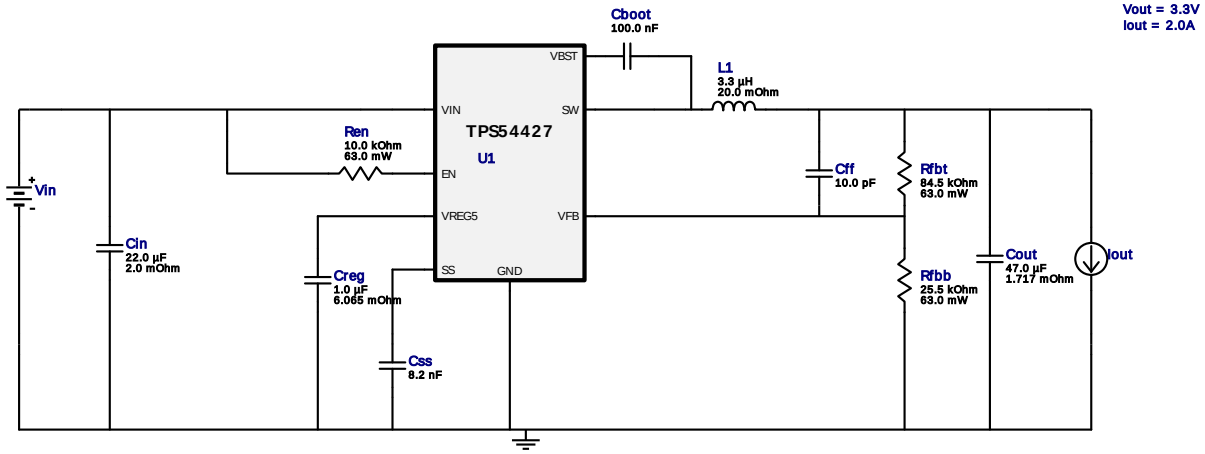
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 18.0V
Vout = 3.3V
Iout = 2.0A

Device = TPS54427DDAR
Topology = Buck
Created = 8/23/16 6:04:47 AM
BOM Cost = $1.59
BOM Count = 11
Total Pd = 0.85W

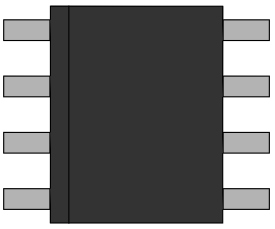
Design : 4728750/29 TPS54427DDAR
TPS54427DDAR 10.0V-18.0V to 3.30V @ 2.0A



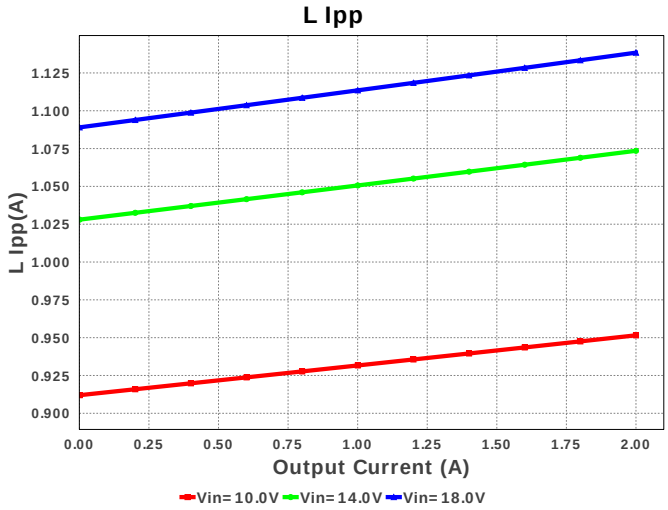
Electrical BOM

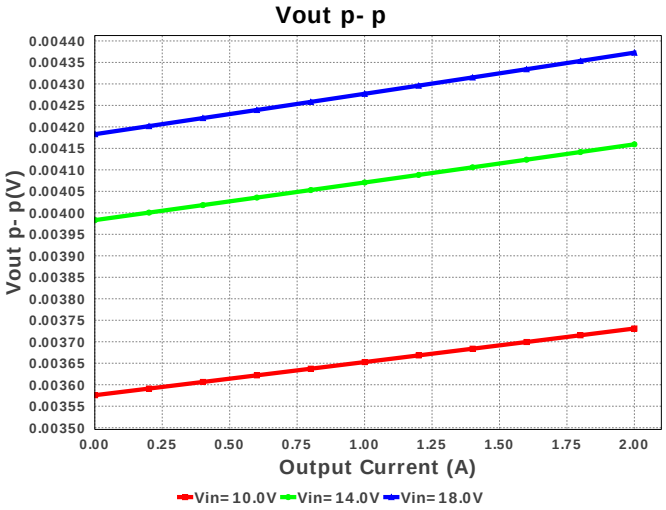
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cff	Kemet	C0805C100M4GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	$0.16	1210 15 mm²
4.	Cout	TDK	C3216JB1A476M Series= JB	Cap= 47.0 uF ESR= 1.717 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.34	1206 11 mm²
5.	Creg	MuRata	GRM188R61A105KA61D Series= X5R	Cap= 1.0 uF ESR= 6.065 mOhm VDC= 10.0 V IRMS= 1.30675 A	1	$0.01	0603 5 mm²
6.	Css	MuRata	GRM033R61A822KA01D Series= X5R	Cap= 8.2 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
7.	L1	Bourns	SDR0805-3R3ML	L= 3.3 µH DCR= 20.0 mOhm	1	$0.22	SDR0805 96 mm²
8.	Ren	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfbb	Vishay-Dale	CRCW040225K5FKED Series= CRCW..e3	Res= 25.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rfbt	Vishay-Dale	CRCW040284K5FKED Series= CRCW..e3	Res= 84.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

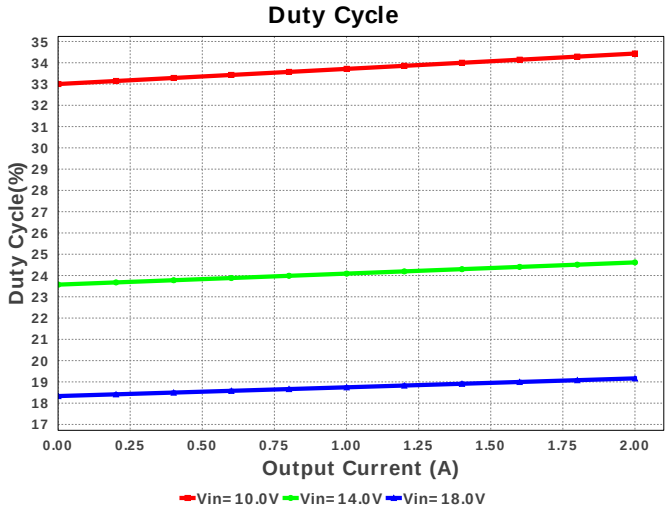
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	TPS54427DDAR	Switcher	1	$0.80	

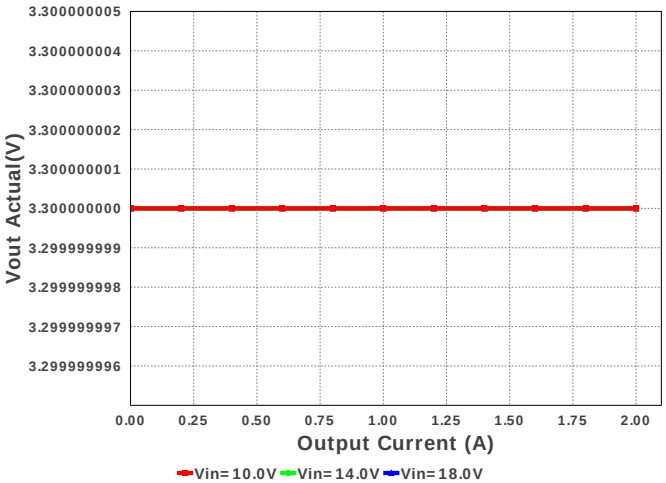


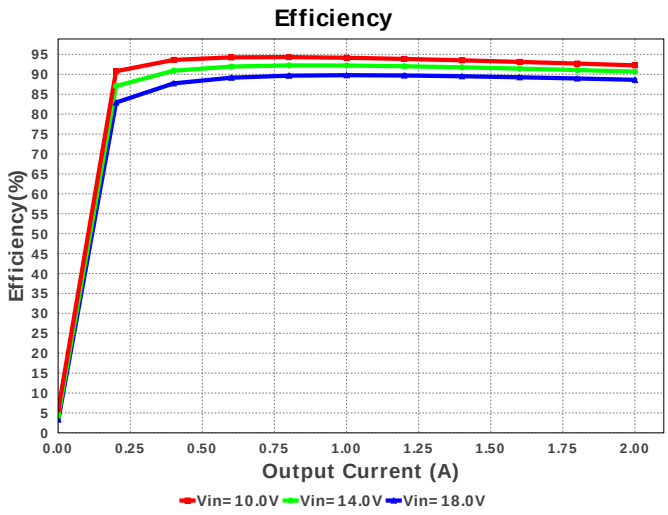
R-PDSO-G8 55 mm²

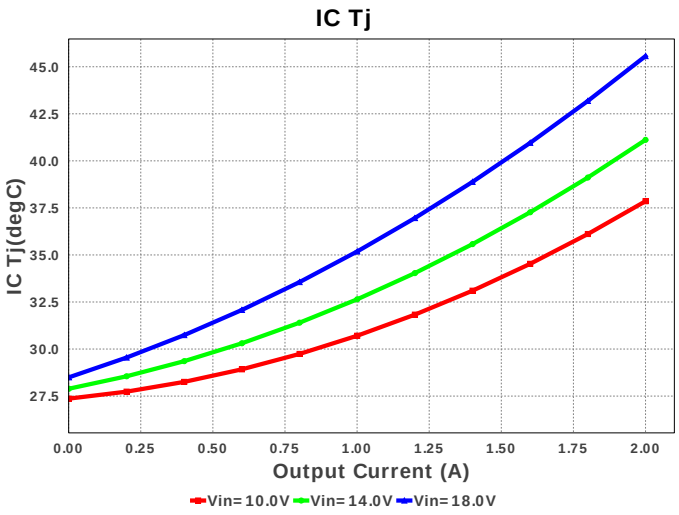


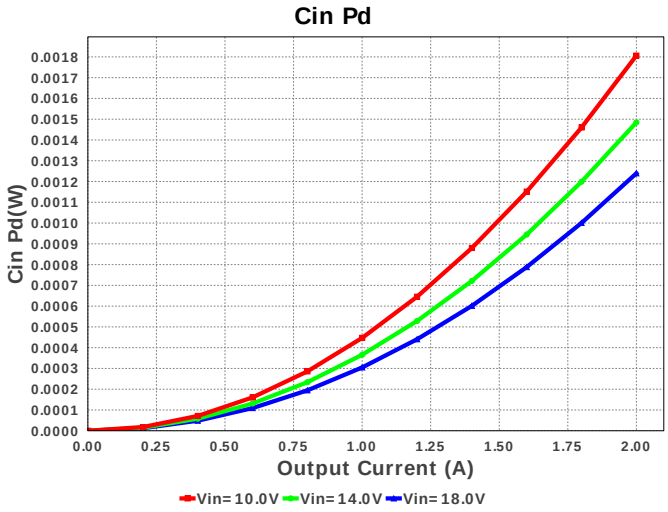


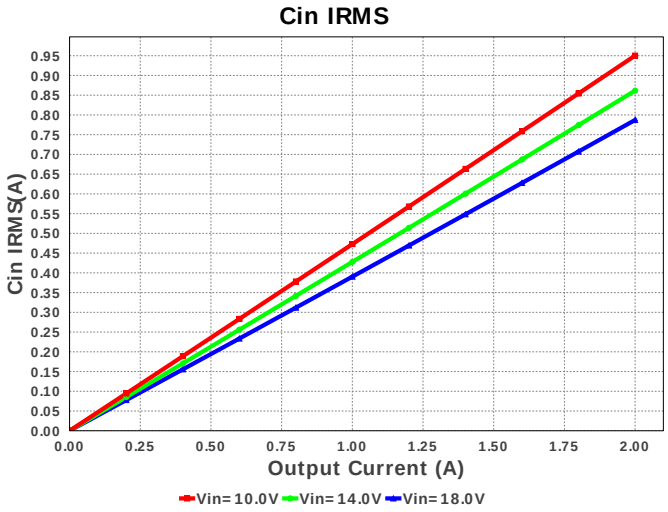


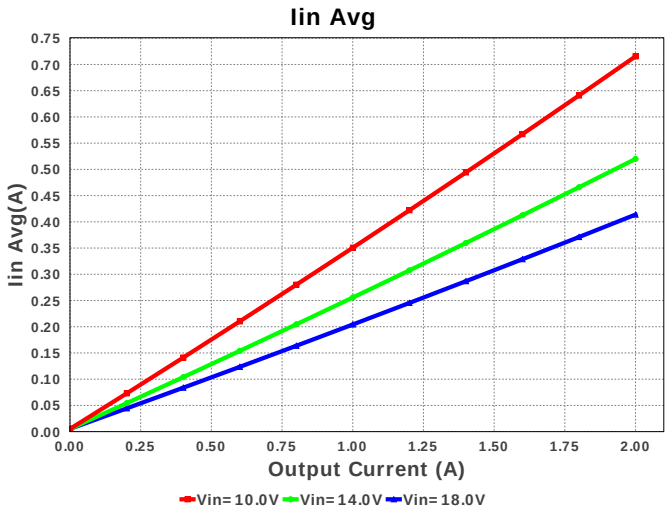


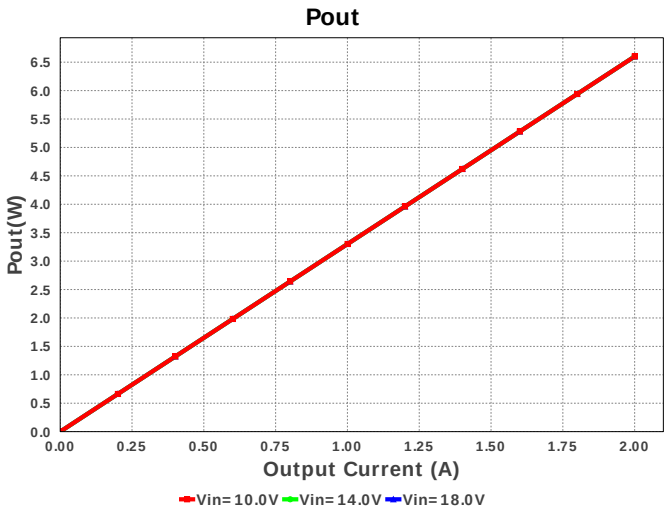


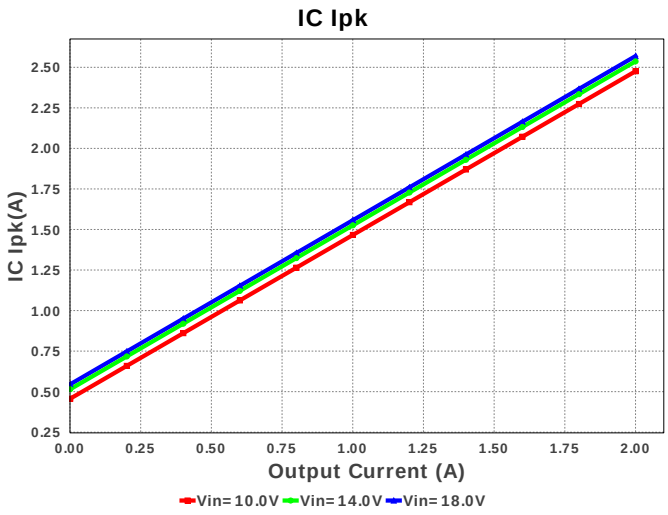


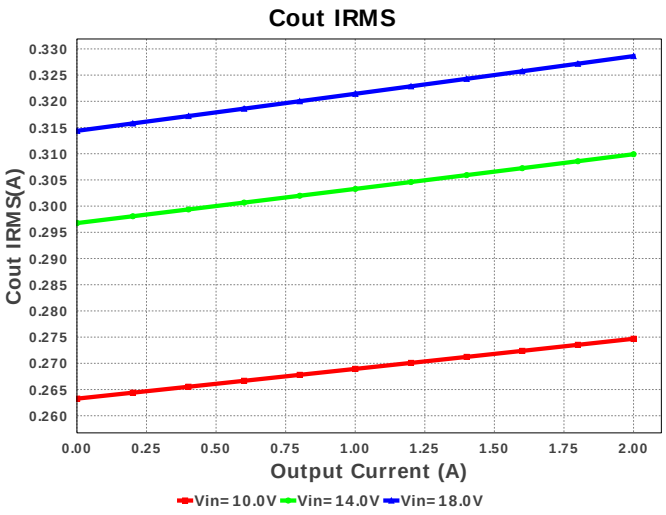


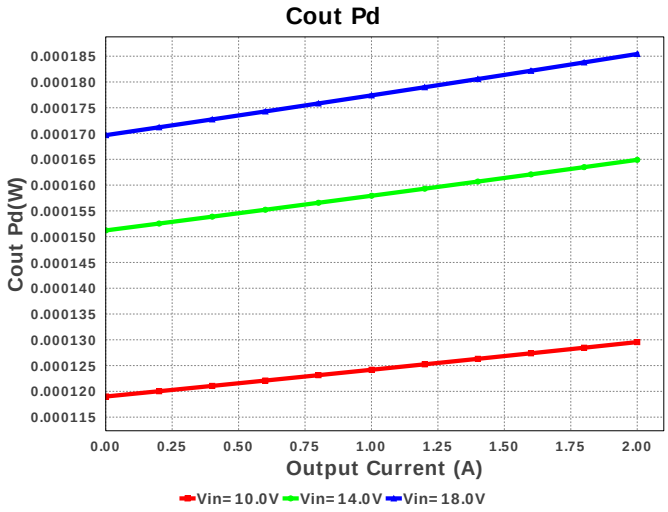


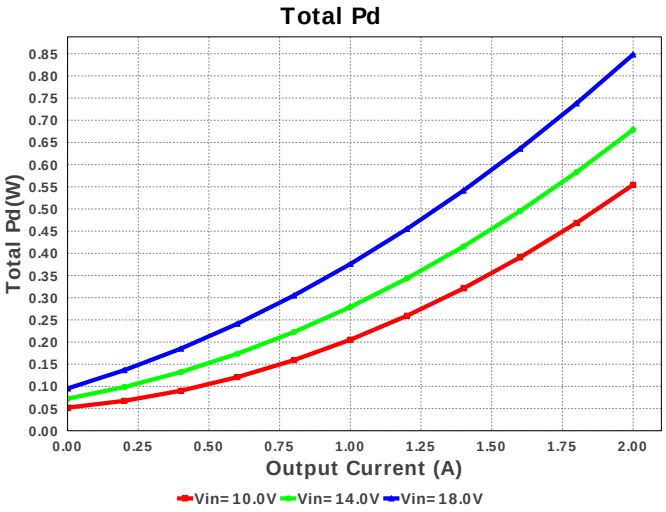


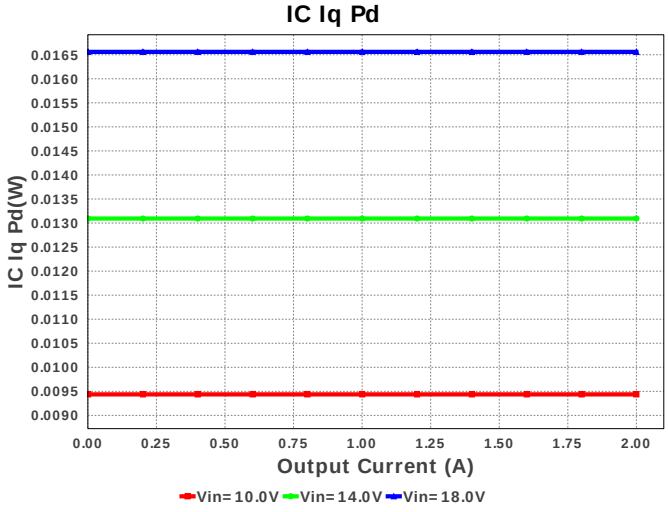


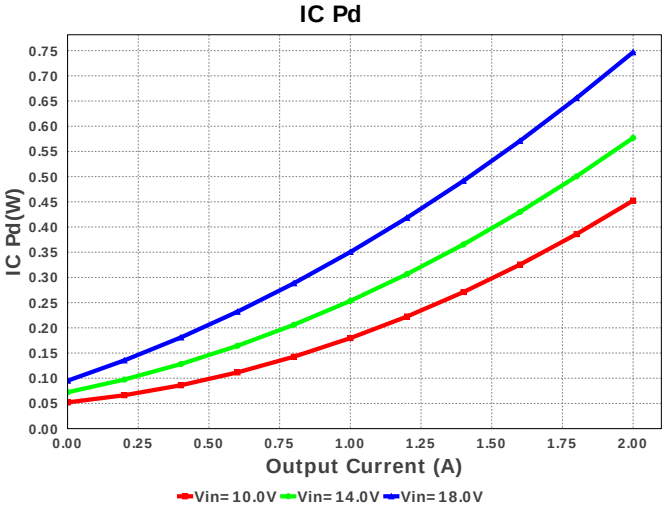


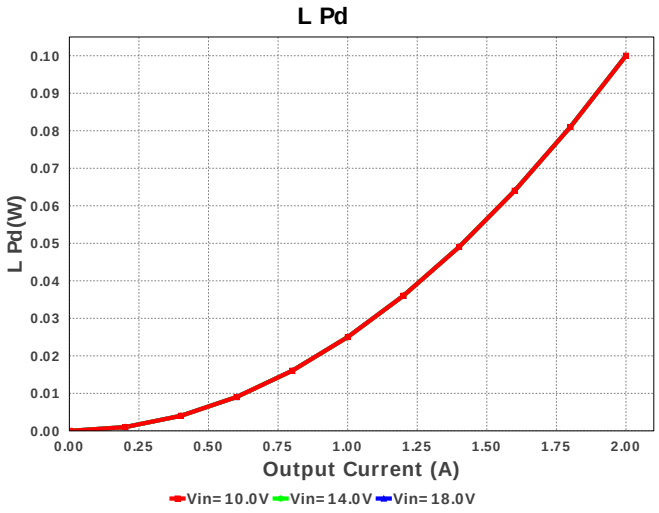












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	787.199 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	328.627 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.569 A	Current	Peak switch current in IC
4.	Iin Avg	413.79 mA	Current	Average input current
5.	L Ipp	1.138 A	Current	Peak-to-peak inductor ripple current
6.	BOM Count	11	General	Total Design BOM count
7.	FootPrint	202.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	749.927 kHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	6.6 W	General	Total output power
11.	Total BOM	$1.59	General	Total BOM Cost
12.	ICThetaJA Effective	26.2 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
13.	Vout Actual	3.3 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	19.165 %	Op_point	Duty cycle
16.	Efficiency	88.612 %	Op_point	Steady state efficiency
17.	IC Tj	45.566 degC	Op_point	IC junction temperature
18.	IOUT_OP	2.0 A	Op_point	Iout operating point
19.	VIN_OP	18.0 V	Op_point	Vin operating point
20.	Vout p-p	4.373 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	1.239 mW	Power	Input capacitor power dissipation
22.	Cout Pd	185.429 µW	Power	Output capacitor power dissipation
23.	IC Iq Pd	16.56 mW	Power	IC Iq Pd
24.	IC Pd	746.786 mW	Power	IC power dissipation
25.	L Pd	100.0 mW	Power	Inductor power dissipation
26.	Total Pd	848.203 mW	Power	Total Power Dissipation
27.	Vout Tolerance	3.41 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	18.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS54427	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	26.0	Ambient temperature

Design Assistance

1. **TPS54427** Product Folder : http://www.ti.com/product/TPS54427 : contains the data sheet and other resources.