Power Sequencing in Distributed Power Applications: Sequenced Turn-on of Seven DC/DC Power Supplies with Latched Shutdown

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It is becoming more common today to see many different power supplies in a system. There can be from 3 to 7 or more different DC/DC controllers. This is typically the result of the proliferation of new microprocessors, ASICs and FPGAs, each with their own variety of power supply voltages and power sequencing requirements.

In this application, two X80140 quad sequencers (See Figure 1) are used to sequence seven DC/DC converters (See Figure 2). The X80140 devices monitor the output of each DC/DC converter. After the supply reaches a minimum operating level, the X80140 powers up the next supply after a fixed delay. When all supplies have reached their proper level, the $\overline{\text{RESET}}$ outputs go inactive (HIGH) (See Figure 3 for timing).

Because of the way the voltage monitors are configured, the failure of any one supply causes either of the two reset outputs to become active. This triggers the latch, which pulls the MR pin on both devices LOW, thus turning off all supplies. To allow resequencing requires a separate reset signal or the main supply to be cycled off, then on.

The X80140 provides a selectable delay for each supply. The options are 100ms, 500ms, 1s, and 5s. Sequencing seven supplies requires a minimum of 700ms (plus the turn on time for each supply.) The eighth voltage monitor in the circuit is used as a watchdog timer (WDT). This timer starts when the master (first) voltage is applied. For the circuit to work, the timer is set to 1 second or 5 seconds. If the WDT ($\overline{\text{ViGDO}}$) output goes active before all of the supplies have reached their proper level, then one or both of the $\overline{\text{RESET}}$ outputs will be active. In this event, the latch is clocked and the MR pins are pulled HIGH, turning off all supplies. With the WDT set to 5 seconds there is some flexibility in the individual turn on delays. With the WDT set to 1 second, all delay times will likely need to be set to 100ms.

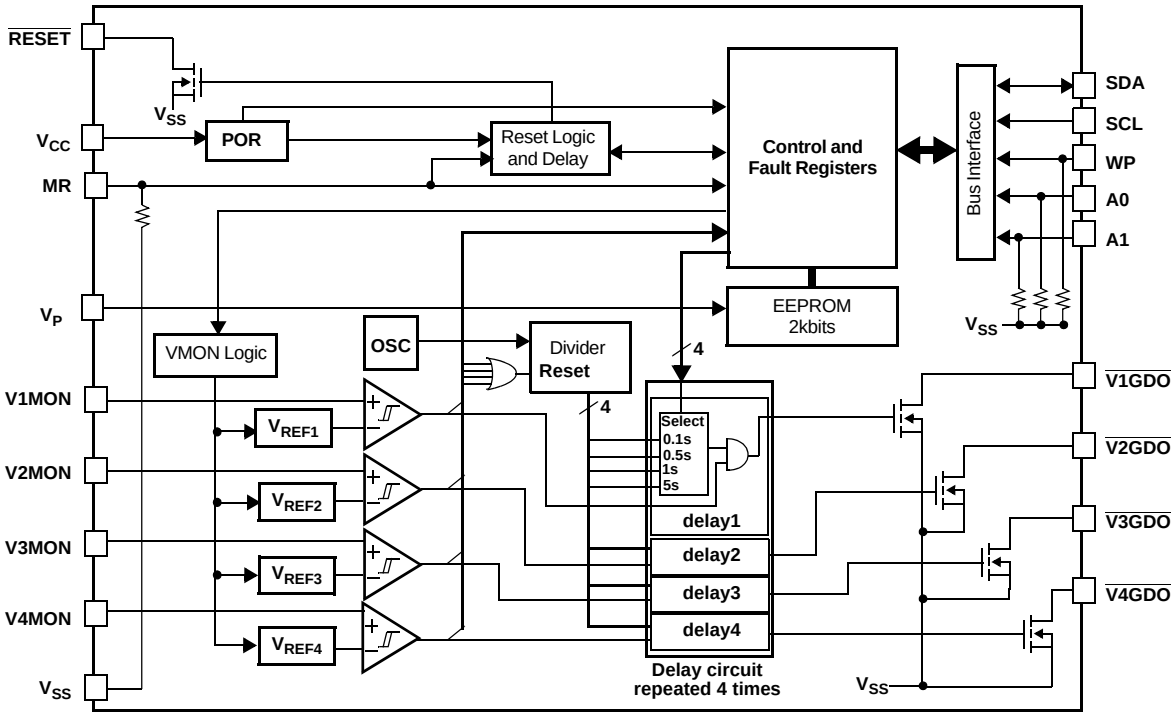

FIGURE 1. X80140 BLOCK DIAGRAM

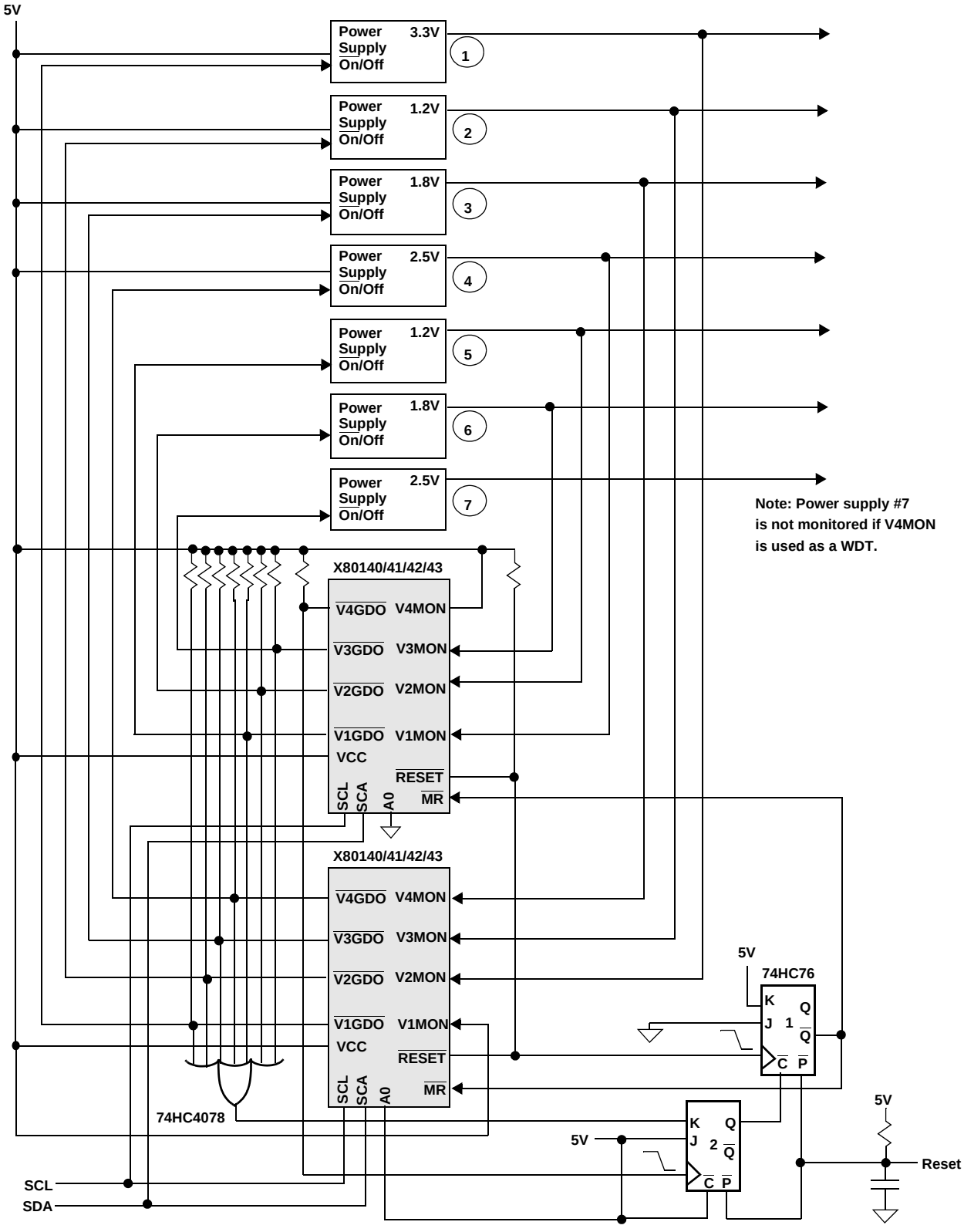

FIGURE 2. EXAMPLE OF RELAY POWER SUPPLY SEQUENCING

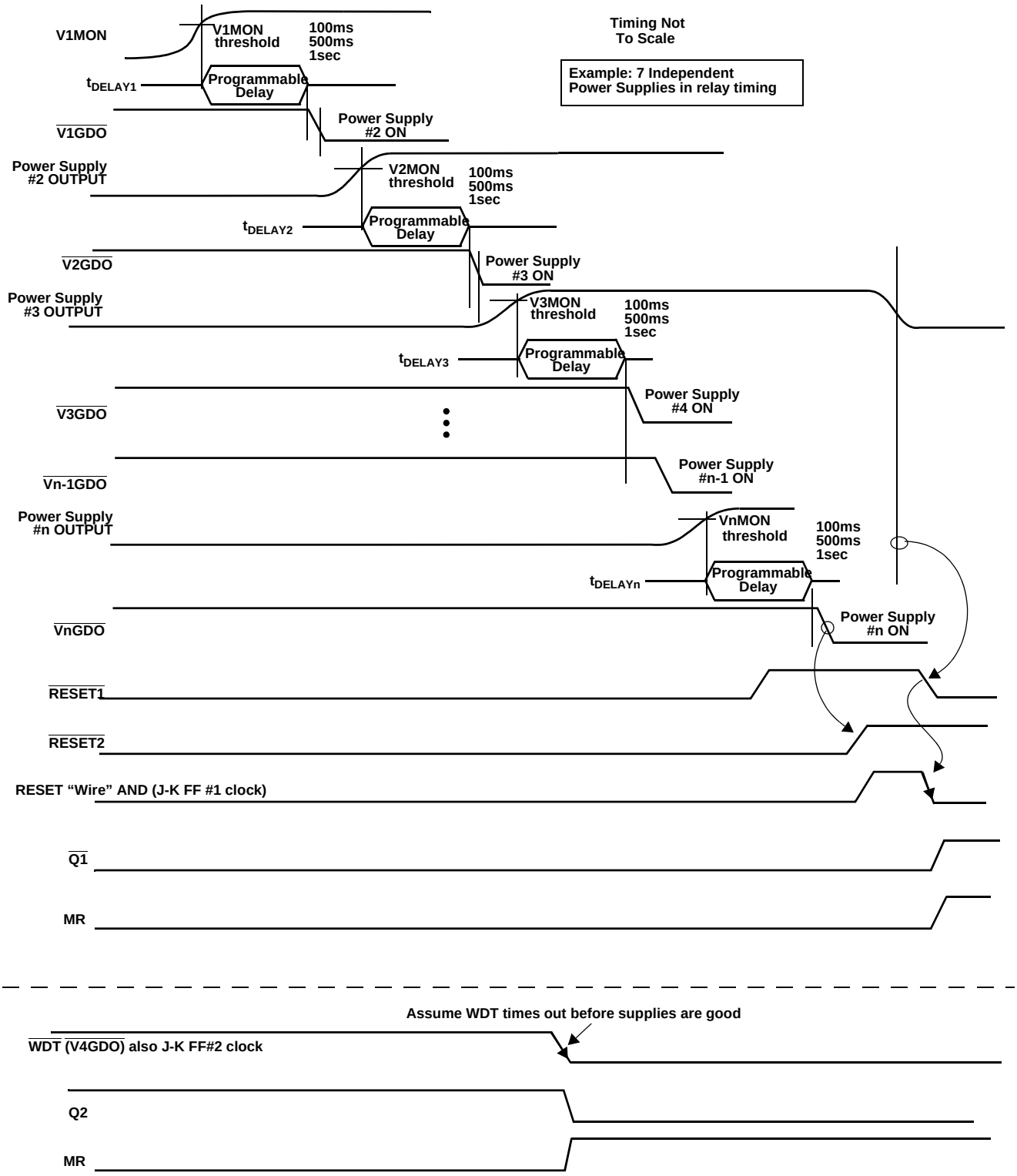

FIGURE 3. RELAY SEQUENCING OF DC/DC SUPPLIES. (TIMING)