Test Data
For PMP21277
November 29, 2017

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1. Design Specifications

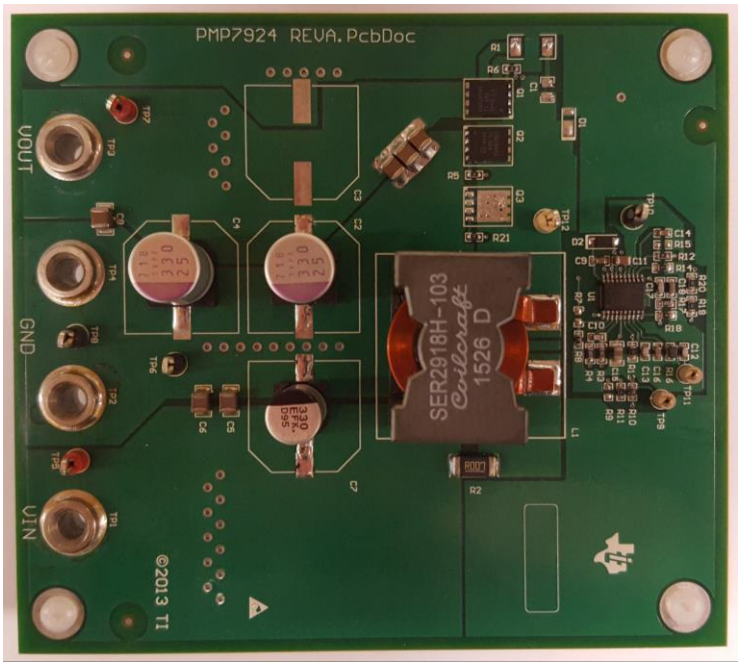
Vin Minimum	**10.8VDC**
Vin Nominal	**12VDC**
Vin Maximum	**13.2VDC**
Vout	**20.5VDC**
Iout	**7.5A Max. Continuous**
Switching Frequency	**≈ 250KHz**

2. Circuit Description

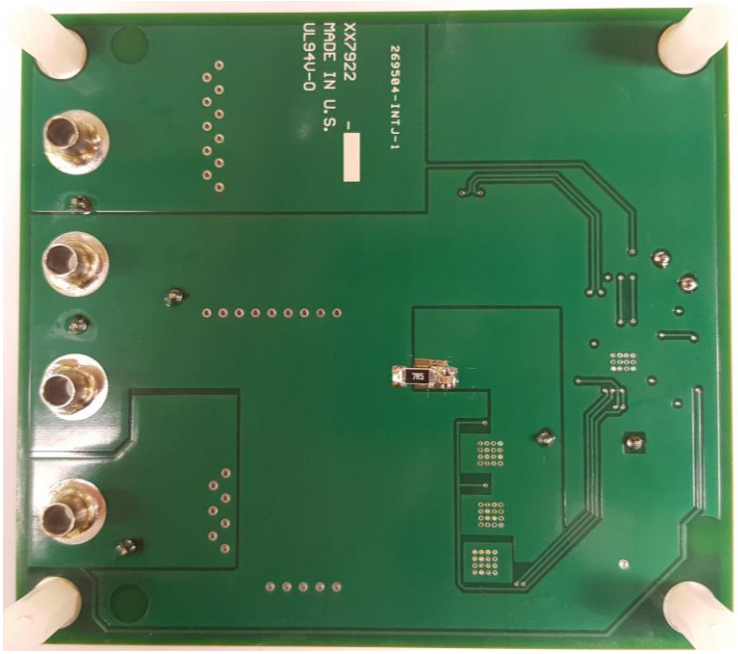
PMP21277 is a Single-Phase Synchronous Boost Converter using the LM5122 boost controller IC. The design accepts an input voltage of 10.8Vin to 13.2Vin (12Vin Nominal) and provides an output of 20.5Vout capable of supplying 7.5A of continuous current to the load. The design was built on the PMP7924 RevA PCB, which was modified to the PMP21277 design configuration and requirements. The PCB is a 4-layer board with 1oz Copper on outer layers and 0.5oz Copper on inner layers.

3. PMP21277 Board Photos

Board Dimensions: 4.31” x 3.85”

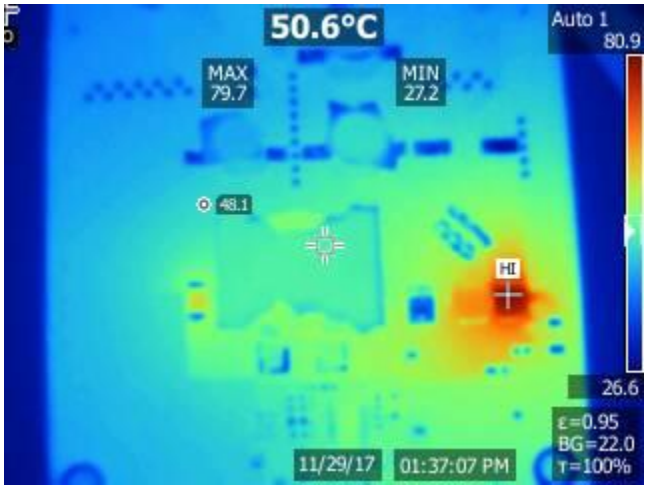


Board Photo (Top)

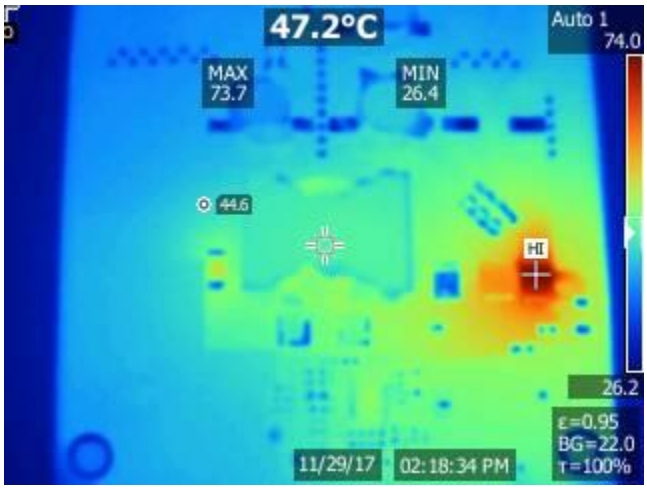


Board Photo (Bottom)

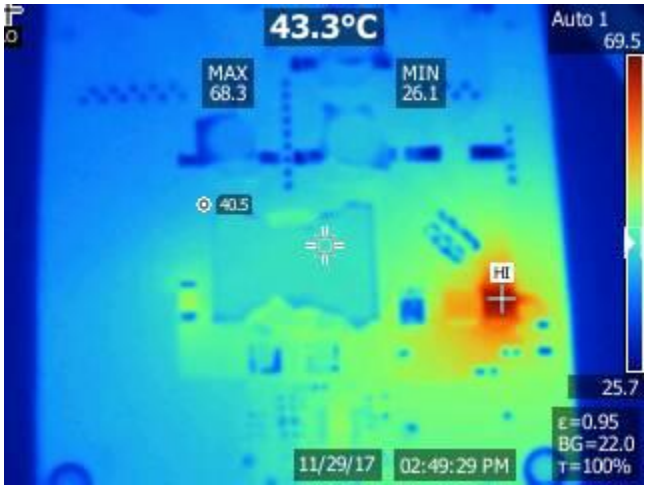
4. Thermal Data



IR thermal image taken at steady state with 10.8Vin and 7.5A load (no airflow; ambient at room temp.)



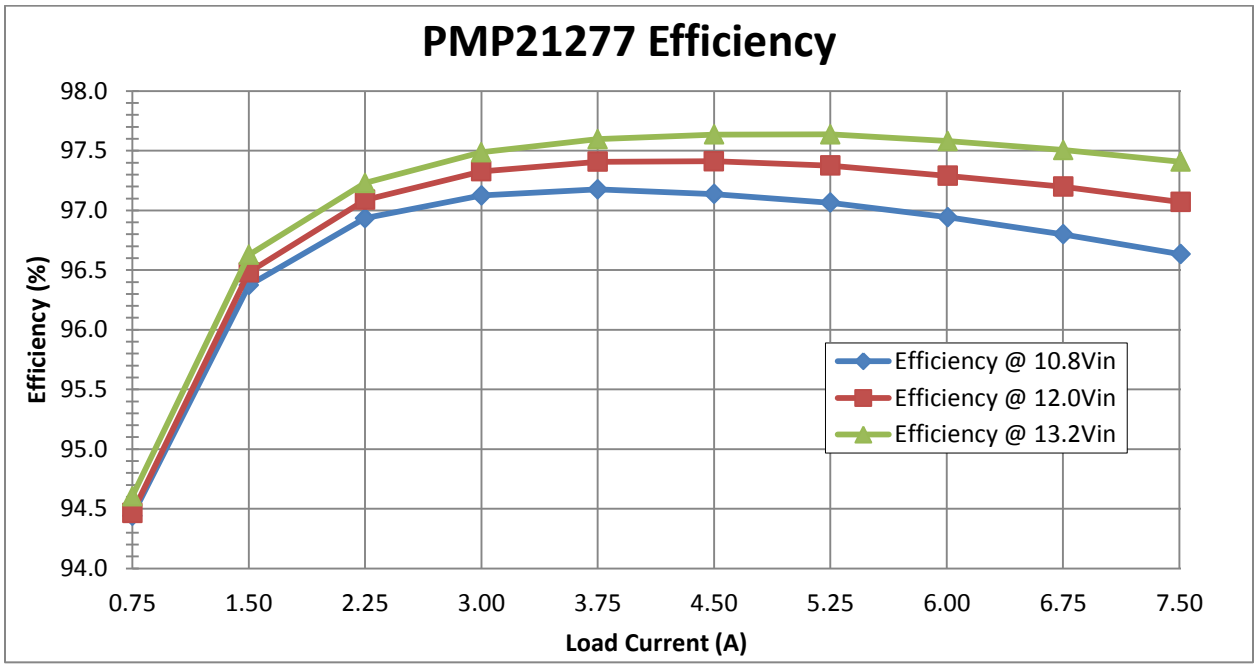
IR thermal image taken at steady state with 12Vin and 7.5A load (no airflow; ambient at room temp.)



IR thermal image taken at steady state with 13.2Vin and 7.5A load (no airflow; ambient at room temp.)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

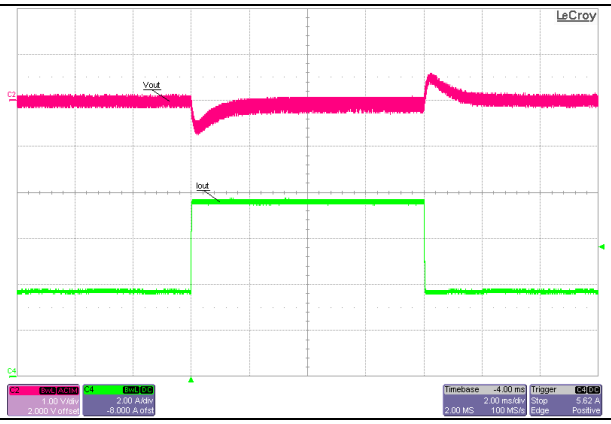
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
10.8	1.506	20.478	0.7501	16.265	15.361	0.904	94.44
10.8	2.953	20.478	1.5009	31.892	30.735	1.157	96.37
10.8	4.402	20.479	2.2503	47.542	46.084	1.458	96.93
10.8	5.859	20.479	3.001	63.277	61.457	1.820	97.12
10.8	7.317	20.479	3.7498	79.024	76.792	2.231	97.18
10.8	8.786	20.479	4.5008	94.889	92.172	2.717	97.14
10.8	10.256	20.479	5.2499	110.765	107.513	3.252	97.06
10.8	11.75	20.479	6.0071	126.900	123.019	3.881	96.94
10.8	13.228	20.479	6.7527	142.862	138.289	4.574	96.80
10.8	14.736	20.479	7.5096	159.149	153.789	5.360	96.63

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
12	1.355	20.48	0.75	16.260	15.360	0.900	94.46
12	2.655	20.479	1.501	31.860	30.739	1.121	96.48
12	3.956	20.479	2.2506	47.472	46.090	1.382	97.09
12	5.26	20.479	2.9998	63.120	61.433	1.687	97.33
12	6.57	20.479	3.75	78.840	76.796	2.044	97.41
12	7.883	20.479	4.4996	94.596	92.147	2.449	97.41
12	9.201	20.479	5.25	110.412	107.515	2.897	97.38
12	10.537	20.479	6.007	126.444	123.017	3.427	97.29
12	11.857	20.48	6.7528	142.284	138.297	3.987	97.20
12	13.203	20.48	7.5095	158.436	153.795	4.641	97.07

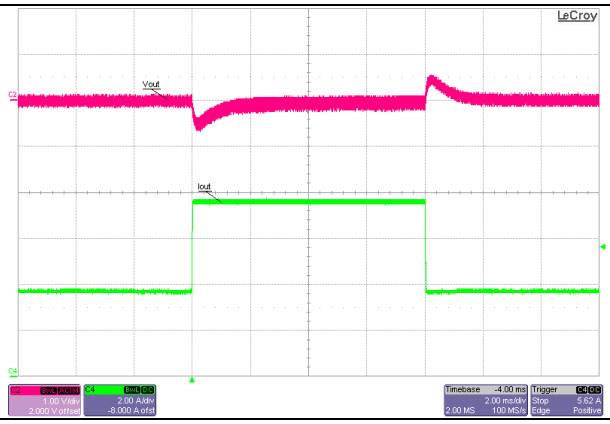
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
13.2	1.23	20.48	0.75	16.236	15.360	0.876	94.60
13.2	2.41	20.479	1.501	31.812	30.739	1.073	96.63
13.2	3.591	20.479	2.2505	47.401	46.088	1.313	97.23
13.2	4.774	20.479	2.9998	63.017	61.433	1.584	97.49
13.2	5.961	20.479	3.7499	78.685	76.794	1.891	97.60
13.2	7.152	20.479	4.5009	94.406	92.174	2.232	97.64
13.2	8.342	20.48	5.2496	110.114	107.512	2.603	97.64
13.2	9.551	20.48	6.007	126.073	123.023	3.050	97.58
13.2	10.745	20.48	6.7527	141.834	138.295	3.539	97.51
13.2	11.961	20.48	7.5094	157.885	153.793	4.093	97.41

6 Waveforms

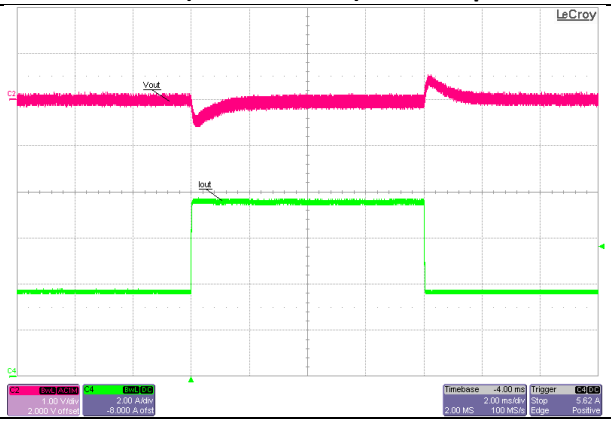
6.1 Load Transient Response



Load Transient Response at 10.8Vin and 3.75A-to-7.5A (50%-to-100%) Load Step

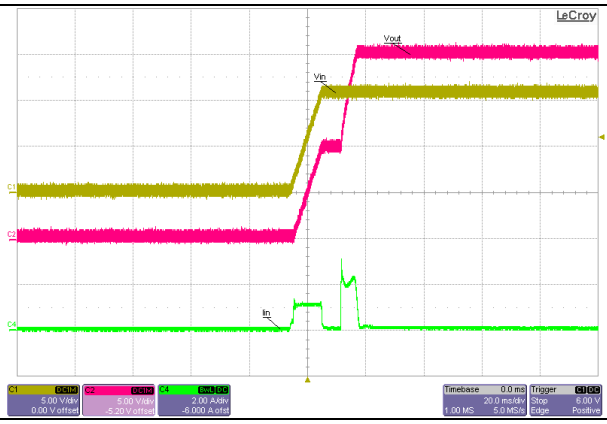


Load Transient Response at 12Vin and 3.75A-to-7.5A (50%-to-100%) Load Step

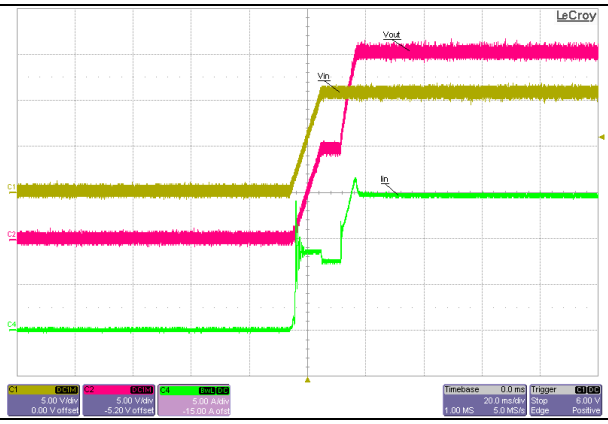


Load Transient Response at 13.2Vin and 3.75A-to-7.5A (50%-to-100%) Load Step

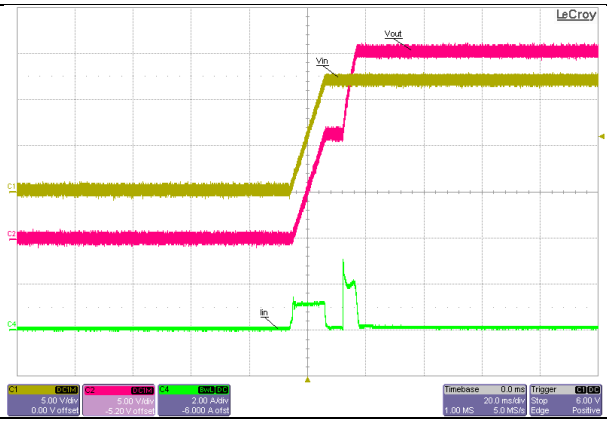
6.2 Startup



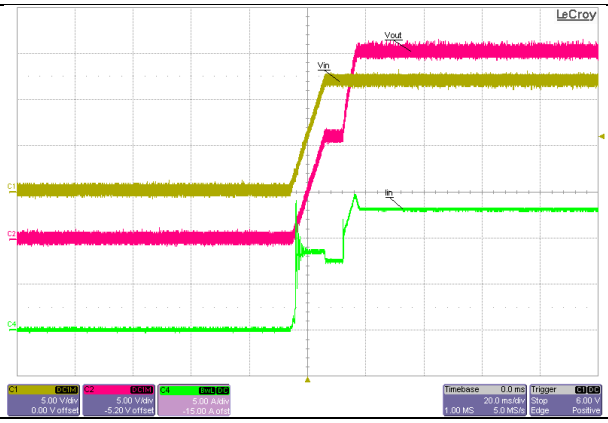
Startup into No Load at 10.8Vin



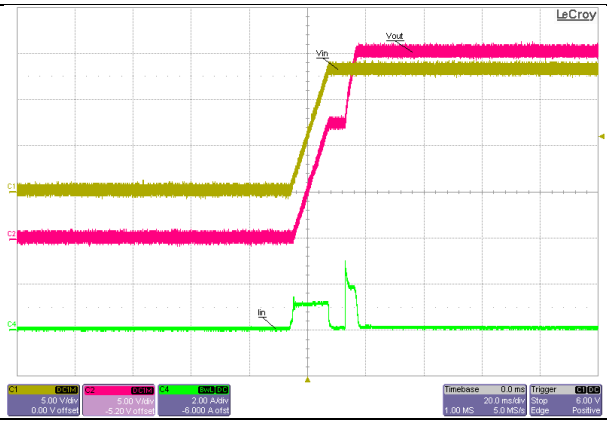
Startup into 7.5A Constant-Current Load at 10.8Vin



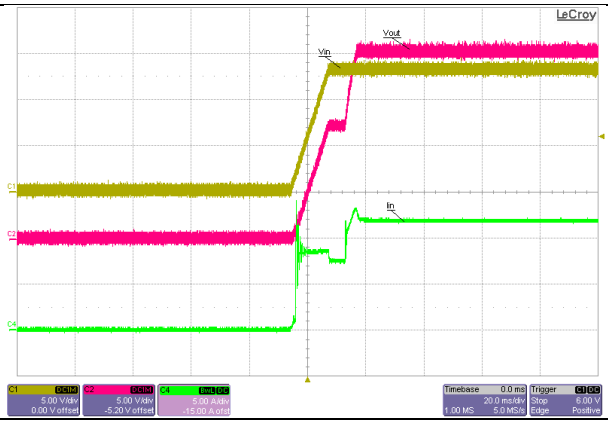
Startup into No Load at 12Vin



Startup into 7.5A Constant-Current Load at 12Vin

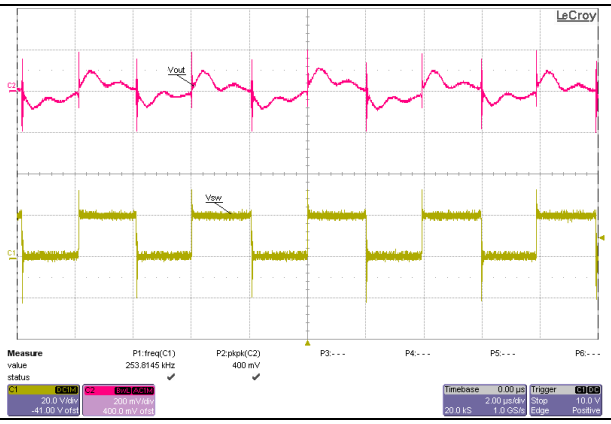


Startup into No Load at 13.2Vin

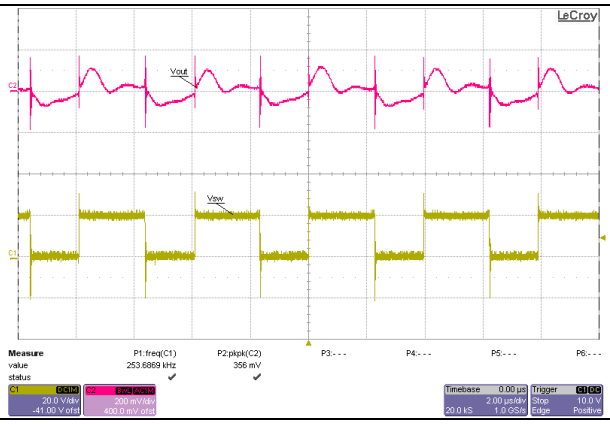


Startup into 7.5A Constant-Current Load at 13.2Vin

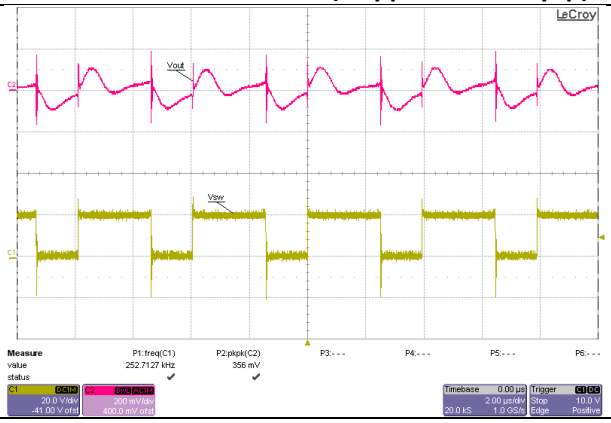
6.3 Output Voltage Ripple and Switch Node Voltage



Switch Node Voltage and Output Voltage Ripple at 10.8Vin and 7.5A Load (Vripple ≈ 400mVp-p)



Switch Node Voltage and Output Voltage Ripple at 12Vin and 7.5A Load (Vripple ≈ 356mVp-p)



Switch Node Voltage and Output Voltage Ripple at 13.2Vin and 7.5A Load (Vripple ≈ 356mVp-p)

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