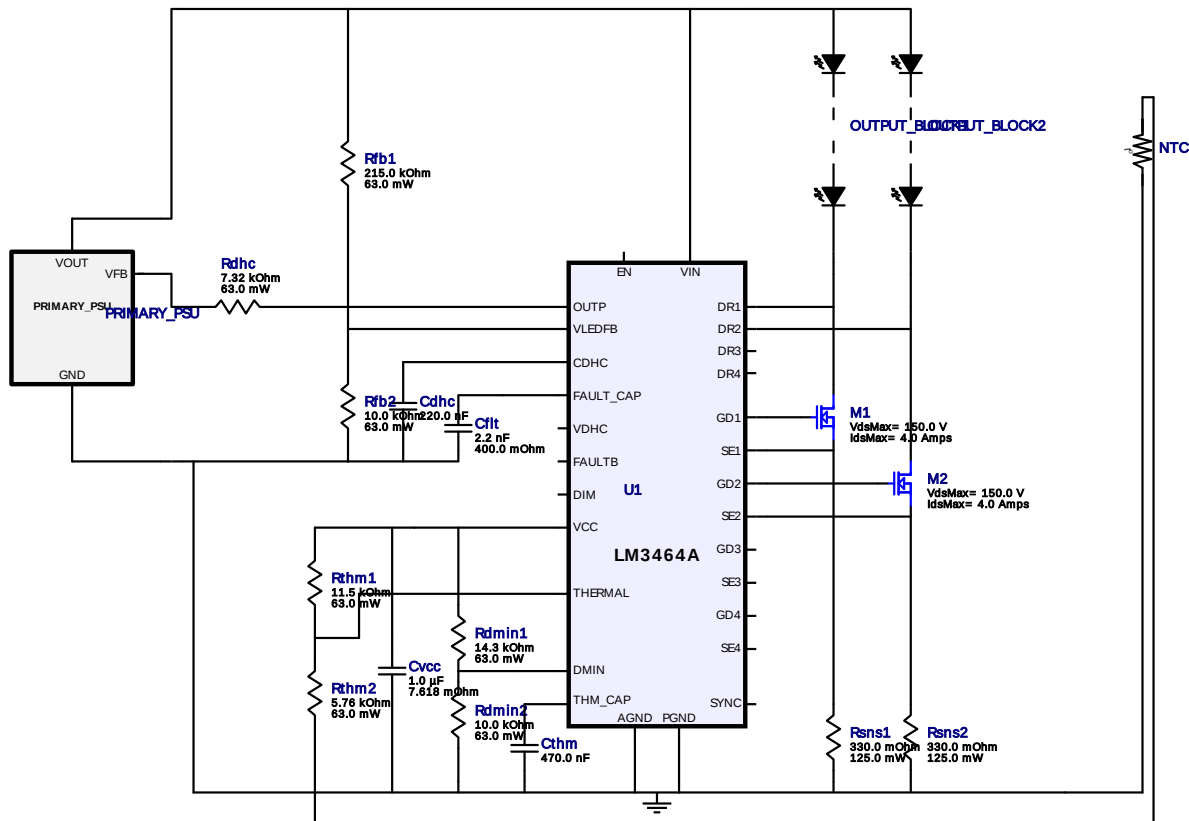


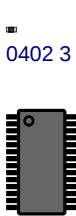
## WEBENCH® Design Report

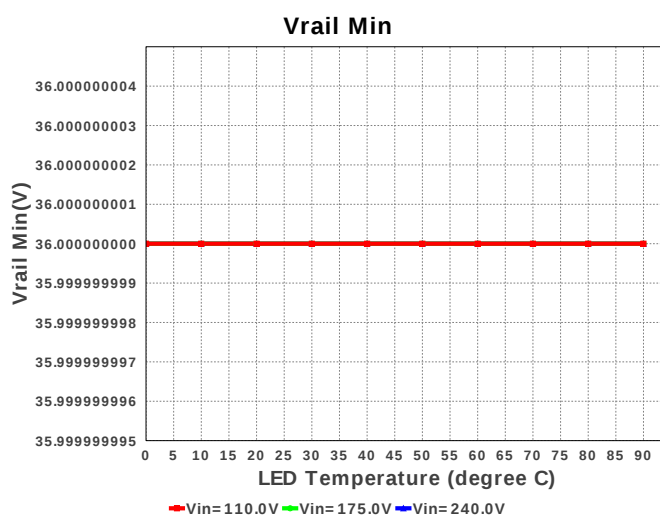
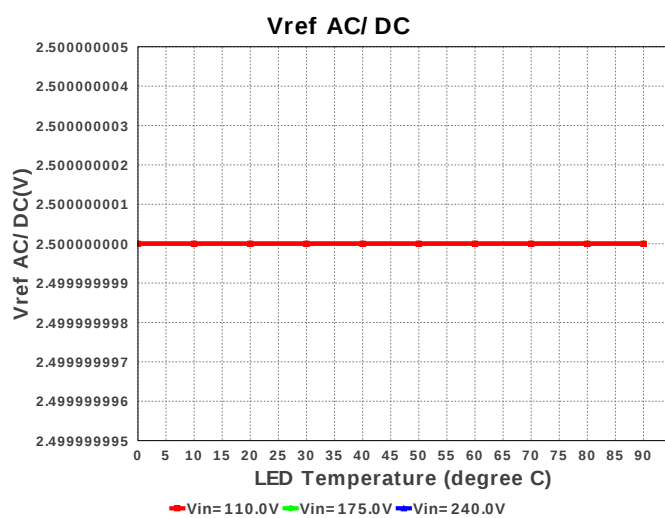
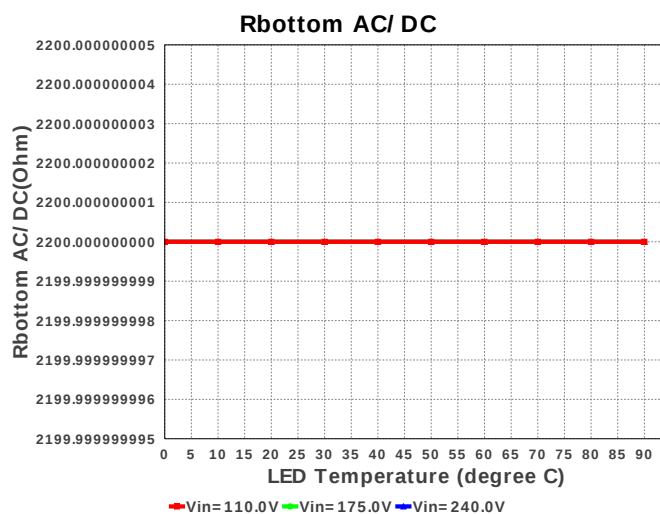
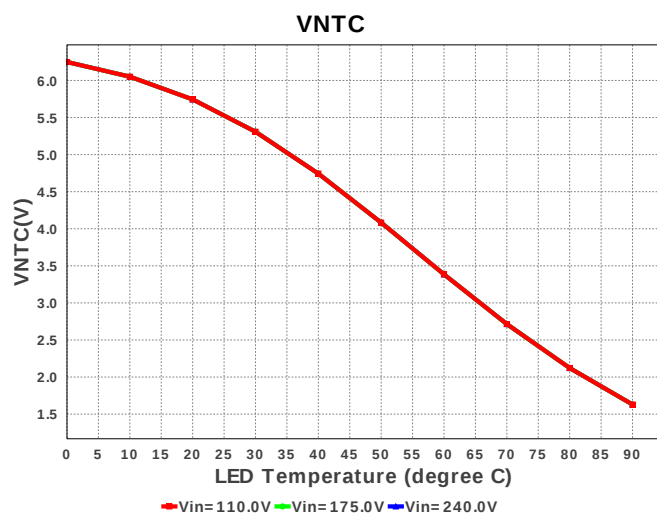
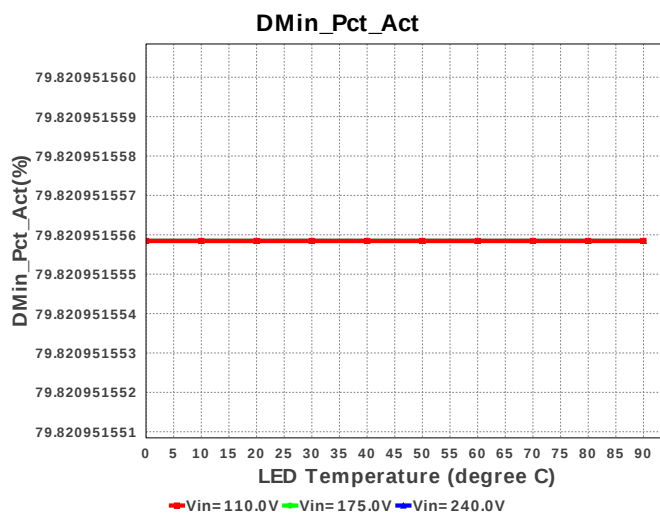
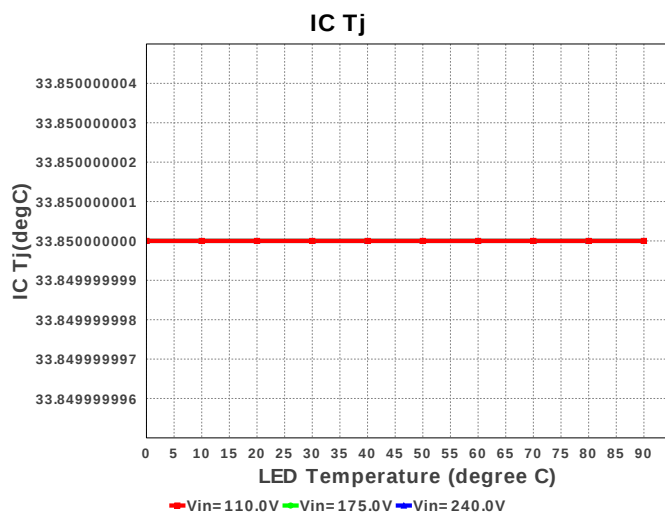
Design : 1217824/113 LM3464AMH/NOPB  
LM3464AMH/NOPB 110.0V-240.0V to 48.00V @ 1.2A

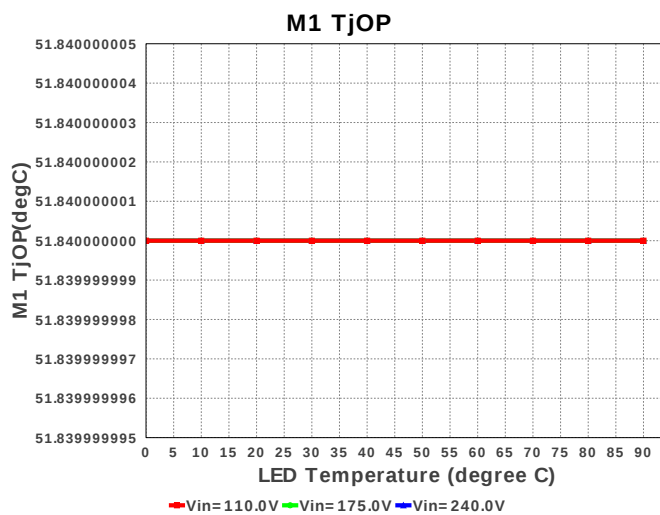
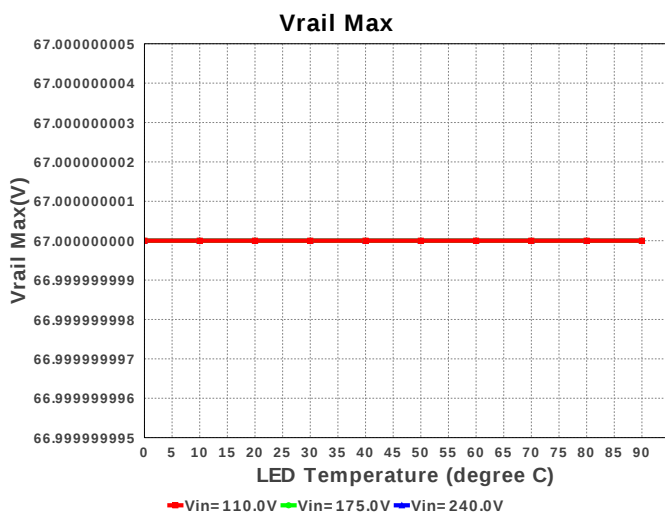
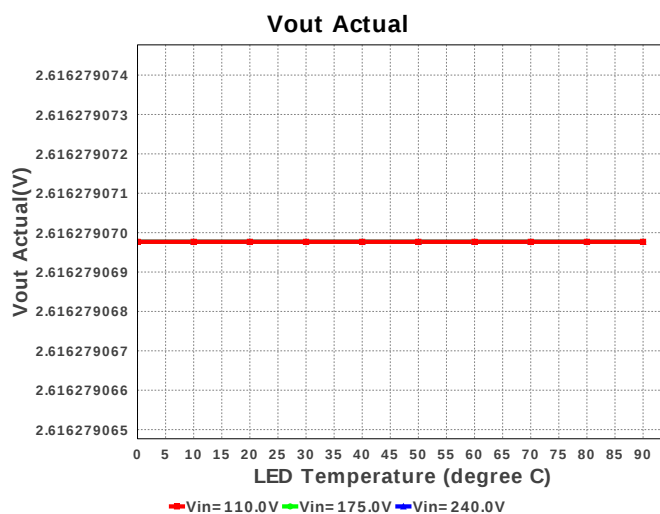
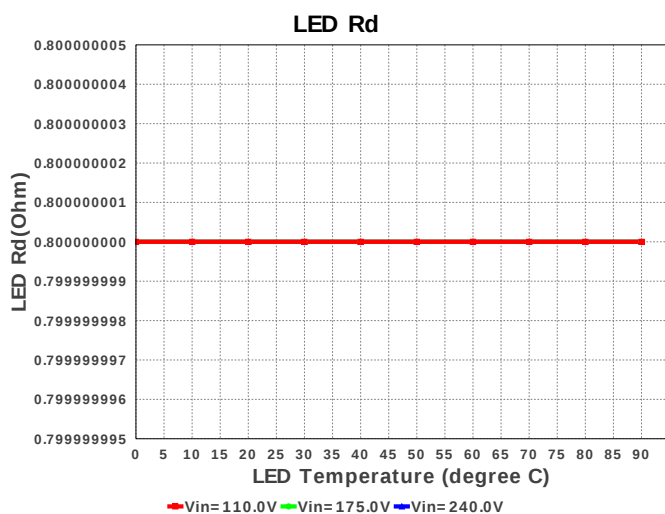
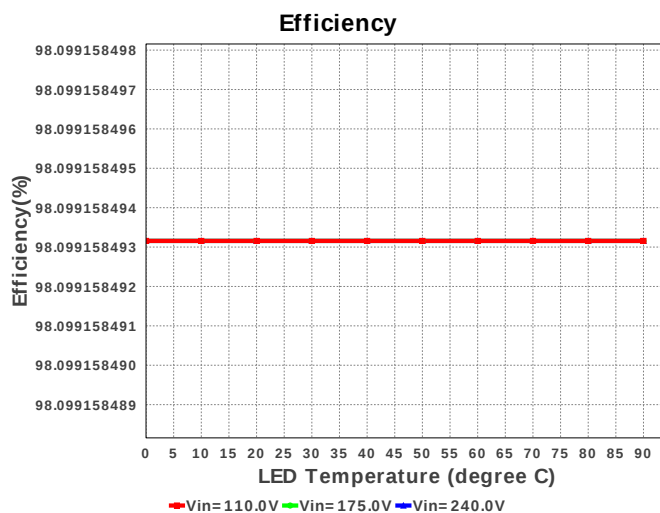
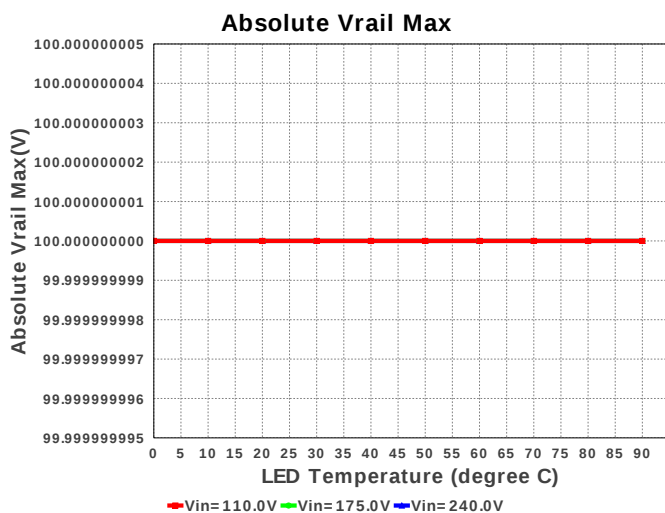


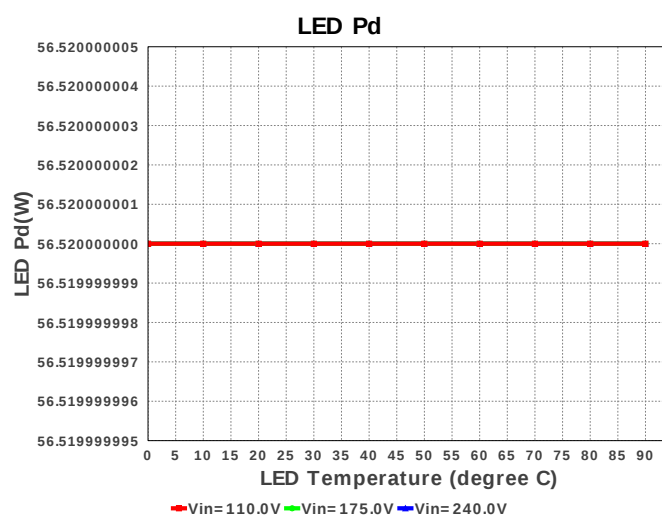
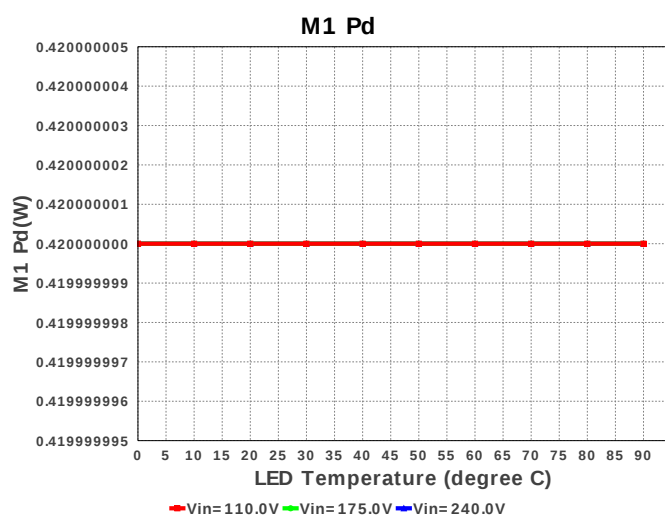
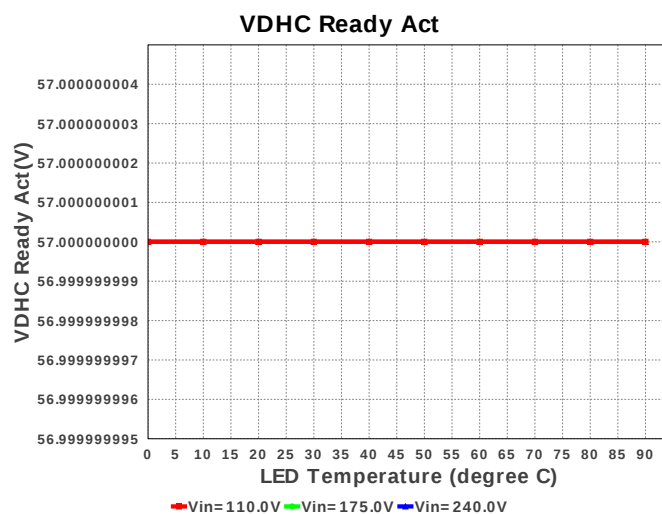
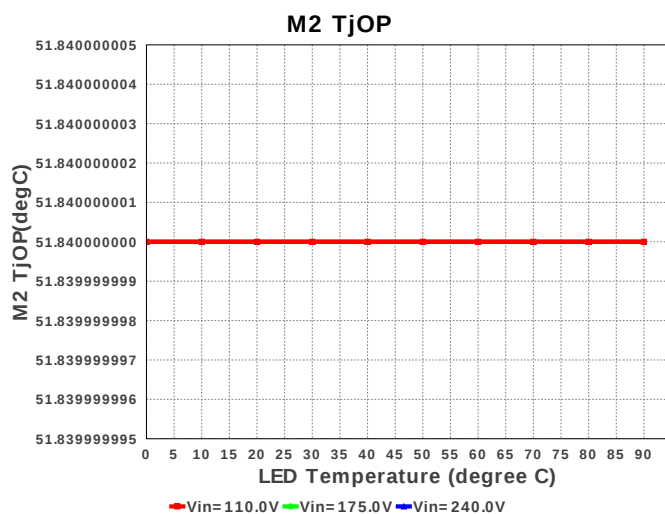
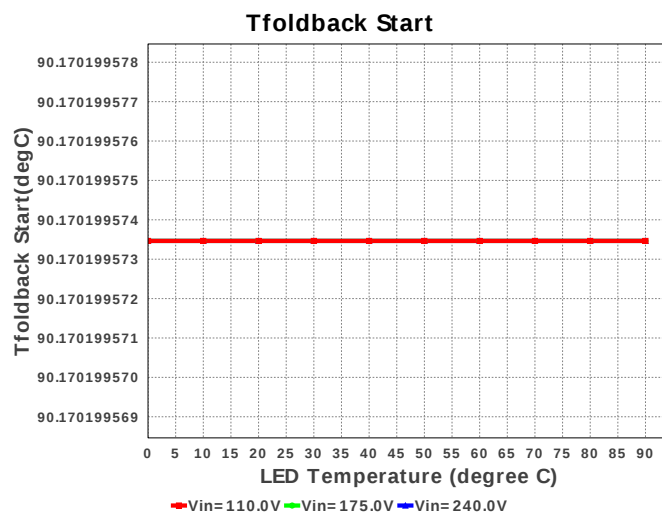
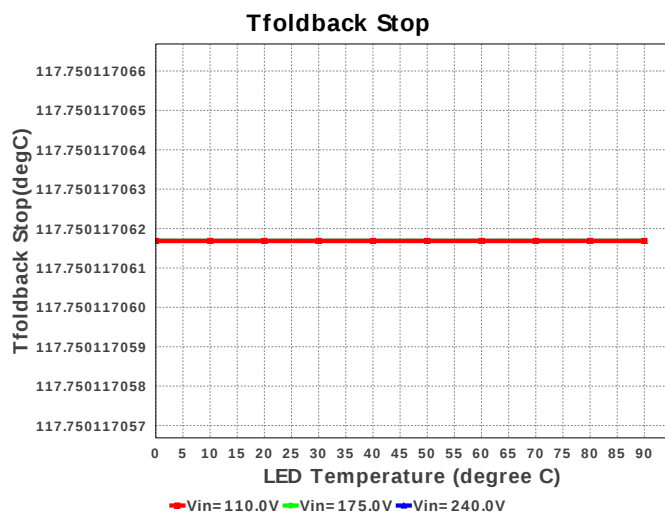
### Electrical BOM

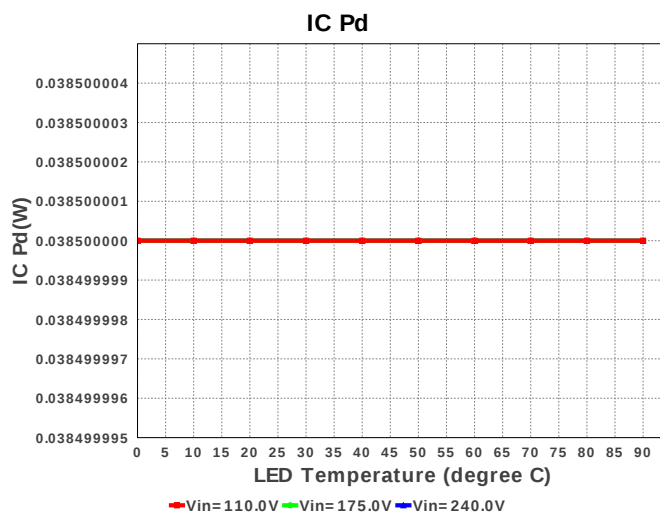
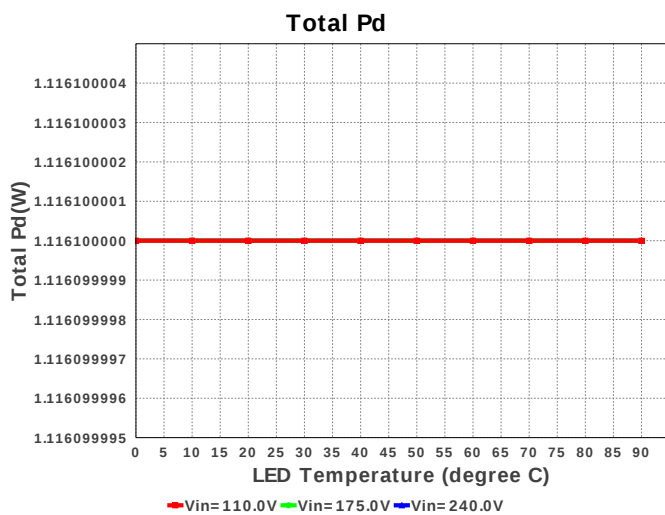
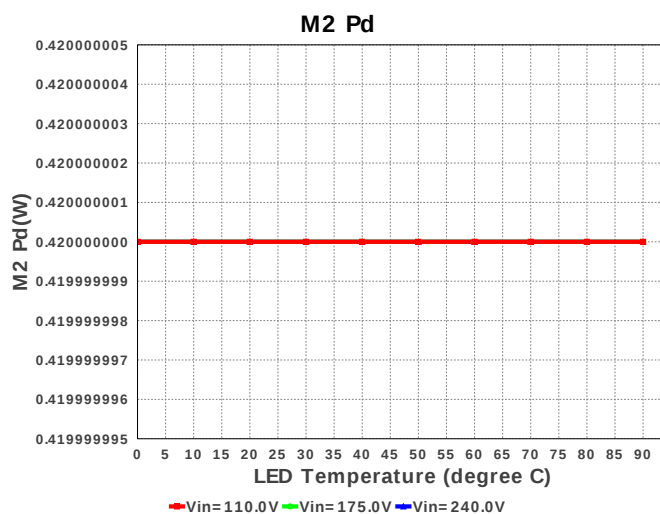
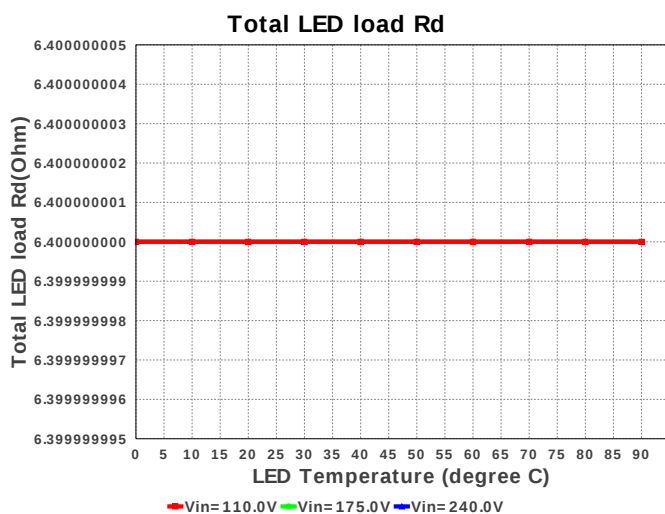
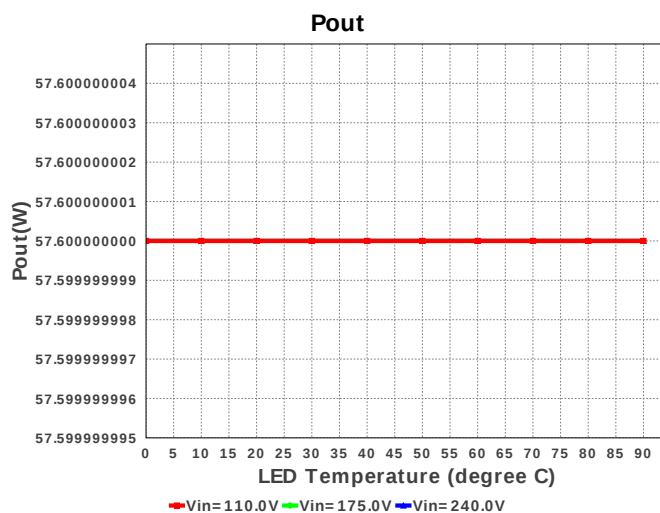
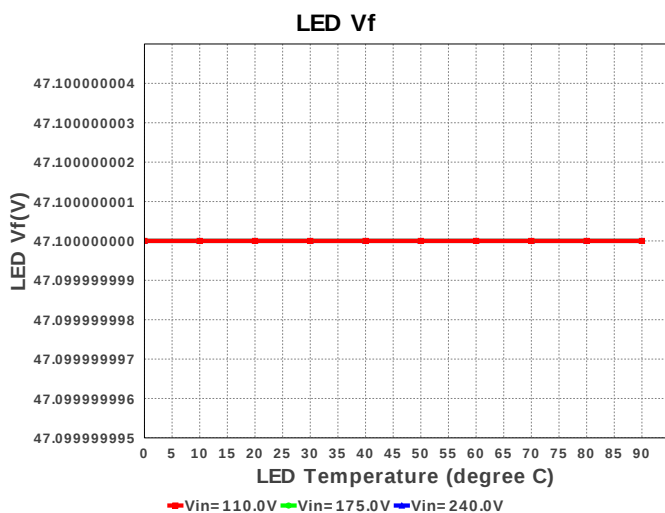
| #  | Name   | Manufacturer | Part Number                       | Properties                                                      | Qty | Price  | Footprint                |
|----|--------|--------------|-----------------------------------|-----------------------------------------------------------------|-----|--------|--------------------------|
| 1. | Cdhc   | MuRata       | GRM155R71C224KA12D<br>Series= X7R | Cap= 220.0 nF<br>VDC= 16.0 V<br>IRMS= 0.0 A                     | 1   | \$0.01 | 0402 3 mm <sup>2</sup>   |
| 2. | Cflt   | Kemet        | C0805C222K5RACTU<br>Series= X7R   | Cap= 2.2 nF<br>ESR= 400.0 mOhm<br>VDC= 50.0 V<br>IRMS= 251.0 mA | 1   | \$0.01 | 0805 7 mm <sup>2</sup>   |
| 3. | Cthm   | MuRata       | GRM155C80J474KE19D<br>Series= X6S | Cap= 470.0 nF<br>VDC= 6.3 V<br>IRMS= 0.0 A                      | 1   | \$0.01 | 0402 3 mm <sup>2</sup>   |
| 4. | Cvcc   | TDK          | C1005X5R0J105M<br>Series= X5R     | Cap= 1.0 uF<br>ESR= 7.618 mOhm<br>VDC= 6.3 V<br>IRMS= 0.0 A     | 1   | \$0.01 | 0402 3 mm <sup>2</sup>   |
| 5. | D_LED1 | CUSTOM       | CUSTOM                            | LED                                                             | 16  | NA     | CUSTOM 0 mm <sup>2</sup> |
| 6. | D_LED2 | CUSTOM       | CUSTOM                            | LED                                                             | 16  | NA     | CUSTOM 0 mm <sup>2</sup> |

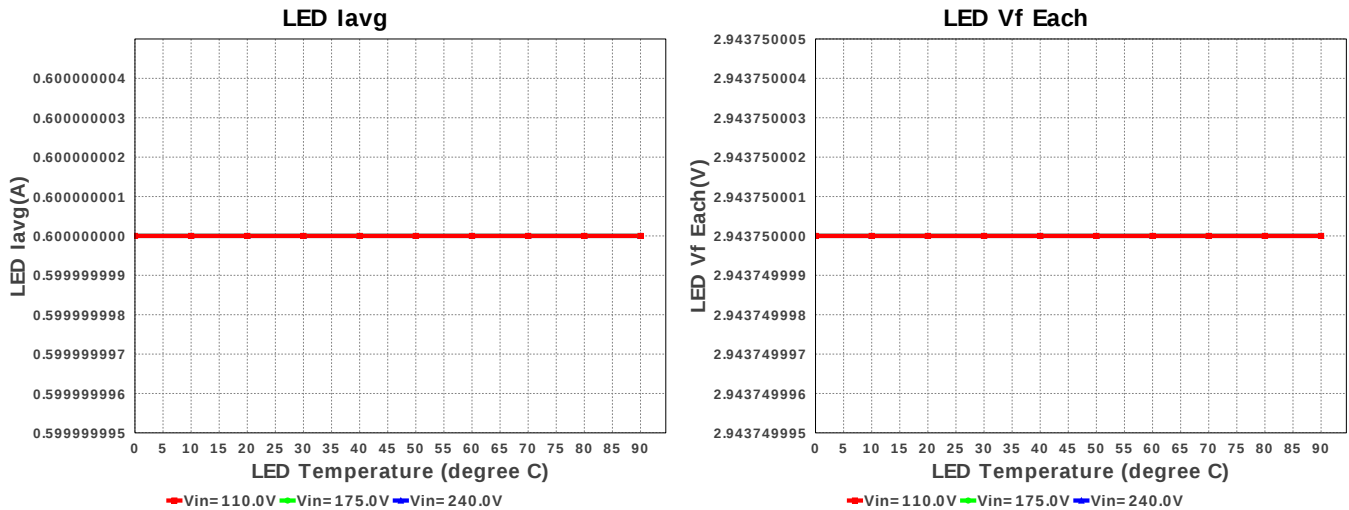
| #   | Name   | Manufacturer            | Part Number                          | Properties                                            | Qty | Price  | Footprint                                                                                                          |
|-----|--------|-------------------------|--------------------------------------|-------------------------------------------------------|-----|--------|--------------------------------------------------------------------------------------------------------------------|
| 7.  | M1     | Fairchild Semiconductor | FDD2572                              | VdsMax= 150.0 V<br>IdsMax= 4.0 Amps                   | 1   | \$0.70 | <br>DPAK 102 mm <sup>2</sup>    |
| 8.  | M2     | Fairchild Semiconductor | FDD2572                              | VdsMax= 150.0 V<br>IdsMax= 4.0 Amps                   | 1   | \$0.70 | <br>DPAK 102 mm <sup>2</sup>    |
| 9.  | NTC    | Panasonic               | ERT-J0EV104H<br>Series= ERT-J        | Thermistor                                            | 1   | \$0.08 | <br>0402 3 mm <sup>2</sup>      |
| 10. | Rdhc   | Vishay-Dale             | CRCW04027K32FKED<br>Series= CRCW..e3 | Res= 7.32 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>      |
| 11. | Rdmin1 | Vishay-Dale             | CRCW040214K3FKED<br>Series= CRCW..e3 | Res= 14.3 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>      |
| 12. | Rdmin2 | 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 3 mm <sup>2</sup>      |
| 13. | Rfb1   | Vishay-Dale             | CRCW0402215KFKED<br>Series= CRCW..e3 | Res= 215.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>      |
| 14. | Rfb2   | 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 3 mm <sup>2</sup>      |
| 15. | Rsns1  | Panasonic               | ERJ-6RQFR33V<br>Series= ERJ-6R       | Res= 330.0 mOhm<br>Power= 125.0 mW<br>Tolerance= 1.0% | 1   | \$0.04 | <br>0805 7 mm <sup>2</sup>      |
| 16. | Rsns2  | Panasonic               | ERJ-6RQFR33V<br>Series= ERJ-6R       | Res= 330.0 mOhm<br>Power= 125.0 mW<br>Tolerance= 1.0% | 1   | \$0.04 | <br>0805 7 mm <sup>2</sup>     |
| 17. | Rthm1  | Vishay-Dale             | CRCW040211K5FKED<br>Series= CRCW..e3 | Res= 11.5 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>    |
| 18. | Rthm2  | Vishay-Dale             | CRCW04025K76FKED<br>Series= CRCW..e3 | Res= 5.76 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>    |
| 19. | U1     | Texas Instruments       | LM3464AMH/NOPB                       | Switcher                                              | 1   | \$2.52 | <br>MXA28A 98 mm <sup>2</sup> |











## Operating Values

| #   | Name               | Value                 | Category | Description                                                                                |
|-----|--------------------|-----------------------|----------|--------------------------------------------------------------------------------------------|
| 1.  | LED Iavg           | 600.0 mA              | Current  | LED Average Current                                                                        |
| 2.  | BOM Count          | 49                    | General  | Total Design BOM count                                                                     |
| 3.  | FootPrint          | 355.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                                                    |
| 4.  | Frequency          | 0.0 Hz                | General  | Switching frequency                                                                        |
| 5.  | Pout               | 57.6 W                | General  | Total output power                                                                         |
| 6.  | Total BOM          | \$4.19                | General  | Total BOM Cost                                                                             |
| 7.  | Tfoldback Stop     | 117.75 degC           | Op_Point | Stop Temperature for Thermal Foldback                                                      |
| 8.  | Vout Actual        | 2.616 V               | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 9.  | Efficiency         | 98.099 %              | Op_point | Steady state efficiency                                                                    |
| 10. | IC Tj              | 33.85 degC            | Op_point | IC junction temperature                                                                    |
| 11. | IOUT_OP            | 1.2 A                 | Op_point | Iout operating point                                                                       |
| 12. | LED Rd             | 800.0 mOhm            | Op_point | LED DynamicResistance                                                                      |
| 13. | LED Vf             | 47.1 V                | Op_point | Total LED Forward Calculated Voltage                                                       |
| 14. | M1 TjOP            | 51.84 degC            | Op_point | MOSFET junction temperature                                                                |
| 15. | M2 TjOP            | 51.84 degC            | Op_point | MOSFET junction temperature                                                                |
| 16. | VIN_OP             | 240.0 V               | Op_point | Maximum AC voltage input to power supply                                                   |
| 17. | IC Pd              | 38.5 mW               | Power    | IC power dissipation                                                                       |
| 18. | LED Pd             | 56.52 W               | Power    | LED Power Dissipation                                                                      |
| 19. | M1 Pd              | 420.0 mW              | Power    | Average power dissipation in the switching FET over the AC line period                     |
| 20. | M2 Pd              | 420.0 mW              | Power    | Average power dissipation in the switching FET over the AC line period                     |
| 21. | Total Pd           | 1.116 W               | Power    | Total Power Dissipation                                                                    |
| 22. | Absolute Vrail Max | 100.0 V               |          | Absolute Vrail Maximum                                                                     |
| 23. | DMin_Pct_Act       | 79.821 %              |          | Minimum Duty Cycle Limit when LEDs are Hot                                                 |
| 24. | Single LED Vf      | 2.944 V               |          | Calculated Forward Voltage of Each LED                                                     |
| 25. | Rbottom AC/DC      | 2.2 kOhm              |          | Bottom Resistor in Feedback Loop of Power Supply Unit                                      |
| 26. | Tfoldback Start    | 90.17 degC            |          | Start Temperature for Thermal Foldback                                                     |
| 27. | Total LED load Rd  | 6.4 Ohm               |          | Total LED Load DynamicResistance                                                           |
| 28. | VDHC Ready Act     | 57.0 V                |          | Ready Voltage for DHC Startup                                                              |
| 29. | VNTC               | 6.249 V               |          | Voltage across NTC resistor                                                                |
| 30. | Vout Tolerance     | 89.787 m%             |          | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |
| 31. | Vrail Max          | 67.0 V                |          | Maximum Rail voltage that can be pushed up by the LM3464                                   |
| 32. | Vrail Min          | 36.0 V                |          | Minimum Rail voltage of Power Supply Unit                                                  |
| 33. | Vref AC/DC         | 2.5 V                 |          | Reference Voltage for Circuit in Power Supply Unit                                         |

## Design Inputs

| #   | Name          | Value      | Description               |
|-----|---------------|------------|---------------------------|
| 1.  | Iout          | 1.2        | Maximum Output Current    |
| 2.  | VinMax        | 240.0      | Maximum input voltage     |
| 3.  | VinMin        | 110.0      | Minimum input voltage     |
| 4.  | Vout          | 48.0       | Output Voltage            |
| 5.  | line_fsw      | 60.0       | Light Output in Lumen     |
| 6.  | application   | LED_DRIVER | LED Application           |
| 7.  | base_pn       | LM3464A    | Base Product Number       |
| 8.  | LED_Architect | N          | LED Architect Project     |
| 9.  | ledparallel   | 2.0        | Number of LED in parallel |
| 10. | ledpartnumber | Custom     | LED Part number           |
| 11. | ledseries     | 16.0       | Number of LED in series   |
| 12. | line_fsw      | 60.0       | AC Line Frequency         |
| 13. | source        | AC         | Input Source Type         |
| 14. | Ta            | 30.0       | Ambient temperature       |

## Design Assistance

1. Thermal foldback is necessary in many applications due to the extreme temperatures created in LED environments. In general, two functions are necessary a temperature break-point after which the nominal operating current needs to be reduced, and a slope corresponding to the amount of LED current decrease per temperature increase.

2. The user can set the 'Start' and 'Stop' temperatures for the thermal foldback by changing the default settings on the 'Thermal Foldback start and end temperatures' in the 'Advanced Options' menu on the left side bar. These values are then updated on the 'Op-Vals' section. The 'Op-Vals' section has a slider to simulate the increase or decrease in temperature. The operating value 'Thermal Resistance' changes based on the change in temperature. This is the resistance of the thermistor at the selected temperature and it's value is then updated in the simulation directly

3. **LM3464A** Product Folder : <http://www.ti.com/product/LM3464A> : 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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