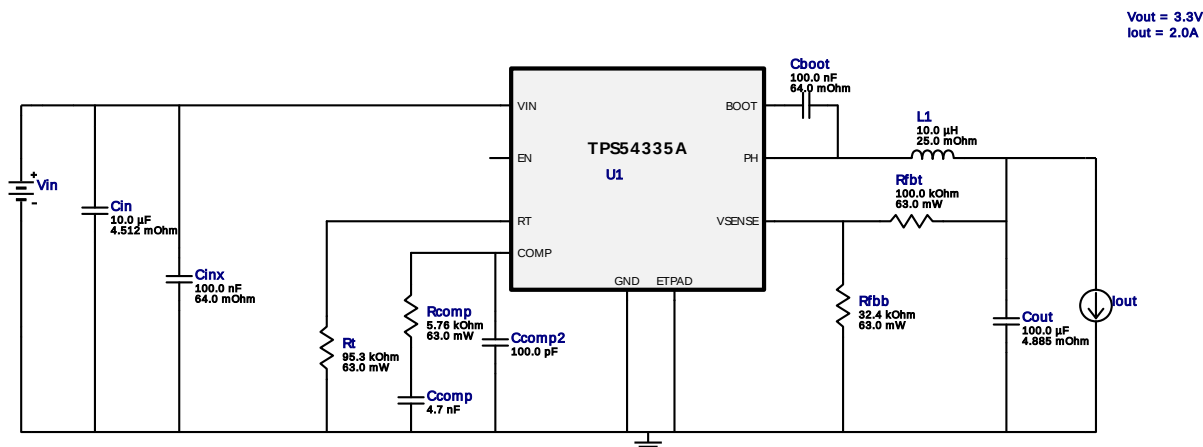


## WEBENCH® Design Report

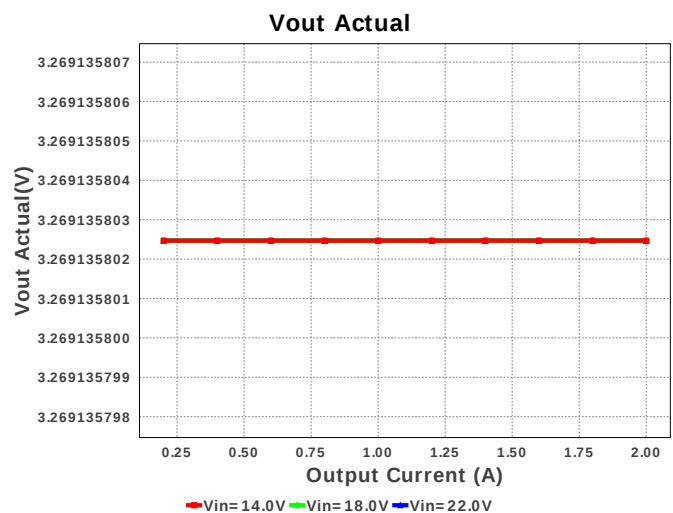
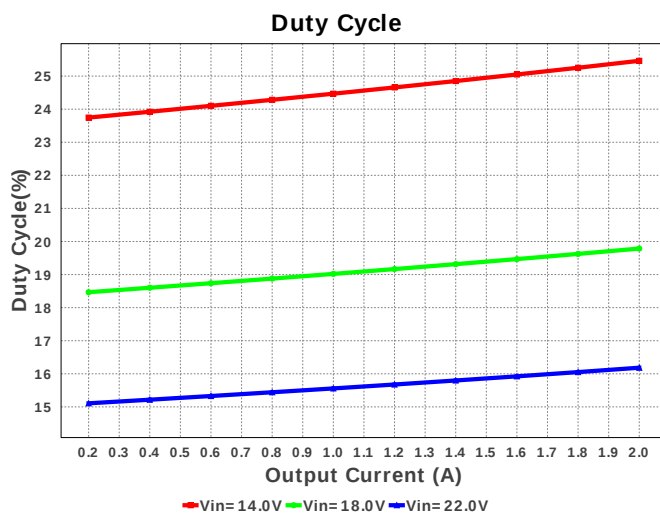
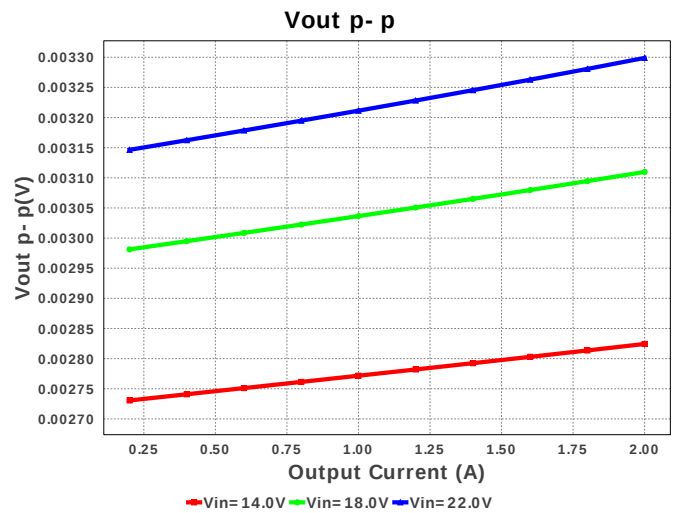
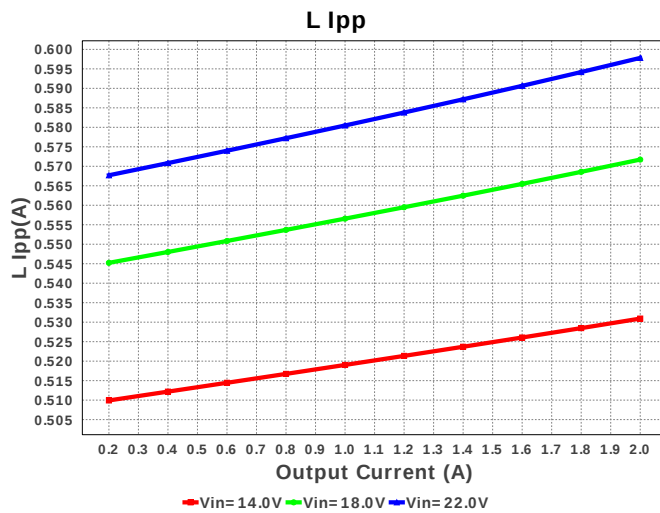
Design : 4077713/38 TPS54335ADDAR  
TPS54335ADDAR 14.0V-22.0V to 3.30V @ 2.0A

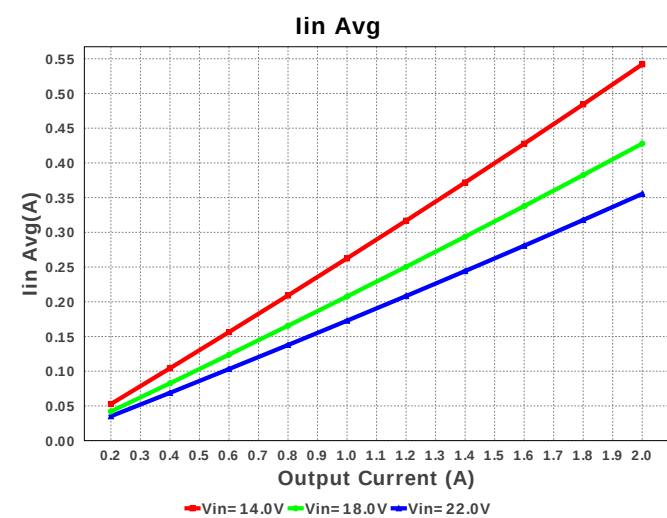
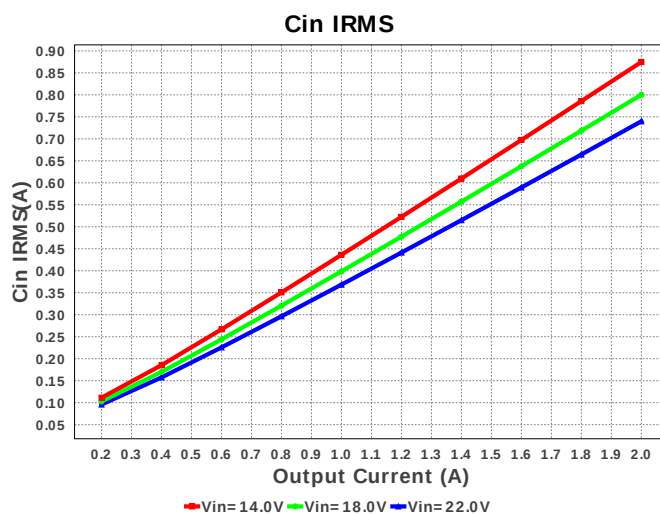
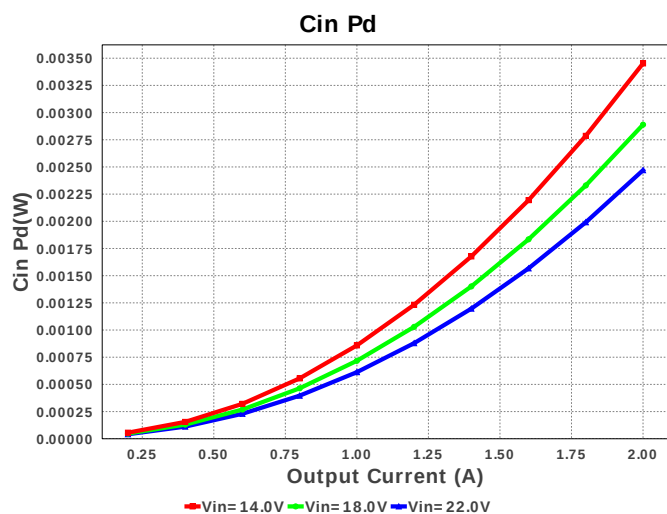
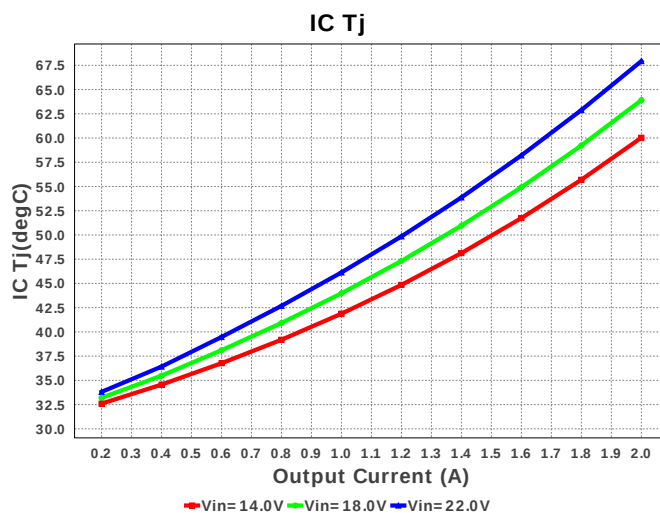
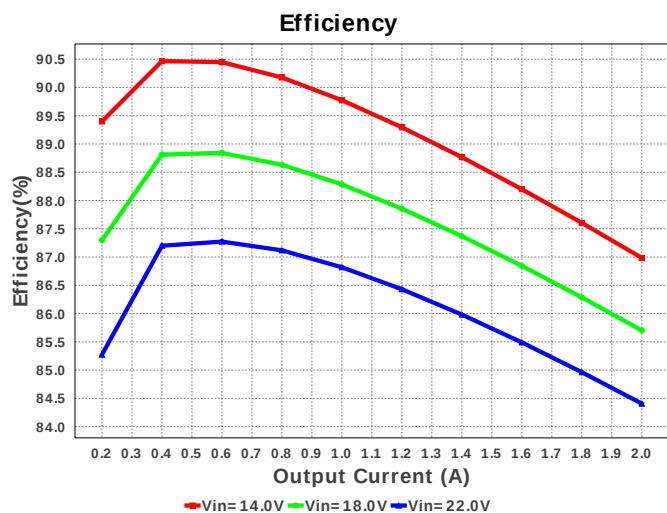


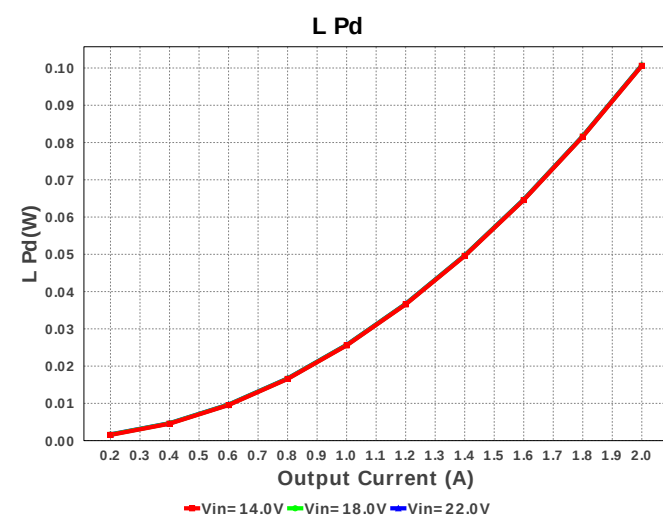
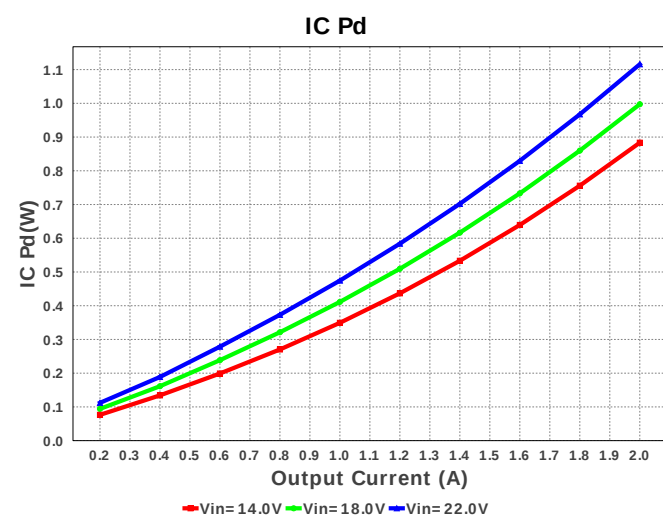
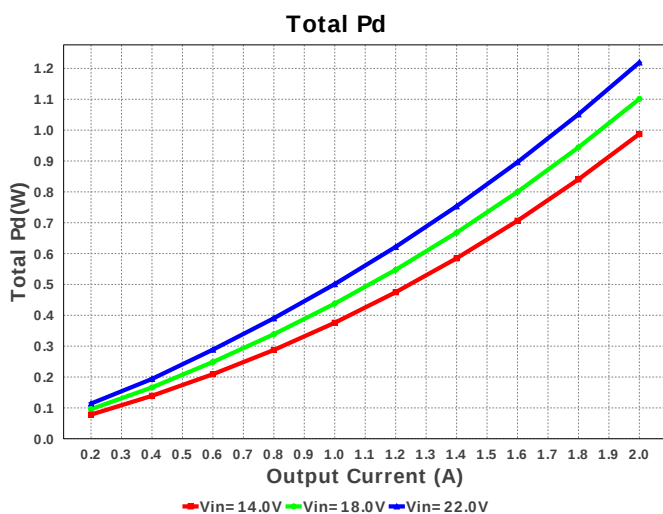
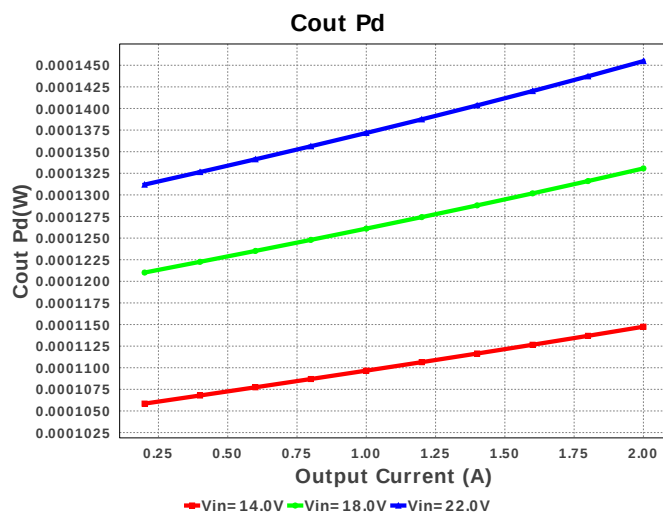
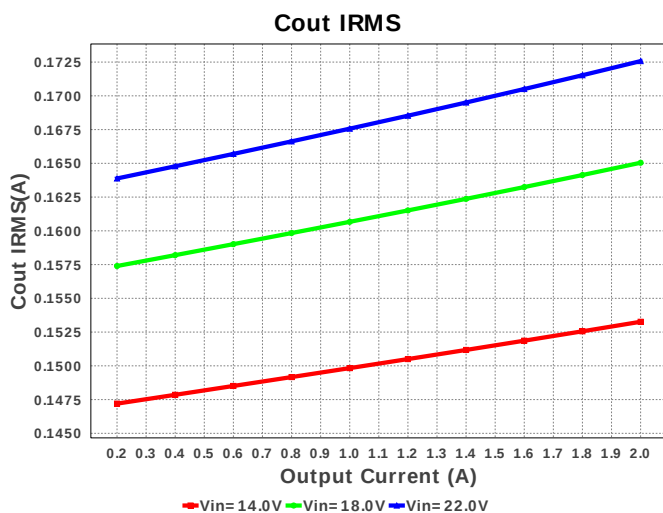
## Electrical BOM

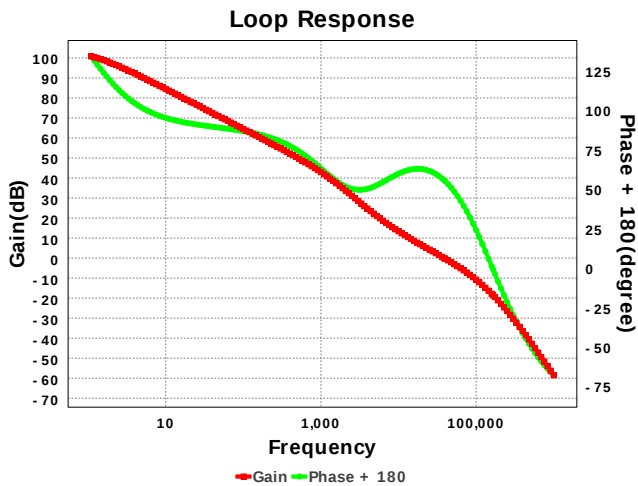
| #   | Name   | Manufacturer  | Part Number                           | Properties                                                       | Qty | Price  | Footprint                                                                                                            |
|-----|--------|---------------|---------------------------------------|------------------------------------------------------------------|-----|--------|----------------------------------------------------------------------------------------------------------------------|
| 1.  | Cboot  | Kemet         | C0805C104K5RACTU<br>Series= X7R       | Cap= 100.0 nF<br>ESR= 64.0 mOhm<br>VDC= 50.0 V<br>IRMS= 1.64 A   | 1   | \$0.01 | <br>0805 7 mm <sup>2</sup>       |
| 2.  | Ccomp  | Yageo America | CC0805KRX7R9BB472<br>Series= X7R      | Cap= 4.7 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | <br>0805 7 mm <sup>2</sup>      |
| 3.  | Ccomp2 | Yageo America | CC0805JRNPO9BN101<br>Series= C0G/NP0  | Cap= 100.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A                      | 1   | \$0.01 | <br>0805 7 mm <sup>2</sup>      |
| 4.  | Cin    | MuRata        | GRM31CR61E106KA12L<br>Series= X5R     | Cap= 10.0 uF<br>ESR= 4.512 mOhm<br>VDC= 25.0 V<br>IRMS= 2.447 A  | 1   | \$0.05 | <br>1206_190 11 mm <sup>2</sup> |
| 5.  | Cinx   | Kemet         | C0805C104K5RACTU<br>Series= X7R       | Cap= 100.0 nF<br>ESR= 64.0 mOhm<br>VDC= 50.0 V<br>IRMS= 1.64 A   | 1   | \$0.01 | <br>0805 7 mm <sup>2</sup>      |
| 6.  | Cout   | MuRata        | GRM31CR60J107ME39L<br>Series= X5R     | Cap= 100.0 uF<br>ESR= 4.885 mOhm<br>VDC= 6.3 V<br>IRMS= 4.4118 A | 1   | \$0.14 | <br>1206_190 11 mm <sup>2</sup> |
| 7.  | L1     | Bourns        | SRU1038-100Y                          | L= 10.0 uH<br>DCR= 25.0 mOhm                                     | 1   | \$0.33 | <br>SRU1038 144 mm <sup>2</sup> |
| 8.  | Rcomp  | Vishay-Dale   | CRCW04025K76FKED<br>Series= CRCW...e3 | Res= 5.76 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%              | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>      |
| 9.  | Rfbb   | Vishay-Dale   | CRCW040232K4FKED<br>Series= CRCW...e3 | Res= 32.4 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%              | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>      |
| 10. | Rfbt   | Vishay-Dale   | CRCW0402100KFKED<br>Series= CRCW...e3 | Res= 100.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%             | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>      |

| #   | Name | Manufacturer      | Part Number                          | Properties                                          | Qty | Price  | Footprint              |
|-----|------|-------------------|--------------------------------------|-----------------------------------------------------|-----|--------|------------------------|
| 11. | Rt   | Vishay-Dale       | CRCW040295K3FKED<br>Series= CRCW..e3 | Res= 95.3 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 | 0402 3 mm <sup>2</sup> |
| 12. | U1   | Texas Instruments | TPS54335ADDAR                        | Switcher                                            | 1   | \$0.90 |                        |

R-PDSO-G8 57 mm<sup>2</sup>







## Operating Values

| #   | Name                | Value                 | Category | Description                                                                                |
|-----|---------------------|-----------------------|----------|--------------------------------------------------------------------------------------------|
| 1.  | Cin IRMS            | 739.877 mA            | Current  | Input capacitor RMS ripple current                                                         |
| 2.  | Cout IRMS           | 172.573 mA            | Current  | Output capacitor RMS ripple current                                                        |
| 3.  | Iin Avg             | 355.42 mA             | Current  | Average input current                                                                      |
| 4.  | L Ipp               | 597.81 mA             | Current  | Peak-to-peak inductor ripple current                                                       |
| 5.  | BOM Count           | 12                    | General  | Total Design BOM count                                                                     |
| 6.  | FootPrint           | 262.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                                                    |
| 7.  | Frequency           | 496.814 kHz           | General  | Switching frequency                                                                        |
| 8.  | IC Tolerance        | 12.0 mV               | General  | IC Feedback Tolerance                                                                      |
| 9.  | Pout                | 6.6 W                 | General  | Total output power                                                                         |
| 10. | Total BOM           | \$1.5                 | General  | Total BOM Cost                                                                             |
| 11. | ICThetaJA Effective | 34.0 degC/W           | Op_Point | Effective IC Junction-to-Ambient Thermal Resistance                                        |
| 12. | Low Freq Gain       | 100.743 dB            | Op_Point | Gain at 10Hz                                                                               |
| 13. | Vout Actual         | 3.269 V               | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 14. | Vout OP             | 3.3 V                 | Op_Point | Operational Output Voltage                                                                 |
| 15. | Cross Freq          | 38.81 kHz             | Op_point | Bode plot crossover frequency                                                              |
| 16. | Duty Cycle          | 16.184 %              | Op_point | Duty cycle                                                                                 |
| 17. | Efficiency          | 84.407 %              | Op_point | Steady state efficiency                                                                    |
| 18. | Gain Marg           | -18.499 dB            | Op_point | Bode Plot Gain Margin                                                                      |
| 19. | IC Tj               | 67.937 degC           | Op_point | IC junction temperature                                                                    |
| 20. | IOUT_OP             | 2.0 A                 | Op_point | Iout operating point                                                                       |
| 21. | Phase Marg          | 56.318 deg            | Op_point | Bode Plot Phase Margin                                                                     |
| 22. | VIN_OP              | 22.0 V                | Op_point | Vin operating point                                                                        |
| 23. | Vout p-p            | 3.299 mV              | Op_point | Peak-to-peak output ripple voltage                                                         |
| 24. | Cin Pd              | 2.47 mW               | Power    | Input capacitor power dissipation                                                          |
| 25. | Cout Pd             | 145.482 $\mu$ W       | Power    | Output capacitor power dissipation                                                         |
| 26. | IC Iq Pd            | 6.82 mW               | Power    | IC Iq Pd                                                                                   |
| 27. | IC Pd               | 1.116 W               | Power    | IC power dissipation                                                                       |
| 28. | L Pd                | 100.745 mW            | Power    | Inductor power dissipation                                                                 |
| 29. | Total Pd            | 1.219 W               | Power    | Total Power Dissipation                                                                    |
| 30. | Vout Tolerance      | 3.049 %               |          | 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  | 22.0      | Maximum input voltage  |
| 3. | VinMin  | 14.0      | Minimum input voltage  |
| 4. | Vout    | 3.3       | Output Voltage         |
| 5. | base_pn | TPS54335A | Base Product Number    |
| 6. | source  | DC        | Input Source Type      |
| 7. | Ta      | 30.0      | Ambient temperature    |

## Design Assistance

1. **TPS54335A** Product Folder : <http://www.ti.com/product/TPS54335A> : contains the data sheet and other resources.

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