

Test setup: 8.4 with conducted test sample 60337 (see section 5.2)

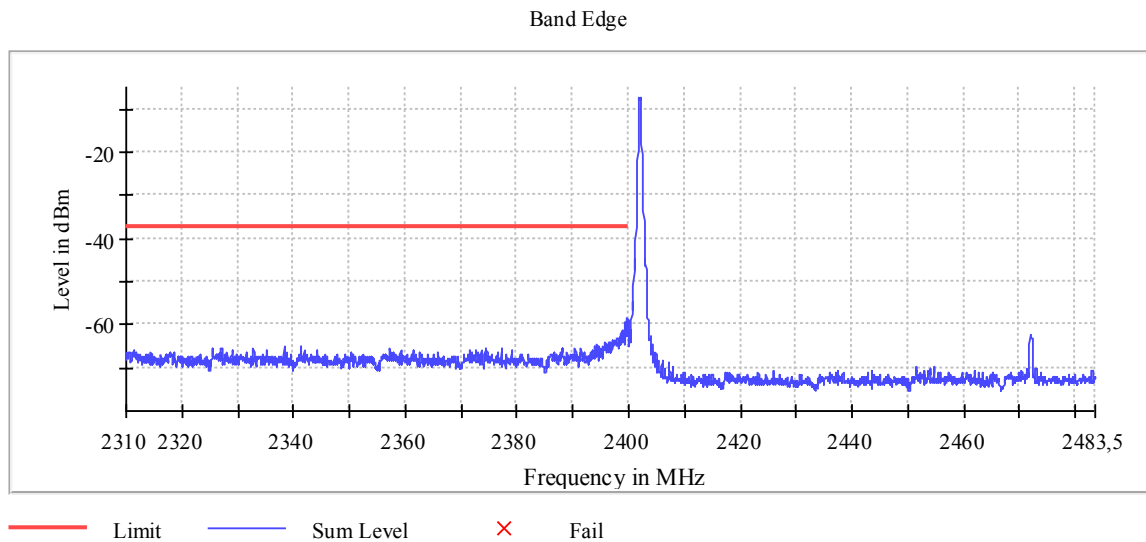
Test results

| BEC | low channel [dBc] | high channel [dBc] | Limit [dBc] |
|--------|-------------------|--------------------|-------------|
| Mode 1 | > 50 | > 55 | ≥ 20 |
| Mode 2 | > 50 | > 55 | ≥ 20 |
| Mode 3 | > 50 | > 55 | ≥ 20 |

Comment: ---

| | | |
|----------------|-----------------|-----------------------|
| Verdict | - PASS - | <i>see next plots</i> |
|----------------|-----------------|-----------------------|

Plot 61: Mode 1, BEC, low channel



Result

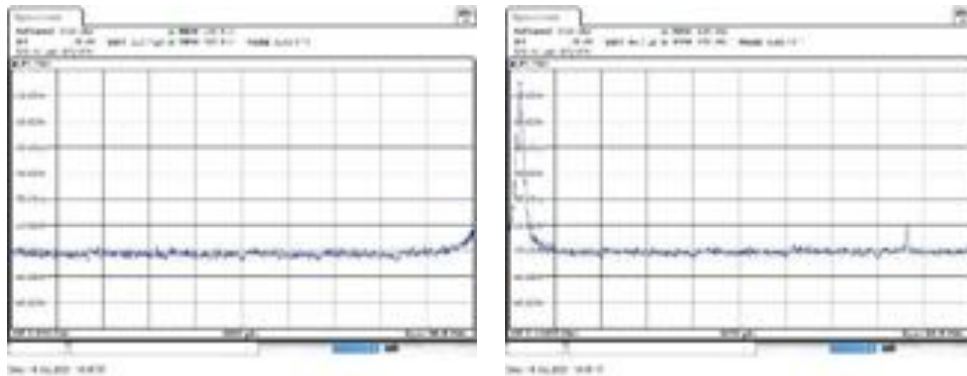
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2402.000000 | PASS |

Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2401.825000 | -7.2 |

Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2399.775000 | -58.6 | 21.5 | -37.2 | PASS |
| 2399.825000 | -58.7 | 21.5 | -37.2 | PASS |
| 2399.475000 | -59.3 | 22.1 | -37.2 | PASS |
| 2399.425000 | -59.4 | 22.3 | -37.2 | PASS |
| 2399.725000 | -59.8 | 22.7 | -37.2 | PASS |
| 2399.525000 | -60.4 | 23.2 | -37.2 | PASS |
| 2399.875000 | -60.5 | 23.3 | -37.2 | PASS |
| 2399.925000 | -60.9 | 23.8 | -37.2 | PASS |
| 2399.175000 | -61.1 | 24.0 | -37.2 | PASS |
| 2399.125000 | -61.3 | 24.1 | -37.2 | PASS |
| 2399.675000 | -61.3 | 24.2 | -37.2 | PASS |
| 2399.975000 | -61.3 | 24.2 | -37.2 | PASS |
| 2398.775000 | -61.4 | 24.2 | -37.2 | PASS |
| 2398.825000 | -61.5 | 24.3 | -37.2 | PASS |
| 2399.225000 | -61.6 | 24.4 | -37.2 | PASS |



Measurement 1

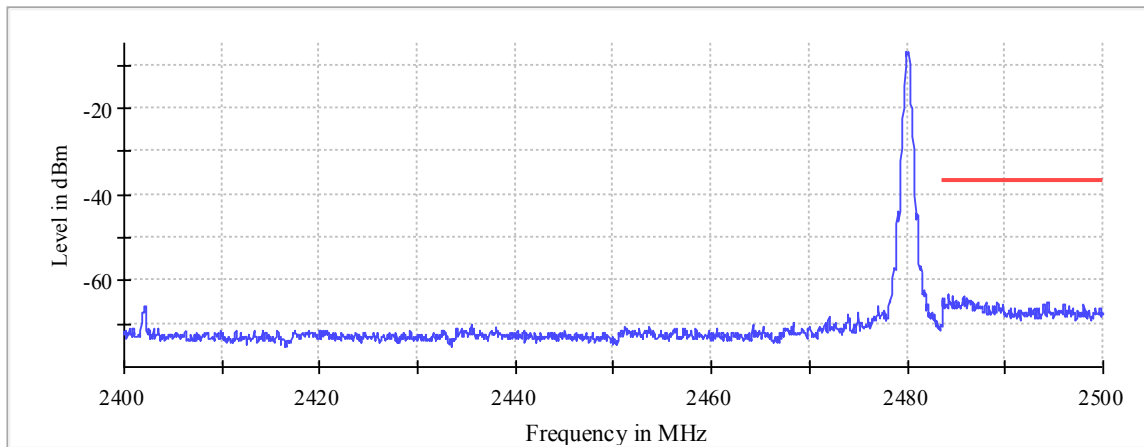
| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.31000 GHz | 2.31000 GHz |
| Stop Frequency | 2.40000 GHz | 2.40000 GHz |
| Span | 90.000 MHz | 90.000 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1800 | ~ 1800 |
| Sweeptime | 113.672 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Measurement 2

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.40000 GHz | 2.40000 GHz |
| Stop Frequency | 2.48350 GHz | 2.48350 GHz |
| Span | 83.500 MHz | 83.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1670 | ~ 1670 |
| Sweeptime | 94.727 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 8 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.02 dB | 0.50 dB |

Plot 62: Mode 1, BEC, high channel

Band Edge



— Limit — Sum Level × Fail

Result

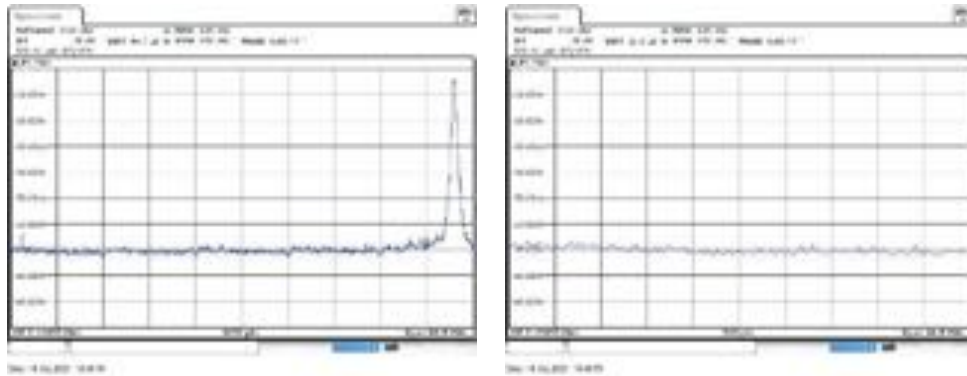
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2480.000000 | PASS |

Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2479.825000 | -6.8 |

Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2484.225000 | -63.3 | 26.5 | -36.8 | PASS |
| 2484.625000 | -63.6 | 26.7 | -36.8 | PASS |
| 2485.775000 | -63.8 | 26.9 | -36.8 | PASS |
| 2484.275000 | -63.8 | 27.0 | -36.8 | PASS |
| 2485.725000 | -63.9 | 27.1 | -36.8 | PASS |
| 2484.175000 | -63.9 | 27.1 | -36.8 | PASS |
| 2486.025000 | -64.1 | 27.3 | -36.8 | PASS |
| 2483.525000 | -64.2 | 27.4 | -36.8 | PASS |
| 2483.725000 | -64.3 | 27.5 | -36.8 | PASS |
| 2484.575000 | -64.3 | 27.5 | -36.8 | PASS |
| 2485.975000 | -64.4 | 27.6 | -36.8 | PASS |
| 2483.675000 | -64.5 | 27.6 | -36.8 | PASS |
| 2486.175000 | -64.5 | 27.7 | -36.8 | PASS |
| 2486.525000 | -64.6 | 27.7 | -36.8 | PASS |
| 2486.225000 | -64.6 | 27.8 | -36.8 | PASS |



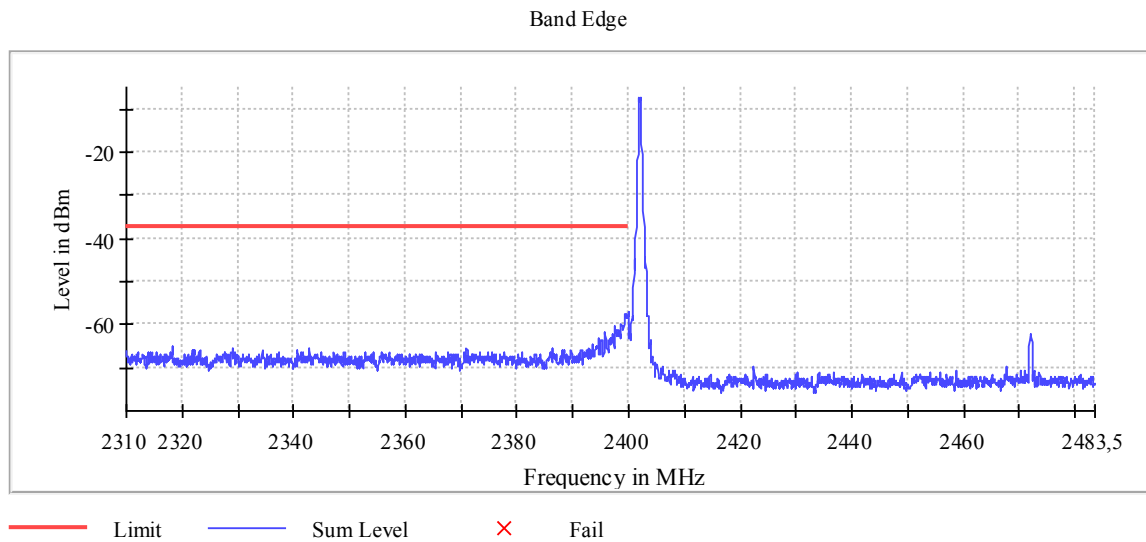
Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.40000 GHz | 2.40000 GHz |
| Stop Frequency | 2.48350 GHz | 2.48350 GHz |
| Span | 83.500 MHz | 83.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1670 | ~ 1670 |
| Sweeptime | 94.727 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 10 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Measurement 2

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.48350 GHz | 2.48350 GHz |
| Stop Frequency | 2.50000 GHz | 2.50000 GHz |
| Span | 16.500 MHz | 16.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 330 | ~ 330 |
| Sweeptime | 18.945 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 63: Mode 2, BEC, low channel



Result

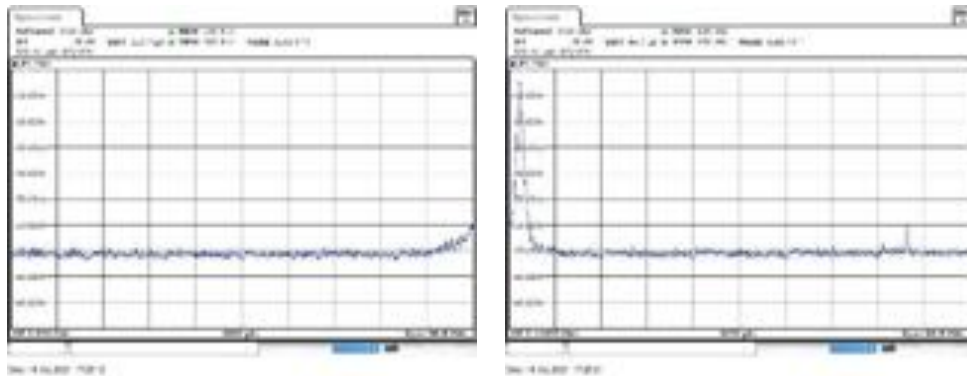
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2402.000000 | PASS |

Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2401.825000 | -7.2 |

Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2399.925000 | -56.9 | 19.7 | -37.2 | PASS |
| 2399.875000 | -57.0 | 19.8 | -37.2 | PASS |
| 2399.975000 | -57.3 | 20.1 | -37.2 | PASS |
| 2399.425000 | -57.5 | 20.3 | -37.2 | PASS |
| 2399.475000 | -57.5 | 20.4 | -37.2 | PASS |
| 2399.775000 | -57.7 | 20.6 | -37.2 | PASS |
| 2399.375000 | -57.8 | 20.7 | -37.2 | PASS |
| 2399.725000 | -57.9 | 20.7 | -37.2 | PASS |
| 2399.825000 | -58.0 | 20.8 | -37.2 | PASS |
| 2399.575000 | -58.0 | 20.8 | -37.2 | PASS |
| 2399.625000 | -58.0 | 20.8 | -37.2 | PASS |
| 2399.525000 | -58.3 | 21.1 | -37.2 | PASS |
| 2399.675000 | -58.6 | 21.5 | -37.2 | PASS |
| 2399.225000 | -58.7 | 21.5 | -37.2 | PASS |
| 2399.325000 | -58.9 | 21.7 | -37.2 | PASS |



Measurement 1

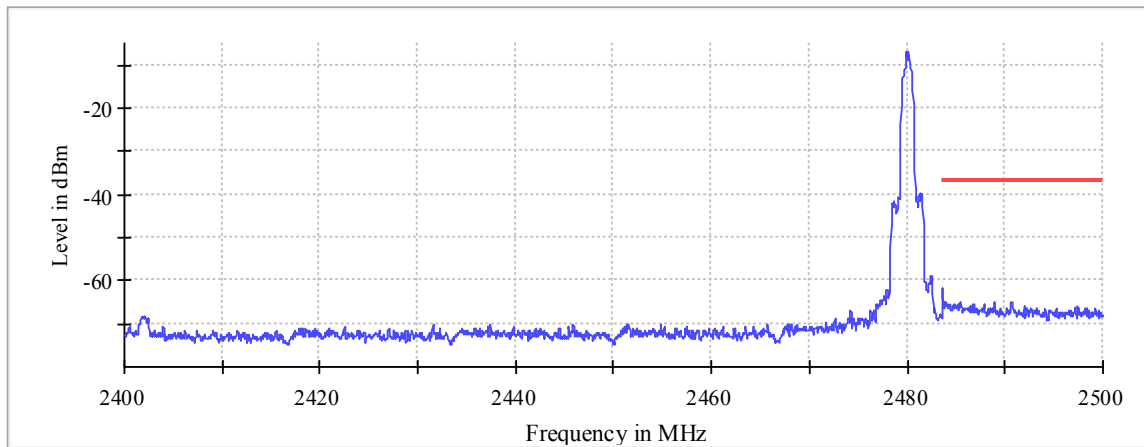
| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.31000 GHz | 2.31000 GHz |
| Stop Frequency | 2.40000 GHz | 2.40000 GHz |
| Span | 90.000 MHz | 90.000 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1800 | ~ 1800 |
| Sweeptime | 113.672 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Measurement 2

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.40000 GHz | 2.40000 GHz |
| Stop Frequency | 2.48350 GHz | 2.48350 GHz |
| Span | 83.500 MHz | 83.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1670 | ~ 1670 |
| Sweeptime | 94.727 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 64: Mode 2, BEC, high channel

Band Edge



— Limit — Sum Level × Fail

Result

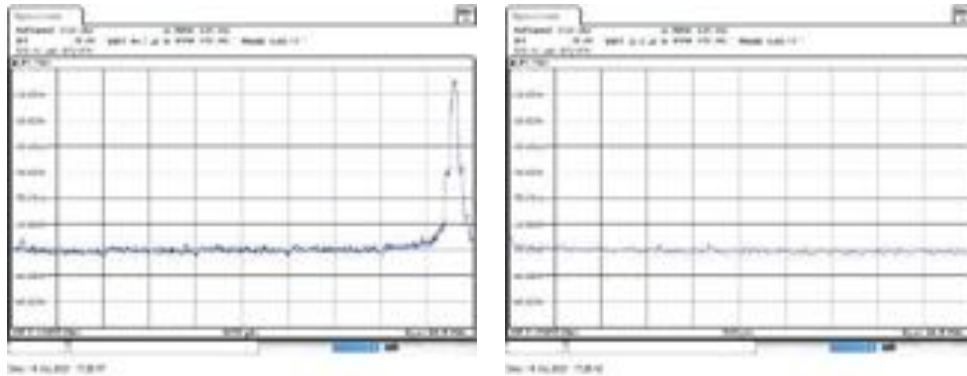
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2480.000000 | PASS |

Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2480.175000 | -6.8 |

Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2483.575000 | -61.8 | 25.0 | -36.8 | PASS |
| 2483.625000 | -61.9 | 25.1 | -36.8 | PASS |
| 2483.525000 | -62.9 | 26.1 | -36.8 | PASS |
| 2483.675000 | -63.9 | 27.0 | -36.8 | PASS |
| 2485.425000 | -64.8 | 28.0 | -36.8 | PASS |
| 2483.925000 | -64.9 | 28.1 | -36.8 | PASS |
| 2490.675000 | -64.9 | 28.1 | -36.8 | PASS |
| 2483.875000 | -65.0 | 28.1 | -36.8 | PASS |
| 2488.925000 | -65.1 | 28.2 | -36.8 | PASS |
| 2485.375000 | -65.1 | 28.3 | -36.8 | PASS |
| 2488.875000 | -65.1 | 28.3 | -36.8 | PASS |
| 2490.625000 | -65.1 | 28.3 | -36.8 | PASS |
| 2484.025000 | -65.3 | 28.5 | -36.8 | PASS |
| 2483.825000 | -65.4 | 28.6 | -36.8 | PASS |
| 2483.725000 | -65.4 | 28.6 | -36.8 | PASS |



Measurement 1

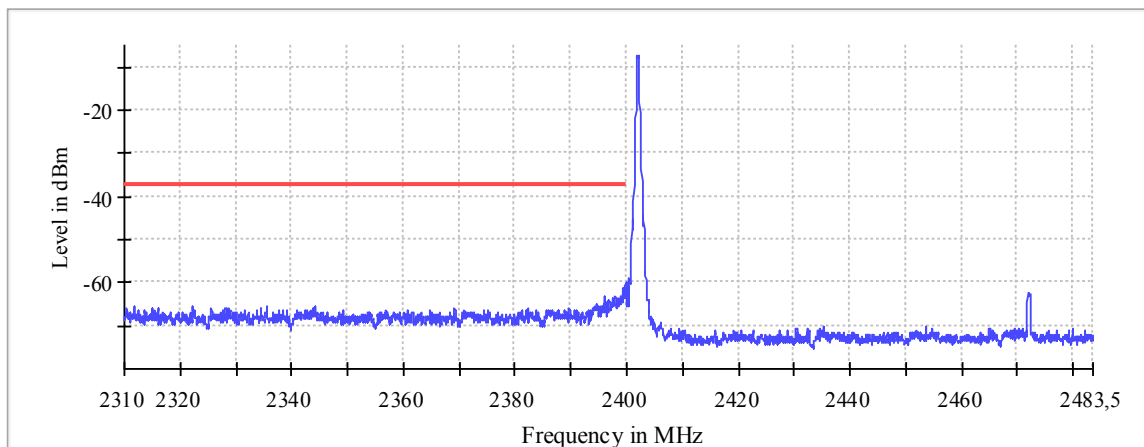
| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.40000 GHz | 2.40000 GHz |
| Stop Frequency | 2.48350 GHz | 2.48350 GHz |
| Span | 83.500 MHz | 83.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1670 | ~ 1670 |
| Sweeptime | 94.727 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 14 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Measurement 2

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.48350 GHz | 2.48350 GHz |
| Stop Frequency | 2.50000 GHz | 2.50000 GHz |
| Span | 16.500 MHz | 16.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 330 | ~ 330 |
| Sweeptime | 18.945 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 65: Mode 3, BEC, low channel

Band Edge



— Limit — Sum Level × Fail

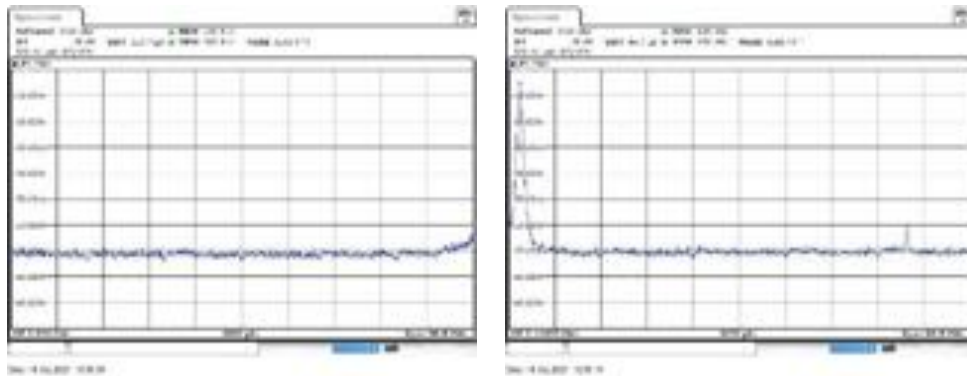
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2402.000000 | PASS |

Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2401.825000 | -7.2 |

Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2399.825000 | -59.9 | 22.7 | -37.2 | PASS |
| 2399.875000 | -60.0 | 22.8 | -37.2 | PASS |
| 2399.775000 | -60.6 | 23.5 | -37.2 | PASS |
| 2399.925000 | -60.8 | 23.6 | -37.2 | PASS |
| 2399.425000 | -61.4 | 24.2 | -37.2 | PASS |
| 2399.475000 | -61.5 | 24.3 | -37.2 | PASS |
| 2399.975000 | -61.5 | 24.3 | -37.2 | PASS |
| 2399.525000 | -61.9 | 24.8 | -37.2 | PASS |
| 2399.375000 | -62.1 | 25.0 | -37.2 | PASS |
| 2399.725000 | -62.8 | 25.6 | -37.2 | PASS |
| 2399.175000 | -62.8 | 25.7 | -37.2 | PASS |
| 2399.575000 | -62.9 | 25.7 | -37.2 | PASS |
| 2397.975000 | -63.0 | 25.9 | -37.2 | PASS |
| 2395.975000 | -63.0 | 25.9 | -37.2 | PASS |
| 2398.825000 | -63.0 | 25.9 | -37.2 | PASS |



Measurement 1

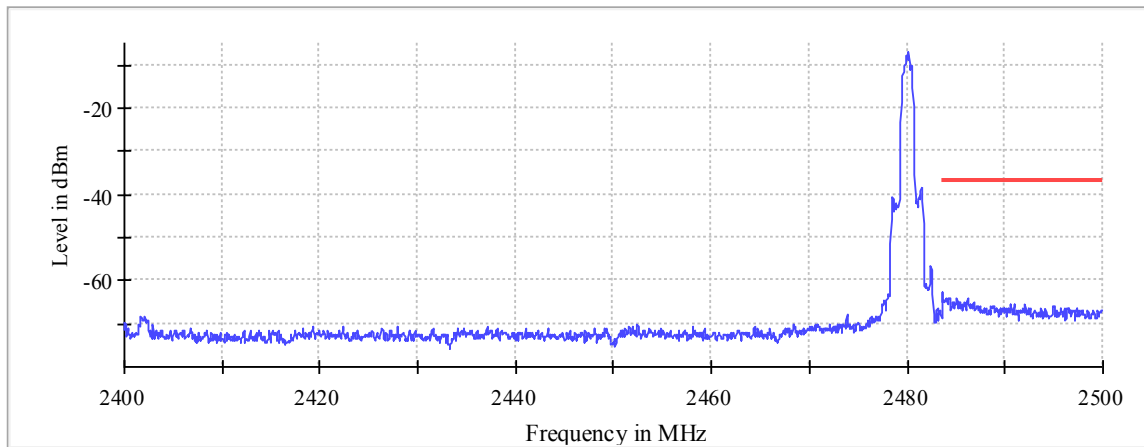
| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.31000 GHz | 2.31000 GHz |
| Stop Frequency | 2.40000 GHz | 2.40000 GHz |
| Span | 90.000 MHz | 90.000 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1800 | ~ 1800 |
| Sweeptime | 113.672 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Measurement 2

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.40000 GHz | 2.40000 GHz |
| Stop Frequency | 2.48350 GHz | 2.48350 GHz |
| Span | 83.500 MHz | 83.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1670 | ~ 1670 |
| Sweeptime | 94.727 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 8 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.05 dB | 0.50 dB |

Plot 66: Mode 3, BEC, high channel

Band Edge



— Limit — Sum Level × Fail

Result

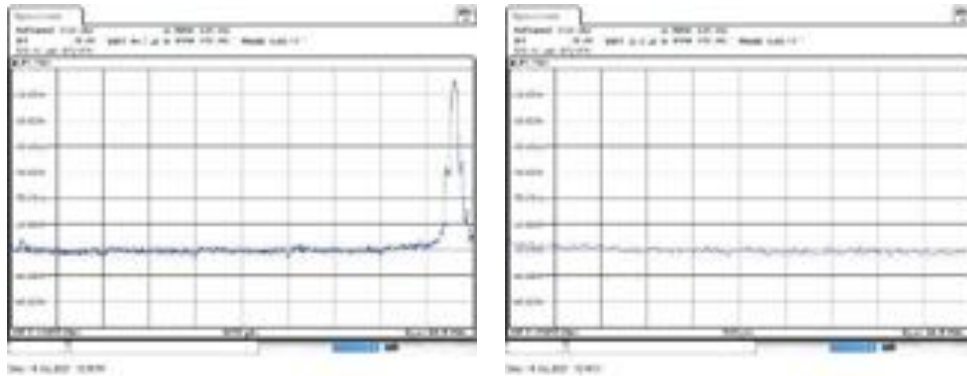
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2480.000000 | PASS |

Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2480.175000 | -6.8 |

Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2483.525000 | -62.9 | 26.0 | -36.8 | PASS |
| 2483.575000 | -62.9 | 26.1 | -36.8 | PASS |
| 2484.325000 | -63.8 | 27.0 | -36.8 | PASS |
| 2483.625000 | -63.9 | 27.1 | -36.8 | PASS |
| 2484.275000 | -63.9 | 27.1 | -36.8 | PASS |
| 2486.175000 | -64.0 | 27.1 | -36.8 | PASS |
| 2485.075000 | -64.1 | 27.3 | -36.8 | PASS |
| 2486.225000 | -64.1 | 27.3 | -36.8 | PASS |
| 2483.925000 | -64.2 | 27.4 | -36.8 | PASS |
| 2483.975000 | -64.3 | 27.4 | -36.8 | PASS |
| 2484.075000 | -64.4 | 27.5 | -36.8 | PASS |
| 2484.225000 | -64.5 | 27.7 | -36.8 | PASS |
| 2483.725000 | -64.5 | 27.7 | -36.8 | PASS |
| 2483.775000 | -64.6 | 27.7 | -36.8 | PASS |
| 2485.025000 | -64.7 | 27.9 | -36.8 | PASS |



Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.40000 GHz | 2.40000 GHz |
| Stop Frequency | 2.48350 GHz | 2.48350 GHz |
| Span | 83.500 MHz | 83.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 1670 | ~ 1670 |
| Sweeptime | 94.727 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| SweepType | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 10 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.01 dB | 0.50 dB |

Measurement 2

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| Start Frequency | 2.48350 GHz | 2.48350 GHz |
| Stop Frequency | 2.50000 GHz | 2.50000 GHz |
| Span | 16.500 MHz | 16.500 MHz |
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 330 | ~ 330 |
| Sweeptime | 18.945 µs | AUTO |
| Reference Level | 0.000 dBm | 0.000 dBm |
| Attenuation | 20.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 100 | 100 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| SweepType | FFT | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 150 | max. 150 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

7.9 Band Edge Compliance (BEC), radiated

Applicability
This requirement applies to all types of FHS equipment operating in the 2400 – 2483.5 MHz band.

Description
Emissions within a restricted band and within 2 MHz of an authorized band edge may be measured using either the marker-delta method (ANSI C63.10, 6.10.6) or the integration method (ANSI C63.20, 11.13.3), provided that the DTS bandwidth (or EBW) edge falls within 2 MHz of the band edge. Otherwise, all unwanted emissions measurements shall be performed using the standard methods.

Limits
§15.247
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test procedure
The marker-delta method as described in ANSI C63.10, 6.10.6 or the integration method as described in ANSI C63.10, 11.13.3 can be used to perform measurements of the unwanted emissions level at the band edges.

Test setup: 8.2 with radiated sample 61314 (see 5.2)

| BEC | low channel AVG / Peak [dµV/m @3m] | high channel AVG / Peak [dµV/m @3m] | Limit AVG / Peak [dµV/m @3m] |
|--------|--|---|------------------------------------|
| Mode 3 | ≤ 40 AVG / ≤ 55 PK | ≤ 40 AVG / ≤ 55 PK | ≤ 54 AVG / ≤ 74 PK |

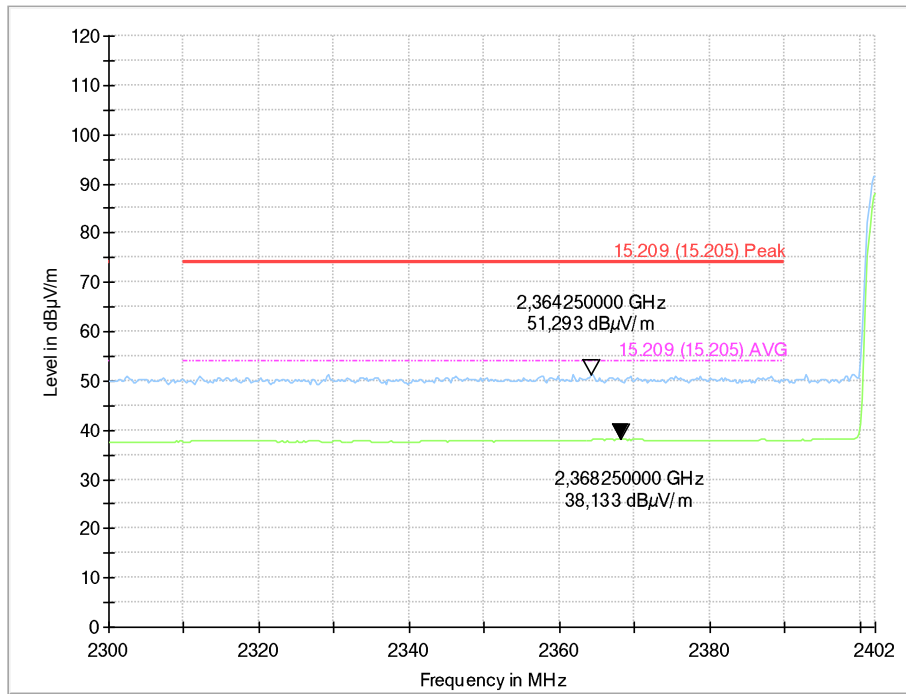
Comment: ---

| | | |
|----------------|-----------------|------------------------|
| Verdict | - PASS - | <i>see next plots*</i> |
|----------------|-----------------|------------------------|

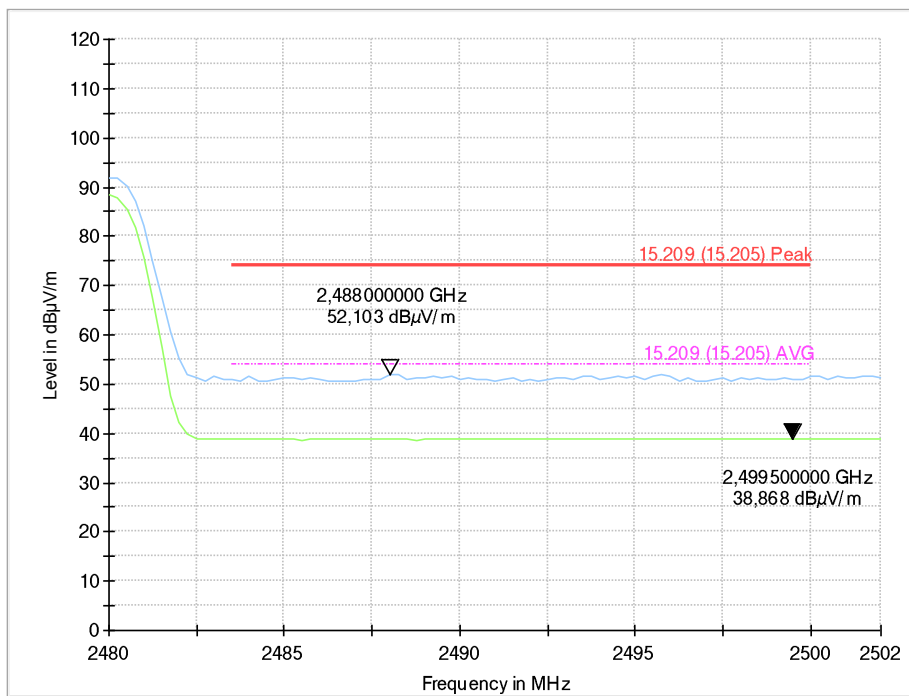
* description of traces for radiated Bend Edge Compliance (BEC) measurements:

- positive Peak (Max Hold) trace
- average Peak (Max Hold) trace

Plot 67: Mode 3, BEC, low channel, 2402 MHz



Plot 68: Mode 3, BEC, high channel, 2480 MHz



7.10 Conducted Spurious Emissions (CSE)

Applicability

This requirement applies to all types of FHS equipment operating in the 2400 – 2483.5 MHz band.

Description

Spurious emission / unwanted emissions are emission on a frequency or frequencies which are outside the authorized band and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products.

Limits

§15.247

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in §15.209(a) is not required.

Test procedure

ANSI C63.10, 11.11

Reference level measurement:

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
 - b) Set the span to ≥ 1.5 times the DTS bandwidth.
 - c) Set the RBW = 100 kHz.
 - d) Set the VBW $\geq [3 \times \text{RBW}]$.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum PSD level.
- Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Emission level measurement:

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq [3 \times \text{RBW}]$.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements as specified (≥ 20 dBc).

The marker-delta method, as described in ANSI C63.10, 6.10.6 can be used to perform measurements of the radiated unwanted emissions level at the band-edges provided that the 99 % OBW of the fundamental emission is within 2 MHz of the authorized band edge.

Test setup: 8.4 with conducted sample 60337 (see 5.2)

Test results

| EUT Mode / Channel | Frequency [MHz] | Peak/RMS Detector | Level [dBm] | Limit [dBm] | Verdict |
|--------------------|-----------------|-------------------|--------------|-------------|------------|
| Mode 1 | (see plots) | MaxPeak | (see plots)* | (see plots) | - passed - |
| Mode 2 | (see plots) | MaxPeak | (see plots)* | (see plots) | - passed - |
| Mode 3 | (see plots) | MaxPeak | (see plots)* | (see plots) | - passed - |

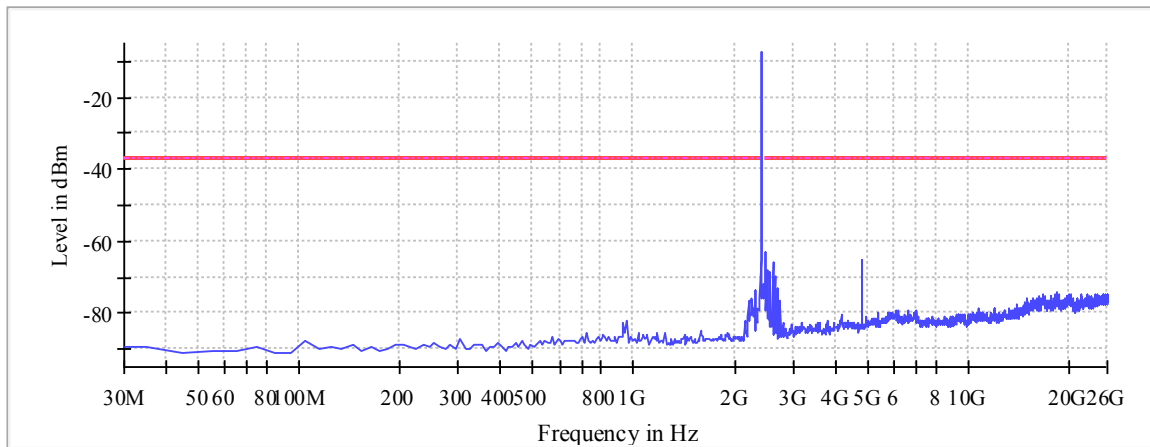
* all detected peaks are more than 6 dB below the limit

| | |
|-----------------|-----|
| Comment: | --- |
|-----------------|-----|

| | | |
|----------------|-----------------|-----------------------|
| Verdict | - PASS - | <i>see next plots</i> |
|----------------|-----------------|-----------------------|

Plot 69: Mode 1, CSE, low channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2402.000000 | PASS |

Final measurements

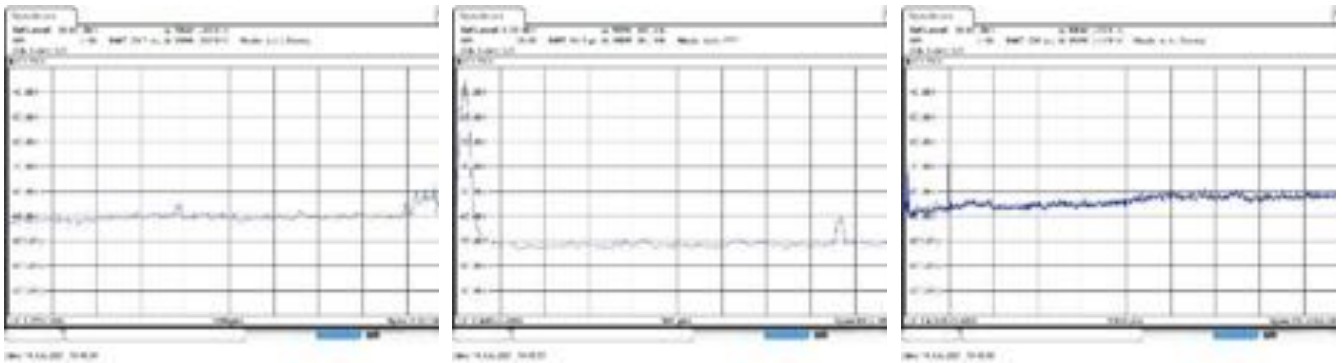
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2395.021008 | -65.0 | 27.9 | -37.2 |
| 4807.166065 | -65.3 | 28.1 | -37.2 |
| 2598.434020 | -65.7 | 28.6 | -37.2 |
| 2498.491394 | -68.0 | 30.9 | -37.2 |
| 2548.462707 | -68.3 | 31.1 | -37.2 |
| 2638.411071 | -69.7 | 32.6 | -37.2 |
| 2688.382384 | -73.3 | 36.1 | -37.2 |
| 2305.399160 | -73.9 | 36.7 | -37.2 |
| 18369.380472 | -73.9 | 36.8 | -37.2 |
| 25185.467595 | -74.5 | 37.3 | -37.2 |
| 20378.227263 | -74.5 | 37.3 | -37.2 |
| 22497.010943 | -74.5 | 37.3 | -37.2 |
| 25875.071717 | -74.7 | 37.5 | -37.2 |
| 20038.422333 | -74.7 | 37.5 | -37.2 |
| 25605.226626 | -74.8 | 37.6 | -37.2 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

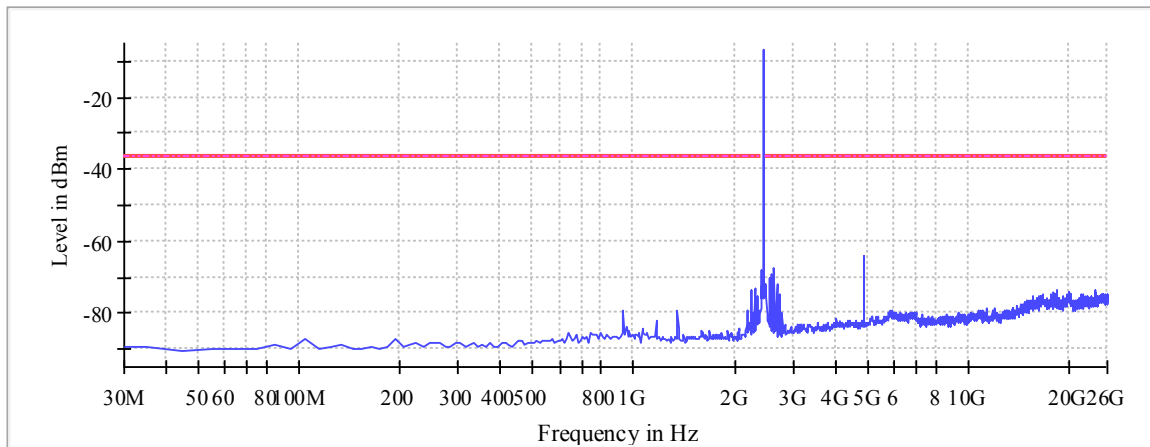


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|--------------------|
| RBW | 100.000 kHz | ≤ 100.000 kHz |
| VBW | 300.000 kHz | ≥ 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| Sweeptime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 70: Mode 1, CSE, mid channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2441.000000 | PASS |

Final measurements

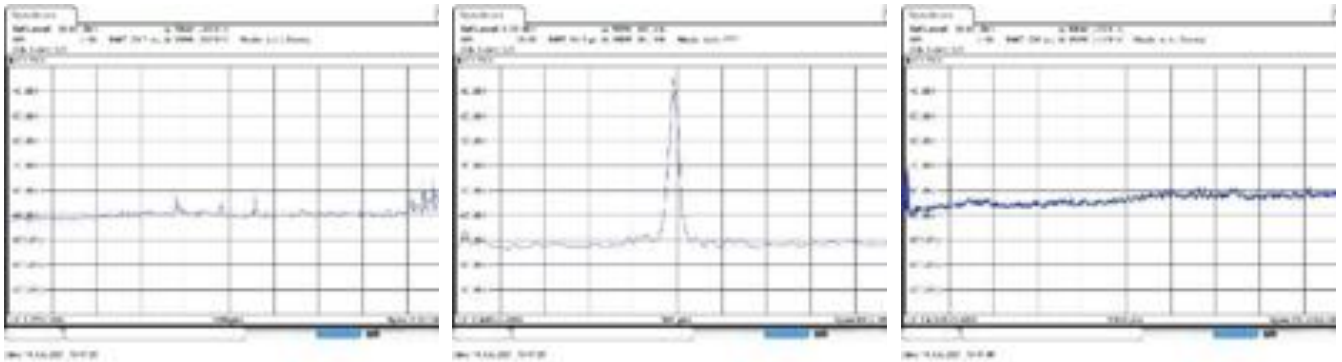
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4877.125903 | -63.9 | 27.3 | -36.7 |
| 4887.120166 | -64.7 | 28.1 | -36.7 |
| 2628.416808 | -67.4 | 30.8 | -36.7 |
| 2588.439758 | -69.0 | 32.3 | -36.7 |
| 2538.468445 | -70.0 | 33.3 | -36.7 |
| 2678.388122 | -71.7 | 35.1 | -36.7 |
| 2295.441176 | -72.9 | 36.2 | -36.7 |
| 2245.651261 | -73.4 | 36.8 | -36.7 |
| 23936.184764 | -73.7 | 37.0 | -36.7 |
| 2488.497131 | -73.7 | 37.1 | -36.7 |
| 18349.391946 | -73.9 | 37.2 | -36.7 |
| 18019.581279 | -74.0 | 37.3 | -36.7 |
| 23886.213451 | -74.2 | 37.5 | -36.7 |
| 19868.519868 | -74.4 | 37.7 | -36.7 |
| 20038.422333 | -74.4 | 37.7 | -36.7 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

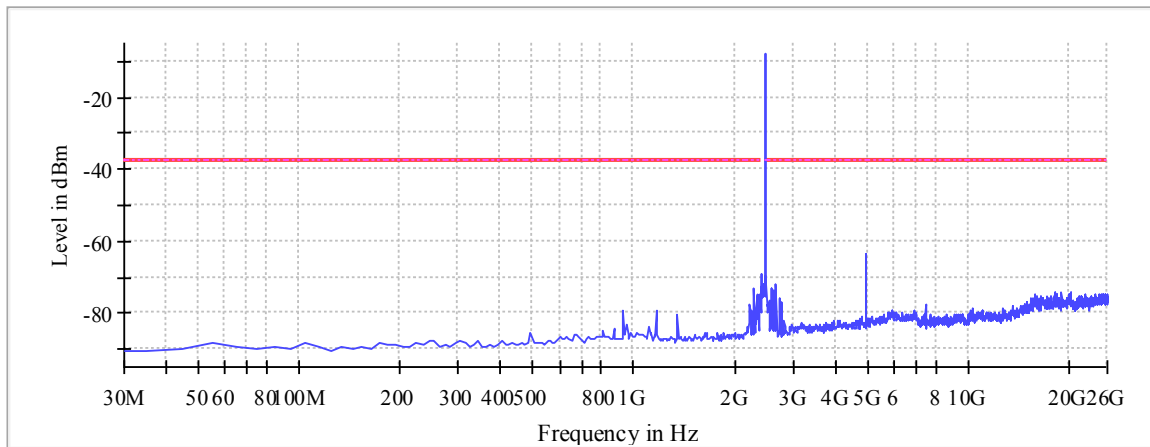


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| Sweeptime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 10 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 71: Mode 1, CSE, high channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2480.000000 | PASS |

Final measurements

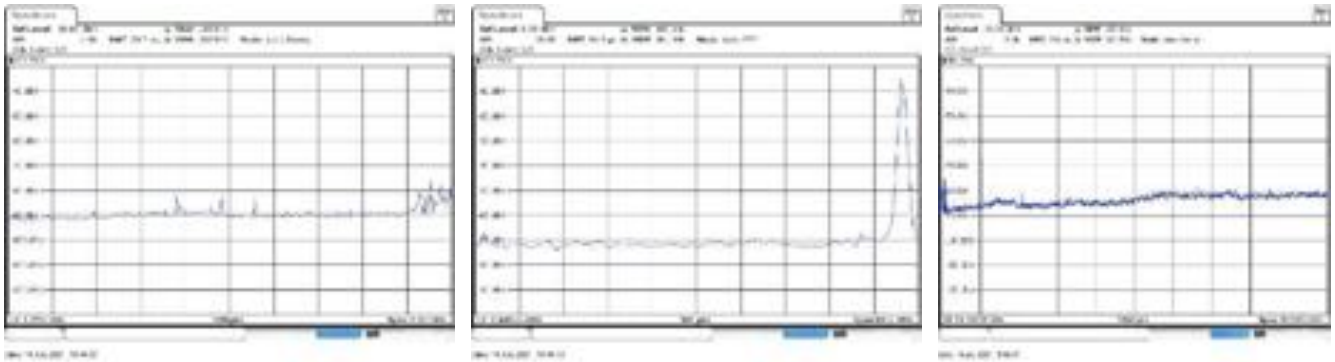
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4957.080004 | -63.3 | 25.7 | -37.5 |
| 2488.497131 | -69.5 | 31.9 | -37.5 |
| 2668.393859 | -72.1 | 34.6 | -37.5 |
| 2285.483193 | -72.9 | 35.3 | -37.5 |
| 2578.445495 | -73.3 | 35.8 | -37.5 |
| 2628.416808 | -73.5 | 35.9 | -37.5 |
| 20388.221526 | -74.2 | 36.7 | -37.5 |
| 18049.564067 | -74.3 | 36.8 | -37.5 |
| 19038.996069 | -74.4 | 36.8 | -37.5 |
| 18029.575542 | -74.5 | 37.0 | -37.5 |
| 22457.033893 | -74.5 | 37.0 | -37.5 |
| 25195.461857 | -74.5 | 37.0 | -37.5 |
| 2335.273109 | -74.6 | 37.0 | -37.5 |
| 25885.065980 | -74.6 | 37.1 | -37.5 |
| 25615.220888 | -74.8 | 37.2 | -37.5 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

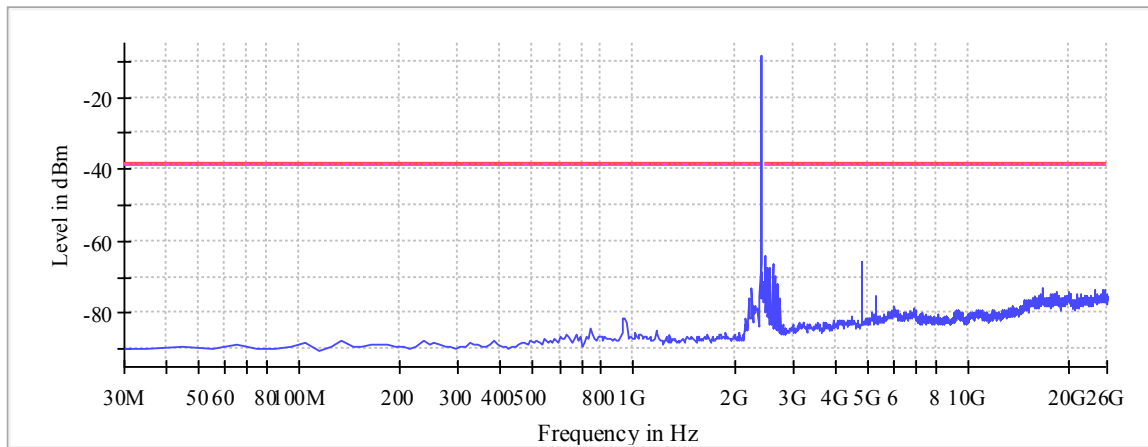


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| Sweeptime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 11 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 72: Mode 2, CSE, low channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2402.000000 | PASS |

Final measurements

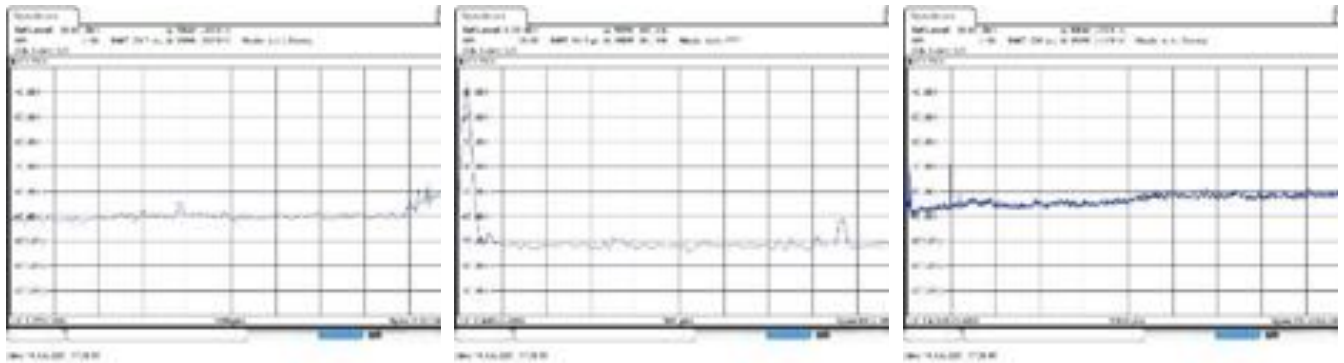
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4807.166065 | -65.8 | 27.1 | -38.6 |
| 2598.434020 | -66.3 | 27.7 | -38.6 |
| 2395.021008 | -66.4 | 27.8 | -38.6 |
| 2548.462707 | -67.2 | 28.5 | -38.6 |
| 2498.491394 | -67.5 | 28.8 | -38.6 |
| 2638.411071 | -69.6 | 30.9 | -38.6 |
| 2688.382384 | -71.8 | 33.1 | -38.6 |
| 2255.609244 | -73.3 | 34.7 | -38.6 |
| 16650.367297 | -73.3 | 34.7 | -38.6 |
| 23786.270824 | -73.7 | 35.0 | -38.6 |
| 25545.261050 | -73.7 | 35.0 | -38.6 |
| 25365.364322 | -73.9 | 35.2 | -38.6 |
| 20068.405121 | -74.0 | 35.3 | -38.6 |
| 25355.370059 | -74.0 | 35.4 | -38.6 |
| 25495.289737 | -74.0 | 35.4 | -38.6 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

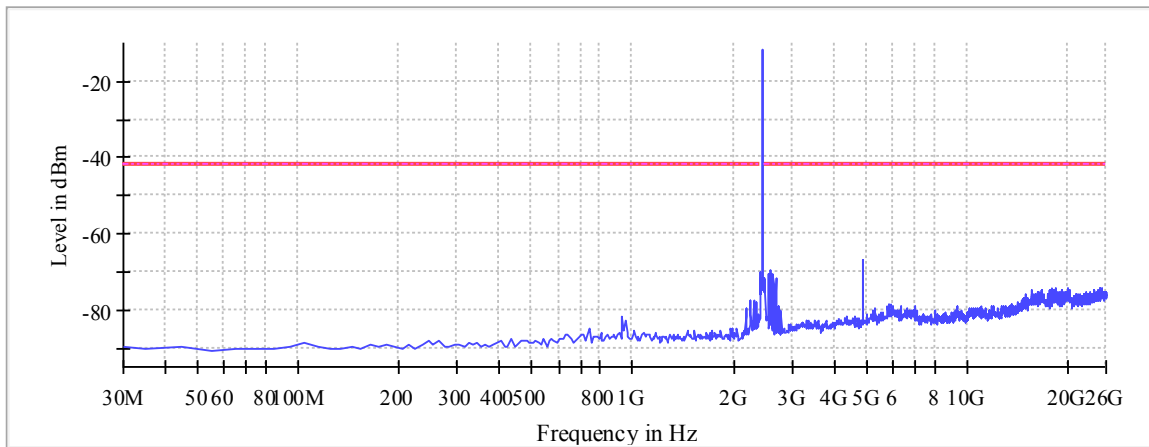


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|--------------------|
| RBW | 100.000 kHz | ≤ 100.000 kHz |
| VBW | 300.000 kHz | ≥ 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| Sweeptime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 7 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 73: Mode 2, CSE, mid channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2441.000000 | PASS |

Final measurements

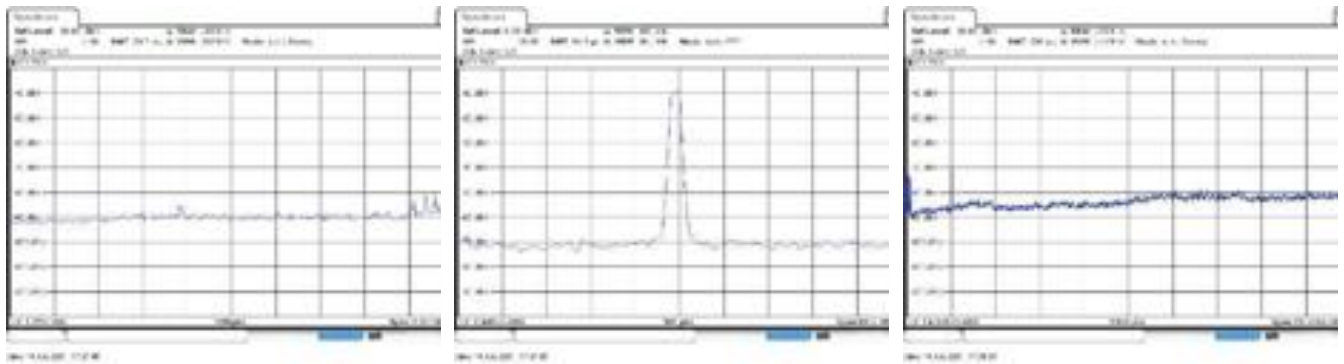
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4877.125903 | -66.8 | 25.1 | -41.7 |
| 4887.120166 | -67.6 | 25.9 | -41.7 |
| 2588.439758 | -69.7 | 28.0 | -41.7 |
| 2538.468445 | -70.5 | 28.8 | -41.7 |
| 2628.416808 | -70.7 | 29.0 | -41.7 |
| 2678.388122 | -71.4 | 29.8 | -41.7 |
| 2488.497131 | -72.9 | 31.2 | -41.7 |
| 2638.411071 | -74.0 | 32.3 | -41.7 |
| 18389.368997 | -74.1 | 32.5 | -41.7 |
| 25385.352847 | -74.2 | 32.6 | -41.7 |
| 20098.387909 | -74.3 | 32.6 | -41.7 |
| 24875.645453 | -74.3 | 32.6 | -41.7 |
| 24935.611028 | -74.3 | 32.7 | -41.7 |
| 18019.581279 | -74.4 | 32.7 | -41.7 |
| 23846.236400 | -74.6 | 33.0 | -41.7 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

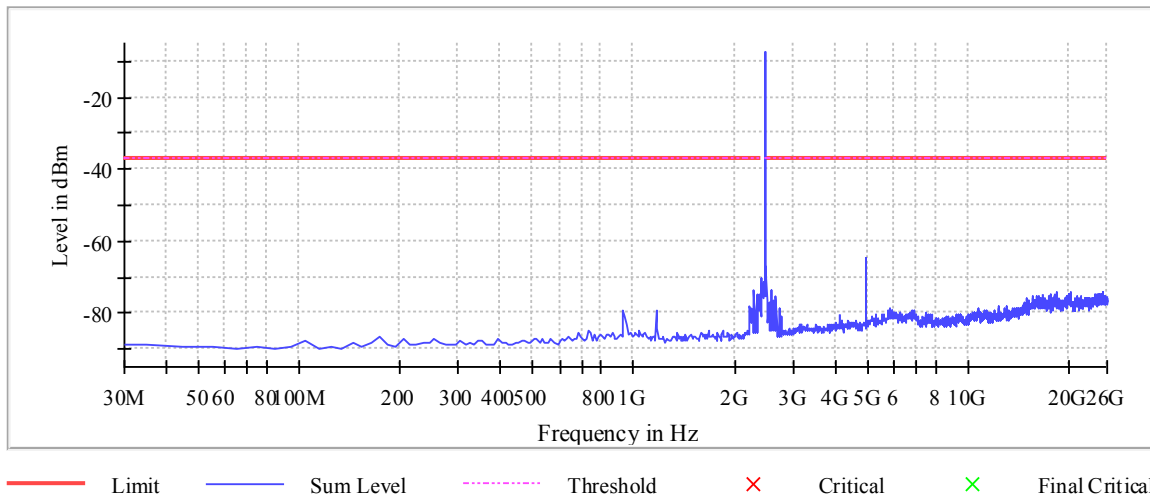


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| Sweeptime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 5 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 74: Mode 2, CSE, high channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2480.000000 | PASS |

Final measurements

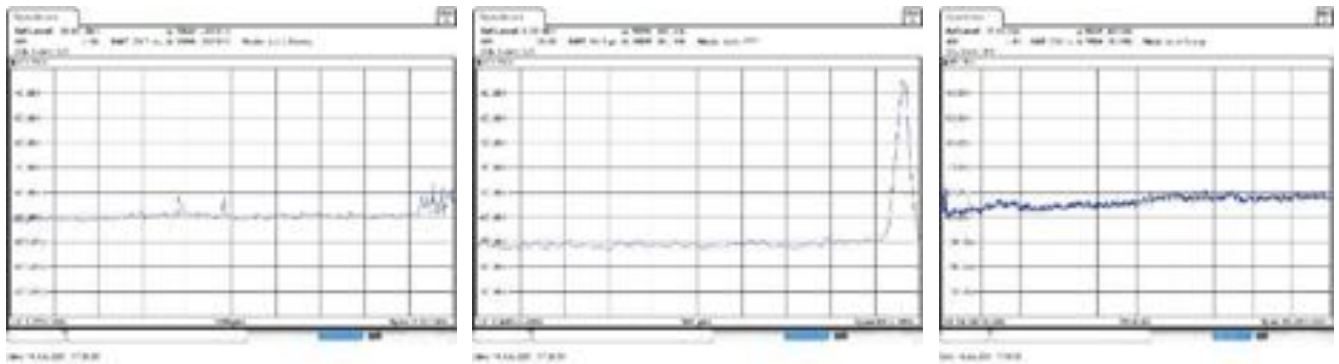
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4957.080004 | -64.5 | 27.5 | -37.0 |
| 2488.497131 | -66.7 | 29.7 | -37.0 |
| 2578.445495 | -73.6 | 36.6 | -37.0 |
| 2285.483193 | -73.7 | 36.7 | -37.0 |
| 25455.312686 | -74.0 | 37.0 | -37.0 |
| 18359.386209 | -74.2 | 37.2 | -37.0 |
| 20348.244475 | -74.3 | 37.2 | -37.0 |
| 25345.375797 | -74.4 | 37.4 | -37.0 |
| 20008.439545 | -74.5 | 37.5 | -37.0 |
| 18409.357522 | -74.5 | 37.5 | -37.0 |
| 20048.416596 | -74.5 | 37.5 | -37.0 |
| 24006.144603 | -74.6 | 37.6 | -37.0 |
| 18459.328836 | -74.6 | 37.6 | -37.0 |
| 24515.851997 | -74.6 | 37.6 | -37.0 |
| 23996.150340 | -74.7 | 37.7 | -37.0 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

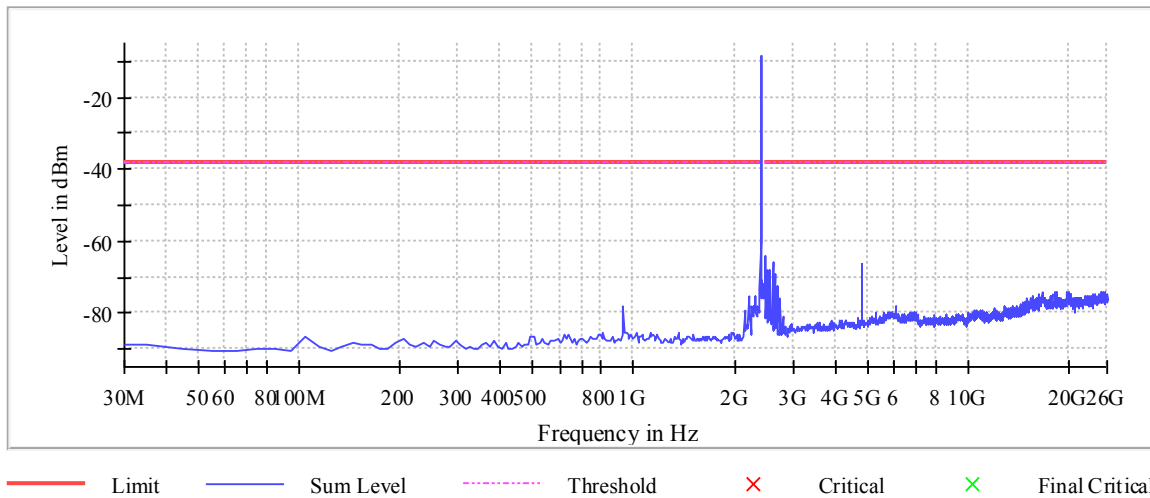


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| Sweeptime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 17 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 75: Mode 3, CSE, low channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2402.000000 | PASS |

Final measurements

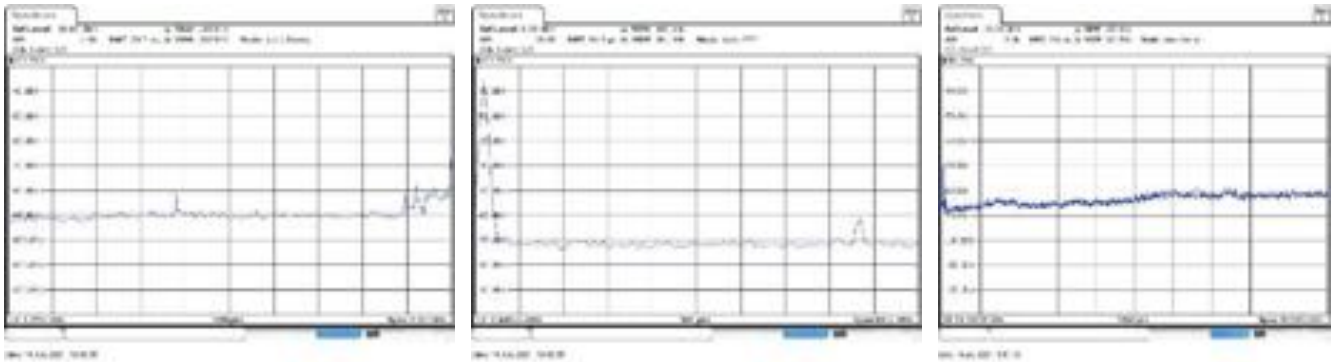
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2395.021008 | -60.1 | 21.9 | -38.2 |
| 2598.434020 | -66.0 | 27.8 | -38.2 |
| 4807.166065 | -66.4 | 28.2 | -38.2 |
| 2548.462707 | -67.8 | 29.6 | -38.2 |
| 2498.491394 | -68.1 | 29.9 | -38.2 |
| 2638.411071 | -69.2 | 31.0 | -38.2 |
| 2688.382384 | -72.7 | 34.5 | -38.2 |
| 2385.063025 | -72.9 | 34.7 | -38.2 |
| 25285.410221 | -74.2 | 36.0 | -38.2 |
| 18039.569805 | -74.3 | 36.1 | -38.2 |
| 24955.599554 | -74.3 | 36.1 | -38.2 |
| 19748.588717 | -74.4 | 36.2 | -38.2 |
| 25585.238100 | -74.4 | 36.2 | -38.2 |
| 20018.433808 | -74.4 | 36.2 | -38.2 |
| 16590.401721 | -74.4 | 36.2 | -38.2 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

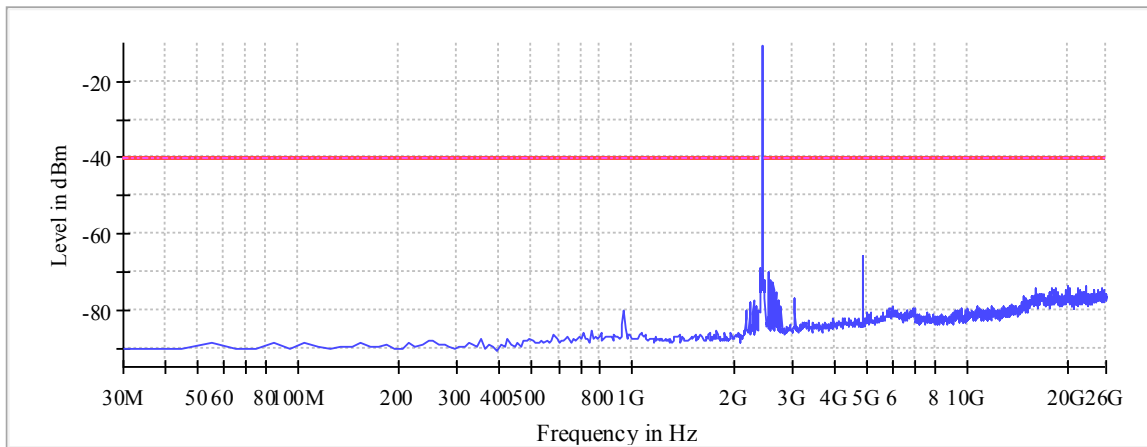


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| Sweeptime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 6 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 76: Mode 3, CSE, mid channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2441.000000 | PASS |

Final measurements

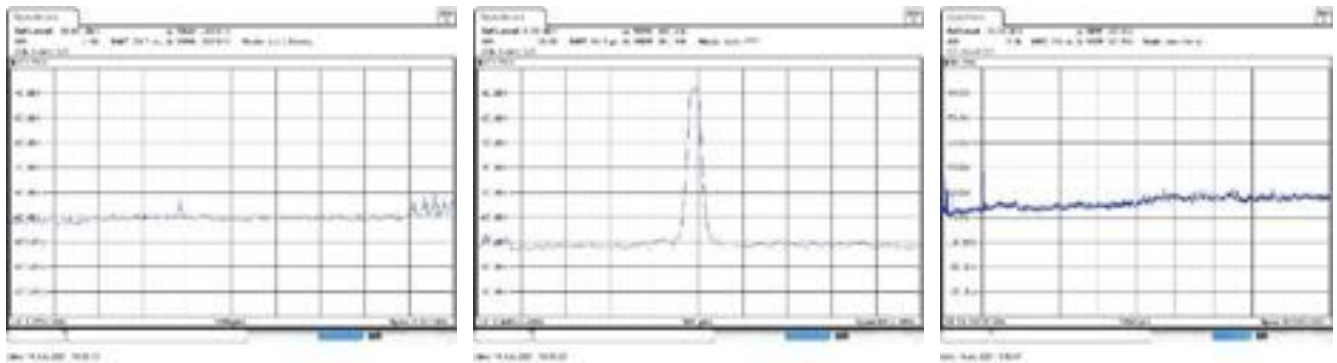
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4877.125903 | -65.7 | 25.4 | -40.3 |
| 4887.120166 | -68.1 | 27.8 | -40.3 |
| 2538.468445 | -70.2 | 30.0 | -40.3 |
| 2588.439758 | -72.3 | 32.1 | -40.3 |
| 2628.416808 | -72.8 | 32.5 | -40.3 |
| 22507.005206 | -73.8 | 33.5 | -40.3 |
| 20008.439545 | -73.9 | 33.6 | -40.3 |
| 15940.774649 | -74.1 | 33.9 | -40.3 |
| 25335.381534 | -74.2 | 33.9 | -40.3 |
| 18369.380472 | -74.3 | 34.0 | -40.3 |
| 20278.284637 | -74.3 | 34.0 | -40.3 |
| 21457.607629 | -74.5 | 34.2 | -40.3 |
| 18009.587017 | -74.5 | 34.3 | -40.3 |
| 23906.201976 | -74.6 | 34.3 | -40.3 |
| 18019.581279 | -74.6 | 34.4 | -40.3 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |

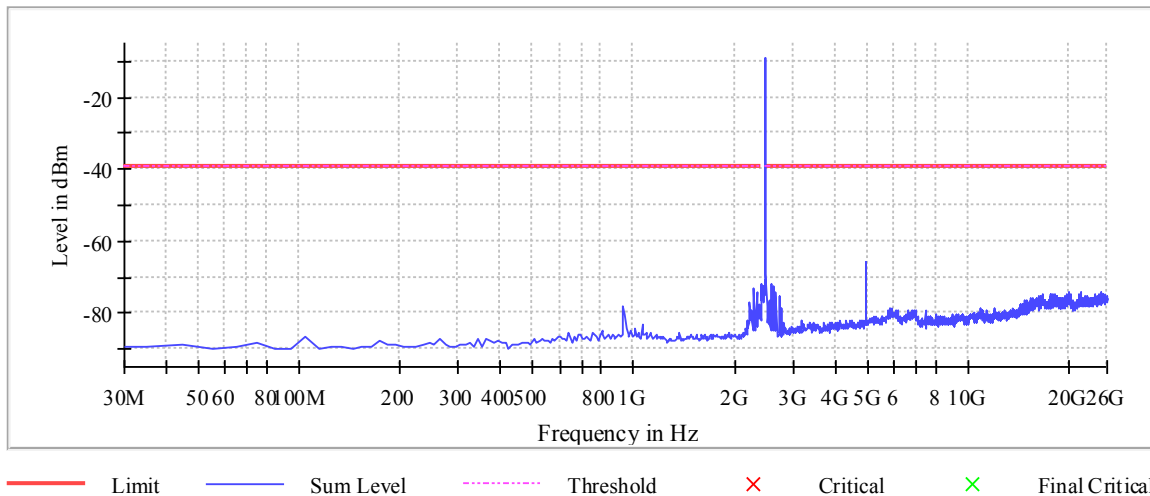


Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| SweepTime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 4 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

Plot 77: Mode 3, CSE, high channel

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Result

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2480.000000 | PASS |

Final measurements

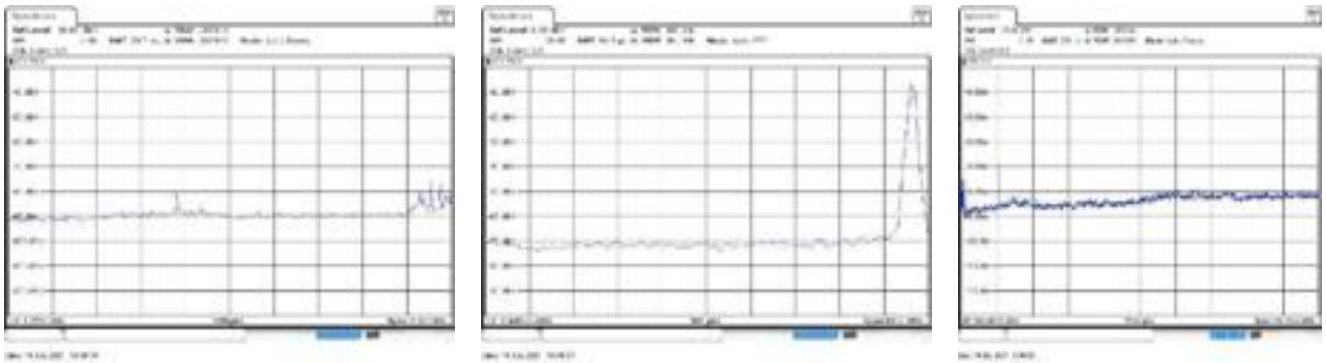
| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-----------------------------|-------------|-------------|-------------|--------|
| --- | --- | --- | --- | --- | --- |

Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4957.080004 | -65.5 | 26.5 | -39.1 |
| 2488.497131 | -69.1 | 30.0 | -39.1 |
| 2578.445495 | -71.8 | 32.7 | -39.1 |
| 2628.416808 | -72.6 | 33.5 | -39.1 |
| 2285.483193 | -73.2 | 34.1 | -39.1 |
| 2335.273109 | -74.0 | 34.9 | -39.1 |
| 19938.479707 | -74.2 | 35.1 | -39.1 |
| 2668.393859 | -74.2 | 35.1 | -39.1 |
| 21737.446983 | -74.2 | 35.2 | -39.1 |
| 24885.639715 | -74.5 | 35.4 | -39.1 |
| 20368.233000 | -74.5 | 35.5 | -39.1 |
| 18009.587017 | -74.6 | 35.5 | -39.1 |
| 17709.759137 | -74.6 | 35.5 | -39.1 |
| 25295.404484 | -74.6 | 35.6 | -39.1 |
| 25345.375797 | -74.7 | 35.6 | -39.1 |

Measurement Settings

| Start Frequency (MHz) | Stop Frequency (MHz) | Pre Measurement | Final Measurement |
|-----------------------|----------------------|-----------------|-------------------|
| 30.000000 | 2400.000000 | 1 | 1 |
| 2400.000000 | 2483.500000 | 1 | 1 |
| 2483.500000 | 26000.000000 | 1 | 1 |



Pre Measurement 1

| Setting | Instrument Value | Target Value |
|-----------------------|------------------|----------------|
| RBW | 100.000 kHz | <= 100.000 kHz |
| VBW | 300.000 kHz | >= 300.000 kHz |
| SweepPoints | 238 | ~ 238 |
| SweepTime | 23.700 ms | AUTO |
| Reference Level | -30.000 dBm | -30.000 dBm |
| Attenuation | 0.000 dB | AUTO |
| Detector | MaxPeak | MaxPeak |
| SweepCount | 3 | 3 |
| Filter | 3 dB | 3 dB |
| Trace Mode | Max Hold | Max Hold |
| Sweeptype | Sweep | AUTO |
| Preamp | off | off |
| Stablemode | Trace | Trace |
| Stablevalue | 0.50 dB | 0.50 dB |
| Run | 14 / max. 40 | max. 40 |
| Stable | 3 / 3 | 3 |
| Max Stable Difference | 0.00 dB | 0.50 dB |

7.11 Radiated Spurious Emissions (RSE)

Applicability

This requirement applies to all types of DTS and FHS equipment.

Description

Spurious emission / unwanted emissions are emission on a frequency or frequencies which are outside the authorized band and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products. Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation.

Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

| Frequency [MHz] | Field Strength [$\mu\text{V}/\text{m}$] / [dB $\mu\text{V}/\text{m}$] | Measurement distance [m] |
|-----------------|--|--------------------------|
| 0.009 – 0.490 | 2400/F[kHz] | 300 |
| 0.490 – 1.705 | 24000/F[kHz] | 30 |
| 1.705 – 30.0 | 30.0 / 29.5 | 30 |
| 30 – 88 | 100 / 40.0 | 3 |
| 88 – 216 | 150 / 43.5 | 3 |
| 216 – 960 | 200 / 46.0 | 3 |
| 960 – 40 000 | 500 / 54.0 | 3 |

Note: Radiated Spurious Emissions (RSE) are performed for mode 1, low / high channel.

Test setup: 8.1, 8.2, 8.3 8.2 with radiated sample 61314 (see 5.2)




| Test results | | | | | |
|-----------------------|-----------------|-------------------|--------------|-------------|------------|
| EUT Mode / Channel | Frequency [MHz] | Peak/RMS Detector | Level [dBm] | Limit [dBm] | Verdict |
| Mode 1 / low channel | 2402 | MaxPeak | (see plots)* | (see plots) | - passed - |
| Mode 1 / high channel | 2480 | MaxPeak | (see plots)* | (see plots) | - passed - |

* all detected peaks are more than 6 dB below the limit

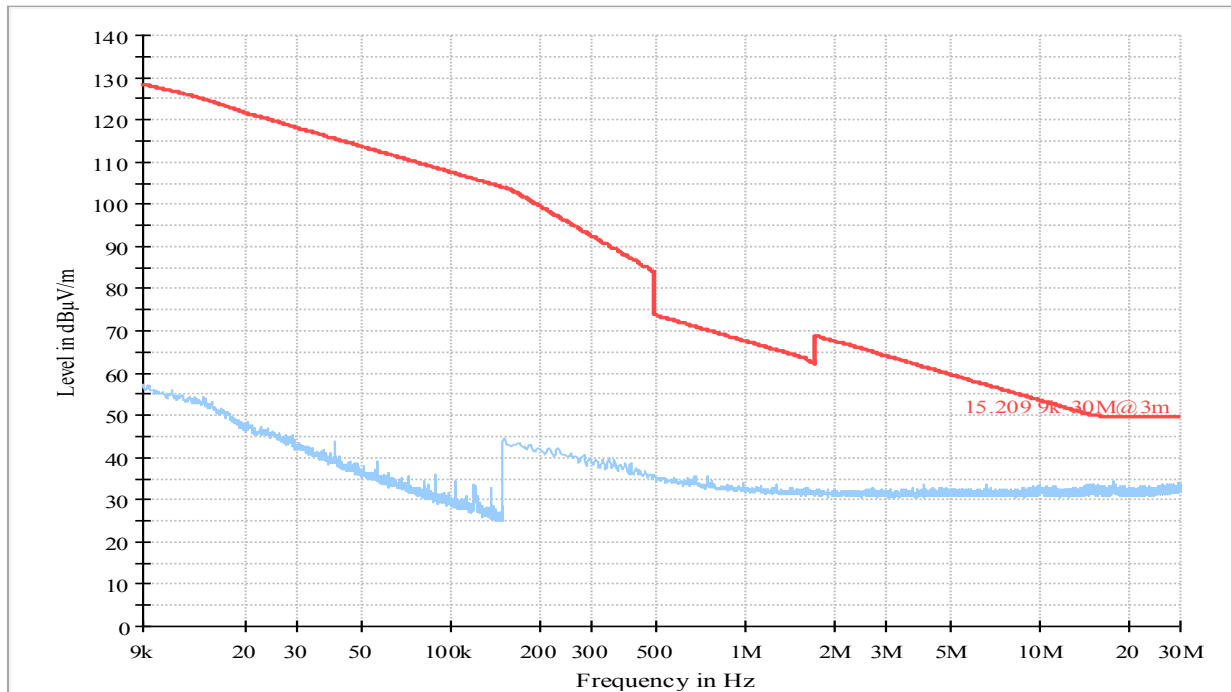
| | |
|-----------------|-----|
| Comment: | --- |
|-----------------|-----|

| | | |
|----------------|-----------------|-------------------------|
| Verdict | - PASS - | <i>see next plots**</i> |
|----------------|-----------------|-------------------------|

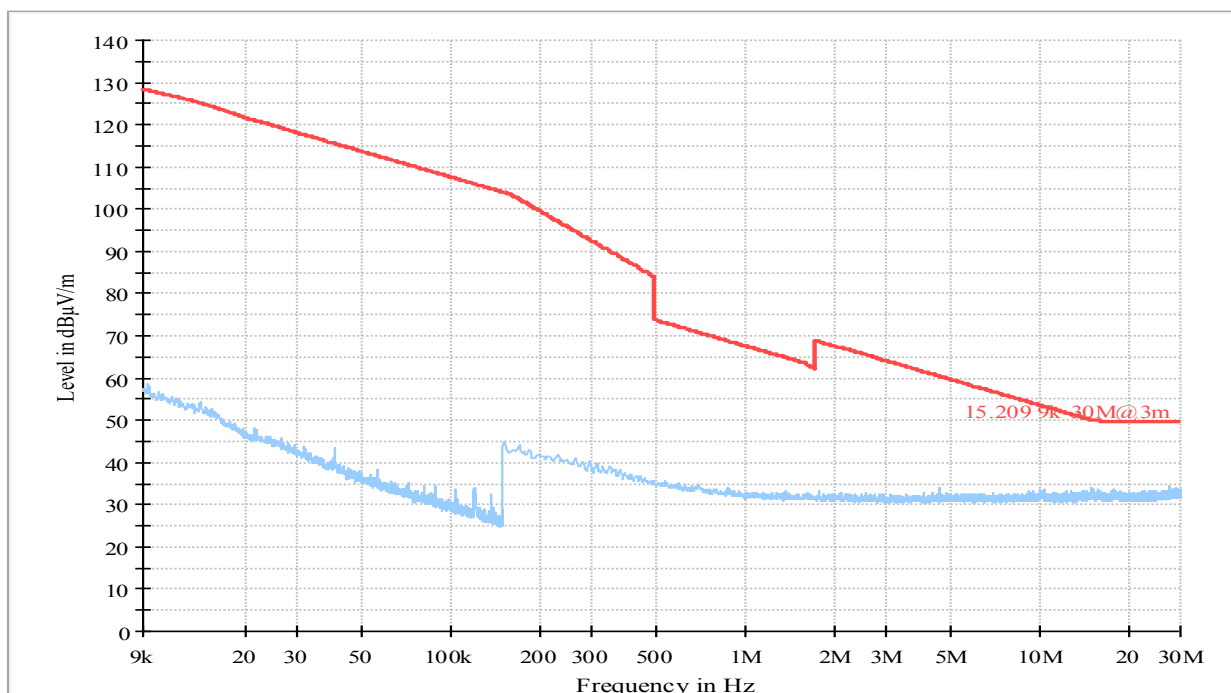
** description of line and marker for all radiated spurious emission (RSE) measurements:

-  positive Peak (Max Hold) trace during pre-scan
-  Max Peak value
-  final Quasi Peak value

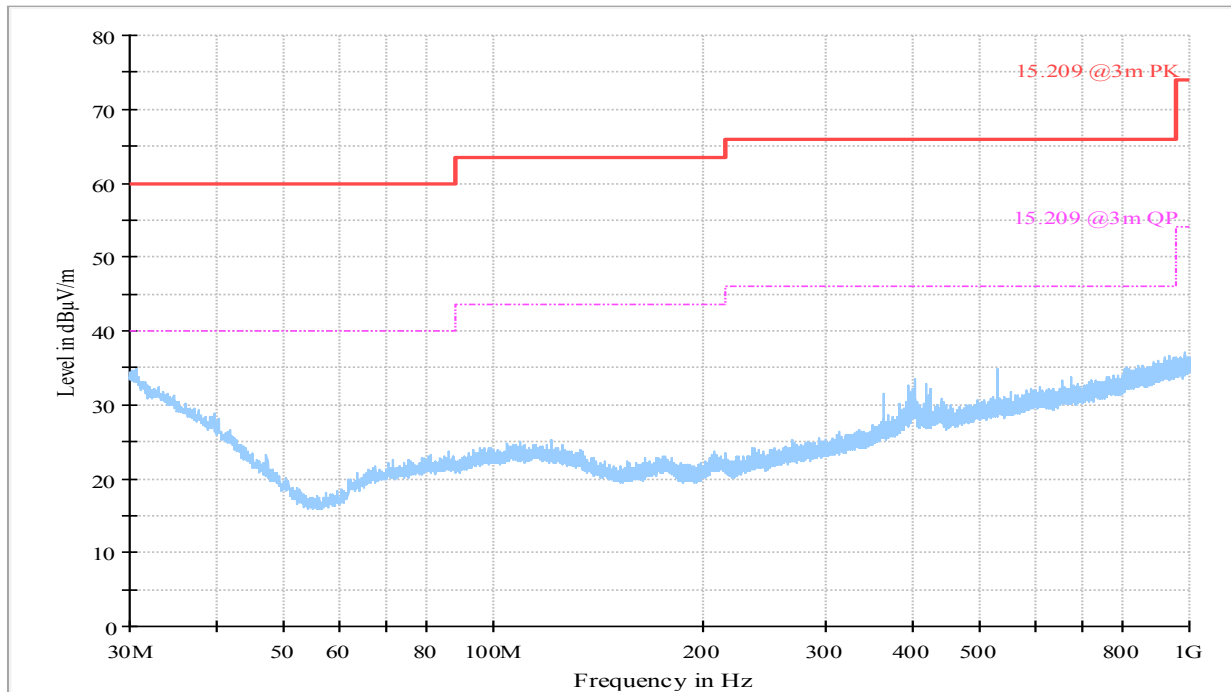
Plot 78: Mode 1, RSE 9 kHz – 30 MHz, low channel, 2402 MHz, loop antenna



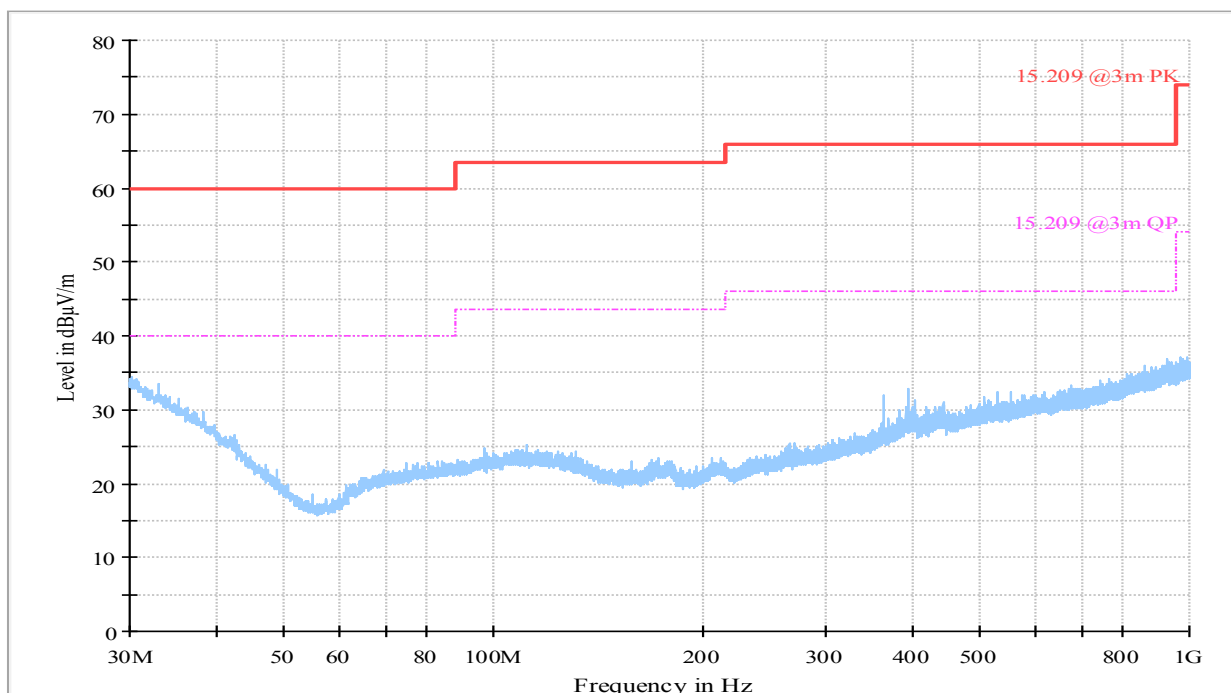
Plot 79: Mode 1, RSE 9 kHz – 30 MHz, high channel, 2480 MHz, loop antenna



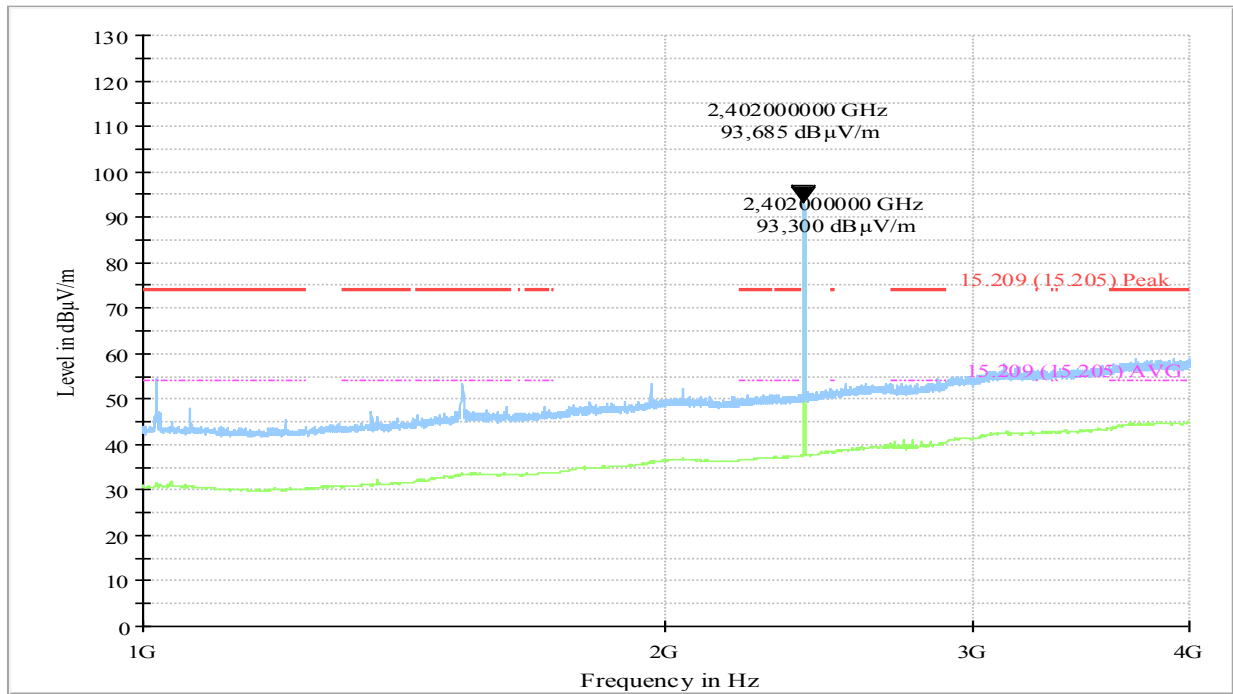
Plot 80: Mode 1, RSE 30 MHz – 1 GHz, low channel, 2402 MHz, horizontal / vertical polarisation



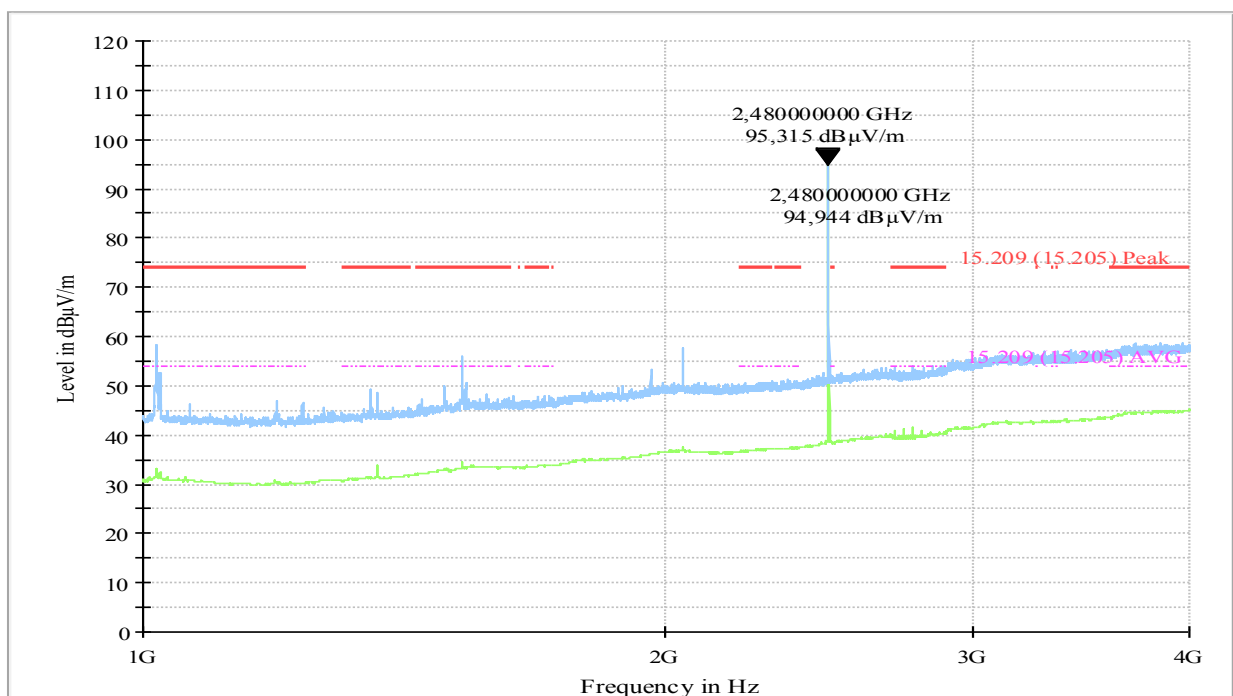
Plot 81: Mode 1, RSE 30 MHz – 1 GHz, high channel, 2480 MHz, horizontal / vertical polarisation



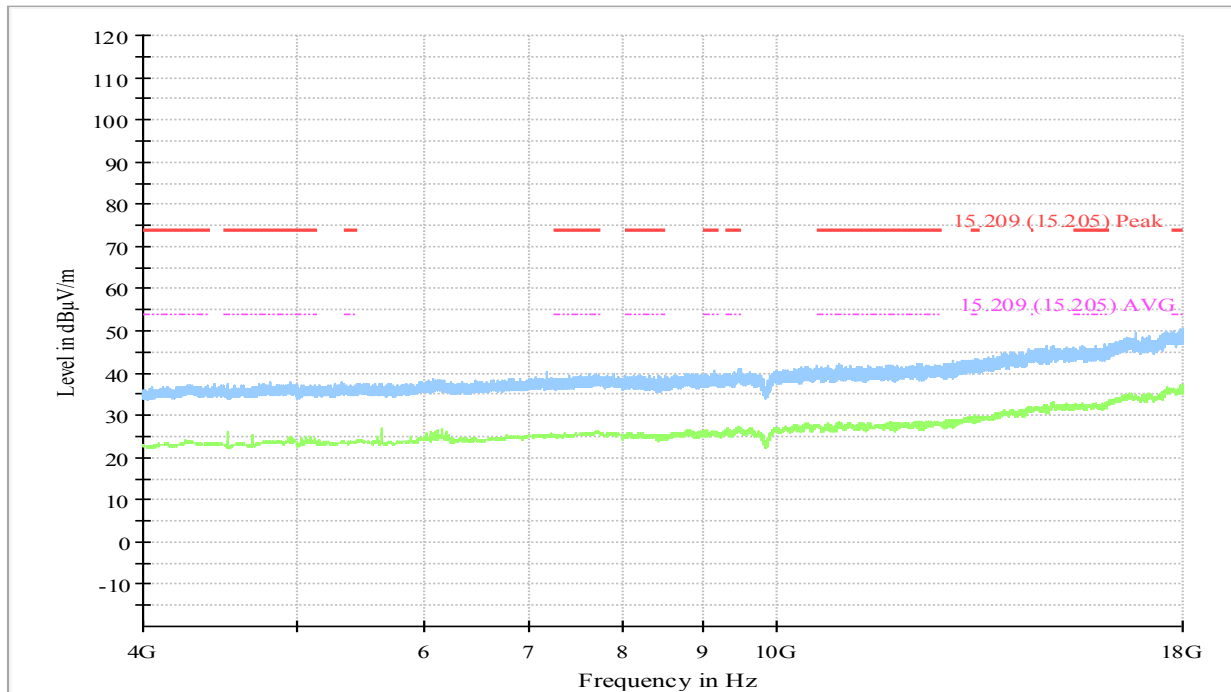
Plot 82: Mode 1, RSE 1 GHz – 4 GHz, low channel, 2402 MHz, horizontal / vertical polarisation



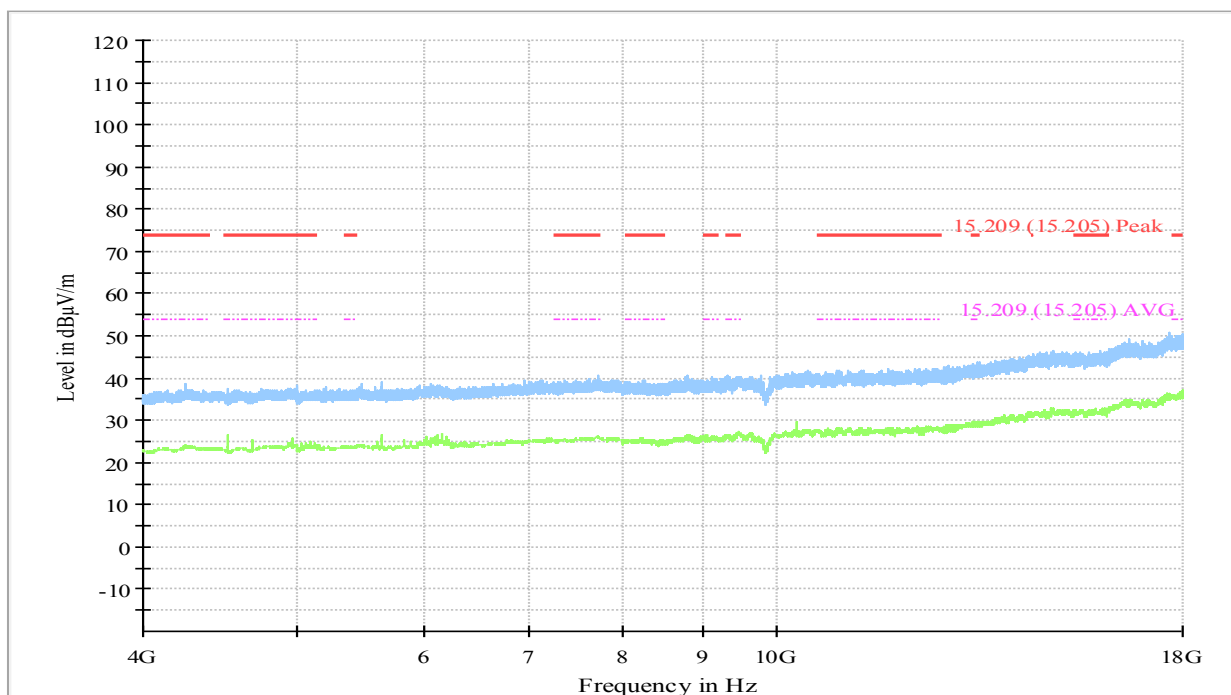
Plot 83: Mode 1, RSE 1 GHz – 4 GHz, high channel, 2480 MHz, horizontal / vertical polarisation



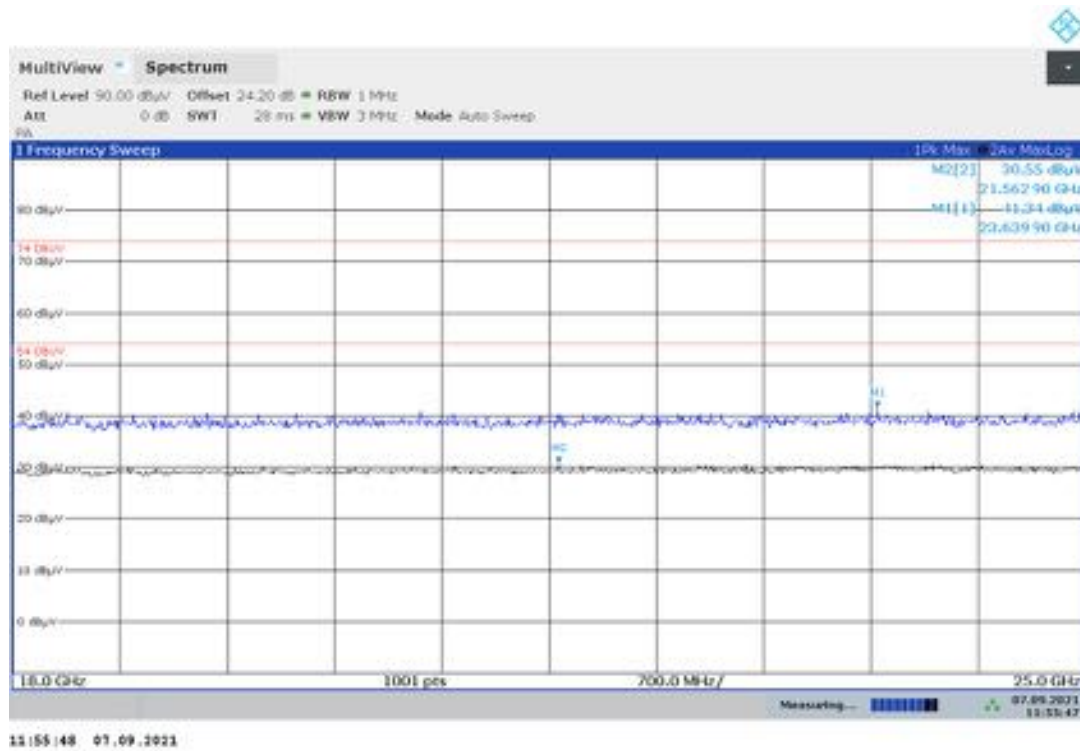
Plot 84: Mode 1, RSE 4 GHz – 18 GHz, low channel, 2402 MHz, horizontal / vertical polarisation



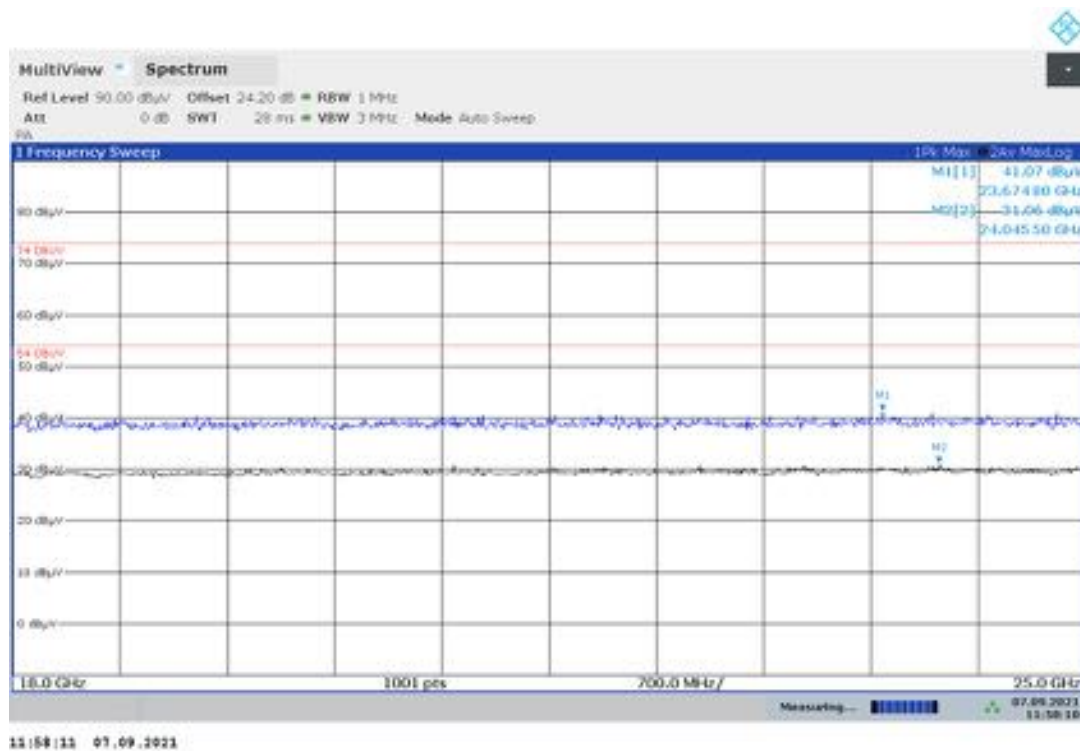
Plot 85: Mode 1, RSE 4 GHz – 18 GHz, high channel, 2480 MHz, horizontal / vertical polarisation



Plot 86: Mode 1, RSE 18 GHz – 25 GHz, low channel, 2402 MHz, horizontal / vertical polarisation



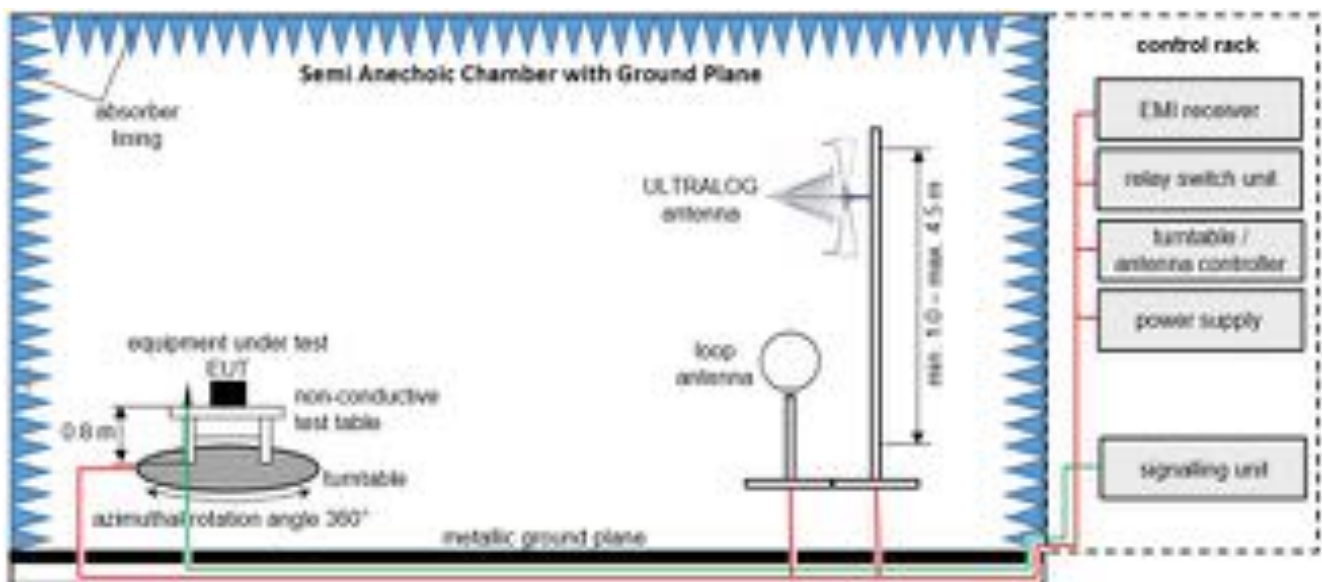
Plot 87: Mode 1, RSE 18 GHz – 25 GHz, high channel, 2480 MHz, horizontal / vertical polarisation



8 TEST SETUP DESCRIPTION

8.1 Semi Anechoic Chamber with Ground Plane

Radiated measurements are performed in vertical and horizontal plane in the frequency range 30 MHz to 1 GHz in a Semi Anechoic Chamber with a metallic ground plane. The EUT is positioned on a non-conductive test table with a height of 0.80 m above the metallic ground plane that covers the whole chamber. The receiving antennas conform to specification ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices. These antennas can be moved over the height range between 1.0 m and 4.5 m in order to search for maximum field strength emitted from the EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by a spectrum analyzer where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: loop antenna 3 m, ULTRALOG antenna 3 m
 EMC32 software version: 11.10.00

$$FS = UR + CL + AF$$

(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

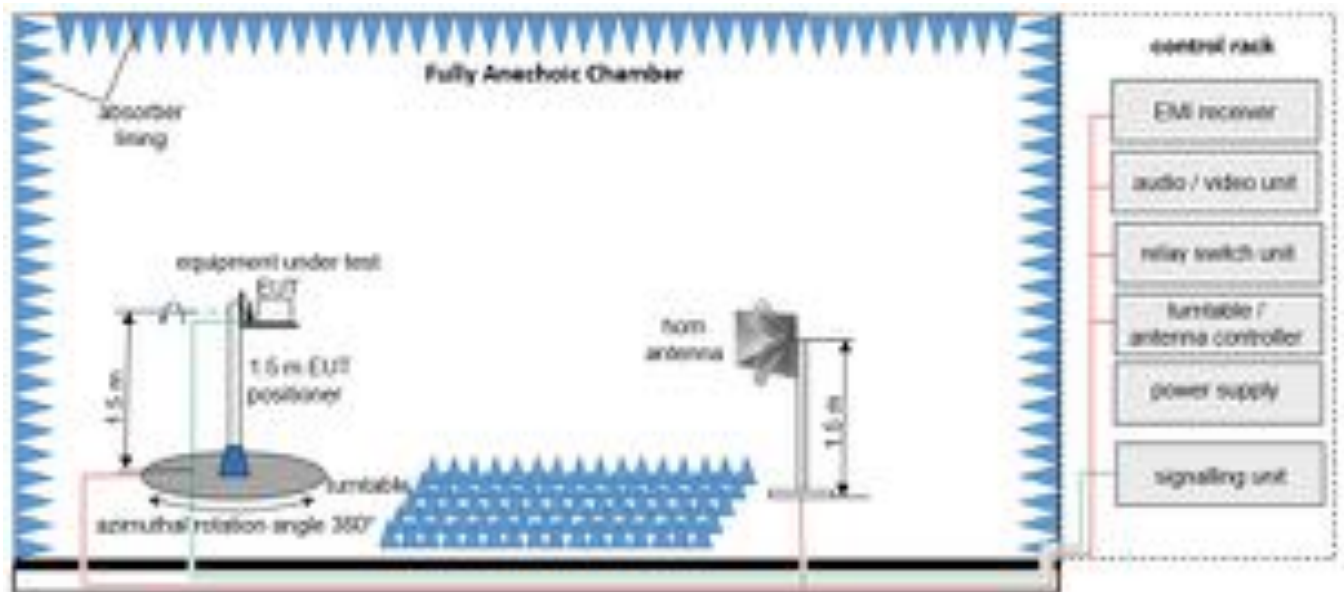
Example calculation:

$$FS \text{ [dB}\mu\text{V/m]} = 12.35 \text{ [dB}\mu\text{V/m]} + 1.90 \text{ [dB]} + 16.80 \text{ [dB/m]} = 31.05 \text{ [dB}\mu\text{V/m]} \text{ (35.69 } \mu\text{V/m)}$$

List of test equipment used:

| No. | Equipment | Manufacturer | Type | Serial No. | INV. No. | Last / Next Calibration |
|-----|----------------------------------|---------------------------------|--------------------------------|--------------|-----------|----------------------------|
| 1 | Power Supply | Elektro-Automatik GmbH & Co. KG | EA-PSI 9080-40 T | 2000230001 | LAB000313 | – |
| 2 | Test table | innco systems GmbH | PT1208-080-RH | - | LAB000306 | – |
| 3 | Power Supply | Chroma | 61604 | 616040005416 | LAB000285 | – |
| 4 | Positioner | matur GmbH | TD 1.5-10KG | | LAB000258 | – |
| 5 | Compressed Air | Implotex | 1-850-30 | - | LAB000256 | – |
| 6 | EMI Test Receiver | Rohde & Schwarz | ESW26 | 101517 | LAB000363 | 2021-02-05 → 2022-02-05 |
| 7 | Semi-Anechoic Chamber (SAC) | Albatross Projects GmbH | SAC 5 (Babylon 5) | 20168.PRB | LAB000235 | - |
| 8 | Measurement Software | Rohde & Schwarz | EMC32 V11.00.10 | | LAB000226 | – |
| 9 | Turntable | matur GmbH | TT2.0-2t | TT2.0-2t/921 | LAB000225 | – |
| 10 | Antenna Mast | matur GmbH | CAM4.0-P | CAM4.0-P/316 | LAB000224 | – |
| 11 | Antenna Mast | matur GmbH | BAM4.5-P | BAM4.5-P/272 | LAB000223 | – |
| 12 | Controller | matur GmbH | FCU 3.0 | 10082 | LAB000222 | – |
| 13 | Power Supply | Elektro-Automatik GmbH & Co. KG | PS 2042-10 B | 2878350292 | LAB000191 | – |
| 14 | Pre-Amplifier | Schwarzbeck Mess-Elektronik OHG | BBV 9718 C | 84 | LAB000169 | – |
| 15 | Open Switch and Control Platform | Rohde & Schwarz | OSP200 Base Unit 2HU | 101748 | LAB000149 | – |
| 16 | Antenna | Rohde & Schwarz | HL562E | 102001 | LAB000123 | 2020-07-05 → 2023-07-05 |
| 17 | Antenna | Rohde & Schwarz | HFH2-Z2E - Active Loop Antenna | 100954 | LAB000108 | 2020-03-25 → 2023-03-25 |

8.2 Fully Anechoic Chamber



Measurement distance: horn antenna 3 meter
EMC32 software version: 11.10.00

$FS = UR + CL + AF$
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

Example calculation:

$FS [dB\mu V/m] = 12.35 [dB\mu V/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB\mu V/m] (35.69 \mu V/m)$

$OP = AV + D - G + CA$

(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance;
G-antenna gain+amplifier gain; CA-loss signal path)

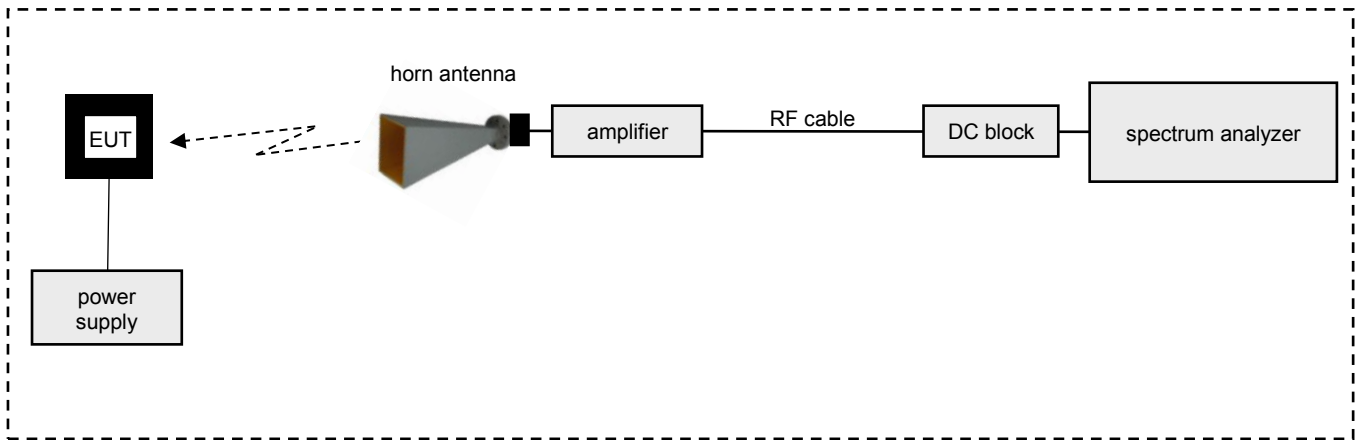
Example calculation:

$OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 \mu W)$

List of test equipment used:

| No. | Equipment | Manufacturer | Type | Serial No. | INV. No. | Last / Next Calibration |
|-----|----------------------------------|---------------------------------|----------------------|--------------|-----------|----------------------------|
| 1 | Power Supply | Elektro-Automatik GmbH & Co. KG | EA-PSI 9080-40 T | 2000230001 | LAB000313 | – |
| 2 | Test table | innco systems GmbH | PT1208-080-RH | - | LAB000306 | – |
| 3 | Power Supply | Chroma | 61604 | 616040005416 | LAB000285 | – |
| 4 | Positioner | matur GmbH | TD 1.5-10KG | – | LAB000258 | – |
| 5 | Compressed Air | Implotex | 1-850-30 | - | LAB000256 | – |
| 6 | EMI Test Receiver | Rohde & Schwarz | ESW26 | 101517 | LAB000363 | 2021-02-05 → 2022-02-05 |
| 7 | Semi-Anechoic Chamber (SAC) | Albatross Projects GmbH | SAC 5 (Babylon 5) | 20168.PRB | LAB000235 | - |
| 8 | Measurement Software | Rohde & Schwarz | EMC32 V11.00.10 | – | LAB000226 | – |
| 9 | Turntable | matur GmbH | TT2.0-2t | TT2.0-2t/921 | LAB000225 | – |
| 10 | Antenna Mast | matur GmbH | BAM4.5-P | BAM4.5-P/272 | LAB000223 | – |
| 11 | Controller | matur GmbH | FCU 3.0 | 10082 | LAB000222 | – |
| 12 | Power Supply | Elektro-Automatik GmbH & Co. KG | PS 2042-10 B | 2878350292 | LAB000191 | – |
| 13 | Pre-Amplifier | Schwarzbeck Mess-Elektronik OHG | BBV 9718 C | 84 | LAB000169 | – |
| 14 | Open Switch and Control Platform | Rohde & Schwarz | OSP200 Base Unit 2HU | 101748 | LAB000149 | – |
| 15 | Antenna | Rohde & Schwarz | HF907 | 102898 | LAB000124 | 2020-04-23 → 2023-04-23 |
| 16 | HP-filter | AtlantRF | – | – | LAB000382 | – |

8.3 Radiated measurements > 18 GHz

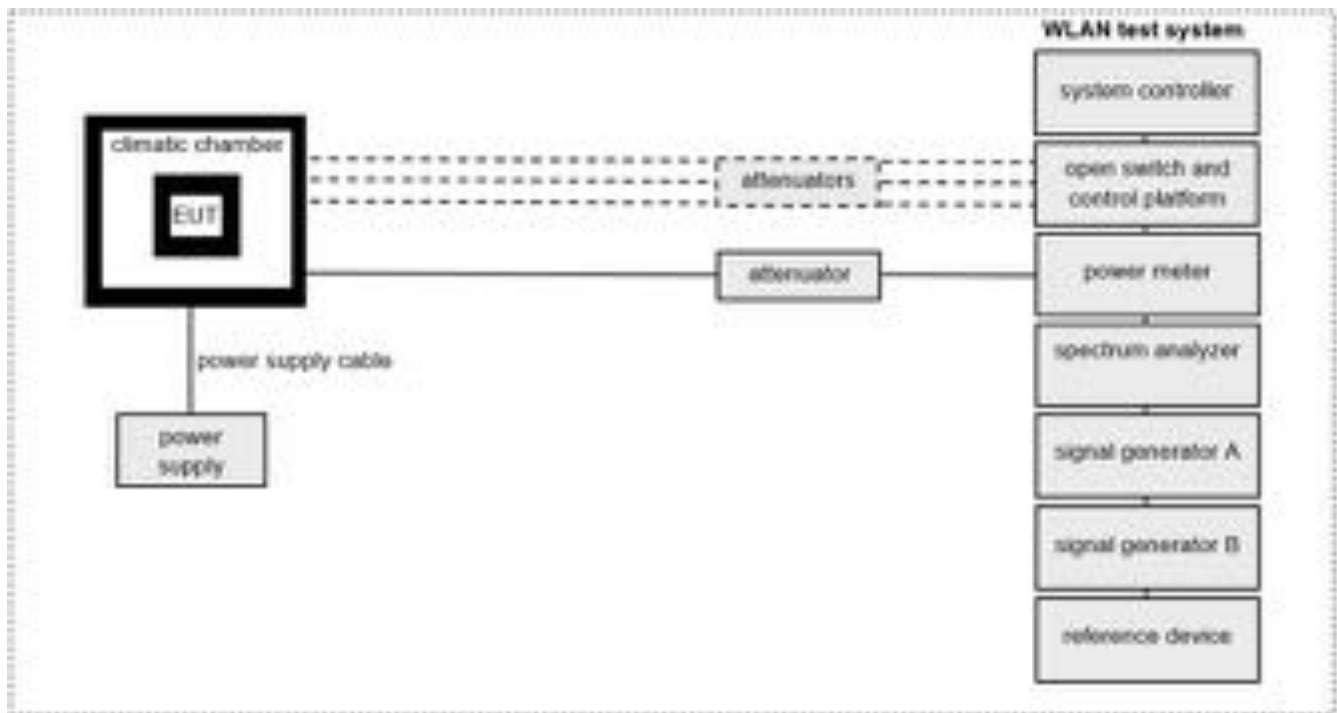


List of test equipment used:

| No. | Equipment | Manufacturer | Type | Serial No. | INV. No. | Last / Next Calibration |
|-----|-------------------|---------------------|----------------------|------------|-----------|----------------------------|
| 1 | Test table | innco systems GmbH | PT0707-RH light | - | LAB000303 | - |
| 2 | WG-Coax-Adapter | Flann Microwave Ltd | 20093-TF30 UBR220 | 273374 | LAB000181 | - |
| 3 | Coaxial Cable | Huber & Suhner | SF101/1.5m | 503987/1 | LAB000165 | - |
| 4 | Antenna | Flann Microwave Ltd | 20240-20 | 266403 | LAB000128 | 2020-06-29 → 2023-06-29 |
| 5 | Spectrum Analyser | Rohde & Schwarz | FSW43 | 101391 | LAB000289 | 2021-07-02 → 2022-07-02 |

8.4 Conducted measurements WLAN test system R&S TS 8997

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The losses for all signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



EMC32/WMS32 software version: 11.00.00

List of test equipment used:

| No. | Equipment | Manufacturer | Type | Serial No. | INV. No. | Last / Next Calibration |
|-----|----------------------------------|-----------------|--------------|------------|-----------|----------------------------|
| 1 | TS8997-Rack | Rohde & Schwarz | TS8997-Rack | 100829 | LAB000322 | – |
| 2 | Open Switch and Control Platform | Rohde & Schwarz | OSP-B157WX | 101247 | LAB000280 | – |
| 3 | Open Switch and Control Platform | Rohde & Schwarz | OSP-B157W8 | 100982 | LAB000279 | – |
| 4 | Spectrum Analyser | Rohde & Schwarz | FSV40 | 101403 | LAB000278 | 2021-06-15 → 2022-06-15 |
| 5 | Signal Generator | Rohde & Schwarz | SMBV100A | 258240 | LAB000277 | 2021-06-02 → 2022-06-02 |
| 6 | Signal Generator | Rohde & Schwarz | SMB100A-20 | 178175 | LAB000276 | 2021-05-27 → 2022-05-27 |
| 7 | Radio Communication Tester | Rohde & Schwarz | CMW270 | 101479 | LAB000275 | – |
| 8 | Controller | Hewlett Packard | ATS-Z230 | 101379 | LAB000274 | – |
| 9 | Power Supply | EA | PS 2042-10 B | 2878350263 | LAB000190 | – |

9 MEASUREMENT UNCERTAINTIES

| | |
|--|---------------------------------------|
| Radio frequency | $\leq \pm 1 \times 10^{-7}$ |
| RF power, conducted | $\leq \pm 0.75 \text{ dB}$ |
| Power spectral density | $\leq \pm 3 \text{ dB}$ |
| Maximum frequency deviation | $\leq \pm 5 \%$ |
| Deviation limitation Duty Cycle, Tx-sequence, Tx-gap | $\leq \pm 5 \%$ |
| Occupied channel bandwidth | $\leq \pm 5 \%$ |
| Conducted spurious emission of transmitter | $\leq \pm 4 \text{ dB}$ |
| Conducted emission of receivers | $\leq \pm 4 \text{ dB}$ |
| Radiated emission of transmitter | $\leq \pm 6 \text{ dB}$ |
| Radiated emission of receiver | $\leq \pm 6 \text{ dB}$ |
| Temperature | $\leq \pm 2.5 \text{ }^\circ\text{C}$ |
| Humidity | $\leq \pm 10 \%$ |

The indicated expanded measurement uncertainty corresponds to the standard measurement uncertainty for the measurement results multiplied by the coverage factor $k = 2$. It was determined in accordance with EA-4/02 M:2013. The true value is located in the corresponding interval with a probability of 95 %.