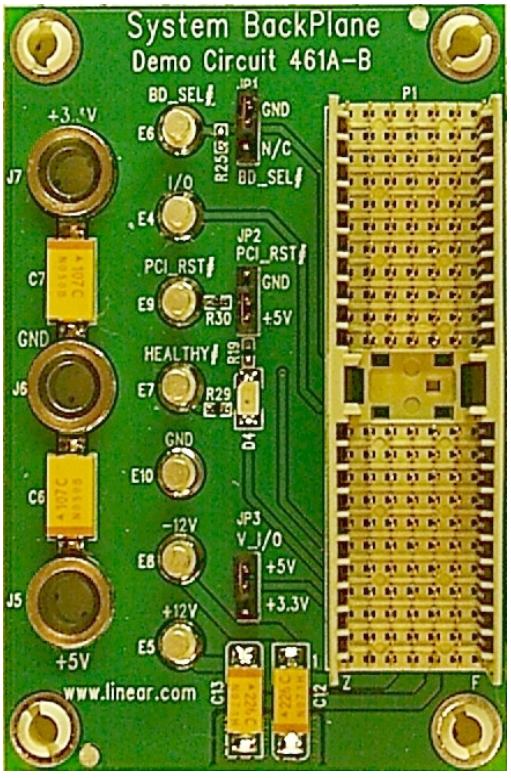
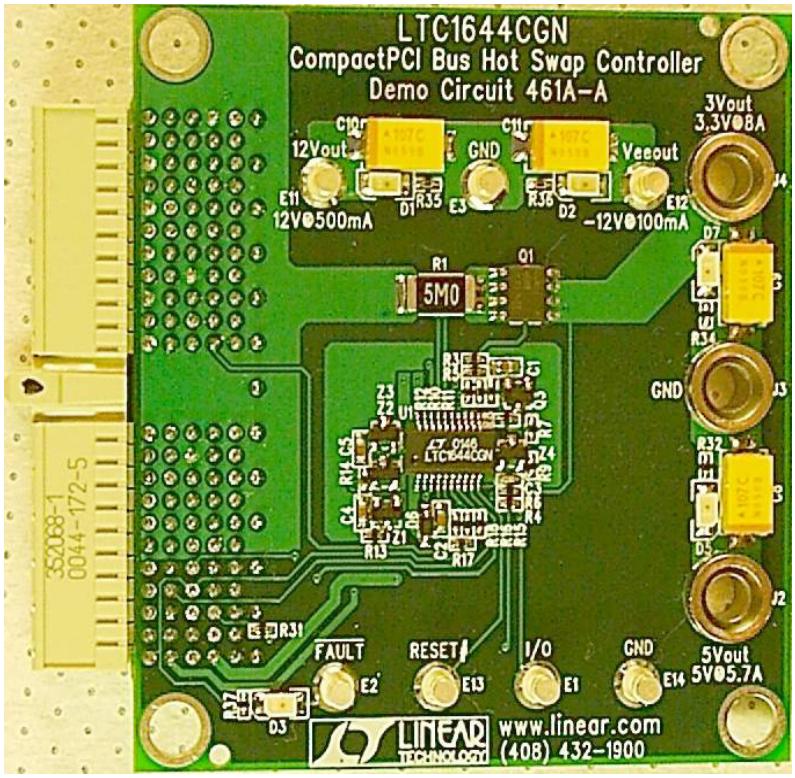
DESCRIPTION

Demonstration circuit 461A-**A** is a circuit board which demonstrates an application of the LTC®1644CGN Compact PCI Hot Swap Controller. DC 461A-**B** simulates the backplane of a Compact PCI Bus system. Together the demo boards demonstrate the Hot Swap controller and how it allows a board to be safely inserted or removed from an active (powered) Compact PCI (CPCI) bus slot. In addition to demonstrating the Hot Swap capability, the DC461A also demonstrates the ability of the LTC1644CGN to monitor, control and protect the +5, +3.3, +12 and -12 volt power supplies, and bias the I/O pins for minimal disruption during card insertion and extraction.

External N-channel transistors control the 3.3V/5V supplies, while on-chip switches control the –12V and 12V supplies. The 3.3V and 5V supplies can be ramped up at a programmable rate. Electronic circuit breakers protect all four supplies against overcurrent faults. The PWRGD output indicates when all of the supply voltages are within tolerance. The OFF/ON pin is used to cycle the board power or reset the circuit breaker. The PRECHARGE output can be used to bias the bus I/O pins during card insertion and extraction. PCI_RST# is combined on-chip with HEALTHY# in order to generate LOCAL_PCI_RST#.

Design files for this circuit board are available. Call the LTC factory.





QUICK START PROCEDURE

Demonstration circuit 641A is easy to set up to evaluate the performance of the LTC1644CGN. The DC641A-**B** board will be referred to as the backplane, and the DC641A-**A** will be referred to as the application board.

Initial Setup

Place jumpers on the backplane board as follows:

JP1	JP2	JP3
GND	+5V	+5V

Connect the input +5, +3.3, +12 and -12 volt power supplies to the backplane board (See figure 1). If you plan to test the circuit breaker and current limit features, make sure your power supplies are capable of delivering at least 8 Amps at +5 volts, 10 Amps at +3.3Volts, 1 Amp at +12 Volts and 500mA at -12Volts.

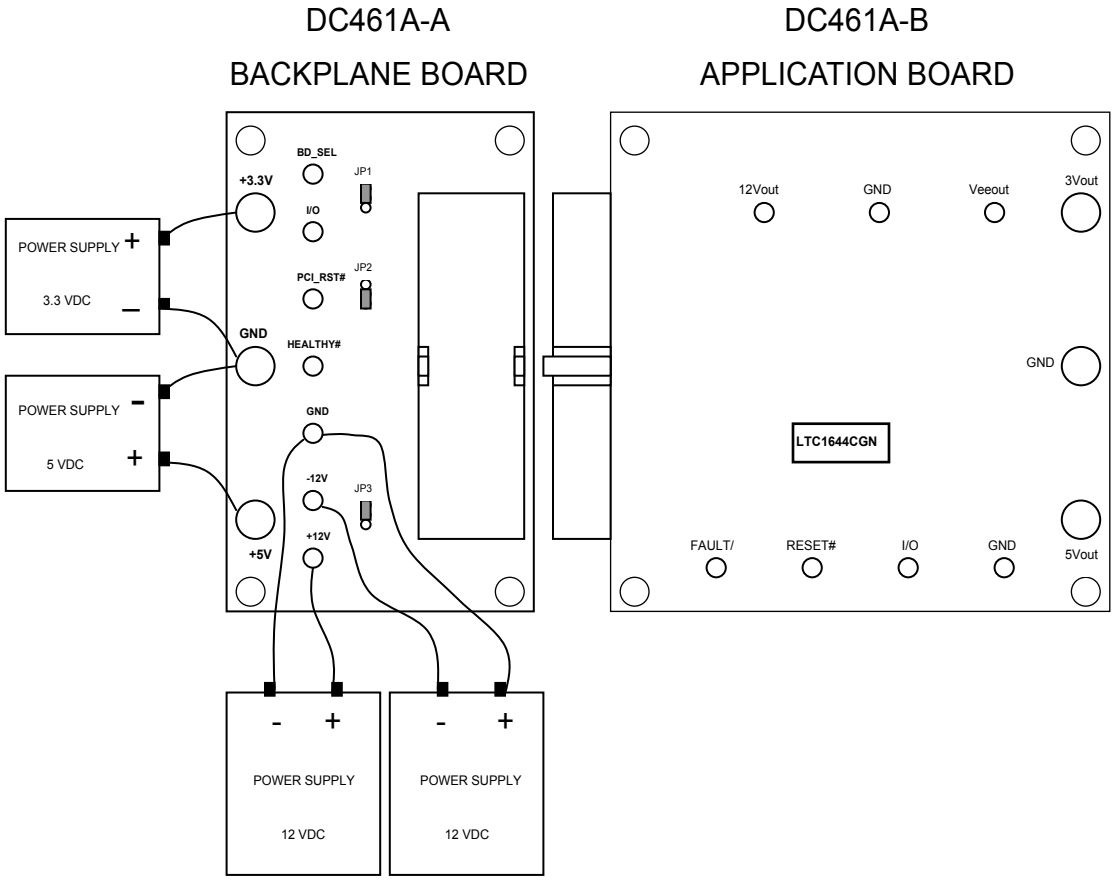


Figure 1- Power Supply Connections

Initial verification

Plug the application board into the backplane and power up the input power supplies. Observe the LEDs. The green "HEALTHY" LED (D4 on backplane) should be ON indicating that the input power supplies are good, The red power LEDs (D1, D2, D5, and D7 on the application board) should also be ON indicating that the +12V, -12V, +5V and +3.3V power supplies are operating. Measure the application board power supply output voltages to verify that the proper voltages are present.

HEALTHY# Function

Under voltage problems with the input power supplies are detected and indicated. Slowly reduce the voltage of one input power supply. Observe that the green HEALTHY LED goes out when the input voltage drops below its power-good threshold. Slowly return the voltage to its nominal value. Observe that the green HEALTHY LED comes back ON when the input power is once again in the allowable range. Repeat the process on the 3 remaining input power supplies if desired.

Precharging I/O pins Function

Upon application board insertion, the application board I/O pin is precharged to the desired level before the application circuitry is powered up. Upon PCI connector extraction the precharge voltage level is maintained until after the application circuitry is powered down. Monitor the voltage level (1 Volt) at the I/O testpoint. Slowly unplug the application board from the backplane and observe that the I/O pin remains charged after the application board has been removed far enough to cause the power supplies to cut off. Slowly plug the application board into the backplane and observe that the I/O pin charges to 1 Volt before application board has been inserted far enough to enable the application power supplies.

Over Current Protection Function

The LTC1644 provides overcurrent protection for all of its output supplies. The overcurrent fault will trip the electronic circuit breaker causing the LTC 1644 to latch off. Apply an adjustable load to one of the application power supplies. Slowly increase the load while monitoring the load current. When the application board's current limit for that power supply is exceeded, the electronic circuit breaker will activate and all application power supplies will be cut off. Observe that when the electronic circuit breaker activates the green HEALTHY LED turns OFF, all 4 of the red power LEDs turn OFF, and the red FAULT LED turns ON. Repeat the process on the 3 remaining power supply outputs if desired.

Short Circuit Protection Function

Unplug the application board from the backplane and apply a short across any of the power supply outputs on the application board, then plug it back into the backplane. Observe that the green HEALTHY LED is now OFF, and all 4 of the red power LEDs are OFF, and the red FAULT LED is ON. Unplug the application board from the backplane and remove the short, then plug it back into the backplane. The Green "HEALTHY" LED and the red power LEDs should come ON again, and the red FAULT LED should be OFF. You can also apply the short while the application board is plugged into the backplane and powered up with the same results and no sparking or popping. Repeat the process on the 3 remaining application power supply outputs if desired.

BD_SEL# Function

The application power supplies can be turned on and off, and the latched fault condition cleared by toggling the BD_SEL# signal. On the backplane board, set the BD_SEL (J1) to the N/C (floating) position. The BD_SEL# signal is now no longer grounded through the backplane so the BD_SEL# is pulled high by circuitry on the application board. Observe that when the BD_SEL# testpoint goes low this enables the application power supplies, and when BD_SEL# goes high the application power supplies are disabled (no LEDs ON). Force a fault condition by momentarily applying a short to one of the application board power supplies. Observe that the application power supplies can be reset from a faulted state (once the fault condition is resolved) by taking BD_SEL# hi then low again.

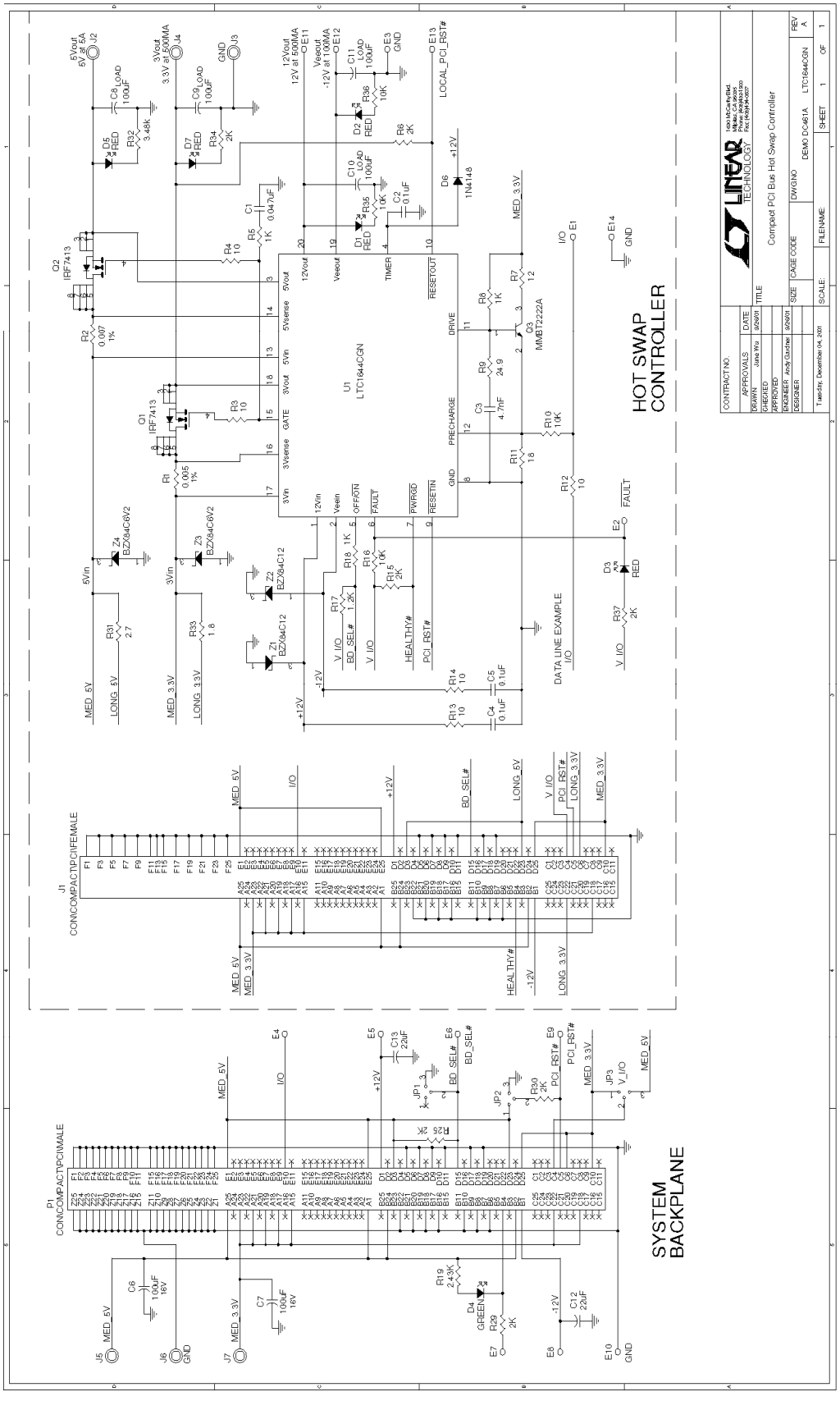
Fault/ Function

A fault response can be initiated by momentarily taking the FAULT / testpoint low. The fault can be cleared by taking BD_SEL# high then low again.

PCI_RST# Function

When input power is good (HEALTHY LED is ON), the PCI Reset signal from the backplane is propagated to the Local PCI Reset line on the application board. Alternately ground and allow PCI_RST# on the backplane to be pulled high while observing RESET# on the application board board. RESET# follows PCI_RST#.

When input power is not good (HEALTHY LED is OFF), RESET# is held low regardless of the state of PCI_RST#. Reduce one of the input power supplies until the HEALTHY LED turns OFF. Alternately ground and allow PCI_RST# on the backplane to be pulled high while observing RESET# on the application board board. RESET# stays low.


HOT SWAP CONTROLLER
SYSTEM BACKPLANE
U1 LTC1644CGN
P1 CONNCOMPACTPCIMALE
J1 CONNCOMPACTPCIFEMALE
Compact PCI Bus Hot Swap Controller
DEMO DC461A
LTC1644CGN