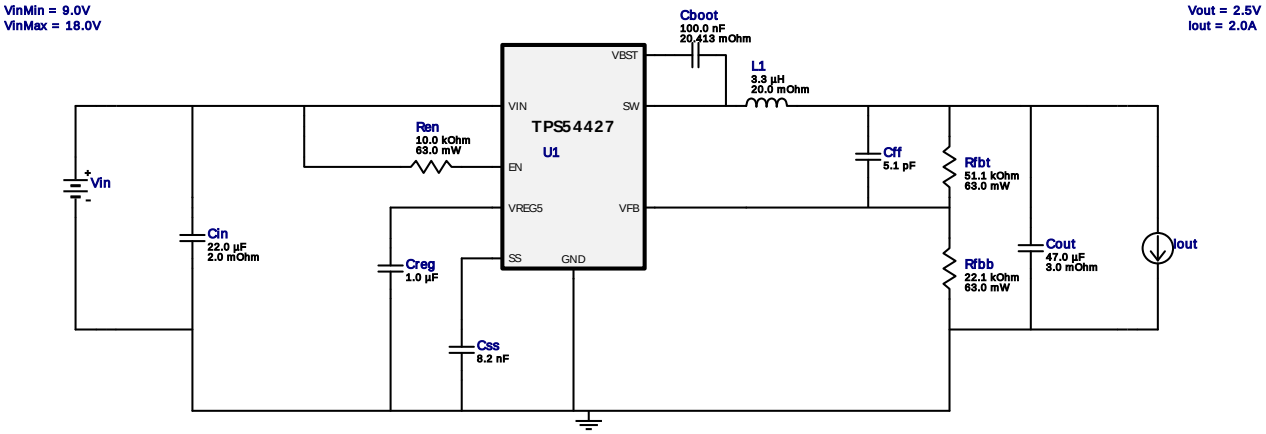
WEBENCH® Design Report

VinMin = 9.0V
VinMax = 18.0V
Vout = 2.5V
Iout = 2.0A

Device = TPS54427DDAR
Topology = Buck
Created = 11/8/14 6:10:48 PM
BOM Cost = $1.59
Footprint = 217.0 mm^2
BOM Count = 11
Total Pd = 0.87W

Design : 4058737/5 TPS54427DDAR
TPS54427DDAR 9.0V-18.0V to 2.50V @ 2.0A

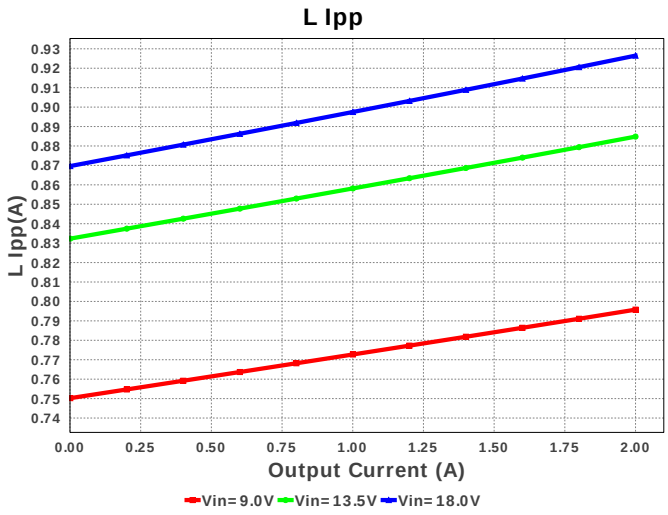


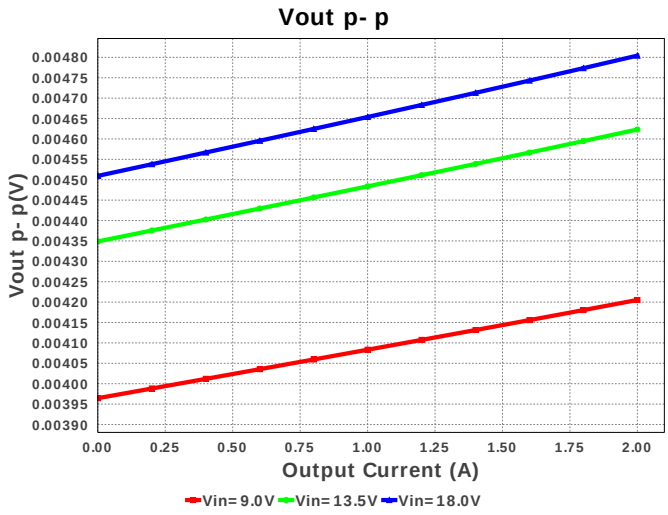
Electrical BOM

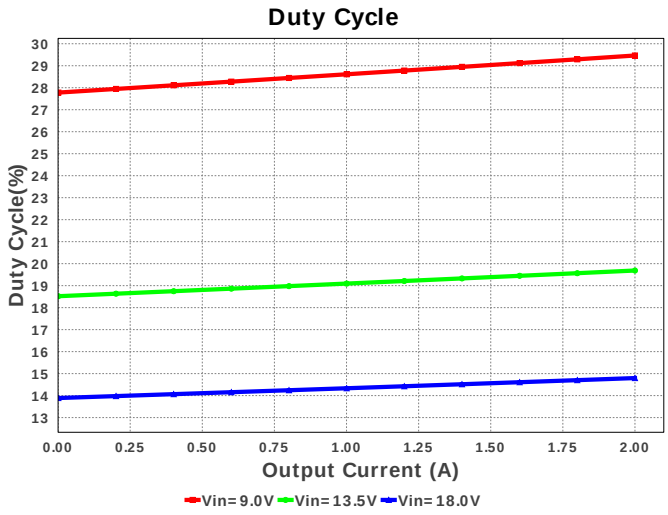
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	TDK	C1005X5R1A104K Series= 285	Cap= 100.0 nF ESR= 20.413 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
2.	Cff	MuRata	GRM1555C1E5R1CA01D Series= C0G/NP0	Cap= 5.1 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Cin	MuRata	GRM32ER61E226KE15L 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	GRM31CR60J476ME19L Series= X5R	Cap= 47.0 uF ESR= 3.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.12	1206 11 mm^2
5.	Creg	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 uF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
6.	Css	MuRata	GRM155R71E822KA01D Series= X7R	Cap= 8.2 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
7.	L1	TDK	VLP8040T-3R3N	L= 3.3 µH DCR= 20.0 mOhm	1	$0.22	VLP8040 113 mm^2
8.	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
9.	Rfbb	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
10.	Rfbt	Vishay-Dale	CRCW040251K1FKED Series= CRCW..e3	Res= 51.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

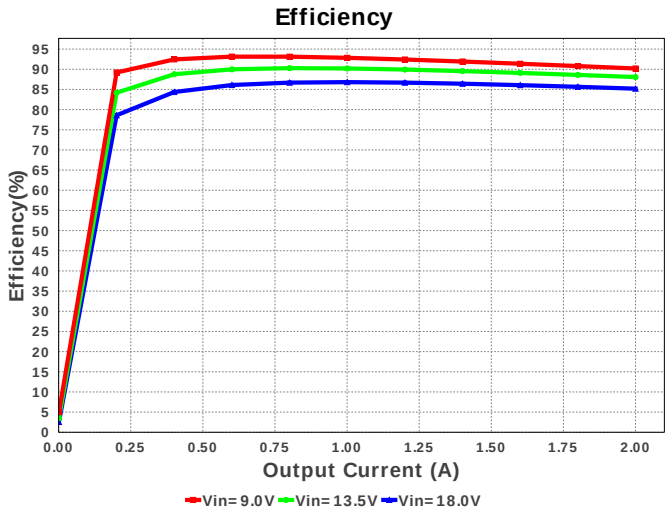
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	TPS54427DDAR	Switcher	1	$0.90	

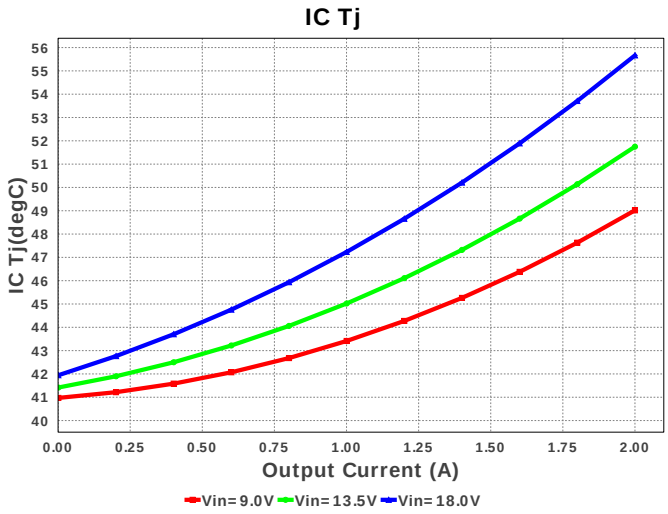
R-PDSO-G8 57 mm^2

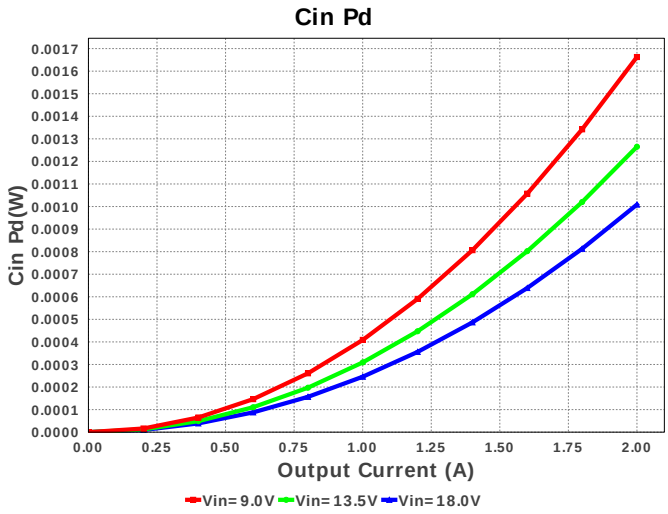




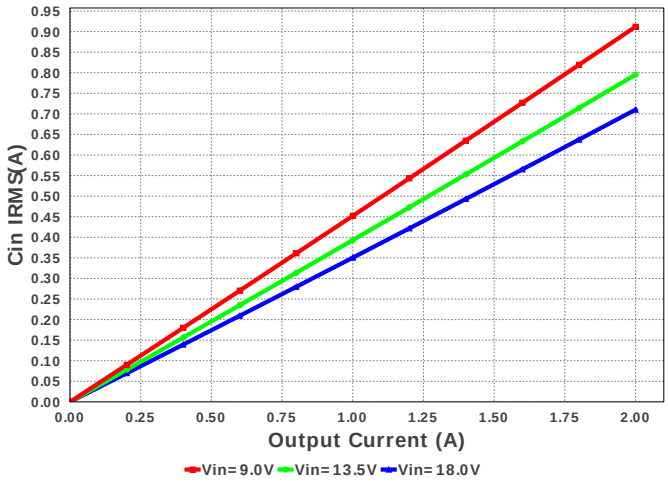




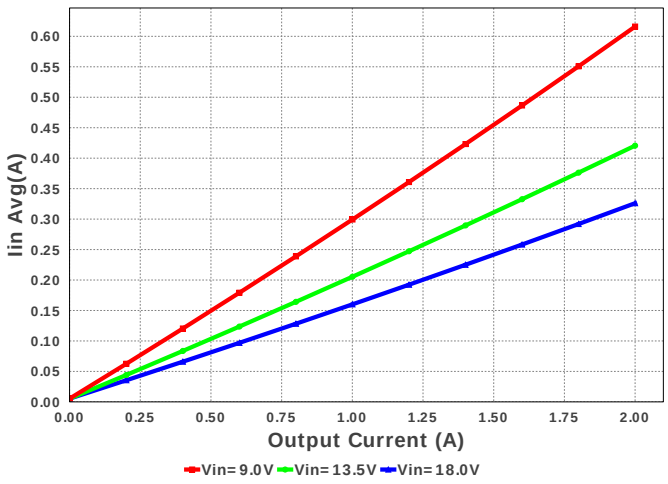




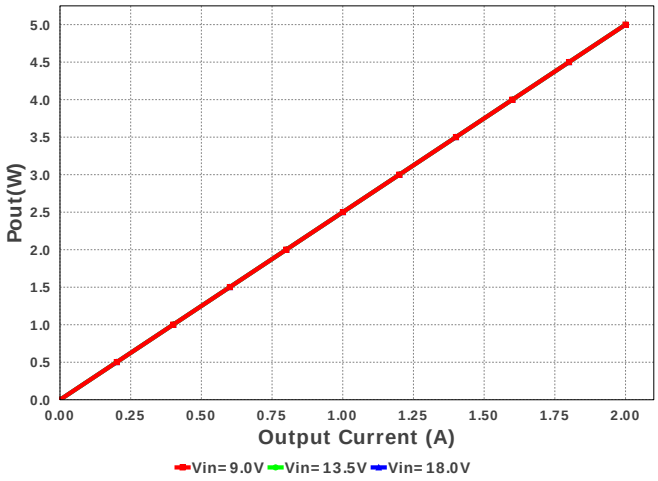
Cin IRMS



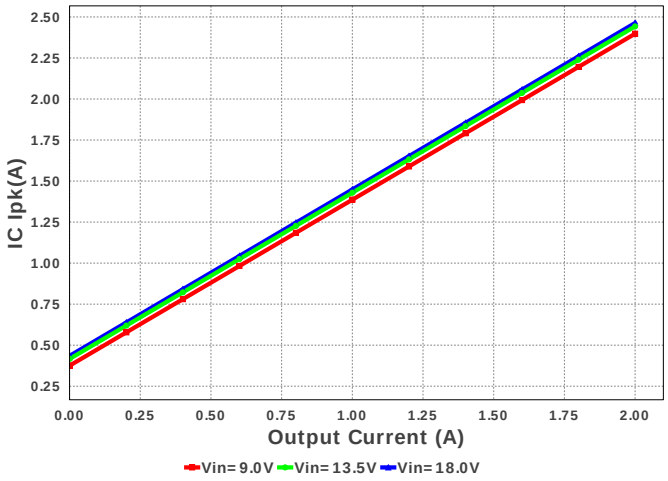
Iin Avg



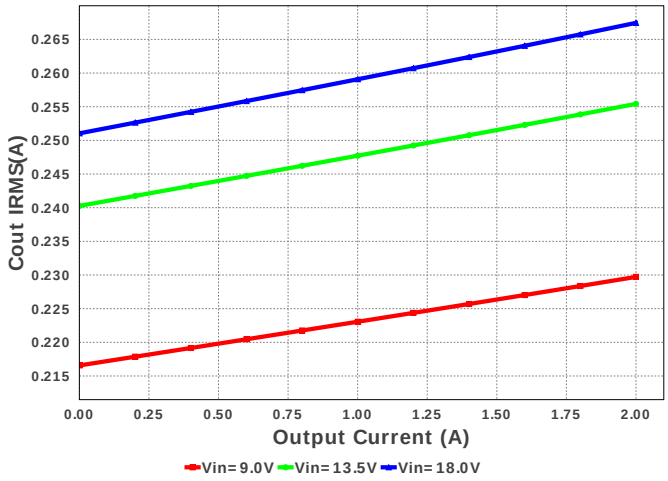
Pout



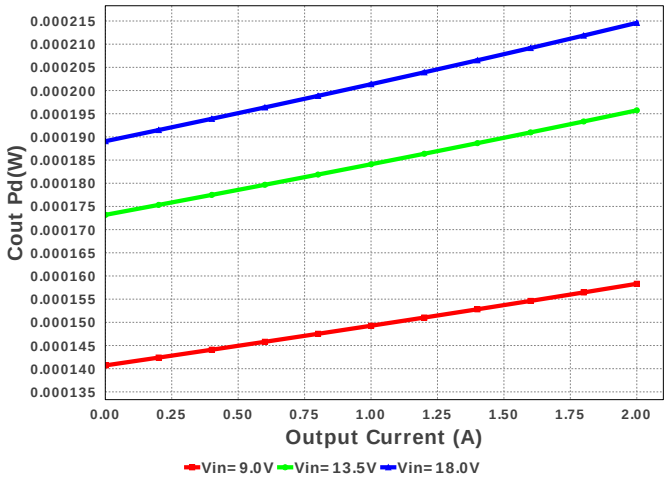
IC Ipk

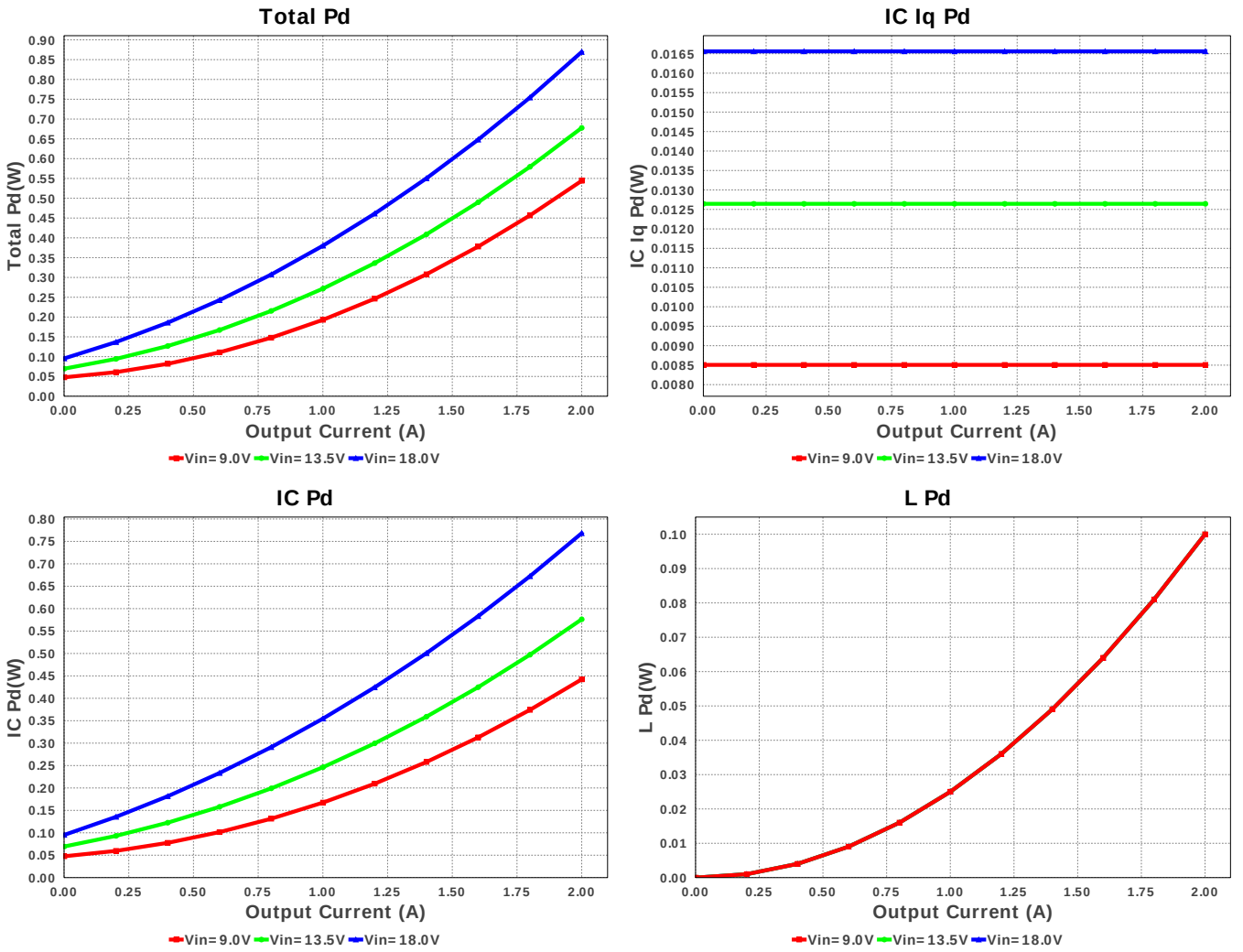


Cout IRMS



Cout Pd





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	710.14 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	267.455 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.463 A	Current	Peak switch current in IC
4.	Iin Avg	326.08 mA	Current	Average input current
5.	L Ipp	926.492 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	11	General	Total Design BOM count
7.	FootPrint	217.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	750.153 kHz	General	Switching frequency
9.	Pout	5.0 W	General	Total output power
10.	Total BOM	$1.59	General	Total BOM Cost
11.	Vout OP	2.5 V	Op_Point	Operational Output Voltage
12.	Duty Cycle	14.797 %	Op_point	Duty cycle
13.	Efficiency	85.187 %	Op_point	Steady state efficiency
14.	IC Tj	55.665 degC	Op_point	IC junction temperature
15.	ICThetaJA	20.39 degC/W	Op_point	IC junction-to-ambient thermal resistance
16.	IOUT_OP	2.0 A	Op_point	Iout operating point
17.	VIN_OP	18.0 V	Op_point	Vin operating point
18.	Vout p-p	4.804 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	1.009 mW	Power	Input capacitor power dissipation
20.	Cout Pd	214.597 µW	Power	Output capacitor power dissipation
21.	IC Iq Pd	16.56 mW	Power	IC Iq Pd
22.	IC Pd	768.247 mW	Power	IC power dissipation
23.	L Pd	100.0 mW	Power	Inductor power dissipation
24.	Total Pd	869.44 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	18.0 V	Maximum input voltage

#	Name	Value	Description
4.	VinMin	9.0 V	Minimum input voltage
5.	Vout	2.5 V	Output Voltage
6.	Vout1	2.5 Volt	Output Voltage #1
7.	base_pn	TPS54427	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	40.0 degC	Ambient temperature

Design Assistance

1. TPS54427 Product Folder : http://www.ti.com/product/tps54427 : contains the data sheet and other resources.