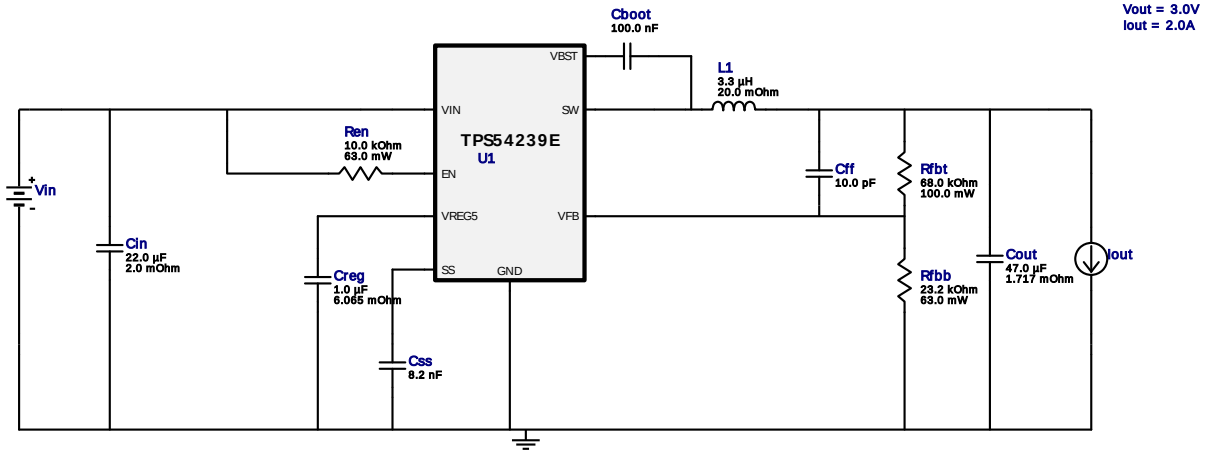
WEBENCH® Design Report

VinMin = 11.0V
VinMax = 15.0V
Vout = 3.0V
Iout = 2.0A

Device = TPS54239EDDAR
Topology = Buck
Created = 7/17/16 10:14:23 PM
BOM Cost = $1.74
BOM Count = 11
Total Pd = 0.73W

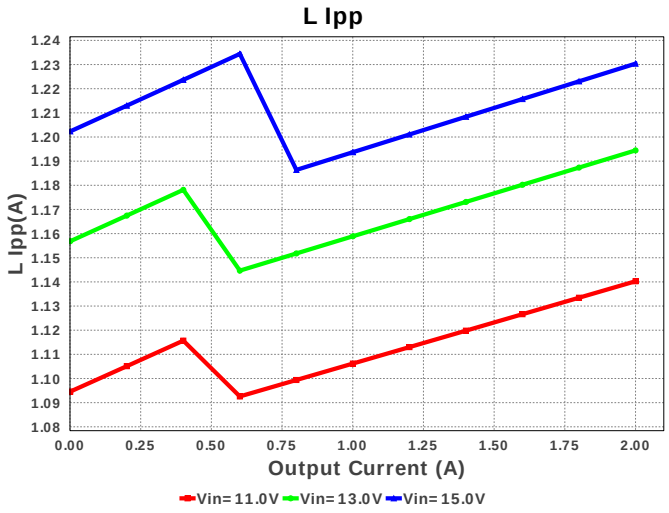
Design : 4743458/4 TPS54239EDDAR
TPS54239EDDAR 11.0V-15.0V to 3.00V @ 2.0A

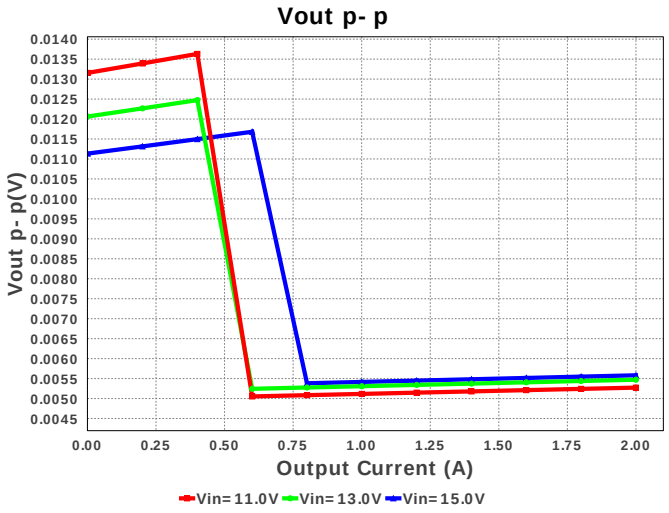


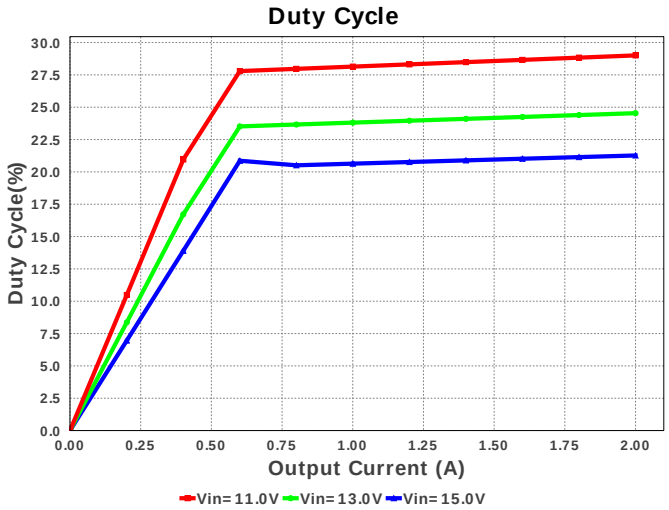
Electrical BOM

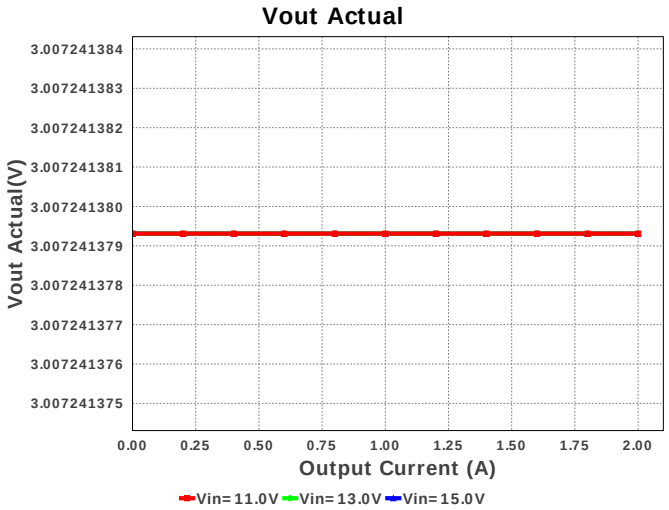
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cff	Kemet	C0805C100M4GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM32ER61E226KE15L 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	TDK	CLF7045T-3R3N	L= 3.3 µH DCR= 20.0 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	Vishay-Dale	CRCW040223K2FKED Series= CRCW..e3	Res= 23.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rfbt	Yageo America	RC0603FR-0768KL Series= ?	Res= 68.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	TPS54239EDDAR	Switcher	1	$0.75	DDA0008E 57 mm^2

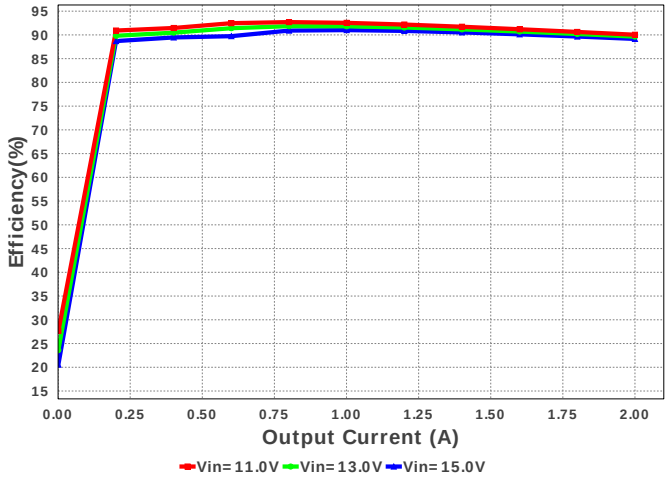




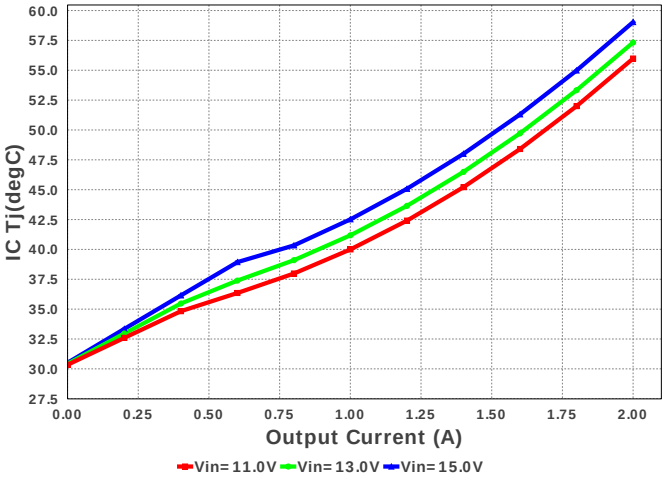




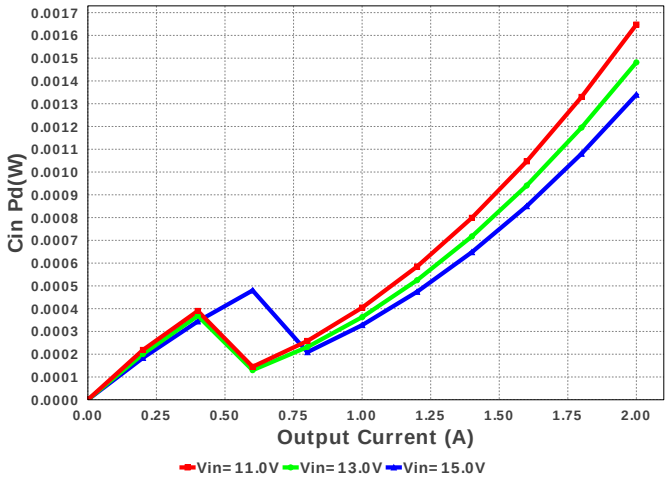
Efficiency



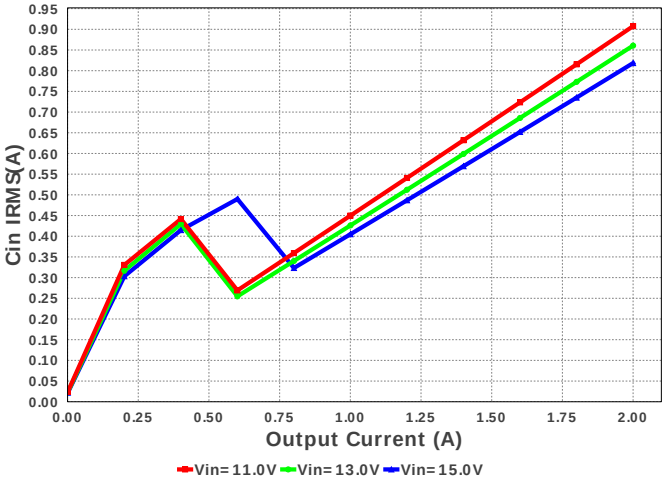
IC Tj



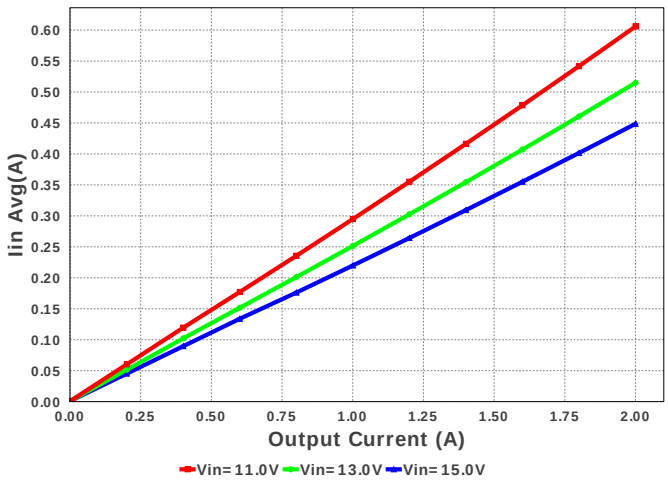
Cin Pd



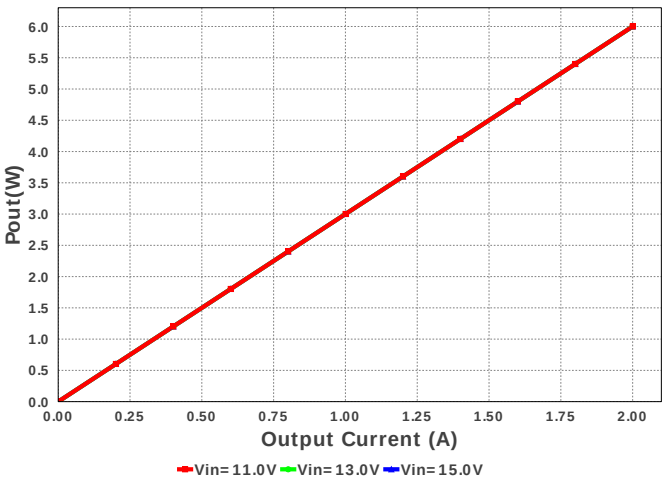
Cin IRMS

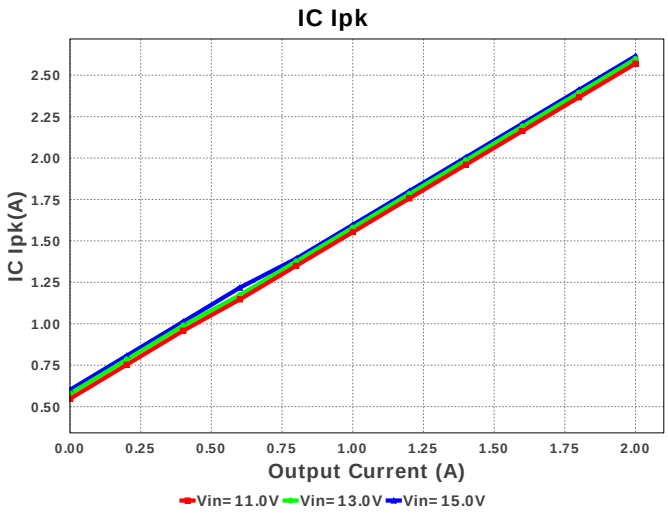


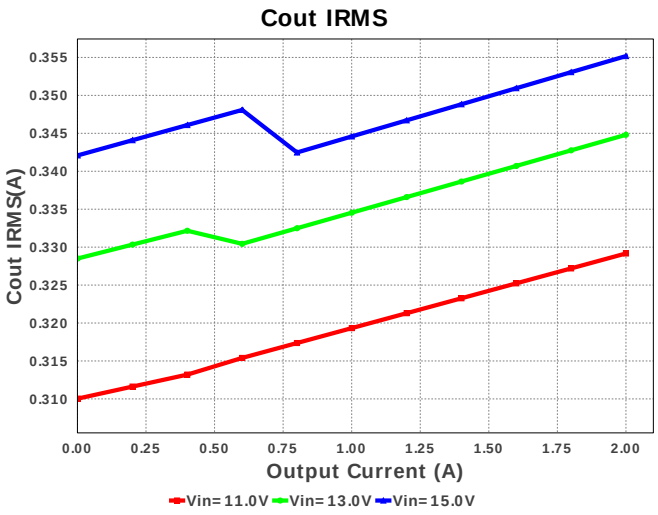
Iin Avg

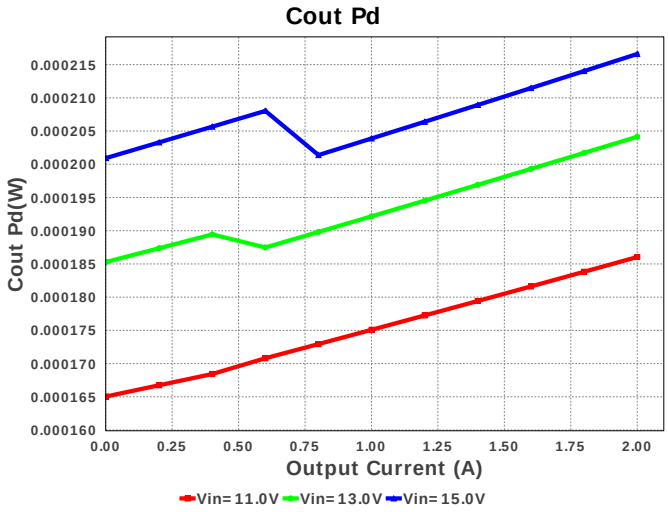


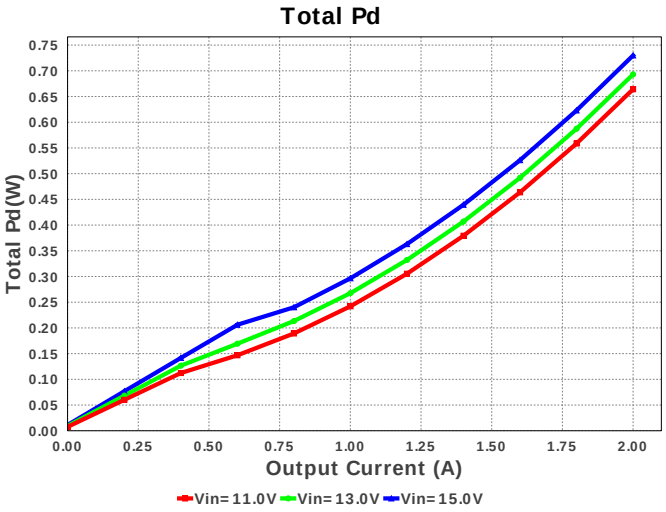
Pout

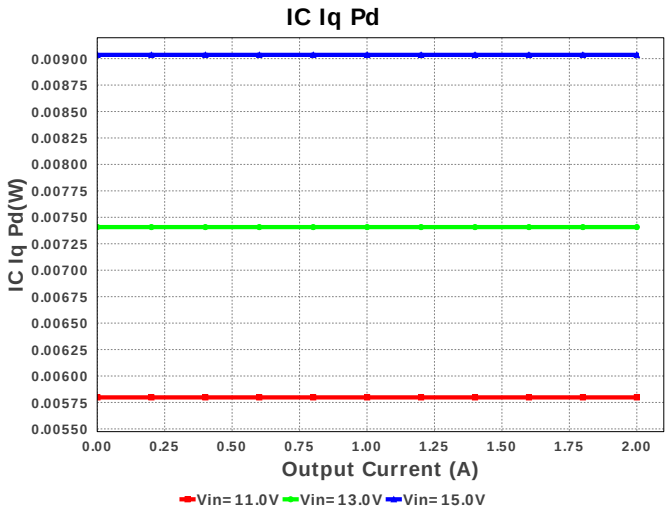


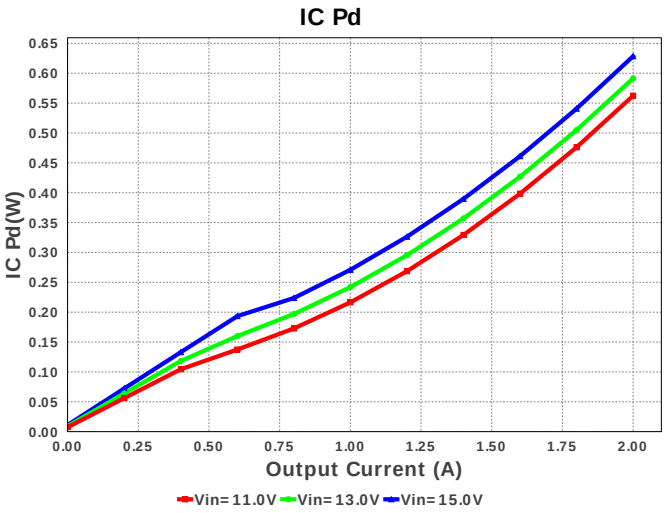


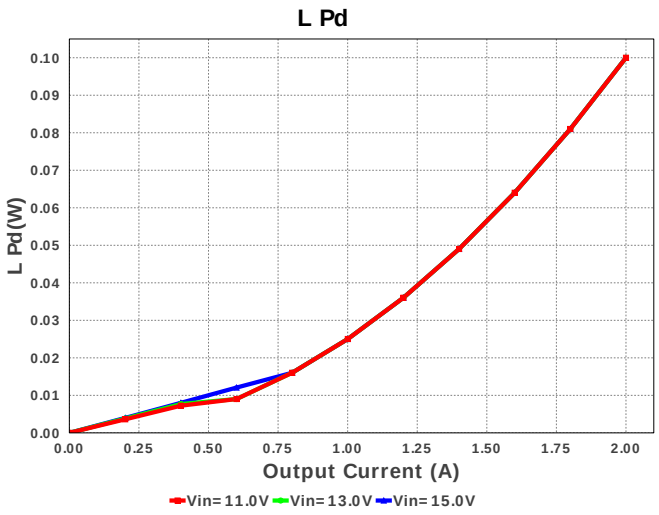


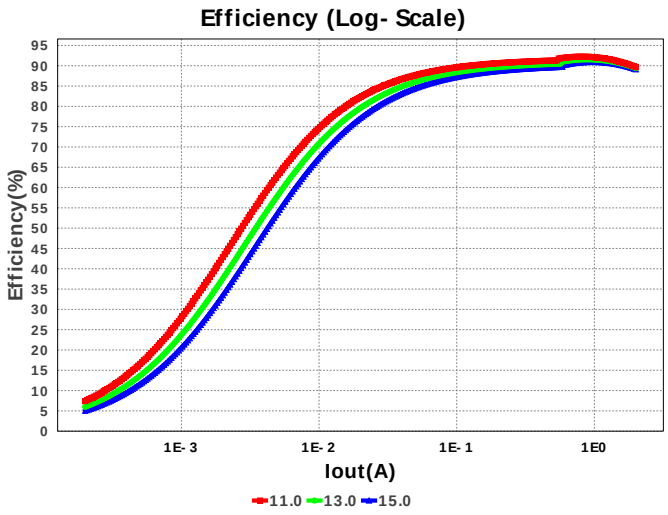












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	818.423 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	355.177 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.615 A	Current	Peak switch current in IC
4.	Iin Avg	448.66 mA	Current	Average input current
5.	L Ipp	1.23 A	Current	Peak-to-peak inductor ripple current
6.	BOM Count	11	General	Total Design BOM count
7.	FootPrint	196.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	628.612 kHz	General	Switching frequency
9.	Pout	6.0 W	General	Total output power
10.	Total BOM	$1.74	General	Total BOM Cost
11.	Vout Actual	3.007 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
12.	Vout OP	3.0 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	21.269 %	Op_point	Duty cycle
14.	Efficiency	89.154 %	Op_point	Steady state efficiency
15.	IC Tj	59.031 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	15.0 V	Op_point	Vin operating point
19.	Vout p-p	5.582 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	1.34 mW	Power	Input capacitor power dissipation
21.	Cout Pd	216.601 µW	Power	Output capacitor power dissipation
22.	IC Iq Pd	9.035 mW	Power	IC Iq Pd
23.	IC Pd	628.387 mW	Power	IC power dissipation
24.	L Pd	100.0 mW	Power	Inductor power dissipation
25.	Total Pd	729.925 mW	Power	Total Power Dissipation
26.	Vout Tolerance	3.364 %		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	15.0	Maximum input voltage
3.	VinMin	11.0	Minimum input voltage
4.	Vout	3.0	Output Voltage
5.	base_pn	TPS54239E	Base Product 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.