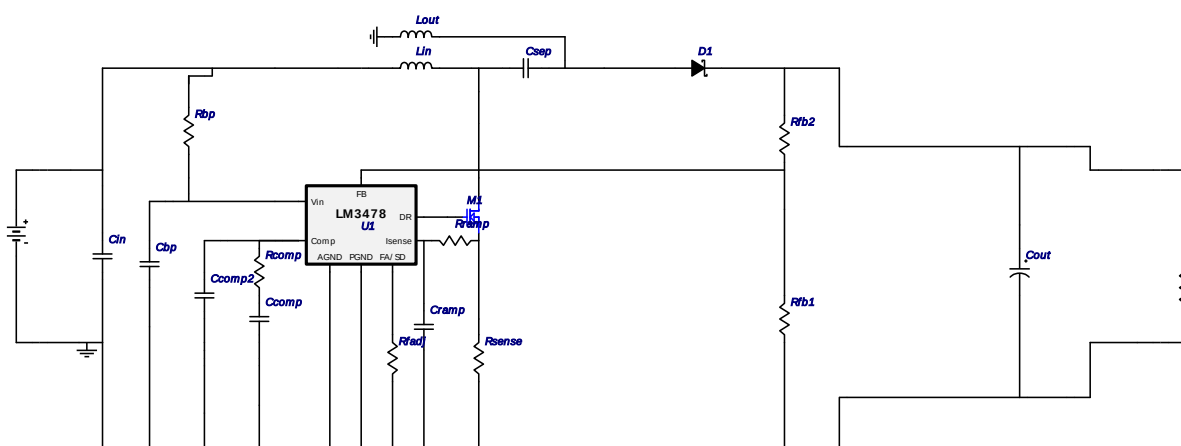
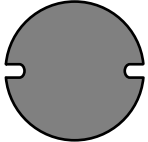
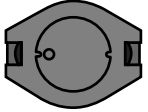


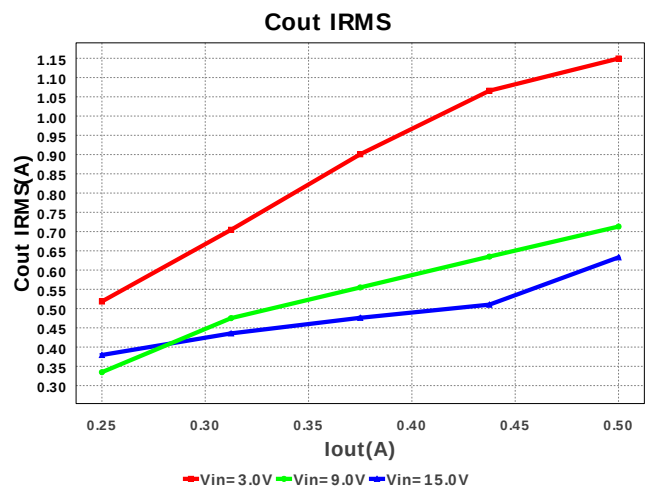
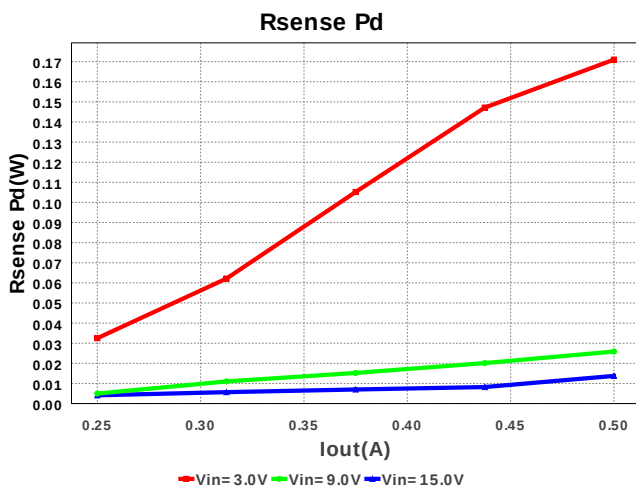


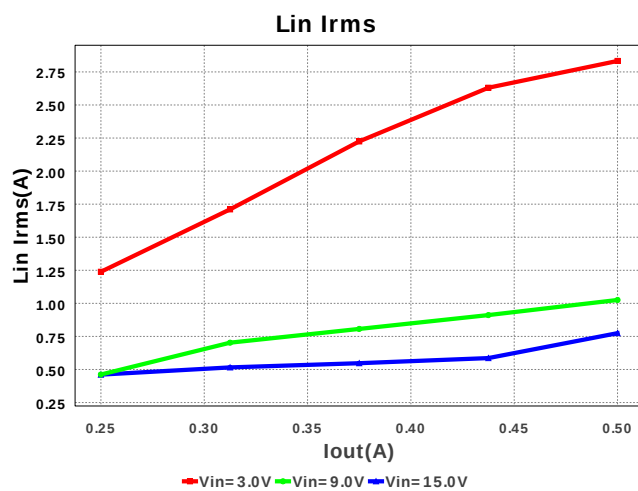
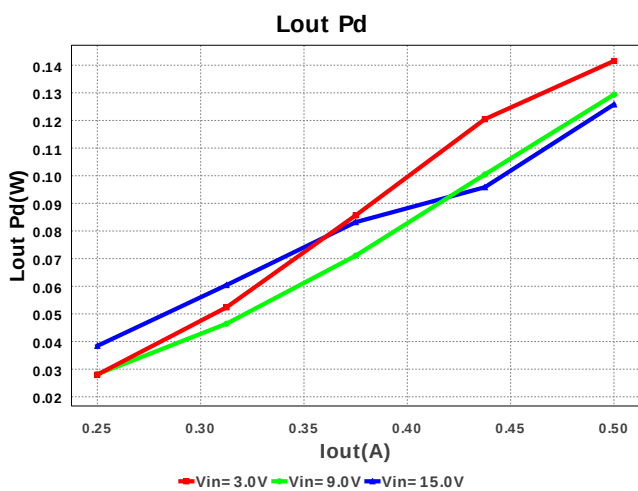
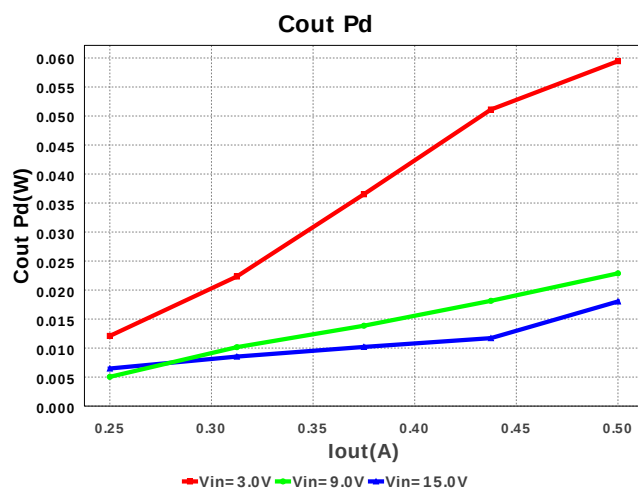
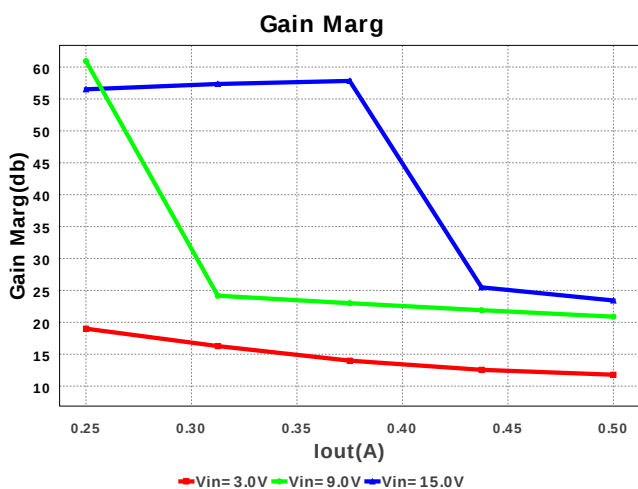
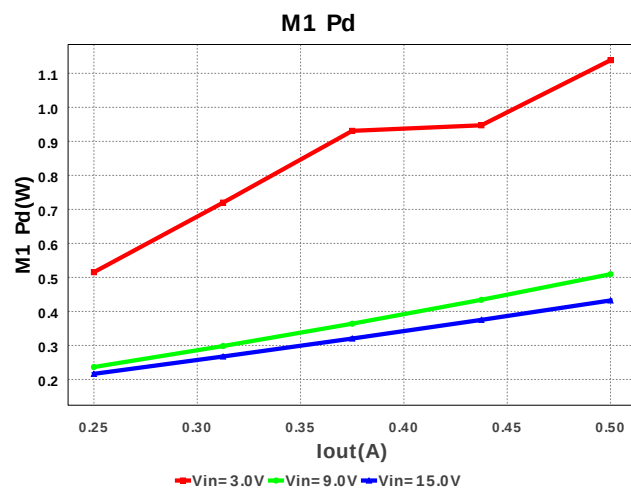
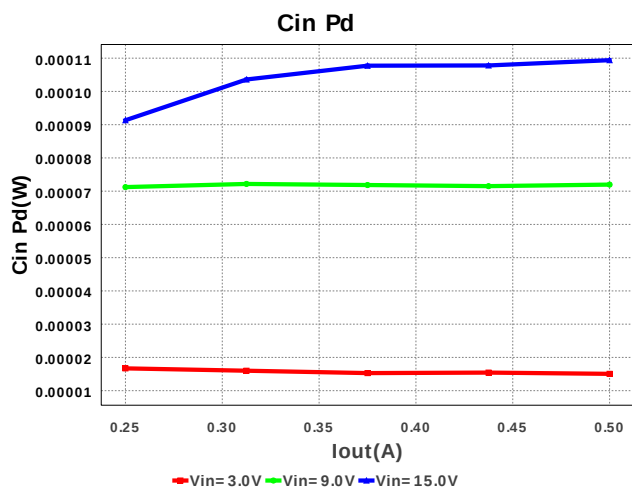
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Topology = SEPIC  
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Total Pd = 2.28W  
Footprint = 778.0mm2  
BOM Count = 19

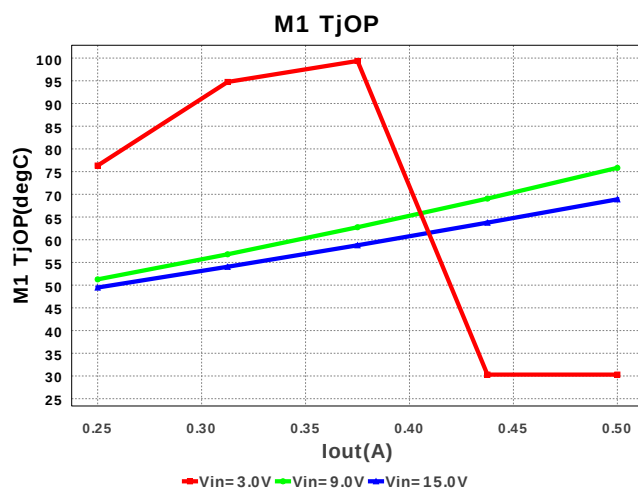
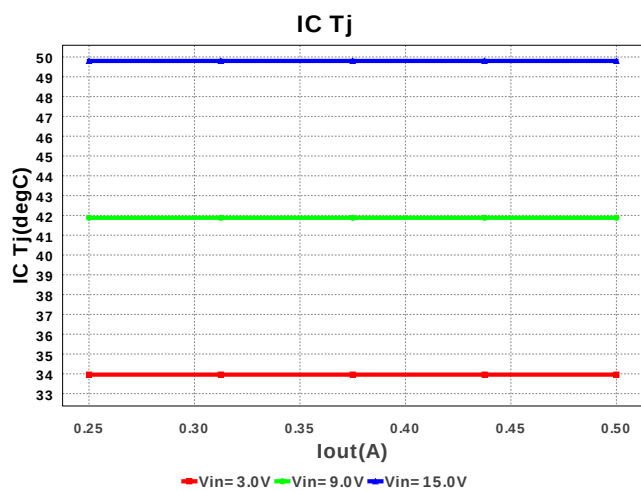
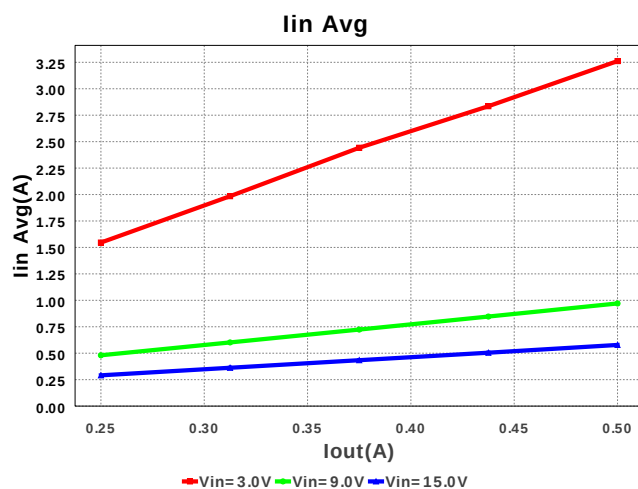
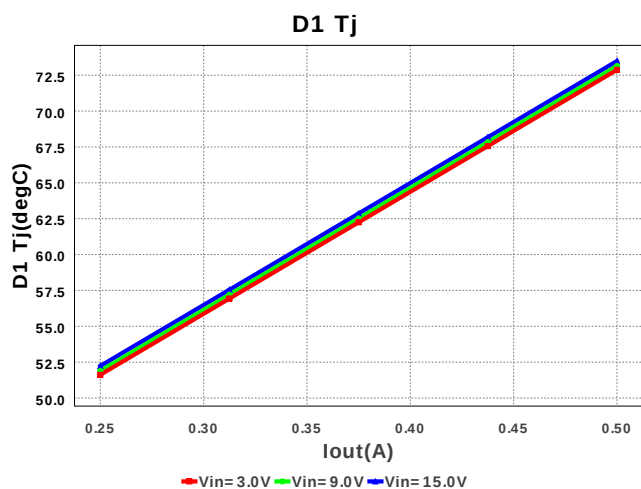
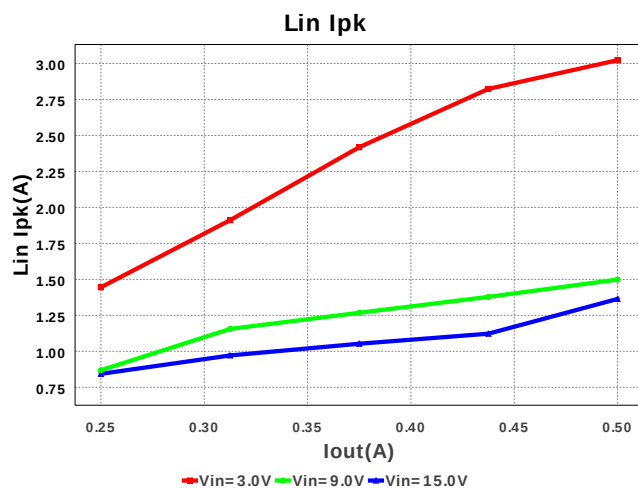
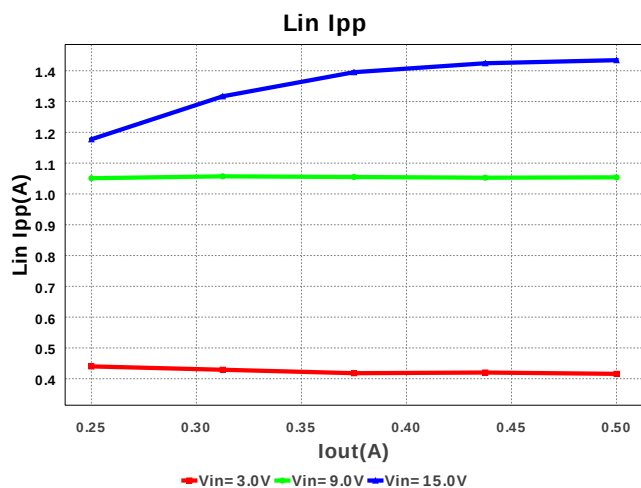


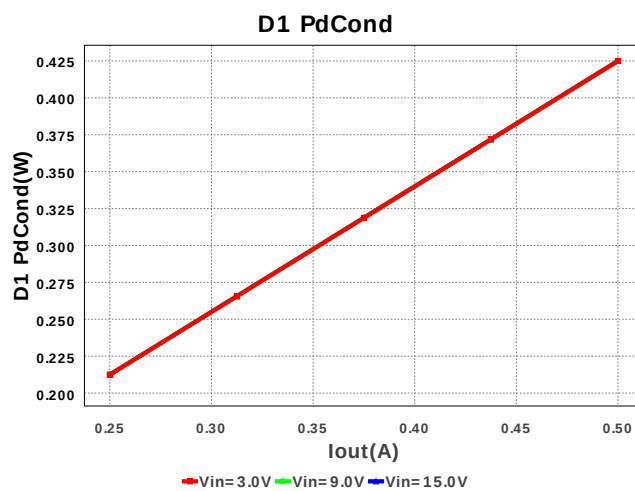
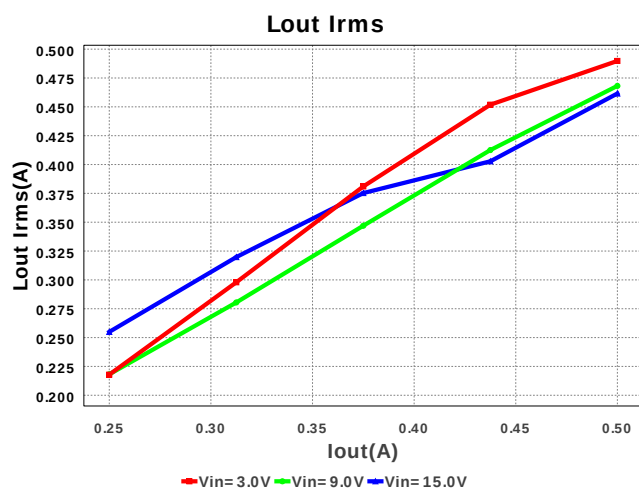
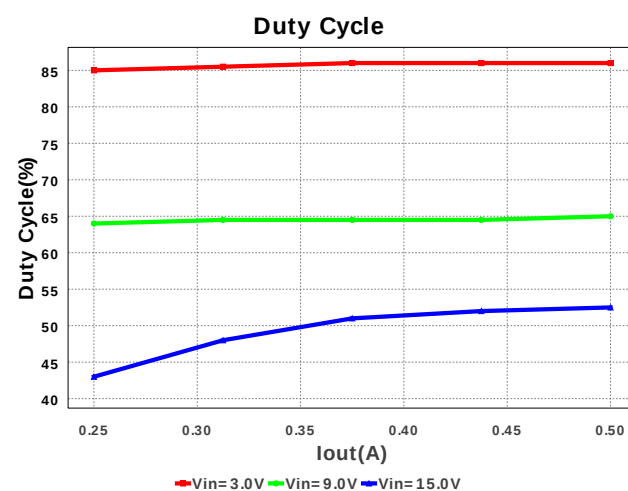
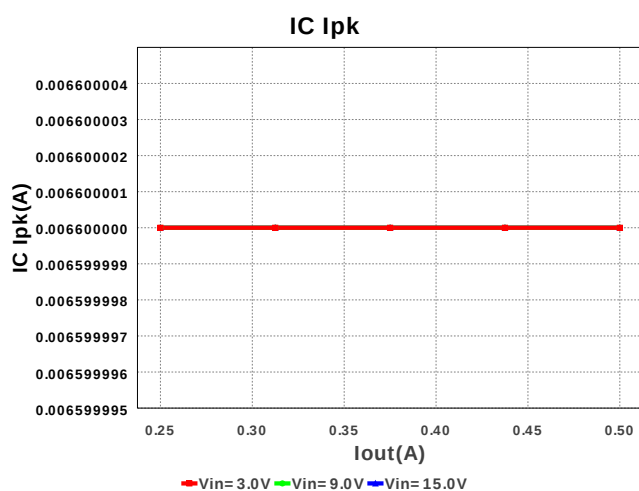
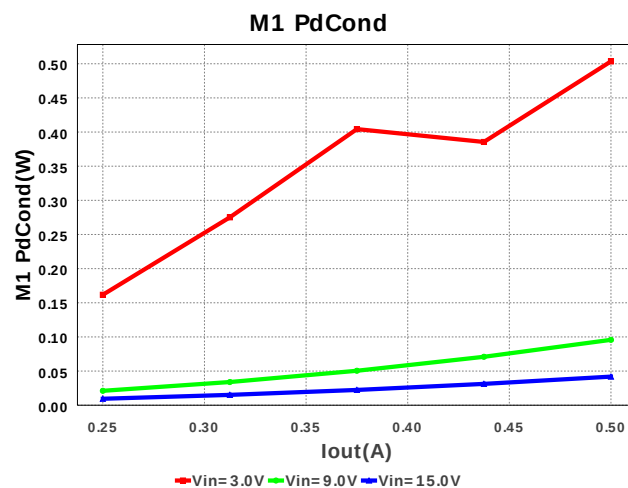
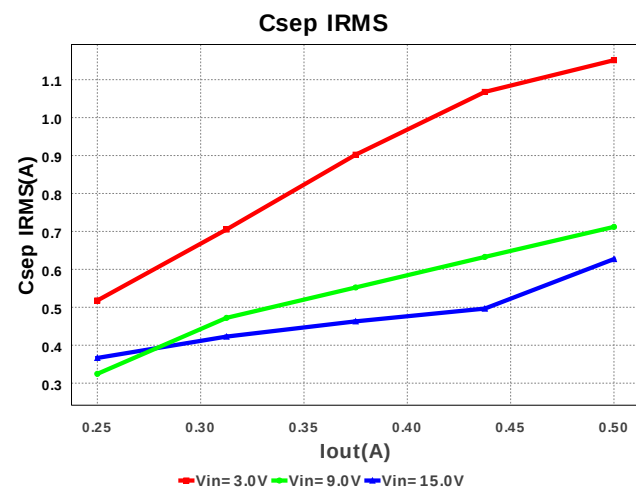
| #  | Name   | Manufacturer                | Part Number                           | Properties                                                   | Qty | Price  | Footprint                                                                                                  |
|----|--------|-----------------------------|---------------------------------------|--------------------------------------------------------------|-----|--------|------------------------------------------------------------------------------------------------------------|
| 1. | Cbp    | Kemet                       | C0603C104K3RACTU<br>Series= X7R       | Cap= 100.0 nF<br>VDC= 25.0 V<br>IRMS= 0.0 A                  | 1   | \$0.01 |  0603 10mm2           |
| 2. | Ccomp  | MuRata                      | GRM155R60J274KE01D<br>Series= X5R     | Cap= 270.0 nF<br>VDC= 6.3 V<br>IRMS= 0.0 A                   | 1   | \$0.02 |  0402 8mm2            |
| 3. | Ccomp2 | MuRata                      | GRM1555C1E751JA01D<br>Series= C0G/NP0 | Cap= 750.0 pF<br>VDC= 25.0 V<br>IRMS= 0.0 A                  | 1   | \$0.01 |  0402 8mm2            |
| 4. | Cin    | TDK                         | C3225X5R1E106K<br>Series= X5R         | Cap= 10.0 µF<br>ESR= 15.0 mOhm<br>VDC= 25.0 V<br>IRMS= 3.0 A | 1   | \$0.15 |  1210 23mm2           |
| 5. | Cout   | Nippon Chemi-Con            | APXH200ARA470MH70G<br>Series= PXH     | Cap= 47.0 µF<br>ESR= 45.0 mOhm<br>VDC= 20.0 V<br>IRMS= 2.0 A | 1   | \$0.88 |  CAPSMT_62_H70 110mm2 |
| 6. | Cramp  | Yageo America               | CC0805KRX7R9BB681<br>Series= X7R      | Cap= 680.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A                  | 1   | \$0.01 |  0805 13mm2           |
| 7. | Csep   | MuRata                      | GRM21BR61E475MA12L<br>Series= X5R     | Cap= 4.7 µF<br>ESR= 2.0 mOhm<br>VDC= 25.0 V<br>IRMS= 7.29 A  | 1   | \$0.06 |  0805 13mm2           |
| 8. | D1     | Micro Commercial Components | SK310A-TP                             | VF@Io= 850.0 mV<br>VRRM= 100.0 V                             | 1   | \$0.10 |  SMA 37mm2            |

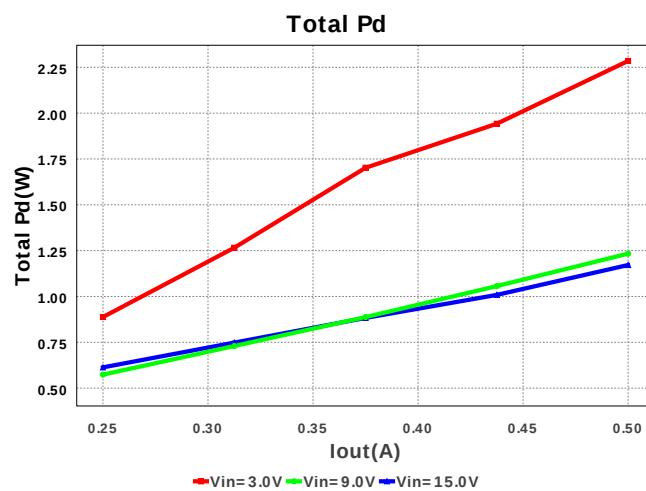
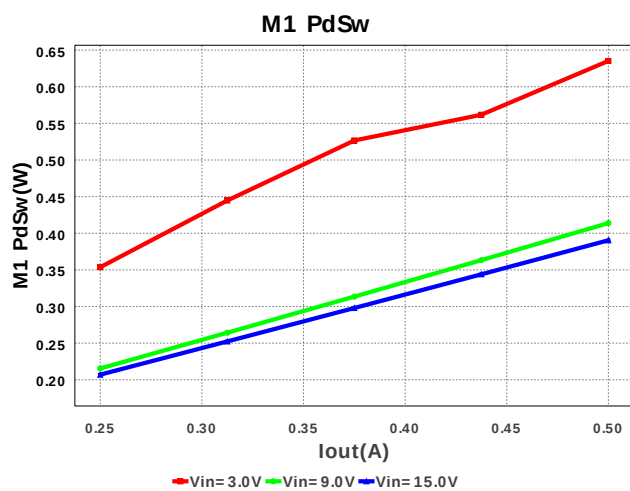
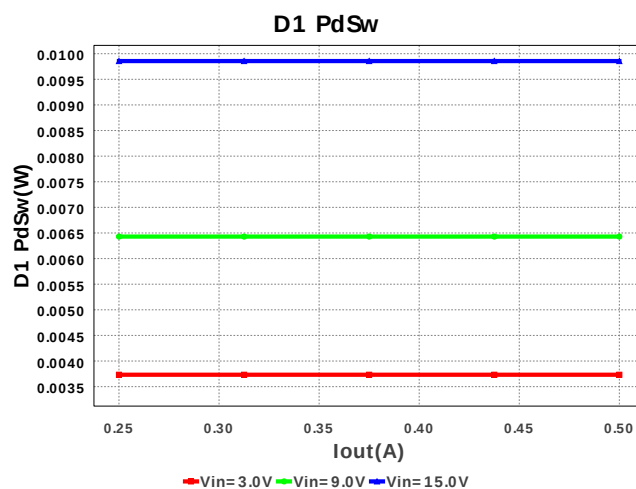
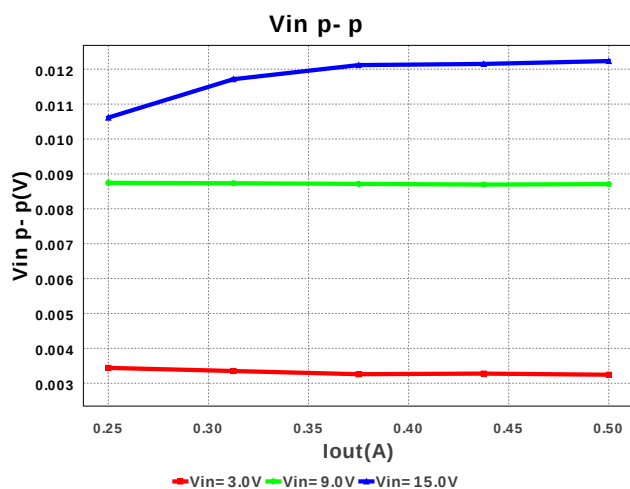
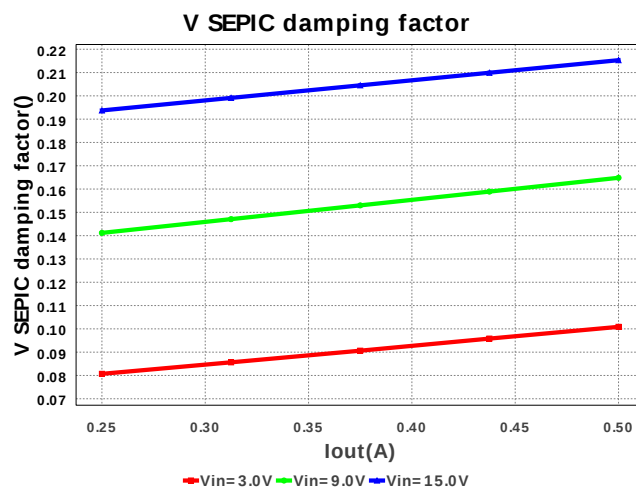
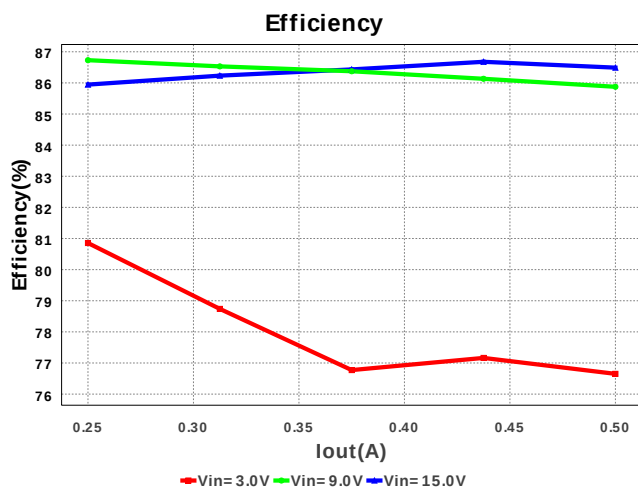
| #   | Name   | Manufacturer      | Part Number                           | Properties                                           | Qty | Price  | Footprint                                                                                             |
|-----|--------|-------------------|---------------------------------------|------------------------------------------------------|-----|--------|-------------------------------------------------------------------------------------------------------|
| 9.  | Lin    | Bourns            | SDR1307-120ML                         | L= 12.0 $\mu$ H<br>DCR= 30.0 mOhm                    | 1   | \$0.34 | <br>SDR1307 227mm2 |
| 10. | Lout   | Bourns            | SDR1005-151KL                         | L= 150.0 $\mu$ H<br>DCR= 590.0 mOhm                  | 1   | \$0.25 | <br>SDR1005 176mm2 |
| 11. | M1     | Vishay-Siliconix  | SI4446DY                              | VdsMax= 40.0 V<br>IdsMax= 3.9 Amps                   | 1   | \$0.26 | <br>SOIC-8 55mm2   |
| 12. | Rbp    | Vishay-Dale       | CRCW040220R0FKED<br>Series= CRCW..e3  | Res= 20.0 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 | <br>0402 8mm2      |
| 13. | Rcomp  | Vishay-Dale       | CRCW04021K33FKED<br>Series= CRCW..e3  | Res= 1.33 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 8mm2      |
| 14. | Rfadj  | Vishay-Dale       | CRCW040234K0FKED<br>Series= CRCW..e3  | Res= 34.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 8mm2      |
| 15. | Rfb1   | Vishay-Dale       | CRCW040210K0FKED<br>Series= CRCW..e3  | Res= 10.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 8mm2      |
| 16. | Rfb2   | Vishay-Dale       | CRCW0402110KFKED<br>Series= CRCW..e3  | Res= 110.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 | <br>0402 8mm2     |
| 17. | Rramp  | Vishay-Dale       | CRCW0402100R0FKED<br>Series= CRCW..e3 | Res= 100.0 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 8mm2    |
| 18. | Rsense | Susumu Co Ltd     | PRL1632-R018-F-T1<br>Series= 237      | Res= 18.0 mOhm<br>Power= 1.0 W<br>Tolerance= 1.0%    | 1   | \$0.19 | <br>1206 19mm2   |
| 19. | U1     | Texas Instruments | LM3478MM/NOPB                         | Switcher                                             | 1   | \$0.80 | <br>MUA08A 34mm2 |

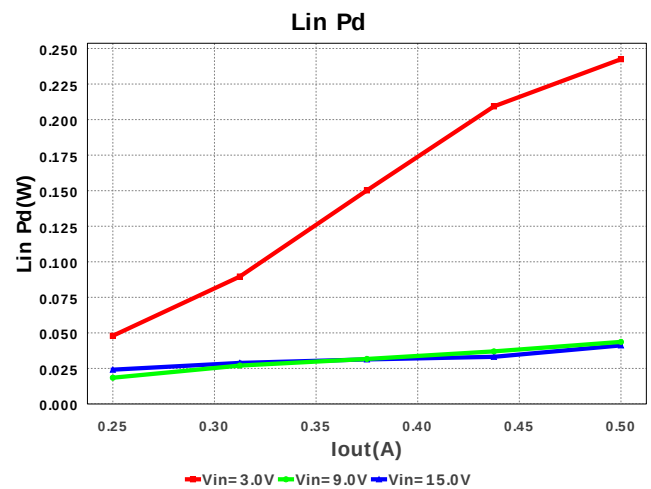
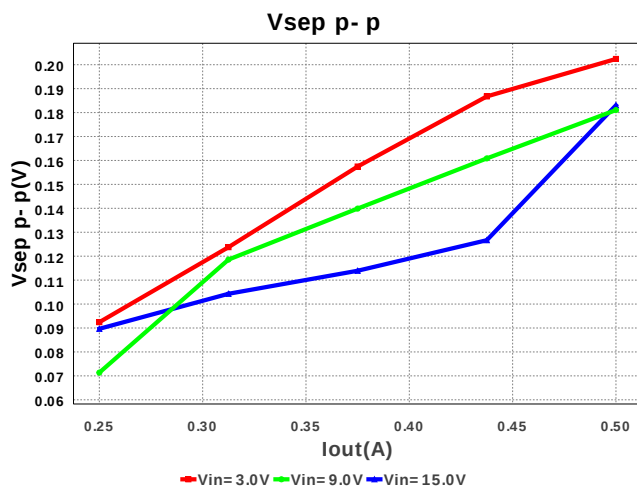
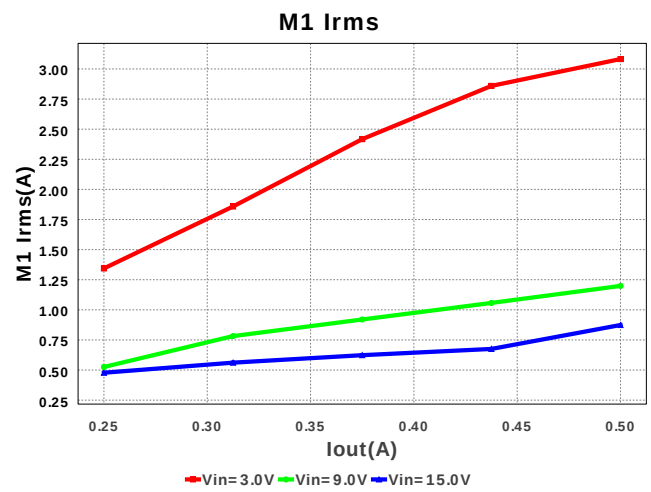
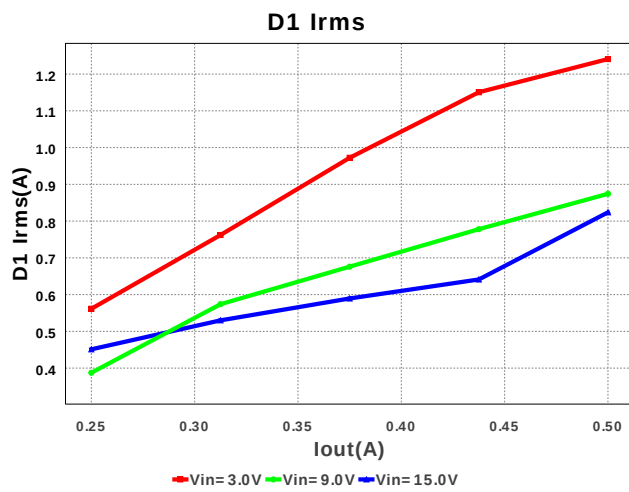
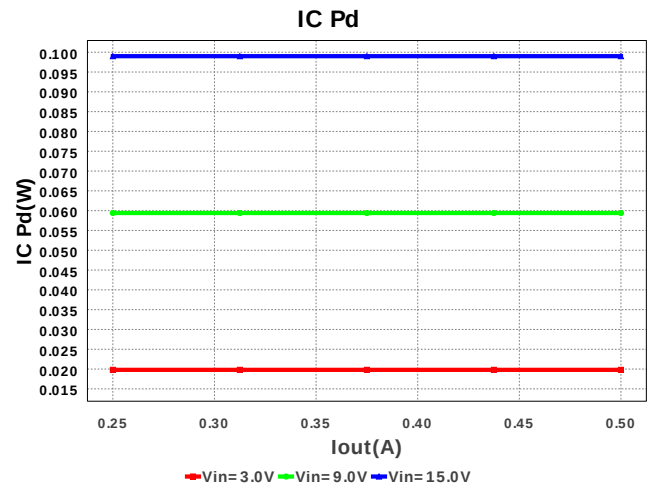
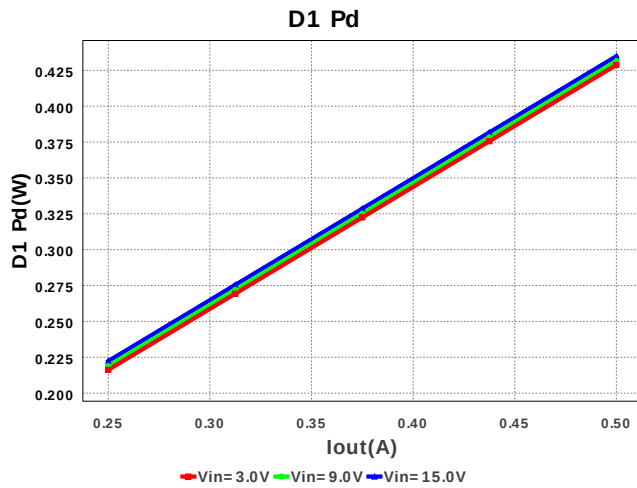


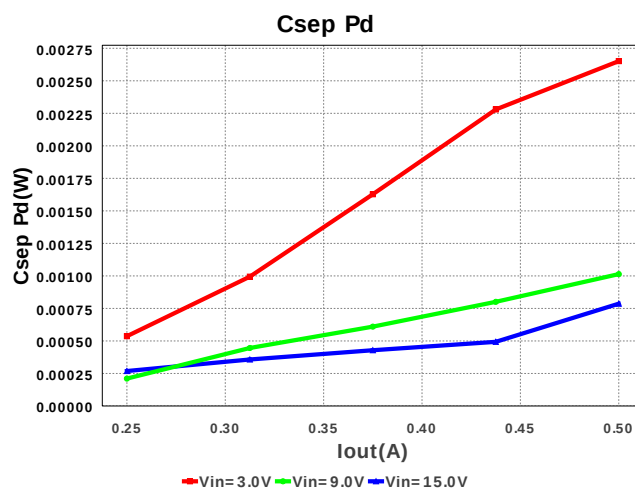
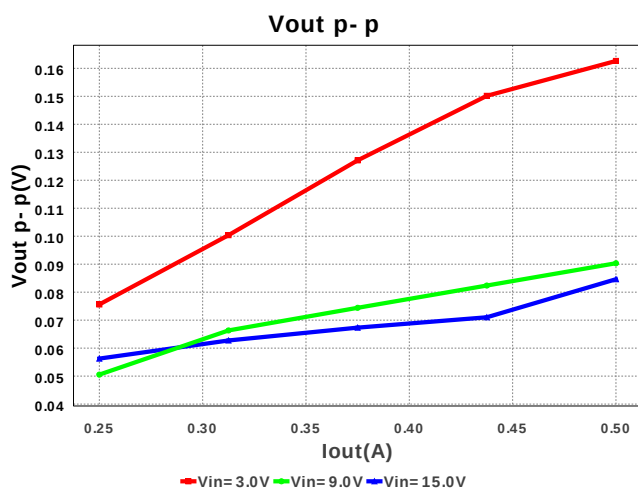
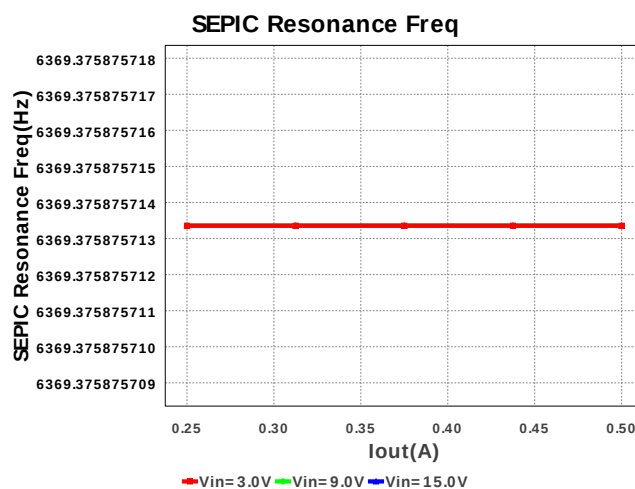
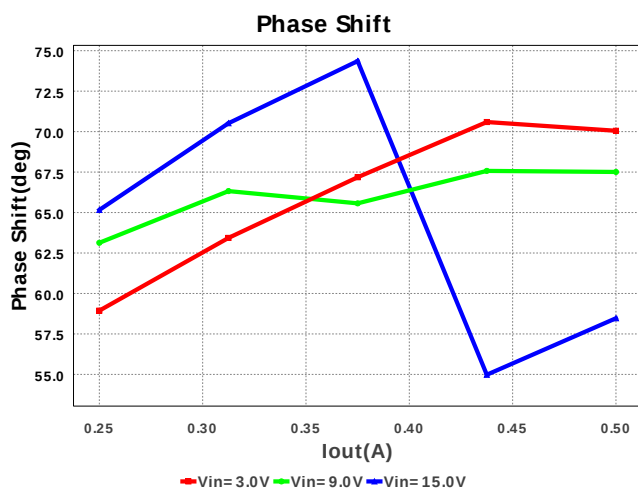
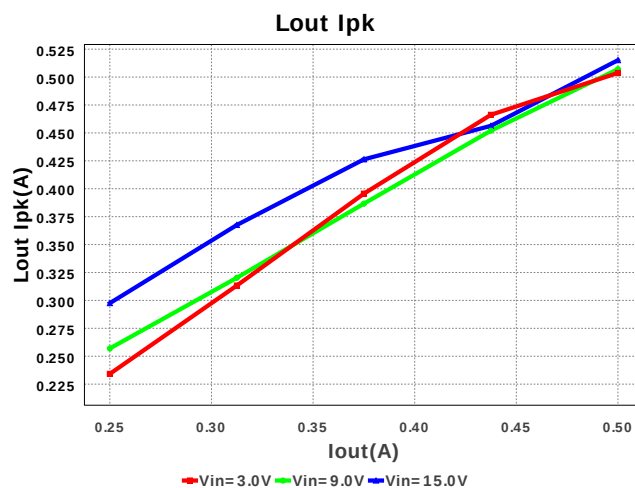
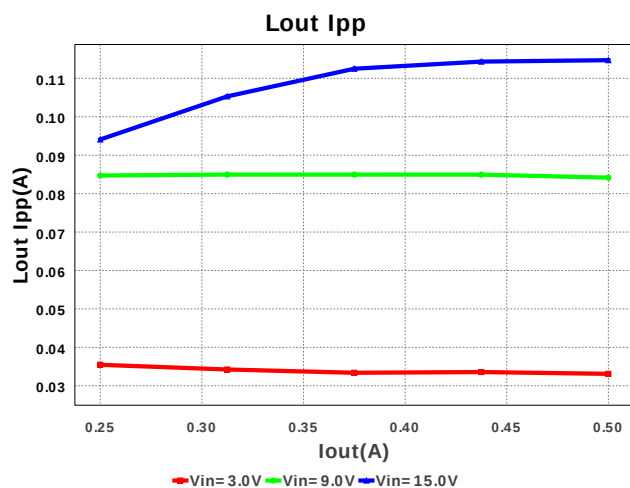


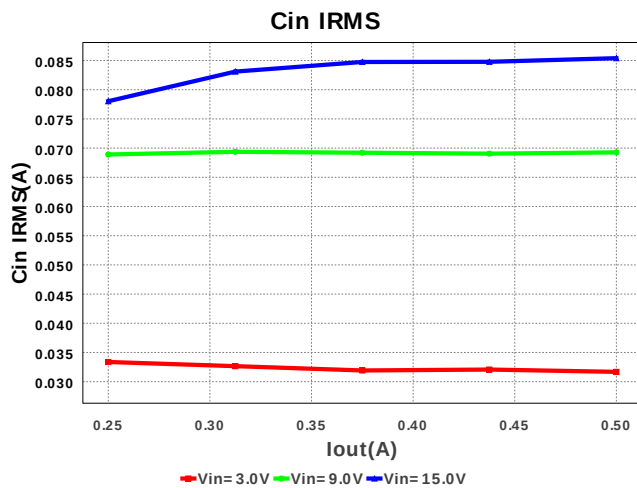












## Operating Values

| #   | Name                   | Value       | Category | Description                                 |
|-----|------------------------|-------------|----------|---------------------------------------------|
| 1.  | Cin IRMS               | 31.682 mA   | Current  | Input capacitor RMS ripple current          |
| 2.  | Cout IRMS              | 1.149 A     | Current  | Output capacitor RMS ripple current         |
| 3.  | Csep IRMS              | 1.151 A     | Current  | SEPIC capacitor RMS ripple current          |
| 4.  | D1 Irms                | 1.241 A     | Current  | D1 Irms                                     |
| 5.  | IC Ipk                 | 6.6 mA      | Current  | Peak switch current in IC                   |
| 6.  | Iin Avg                | 3.262 A     | Current  | Average input current                       |
| 7.  | Iin Ipk                | 3.023 A     | Current  | Iin peak current                            |
| 8.  | Iin Ipp                | 415.834 mA  | Current  | Peak-to-peak input inductor ripple current  |
| 9.  | Iin Irms               | 2.833 A     | Current  | Iin ripple current                          |
| 10. | Iout Ipk               | 503.71 mA   | Current  | Iout peak current                           |
| 11. | Iout Ipp               | 33.105 mA   | Current  | Peak-to-peak output inductor ripple current |
| 12. | Iout Irms              | 489.775 mA  | Current  | Iout ripple current                         |
| 13. | M1 Irms                | 3.082 A     | Current  | M1 MOSFET Irms                              |
| 14. | BOM Count              | 19          | General  | Total Design BOM count                      |
| 15. | FootPrint              | 778.0 mm2   | General  | Total Foot Print Area of BOM components     |
| 16. | Frequency              | 450.0 kHz   | General  | Switching frequency                         |
| 17. | IC Tolerance           | 24.3 mV     | General  | IC Feedback Tolerance                       |
| 18. | Mode                   | CCM         | General  | Conduction Mode                             |
| 19. | Total BOM              | \$3.14      | General  | Total BOM Cost                              |
| 20. | D1 Tj                  | 72.873 degC | Op_Point | D1 junction temperature                     |
| 21. | SEPIC Resonance Freq   | 6.369 kHz   | Op_Point | SEPIC Resonance Frequency                   |
| 22. | V SEPIC damping factor | 100.866 m   | Op_Point | V SEPIC damping factor                      |
| 23. | Vin p-p                | 3.244 mV    | Op_Point | Peak-to-peak input voltage                  |
| 24. | Vsep p-p               | 202.407 mV  | Op_Point | Peak-to-peak sepic voltage                  |
| 25. | Cross Freq             | 2.437 kHz   | Op_point | Bode plot crossover frequency               |
| 26. | Duty Cycle             | 86.0 %      | Op_point | Duty cycle                                  |
| 27. | Efficiency             | 76.651 %    | Op_point | Steady state efficiency                     |
| 28. | Gain Marg              | 11.787 db   | Op_point | Bode Plot Gain Margin                       |
| 29. | IC Tj                  | 49.8 degC   | Op_point | IC junction temperature                     |
| 30. | IOUT_OP                | 500.0 mA    | Op_point | Iout operating point                        |
| 31. | M1 TJOP                | 30.3 degC   | Op_point | M1 MOSFET junction temperature              |
| 32. | Phase Marg             | 69.359 deg  | Op_point | Bode Plot Phase Margin                      |
| 33. | Phase Shift            | 70.052 deg  | Op_point | Bode Plot Phase Shift                       |
| 34. | VIN_OP                 | 3.0 V       | Op_point | Vin operating point                         |
| 35. | Vout p-p               | 162.639 mV  | Op_point | Peak-to-peak output ripple voltage          |
| 36. | Cin Pd                 | 15.056 μW   | Power    | Input capacitor power dissipation           |
| 37. | Cout Pd                | 59.453 mW   | Power    | Output capacitor power dissipation          |
| 38. | Csep Pd                | 2.651 mW    | Power    | SEPIC capacitor power dissipation           |
| 39. | D1 Pd                  | 428.732 mW  | Power    | Diode power dissipation                     |
| 40. | D1 PdCond              | 425.0 mW    | Power    | Diode conduction losses                     |
| 41. | D1 PdSw                | 3.732 mW    | Power    | Diode switching losses                      |
| 42. | IC Pd                  | 99.0 mW     | Power    | IC power dissipation                        |
| 43. | Iin Pd                 | 242.478 mW  | Power    | Iin power dissipation                       |
| 44. | Iout Pd                | 141.538 mW  | Power    | Iout power dissipation                      |
| 45. | M1 Pd                  | 1.139 W     | Power    | M1 MOSFET total power dissipation           |
| 46. | M1 PdCond              | 503.499 mW  | Power    | M1 MOSFET conduction losses                 |
| 47. | M1 PdSw                | 635.21 mW   | Power    | M1 MOSFET switching losses                  |
| 48. | Rsense Pd              | 171.001 mW  | Power    | LED Current Rsns Power Dissipation          |
| 49. | Total Pd               | 2.285 W     | Power    | Total Power Dissipation                     |

## Design Inputs

| #  | Name    | Value       | Description                   |
|----|---------|-------------|-------------------------------|
| 1. | Iout    | 500.0 mA    | Maximum Output Current        |
| 2. | Iout1   | 500.0 mAmps | Output Current #1             |
| 3. | VinMax  | 15.0 V      | Maximum input voltage         |
| 4. | VinMin  | 3.0 V       | Minimum input voltage         |
| 5. | Vout    | 15.0 V      | Output Voltage                |
| 6. | Vout1   | 15.0 Volt   | Output Voltage #1             |
| 7. | base_pn | LM3478      | National Based Product Number |
| 8. | source  | DC          | Input Source Type             |
| 9. | Ta      | 30.0 degC   | Ambient temperature           |

## Design Assistance

1. **LM3478** Product Folder : <http://www.ti.com/product/lm3478> : contains the data sheet and other resources.

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