

TPS22995H-Q1 CISPR-25 EMI Measurement Report



ABSTRACT

This test report exhibits CISPR-25 Conducted Emissions (CE) and Radiated Emission (RE) test results for the TPS22995H-Q1 load switch evaluation module. It shows that the TPS22995H-Q1 will not produce any significant noise on the ECU by meeting the CISPR-25 class-5 limits.

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1 Description of Test Setup

CISPR-25 compliant anechoic chamber and equipment were used to conduct both conducted emissions and radiated emissions. Both tests were performed with a 5V battery to isolate the noise of the load switch. Since our device supply is not a global pin, and the output of our device is also not a global pin EMI is typically not a concern; however, we gathered this data to prove that our device will not introduce noise into the ECU.

1.1 TPS22995H-Q1 evaluation module

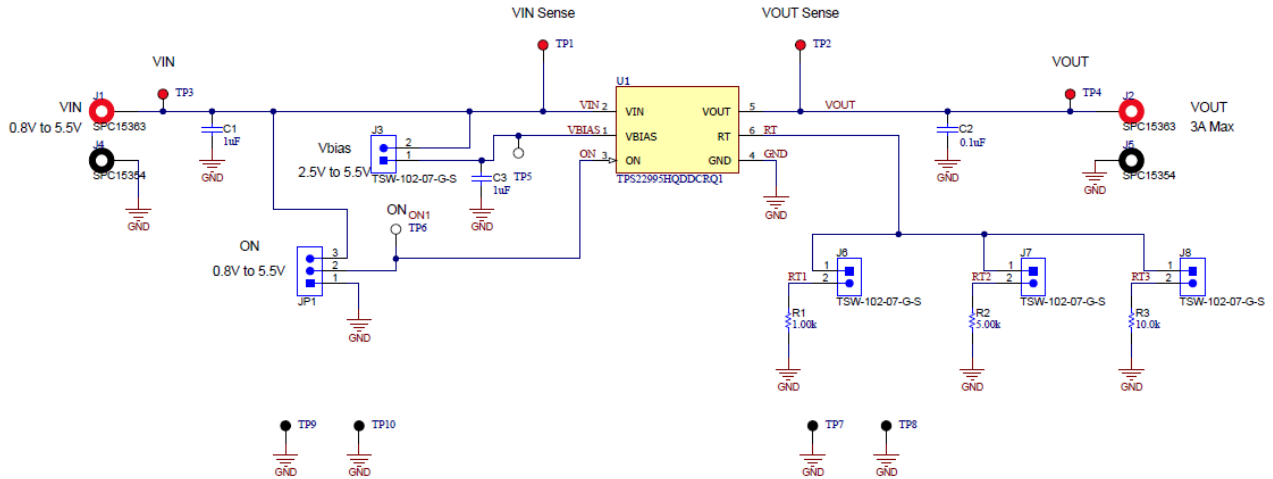


Figure 1-1. Schematic of TPS22995HQ1EVM

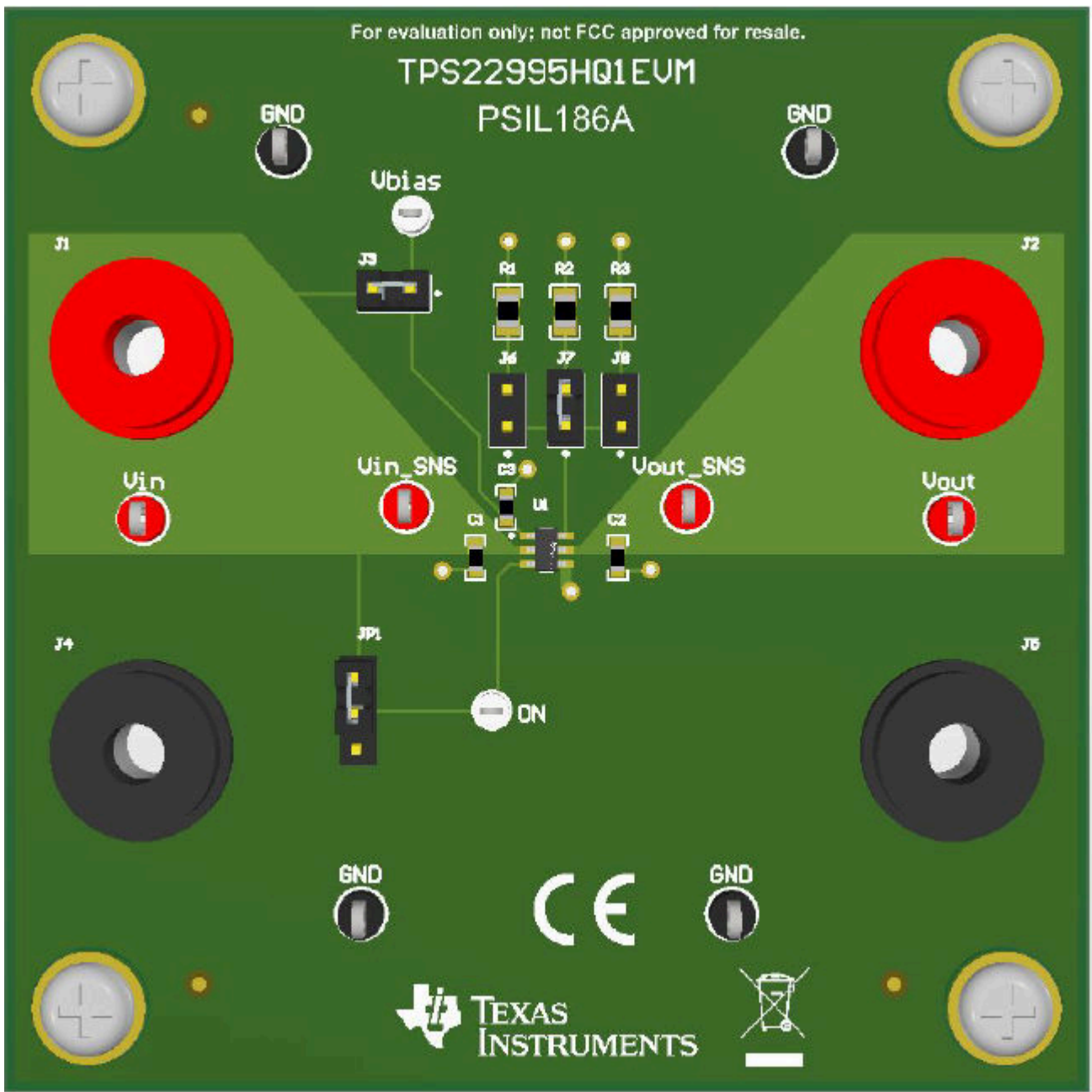


Figure 1-2. Front layout of TPS22995HQ1EVM

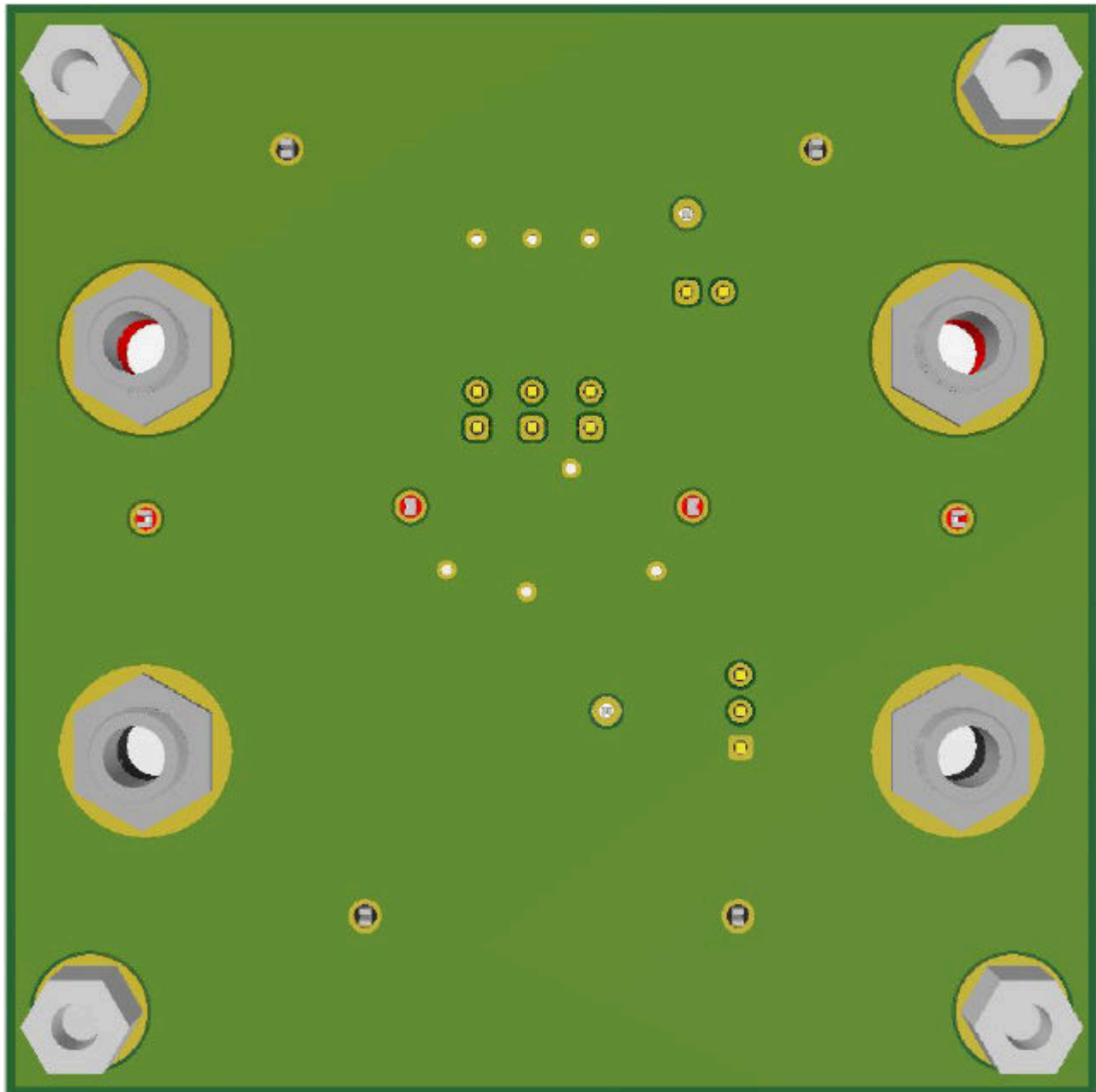


Figure 1-3. Back layout of TPS22995HQ1EVM

1.2 Test Conditions

This section provides the test conditions for the CE and RE measurements.

- Input supply:
 - Fully charged 5-V battery
- Load on load switch evaluation module:
 - Maximum Current, 16Ω (312.5 mA)
- Antenna configurations for radiated emission measurements
 - Monopole: 150 kHz–30 MHz
 - Biconical (Horizontal/Vertical): 30 MHz–200 MHz
 - Log Periodic (Horizontal/Vertical): 200 MHz–1 GHz

Table 1-1 shows EMI receiver settings for the conducted emission measurements.

Table 1-1. EMI Receiver Settings for CE Measurements

Frequency Range	Resolution Bandwidth	Step Size	Measure Time
150 kHz–30 MHz	9 kHz	2.25 kHz	100 ms
30 MHz–108 MHz	120 kHz	30 kHz	100 ms

Table 1-2 shows EMI receiver setting for the radiated emission measurements.

Table 1-2. EMI Receiver Settings for RE Measurements

Frequency Range	Resolution Bandwidth	Step Size	Measure Time
150 kHz–30 MHz	9 kHz	2.25 kHz	1 s
30 MHz–200 MHz	120 kHz	30 kHz	1 s
200 MHz–1 GHz	120 kHz	30 kHz	1 s

1.3 Test Setup Photos

The following photos show the test setup under varying conditions.



Figure 1-4. Test setup for noise floor measurements



Figure 1-5. Test Setup for Conducted Emission Unloaded Measurement



Figure 1-6. Test Setup for Conducted Emission Loaded Measurement



Figure 1-7. Test Setup for Radiated Emission Measurement: Biconical Horizontal Antenna

1.4 Pass or Fail Criteria

Pass or fail criteria is shown in the following list:

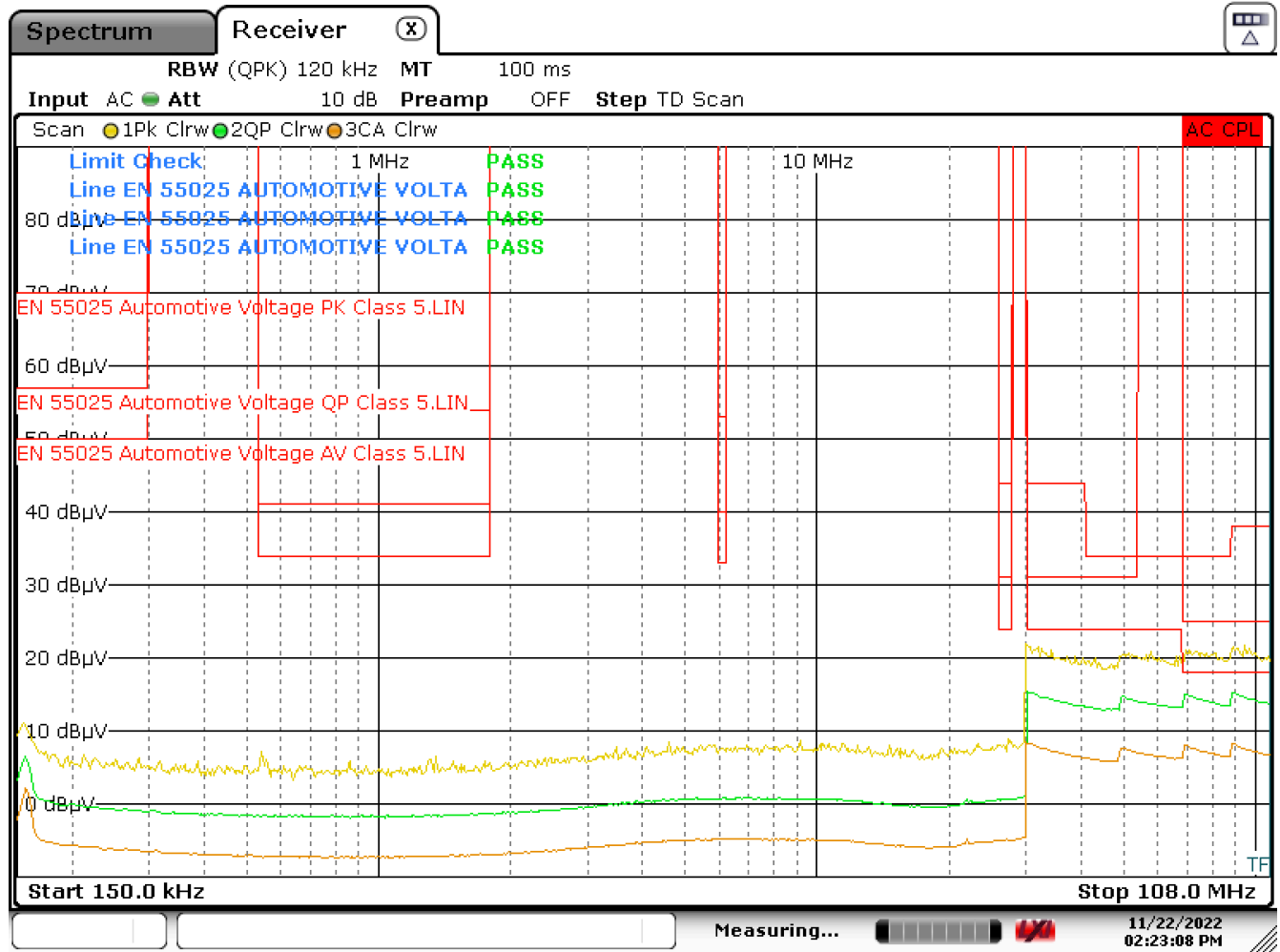
1. Any peaks below the average limit are an automatic pass.
2. Any peaks above the peak limit are an automatic fail.
3. When the peak is below the peak limit and if the average is below the average limit, it is considered a pass.

2 Test Results

This section contains the test results waveforms for both conducted emissions and radiative emissions.

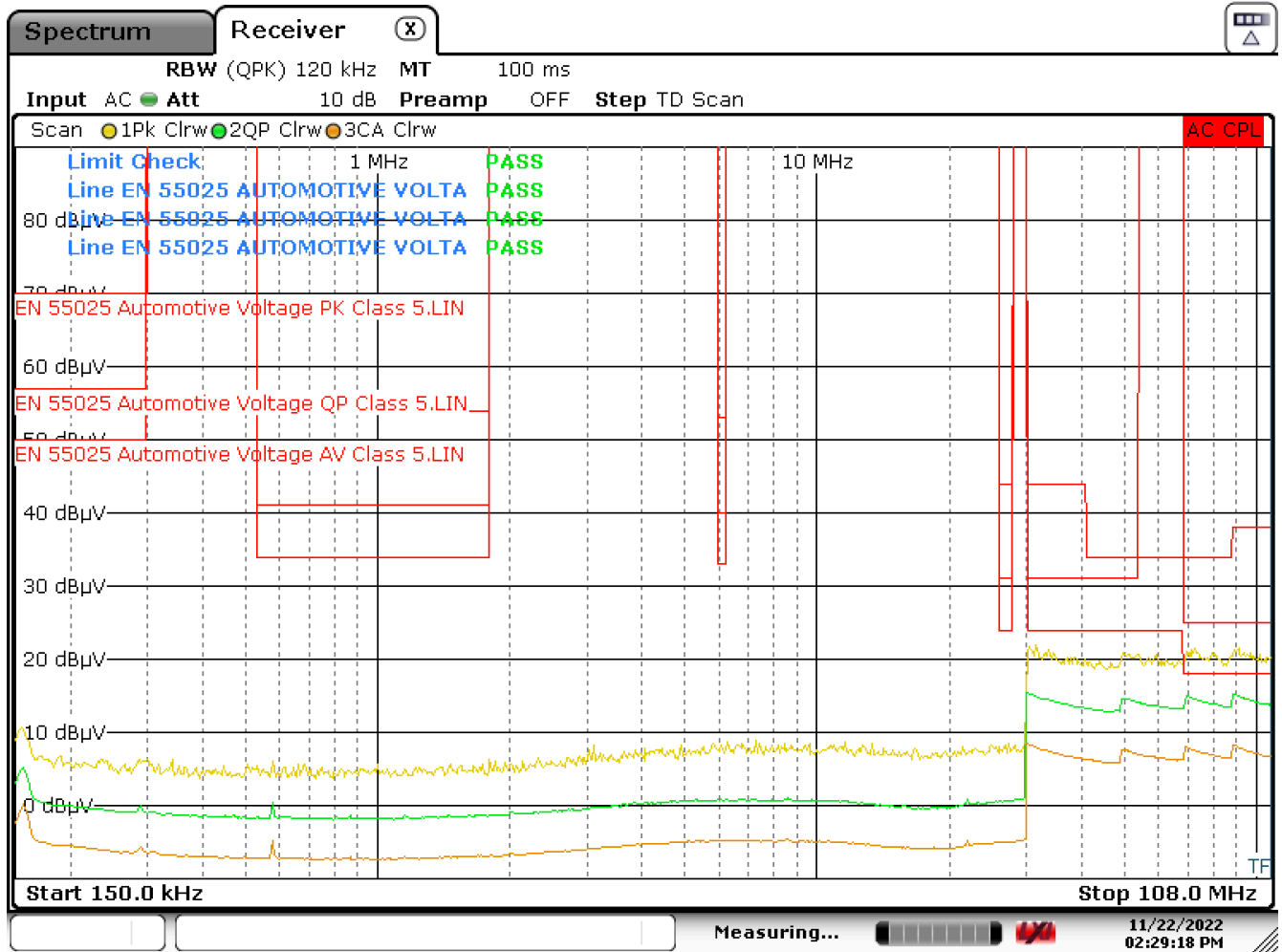
2.1 Conducted Emission (CE) Results

The following images show conducted emission waveforms.



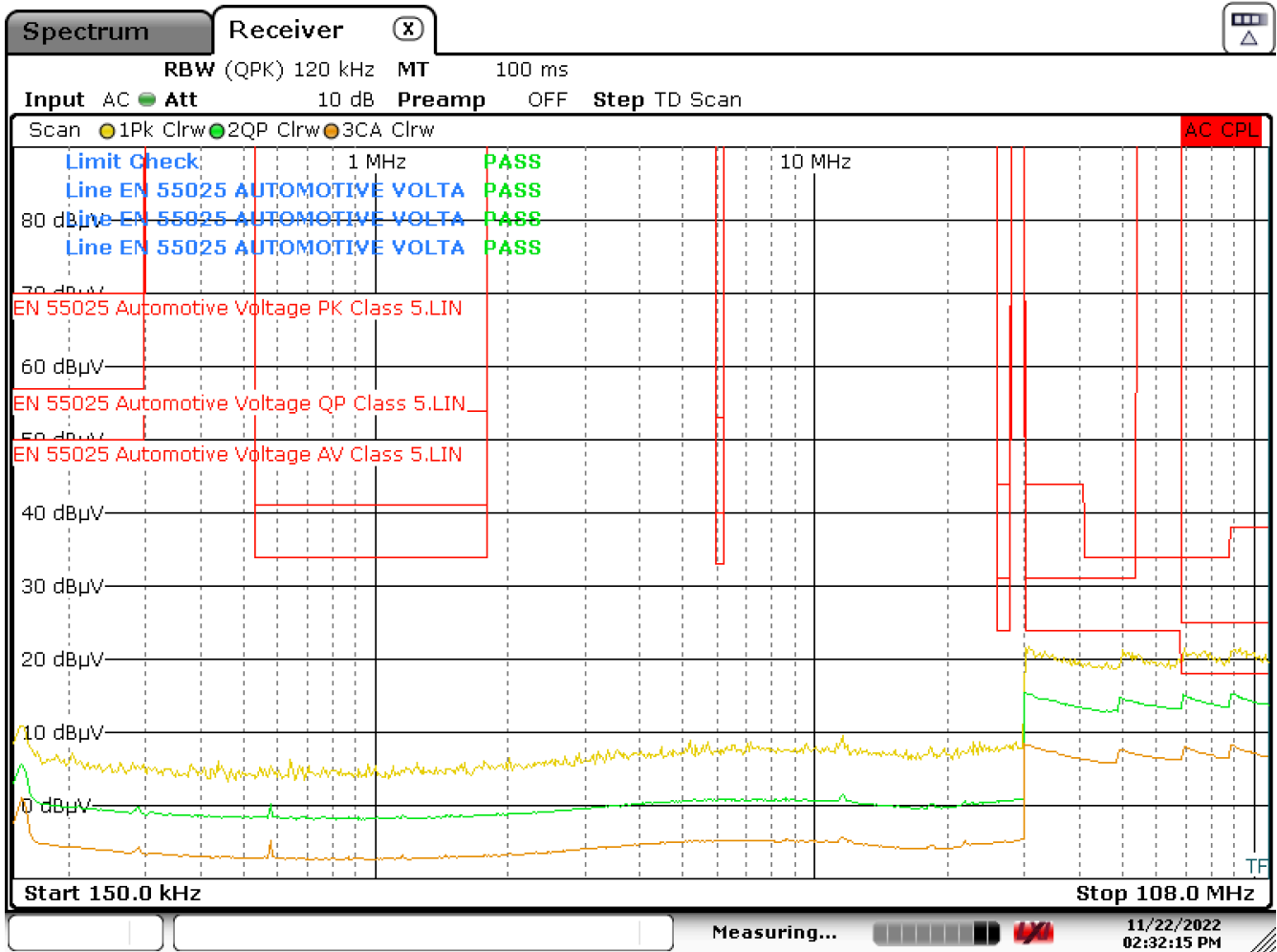
Date: 22.NOV.2022 14:23:08

Figure 2-1. CE – Noise Floor



Date: 22.NOV.2022 14:29:19

Figure 2-2. CE – Unloaded



Date: 22.NOV.2022 14:32:16

Figure 2-3. CE – 312.5 mA

2.2 Radiative Emission (RE): 150 kHz to 30 MHz, Monopole Antenna

The following images show radiative emission waveforms at 150 kHz to 30 MHz.

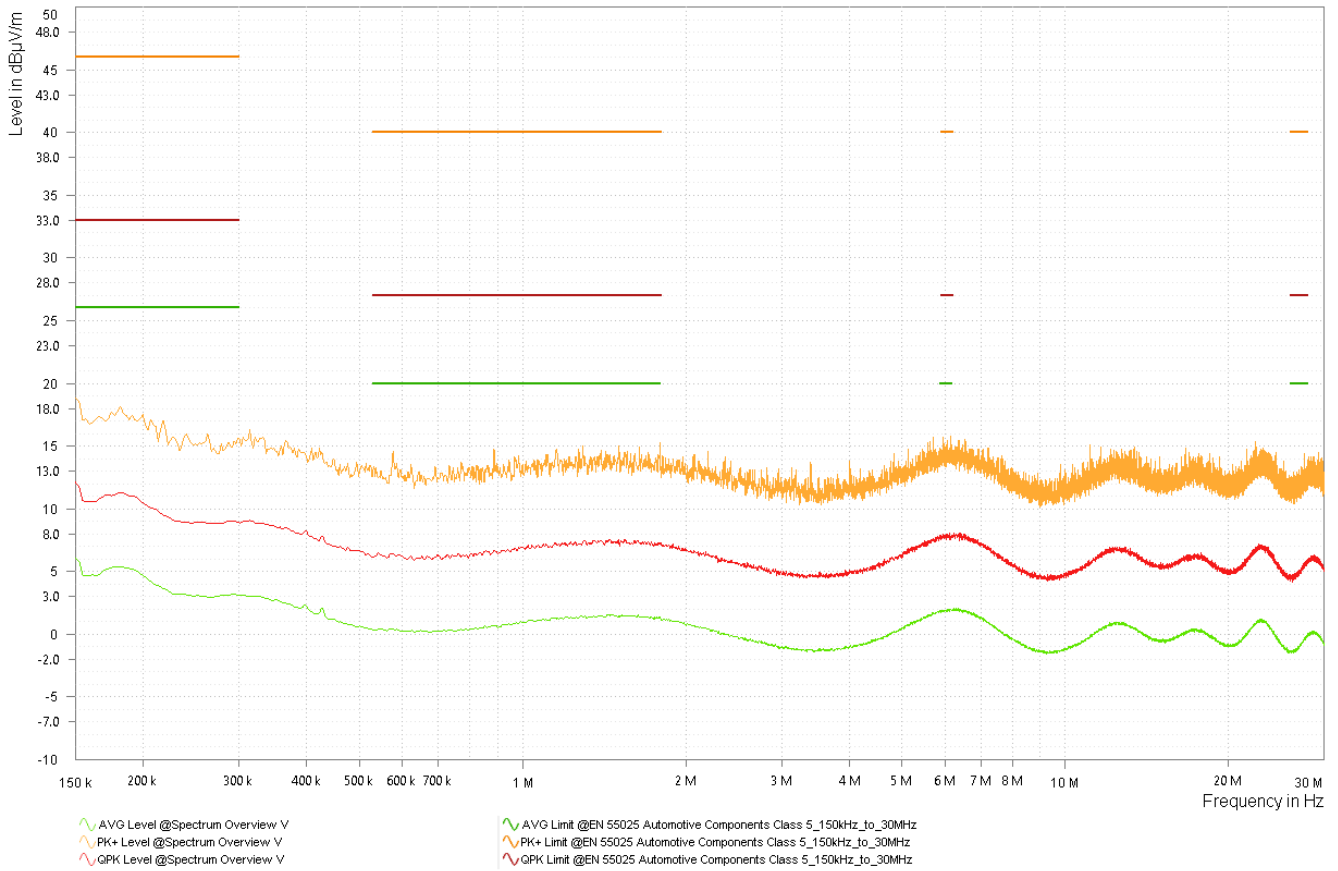


Figure 2-4. RE: 150 kHz to 30 MHz, Monopole Antenna: Noise Floor

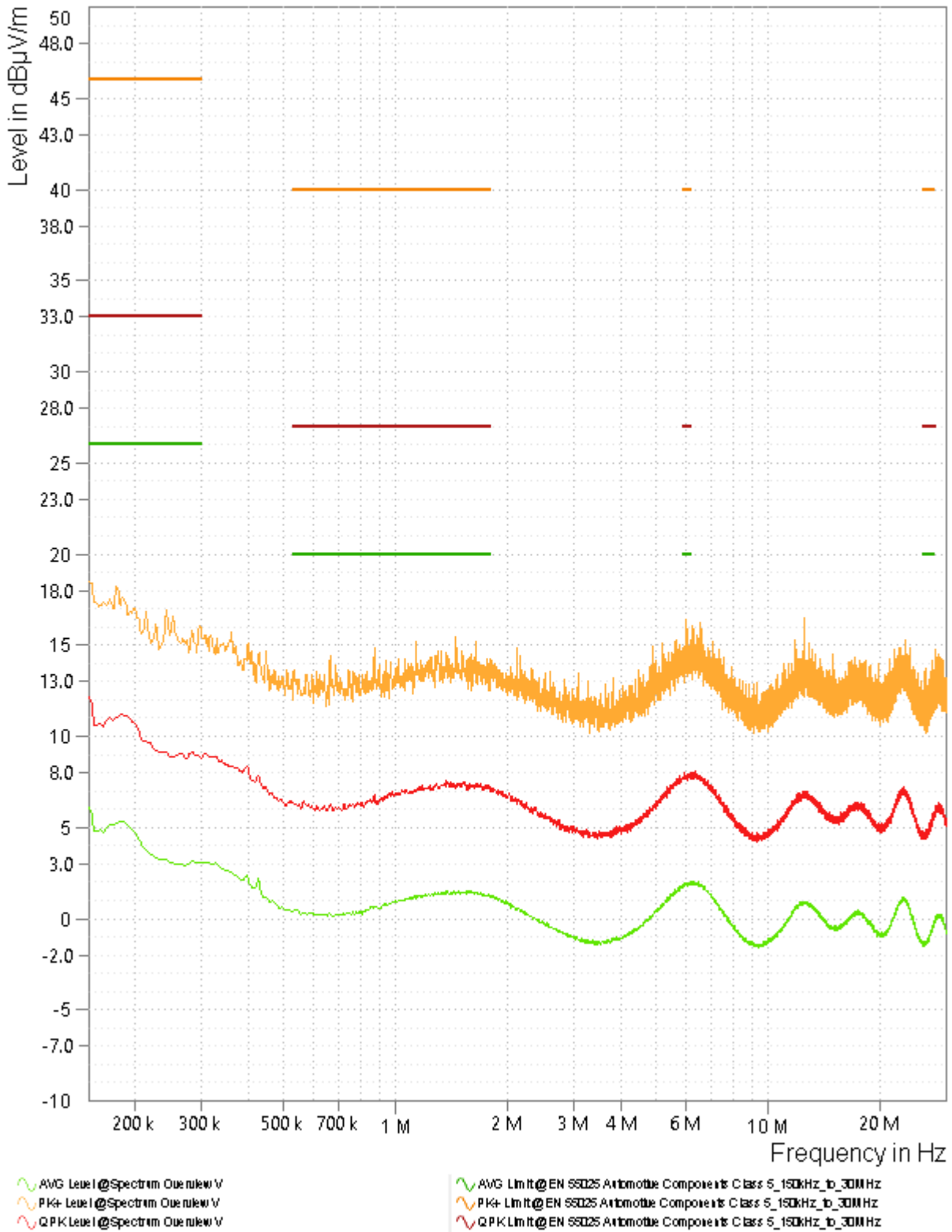


Figure 2-5. RE: 150 kHz to 30 MHz, Monopole Antenna: Unloaded

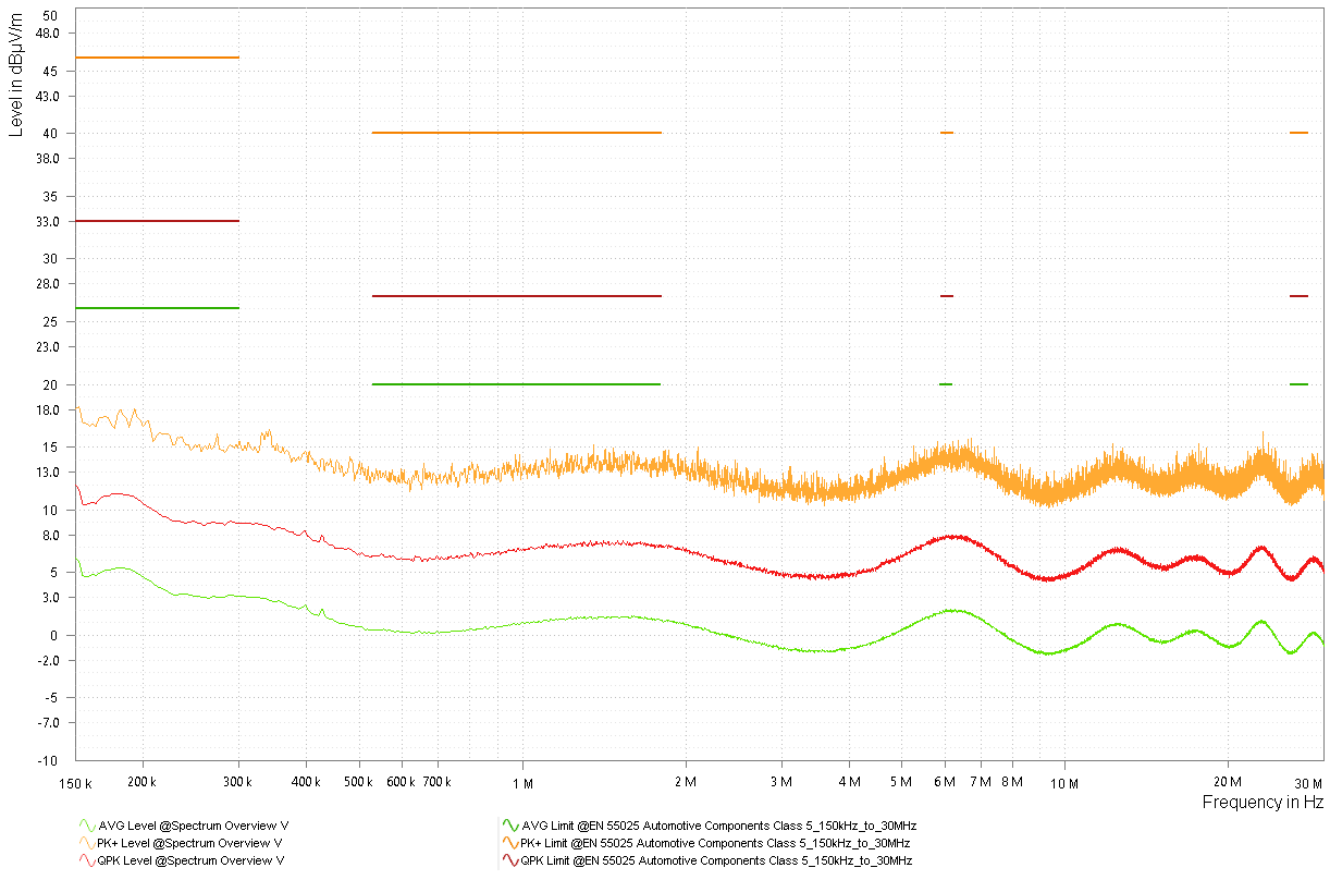


Figure 2-6. RE: 150 kHz to 30 MHz, Monopole Antenna: 312.5 mA

2.3 Radiative Emission (RE): 30 kHz to 200 MHz, Biconical Antenna

The following images show radiative emission waveforms at 30 kHz to 200 MHz.

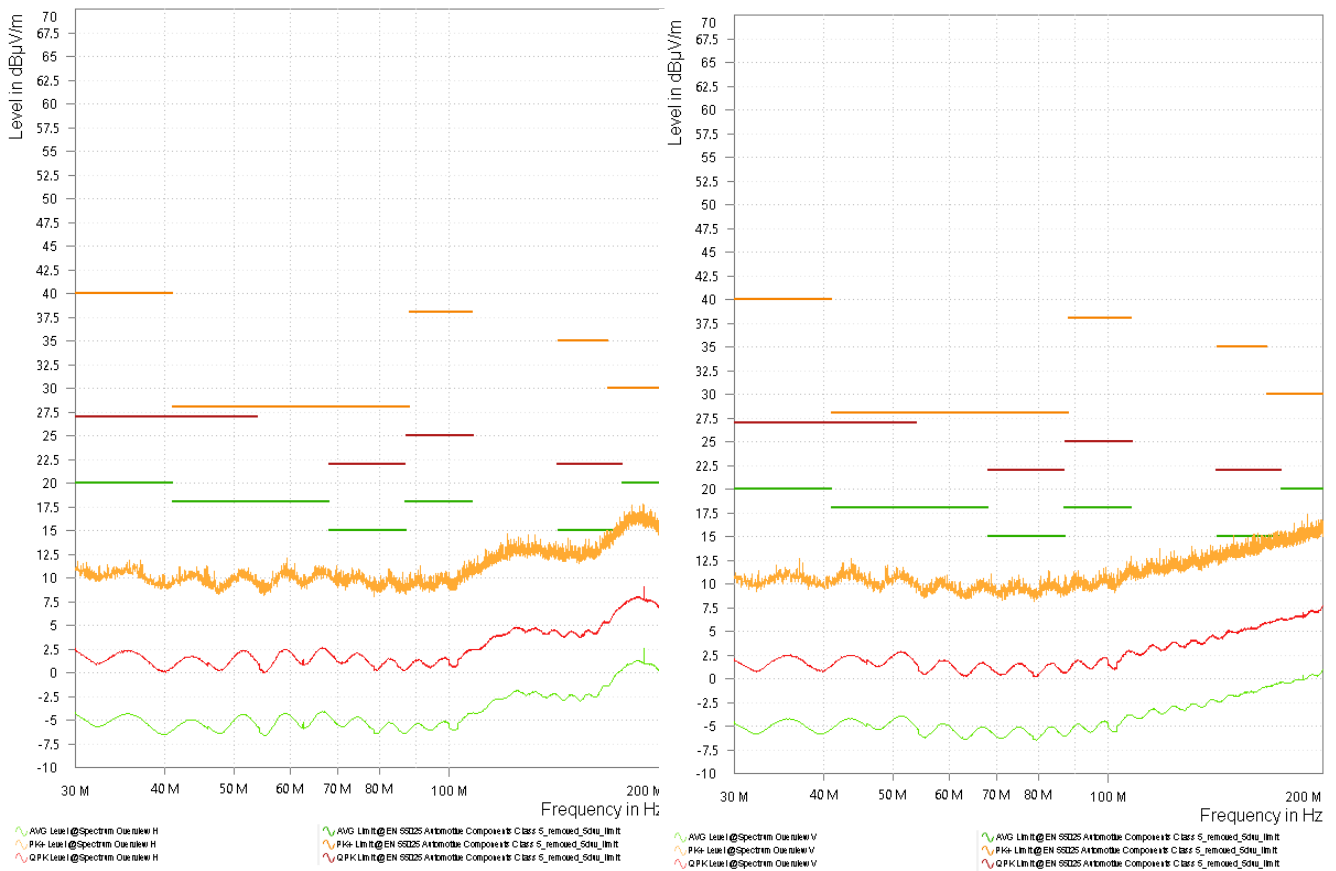


Figure 2-7. RE: 30 kHz to 200 MHz, Biconical Horizontal(Left)/Vertical(Right) Antenna: Noise Floor

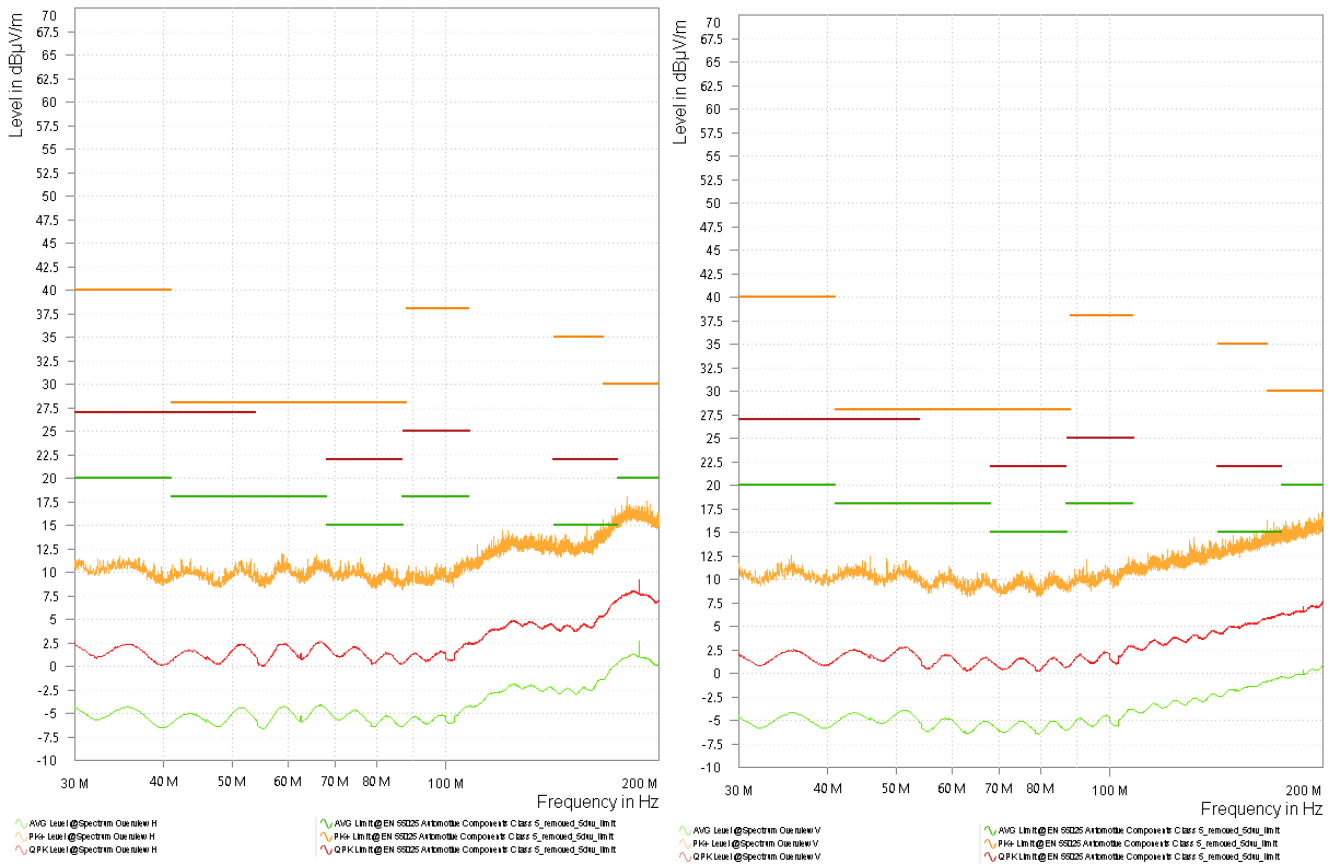


Figure 2-8. RE: 30 kHz to 200 MHz, Biconical Horizontal(Left)/Vertical(Right) Antenna: Unloaded

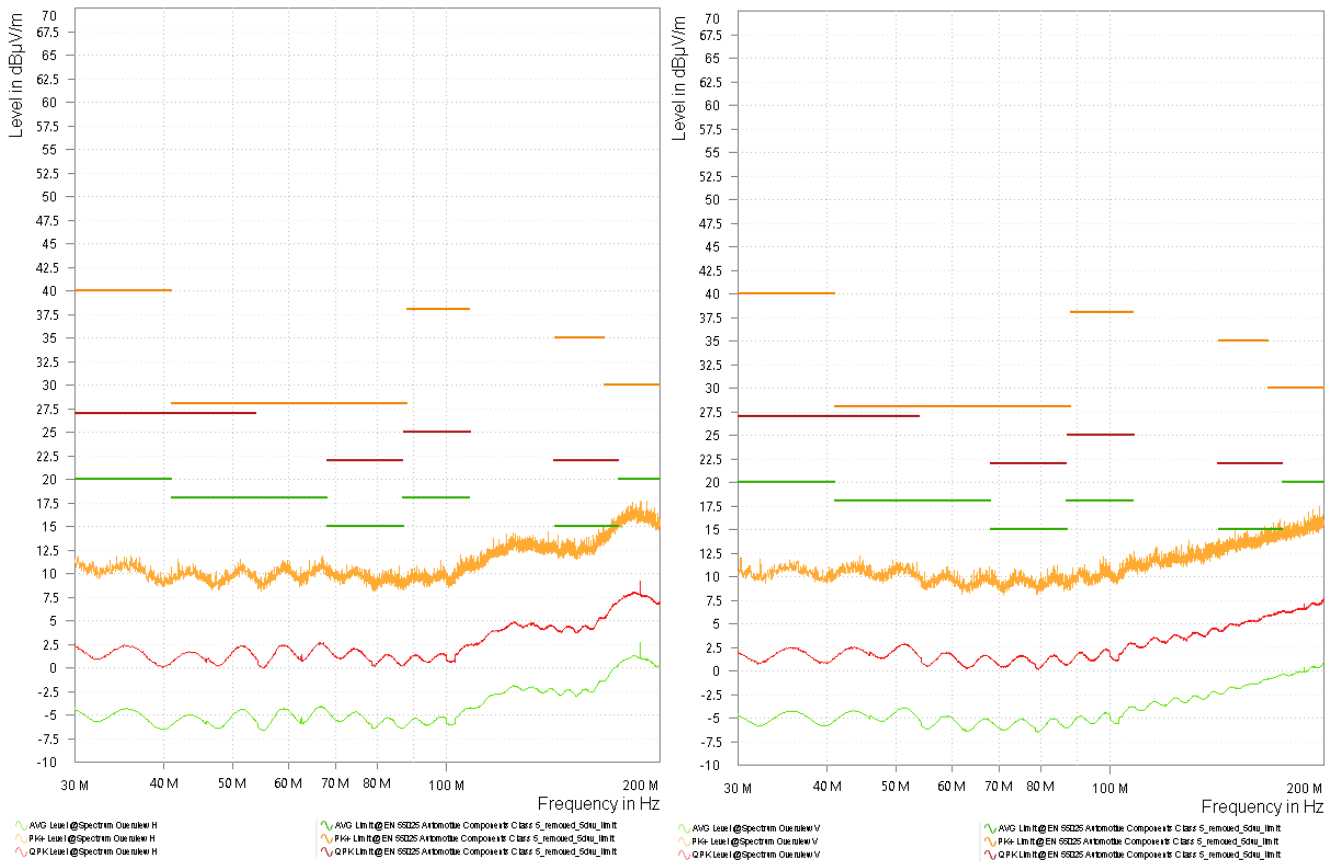


Figure 2-9. RE: 30 kHz to 200 MHz, Biconical Horizontal(Left)/Vertical(Right) Antenna: 312.5 mA

2.4 Radiative Emission (RE): 200 MHz to 1 GHz, Log Periodic Antenna

The following images show radiative emission waveforms at 200 MHz to 1 GHz.

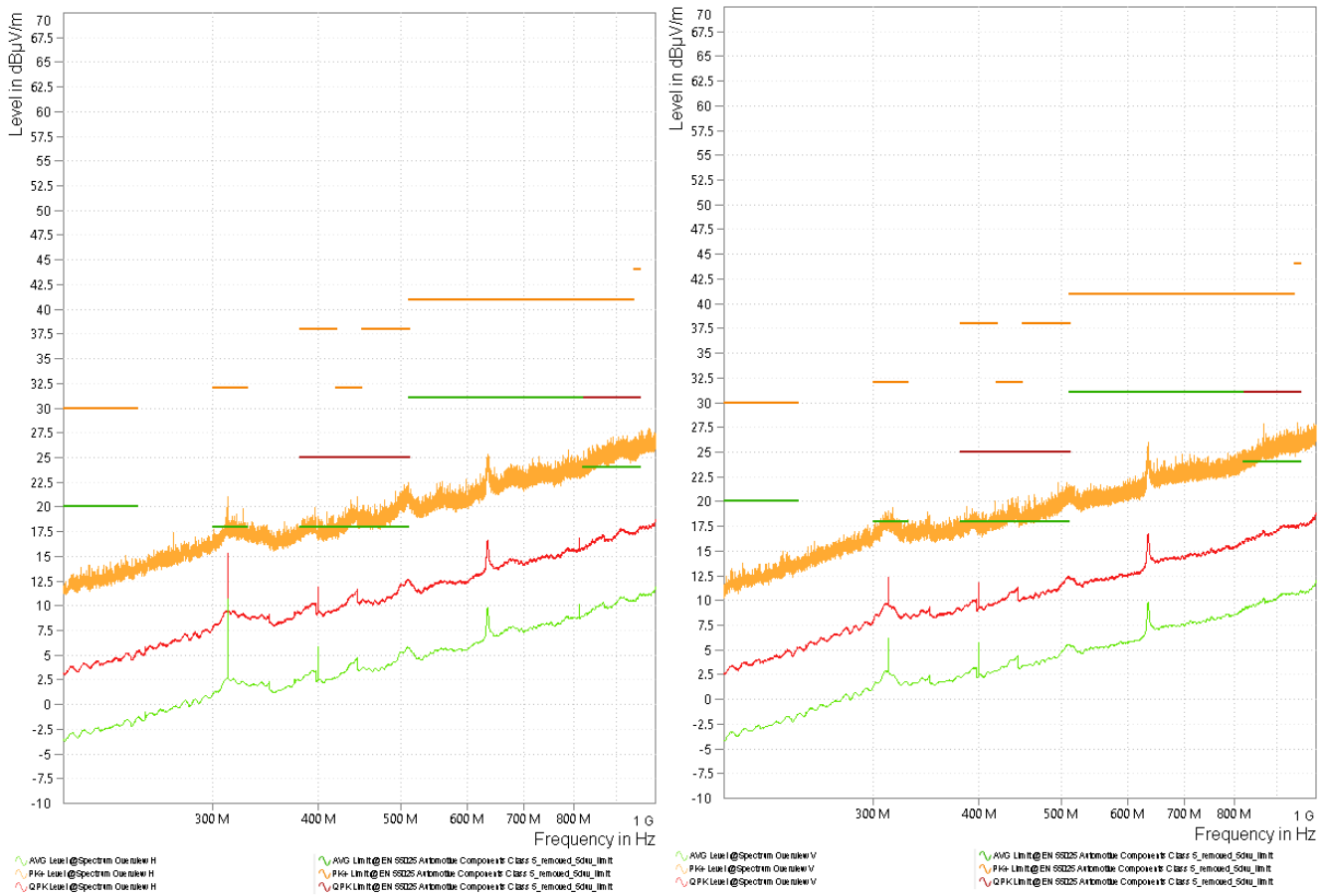


Figure 2-10. RE: 200 MHz to 1 GHz, Log Periodic Horizontal(Left)/Vertical(Right) Antenna: Noise Floor

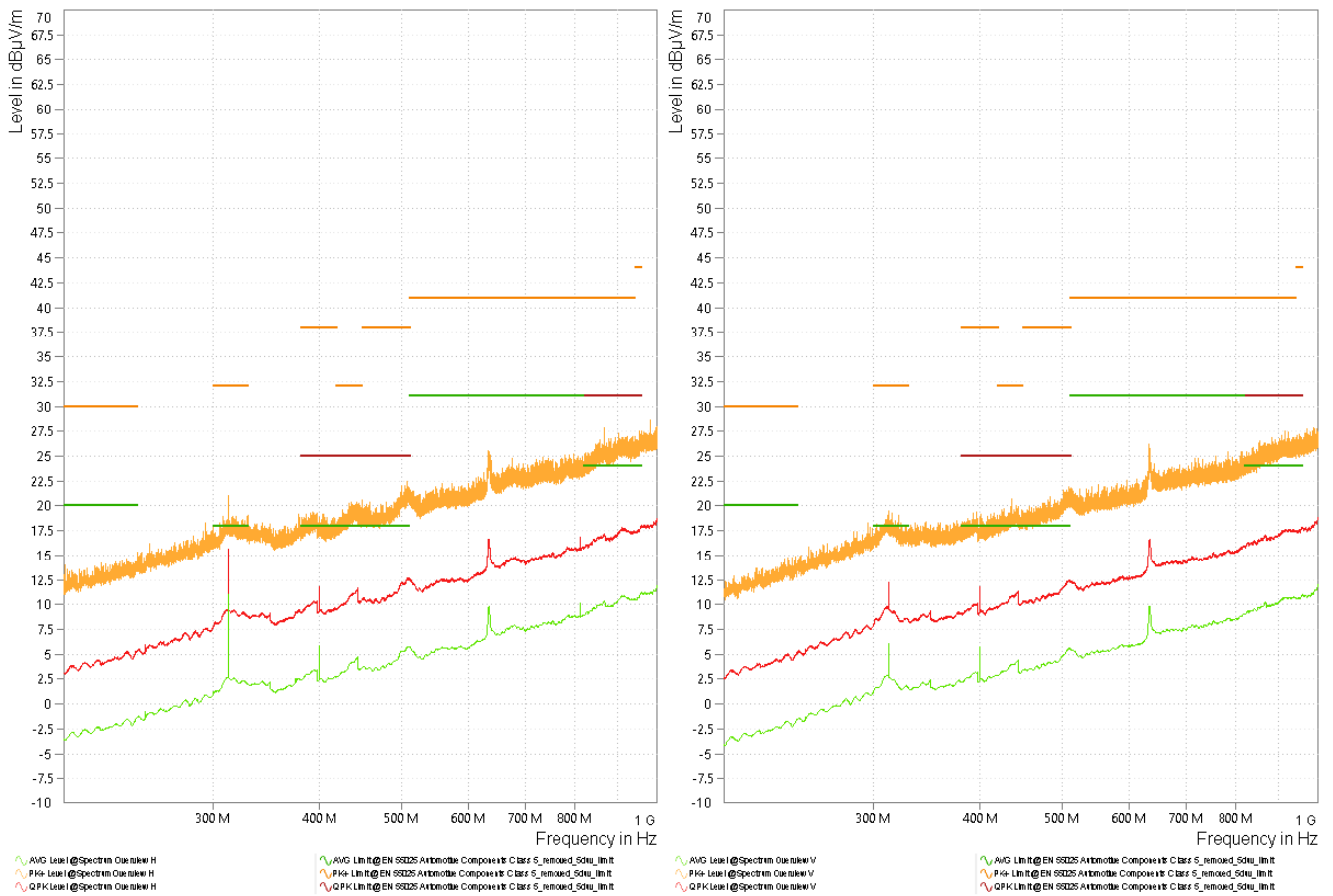


Figure 2-11. RE: 200 MHz to 1 GHz, Log Periodic Horizontal(Left)/Vertical(Right) Antenna: Unloaded

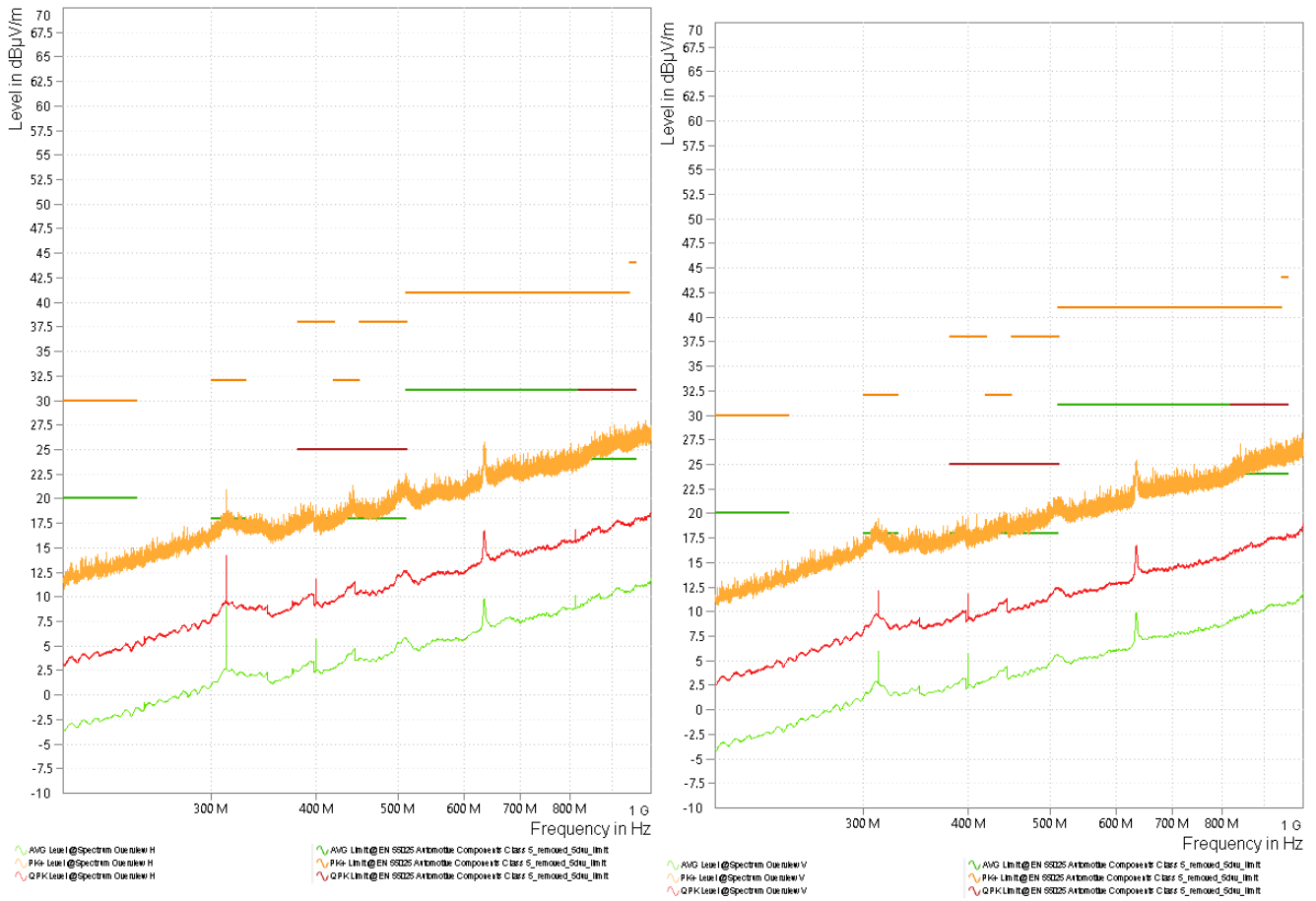


Figure 2-12. RE: 200 MHz to 1 GHz, Log Periodic Horizontal(Left)/Vertical(Right) Antenna: 312.5 mA

3 Conclusion

The TPS22995HQ1EVM is CISPR-25 class-5 compliant, without any significant noise introduced for both conducted and radiated emissions testing.

4 References

1. Texas Instruments, [TPS22995H-Q1](#) product page
2. Texas Instruments, [TPS22995H-Q1 Load Switch Evaluation Module](#) user's guide

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