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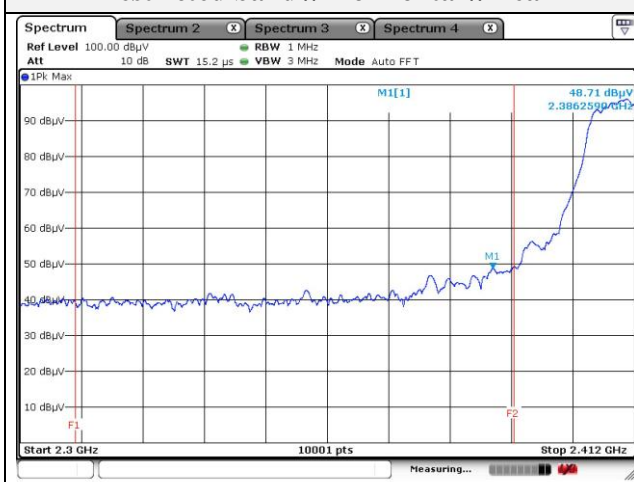
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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Report No.:

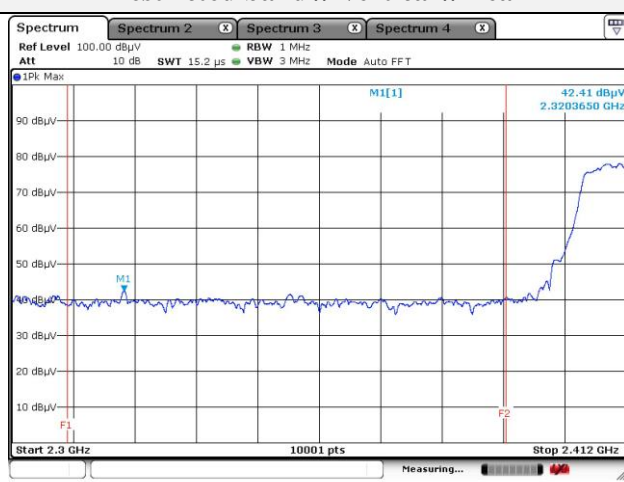
KES-RF1-22T0063

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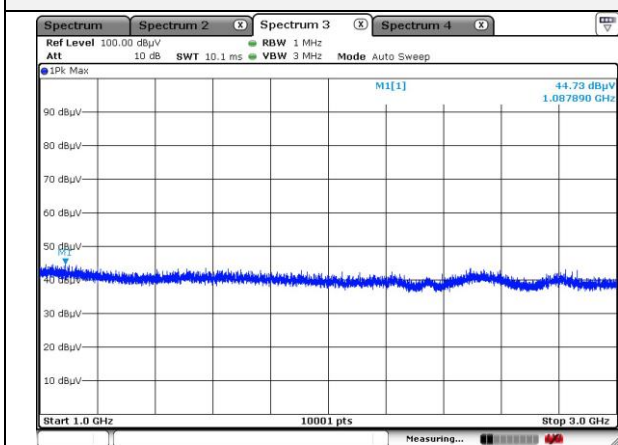
Restricted band // Horizontal // Peak



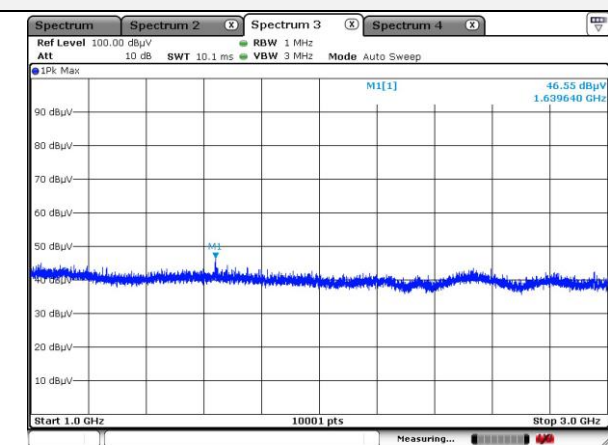
Restricted band // Vertical // Peak



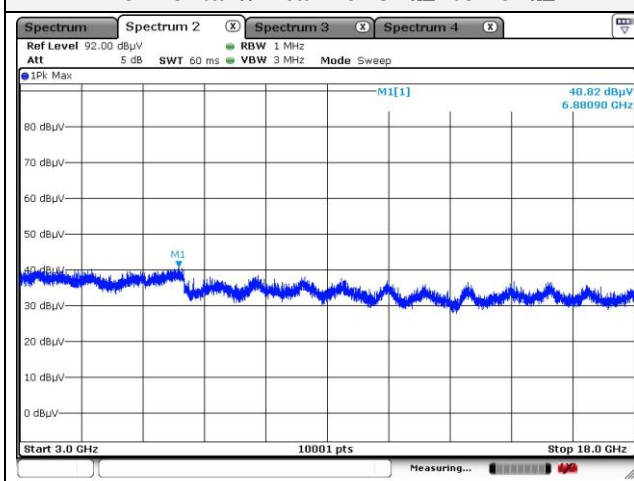
Horizontal // Peak for 1 GHz to 3 GHz



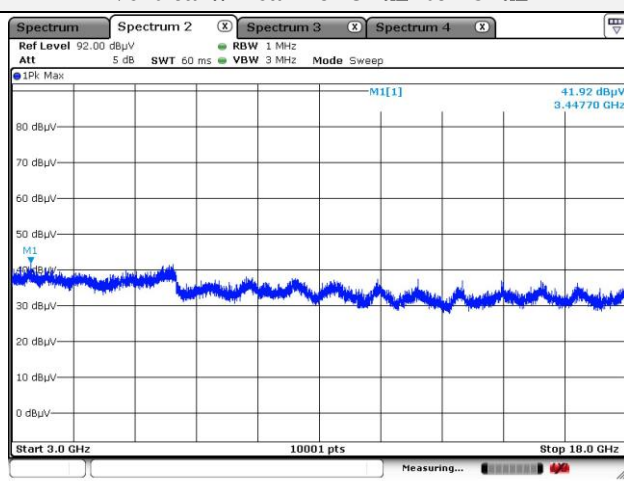
Vertical // Peak for 1 GHz to 3 GHz



Horizontal // Peak for 3 GHz to 18 GHz



Vertical // Peak for 3 GHz to 18 GHz



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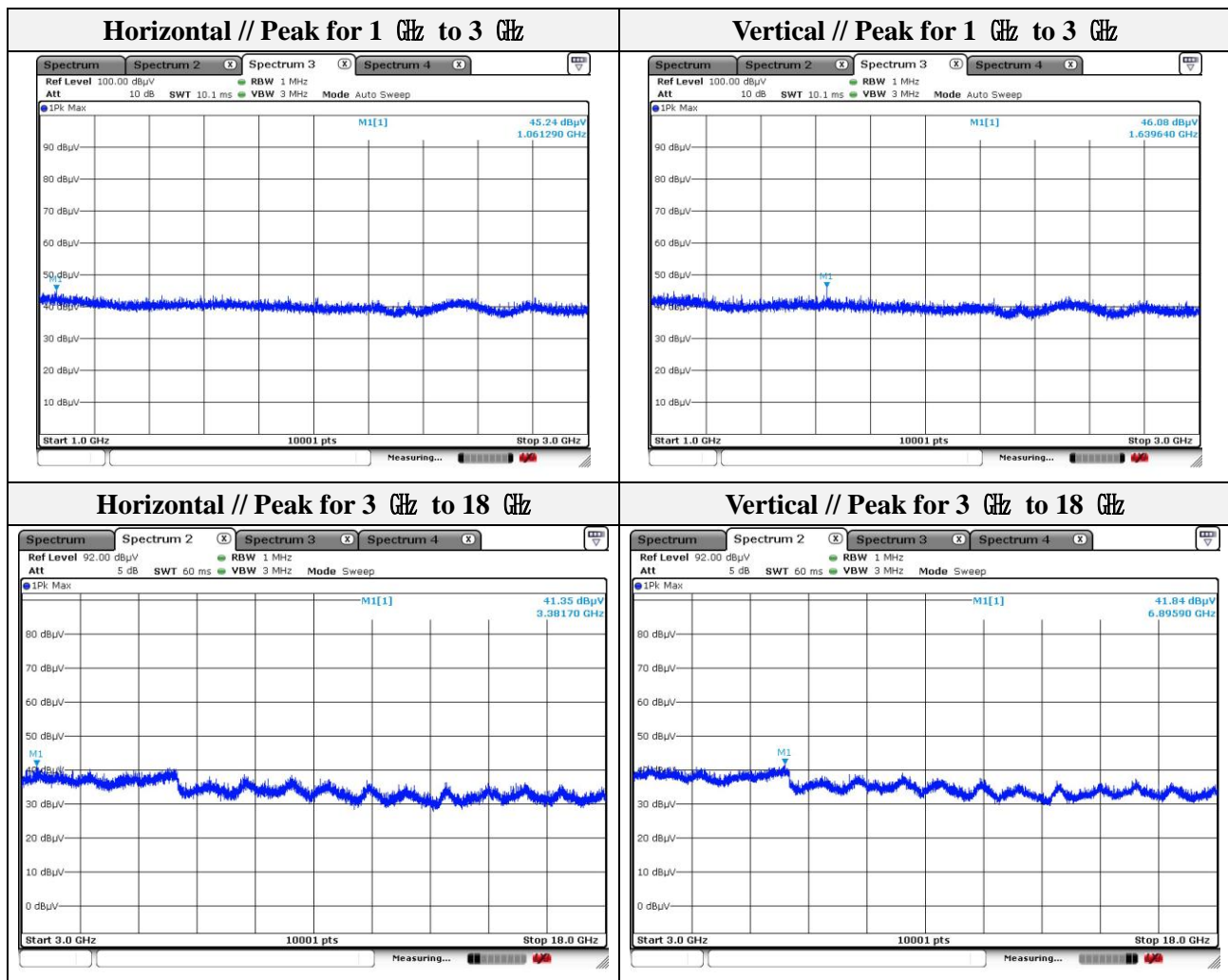
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Mode: 802.11g
Distance of measurement: 3 meter
Channel: 06

- Spurious

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|--------------|-------------|-----------------|---------|----------|-------------------------|----------------|-------------|
| 1 061.29 | 45.24 | Peak | H | -10.83 | - | 34.41 | 74.00 | 39.59 |
| 1 639.64 | 46.08 | Peak | V | -7.34 | - | 38.74 | 74.00 | 35.26 |
| 3 381.70 | 41.35 | Peak | H | -0.09 | - | 41.26 | 74.00 | 32.74 |
| 6 895.90 | 41.84 | Peak | V | 8.91 | - | 50.75 | 74.00 | 23.25 |



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Mode: 802.11g
Distance of measurement: 3 meter
Channel: 11

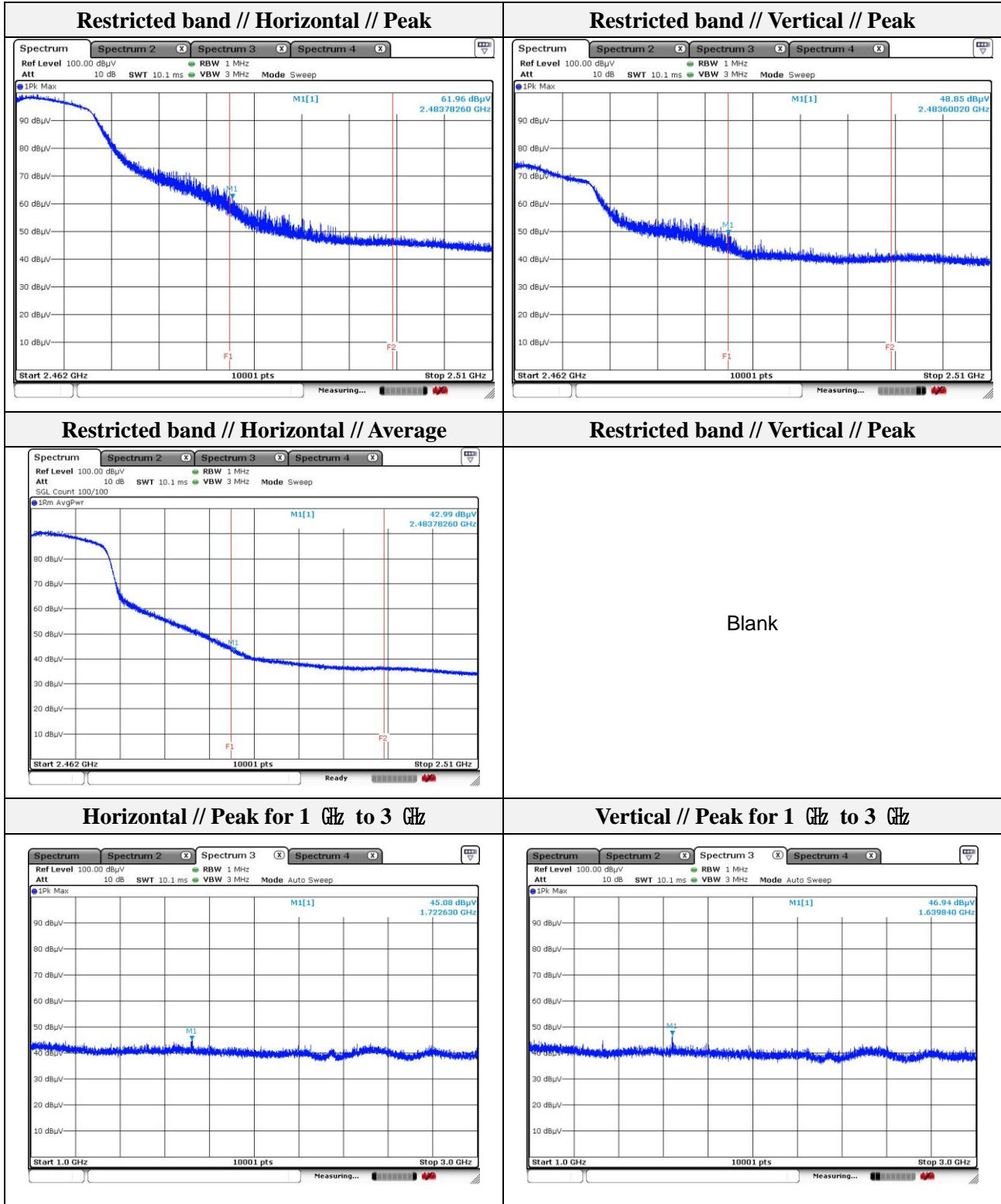
- Spurious

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------|-----------------|-------------|--------------------|------------|-------------|----------------------------|-------------------|----------------|
| 1 639.84 | 46.94 | Peak | V | -7.34 | - | 39.60 | 74.00 | 34.40 |
| 1 722.63 | 45.08 | Peak | H | -6.69 | - | 38.39 | 74.00 | 35.61 |
| 4 316.10 | 40.99 | Peak | V | 3.06 | - | 44.05 | 74.00 | 29.95 |
| 6 888.40 | 40.89 | Peak | H | 8.89 | - | 49.78 | 74.00 | 24.22 |

- Band edge

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------|-----------------|-------------|--------------------|------------|-------------|----------------------------|-------------------|----------------|
| 2 483.60 | 48.85 | Peak | V | -2.40 | - | 46.45 | 74.00 | 27.55 |
| 2 483.78 | 61.96 | Peak | H | -2.40 | - | 59.56 | 74.00 | 14.44 |
| 2 483.78 | 42.99 | Average | H | -2.40 | 0.12 | 40.59 | 54.00 | 13.29 |

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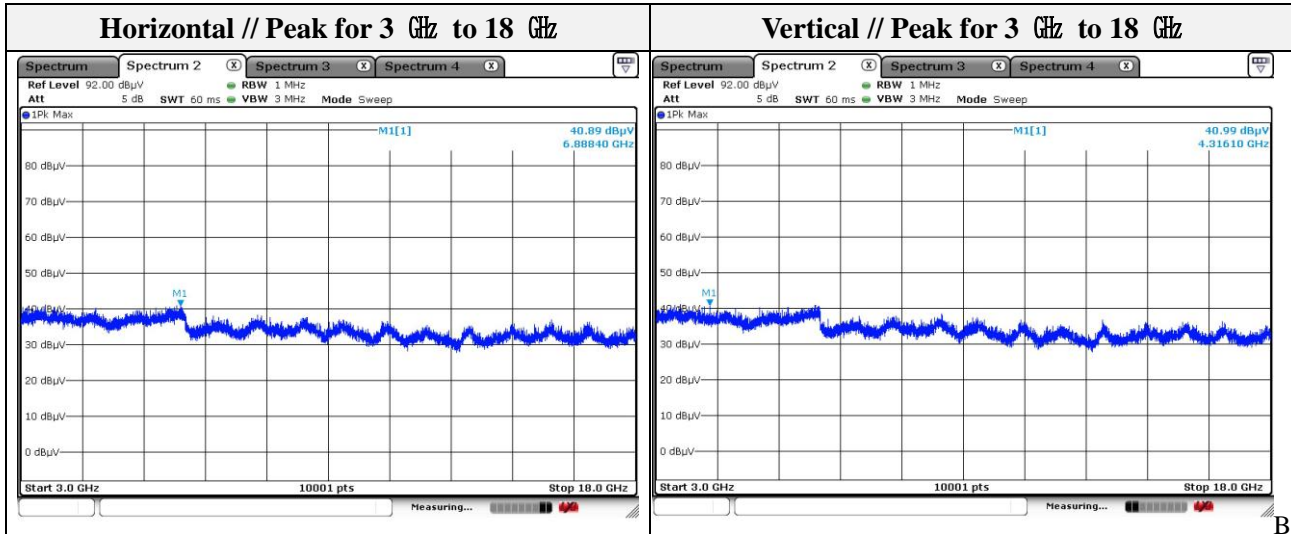
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Mode: 802.11n_HT20

Distance of measurement: 3 meter

Channel: 01

- Spurious

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------|-----------------|-------------|--------------------|------------|-------------|----------------------------|-------------------|----------------|
| 1 047.30 | 45.44 | Peak | H | -10.91 | - | 34.53 | 74.00 | 39.47 |
| 1 639.84 | 45.05 | Peak | V | -7.34 | - | 37.71 | 74.00 | 36.29 |
| 3 479.20 | 41.16 | Peak | H | 0.03 | - | 41.19 | 74.00 | 32.81 |
| 6 852.40 | 41.32 | Peak | V | 8.76 | - | 50.08 | 74.00 | 23.92 |

- Band edge

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------|-----------------|-------------|--------------------|------------|-------------|----------------------------|-------------------|----------------|
| 2 313.35 | 42.26 | Peak | V | -3.10 | - | 39.16 | 74.00 | 34.84 |
| 2 385.16 | 49.40 | Peak | H | -2.79 | - | 46.61 | 74.00 | 27.39 |

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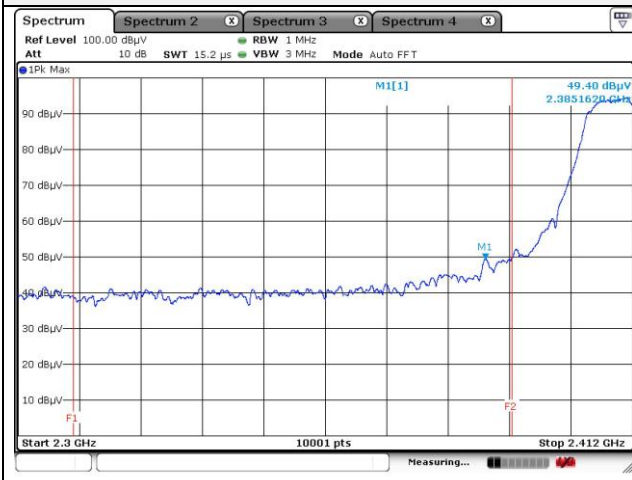
3701, 40, Simin-daero 365beon-gil,
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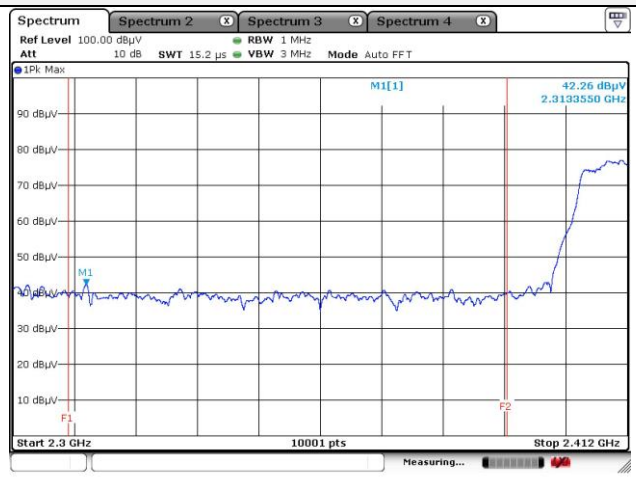
KES-RF1-22T0063

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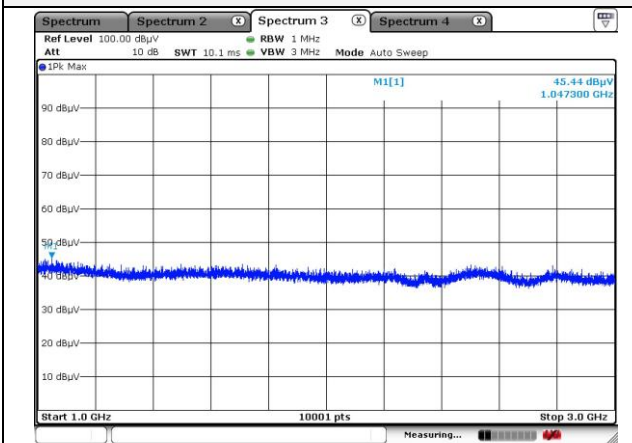
Restricted band // Horizontal // Peak



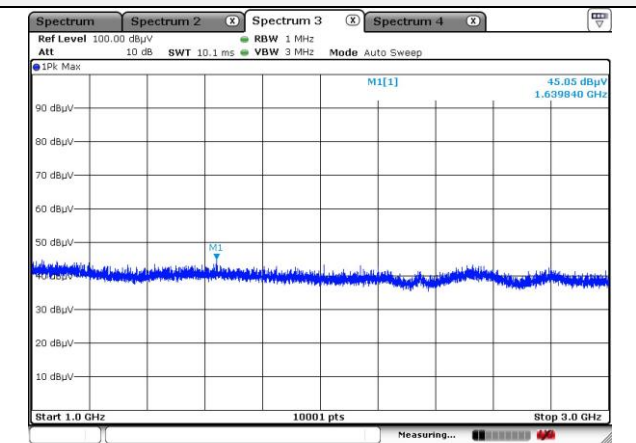
Restricted band // Vertical // Peak



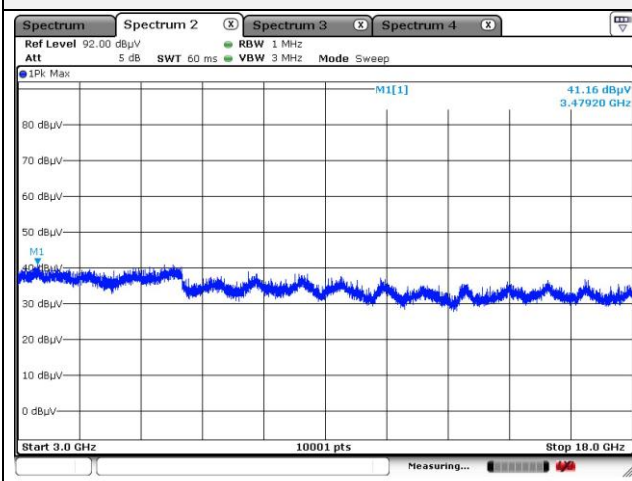
Horizontal // Peak for 1 GHz to 3 GHz



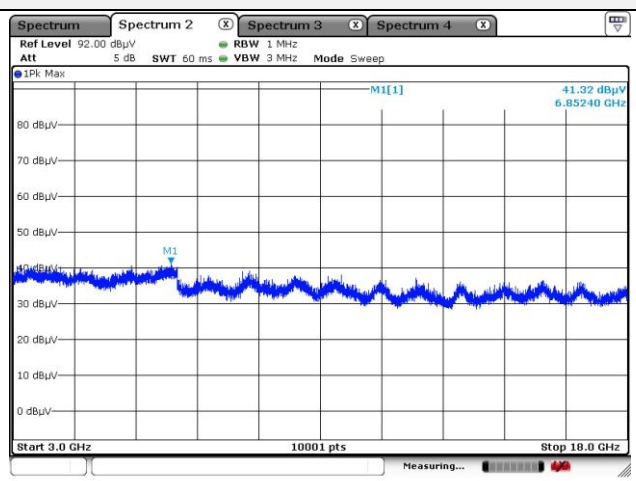
Vertical // Peak for 1 GHz to 3 GHz



Horizontal // Peak for 3 GHz to 18 GHz



Vertical // Peak for 3 GHz to 18 GHz



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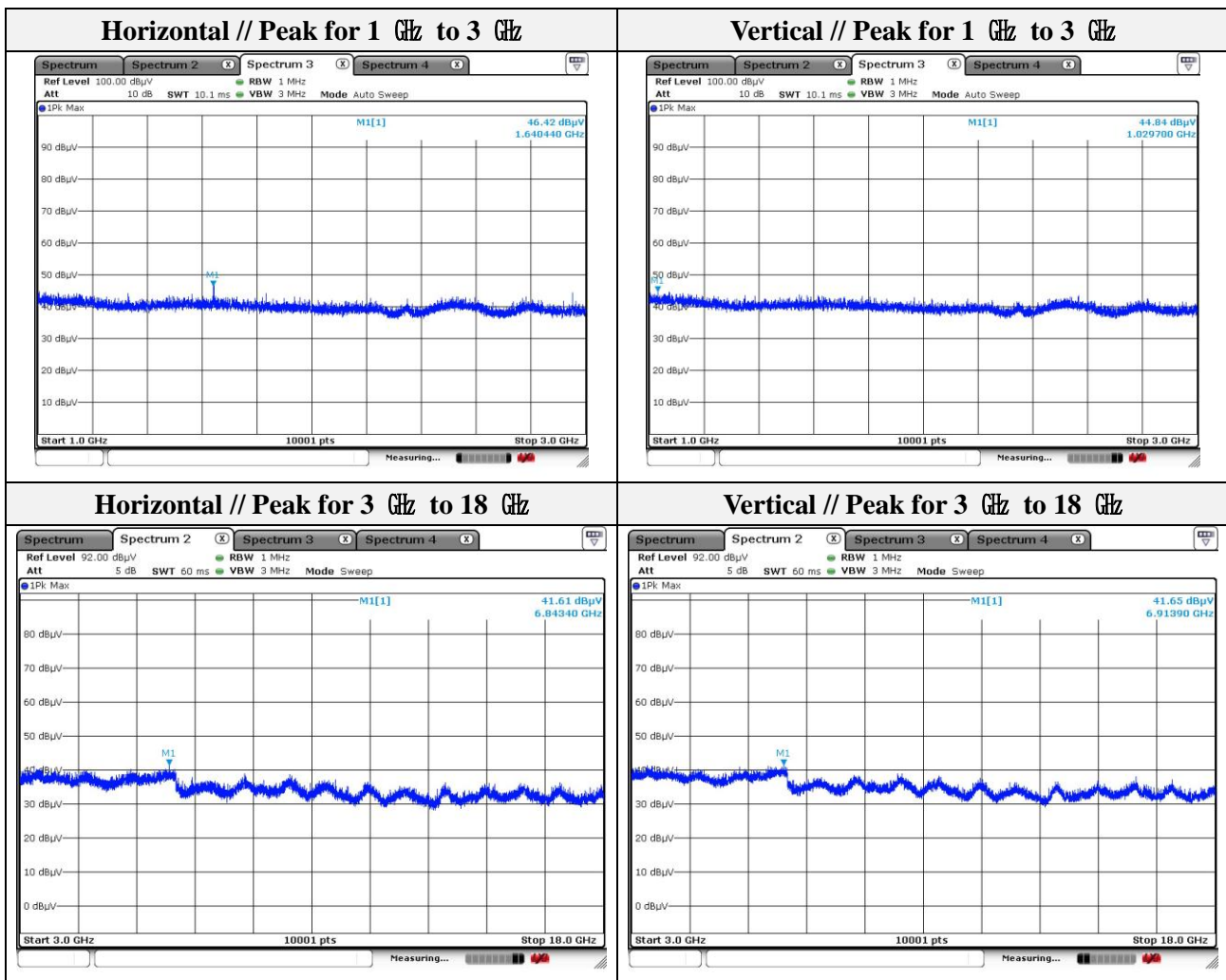
Mode: 802.11n_HT20

Distance of measurement: 3 meter

Channel: 06

- Spurious

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|--------------|-------------|-----------------|---------|----------|-------------------------|----------------|-------------|
| 1 029.70 | 44.84 | Peak | V | -11.00 | - | 33.84 | 74.00 | 40.16 |
| 1 640.44 | 46.42 | Peak | H | -7.34 | - | 39.08 | 74.00 | 34.92 |
| 6 843.40 | 41.61 | Peak | H | 8.73 | - | 50.62 | 74.00 | 23.66 |
| 6 913.90 | 41.65 | Peak | V | 8.97 | - | 50.62 | 74.00 | 23.38 |



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Mode: 802.11n_HT20
Distance of measurement: 3 meter
Channel: 11

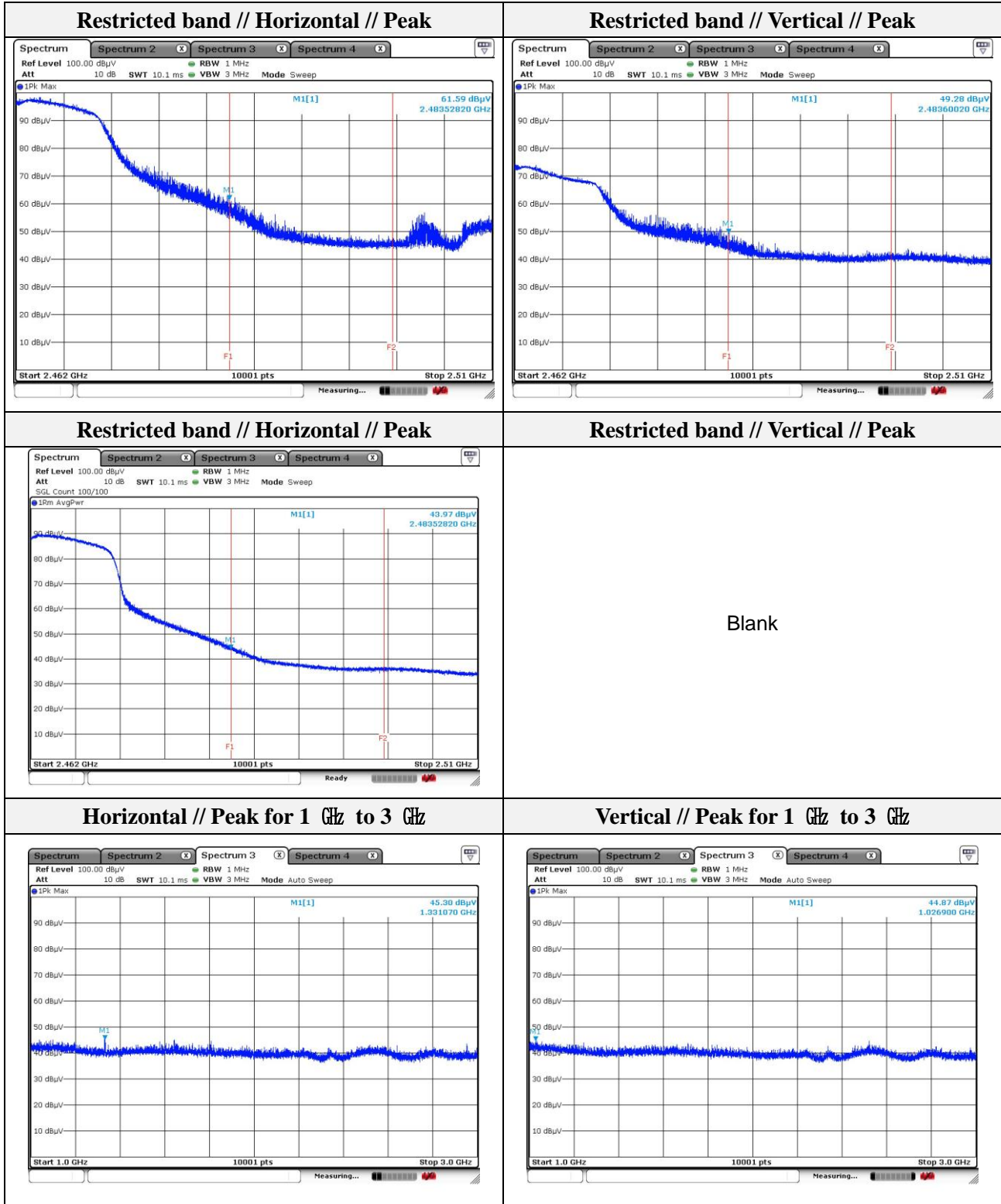
- Spurious

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------|-----------------|-------------|--------------------|------------|-------------|----------------------------|-------------------|----------------|
| 1 026.90 | 44.87 | Peak | V | -11.02 | - | 33.85 | 74.00 | 40.15 |
| 1 331.07 | 45.30 | Peak | H | -9.40 | - | 35.90 | 74.00 | 38.10 |
| 4 724.10 | 40.75 | Peak | V | 4.46 | - | 45.21 | 74.00 | 28.79 |
| 6 286.90 | 40.75 | Peak | H | 7.86 | - | 48.61 | 74.00 | 25.39 |

- Band edge

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------|-----------------|-------------|--------------------|------------|-------------|----------------------------|-------------------|----------------|
| 2 483.53 | 61.59 | Peak | H | -2.40 | - | 59.19 | 74.00 | 14.81 |
| 2 483.53 | 43.97 | Average | H | -2.40 | 0.13 | 41.57 | 54.00 | 12.30 |
| 2 483.60 | 49.28 | Peak | V | -2.40 | - | 46.88 | 74.00 | 27.12 |

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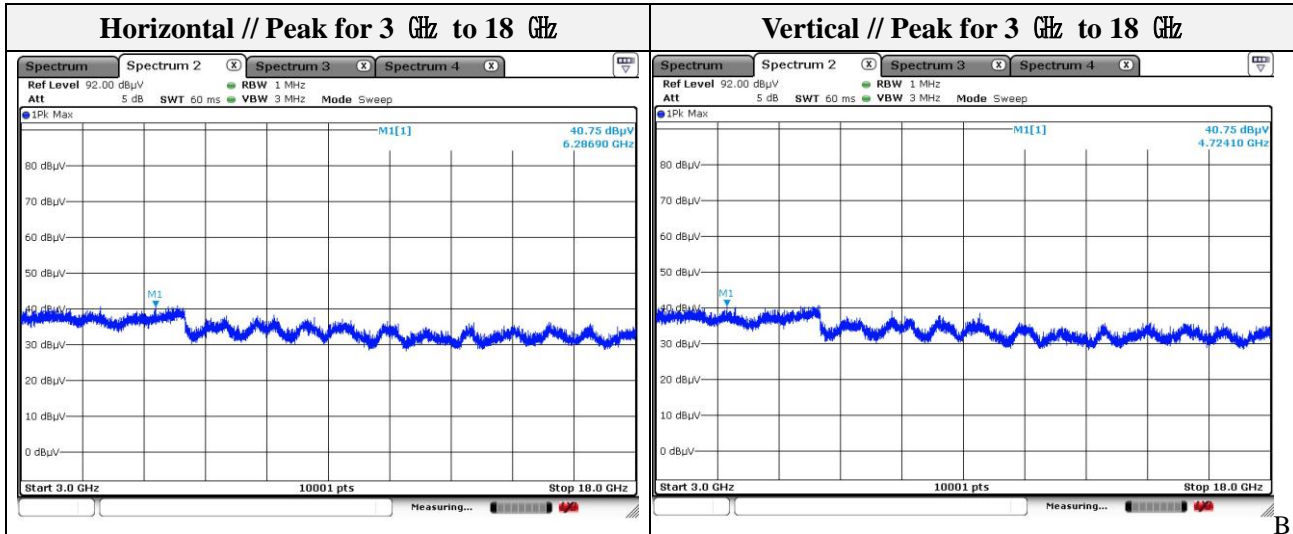
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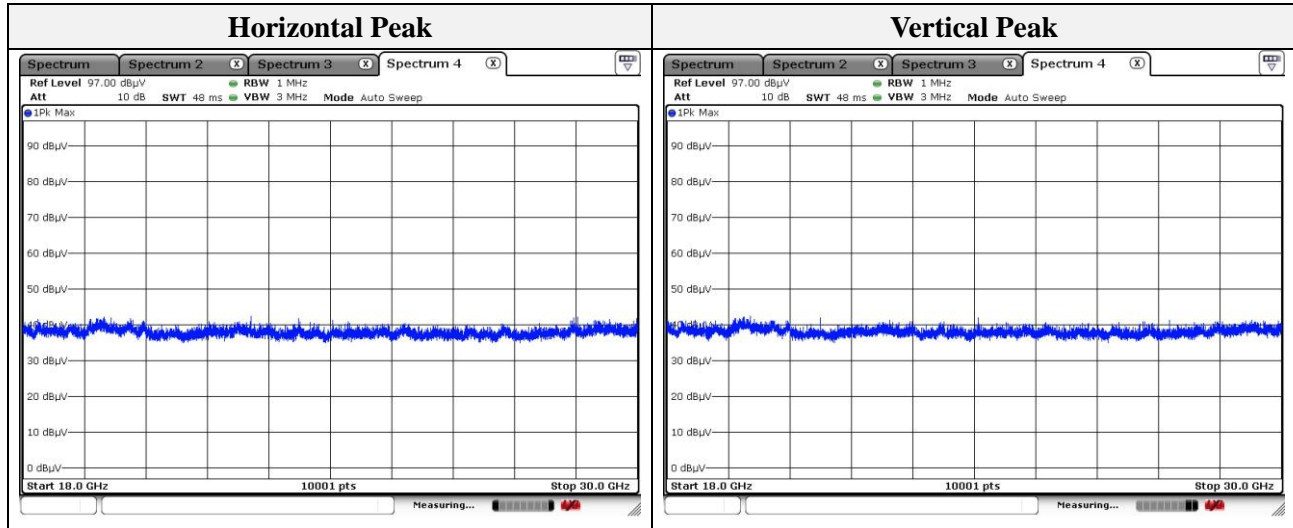
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Test results (18 GHz to 30 GHz) – Worst case

Mode: 802.11b

Distance of measurement: 3 meter

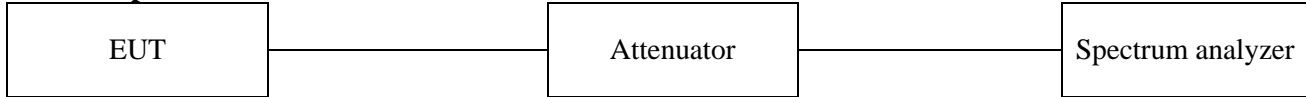
Channel: 00 (Worst case)



Note.

No spurious emission were detected above 18 GHz.

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3.5. Conducted spurious emissions & band edge**Test setup****Test procedure****Band edge**

ANSI C63.10-2013 - Section 11.11

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. Set the RBW = 100 kHz
4. Set the VBW = $[3 \times \text{RBW}]$.
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow trace to fully stabilize.

Out of band emissions

ANSI C63.10-2013 - Section 11.11

1. Start frequency was set to 30 MHz and stop frequency was set to 25 GHz for 2.4 GHz frequencies and 40 GHz for 5 GHz frequencies
2. Set the RBW = 100 kHz
3. Set the VBW = $[3 \times \text{RBW}]$.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow trace to fully stabilize.

Limit

According to 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 section 15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section 15.205(a), must also comply the radiated emission limits specified in section 15.209(a) (see section 15.205(c))

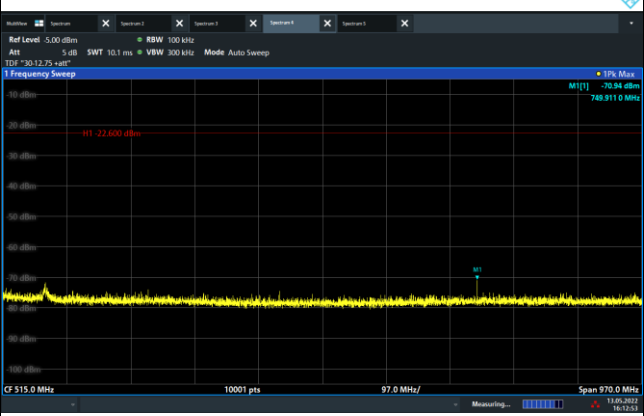
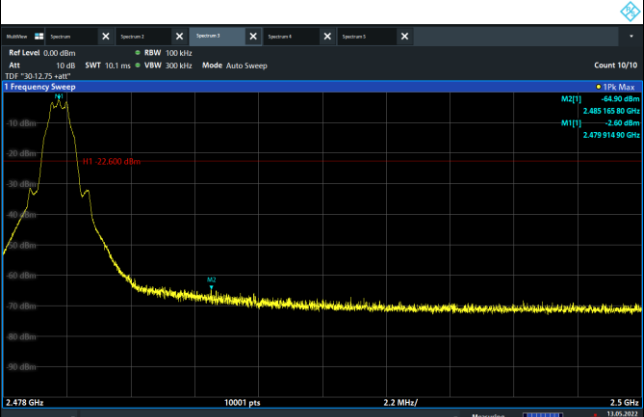
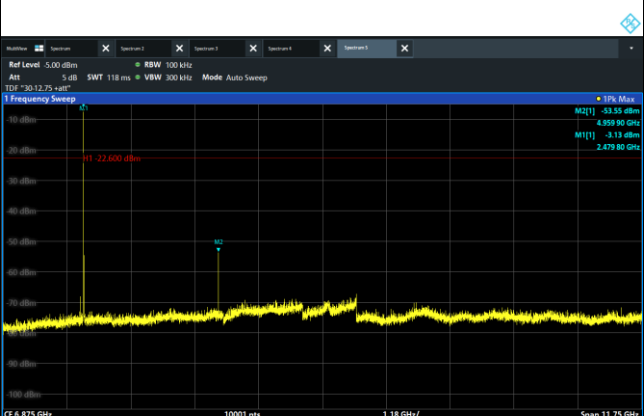


Test results

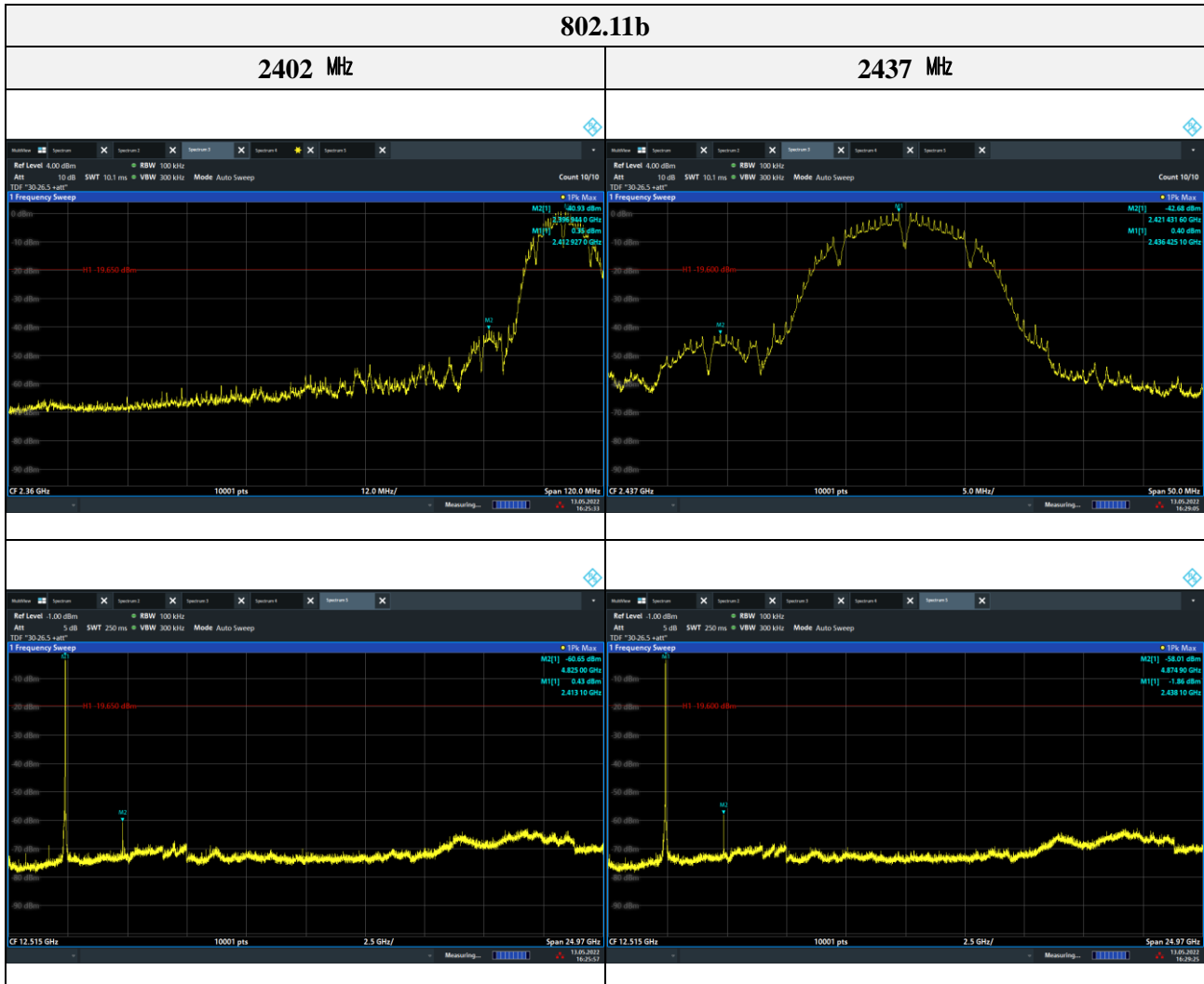


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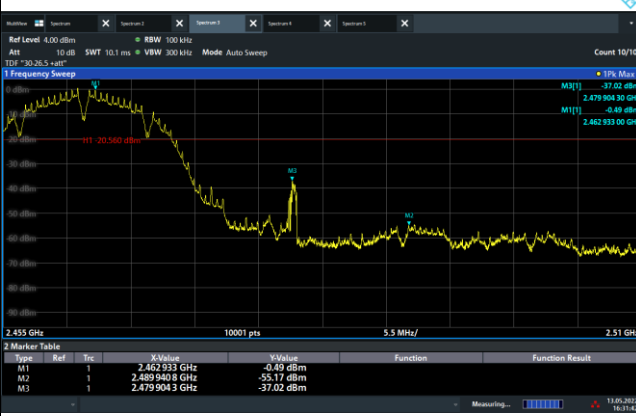
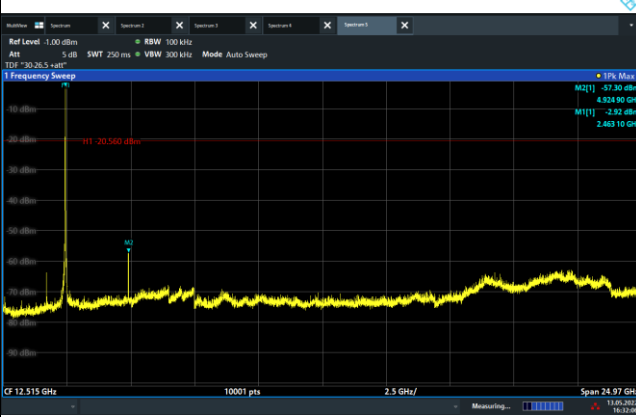
| LE 1Mbps | |
|---|-------|
| 2480 MHz | - |
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|  | BLANK |
|  | BLANK |

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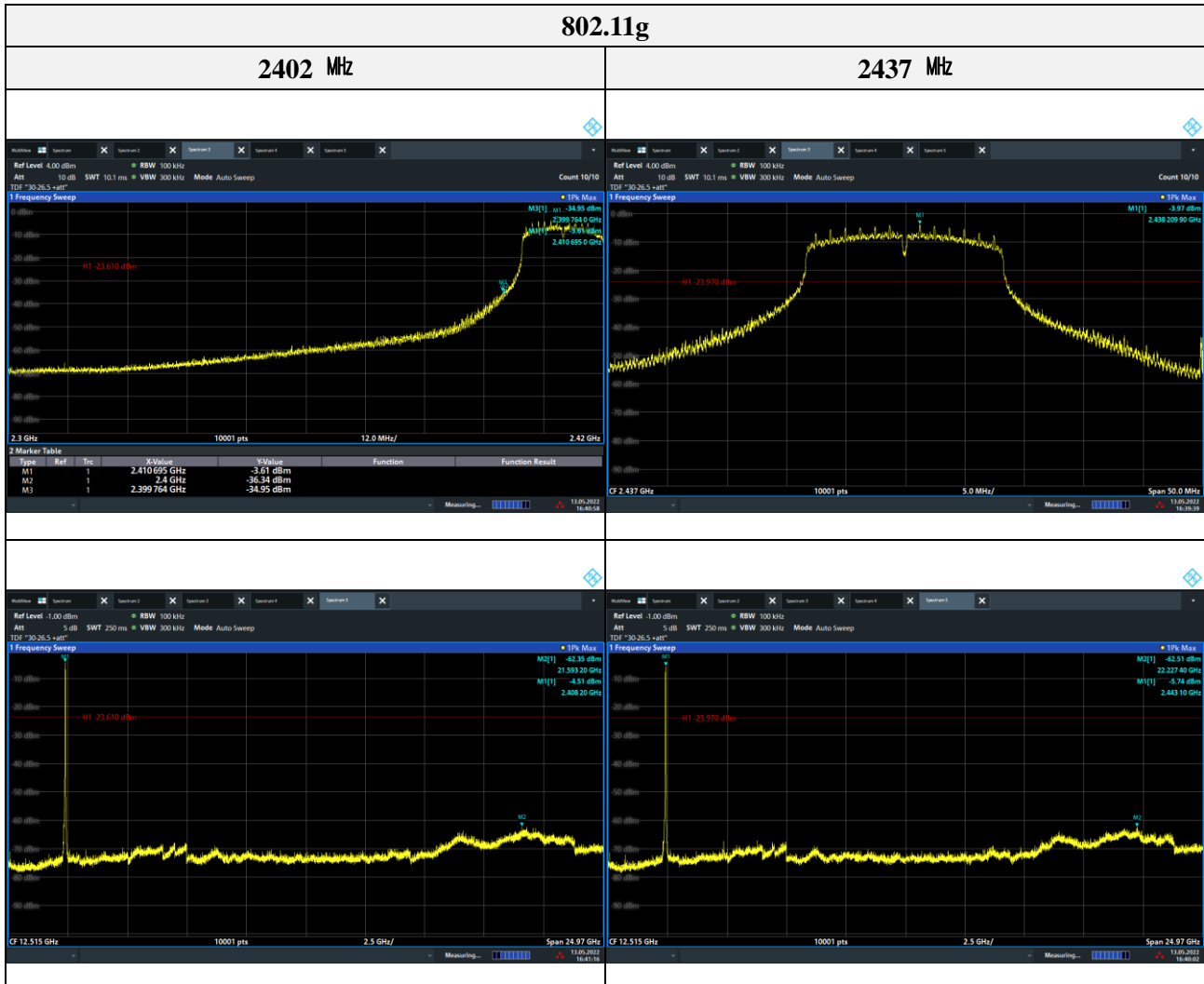


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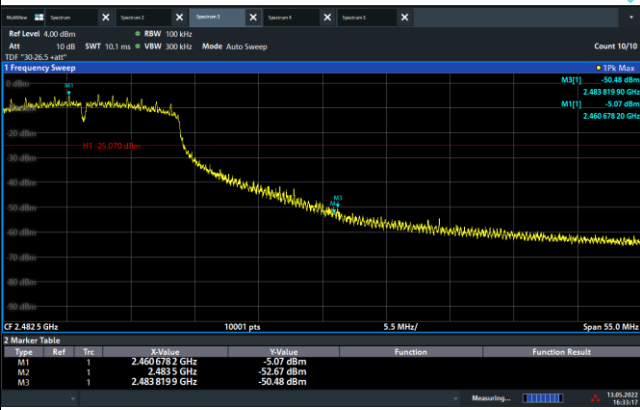
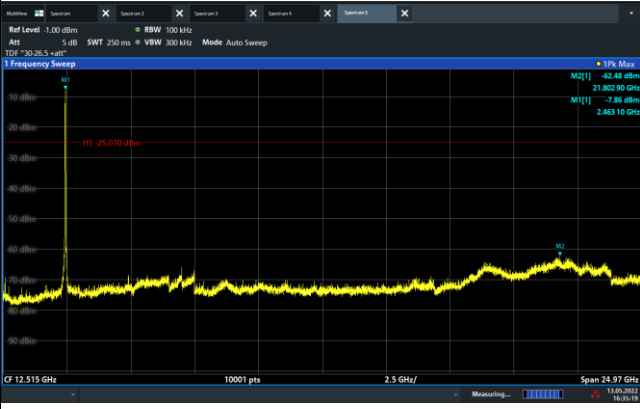
| 802.11b | |
|--|-------|
| 2462 MHz | - |
|  | Blank |
|  | Blank |

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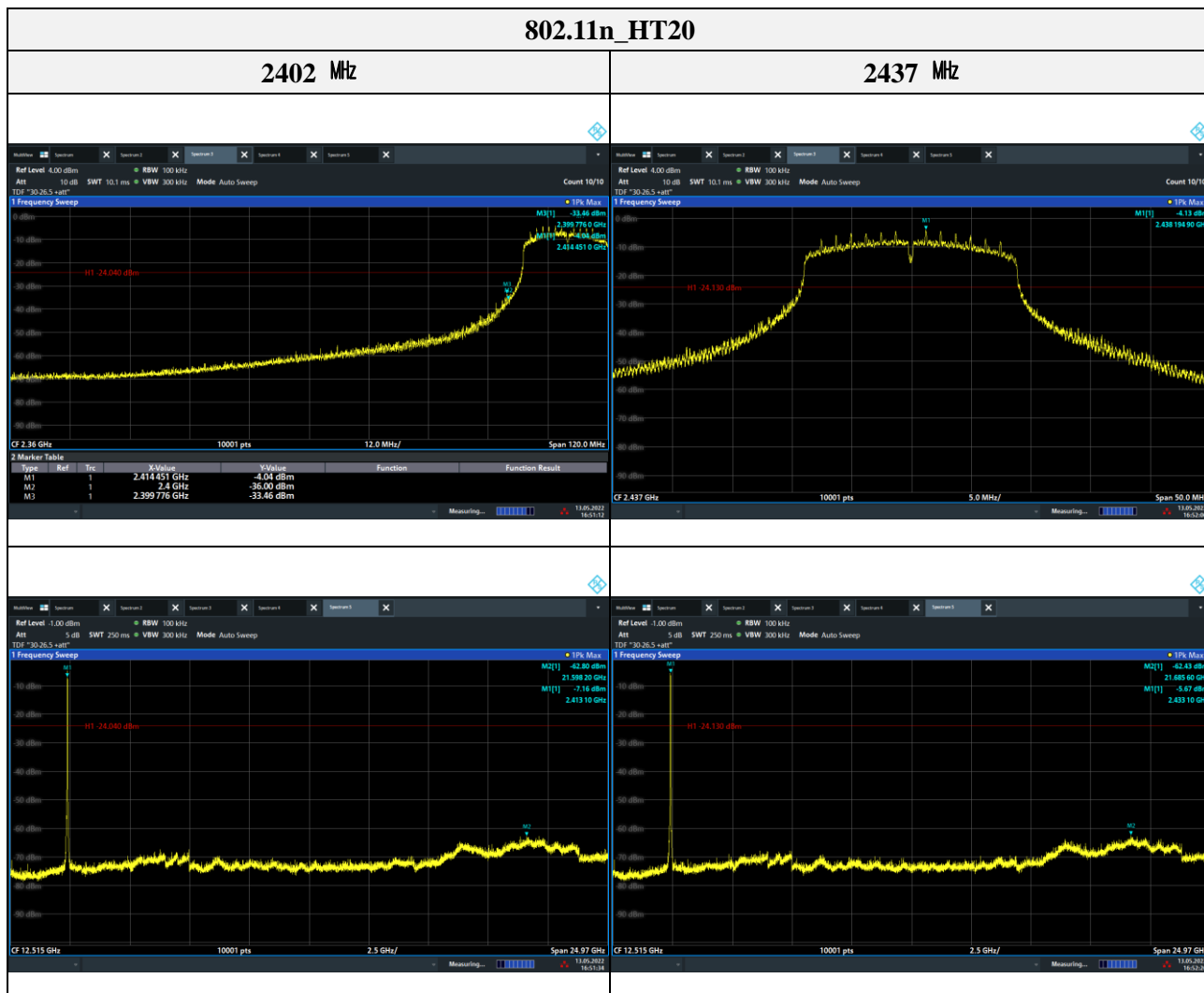


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| 802.11g | |
|--|-------|
| 2462 MHz | - |
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|  | BLANK |

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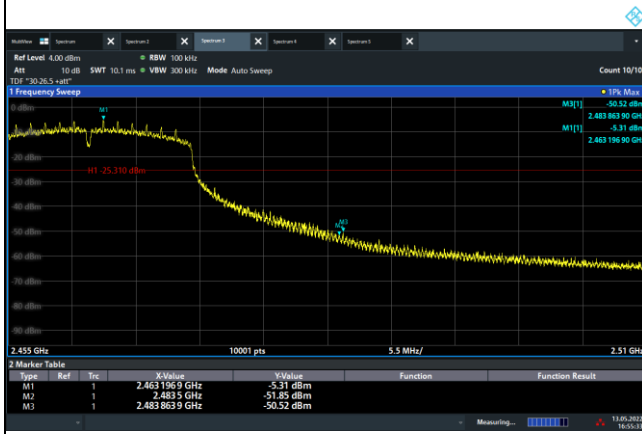
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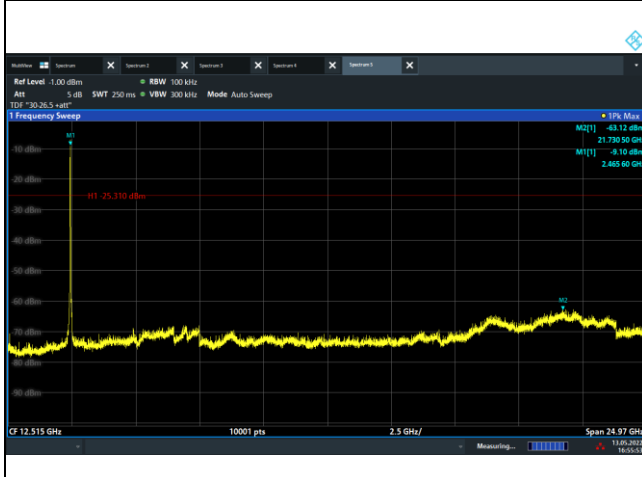
802.11n_HT20

2462 MHz

-



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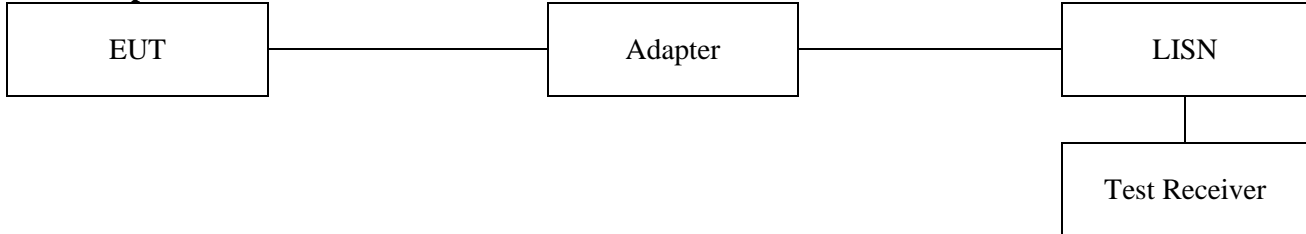


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3.6. AC conducted emissions

Test setup



Limit

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

According to RSS-Gen Issue 5, 8.8, a radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in Table 3. Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 3 below. The more stringent limit applies at the frequency range boundaries.

The conducted emissions shall be measured in accordance with the reference publication mentioned in Section 3.

| Frequency of Emission (MHz) | Conducted limit (dBμV/m) | |
|-----------------------------|--------------------------|----------|
| | Quasi-peak | Average |
| 0.15 – 0.50 | 66 - 56* | 56 - 46* |
| 0.50 – 5.00 | 56 | 46 |
| 5.00 – 30.0 | 60 | 50 |

Note:

1. All AC line conducted spurious emission are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and the appropriate frequencies. All data rates and modes were investigated for conducted spurious emission. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.
3. Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).



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Report No.:

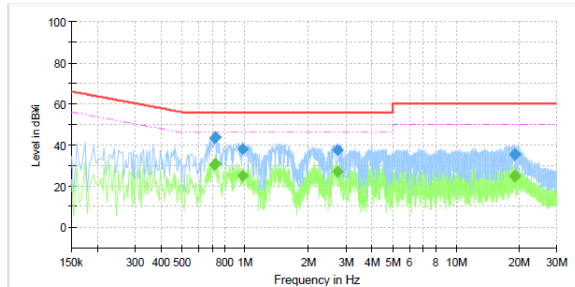
KES-RF1-22T0063

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Test results

LE 1Mbps

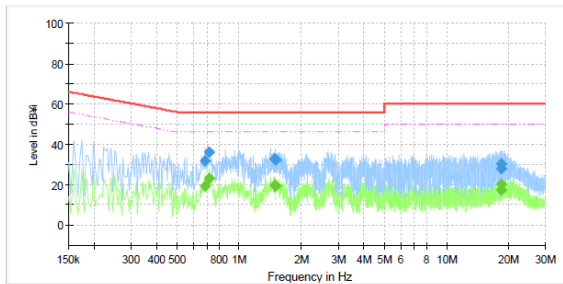
Hot Line



Final Result

| Frequency (MHz) | QuasiPeak (dBm V) | Average (dBm V) | Limit (dBm V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|-------------------|-----------------|---------------|-------------|-----------------|-----------------|------|------------|
| 0.718000 | --- | 30.54 | 46.00 | 15.46 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.718000 | 43.44 | --- | 56.00 | 12.56 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.722000 | --- | 30.86 | 46.00 | 15.14 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.722000 | 43.98 | --- | 56.00 | 12.02 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.974000 | --- | 25.18 | 46.00 | 20.82 | 1000.0 | 9.000 | L1 | 20.2 |
| 0.974000 | 37.83 | --- | 56.00 | 18.17 | 1000.0 | 9.000 | L1 | 20.2 |
| 2.742000 | --- | 27.12 | 46.00 | 18.88 | 1000.0 | 9.000 | L1 | 20.4 |
| 2.742000 | 37.68 | --- | 56.00 | 18.32 | 1000.0 | 9.000 | L1 | 20.4 |
| 18.930000 | --- | 25.11 | 50.00 | 24.89 | 1000.0 | 9.000 | L1 | 20.8 |
| 18.930000 | 35.73 | --- | 60.00 | 24.27 | 1000.0 | 9.000 | L1 | 20.8 |
| 19.066000 | --- | 24.82 | 50.00 | 25.18 | 1000.0 | 9.000 | L1 | 20.8 |
| 19.066000 | 35.32 | --- | 60.00 | 24.68 | 1000.0 | 9.000 | L1 | 20.8 |

Neutral Line



Final Result

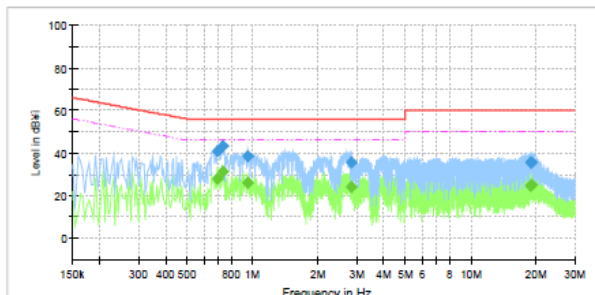
| Frequency (MHz) | QuasiPeak (dBm V) | Average (dBm V) | Limit (dBm V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|-------------------|-----------------|---------------|-------------|-----------------|-----------------|------|------------|
| 0.682000 | --- | 19.27 | 46.00 | 26.73 | 1000.0 | 9.000 | N | 20.0 |
| 0.682000 | 31.67 | --- | 56.00 | 24.33 | 1000.0 | 9.000 | N | 20.0 |
| 0.718000 | --- | 22.97 | 46.00 | 23.03 | 1000.0 | 9.000 | N | 20.0 |
| 0.718000 | 36.12 | --- | 56.00 | 19.88 | 1000.0 | 9.000 | N | 20.0 |
| 1.482000 | --- | 19.85 | 46.00 | 26.15 | 1000.0 | 9.000 | N | 20.3 |
| 1.482000 | 32.82 | --- | 56.00 | 23.18 | 1000.0 | 9.000 | N | 20.3 |
| 1.498000 | --- | 19.54 | 46.00 | 26.46 | 1000.0 | 9.000 | N | 20.3 |
| 1.498000 | 32.37 | --- | 56.00 | 23.63 | 1000.0 | 9.000 | N | 20.3 |
| 18.418000 | --- | 17.16 | 50.00 | 32.84 | 1000.0 | 9.000 | N | 20.7 |
| 18.418000 | 28.10 | --- | 60.00 | 31.90 | 1000.0 | 9.000 | N | 20.7 |
| 18.430000 | --- | 20.20 | 50.00 | 29.80 | 1000.0 | 9.000 | N | 20.7 |
| 18.430000 | 30.12 | --- | 60.00 | 29.88 | 1000.0 | 9.000 | N | 20.7 |

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802.11b (Worst Case)

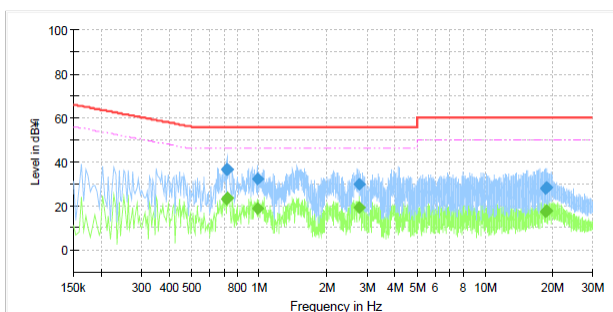
Hot Line



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.690000 | 40.86 | --- | 56.00 | 15.14 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.690000 | --- | 27.93 | 46.00 | 18.07 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.730000 | --- | 31.32 | 46.00 | 14.68 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.730000 | 43.33 | --- | 56.00 | 12.67 | 1000.0 | 9.000 | L1 | 20.1 |
| 0.954000 | --- | 25.90 | 46.00 | 20.10 | 1000.0 | 9.000 | L1 | 20.2 |
| 0.954000 | 38.68 | --- | 56.00 | 17.32 | 1000.0 | 9.000 | L1 | 20.2 |
| 2.838000 | --- | 24.00 | 46.00 | 22.00 | 1000.0 | 9.000 | L1 | 20.4 |
| 2.838000 | 35.80 | --- | 56.00 | 20.20 | 1000.0 | 9.000 | L1 | 20.4 |
| 18.878000 | --- | 24.77 | 50.00 | 25.23 | 1000.0 | 9.000 | L1 | 20.8 |
| 18.878000 | 35.42 | --- | 60.00 | 24.58 | 1000.0 | 9.000 | L1 | 20.8 |
| 19.058000 | --- | 25.29 | 50.00 | 24.71 | 1000.0 | 9.000 | L1 | 20.8 |
| 19.058000 | 35.74 | --- | 60.00 | 24.26 | 1000.0 | 9.000 | L1 | 20.8 |

Neutral Line



Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.718000 | --- | 23.30 | 46.00 | 22.70 | 1000.0 | 9.000 | N | 20.0 |
| 0.718000 | 36.56 | --- | 56.00 | 19.44 | 1000.0 | 9.000 | N | 20.0 |
| 0.722000 | --- | 23.71 | 46.00 | 22.29 | 1000.0 | 9.000 | N | 20.0 |
| 0.722000 | 36.49 | --- | 56.00 | 19.51 | 1000.0 | 9.000 | N | 20.0 |
| 0.978000 | --- | 18.84 | 46.00 | 27.16 | 1000.0 | 9.000 | N | 20.2 |
| 0.978000 | 32.26 | --- | 56.00 | 23.74 | 1000.0 | 9.000 | N | 20.2 |
| 2.765000 | --- | 19.20 | 46.00 | 26.80 | 1000.0 | 9.000 | N | 20.4 |
| 2.765000 | 29.79 | --- | 56.00 | 26.21 | 1000.0 | 9.000 | N | 20.4 |
| 18.598000 | --- | 17.28 | 50.00 | 32.72 | 1000.0 | 9.000 | N | 20.7 |
| 18.598000 | 28.08 | --- | 60.00 | 31.92 | 1000.0 | 9.000 | N | 20.7 |
| 18.834000 | --- | 17.81 | 50.00 | 32.19 | 1000.0 | 9.000 | N | 20.8 |
| 18.834000 | 28.38 | --- | 60.00 | 31.62 | 1000.0 | 9.000 | N | 20.8 |

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Appendix A. Measurement equipment

| Equipment | Manufacturer | Model | Serial No. | Calibration interval | Calibration due. |
|-------------------------------------|-------------------|---------------|--------------|----------------------|------------------|
| Spectrum Analyzer | R&S | FSV40 | 101725 | 1 year | 2022.06.18 |
| Spectrum Analyzer | R&S | FSV3044 | 101272 | 1 year | 2023.03.14 |
| 8360B Series Swept Signal Generator | HP | 83630B | 3844A00786 | 1 year | 2023.01.14 |
| SIGNAL GENERATOR | KEYSIGHT | N5182B | MY59100115 | 1 year | 2023.01.14 |
| DC Power supply | Agilent | 6632B | MY43004090 | 1 year | 2022.06.21 |
| Power Meter | Anritsu | ML2495A | 2010001 | 1 year | 2023.04.27 |
| Pulse Power Sensor | Anritsu | MA2411B | 1911111 | 1 year | 2023.04.27 |
| Attenuator | Mini-Circuits | BW-S10-2W263+ | 2 | 1 year | 2023.01.14 |
| Attenuator | HUBER+SUHNER | 6806.17.A | - | 1 year | 2023.04.01 |
| Loop Antenna | Schwarzbeck | FMZB1513 | 225 | 2 years | 2023.01.18 |
| BILOG ANTENNA | Schwarzbeck | VULB 9168 | 9168-461 | 2 years | 2024.04.27 |
| Horn Antenna | A.H | SAS-571 | 414 | 1 years | 2023.01.18 |
| Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA 9170550 | 1 years | 2023.01.20 |
| Amplifier | SONOMA INSTRUMENT | 310N | 401123 | 1 year | 2022.06.07 |
| | | | | | 2023.06.02 |
| PREAMPLIFIER | 8449B | HP | 3008A00538 | 1 year | 2022.06.21 |
| | | | | | 2023.06.02 |
| EMI Test Receiver | R&S | ESU26 | 100552 | 1 year | 2023.03.31 |
| LISN | ENV216 | R & S | 101787 | 1 year | 2022.12.27 |
| EMI TEST RECEIVER | ESR3 | R & S | 101783 | 1 year | 2022.12.28 |
| PULSE LIMITER | ESH3-Z2 | R & S | 101915 | 1 year | 2022.12.27 |

Peripheral devices

| Device | Manufacturer | Model No. | Serial No. |
|------------------------|--|------------|---------------|
| NoteBook | LG Electronics. | LG15N54 | 411NZJV044052 |
| NoteBook DC Power Unit | LITE-ON TECHNOLOGY (CHANGZHOU)CO., LTD | PA-1900-14 | N/A |

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