Simplify Multiple Bias Voltage Sequencing and Ramping for PC Motherboard Test

Application Note 1504

Description
It is vital that multiple bias voltages powering PC motherboard assemblies are correctly sequenced, usually within milliseconds, for the assembly to function correctly at turn-on. Not only can incorrect sequencing can lead to the assembly not starting up, it can also induce current latch up causing subsequent damage.

Problem
Sequencing and ramping multiple bias voltages to specified timing conditions during test is difficult or impossible to do with separate programmable system power supplies. Even most conventional multiple-output system power supplies do not adequately address this need.

Solution
Agilent Technologies N6700 Modular Power System incorporates several features ideally suited for sequencing and ramping multiple bias voltages during test:

- The N6700A-B mainframe holds up to 4 output modules in a 1-U package for high system density.
- Programmable precision delay and slew rate controls for each output provide exacting output voltage sequencing and ramping within a mainframe.
- Fast (< 1 ms) command processing time provides a simple means to sequence additional outputs across multiple mainframes. Alternately the hardware trigger system can be used to synchronize multiple mainframes.
- The N673xB 50W and N674xB 100 W, 5 V to 100 V basic power modules are economical choices when the primary focus is powering the PC motherboard.
- Up to four identical power modules can be paralleled and operated as a virtual single output for greater current and power.

ATX PC Motherboard Bias Voltage Requirements
A 160 W ATX power supply output voltages and currents are given in Table 1. The PC motherboard itself draws only a portion of the total power; the rest is used to power the drives, peripherals, and other PC components.

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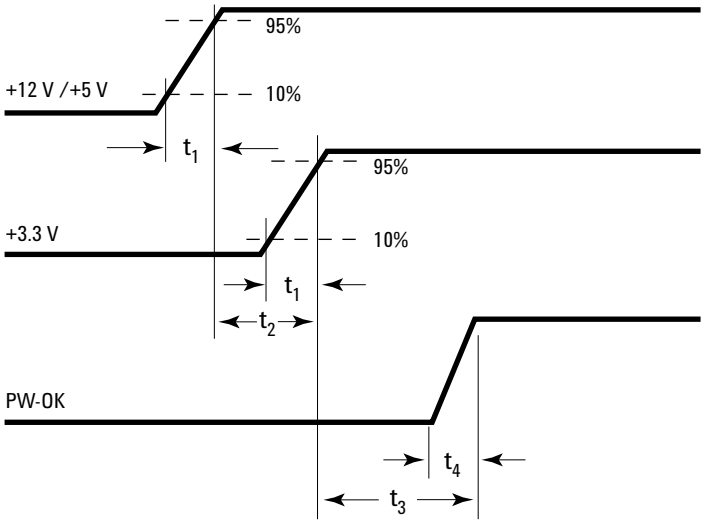

	Min. (ms)	Max. (ms)
t_1	2	20
t_2	0	20
t_3	100	2,000
t_4	2	10

Figure 1. ATX Power Supply Power-on Output Sequencing Requirements

The ATX motherboard standards specify the positive outputs and Power-OK signal be brought up with a certain sequence and rise times, as outlined in Figure 1.

Output	Min. Current (amps)	Max Current (amps)	Peak Current (amps)
+12 VDC	0.0	6.0	8.0
+5 VDC	1.0	18.0	
+3.3 VDC	0.3	14.0	
-5 VDC	0.0	0.3	
-12 VDC	0.0	0.3	
+5 VDC standby	0.0	1.5	2.5

Table 1: 160 W ATX Power Supply Outputs

Bias Voltage Sequencing and Ramping Solution

The configuration for bias voltage sequencing and ramping during test is shown in Figure 2. Due to the N6700 Modular Power System's flexibility the location of each output is not critical. The + and – output pairs were grouped together in a mainframe for ease of bringing them up simultaneously. The mainframe digital I/O port provided a convenient means of generating the PW-OK output signal without any extra equipment. An extra slot is available in each of the mainframes for adding another module. This could be used as another output or paralleled with an existing output for greater power, if desired.

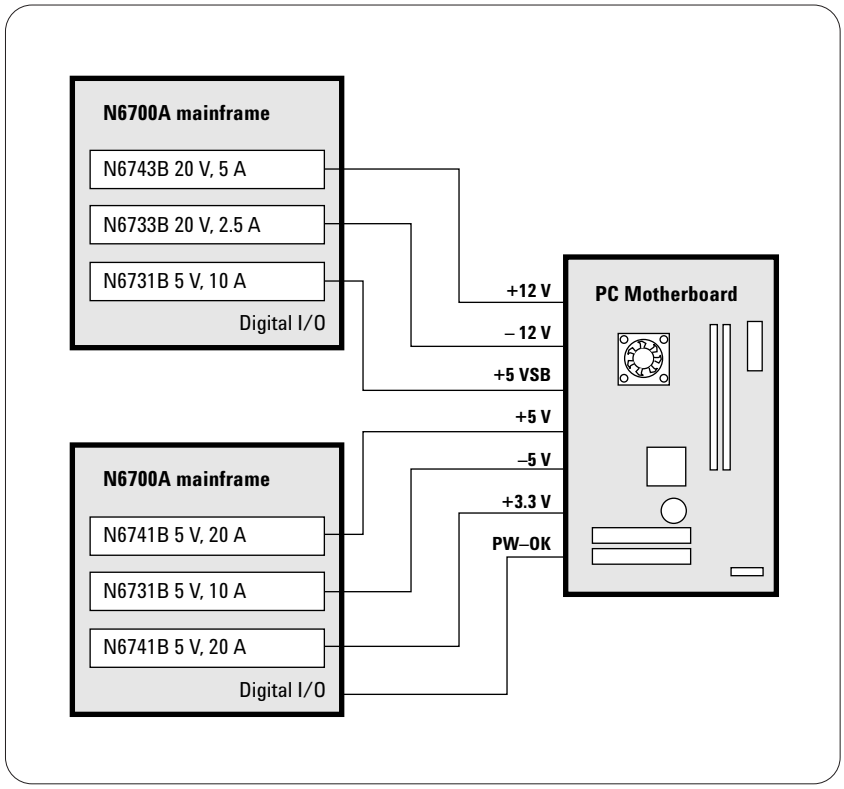

Figure 2. PC Motherboard Bias Voltage Sequencing and Ramping Solution

Results

Agilent Technologies N6700 Modular Power System readily addresses the need for sequencing and ramping multiple bias voltages powering PC motherboard assemblies during test. The assembly can now be correctly tested to its specified bias voltage timing with millisecond accuracy. In addition it is also now possible to determine the assembly's sequencing and ramping limits by making timing changes in sequence and slew rates of the multiple bias voltages.

Related Applications

- PC peripheral boards
- Base station Control Radio Interface Frame (CRIF) boards
- Digital radio Network Interface Units

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