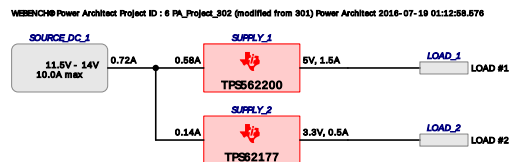


WEBENCH® Power Architect



Project Report

Project : 3496425/6 : PA_Project_302 (modified from 301)

Created : 2016-07-19 01:12:58.576

Optimize project optFactor=3

Project Summary

1. Total System Efficiency	91.08 %
2. Total System BOM Count	12.0
3. Total System Footprint	163.0 mm ²
4. Total System BOM Cost	\$1.91
5. Total System Power Dissipation	896.1 mW

--> Launch WEBENCH Power Architect.

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_1	LOAD #1
SUPPLY_2	0	LOAD_2	LOAD #2

Power Supplies

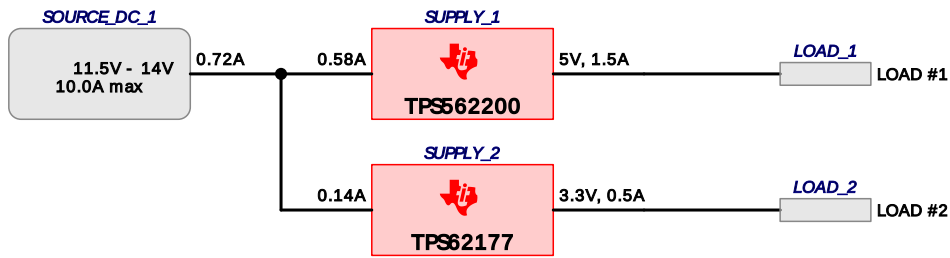
#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	TPS562200	Switcher : 17V, 2A,6-pin, Low Iq Synchronous buck converter with Advanced Eco-mode	5 V	1.5 A	92.5%	113	\$0.89	32	4
2.	SUPPLY_2	TPS62177	Switcher : Fixed 3.3Vout, High Light-Load Efficiency Buck Converter	3.3 V	0.5 A	85.2%	50	\$1.02	33	9

Power Loads

#	Name	VLoad	ILoad	Description
1.	LOAD #1	5 V	1.5 A	VoutRipple=5%, SoftStart delay=50.0 µSec
2.	LOAD #2	3.3 V	0.5 A	VoutRipple=10%

Project Diagram

WEBENCH® Power Architect Project ID : 6 PA_Project_302 (modified from 301) Power Architect 2016-07-19 01:12:58.576



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
AVX	08053C104KAT2A	0805	1	\$0.01	7
Vishay-Dale	CRCW0402100KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040210K0FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040256K2FKED	0402	1	\$0.01	3
MuRata	GRM188R61C225KE15D	0603	1	\$0.02	5
MuRata	GRM21BR60J226ME39L	0805	1	\$0.04	7
MuRata	GRM31CR61A226KE19L	1206_190	1	\$0.07	11
MuRata	GRM32ER61E226KE15L	1210	1	\$0.16	15
Coilcraft	LPS4018-103MRB	LPS4018	1	\$0.35	24
Bourns	SRN6045-4R7Y	SRN6045	1	\$0.16	64
Texas Instruments	TPS562200DDCR	DDC0006A	1	\$0.47	10
Texas Instruments	TPS62177DQCR	R- PWSN- N10	1	\$0.60	12
Total			12	\$1.91	163.2775

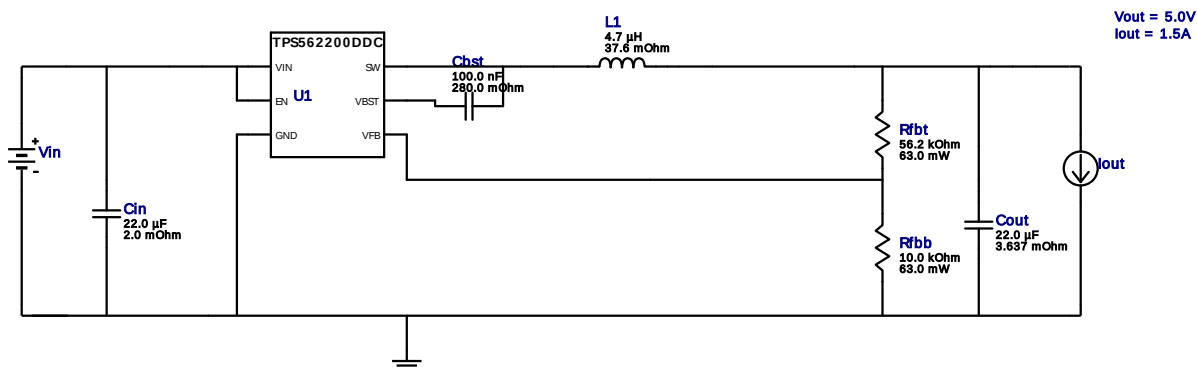


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Iout = 1.5A

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Topology = Buck
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BOM Count = 7
Total Pd = 0.61W

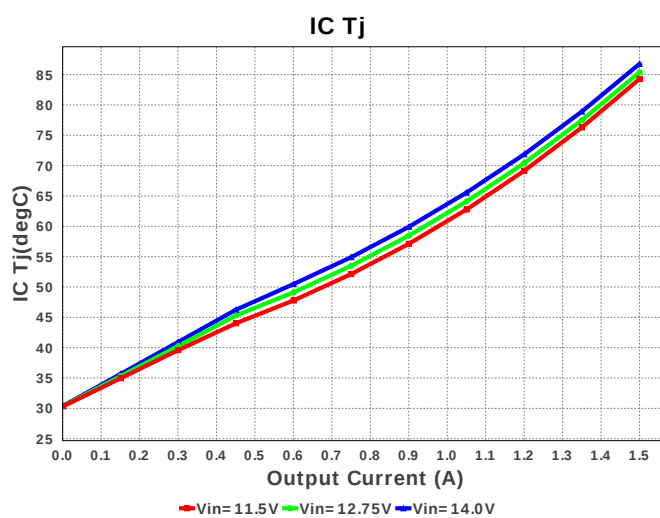
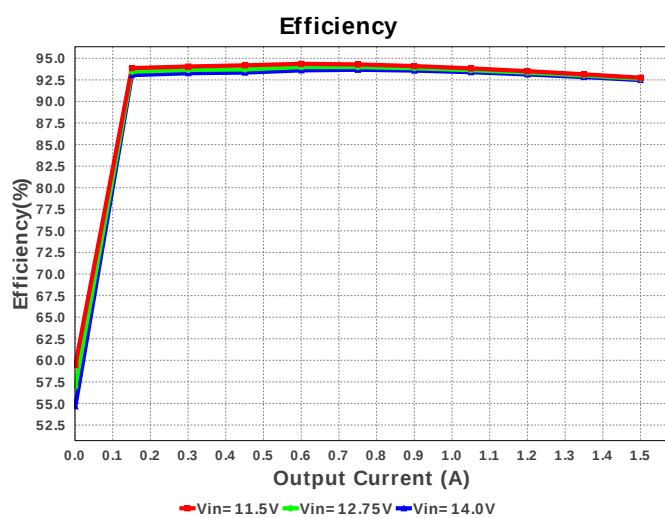
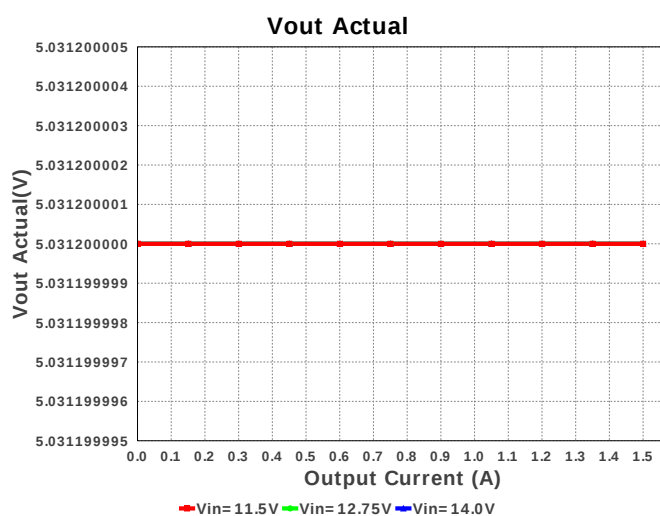
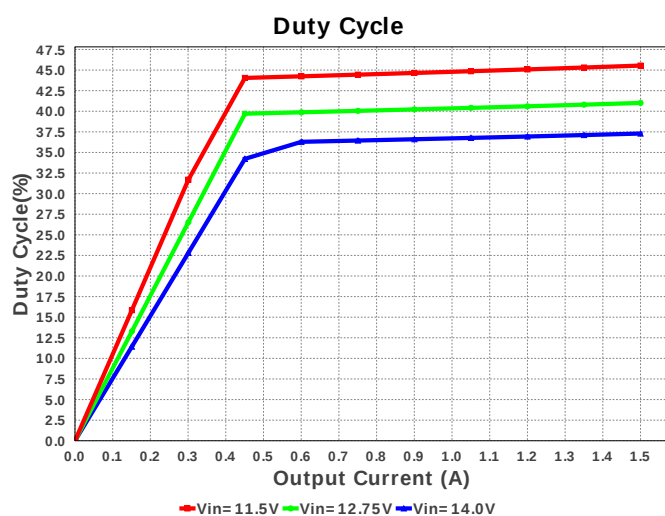
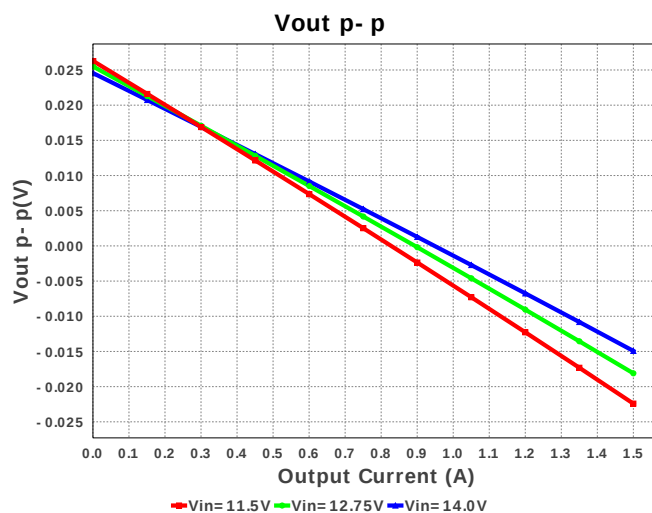
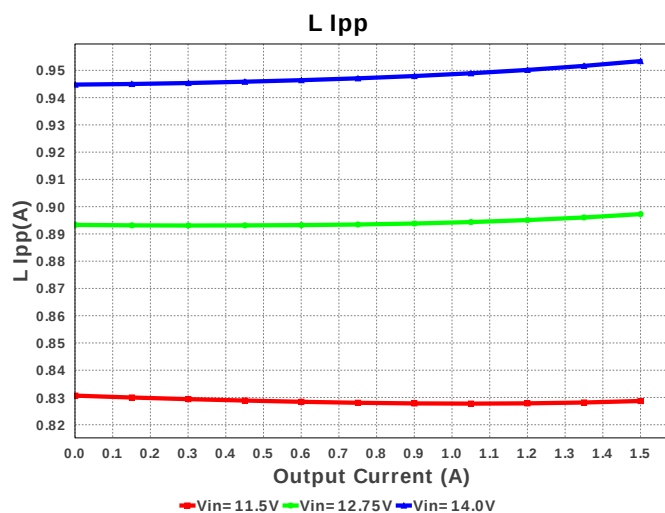
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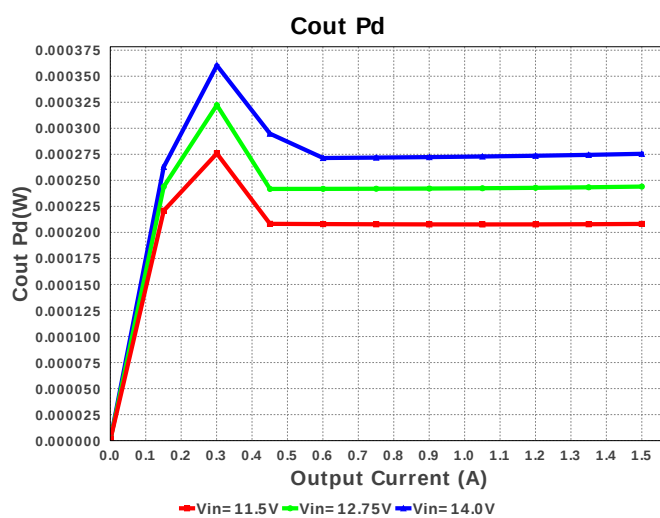
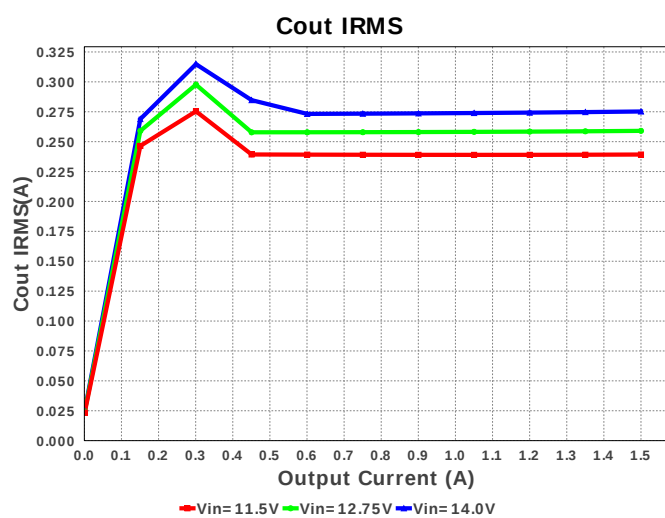
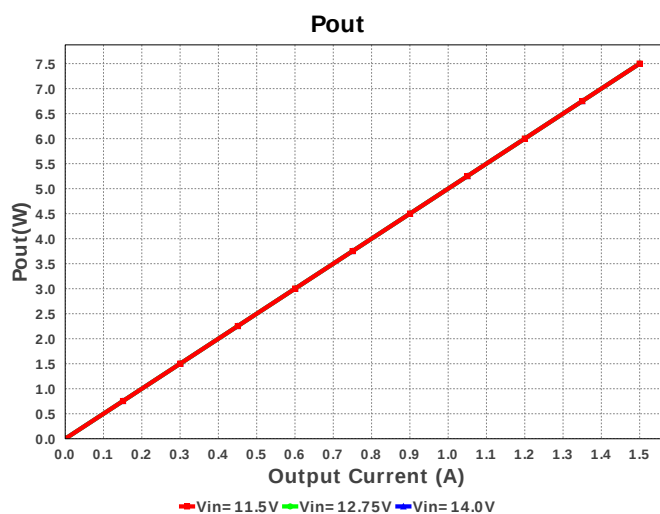
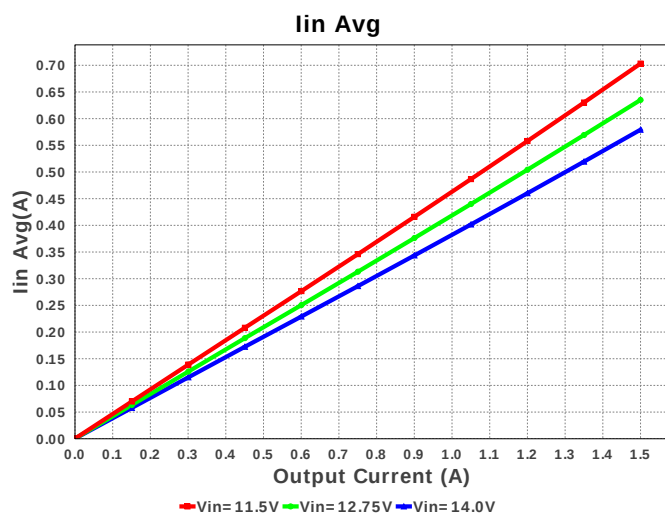
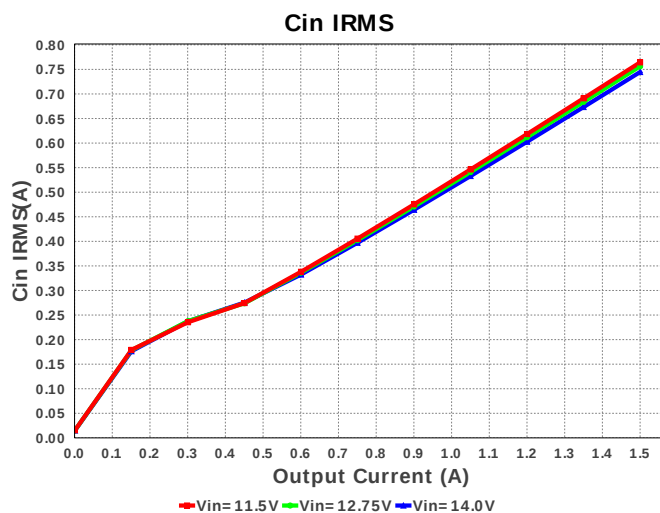
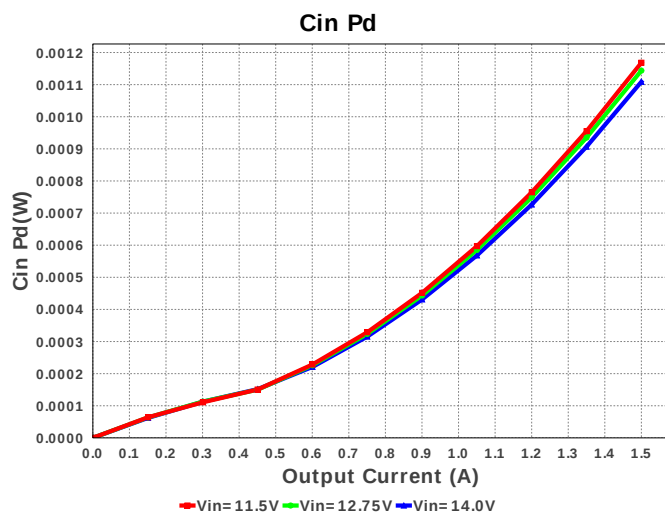
Design : 3496425/32 TPS562200DDCR
TPS562200DDCR 11.5V-14.0V to 5.00V @ 1.5A

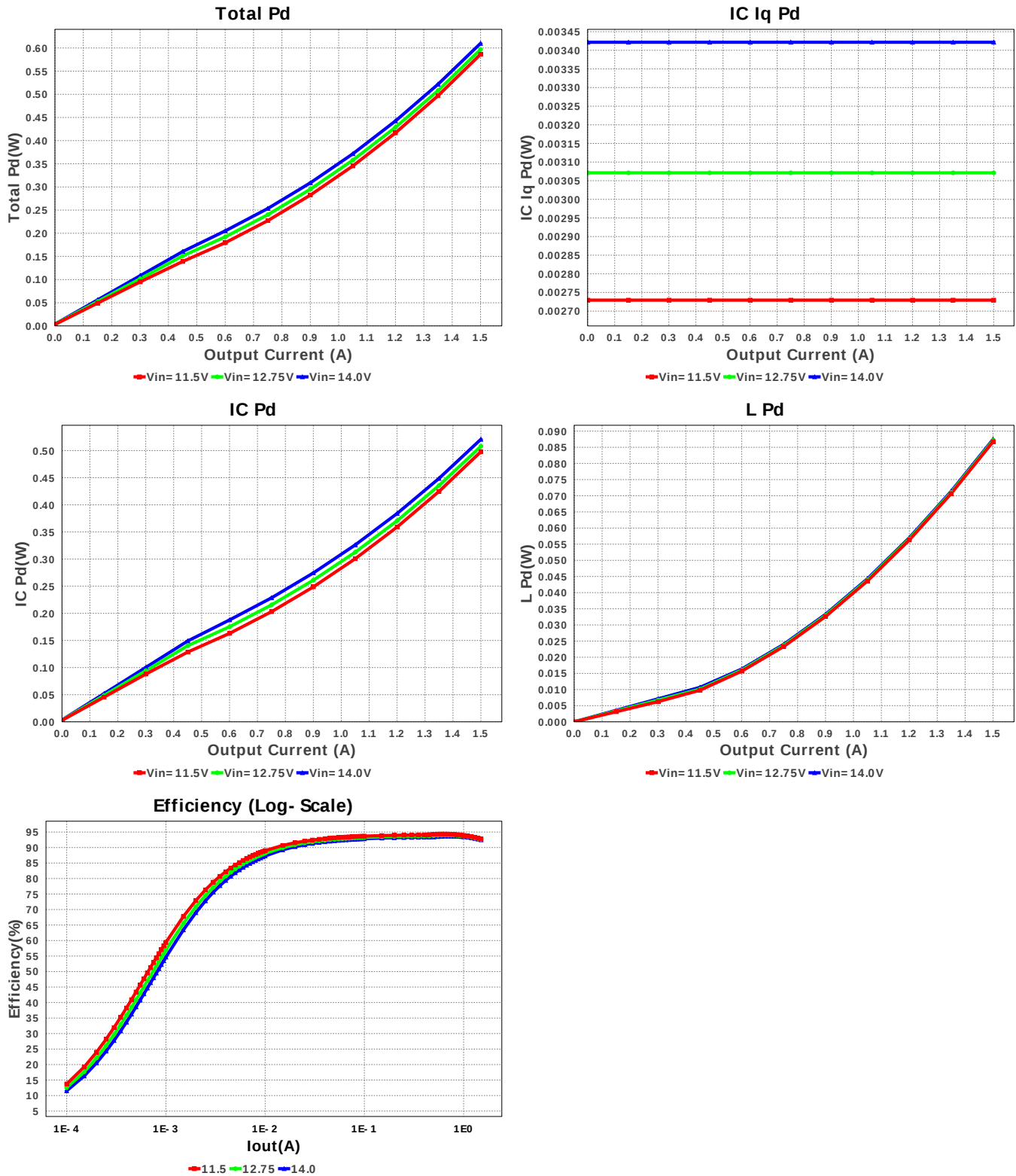


Electrical BOM

#	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	GRM31CR61A226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	1	\$0.07	 1206_190 11 mm ²
4.	L1	Bourns	SRN6045-4R7Y	L= 4.7 uH DCR= 37.6 mOhm	1	\$0.16	 SRN6045 64 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	CRCW040256K2FKED Series= CRCW...e3	Res= 56.2 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	744.604 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	275.222 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	579.28 mA	Current	Average input current
4.	L Ipp	953.4 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	113.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	719.739 kHz	General	Switching frequency
8.	Pout	7.5 W	General	Total output power
9.	Total BOM	\$0.89	General	Total BOM Cost
10.	Vout Actual	5.031 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
11.	Vout OP	5.0 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
12.	Duty Cycle	37.295 %	Op_point	Duty cycle
13.	Efficiency	92.479 %	Op_point	Steady state efficiency
14.	IC Tj	86.763 degC	Op_point	IC junction temperature
15.	ICThetaJA	109.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
16.	IOUT_OP	1.5 A	Op_point	Iout operating point
17.	VIN_OP	14.0 V	Op_point	Vin operating point
18.	Vout p-p	9.094 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	1.109 mW	Power	Input capacitor power dissipation
20.	Cout Pd	275.493 µW	Power	Output capacitor power dissipation
21.	IC Iq Pd	3.422 mW	Power	IC Iq Pd
22.	IC Pd	520.766 mW	Power	IC power dissipation
23.	L Pd	87.448 mW	Power	Inductor power dissipation
24.	Total Pd	609.947 mW	Power	Total Power Dissipation
25.	Vout Tolerance	3.053 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.5	Maximum Output Current
2.	SoftStart	0.05 ms	Soft Start Time (ms)
3.	VinMax	14.0	Maximum input voltage
4.	VinMin	11.5	Minimum input voltage
5.	Vout	5.0	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> : contains the data sheet and other resources.

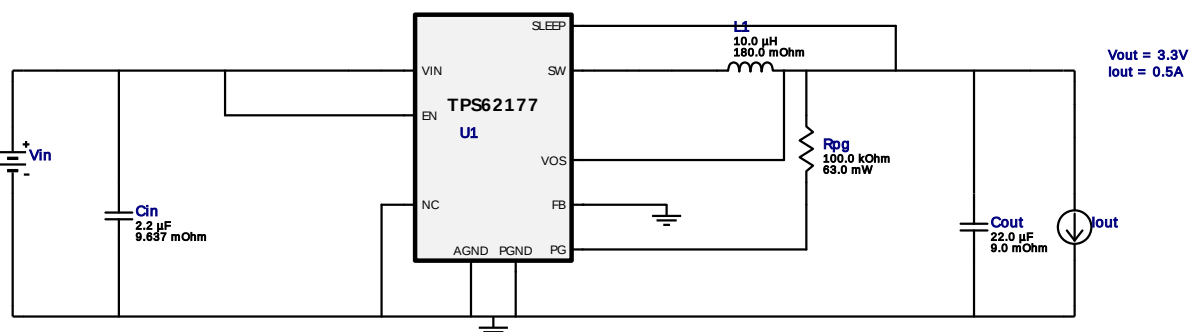


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Iout = 0.5A

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Topology = Buck
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BOM Cost = \$1.02
BOM Count = 5
Total Pd = 0.29W

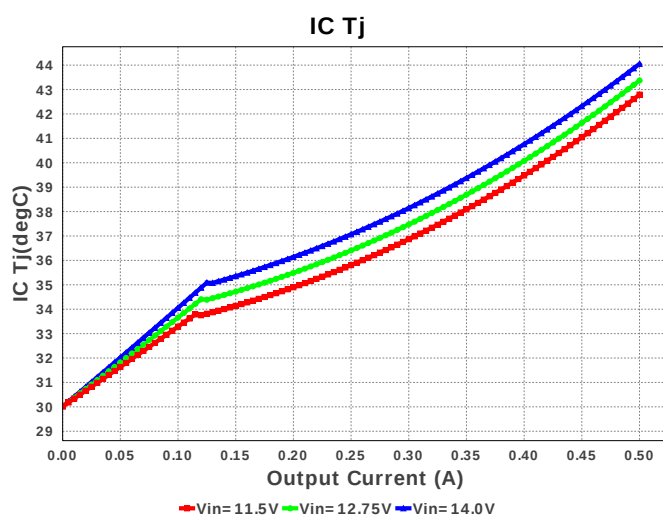
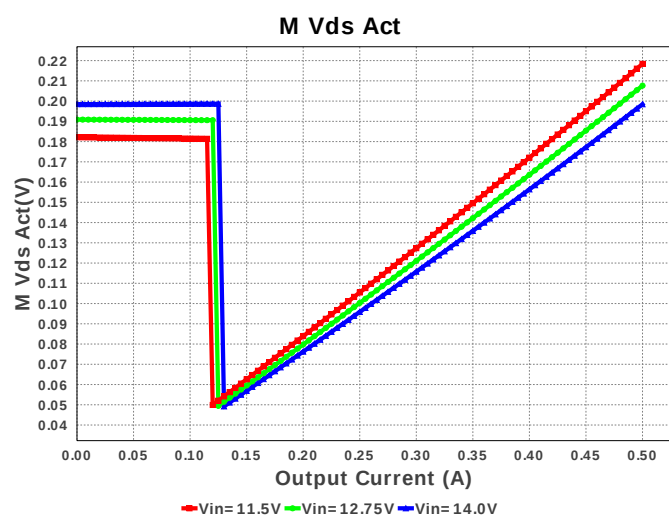
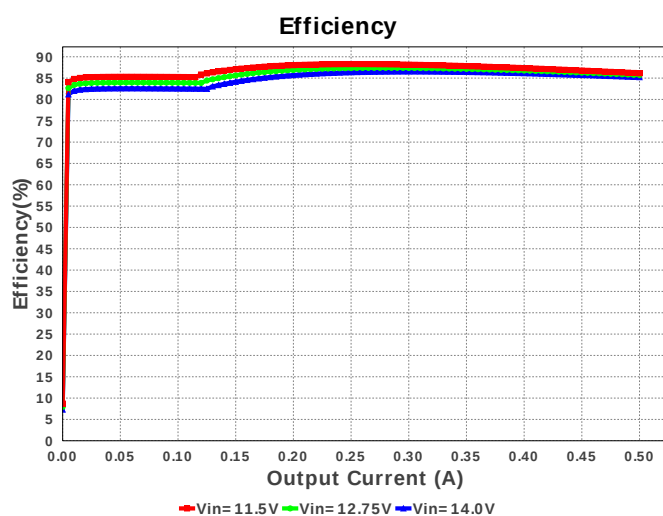
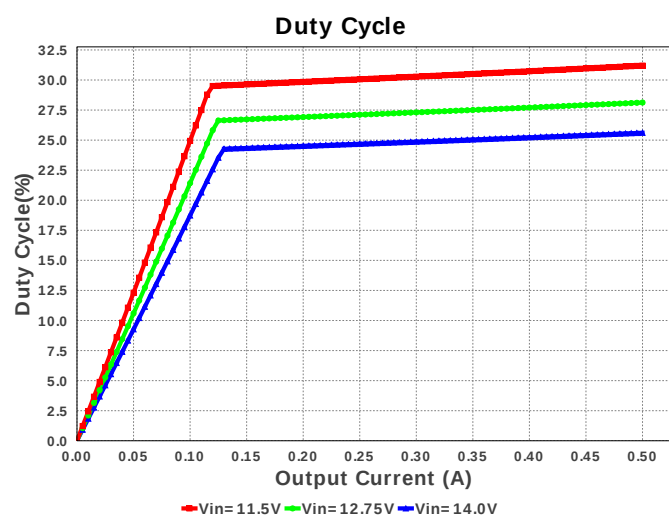
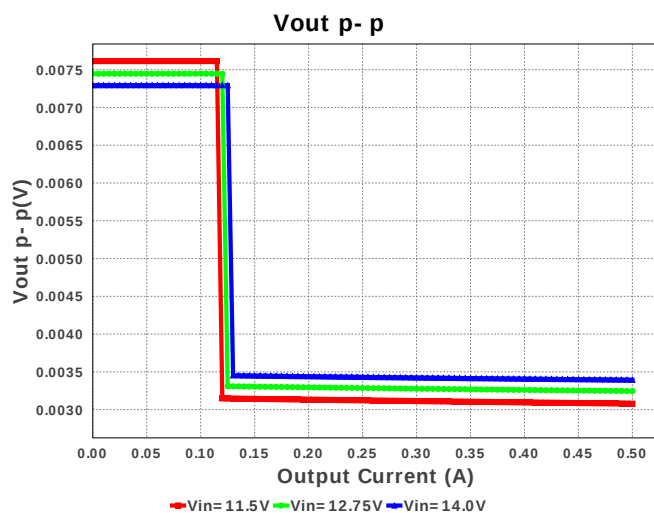
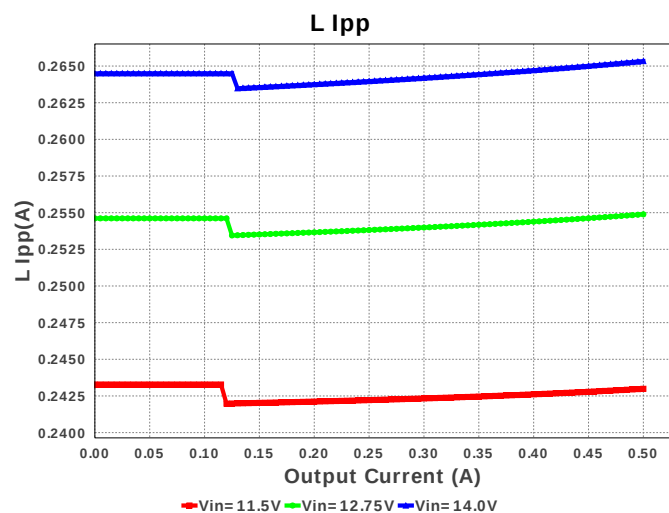
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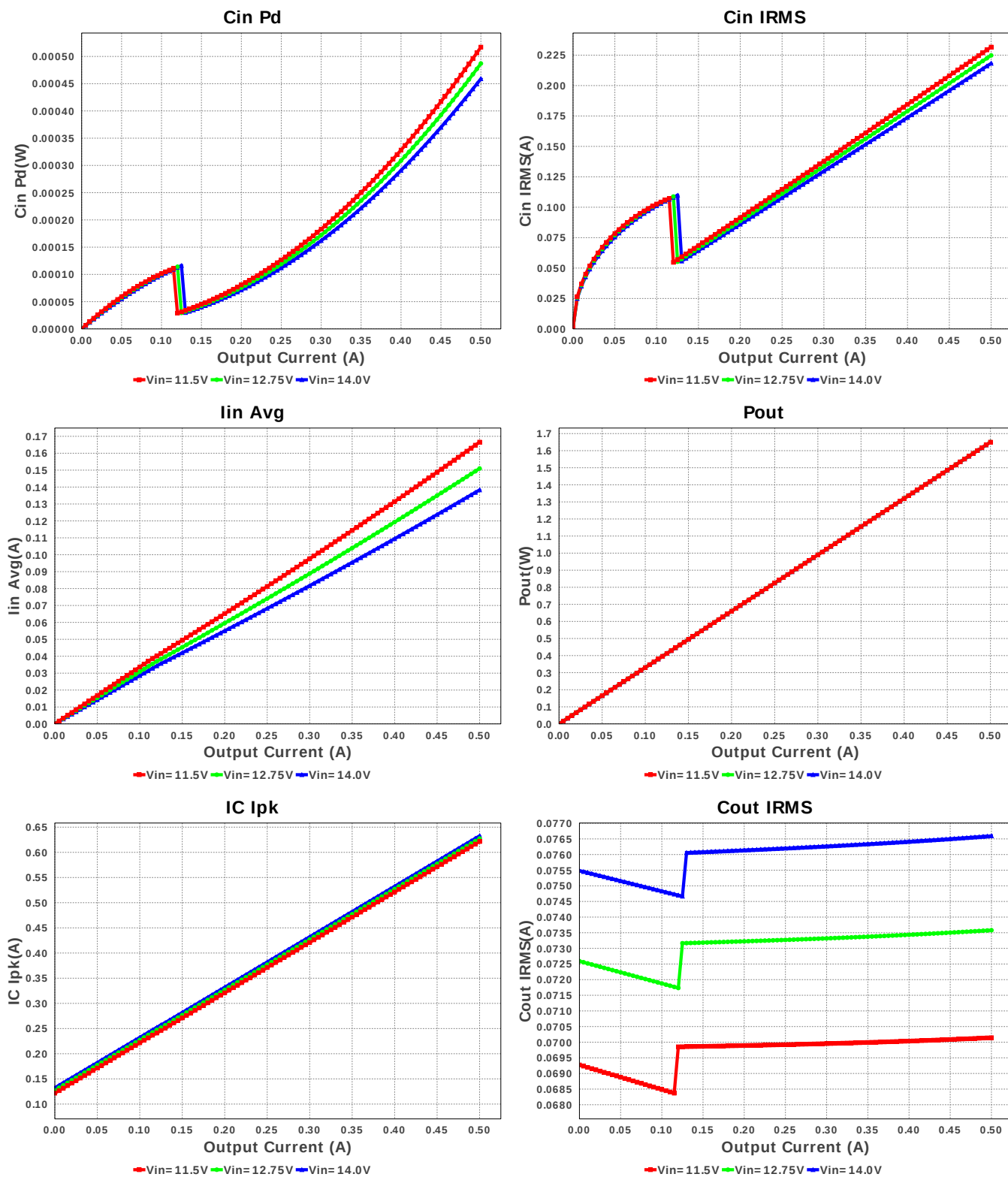
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TPS62177DQCR 11.5V-14.0V to 3.30V @ 0.5A

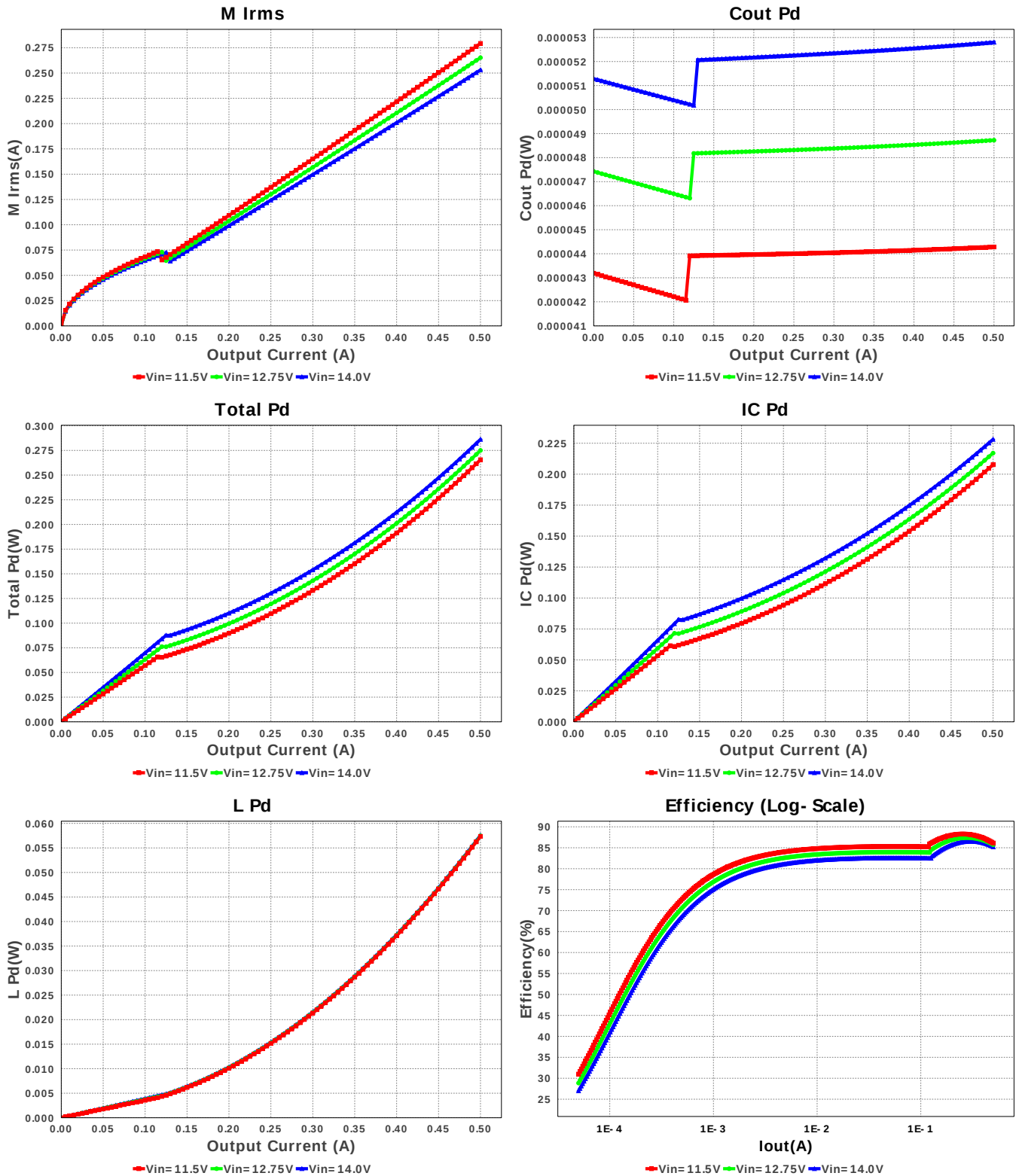


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM188R61C225KE15D Series= X5R	Cap= 2.2 uF ESR= 9.637 mOhm VDC= 16.0 V IRMS= 1.20373 A	1	\$0.02	0603 5 mm ²
2.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	\$0.04	0805 7 mm ²
3.	L1	Coilcraft	LPS4018-103MRB	L= 10.0 µH DCR= 180.0 mOhm	1	\$0.35	LPS4018 24 mm ²
4.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
5.	U1	Texas Instruments	TPS62177DQCR	Switcher	1	\$0.60	R-PWSON-N10 12 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	218.239 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	76.596 mA	Current	Output capacitor RMS ripple current
3.	IC IpK	632.669 mA	Current	Peak switch current in IC
4.	Iin Avg	138.3 mA	Current	Average input current
5.	L Ipp	265.34 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	253.032 mA	Current	MOSFET RMS current
7.	BOM Count	5	General	Total Design BOM count
8.	FootPrint	50.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1.033 MHz	General	Switching frequency
10.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	198.443 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	1.65 W	General	Total output power
13.	Total BOM	\$1.02	General	Total BOM Cost
14.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	25.61 %	Op_point	Duty cycle
16.	Efficiency	85.219 %	Op_point	Steady state efficiency
17.	IC Tj	44.052 degC	Op_point	IC junction temperature
18.	ICThetaJA	61.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	500.0 mA	Op_point	Iout operating point
20.	VIN_OP	14.0 V	Op_point	Vin operating point
21.	Vout p-p	3.395 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	458.993 µW	Power	Input capacitor power dissipation
23.	Cout Pd	52.803 µW	Power	Output capacitor power dissipation
24.	IC Pd	228.111 mW	Power	IC power dissipation
25.	L Pd	57.57 mW	Power	Inductor power dissipation
26.	Total Pd	286.19 mW	Power	Total Power Dissipation
27.	Vout Tolerance	727.273 m%		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.	VinMax	14.0	Maximum input voltage
3.	VinMin	11.5	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS62177	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. [TPS62177 Product Folder](http://www.ti.com/product/TPS62177) : <http://www.ti.com/product/TPS62177> : contains the data sheet and other resources.

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