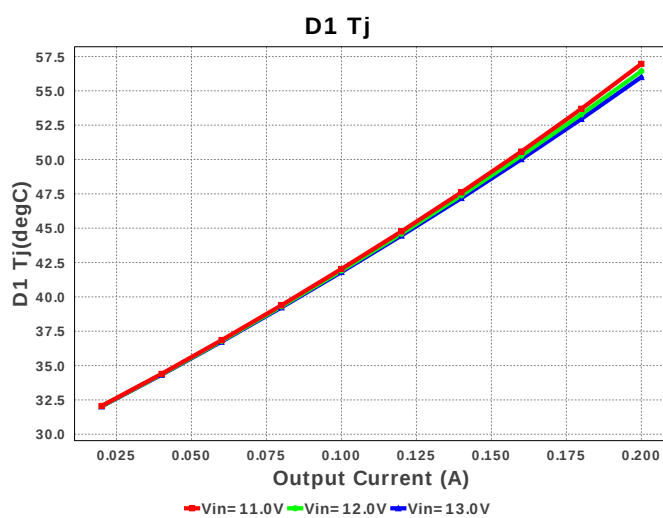
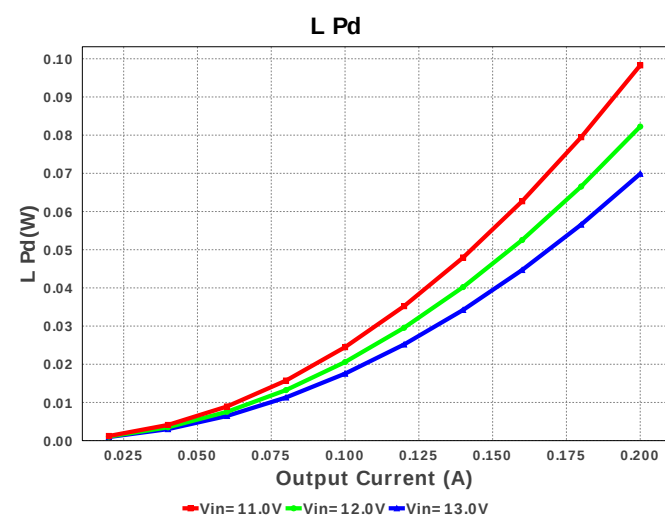
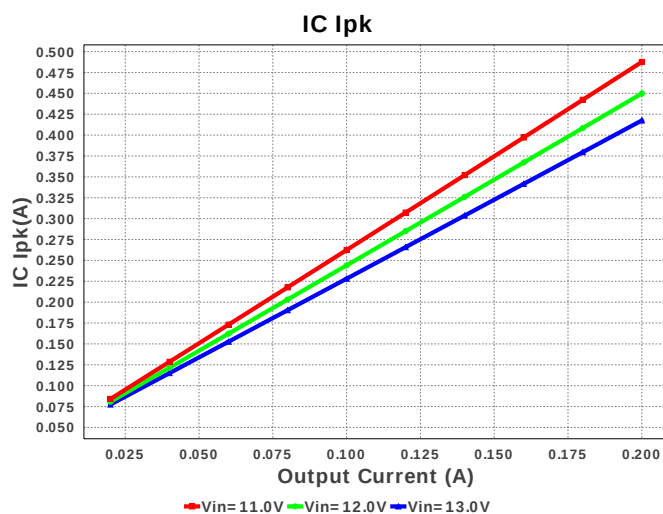
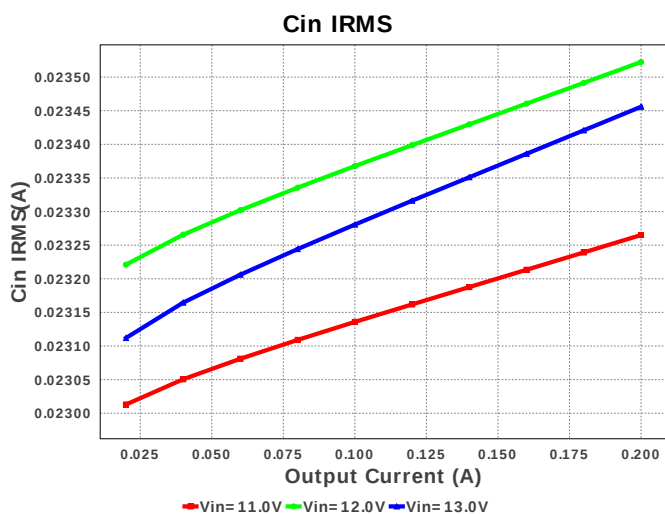
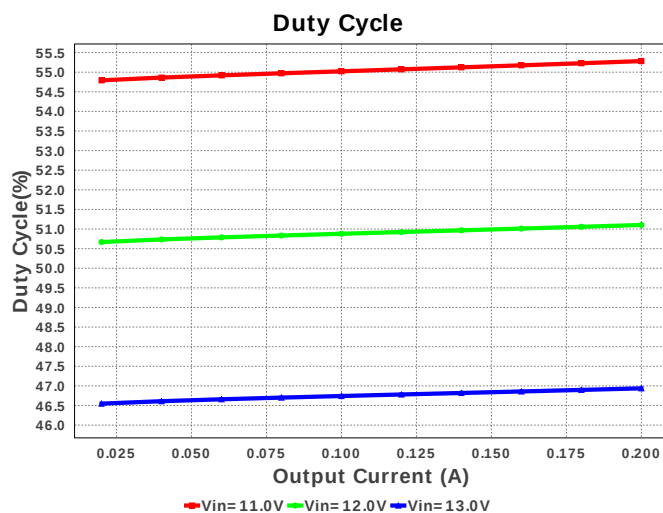
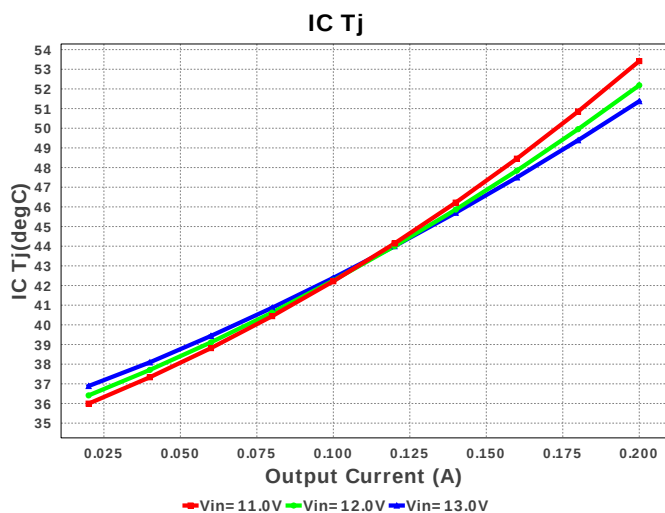
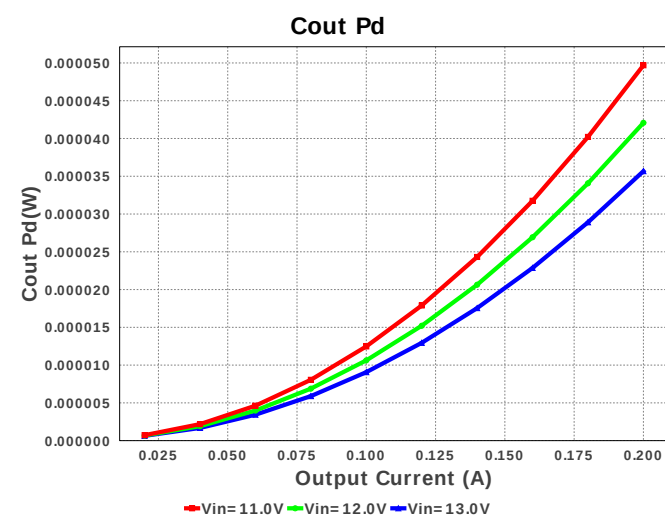
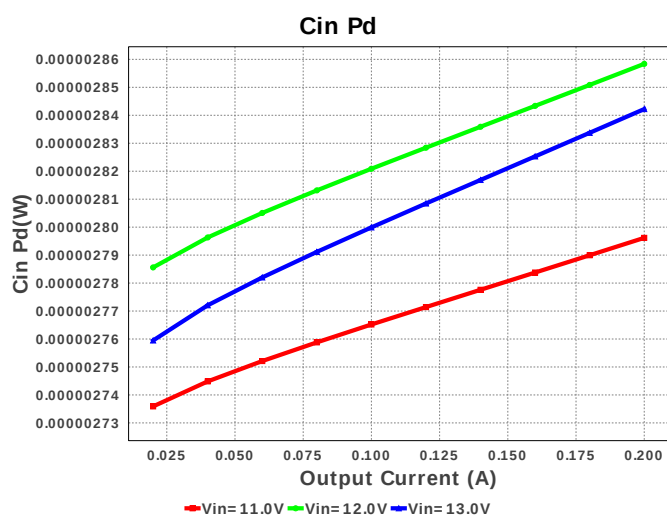
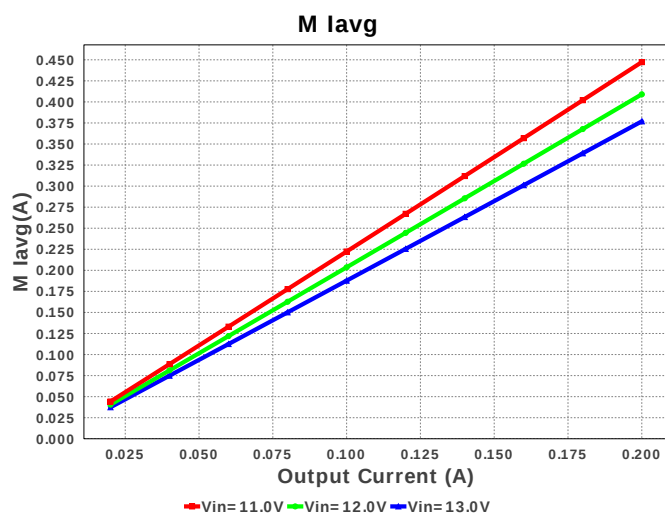
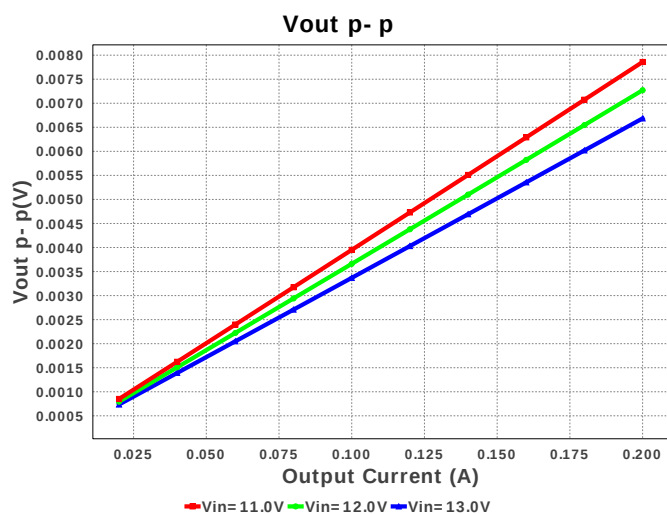
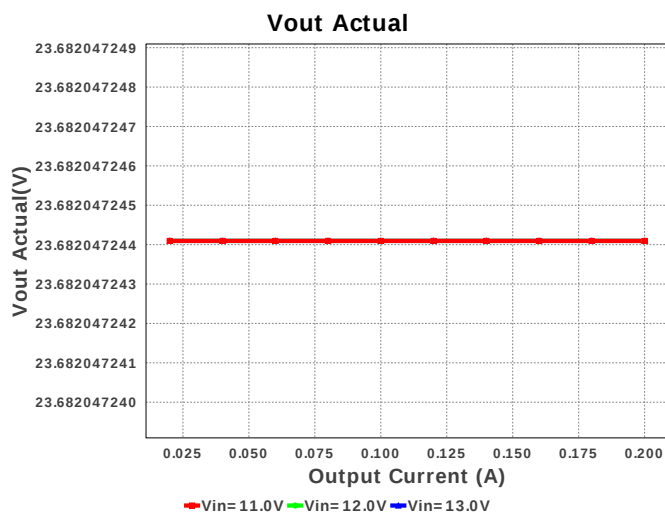
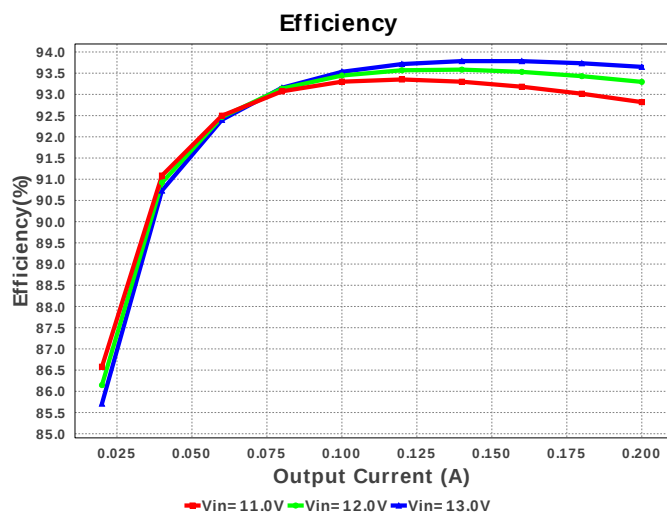


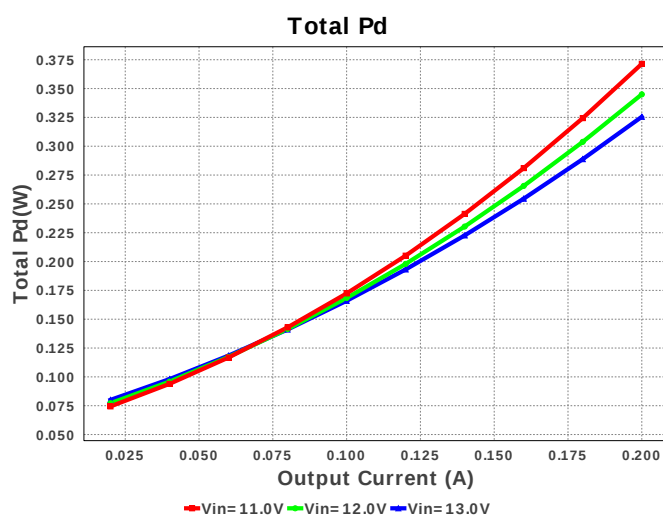
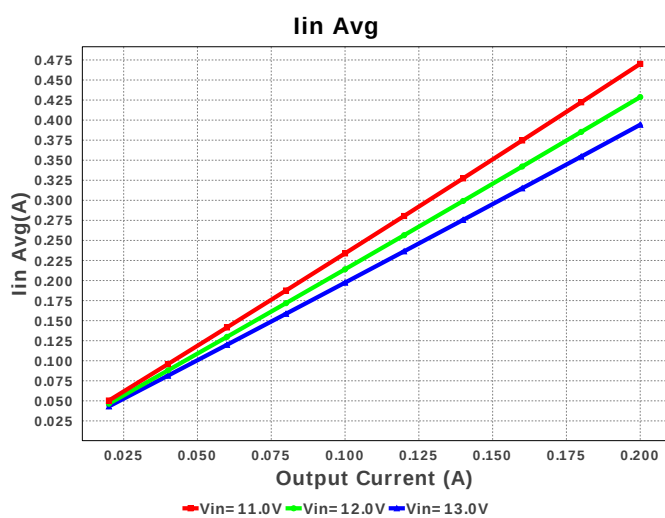
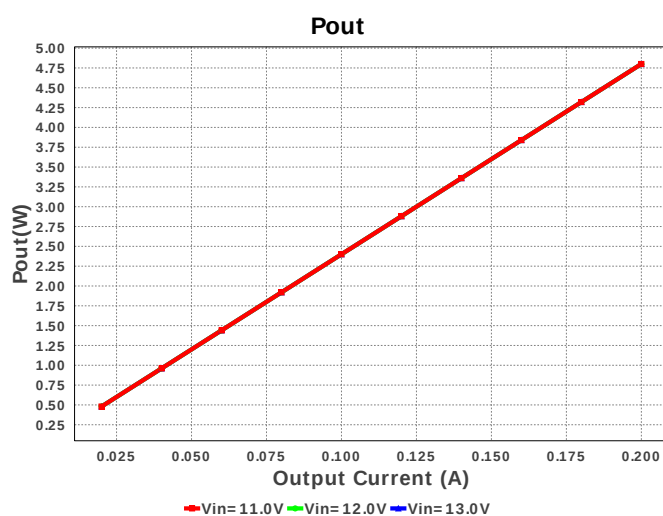
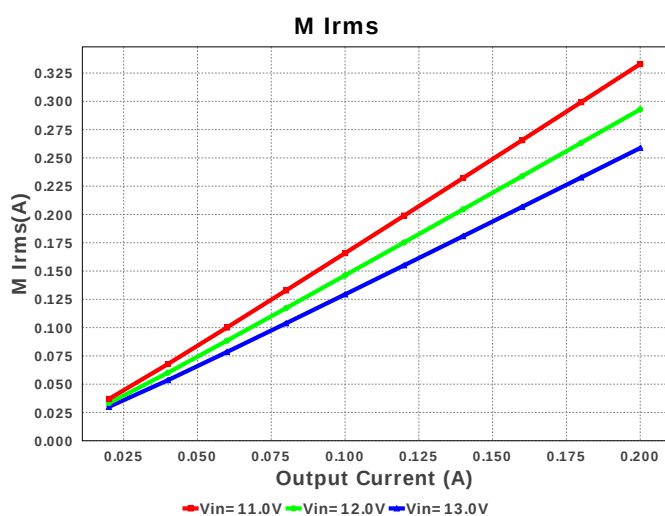
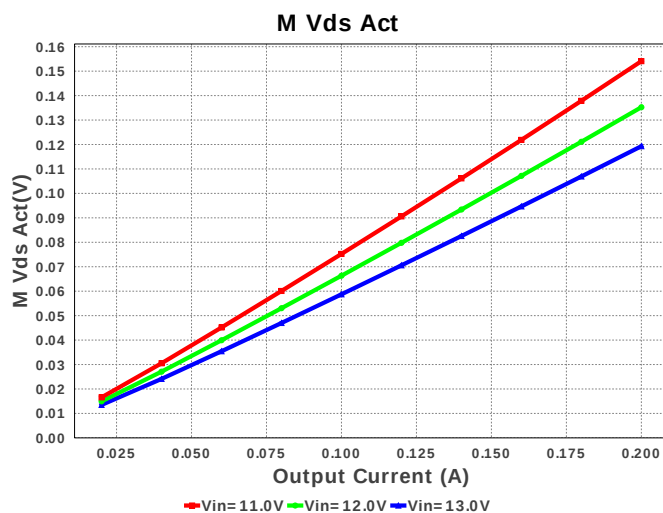
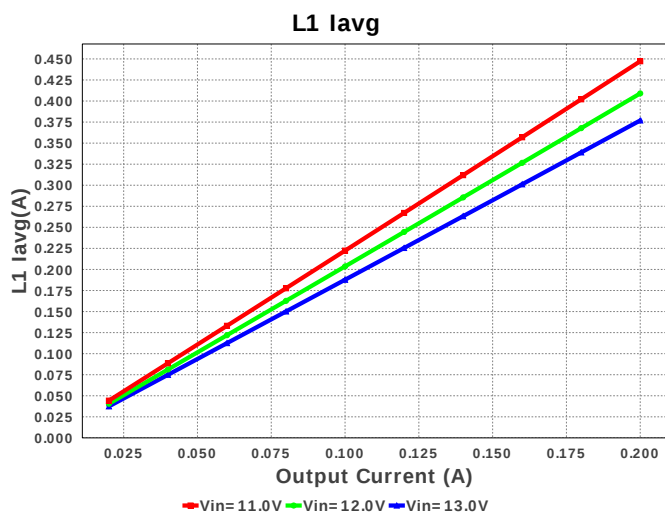


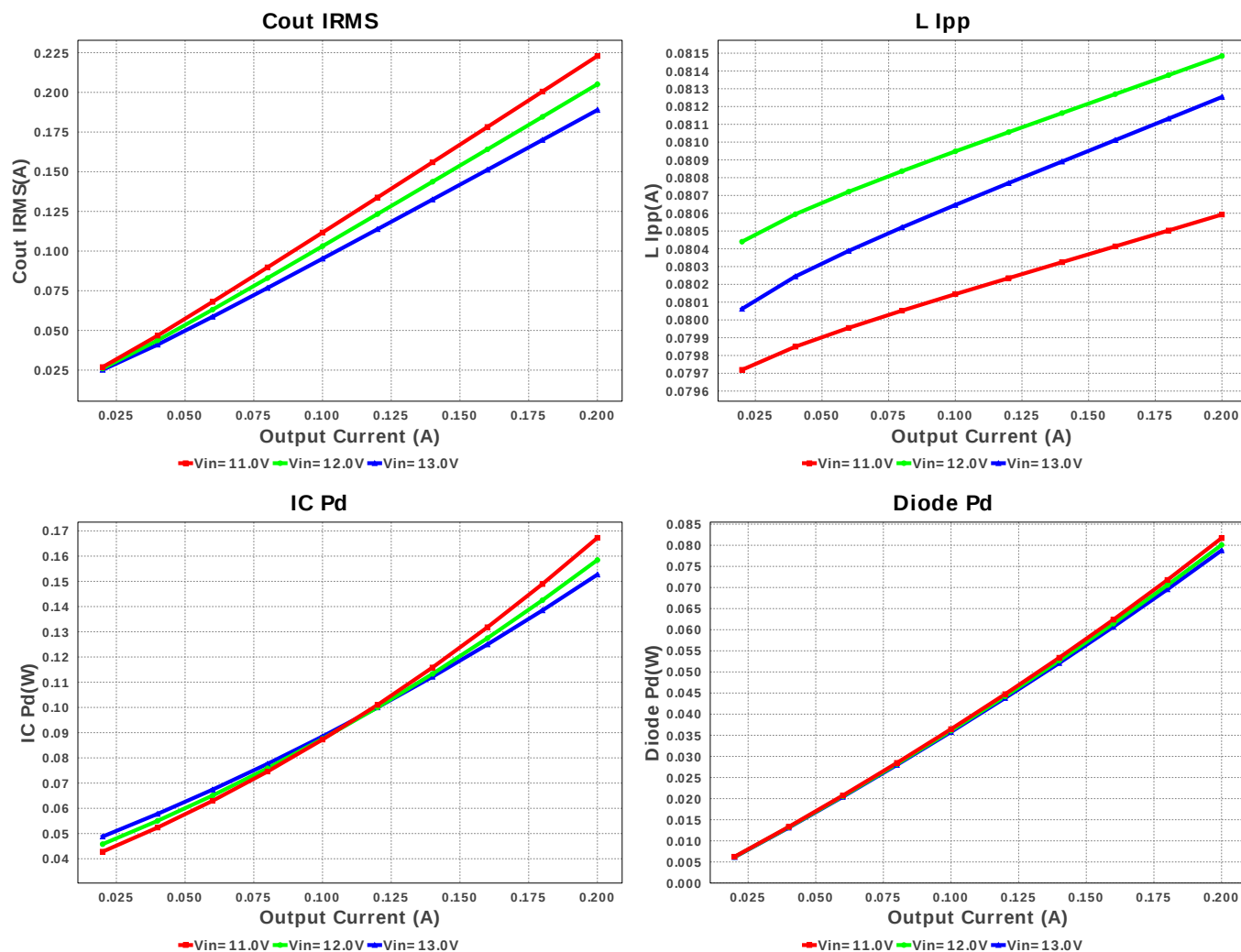
Device = LM5001SD/NOPB  
Topology = Boost  
Created = 7/15/16 8:37:12 PM  
BOM Cost = \$2.41  
BOM Count = 25  
Total Pd = 0.37W

| #   | Name | Manufacturer      | Part Number                          | Properties                                           | Qty | Price  | Footprint                                                                                                           |
|-----|------|-------------------|--------------------------------------|------------------------------------------------------|-----|--------|---------------------------------------------------------------------------------------------------------------------|
| 10. | D1   | NXP Semiconductor | PMEG6010CEH,115                      | VF@Io= 570.0 mV<br>VRRM= 60.0 V                      | 1   | \$0.04 | <br>SOD-123F 12 mm <sup>2</sup>  |
| 11. | D2   | Bourns            | CD0603-B0230                         | VF@Io= 500.0 mV<br>VRRM= 35.0 V                      | 1   | \$0.09 | <br>Diode_0603 5 mm <sup>2</sup> |
| 12. | D3   | Bourns            | CD0603-B0230                         | VF@Io= 500.0 mV<br>VRRM= 35.0 V                      | 1   | \$0.09 | <br>Diode_0603 5 mm <sup>2</sup> |
| 13. | L1   | TDK               | VLP8040T-151M                        | L= 150.0 µH<br>DCR= 490.0 mOhm                       | 1   | \$0.22 | <br>VLP8040 113 mm <sup>2</sup>  |
| 14. | Rb   | Yageo America     | RC0805FR-076R8L<br>Series= ?         | Res= 6.8 Ohm<br>Power= 125.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 | <br>0805 7 mm <sup>2</sup>       |
| 15. | Rc2  | Vishay-Dale       | CRCW040218K2FKED<br>Series= CRCW..e3 | Res= 18.2 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>       |
| 16. | Rfb1 | Vishay-Dale       | CRCW04021K27FKED<br>Series= CRCW..e3 | Res= 1.27 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>       |
| 17. | Rfb2 | Vishay-Dale       | CRCW040222K6FKED<br>Series= CRCW..e3 | Res= 22.6 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>       |
| 18. | Rin  | Vishay-Dale       | CRCW040210R0FKED<br>Series= CRCW..e3 | Res= 10.0 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0%   | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>       |
| 19. | Rs1  | Vishay-Dale       | CRCW0402100KFKED<br>Series= CRCW..e3 | Res= 100.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>      |
| 20. | Rt   | Vishay-Dale       | CRCW040224K9FKED<br>Series= CRCW..e3 | Res= 24.9 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>     |
| 21. | Ruv1 | Vishay-Dale       | CRCW04029K53FKED<br>Series= CRCW..e3 | Res= 9.53 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>     |
| 22. | Ruv2 | Vishay-Dale       | CRCW040260K4FKED<br>Series= CRCW..e3 | Res= 60.4 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | <br>0402 3 mm <sup>2</sup>     |
| 23. | U1   | Texas Instruments | LM5001SD/NOPB                        | Switcher                                             | 1   | \$1.55 | <br>SDC08A 25 mm <sup>2</sup>  |









## Operating Values

| #   | Name         | Value                 | Category | Description                                                        |
|-----|--------------|-----------------------|----------|--------------------------------------------------------------------|
| 1.  | Cin IRMS     | 23.27 mA              | Current  | Input capacitor RMS ripple current                                 |
| 2.  | Cout IRMS    | 222.873 mA            | Current  | Output capacitor RMS ripple current                                |
| 3.  | IC Ipk       | 487.457 mA            | Current  | Peak switch current in IC                                          |
| 4.  | Iin Avg      | 469.98 mA             | Current  | Average input current                                              |
| 5.  | L Ipp        | 80.611 mA             | Current  | Peak-to-peak inductor ripple current                               |
| 6.  | L1 Iavg      | 447.152 mA            | Current  | Inductor average current                                           |
| 7.  | M Iavg       | 447.152 mA            | Current  | MOSFET Average current                                             |
| 8.  | M1 Irms      | 332.887 mA            | Current  | Q Iavg                                                             |
| 9.  | BOM Count    | 25                    | General  | Total Design BOM count                                             |
| 10. | FootPrint    | 273.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components                            |
| 11. | Frequency    | 504.092 kHz           | General  | Switching frequency                                                |
| 12. | IC Tolerance | 19.0 mV               | General  | IC Feedback Tolerance                                              |
| 13. | M Vds Act    | 149.567 mV            | General  | Voltage drop across the MosFET                                     |
| 14. | Pout         | 4.8 W                 | General  | Total output power                                                 |
| 15. | Total BOM    | \$2.41                | General  | Total BOM Cost                                                     |
| 16. | D1 Tj        | 56.962 degC           | Op_Point | D1 junction temperature                                            |
| 17. | Vout Actual  | 23.682 V              | Op_Point | Vout Actual calculated based on selected voltage divider resistors |
| 18. | Vout OP      | 24.0 V                | Op_Point | Operational Output Voltage                                         |
| 19. | Cross Freq   | 4.539 kHz             | Op_point | Bode plot crossover frequency                                      |
| 20. | Duty Cycle   | 55.272 %              | Op_point | Duty cycle                                                         |
| 21. | Efficiency   | 92.846 %              | Op_point | Steady state efficiency                                            |
| 22. | IC Tj        | 36.628 degC           | Op_point | IC junction temperature                                            |
| 23. | ICThetaJA    | 40.0 degC/W           | Op_point | IC junction-to-ambient thermal resistance                          |
| 24. | IOUT_OP      | 200.0 mA              | Op_point | Iout operating point                                               |
| 25. | Phase Marg   | 74.933 deg            | Op_point | Bode Plot Phase Margin                                             |
| 26. | VIN_OP       | 11.0 V                | Op_point | Vin operating point                                                |
| 27. | Vout p-p     | 9.015 mV              | Op_point | Peak-to-peak output ripple voltage                                 |
| 28. | Cin Pd       | 2.797 μW              | Power    | Input capacitor power dissipation                                  |
| 29. | Cout Pd      | 49.673 μW             | Power    | Output capacitor power dissipation                                 |
| 30. | Diode Pd     | 81.702 mW             | Power    | Diode power dissipation                                            |
| 31. | IC Pd        | 165.711 mW            | Power    | IC power dissipation                                               |

| #   | Name           | Value      | Category | Description                                                                                |
|-----|----------------|------------|----------|--------------------------------------------------------------------------------------------|
| 32. | L Pd           | 98.238 mW  | Power    | Inductor power dissipation                                                                 |
| 33. | Total Pd       | 369.846 mW | Power    | Total Power Dissipation                                                                    |
| 34. | Vout Tolerance | 3.449 %    |          | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |

## Design Inputs

| #  | Name    | Value   | Description            |
|----|---------|---------|------------------------|
| 1. | Iout    | 200.0 m | Maximum Output Current |
| 2. | VinMax  | 13.0    | Maximum input voltage  |
| 3. | VinMin  | 11.0    | Minimum input voltage  |
| 4. | Vout    | 24.0    | Output Voltage         |
| 5. | base_pn | LM5001  | Base Product Number    |
| 6. | source  | DC      | Input Source Type      |
| 7. | Ta      | 30.0    | Ambient temperature    |

## Design Assistance

1. The LM5001 high voltage switch mode regulator features all of the functions necessary to implement efficient high voltage Boost, Flyback, SEPIC and Forward converters, using few external components. This easy to use regulator integrates a 75 Volt N-Channel MOSFET with a 1 Amp peak current limit. Current mode control provides inherently simple loop compensation and line-voltage feed-forward for superior rejection of input transients. The switching frequency is set with a single resistor and is programmable up to 1.5MHz. The oscillator can also be synchronized to an external clock. Additional protection features include: current limit, thermal shutdown, under-voltage lockout and remote shutdown capability. The device is available in both SO-8 and LLP-8 packages.

2. **LM5001 Product Folder** : <http://www.ti.com/product/LM5001> : 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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