Loudness of brief signals increases when signal duration increases up to about 100 ms, this increase is called 
temporal summation. The question examined in this study is to determine how loudness change as a function 
of duration. Literature shows different results that lead to different conclusions: when duration increases 
(i) the loudness increases in direct proportion to energy (intensity x duration); (ii) the loudness increases 
 faster than energy; (iii) the loudness increases slower than energy. We have shown, in previous experiments, 
that loudness change with duration can follow either (i) or (ii) depending on signal level. The present study 
provides a parametric examination of this question. Loudness was measured for signals whose energy was 
kept constant while the duration was varied. The parameters of the experiment were the signal frequency 
and level. The results allow to explain part of the discrepancies found in literature. Moreover, the results 
of this study are used into a model of impulsive sounds that calculate with a good precision the loudness of 
environmental short-duration sounds.