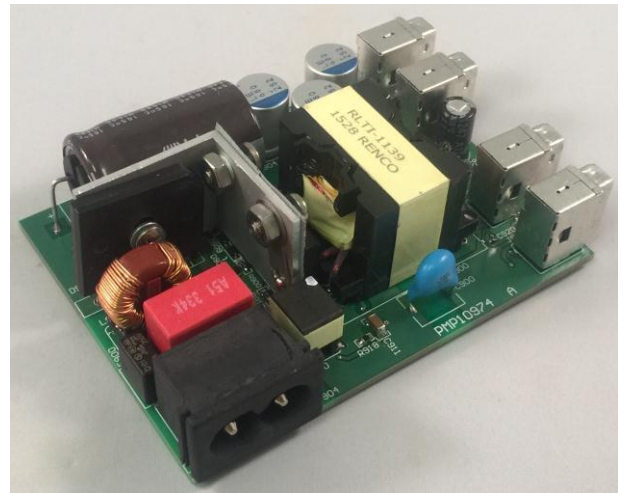
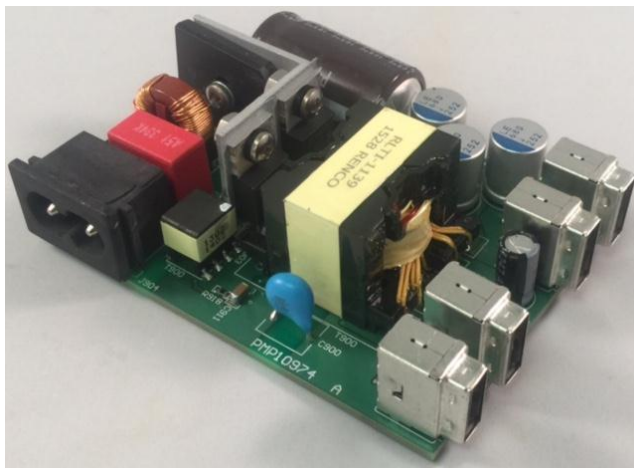
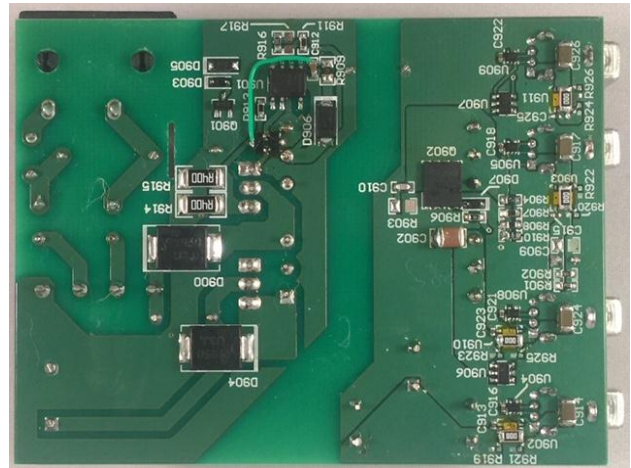
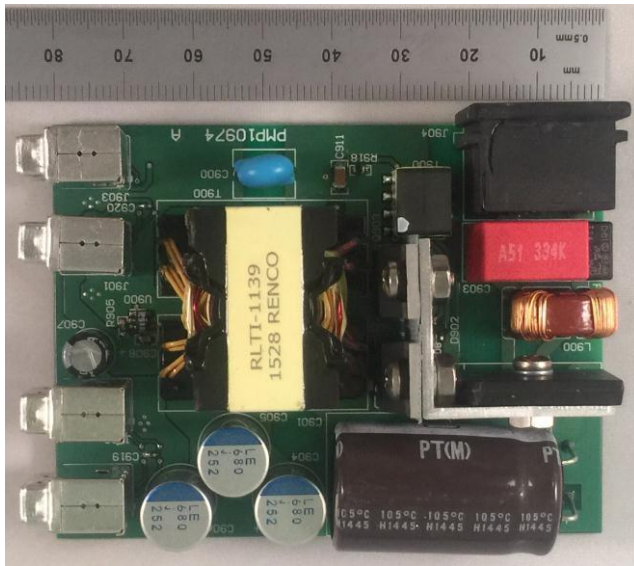


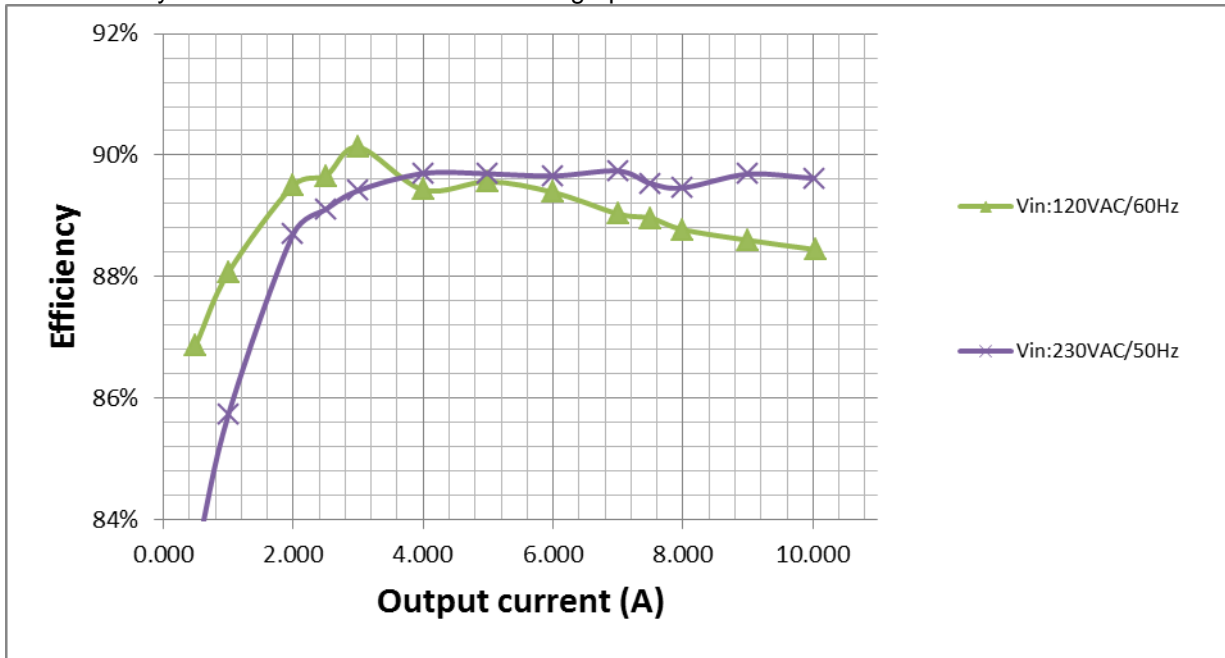
1 Photo

The photographs below show the PMP10974 Rev A assembly. This circuit was built on a PMP10974 Rev A PCB.



2 Converter Efficiency

The efficiency data are shown in the tables and graph below.



V_{IN}=120V_{AC}/60Hz

| V _{in} (AC) | I _{in} (A) | P _{in} (W) | V _{out} (V) | I _{out} (A) | P _{out} (W) | Losses | Eff. (%) |
|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|--------|----------|
| 119.97 | 0.858 | 59.210 | 5.216 | 10.040 | 52.369 | 6.841 | 88.45% |
| 120.07 | 0.770 | 52.690 | 5.187 | 9.000 | 46.683 | 6.007 | 88.60% |
| 120.17 | 0.686 | 46.500 | 5.16 | 8.000 | 41.280 | 5.220 | 88.77% |
| 120.02 | 0.645 | 43.400 | 5.148 | 7.500 | 38.610 | 4.790 | 88.96% |
| 120.06 | 0.604 | 40.380 | 5.136 | 7.000 | 35.952 | 4.428 | 89.03% |
| 120.16 | 0.521 | 34.320 | 5.113 | 6.000 | 30.678 | 3.642 | 89.39% |
| 120.27 | 0.439 | 28.410 | 5.089 | 5.000 | 25.445 | 2.965 | 89.56% |
| 120.03 | 0.360 | 22.650 | 5.064 | 4.000 | 20.256 | 2.394 | 89.43% |
| 120.1 | 0.276 | 16.801 | 5.046 | 3.001 | 15.143 | 1.658 | 90.13% |
| 120.16 | 0.235 | 14.031 | 5.032 | 2.500 | 12.580 | 1.451 | 89.66% |
| 120.21 | 0.193 | 11.220 | 5.021 | 2.000 | 10.042 | 1.178 | 89.50% |
| 120.32 | 0.107 | 5.690 | 5.011 | 1.000 | 5.011 | 0.679 | 88.07% |
| 120.39 | 0.060 | 2.884 | 5.011 | 0.500 | 2.506 | 0.379 | 86.88% |
| 120.03 | 0.015 | 0.036 | 5.014 | 0.000 | 0.000 | 0.036 | 0.00% |

V_{IN}=230V_{AC}/50Hz

| Vin(AC) | Iin(A) | Pin(W) | Vo1(V) | Io1(A) | Pout(W) | Losses | Eff. (%) |
|---------|--------|--------|--------|--------|---------|--------|----------|
| 230.0 | 0.521 | 58.330 | 5.217 | 10.020 | 52.274 | 6.056 | 89.62% |
| 230.0 | 0.471 | 52.070 | 5.189 | 9.000 | 46.701 | 5.369 | 89.69% |
| 230.1 | 0.423 | 46.160 | 5.162 | 8.000 | 41.296 | 4.864 | 89.46% |
| 230.1 | 0.399 | 43.140 | 5.15 | 7.500 | 38.625 | 4.515 | 89.53% |
| 230.1 | 0.373 | 40.070 | 5.137 | 7.000 | 35.959 | 4.111 | 89.74% |
| 230.2 | 0.325 | 34.230 | 5.115 | 6.000 | 30.690 | 3.540 | 89.66% |
| 230.2 | 0.276 | 28.380 | 5.091 | 5.000 | 25.455 | 2.925 | 89.69% |
| 230.3 | 0.226 | 22.600 | 5.068 | 4.000 | 20.272 | 2.328 | 89.70% |
| 230.3 | 0.176 | 16.933 | 5.047 | 3.000 | 15.141 | 1.792 | 89.42% |
| 230.1 | 0.150 | 14.115 | 5.031 | 2.500 | 12.578 | 1.538 | 89.11% |
| 230.1 | 0.125 | 11.314 | 5.018 | 2.000 | 10.036 | 1.278 | 88.70% |
| 230.1 | 0.073 | 5.865 | 5.023 | 1.001 | 5.028 | 0.837 | 85.73% |
| 230.2 | 0.045 | 3.013 | 5.024 | 0.500 | 2.512 | 0.501 | 83.37% |
| 230.2 | 0.024 | 0.035 | 5.016 | 0.000 | 0.000 | 0.035 | 0.00% |

Average Efficiency

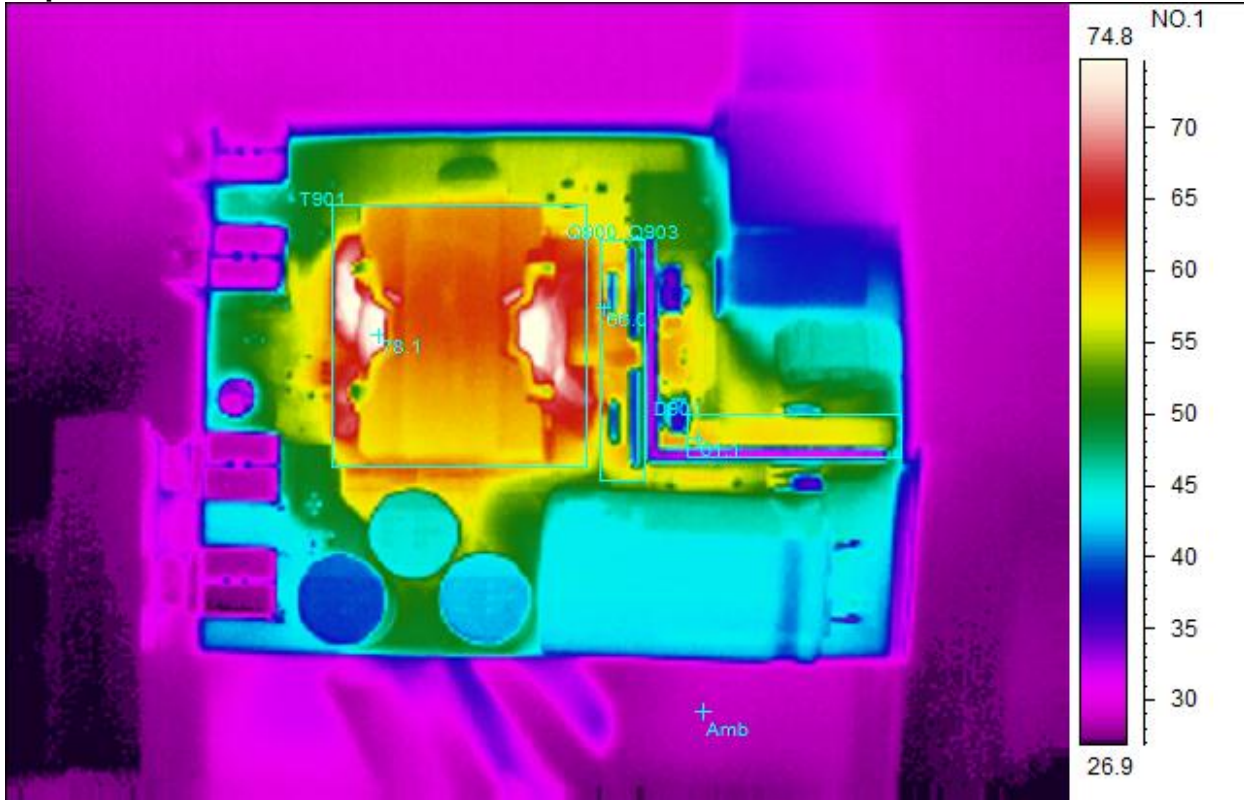
| Vin | Pin(W) | Vout(V) | Iout(A) | Load | Avg Eff. |
|-------------|--------|---------|---------|------|----------|
| 120VAC/60Hz | 14.031 | 5.032 | 2.500 | 25% | 89.16% |
| | 28.410 | 5.089 | 5.000 | 50% | |
| | 43.400 | 5.148 | 7.500 | 75% | |
| | 59.210 | 5.216 | 10.040 | 100% | |
| 230VAC/50Hz | 14.115 | 5.031 | 2.500 | 25% | 89.49% |
| | 28.380 | 5.091 | 5.000 | 50% | |
| | 43.140 | 5.15 | 7.500 | 75% | |
| | 58.330 | 5.217 | 10.020 | 100% | |

3 Thermal Images

The thermal images below show a top view and bottom view of the board. The ambient temperature was 20°C with no forced air flow. The output was at 5V/50W full load.

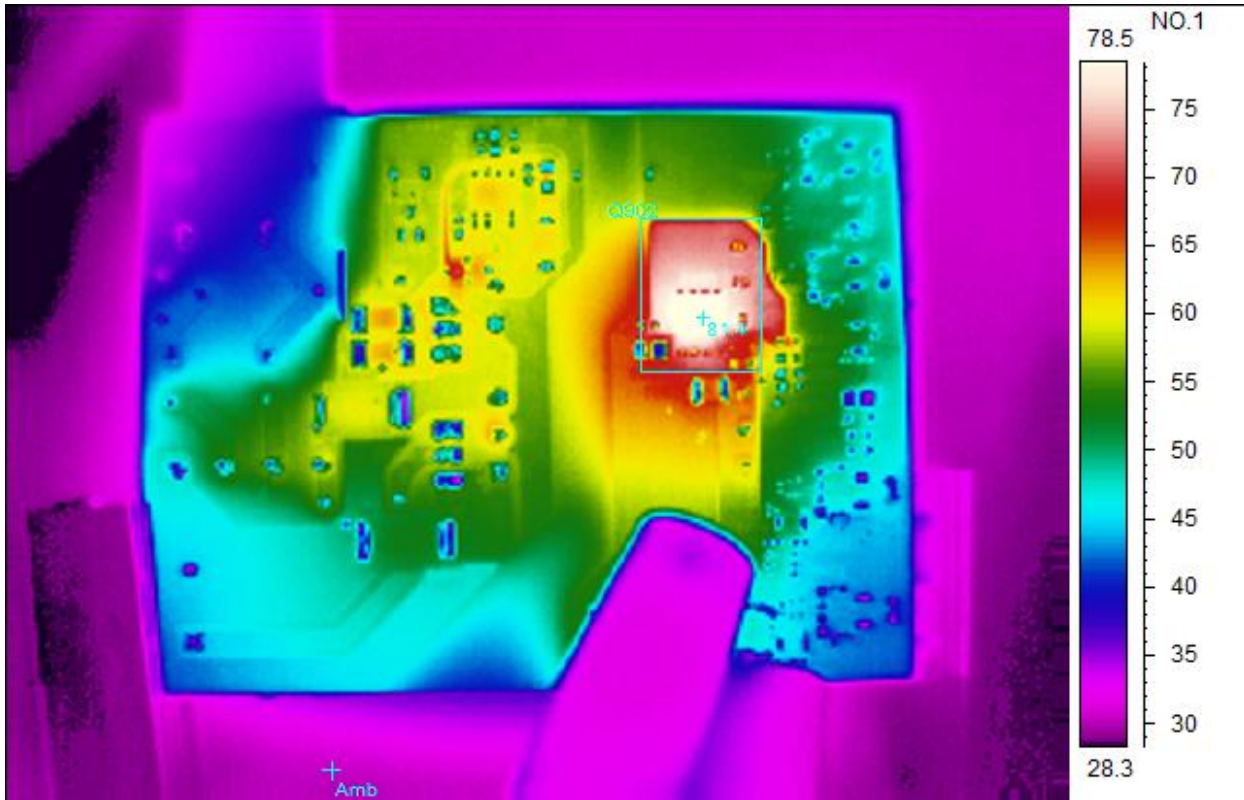
120V_{AC}/60Hz

Top Side



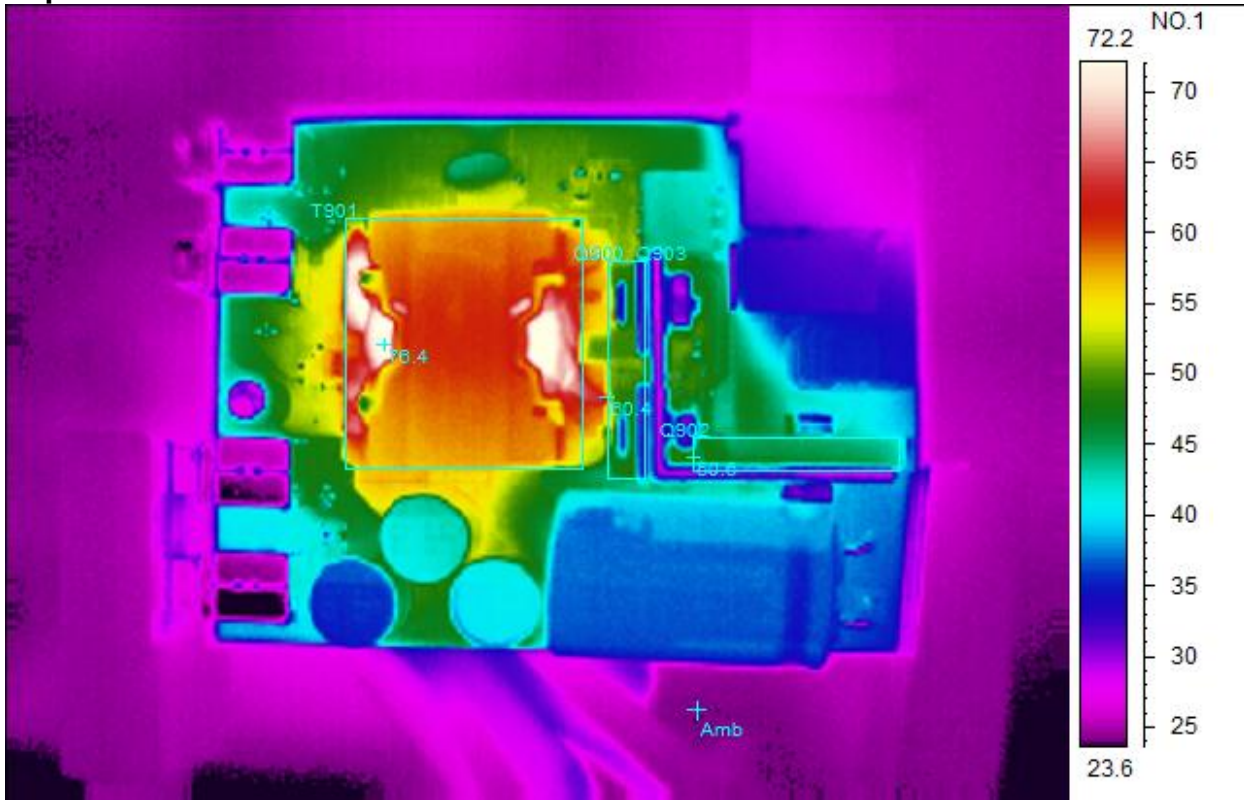
| Spot analysis | Value |
|-----------------|--------|
| Amb Temperature | 29.1°C |
| Area analysis | Value |
| T901Max | 78.1°C |
| Q900, Q903Max | 66.0°C |
| D901Max | 61.1°C |

120V_{AC}/60Hz
Bottom Side



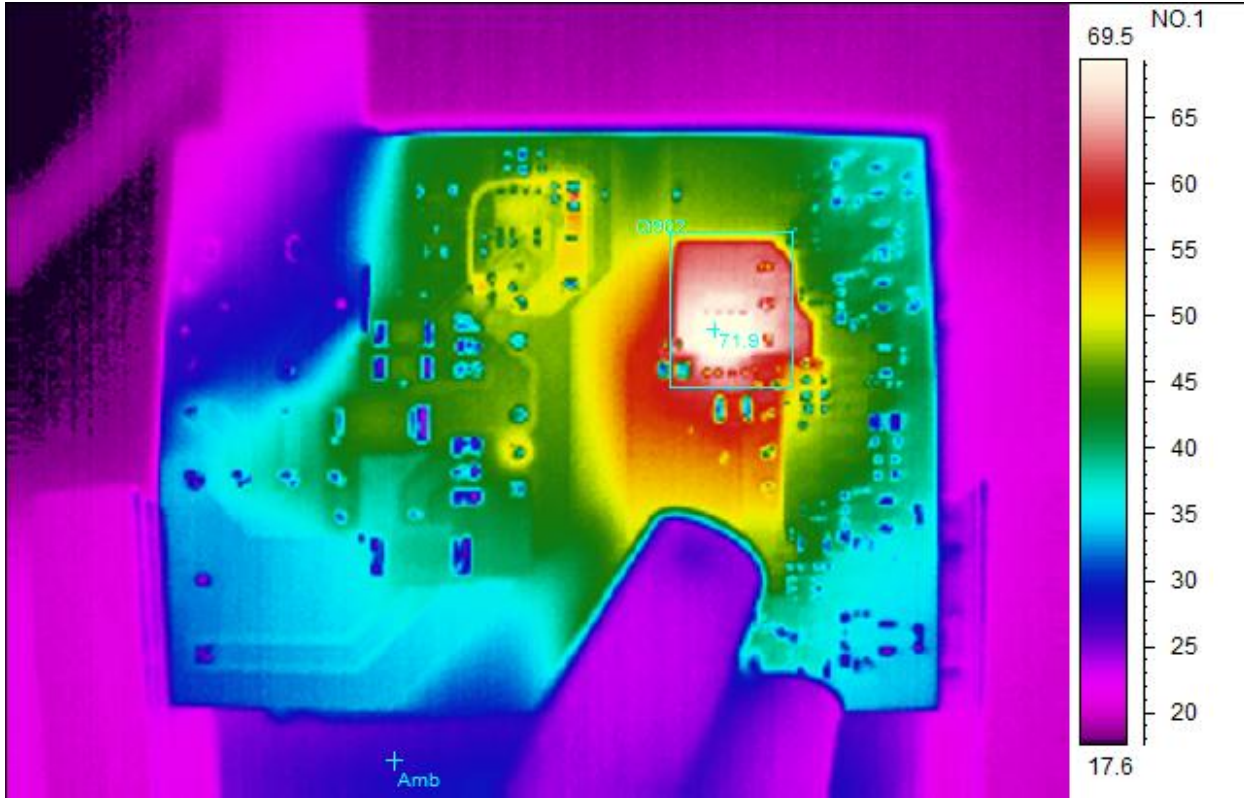
| Spot analysis | Value |
|-----------------|--------|
| Amb Temperature | 30.8°C |
| Area analysis | Value |
| Q902Max | 81.4°C |

**230V_{AC}/50Hz
Top Side**



| Spot analysis | Value |
|-----------------|--------|
| Amb Temperature | 24.3°C |
| Area analysis | Value |
| T901Max | 76.4°C |
| Q900, Q903Max | 60.4°C |
| Q902 Max | 50.6°C |

230V_{AC}/50Hz Bottom Side

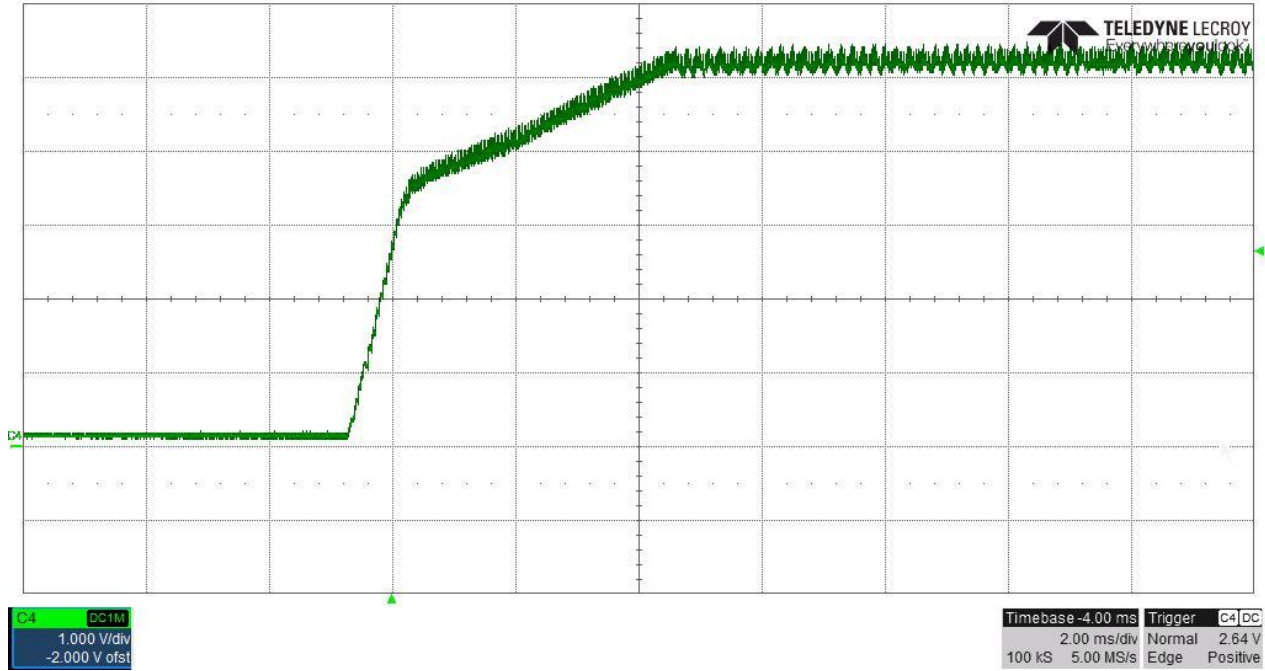


| Spot analysis | Value |
|-----------------|--------|
| Amb Temperature | 28.9°C |
| Area analysis | Value |
| Q902Max | 71.9°C |

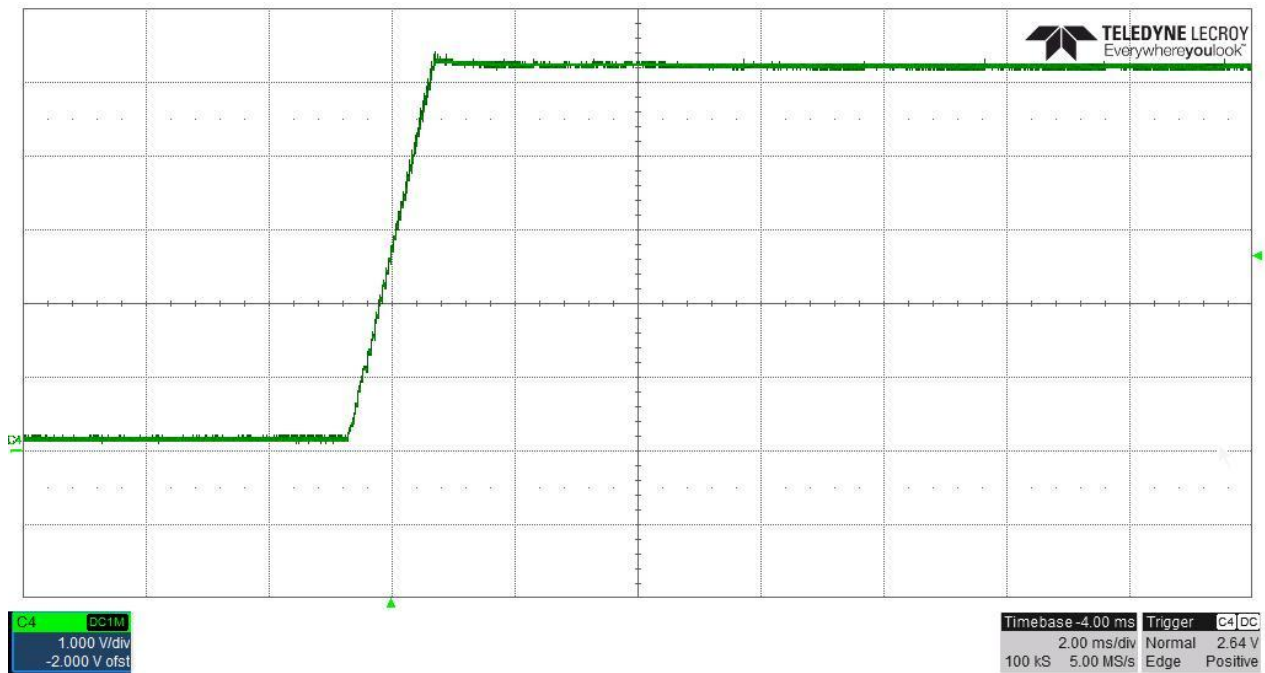
4 Startup

The output voltages at startup are shown in the images below.

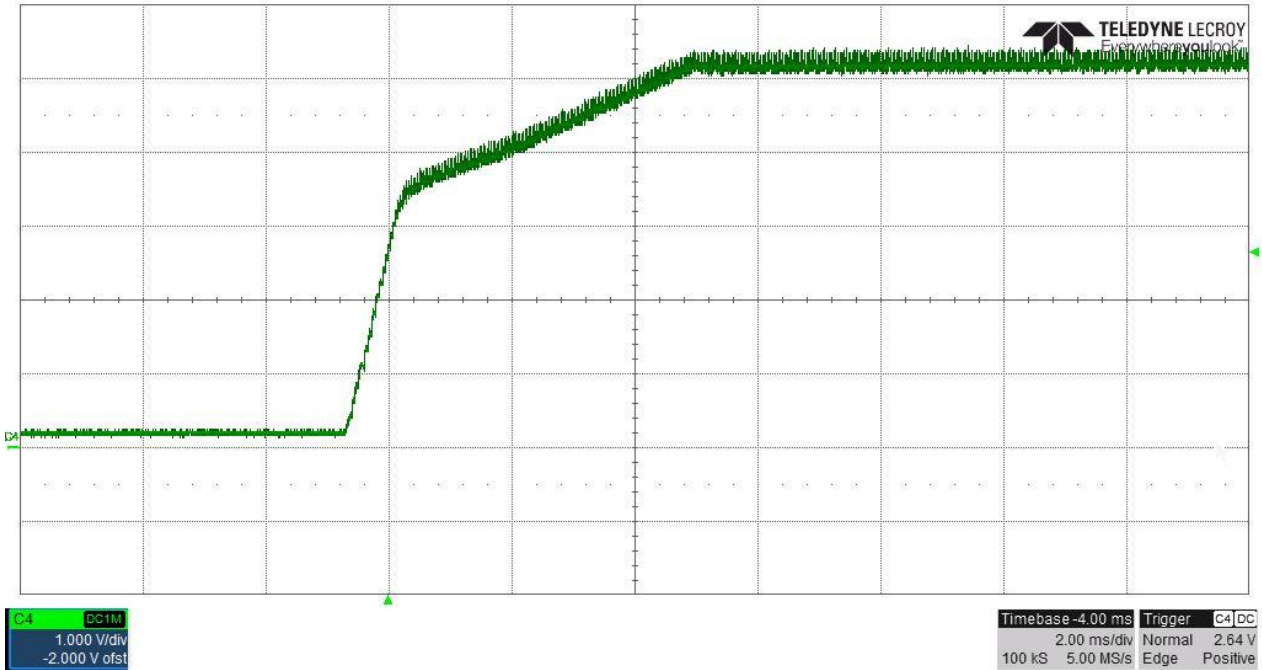
4.1 Startup @ 120V_{AC}/60Hz: 5V/10A at C907.



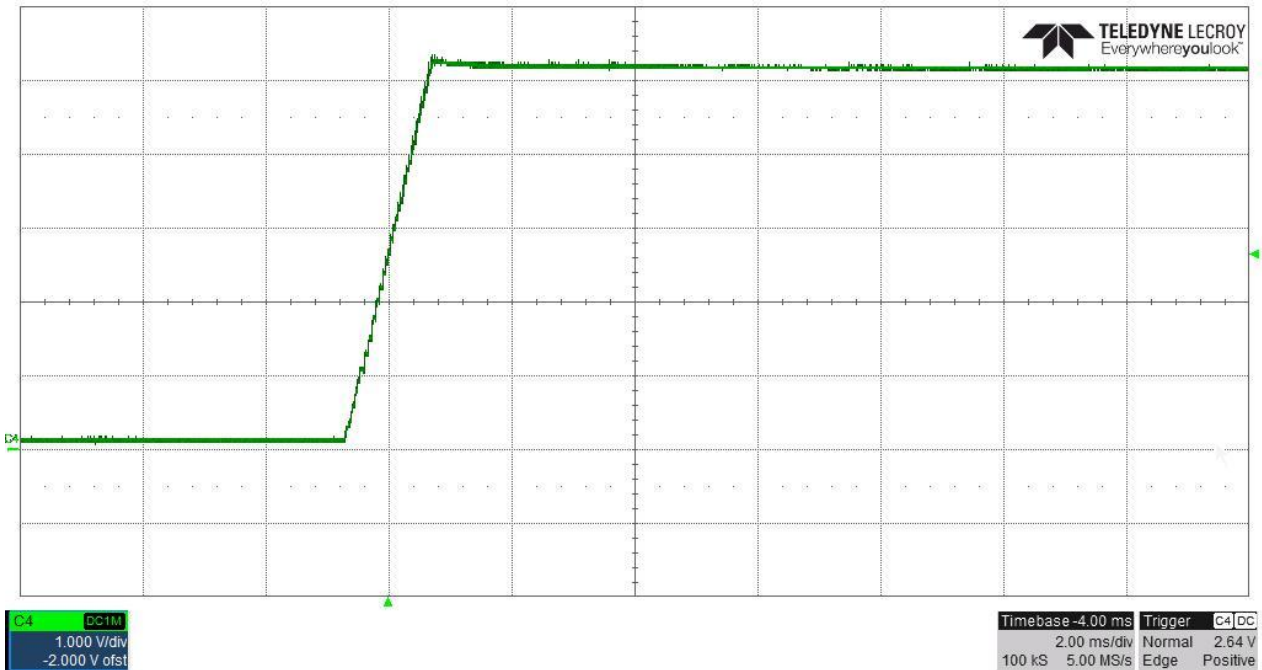
4.2 Startup @ 120V_{AC}/60Hz: no load.



4.3 Startup @ 230V_{AC}/50Hz: 5V/10A at C907.

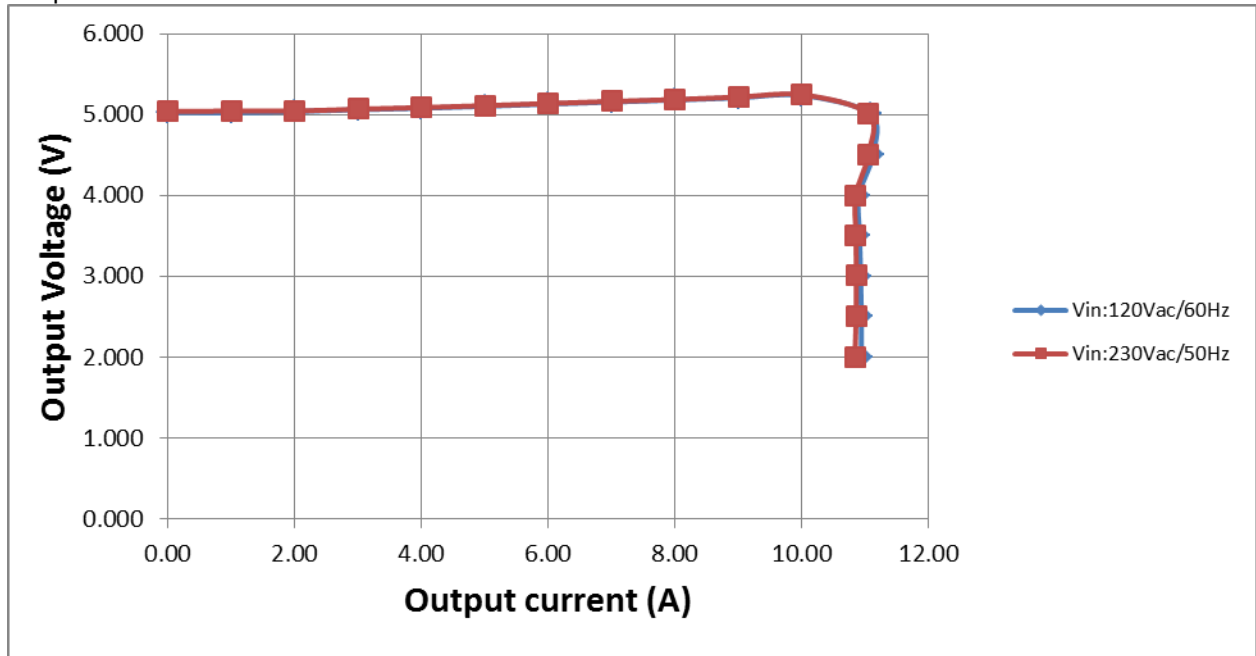


4.4 Startup @ 230V_{AC}/50Hz: no load.



5 Constant Current/ Constant Coltage

The plots and table below show the CC/CV curves of this board.

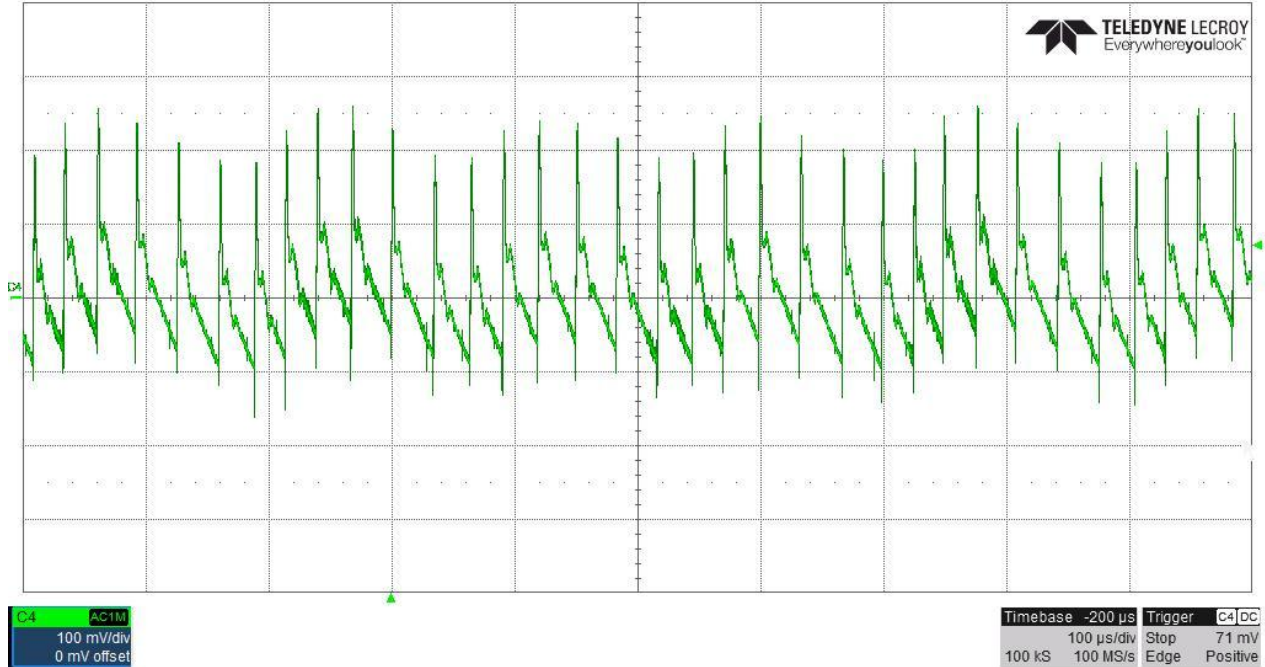


| 120VAC/60Hz | | 230VAC/50Hz | |
|-------------|--------|-------------|--------|
| Vout | Iout | Vout | Iout |
| 5.027 | 0.000 | 5.037 | 0.000 |
| 5.021 | 1.000 | 5.044 | 1.000 |
| 5.037 | 2.000 | 5.044 | 2.000 |
| 5.060 | 3.000 | 5.067 | 3.000 |
| 5.078 | 4.000 | 5.087 | 4.000 |
| 5.103 | 5.000 | 5.111 | 5.000 |
| 5.130 | 6.000 | 5.137 | 6.000 |
| 5.155 | 7.000 | 5.163 | 7.000 |
| 5.180 | 8.000 | 5.186 | 8.000 |
| 5.207 | 9.000 | 5.217 | 9.000 |
| 5.238 | 10.000 | 5.246 | 10.000 |
| 5.006 | 11.082 | 5.010 | 11.048 |
| 4.502 | 11.118 | 4.507 | 11.048 |
| 4.003 | 10.896 | 4.001 | 10.848 |
| 3.500 | 10.908 | 3.500 | 10.850 |
| 2.998 | 10.924 | 3.018 | 10.856 |
| 2.498 | 10.936 | 2.503 | 10.854 |
| 2.001 | 10.936 | 2.000 | 10.834 |

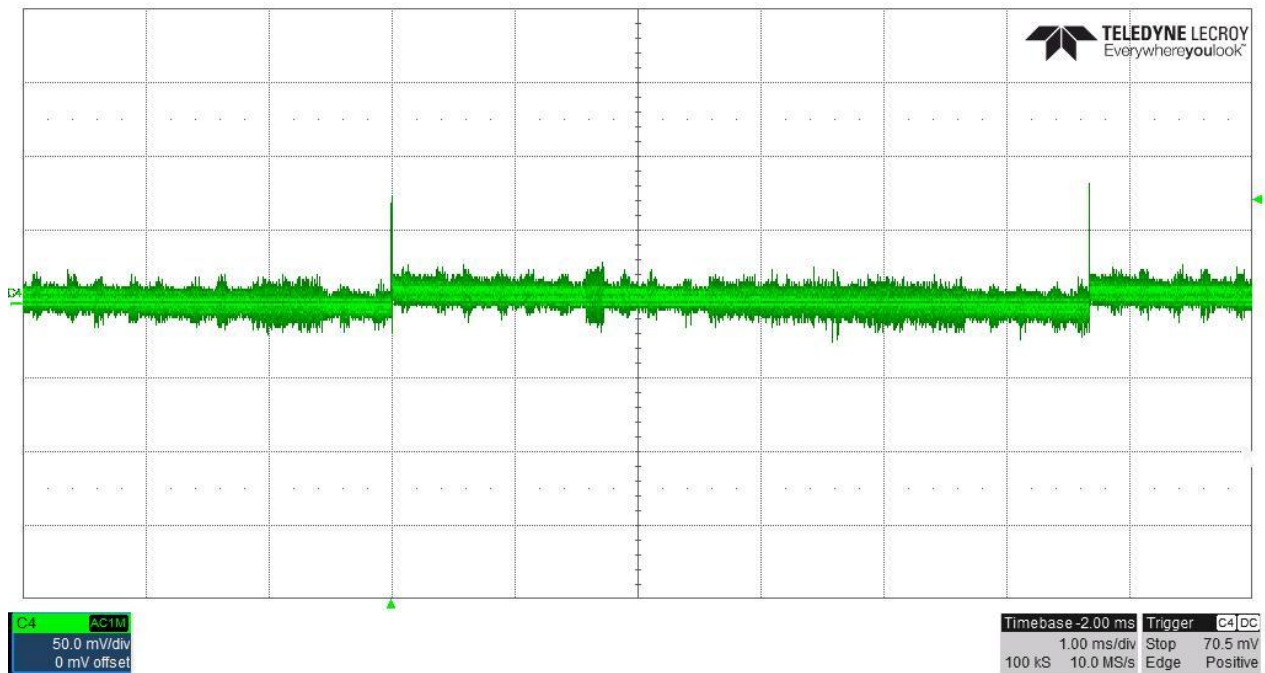
6 Output Ripple Voltages

The output ripple voltage is shown in the plots below.

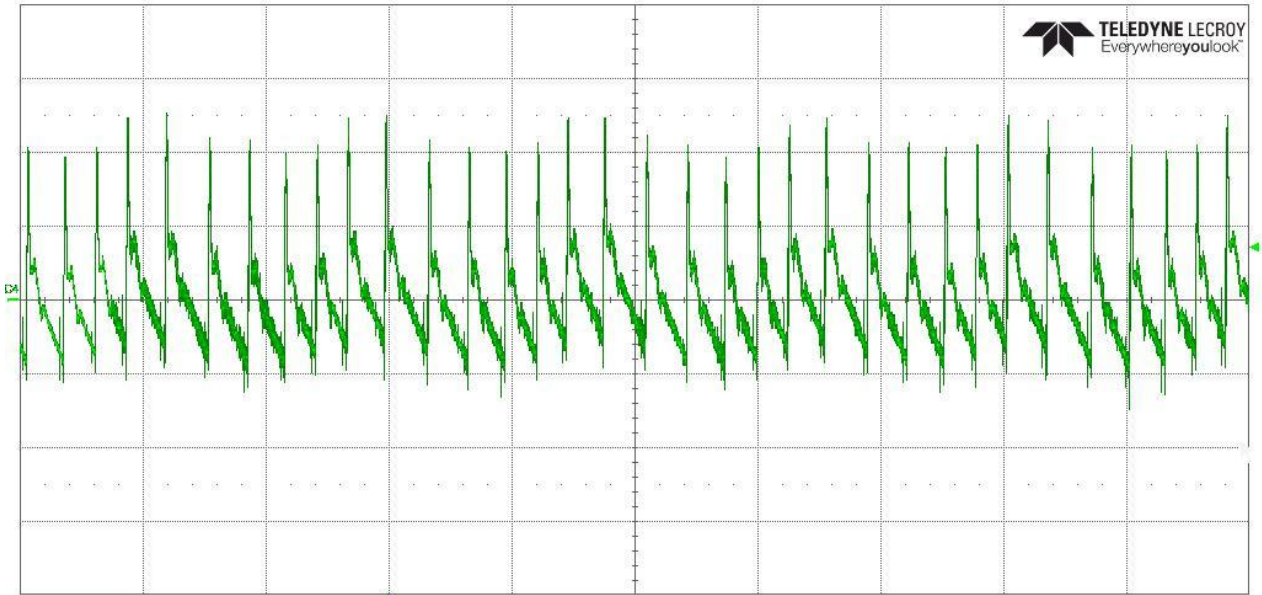
6.1 120V_{AC}/60Hz: 5V/10A at C907.



6.2 120V_{AC}/60Hz: no Load.



6.3 230V_{AC}/50Hz: 5V/10A at C907

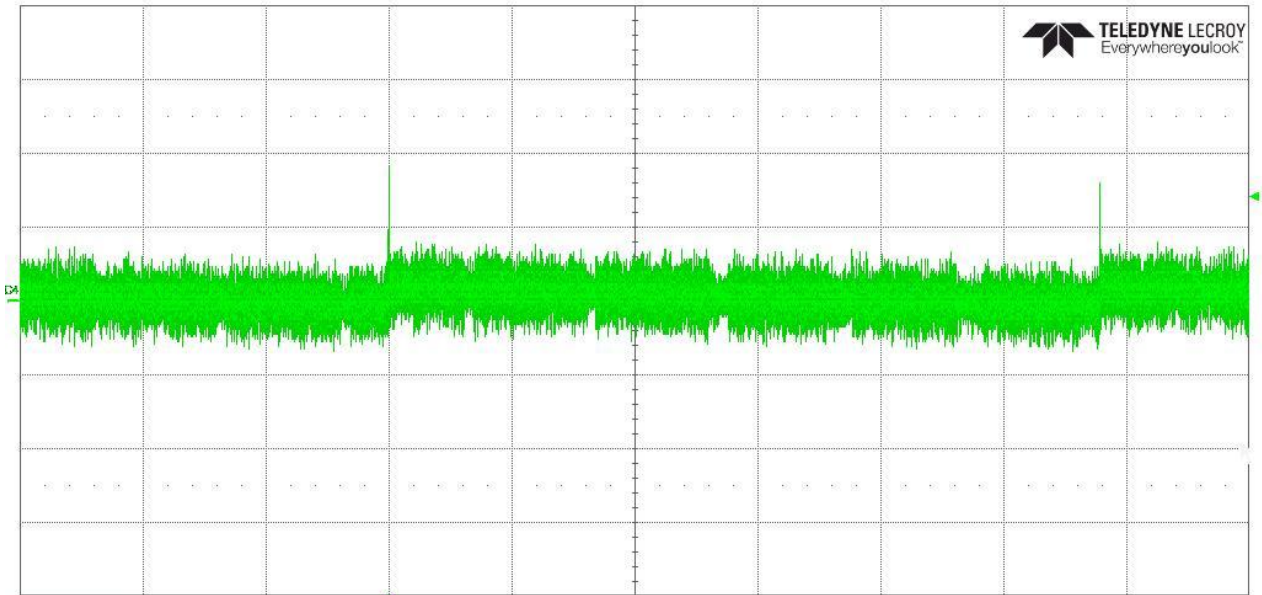


C4 AC1M
100 mV/div
0 mV offset

TELEDYNE LECROY
Everywhereyoulook™

Timebase -200 μ s Trigger C4 DC
100 μ s/div Stop 71 mV
100 kS 100 MS/s Edge Positive

6.4 230V_{AC}/50Hz: no Load.



C4 AC1M
50.0 mV/div
0 mV offset

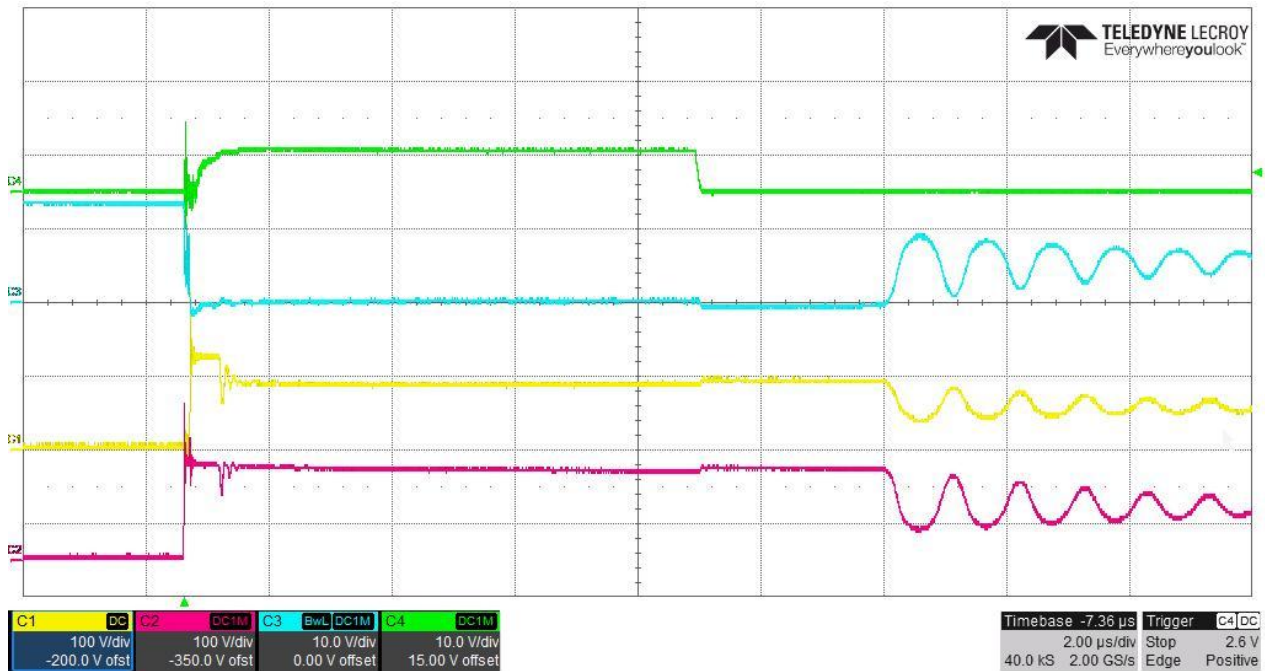
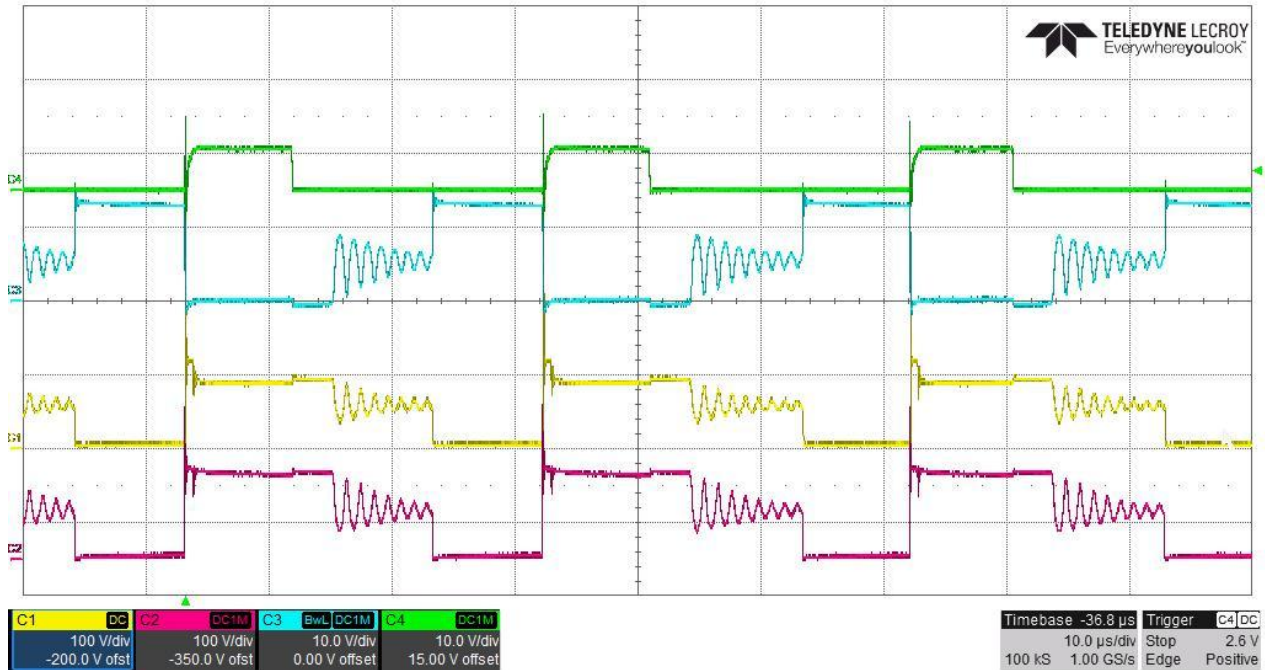
TELEDYNE LECROY
Everywhereyoulook™

Timebase -2.00 ms Trigger C4 DC
1.00 ms/div Stop 70.5 mV
100 kS 10.0 MS/s Edge Positive

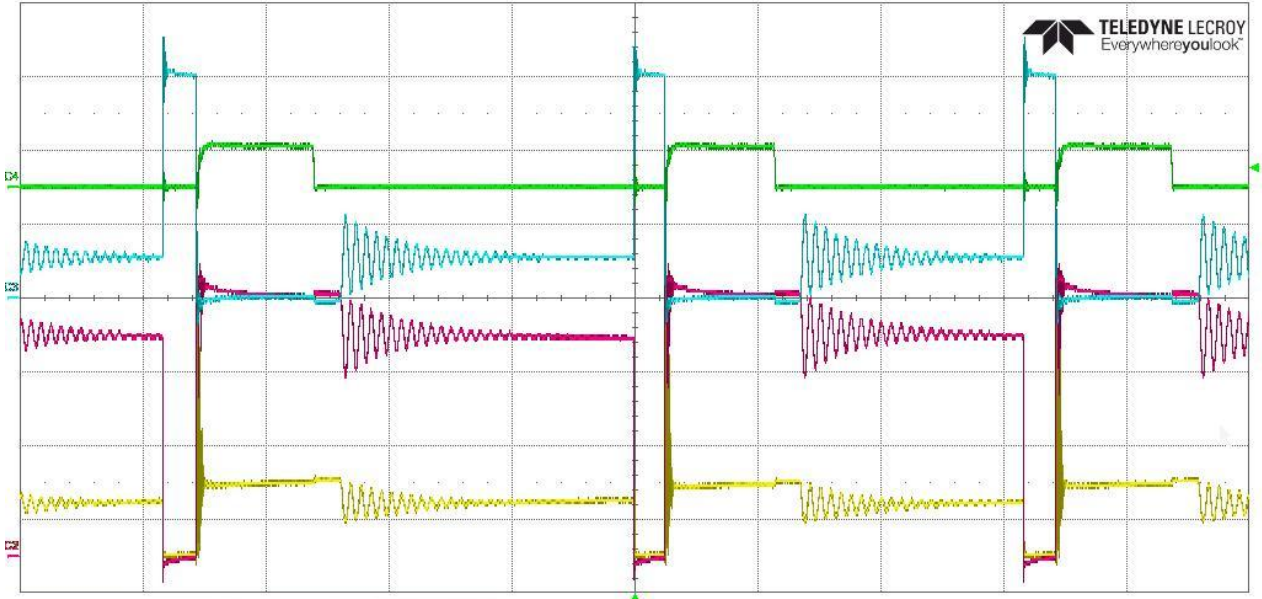
7 Switching Waveforms

The images below show key switching waveforms of this board. The waveforms are measured with 5V/50W full load. CH1: V_{DS} (Q900), CH2: V_D to GND (Q903), CH3: V_{DS} (Q902), CH4: V_{GS} (Q902).

7.1 85V_{AC}/60Hz

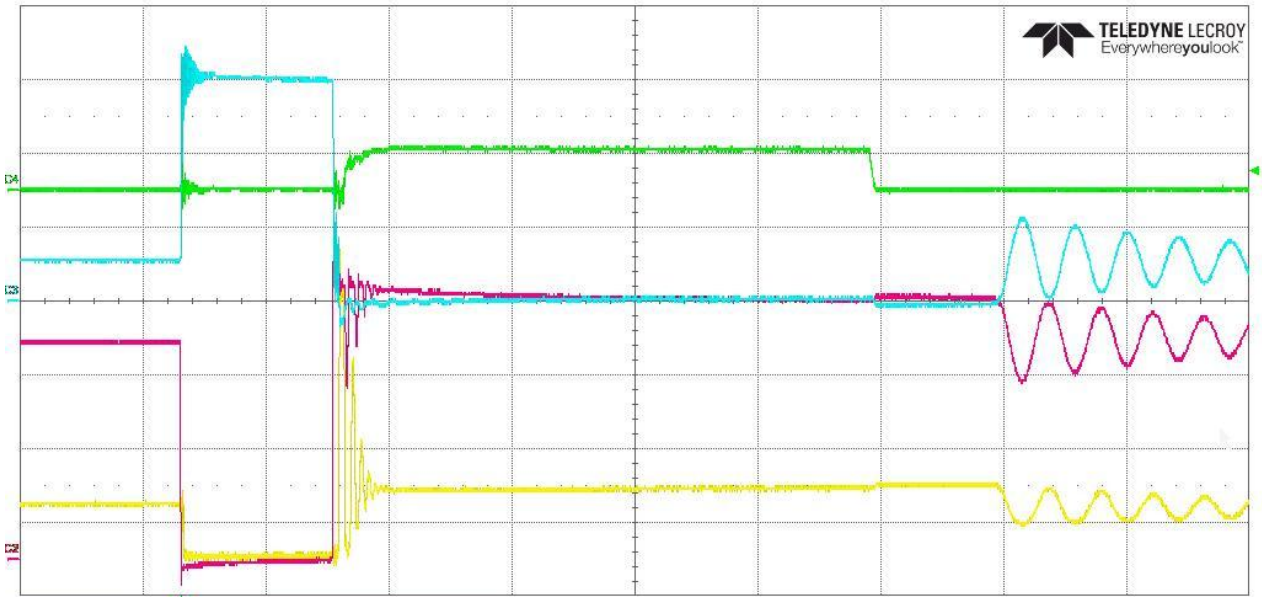


7.2 264V_{AC}/50Hz



| C1 | C2 | C3 | C4 |
|---------------|---------------|---------------|----------------|
| DC | DC1M | BwL DC1M | DC1M |
| 100 V/div | 100 V/div | 10.0 V/div | 10.0 V/div |
| -350.0 V ofst | -350.0 V ofst | 0.00 V offset | 15.00 V offset |

| | | | |
|----------|-------------|-----------|---------------|
| Timebase | 0.0 μs | Trigger | C4 DC |
| | 10.0 μs/div | Stop | 2.6 V |
| | 100 kS | 1.00 GS/s | Edge Positive |



| C1 | C2 | C3 | C4 |
|---------------|---------------|---------------|----------------|
| DC | DC1M | BwL DC1M | DC1M |
| 100 V/div | 100 V/div | 10.0 V/div | 10.0 V/div |
| -350.0 V ofst | -350.0 V ofst | 0.00 V offset | 15.00 V offset |

| | | | |
|----------|-------------|-----------|---------------|
| Timebase | -7.36 μs | Trigger | C4 DC |
| | 2.00 μs/div | Stop | 2.6 V |
| | 40.0 kS | 2.00 GS/s | Edge Positive |

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