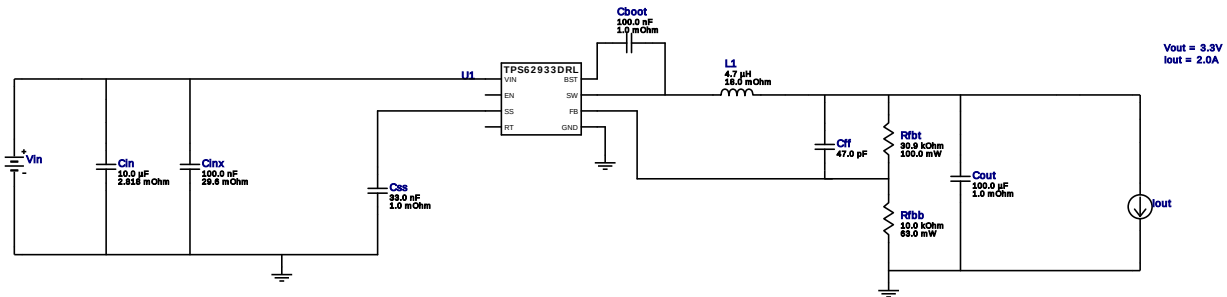


VinMin = 14.0V  
VinMax = 22.0V  
Vout = 3.3V  
Iout = 2.0A

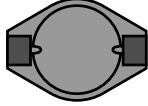
Device = TPS62933DRLR  
Topology = Buck  
Created = 2023-08-23 05:51:16.719  
BOM Cost = \$0.76  
BOM Count = 10  
Total Pd = 0.76W

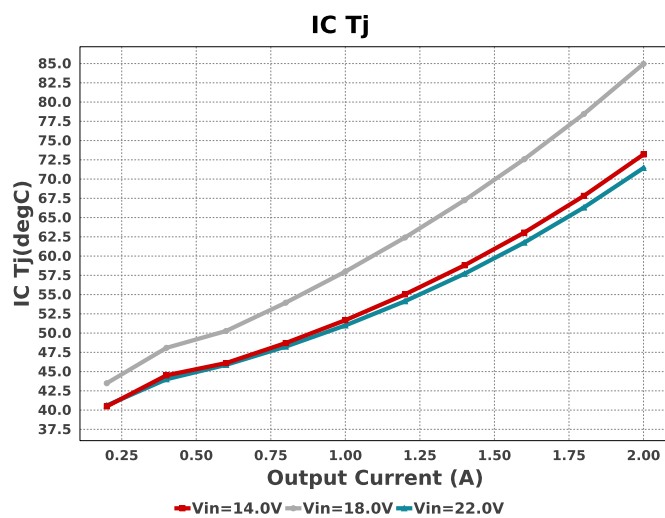
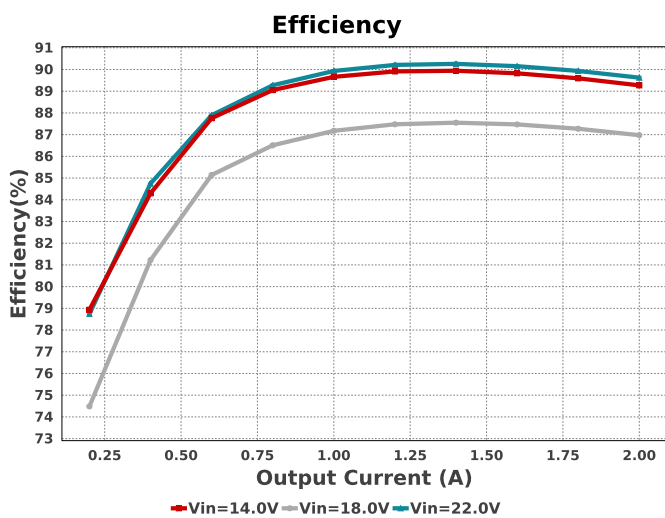
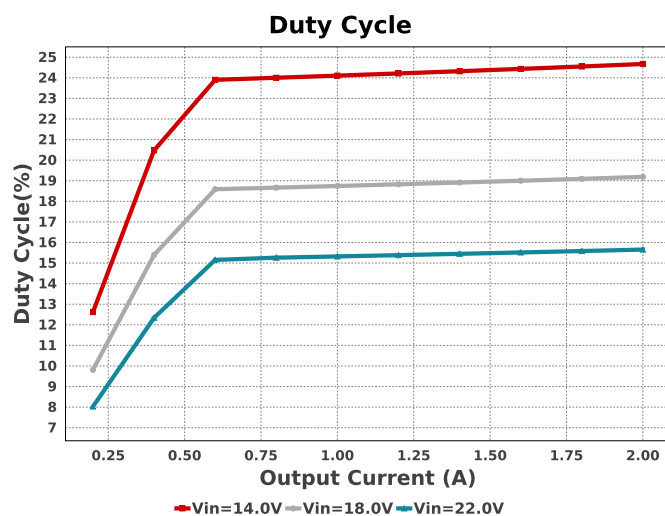
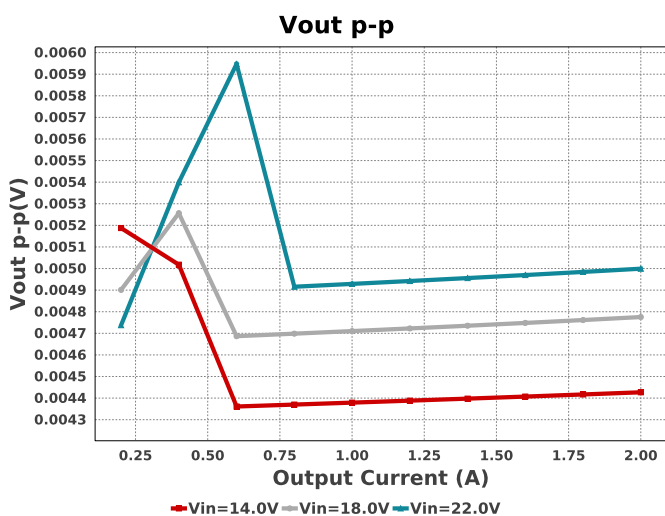
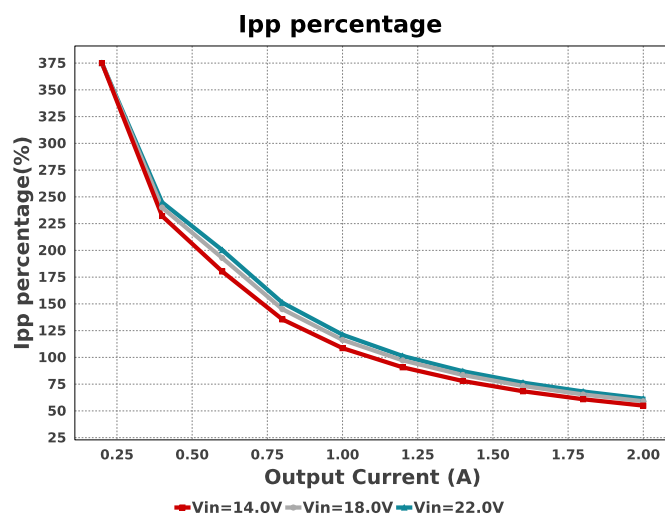
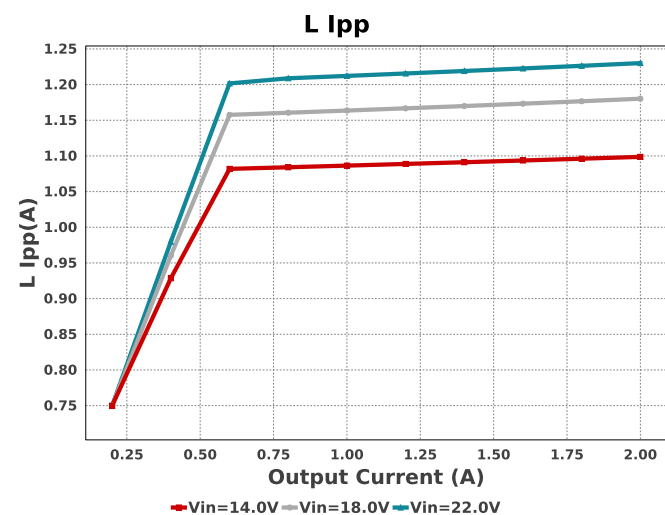
## WEBENCH<sup>®</sup> Design Report

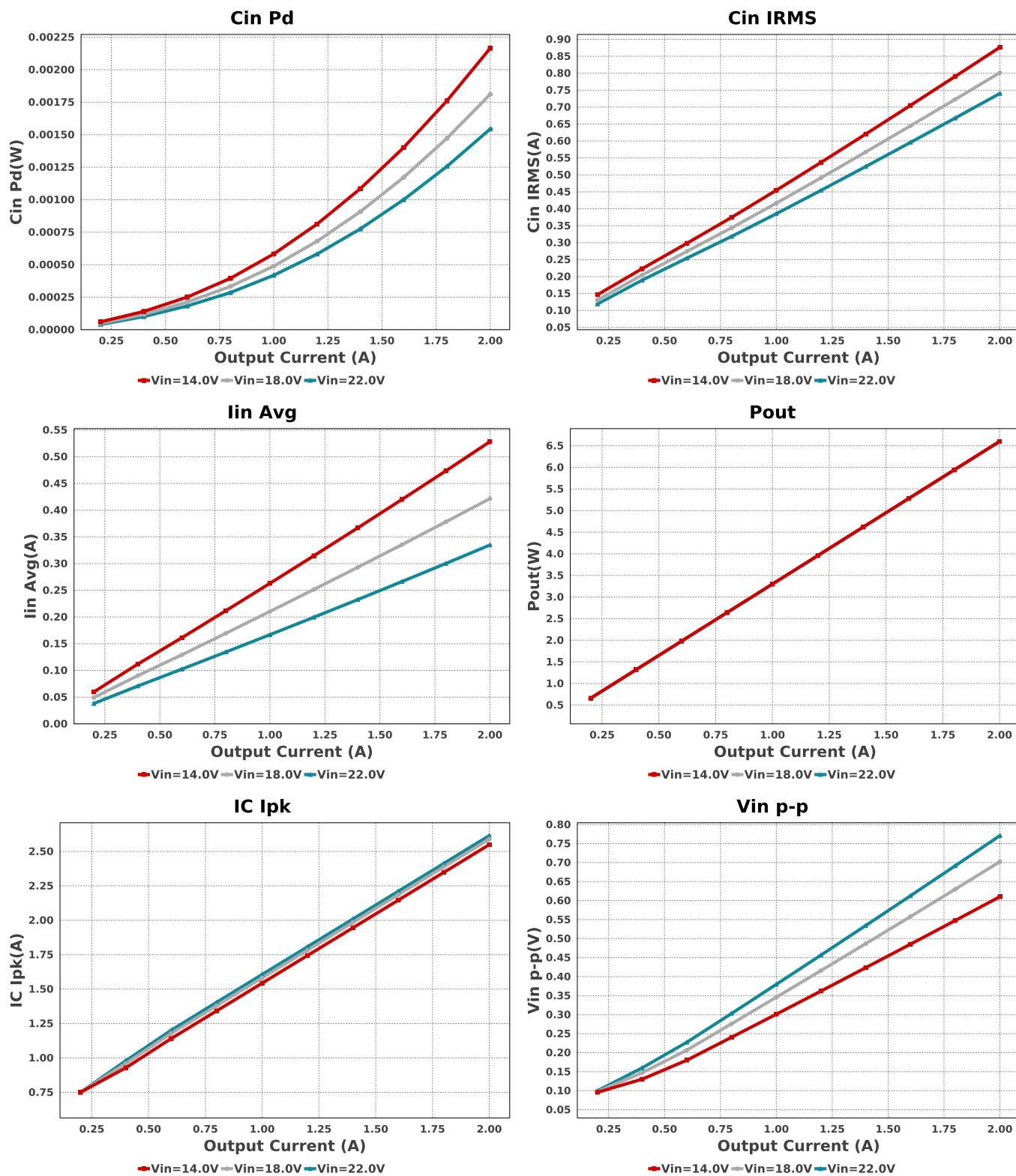
Design : 2468 TPS62933DRLR  
TPS62933DRLR 8V-30V to 5.00V @ 3A

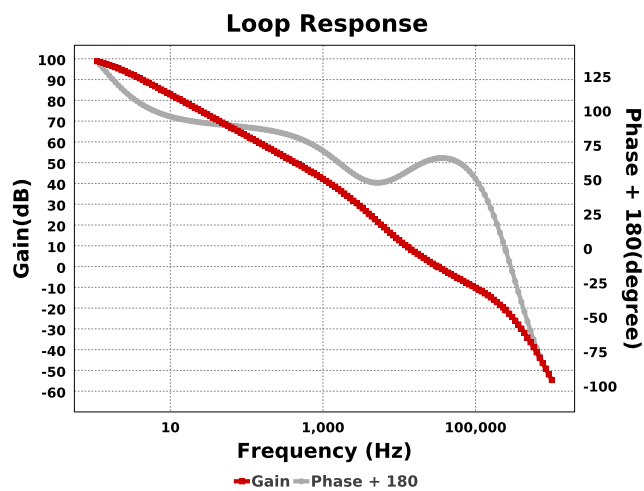
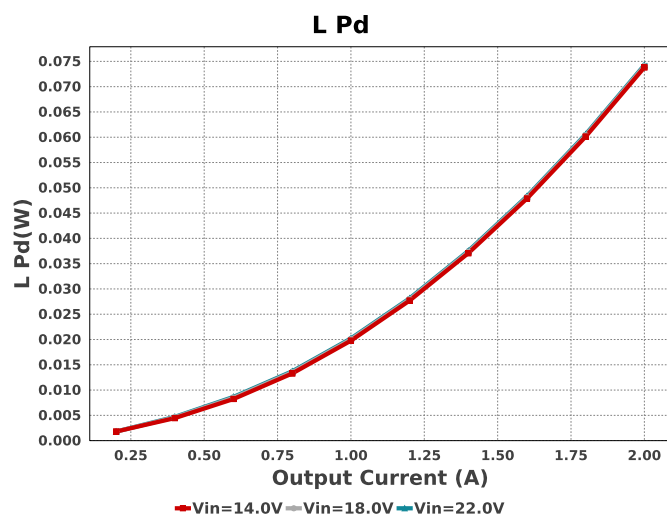
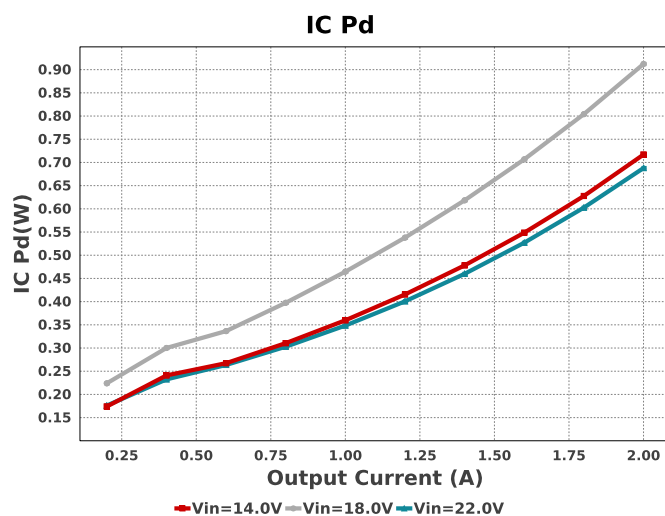
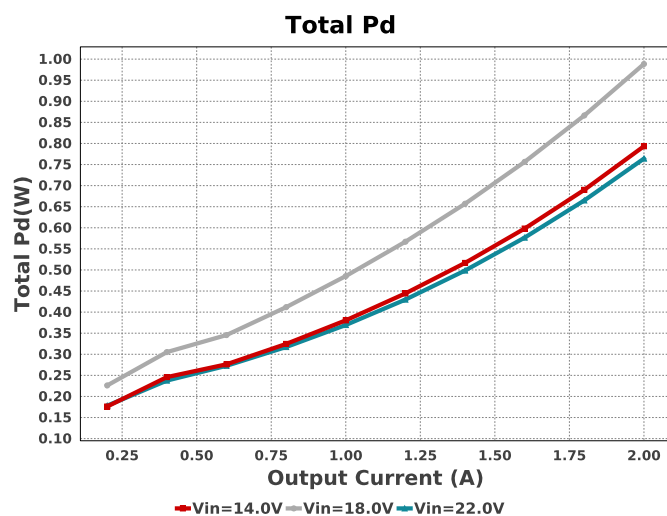
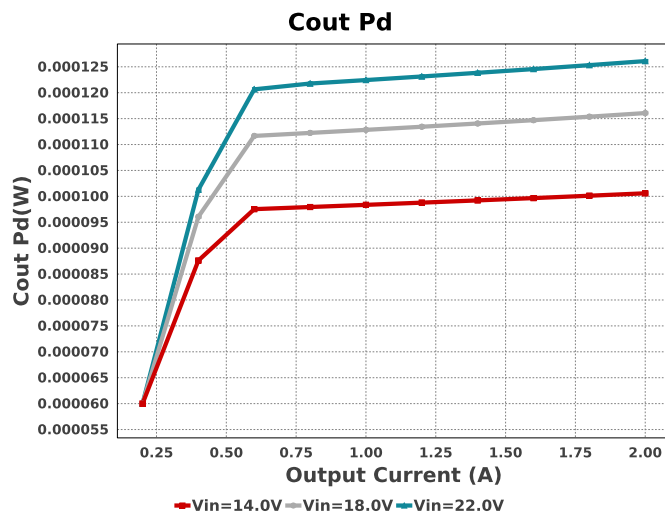
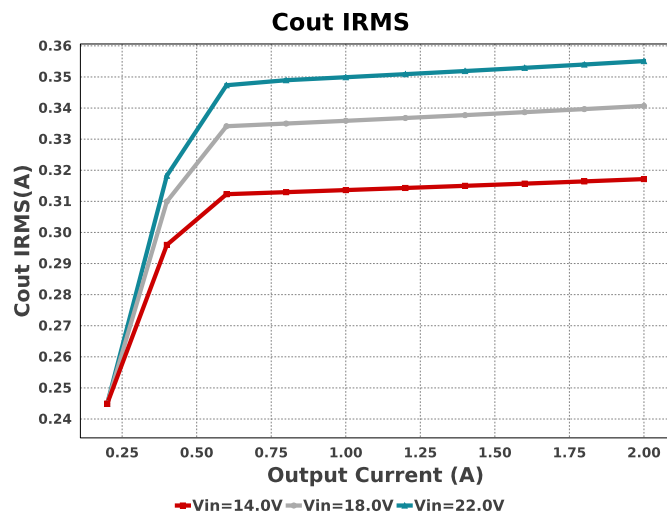


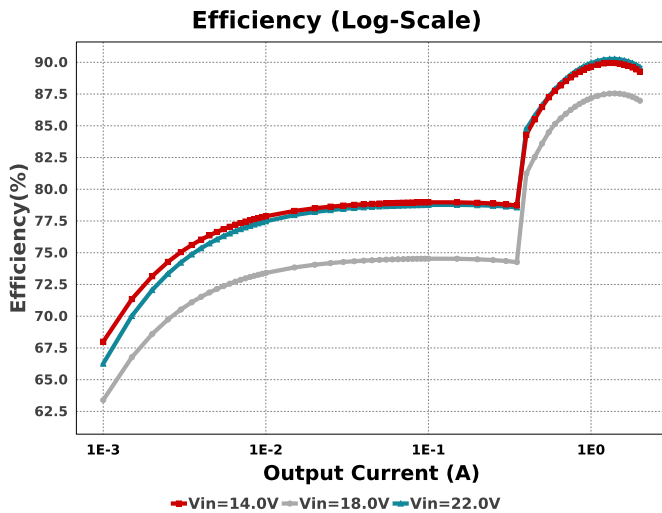
### Electrical BOM

| Name  | Manufacturer      | Part Number                           | Properties                                                        | Qty | Price  | Footprint                                                                                                               |
|-------|-------------------|---------------------------------------|-------------------------------------------------------------------|-----|--------|-------------------------------------------------------------------------------------------------------------------------|
| Cboot | MuRata            | GRM155R71A104KA01D<br>Series= X7R     | Cap= 100.0 nF<br>ESR= 1.0 mOhm<br>VDC= 10.0 V<br>IRMS= 0.0 A      | 1   | \$0.01 | 0402 3 mm <sup>2</sup>                                                                                                  |
| Cff   | MuRata            | GRM0335C1E470JA01D<br>Series= C0G/NP0 | Cap= 47.0 pF<br>VDC= 25.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | 0201 2 mm <sup>2</sup>                                                                                                  |
| Cin   | TDK               | C2012X5R1V106K085AC<br>Series= X5R    | Cap= 10.0 uF<br>ESR= 2.818 mOhm<br>VDC= 35.0 V<br>IRMS= 3.8868 A  | 1   | \$0.12 | 0805 7 mm <sup>2</sup>                                                                                                  |
| Cinx  | TDK               | CGA3E2X7R1H104K080AA<br>Series= X7R   | Cap= 100.0 nF<br>ESR= 29.6 mOhm<br>VDC= 50.0 V<br>IRMS= 971.99 mA | 1   | \$0.01 | 0603 5 mm <sup>2</sup>                                                                                                  |
| Cout  | MuRata            | GRM32EC80J107ME20L<br>Series= X6S     | Cap= 100.0 uF<br>ESR= 1.0 mOhm<br>VDC= 6.3 V<br>IRMS= 6.0 A       | 1   | \$0.17 | 1210_270 15 mm <sup>2</sup>                                                                                             |
| Css   | MuRata            | GRM155R71A333KA01D<br>Series= X7R     | Cap= 33.0 nF<br>ESR= 1.0 mOhm<br>VDC= 10.0 V<br>IRMS= 0.0 A       | 1   | \$0.01 | 0402 3 mm <sup>2</sup>                                                                                                  |
| L1    | NIC Components    | NPI31W4R7MTRF                         | L= 4.7 uH<br>18.0 mOhm                                            | 1   | \$0.23 | <br>IND_NPI31W 172 mm <sup>2</sup> |
| Rfbb  | Vishay-Dale       | CRCW040210K0FKED<br>Series= CRCW..e3  | Res= 10.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%               | 1   | \$0.01 | 0402 3 mm <sup>2</sup>                                                                                                  |
| Rfht  | Vishay-Dale       | CRCW060330K9FKEA<br>Series= CRCW..e3  | Res= 30.9 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0%              | 1   | \$0.01 | 0603 5 mm <sup>2</sup>                                                                                                  |
| U1    | Texas Instruments | TPS62933DRLR                          | Switcher                                                          | 1   | \$0.18 | DRL0008A-MFG 9 mm <sup>2</sup>                                                                                          |









## Operating Values

| #   | Name                                                            | Value                 | Category           | Description                                                                                            |
|-----|-----------------------------------------------------------------|-----------------------|--------------------|--------------------------------------------------------------------------------------------------------|
| 1.  | Cin IRMS                                                        | 740.215 mA            | Capacitor          | Input capacitor RMS ripple current                                                                     |
| 2.  | Cin Pd                                                          | 1.544 mW              | Capacitor          | Input capacitor power dissipation                                                                      |
| 3.  | Cout IRMS                                                       | 355.101 mA            | Capacitor          | Output capacitor RMS ripple current                                                                    |
| 4.  | Cout Pd                                                         | 126.1 $\mu$ W         | Capacitor          | Output capacitor power dissipation                                                                     |
| 5.  | IC Ipk                                                          | 2.615 A               | IC                 | Peak switch current in IC                                                                              |
| 6.  | IC Pd                                                           | 687.89 mW             | IC                 | IC power dissipation                                                                                   |
| 7.  | IC Tj                                                           | 71.445 degC           | IC                 | IC junction temperature                                                                                |
| 8.  | IC Tolerance                                                    | 16.0 mV               | IC                 | IC Feedback Tolerance                                                                                  |
| 9.  | ICThetaJA Effective                                             | 60.25 degC/W          | IC                 | Effective IC Junction-to-Ambient Thermal Resistance                                                    |
| 10. | Iin Avg                                                         | 334.73 mA             | IC                 | Average input current                                                                                  |
| 11. | Ipp percentage                                                  | 61.505 %              | Inductor           | Inductor ripple current percentage (with respect to average inductor current)                          |
| 12. | L Ipp                                                           | 1.23 A                | Inductor           | Peak-to-peak inductor ripple current                                                                   |
| 13. | L Pd                                                            | 74.27 mW              | Inductor           | Inductor power dissipation                                                                             |
| 14. | Cin Pd                                                          | 1.544 mW              | Power              | Input capacitor power dissipation                                                                      |
| 15. | Cout Pd                                                         | 126.1 $\mu$ W         | Power              | Output capacitor power dissipation                                                                     |
| 16. | IC Pd                                                           | 687.89 mW             | Power              | IC power dissipation                                                                                   |
| 17. | L Pd                                                            | 74.27 mW              | Power              | Inductor power dissipation                                                                             |
| 18. | Total Pd                                                        | 764.095 mW            | Power              | Total Power Dissipation                                                                                |
| 19. | BOM Count                                                       | 10                    | System             | Total Design BOM count                                                                                 |
| 20. | Cross Freq                                                      | 31.898 kHz            | System Information | Bode plot crossover frequency                                                                          |
| 21. | Duty Cycle                                                      | 15.655 %              | System Information | Duty cycle                                                                                             |
| 22. | Efficiency                                                      | 89.624 %              | System Information | Steady state efficiency                                                                                |
| 23. | FootPrint                                                       | 223.0 mm <sup>2</sup> | System Information | Total Foot Print Area of BOM components                                                                |
| 24. | Frequency                                                       | 500.0 kHz             | System Information | Switching frequency                                                                                    |
| 25. | Gain Marg                                                       | -20.794 dB            | System Information | Bode Plot Gain Margin                                                                                  |
| 26. | Inductor ripple current requirement used for Inductor selection | 40.0 %                | System Information | Custom Inductor ripple current (% of average inductor current) requirement used for Inductor selection |
| 27. | Iout                                                            | 2.0 A                 | System Information | Iout operating point                                                                                   |
| 28. | Iout transient step used for Cout calculations                  | 1.0 A                 | System Information | Custom Transient current step requirement that was used for Cout selection (A).                        |
| 29. | Low Freq Gain                                                   | 98.834 dB             | System Information | Gain at 1Hz                                                                                            |
| 30. | Mode                                                            | CCM                   | System Information | Conduction Mode                                                                                        |
| 31. | Overshoot Value                                                 | 11.235 mV             | System Information | Theoretical Vout Overshoot Value                                                                       |
| 32. | Phase Marg                                                      | 66.074 deg            | System Information | Bode Plot Phase Margin                                                                                 |
| 33. | Pout                                                            | 6.6 W                 | System Information | Total output power                                                                                     |
| 34. | Total BOM                                                       | \$0.76                | System Information | Total BOM Cost                                                                                         |

| #   | Name                                                  | Value      | Category           | Description                                                                                |
|-----|-------------------------------------------------------|------------|--------------------|--------------------------------------------------------------------------------------------|
| 35. | Undershoot Value                                      | 28.802 mV  | System Information | Theoretical Vout Undershoot Value                                                          |
| 36. | Vin                                                   | 22.0 V     | System Information | Vin operating point                                                                        |
| 37. | Vin p-p                                               | 770.938 mV | System Information | Peak-to-peak input voltage                                                                 |
| 38. | Vout                                                  | 3.3 V      | System Information | Operational Output Voltage                                                                 |
| 39. | Vout Actual                                           | 3.272 V    | System Information | Vout Actual calculated based on selected voltage divider resistors                         |
| 40. | Vout Ripple requirement used for Cout calculations    | 1.0 %      | System Information | Custom maximum output ripple requirement that was used for Cout selection(% of Vout).      |
| 41. | Vout Tolerance                                        | 3.557 %    | System Information | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |
| 42. | Vout p-p                                              | 4.999 mV   | System Information | Peak-to-peak output ripple voltage                                                         |
| 43. | Vout transient requirement used for Cout calculations | 3.0 %      | System Information | Custom Transient voltage change requirement that was used for Cout selection (% of Vout).  |

## Design Inputs

| Name    | Value    | Description            |
|---------|----------|------------------------|
| Iout    | 2.0      | Maximum Output Current |
| VinMax  | 22.0     | Maximum input voltage  |
| VinMin  | 14.0     | Minimum input voltage  |
| Vout    | 3.3      | Output Voltage         |
| base_pn | TPS62933 | Base Product Number    |
| source  | DC       | Input Source Type      |
| Ta      | 30.0     | Ambient temperature    |

## WEBENCH® Assembly

### Design Assistance

1. Master key : 4DBC92FC97185CFB[v1]
2. **TPS62933** Product Folder : <http://www.ti.com/product/TPS62933> : contains the data sheet and other resources.

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