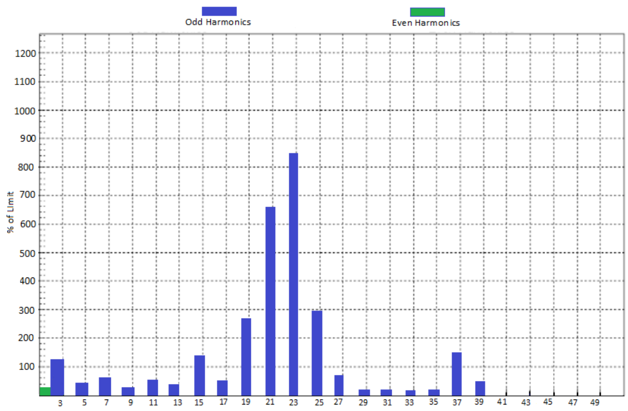

Fig. 17 Harmonic limits in compliance with IEC 61000-3-2

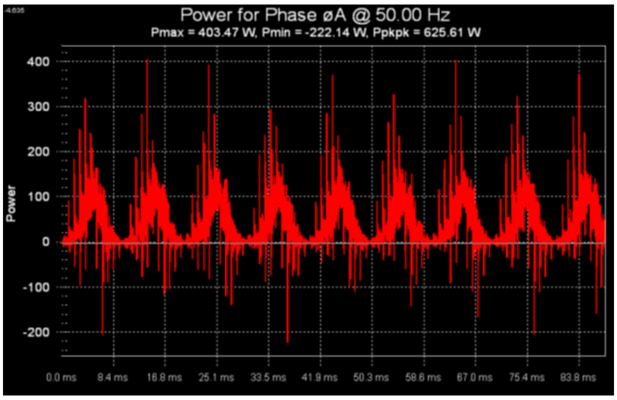

Fig. 18. Instantaneous power for cascaded H bridge multilevel inverter supply

One can easily see that the results are far better than in the previous case. From Table III and Fig. 17 one can see that there is only one group of four odd harmonics exceeding the standard limits, situated between the 19$^{th}$ and 25$^{th}$ harmonics order.

At the same time, for a $THD_V$ of only 11.72, the rms current is only of Irms = 0.280 A, exceeding with 39% the rms current drawn in the case of the pure sinusoidal supply. The power factor is also improved, being 0.620. Only a difference of 0.078 A is meant to support the reactive and the harmonic distortion power. The measured crest factor was in this situation only of 4.562. The instantaneous power has a shape similar to the previous case.

## 4. Conclusions

The above analysis revealed that in terms of efficiency the inverters waveforms were obviously far from the pure sinusoidal supply but considering that the approach considered only residential green energy systems not connected to a distribution grid, power efficiency and the harmonic content of the voltage and current waveforms don't represent capital issues.

However, if one intends to inject power into a low voltage power distribution grid, some cautions are needed. Among them the retrofitting of a filtering system is compulsory. At the level of domestic systems, a passive filtering method would be enough. Obviously, for more powerful PV systems, other filtering methods presented in the literature would be necessary [10 – 14].

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