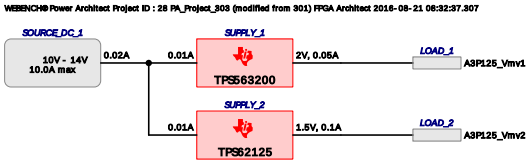
WEBENCH® Power Architect



Project Report

Project : 4009018/28 : PA_Project_303 (modified from 301)
Created : 2016-08-21 08:32:37.307
Optimize project optFactor=3

Project Summary

1.	Total System Efficiency	86.709 %
2.	Total System BOM Count	17.0
3.	Total System Footprint	135.0 mm2
4.	Total System BOM Cost	$1.78
5.	Total System Power Dissipation	38.3 mW

--> Launch WEBENCH Power Architect.

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_1	A3P125_Vmv1
SUPPLY_2	0	LOAD_2	A3P125_Vmv2

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 V	0.05 A	83.5%	65	$1.07	121	4
2.	SUPPLY_2	TPS62125	Switcher : 3V-17V, 300mA Buck Converter With Adjustable Enable Threshold And Hysteresis	1.5 V	0.1 A	89%	70	$0.71	122	9

Power Loads

#	Name	VLoad	ILoad	Description
1.	A3P125_Vmv1	2 V	0.05 A	VoutRipple=5%, SoftStart delay=1.0 mSec
2.	A3P125_Vmv2	1.5 V	0.1 A	VoutRipple=5%, SoftStart delay=1.0 mSec

FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Actel http://www.actel.com/documents/PA3_DS.pdf	A3P125	FPGA_1	ProASIC3	FPGA Actel ProASIC3 A3P125

Project Diagram

Electrical Procurement BOM

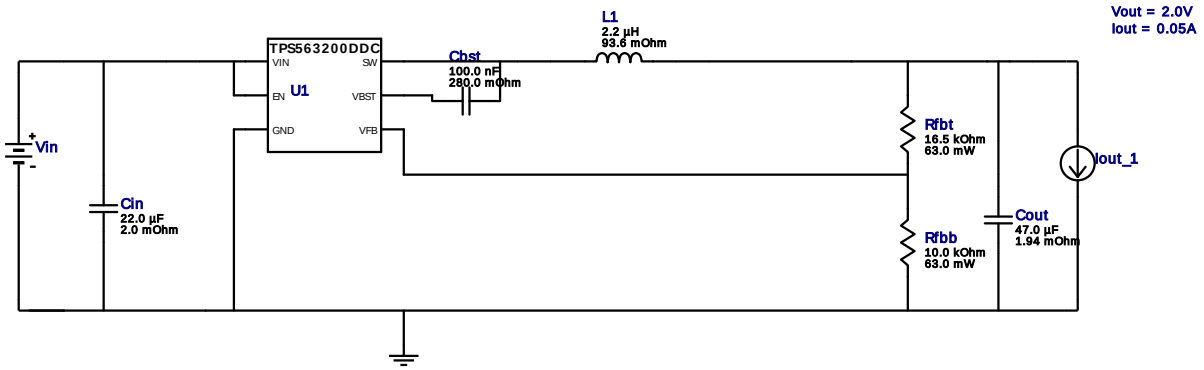
Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm^2)
AVX	08053C104KAT2A	0805	1	$0.01	7
TDK	C3216X6S0G476M	1206	1	$0.13	11
Vishay-Dale	CRCW0402100KFKED	0402	2	$0.01	6
Vishay-Dale	CRCW040210K0FKED	0402	1	$0.01	3
Vishay-Dale	CRCW040216K5FKED	0402	1	$0.01	3
Vishay-Dale	CRCW04021M33FKED	0402	1	$0.01	3
Vishay-Dale	CRCW0402200KFKED	0402	1	$0.01	3
Vishay-Dale	CRCW040233K2FKED	0402	1	$0.01	3
Vishay-Dale	CRCW040286K6FKED	0402	1	$0.01	3
MuRata	GRM188R60G106ME47D	0603	1	$0.02	5
MuRata	GRM21BR61C106KE15L	0805	1	$0.03	7
MuRata	GRM32ER61E226KE15L	1210	1	$0.16	15
Coilcraft	ME3220-222MLB	ME3220	1	$0.23	16
NIC Components	NPI43C150MTRF	IND_NPI43C	1	$0.07	31
Texas Instruments	TPS563200DDCR	DDC0006A	1	$0.52	10
Texas Instruments	TPS62125DSGR	S-PWSON-N8	1	$0.53	10
Total			17	$1.78	134.5775

WEBENCH® Design Report

Vout = 2.0V
Iout = 0.05A

Device = TPS563200DDCR
Topology = Buck
Created = 8/21/16 8:32:36 AM
BOM Cost = $1.07
BOM Count = 7
Total Pd = 0.02W

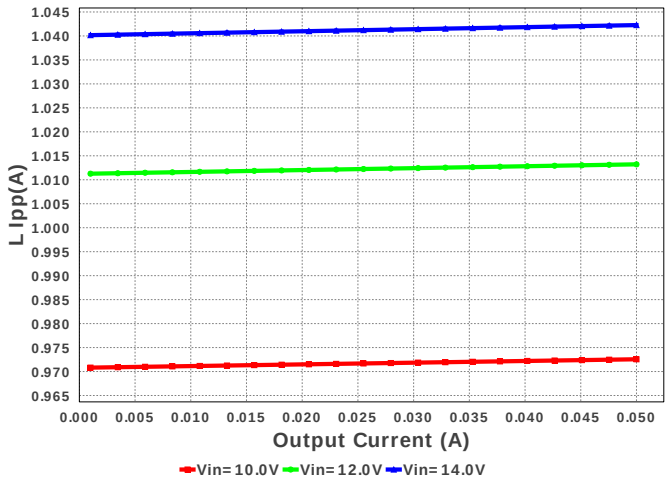
Design : 4009018/121 TPS563200DDCR
TPS563200DDCR 10.0V-14.0V to 2.00V @ 0.05A



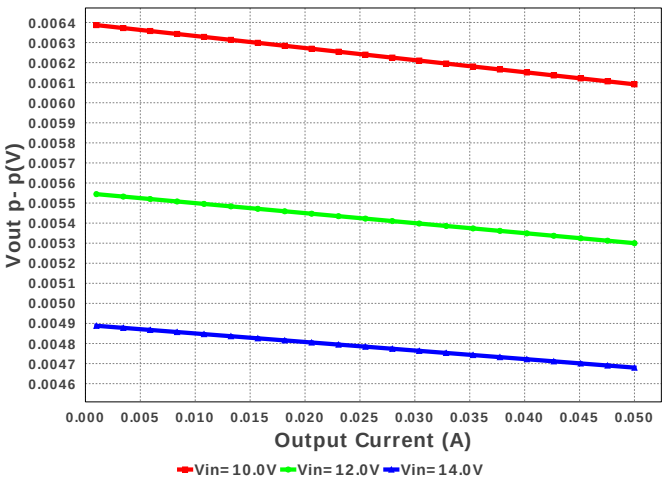
Electrical BOM

#	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	Coilcraft	ME3220-222MLB	L= 2.2 µH DCR= 93.6 mOhm	1	$0.23	ME3220 16 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.	Rfbt	Vishay-Dale	CRCW040216K5FKED Series= CRCW..e3	Res= 16.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	U1	Texas Instruments	TPS563200DDCR	Switcher	1	$0.52	DDC0006A 10 mm²

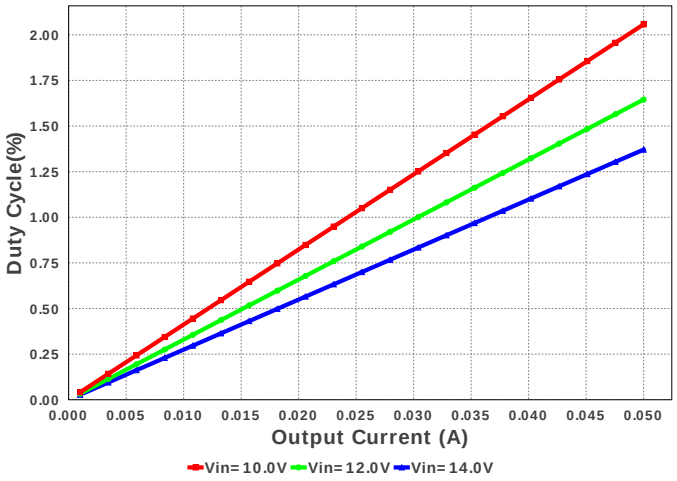
L Ipp



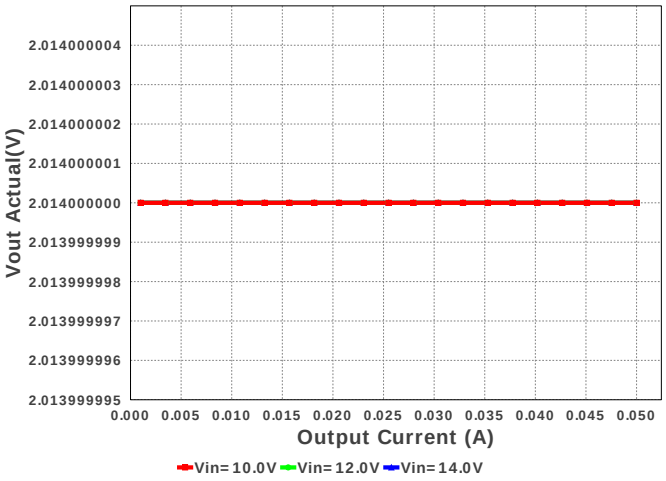
Vout p- p



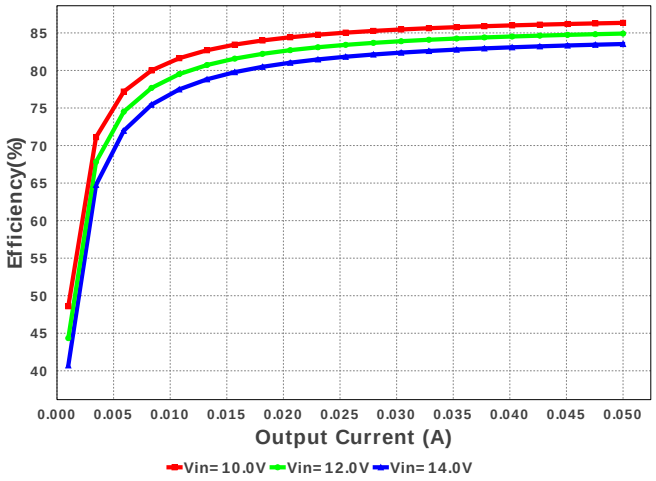
Duty Cycle



Vout Actual



Efficiency



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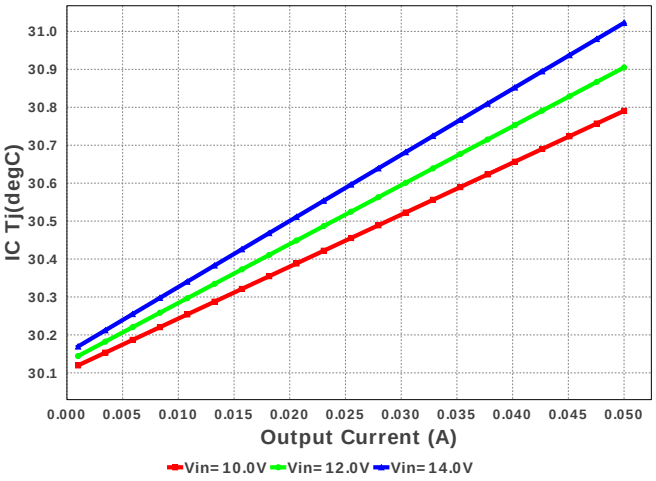
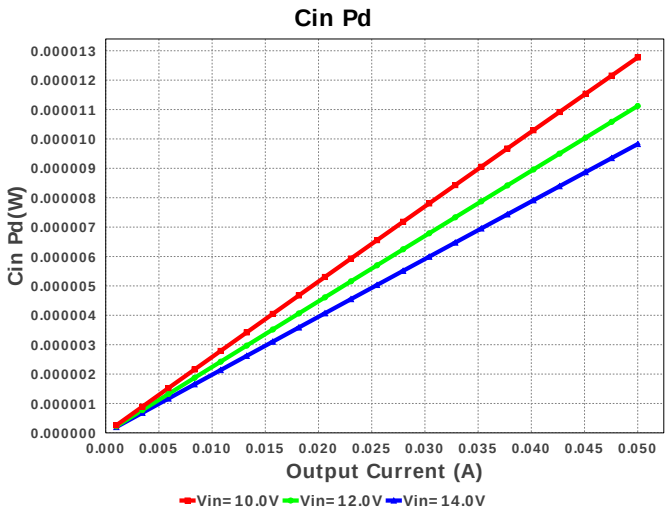
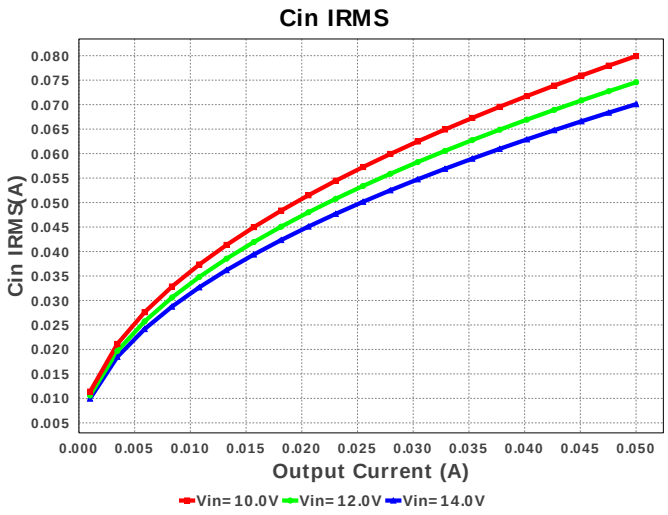
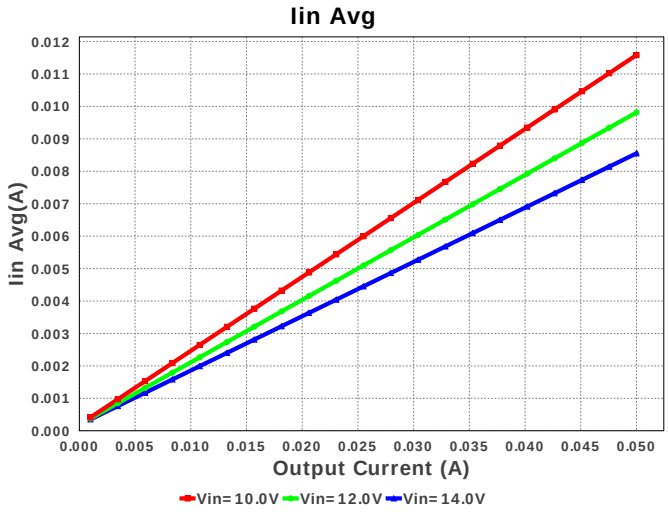
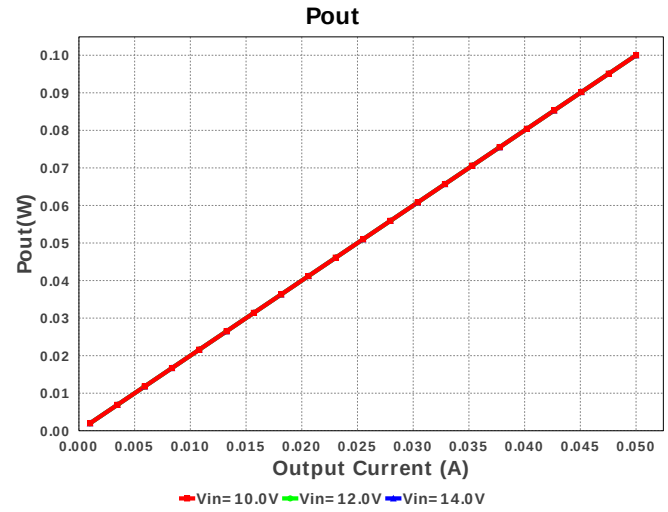
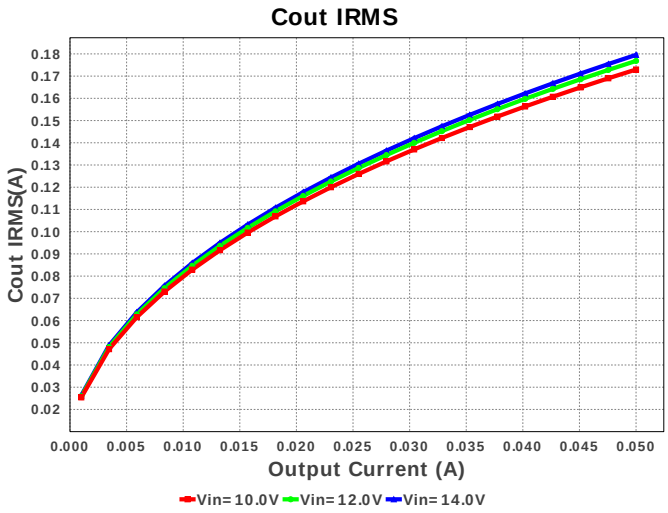


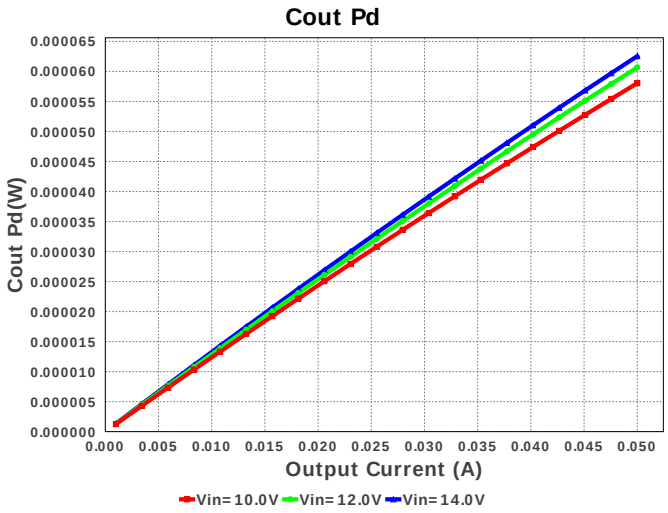


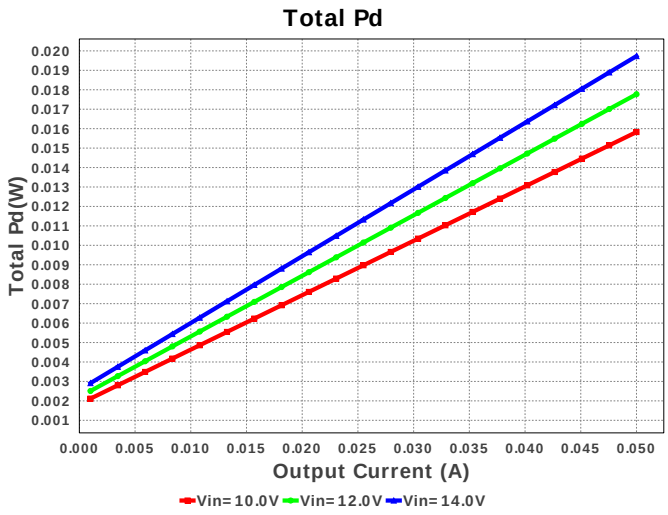


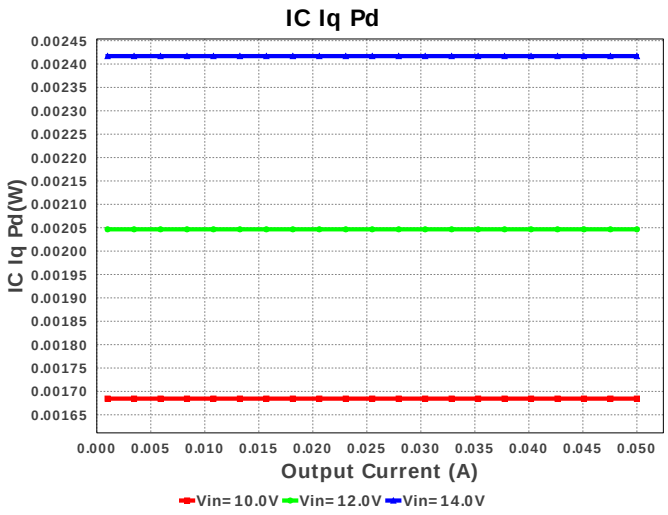


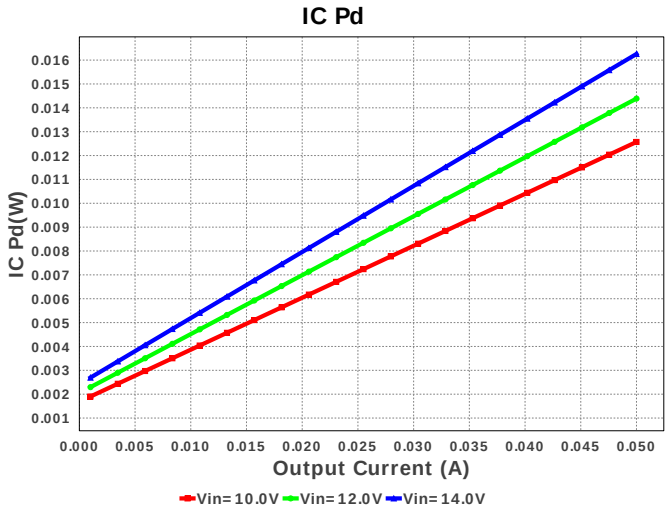


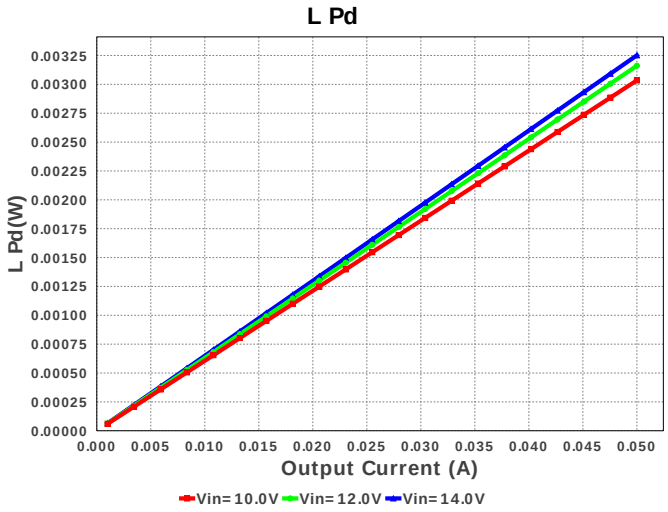


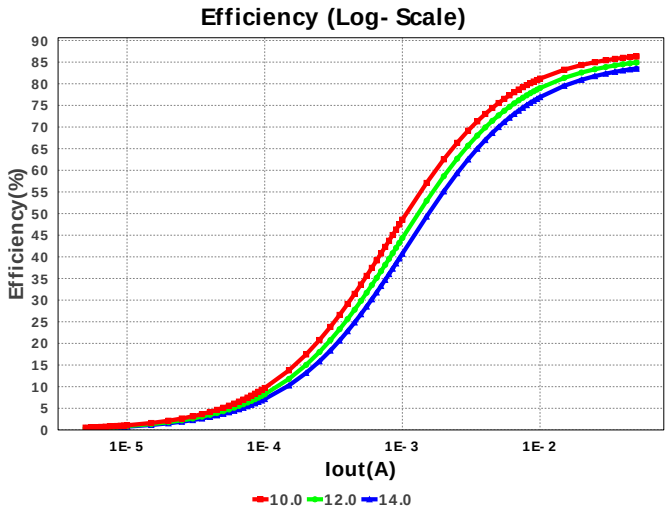












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	70.091 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	179.561 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	8.552 mA	Current	Average input current
4.	L Ipp	1.042 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	65.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	71.698 kHz	General	Switching frequency
8.	Mode	PFM	General	Conduction Mode
9.	Pout	100.0 mW	General	Total output power
10.	Total BOM	$1.07	General	Total BOM Cost
11.	Vout Actual	2.014 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors

#	Name	Value	Category	Description
12.	Vout OP	2.0 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	1.371 %	Op_point	Duty cycle
14.	Efficiency	83.52 %	Op_point	Steady state efficiency
15.	IC Tj	31.023 degC	Op_point	IC junction temperature
16.	ICThetaJA	62.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	50.0 mA	Op_point	Iout operating point
18.	VIN_OP	14.0 V	Op_point	Vin operating point
19.	Vout p-p	4.916 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	9.825 µW	Power	Input capacitor power dissipation
21.	Cout Pd	62.55 µW	Power	Output capacitor power dissipation
22.	IC Iq Pd	2.417 mW	Power	IC Iq Pd
23.	IC Pd	16.256 mW	Power	IC power dissipation
24.	L Pd	3.252 mW	Power	Inductor power dissipation
25.	Total Pd	19.732 mW	Power	Total Power Dissipation
26.	Vout Tolerance	2.59 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	50.0 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	2.0	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.

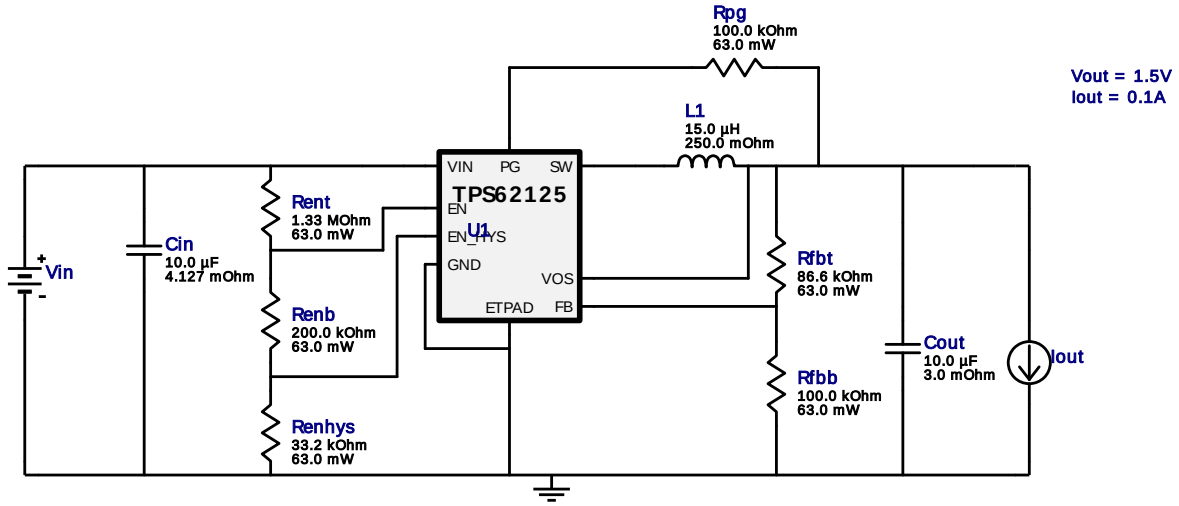
TEXAS INSTRUMENTS

WEBENCH® Design Report

Vout = 1.5V
Iout = 0.1A

Device = TPS62125DSGR
Topology = Buck
Created = 8/21/16 8:32:36 AM
BOM Cost = $0.71
BOM Count = 10
Total Pd = 0.02W

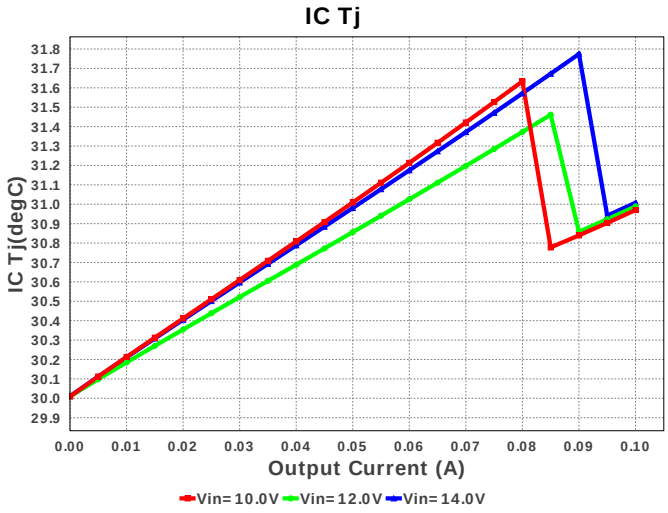
Design : 4009018/122 TPS62125DSGR
TPS62125DSGR 10.0V-14.0V to 1.50V @ 0.1A

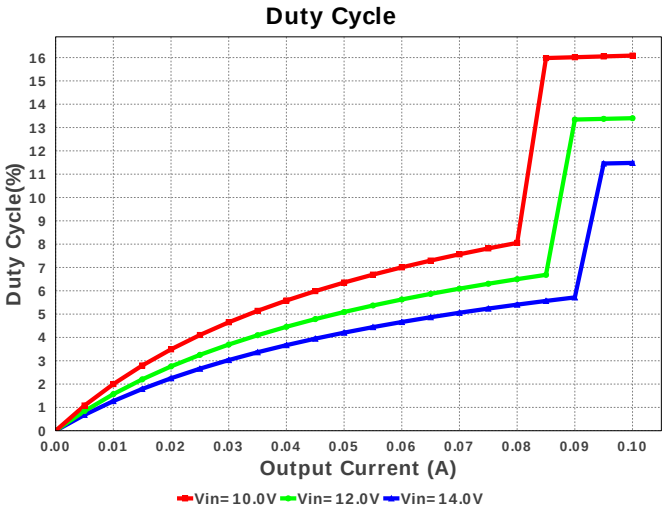


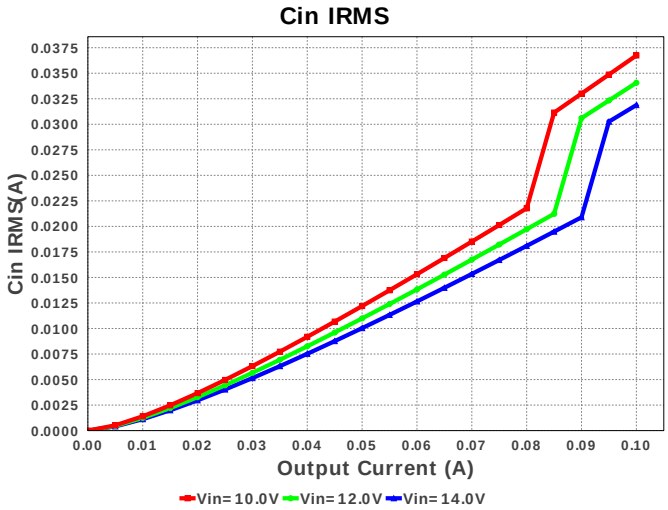
Electrical BOM

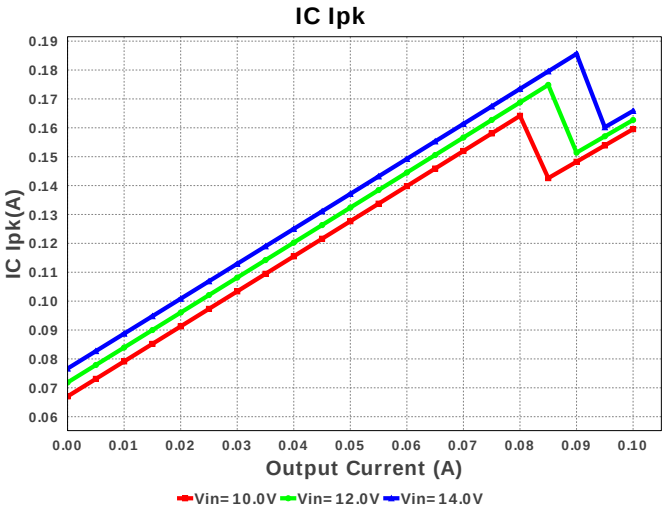
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	1	$0.03	0805 7 mm²
2.	Cout	MuRata	GRM188R60G106ME47D Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 4.0 V IRMS= 3.0 A	1	$0.02	0603 5 mm²
3.	L1	NIC Components	NPI43C150MTRF	L= 15.0 µH 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	CRCW040286K6FKED Series= CRCW..e3	Res= 86.6 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

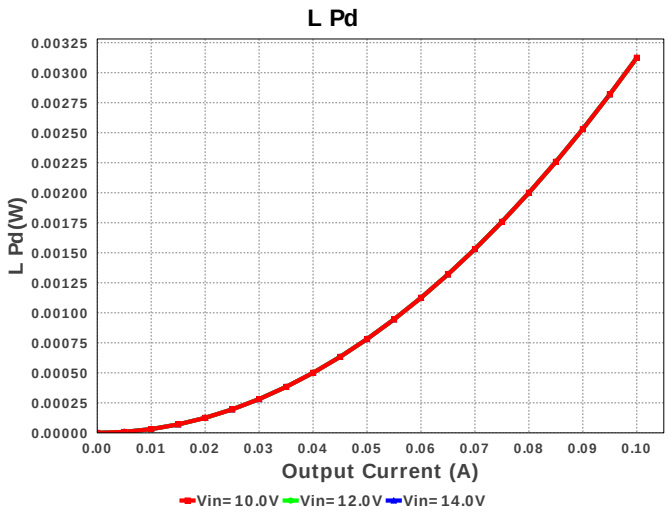
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	TPS62125DSGR	Switcher	1	$0.53	S-PWSON-N8 10 mm²

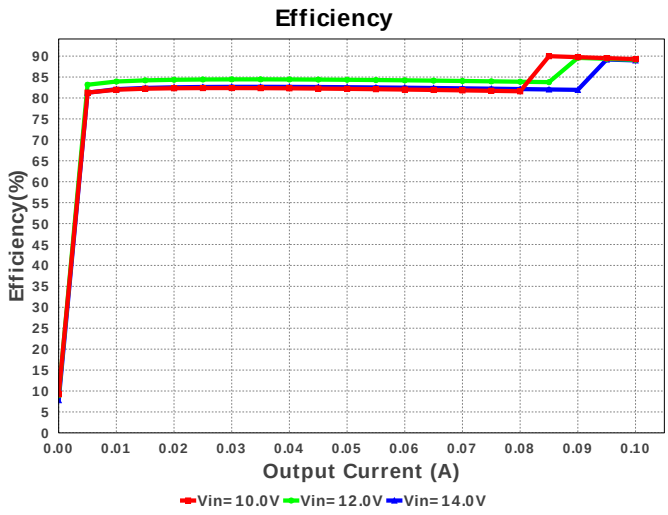


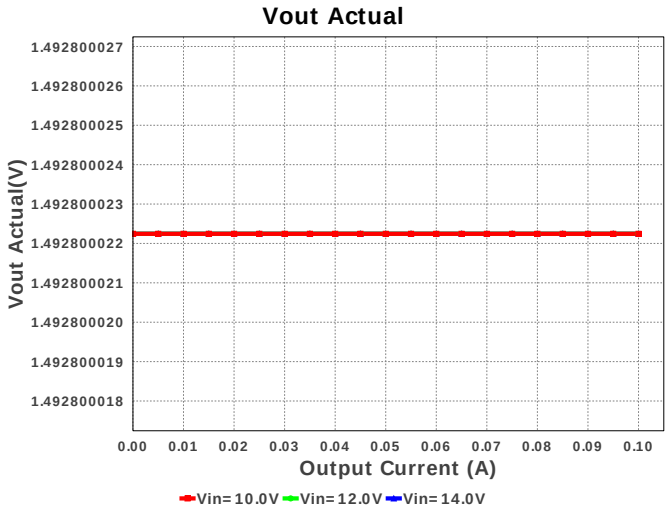


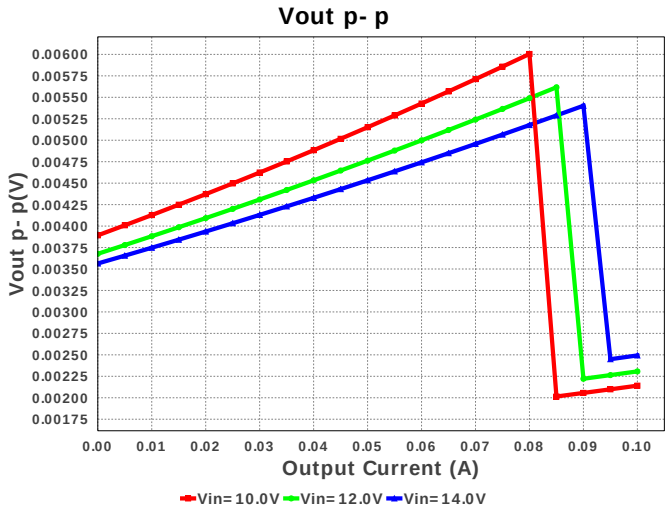


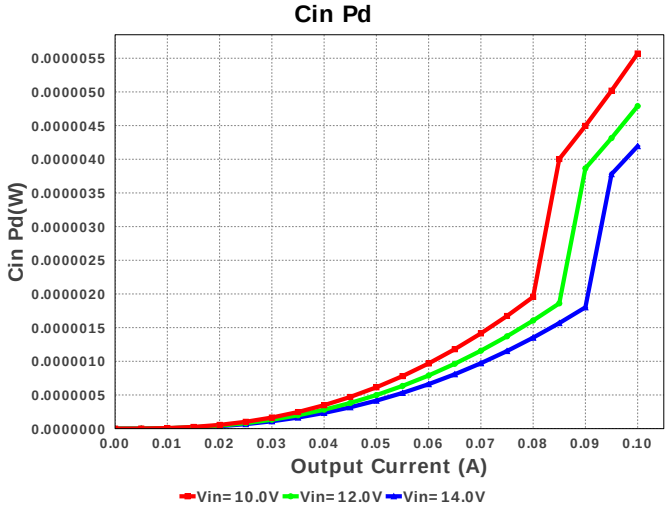


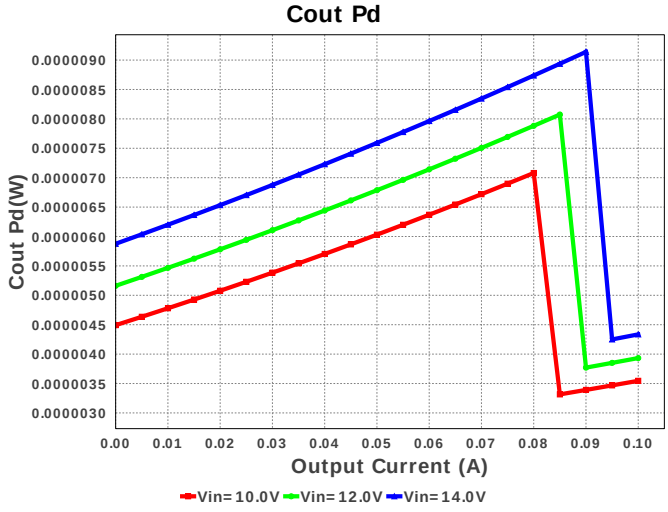












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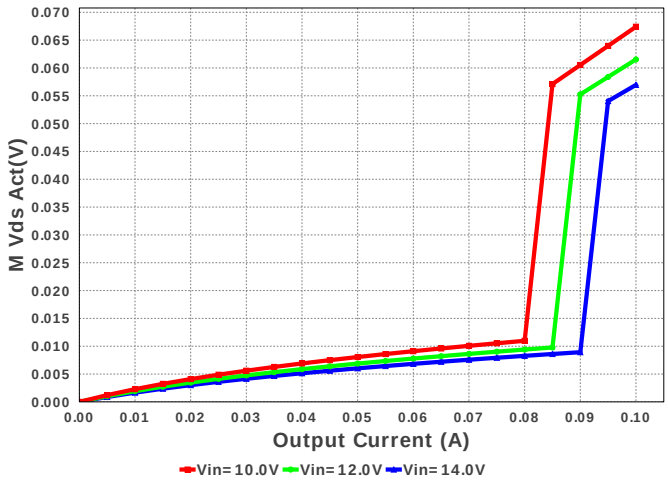
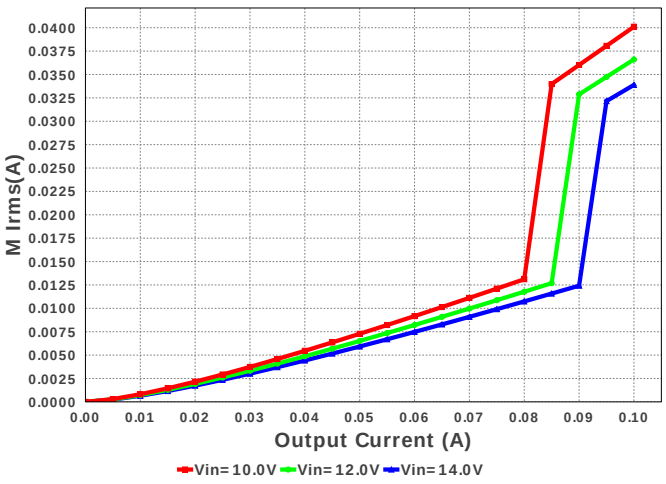


M Irms



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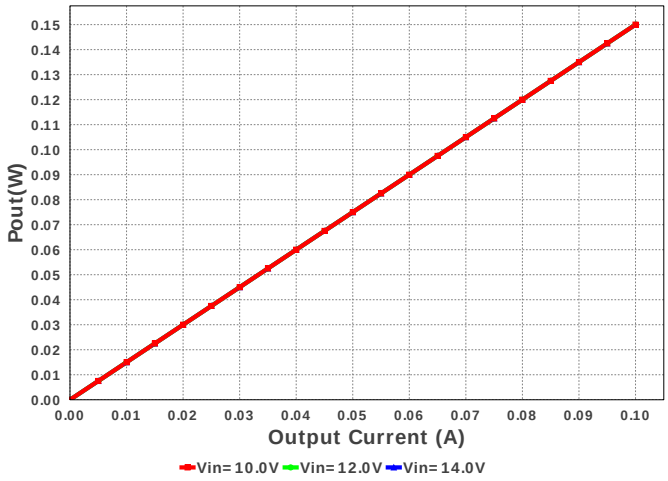

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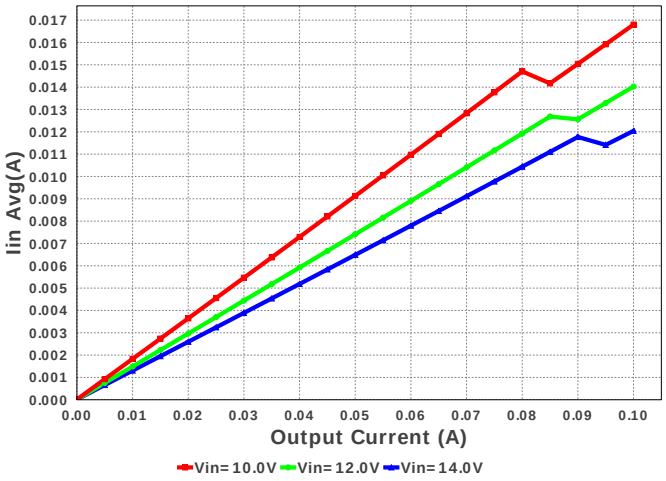

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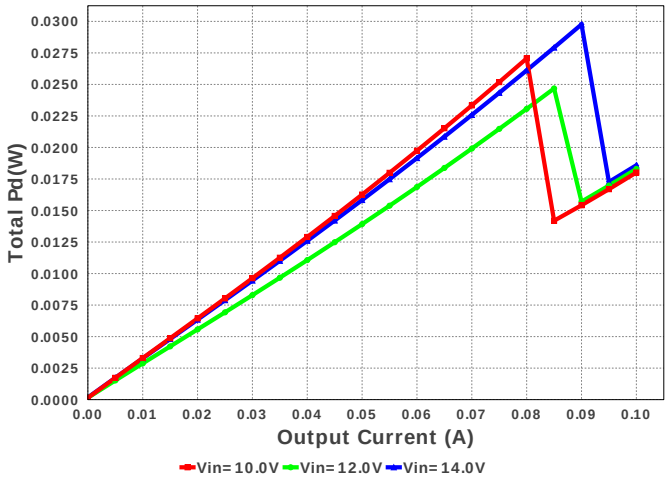

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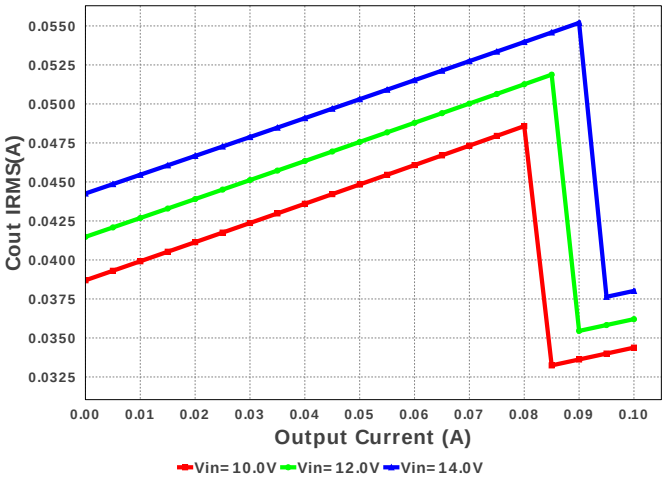

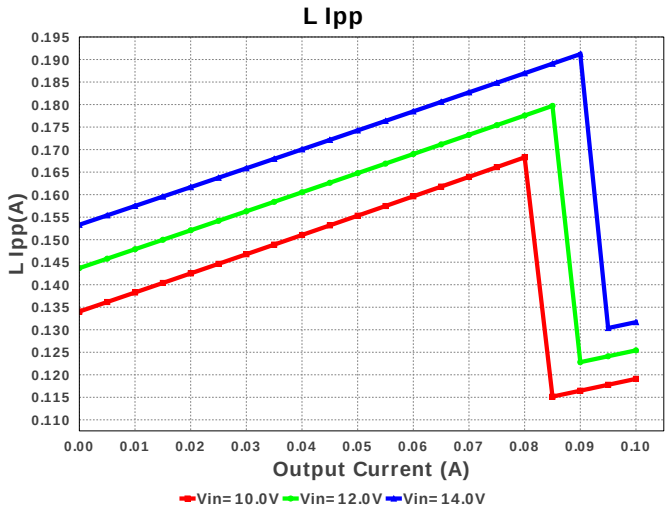

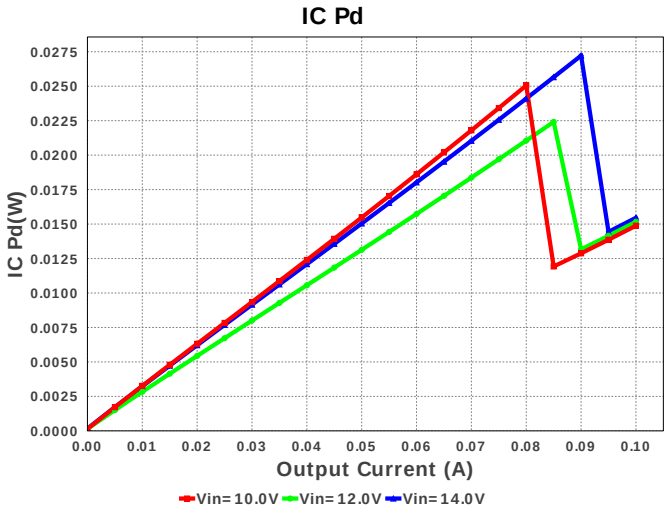

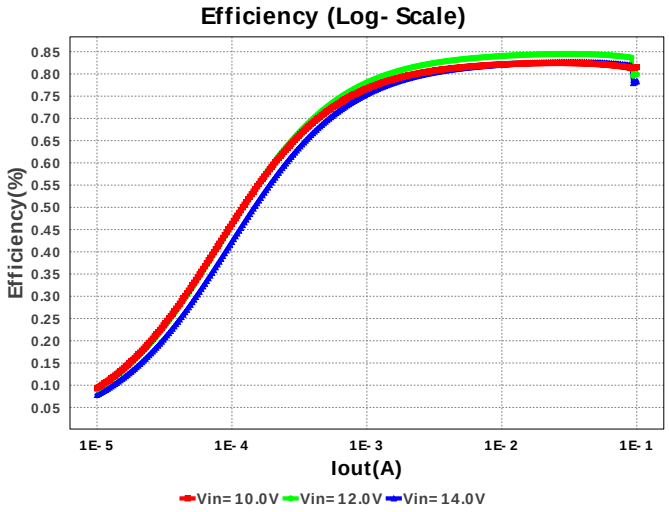

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	31.882 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	38.015 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	165.843 mA	Current	Peak switch current in IC
4.	Iin Avg	12.042 mA	Current	Average input current
5.	L Ipp	131.69 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	33.886 mA	Current	Q Iavg
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	70.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	726.657 kHz	General	Switching frequency
10.	IC Tolerance	20.2 mV	General	IC Feedback Tolerance
11.	M Vds Act	56.954 mV	General	Voltage drop across the MosFET
12.	Mode	CCM	General	Conduction Mode
13.	Pout	150.0 mW	General	Total output power
14.	Total BOM	$0.71	General	Total BOM Cost
15.	Vout Actual	1.493 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	1.5 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	11.483 %	Op_point	Duty cycle
18.	Efficiency	88.973 %	Op_point	Steady state efficiency
19.	IC Tj	31.008 degC	Op_point	IC junction temperature
20.	ICThetaJA	65.2 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	100.0 mA	Op_point	Iout operating point
22.	VIN_OP	14.0 V	Op_point	Vin operating point
23.	Vout p-p	2.493 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	4.195 µW	Power	Input capacitor power dissipation
25.	Cout Pd	4.335 µW	Power	Output capacitor power dissipation
26.	IC Pd	15.456 mW	Power	IC power dissipation
27.	L Pd	3.125 mW	Power	Inductor power dissipation
28.	Total Pd	18.59 mW	Power	Total Power Dissipation
29.	Vout Tolerance	3.486 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	100.0 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	1.5	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.