

WEBENCH® Power Architect

Project Report

Project : 3496425/12 : PA_Project_0 (modified from 0)

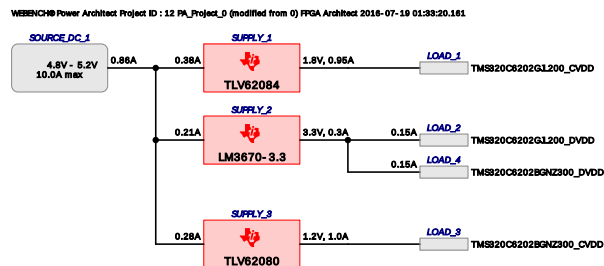
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Optimize project optFactor=3

Project Summary

1. Total System Efficiency	87.154 %
2. Total System BOM Count	18.0
3. Total System Footprint	127.0 mm ²
4. Total System BOM Cost	\$2.48
5. Total System Power Dissipation	574.8 mW

--> Launch WEBENCH Power Architect.



Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_1	TMS320C6202GJL200_CVDD
SUPPLY_2	0	LOAD_2	TMS320C6202GJL200_DVDD
SUPPLY_2	0	LOAD_4	TMS320C6202BGNZ300_DVDD
SUPPLY_3	0	LOAD_3	TMS320C6202BGNZ300_CVDD

Power Supplies

#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	TLV62084	Switcher : 2.0A High Efficiency	1.8 V	0.95 A	87.4%	45	\$1.06	51	4
2.	SUPPLY_2	LM3670-3.3	Switcher : Miniature Buck Converter for Ultra Low Voltage Circuits	3.3 V	0.3 A	92.8%	36	\$0.49	52	9
3.	SUPPLY_3	TLV62080	Switcher : 1.2A High Efficient Step Down Converter in 2x2mm SON Package	1.2 V	1.0 A	82.6%	46	\$0.93	53	14

Power Loads

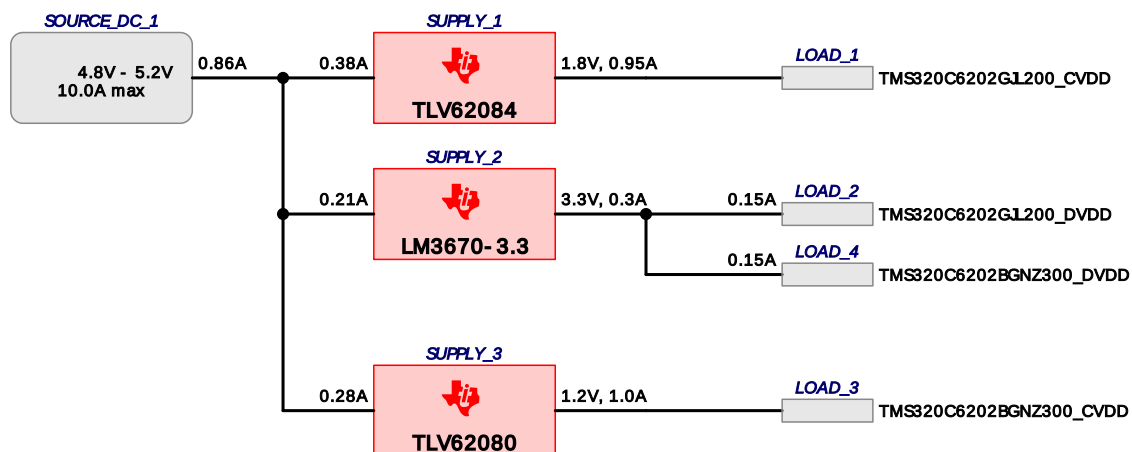
#	Name	VLoad	ILoad	Description
1.	TMS320C6202GJL200_CVDD	1.8 V	0.95 A	VoutRipple=5%
2.	TMS320C6202GJL200_DVDD	3.3 V	0.15 A	VoutRipple=10%
3.	TMS320C6202BGNZ300_DVDD	3.3 V	0.15 A	VoutRipple=9%
4.	TMS320C6202BGNZ300_CVDD	1.2 V	1 A	VoutRipple=5%

FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Texas Instruments	TMS320C6202GJL200	FPGA_1	TMS320C62xx	FPGA Texas Instruments TMS320C62xx TMS320C6202GJL200 http://focus.ti.com/lit/ds/symlink/tms320c6202b.pdf
2.	Texas Instruments	TMS320C6202BGNZ300	FPGA_1	TMS320C62xx	FPGA Texas Instruments TMS320C62xx TMS320C6202BGNZ300 http://focus.ti.com/lit/ds/symlink/tms320c6202b.pdf

Project Diagram

WEBENCH® Power Architect Project ID : 12_PA_Project_0 (modified from 0) FPGA Architect 2016-07-19 01:33:20.161



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
Vishay-Dale	CRCW0402118KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402178KFKED	0402	2	\$0.01	6
Vishay-Dale	CRCW040239K2FKED	0402	2	\$0.01	6
Vishay-Dale	CRCW040264K9FKED	0402	1	\$0.01	3
MuRata	GRM188R60J475KE19D	0603	1	\$0.01	5
MuRata	GRM21BR60J226ME39L	0805	1	\$0.04	7
Taiyo Yuden	JMK212BJ106KD-T	0805	2	\$0.03	14
Taiyo Yuden	JMK212BJ226KG-T	0805	2	\$0.13	14
Texas Instruments	LM3670MF-3.3/NOPB	MF05A	1	\$0.30	15
Coilcraft	PFL3215-102MEB	PFL3215	2	\$0.28	28
Texas Instruments	TLV62080DSGR	S- PWSON- N8	1	\$0.46	10
Texas Instruments	TLV62084DSGR	DSG0008A	1	\$0.59	9
TDK	VLS2010ET-4R7M	VLS2010ET	1	\$0.14	10
Total			18	\$2.48	127.3052

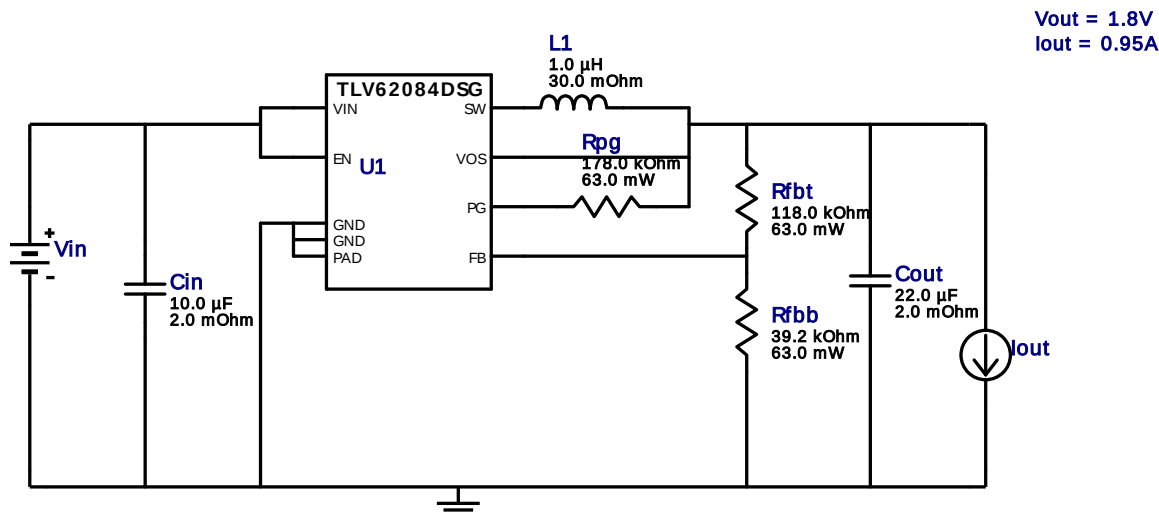


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Iout = 0.95A

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Topology = Buck
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BOM Cost = \$1.06
BOM Count = 7
Total Pd = 0.25W

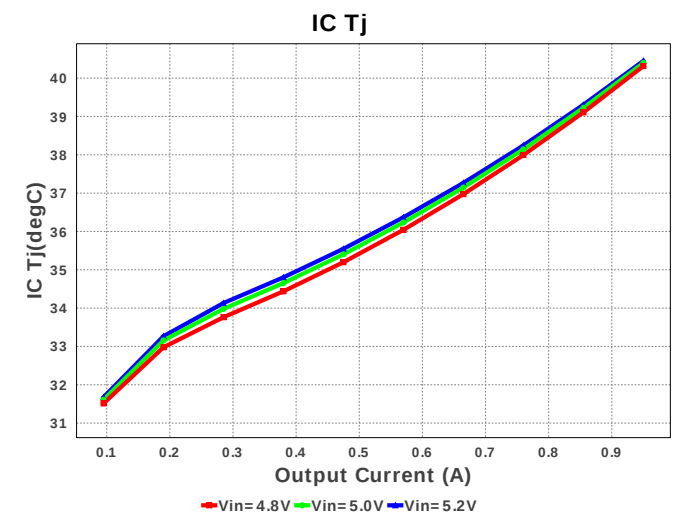
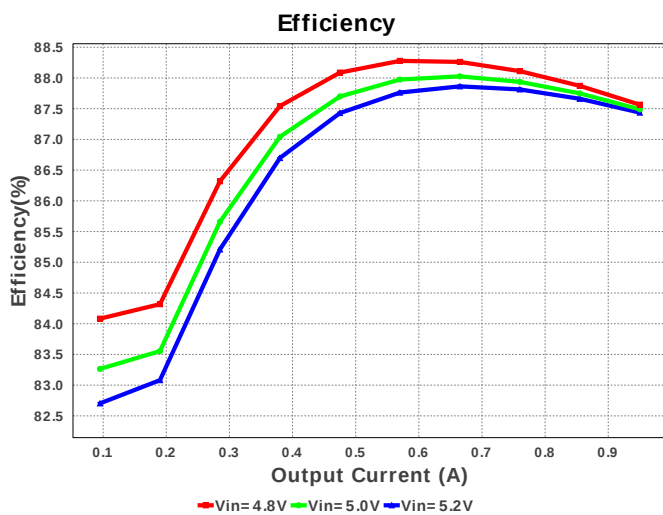
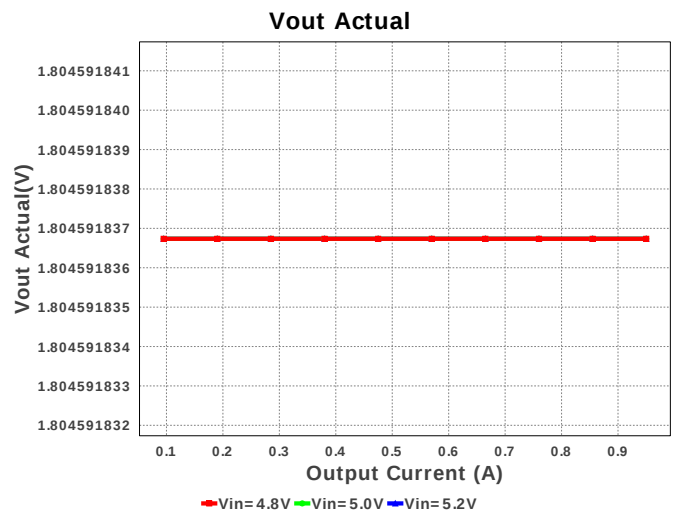
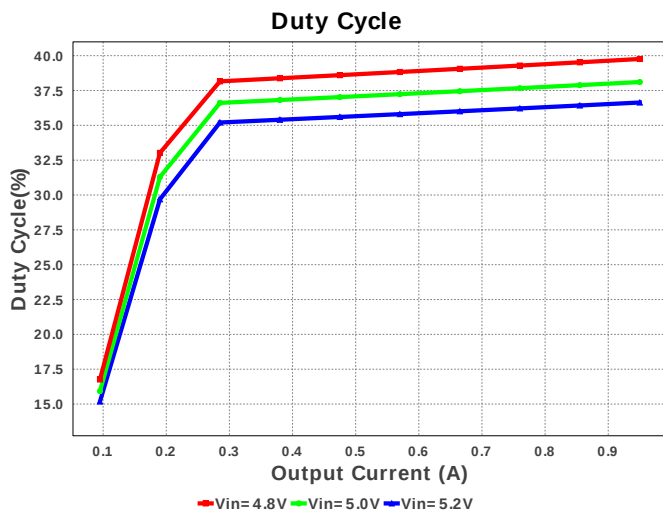
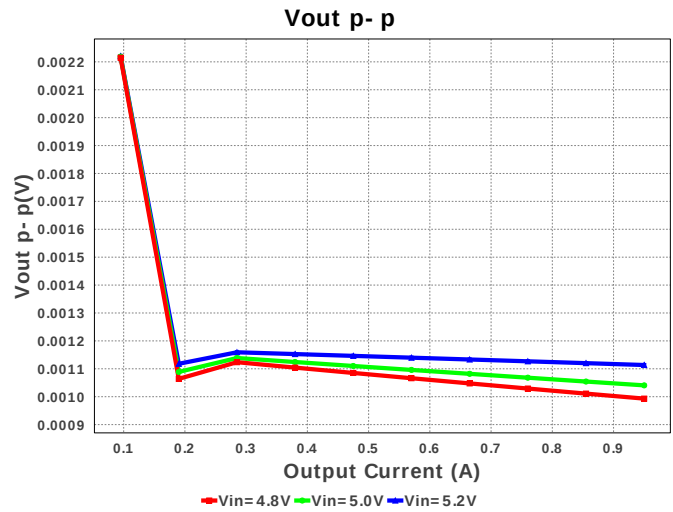
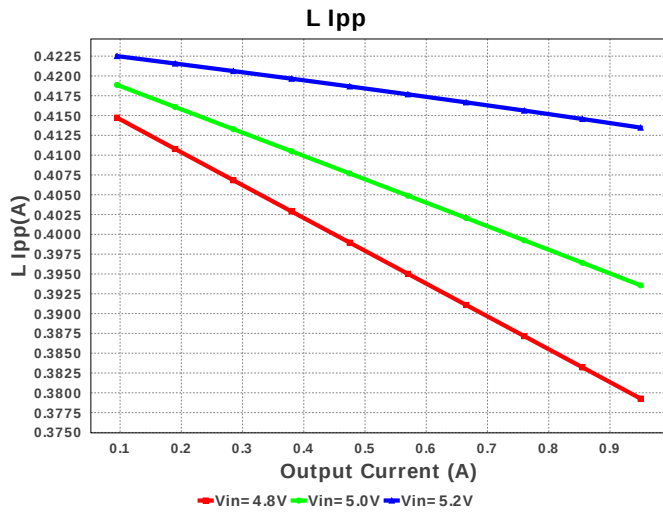
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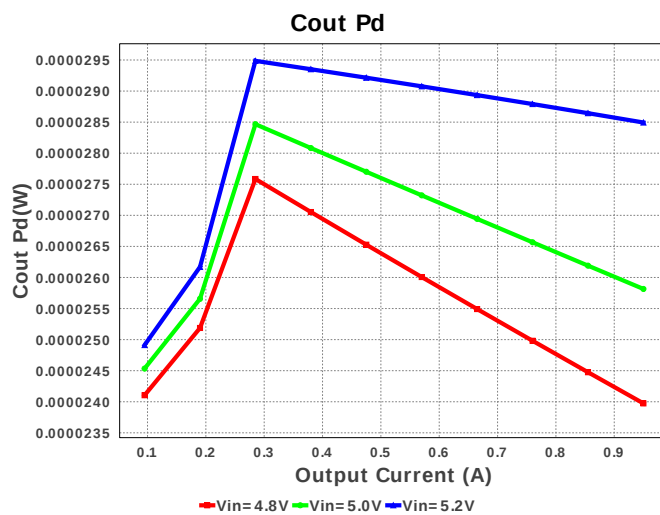
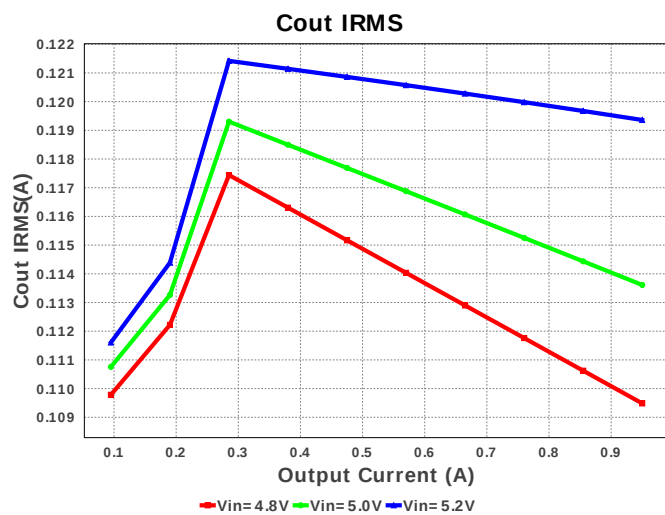
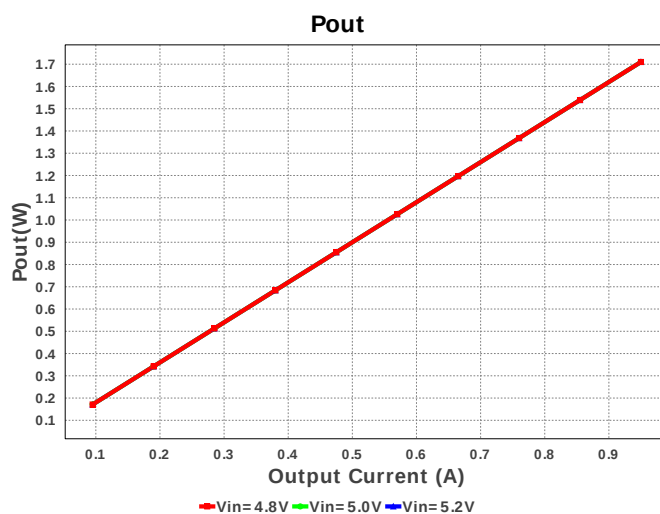
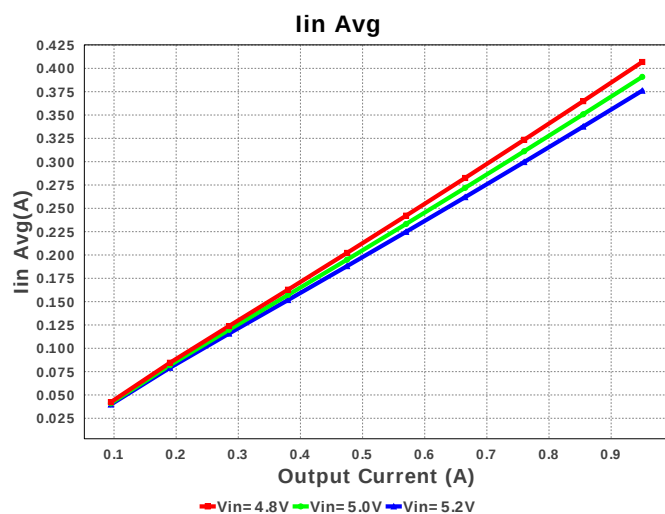
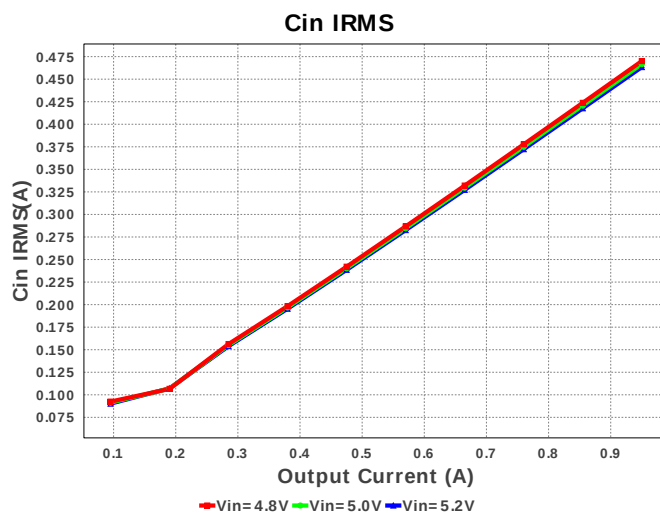
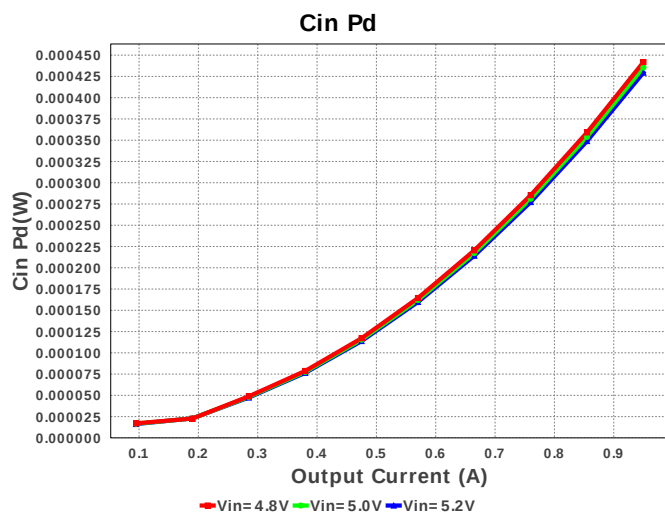
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TLV62084DSGR 4.8V-5.2V to 1.80V @ 0.95A

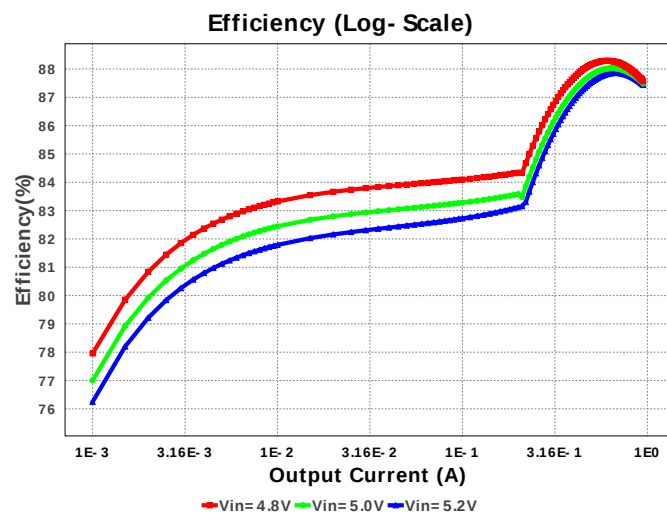
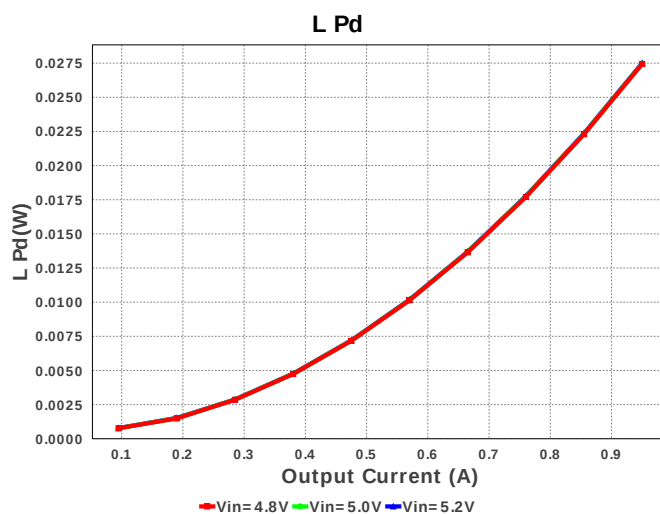
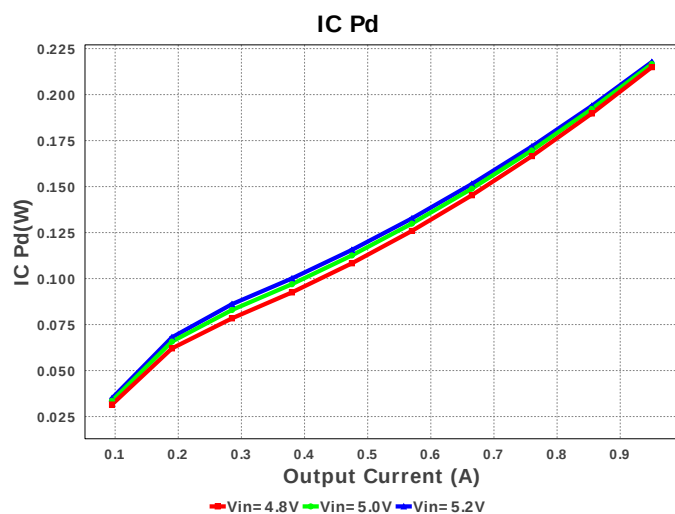
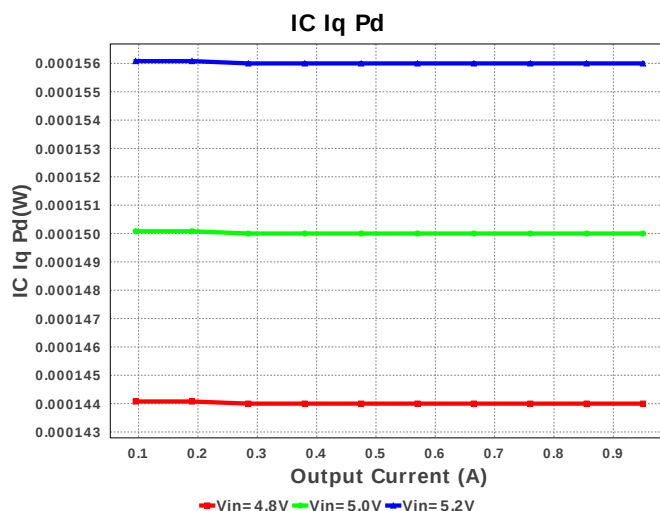
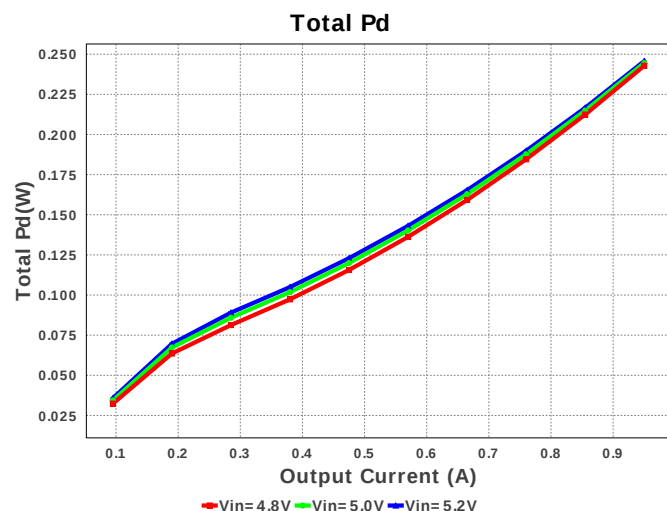


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	Taiyo Yuden	JMK212BJ106KD-T Series= X5R	Cap= 10.0 uF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Cout	Taiyo Yuden	JMK212BJ226KG-T Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.13	0805 7 mm ²
3.	L1	Coilcraft	PFL3215-102MEB	L= 1.0 uH DCR= 30.0 mOhm	1	\$0.28	PFL3215 14 mm ²
4.	Rfbb	Vishay-Dale	CRCW040239K2FKED Series= CRCW..e3	Res= 39.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
5.	Rfbb	Vishay-Dale	CRCW0402118KFKED Series= CRCW..e3	Res= 118.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
6.	Rpg	Vishay-Dale	CRCW0402178KFKED Series= CRCW..e3	Res= 178.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
7.	U1	Texas Instruments	TLV62084DSGR	Switcher	1	\$0.59	DSG0008A 9 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	463.39 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	119.361 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	376.1 mA	Current	Average input current
4.	L Ipp	413.48 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	45.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	2.751 MHz	General	Switching frequency
8.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
9.	Pout	1.71 W	General	Total output power
10.	Total BOM	\$1.06	General	Total BOM Cost
11.	Vout Actual	1.805 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors

#	Name	Value	Category	Description
12.	Vout OP	1.8 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	36.638 %	Op_point	Duty cycle
14.	Efficiency	87.436 %	Op_point	Steady state efficiency
15.	IC Tj	40.451 degC	Op_point	IC junction temperature
16.	ICThetaJA	48.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	950.0 mA	Op_point	Iout operating point
18.	VIN_OP	5.2 V	Op_point	Vin operating point
19.	Vout p-p	1.07 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	429.461 μ W	Power	Input capacitor power dissipation
21.	Cout Pd	28.494 μ W	Power	Output capacitor power dissipation
22.	IC Iq Pd	156.0 μ W	Power	IC Iq Pd
23.	IC Pd	217.728 mW	Power	IC power dissipation
24.	L Pd	27.502 mW	Power	Inductor power dissipation
25.	Total Pd	245.717 mW	Power	Total Power Dissipation
26.	Vout Tolerance	4.224 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	950.0 m	Maximum Output Current
2.	VinMax	5.2	Maximum input voltage
3.	VinMin	4.8	Minimum input voltage
4.	Vout	1.8	Output Voltage
5.	base_pn	TLV62084	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TLV62084 Product Folder : <http://www.ti.com/product/TLV62084> : contains the data sheet and other resources.

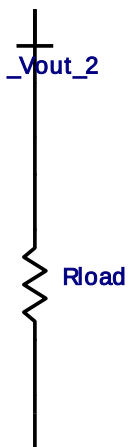
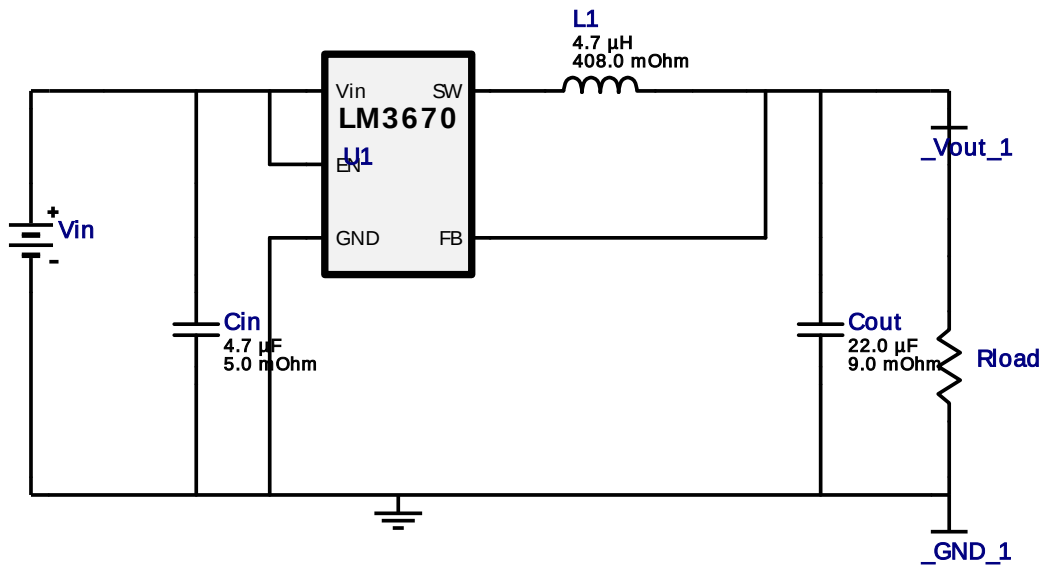


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Iout = 0.3A

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BOM Cost = \$0.49
BOM Count = 4
Total Pd = 0.08W

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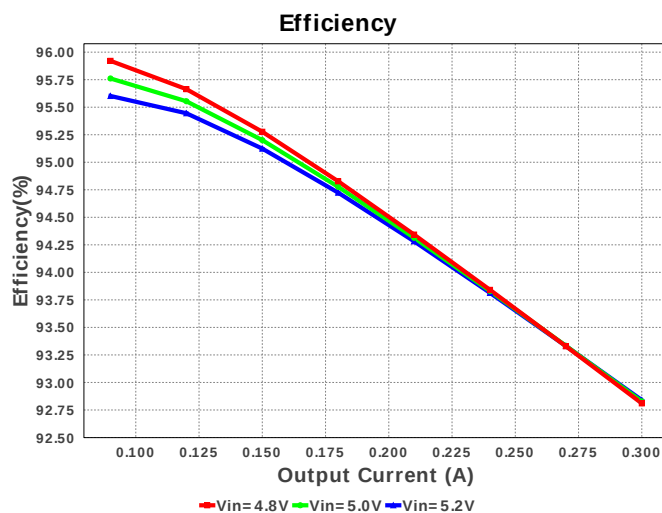
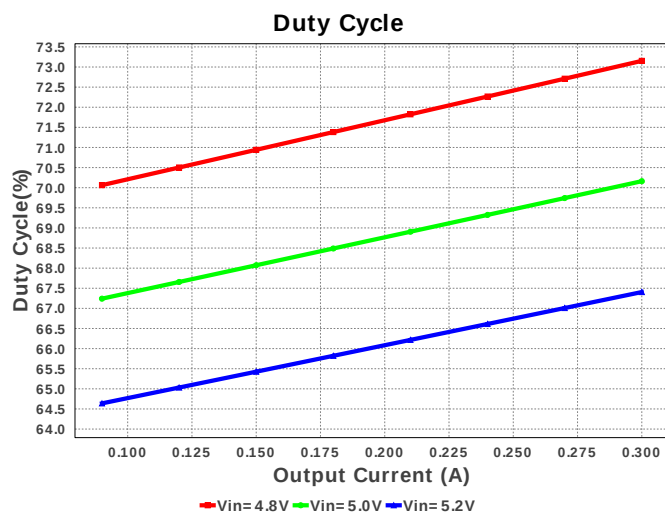
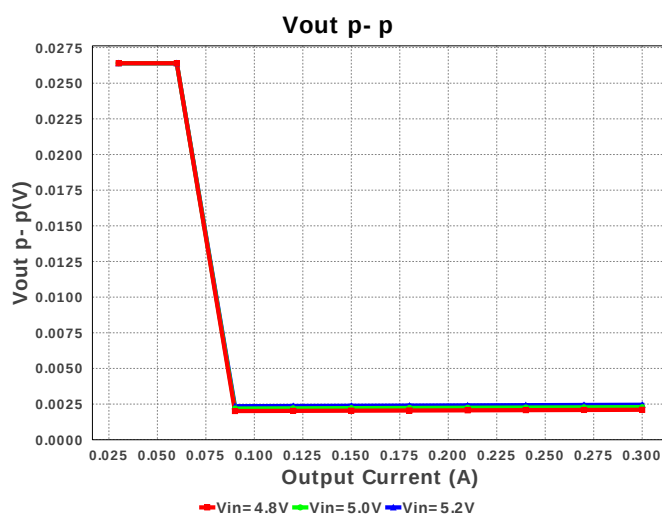
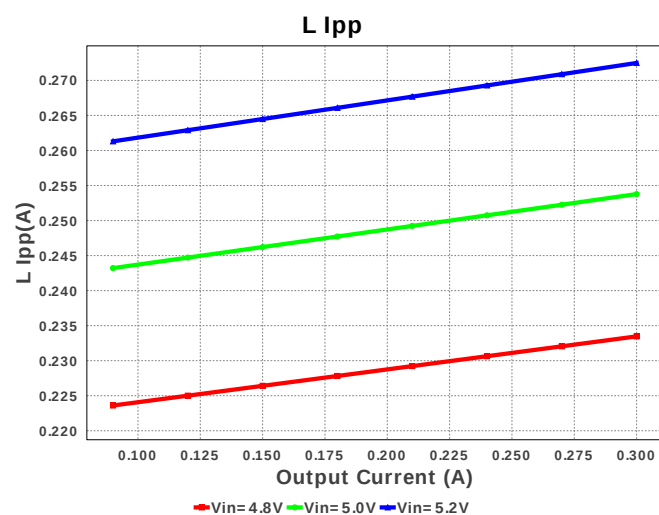
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LM3670MF-3.3/NOPB 4.8V-5.2V to 3.30V @ 0.3A

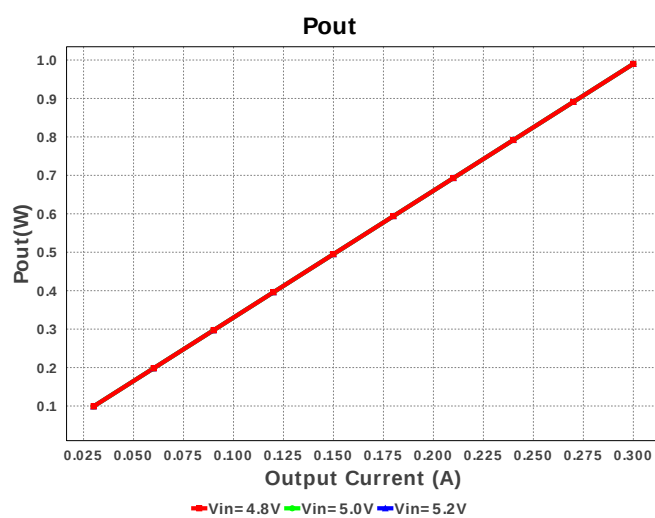
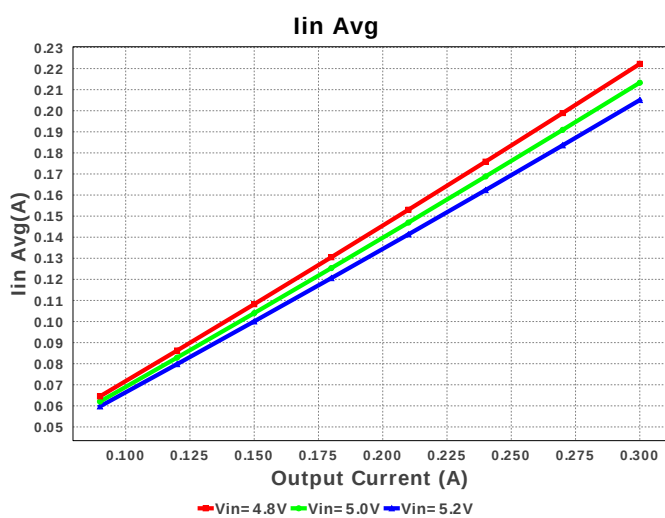
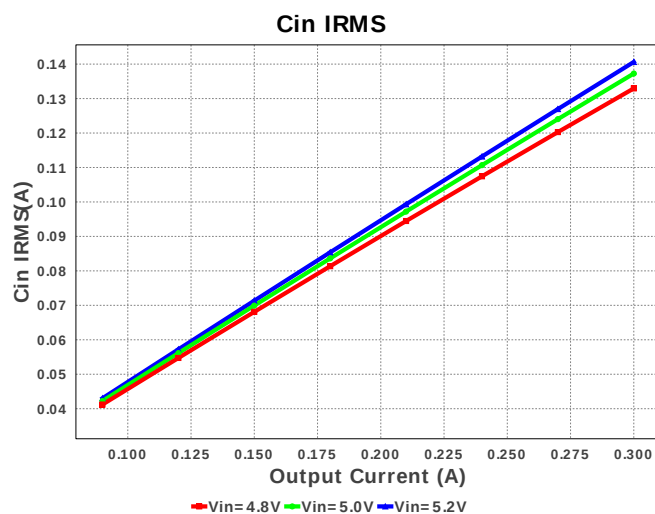
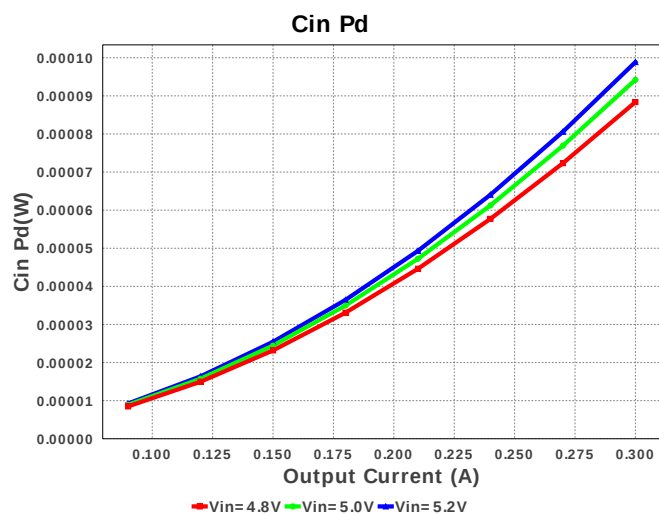
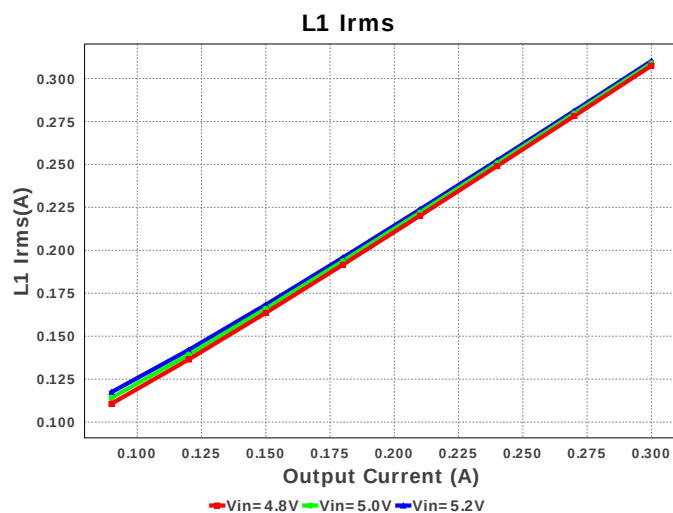
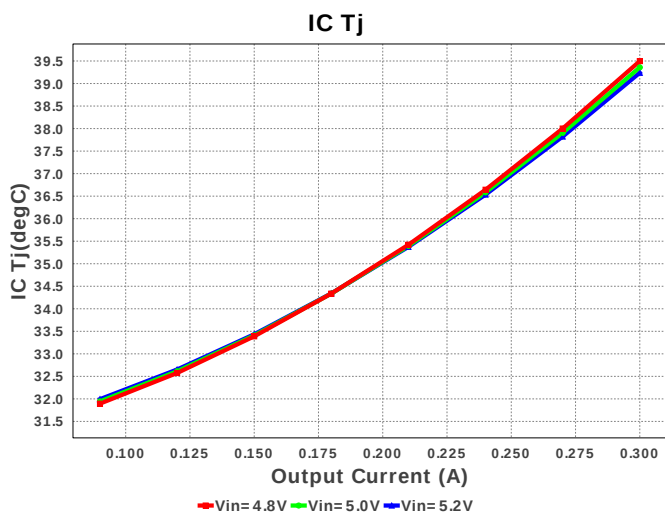


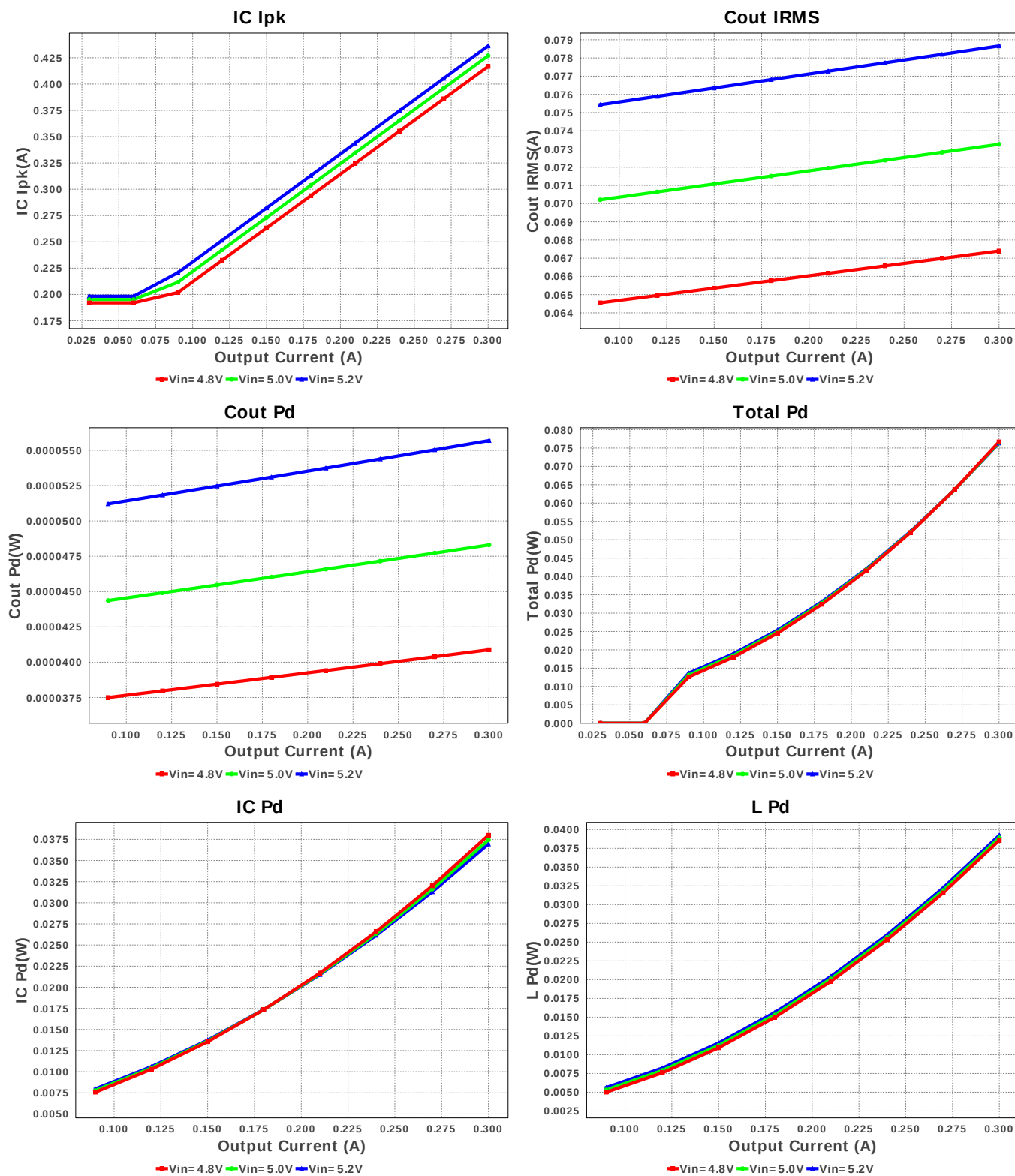
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	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
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 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
3.	L1	TDK	VLS2010ET-4R7M	L= 4.7 μ H DCR= 408.0 mOhm	1	\$0.14	 VLS2010ET 10 mm ²
4.	U1	Texas Instruments	LM3670MF-3.3/NOPB	Switcher	1	\$0.30	 MF05A 15 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	140.618 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	78.661 mA	Current	Output capacitor RMS ripple current
3.	IC IpK	436.246 mA	Current	Peak switch current in IC
4.	Iin Avg	205.07 mA	Current	Average input current
5.	L Ipp	272.49 mA	Current	Peak-to-peak inductor ripple current
6.	L1 Irms	310.141 mA	Current	Inductor ripple current
7.	BOM Count	4	General	Total Design BOM count
8.	FootPrint	36.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1000.0 kHz	General	Switching frequency
10.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
11.	Pout	990.0 mW	General	Total output power

#	Name	Value	Category	Description
12.	Total BOM	\$0.49	General	Total BOM Cost
13.	Duty Cycle	67.406 %	Op_point	Duty cycle
14.	Efficiency	92.84 %	Op_point	Steady state efficiency
15.	IC Tj	39.239 degC	Op_point	IC junction temperature
16.	ICThetaJA	250.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	300.0 mA	Op_point	Iout operating point
18.	VIN_OP	5.2 V	Op_point	Vin operating point
19.	Vout p-p	2.452 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	98.867 μ W	Power	Input capacitor power dissipation
21.	Cout Pd	55.689 μ W	Power	Output capacitor power dissipation
22.	IC Pd	36.954 mW	Power	IC power dissipation
23.	L Pd	39.245 mW	Power	Inductor power dissipation
24.	Total Pd	76.352 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	300.0 m	Maximum Output Current
2.	VinMax	5.2	Maximum input voltage
3.	VinMin	4.8	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LM3670	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LM3670 Product Folder : <http://www.ti.com/product/LM3670> : contains the data sheet and other resources.

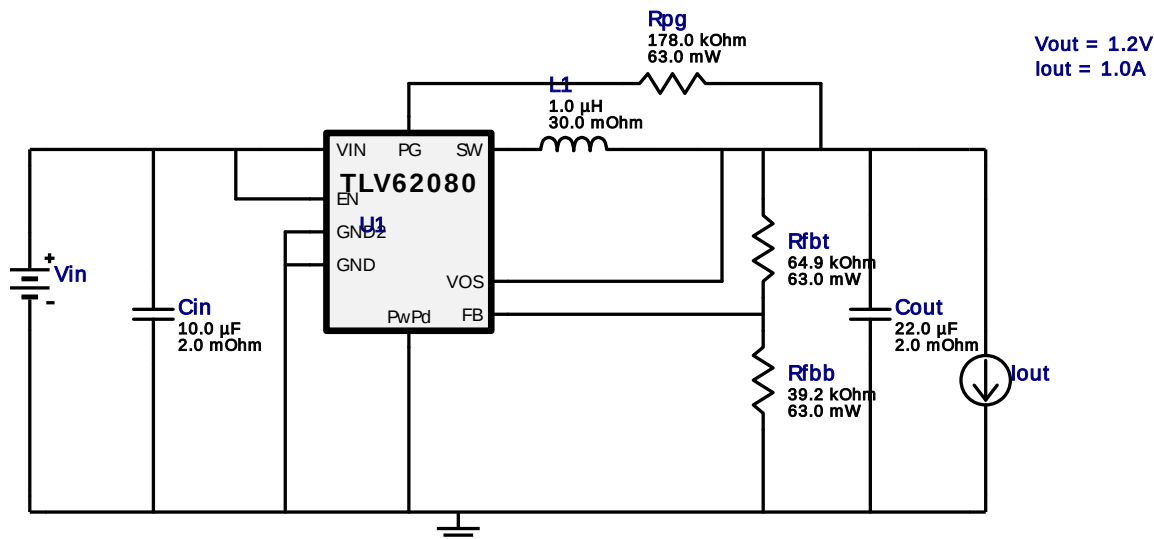


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Iout = 1.0A

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Topology = Buck
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BOM Cost = \$0.93
BOM Count = 7
Total Pd = 0.25W

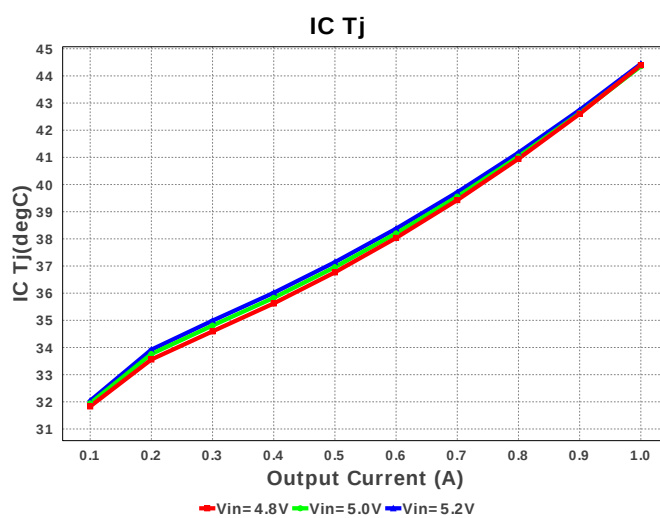
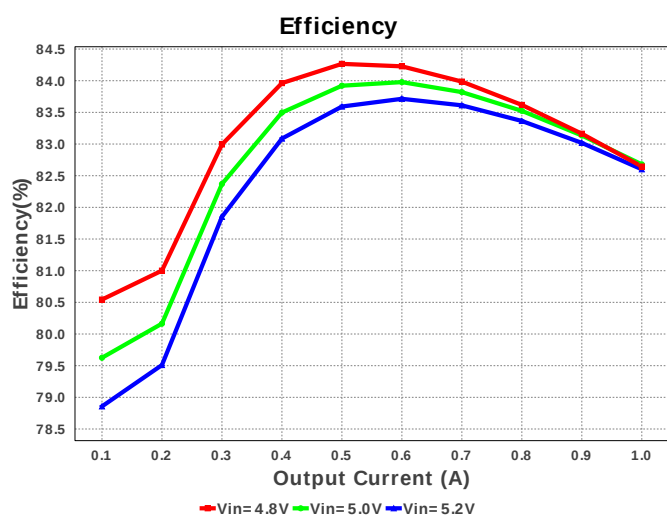
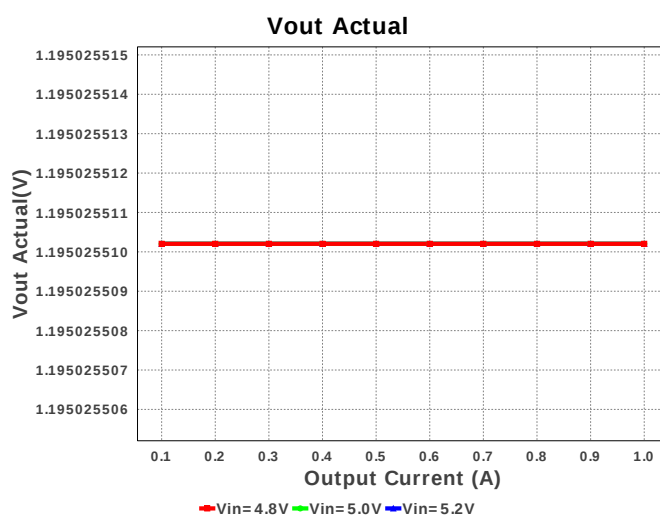
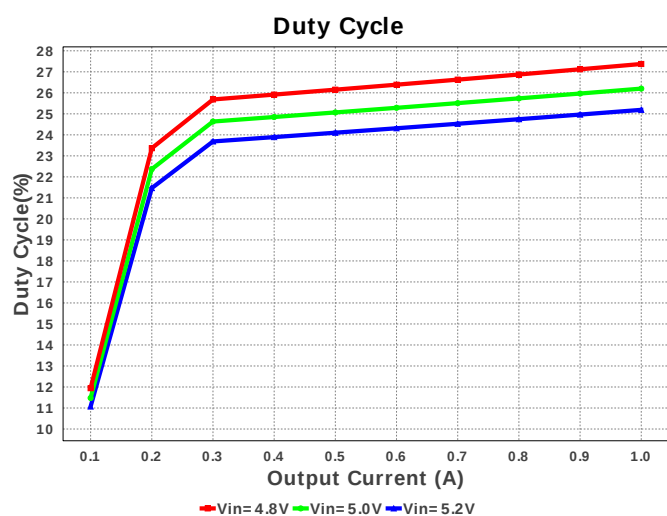
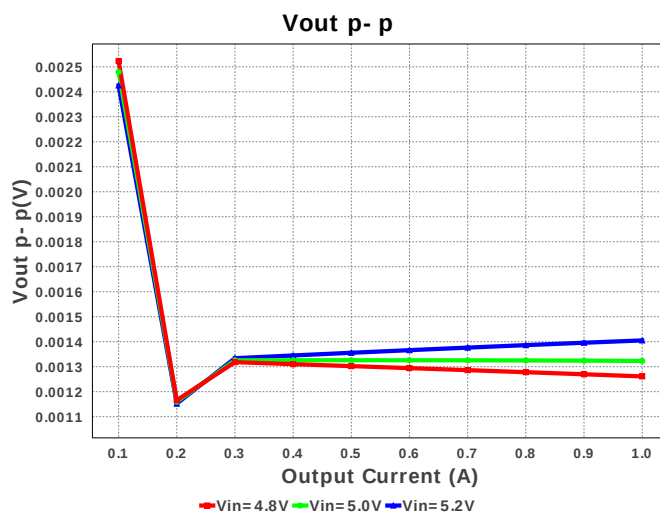
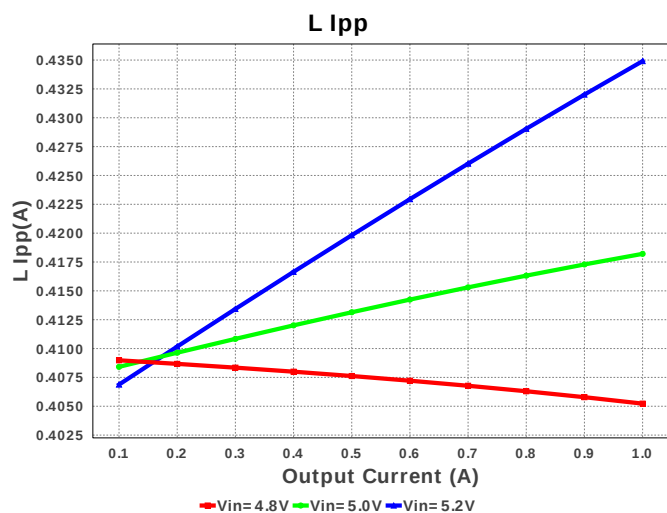
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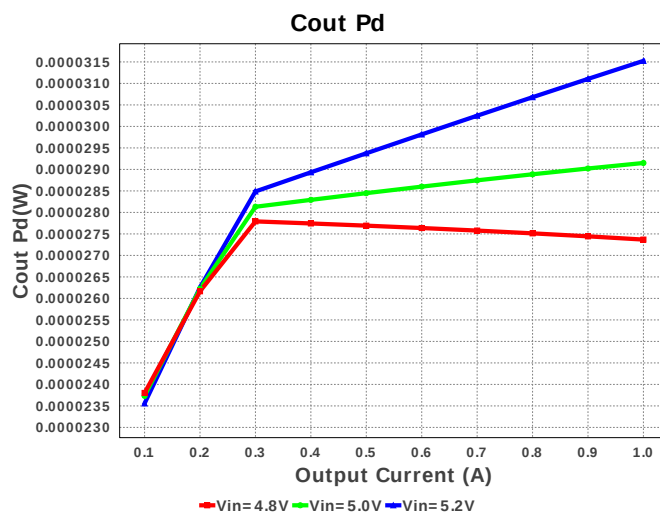
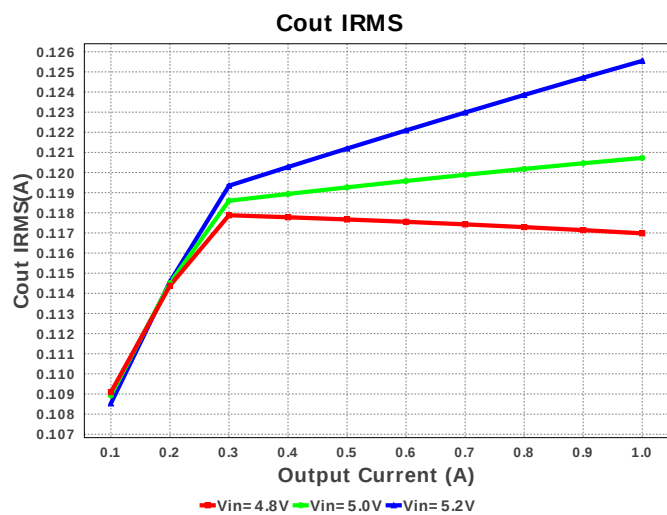
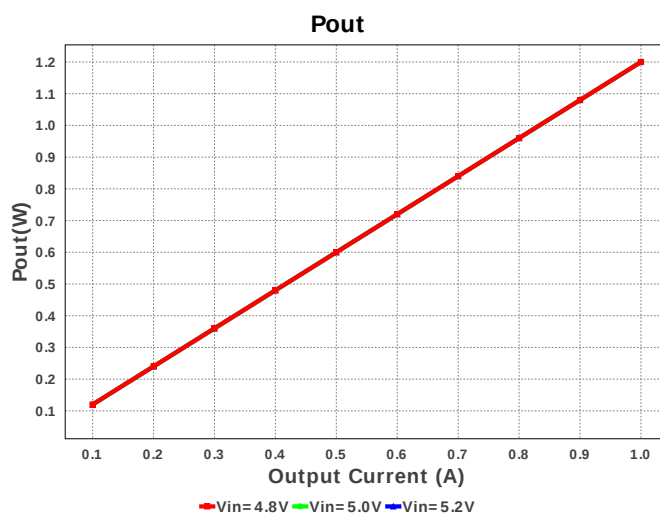
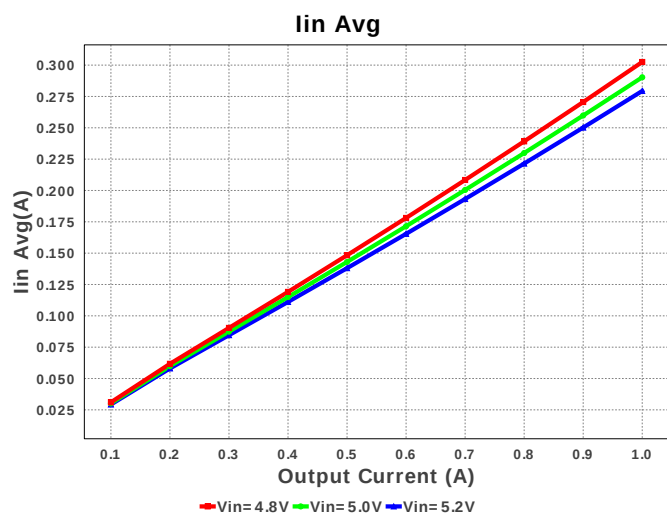
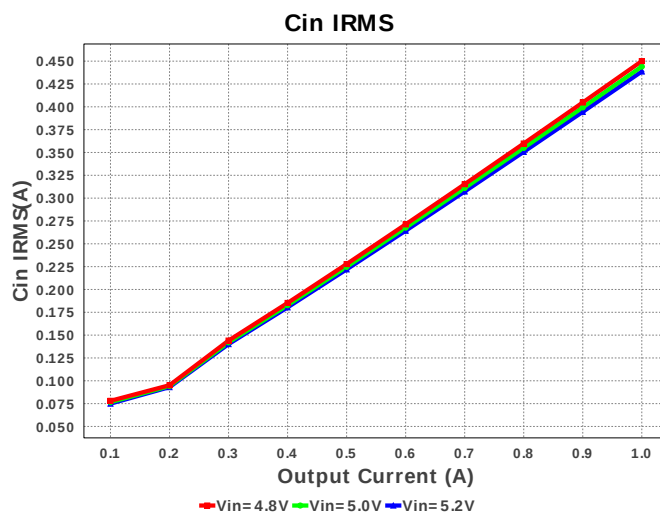
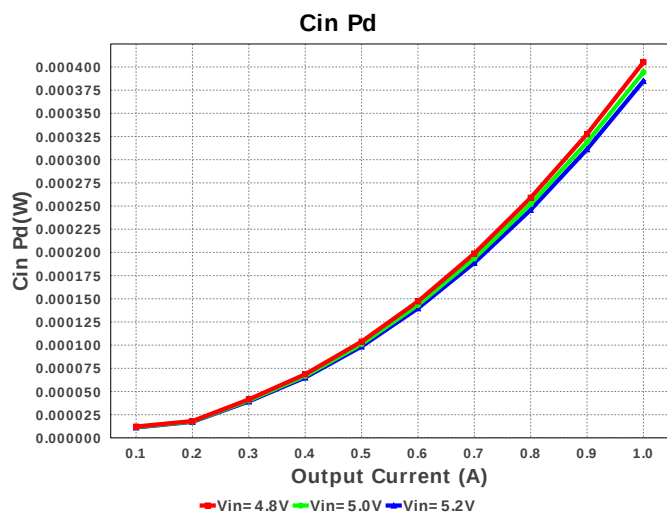
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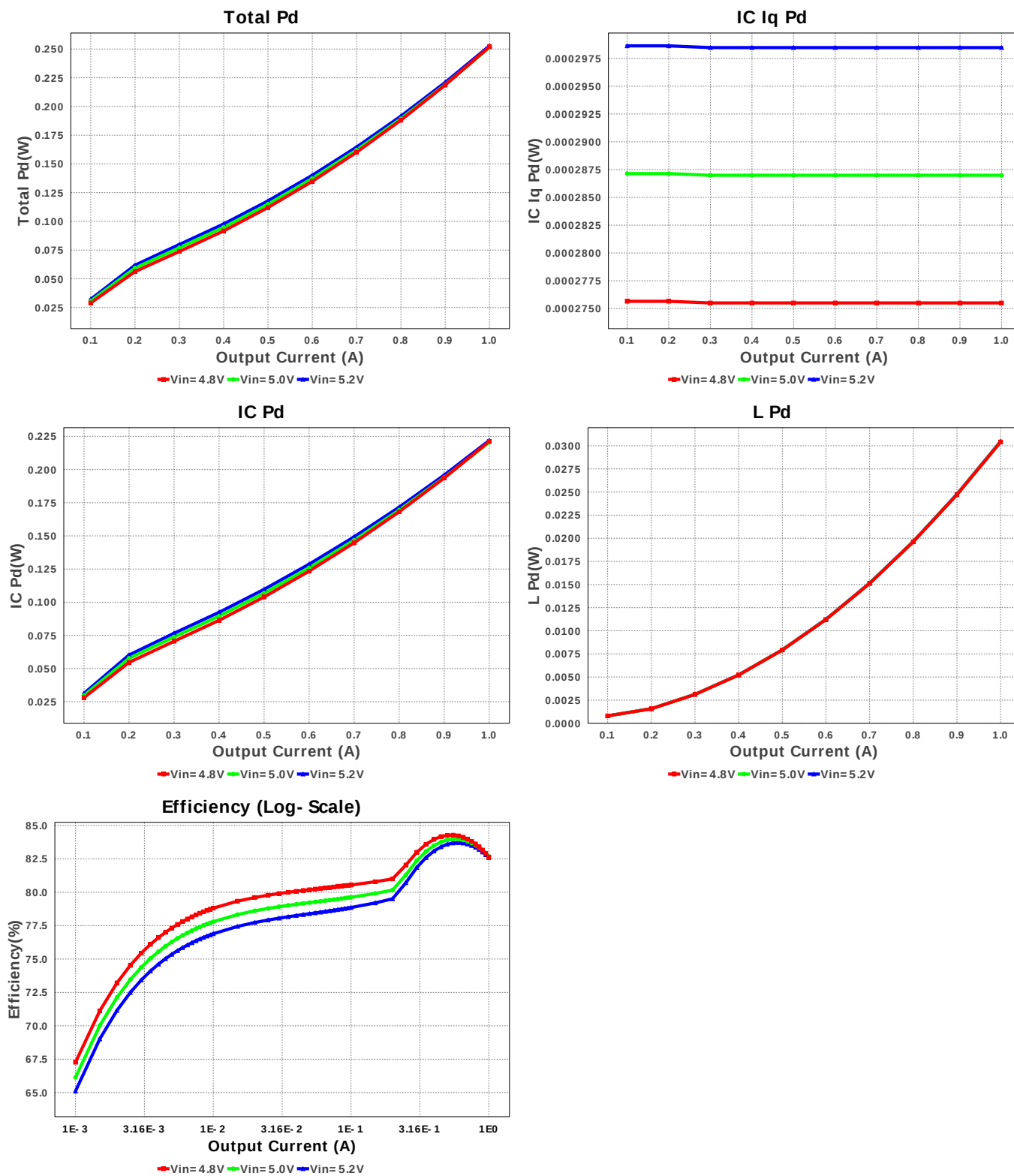


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	Taiyo Yuden	JMK212BJ106KD-T Series= X5R	Cap= 10.0 uF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Cout	Taiyo Yuden	JMK212BJ226KG-T Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.13	0805 7 mm ²
3.	L1	Coilcraft	PFL3215-102MEB	L= 1.0 µH DCR= 30.0 mOhm	1	\$0.28	PFL3215 14 mm ²
4.	Rfbb	Vishay-Dale	CRCW040239K2FKED Series= CRCW..e3	Res= 39.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
5.	Rfbt	Vishay-Dale	CRCW040264K9FKED Series= CRCW..e3	Res= 64.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
6.	Rpg	Vishay-Dale	CRCW0402178KFKED Series= CRCW..e3	Res= 178.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
7.	U1	Texas Instruments	TLV62080DSGR	Switcher	1	\$0.46	S-PWSON-N8 10 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	438.651 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	125.548 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	279.38 mA	Current	Average input current
4.	L Ipp	434.91 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	46.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	2.149 MHz	General	Switching frequency
8.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
9.	Pout	1.2 W	General	Total output power
10.	Total BOM	\$0.93	General	Total BOM Cost
11.	Vout Actual	1.195 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors

#	Name	Value	Category	Description
12.	Vout OP	1.2 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	25.19 %	Op_point	Duty cycle
14.	Efficiency	82.601 %	Op_point	Steady state efficiency
15.	IC Tj	44.443 degC	Op_point	IC junction temperature
16.	ICThetaJA	65.1 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	1.0 A	Op_point	Iout operating point
18.	VIN_OP	5.2 V	Op_point	Vin operating point
19.	Vout p-p	1.368 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	384.83 µW	Power	Input capacitor power dissipation
21.	Cout Pd	31.524 µW	Power	Output capacitor power dissipation
22.	IC Iq Pd	298.47 µW	Power	IC Iq Pd
23.	IC Pd	221.857 mW	Power	IC power dissipation
24.	L Pd	30.473 mW	Power	Inductor power dissipation
25.	Total Pd	252.768 mW	Power	Total Power Dissipation
26.	Vout Tolerance	6.66 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	5.2	Maximum input voltage
3.	VinMin	4.8	Minimum input voltage
4.	Vout	1.2	Output Voltage
5.	base_pn	TLV62080	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TLV62080 Product Folder : <http://www.ti.com/product/TLV62080> : contains the data sheet and other resources.

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