Keywords: power suppliy, power sequencing, voltage tracking, power-supply controllers, xDSL, cable modem

APPLICATION NOTE 841

Staggered- or Simultaneous-Output Voltage Sequencing/Tracking is Flexible for xDSL and Cable Modem Systems

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Abstract: This application note shows a quad power-supply controller, the MAX1964, that has staggered voltage-output sequencing. Another quad power-supply controller, the MAX1965, turns on voltage outputs simultaneously for voltage tracking; two outputs for core and I/O supplies during power-up and two outputs for line driver supplies where tracking is not critical.

The MAX1964 and MAX1965 were developed to meet the power sequencing requirements of the core processor and the I/O logic circuits in various xDSL and cable modem systems. Improper power sequencing can cause system latch-up or damage integrated circuits. Sequencing problems jeopardize quality and reliability and often cause intermittent failures that are difficult to detect. This application note describes ways to meet the IC manufacturers' recommended power sequencing specifications.

The MAX1964 provides a staggered output sequence. V_{OUT1} comes up first. When V_{OUT1} reaches ~90% of nominal value, V_{OUT2} is turned on. Similarly, when V_{OUT2} reaches ~90% of nominal value, V_{OUT3} is turned on. **Figures 1** and **2** below show the schematic and the associated timing diagram of a typical circuit.

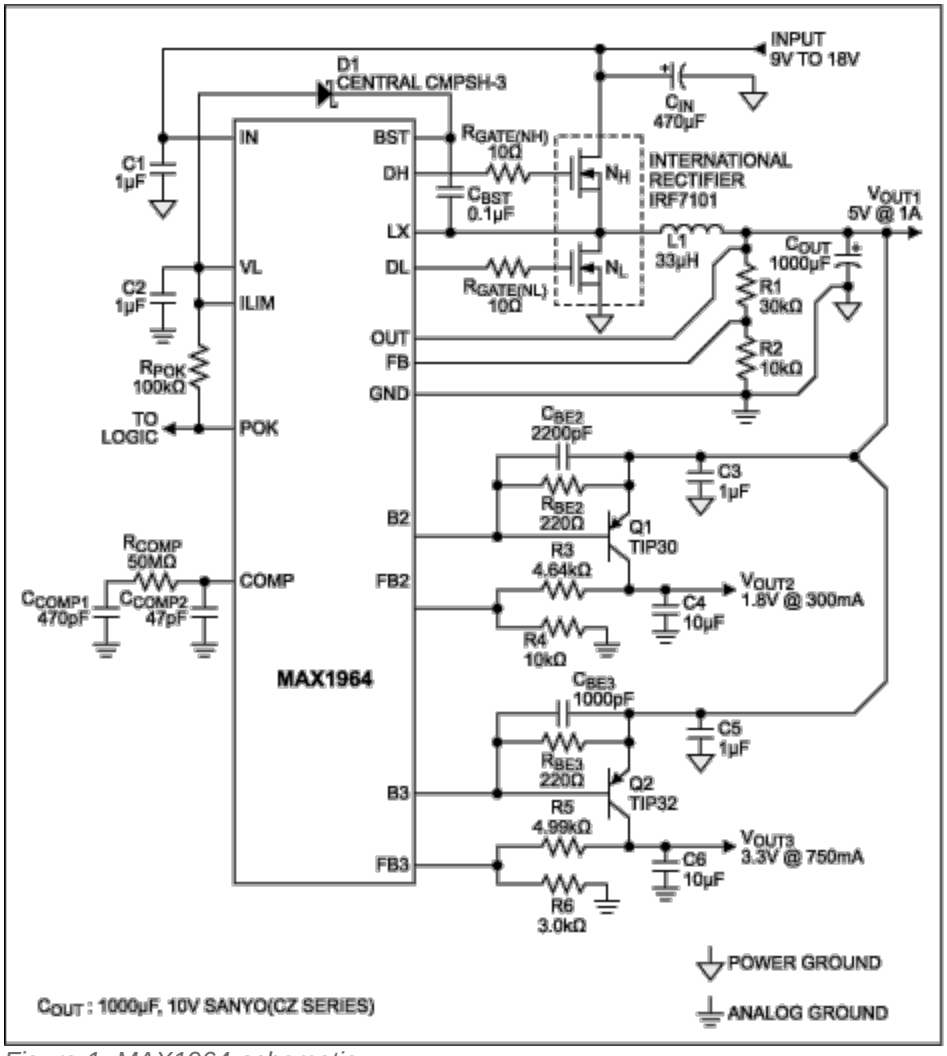

Figure 1. MAX1964 schematic.

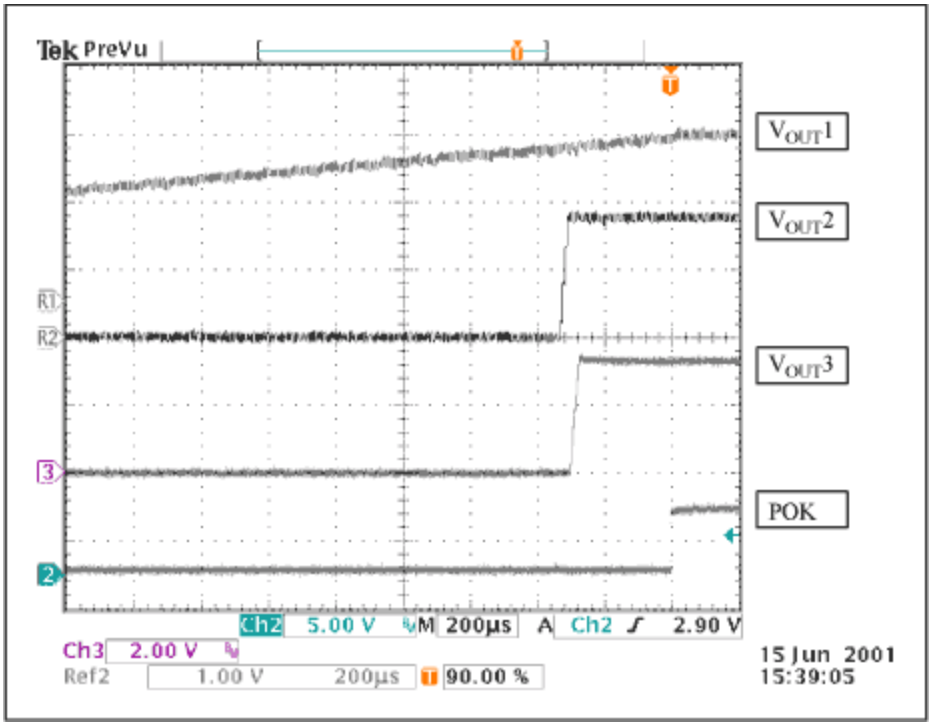

Figure 2. Output staggering sequence (from top trace down: V_{OUT1}, V_{OUT2}, V_{OUT3}, and POK).

Alternately, the MAX1965 provides output tracking sequencing, where all outputs are turned on at the same time, but track each other on the way up. This is useful when the core and I/O supplies must remain within a maximum delta when powering up. **Figures 3** and **4** show the schematic and the associated timing diagram of a typical operating circuit using the MAX1965.

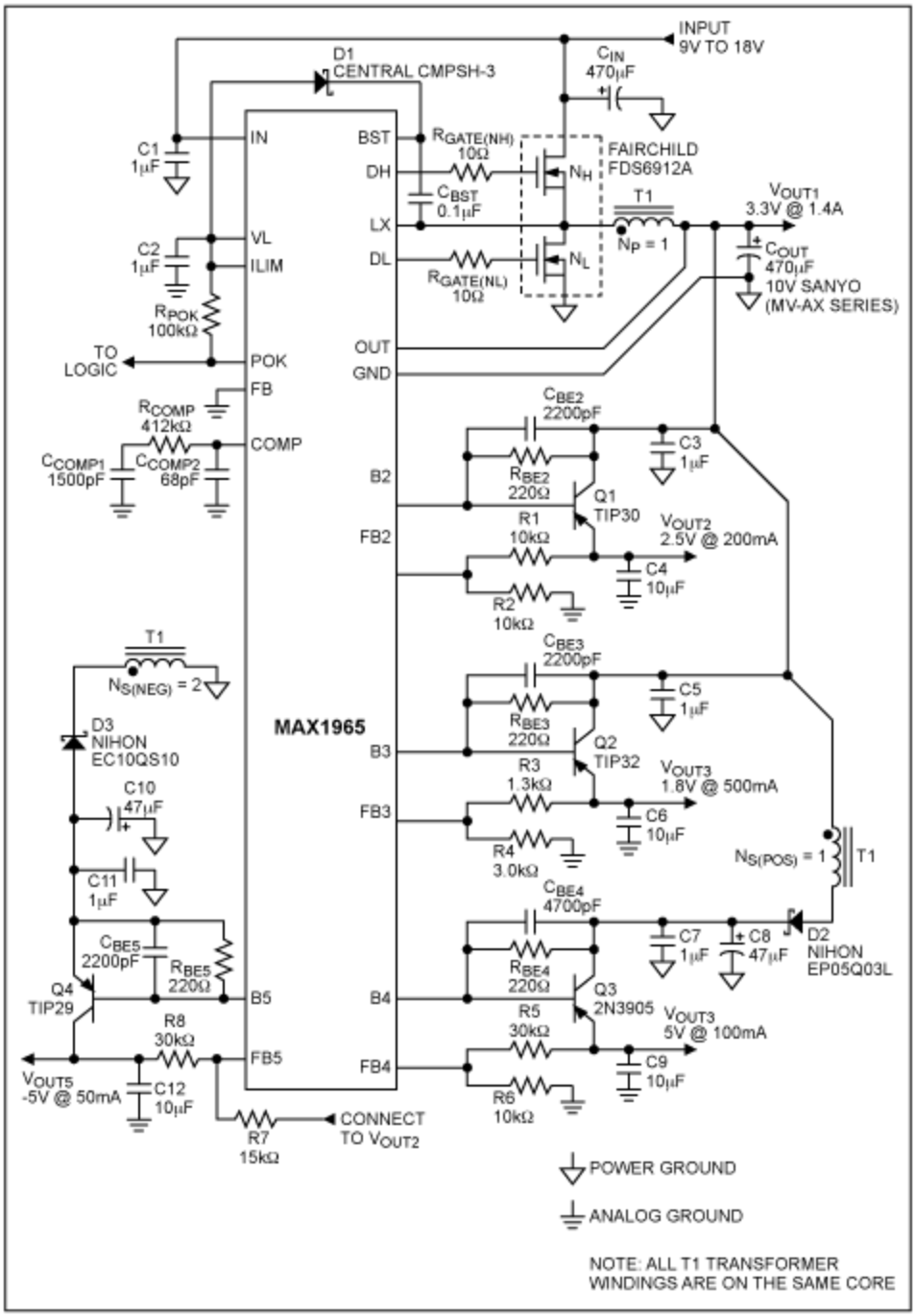

Figure 3. MAX1965 schematic.

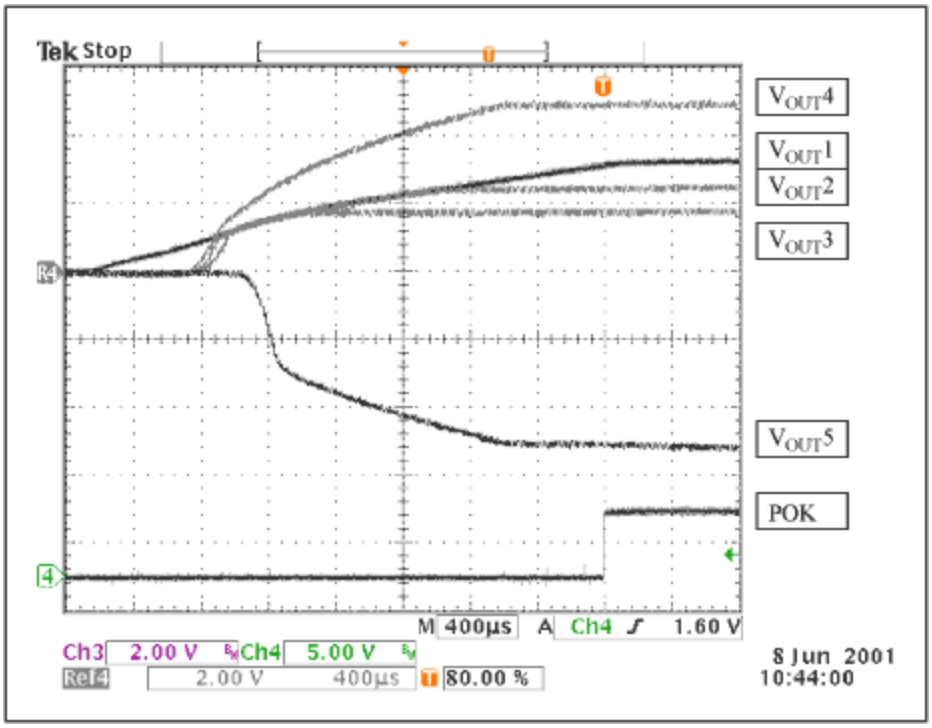

Figure 4. Output tracking sequence (from top trace down: V_{OUT4}, V_{OUT1}, V_{OUT2}, V_{OUT3}, V_{OUT5}, and POK).

As seen from Figure 4, after an initial offset of approximately one diode drop from V_{OUT1}, all outputs rise together. The circuit in Figure 3 focuses on having V_{OUT1}, V_{OUT2}, and V_{OUT3} track very closely during power up, which are normally used for core and logic I/O supplies that need tracking. V_{OUT4} and V_{OUT5} are typically used for line drivers supplies where tracking is not critical.

Related Parts		
MAX1964	Tracking/Sequencing Triple/Quintuple Power-Supply Controllers	Free Samples
MAX1965	Tracking/Sequencing Triple/Quintuple Power-Supply Controllers	

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