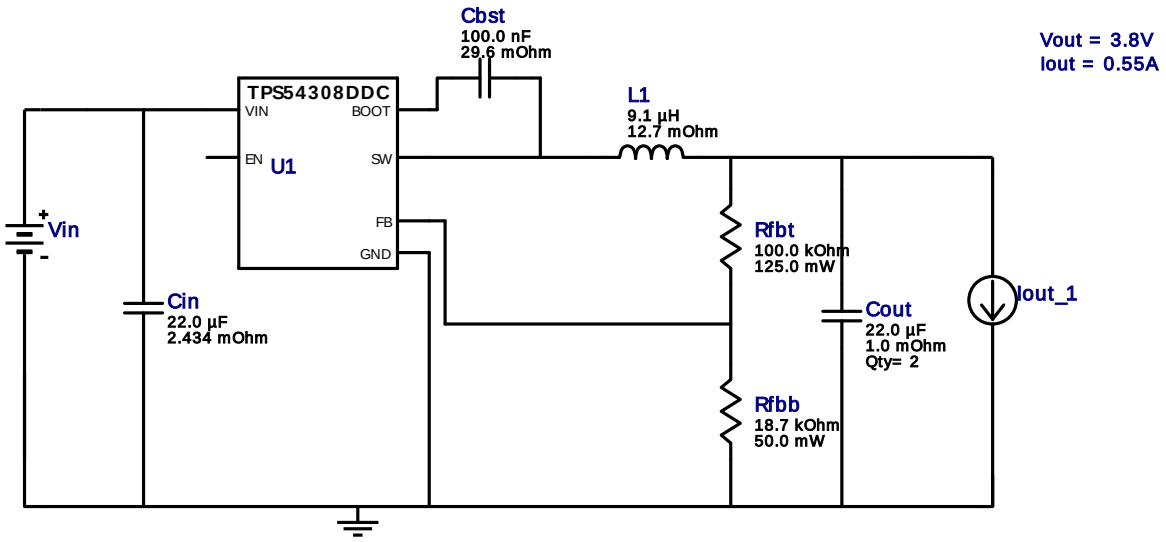
# WEBENCH® Design Report

VinMin = 9.0V
VinMax = 12.6V
Vout = 3.8V
Iout = 0.55A

Device = TPS54308DDCR
Topology = Buck
Created = 2018-06-16 06:28:30.500
BOM Cost = $3.86
BOM Count = 8
Total Pd = 0.09W

Design : TPS54308DDCR
TPS54308DDCR 9.0V-12.6V to 3.80V @ 0.55A



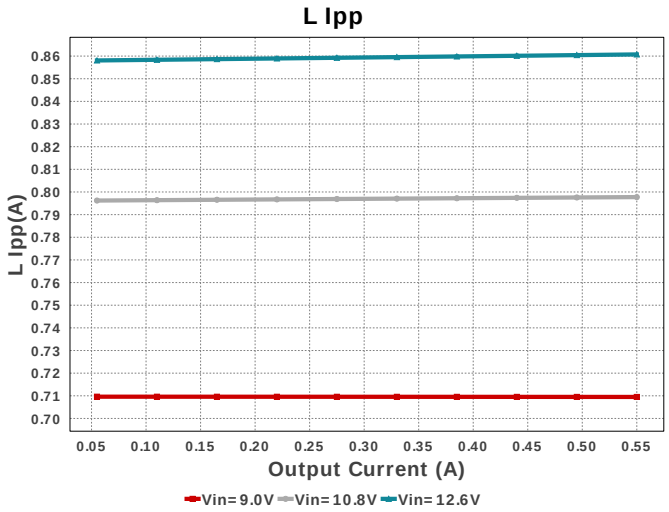

## My Comments

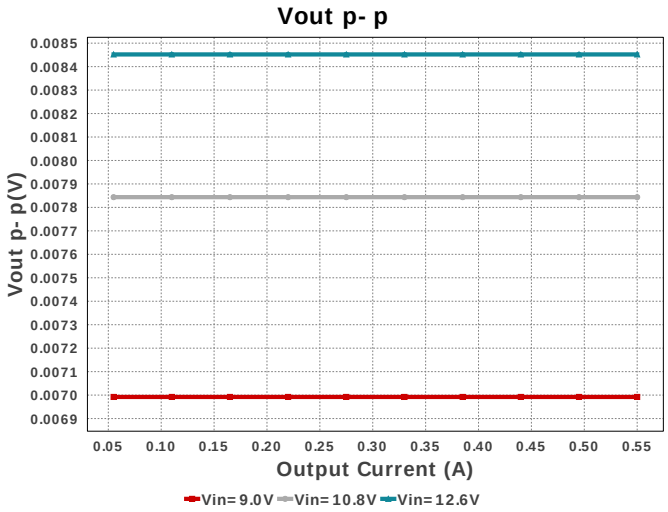
No comments

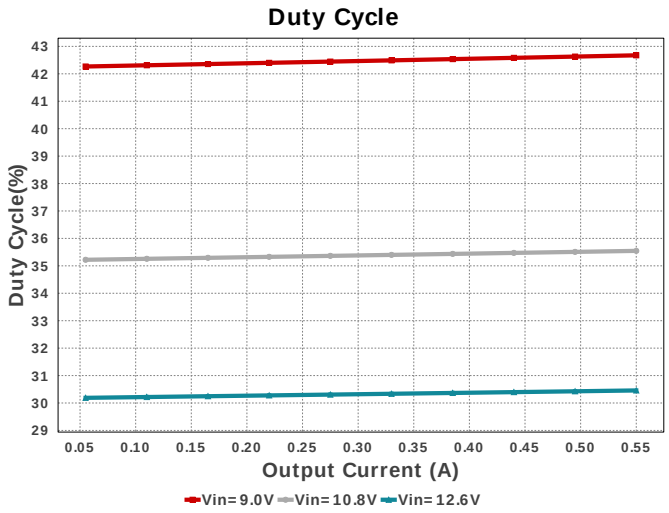
## Electrical BOM

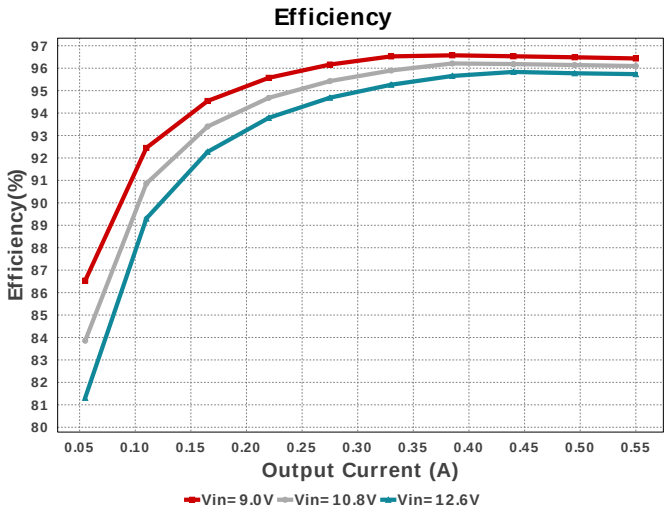
| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 1. | Cbst | TDK | CGA3E2X7R1H104K080AA<br>Series= X7R | Cap= 100.0 nF<br>ESR= 29.6 mOhm<br>VDC= 50.0 V<br>IRMS= 971.99 mA | 1 | $0.02 | 0603 5 mm² |
| 2. | Cin | TDK | C4532X7R1E226M250KC<br>Series= X7R | Cap= 22.0 uF<br>ESR= 2.434 mOhm<br>VDC= 25.0 V<br>IRMS= 4.9165 A | 1 | $0.47 | 1812_280 23 mm² |
| 3. | Cout | AVX | 12103D226MAT2A<br>Series= X5R | Cap= 22.0 uF<br>ESR= 1.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 2 | $0.26 | 1210 15 mm² |
| 4. | L1 | Wurth Elektronik | 7447798910 | L= 9.1 µH<br>DCR= 12.7 mOhm | 1 | $2.23 | WE-PDF-1045 149 mm² |
| 5. | Rfbb | Yageo | RC0201FR-0718K7L<br>Series= ? | Res= 18.7 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0201 2 mm² |
| 6. | Rfbt | Panasonic | ERJ-6ENF1003V<br>Series= ERJ-6E | Res= 100.0 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0805 7 mm² |

| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|---|
| 7. | U1 | Texas Instruments | TPS54308DDCR | Switcher | 1 | $0.60 | DDC0006A_N 10 mm$^2$ |

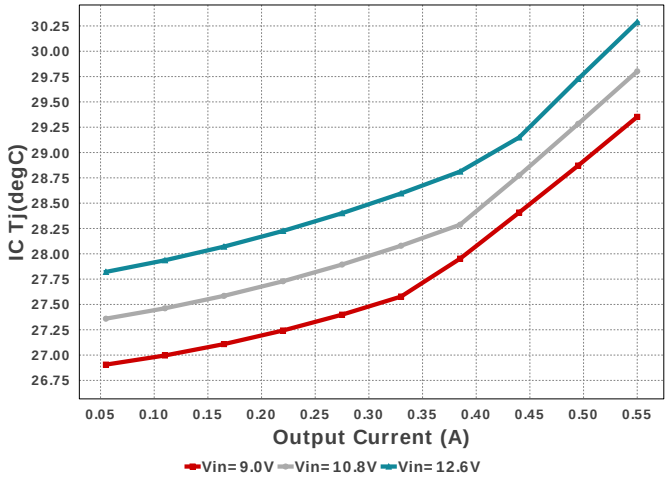


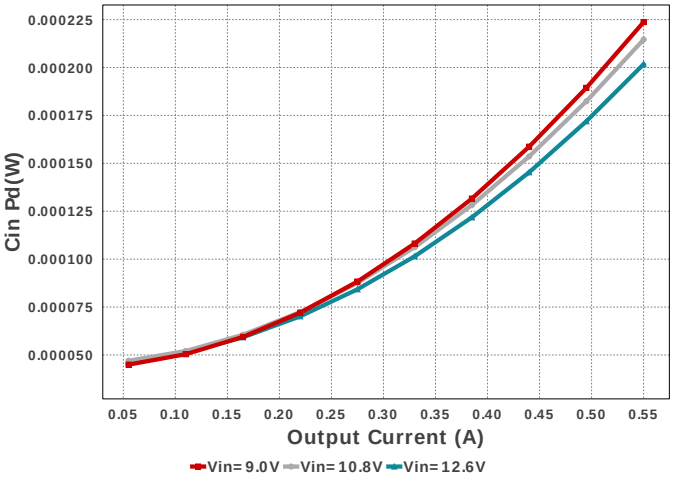



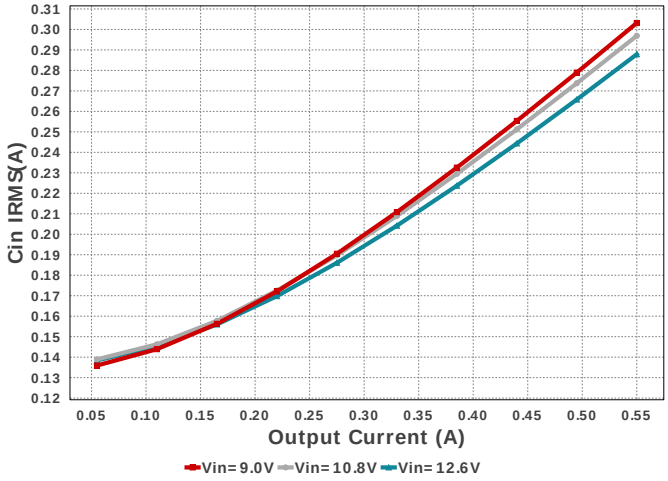
## IC Tj



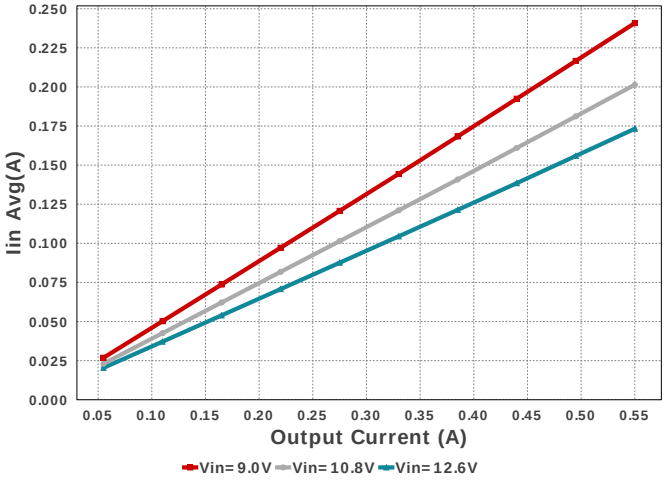

## Cin Pd



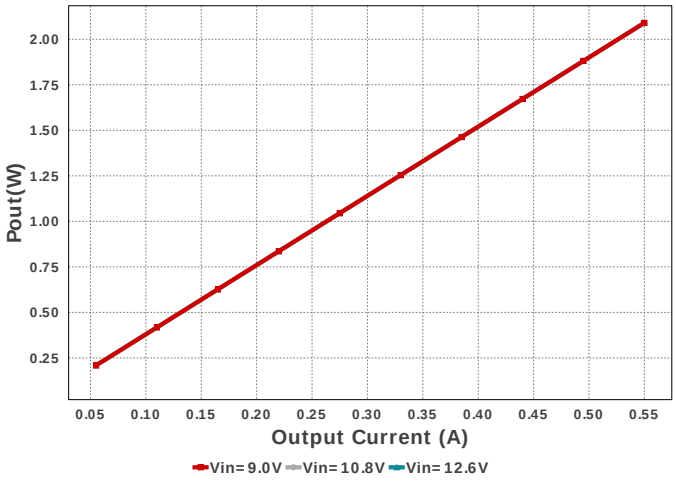

## Cin IRMS



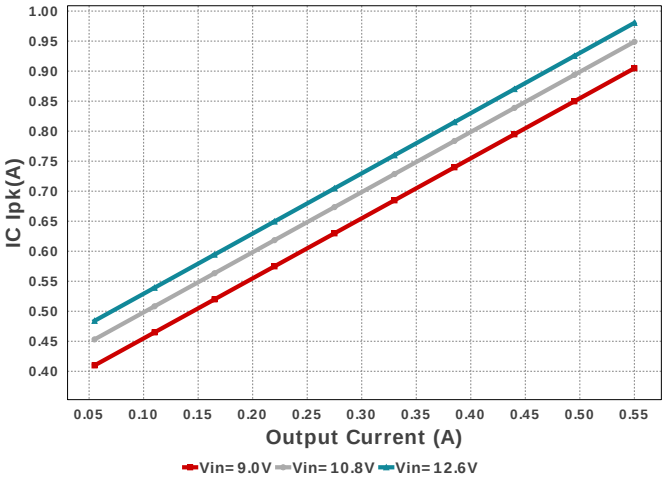

## Iin Avg

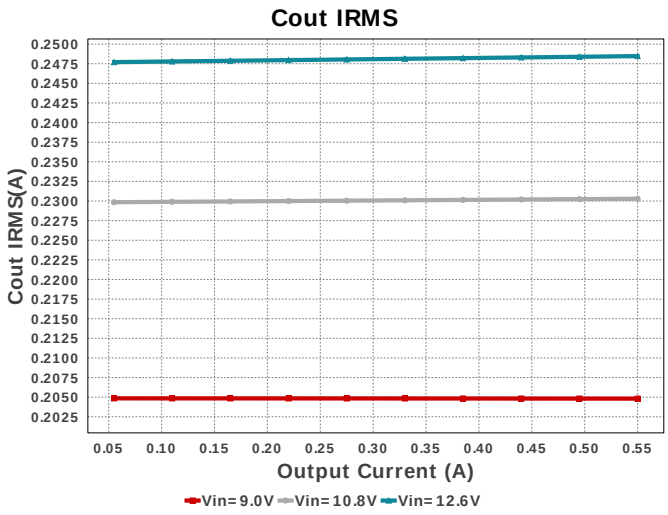


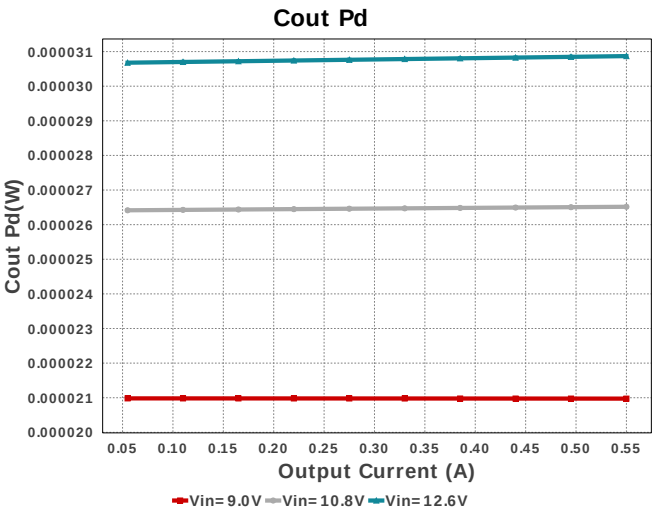

## Pout

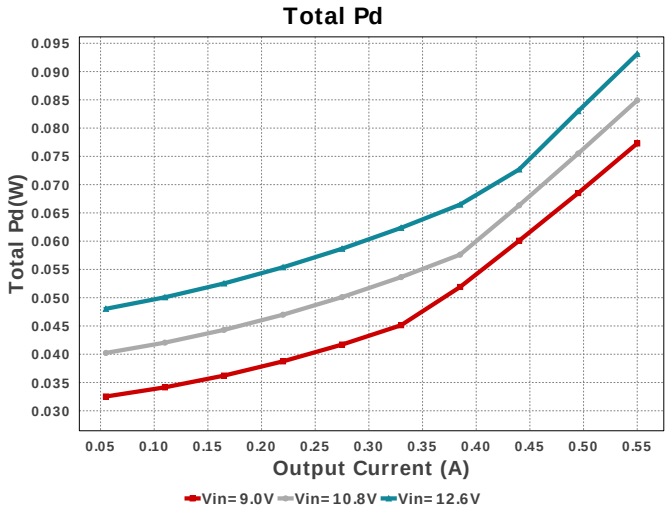


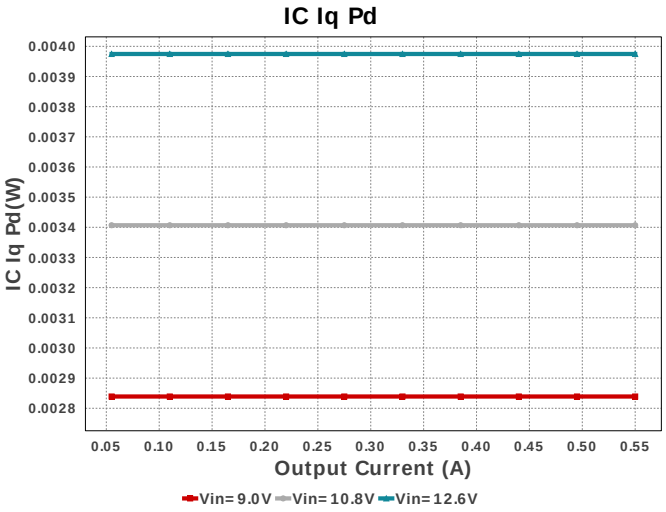

## IC Ipk

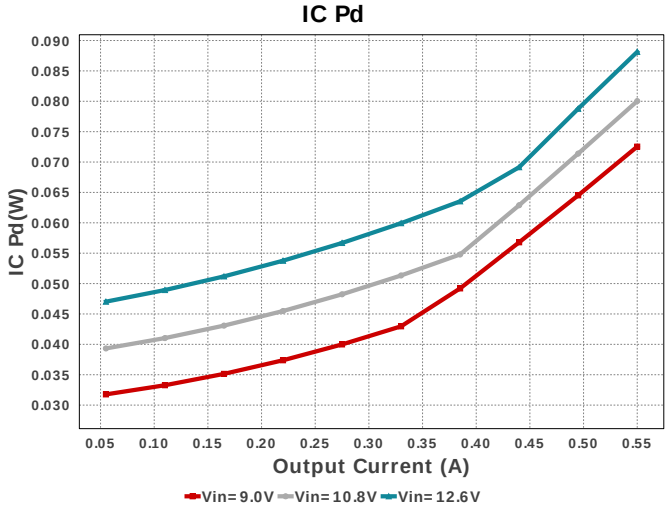


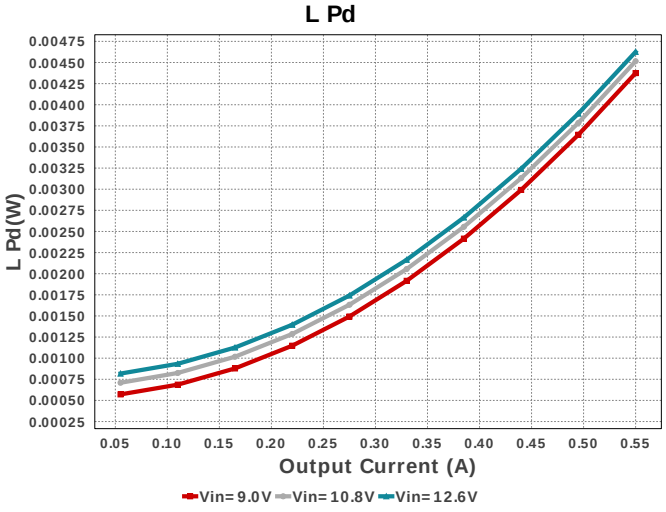



## Operating Values

| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 1. | Cin IRMS | 287.882 mA | Current | Input capacitor RMS ripple current |
| 2. | Cout IRMS | 248.472 mA | Current | Output capacitor RMS ripple current |
| 3. | IC Ipk | 980.367 mA | Current | Peak switch current in IC |
| 4. | Iin Avg | 173.26 mA | Current | Average input current |
| 5. | L Ipp | 860.73 mA | Current | Peak-to-peak inductor ripple current |
| 6. | BOM Count | 8 | General | Total Design BOM count |
| 7. | FootPrint | 225.0 $mm^2$ | General | Total Foot Print Area of BOM components |
| 8. | Frequency | 340.0 kHz | General | Switching frequency |
| 9. | Mode | CCM | General | PWM/PFM Mode |
| 10. | Pout | 2.09 W | General | Total output power |
| 11. | Total BOM | $3.86 | General | Total BOM Cost |

| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 12. | Duty Cycle | 30.458 % | Op Point | Duty cycle |
| 13. | Efficiency | 95.735 % | Op Point | Steady state efficiency |
| 14. | IC Tj | 30.288 degC | Op Point | IC junction temperature |
| 15. | ICThetaJA Effective | 60.0 degC/W | Op Point | Effective IC Junction-to-Ambient Thermal Resistance |
| 16. | IOUT_OP | 550.0 mA | Op Point | Iout operating point |
| 17. | VIN_OP | 12.6 V | Op Point | Vin operating point |
| 18. | Vout Actual | 3.783 V | Op Point | Vout Actual calculated based on selected voltage divider resistors |
| 19. | Vout Tolerance | 1.702 % | Op Point | Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable |
| 20. | Vout p-p | 8.452 mV | Op Point | Peak-to-peak output ripple voltage |
| 21. | Cin Pd | 201.721 µW | Power | Input capacitor power dissipation |
| 22. | Cout Pd | 30.869 µW | Power | Output capacitor power dissipation |
| 23. | IC Iq Pd | 3.975 mW | Power | IC Iq Pd |
| 24. | IC Pd | 88.131 mW | Power | IC power dissipation |
| 25. | L Pd | 4.626 mW | Power | Inductor power dissipation |
| 26. | Total Pd | 93.108 mW | Power | Total Power Dissipation |

## Design Inputs

| # | Name | Value | Description |
|---|---|---|---|
| 1. | Iout | 550.0 m | Maximum Output Current |
| 2. | VinMax | 12.6 | Maximum input voltage |
| 3. | VinMin | 9.0 | Minimum input voltage |
| 4. | Vout | 3.8 | Output Voltage |
| 5. | base_pn | TPS54308 | Base Product Number |
| 6. | source | DC | Input Source Type |
| 7. | Ta | 25.0 | Ambient temperature |

## Design Assistance

1. **TPS54308** Product Folder : http://www.ti.com/product/TPS54308 : contains the data sheet and other resources.