

WEBENCH® Power Architect

Project Report

Project : 1194016/438 : PA_Project_304 (modified from 302)

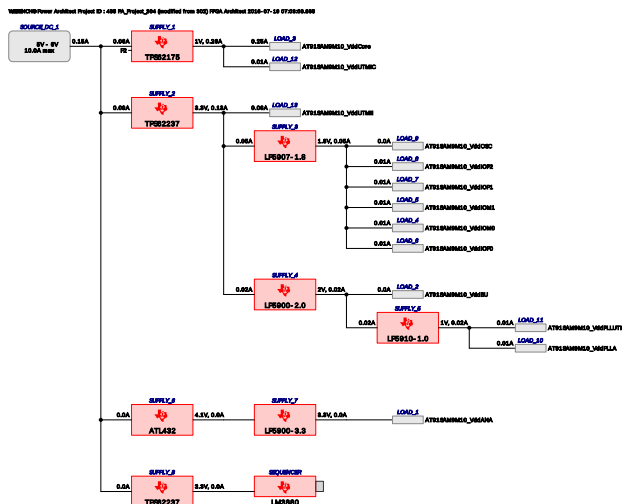
Created : 2016-07-19 07:03:08.868

Optimize project optFactor=3

Project Summary

1. Total System Efficiency	64.216 %
2. Total System BOM Count	36.0
3. Total System Footprint	190.0 mm2
4. Total System BOM Cost	\$3.75
5. Total System Power Dissipation	321.5 mW

--> Launch WEBENCH Power Architect.



My Comments

No comments

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	2	LOAD_3	AT91SAM9M10_VddCore
SUPPLY_1	2	LOAD_12	AT91SAM9M10_VddUTMIC
SUPPLY_2	0	LOAD_13	AT91SAM9M10_VddUTMII
SUPPLY_3	0	LOAD_9	AT91SAM9M10_VddOSC
SUPPLY_3	0	LOAD_8	AT91SAM9M10_VddIOP2
SUPPLY_3	0	LOAD_7	AT91SAM9M10_VddIOP1
SUPPLY_3	0	LOAD_5	AT91SAM9M10_VddIOM1
SUPPLY_3	0	LOAD_4	AT91SAM9M10_VddIOM0
SUPPLY_3	0	LOAD_6	AT91SAM9M10_VddIOP0
SUPPLY_4	0	LOAD_2	AT91SAM9M10_VddBU
SUPPLY_5	0	LOAD_11	AT91SAM9M10_VddPLLUTMI
SUPPLY_5	0	LOAD_10	AT91SAM9M10_VddPLLA
SUPPLY_7	0	LOAD_1	AT91SAM9M10_VddANA
SUPPLY_6	NA		
SUPPLY_8	NA		
SEQUENCER	NA		

Power Supplies

#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	TPS62175	Switcher : High Light-Load Efficiency Buck Converter	1 V	0.26 A	78.2%	62	\$1.08	2122	5
2.	SUPPLY_2	TPS62237	Switcher : NA	3.3 V	0.133 A	83%	23	\$0.62	2126	23
3.	SUPPLY_3	LP5907-1.8	LDO : Ultra low noise with no bypass capacitor	1.8 V	0.052 A	49.4%	9	\$0.16	2123	11
4.	SUPPLY_4	LP5900-2.0	LDO : Ultra low noise with no bypass capacitor	2 V	0.021 A	54.9%	11	\$0.22	2125	19
5.	SUPPLY_5	LP5910-1.0	LDO : Ultra Low-Noise, 300-mA Linear Regulator for RF/Analog Circuits	1 V	0.02 A	45.2%	9	\$0.16	2124	15
6.	SUPPLY_6	ATL432	LDO : 2.5V Precision Programmable Shunt Regulator	4.1 V	0.001 A	65.8%	23	\$0.19	2128	31
7.	SUPPLY_7	LP5900-3.3	LDO : Ultra low noise with no bypass capacitor	3.3 V	0.001 A	70.9%	11	\$0.22	2127	28
8.	SUPPLY_8	TPS62237	Switcher : NA	3.3 V	0.001 A	77.7%	23	\$0.62	2130	36
9.	SEQUENCER	LM3880	Sequencer : Power Sequencer	3.3 V	0.001 A	0%	19	\$0.48	2129	34

Power Loads

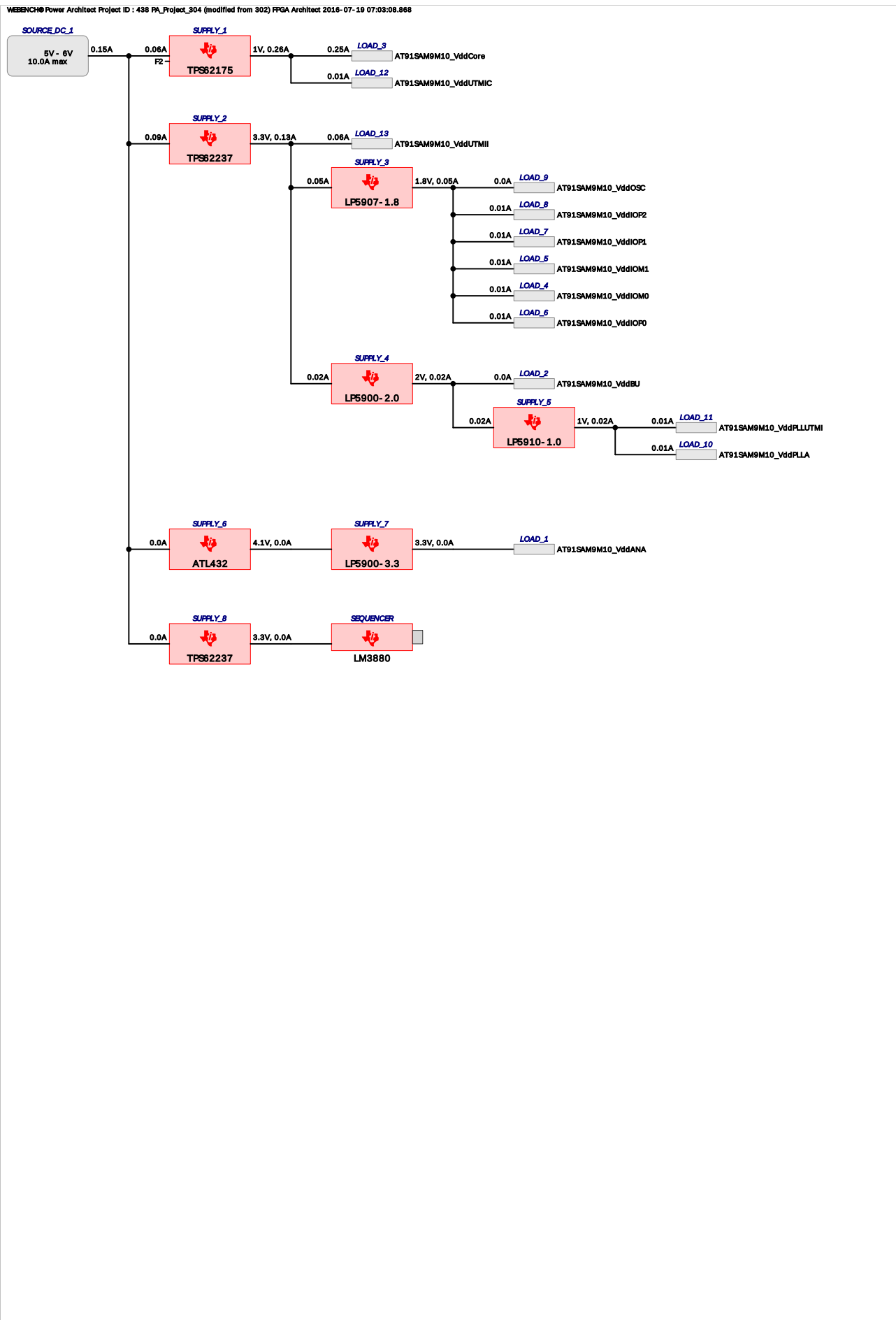
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1.	AT91SAM9M10_VddCore	1 V	0.25 A	VoutRipple=20%, Up Sequence Order=1 delay=2.0 mSec, Down Sequence Order=0 delay=2.0 mSec

#	Name	VLoad	ILoad	Description
2.	AT91SAM9M10_VddUTMIC	1 V	0.01 A	VoutRipple=10%
3.	AT91SAM9M10_VddUTMII	3.3 V	0.06 A	VoutRipple=10%
4.	AT91SAM9M10_VddOSC	1.8 V	0.002 A	VoutRipple=16%
5.	AT91SAM9M10_VddIOP2	1.8 V	0.01 A	
6.	AT91SAM9M10_VddIOP1	1.8 V	0.01 A	
7.	AT91SAM9M10_VddIOM1	1.8 V	0.01 A	
8.	AT91SAM9M10_VddIOM0	1.8 V	0.01 A	
9.	AT91SAM9M10_VddIOP0	1.8 V	0.01 A	Up Sequence Order=0 delay=2.0 mSec, Down Sequence Order=1 delay=2.0 mSec
10.	AT91SAM9M10_VddBU	2 V	0.001 A	VoutRipple=10%
11.	AT91SAM9M10_VddPLLUTMI	1 V	0.01 A	VoutRipple=20%
12.	AT91SAM9M10_VddPLLA	1 V	0.01 A	VoutRipple=20%
13.	AT91SAM9M10_VddANA	3.3 V	0.001 A	

FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Atmel	AT91SAM9M10	FPGA_1	SAM9	FPGA Atmel SAM9 AT91SAM9M10 http://www.atmel.com/dyn/resources/prod_documents/doc6355.pdf

Project Diagram

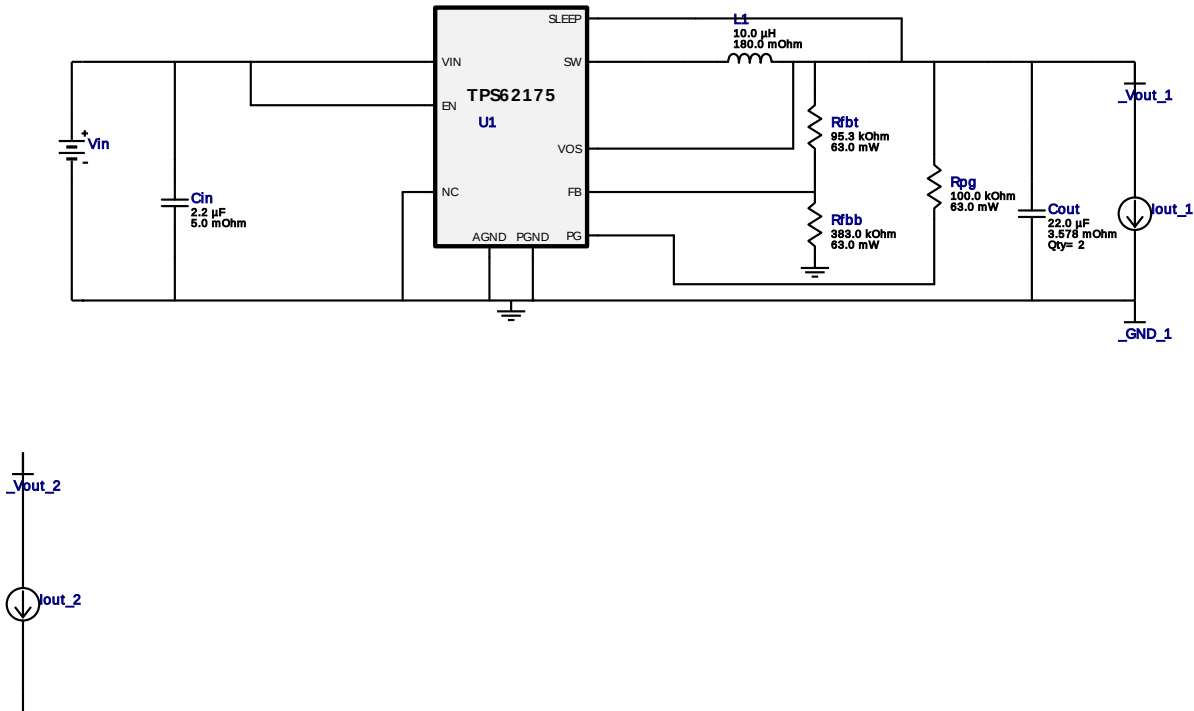


Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
Texas Instruments	ATL432BQDBZR	DBZ0003A	1	\$0.16	14
TDK	C1005X5R0J105M	0402	8	\$0.01	24
Vishay-Dale	CRCW0402100KFKED	0402	4	\$0.01	12
Vishay-Dale	CRCW0402121KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040219R1FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402383KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040276K8FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040295K3FKED	0402	1	\$0.01	3
MuRata	GRM155R60J225ME15D	0402	1	\$0.02	3
MuRata	GRM188R60J475KE19D	0603	2	\$0.01	9
MuRata	GRM21BC80G226ME39L	0805	2	\$0.04	7
MuRata	GRM21BR61A475KA73L	0805	2	\$0.03	14
Texas Instruments	LM3880MF-1AE/NOPB	R-PDSO- G6	1	\$0.45	10
Texas Instruments	LP5900TLX-2.0/NOPB	TLA04BCA	1	\$0.20	5
Texas Instruments	LP5900TLX-3.3/NOPB	TLA04BCA	1	\$0.20	5
Texas Instruments	LP5907UVX-1.8/NOPB	UVK04AAA	1	\$0.14	3
Texas Instruments	LP5910-1.0YKAR	YKA0004ACAC	1	\$0.14	3
Coilcraft	LPS4018-103MRB	LPS4018	1	\$0.35	24
MuRata	LQM21PN1R0MC0D	0805	2	\$0.10	14
Texas Instruments	TPS62175DQCR	R- PWSON- N10	1	\$0.60	12
Texas Instruments	TPS62237DRYR	DRY0006A	2	\$0.48	10
Total			36	\$3.75	182.030244

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Topology = Buck
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BOM Count = 8
Total Pd = 0.07W

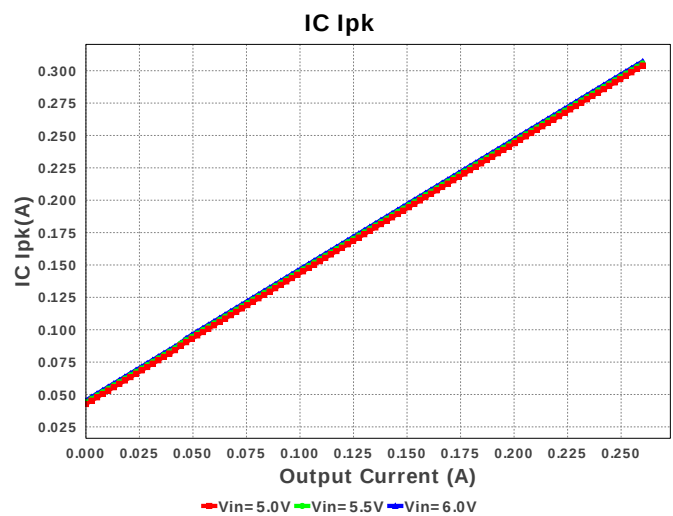
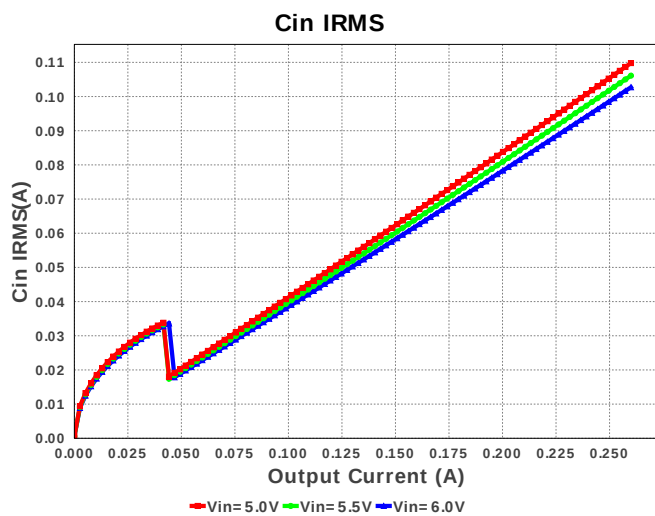
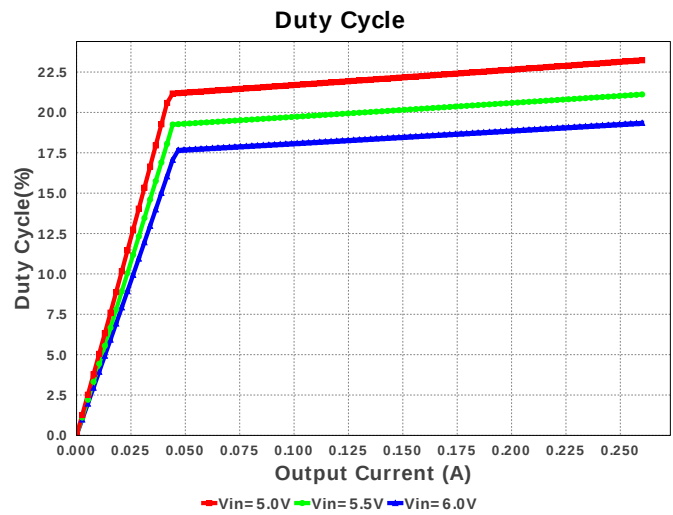
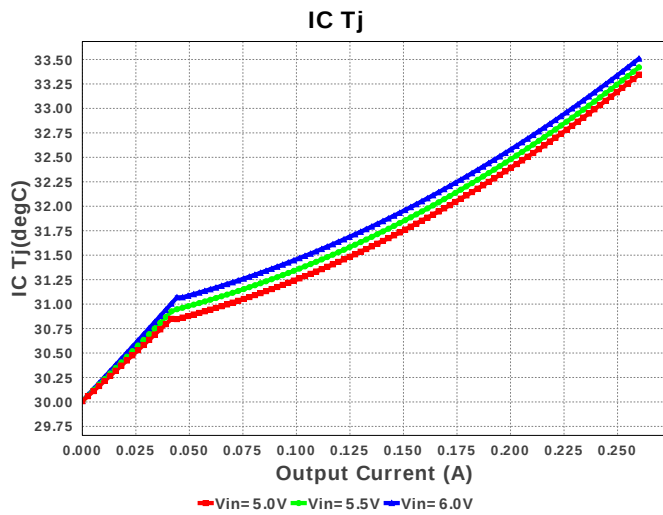
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TPS62175DQCR 5.0V-6.0V to 1.00V @ 0.26A

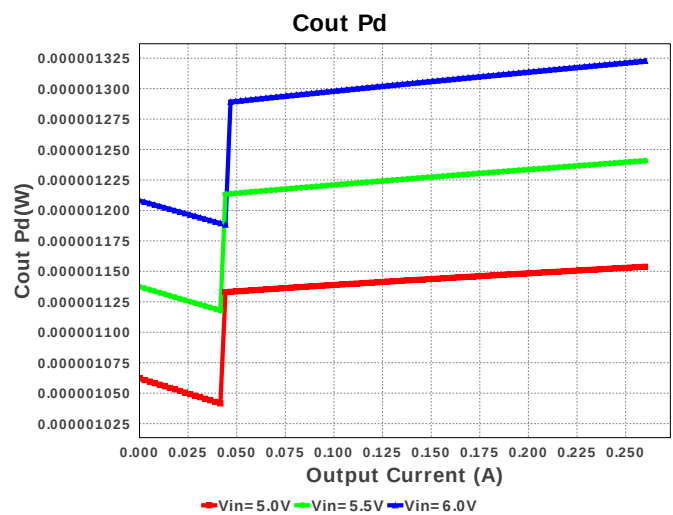
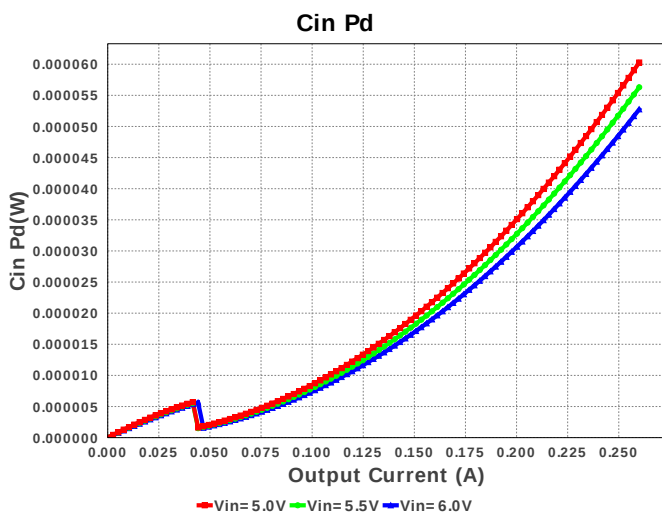
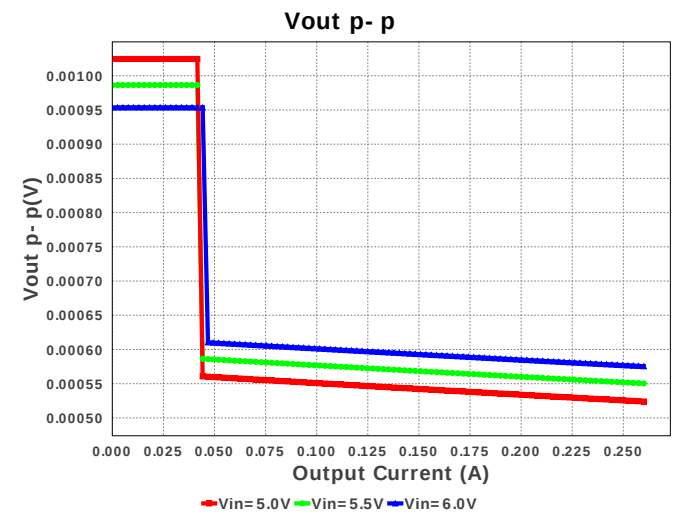
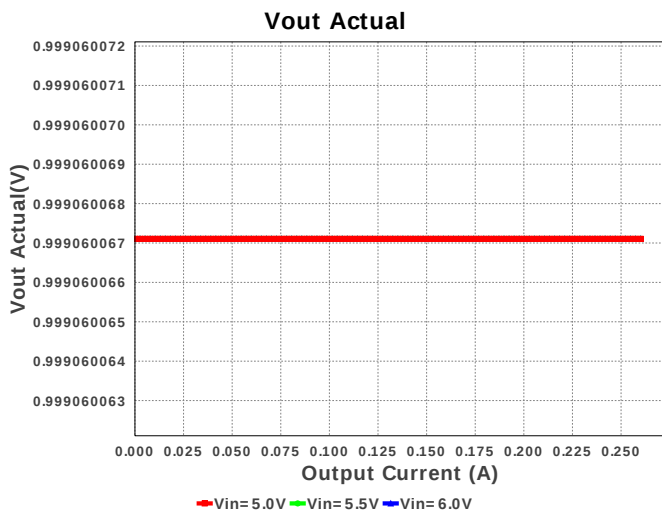
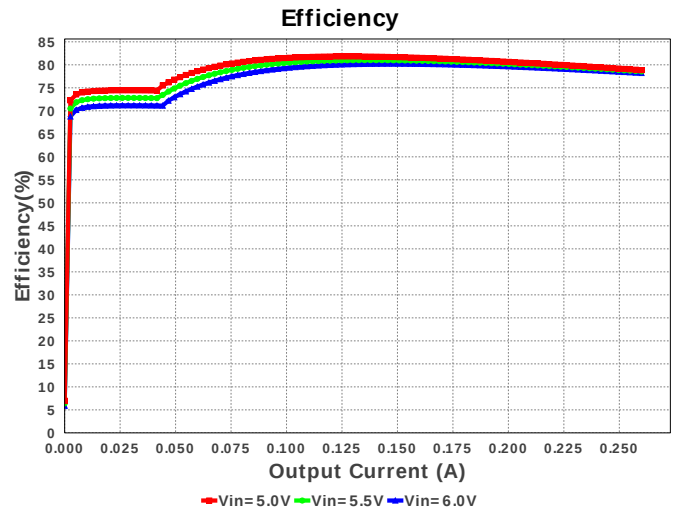
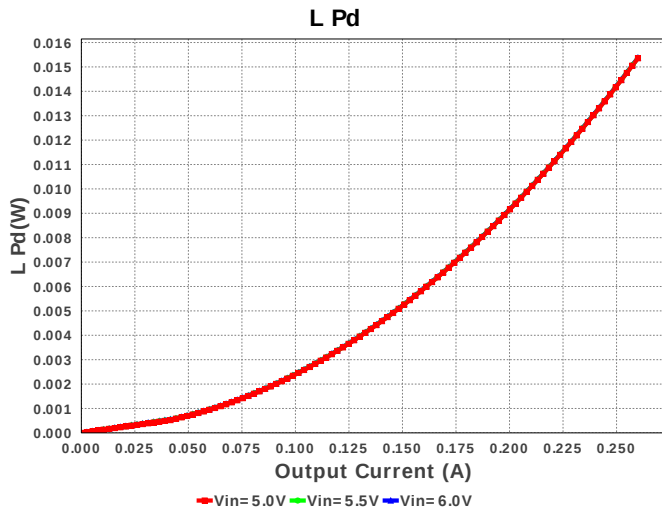


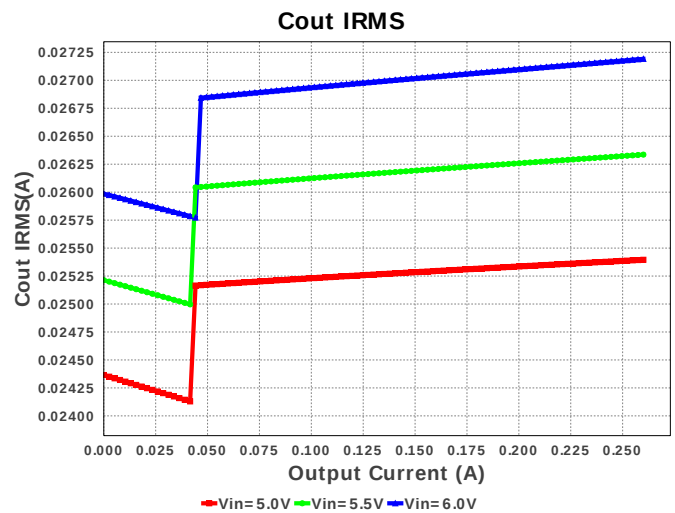
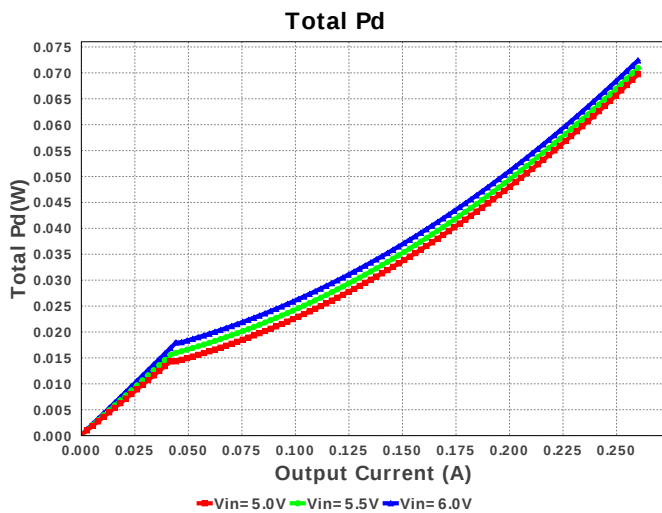
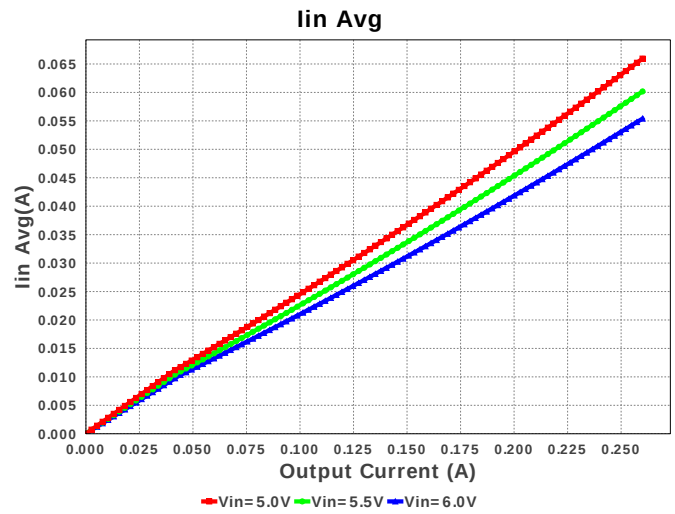
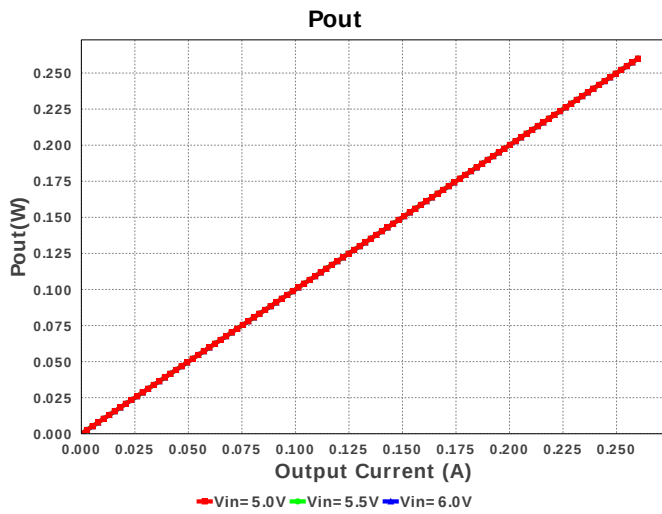
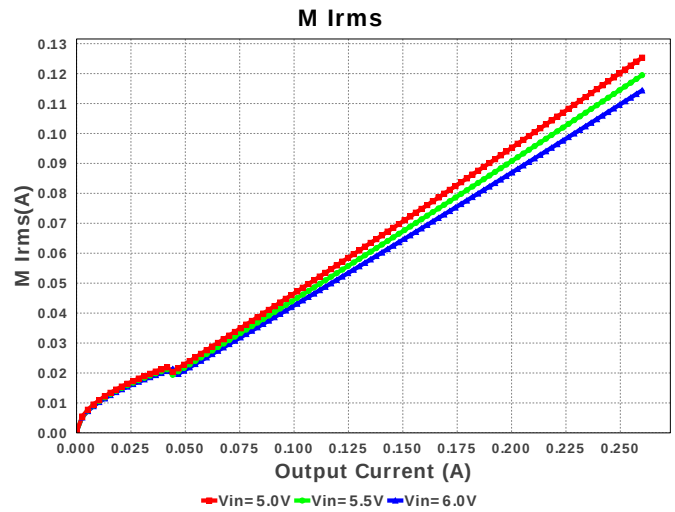
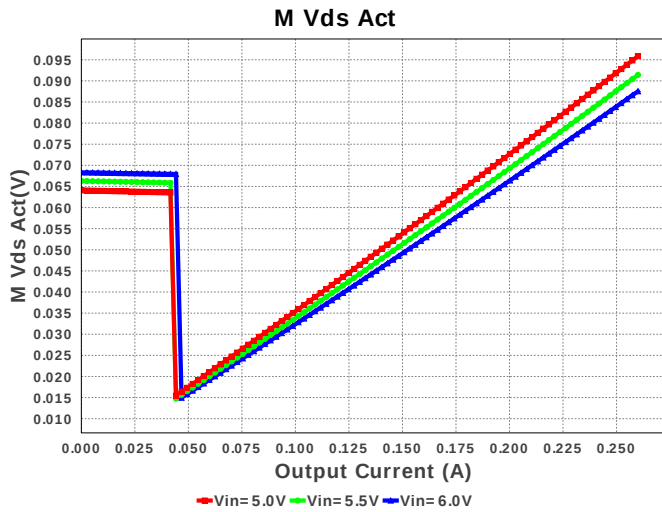
Electrical BOM

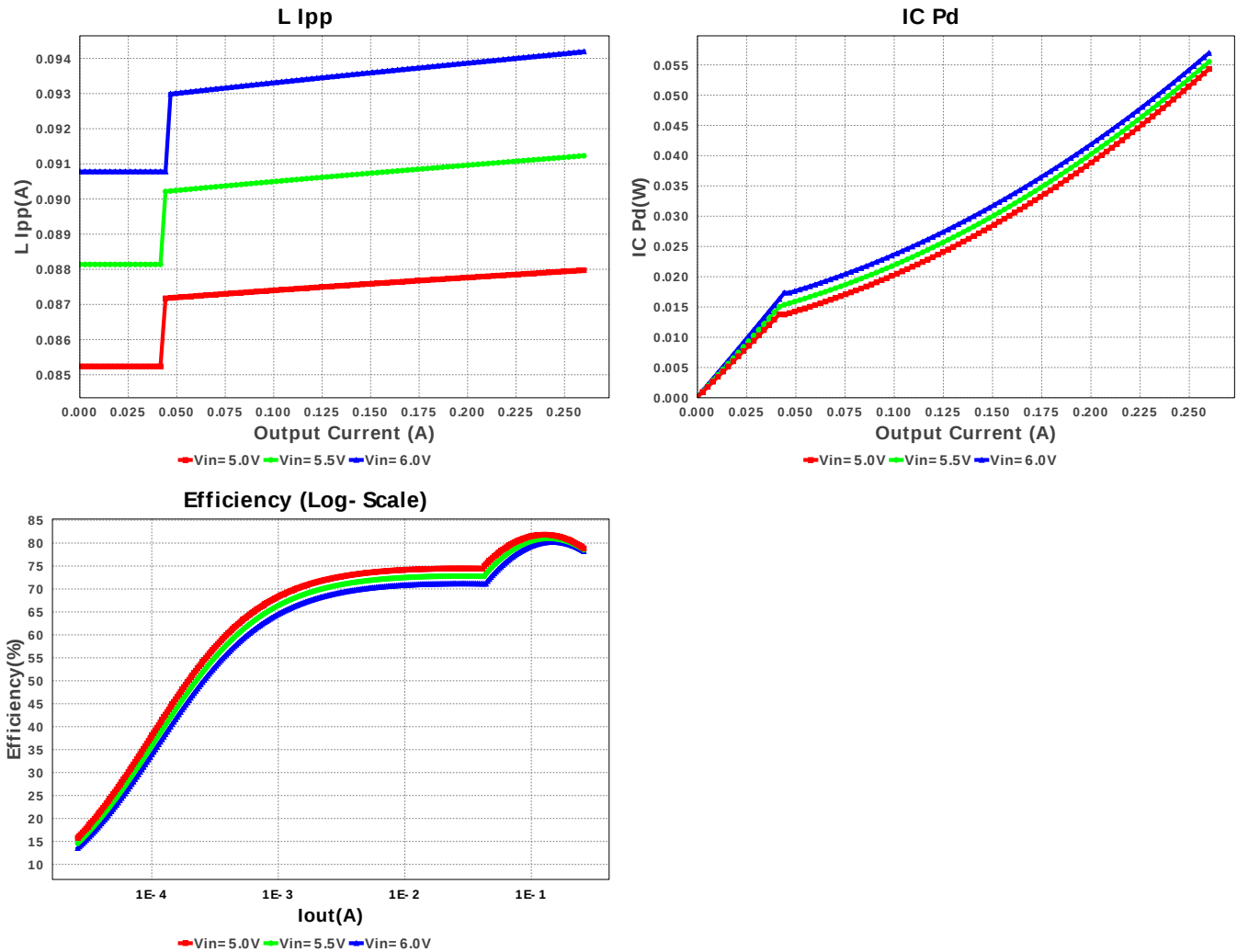
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM155R60J225ME15D Series= X5R	Cap= 2.2 uF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 3.67 A	1	\$0.02	 0402 3 mm²
2.	Cout	MuRata	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 uF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.29633 A	2	\$0.04	 0805 7 mm²
3.	L1	Coilcraft	LPS4018-103MRB	L= 10.0 µH DCR= 180.0 mOhm	1	\$0.35	 LPS4018 24 mm²
4.	Rfbb	Vishay-Dale	CRCW0402383KFKED Series= CRCW..e3	Res= 383.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
5.	Rfbt	Vishay-Dale	CRCW040295K3KFKED Series= CRCW..e3	Res= 95.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
6.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	U1	Texas Instruments	TPS62175DQCR	Switcher	1	\$0.60	 R-PWSON-N10 12 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	102.715 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	27.192 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	307.098 mA	Current	Peak switch current in IC
4.	Iin Avg	55.399 mA	Current	Average input current
5.	L Ipp	94.195 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	114.377 mA	Current	Q lavg
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	62.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1.027 MHz	General	Switching frequency
10.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	87.534 mV	General	Voltage drop across the MosFET
12.	Pout	260.0 mW	General	Total output power
13.	Total BOM	\$1.08	General	Total BOM Cost
14.	Vout Actual	999.06 mV	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	1.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	19.352 %	Op_point	Duty cycle
17.	Efficiency	78.221 %	Op_point	Steady state efficiency
18.	IC Tj	33.509 degC	Op_point	IC junction temperature
19.	ICThetaJA	61.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	260.0 mA	Op_point	Iout operating point
21.	VIN_OP	6.0 V	Op_point	Vin operating point
22.	Vout p-p	322.626 μ V	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	52.752 μ W	Power	Input capacitor power dissipation
24.	Cout Pd	1.323 μ W	Power	Output capacitor power dissipation
25.	IC Pd	56.961 mW	Power	IC power dissipation
26.	L Pd	15.376 mW	Power	Inductor power dissipation
27.	Total Pd	72.392 mW	Power	Total Power Dissipation
28.	Vout Tolerance	3.415 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	260.0 m	Maximum Output Current
2.	VinMax	6.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	1.0	Output Voltage
5.	base_pn	TPS62175	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS62175** Product Folder : <http://www.ti.com/product/TPS62175> : contains the data sheet and other resources.

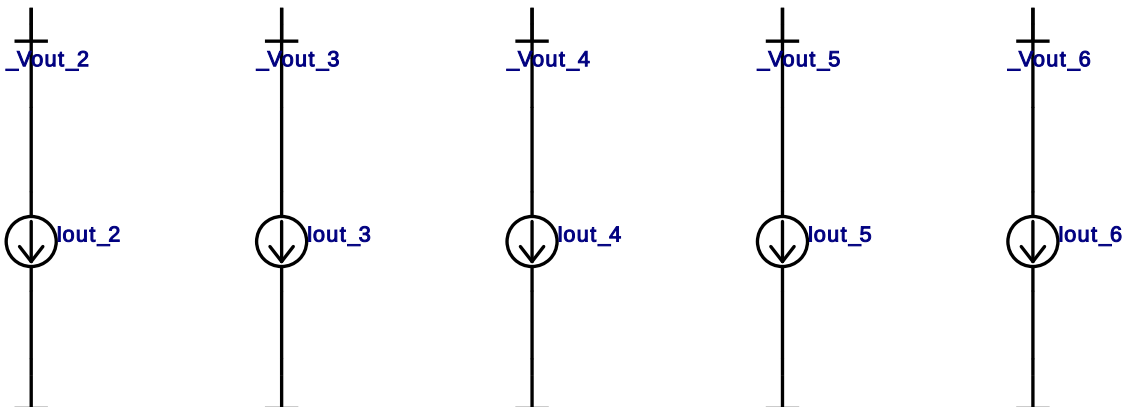
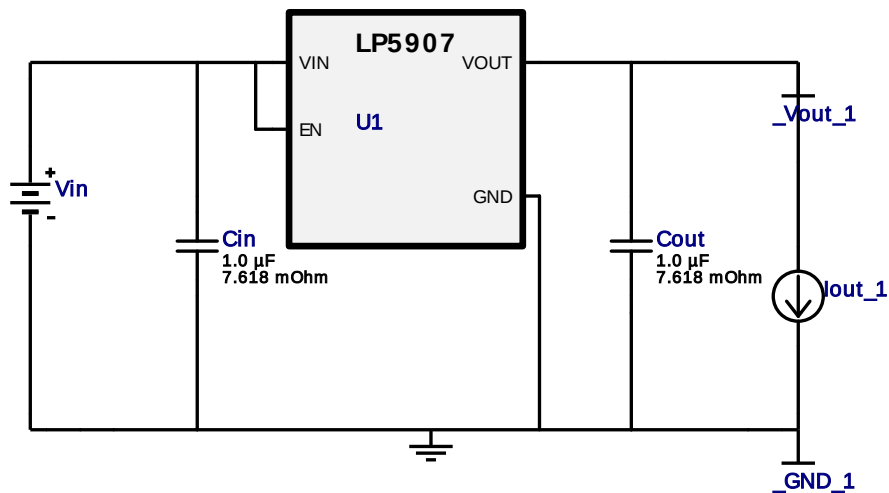


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Iout = 0.05A

Device = LP5907UVX-1.8/NOPB
Topology = LDO
Created = 7/19/16 7:03:04 AM
BOM Cost = \$0.16
BOM Count = 3
Total Pd = 0.1W

WEBENCH® Design Report

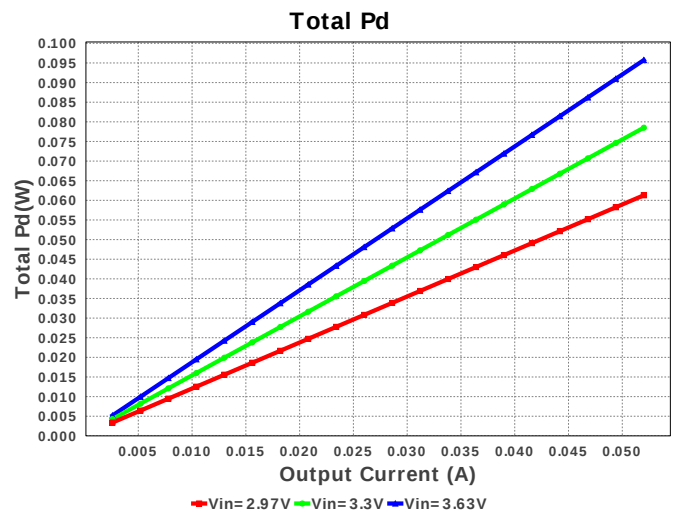
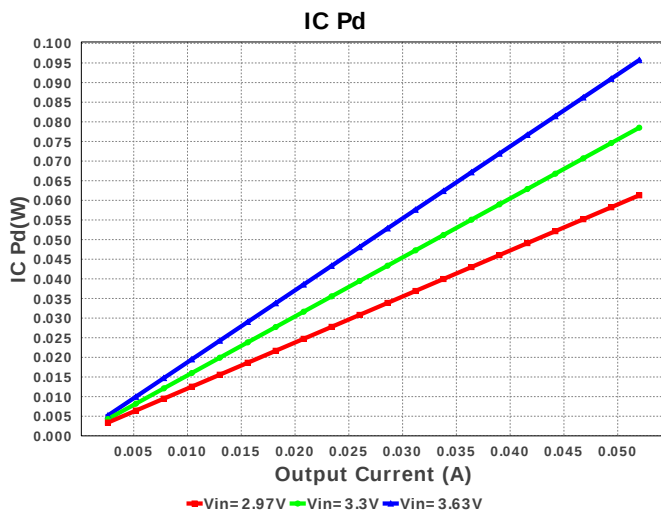
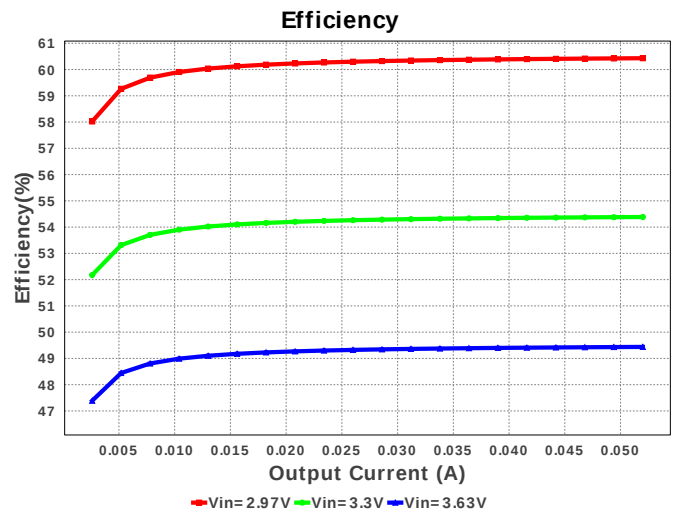
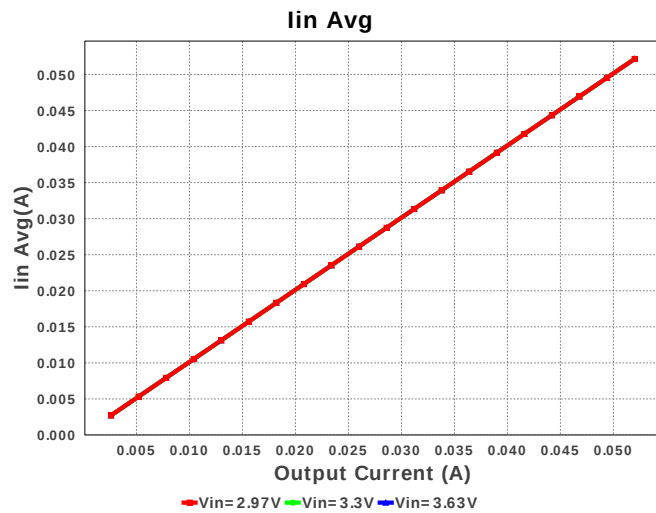
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LP5907UVX-1.8/NOPB 2.97V-3.63V to 1.80V @ 0.052A

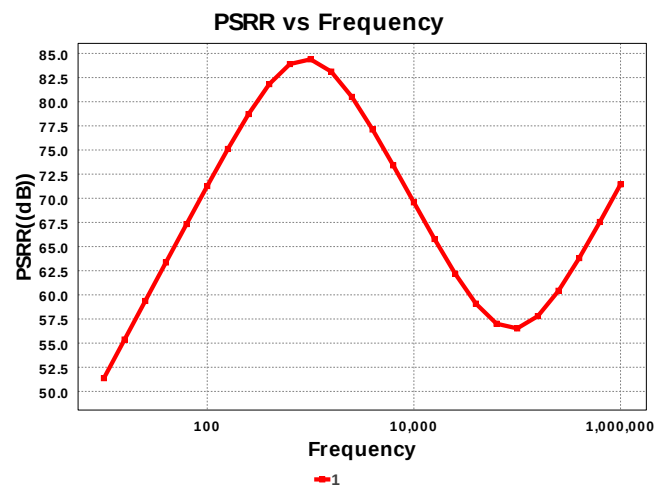
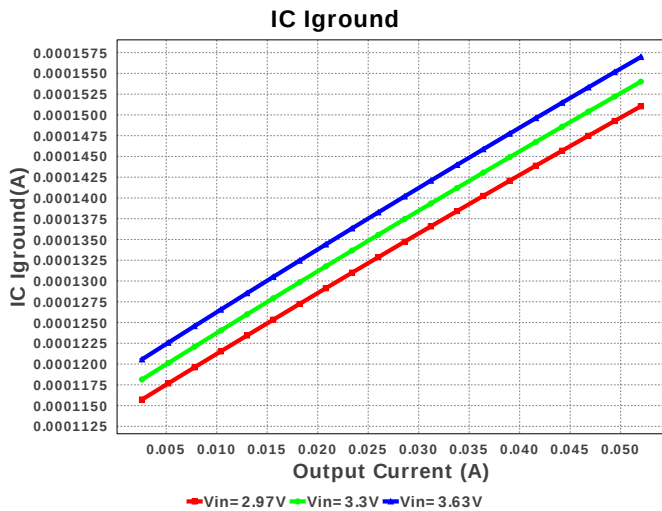
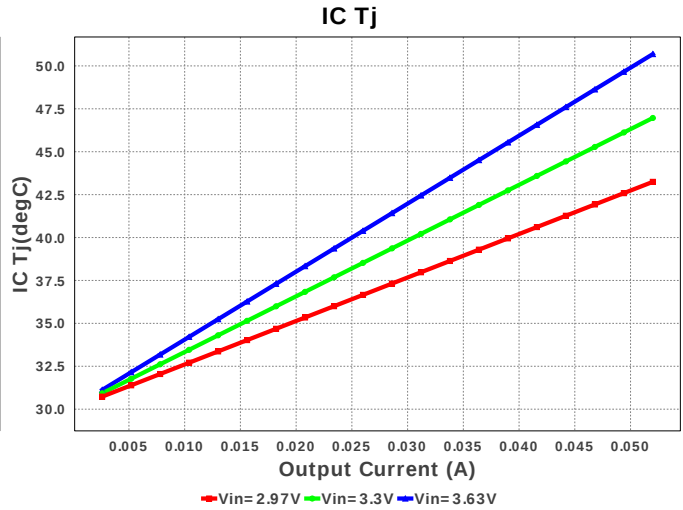
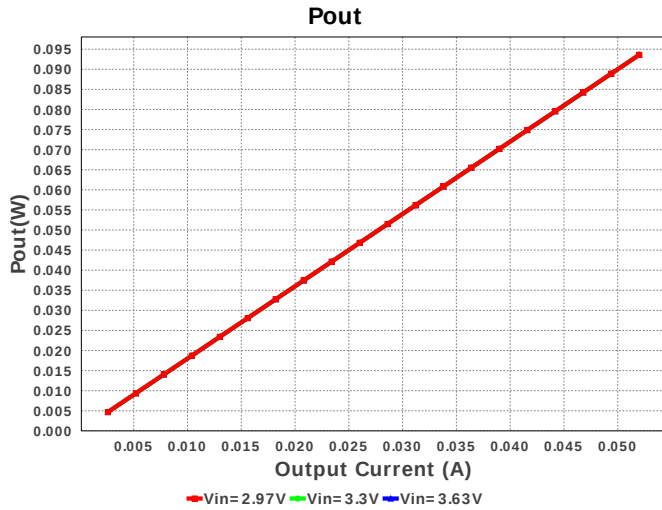


Electrical BOM

#	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
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

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
3.	U1	Texas Instruments	LP5907UVX-1.8/NOPB	Switcher	1	\$0.14	UVK04AAA 3 mm ²





Operating Values

#	Name	Value	Category	Description
1.	IC Iground	156.975 μ A	Current	IC ground current
2.	Iin Avg	52.157 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	36.0 mV	General	IC Feedback Tolerance
6.	Pout	93.6 mW	General	Total output power
7.	Total BOM	\$0.16	General	Total BOM Cost
8.	Vin p-p	6.05 mV	Op_Point	Input Source ripple voltage
9.	Vout OP	1.8 V	Op_Point	Operational Output Voltage
10.	Efficiency	49.438 %	Op_point	Steady state efficiency
11.	IC Tj	41.449 degC	Op_point	IC junction temperature
12.	ICThetaJA	119.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
13.	IOUT_OP	52.0 mA	Op_point	Iout operating point
14.	Input Ripple Frequency	2.105 MHz	Op_point	Input Source Ripple Frequency for PSRR Calculation
15.	PSRR est.	-77.853 dB	Op_point	Power Supply Rejection Ratio estimated
16.	VIN_OP	3.63 V	Op_point	Vin operating point
17.	Vout p-p	774.651 nV	Op_point	Peak-to-peak output ripple voltage
18.	IC Pd	95.73 mW	Power	IC power dissipation
19.	Total Pd	95.73 mW	Power	Total Power Dissipation
20.	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	52.0 m	Maximum Output Current
2.	VinMax	3.63	Maximum input voltage
3.	VinMin	2.97	Minimum input voltage
4.	Vout	1.8	Output Voltage
5.	base_pn	LP5907	Base Product Number
6.	source	DC	Input Source Type

#	Name	Value	Description
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.

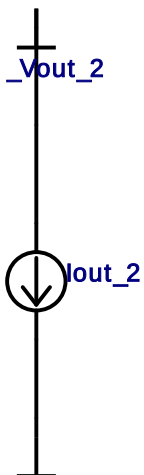
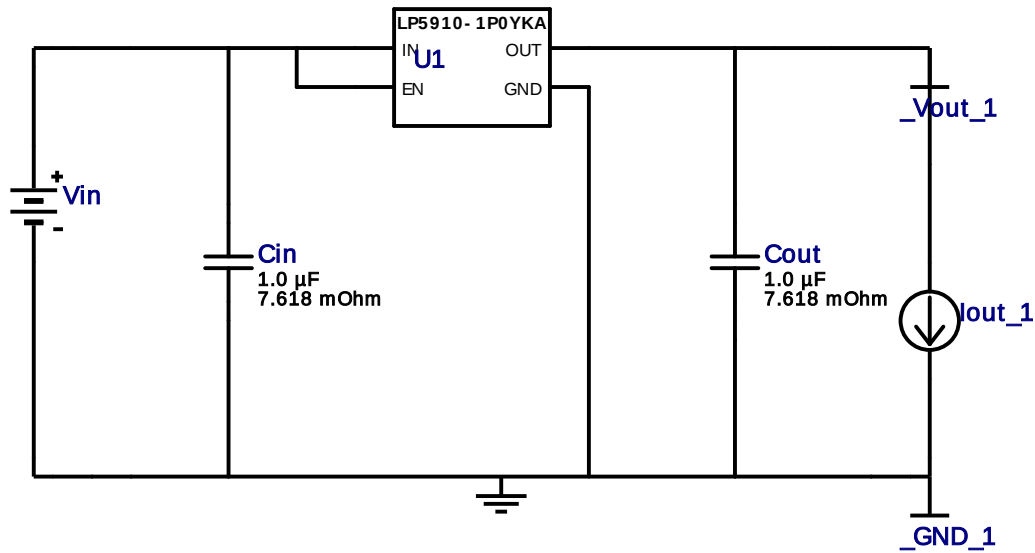


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Iout = 0.02A

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Topology = LDO
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BOM Cost = \$0.16
BOM Count = 3
Total Pd = 0.02W

WEBENCH® Design Report

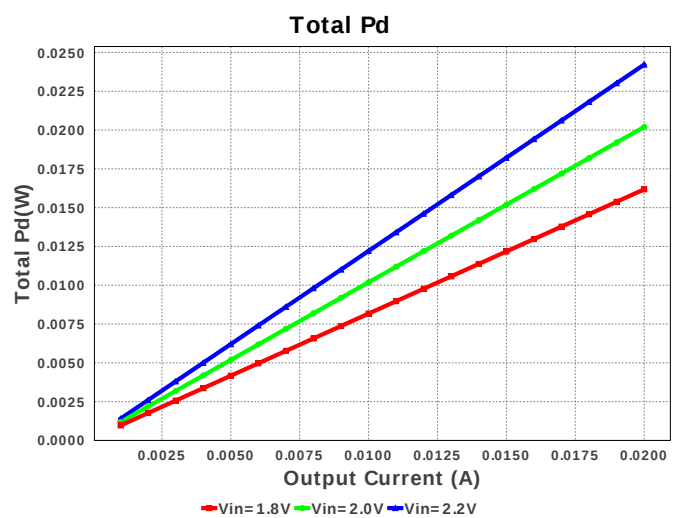
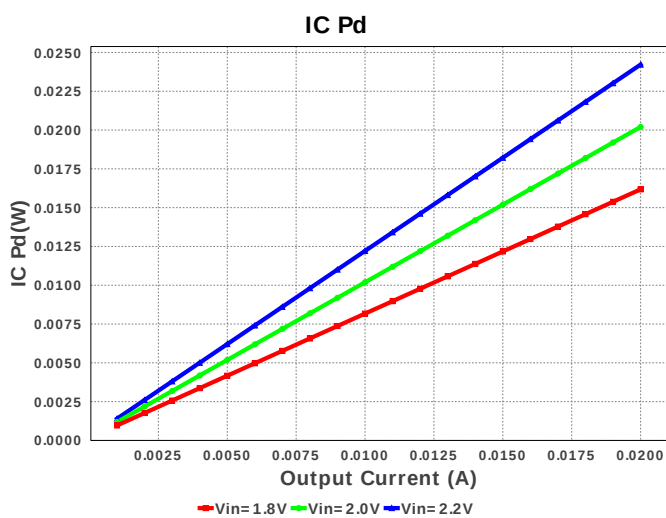
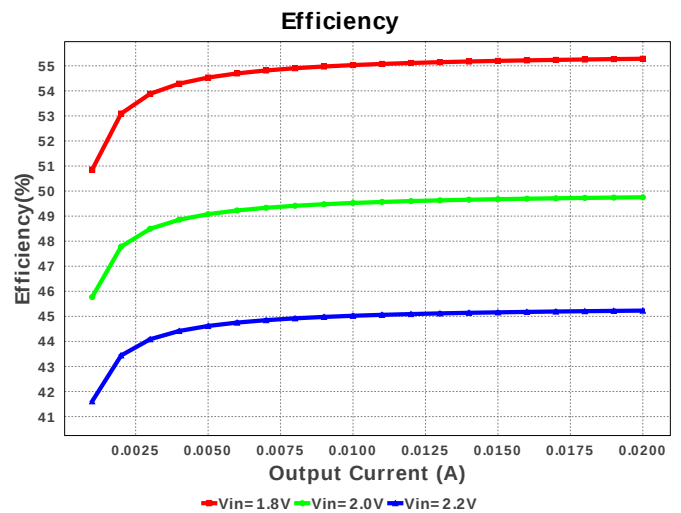
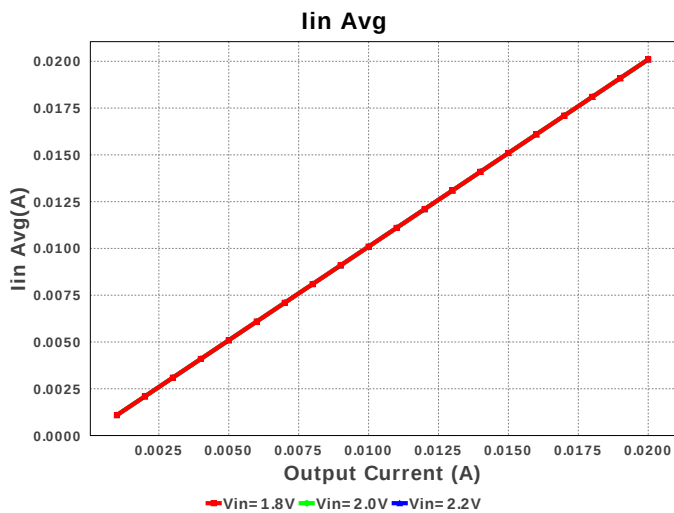
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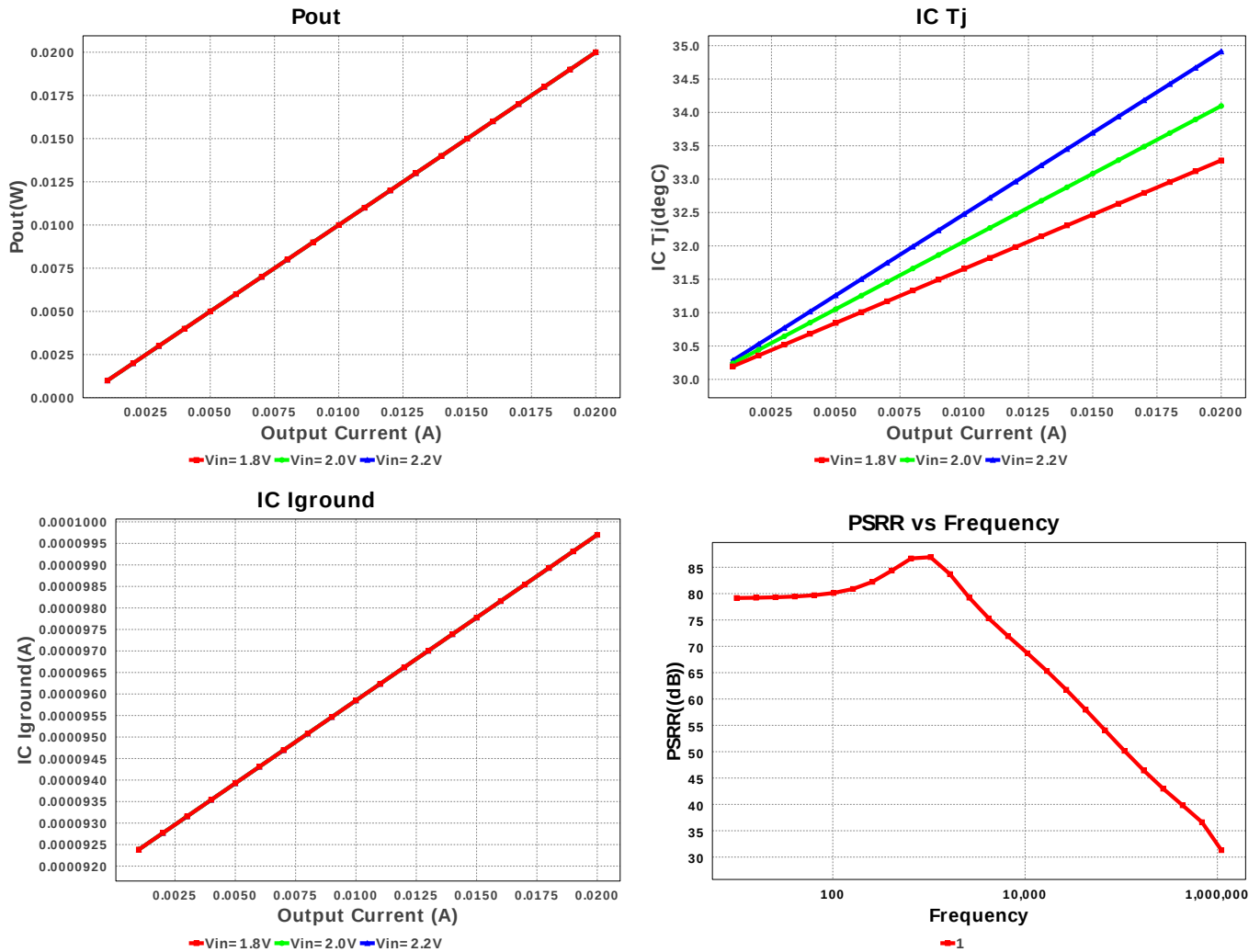


Electrical BOM

#	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	LP5910-1.0YKAR	Switcher	1	\$0.14	YKA0004ACAC 3 mm ²





Operating Values

#	Name	Value	Category	Description
1.	IC Ignd	99.7 μ A	Current	IC ground current
2.	Iin Avg	20.1 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	20.0 mV	General	IC Feedback Tolerance
6.	Pout	20.0 mW	General	Total output power
7.	Total BOM	\$0.16	General	Total BOM Cost
8.	Vin p-p	384.717 μ V	Op_point	Input Source ripple voltage
9.	Vout OP	0.0 V	Op_point	Operational Output Voltage
10.	Efficiency	45.229 %	Op_point	Steady state efficiency
11.	IC Tj	34.912 degC	Op_point	IC junction temperature
12.	ICThetaJA	202.8 degC/W	Op_point	IC junction-to-ambient thermal resistance
13.	IOUT_OP	20.0 mA	Op_point	Iout operating point
14.	Input Ripple Frequency	100.0 kHz	Op_point	Input Source Ripple Frequency for PSRR Calculation
15.	PSRR est.	-50.796 dB	Op_point	Power Supply Rejection Ratio estimated
16.	VIN_OP	2.2 V	Op_point	Vin operating point
17.	Vout p-p	1.11 μ V	Op_point	Peak-to-peak output ripple voltage
18.	IC Pd	24.219 mW	Power	IC power dissipation
19.	Total Pd	24.219 mW	Power	Total Power Dissipation
20.	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	20.0 m	Maximum Output Current
2.	VinMax	2.2	Maximum input voltage
3.	VinMin	1.8	Minimum input voltage
4.	Vout	1.0	Output Voltage
5.	base_pn	LP5910-1.0	Base Product Number
6.	source	DC	Input Source Type

#	Name	Value	Description
7.	Ta	30.0	Ambient temperature

Design Assistance

1.

2. **LP5910-1.0** Product Folder : <http://www.ti.com/product/LP5910> : contains the data sheet and other resources.

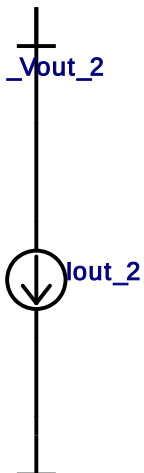
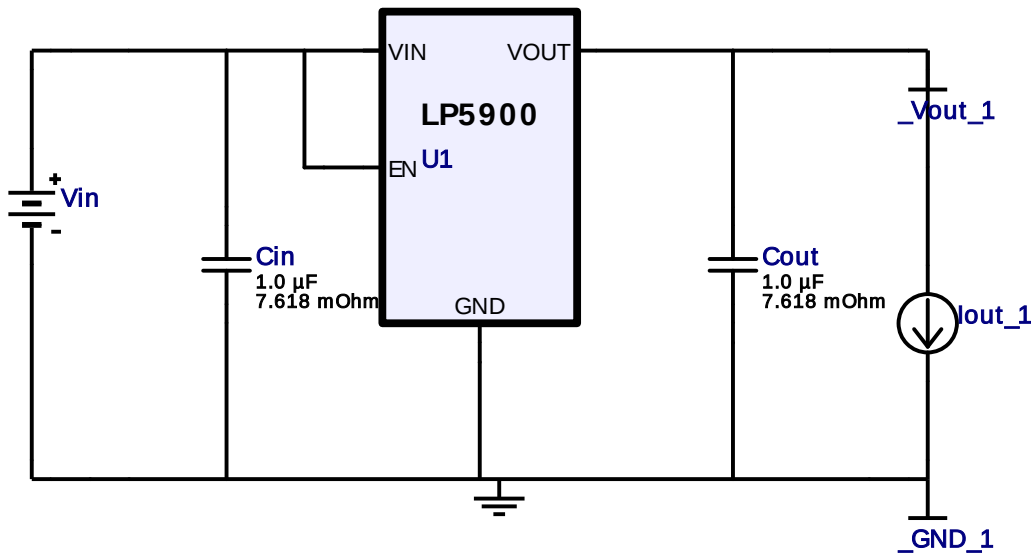


Vout = 2.0V
Iout = 0.02A

Device = LP5900TLX-2.0/NOPB
Topology = LDO
Created = 7/19/16 7:03:05 AM
BOM Cost = \$0.22
BOM Count = 3
Total Pd = 0.03W

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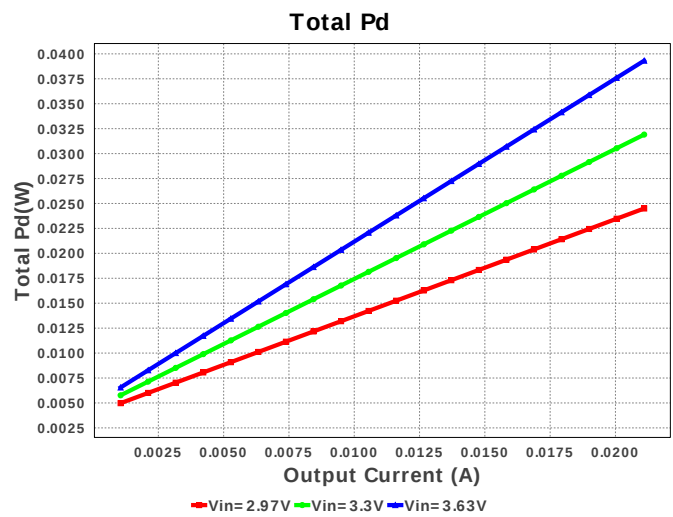
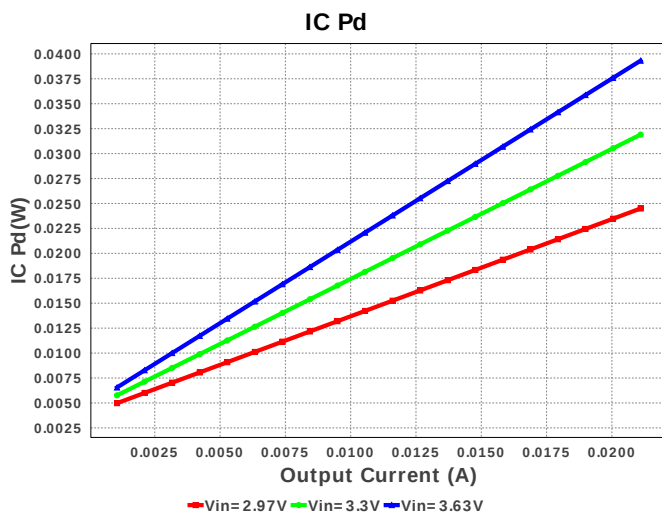
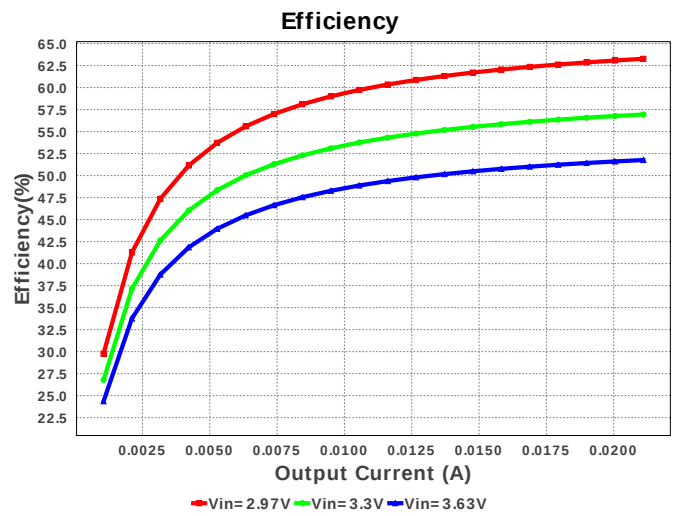
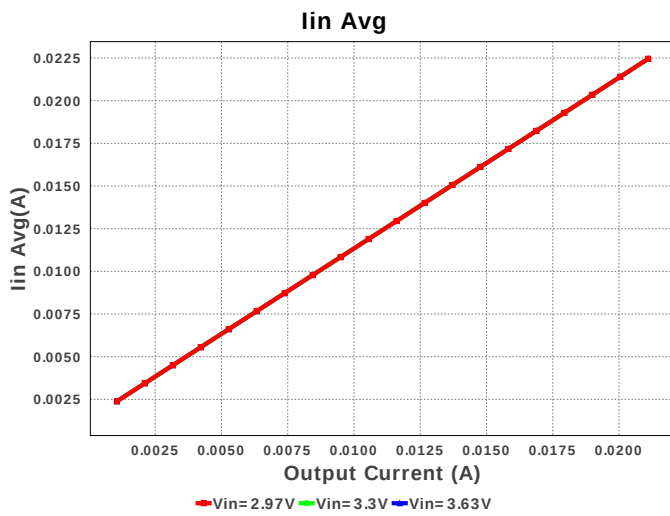
Design : 1194016/2125 LP5900TLX-2.0/NOPB
LP5900TLX-2.0/NOPB 2.97V-3.63V to 2.00V @ 0.0211A

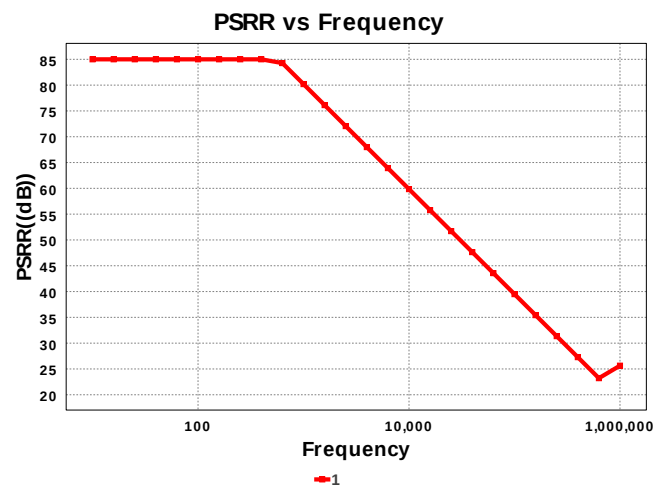
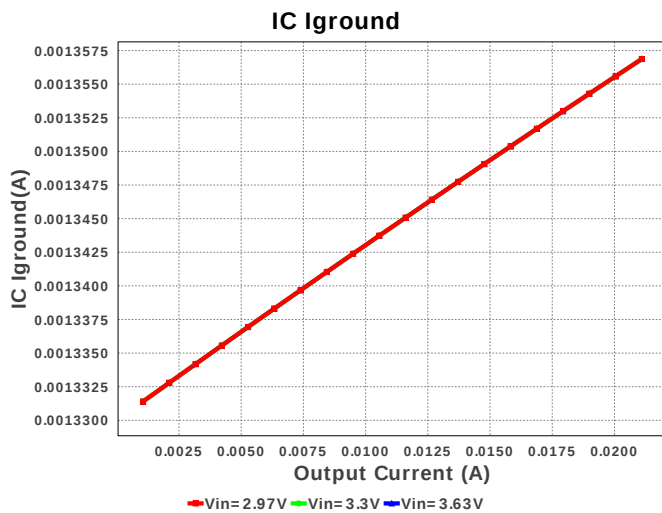
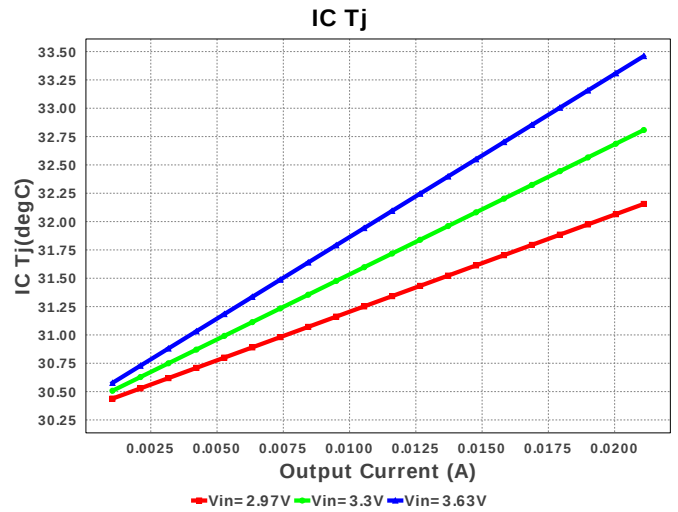
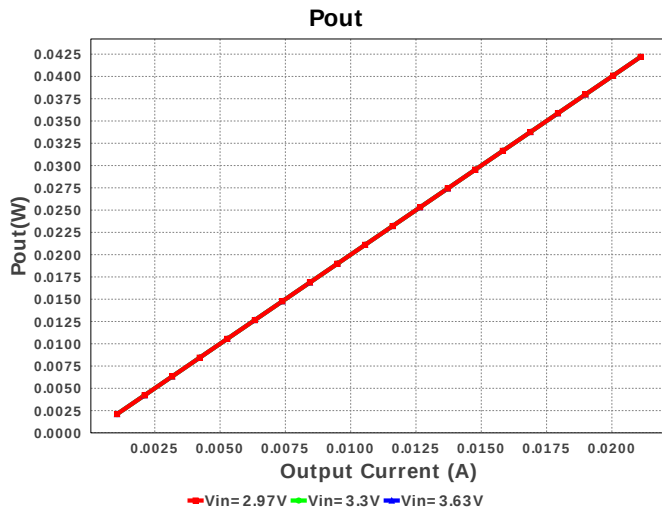


Electrical BOM

#	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	LP5900TLX-2.0/NOPB	Switcher	1	\$0.20	TLA04BCA 5 mm ²





Operating Values

#	Name	Value	Category	Description
1.	IC Ignd	56.874 µA	Current	IC ground current
2.	Iin Avg	21.157 mA	Current	Average input current
3.	BOM Count	3	General	Total Design BOM count
4.	FootPrint	11.0 mm ²	General	Total Foot Print Area of BOM components
5.	IC Tolerance	40.0 mV	General	IC Feedback Tolerance
6.	Pout	42.2 mW	General	Total output power
7.	Total BOM	\$0.22	General	Total BOM Cost
8.	Vin p-p	6.05 mV	Op_point	Input Source ripple voltage
9.	Vout OP	2.0 V	Op_point	Operational Output Voltage
10.	Efficiency	54.948 %	Op_point	Steady state efficiency
11.	IC Tj	33.045 degC	Op_point	IC junction temperature
12.	ICThetaJA	88.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
13.	IOUT_OP	21.1 mA	Op_point	Iout operating point
14.	Input Ripple Frequency	2.105 MHz	Op_point	Input Source Ripple Frequency for PSRR Calculation
15.	PSRR est.	-41.744 dB	Op_point	Power Supply Rejection Ratio estimated
16.	VIN_OP	3.63 V	Op_point	Vin operating point
17.	Vout p-p	49.497 µV	Op_point	Peak-to-peak output ripple voltage
18.	IC Pd	34.599 mW	Power	IC power dissipation
19.	Total Pd	34.599 mW	Power	Total Power Dissipation
20.	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	21.1 m	Maximum Output Current
2.	VinMax	3.63	Maximum input voltage
3.	VinMin	2.97	Minimum input voltage
4.	Vout	2.0	Output Voltage
5.	base_pn	LP5900	Base Product Number
6.	source	DC	Input Source Type

#	Name	Value	Description
7.	Ta	30.0	Ambient temperature

Design Assistance

1.

2. **LP5900** Product Folder : <http://www.ti.com/product/lp5900> : contains the data sheet and other resources.

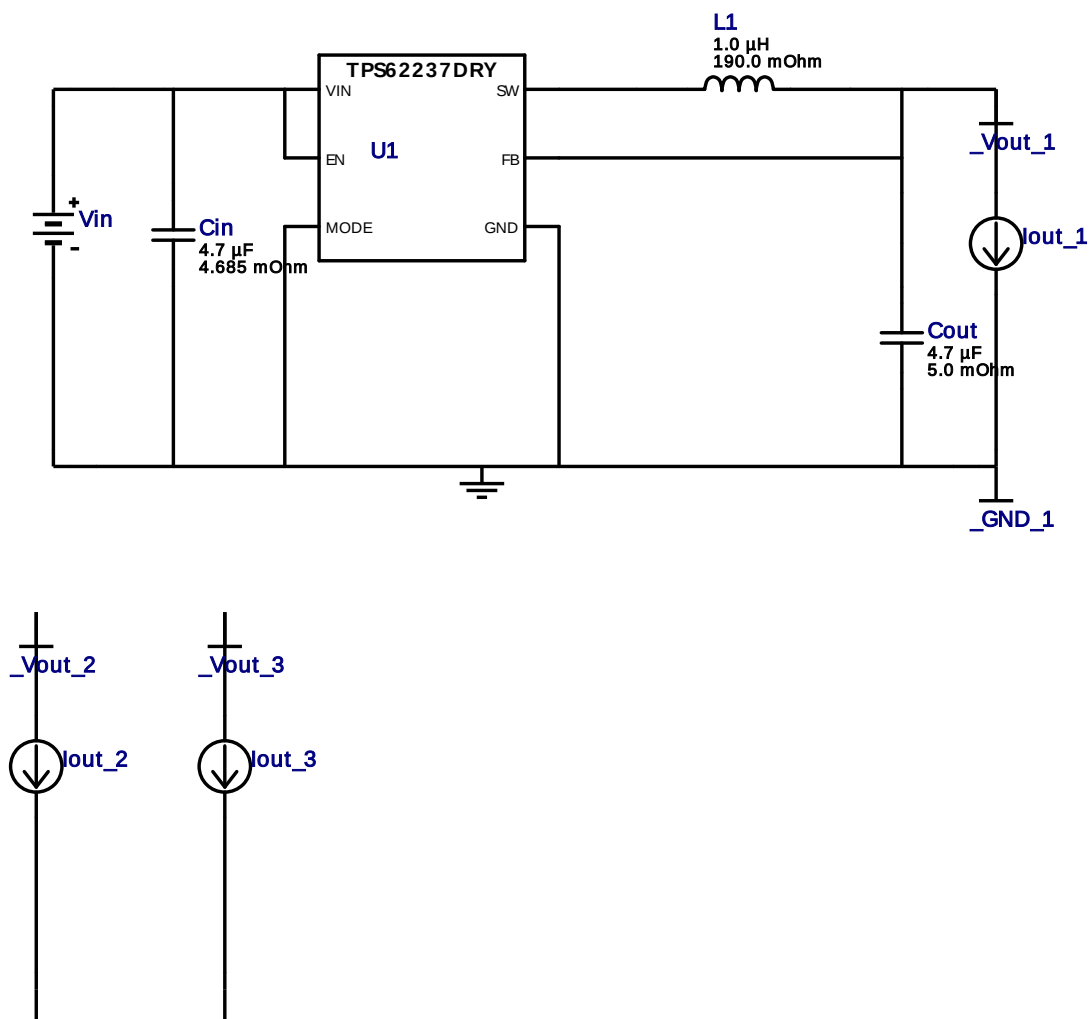


Vout = 3.3V
Iout = 0.13A

Device = TPS62237DRYR
Topology = Buck
Created = 7/19/16 7:03:05 AM
BOM Cost = \$0.62
BOM Count = 4
Total Pd = 0.09W

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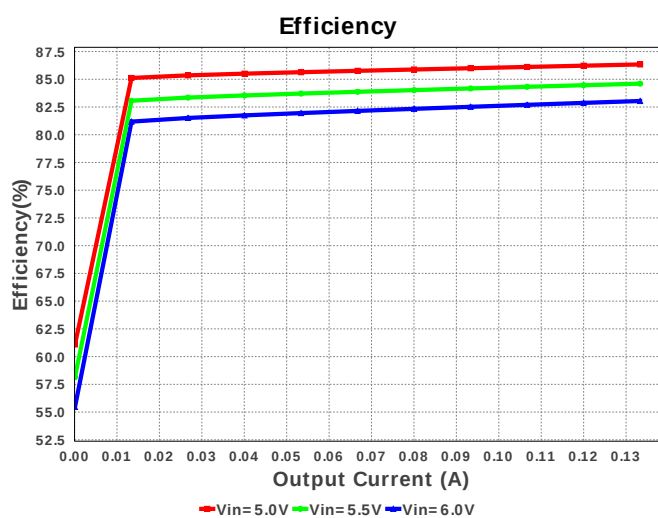
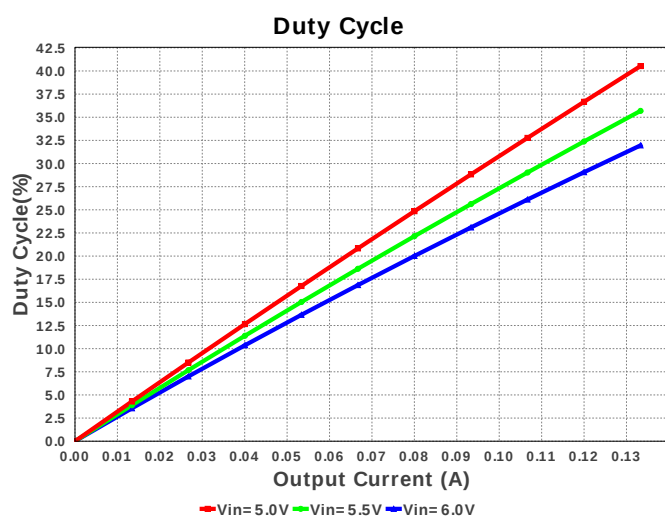
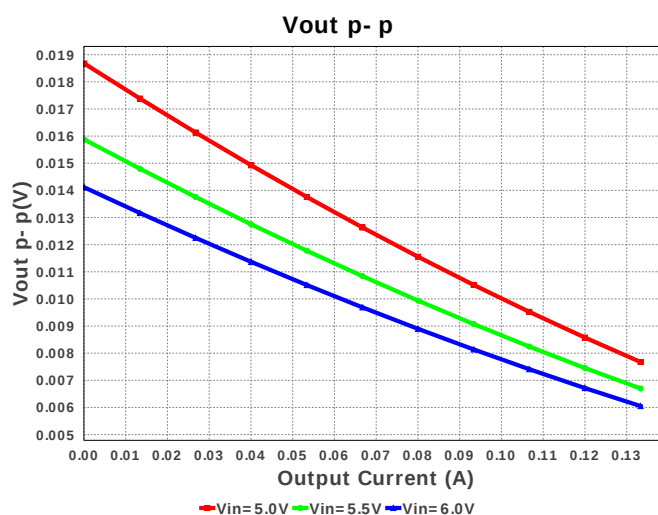
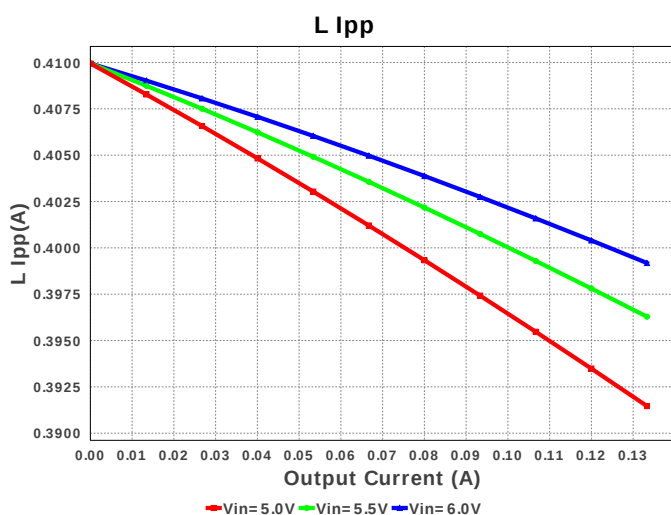
Design : 1194016/2126 TPS62237DRYR
TPS62237DRYR 5.0V-6.0V to 3.30V @ 0.13331A

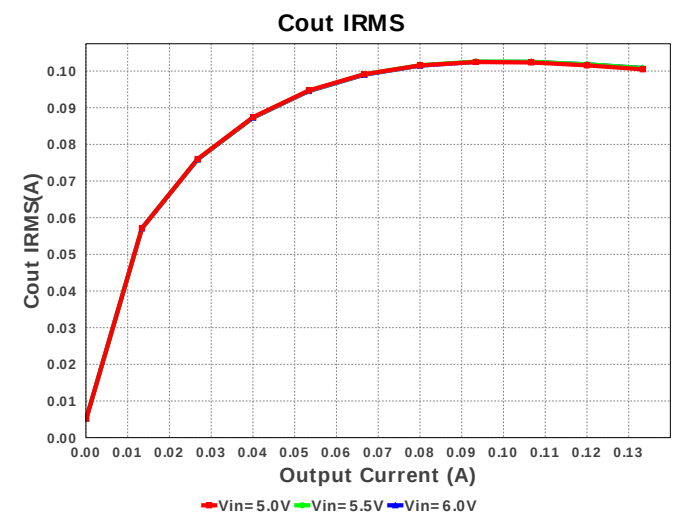
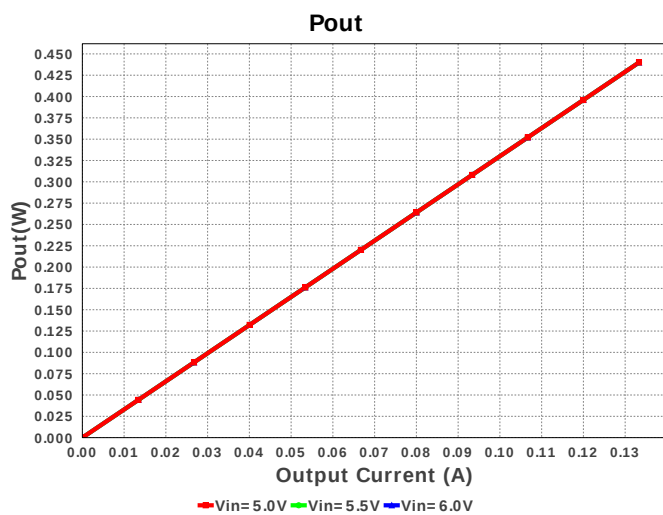
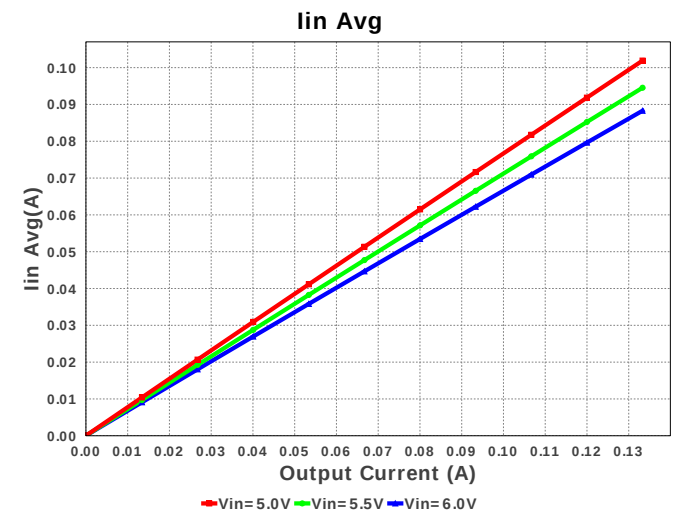
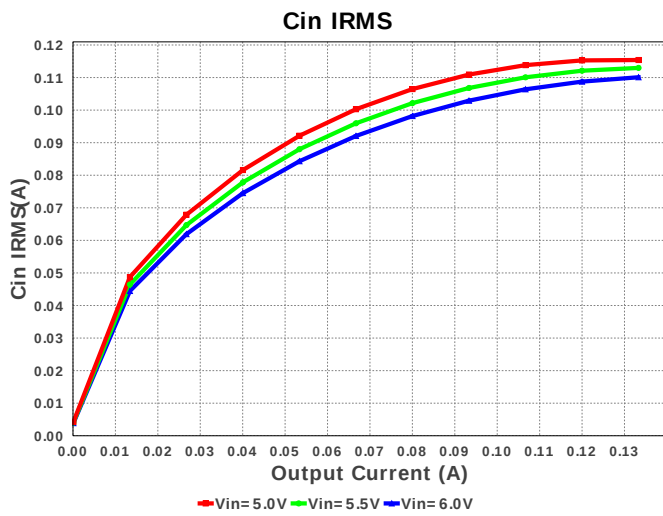
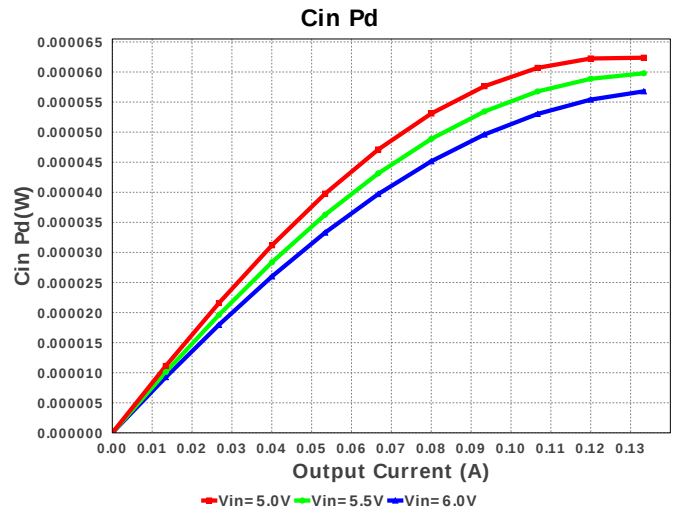
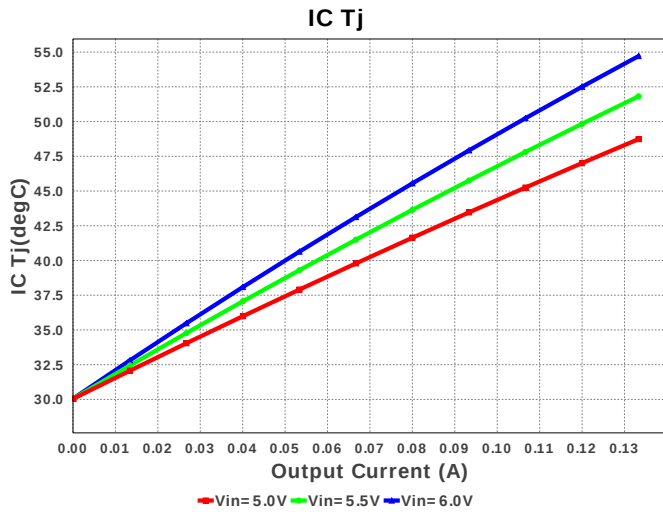


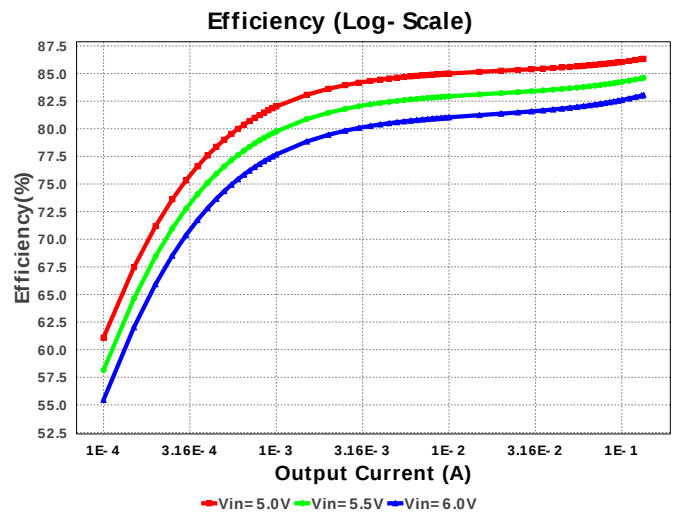
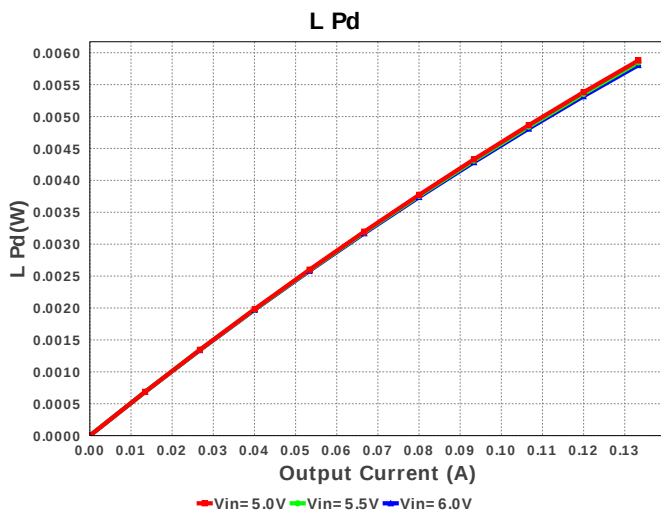
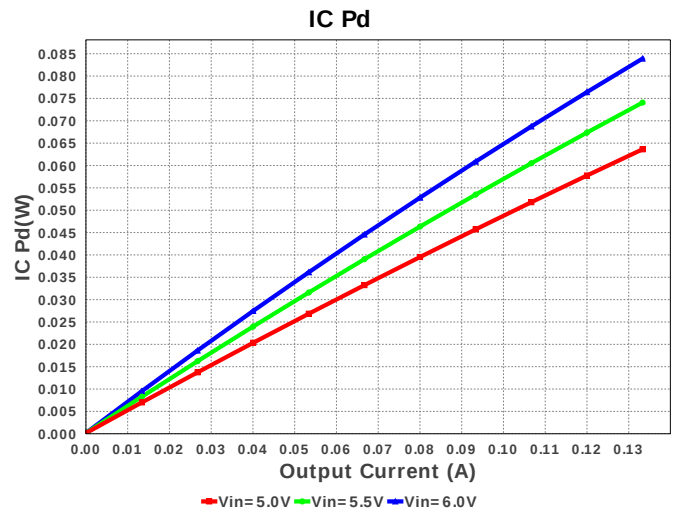
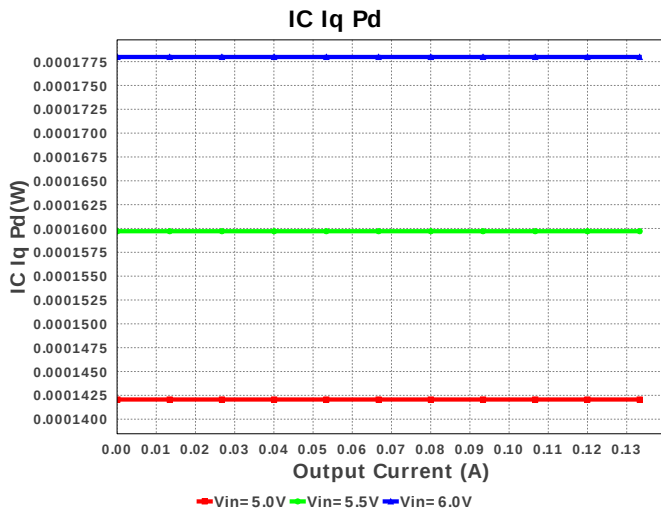
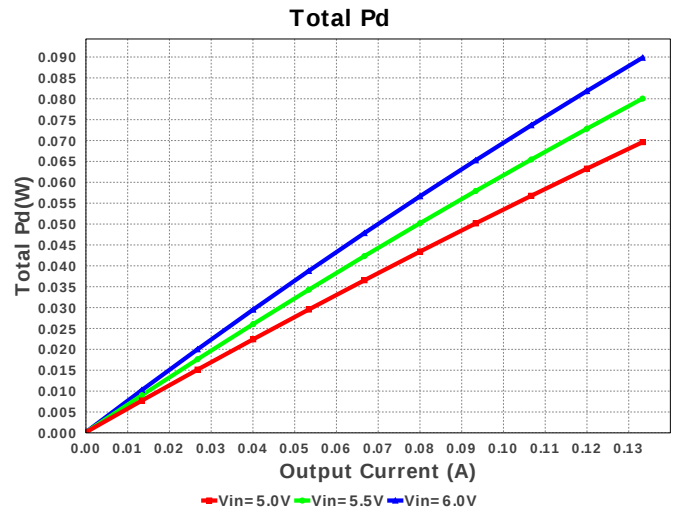
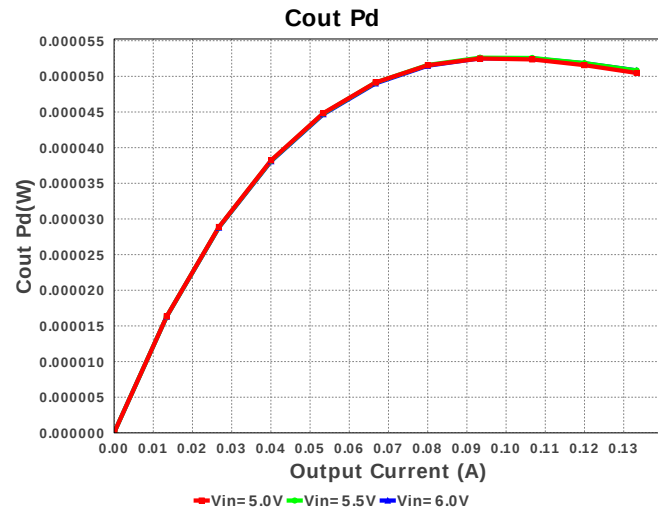
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM21BR61A475KA73L Series= X5R	Cap= 4.7 uF ESR= 4.685 mOhm VDC= 10.0 V IRMS= 1.84175 A	1	\$0.03	0805 7 mm ²
2.	Cout	MuRata	GRM188R60J475KE19D Series= X5R	Cap= 4.7 uF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 2.0 A	1	\$0.01	0603 5 mm ²
3.	L1	MuRata	LQM21PN1R0MC0D	L= 1.0 µH DCR= 190.0 mOhm	1	\$0.10	0805 7 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
4.	U1	Texas Instruments	TPS62237DRYR	Switcher	1	\$0.48	DRY0006A 5 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	110.092 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	100.831 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	88.294 mA	Current	Average input current
4.	L Ipp	399.18 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	4	General	Total Design BOM count
6.	FootPrint	23.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	2.105 MHz	General	Switching frequency
8.	Pout	439.923 mW	General	Total output power
9.	Total BOM	\$0.62	General	Total BOM Cost
10.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
11.	Duty Cycle	31.96 %	Op_point	Duty cycle

#	Name	Value	Category	Description
12.	Efficiency	83.042 %	Op_point	Steady state efficiency
13.	IC Tj	54.713 degC	Op_point	IC junction temperature
14.	ICThetaJA	294.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
15.	IOUT_OP	133.31 mA	Op_point	Iout operating point
16.	VIN_OP	6.0 V	Op_point	Vin operating point
17.	Vout p-p	6.05 mV	Op_point	Peak-to-peak output ripple voltage
18.	Cin Pd	56.783 µW	Power	Input capacitor power dissipation
19.	Cout Pd	50.835 µW	Power	Output capacitor power dissipation
20.	IC Iq Pd	177.985 µW	Power	IC Iq Pd
21.	IC Pd	83.915 mW	Power	IC power dissipation
22.	L Pd	5.806 mW	Power	Inductor power dissipation
23.	Total Pd	89.837 mW	Power	Total Power Dissipation
24.	Vout Tolerance	303.03 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	133.31 m	Maximum Output Current
2.	VinMax	6.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS62237	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS62237** Product Folder : <http://www.ti.com/product/TPS62237> : contains the data sheet and other resources.

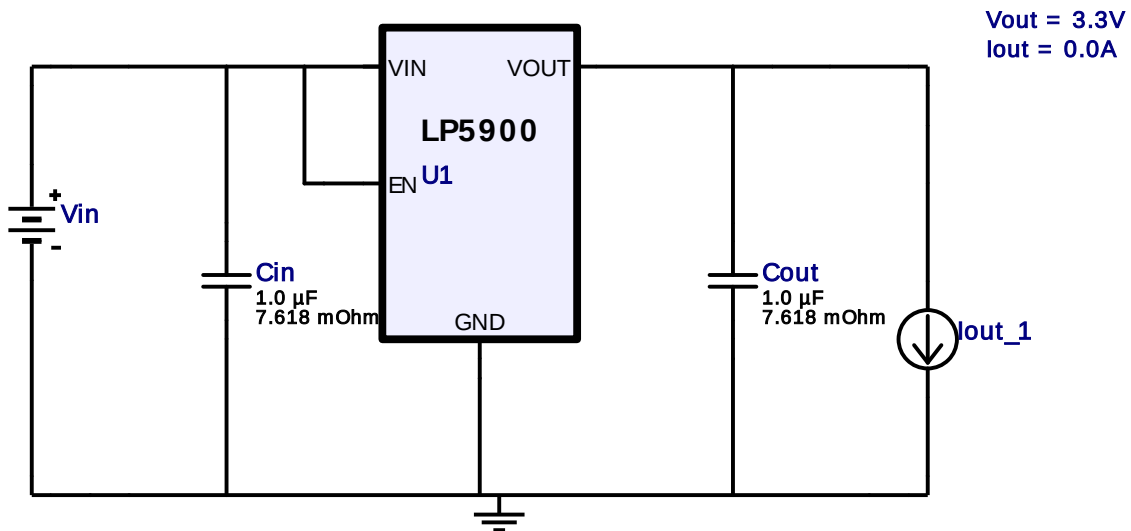


Vout = 3.3V
Iout = 0.0A

Device = LP5900TLX-3.3/NOPB
Topology = LDO
Created = 7/19/16 7:03:06 AM
BOM Cost = \$0.22
BOM Count = 3
Total Pd = 0.0W

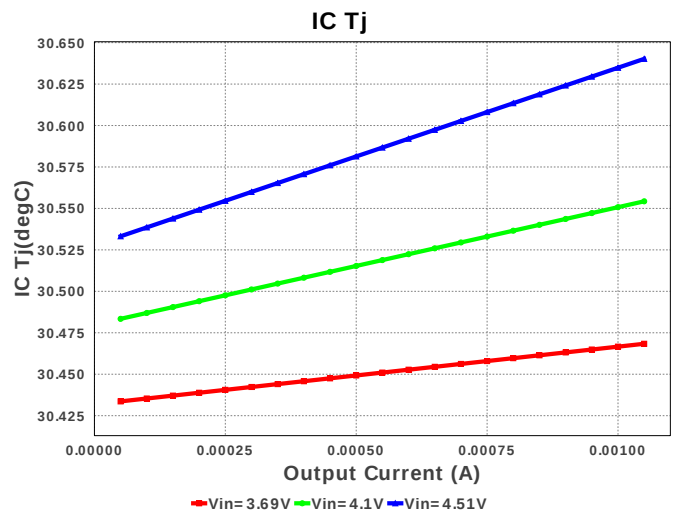
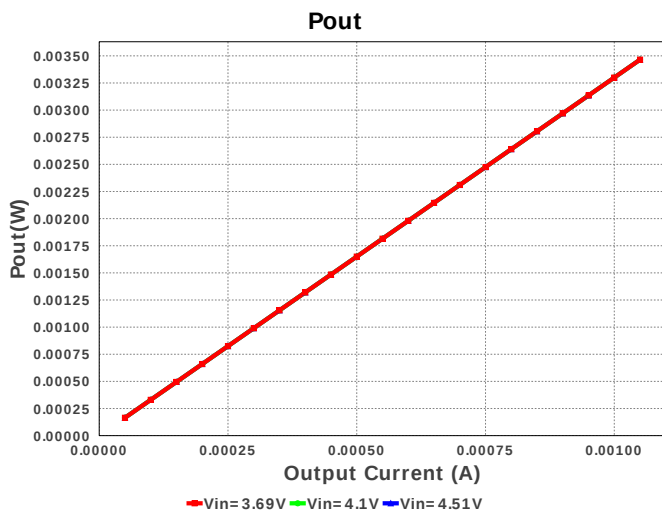
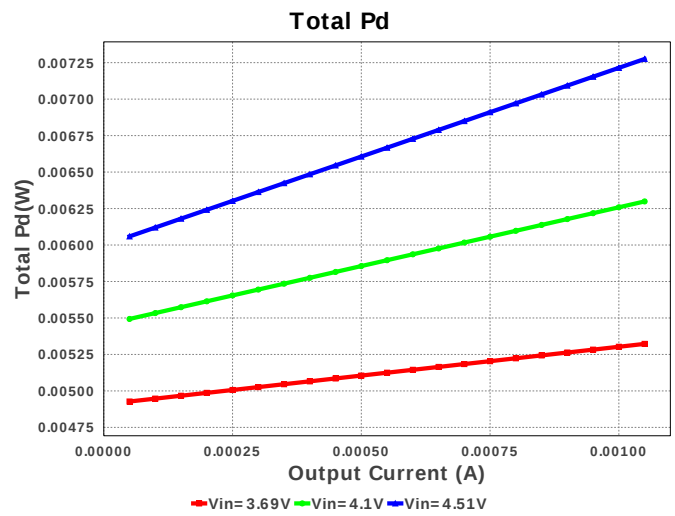
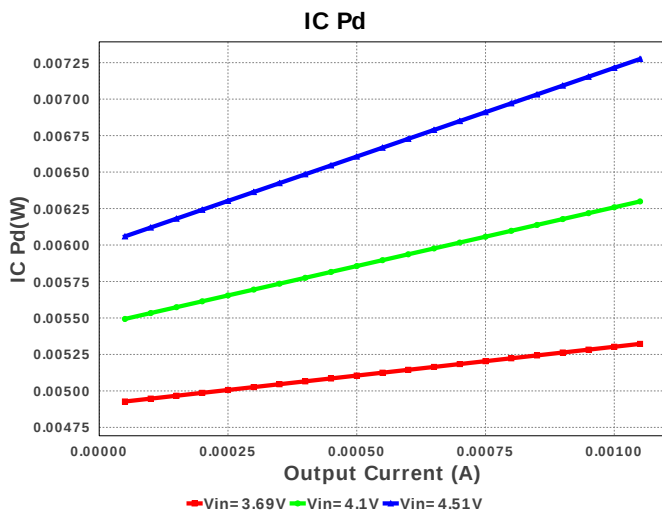
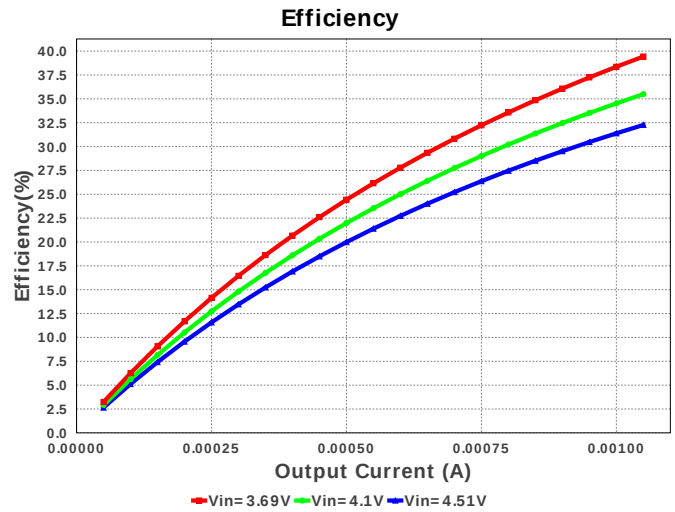
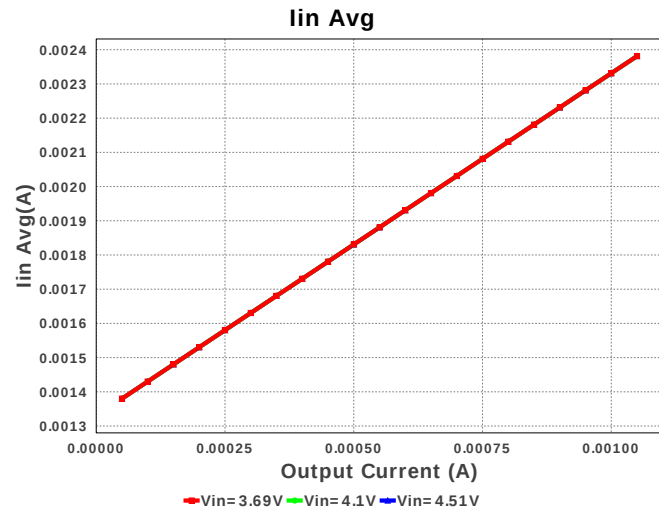
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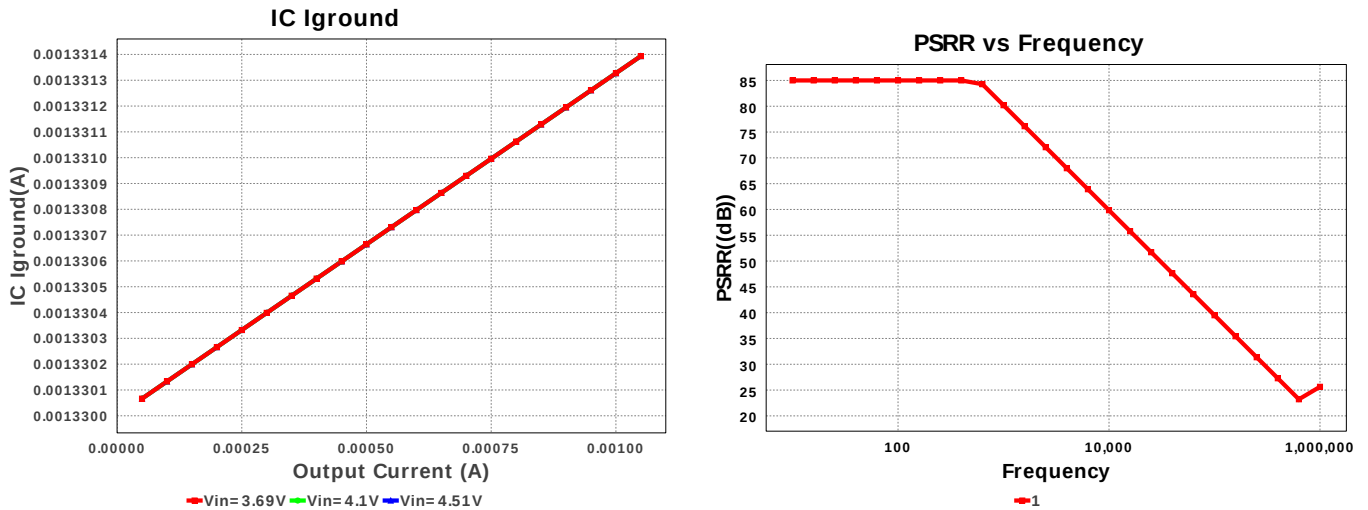
Design : 1194016/2127 LP5900TLX-3.3/NOPB
LP5900TLX-3.3/NOPB 3.69V-4.51V to 3.30V @ 0.001A



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
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	LP5900TLX-3.3/NOPB	Switcher	1	\$0.20	TLA04BCA 5 mm ²





Operating Values

#	Name	Value	Category	Description
1.	IC Iground	31.327 μ A	Current	IC ground current
2.	Iin Avg	1.031 mA	Current	Average input current
3.	BOM Count	3	General	Total Design BOM count
4.	FootPrint	11.0 mm ²	General	Total Foot Print Area of BOM components
5.	IC Tolerance	66.0 mV	General	IC Feedback Tolerance
6.	Pout	3.3 mW	General	Total output power
7.	Total BOM	\$0.22	General	Total BOM Cost
8.	Vin p-p	45.1 mV	Op_Point	Input Source ripple voltage
9.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
10.	Efficiency	70.948 %	Op_point	Steady state efficiency
11.	IC Tj	30.119 degC	Op_point	IC junction temperature
12.	ICThetaJA	88.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
13.	IOUT_OP	1.0 mA	Op_point	Iout operating point
14.	Input Ripple Frequency	100.0 kHz	Op_point	Input Source Ripple Frequency for PSRR Calculation
15.	PSRR est.	-39.495 dB	Op_point	Power Supply Rejection Ratio estimated
16.	VIN_OP	4.51 V	Op_point	Vin operating point
17.	Vout p-p	477.981 μ V	Op_point	Peak-to-peak output ripple voltage
18.	IC Pd	1.351 mW	Power	IC power dissipation
19.	Total Pd	1.351 mW	Power	Total Power Dissipation
20.	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	1.0 m	Maximum Output Current
2.	VinMax	4.51	Maximum input voltage
3.	VinMin	3.69	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LP5900	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

-
- LP5900** Product Folder : <http://www.ti.com/product/lp5900> : contains the data sheet and other resources.

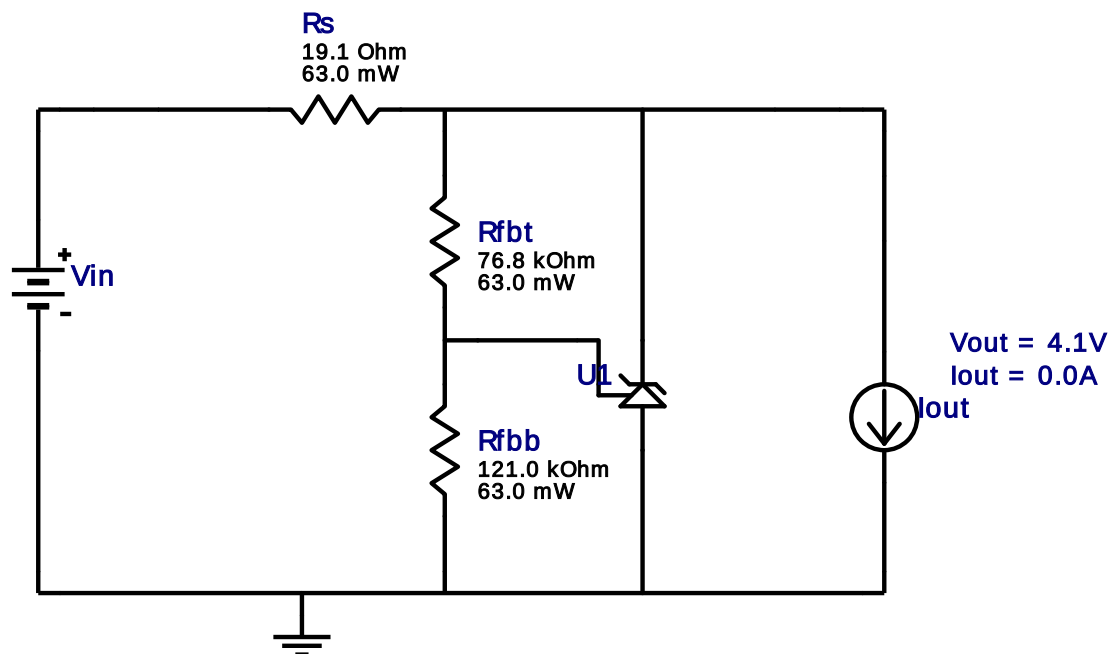


Vout = 4.1V
Iout = 0.0A

Device = ATL432BQDBZR
Topology = SHUNT_LINEAR
Created = 7/19/16 7:03:06 AM
BOM Cost = \$0.19
BOM Count = 4
Total Pd = 0.0W

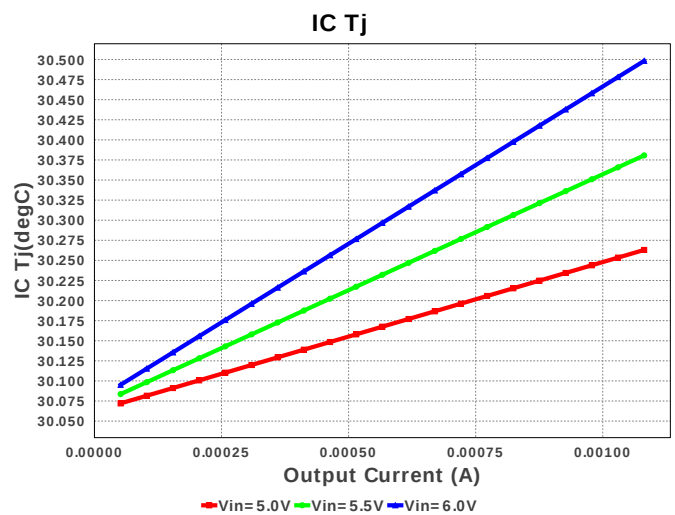
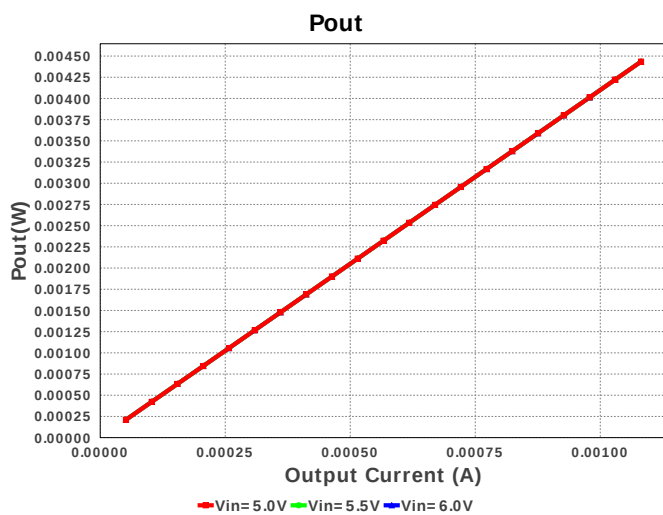
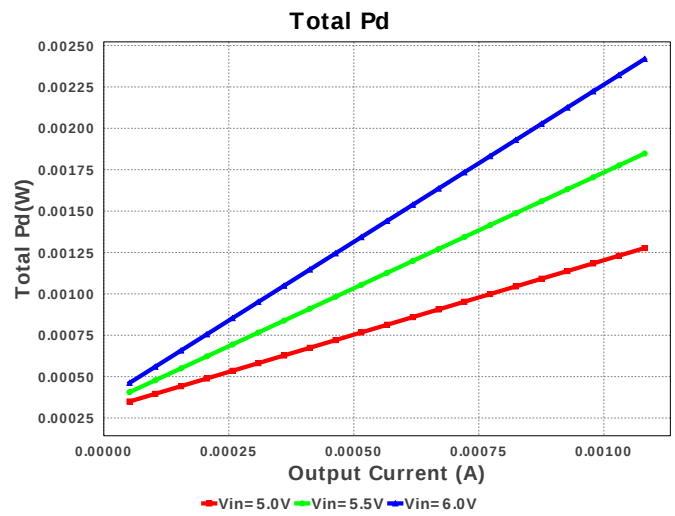
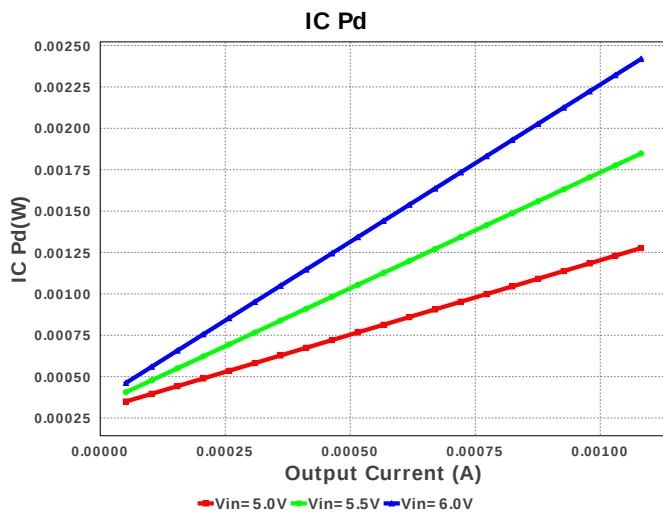
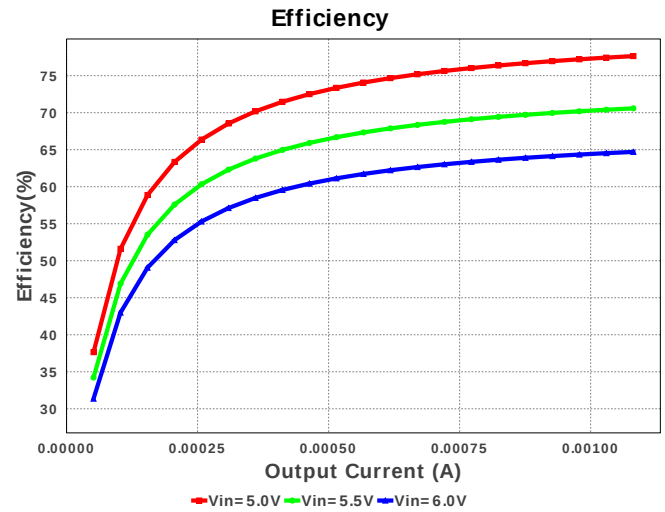
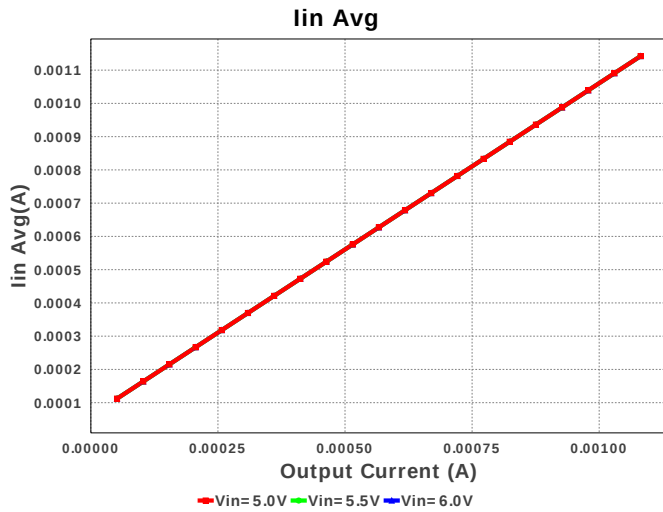
WEBENCH® Design Report

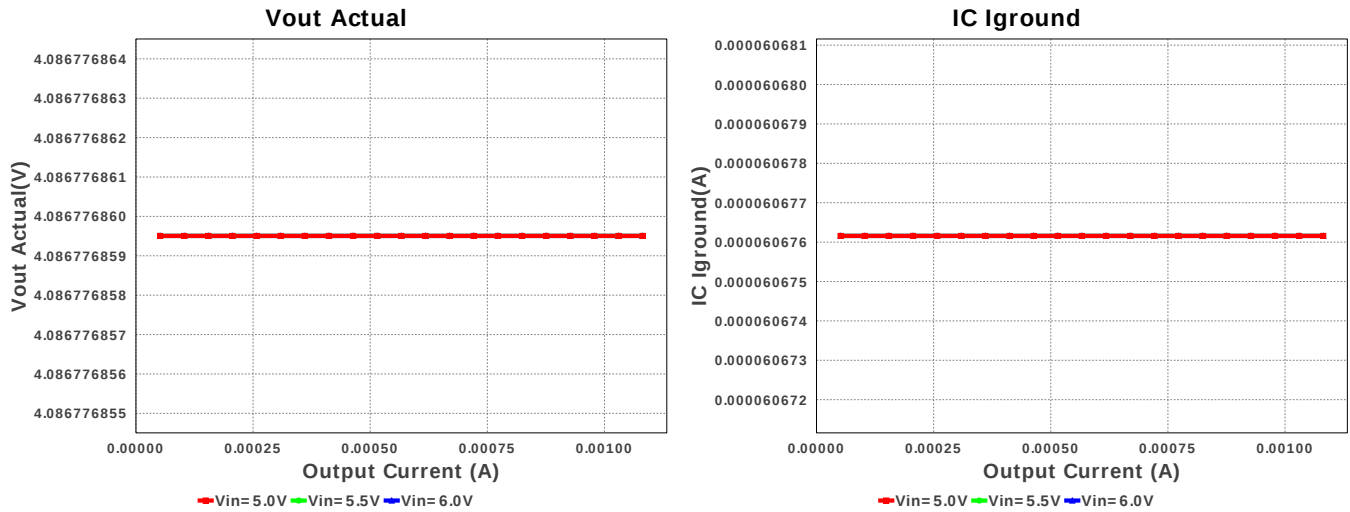
Design : 1194016/2128 ATL432BQDBZR
ATL432BQDBZR 5.0V-6.0V to 4.10V @ 0.00103A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Rfbb	Vishay-Dale	CRCW0402121KFKED Series= CRCW..e3	Res= 121.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
2.	Rfbb	Vishay-Dale	CRCW040276K8FKED Series= CRCW..e3	Res= 76.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
3.	Rs	Vishay-Dale	CRCW040219R1FKED Series= CRCW..e3	Res= 19.1 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
4.	U1	Texas Instruments	ATL432BQDBZR	Switcher	1	\$0.16	DBZ0003A 14 mm ²





Operating Values

#	Name	Value	Category	Description
1.	IC Igground	60.676 μ A	Current	IC ground current
2.	Iin Avg	1.091 mA	Current	Average input current
3.	BOM Count	4	General	Total Design BOM count
4.	FootPrint	23.0 mm ²	General	Total Foot Print Area of BOM components
5.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
6.	Pout	4.223 mW	General	Total output power
7.	Total BOM	\$0.19	General	Total BOM Cost
8.	Vout Actual	4.087 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
9.	Efficiency	64.532 %	Op_point	Steady state efficiency
10.	IC Tj	30.478 degC	Op_point	IC junction temperature
11.	ICThetaJA	206.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
12.	IOUT_OP	1.03 mA	Op_point	Iout operating point
13.	VIN_OP	6.0 V	Op_point	Vin operating point
14.	IC Pd	2.321 mW	Power	IC power dissipation
15.	Total Pd	2.321 mW	Power	Total Power Dissipation
16.	Vout Tolerance	1.792 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.03 m	Maximum Output Current
2.	VinMax	6.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	4.1	Output Voltage
5.	base_pn	ATL432	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

-
- ATL432** Product Folder : <http://www.ti.com/product/atl432> : contains the data sheet and other resources.

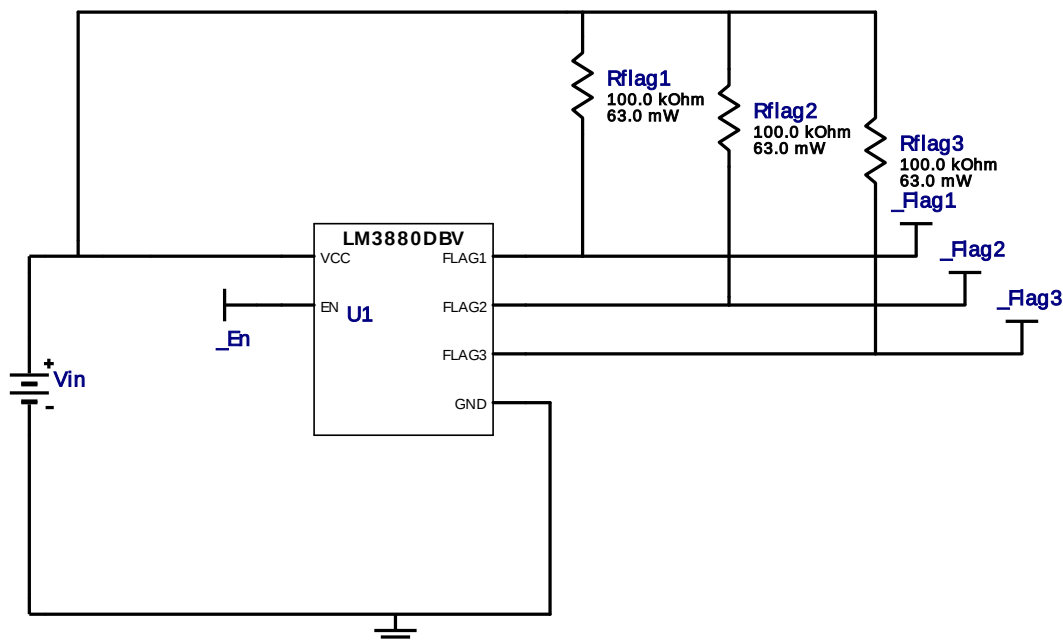


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Iout = 0.0A

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Topology = SEQUENCER
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BOM Cost = \$0.48
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Total Pd = 0.0W

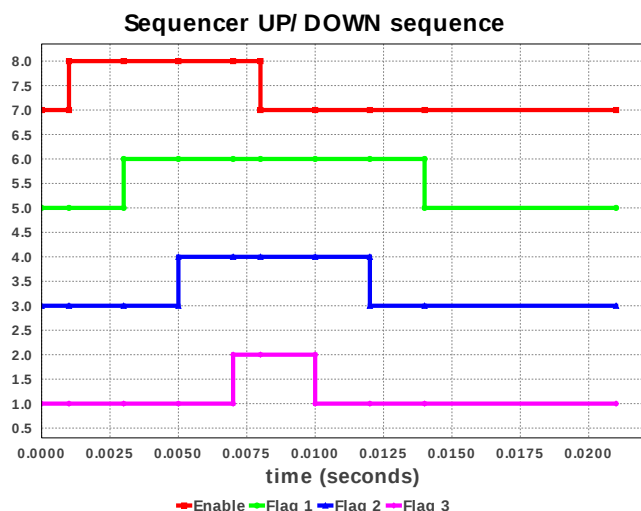
WEBENCH® Design Report

Design : 1194016/2129 LM3880MF-1AE/NOPB
Design 2129 - LM3880MF-1AE/NOPB



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Rflag1	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
2.	Rflag2	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
3.	Rflag3	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
4.	U1	Texas Instruments	LM3880MF-1AE/NOPB	Switcher	1	\$0.45	R-PDSO-G6 10 mm ²



Operating Values

#	Name	Value	Category	Description
1.	BOM Count	4	General	Total Design BOM count
2.	FootPrint	19.0 mm ²	General	Total Foot Print Area of BOM components
3.	Total BOM	\$0.48	General	Total BOM Cost
4.	Total Pd	82.5 μ W	Power	Total Power Dissipation
5.	Flag Voltage	3.3 V		Flag Voltage
6.	Flag1 Down delay (From EN high to low)	6.0 ms		Flag Delay
7.	Flag1 Up delay (From EN low to high)	2.0 ms		Flag Delay
8.	Flag2 Down delay (From EN high to low)	4.0 ms		Flag Delay
9.	Flag2 Up delay (From EN low to high)	4.0 ms		Flag Delay
10.	Flag3 Down delay (From EN high to low)	2.0 ms		Flag Delay
11.	Flag3 Up delay (From EN low to high)	6.0 ms		Flag Delay
12.	Flags Used	2.0		Flags Used
13.	Total Flags	3.0		Total Flags
14.	Vcc	3.3 V		Vcc

Design Inputs

#	Name	Value	Description
1.	Iout	1.0 μ	Maximum Output Current
2.	VinMax	3.3	Maximum input voltage
3.	VinMin	3.3	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LM3880	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM3880** Product Folder : <http://www.ti.com/product/LM3880> : contains the data sheet and other resources.



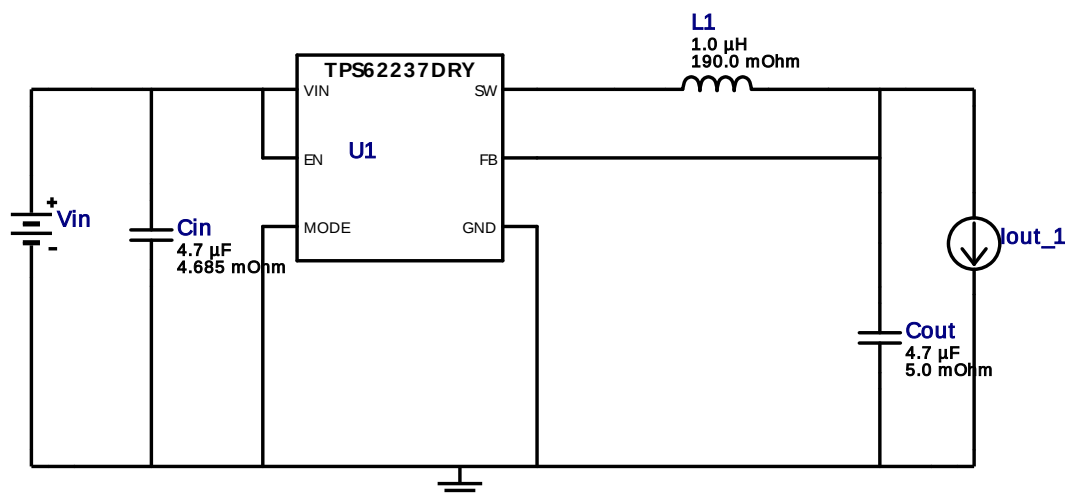
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Device = TPS62237DRYR
Topology = Buck
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BOM Cost = \$0.62
BOM Count = 4
Total Pd = 0.0W

WEBENCH® Design Report

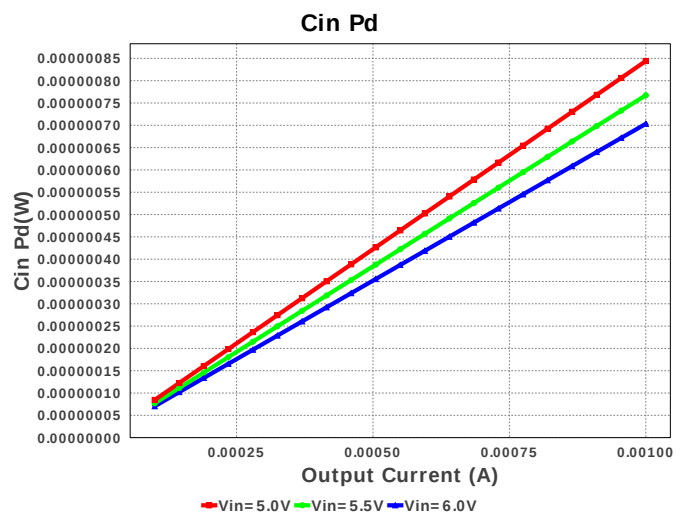
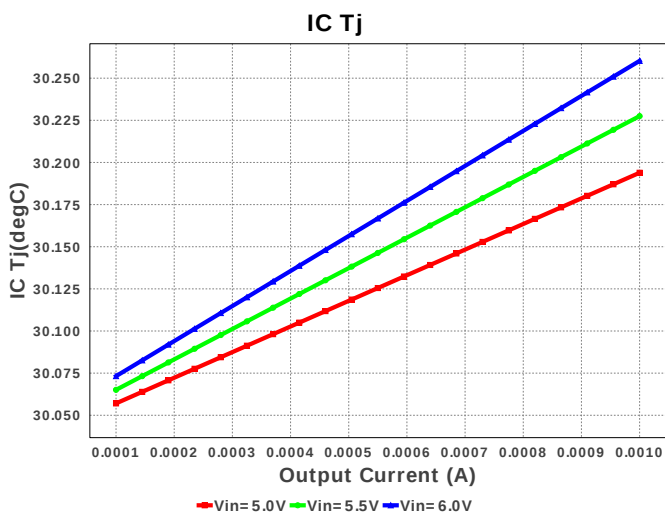
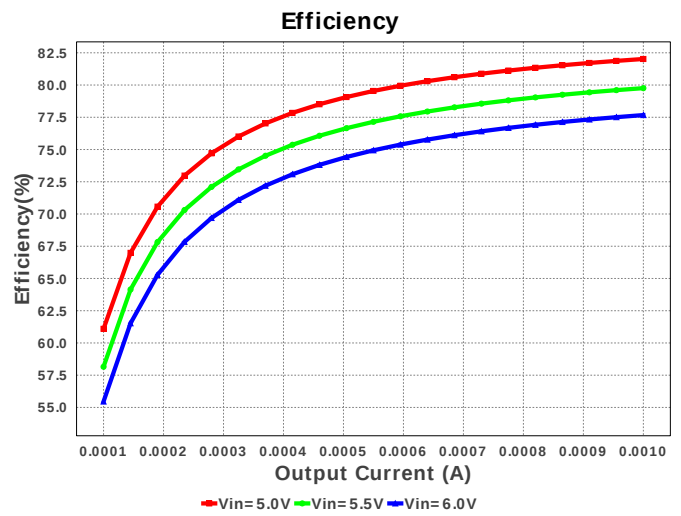
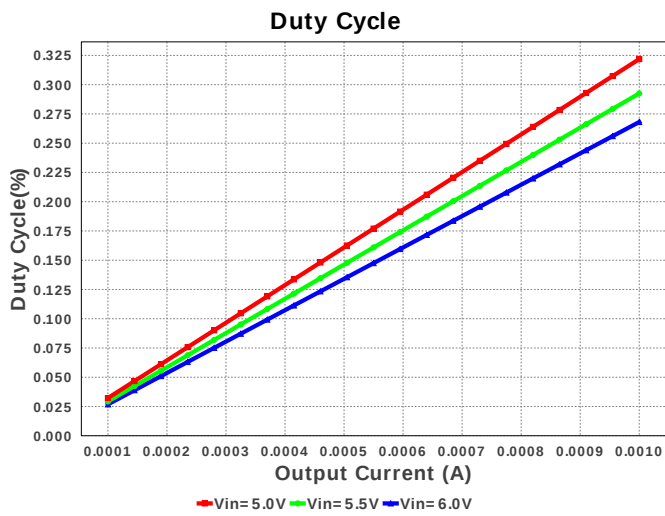
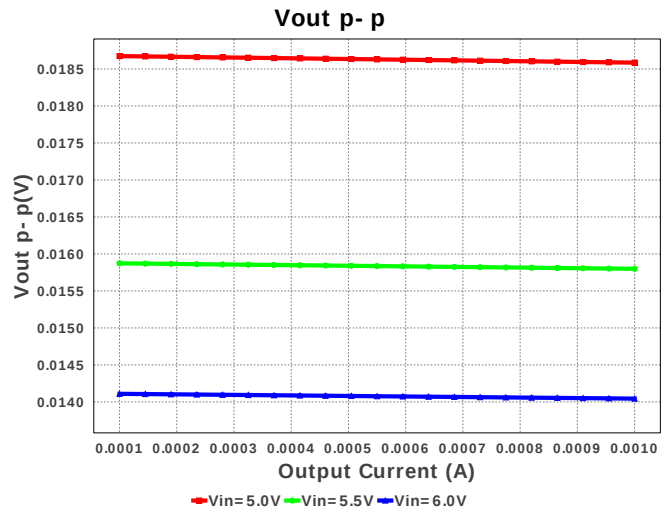
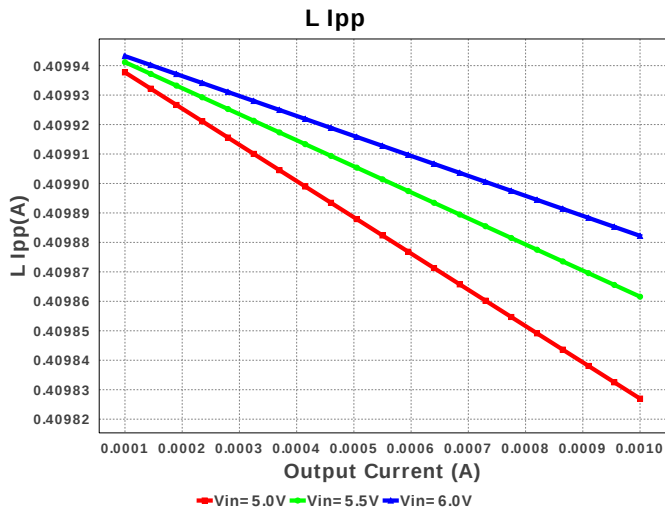
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TPS62237DRYR 5.0V-6.0V to 3.30V @ 0.001A

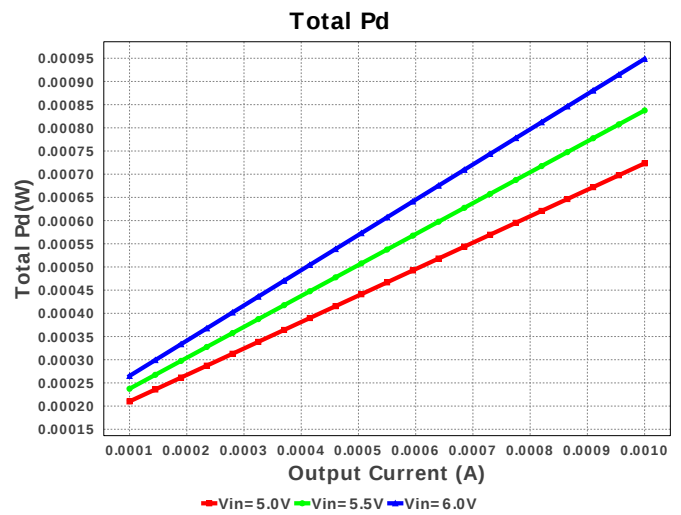
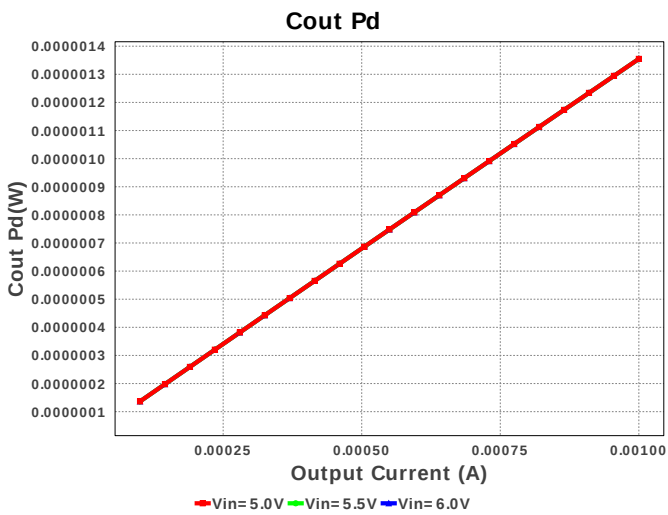
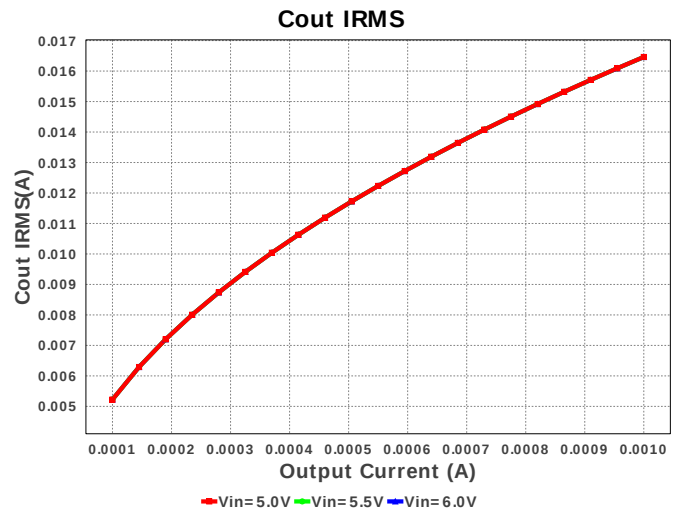
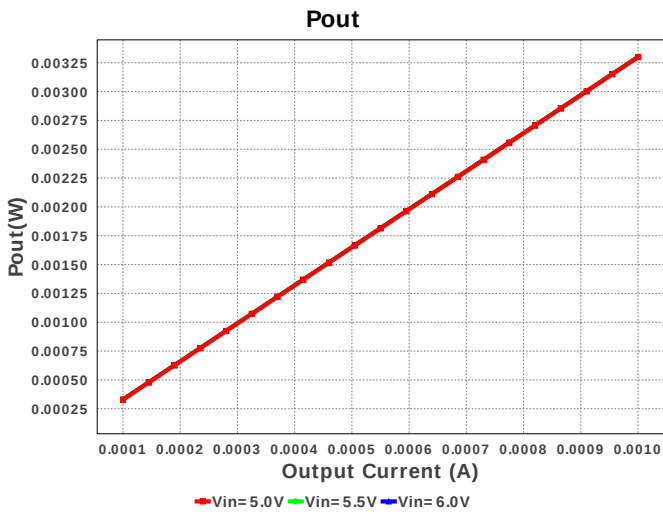
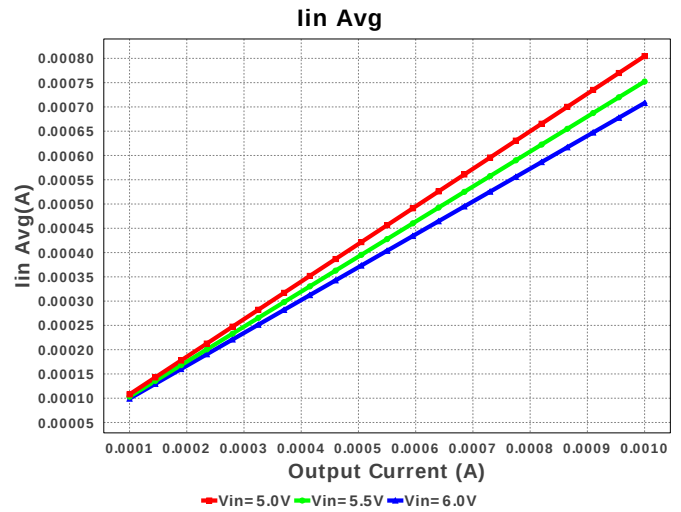
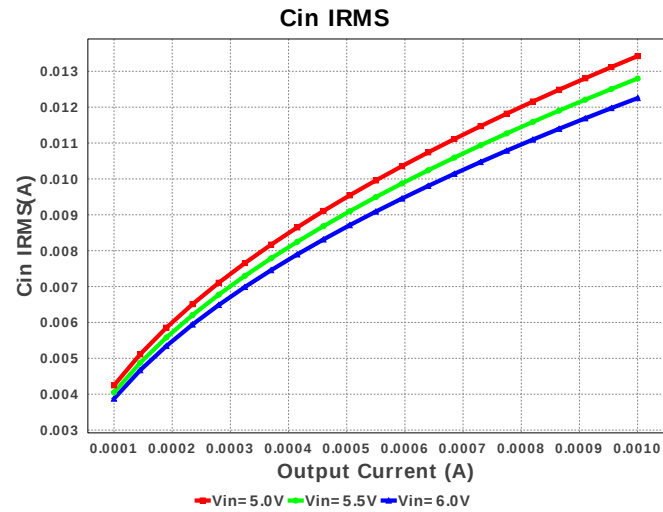
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Iout = 0.0A

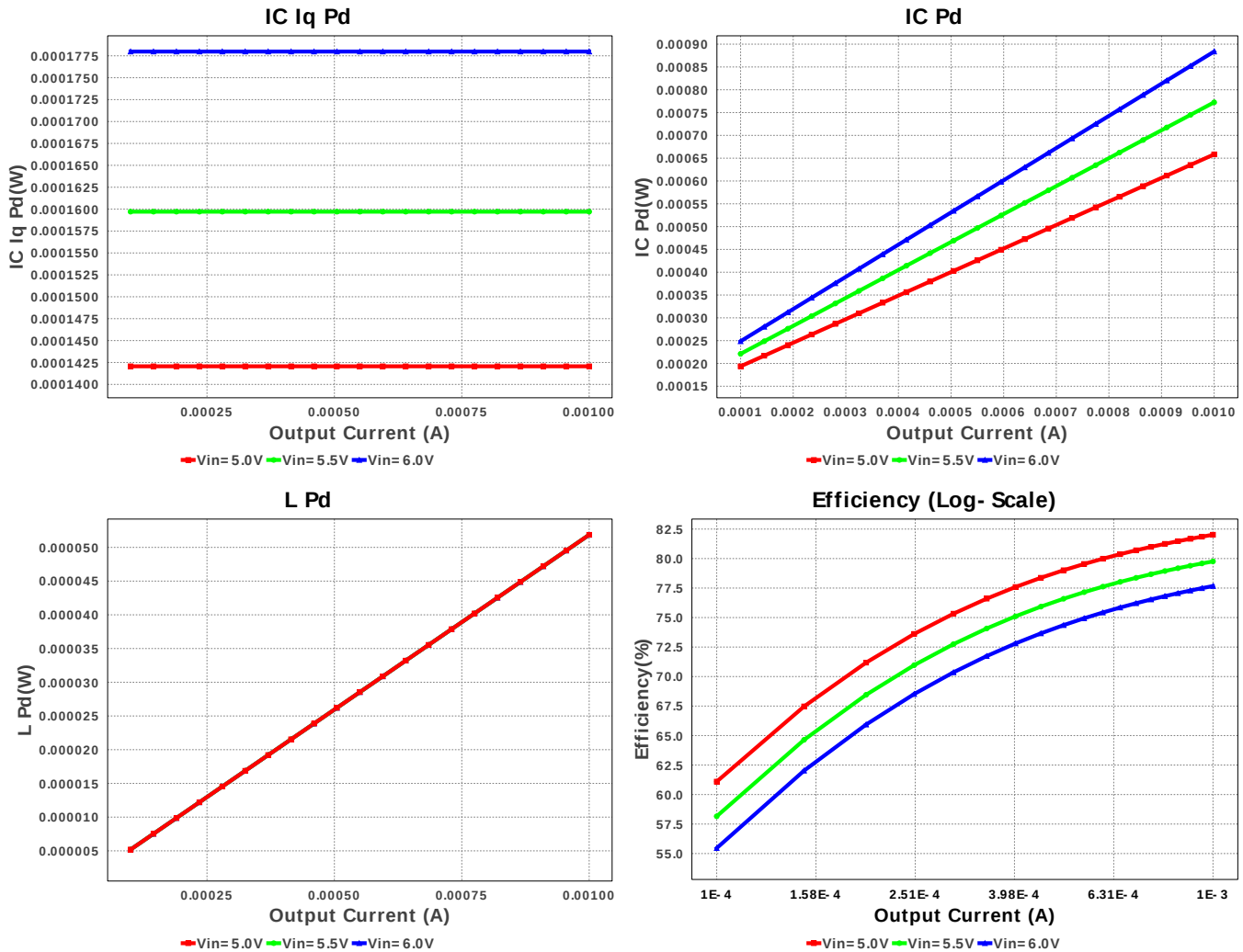


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM21BR61A475KA73L Series= X5R	Cap= 4.7 uF ESR= 4.685 mOhm VDC= 10.0 V IRMS= 1.84175 A	1	\$0.03	0805 7 mm ²
2.	Cout	MuRata	GRM188R60J475KE19D Series= X5R	Cap= 4.7 uF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 2.0 A	1	\$0.01	0603 5 mm ²
3.	L1	MuRata	LQM21PN1R0MC0D	L= 1.0 µH DCR= 190.0 mOhm	1	\$0.10	0805 7 mm ²
4.	U1	Texas Instruments	TPS62237DRYR	Switcher	1	\$0.48	DRY0006A 5 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	12.252 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	16.46 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	708.12 μ A	Current	Average input current
4.	L Ipp	409.88 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	4	General	Total Design BOM count
6.	FootPrint	23.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	17.656 kHz	General	Switching frequency
8.	Pout	3.3 mW	General	Total output power
9.	Total BOM	\$0.62	General	Total BOM Cost
10.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
11.	Duty Cycle	268.074 m%	Op_point	Duty cycle
12.	Efficiency	77.671 %	Op_point	Steady state efficiency
13.	IC Tj	30.26 degC	Op_point	IC junction temperature
14.	ICThetaJA	294.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
15.	IOUT_OP	1.0 mA	Op_point	Iout operating point
16.	VIN_OP	6.0 V	Op_point	Vin operating point
17.	Vout p-p	14.045 mV	Op_point	Peak-to-peak output ripple voltage
18.	Cin Pd	703.321 nW	Power	Input capacitor power dissipation
19.	Cout Pd	1.355 μ W	Power	Output capacitor power dissipation
20.	IC Iq Pd	177.985 μ W	Power	IC Iq Pd
21.	IC Pd	883.777 μ W	Power	IC power dissipation
22.	L Pd	51.858 μ W	Power	Inductor power dissipation
23.	Total Pd	948.697 μ W	Power	Total Power Dissipation
24.	Vout Tolerance	303.03 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0 m	Maximum Output Current
2.	VinMax	6.0	Maximum input voltage

#	Name	Value	Description
3.	VinMin	5.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS62237	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS62237** Product Folder : <http://www.ti.com/product/TPS62237> : contains the data sheet and other resources.

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