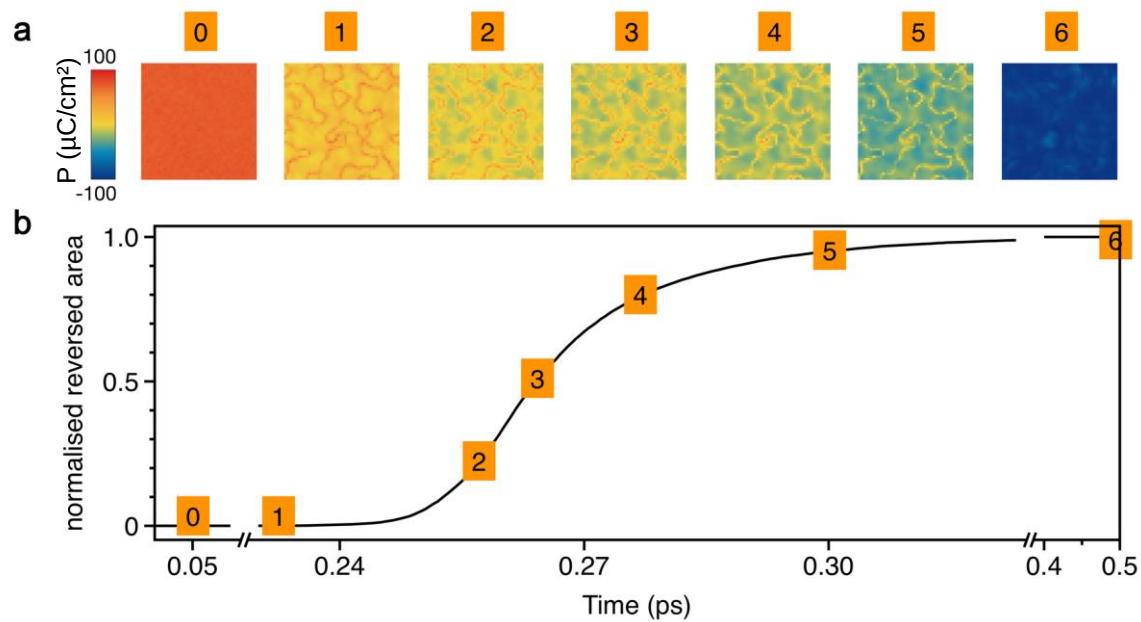
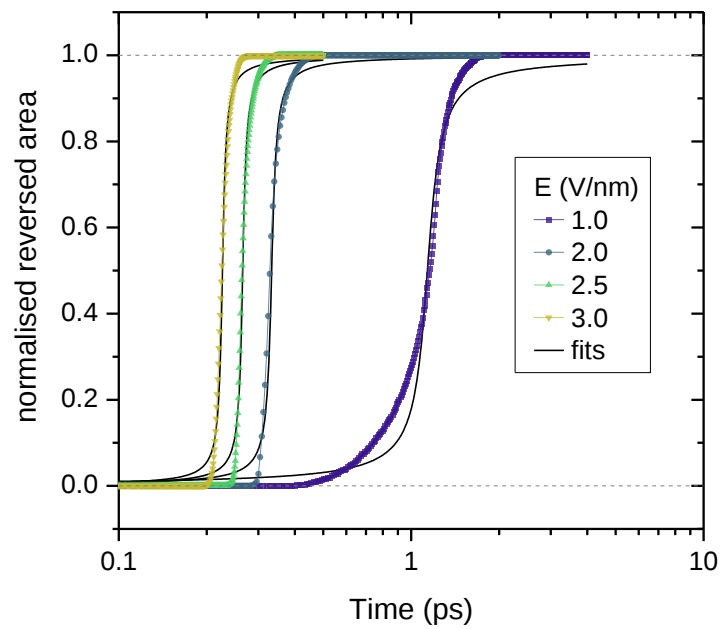




Supplementary Figure 1 | Polarisation switching predicted by effective Hamiltonian simulations.

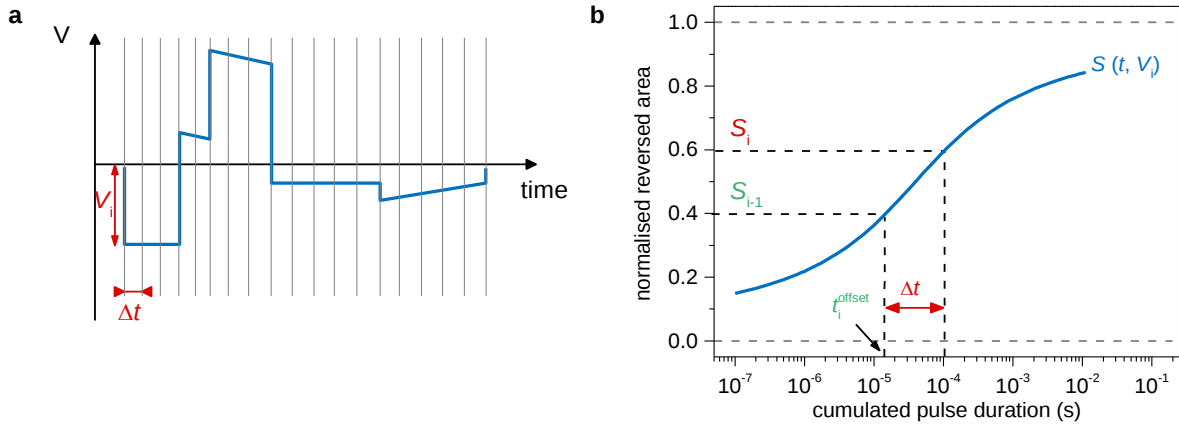
(a) Evolution of the polarisation pattern along the [001] direction under a dc electric field of 2.5 V nm^{-1} .

(b) Normalised switched area as a function of time.



Supplementary Figure 2 | Switching dynamics as simulated by the effective Hamiltonian technique.

Normalised switched area as a function of time under various dc electric fields ranging from 1 to 3 V nm⁻¹. The black lines are fit results from the nucleation-limited switching model from Eq. 1.



Supplementary Figure 3 | Modelling conductance variations under arbitrary voltage waveforms.

(a) Sketch of the voltage waveform divided in short segments of width Δt for which we assume a constant voltage (V_i). (b) Determination of the final state (S_i) resulting from the application of the pulse segment of voltage V_i , and length Δt . S_{i-1} corresponds to the polarisation state before the pulse. t_i^{offset} and S_i are computed from $S(V_i, t)$ curves from Eq. 1.