PMP40042 Test Results

1 General

1.1 PURPOSE

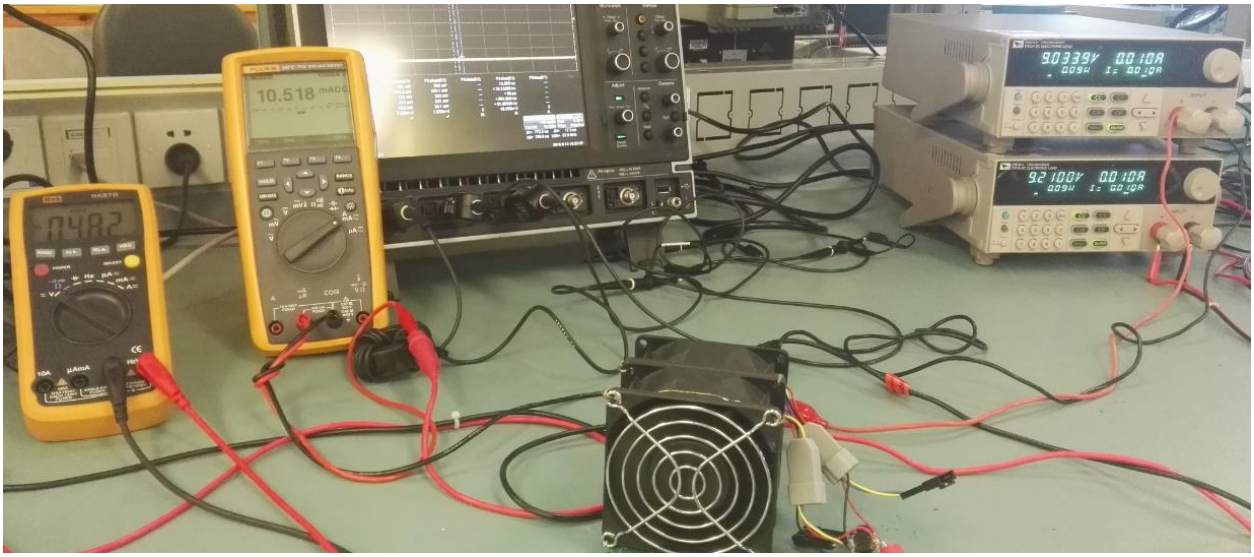
This report provides the detailed data and waveforms for evaluating and verifying the PMP40042. The PMP40042 is the 48V to 9V/0.1A, 9V/0.1A DC-DC converter with the D-Cap controller LM5161. The converter could provide high efficiency with the good performance, which makes it an ideal choice for 48Vin isolated system Aux. power supply. For testing applications, cooling airflow is required.

1.3 TEST EQUIPMENTS

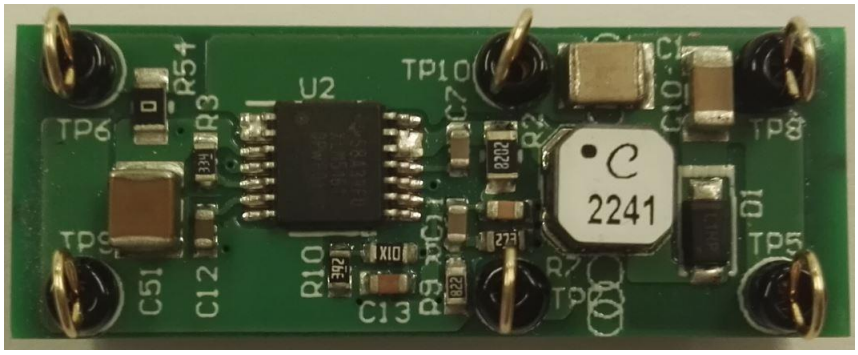
Multi-meter: Fluke Multimeter 287C
DC Source: GPS-3303C
DC Load: IT8512+
Oscilloscope: WaveSurfer 104Mxs-B

1.4 Testing Setup Photos

Testing Setup



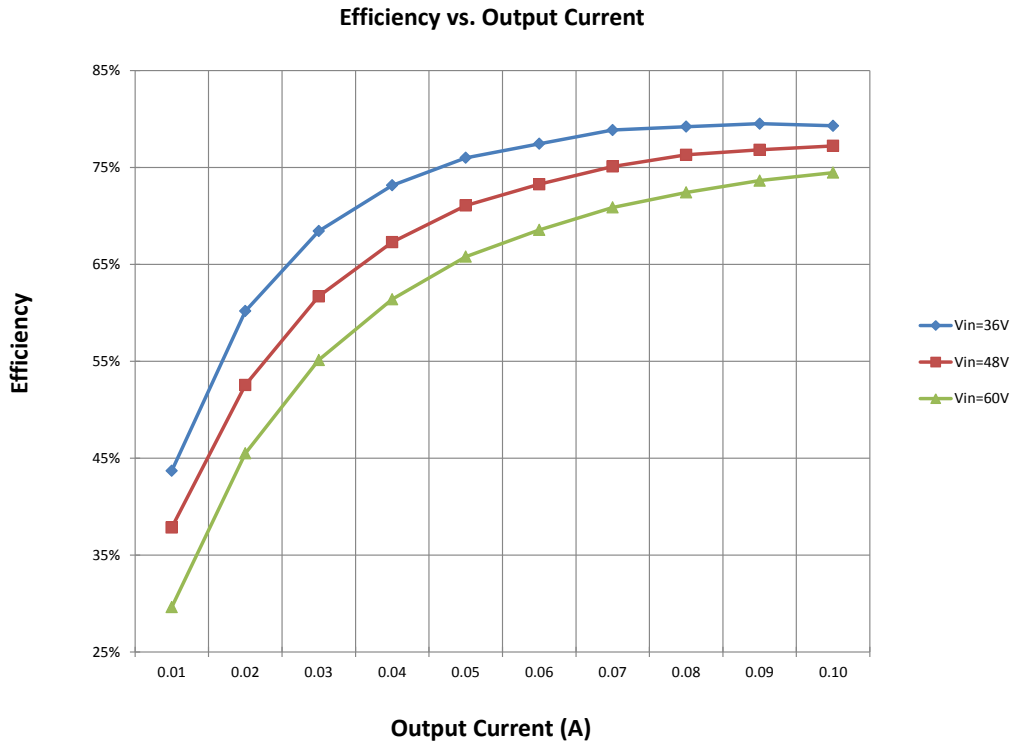
Top View of the Board



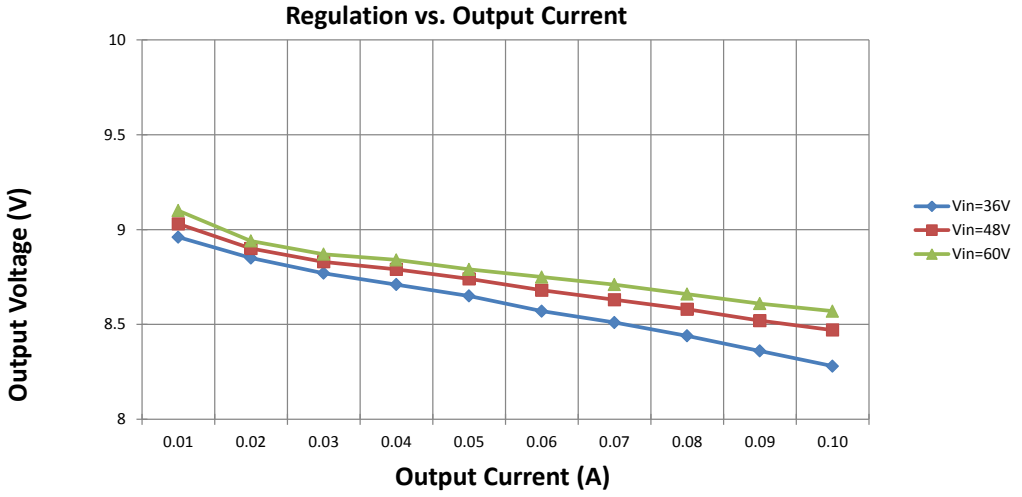
2 INPUT & Output CHARACTERISTICS

2.1: Efficiency vs Output Current

Vin (V)	Iin (A)	Vout_P (V)	Vout_S (V)	Iout (A)	Eff. (%)
36V Input					
36.160	0.0115	9.210	8.960	0.01	43.7%
36.160	0.0166	9.210	8.850	0.02	60.2%
36.160	0.0218	9.210	8.770	0.03	68.4%
36.160	0.0271	9.210	8.710	0.04	73.1%
36.160	0.0325	9.210	8.650	0.05	76.0%
36.160	0.0381	9.210	8.570	0.06	77.4%
36.160	0.0435	9.210	8.510	0.07	78.9%
36.160	0.0493	9.210	8.440	0.08	79.2%
36.160	0.0550	9.210	8.360	0.09	79.5%
36.160	0.0610	9.210	8.280	0.10	79.3%
48V Input					
48.200	0.0100	9.210	9.030	0.01	37.8%
48.200	0.0143	9.210	8.900	0.02	52.5%
48.200	0.0182	9.210	8.830	0.03	61.7%
48.200	0.0222	9.210	8.790	0.04	67.3%
48.200	0.0262	9.210	8.740	0.05	71.1%
48.200	0.0304	9.210	8.680	0.06	73.3%
48.200	0.0345	9.210	8.630	0.07	75.1%
48.200	0.0387	9.210	8.580	0.08	76.3%
48.200	0.0431	9.210	8.520	0.09	76.8%
48.200	0.0475	9.210	8.470	0.10	77.2%
60V Input					
60.000	0.0103	9.210	9.100	0.01	29.6%
60.000	0.0133	9.210	8.940	0.02	45.5%
60.000	0.0164	9.210	8.870	0.03	55.1%
60.000	0.0196	9.210	8.840	0.04	61.4%
60.000	0.0228	9.210	8.790	0.05	65.8%
60.000	0.0262	9.210	8.750	0.06	68.5%
60.000	0.0295	9.210	8.710	0.07	70.9%
60.000	0.0329	9.210	8.660	0.08	72.4%
60.000	0.0363	9.210	8.610	0.09	73.6%
60.000	0.0398	9.210	8.570	0.10	74.5%



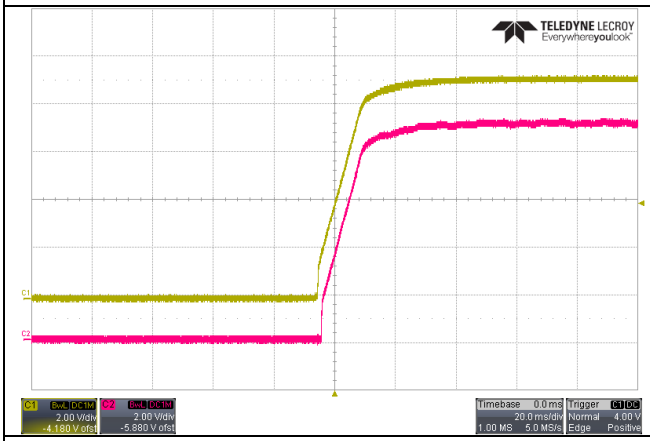
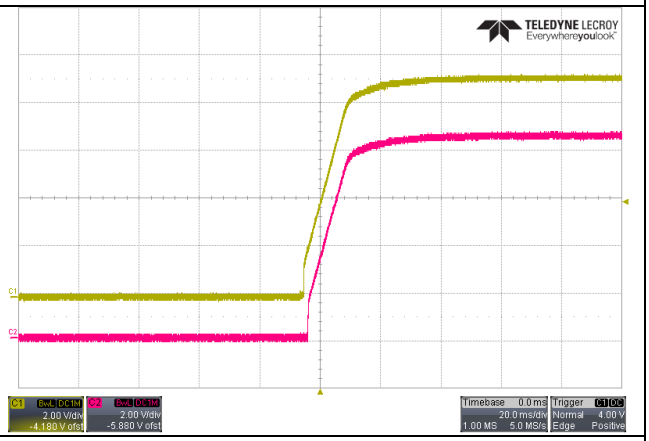
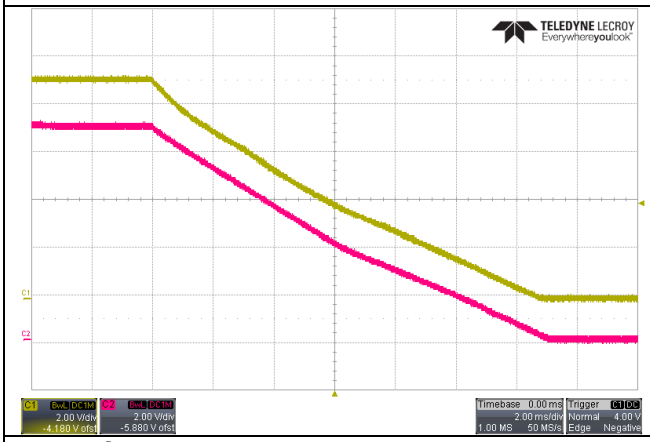
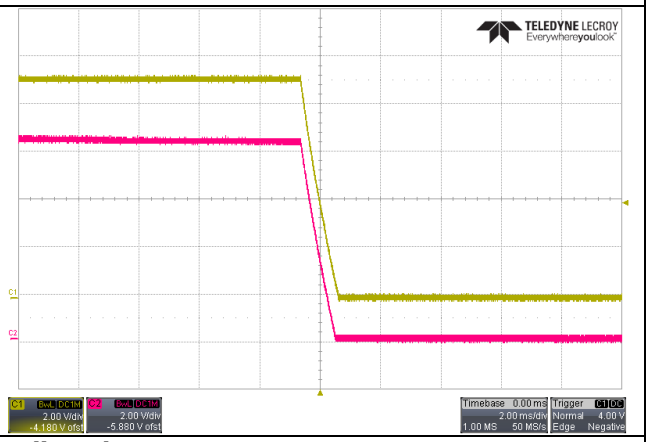
Efficiency Curve vs. Output Current



Isolated Output Regulation vs. Output Current

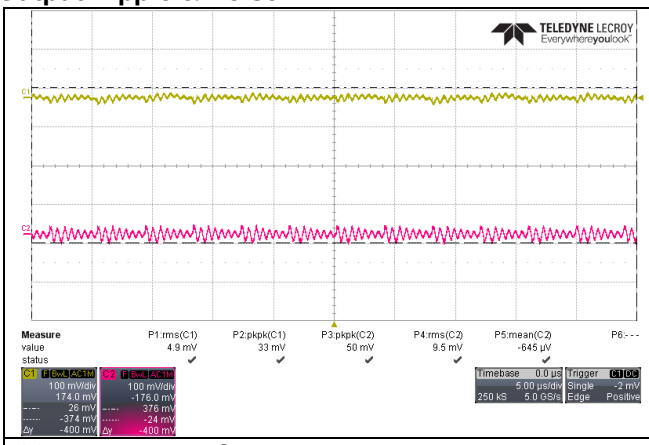
2.2: Start Up & Shut Down Waveforms

48V Input with Full Load & No Load

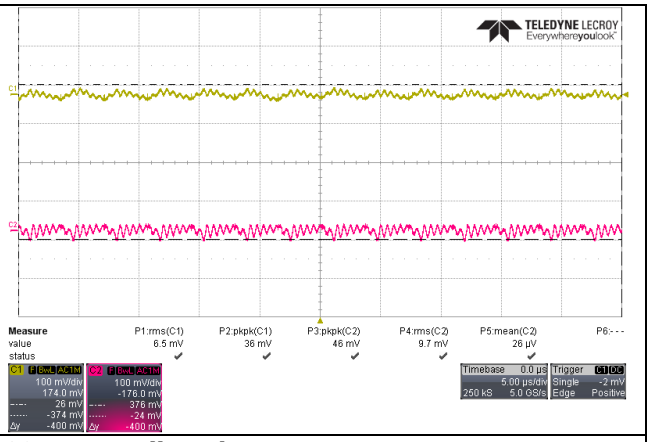
Start Up	
	
No Load C1: Primary Output Voltage 2.0V/Div C2: Secondary Output Voltage 2.0V/Div	Full Load C1: Primary Output Voltage 2.0V/Div C2: Secondary Output Voltage 2.0V/Div
Shunt Down	
	
No Load C1: Primary Output Voltage 2.0V/Div C2: Secondary Output Voltage 2.0V/Div	Full Load C1: Primary Output Voltage 2.0V/Div C2: Secondary Output Voltage 2.0V/Div

2.3: Output Ripple & Noise

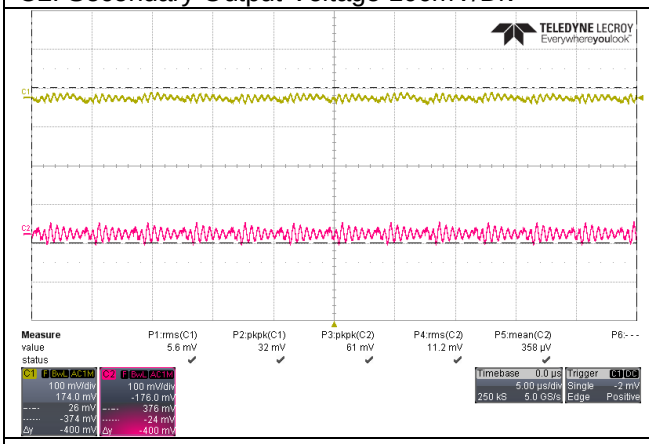
Output Ripple & Noise



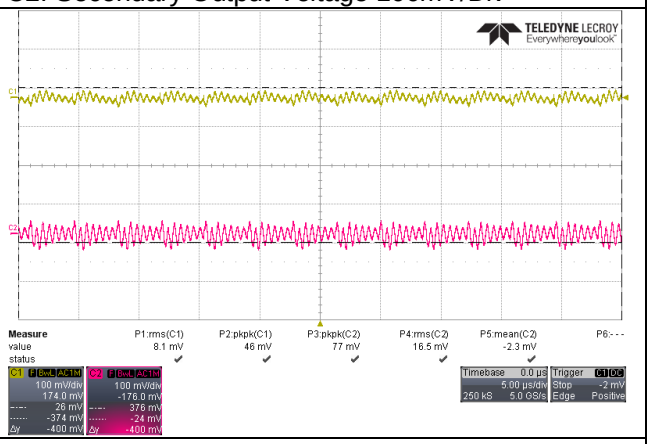
36V Input No Load
C1: Primary Output Voltage 100mV/Div
C2: Secondary Output Voltage 100mV/Div



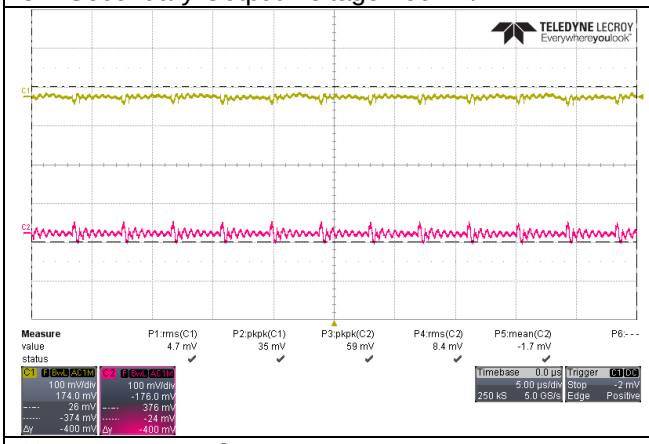
36V Input Full Load
C1: Primary Output Voltage 100mV/Div
C2: Secondary Output Voltage 100mV/Div



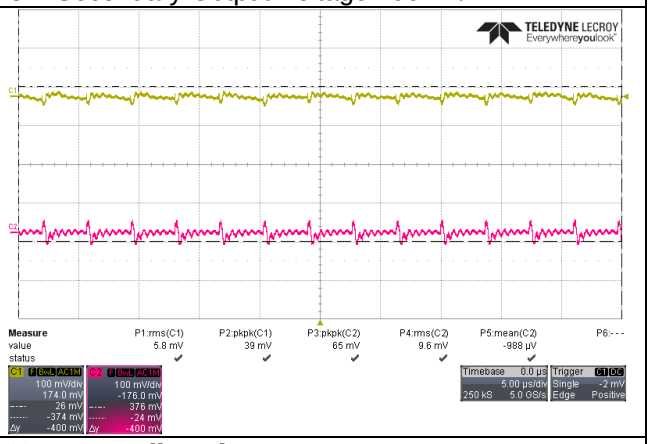
48V Input No Load
C1: Primary Output Voltage 100mV/Div
C2: Secondary Output Voltage 100mV/Div



48V Input Full Load
C1: Primary Output Voltage 100mV/Div
C2: Secondary Output Voltage 100mV/Div

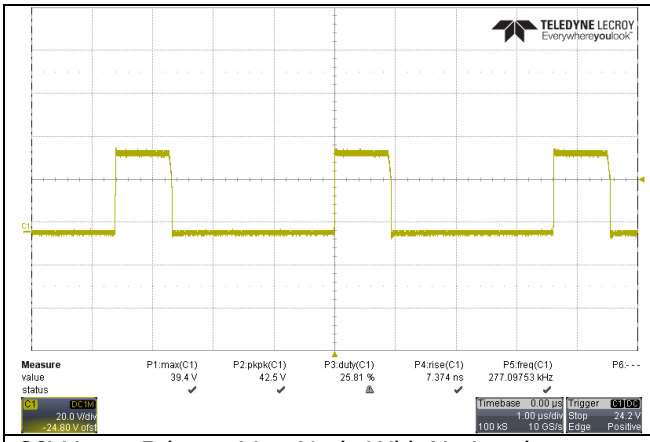


60V Input No Load
C1: Primary Output Voltage 100mV/Div
C2: Secondary Output Voltage 100mV/Div

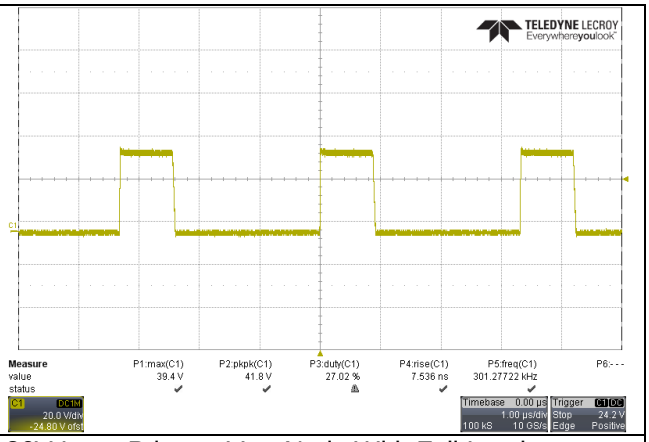


60V Input Full Load
C1: Primary Output Voltage 100mV/Div
C2: Secondary Output Voltage 100mV/Div

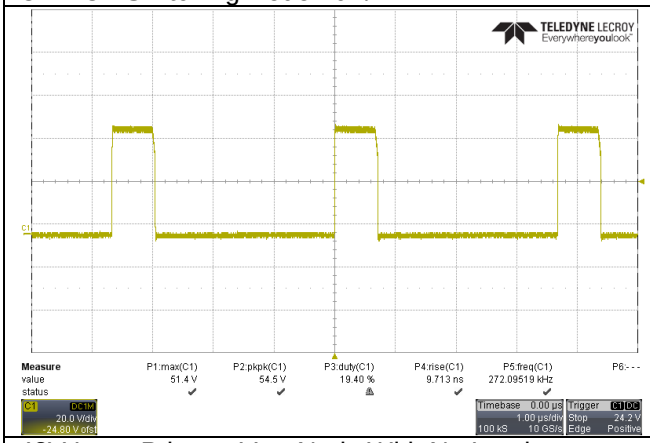
Switching Node Waveforms (Full Bandwidth)



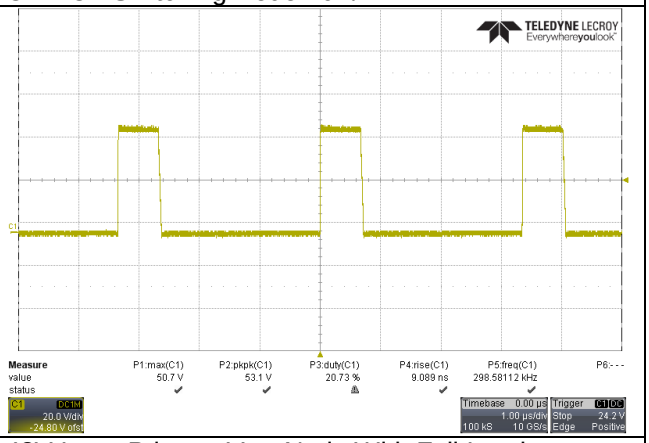
36V Input Primary Vsw Node With No Load
C1: Vsw Switching Node 20V/Div



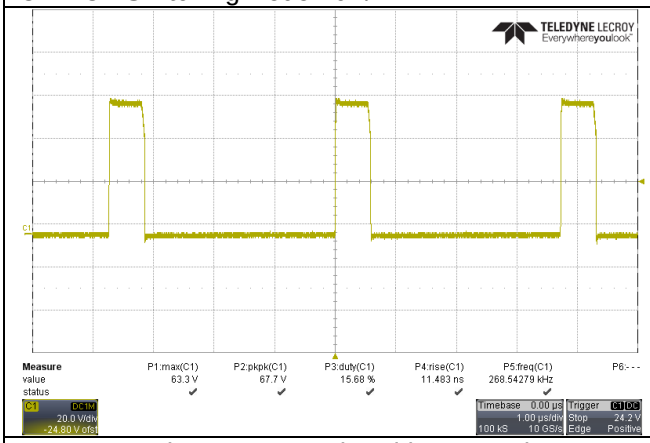
36V Input Primary Vsw Node With Full Load
C1: Vsw Switching Node 20V/Div



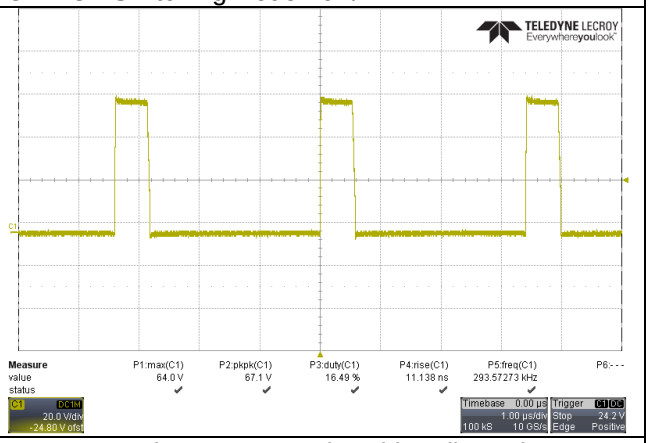
48V Input Primary Vsw Node With No Load
C1: Vsw Switching Node 20V/Div



48V Input Primary Vsw Node With Full Load
C1: Vsw Switching Node 20V/Div



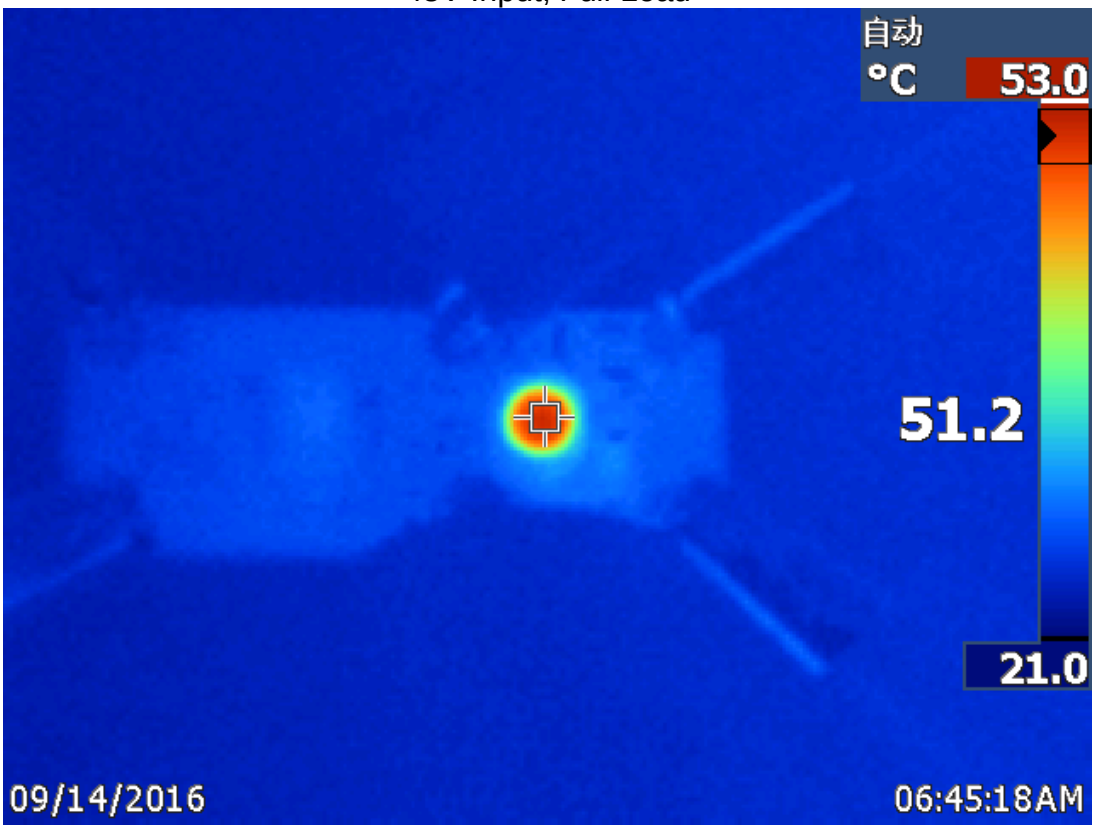
60V Input Primary Vsw Node With No Load
C1: Vsw Switching Node 20V/Div



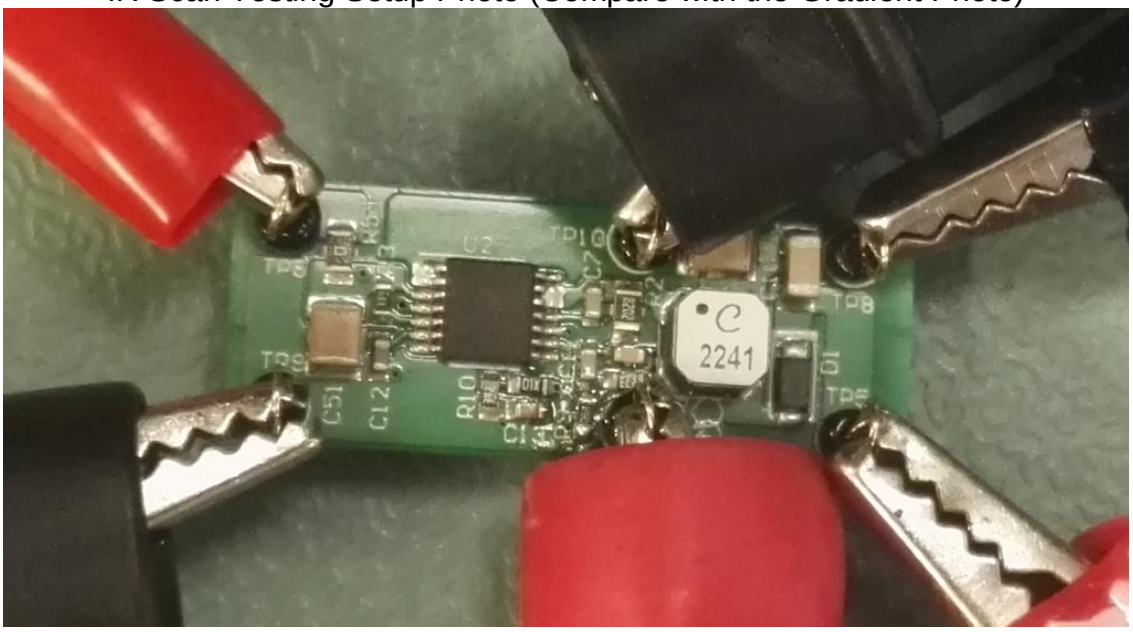
60V Input Primary Vsw Node With Full Load
C1: Vsw Switching Node 20V/Div

3 IR Scan Thermal Gradient (With Fan Cooling, ≈1m/s)

48V Input, Full Load



IR Scan Testing Setup Photo (Compare with the Gradient Photo)



IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale (https:www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

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