

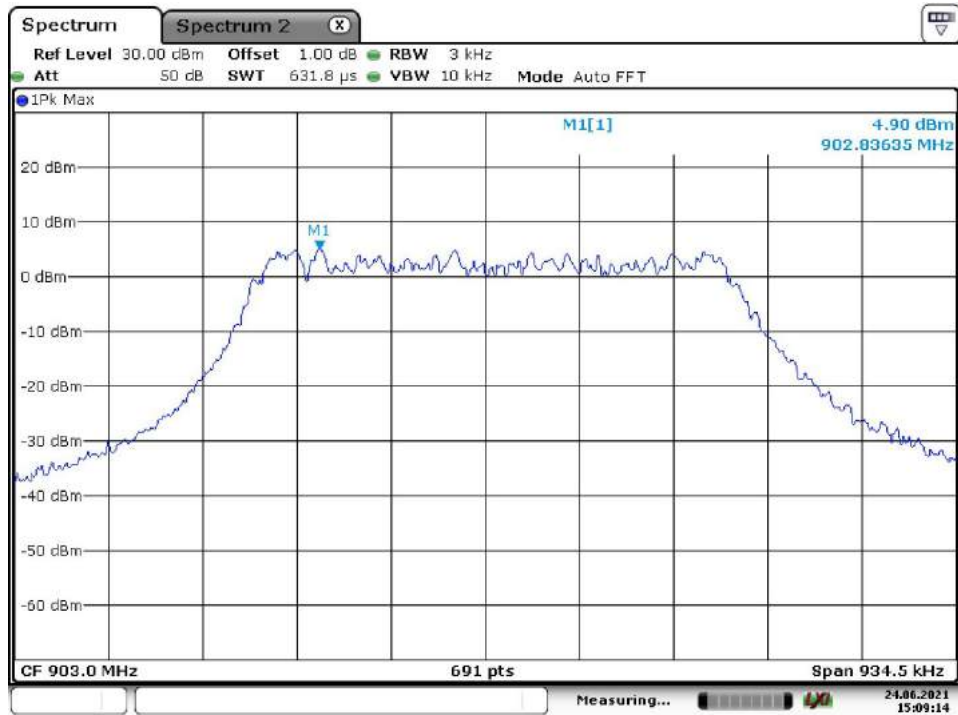
## Appendix B: Test Results

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## Appendix B.1: Conducted Power Spectral Density

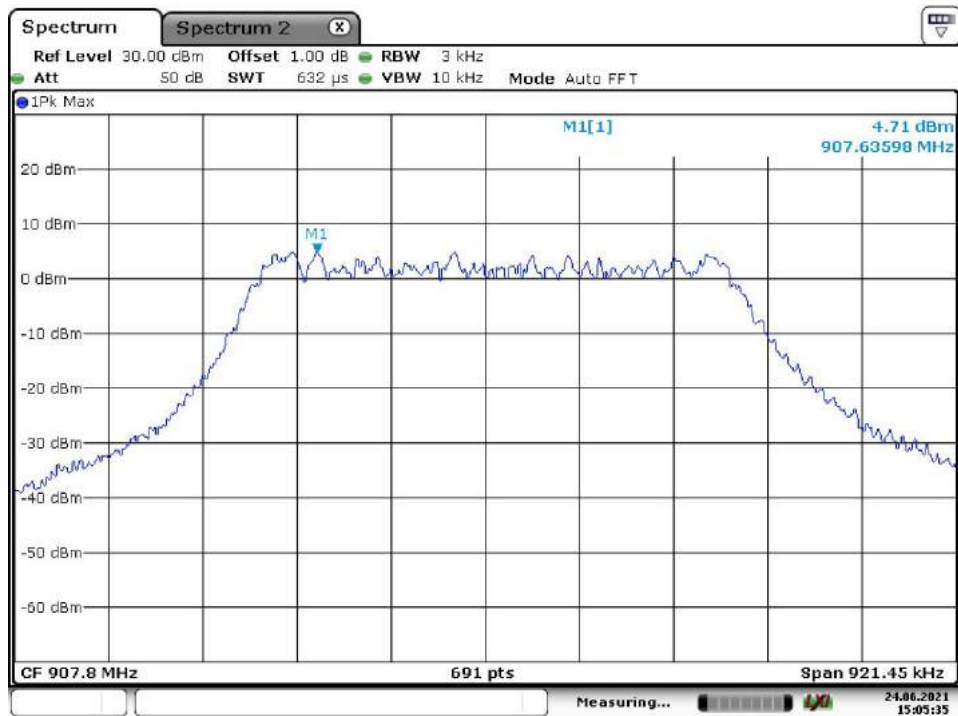
### Lora DTS

#### Low Channel



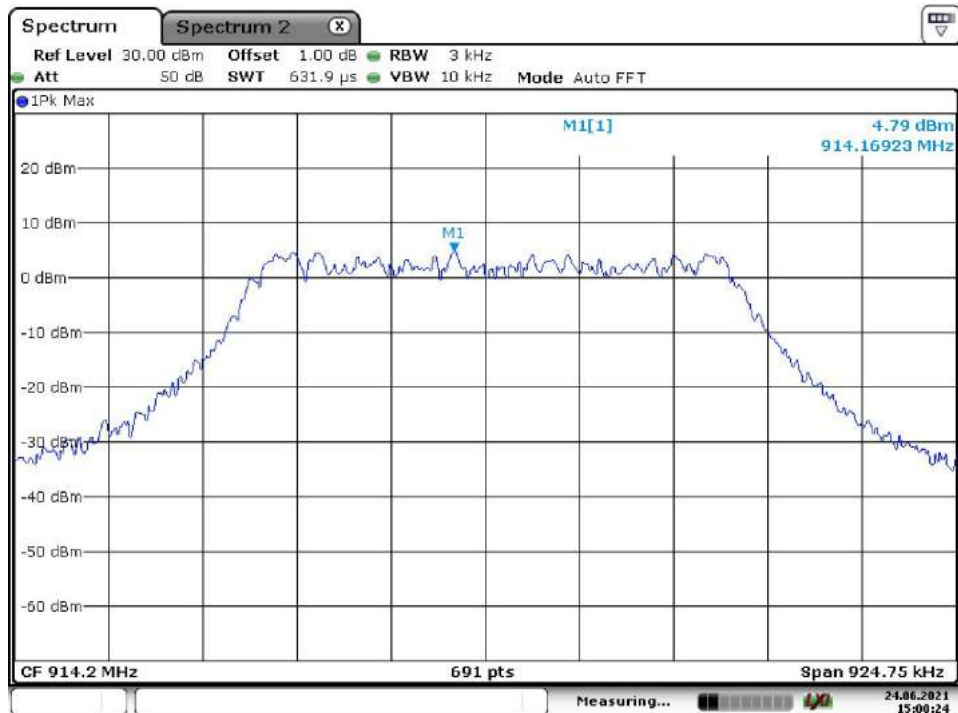
Date: 24.JUN.2021 15:09:14

#### Middle Channel



Date: 24.JUN.2021 15:09:35

## High Channel

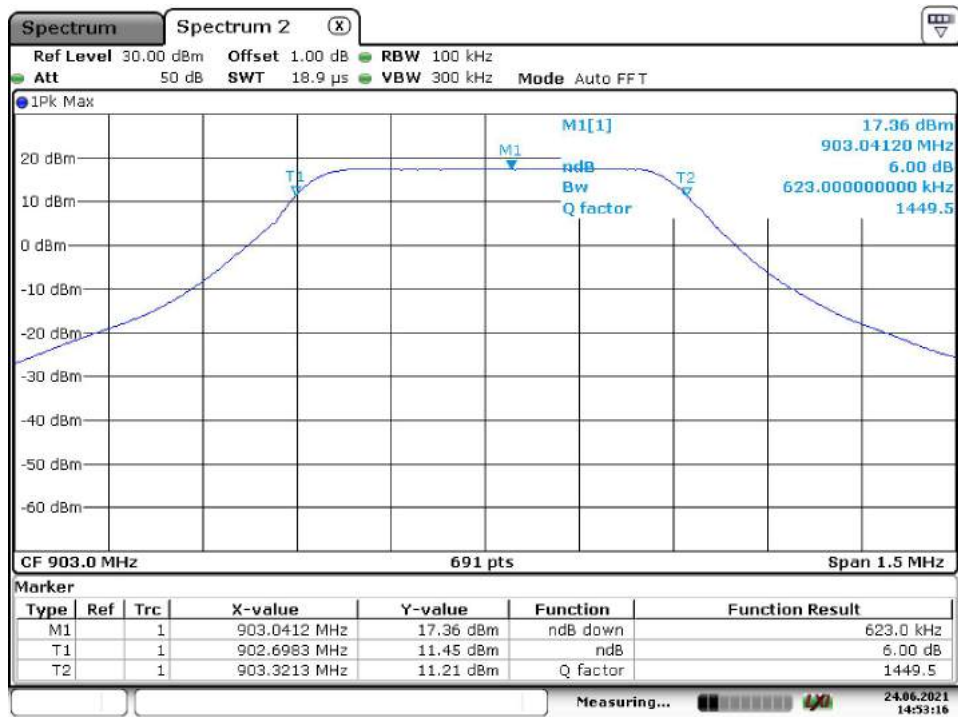


Date: 24.JUN.2021 15:00:24

## Appendix B.2: 6dB Bandwidth

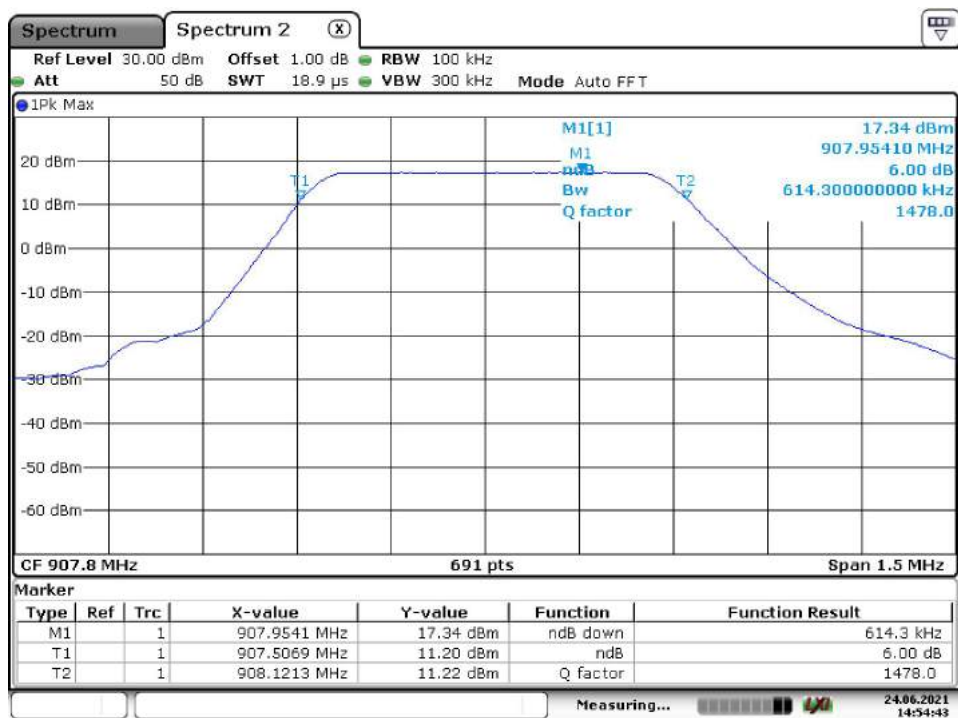
### Lora DTS

#### Low Channel



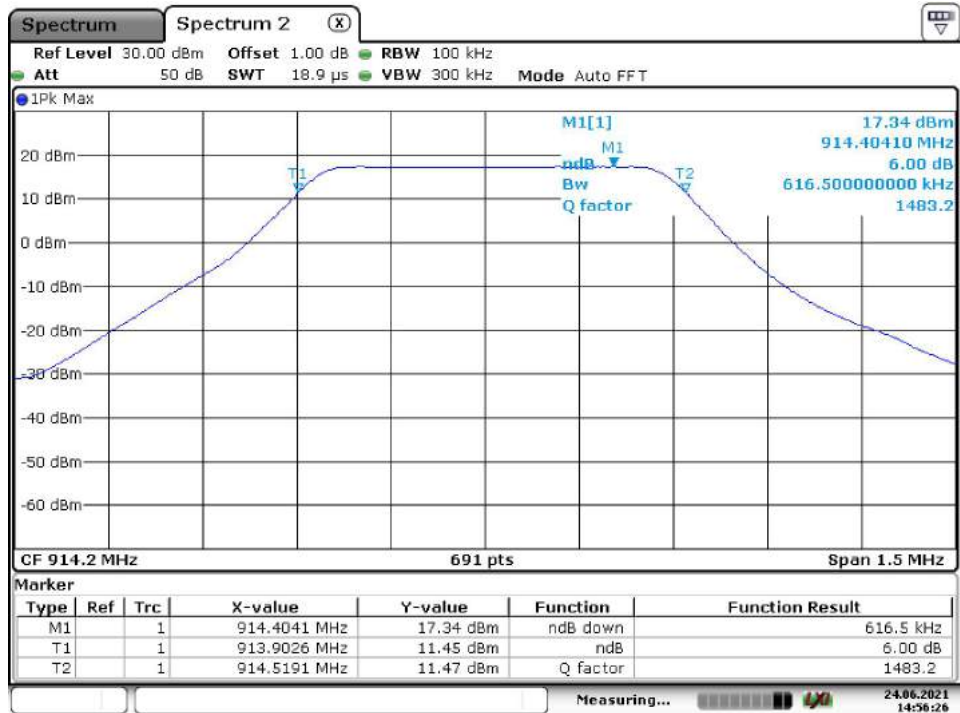
Date: 24.JUN.2021 14:53:15

#### Middle Channel



Date: 24.JUN.2021 14:54:43

# High Channel



Date: 24.JUN.2021 14:56:26

## Appendix B.3: 20dB Bandwidth

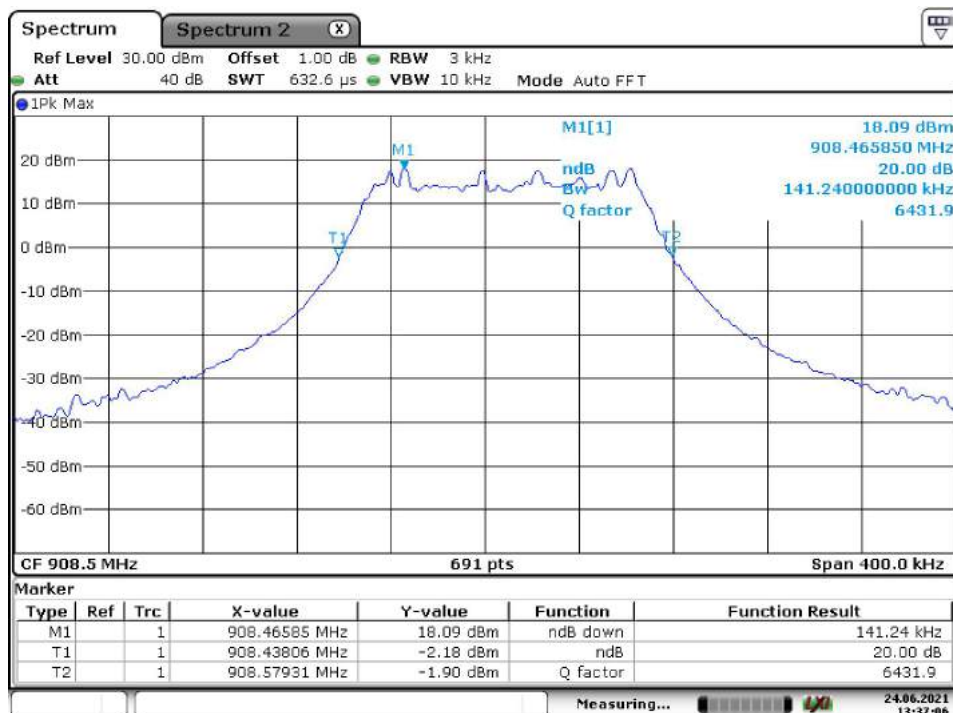
### Lora FHSS

#### Low Channel



Date: 24.JUN.2021 13:34:59

#### Middle Channel



Date: 24.JUN.2021 13:37:06

# High Channel



Date: 24.JUN.2021 13:38:04

## Appendix B.4: 99% Bandwidth

### Lora FHSS

#### Low Channel



Date: 21.JUN.2021 02:42:47

#### Middle Channel



Date: 21.JUN.2021 02:52:42

## High Channel



## Lora DTS

### Low Channel



### Middle Channel



### High Channel



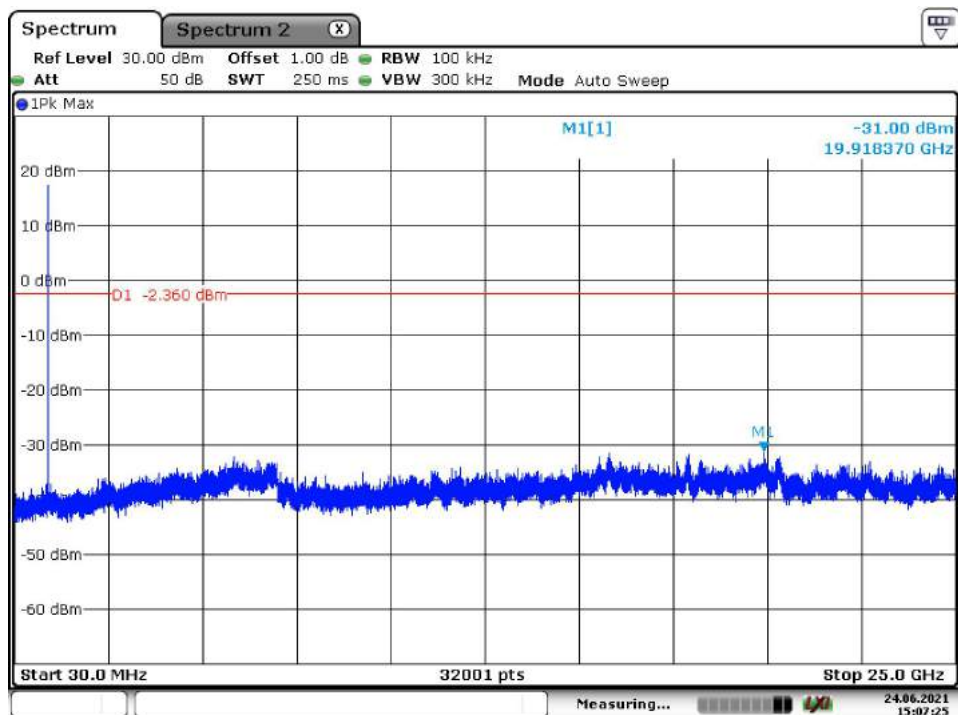
## Appendix B.5: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

### Lora DTS

#### Low Channel

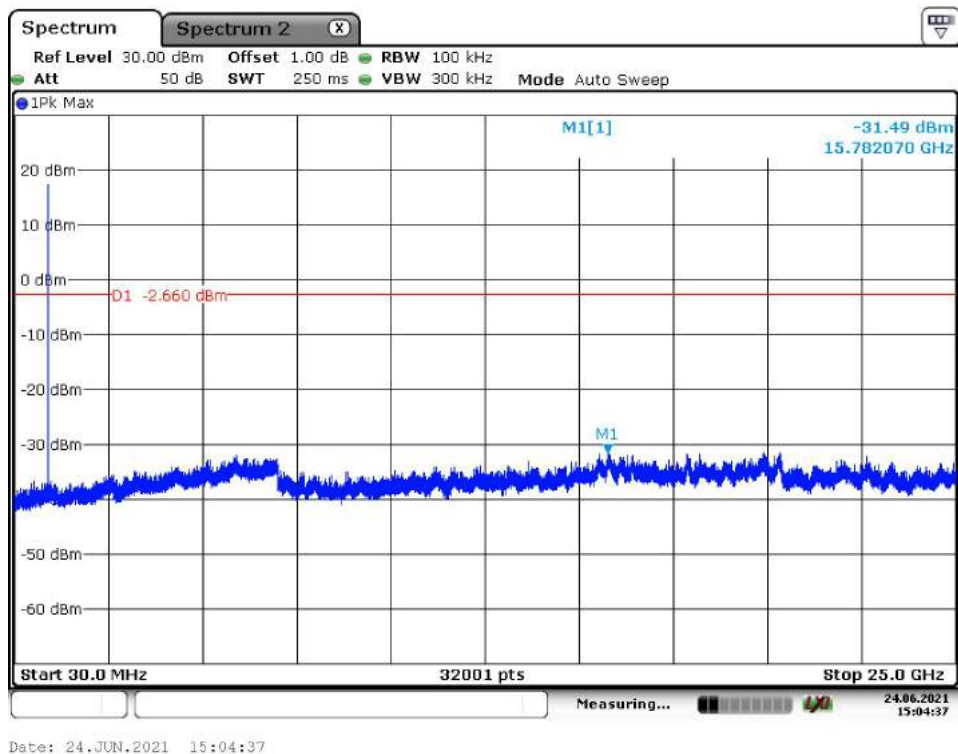
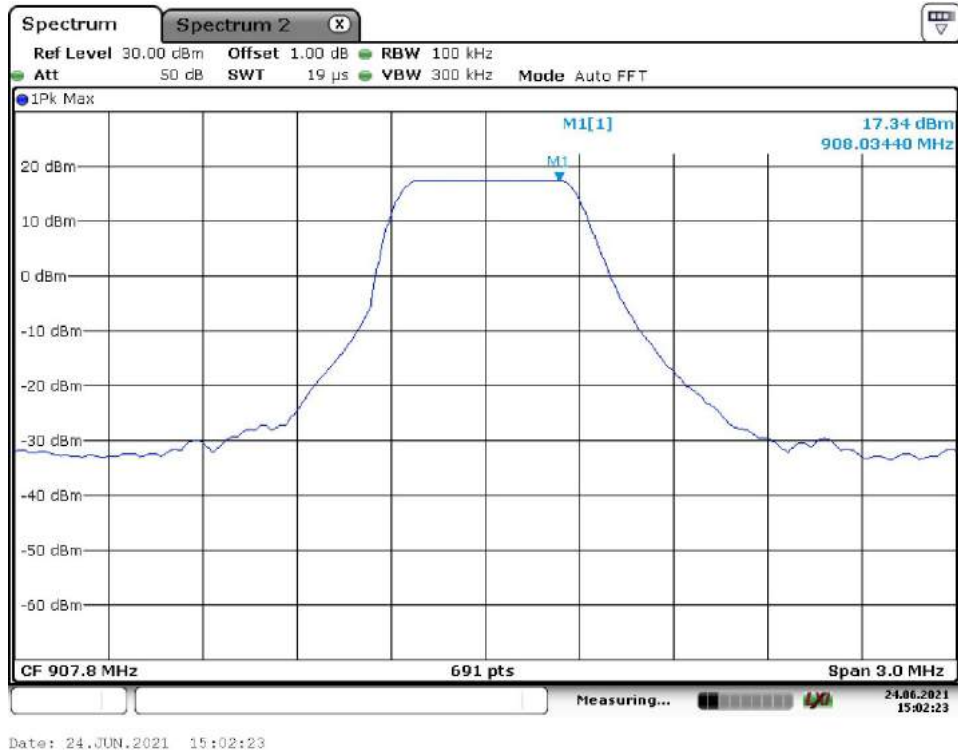


Date: 24.JUN.2021 15:06:42



Date: 24.JUN.2021 15:07:25

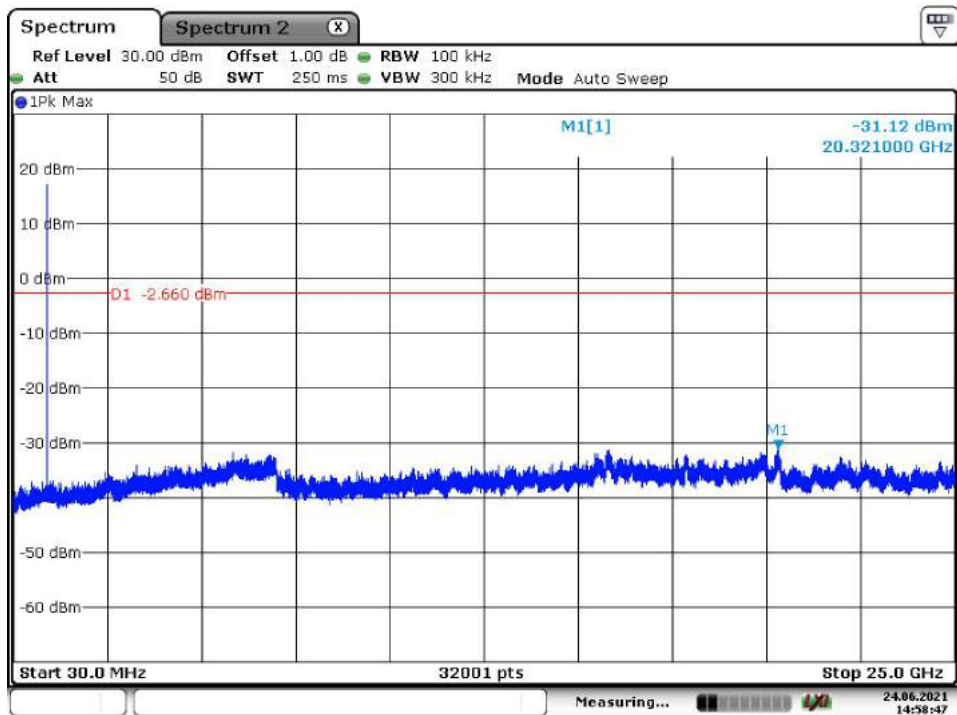
Middle Channel



## High Channel



Date: 24.JUN.2021 14:57:07

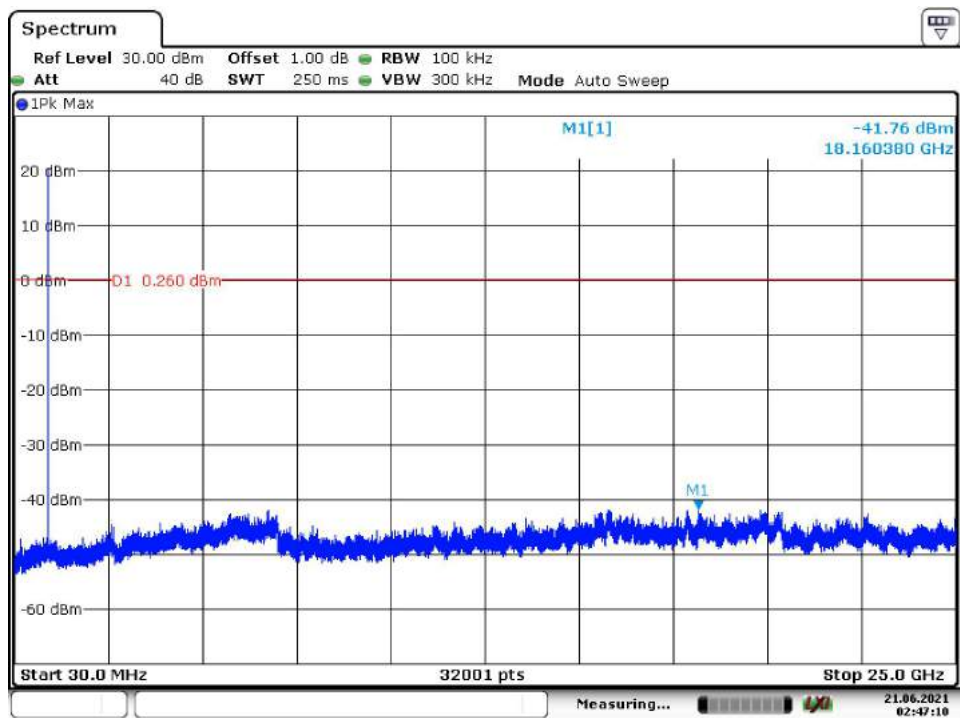


Date: 24.JUN.2021 14:58:48

**Lora FHSS, No hopping**  
*Low Channel*



Date: 21.JUN.2021 02:45:07

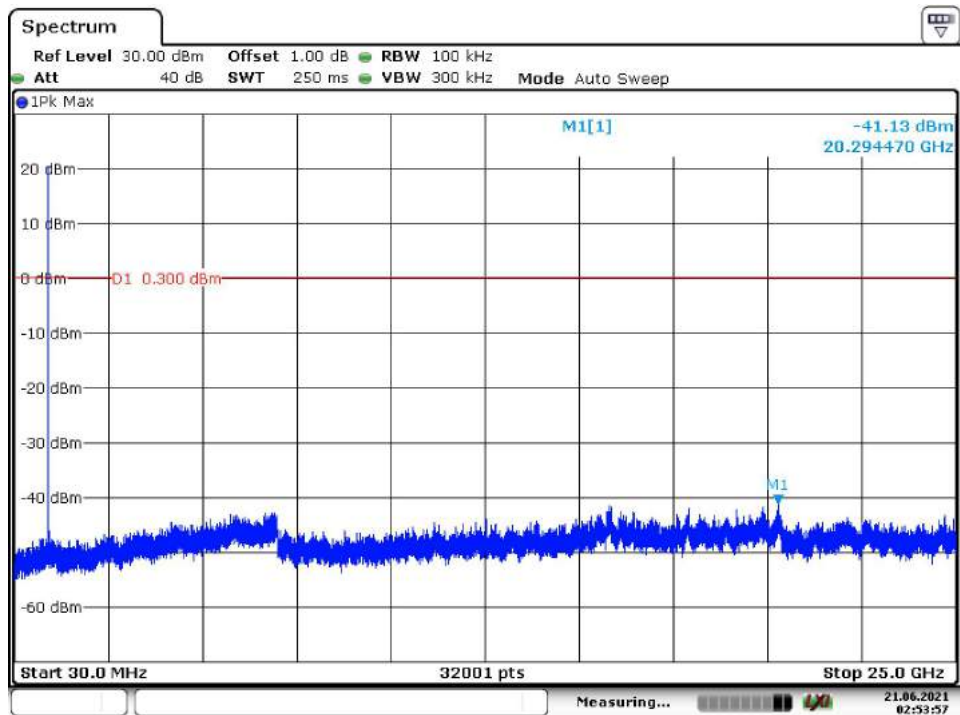


Date: 21.JUN.2021 02:47:11

Middle Channel



Date: 21.JUN.2021 02:51:16

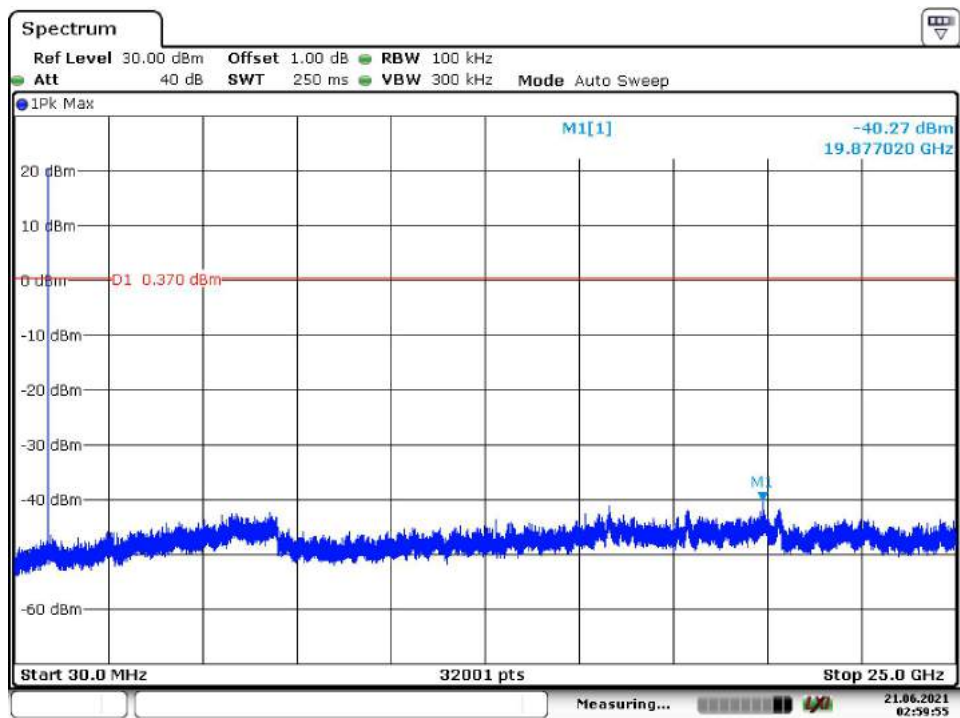


Date: 21.JUN.2021 02:53:58

### High Channel

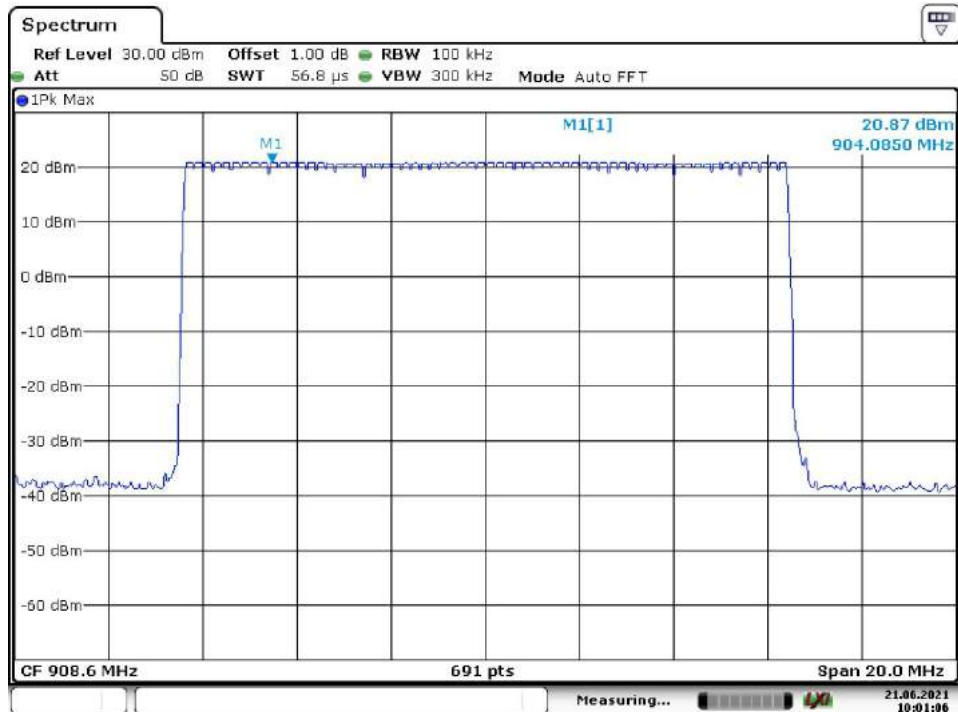


Date: 21.JUN.2021 02:55:36

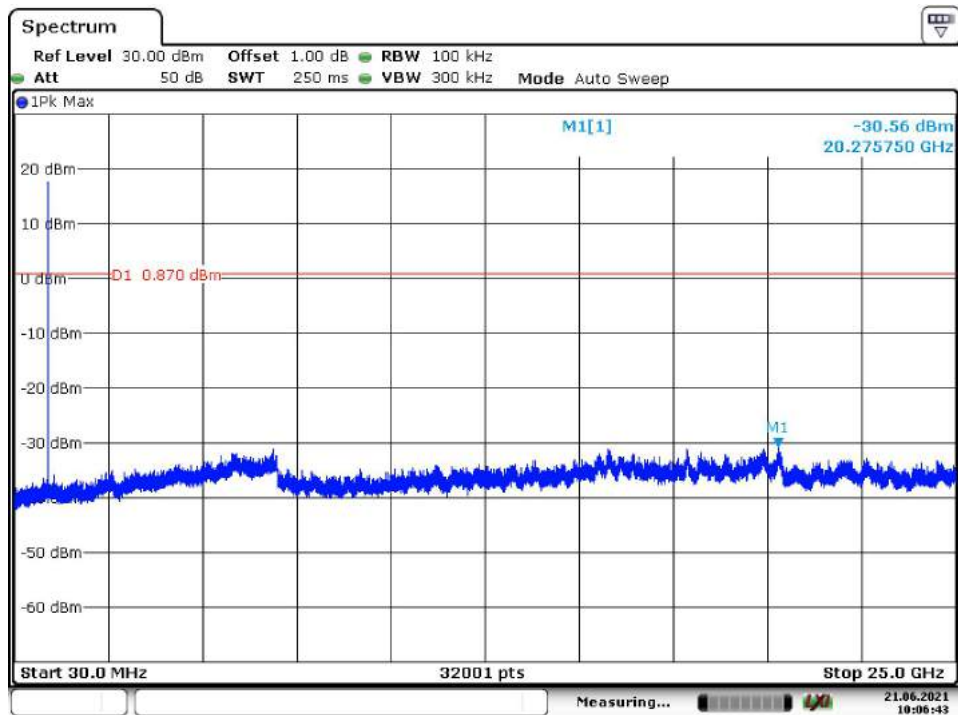


Date: 21.JUN.2021 02:59:56

## Lora FHSS, hopping



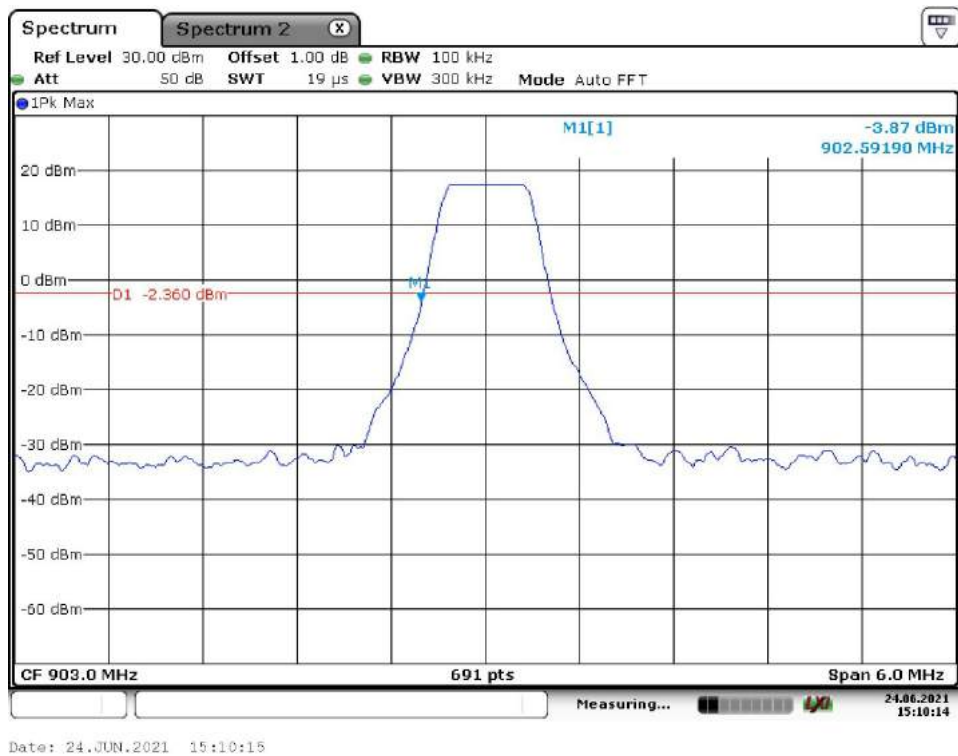
Date: 21.JUN.2021 10:01:07



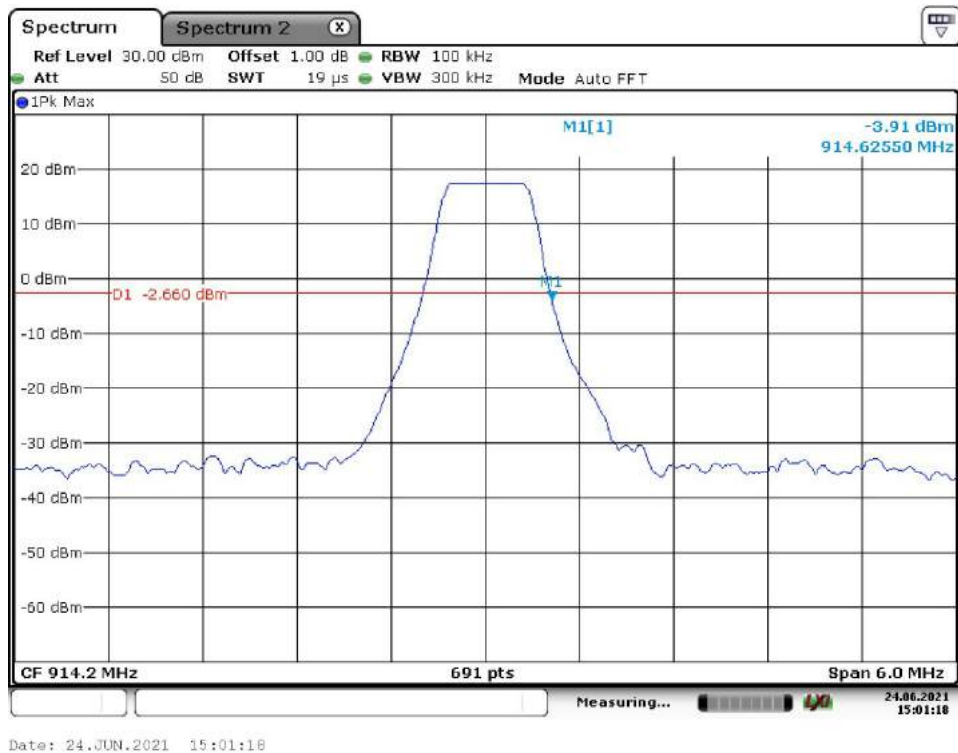
Date: 21.JUN.2021 10:06:43

## Lora DTS, Band Edge

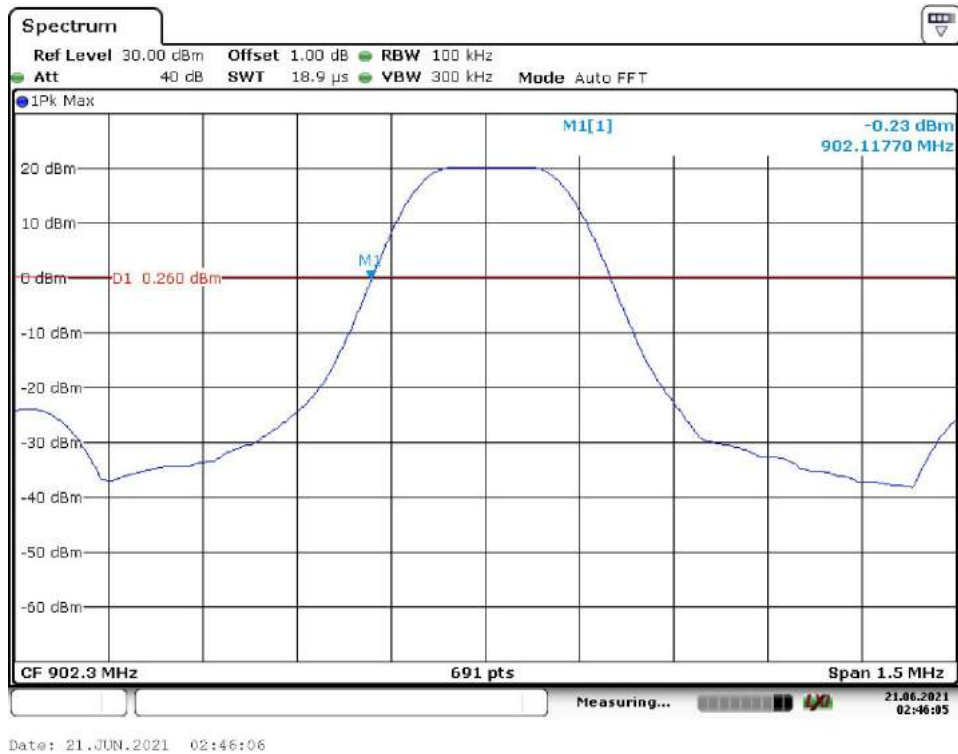
### Low Channel



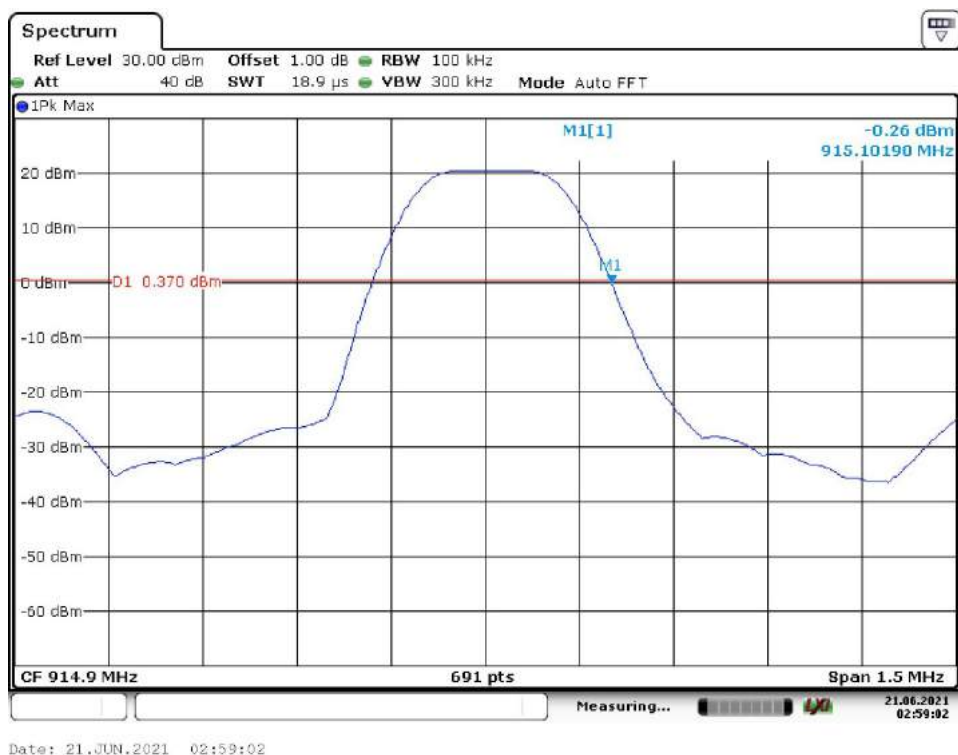
### High Channel



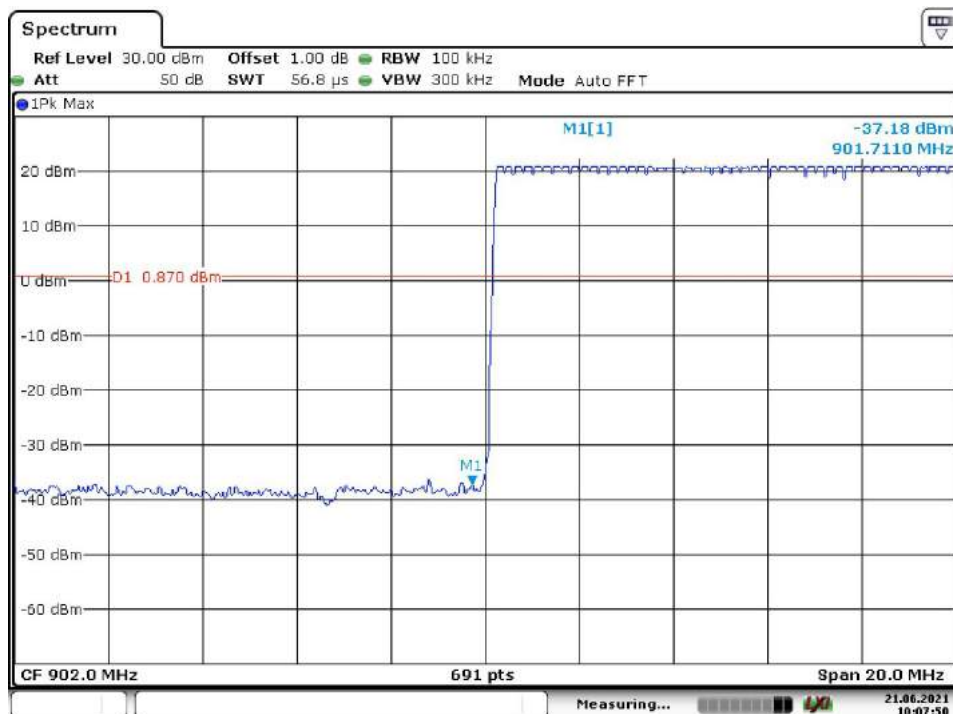
**Lora FHSS, No hopping, Band Edge**  
*Low Channel*



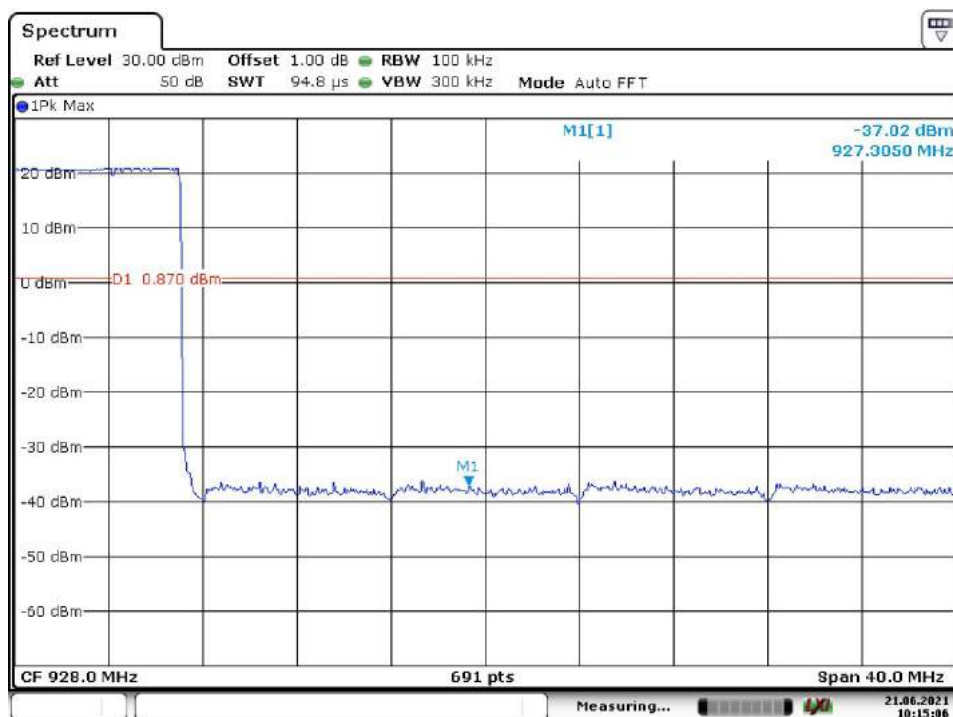
*High Channel*



## Lora FHSS, hopping, Band Edge



Date: 21.JUN.2021 10:07:50



Date: 21.JUN.2021 10:15:06

## Appendix B.6: Carrier Frequency Separation

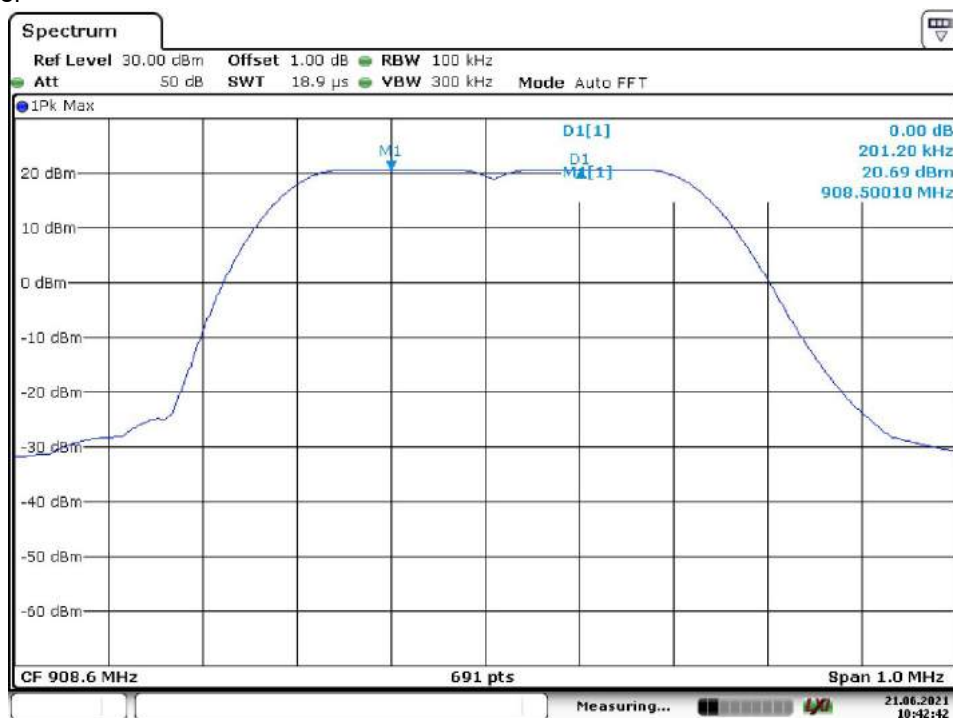
### Lora FHSS

#### Low Channel



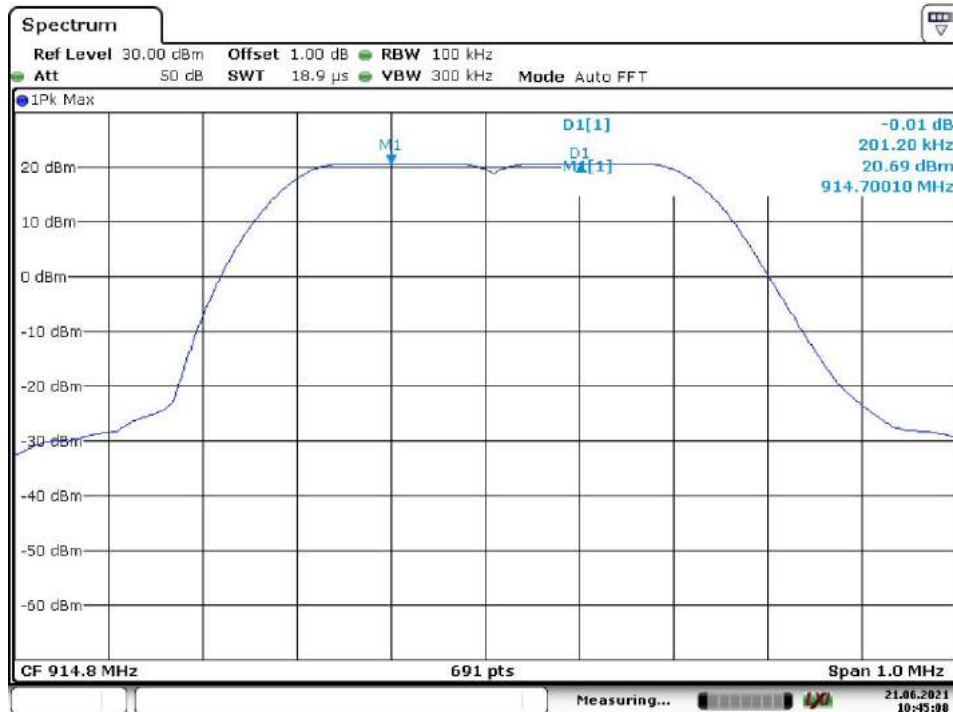
Date: 21.JUN.2021 10:41:07

#### Middle Channel



Date: 21.JUN.2021 10:42:42

## High Channel



Date: 21.JUN.2021 10:45:09

Note 1: Testing was carried out within frequency range 9 kHz to the tenth harmonics. The measurement results below 30MHz and above 18GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

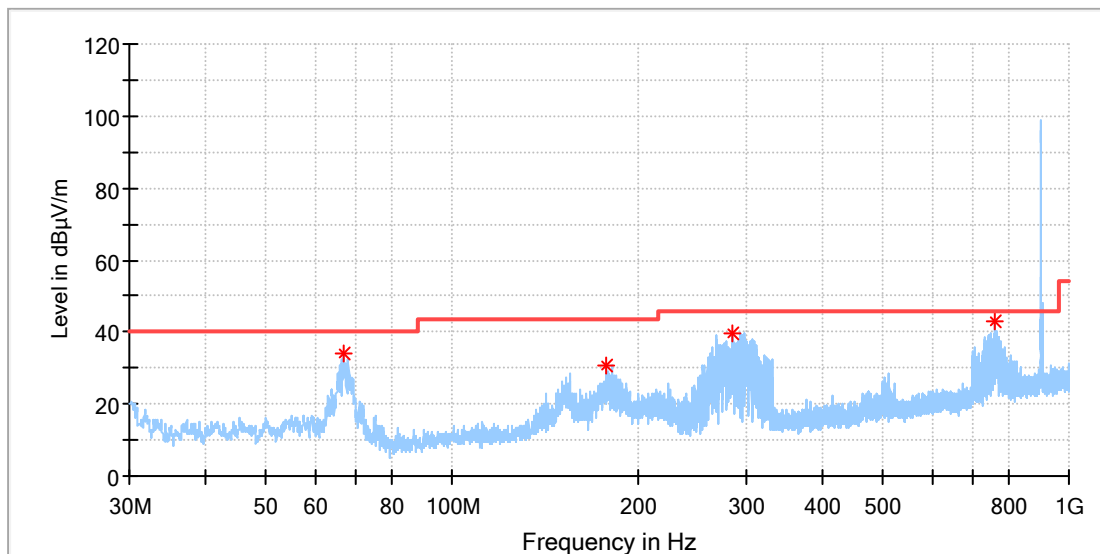
## Appendix B.7: Test Results of Radiated Spurious Emissions

Lora DTS

30MHz - 1GHz

### EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_903MHz     |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

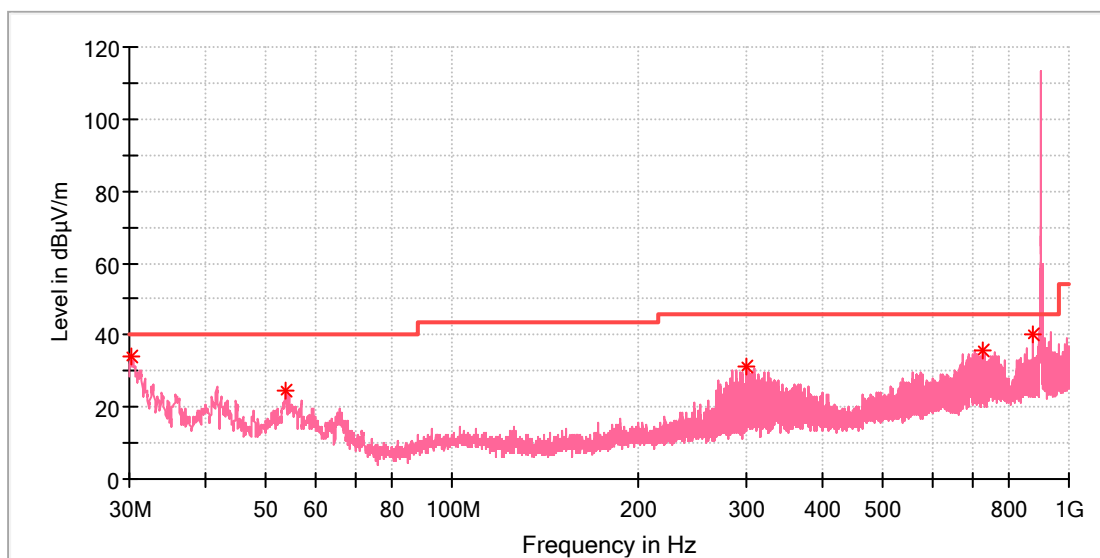


### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 66.811500       | 34.18            | 40.00          | 5.82        | 100.0       | H   | 0.0           | -20.7        |
| 177.925000      | 30.77            | 43.50          | 12.73       | 100.0       | H   | 346.0         | -20.7        |
| 284.237000      | 39.70            | 46.00          | 6.30        | 100.0       | H   | 198.0         | -16.6        |
| 759.779500      | 42.80            | 46.00          | 3.20        | 100.0       | H   | 256.0         | -7.0         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_903MHz     |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

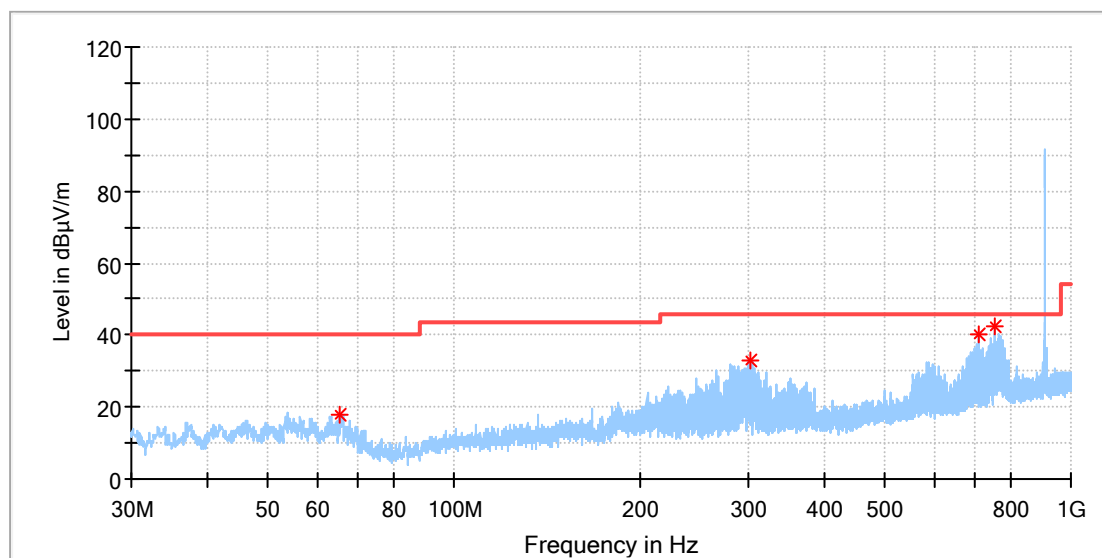


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 30.194000       | 34.09            | 40.00          | 5.91        | 100.0       | V   | 298.0         | -23.0        |
| 53.668000       | 24.67            | 40.00          | 15.33       | 100.0       | V   | 0.0           | -18.4        |
| 300.484500      | 31.42            | 46.00          | 14.58       | 100.0       | V   | 169.0         | -16.3        |
| 725.441500      | 35.65            | 46.00          | 10.35       | 100.0       | V   | 28.0          | -7.6         |
| 871.232500      | 39.98            | 46.00          | 6.02        | 100.0       | V   | 28.0          | -5.2         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_907.8MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

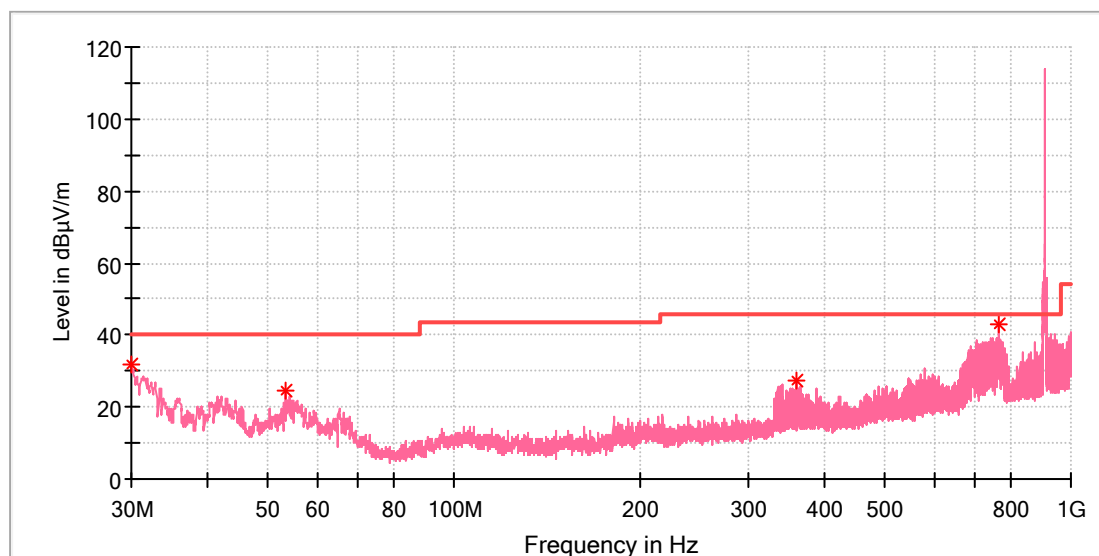


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 65.502000       | 18.01            | 40.00          | 21.99       | 100.0       | H   | 330.0         | -20.2        |
| 301.842500      | 33.14            | 46.00          | 12.86       | 100.0       | H   | 0.0           | -16.2        |
| 708.515000      | 40.41            | 46.00          | 5.59        | 100.0       | H   | 83.0          | -7.9         |
| 752.892500      | 42.27            | 46.00          | 3.73        | 100.0       | H   | 252.0         | -7.1         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_907.8MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

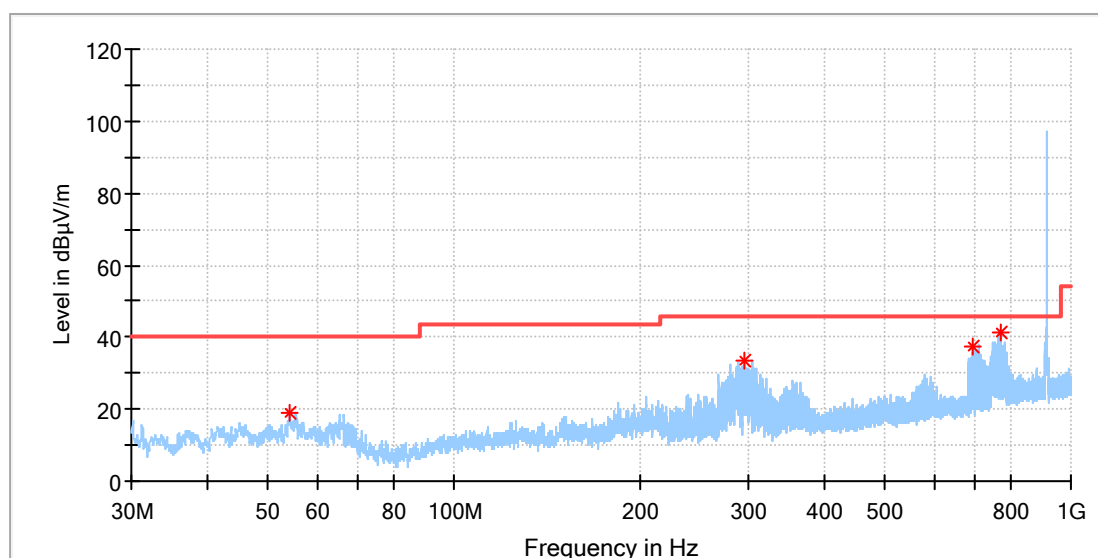


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 30.097000       | 31.54            | 40.00          | 8.46        | 100.0       | V   | 341.0         | -23.0        |
| 53.280000       | 24.74            | 40.00          | 15.26       | 100.0       | V   | 257.0         | -18.4        |
| 359.994000      | 27.61            | 46.00          | 18.39       | 100.0       | V   | 0.0           | -14.6        |
| 764.581000      | 42.77            | 46.00          | 3.23        | 100.0       | V   | 144.0         | -6.9         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_914.2MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

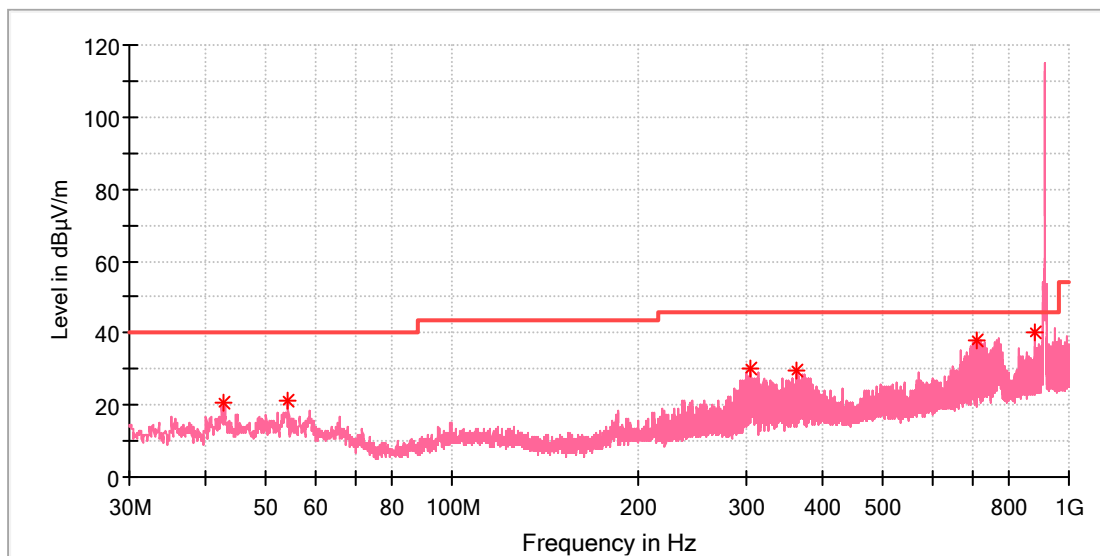


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 54.298500       | 19.23            | 40.00          | 20.77       | 100.0       | H   | 341.0         | -18.4        |
| 295.198000      | 33.61            | 46.00          | 12.39       | 100.0       | H   | 266.0         | -16.4        |
| 694.595500      | 37.58            | 46.00          | 8.42        | 100.0       | H   | 198.0         | -8.1         |
| 771.322500      | 41.58            | 46.00          | 4.42        | 100.0       | H   | 198.0         | -6.8         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_914.2MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |



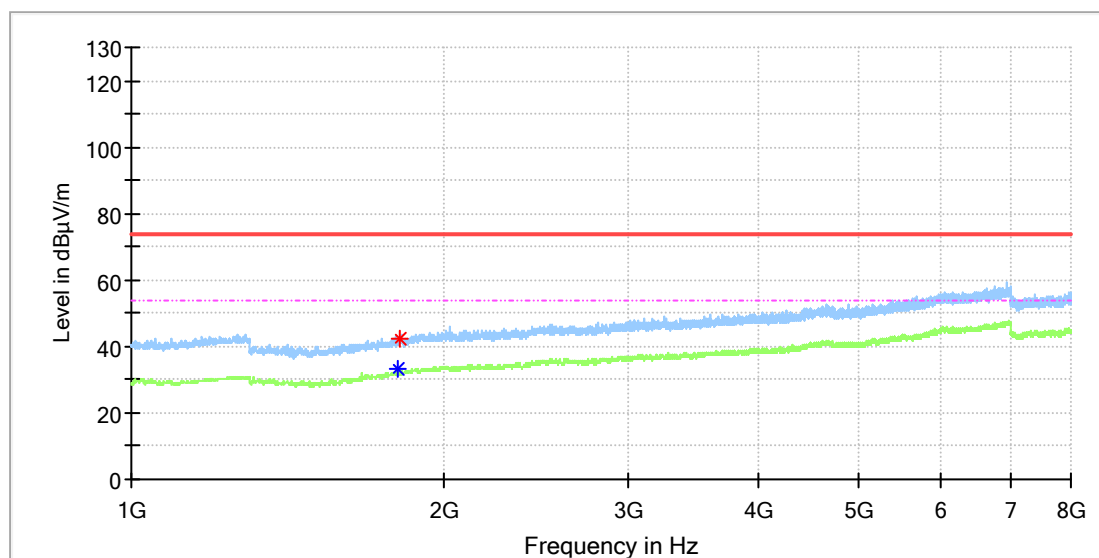
## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 42.755500       | 20.81            | 40.00          | 19.19       | 100.0       | V   | 0.0           | -19.4        |
| 54.250000       | 21.36            | 40.00          | 18.64       | 100.0       | V   | 87.0          | -18.4        |
| 305.480000      | 30.19            | 46.00          | 15.81       | 100.0       | V   | 216.0         | -16.1        |
| 363.049500      | 29.62            | 46.00          | 16.38       | 100.0       | V   | 216.0         | -14.6        |
| 711.182500      | 38.13            | 46.00          | 7.87        | 100.0       | V   | 174.0         | -7.8         |
| 882.290500      | 40.19            | 46.00          | 5.81        | 100.0       | V   | 0.0           | -5.1         |

1GHz - 10GHz

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_903MHz     |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

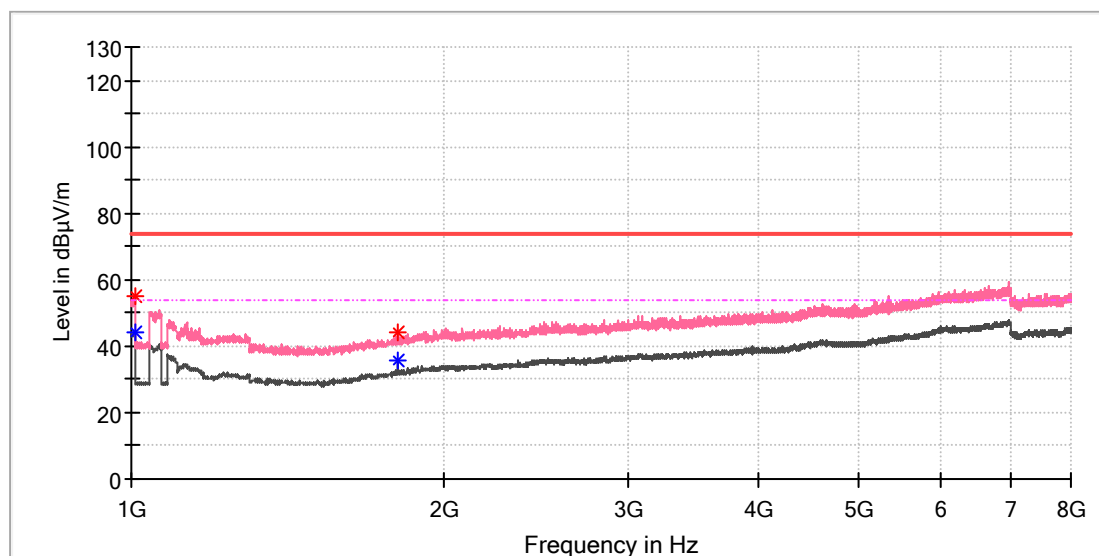


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1805.850000     | ---              | 33.11            | 54.00          | 20.89       | 100.0       | H   | 198.0         | 4.8          |
| 1807.525000     | 42.35            | ---              | 74.00          | 31.65       | 100.0       | H   | 26.0          | 4.8          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_903MHz     |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

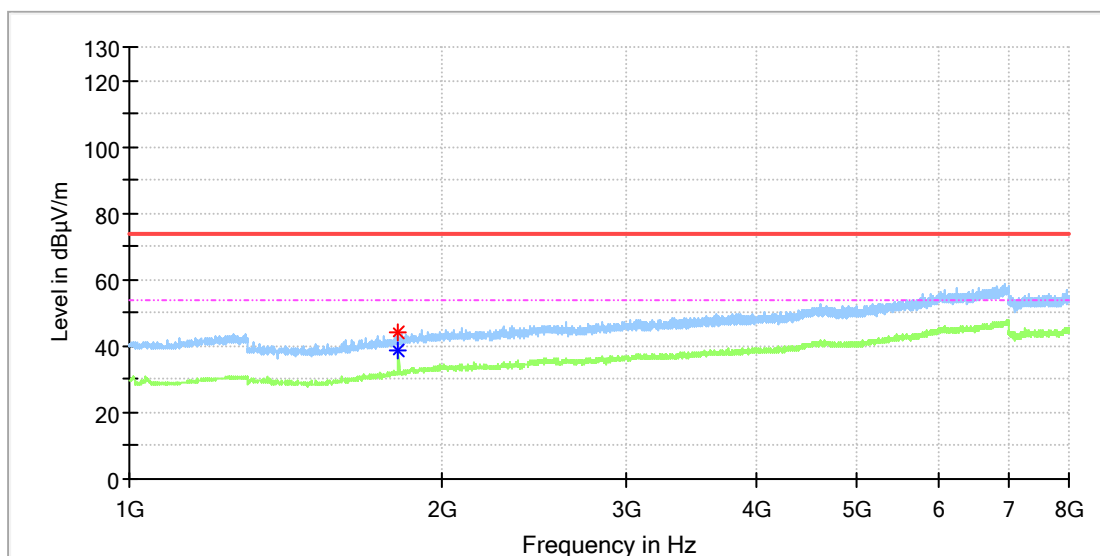


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1007.000000     | ---              | 44.01            | 54.00          | 9.99        | 100.0       | V   | 194.0         | -0.1         |
| 1008.000000     | 54.88            | ---              | 74.00          | 19.12       | 100.0       | V   | 194.0         | -0.1         |
| 1805.850000     | ---              | 35.51            | 54.00          | 18.49       | 100.0       | V   | 220.0         | 4.8          |
| 1806.687500     | 43.89            | ---              | 74.00          | 30.11       | 100.0       | V   | 220.0         | 4.8          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_907.8MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

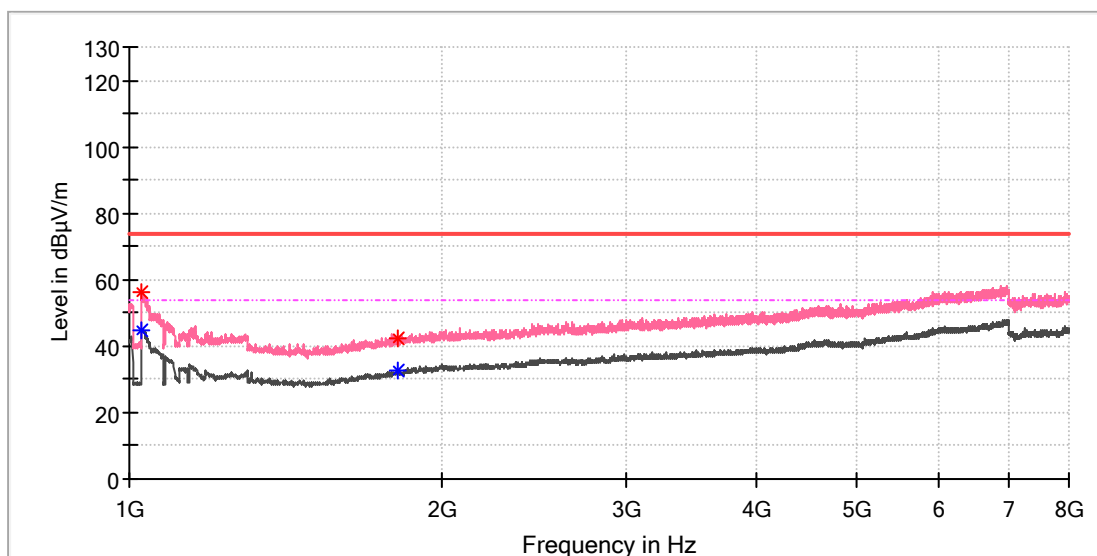


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1814.225000     | 44.40            | ---              | 74.00          | 29.60       | 100.0       | H   | 323.0         | 4.8          |
| 1815.062500     | ---              | 38.79            | 54.00          | 15.21       | 100.0       | H   | 323.0         | 4.8          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_907.8MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

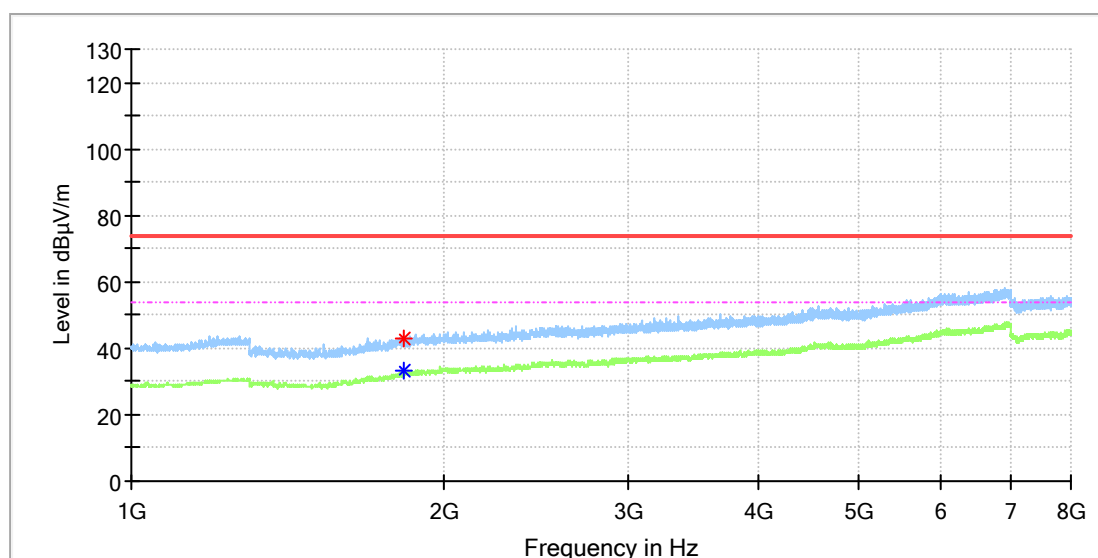


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1028.500000     | ---              | 44.88            | 54.00          | 9.12        | 100.0       | V   | 12.0          | -0.2         |
| 1028.500000     | 56.00            | ---              | 74.00          | 18.00       | 100.0       | V   | 12.0          | -0.2         |
| 1814.225000     | ---              | 32.52            | 54.00          | 21.48       | 100.0       | V   | 224.0         | 4.8          |
| 1815.062500     | 42.33            | ---              | 74.00          | 31.67       | 100.0       | V   | 278.0         | 4.8          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_914.2MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

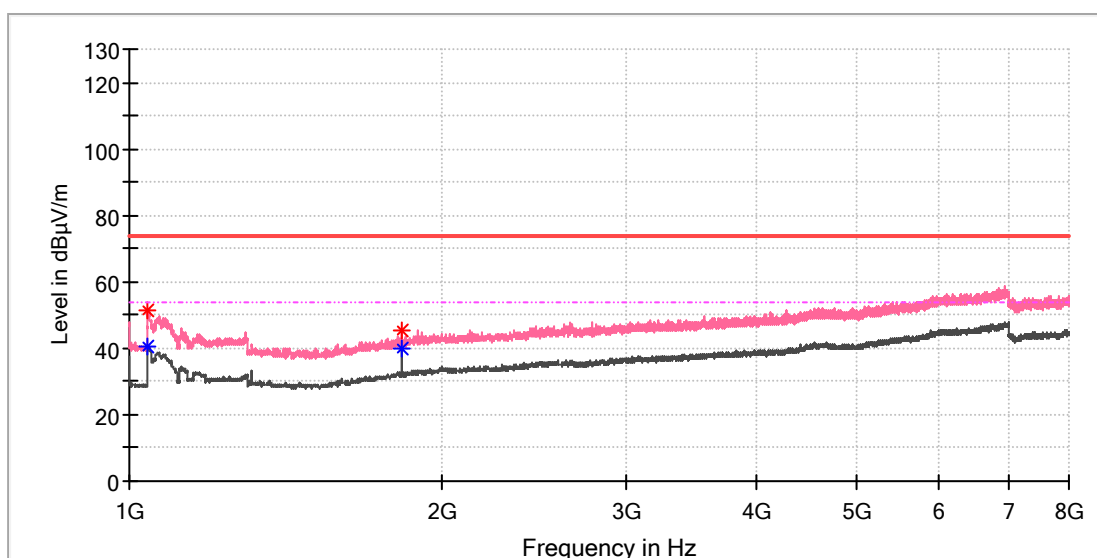


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1826.787500     | 42.90            | ---              | 74.00          | 31.10       | 100.0       | H   | 269.0         | 4.9          |
| 1828.462500     | ---              | 33.46            | 54.00          | 20.54       | 100.0       | H   | 191.0         | 4.9          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_914.2MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

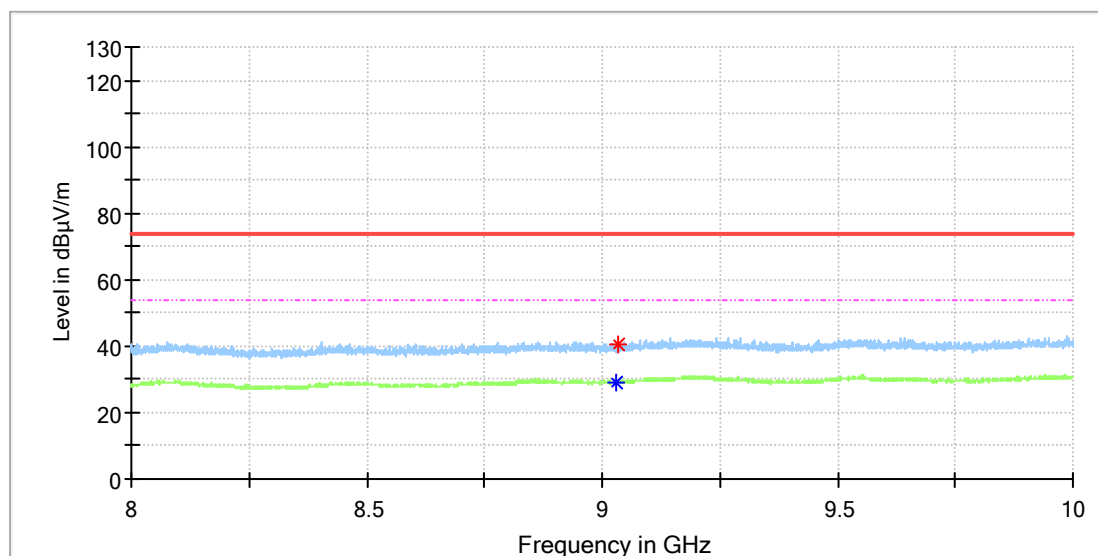


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1042.000000     | ---              | 40.72            | 54.00          | 13.28       | 100.0       | V   | 0.0           | -0.2         |
| 1042.500000     | 51.44            | ---              | 74.00          | 22.56       | 100.0       | V   | 0.0           | -0.2         |
| 1828.462500     | ---              | 39.64            | 54.00          | 14.36       | 100.0       | V   | 106.0         | 4.9          |
| 1828.462500     | 45.30            | ---              | 74.00          | 28.70       | 100.0       | V   | 106.0         | 4.9          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: DTS\_500k\_903MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

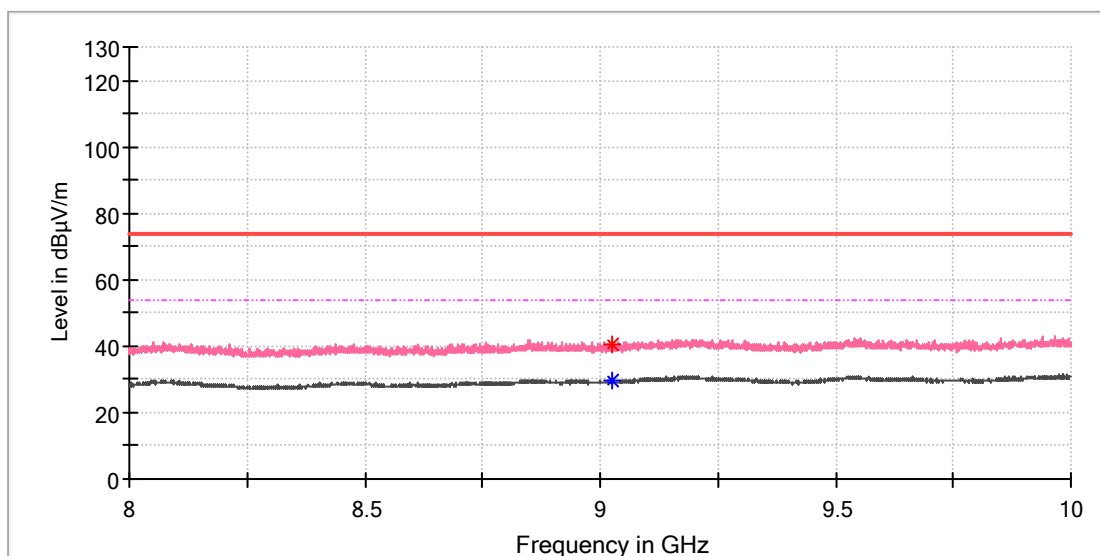


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9029.500000     | ---              | 29.22            | 54.00          | 24.78       | 100.0       | H   | 74.0          | 8.9          |
| 9033.500000     | 40.24            | ---              | 74.00          | 33.76       | 100.0       | H   | 277.0         | 8.9          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: DTS\_500k\_903MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

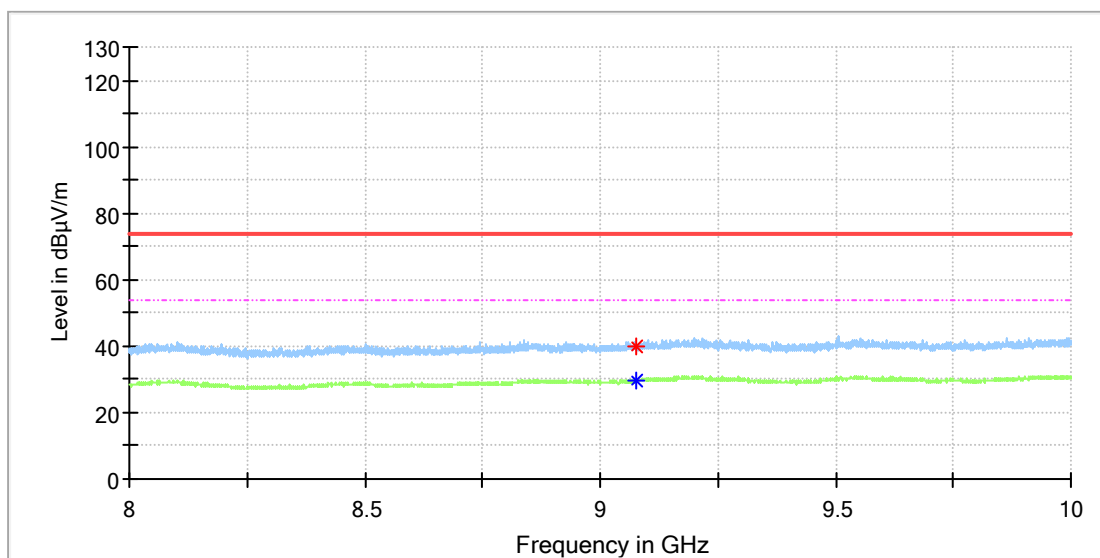


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9025.000000     | 40.66            | ---              | 74.00          | 33.34       | 100.0       | V   | 17.0          | 8.9          |
| 9027.000000     | ---              | 29.42            | 54.00          | 24.58       | 100.0       | V   | 221.0         | 8.9          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: DTS\_500k\_907.8MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

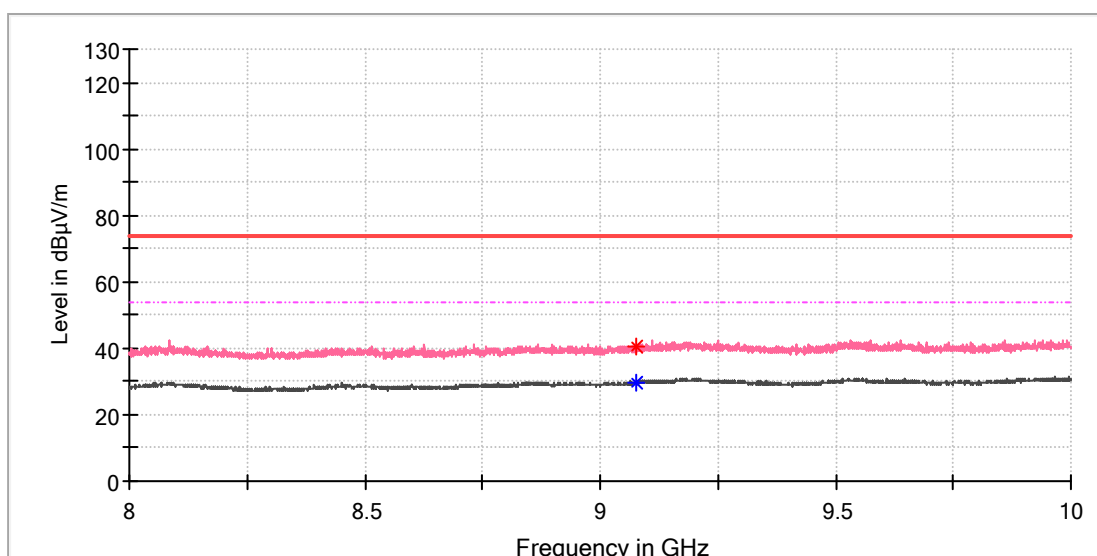


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9077.000000     | 40.19            | ---              | 74.00          | 33.81       | 100.0       | H   | 9.0           | 9.4          |
| 9078.500000     | ---              | 29.89            | 54.00          | 24.11       | 100.0       | H   | 54.0          | 9.4          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_907.8MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

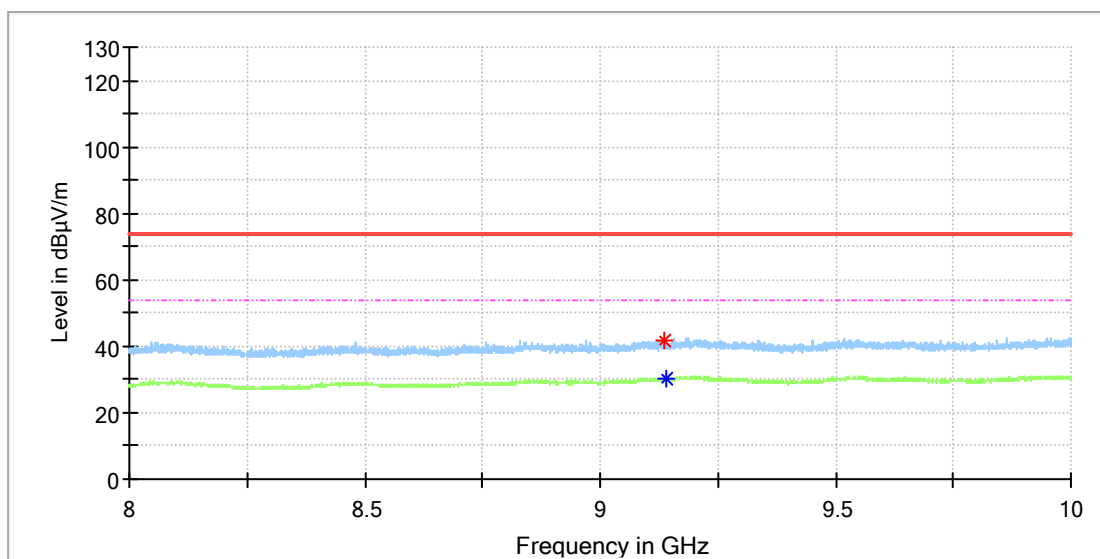


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9075.000000     | 40.44            | ---              | 74.00          | 33.56       | 100.0       | V   | 346.0         | 9.4          |
| 9075.000000     | ---              | 29.78            | 54.00          | 24.22       | 100.0       | V   | 346.0         | 9.4          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_914.2MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

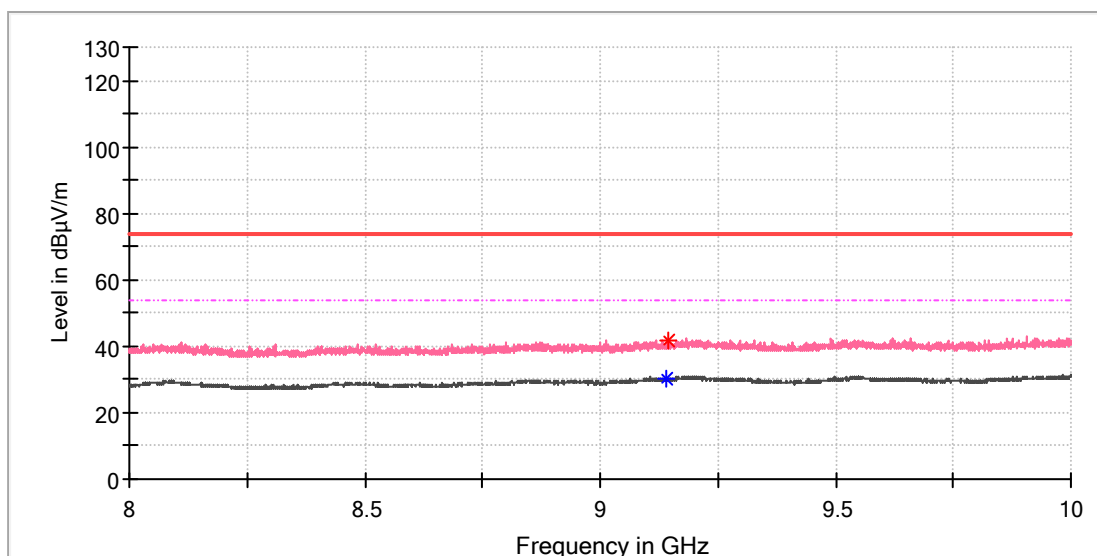


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9136.500000     | 41.76            | ---              | 74.00          | 32.24       | 100.0       | H   | 349.0         | 10.0         |
| 9139.500000     | ---              | 30.07            | 54.00          | 23.93       | 100.0       | H   | 279.0         | 10.0         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | DTS_500k_914.2MHz   |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |



## Critical\_Freqs

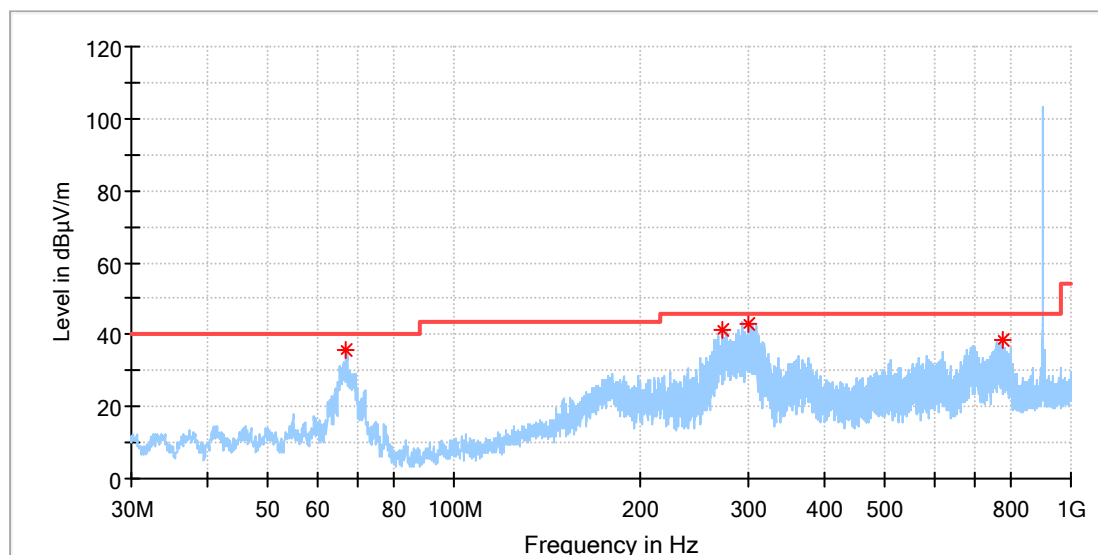
| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9142.500000     | ---              | 30.31            | 54.00          | 23.69       | 100.0       | V   | 104.0         | 10.1         |
| 9143.000000     | 41.81            | ---              | 74.00          | 32.19       | 100.0       | V   | 67.0          | 10.1         |

## Lora FHSS

30MHz - 1GHz

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_902.3MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

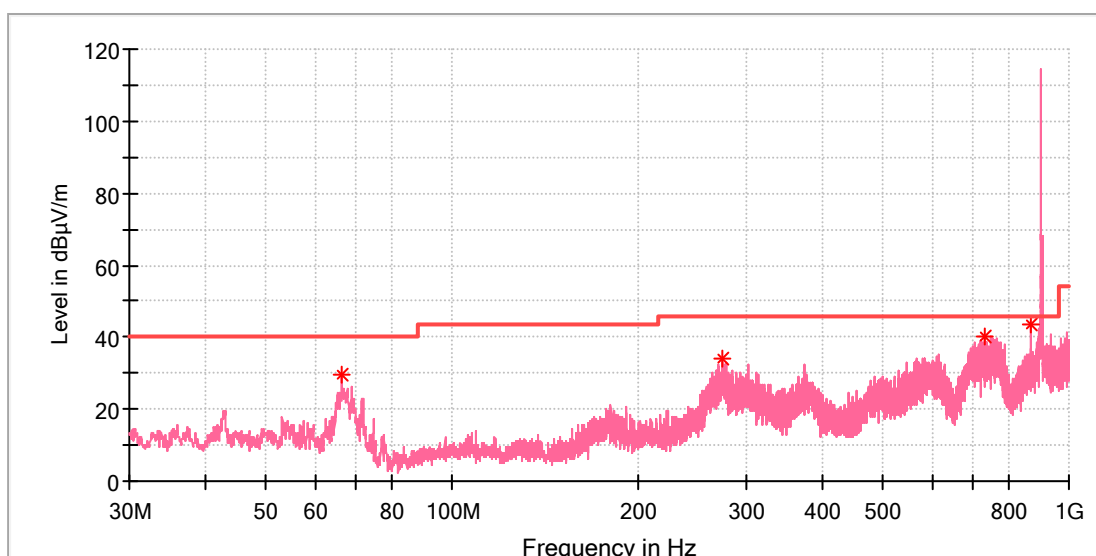


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 66.908500       | 35.88            | 40.00          | 4.12        | 100.0       | H   | 0.0           | -20.7        |
| 272.403000      | 41.30            | 46.00          | 4.70        | 100.0       | H   | 299.0         | -16.9        |
| 300.824000      | 42.85            | 46.00          | 3.15        | 100.0       | H   | 299.0         | -16.3        |
| 777.385000      | 38.31            | 46.00          | 7.69        | 100.0       | H   | 273.0         | -6.7         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_902.3MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

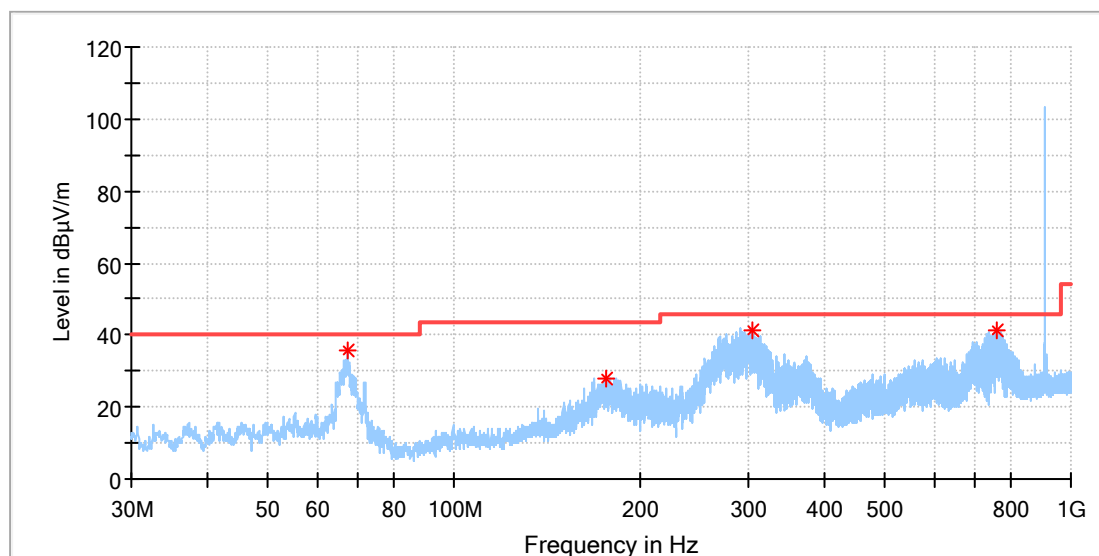


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 66.229500       | 29.83            | 40.00          | 10.17       | 100.0       | V   | 274.0         | -20.5        |
| 273.567000      | 34.28            | 46.00          | 11.72       | 100.0       | V   | 60.0          | -16.9        |
| 732.280000      | 40.43            | 46.00          | 5.57        | 100.0       | V   | 123.0         | -7.5         |
| 870.311000      | 43.64            | 46.00          | 2.36        | 100.0       | V   | 75.0          | -5.2         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_908.5MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

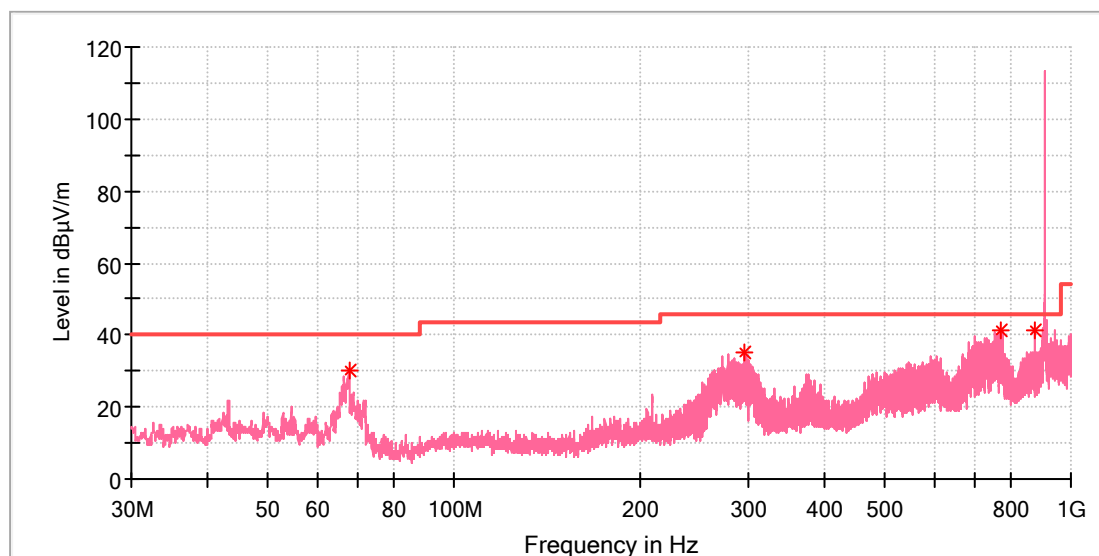


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 67.345000       | 35.52            | 40.00          | 4.48        | 100.0       | H   | 0.0           | -20.9        |
| 175.985000      | 27.91            | 43.50          | 15.59       | 100.0       | H   | 95.0          | -20.8        |
| 304.995000      | 41.36            | 46.00          | 4.64        | 100.0       | H   | 213.0         | -16.1        |
| 759.100500      | 41.53            | 46.00          | 4.47        | 100.0       | H   | 213.0         | -7.0         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_908.5MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

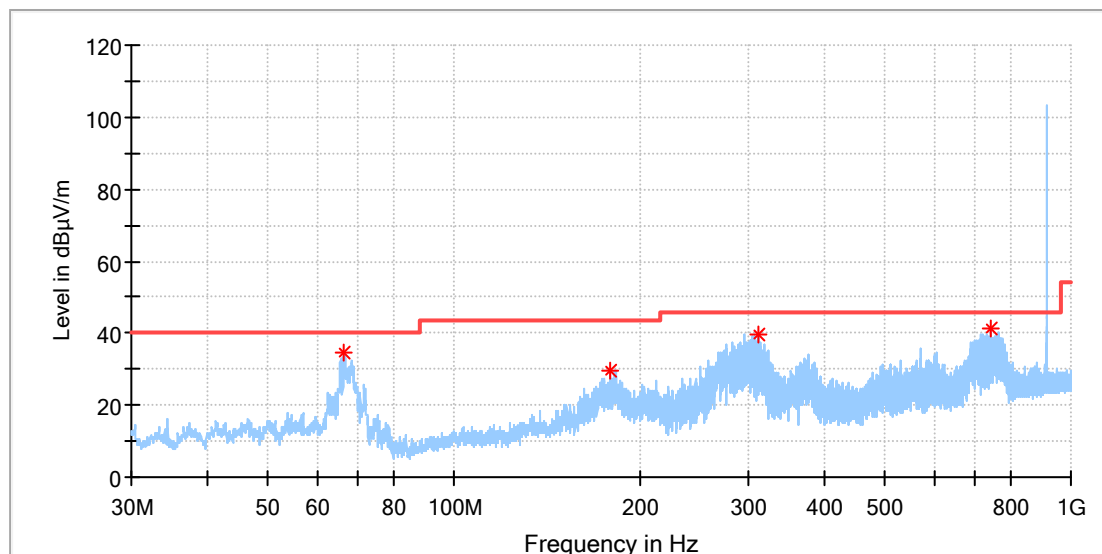


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 67.539000       | 29.87            | 40.00          | 10.13       | 100.0       | V   | 283.0         | -21.0        |
| 295.974000      | 35.43            | 46.00          | 10.57       | 100.0       | V   | 274.0         | -16.4        |
| 770.158500      | 41.24            | 46.00          | 4.76        | 100.0       | V   | 274.0         | -6.8         |
| 876.567500      | 41.21            | 46.00          | 4.79        | 100.0       | V   | 158.0         | -5.2         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_914.9MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

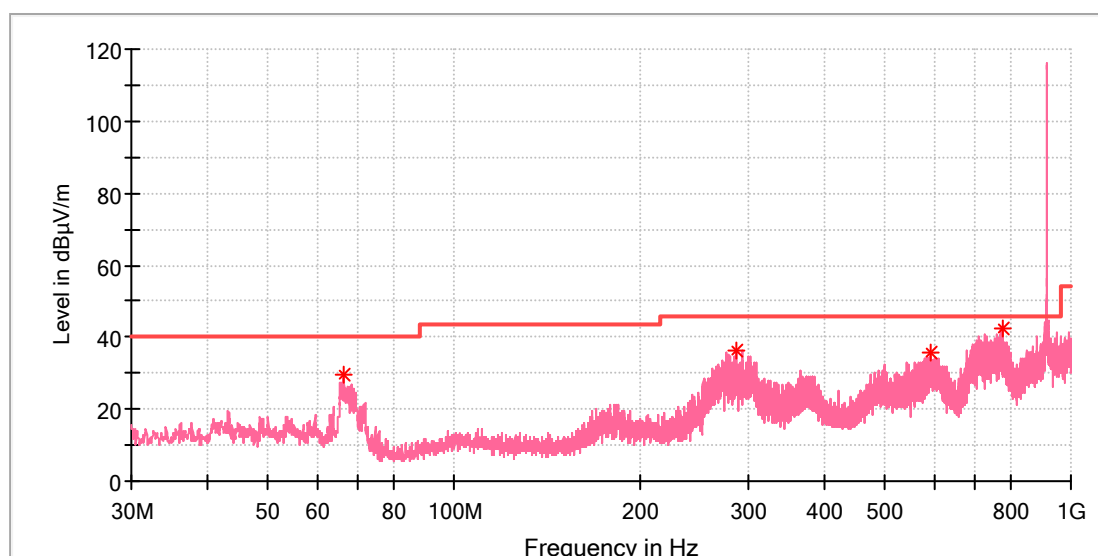


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 66.423500       | 34.77            | 40.00          | 5.23        | 100.0       | H   | 5.0           | -20.6        |
| 179.089000      | 29.77            | 43.50          | 13.73       | 100.0       | H   | 126.0         | -20.6        |
| 310.912000      | 39.42            | 46.00          | 6.58        | 100.0       | H   | 22.0          | -15.9        |
| 742.077000      | 41.33            | 46.00          | 4.67        | 100.0       | H   | 260.0         | -7.3         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_914.9MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |



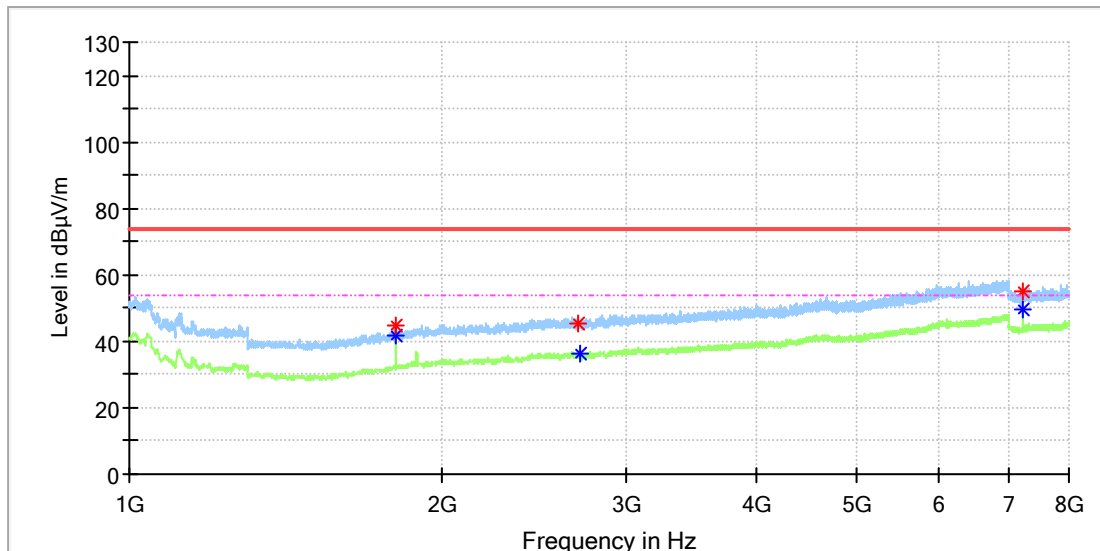
## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 66.229500       | 29.42            | 40.00          | 10.58       | 100.0       | V   | 271.0         | -20.5        |
| 286.322500      | 36.56            | 46.00          | 9.44        | 100.0       | V   | 271.0         | -16.6        |
| 594.249000      | 35.81            | 46.00          | 10.19       | 100.0       | V   | 70.0          | -10.0        |
| 776.609000      | 42.66            | 46.00          | 3.34        | 100.0       | V   | 271.0         | -6.7         |

1GHz - 10GHz

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_902.3MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

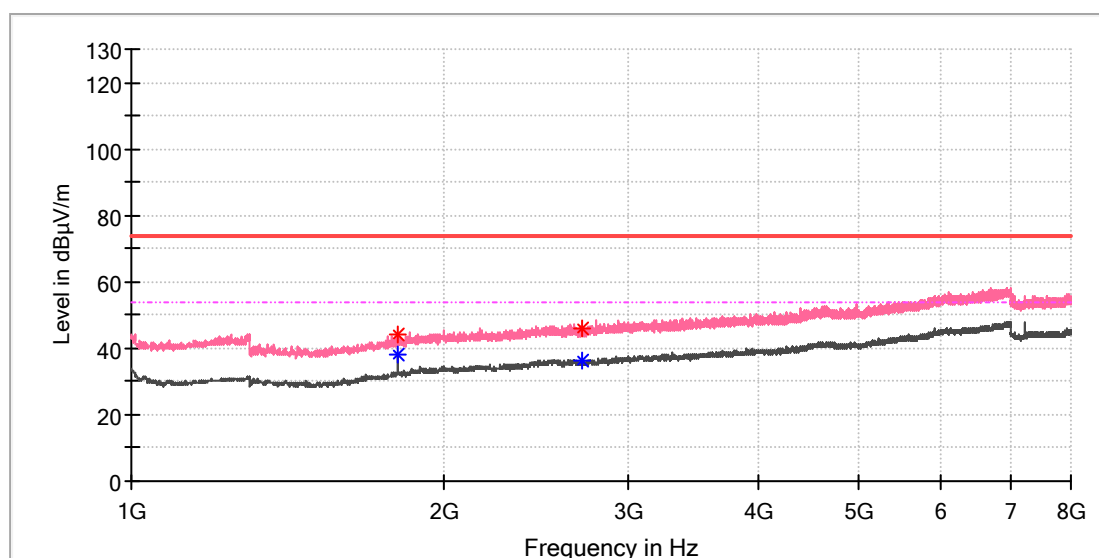


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1804.175000     | ---              | 41.43            | 54.00          | 12.57       | 100.0       | H   | 4.0           | 4.7          |
| 1804.175000     | 44.96            | ---              | 74.00          | 29.04       | 100.0       | H   | 4.0           | 4.7          |
| 2702.812500     | 45.46            | ---              | 74.00          | 28.54       | 100.0       | H   | 105.0         | 7.5          |
| 2706.162500     | ---              | 36.06            | 54.00          | 17.94       | 100.0       | H   | 93.0          | 7.5          |
| 7218.612500     | 54.79            | ---              | 74.00          | 19.21       | 100.0       | H   | 278.0         | 17.9         |
| 7218.612500     | ---              | 49.59            | 54.00          | 4.41        | 100.0       | H   | 278.0         | 17.9         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_902.3MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

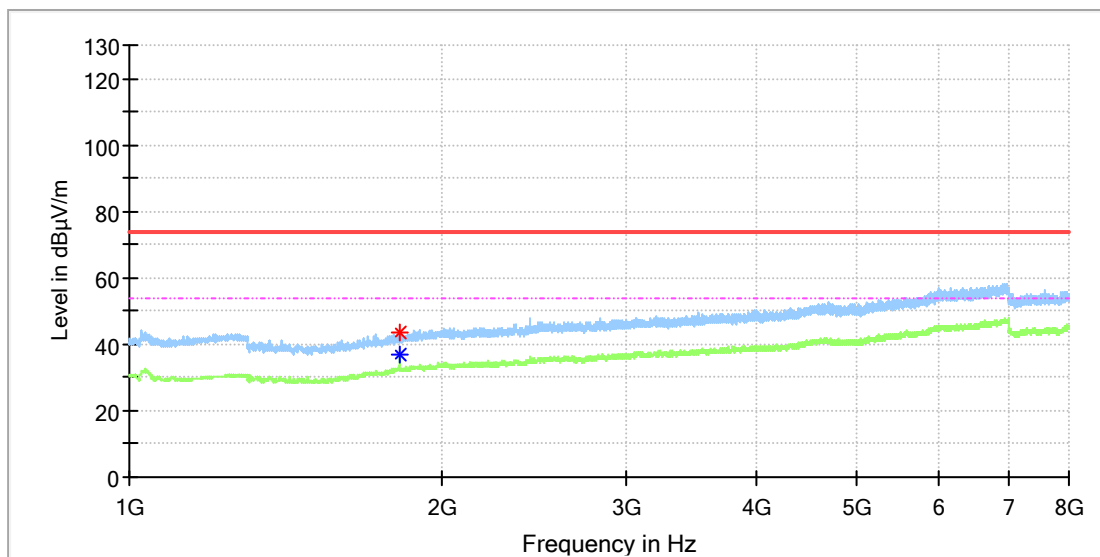


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1804.175000     | 44.20            | ---              | 74.00          | 29.80       | 100.0       | V   | 127.0         | 4.7          |
| 1804.175000     | ---              | 37.83            | 54.00          | 16.17       | 100.0       | V   | 127.0         | 4.7          |
| 2706.162500     | ---              | 36.25            | 54.00          | 17.75       | 100.0       | V   | 3.0           | 7.5          |
| 2707.000000     | 46.11            | ---              | 74.00          | 27.89       | 100.0       | V   | 42.0          | 7.6          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_908.5MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

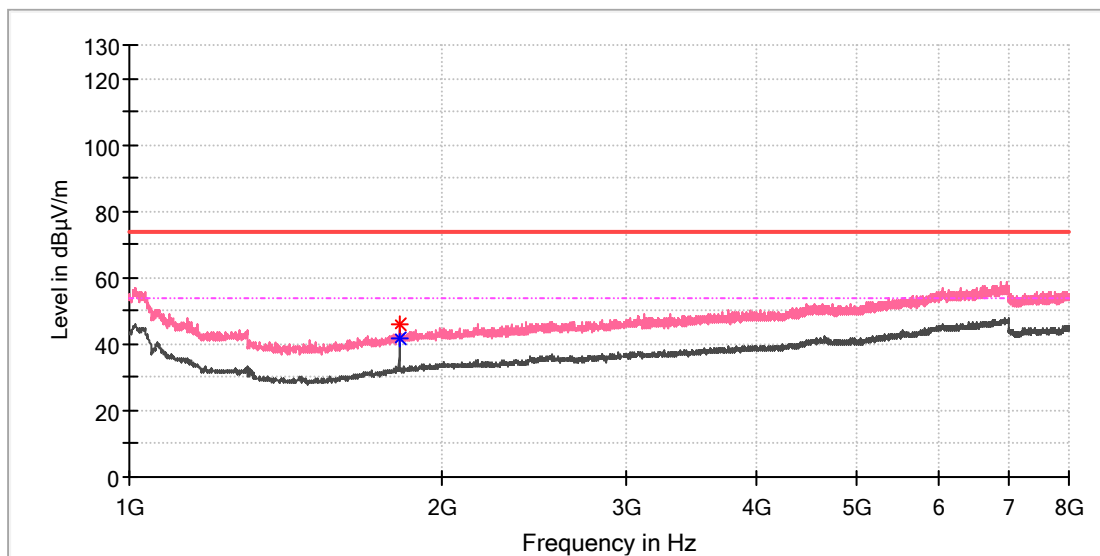


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1816.737500     | 43.55            | ---              | 74.00          | 30.45       | 100.0       | H   | 128.0         | 4.8          |
| 1816.737500     | ---              | 36.93            | 54.00          | 17.07       | 100.0       | H   | 128.0         | 4.8          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_908.5MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

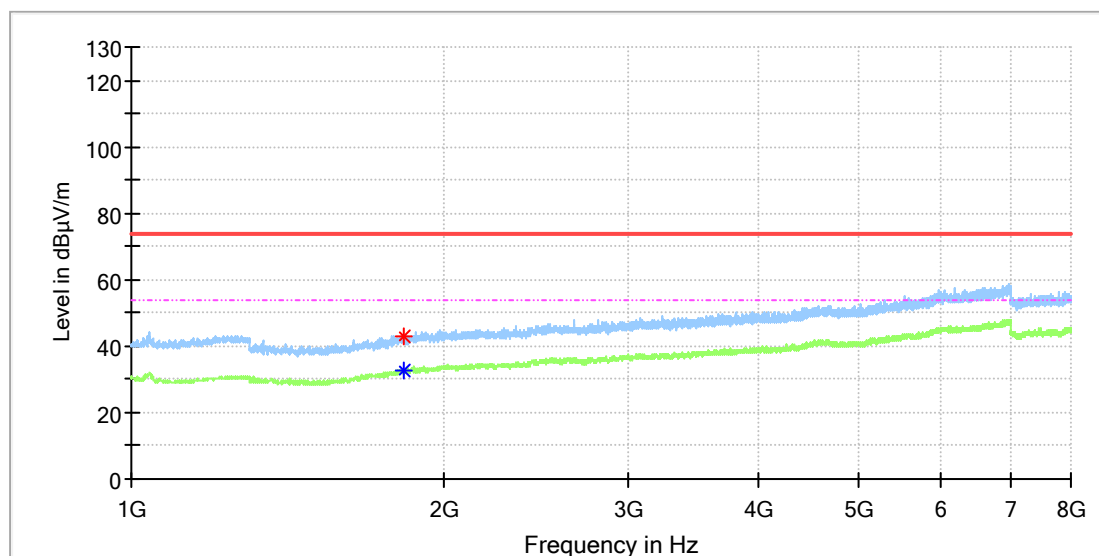


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1816.737500     | 45.87            | ---              | 74.00          | 28.13       | 100.0       | V   | 148.0         | 4.8          |
| 1816.737500     | ---              | 41.76            | 54.00          | 12.24       | 100.0       | V   | 148.0         | 4.8          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: Lora\_125k\_914.9MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 23 Humi:45%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

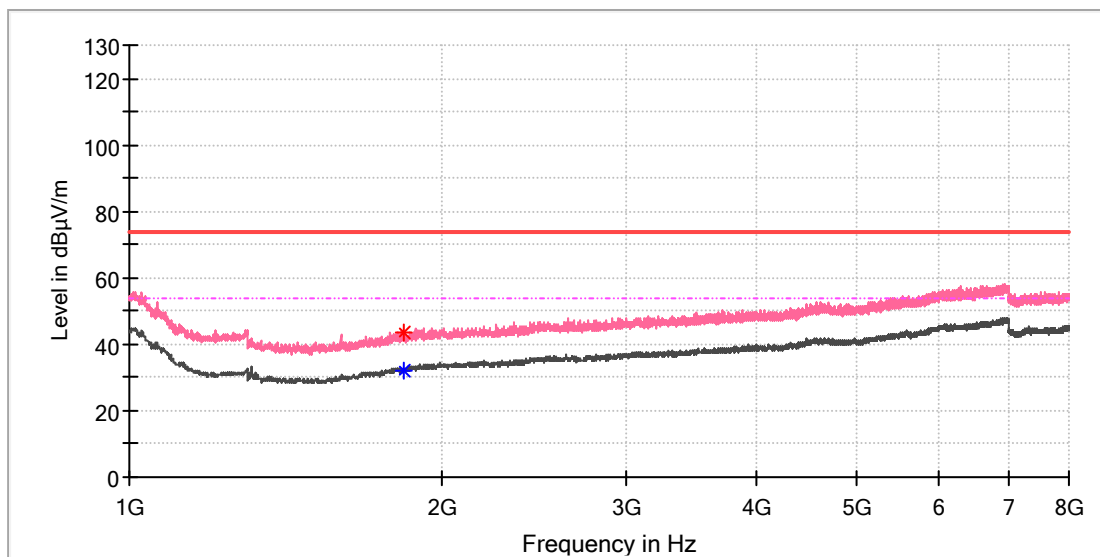


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1825.112500     | ---              | 32.80            | 54.00          | 21.20       | 100.0       | H   | 10.0          | 4.9          |
| 1828.462500     | 42.88            | ---              | 74.00          | 31.12       | 100.0       | H   | 68.0          | 4.9          |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_914.9MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 23 Humi:45%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |

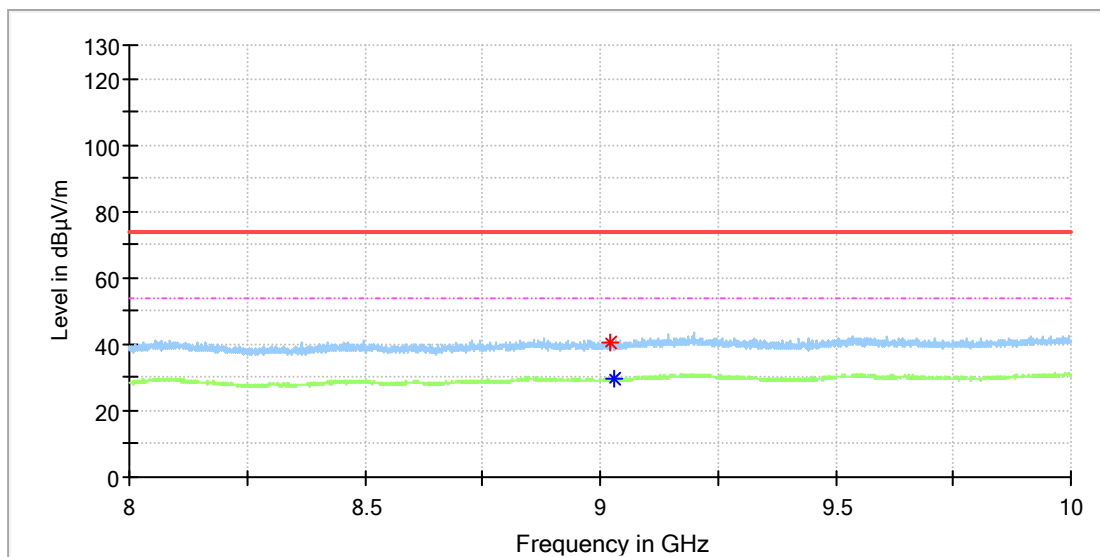


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1831.812500     | 43.66            | ---              | 74.00          | 30.34       | 100.0       | V   | 232.0         | 4.9          |
| 1831.812500     | ---              | 32.31            | 54.00          | 21.69       | 100.0       | V   | 232.0         | 4.9          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: Lora\_125k\_902.3MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

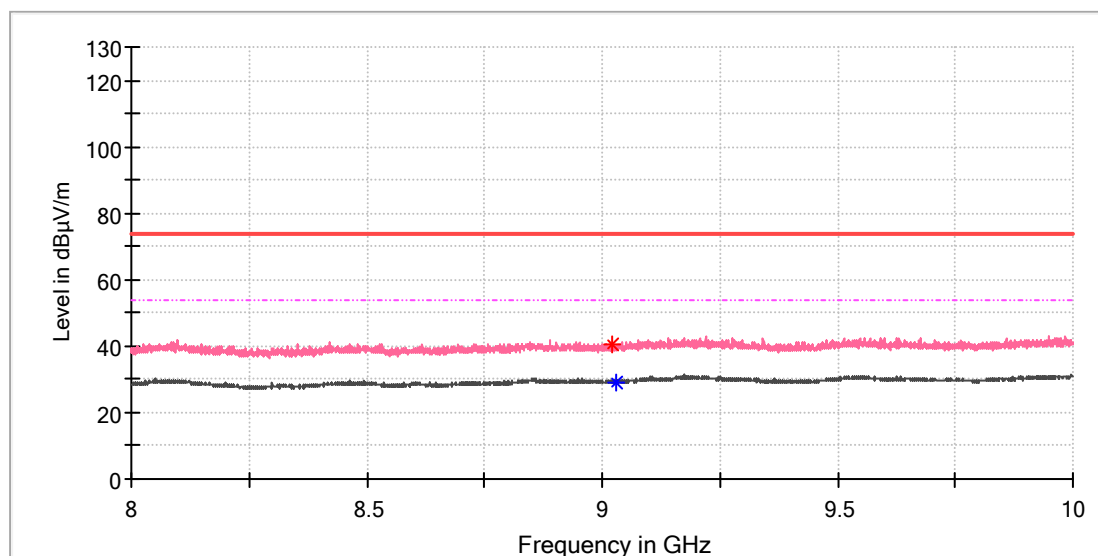


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9022.000000     | 40.35            | ---              | 74.00          | 33.65       | 100.0       | H   | 188.0         | 8.9          |
| 9028.500000     | ---              | 29.43            | 54.00          | 24.57       | 100.0       | H   | 254.0         | 8.9          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: Lora\_125k\_902.3MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

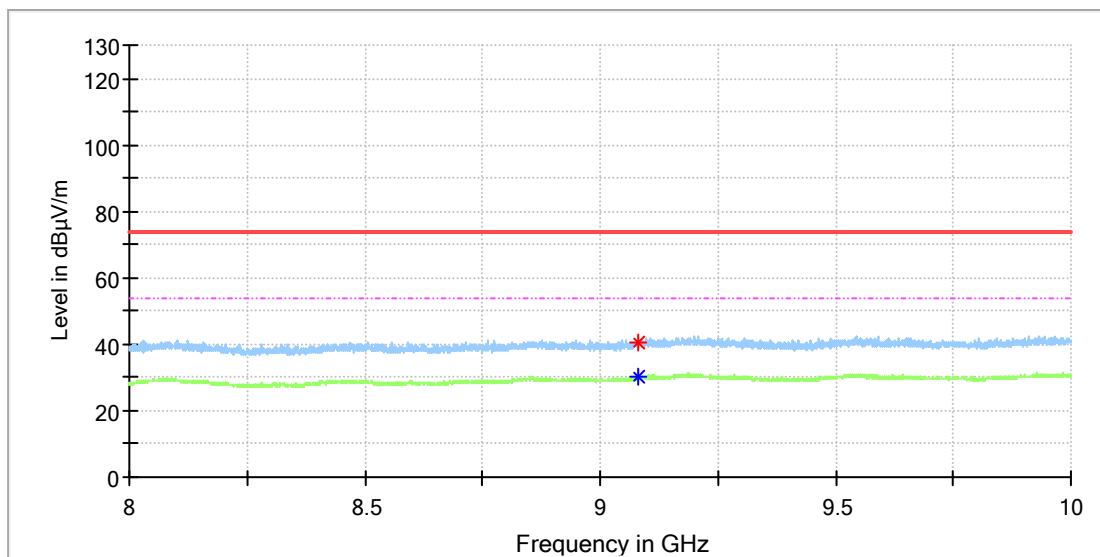


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9023.000000     | 40.28            | ---              | 74.00          | 33.72       | 100.0       | V   | 225.0         | 8.9          |
| 9029.500000     | ---              | 29.30            | 54.00          | 24.70       | 100.0       | V   | 271.0         | 8.9          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: Lora\_125k\_908.5MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

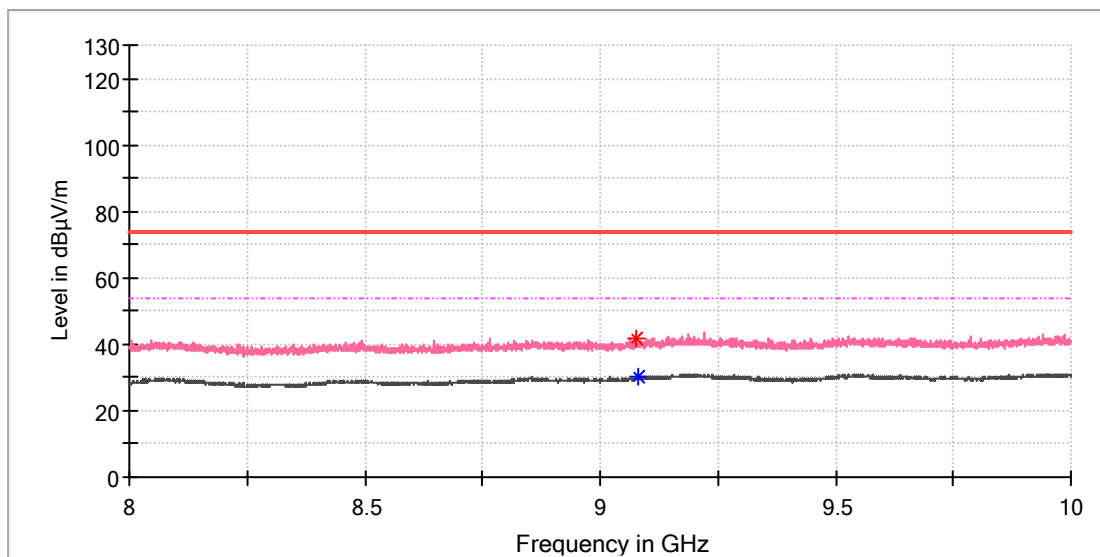


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBμV/m) | Average (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9079.500000     | 40.77            | ---              | 74.00          | 33.23       | 100.0       | H   | 146.0         | 9.4          |
| 9081.000000     | ---              | 30.02            | 54.00          | 23.98       | 100.0       | H   | 154.0         | 9.5          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: Lora\_125k\_908.5MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

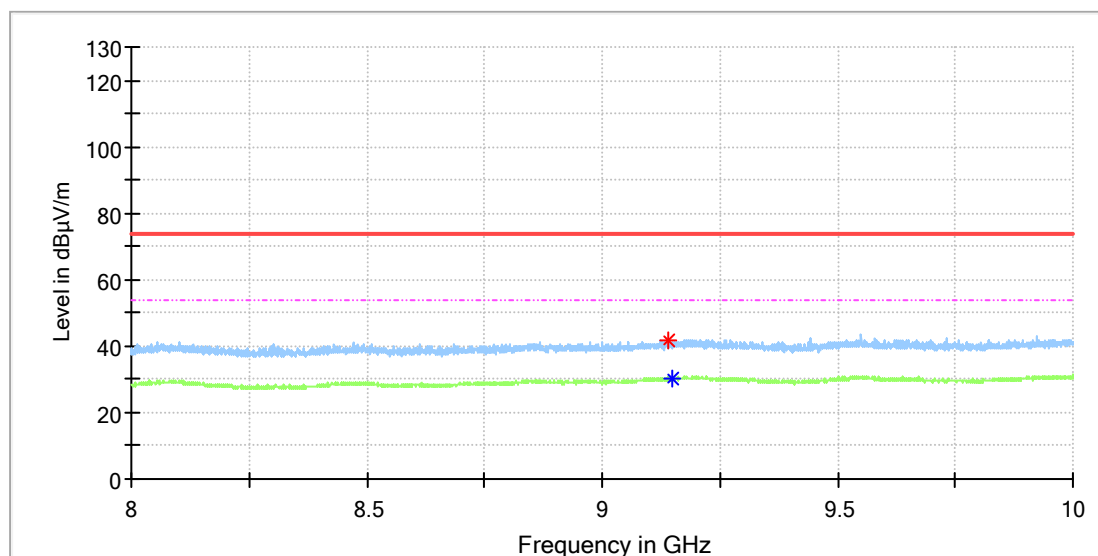


## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9077.500000     | 41.45            | ---              | 74.00          | 32.55       | 100.0       | V   | 100.0         | 9.4          |
| 9082.500000     | ---              | 30.00            | 54.00          | 24.00       | 100.0       | V   | 356.0         | 9.5          |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Mode: Lora\_125k\_914.9MHz  
Test Voltage:: DC 5V from USB  
Remark: Temp 24 Humi:47%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

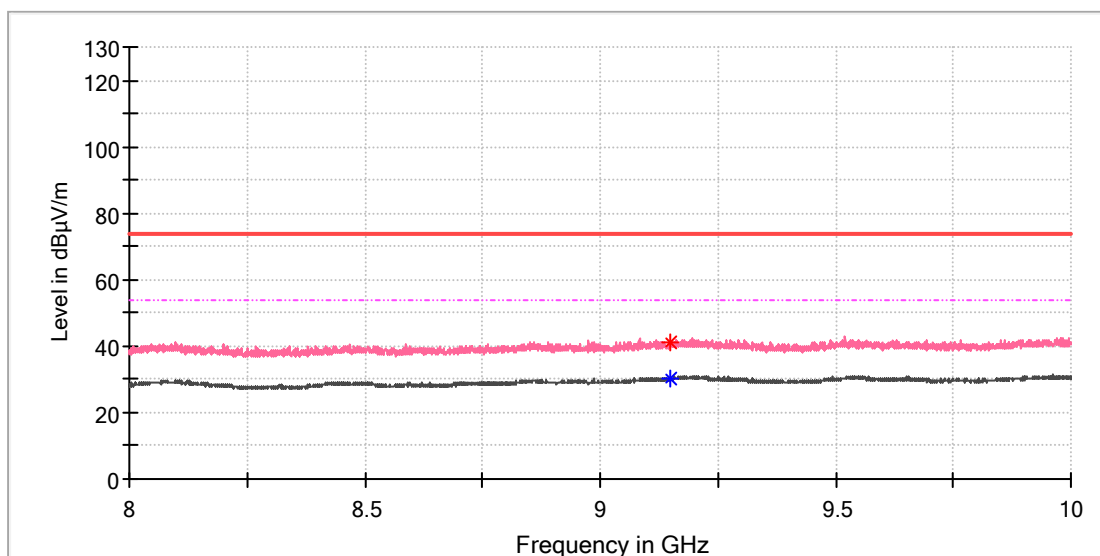


## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9140.500000     | 41.75            | ---              | 74.00          | 32.25       | 100.0       | H   | 17.0          | 10.0         |
| 9148.500000     | ---              | 30.27            | 54.00          | 23.73       | 100.0       | H   | 294.0         | 10.1         |

## EUT Information

|                |                     |
|----------------|---------------------|
| EUT Name:      | WisDuo LPWAN Module |
| Model:         | RAK3172             |
| Test Mode:     | Lora_125k_914.9MHz  |
| Test Voltage:: | DC 5V from USB      |
| Remark:        | Temp 24 Humi:47%    |
| Test Standard: | FCC 15.247          |
| Tested By:     | Kei Zhang           |
| Reviewed By:   | Terry Yin           |



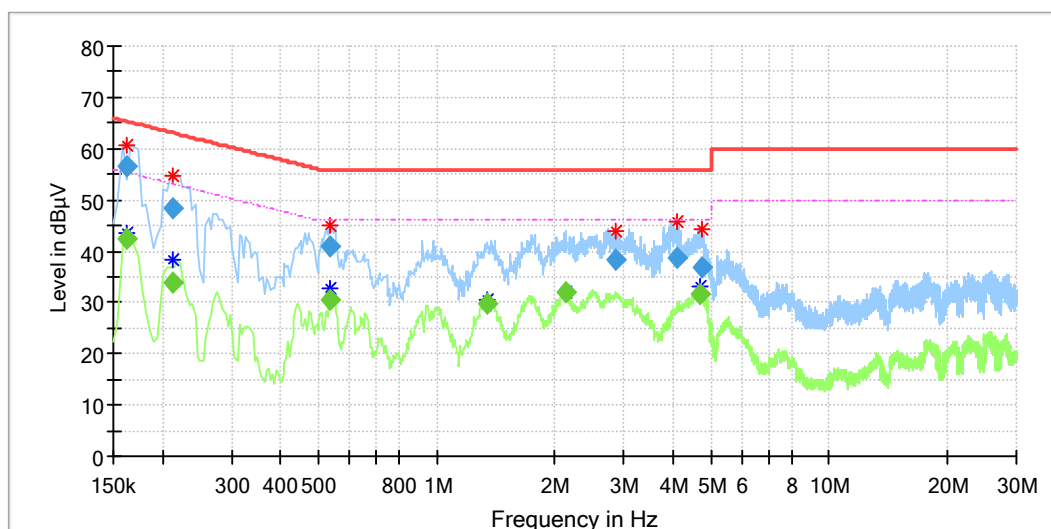
## Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 9147.000000     | 41.21            | ---              | 74.00          | 32.79       | 100.0       | V   | 207.0         | 10.1         |
| 9150.500000     | ---              | 30.47            | 54.00          | 23.53       | 100.0       | V   | 44.0          | 10.1         |

## Appendix B.8: Test Results of Conducted Emission on AC Mains

### EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Voltage: AC 120V/60Hz  
Test By: Ouyang Wang  
Review By: Gary Chen  
Remark: SR2

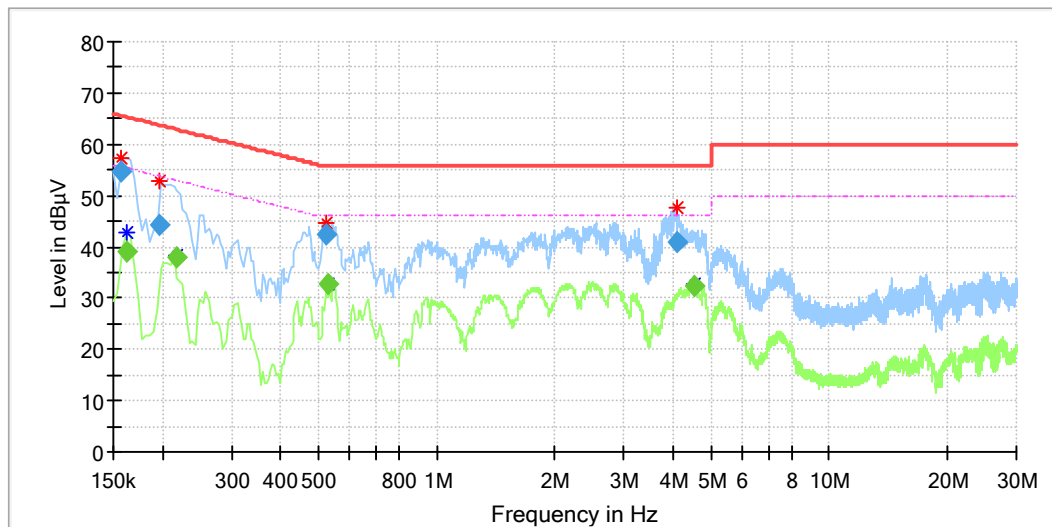


### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.161500        | ---              | 42.31          | 55.39        | 13.08       | 200.0           | 9.000           | L1   | 9.9        |
| 0.161500        | 56.56            | ---            | 65.39        | 8.83        | 200.0           | 9.000           | L1   | 9.9        |
| 0.213500        | ---              | 33.76          | 53.07        | 19.30       | 200.0           | 9.000           | L1   | 9.9        |
| 0.213500        | 48.29            | ---            | 63.07        | 14.78       | 200.0           | 9.000           | L1   | 9.9        |
| 0.533500        | 40.81            | ---            | 56.00        | 15.19       | 200.0           | 9.000           | L1   | 10.0       |
| 0.537500        | ---              | 30.46          | 46.00        | 15.54       | 200.0           | 9.000           | L1   | 10.0       |
| 1.349500        | ---              | 29.85          | 46.00        | 16.15       | 200.0           | 9.000           | L1   | 10.1       |
| 2.137500        | ---              | 32.01          | 46.00        | 13.99       | 200.0           | 9.000           | L1   | 10.1       |
| 2.866500        | 38.32            | ---            | 56.00        | 17.68       | 200.0           | 9.000           | L1   | 10.2       |
| 4.117500        | 38.84            | ---            | 56.00        | 17.16       | 200.0           | 9.000           | L1   | 10.2       |
| 4.713500        | ---              | 31.67          | 46.00        | 14.33       | 200.0           | 9.000           | L1   | 10.2       |
| 4.753500        | 37.00            | ---            | 56.00        | 19.00       | 200.0           | 9.000           | L1   | 10.2       |

## EUT Information

EUT Name: WisDuo LPWAN Module  
Model: RAK3172  
Test Voltage: AC 120V/60Hz  
Test By: Ouyang Wang  
Review By: Gary Chen  
Remark: SR2



## Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.157500        | 54.64            | ---            | 65.60        | 10.95       | 200.0           | 9.000           | N    | 9.8        |
| 0.161500        | ---              | 39.19          | 55.39        | 16.19       | 200.0           | 9.000           | N    | 9.8        |
| 0.197500        | 44.23            | ---            | 63.72        | 19.48       | 200.0           | 9.000           | N    | 9.8        |
| 0.218500        | ---              | 37.77          | 52.88        | 15.10       | 200.0           | 9.000           | N    | 9.8        |
| 0.525500        | 42.41            | ---            | 56.00        | 13.59       | 200.0           | 9.000           | N    | 9.8        |
| 0.529500        | ---              | 32.81          | 46.00        | 13.19       | 200.0           | 9.000           | N    | 9.8        |
| 4.101500        | 40.85            | ---            | 56.00        | 15.15       | 200.0           | 9.000           | N    | 9.9        |
| 4.537500        | ---              | 32.20          | 46.00        | 13.80       | 200.0           | 9.000           | N    | 9.9        |