

VinMin = 12.0V
VinMax = 14.0V
Vout = 4.0V
Iout = 4.0A

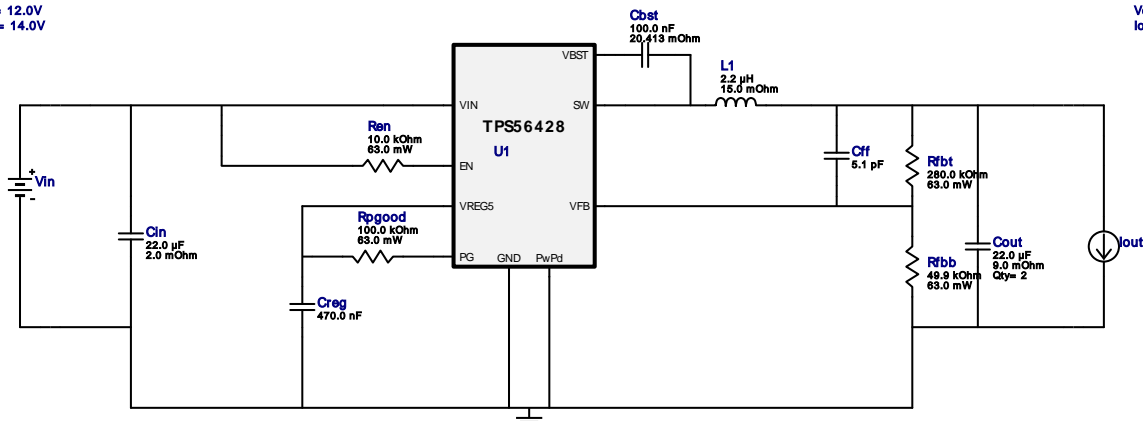
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Topology = Buck
Created = 11/3/14 7:39:43 AM
BOM Cost = \$1.84
Footprint = 220.0 mm²
BOM Count = 12
Total Pd = 1.84W

WEBENCH® Design Report

Design : 1244294/68 TPS56428DDAR
TPS56428DDAR 12.0V-14.0V to 4.00V @ 4.0A

VinMin = 12.0V
VinMax = 14.0V

Vout = 4.0V
Iout = 4.0A



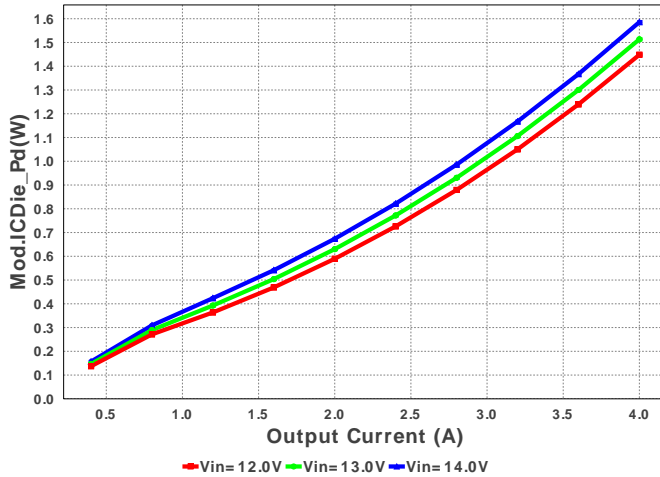
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	TDK	C1005X5R1A104K Series= 285	Cap= 100.0 nF ESR= 20.413 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Cff	MuRata	GRM1555C1E5R1CA01D Series= C0G/NP0	Cap= 5.1 pF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
3.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	\$0.28	1210 15 mm ²
4.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	\$0.03	0805 7 mm ²
5.	Creg	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
6.	L1	TDK	VLP8040T-2R2N	L= 2.2 uH DCR= 15.0 mOhm	1	\$0.22	VLP8040 113 mm ²
7.	Ren	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
8.	Rfbb	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
9.	Rfht	Vishay-Dale	CRCW0402280KFKED Series= CRCW..e3	Res= 280.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rpgood	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

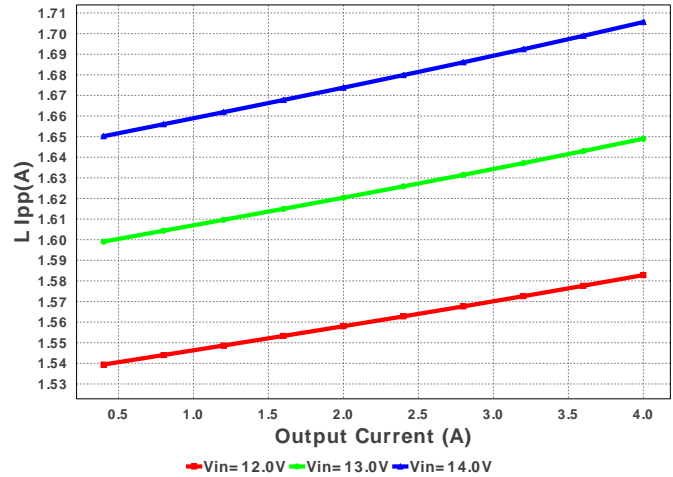
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11. U1		Texas Instruments	TPS56428DDAR	Switcher	1	\$1.22	

R-PDSO-G8 57 mm²

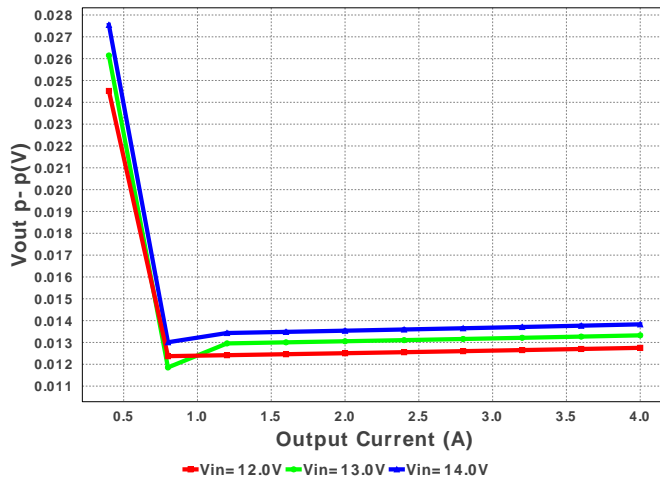
Mod.ICDie_Pd



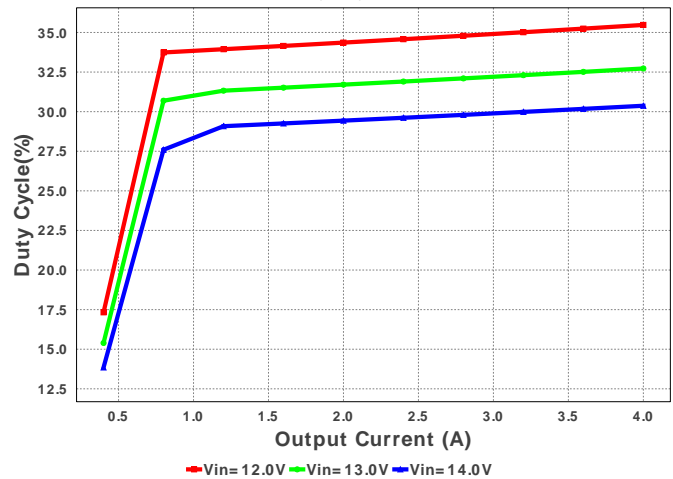
L Ipp



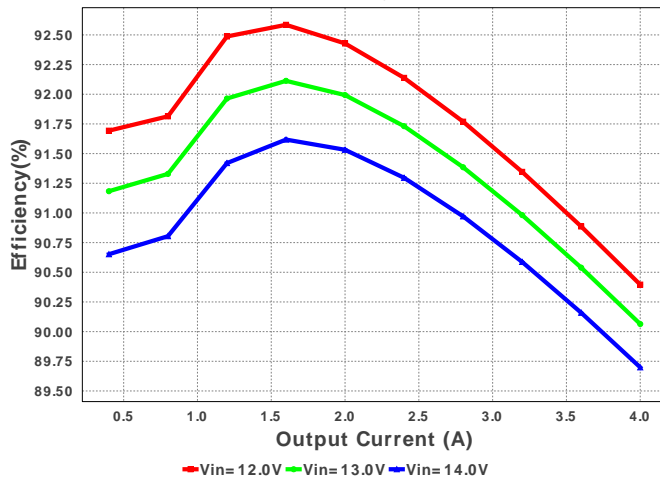
Vout p- p



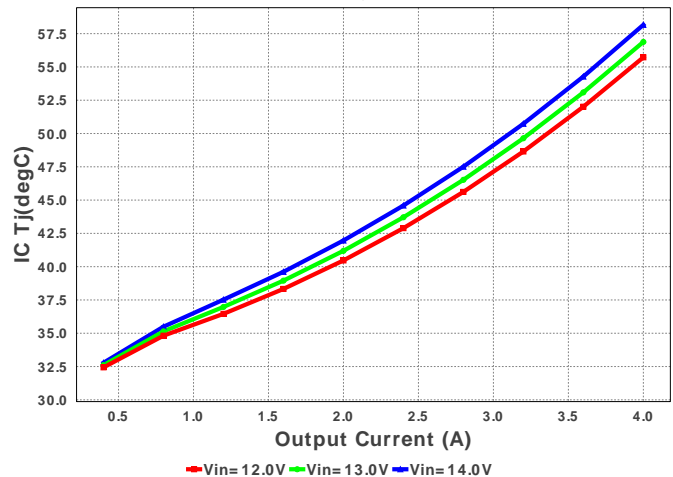
Duty Cycle

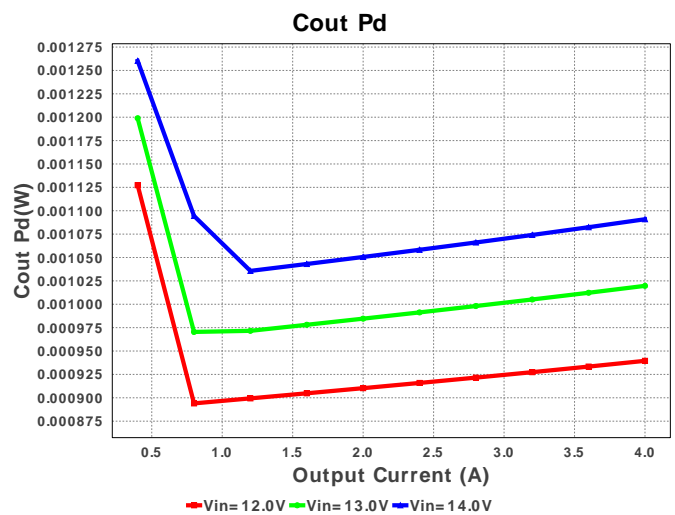
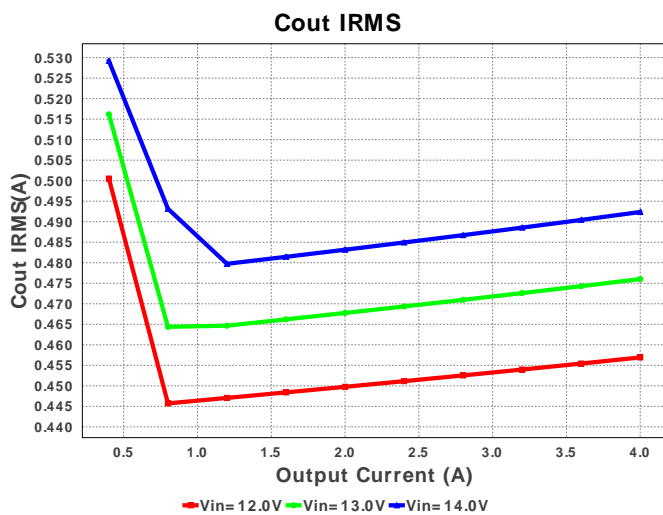
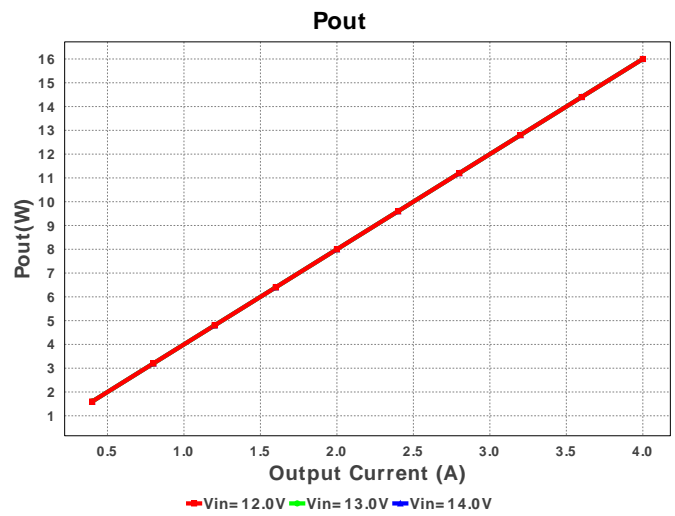
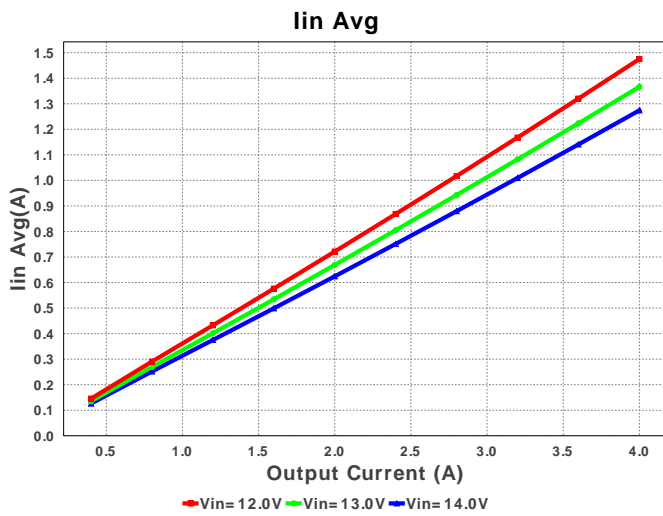
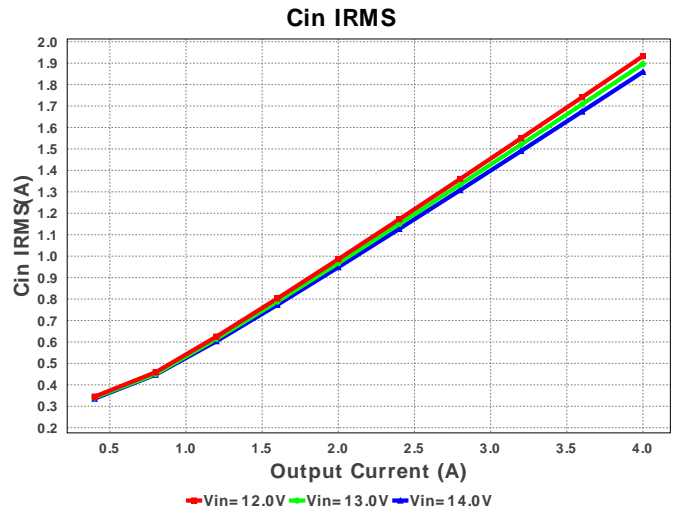
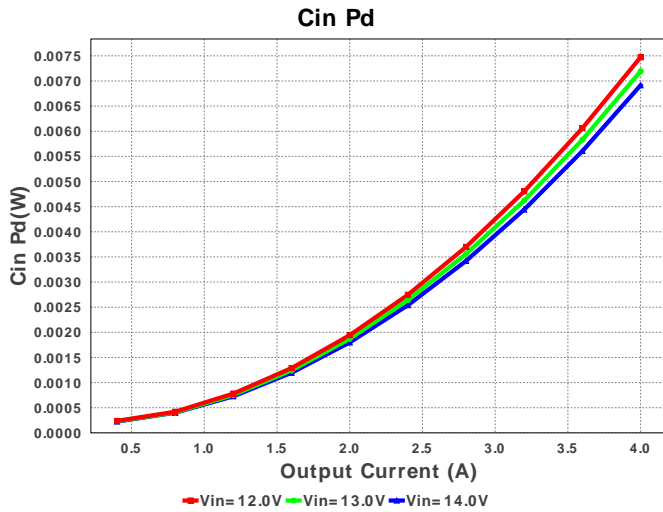


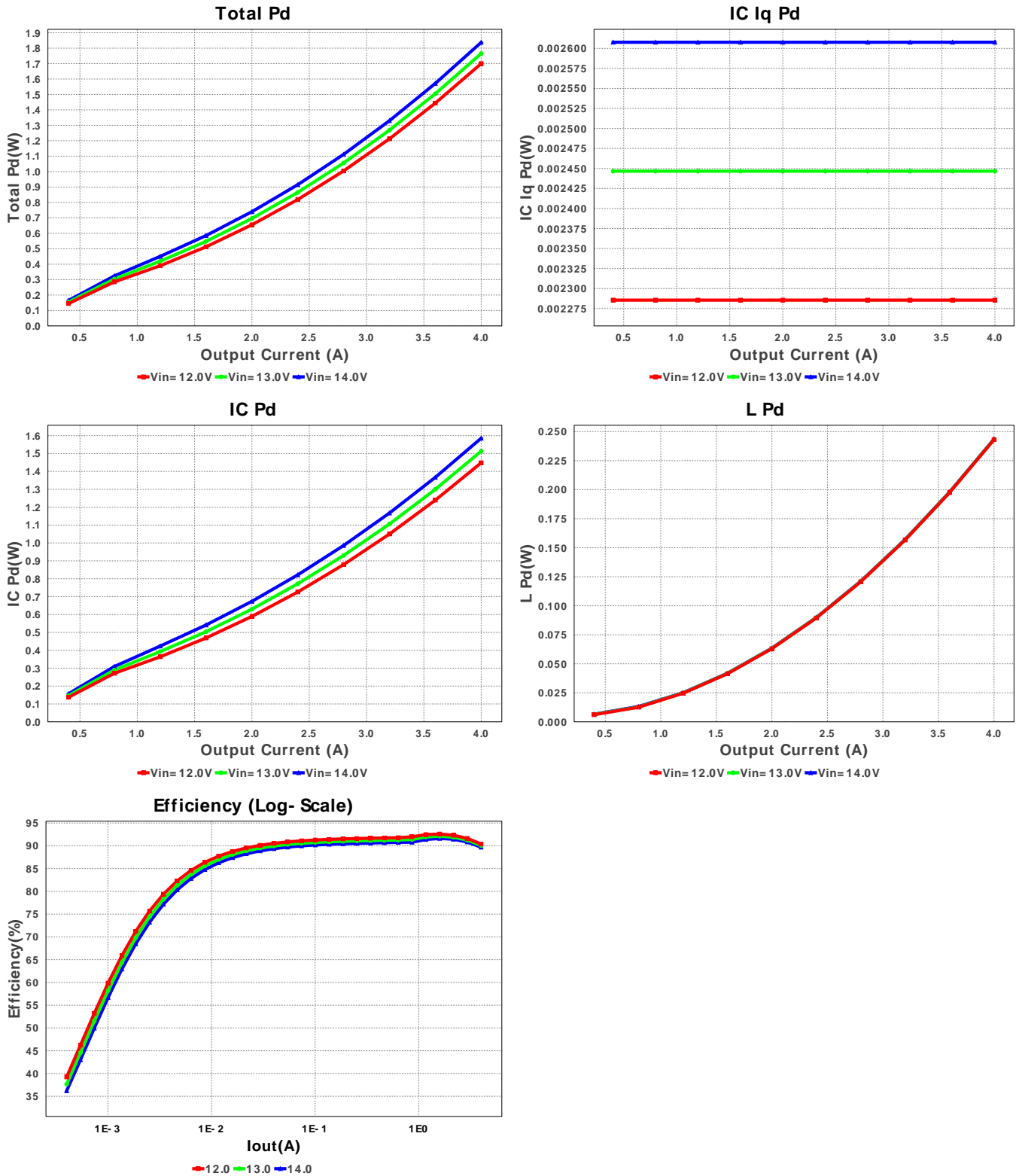
Efficiency



IC Tj







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.859 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	492.363 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.274 A	Current	Average input current
4.	L Ipp	1.706 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	220.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	781.914 kHz	General	Switching frequency
8.	Pout	16.0 W	General	Total output power
9.	Total BOM	\$1.84	General	Total BOM Cost
10.	Vout OP	4.0 V	Op_Point	Operational Output Voltage
11.	Duty Cycle	30.372 %	Op_point	Duty cycle

#	Name	Value	Category	Description
12.	Efficiency	89.699 %	Op_point	Steady state efficiency
13.	IC Tj	58.162 degC	Op_point	IC junction temperature
14.	ICThetaJA	17.76 degC/W	Op_point	IC junction-to-ambient thermal resistance
15.	IOUT_OP	4.0 A	Op_point	Iout operating point
16.	VIN_OP	14.0 V	Op_point	Vin operating point
17.	Vout p-p	13.829 mV	Op_point	Peak-to-peak output ripple voltage
18.	Cin Pd	6.914 mW	Power	Input capacitor power dissipation
19.	Cout Pd	1.091 mW	Power	Output capacitor power dissipation
20.	IC Iq Pd	2.608 mW	Power	IC Iq Pd
21.	IC Pd	1.586 W	Power	IC power dissipation
22.	L Pd	243.636 mW	Power	Inductor power dissipation
23.	Total Pd	1.837 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	4.0 A	Maximum Output Current
2.	Iout1	4.0 Amps	Output Current #1
3.	VinMax	14.0 V	Maximum input voltage
4.	VinMin	12.0 V	Minimum input voltage
5.	Vout	4.0 V	Output Voltage
6.	Vout1	4.0 Volt	Output Voltage #1
7.	base_pn	TPS56428	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **TPS56428** Product Folder : <http://www.ti.com/product/tps56428> : contains the data sheet and other resources.

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