# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 898

## 2-PHASE DUAL OUTPUT HIGH DENSITY POWER SUPPLY

## LTC3728LCUH

## DESCRIPTION

Demonstration circuit 898 is a high current density supply featuring the dual-output, 2-phase synchronous buck regulator LTC3728L. The input voltage of the demo board is designed from 4.5V to 13.2V, though the LTC3728L controller can take up to $30V_{MAX}$ Vin. There are two assemblies of the demo board, DC898A-A and DC898A-B. DC898A-A is a cost effective design with 2.0V/10A and 1.8V/10A outputs. DC898A-B is a high current design with 1.5V/15A and 1.2V/15A outputs. All the critical power and controller IC circuit are within a 1.35” x 0.9” “drop-in” layout space to delivery up to 25A/inch$^2$ current density solution. The outputs can be easily configured to have two separated output voltages or a single high current output voltage with two phases in paralleling.

The supply can also be synchronized by an external clock signal. The LTC3728LCUH regulator IC is in a small 5 mm x 5 mm package with exposed thermal pad for low thermal impedance, with an integrated 5V bias LDO.

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



**Table 1. Performance Summary ($T_A$ = 25°C)**

| PARAMETER | CONDITION | VALUE |
|---|---|---|
| Input Voltage | Typical | 4.5V-13.2V (15V abs_max) |
| | **Demo Board DC898A-A** | |
| Output Voltage $V_{OUT1}$ | $I_{OUT1}$ = 0A to 10A | 2.0V ± 2% |
| Output Voltage $V_{OUT2}$ | $I_{OUT2}$ = 0A to 10A | 1.8V ± 2% |
| Maximum Output Current | VIN = 4.5V-13.2V | 10A Each Output |
| Switching frequency | 5V-12Vin | 450kHz |
| Full Load Efficiency | $V_{IN}$ = 12V, $V_{OUT1}$ = 2.0V, $I_{OUT1}$ = 10A | 88.2% Typical |
| | $V_{IN}$ = 12V, $V_{OUT2}$ = 1.8V, $I_{OUT2}$ = 10A | 87.5 % Typical |
| | **Demo Board DC898A-B** | |
| Output Voltage $V_{OUT1}$ | $I_{OUT1}$ = 0A to 15A | 1.5V ± 2% |
| Output Voltage $V_{OUT2}$ | $I_{OUT2}$ = 0A to 15A | 1.2V ± 2% |
| Maximum Output Current | VIN = 4.5V-13.2V | 15A Each Output |
| Switching frequency | 5V-12Vin | 400kHz |
| Full Load Efficiency | $V_{IN}$ = 12V, $V_{OUT1}$ = 1.5V, $I_{OUT1}$ = 15A | 86.5% Typical |
| | $V_{IN}$ = 12V, $V_{OUT2}$ = 1.2V, $I_{OUT2}$ = 15A | 83.5 % Typical |

## QUICK START PROCEDURE

Demonstration circuit 898 is easy to set up to evaluate the performance of the LTC3728LCUH. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

**NOTE:** When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the Vin or Vout and GND terminals. See Figure 2 for proper scope probe technique.

1. With power off, connect the input power supply to VIN and GND. Connect the load between VOUT1, VOUT2 and GND. Preset the load current at 0A (minimum). Refer to Figure 1 for correct test set up. The RUN/SS1 and RUN/SS2 jumpers should be at “on” position.
2. Turn on the input power.

   **NOTE:** Make sure that the input voltage does not exceed 15V.
3. Check for the proper output voltages:

| | $V_{OUT1}$ | $V_{OUT2}$ |
|---|---|---|
| DC898A-A | 1.96V – 2.04V | 1.76V – 1.84V |
| DC898A-B | 1.47V – 1.53V | 1.17V – 1.23V |

   **NOTE:** If there is no output, temporarily disconnect the load to make sure that the load is not set too high.
4. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

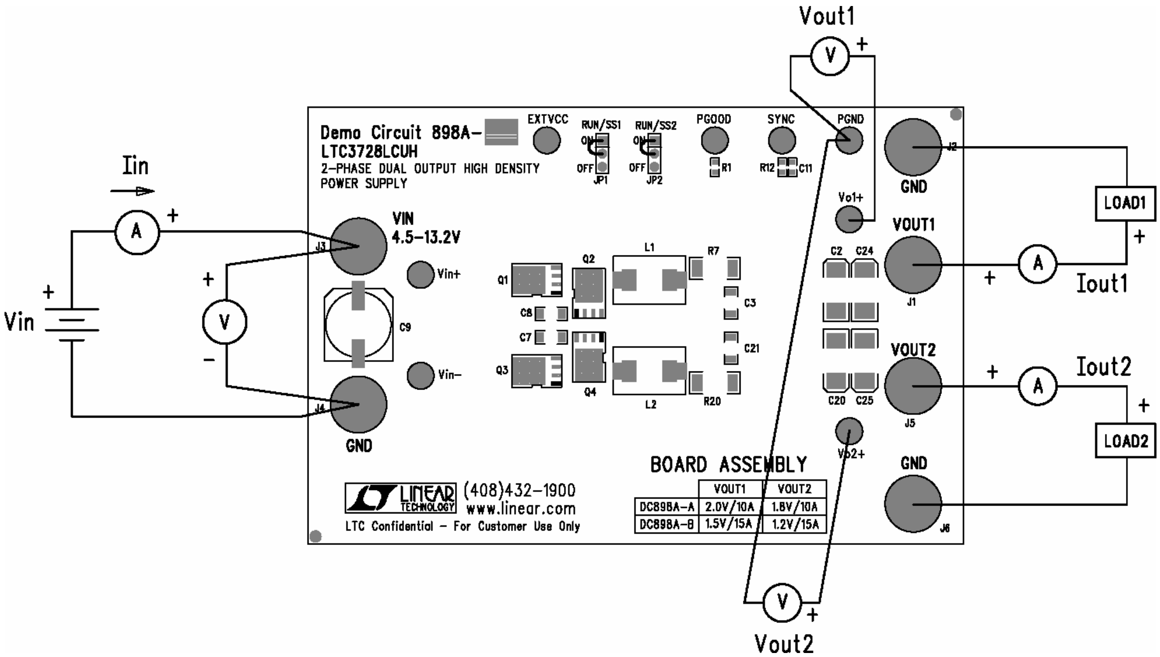



**Figure 1. Proper Measurement Equipment Setup**

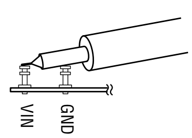



**Figure 2. Measuring Input or Output Ripple**

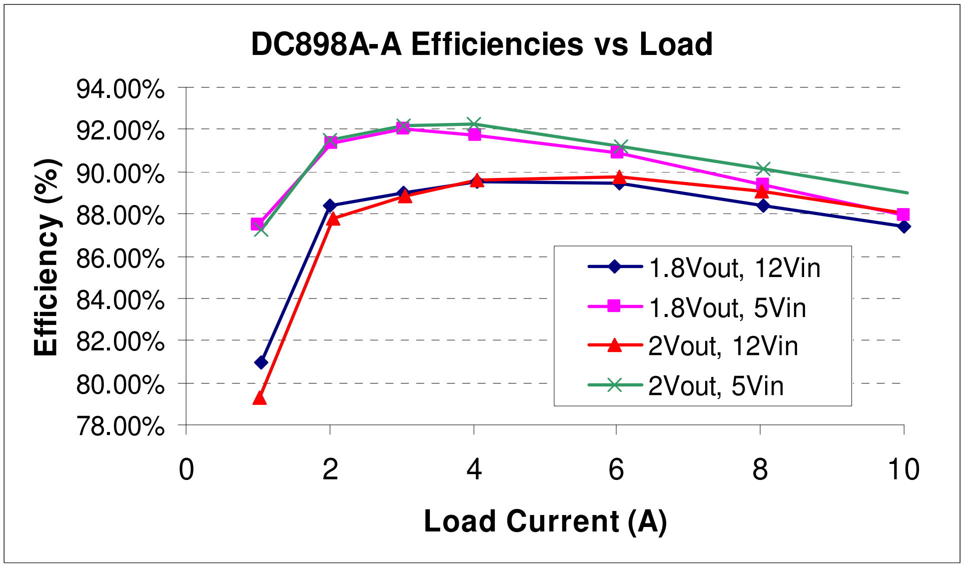



**Figure 3. Typical Supply Efficiency vs Load Current of DC898A-A**

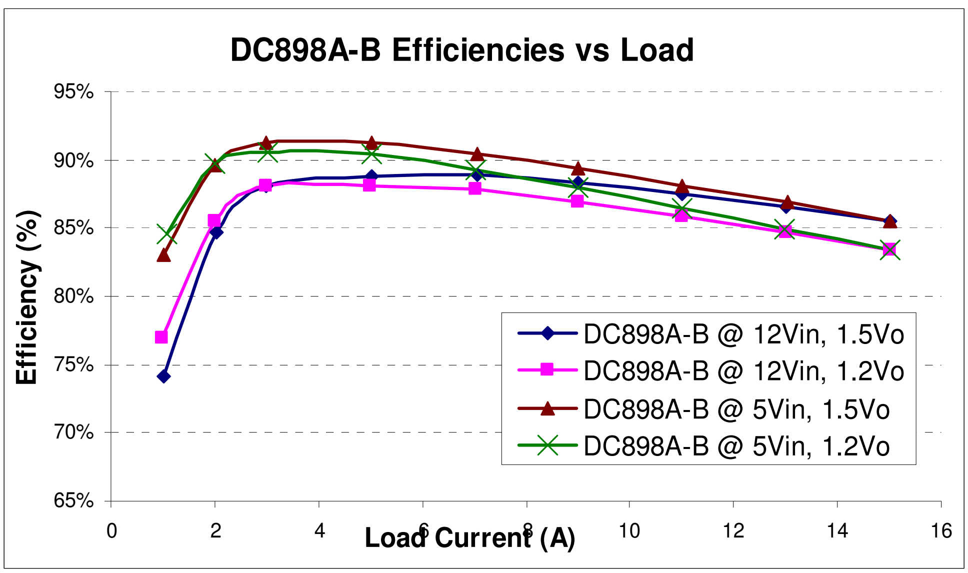
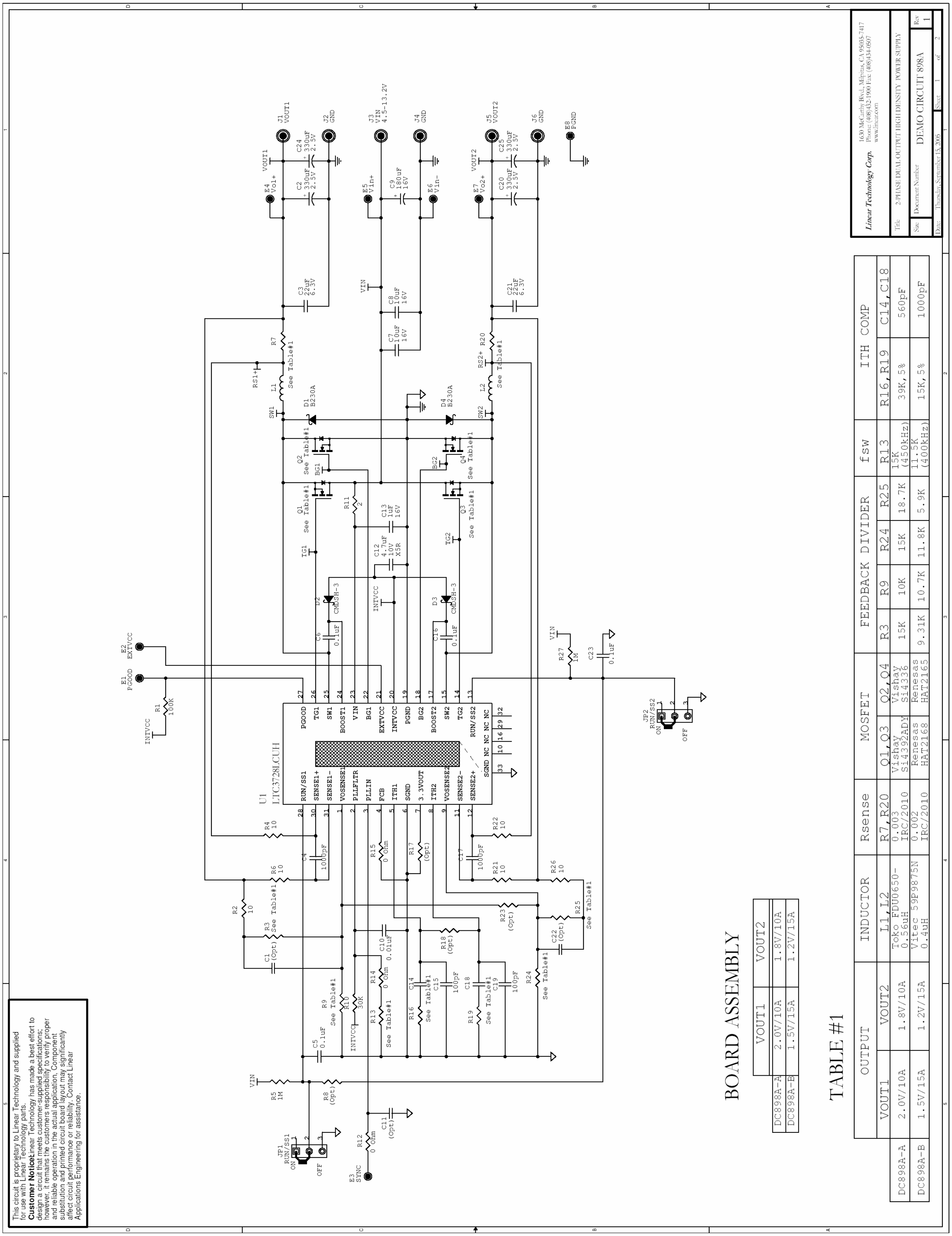



**Figure 4. Typical Supply Efficiency vs Load Current of DC898A-B**




BOARD ASSEMBLY

| | VOUT1 | VOUT2 |
|---|---|---|
| DC898A-A | 2.0V/10A | 1.8V/10A |
| DC898A-B | 1.5V/15A | 1.2V/15A |

TABLE #1

| | OUTPUT | | INDUCTOR | Rsense | MOSFET | | FEEDBACK DIVIDER | | | | fsw | ITH COMP | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOUT1 | VOUT2 | L1,L2 | R7,R20 | Q1,Q3 | Q2,Q4 | R3 | R9 | R24 | R25 | R13 | R16,R19 | C14,C18 |
| DC898A-A | 2.0V/10A | 1.8V/10A | Toko FDU0650-0.56uH | 0.003 IRC/2010 | Vishay Si4392ADY | Vishay Si4336 | 15K | 10K | 15K | 18.7K | 15K (450kHz) | 39K, 5% | 560pF |
| DC898A-B | 1.5V/15A | 1.2V/15A | Vitec 59P9875N 0.4uH | 0.002 IRC/2010 | Renesas HAT2168 | Renesas HAT2165 | 9.31K | 10.7K | 11.8K | 5.9K | 11.5K (400kHz) | 15K, 5% | 1000pF |