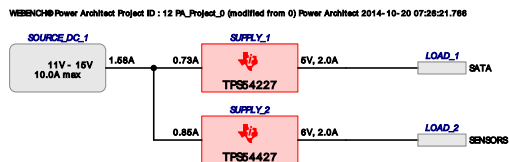


# WEBENCH® Power Architect



## Project Report

Project : 1244294/12 : PA\_Project\_0 (modified from 0)

Created : 2014-10-20 07:26:21.766

Optimize project optFactor=3

### Project Summary

1. Total System Efficiency	92.98 %
2. Total System BOM Count	22.0
3. Total System Footprint	429.0 mm <sup>2</sup>
4. Total System BOM Cost	\$3.17
5. Total System Power Dissipation	1.661 W

--> Launch WEBENCH Power Architect.

## Power Supplies

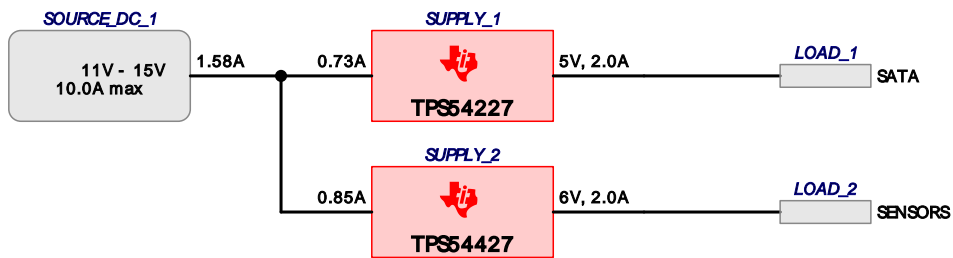
#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	TPS54227	Switcher : 2A Synchronous Buck Converter	5 V	2.0 A	91.8%	221	\$1.44	64	4
2.	SUPPLY_2	TPS54427	Switcher : 4A Synchronous Buck SWIFT Converter	6 V	2.0 A	94%	208	\$1.73	65	9

## Power Loads

#	Name	VLoad	ILoad	Description
1.	SATA	5 V	2 A	VoutRipple=1%
2.	SENSORS	6 V	2 A	VoutRipple=1%

## Project Diagram

WEBENCH® Power Architect Project ID : 12\_PA\_Project\_0 (modified from 0) Power Architect 2014- 10-20 07:26:21.766



## Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm <sup>2</sup> )
TDK	C1005X5R1A104K	0402	2	\$0.01	6
TDK	C3216X6S1A476M	1206	2	\$0.26	22
Yageo America	CC0805DRNP09BN8R0	0805	2	\$0.01	14
Vishay-Dale	CRCW040210K0FKED	0402	2	\$0.01	6
Vishay-Dale	CRCW0402124KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402154KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040222K1FKED	0402	2	\$0.01	6
MuRata	GRM155R61A105KE15D	0402	2	\$0.01	6
MuRata	GRM155R71E822KA01D	0402	2	\$0.01	6
MuRata	GRM32ER61E226KE15L	1210	2	\$0.28	29
Bourns	SRN8040-4R7Y	SRN8040	1	\$0.22	100
Texas Instruments	TPS54227DDAR	R-PDSO-G8	1	\$0.61	57
Texas Instruments	TPS54427DDAR	R-PDSO-G8	1	\$0.90	57
TDK	VLP8040T-6R8M	VLP8040	1	\$0.22	113
<b>Total</b>			<b>22</b>	<b>\$3.17</b>	<b>429</b>



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 VinMax = 15.0V  
 Vout = 5.0V  
 Iout = 2.0A

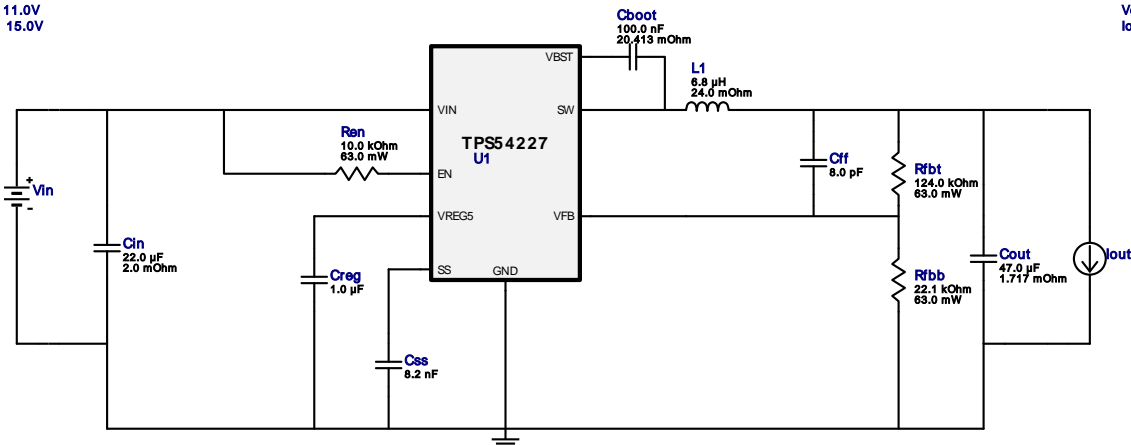
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 Topology = Buck  
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 BOM Cost = \$1.44  
 Footprint = 221.0 mm<sup>2</sup>  
 BOM Count = 11  
 Total Pd = 0.9W

## WEBENCH® Design Report

Design : 1244294/64 TPS54227DDAR  
 TPS54227DDAR 11.0V-15.0V to 5.00V @ 2.0A

VinMin = 11.0V  
 VinMax = 15.0V

Vout = 5.0V  
 Iout = 2.0A



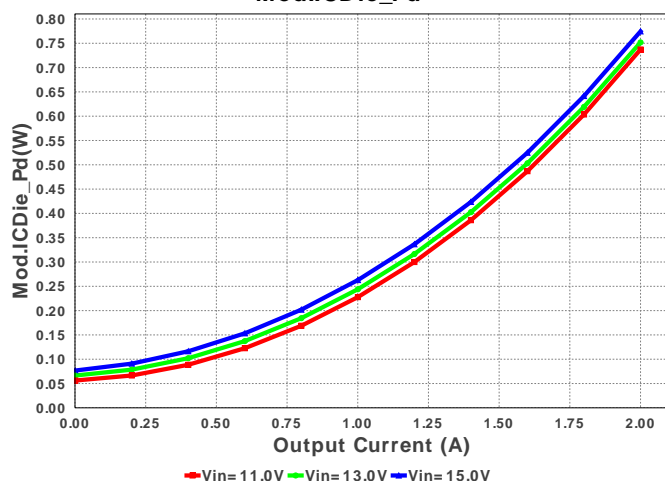
## Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	TDK	C1005X5R1A104K Series= 285	Cap= 100.0 nF ESR= 20.413 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
2.	Cff	Yageo America	CC0805DRNP09BN8R0 Series= C0G/NP0	Cap= 8.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
3.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	\$0.28	1210 15 mm <sup>2</sup>
4.	Cout	TDK	C3216X6S1A476M Series= 285	Cap= 47.0 uF ESR= 1.717 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.26	1206 11 mm <sup>2</sup>
5.	Creg	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 uF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
6.	Css	MuRata	GRM155R71E822KA01D Series= X7R	Cap= 8.2 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
7.	L1	TDK	VLP8040T-6R8M	L= 6.8 uH DCR= 24.0 mOhm	1	\$0.22	VLP8040 113 mm <sup>2</sup>
8.	Ren	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
9.	Rfbb	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
10.	Rfbb	Vishay-Dale	CRCW0402124KFKED Series= CRCW..e3	Res= 124.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>

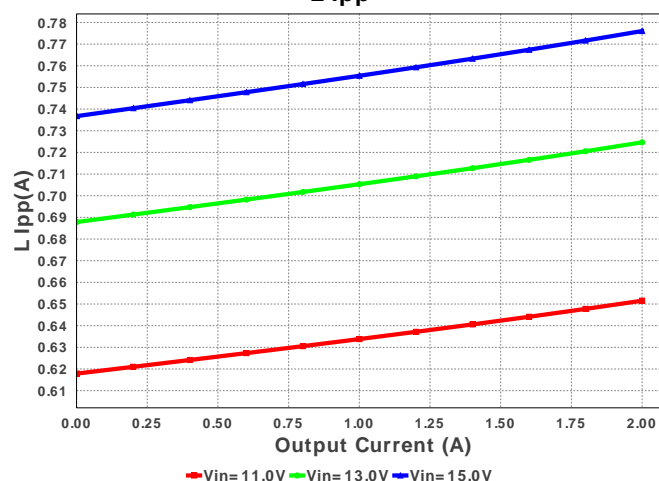
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	TPS54227DDAR	Switcher	1	\$0.61	

R-PDSO-G8 57 mm<sup>2</sup>

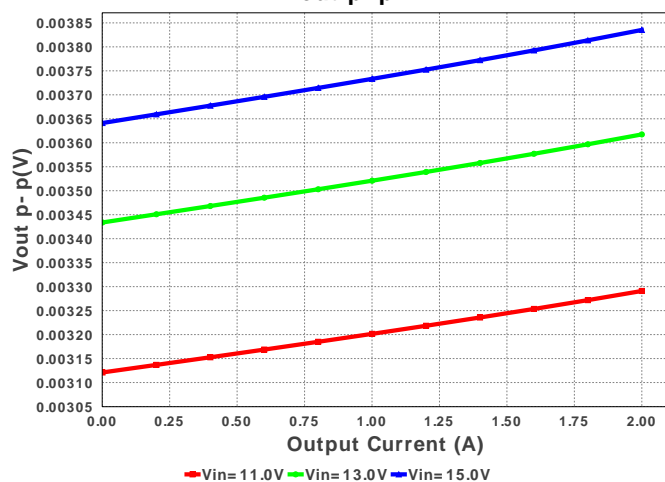
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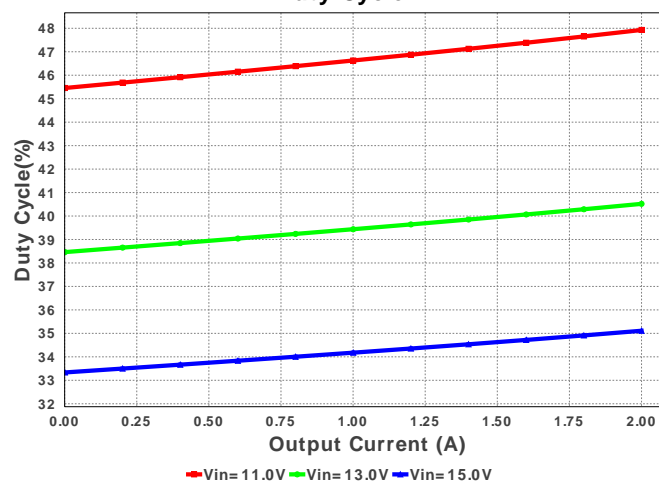
L Ipp



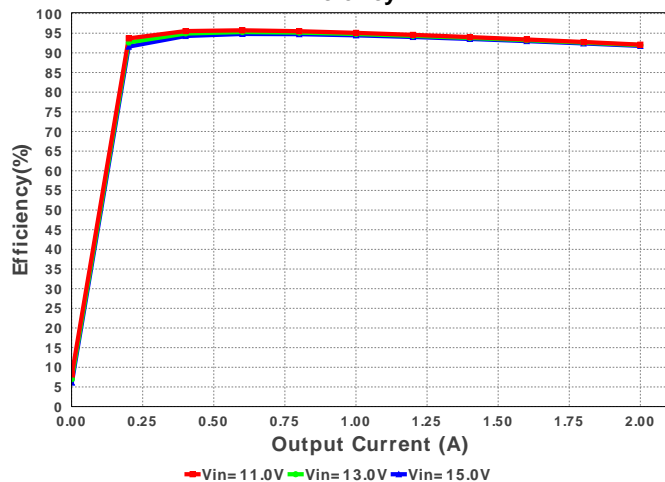
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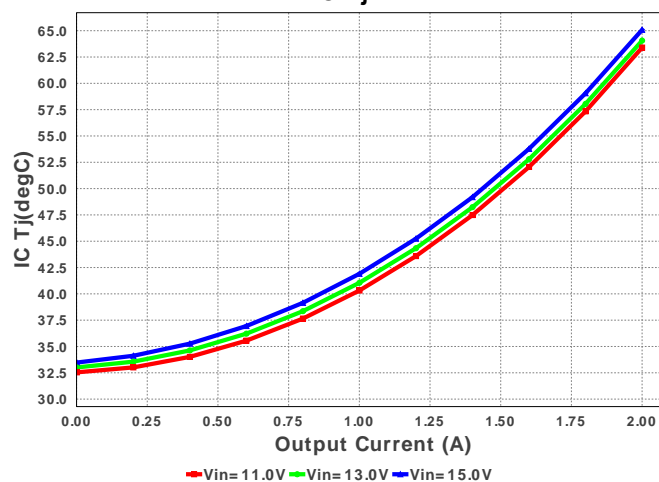
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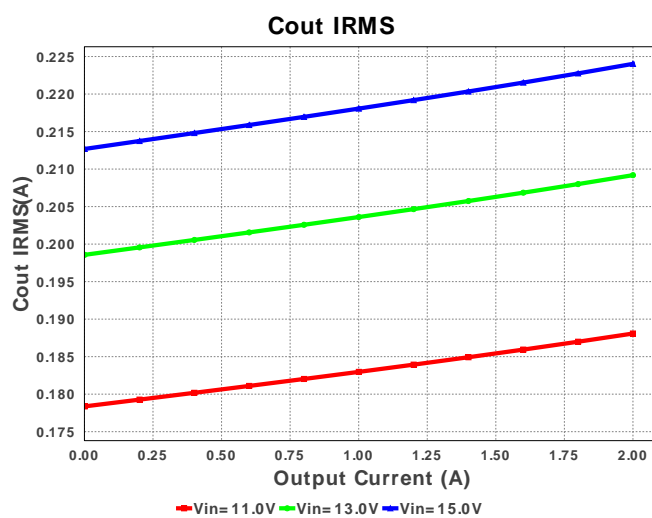
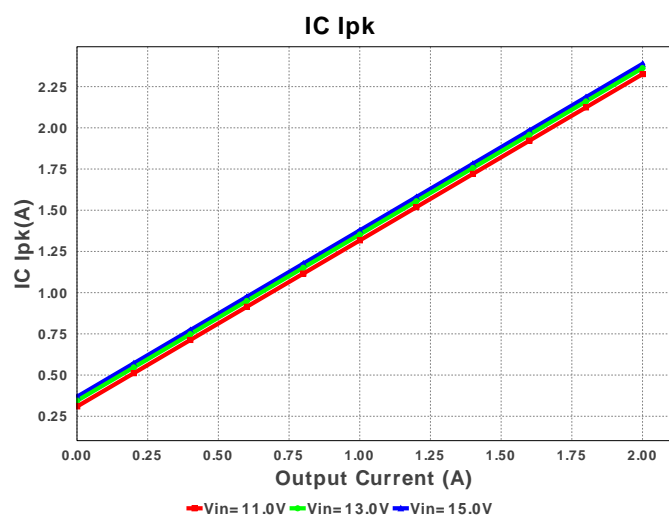
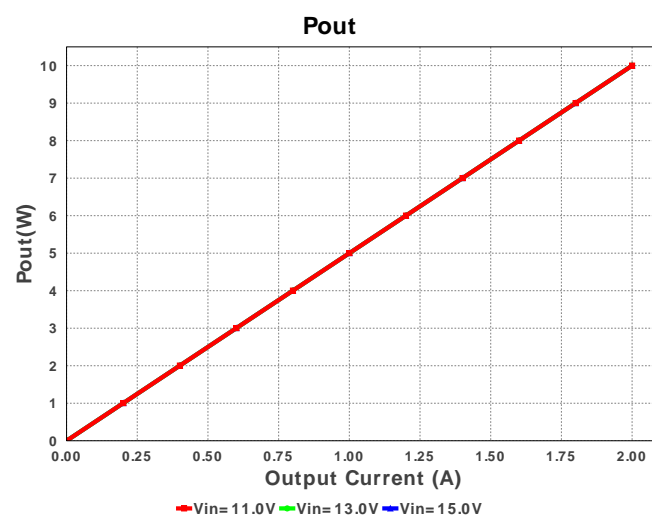
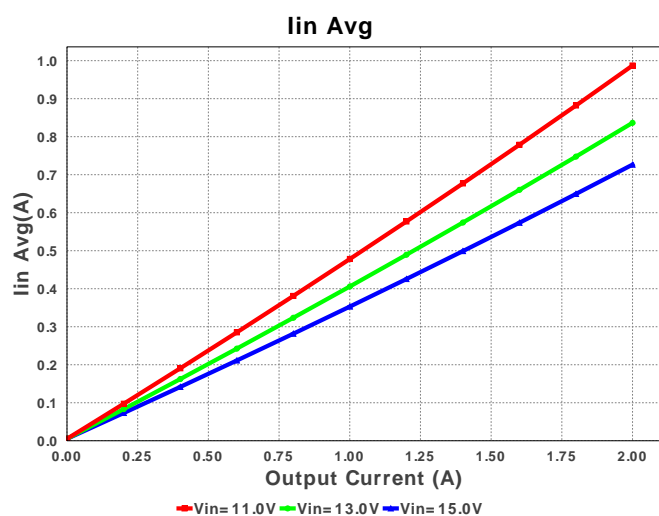
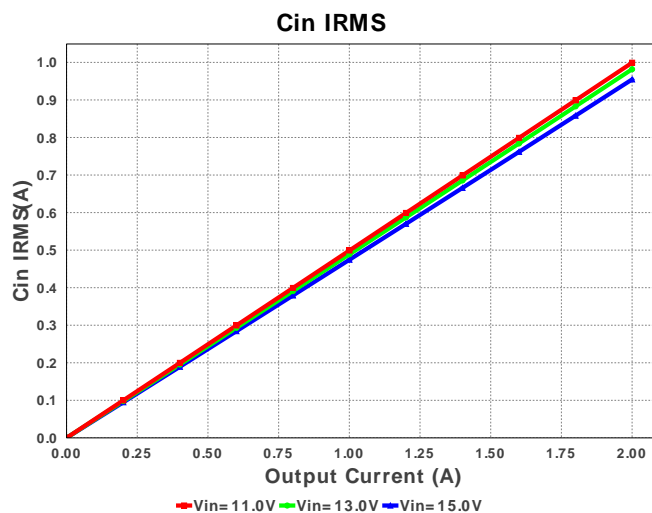
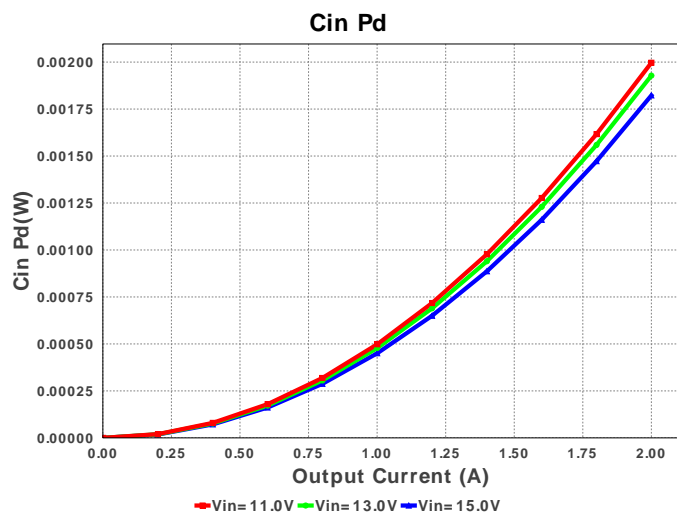


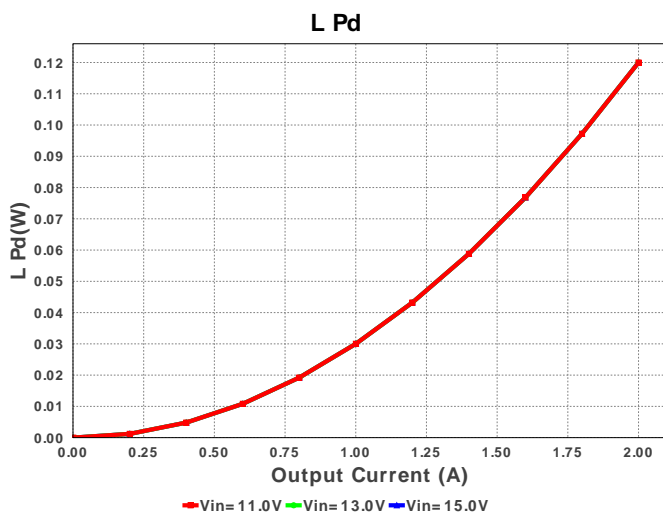
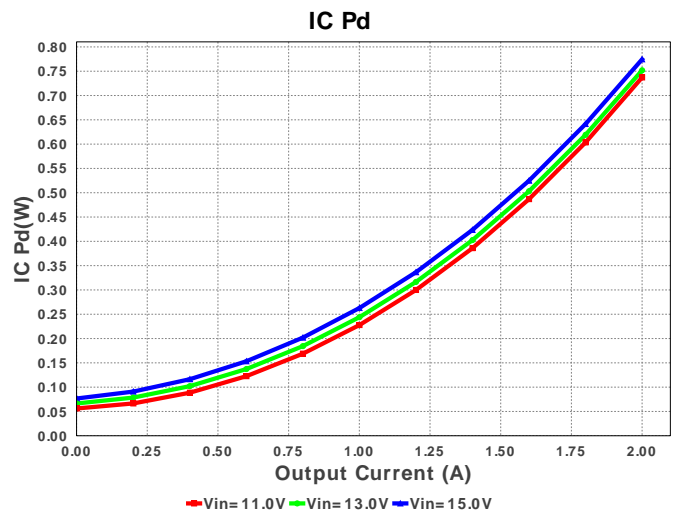
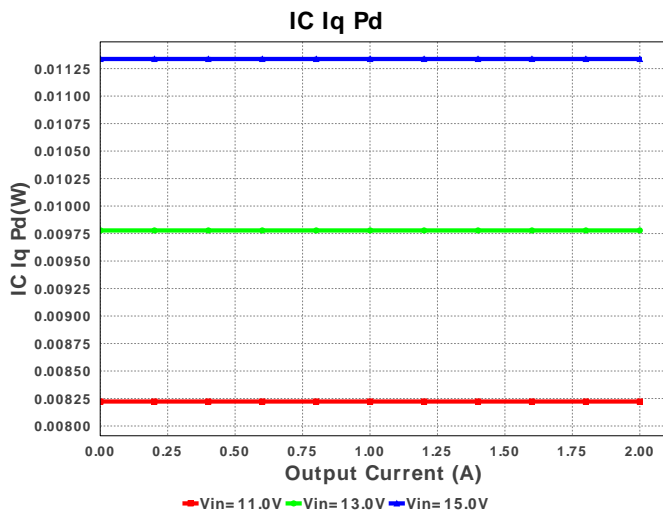
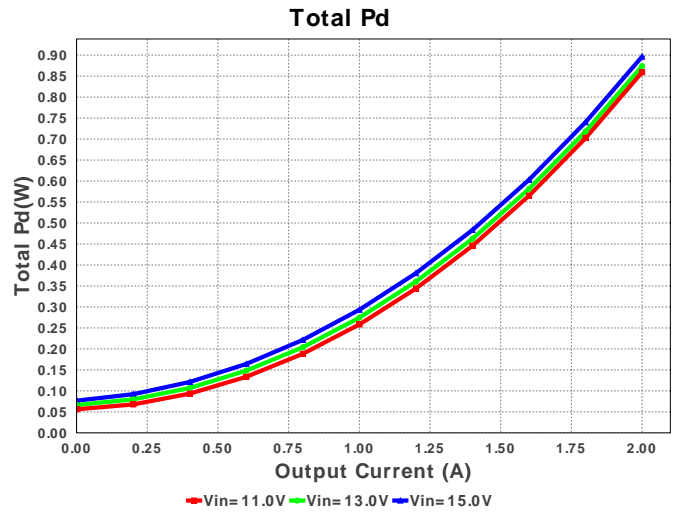
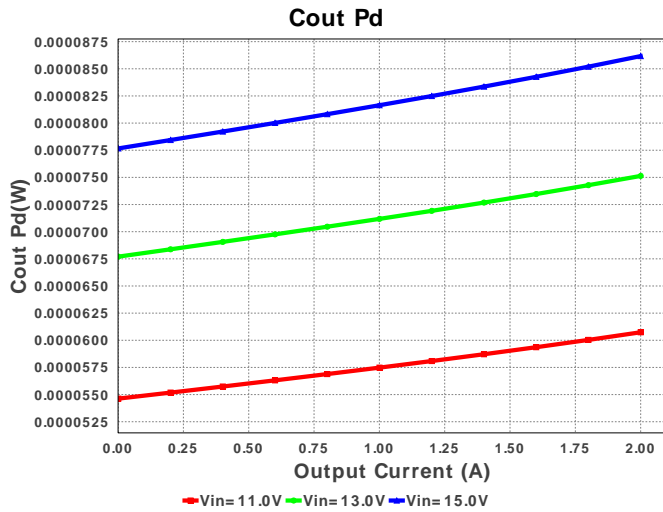
Efficiency



IC Tj







## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	954.635 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	224.022 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.388 A	Current	Peak switch current in IC
4.	Iin Avg	726.43 mA	Current	Average input current
5.	L Ipp	776.035 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	11	General	Total Design BOM count
7.	FootPrint	221.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
8.	Frequency	665.357 kHz	General	Switching frequency
9.	Pout	10.0 W	General	Total output power
10.	Total BOM	\$1.44	General	Total BOM Cost
11.	Vout OP	5.0 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
12.	Duty Cycle	35.111 %	Op_point	Duty cycle
13.	Efficiency	91.773 %	Op_point	Steady state efficiency
14.	IC Tj	65.084 degC	Op_point	IC junction temperature
15.	ICThetaJA	45.3 degC/W	Op_point	IC junction-to-ambient thermal resistance
16.	IOUT_OP	2.0 A	Op_point	Iout operating point
17.	VIN_OP	15.0 V	Op_point	Vin operating point
18.	Vout p-p	3.835 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	1.823 mW	Power	Input capacitor power dissipation
20.	Cout Pd	86.169 µW	Power	Output capacitor power dissipation
21.	IC Iq Pd	11.337 mW	Power	IC Iq Pd
22.	IC Pd	774.484 mW	Power	IC power dissipation
23.	L Pd	120.0 mW	Power	Inductor power dissipation
24.	Total Pd	896.451 mW	Power	Total Power Dissipation

## Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	15.0 V	Maximum input voltage
4.	VinMin	11.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	TPS54227	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

## Design Assistance

1. **TPS54227** Product Folder : <http://www.ti.com/product/tps54227> : contains the data sheet and other resources.





VinMin = 11.0V  
 VinMax = 15.0V  
 Vout = 6.0V  
 Iout = 2.0A

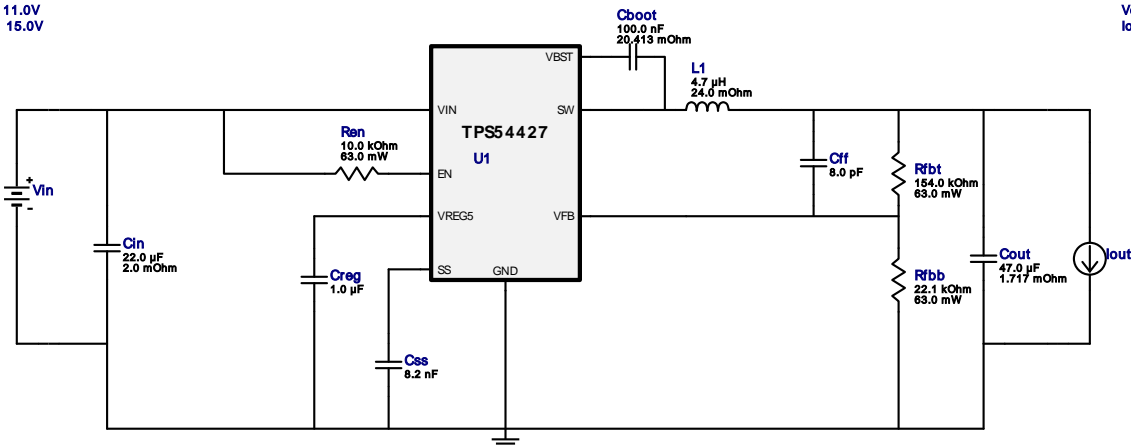
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 Topology = Buck  
 Created = 10/20/14 7:26:21 AM  
 BOM Cost = \$1.73  
 Footprint = 208.0 mm<sup>2</sup>  
 BOM Count = 11  
 Total Pd = 0.76W

## WEBENCH® Design Report


Design : 1244294/65 TPS54427DDAR  
 TPS54427DDAR 11.0V-15.0V to 6.00V @ 2.0A

VinMin = 11.0V  
 VinMax = 15.0V

Vout = 6.0V  
 Iout = 2.0A



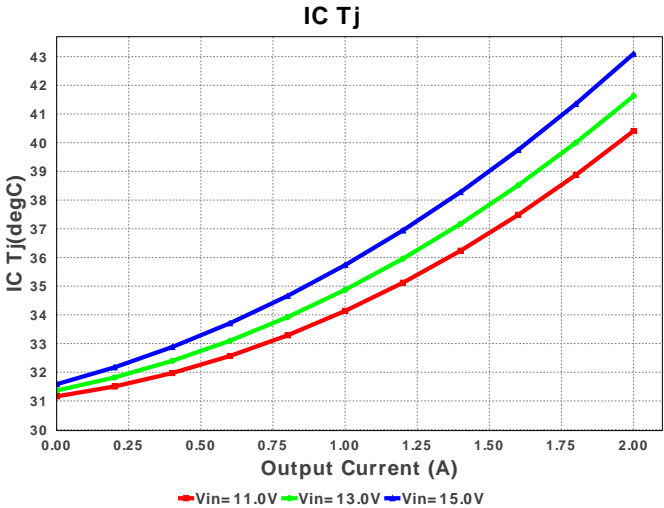
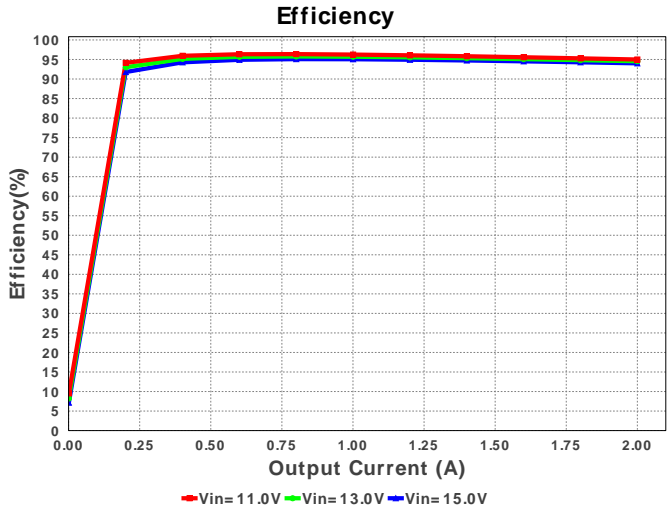
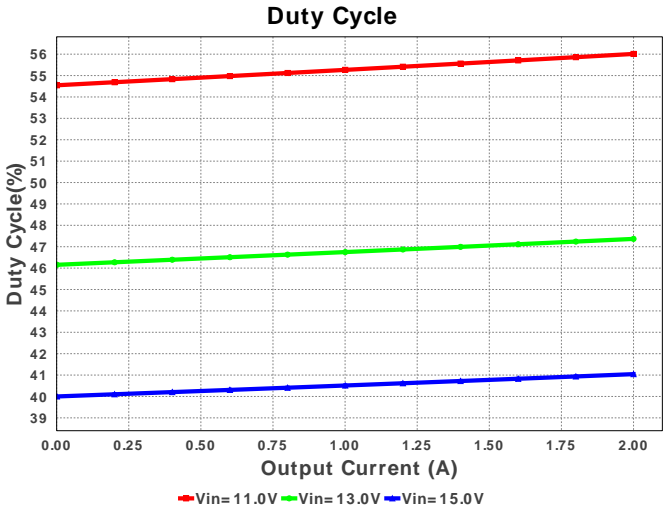
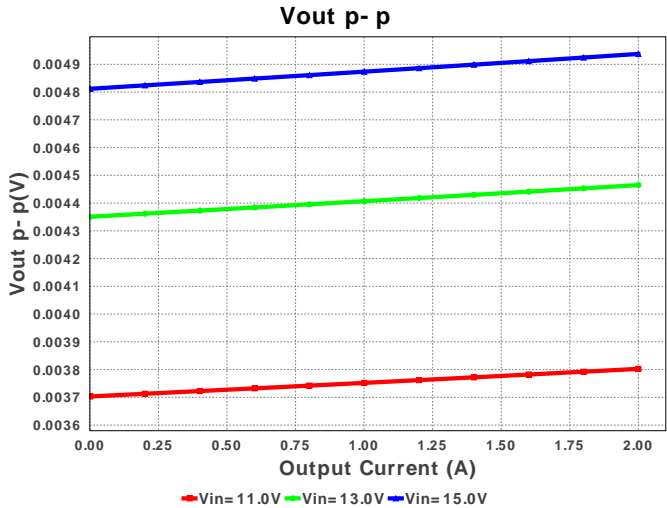
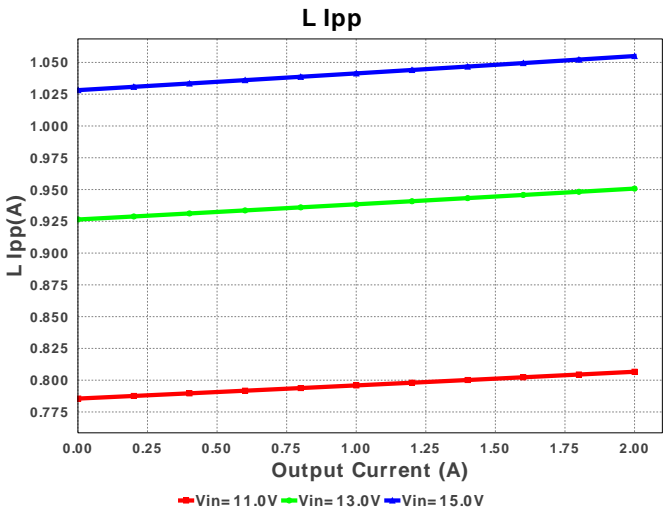
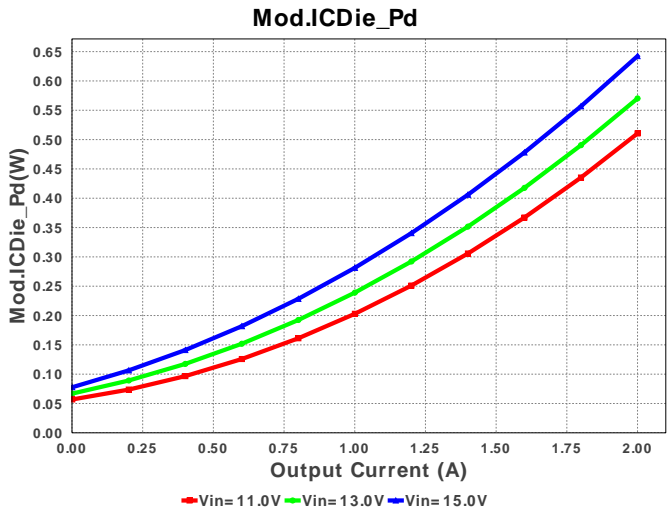
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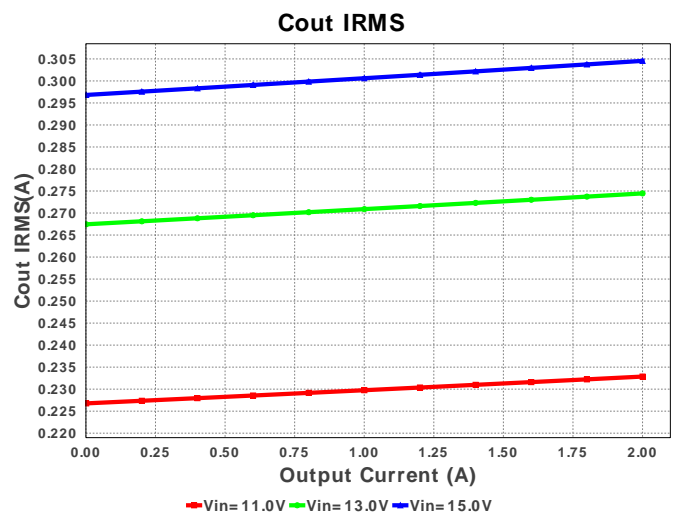
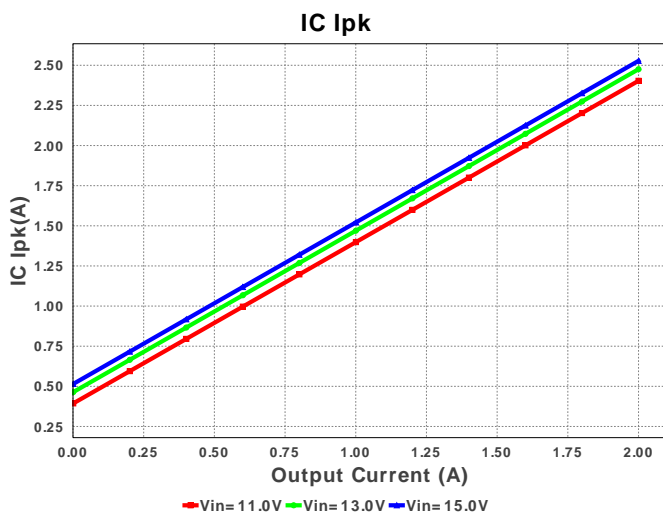
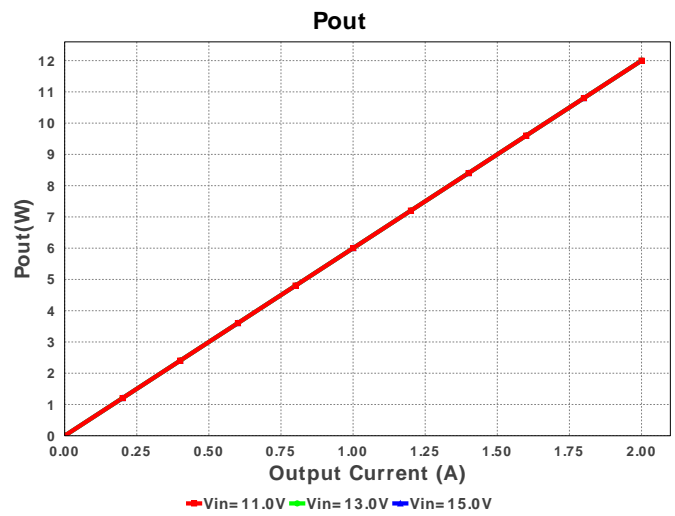
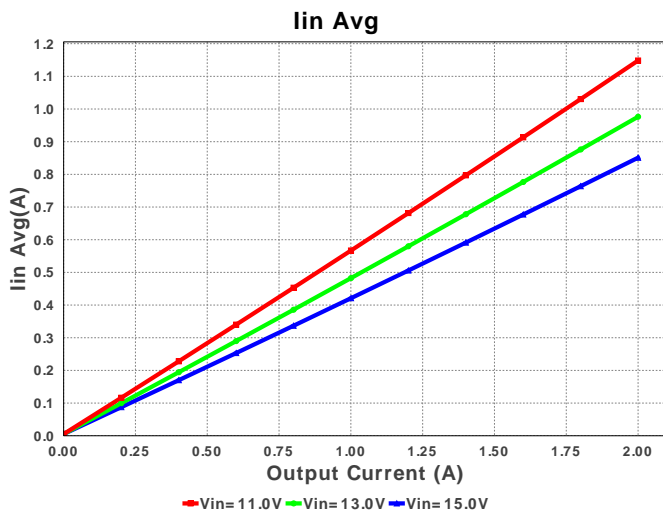
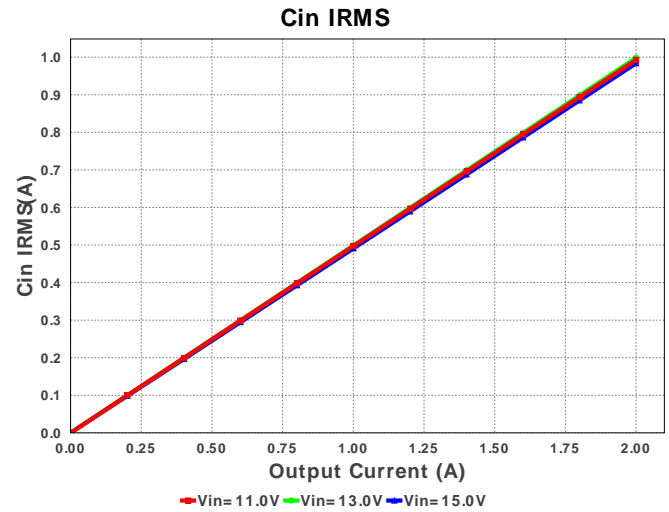
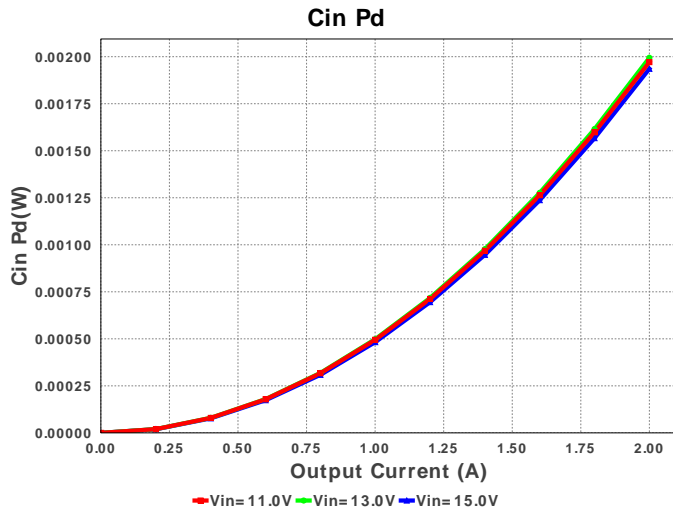
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	TDK	C1005X5R1A104K Series= 285	Cap= 100.0 nF ESR= 20.413 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
2.	Cff	Yageo America	CC0805DRNP09BN8R0 Series= C0G/NP0	Cap= 8.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm <sup>2</sup>
3.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	\$0.28	 1210 15 mm <sup>2</sup>
4.	Cout	TDK	C3216X6S1A476M Series= 285	Cap= 47.0 uF ESR= 1.717 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.26	 1206 11 mm <sup>2</sup>
5.	Creg	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 uF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
6.	Css	MuRata	GRM155R71E822KA01D Series= X7R	Cap= 8.2 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
7.	L1	Bourns	SRN8040-4R7Y	L= 4.7 uH DCR= 24.0 mOhm	1	\$0.22	 SRN8040 100 mm <sup>2</sup>
8.	Ren	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
9.	Rfbb	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
10.	Rfbt	Vishay-Dale	CRCW0402154KFKED Series= CRCW..e3	Res= 154.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

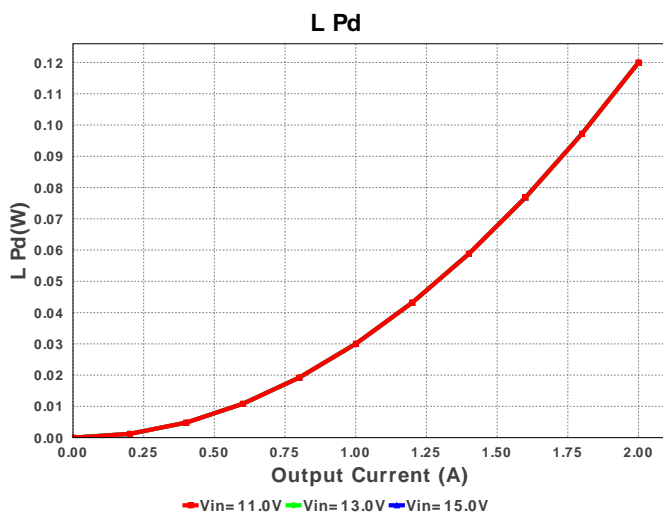
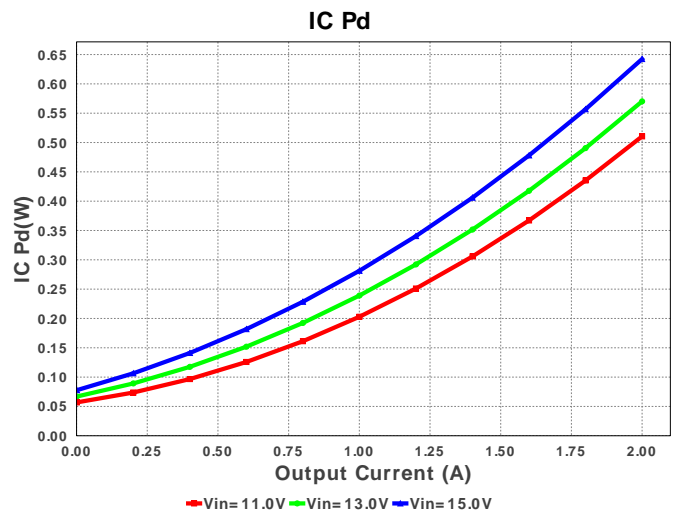
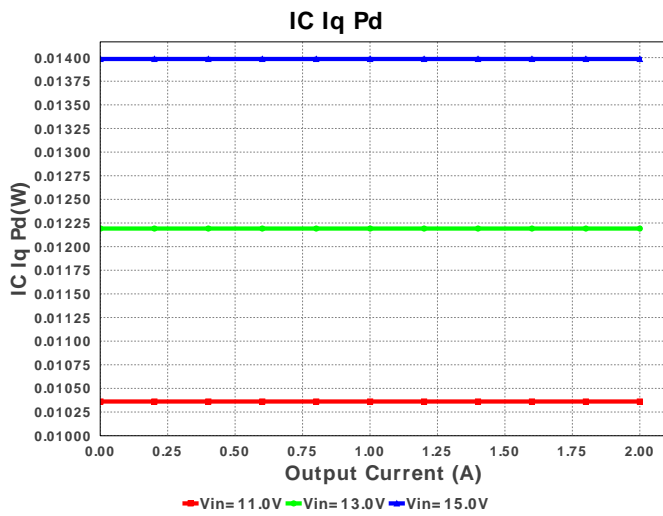
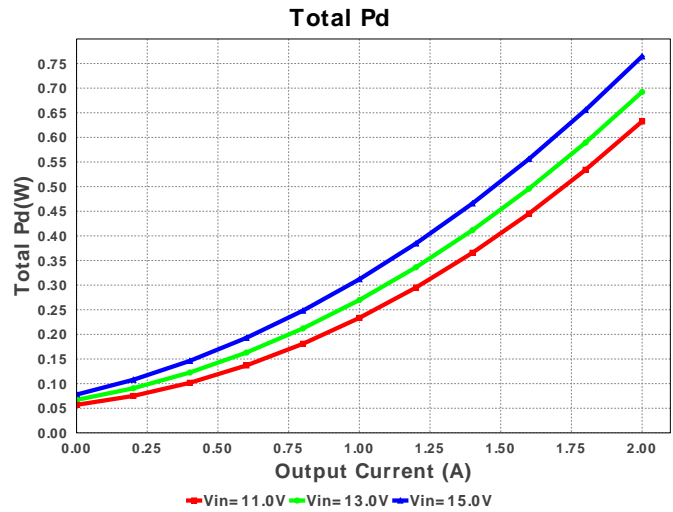
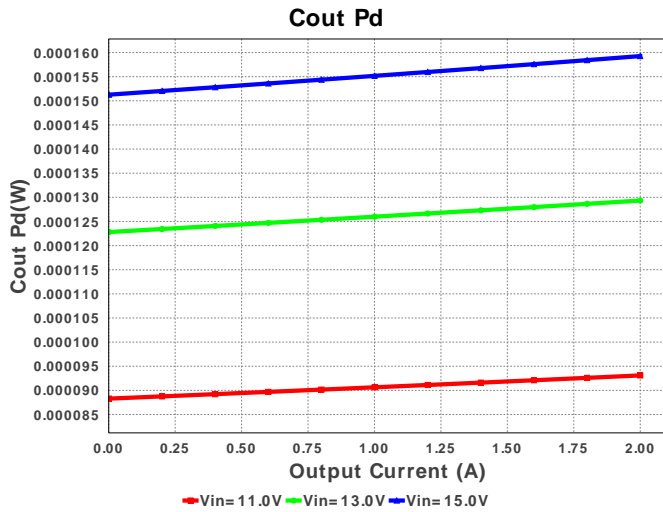
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	TPS54427DDAR	Switcher	1	\$0.90	



R-PDSO-G8 57 mm<sup>2</sup>







## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	983.827 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	304.558 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.528 A	Current	Peak switch current in IC
4.	Iin Avg	850.96 mA	Current	Average input current
5.	L Ipp	1.055 A	Current	Peak-to-peak inductor ripple current
6.	BOM Count	11	General	Total Design BOM count
7.	FootPrint	208.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
8.	Frequency	744.958 kHz	General	Switching frequency
9.	Pout	12.0 W	General	Total output power
10.	Total BOM	\$1.73	General	Total BOM Cost
11.	Vout OP	6.0 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
12.	Duty Cycle	41.044 %	Op_point	Duty cycle
13.	Efficiency	94.011 %	Op_point	Steady state efficiency
14.	IC Tj	43.098 degC	Op_point	IC junction temperature
15.	ICThetaJA	20.39 degC/W	Op_point	IC junction-to-ambient thermal resistance
16.	IOUT_OP	2.0 A	Op_point	Iout operating point
17.	VIN_OP	15.0 V	Op_point	Vin operating point
18.	Vout p-p	4.937 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	1.936 mW	Power	Input capacitor power dissipation
20.	Cout Pd	159.261 $\mu$ W	Power	Output capacitor power dissipation
21.	IC Iq Pd	13.985 mW	Power	IC Iq Pd
22.	IC Pd	642.369 mW	Power	IC power dissipation
23.	L Pd	120.0 mW	Power	Inductor power dissipation
24.	Total Pd	764.46 mW	Power	Total Power Dissipation

## Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	15.0 V	Maximum input voltage
4.	VinMin	11.0 V	Minimum input voltage
5.	Vout	6.0 V	Output Voltage
6.	Vout1	6.0 Volt	Output Voltage #1
7.	base_pn	TPS54427	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

## Design Assistance

1. **TPS54427** Product Folder : <http://www.ti.com/product/tps54427> : contains the data sheet and other resources.

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