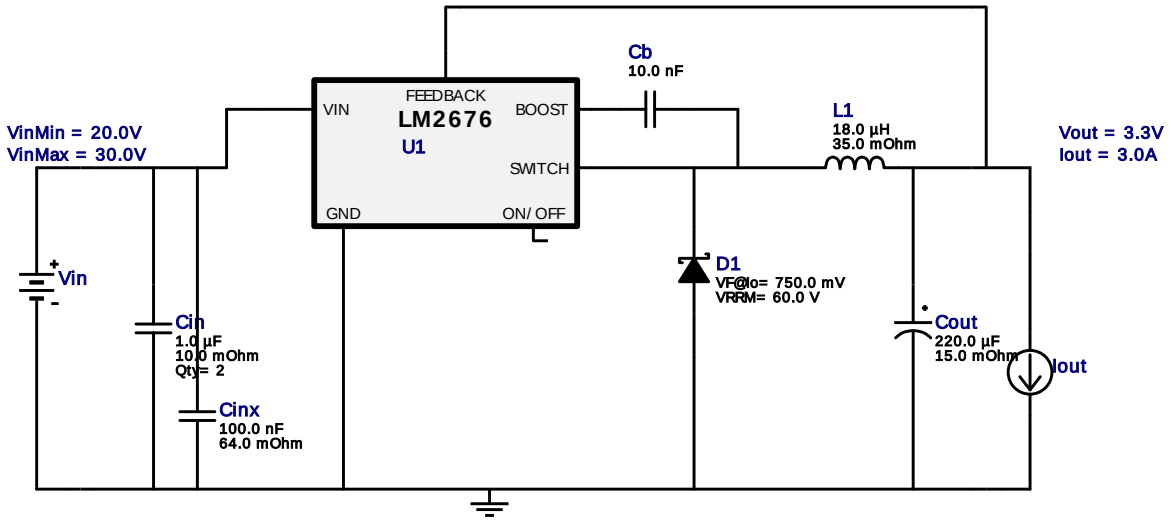
TEXAS INSTRUMENTS

# WEBENCH® 设计报告

VinMin = 20.0V
VinMax = 30.0V
Vout = 3.3V
Iout = 3.0A

Device = LM2676S-3.3/NOPB
Topology = Buck
创建 = 9/29/13 4:51:44 AM
BOM成本 = $3.03
Total Pd = 2.82W
大小 = 615.0mm2
BOM 数量 = 8

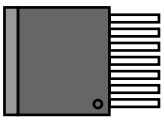
Design : 3745715/570 LM2676S-3.3/NOPB
LM2676S-3.3/NOPB 20.0V-30.0V to 3.3V @ 3.0A



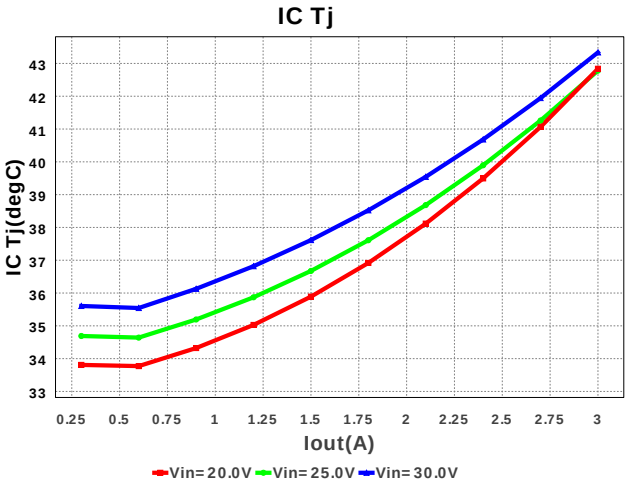

## 电气材料清单

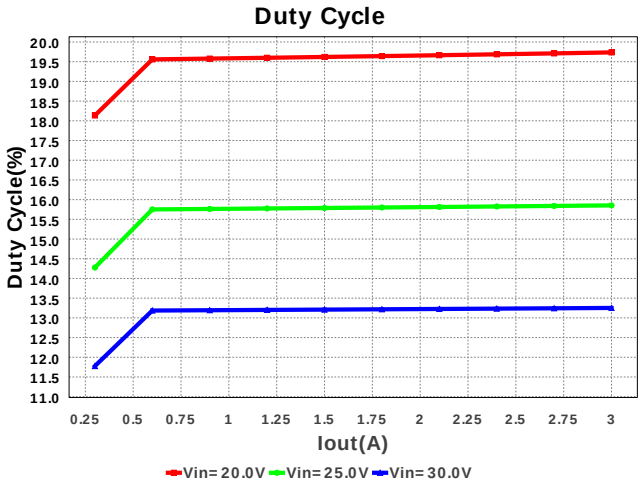
| # | 名称 | 制造商 | 零件编号 | 属性 | Qty | Price | 大小 |
|---|---|---|---|---|---|---|---|
| 1. | Cb | MuRata | GRM216R71H103KA01D<br>Series= X7R | Cap= 10.0 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A | 1 | $0.01 |  <br>0805 7mm2 |
| 2. | Cin | TDK | C3216X7R1H105K<br>Series= X7R | Cap= 1.0 µF<br>ESR= 10.0 mOhm<br>VDC= 50.0 V<br>IRMS= 3.2 A | 2 | $0.04 |  <br>1206 11mm2 |
| 3. | 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 |  <br>0805 7mm2 |
| 4. | Cout | Nippon Chemi-Con | APXE6R3ARA221MF61G<br>Series= PXE | Cap= 220.0 µF<br>ESR= 15.0 mOhm<br>VDC= 6.3 V<br>IRMS= 3.16 A | 1 | $0.43 |  <br>CAPSMT_62_F61 74mm2 |
| 5. | D1 | Comchip Technology | CDBC560-G | VF@Io= 750.0 mV<br>VRRM= 60.0 V | 1 | $0.26 |  <br>SMC 83mm2 |
| 6. | L1 | Bourns | SRR1210-180M | L= 18.0 µH<br>DCR= 35.0 mOhm | 1 | $0.44 |  <br>SRR1210 196mm2 |

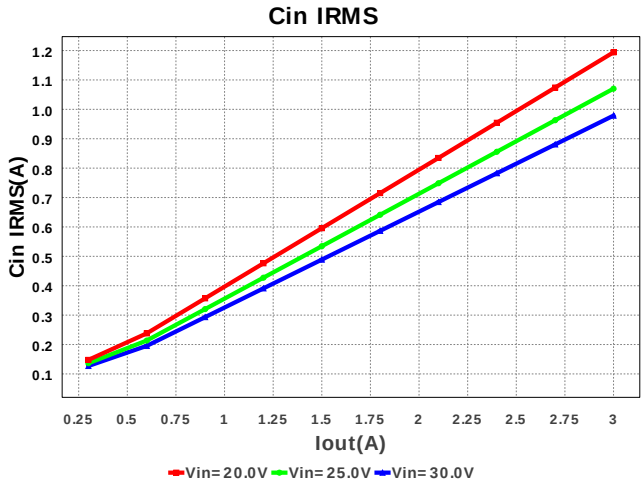
| # | 名称 | 制造商 | 零件编号 | 属性 | Qty | Price | 大小 |
|---|---|---|---|---|---|---|---|
| 7. | U1 | Texas Instruments | LM2676S-3.3/NOPB | Switcher | 1 | $1.80 | |

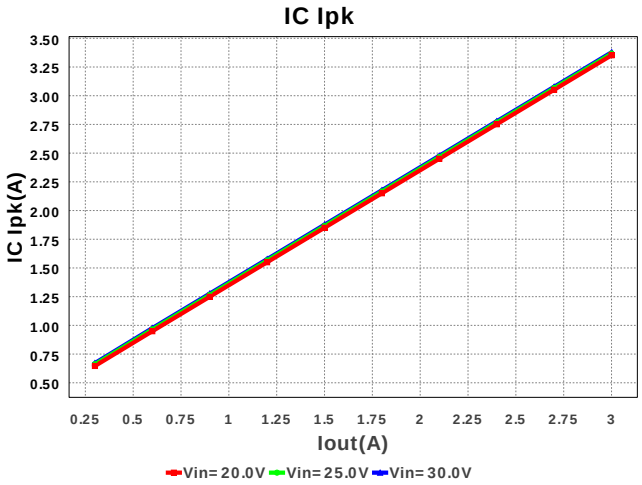


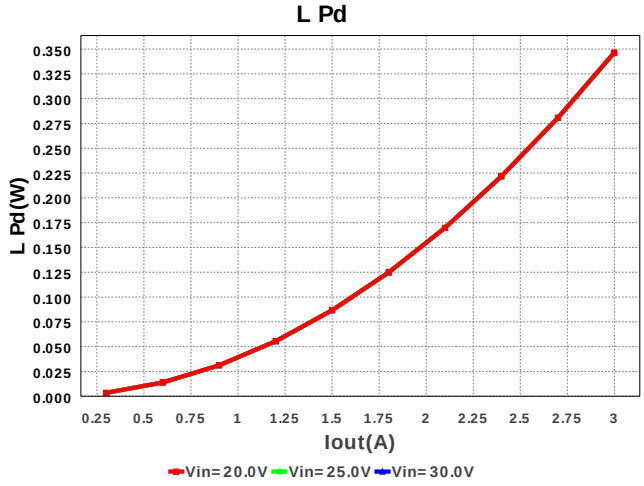
TS7B 199mm2

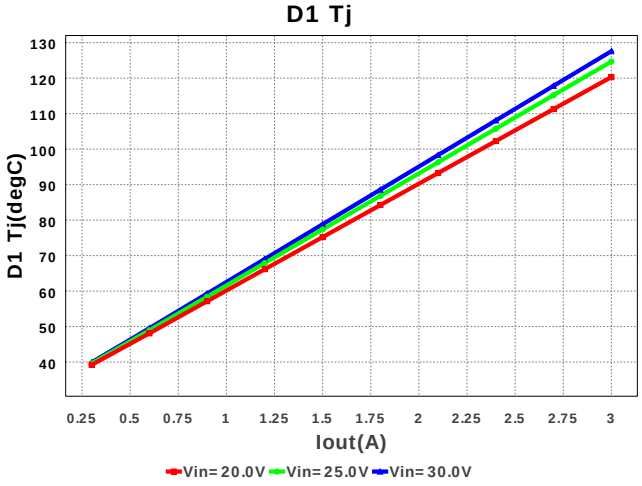


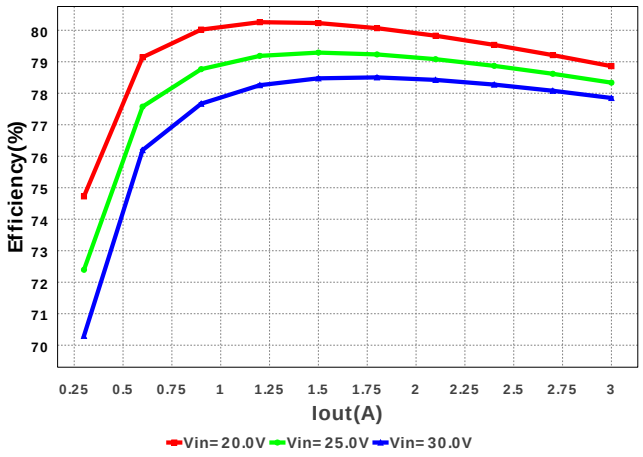



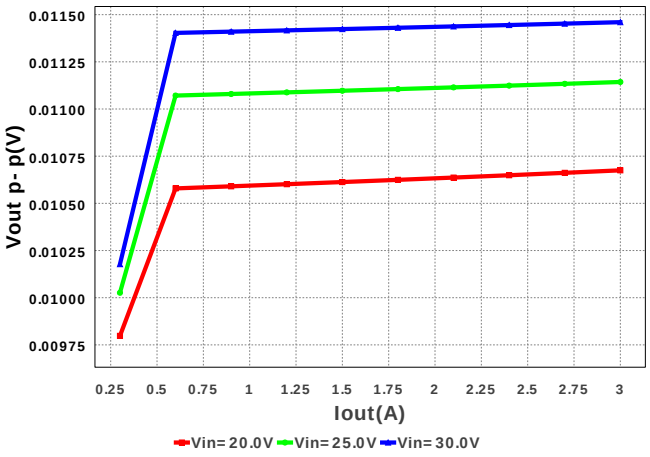



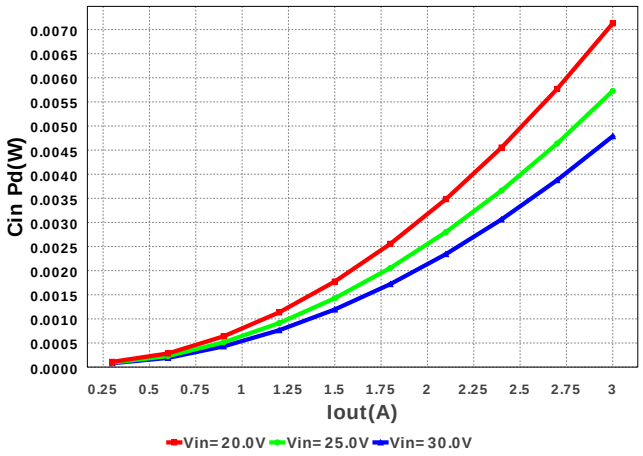
## Efficiency



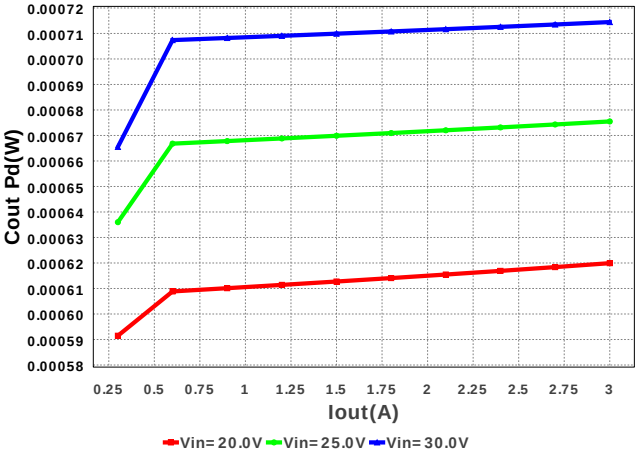

## Vout p- p



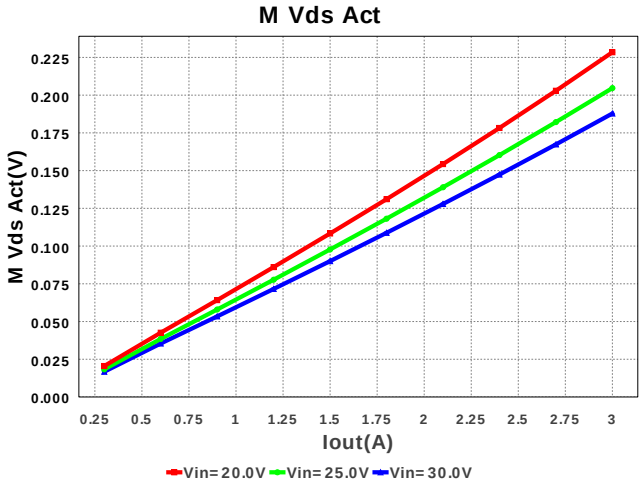

## Cin Pd



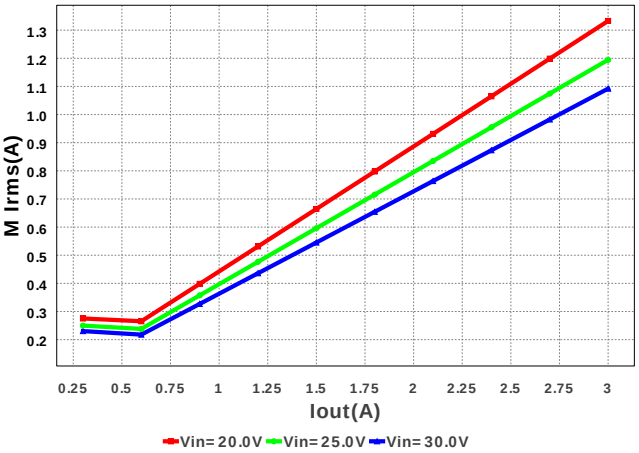

## Cout Pd

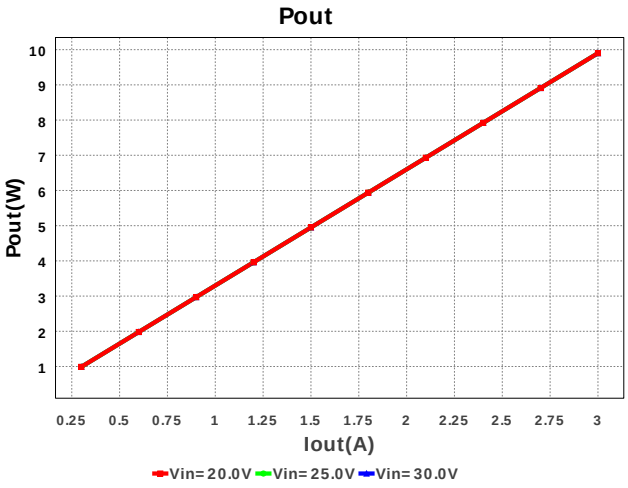


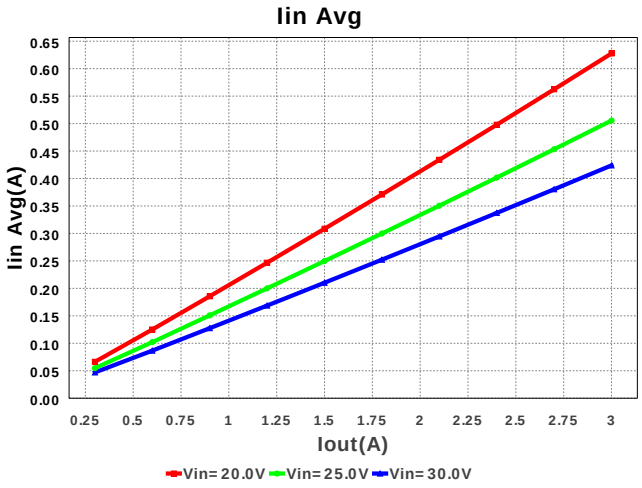

## M Vds Act

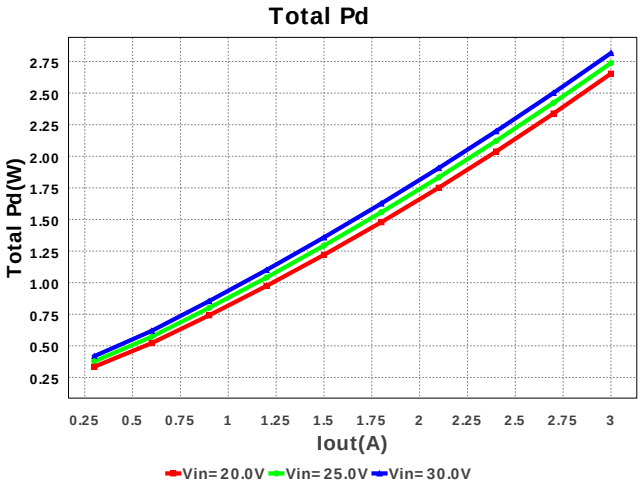


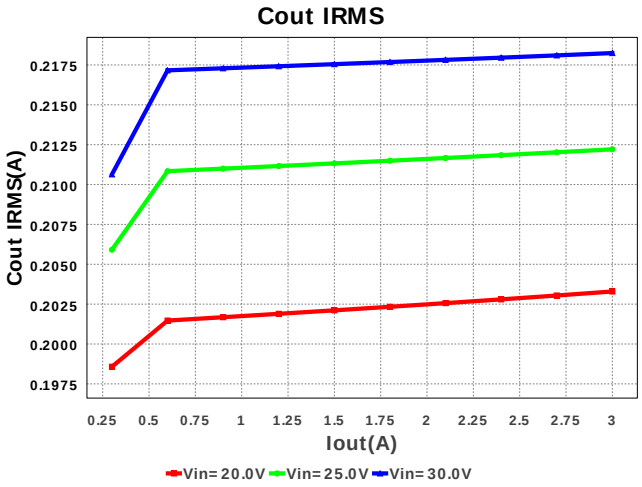

## M Irms

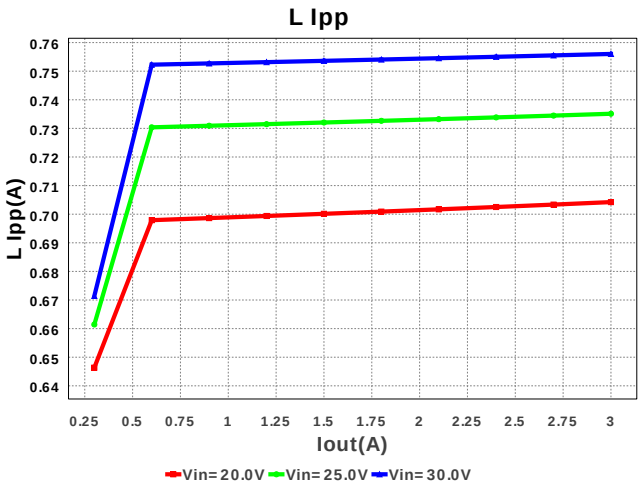


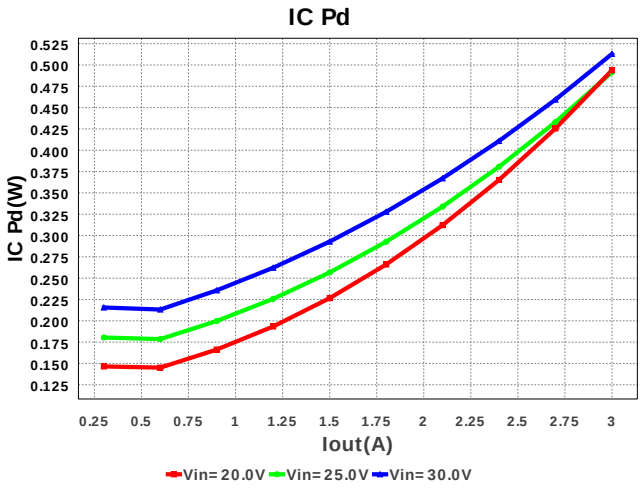


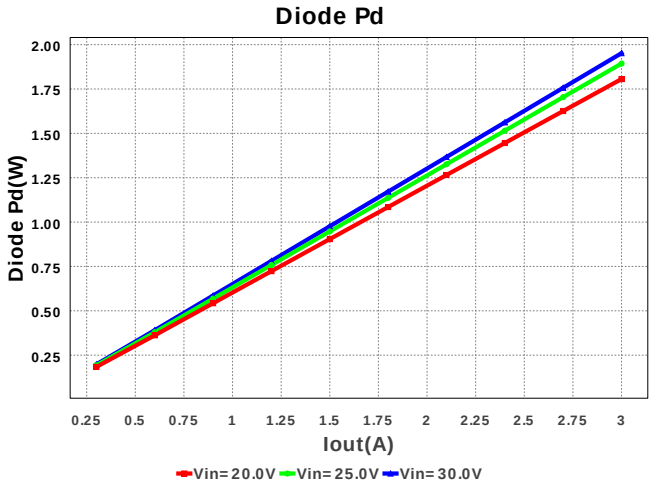






## 工作数值

| # | 名称 | 数值 | 类别 | 说明 |
|---|---|---|---|---|
| 1. | Cin IRMS | 978.643 mA | Current | 输入电容器均方根纹波电流 |
| 2. | Cout IRMS | 218.246 mA | Current | 输出电容器均方根纹波电流 |
| 3. | IC Ipk | 3.378 A | Current | 电路内的峰值开关电流 |
| 4. | Iin Avg | 423.89 mA | Current | 平均输入电流 |
| 5. | L Ipp | 756.025 mA | Current | 峰值到峰值电感器纹波电流 |
| 6. | M1 Irms | 1.092 A | Current | Q Iavg |
| 7. | BOM 数量 | 8 | General | Total Design BOM count |
| 8. | 大小 | 615.0 mm2 | General | BOM组件的总所占面积 |
| 9. | 频率 | 260.0 kHz | General | 开关频率 |
| 10. | IC Tolerance | 66.0 mV | General | IC Feedback Tolerance |
| 11. | M Vds Act | 187.842 mV | General | Voltage drop across the MosFET |
| 12. | Pout | 9.9 W | General | 总输出功率 |
| 13. | 总 BOM | $3.03 | General | Total BOM Cost |
| 14. | D1 Tj | 127.592 degC | Op_Point | D1接点温度 |
| 15. | Vout OP | 3.3 V | Op_Point | Operational Output Voltage |
| 16. | 交叉频率 | 25.172 kHz | Op_point | 波特图交叉频率 |
| 17. | 占空比 | 13.252 % | Op_point | 占空比 |
| 18. | 效率 | 77.85 % | Op_point | 稳态效率 |
| 19. | IC Tj | 43.336 degC | Op_point | 电路接点温度 |
| 20. | ICThetaJA | 26.0 degC/W | Op_point | 电路接点到环境热敏电阻 |
| 21. | IOUT_OP | 3.0 A | Op_point | Iout 操作点 |
| 22. | 相位裕度 | 68.297 deg | Op_point | 波特图相位裕度 |
| 23. | VIN_OP | 30.0 V | Op_point | Vin操作点 |
| 24. | Vout p-p | 11.46 mV | Op_point | 峰值到峰值输出纹波电压 |
| 25. | Cin Pd | 4.789 mW | Power | 输入电容器功率耗散 |
| 26. | Cout Pd | 714.468 µW | Power | 输出电容器功率耗散 |
| 27. | 二极管 Pd | 1.952 W | Power | 二极管功率耗散 |
| 28. | IC Pd | 512.914 mW | Power | 电路功率耗散 |
| 29. | L Pd | 346.5 mW | Power | 电感器功率耗散 |
| 30. | 整体 Pd | 2.817 W | Power | 总功率耗散 |

## 设计输入

| # | 名称 | 数值 | 说明 |
|---|---|---|---|
| 1. | 输出电流 | 3.0 A | 最大输出电流 |
| 2. | Iout1 | 3.0 Amps | Output Current #1 |
| 3. | Vin 最大 | 30.0 V | 最高输入电压 |
| 4. | Vin 最小 | 20.0 V | 最低输入电压 |
| 5. | 输出电压: | 3.3 V | 输出电压 |
| 6. | Vout1 | 3.3 Volt | Output Voltage #1 |
| 7. | base_pn | LM2676 | 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. LM2676 Product Folder : http://www.ti.com/product/lm2676 : contains the data sheet and other resources.