

WEBENCH® Power Architect

Project Report

Project : 4394885/4 : PA_Project_303 (modified from 301)

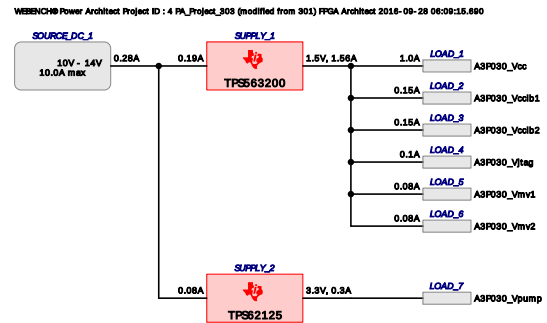
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Optimize project optFactor=3

Project Summary

1. Total System Efficiency	86.461 %
2. Total System BOM Count	17.0
3. Total System Footprint	221.0 mm ²
4. Total System BOM Cost	\$1.77
5. Total System Power Dissipation	521.4 mW

--> Launch WEBENCH Power Architect.



Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_1	A3P030_Vcc
SUPPLY_1	0	LOAD_2	A3P030_Vccib1
SUPPLY_1	0	LOAD_3	A3P030_Vccib2
SUPPLY_1	0	LOAD_4	A3P030_Vjtag
SUPPLY_1	0	LOAD_5	A3P030_Vmv1
SUPPLY_1	0	LOAD_6	A3P030_Vmv2
SUPPLY_2	0	LOAD_7	A3P030_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	1.5 V	1.56 A	85.9%	149	\$1.06	15	4
2.	SUPPLY_2	TPS62125	Switcher : 3V-17V, 300mA Buck Converter With Adjustable Enable Threshold And Hysteresis	3.3 V	0.3 A	87.7%	72	\$0.71	16	9

Power Loads

#	Name	VLoad	ILoad	Description
1.	A3P030_Vcc	1.5 V	1 A	VoutRipple=5%, SoftStart delay=1.0 mSec
2.	A3P030_Vccib1	1.5 V	0.15 A	VoutRipple=5%, SoftStart delay=1.0 mSec
3.	A3P030_Vccib2	1.5 V	0.15 A	VoutRipple=5%, SoftStart delay=1.0 mSec
4.	A3P030_Vjtag	1.5 V	0.1 A	VoutRipple=5%, SoftStart delay=1.0 mSec
5.	A3P030_Vmv1	1.5 V	0.08 A	VoutRipple=5%, SoftStart delay=1.0 mSec
6.	A3P030_Vmv2	1.5 V	0.08 A	VoutRipple=5%, SoftStart delay=1.0 mSec
7.	A3P030_Vpump	3.3 V	0.3 A	VoutRipple=9%, Group=Pump, SoftStart delay=1.0 mSec

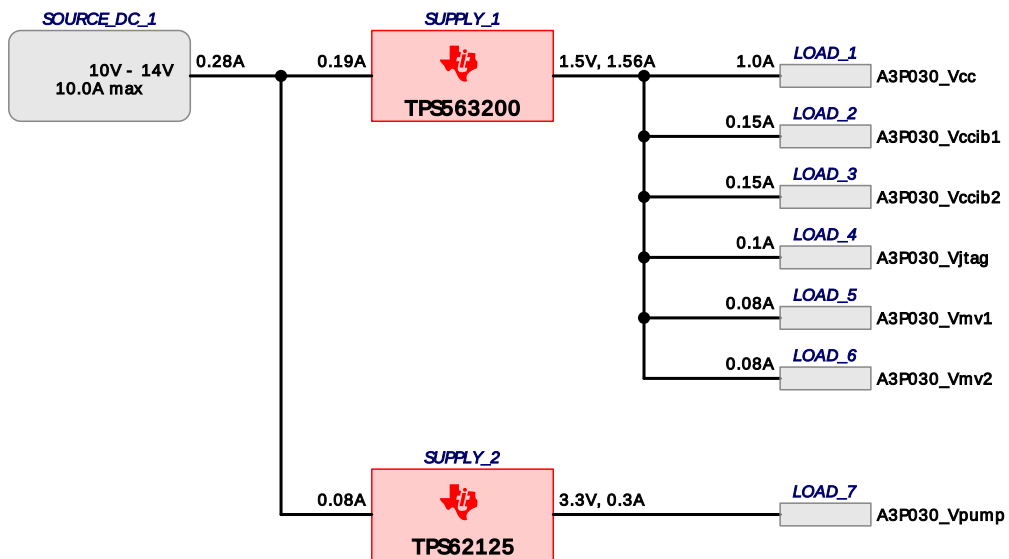
FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Actel	A3P030	FPGA_1	ProASIC3	FPGA Actel ProASIC3 A3P030

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

Project Diagram

WEBENCH® Power Architect Project ID : 4 PA_Project_303 (modified from 301) FPGA Architect 2016-09-28 06:09:15.690



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
AVX	08053C104KAT2A	0805	1	\$0.01	7
TDK	C3216X6S0G476M	1206	1	\$0.13	11
Vishay-Dale	CRCW0402100KFKED	0402	2	\$0.01	6
Vishay-Dale	CRCW040210K0FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW04021M33FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402200KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402309KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040233K2FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW04029K76FKED	0402	1	\$0.01	3
MuRata	GRM21BR60J106ME19L	0805	1	\$0.02	7
MuRata	GRM21BR61C106KE15L	0805	1	\$0.03	7
MuRata	GRM32ER61E226KE15L	1210	1	\$0.16	15
NIC Components	NPI43C150MTRF	IND_NPI43C	1	\$0.07	31
Bourns	SRN8040-1R5Y	SRN8040	1	\$0.22	100
Texas Instruments	TPS563200DDCR	DDC0006A	1	\$0.52	10
Texas Instruments	TPS62125DSGR	S- PWSON- N8	1	\$0.53	10
Total			17	\$2.768750000000003	

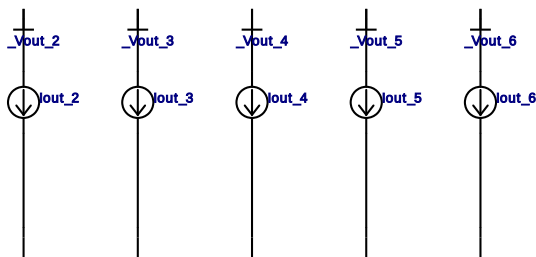
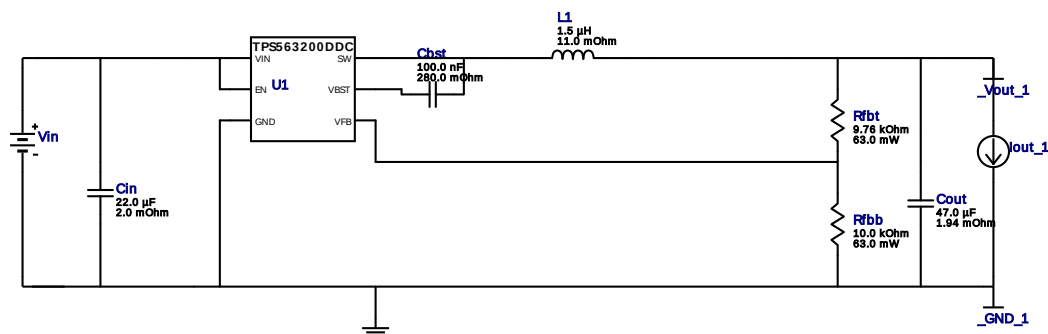


Vout = 1.5V
Iout = 1.56A

Device = TPS563200DDCR
Topology = Buck
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BOM Cost = \$1.06
BOM Count = 7
Total Pd = 0.38W

WEBENCH® Design Report

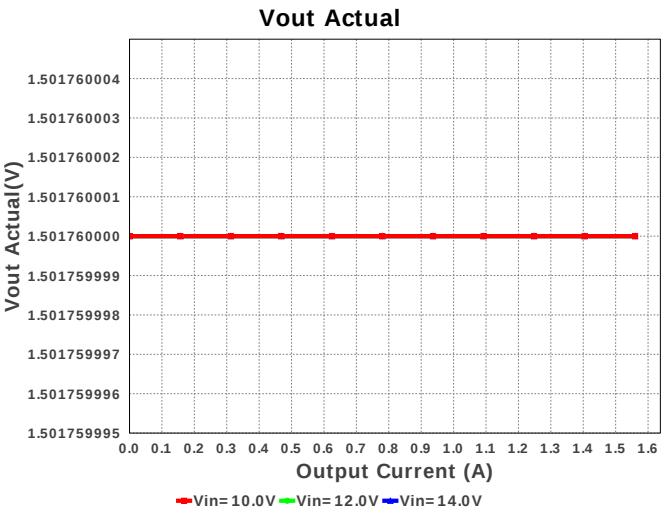
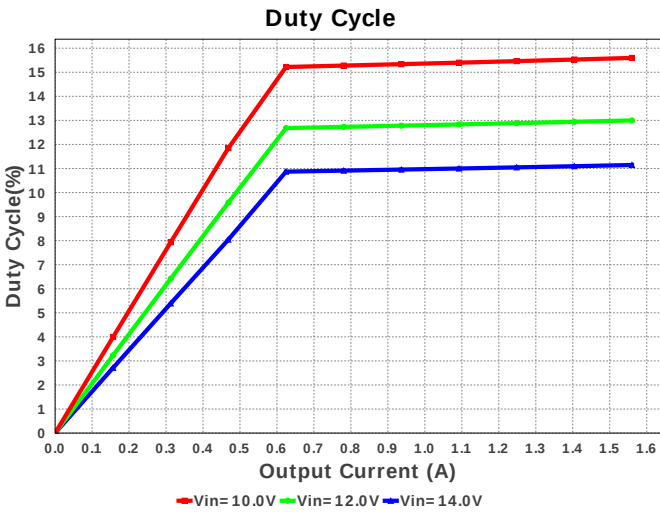
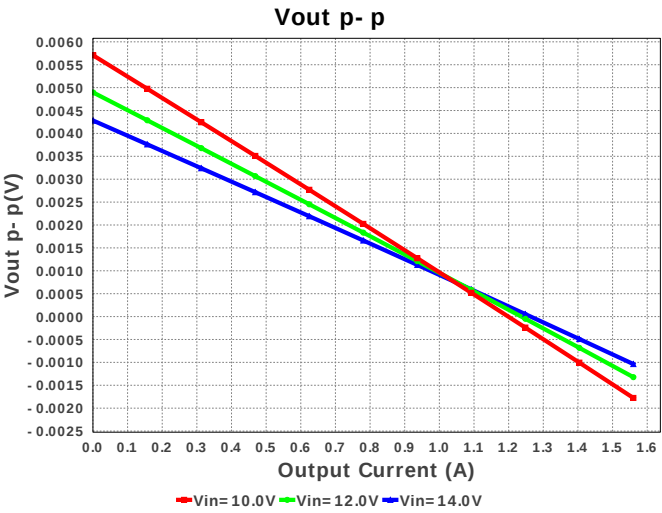
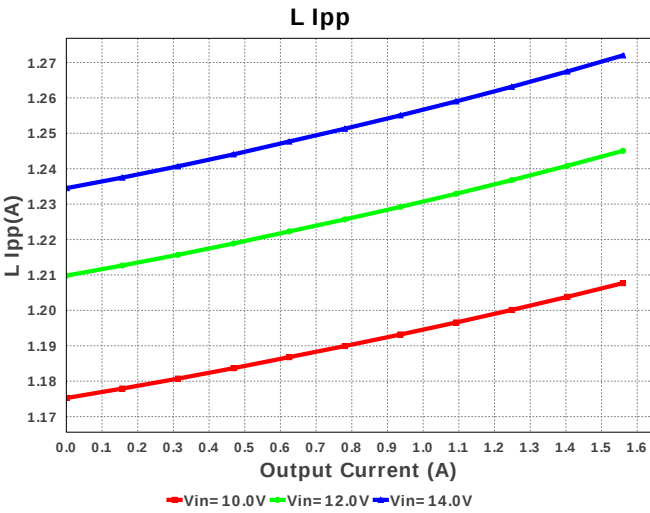
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TPS563200DDCR 10.0V-14.0V to 1.50V @ 1.56A

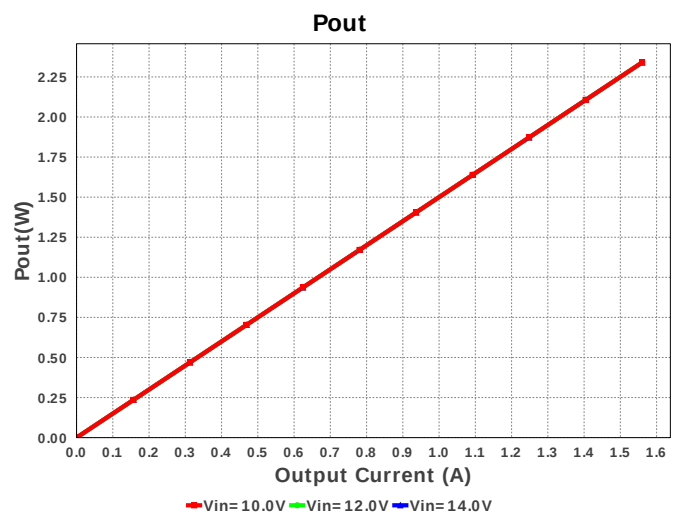
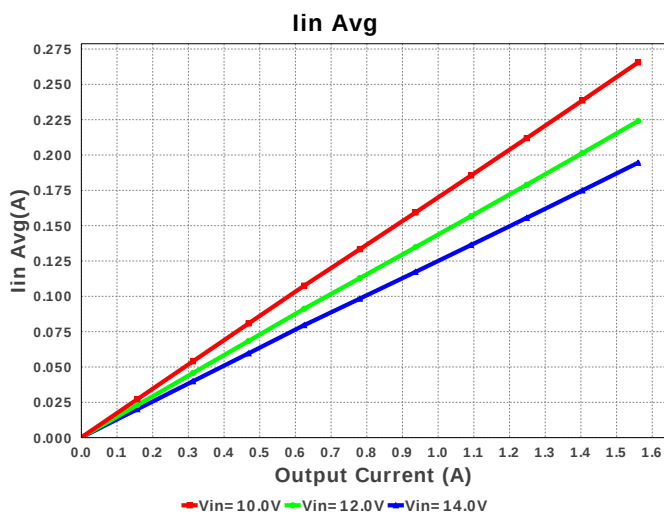
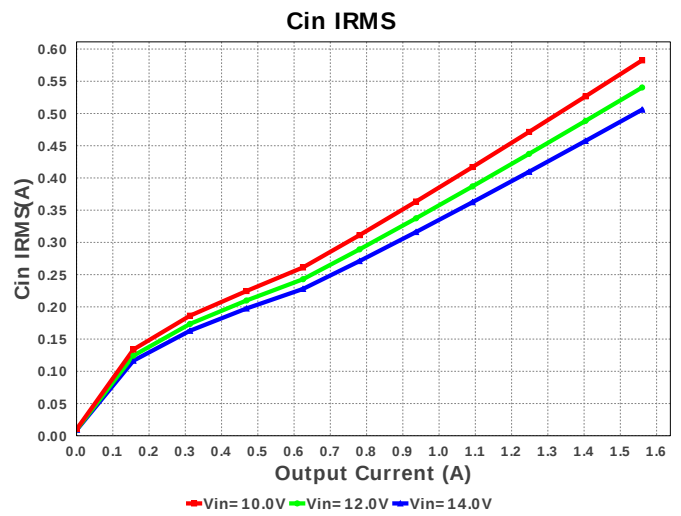
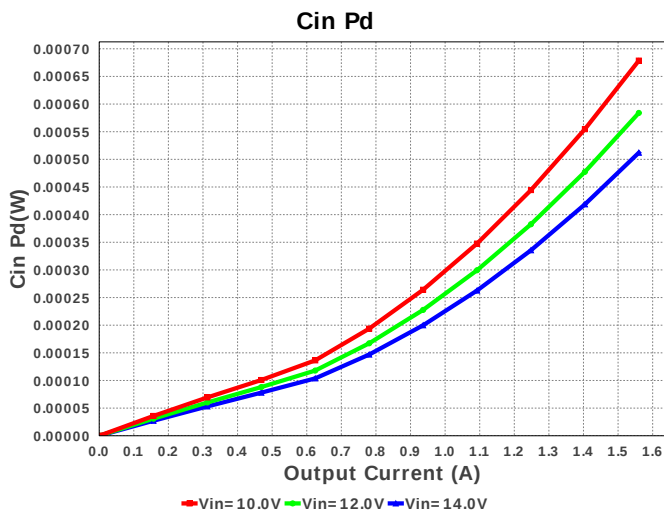
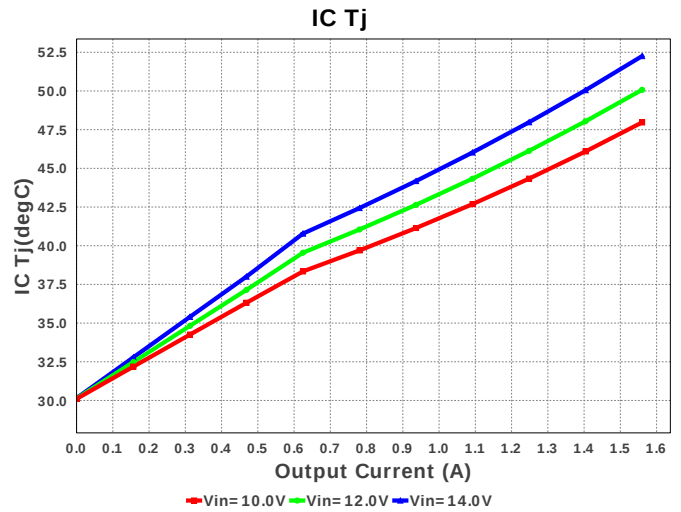
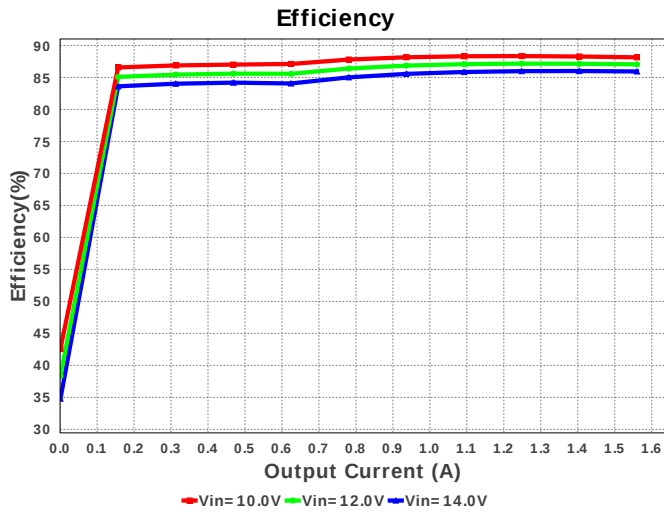


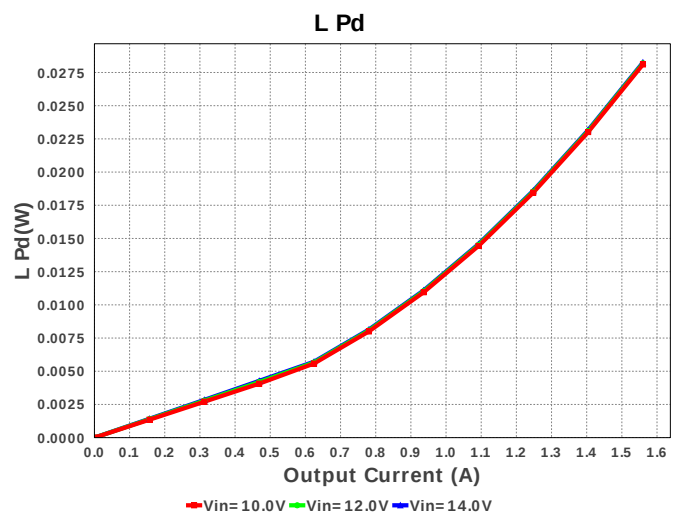
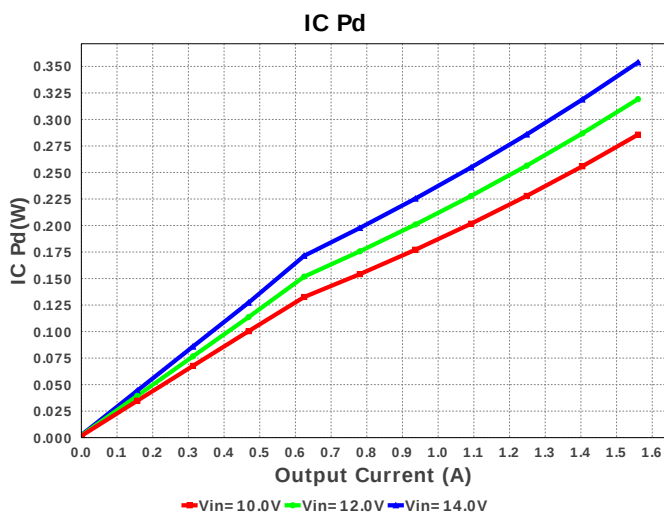
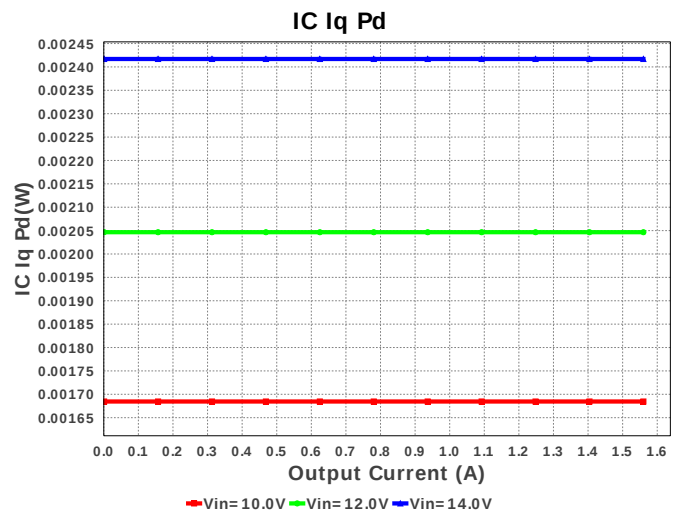
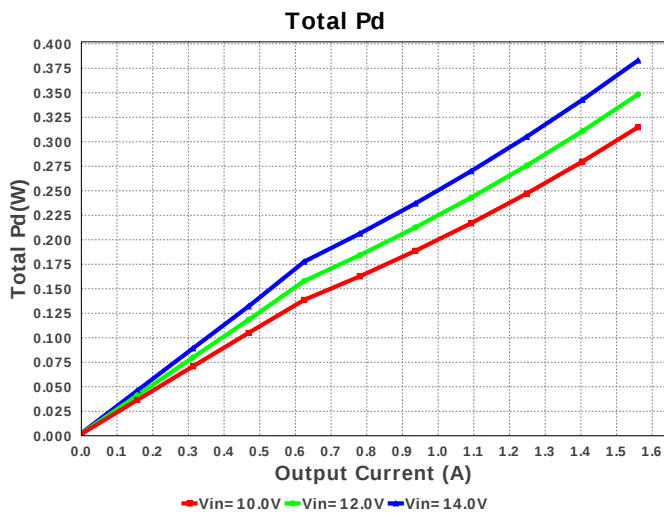
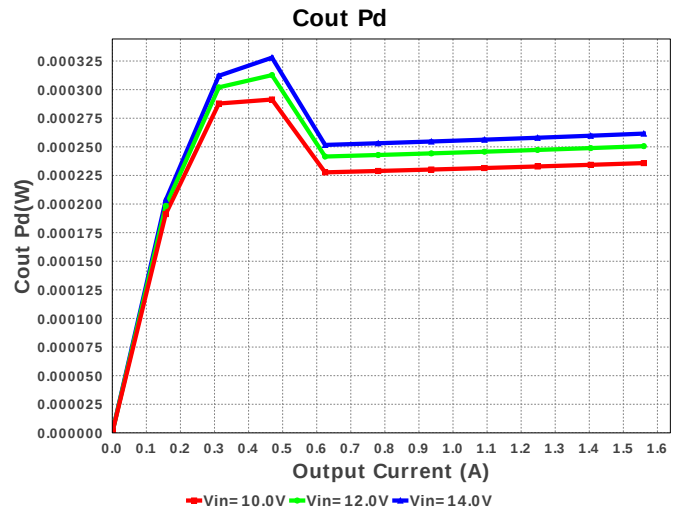
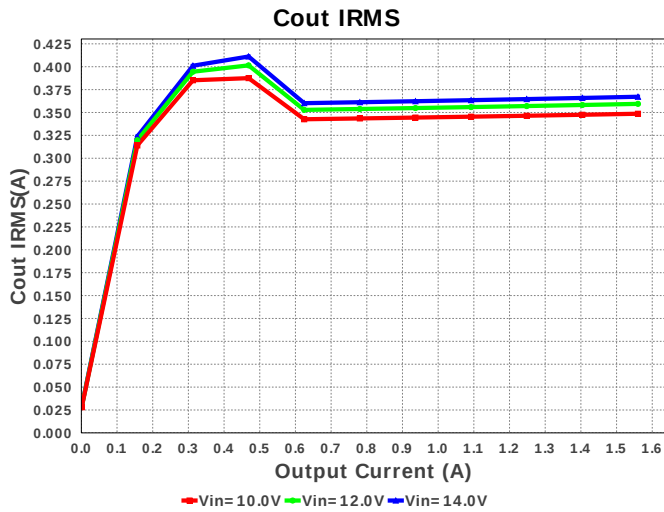
Electrical BOM

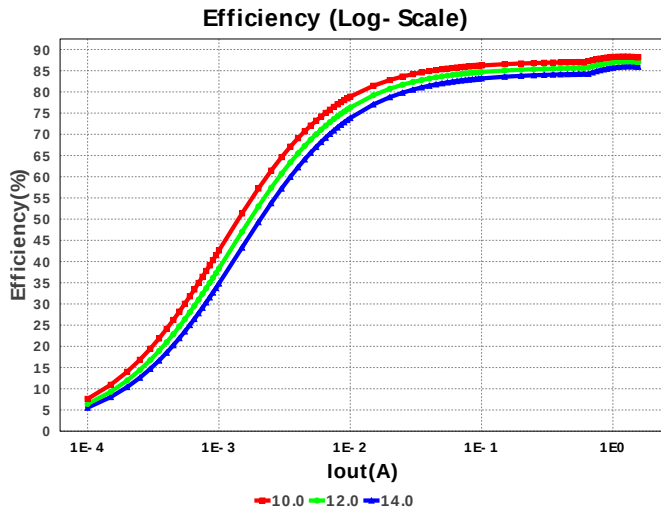
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm²
2.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	\$0.16	 1210 15 mm²
3.	Cout	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	SRN8040-1R5Y	L= 1.5 uH DCR= 11.0 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.	Rfht	Vishay-Dale	CRCW04029K76FKED Series= CRCW..e3	Res= 9.76 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	505.969 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	367.193 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	194.49 mA	Current	Average input current
4.	L Ipp	1.272 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	724.854 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	2.34 W	General	Total output power
10.	Total BOM	\$1.06	General	Total BOM Cost
11.	Vout Actual	1.502 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
12.	Vout OP	1.5 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	11.144 %	Op_point	Duty cycle
14.	Efficiency	85.937 %	Op_point	Steady state efficiency
15.	IC Tj	52.253 degC	Op_point	IC junction temperature
16.	ICThetaJA	62.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	1.56 A	Op_point	Iout operating point
18.	VIN_OP	14.0 V	Op_point	Vin operating point
19.	Vout p-p	5.881 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	512.009 μW	Power	Input capacitor power dissipation
21.	Cout Pd	261.571 μW	Power	Output capacitor power dissipation
22.	IC Iq Pd	2.417 mW	Power	IC Iq Pd
23.	IC Pd	353.789 mW	Power	IC power dissipation
24.	L Pd	28.253 mW	Power	Inductor power dissipation
25.	Total Pd	382.916 mW	Power	Total Power Dissipation
26.	Vout Tolerance	2.327 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.56	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	1.5	Output Voltage
6.	base_pn	TPS563200	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	30.0	Ambient temperature

Design Assistance

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

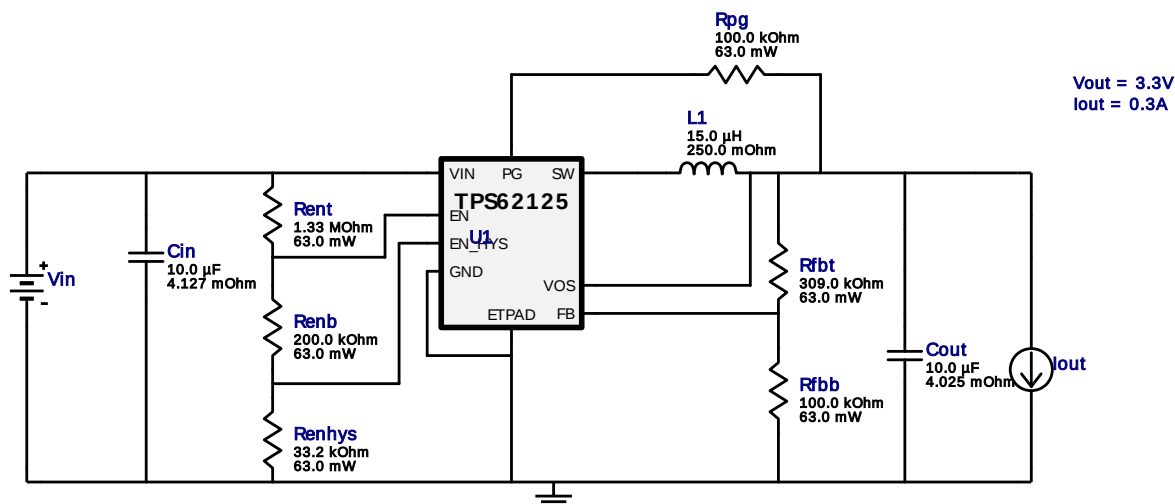


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Iout = 0.3A

Device = TPS62125DSGR
Topology = Buck
Created = 9/28/16 6:09:15 AM
BOM Cost = \$0.71
BOM Count = 10
Total Pd = 0.14W

WEBENCH® Design Report

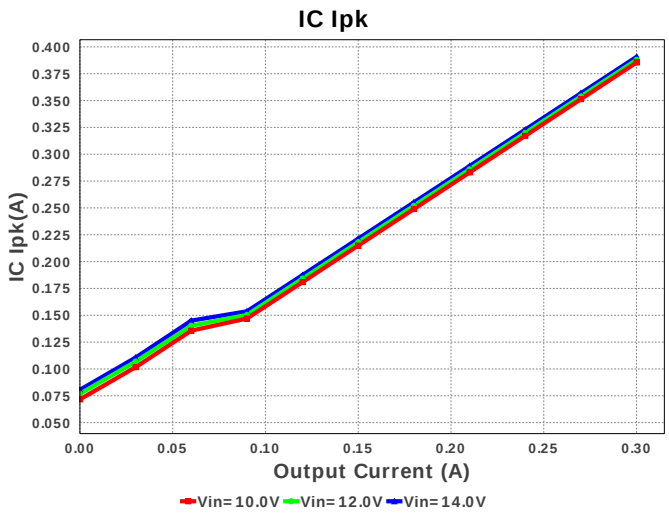
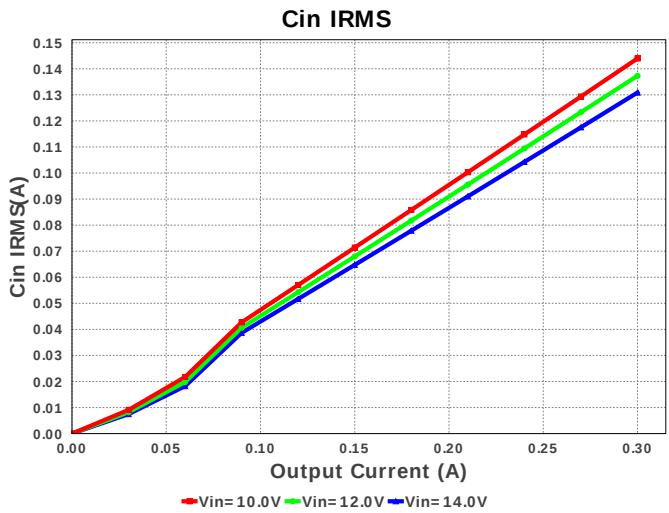
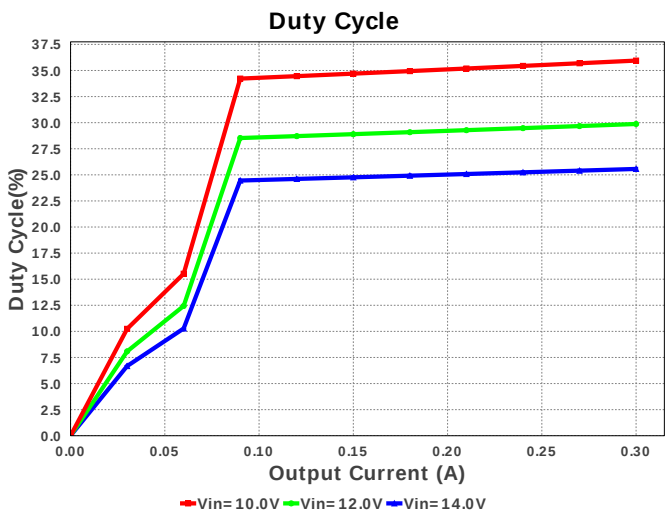
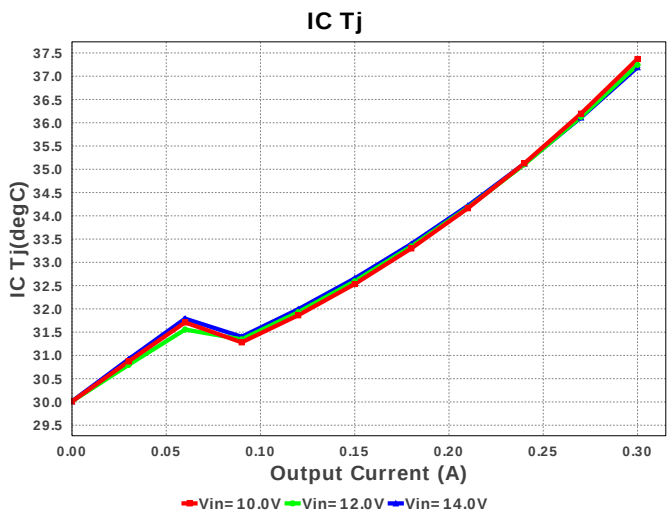
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TPS62125DSGR 10.0V-14.0V to 3.30V @ 0.3A

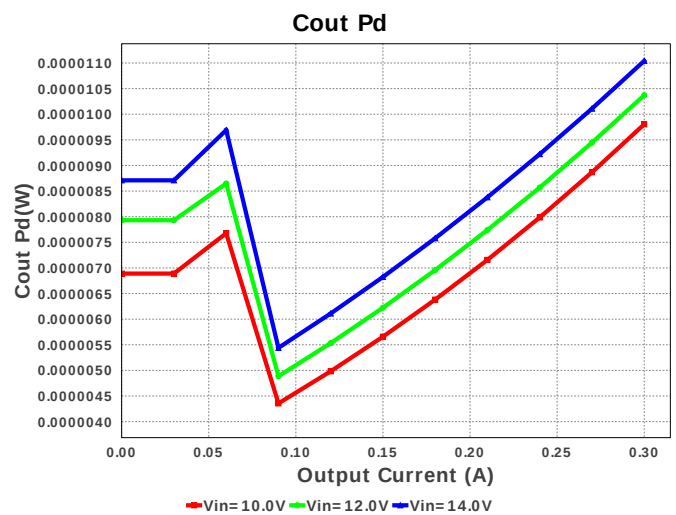
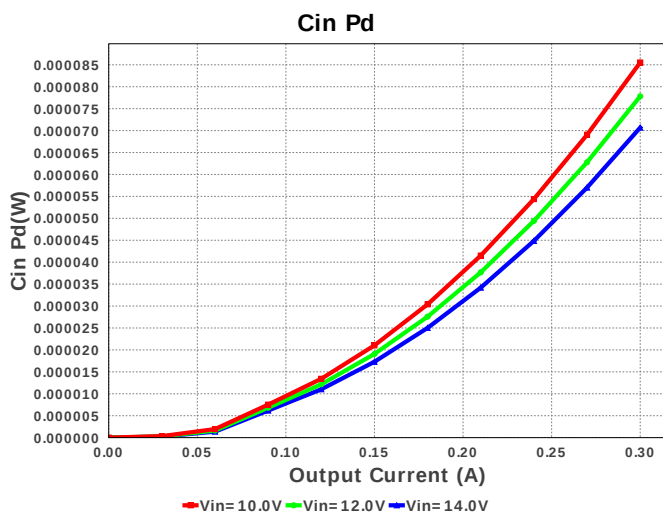
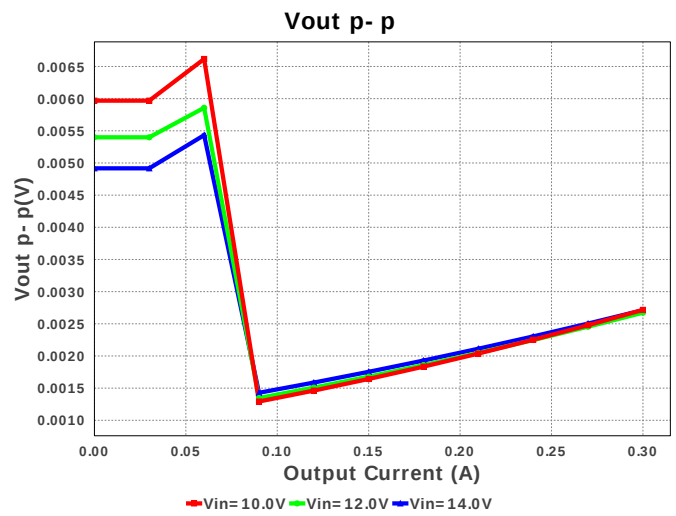
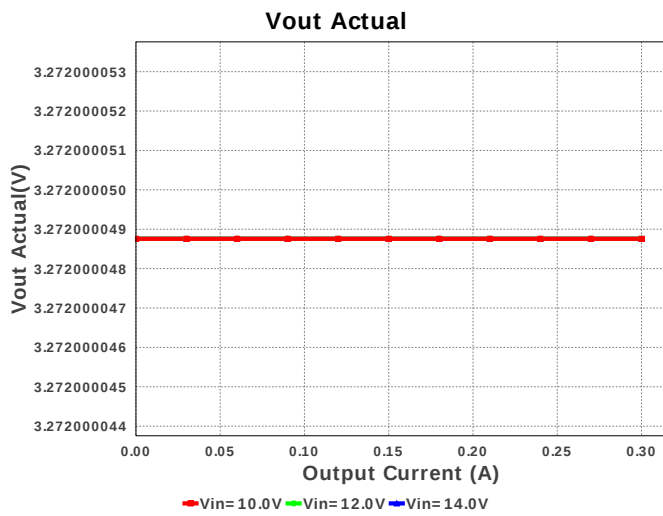
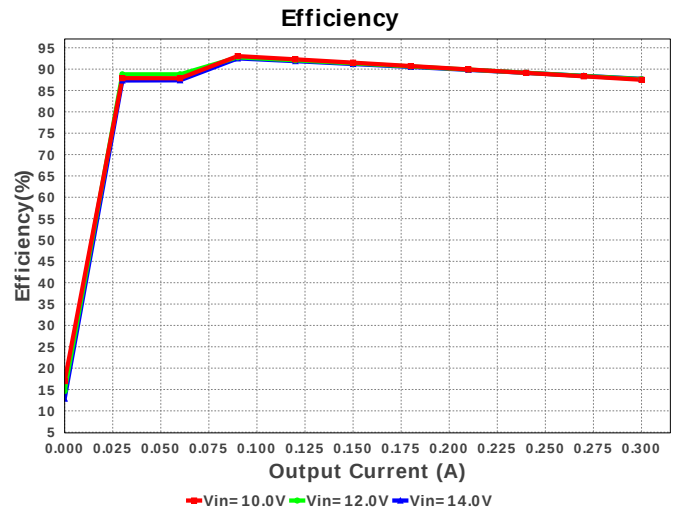
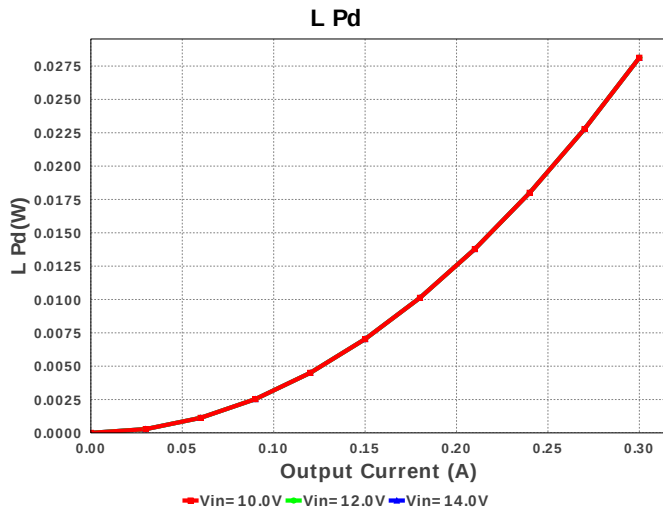


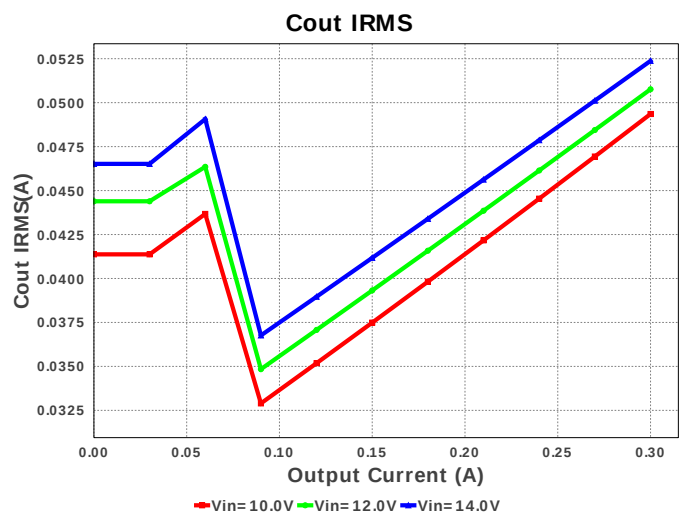
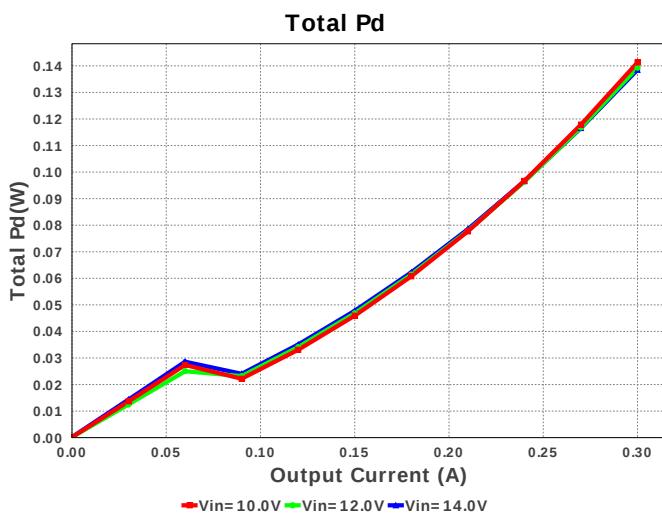
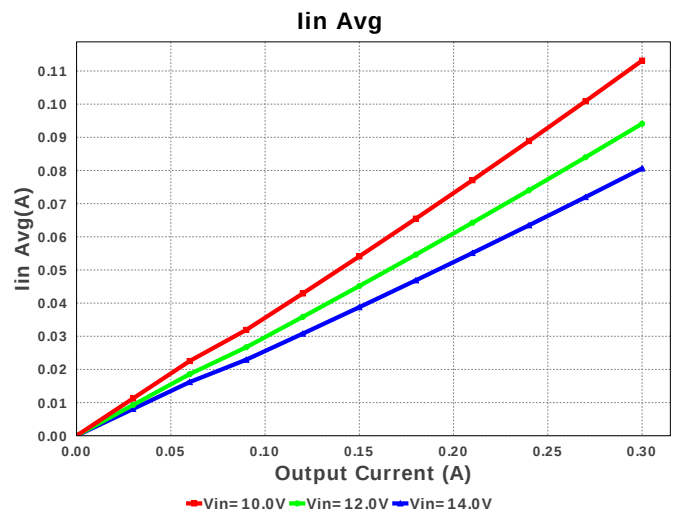
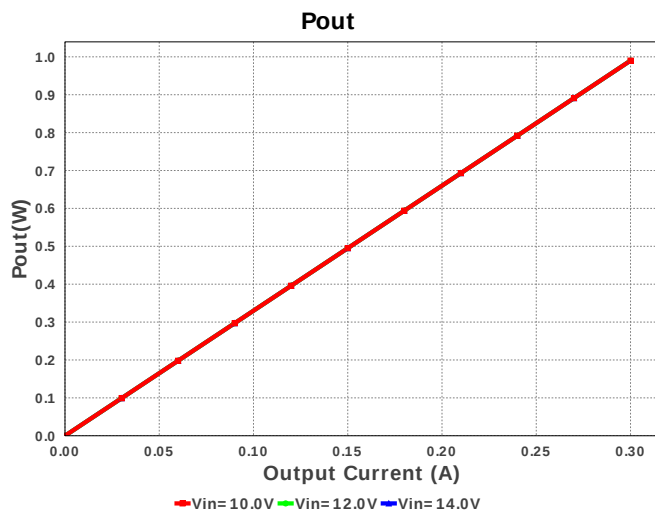
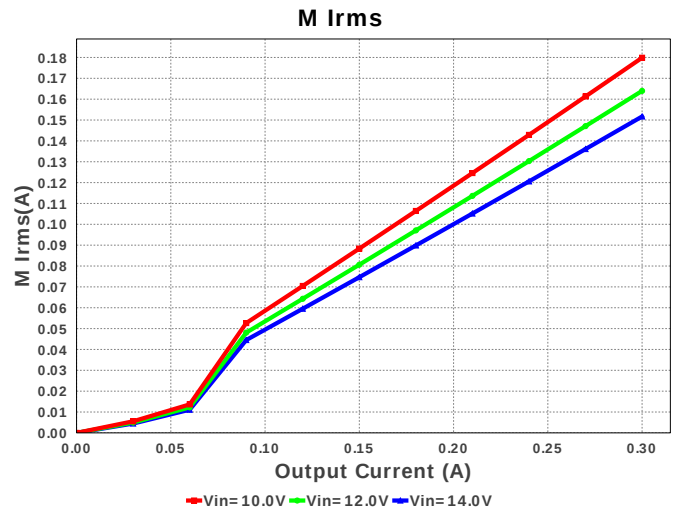
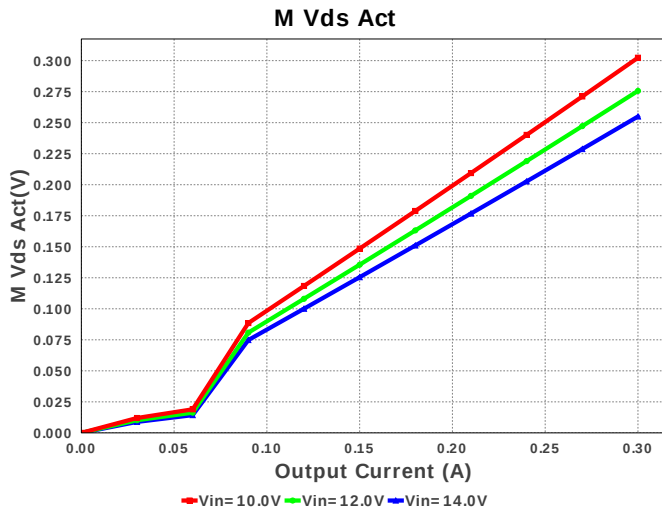
Electrical BOM

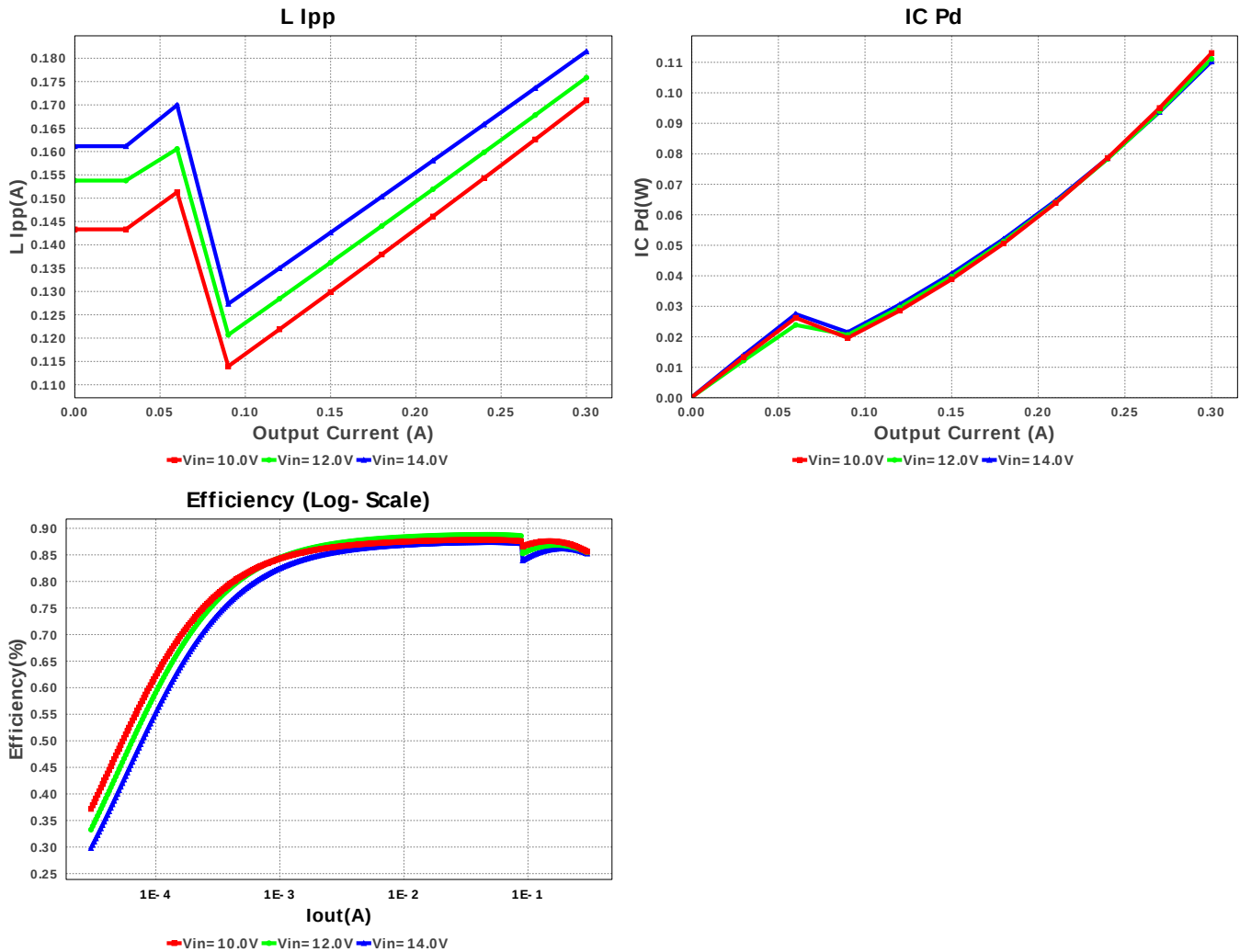
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1.	Cin	MuRata	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	1	\$0.03	0805 7 mm²
2.	Cout	MuRata	GRM21BR60J106ME19L Series= X5R	Cap= 10.0 uF ESR= 4.025 mOhm VDC= 6.3 V IRMS= 2.6173 A	1	\$0.02	0805 7 mm²
3.	L1	NIC Components	NPI43C150MTRF	L= 15.0 uH DCR= 250.0 mOhm	1	\$0.07	IND_NPI43C 31 mm²
4.	Renb	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm²
5.	Renhys	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm²
6.	Rent	Vishay-Dale	CRCW04021M33FKED Series= CRCW..e3	Res= 1.33 MOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm²
7.	Rfbb	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm²
8.	Rfbt	Vishay-Dale	CRCW0402309KFKED Series= CRCW..e3	Res= 309.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm²
9.	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
10.	U1	Texas Instruments	TPS62125DSGR	Switcher	1	\$0.53	S-PWSON-N8 10 mm²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	130.868 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	52.376 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	390.717 mA	Current	Peak switch current in IC
4.	Iin Avg	80.609 mA	Current	Average input current
5.	L Ipp	181.43 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	151.687 mA	Current	Q Iavg
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	72.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1.005 MHz	General	Switching frequency
10.	IC Tolerance	20.2 mV	General	IC Feedback Tolerance
11.	M Vds Act	254.957 mV	General	Voltage drop across the MosFET
12.	Mode	CCM	General	Conduction Mode
13.	Pout	990.0 mW	General	Total output power
14.	Total BOM	\$0.71	General	Total BOM Cost
15.	Vout Actual	3.272 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	25.565 %	Op_point	Duty cycle
18.	Efficiency	87.725 %	Op_point	Steady state efficiency
19.	IC Tj	37.193 degC	Op_point	IC junction temperature
20.	ICThetaJA	65.2 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	300.0 mA	Op_point	Iout operating point
22.	VIN_OP	14.0 V	Op_point	Vin operating point
23.	Vout p-p	2.712 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	70.681 μW	Power	Input capacitor power dissipation
25.	Cout Pd	11.041 μW	Power	Output capacitor power dissipation
26.	IC Pd	110.316 mW	Power	IC power dissipation
27.	L Pd	28.125 mW	Power	Inductor power dissipation
28.	Total Pd	138.527 mW	Power	Total Power Dissipation
29.	Vout Tolerance	4.09 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	300.0 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	3.3	Output Voltage
6.	base_pn	TPS62125	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS62125** Product Folder : <http://www.ti.com/product/TPS62125> : contains the data sheet and other resources.

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