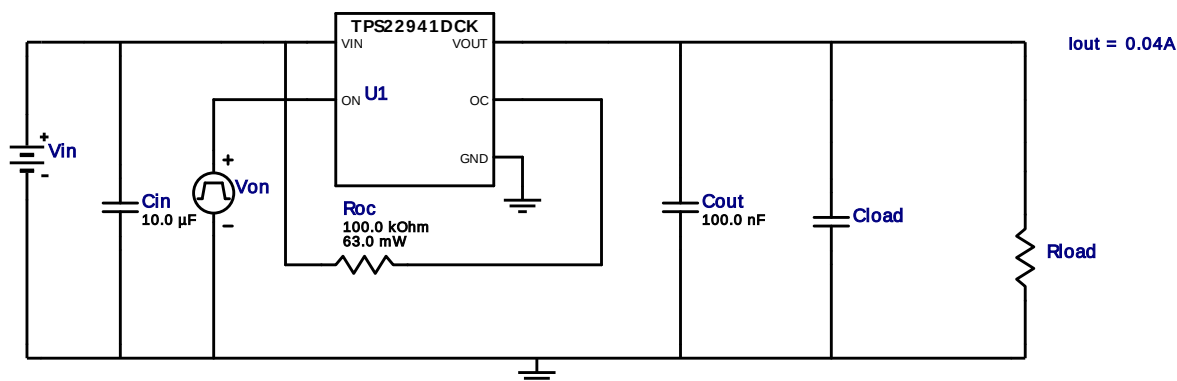


## WEBENCH® Design Report

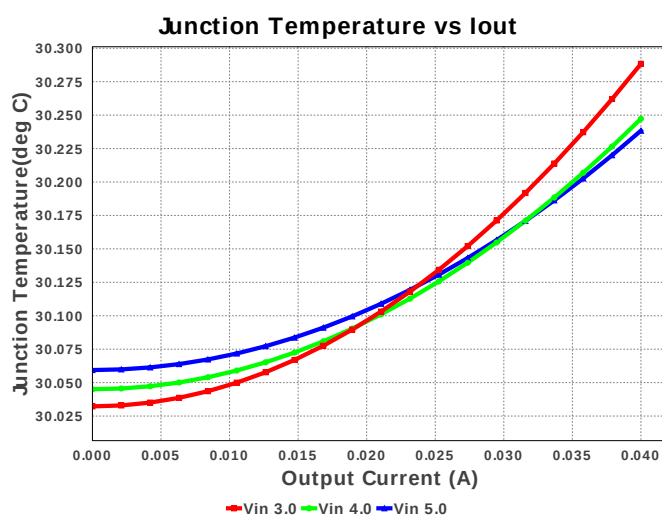
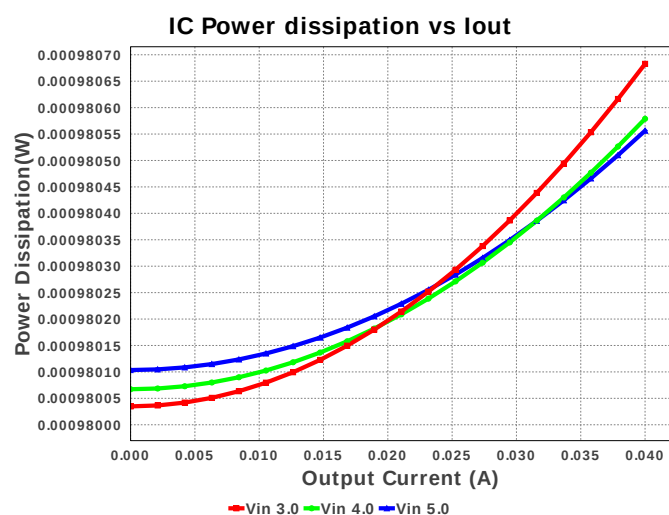
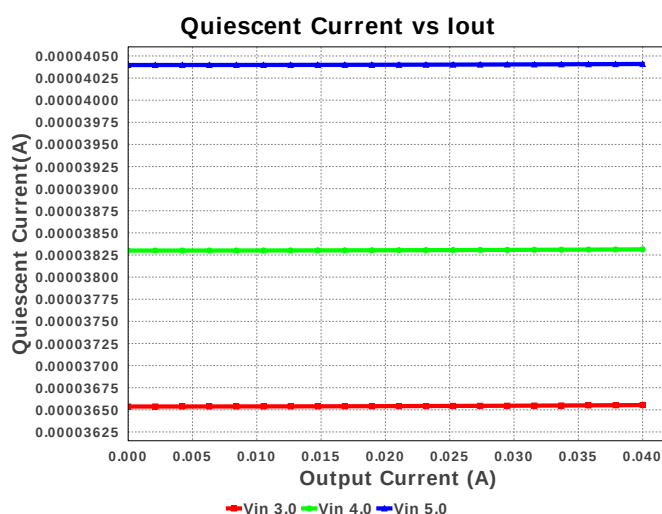
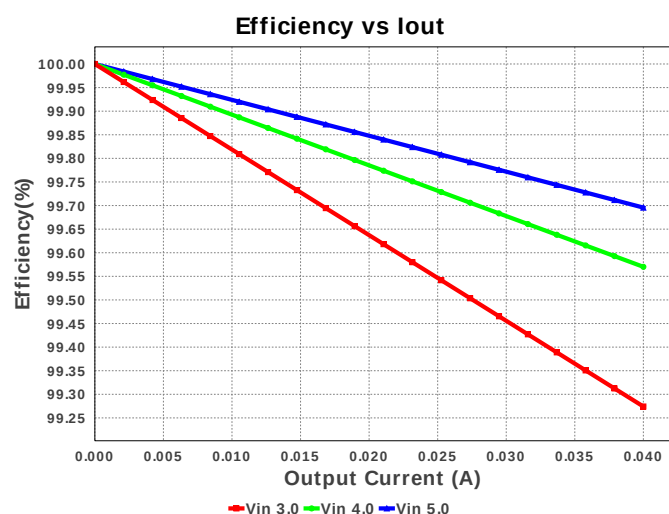
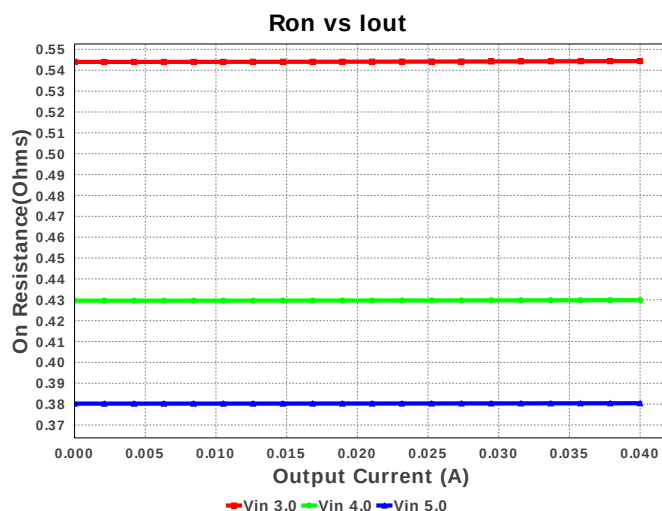
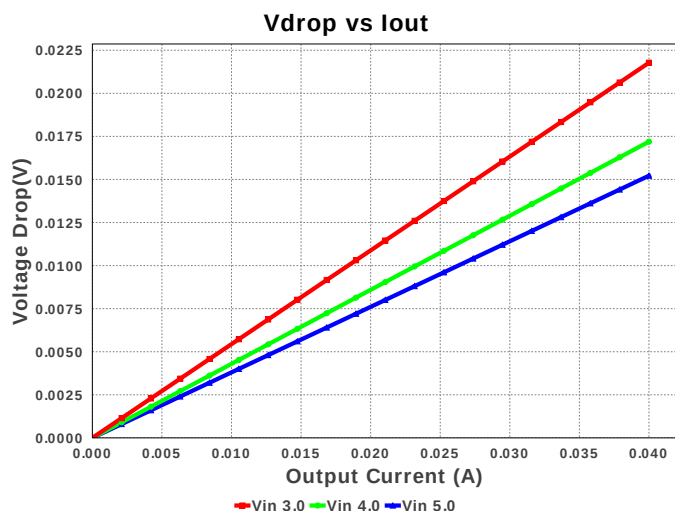
Design : 4799888/4 TPS22941DCKR  
 Design 4 - TPS22941DCKR



1. To limit the voltage drop on the input supply caused by transient in-rush currents when the switch turns on into a discharged load capacitor or a short circuit, it is generally recommended to have a capacitor of at least  $C_{load} \times 10$  between VIN and GND.

### Electrical BOM

| #  | Name | Manufacturer              | Part Number                          | Properties                                           | Qty | Price  | Footprint                    |
|----|------|---------------------------|--------------------------------------|------------------------------------------------------|-----|--------|------------------------------|
| 1. | Cin  | Samsung Electro-Mechanics | CL10A106MQ8NNNC<br>Series= X5R       | Cap= 10.0 uF<br>VDC= 6.3 V<br>IRMS= 0.0 A            | 1   | \$0.03 | 0603 5 mm <sup>2</sup>       |
| 2. | Cout | MuRata                    | GRM155R60J104KA01D<br>Series= X5R    | Cap= 100.0 nF<br>VDC= 6.3 V<br>IRMS= 0.0 A           | 1   | \$0.01 | 0402 3 mm <sup>2</sup>       |
| 3. | Roc  | Vishay-Dale               | CRCW0402100KFKED<br>Series= CRCW..e3 | Res= 100.0 kOhm<br>Power= 63.0 mW<br>Tolerance= 1.0% | 1   | \$0.01 | 0402 3 mm <sup>2</sup>       |
| 4. | U1   | Texas Instruments         | TPS22941DCKR                         | Switcher                                             | 1   | \$0.30 | R-PDSO-G5 16 mm <sup>2</sup> |



## Operating Values

| #   | Name           | Value                | Category | Description                             |
|-----|----------------|----------------------|----------|-----------------------------------------|
| 1.  | BOM Count      | 4                    | General  | Total Design BOM count                  |
| 2.  | FootPrint      | 27.0 mm <sup>2</sup> | General  | Total Foot Print Area of BOM components |
| 3.  | Inrush Current | 80.0 mA              | General  | User entered Inrush Current             |
| 4.  | Pout           | 199.391 mW           | General  | Total output power                      |
| 5.  | Total BOM      | \$0.35               | General  | Total BOM Cost                          |
| 6.  | Cloud Act      | 200.0 nF             | Op_Point | Cloud (Actual)                          |
| 7.  | Ron Act        | 380.42 mOhm          | Op_Point | Ron (Actual)                            |
| 8.  | SlewRate Act   | 398.783 mV/us        | Op_Point | Change in volt per unit time            |
| 9.  | Trise Act      | 10.0 μs              | Op_Point | Rise time                               |
| 10. | Vdrop Act      | 15.217 mV            | Op_Point | Voltage drop                            |

| #   | Name                   | Value           | Category | Description                                                                             |
|-----|------------------------|-----------------|----------|-----------------------------------------------------------------------------------------|
| 11. | DC Load Fall Time      | 54.763 $\mu$ s  | Op_point | Fall time calculated with the DC load attached. Considering only CLoad + Cout and RLoad |
| 12. | DC Load Inrush Current | 79.757 mA       | Op_point | Inrush current calculated with the DC load connected                                    |
| 13. | Efficiency             | 99.696 %        | Op_point | Steady state efficiency                                                                 |
| 14. | IC Tj                  | 30.238 degC     | Op_point | IC junction temperature                                                                 |
| 15. | IOUT_OP                | 40.0 mA         | Op_point | Iout operating point                                                                    |
| 16. | No Load Fall Time      | NaN s           | Op_point |                                                                                         |
| 17. | No Load Inrush Current | 79.757 mA       | Op_point | Inrush current calculated with the DC load not connected                                |
| 18. | VIN_OP                 | 5.0 V           | Op_point | Vin operating point                                                                     |
| 19. | Total Pd               | 810.718 $\mu$ W | Power    | Total Power Dissipation                                                                 |

## Design Inputs

| #   | Name           | Value    | Description                               |
|-----|----------------|----------|-------------------------------------------|
| 1.  | Iout           | 40.0 m   | Maximum Output Current                    |
| 2.  | Iout           | 40.0 m   | Maximum Output Current                    |
| 3.  | VinMax         | 5.0      | Maximum input voltage                     |
| 4.  | VinMin         | 3.0      | Minimum input voltage                     |
| 5.  | base_pn        | TPS22941 | Base Product Number                       |
| 6.  | cload          | 100.0 n  | Minimum load capacitance user requirement |
| 7.  | inrush_Current | 80.0 m   | Inrush current                            |
| 8.  | source         | DC       | Input Source Type                         |
| 9.  | Ta             | 30.0     | Ambient temperature                       |
| 10. | vdrop_max      | 200.0 m  | Maximum voltage drop user requirement     |

## Design Assistance

1. **TPS22941** Product Folder : <http://www.ti.com/product/tps22941> : contains the data sheet and other resources.

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