

**Test Report  
For PMP11479  
10/29/2015**



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## 1. Design Specifications

|  |                        |
|--|------------------------|
| <b>Vin Minimum</b>                     | <b>6VDC</b>            |
| <b>Vin Maximum</b>                     | <b>16VDC</b>           |
| <b>Vout</b>                            | <b>12VDC</b>           |
| <b>Iout</b>                            | <b>2.5A continuous</b> |
| <b>Approximate Switching Frequency</b> | <b>~300KHz</b>         |

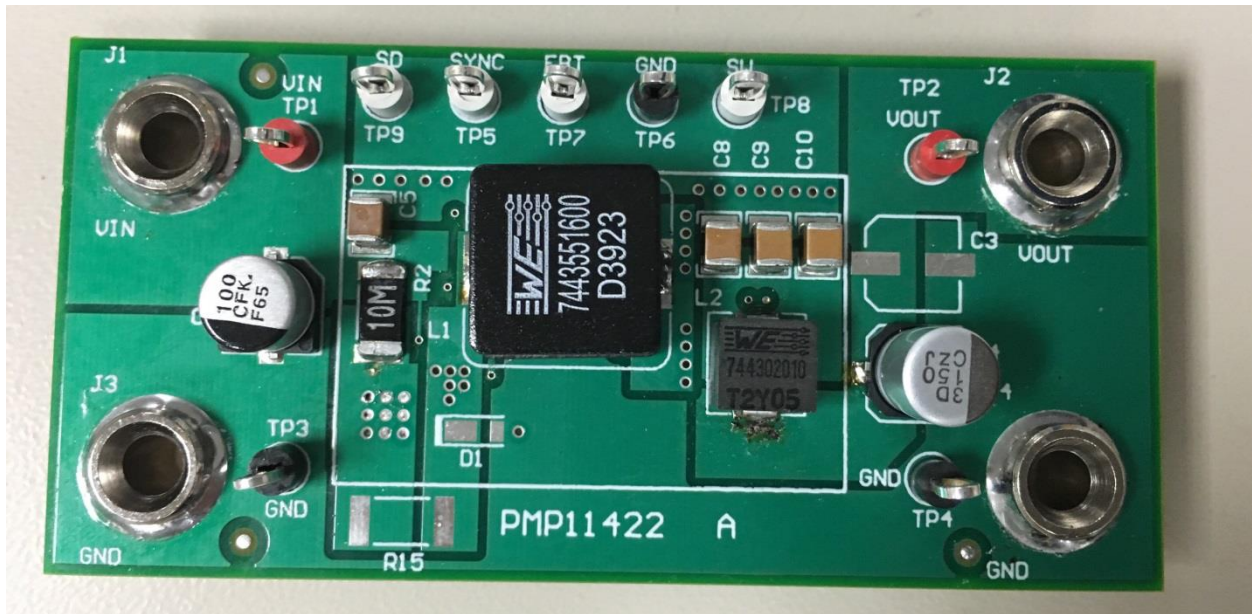
## 2. Circuit Description and PCB Details

PMP11479 is a synchronous boost power supply using the LM5122 controllers. The design accepts an input voltage of 6Vin to 16Vin, and boosts a 12Vout rail capable of sourcing 2.5A continuous current. The LM5122 has an internal current source to keep the high side FET to run at 100% duty cycle which allows a bypass operation when the input voltage is greater than the configured output voltage.

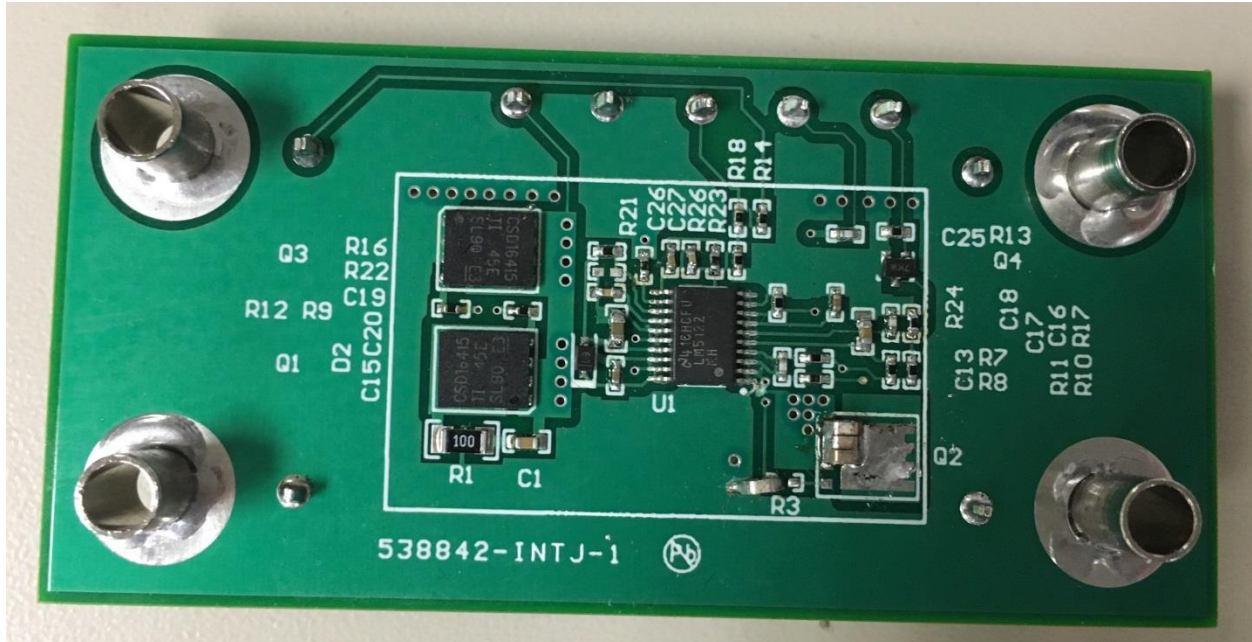
The design was built on PMP11422 with a dimension of 78.7mm \* 38mm. Four layer PCB was used for the design, 1 oz. copper on top and bottom layer, 0.5 oz. copper on the internal layers.

### 3. PMP11479 Board Photos

Board Dimensions: 78.7mm x 38mm

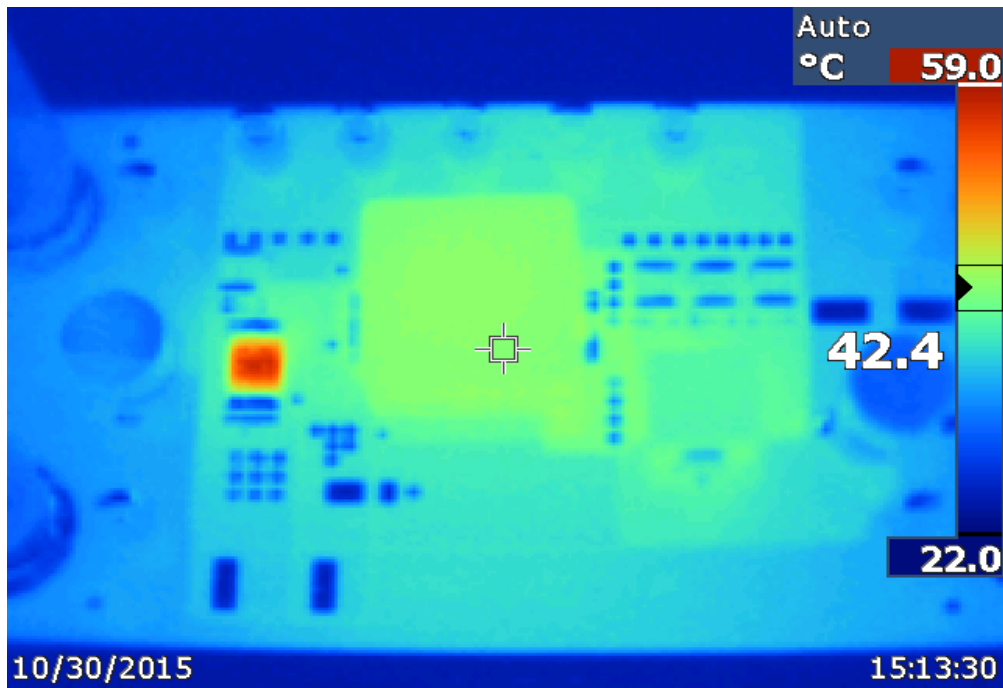


Board Photo (Top)

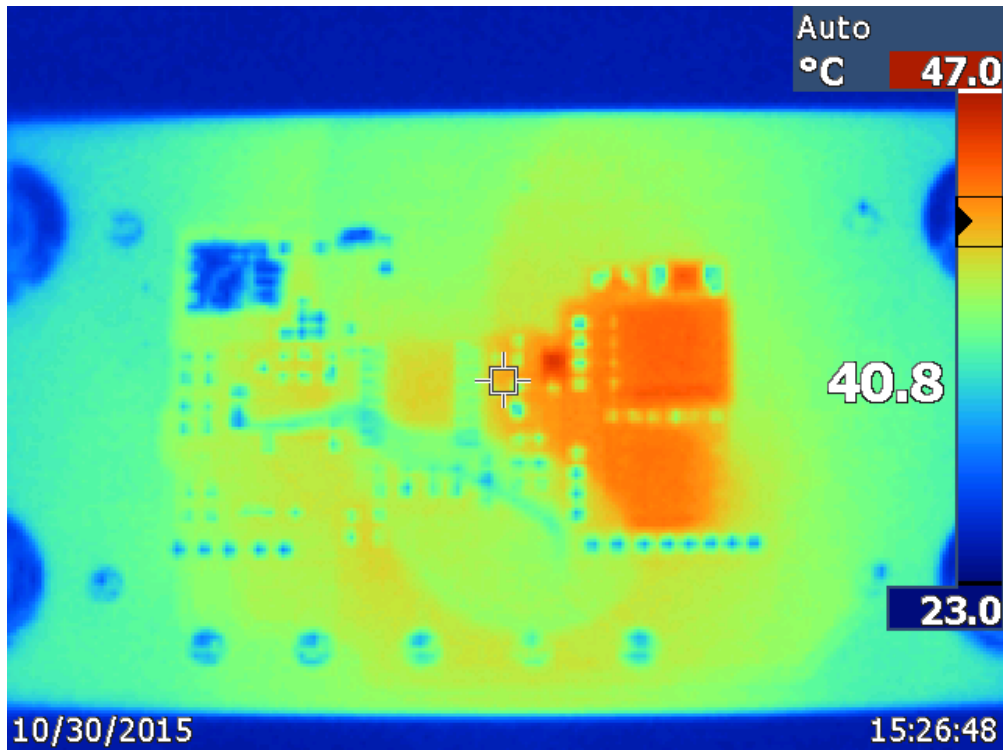


Board Photo (Bottom)

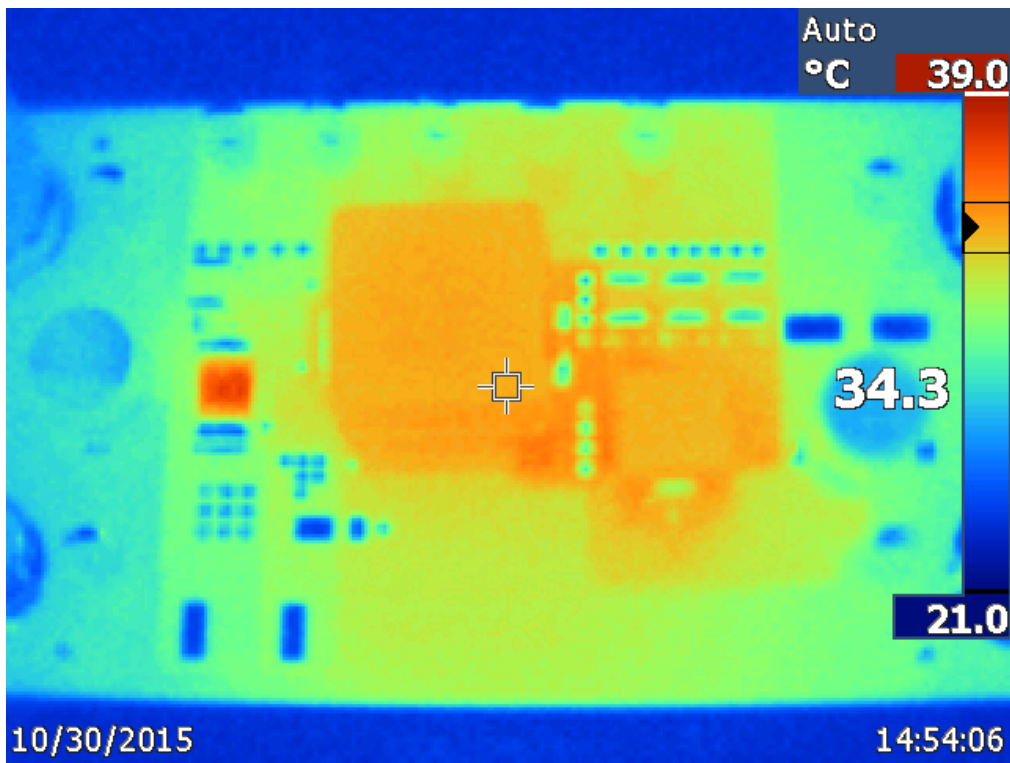
#### 4. Thermal



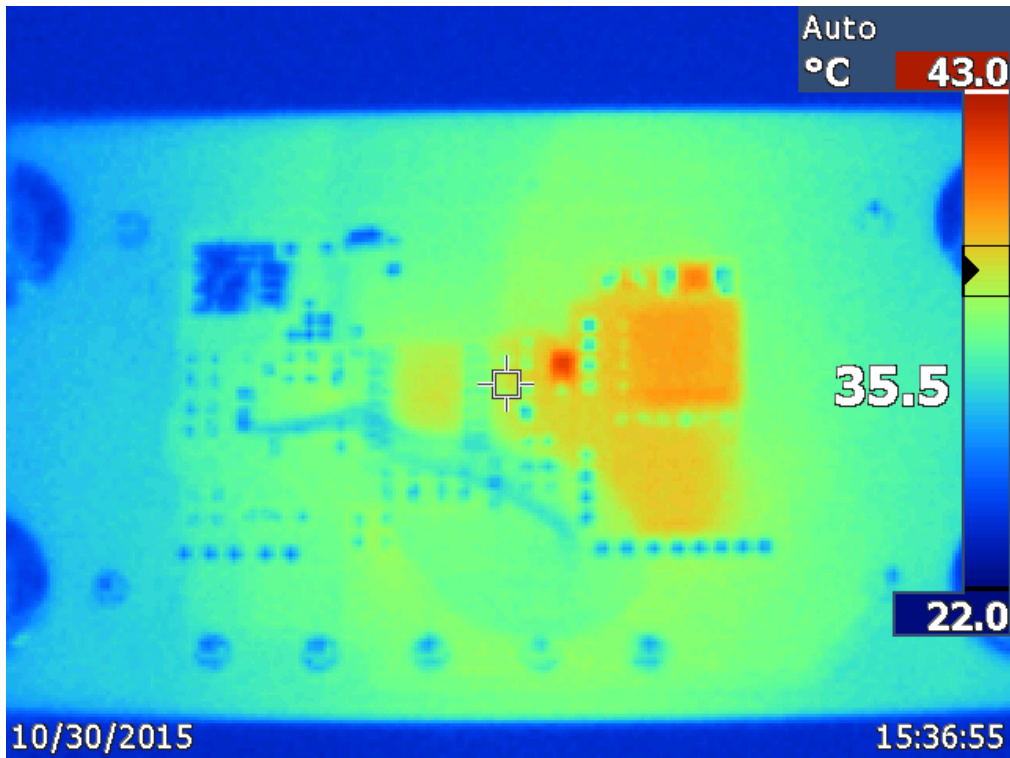
Top Thermal image reaches equilibrium at 6Vin, 2.5A load.



Bottom Thermal image reaches equilibrium at 6Vin, 2.5A load.



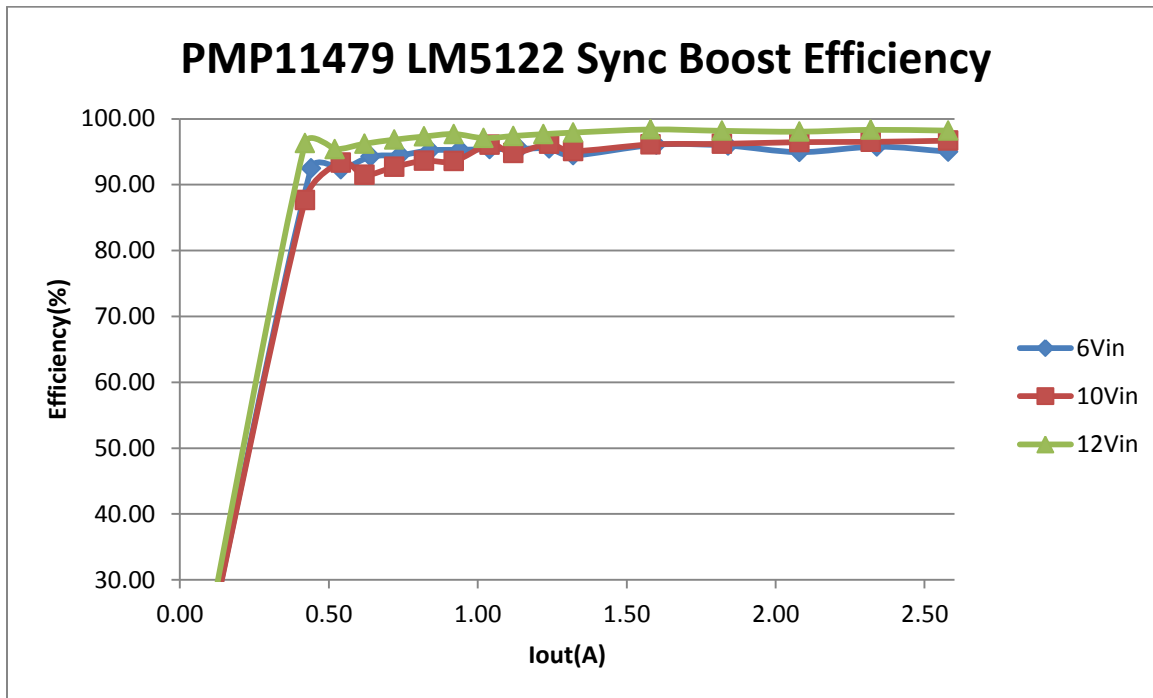
Top Thermal image reaches equilibrium at 10Vin, 2.5A load.



Bottom Thermal image reaches equilibrium at 10Vin, 2.5A load.

## 5. Efficiency

### 5.1 Efficiency Chart



### 5.2 Efficiency Data

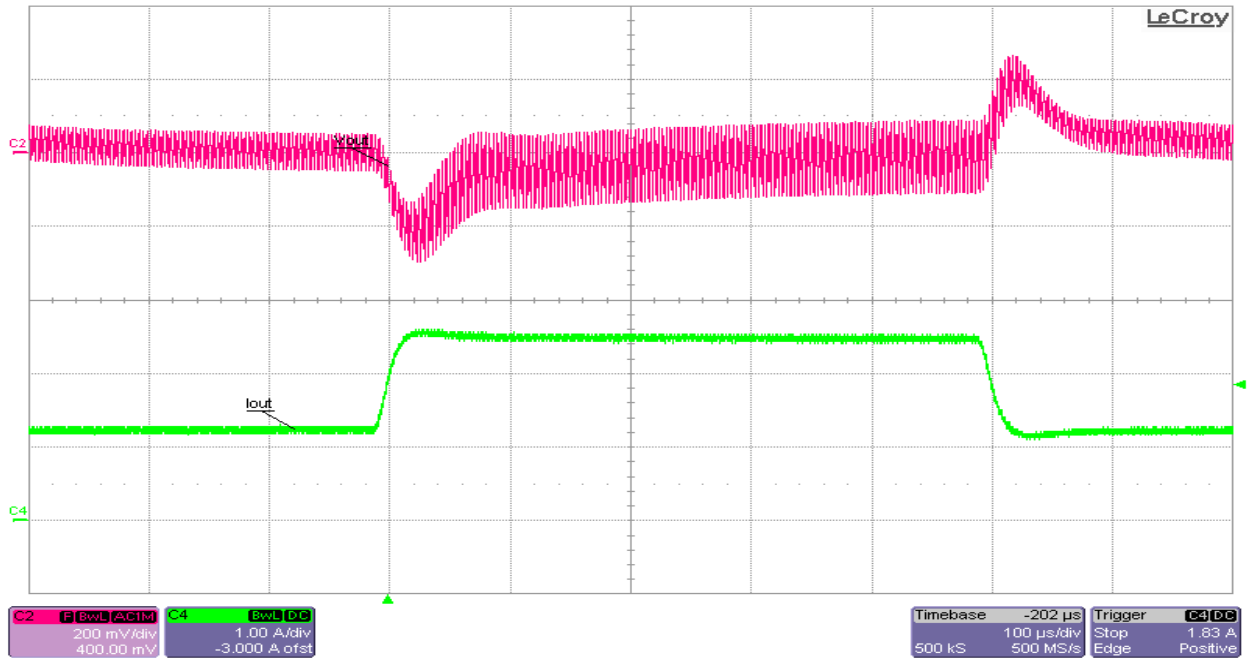
| Vin(V) | Iin(A) | Pin(W) | Vout(V) | Iout(A) | Pout(W) | Losses(W) | Efficiency(%) |
|--------|--------|--------|---------|---------|---------|-----------|---------------|
| 6.00   | 0.04   | 0.24   | 12.11   | 0.00    | 0.00    | 0.24      | 0.00          |
| 6.00   | 0.96   | 5.76   | 12.11   | 0.44    | 5.33    | 0.43      | 92.48         |
| 6.00   | 1.18   | 7.08   | 12.11   | 0.54    | 6.54    | 0.54      | 92.33         |
| 6.00   | 1.37   | 8.22   | 12.11   | 0.64    | 7.75    | 0.47      | 94.26         |
| 6.00   | 1.58   | 9.48   | 12.11   | 0.74    | 8.96    | 0.52      | 94.50         |
| 6.00   | 1.78   | 10.68  | 12.11   | 0.84    | 10.17   | 0.51      | 95.22         |
| 6.00   | 1.99   | 11.94  | 12.11   | 0.94    | 11.38   | 0.56      | 95.31         |
| 6.00   | 2.20   | 13.20  | 12.11   | 1.04    | 12.59   | 0.61      | 95.38         |
| 6.00   | 2.41   | 14.46  | 12.11   | 1.14    | 13.80   | 0.66      | 95.44         |
| 6.00   | 2.62   | 15.72  | 12.11   | 1.24    | 15.01   | 0.71      | 95.49         |
| 6.00   | 2.82   | 16.92  | 12.11   | 1.32    | 15.98   | 0.94      | 94.44         |
| 6.00   | 3.36   | 20.16  | 12.11   | 1.60    | 19.37   | 0.79      | 96.08         |
| 6.00   | 3.87   | 23.22  | 12.11   | 1.84    | 22.28   | 0.94      | 95.93         |
| 6.00   | 4.42   | 26.52  | 12.11   | 2.08    | 25.18   | 1.34      | 94.95         |
| 6.00   | 4.93   | 29.58  | 12.11   | 2.34    | 28.33   | 1.25      | 95.78         |
| 6.00   | 5.48   | 32.87  | 12.11   | 2.58    | 31.24   | 1.64      | 95.02         |
| 6.00   | 5.99   | 35.93  | 12.11   | 2.82    | 34.14   | 1.79      | 95.01         |
| 6.00   | 6.56   | 39.35  | 12.11   | 3.08    | 37.29   | 2.06      | 94.76         |

|       |      |       |       |      |       |      |       |
|-------|------|-------|-------|------|-------|------|-------|
| 6.00  | 7.07 | 42.41 | 12.11 | 3.32 | 40.20 | 2.22 | 94.77 |
| 10.01 | 0.04 | 0.40  | 12.11 | 0.00 | 0.00  | 0.40 | 0.00  |
| 10.01 | 0.58 | 5.80  | 12.11 | 0.42 | 5.09  | 0.72 | 87.65 |
| 10.01 | 0.70 | 7.00  | 12.11 | 0.54 | 6.54  | 0.46 | 93.36 |
| 10.01 | 0.82 | 8.20  | 12.11 | 0.62 | 7.51  | 0.70 | 91.51 |
| 10.01 | 0.94 | 9.41  | 12.11 | 0.72 | 8.72  | 0.69 | 92.71 |
| 10.01 | 1.06 | 10.61 | 12.11 | 0.82 | 9.93  | 0.68 | 93.63 |
| 10.01 | 1.19 | 11.91 | 12.11 | 0.92 | 11.14 | 0.77 | 93.58 |
| 10.01 | 1.31 | 13.11 | 12.11 | 1.04 | 12.60 | 0.51 | 96.09 |
| 10.01 | 1.43 | 14.31 | 12.11 | 1.12 | 13.56 | 0.74 | 94.81 |
| 10.01 | 1.56 | 15.61 | 12.11 | 1.24 | 15.02 | 0.59 | 96.21 |
| 10.01 | 1.68 | 16.81 | 12.11 | 1.32 | 15.99 | 0.82 | 95.10 |
| 10.01 | 1.99 | 19.91 | 12.11 | 1.58 | 19.14 | 0.77 | 96.11 |
| 10.01 | 2.29 | 22.91 | 12.11 | 1.82 | 22.04 | 0.87 | 96.21 |
| 10.01 | 2.61 | 26.11 | 12.11 | 2.08 | 25.19 | 0.92 | 96.47 |
| 10.01 | 2.91 | 29.11 | 12.11 | 2.32 | 28.10 | 1.02 | 96.51 |
| 10.01 | 3.23 | 32.32 | 12.11 | 2.58 | 31.25 | 1.07 | 96.69 |
| 10.01 | 3.52 | 35.22 | 12.11 | 2.82 | 34.15 | 1.06 | 96.98 |
| 10.01 | 3.85 | 38.52 | 12.11 | 3.08 | 37.30 | 1.22 | 96.84 |
| 10.01 | 4.15 | 41.52 | 12.11 | 3.32 | 40.21 | 1.31 | 96.84 |
|       |      |       |       |      |       |      |       |
| 12.01 | 0.01 | 0.12  | 12.11 | 0.00 | 0.00  | 0.12 | 0.00  |
| 12.01 | 0.44 | 5.28  | 12.11 | 0.42 | 5.09  | 0.20 | 96.30 |
| 12.01 | 0.55 | 6.60  | 12.11 | 0.52 | 6.30  | 0.31 | 95.38 |
| 12.01 | 0.65 | 7.80  | 12.11 | 0.62 | 7.51  | 0.29 | 96.23 |
| 12.01 | 0.75 | 9.00  | 12.11 | 0.72 | 8.72  | 0.28 | 96.84 |
| 12.01 | 0.85 | 10.20 | 12.11 | 0.82 | 9.93  | 0.27 | 97.32 |
| 12.01 | 0.95 | 11.40 | 12.11 | 0.92 | 11.14 | 0.26 | 97.70 |
| 12.01 | 1.06 | 12.73 | 12.11 | 1.02 | 12.35 | 0.37 | 97.08 |
| 12.01 | 1.16 | 13.93 | 12.11 | 1.12 | 13.56 | 0.36 | 97.40 |
| 12.01 | 1.26 | 15.13 | 12.11 | 1.22 | 14.78 | 0.35 | 97.68 |
| 12.01 | 1.36 | 16.33 | 12.11 | 1.32 | 15.99 | 0.34 | 97.92 |
| 12.01 | 1.62 | 19.45 | 12.11 | 1.58 | 19.14 | 0.31 | 98.39 |
| 12.01 | 1.87 | 22.45 | 12.11 | 1.82 | 22.04 | 0.41 | 98.19 |
| 12.01 | 2.14 | 25.69 | 12.11 | 2.08 | 25.19 | 0.50 | 98.05 |
| 12.01 | 2.38 | 28.57 | 12.11 | 2.32 | 28.10 | 0.47 | 98.34 |
| 12.01 | 2.65 | 31.81 | 12.11 | 2.58 | 31.25 | 0.57 | 98.22 |
| 12.01 | 2.90 | 34.81 | 12.11 | 2.82 | 34.15 | 0.66 | 98.10 |
| 12.01 | 3.16 | 37.94 | 12.11 | 3.08 | 37.30 | 0.63 | 98.33 |
| 12.01 | 3.41 | 40.94 | 12.11 | 3.32 | 40.21 | 0.73 | 98.22 |

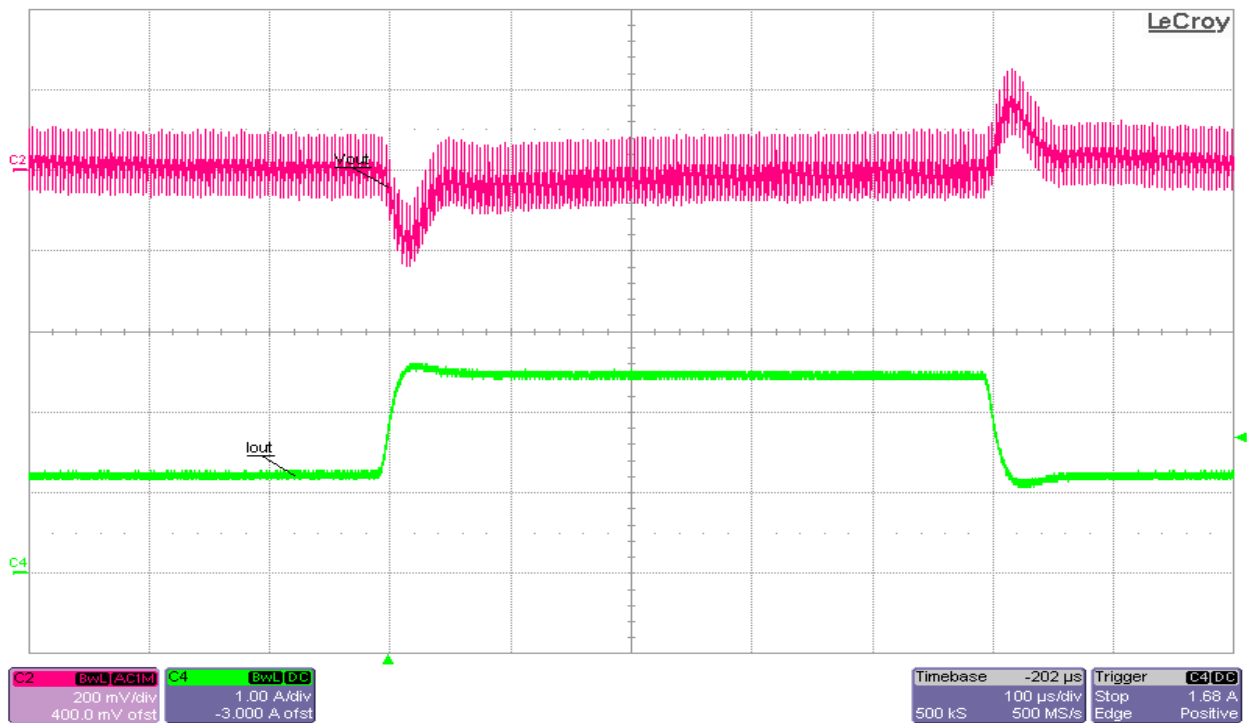


## 6 Waveforms

### 6.1 Load Transient Response

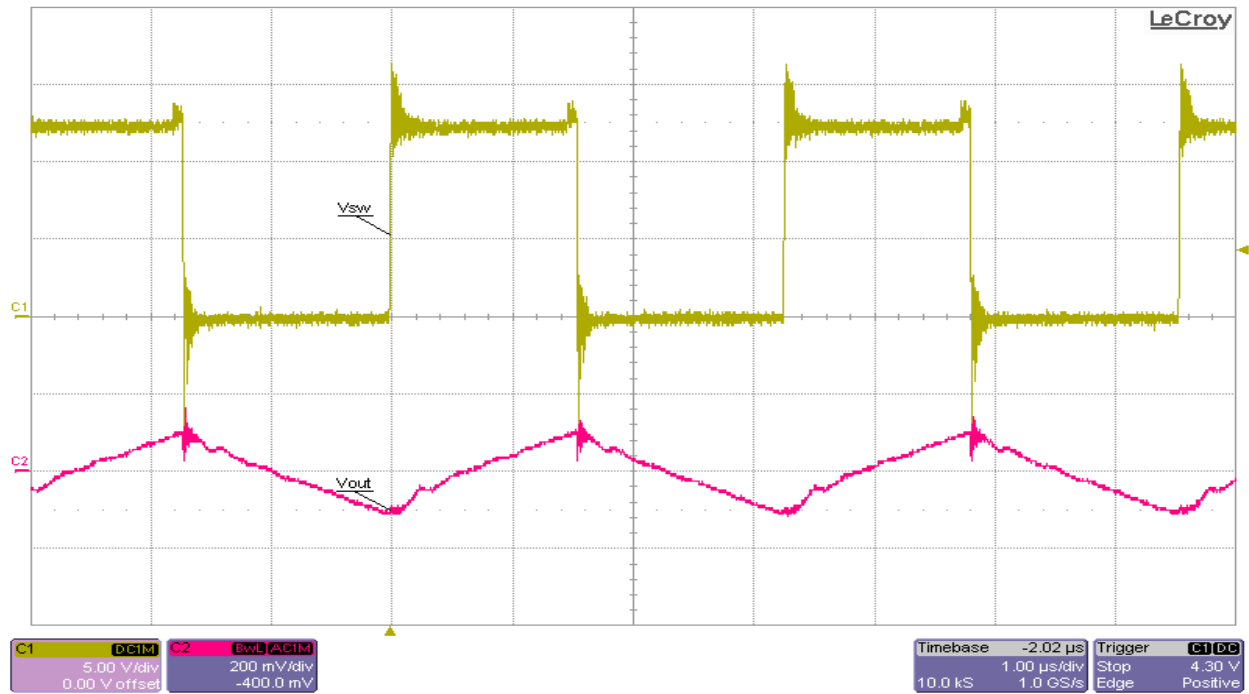


Load Transient Response at 6Vin and 1.25A-to-2.5A Load Step, Ch2 – Vout (AC coupled), Ch4- Iout.

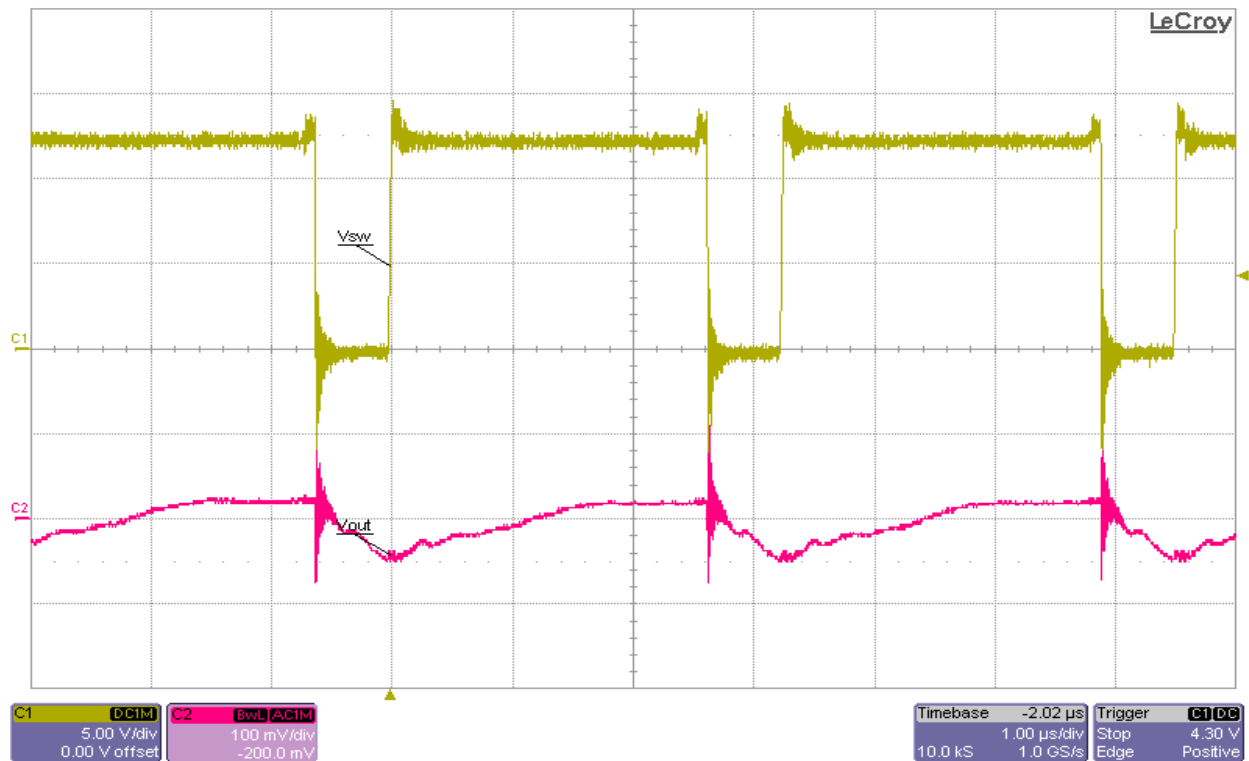


Load Transient Response at 10Vin and 1.25A-to-2.5A Load Step, Ch2 – Vout (AC coupled), Ch4- Iout.

## 6.2 Switch Node Voltage and Output Ripple

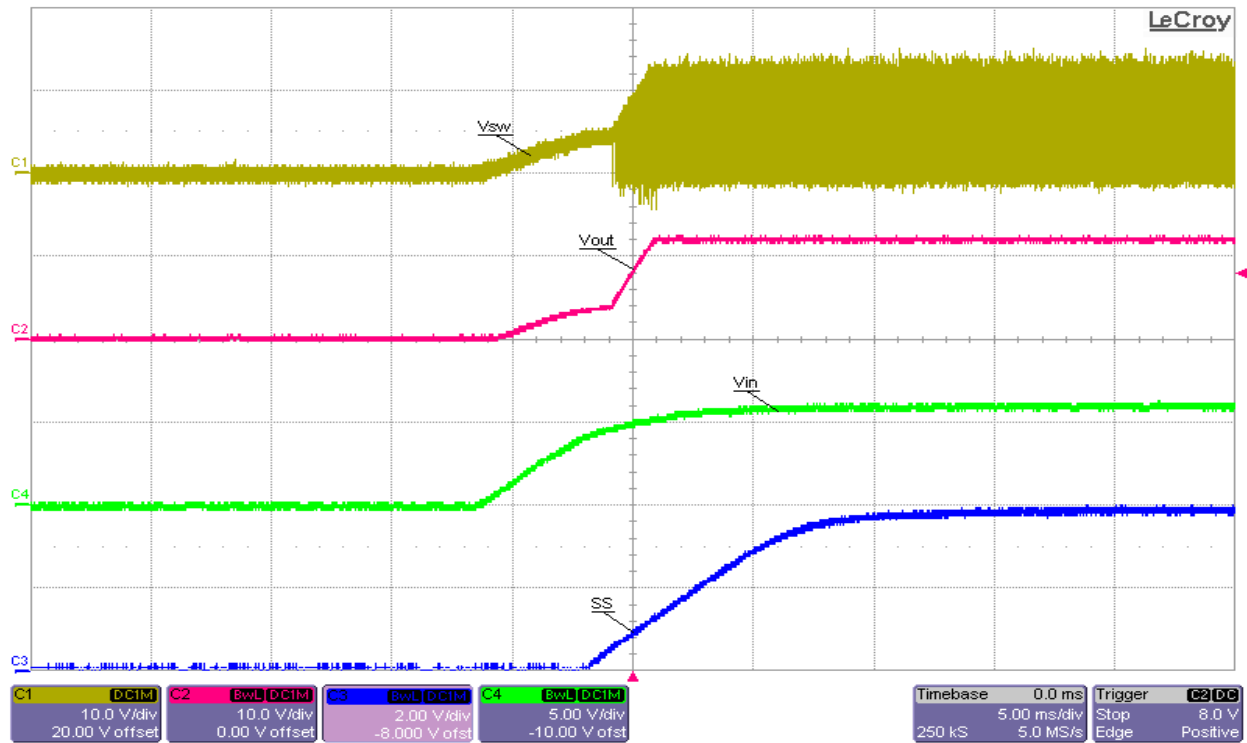


Switch Node Voltage of 6Vin and Full Load. Ch2-Vout (AC Coupled), Ch1-SW.

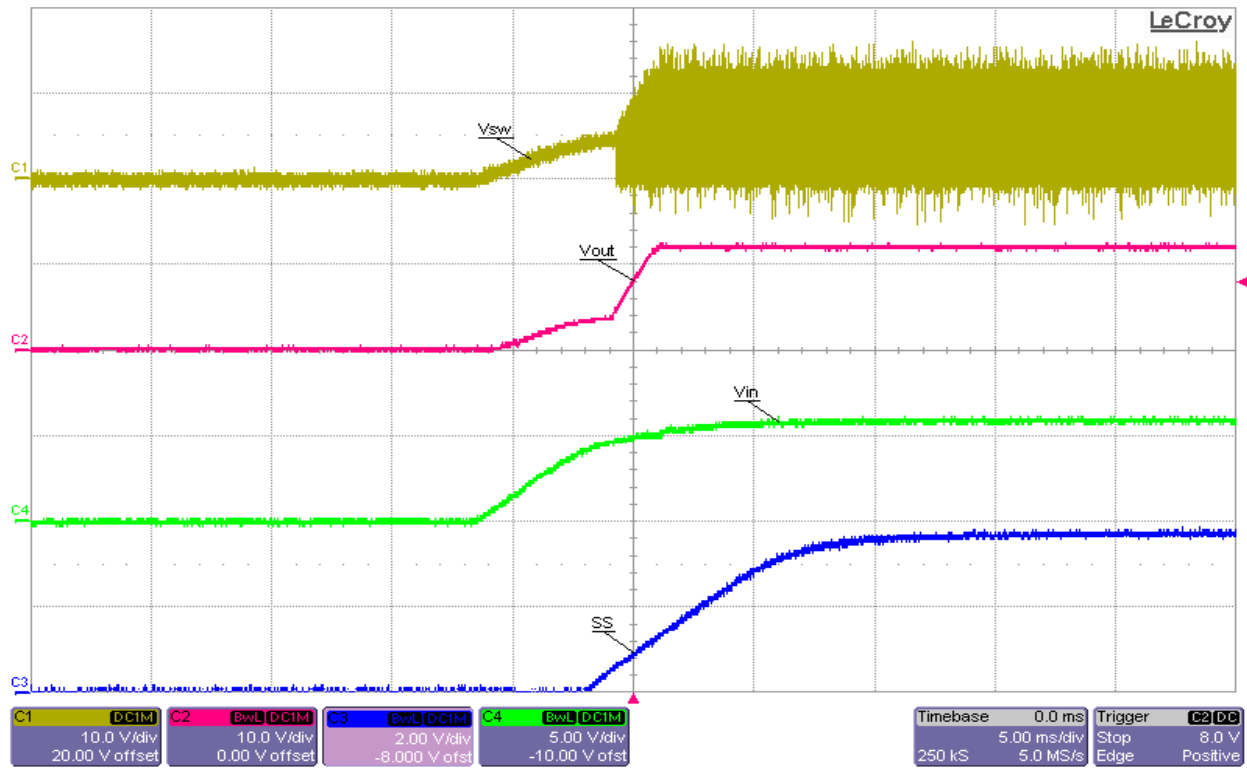


Switch Node Voltage of 10Vin and Full Load. Ch2-Vout (AC Coupled), Ch1-SW.

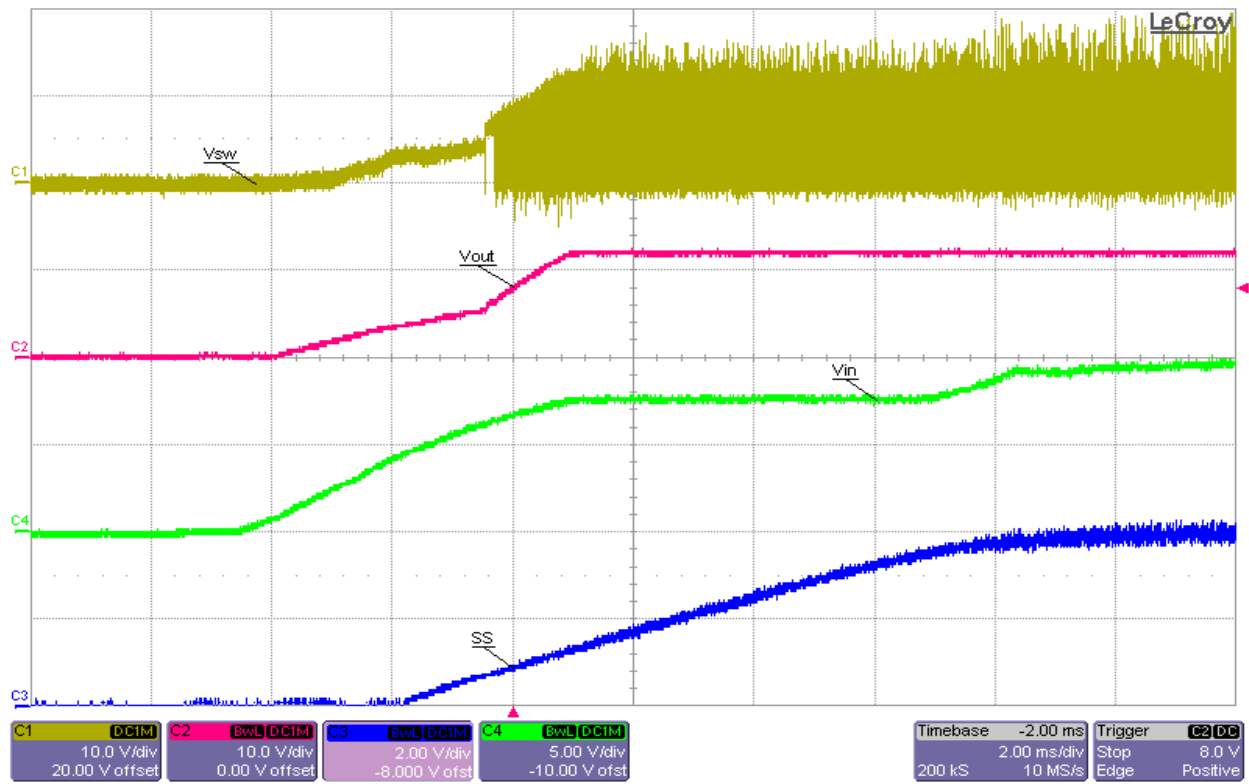
### 6.3 Start Up



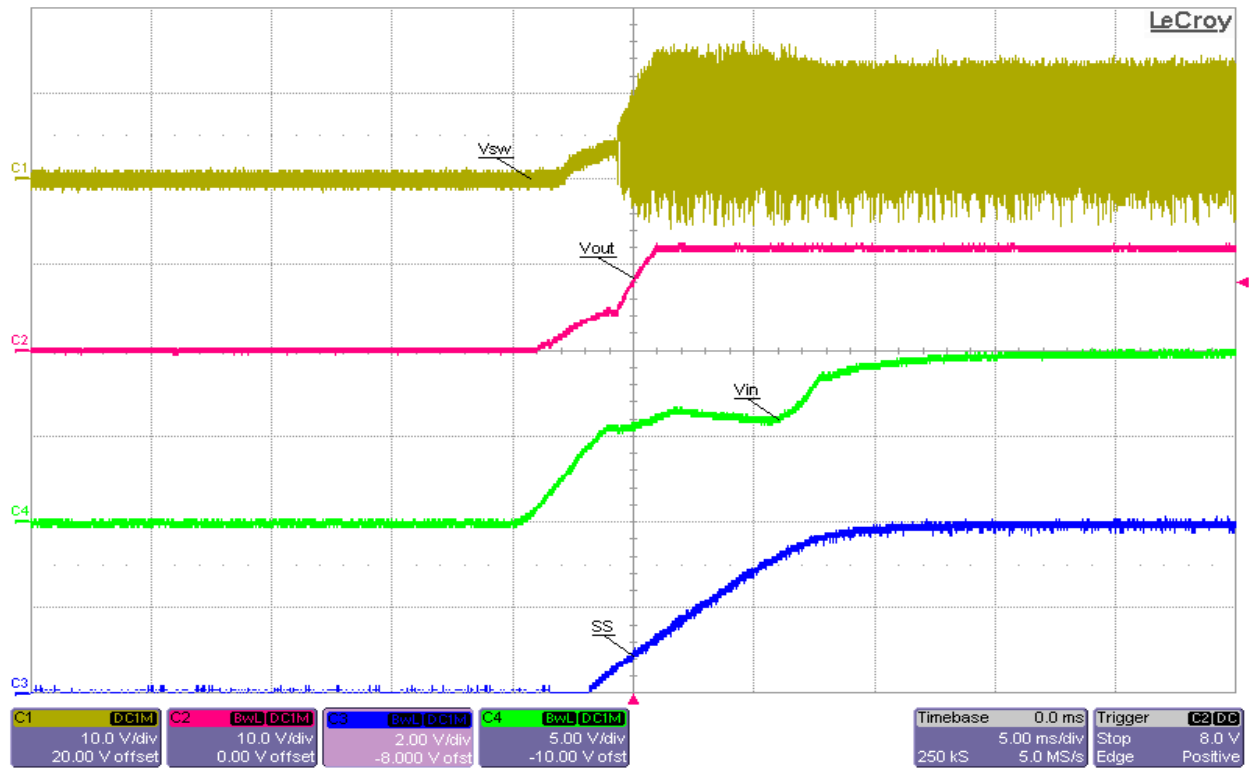
Start-up from 6Vin and No Load. Ch2-Vout, Ch1-SW Ch3-SS, Ch4-Vin.



Start-up from 6Vin and Full Load. Ch2-Vout, Ch1-SW Ch3-SS, Ch4-Vin.

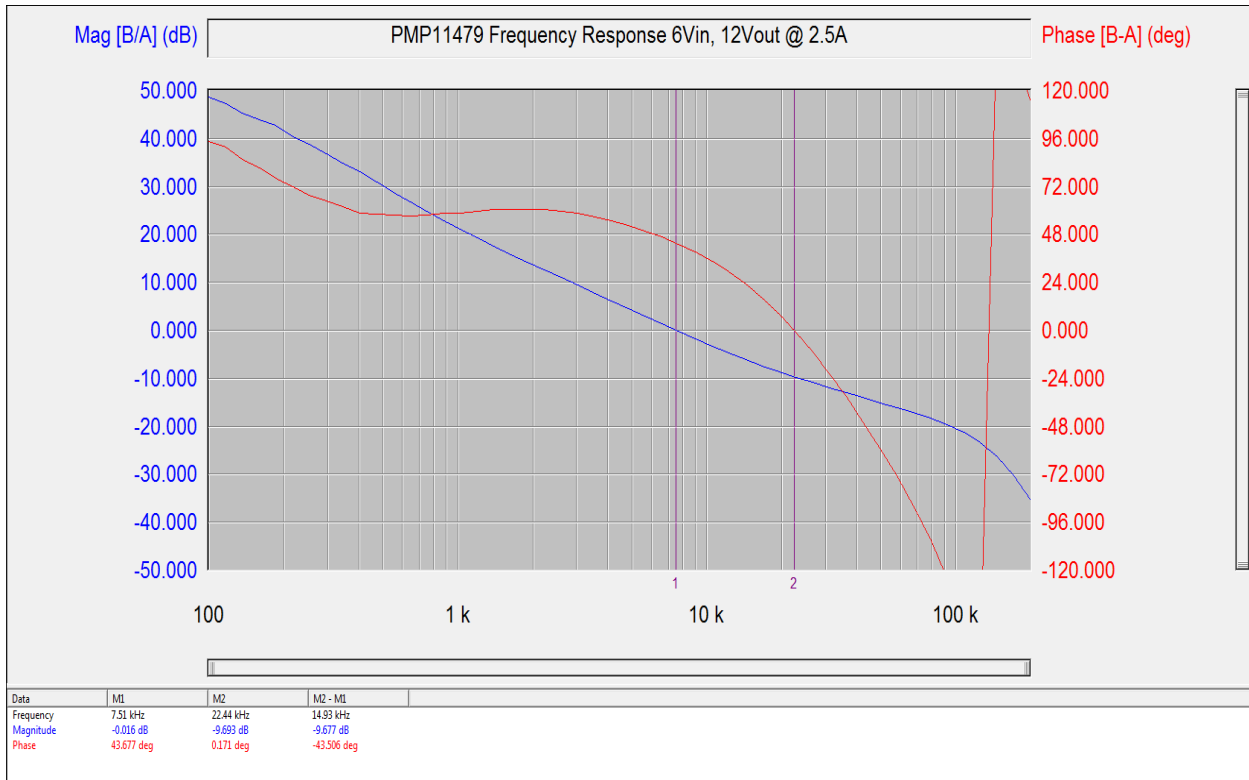


Start-up from 10Vin and No Load. Ch2-Vout, Ch1-SW Ch3-SS, Ch4-Vin.

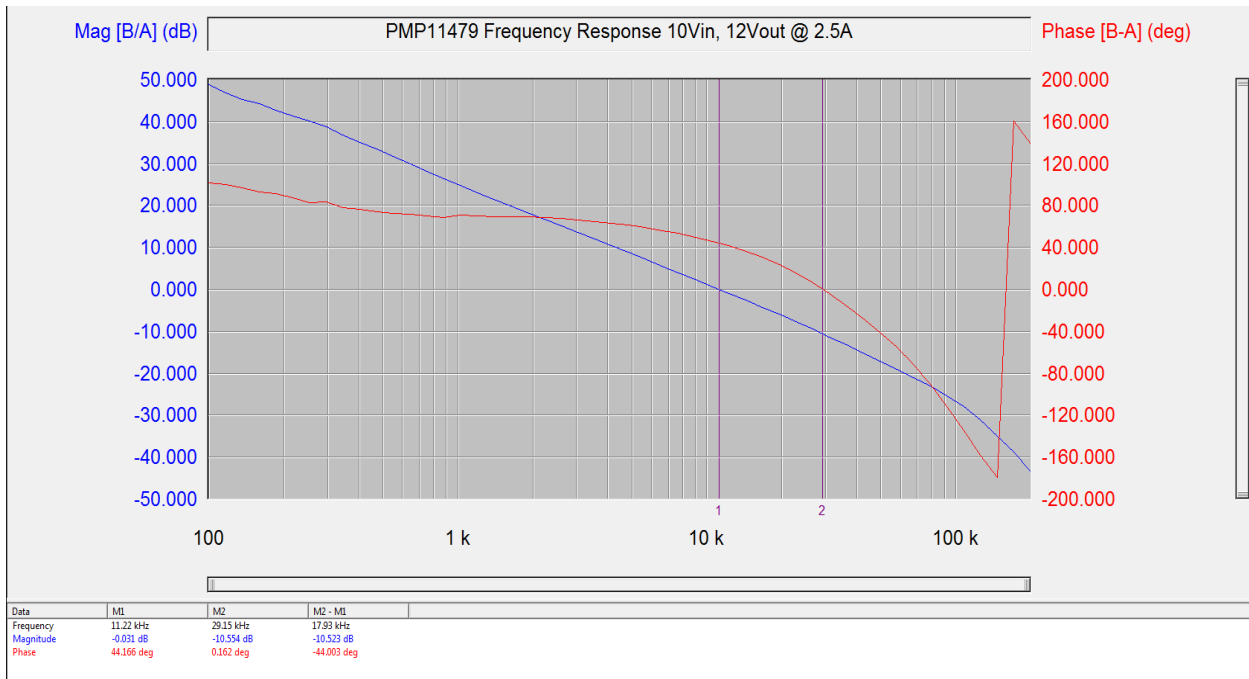


Start-up from 10Vin and Full Load. Ch2-Vout, Ch1-SW Ch3-SS, Ch4-Vin.

## 6.4 Frequency Analysis

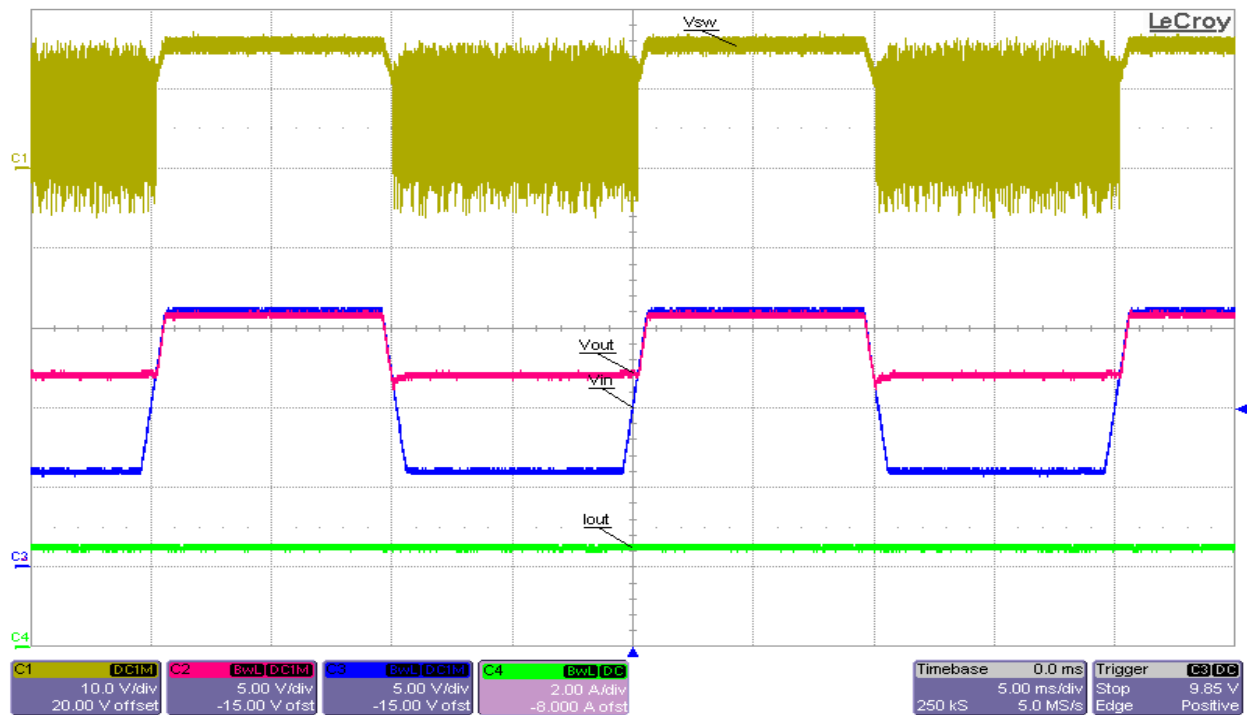


**Control Loop Analysis at 6Vin 2.5A Full Load, Phase Margin of 44 deg, Gain Margin of 10dB.**

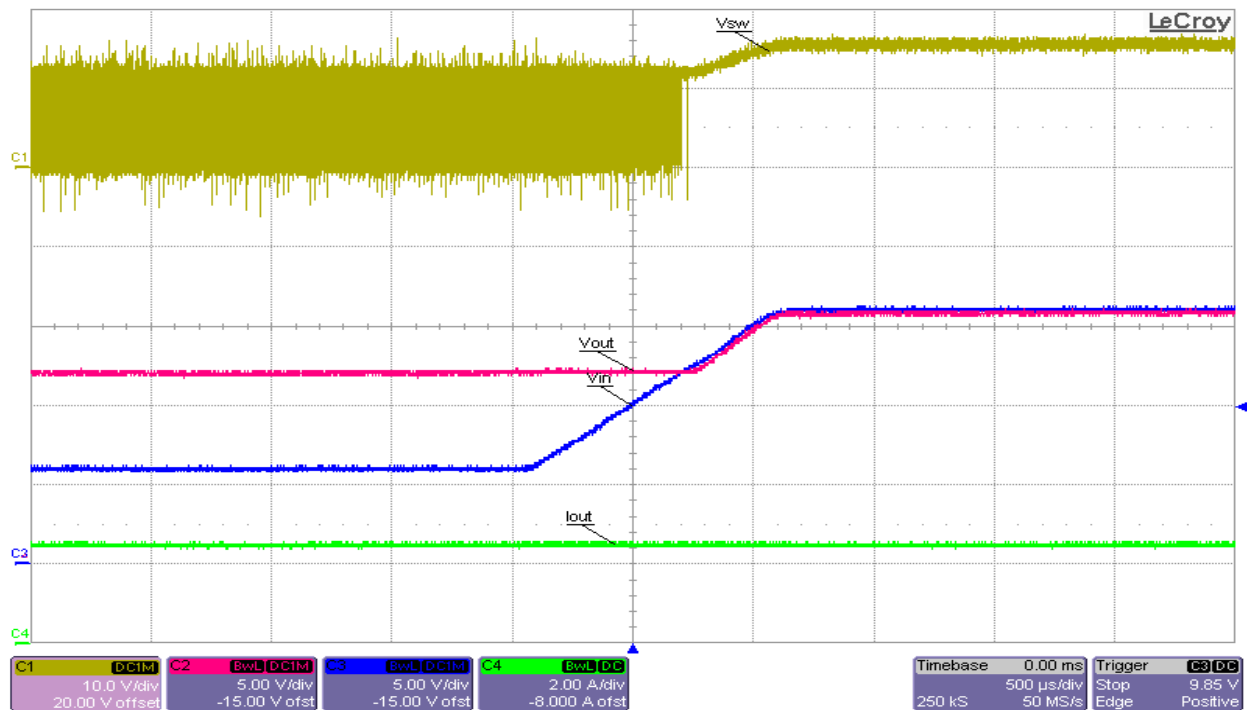


**Control Loop Analysis at 10Vin 2.5A Full Load, Phase Margin of 44 deg, Gain Margin of 10.5dB.**

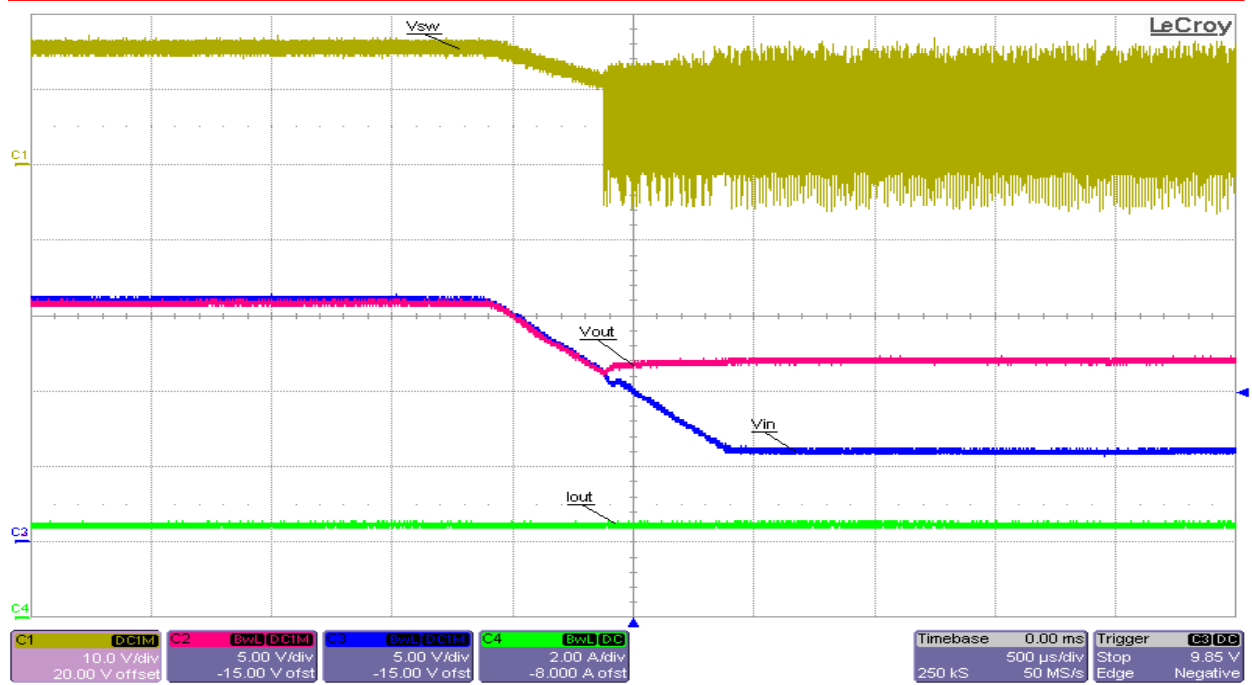
## 6.5 By-Pass Feature



2.5A Load Bypass operation, Vin steps from 6V to 16V, Ch1 – Vsw, Ch2 – Vout, Ch3 – Vin, Ch4 - Iout.



2.5A Load Bypass operation Rising Edge, Vin steps from 6V to 16V, Ch1 – Vsw, Ch2 – Vout, Ch3 – Vin, Ch4 - Iout.



2.5A Load Bypass operation Falling Edge, Vin steps from 6V to 16V, Ch1 – Vsw, Ch2 – Vout, Ch3 – Vin, Ch4 - Iout.

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