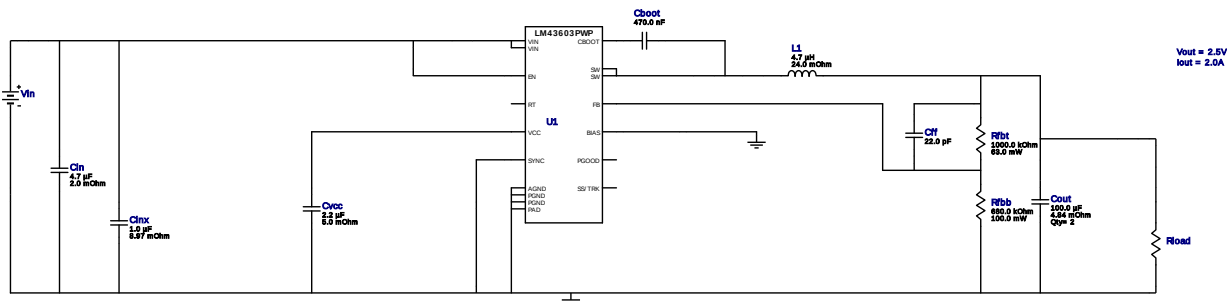


## WEBENCH® Design Report

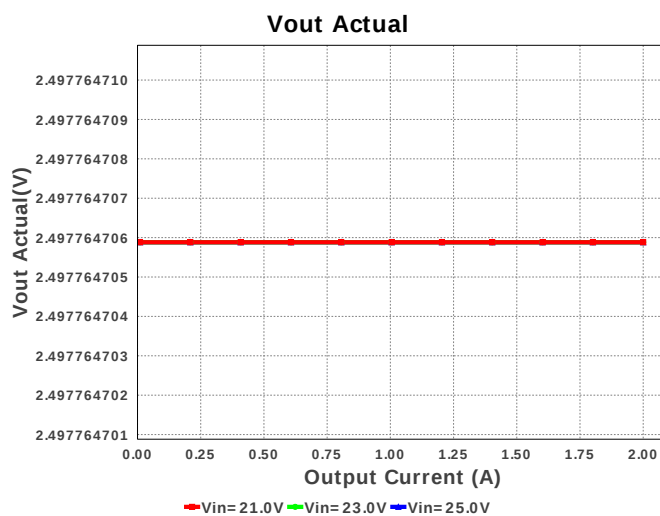
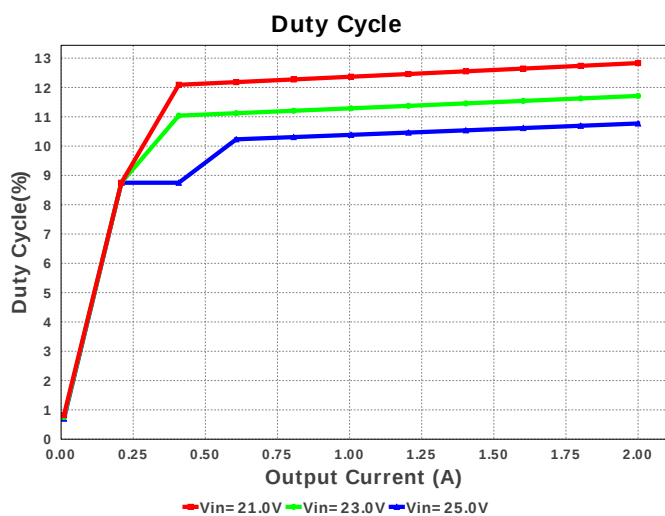
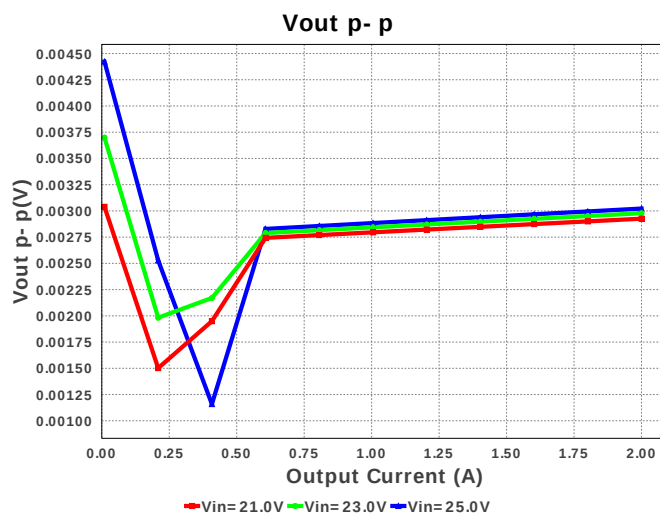
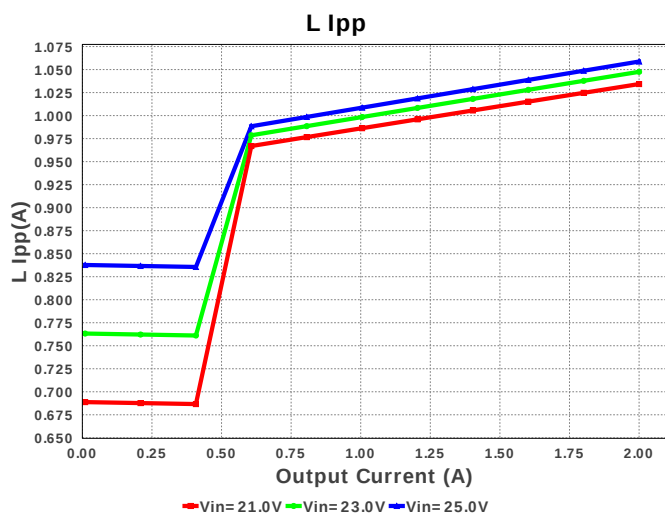
Design : 4742013/190 LM43603PWPR  
LM43603PWPR 21.0V-25.0V to 2.50V @ 2.0A


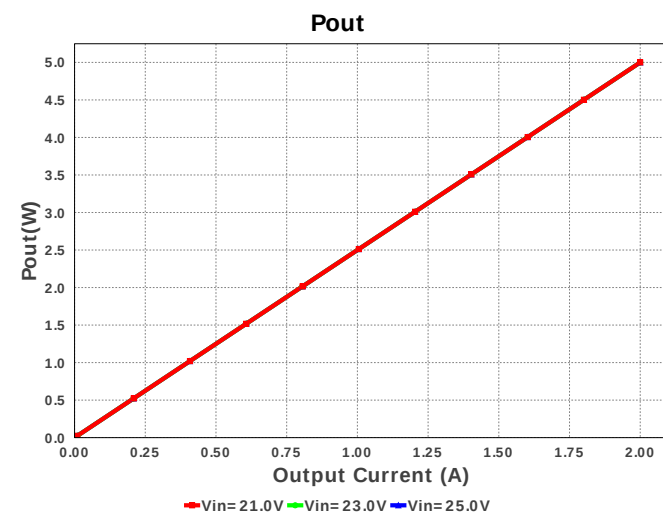
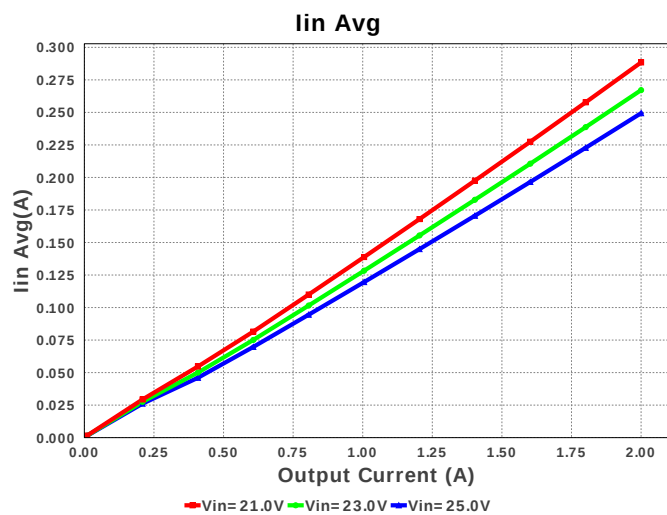
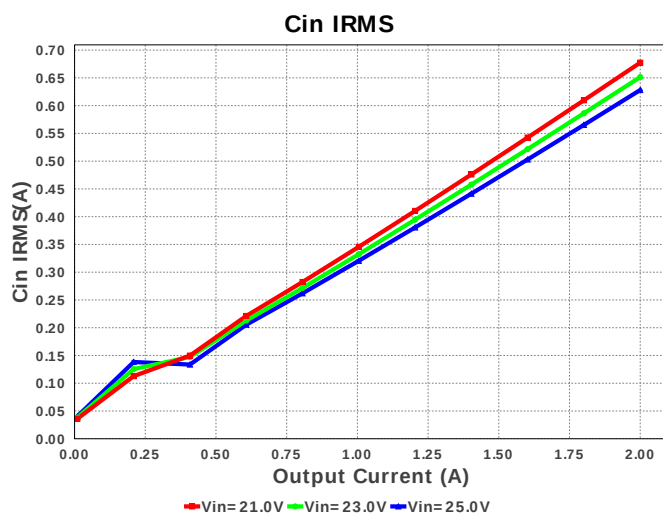
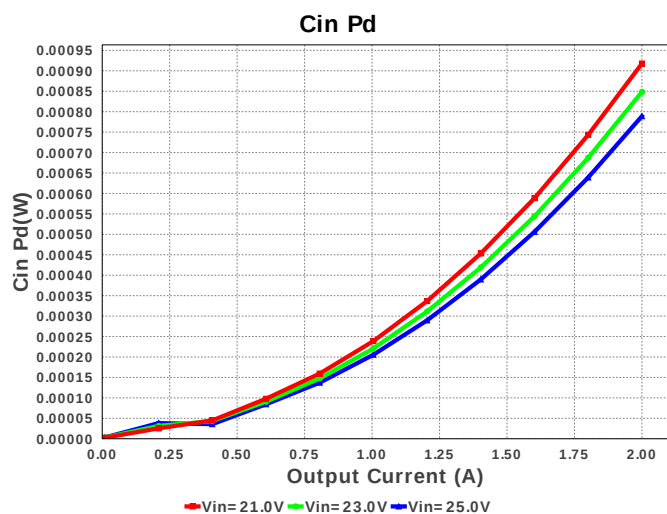
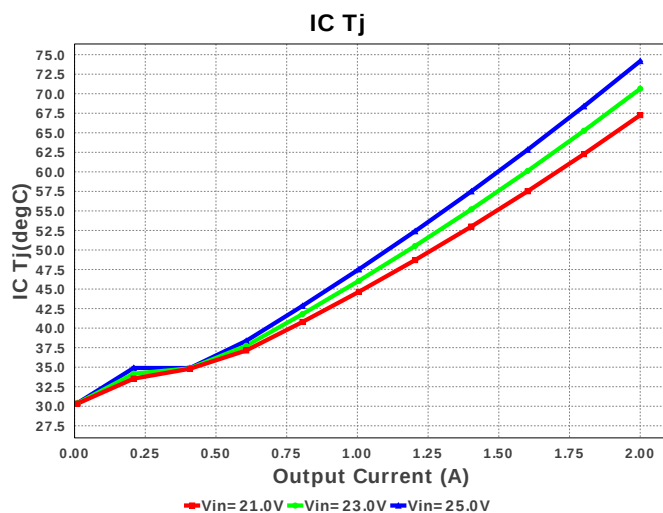
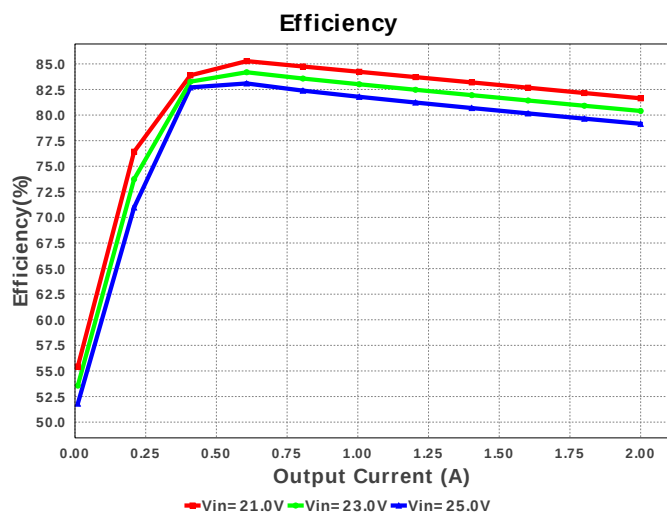
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating at a much lower voltage than the maximum input voltage. Sizing the inductor based on the maximum input voltage may yield an inductance much larger than typically needed, causing a larger footprint for the overall design. At the same time, components such as the input capacitor must be rated based on the maximum input voltage. WEBENCH now supports the use of this additional input voltage specification.

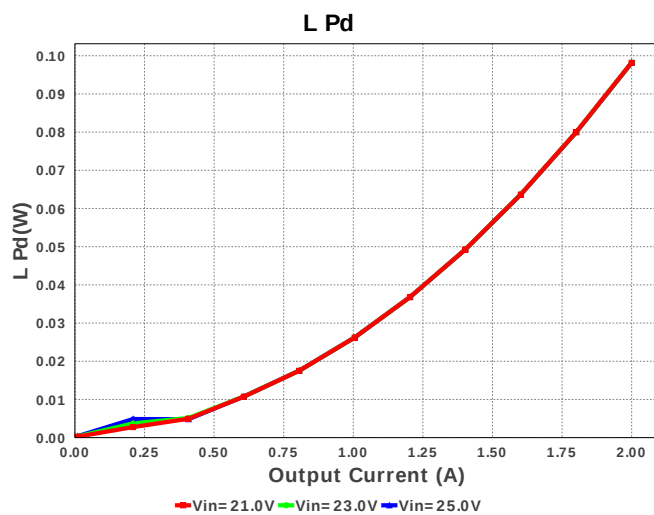
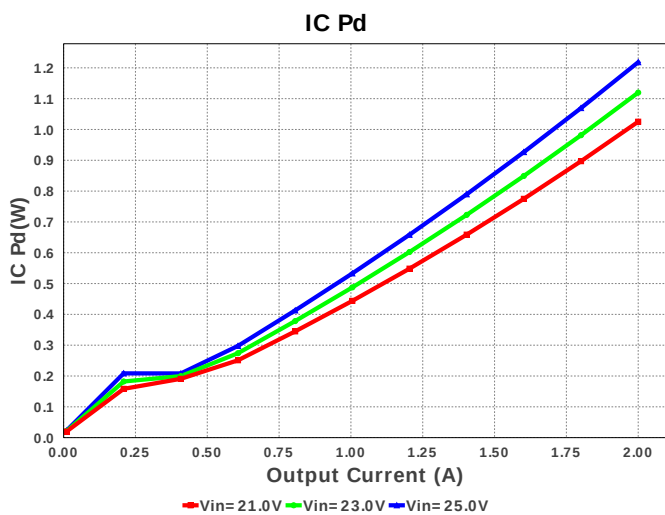
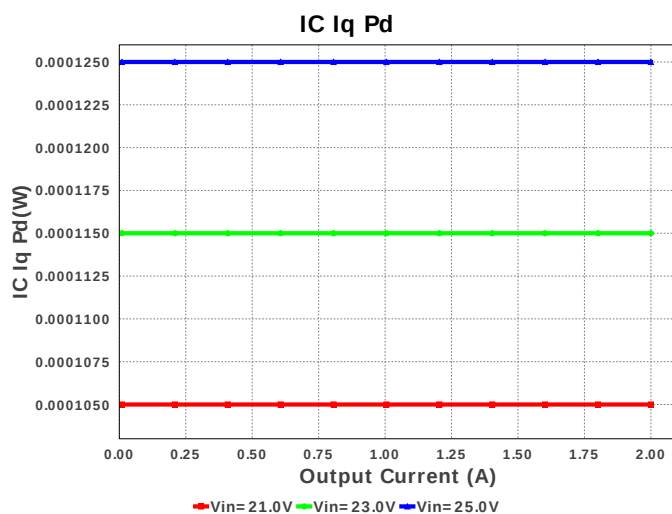
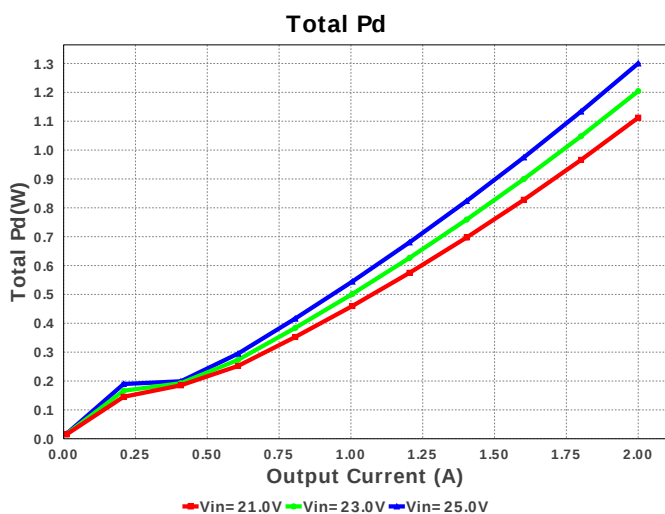
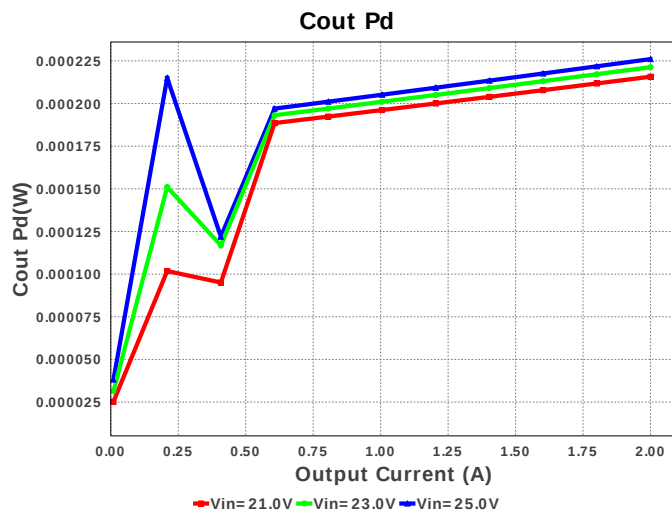
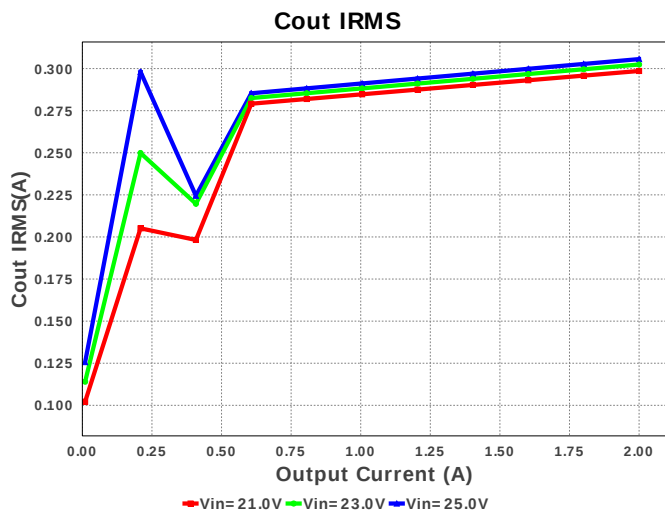
## Electrical BOM

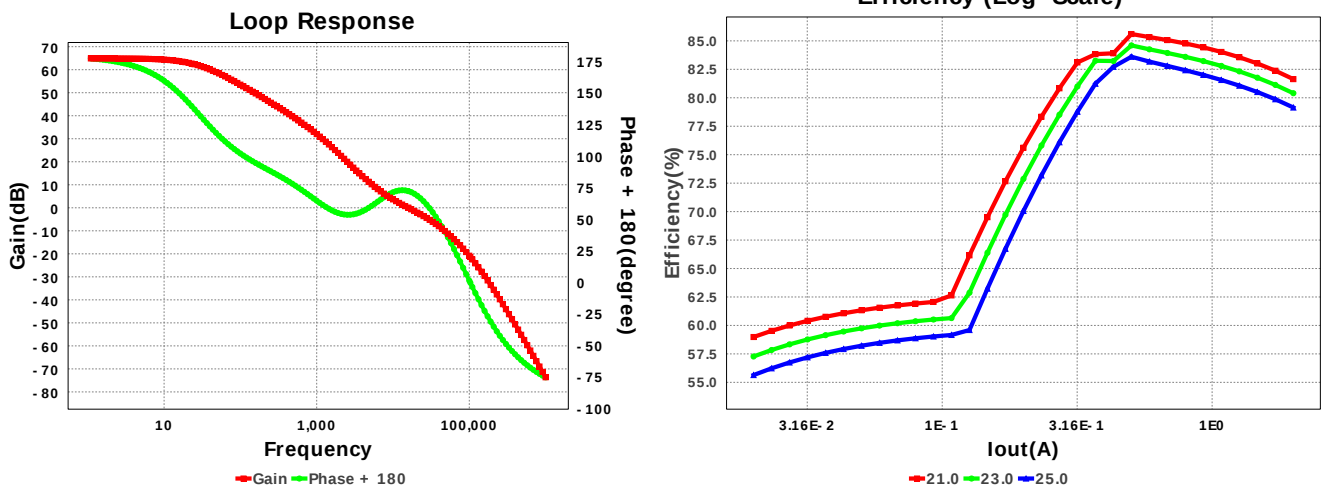
| #  | Name  | Manufacturer  | Part Number                           | Properties                                                      | Qty | Price  | Footprint                                                                                                         |
|----|-------|---------------|---------------------------------------|-----------------------------------------------------------------|-----|--------|-------------------------------------------------------------------------------------------------------------------|
| 1. | Cboot | MuRata        | GRM155C80J474KE19D<br>Series= X6S     | Cap= 470.0 nF<br>VDC= 6.3 V<br>IRMS= 0.0 A                      | 1   | \$0.01 |  0402 3 mm <sup>2</sup>      |
| 2. | Cff   | Kemet         | C0201C220J3GACTU<br>Series= C0G/NP0   | Cap= 22.0 pF<br>VDC= 5.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 |  0201 2 mm <sup>2</sup>      |
| 3. | Cin   | MuRata        | GRM32ER71H475KA88L<br>Series= X7R     | Cap= 4.7 uF<br>ESR= 2.0 mOhm<br>VDC= 50.0 V<br>IRMS= 5.35 A     | 1   | \$0.19 |  1210 15 mm <sup>2</sup>     |
| 4. | Cinx  | TDK           | C3216X5R1H105K<br>Series= X5R         | Cap= 1.0 uF<br>ESR= 8.97 mOhm<br>VDC= 50.0 V<br>IRMS= 0.0 A     | 1   | \$0.02 |  1206 11 mm <sup>2</sup>     |
| 5. | Cout  | MuRata        | GRM31CD80G107ME39L<br>Series= X6T     | Cap= 100.0 uF<br>ESR= 4.84 mOhm<br>VDC= 4.0 V<br>IRMS= 4.3381 A | 2   | \$0.14 |  1206_190 11 mm <sup>2</sup> |
| 6. | Cvcc  | MuRata        | GRM155R60J225ME15D<br>Series= X5R     | Cap= 2.2 uF<br>ESR= 5.0 mOhm<br>VDC= 6.3 V<br>IRMS= 3.67 A      | 1   | \$0.02 |  0402 3 mm <sup>2</sup>      |
| 7. | L1    | Bourns        | SRN8040-4R7Y                          | L= 4.7 uH<br>DCR= 24.0 mOhm                                     | 1   | \$0.22 |  SRN8040 100 mm <sup>2</sup> |
| 8. | Rfbb  | Yageo America | RC0603FR-07680KL<br>Series= ?         | Res= 680.0 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 |  0603 5 mm <sup>2</sup>      |
| 9. | Rfbb  | Vishay-Dale   | CRCW04021M00FKED<br>Series= CRCW...e3 | Res= 1000.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 |  0402 3 mm <sup>2</sup>      |

| #   | Name | Manufacturer      | Part Number | Properties | Qty | Price  | Footprint                                                                                                          |
|-----|------|-------------------|-------------|------------|-----|--------|--------------------------------------------------------------------------------------------------------------------|
| 10. | U1   | Texas Instruments | LM43603PWPR | Switcher   | 1   | \$1.85 | <br>PWP0016F 59 mm <sup>2</sup> |









## Operating Values

| #   | Name           | Value                 | Category | Description                                                                                |
|-----|----------------|-----------------------|----------|--------------------------------------------------------------------------------------------|
| 1.  | Cin IRMS       | 628.093 mA            | Current  | Input capacitor RMS ripple current                                                         |
| 2.  | Cout IRMS      | 305.623 mA            | Current  | Output capacitor RMS ripple current                                                        |
| 3.  | Iin Avg        | 249.39 mA             | Current  | Average input current                                                                      |
| 4.  | L Ipp          | 1.059 A               | Current  | Peak-to-peak inductor ripple current                                                       |
| 5.  | BOM Count      | 11                    | General  | Total Design BOM count                                                                     |
| 6.  | FootPrint      | 222.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                                                    |
| 7.  | Frequency      | 500.0 kHz             | General  | Switching frequency                                                                        |
| 8.  | Pout           | 5.0 W                 | General  | Total output power                                                                         |
| 9.  | Total BOM      | \$2.62                | General  | Total BOM Cost                                                                             |
| 10. | Low Freq Gain  | 64.892 dB             | Op_Point | Gain at 10Hz                                                                               |
| 11. | Vout Actual    | 2.498 V               | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 12. | Vout OP        | 2.5 V                 | Op_Point | Operational Output Voltage                                                                 |
| 13. | Cross Freq     | 15.88 kHz             | Op_point | Bode plot crossover frequency                                                              |
| 14. | Duty Cycle     | 10.771 %              | Op_point | Duty cycle                                                                                 |
| 15. | Efficiency     | 79.145 %              | Op_point | Steady state efficiency                                                                    |
| 16. | Gain Marg      | -21.37 dB             | Op_point | Bode Plot Gain Margin                                                                      |
| 17. | IC Tj          | 74.175 degC           | Op_point | IC junction temperature                                                                    |
| 18. | ICThetaJA      | 38.9 degC/W           | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 19. | IOUT_OP        | 2.0 A                 | Op_point | Iout operating point                                                                       |
| 20. | Phase Marg     | 72.629 deg            | Op_point | Bode Plot Phase Margin                                                                     |
| 21. | VIN_OP         | 25.0 V                | Op_point | Vin operating point                                                                        |
| 22. | Vout p-p       | 3.022 mV              | Op_point | Peak-to-peak output ripple voltage                                                         |
| 23. | Cin Pd         | 789.002 μW            | Power    | Input capacitor power dissipation                                                          |
| 24. | Cout Pd        | 226.041 μW            | Power    | Output capacitor power dissipation                                                         |
| 25. | IC Iq Pd       | 125.0 μW              | Power    | IC Iq Pd                                                                                   |
| 26. | IC Pd          | 1.218 W               | Power    | IC power dissipation                                                                       |
| 27. | L Pd           | 98.242 mW             | Power    | Inductor power dissipation                                                                 |
| 28. | Total Pd       | 1.3 W                 | Power    | Total Power Dissipation                                                                    |
| 29. | Vout Tolerance | 2.204 %               |          | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |

## Design Inputs

| #  | Name    | Value   | Description                        |
|----|---------|---------|------------------------------------|
| 1. | Iout    | 2.0     | Maximum Output Current             |
| 2. | VinMax  | 25.0    | Maximum input voltage              |
| 3. | VinMin  | 21.0    | Minimum input voltage              |
| 4. | Vout    | 2.5     | Output Voltage                     |
| 5. | base_pn | LM43603 | Texas Instruments Base Part Number |
| 6. | source  | DC      | Input Source Type                  |
| 7. | ta      | 30.0    | Ambient temperature                |

## Design Assistance

1. LM43603 Product Folder : <http://www.ti.com/product/LM43603> : contains the data sheet and other resources.

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