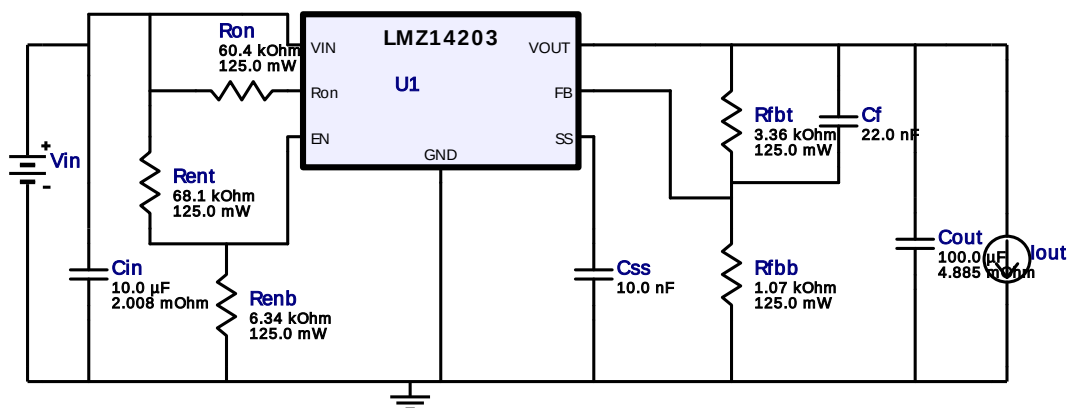


## WEBENCH® Design Report

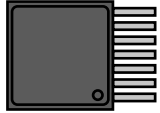
Design : 4709062/1 LMZ14203TZ-ADJ/NOPB  
LMZ14203TZ-ADJ/NOPB 14.0V-22.0V to 3.30V @ 2.0A

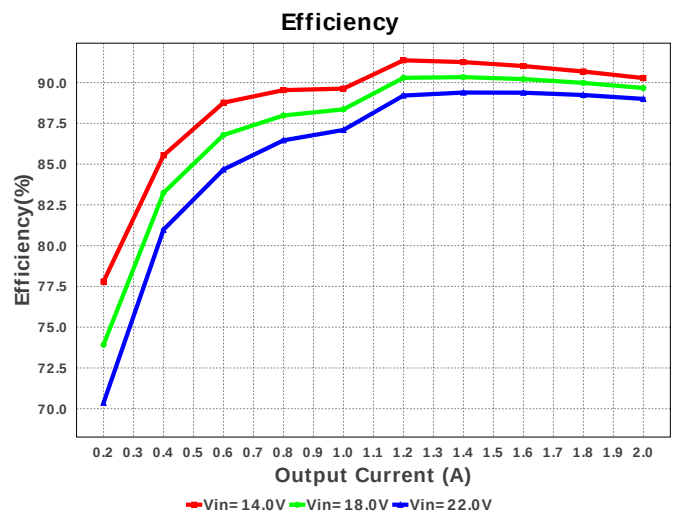
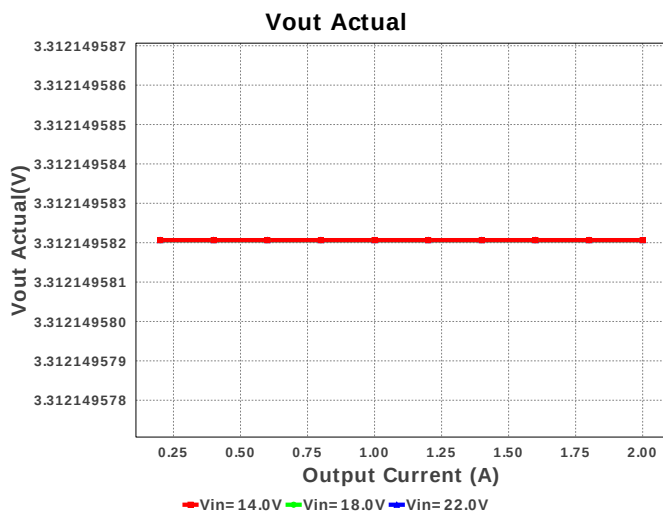
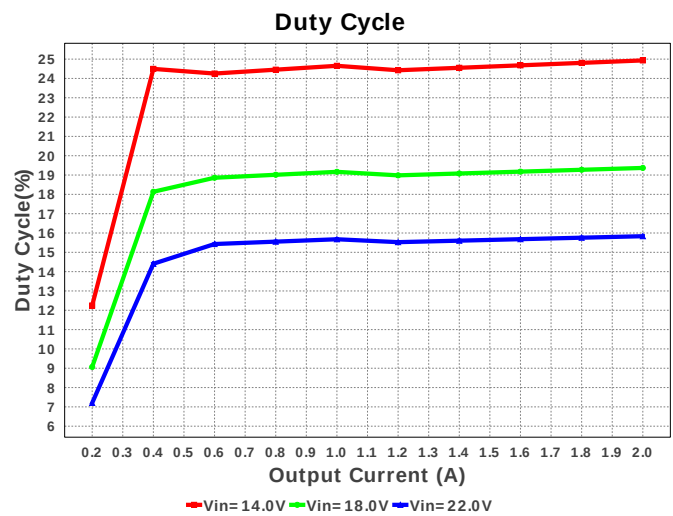
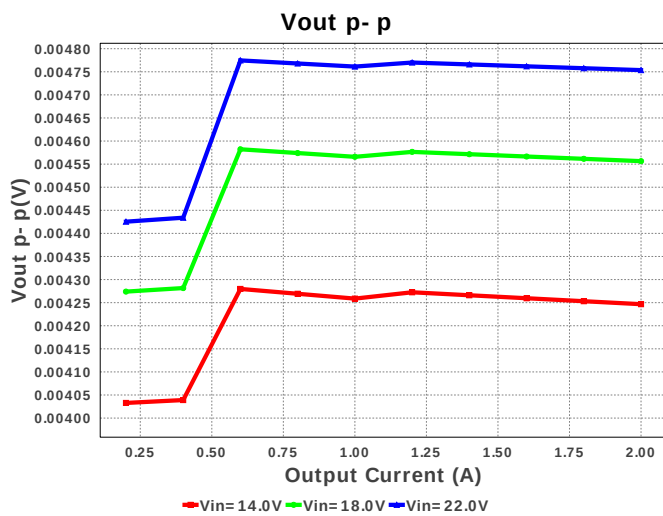
Vout = 3.3V  
Iout = 2.0A

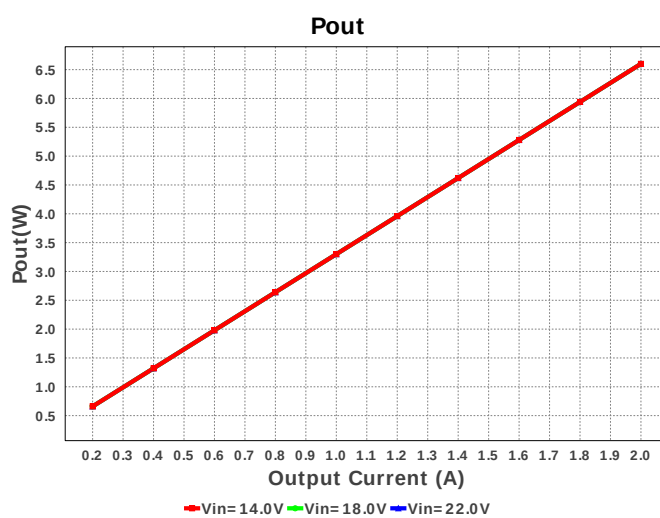
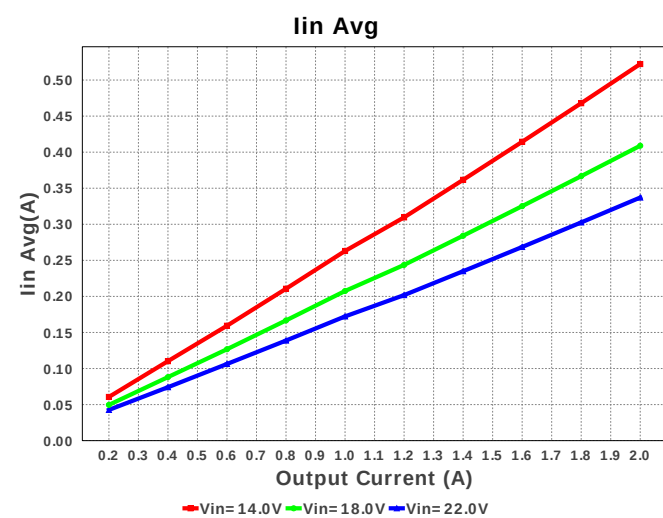
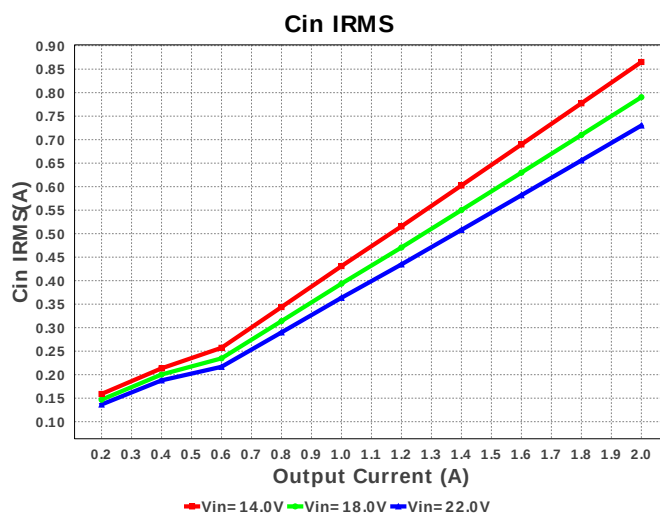
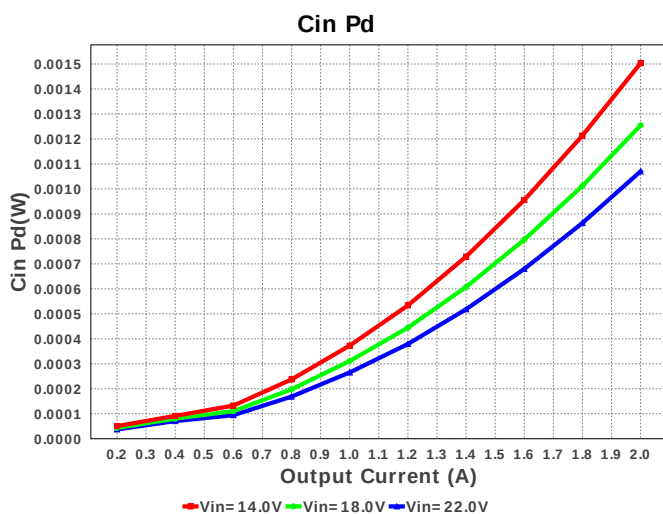
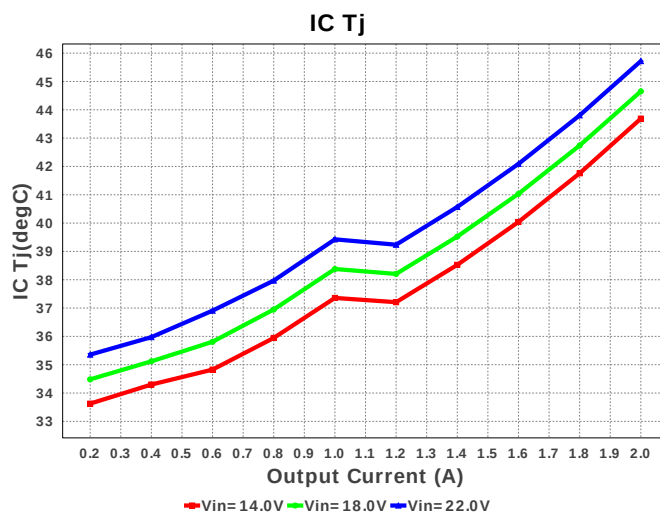
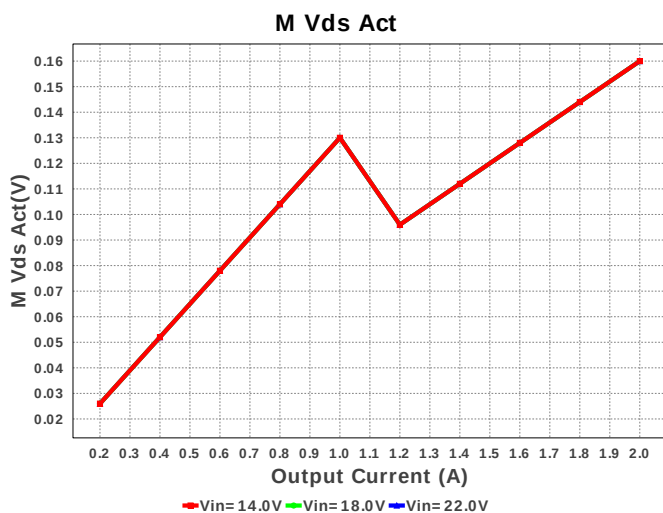


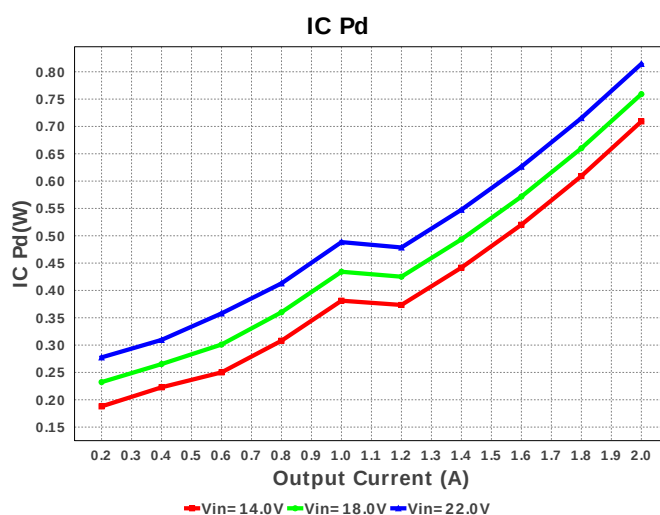
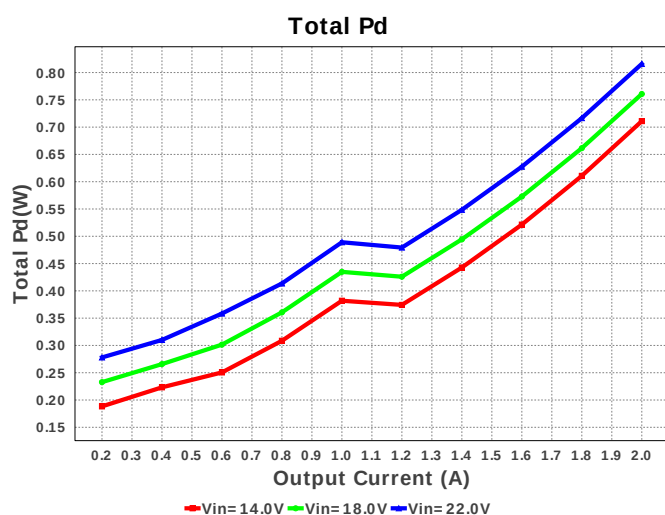
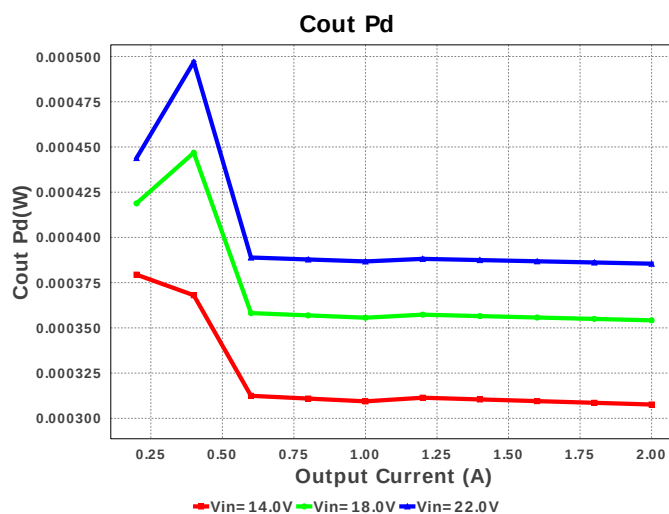
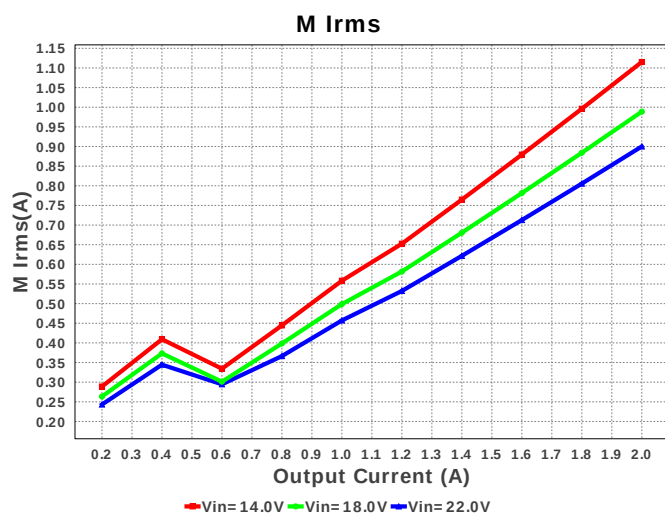
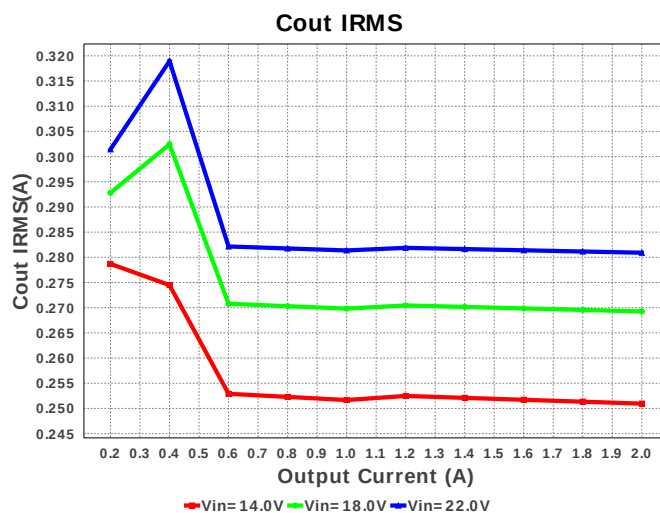
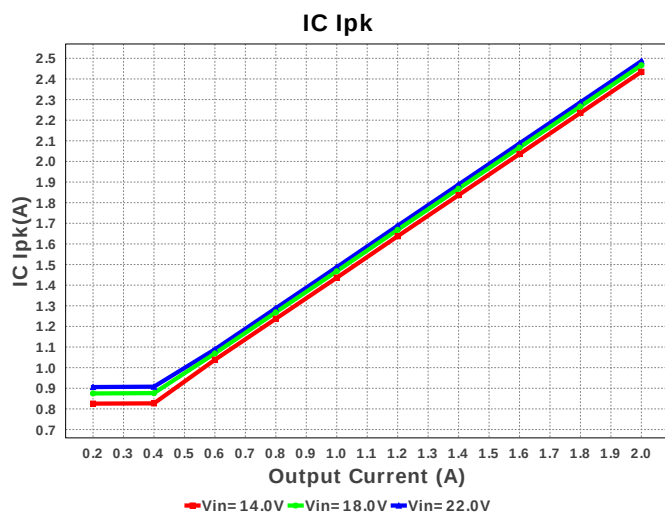
## Electrical BOM

| #  | Name | Manufacturer  | Part Number                        | Properties                                                       | Qty | Price  | Footprint                   |
|----|------|---------------|------------------------------------|------------------------------------------------------------------|-----|--------|-----------------------------|
| 1. | Cf   | Yageo America | CC0805KRX7R9BB223<br>Series= X7R   | Cap= 22.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |
| 2. | Cin  | MuRata        | GRM32ER7YA106KA12L<br>Series= X7R  | Cap= 10.0 uF<br>ESR= 2.008 mOhm<br>VDC= 35.0 V<br>IRMS= 4.6772 A | 1   | \$0.22 | 1210_280 15 mm <sup>2</sup> |
| 3. | 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 | 1206_190 11 mm <sup>2</sup> |
| 4. | Css  | MuRata        | GRM216R71H103KA01D<br>Series= X7R  | Cap= 10.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |
| 5. | Renb | Panasonic     | ERJ-6ENF6341V<br>Series= ERJ-6E    | Res= 6.34 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%             | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |
| 6. | Rent | Panasonic     | ERJ-6ENF6812V<br>Series= ERJ-6E    | Res= 68.1 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%             | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |
| 7. | Rfbb | Panasonic     | ERJ-6ENF1071V<br>Series= ERJ-6E    | Res= 1.07 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%             | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |
| 8. | Rfbt | Yageo America | RT0805BRD073K36L<br>Series= RT0805 | Res= 3.36 kOhm<br>Power= 125.0 mW<br>Tolerance= 0.1%             | 1   | \$0.05 | 0805 7 mm <sup>2</sup>      |
| 9. | Ron  | Panasonic     | ERJ-6ENF6042V<br>Series= ERJ-6E    | Res= 60.4 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%             | 1   | \$0.01 | 0805 7 mm <sup>2</sup>      |

| #      | Name | Manufacturer      | Part Number         | Properties | Qty | Price  | Footprint                                                                                                         |
|--------|------|-------------------|---------------------|------------|-----|--------|-------------------------------------------------------------------------------------------------------------------|
| 10. U1 |      | Texas Instruments | LMZ14203TZ-ADJ/NOPB | Switcher   | 1   | \$9.78 | <br>TZA07A 199 mm <sup>2</sup> |







## Operating Values

| #   | Name               | Value                 | Category | Description                             |
|-----|--------------------|-----------------------|----------|-----------------------------------------|
| 1.  | Cin IRMS           | 730.113 mA            | Current  | Input capacitor RMS ripple current      |
| 2.  | Cout IRMS          | 280.91 mA             | Current  | Output capacitor RMS ripple current     |
| 3.  | IC Ip <sub>k</sub> | 2.487 A               | Current  | Peak switch current in IC               |
| 4.  | Iin Avg            | 333.5 mA              | Current  | Average input current                   |
| 5.  | M1 Irms            | 891.041 mA            | Current  | Q Iavg                                  |
| 6.  | BOM Count          | 10                    | General  | Total Design BOM count                  |
| 7.  | FootPrint          | 272.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components |
| 8.  | Frequency          | 420.275 kHz           | General  | Switching frequency                     |
| 9.  | IC Tolerance       | 20.0 mV               | General  | IC Feedback Tolerance                   |
| 10. | M Vds Act          | 160.0 mV              | General  | Voltage drop across the MosFET          |
| 11. | Mode               | CCM                   | General  | Conduction Mode                         |

| #   | Name           | Value           | Category | Description                                                                                |
|-----|----------------|-----------------|----------|--------------------------------------------------------------------------------------------|
| 12. | Pout           | 6.6 W           | General  | Total output power                                                                         |
| 13. | Total BOM      | \$10.25         | General  | Total BOM Cost                                                                             |
| 14. | Vout Actual    | 3.312 V         | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 15. | Vout OP        | 3.3 V           | Op_Point | Operational Output Voltage                                                                 |
| 16. | Duty Cycle     | 15.834 %        | Op_point | Duty cycle                                                                                 |
| 17. | Efficiency     | 89.955 %        | Op_point | Steady state efficiency                                                                    |
| 18. | IC Tj          | 44.196 degC     | Op_point | IC junction temperature                                                                    |
| 19. | ICThetaJA      | 19.3 degC/W     | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 20. | IOUT_OP        | 2.0 A           | Op_point | Iout operating point                                                                       |
| 21. | VIN_OP         | 22.0 V          | Op_point | Vin operating point                                                                        |
| 22. | Vout p-p       | 4.754 mV        | Op_point | Peak-to-peak output ripple voltage                                                         |
| 23. | Cin Pd         | 1.07 mW         | Power    | Input capacitor power dissipation                                                          |
| 24. | Cout Pd        | 385.479 $\mu$ W | Power    | Output capacitor power dissipation                                                         |
| 25. | IC Pd          | 735.569 mW      | Power    | IC power dissipation                                                                       |
| 26. | Total Pd       | 737.002 mW      | Power    | Total Power Dissipation                                                                    |
| 27. | Vout Tolerance | 3.364 %         |          | 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 | LMZ14203 | Base Product Number    |
| 6. | source  | DC       | Input Source Type      |
| 7. | Ta      | 30.0     | Ambient temperature    |

## Design Assistance

1. **LMZ14203** Product Folder : <http://www.ti.com/product/LMZ14203> : contains the data sheet and other resources.

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