DEMO CIRCUIT 1054A/B
QUICK START GUIDE

LTC4242 Dual Port, PCI Express Hot Swap Controller

DESCRIPTION

Demonstration Circuit 1054A showcases the LTC4242 Dual Slot Hot Swap Controller for PCI Express. DC1054A features two PCI-X slots into which DC1054B may be inserted. Two DC1054B daughter cards are included with each DC1054A.

LEDs indicate the presence of input and output voltages, as well as faults and "power good" conditions. The daughter cards are loaded with the maximum capacitance on each supply.

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

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PERFORMANCE SUMMARY

Specifications are at TA = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{CC}	Input Supply Range		2.7	3.3	6.0	V
+12VIN	Input Supply Range		10.1	12	14.4	V
+3.3VIN	Input Supply Range		3.0	3.3	6.0	V
3.3VAUX INPUT	Input Supply Range		3.0	3.3	6.0	V
I_{12VOUT}	Load Current				5.5	A
$I_{3.3VOUT}$	Load Current				3	A
$I_{3.3VAUXOUT}$	Load Current				375	mA

OPERATING PRINCIPLES

Board Layout

Supply inputs and logic control inputs are located along the left side of DC1054B. Along the right side are the supply outputs and fault and power good outputs. LEDs are located adjacent to inputs and outputs of interest.

The Vcc pin bypass capacitor is located on the bottom of the board, directly under the LTC4242 where it can be of greatest efficacy.

Input Bypassing

In a practical application, the input supplies are bypassed near the supply switches (MOSFETs Q1-Q4). For the purposes of DC1054A, bypassing has been omitted except for the Vcc bypass capacitor C1, located directly under the LTC4242. This simplification affects the operation of the board in two ways. First, inductive reaction on the inputs arising from bench test leads during overload or short circuit tests can cause potentially damaging high voltage surges or transients to appear at the input pins of the LTC4242. Transient voltage suppressors (Z1, Z2 and Z3) have been included near the input turrets to protect against these transients. Surges may also arise as a result of poor loop response in a bench supply.

Second, dips in the input voltage arising from load steps and wiring resistance and inductance may activate undervoltage lockout and temporarily shut down the LTC4242, particularly if both slots are fully loaded. Take care to ensure that the proper supply voltage is delivered to the board, particularly at the +3.3VIN input.

Input Supplies

There are three supply inputs along the left side of DC 1054A, with adjacent LEDs to indicate when power is applied. In the lower left are turrets for the main supply inputs, +12VIN and +3.3VIN. In the upper left is a turret for connecting the 3.3VAUX input.

1A supplies are adequate to power the board, but to deliver full power to both ports the following ratings are recommended:

3.3VAUX	1A
+3.3VIN	7A
+12VIN	12A

Vcc for the LTC4242 may be obtained from either the 3.3VAUX supply or from the +3.3VIN supply by setting jumper JP9. A separate power supply for 3.3VAUX is not strictly necessary; 3.3VAUX and +3.3VIN may be powered from the same source as long as adequate current is available to power the combined load.

Controlling the LTC4242

There are several ways to control the LTC4242. Each port is fully independent and identical to the other, so this discussion will describe the operation of port 1. Note that external logic signals are applied via the turrets adjacent to each jumper.

Port 1 is activated by pulling low the enable pin, EN1#. Jumper JP7 provides 4 options for controlling EN#. It can be forced HIGH or LOW, connected to an external logic signal (EXT), or operated by the short pins on the daughter card using the J1(A1) jumper position. For normal operation, JP7 should

be in the J1(A1) position to allow the short, A1 finger of the daughter card to initiate port activation.

Fingers B17 and A1 are connected together on the daughter card. When the daughter card is inserted into the edge connector, B17 is grounded by DC 1054A. In turn A1 and EN1# are grounded, turning on the card.

EN1# is a "global" port enable, but two other pins also exercise control over the individual supply outputs. The main 12V and 3.3V outputs are gated by the ON1 pin. Using jumper JP2, ON1 may be connected HIGH, LOW, or connected to an external logic signal. The auxiliary 3.3V output has its own control line, AUXON1, which is connected HIGH, LOW or an external logic signal using JP3. In order for ON1 and AUXON1 to have any effect, EN1# must be low.

One last pin can exert control over the outputs. The Force ON pin, FON1 overrides all other logic commands. FON1 is set by JP1 to HIGH, LOW, or EXT. Care must be exercised in using FON1. If EN1# is low, FON1 overrides both the various enable inputs and short circuit current limiting. If one of the main outputs is shorted the MOSFET and current sense resistor may be destroyed. If EN1# is high, FON1 forces all outputs on and current limiting is present, but the circuit breaker function is disabled. Again, a short circuit will lead to the eventual destruction of the external MOSFET. Treat FON1 as a "battle override" switch, or use it for debugging purposes where a daughter card is consuming more current than specified, but does not have a hard short across its supply. See the LTC4242 data sheet for further information on the FON1 pin.

Activating a Port

To consolidate the foregoing discussion into a simple procedure for activating port 1, set ON1 and AUXON1 high using JP2 and JP3; set FON1 low using JP1, and set EN1# (JP7) to the J1(A1) position to monitor for card insertion. The port will turn on automatically when the card is inserted into edge connector J1.

Outputs, Power Good, and Faults

The supply outputs are brought out to turrets on the daughter cards (DC 1054B), with LEDs to show when the outputs are powered.

Along the right side of DC 1054A are not only the supply outputs, but also the power good and fault outputs. Every power and signal line has a turret for external connections and an LED to indicate the operating condition. Outputs and power good signals have green LEDs, while faults are shown with red LEDs. Under normal conditions 5 green LEDs will light up per port (3 outputs and 2 power good signals) when the port is enabled.

QUICK START PROCEDURE

Check that the jumpers are in the following default positions:

FON: LOW
ON: HIGH
AUXON: HIGH
EN#: J1(A1) and J2(A1)

Connect a 12V and 3.3V supply to +12VIN and +3.3VIN. 3.3VAUX INPUT may be powered from the same supply as +3.3VIN, or from a separate 3.3V supply. Turn the supplies on–there is no requirement for any particular sequence. To verify that all 3 supplies are present, check to see that the LEDs (D1, D2, D3) are lit.

Next, insert one of the DC 1054B daughter cards into edge connector J1 or J2. The port will turn on automatically when the card is inserted, and turn off when withdrawn.

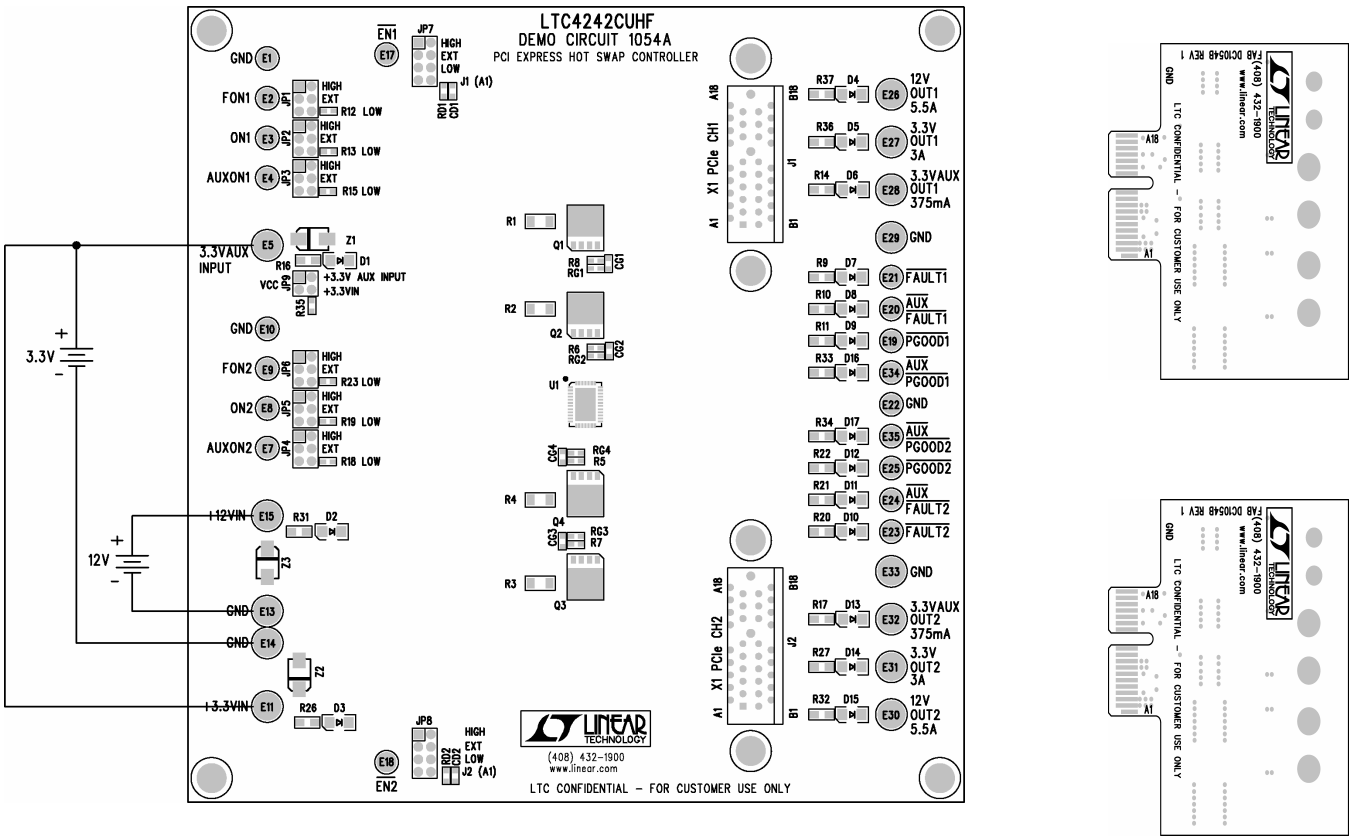
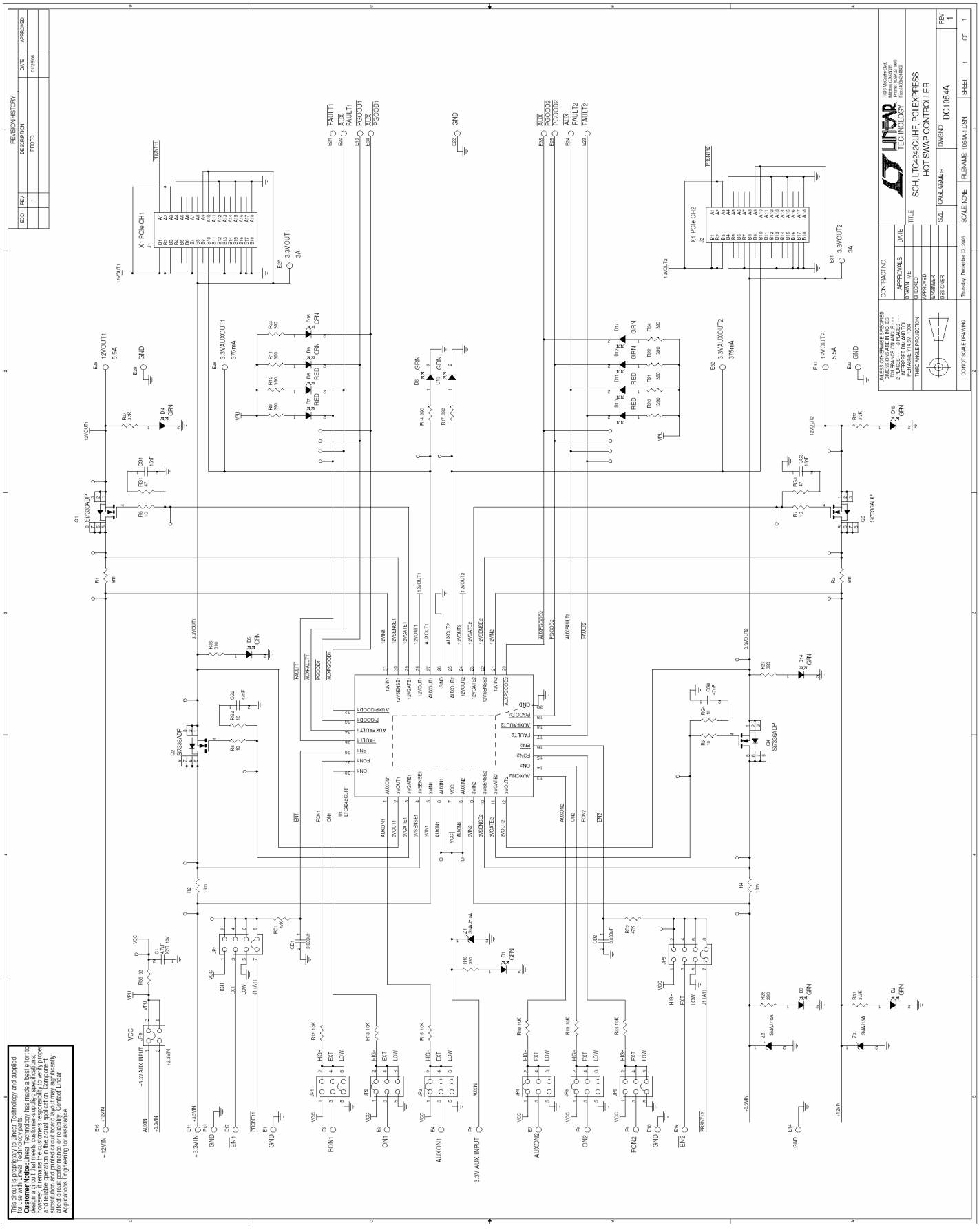
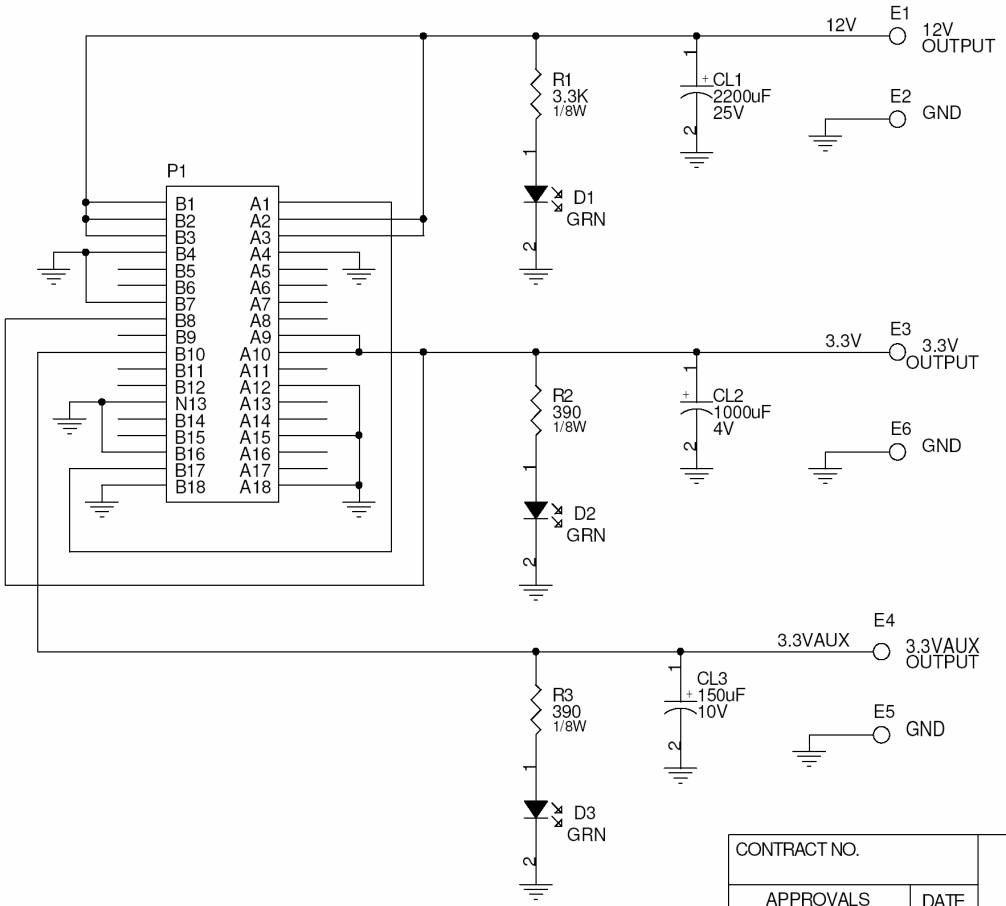


Figure 1. Proper Measurement Equipment Setup


REVISION HISTORY
DESCRIPTION
PROTO
DATE
APPROVED
LINEAR TECHNOLOGY
SCH, LTC4242CUHF, PCI EXPRESS HOT SWAP CONTROLLER
DC1054A
SIZE
SCALE: NONE
SHEET 1 OF 1
DO NOT SCALE DRAWING
This circuit is proprietary to Linear Technology and supplied for use with Linear Technology parts.
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LTC4242CUHF
X1 PCIe CH1
X1 PCIe CH2
3.3VOUT1 3A
3.3VOUT2 3A
12VOUT1 5.5A
12VOUT2 5.5A
3.3VAUXOUT1 375mA
3.3VAUXOUT2 375mA
FAULT1
AUX PGOOD1
FAULT2
AUX PGOOD2
PRSNT#1
PRSNT#2
GND
3.3V AUX INPUT
VCC
HIGH
EXT
LOW
ON1
ON2
FON1
FON2
EN1
EN2
AUXON1
AUXON2

This circuit is proprietary to Linear Technology and supplied for use with Linear Technology parts.
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REVISION HISTORY				
ECO	REV	DESCRIPTION	DATE	APPROVED
	1	PROTO	02/01/06	



CONTRACT NO.	
APPROVALS	DATE
DRAWN mei	02/01/06
CHECKED	
APPROVED	
ENGINEER	
DESIGNER	
Wednesday, November 15, 2006	

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TITLE SCH, LTC4242CUHF, HOT SWAP CONTROLLER DAUGHTER BOARD

SIZE	CAGE CODE	DWG NO	REV
		DC1054B	1

SCALE:	FILENAME: 1054B-1.DSN	SHEET 1 OF 1