Dynamics of a current-biased Bi$_2$Sr$_2$CaCu$_2$O$_{x+d}$ surface intrinsic\textsuperscript{1} SHAOXIONG LI, WEI QIU, SIYUAN HAN, Department of Physics and Astronomy, University of Kansas, Y. F. WEI, X. B. ZHU, C. Z. GU, S. P. ZHAO, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, H. B. WANG, National Institute for Materials Science, Tsukuba, Japan — The dynamics of switching from superconducting to voltage state of a current-biased Bi$_2$Sr$_2$CaCu$_2$O$_{x+d}$ surface intrinsic Josephson junction is studied by measuring the temperature-dependent switching current distributions at temperatures ranging from 15 mK to 4.8 K. Crossover from phase diffusion to Kramers switching and thermal activation to quantum tunneling have been observed. Quantitative analysis indicates that the dynamics of a single high T\textsubscript{c} Josephson junction can be described very well by theories whose predictions have been confirmed by experiments performed on low T\textsubscript{c} Josephson junctions. Our result also indicate that the d-wave order parameter symmetry has no observable effect on the dynamics of Bi$_2$Sr$_2$CaCu$_2$O$_{x+d}$ surface intrinsic Josephson junctions where current is along c-axis of the crystal.

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