We consider the Evolutionary Spectrum (ES) of nonstationary processes. Considering the ES and its log-transformation on any 2-dimensional finite grid of time-frequency values, we obtain two matrices. The spectral matrix has rank 1 for stationary and Uniformly Modulated (UM) processes and greater than 1 otherwise. The log-spectral matrix has rank 1 for stationary processes, 2 for UM processes, and greater than 2 otherwise. We develop graphical and statistical tests based on the singular values and 2 by 2 minors of the estimates of these matrices to decide on their ranks. We illustrate the performance of our test via simulations.