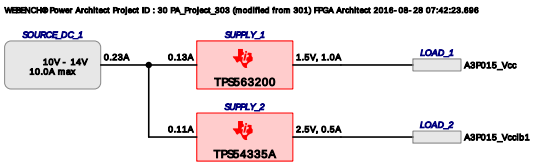
WEBENCH® Power Architect



Project Report

Project : 4009018/30 : PA_Project_303 (modified from 301)
Created : 2016-08-28 07:42:23.696
Optimize project optFactor=3

Project Summary

1.	Total System Efficiency	85.145 %
2.	Total System BOM Count	19.0
3.	Total System Footprint	320.0 mm2
4.	Total System BOM Cost	$2.35
5.	Total System Power Dissipation	479.8 mW

--> Launch WEBENCH Power Architect.

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_1	A3P015_Vcc
SUPPLY_2	0	LOAD_2	A3P015_Vccib1

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	1.0 A	85.7%	149	$1.06	131	4
2.	SUPPLY_2	TPS54335A	Switcher : 28V, 3A, Low Iq, Synchronous, monolithic buck converter with Eco-mode	2.5 V	0.5 A	84.5%	171	$1.29	132	9

Power Loads

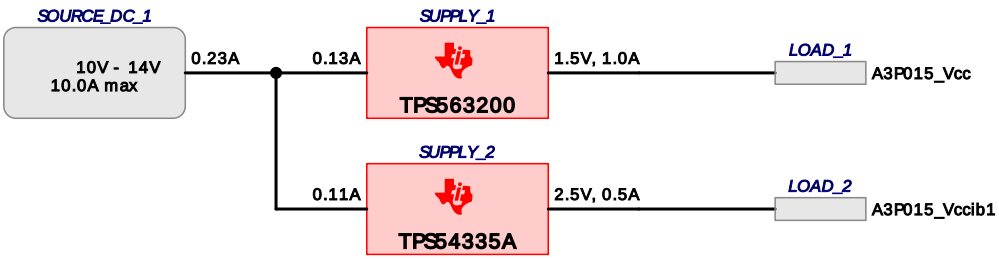
#	Name	VLoad	ILoad	Description
1.	A3P015_Vcc	1.5 V	1 A	VoutRipple=5%, SoftStart delay=1.0 mSec
2.	A3P015_Vccib1	2.5 V	0.5 A	VoutRipple=5%, SoftStart delay=1.0 mSec

FPGAs, Processors

#	Manufacturer	Part Number	Name	Series	Description
1.	Actel http://www.actel.com/documents/PA3_DS.pdf	A3P015	FPGA_1	ProASIC3	FPGA Actel ProASIC3 A3P015

Project Diagram

WEBENCH® Power Architect Project ID : 30 PA_Project_303 (modified from 301) FPGA Architect 2016-08-28 07:42:23.696



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm^2)
AVX	08053C104KAT2A	0805	1	$0.01	7
Kemet	C0805C104K5RACTU	0805	2	$0.01	14
TDK	C3216X6S0G476M	1206	1	$0.13	11
Yageo America	CC0805KRX7R9BB272	0805	1	$0.01	7
Vishay-Dale	CRCW0402100KFKED	0402	1	$0.01	3
Vishay-Dale	CRCW040210K0FKED	0402	1	$0.01	3
Vishay-Dale	CRCW0402634RFKED	0402	1	$0.01	3
Vishay-Dale	CRCW040295K3FKED	0402	1	$0.01	3
Vishay-Dale	CRCW04029K76FKED	0402	1	$0.01	3
MuRata	GRM155R60J154KE01D	0402	1	$0.01	3
MuRata	GRM21BR61C106KE15L	0805	1	$0.03	7
MuRata	GRM31CE70G476ME15L	1206_190	1	$0.10	11
MuRata	GRM32ER61E226KE15L	1210	1	$0.16	15
Yageo America	RC0603FR-0747KL	0603	1	$0.01	5
Bourns	SDR0604-330KL	SDR0604	1	$0.18	61
Bourns	SRN8040-1R5Y	SRN8040	1	$0.22	100
Texas Instruments	TPS54335ADDAR	R-PDSO-G8	1	$0.90	55
Texas Instruments	TPS563200DDCR	DDC0006A	1	$0.52	10
Total			19	$2.35	213.54774999999996

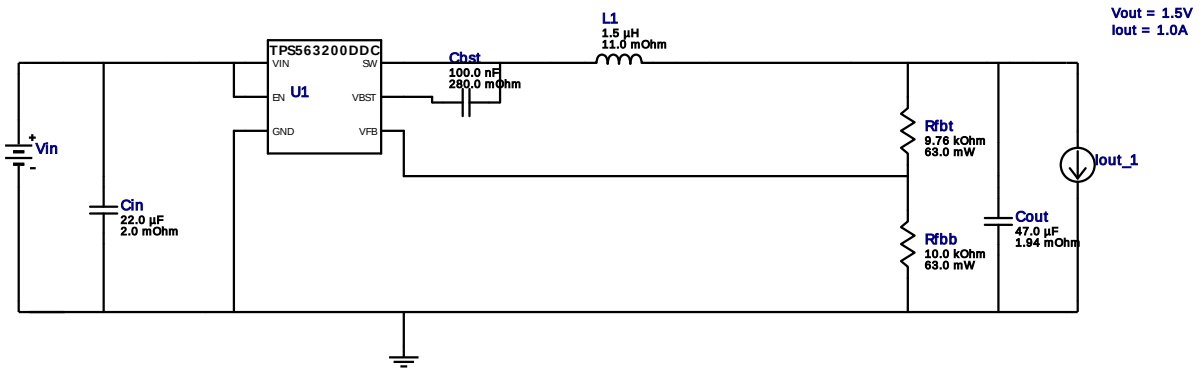
TEXAS INSTRUMENTS

WEBENCH® Design Report

Vout = 1.5V
Iout = 1.0A

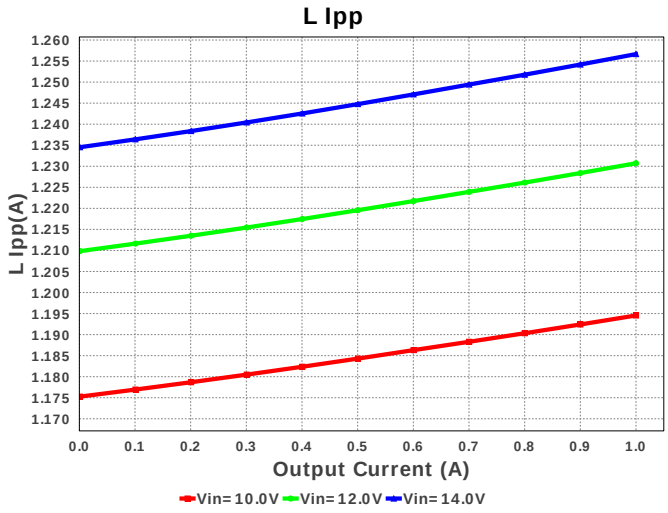
Device = TPS563200DDCR
Topology = Buck
Created = 8/28/16 7:42:23 AM
BOM Cost = $1.06
BOM Count = 7
Total Pd = 0.25W

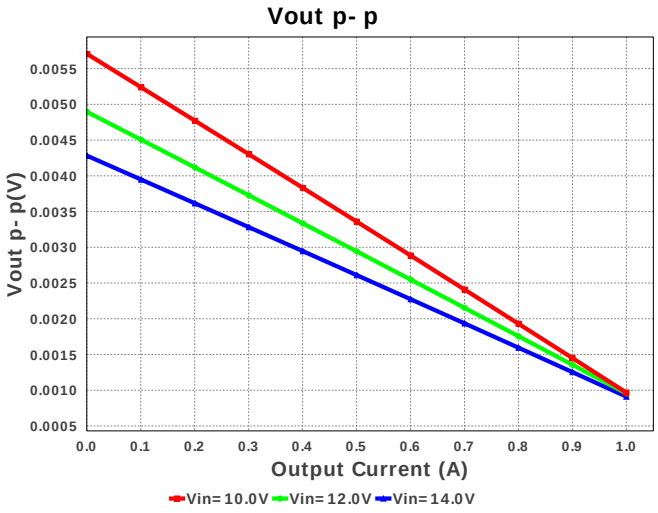
Design : 4009018/131 TPS563200DDCR
TPS563200DDCR 10.0V-14.0V to 1.50V @ 1.0A

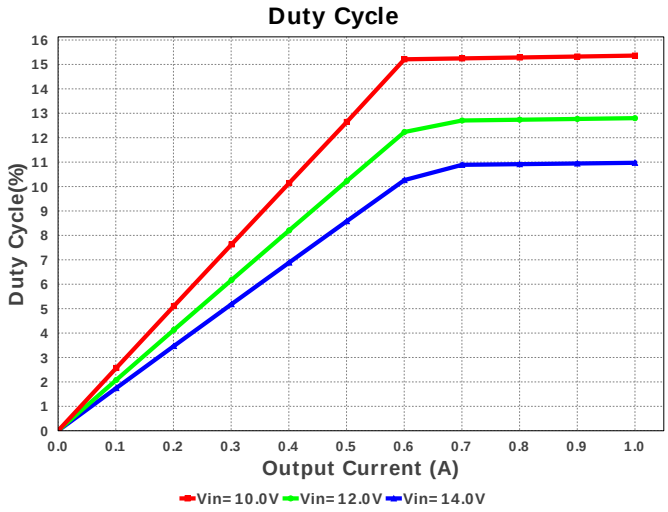


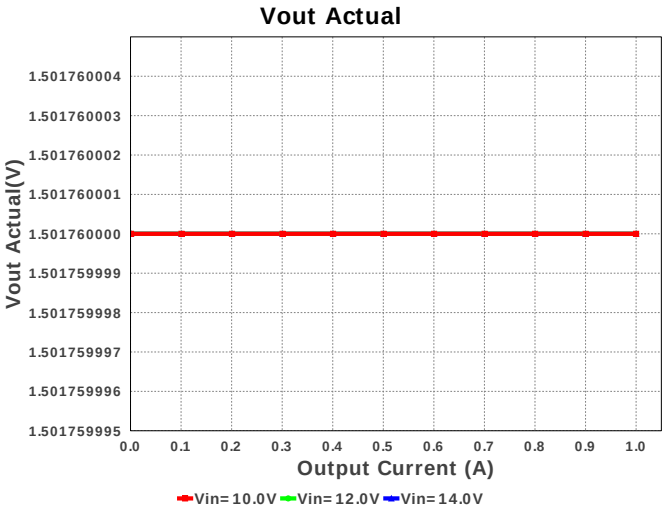
Electrical BOM

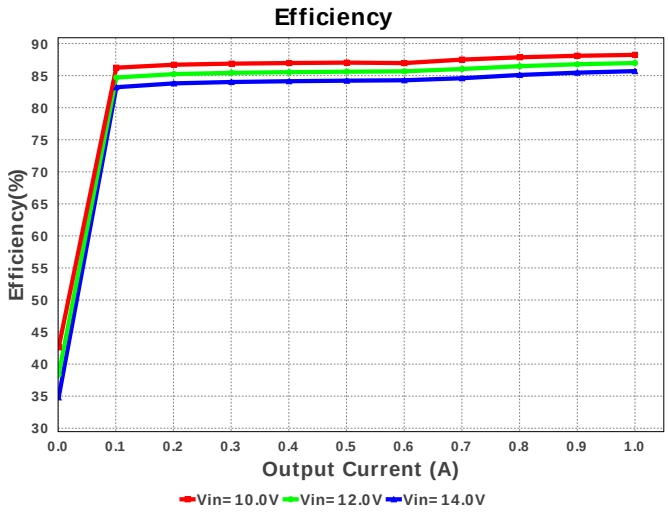
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	$0.16	1210 15 mm²
3.	Cout	TDK	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 µH 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.	Rfbt	Vishay-Dale	CRCW04029K76FKED Series= CRCW..e3	Res= 9.76 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

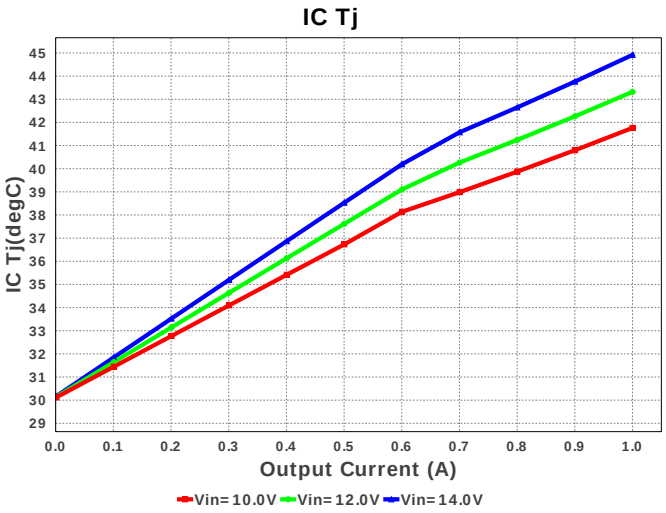


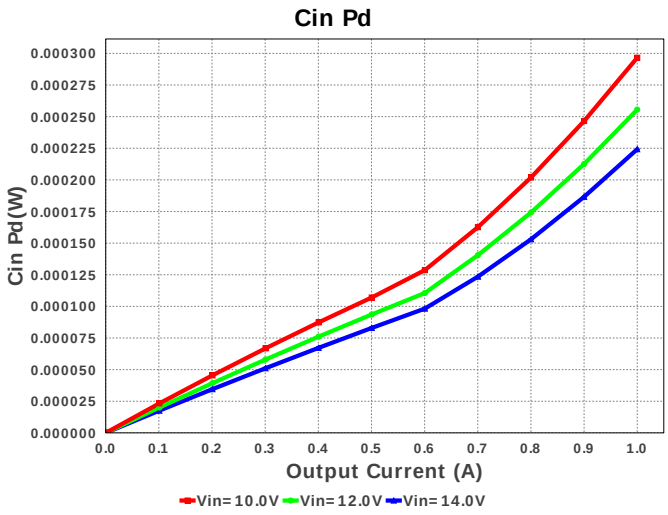


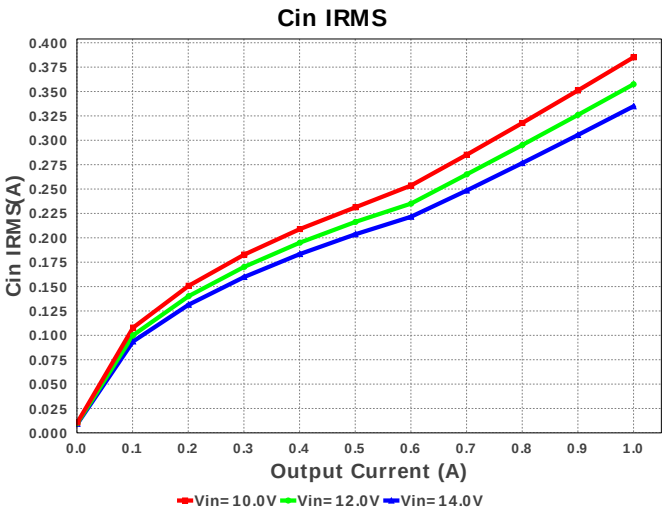


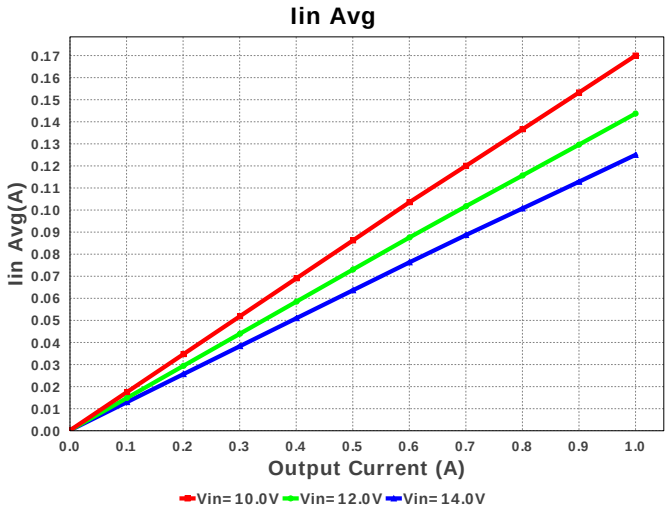


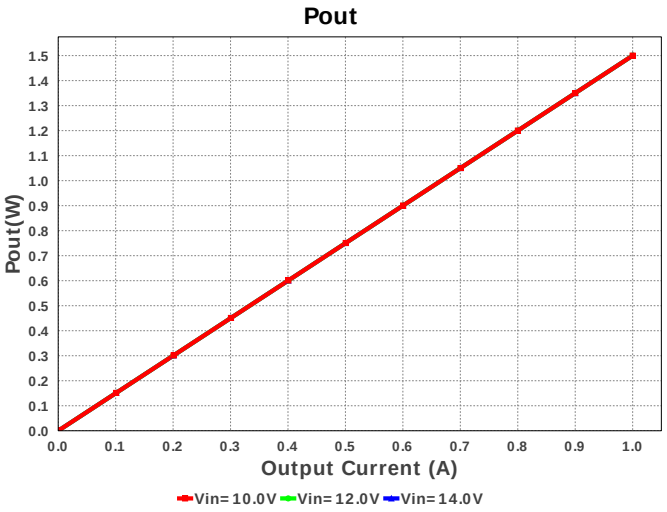


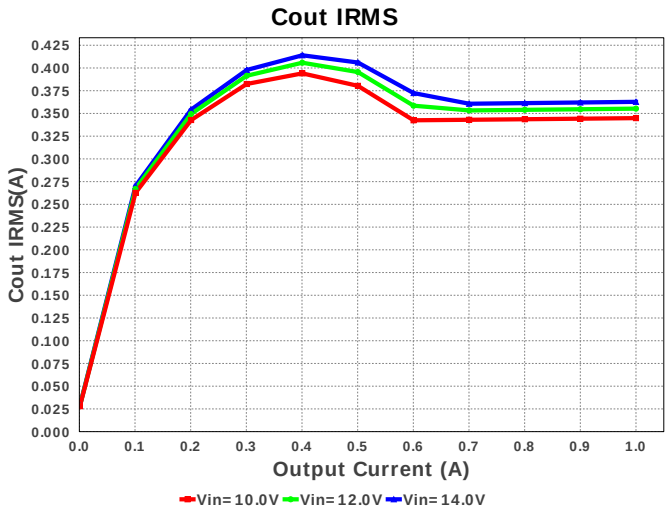


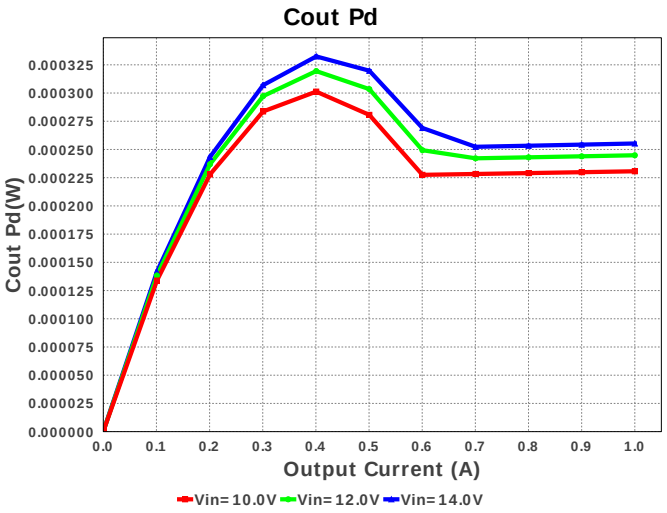


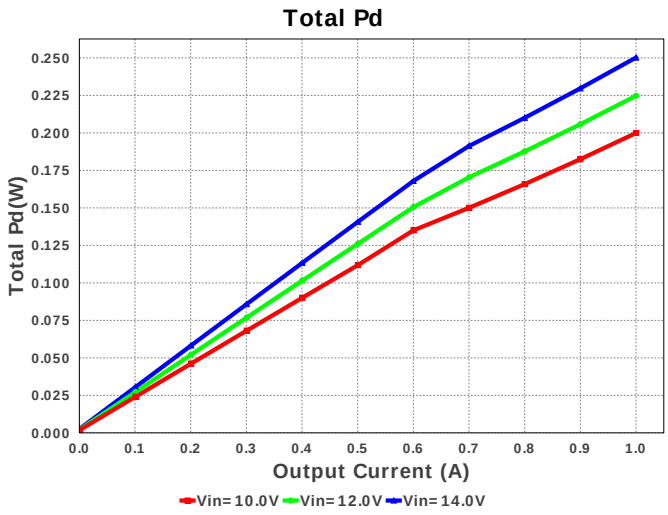


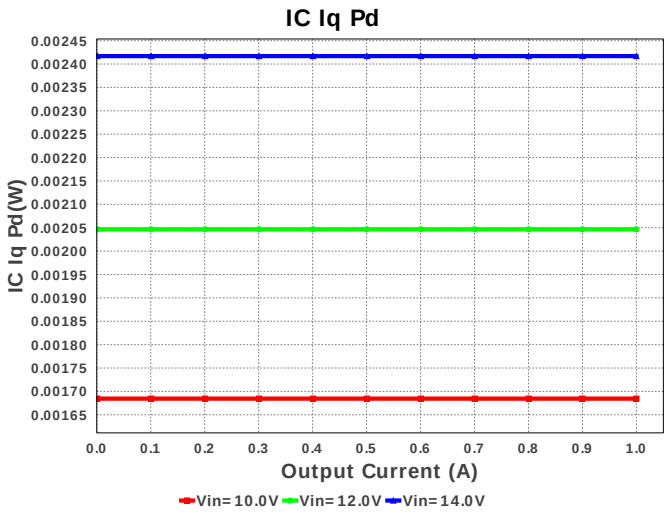


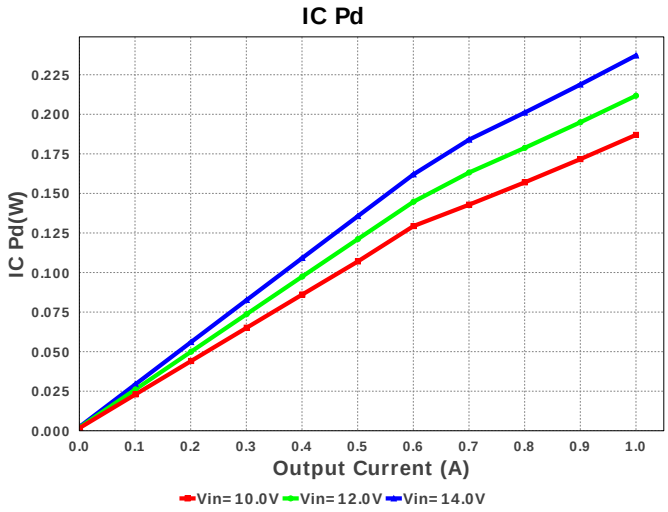


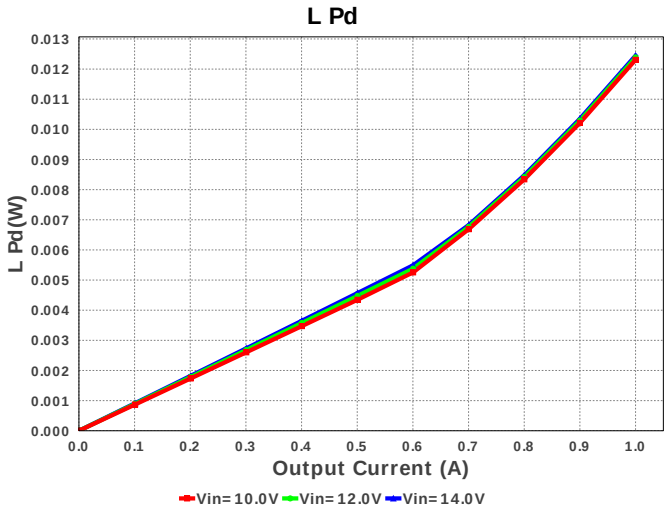


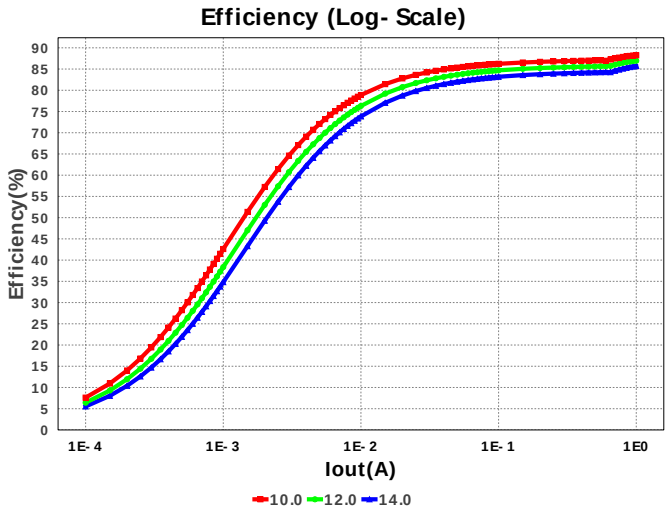












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	334.85 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	362.765 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	125.02 mA	Current	Average input current
4.	L Ipp	1.257 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	724.276 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	1.5 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

#	Name	Value	Category	Description
12.	Vout OP	1.5 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	10.972 %	Op_point	Duty cycle
14.	Efficiency	85.704 %	Op_point	Steady state efficiency
15.	IC Tj	44.918 degC	Op_point	IC junction temperature
16.	ICThetaJA	62.9 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	5.823 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	224.249 µW	Power	Input capacitor power dissipation
21.	Cout Pd	255.301 µW	Power	Output capacitor power dissipation
22.	IC Iq Pd	2.417 mW	Power	IC Iq Pd
23.	IC Pd	237.176 mW	Power	IC power dissipation
24.	L Pd	12.448 mW	Power	Inductor power dissipation
25.	Total Pd	250.22 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	1.0	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	1.5	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

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

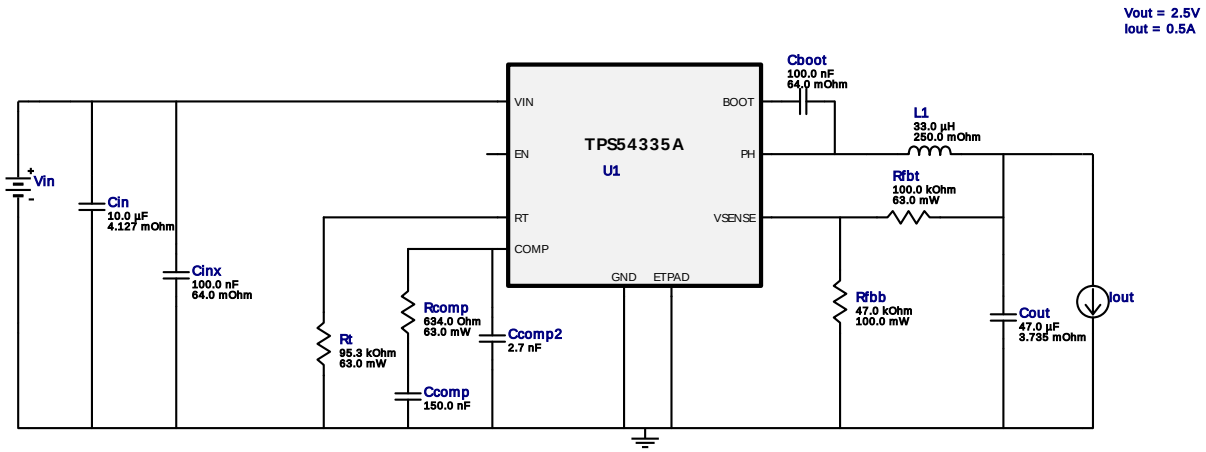
TEXAS INSTRUMENTS

WEBENCH® Design Report

Vout = 2.5V
Iout = 0.5A

Device = TPS54335ADDAR
Topology = Buck
Created = 8/28/16 7:42:23 AM
BOM Cost = $1.29
BOM Count = 12
Total Pd = 0.23W

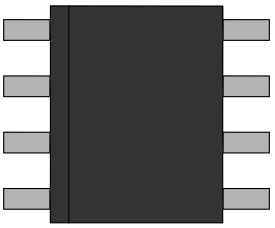
Design : 4009018/132 TPS54335ADDAR
TPS54335ADDAR 10.0V-14.0V to 2.50V @ 0.5A

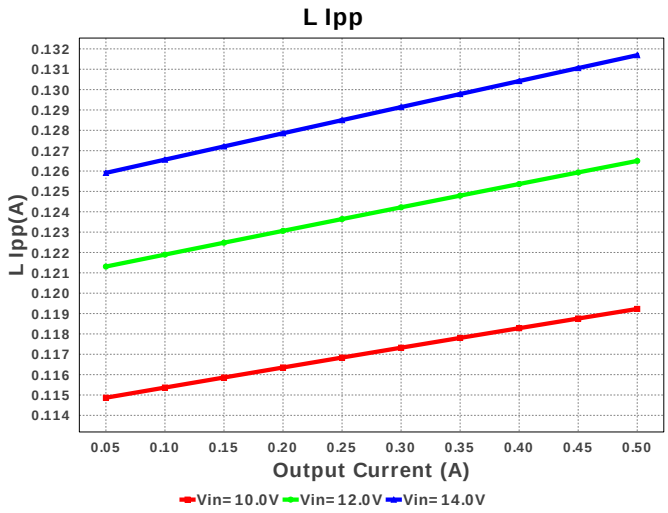


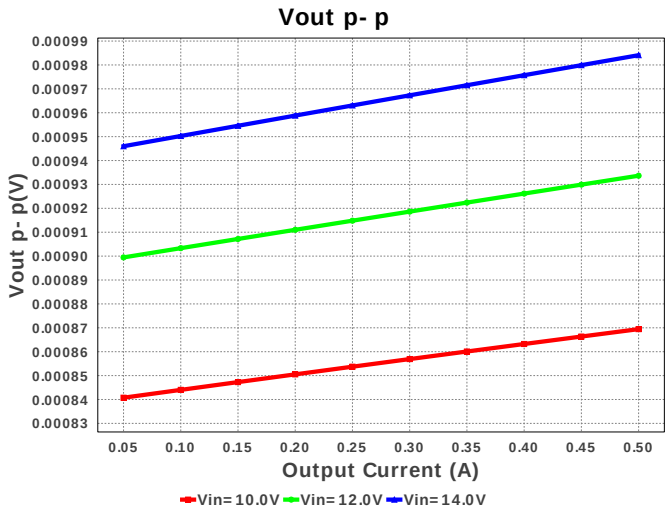
Electrical BOM

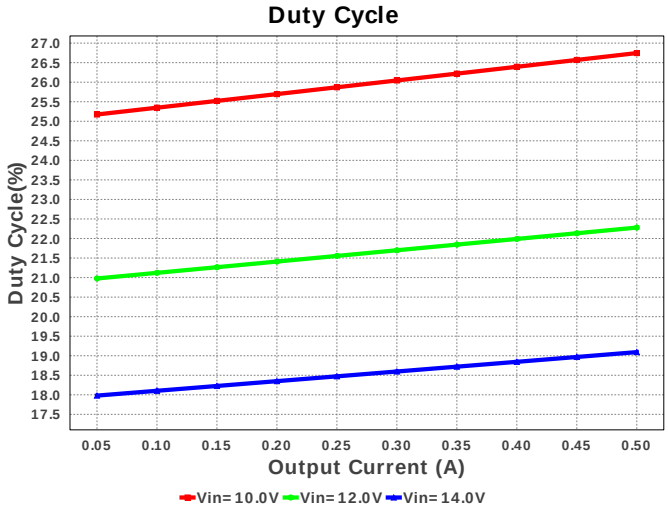
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Ccomp	MuRata	GRM155R60J154KE01D Series= X5R	Cap= 150.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB272 Series= X7R	Cap= 2.7 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	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
5.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
6.	Cout	MuRata	GRM31CE70G476ME15L Series= X7U	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 4.0 V IRMS= 4.1841 A	1	$0.10	1206_190 11 mm²
7.	L1	Bourns	SDR0604-330KL	L= 33.0 µH DCR= 250.0 mOhm	1	$0.18	SDR0604 61 mm²
8.	Rcomp	Vishay-Dale	CRCW0402634RFKED Series= CRCW..e3	Res= 634.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfbb	Yageo America	RC0603FR-0747KL Series= ?	Res= 47.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
10.	Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

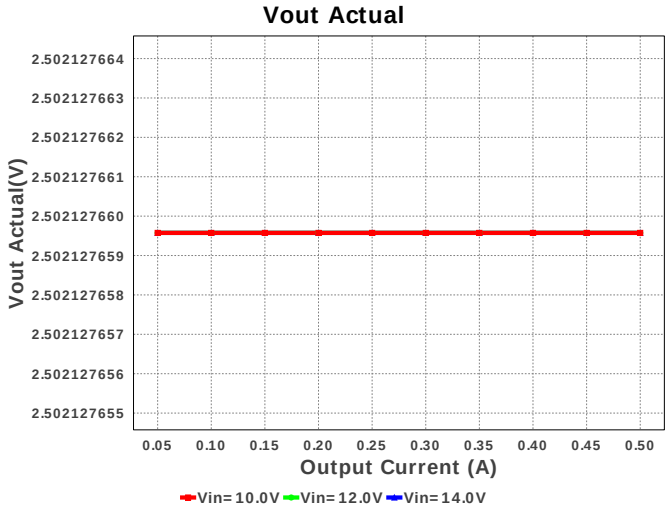
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rt	Vishay-Dale	CRCW040295K3FKED Series= CRCW..e3	Res= 95.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
12.	U1	Texas Instruments	TPS54335ADDAR	Switcher	1	$0.90	R-PDSO-G8 55 mm^2

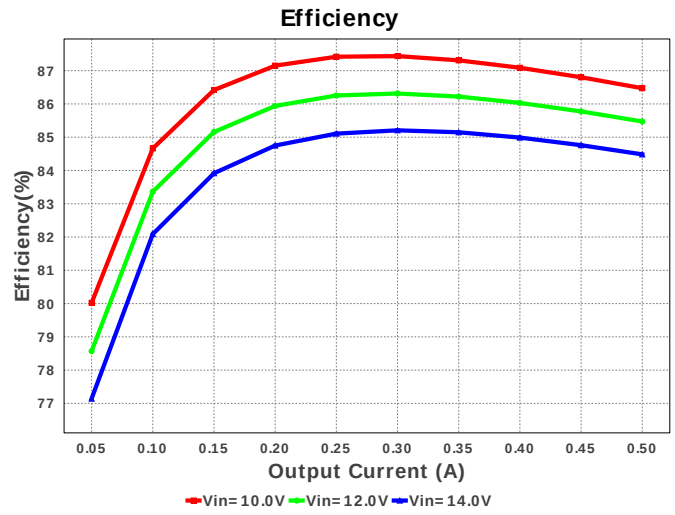


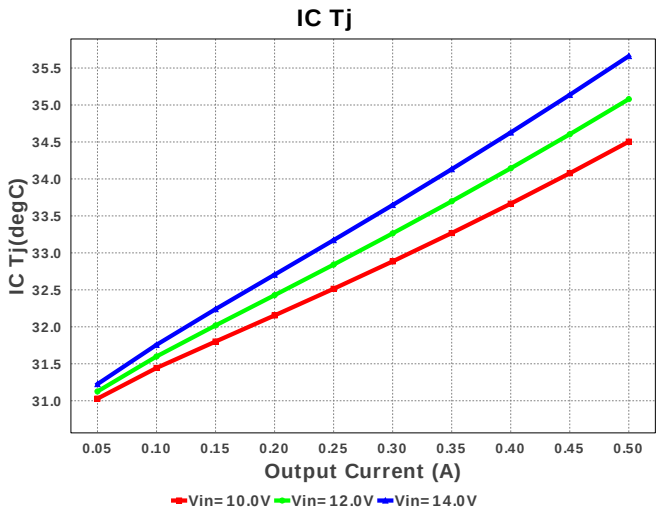


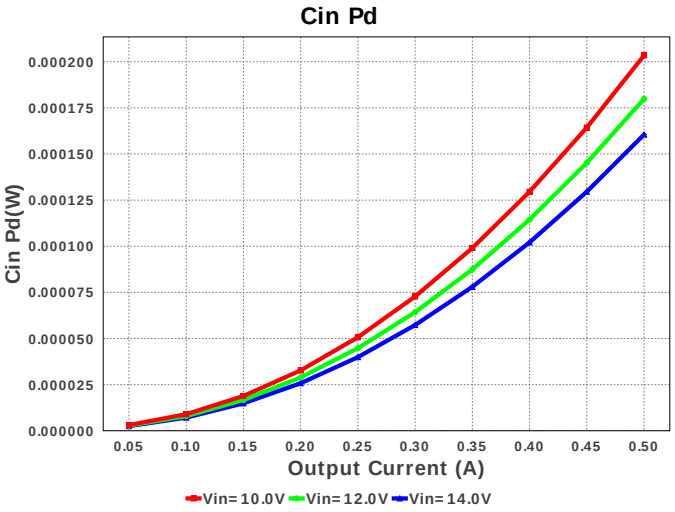


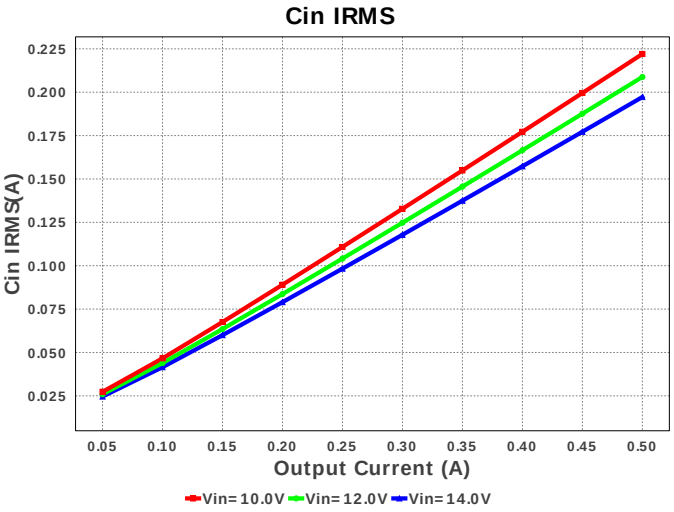


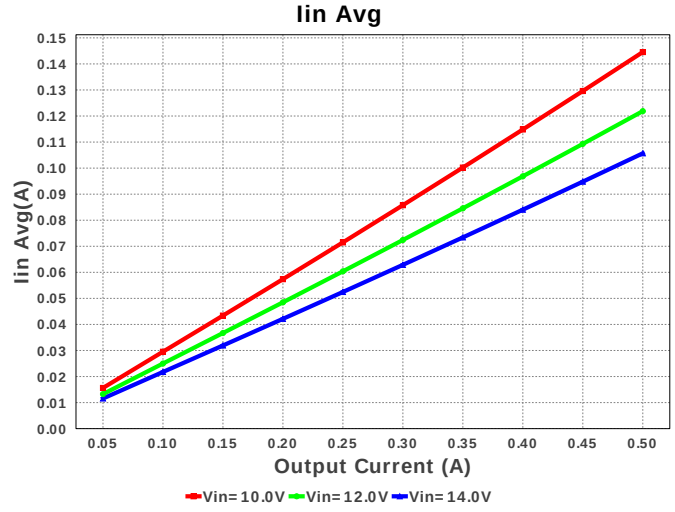


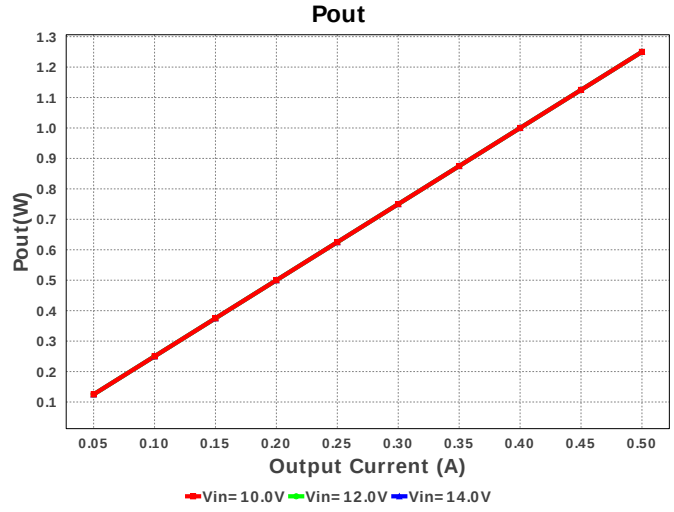


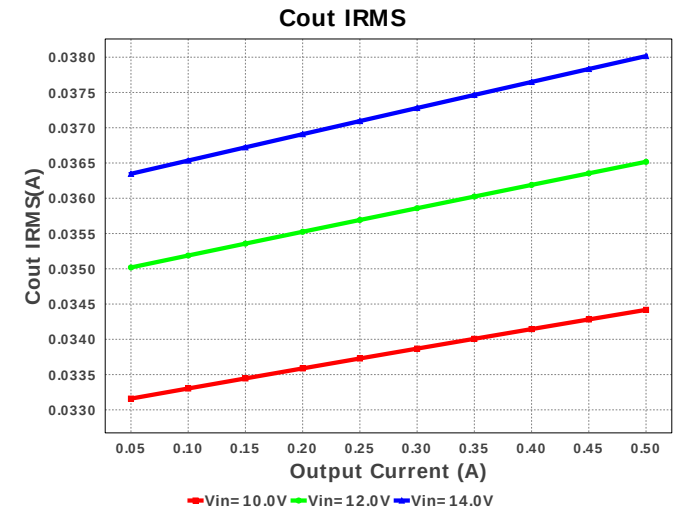


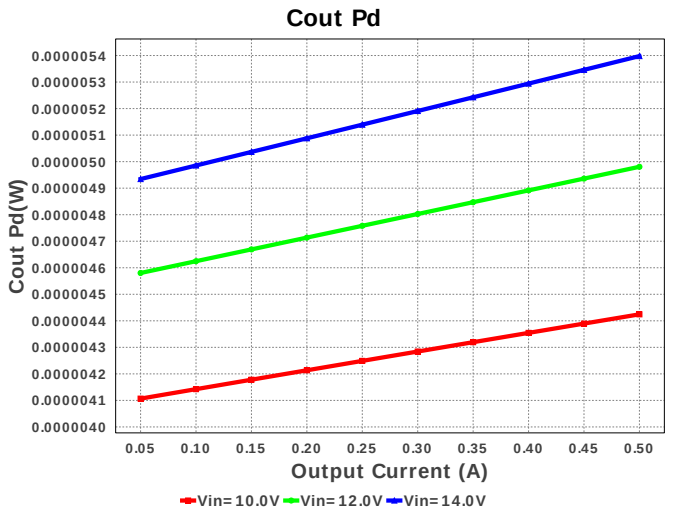


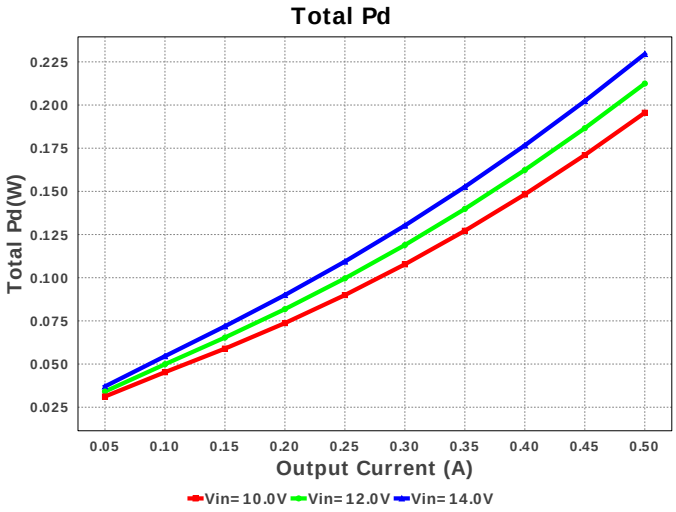


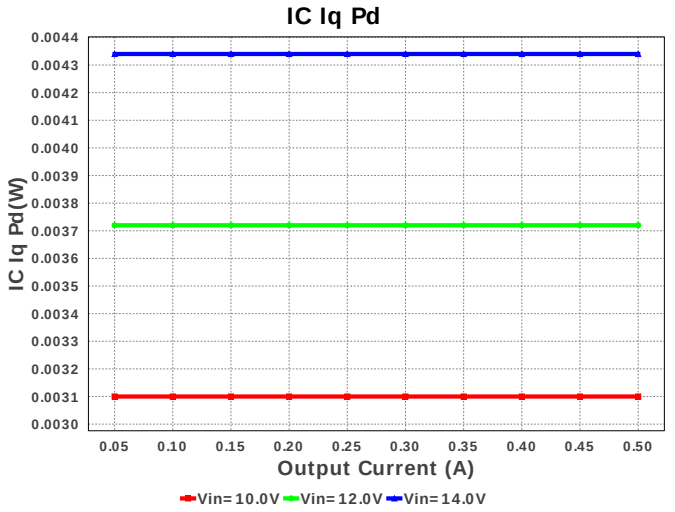


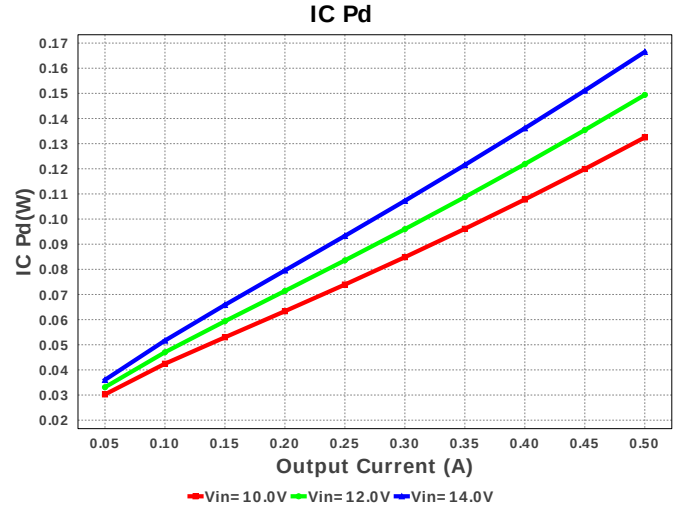


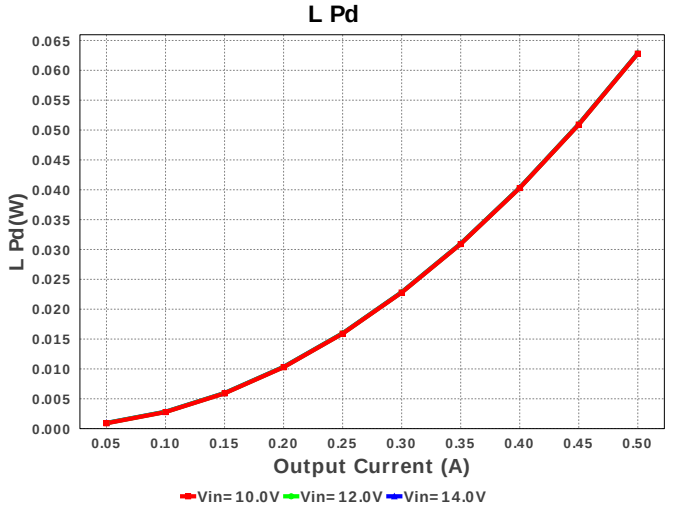


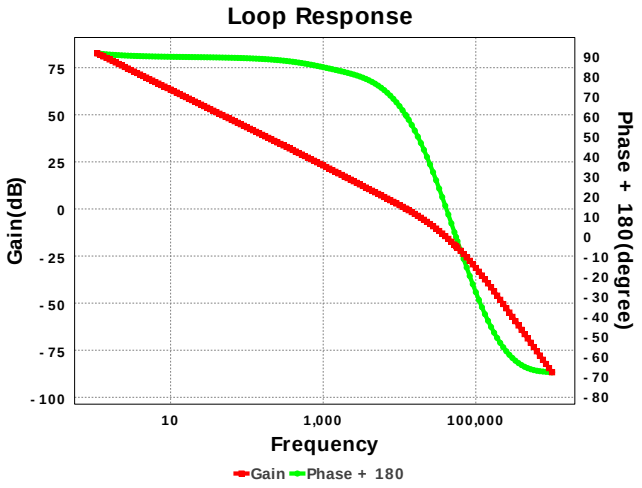












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	197.216 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	38.016 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	105.68 mA	Current	Average input current
4.	L Ipp	131.69 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	171.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	496.814 kHz	General	Switching frequency
8.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
9.	Mode	CCM	General	Conduction Mode
10.	Pout	1.25 W	General	Total output power
11.	Total BOM	$1.29	General	Total BOM Cost
12.	ICThetaJA Effective	34.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
13.	Low Freq Gain	82.566 dB	Op_Point	Gain at 10Hz
14.	Vout Actual	2.502 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	2.5 V	Op_Point	Operational Output Voltage
16.	Cross Freq	12.304 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	19.092 %	Op_point	Duty cycle
18.	Efficiency	84.484 %	Op_point	Steady state efficiency
19.	Gain Marg	-19.793 dB	Op_point	Bode Plot Gain Margin
20.	IC Tj	35.661 degC	Op_point	IC junction temperature
21.	IOUT_OP	500.0 mA	Op_point	Iout operating point
22.	Phase Marg	60.519 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	14.0 V	Op_point	Vin operating point
24.	Vout p-p	984.085 µV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	160.516 µW	Power	Input capacitor power dissipation
26.	Cout Pd	5.398 µW	Power	Output capacitor power dissipation
27.	IC Iq Pd	4.34 mW	Power	IC Iq Pd
28.	IC Pd	166.509 mW	Power	IC power dissipation
29.	L Pd	62.861 mW	Power	Inductor power dissipation
30.	Total Pd	229.562 mW	Power	Total Power Dissipation
31.	Vout Tolerance	2.895 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 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	2.5	Output Voltage
6.	base_pn	TPS54335A	Texas Instruments Base Part Number
7.	source	DC	Input Source Type
8.	ta	30.0	Ambient temperature

Design Assistance

1. TPS54335A Product Folder : http://www.ti.com/product/TPS54335A : contains the data sheet and other resources.