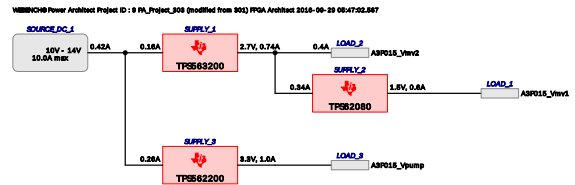


WEBENCH® Power Architect



Project Report

Project : 4790845/9 : PA_Project_303 (modified from 301)

Created : 2016-09-29 05:47:02.567

Optimize project optFactor=3

Project Summary

1. Total System Efficiency	88.838 %
2. Total System BOM Count	21.0
3. Total System Footprint	279.0 mm ²
4. Total System BOM Cost	\$3.20
5. Total System Power Dissipation	663.4 mW

--> Launch WEBENCH Power Architect.

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_2	A3P015_Vmv2
SUPPLY_2	0	LOAD_1	A3P015_Vmv1
SUPPLY_3	0	LOAD_3	A3P015_Vpump

Power Supplies

#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	TPS563200	Switcher : 17V, 3A,6-pin, Low Iq Synchronous buck converter with Advanced Eco-mode	2.7 V	0.741 A	90.3%	149	\$1.06	55	9
2.	SUPPLY_2	TPS62080	Switcher : 1.2A High Efficient Step Down Converter in 2x2mm QFN Package	1.5 V	0.6 A	89%	48	\$1.14	54	4
3.	SUPPLY_3	TPS562200	Switcher : 17V, 2A,6-pin, Low Iq Synchronous buck converter with Advanced Eco-mode	3.3 V	1.0 A	90.8%	82	\$1.00	56	14

Power Loads

#	Name	VLoad	ILoad	Description
1.	A3P015_Vmv2	2.7 V	0.4 A	VoutRipple=5%, SoftStart delay=1.0 mSec
2.	A3P015_Vmv1	1.5 V	0.6 A	VoutRipple=5%, SoftStart delay=1.0 mSec
3.	A3P015_Vpump	3.3 V	1 A	VoutRipple=9%, Group=Pump, SoftStart delay=1.0 mSec

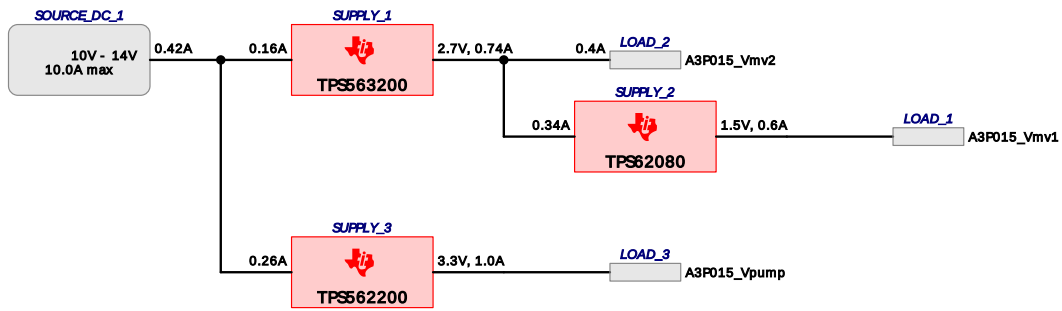
FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Actel	A3P015	FPGA_1	ProASIC3	FPGA Actel ProASIC3 A3P015

http://www.actel.com/documents/PA3_DS.pdf

Project Diagram

WEBENCH® Power Architect Project ID : 9 PA_Project_303 (modified from 301) FPGA Architect 2016-09-29 05:47:02.567



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
AVX	08053C104KAT2A	0805	2	\$0.01	14
TDK	C3216X6S0G476M	1206	1	\$0.13	11
Vishay-Dale	CRCW040210K0FKED	0402	2	\$0.01	6
Vishay-Dale	CRCW0402178KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040225K5FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040233K2FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040239K2FKED	0402	1	\$0.01	3
MuRata	GRM31CR60J226KE19L	1206_190	1	\$0.08	11
MuRata	GRM32ER61E226KE15L	1210	2	\$0.16	29
Taiyo Yuden	JMK212BJ106KD-T	0805	1	\$0.03	7
Taiyo Yuden	JMK212BJ226KG-T	0805	1	\$0.13	7
Coilcraft	PFL3215-102MEB	PFL3215	1	\$0.28	14
Yageo America	RC0603FR-0791KL	0603	1	\$0.01	5
Bourns	SRN8040-2R2Y	SRN8040	1	\$0.22	100
Bourns	SRR4028-3R3Y	SRR4028	1	\$0.26	34
Texas Instruments	TPS562200DDCR	DDC0006A	1	\$0.47	10
Texas Instruments	TPS563200DDCR	DDC0006A	1	\$0.52	10
Texas Instruments	TPS62080DSGR	S- PWSON- N8	1	\$0.67	10
Total			21	\$2720.90619999999996	

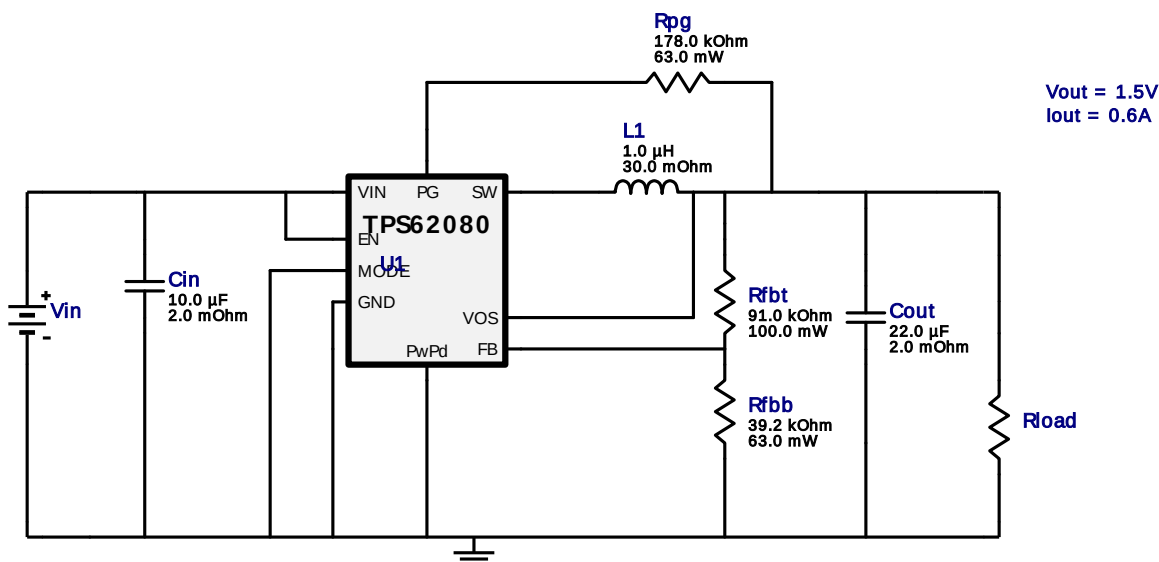


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Iout = 0.6A

Device = TPS62080DSGR
Topology = Buck
Created = 9/29/16 5:47:01 AM
BOM Cost = \$1.14
BOM Count = 7
Total Pd = 0.11W

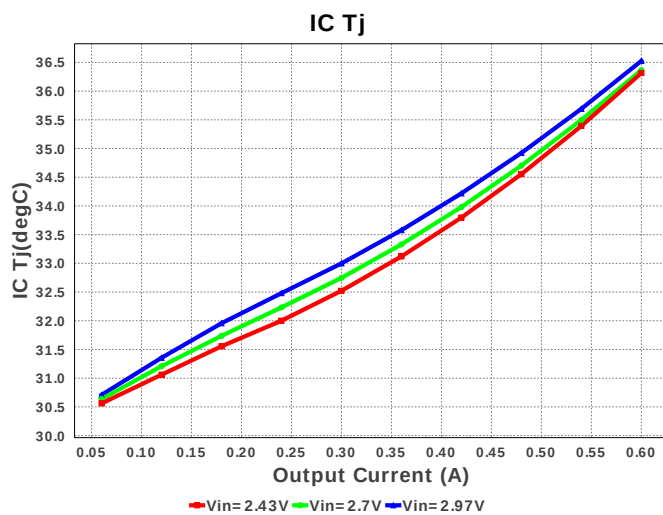
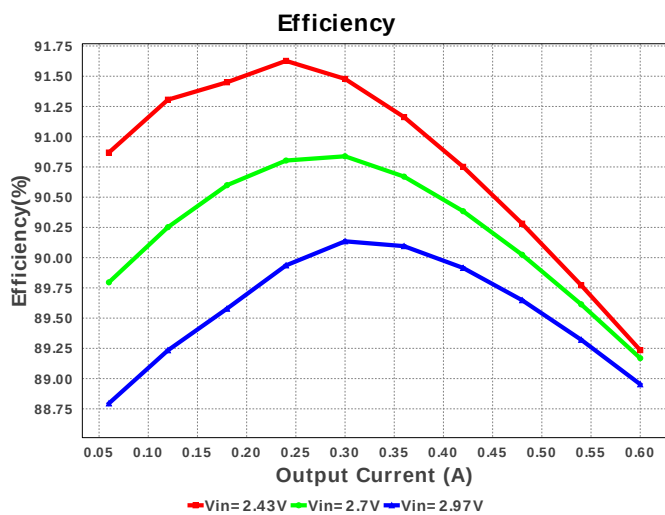
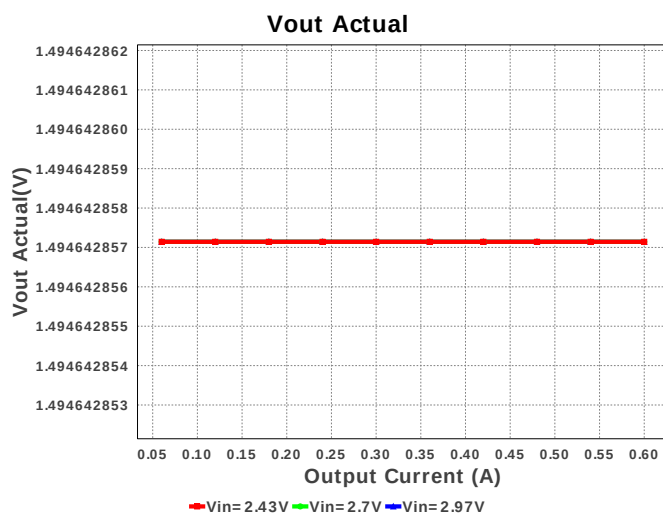
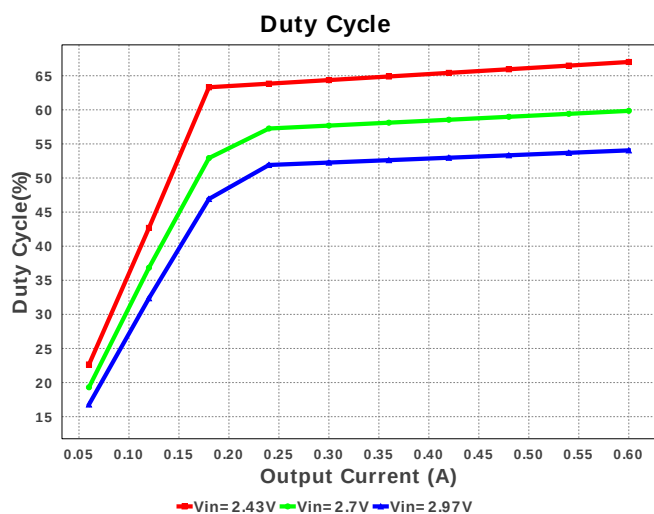
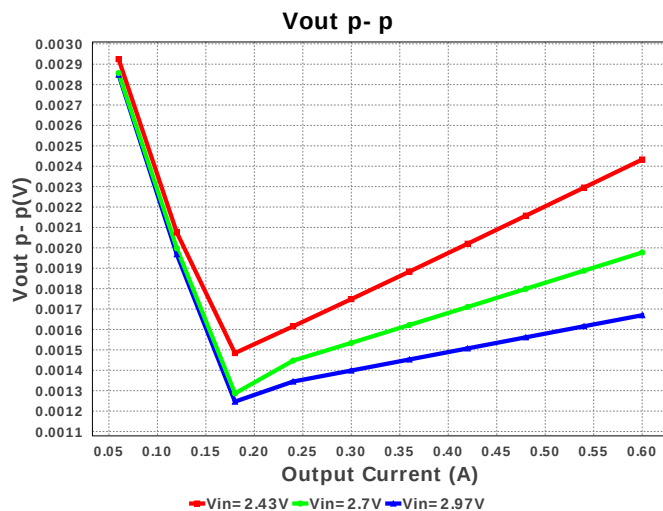
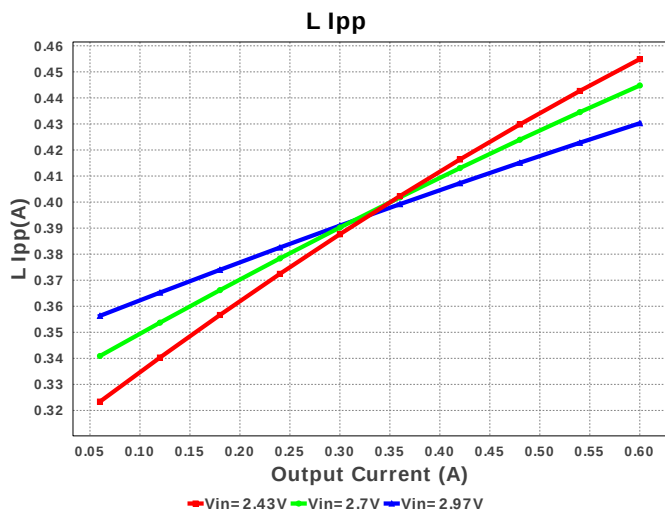
WEBENCH® Design Report

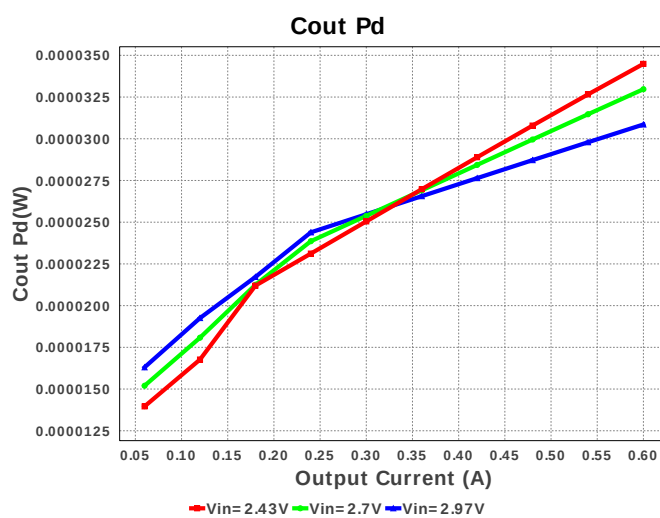
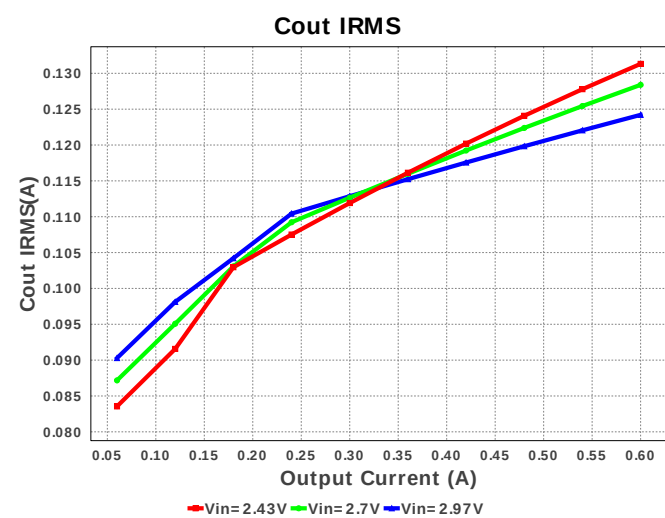
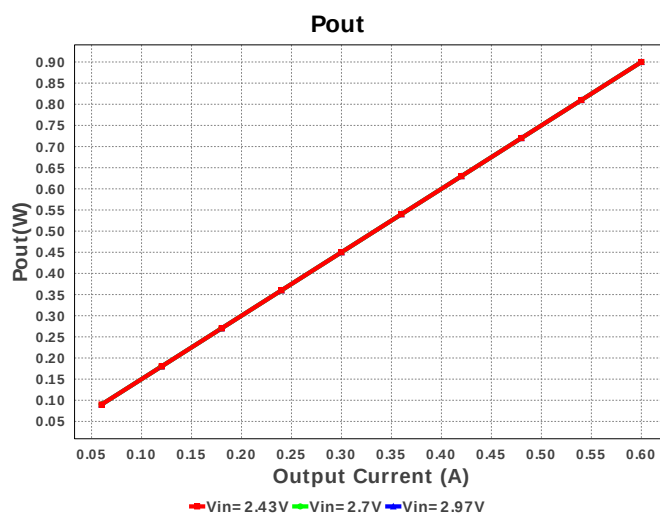
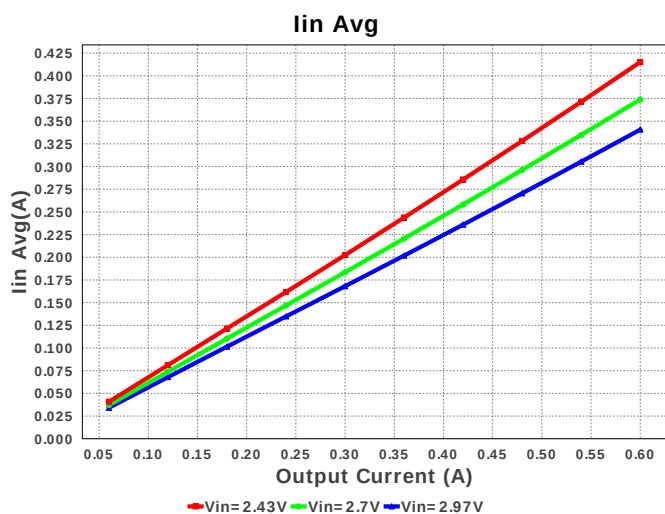
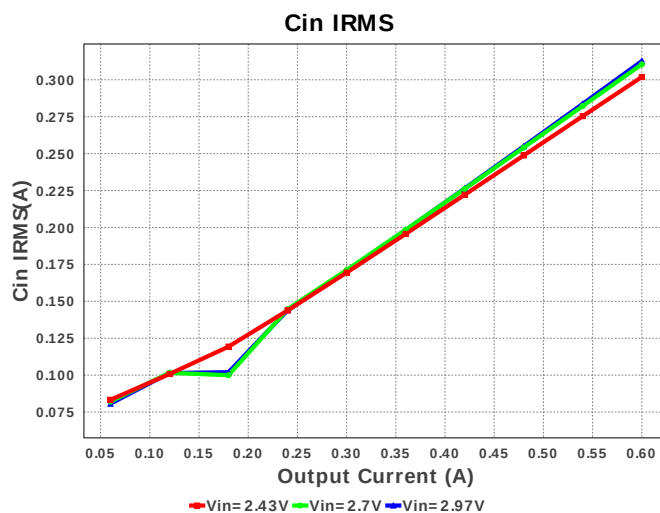
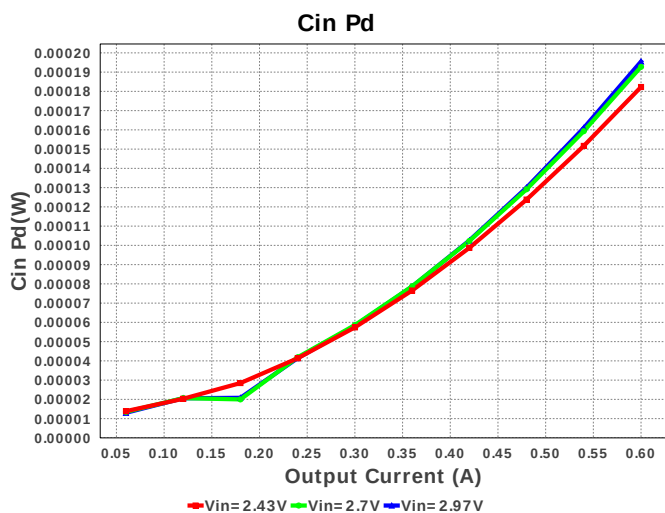
Design : 4790845/54 TPS62080DSGR
TPS62080DSGR 2.43V-2.97V to 1.50V @ 0.6A

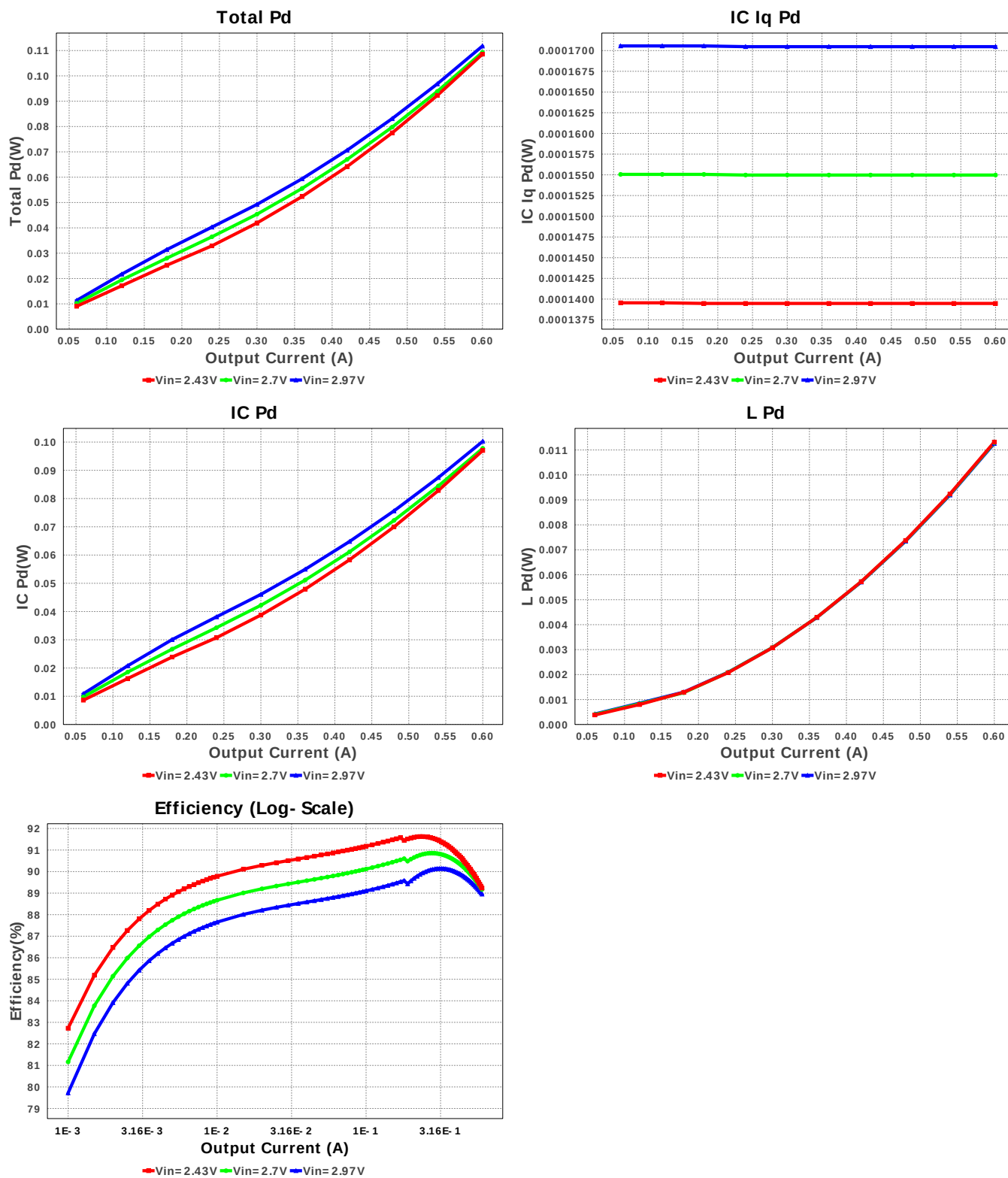


Electrical BOM

#	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	Yageo America	RC0603FR-0791KL Series= ?	Res= 91.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 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	TPS62080DSGR	Switcher	1	\$0.67	S-PWSON-N8 10 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	312.646 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	124.209 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	340.66 mA	Current	Average input current
4.	L Ipp	430.27 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	48.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	1.661 MHz	General	Switching frequency
8.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
9.	Mode	CCM	General	Conduction Mode
10.	Pout	900.0 mW	General	Total output power
11.	Total BOM	\$1.14	General	Total BOM Cost

#	Name	Value	Category	Description
12.	Vout Actual	1.495 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	1.5 V	Op_Point	Operational Output Voltage
14.	Duty Cycle	54.053 %	Op_point	Duty cycle
15.	Efficiency	88.953 %	Op_point	Steady state efficiency
16.	IC Tj	36.527 degC	Op_point	IC junction temperature
17.	ICThetaJA	65.1 degC/W	Op_point	IC junction-to-ambient thermal resistance
18.	IOUT_OP	600.0 mA	Op_point	Iout operating point
19.	VIN_OP	2.97 V	Op_point	Vin operating point
20.	Vout p-p	1.599 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	195.496 μ W	Power	Input capacitor power dissipation
22.	Cout Pd	30.856 μ W	Power	Output capacitor power dissipation
23.	IC Iq Pd	170.472 μ W	Power	IC Iq Pd
24.	IC Pd	100.26 mW	Power	IC power dissipation
25.	L Pd	11.263 mW	Power	Inductor power dissipation
26.	Total Pd	111.769 mW	Power	Total Power Dissipation
27.	Vout Tolerance	7.046 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	600.0 m	Maximum Output Current
2.	SoftStart	1.0 ms	Soft Start Time (ms)
3.	VinMax	2.97	Maximum input voltage
4.	VinMin	2.43	Minimum input voltage
5.	Vout	1.5	Output Voltage
6.	base_pn	TPS62080	Texas Instruments Base Part Number
7.	source	DC	Input Source Type
8.	ta	30.0	Ambient temperature

Design Assistance

1. TPS62080 Product Folder : <http://www.ti.com/product/TPS62080> : contains the data sheet and other resources.

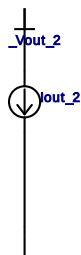
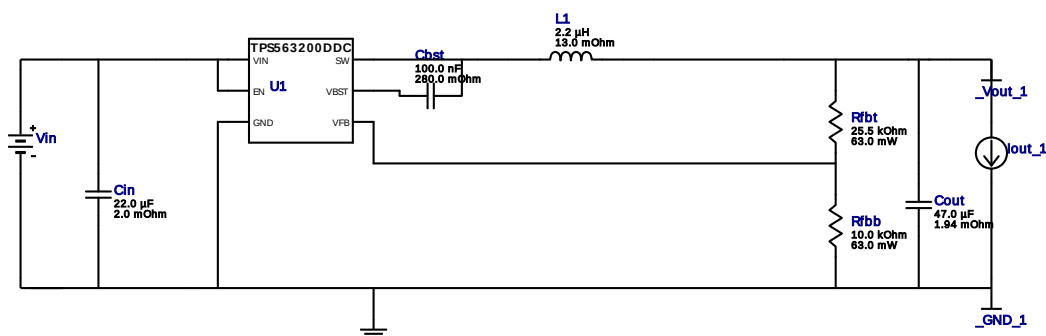


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Iout = 0.74A

Device = TPS563200DDCR
Topology = Buck
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BOM Cost = \$1.06
BOM Count = 7
Total Pd = 0.22W

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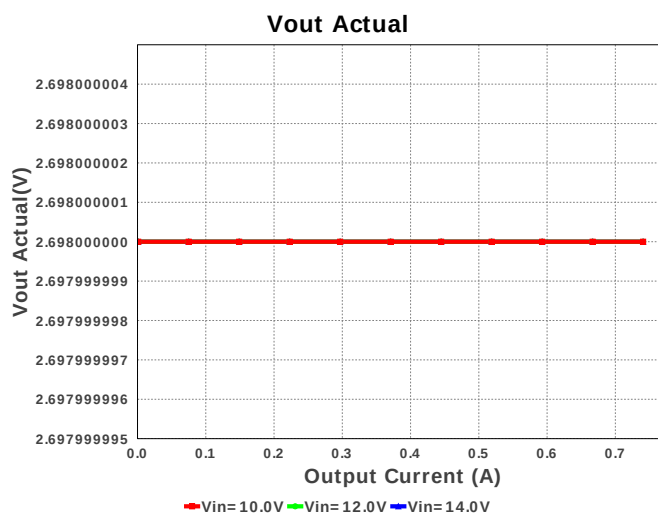
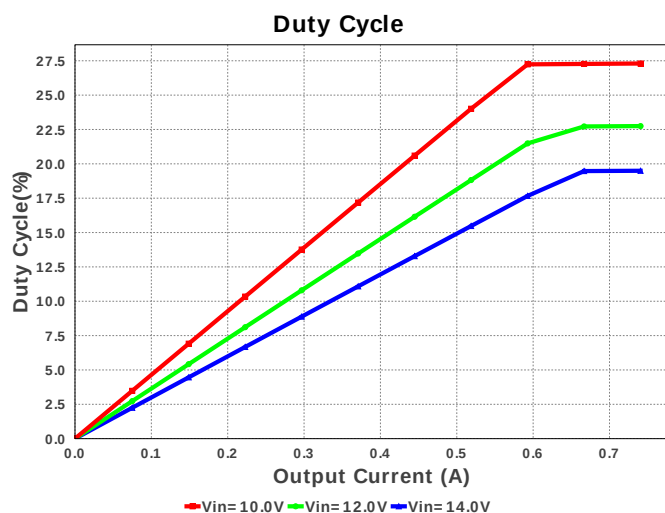
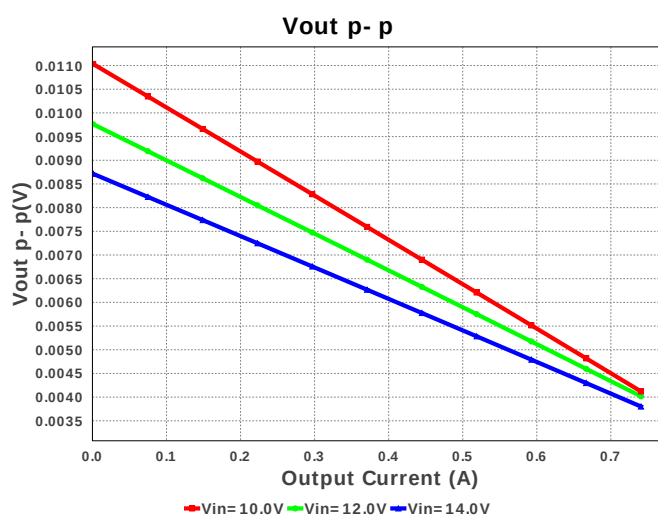
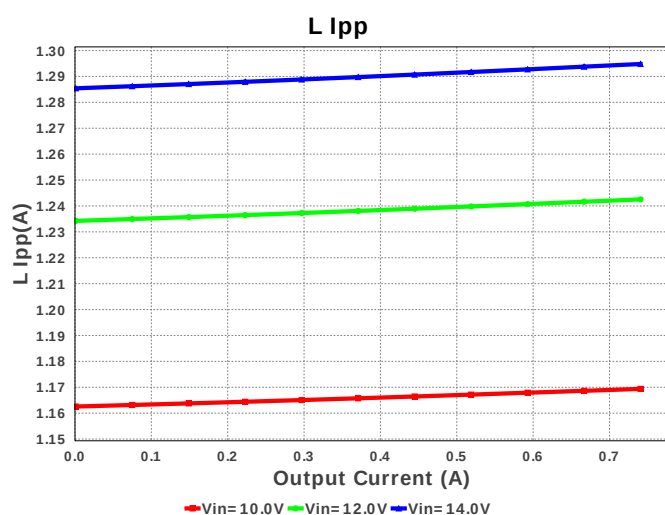
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TPS563200DDCR 10.0V-14.0V to 2.70V @ 0.74066A

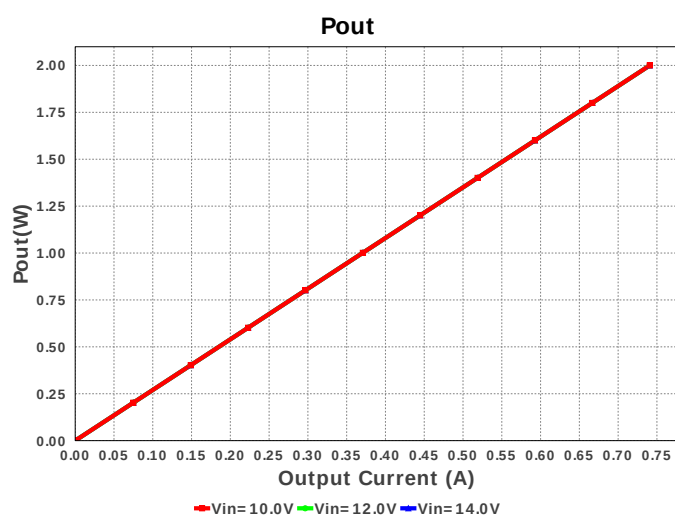
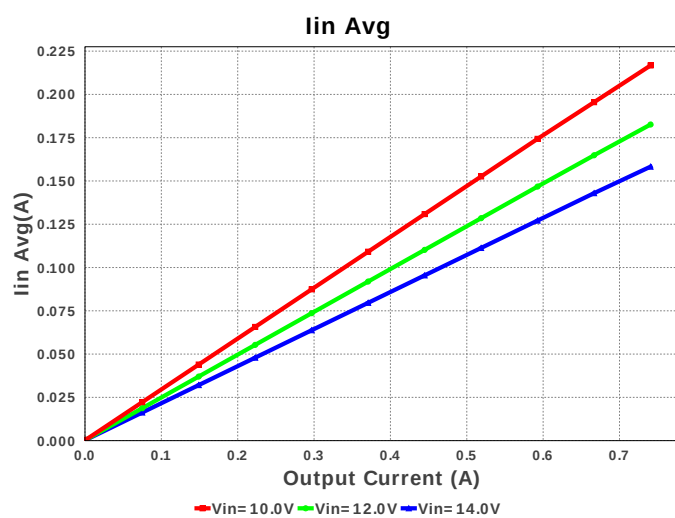
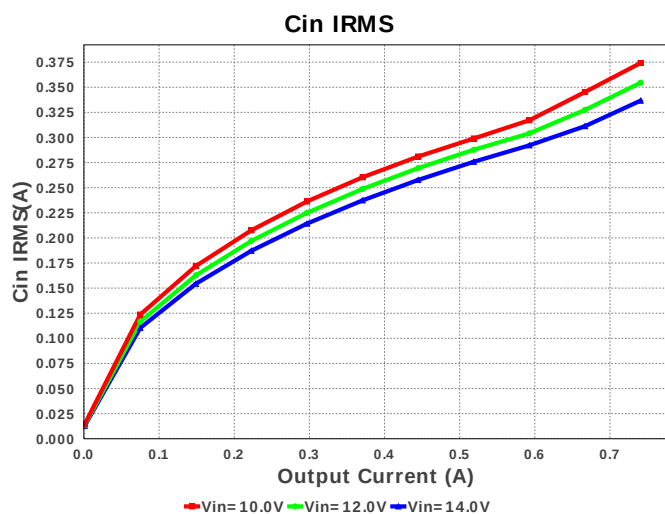
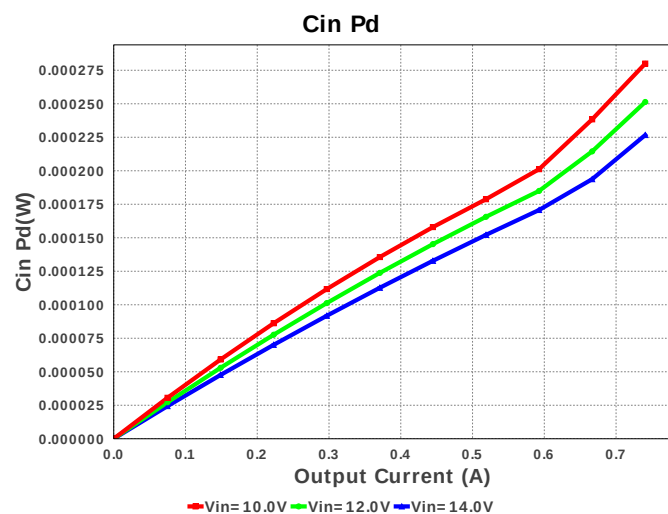
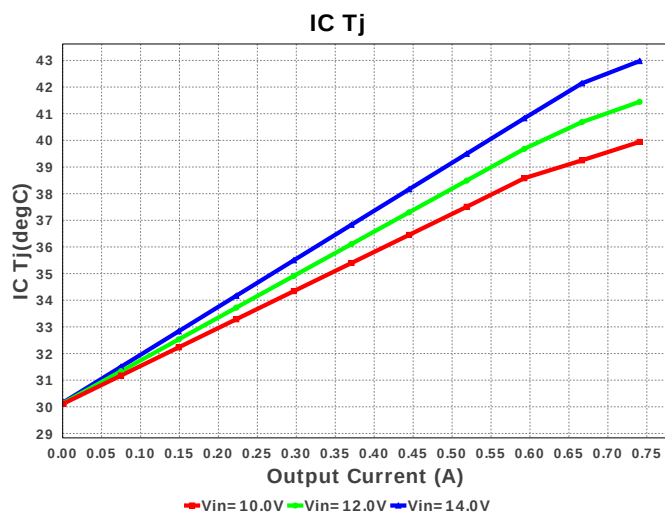
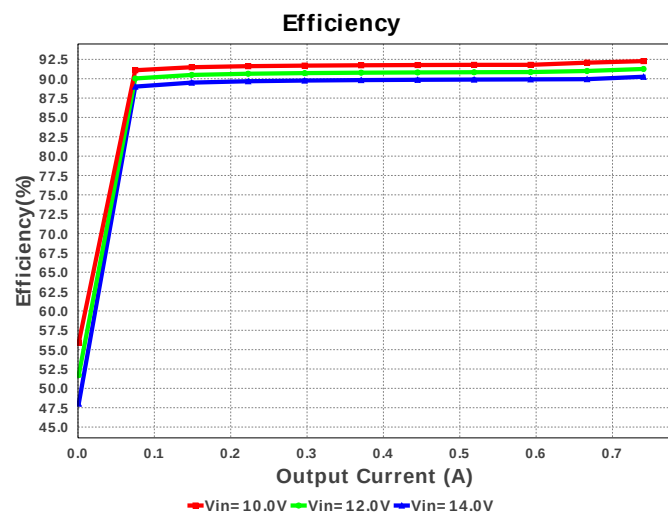


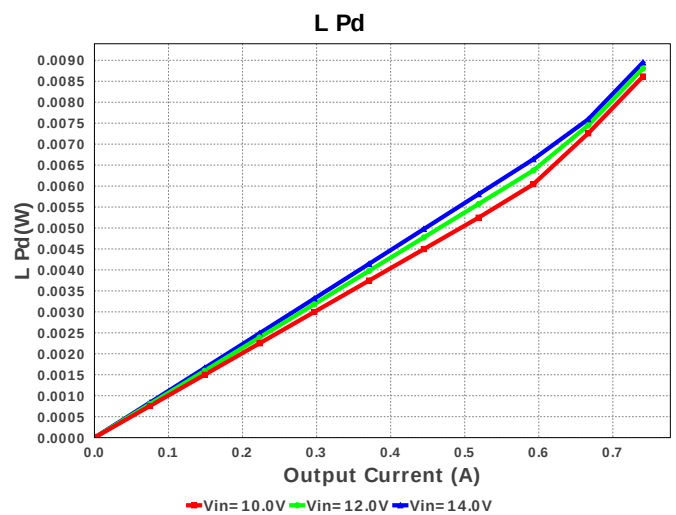
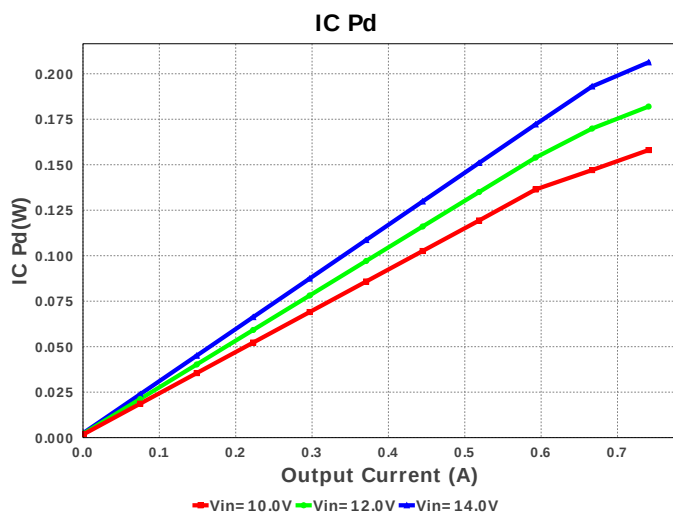
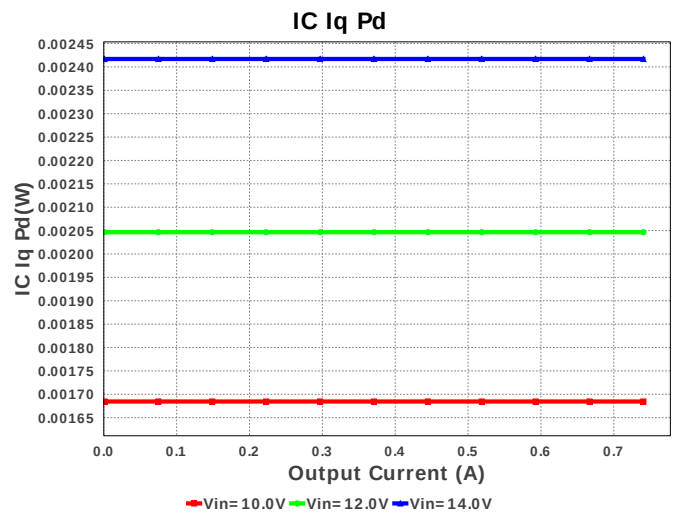
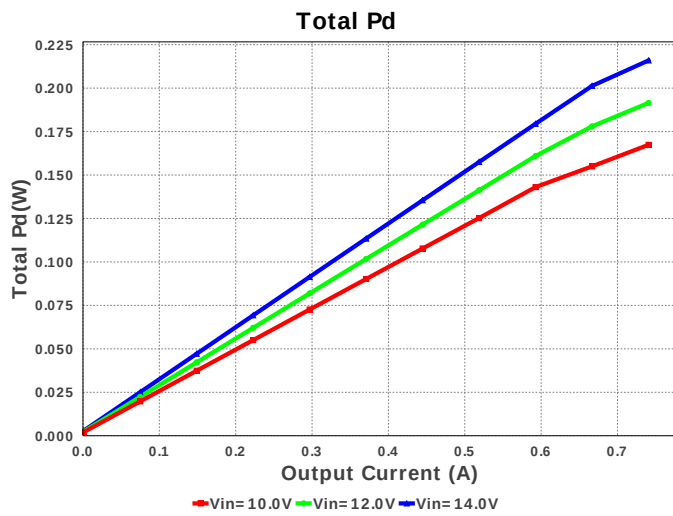
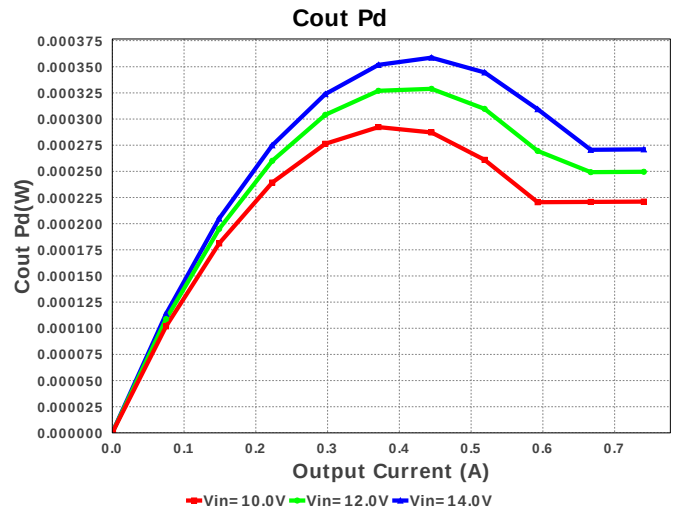
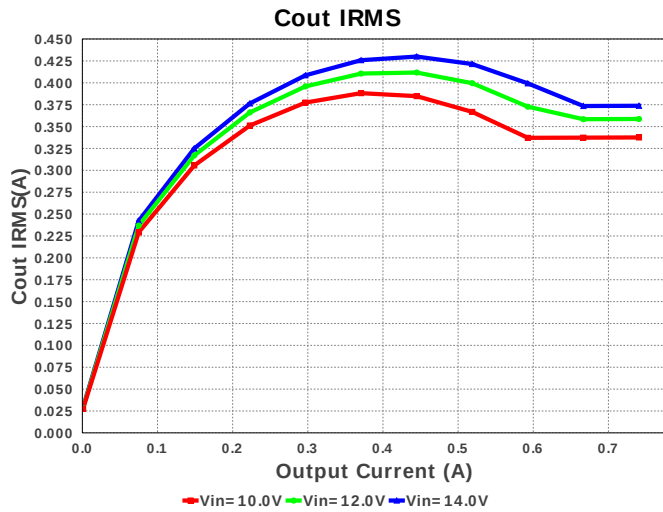
Electrical BOM

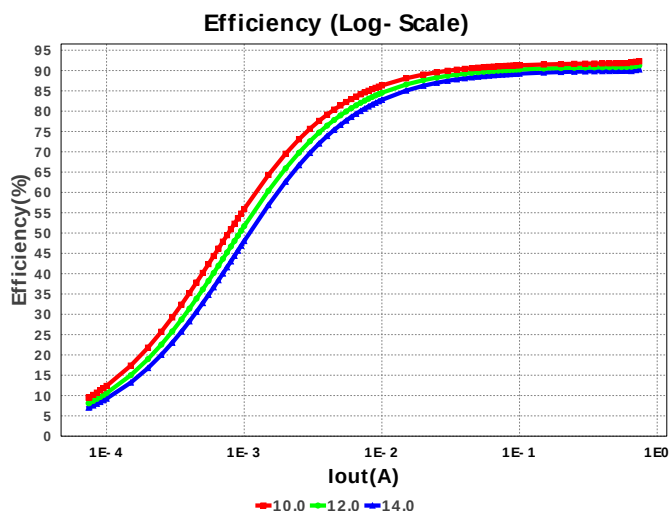
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm²
2.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	\$0.16	 1210 15 mm²
3.	Cout	TDK	C3216X6S0G476M Series= X6S	Cap= 47.0 uF ESR= 1.94 mOhm VDC= 4.0 V IRMS= 0.0 A	1	\$0.13	 1206 11 mm²
4.	L1	Bourns	SRN8040-2R2Y	L= 2.2 uH DCR= 13.0 mOhm	1	\$0.22	 SRN8040 100 mm²
5.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW...e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
6.	Rfbb	Vishay-Dale	CRCW040225K5FKED Series= CRCW...e3	Res= 25.5 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	TPS563200DDCR	Switcher	1	\$0.52	 DDC0006A 10 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	336.651 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	373.777 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	158.27 mA	Current	Average input current
4.	L Ipp	1.295 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	149.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	770.346 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	2.0 W	General	Total output power
10.	Total BOM	\$1.06	General	Total BOM Cost
11.	Vout Actual	2.698 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
12.	Vout OP	2.7 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	19.495 %	Op_point	Duty cycle
14.	Efficiency	90.255 %	Op_point	Steady state efficiency
15.	IC Tj	42.975 degC	Op_point	IC junction temperature
16.	ICThetaJA	62.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	740.66 mA	Op_point	Iout operating point
18.	VIN_OP	14.0 V	Op_point	Vin operating point
19.	Vout p-p	6.137 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	226.668 μW	Power	Input capacitor power dissipation
21.	Cout Pd	271.036 μW	Power	Output capacitor power dissipation
22.	IC Iq Pd	2.417 mW	Power	IC Iq Pd
23.	IC Pd	206.279 mW	Power	IC power dissipation
24.	L Pd	8.948 mW	Power	Inductor power dissipation
25.	Total Pd	215.928 mW	Power	Total Power Dissipation
26.	Vout Tolerance	2.786 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	740.66 m	Maximum Output Current
2.	SoftStart	1.0 ms	Soft Start Time (ms)
3.	VinMax	14.0	Maximum input voltage
4.	VinMin	10.0	Minimum input voltage
5.	Vout	2.7	Output Voltage
6.	base_pn	TPS563200	Texas Instruments Base Part Number
7.	source	DC	Input Source Type
8.	ta	30.0	Ambient temperature

Design Assistance

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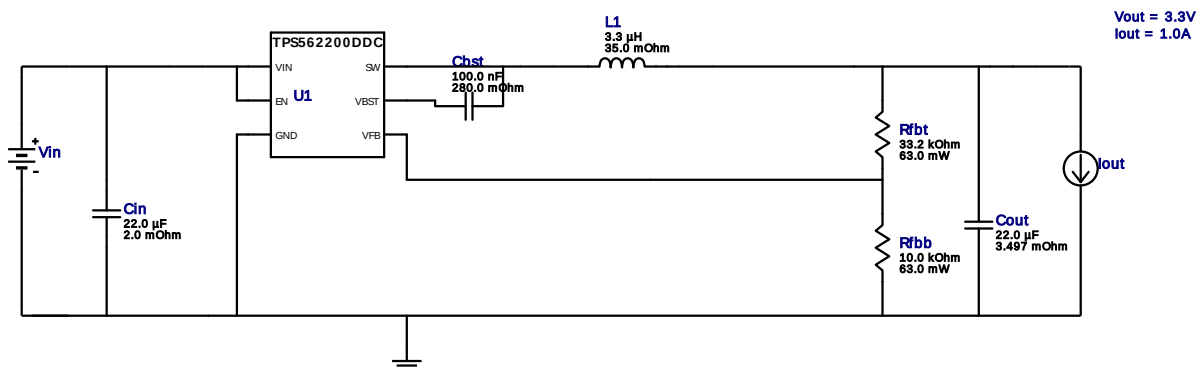


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Iout = 1.0A

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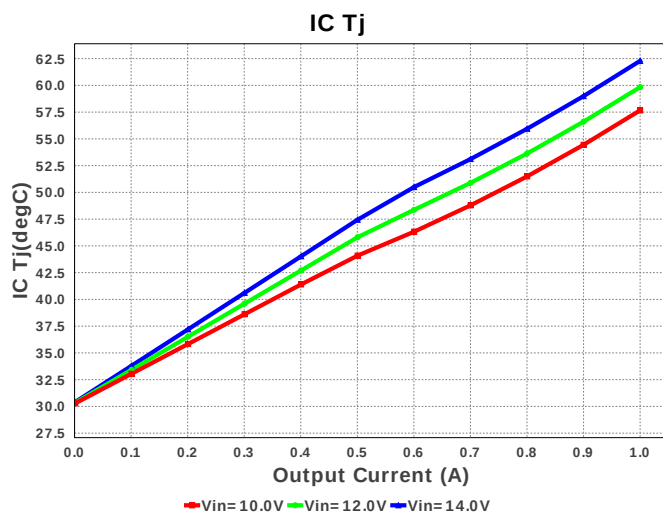
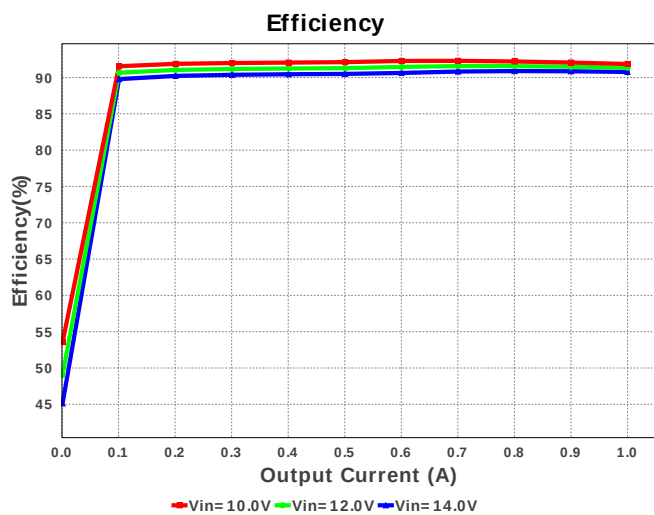
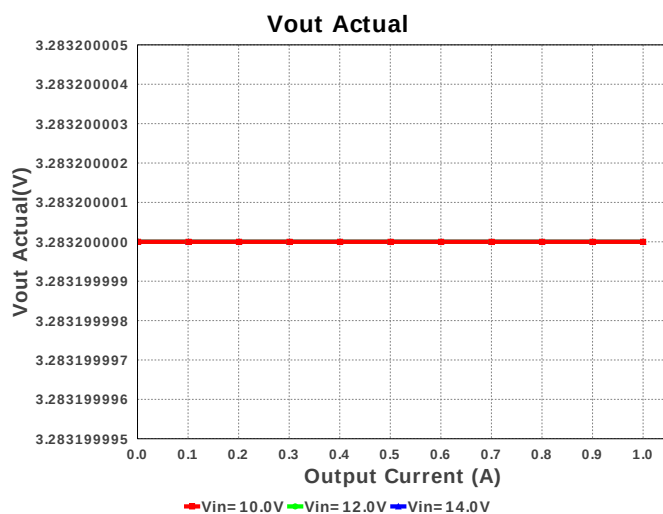
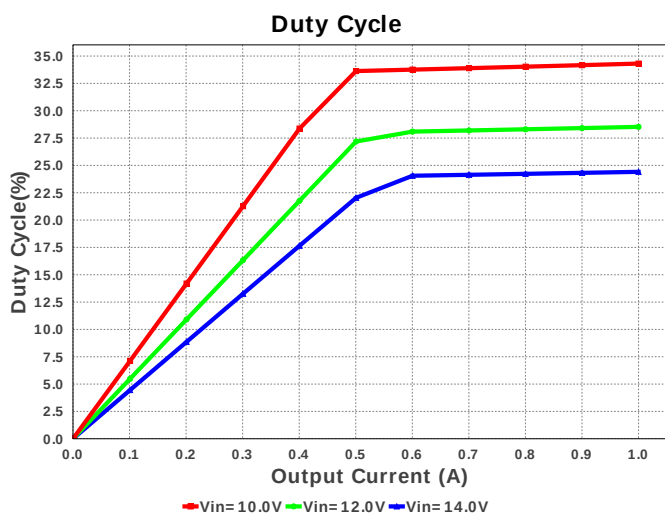
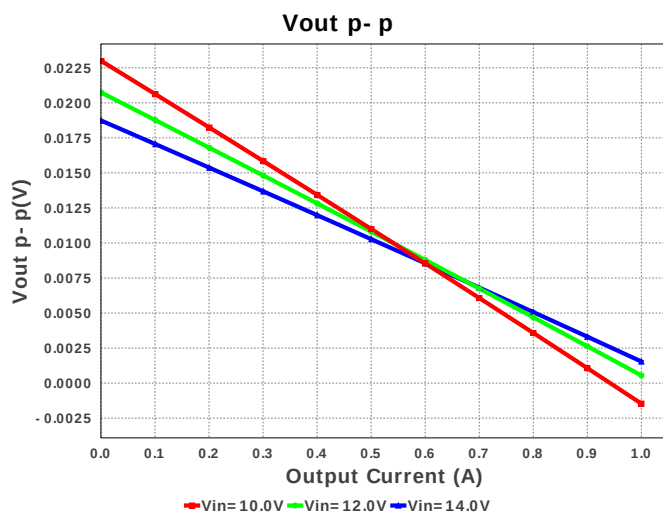
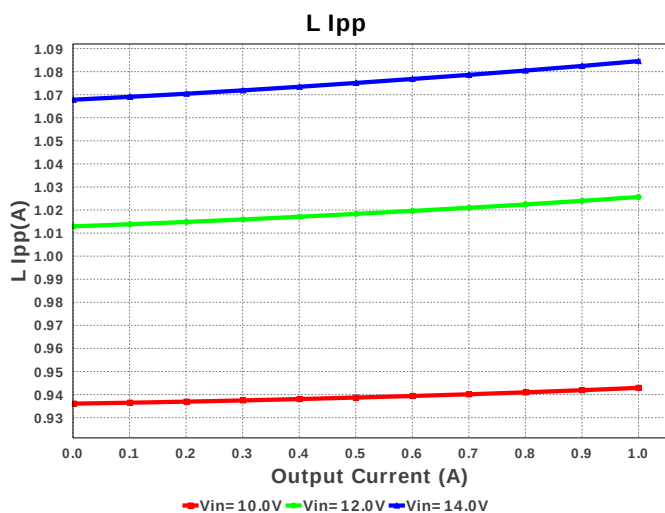
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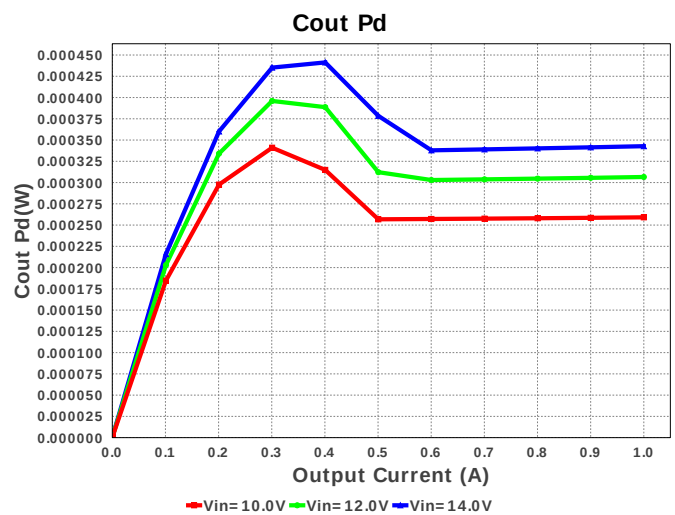
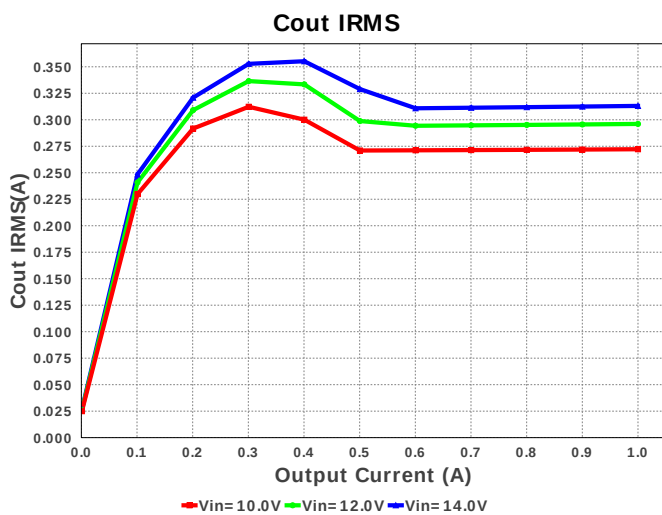
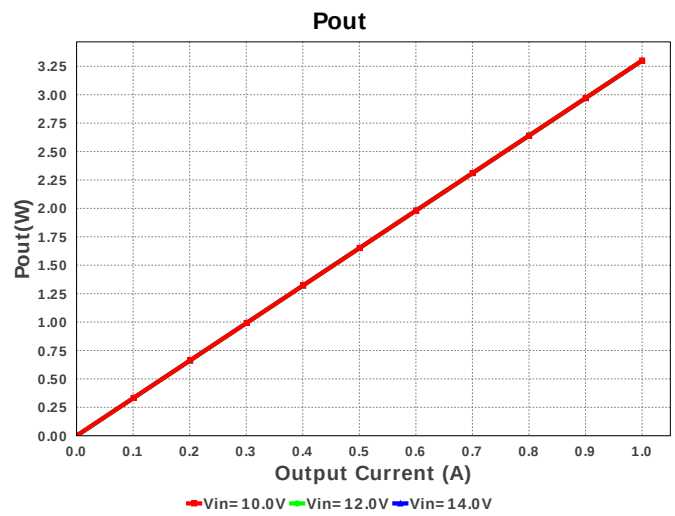
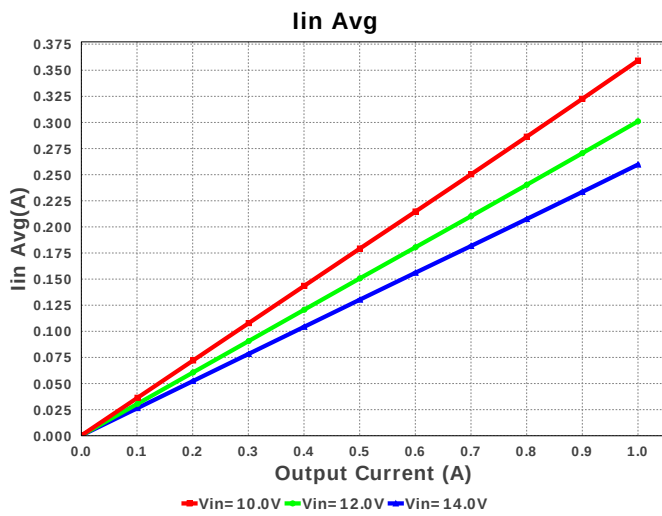
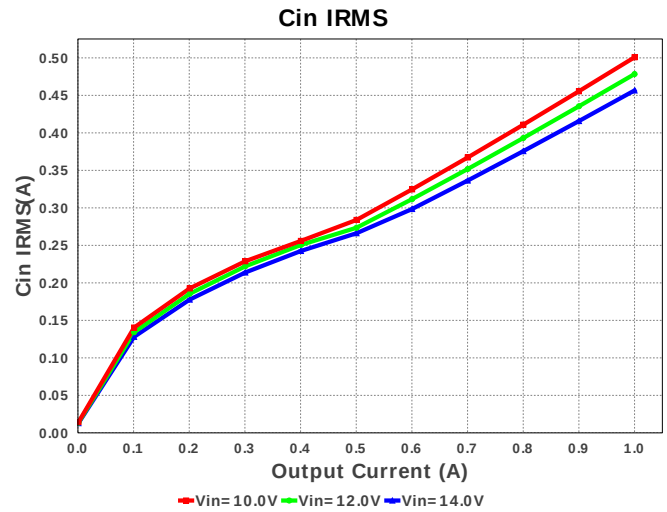
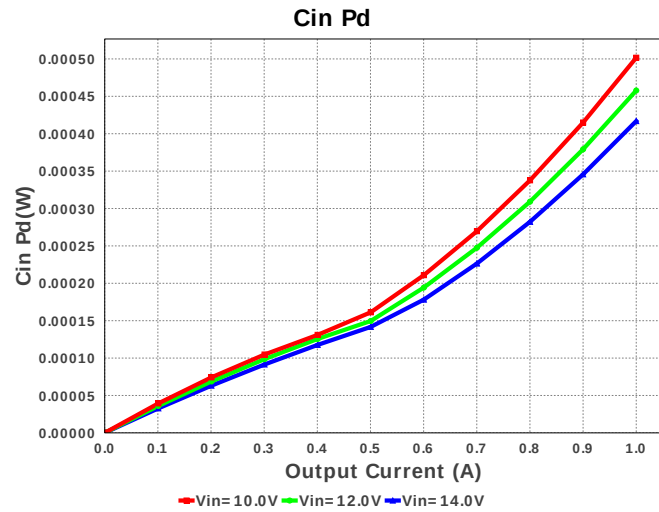
Design : 4790845/56 TPS562200DDCR
TPS562200DDCR 10.0V-14.0V to 3.30V @ 1.0A

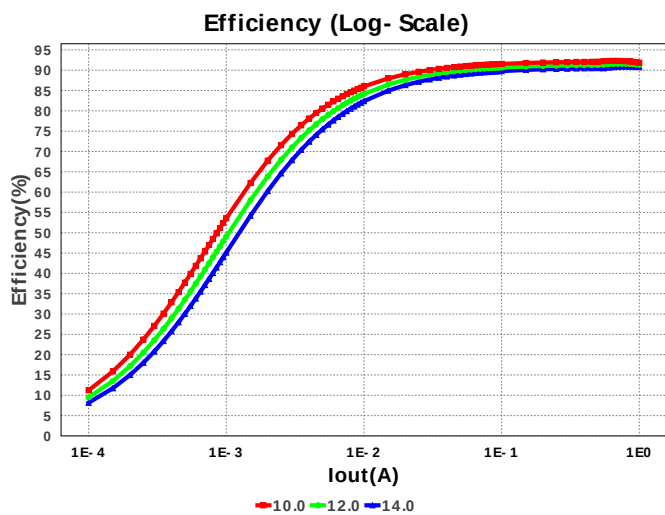
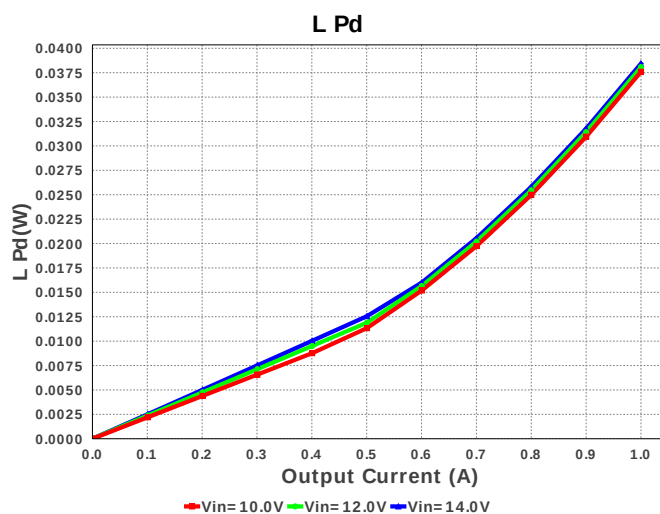
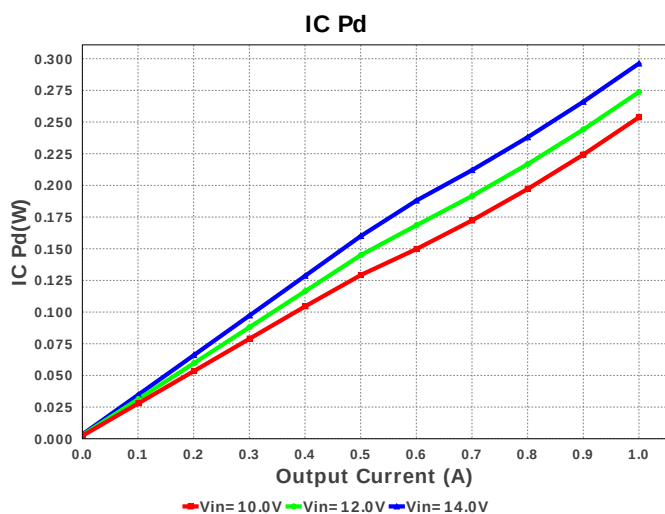
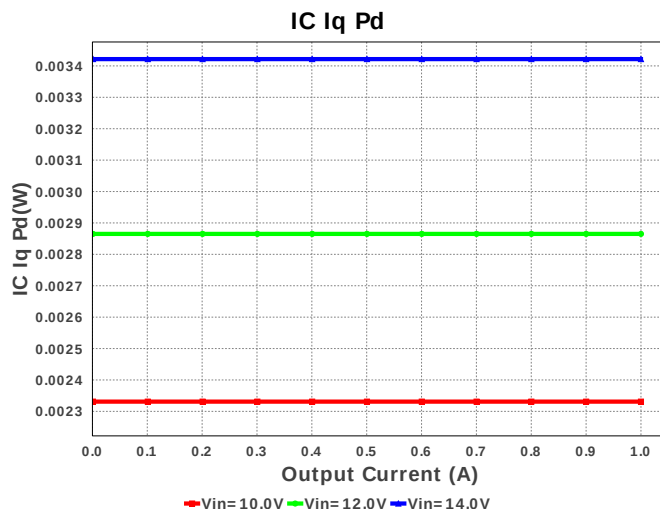
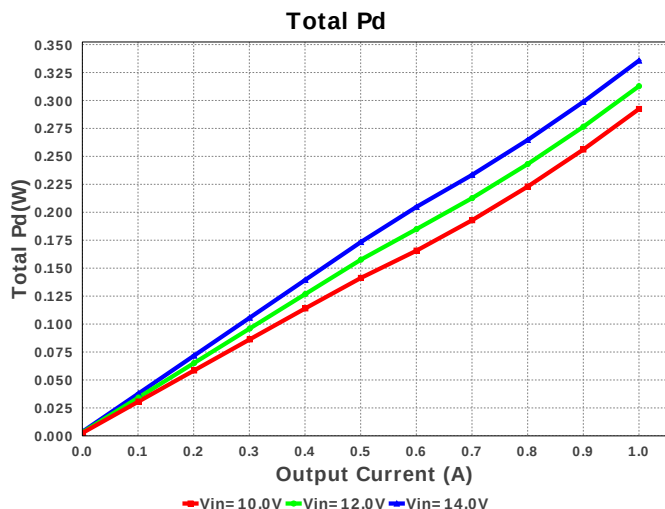


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	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 mm ²
3.	Cout	MuRata	GRM31CR60J226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.497 mOhm VDC= 6.3 V IRMS= 3.40445 A	1	\$0.08	1206_190 11 mm ²
4.	L1	Bourns	SRR4028-3R3Y	L= 3.3 uH DCR= 35.0 mOhm	1	\$0.26	SRR4028 34 mm ²
5.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
6.	Rfht	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
7.	U1	Texas Instruments	TPS562200DDCR	Switcher	1	\$0.47	DDC0006A 10 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	456.564 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	313.083 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	259.69 mA	Current	Average input current
4.	L Ipp	1.085 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	82.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	713.963 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	3.3 W	General	Total output power
10.	Total BOM	\$1.0	General	Total BOM Cost
11.	Vout Actual	3.283 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors

#	Name	Value	Category	Description
12.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	24.411 %	Op_point	Duty cycle
14.	Efficiency	90.767 %	Op_point	Steady state efficiency
15.	IC Tj	62.29 degC	Op_point	IC junction temperature
16.	ICThetaJA	109.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	1.0 A	Op_point	Iout operating point
18.	VIN_OP	14.0 V	Op_point	Vin operating point
19.	Vout p-p	10.602 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	416.902 μ W	Power	Input capacitor power dissipation
21.	Cout Pd	342.78 μ W	Power	Output capacitor power dissipation
22.	IC Iq Pd	3.422 mW	Power	IC Iq Pd
23.	IC Pd	296.241 mW	Power	IC power dissipation
24.	L Pd	38.431 mW	Power	Inductor power dissipation
25.	Total Pd	335.68 mW	Power	Total Power Dissipation
26.	Vout Tolerance	2.889 %		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.	SoftStart	1.0 ms	Soft Start Time (ms)
3.	VinMax	14.0	Maximum input voltage
4.	VinMin	10.0	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	base_pn	TPS562200	Texas Instruments Base Part Number
7.	source	DC	Input Source Type
8.	ta	30.0	Ambient temperature

Design Assistance

1. [TPS562200 Product Folder](http://www.ti.com/product/TPS562200) : <http://www.ti.com/product/TPS562200> : contains the data sheet and other resources.

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