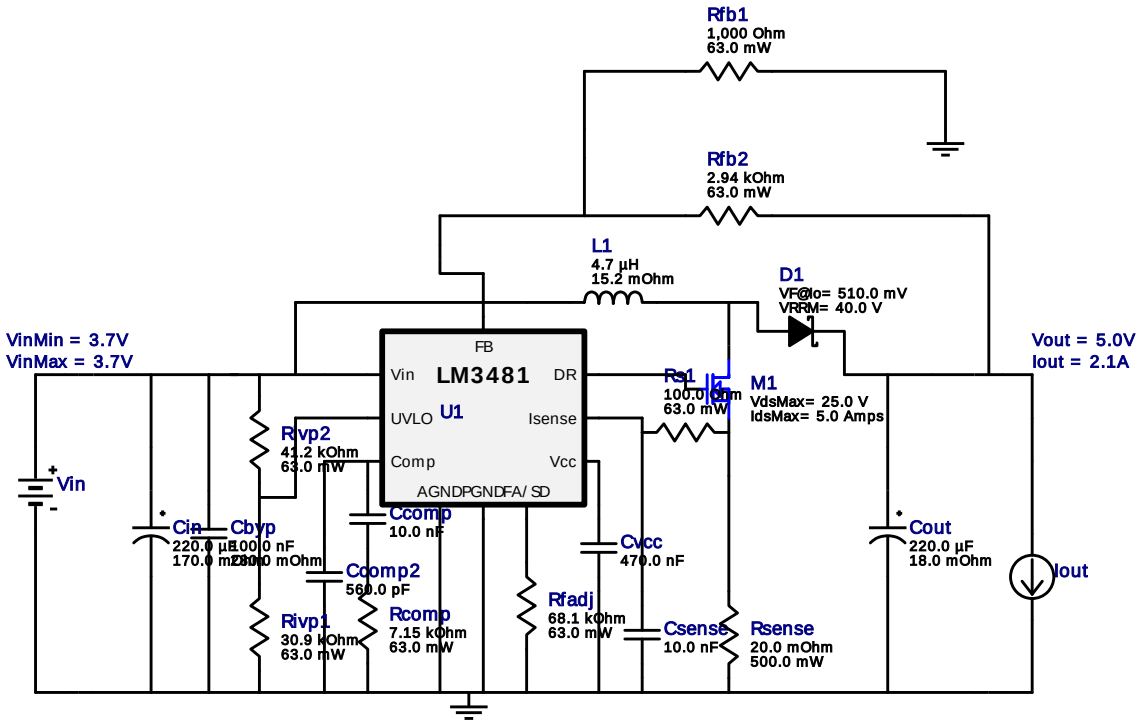
WEBENCH® 设计报告

VinMin = 3.7V
VinMax = 3.7V
Vout = 5.0V
Iout = 2.1A

Device = LM3481MM/NOPB
Topology = Boost
创建 = 5/21/13 6:46:11 AM
BOM成本 = $3.24
Total Pd = 1.61W
大小 = 660.0mm2
BOM 数量 = 20

Design : 3728439/48 LM3481MM/NOPB
LM3481MM/NOPB 3.7V-3.7V to 5.0V @ 2.1A



电气材料清单

#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	Cbyp	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
2.	Ccomp	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
3.	Ccomp2	Yageo America	CC0805KRX7R9BB561 Series= X7R	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
4.	Cin	Nichicon	UUD1E221MNL1GS Series= uD	Cap= 220.0 µF ESR= 170.0 mOhm VDC= 25.0 V IRMS= 450.0 mA	1	$0.16	SM_RADIAL_8MM 113mm2
5.	Cout	Kemet	T520D227M010ATE018 Series= 249	Cap= 220.0 µF ESR= 18.0 mOhm VDC= 10.0 V IRMS= 3.5 A	2	$0.67	7343-31 59mm2
6.	Csense	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
7.	Cvcc	MuRata	GRM155C80J474KE19D Series= 379	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 8mm2

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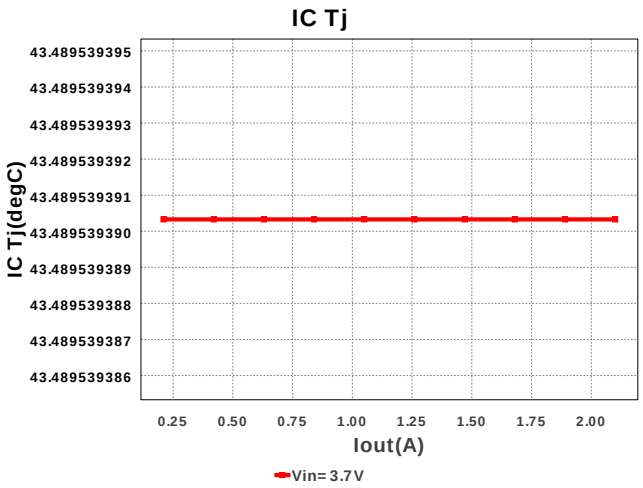
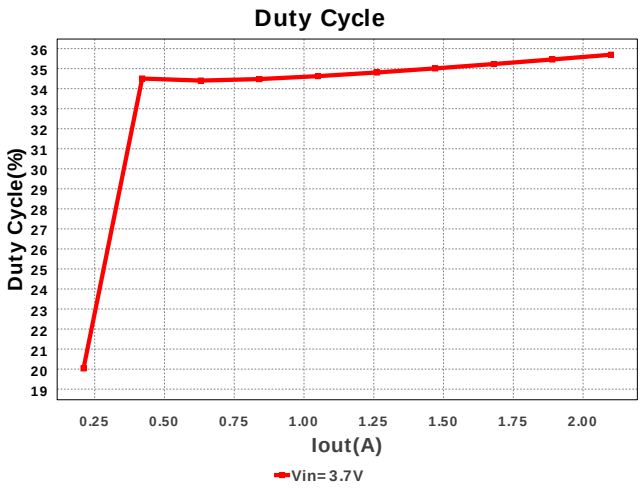
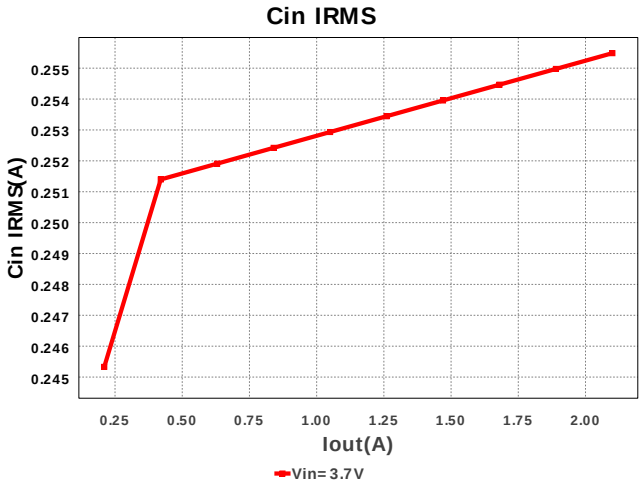
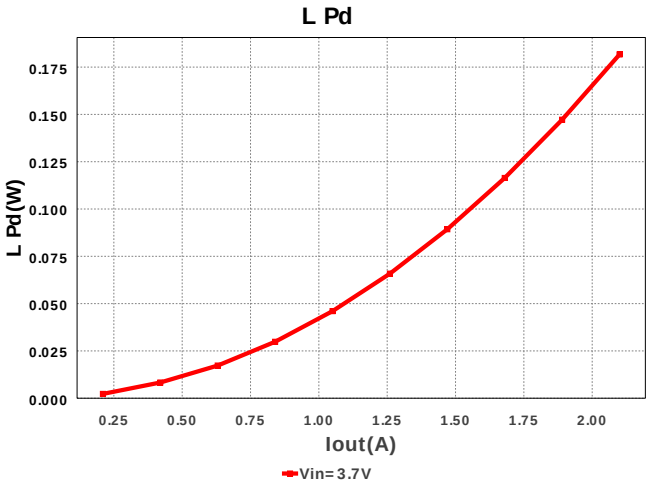
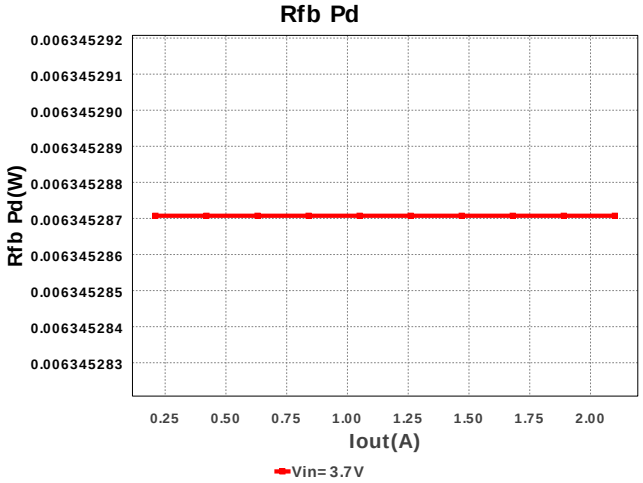
#	名称	制造商	零件编号	属性	Qty	Price	大小
8.	D1	Vishay-Semiconductor	50WQ04FNPBF	VF@Io= 510.0 mV VRRM= 40.0 V	1	$0.40	DPAK 102mm2
9.	L1	TDK	SLF10165T-4R7N4R73PF	L= 4.7 µH DCR= 15.2 mOhm	1	$0.05	SLF10165 146mm2
10.	M1	Texas Instruments	CSD16301Q2	VdsMax= 25.0 V IdsMax= 5.0 Amps	1	$0.17	TRANS_NexFET_Q2 16mm2
11.	Rcomp	Vishay-Dale	CRCW04027K15FKED Series= CRCW..e3	Res= 7.15 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
12.	Rfadj	Vishay-Dale	CRCW040268K1FKED Series= CRCW..e3	Res= 68.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
13.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
14.	Rfb2	Vishay-Dale	CRCW04022K94FKED Series= CRCW..e3	Res= 2.94 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
15.	Rivp1	Vishay-Dale	CRCW040230K9FKED Series= CRCW..e3	Res= 30.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
16.	Rivp2	Vishay-Dale	CRCW040241K2FKED Series= CRCW..e3	Res= 41.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
17.	Rs1	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
18.	Rsense	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	1206 19mm2
19.	U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	$0.90	MUB10A 34mm2

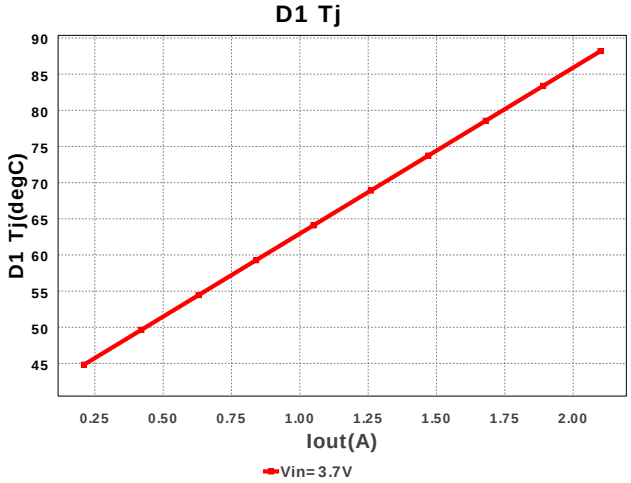




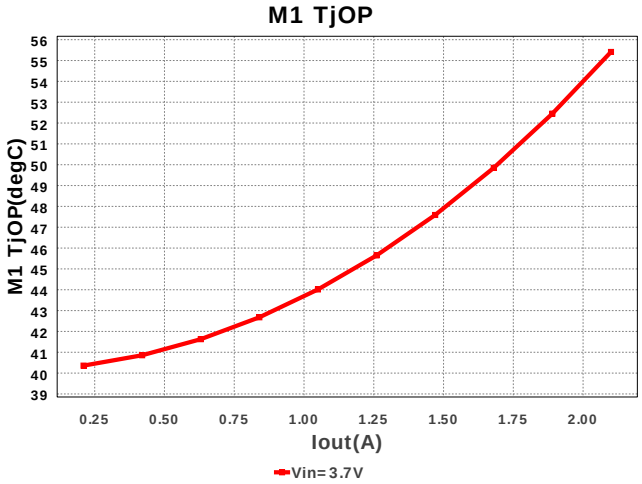

Cin IRMS
Cin IRMS(A)
0.255
0.254
0.253
0.252
0.251
0.250
0.249
0.248
0.247
0.246
0.245
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

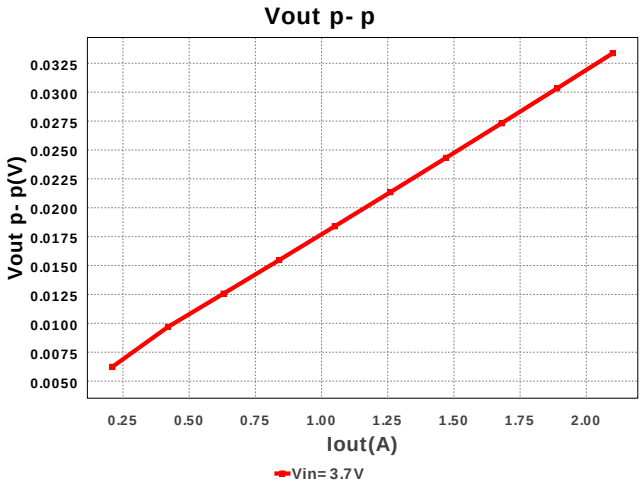

L Pd
L Pd(W)
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

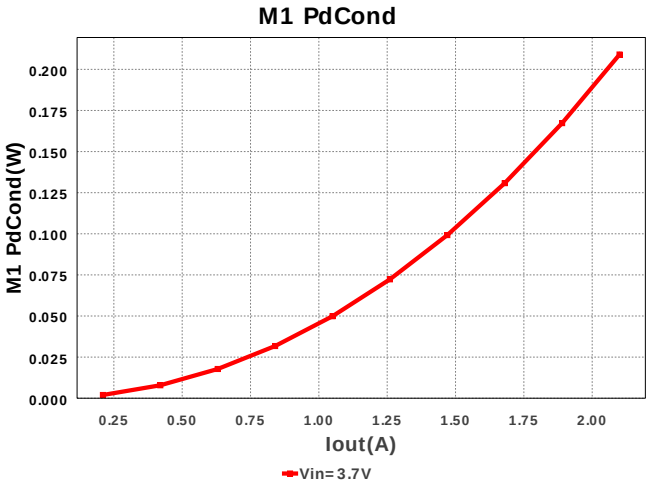

Rfb Pd
Rfb Pd(W)
0.006345292
0.006345291
0.006345290
0.006345289
0.006345288
0.006345287
0.006345286
0.006345285
0.006345284
0.006345283
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

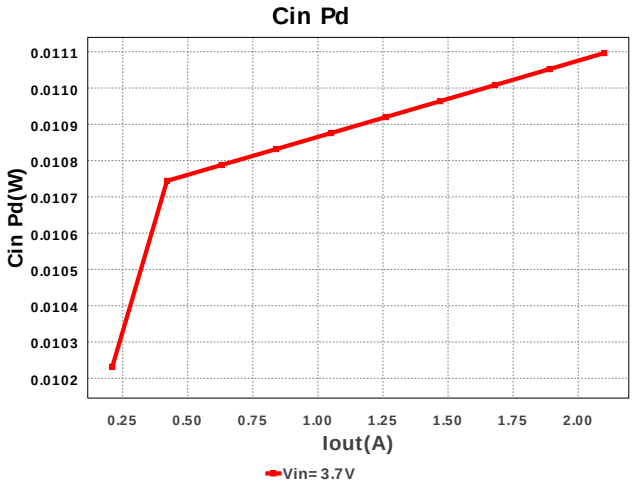

D1 Tj
D1 Tj(degC)
90
85
80
75
70
65
60
55
50
45
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

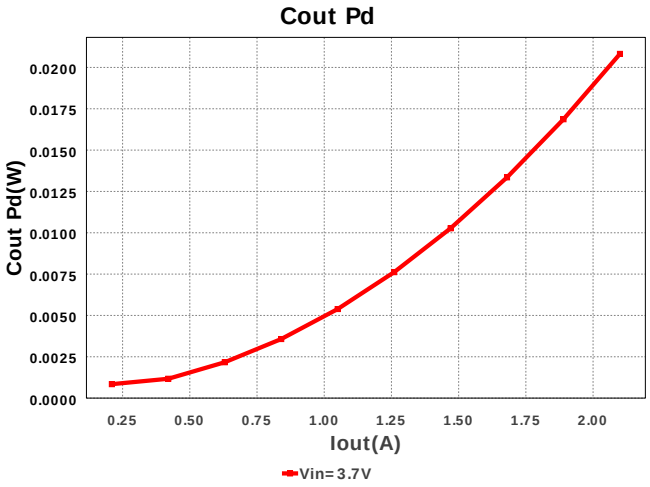
Efficiency
Efficiency(%)
88.50
88.25
88.00
87.75
87.50
87.25
87.00
86.75
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

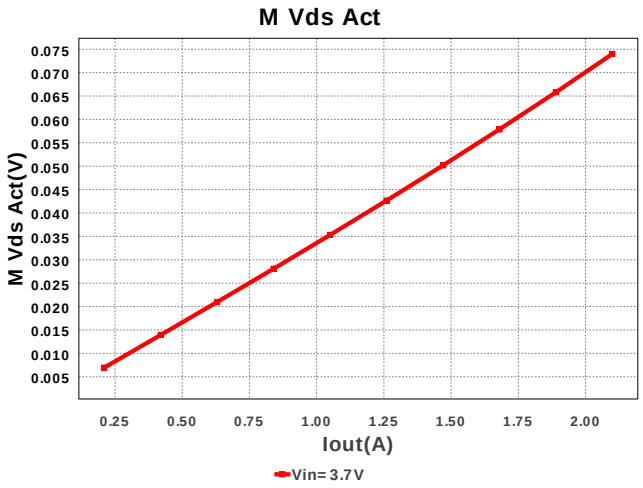

M1 TjOP
M1 TjOP(degC)
56
55
54
53
52
51
50
49
48
47
46
45
44
43
42
41
40
39
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

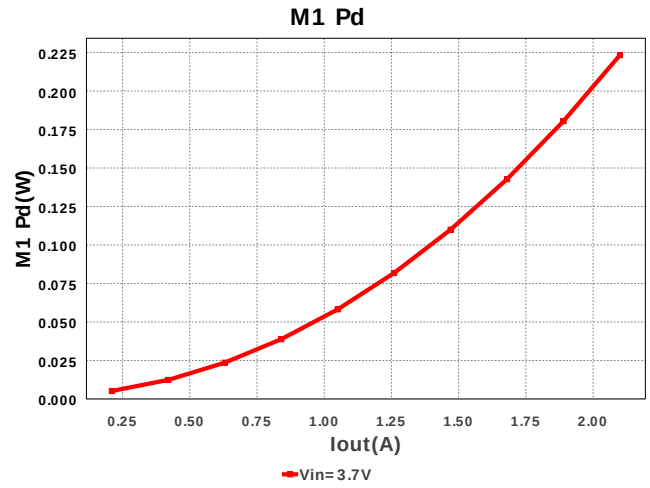












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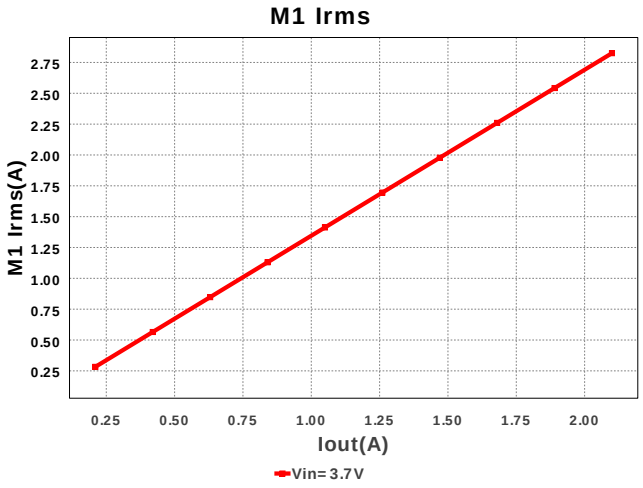

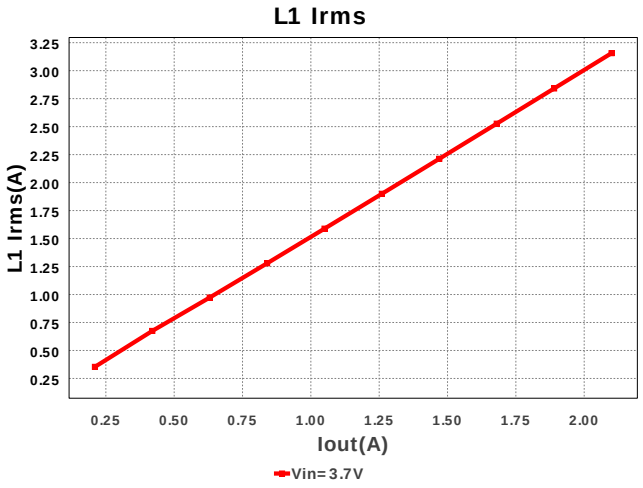

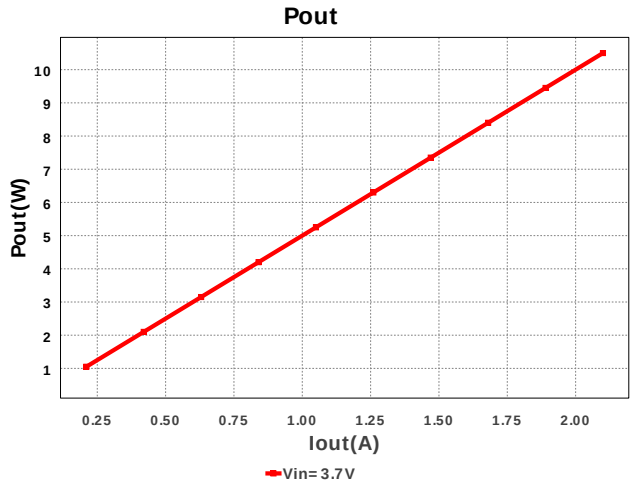

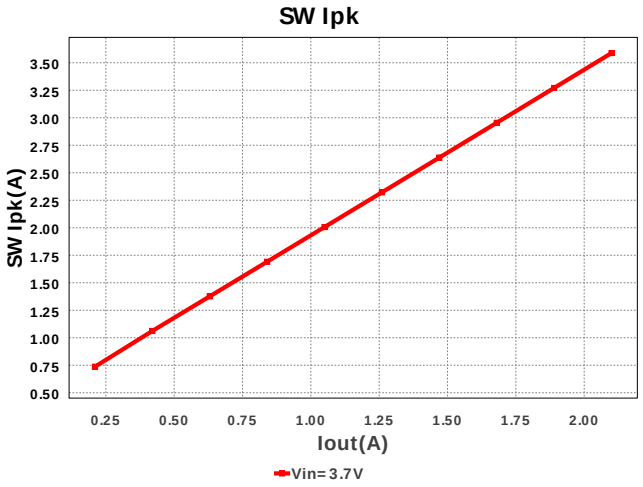

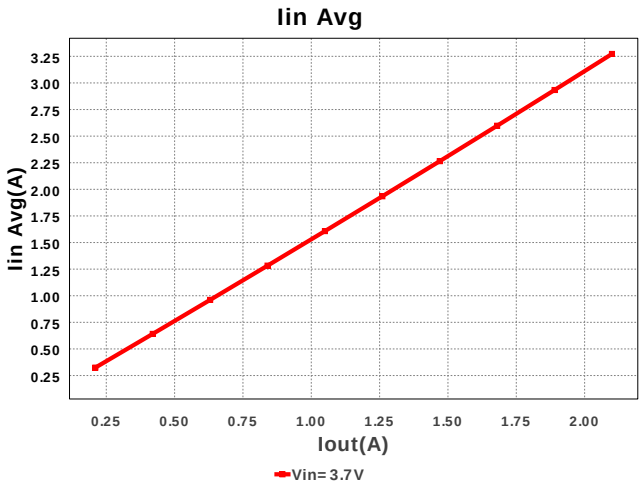

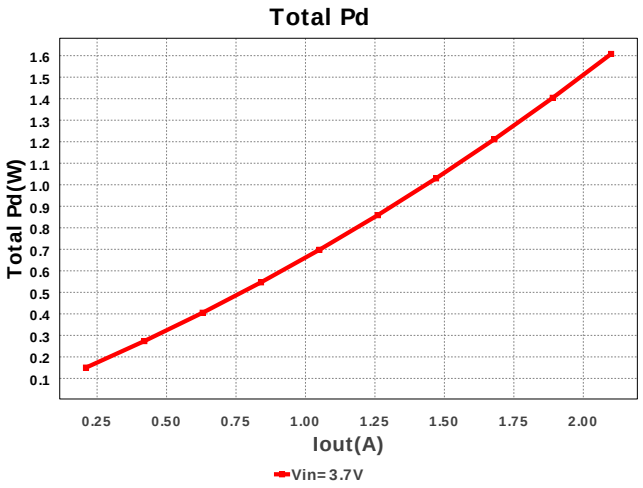

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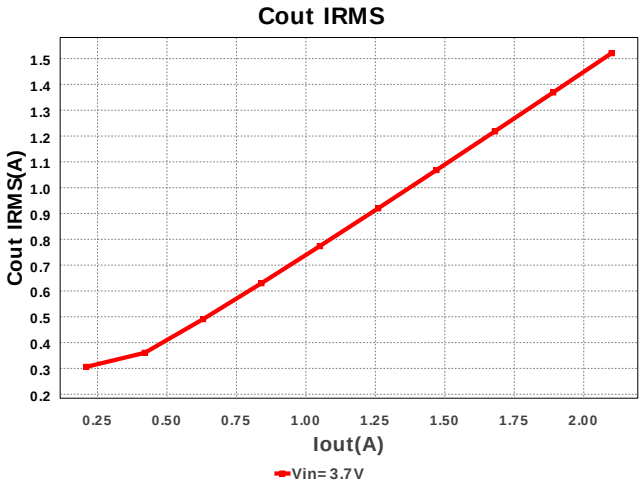
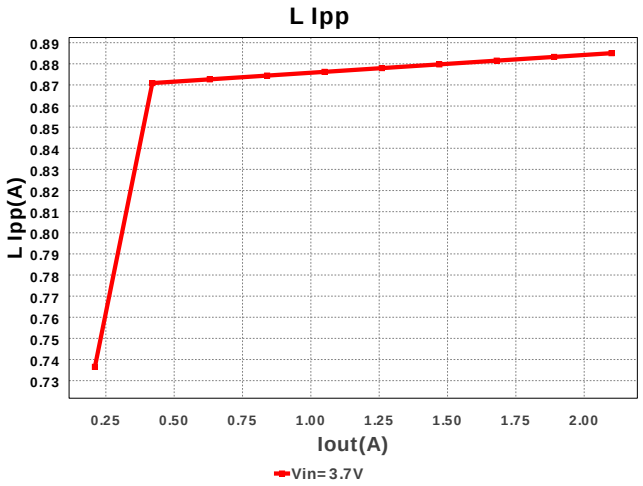
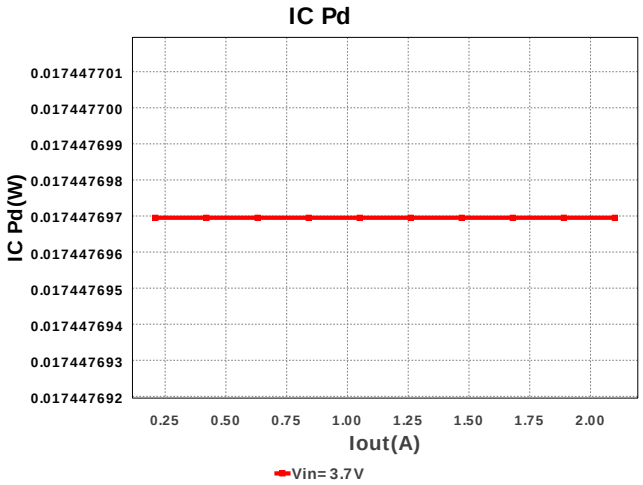
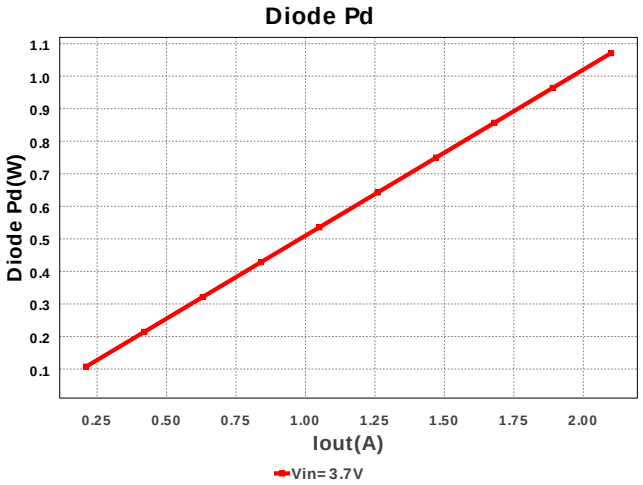
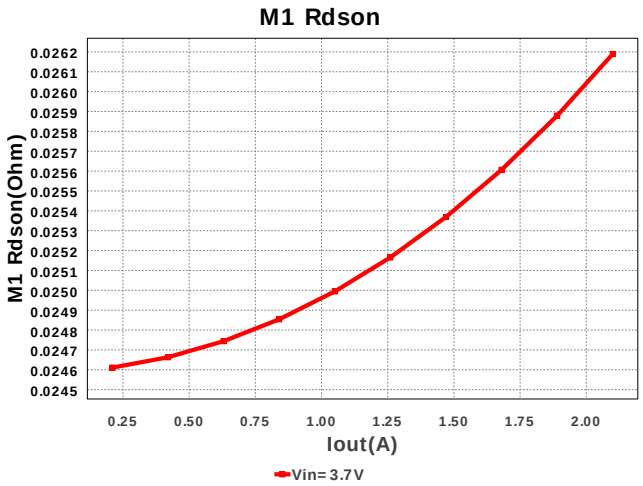
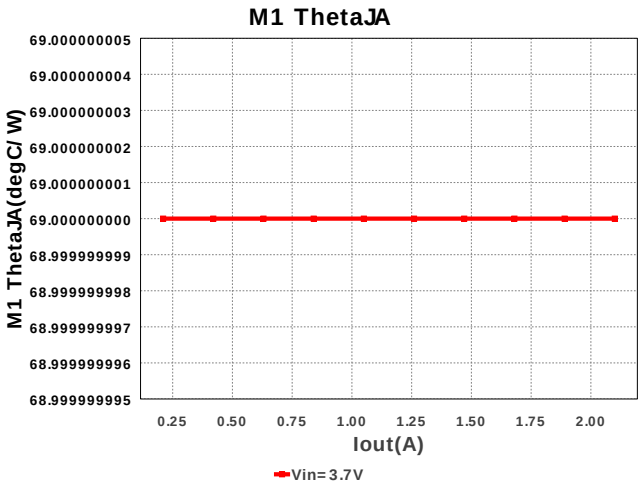

Cout IRMS
Cout IRMS(A)
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

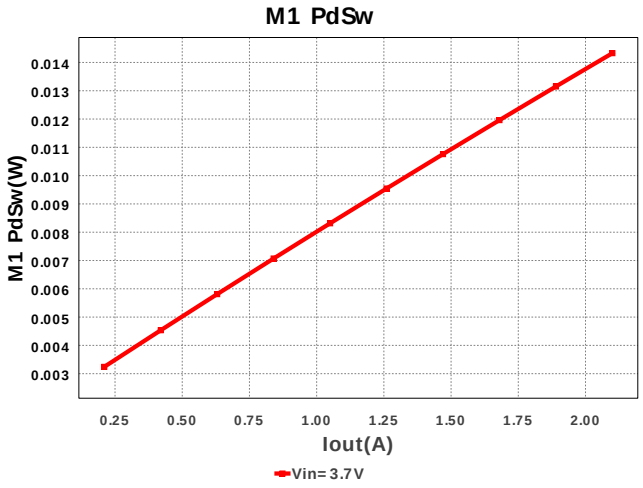

L Ipp
L Ipp(A)
0.89
0.88
0.87
0.86
0.85
0.84
0.83
0.82
0.81
0.80
0.79
0.78
0.77
0.76
0.75
0.74
0.73
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V


IC Pd
IC Pd(W)
0.017447701
0.017447700
0.017447699
0.017447698
0.017447697
0.017447696
0.017447695
0.017447694
0.017447693
0.017447692
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V


Diode Pd
Diode Pd(W)
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V


M1 Rdson
M1 Rdson(Ohm)
0.0262
0.0261
0.0260
0.0259
0.0258
0.0257
0.0256
0.0255
0.0254
0.0253
0.0252
0.0251
0.0250
0.0249
0.0248
0.0247
0.0246
0.0245
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V


M1 ThetaJA
M1 ThetaJA(degC/ W)
69.000000005
69.000000004
69.000000003
69.000000002
69.000000001
69.000000000
68.999999999
68.999999998
68.999999997
68.999999996
68.999999995
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V



工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	255.488 mA	Current	输入电容器均方根纹波电流
2.	Cout IRMS	1.521 A	Current	输出电容器均方根纹波电流
3.	Iin Avg	3.272 A	Current	平均输入电流
4.	L Ipp	885.038 mA	Current	峰值到峰值电感器纹波电流
5.	L1 Irms	3.156 A	Current	电感器纹波电流
6.	M1 Irms	2.819 A	Current	M1 MOSFET Irms
7.	SW Ipk	3.588 A	Current	峰值开关电流
8.	BOM 数量	20	General	Total Design BOM count
9.	大小	660.0 mm2	General	BOM组件的总所占面积
10.	频率	298.164 kHz	General	开关频率
11.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	73.79 mV	General	M Vds
13.	M1 Rdson	26.174 mOhm	General	漏源导通电阻
14.	M1 ThetaJA	69.0 degC/W	General	MOSFET 接点到环境热敏电阻
15.	模式	CCM	General	传导模式
16.	Pout	10.5 W	General	总输出功率
17.	总 BOM	$3.24	General	Total BOM Cost
18.	D1 Tj	88.195 degC	Op_Point	D1接点温度
19.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
20.	交叉频率	4.594 kHz	Op_point	波特图交叉频率
21.	占空比	35.683 %	Op_point	占空比
22.	效率	86.737 %	Op_point	稳态效率
23.	IC Tj	43.493 degC	Op_point	电路接点温度
24.	ICThetaJA	200.0 degC/W	Op_point	电路接点到环境热敏电阻
25.	IOUT_OP	2.1 A	Op_point	Iout 操作点
26.	M1 TjOP	55.259 degC	Op_point	M1 MOSFET 接点温度
27.	相位裕度	54.615 deg	Op_point	波特图相位裕度
28.	VIN_OP	3.7 V	Op_point	Vin操作点
29.	Vout p-p	33.368 mV	Op_point	峰值到峰值输出纹波电压
30.	Cin Pd	11.097 mW	Power	输入电容器功率耗散
31.	Cout Pd	20.816 mW	Power	输出电容器功率耗散
32.	二极管 Pd	1.071 W	Power	二极管功率耗散
33.	IC Pd	17.464 mW	Power	电路功率耗散
34.	L Pd	181.674 mW	Power	电感器功率耗散
35.	M1 Pd	221.149 mW	Power	M1 MOSFET 总功率耗散
36.	M1 PdCond	208.034 mW	Power	M1 MOSFET 传导损耗
37.	M1 PdSw	13.115 mW	Power	M1 MOSFET 开关损耗
38.	Rfb Pd	6.345 mW	Power	Rfb Power Dissipation
39.	整体 Pd	1.606 W	Power	总功率耗散

设计输入

#	名称	数值	说明
1.	输出电流	2.1 A	最大输出电流
2.	Iout1	2.1 Amps	Output Current #1
3.	Vin 最大	3.7 V	最高输入电压
4.	Vin 最小	3.7 V	最低输入电压
5.	输出电压:	5.0 V	输出电压
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	LM3481	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	40.0 degC	环境温度

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设计协助

1. LM3481 Product Folder : http://www.ti.com/product/lm3481 : contains the data sheet and other resources.

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