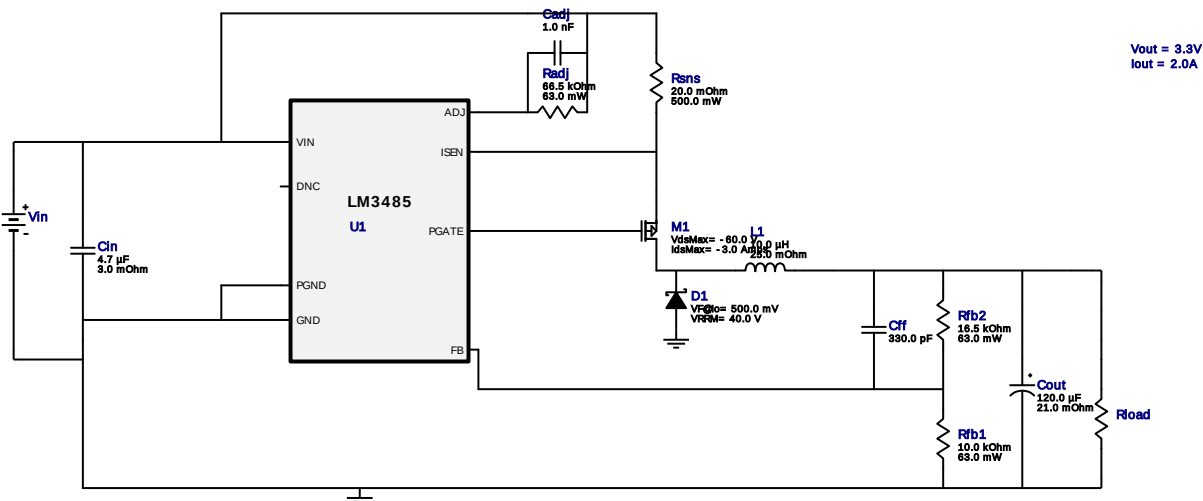


## WEBENCH® Design Report

Design : 4807269/2 LM3485MM/NOPB  
LM3485MM/NOPB 14.0V-22.0V to 3.30V @ 2.0A

VinMin = 14.0V  
VinMax = 22.0V  
Vout = 3.3V  
Iout = 2.0A

Device = LM3485MM/NOPB  
Topology = Buck  
Created = 9/29/16 7:14:05 PM  
BOM Cost = \$1.69  
BOM Count = 12  
Total Pd = 1.14W

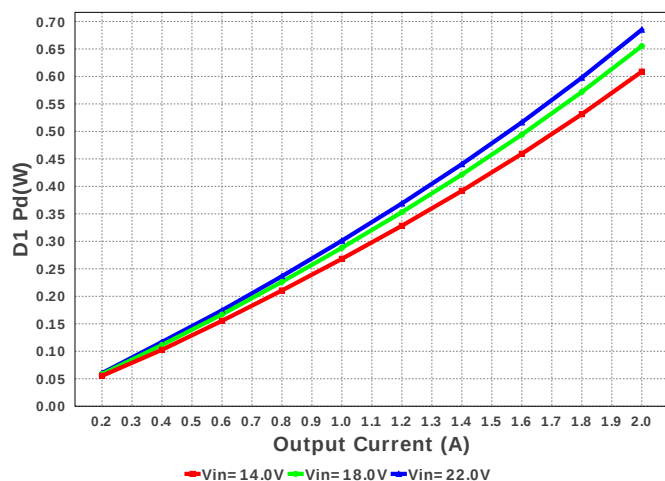


### Electrical BOM

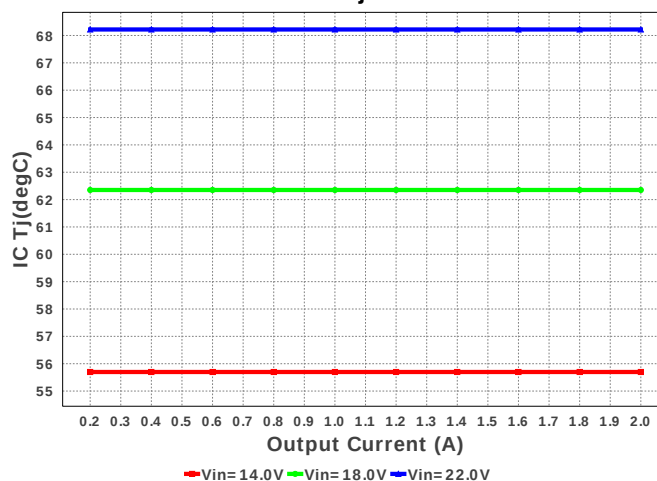
| #  | Name | Manufacturer              | Part Number                          | Properties                                                    | Qty | Price  | Footprint                        |
|----|------|---------------------------|--------------------------------------|---------------------------------------------------------------|-----|--------|----------------------------------|
| 1. | Cadj | Samsung Electro-Mechanics | CL21C102JBCNFNC<br>Series= C0G/NP0   | Cap= 1.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                     | 1   | \$0.01 | 0805 7 mm <sup>2</sup>           |
| 2. | Cff  | Samsung Electro-Mechanics | CL21C331JBANFNC<br>Series= C0G/NP0   | Cap= 330.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A                   | 1   | \$0.01 | 0805 7 mm <sup>2</sup>           |
| 3. | Cin  | MuRata                    | GRM31CR71H475KA12L<br>Series= X7R    | Cap= 4.7 uF<br>ESR= 3.0 mOhm<br>VDC= 50.0 V<br>IRMS= 4.98 A   | 1   | \$0.07 | 1206 11 mm <sup>2</sup>          |
| 4. | Cout | Panasonic                 | 6SVPC120MV<br>Series= SVPC           | Cap= 120.0 uF<br>ESR= 21.0 mOhm<br>VDC= 6.3 V<br>IRMS= 2.66 A | 1   | \$0.28 | SM_RADIAL_5MM 58 mm <sup>2</sup> |
| 5. | 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>           |
| 6. | L1   | Bourns                    | SRU1038-100Y                         | L= 10.0 uH<br>DCR= 25.0 mOhm                                  | 1   | \$0.33 | SRU1038 144 mm <sup>2</sup>      |
| 7. | M1   | Fairchild Semiconductor   | FDC5614P                             | VdsMax= -60.0 V<br>IdsMax= -3.0 Amps                          | 1   | \$0.23 | SOT-23-6 15 mm <sup>2</sup>      |
| 8. | Radj | Vishay-Dale               | CRCW040266K5FKED<br>Series= CRCW..e3 | Res= 66.5 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 | 0402 3 mm <sup>2</sup>           |
| 9. | Rfb1 | Vishay-Dale               | CRCW040210K0FKED<br>Series= CRCW..e3 | Res= 10.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 | 0402 3 mm <sup>2</sup>           |

| #   | Name | Manufacturer              | Part Number                          | Properties                                           | Qty | Price  | Footprint                                                                                                     |
|-----|------|---------------------------|--------------------------------------|------------------------------------------------------|-----|--------|---------------------------------------------------------------------------------------------------------------|
| 10. | Rfb2 | Vishay-Dale               | CRCW040216K5FKED<br>Series= CRCW..e3 | Res= 16.5 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 |  0402 3 mm <sup>2</sup>    |
| 11. | Rsns | Stackpole Electronics Inc | CSR1206FK20L0<br>Series= ?           | Res= 20.0 mOhm<br>Power= 500.0 mW<br>Tolerance= 1.0% | 1   | \$0.10 |  1206 11 mm <sup>2</sup>   |
| 12. | U1   | Texas Instruments         | LM3485MM/NOPB                        | Switcher                                             | 1   | \$0.52 |  MUA08A 24 mm <sup>2</sup> |

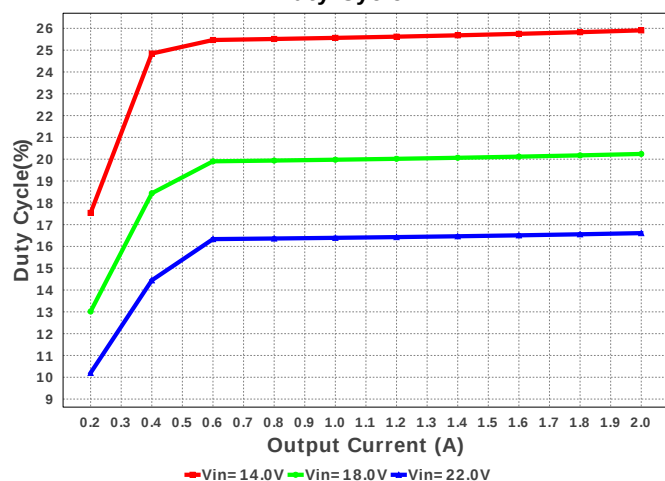
D1 Pd



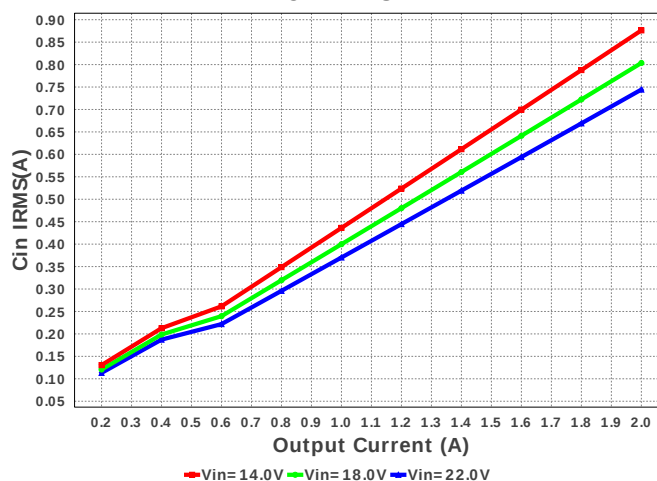
IC Tj

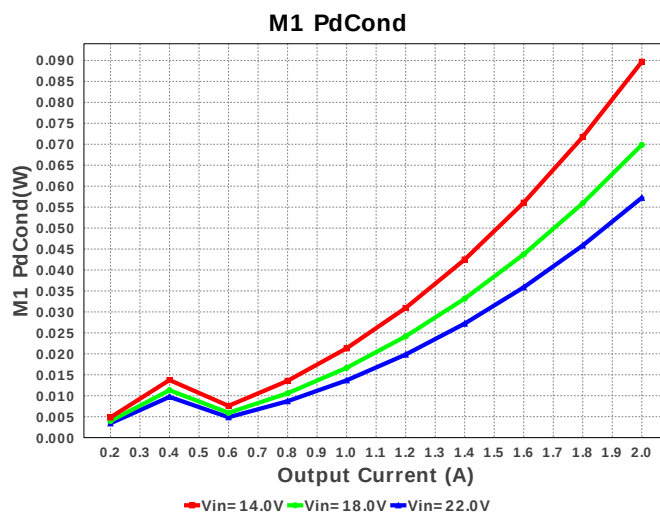
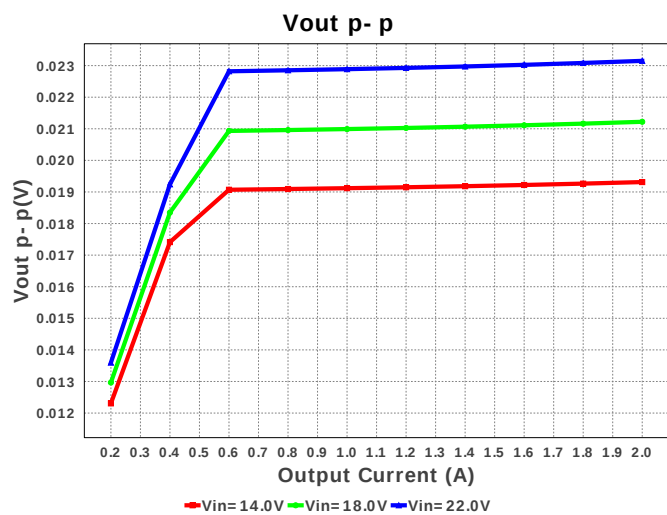
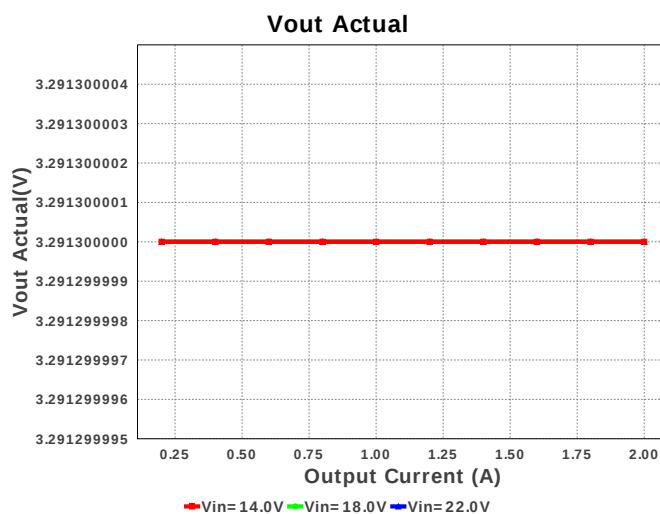
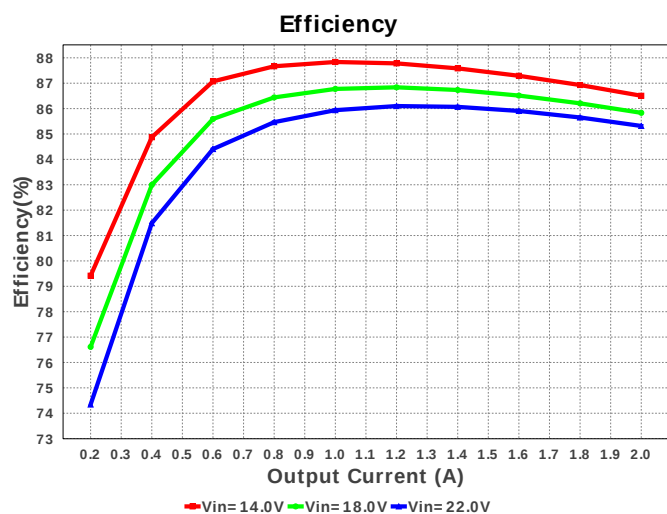
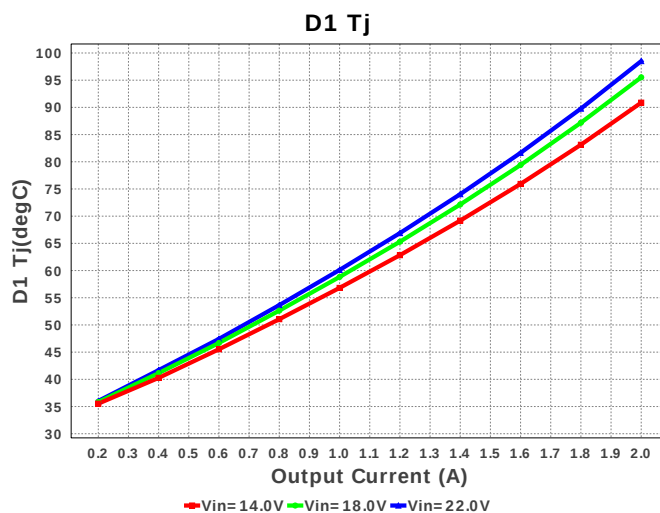
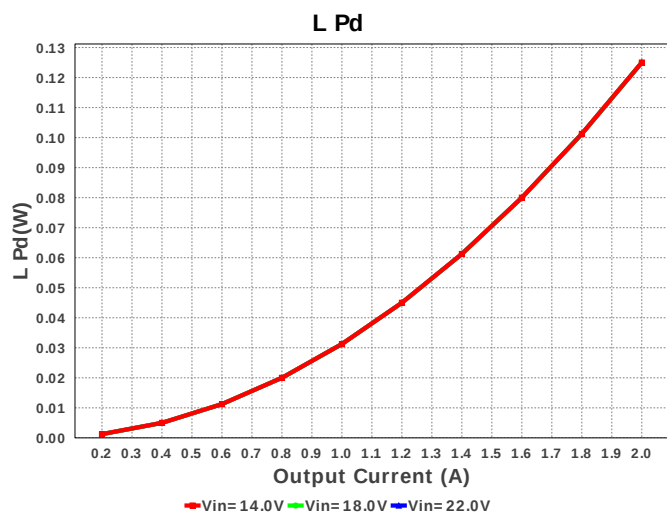


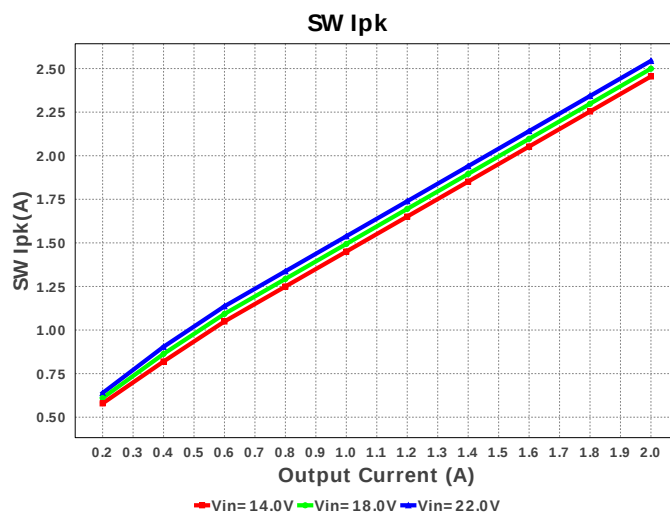
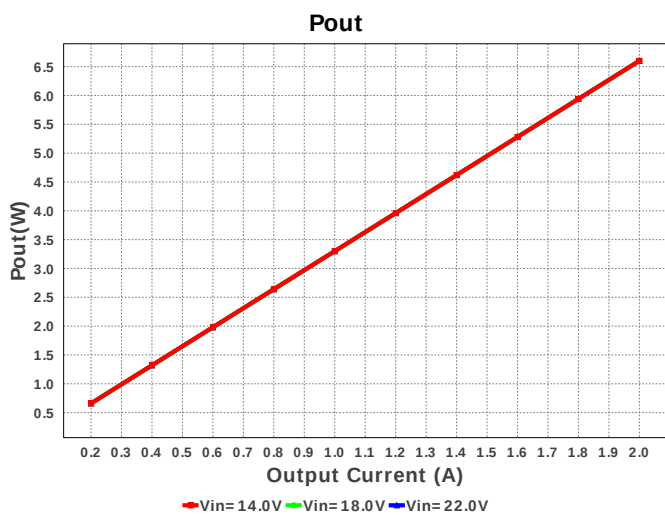
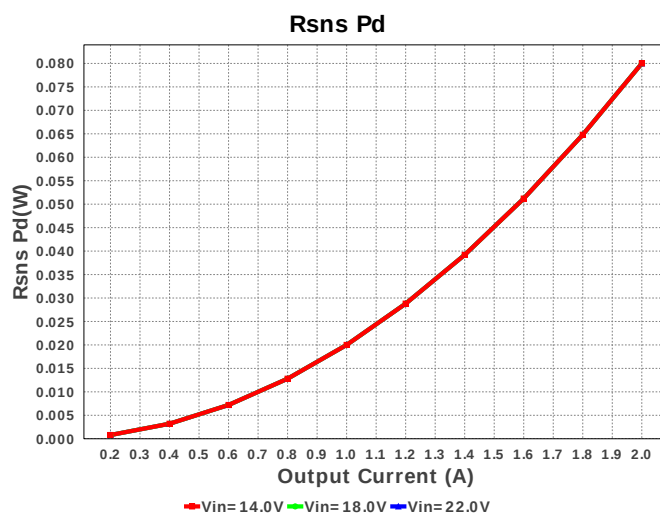
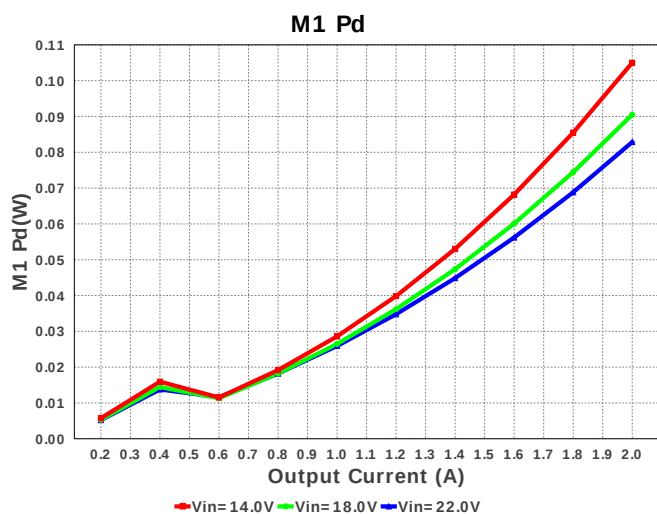
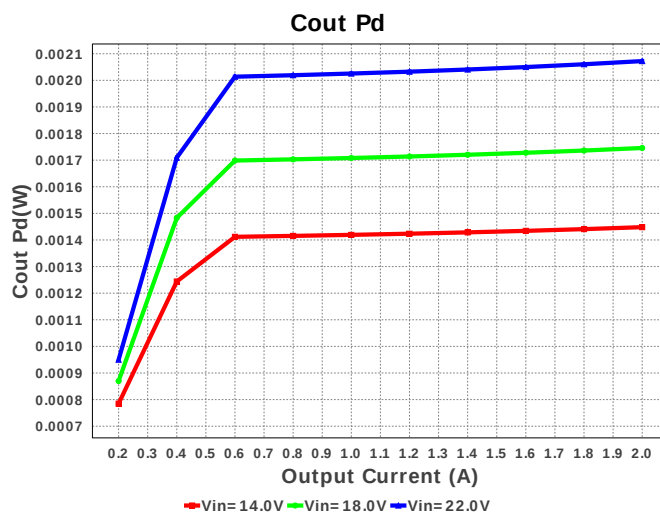
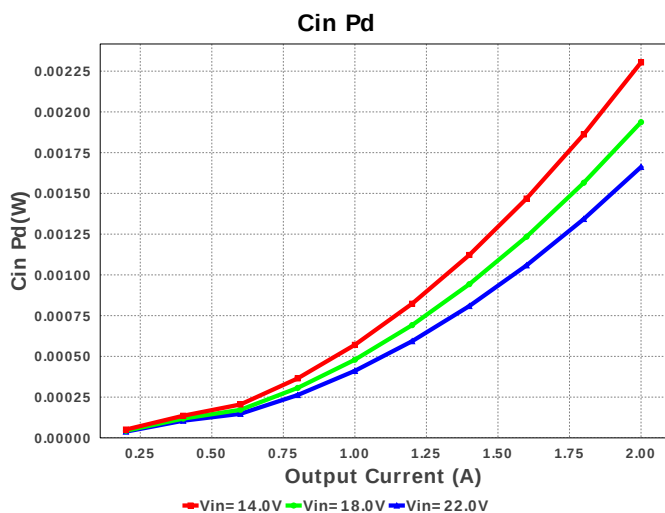
Duty Cycle

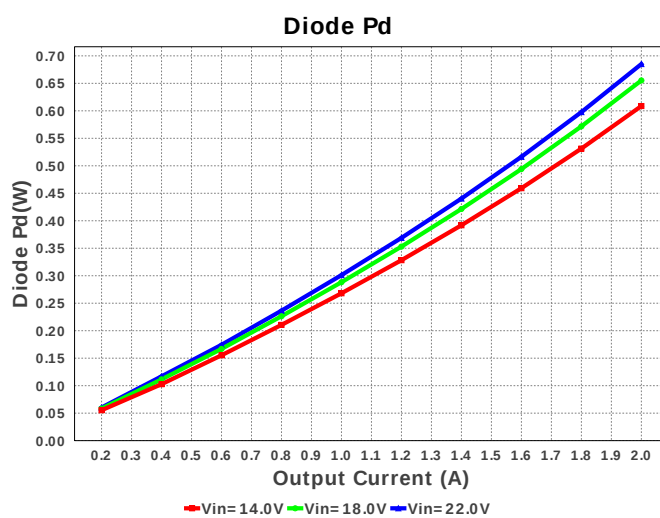
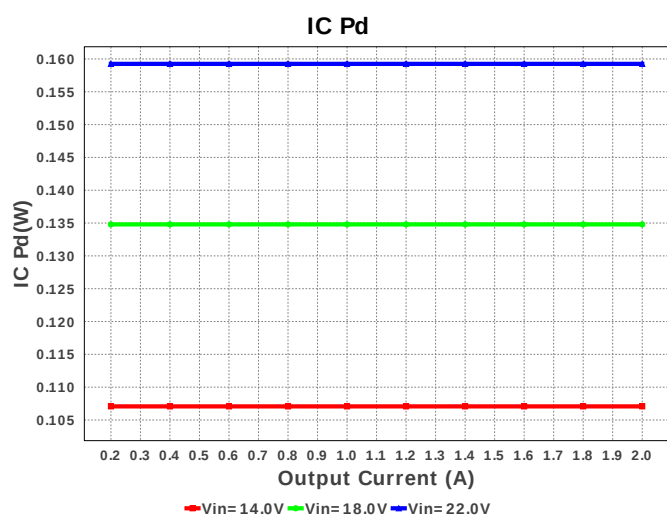
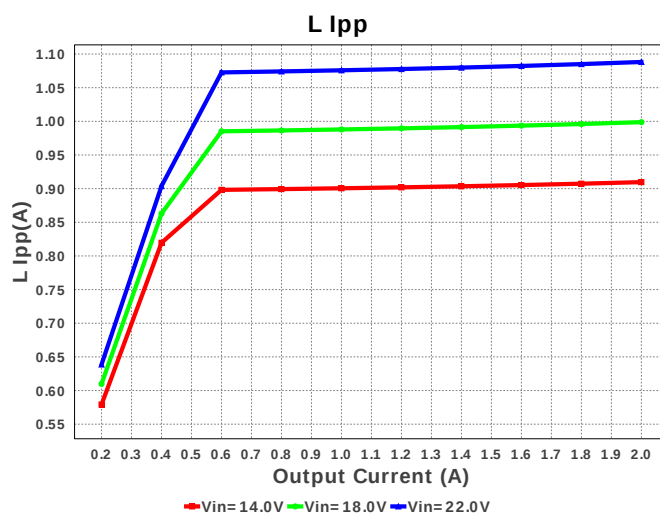
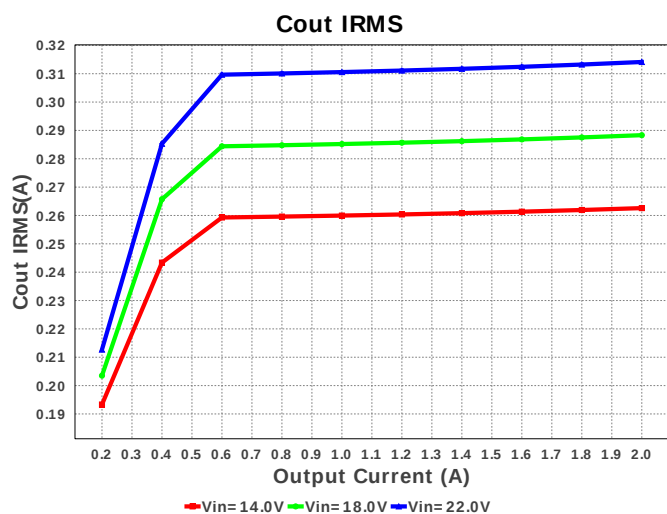
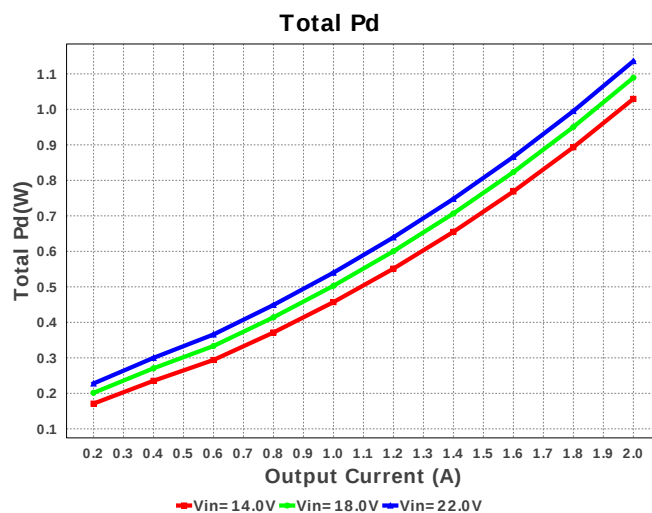
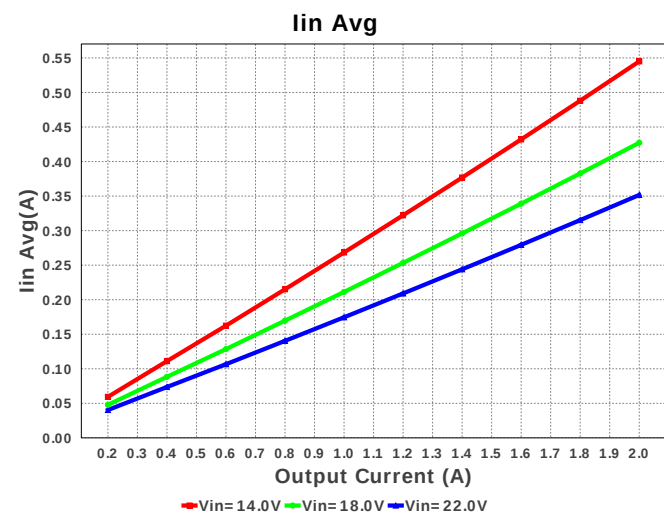


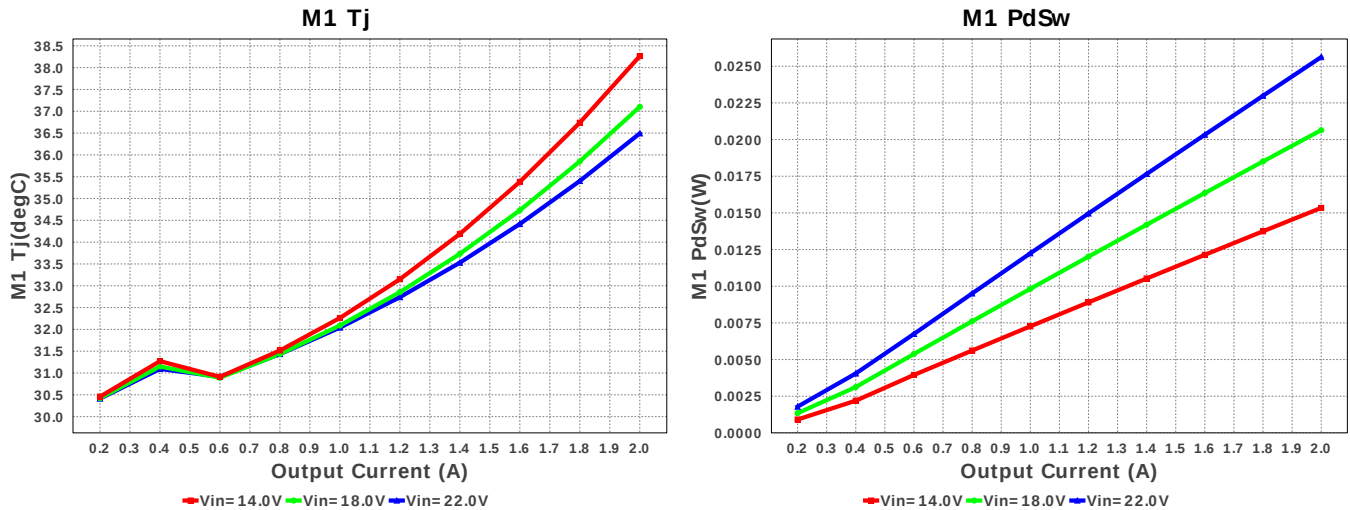
Cin IRMS











## Operating Values

| #   | Name           | Value                 | Category | Description                                                                                |
|-----|----------------|-----------------------|----------|--------------------------------------------------------------------------------------------|
| 1.  | Cin IRMS       | 744.345 mA            | Current  | Input capacitor RMS ripple current                                                         |
| 2.  | Cout IRMS      | 307.126 mA            | Current  | Output capacitor RMS ripple current                                                        |
| 3.  | Iin Avg        | 351.64 mA             | Current  | Average input current                                                                      |
| 4.  | L Ipp          | 1.064 A               | Current  | Peak-to-peak inductor ripple current                                                       |
| 5.  | SW Ipk         | 2.532 A               | Current  | Peak switch current                                                                        |
| 6.  | BOM Count      | 12                    | General  | Total Design BOM count                                                                     |
| 7.  | FootPrint      | 323.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                                                    |
| 8.  | Frequency      | 306.159 kHz           | General  | Switching frequency                                                                        |
| 9.  | IC Tolerance   | 0.0 V                 | General  | IC Feedback Tolerance                                                                      |
| 10. | Mode           | CCM                   | General  | Conduction Mode                                                                            |
| 11. | Pout           | 6.6 W                 | General  | Total output power                                                                         |
| 12. | Total BOM      | \$1.69                | General  | Total BOM Cost                                                                             |
| 13. | D1 Tj          | 98.509 degC           | Op_Point | D1 junction temperature                                                                    |
| 14. | Vout Actual    | 3.291 V               | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 15. | Vout OP        | 3.3 V                 | Op_Point | Operational Output Voltage                                                                 |
| 16. | Duty Cycle     | 16.61 %               | Op_point | Duty cycle                                                                                 |
| 17. | Efficiency     | 85.315 %              | Op_point | Steady state efficiency                                                                    |
| 18. | IC Tj          | 61.85 degC            | Op_point | IC junction temperature                                                                    |
| 19. | ICThetaJA      | 200.0 degC/W          | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 20. | IOUT_OP        | 2.0 A                 | Op_point | Iout operating point                                                                       |
| 21. | M1 Tj          | 36.492 degC           | Op_point | M1 MOSFET junction temperature                                                             |
| 22. | VIN_OP         | 22.0 V                | Op_point | Vin operating point                                                                        |
| 23. | Vout p-p       | 22.634 mV             | Op_point | Peak-to-peak output ripple voltage                                                         |
| 24. | Cin Pd         | 1.662 mW              | Power    | Input capacitor power dissipation                                                          |
| 25. | Cout Pd        | 1.981 mW              | Power    | Output capacitor power dissipation                                                         |
| 26. | D1 Pd          | 685.09 mW             | Power    | Output Diode Power Dissipation                                                             |
| 27. | Diode Pd       | 685.09 mW             | Power    | Diode power dissipation                                                                    |
| 28. | IC Pd          | 159.249 mW            | Power    | IC power dissipation                                                                       |
| 29. | L Pd           | 125.0 mW              | Power    | Inductor power dissipation                                                                 |
| 30. | M1 Pd          | 83.067 mW             | Power    | M1 MOSFET total power dissipation                                                          |
| 31. | M1 PdCond      | 57.444 mW             | Power    | M1 MOSFET conduction losses                                                                |
| 32. | M1 PdSw        | 25.623 mW             | Power    | M1 MOSFET switching losses                                                                 |
| 33. | Rsns Pd        | 80.0 mW               | Power    | LED Current Rsns Power Dissipation                                                         |
| 34. | Total Pd       | 1.136 W               | Power    | Total Power Dissipation                                                                    |
| 35. | Vout Tolerance | 1.258 %               |          | 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 | LM3485 | Base Product Number    |
| 6. | source  | DC     | Input Source Type      |
| 7. | Ta      | 30.0   | Ambient temperature    |

## Design Assistance

1. Outline The LM3485 is a hysteretic PFET controller. The hysteretic control architecture provides for a stable design without the use of a control loop. The switching frequency depends on the inductance value, output capacitor ESR, and the input voltage. Therefore depending on the chosen BOM, the frequency at different input voltages would vary.

2. **LM3485** Product Folder : <http://www.ti.com/product/LM3485> : contains the data sheet and other resources.

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**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

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