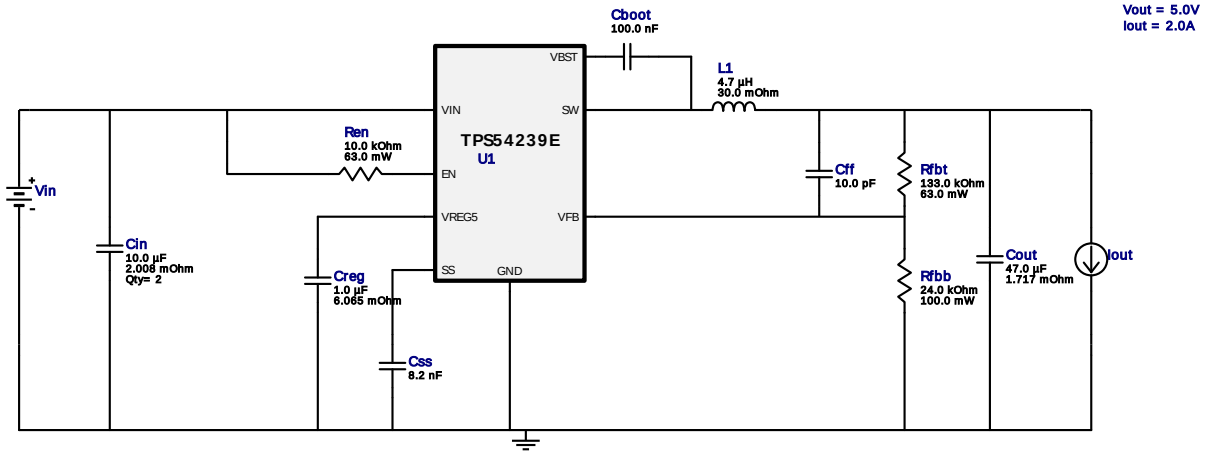
WEBENCH® Design Report

VinMin = 11.0V
VinMax = 22.0V
Vout = 5.0V
Iout = 2.0A

Device = TPS54239EDDAR
Topology = Buck
Created = 7/9/16 6:03:34 AM
BOM Cost = $2.02
BOM Count = 12
Total Pd = 1.04W

Design : 1899731/76 TPS54239EDDAR
TPS54239EDDAR 11.0V-22.0V to 5.00V @ 2.0A



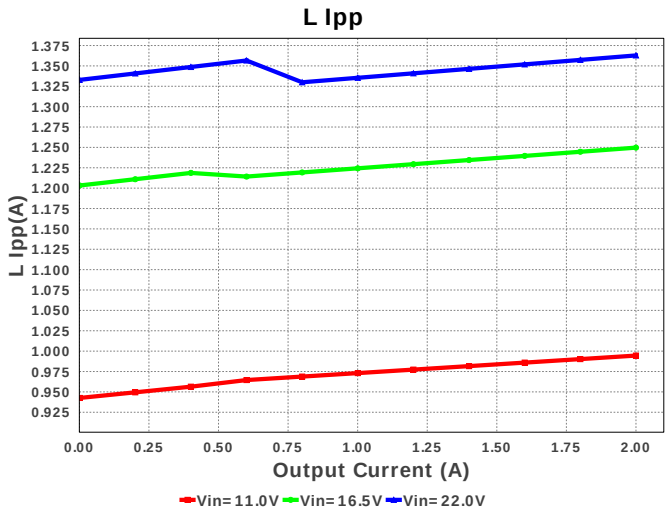
My Comments

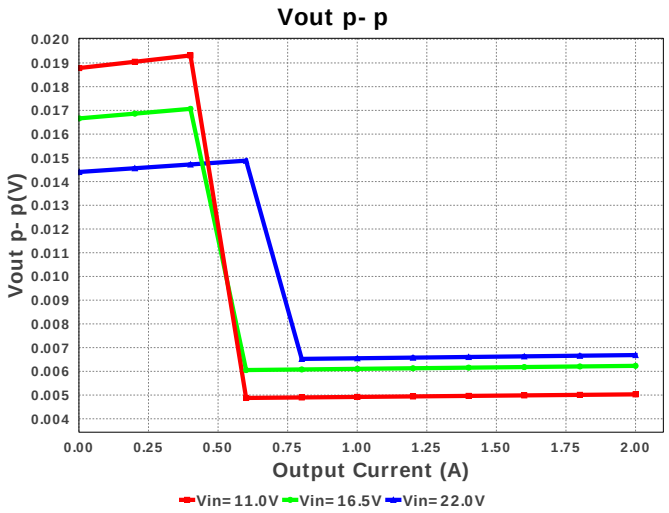
No comments

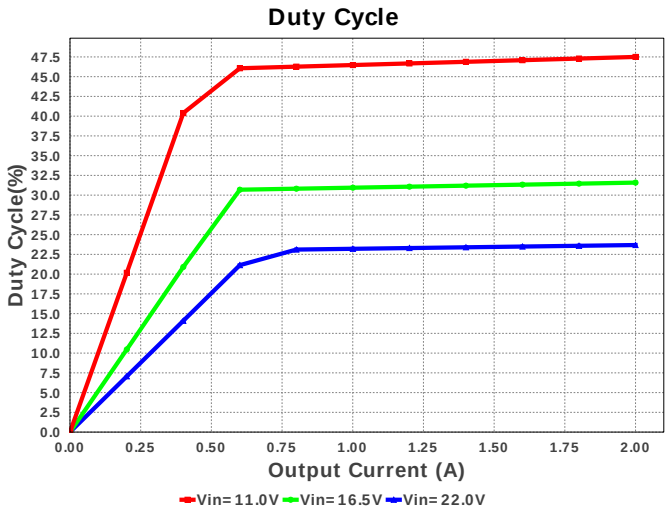
Electrical BOM

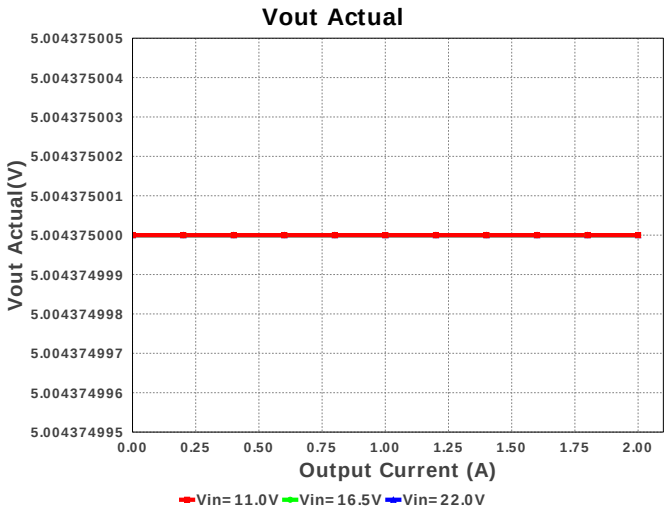
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cff	Samsung Electro-Mechanics	CL02C100JO2ANNC Series= C0G/NP0	Cap= 10.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	01005 2 mm²
3.	Cin	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	2	$0.22	1210_280 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	TDK	CLF7045T-4R7N	L= 4.7 µH DCR= 30.0 mOhm	1	$0.42	CLF7045 86 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

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfbt	Vishay-Dale	CRCW0402133KFKED Series= CRCW..e3	Res= 133.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	U1	Texas Instruments	TPS54239EDDAR	Switcher	1	$0.75	DDA0008E 57 mm^2

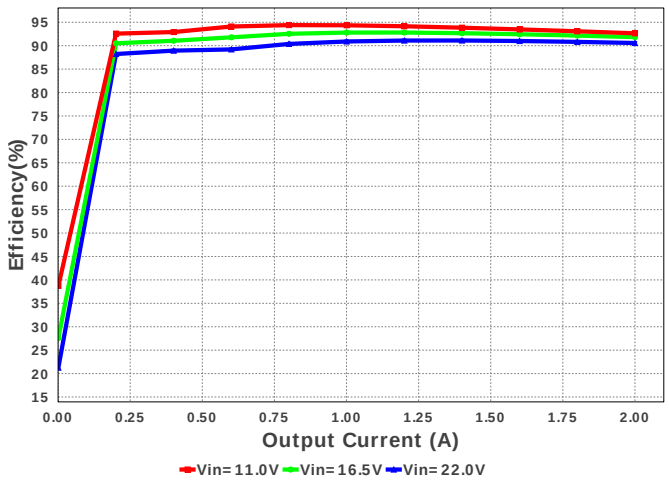




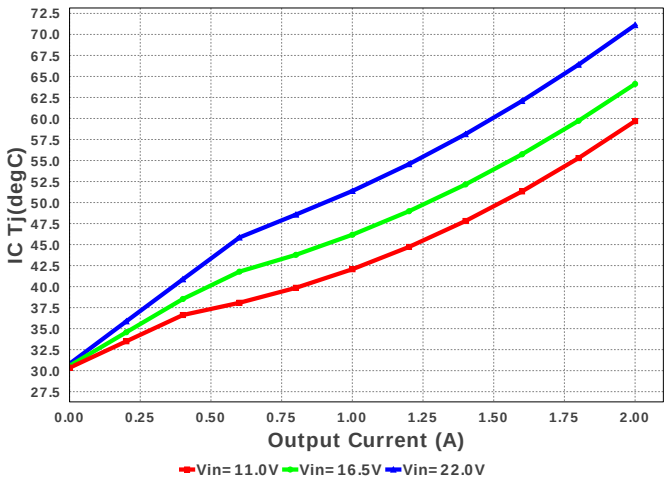




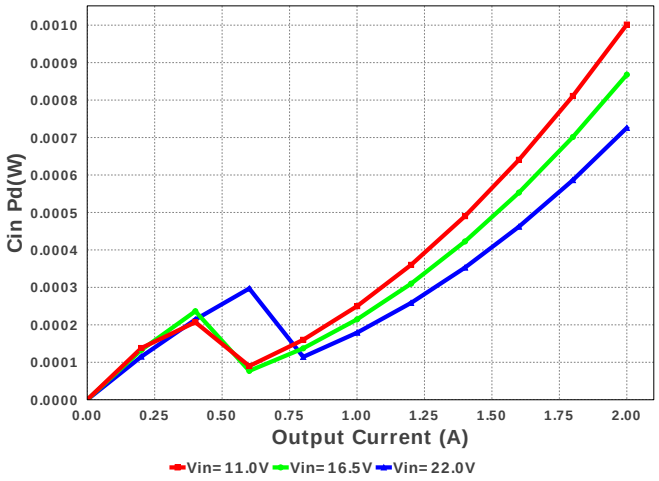
Efficiency



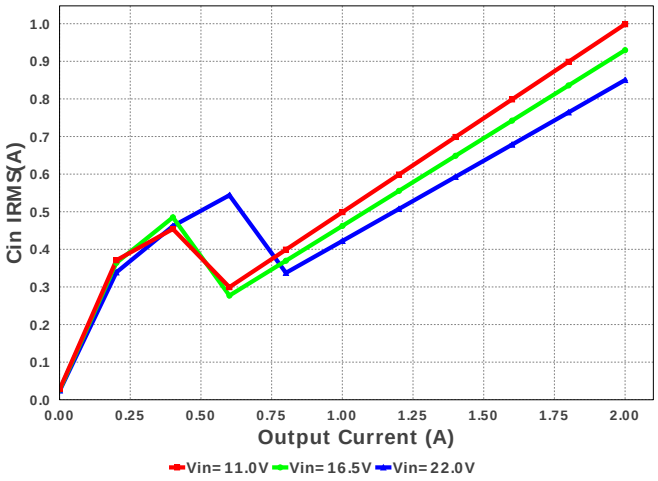
IC Tj



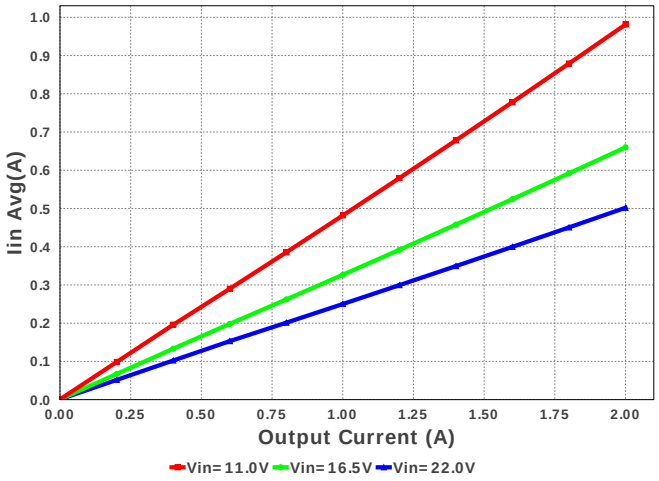
Cin Pd



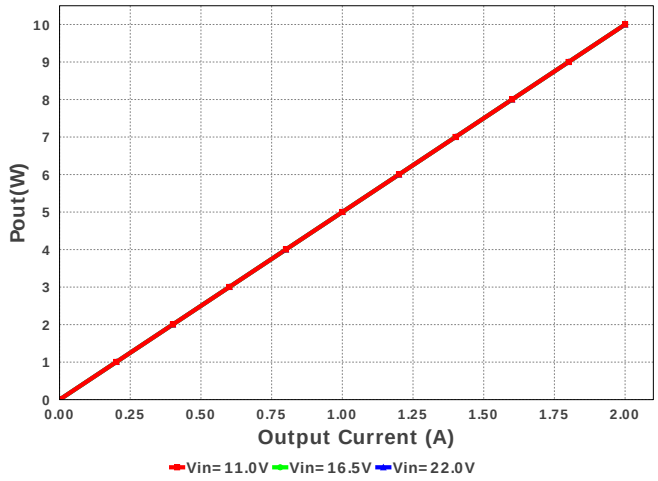
Cin IRMS

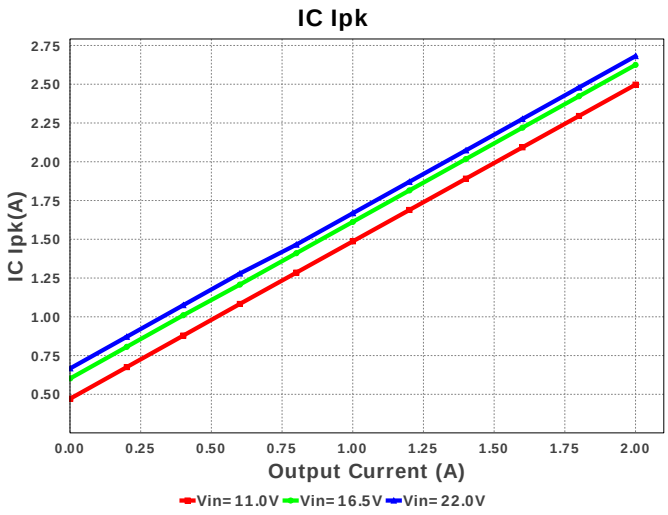


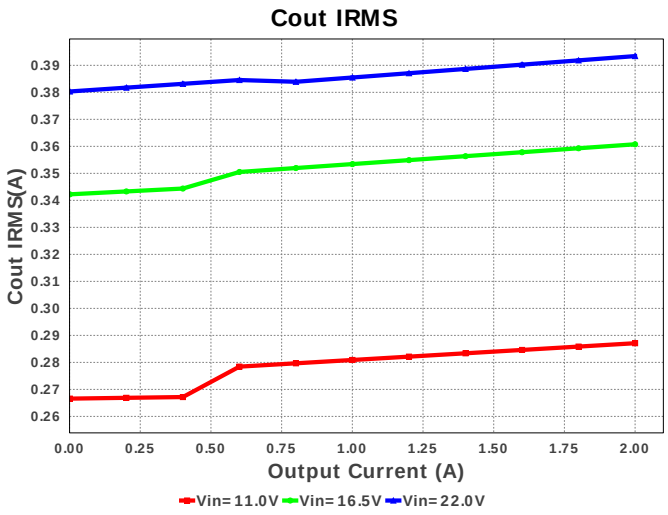
Iin Avg

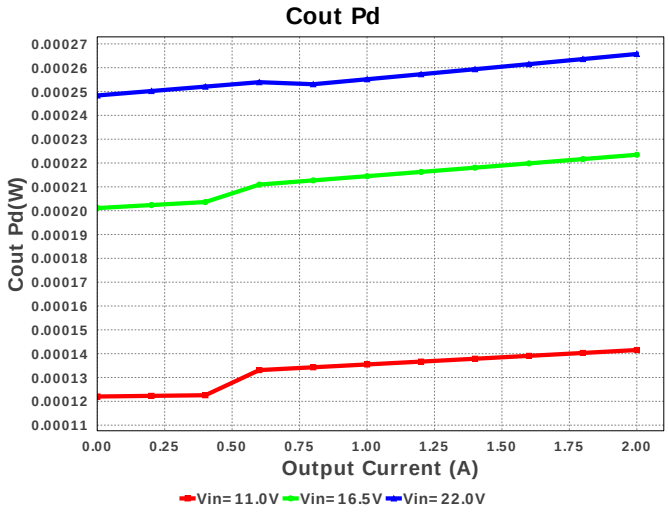


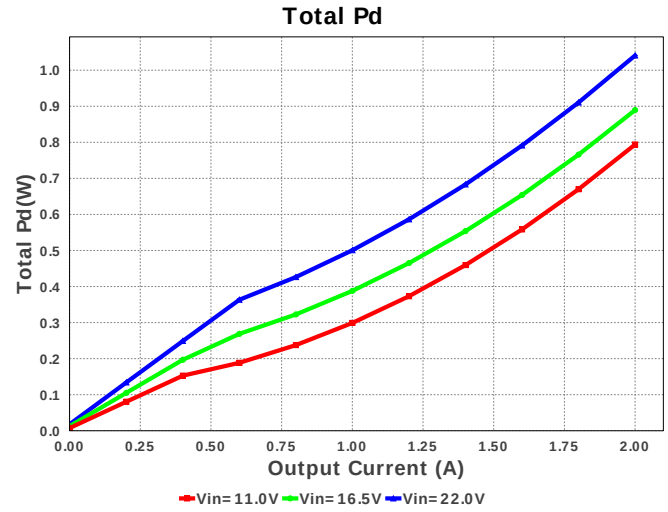
Pout

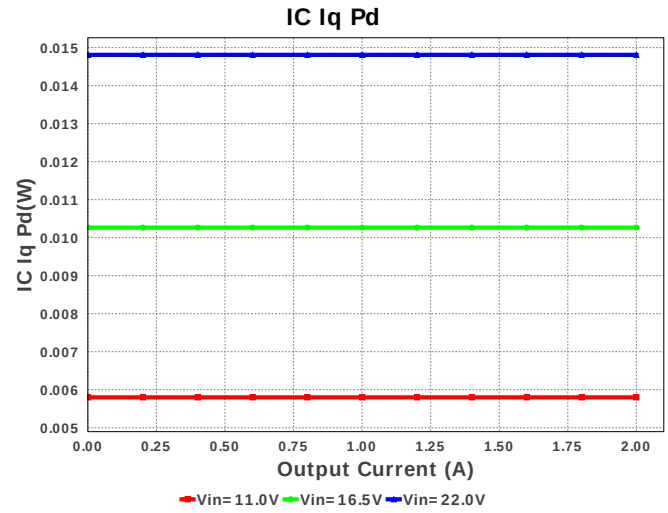


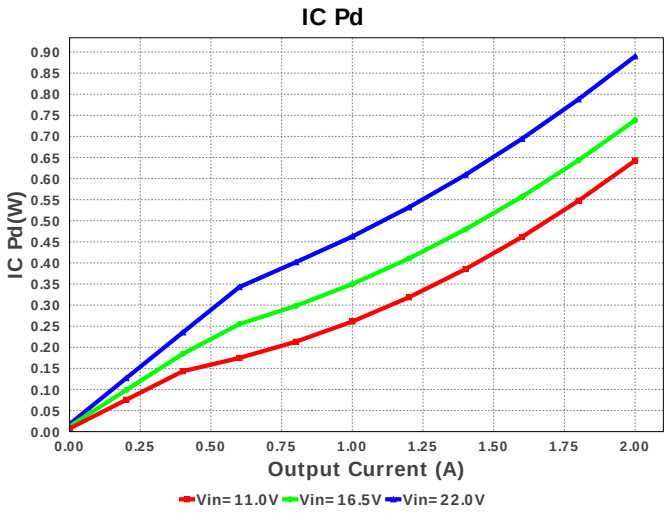


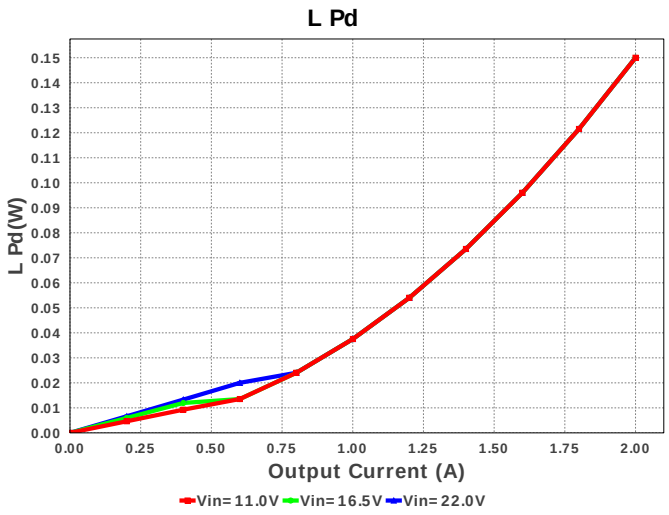


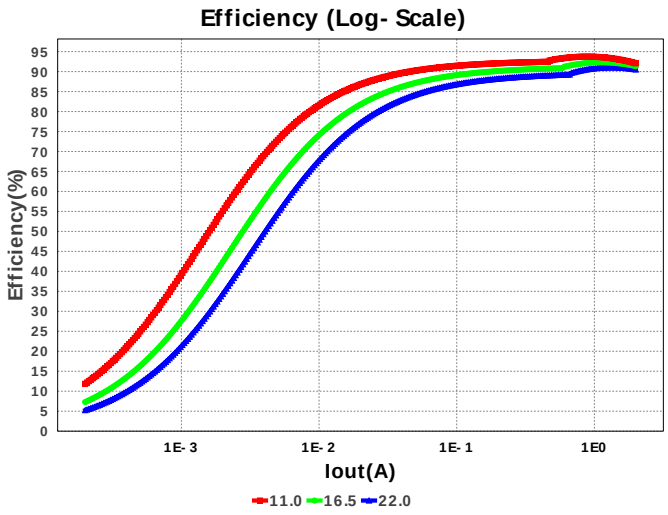












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	850.263 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	393.418 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.681 A	Current	Peak switch current in IC
4.	Iin Avg	501.86 mA	Current	Average input current
5.	L Ipp	1.363 A	Current	Peak-to-peak inductor ripple current
6.	BOM Count	12	General	Total Design BOM count
7.	FootPrint	205.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	628.53 kHz	General	Switching frequency
9.	Pout	10.0 W	General	Total output power
10.	Total BOM	$2.02	General	Total BOM Cost
11.	Vout Actual	5.004 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
12.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	23.682 %	Op_point	Duty cycle
14.	Efficiency	90.573 %	Op_point	Steady state efficiency
15.	IC Tj	71.111 degC	Op_point	IC junction temperature
16.	ICThetaJA	46.2 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	2.0 A	Op_point	Iout operating point
18.	VIN_OP	22.0 V	Op_point	Vin operating point
19.	Vout p-p	6.686 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	725.839 µW	Power	Input capacitor power dissipation
21.	Cout Pd	265.754 µW	Power	Output capacitor power dissipation
22.	IC Iq Pd	14.809 mW	Power	IC Iq Pd
23.	IC Pd	889.842 mW	Power	IC power dissipation
24.	L Pd	150.0 mW	Power	Inductor power dissipation
25.	Total Pd	1.041 W	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	2.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	11.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS54239E	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TPS54239E Product Folder : http://www.ti.com/product/TPS54239E : contains the data sheet and other resources.