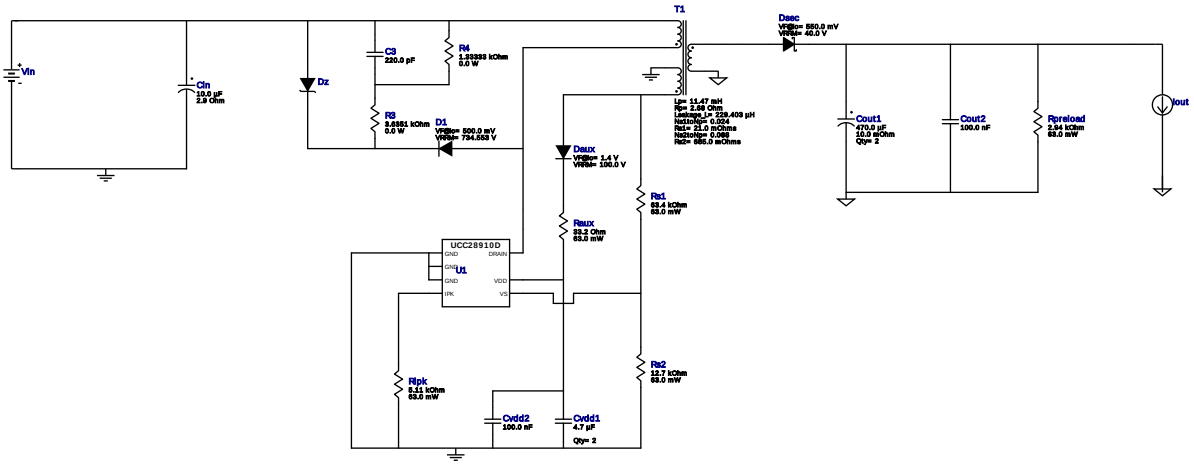
# WEBENCH® Design Report

VinMin = 210.0V
VinMax = 230.0V
Vout = 5.0V
Iout = 0.8A

Device = UCC28910D
Topology = Flyback
Created = 8/10/16 7:05:57 PM
BOM Cost = $0.00
BOM Count = 21
Total Pd = 0.0W

Design : 3943027/7 UCC28910D
UCC28910D 210.0V-230.0V to 5.00V @ 0.8A




## Electrical BOM

| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 1. | C3 | Vishay-Vitramon | VJ0805A221JXGAT5Z<br>Series= C0G/NP0 | Cap= 220.0 pF<br>VDC= 1000.0 V<br>IRMS= 0.0 A | 1 | $0.24 | 0805 7 mm² |
| 2. | Cin | Kemet | ESG106M400AH4AA<br>Series= 2334 | Cap= 10.0 uF<br>ESR= 2.9 Ohm<br>VDC= 400.0 V<br>IRMS= 100.0 mA | 1 | $0.19 | ESG106 144 mm² |
| 3. | Cout1 | Nichicon | RNU1C471MDN1PH<br>Series= ? | Cap= 470.0 uF<br>ESR= 10.0 mOhm<br>VDC= 16.0 V<br>IRMS= 6.1 A | 2 | $0.52 | NU_1000x1250 144 mm² |
| 4. | Cout2 | 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 |
| 5. | Cvdd1 | Taiyo Yuden | TMK212BJ475KG-T<br>Series= X5R | Cap= 4.7 uF<br>VDC= 25.0 V<br>IRMS= 0.0 A | 2 | $0.05 | 0805 7 mm² |
| 6. | Cvdd2 | Kemet | C0603C104K5RACTU<br>Series= X7R | Cap= 100.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0603 5 mm² |
| 7. | D1 | CUSTOM | CUSTOM | VF@Io= 500.0 mV<br>VRRM= 734.553 V | 1 | NA | CUSTOM 0 mm² |
| 8. | Daux | NXP Semiconductor | BAS316,115 | VF@Io= 1.4 V<br>VRRM= 100.0 V | 1 | $0.02 | SOD-323 9 mm² |
| 9. | Dsec | Diodes Inc. | B540C-13-F | VF@Io= 550.0 mV<br>VRRM= 40.0 V | 1 | $0.17 | SMC 83 mm² |

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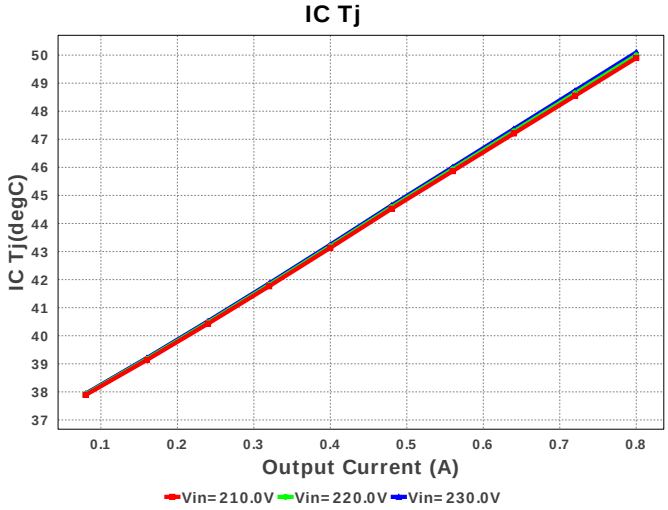
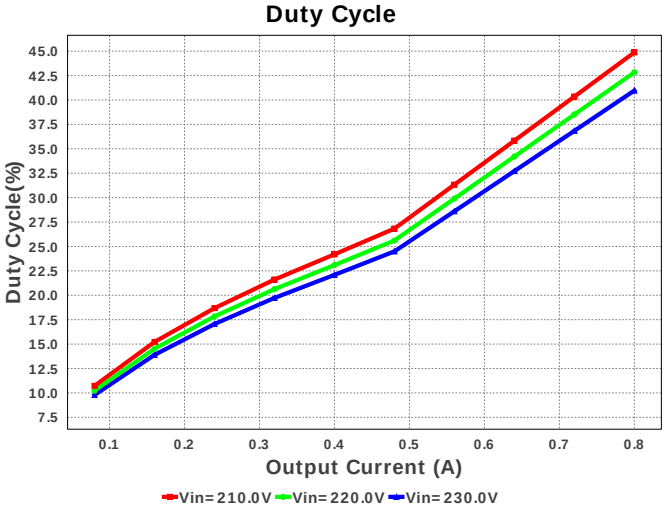
| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 10. | Dz | CUSTOM | CUSTOM | Zener | 1 | NA | CUSTOM 0 mm² |
| 11. | R3 | CUSTOM | CUSTOM<br>Series= ? | Res= 3.6351 kOhm<br>Power= 0.0 W<br>Tolerance= 0.0% | 1 | NA | CUSTOM 0 mm² |
| 12. | R4 | CUSTOM | CUSTOM<br>Series= ? | Res= 1.33333 kOhm<br>Power= 0.0 W<br>Tolerance= 0.0% | 1 | NA | CUSTOM 0 mm² |
| 13. | Raux | Vishay-Dale | CRCW040233R2FKED<br>Series= CRCW..e3 | Res= 33.2 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| 14. | Ripk | Vishay-Dale | CRCW04025K11FKED<br>Series= CRCW..e3 | Res= 5.11 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| 15. | Rpreload | Vishay-Dale | CRCW04022K94FKED<br>Series= CRCW..e3 | Res= 2.94 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| 16. | Rs1 | Vishay-Dale | CRCW040263K4FKED<br>Series= CRCW..e3 | Res= 63.4 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| 17. | Rs2 | Vishay-Dale | CRCW040212K7FKED<br>Series= CRCW..e3 | Res= 12.7 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| 18. | T1 | CUSTOM | CUSTOM | Lp= 11.47 mH<br>Rp= 2.68 Ohm<br>Leakage_L= 229.403 µH<br>Ns1toNp= 0.024<br>Rs1= 21.0 mOhms<br>Ns2toNp= 0.088<br>Rs2= 685.0 mOhms | 1 | NA | CUSTOM 0 mm² |
| 19. | U1 | Texas Instruments | UCC28910D | Switcher | 1 | $0.70 | D0007A 55 mm² |

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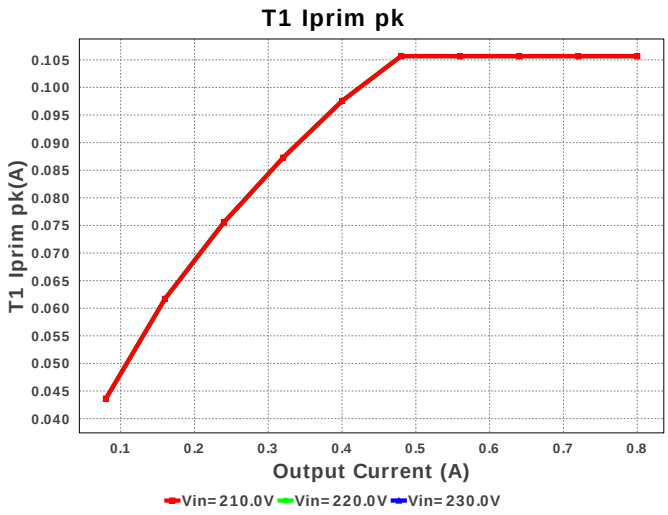


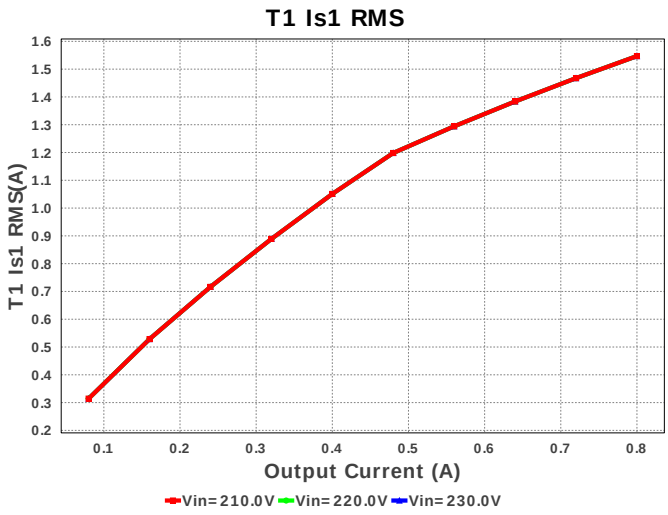


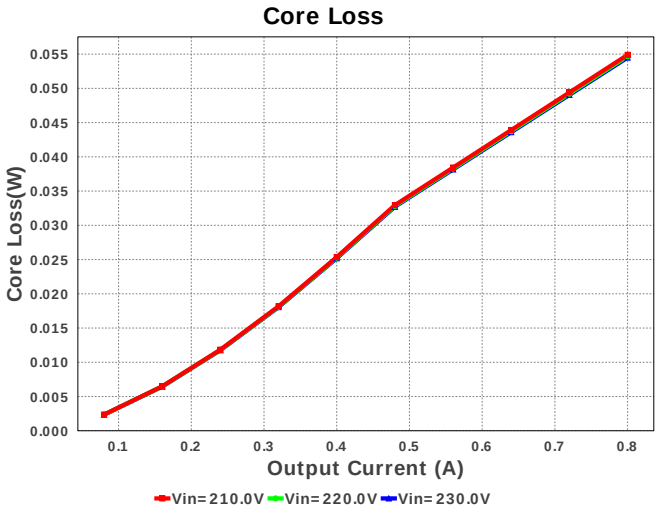


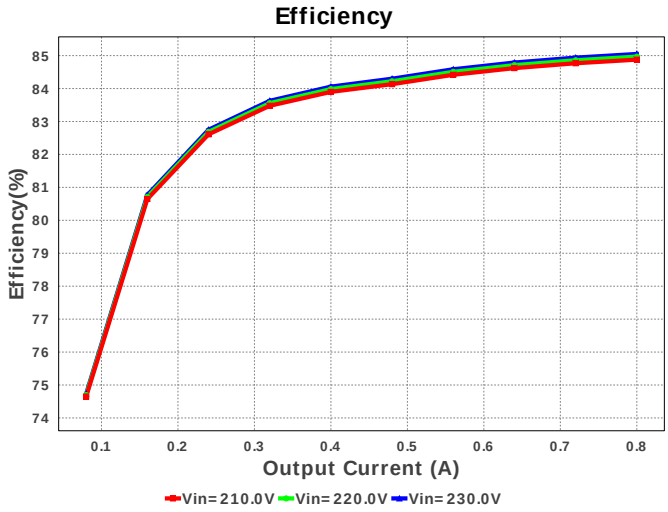


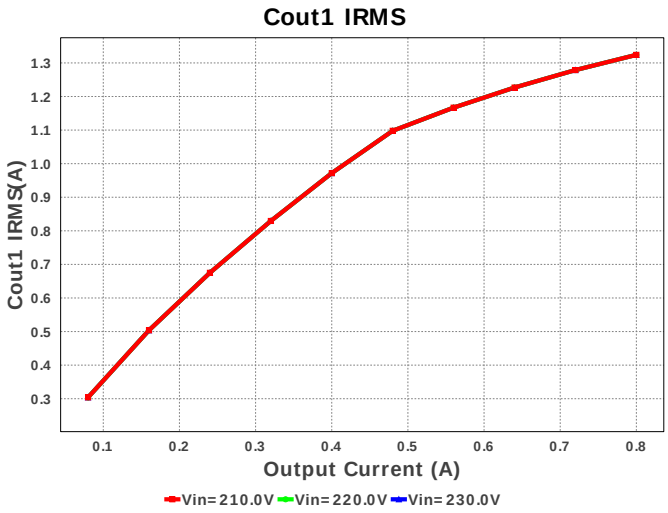


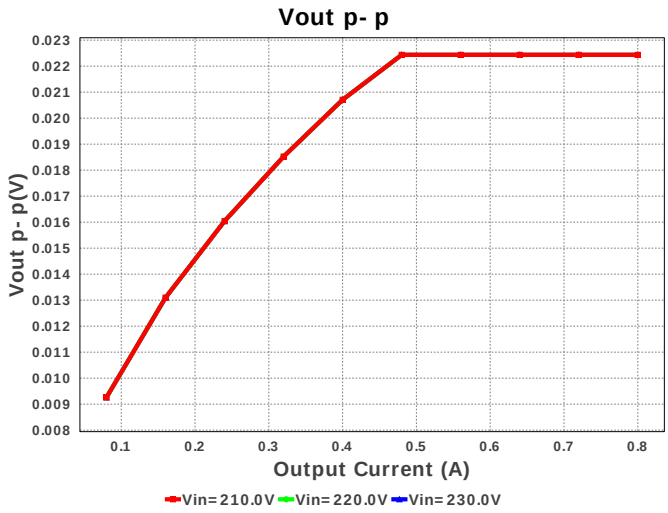


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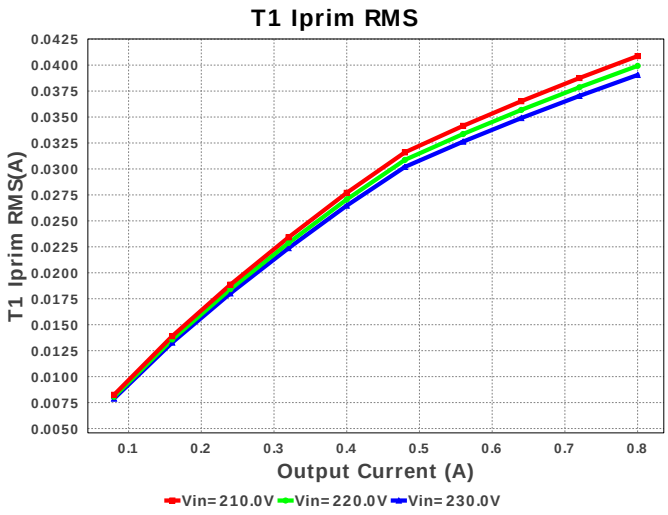


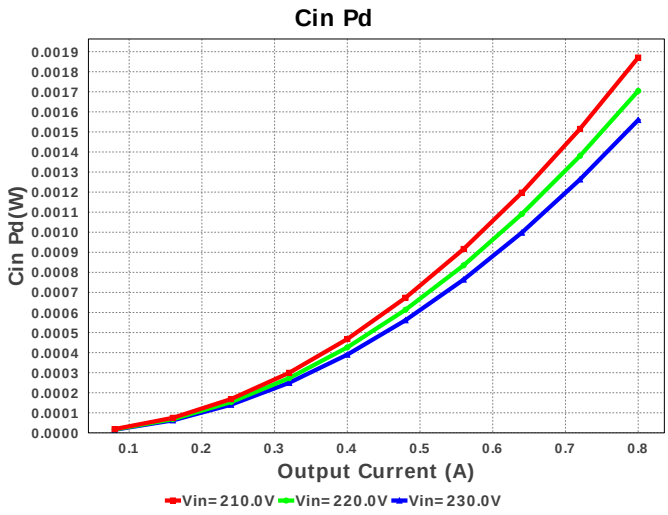


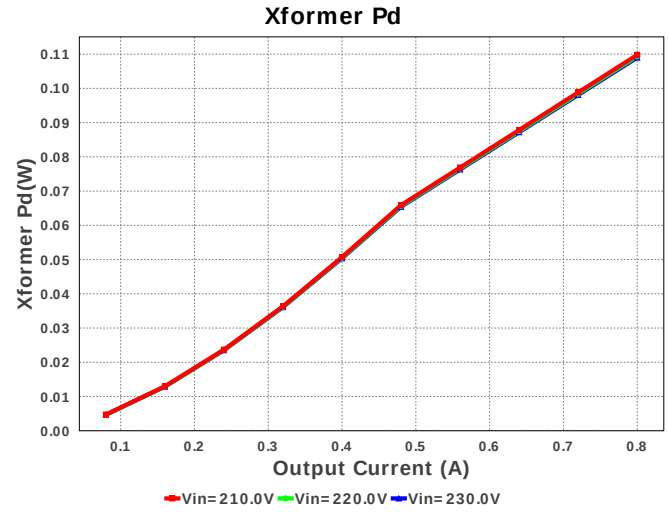


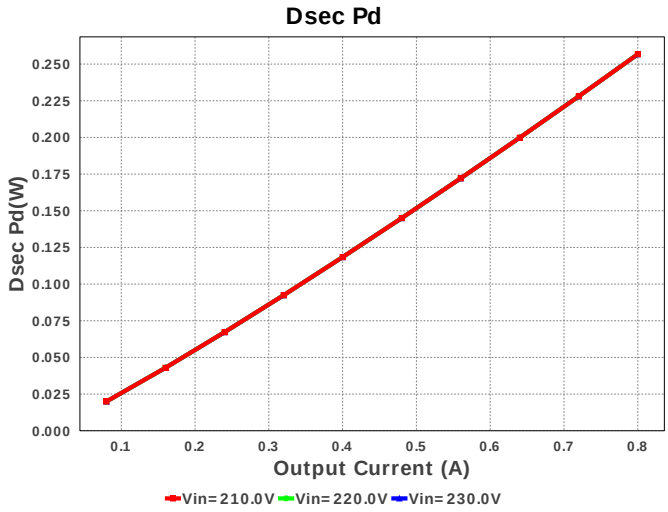


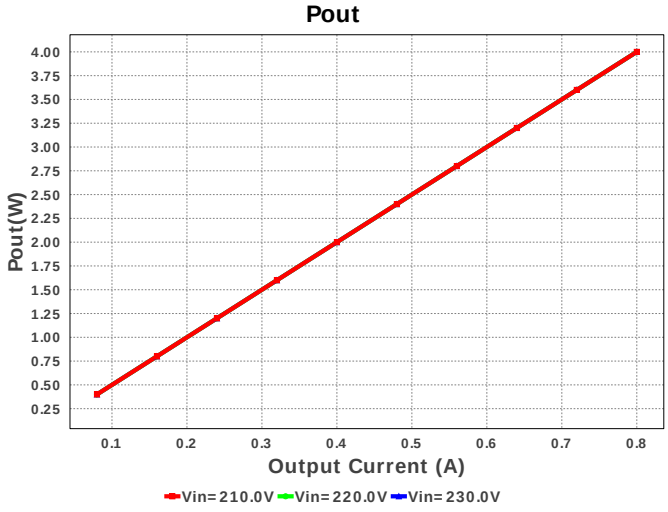


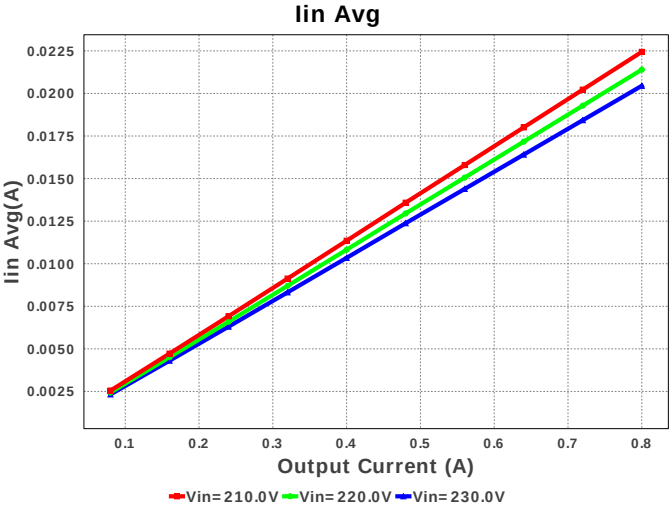


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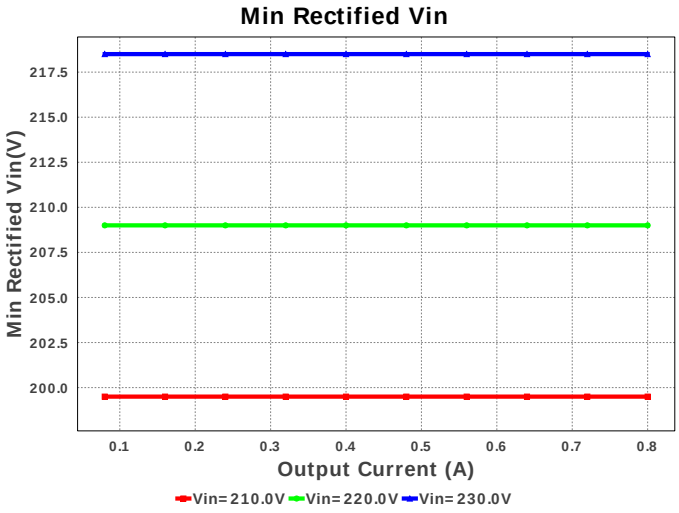


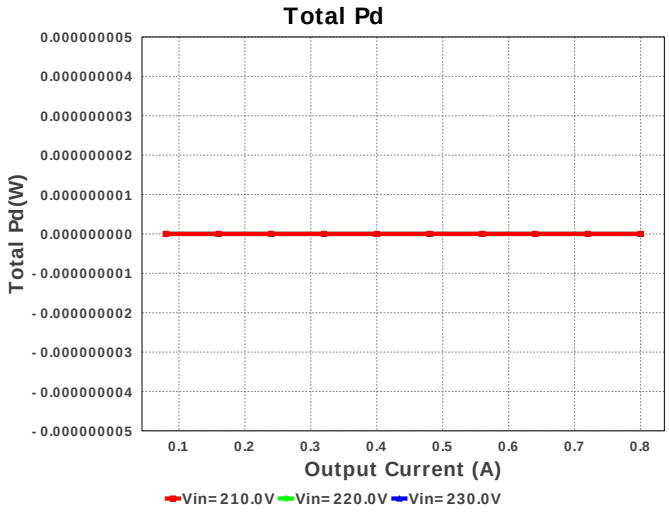


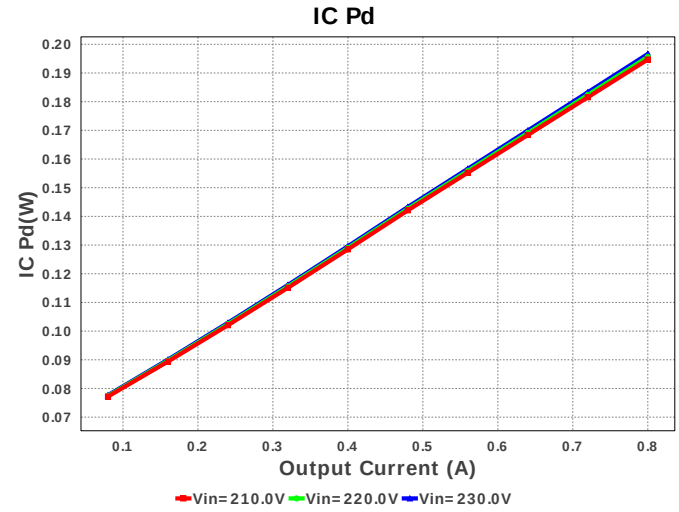


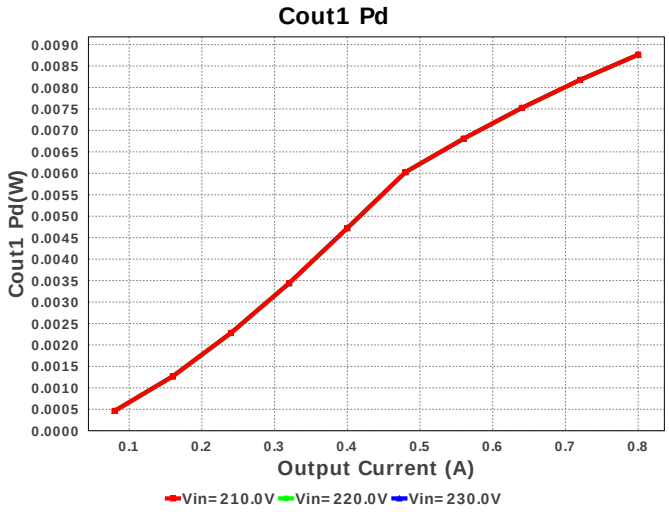


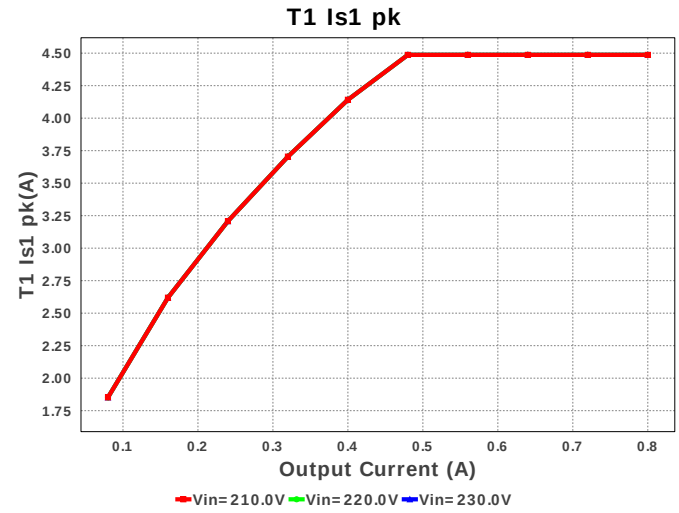


## Operating Values

| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 1. | Cout1 IRMS | 1.324 A | Current | Output capacitor1 RMS ripple current |
| 2. | Iin Avg | 22.441 mA | Current | Average input current |
| 3. | T1 Iprim RMS | 40.868 mA | Current | Transformer Primary RMS Current |
| 4. | T1 Iprim pk | 105.675 mA | Current | Transformer Primary Peak Current |
| 5. | T1 Is1 RMS | 1.547 A | Current | Transformer Secondary1 RMS Current |
| 6. | T1 Is1 pk | 4.487 A | Current | Transformer Secondary1 Peak Current |
| 7. | BOM Count | 21 | General | Total Design BOM count |
| 8. | D1 trr | 500.0 ns | General | D1 Reverse Recovery Time |
| 9. | Daux trr | 4.0 ns | General | Auxiliary Diode Reverse Recovery Time |
| 10. | Dsec trr | 0.0 ns | General | Output Diode Reverse Recovery Time |
| 11. | FootPrint | 742.0 $mm^2$ | General | Total Foot Print Area of BOM components |

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| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 12. | Frequency | 73.85 kHz | General | Approximate switching frequency |
| 13. | Mode | DCM | General | Conduction Mode |
| 14. | Pout | 4.0 W | General | Total output power |
| 15. | Total BOM | $0.0 | General | Total BOM Cost |
| 16. | Vout OP | 5.0 V | Op_Point | Operational Output Voltage |
| 17. | Duty Cycle | 44.869 % | Op_point | Duty cycle at the Minimum voltage seen at the rectified input |
| 18. | Efficiency | 84.878 % | Op_point | Steady state efficiency |
| 19. | IC Tj | 49.898 degC | Op_point | IC junction temperature |
| 20. | ICThetaJA | 102.2 degC/W | Op_point | IC junction-to-ambient thermal resistance |
| 21. | IOUT_OP | 800.0 mA | Op_point | Iout operating point |
| 22. | Min Rectified Vin | 199.5 V | Op_point | Minimum voltage seen at rectified input |
| 23. | Vout p-p | 22.434 mV | Op_point | Peak-to-peak output ripple voltage |
| 24. | Cin Pd | 1.87 mW | Power | Input capacitor power dissipation |
| 25. | Core Loss | 54.894 mW | Power | CoreLoss |
| 26. | Cout1 Pd | 8.765 mW | Power | Output capacitor1 power dissipation |
| 27. | Dsec Pd | 256.729 mW | Power | Secondary Diode Power Dissipation |
| 28. | IC Pd | 194.697 mW | Power | IC power dissipation |
| 29. | Total Pd | 0.0 W | Power | Total Power Dissipation |
| 30. | Xformer Pd | 109.788 mW | Power | Transformer power dissipation |
| 31. | Vout Tolerance | 160.0 m% | | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |

## Design Inputs

| # | Name | Value | Description |
|---|---|---|---|
| 1. | Iout | 800.0 m | Maximum Output Current |
| 2. | VinMax | 230.0 | Maximum input voltage |
| 3. | VinMin | 210.0 | Minimum input voltage |
| 4. | Vout | 5.0 | Output Voltage |
| 5. | base_pn | UCC28910 | Base Product Number |
| 6. | source | DC | Input Source Type |
| 7. | Ta | 30.0 | Ambient temperature |

## Design Assistance

1. **UCC28910** Product Folder : http://www.ti.com/product/UCC28910 : contains the data sheet and other resources.

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