QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 389
HIGH EFFICIENCY NOTEBOOK CPU POWER SUPPLY
LTC3778

DESCRIPTION

Demonstration circuit 389 is a step down controller featuring the LTC3778. It produces an output voltage suitable for Intel Mobile Tualatin, Low Voltage Tualatin and Ultra Low Voltage mobile processors. The LTC3778 is a synchronous step-down controller. It uses valley current control architecture to deliver low duty cycles.

The maximum current supported by each version of the DC389 conforms to Intel IMVP-II Mobile Processor Core Voltage Design Guide REF. NO. OR-2980. *Please contact Intel to obtain this restricted document.* DC389 includes a dynamic load circuit for the convenience of the user.

There are three versions of the board:

- 389A-A: Mobile Tualatin, 23A max output
- 389A-B: Low Voltage Tualatin, 15A max
- 389A-C: Ultra Low Voltage Tualatin, 13A max

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

Table 1. Performance Summary

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		7.5V
Maximum Input Voltage		24
V_{OUT} , I_{OUT}		See Tables 2,3,4
Typical Output Ripple V_{OUT}	V_{IN} = 12V, I_{OUT} =15A	20mV_{P-P}
Nominal Switching Frequency		300kHz

QUICK START PROCEDURE

Demonstration circuit 389 is easy to set up to evaluate the performance of the LTC3778. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

Table 2. Jumper Descriptions (See Figure 1)

JUMPER DESCRIPTION		JUMPER POSITION	
PURPOSE	**NUMBER**	**1-2**	**2-3**
Dynamic Load	JP1	Disabled	Enabled
VRON	JP2	Enabled	Disabled
Deep Sleep	JP3	Disabled	Enabled
Deeper Sleep	JP4	Enabled	Disabled
Performance	JP5	Performance Optimized Mode	Battery Optimized Mode

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 input or output and ground terminals. See Figure 2 for proper scope probe technique.

1. Set jumpers as shown in Figure 1. See also Table 2 for jumper descriptions.
2. With power off, connect the input power supply to VIN and GND.
3. Turn on the power in this sequence:
   a. VIN *(Do not exceed 24V)*
   b. 3.3V
   c. 5V *(Do not allow 5V to be ON without VIN ON)*
   d. ±12V.

4. Check for the proper output voltages. See Tables 3 to 5 for expected output voltages.

   If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

5. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

   See Figures 3 to 5 for expected performance.

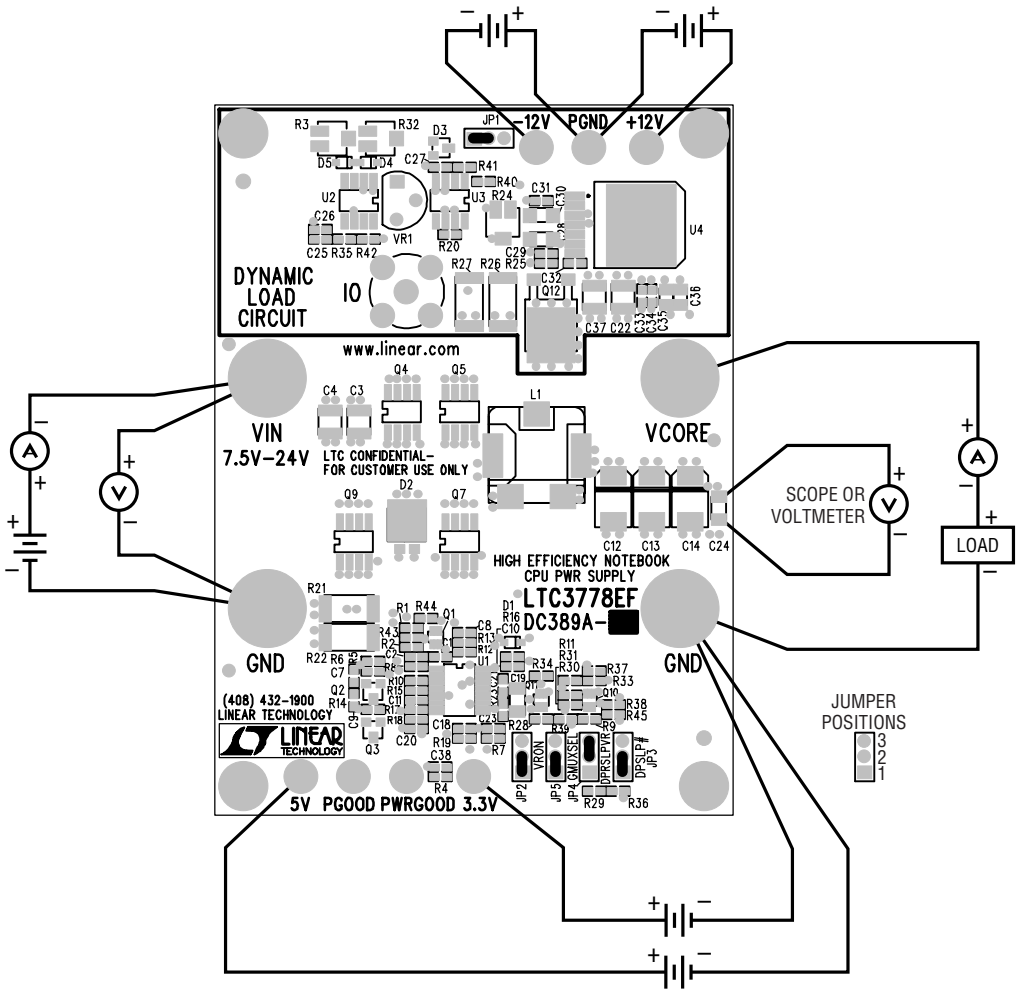

Figure 1. Proper Measurement Equipment Setup

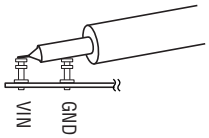

Figure 2. Measuring Input or Output Ripple

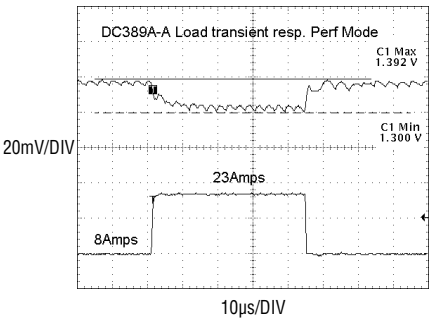

Figure 3. Step Load Response (389A-A, Performance Optimized Mode, V_{IN} = 15V)

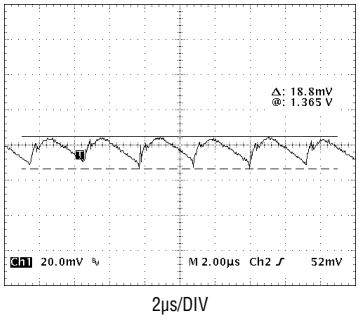

Figure 4. Typical Output Ripple (389A-A, Performance Optimized Mode, I_{OUT} = 15A, V_{IN} = 15V)

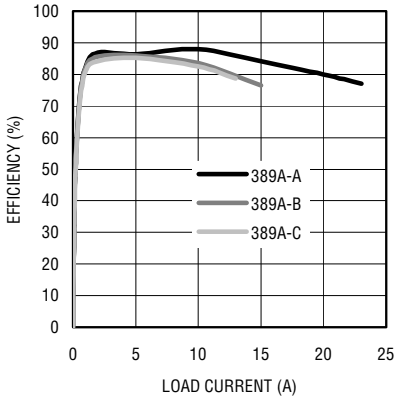

Figure 5. Typical Performance Mode Efficiency curves for the 389A-A, 389A-B and 389A-C

Table 3. Version A for Mobile Tualatin CPU

MODE	JP2	JP3	JP4	JP5	0A	3A	6A	8A	14A	23A
BOM*	1–2	1–2	2–3	2–3	1.115–1.155				1.059–1.099	
POM**	1–2	1–2	2–3	1–2	1.380–1.420					1.288 – 1.328
POM** DEEP SLP	1–2	2–3	2–3	1–2	1.318–1.358			1.286–1.326		
BOM* DEEP SLP	1–2	2–3	2–3	2–3	1.064–1.104		1.040–1.080			
DEEPER SLP	1–2	2–3	1–2	2–3	0 .810–0.870	0 .810 – 0.870				

*Battery Optimized Mode
**Performance Optimized Mode

Table 4. Version B for Low Voltage Tualatin CPU

MODE	JP2	JP3	JP4	JP5	0A	3A	5A	6A	10A	15A
BOM*	1–2	1–2	2–3	2–3	1.016–1.056				0.976–1.016	
POM**	1–2	1–2	2–3	1–2	1.130 – 1.170					1.070 – 1.110
POM** DEEP SLP	1–2	2–3	2–3	1–2	1.094–1.134			1.070–1.110		
BOM* DEEP SLP	1–2	2–3	2–3	2–3	0.996 – 1.036		0.976–1.016			
DEEPER SLP	1–2	2–3	1–2	2–3	0 .810–0.870	0.810–0.870				

*Battery Optimized Mode
**Performance Optimized Mode

Table 5. Version C for Ultra Low Voltage Tualatin CPU

MODE	JP2	JP3	JP4	JP5	0A	3A	4A	5A	8A	13A
BOM*	1–2	1–2	2–3	2–3	0.918–0.958				0.886–0.926	
POM**	1–2	1–2	2–3	1–2	1.080–1.120					1.028–1.068
POM** DEEP SLP	1–2	2–3	2–3	1–2	1.048–1.088			1.028–1.068		
BOM* DEEP SLP	1–2	2–3	2–3	2–3	0.902–0.942		0.886–0.926			
DEEPER SLP	1–2	2–3	1–2	2–3	0 .810–0.870	0.810–0.870				

*Battery Optimized Mode
**Performance Optimized Mode