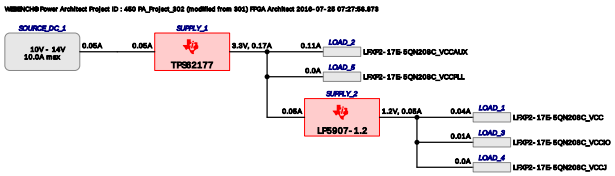
WEBENCH® Power Architect



Project Report

Project : 1194016/450 : PA_Project_302 (modified from 301)
Created : 2016-07-25 07:27:56.873
Optimize project optFactor=3

Project Summary

1.	Total System Efficiency	66.12 %
2.	Total System BOM Count	8.0
3.	Total System Footprint	59.0 mm2
4.	Total System BOM Cost	$1.18
5.	Total System Power Dissipation	224.2 mW

--> Launch WEBENCH Power Architect.

My Comments

No comments

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_2	LFXP2-17E-5QN208C_VCCAUX
SUPPLY_2	0	LOAD_1	LFXP2-17E-5QN208C_VCC
SUPPLY_2	0	LOAD_3	LFXP2-17E-5QN208C_VCCIO
SUPPLY_2	0	LOAD_4	LFXP2-17E-5QN208C_VCCJ
SUPPLY_1	0	LOAD_5	LFXP2-17E-5QN208C_VCCPLL

Power Supplies

#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	TPS62177	Switcher : Fixed 3.3Vout, High Light-Load Efficiency Buck Converter	3.3 V	0.166 A	84.8%	50	$1.02	2210	8
2.	SUPPLY_2	LP5907-1.2	LDO : Ultra low noise with no bypass capacitor	1.2 V	0.052 A	33%	9	$0.16	2209	4

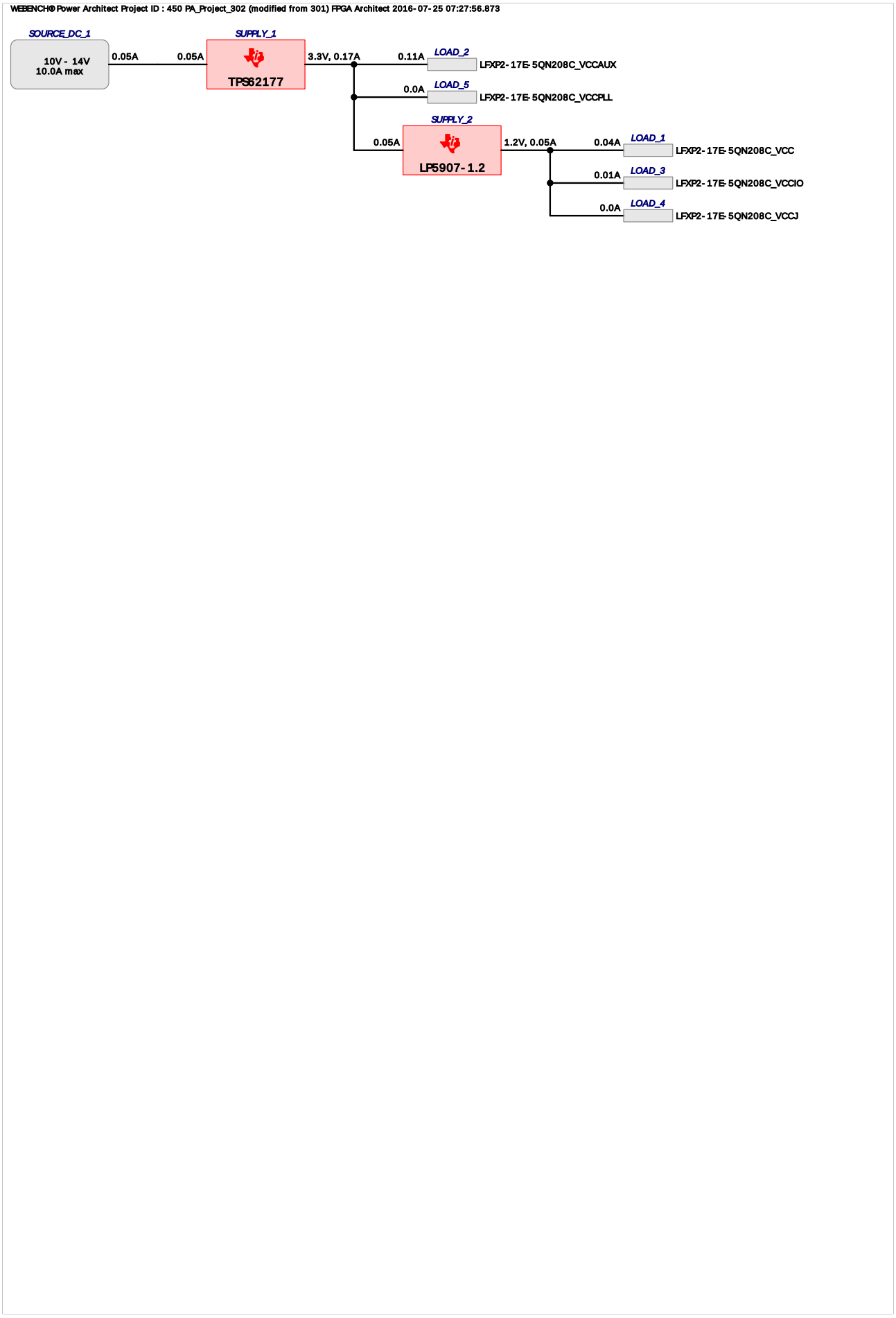
Power Loads

#	Name	VLoad	ILoad	Description
1.	LFXP2-17E-5QN208C_VCCAUX	3.3 V	0.112 A	VoutRipple=10%
2.	LFXP2-17E-5QN208C_VCC	1.2 V	0.044 A	VoutRipple=10%
3.	LFXP2-17E-5QN208C_VCCIO	1.2 V	0.0064 A	VoutRipple=10%
4.	LFXP2-17E-5QN208C_VCCJ	1.2 V	0.0012 A	VoutRipple=10%
5.	LFXP2-17E-5QN208C_VCCPLL	3.3 V	0.0018 A	VoutRipple=10%

FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Lattice http://www.latticesemi.com/documents/DS1009.pdf	LFXP2-17E-5QN208C	FPGA_1	LFXP2	FPGA Lattice LFXP2 LFXP2-17E-5QN208C

Project Diagram



Electrical Procurement BOM

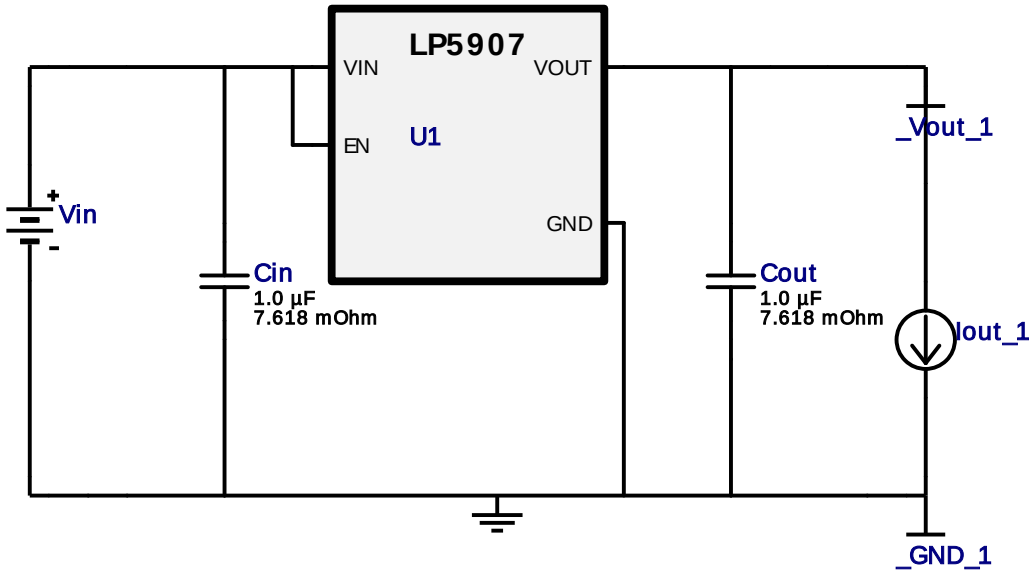
Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm^2)
TDK	C1005X5R0J105M	0402	2	$0.01	6
Vishay-Dale	CRCW0402100KFKED	0402	1	$0.01	3
MuRata	GRM188R61C225KE15D	0603	1	$0.02	5
MuRata	GRM21BR60J226ME39L	0805	1	$0.04	7
Texas Instruments	LP5907UVX-1.2/NOPB	UVK04AAA	1	$0.14	3
Coilcraft	LPS4018-103MRB	LPS4018	1	$0.35	24
Texas Instruments	TPS62177DQCR	R-PWSON-N10	1	$0.60	12
Total			8	$1.38	59.816250000000001

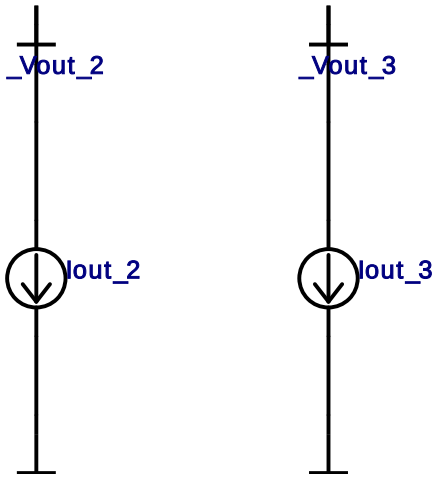
WEBENCH® Design Report

Vout = 1.2V
Iout = 0.05A

Device = LP5907UVX-1.2/NOPB
Topology = LDO
Created = 7/25/16 7:27:54 AM
BOM Cost = $0.16
BOM Count = 3
Total Pd = 0.13W

Design : 1194016/2209 LP5907UVX-1.2/NOPB
LP5907UVX-1.2/NOPB 2.97V-3.63V to 1.20V @ 0.0516A

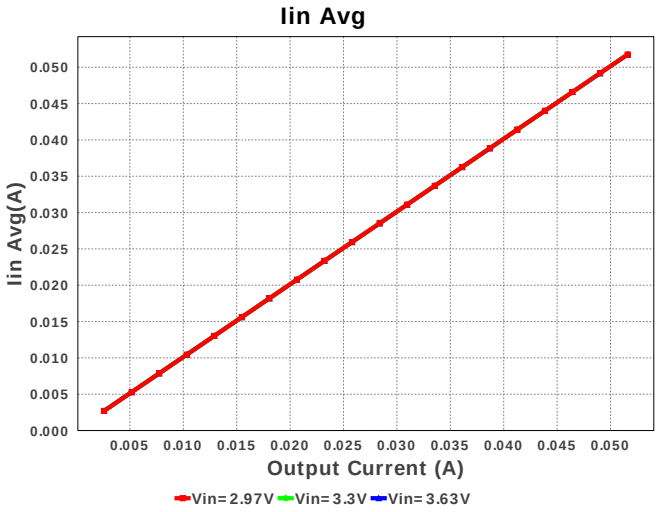


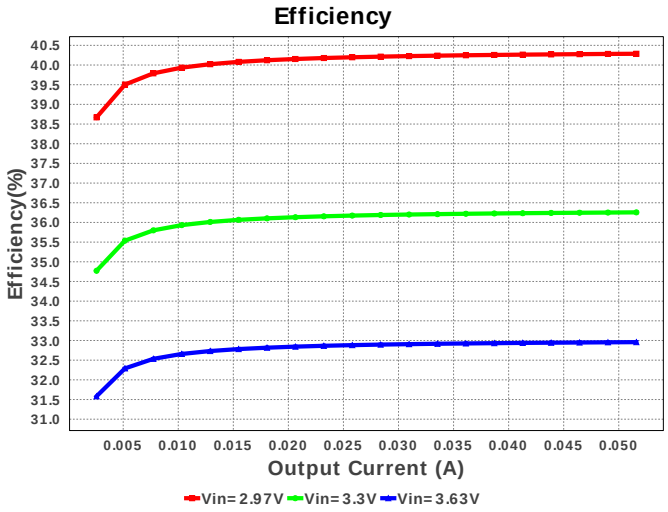


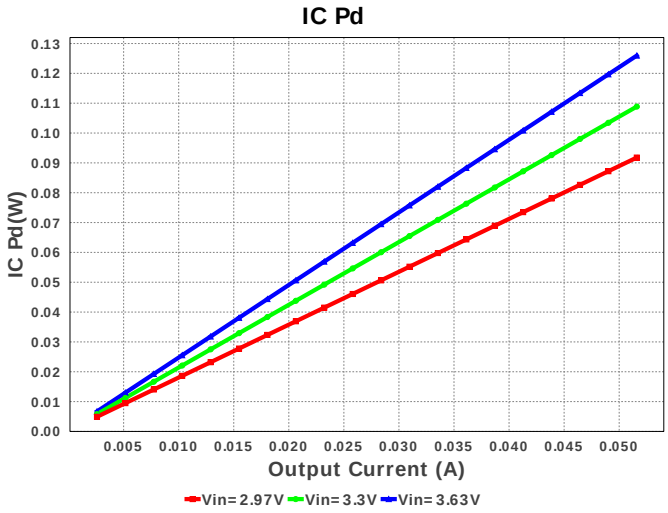
Electrical BOM

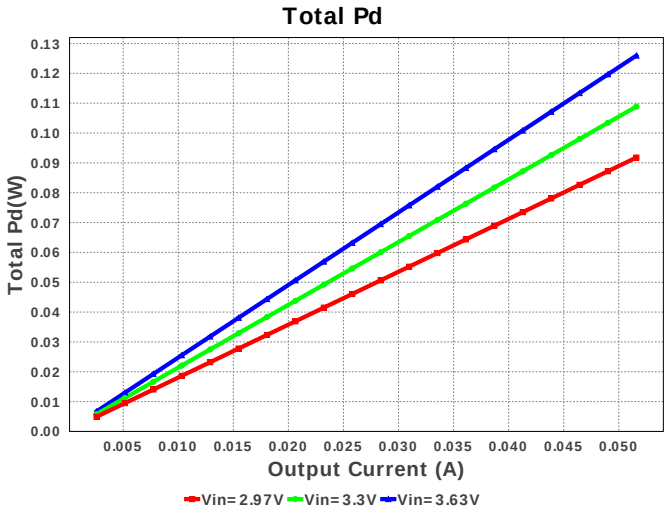
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	TDK	C1005X5R0J105M Series= X5R	Cap= 1.0 uF ESR= 7.618 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2

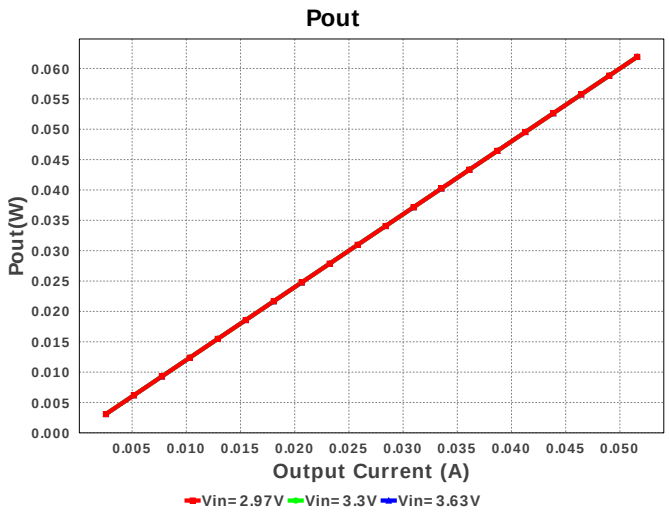
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
2.	Cout	TDK	C1005X5R0J105M Series= X5R	Cap= 1.0 uF ESR= 7.618 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	U1	Texas Instruments	LP5907UVX-1.2/NOPB	Switcher	1	$0.14	UVK04AAA 3 mm^2

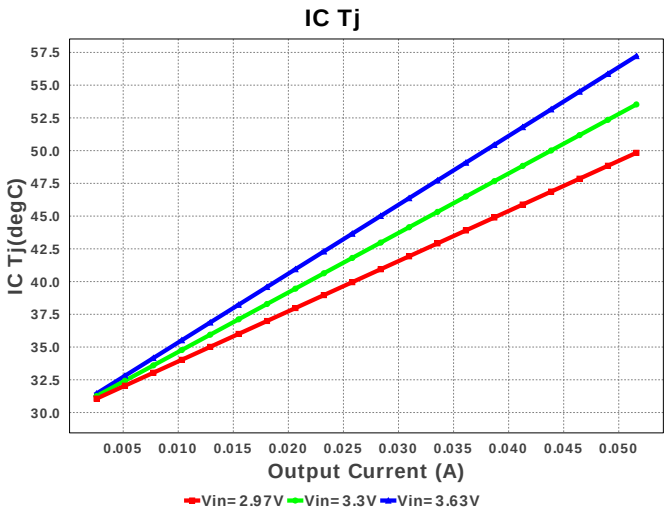


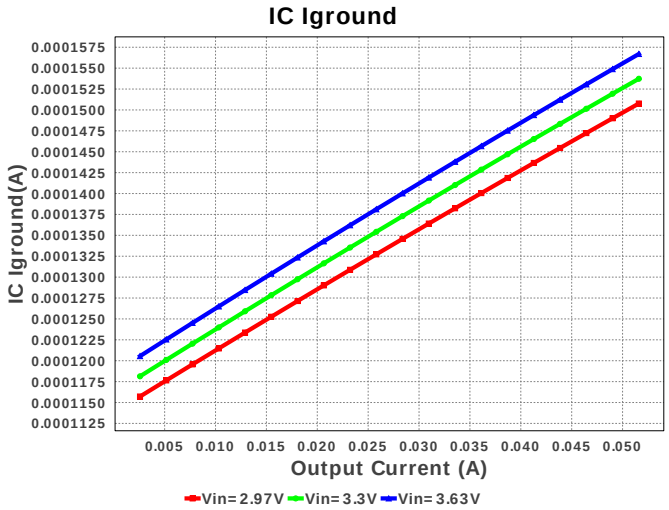


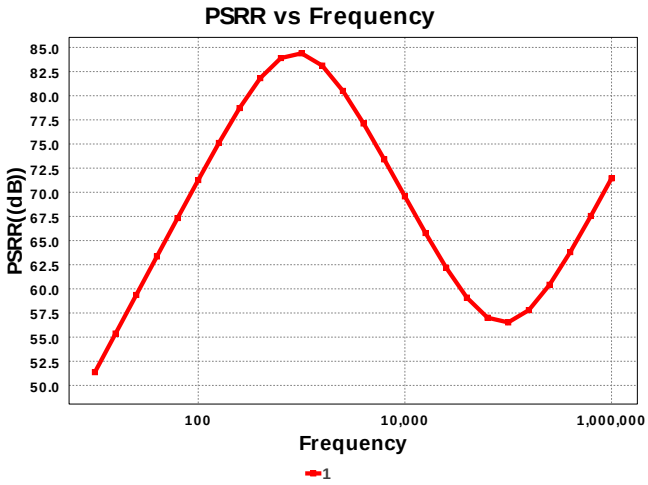












Operating Values

#	Name	Value	Category	Description
1.	IC Iground	156.694 µA	Current	IC ground current
2.	Iin Avg	51.757 mA	Current	Average input current
3.	BOM Count	3	General	Total Design BOM count
4.	FootPrint	9.0 mm^2	General	Total Foot Print Area of BOM components
5.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
6.	Output Noise RMS	10.0 µV	General	Noise RMS
7.	Pout	61.92 mW	General	Total output power
8.	Total BOM	$0.16	General	Total BOM Cost
9.	Vin p-p	3.447 mV	Op_Point	Input Source ripple voltage
10.	Vout OP	1.2 V	Op_Point	Operational Output Voltage
11.	Efficiency	32.958 %	Op_point	Steady state efficiency
12.	IC Tj	45.064 degC	Op_point	IC junction temperature
13.	ICThetaJA	119.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
14.	IOUT_OP	51.6 mA	Op_point	Iout operating point
15.	Input Ripple Frequency	990.266 kHz	Op_point	Input Source Ripple Frequency for PSRR Calculation
16.	PSRR est.	-71.359 dB	Op_point	Power Supply Rejection Ratio estimated
17.	VIN_OP	3.63 V	Op_point	Vin operating point
18.	Vout p-p	932.179 nV	Op_point	Peak-to-peak output ripple voltage
19.	IC Pd	125.957 mW	Power	IC power dissipation
20.	Total Pd	125.957 mW	Power	Total Power Dissipation
21.	Vout Tolerance	2.0 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	51.6 m	Maximum Output Current
2.	VinMax	3.63	Maximum input voltage
3.	VinMin	2.97	Minimum input voltage
4.	Vout	1.2	Output Voltage
5.	base_pn	LP5907	Base Product Number

#	Name	Value	Description
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1.

2. **LP5907** Product Folder : http://www.ti.com/product/lp5907 : contains the data sheet and other resources.

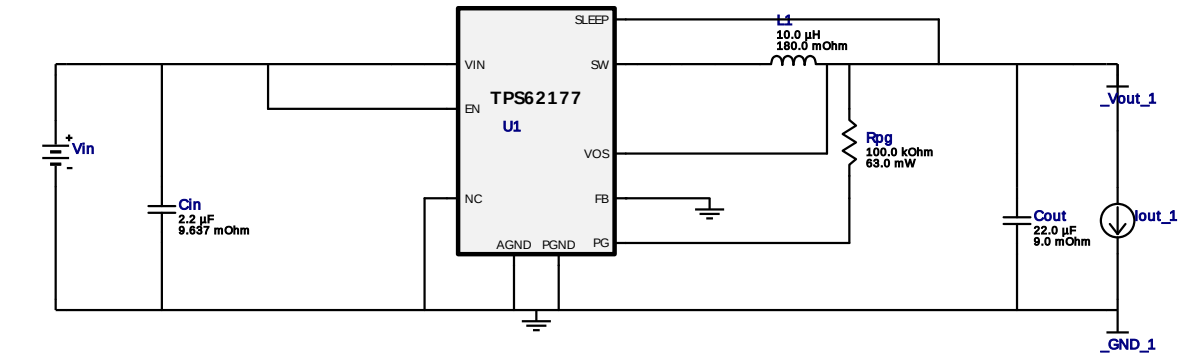
TEXAS INSTRUMENTS

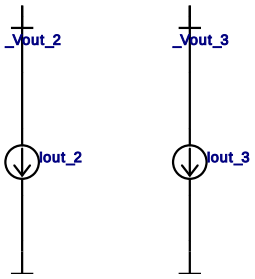
WEBENCH® Design Report

Vout = 3.3V
Iout = 0.17A

Device = TPS62177DQCR
Topology = Buck
Created = 7/25/16 7:27:55 AM
BOM Cost = $1.02
BOM Count = 5
Total Pd = 0.1W

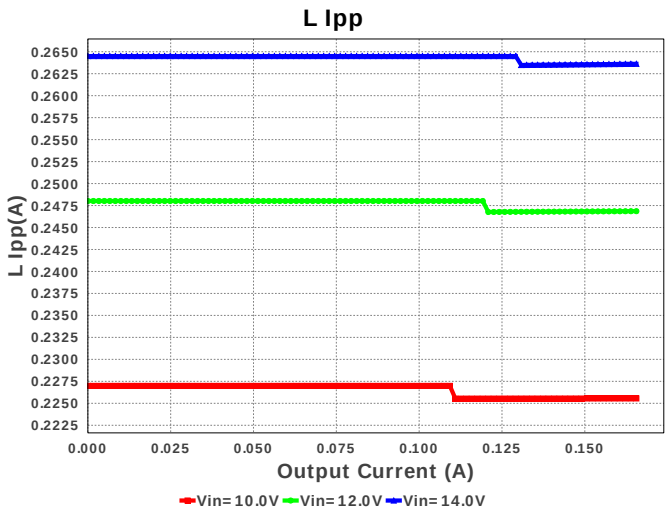
Design : 1194016/2210 TPS62177DQCR
TPS62177DQCR 10.0V-14.0V to 3.30V @ 0.16556A

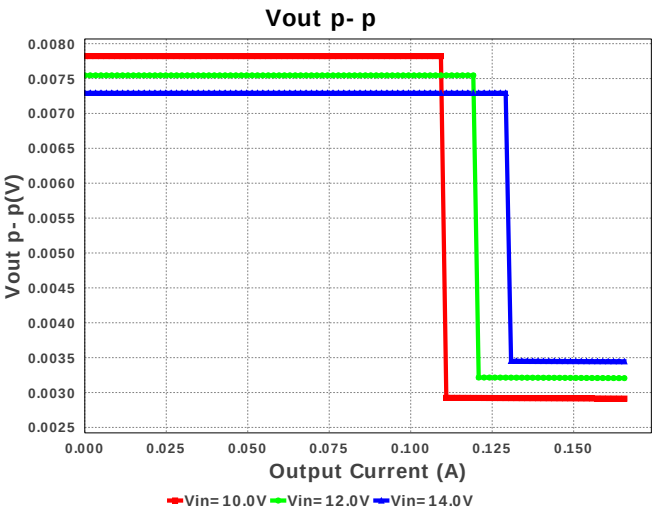


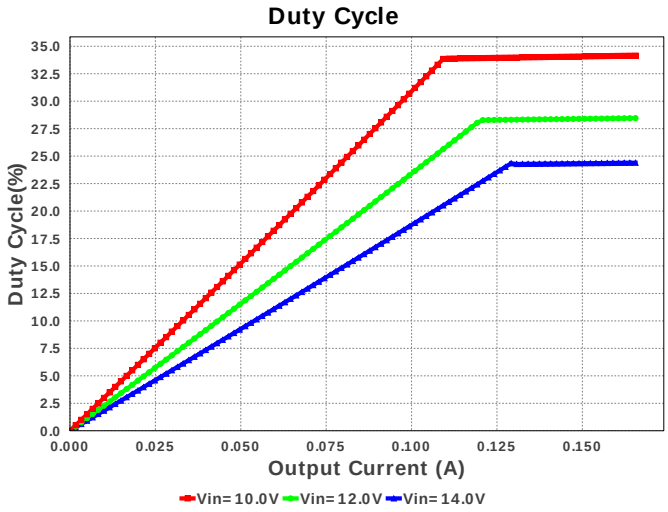


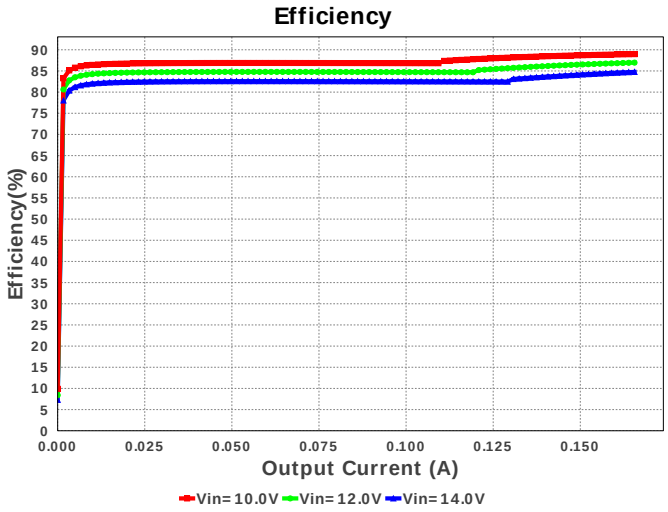
Electrical BOM

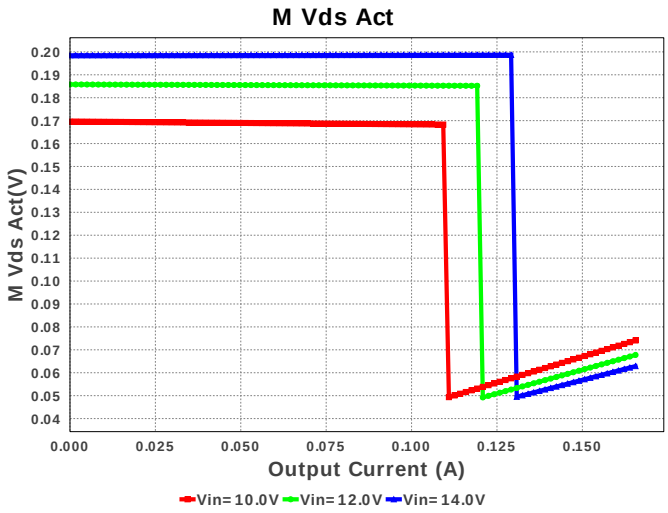
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM188R61C225KE15D Series= X5R	Cap= 2.2 uF ESR= 9.637 mOhm VDC= 16.0 V IRMS= 1.20373 A	1	$0.02	0603 5 mm²
2.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	$0.04	0805 7 mm²
3.	L1	Coilcraft	LPS4018-103MRB	L= 10.0 µH DCR= 180.0 mOhm	1	$0.35	LPS4018 24 mm²
4.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
5.	U1	Texas Instruments	TPS62177DQCR	Switcher	1	$0.60	R-PWSON-N10 12 mm²

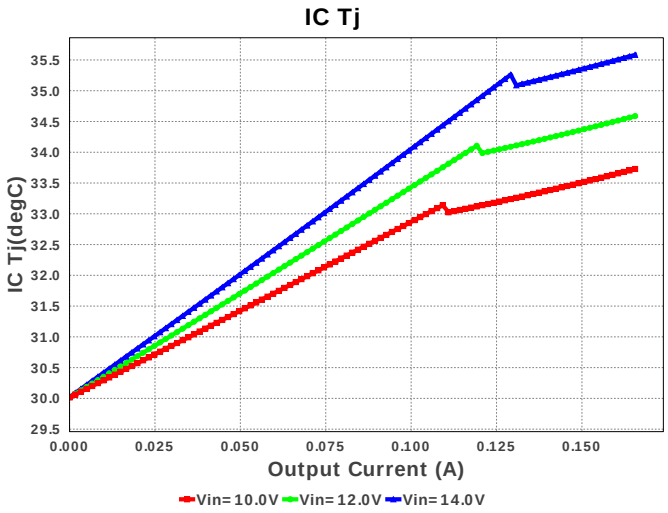


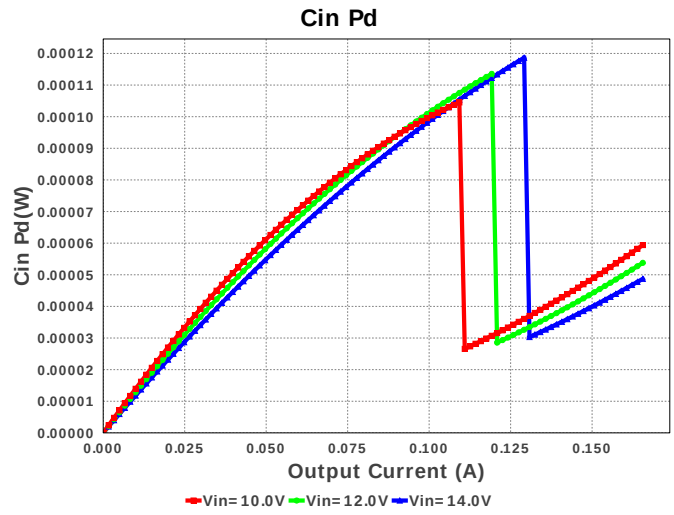


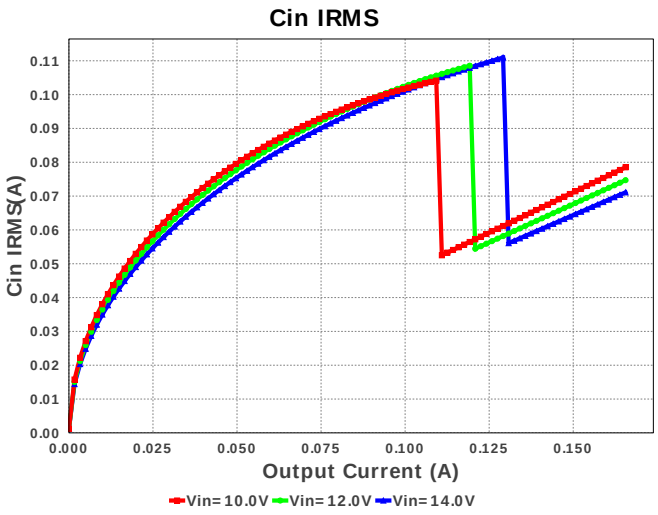


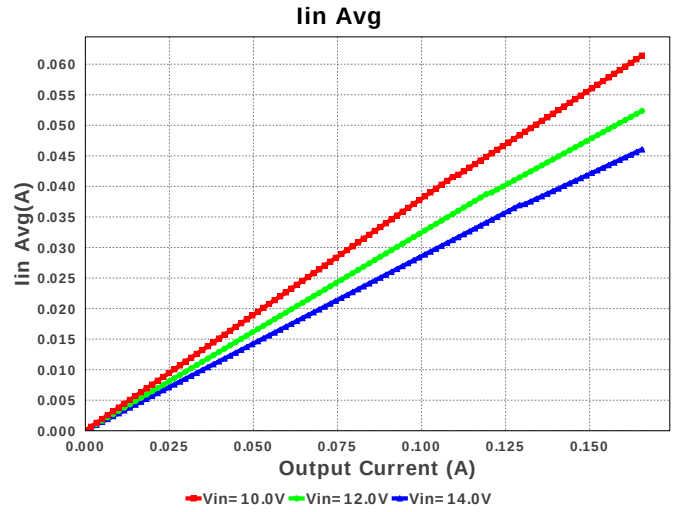


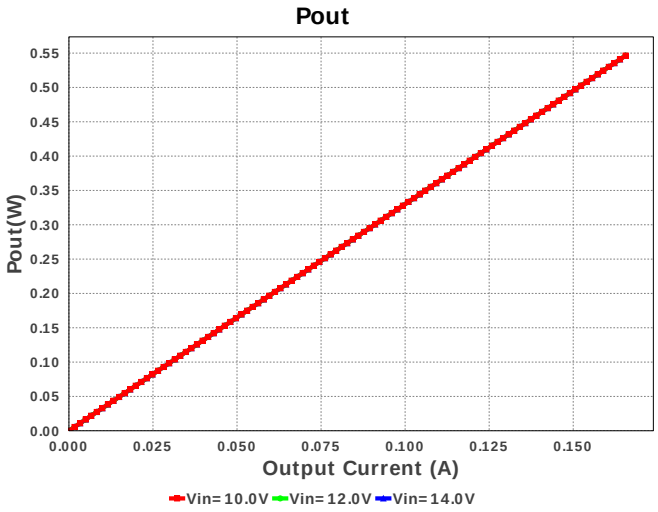


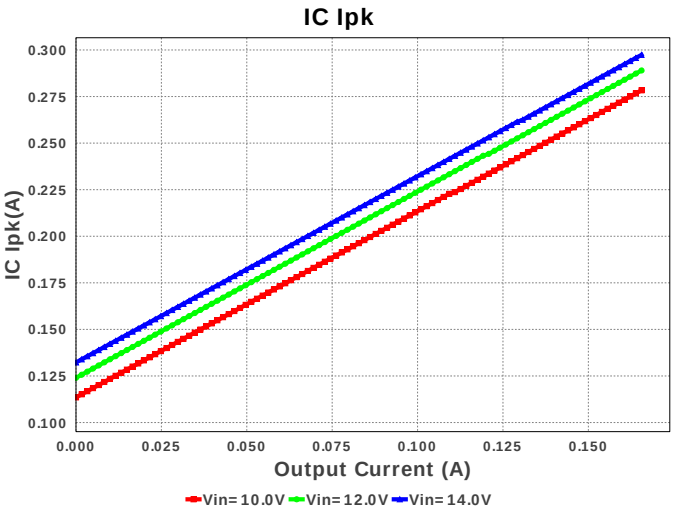


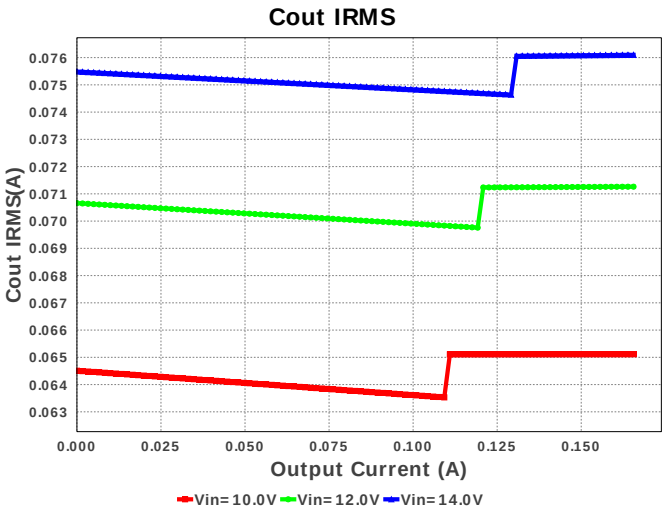


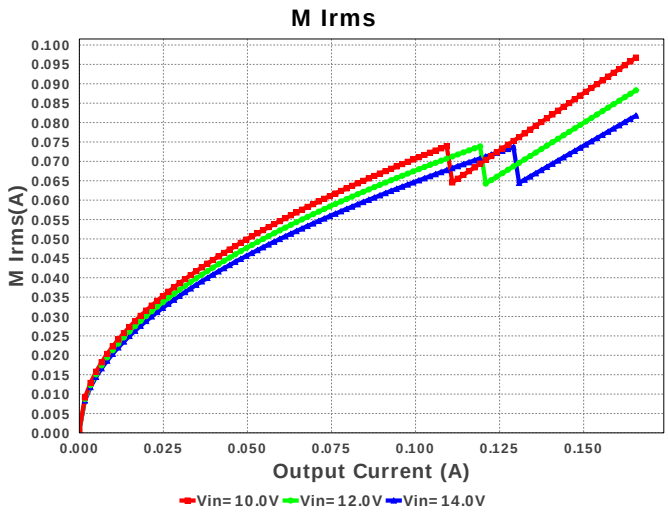


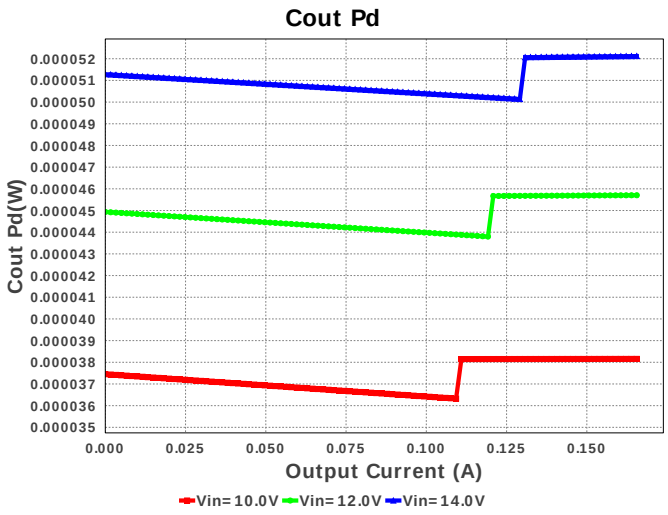


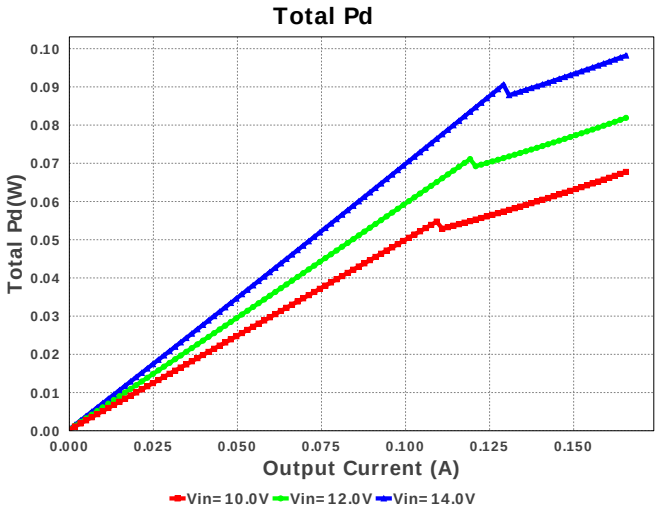


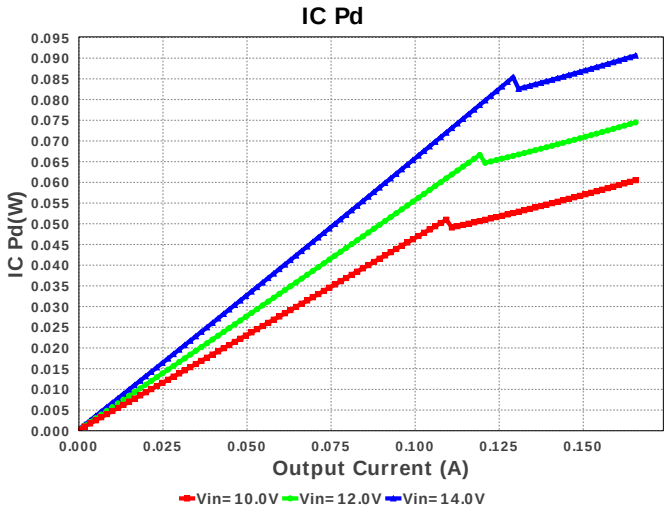


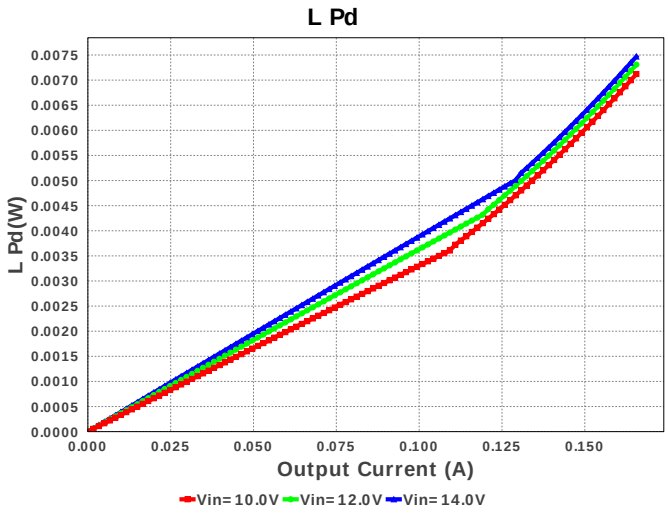


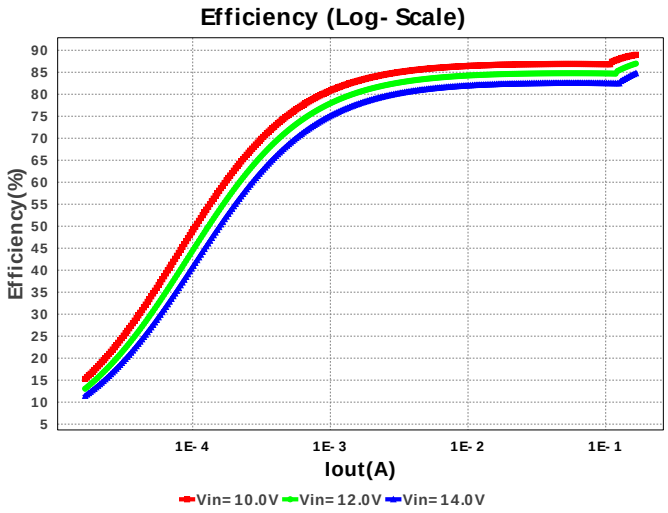












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	71.104 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	76.1 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	297.37 mA	Current	Peak switch current in IC
4.	Iin Avg	46.039 mA	Current	Average input current
5.	L Ipp	263.62 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	81.776 mA	Current	Q Iavg
7.	BOM Count	5	General	Total Design BOM count
8.	FootPrint	50.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	990.266 kHz	General	Switching frequency
10.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	62.889 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	546.348 mW	General	Total output power
13.	Total BOM	$1.02	General	Total BOM Cost
14.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	24.397 %	Op_point	Duty cycle
16.	Efficiency	84.765 %	Op_point	Steady state efficiency
17.	IC Tj	35.583 degC	Op_point	IC junction temperature
18.	ICThetaJA	61.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	165.56 mA	Op_point	Iout operating point
20.	VIN_OP	14.0 V	Op_point	Vin operating point
21.	Vout p-p	3.447 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	48.723 µW	Power	Input capacitor power dissipation
23.	Cout Pd	52.121 µW	Power	Output capacitor power dissipation
24.	IC Pd	90.629 mW	Power	IC power dissipation
25.	L Pd	7.47 mW	Power	Inductor power dissipation
26.	Total Pd	98.197 mW	Power	Total Power Dissipation
27.	Vout Tolerance	727.273 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	165.56 m	Maximum Output Current
2.	VinMax	14.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS62177	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS62177** Product Folder : http://www.ti.com/product/TPS62177 : contains the data sheet and other resources.