DESCRIPTION

Demonstration circuit 1318 is a Synchronous Step-Down Converter featuring the LTC®3611, the high efficiency, high density DC/DC regulator. The input voltage range of DC1318 is from 9V to 32V and the output voltage is jumper selectable from 1.5V to 3.3V, although LTC®3611 has an input range from 4.5V to 32V and the output voltage range is from 0.6V. The rated load current is 10A. The regulator includes the controller and power MOSFETs in the 9mm by 9 mm QFN package.

The constant on time valley mode current control structure delivers very low duty cycle with excellent load transient response. The MOSFET RDS(on) sensing eliminates external sensing resistor and improves supply efficiency.

Discontinuous mode operation and continuous mode at light load is also jumper selectable. A forced continuous control reduces noise and RF interference while discontinuous control provides high efficiency at light loads.

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

Table 1. Performance Summary (T_a = 25°C)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>CONDITION</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Input Voltage</td>
<td></td>
<td>9V</td>
</tr>
<tr>
<td>Maximum Input Voltage</td>
<td></td>
<td>32V</td>
</tr>
<tr>
<td>Output Voltage V_out</td>
<td>Jumper selectable (open for 0.6V)</td>
<td>1.5V, 1.8V, 2.5V, 3.3V ± 2%</td>
</tr>
<tr>
<td>Maximum Continuous Output Current</td>
<td>De-rating is necessary for certain V_in, V_out, and thermal conditions, see datasheet</td>
<td>10A_in</td>
</tr>
<tr>
<td>Operating Frequency</td>
<td>Programmable</td>
<td>500kHz default</td>
</tr>
<tr>
<td>Efficiency V_in=24V, V_out=2.5V, I_out=10A</td>
<td>87.8%, See Figure 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V_in=24V, V_out=3.3V, I_out=10A</td>
<td>89.1%, See Figure 3</td>
</tr>
<tr>
<td>Load Transient V_in=24V, V_out=1.8V</td>
<td></td>
<td>See Figure 5</td>
</tr>
</tbody>
</table>

QUICK START PROCEDURE

Demonstration circuit 1318 is easy to set up to evaluate the performance of the LTC3611. Please refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place jumpers in the following positions for a typical 1.8V_out application:

<table>
<thead>
<tr>
<th>Vout Select</th>
<th>RUN</th>
<th>FCB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8V</td>
<td>ON</td>
<td>CCM</td>
</tr>
</tbody>
</table>

2. With power off, connect the input power supply, load and meters as shown in Figure

1. Preset the load to 0A and Vin supply to be less than 32V.

3. Turn on the power at the input. The output voltage should be 1.8V ± 2%.

4. 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. Output ripple should be measured across the output bulk capacitor as shown in Figure 2.
5. For optional load transient test, apply adjustable pulse signal between IOSTEP CLK and GND pins. Pulse amplitude sets the current step. The pulse signal should have very small duty cycle (<5%) to limit the thermal stress on the transient load circuit. The output transient current can be monitored at BNC connector J6 (5mV/A). Output voltage transient response should be measured at J5 with a BNC cable.

Figure 1. Proper Measurement Equipment Setup
(EXTVCC Bias Supply is Optional)

Figure 2. Scope Probe Placements for Measuring Input or Output Ripple.
Figure 3. Measured Supply Efficiency with Different $V_{IN}$ and $V_{OUT}$

Figure 4. Thermal image of DC1318

Vin = 24V  
Vout = 1.8V  
Iout = 10A  
Tambient = 25°C, no forced airflow  
Cross 1: MOSFETs  
Cross 2: Inductor
Vin = 24V
Vout = 1.8V
2.5A to 7.5A LOAD STEP
Cout = 2 X 22uF ceramic, X5R, 0805, 2X100uF ceramic, X5R, 1812

Figure 5. Measured Load Transient Response (2.5-7.5A Step, 25% to 75%)
QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1318
HIGH INPUT VOLTAGE AND HIGH CURRENT DENSITY STEP-DOWN CONVERTER

CUSTOMER NOTICE

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS, 0603.
2. INSTALL SHUNT ON JP1, PIN 1 AND 2, JP3.

LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER SPECIFICATIONS. IMPORTANT: ALWAYS VERIFY BOARD LAYOUT, PARTS MISMATCH, AND ACTUAL PERFORMANCE OR RELIABILITY CONFORMS TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

DC1318A EWO-11EWP