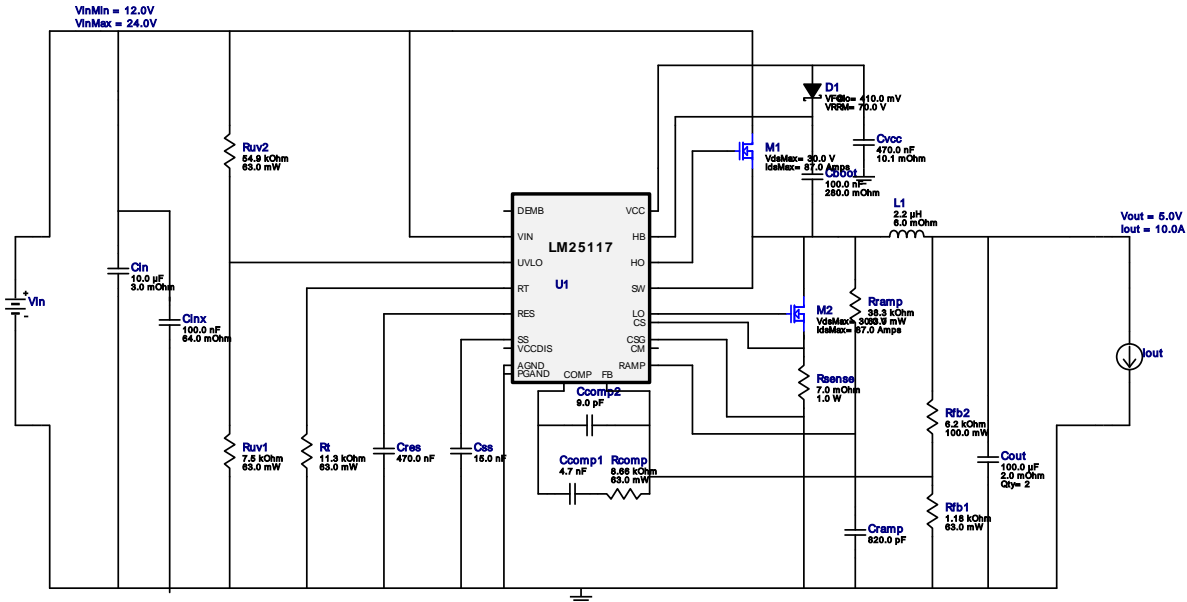
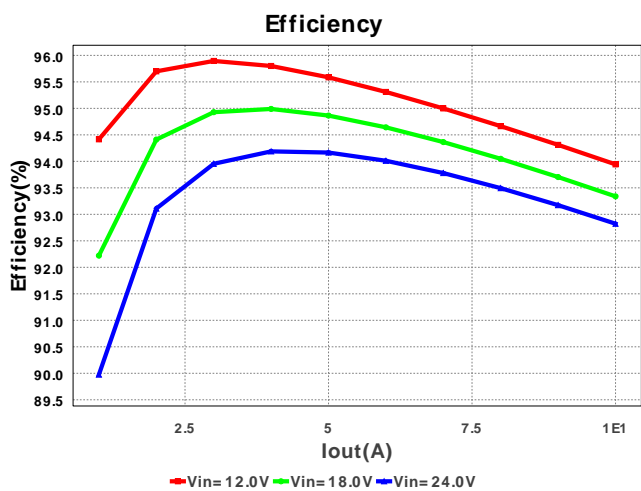
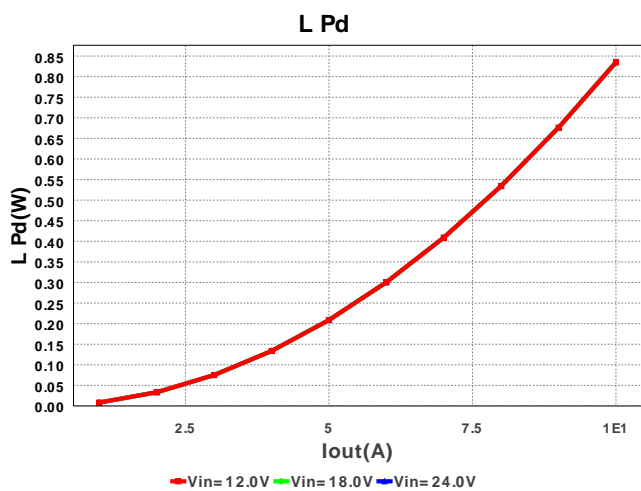
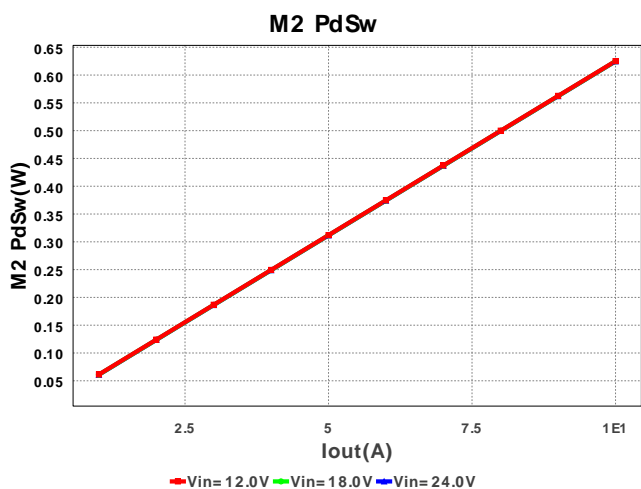
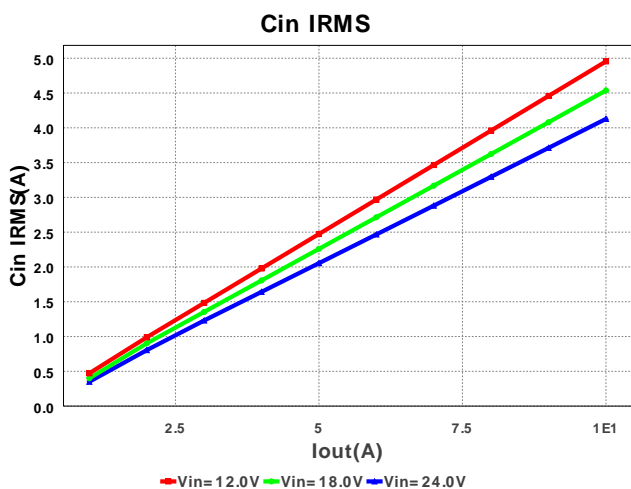
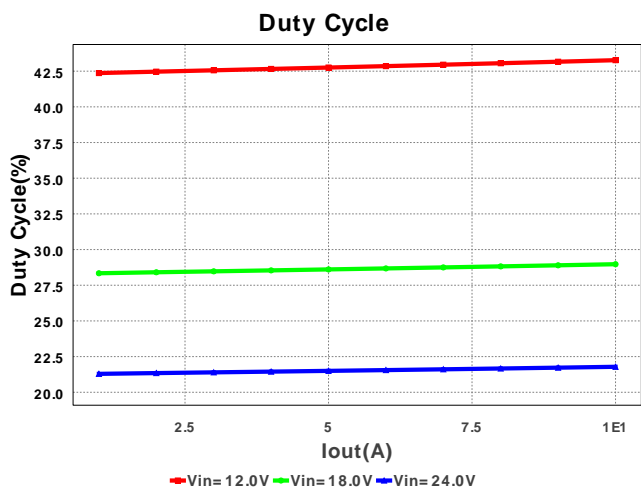
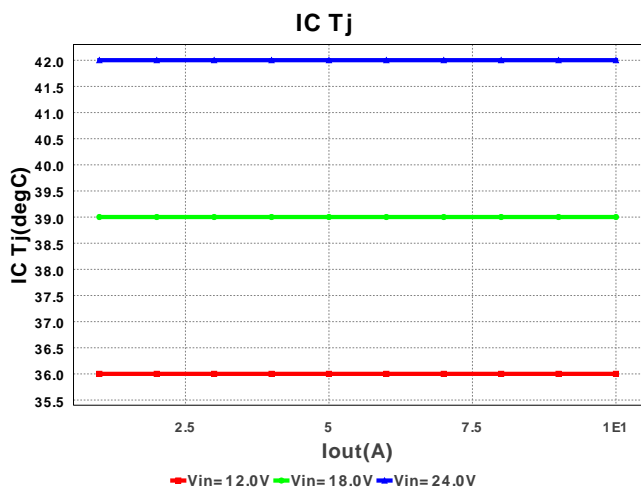


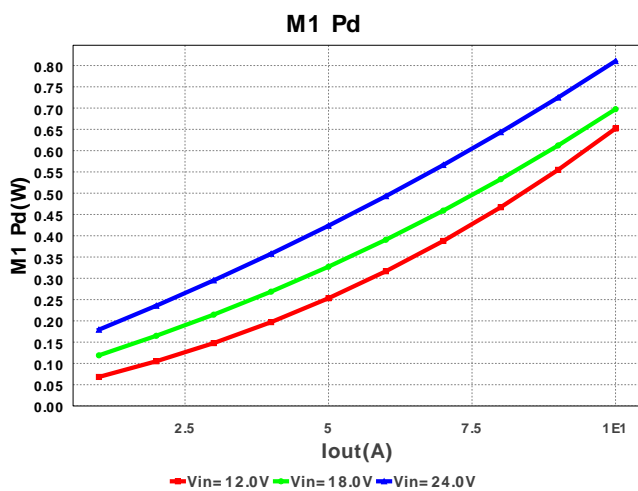
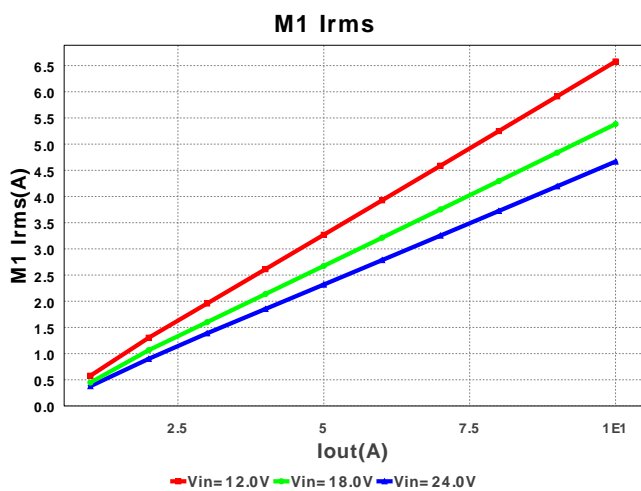
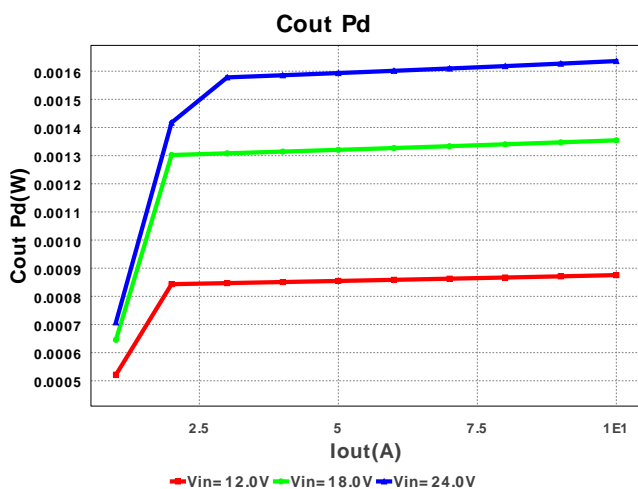
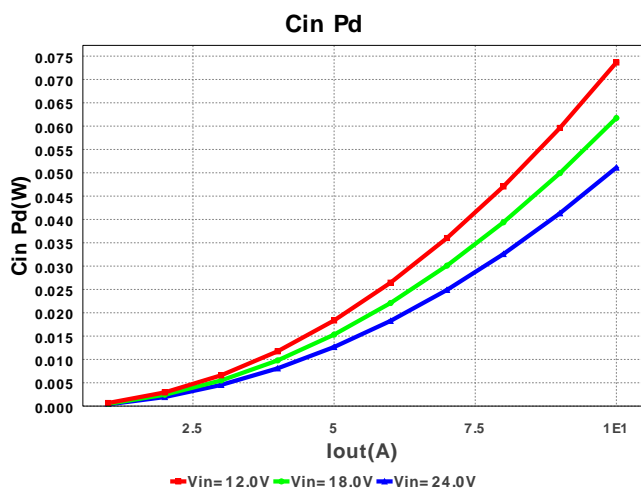
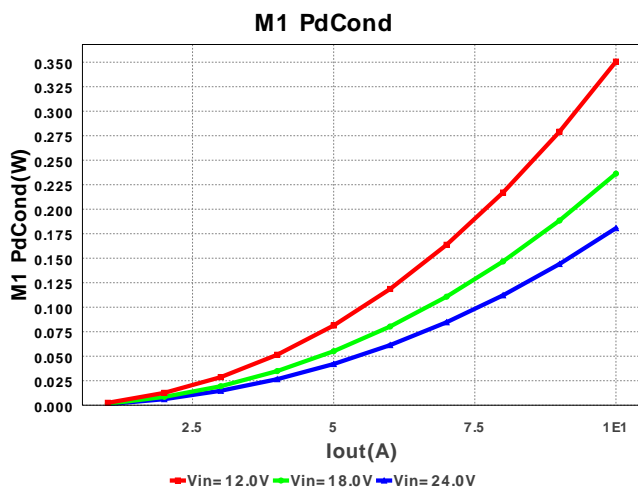
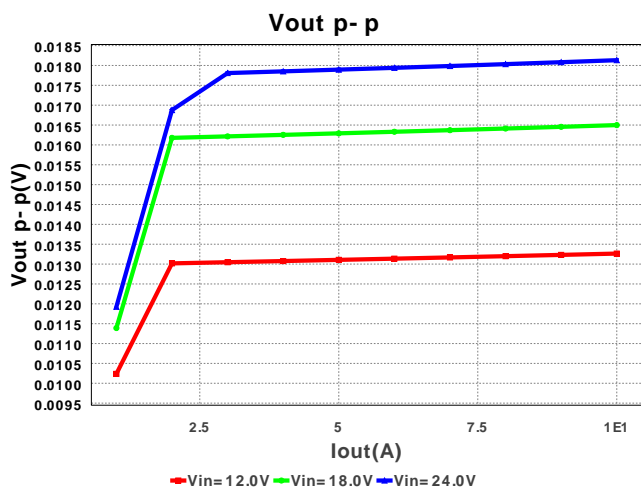
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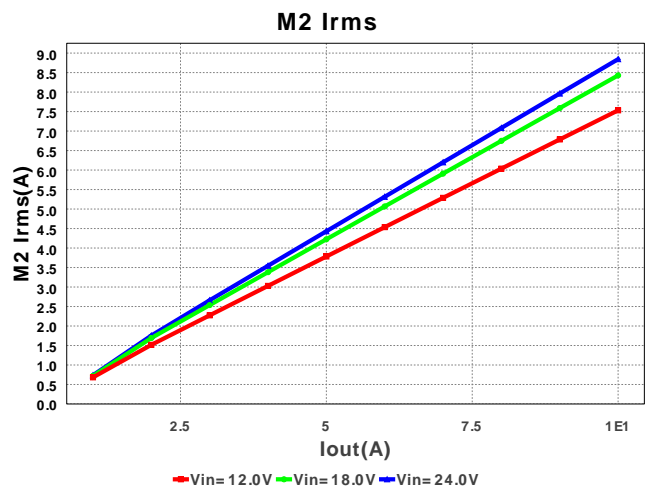
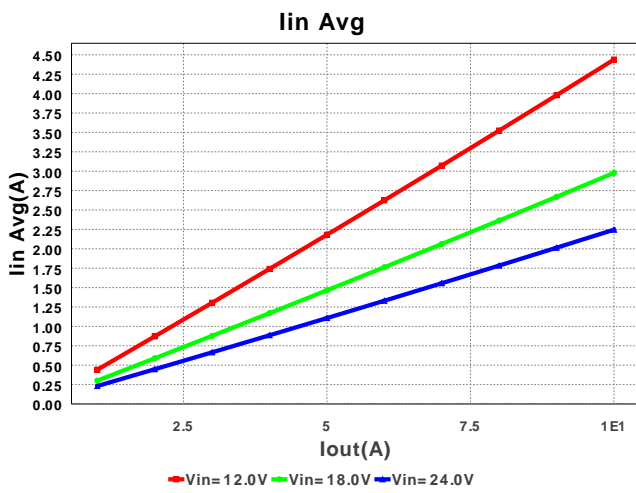
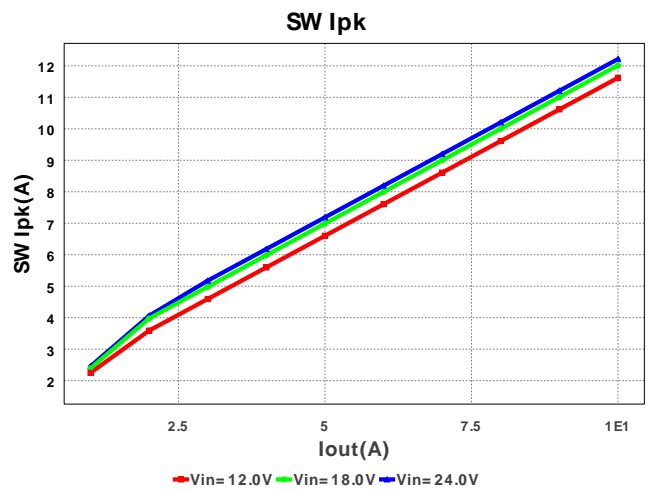
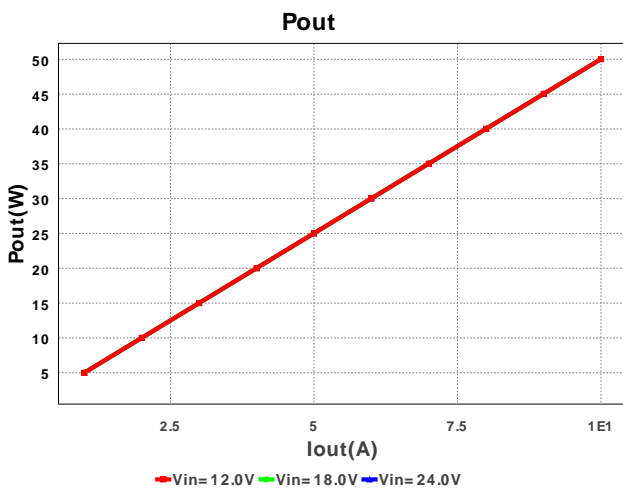
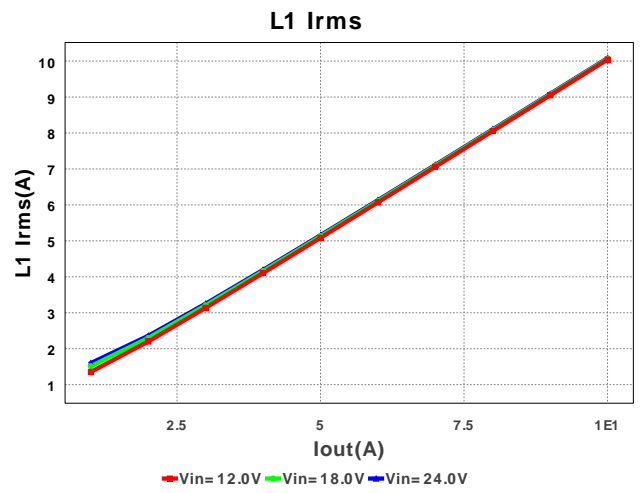
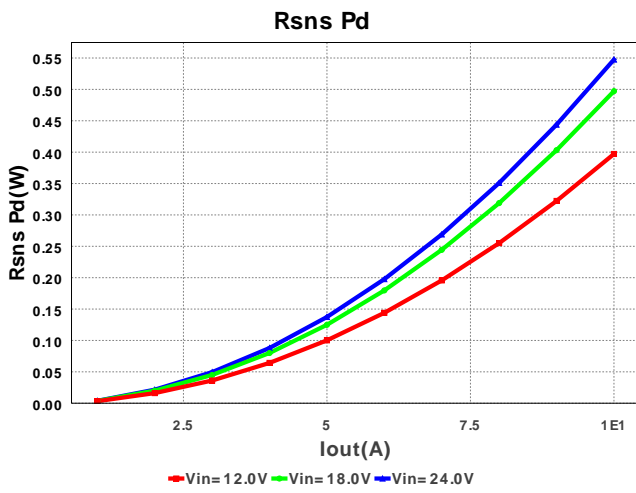
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 LM25117PMH/NOPB 12.0V-24.0V to 5.003389830508475V @ 10.0A

**电气材料清单**

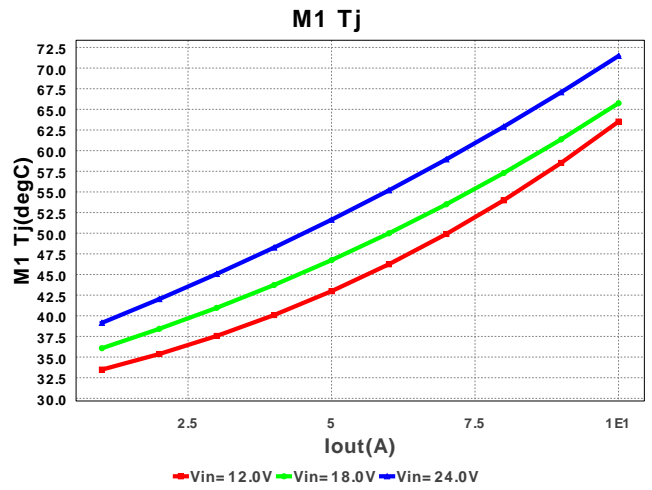
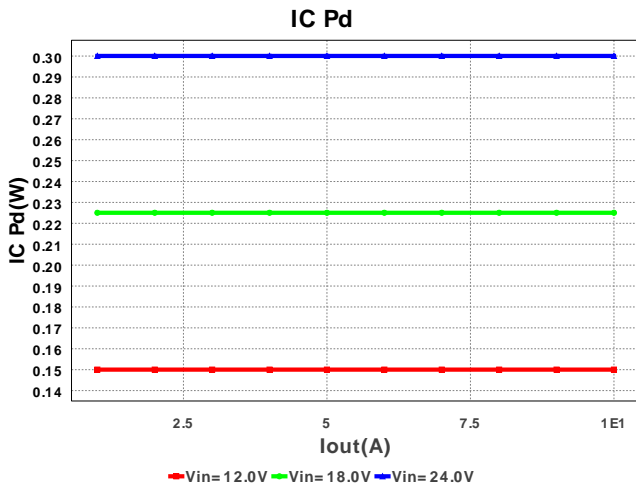
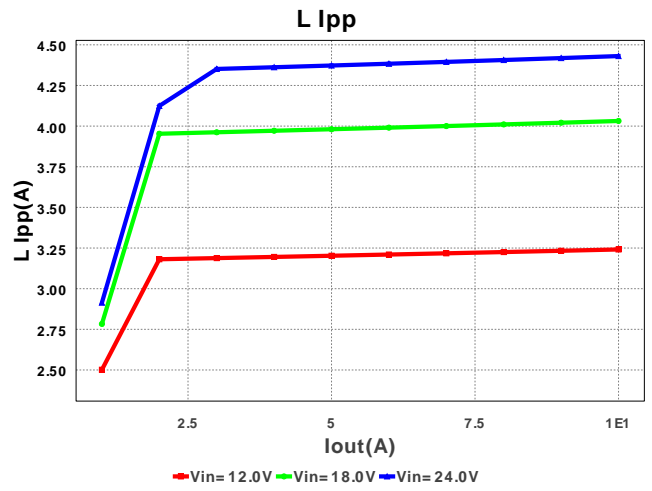
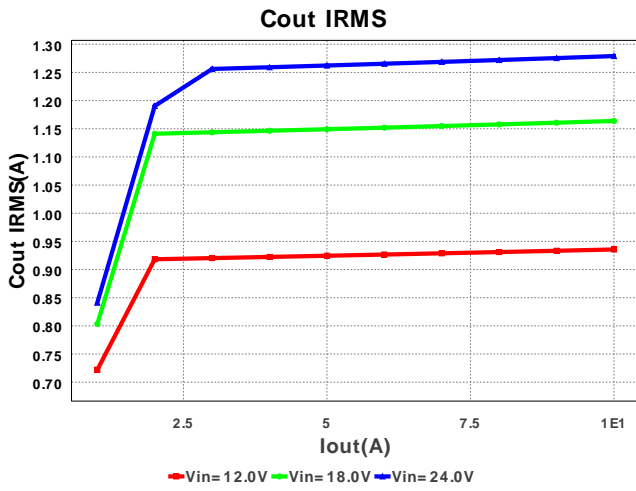
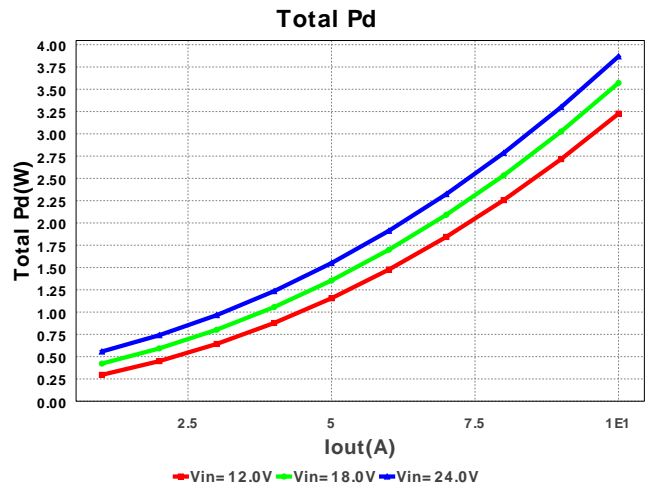
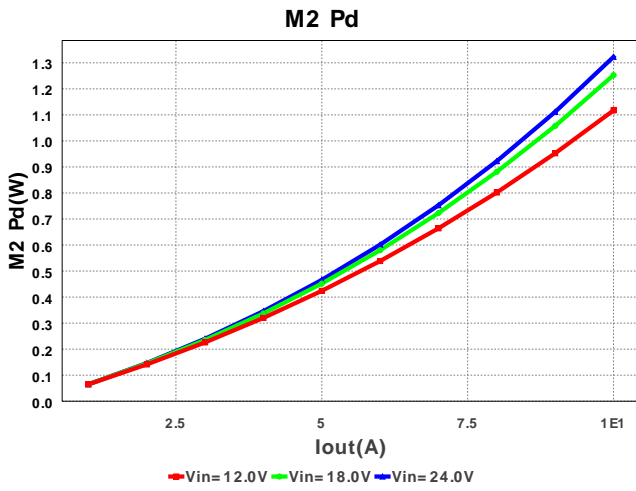
| #  | 名称     | 制造商           | 零件编号                                 | 属性   | Qty | Price  | 大小   |
|----|--------|---------------|--------------------------------------|--|-----|--------|--|
| 1. | Cboot  | AVX           | 08053C104KAT2A<br>Series= X7R        | Cap= 100.0 nF<br>ESR= 280.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 1   | \$0.01 |  0805 13mm2 |
| 2. | Ccomp1 | Yageo America | CC0805KRX7R9BB472<br>Series= X7R     | Cap= 4.7 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                      | 1   | \$0.01 |  0805 13mm2 |
| 3. | Ccomp2 | Yageo America | CC0805DRNP09BN9R0<br>Series= C0G/NP0 | Cap= 9.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A                      | 1   | \$0.01 |  0805 13mm2 |
| 4. | Cin    | TDK           | C5750X7R1H106M<br>Series= X7R        | Cap= 10.0 µF<br>ESR= 3.0 mOhm<br>VDC= 50.0 V<br>IRMS= 5.5 A    | 1   | \$0.68 |  2220 60mm2 |
| 5. | Cinx   | Kemet         | C0805C104K5RACTU<br>Series= X7R      | Cap= 100.0 nF<br>ESR= 64.0 mOhm<br>VDC= 50.0 V<br>IRMS= 1.64 A | 1   | \$0.01 |  0805 13mm2 |
| 6. | Cout   | TDK           | C3225X5R0J107M<br>Series= X5R        | Cap= 100.0 µF<br>ESR= 2.0 mOhm<br>VDC= 6.3 V<br>IRMS= 3.5 A    | 2   | \$0.38 |  1210 23mm2 |
| 7. | Cramp  | Yageo America | CC0805KRX7R9BB821<br>Series= X7R     | Cap= 820.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A                    | 1   | \$0.01 |  0805 13mm2 |
| 8. | Cres   | MuRata        | GRM155C80J474KE19D<br>Series= 379    | Cap= 470.0 nF<br>VDC= 6.3 V<br>IRMS= 0.0 A                     | 1   | \$0.01 |  0402 8mm2  |
| 9. | Css    | Yageo America | CC0805KRX7R9BB153<br>Series= X7R     | Cap= 15.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A                     | 1   | \$0.01 |  0805 13mm2 |

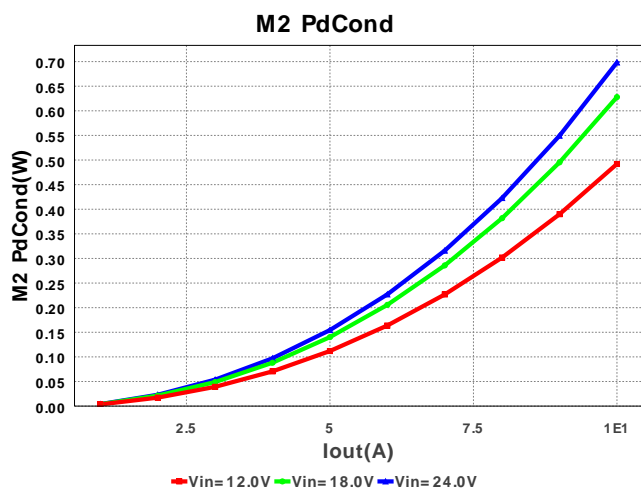
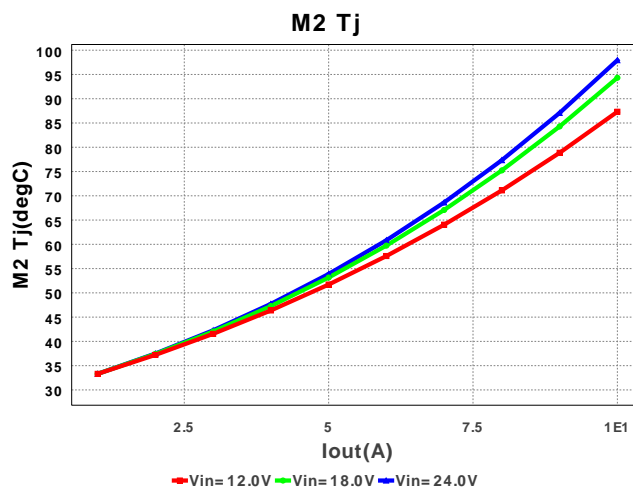
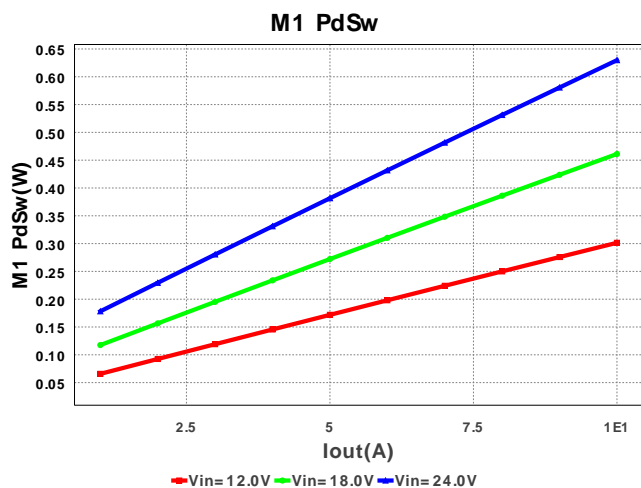
| #   | 名称     | 制造商               | 零件编号                                 | 属性  | Qty | Price  | 大小  |
|-----|--------|-------------------|--------------------------------------|---|-----|--------|---|
| 10. | Cvcc   | TDK               | C1608X5R1A474K<br>Series= X5R        | Cap= 470.0 nF<br>ESR= 10.1 mOhm<br>VDC= 10.0 V<br>IRMS= 0.0 A | 1   | \$0.01 |  0603 10mm2                |
| 11. | D1     | Diodes Inc.       | BAS70-7-F                            | VF@Io= 410.0 mV<br>VRRM= 70.0 V                               | 1   | \$0.05 |  SOT-23 22mm2              |
| 12. | L1     | Coilcraft         | XAL6060-222MEB                       | L= 2.2 µH<br>DCR= 6.0 mOhm                                    | 1   | \$0.76 |  XAL6060 72mm2             |
| 13. | M1     | Texas Instruments | CSD17302Q5A                          | VdsMax= 30.0 V<br>IdsMax= 87.0 Amps                           | 1   | \$0.36 |  TRANS_NexFET_Q5A<br>55mm2 |
| 14. | M2     | Texas Instruments | CSD17302Q5A                          | VdsMax= 30.0 V<br>IdsMax= 87.0 Amps                           | 1   | \$0.36 |  TRANS_NexFET_Q5A<br>55mm2 |
| 15. | Rcomp  | Vishay-Dale       | CRCW04028K66FKED<br>Series= CRCW..e3 | Res= 8.66 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 |  0402 8mm2                 |
| 16. | Rfb1   | Vishay-Dale       | CRCW04021K18FKED<br>Series= CRCW..e3 | Res= 1.18 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 |  0402 8mm2                 |
| 17. | Rfb2   | Susumu Co Ltd     | RR1220P-622-D<br>Series= 264         | Res= 6.2 kOhm<br>Power= 100.0 mW<br>Tolerance= 0.5%           | 1   | \$0.01 |  0805 13mm2                |
| 18. | Rramp  | Vishay-Dale       | CRCW040238K3FKED<br>Series= CRCW..e3 | Res= 38.3 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 |  0402 8mm2               |
| 19. | Rsense | Susumu Co Ltd     | PRL1632-R007-F-T1<br>Series= 237     | Res= 7.0 mOhm<br>Power= 1.0 W<br>Tolerance= 1.0%              | 1   | \$0.19 |  1206 19mm2              |
| 20. | Rt     | Vishay-Dale       | CRCW040211K3FKED<br>Series= CRCW..e3 | Res= 11.3 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 |  0402 8mm2               |
| 21. | Ruv1   | Vishay-Dale       | CRCW04027K50FKED<br>Series= CRCW..e3 | Res= 7.5 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%            | 1   | \$0.01 |  0402 8mm2               |
| 22. | Ruv2   | Vishay-Dale       | CRCW040254K9FKED<br>Series= CRCW..e3 | Res= 54.9 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0%           | 1   | \$0.01 |  0402 8mm2               |
| 23. | U1     | Texas Instruments | LM25117PMH/NOPB                      | Switcher  | 1   | \$1.75 |  MXA20A 71mm2            |











## 工作数值

| #   | 名称           | 数值                    | 类别       | 说明                         |
|-----|--------------|-----------------------|----------|----------------------------|
| 1.  | Cin IRMS     | 4.128 A               | Current  | 输入电容器均方根纹波电流               |
| 2.  | Cout IRMS    | 1.279 A               | Current  | 输出电容器均方根纹波电流               |
| 3.  | Iin Avg      | 2.246 A               | Current  | 平均输入电流                     |
| 4.  | L Ipp        | 4.431 A               | Current  | 峰值到峰值电感器纹波电流               |
| 5.  | L1 Irms      | 10.081 A              | Current  | 电感器纹波电流                    |
| 6.  | M1 Irms      | 4.668 A               | Current  | MOSFET RMS 纹波电流            |
| 7.  | M2 Irms      | 8.844 A               | Current  | MOSFET RMS 纹波电流            |
| 8.  | SW Ipk       | 12.215 A              | Current  | 峰值开关电流                     |
| 9.  | BOM 数量       | 24                    | General  | Total Design BOM count     |
| 10. | 大小           | 555.0 mm <sup>2</sup> | General  | BOM组件的总所占面积                |
| 11. | 频率           | 424.559 kHz           | General  | 开关频率                       |
| 12. | IC Tolerance | 12.0 mV               | General  | IC Feedback Tolerance      |
| 13. | 模式           | CCM                   | General  | 传导模式                       |
| 14. | Pout         | 50.034 W              | General  | 总输出功率                      |
| 15. | 总 BOM        | \$5.06                | General  | Total BOM Cost             |
| 16. | Vout OP      | 5.003 V               | Op_Point | Operational Output Voltage |
| 17. | 交叉频率         | 42.598 kHz            | Op_point | 波特图交叉频率                    |
| 18. | 占空比          | 21.786 %              | Op_point | 占空比                        |
| 19. | 效率           | 92.818 %              | Op_point | 稳态效率                       |
| 20. | IC Tj        | 42.108 degC           | Op_point | 电路接点温度                     |
| 21. | IOUT_OP      | 10.0 A                | Op_point | Iout 操作点                   |
| 22. | M1 Tj        | 71.469 degC           | Op_point | M1 MOSFET 接点温度             |
| 23. | M2 Tj        | 97.943 degC           | Op_point | M2 MOSFET 接点温度             |
| 24. | 相位裕度         | 76.5 deg              | Op_point | 波特图相位裕度                    |
| 25. | VIN_OP       | 24.0 V                | Op_point | Vin操作点                     |
| 26. | Vout p-p     | 18.146 mV             | Op_point | 峰值到峰值输出纹波电压                |
| 27. | Cin Pd       | 51.119 mW             | Power    | 输入电容器功率耗散                  |
| 28. | Cout Pd      | 1.636 mW              | Power    | 输出电容器功率耗散                  |
| 29. | IC Pd        | 302.71 mW             | Power    | 电路功率耗散                     |
| 30. | L Pd         | 834.912 mW            | Power    | 电感器功率耗散                    |
| 31. | M1 Pd        | 810.502 mW            | Power    | M1 MOSFET 总功率耗散            |
| 32. | M1 PdCond    | 180.667 mW            | Power    | M1 MOSFET 传导损耗             |

| #   | 名称        | 数值         | 类别    | 说明              |
|-----|-----------|------------|-------|-----------------|
| 33. | M1 PdSw   | 629.835 mW | Power | M1 MOSFET 开关损耗  |
| 34. | M2 Pd     | 1.323 W    | Power | M2 MOSFET 总功率耗散 |
| 35. | M2 PdCond | 698.206 mW | Power | M2 MOSFET 传导损耗  |
| 36. | M2 PdSw   | 624.644 mW | Power | M2 MOSFET 开关损耗  |
| 37. | Rsns Pd   | 547.5 mW   | Power | 电流限幅传感电阻器功率耗散   |
| 38. | 整体 Pd     | 3.871 W    | Power | 总功率耗散           |

## 设计输入

| #  | 名称      | 数值        | 说明                |
|----|---------|-----------|-------------------|
| 1. | 输出电流    | 10.0 A    | 最大输出电流            |
| 2. | Iout1   | 10.0 Amps | Output Current #1 |
| 3. | Vin 最大  | 24.0 V    | 最高输入电压            |
| 4. | Vin 最小  | 12.0 V    | 最低输入电压            |
| 5. | 输出电压:   | 5.0 V     | 输出电压              |
| 6. | Vout1   | 5.0 Volt  | Output Voltage #1 |
| 7. | base_pn | LM25117   | 美国国家半导体的产品编号      |
| 8. | 源       | DC        | 输入源类别             |
| 9. | 工作环境温度  | 30.0 degC | 环境温度              |

## 设计协助

1. Outline The LM5117 is a synchronous buck controller intended for step-down regulator applications from a high voltage or widely varying input supply. The control method is based upon current mode control utilizing an emulated current ramp. Current mode control provides inherent line feed-forward, cycle-by-cycle current limiting and ease of loop compensation. The use of an emulated control ramp reduces noise sensitivity of the pulse-width modulation circuit, allowing reliable control of very small duty cycles necessary in high input voltage applications. External Vcc An output voltage derived bias supply can be applied to the VCC pin to reduce the controller power dissipation at higher input voltage. This can also relax constraints on the driver supply current if your external source can supply more than the LM(2)5117 internal regulator. Please see Datasheet for more information. Diode Emulation A fully synchronous buck regulator implemented with a freewheel MOSFET rather than a diode has the capability to sink current from the output in certain conditions such as light load, over-voltage or pre-bias startup. The LM(2)5117 provides a diode emulation feature that can be enabled to prevent reverse (drain to source) current flow in the low side free-wheel MOSFET.

2. LM25117 Product Folder : <http://www.ti.com/product/lm25117> : 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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