Single events by alpha particles and neutrons on the terrestrial region threaten safety, reliability and serviceability of semiconductor devices on which our daily life highly depends on. Radiation hardening by design must be taken into account for mission critical applications such as autonomous driving, aerospace and so on. This tutorial will provide an introduction of single events on digital circuits to cause a single event upset (SEU) on storage cells such as SRAMs, latches and flip-flops. Then several radiation-hardening-by-design (RHBD) techniques will be introduced to mitigate SEU including multimodal structures applicable to both of bulk and SOI and stacking structures effective to SOI.

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