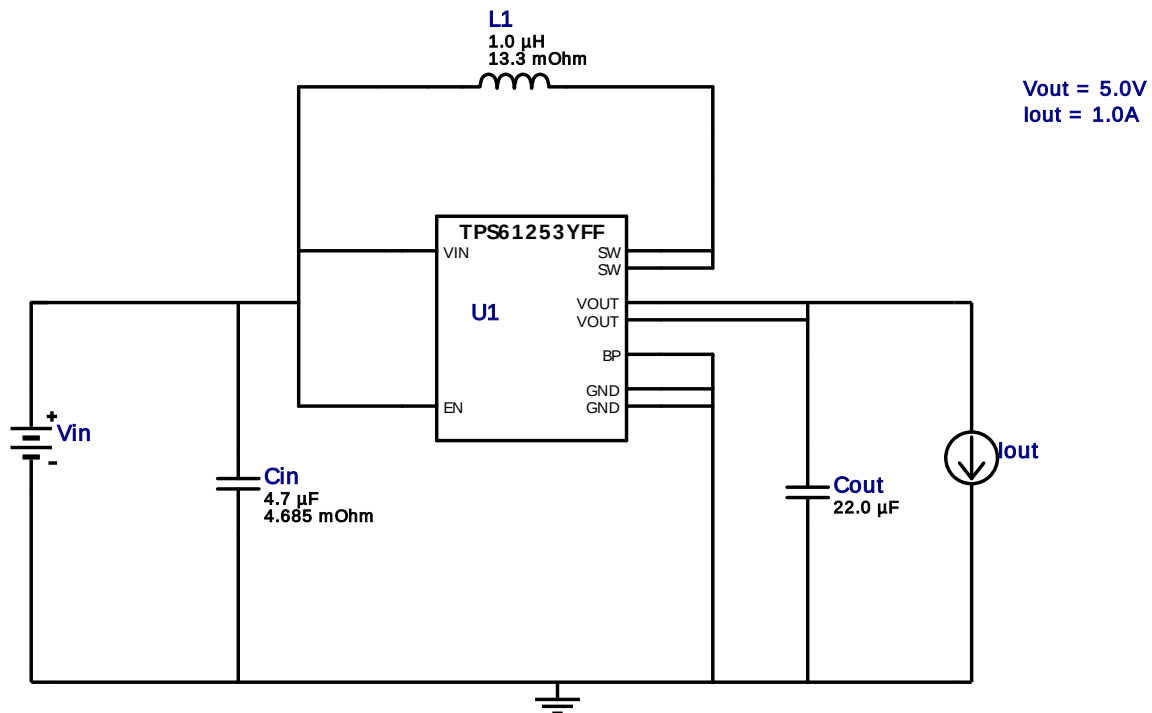


## WEBENCH® Design Report

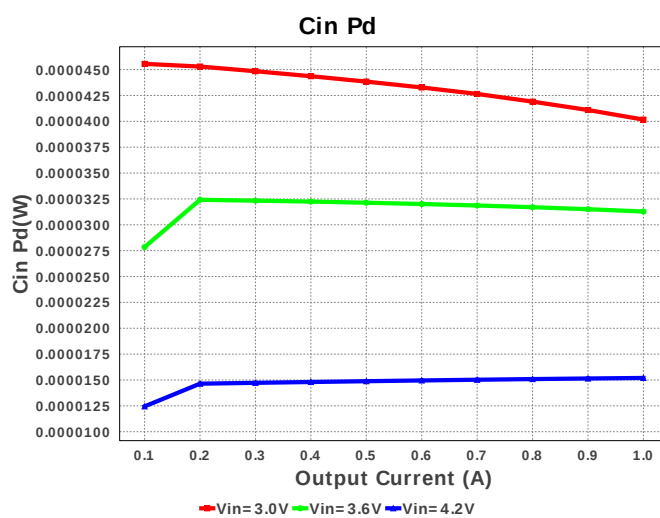
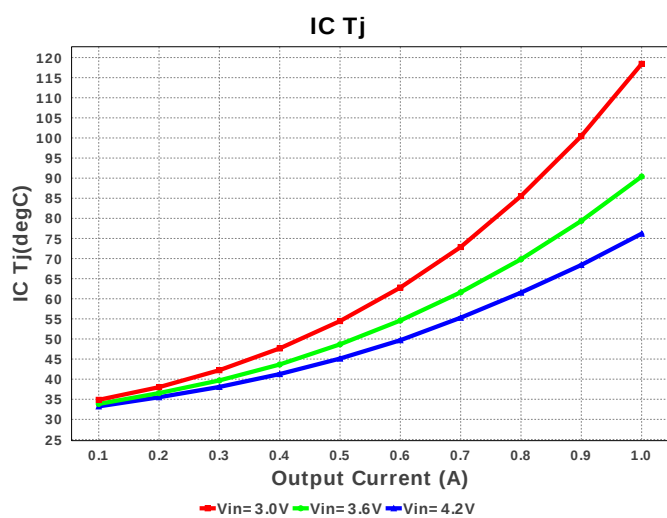
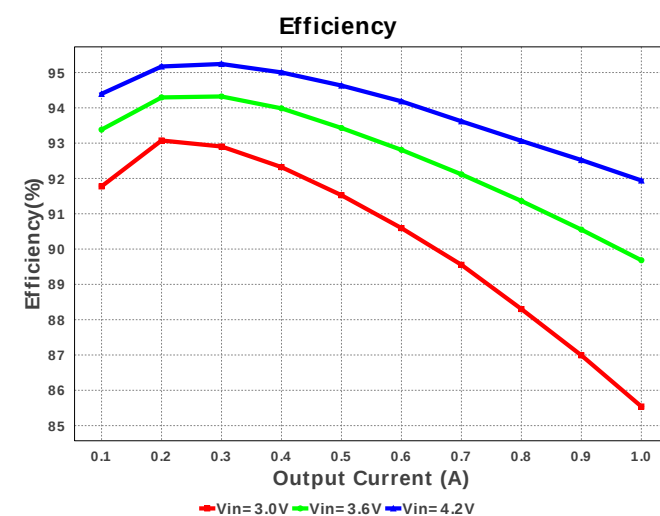
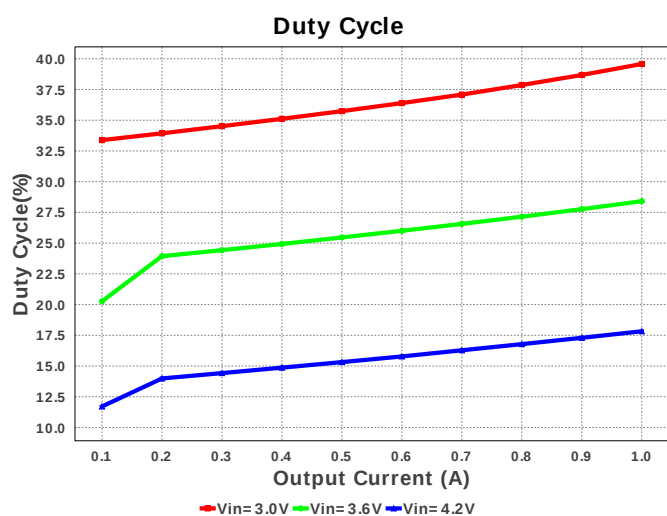
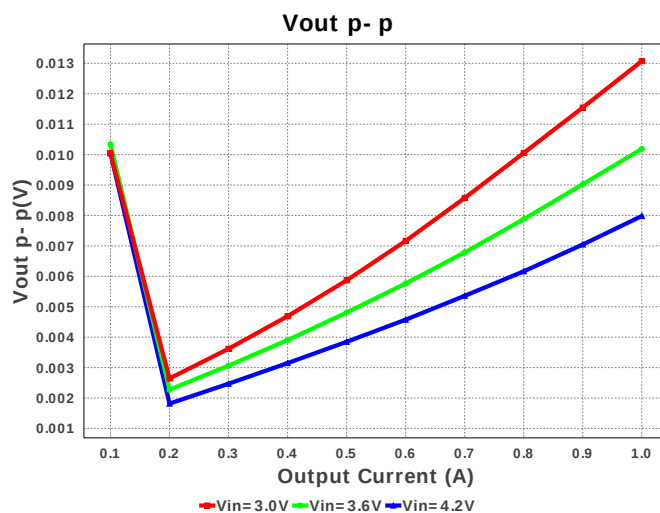
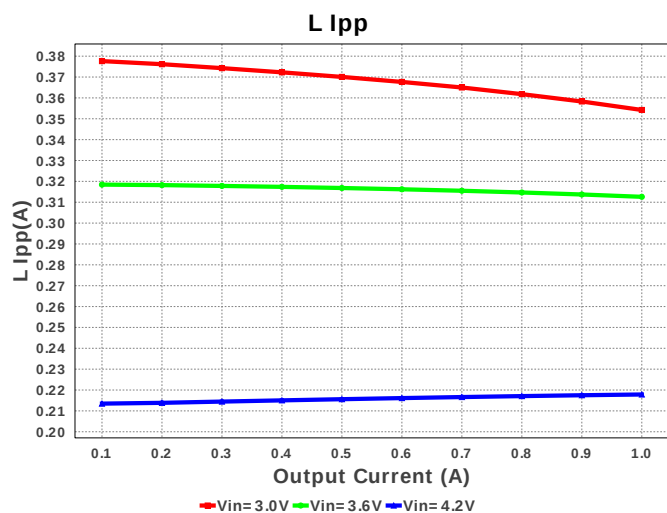
Design : 1899731/81 TPS61253YFFR  
TPS61253YFFR 3.0V-4.2V to 5.00V @ 1.0A

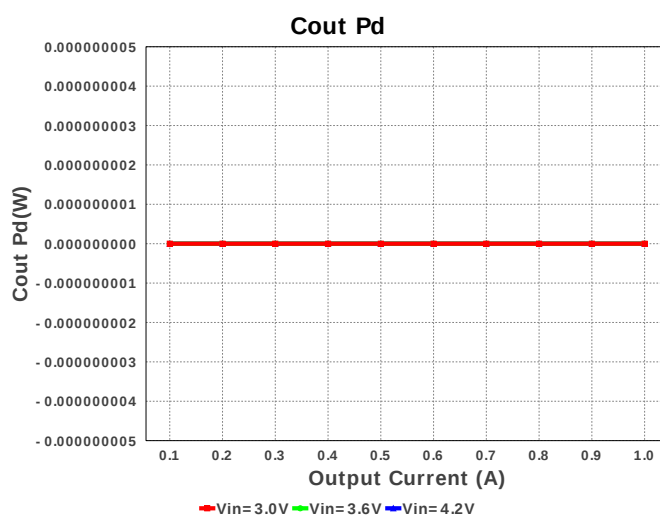
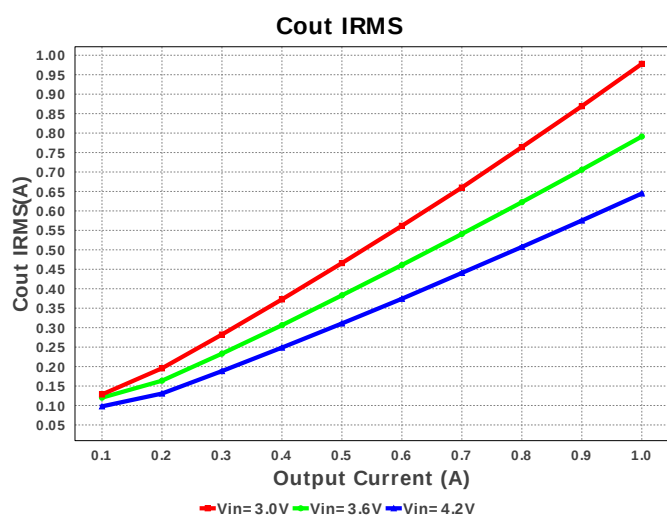
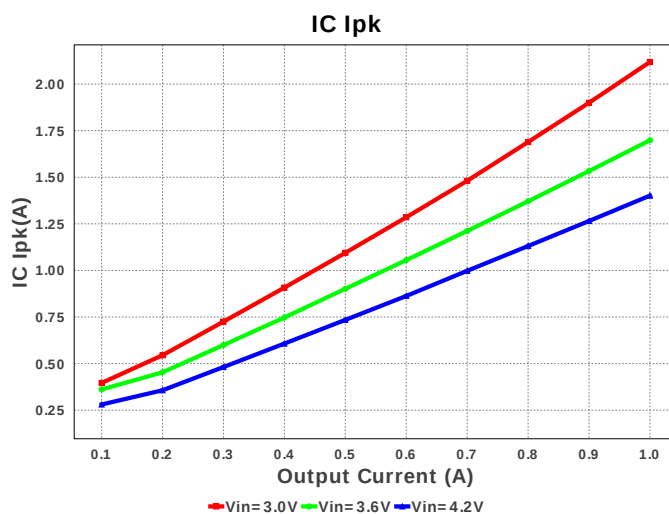
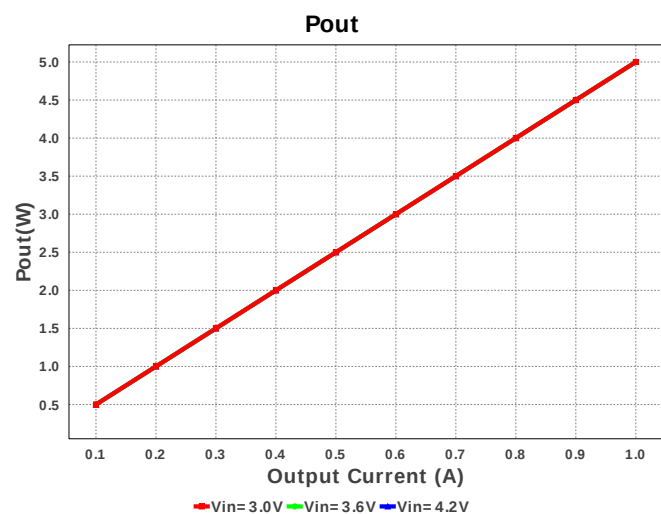
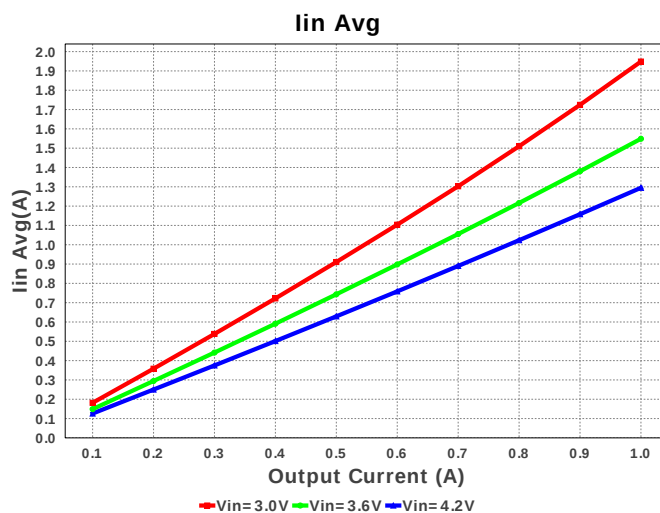
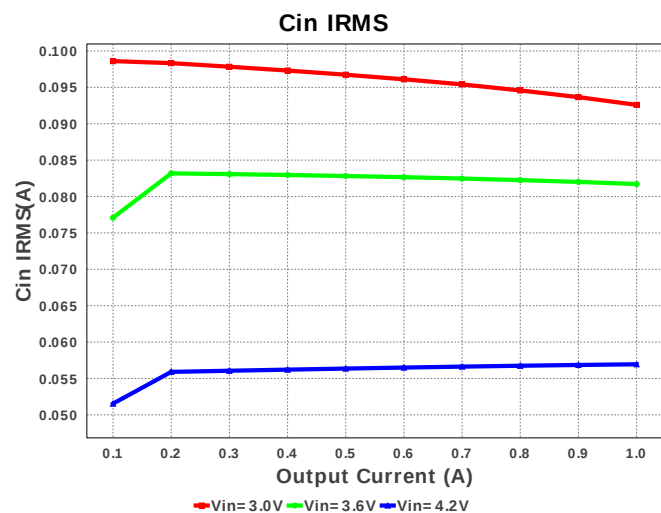


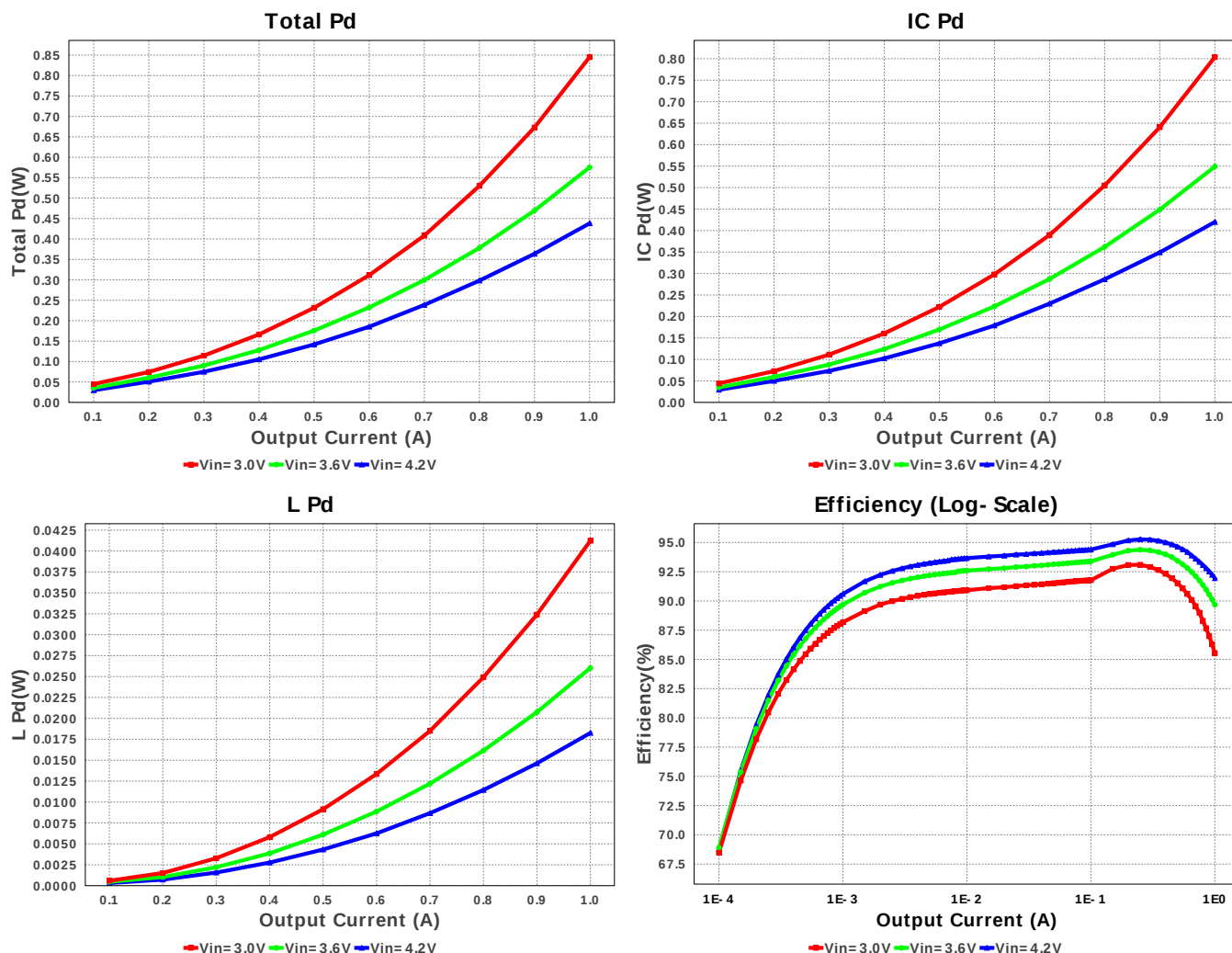
1. The device may not be able to startup into full load current. During startup, the resistive load must be at least 55 Ohm, according to the datasheet section on "Recommended Operating Conditions." The load current can be increased to the full load after the output voltage has reached its final value.

### Electrical BOM

| #  | Name | Manufacturer      | Part Number                       | Properties                                                       | Qty | Price  | Footprint                     |
|----|------|-------------------|-----------------------------------|------------------------------------------------------------------|-----|--------|-------------------------------|
| 1. | Cin  | MuRata            | GRM21BR61A475KA73L<br>Series= X5R | Cap= 4.7 uF<br>ESR= 4.685 mOhm<br>VDC= 10.0 V<br>IRMS= 1.84175 A | 1   | \$0.03 | 0805 7 mm <sup>2</sup>        |
| 2. | Cout | Taiyo Yuden       | LMK212BJ226MG-T<br>Series= X5R    | Cap= 22.0 uF<br>VDC= 10.0 V<br>IRMS= 0.0 A                       | 1   | \$0.12 | 0805 7 mm <sup>2</sup>        |
| 3. | L1   | Coilcraft         | XAL4020-102MEB                    | L= 1.0 µH<br>DCR= 13.3 mOhm                                      | 1   | \$0.60 | XAL4020 28 mm <sup>2</sup>    |
| 4. | U1   | Texas Instruments | TPS61253YFFR                      | Switcher                                                         | 1   | \$0.70 | YFF0009ACAG 5 mm <sup>2</sup> |







## Operating Values

| #   | Name           | Value                | Category | Description                                                                                |
|-----|----------------|----------------------|----------|--------------------------------------------------------------------------------------------|
| 1.  | Cin IRMS       | 92.595 mA            | Current  | Input capacitor RMS ripple current                                                         |
| 2.  | Cout IRMS      | 977.859 mA           | Current  | Output capacitor RMS ripple current                                                        |
| 3.  | IC IpK         | 2.119 A              | Current  | Peak switch current in IC                                                                  |
| 4.  | Iin Avg        | 1.948 A              | Current  | Average input current                                                                      |
| 5.  | L Ipp          | 354.22 mA            | Current  | Peak-to-peak inductor ripple current                                                       |
| 6.  | BOM Count      | 4                    | General  | Total Design BOM count                                                                     |
| 7.  | FootPrint      | 47.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                                                    |
| 8.  | Frequency      | 3.646 MHz            | General  | Switching frequency                                                                        |
| 9.  | Pout           | 5.0 W                | General  | Total output power                                                                         |
| 10. | Total BOM      | \$1.45               | General  | Total BOM Cost                                                                             |
| 11. | Duty Cycle     | 39.576 %             | Op_point | Duty cycle                                                                                 |
| 12. | Efficiency     | 85.541 %             | Op_point | Steady state efficiency                                                                    |
| 13. | IC Tj          | 118.43 degC          | Op_point | IC junction temperature                                                                    |
| 14. | ICThetaJA      | 110.0 degC/W         | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 15. | IOUT_OP        | 1.0 A                | Op_point | Iout operating point                                                                       |
| 16. | VIN_OP         | 3.0 V                | Op_point | Vin operating point                                                                        |
| 17. | Vout p-p       | 13.074 mV            | Op_point | Peak-to-peak output ripple voltage                                                         |
| 18. | Cin Pd         | 40.168 $\mu$ W       | Power    | Input capacitor power dissipation                                                          |
| 19. | Cout Pd        | 0.0 W                | Power    | Output capacitor power dissipation                                                         |
| 20. | IC Pd          | 803.91 mW            | Power    | IC power dissipation                                                                       |
| 21. | L Pd           | 41.221 mW            | Power    | Inductor power dissipation                                                                 |
| 22. | Total Pd       | 845.157 mW           | Power    | Total Power Dissipation                                                                    |
| 23. | Vout Tolerance | 400.0 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 | 4.2   | Maximum input voltage  |
| 3. | VinMin | 3.0   | Minimum input voltage  |

| #  | Name    | Value    | Description         |
|----|---------|----------|---------------------|
| 4. | Vout    | 5.0      | Output Voltage      |
| 5. | base_pn | TPS61253 | Base Product Number |
| 6. | source  | DC       | Input Source Type   |
| 7. | Ta      | 30.0     | Ambient temperature |

## Design Assistance

1. **TPS61253** Product Folder : <http://www.ti.com/product/TPS61253> : contains the data sheet and other resources.

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