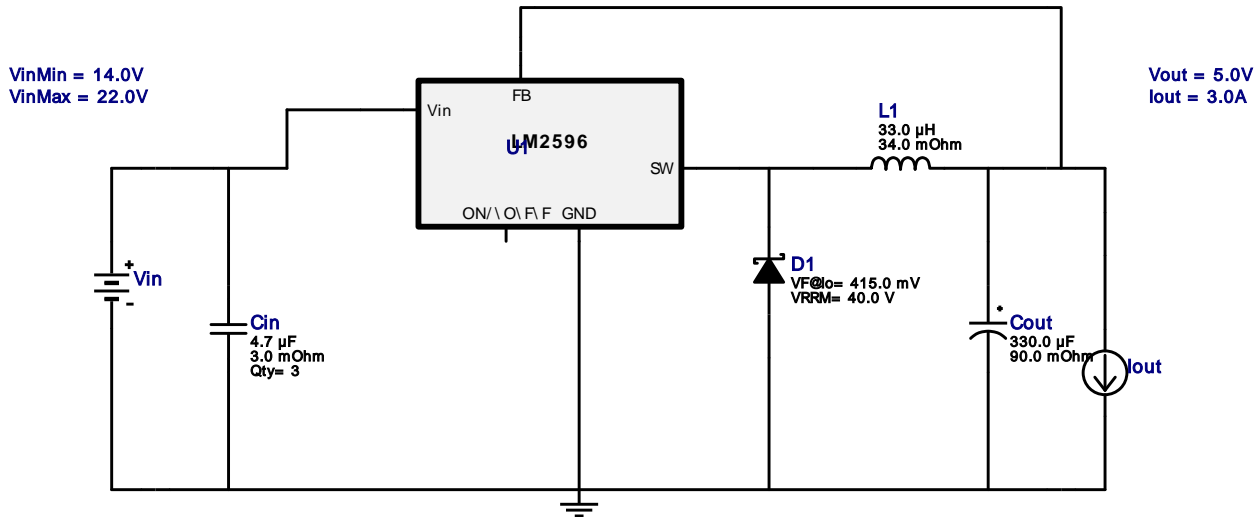

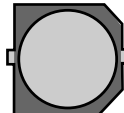


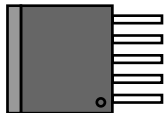
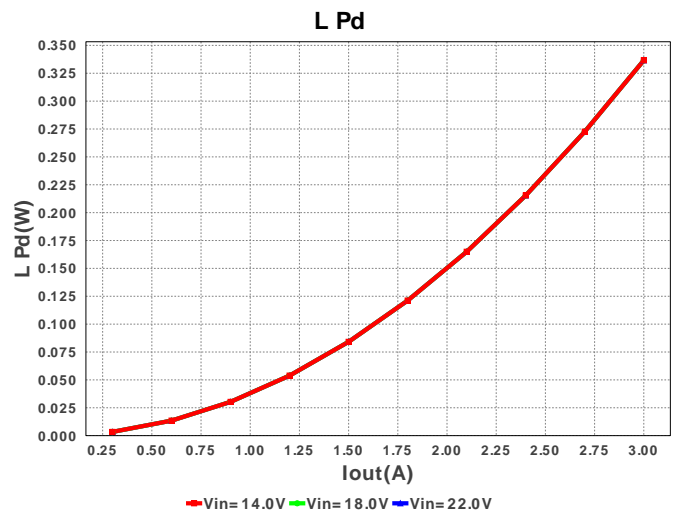
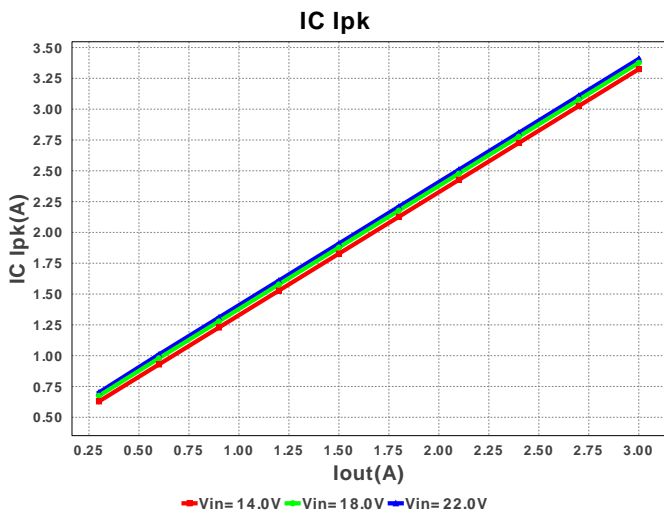
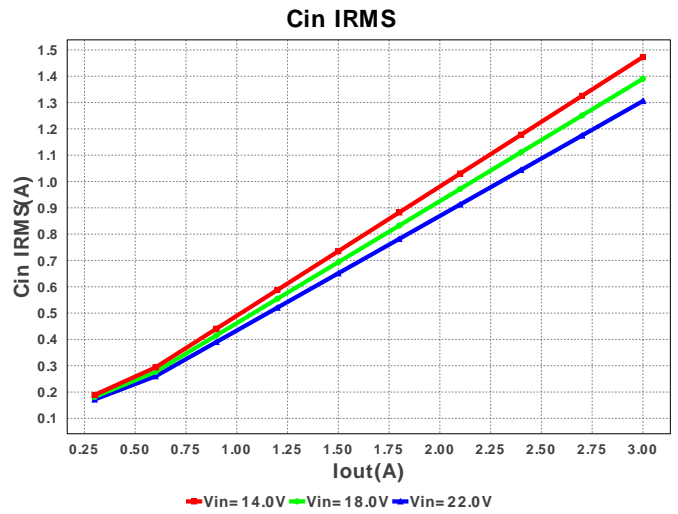
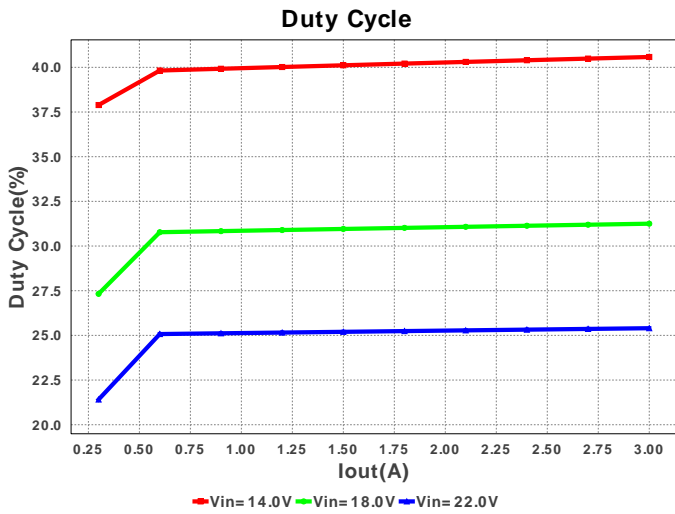
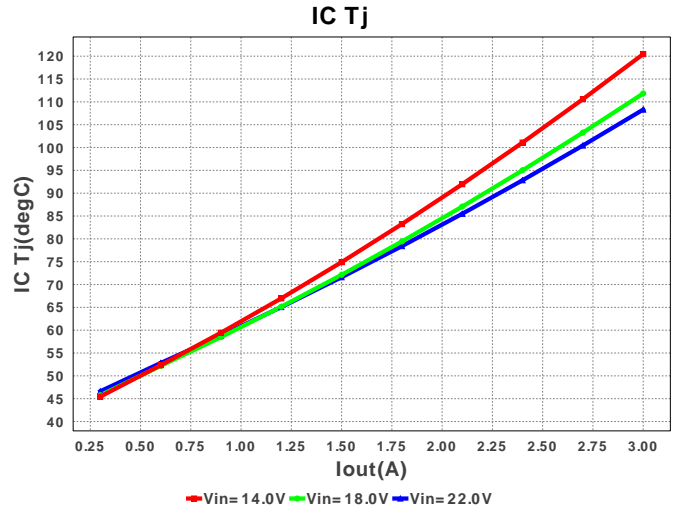
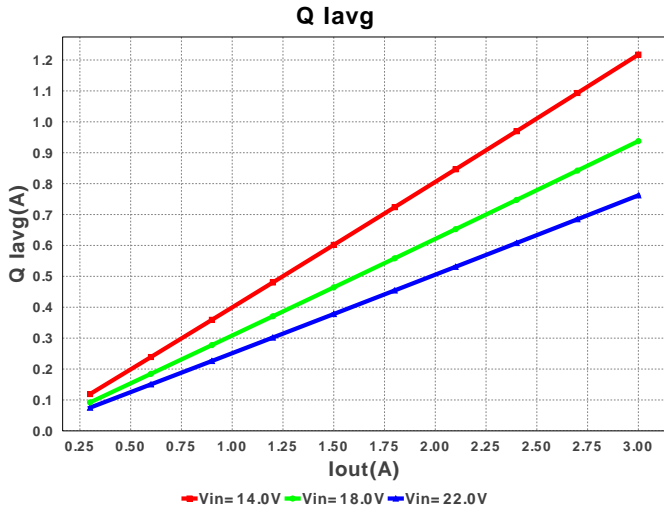
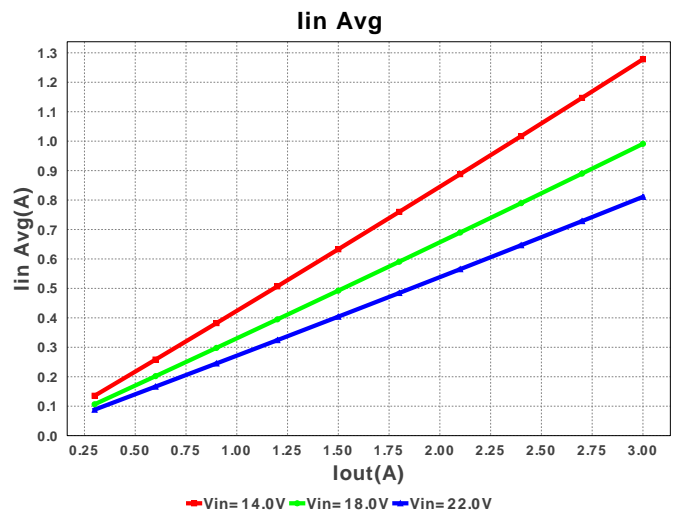
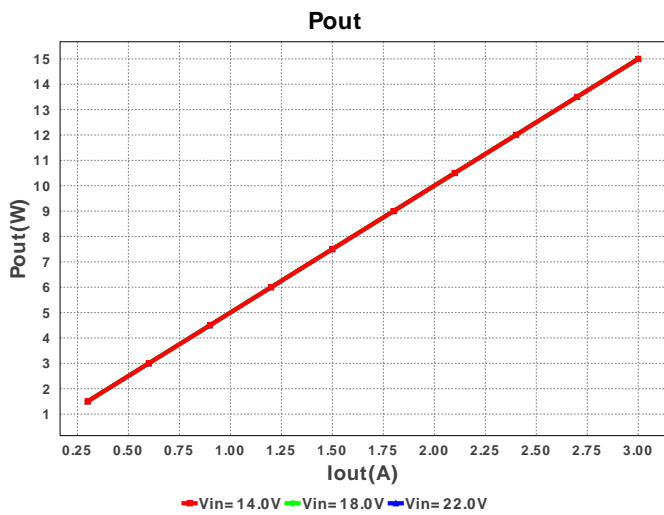
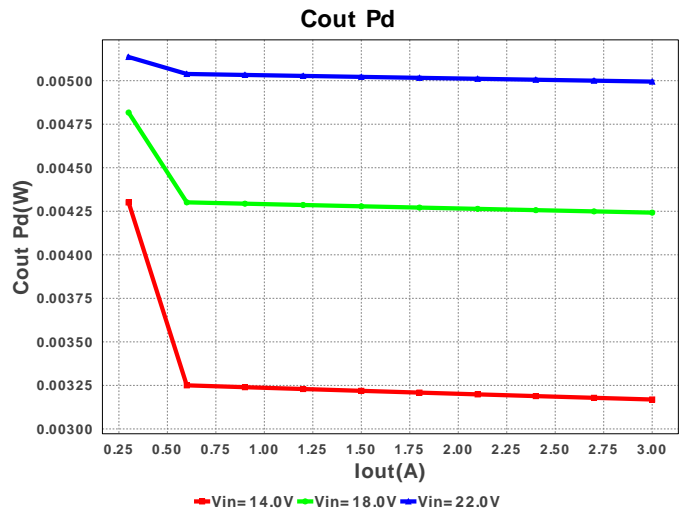
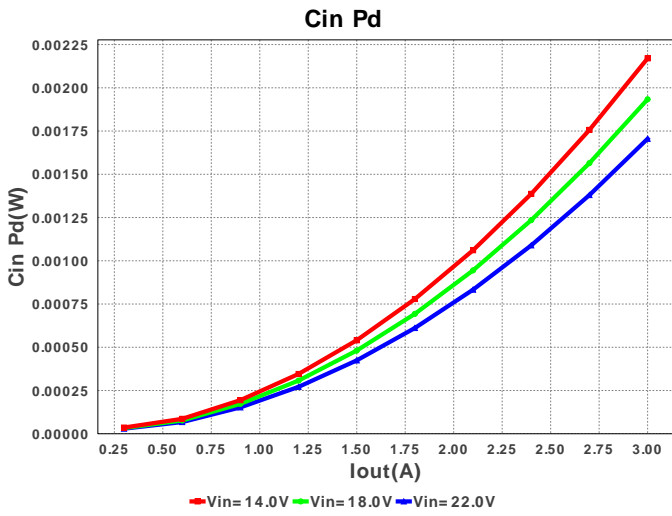
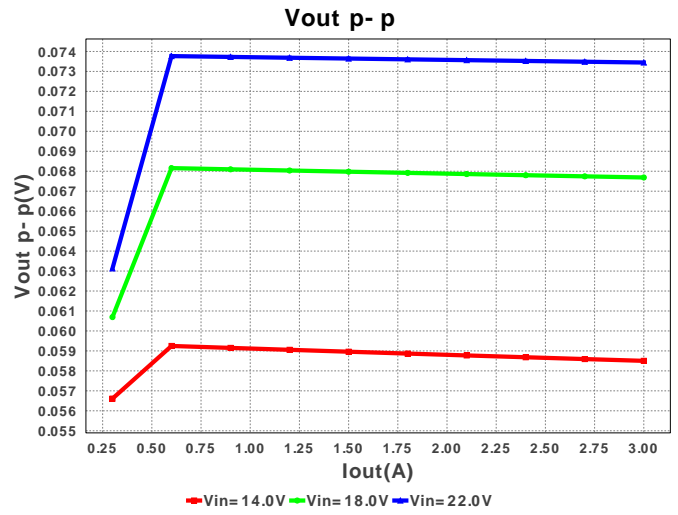
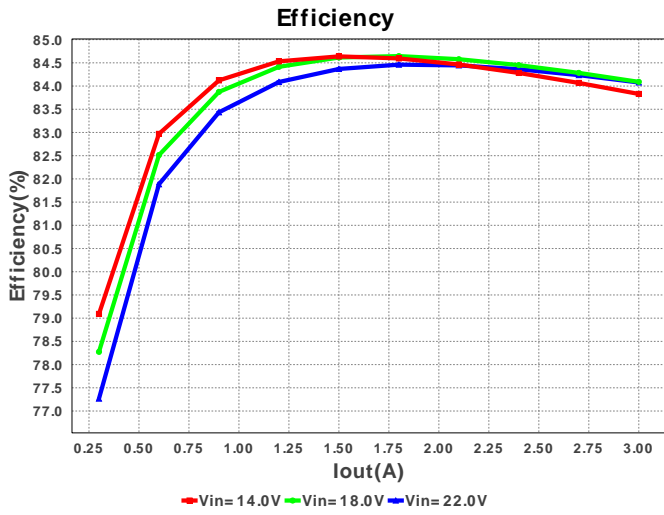


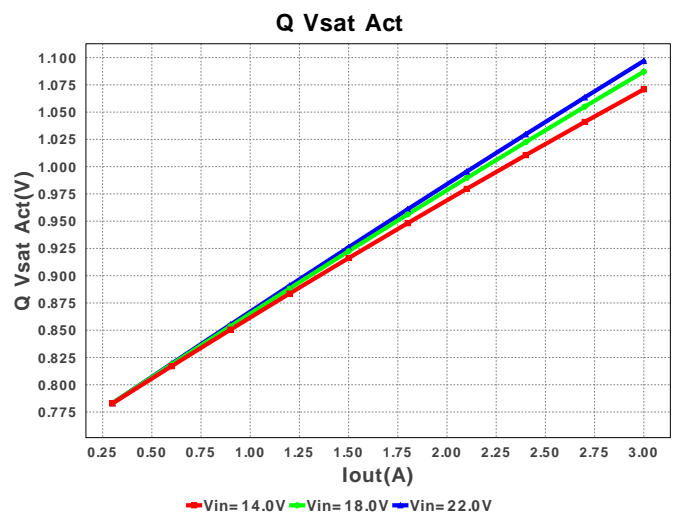
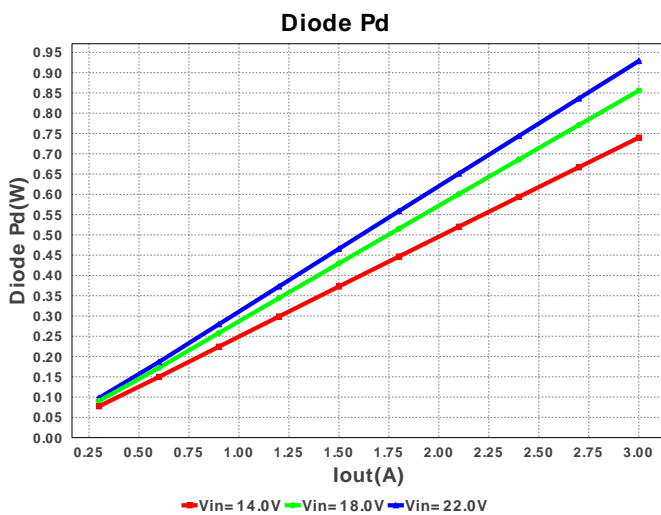
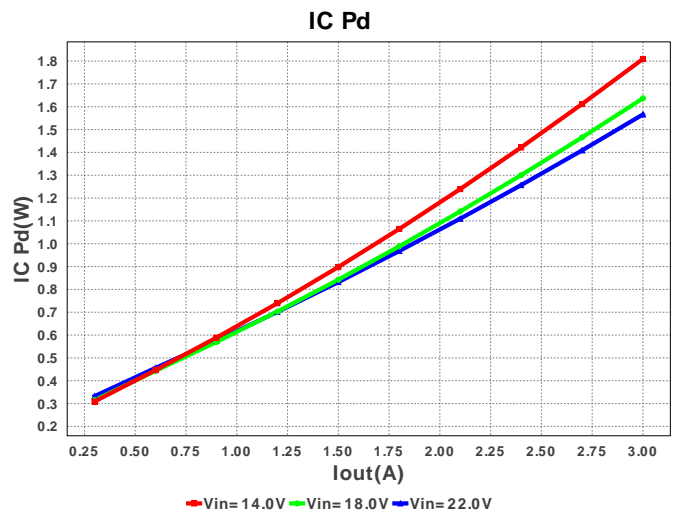
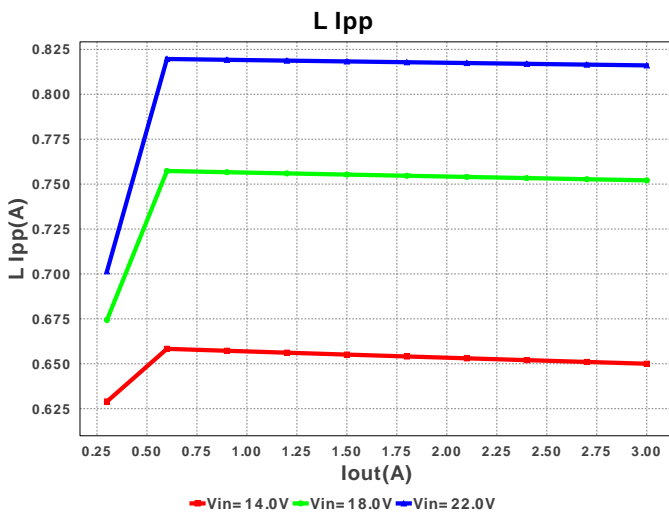
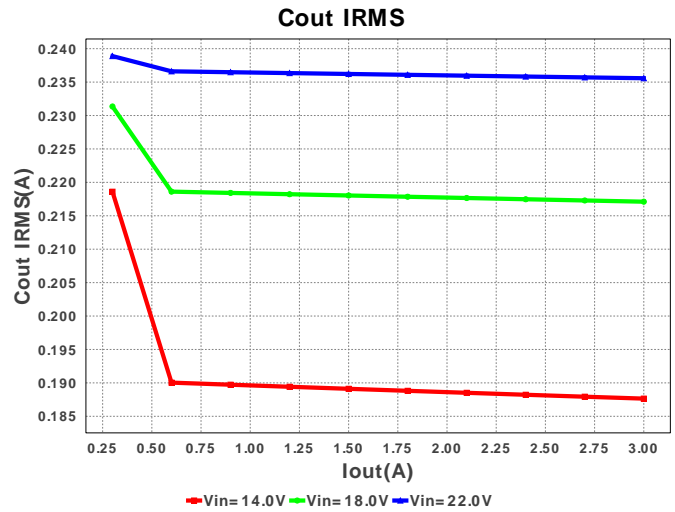
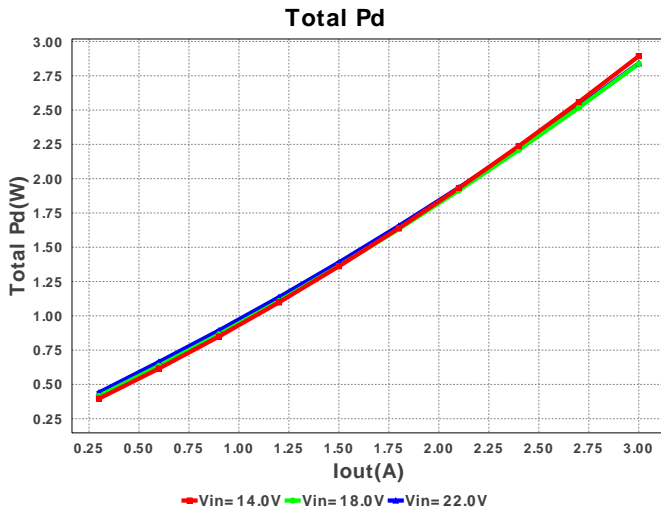
WEBENCH[®] Design Report

 Design : 1913858/1263 LM2596SX-5.0/NOPB
 LM2596SX-5.0/NOPB 14.0V-22.0V to 5.0V @ 3.0A

Electrical BOM

| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|----|------|-------------------|-----------------------------------|--|-----|--------|--|
| 1. | Cin | MuRata | GRM31CR71H475KA12L Series= X7R | Cap= 4.7 µF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A | 3 | \$0.10 |  1206 11mm ² |
| 2. | Cout | Nichicon | UUD1V331MNL1GS Series= uD | Cap= 330.0 µF ESR= 90.0 mOhm VDC= 35.0 V IRMS= 670.0 mA | 1 | \$0.25 |  SM_RADIAL_10BMM 160mm ² |
| 3. | D1 | ON Semiconductor | MBRA340T3G | VF@Io= 415.0 mV VRRM= 40.0 V | 1 | \$0.19 |  SMA 37mm ² |
| 4. | L1 | Coilcraft | MSS1210-333MEB | L= 33.0 µH DCR= 34.0 mOhm | 1 | \$0.81 |  MSS1210 204mm ² |
| 5. | U1 | Texas Instruments | LM2596SX-5.0/NOPB | Switcher | 1 | \$1.80 |  TS5B 199mm ² |







Operating Values

| # | Name | Value | Category | Description |
|-----|--------------|------------|----------|---|
| 1. | Cin IRMS | 1.306 A | Current | Input capacitor RMS ripple current |
| 2. | Cout IRMS | 235.578 mA | Current | Output capacitor RMS ripple current |
| 3. | IC Ipk | 3.408 A | Current | Peak switch current in IC |
| 4. | Iin Avg | 811.28 mA | Current | Average input current |
| 5. | L Ipp | 816.067 mA | Current | Peak-to-peak inductor ripple current |
| 6. | Q Iavg | 762.031 mA | Current | Q Iavg |
| 7. | BOM Count | 7 | General | Total Design BOM count |
| 8. | FootPrint | 633.0 mm2 | General | Total Foot Print Area of BOM components |
| 9. | Frequency | 150.0 kHz | General | Switching frequency |
| 10. | IC Tolerance | 0.0 V | General | IC Feedback Tolerance |
| 11. | Pout | 15.0 W | General | Total output power |

| # | Name | Value | Category | Description |
|-----|------------|--------------|----------|---|
| 12. | Q Vsat Act | 1.097 V | General | Q Vsat |
| 13. | Total BOM | \$3.34 | General | Total BOM Cost |
| 14. | Cross Freq | 22.909 kHz | Op_point | Bode plot crossover frequency |
| 15. | Duty Cycle | 25.401 % | Op_point | Duty cycle |
| 16. | Efficiency | 84.042 % | Op_point | Steady state efficiency |
| 17. | IC Tj | 108.308 degC | Op_point | IC junction temperature |
| 18. | ICThetaJA | 50.0 degC/W | Op_point | IC junction-to-ambient thermal resistance |
| 19. | IOUT_OP | 3.0 A | Op_point | Iout operating point |
| 20. | Phase Marg | 75.579 deg | Op_point | Bode Plot Phase Margin |
| 21. | VIN_OP | 22.0 V | Op_point | Vin operating point |
| 22. | Vout p-p | 73.446 mV | Op_point | Peak-to-peak output ripple voltage |
| 23. | Cin Pd | 1.705 mW | Power | Input capacitor power dissipation |
| 24. | Cout Pd | 4.995 mW | Power | Output capacitor power dissipation |
| 25. | Diode Pd | 928.757 mW | Power | Diode power dissipation |
| 26. | IC Pd | 1.566 W | Power | IC power dissipation |
| 27. | L Pd | 336.6 mW | Power | Inductor power dissipation |
| 28. | Total Pd | 2.848 W | Power | Total Power Dissipation |

Design Inputs

| # | Name | Value | Description |
|----|---------|-----------|------------------------|
| 1. | Iout | 3.0 A | Maximum Output Current |
| 2. | Iout1 | 3.0 Amps | Output Current #1 |
| 3. | VinMax | 22.0 V | Maximum input voltage |
| 4. | VinMin | 14.0 V | Minimum input voltage |
| 5. | Vout | 5.0 V | Output Voltage |
| 6. | Vout1 | 5.0 Volt | Output Voltage #1 |
| 7. | base_pn | LM2596 | Base Product Number |
| 8. | source | DC | Input Source Type |
| 9. | Ta | 30.0 degC | Ambient temperature |

Design Assistance

1. **LM2596** Product Folder : <http://www.ti.com/product/lm2596> : contains the data sheet and other resources.

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