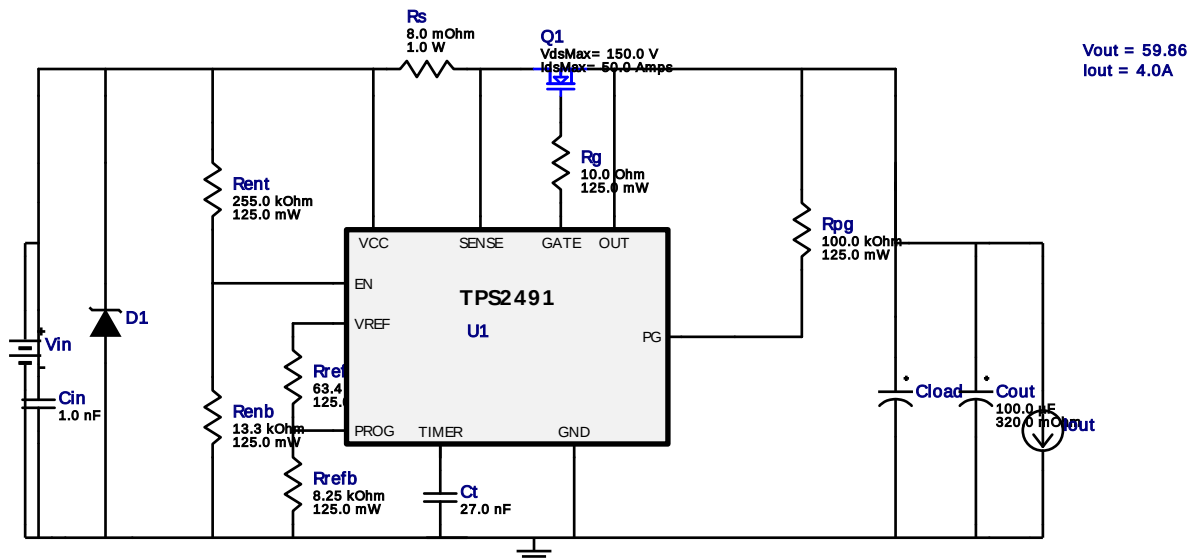


## WEBENCH® Design Report

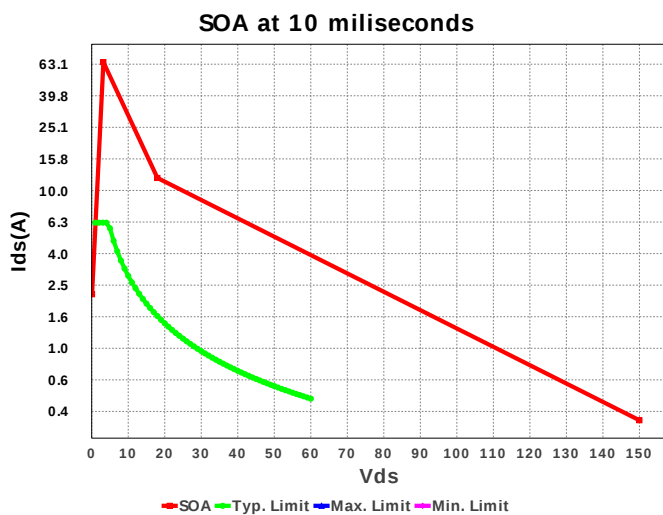
Design : 4766793/5 TPS2491DGSR  
TPS2491DGSR 30.0V-60.0V to 59.86V @ 5.0A



## Electrical BOM

| #  | Name | Manufacturer          | Part Number                          | Properties                                                        | Qty | Price  | Footprint                         |
|----|------|-----------------------|--------------------------------------|-------------------------------------------------------------------|-----|--------|-----------------------------------|
| 1. | Cin  | MuRata                | GRM155R72A102KA01D<br>Series= X7R    | Cap= 1.0 nF<br>VDC= 100.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | 0402 3 mm <sup>2</sup>            |
| 2. | Cout | Panasonic             | EEV-FK1K101Q<br>Series= FK           | Cap= 100.0 uF<br>ESR= 320.0 mOhm<br>VDC= 80.0 V<br>IRMS= 500.0 mA | 1   | \$0.45 | SM_RADIAL_H13 264 mm <sup>2</sup> |
| 3. | Ct   | MuRata                | GRM155R61C273KA01D<br>Series= X5R    | Cap= 27.0 nF<br>VDC= 16.0 V<br>IRMS= 0.0 A                        | 1   | \$0.01 | 0402 3 mm <sup>2</sup>            |
| 4. | D1   | Littelfuse            | 5.0SMDJ70A                           | Zener                                                             | 1   | \$0.85 | SMC 83 mm <sup>2</sup>            |
| 5. | Q1   | Infineon Technologies | BSC190N15NS3 G                       | VdsMax= 150.0 V<br>IdsMax= 50.0 Amps                              | 1   | \$1.18 | PG-TDSON-8 55 mm <sup>2</sup>     |
| 6. | Renb | Panasonic             | ERJ-6ENF1332V<br>Series= ERJ-6E      | Res= 13.3 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%              | 1   | \$0.01 | 0805 7 mm <sup>2</sup>            |
| 7. | Rent | Panasonic             | ERJ-6ENF2553V<br>Series= ERJ-6E      | Res= 255.0 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%             | 1   | \$0.01 | 0805 7 mm <sup>2</sup>            |
| 8. | Rg   | Vishay-Dale           | CRCW080510R0FKEA<br>Series= CRCW..e3 | Res= 10.0 Ohm<br>Power= 125.0 mW<br>Tolerance= 1.0%               | 1   | \$0.01 | 0805 7 mm <sup>2</sup>            |

| #   | Name  | Manufacturer      | Part Number                          | Properties                                            | Qty | Price  | Footprint                 |
|-----|-------|-------------------|--------------------------------------|-------------------------------------------------------|-----|--------|---------------------------|
| 9.  | Rpg   | 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 mm <sup>2</sup>    |
| 10. | Rrefb | Panasonic         | ERJ-6ENF8251V<br>Series= ERJ-6E      | Res= 8.25 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | 0805 7 mm <sup>2</sup>    |
| 11. | Rref1 | Panasonic         | ERJ-6ENF6342V<br>Series= ERJ-6E      | Res= 63.4 kOhm<br>Power= 125.0 mW<br>Tolerance= 1.0%  | 1   | \$0.01 | 0805 7 mm <sup>2</sup>    |
| 12. | Rs    | Susumu Co Ltd     | PRL1632-R008-F-T1<br>Series= PRL1632 | Res= 8.0 mOhm<br>Power= 1.0 W<br>Tolerance= 1.0%      | 1   | \$0.19 | 0612 11 mm <sup>2</sup>   |
| 13. | U1    | Texas Instruments | TPS2491DGSR                          | Switcher                                              | 1   | \$1.20 | MUB10A 24 mm <sup>2</sup> |



## Operating Values

| #   | Name                | Value                 | Category | Description                             |
|-----|---------------------|-----------------------|----------|-----------------------------------------|
| 1.  | BOM Count           | 13                    | General  | Total Design BOM count                  |
| 2.  | FootPrint           | 483.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components |
| 3.  | Pout                | 299.278 W             | General  | Total output power                      |
| 4.  | Total BOM           | \$3.95                | General  | Total BOM Cost                          |
| 5.  | Q TjOp              | 56.099 degC           | Op_Point | Q TjOp                                  |
| 6.  | Vout OP             | 59.856 V              | Op_Point | Operational Output Voltage              |
| 7.  | Efficiency          | 99.75 %               | Op_point | Steady state efficiency                 |
| 8.  | IOUT_OP             | 5.0 A                 | Op_point | Iout operating point                    |
| 9.  | VIN_OP              | 60.0 V                | Op_point | Vin operating point                     |
| 10. | IC Pd               | 27.0 mW               | Power    | IC power dissipation                    |
| 11. | Q1 Pd               | 521.978 mW            | Power    | Q1 Power Dissipation                    |
| 12. | Total Pd            | 27.0 mW               | Power    | Total Power Dissipation                 |
| 13. | Total Pd            | 748.978 mW            | Power    | Total Power Dissipation                 |
| 14. | Calculated FET Plim | 28.786 W              |          | Calculated FET Power Limit              |
| 15. | Calculated Voff     | 25.216 V              |          | Calculated Voff                         |
| 16. | Calculated Von      | 27.233 V              |          | Calculated Von                          |
| 17. | Calculated Vprog    | 460.572 mV            |          | Calculated Vprog                        |
| 18. | Charge Time         | 6.253 ms              |          | Charge Time                             |
| 19. | Turn on time        | 3.145 ms              |          | Turn on time                            |

## Design Inputs

| #   | Name                  | Value   | Description             |
|-----|-----------------------|---------|-------------------------|
| 1.  | Iout                  | 4.0     | Maximum Output Current  |
| 2.  | OVLO                  | 70.0    | OVLO nominal            |
| 3.  | UVLO                  | 20.0    | UVLO nominal            |
| 4.  | VinMax                | 60.0    | Maximum input voltage   |
| 5.  | VinMin                | 30.0    | Minimum input voltage   |
| 6.  | base_pn               | TPS2491 | Base Product Number     |
| 7.  | currentLimit          | 5.0     | Current limit           |
| 8.  | outputLoadCapacitance | 1.0     | Output Load capacitance |
| 9.  | source                | DC      | Input Source Type       |
| 10. | Ta                    | 30.0    | Ambient temperature     |

## Design Assistance

1. The TPS2491 Webench Designer provides the design engineer with a fully functional HotSwap schematic for the positive voltage system. The created design calculates a complete BOM and the total cost of the BOM. Also, the Webench designer offers simulation to emulate the behavior of the device such as Power Sequence, Restart Sequence and Input Transients. To learn more about HotSwap devices and its applications, please refer to the following link: [http://www.ti.com/analog/docs/analogtechdoc\\_hh.tsp?viewType=mostuseful&techDoc=1&rootFamilyId=64&familyId=420&docCategoryId=1&Input3=GoFET](http://www.ti.com/analog/docs/analogtechdoc_hh.tsp?viewType=mostuseful&techDoc=1&rootFamilyId=64&familyId=420&docCategoryId=1&Input3=GoFET) power limit may have been derated by: 100.0.

2. **TPS2491** Product Folder : <http://www.ti.com/product/tps2491> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

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