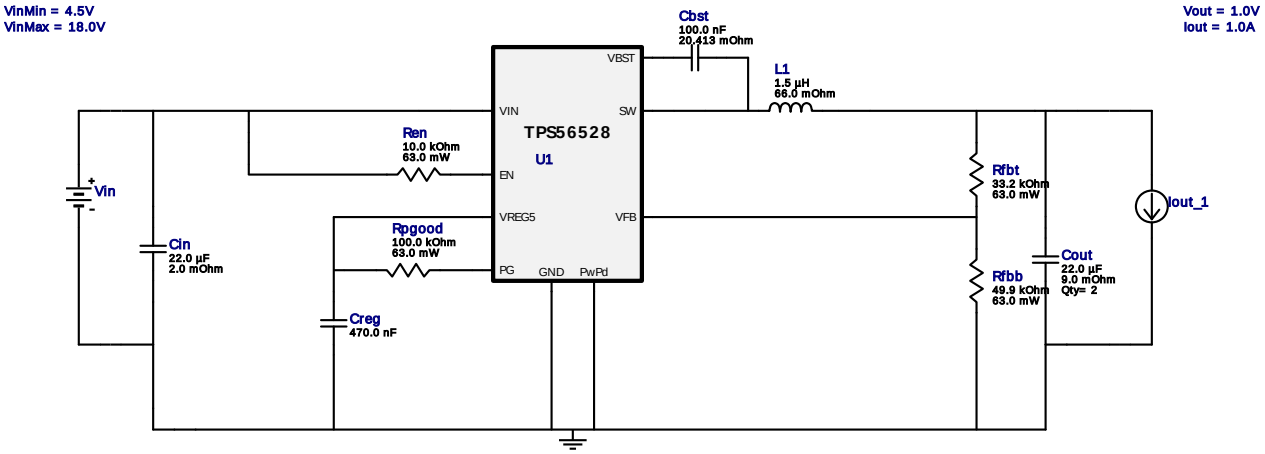
# WEBENCH® Design Report

VinMin = 4.5V
VinMax = 18.0V
Vout = 1.0V
Iout = 1.0A

Device = TPS56528DDAR
Topology = Buck
Created = 7/18/14 1:08:27 AM
BOM Cost = $1.73
Footprint = 120.0mm2
BOM Count = 11
Total Pd = 0.36W

Design : 3820738/488 TPS56528DDAR
TPS56528DDAR 4.5V-18.0V to 1.0V @ 1.0A

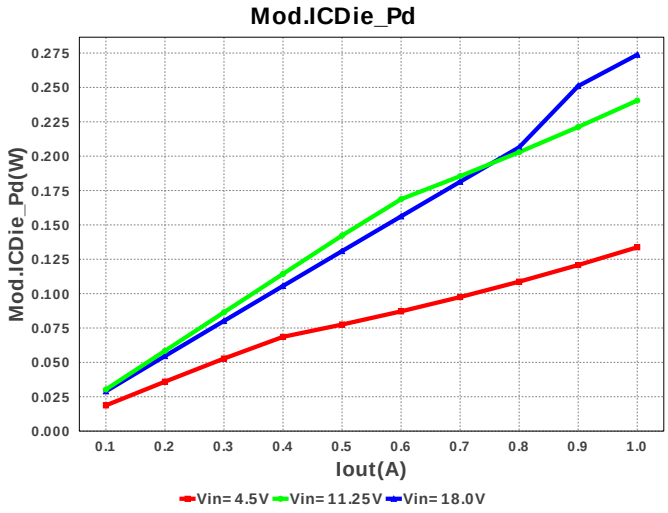


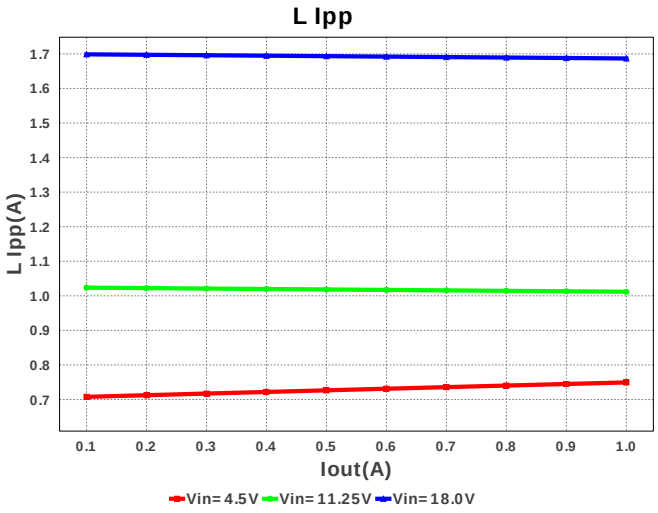

## Electrical BOM

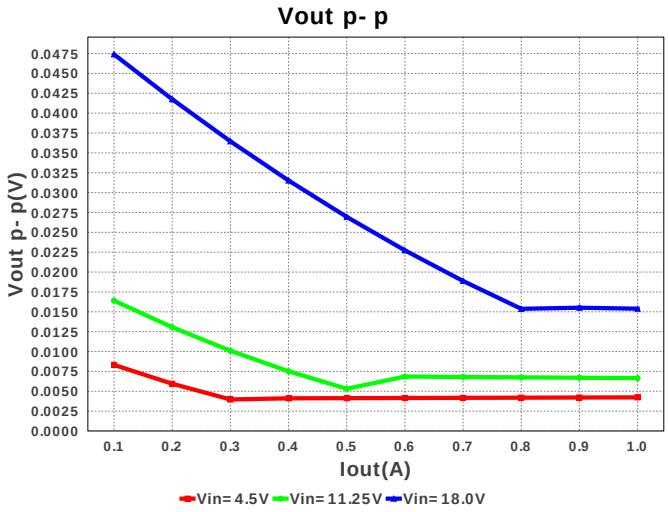
| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 1. | Cbst | TDK | C1005X5R1A104K<br>Series= 285 | Cap= 100.0 nF<br>ESR= 20.413 mOhm<br>VDC= 10.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0402 3mm2 |
| 2. | Cin | MuRata | GRM32ER61E226KE15L<br>Series= X5R | Cap= 22.0 µF<br>ESR= 2.0 mOhm<br>VDC= 25.0 V<br>IRMS= 3.67 A | 1 | $0.28 | 1210 15mm2 |
| 3. | Cout | MuRata | GRM21BR60J226ME39L<br>Series= X5R | Cap= 22.0 µF<br>ESR= 9.0 mOhm<br>VDC= 6.3 V<br>IRMS= 3.5 A | 2 | $0.03 | 0805 7mm2 |
| 4. | Creg | MuRata | GRM155R61A474KE15D<br>Series= X5R | Cap= 470.0 nF<br>VDC= 10.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0402 3mm2 |
| 5. | L1 | Bourns | SRN3015-1R5Y | L= 1.5 µH<br>DCR= 66.0 mOhm | 1 | $0.14 | SRN3015 16mm2 |
| 6. | Ren | Vishay-Dale | CRCW040210K0FKED<br>Series= CRCW..e3 | Res= 10.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3mm2 |
| 7. | Rfbb | Vishay-Dale | CRCW040249K9FKED<br>Series= CRCW..e3 | Res= 49.9 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3mm2 |
| 8. | Rfbt | Vishay-Dale | CRCW040233K2FKED<br>Series= CRCW..e3 | Res= 33.2 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3mm2 |
| 9. | Rpgood | Vishay-Dale | CRCW0402100KFKED<br>Series= CRCW..e3 | Res= 100.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3mm2 |

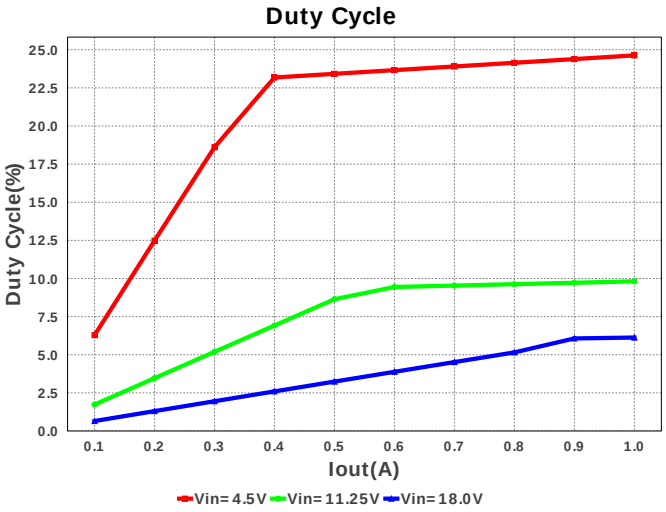
| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 10. | U1 | Texas Instruments | TPS56528DDAR | Switcher | 1 | $1.20 | |

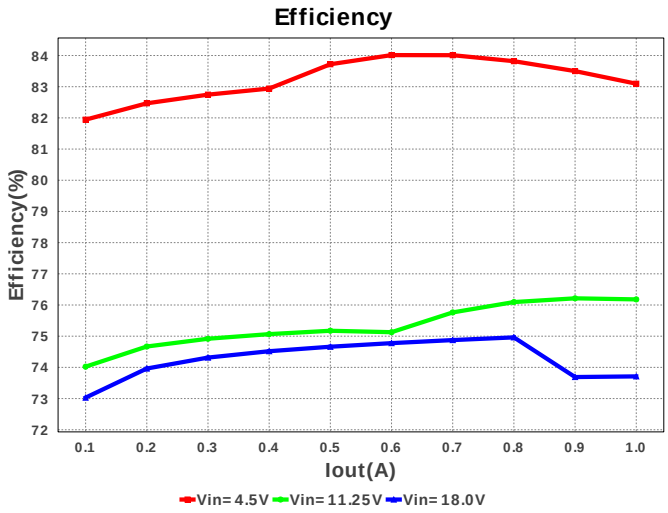
R-PDSO-G8 57mm2

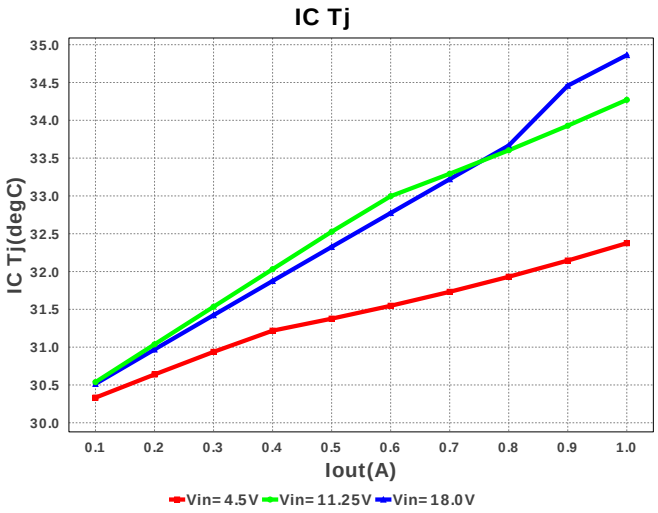


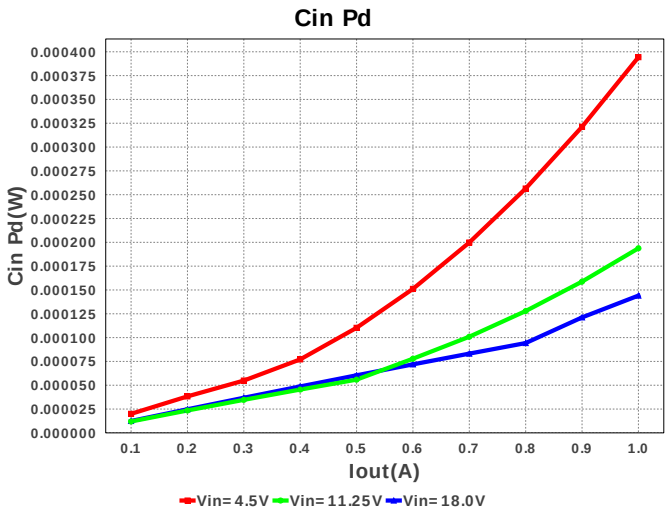



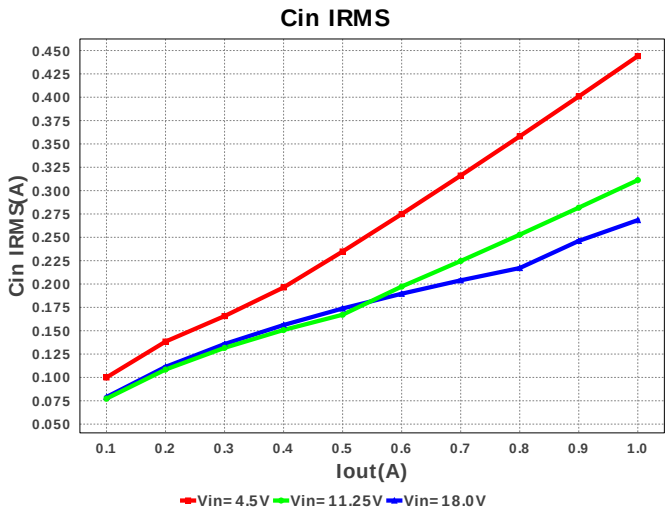



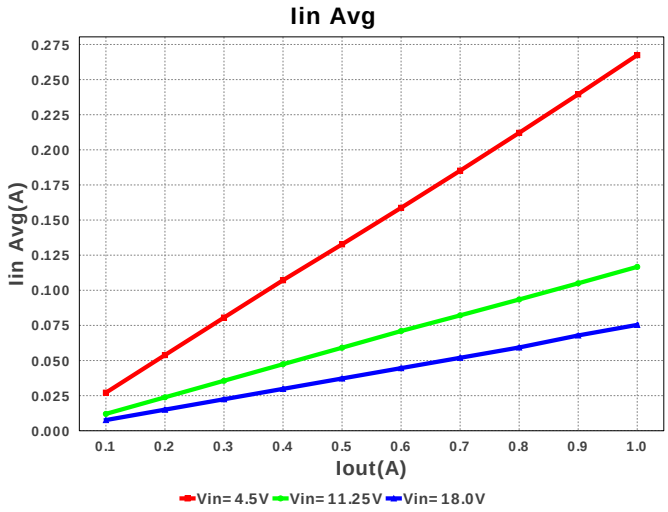



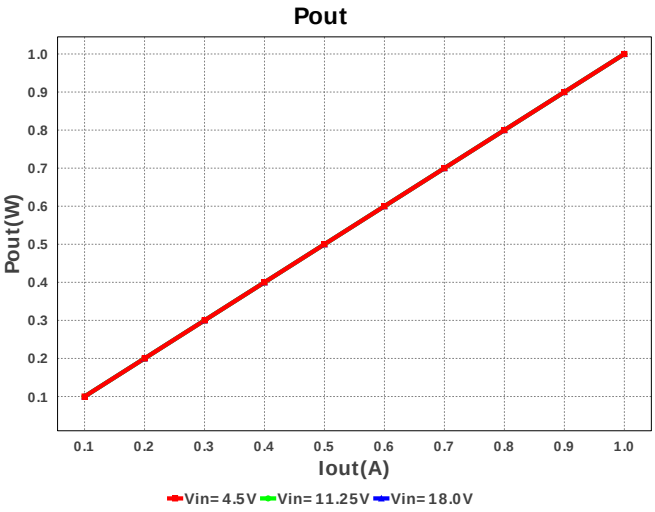



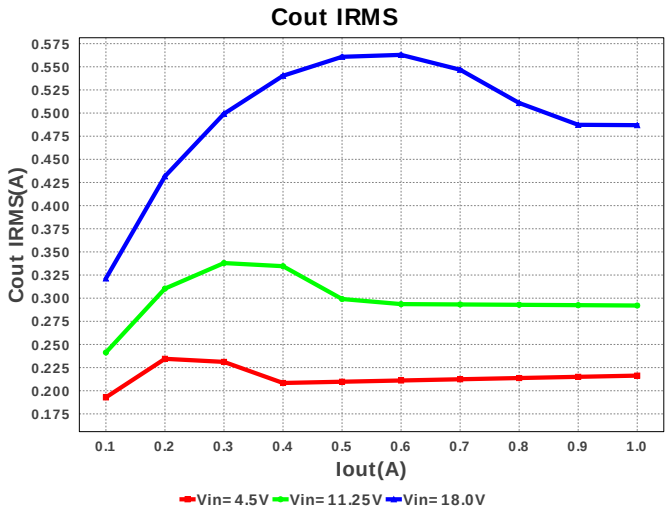



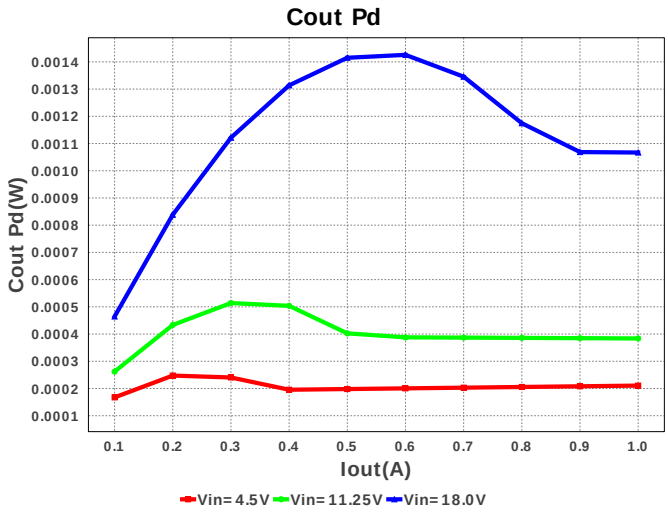


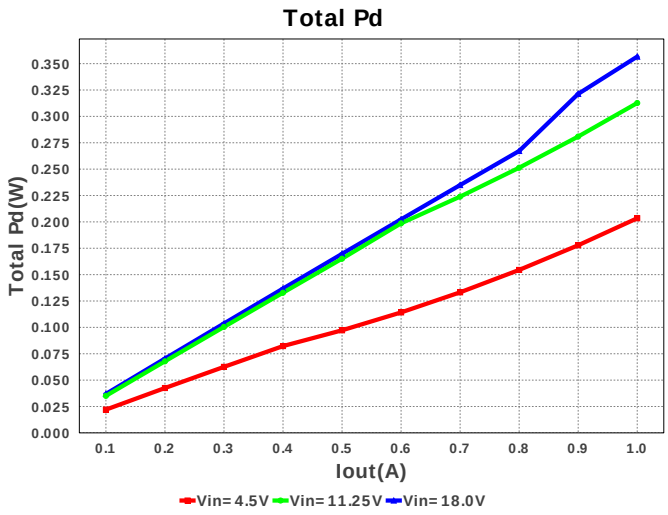



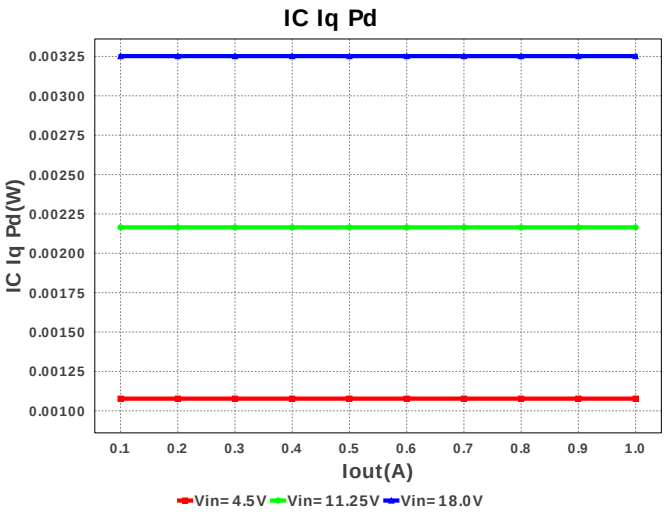



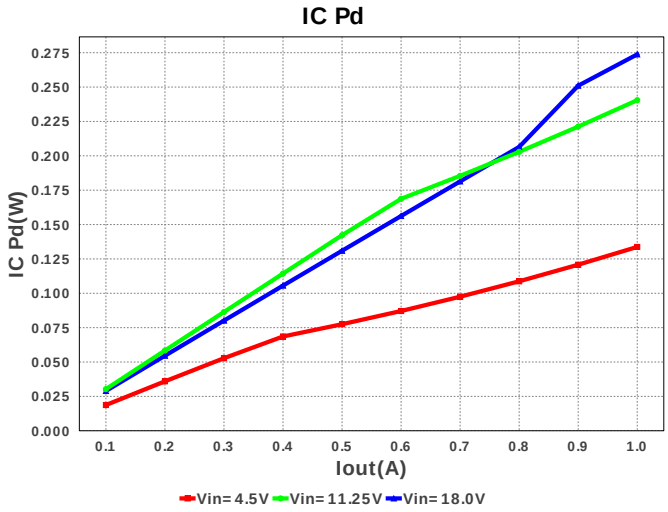



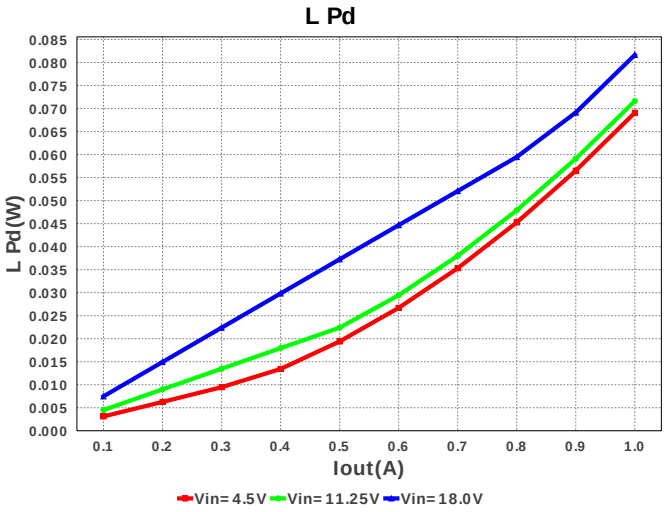



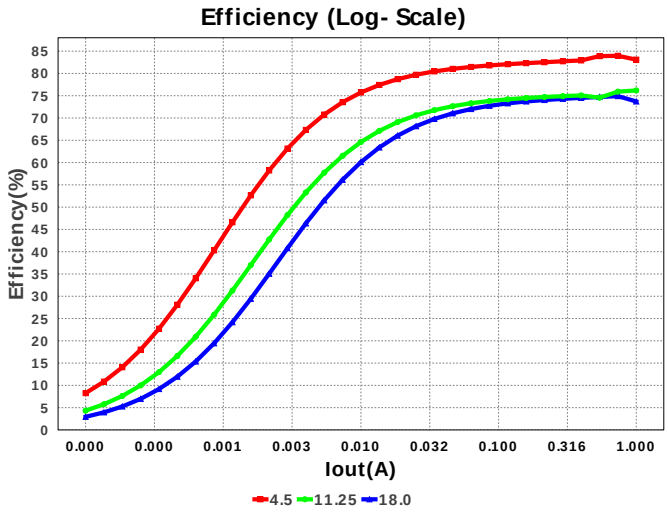






## Operating Values

| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 1. | Cin IRMS | 268.411 mA | Current | Input capacitor RMS ripple current |
| 2. | Cout IRMS | 486.923 mA | Current | Output capacitor RMS ripple current |
| 3. | Iin Avg | 75.369 mA | Current | Average input current |
| 4. | L Ipp | 1.687 A | Current | Peak-to-peak inductor ripple current |
| 5. | BOM Count | 11 | General | Total Design BOM count |
| 6. | FootPrint | 120.0 mm2 | General | Total Foot Print Area of BOM components |
| 7. | Frequency | 408.478 kHz | General | Switching frequency |
| 8. | Pout | 1.0 W | General | Total output power |
| 9. | Total BOM | $1.73 | General | Total BOM Cost |
| 10. | Vout OP | 1.0 V | Op_Point | Operational Output Voltage |
| 11. | Duty Cycle | 6.127 % | Op_point | Duty cycle |

| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 12. | Efficiency | 73.711 % | Op_point | Steady state efficiency |
| 13. | IC Tj | 34.862 degC | Op_point | IC junction temperature |
| 14. | ICThetaJA | 17.76 degC/W | Op_point | IC junction-to-ambient thermal resistance |
| 15. | IOUT_OP | 1.0 A | Op_point | Iout operating point |
| 16. | VIN_OP | 18.0 V | Op_point | Vin operating point |
| 17. | Vout p-p | 15.391 mV | Op_point | Peak-to-peak output ripple voltage |
| 18. | Cin Pd | 144.089 µW | Power | Input capacitor power dissipation |
| 19. | Cout Pd | 1.067 mW | Power | Output capacitor power dissipation |
| 20. | IC Iq Pd | 3.252 mW | Power | IC Iq Pd |
| 21. | IC Pd | 273.778 mW | Power | IC power dissipation |
| 22. | L Pd | 81.648 mW | Power | Inductor power dissipation |
| 23. | Total Pd | 356.648 mW | Power | Total Power Dissipation |

## Design Inputs

| # | Name | Value | Description |
|---|---|---|---|
| 1. | Iout | 1.0 A | Maximum Output Current |
| 2. | Iout1 | 1.0 Amps | Output Current #1 |
| 3. | VinMax | 18.0 V | Maximum input voltage |
| 4. | VinMin | 4.5 V | Minimum input voltage |
| 5. | Vout | 1.0 V | Output Voltage |
| 6. | Vout1 | 1.0 Volt | Output Voltage #1 |
| 7. | base_pn | TPS56528 | Texas Instruments Base Part Number |
| 8. | source | DC | Input Source Type |
| 9. | ta | 30.0 degC | Ambient temperature |

## Design Assistance

1. TPS56528 Product Folder : http://www.ti.com/product/tps56528 : contains the data sheet and other resources.