Self-Initiated Global Reset

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For some designs, it may be necessary to drive the device Global Set/Rest (GSR) from on-chip logic. This poses a problem, because all flip-flops on the chip are affected by GSR, which will cause the operation to end prematurely, resulting in unpredictable behavior. Described here is a reliable solution that fits into a single CLB. The circuit consists of two latches built into the G and H function generators, using direct feedback. These latches are unaffected by GSR.

Figure 1. One CLB

 $\mathbf{28}$



Circuit Description:

The GSR input condition is decoded in look-up table F, and the next rising clock edge sets flip-flop Q0. Q0 in turn sets latch Q1, which drives the GSR signal that affects all flip-flops, even resetting Q0, but leaving Q1 unaffected. The subsequent clock Low signal sets Q2, the following clock High signal resets Q1, and the following clock Low signal resets Q2.

As shown, this circuit generates a GSR signal that lasts one clock period. If necessary, this period can be extended throughout the following clock Low time by driving GSR with the logic OR of Q1 and Q2. This circuit is hazard-free and reliable, but may cause problems with simulators that cannot cope with combinatorial feedback loops. ◆

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