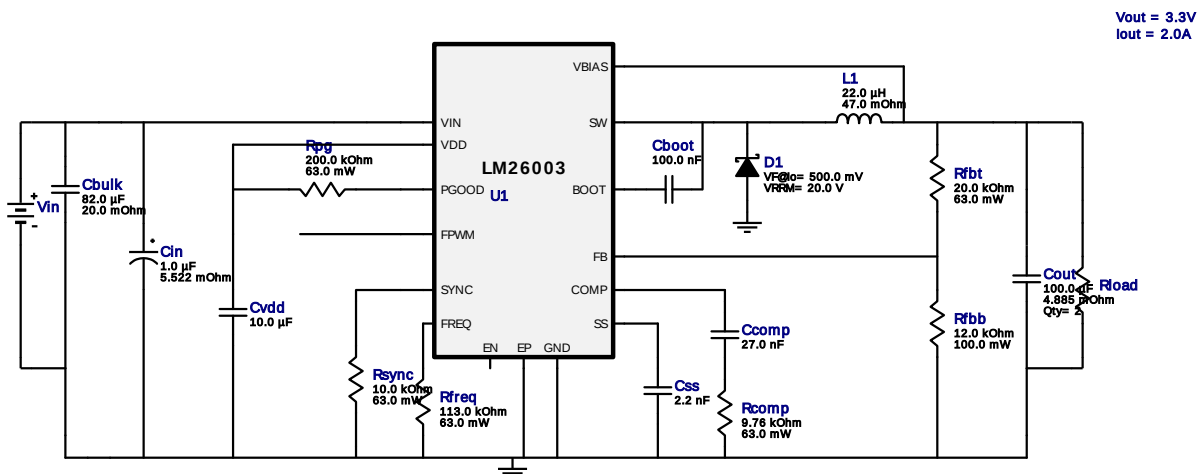
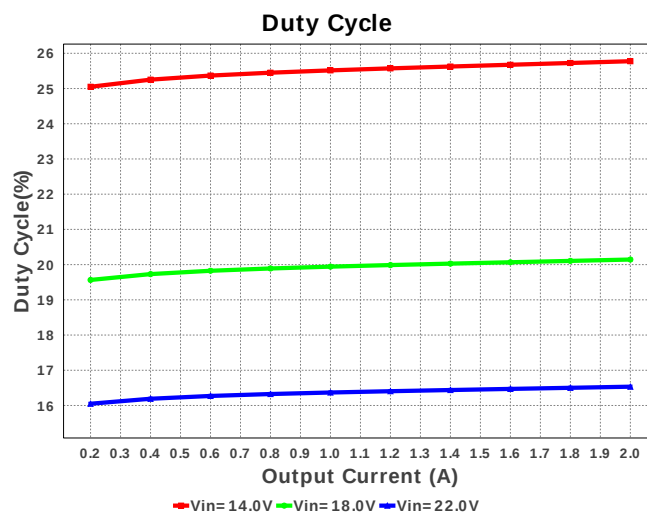
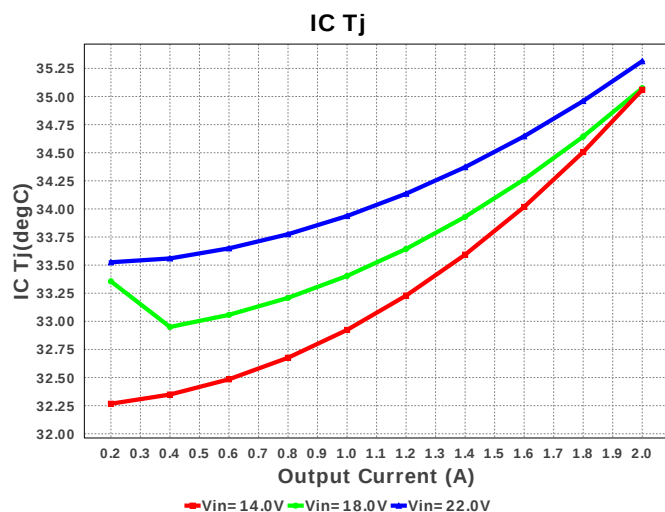


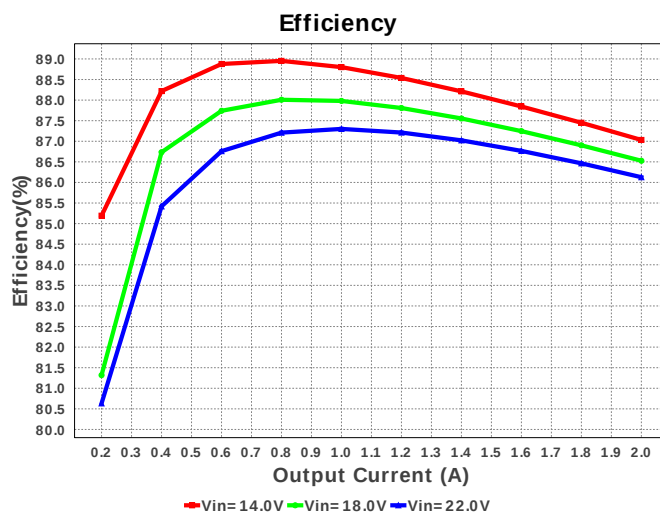
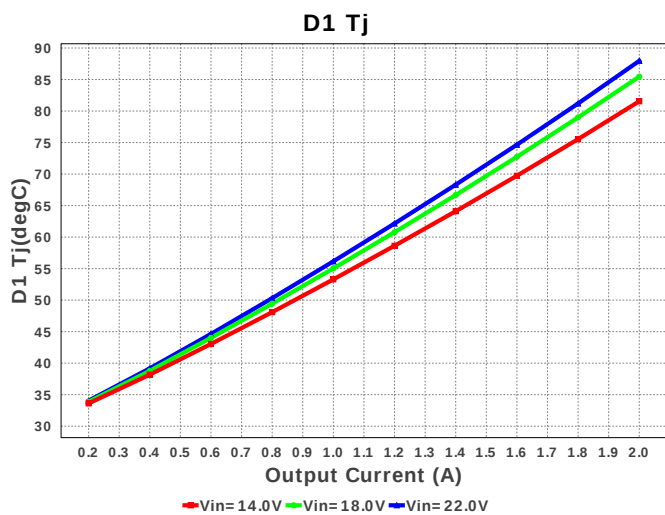
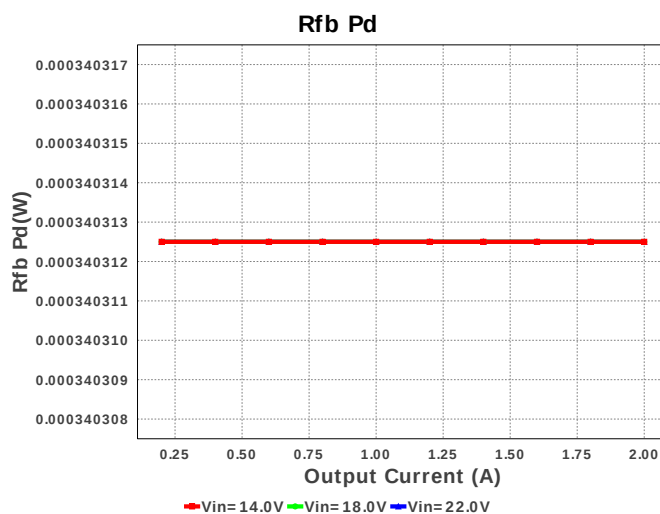
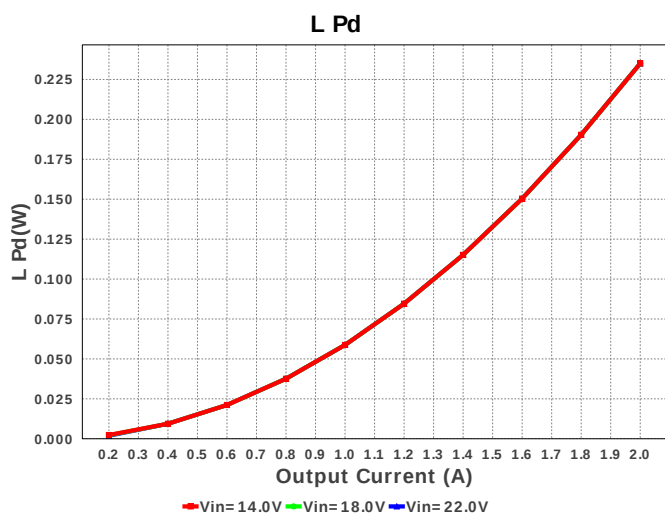
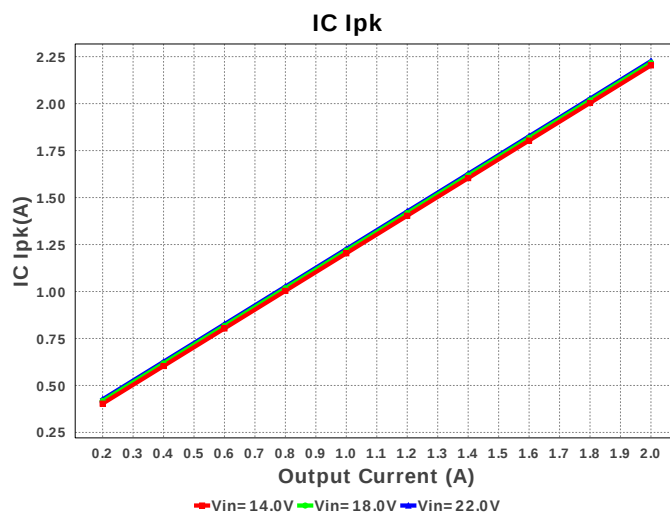
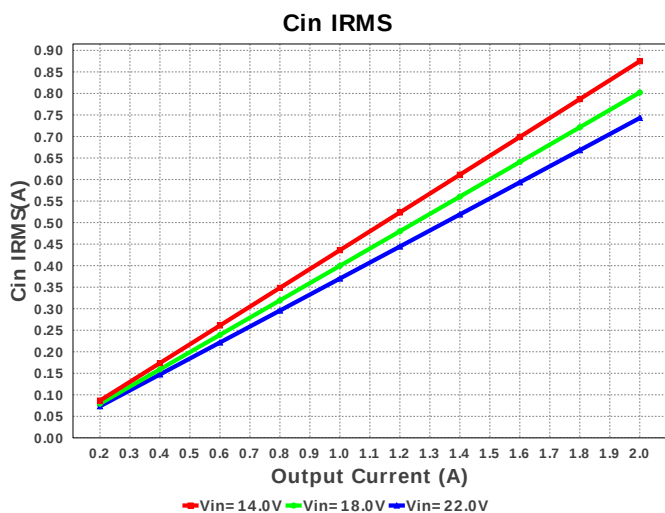


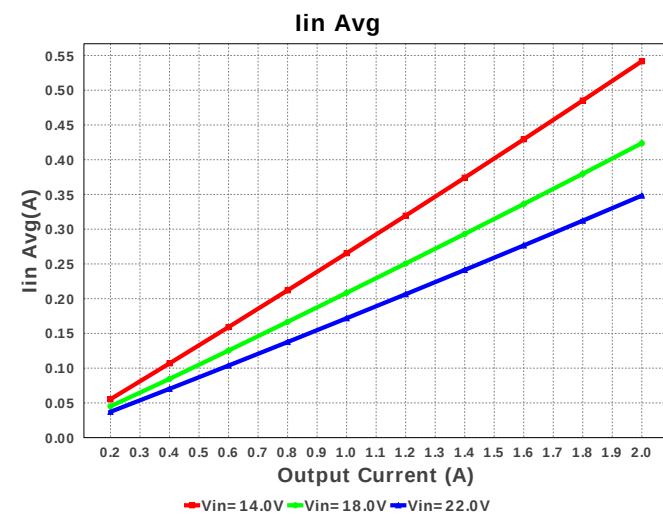
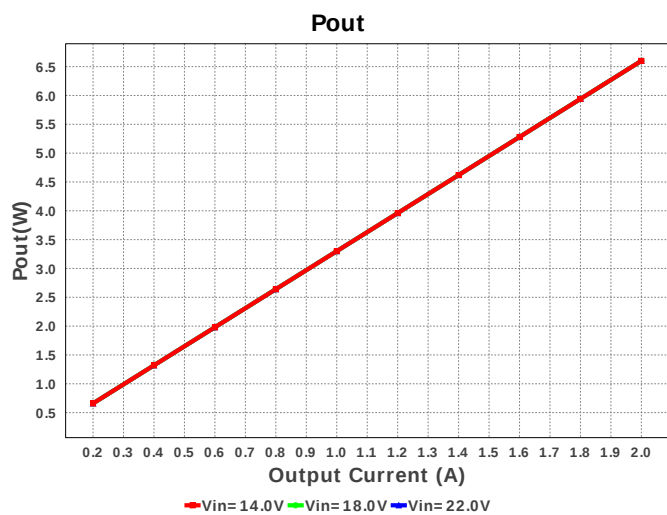
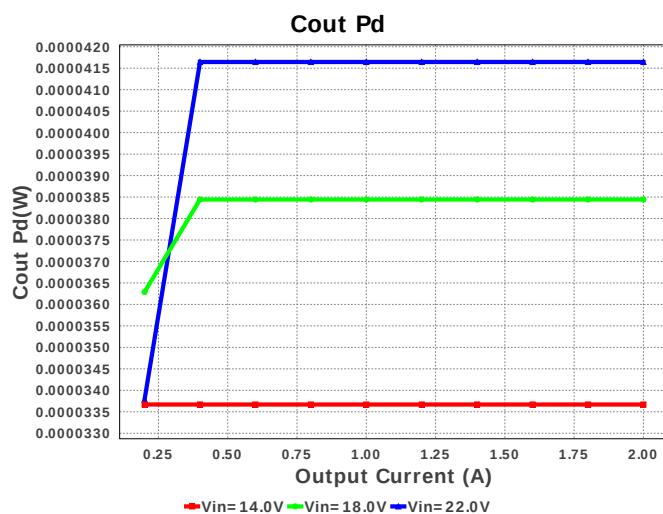
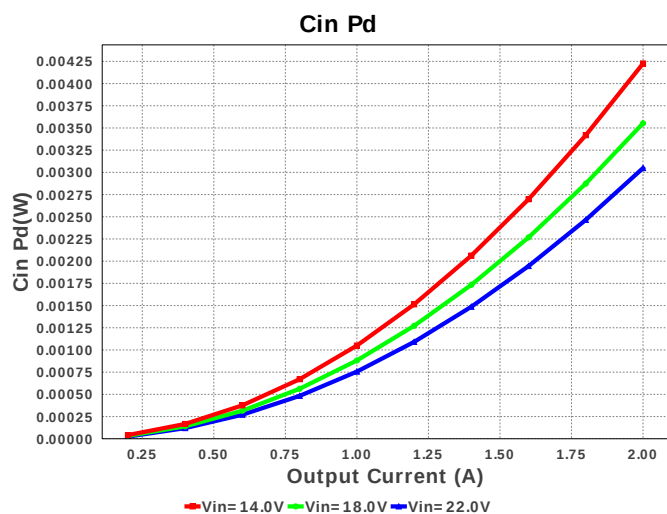
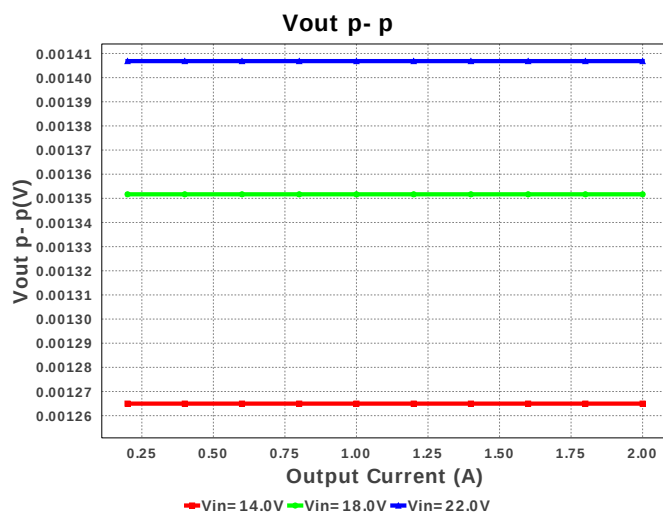
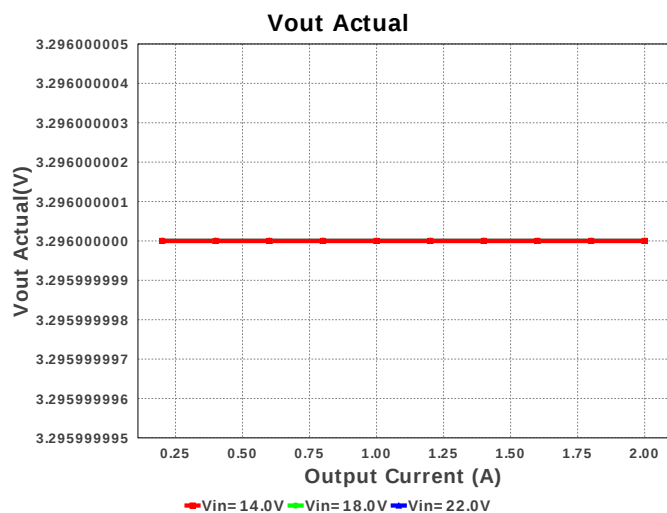
## Electrical BOM

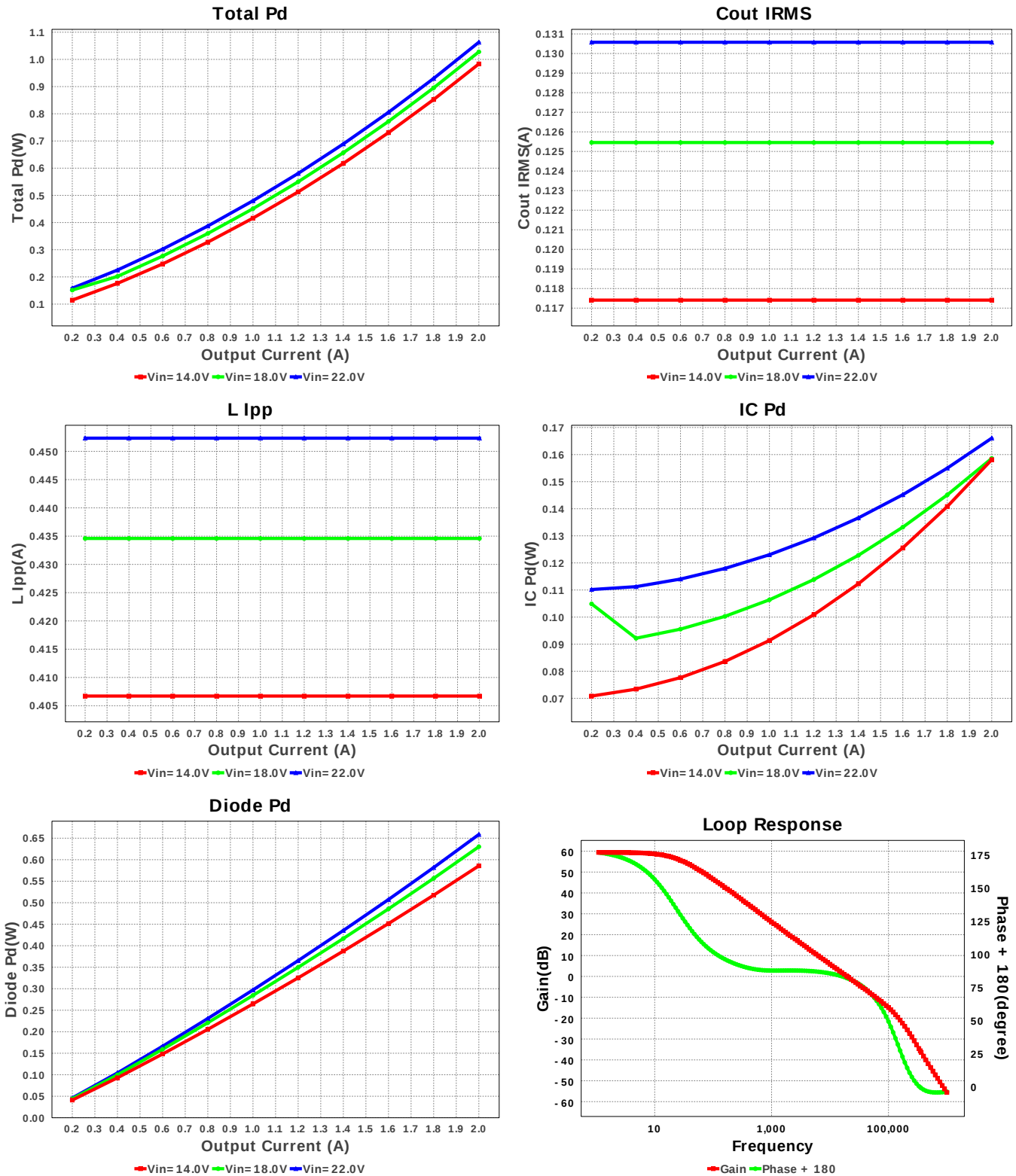
| #  | Name  | Manufacturer         | Part Number                        | Properties                                                       | Qty | Price  | Footprint                         |
|----|-------|----------------------|------------------------------------|------------------------------------------------------------------|-----|--------|-----------------------------------|
| 1. | Cboot | MuRata               | GRM21BR71E104KA01L<br>Series= X7R  | Cap= 100.0 nF<br>VDC= 25.0 V<br>IRMS= 0.0 A                      | 1   | \$0.01 | 0805 7 mm <sup>2</sup>            |
| 2. | Cbulk | Panasonic            | 35SVPF82M<br>Series= ?             | Cap= 82.0 uF<br>ESR= 20.0 mOhm<br>VDC= 35.0 V<br>IRMS= 4.0 A     | 1   | \$0.61 | CAPSMT_62_E12 106 mm <sup>2</sup> |
| 3. | Ccomp | Yageo America        | CC0805KRX7R9BB273<br>Series= X7R   | Cap= 27.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | 0805 7 mm <sup>2</sup>            |
| 4. | Cin   | TDK                  | C1608X7R1V105K080AC<br>Series= X7R | Cap= 1.0 uF<br>ESR= 5.522 mOhm<br>VDC= 35.0 V<br>IRMS= 2.2162 A  | 1   | \$0.05 | 0603 5 mm <sup>2</sup>            |
| 5. | 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 | 2   | \$0.14 | 1206_190 11 mm <sup>2</sup>       |
| 6. | Css   | Yageo America        | CC0805KRX7R9BB222<br>Series= X7R   | Cap= 2.2 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | 0805 7 mm <sup>2</sup>            |
| 7. | Cvdd  | Taiyo Yuden          | LMK212BJ106KG-T<br>Series= X5R     | Cap= 10.0 uF<br>VDC= 10.0 V<br>IRMS= 0.0 A                       | 1   | \$0.03 | 0805 7 mm <sup>2</sup>            |
| 8. | D1    | Vishay-Semiconductor | SS12-E3/61T                        | VF@Io= 500.0 mV<br>VRRM= 20.0 V                                  | 1   | \$0.08 | SMA 37 mm <sup>2</sup>            |
| 9. | L1    | Bourns               | SDR1307-220ML                      | L= 22.0 uH<br>DCR= 47.0 mOhm                                     | 1   | \$0.35 | SDR1307 227 mm <sup>2</sup>       |

| #   | Name  | Manufacturer      | Part Number                          | Properties                                           | Qty | Price  | Footprint                                                                                                     |
|-----|-------|-------------------|--------------------------------------|------------------------------------------------------|-----|--------|---------------------------------------------------------------------------------------------------------------|
| 10. | Rcomp | Vishay-Dale       | CRCW04029K76FKED<br>Series= CRCW..e3 | Res= 9.76 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 |  0402 3 mm <sup>2</sup>    |
| 11. | Rfbb  | Yageo America     | RC0603FR-0712KL<br>Series= ?         | Res= 12.0 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 |  0603 5 mm <sup>2</sup>    |
| 12. | Rfbt  | Vishay-Dale       | CRCW040220K0FKED<br>Series= CRCW..e3 | Res= 20.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 |  0402 3 mm <sup>2</sup>    |
| 13. | Rfreq | Vishay-Dale       | CRCW0402113KFKED<br>Series= CRCW..e3 | Res= 113.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 |  0402 3 mm <sup>2</sup>    |
| 14. | Rpg   | Vishay-Dale       | CRCW0402200KFKED<br>Series= CRCW..e3 | Res= 200.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 |  0402 3 mm <sup>2</sup>    |
| 15. | Rsync | 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>    |
| 16. | U1    | Texas Instruments | LM26003MHX/NOPB                      | Switcher                                             | 1   | \$1.45 |  MXA20A 71 mm <sup>2</sup> |









## Operating Values

| #  | Name      | Value                 | Category | Description                             |
|----|-----------|-----------------------|----------|-----------------------------------------|
| 1. | Cin IRMS  | 742.97 mA             | Current  | Input capacitor RMS ripple current      |
| 2. | Cout IRMS | 130.576 mA            | Current  | Output capacitor RMS ripple current     |
| 3. | IC Ipk    | 2.226 A               | Current  | Peak switch current in IC               |
| 4. | Iin Avg   | 348.32 mA             | Current  | Average input current                   |
| 5. | L Ipp     | 452.33 mA             | Current  | Peak-to-peak inductor ripple current    |
| 6. | BOM Count | 17                    | General  | Total Design BOM count                  |
| 7. | FootPrint | 515.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components |
| 8. | Frequency | 324.583 kHz           | General  | Switching frequency                     |
| 9. | Pout      | 6.6 W                 | General  | Total output power                      |

| #   | Name           | Value           | Category | Description                                                                                |
|-----|----------------|-----------------|----------|--------------------------------------------------------------------------------------------|
| 10. | Total BOM      | \$2.94          | General  | Total BOM Cost                                                                             |
| 11. | D1 Tj          | 87.96 degC      | Op_Point | D1 junction temperature                                                                    |
| 12. | Low Freq Gain  | 59.406 dB       | Op_Point | Gain at 10Hz                                                                               |
| 13. | Vout Actual    | 3.296 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     | 19.622 kHz      | Op_point | Bode plot crossover frequency                                                              |
| 16. | Duty Cycle     | 16.534 %        | Op_point | Duty cycle                                                                                 |
| 17. | Efficiency     | 86.127 %        | Op_point | Steady state efficiency                                                                    |
| 18. | Gain Marg      | -35.585 dB      | Op_point | Bode Plot Gain Margin                                                                      |
| 19. | IC Tj          | 35.314 degC     | Op_point | IC junction temperature                                                                    |
| 20. | ICThetaJA      | 32.0 degC/W     | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 21. | IOUT_OP        | 2.0 A           | Op_point | Iout operating point                                                                       |
| 22. | Phase Marg     | 82.414 deg      | Op_point | Bode Plot Phase Margin                                                                     |
| 23. | VIN_OP         | 22.0 V          | Op_point | Vin operating point                                                                        |
| 24. | Vout p-p       | 1.407 mV        | Op_point | Peak-to-peak output ripple voltage                                                         |
| 25. | Cin Pd         | 3.048 mW        | Power    | Input capacitor power dissipation                                                          |
| 26. | Cout Pd        | 41.645 $\mu$ W  | Power    | Output capacitor power dissipation                                                         |
| 27. | Diode Pd       | 658.639 mW      | Power    | Diode power dissipation                                                                    |
| 28. | IC Pd          | 166.062 mW      | Power    | IC power dissipation                                                                       |
| 29. | L Pd           | 235.0 mW        | Power    | Inductor power dissipation                                                                 |
| 30. | Rfb Pd         | 340.312 $\mu$ W | Power    | Rfb Power Dissipation                                                                      |
| 31. | Total Pd       | 1.063 W         | Power    | Total Power Dissipation                                                                    |
| 32. | Vout Tolerance | 2.819 %         |          | 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 | LM26003 | Texas Instruments Base Part Number |
| 6. | source  | DC      | Input Source Type                  |
| 7. | ta      | 30.0    | Ambient temperature                |

## Design Assistance

1. LM26003 Product Folder : <http://www.ti.com/product/LM26003> : contains the data sheet and other resources.

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