Description

The PMP40500 is a 12V42A output half-bridge reference design with LM5036. The primary and secondary isolated driver is UCC21220AD. This document also contains the comparison using different isolated drivers such as UCC21220D, UCC21222D, UCC21540DW, UCC21540DWK, and UCC21541DW. These isolated drivers have the good performance. The design features high efficiency and various fault protections (over-current, short-circuit).
1 Test Prerequisites

1.1 Voltage and Current Requirements

Table 1. Voltage and Current Requirements

<table>
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<tr>
<th>PARAMETER</th>
<th>SPECIFICATIONS</th>
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<tbody>
<tr>
<td>Input</td>
<td>DC Source: 51.5V to 60.0V</td>
</tr>
<tr>
<td>Output</td>
<td>12V/42A</td>
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</tbody>
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1.2 Required Equipment

- DC Source: Chroma 62006P-100-25
- E-Load: Chroma 63101 module
- Multi-meter (voltage): Fluke 287C
- Multi-meter (current): Fluke 287C
- DPO 3054 Digital Phosphor Oscilloscope
- Fluke Thermal Imager
2 Testing and Results

2.1 Efficiency Graphs with UCC21220AD

![Efficiency VS Load Current Graph](image1)

2.2 Efficiency Graphs with UCC21220D

Note: just drop in UCC21220D on the PMP40500 U2 designator.

![Efficiency VS Load Current Graph](image2)
2.3 Efficiency Graphs with UCC21222D

Note: just drop in UCC21222D on the PMP40500 U2 designator.

![Efficiency VS Load Current](image)

2.4 Efficiency Graphs with UCC21540DW

Note: Need to use the fly-wire to solder UCC21540DW on the PMP40500 U2 designator and connect DT to VCCI

![Efficiency VS Load Current](image)
2.5 Efficiency Graphs with UCC21540DWK

Note: Need to use the fly-wire to solder UCC21540DW on the PMP40500 U2 designator and connect DT to VCCI.

![Efficiency VS Load Current](image1)

2.6 Efficiency Graphs with UCC21541DW

Note: Need to use the fly-wire to solder UCC21540DW on the PMP40500 U2 designator and connect DT to VCCI.

![Efficiency VS Load Current](image2)
3 Waveforms

3.1 Output Voltage Ripple*

51.5Vin 12Vout 42A

51.5Vin 12Vout No Load
3.2 Steady State Waveform

51.5Vin, 12Vout with No Load

51.5Vin, 12Vout with 42A
54.5Vin, 12Vout with No Load

54.5Vin, 12Vout with 42A
60.0Vin, 12Vout with No Load

60.0Vin, 12Vout with 42A
3.3 Start-up Sequence

54.5Vin 12Vout No Load Start-up

54.5Vin 12Vout Full Load Start-up
3.4 Dynamic Response

51.5Vin 12V Load from 0A to 25A to 0A, 20Hz, 2.5A/us.

Undershoot

Overshoot
54.5Vin 12V Load from 0A to 25A to 0A, 20Hz, 2.5A/us.

Undershoot

Zoom Factor: 10 X  
Zoom Position: -46.7ms

200mV  10.0 A  2.5MS/s

60.0Vin 12V Load from 0A to 25A to 0A, 20Hz, 2.5A/us.

Overshoot

Zoom Factor: 10 X  
Zoom Position: -33.0ms

200mV  10.0 A  2.5MS/s
Undershoot

Overshoot
### 3.5 Thermal Performance

51.5Vin, 12Vout 42A
The converter runs 1 mins at ambient temperature 25°C with external SUNON PSD1208PMB1-A DC 12V 9.4W Fan.

54.5Vin, 12Vout 42A
60.0Vin, 12Vout 42A
The converter runs 30mins at ambient temperature 25°C with external SUNON PSD1208PMB1-A DC 12V 9.4W Fan

3.6 Holdup Time

The diagram shows the holdup time measurements with the values:
- Secondary Q8 FET: 38.8 ms
- Primary Low-side FET: 76.2 ms
- Primary High-side FET: 93.0 ms
- Fan: 108.2 ms

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
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