Efficiency

The efficiency of the converter is shown below:

<table>
<thead>
<tr>
<th>Iout (A)</th>
<th>Vout (V)</th>
<th>Iin (A)</th>
<th>Vin (V)</th>
<th>Eff (%)</th>
<th>Vout (V)</th>
<th>Iin (A)</th>
<th>Vin (V)</th>
<th>Eff (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>53.94</td>
<td>0.025</td>
<td>24.0</td>
<td>0.0%</td>
<td>53.96</td>
<td>0.018</td>
<td>48.0</td>
<td>0.0%</td>
</tr>
<tr>
<td>0.10</td>
<td>53.92</td>
<td>0.261</td>
<td>24.0</td>
<td>86.1%</td>
<td>53.93</td>
<td>0.132</td>
<td>48.0</td>
<td>85.1%</td>
</tr>
<tr>
<td>0.20</td>
<td>53.92</td>
<td>0.497</td>
<td>24.0</td>
<td>90.4%</td>
<td>53.92</td>
<td>0.249</td>
<td>48.0</td>
<td>90.2%</td>
</tr>
<tr>
<td>0.30</td>
<td>53.92</td>
<td>0.725</td>
<td>24.0</td>
<td>93.0%</td>
<td>53.92</td>
<td>0.373</td>
<td>48.0</td>
<td>90.3%</td>
</tr>
<tr>
<td>0.40</td>
<td>53.91</td>
<td>0.970</td>
<td>24.0</td>
<td>92.6%</td>
<td>53.91</td>
<td>0.483</td>
<td>48.0</td>
<td>93.0%</td>
</tr>
<tr>
<td>0.50</td>
<td>53.91</td>
<td>1.206</td>
<td>24.0</td>
<td>93.1%</td>
<td>53.91</td>
<td>0.610</td>
<td>48.0</td>
<td>92.1%</td>
</tr>
<tr>
<td>0.60</td>
<td>53.91</td>
<td>1.447</td>
<td>24.0</td>
<td>93.1%</td>
<td>53.91</td>
<td>0.718</td>
<td>48.0</td>
<td>93.9%</td>
</tr>
<tr>
<td>0.70</td>
<td>53.91</td>
<td>1.688</td>
<td>24.0</td>
<td>93.2%</td>
<td>53.91</td>
<td>0.843</td>
<td>48.0</td>
<td>93.3%</td>
</tr>
<tr>
<td>0.80</td>
<td>53.91</td>
<td>1.930</td>
<td>24.0</td>
<td>93.1%</td>
<td>53.91</td>
<td>0.963</td>
<td>48.0</td>
<td>93.2%</td>
</tr>
<tr>
<td>0.90</td>
<td>53.91</td>
<td>2.174</td>
<td>24.0</td>
<td>93.0%</td>
<td>53.91</td>
<td>1.083</td>
<td>48.0</td>
<td>93.3%</td>
</tr>
<tr>
<td>1.00</td>
<td>53.90</td>
<td>2.418</td>
<td>24.0</td>
<td>92.9%</td>
<td>53.91</td>
<td>1.202</td>
<td>48.0</td>
<td>93.4%</td>
</tr>
<tr>
<td>1.10</td>
<td>53.90</td>
<td>2.662</td>
<td>24.0</td>
<td>92.8%</td>
<td>53.91</td>
<td>1.322</td>
<td>48.0</td>
<td>93.5%</td>
</tr>
</tbody>
</table>

![Graph showing efficiency over current range]
**Ripple and Noise**

Ripple measurements taken with a 1.1A load and 20MHz BWL.

Output ripple across C20, 48Vin
50mV/div; 2usec/div
Measured 144mVpp:

Output ripple across C20, 24Vin
50mV/div; 2usec/div
Measured 191mVpp:

Input ripple across J1, 48Vin
50mV/div; 2usec/div
Measured 91mVpp:

Input ripple across J1, 24Vin
50mV/div; 2usec/div
Measured 103mVpp:

**Dynamic Loading**

Output load step, 0.55A to 1.1A, 48Vin
200mV/div; 0.5A/div; 10msec/div
Measured +240mV; -300mV:

Output load step, 0.55A to 1.1A, 24Vin
200mV/div; 0.5A/div; 10msec/div
Measured +30mV; -400mV:
**Turn On Response**

Turn-on response: 48Vin, 1.1 load
10V/div; 5msec/div:

Turn-on response: 48Vin, 0A load
10V/div; 5msec/div:

Turn-on response: 24Vin, 1.1 load
10V/div; 5msec/div:

Turn-on response: 24Vin, 0A load
10V/div; 5msec/div:

**Hold Up Capacitor Charge and Discharge:**

Hold up capacitor charge time
48Vin; 10V/div; 1sec/div:

Hold up capacitor charge time
24Vin; 10V/div; 1sec/div:
Hold up time; 48Vin; 1.1A load
Top: Vout
Bottom: Vin
10V/div; 2msec/div
14.5msec hold up time to 5V droop:

Hold up time; 24Vin; 1.1A load
Top: Vout
Bottom: Vin
10V/div; 2msec/div
14msec hold up time to 5V droop:
Stability Analysis (Loop Gain)

The figure below is the loop gain of the converter with a 48V input and a 1.1A load. The Bandwidth is 4.8 KHz, the Phase Margin is 68 degrees, and the Gain Margin is 13 dB.

The figure below is the loop gain of the converter with a 24V input and a 1.1A load. The Bandwidth is 2.6 KHz, the Phase Margin is 74 degrees, and the Gain Margin is 16 dB.
Thermal Plots

48V input and 1.1A load.

24V input and 1.1A load.
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