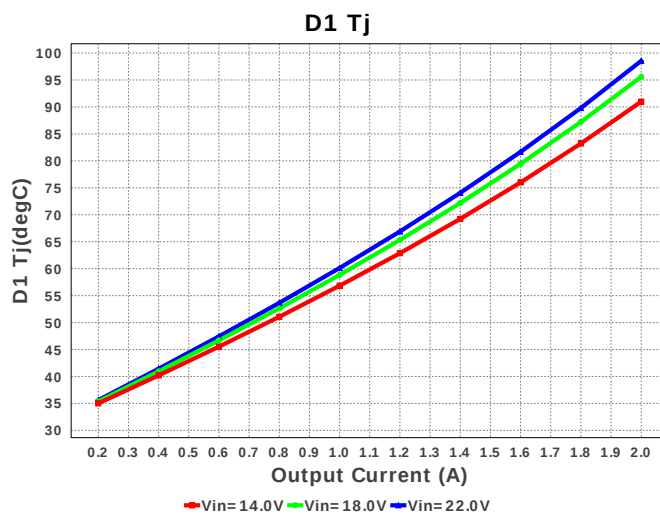
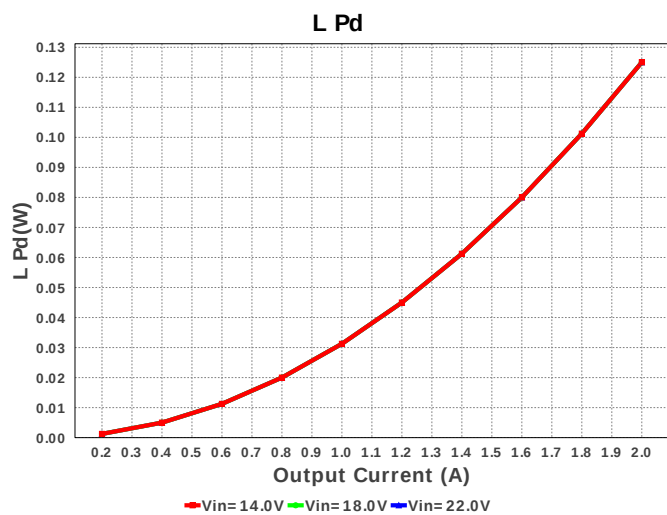
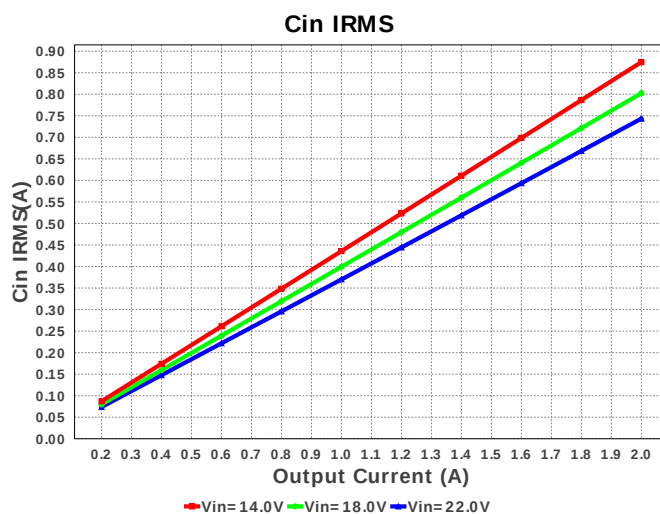
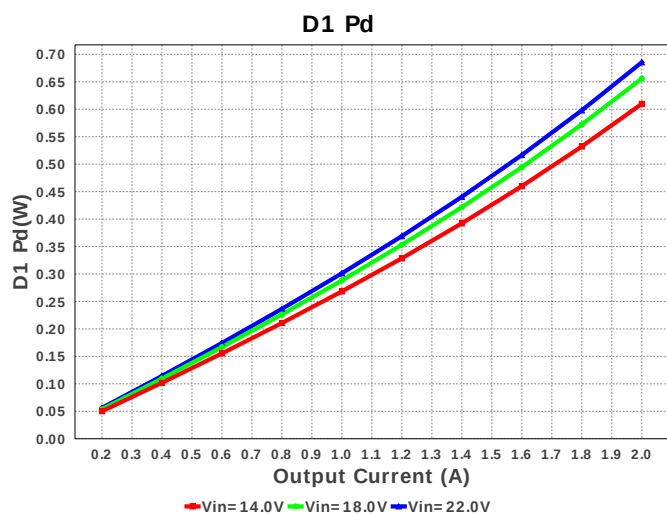
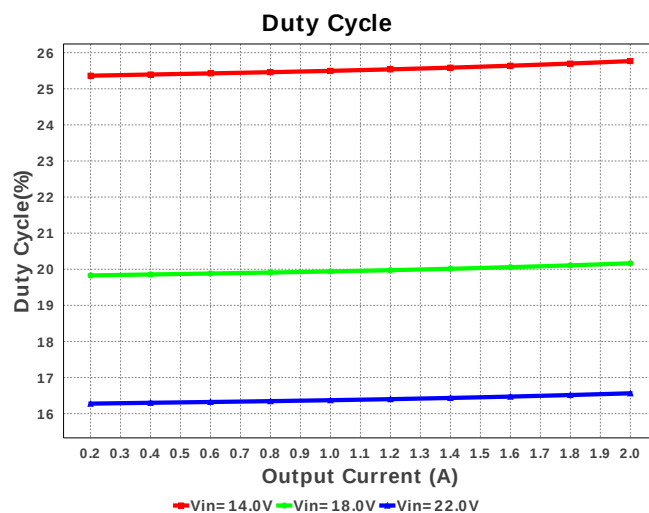
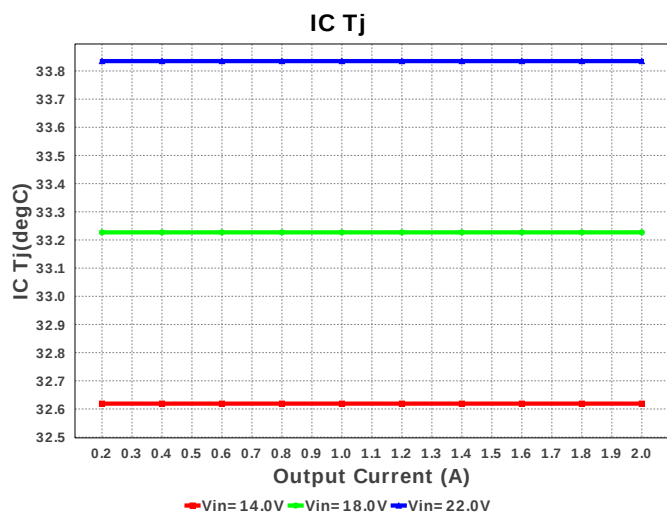


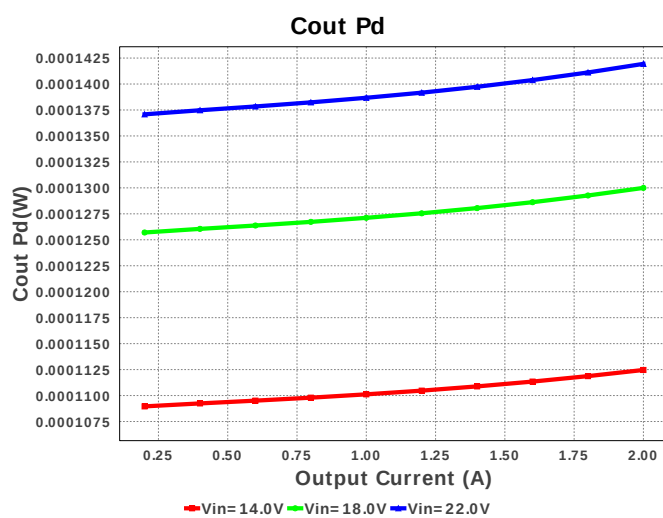
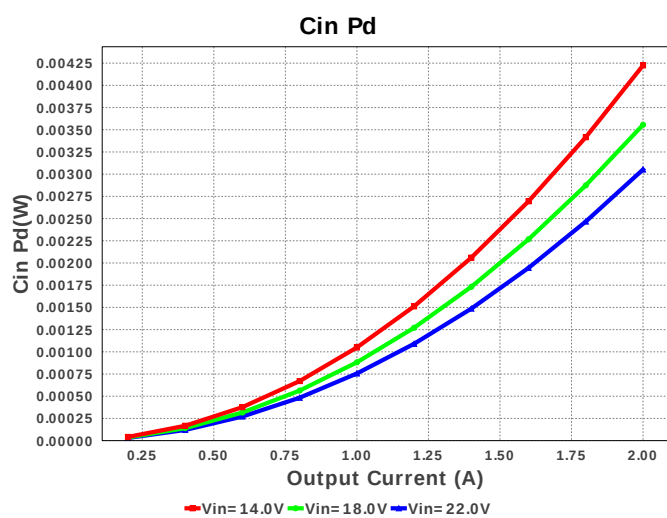
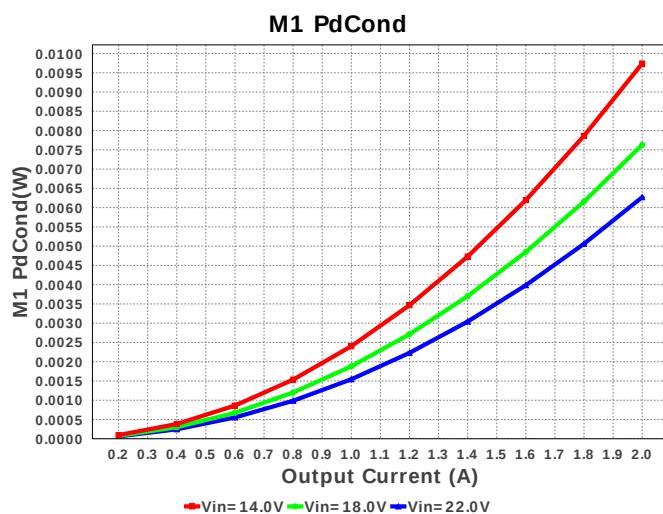
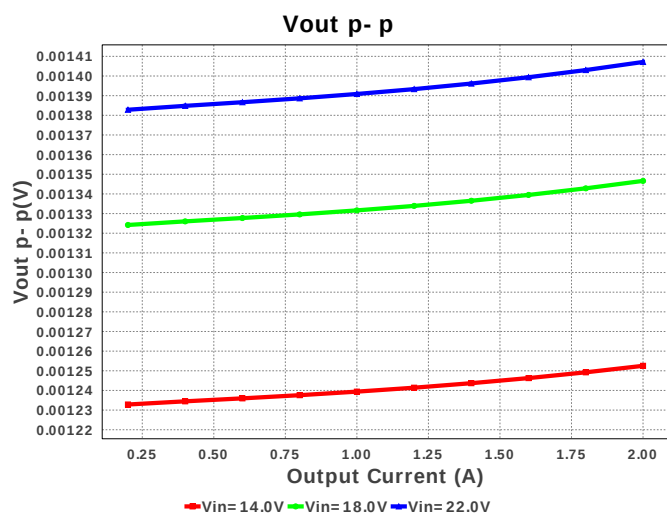
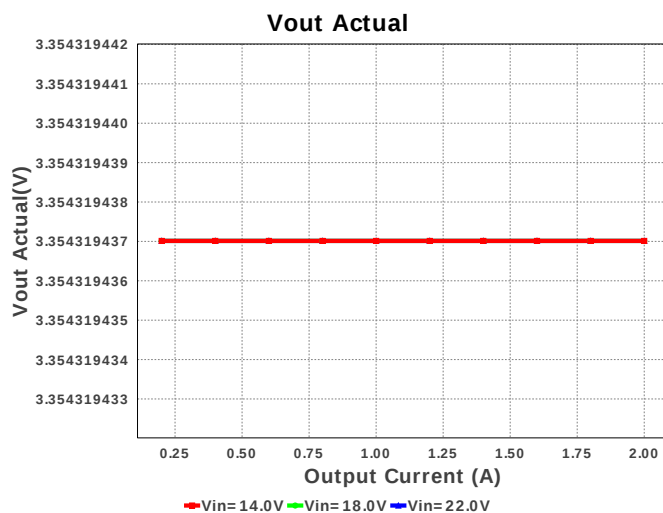
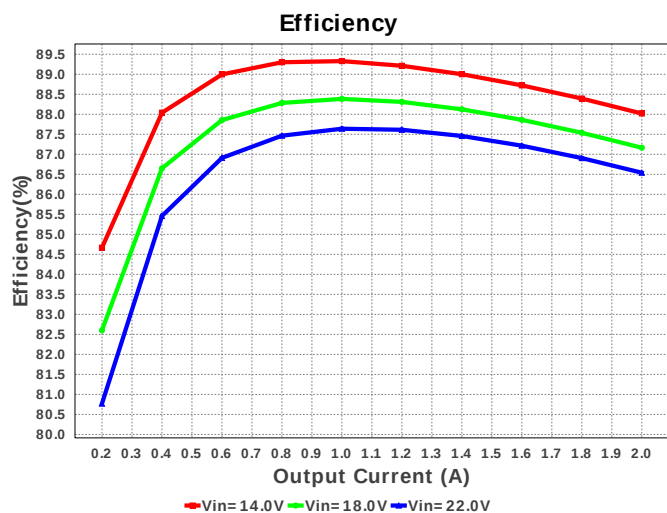
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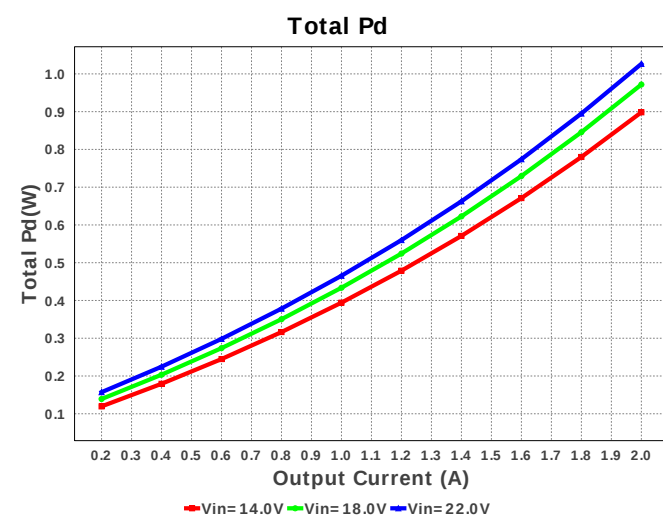
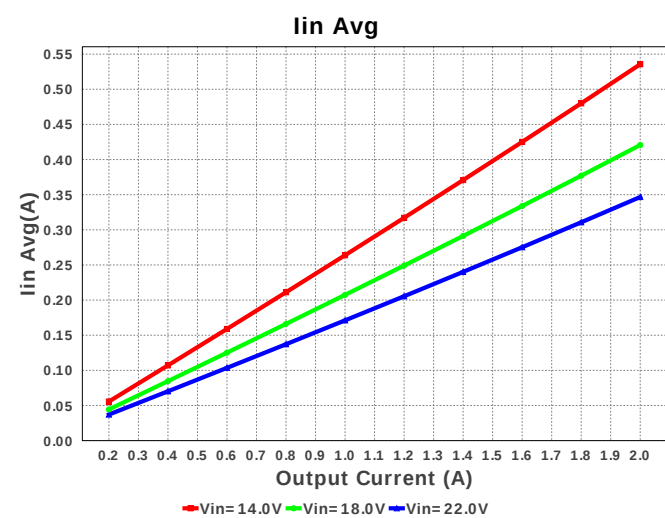
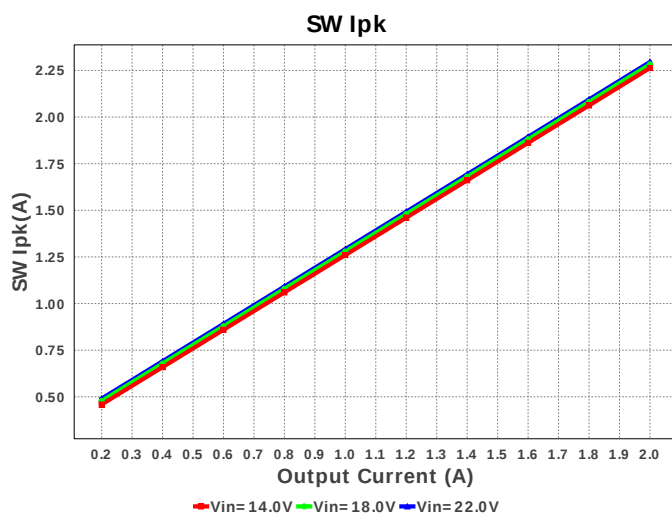
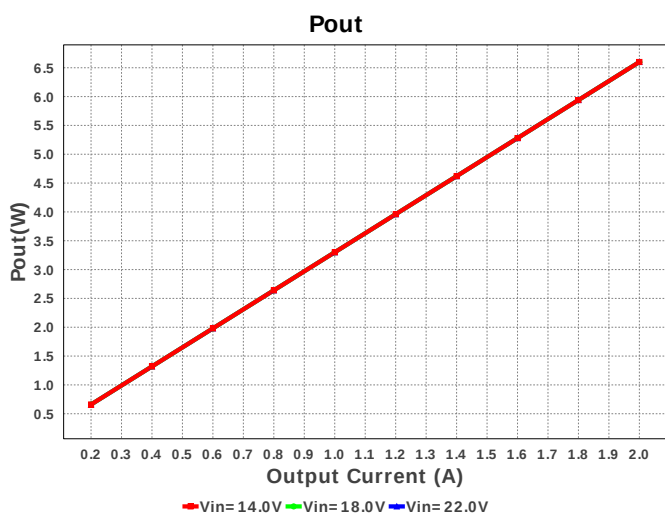
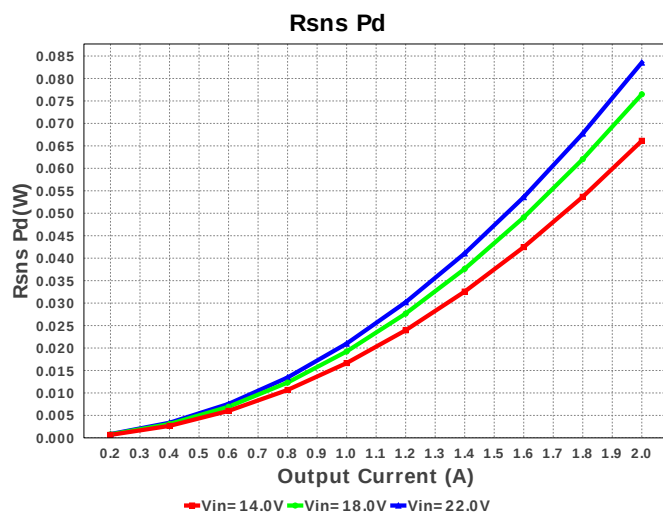
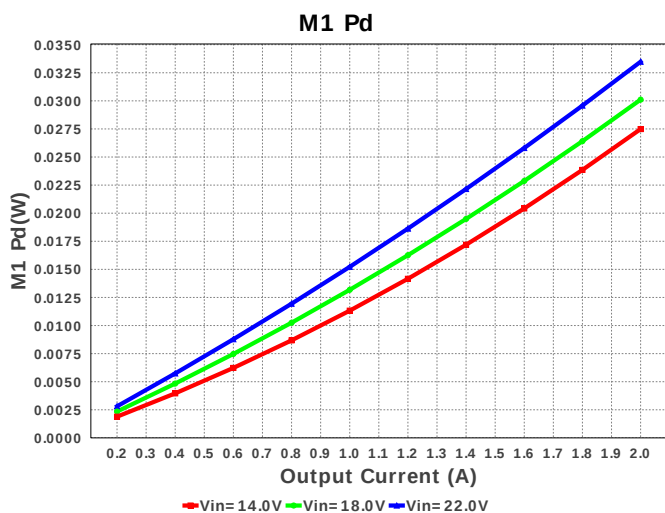
## Electrical BOM

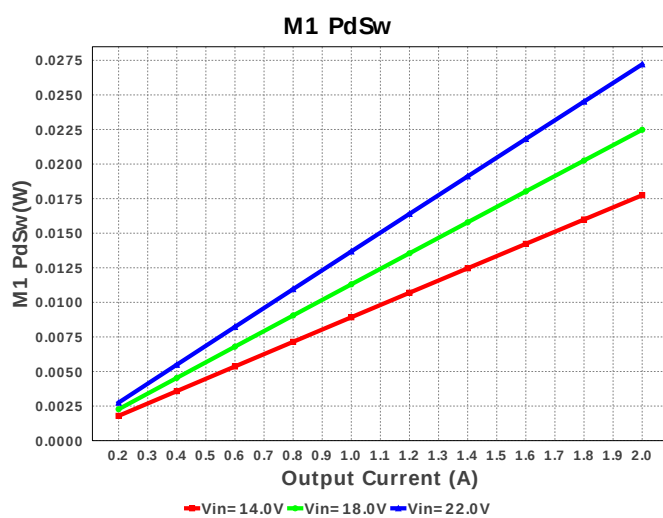
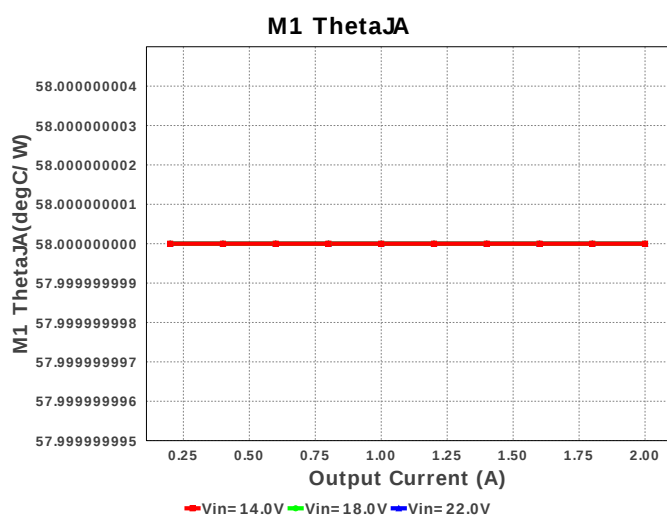
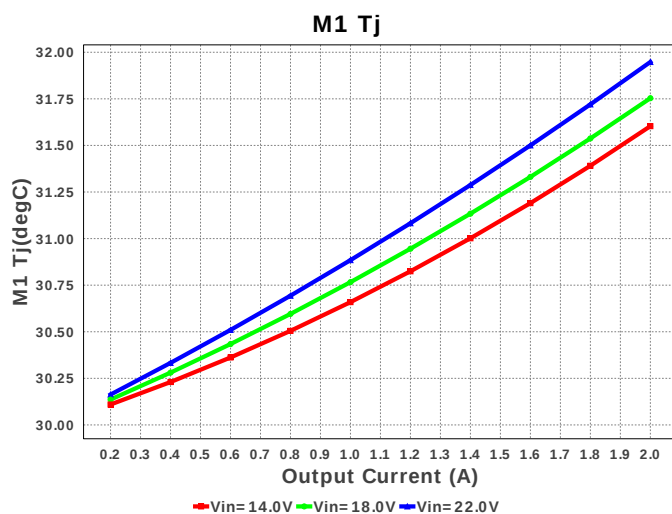
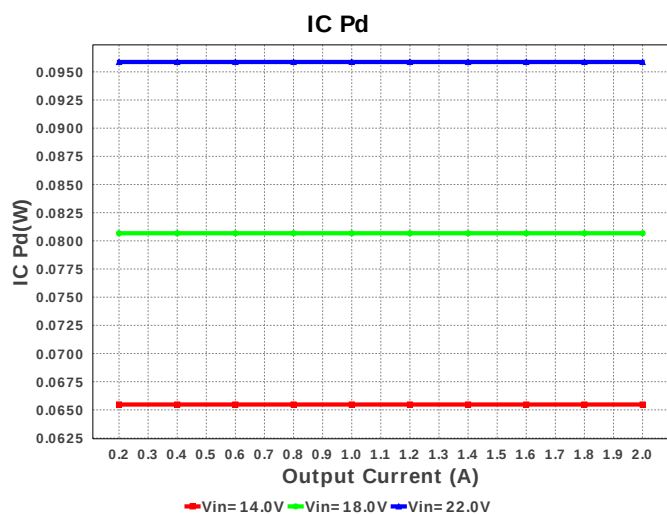
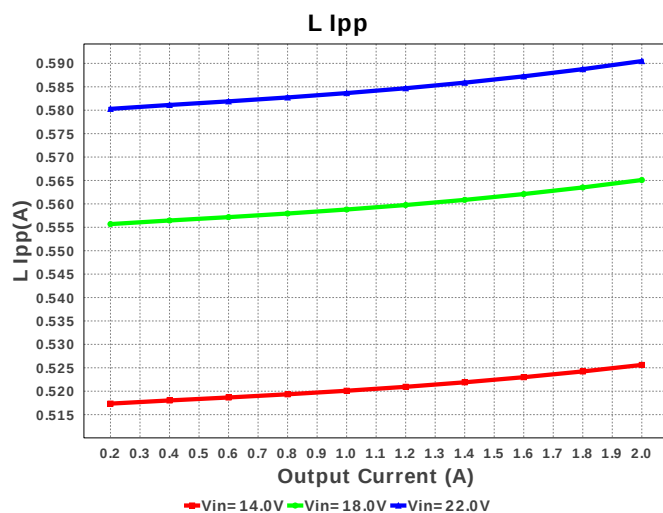
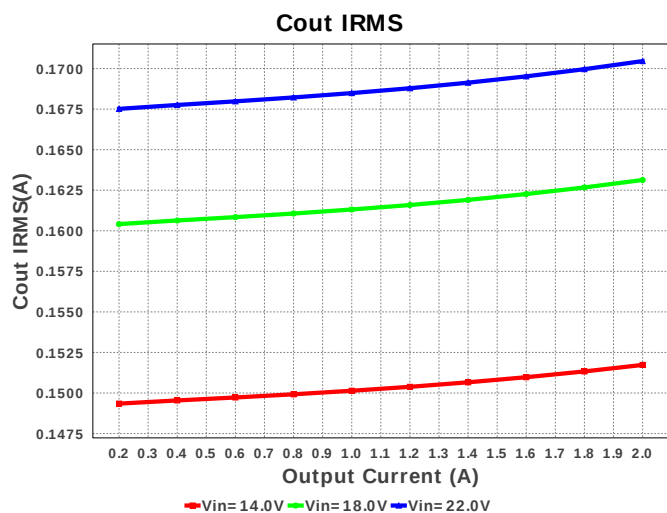
| #  | Name  | Manufacturer              | Part Number                           | Properties                                                       | Qty | Price  | Footprint                                                                                                            |
|----|-------|---------------------------|---------------------------------------|------------------------------------------------------------------|-----|--------|----------------------------------------------------------------------------------------------------------------------|
| 1. | Cboot | Kemet                     | C0603C682K5RACTU<br>Series= X7R       | Cap= 6.8 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | <br>0603 5 mm <sup>2</sup>      |
| 2. | Ccomp | MuRata                    | GRM1885C1H182JA01J<br>Series= C0G/NP0 | Cap= 1.8 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | <br>0603 5 mm <sup>2</sup>      |
| 3. | Cdthr | MuRata                    | GRM188R71C473KA01D<br>Series= X7R     | Cap= 47.0 nF<br>VDC= 16.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | <br>0603 5 mm <sup>2</sup>      |
| 4. | Chf   | Kemet                     | C0603C220K3GACTU<br>Series= C0G/NP0   | Cap= 22.0 pF<br>VDC= 25.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | <br>0603 5 mm <sup>2</sup>      |
| 5. | 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 | <br>0603 5 mm <sup>2</sup>      |
| 6. | 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 | 1   | \$0.14 | <br>1206_190 11 mm <sup>2</sup> |
| 7. | Cout1 | MuRata                    | GRM155R60J225ME15D<br>Series= X5R     | Cap= 2.2 uF<br>ESR= 5.0 mOhm<br>VDC= 6.3 V<br>IRMS= 3.67 A       | 1   | \$0.02 | <br>0402 3 mm <sup>2</sup>      |
| 8. | Cramp | Samsung Electro-Mechanics | CL10C161JB8NNNC<br>Series= C0G/NP0    | Cap= 160.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A                      | 1   | \$0.01 | <br>0603 5 mm <sup>2</sup>      |
| 9. | Css   | Kemet                     | C0603C103J5RACTU<br>Series= X7R       | Cap= 10.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | <br>0603 5 mm <sup>2</sup>      |

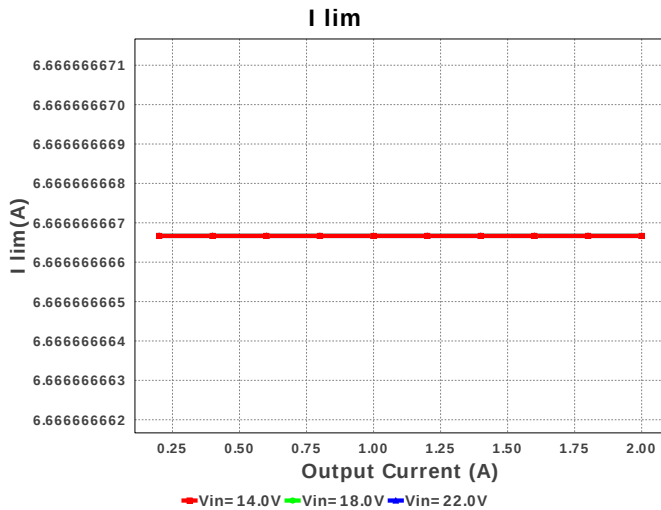
| #   | Name  | Manufacturer              | Part Number                          | Properties                                             | Qty | Price  | Footprint                                                                                                              |
|-----|-------|---------------------------|--------------------------------------|--------------------------------------------------------|-----|--------|------------------------------------------------------------------------------------------------------------------------|
| 10. | Cvcc  | Kemet                     | C0603C104K3RACTU<br>Series= X7R      | Cap= 100.0 nF<br>VDC= 25.0 V<br>IRMS= 0.0 A            | 1   | \$0.01 |  0603 5 mm <sup>2</sup>             |
| 11. | D1    | Diodes Inc.               | B340A-13-F                           | VF@Io= 500.0 mV<br>VRRM= 40.0 V                        | 1   | \$0.11 |  SMA 37 mm <sup>2</sup>             |
| 12. | L1    | Bourns                    | SRU1038-100Y                         | L= 10.0 µH<br>DCR= 25.0 mOhm                           | 1   | \$0.33 |  SRU1038 144 mm <sup>2</sup>        |
| 13. | M1    | Texas Instruments         | CSD17308Q3                           | VdsMax= 30.0 V<br>IdsMax= 47.0 Amps                    | 1   | \$0.34 |  TRANS_NexFET_Q3 18 mm <sup>2</sup> |
| 14. | Rcomp | Yageo America             | RC0603FR-0733KL<br>Series= ?         | Res= 33.0 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 |  0603 5 mm <sup>2</sup>             |
| 15. | Rfbb  | Vishay-Dale               | CRCW04021K91FKED<br>Series= CRCW..e3 | Res= 1.91 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%    | 1   | \$0.01 |  0402 3 mm <sup>2</sup>             |
| 16. | Rfbt  | Vishay-Dale               | CRCW04023K32FKED<br>Series= CRCW..e3 | Res= 3.32 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%    | 1   | \$0.01 |  0402 3 mm <sup>2</sup>             |
| 17. | Rramp | Vishay-Dale               | CRCW06031M00FKEA<br>Series= CRCW..e3 | Res= 1000.0 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 |  0603 5 mm <sup>2</sup>             |
| 18. | Rsns  | Stackpole Electronics Inc | CSR1206FK30L0<br>Series= ?           | Res= 30.0 mOhm<br>Power= 500.0 mW<br>Tolerance= 1.0%   | 1   | \$0.10 |  1206 11 mm <sup>2</sup>           |
| 19. | Rt    | Vishay-Dale               | CRCW060310K7FKEA<br>Series= CRCW..e3 | Res= 10.7 kOhm<br>Power= 100.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 |  0603 5 mm <sup>2</sup>           |
| 20. | Ruv1  | Panasonic                 | ERJ-6ENF6041V<br>Series= ERJ-6E      | Res= 6.04 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 |  0805 7 mm <sup>2</sup>           |
| 21. | Ruv2  | Panasonic                 | ERJ-6ENF4992V<br>Series= ERJ-6E      | Res= 49.9 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 |  0805 7 mm <sup>2</sup>           |
| 22. | U1    | Texas Instruments         | LM5088MH-1/NOPB                      | Switcher                                               | 1   | \$1.76 |  MXA16A 59 mm <sup>2</sup>        |











## Operating Values

| #   | Name           | Value                 | Category | Description                                                                                |
|-----|----------------|-----------------------|----------|--------------------------------------------------------------------------------------------|
| 1.  | Cin IRMS       | 743.508 mA            | Current  | Input capacitor RMS ripple current                                                         |
| 2.  | Cout IRMS      | 170.313 mA            | Current  | Output capacitor RMS ripple current                                                        |
| 3.  | I lim          | 6.667 A               | Current  | Current limit threshold                                                                    |
| 4.  | Iin Avg        | 346.66 mA             | Current  | Average input current                                                                      |
| 5.  | L Ipp          | 589.98 mA             | Current  | Peak-to-peak inductor ripple current                                                       |
| 6.  | SW Ipk         | 2.295 A               | Current  | Peak switch current                                                                        |
| 7.  | BOM Count      | 22                    | General  | Total Design BOM count                                                                     |
| 8.  | FootPrint      | 354.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                                                    |
| 9.  | Frequency      | 524.549 kHz           | General  | Switching frequency                                                                        |
| 10. | IC Tolerance   | 18.0 mV               | General  | IC Feedback Tolerance                                                                      |
| 11. | M1 ThetaJA     | 58.0 degC/W           | General  | MOSFET junction-to-ambient thermal resistance                                              |
| 12. | Pout           | 6.6 W                 | General  | Total output power                                                                         |
| 13. | Total BOM      | \$2.99                | General  | Total BOM Cost                                                                             |
| 14. | D1 Tj          | 98.547 degC           | Op_Point | D1 junction temperature                                                                    |
| 15. | Vout Actual    | 3.3 V                 | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 16. | Duty Cycle     | 16.564 %              | Op_point | Duty cycle                                                                                 |
| 17. | Efficiency     | 86.54 %               | Op_point | Steady state efficiency                                                                    |
| 18. | IC Tj          | 33.835 degC           | Op_point | IC junction temperature                                                                    |
| 19. | ICThetaJA      | 40.0 degC/W           | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 20. | IOUT_OP        | 2.0 A                 | Op_point | Iout operating point                                                                       |
| 21. | M1 Tj          | 31.948 degC           | Op_point | M1 MOSFET junction temperature                                                             |
| 22. | VIN_OP         | 22.0 V                | Op_point | Vin operating point                                                                        |
| 23. | Vout p-p       | 1.406 mV              | Op_point | Peak-to-peak output ripple voltage                                                         |
| 24. | Cin Pd         | 3.053 mW              | Power    | Input capacitor power dissipation                                                          |
| 25. | Cout Pd        | 141.697 $\mu$ W       | Power    | Output capacitor power dissipation                                                         |
| 26. | D1 Pd          | 685.473 mW            | Power    | Diode1 power dissipation                                                                   |
| 27. | IC Pd          | 95.874 mW             | Power    | IC power dissipation                                                                       |
| 28. | L Pd           | 125.0 mW              | Power    | Inductor power dissipation                                                                 |
| 29. | M1 Pd          | 33.483 mW             | Power    | M1 MOSFET total power dissipation                                                          |
| 30. | M1 PdCond      | 6.27 mW               | Power    | M1 MOSFET conduction losses                                                                |
| 31. | M1 PdSw        | 27.213 mW             | Power    | M1 MOSFET switching losses                                                                 |
| 32. | Rsns Pd        | 83.539 mW             | Power    | Current Limit Sense Resistor Power Dissipation                                             |
| 33. | Total Pd       | 1.027 W               | Power    | Total Power Dissipation                                                                    |
| 34. | Vout Tolerance | 2.795 %               |          | 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 | LM5088 | Texas Instruments Base Part Number |
| 6. | source  | DC     | Input Source Type                  |
| 7. | ta      | 30.0   | Ambient temperature                |

## Design Assistance

1. LM5088 Product Folder : <http://www.ti.com/product/LM5088> : contains the data sheet and other resources.

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