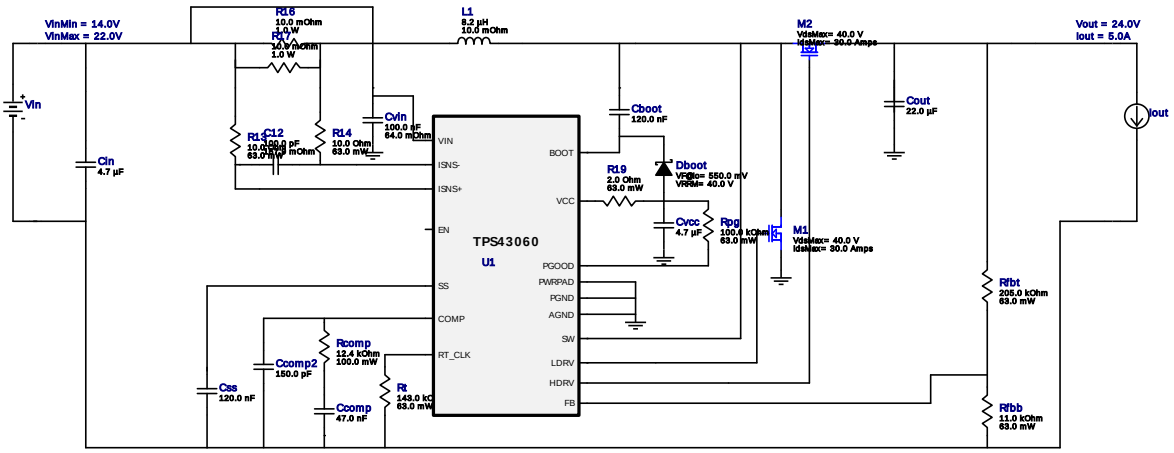
WEBENCH® 设计报告

VinMin = 14.0V
VinMax = 22.0V
Vout = 24.0V
Iout = 5.0A

Device = TPS43060RTER
Topology = Boost
创建 = 5/26/13 9:54:00 PM
BOM成本 = $12.47
Total Pd = 3.11W
大小 = 951.0mm2
BOM 数量 = 34

Design : 1147140/148 TPS43060RTER
TPS43060RTER 14.0V-22.0V to 24.0V @ 5.0A



1. The pulse skip mode in the device has not been modeled. Efficiency and operational parameters of the model in pulse skip mode is not guaranteed.

电气材料清单

#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	C12	TDK	C1608C0G1H101J Series= C0G/NP0	Cap= 100.0 pF ESR= 167.9 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
2.	Cboot	MuRata	GRM188R71C124KA01D Series= X7R	Cap= 120.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
3.	Ccomp	MuRata	GRM188R71C473KA01D Series= X7R	Cap= 47.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
4.	Ccomp2	Kemet	C0603C151J5GACTU Series= C0G/NP0	Cap= 150.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
5.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 µF VDC= 50.0 V IRMS= 0.0 A	6	$0.10	1206 19mm2
6.	Cout	MuRata	KCM55WR71J226MH01K Series= ?	Cap= 22.0 µF VDC= 63.0 V IRMS= 0.0 A	6	$1.34	2220 60mm2
7.	Css	MuRata	GRM188R71C124KA01D Series= X7R	Cap= 120.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
8.	Cvcc	MuRata	GRM219R61C475KE15D Series= X5R	Cap= 4.7 µF VDC= 16.0 V IRMS= 0.0 A	1	$0.04	0805 13mm2
9.	Cvin	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 13mm2
10.	Dboot	Diodes Inc.	SDM20U40-7-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.06	SOD-523 11mm2

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#	名称	制造商	零件编号	属性	Qty	Price	大小
11.	L1	Coilcraft	XAL1010-822MEB	L= 8.2 µH DCR= 10.0 mOhm	1	$1.08	XAL1010 160mm2
12.	M1	AOS	AON7242	VdsMax= 40.0 V IdsMax= 30.0 Amps	1	$0.41	TRANS_AOS_DFN3.3X3.3 28mm2
13.	M2	AOS	AON7242	VdsMax= 40.0 V IdsMax= 30.0 Amps	1	$0.41	TRANS_AOS_DFN3.3X3.3 28mm2
14.	R13	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
15.	R14	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
16.	R16	Panasonic	ERJ-M1WSF10MU Series= 1119	Res= 10.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.15	2512 43mm2
17.	R17	Panasonic	ERJ-M1WSF10MU Series= 1119	Res= 10.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.15	2512 43mm2
18.	R19	Vishay-Dale	CRCW04022R00FKED Series= CRCW..e3	Res= 2.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
19.	Rcomp	Vishay-Dale	CRCW060312K4FKEA Series= CRCW..e3	Res= 12.4 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 10mm2
20.	Rfbb	Vishay-Dale	CRCW040211K0FKED Series= CRCW..e3	Res= 11.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
21.	Rfbt	Vishay-Dale	CRCW0402205KFKED Series= CRCW..e3	Res= 205.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
22.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
23.	Rt	Vishay-Dale	CRCW0402143KFKED Series= CRCW..e3	Res= 143.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
24.	U1	Texas Instruments	TPS43060RTER	Switcher	1	$1.40	S-PWQFN-N16 27mm2

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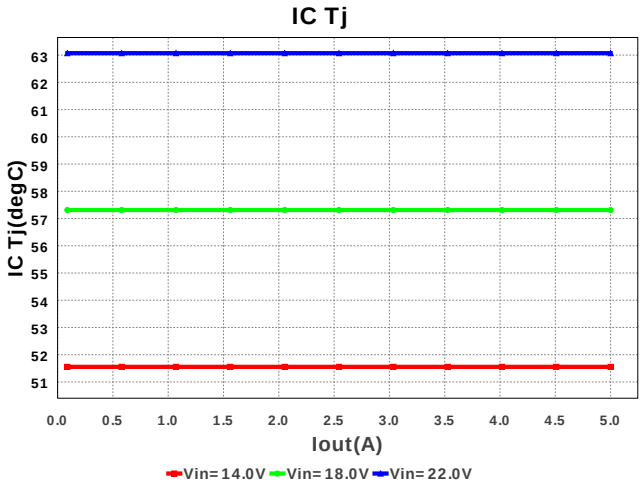

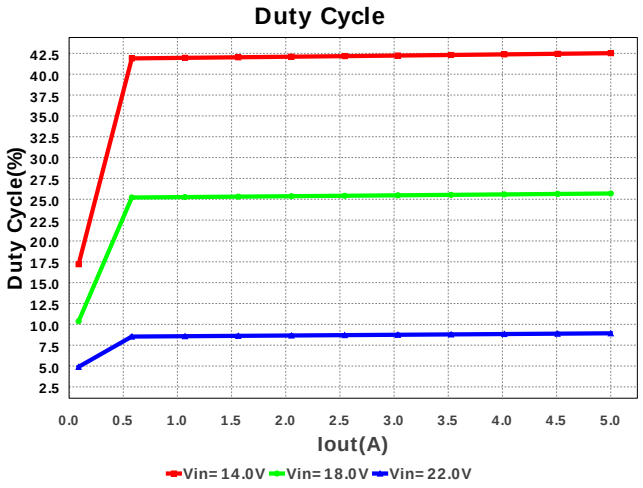

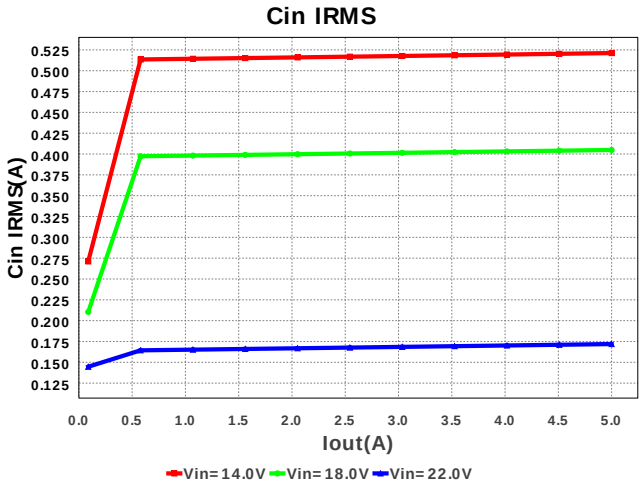

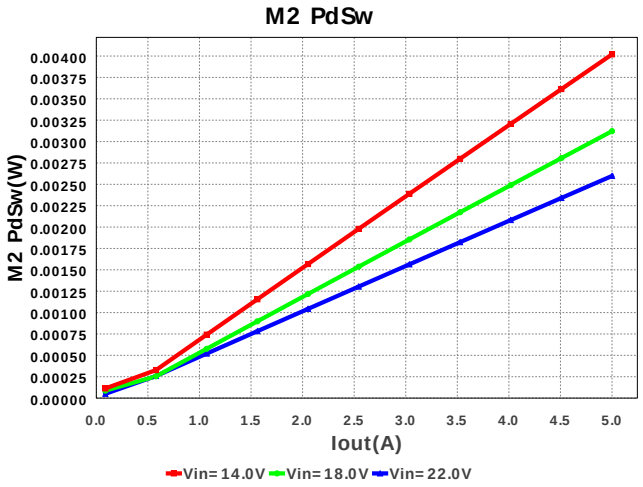

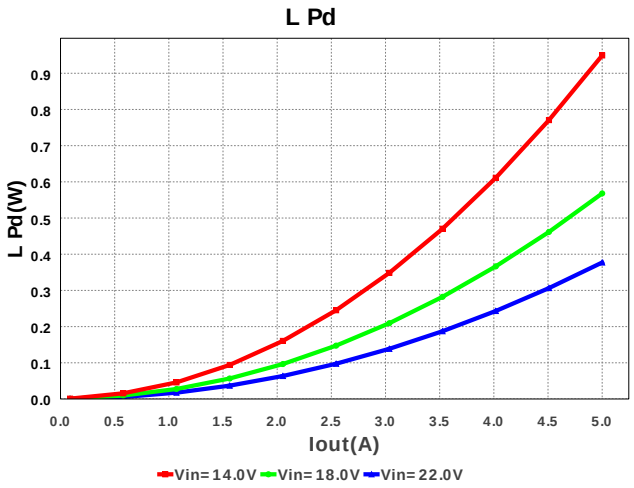

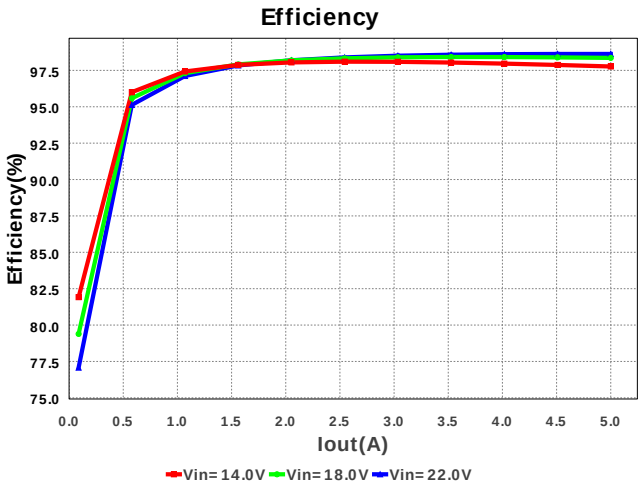

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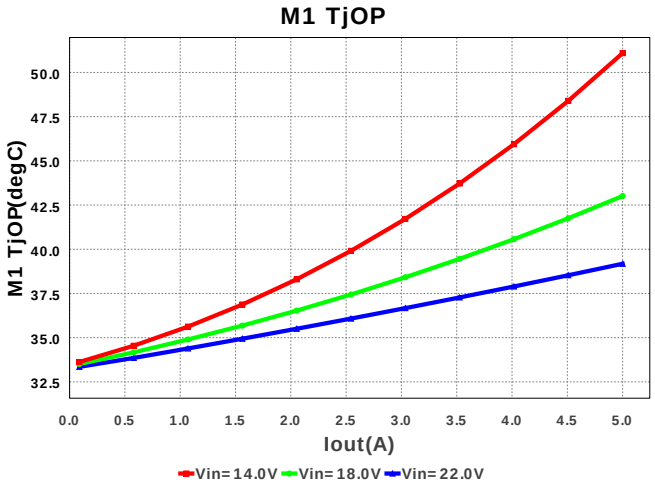
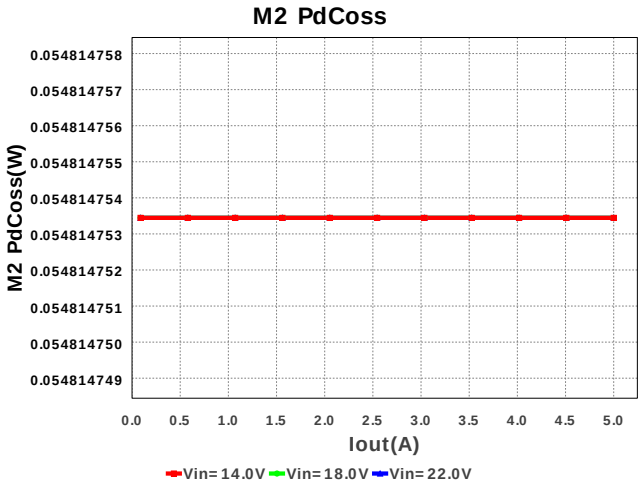
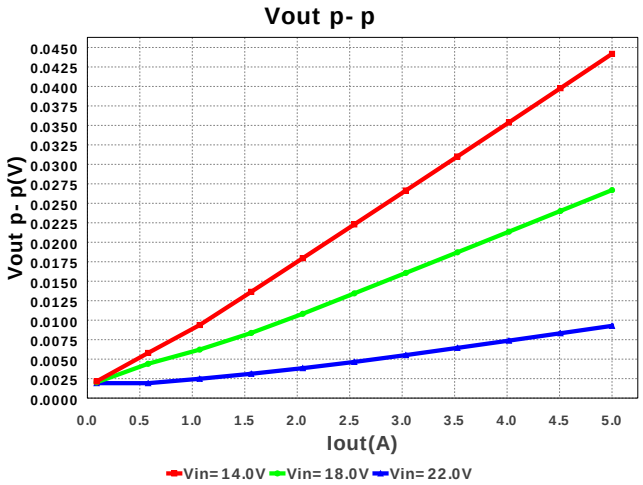
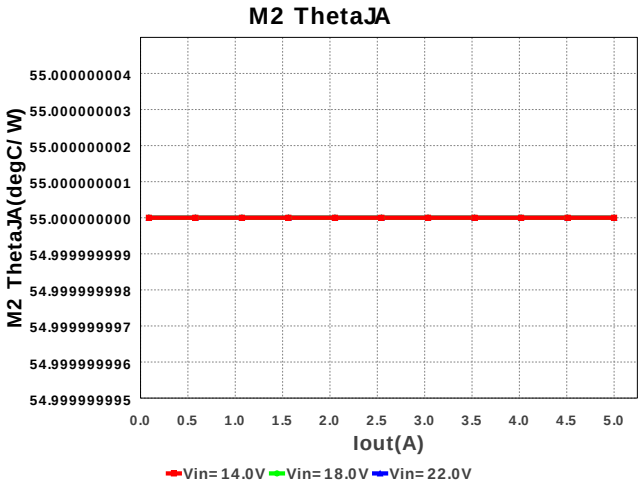
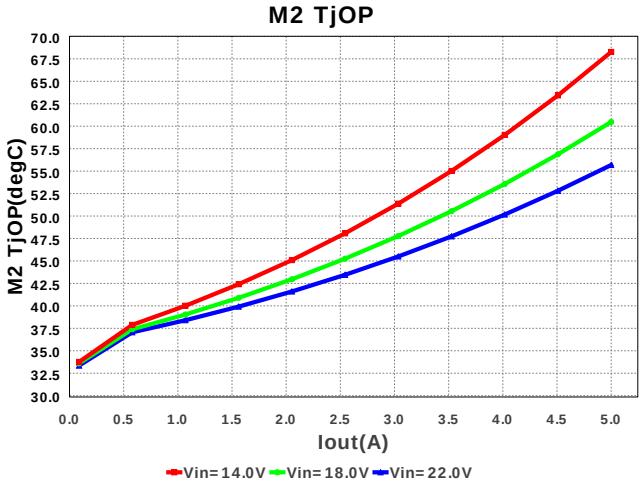
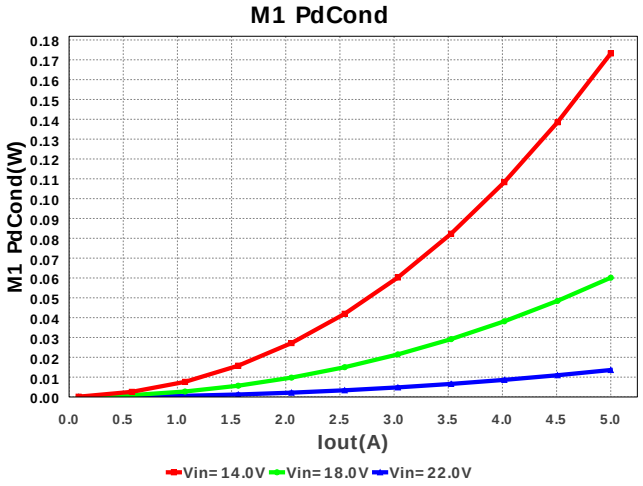

M1 TjOP
M1 TjOP(degC)
50.0
47.5
45.0
42.5
40.0
37.5
35.0
32.5
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Iout(A)
Vin=14.0V Vin=18.0V Vin=22.0V

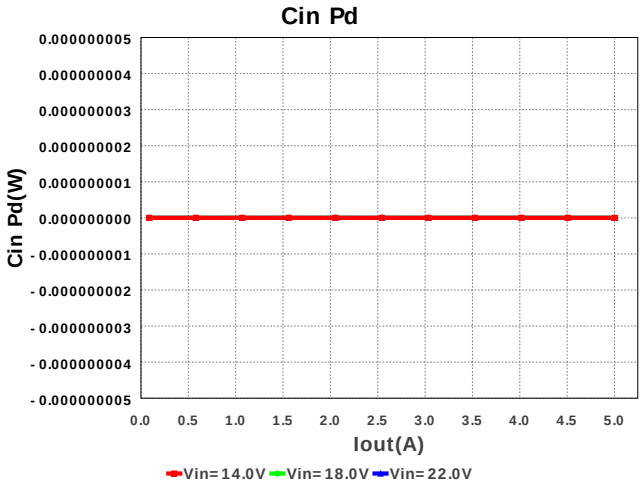

M2 PdCoss
M2 PdCoss(W)
0.054814758
0.054814757
0.054814756
0.054814755
0.054814754
0.054814753
0.054814752
0.054814751
0.054814750
0.054814749
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Iout(A)
Vin=14.0V Vin=18.0V Vin=22.0V

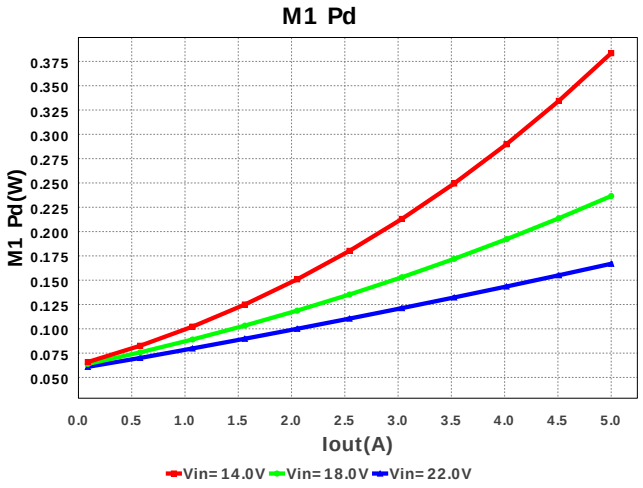

Vout p-p
Vout p-p(V)
0.0450
0.0425
0.0400
0.0375
0.0350
0.0325
0.0300
0.0275
0.0250
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Iout(A)
Vin=14.0V Vin=18.0V Vin=22.0V

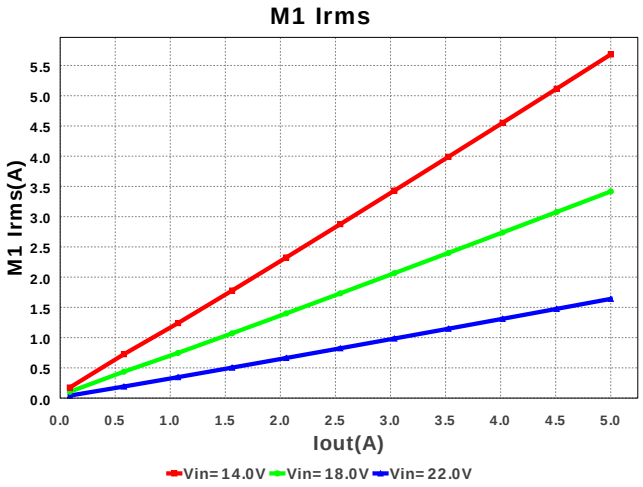

M2 ThetaJA
M2 ThetaJA(degC/W)
55.000000004
55.000000003
55.000000002
55.000000001
55.000000000
54.999999999
54.999999998
54.999999997
54.999999996
54.999999995
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Iout(A)
Vin=14.0V Vin=18.0V Vin=22.0V

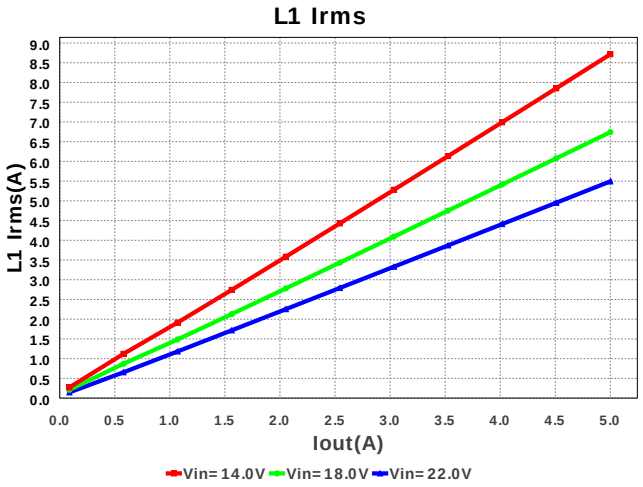

M2 TjOP
M2 TjOP(degC)
70.0
67.5
65.0
62.5
60.0
57.5
55.0
52.5
50.0
47.5
45.0
42.5
40.0
37.5
35.0
32.5
30.0
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Iout(A)
Vin=14.0V Vin=18.0V Vin=22.0V

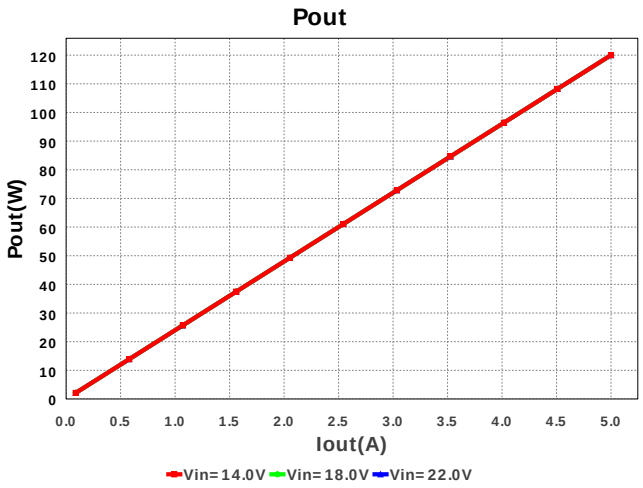

M1 PdCond
M1 PdCond(W)
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Iout(A)
Vin=14.0V Vin=18.0V Vin=22.0V

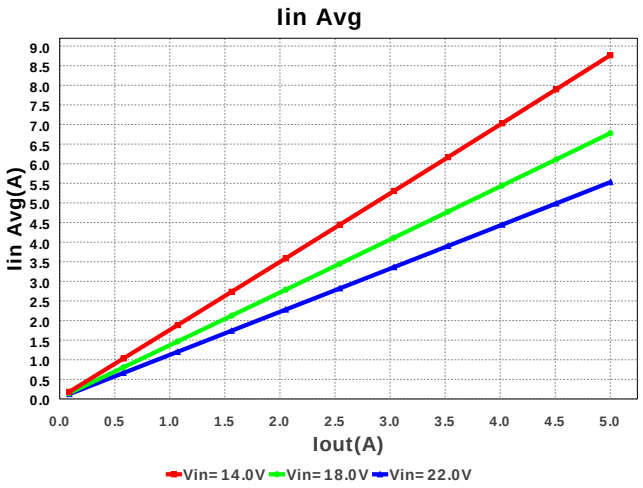












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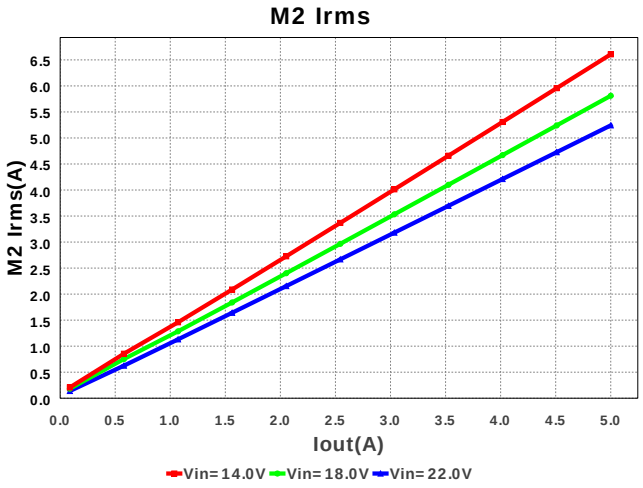

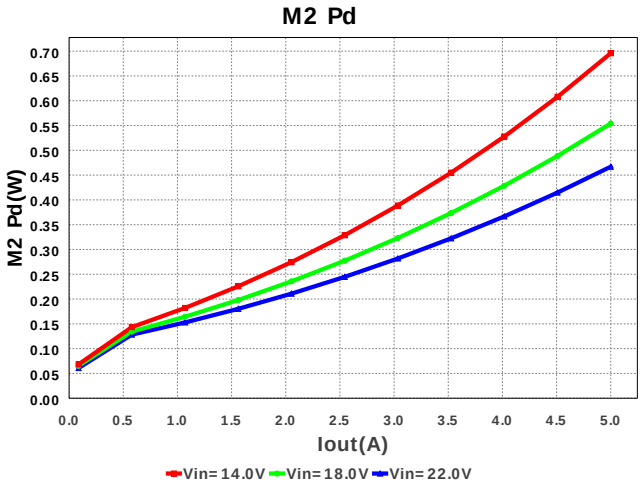

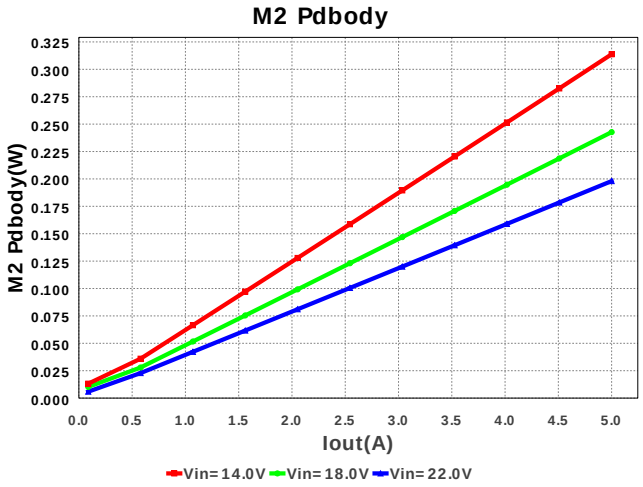

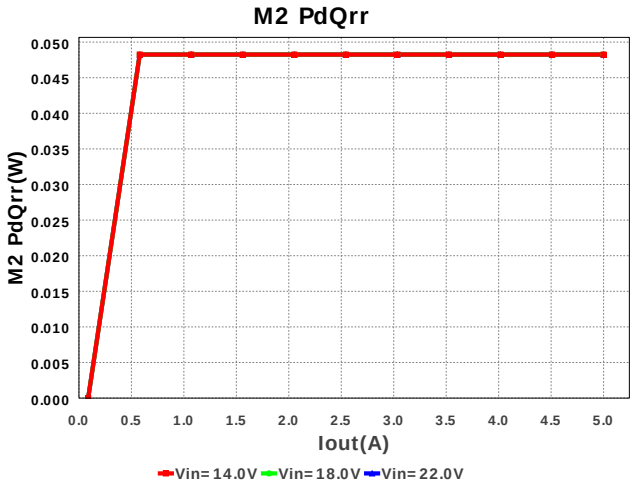

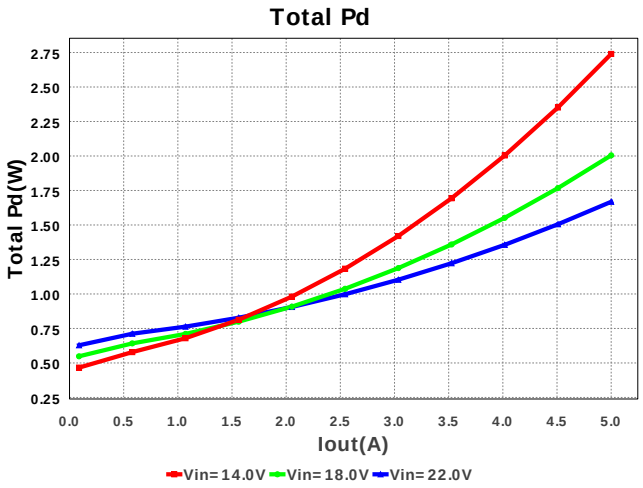

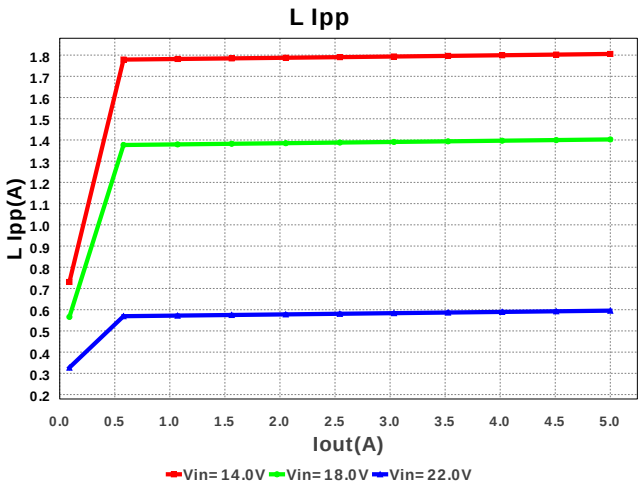

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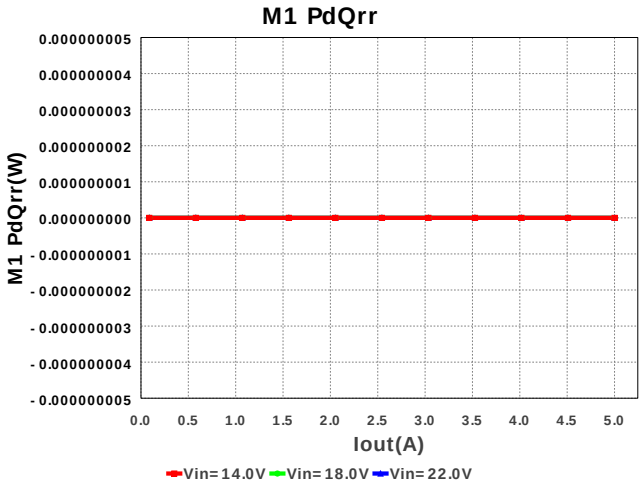

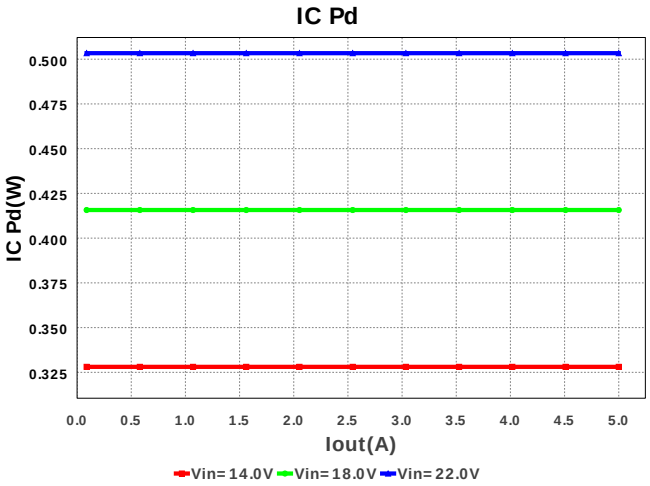

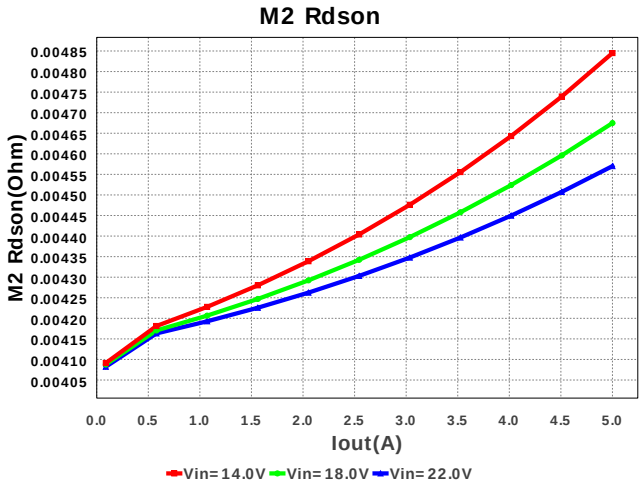

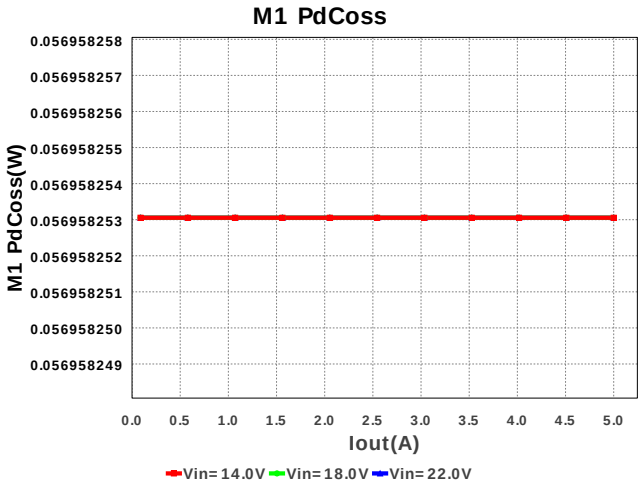

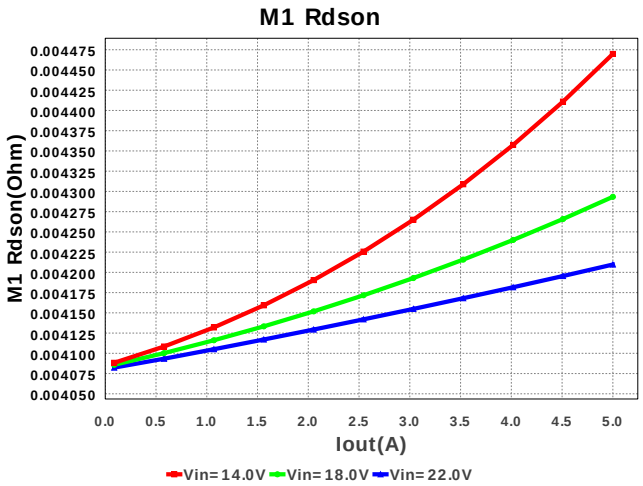

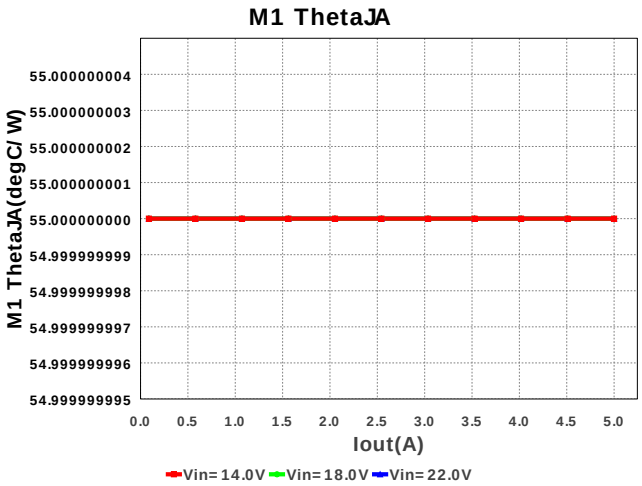

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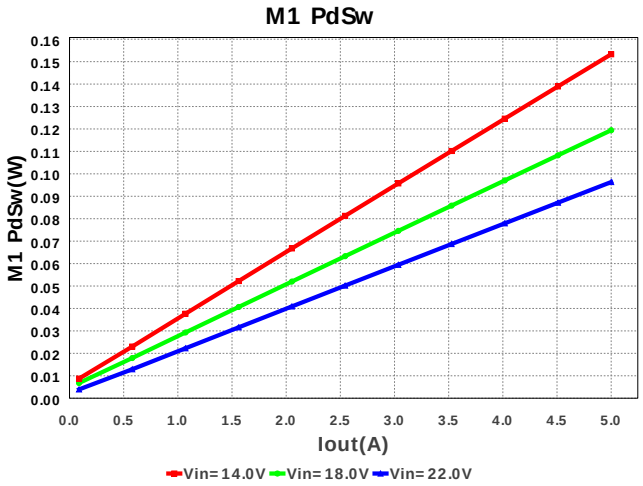

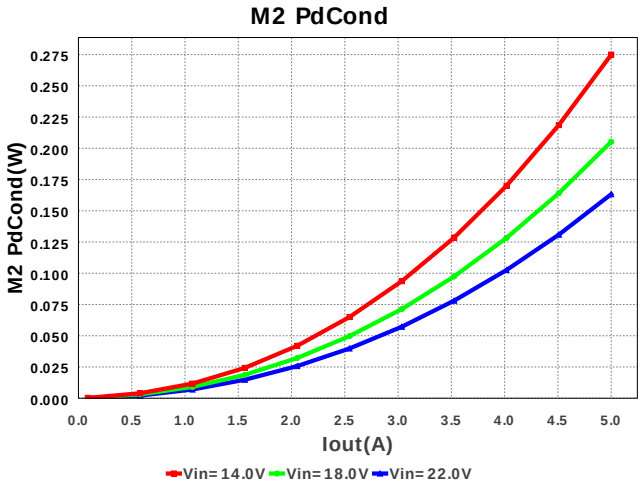

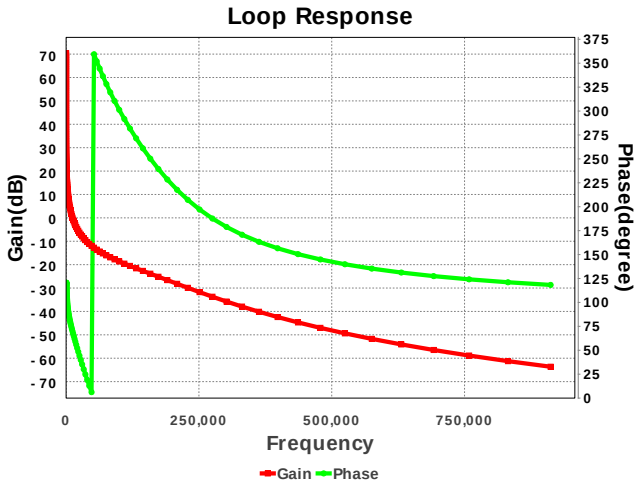

工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	523.916 mA	Current	输入电容器均方根纹波电流
2.	Iin Avg	8.794 A	Current	平均输入电流
3.	L Ipp	1.815 A	Current	峰值到峰值电感器纹波电流
4.	L1 Irms	8.715 A	Current	电感器纹波电流
5.	M1 Irms	5.683 A	Current	MOSFET RMS 纹波电流
6.	M2 Irms	6.607 A	Current	MOSFET RMS 纹波电流
7.	BOM 数量	34	General	Total Design BOM count
8.	大小	951.0 mm2	General	BOM组件的总所占面积
9.	频率	400.0 kHz	General	开关频率
10.	M1 Rdson	4.468 mOhm	General	漏源导通电阻
11.	M1 ThetaJA	55.0 degC/W	General	MOSFET 接点到环境热敏电阻
12.	M2 Rdson	4.842 mOhm	General	漏源导通电阻
13.	M2 ThetaJA	55.0 degC/W	General	MOSFET 接点到环境热敏电阻
14.	模式	CCM	General	传导模式
15.	Pout	120.0 W	General	总输出功率
16.	总 BOM	$12.47	General	Total BOM Cost
17.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
18.	交叉频率	7.738 kHz	Op_point	波特图交叉频率
19.	占空比	42.52 %	Op_point	占空比
20.	效率	97.471 %	Op_point	稳态效率
21.	IC Tj	51.444 degC	Op_point	电路接点温度
22.	ICThetaJA	65.7 degC/W	Op_point	电路接点到环境热敏电阻
23.	IOUT_OP	5.0 A	Op_point	Iout 操作点
24.	M1 TjOP	51.028 degC	Op_point	M1 MOSFET 接点温度
25.	M2 TjOP	68.138 degC	Op_point	MOSFET 接点温度
26.	相位裕度	71.1 deg	Op_point	波特图相位裕度
27.	VIN_OP	14.0 V	Op_point	Vin操作点
28.	Vout p-p	44.414 mV	Op_point	峰值到峰值输出纹波电压
29.	Cin Pd	0.0 W	Power	输入电容器功率耗散
30.	IC Pd	326.4 mW	Power	电路功率耗散
31.	L Pd	949.284 mW	Power	电感器功率耗散
32.	M1 Pd	382.327 mW	Power	MOSFET 功率耗散

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#	名称	数值	类别	说明
33.	M1 PdCond	173.15 mW	Power	M1 MOSFET 传导损耗
34.	M1 PdCoss	56.661 mW	Power	M1 MOSFET Coss Losses
35.	M1 PdQrr	0.0 W	Power	M1 MOSFET 开关损耗
36.	M1 PdSw	152.516 mW	Power	M1 MOSFET 开关损耗
37.	M2 Pd	693.413 mW	Power	MOSFET 功率耗散
38.	M2 PdCond	274.775 mW	Power	M2 MOSFET 传导损耗
39.	M2 PdCoss	54.529 mW	Power	M2 MOSFET Coss Losses
40.	M2 PdQrr	48.0 mW	Power	Synchronous Boost High Side Reverse Recovery
41.	M2 PdSw	3.998 mW	Power	M2 MOSFET 开关损耗
42.	M2 Pdbody	312.111 mW	Power	较低功率FET的功率耗散
43.	整体 Pd	3.114 W	Power	总功率耗散

设计输入

#	名称	数值	说明
1.	输出电流	5.0 A	最大输出电流
2.	Iout1	5.0 Amps	Output Current #1
3.	Vin 最大	22.0 V	最高输入电压
4.	Vin 最小	14.0 V	最低输入电压
5.	输出电压:	24.0 V	输出电压
6.	Vout1	24.0 Volt	Output Voltage #1
7.	base_pn	TPS43060	美国国家半导体的产品编号
8.	源	DC	输入源类别
9.	工作环境温度	30.0 degC	环境温度

设计协助

1. TPS43060 Product Folder : http://www.ti.com/product/tps43060 : contains the data sheet and other resources.

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