the deviation using a 200 Hz-grouping bandwidth is ±14 %. Lastly, the worst uncertainty case in this experiment relates to lamp L003 (Fig. 10): the deviation of the TSHC over time about its mean value when using a 10 kHz-grouping bandwidth is ±2 % for this individual.

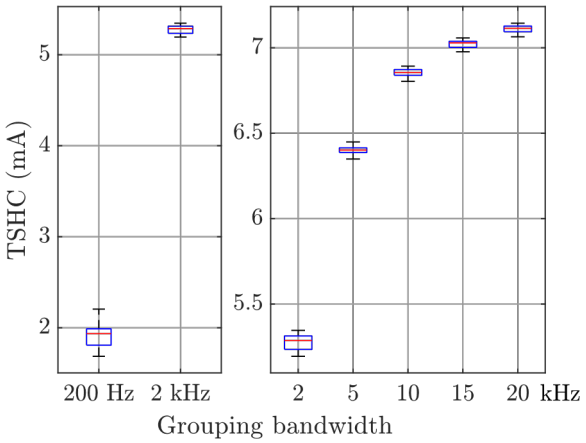

Fig. 11. Variation of TSHC of the supraharmonic emission of lamp L004 after thermal stabilization. Comparison with a 200 Hz-grouping bandwidth.

6. Conclusions

The conclusions of this study are summarized next:

- The thermal stabilization time of the lamp can be identified based on its fundamental current in addition to the temperature and the light output.
- The supraharmonic distortion emitted by the lamp under study experiences an increase in magnitude during the thermal stabilization of the lamp. The distortion also shifts in frequency during the thermal stabilization of the lamp. On the basis of this evidence, one can hypothesize that lamps with similar characteristics to this one (namely, lamps with drivers using APFC) behave similarly. Experiments with a variety of lamps of different manufacturers should be performed in order to generalize this point.
- The characterization of the behavior of the supraharmonic distortion emitted by this lamp during its thermal stabilization is better achieved by using a grouping bandwidth of at least 10 kHz for calculating the TSHC. The band should be broad enough so that it involves the whole emission of interest plus possible shifts in frequency happening during the thermal stabilization of the lamp.
- Although there is a correspondence between changes in the supraharmonic emission and thermal stabilization of the lamp, the supraharmonic emission presents variations even when the lamp can be considered stable. How much these variations affect the quantification of the emission depends on the bandwidth used to calculate the TSHC. Variations in the quantification of the main supraharmonic emission can be reduced by using a grouping band wide enough, e.g.: 10 and 20 kHz give better results than using 200 Hz and 2 kHz bandwidths. The highest TSHC variation after thermal stabilization, for the lamps tested in this experiment, using a 10 kHz grouping bandwidth, is ±2 % of the average value of the sample data. The latter value can be used as a reference for expected deviations in the quantification of supraharmonic emission for this type of lamp.
- Standardization measures for quantification of supraharmonic emission from LED lamps should consider a stabilization time and grouping bandwidths broader than those currently used. In this case, 60 min and 10 kHz are recommended.

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