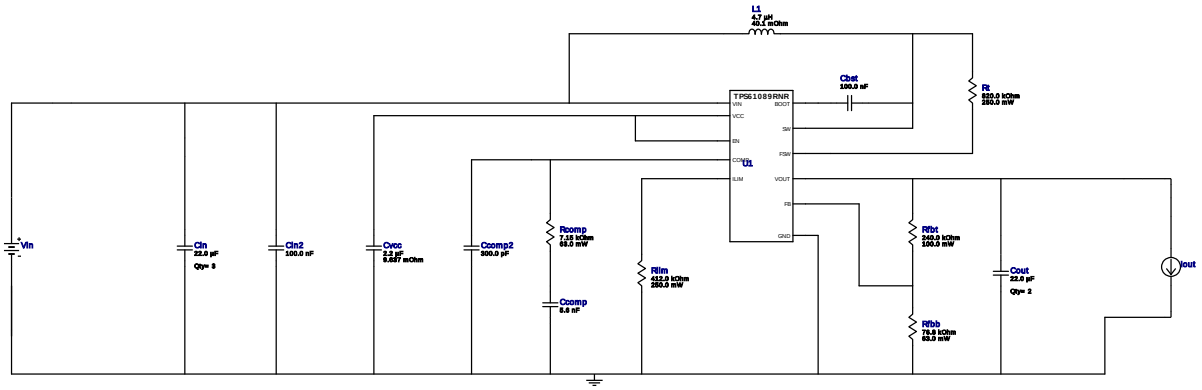
# WEBENCH® Design Report

VinMin = 3.0V
VinMax = 4.8V
Vout = 5.0V
Iout = 0.5A

Device = TPS61089RNRR
Topology = Boost
Created = 11/20/16 2:00:41 PM
BOM Cost = $3.23
BOM Count = 17
Total Pd = 0.08W

Design : 3918487/117 TPS61089RNRR
MSD_HABIP_PI_HAT_5V_BOOST




## My Comments

No comments

## Electrical BOM

| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 1. | Cbst | MuRata | GRM155R61A104KA01D<br>Series= X5R | Cap= 100.0 nF<br>VDC= 10.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0402 3 mm² |
| 2. | Ccomp | Yageo America | CC0805KRX7R9BB562<br>Series= X7R | Cap= 5.6 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0805 7 mm² |
| 3. | Ccomp2 | MuRata | GRM1555C1H301GA01D<br>Series= C0G/NP0 | Cap= 300.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0402 3 mm² |
| 4. | Cin | Taiyo Yuden | LMK212BJ226MG-T<br>Series= X5R | Cap= 22.0 uF<br>VDC= 10.0 V<br>IRMS= 0.0 A | 3 | $0.12 | 0805 7 mm² |
| 5. | Cin2 | MuRata | GRM155R61A104KA01D<br>Series= X5R | Cap= 100.0 nF<br>VDC= 10.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0402 3 mm² |
| 6. | Cout | Taiyo Yuden | LMK212BJ226MG-T<br>Series= X5R | Cap= 22.0 uF<br>VDC= 10.0 V<br>IRMS= 0.0 A | 2 | $0.12 | 0805 7 mm² |
| 7. | Cvcc | MuRata | GRM188R61A225KE34D<br>Series= X5R | Cap= 2.2 uF<br>ESR= 9.637 mOhm<br>VDC= 10.0 V<br>IRMS= 1.24283 A | 1 | $0.02 | 0603 5 mm² |
| 8. | L1 | Coilcraft | XAL4030-472MEB | L= 4.7 µH<br>DCR= 40.1 mOhm | 1 | $0.72 | XAL4030 25 mm² |
| 9. | Rcomp | Vishay-Dale | CRCW04027K15FKED<br>Series= CRCW..e3 | Res= 7.15 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| 10. | Rfbb | Vishay-Dale | CRCW040276K8FKED<br>Series= CRCW..e3 | Res= 76.8 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| 11. | Rfbt | Yageo America | RC0603FR-07240KL<br>Series= ? | Res= 240.0 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0603 5 mm² |

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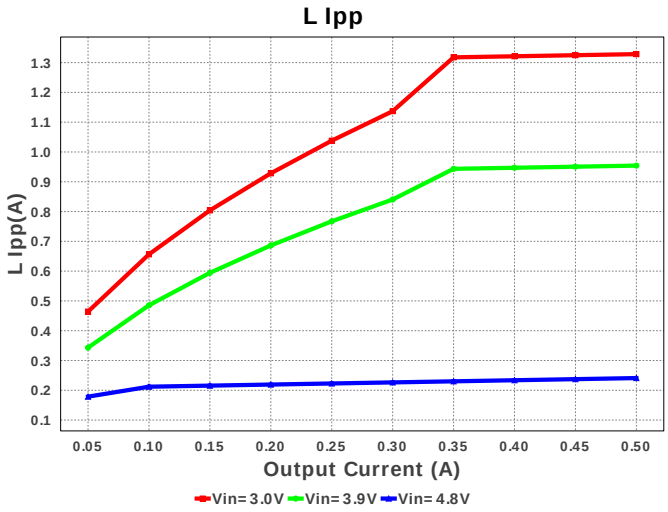
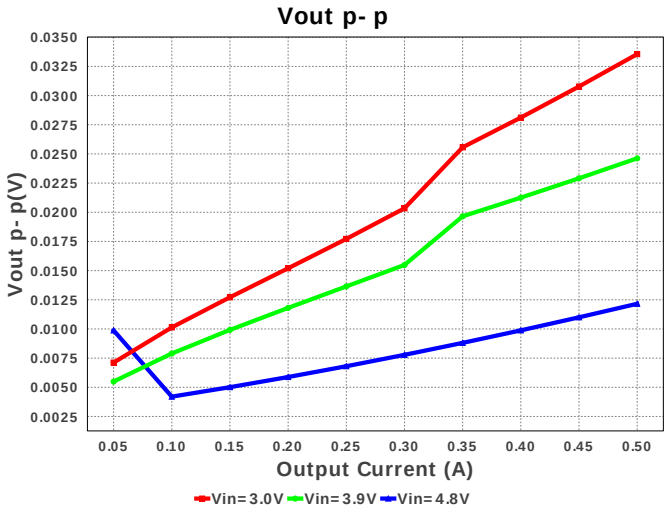
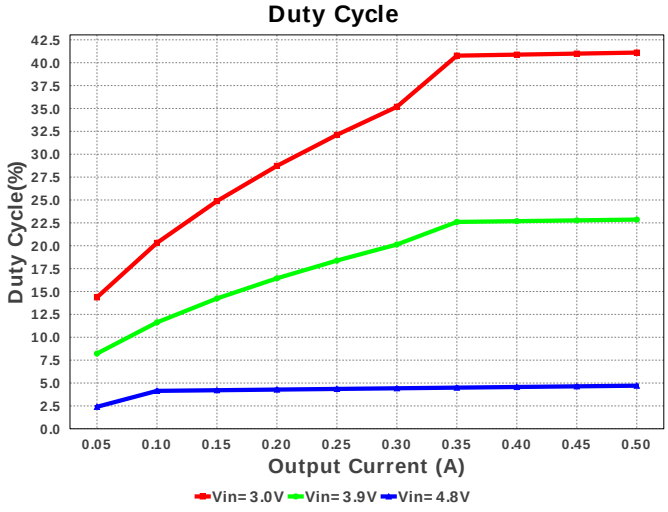
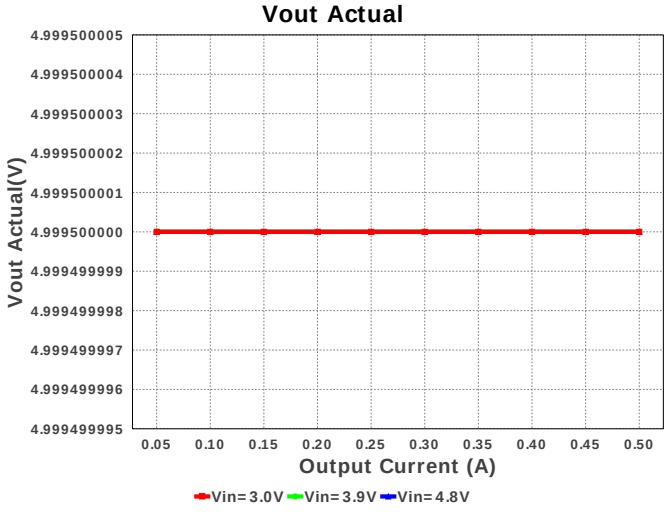
| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 12. | Rlim | Panasonic | ERJ-8ENF4123V<br>Series= ERJ-8E | Res= 412.0 kOhm<br>Power= 250.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 1206 11 mm$^2$ |
| 13. | Rt | Yageo America | RC1206FR-07820KL<br>Series= ? | Res= 820.0 kOhm<br>Power= 250.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 1206 11 mm$^2$ |
| 14. | U1 | Texas Instruments | TPS61089RNRR | Switcher | 1 | $1.80 | RNR0011A 10 mm$^2$ |

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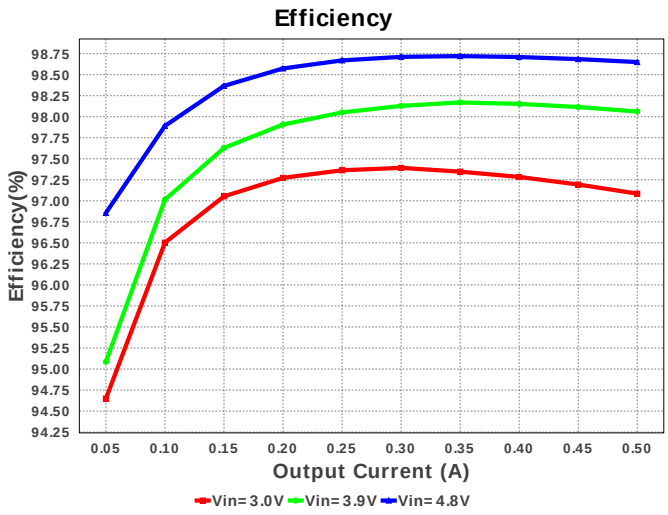


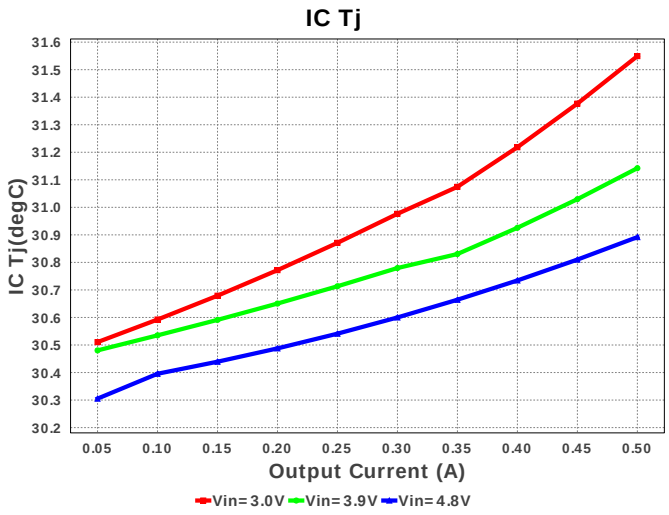


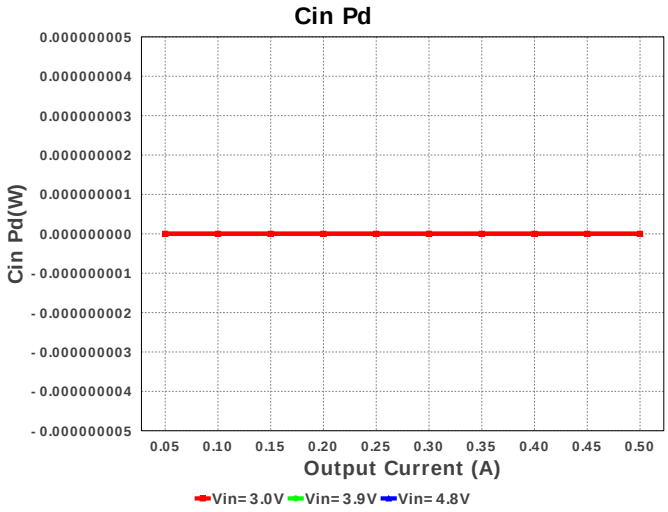


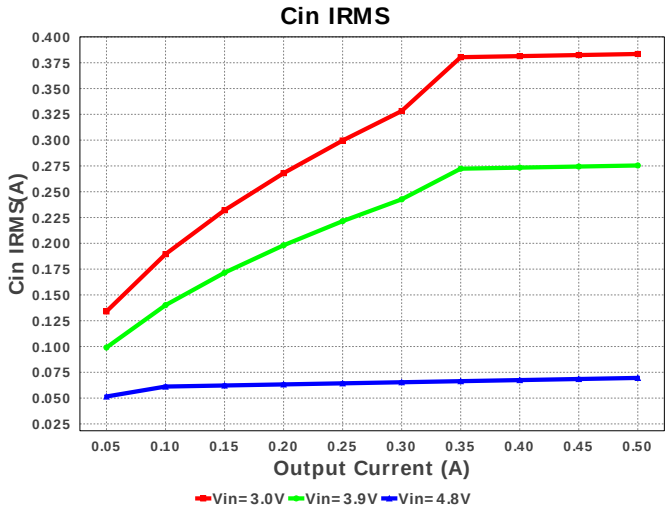


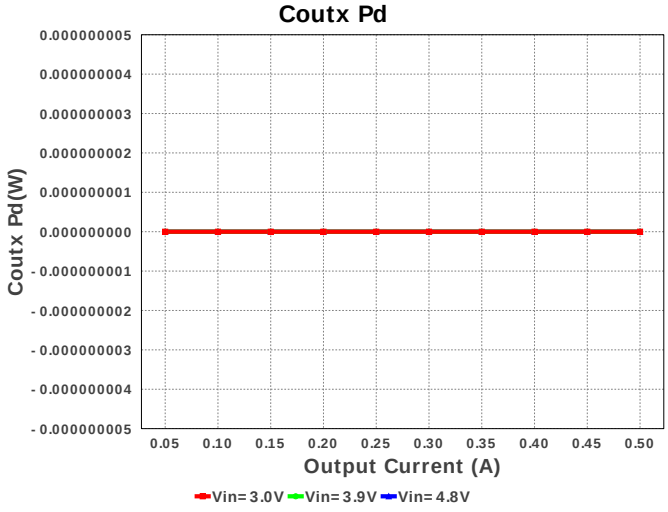


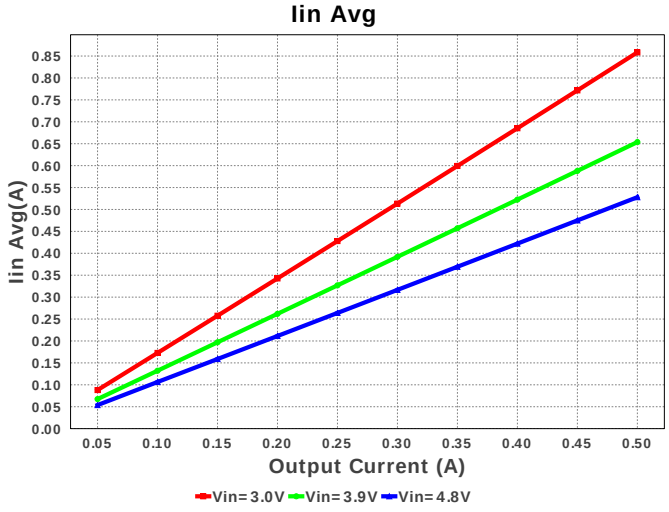


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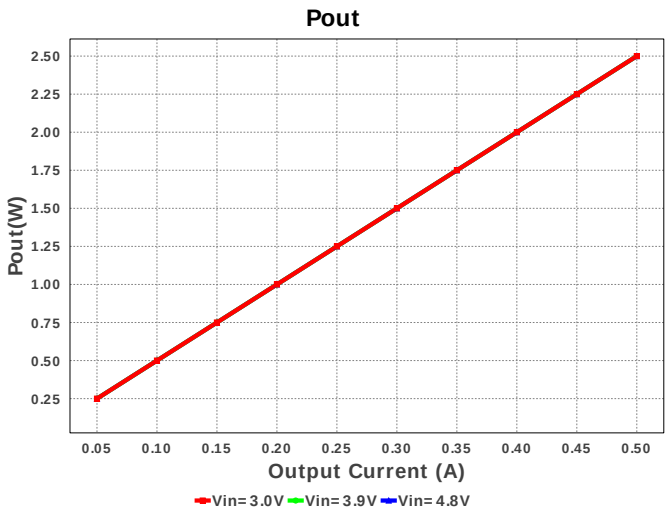


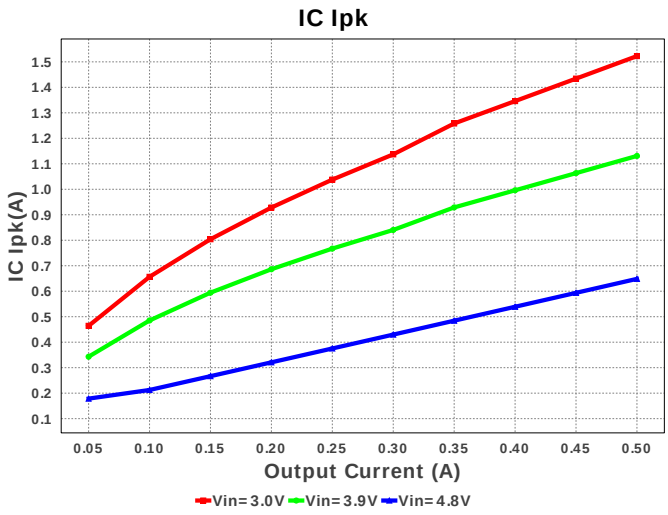


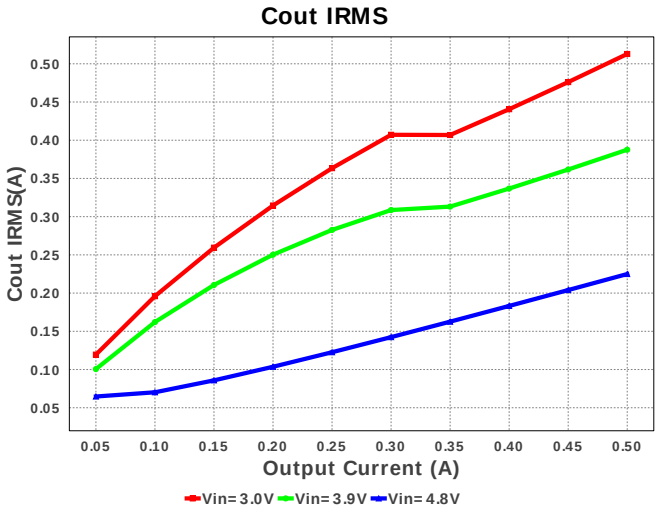


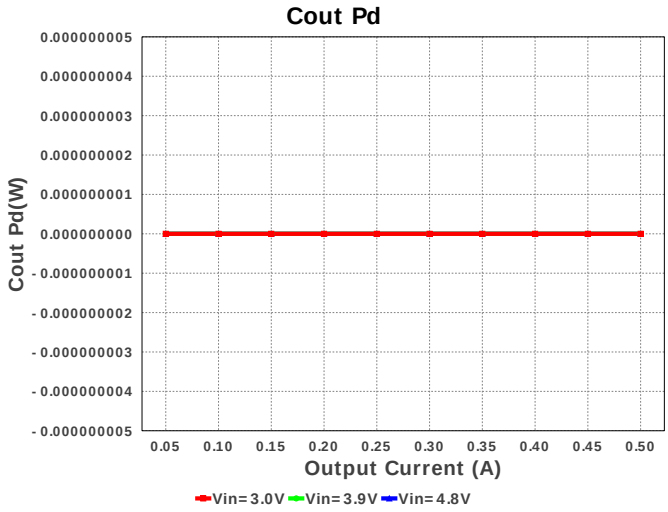


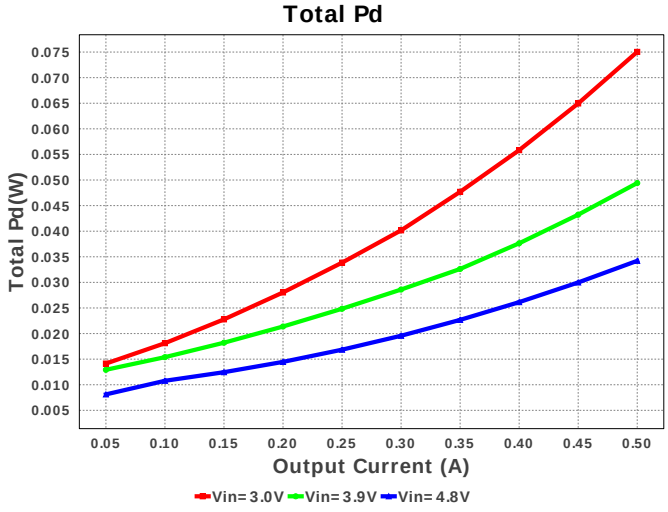


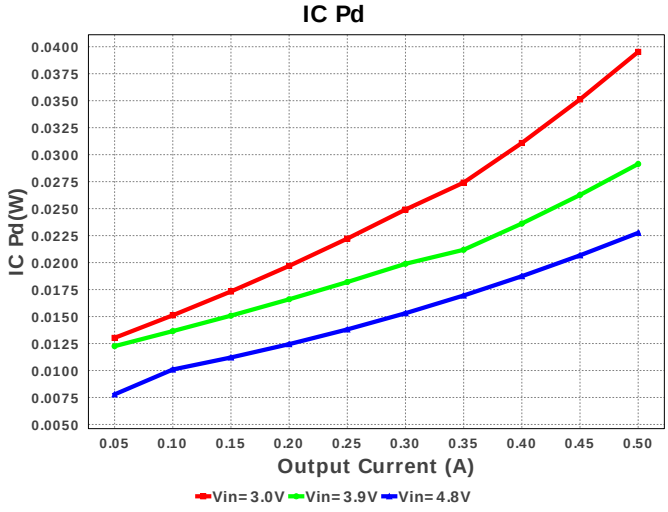


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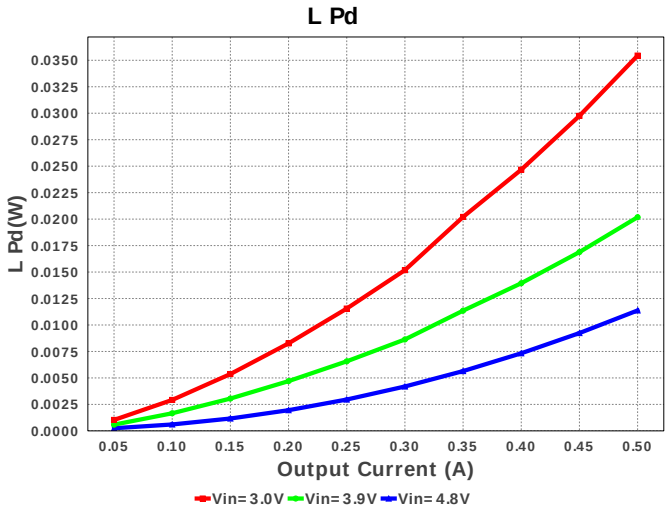


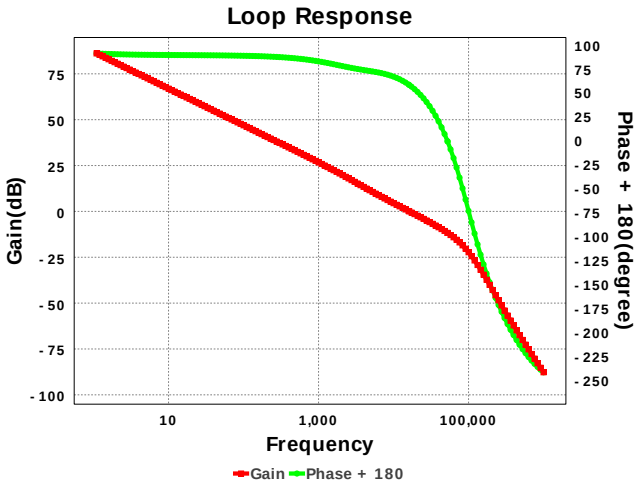


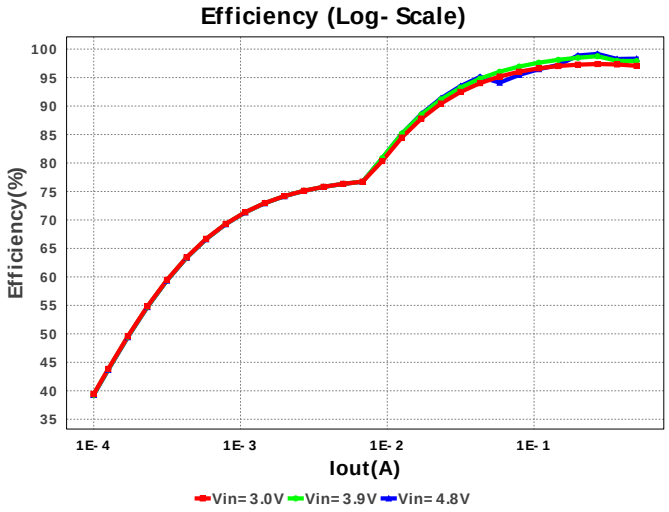


## Operating Values

| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 1. | Cin IRMS | 383.492 mA | Current | Input capacitor RMS ripple current |
| 2. | Cout IRMS | 512.819 mA | Current | Output capacitor RMS ripple current |
| 3. | IC Ipk | 1.523 A | Current | Peak switch current in IC |
| 4. | Iin Avg | 858.35 mA | Current | Average input current |
| 5. | L Ipp | 1.328 A | Current | Peak-to-peak inductor ripple current |
| 6. | BOM Count | 17 | General | Total Design BOM count |
| 7. | FootPrint | 122.0 $mm^2$ | General | Total Foot Print Area of BOM components |
| 8. | Frequency | 197.498 kHz | General | Switching frequency |
| 9. | Mode | BOOST CCM | General | PWM/PFM Mode |
| 10. | Pout | 2.5 W | General | Total output power |
| 11. | Total BOM | $3.23 | General | Total BOM Cost |
| 12. | ICThetaJA Effective | 39.2 degC/W | Op_Point | Effective IC Junction-to-Ambient Thermal Resistance |
| 13. | Low Freq Gain | 89.65 dB | Op_Point | Gain at 10Hz |
| 14. | Vout Actual | 5.0 V | Op_Point | Vout Actual calculated based on selected voltage divider resistors |
| 15. | Cross Freq | 16.032 kHz | Op_point | Bode plot crossover frequency |
| 16. | Duty Cycle | 41.104 % | Op_point | Duty cycle |
| 17. | Efficiency | 97.086 % | Op_point | Steady state efficiency |
| 18. | Gain Marg | -11.741 dB | Op_point | Bode Plot Gain Margin |
| 19. | IC Tj | 31.549 degC | Op_point | IC junction temperature |
| 20. | IOUT_OP | 500.0 mA | Op_point | Iout operating point |
| 21. | Phase Marg | 55.493 deg | Op_point | Bode Plot Phase Margin |
| 22. | VIN_OP | 3.0 V | Op_point | Vin operating point |
| 23. | Vout p-p | 33.553 mV | Op_point | Peak-to-peak output ripple voltage |
| 24. | Cin Pd | 0.0 W | Power | Input capacitor power dissipation |
| 25. | Cout Pd | 0.0 W | Power | Output capacitor power dissipation |
| 26. | Coutx Pd | 0.0 W | Power | Output capacitor_x power loss |
| 27. | IC Pd | 39.523 mW | Power | IC power dissipation |
| 28. | L Pd | 35.442 mW | Power | Inductor power dissipation |
| 29. | Total Pd | 75.037 mW | Power | Total Power Dissipation |
| 30. | Vout Tolerance | 4.169 % | | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |

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## Design Inputs

| # | Name | Value | Description |
|---|---|---|---|
| 1. | Iout | 500.0 m | Maximum Output Current |
| 2. | VinMax | 4.8 | Maximum input voltage |
| 3. | VinMin | 3.0 | Minimum input voltage |
| 4. | VinTyp | 3.7 | Typical input voltage |
| 5. | Vout | 5.0 | Output Voltage |
| 6. | base_pn | TPS61089 | Base Product Number |
| 7. | source | DC | Input Source Type |
| 8. | Ta | 30.0 | Ambient temperature |

## Design Assistance

1. **TPS61089** Product Folder : http://www.ti.com/product/TPS61089 : contains the data sheet and other resources.

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