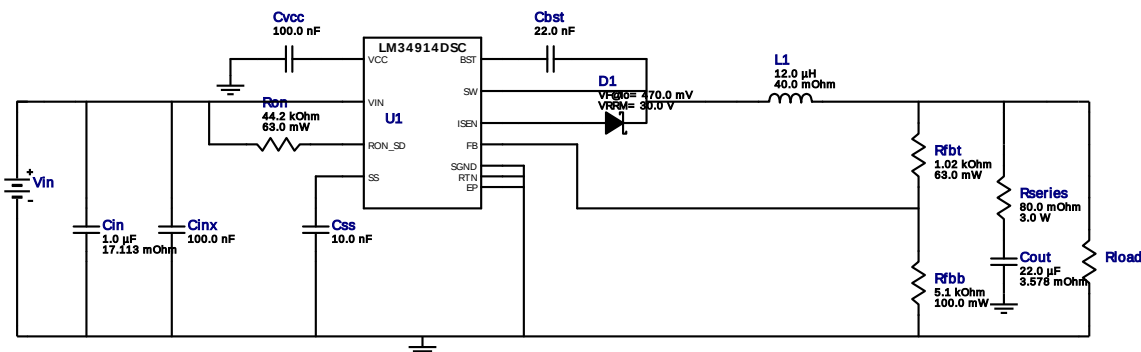


## WEBENCH® Design Report

Design : 4728729/23 LM34914SD/NOPB  
LM34914SD/NOPB 10.0V-19.0V to 3.00V @ 1.0A

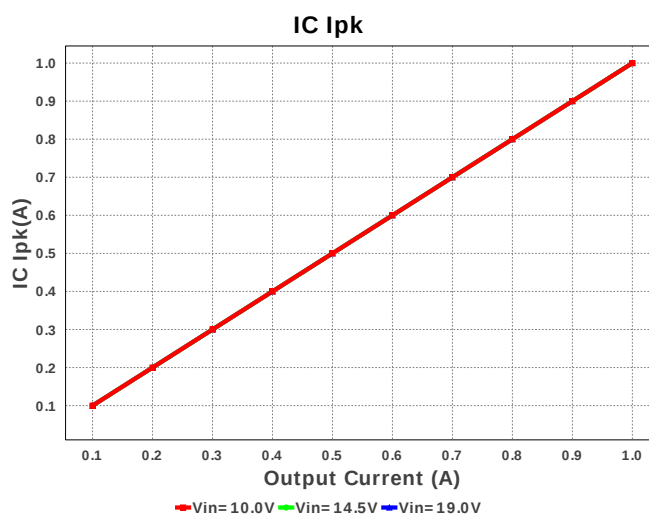
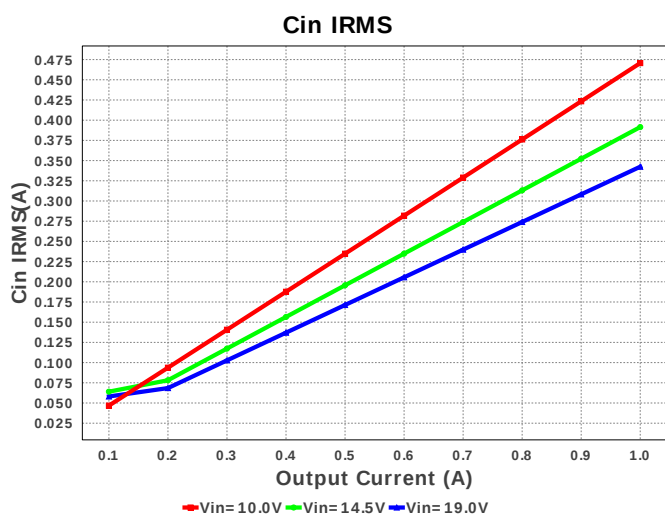
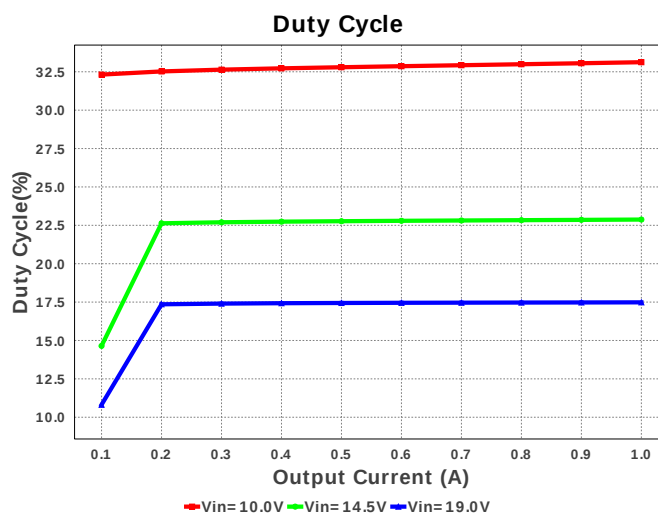
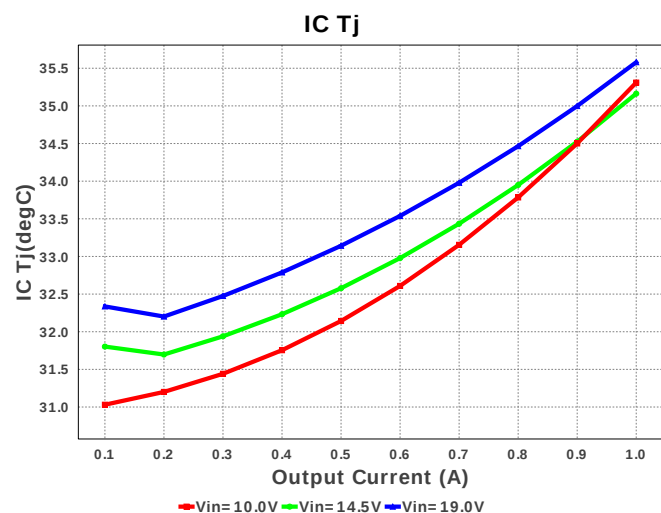
Vout = 3.0V  
Iout = 1.0A

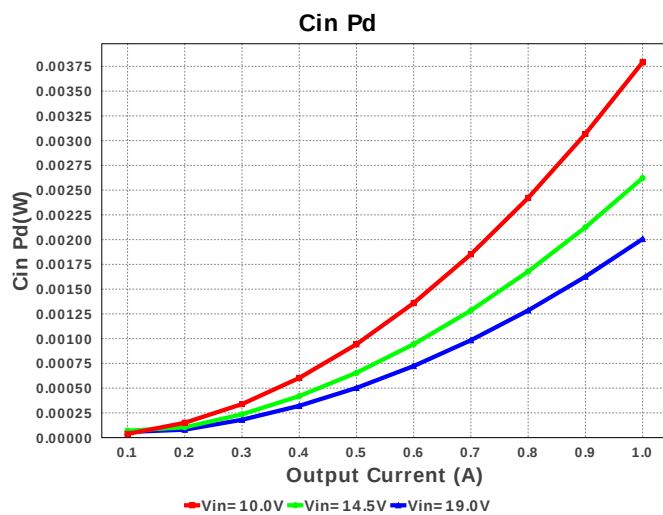
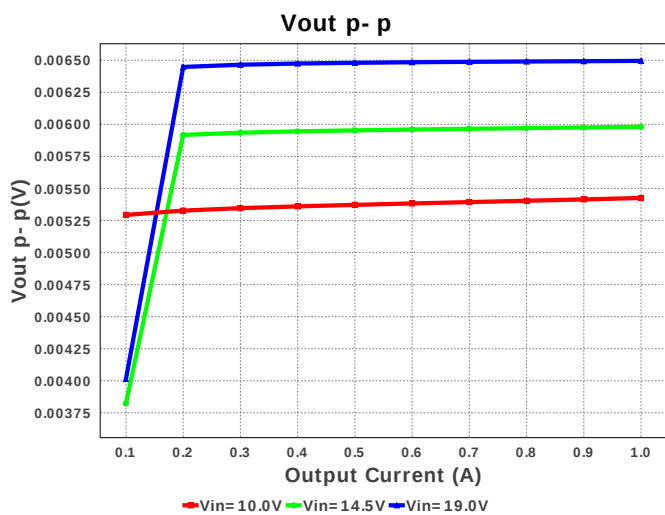
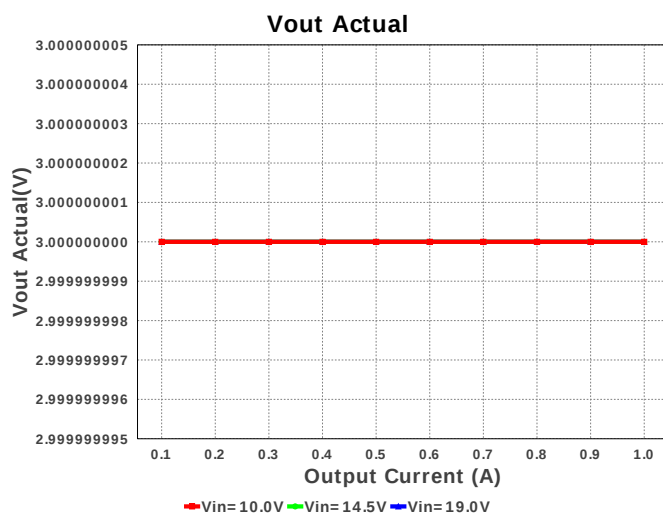
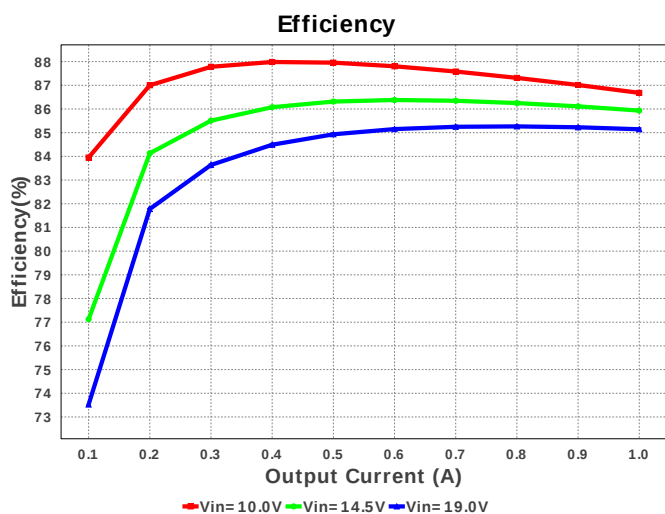
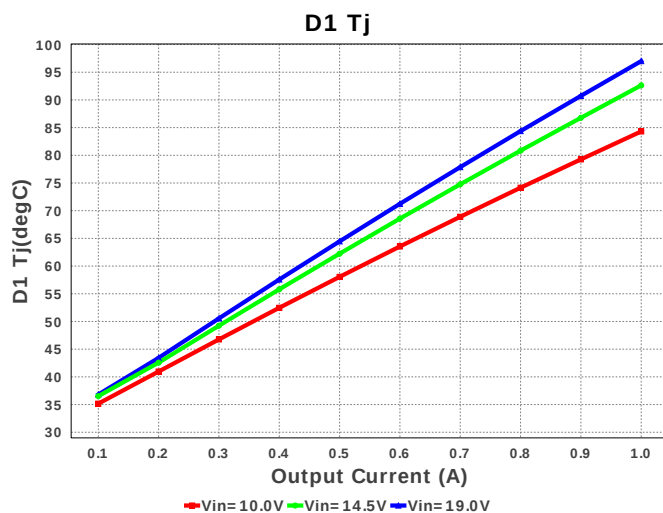
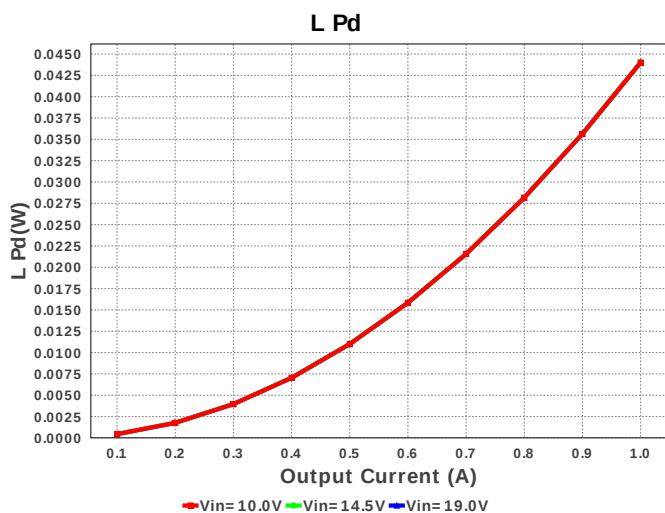


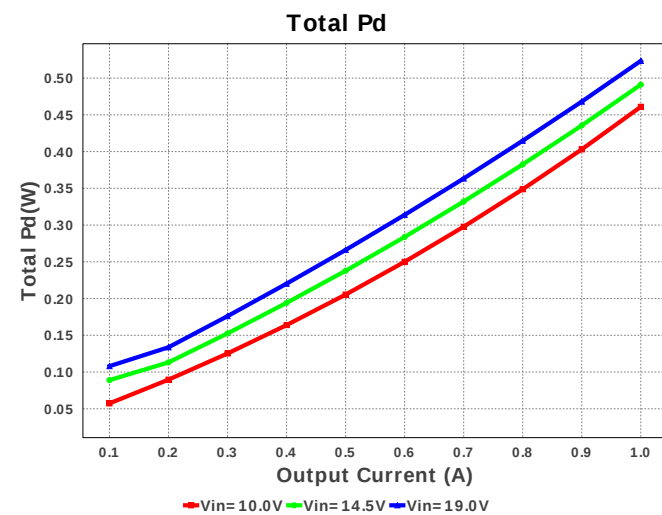
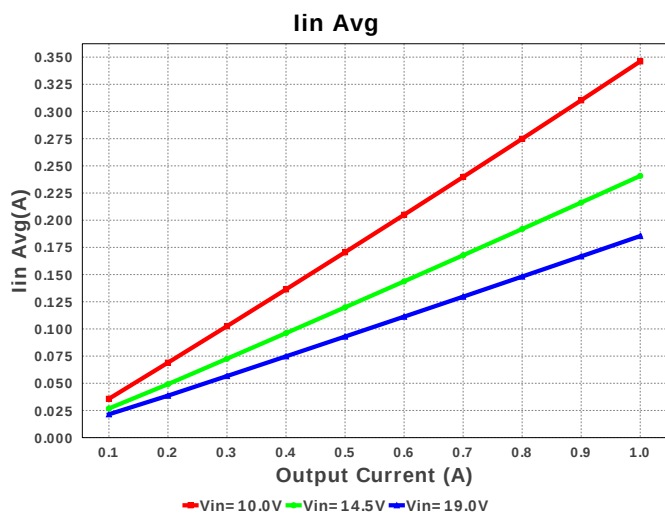
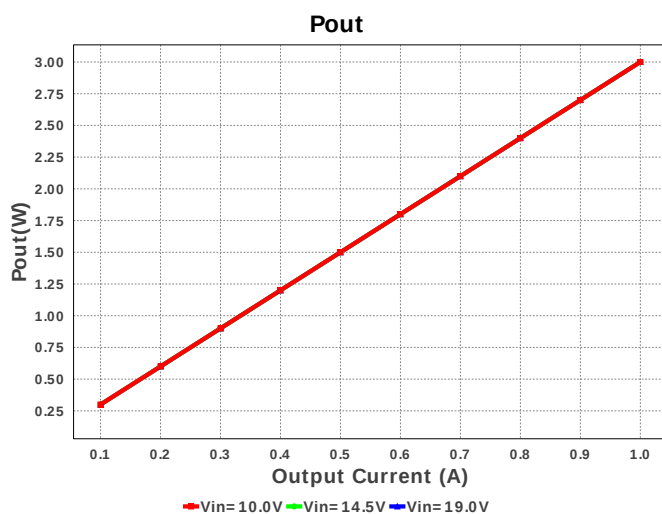
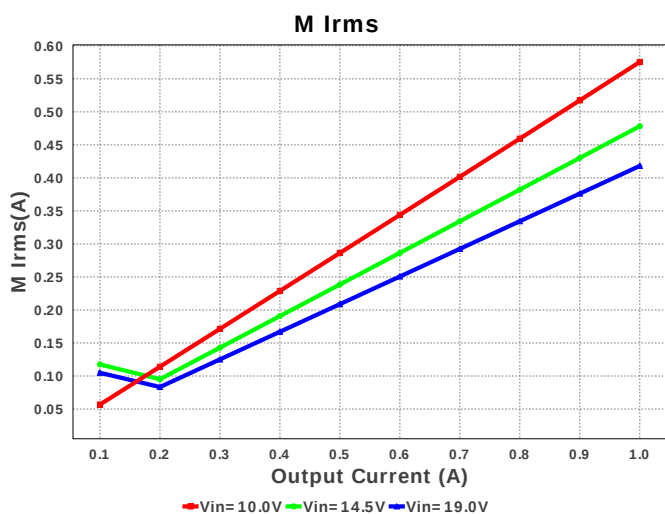
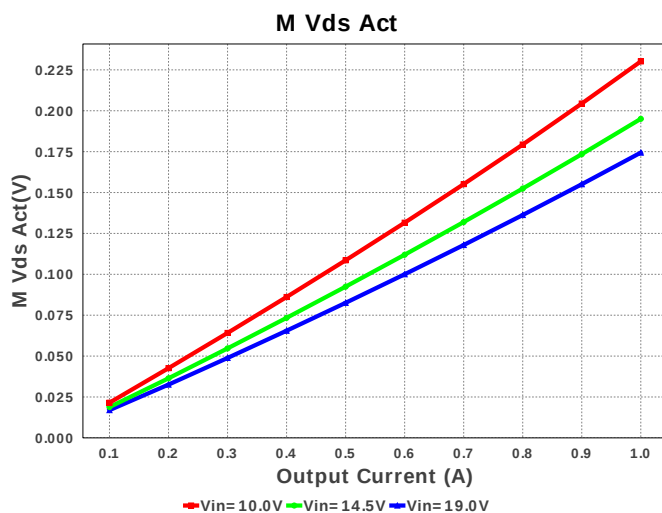
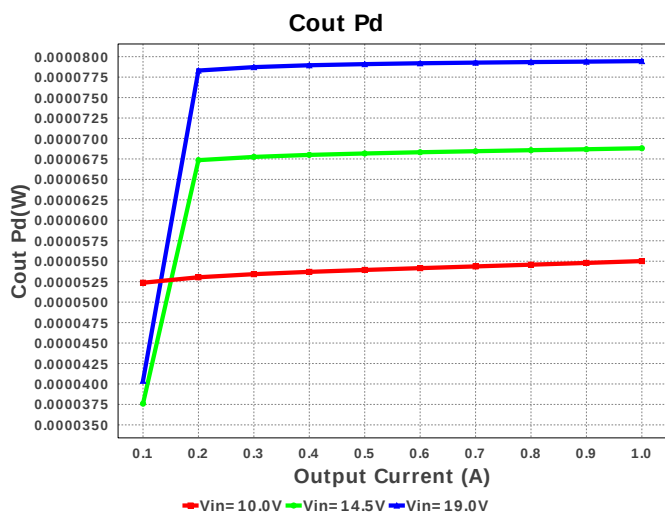
## Electrical BOM

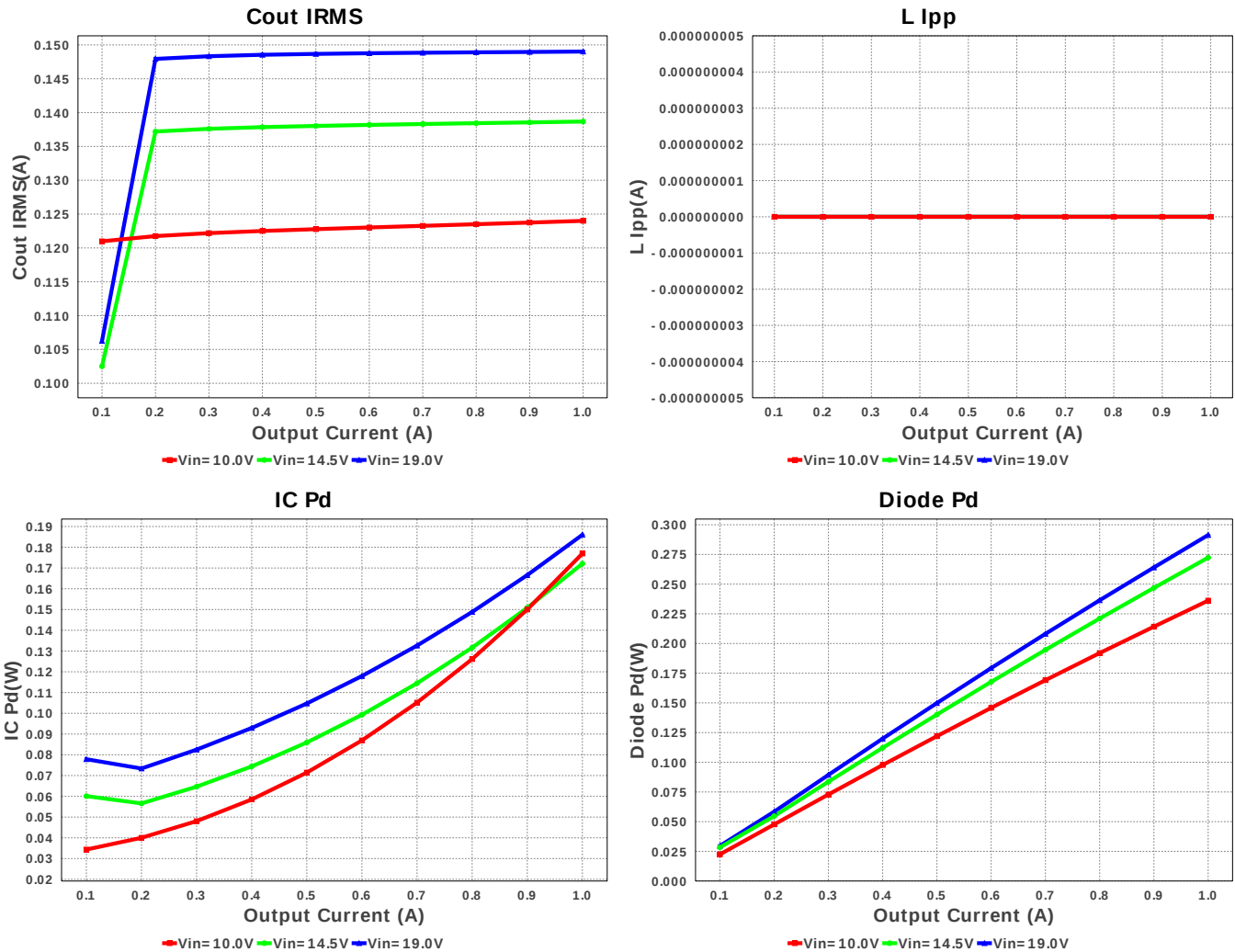
| #   | Name    | Manufacturer     | Part Number                           | Properties                                                        | Qty | Price  | Footprint                   |
|-----|---------|------------------|---------------------------------------|-------------------------------------------------------------------|-----|--------|-----------------------------|
| 1.  | Cbst    | MuRata           | GRM033C80J223KE01D<br>Series= X6S     | Cap= 22.0 nF<br>VDC= 6.3 V<br>IRMS= 0.0 A                         | 1   | \$0.01 | 0201 2 mm <sup>2</sup>      |
| 2.  | Cin     | MuRata           | GRM188R61E105KA12D<br>Series= X5R     | Cap= 1.0 uF<br>ESR= 17.113 mOhm<br>VDC= 25.0 V<br>IRMS= 979.39 mA | 1   | \$0.01 | 0603 5 mm <sup>2</sup>      |
| 3.  | Cinx    | MuRata           | GRM21BR71E104KA01L<br>Series= X7R     | Cap= 100.0 nF<br>VDC= 25.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |
| 4.  | Cout    | MuRata           | GRM21BC80G226ME39L<br>Series= X6S     | Cap= 22.0 uF<br>ESR= 3.578 mOhm<br>VDC= 4.0 V<br>IRMS= 3.29633 A  | 1   | \$0.04 | 0805 7 mm <sup>2</sup>      |
| 5.  | Css     | MuRata           | GRM155R61C103KA01D<br>Series= X5R     | Cap= 10.0 nF<br>VDC= 16.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | 0402 3 mm <sup>2</sup>      |
| 6.  | Cvcc    | MuRata           | GRM21BR71E104KA01L<br>Series= X7R     | Cap= 100.0 nF<br>VDC= 25.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |
| 7.  | D1      | ON Semiconductor | MBR130T1G                             | VF@Io= 470.0 mV<br>VRRM= 30.0 V                                   | 1   | \$0.09 | SOD-123 13 mm <sup>2</sup>  |
| 8.  | L1      | Coilcraft        | MSS7341T-123MLB                       | L= 12.0 uH<br>DCR= 40.0 mOhm                                      | 1   | \$0.50 | MSS7341T 83 mm <sup>2</sup> |
| 9.  | Rfbb    | Yageo America    | RC0603FR-075K1L<br>Series= ?          | Res= 5.1 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0%               | 1   | \$0.01 | 0603 5 mm <sup>2</sup>      |
| 10. | Rfbt    | Vishay-Dale      | CRCW04021K02FKED<br>Series= CRCW...e3 | Res= 1.02 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%               | 1   | \$0.01 | 0402 3 mm <sup>2</sup>      |
| 11. | Ron     | Vishay-Dale      | CRCW040244K2FKED<br>Series= CRCW...e3 | Res= 44.2 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%               | 1   | \$0.01 | 0402 3 mm <sup>2</sup>      |
| 12. | Rseries | Bourns           | CRA2512-FZ-R080ELF<br>Series= ?       | Res= 80.0 mOhm<br>Power= 3.0 W<br>Tolerance= 1.0%                 | 1   | \$0.17 | 2512 43 mm <sup>2</sup>     |

| #   | Name | Manufacturer      | Part Number    | Properties | Qty | Price  | Footprint                                                                                                       |
|-----|------|-------------------|----------------|------------|-----|--------|-----------------------------------------------------------------------------------------------------------------|
| 13. | U1   | Texas Instruments | LM34914SD/NOPB | Switcher   | 1   | \$1.35 |  DSC0010B 16 mm <sup>2</sup> |









## Operating Values

| #   | Name           | Value                 | Category | Description                                                                                |
|-----|----------------|-----------------------|----------|--------------------------------------------------------------------------------------------|
| 1.  | Cin IRMS       | 342.402 mA            | Current  | Input capacitor RMS ripple current                                                         |
| 2.  | Cout IRMS      | 149.021 mA            | Current  | Output capacitor RMS ripple current                                                        |
| 3.  | IC Ipk         | 1.231 A               | Current  | Peak switch current in IC                                                                  |
| 4.  | Iin Avg        | 185.44 mA             | Current  | Average input current                                                                      |
| 5.  | L Ipp          | 461.52 mA             | Current  | Peak-to-peak inductor ripple current                                                       |
| 6.  | M Irms         | 418.131 mA            | Current  | MOSFET RMS current                                                                         |
| 7.  | BOM Count      | 13                    | General  | Total Design BOM count                                                                     |
| 8.  | FootPrint      | 196.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                                                    |
| 9.  | Frequency      | 451.57 kHz            | General  | Switching frequency                                                                        |
| 10. | IC Tolerance   | 5.0 mV                | General  | IC Feedback Tolerance                                                                      |
| 11. | M Vds Act      | 174.403 mV            | General  | Voltage drop across the MosFET                                                             |
| 12. | Pout           | 3.0 W                 | General  | Total output power                                                                         |
| 13. | Total BOM      | \$2.23                | General  | Total BOM Cost                                                                             |
| 14. | D1 Tj          | 97.008 degC           | Op_Point | D1 junction temperature                                                                    |
| 15. | Vout Actual    | 3.0 V                 | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 16. | Vout OP        | 3.0 V                 | Op_Point | Operational Output Voltage                                                                 |
| 17. | Duty Cycle     | 17.483 %              | Op_point | Duty cycle                                                                                 |
| 18. | Efficiency     | 85.144 %              | Op_point | Steady state efficiency                                                                    |
| 19. | IC Tj          | 35.58 degC            | Op_point | IC junction temperature                                                                    |
| 20. | ICThetaJA      | 30.0 degC/W           | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 21. | IOUT_OP        | 1.0 A                 | Op_point | Iout operating point                                                                       |
| 22. | VIN_OP         | 19.0 V                | Op_point | Vin operating point                                                                        |
| 23. | Vout p-p       | 43.417 mV             | Op_point | Peak-to-peak output ripple voltage                                                         |
| 24. | Cin Pd         | 2.006 mW              | Power    | Input capacitor power dissipation                                                          |
| 25. | Cout Pd        | 79.457 μW             | Power    | Output capacitor power dissipation                                                         |
| 26. | Diode Pd       | 291.34 mW             | Power    | Diode power dissipation                                                                    |
| 27. | IC Pd          | 186.008 mW            | Power    | IC power dissipation                                                                       |
| 28. | L Pd           | 44.0 mW               | Power    | Inductor power dissipation                                                                 |
| 29. | Total Pd       | 523.43 mW             | Power    | Total Power Dissipation                                                                    |
| 30. | Vout Tolerance | 537.374 m%            |          | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |

## Design Inputs

| #  | Name    | Value   | Description                        |
|----|---------|---------|------------------------------------|
| 1. | Iout    | 1.0     | Maximum Output Current             |
| 2. | VinMax  | 19.0    | Maximum input voltage              |
| 3. | VinMin  | 10.0    | Minimum input voltage              |
| 4. | Vout    | 3.0     | Output Voltage                     |
| 5. | base_pn | LM34914 | Texas Instruments Base Part Number |
| 6. | source  | DC      | Input Source Type                  |
| 7. | ta      | 30.0    | Ambient temperature                |

## Design Assistance

1. For a Constant On Time device to be stable, we need to provide a ripple at the feedback comparator. There are various methods to implement the ripple. Depending on the circuit complexity vs. the allowable ripple, we have three options to choose from. The simplest option, 'Low Complexity', would require only a high ESR cap at the output. This means that the BOM count will be small, but the output voltage ripple will be quite large. The 'Optimal Solution' would require a feed-forward cap in parallel with the upper feedback resistor to AC couple the ripple to the feedback node. This increases the BOM count slightly, but now we have more control over the output voltage ripple. If the output voltage requirement is very tight, then the best option is to go for the 'Low Output Ripple' solution. In this option we can go with very low ESR output caps and have very good control over the output voltage ripple.

2. LM34914 Product Folder : <http://www.ti.com/product/LM34914> : contains the data sheet and other resources.

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**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

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