Testing Report: Tiny Box Challenge 2020

Competitor Name:

1. Experimental Measurements

|  |  |
| --- | --- |
| Parameter | Measured Value |
| Dimensions of Rectangular Enclosure | 2 in x 2 in x 1 in |
| Volume of Rectangular Enclosure | 4 in3 |
| Power Density at 12W out | 15 W/in3 |
| Efficiency @ *Pout* | 75% @ 3W  80% @ 6W  95% @ 9W  98% @ 12W |
| TPE Efficiency | 92.2% |
| No-load Power Losses | 2W |
| Input Voltage Ripple | 1% |

1. Converter Schematic

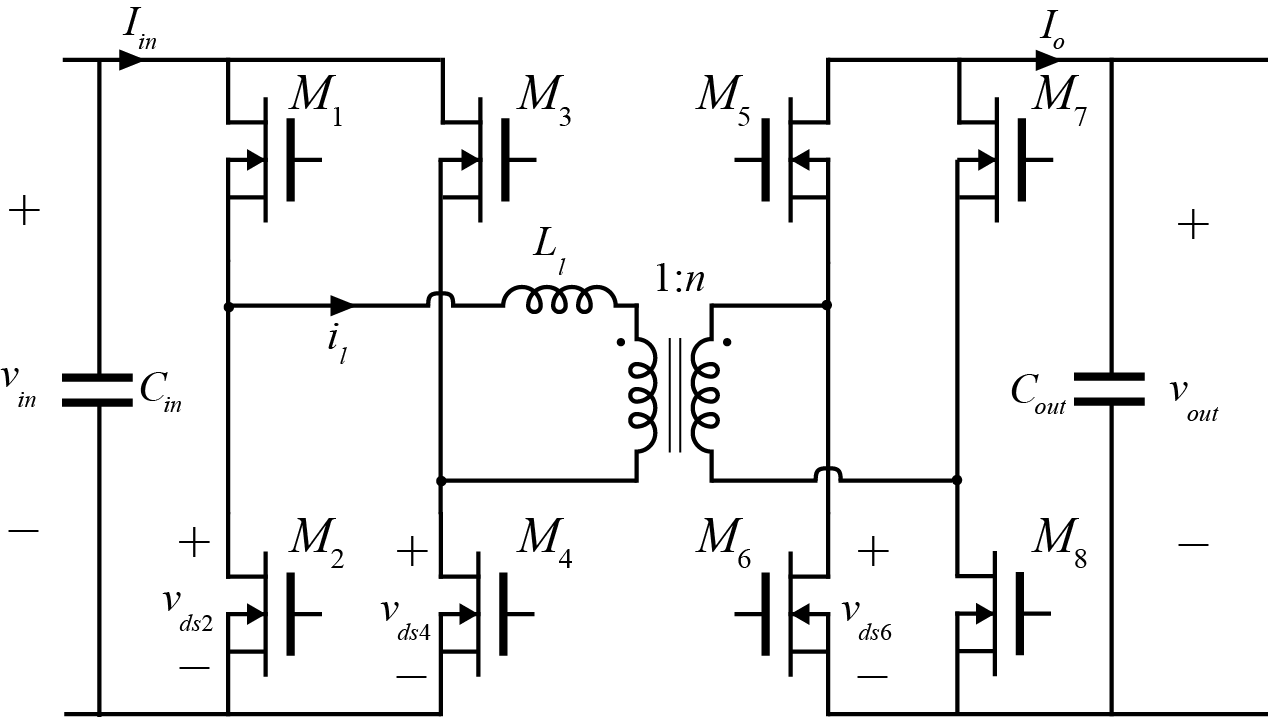


Fig.1: Converter Schematic

1. Converter Parameters

|  |  |
| --- | --- |
| Parameter | Value |
| *Ll* | 10 μH |
| *Cin* | 5 μF |
| *Cout* | 10 μF |
| *n* | 0.08 |
| *fs* | 1 MHz |

1. Component Implementation

|  |  |
| --- | --- |
| Component | Implementation |
| *Ll* | 2107-V-RC |
| *M*1*-M*4 | EPC2004  LM5121 Gate Driver |
| *M*5*-M*8 | EPC2004  LM5121 Gate Driver |
| Transformer | Ferroxcube 3F3  ER2312  primary: 10 turns 20AWG  secondary: 3 turns 10 AWG |
| *Cin* | B32524Q1156K |
| *Cout* | 2x B32524Q1156K |

1. Converter Waveforms

*Note: for each waveform, include the specified measured voltages/currents with sufficient scale to see all salient features. Include between two and four complete switching periods.*

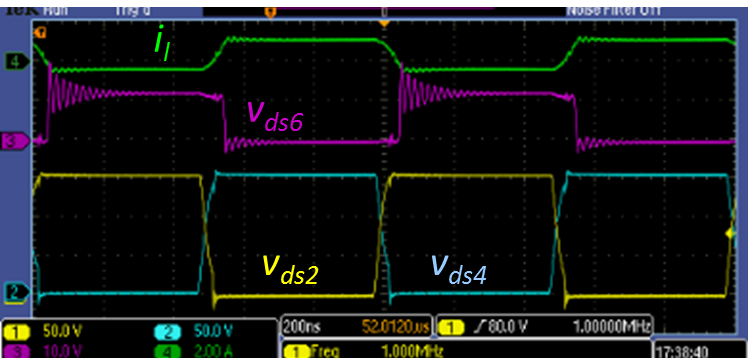


Fig. 2: General converter waveforms (e.g. switching nodes, inductor currents, etc. Label each waveform corresponding to a label in Fig. 1)

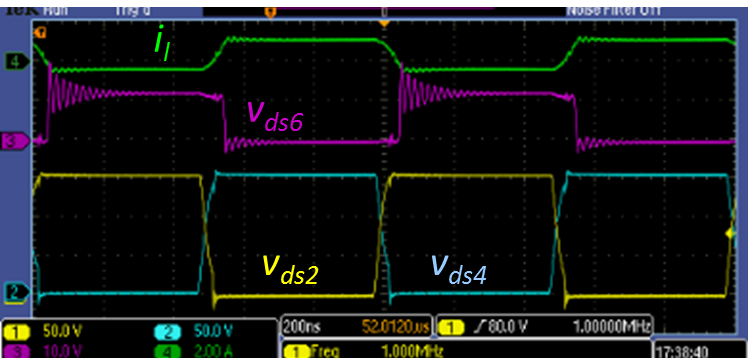


Fig. 3: Input current and input voltage at full power

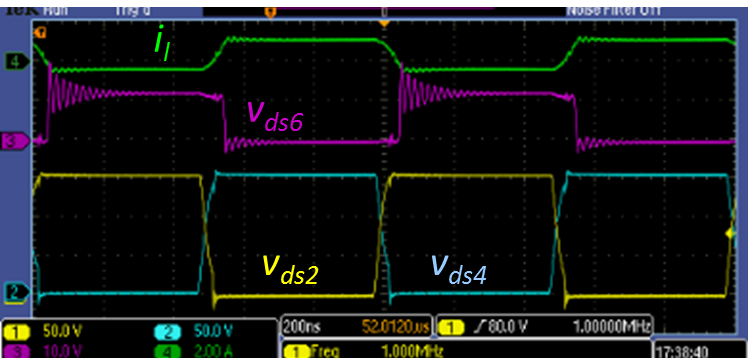


Fig. 4: Output current and outptut voltage at full power

1. Photographs

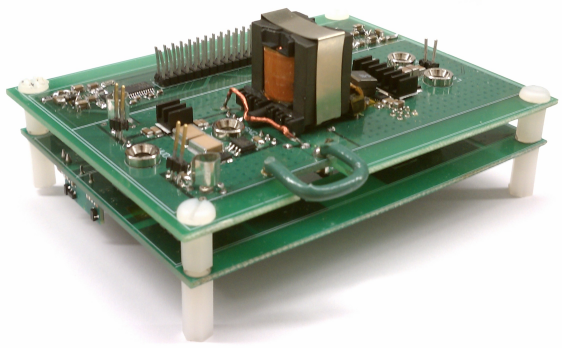


Fig. 5: Prototype Converter picture