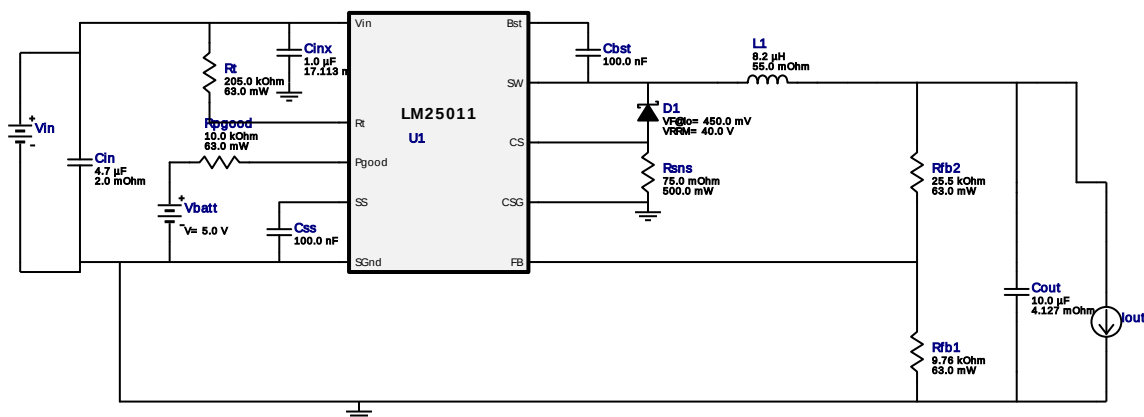


## WEBENCH® Design Report

Design : 4502117/169 LM25011MYX/NOPB  
LM25011MYX/NOPB 10.0V-14.4V to 9.00V @ 1.6A

Vout = 9.0V  
Iout = 1.6A

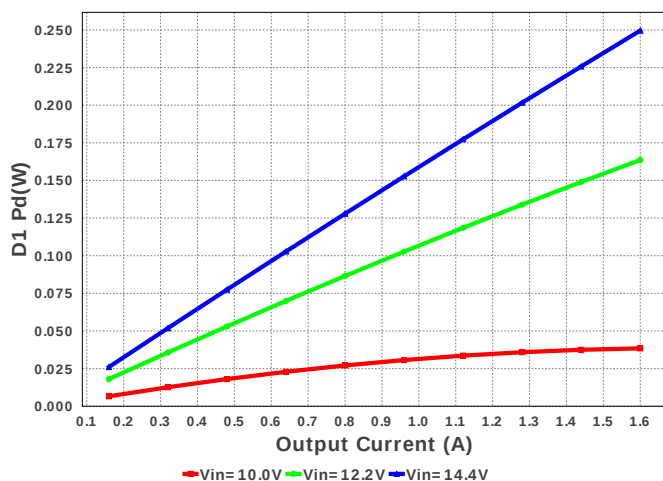


## Electrical BOM

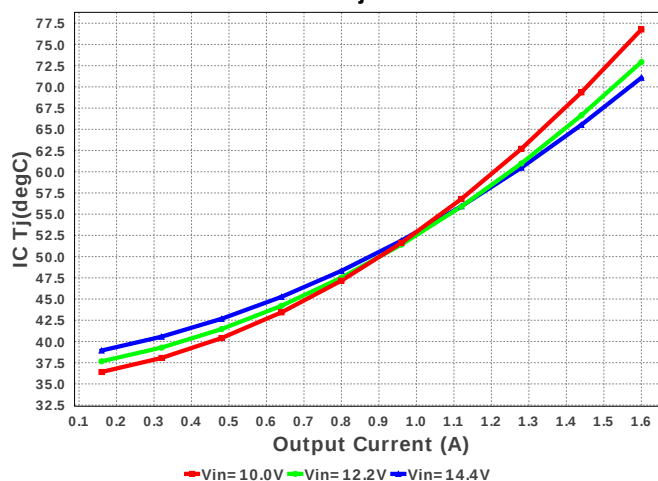
| #   | Name   | Manufacturer | Part Number                          | Properties                                                        | Qty | Price  | Footprint                  |
|-----|--------|--------------|--------------------------------------|-------------------------------------------------------------------|-----|--------|----------------------------|
| 1.  | Cbst   | MuRata       | GRM21BR71E104KA01L<br>Series= X7R    | Cap= 100.0 nF<br>VDC= 25.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | 0805 7 mm <sup>2</sup>     |
| 2.  | Cin    | MuRata       | GRM21BR61E475MA12L<br>Series= X5R    | Cap= 4.7 uF<br>ESR= 2.0 mOhm<br>VDC= 25.0 V<br>IRMS= 7.29 A       | 1   | \$0.02 | 0805 7 mm <sup>2</sup>     |
| 3.  | Cinx   | MuRata       | GRM188R61E105KA12D<br>Series= X5R    | Cap= 1.0 uF<br>ESR= 17.113 mOhm<br>VDC= 25.0 V<br>IRMS= 979.39 mA | 1   | \$0.01 | 0603 5 mm <sup>2</sup>     |
| 4.  | Cout   | MuRata       | GRM21BR61C106KE15L<br>Series= X5R    | Cap= 10.0 uF<br>ESR= 4.127 mOhm<br>VDC= 16.0 V<br>IRMS= 2.46634 A | 1   | \$0.03 | 0805 7 mm <sup>2</sup>     |
| 5.  | Css    | MuRata       | GRM21BR71E104KA01L<br>Series= X7R    | Cap= 100.0 nF<br>VDC= 25.0 V<br>IRMS= 0.0 A                       | 1   | \$0.01 | 0805 7 mm <sup>2</sup>     |
| 6.  | D1     | Diodes Inc.  | 1N5819HW-7-F                         | VF@Io= 450.0 mV<br>VRRM= 40.0 V                                   | 1   | \$0.08 | SOD-123 13 mm <sup>2</sup> |
| 7.  | L1     | Bourns       | SRN6045-8R2Y                         | L= 8.2 µH<br>DCR= 55.0 mOhm                                       | 1   | \$0.16 | SRN6045 64 mm <sup>2</sup> |
| 8.  | Rfb1   | Vishay-Dale  | CRCW04029K76FKED<br>Series= CRCW..e3 | Res= 9.76 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%               | 1   | \$0.01 | 0402 3 mm <sup>2</sup>     |
| 9.  | Rfb2   | Vishay-Dale  | CRCW040225K5FKED<br>Series= CRCW..e3 | Res= 25.5 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%               | 1   | \$0.01 | 0402 3 mm <sup>2</sup>     |
| 10. | Rpgood | 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                                                                                                     |
|-----|------|---------------------------|--------------------------------------|------------------------------------------------------|-----|--------|---------------------------------------------------------------------------------------------------------------|
| 11. | Rsns | Stackpole Electronics Inc | CSR1206FK75L0<br>Series= ?           | Res= 75.0 mOhm<br>Power= 500.0 mW<br>Tolerance= 1.0% | 1   | \$0.10 |  1206 11 mm <sup>2</sup>   |
| 12. | Rt   | Vishay-Dale               | CRCW0402205KFKED<br>Series= CRCW..e3 | Res= 205.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 |  0402 3 mm <sup>2</sup>    |
| 13. | U1   | Texas Instruments         | LM25011MYX/NOPB                      | Switcher                                             | 1   | \$0.95 |  MUC10A 24 mm <sup>2</sup> |

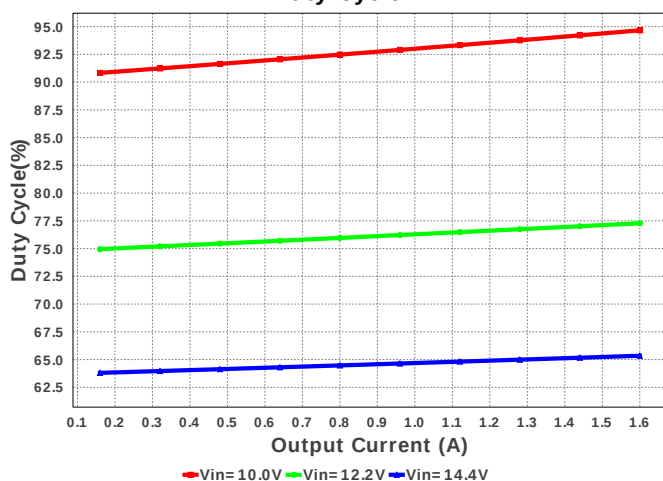
D1 Pd



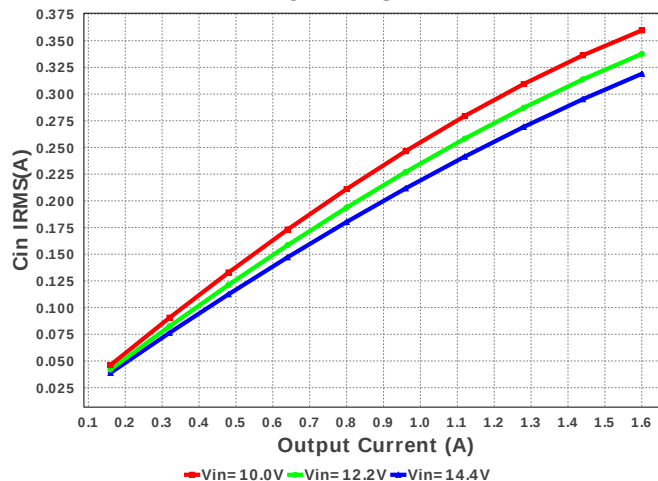
IC Tj

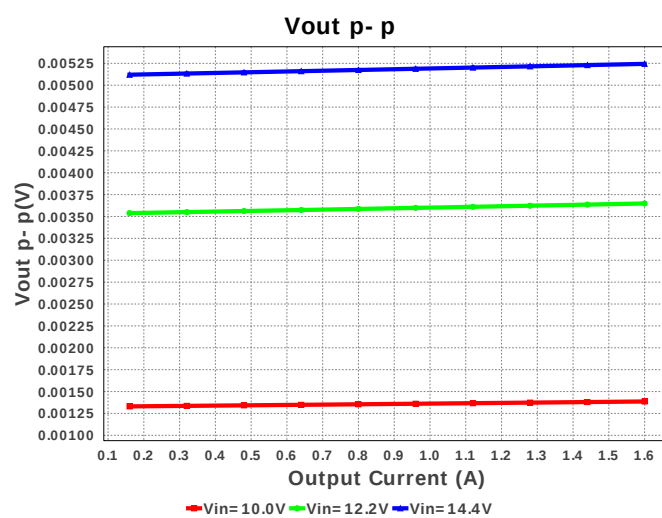
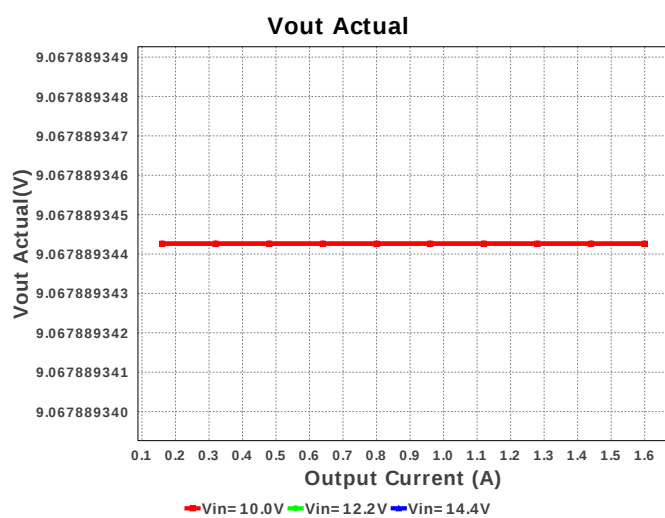
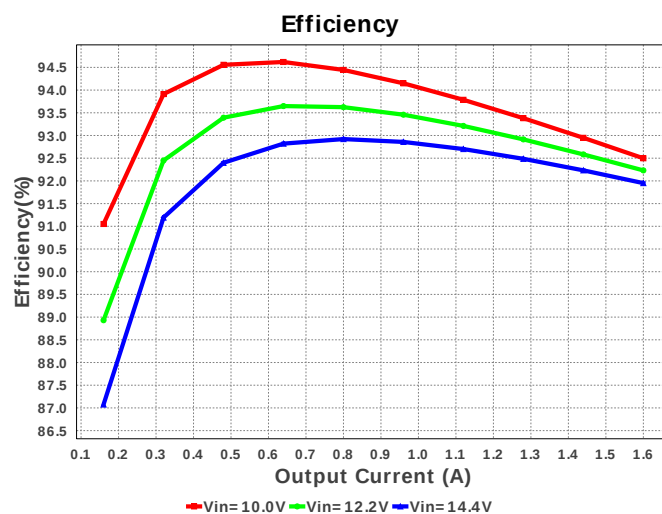
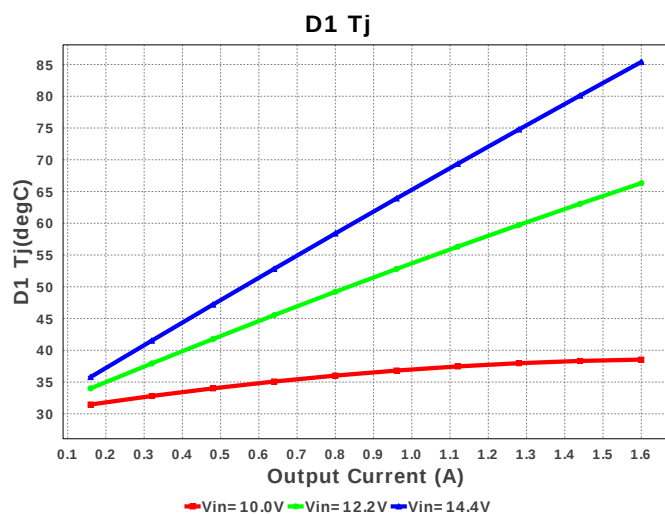
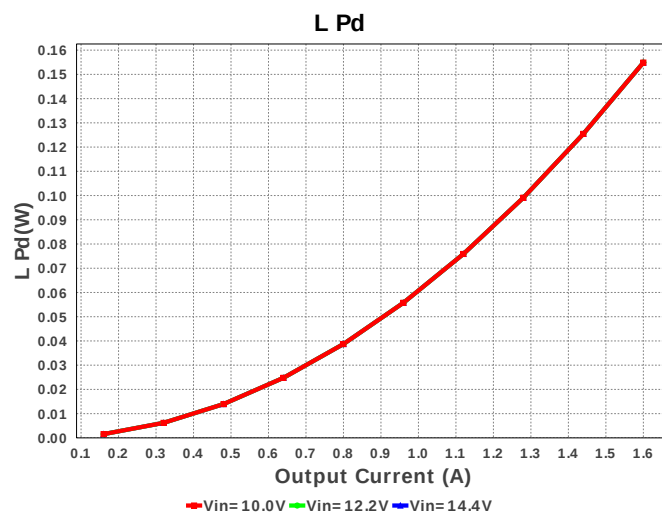
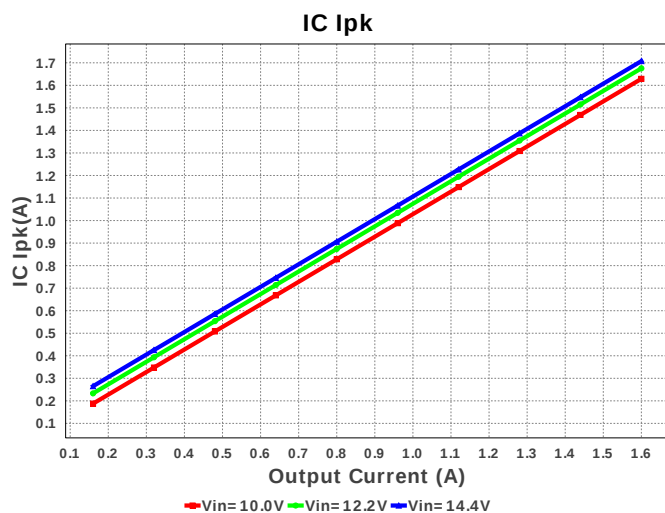


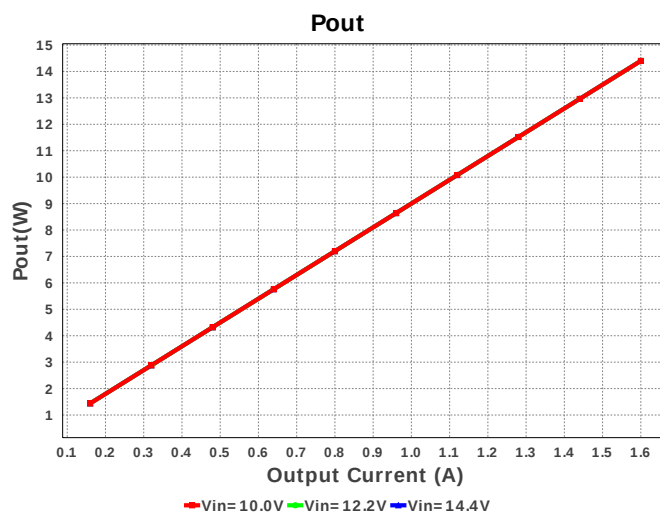
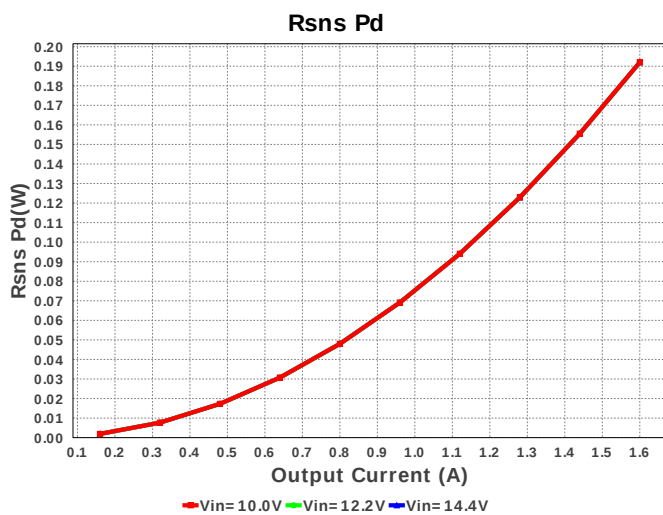
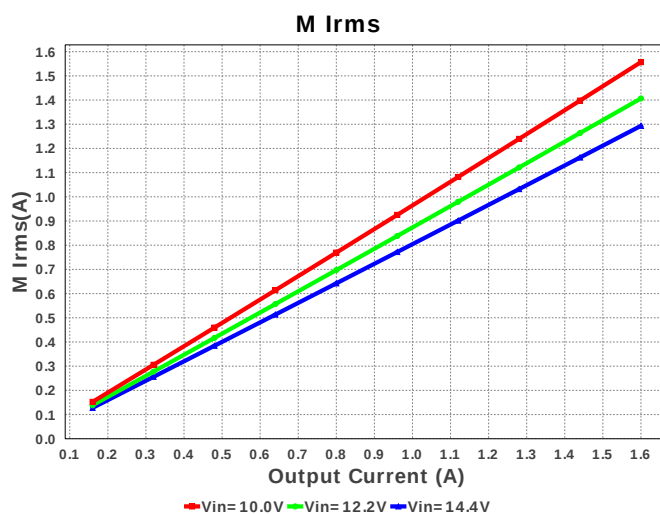
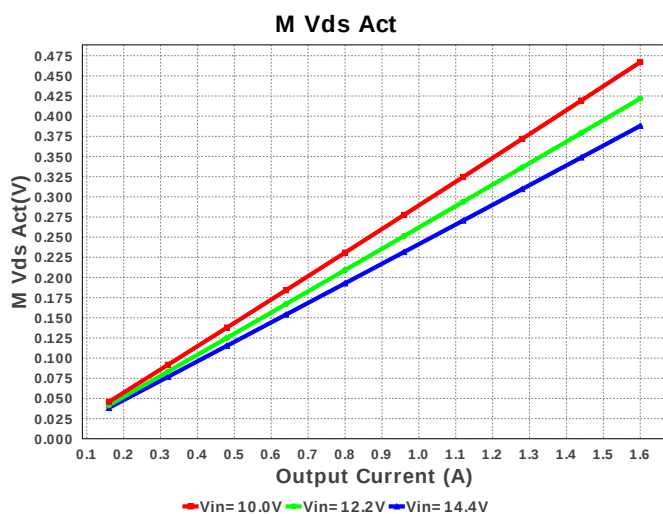
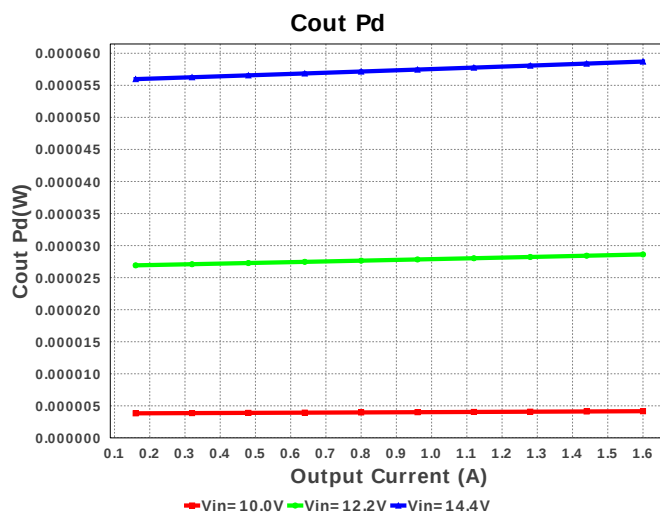
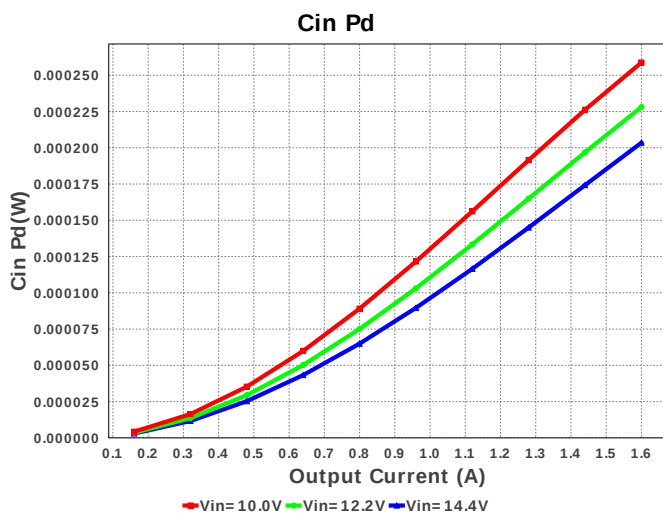
Duty Cycle

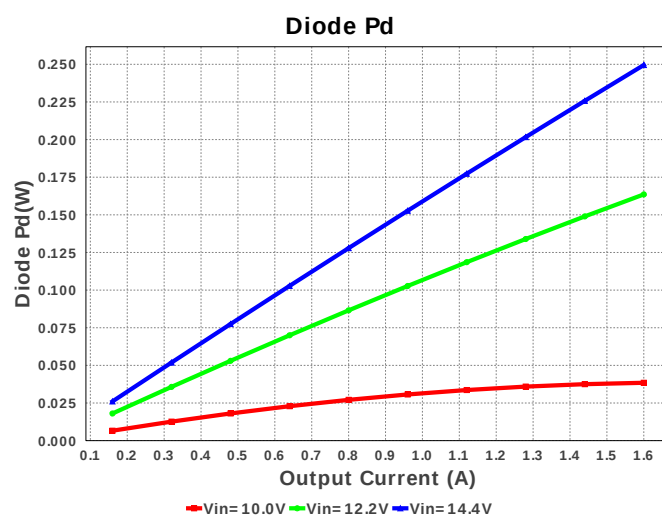
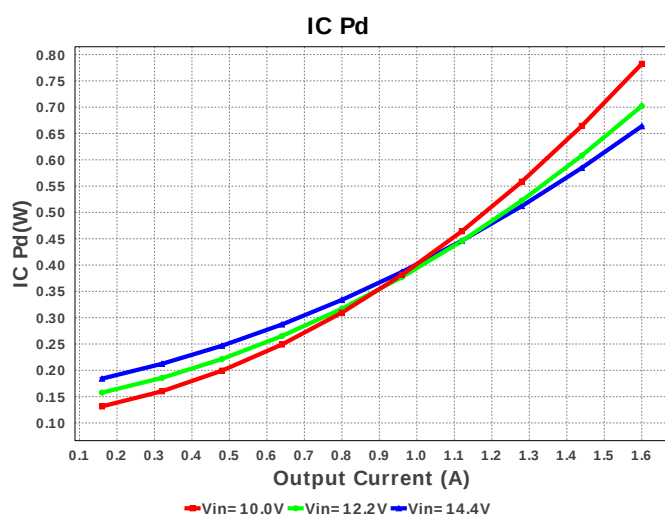
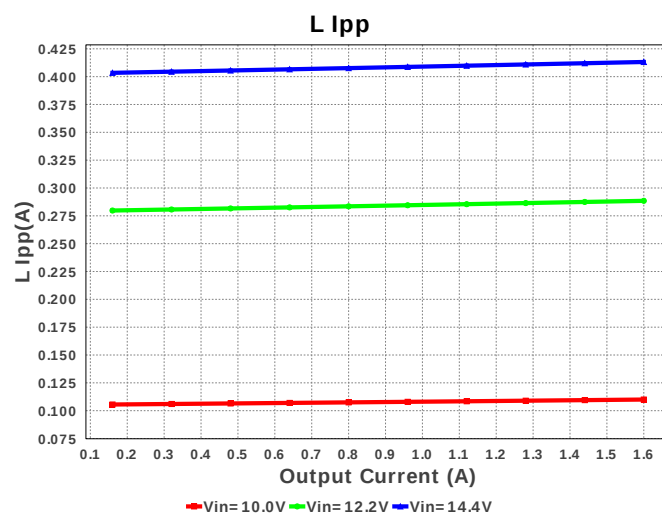
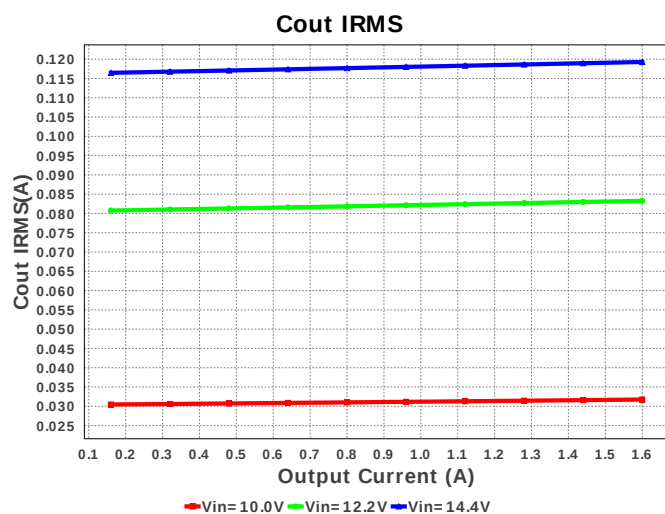
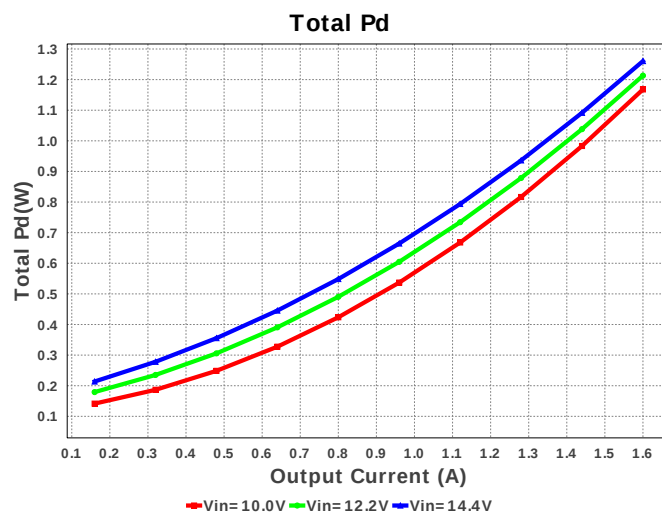
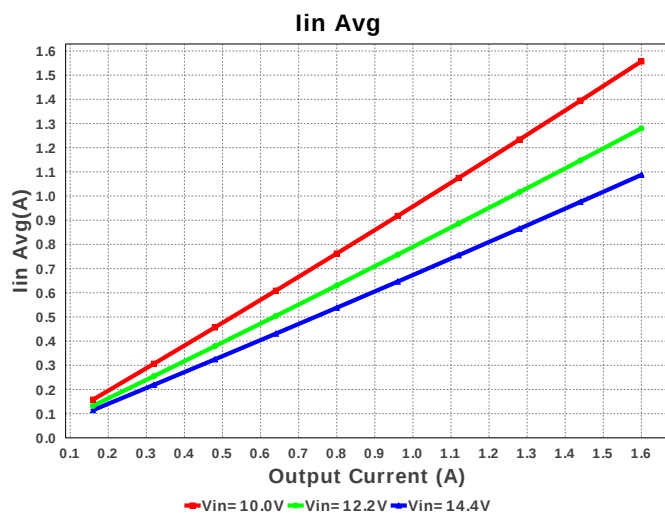


Cin IRMS









## Operating Values

| #   | Name         | Value                 | Category | Description                             |
|-----|--------------|-----------------------|----------|-----------------------------------------|
| 1.  | Cin IRMS     | 318.972 mA            | Current  | Input capacitor RMS ripple current      |
| 2.  | Cout IRMS    | 119.272 mA            | Current  | Output capacitor RMS ripple current     |
| 3.  | IC Ipk       | 1.807 A               | Current  | Peak switch current in IC               |
| 4.  | Iin Avg      | 1.088 A               | Current  | Average input current                   |
| 5.  | L Ipp        | 413.17 mA             | Current  | Peak-to-peak inductor ripple current    |
| 6.  | M1 Irms      | 1.293 A               | Current  | Q lavg                                  |
| 7.  | BOM Count    | 13                    | General  | Total Design BOM count                  |
| 8.  | FootPrint    | 155.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components |
| 9.  | Frequency    | 1.041 MHz             | General  | Switching frequency                     |
| 10. | IC Tolerance | 50.0 mV               | General  | IC Feedback Tolerance                   |
| 11. | M Vds Act    | 388.01 mV             | General  | Voltage drop across the MosFET          |

| #   | Name           | Value           | Category | Description                                                                                |
|-----|----------------|-----------------|----------|--------------------------------------------------------------------------------------------|
| 12. | Pout           | 14.4 W          | General  | Total output power                                                                         |
| 13. | Total BOM      | \$1.41          | General  | Total BOM Cost                                                                             |
| 14. | D1 Tj          | 85.395 degC     | Op_Point | D1 junction temperature                                                                    |
| 15. | Vout Actual    | 9.068 V         | Op_Point | Vout Actual calculated based on selected voltage divider resistors                         |
| 16. | Vout OP        | 9.0 V           | Op_Point | Operational Output Voltage                                                                 |
| 17. | Duty Cycle     | 65.344 %        | Op_point | Duty cycle                                                                                 |
| 18. | Efficiency     | 91.951 %        | Op_point | Steady state efficiency                                                                    |
| 19. | IC Tj          | 71.078 degC     | Op_point | IC junction temperature                                                                    |
| 20. | ICThetaJA      | 48.0 degC/W     | Op_point | IC junction-to-ambient thermal resistance                                                  |
| 21. | IOUT_OP        | 1.6 A           | Op_point | Iout operating point                                                                       |
| 22. | VIN_OP         | 14.4 V          | Op_point | Vin operating point                                                                        |
| 23. | Vout p-p       | 5.244 mV        | Op_point | Peak-to-peak output ripple voltage                                                         |
| 24. | Cin Pd         | 203.486 $\mu$ W | Power    | Input capacitor power dissipation                                                          |
| 25. | Cout Pd        | 58.71 $\mu$ W   | Power    | Output capacitor power dissipation                                                         |
| 26. | D1 Pd          | 249.525 mW      | Power    | Output Diode Power Dissipation                                                             |
| 27. | Diode Pd       | 249.525 mW      | Power    | Diode power dissipation                                                                    |
| 28. | IC Pd          | 855.791 mW      | Power    | IC power dissipation                                                                       |
| 29. | L Pd           | 154.88 mW       | Power    | Inductor power dissipation                                                                 |
| 30. | Rsns Pd        | 10.014 mW       | Power    | Current Limit Sense Resistor Power Dissipation                                             |
| 31. | Total Pd       | 1.27 W          | Power    | Total Power Dissipation                                                                    |
| 32. | Vout Tolerance | 3.482 %         |          | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |

## Design Inputs

| #  | Name    | Value   | Description            |
|----|---------|---------|------------------------|
| 1. | Iout    | 1.6     | Maximum Output Current |
| 2. | VinMax  | 14.4    | Maximum input voltage  |
| 3. | VinMin  | 10.0    | Minimum input voltage  |
| 4. | Vout    | 9.0     | Output Voltage         |
| 5. | base_pn | LM25011 | Base Product Number    |
| 6. | source  | DC      | Input Source Type      |
| 7. | Ta      | 30.0    | Ambient temperature    |

## Design Assistance

1. **LM25011** Product Folder : <http://www.ti.com/product/LM25011> : contains the data sheet and other resources.

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