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In this study, we consider a special type of quantum channel characterized by exposure to a random environment, where the property of randomness is modeled by so-called i.i.d phases arranged as elements of the governing unitary matrix. In this context, the averaged motion of the quantum channel is shown to be primitive. Accordingly, this model permits an in-depth treatment of the role of decoherence and a detailed description of the quantum-to-classical transition. (Received September 14, 2013)