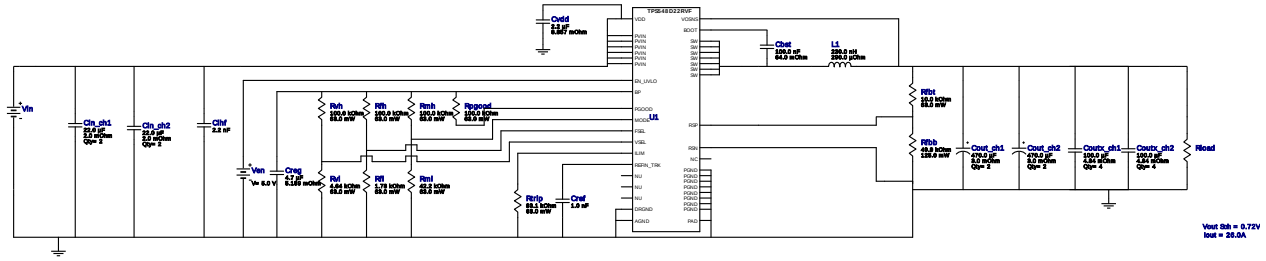
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 14.0V
Vout = 0.72V
Vout Sch = 0.72V
Iout = 26.0A

Device = TPS548D22RVFR
Topology = Buck
Created = 2017-07-28 11:22:47.382
BOM Cost = $9.72
BOM Count = 33
Total Pd = 2.87W

Design : 1223199/144 TPS548D22RVFR
TPS548D22RVFR 10.0V-14.0V to .72V @ 26.0A



My Comments

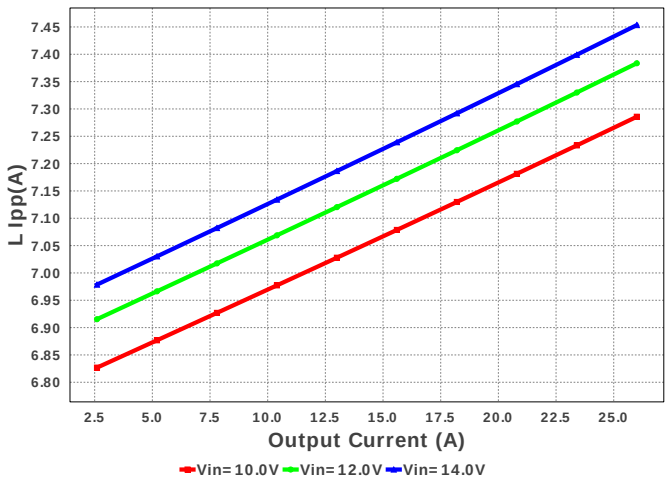
TPS548D22 Design Vout = 0.72V, Iout =26A, Ta = 85C

Electrical BOM

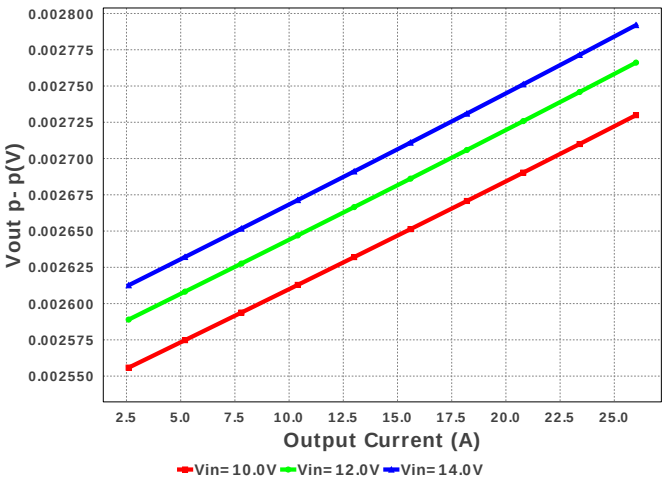
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm^2
2.	Cihf	MuRata	GRM155R61E222KA01D Series= X5R	Cap= 2.2 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Cin_ch1	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	2	$0.18	1210 15 mm^2
4.	Cin_ch2	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	2	$0.18	1210 15 mm^2
5.	Cout_ch1	Panasonic	EEFGX0D471R Series= GX	Cap= 470.0 uF ESR= 3.0 mOhm VDC= 2.0 V IRMS= 10.2 A	2	$0.64	7343-20 59 mm^2
6.	Cout_ch2	Panasonic	EEFGX0D471R Series= GX	Cap= 470.0 uF ESR= 3.0 mOhm VDC= 2.0 V IRMS= 10.2 A	2	$0.64	7343-20 59 mm^2
7.	Coutx_ch1	MuRata	GRM31CD80G107ME39L Series= X6T	Cap= 100.0 uF ESR= 4.84 mOhm VDC= 4.0 V IRMS= 4.3381 A	4	$0.15	1206_190 11 mm^2
8.	Coutx_ch2	MuRata	GRM31CD80G107ME39L Series= X6T	Cap= 100.0 uF ESR= 4.84 mOhm VDC= 4.0 V IRMS= 4.3381 A	4	$0.15	1206_190 11 mm^2
9.	Cref	MuRata	GRM216R71E102KA01D Series= X7R	Cap= 1.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
10.	Creg	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	$0.03	0805 7 mm^2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Cvdd	MuRata	GRM21BR61E225KA12L Series= X5R	Cap= 2.2 uF ESR= 8.857 mOhm VDC= 25.0 V IRMS= 1.3111 A	1	$0.05	 0805 7 mm²
12.	L1	Coiltronics	FP1107R1-R23-R	L= 230.0 nH DCR= 290.0 µOhm	1	$0.84	 FP1107 120 mm²
13.	Rfbb	Panasonic	ERJ-6ENF4992V Series= ERJ-6E	Res= 49.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
14.	Rfbt	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	Rfh	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	Rfl	Vishay-Dale	CRCW04021K78FKED Series= CRCW..e3	Res= 1.78 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	Rmh	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
18.	Rml	Vishay-Dale	CRCW040242K2FKED Series= CRCW..e3	Res= 42.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
19.	Rpgood	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	Rtrip	Vishay-Dale	CRCW040293K1FKED Series= CRCW..e3	Res= 93.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
21.	Rvh	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
22.	Rvl	Vishay-Dale	CRCW04024K64FKED Series= CRCW..e3	Res= 4.64 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
23.	U1	Texas Instruments	TPS548D22RVFR	Switcher	1	$4.19	 RVF0040A 63 mm²

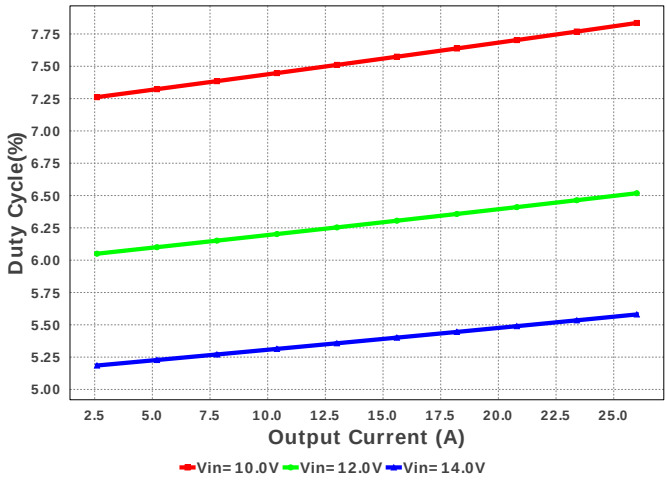
L Ipp



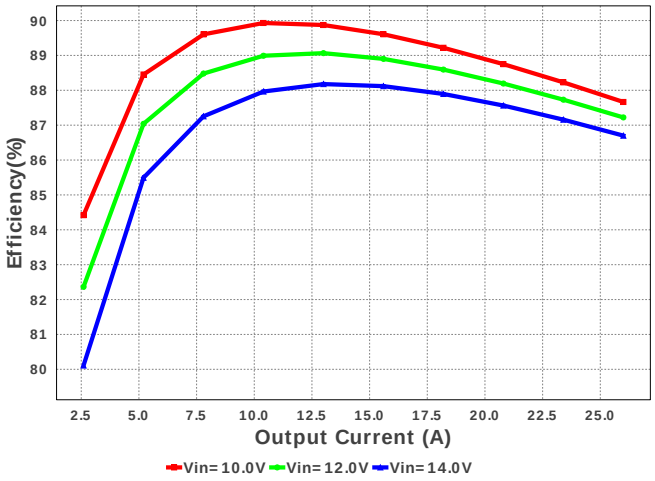
Vout p- p



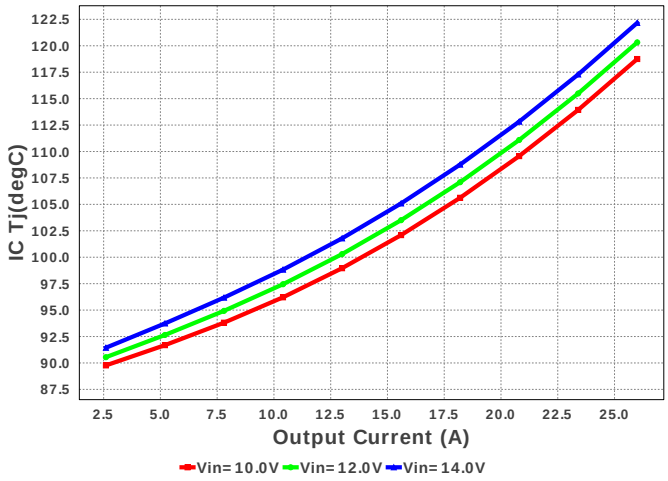
Duty Cycle



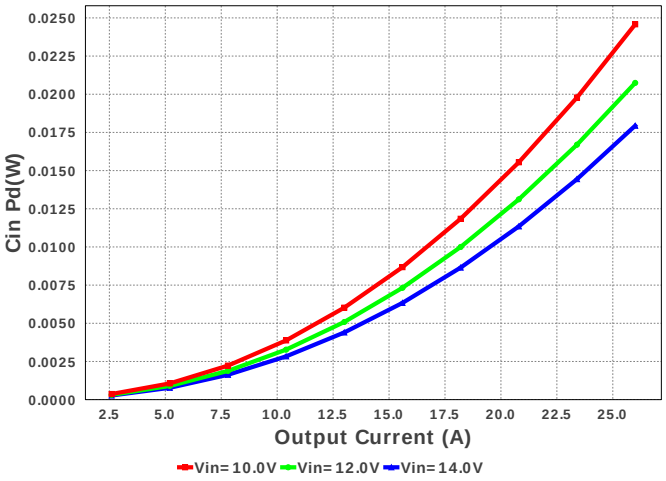
Efficiency



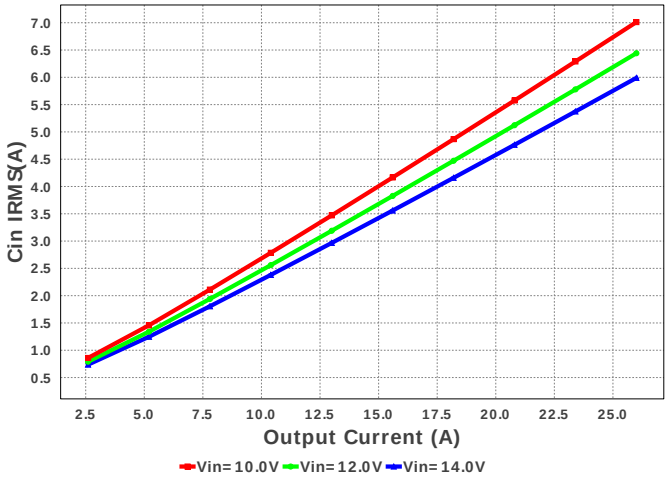
IC Tj



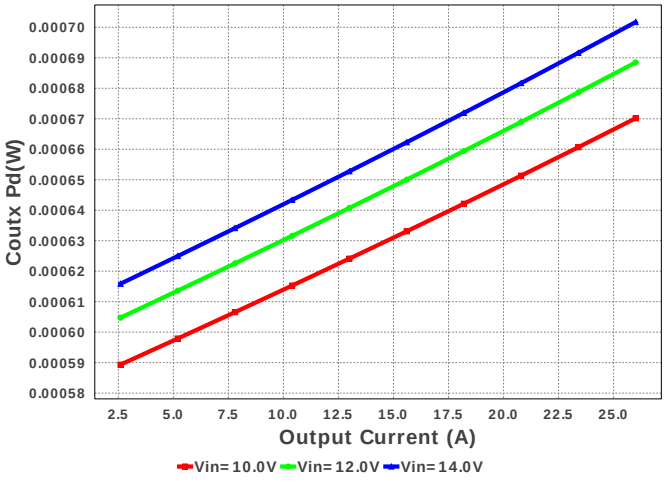
Cin Pd



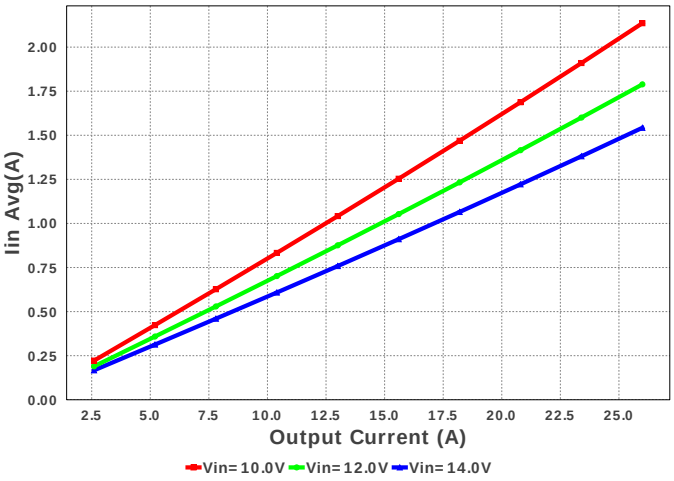
Cin IRMS



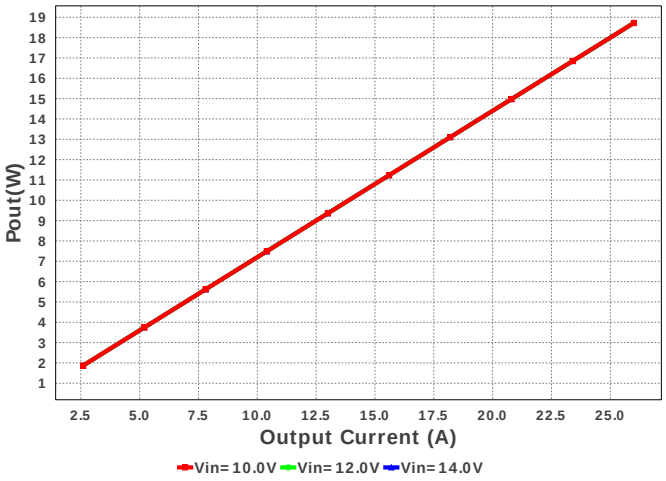
Coutx Pd



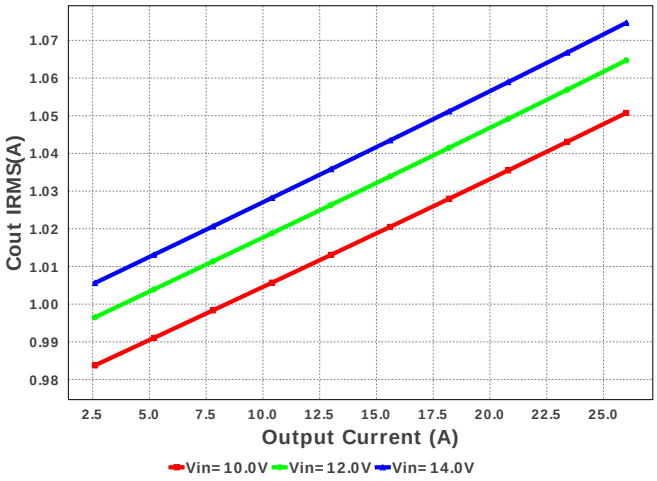
Iin Avg



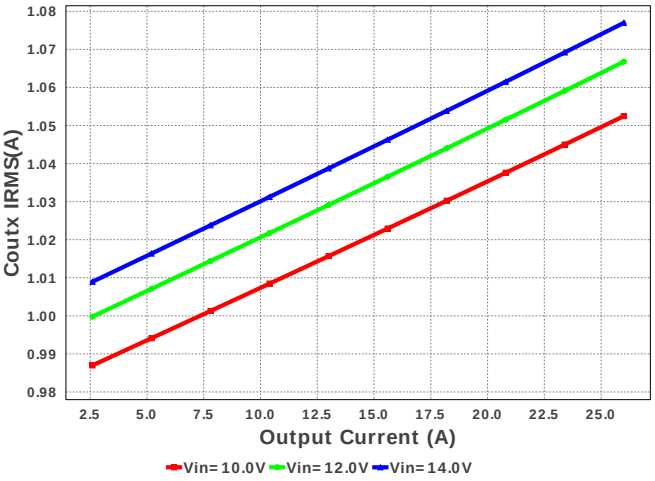
Pout

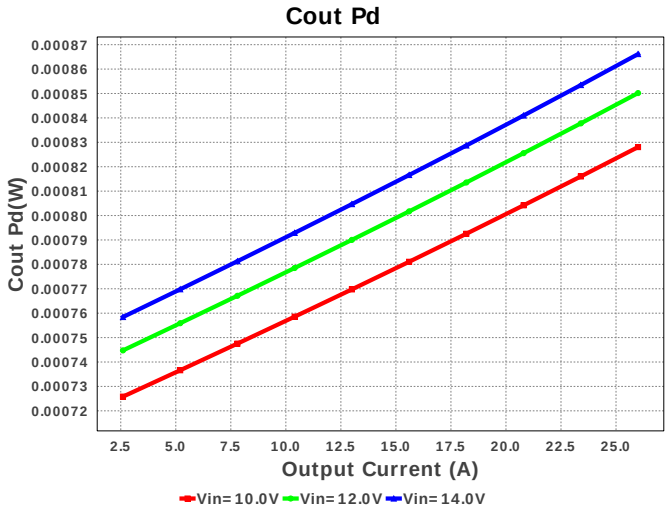


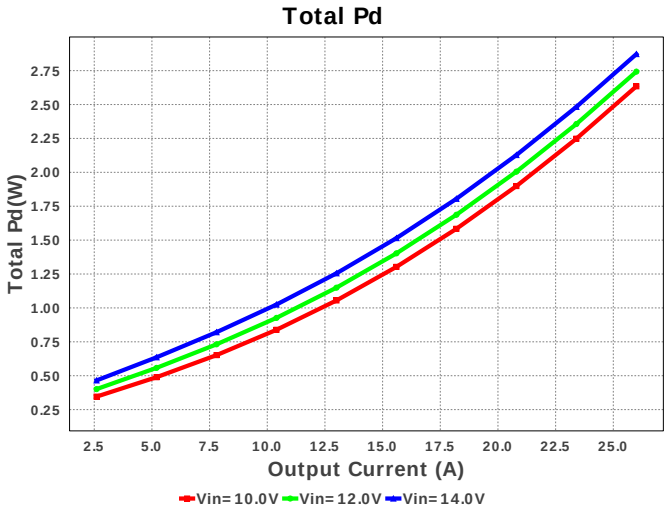
Cout IRMS

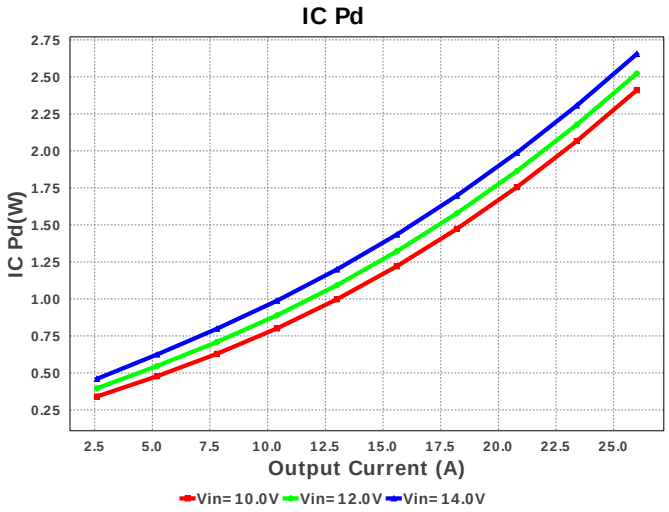


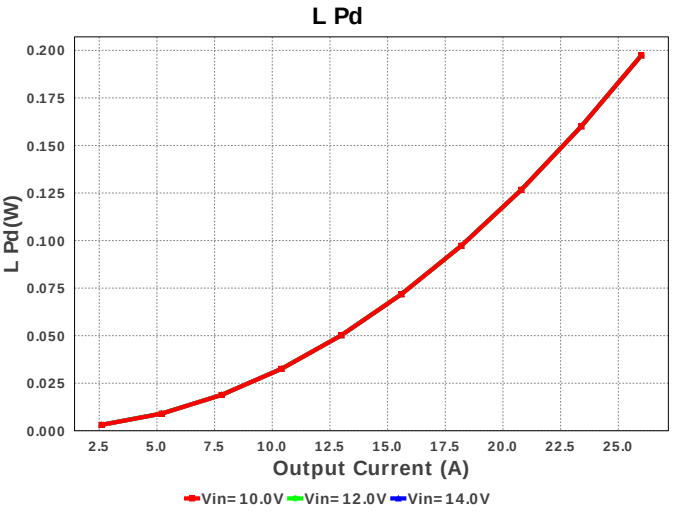
Coutx IRMS











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	5.99 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.075 A	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	1.077 A	Current	Output capacitor_x RMS ripple current
4.	Iin Avg	1.542 A	Current	Average input current
5.	L Ipp	7.453 A	Current	Peak-to-peak inductor ripple current
6.	BOM Count	33	General	Total Design BOM count
7.	FootPrint	627.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	426.964 kHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	18.72 W	General	Total output power
11.	Total BOM	$9.72	General	Total BOM Cost
12.	ICThetaJA Effective	14.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
13.	Vout Actual	719.76 mV	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	720.0 mV	Op_Point	Operational Output Voltage
15.	Duty Cycle	5.58 %	Op_point	Duty cycle
16.	Efficiency	86.7 %	Op_point	Steady state efficiency
17.	IC Tj	122.166 degC	Op_point	IC junction temperature
18.	IOUT_OP	26.0 A	Op_point	Iout operating point
19.	VIN_OP	14.0 V	Op_point	Vin operating point
20.	Vout p-p	2.792 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	17.938 mW	Power	Input capacitor power dissipation
22.	Cout Pd	866.137 µW	Power	Output capacitor power dissipation
23.	Coutx Pd	701.713 µW	Power	Output capacitor_x power loss
24.	IC Pd	2.655 W	Power	IC power dissipation
25.	L Pd	197.383 mW	Power	Inductor power dissipation
26.	Total Pd	2.872 W	Power	Total Power Dissipation
27.	Vout Tolerance	1.09 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	26.0	Maximum Output Current
2.	VinMax	14.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	720.0 m	Output Voltage
5.	base_pn	TPS548D22	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	85.0	Ambient temperature
1.	Vout Sch	720.0 m	Output voltage selected

Design Assistance

1. **TPS548D22** Product Folder : http://www.ti.com/product/TPS548D22 : contains the data sheet and other resources.