DEMO CIRCUIT 1594
QUICK START GUIDE

LTC4219
5A Integrated Hot Swap Controller

DESCRIPTION

Demonstration circuit DC1594A is a +5V or +12V rail with hot swap functionality featuring the LTC4219 - 5A Integrated Hot Swap Controller. As a Controller has two dedicated voltage versions- for 5.0V and 12V operation- the DC1594 also has similar variation-DC1594A-A (5.0V) and DC1594A-B ((12V). The DC1594A allows evaluating performance of the LTC4219 in the transient conditions, such as turning on and off the power rail, in the steady state conditions with different load and in the fault conditions, when Controller interrupts its functions from overcurrent, nonproprietary voltage level, or thermal condition.

The LTC4219 features 5% accuracy in 5.4A current limit and has a current limiting foldback characteristic. Current limit can be reduced by placing the external resistor between Iset and GND pins, and it can be adjusted dynamically during transient.

The Controller monitors a load current generating ground reference signal proportional to the sense resistor voltage. Thermal limit and power good signaling increase Controller reliability and options in application.

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

PERFORMANCE SUMMARY

Specifications are at TA = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{DD}	Input Supply Range		2.9		15	V
$V_{DD(UVL)}$	Input Supply Undervoltage Lockout	V_{DD} Rising	2.65	2.73	2.85	V
$V_{OUT(PGTH))}$	Output Power Good Threshold	LTC4219-12 Only V_{OUT} Rising	10.2	10.5	10.8	Vo
		LTC4219-5 Only V_{OUT} Rising	4.2	4.35	4.5	V
$V_{OUT(PGHYST)}$	Output Power Good Hysteresis	LTC4219-12 Only	127	170	213	mV
		LTC4219-5 Only	53	71	89	mV
$\Delta V_{GATE}/\Delta t$	GATE Pin Turn-On Ramp Rate		0.15	0.3	0.55	µA
R_{ON}	MOSFET+Sense Resistor ON Resistance		15	33	50	mΩ
$I_{LIM(TH)}$	Current Limit Threshold	V_{FB}= 1.23V	5.0	5.4	5.8	A
		V_{FB}= 0V	1.0	1.4	1.9	A
		V_{FB}= 1.23V, R_{SET}= 20kΩ	2.3	2.7	3.2	A
$V_{TIMER(H)}$	TIMER Pin High Threshold	V_{TIMER} Rising	1.2	1.235	1.28	V
$V_{TIMER(L)}$	TIMER Pin Low Threshold	V_{TIMER} Falling	0.1	0.21	0.3	V
$I_{TIMER(UP)}$	TIMER Pin Pull-Up Current	V_{TIMER} =0	80	100	120	µA
$I_{TIMER(DN)}$	TIMER Pin Pull-Down Current	V_{TIMER} =1.2V	1.4	2	2.6	µA
$I_{TIMER(RATIO)}$	TIMER Pin Current Ratio	$I_{TIMER(DN)}/ I_{TIMER(UP)}$	1.6	2	2.7	%

OPERATING PRINCIPLES

The LTC4219A-12 and LTC4219A-5 are suited accordingly for 12V and 5V power control in applications for hot board insertion or removal with electronic circuit breaker function, foldback current limiting, load current monitoring, power good and fault signaling. The LTC4219A has a rich set of features to support hot swap applications including:

- 5% Accurate Current Limit for 5.4A,,
- Adjustable Current Limit for lower than 5.4A,
- Adjustable Inrush Current Control,
- Load Current Monitoring,
- Adjustable duration for Current Limit before switch is turned off,
- Power good and Fault signaling.

QUICK START PROCEDURE

The Demo Board DC1594A includes the LTC4219-12 or LTC4219-5 5A Integrated Hot Swap Controller, four LEDs to indicate input and output voltages (D2, D4), and the state of the fault (D3) and Power Good (D5) pins, three jumpers, and a few associated components.

Demonstration circuit DC1594A is easy to set up to evaluate the performance of the LTC4219. Refer to **Error! Reference source not found.** for proper measurement equipment setup and follow the procedure below:

The performance evaluation for LTC4219-12 and LTC4219-5 is identical. The difference is in a value of the loading components and power supply voltage.

1. Place jumpers in the following positions:

JP1 CT OFF,

JP2 $\overline{\text{EN1}}$ DISABLE,

JP3 $\overline{\text{EN2}}$ ENABLE.

2. With power off, connect the power supply terminals to the VDD (E1) and GND (E3) turrets.

3. In all evaluations steps the Demo Board is connected to the appropriative power supply (+12V or +5.0V), Controller is turned on by replacing the jumper head JP2 position from the DISABLE to the ENABLE, and a resetting Controller is achieved by first placing the jumper head JP2 on the DISABLE position and then on the ENABLE.

4. Place a scope probe to the output turret, turn on the Controller, and measure a power-up time with no load. For LTC4219-12 this time must be in the range (22.0-80.0) ms, and for LTC4219-5 - (9.0-34) ms.

5. Connect a Low Capacitive Load (5600uf for both Controllers-LTC4219-12 and LTC4219-5) to the output of hot swap circuitry (OUT turret). Turn on the controller. This power up should be successful and two LEDs (OUT –green- and PG -orange) lights must indicate this.

6. Connect a High Reset Capacitive Load (6800uf for both Controllers-LTC4219-12 and LTC4219-5) to the output of hot swap circuitry. Turn on a controller. This power up should be unsuccessful, and no light of the two LEDs, - OUT and PG,- and the light of the $\overline{\text{FLT}}$ LED (red) confirms this. Reset controller after a fault.

7. Load the output with a Low Resistive Load (2.5 Ohms for LTC4219-12 and 1.1 Ohms for LTC4219-5) and turn the controller on. Controller should successfully keep this load. Verify performance of the current monitoring.

8. Load the output with a High Resistive Load (2.0 Ohms for LTC4219-12 and 0.8 Ohms for LTC4219-5) and turn the controller on. Controller should fail to keep this load. Reset Controller after a fault.

9. Pay special attention to the MOSFET Safe operating Area, when TIMER period is changed.

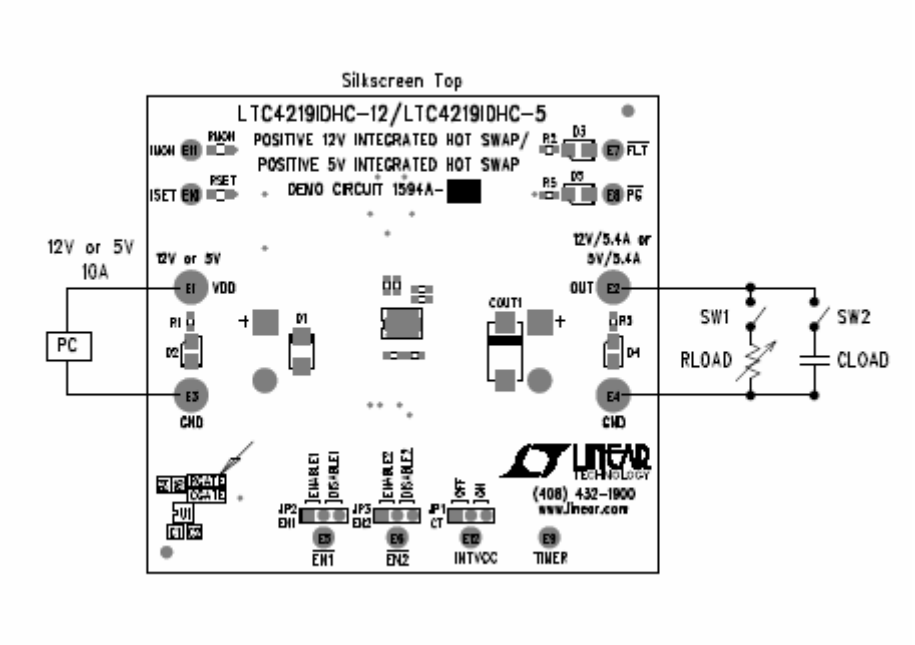

Figure 1. Proper Equipment Measurement Set-Up