While the controlled dielectric breakdown approach has been demonstrated to be effective for various solid-state thin-film materials and provided an accessible nanopore fabrication for ordinary labs, considerable reliability challenges remain, particularly in controlling the number and location of the formed nanopore(s). The localized breakdown for nanopore fabrication often requires additional lithography patterning process, thus limiting its flexibility and tunability. Optical beams can be easily manipulated and tightly focused into a diffraction-limited spot size, offering an alternative approach for solid-state nanopore localization. In this work, we explored the laser-assisted deterministic dielectric breakdown. In particular, we studied the laser-assisted etching dynamics, and investigated the competitive effects of laser etching enhanced electric field and laser etching itself. We developed a physical model for projecting the confidence level of forming a single nanopore in the laser-assisted dielectric breakdown method. With this model, we studied and validated the impact of membrane thickness, membrane absorption coefficient and randomness of the system at different laser power and voltage on the confidence of deterministic fabrication. We anticipate our study would provide useful and practical insight for deterministic nanopore formation in dielectric breakdown.