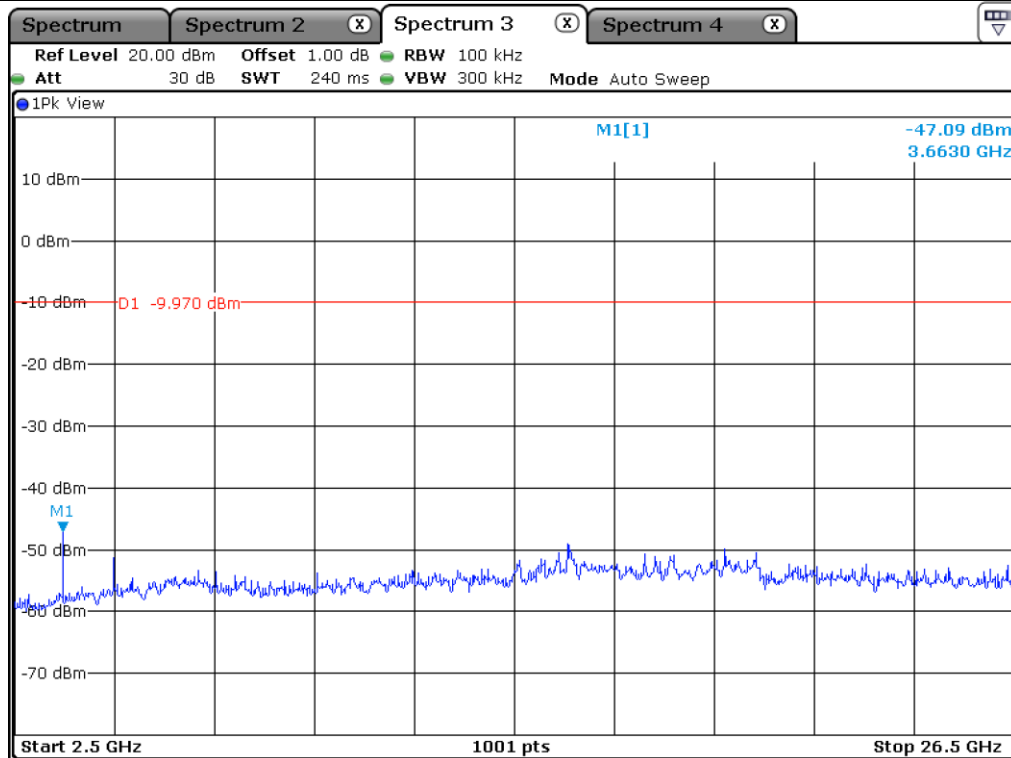
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Middle Channel



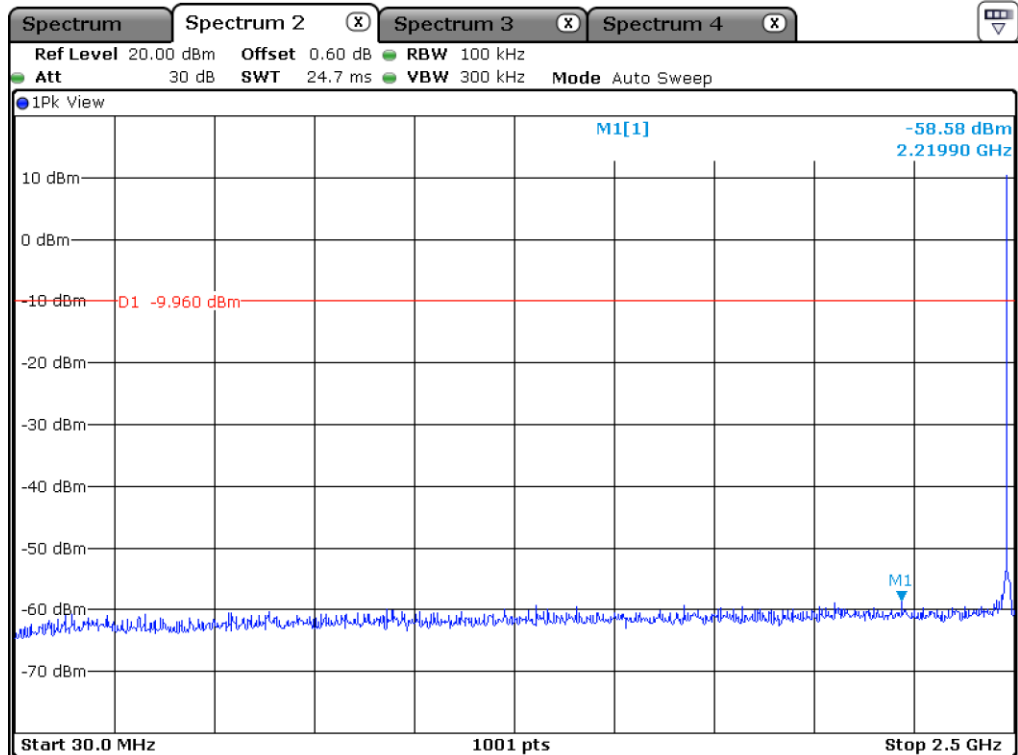
Middle Channel

This Report is not correlated with the authentication of KOLAS

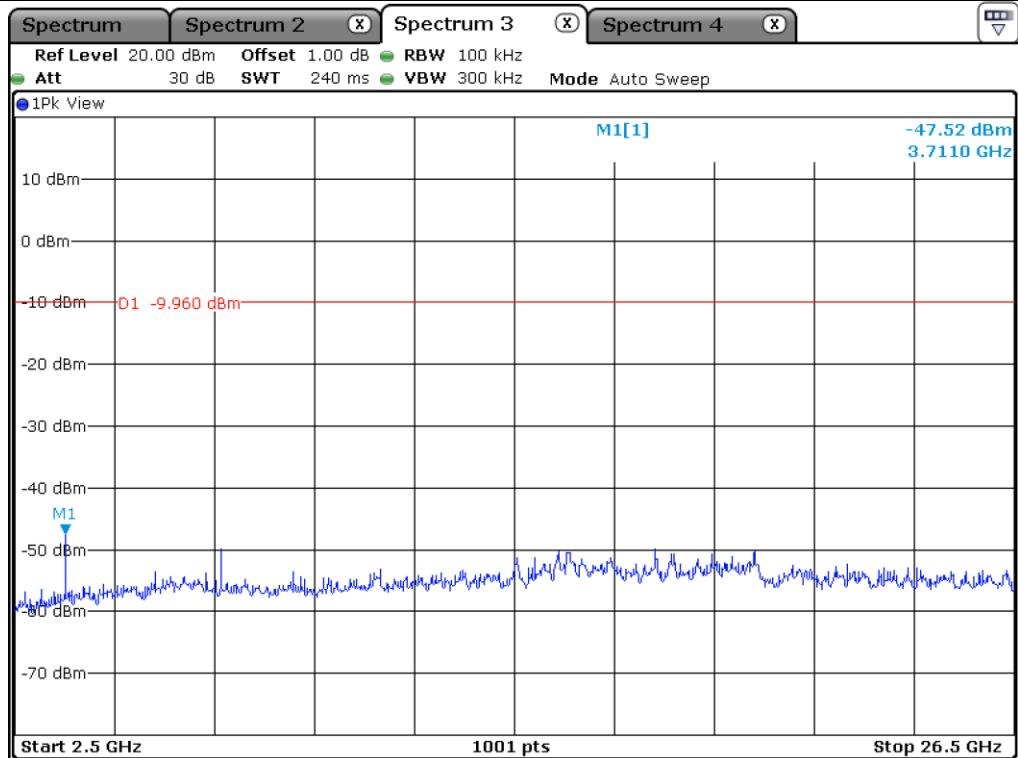
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### High Channel



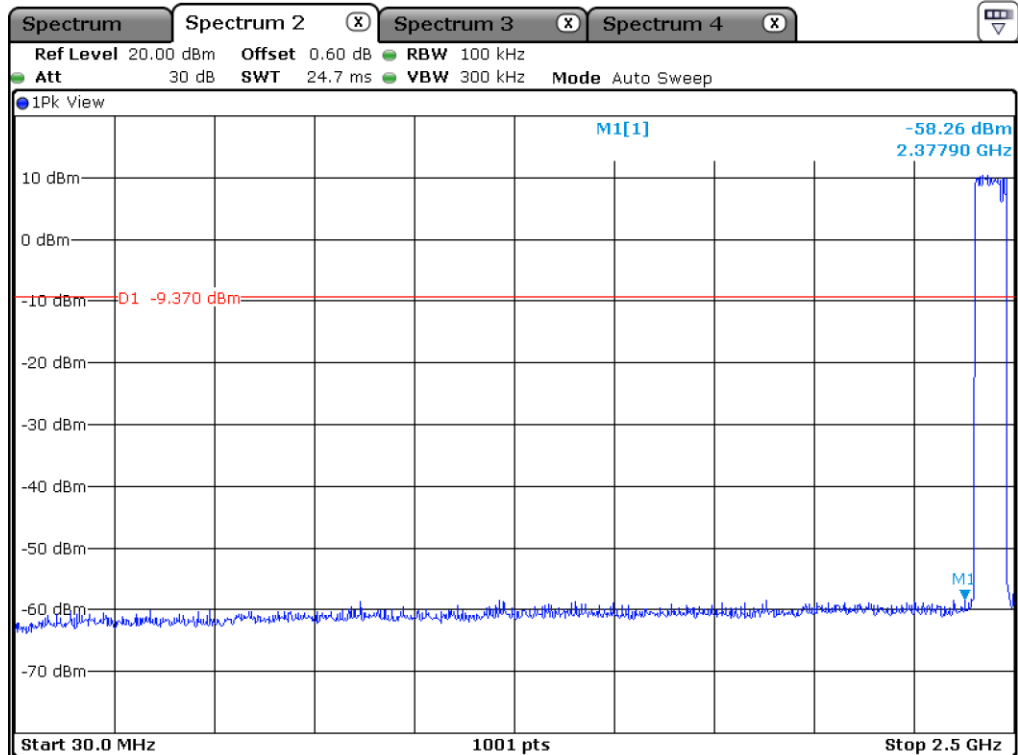
### High Channel

This Report is not correlated with the authentication of KOLAS

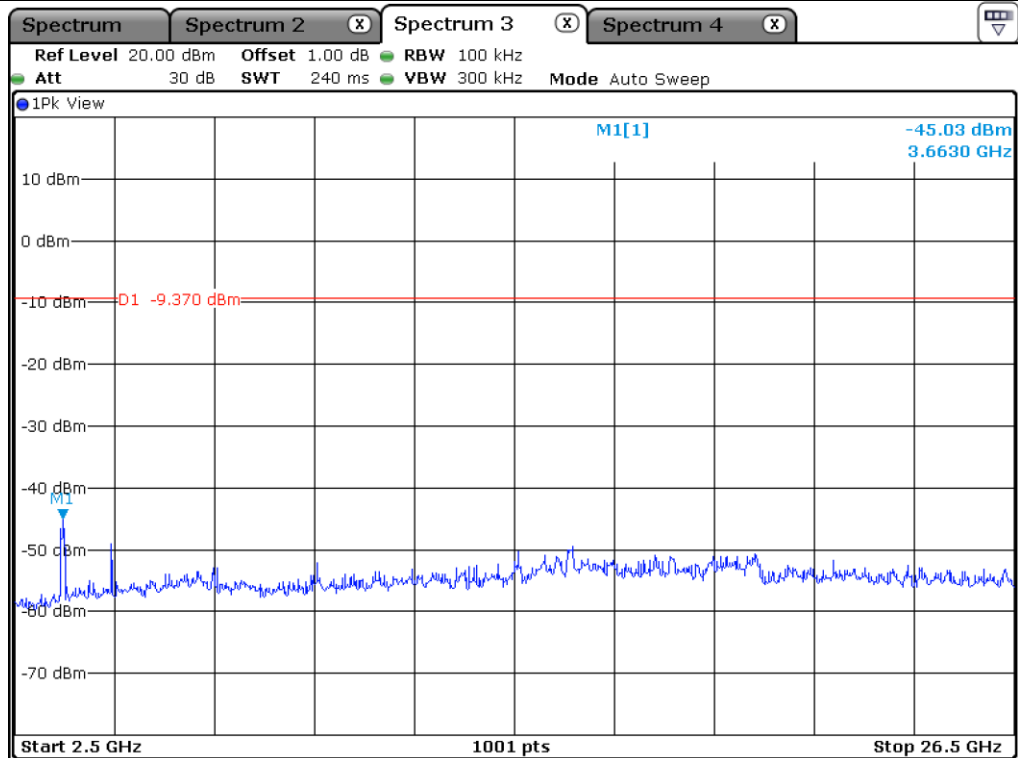
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Hopping Mode



Hopping Mode

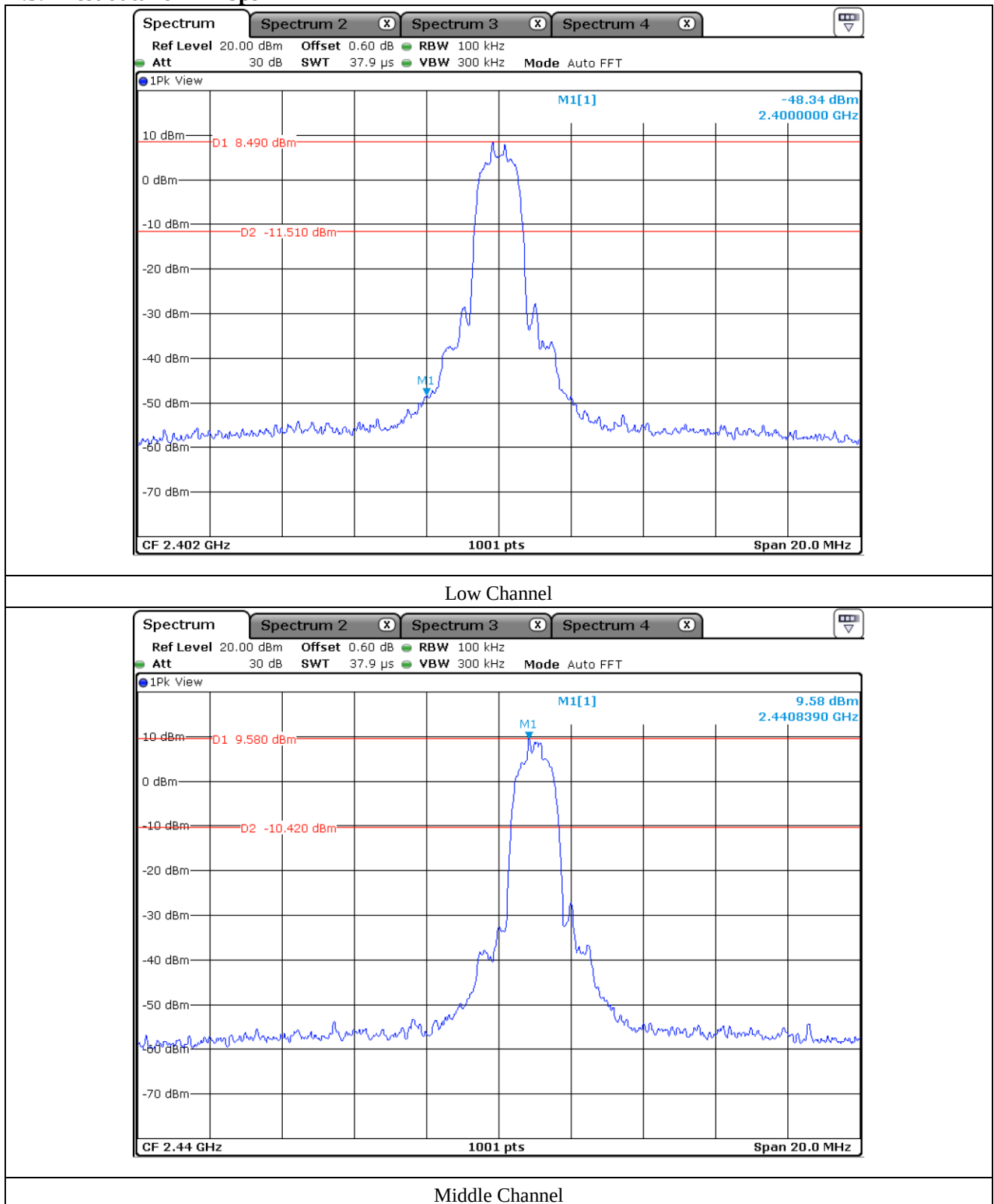
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## 12.5.2 Test data for 2 Mbps

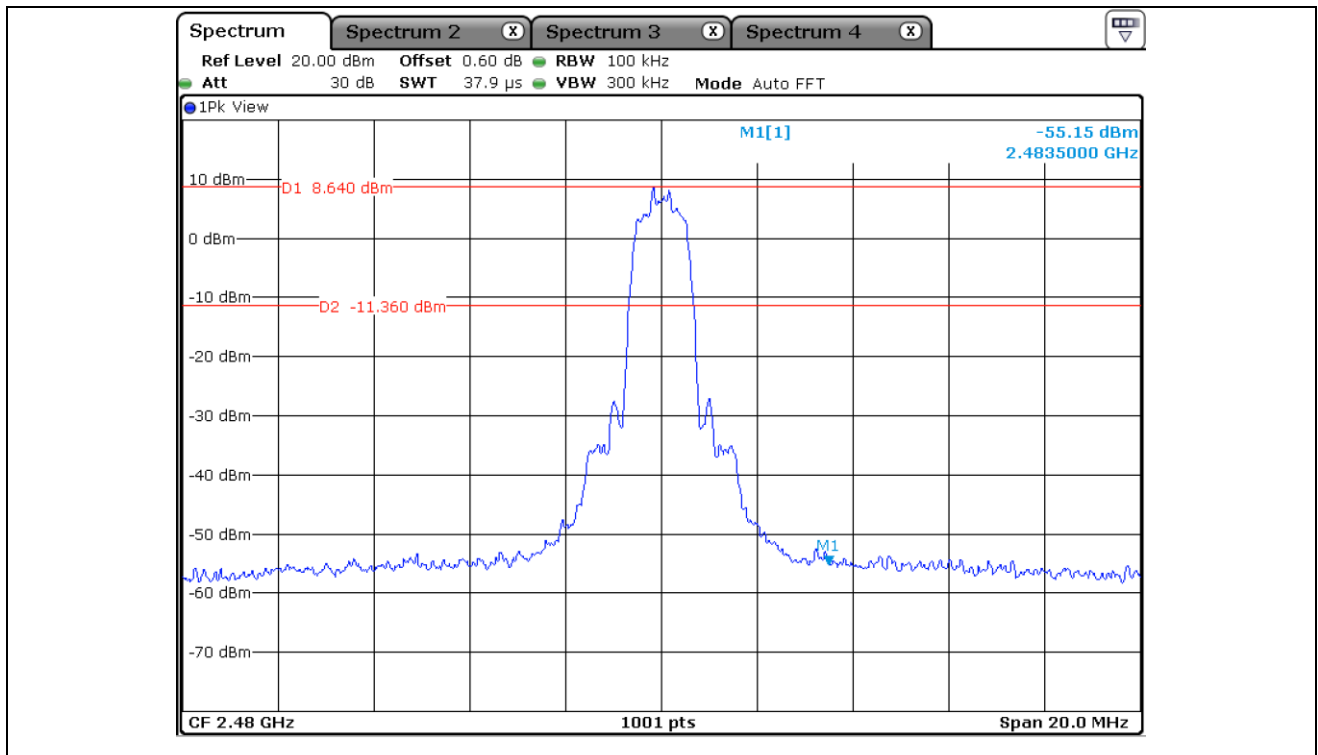


This Report is not correlated with the authentication of KOLAS

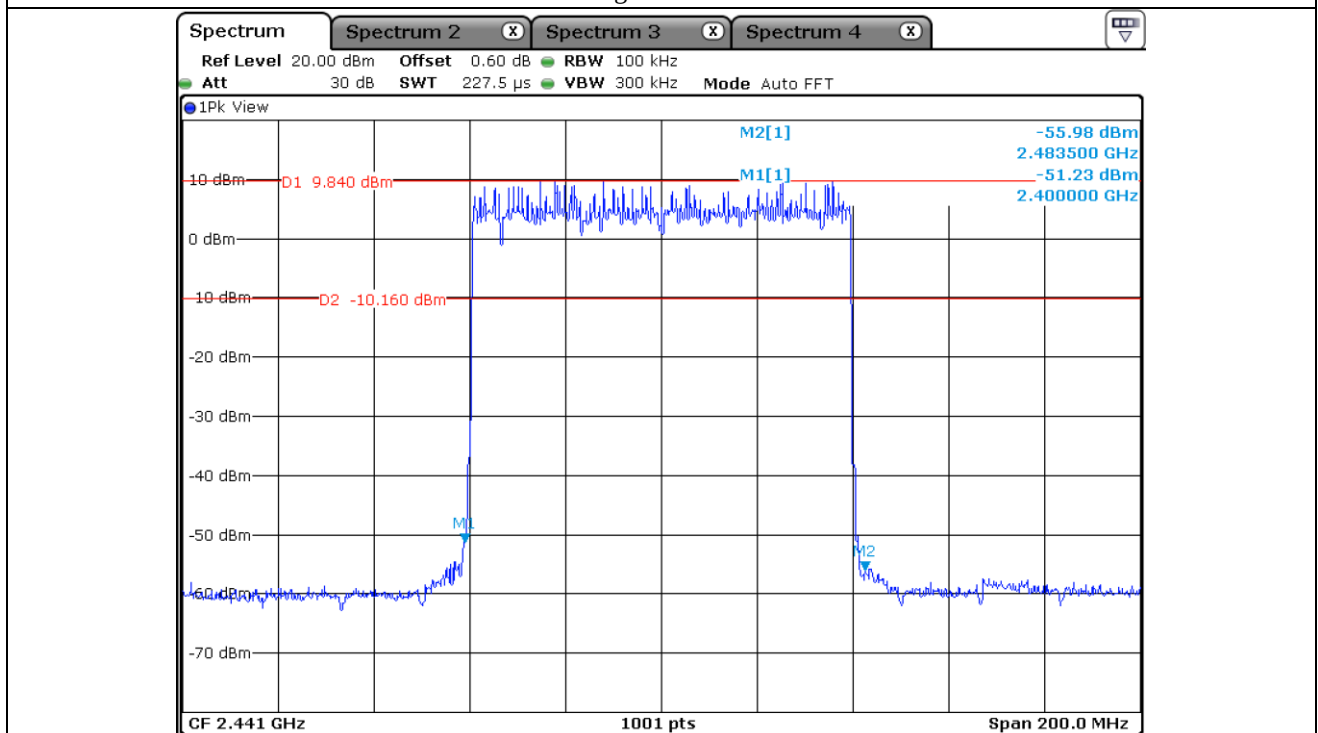
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### High Channel

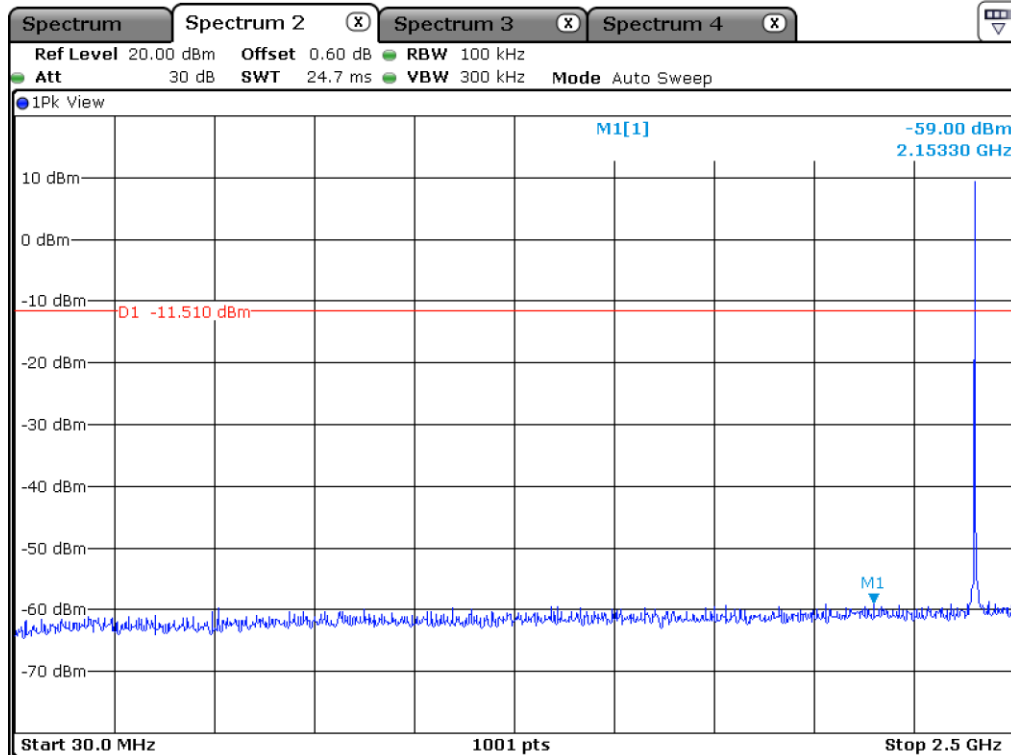


### Hopping Mode

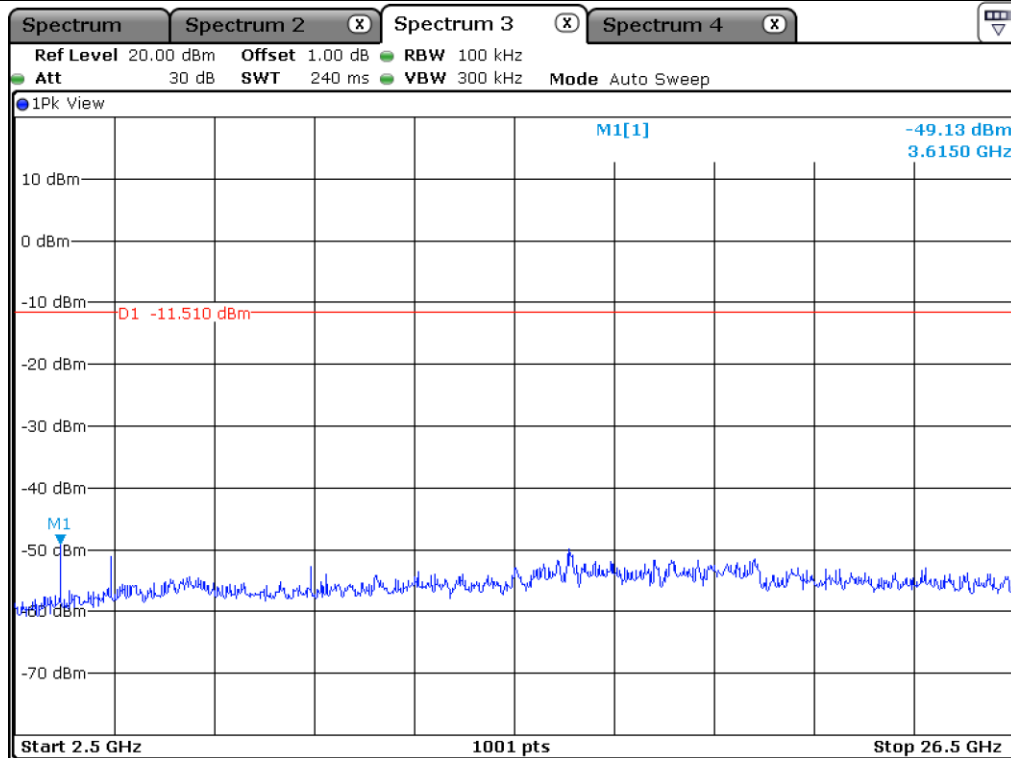
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Low Channel



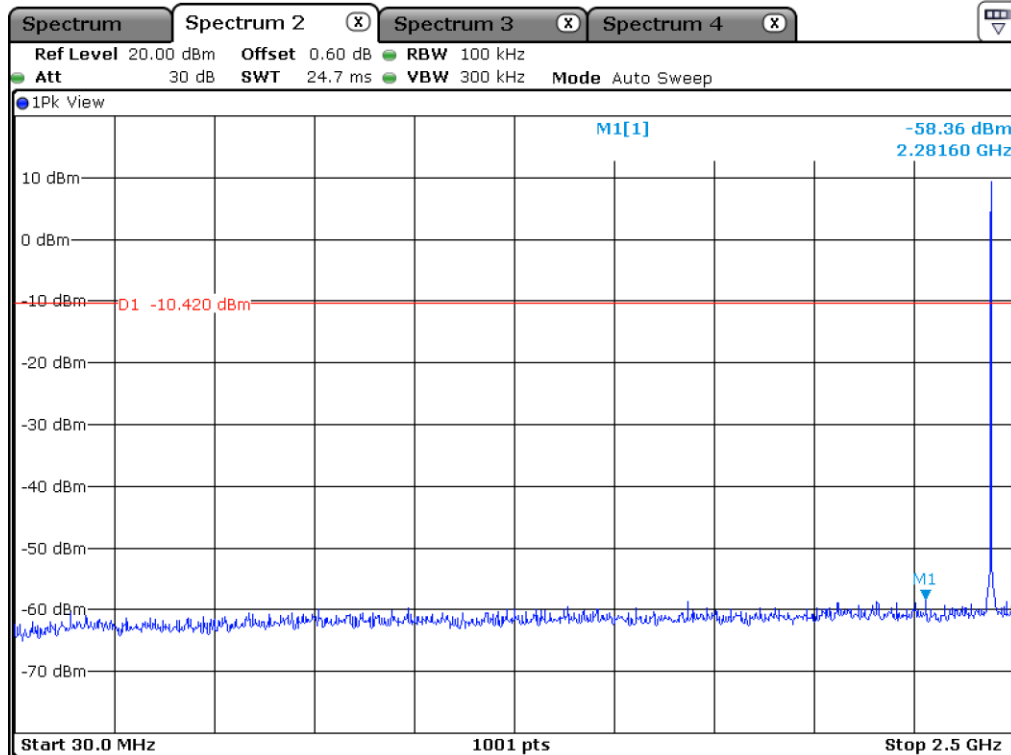
Low Channel

This Report is not correlated with the authentication of KOLAS

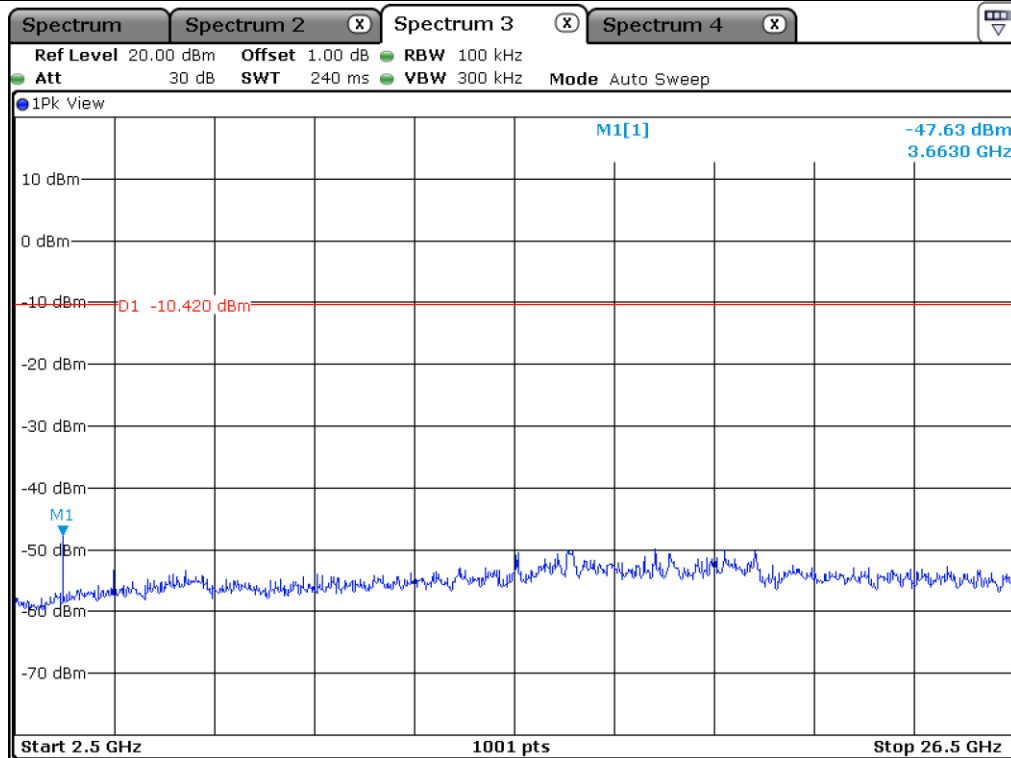
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Middle Channel



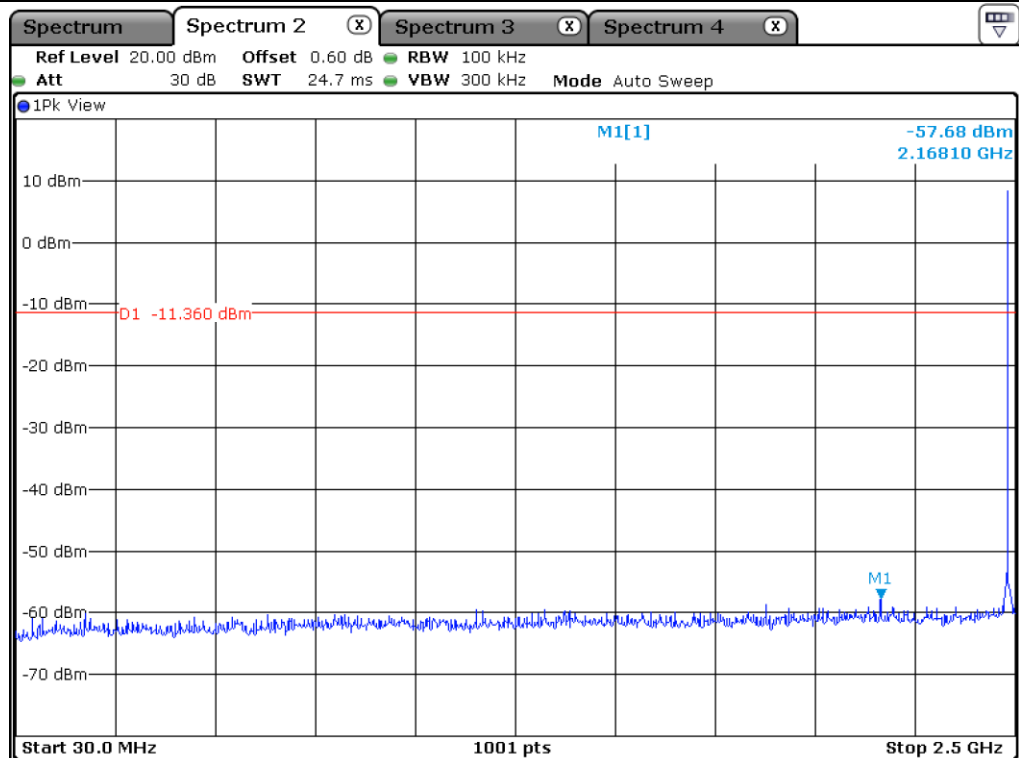
Middle Channel

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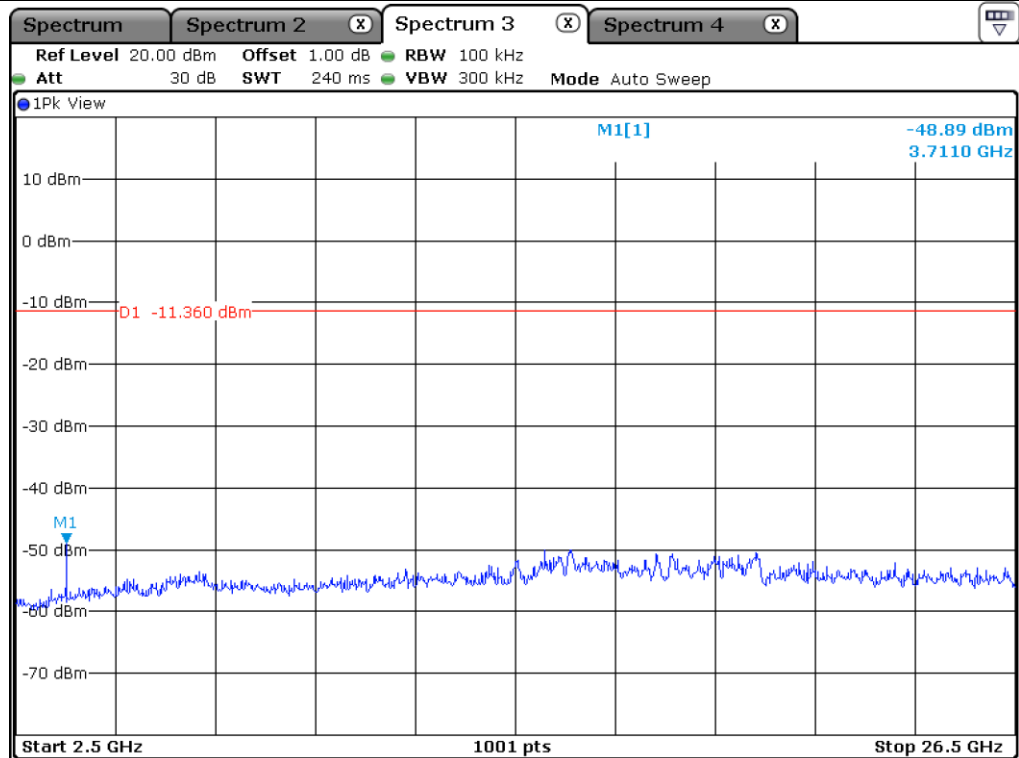
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### High Channel



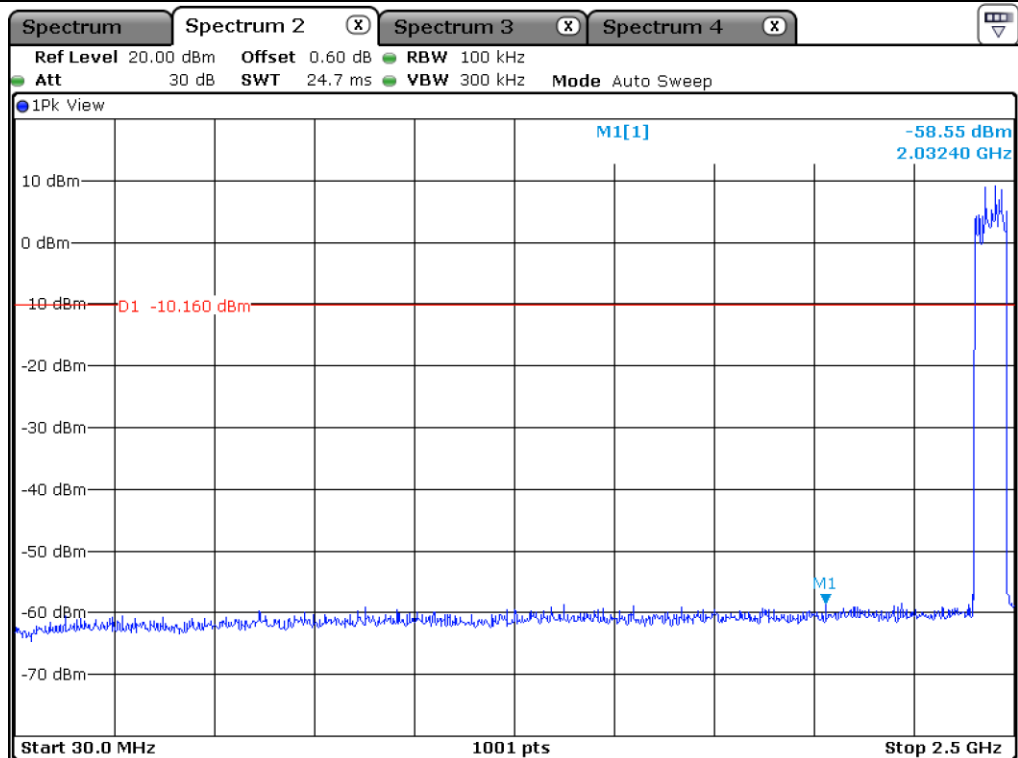
### High Channel

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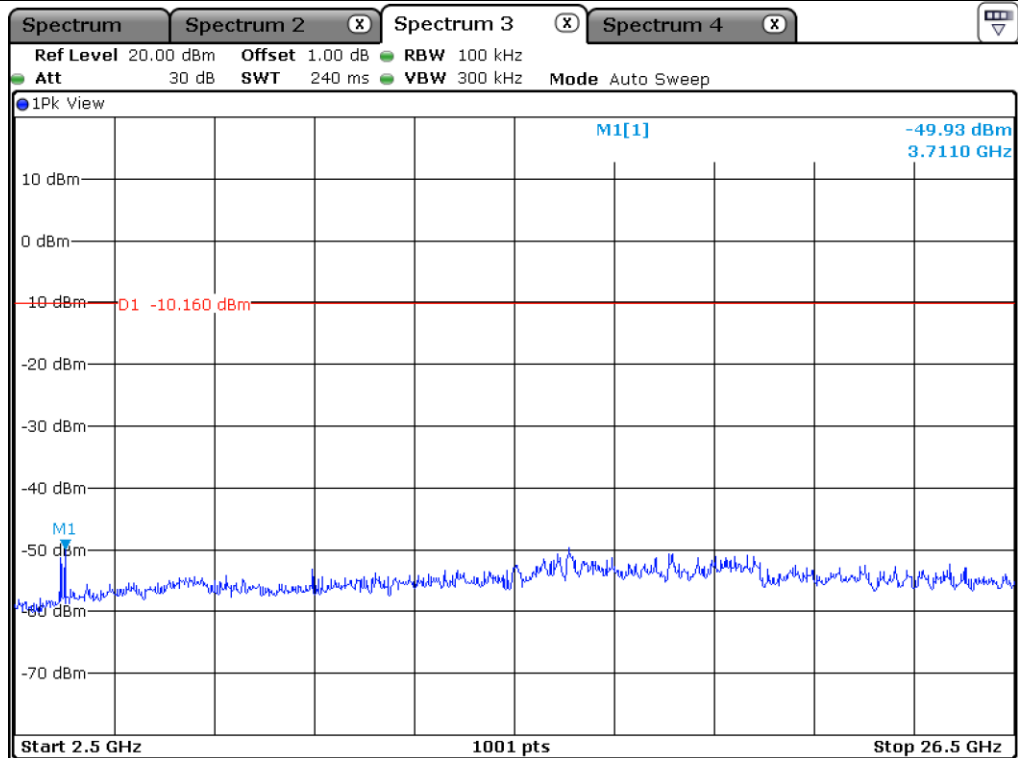
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### Hopping Mode



### Hopping Mode

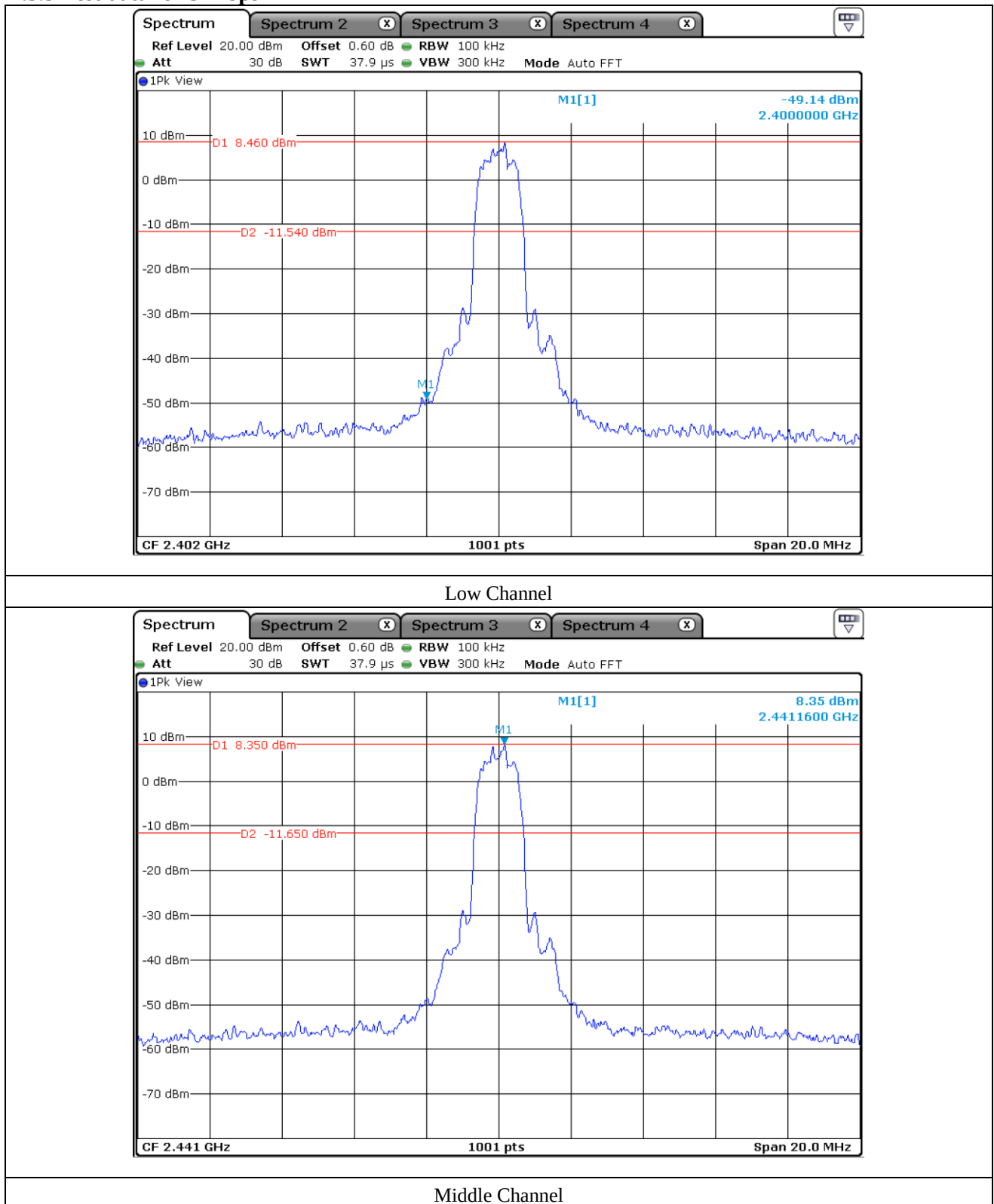
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### 12.5.3 Test data for 3 Mbps

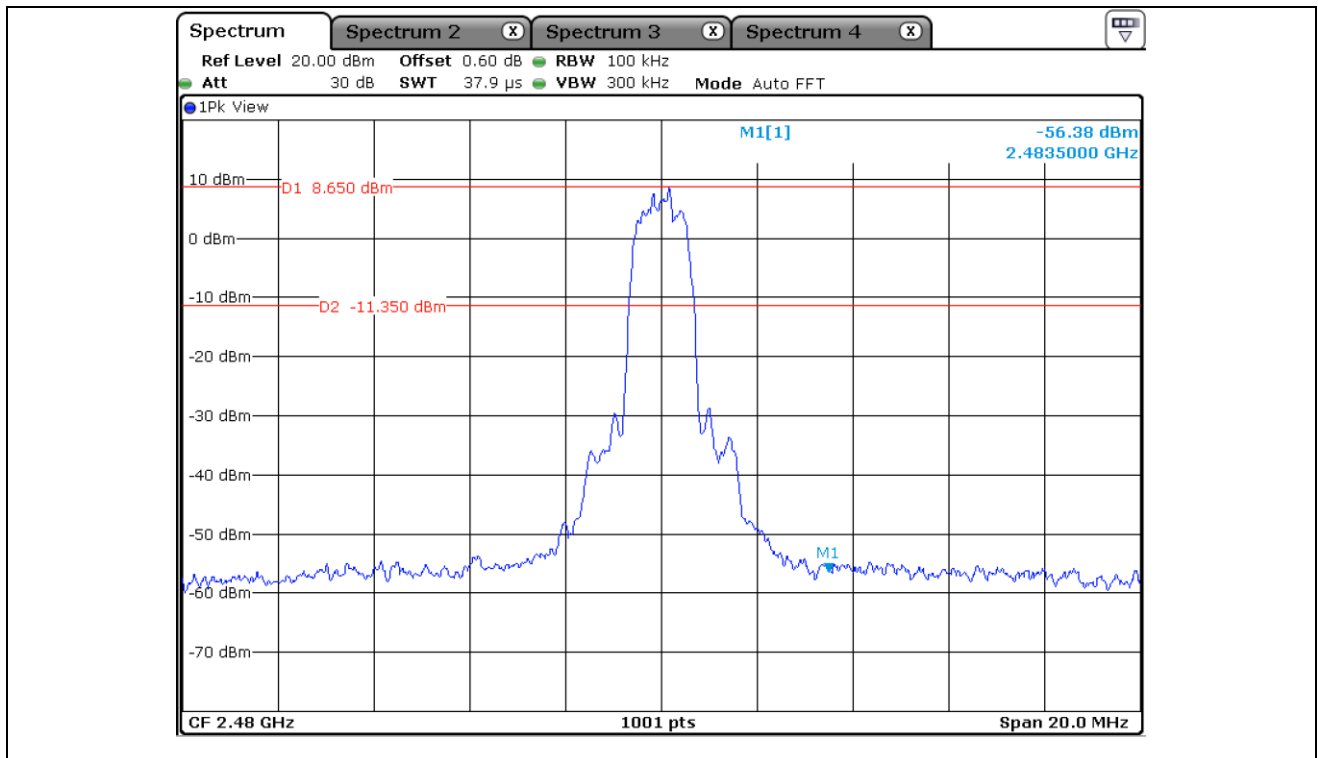


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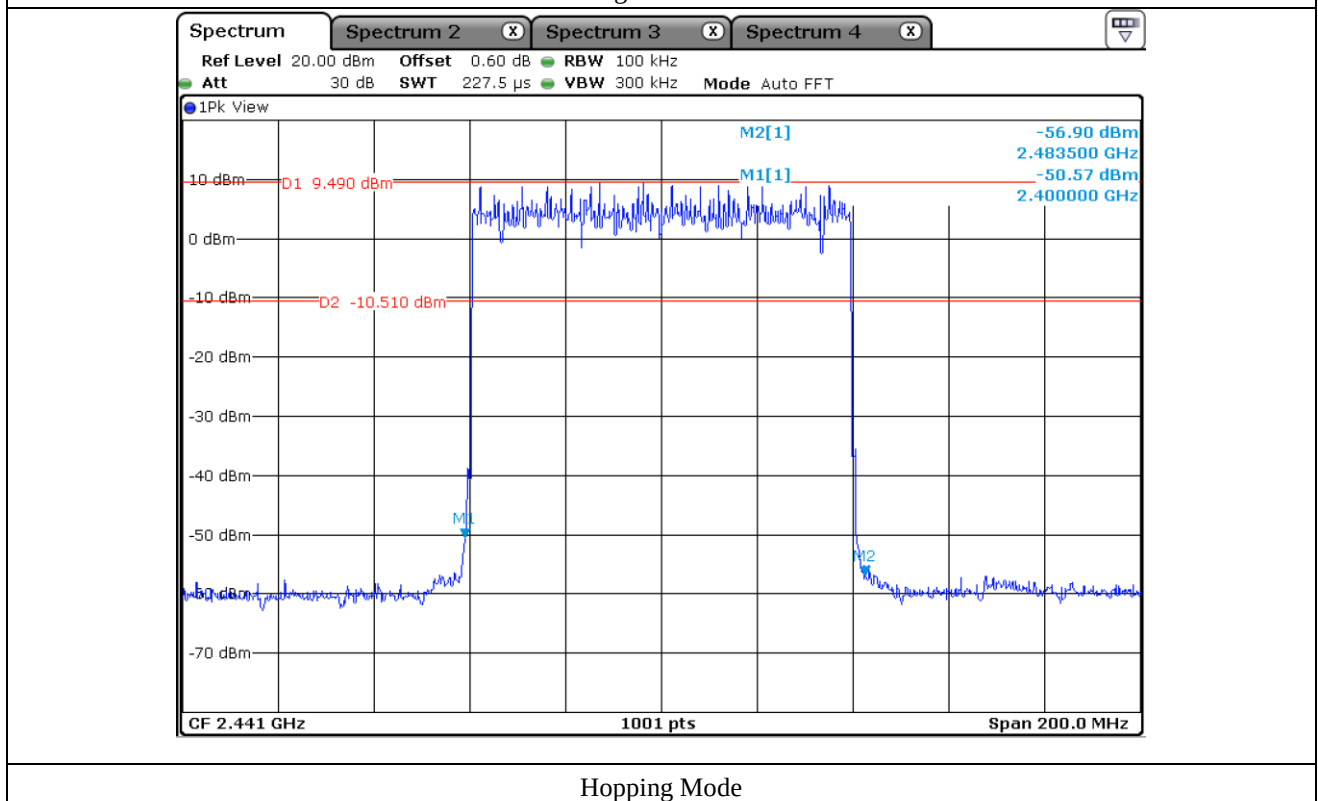
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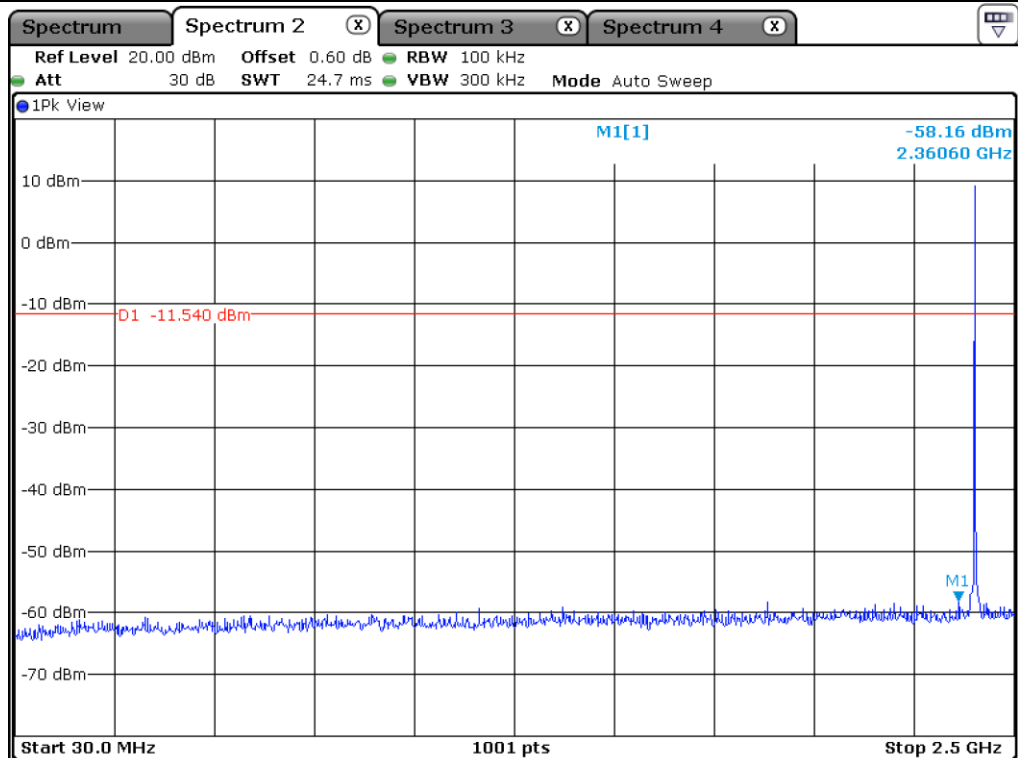
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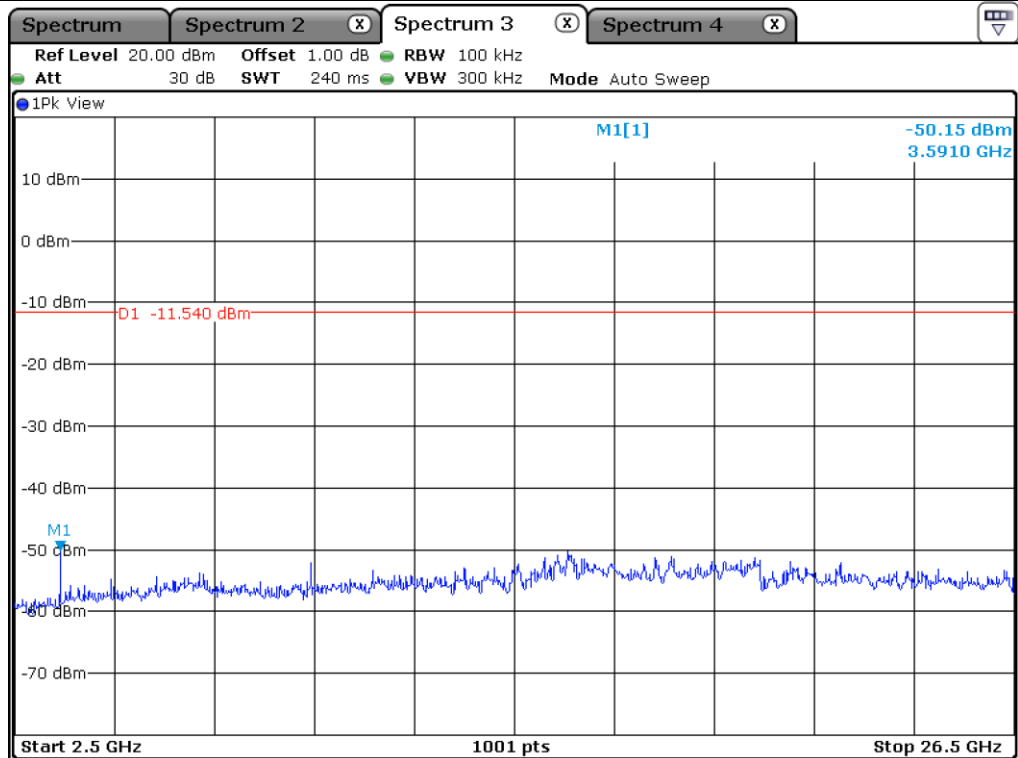
High Channel



Hopping Mode



Low Channel



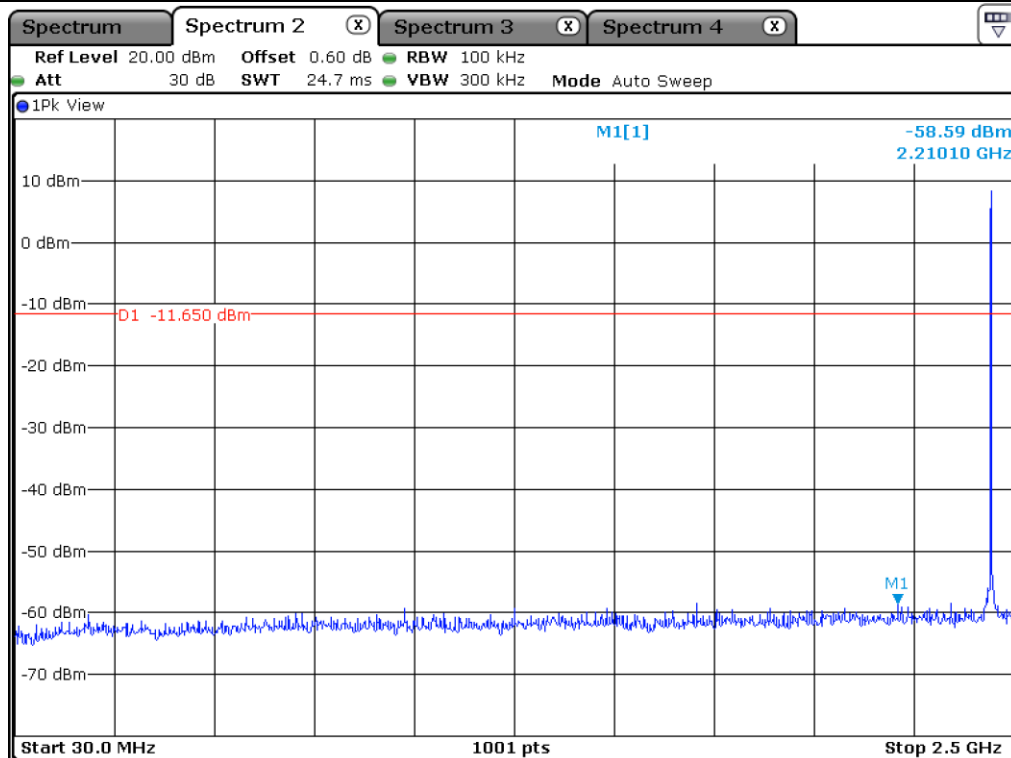
Low Channel

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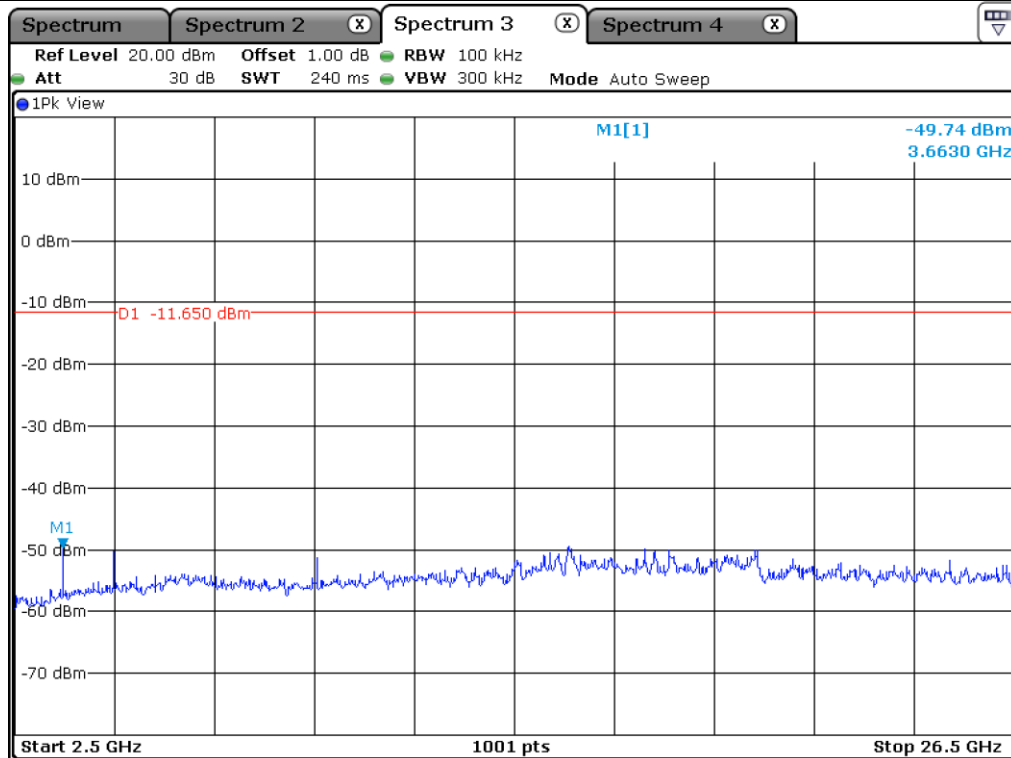
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Middle Channel



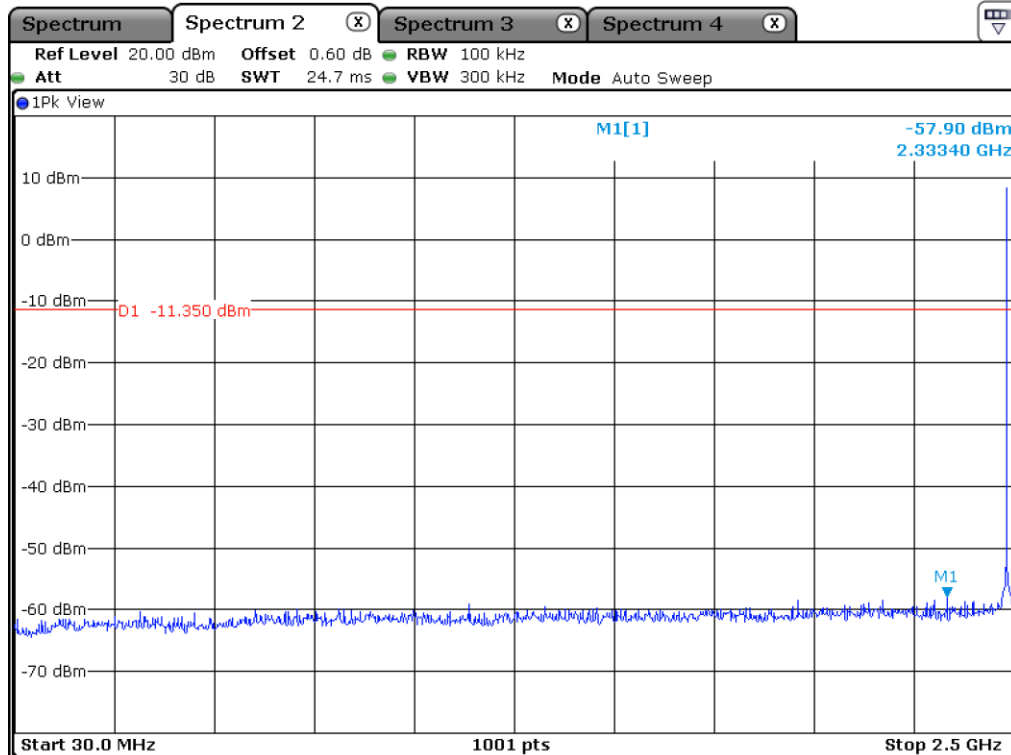
Middle Channel

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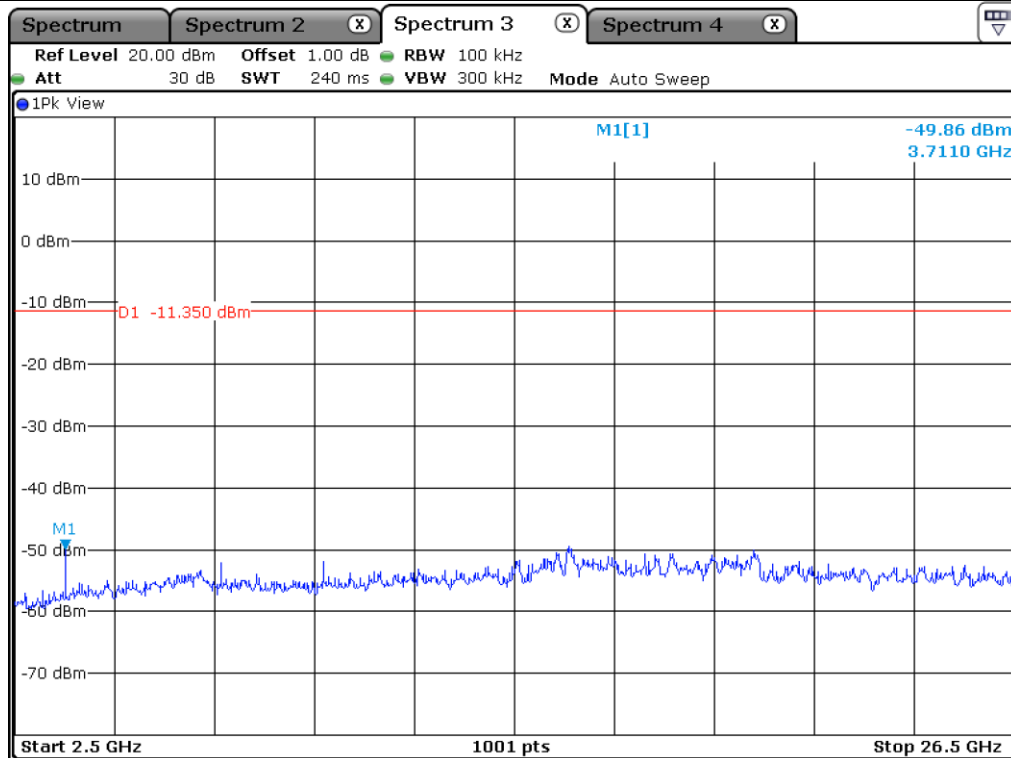
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### High Channel



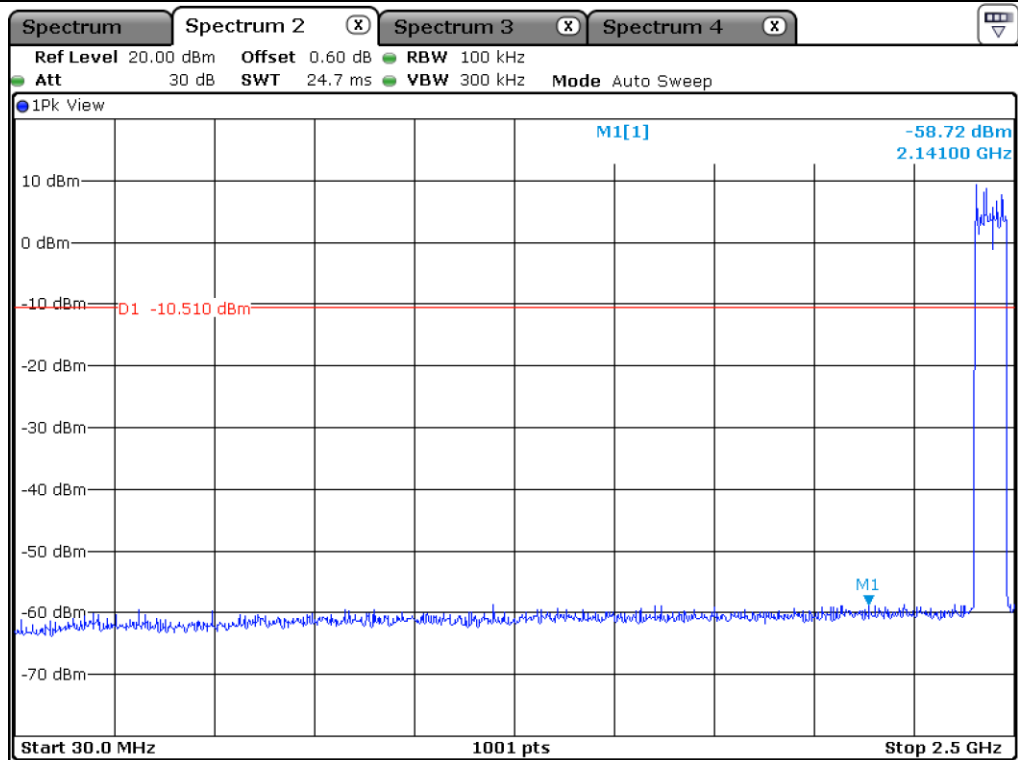
### High Channel

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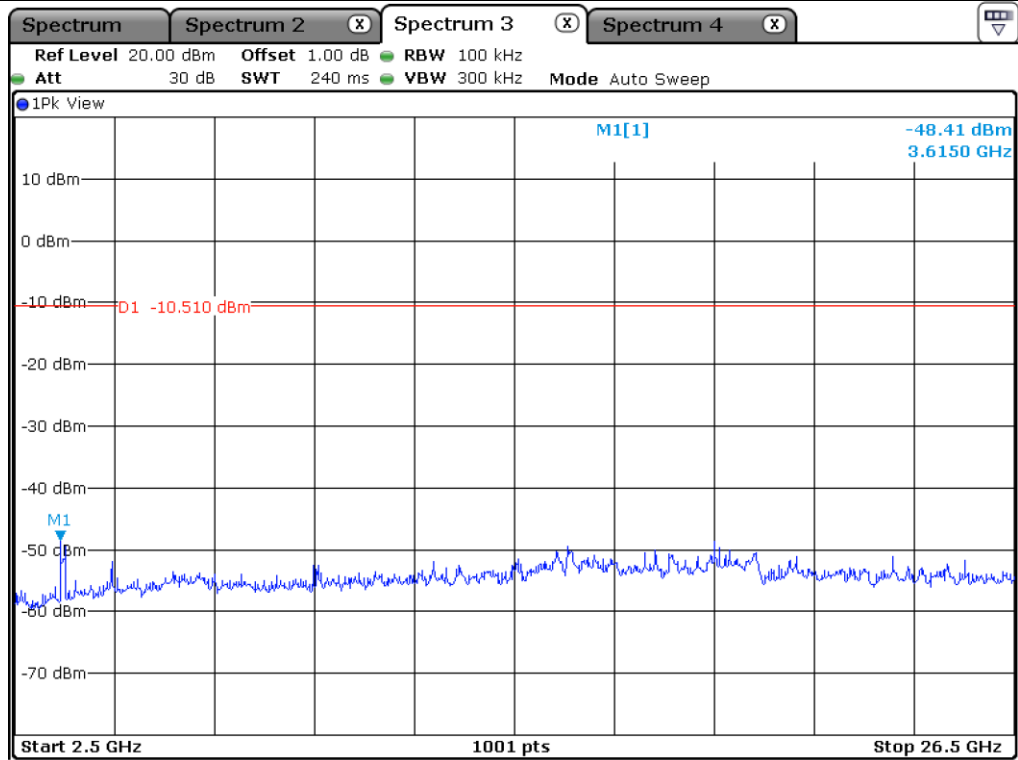
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### Hopping Mode



### Hopping Mode

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## 12.6 Test data for Transmitting mode radiated emission

### 12.6.1 Radiated Emission which fall in the Restricted Band

#### 12.6.1.1 Test data for 1 Mbps

- . Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode  
1 MHz and RMS Detector for Average Mode
- . Video bandwidth : 3 MHz for Peak and Average Mode
- . Measurement distance : 3 m
- . Duty Cycle : 57.60 %
- . Result : PASSED

| Frequency<br>(MHz)                | Reading<br>(dBμV) | Detector<br>Mode | Ant. Pol.<br>(H/V) | Ant.<br>Factor | Cable<br>Loss | AMP<br>Gain | Duty<br>Factor<br>(dB) | Total<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) |
|-----------------------------------|-------------------|------------------|--------------------|----------------|---------------|-------------|------------------------|-------------------|--------------------|----------------|
| <b>Test Data for Low Channel</b>  |                   |                  |                    |                |               |             |                        |                   |                    |                |
| 2 389.55                          | 51.98             | Peak             | H                  | 27.50          | 8.20          | 45.79       | -                      | 41.89             | 74.00              | 32.11          |
| 2 390.00                          | 42.43             | Average          | H                  | 27.50          | 8.20          | 45.79       | 2.40                   | 34.74             | 54.00              | 19.26          |
| 2 388.56                          | 51.68             | Peak             | V                  | 27.50          | 8.20          | 45.79       | -                      | 41.59             | 74.00              | 32.41          |
| 2 390.00                          | 41.65             | Average          | V                  | 27.50          | 8.20          | 45.79       | 2.40                   | 33.96             | 54.00              | 20.04          |
| <b>Test Data for High Channel</b> |                   |                  |                    |                |               |             |                        |                   |                    |                |
| 2 483.50                          | 55.94             | Peak             | H                  | 27.30          | 8.33          | 45.79       | -                      | 45.78             | 74.00              | 28.22          |
| 2 483.50                          | 45.40             | Average          | H                  | 27.30          | 8.33          | 45.79       | 2.40                   | 37.64             | 54.00              | 16.36          |
| 2 483.74                          | 55.28             | Peak             | V                  | 27.30          | 8.33          | 45.79       | -                      | 45.12             | 74.00              | 28.88          |
| 2 483.50                          | 44.95             | Average          | V                  | 27.30          | 8.33          | 45.79       | 2.40                   | 37.19             | 54.00              | 16.81          |

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Gain} + \text{Duty Factor}$$

### 12.6.1.2 Test data for 2 Mbps

- . Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode  
1 MHz and RMS Detector for Average Mode
- . Video bandwidth : 3 MHz for Peak and Average Mode
- . Measurement distance : 3 m
- . Duty Cycle : 57.60 %
- . Result : PASSED

| Frequency<br>(MHz)                | Reading<br>(dBμV) | Detector<br>Mode | Ant. Pol.<br>(H/V) | Ant.<br>Factor | Cable<br>Loss | AMP<br>Gain | Duty<br>Factor<br>(dB) | Total<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) |
|-----------------------------------|-------------------|------------------|--------------------|----------------|---------------|-------------|------------------------|-------------------|--------------------|----------------|
| <b>Test Data for Low Channel</b>  |                   |                  |                    |                |               |             |                        |                   |                    |                |
| 2 389.82                          | 51.96             | Peak             | H                  | 27.50          | 8.20          | 45.79       | -                      | 41.87             | 74.00              | 32.13          |
| 2 390.00                          | 42.46             | Average          | H                  | 27.50          | 8.20          | 45.79       | 2.40                   | 34.77             | 54.00              | 19.23          |
| 2 389.73                          | 51.43             | Peak             | V                  | 27.50          | 8.20          | 45.79       | -                      | 41.34             | 74.00              | 32.66          |
| 2 390.00                          | 42.07             | Average          | V                  | 27.50          | 8.20          | 45.79       | 2.40                   | 34.38             | 54.00              | 19.62          |
| <b>Test Data for High Channel</b> |                   |                  |                    |                |               |             |                        |                   |                    |                |
| 2 486.93                          | 55.74             | Peak             | H                  | 27.30          | 8.33          | 45.79       | -                      | 45.58             | 74.00              | 28.42          |
| 2 483.50                          | 44.50             | Average          | H                  | 27.30          | 8.33          | 45.79       | 2.40                   | 36.74             | 54.00              | 17.26          |
| 2 486.39                          | 55.13             | Peak             | V                  | 27.30          | 8.33          | 45.79       | -                      | 44.97             | 74.00              | 29.03          |
| 2 483.50                          | 44.18             | Average          | V                  | 27.30          | 8.33          | 45.79       | 2.40                   | 36.42             | 54.00              | 17.58          |

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Gain} + \text{Duty Factor}$$

### 12.6.1.3 Test data for 3 Mbps

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode  
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 57.60 %
- Result : PASSED

| Frequency<br>(MHz)                | Reading<br>(dBμV) | Detector<br>Mode | Ant. Pol.<br>(H/V) | Ant.<br>Factor | Cable<br>Loss | AMP<br>Gain | Duty<br>Factor<br>(dB) | Total<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) |
|-----------------------------------|-------------------|------------------|--------------------|----------------|---------------|-------------|------------------------|-------------------|--------------------|----------------|
| <b>Test Data for Low Channel</b>  |                   |                  |                    |                |               |             |                        |                   |                    |                |
| 2 385.23                          | 52.65             | Peak             | H                  | 27.50          | 8.20          | 45.79       | -                      | 42.56             | 74.00              | 31.44          |
| 2 390.00                          | 43.01             | Average          | H                  | 27.50          | 8.20          | 45.79       | 2.40                   | 35.32             | 54.00              | 18.68          |
| 2 388.29                          | 51.83             | Peak             | V                  | 27.50          | 8.20          | 45.79       | -                      | 41.74             | 74.00              | 32.26          |
| 2 390.00                          | 42.19             | Average          | V                  | 27.50          | 8.20          | 45.79       | 2.40                   | 34.50             | 54.00              | 19.50          |
| <b>Test Data for High Channel</b> |                   |                  |                    |                |               |             |                        |                   |                    |                |
| 2 484.39                          | 55.93             | Peak             | H                  | 27.30          | 8.33          | 45.79       | -                      | 45.77             | 74.00              | 28.23          |
| 2 483.50                          | 45.27             | Average          | H                  | 27.30          | 8.33          | 45.79       | 2.40                   | 37.51             | 54.00              | 16.49          |
| 2 483.50                          | 55.06             | Peak             | V                  | 27.30          | 8.33          | 45.79       | -                      | 44.90             | 74.00              | 29.10          |
| 2 483.50                          | 44.48             | Average          | V                  | 27.30          | 8.33          | 45.79       | 2.40                   | 36.72             | 54.00              | 17.28          |

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Gain} + \text{Duty Factor}$$

## 12.6.2 Spurious & Harmonic Radiated Emission above 1 GHz

### 12.6.2.1 Test data for 1 Mbps

- . Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,  
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band  
100 kHz for Peak Mode for the emissions outside restricted band
- . Video bandwidth : 3 MHz for Peak and Average Mode
- . Frequency range : 1 GHz ~ 26.5 GHz
- . Measurement distance : 3 m
- . Duty Cycle : 57.60 %
- . Result : PASSED

| Frequency (MHz)                     | Reading (dBμV) | Detector Mode | Ant. Pol. (H/V) | Ant. Factor | Cable Loss | AMP Gain | Duty Factor (dB) | Total (dBμV/m) | Limits (dBμV/m) | Margin (dB) |
|-------------------------------------|----------------|---------------|-----------------|-------------|------------|----------|------------------|----------------|-----------------|-------------|
| <b>Test Data for Low Channel</b>    |                |               |                 |             |            |          |                  |                |                 |             |
| 4 804.00                            | 49.27          | Peak          | H               | 31.10       | 11.19      | 45.10    | -                | 46.46          | 74.00           | 27.54       |
| 4 804.00                            | 39.36          | Average       | H               | 31.10       | 11.19      | 45.10    | 2.40             | 38.95          | 54.00           | 15.05       |
| 4 804.00                            | 49.52          | Peak          | V               | 31.10       | 11.19      | 45.10    | -                | 46.71          | 74.00           | 27.29       |
| 4 804.00                            | 39.26          | Average       | V               | 31.10       | 11.19      | 45.10    | 2.40             | 38.85          | 54.00           | 15.15       |
| <b>Test Data for Middle Channel</b> |                |               |                 |             |            |          |                  |                |                 |             |
| 4 882.00                            | 49.52          | Peak          | H               | 31.10       | 11.24      | 45.10    | -                | 46.76          | 74.00           | 27.24       |
| 4 882.00                            | 39.26          | Average       | H               | 31.10       | 11.24      | 45.10    | 2.40             | 38.90          | 54.00           | 15.10       |
| 4 882.00                            | 49.49          | Peak          | V               | 31.10       | 11.24      | 45.10    | -                | 46.73          | 74.00           | 27.27       |
| 4 882.00                            | 39.20          | Average       | V               | 31.10       | 11.24      | 45.10    | 2.40             | 38.84          | 54.00           | 15.16       |
| <b>Test Data for High Channel</b>   |                |               |                 |             |            |          |                  |                |                 |             |
| 4 960.00                            | 49.40          | Peak          | H               | 31.20       | 11.33      | 45.03    | -                | 46.90          | 74.00           | 27.10       |
| 4 960.00                            | 39.18          | Average       | H               | 31.20       | 11.33      | 45.03    | 2.40             | 39.08          | 54.00           | 14.92       |
| 4 960.00                            | 49.38          | Peak          | V               | 31.20       | 11.33      | 45.03    | -                | 46.88          | 74.00           | 27.12       |
| 4 960.00                            | 39.20          | Average       | V               | 31.20       | 11.33      | 45.03    | 2.40             | 39.10          | 54.00           | 14.90       |

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dBμV/m)} - \text{Total Level (dBμV/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Gain} + \text{Duty Factor}$$

### 12.6.2.2 Test data for 2 Mbps

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,  
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band  
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Duty Cycle : 57.60 %
- Result : PASSED

| Frequency (MHz)                     | Reading (dBμV) | Detector Mode | Ant. Pol. (H/V) | Ant. Factor | Cable Loss | AMP Gain | Duty Factor (dB) | Total (dBμV/m) | Limits (dBμV/m) | Margin (dB) |
|-------------------------------------|----------------|---------------|-----------------|-------------|------------|----------|------------------|----------------|-----------------|-------------|
| <b>Test Data for Low Channel</b>    |                |               |                 |             |            |          |                  |                |                 |             |
| 4 804.00                            | 49.33          | Peak          | H               | 31.10       | 11.19      | 45.10    | -                | 46.52          | 74.00           | 27.48       |
| 4 804.00                            | 39.26          | Average       | H               | 31.10       | 11.19      | 45.10    | 2.40             | 38.85          | 54.00           | 15.15       |
| 4 804.00                            | 49.35          | Peak          | V               | 31.10       | 11.19      | 45.10    | -                | 46.54          | 74.00           | 27.46       |
| 4 804.00                            | 39.27          | Average       | V               | 31.10       | 11.19      | 45.10    | 2.40             | 38.86          | 54.00           | 15.14       |
| <b>Test Data for Middle Channel</b> |                |               |                 |             |            |          |                  |                |                 |             |
| 4 882.00                            | 49.48          | Peak          | H               | 31.10       | 11.24      | 45.10    | -                | 46.72          | 74.00           | 27.28       |
| 4 882.00                            | 39.17          | Average       | H               | 31.10       | 11.24      | 45.10    | 2.40             | 38.81          | 54.00           | 15.19       |
| 4 882.00                            | 49.42          | Peak          | V               | 31.10       | 11.24      | 45.10    | -                | 46.66          | 74.00           | 27.34       |
| 4 882.00                            | 39.24          | Average       | V               | 31.10       | 11.24      | 45.10    | 2.40             | 38.88          | 54.00           | 15.12       |
| <b>Test Data for High Channel</b>   |                |               |                 |             |            |          |                  |                |                 |             |
| 4 960.00                            | 49.46          | Peak          | H               | 31.20       | 11.33      | 45.03    | -                | 46.96          | 74.00           | 27.04       |
| 4 960.00                            | 39.15          | Average       | H               | 31.20       | 11.33      | 45.03    | 2.40             | 39.05          | 54.00           | 14.95       |
| 4 960.00                            | 49.21          | Peak          | V               | 31.20       | 11.33      | 45.03    | -                | 46.71          | 74.00           | 27.29       |
| 4 960.00                            | 39.17          | Average       | V               | 31.20       | 11.33      | 45.03    | 2.40             | 39.07          | 54.00           | 14.93       |

Remark: "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

### 12.6.2.3 Test data for 3 Mbps

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,  
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band  
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Duty Cycle : 57.60 %
- Result : PASSED

| Frequency (MHz)                     | Reading (dBμV) | Detector Mode | Ant. Pol. (H/V) | Ant. Factor | Cable Loss | AMP Gain | Duty Factor (dB) | Total (dBμV/m) | Limits (dBμV/m) | Margin (dB) |
|-------------------------------------|----------------|---------------|-----------------|-------------|------------|----------|------------------|----------------|-----------------|-------------|
| <b>Test Data for Low Channel</b>    |                |               |                 |             |            |          |                  |                |                 |             |
| 4 804.00                            | 49.46          | Peak          | H               | 31.10       | 11.19      | 45.10    | -                | 46.65          | 74.00           | 27.35       |
| 4 804.00                            | 39.33          | Average       | H               | 31.10       | 11.19      | 45.10    | 2.40             | 38.92          | 54.00           | 15.08       |
| 4 804.00                            | 49.43          | Peak          | V               | 31.10       | 11.19      | 45.10    | -                | 46.62          | 74.00           | 27.38       |
| 4 804.00                            | 39.19          | Average       | V               | 31.10       | 11.19      | 45.10    | 2.40             | 38.78          | 54.00           | 15.22       |
| <b>Test Data for Middle Channel</b> |                |               |                 |             |            |          |                  |                |                 |             |
| 4 882.00                            | 49.31          | Peak          | H               | 31.10       | 11.24      | 45.10    | -                | 46.55          | 74.00           | 27.45       |
| 4 882.00                            | 39.39          | Average       | H               | 31.10       | 11.24      | 45.10    | 2.40             | 39.03          | 54.00           | 14.97       |
| 4 882.00                            | 49.49          | Peak          | V               | 31.10       | 11.24      | 45.10    | -                | 46.73          | 74.00           | 27.27       |
| 4 882.00                            | 39.24          | Average       | V               | 31.10       | 11.24      | 45.10    | 2.40             | 38.88          | 54.00           | 15.12       |
| <b>Test Data for High Channel</b>   |                |               |                 |             |            |          |                  |                |                 |             |
| 4 960.00                            | 49.50          | Peak          | H               | 31.20       | 11.33      | 45.03    | -                | 47.00          | 74.00           | 27.00       |
| 4 960.00                            | 39.45          | Average       | H               | 31.20       | 11.33      | 45.03    | 2.40             | 39.35          | 54.00           | 14.65       |
| 4 960.00                            | 49.30          | Peak          | V               | 31.20       | 11.33      | 45.03    | -                | 46.80          | 74.00           | 27.20       |
| 4 960.00                            | 39.30          | Average       | V               | 31.20       | 11.33      | 45.03    | 2.40             | 39.20          | 54.00           | 14.80       |

Remark: "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

## 13. RADIATED EMISSION TEST

### 13.1 Operating environment

Temperature : 22 °C  
Relative humidity : 46 % R.H.

### 13.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

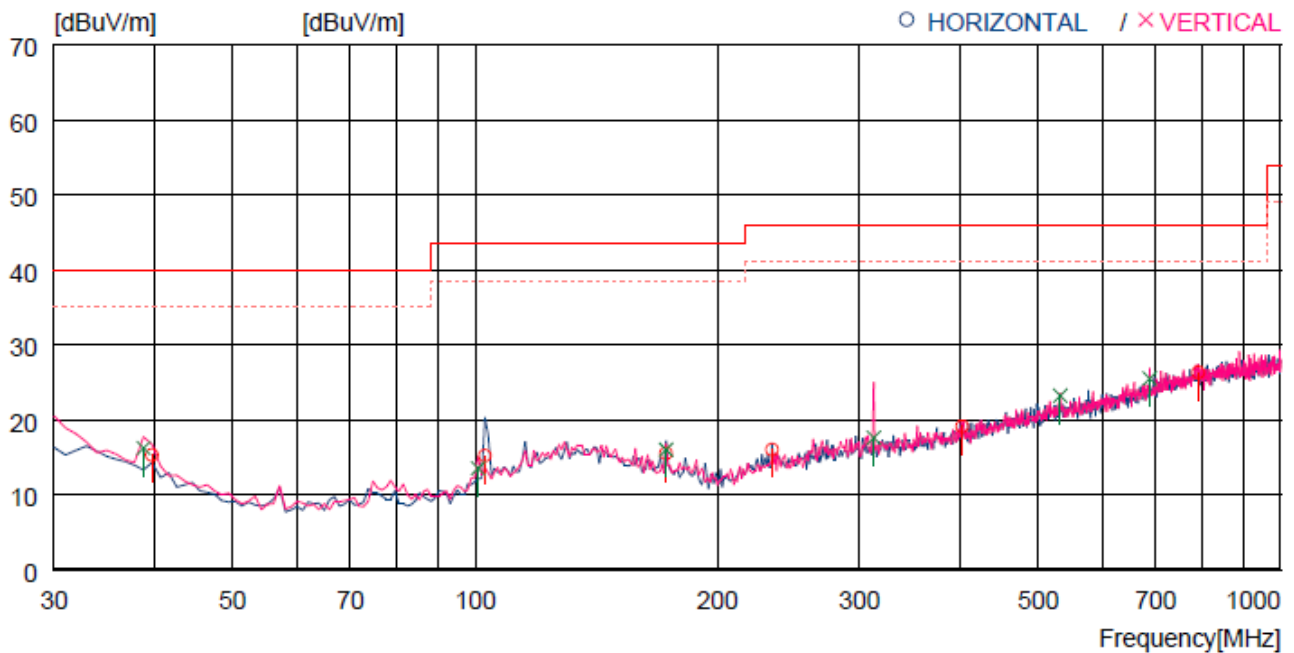
### 13.3 Test Date

October 07, 2021 ~ October 20, 2021

### 13.4 Test data for 30 MHz ~ 1 000 MHz

#### 13.4.1 Test data for Bluetooth Mode

- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m



| No.                    | FREQ    | READING | ANT  | LOSS | GAIN | RESULT   | LIMIT    | MARGIN | ANTENNA | TABLE |
|------------------------|---------|---------|------|------|------|----------|----------|--------|---------|-------|
|                        | [MHz]   | [dBuV]  | [dB] | [dB] | [dB] | [dBuV/m] | [dBuV/m] | [dB]   | [cm]    | [DEG] |
| ----- Horizontal ----- |         |         |      |      |      |          |          |        |         |       |
| 1                      | 39.700  | 28.6    | 17.4 | 1.3  | 32.0 | 15.3     | 40.0     | 24.7   | 100     | 210   |
| 2                      | 102.750 | 29.6    | 15.8 | 1.8  | 32.0 | 15.2     | 43.5     | 28.3   | 100     | 270   |
| 3                      | 172.590 | 28.1    | 17.1 | 2.3  | 32.0 | 15.5     | 43.5     | 28.0   | 100     | 219   |
| 4                      | 233.700 | 28.3    | 17.1 | 2.6  | 32.0 | 16.0     | 46.0     | 30.0   | 100     | 229   |
| 5                      | 402.480 | 26.9    | 20.8 | 3.5  | 32.1 | 19.1     | 46.0     | 26.9   | 100     | 147   |
| 6                      | 790.472 | 26.4    | 27.0 | 4.9  | 32.0 | 26.3     | 46.0     | 19.7   | 100     | 245   |
| ----- Vertical -----   |         |         |      |      |      |          |          |        |         |       |
| 7                      | 38.730  | 29.1    | 17.8 | 1.3  | 32.0 | 16.2     | 40.0     | 23.8   | 100     | 132   |
| 8                      | 100.810 | 28.3    | 15.4 | 1.8  | 32.0 | 13.5     | 43.5     | 30.0   | 100     | 151   |
| 9                      | 172.590 | 28.6    | 17.1 | 2.3  | 32.0 | 16.0     | 43.5     | 27.5   | 100     | 297   |
| 10                     | 312.270 | 27.1    | 19.4 | 3.1  | 32.0 | 17.6     | 46.0     | 28.4   | 100     | 132   |
| 11                     | 532.460 | 28.0    | 23.5 | 4.0  | 32.3 | 23.2     | 46.0     | 22.8   | 100     | 141   |
| 12                     | 687.655 | 27.8    | 25.4 | 4.6  | 32.3 | 25.5     | 46.0     | 20.5   | 100     | 132   |

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### 13.4.2 Test data for Intermodulation Mode(Bluetooth + WLAN 2.4 GHz + WLAN 5 GHz)

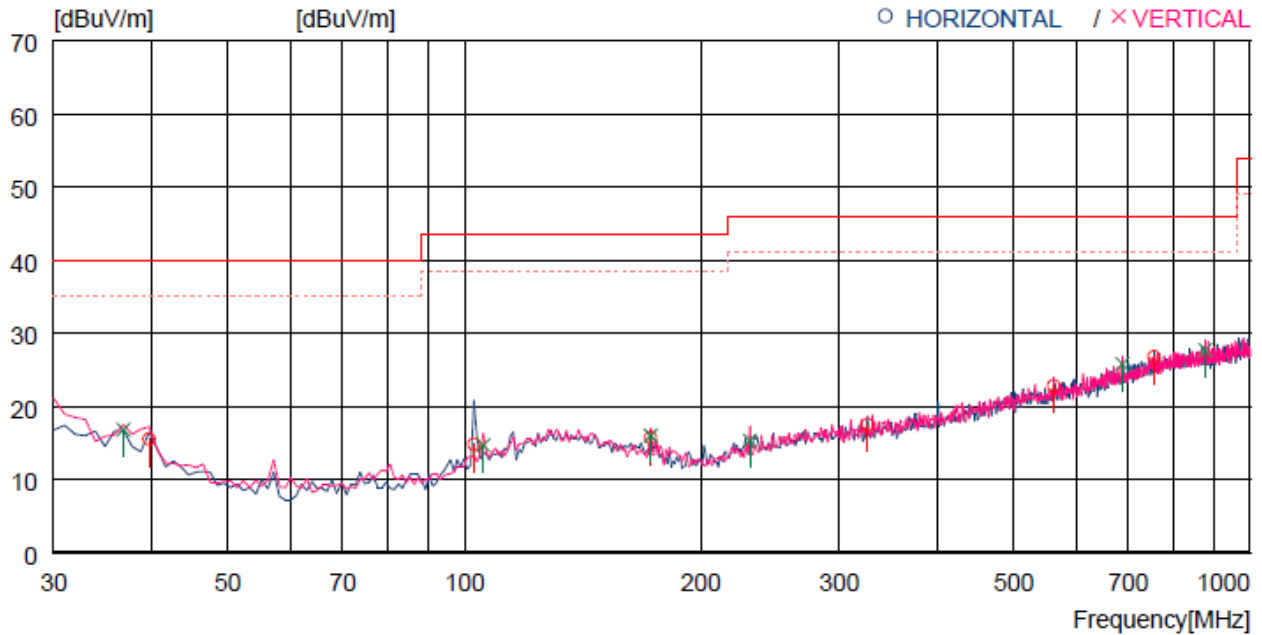
Humidity Level : 46 % R.H. Temperature: 22 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Wi-Fi/BT Transceiver

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



| No.                  | FREQ    | READING | ANT  | LOSS | GAIN | RESULT   | LIMIT    | MARGIN | ANTENNA | TABLE |
|----------------------|---------|---------|------|------|------|----------|----------|--------|---------|-------|
|                      | [MHz]   | [dBuV]  | [dB] | [dB] | [dB] | [dBuV/m] | [dBuV/m] | [dB]   | [cm]    | [DEG] |
| ---- Horizontal ---- |         |         |      |      |      |          |          |        |         |       |
| 1                    | 39.700  | 28.8    | 17.4 | 1.3  | 32.0 | 15.5     | 40.0     | 24.5   | 100     | 185   |
| 2                    | 102.750 | 29.2    | 15.8 | 1.8  | 32.0 | 14.8     | 43.5     | 28.7   | 100     | 204   |
| 3                    | 172.590 | 28.3    | 17.1 | 2.3  | 32.0 | 15.7     | 43.5     | 27.8   | 100     | 185   |
| 4                    | 325.850 | 26.8    | 19.6 | 3.1  | 32.0 | 17.5     | 46.0     | 28.5   | 100     | 185   |
| 5                    | 562.529 | 27.3    | 23.8 | 4.1  | 32.4 | 22.8     | 46.0     | 23.2   | 100     | 331   |
| 6                    | 754.583 | 27.7    | 26.4 | 4.8  | 32.1 | 26.8     | 46.0     | 19.2   | 100     | 354   |
| ---- Vertical ----   |         |         |      |      |      |          |          |        |         |       |
| 7                    | 36.790  | 29.0    | 18.5 | 1.3  | 32.0 | 16.8     | 40.0     | 23.2   | 100     | 180   |
| 8                    | 105.660 | 28.6    | 16.2 | 1.9  | 32.0 | 14.7     | 43.5     | 28.8   | 100     | 289   |
| 9                    | 172.590 | 28.6    | 17.1 | 2.3  | 32.0 | 16.0     | 43.5     | 27.5   | 100     | 359   |
| 10                   | 230.790 | 27.7    | 17.0 | 2.6  | 32.0 | 15.3     | 46.0     | 30.7   | 100     | 359   |
| 11                   | 687.655 | 28.1    | 25.4 | 4.6  | 32.3 | 25.8     | 46.0     | 20.2   | 100     | 180   |
| 12                   | 876.800 | 26.9    | 27.4 | 5.2  | 31.8 | 27.7     | 46.0     | 18.3   | 100     | 206   |

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### 13.5 Test data for Below 30 MHz

- . Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- . Frequency range : 9 kHz ~ 30 MHz
- . Measurement distance : 3 m

| Frequency<br>(MHz)                                                             | Reading<br>(dBμV) | Ant. Pol.<br>(H/V) | Ant. Factor<br>(dB/m) | Cable<br>Loss | Amp<br>Gain | Emission<br>Level(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------------------------------------------------------------|-------------------|--------------------|-----------------------|---------------|-------------|---------------------------|--------------------|----------------|
| Emission from the EUT more than 20 dB below the limit in each frequency range. |                   |                    |                       |               |             |                           |                    |                |

### 13.6 Test data for above 1 GHz

- . Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode  
1 MHz and RMS Detector for Average Mode
- . Video bandwidth : 3 MHz for Peak and Average Mode
- . Frequency range : 1 GHz ~ 26.5 GHz
- . Measurement distance : 3 m

| Frequency<br>(MHz)                                                             | Reading<br>(dBμV) | Ant. Pol.<br>(H/V) | Ant. Factor<br>(dB/m) | Cable<br>Loss | Amp<br>Gain | Emission<br>Level(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------------------------------------------------------------|-------------------|--------------------|-----------------------|---------------|-------------|---------------------------|--------------------|----------------|
| Emission from the EUT more than 20 dB below the limit in each frequency range. |                   |                    |                       |               |             |                           |                    |                |

## 14. CONDUCTED EMISSION TEST

### 14.1 Operating environment

Temperature : 22 °C  
Relative humidity : 46 % R.H.

### 14.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a  $50\ \Omega$  /  $50\ \mu\text{H}$  +  $5\ \Omega$  Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

### 14.3 Test Date

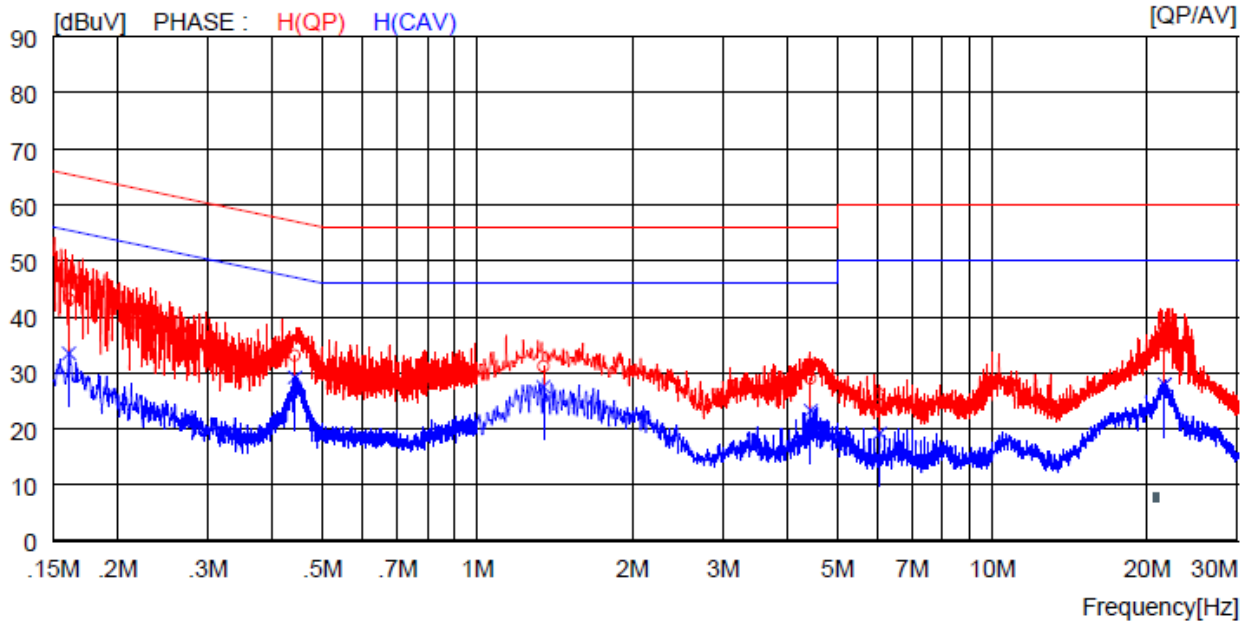
October 07, 2021 ~ October 20, 2021

## 14.4 Test data

### 14.4.1 Test data for Bluetooth

- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : LIVE LINE

LIMIT : EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Quasi-Peak Limits (Mains Ports)  
EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Average Limits (Mains Ports)



| NO | FREQ<br>[MHz] | READING      |              | C.FACTOR<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN       |              | PHASE   |
|----|---------------|--------------|--------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------|
|    |               | QP<br>[dBuV] | AV<br>[dBuV] |                  | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] |         |
| 1  | 0.16100       | 33.1         | ----         | 10.0             | 43.1         | ----         | 65.4         | ----         | 22.3         | ----         | H (QP)  |
| 2  | 0.44200       | 23.1         | ----         | 10.0             | 33.1         | ----         | 57.0         | ----         | 23.9         | ----         | H (QP)  |
| 3  | 1.34400       | 21.1         | ----         | 10.1             | 31.2         | ----         | 56.0         | ----         | 24.8         | ----         | H (QP)  |
| 4  | 4.44400       | 18.9         | ----         | 10.1             | 29.0         | ----         | 56.0         | ----         | 27.0         | ----         | H (QP)  |
| 5  | 6.05000       | 15.9         | ----         | 10.2             | 26.1         | ----         | 60.0         | ----         | 33.9         | ----         | H (QP)  |
| 6  | 21.63000      | 24.4         | ----         | 10.4             | 34.8         | ----         | 60.0         | ----         | 25.2         | ----         | H (QP)  |
| 7  | 0.16100       | ----         | 23.5         | 10.0             | ----         | 33.5         | ----         | 55.4         | ----         | 21.9         | H (CAV) |
| 8  | 0.44200       | ----         | 19.2         | 10.0             | ----         | 29.2         | ----         | 47.0         | ----         | 17.8         | H (CAV) |
| 9  | 1.34400       | ----         | 17.4         | 10.1             | ----         | 27.5         | ----         | 46.0         | ----         | 18.5         | H (CAV) |
| 10 | 4.44400       | ----         | 13.2         | 10.1             | ----         | 23.3         | ----         | 46.0         | ----         | 22.7         | H (CAV) |
| 11 | 6.05000       | ----         | 9.0          | 10.2             | ----         | 19.2         | ----         | 50.0         | ----         | 30.8         | H (CAV) |
| 12 | 21.63000      | ----         | 17.5         | 10.4             | ----         | 27.9         | ----         | 50.0         | ----         | 22.1         | H (CAV) |

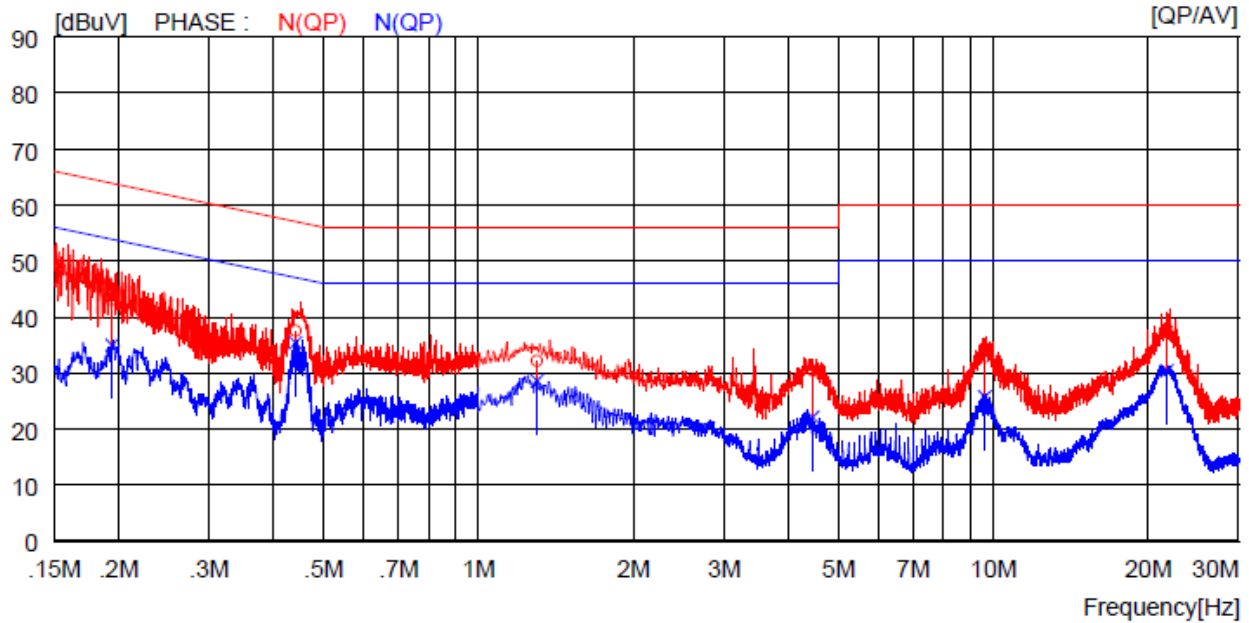
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OTC-TRF-RF-001(0)

-. Tested Line : NEUTRAL LINE

LIMIT : EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Quasi-Peak Limits (Mains Ports)  
EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Average Limits (Mains Ports)



| NO | FREQ<br>[MHz] | READING      |              | C.FACTOR<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN       |              | PHASE   |
|----|---------------|--------------|--------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------|
|    |               | QP<br>[dBuV] | AV<br>[dBuV] |                  | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] |         |
| 1  | 0.19400       | 33.1         | ----         | 10.0             | 43.1         | ----         | 63.9         | ----         | 20.8         | ----         | N (QP)  |
| 2  | 0.44100       | 27.5         | ----         | 10.0             | 37.5         | ----         | 57.0         | ----         | 19.5         | ----         | N (QP)  |
| 3  | 1.30000       | 22.1         | ----         | 10.1             | 32.2         | ----         | 56.0         | ----         | 23.8         | ----         | N (QP)  |
| 4  | 4.46000       | 20.4         | ----         | 10.1             | 30.5         | ----         | 56.0         | ----         | 25.5         | ----         | N (QP)  |
| 5  | 9.64000       | 22.7         | ----         | 10.2             | 32.9         | ----         | 60.0         | ----         | 27.1         | ----         | N (QP)  |
| 6  | 21.75000      | 27.5         | ----         | 10.4             | 37.9         | ----         | 60.0         | ----         | 22.1         | ----         | N (QP)  |
| 7  | 0.19400       | ----         | 25.0         | 10.0             | ----         | 35.0         | ----         | 53.9         | ----         | 18.9         | N (CAV) |
| 8  | 0.44100       | ----         | 25.4         | 10.0             | ----         | 35.4         | ----         | 47.0         | ----         | 11.6         | N (CAV) |
| 9  | 1.30000       | ----         | 18.5         | 10.1             | ----         | 28.6         | ----         | 46.0         | ----         | 17.4         | N (CAV) |
| 10 | 4.46000       | ----         | 12.0         | 10.1             | ----         | 22.1         | ----         | 46.0         | ----         | 23.9         | N (CAV) |
| 11 | 9.64000       | ----         | 15.6         | 10.2             | ----         | 25.8         | ----         | 50.0         | ----         | 24.2         | N (CAV) |
| 12 | 21.75000      | ----         | 20.0         | 10.4             | ----         | 30.4         | ----         | 50.0         | ----         | 19.6         | N (CAV) |

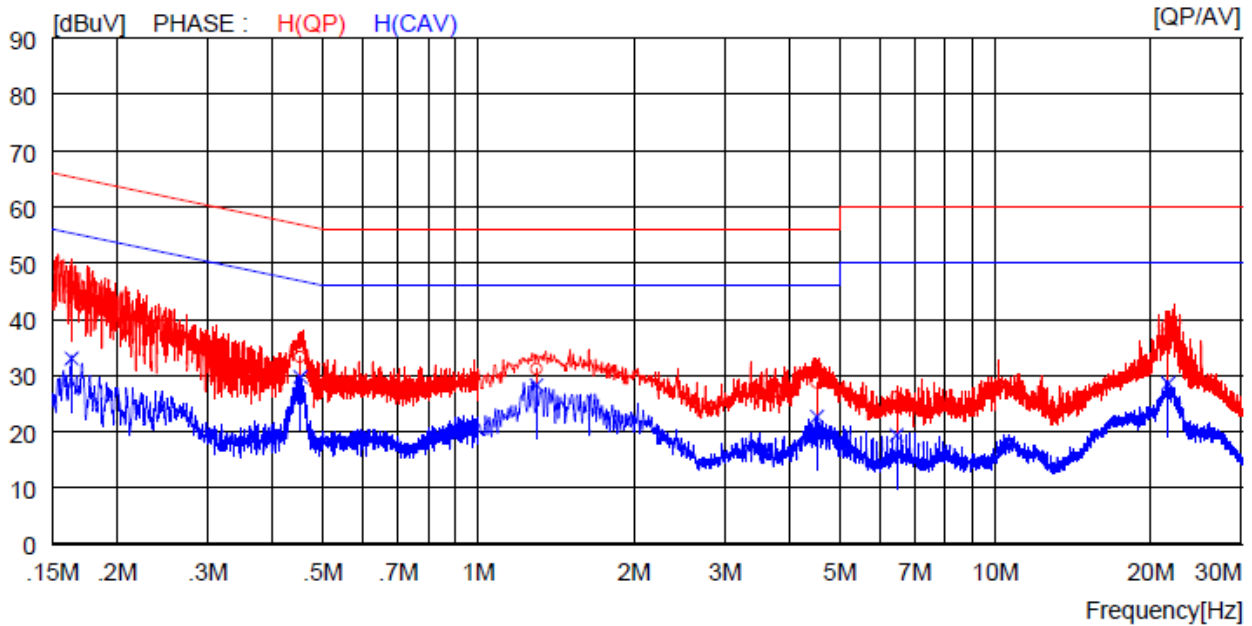
Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

#### 14.4.2 Test data for Intermodulation Mode(Bluetooth + WLAN 2.4 GHz + WLAN 5 GHz)

- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : LIVE LINE

LIMIT : EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Quasi-Peak Limits (Mains Ports)  
EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Average Limits (Mains Ports)



| NO | FREQ<br>[MHz] | READING      |              | C.FACTOR<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN       |              | PHASE   |
|----|---------------|--------------|--------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------|
|    |               | QP<br>[dBuV] | AV<br>[dBuV] |                  | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] |         |
| 1  | 0.16300       | 35.5         | ----         | 10.0             | 45.5         | ----         | 65.3         | ----         | 19.8         | ----         | H (QP)  |
| 2  | 0.45200       | 23.3         | ----         | 10.0             | 33.3         | ----         | 56.8         | ----         | 23.5         | ----         | H (QP)  |
| 3  | 1.29600       | 21.1         | ----         | 10.1             | 31.2         | ----         | 56.0         | ----         | 24.8         | ----         | H (QP)  |
| 4  | 4.51600       | 18.5         | ----         | 10.2             | 28.7         | ----         | 56.0         | ----         | 27.3         | ----         | H (QP)  |
| 5  | 6.45000       | 15.9         | ----         | 10.2             | 26.1         | ----         | 60.0         | ----         | 33.9         | ----         | H (QP)  |
| 6  | 21.62000      | 28.5         | ----         | 10.4             | 38.9         | ----         | 60.0         | ----         | 21.1         | ----         | H (QP)  |
| 7  | 0.16300       | ----         | 23.0         | 10.0             | ----         | 33.0         | ----         | 55.3         | ----         | 22.3         | H (CAV) |
| 8  | 0.45200       | ----         | 19.7         | 10.0             | ----         | 29.7         | ----         | 46.8         | ----         | 17.1         | H (CAV) |
| 9  | 1.29600       | ----         | 18.2         | 10.1             | ----         | 28.3         | ----         | 46.0         | ----         | 17.7         | H (CAV) |
| 10 | 4.51600       | ----         | 12.5         | 10.2             | ----         | 22.7         | ----         | 46.0         | ----         | 23.3         | H (CAV) |
| 11 | 6.45000       | ----         | 9.2          | 10.2             | ----         | 19.4         | ----         | 50.0         | ----         | 30.6         | H (CAV) |
| 12 | 21.62000      | ----         | 18.2         | 10.4             | ----         | 28.6         | ----         | 50.0         | ----         | 21.4         | H (CAV) |

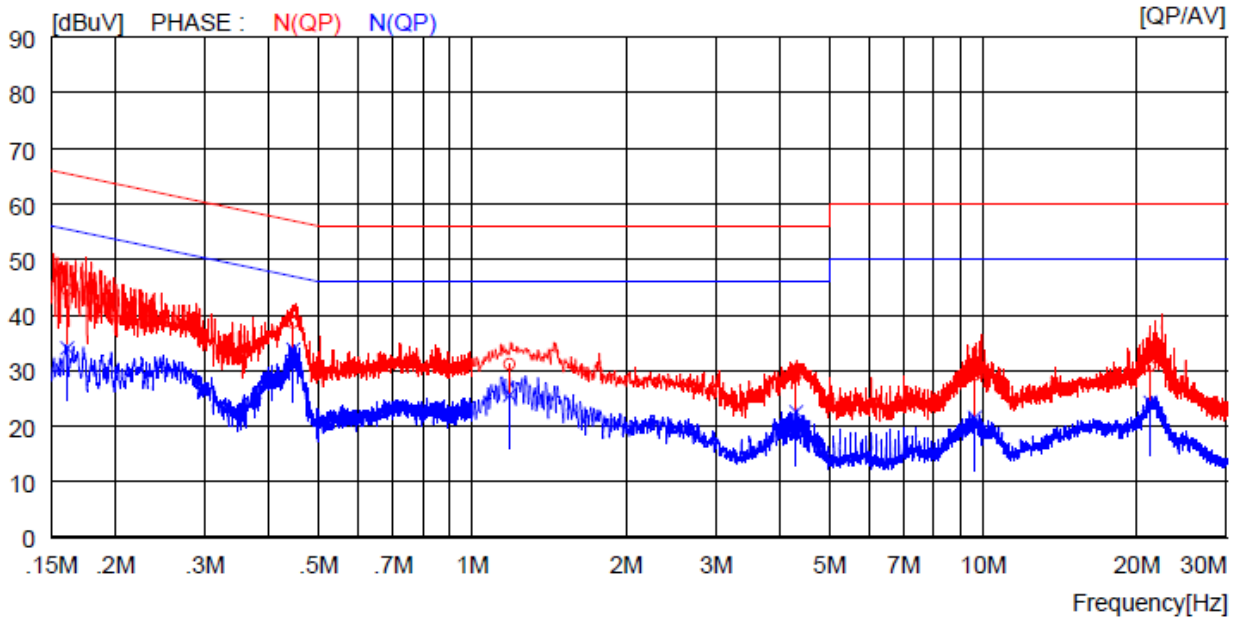
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OTC-TRF-RF-001(0)

-. Tested Line : NEUTRAL LINE

LIMIT : EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Quasi-Peak Limits (Mains Ports)  
EN.KN.FCC.VCCI\_CISPR Pub.22 Class B, Average Limits (Mains Ports)



| NO | FREQ<br>[MHz] | READING      |              | C.FACTOR<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN       |              | PHASE   |
|----|---------------|--------------|--------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------|
|    |               | QP<br>[dBuV] | AV<br>[dBuV] |                  | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] |         |
| 1  | 0.16100       | 34.5         | ----         | 10.0             | 44.5         | ----         | 65.4         | ----         | 20.9         | ----         | N (QP)  |
| 2  | 0.44600       | 28.7         | ----         | 10.0             | 38.7         | ----         | 56.9         | ----         | 18.2         | ----         | N (QP)  |
| 3  | 1.18400       | 21.0         | ----         | 10.1             | 31.1         | ----         | 56.0         | ----         | 24.9         | ----         | N (QP)  |
| 4  | 4.30400       | 18.9         | ----         | 10.1             | 29.0         | ----         | 56.0         | ----         | 27.0         | ----         | N (QP)  |
| 5  | 9.64500       | 19.0         | ----         | 10.2             | 29.2         | ----         | 60.0         | ----         | 30.8         | ----         | N (QP)  |
| 6  | 21.25000      | 20.4         | ----         | 10.4             | 30.8         | ----         | 60.0         | ----         | 29.2         | ----         | N (QP)  |
| 7  | 0.16100       | ----         | 24.0         | 10.0             | ----         | 34.0         | ----         | 55.4         | ----         | 21.4         | N (CAV) |
| 8  | 0.44600       | ----         | 23.8         | 10.0             | ----         | 33.8         | ----         | 46.9         | ----         | 13.1         | N (CAV) |
| 9  | 1.18400       | ----         | 15.5         | 10.1             | ----         | 25.6         | ----         | 46.0         | ----         | 20.4         | N (CAV) |
| 10 | 4.30400       | ----         | 12.5         | 10.1             | ----         | 22.6         | ----         | 46.0         | ----         | 23.4         | N (CAV) |
| 11 | 9.64500       | ----         | 11.3         | 10.2             | ----         | 21.5         | ----         | 50.0         | ----         | 28.5         | N (CAV) |
| 12 | 21.25000      | ----         | 13.9         | 10.4             | ----         | 24.3         | ----         | 50.0         | ----         | 25.7         | N (CAV) |

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

## 15. LIST OF TEST EQUIPMENT

| Model Number | Manufacturer      | Description       | Serial Number | Last Cal.(Interval) |
|--------------|-------------------|-------------------|---------------|---------------------|
| FSV40-N      | Rohde & Schwarz   | Signal Analyzer   | 102177        | Apr. 16, 2021 (1Y)  |
| ESW 44       | Rohde & Schwarz   | EMI Test Receiver | 101851        | Mar. 23, 2021 (1Y)  |
| 310N         | Sonoma Instrument | Pre-Amplifier     | 392756        | Oct. 14, 2021 (1Y)  |
| SCU18        | Rohde & Schwarz   | Pre-Amplifier     | 102266        | Jul. 14, 2021 (1Y)  |
| PAM-840A     | Com-Power         | Pre-Amplifier     | 461339        | Oct. 12, 2021 (1Y)  |
| DT3000-3t    | Innco System      | Turn Table        | DT3000/093    | N/A                 |
| MA-4000XPET  | Innco System      | Antenna Master    | MA4000/509    | N/A                 |
| FMZB 1513    | Schwarzbeck       | Loop Antenna      | 1513-235      | Mar. 24, 2020 (2Y)  |
| HLP-2008     | TDK               | Hybrid Antenna    | 131316        | Feb. 27, 2020 (2Y)  |
| BBHA9120D    | Schwarzbeck       | Horn Antenna      | 9120D-1366    | Jul. 20, 2021 (1Y)  |
| BBHA9170     | Schwarzbeck       | Horn Antenna      | BBHA9170178   | Jan. 07, 2021(1Y)   |
| HPF 3GHz     | Rohde & Schwarz   | High Pass Filter  | N/A           | Feb. 08, 2021 (1Y)  |
| ESCI         | Rohde & Schwarz   | EMI TEST RECEIVER | 101012        | Oct. 20, 2021 (1Y)  |
| NSLK8126     | Schwarzbeck       | AMN               | 8126-404      | Mar. 16, 2021 (1Y)  |
| ESH3-Z2      | Rohde & Schwarz   | PULSE LIMITER     | 100655        | Mar. 15, 2021 (1Y)  |

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