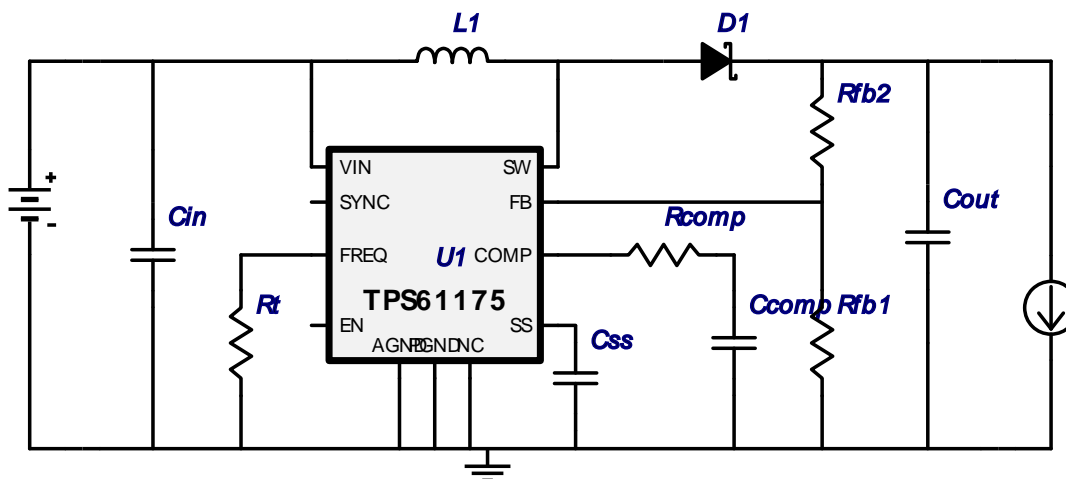



## WEBENCH® Design Report

Design : 1245947/12 TPS61175PWPR  
TPS61175PWPR 4.5V-5.5V to 18.0V @ 0.5A



### Electrical BOM

| #   | Name  | Manufacturer         | Part Number                          | Quantity | Price  | Properties  | Footprint  |
|-----|-------|----------------------|--------------------------------------|----------|--------|---|--|
| 1.  | Ccomp | MuRata               | GRM155R61A823KA01D<br>Series= X5R    | 1        | \$0.01 | Cap= 82.0 nF<br>VDC= 10.0 V<br>IRMS= 0.0 A                  | <br>0402 8mm2     |
| 2.  | Cin   | Kemet                | C0603C475K8PACTU<br>Series= X5R      | 1        | \$0.05 | Cap= 4.7 µF<br>ESR= 6.0 mOhm<br>VDC= 10.0 V<br>IRMS= 7.24 A | <br>0603 10mm2    |
| 3.  | Cout  | TDK                  | C5750X7R1H106M<br>Series= X7R        | 1        | \$0.68 | Cap= 10.0 µF<br>ESR= 3.0 mOhm<br>VDC= 50.0 V<br>IRMS= 5.5 A | <br>2220 60mm2    |
| 4.  | Css   | MuRata               | GRM033C80G473KE01D<br>Series= 379    | 1        | \$0.01 | Cap= 47.0 nF<br>VDC= 4.0 V<br>IRMS= 0.0 A                   | <br>0201 6mm2     |
| 5.  | D1    | Vishay-Semiconductor | SS34-E3/57T                          | 1        | \$0.18 | VF@Io= 500.0 mV<br>VRRM= 40.0 V                             | <br>SMC 83mm2     |
| 6.  | L1    | Coilcraft            | XAL5050-822MEB                       | 1        | \$0.83 | L= 8.2 µH<br>DCR= 30.0 mOhm                                 | <br>XAL5050 54mm2 |
| 7.  | Rcomp | Vishay-Dale          | CRCW04022K74FKED<br>Series= CRCW..e3 | 1        | \$0.01 | Res= 2.74 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%         | <br>0402 8mm2     |
| 8.  | Rfb2  | Vishay-Dale          | CRCW040216K2FKED<br>Series= CRCW..e3 | 1        | \$0.01 | Res= 16.2 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%         | <br>0402 8mm2     |
| 9.  | Rfb1  | Vishay-Dale          | CRCW0402226KFKED<br>Series= CRCW..e3 | 1        | \$0.01 | Res= 226.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%        | <br>0402 8mm2     |
| 10. | Rt    | Vishay-Dale          | CRCW040249K9FKED<br>Series= CRCW..e3 | 1        | \$0.01 | Res= 49.9 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%         | <br>0402 8mm2     |

| #   | Name | Manufacturer      | Part Number  | Quantity | Price  | Properties | Footprint   |
|-----|------|-------------------|--------------|----------|--------|------------|---|
| 11. | U1   | Texas Instruments | TPS61175PWPR | 1        | \$1.80 | Switcher   | <br>R-PDSO-G14 46mm2 |

## Operating Values

| #   | Name         | Value       | Category | Description                               |
|-----|--------------|-------------|----------|---|
| 1.  | Cin IRMS     | 51.014 m A  | Current  | Input capacitor RMS ripple current        |
| 2.  | Cout IRMS    | 982.08 m A  | Current  | Output capacitor RMS ripple current       |
| 3.  | IC Ipk       | 2.516 A     | Current  | Peak switch current in IC                 |
| 4.  | Iin Avg      | 2.443 A     | Current  | Average input current                     |
| 5.  | L Ipp        | 176.717 m A | Current  | Peak-to-peak inductor ripple current      |
| 6.  | M Iavg       | 2.428 A     | Current  | MOSFET Average current                    |
| 7.  | M1 Irms      | 2.164 A     | Current  | Q Iavg                                    |
| 8.  | BOM Count    | 11.0        | General  | Total Design BOM count                    |
| 9.  | FootPrint    | 297.0 mm2   | General  | Total Foot Print Area of BOM components   |
| 10. | Frequency    | 2.0 M Hz    | General  | Switching frequency                       |
| 11. | IC Tolerance | 20.0 m V    | General  | IC Feedback Tolerance                     |
| 12. | M Vds Act    | 286.152 m V | General  | Voltage drop across the MosFET            |
| 13. | Mode         | CCM         | General  | Conduction Mode                           |
| 14. | Pout         | 9.0 W       | General  | Total output power                        |
| 15. | Total BOM    | \$3.6       | General  | Total BOM Cost                            |
| 16. | D1 Tj        | 43.75 degC  | Op_Point | D1 junction temperature                   |
| 17. | Vout OP      | 18.0 V      | Op_Point | Operational Output Voltage                |
| 18. | Cross Freq   | 7.026 k Hz  | Op_point | Bode plot crossover frequency             |
| 19. | Duty Cycle   | 79.406 %    | Op_point | Duty cycle                                |
| 20. | Efficiency   | 81.874 %    | Op_point | Steady state efficiency                   |
| 21. | IC Tj        | 99.482 degC | Op_point | IC junction temperature                   |
| 22. | ICThetaJA    | 44.5 degC/W | Op_point | IC junction-to-ambient thermal resistance |
| 23. | IOUT_OP      | 500.0 m A   | Op_point | Iout operating point                      |
| 24. | Phase Marg   | 75.878 deg  | Op_point | Bode Plot Phase Margin                    |
| 25. | VIN_OP       | 4.5 V       | Op_point | Vin operating point                       |
| 26. | Vout p-p     | 13.847 m V  | Op_point | Peak-to-peak output ripple voltage        |
| 27. | Cin Pd       | 15.614 μ W  | Power    | Input capacitor power dissipation         |
| 28. | Cout Pd      | 2.893 m W   | Power    | Output capacitor power dissipation        |
| 29. | Diode Pd     | 250.0 m W   | Power    | Diode power dissipation                   |
| 30. | IC Pd        | 1.561 W     | Power    | IC power dissipation                      |
| 31. | L Pd         | 176.918 m W | Power    | Inductor power dissipation                |
| 32. | Total Pd     | 1.993 W     | Power    | Total Power Dissipation                   |

## Design Inputs

| #   | Name    | Value       | Description                   |
|-----|---------|-------------|-------------------------------|
| 1.  | Iout    | 500.0 mA    | Maximum Output Current        |
| 2.  | Iout1   | 500.0 mAmps | Output Current #1             |
| 3.  | VinMax  | 5.5 V       | Maximum input voltage         |
| 4.  | VinMin  | 4.5 V       | Minimum input voltage         |
| 5.  | Vout    | 18.0 V      | Output Voltage                |
| 6.  | Vout1   | 18.0 Volt   | Output Voltage #1             |
| 7.  | base_pn | TPS61175    | National Based Product Number |
| 8.  | source  | DC          | Input Source Type             |
| 9.  | Ta      | 30.0 degC   | Ambient temperature           |
| 10. | UserFsw | 2.0 MHz     | Customer Selected Frequency   |

## Design Assistance

1. **TPS61175** Product Folder : <http://www.ti.com/product/tps61175> : contains the data sheet and other resources.

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