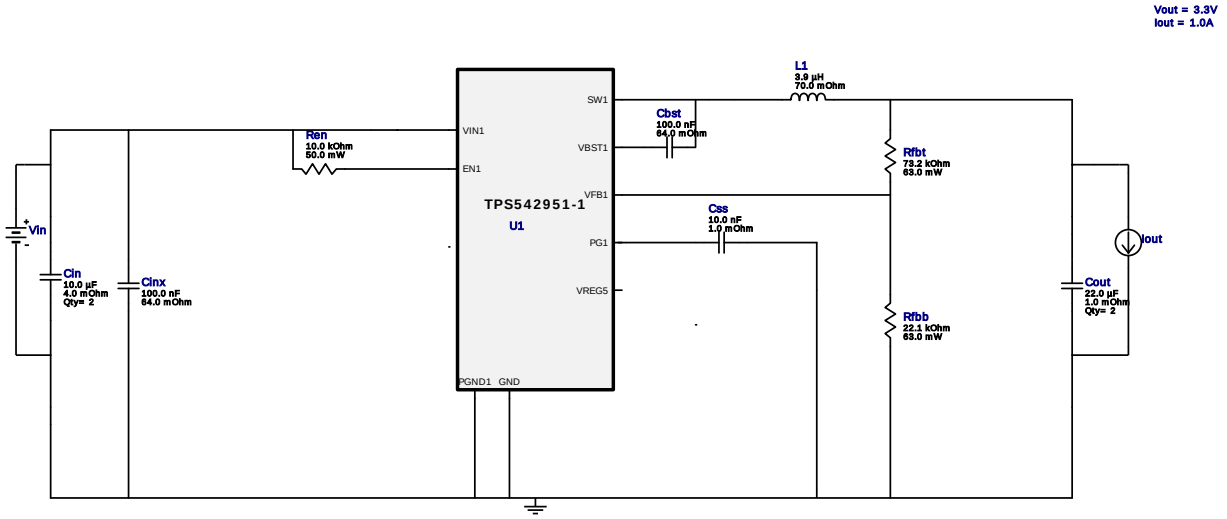
VinMin = 6.0V
VinMax = 18.0V
Vout = 3.3V
Iout = 1.0A

Device = TPS542951PWPR
Topology = Buck
Created = 2021-09-26 00:47:39.976
BOM Cost = $1.36
BOM Count = 12
Total Pd = 0.39W

WEBENCH® Design Report

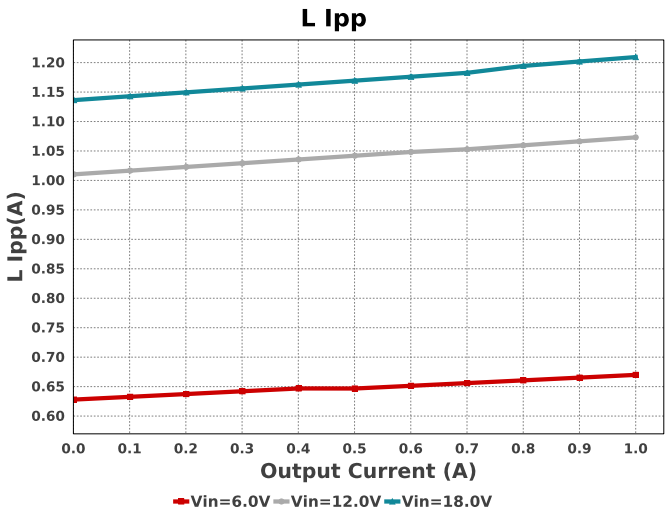
Design : 11 TPS542951PWPR
TPS542951PWPR 6V-18V to 5.00V @ 2A

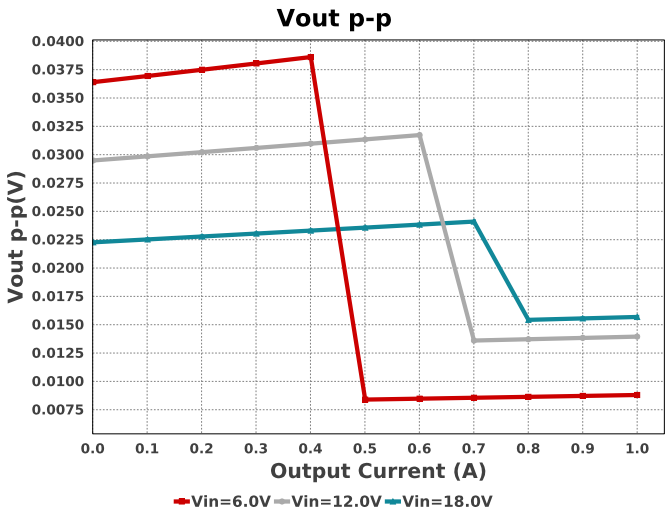


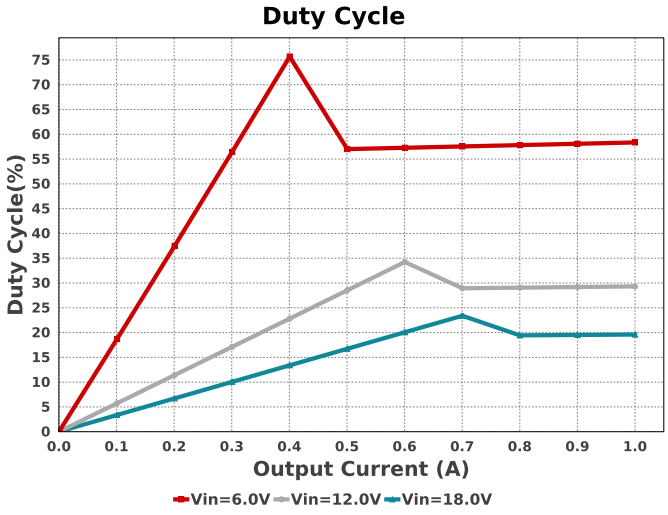
Electrical BOM

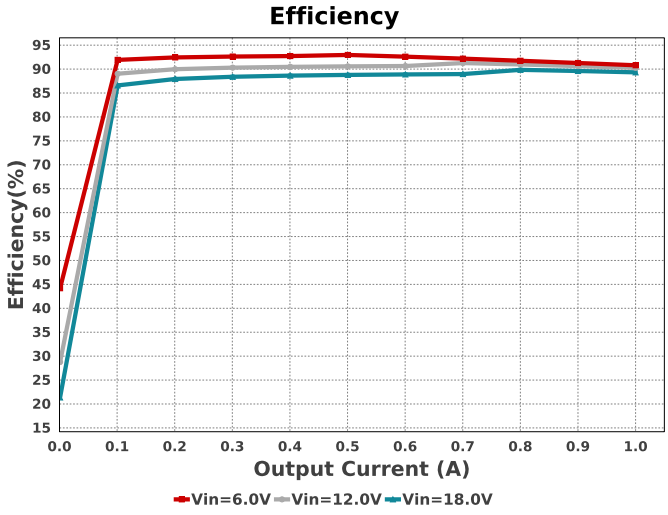
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cbst	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
Cin	MuRata	GRM21BR61E106MA73L Series= X5R	Cap= 10.0 uF ESR= 4.0 mOhm VDC= 25.0 V IRMS= 2.8 A	2	$0.05	0805 7 mm²
Cinx	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
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 mm²
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 mm²
L1	NIC Components	NPI43C3R9MTRF	L= 3.9 µH 70.0 mOhm	1	$0.09	IND_NPI43C 31 mm²
Ren	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Rfbb	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rfbt	Vishay-Dale	CRCW040273K2FKED Series= CRCW..e3	Res= 73.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

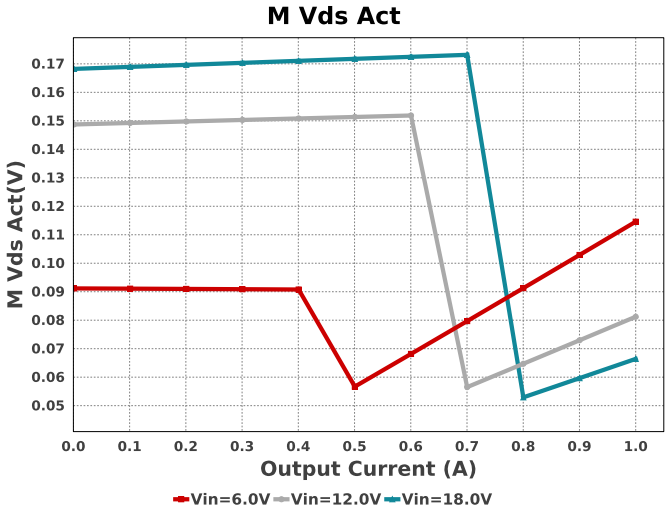
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
U1	Texas Instruments	TPS542951PWPR	Switcher	1	$1.02	PWP0016C 59 mm²

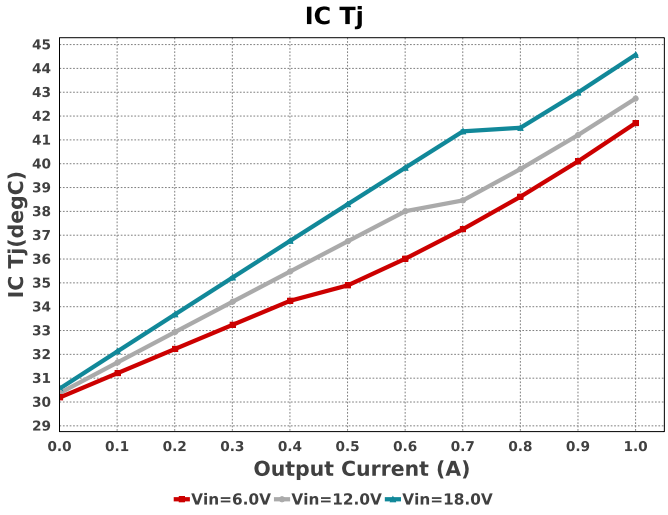


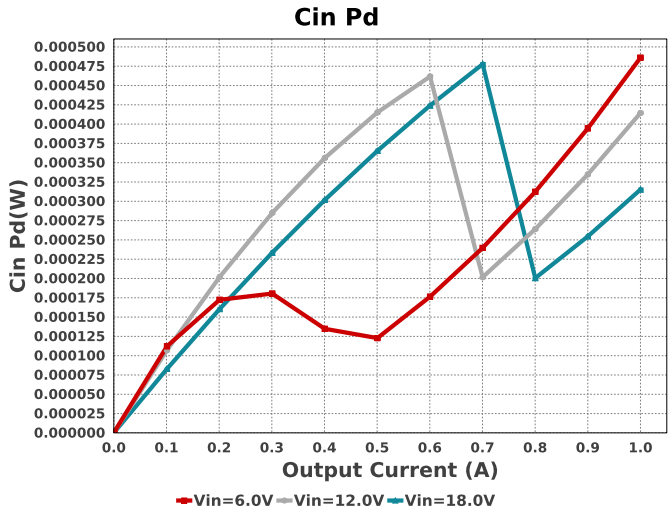


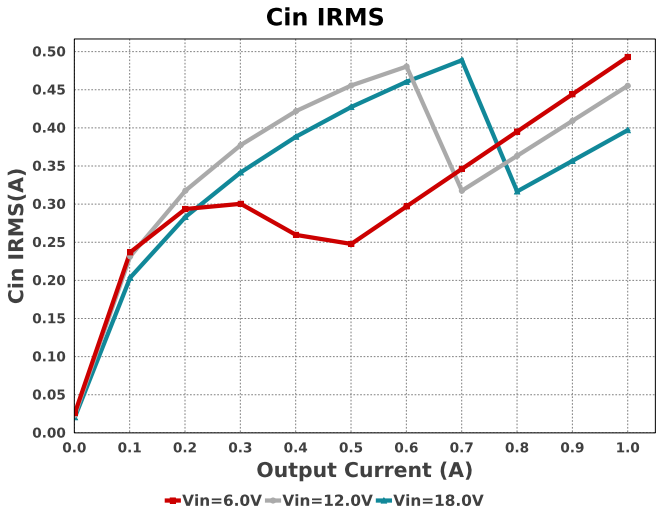


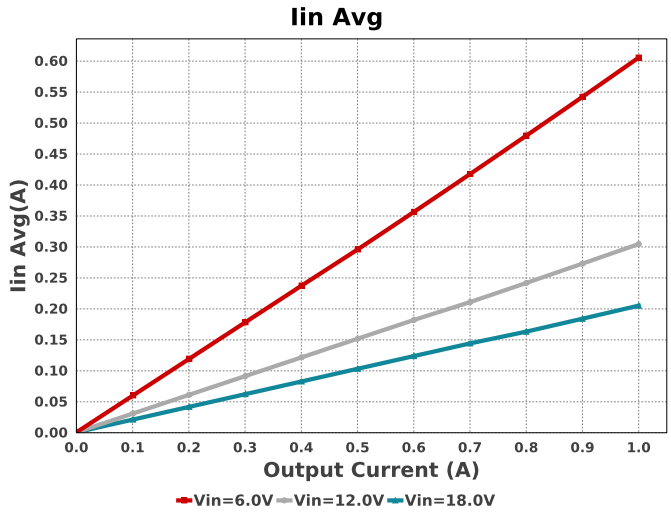


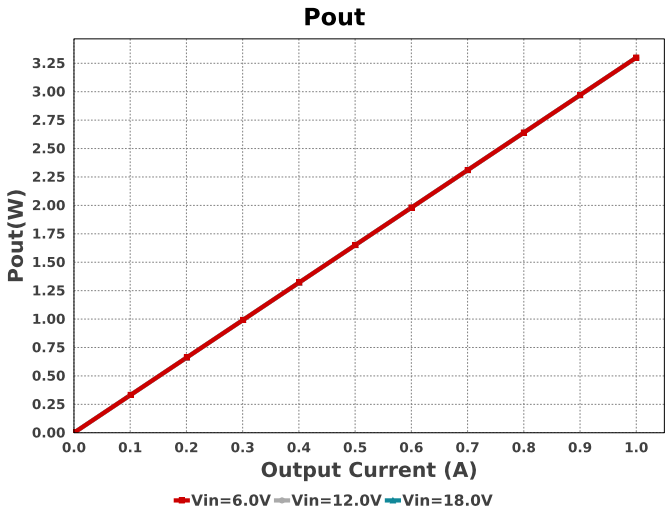


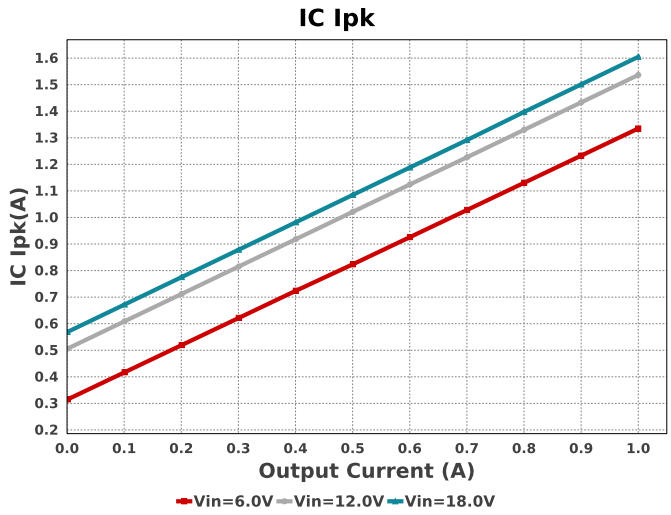


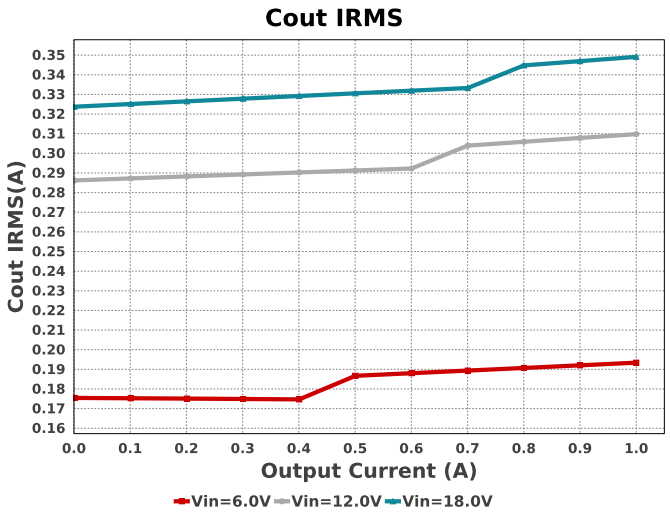


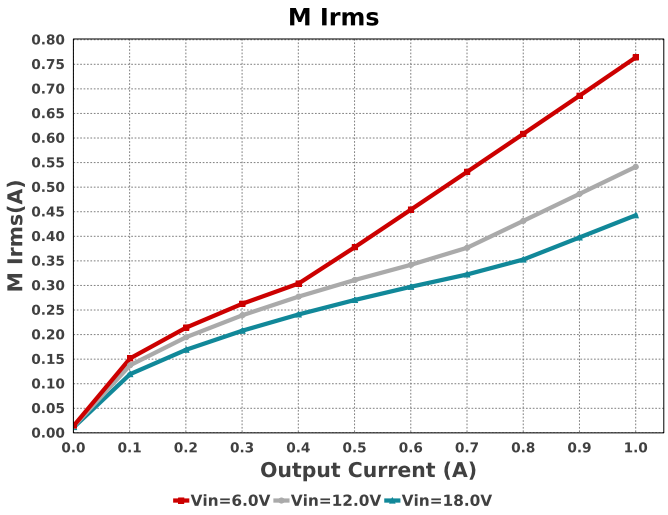


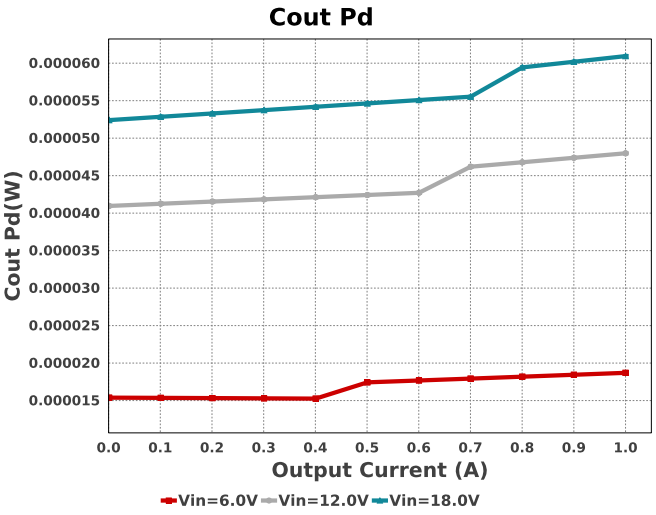


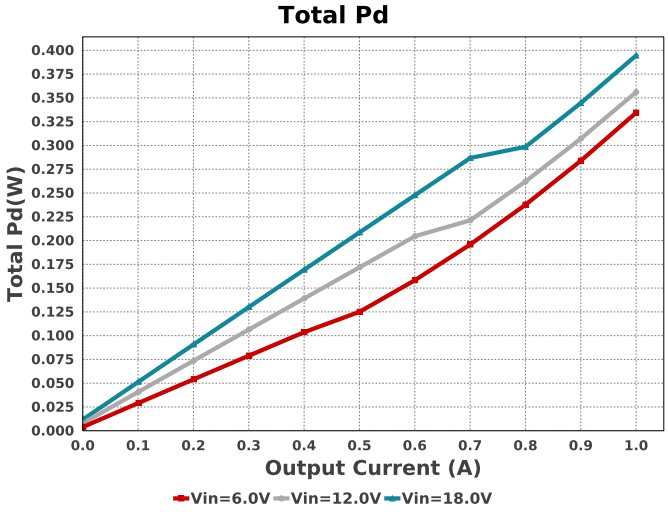


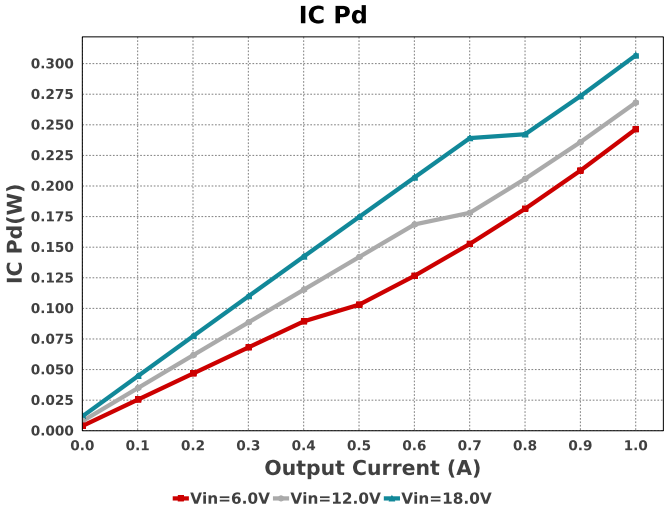


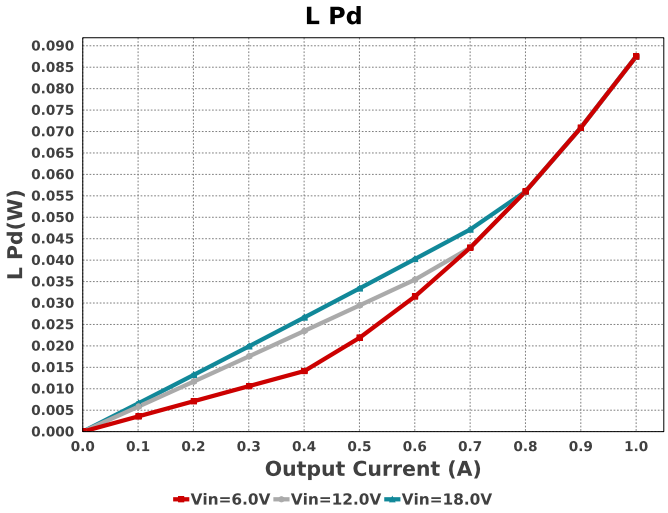


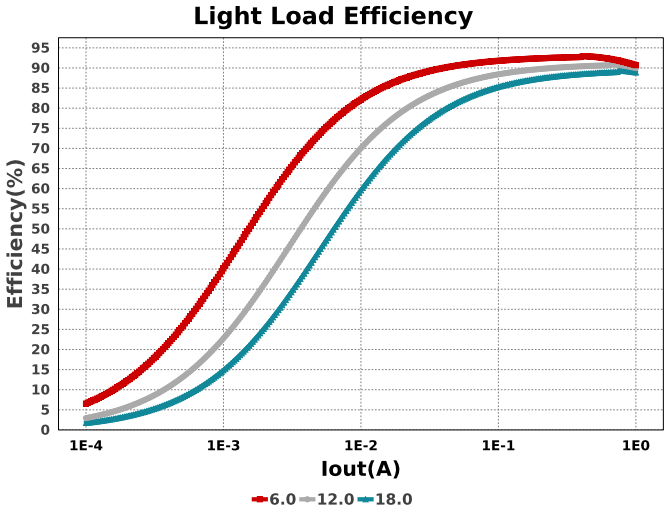












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	397.002 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	315.22 µW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	349.127 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	60.945 µW	Capacitor	Output capacitor power dissipation
5.	IC Ipk	1.605 A	IC	Peak switch current in IC
6.	IC Iq Pd	11.7 mW	IC	IC Iq Pd
7.	IC Pd	306.73 mW	IC	IC power dissipation
8.	IC Tj	44.57 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	205.26 mA	IC	Average input current

#	Name	Value	Category	Description
12.	L Ipp	1.209 A	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	87.5 mW	Inductor	Inductor power dissipation
14.	M1 Irms	442.768 mA	Mosfet	Q Iavg
15.	M Vds Act	66.415 mV	Mosfet	Voltage drop across the MosFET
16.	M1 PdCond	29.407 mW	Mosfet	M1 MOSFET switching losses
17.	M1 PdSw	35.993 mW	Mosfet	M1 MOSFET switching losses
18.	M1 PdCond	80.396 mW	Mosfet	M2 MOSFET switching losses
19.	M2 Pdbody	91.648 mW	Mosfet	Power dissipation through lower FET
20.	Cin Pd	315.22 µW	Power	Input capacitor power dissipation
21.	Cout Pd	60.945 µW	Power	Output capacitor power dissipation
22.	IC Pd	306.73 mW	Power	IC power dissipation
23.	L Pd	87.5 mW	Power	Inductor power dissipation
24.	M1 PdCond	29.407 mW	Power	M1 MOSFET switching losses
25.	M1 PdSw	35.993 mW	Power	M1 MOSFET switching losses
26.	M1 PdCond	80.396 mW	Power	M2 MOSFET switching losses
27.	M2 Pdbody	91.648 mW	Power	Power dissipation through lower FET
28.	Total Pd	394.629 mW	Power	Total Power Dissipation
29.	BOM Count	12	System Information	Total Design BOM count
30.	Duty Cycle	19.604 %	System Information	Duty cycle
31.	Efficiency	89.319 %	System Information	Steady state efficiency
32.	FootPrint	137.0 mm^2	System Information	Total Foot Print Area of BOM components
33.	Frequency	610.987 kHz	System Information	Switching frequency
34.	Iout	1.0 A	System Information	Iout operating point
35.	Mode	CCM	System Information	Conduction Mode
36.	Pout	3.3 W	System Information	Total output power
37.	Total BOM	$1.36	System Information	Total BOM Cost
38.	Vin	18.0 V	System Information	Vin operating point
39.	Vout	3.3 V	System Information	Operational Output Voltage
40.	Vout Actual	3.299 V	System Information	Vout Actual calculated based on selected voltage divider resistors
41.	Vout Tolerance	2.561 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
42.	Vout p-p	16.278 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	1.0	Maximum Output Current
VinMax	18.0	Maximum input voltage
VinMin	6.0	Minimum input voltage
Vout	3.3	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.