

Annex 1: Measurement diagrams 21-1-0132201T01a-A1

| | | | |
|---|--|------------------------|--|
| Number of pages: | 13 | Date of Report: | 2022-Mar-08 |
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| Product: | Remote Control | | |
| Model: | Pearl | | |
| FCC ID: | T8C202 | IC: | 6496A-202 |
| Testing has been carried out in accordance with: | FCC Regulations: Title 47 CFR, Chapter I, Subchapter A, Subpart C: §15.231 ISED Regulations: RSS-210, Issue 10 RSS-Gen, Issue 5 Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit". | | |

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1 Measurement diagrams

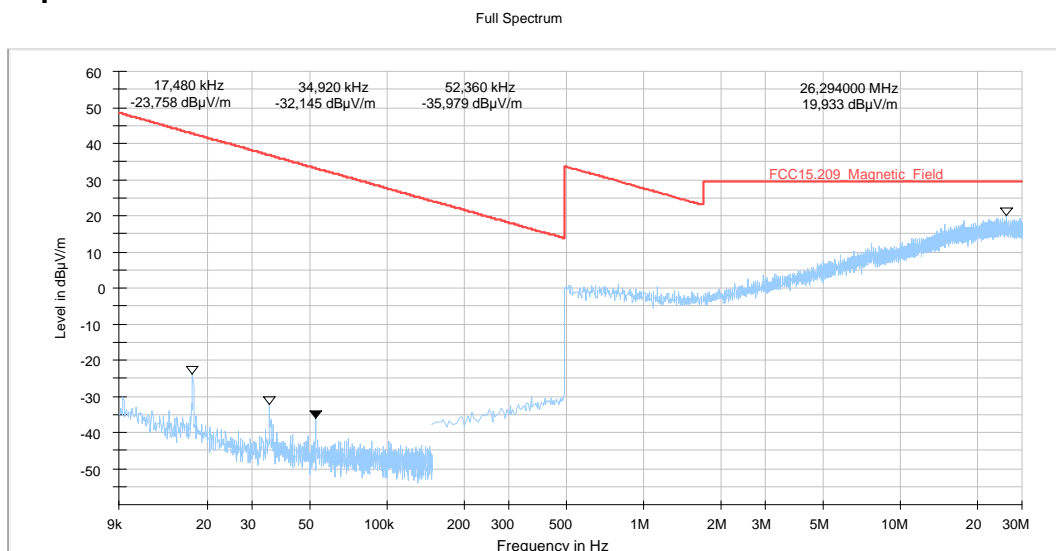
1.1 Radiated spurious emissions

2.01_RSE_TX_standing

Common Information

| | |
|----------------------------|---|
| Test Description: | Magnetic Field Strength Measurement related to 30/300 m distance |
| Test Site Location: | Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance |
| Version of Testsoftware: | EMC32 V10.50.0 |
| Technical Data: | Please see page 2 for detailed data of measurement setup |
| Rec. antenna (pre-scan): | height 1.00 m, parallel and 90° to EUT polarisation |
| Test Standard: | FCC 15.205 § 15.209 § 15.231; RSS-Gen: Issue 5; RSS-210: Issue 10 |
| Operator: | SSanthakum/TFra |
| Environmental Conditions:: | Humidity : 40%rH; Temperature: 20°C |
| Operating Mode: | Continuous TX |
| Verdict: | Passed |
| | |
| PMT number: | 21-1-01322S20_C01 |
| Power Supply: | 3 VDC |
| EUT Setup: | standing |

Full Spectrum

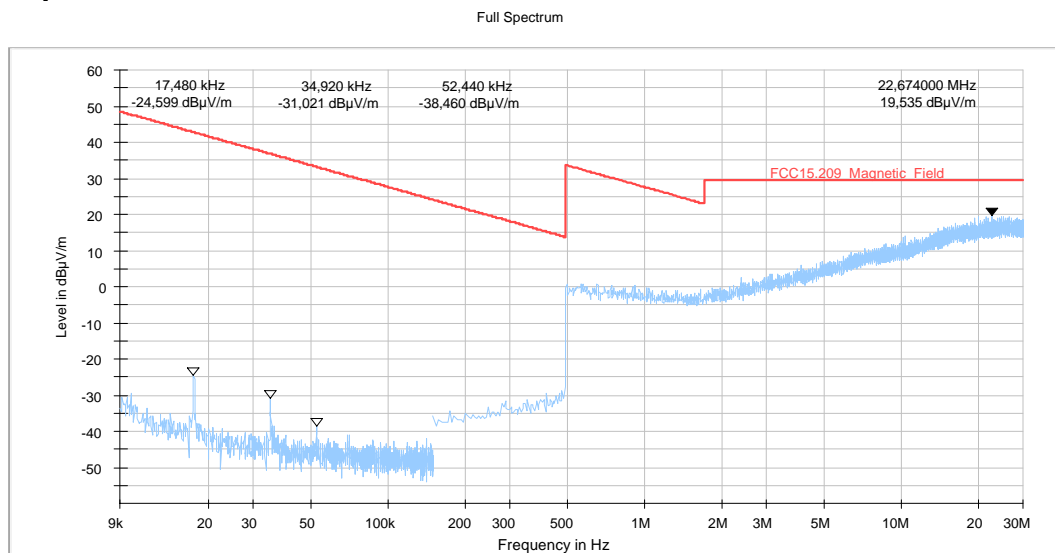


2.02_RSE_TX_lying

Common Information

| | |
|---------------------------|---|
| Test Description: | Magnetic Field Strength Measurement related to 30/300 m distance |
| Test Site Location: | Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance |
| Version of Testsoftware: | EMC32 V10.50.0 |
| Technical Data: | Please see page 2 for detailed data of measurement setup |
| Rec. antenna (pre-scan): | height 1.00 m, parallel and 90° to EUT polarisation |
| Test Standard: | FCC 15.205 § 15.209 § 15.231; RSS-Gen: Issue 5; RSS-210: Issue 10 |
| Operator: | SSanthakum/TFra |
| Environmental Conditions: | Humidity : 40%rH; Temperature: 20°C |
| Operating Mode: | Continuous TX |
| Verdict: | Passed |
| PMT number: | 21-1-01322S20_C01 |
| Power Supply: | 3 VDC |
| EUT Setup: | lying |

Full Spectrum



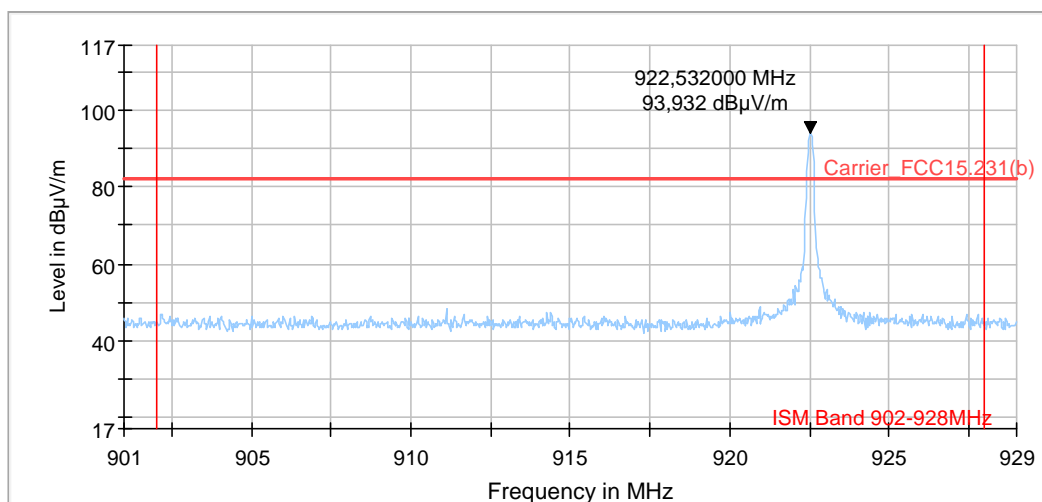
3.01_PWR_TX_standing

Common Information

| | |
|---------------------------|---|
| Test Description: | Radiated field strength emission in 3m distance |
| Test Site Location: | CETECOM GmbH Essen |
| Version of Testsoftware: | EMC32 V10.50.0 |
| Test Standard: | FCC 15.205 § 15.209 § 15.231; RSS-Gen: Issue 5; RSS-210: Issue 10 |
| Operator: | SSanthakum/TFra |
| Environmental Conditions: | Humidity : 40%rH; Temperature: 20°C |
| Operating Mode: | Continuous TX |
| Verdict: | Passed |
| PMT number: | 21-1-01322S20_C01 |
| Power Supply: | 3 VDC |
| EUT Setup: | standing |

Full Spectrum

Full Spectrum



Remark: due to testmode EUT was transmitting a continuous wave (CW) signal and measured with a peak detector, therefore a duty-cycle correction factor is applied reducing the peak value by 15.87 dB. See section 1.2 Duty-cycle correction for more information.

$93.932 \text{ dB}\mu\text{V/m (PK)} - 15.87 \text{ dB } (\delta) = 78.06 \text{ dB}\mu\text{V/m (AV)} = \text{PASSED}$

3.02_RSE_TX_standing

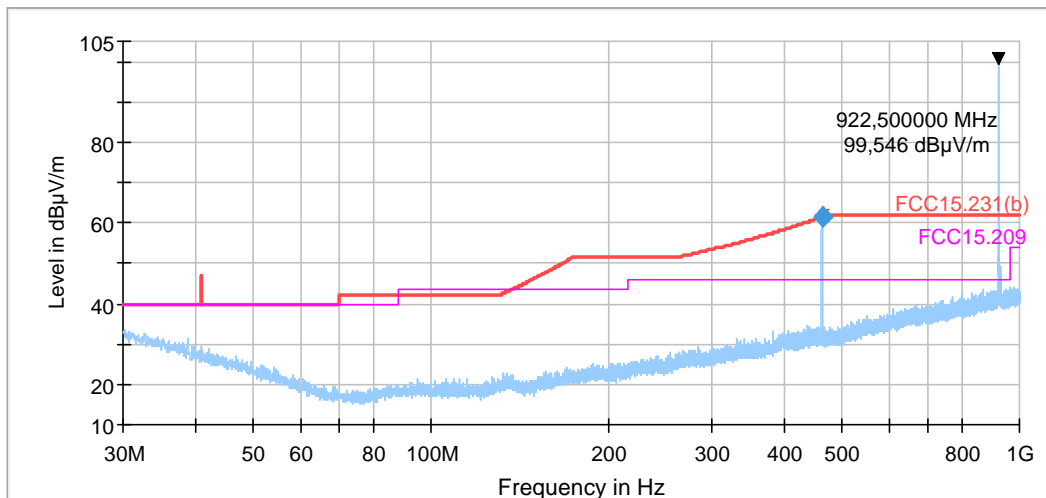
Common Information

Test Description: Radiated field strength emission in 3m distance
 Test Site Location: CETECOM GmbH Essen
 Version of Testsoftware: EMC32 V10.50.0
 Test Standard: FCC 15.205 § 15.209 § 15.231; RSS-Gen: Issue 5; RSS-210: Issue 10
 Operator: SSanthakum/TFra
 Environmental Conditions: Humidity : 40%rH; Temperature: 20°C
 Operating Mode: Continuous TX
 Verdict: Passed

 PMT number: 21-1-01322S20_C01
 Power Supply: 3 VDC
 EUT Setup: standing

Full Spectrum

Full Spectrum



Final Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Sig Path (dB) | Preamplifier (dB) | Trd Corr. (dB/m) |
|-----------------|--------------------|----------------|-------------|-----------------|-------------|-----|---------------|--------------|---------------|-------------------|------------------|
| 461.255000 | 61.55 | 61.49 | -0.06 | 120.000 | 128.0 | V | 92.0 | 19.5 | 0.0 | 2.2 | 17.3 |

Remark 1: for the fundamental emission at 922.5 MHz a different limit applies.

Remark 2: due to testmode EUT was transmitting a continuous wave (CW) signal and measured with a peak detector, therefore a duty-cycle correction factor is applied reducing the peak value by 15.87 dB. See section 1.2 Duty-cycle correction for more information.

61.55dBµV/m (PK) – 15.87dB (δ) = 45.68dBµV/m (AV) = PASSED

3.03_RSE_TX_lying

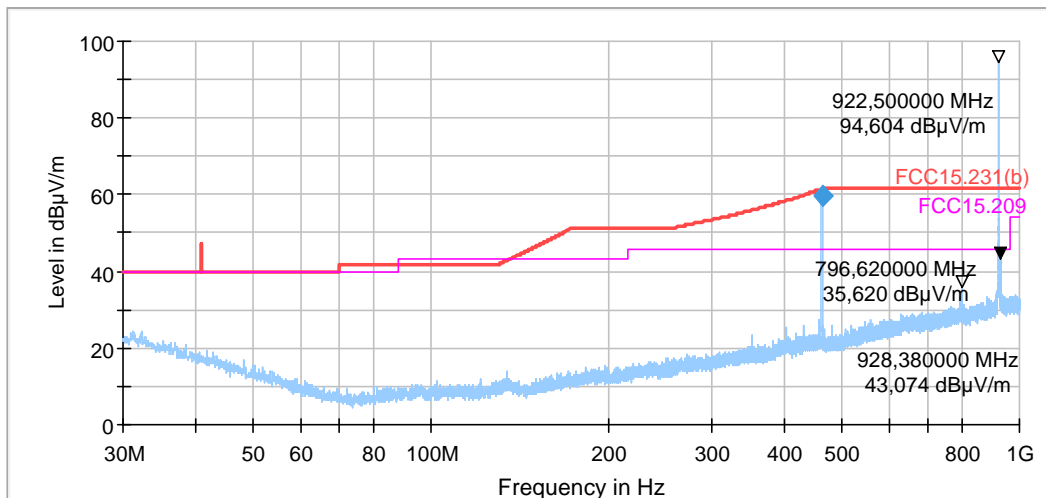
Common Information

Test Description: Radiated field strength emission in 3m distance
 Test Site Location: CETECOM GmbH Essen
 Version of Testsoftware: EMC32 V10.50.0
 Test Standard: FCC 15.205 § 15.209 § 15.231; RSS-Gen: Issue 5; RSS-210: Issue 10
 Operator: SSanthakum/TFra
 Environmental Conditions: Humidity : 40%rH; Temperature: 20°C
 Operating Mode: Continuous TX
 Verdict: Passed

 PMT number: 21-1-01322S20_C01
 Power Supply: 3 VDC
 EUT Setup: lying

Full Spectrum

Full Spectrum



Final Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Sig Path (dB) | Preamplifier (dB) | Trd Corr. (dB/m) |
|-----------------|--------------------|----------------|-------------|-----------------|-------------|-----|---------------|--------------|---------------|-------------------|------------------|
| 461.255000 | 59.87 | 61.49 | 1.62 | 120.000 | 125.0 | V | 80.0 | 19.5 | 0.0 | 2.2 | 17.3 |

Remark 1: for the fundamental emission at 922.5 MHz a different limit applies.

Remark 2: due to testmode EUT was transmitting a continuous wave (CW) signal and measured with a peak detector, therefore a duty-cycle correction factor is applied reducing the peak value by 15.87 dB. See section 1.2 Duty-cycle correction for more information.

59.87dBµV/m (PK) – 15.87dB = 44dBµV/m (AV) = PASSED

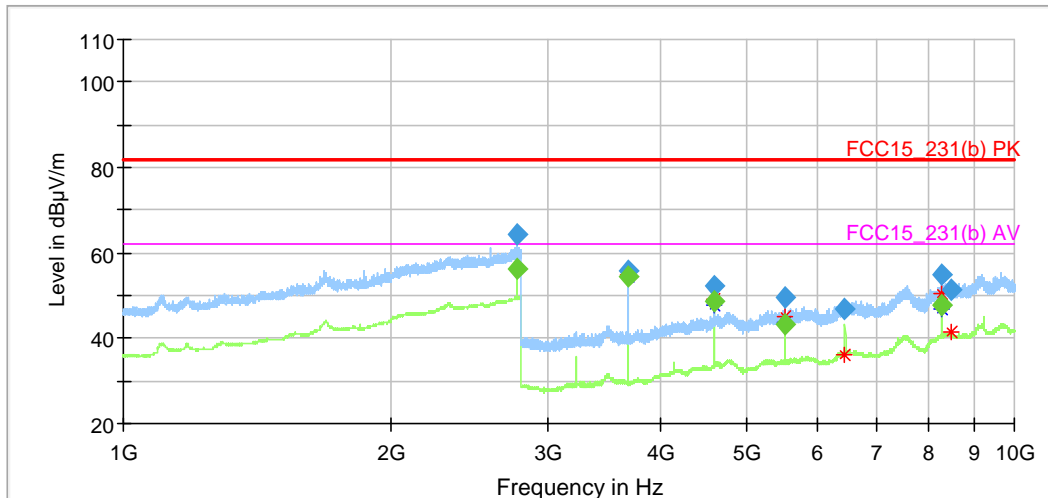
4.01_RSE_TX

Common Information

| | |
|-----------------------|---|
| Test Description: | Radiated Field Strength Emissions Emissions in 3m distance |
| Test Site: | Fully Anechoic Chamber (FAC1) - EMC32 V10.60.20 |
| Test Standard: | FCC 15.205 § 15.209 § 15.231; RSS-Gen: Issue 5; RSS-210: Issue 10 |
| Antenna polarisation: | horizontal/vertical |
| Operator: | HEI |
| Operating Mode: | Continuous TX |
| Verdict: | Passed |
| | |
| PMT number: | 21-1-01322S20_C01 |
| Power Supply: | 3 VDC |
| EUT Setup: | -- |

Full Spectrum

Full Spectrum



Final Result

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Trd Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|------------------|
| 2767.530000 | --- | 56.37 | 62.00 | 5.63 | 100.0 | 1000.000 | 155.0 | V | 47.0 | 0.0 | 32 |
| 2767.530000 | 64.21 | --- | 82.00 | 17.79 | 100.0 | 1000.000 | 155.0 | V | 40.0 | 0.0 | 32 |
| 3690.050000 | 56.01 | --- | 82.00 | 25.99 | 100.0 | 1000.000 | 155.0 | H | 139.0 | 90.0 | 33 |
| 3690.050000 | --- | 54.35 | 62.00 | 7.65 | 100.0 | 1000.000 | 155.0 | H | 141.0 | 90.0 | 33 |
| 4612.570000 | 52.14 | --- | 82.00 | 29.86 | 100.0 | 1000.000 | 155.0 | V | 36.0 | 90.0 | 35 |
| 4612.570000 | --- | 48.79 | 62.00 | 13.21 | 100.0 | 1000.000 | 155.0 | V | 36.0 | 90.0 | 35 |
| 5535.090000 | 49.51 | --- | 82.00 | 32.49 | 100.0 | 1000.000 | 155.0 | V | -4.0 | 90.0 | 36 |
| 5535.090000 | --- | 43.15 | 62.00 | 18.85 | 100.0 | 1000.000 | 155.0 | V | -4.0 | 90.0 | 36 |
| 6438.410000 | 46.71 | --- | 82.00 | 35.29 | 100.0 | 1000.000 | 155.0 | V | 101.0 | 0.0 | 38 |
| 8302.650000 | --- | 47.80 | 62.00 | 14.20 | 100.0 | 1000.000 | 155.0 | V | -4.0 | 90.0 | 40 |
| 8302.650000 | 54.79 | --- | 82.00 | 27.21 | 100.0 | 1000.000 | 155.0 | V | -5.0 | 90.0 | 40 |
| 8493.970000 | 51.30 | --- | 82.00 | 30.70 | 100.0 | 1000.000 | 155.0 | H | 70.0 | 90.0 | 40 |

1.2 Duty-cycle correcton

A duty-cycle Peak to Average correction factor applies since the transmitter is not 100% on during one complete pulse train, as long the pulse train does not exceed 100 ms. When the Pulse train exceeds 100 ms the absolute voltage during a 100 ms window where the field strength is at its maximum shall be used to determine the correction factor.

PEAK to AVARAGE calculation:

Pulse train exceeds 100 ms time periode, therefore cumulative TX_{on}-Time within a 100 ms time periode used.

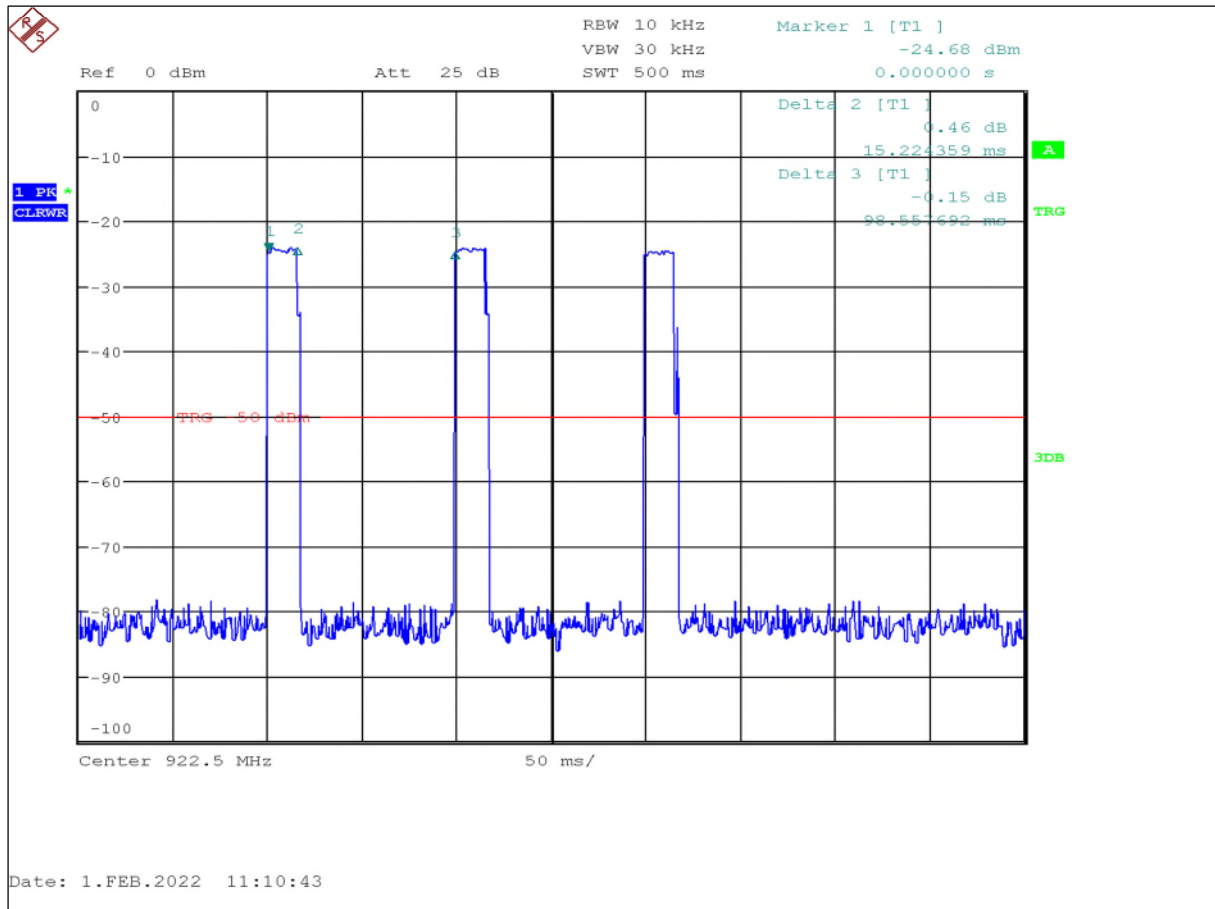
Only one pulse can be observed during a 100 ms time period.

TX_{on}(100ms) = 16.09 ms

$$\delta[dB] = 20 * \log_{10} \left(\frac{16.09ms}{100ms} \right) = 15.87dB$$

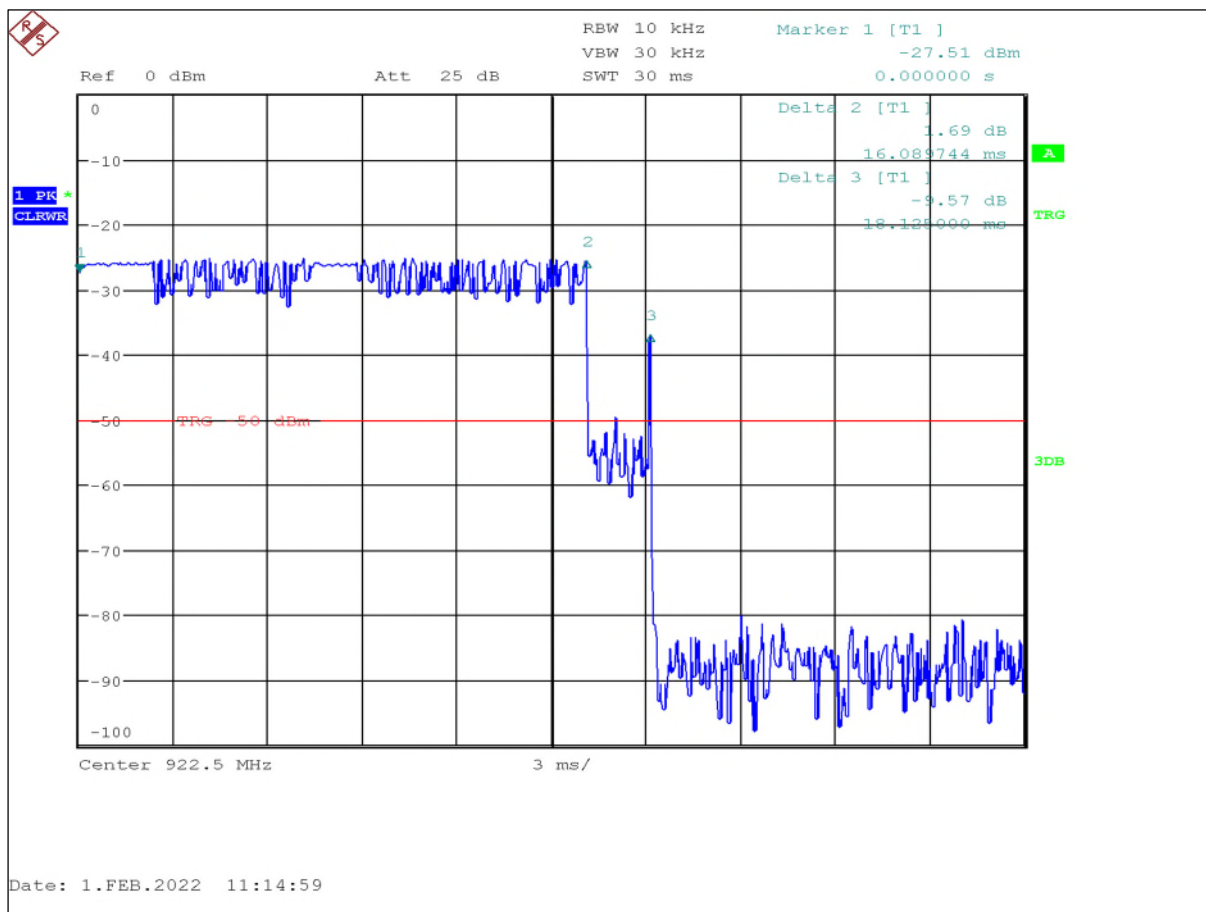
1.3 Timing parameter

D001_01_SWT500ms



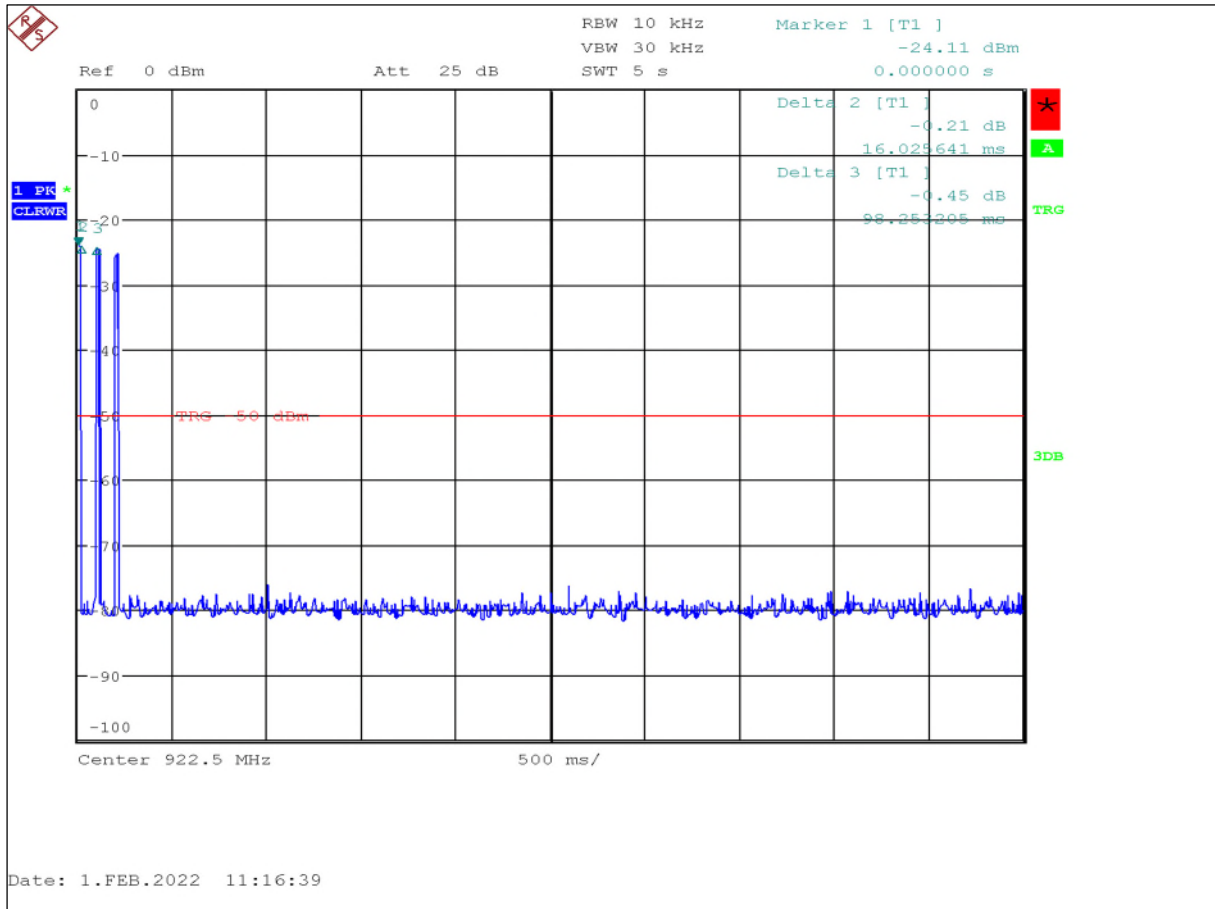
Remark: complete pulse train when activating the transmitter.

D002_01_SWT30ms



Remark: one single pulse within a pulse train.

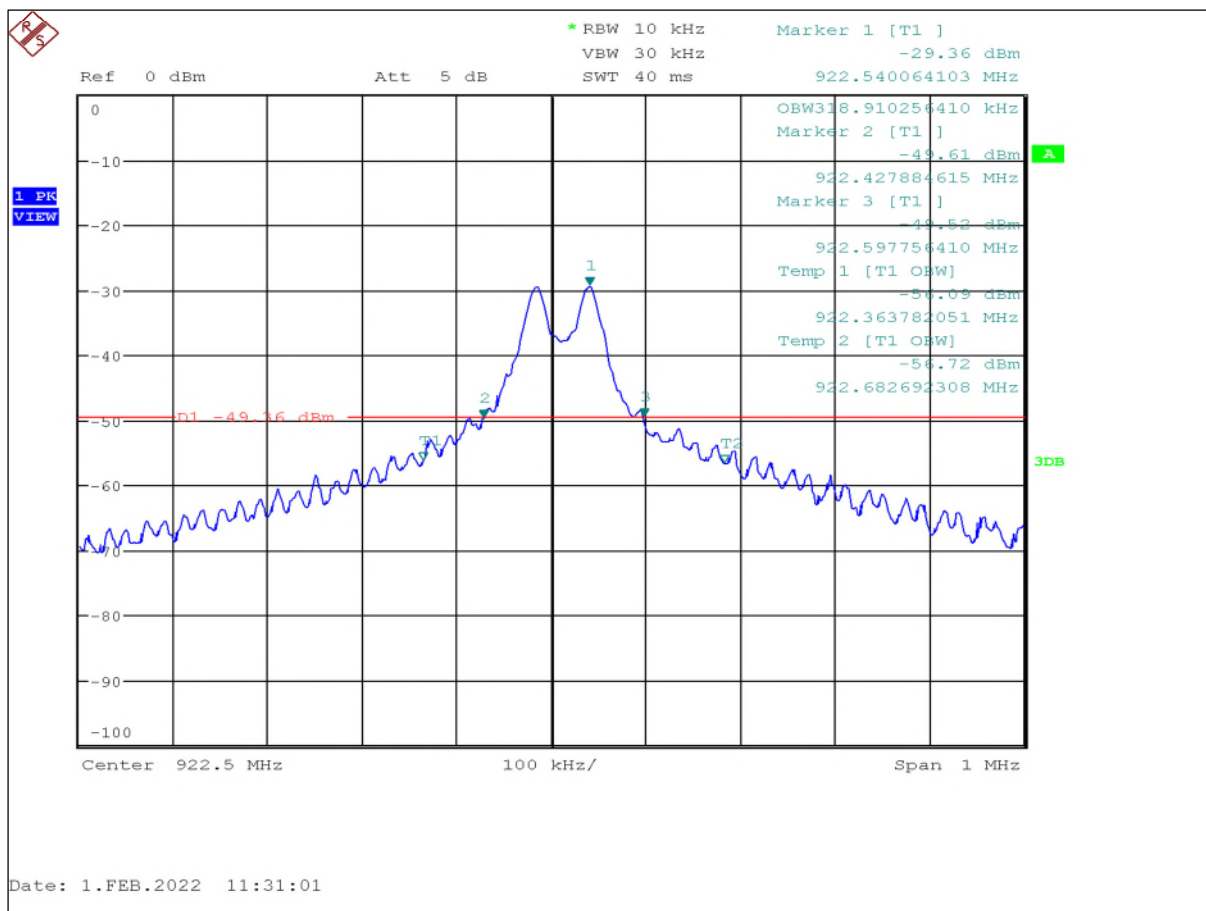
D003_01_SWT5s



Remark: transmitter deactivates after not more than 5 s after manually activating the transmitter.

1.4 Emission bandwidth

D004_01_99%OBW_20dB



Remark: the modulated bandwidth is determined at Marker 2 and Marker 3 - 20dB below the maximum level.

$$MBW = \Delta M_{23} = 169.87kHz$$

End Of Annex 1