Keysight Technologies
Simplify Multiple Bias Voltage Sequencing and Ramping for PC Motherboard Test

Application Note

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

Keysight Technologies, Inc. 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.

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.

<table>
<thead>
<tr>
<th>Output</th>
<th>Min. Current (amps)</th>
<th>Max Current (amps)</th>
<th>Peak Current (amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+12 VDC</td>
<td>0.0</td>
<td>6.0</td>
<td>8.0</td>
</tr>
<tr>
<td>+5 VDC</td>
<td>1.0</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>+3.3 VDC</td>
<td>0.3</td>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>-5 VDC</td>
<td>0.0</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>-12 VDC</td>
<td>0.0</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>+5 VDC standby</td>
<td>0.0</td>
<td>1.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

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

Results

Keysight 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

Figure 2. PC Motherboard Bias Voltage Sequencing and Ramping Solution
Evolving Since 1939

Our unique combination of hardware, software, services, and people can help you reach your next breakthrough. We are unlocking the future of technology. From Hewlett-Packard to Agilent to Keysight.

myKeysight

myKeysight
www.keysight.com/find/mykeysight
A personalized view into the information most relevant to you.

http://www.keysight.com/find/emet_product_registration
Register your products to get up-to-date product information and find warranty information.

Keysight Services

www.keysight.com/find/service
Keysight Services can help from acquisition to renewal across your instrument’s lifecycle. Our comprehensive service offerings—one-stop calibration, repair, asset management, technology refresh, consulting, training and more—helps you improve product quality and lower costs.

Keysight Assurance Plans

www.keysight.com/find/AssurancePlans
Up to ten years of protection and no budgetary surprises to ensure your instruments are operating to specification, so you can rely on accurate measurements.

Keysight Channel Partners

www.keysight.com/find/channelpartners
Get the best of both worlds: Keysight’s measurement expertise and product breadth, combined with channel partner convenience.

This document was formerly known as application note number 1504