

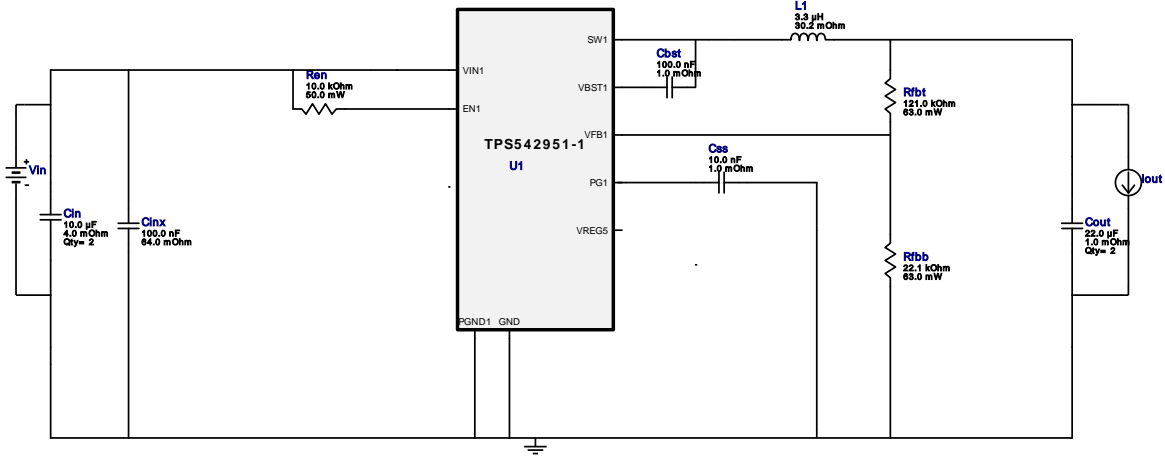
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 VinMax = 18.0V  
 Vout = 5.0V  
 Iout = 2.0A

Device = TPS542951PWPR  
 Topology = Buck  
 Created = 2021-09-26 00:47:39.976  
 BOM Cost = \$1.48  
 BOM Count = 12  
 Total Pd = 0.94W

# WEBENCH® Design Report


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 TPS542951PWPR 6V-18V to 5.00V @ 2A

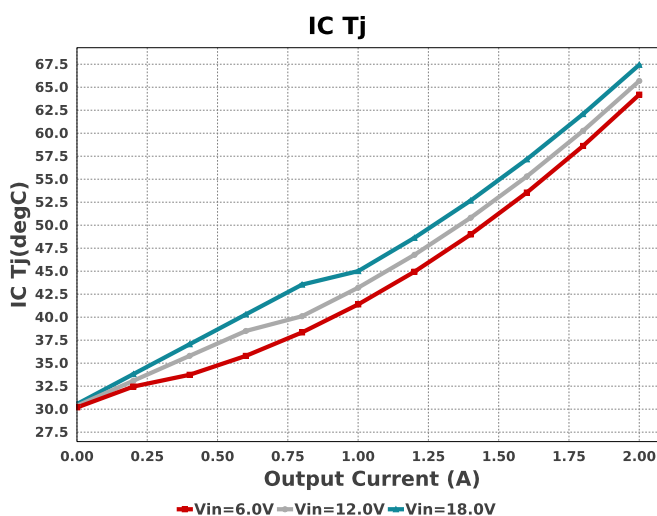
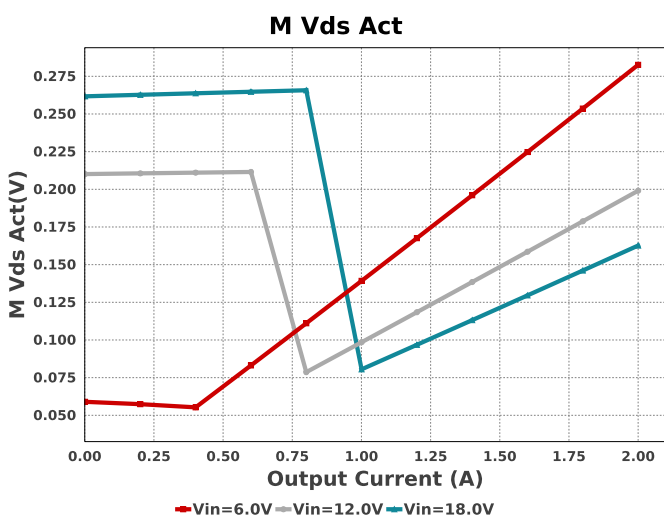
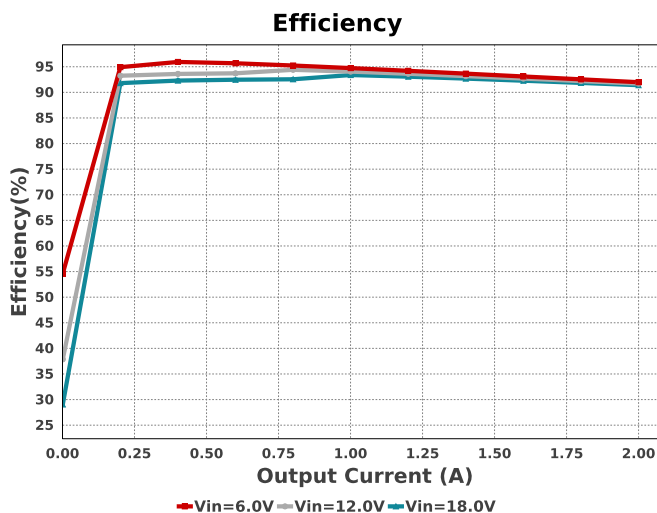
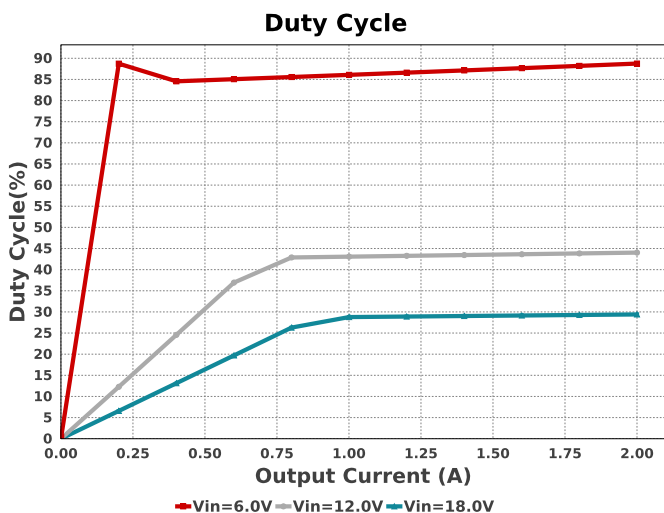
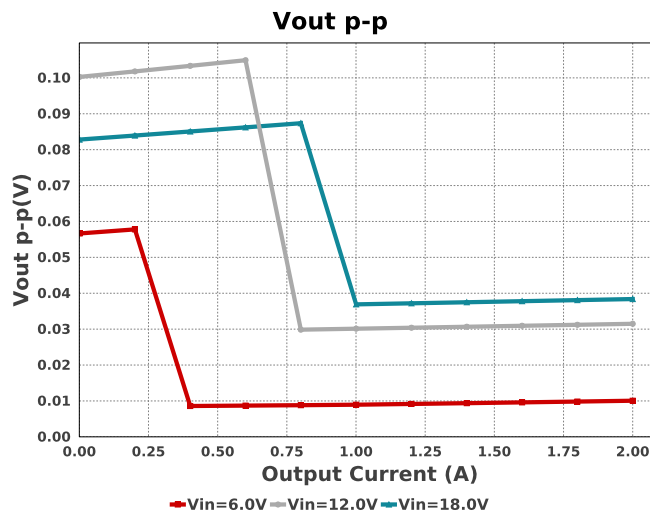
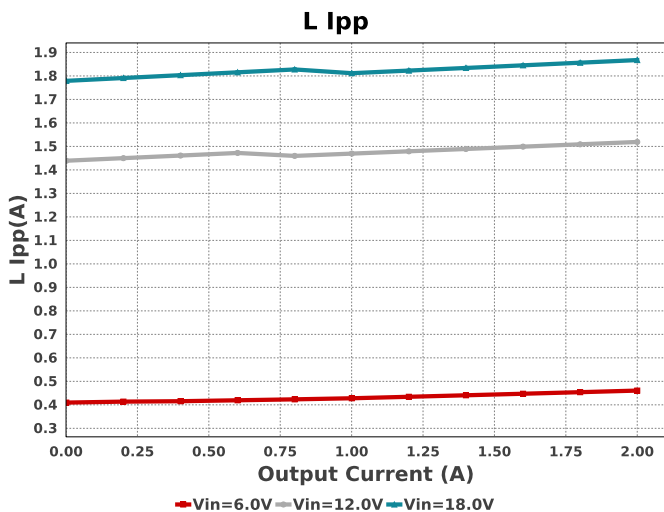
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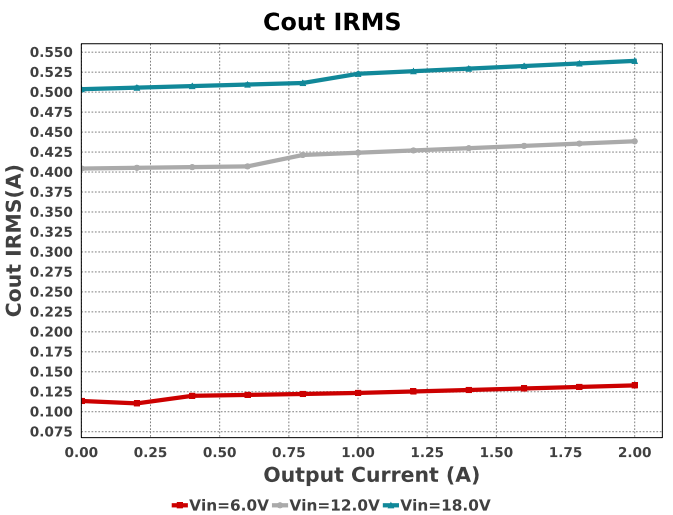
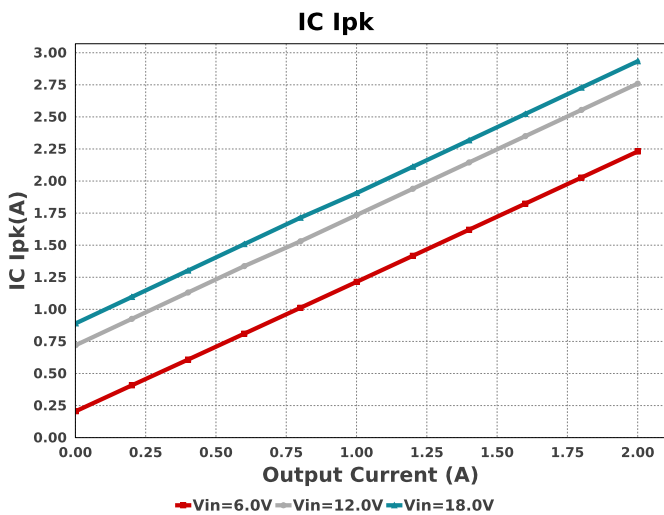
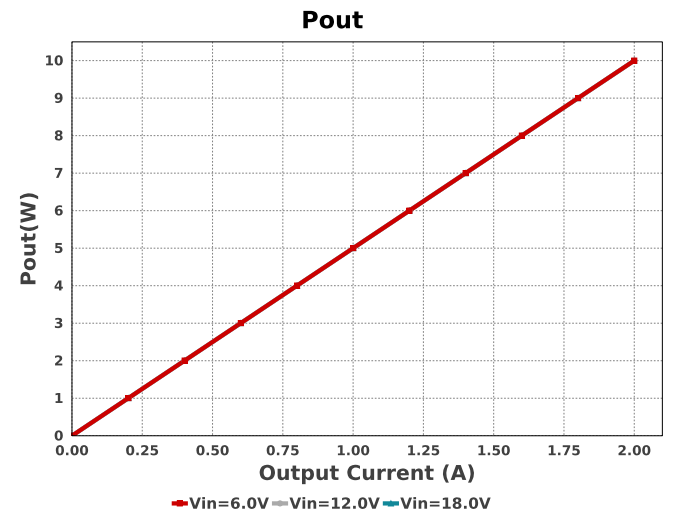
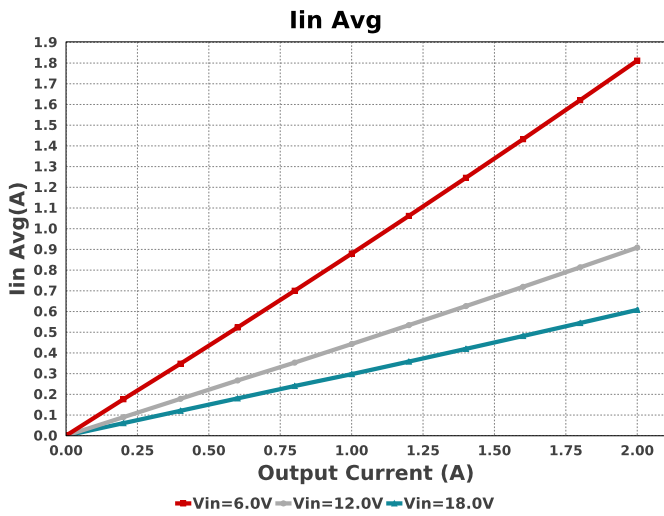
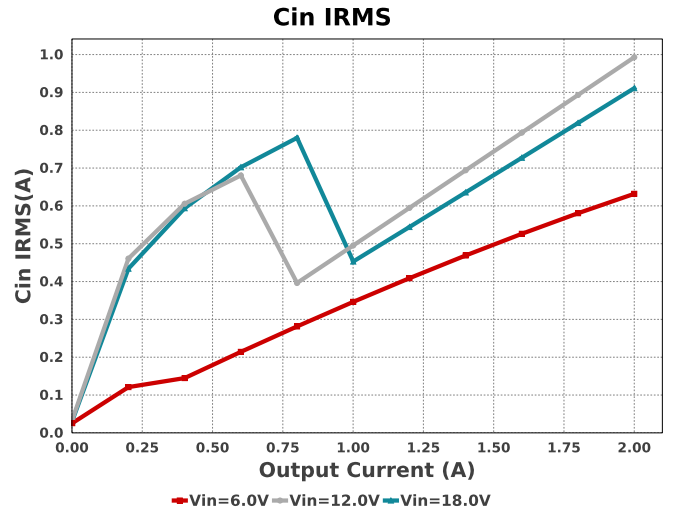
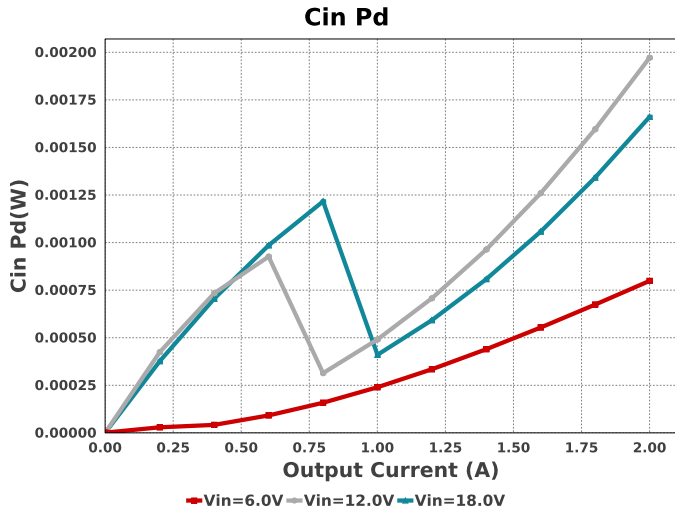


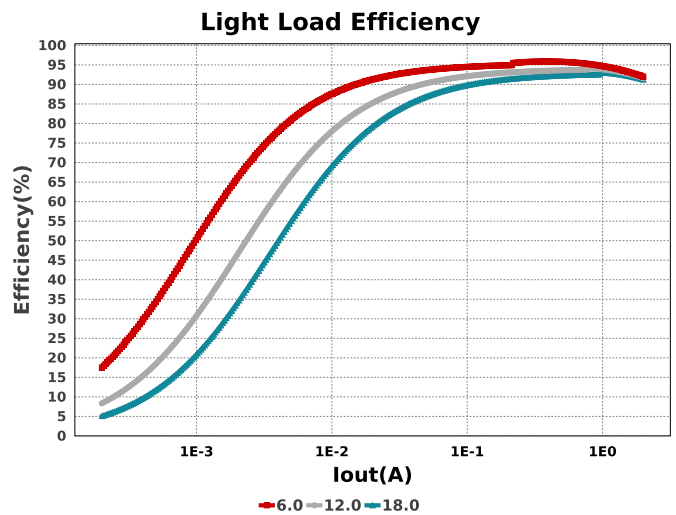
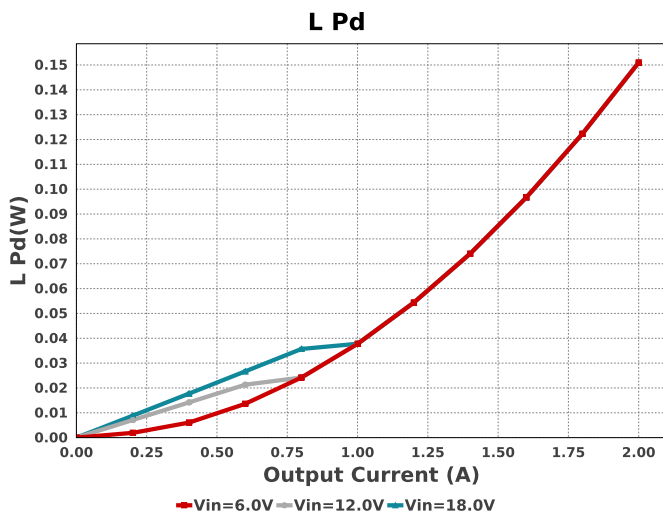
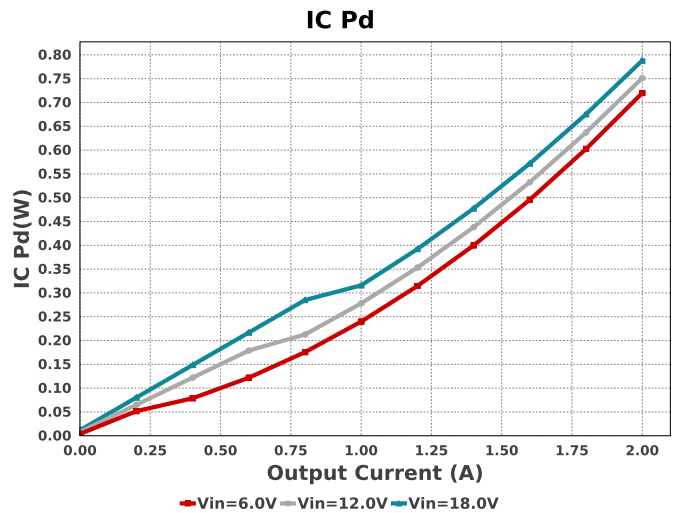
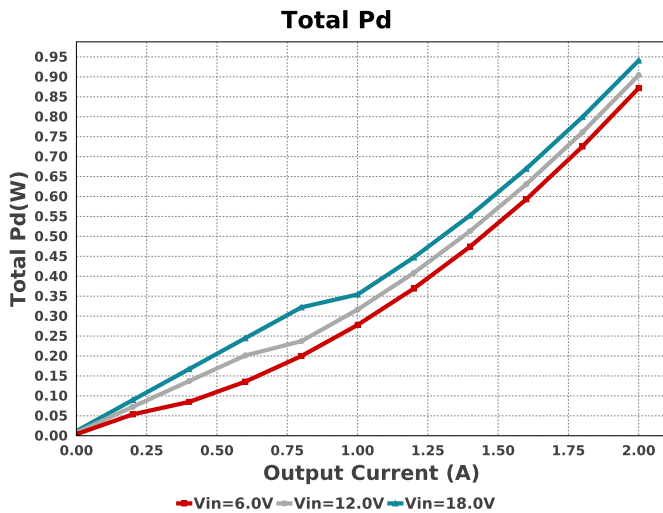
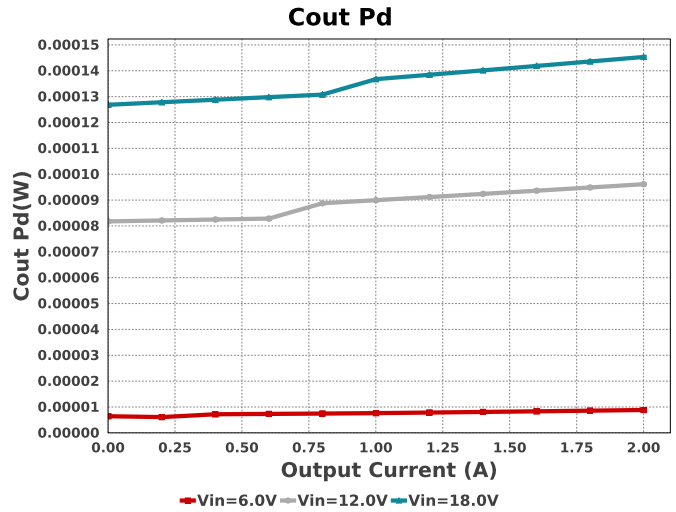
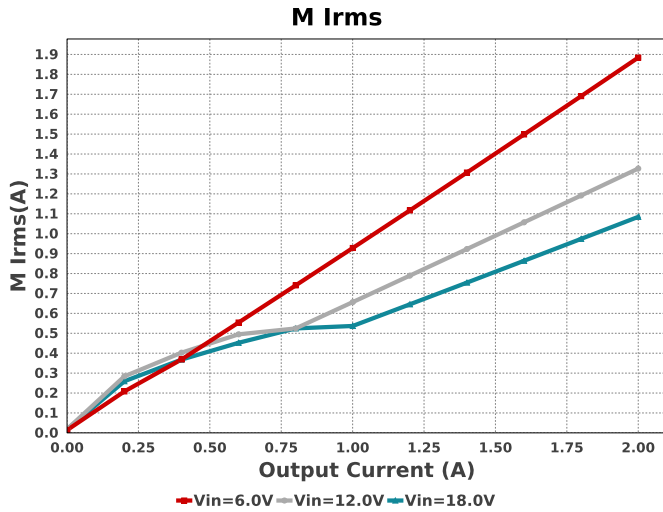
## Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cbst	MuRata	GRM155R70J104KA01D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
Cin	MuRata	GRM21BR61E106MA73L Series= X5R	Cap= 10.0 uF ESR= 4.0 mOhm VDC= 25.0 V IRMS= 2.8 A	2	\$0.05	0805 7 mm <sup>2</sup>
Cinx	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	0805 7 mm <sup>2</sup>
Cout	MuRata	GRM188R60J226MEA0D Series= X5R	Cap= 22.0 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 6.0 A	2	\$0.05	0603 5 mm <sup>2</sup>
Css	MuRata	GRM155R71E103KA01D Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
L1	Bourns	SRN6045-3R3Y	L= 3.3 uH 30.2 mOhm	1	\$0.20	 SRN6045 64 mm <sup>2</sup>
Ren	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	0201 2 mm <sup>2</sup>
Rfbb	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
Rfbt	Vishay-Dale	CRCW0402121KFKED Series= CRCW..e3	Res= 121.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
U1	Texas Instruments	TPS542951PWPR	Switcher	1	\$1.02	 PWP0016C 59 mm <sup>2</sup>







### Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	911.211 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	1.661 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	539.131 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	145.33 $\mu$ W	Capacitor	Output capacitor power dissipation
5.	IC Ipk	2.934 A	IC	Peak switch current in IC
6.	IC Iq Pd	11.7 mW	IC	IC Iq Pd
7.	IC Pd	788.09 mW	IC	IC power dissipation
8.	IC Tj	67.434 degC	IC	IC junction temperature
9.	IC Tolerance	7.6 mV	IC	IC Feedback Tolerance
10.	ICThetaJA	47.5 degC/W	IC	IC junction-to-ambient thermal resistance
11.	Iin Avg	607.83 mA	IC	Average input current

#	Name	Value	Category	Description
12.	L Ipp	1.868 A	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	151.0 mW	Inductor	Inductor power dissipation
14.	M1 Irms	1.084 A	Mosfet	Q lavg
15.	M Vds Act	162.674 mV	Mosfet	Voltage drop across the MosFET
16.	M1 PdCond	176.42 mW	Mosfet	M1 MOSFET switching losses
17.	M1 PdSw	73.072 mW	Mosfet	M1 MOSFET switching losses
18.	M1 PdCond	282.39 mW	Mosfet	M2 MOSFET switching losses
19.	M2 Pdbody	186.06 mW	Mosfet	Power dissipation through lower FET
20.	Cin Pd	1.661 mW	Power	Input capacitor power dissipation
21.	Cout Pd	145.33 $\mu$ W	Power	Output capacitor power dissipation
22.	IC Pd	788.09 mW	Power	IC power dissipation
23.	L Pd	151.0 mW	Power	Inductor power dissipation
24.	M1 PdCond	176.42 mW	Power	M1 MOSFET switching losses
25.	M1 PdSw	73.072 mW	Power	M1 MOSFET switching losses
26.	M1 PdCond	282.39 mW	Power	M2 MOSFET switching losses
27.	M2 Pdbody	186.06 mW	Power	Power dissipation through lower FET
28.	Total Pd	940.921 mW	Power	Total Power Dissipation
29.	BOM Count	12	System	Total Design BOM count
30.	Duty Cycle	29.403 %	System	Duty cycle
31.	Efficiency	91.4 %	System	Steady state efficiency
32.	FootPrint	166.0 mm <sup>2</sup>	System	Total Foot Print Area of BOM components
33.	Frequency	620.206 kHz	System	Switching frequency
34.	Iout	2.0 A	System	Iout operating point
35.	Mode	CCM	System	Conduction Mode
36.	Pout	10.0 W	System	Total output power
37.	Total BOM	\$1.48	System	Total BOM Cost
38.	Vin	18.0 V	System	Vin operating point
39.	Vout	5.0 V	System	Operational Output Voltage
40.	Vout Actual	4.953 V	System	Vout Actual calculated based on selected voltage divider resistors
41.	Vout Tolerance	2.719 %	System	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
42.	Vout p-p	39.311 mV	System	Peak-to-peak output ripple voltage

## Design Inputs

Name	Value	Description
Iout	2.0	Maximum Output Current
VinMax	18.0	Maximum input voltage
VinMin	6.0	Minimum input voltage
Vout	5.0	Output Voltage
base_pn	TPS542951/1	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

## WEBENCH® Assembly

### Design Assistance

1. Master key : 298A6B240A91A340[v1]
2. **TPS542951/1** Product Folder : <http://www.ti.com/product/TPS542951> : contains the data sheet and other resources.

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