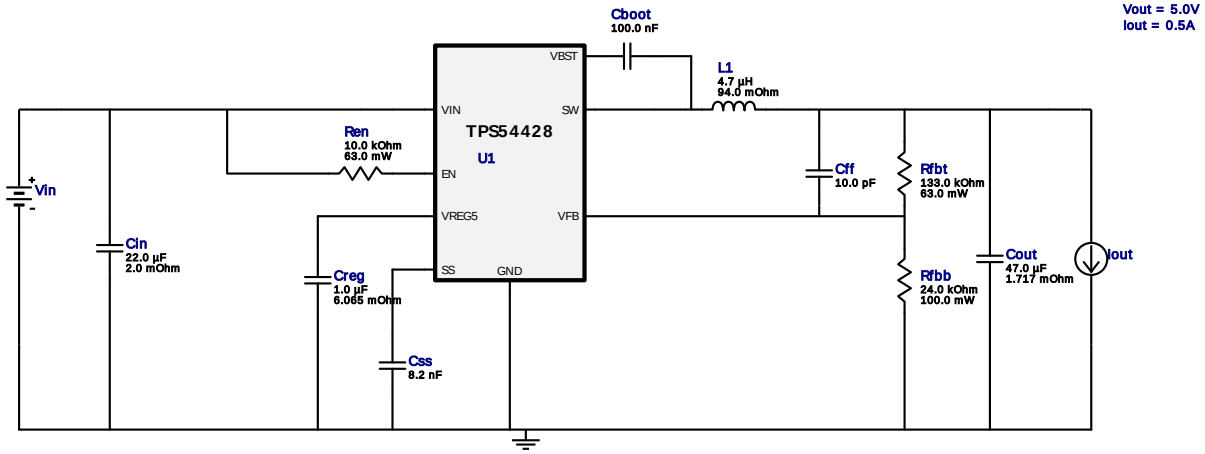
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 12.0V
Vout = 5.0V
Iout = 0.5A

Device = TPS54428DDAR
Topology = Buck
Created = 7/21/16 8:59:13 PM
BOM Cost = $1.51
BOM Count = 11
Total Pd = 0.15W

Design : 4742013/255 TPS54428DDAR
TPS54428DDAR 10.0V-12.0V to 5.00V @ 0.5A

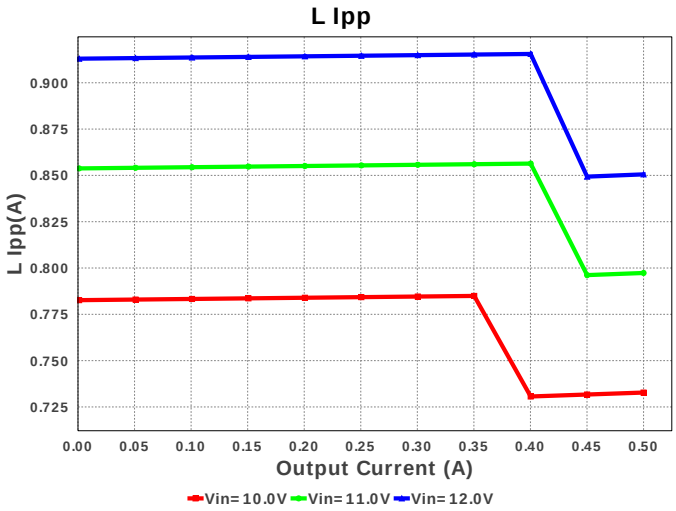


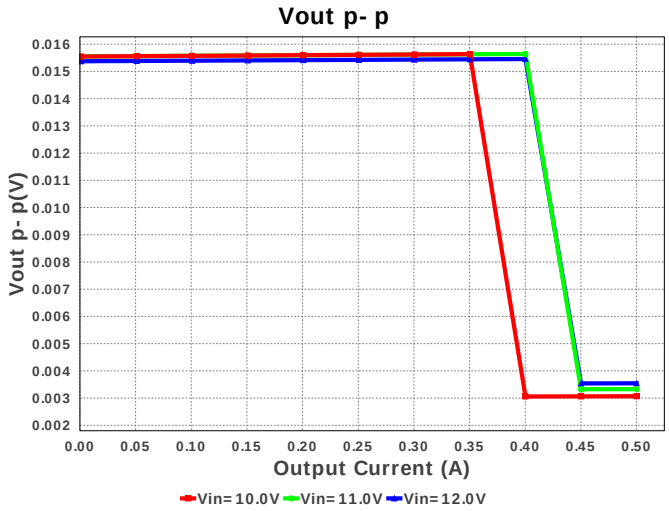
Electrical BOM

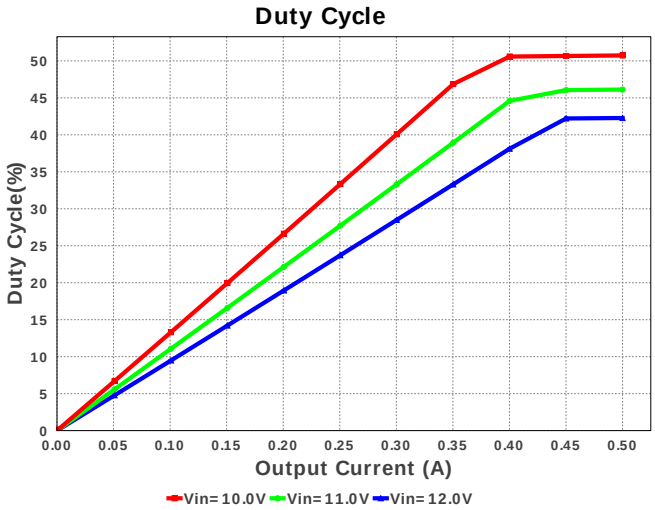
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cff	Kemet	C0805C100M4GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM32ER61C226ME20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	1	$0.12	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	SDR0403-4R7ML	L= 4.7 µH DCR= 94.0 mOhm	1	$0.18	SDR0403 28 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	Yageo America	RC0603FR-0724KL Series= ?	Res= 24.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
10.	Rfbt	Vishay-Dale	CRCW0402133KFKED Series= CRCW..e3	Res= 133.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

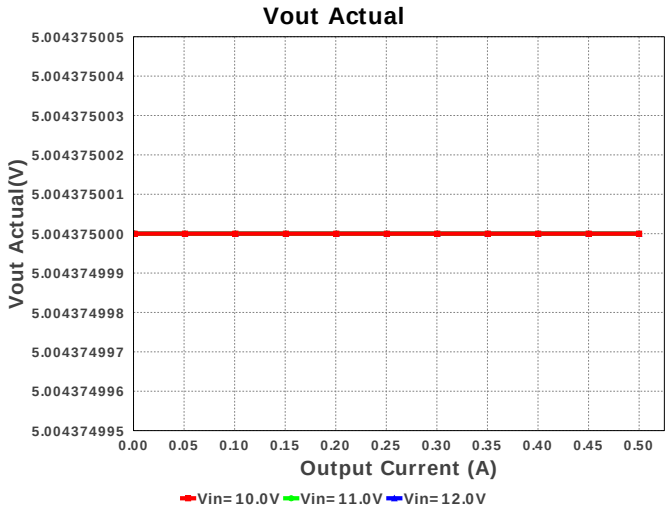
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	TPS54428DDAR	Switcher	1	$0.80	

R-PDSO-G8 57 mm^2

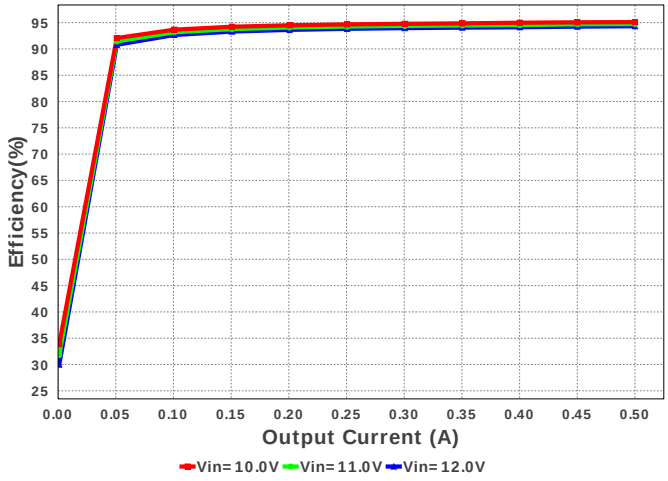




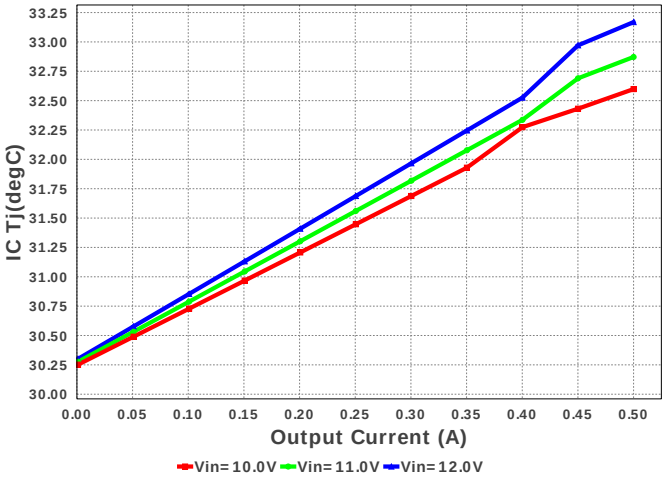




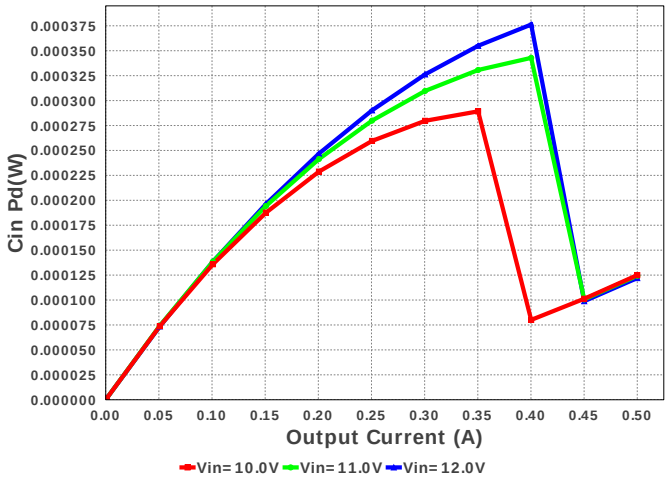
Efficiency



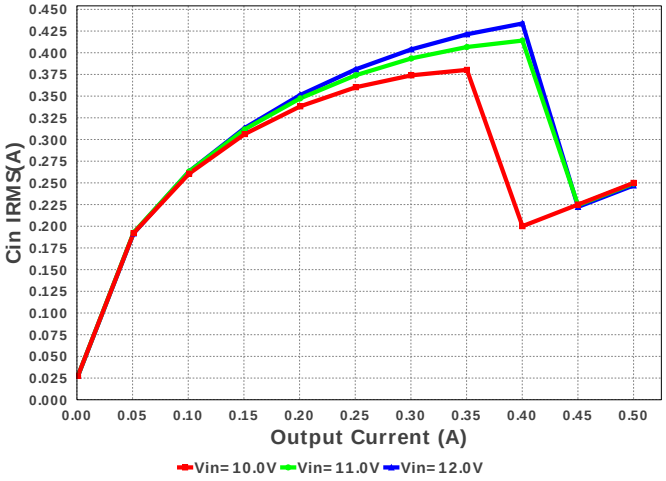
IC Tj



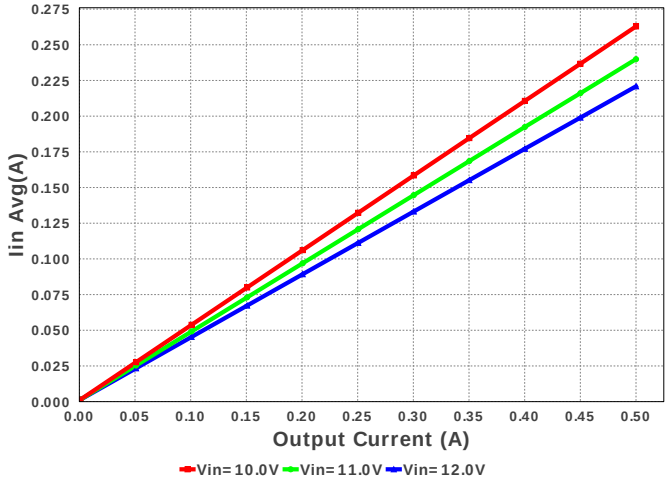
Cin Pd



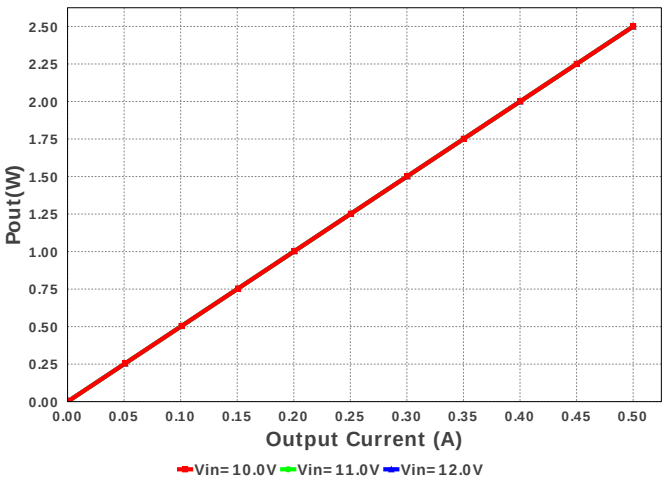
Cin IRMS

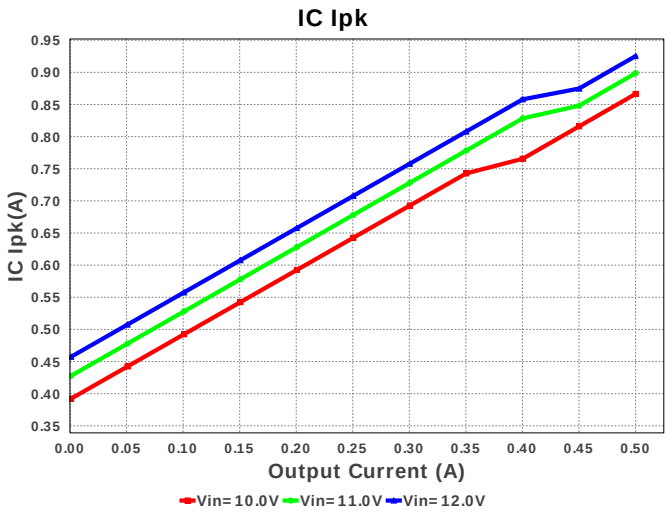


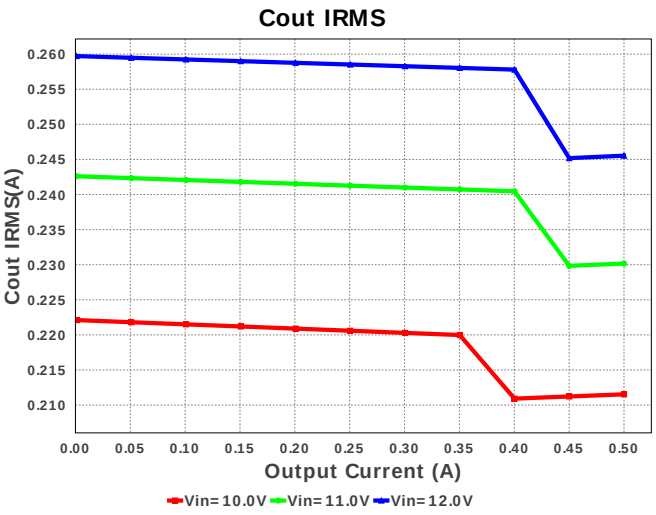
Iin Avg

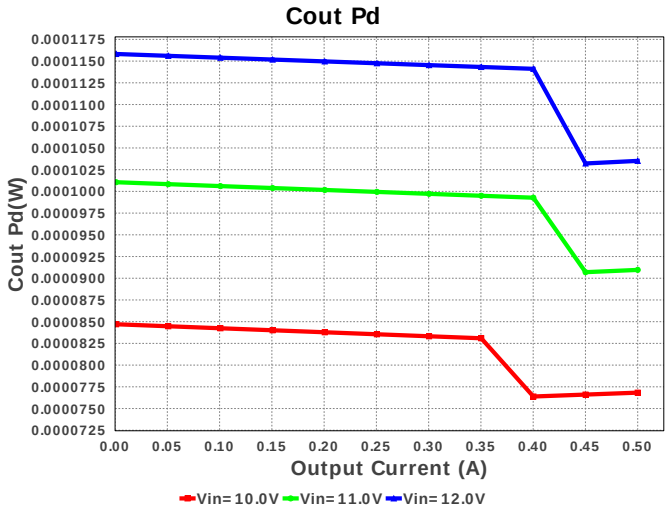


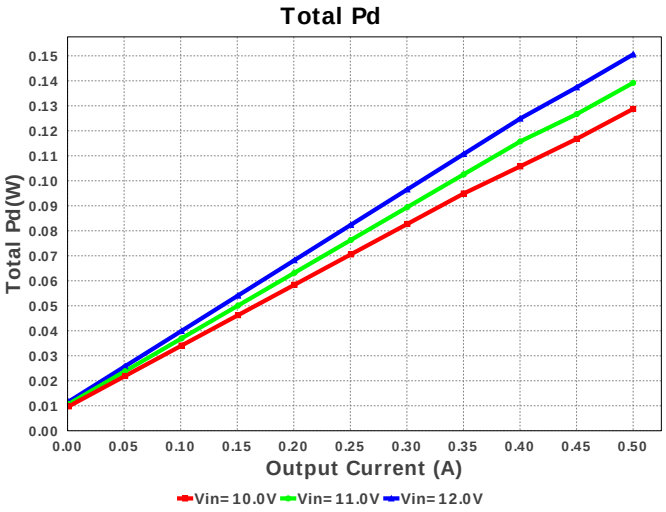
Pout

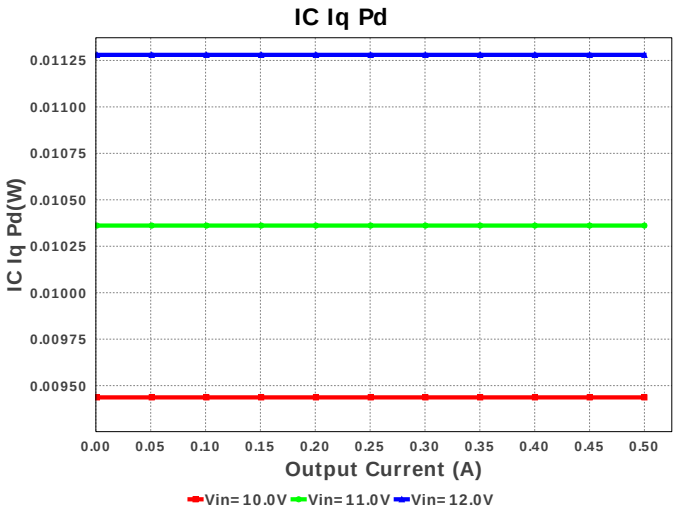


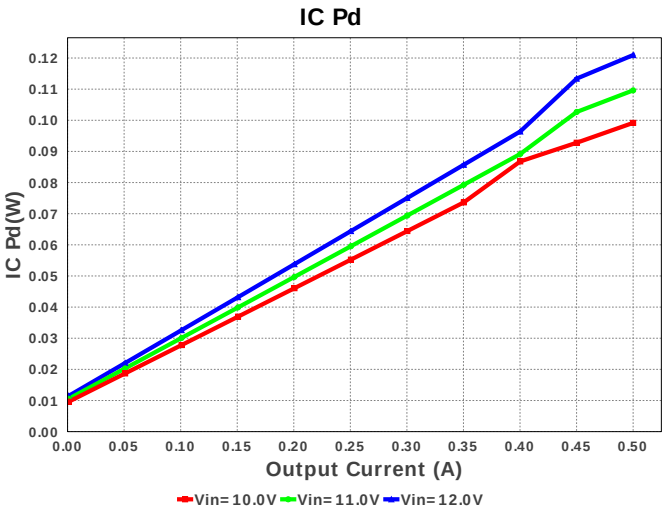


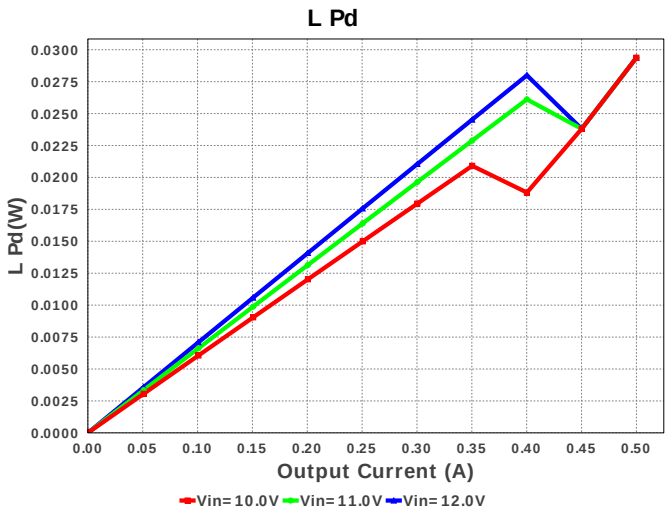


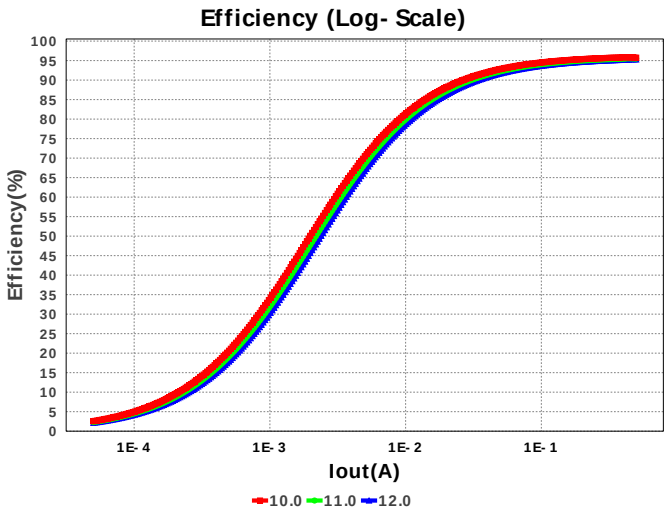












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	246.997 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	245.533 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	925.276 mA	Current	Peak switch current in IC
4.	Iin Avg	220.88 mA	Current	Average input current
5.	L Ipp	850.55 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	11	General	Total Design BOM count
7.	FootPrint	138.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	740.224 kHz	General	Switching frequency
9.	Pout	2.5 W	General	Total output power
10.	Total BOM	$1.51	General	Total BOM Cost
11.	ICThetaJA Effective	26.2 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
12.	Vout Actual	5.004 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
14.	Duty Cycle	42.273 %	Op_point	Duty cycle
15.	Efficiency	94.32 %	Op_point	Steady state efficiency
16.	IC Tj	33.169 degC	Op_point	IC junction temperature
17.	IOUT_OP	500.0 mA	Op_point	Iout operating point
18.	VIN_OP	12.0 V	Op_point	Vin operating point
19.	Vout p-p	3.543 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	122.015 µW	Power	Input capacitor power dissipation
21.	Cout Pd	103.512 µW	Power	Output capacitor power dissipation
22.	IC Iq Pd	11.28 mW	Power	IC Iq Pd
23.	IC Pd	120.945 mW	Power	IC power dissipation
24.	L Pd	29.375 mW	Power	Inductor power dissipation
25.	Total Pd	150.552 mW	Power	Total Power Dissipation
26.	Vout Tolerance	3.573 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	12.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS54428	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54428** Product Folder : http://www.ti.com/product/TPS54428 : contains the data sheet and other resources.