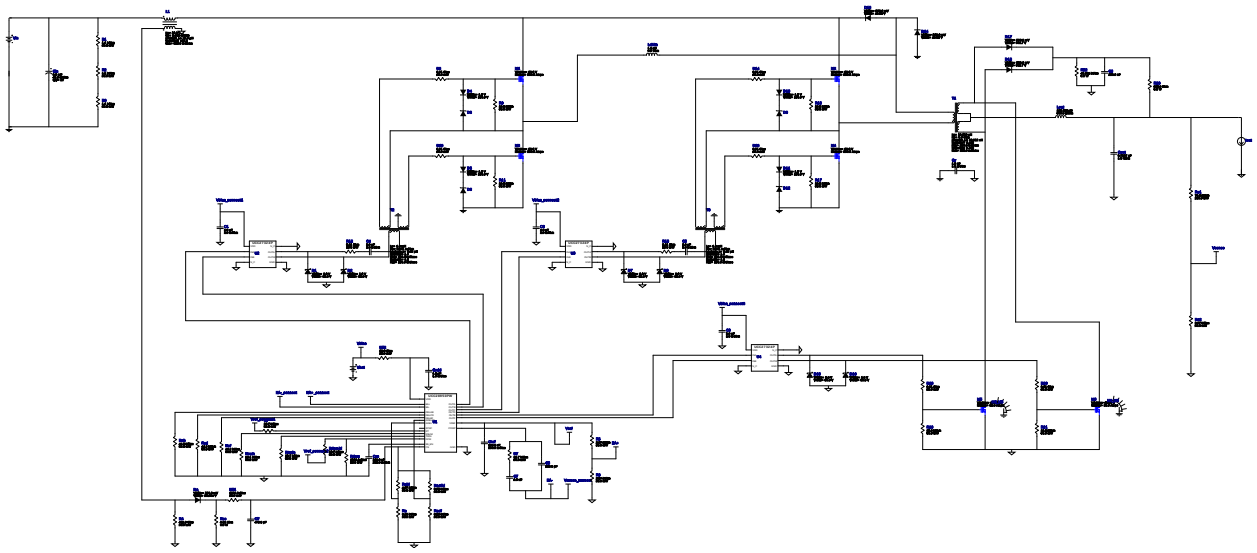
# WEBENCH® Design Report

VinMin = 19.0V
VinMax = 29.0V
Vout = 80.0V
Iout = 5.0A

Device = UCC28950PWR
Topology = Phase Shifted Full Bridge
Created = 2025-07-28 05:40:50.200
BOM Cost = NA
BOM Count = 118
Total Pd = 27.31W

Design : 108 UCC28950PWR
UCC28950PWR 19V-29V to 80.00V @ 5A



## Electrical BOM

| Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|
| C1 | Taiyo Yuden | TMK212BJ105KG-T<br>Series= X5R | Cap= 1.0 uF<br>ESR= 1.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 1 | $0.03 | 0805 7 mm$^2$ |
| C2 | Taiyo Yuden | TMK212BJ105KG-T<br>Series= X5R | Cap= 1.0 uF<br>ESR= 1.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 1 | $0.03 | 0805 7 mm$^2$ |
| C3 | Taiyo Yuden | TMK212BJ105KG-T<br>Series= X5R | Cap= 1.0 uF<br>ESR= 1.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 1 | $0.03 | 0805 7 mm$^2$ |
| C4 | Taiyo Yuden | TMK212BJ105KG-T<br>Series= X5R | Cap= 1.0 uF<br>ESR= 1.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 1 | $0.03 | 0805 7 mm$^2$ |
| C5 | Taiyo Yuden | TMK212BJ105KG-T<br>Series= X5R | Cap= 1.0 uF<br>ESR= 1.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 1 | $0.03 | 0805 7 mm$^2$ |
| C6 | CUSTOM | CUSTOM<br>Series= ? | Cap= 220.0 nF<br>VDC= 901.7 V<br>IRMS= 0.0 A | 1 | NA | CUSTOM 0 mm$^2$ |
| C7 | TDK | C2012C0G1H682J060AA<br>Series= C0G/NP0 | Cap= 6.8 nF<br>VDC= 50.0 V<br>IRMS= 0.0 A | 1 | $0.04 | 0805 7 mm$^2$ |
| C8 | Samsung Electro-Mechanics | CL05C681JB5NNNC<br>Series= C0G/NP0 | Cap= 680.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A | 1 | $0.01 | 0402 3 mm$^2$ |

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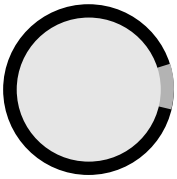
| Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|
| Cin | Chemi-Con | ELXZ350ELL332ML40S<br>Series= LXZ | Cap= 3.3 mF<br>ESR= 48.2 mOhm<br>VDC= 35.0 V<br>IRMS= 3.71 A | 27 | $1.36 |  <br>Chemi-Con_1600x3000 324 mm$^2$ |
| Clf | Samsung Electro-Mechanics | CL21C471JBANNNC<br>Series= C0G/NP0 | Cap= 470.0 pF<br>VDC= 50.0 V<br>IRMS= 0.0 A | 1 | $0.01 | <br>0805 7 mm$^2$ |
| Cout | CUSTOM | CUSTOM<br>Series= ? | Cap= 9.7537 uF<br>ESR= 1.0 fOhm<br>VDC= 200.0 V<br>IRMS= 787.3 mA | 1 | NA | CUSTOM 0 mm$^2$ |
| Cref | 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 | $0.01 | <br>0805 7 mm$^2$ |
| Css | 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 | $0.01 | <br>0805 7 mm$^2$ |
| Cvdd | Taiyo Yuden | TMK212BJ105KG-T<br>Series= X5R | Cap= 1.0 uF<br>ESR= 1.0 mOhm<br>VDC= 25.0 V<br>IRMS= 0.0 A | 1 | $0.03 | <br>0805 7 mm$^2$ |
| Cy | CUSTOM | CUSTOM<br>Series= ? | Cap= 1.0 nF<br>ESR= 1.0 mOhm<br>VDC= 43.5 V<br>IRMS= 500.0 uA | 1 | NA | CUSTOM 0 mm$^2$ |
| D1 | SMC Diode Solutions | BAT54WSTR | VF@Io= 1.0 V<br>VRRM= 30.0 V | 1 | $0.02 |  <br>SOD-323 9 mm$^2$ |
| D10 | ON Semiconductor | MMSD4148T1G | VF@Io= 1.0 V<br>VRRM= 100.0 V | 1 | $0.03 |  <br>SOD-123 13 mm$^2$ |
| D11 | ON Semiconductor | MMSD4148T1G | VF@Io= 1.0 V<br>VRRM= 100.0 V | 1 | $0.03 |  <br>SOD-123 13 mm$^2$ |
| D12 | Diodes Inc. | MMSZ5242B-7-F | Zener | 1 | $0.04 |  <br>SOD-123 13 mm$^2$ |
| D13 | CUSTOM | CUSTOM | VF@Io= 500.0 mV<br>VRRM= 42.05 V | 1 | NA | CUSTOM 0 mm$^2$ |
| D14 | CUSTOM | CUSTOM | VF@Io= 500.0 mV<br>VRRM= 42.05 V | 1 | NA | CUSTOM 0 mm$^2$ |
| D15 | SMC Diode Solutions | BAT54WSTR | VF@Io= 1.0 V<br>VRRM= 30.0 V | 1 | $0.02 |  <br>SOD-323 9 mm$^2$ |
| D16 | SMC Diode Solutions | BAT54WSTR | VF@Io= 1.0 V<br>VRRM= 30.0 V | 1 | $0.02 |  <br>SOD-323 9 mm$^2$ |
| D17 | CUSTOM | CUSTOM | VF@Io= 500.0 mV<br>VRRM= 901.7 V | 1 | NA | CUSTOM 0 mm$^2$ |
| D18 | CUSTOM | CUSTOM | VF@Io= 500.0 mV<br>VRRM= 901.7 V | 1 | NA | CUSTOM 0 mm$^2$ |
| D2 | SMC Diode Solutions | BAT54WSTR | VF@Io= 1.0 V<br>VRRM= 30.0 V | 1 | $0.02 |  <br>SOD-323 9 mm$^2$ |
| D3 | Diodes Inc. | MMSZ5242B-7-F | Zener | 1 | $0.04 |  <br>SOD-123 13 mm$^2$ |
| D4 | ON Semiconductor | MMSD4148T1G | VF@Io= 1.0 V<br>VRRM= 100.0 V | 1 | $0.03 |  <br>SOD-123 13 mm$^2$ |
| D5 | ON Semiconductor | MMSD4148T1G | VF@Io= 1.0 V<br>VRRM= 100.0 V | 1 | $0.03 |  <br>SOD-123 13 mm$^2$ |

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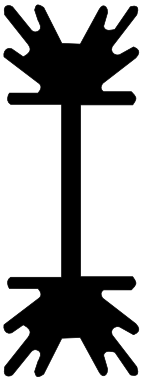
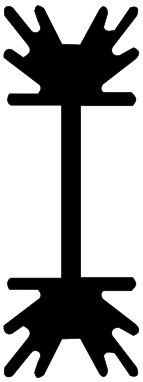
| Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|
| D6 | Diodes Inc. | MMSZ5242B-7-F | Zener | 1 | $0.04 |  SOD-123 13 mm$^2$ |
| D7 | SMC Diode Solutions | BAT54WSTR | VF@Io= 1.0 V<br>VRRM= 30.0 V | 1 | $0.02 |  SOD-323 9 mm$^2$ |
| D8 | SMC Diode Solutions | BAT54WSTR | VF@Io= 1.0 V<br>VRRM= 30.0 V | 1 | $0.02 |  SOD-323 9 mm$^2$ |
| D9 | Diodes Inc. | MMSZ5242B-7-F | Zener | 1 | $0.04 |  SOD-123 13 mm$^2$ |
| Da | CUSTOM | CUSTOM | VF@Io= 500.0 mV<br>VRRM= 63.604 V | 1 | NA | CUSTOM 0 mm$^2$ |
| HS_M5 | Aavid | 531202B02500G | Heatsink | 1 | $0.93 |  531202 545 mm$^2$ |
| HS_M6 | Aavid | 531202B02500G | Heatsink | 1 | $0.93 |  531202 545 mm$^2$ |
| L1 | CUSTOM | CUSTOM | Lp= 20.0 mH<br>Rp= 3.631 mOhm<br>Leakage_L= 20.0 µH<br>Ns1toNp= 100.0<br>Rs1= 320.0 mOhms | 1 | NA | CUSTOM 0 mm$^2$ |
| Lout | CUSTOM | CUSTOM | L= 126.108 µH<br>500.0 µOhm | 1 | NA | CUSTOM 0 mm$^2$ |
| Lshim | CUSTOM | CUSTOM | L= 1.1 µH<br>0.0 Ohm | 1 | NA | CUSTOM 0 mm$^2$ |
| M1 | Texas Instruments | CSD18536KCS | VdsMax= 60.0 V<br>IdsMax= 200.0 Amps | 1 | $1.56 | KCS0003B 80 mm$^2$ |
| M2 | Texas Instruments | CSD18536KCS | VdsMax= 60.0 V<br>IdsMax= 200.0 Amps | 1 | $1.56 | KCS0003B 80 mm$^2$ |
| M3 | Texas Instruments | CSD18536KCS | VdsMax= 60.0 V<br>IdsMax= 200.0 Amps | 1 | $1.56 | KCS0003B 80 mm$^2$ |
| M4 | Texas Instruments | CSD18536KCS | VdsMax= 60.0 V<br>IdsMax= 200.0 Amps | 1 | $1.56 | KCS0003B 80 mm$^2$ |

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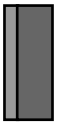
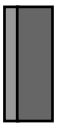
| Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|
| M5 | Infineon Technologies | IPP65R190C7 | VdsMax= 650.0 V<br>IdsMax= 13.0 Amps | 1 | $2.19 |  <br>TO-220AB 79 mm$^2$ |
| M6 | Infineon Technologies | IPP65R190C7 | VdsMax= 650.0 V<br>IdsMax= 13.0 Amps | 1 | $2.19 |  <br>TO-220AB 79 mm$^2$ |
| R1 | Vishay-Dale | CRCW04021K10FKED<br>Series= CRCW..e3 | Res= 1.1 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R10 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R11 | Yageo | RC0201FR-0710KL<br>Series= ? | Res= 10.0 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0201 2 mm$^2$ |
| R12 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R13 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R14 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R15 | Yageo | RC0201FR-0710KL<br>Series= ? | Res= 10.0 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0201 2 mm$^2$ |
| R16 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R17 | Yageo | RC0201FR-0710KL<br>Series= ? | Res= 10.0 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0201 2 mm$^2$ |
| R18 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R19 | Yageo | RC0201FR-0710KL<br>Series= ? | Res= 10.0 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0201 2 mm$^2$ |
| R2 | Vishay-Dale | CRCW04021K10FKED<br>Series= CRCW..e3 | Res= 1.1 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R20 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |
| R21 | Yageo | RC0201FR-0710KL<br>Series= ? | Res= 10.0 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0201 2 mm$^2$ |
| R22 | CUSTOM | CUSTOM<br>Series= ? | Res= 45.382 kOhm<br>Power= 0.0 W<br>Tolerance= 0.0% | 1 | NA | CUSTOM 0 mm$^2$ |
| R23 | CUSTOM | CUSTOM<br>Series= ? | Res= 800.0 Ohm<br>Power= 0.0 W<br>Tolerance= 0.0% | 1 | NA | CUSTOM 0 mm$^2$ |
| R3 | Vishay-Dale | CRCW04021K10FKED<br>Series= CRCW..e3 | Res= 1.1 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0402 3 mm$^2$ |

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| Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|
| R4 | Vishay-Dale | CRCW0402432RFKED<br>Series= CRCW..e3 | Res= 432.0 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| R5 | Vishay-Dale | CRCW04022K37FKED<br>Series= CRCW..e3 | Res= 2.37 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| R6 | Vishay-Dale | CRCW04022K37FKED<br>Series= CRCW..e3 | Res= 2.37 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| R7 | Vishay-Dale | CRCW040212K7FKED<br>Series= CRCW..e3 | Res= 12.7 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| R8 | Vishay-Dale | CRCW04023R01FKED<br>Series= CRCW..e3 | Res= 3.01 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| R9 | Yageo | RC0201FR-0710KL<br>Series= ? | Res= 10.0 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0201 2 mm² |
| Ra | Vishay-Dale | CRCW04028K25FKED<br>Series= CRCW..e3 | Res= 8.25 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Rab | Vishay-Dale | CRCW020144K2FNED<br>Series= ? | Res= 44.2 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0201 2 mm² |
| Raef | Vishay-Dale | CRCW04028K25FKED<br>Series= CRCW..e3 | Res= 8.25 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Raefhi | Vishay-Dale | CRCW04028K25FKED<br>Series= CRCW..e3 | Res= 8.25 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Rahi | Vishay-Dale | CRCW04024K87FKED<br>Series= CRCW..e3 | Res= 4.87 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Rcd | Vishay-Dale | CRCW020144K2FNED<br>Series= ? | Res= 44.2 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0201 2 mm² |
| Rcs | CUSTOM | CUSTOM<br>Series= ? | Res= 4.36 Ohm<br>Power= 0.0 W<br>Tolerance= 0.0% | 1 | NA | CUSTOM 0 mm² |
| Rdcm | Vishay-Dale | CRCW04021K00FKED<br>Series= CRCW..e3 | Res= 1000.0 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Rdcmhi | Vishay-Dale | CRCW040213K7FKED<br>Series= CRCW..e3 | Res= 13.7 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Ref | Vishay-Dale | CRCW020144K2FNED<br>Series= ? | Res= 44.2 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0201 2 mm² |
| Rlf1 | Vishay-Dale | CRCW04021K00FKED<br>Series= CRCW..e3 | Res= 1000.0 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Rlf2 | Vishay-Dale | CRCW040222R6FKED<br>Series= CRCW..e3 | Res= 22.6 Ohm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Ro1 | Vishay-Dale | CRCW120673K2FKEA<br>Series= CRCW..e3 | Res= 73.2 kOhm<br>Power= 250.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 1206 11 mm² |
| Ro2 | Vishay-Dale | CRCW04022K37FKED<br>Series= CRCW..e3 | Res= 2.37 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0402 3 mm² |
| Rsum | Yageo | RC0201FR-7D68K1L<br>Series= ? | Res= 68.1 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | 0201 2 mm² |

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| Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|---|---|---|---|---|---|---|
| Rt | Yageo | RC0201FR-0728K7L<br>Series= ? | Res= 28.7 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0201 2 mm$^2$ |
| Rtmin | Yageo | RC0201FR-0718K7L<br>Series= ? | Res= 18.7 kOhm<br>Power= 50.0 mW<br>Tolerance= 1.0% | 1 | $0.01 | <br>0201 2 mm$^2$ |
| T1 | CUSTOM | CUSTOM | Lp= 12.208 µH<br>Rp= 0.0 Ohm<br>Leakage_L= 18.312 nH<br>Ns1toNp= 6.478<br>Rs1= 320.0 mOhms<br>Ns2toNp= 6.478<br>Rs2= 100.0 mOhms | 1 | NA | CUSTOM 0 mm$^2$ |
| T2 | CUSTOM | CUSTOM | Lp= 1.3 mH<br>Rp= 3.631 mOhm<br>Leakage_L= 1.95 µH<br>Ns1toNp= 1.0<br>Rs1= 320.0 mOhms<br>Ns2toNp= 1.0<br>Rs2= 100.0 mOhms | 1 | NA | CUSTOM 0 mm$^2$ |
| T3 | CUSTOM | CUSTOM | Lp= 1.3 mH<br>Rp= 3.631 mOhm<br>Leakage_L= 1.95 µH<br>Ns1toNp= 1.0<br>Rs1= 320.0 mOhms<br>Ns2toNp= 1.0<br>Rs2= 100.0 mOhms | 1 | NA | CUSTOM 0 mm$^2$ |
| U1 | Texas Instruments | UCC28950PWR | Switcher | 1 | $2.31 |  <br>0 mm$^2$ |
| U2 | Texas Instruments | UCC27324P | Switcher | 0 | $0.60 |  <br>D0008A_N 57 mm$^2$ |
| U3 | Texas Instruments | UCC27324P | Switcher | 0 | $0.60 |  <br>D0008A_N 57 mm$^2$ |
| U4 | Texas Instruments | UCC27324P | Switcher | 0 | $0.60 |  <br>D0008A_N 57 mm$^2$ |

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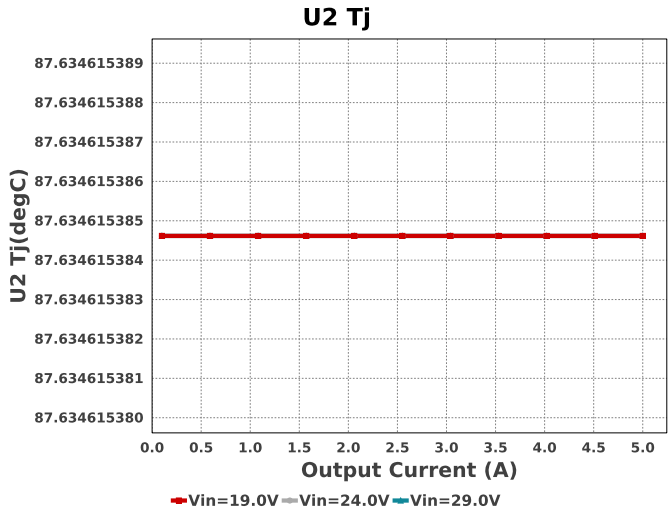


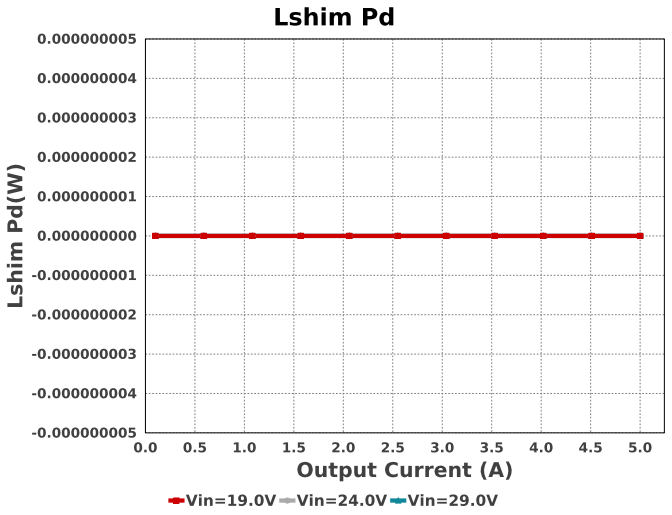


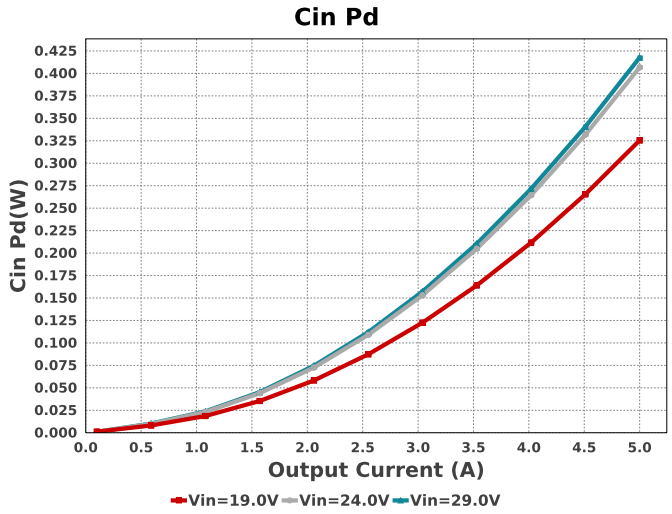


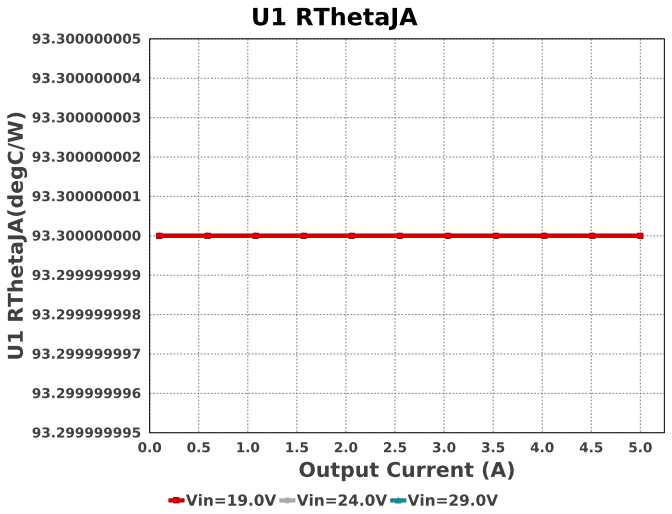


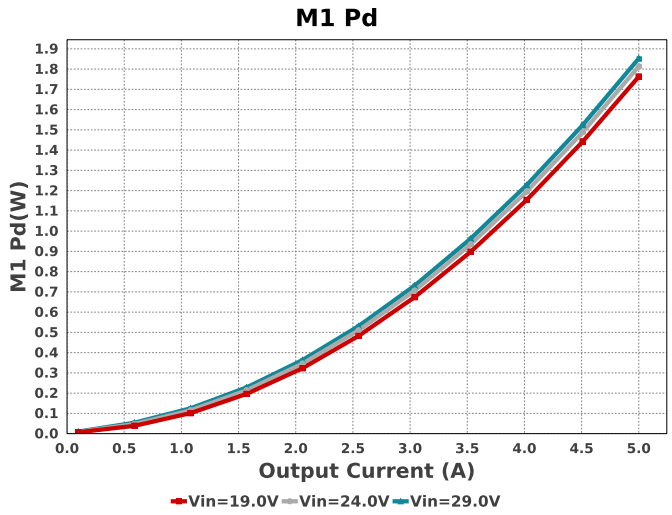


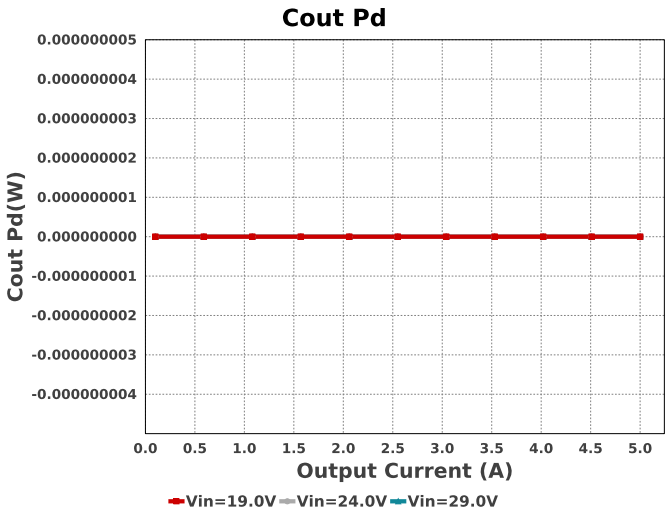


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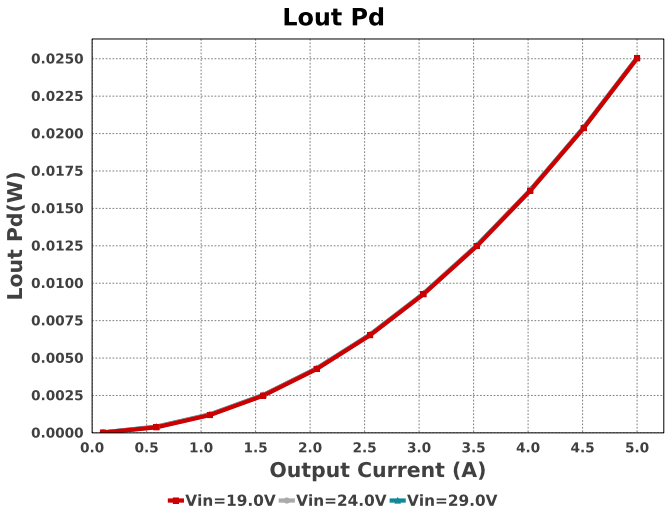


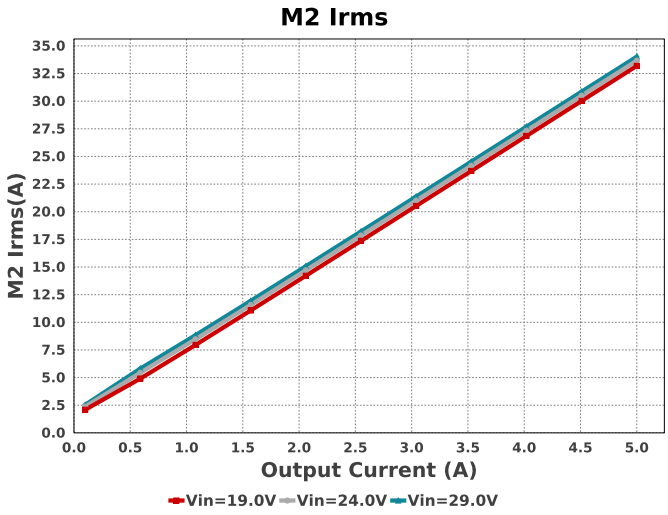


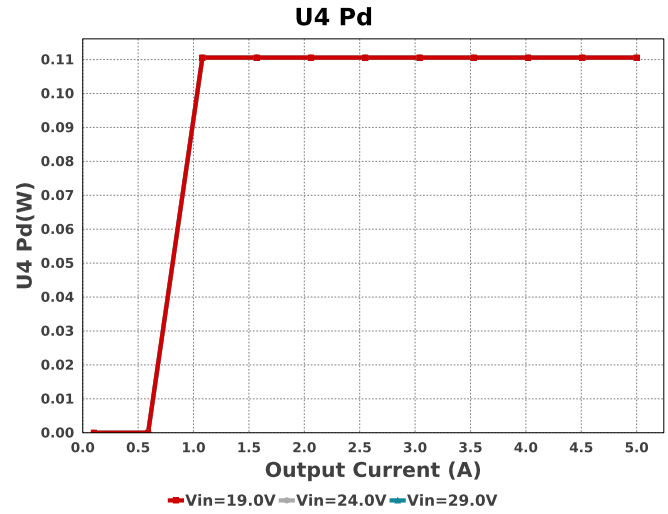


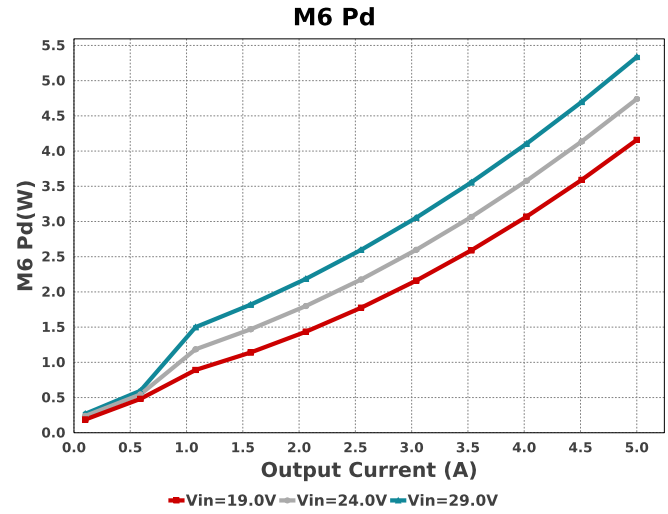


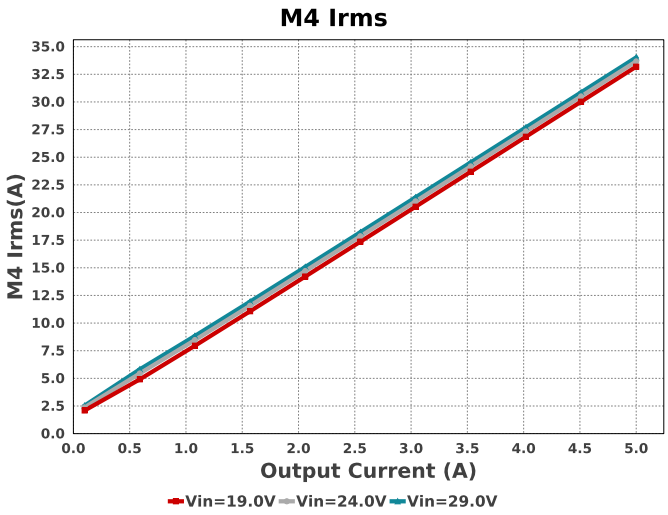


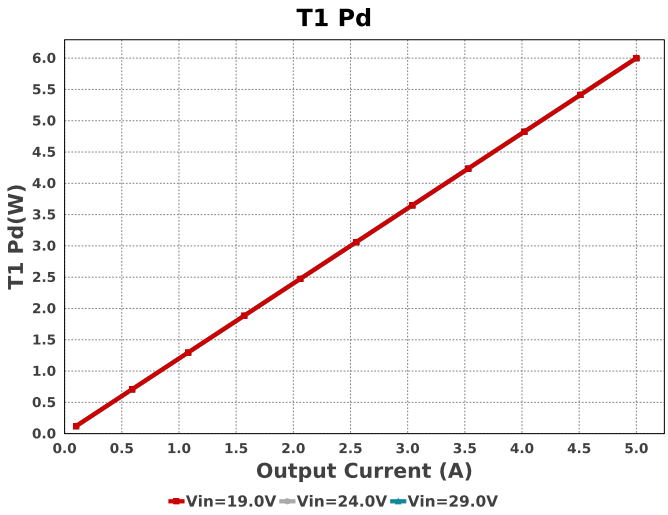


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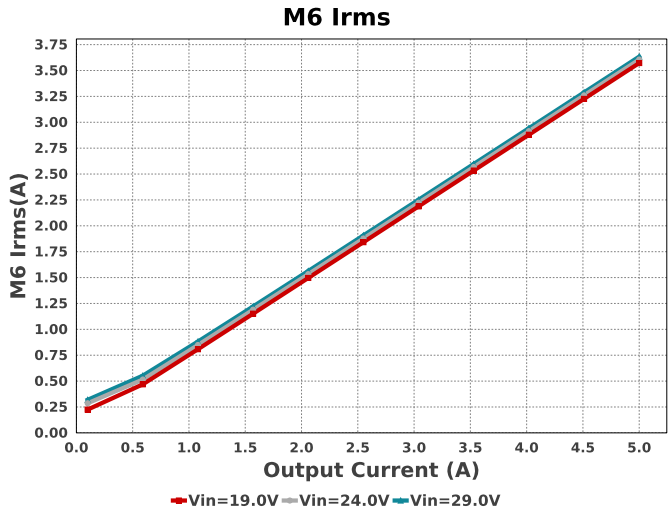


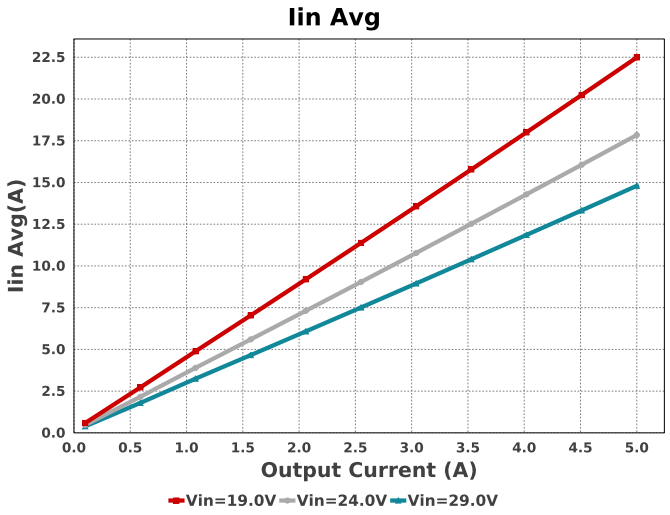


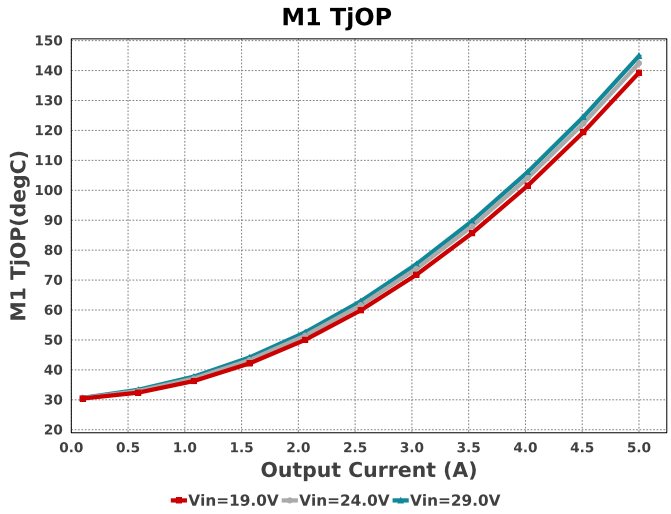


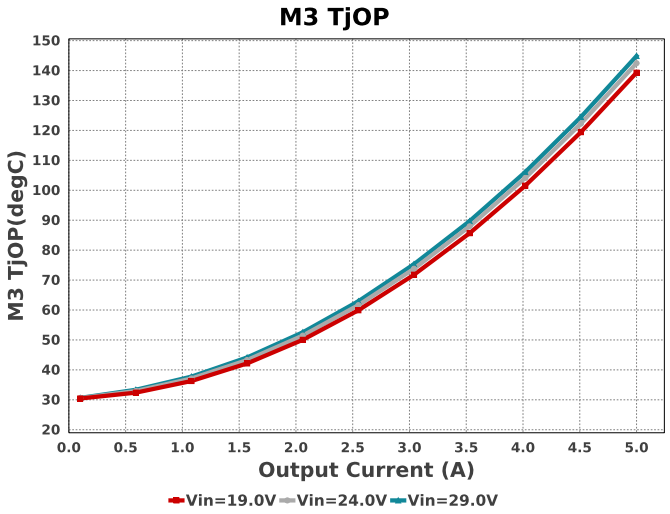


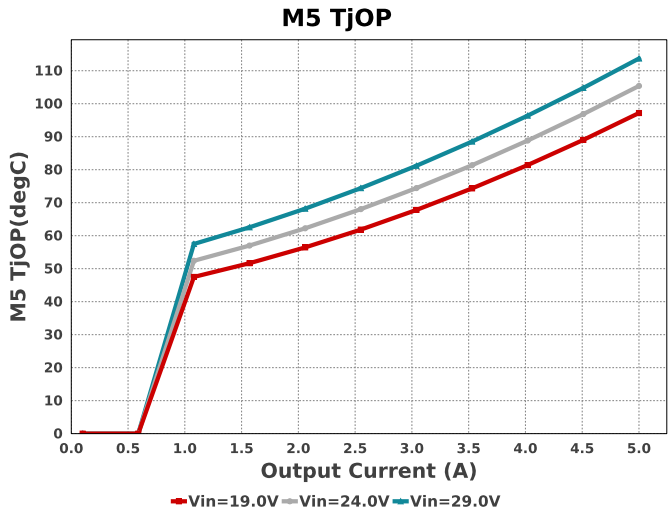


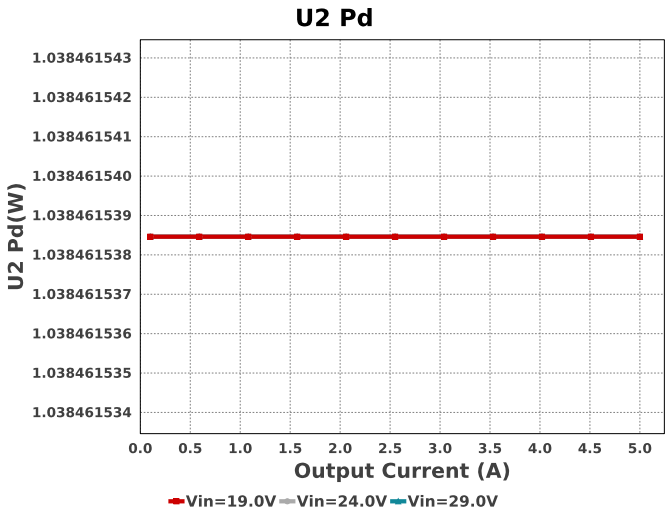


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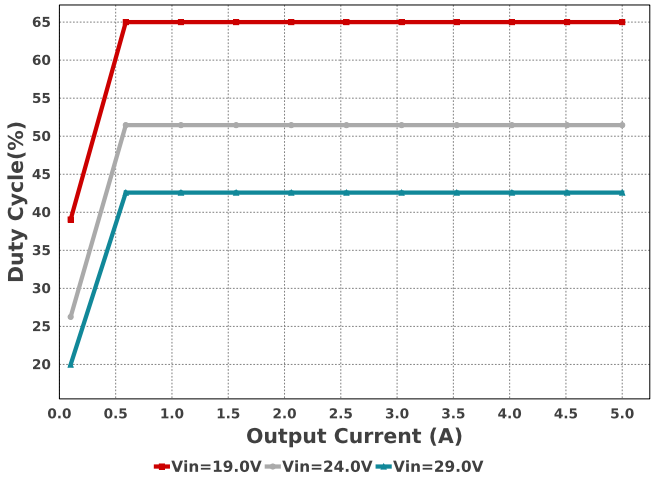
## Duty Cycle

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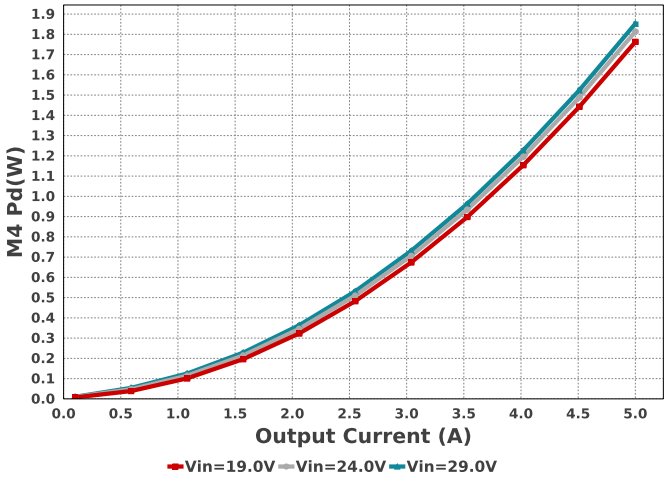


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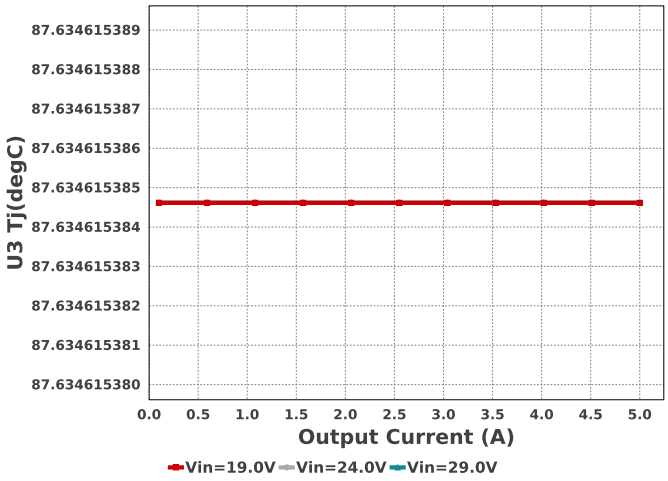
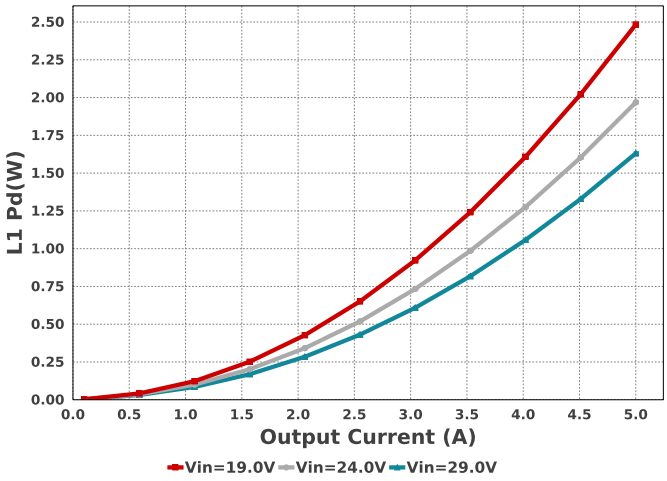
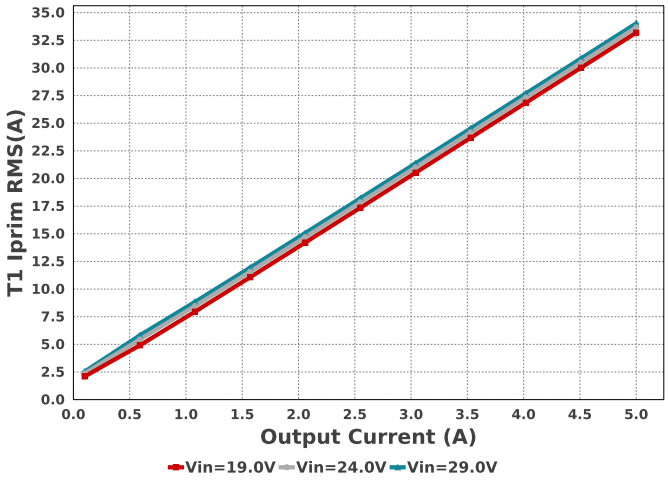


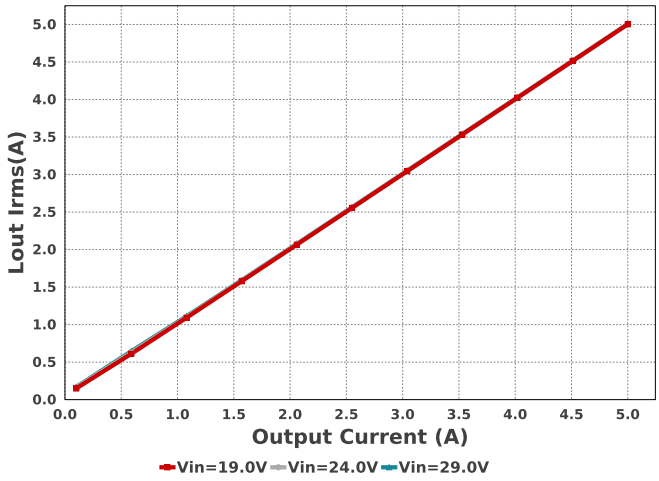

## L1 Pd




## T1 Iprim RMS




## Lout Irms

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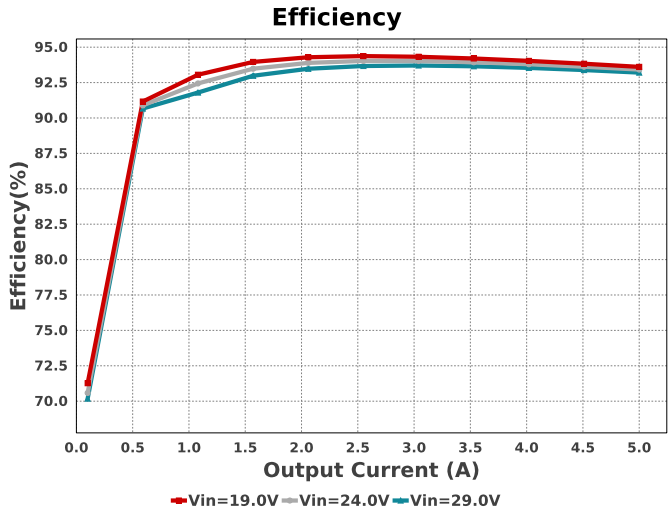


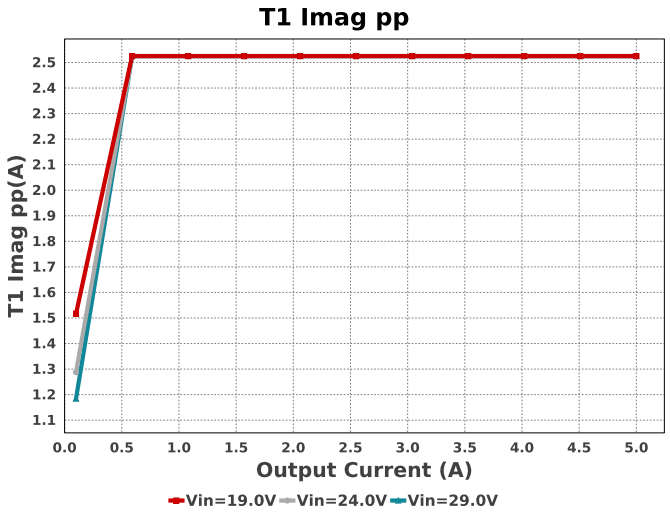


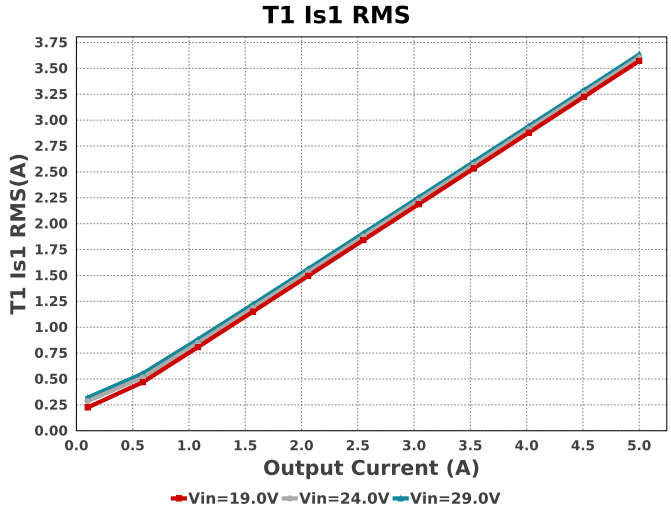


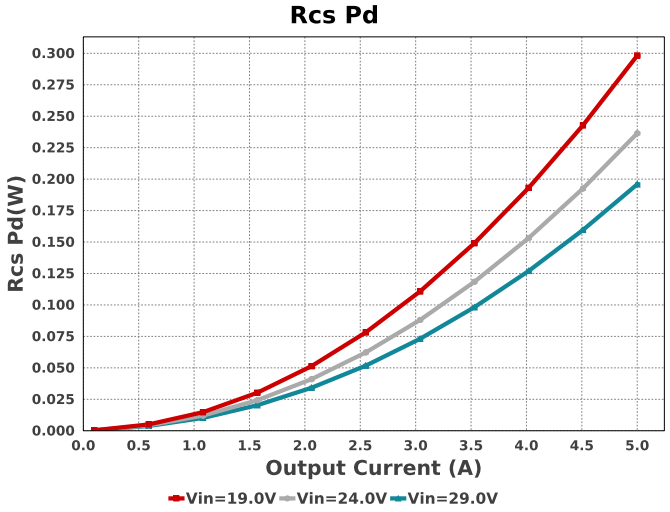


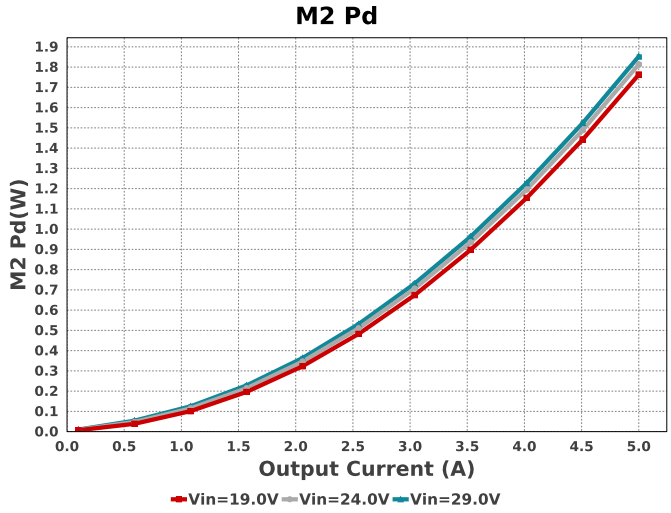


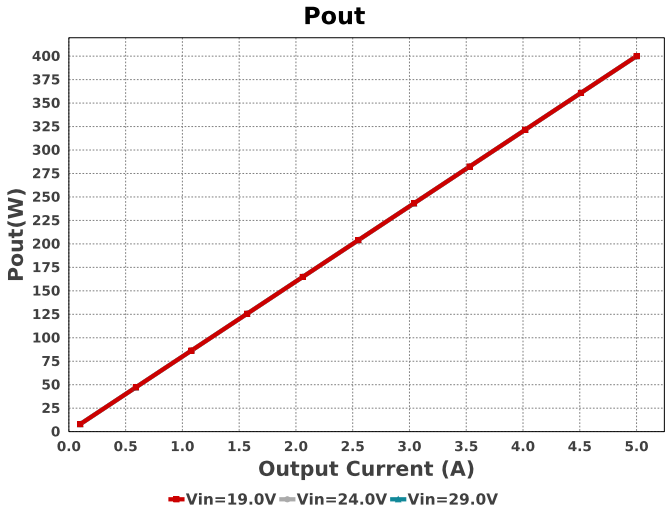


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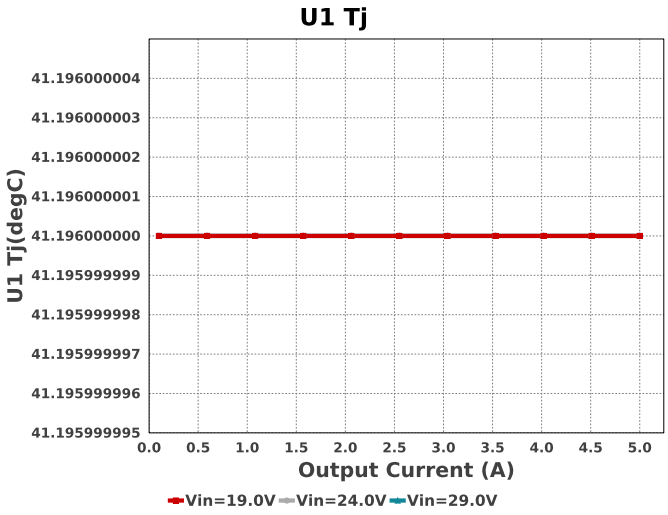


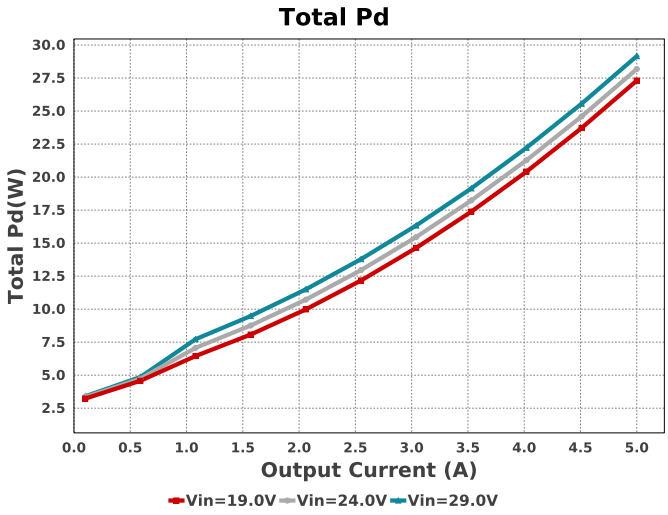


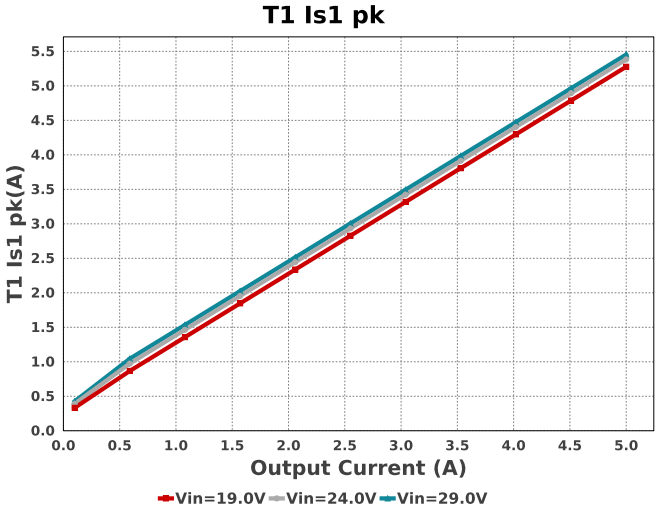


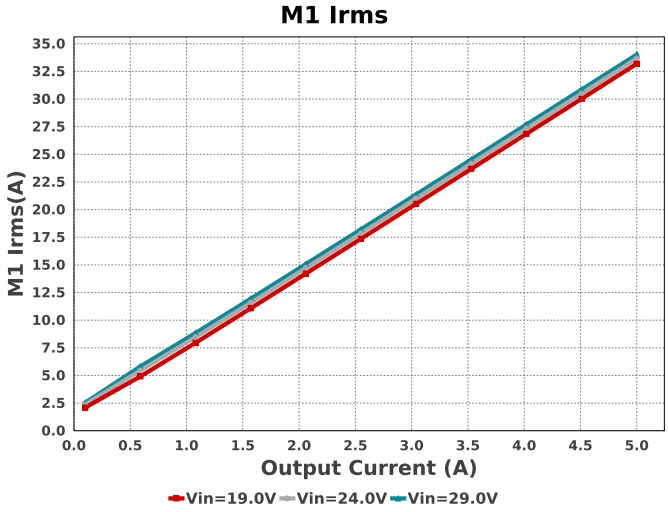


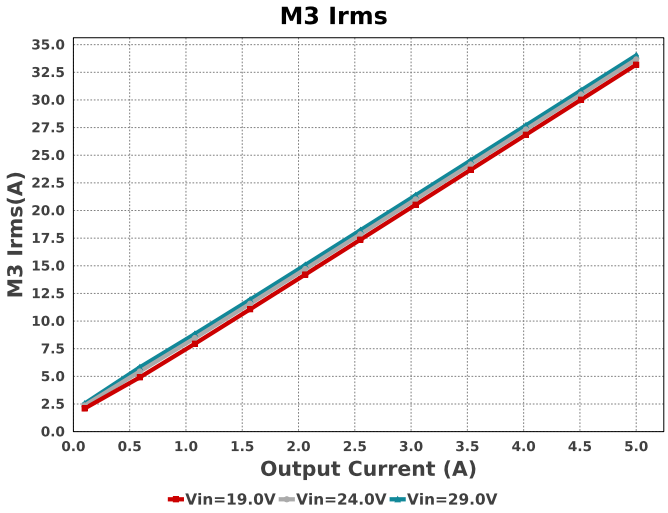


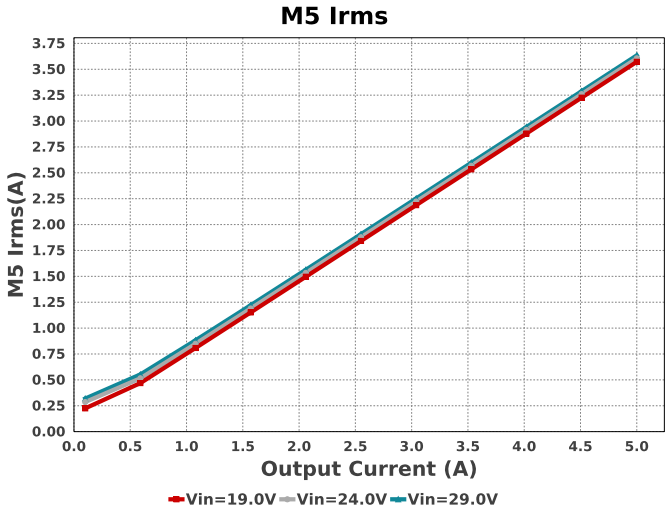


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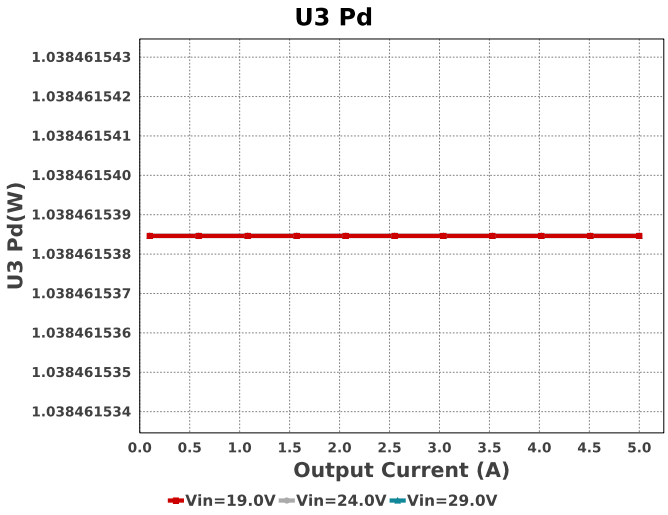


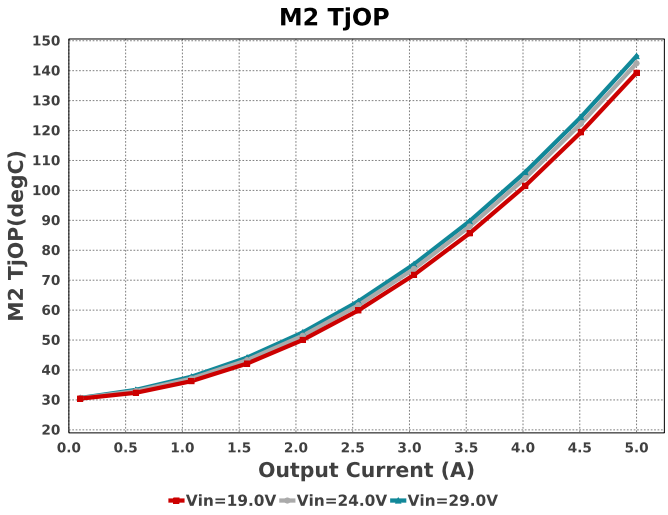


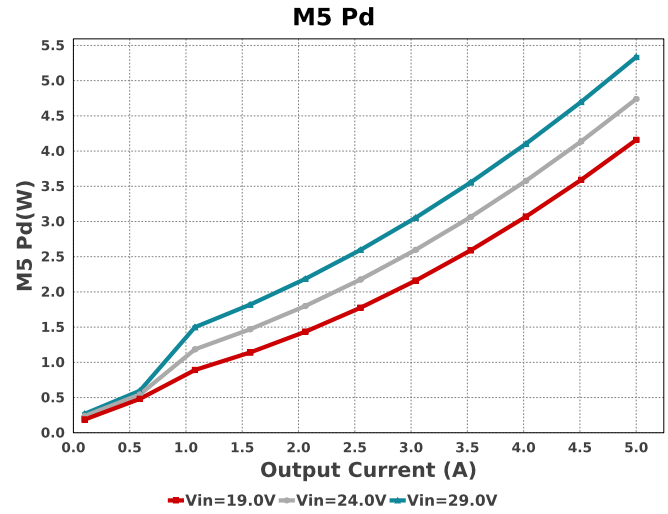


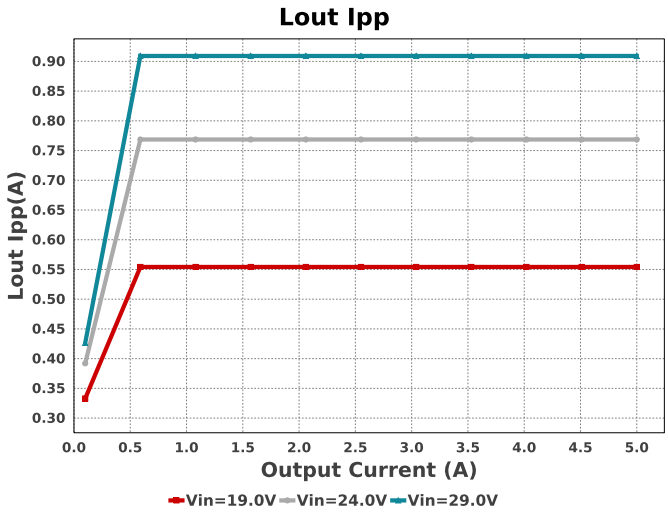


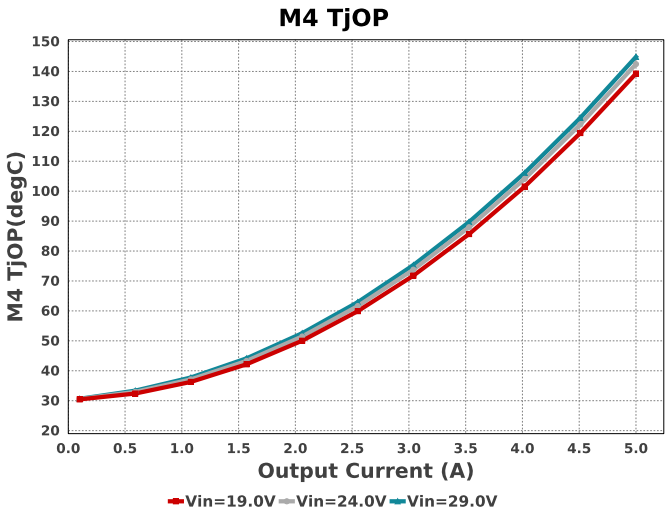


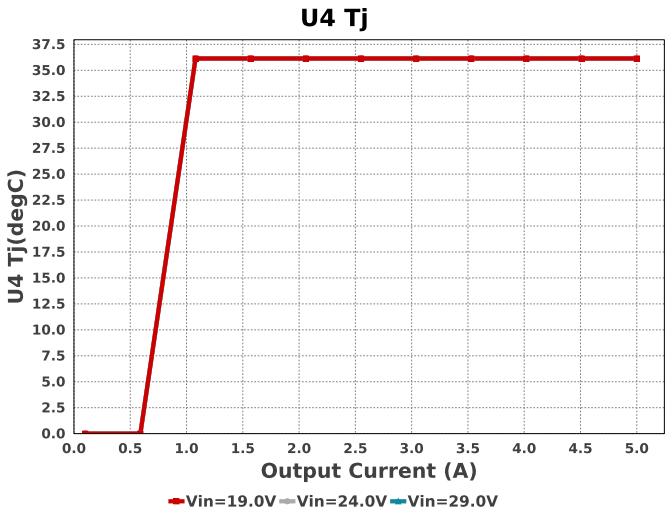


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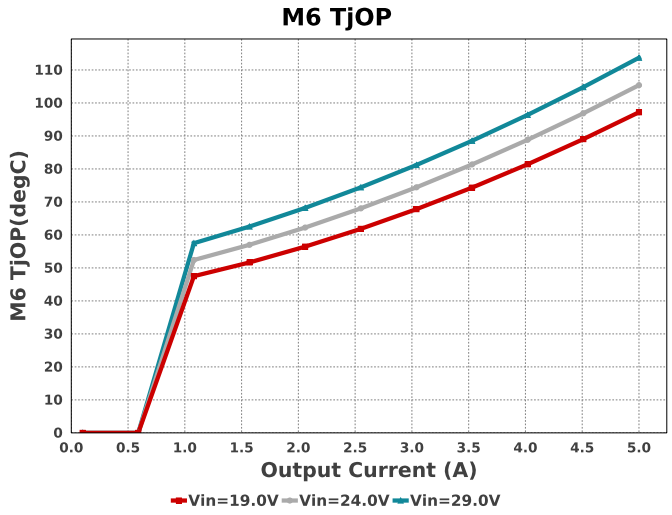


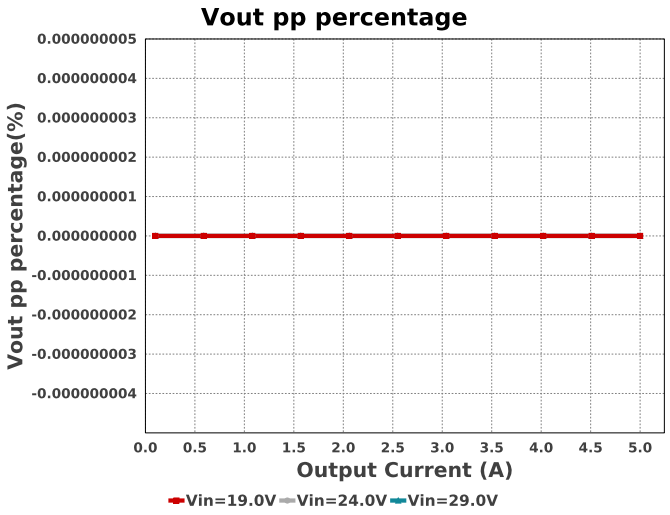


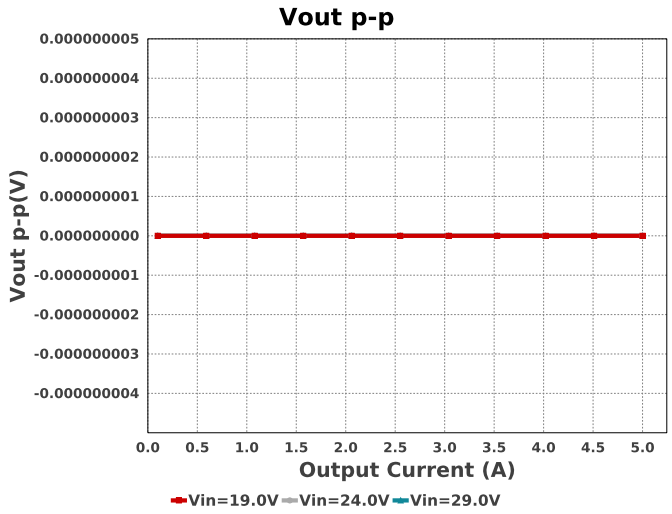


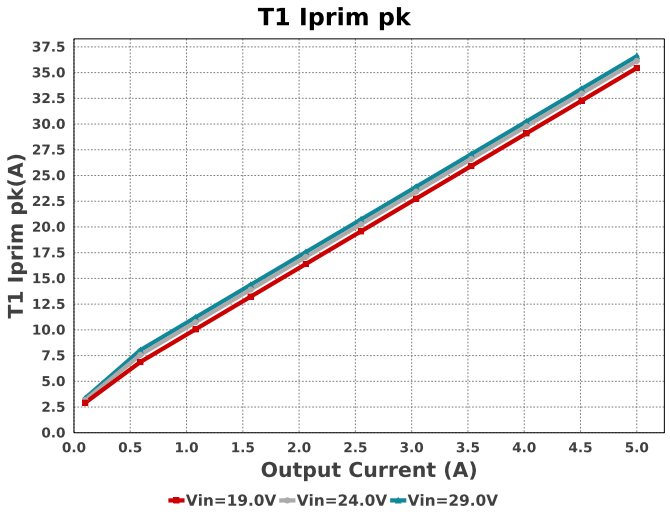


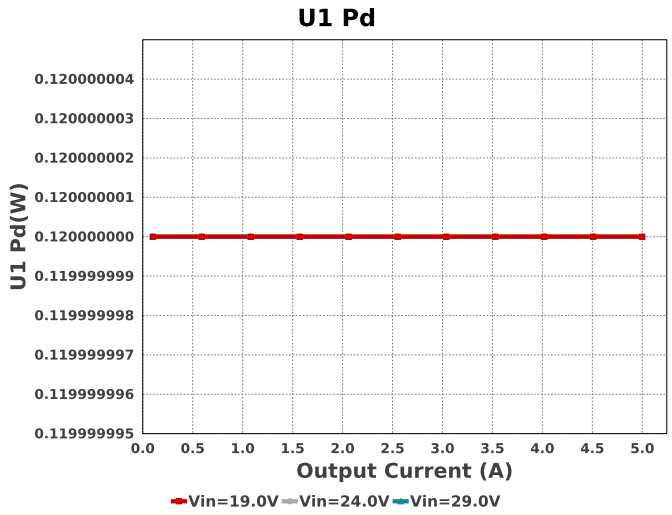


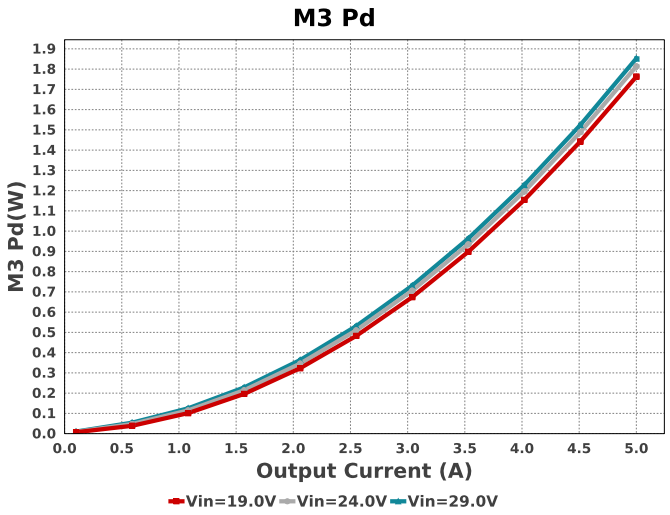


## Operating Values

| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 1. | Cin Pd | 325.43 mW | Capacitor | Input capacitor power dissipation |
| 2. | Cout Pd | 0.102 fW | Capacitor | Output capacitor power dissipation |
| 3. | Lout Irms | 5.003 A | Current | Lout ripple current |
| 4. | Iin Avg | 22.49 A | IC | Average input current |
| 5. | U1 RThetaJA | 93.3 degC/W | IC | U1 IC junction-to-ambient thermal resistance |
| 6. | L1 Pd | 2.483 W | Inductor | Power Dissipation in the Inductor |
| 7. | Lout Ipp | 554.191 mA | Inductor | Peak-to-peak output inductor ripple current |
| 8. | Lshim Pd | 0.0 W | Inductor | Power Dissipation in Shim Inductor |
| 9. | M1 Irms | 33.193 A | Mosfet | M1 MOSFET Irms |
| 10. | M1 Pd | 1.763 W | Mosfet | M1 MOSFET total power dissipation |
| 11. | M1 TjOP | 139.29 degC | Mosfet | M1 MOSFET junction temperature |

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| # | Name | Value | Category | Description |
|---|---|---|---|---|
| 12. | M2 Irms | 33.193 A | Mosfet | M2 MOSFET Irms |
| 13. | M2 Pd | 1.763 W | Mosfet | M2 MOSFET total power dissipation |
| 14. | M2 TjOP | 139.29 degC | Mosfet | M2 MOSFET junction temperature |
| 15. | M3 Irms | 33.193 A | Mosfet | M3 MOSFET Irms |
| 16. | M3 Pd | 1.763 W | Mosfet | M3 MOSFET total power dissipation |
| 17. | M3 TjOp | 139.29 degC | Mosfet | M3 MOSFET junction temperature |
| 18. | M4 Irms | 33.193 A | Mosfet | M4 MOSFET Irms |
| 19. | M4 Pd | 1.763 W | Mosfet | M4 MOSFET total power dissipation |
| 20. | M4 TjOp | 139.29 degC | Mosfet | M4 MOSFET junction temperature |
| 21. | M5 Irms | 3.572 A | Mosfet | M5 MOSFET Irms |
| 22. | M5 Pd | 4.158 W | Mosfet | M5 MOSFET total power dissipation |
| 23. | M5 TjOP | 97.18 degC | Mosfet | M5 MOSFET junction temperature |
| 24. | M6 Irms | 3.572 A | Mosfet | M6 MOSFET Irms |
| 25. | M6 Pd | 4.158 W | Mosfet | M6 MOSFET total power dissipation |
| 26. | M6 TjOP | 97.18 degC | Mosfet | M6 MOSFET junction temperature |
| 27. | Cin Pd | 325.43 mW | Power | Input capacitor power dissipation |
| 28. | Cout Pd | 0.102 fW | Power | Output capacitor power dissipation |
| 29. | L1 Pd | 2.483 W | Power | Power Dissipation in the Inductor |
| 30. | Lout Pd | 25.026 mW | Power | Lout power dissipation |
| 31. | Lshim Pd | 0.0 W | Power | Power Dissipation in Shim Inductor |
| 32. | M1 Pd | 1.763 W | Power | M1 MOSFET total power dissipation |
| 33. | M2 Pd | 1.763 W | Power | M2 MOSFET total power dissipation |
| 34. | M3 Pd | 1.763 W | Power | M3 MOSFET total power dissipation |
| 35. | M4 Pd | 1.763 W | Power | M4 MOSFET total power dissipation |
| 36. | M5 Pd | 4.158 W | Power | M5 MOSFET total power dissipation |
| 37. | M6 Pd | 4.158 W | Power | M6 MOSFET total power dissipation |
| 38. | Rcs Pd | 298.18 mW | Power | Power Dissipation in Current Sense Resistors |
| 39. | T1 Pd | 6.0 W | Power | Estimated Losses in Transformer |
| 40. | Total Pd | 27.305 W | Power | Total Power Dissipation |
| 41. | U1 Pd | 120.0 mW | Power | U1 Power Dissipation |
| 42. | U2 Pd | 1.038 W | Power | U2 Power Dissipation |
| 43. | U3 Pd | 1.038 W | Power | U3 Power Dissipation |
| 44. | U4 Pd | 110.577 mW | Power | U4 Power Dissipation |
| 45. | Rcs Pd | 298.18 mW | Resistor | Power Dissipation in Current Sense Resistors |
| 46. | BOM Count | 118 | System Information | Total Design BOM count |
| 47. | Duty Cycle | 65.0 % | System Information | Duty cycle |
| 48. | Efficiency | 93.61 % | System Information | Steady state efficiency |
| 49. | FootPrint | 11.37 k $mm^2$ | System Information | Total Foot Print Area of BOM components |
| 50. | Frequency | 200.321 kHz | System Information | Switching frequency |
| 51. | Iout | 5.0 A | System Information | Iout operating point |
| 52. | Mode | FET Conduction Mode | System Information | Conduction Mode |
| 53. | Pout | 400.0 W | System Information | Total output power |
| 54. | Total BOM | NA | System Information | Total BOM Cost |
| 55. | U1 Tj | 41.196 degC | System Information | U1 junction temperature |
| 56. | U2 Tj | 87.635 degC | System Information | U2 junction temperature |
| 57. | U3 Tj | 87.635 degC | System Information | U3 junction temperature |
| 58. | U4 Tj | 36.137 degC | System Information | U4 junction temperature |
| 59. | Vin | 19.0 V | System Information | Vin operating point |
| 60. | Vout | 80.0 V | System Information | Operational Output Voltage |
| 61. | Vout p-p | 0.554 fV | System Information | Peak-to-peak output ripple voltage |
| 62. | Vout pp percentage | 0.693 f% | System Information | Output Voltage ripple percentage |
| 63. | T1 Imag pp | 2.525 A | Transformer | Transformer peak to peak magnetising current |
| 64. | T1 Iprim RMS | 33.193 A | Transformer | Transformer Primary RMS Current |
| 65. | T1 Iprim pk | 35.446 A | Transformer | Transformer Primary Peak Current |
| 66. | T1 Is1 RMS | 3.572 A | Transformer | Transformer Secondary1 RMS Current |
| 67. | T1 Is1 pk | 5.277 A | Transformer | Transformer Secondary1 Peak Current |
| 68. | T1 Pd | 6.0 W | Transformer | Estimated Losses in Transformer |

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## Design Inputs

| Name | Value | Description |
|---|---|---|
| Iout | 5.0 | Maximum Output Current |
| VinMax | 29.0 | Maximum input voltage |
| VinMin | 19.0 | Minimum input voltage |
| Vout | 80.0 | Output Voltage |
| base_pn | UCC28950 | Base Product Number |
| source | DC | Input Source Type |
| Ta | 30.0 | Ambient temperature |
| UserFsw | 200.0 k | Customer Selected Frequency |

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# WEBENCH® Assembly

## Component Testing

Some published data on components in datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will guarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of Cin and Cout, and the inductance and DC resistance of L1 before assembly of the board. Any large discrepancies in values should be electrically simulated in WEBENCH to check for instabilities and thermally simulated in WebTHERM to make sure critical temperatures are not exceeded.

## Soldering Component to Board

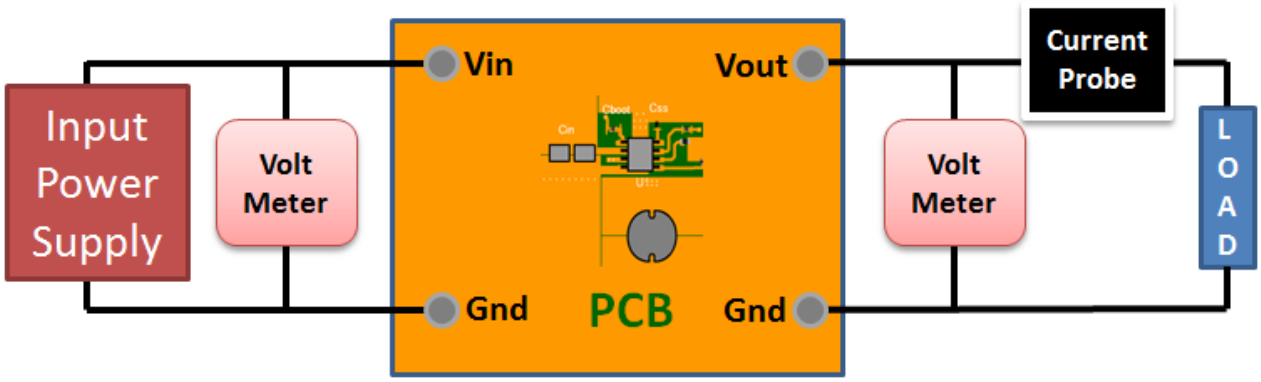
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab town to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with the PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

## Initial Startup of Circuit

It is best to initially power up the board by setting the input supply voltage to the lowest operating input voltage 19.0V and set the input supply's current limit to zero. With the input supply off connect up the input supply to Vin and GND. Connect a digital volt meter and a load if needed to set the minimum Iout of the design from Vout and GND. Turn on the input supply and slowly turn up the current limit on the input supply. If the voltage starts to rise on the input supply continue increasing the input supply current limit while watching the output voltage. If the current increases on the input supply, but the voltage remains near zero, then there may be a short or a component misplaced on the board. Power down the board and visually inspect for solder bridges and recheck the diode and capacitor polarities. Once the power supply circuit is operational then more extensive testing may include full load testing, transient load and line tests to compare with simulation results.

## Load Testing

The setup is the same as the initial startup, except that an additional digital voltmeter is connected between Vin and GND, a load is connected between Vout and GND and a current meter is connected in series between Vout and the load. The load must be able to handle at least rated output power + 50% ( 7.5 watts for this design). Ideally the load is supplied in the form of a variable load test unit. It can also be done in the form of suitably large power resistors. When using an oscilloscope to measure waveforms on the prototype board, the ground leads of the oscilloscope probes should be as short as possible and the area of the loop formed by the ground lead should be kept to a minimum. This will help reduce ground lead inductance and eliminate EMI noise that is not actually present in the circuit.




## Design Assistance

1. Master key : A1CE5C50F16428D42D1B83F15C6C47E8[v1]
2. **UCC28950** Product Folder : http://www.ti.com/product/UCC28950 : contains the data sheet and other resources.

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