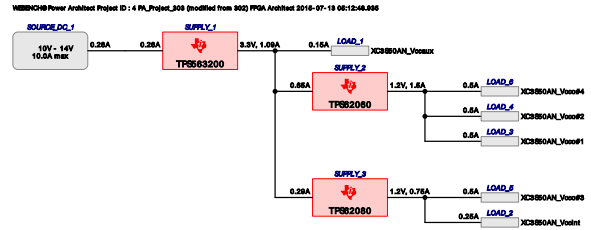


WEBENCH® Power Architect



Project Report

Project : 4425714/4 : PA_Project_303 (modified from 302)
 Created : 2015-07-13 05:12:48.935
 Optimize project optFactor=3

Project Summary

1. Total System Efficiency	75.751 %
2. Total System BOM Count	21.0
3. Total System Footprint	286.0 mm ²
4. Total System BOM Cost	\$3.44
5. Total System Power Dissipation	1.023 W

--> Launch WEBENCH Power Architect.

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	3.3 V	1.09 A	92.1%	149	\$1.05	21	14
2.	SUPPLY_2	TPS62060	Switcher : 3MHz, 1.6A, Buck Converter with Enable pin	1.2 V	1.5 A	76.5%	93	\$1.01	19	4
3.	SUPPLY_3	TPS62080	Switcher : 1.2A High Efficient Step Down Converter in 2x2mm QFN Package	1.2 V	0.75 A	84.9%	44	\$1.38	20	9

Power Loads

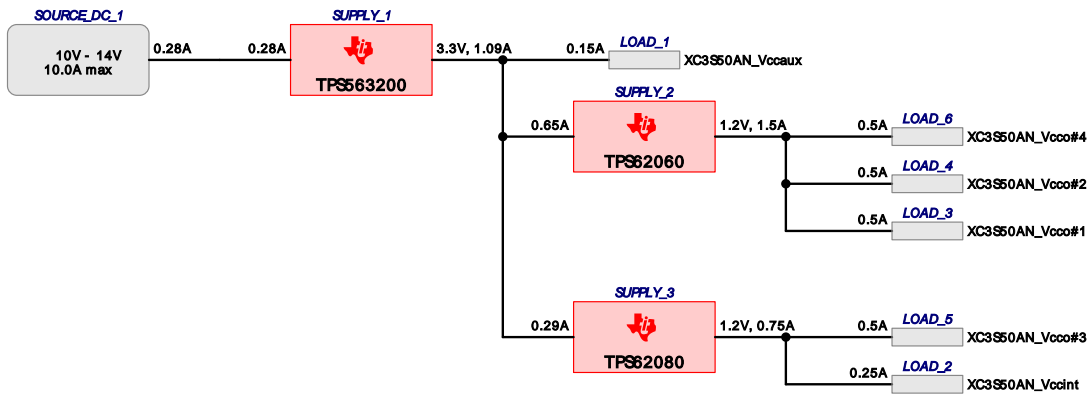
#	Name	VLoad	Iload	Description
1.	XC3S50AN_Vccaux	3.3 V	0.15 A	VoutRipple=18%, SoftStart delay=1.0 mSec
2.	XC3S50AN_Vcco#4	1.2 V	0.5 A	VoutRipple=11%
3.	XC3S50AN_Vcco#2	1.2 V	0.5 A	VoutRipple=11%
4.	XC3S50AN_Vcco#1	1.2 V	0.5 A	VoutRipple=11%
5.	XC3S50AN_Vcco#3	1.2 V	0.5 A	VoutRipple=11%, SoftStart delay=1.0 mSec
6.	XC3S50AN_Vccint	1.2 V	0.25 A	VoutRipple=10%, SoftStart delay=1.0 mSec

FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Xilinx	XC3S50AN	FPGA_1	Spartan-3AN	FPGA Xilinx Spartan-3AN XC3S50AN http://www.xilinx.com/support/documentation/data_sheets/ds557.pdf

Project Diagram

WEBENCH® Power Architect Project ID : 4 PA_Project_303 (modified from 302) FPGA Architect 2015-07-13 05:12:48.935



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
AVX	08053C104KAT2A	0805	1	\$0.01	7
Kemet	C0805C680K5GACTU	0805	1	\$0.01	7
Samsung Electro-Mechanics	CL10A106MQ8NNNC	0603	1	\$0.02	5
Vishay-Dale	CRCW0402100KFKED	0402	2	\$0.01	6
Vishay-Dale	CRCW040210K0FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402178KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040233K2FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040239K2FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040264K9FKED	0402	1	\$0.01	3
MuRata	GRM188R60J475ME19D	0603	1	\$0.02	5
MuRata	GRM219R60J106KE19D	0805	1	\$0.02	7
MuRata	GRM31CR60J476ME19L	1206	1	\$0.12	11
MuRata	GRM32ER61E226KE15L	1210	1	\$0.16	15
Taiyo Yuden	JMK212BJ226KG-T	0805	1	\$0.13	7
Bourns	SRN3015-1R0Y	SRN3015	1	\$0.14	16
Bourns	SRN8040-2R2Y	SRN8040	1	\$0.22	100
Texas Instruments	TPS563200DDCR	DDC0006A	1	\$0.52	10
Texas Instruments	TPS62060DSGR	DSG0008A	1	\$0.80	55
Texas Instruments	TPS62080DSGR	S- PWSON- N8	1	\$0.75	10
TDK	VLF252015MT-1R0N	VLF252015MT	1	\$0.45	12
Total			21	\$3.44	288

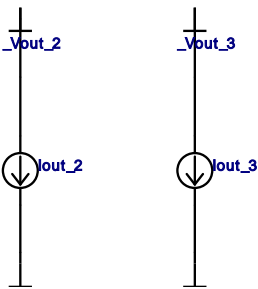
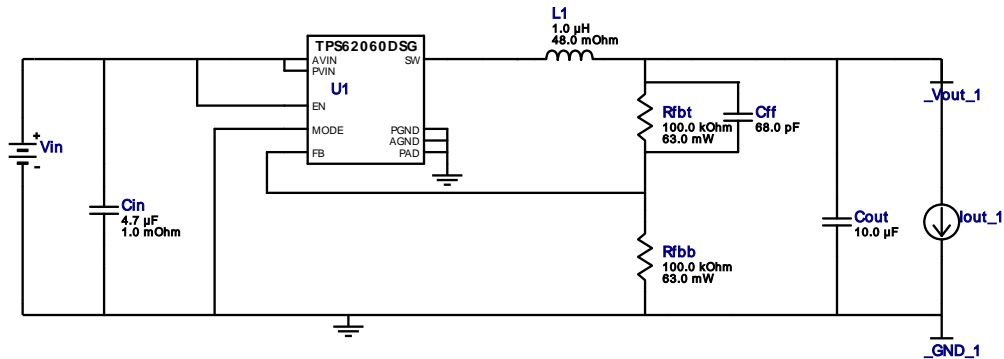


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 VinMax = 3.63V
 Vout = 1.2V
 Iout = 1.5A

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 Topology = Buck
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 BOM Cost = \$1.01
 Footprint = 93.0 mm²
 BOM Count = 7
 Total Pd = 0.55W

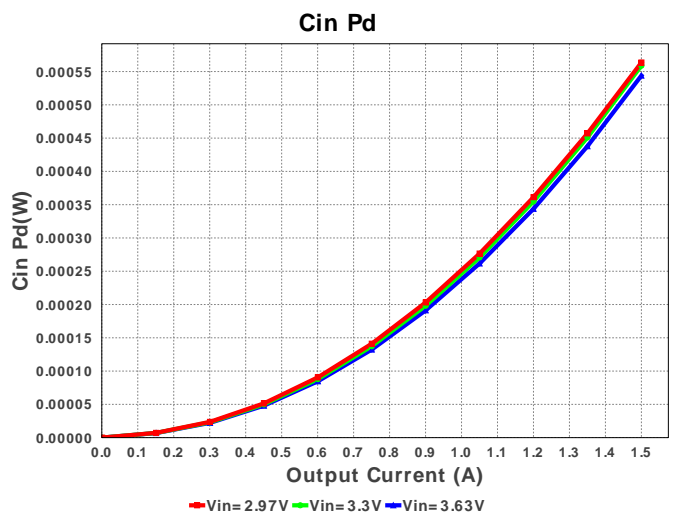
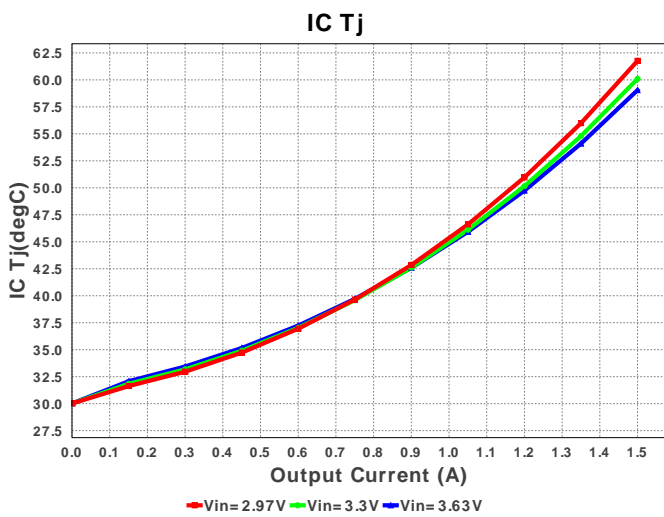
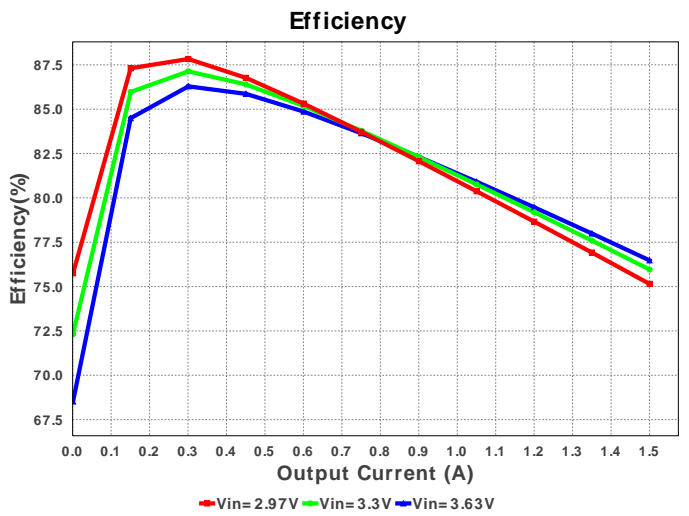
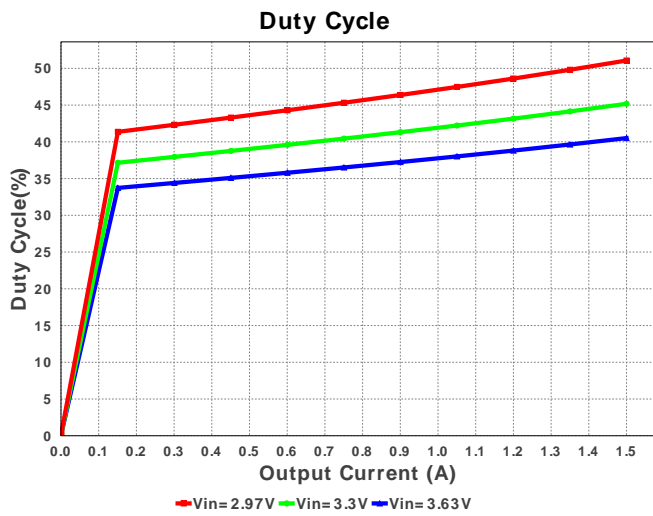
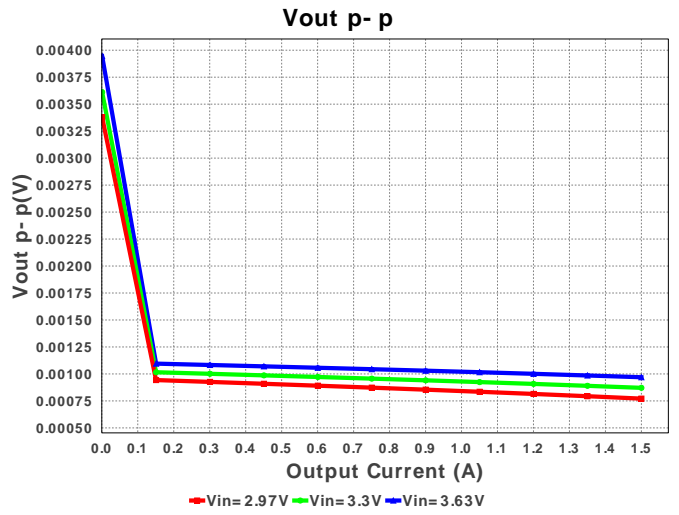
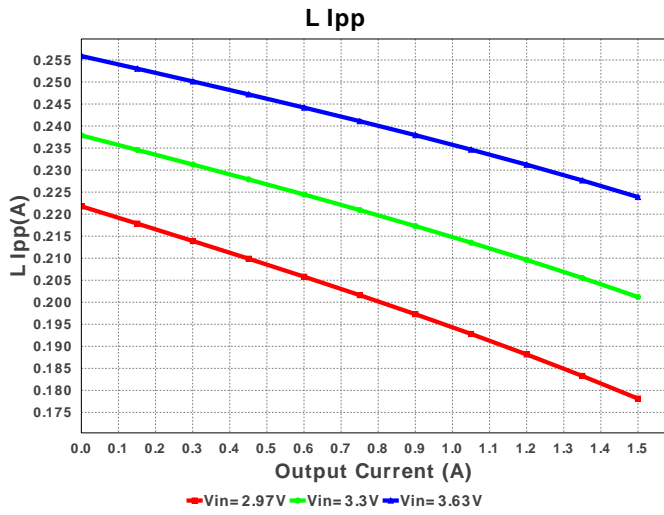
WEBENCH® Design Report

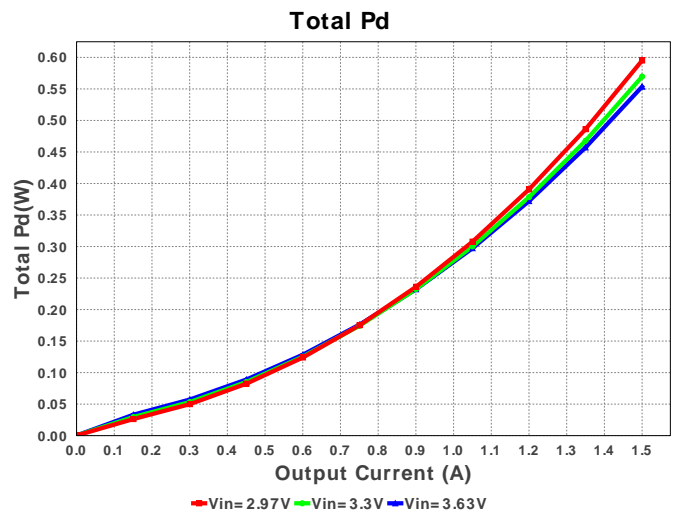
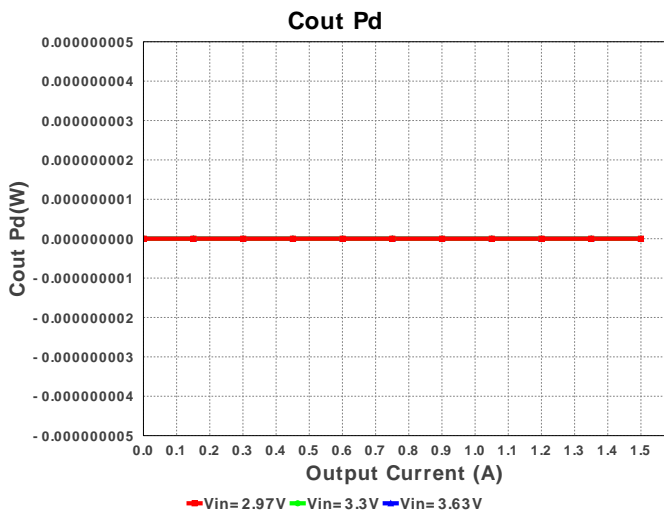
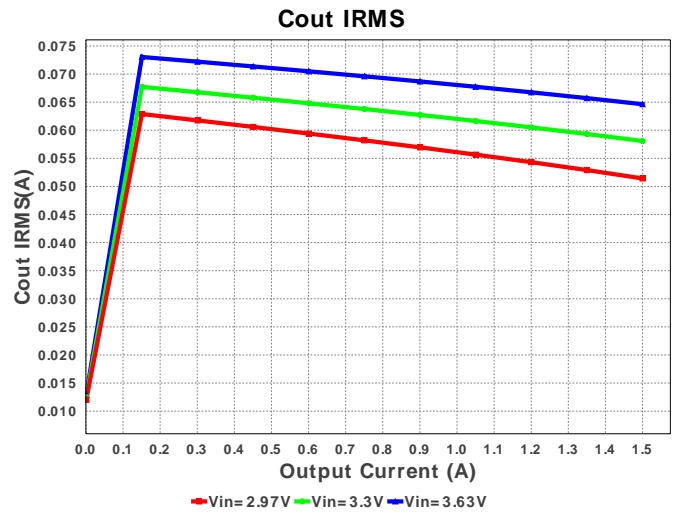
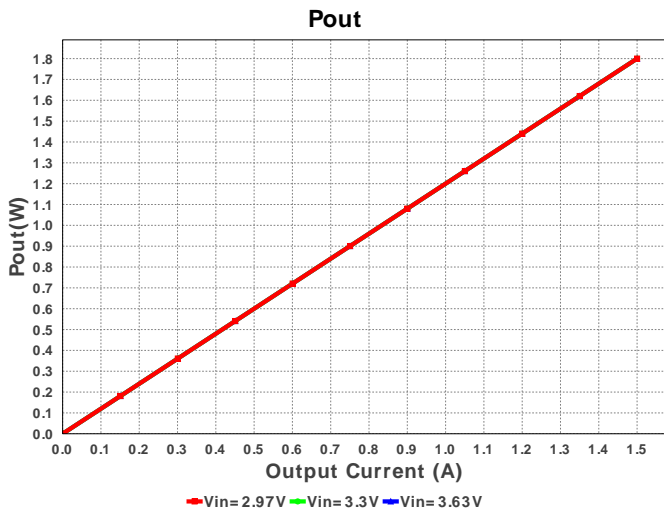
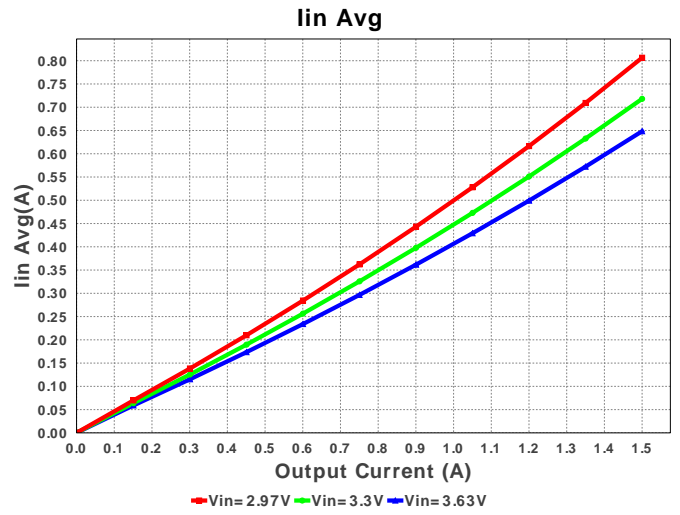
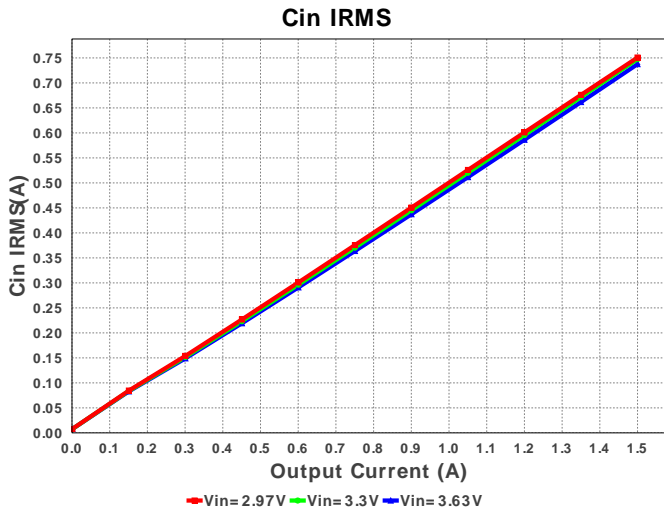
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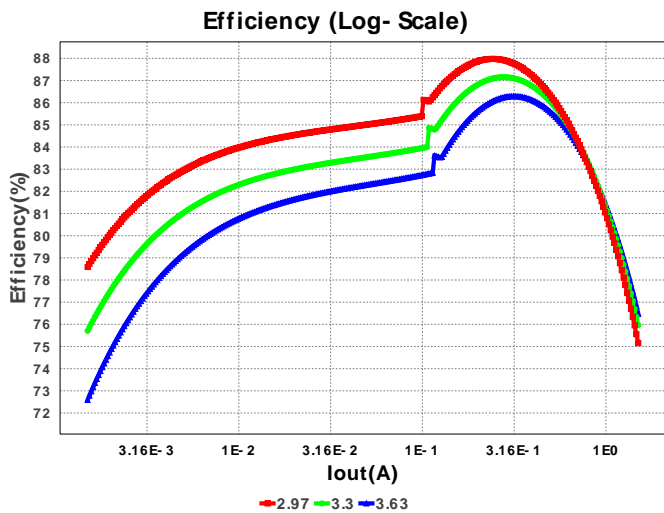
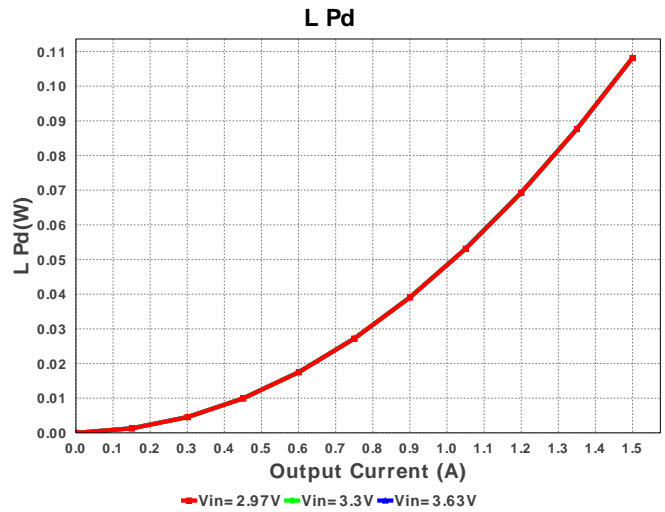
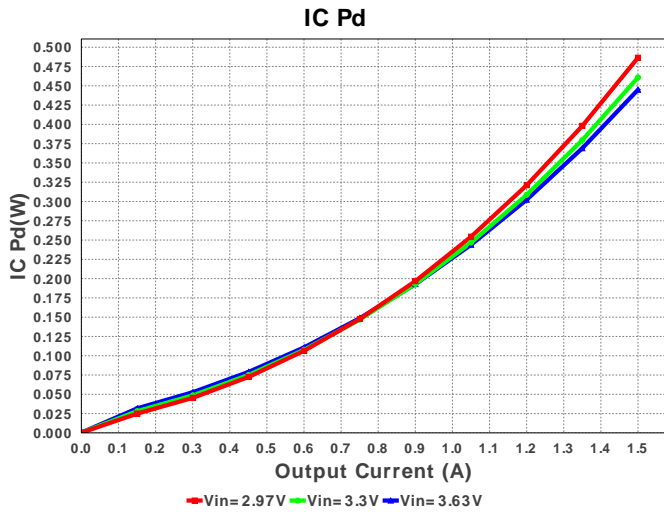


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cff	Kemet	C0805C680K5GACTU Series= C0G/NP0	Cap= 68.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Cin	MuRata	GRM188R60J475ME19D Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.02	0603 5 mm ²
3.	Cout	Samsung Electro-Mechanics	CL10A106MQ8NNNC Series= X5R	Cap= 10.0 uF VDC= 6.3 V IRMS= 0.0 A	1	\$0.02	0603 5 mm ²
4.	L1	Bourns	SRN3015-1R0Y	L= 1.0 µH DCR= 48.0 mOhm	1	\$0.14	SRN3015 16 mm ²
5.	Rfbb	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
6.	Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
7.	U1	Texas Instruments	TPS62060DSGR	Switcher	1	\$0.80	DSG0008A 55 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	737.512 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	64.631 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	648.38 mA	Current	Average input current
4.	L Ipp	223.89 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	93.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	3.0 MHz	General	Switching frequency
8.	Pout	1.8 W	General	Total output power
9.	Total BOM	\$1.01	General	Total BOM Cost
10.	Vout OP	1.2 V	Op_Point	Operational Output Voltage
11.	Duty Cycle	40.509 %	Op_point	Duty cycle
12.	Efficiency	76.478 %	Op_point	Steady state efficiency
13.	IC Tj	59.05 degC	Op_point	IC junction temperature
14.	ICThetaJA	65.3 degC/W	Op_point	IC junction-to-ambient thermal resistance
15.	IOUT_OP	1.5 A	Op_point	Iout operating point
16.	VIN_OP	3.63 V	Op_point	Vin operating point
17.	Vout p-p	932.873 μV	Op_point	Peak-to-peak output ripple voltage
18.	Cin Pd	543.924 μW	Power	Input capacitor power dissipation
19.	Cout Pd	0.0 W	Power	Output capacitor power dissipation
20.	IC Pd	444.875 mW	Power	IC power dissipation
21.	L Pd	108.201 mW	Power	Inductor power dissipation
22.	Total Pd	553.618 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.5	Maximum Output Current
2.	Iout1	1.5	Output Current #1
3.	VinMax	3.63	Maximum input voltage
4.	VinMin	2.97	Minimum input voltage
5.	Vout	1.2	Output Voltage

#	Name	Value	Description
6.	Vout1	1.2	Output Voltage #1
7.	base_pn	TPS62060	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0	Ambient temperature

Design Assistance

1. TPS62060 Product Folder : <http://www.ti.com/product/TPS62060> : contains the data sheet and other resources.

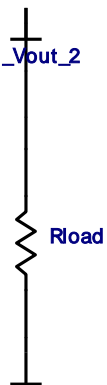
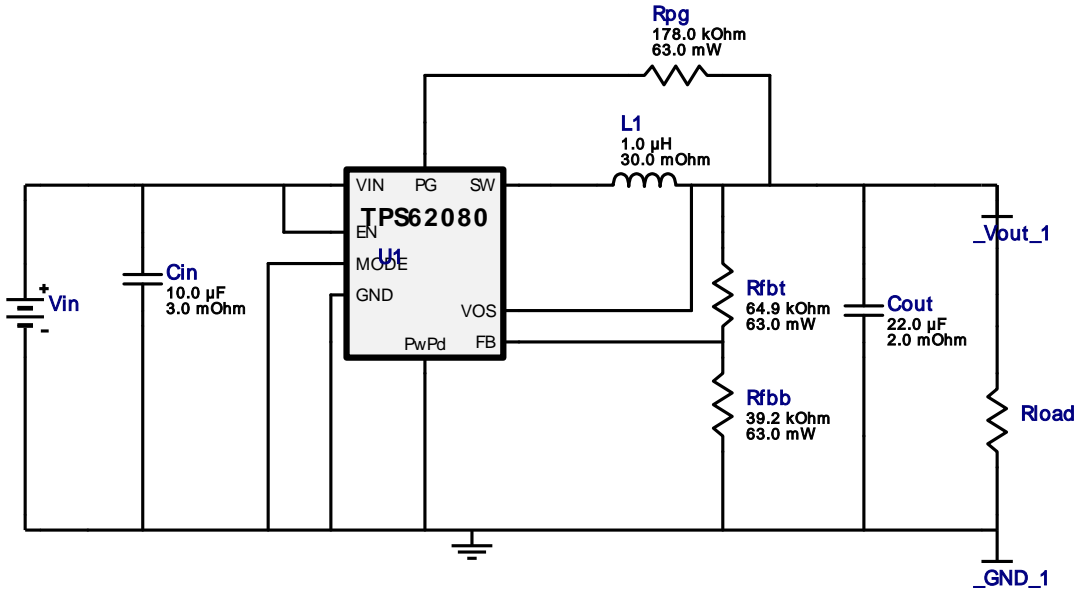


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 Vout = 1.2V
 Iout = 0.75A

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 Topology = Buck
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 Total Pd = 0.16W

WEBENCH® Design Report

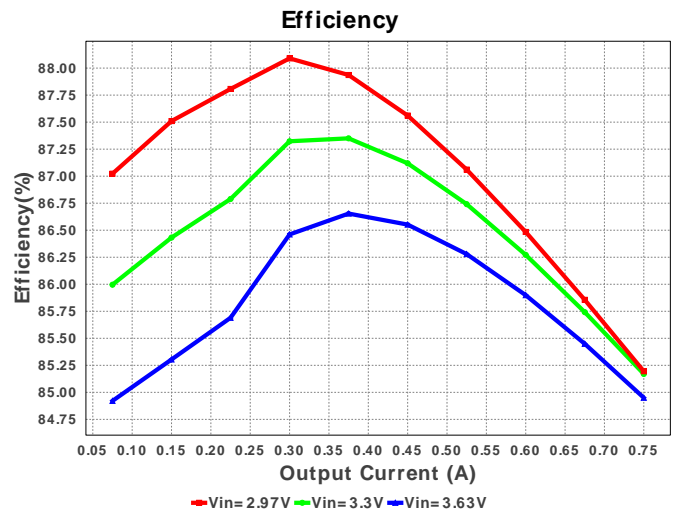
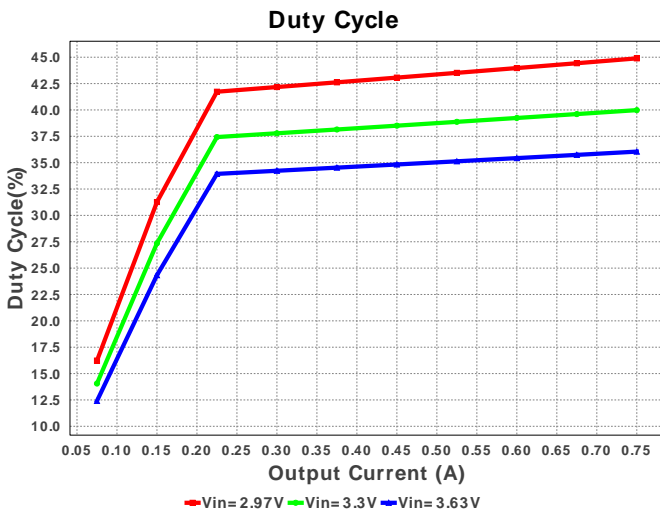
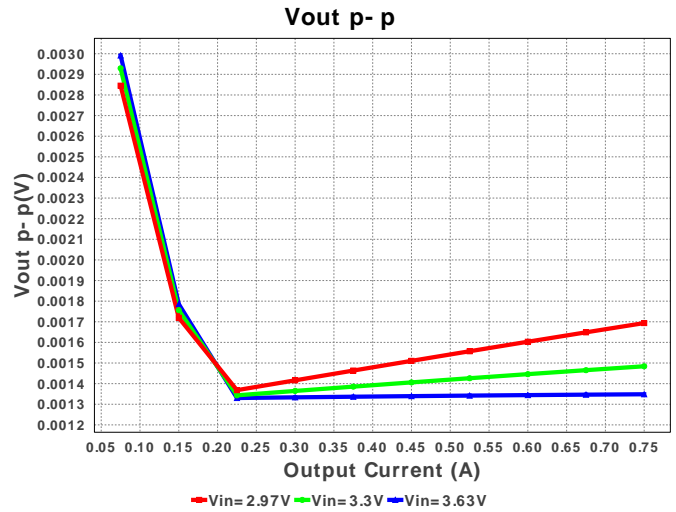
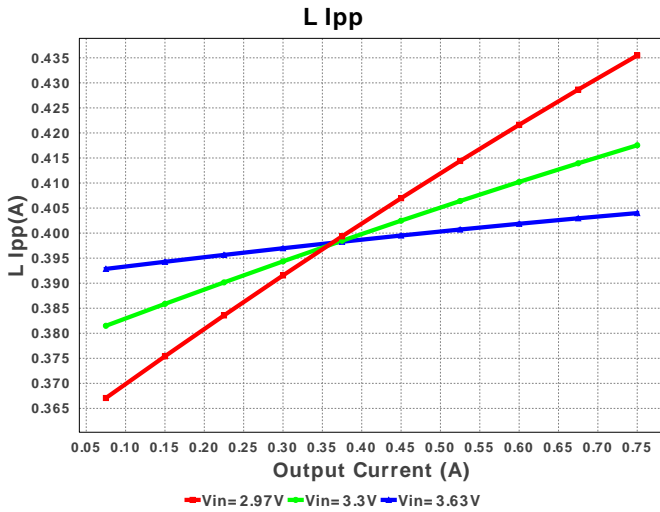
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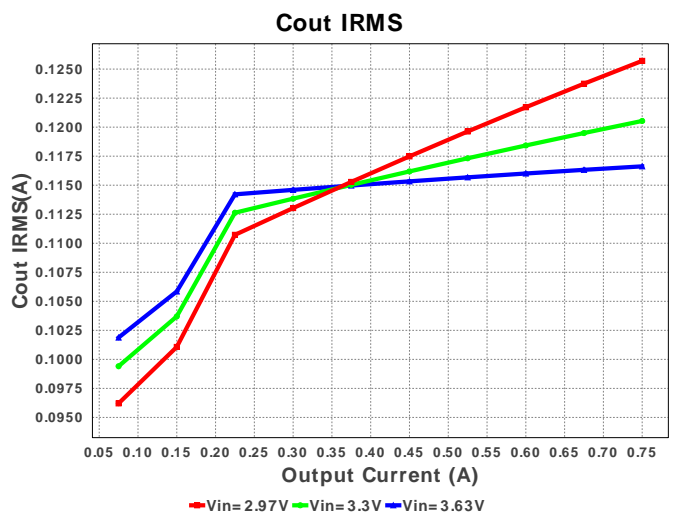
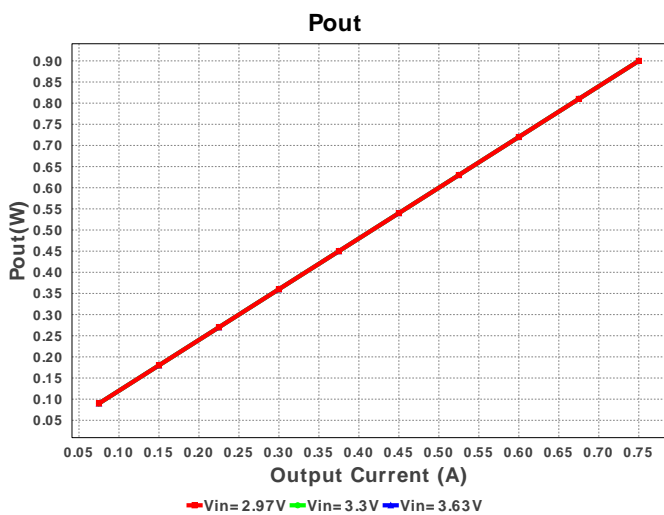
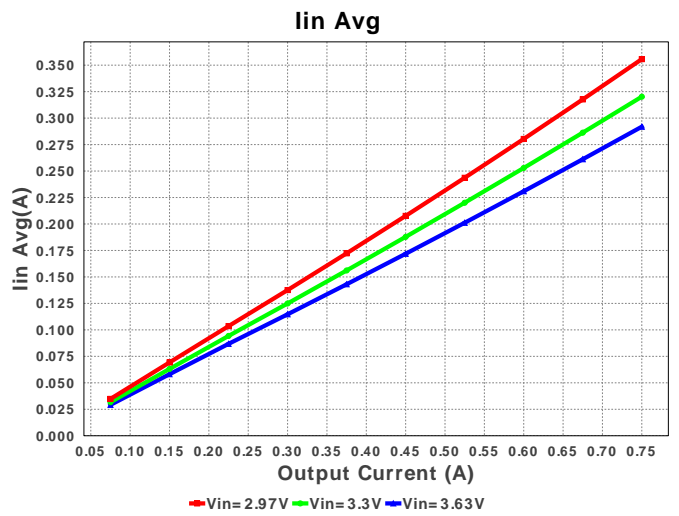
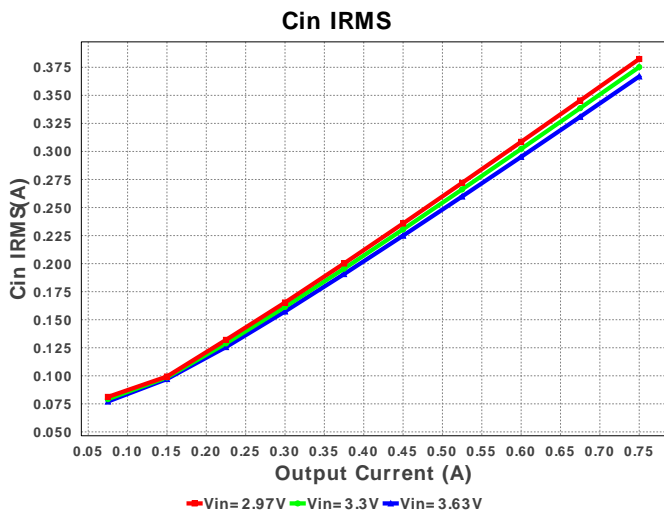
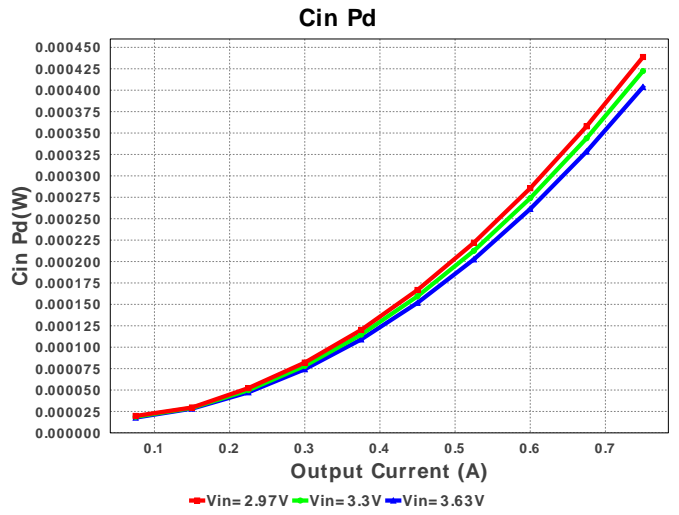
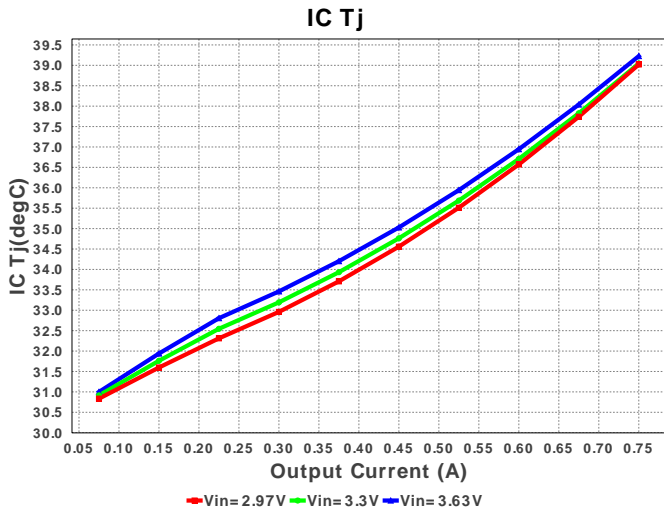


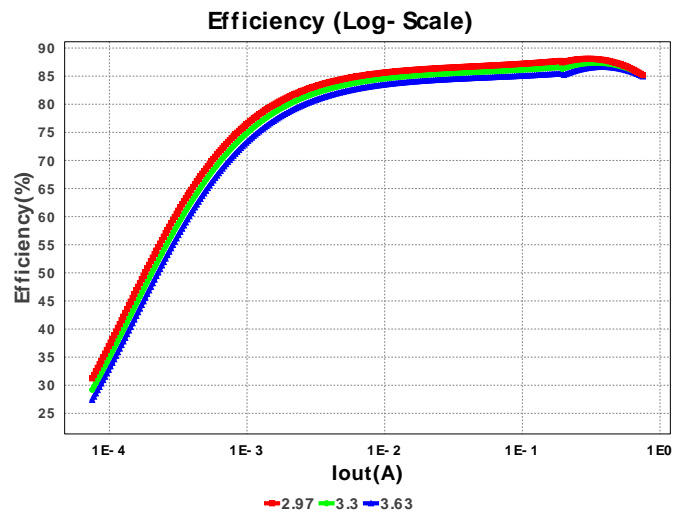
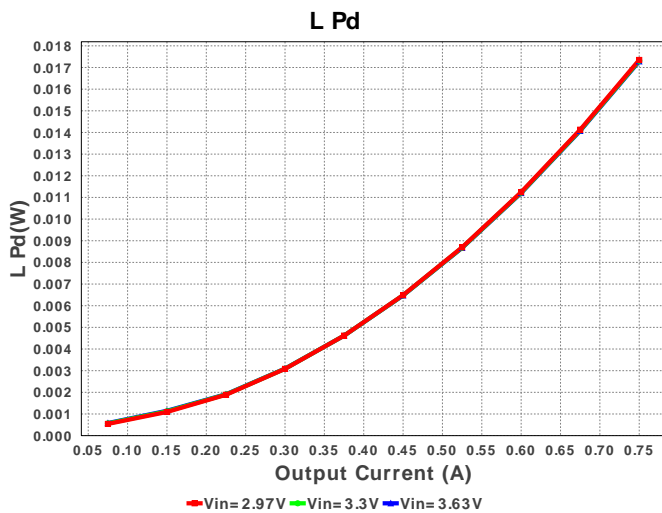
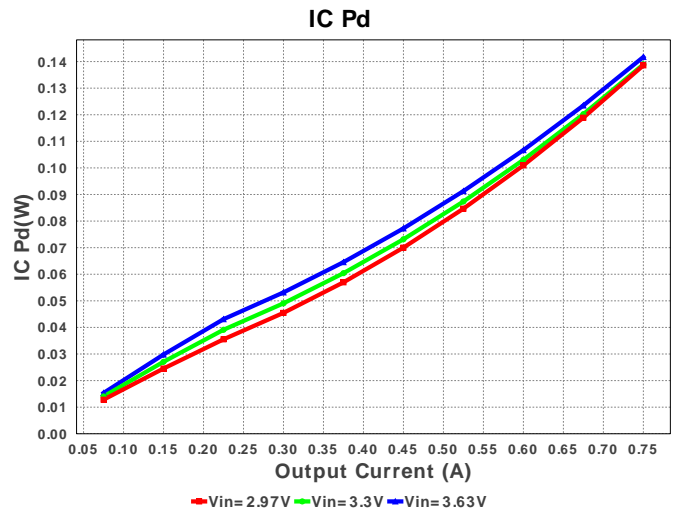
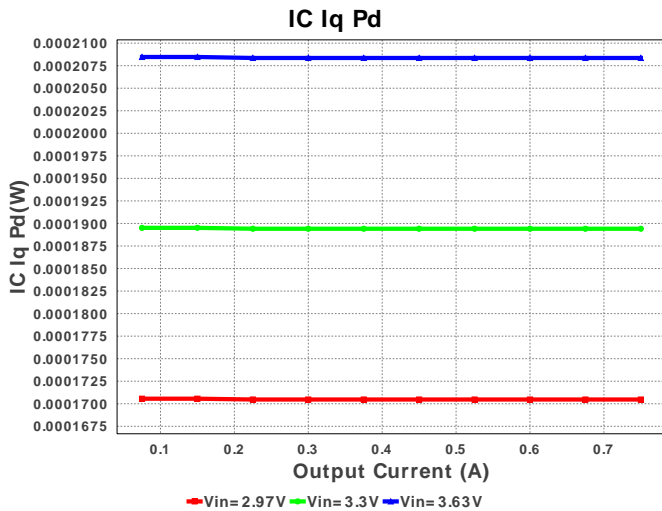
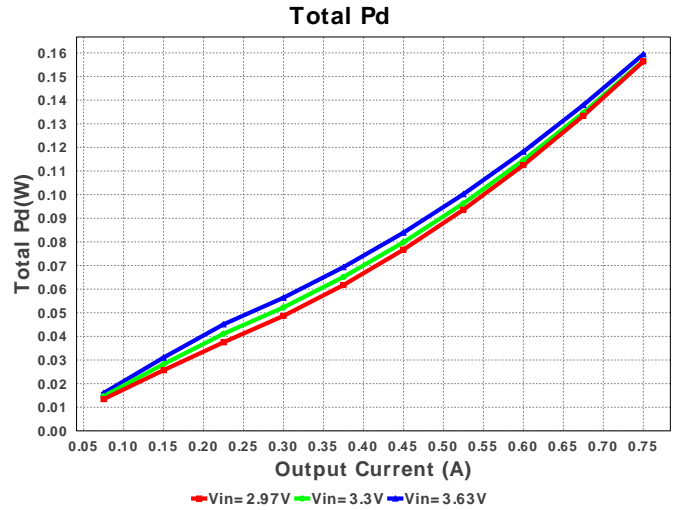
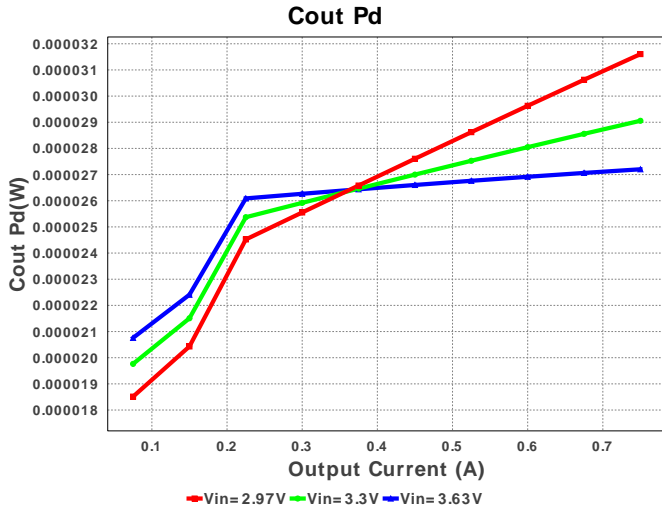
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM219R60J106KE19D Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.02	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	TDK	VLF252015MT-1R0N	L= 1.0 uH DCR= 30.0 mOhm	1	\$0.45	VLF252015MT 12 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
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	TPS62080DSGR	Switcher	1	\$0.75	S-PWSON-N8 10 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	366.848 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	116.624 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	291.86 mA	Current	Average input current
4.	L Ipp	404.0 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	44.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	1.986 MHz	General	Switching frequency
8.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
9.	Pout	900.0 mW	General	Total output power
10.	Total BOM	\$1.38	General	Total BOM Cost
11.	Vout OP	1.2 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
12.	Duty Cycle	36.048 %	Op_point	Duty cycle
13.	Efficiency	84.95 %	Op_point	Steady state efficiency
14.	IC Tj	39.226 degC	Op_point	IC junction temperature
15.	ICThetaJA	65.1 degC/W	Op_point	IC junction-to-ambient thermal resistance
16.	IOUT_OP	750.0 mA	Op_point	Iout operating point
17.	VIN_OP	3.63 V	Op_point	Vin operating point
18.	Vout p-p	1.309 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	403.733 µW	Power	Input capacitor power dissipation
20.	Cout Pd	27.202 µW	Power	Output capacitor power dissipation
21.	IC Iq Pd	208.355 µW	Power	IC Iq Pd
22.	IC Pd	141.722 mW	Power	IC power dissipation
23.	L Pd	17.283 mW	Power	Inductor power dissipation
24.	Total Pd	159.447 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	750.0 m	Maximum Output Current
2.	Iout1	750.0 m	Output Current #1
3.	SoftStart	1.0 ms	Soft Start Time (ms)
4.	VinMax	3.63	Maximum input voltage
5.	VinMin	2.97	Minimum input voltage
6.	Vout	1.2	Output Voltage
7.	Vout1	1.2	Output Voltage #1
8.	base_pn	TPS62080	Texas Instruments Base Part Number
9.	source	DC	Input Source Type
10.	ta	30.0	Ambient temperature

Design Assistance

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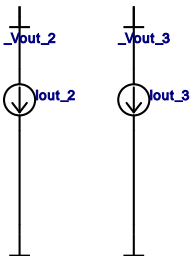
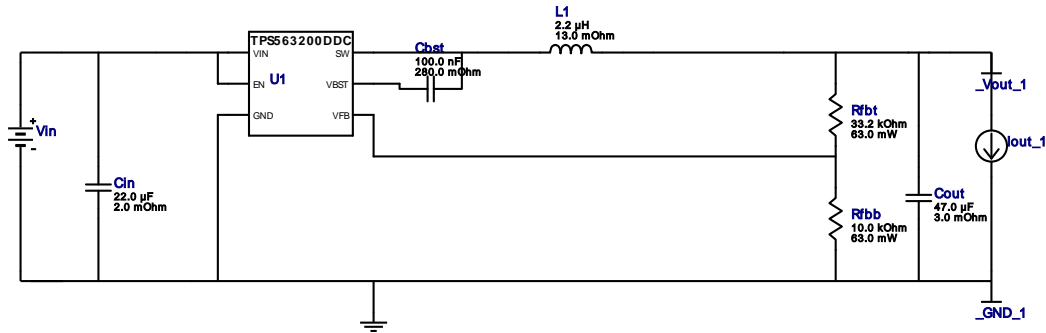


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 Iout = 1.09A

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 Footprint = 149.0 mm²
 BOM Count = 7
 Total Pd = 0.31W


WEBENCH® Design Report

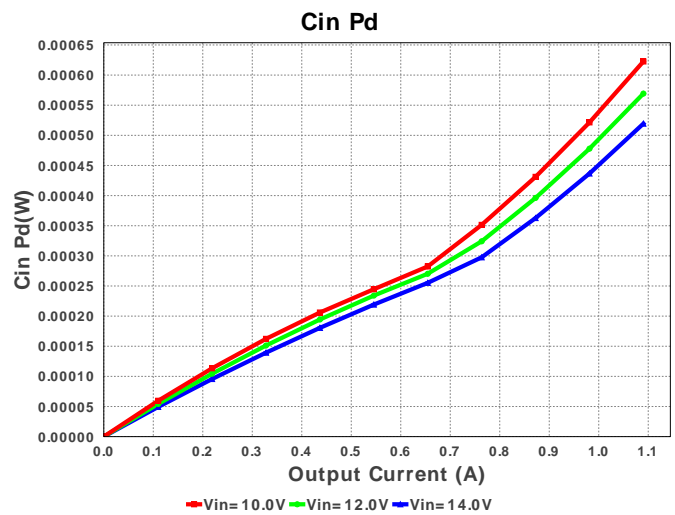
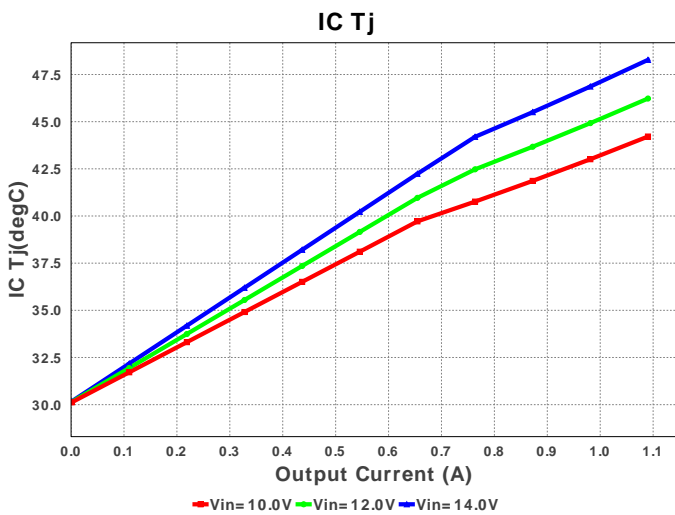
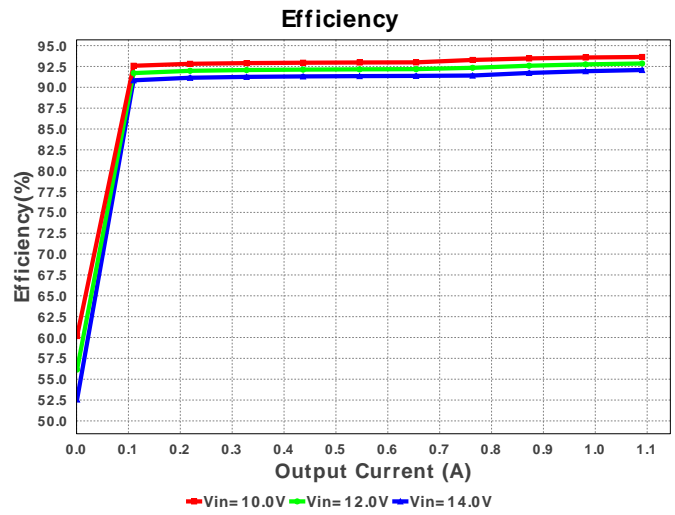
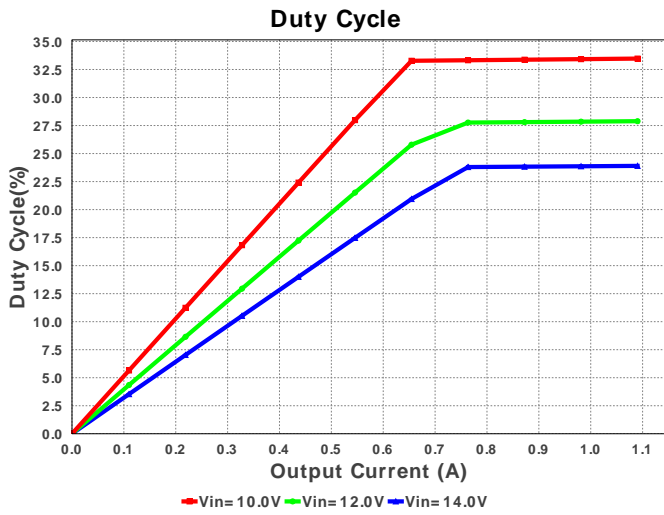
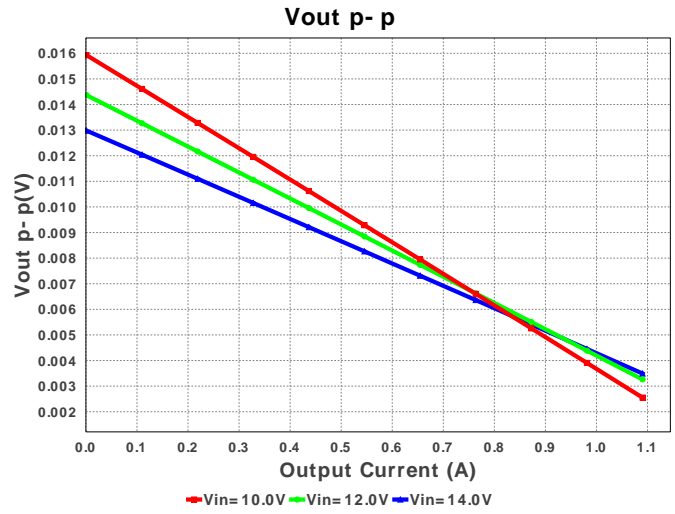
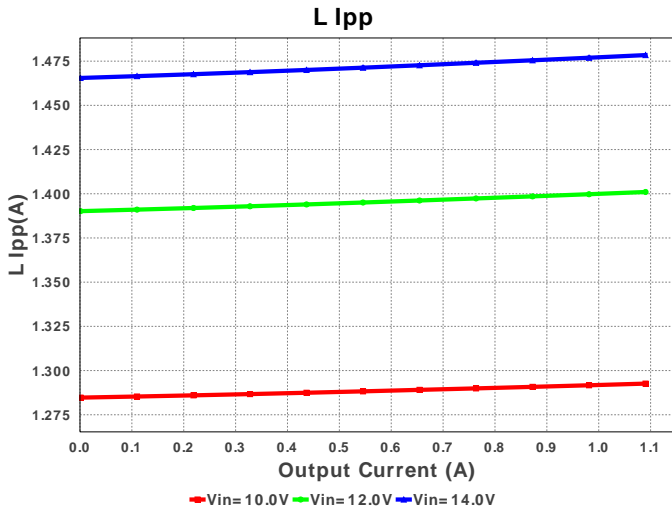
Design : 4425714/21 TPS563200DDCR
 TPS563200DDCR 10.0V-14.0V to 3.30V @ 1.09024A

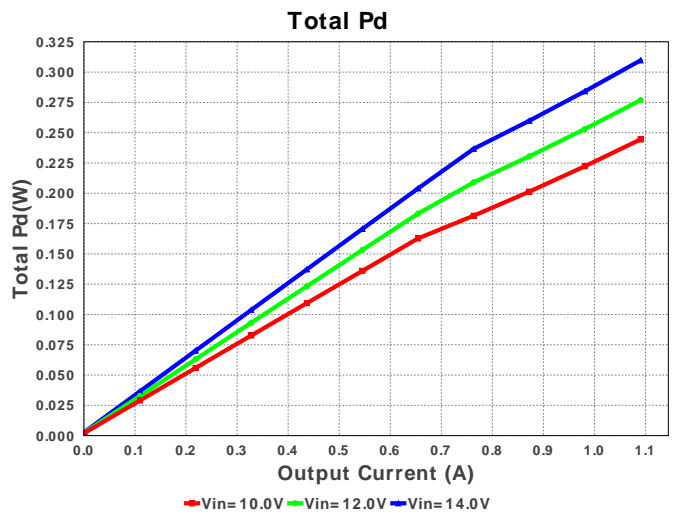
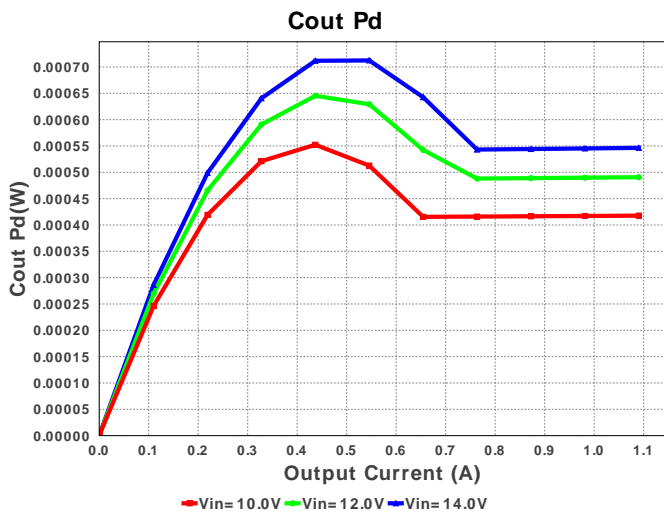
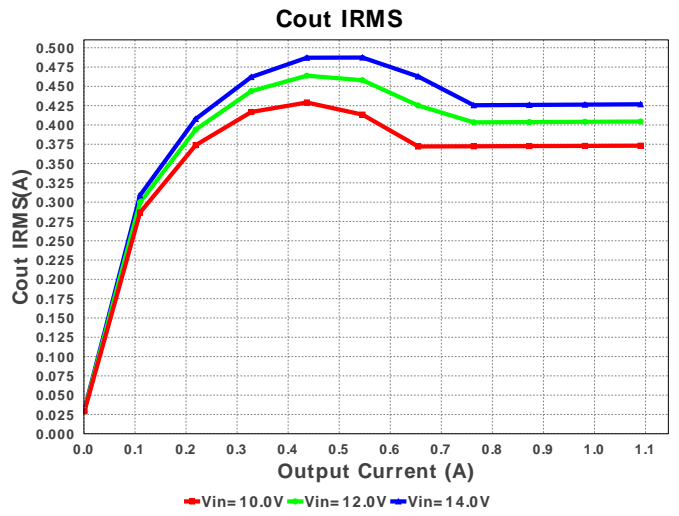
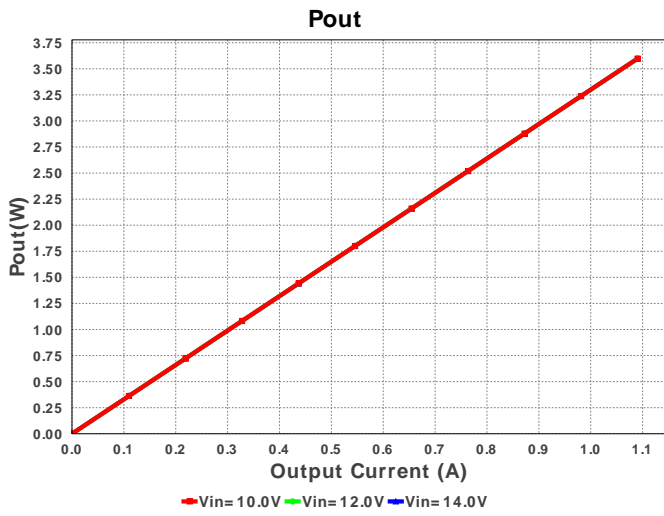
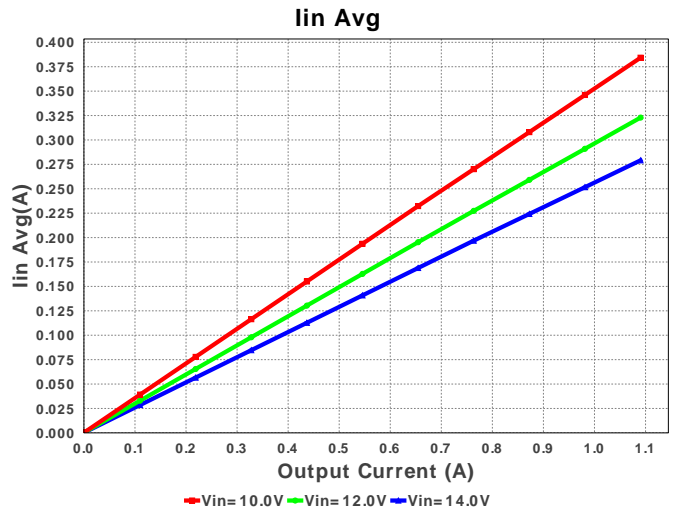
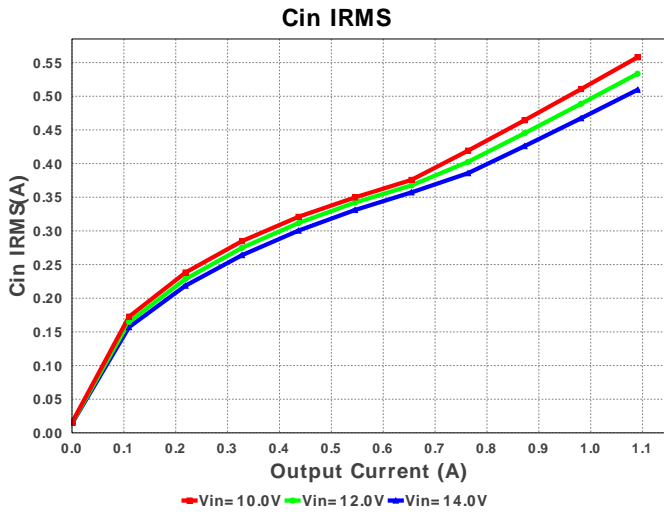


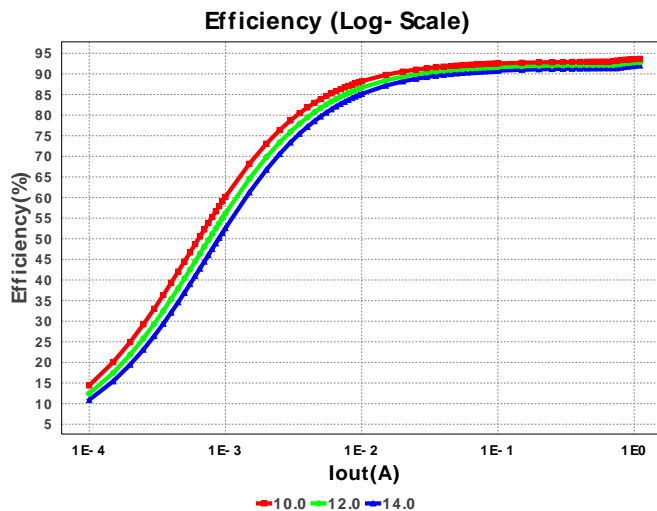
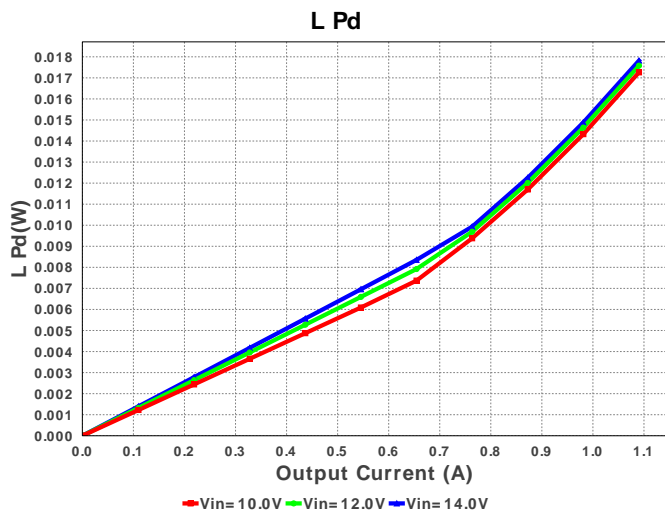
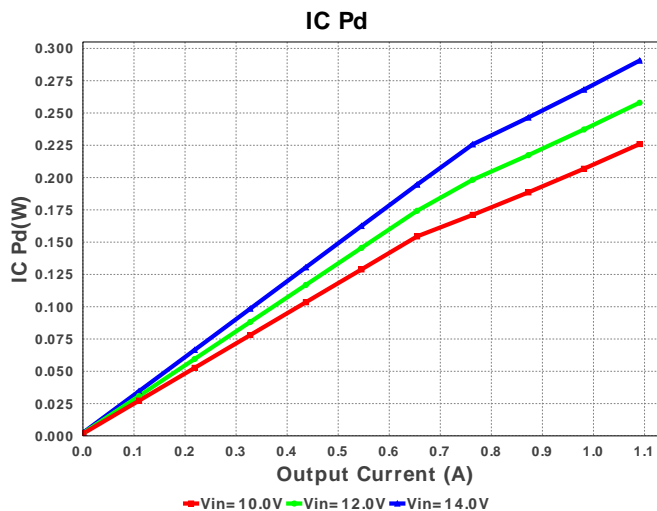
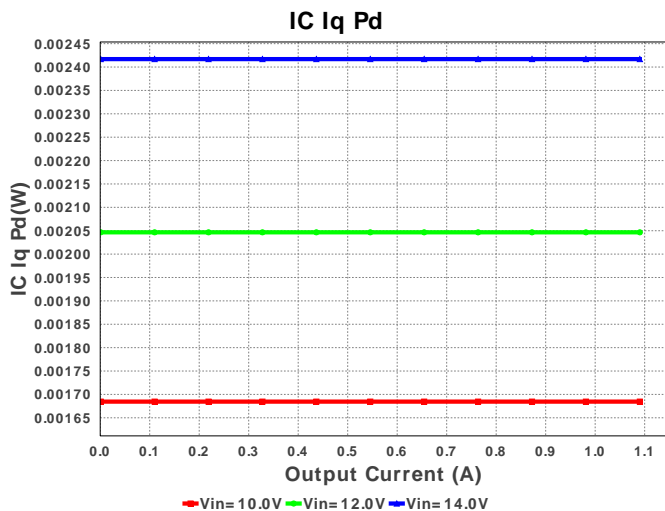
Electrical BOM

#	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	GRM31CR60J476ME19L Series= X5R	Cap= 47.0 uF ESR= 3.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.12	1206 11 mm ²
4.	L1	Bourns	SRN8040-2R2Y	L= 2.2 uH DCR= 13.0 mOhm	1	\$0.22	SRN8040 100 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.	Rfbb	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	U1	Texas Instruments	TPS563200DDCR	Switcher	1	\$0.52	 DCC0006A 10 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	509.625 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	426.786 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	279.11 mA	Current	Average input current
4.	L Ipp	1.478 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	781.477 kHz	General	Switching frequency
8.	Pout	3.598 W	General	Total output power
9.	Total BOM	\$1.05	General	Total BOM Cost
10.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
11.	Duty Cycle	23.9 %	Op_point	Duty cycle
12.	Efficiency	92.074 %	Op_point	Steady state efficiency
13.	IC Tj	48.276 degC	Op_point	IC junction temperature
14.	ICThetaJA	62.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
15.	IOUT_OP	1.09 A	Op_point	Iout operating point
16.	VIN_OP	14.0 V	Op_point	Vin operating point
17.	Vout p-p	7.929 mV	Op_point	Peak-to-peak output ripple voltage
18.	Cin Pd	519.435 μW	Power	Input capacitor power dissipation
19.	Cout Pd	546.438 μW	Power	Output capacitor power dissipation
20.	IC Iq Pd	2.417 mW	Power	IC Iq Pd
21.	IC Pd	290.558 mW	Power	IC power dissipation
22.	L Pd	17.82 mW	Power	Inductor power dissipation
23.	Total Pd	309.712 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.09	Maximum Output Current
2.	Iout1	1.09	Output Current #1
3.	SoftStart	1.0 ms	Soft Start Time (ms)
4.	VinMax	14.0	Maximum input voltage

#	Name	Value	Description
5.	VinMin	10.0	Minimum input voltage
6.	Vout	3.3	Output Voltage
7.	Vout1	3.3	Output Voltage #1
8.	base_pn	TPS563200	Texas Instruments Base Part Number
9.	source	DC	Input Source Type
10.	ta	30.0	Ambient temperature

Design Assistance

1. TPS563200 Product Folder : <http://www.ti.com/product/TPS563200> : contains the data sheet and other resources.

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