

9.11 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at channel 1, 7 and 11. The measurement is repeated for all modulations.

Measurement:

| Measurement parameter | |
|-----------------------|---|
| Detector: | Peak / Quasi Peak / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz |
| Video bandwidth: | Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz |
| Span: | 30 MHz to 25 GHz |
| Trace-Mode: | Max Hold |
| Measured Modulation | <input checked="" type="checkbox"/> DSSS b – mode <input checked="" type="checkbox"/> OFDM g – mode <input checked="" type="checkbox"/> OFDM n – mode |

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

| FCC | IC | |
|---|-------------------------------|----------------------|
| TX Spurious Emissions Radiated | | |
| <p>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)).</p> | | |
| Frequency (MHz) | Field Strength (dB μ V/m) | Measurement distance |
| 30 - 88 | 30.0 | 10 |
| 88 – 216 | 33.5 | 10 |
| 216 – 960 | 36.0 | 10 |
| Above 960 | 54.0 | 3 |

Results: DSSS / b – mode

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|----------|----------------|---|----------|----------------|---|----------|----------------|
| DSSS / b – mode | | | | | | | | |
| 2412 MHz | | | 2442 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| All detected emissions measured with a peak detector are below the average limit! | | | All detected emissions measured with a peak detector are below the average limit! | | | All detected emissions measured with a peak detector are below the average limit! | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

Result: Passed

Results: OFDM / g – mode

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|----------|----------------|---|----------|----------------|---|----------|----------------|
| OFDM / g – mode | | | | | | | | |
| 2412 MHz | | | 2442 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| All detected emissions measured with a peak detector are below the average limit! | | | All detected emissions measured with a peak detector are below the average limit! | | | All detected emissions measured with a peak detector are below the average limit! | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

Result: Passed

Results: OFDM / n – mode

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|----------|----------------|---|----------|----------------|---|----------|----------------|
| OFDM / n – mode | | | | | | | | |
| 2412 MHz | | | 2442 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| All detected emissions measured with a peak detector are below the average limit! | | | All detected emissions measured with a peak detector are below the average limit! | | | All detected emissions measured with a peak detector are below the average limit! | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

Result: Passed

Plots: DSSS / b – mode

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

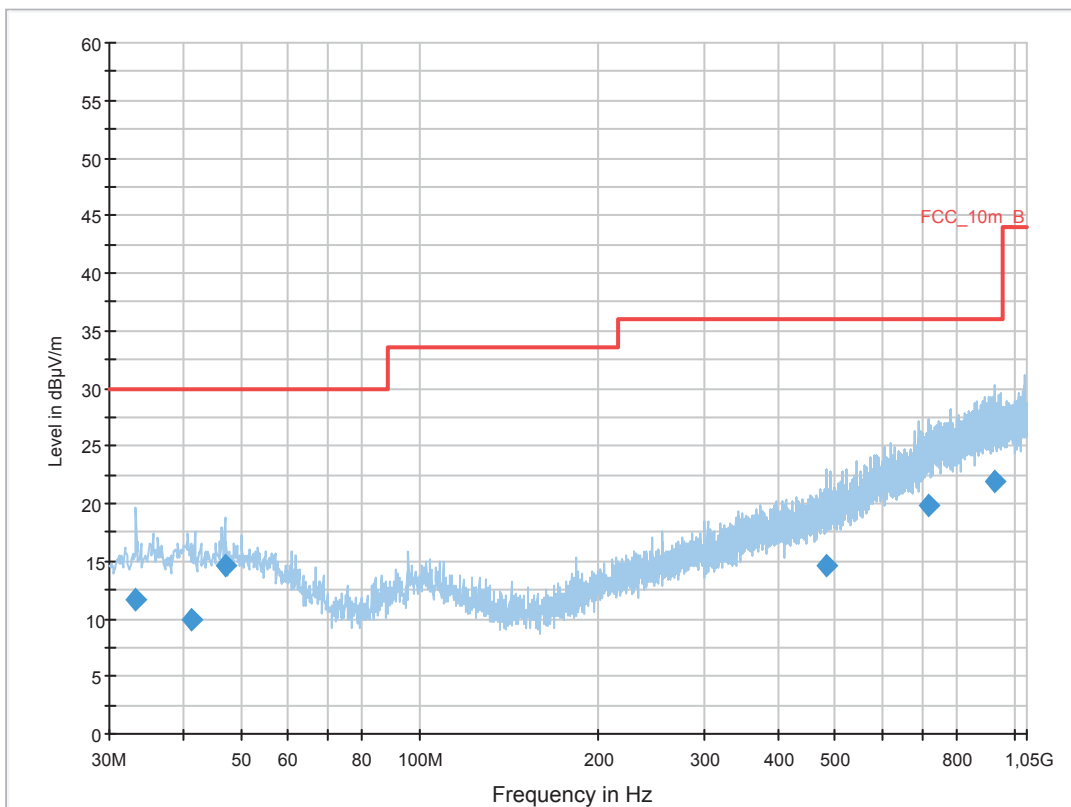
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan b mode CH1
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

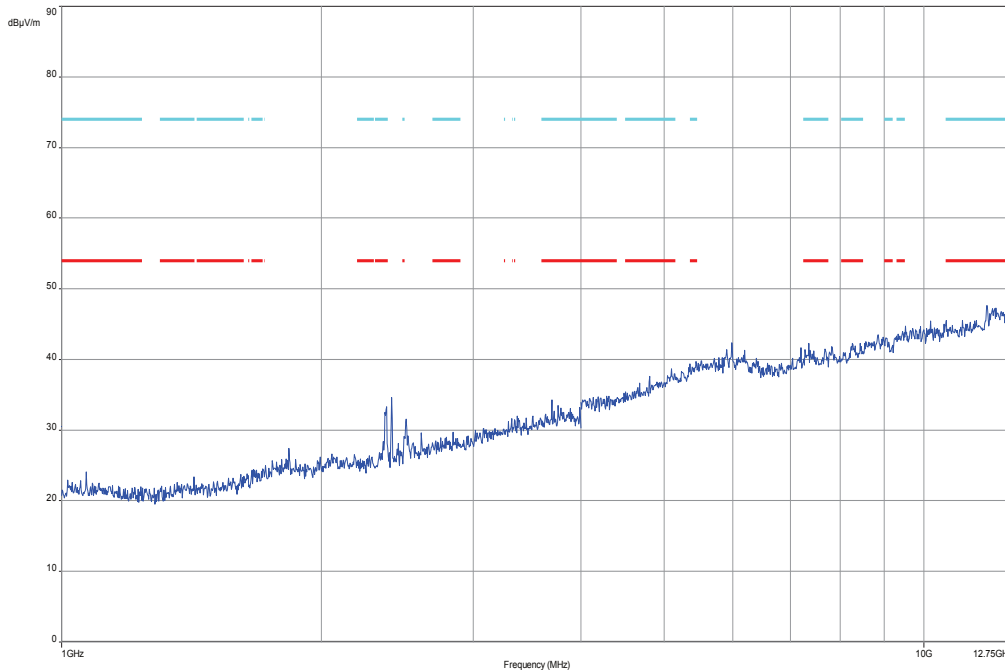
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

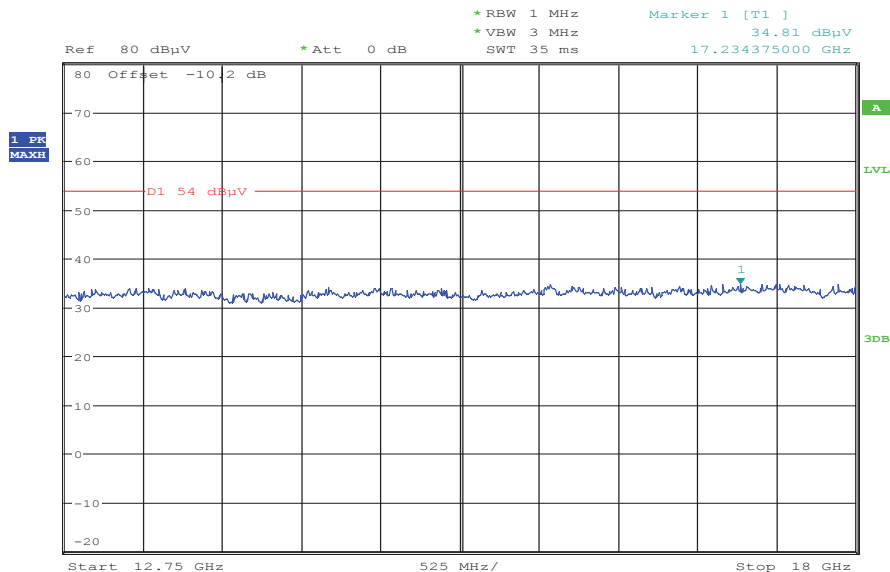
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 33.284550 | 11.7 | 1000.0 | 120.000 | 170.0 | V | 280.0 | 12.9 | 18.3 | 30.0 | |
| 41.273700 | 9.9 | 1000.0 | 120.000 | 170.0 | V | 10.0 | 13.4 | 20.1 | 30.0 | |
| 46.966050 | 14.6 | 1000.0 | 120.000 | 104.0 | V | 280.0 | 13.3 | 15.4 | 30.0 | |
| 483.574950 | 14.6 | 1000.0 | 120.000 | 170.0 | V | 260.0 | 18.4 | 21.4 | 36.0 | |
| 718.480350 | 19.8 | 1000.0 | 120.000 | 170.0 | V | -5.0 | 22.9 | 16.2 | 36.0 | |
| 928.060800 | 21.9 | 1000.0 | 120.000 | 121.0 | H | 100.0 | 25.3 | 14.1 | 36.0 | |

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



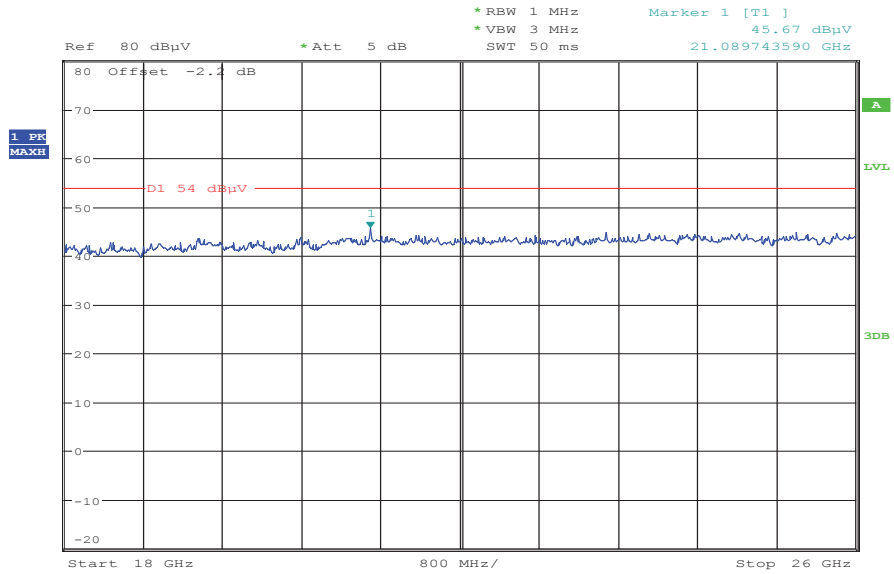
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:17:58

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:33:10

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

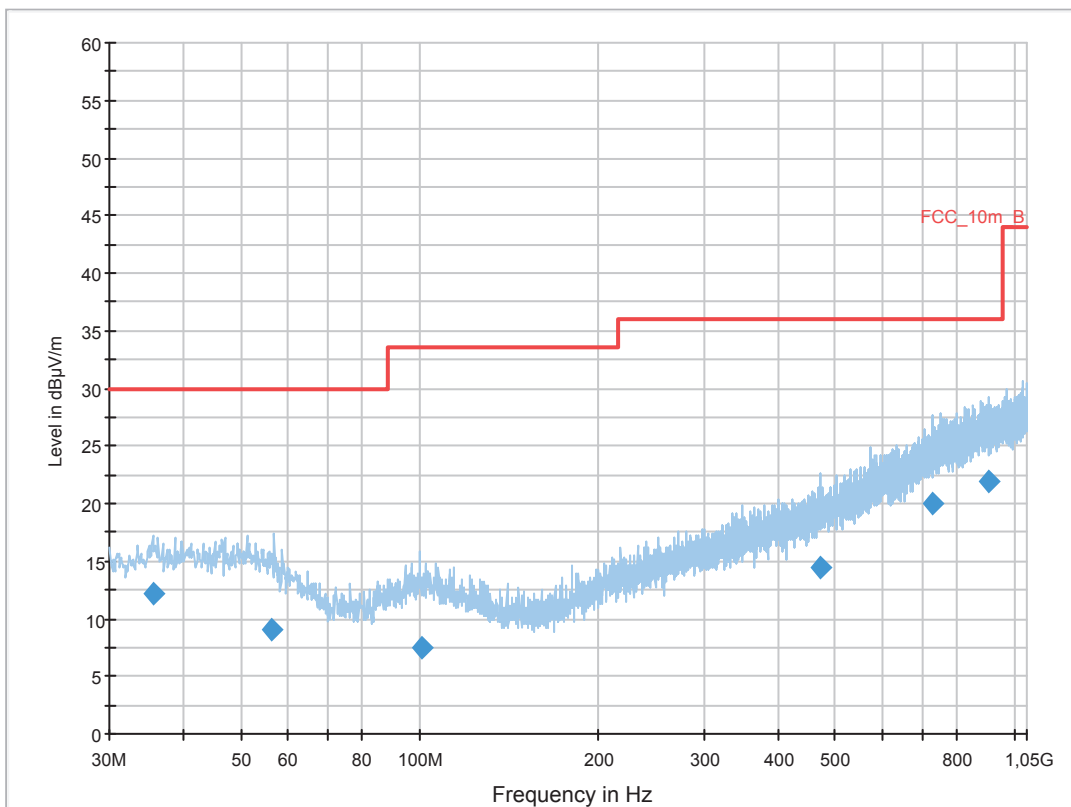
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan b mode CH7
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

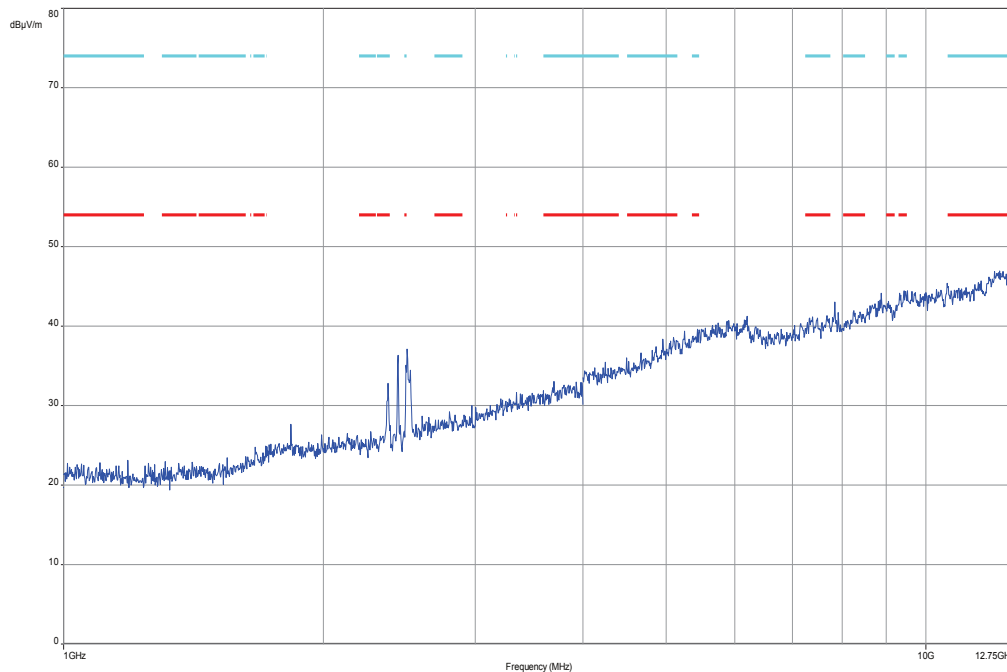
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

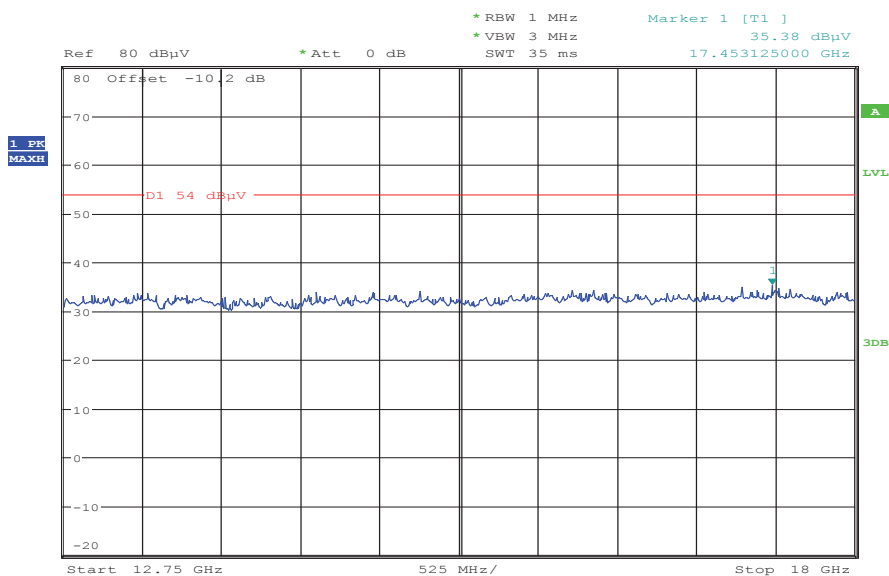
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 35.449350 | 12.2 | 1000.0 | 120.000 | 170.0 | V | 177.0 | 13.1 | 17.8 | 30.0 | |
| 56.329050 | 9.1 | 1000.0 | 120.000 | 170.0 | V | 190.0 | 12.5 | 20.9 | 30.0 | |
| 100.484550 | 7.5 | 1000.0 | 120.000 | 170.0 | H | 10.0 | 11.9 | 26.0 | 33.5 | |
| 473.482800 | 14.4 | 1000.0 | 120.000 | 170.0 | V | 280.0 | 18.2 | 21.6 | 36.0 | |
| 727.653900 | 20.0 | 1000.0 | 120.000 | 98.0 | H | -3.0 | 23.1 | 16.0 | 36.0 | |
| 909.418050 | 21.9 | 1000.0 | 120.000 | 170.0 | V | -10.0 | 25.2 | 14.1 | 36.0 | |

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



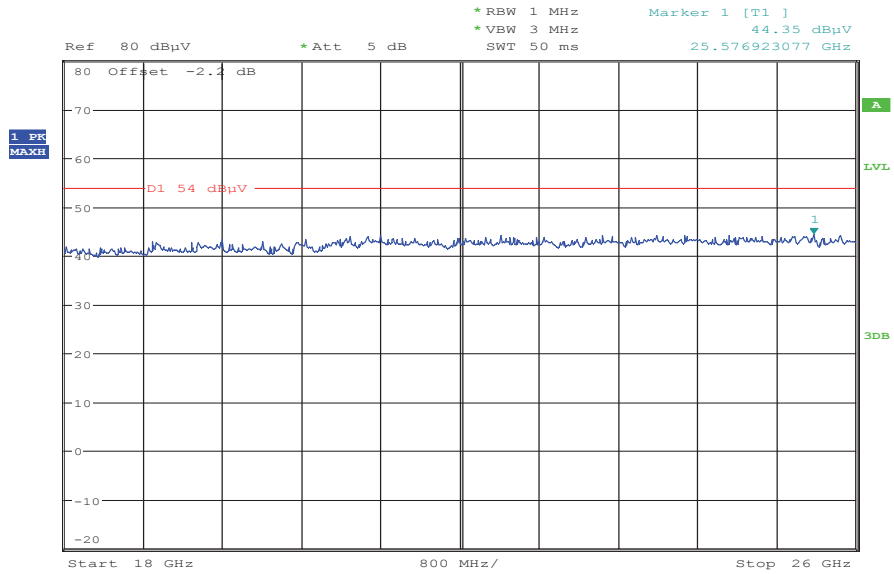
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:18:57

Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:34:32

Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

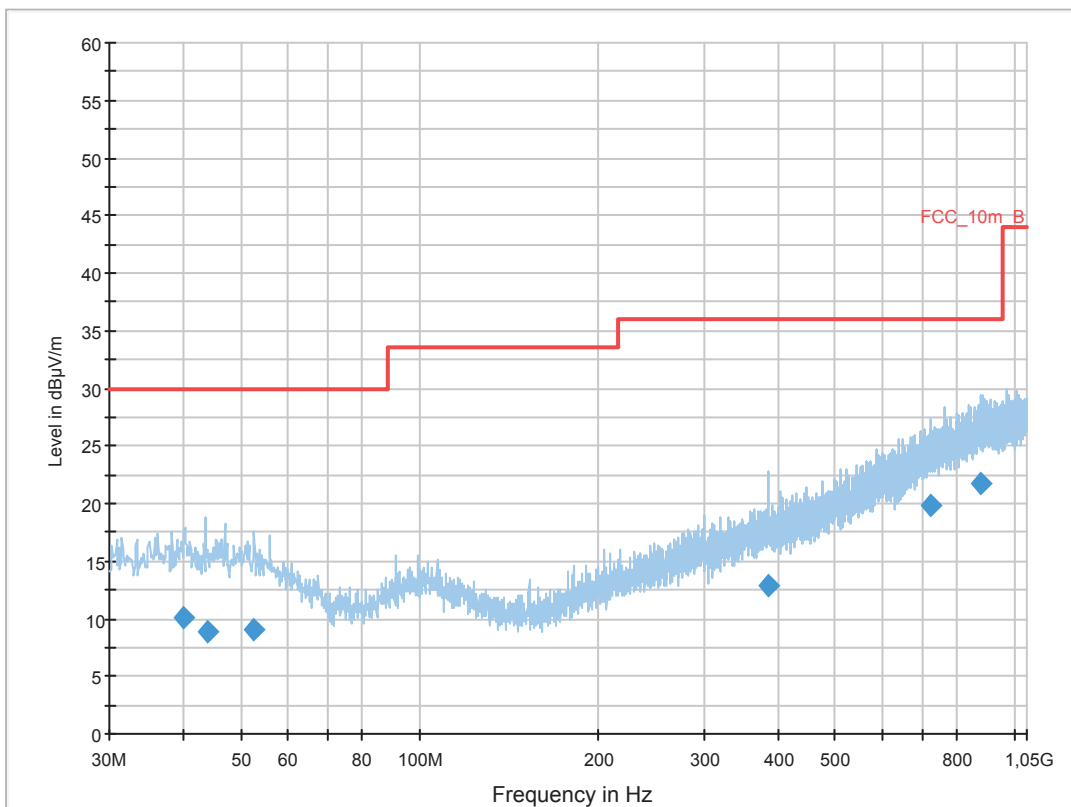
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan b mode CH11
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

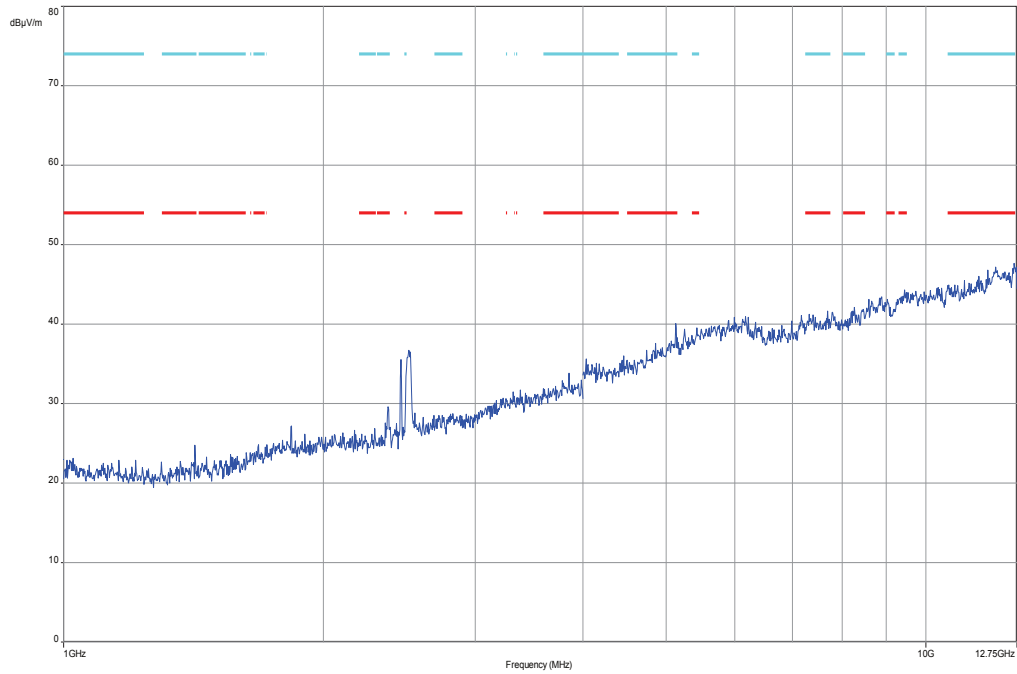
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

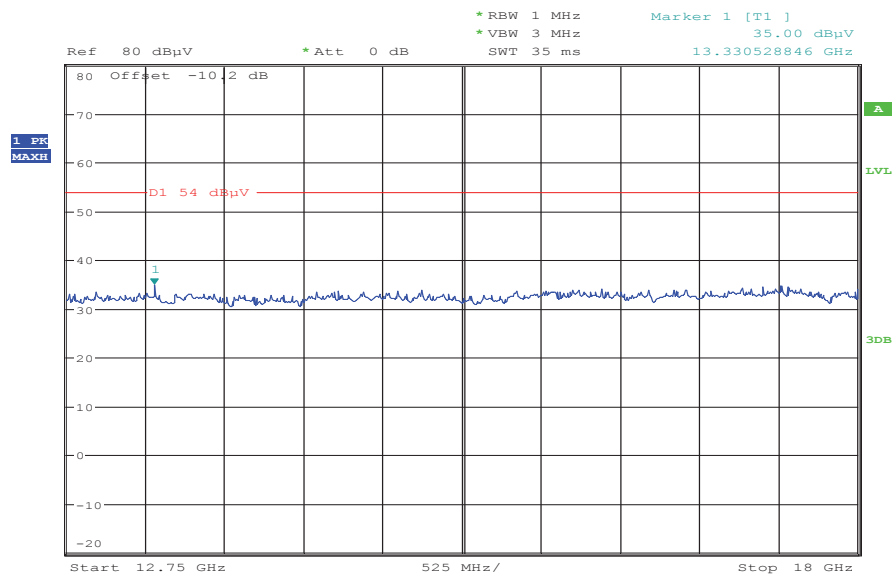
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 39.962550 | 10.1 | 1000.0 | 120.000 | 170.0 | V | 180.0 | 13.4 | 19.9 | 30.0 | |
| 43.997100 | 8.9 | 1000.0 | 120.000 | 170.0 | H | 170.0 | 13.3 | 21.1 | 30.0 | |
| 52.546950 | 9.0 | 1000.0 | 120.000 | 170.0 | V | -10.0 | 13.1 | 21.0 | 30.0 | |
| 385.206600 | 12.8 | 1000.0 | 120.000 | 170.0 | H | 190.0 | 16.7 | 23.2 | 36.0 | |
| 721.086000 | 19.9 | 1000.0 | 120.000 | 170.0 | H | 10.0 | 23.0 | 16.1 | 36.0 | |
| 876.768000 | 21.8 | 1000.0 | 120.000 | 153.0 | V | 182.0 | 24.9 | 14.2 | 36.0 | |

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



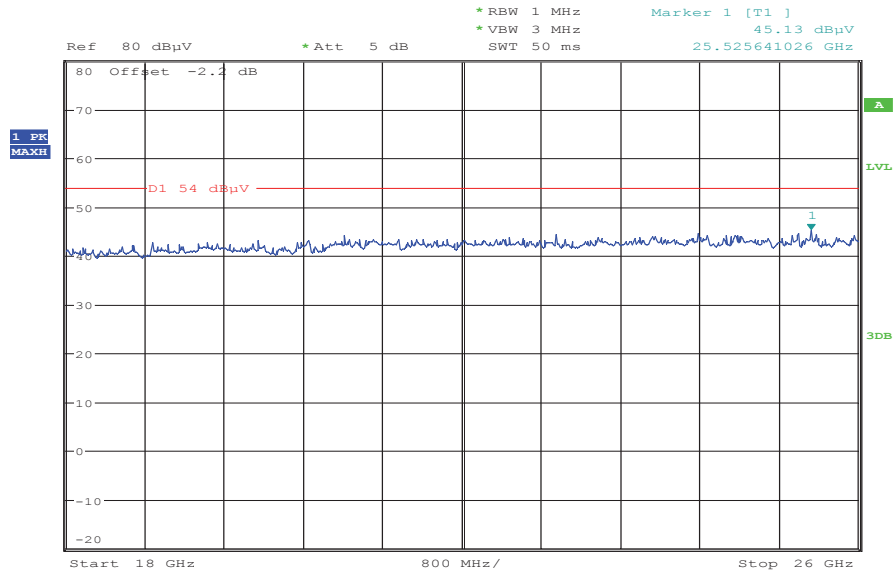
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:20:13

Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:35:29

Plots: OFDM / g – mode

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

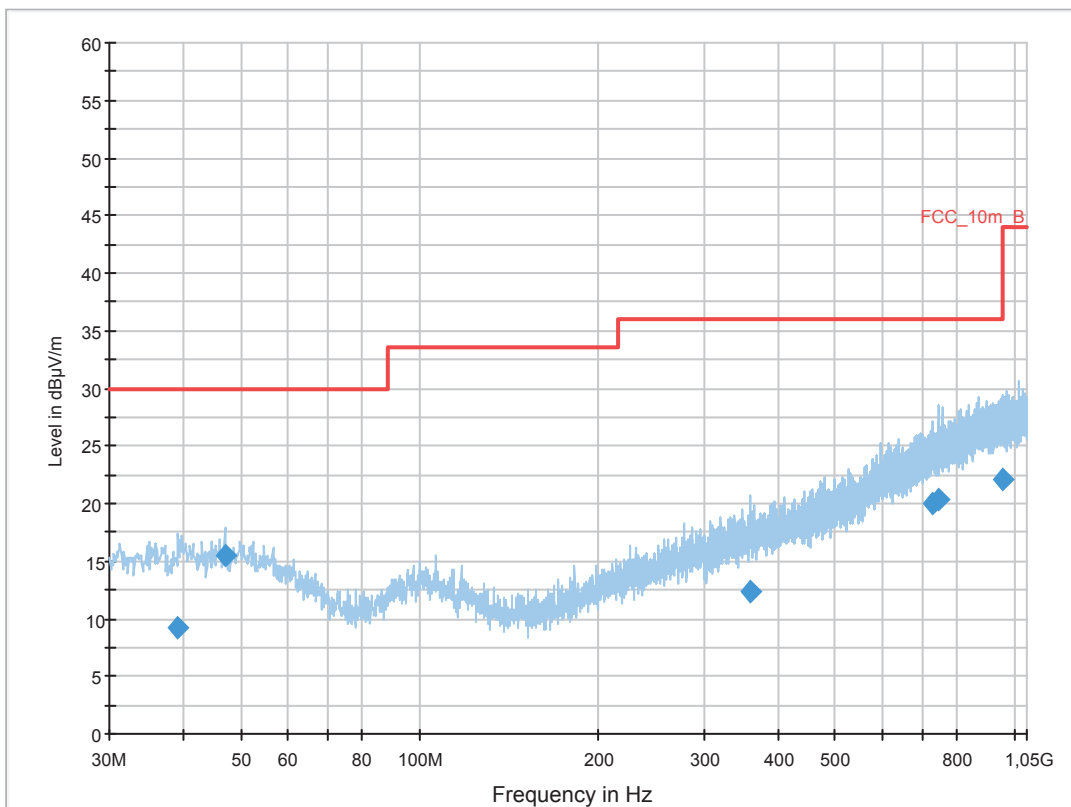
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan g mode CH1
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

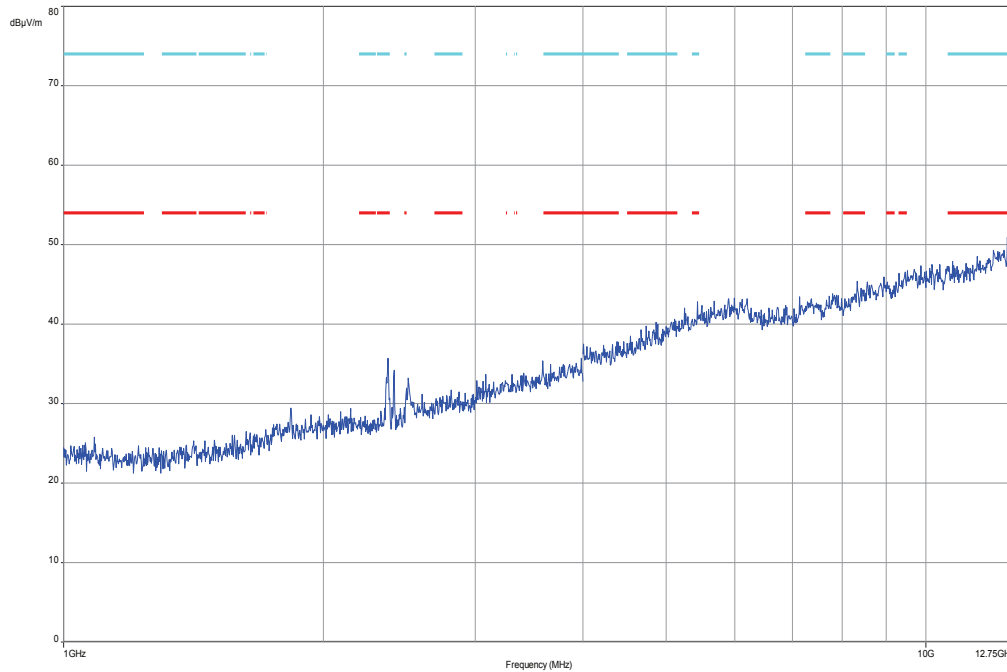
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

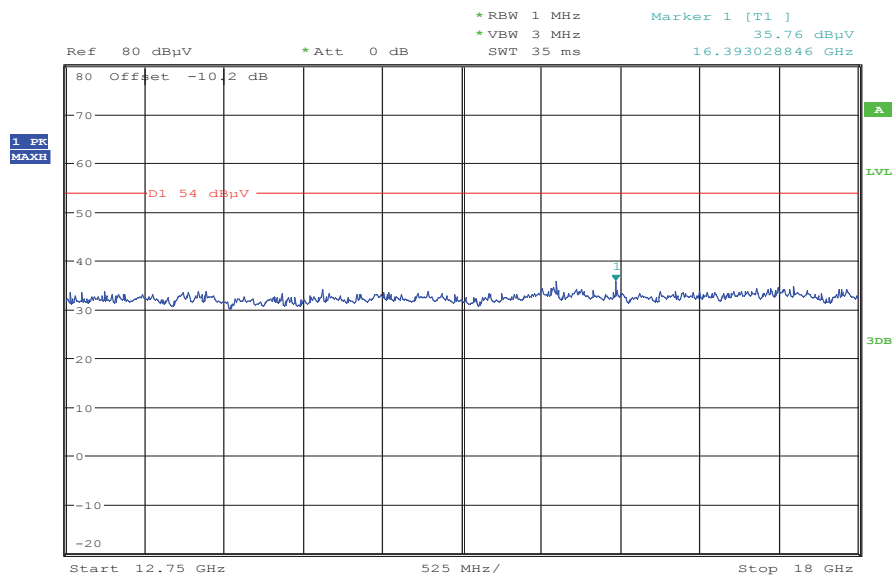
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 39.162750 | 9.3 | 1000.0 | 120.000 | 120.0 | V | 260.0 | 13.4 | 20.7 | 30.0 | |
| 46.988550 | 15.5 | 1000.0 | 120.000 | 98.0 | V | 92.0 | 13.3 | 14.5 | 30.0 | |
| 359.280450 | 12.3 | 1000.0 | 120.000 | 170.0 | V | 261.0 | 16.2 | 23.7 | 36.0 | |
| 730.189650 | 20.0 | 1000.0 | 120.000 | 170.0 | H | 280.0 | 23.2 | 16.0 | 36.0 | |
| 745.066650 | 20.4 | 1000.0 | 120.000 | 98.0 | V | -3.0 | 23.5 | 15.6 | 36.0 | |
| 958.862400 | 22.1 | 1000.0 | 120.000 | 120.0 | H | 170.0 | 25.4 | 13.9 | 36.0 | |

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



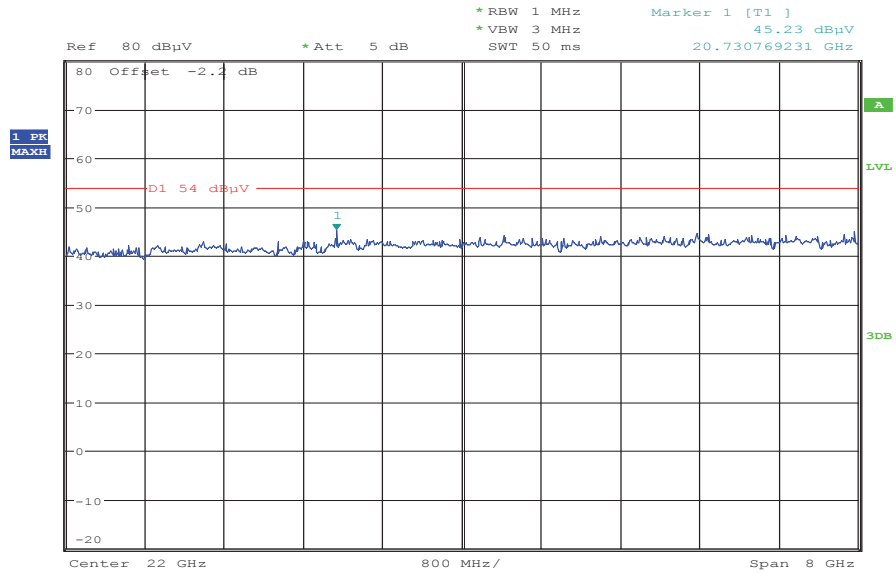
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:21:37

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 10:19:11

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

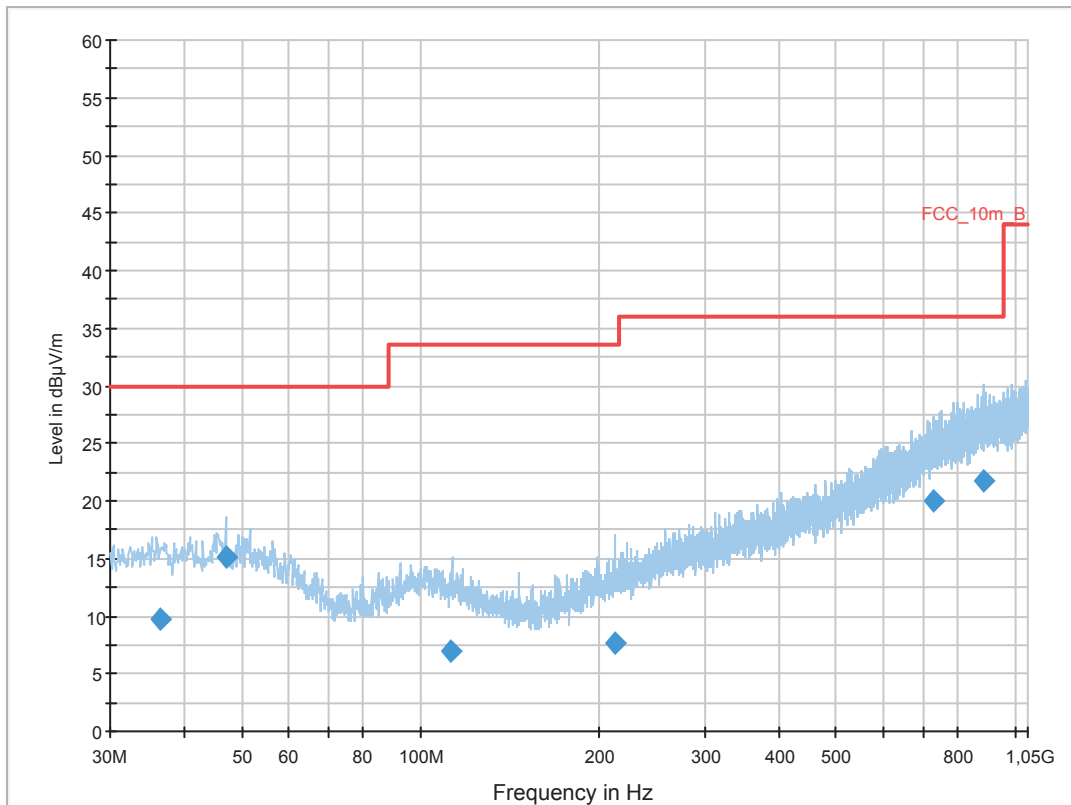
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan g mode CH7
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dBµV/m

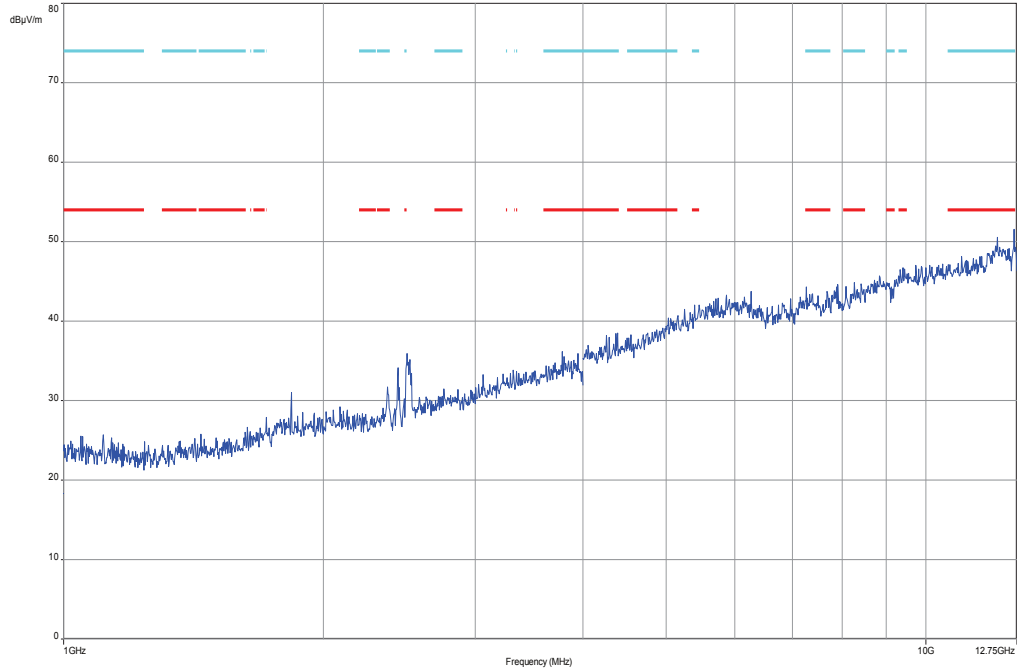
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

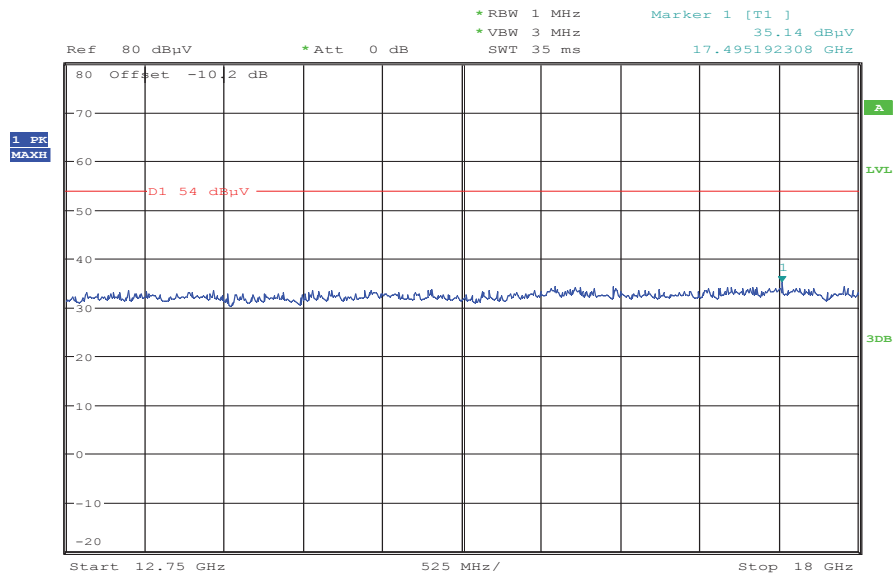
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 36.399000 | 9.8 | 1000.0 | 120.000 | 170.0 | H | 10.0 | 13.1 | 20.2 | 30.0 | |
| 46.979100 | 15.1 | 1000.0 | 120.000 | 98.0 | V | 170.0 | 13.3 | 14.9 | 30.0 | |
| 112.564650 | 7.0 | 1000.0 | 120.000 | 98.0 | V | 100.0 | 10.8 | 26.5 | 33.5 | |
| 212.266950 | 7.7 | 1000.0 | 120.000 | 98.0 | H | 170.0 | 12.1 | 25.8 | 33.5 | |
| 730.870200 | 20.0 | 1000.0 | 120.000 | 170.0 | H | 85.0 | 23.2 | 16.0 | 36.0 | |
| 887.715750 | 21.8 | 1000.0 | 120.000 | 98.0 | H | 260.0 | 25.0 | 14.2 | 36.0 | |

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



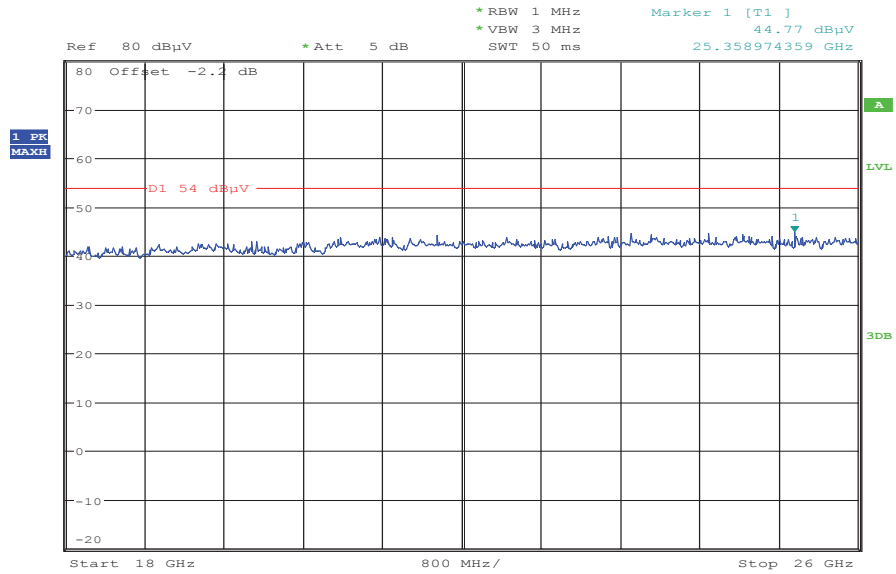
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:22:58

Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:37:58

Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

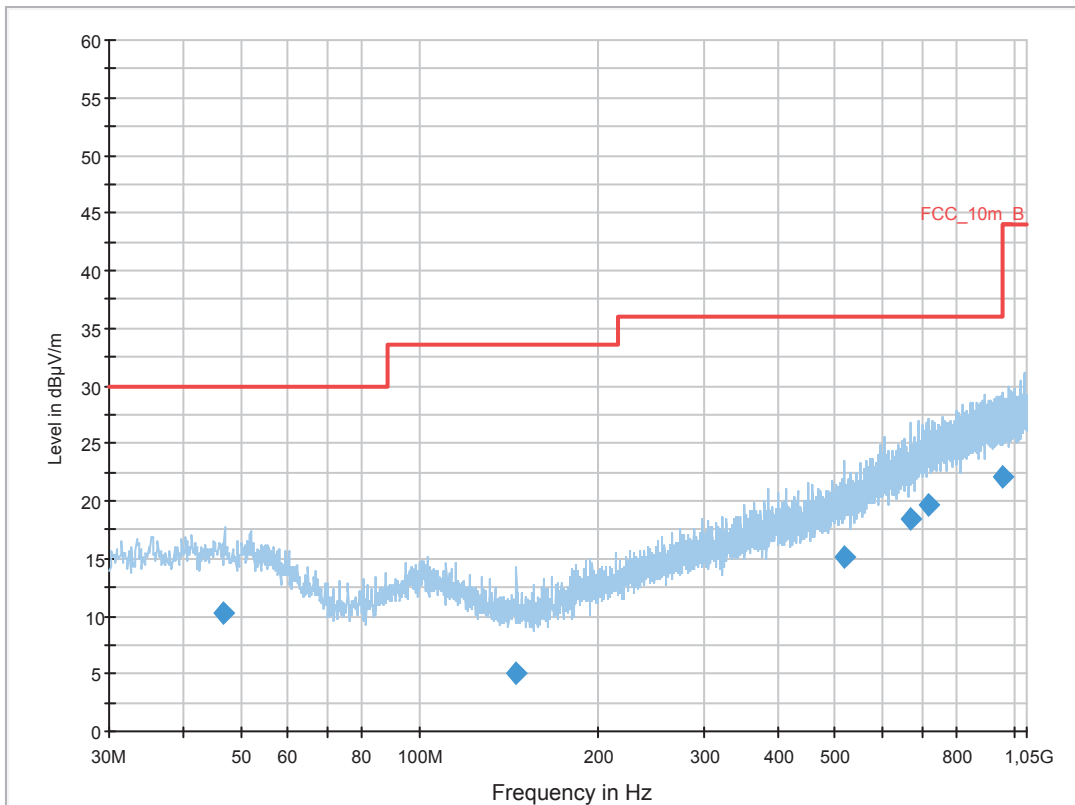
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan g mode CH11
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dBµV/m

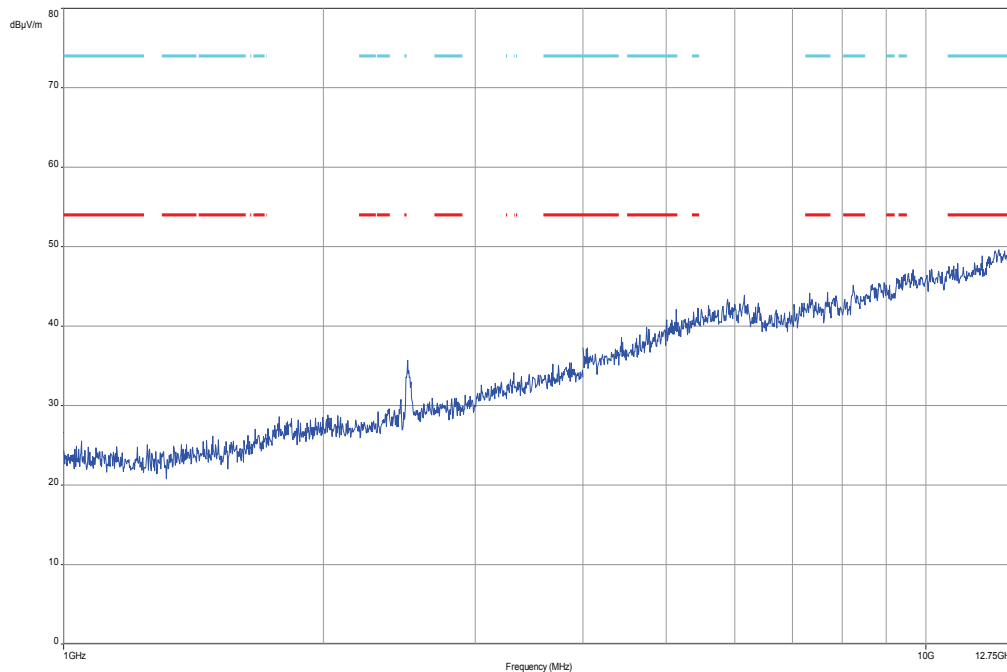
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

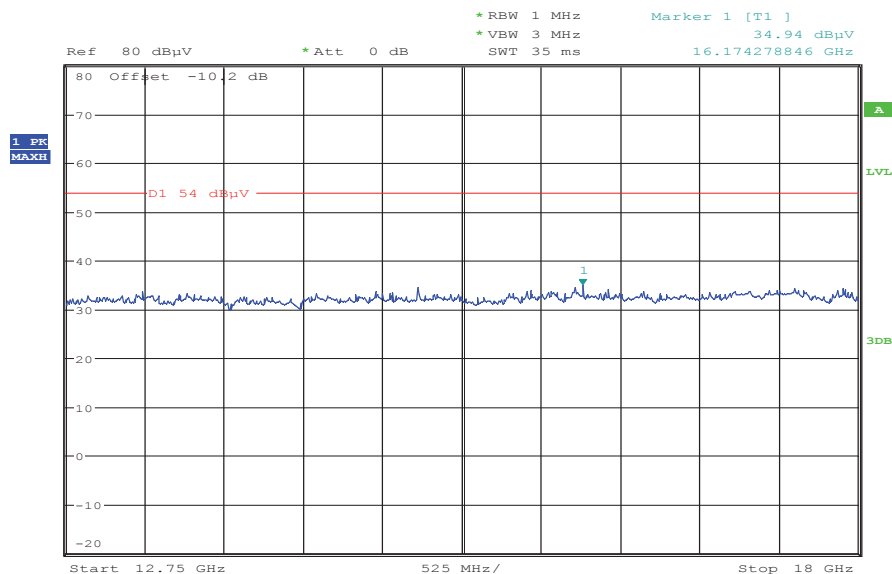
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 46.724550 | 10.2 | 1000.0 | 120.000 | 98.0 | V | 175.0 | 13.3 | 19.8 | 30.0 | |
| 145.589250 | 5.0 | 1000.0 | 120.000 | 98.0 | V | 280.0 | 8.8 | 28.5 | 33.5 | |
| 517.640700 | 15.1 | 1000.0 | 120.000 | 98.0 | V | 183.0 | 18.9 | 20.9 | 36.0 | |
| 670.076250 | 18.4 | 1000.0 | 120.000 | 163.0 | H | 280.0 | 21.7 | 17.6 | 36.0 | |
| 716.510850 | 19.7 | 1000.0 | 120.000 | 98.0 | V | 267.0 | 22.9 | 16.3 | 36.0 | |
| 954.057300 | 22.1 | 1000.0 | 120.000 | 170.0 | V | -10.0 | 25.4 | 13.9 | 36.0 | |

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



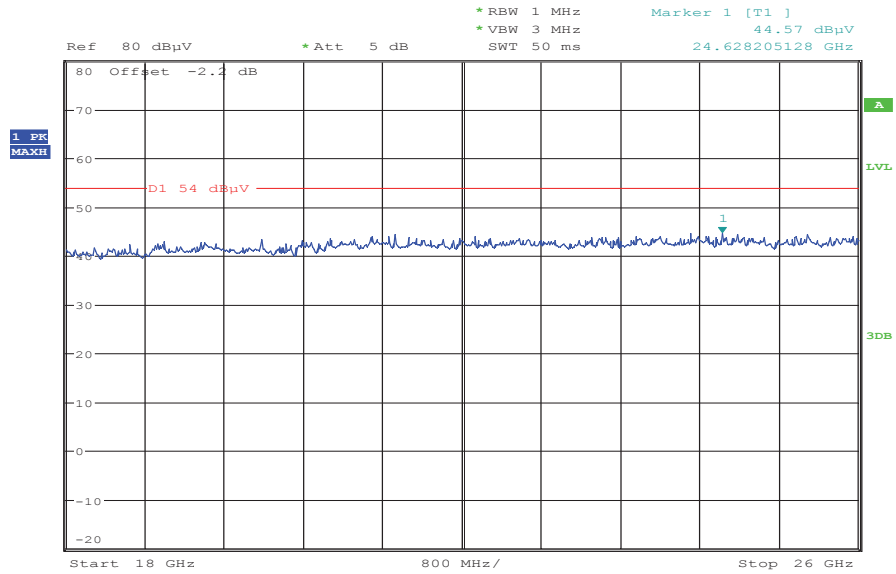
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:24:52

Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:39:06

Plots: OFDM / n – mode

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

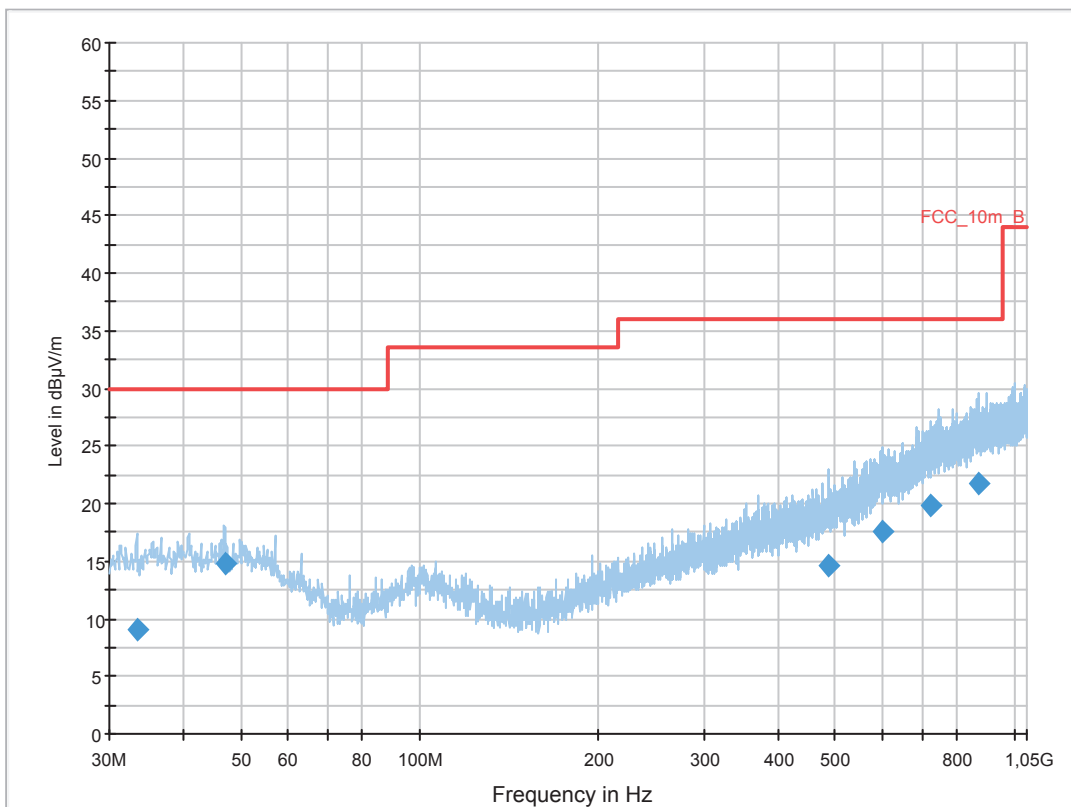
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan n mode CH1 mcs0
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

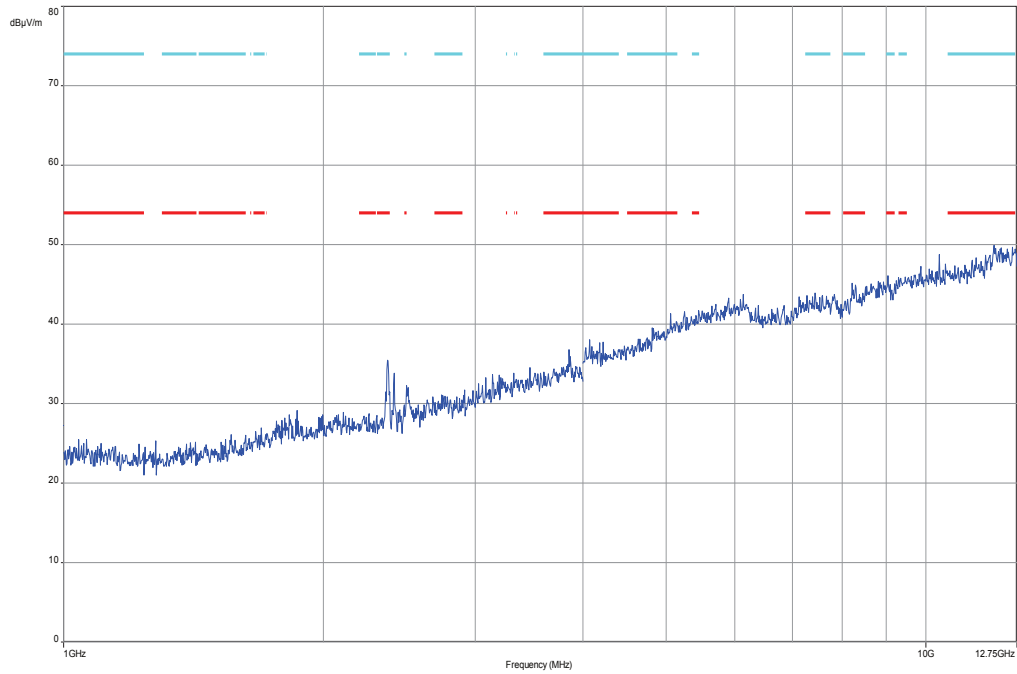
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

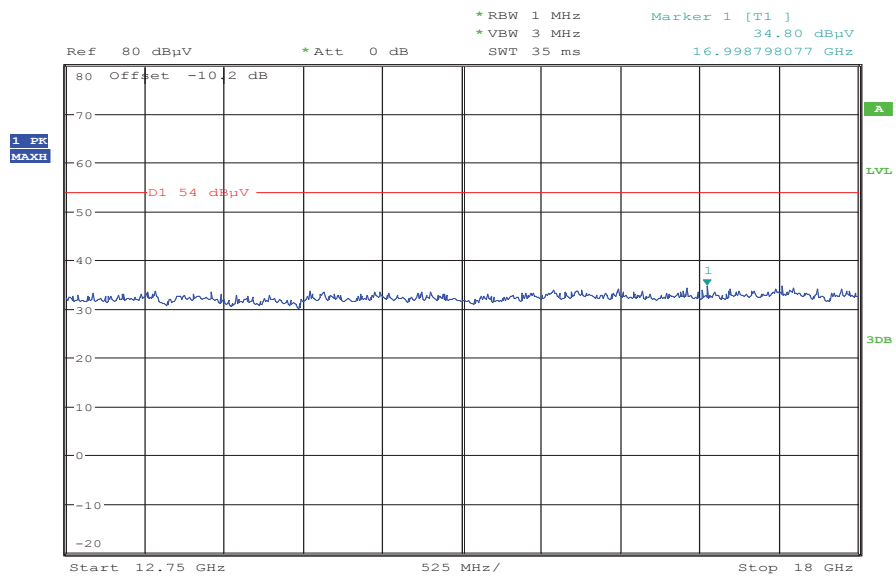
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 33.515700 | 9.1 | 1000.0 | 120.000 | 141.0 | V | 190.0 | 12.9 | 20.9 | 30.0 | |
| 46.985850 | 14.8 | 1000.0 | 120.000 | 120.0 | V | 100.0 | 13.3 | 15.2 | 30.0 | |
| 488.124150 | 14.6 | 1000.0 | 120.000 | 170.0 | V | 265.0 | 18.5 | 21.4 | 36.0 | |
| 602.111100 | 17.5 | 1000.0 | 120.000 | 155.0 | H | 270.0 | 20.8 | 18.5 | 36.0 | |
| 725.955600 | 19.9 | 1000.0 | 120.000 | 170.0 | H | -5.0 | 23.1 | 16.1 | 36.0 | |
| 871.845300 | 21.7 | 1000.0 | 120.000 | 98.0 | H | 190.0 | 24.8 | 14.3 | 36.0 | |

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



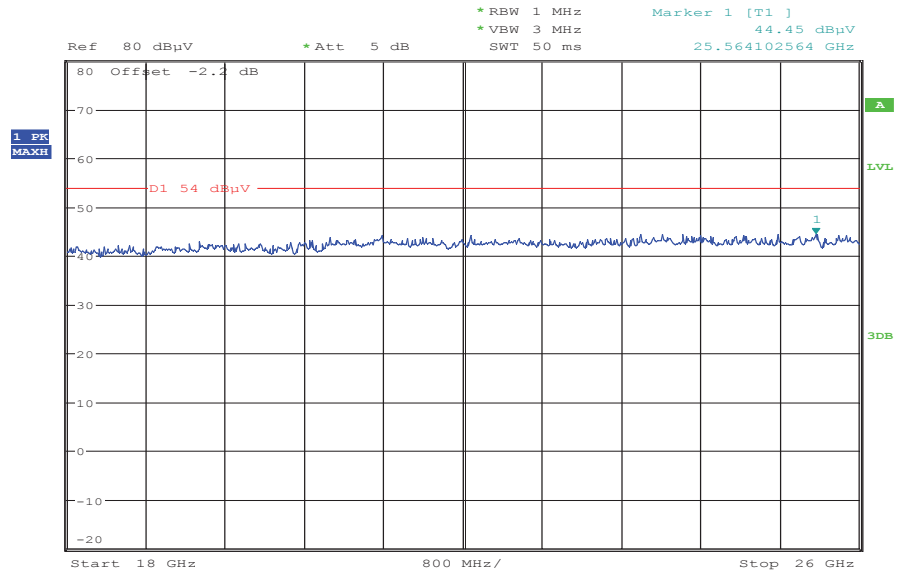
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:26:40

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:40:54

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

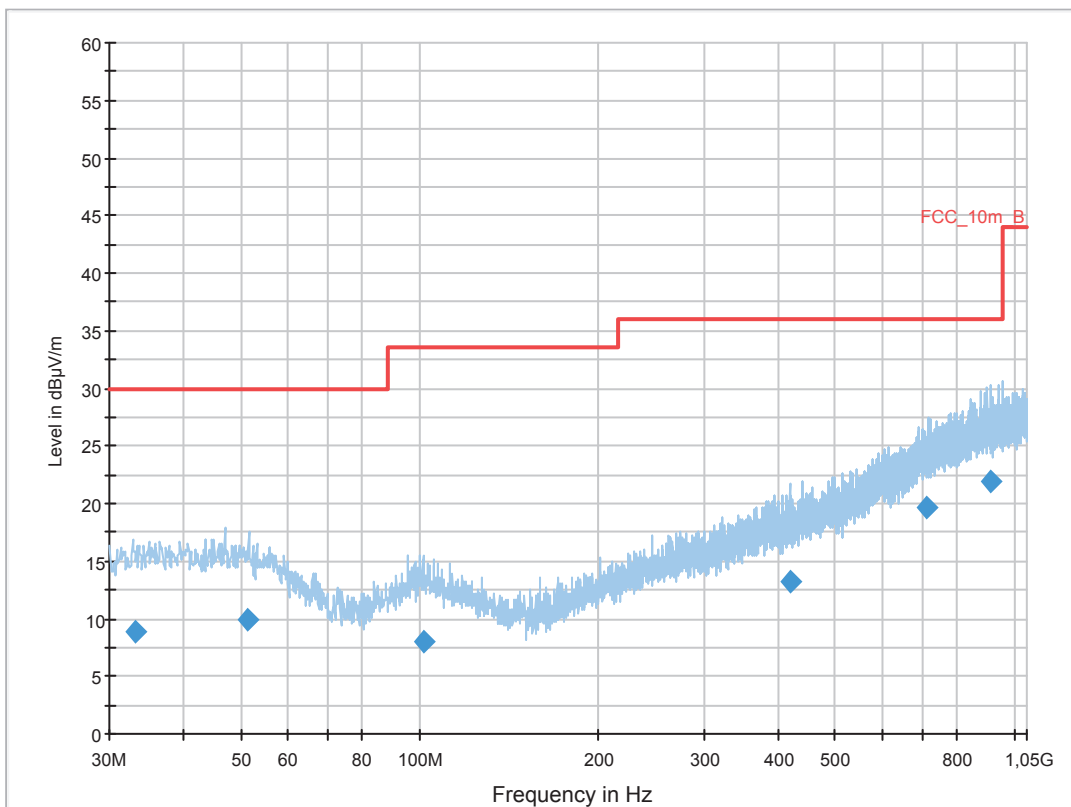
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan n mode CH7 mcs0
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

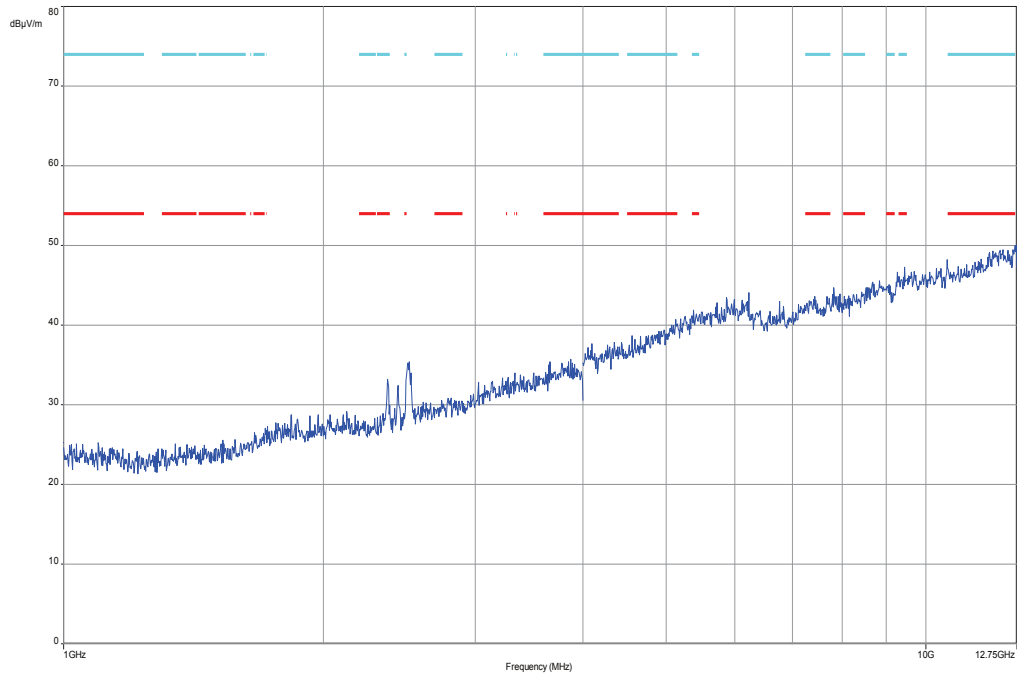
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

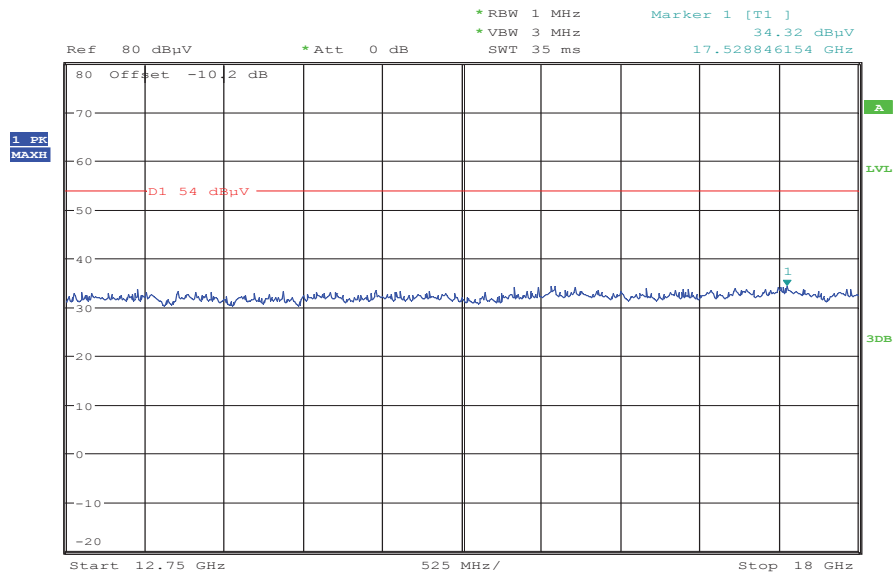
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 33.219150 | 8.9 | 1000.0 | 120.000 | 170.0 | H | 10.0 | 12.8 | 21.1 | 30.0 | |
| 51.089400 | 9.9 | 1000.0 | 120.000 | 170.0 | V | 272.0 | 13.3 | 20.1 | 30.0 | |
| 101.636700 | 7.9 | 1000.0 | 120.000 | 170.0 | V | 261.0 | 11.8 | 25.6 | 33.5 | |
| 419.057250 | 13.2 | 1000.0 | 120.000 | 170.0 | H | 10.0 | 17.2 | 22.8 | 36.0 | |
| 714.875100 | 19.6 | 1000.0 | 120.000 | 170.0 | V | 190.0 | 22.9 | 16.4 | 36.0 | |
| 913.422000 | 21.9 | 1000.0 | 120.000 | 122.0 | H | 87.0 | 25.2 | 14.1 | 36.0 | |

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



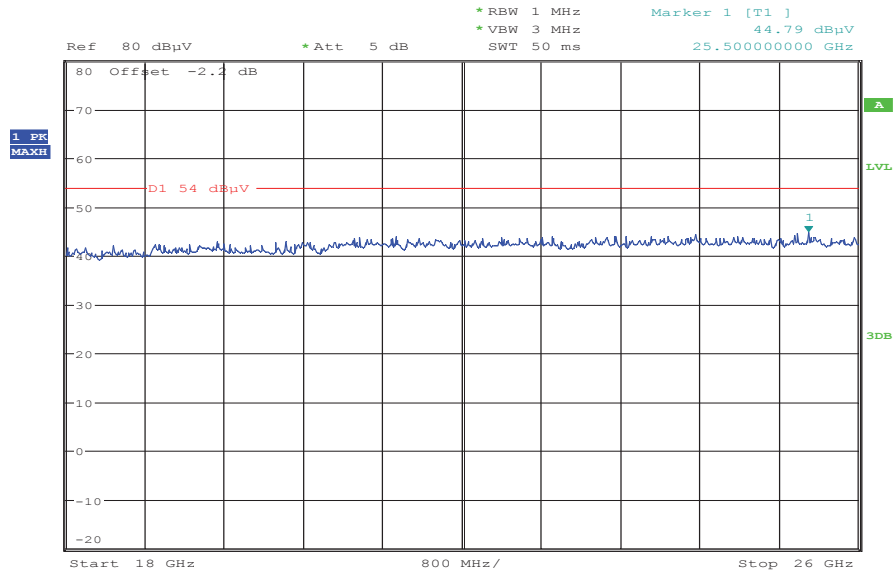
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:27:48

Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:41:56

Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

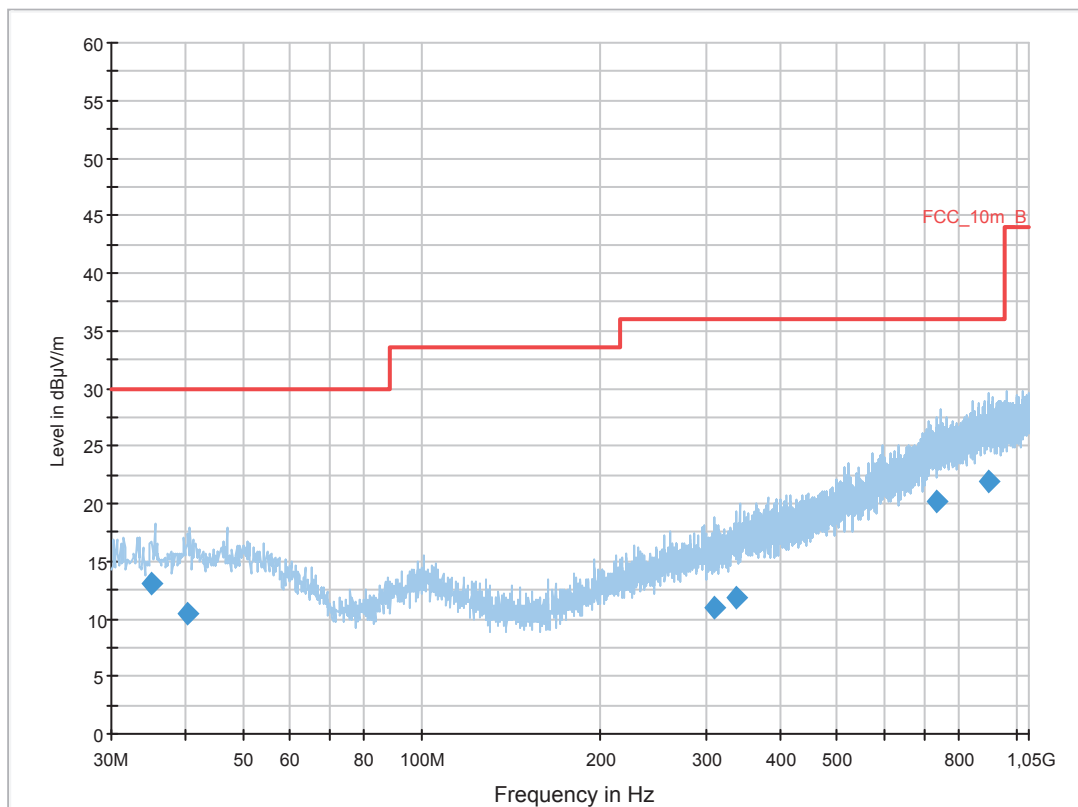
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan n mode CH11 mcs0
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

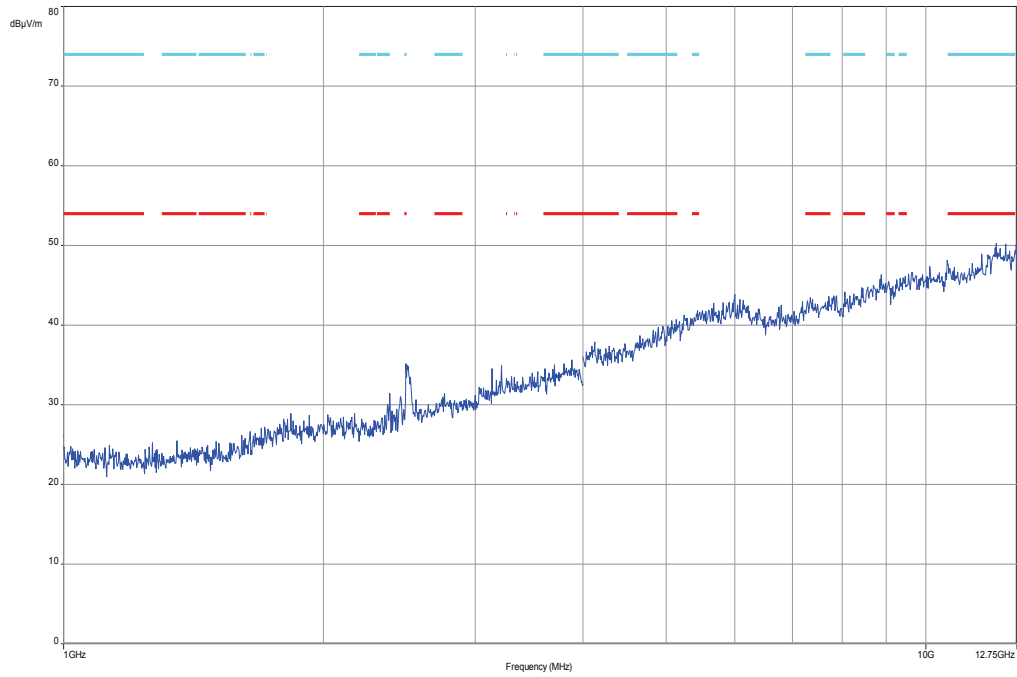
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |



Final Result 1

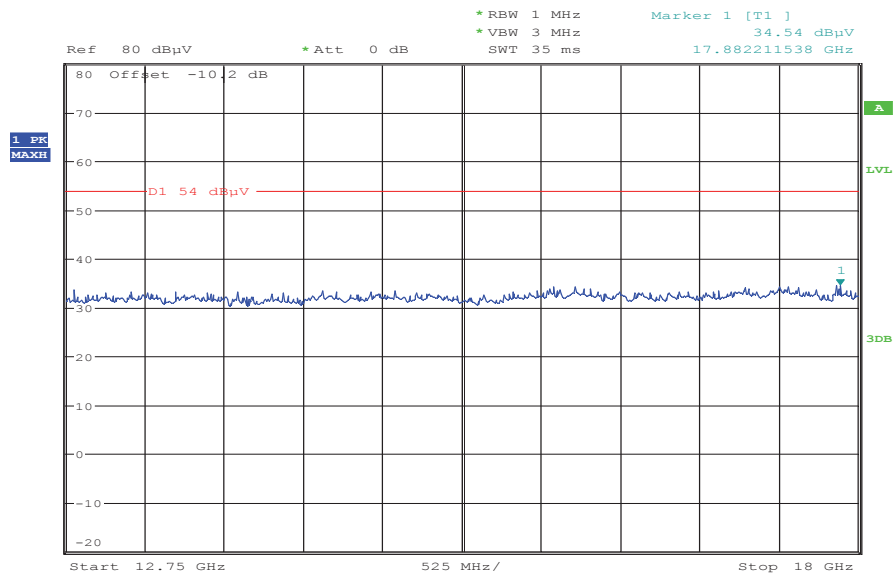
| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 35.022000 | 13.0 | 1000.0 | 120.000 | 98.0 | V | 190.0 | 13.0 | 17.0 | 30.0 | |
| 40.397700 | 10.4 | 1000.0 | 120.000 | 170.0 | V | 272.0 | 13.4 | 19.6 | 30.0 | |
| 310.098450 | 10.9 | 1000.0 | 120.000 | 170.0 | V | 10.0 | 14.8 | 25.1 | 36.0 | |
| 338.662650 | 11.8 | 1000.0 | 120.000 | 170.0 | H | 190.0 | 15.7 | 24.2 | 36.0 | |
| 733.841850 | 20.1 | 1000.0 | 120.000 | 170.0 | H | 190.0 | 23.3 | 15.9 | 36.0 | |
| 899.770050 | 21.8 | 1000.0 | 120.000 | 170.0 | V | 92.0 | 25.2 | 14.2 | 36.0 | |

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



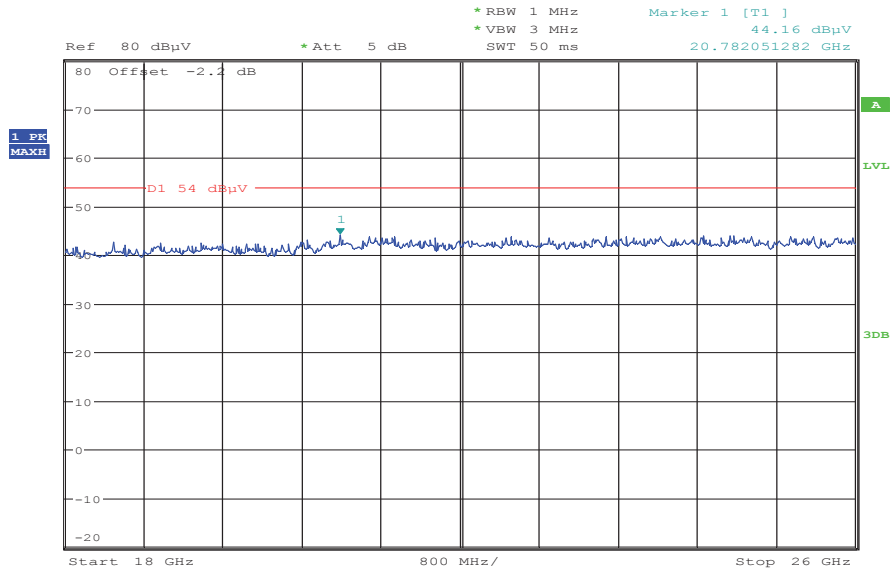
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:29:01

Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 11:42:45

9.12 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for both modes.

Measurement:

| Measurement parameter | |
|-----------------------|--|
| Detector: | Peak / Quasi Peak / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz |
| Video bandwidth: | Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz |
| Span: | 30 MHz to 25 GHz |
| Trace-Mode: | Max Hold |

Limits:

| FCC | | IC |
|--------------------------------|-------------------------------|----------------------|
| RX Spurious Emissions Radiated | | |
| Frequency (MHz) | Field Strength (dB μ V/m) | Measurement distance |
| 30 - 88 | 30.0 | 10 |
| 88 – 216 | 33.5 | 10 |
| 216 – 960 | 36.0 | 10 |
| Above 960 | 54.0 | 3 |

Results:

| RX Spurious Emissions Radiated [dB μ V/m] | | |
|--|----------|----------------------|
| F [MHz] | Detector | Level [dB μ V/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| | | |
| | | |
| | | |
| | | |
| Measurement uncertainty | ± 3 dB | |

Result: Passed.

Plots: RX / Idle – mode

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization

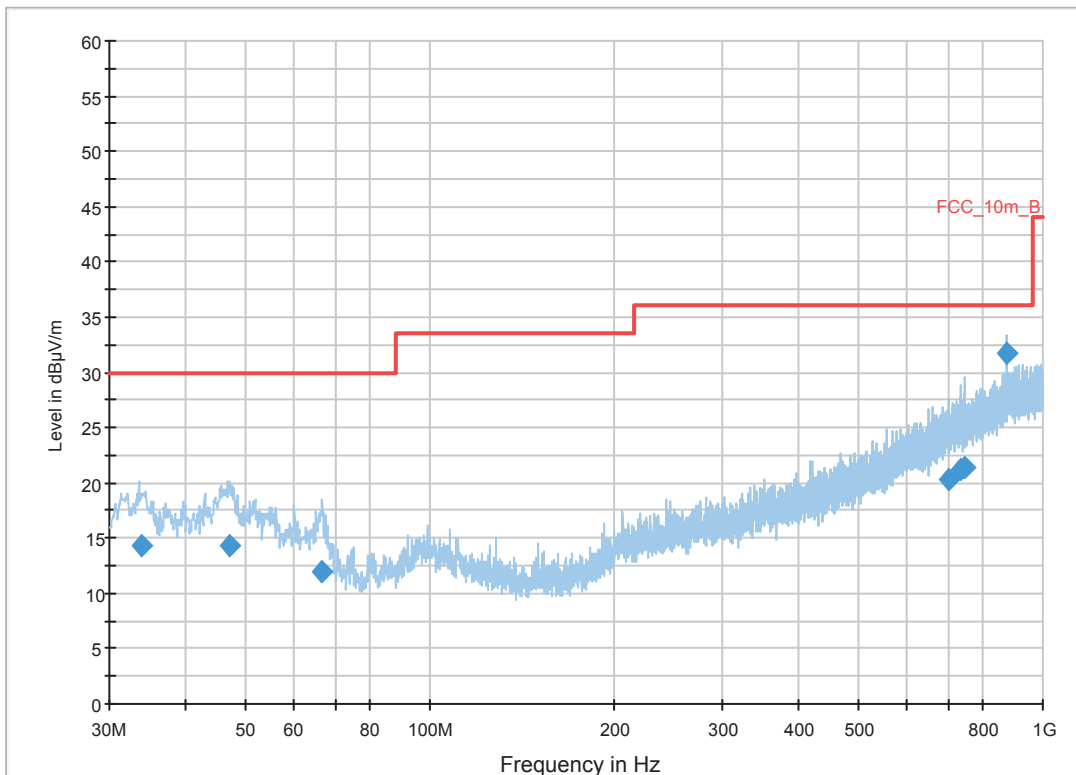
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: Idle + charging
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: GSM_N85_Fin [EMI radiated]

Hardware Setup: Electric Field (N850)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

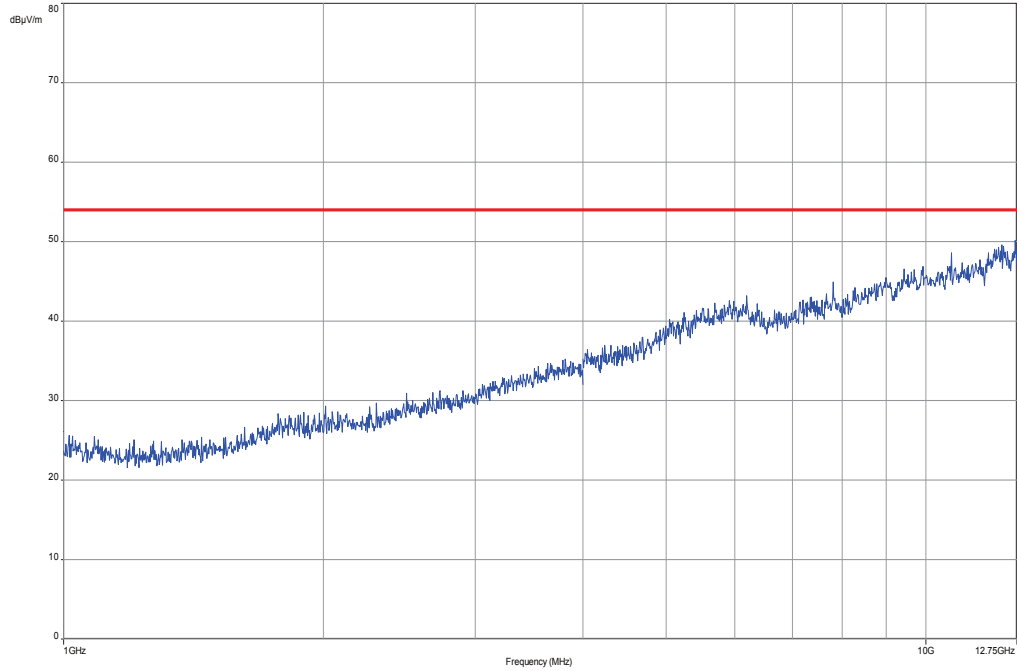
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 1 GHz | 60 kHz | QPK | 120 kHz | 5 s | 20 dB |
| GSM_850TCH | | | | | |



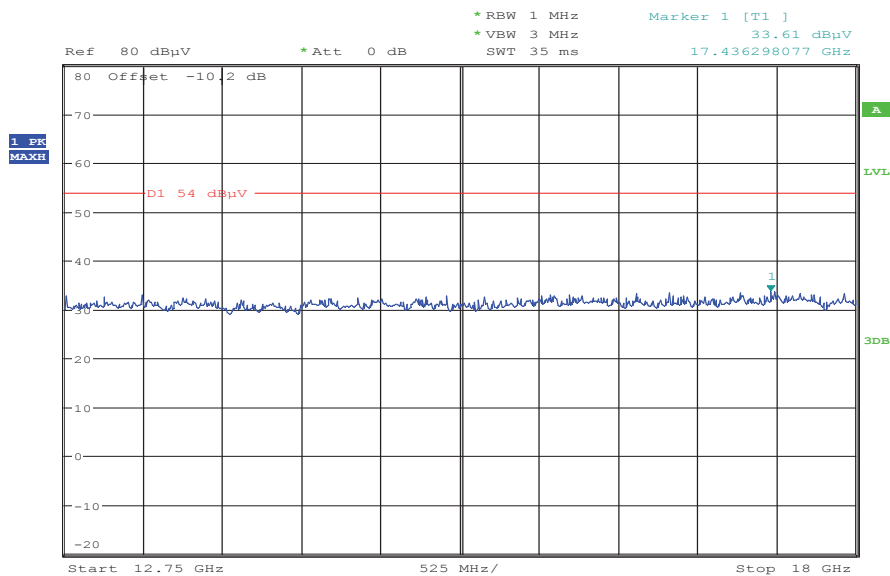
Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|---------|
| 33.720550 | 14.3 | 5000.0 | 120.000 | 185.0 | V | 253.0 | 13.0 | 15.7 | 30.0 | |
| 47.292000 | 14.3 | 5000.0 | 120.000 | 145.0 | V | 127.0 | 13.4 | 15.7 | 30.0 | |
| 66.778650 | 12.0 | 5000.0 | 120.000 | 400.0 | V | 214.0 | 10.1 | 18.0 | 30.0 | |
| 701.084300 | 20.4 | 5000.0 | 120.000 | 239.0 | H | 232.0 | 23.1 | 15.6 | 36.0 | |
| 736.429550 | 21.2 | 5000.0 | 120.000 | 200.0 | H | 117.0 | 24.0 | 14.8 | 36.0 | |
| 744.357000 | 21.3 | 5000.0 | 120.000 | 200.0 | H | 185.0 | 24.1 | 14.7 | 36.0 | |
| 876.072550 | 31.8 | 5000.0 | 120.000 | 100.0 | H | 228.0 | 25.8 | 4.2 | 36.0 | |

Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization

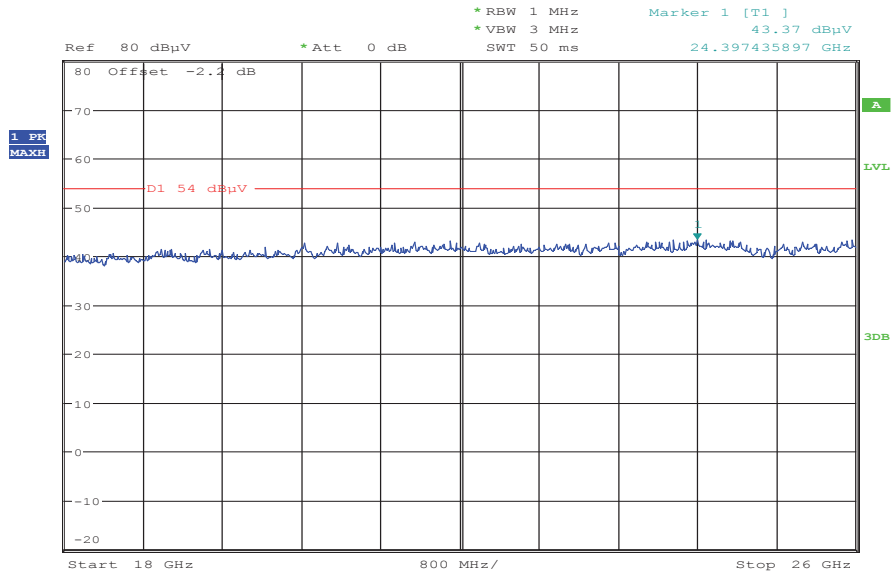


Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 16:25:55

Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 16:26:54

9.13 Spurious emissions radiated < 30 MHz

Not performed! Tests according to manufacturer test plan!

9.14 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If critical peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

| Measurement parameter | |
|-----------------------|--|
| Detector: | Peak - Quasi Peak / Average |
| Sweep time: | Auto |
| Video bandwidth: | F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz |
| Resolution bandwidth: | F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz |
| Span: | 9 kHz to 30 MHz |
| Trace-Mode: | Max Hold |

Limits:

| FCC | | IC |
|--|---------------------|------------------|
| TX Spurious Emissions Conducted < 30 MHz | | |
| Frequency (MHz) | Quasi-Peak (dBµV/m) | Average (dBµV/m) |
| 0.15 – 0.5 | 66 to 56* | 56 to 46* |
| 0.5 – 5 | 56 | 46 |
| 5 – 30.0 | 60 | 50 |

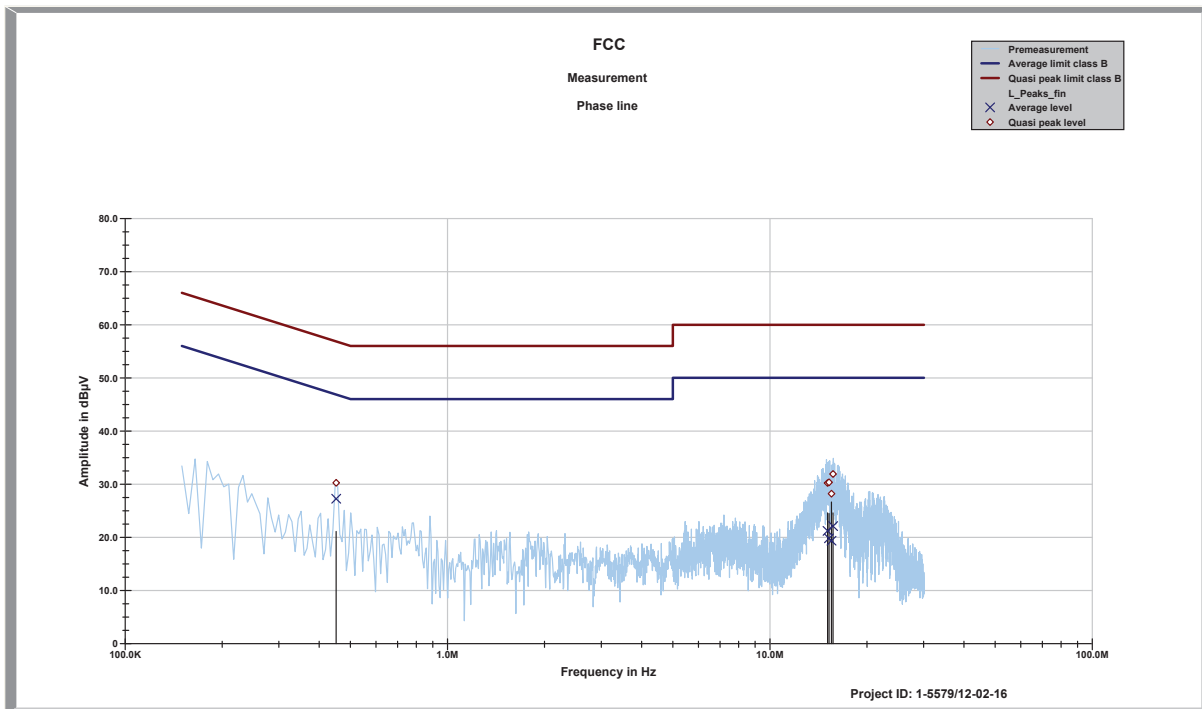
*Decreases with the logarithm of the frequency

Results:

| TX Spurious Emissions Conducted < 30 MHz [dBµV/m] | | |
|--|----------|----------------|
| F [MHz] | Detector | Level [dBµV/m] |
| All detected peak values are below the average limits. | | |
| Measurement uncertainty | ± 3 dB | |

Result: Passed

Plots:



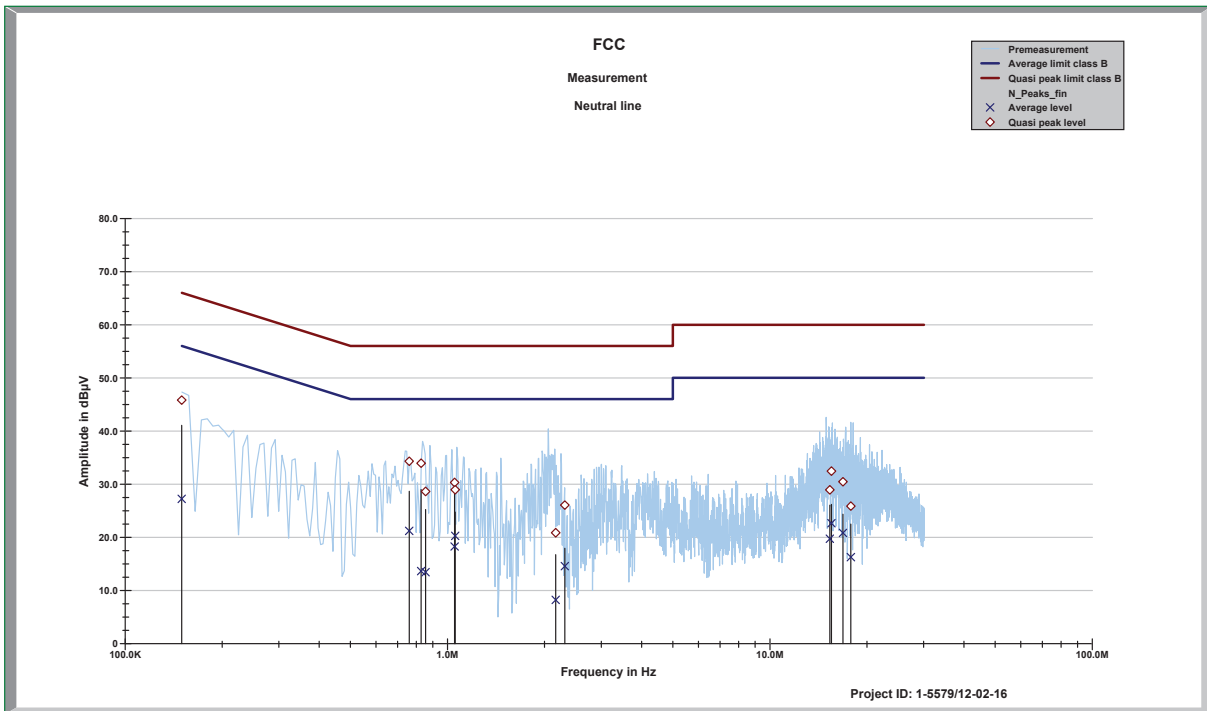
FCC
Phase line tbl

Project ID: 1-5579/12-02-16

01:35:41 PM, Thursday, February 28, 2013

| Frequency | Quasi peak level | Margin quasi peak | Average level | Margin average |
|-----------|------------------|-------------------|---------------|----------------|
| MHz | dBµV | dBµV | dBµV | dBµV |
| 0.45148 | 30.26 | 26.59 | 27.25 | 20.13 |
| 15.074 | 30.21 | 29.79 | 21.22 | 28.78 |
| 15.241 | 30.33 | 29.67 | 19.81 | 30.19 |
| 15.517 | 28.19 | 31.81 | 19.36 | 30.64 |
| 15.689 | 31.91 | 28.09 | 22.10 | 27.90 |

Project ID - 1-5579/12-02-16
 EUT - RFM121LW
 Serial Number - 990002430024636
 Operating mode - W-LAN b-mode + charging; 115V AC/60Hz



FCC
Neutral line tbl

Project ID: 1-5579/12-02-16

01:35:41 PM, Thursday, February 28, 2013

| Frequency | Quasi peak level | Margin quasi peak | Average level | Margin average |
|-----------|------------------|-------------------|---------------|----------------|
| MHz | dBµV | dBµV | dBµV | dBµV |
| 0.14985 | 45.82 | NAN | 27.23 | NAN |
| 0.76069 | 34.30 | 21.70 | 21.21 | 24.79 |
| 0.828 | 33.94 | 22.06 | 13.66 | 32.34 |
| 0.85469 | 28.64 | 27.36 | 13.45 | 32.55 |
| 1.05167 | 30.31 | 25.69 | 18.27 | 27.73 |
| 1.05554 | 28.95 | 27.05 | 20.27 | 25.73 |
| 2.1652 | 20.87 | 35.13 | 8.22 | 37.78 |
| 2.3106 | 26.07 | 29.93 | 14.58 | 31.42 |
| 15.332 | 28.93 | 31.07 | 19.72 | 30.28 |
| 15.507 | 32.45 | 27.55 | 22.65 | 27.35 |
| 16.834 | 30.46 | 29.54 | 20.83 | 29.17 |
| 17.809 | 25.87 | 34.13 | 16.28 | 33.72 |

Project ID - 1-5579/12-02-16
 EUT - RFM121LW
 Serial Number - 990002430024636
 Operating mode - W-LAN b-mode + charging; 115V AC/60Hz

10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|---|---|------------------------|----------------------------|--------------------|------------------------|---------------------|---------------------|
| 1 | 45 | Switch-Unit | 3488A | HP Meßtechnik | 2719A14505 | 300000368 | g | | |
| 2 | 50 | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP Meßtechnik | 2920A04466 | 300000580 | ne | | |
| 3 | n. a. | software | SPS_PHE 1.4f | Spitzberger & Spieß | B5981; 5D1081;B597 9 | 300000210 | ne | | |
| 4 | n. a. | EMI Test Receiver | ESCI 3 | R&S | 100083 | 300003312 | k | 09.01.2013 | 09.01.2014 |
| 5 | n. a. | Analyzer- Reference- System (Harmonics and Flicker) | ARS 16/1 | SPS | A3509 07/0 0205 | 300003314 | k | 14.07.2011 | 14.07.2013 |
| 6 | n. a. | Amplifier | JS42- 00502650- 28-5A | MITEQ | 1084532 | 300003379 | ev | | |
| 7 | n. a. | Antenna Tower | Model 2175 | ETS- LINDGREN | 64762 | 300003745 | izw | | |
| 8 | n. a. | Positioning Controller | Model 2090 | ETS- LINDGREN | 64672 | 300003746 | izw | | |
| 9 | n. a. | Turntable Interface-Box | Model 105637 | ETS- LINDGREN | 44583 | 300003747 | izw | | |
| 10 | n. a. | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbe ck | 295 | 300003787 | k | 12.04.2012 | 12.04.2014 |
| 11 | n. a. | Spectrum- Analyzer | FSU26 | R&S | 200809 | 300003874 | k | 16.01.2013 | 16.01.2014 |
| 12 | n. a. | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP Meßtechnik | 2818A03450 | 300001040 | Ve | 12.01.2012 | 12.01.2015 |
| 13 | n. a. | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 | viKI! | 11.05.2011 | 11.05.2013 |
| 14 | n. a. | Active Loop Antenna | 6502 | EMCO | 2210 | 300001015 | ne | | |
| 15 | n. a. | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | ev | | |
| 16 | n. a. | Switch / Control Unit | 3488A | HP Meßtechnik | * | 300000199 | ne | | |
| 17 | n. a. | Switch / Control Unit | 3488A | HP Meßtechnik | 2719A15013 | 300001156 | ne | | |
| 18 | 9 | Isolating Transformer | MPL IEC625 Bus Regeltrennt ravo | Erfi | 91350 | 300001155 | ne | | |
| 19 | n. a. | Three-Way Power Splitter, 50 Ohm | 11850C | HP Meßtechnik | | 300000997 | ne | | |
| 20 | n. a. | Amplifier | js42- 00502650- 28-5a | Parzich GMBH | 928979 | 300003143 | ne | | |
| 21 | n. a. | Band Reject filter | WRCG240 0/2483- 2375/2505- 50/10SS | Wainwright | 11 | 300003351 | ev | | |
| 22 | n. a. | TRILOG Broadband Test-Antenna | VULB9163 | Schwarzbe ck | 371 | 300003854 | viKI! | 14.10.2011 | 14.10.2014 |

| | | | | | | | | | |
|----|-------|--|-----------------|----------------------|------------|-----------|----|------------|------------|
| | | 30 MHz - 3 GHz | | | | | | | |
| 23 | n. a. | MXE EMI Receiver 20 Hz bis 26,5 GHz | N9038A | Agilent Technologies | MY51210197 | 300004405 | k | 21.02.2013 | 21.02.2014 |
| 24 | 11b | Microwave System Amplifier, 0.5-26.5 GHz | 83017A | HP Meßtechnik | 00419 | 300002268 | ev | | |
| 25 | A025 | Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | | 300000786 | ne | | |
| 26 | A027 | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | | 300000486 | ne | | |
| 27 | n. a. | Std. Gain Horn Antenna 26.5-40.0 GHz | V637 | Narda | 7911 | 300001752 | ne | | |
| 28 | n. a. | Broadband Low Noise Amplifier 18-50 GHz | CBL18503 070-XX | CERNEX | 19338 | 300004273 | ne | | |
| 29 | n. a. | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 22.10.2012 | 22.10.2013 |

Agenda: Kind of Calibration

- | | | | |
|------|--|-----|--|
| k | calibration / calibrated | EK | limited calibration |
| ne | not required (k, ev, izw, zw not required) | zw | cyclical maintenance (external cyclical maintenance) |
| ev | periodic self verification | izw | internal cyclical maintenance |
| Ve | long-term stability recognized | g | blocked for accredited testing |
| vk!! | Attention: extended calibration interval | * | next calibration ordered / currently in progress |
| NK! | Attention: not calibrated | | |

11 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A Document history

| Version | Applied changes | Date of release |
|---------|--------------------------|-----------------|
| 1.0 | Initial release | 2013-03-27 |
| -A | Addition of PIN | 2013-04-02 |
| -B | Changed standard version | 2013-04-04 |

Annex B Further information

Glossary

| | | |
|----------|---|--|
| AVG | - | Average |
| DUT | - | Device under test |
| EMC | - | Electromagnetic Compatibility |
| EN | - | European Standard |
| EUT | - | Equipment under test |
| ETSI | - | European Telecommunications Standard Institute |
| FCC | - | Federal Communication Commission |
| FCC ID | - | Company Identifier at FCC |
| HW | - | Hardware |
| IC | - | Industry Canada |
| Inv. No. | - | Inventory number |
| N/A | - | Not applicable |
| PP | - | Positive peak |
| QP | - | Quasi peak |
| S/N | - | Serial number |
| SW | - | Software |

Annex C Accreditation Certificate

Front side of certificate

Deutsche Akkreditierungsstelle GmbH
 Befehlens gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
 Unterzeichnerin der Multilateralen Abkommen
 von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium
CETECOM ICT Services GmbH
 Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

- Drahtgebundene Kommunikation einschließlich xDSL
- VoIP und DECT
- Akustik
- Funk einschließlich WLAN
- Short Range Devices (SRD)
- RFID
- WiMax und Richtfunk
- Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
- Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
- Produktsicherheit
- SAR und Hearing Aid Compatibility (HAC)
- Umweltsimulation
- Smart Card Terminals
- Bluetooth
- Wi-Fi Services

Die Akkreditierungskunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-01

Frankfurt am Main, 18.01.2018

In Auftrag
 Dorothea Pflüger
 Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

| | | |
|--|---|--|
| Standort Berlin Spittelmarkt 10 10117 Berlin | Standort Frankfurt am Main Gartenstraße 5 60594 Frankfurt am Main | Standort Braunschweig Rundeschaue 100 38116 Braunschweig |
|--|---|--|

Die aussagefreie Veröffentlichung der Akkreditierungskunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverteilung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30). Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
 EA: www.european-accreditation.org
 ILAC: www.ilac.org
 IAF: www.iaf.ru

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>