LM5017
Isolated Supply

TI reference design number: PMP9321 Rev B

Input: 24V Nominal
Output: 5V @ 0.6A

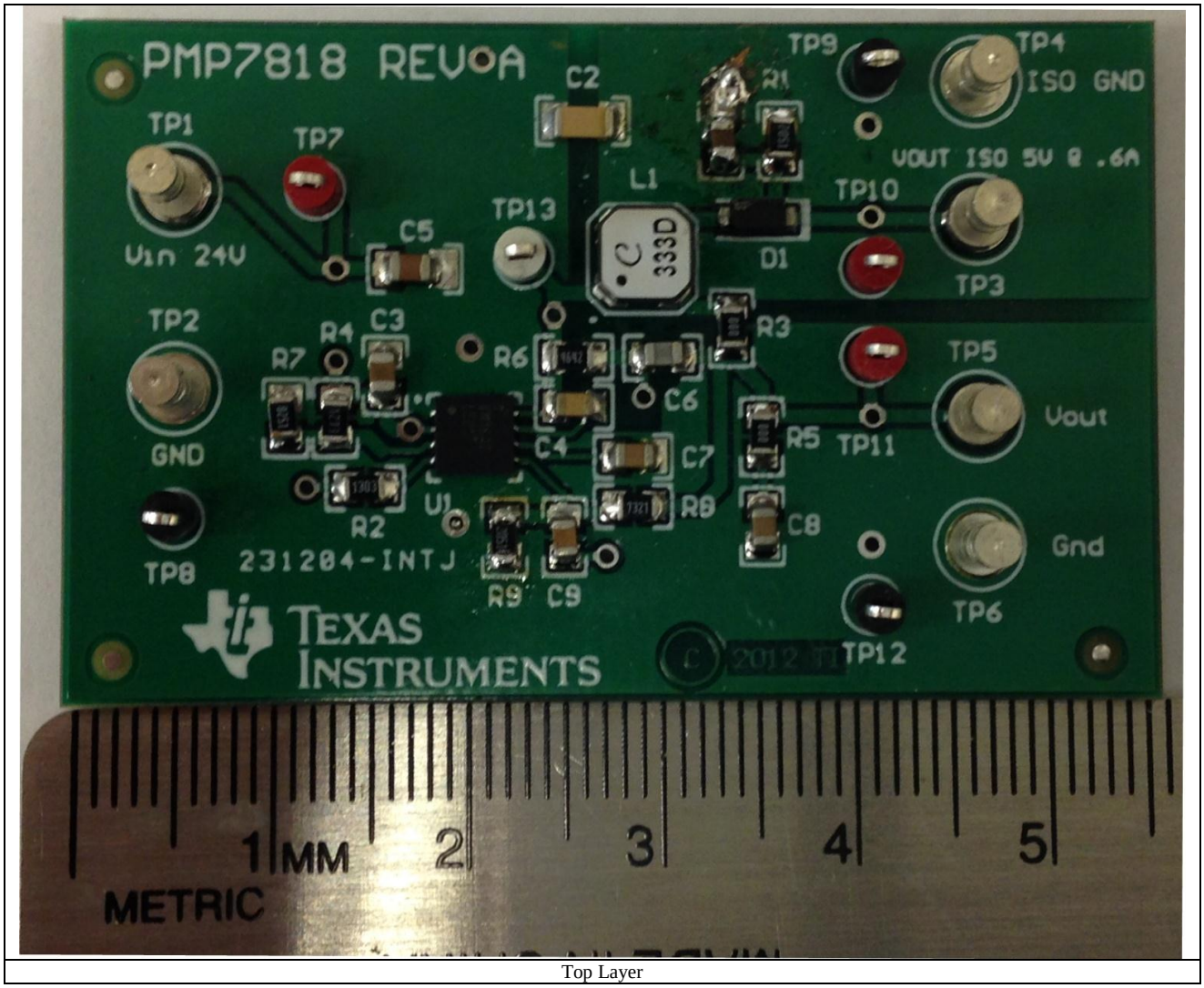
DC–DC Converter Test Results

Table of Contents

1. Circuit Description
PMP9321 uses a LM5017 which is a 100V 600mA synchronous step down regulator with integrated high and low side MOSFETs. The supply delivers an isolated 5V bias supply for various applications. The input voltage is 24V nominal and can deliver 5V out at 0.6A maximum. The input voltage range is 21.6V to 26.4V. The LM5017 uses constant-on-time control. Various configurations are available for the designer to use low ESR ceramics on the output and still provide enough ripple voltage for the feedback comparator in order to operate in a stable condition. Please note, the circuit is meant to provide an isolated output. Yet, if the user chooses to use both the isolated and non-isolated outputs, be sure to limit the total combined output current draw to 0.6A maximum.

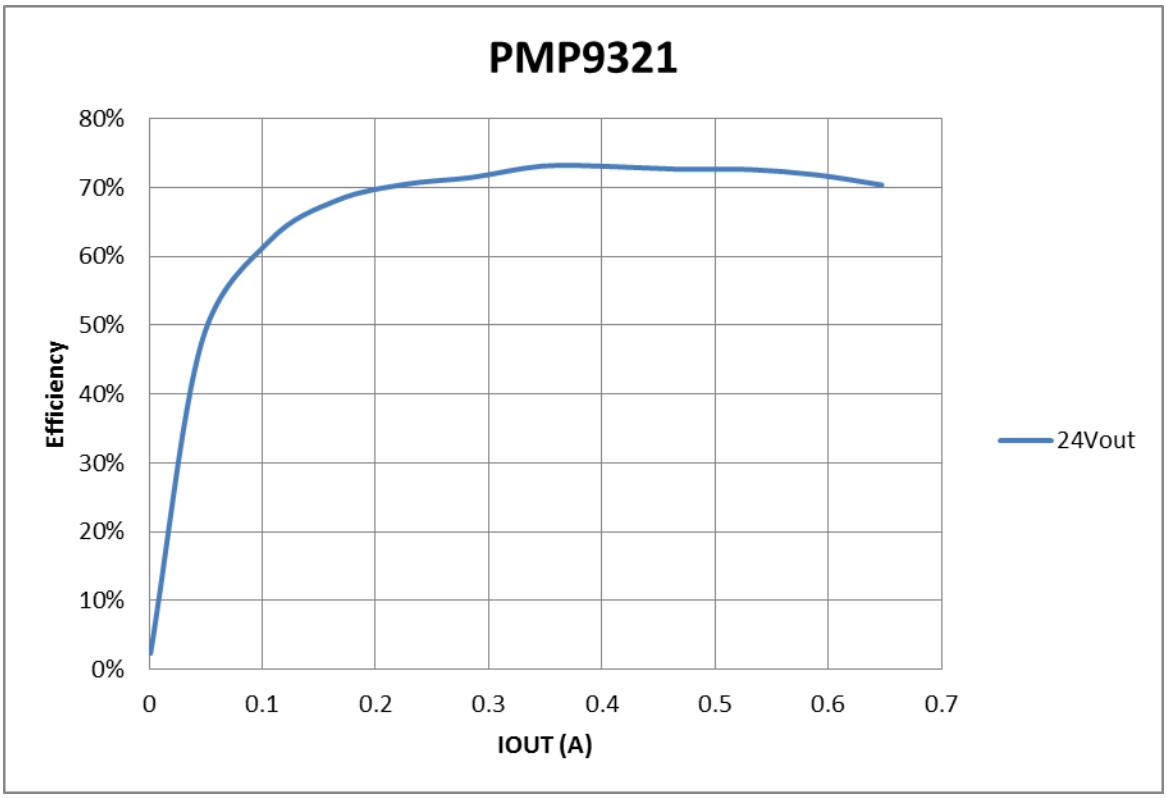
2. Fabrication

The PMP9321 isolated supply was built on PMP7818 printed circuit board. This is a two layer board with overall dimensions of 2.2” (56mm) x 1.37” (35mm). The copper weight is 0.5oz on the outer layer.



Top Layer

3. Efficiency



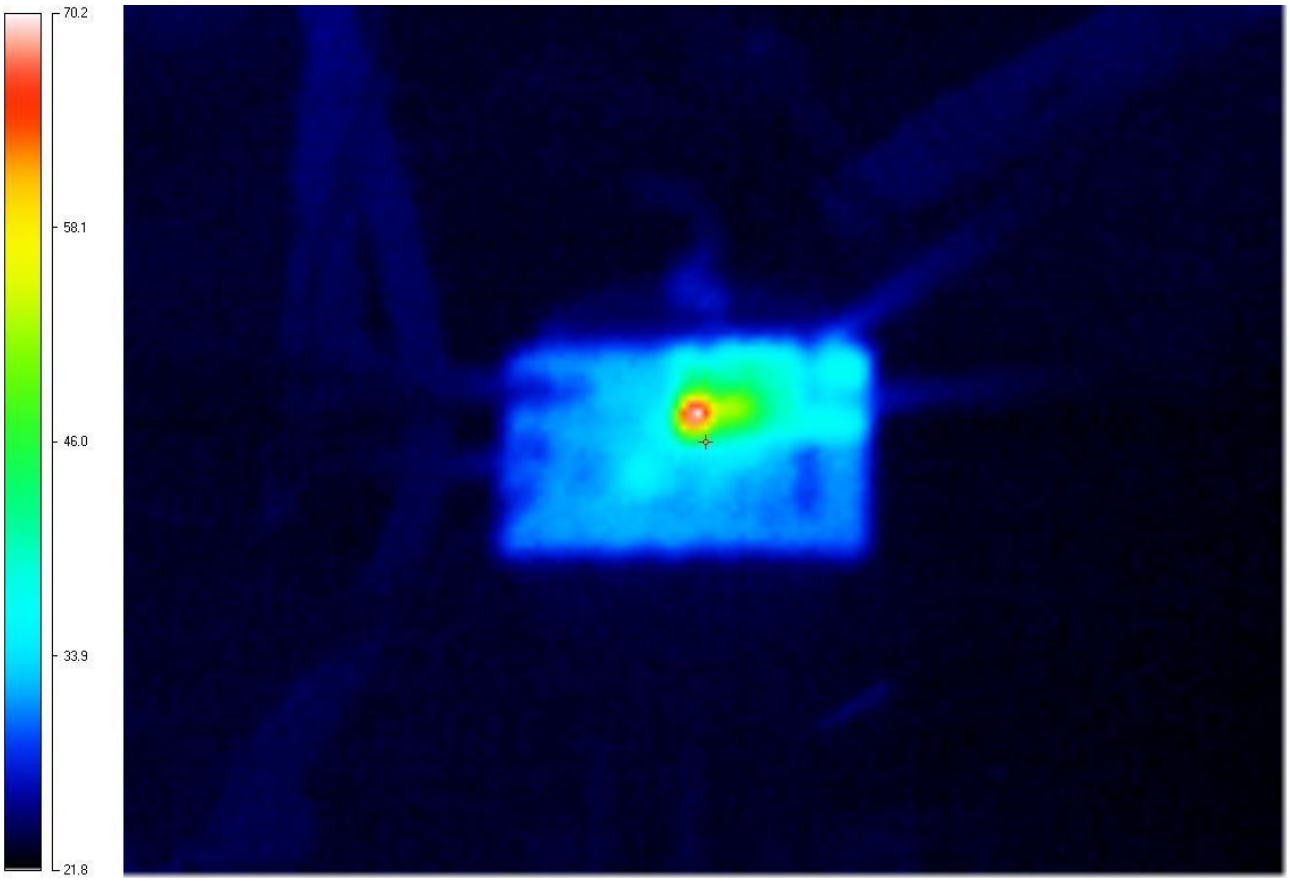
Peak efficiency of 73% was measured. Efficiency can be further improved with a lower forward voltage drop diode and also a larger coupled inductor with a lower DCR. Potential increase of around ~10%, providing a total efficiency of ~84% max, can be realized with these two adjustments in the design.

3.1 LM5017 Isolated Flybuck Efficiency Data

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Efficiency (%)	Pin (W)	Pout (W)	Losses (W)
24.002	0.022	5.323	0.046	47.49%	0.519	0.247	0.273
24.002	0.037	5.239	0.106	62.26%	0.895	0.558	0.338
24.002	0.053	5.193	0.167	68.19%	1.268	0.865	0.403
24.002	0.069	5.152	0.227	70.49%	1.657	1.168	0.489
24.002	0.085	5.119	0.284	71.45%	2.036	1.455	0.581
24.002	0.101	5.089	0.347	73.12%	2.414	1.765	0.649
24.002	0.117	5.063	0.407	73.06%	2.820	2.060	0.760
24.002	0.135	5.037	0.467	72.66%	3.238	2.353	0.885
24.001	0.152	5.011	0.530	72.63%	3.654	2.654	1.000
24.001	0.170	4.982	0.590	71.84%	4.089	2.938	1.152

4. Thermal

4.1 Steady State Temperature - 24Vin, 5Vout with a load of 0.6A

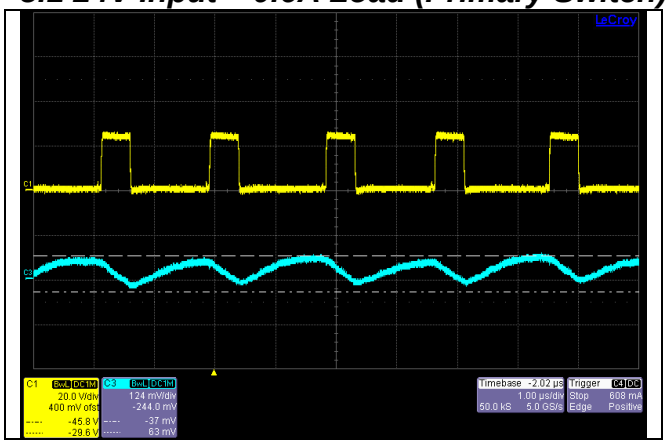


Top View

The warmest area on the printed circuit card is the inductor.

5. Switch Node Voltage and Output Ripple Voltage

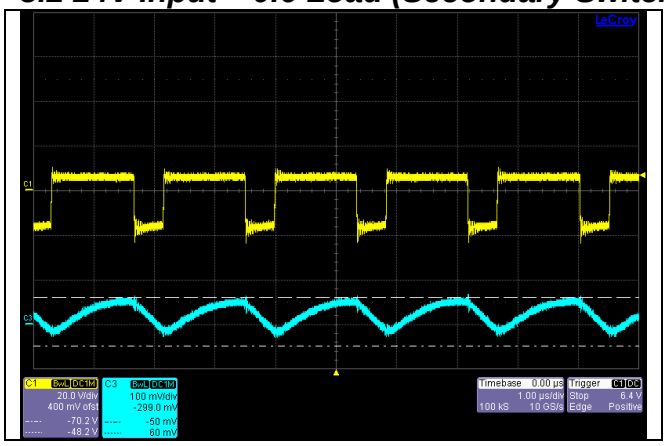
5.1 24V Input – 0.6A Load (Primary Switch)



Less than 100mV p-p Ripple

Channel 1 VSW1
Channel 3 VOUT

5.2 24V Input – 0.6 Load (Secondary Switch)

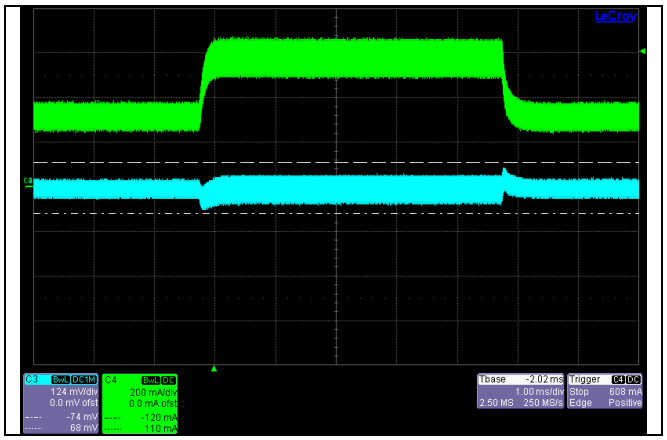


Less than 100mV p-p Ripple

Channel 1 VSW2
Channel 3 VOUT

6. Transient Response

6.1 24V Input – 0.3A to 0.6A, 100mA/µs, 100 Hz, 50% duty cycle, 5V out.



Cursors indicate ~100mV maximum deviation across output capacitor.

Channel 3 VOUT
Channel 4 IOUT

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