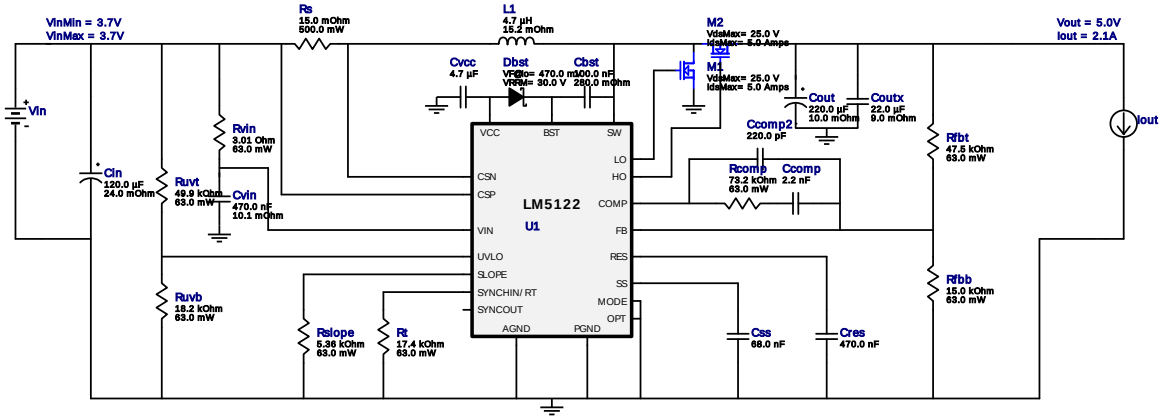
WEBENCH® 设计报告

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

Device = LM5122MH/NOPB
Topology = Boost
创建 = 5/21/13 6:44:28 AM
BOM成本 = $3.83
Total Pd = 1.13W
大小 = 586.0mm2
BOM 数量 = 25

Design : 3728439/47 LM5122MH/NOPB
LM5122MH/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.	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 13mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB222 Series= X7R	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
3.	Ccomp2	Yageo America	CC0805KRX7R9BB221 Series= X7R	Cap= 220.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
4.	Cin	Nippon Chemi-Con	APXE6R3ARA121ME61G Series= PXE	Cap= 120.0 µF ESR= 24.0 mOhm VDC= 6.3 V IRMS= 2.5 A	1	$0.61	CAPSMT_62_E61 53mm2
5.	Cout	Nippon Chemi-Con	APXF6R3ARA221MF61G Series= PXF	Cap= 220.0 µF ESR= 10.0 mOhm VDC= 6.3 V IRMS= 3.9 A	1	$0.54	CAPSMT_62_F61 74mm2
6.	Coutx	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 µF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	$0.05	0805 13mm2
7.	Cres	Taiyo Yuden	TMK212BJ474KD-T Series= X5R	Cap= 470.0 nF VDC= 20.0 V IRMS= 0.0 A	1	$0.02	0805 13mm2
8.	Css	MuRata	GRM155R61C683KA88D Series= X5R	Cap= 68.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
9.	Cvcc	MuRata	GRM21BC81E475KA12L Series= 379	Cap= 4.7 µF VDC= 25.0 V IRMS= 0.0 A	1	$0.04	0805 13mm2
10.	Cvin	TDK	C1608X5R1A474K Series= X5R	Cap= 470.0 nF ESR= 10.1 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
11.	Dbst	ON Semiconductor	MBR130T1G	VF@Io= 470.0 mV VRRM= 30.0 V	1	$0.09	SOD-123 22mm2

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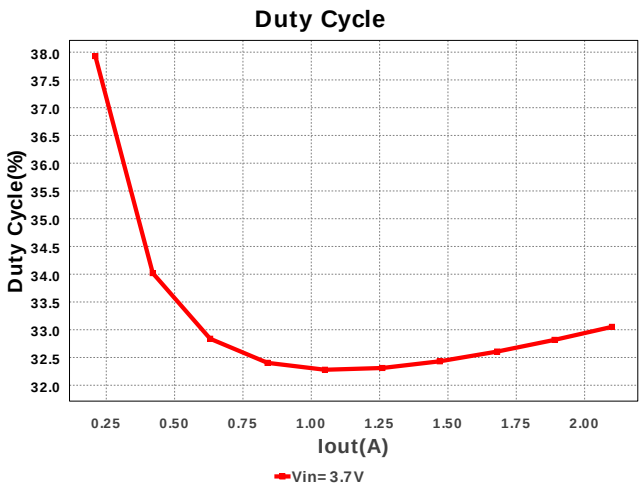
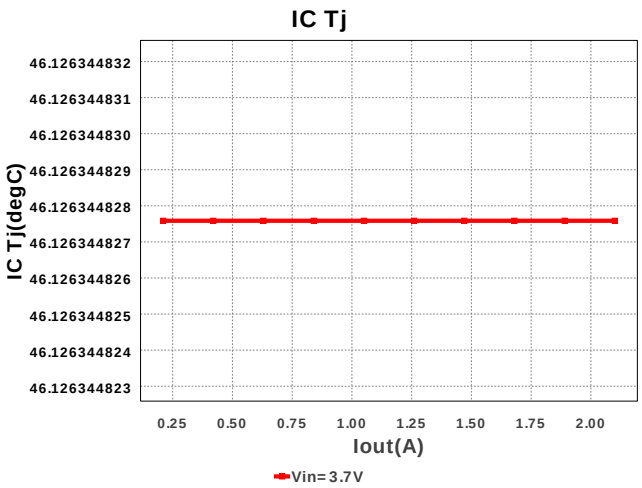
#	名称	制造商	零件编号	属性	Qty	Price	大小
12.	L1	TDK	SLF10165T-4R7N4R73PF	L= 4.7 µH DCR= 15.2 mOhm	1	$0.05	SLF10165 146mm2
13.	M1	Texas Instruments	CSD16301Q2	VdsMax= 25.0 V IdsMax= 5.0 Amps	1	$0.17	TRANS_NexFET_Q2 16mm2
14.	M2	Texas Instruments	CSD16301Q2	VdsMax= 25.0 V IdsMax= 5.0 Amps	1	$0.17	TRANS_NexFET_Q2 16mm2
15.	Rcomp	Vishay-Dale	CRCW040273K2FKED Series= CRCW..e3	Res= 73.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
16.	Rfbb	Vishay-Dale	CRCW040215K0FKED Series= CRCW..e3	Res= 15.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
17.	Rfbt	Vishay-Dale	CRCW040247K5FKED Series= CRCW..e3	Res= 47.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
18.	Rs	Stackpole Electronics Inc	CSR1206FK15L0 Series= ?	Res= 15.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.11	1206 19mm2
19.	Rslope	Vishay-Dale	CRCW04025K36FKED Series= CRCW..e3	Res= 5.36 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
20.	Rt	Vishay-Dale	CRCW040217K4FKED Series= CRCW..e3	Res= 17.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
21.	Ruvb	Vishay-Dale	CRCW040218K2FKED Series= CRCW..e3	Res= 18.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
22.	Ruvt	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
23.	Rvin	Vishay-Dale	CRCW04023R01FKED Series= CRCW..e3	Res= 3.01 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
24.	U1	Texas Instruments	LM5122MH/NOPB	Switcher	1	$1.80	MXA20A 71mm2





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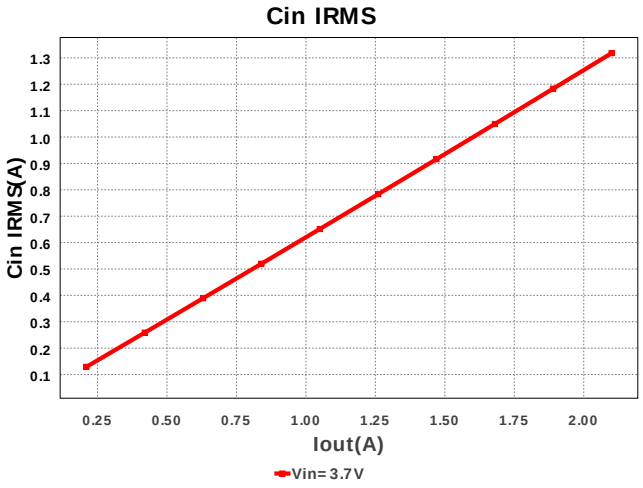

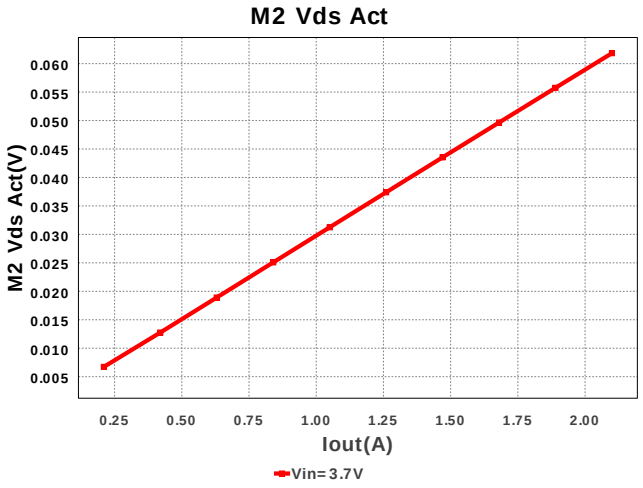

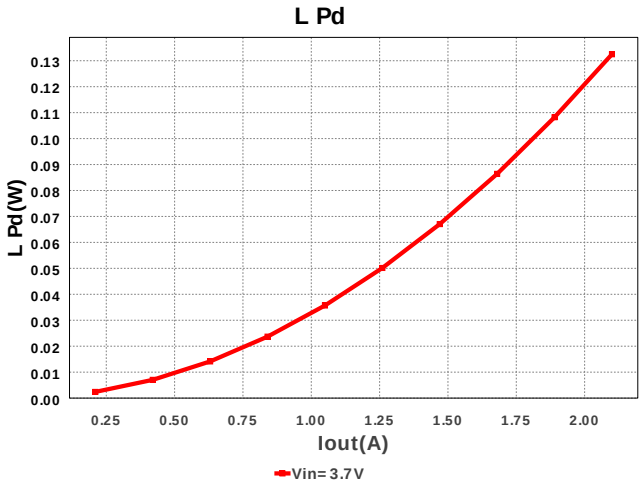

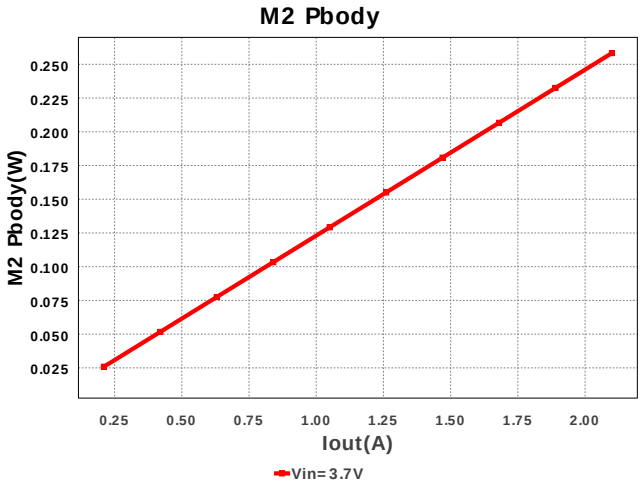

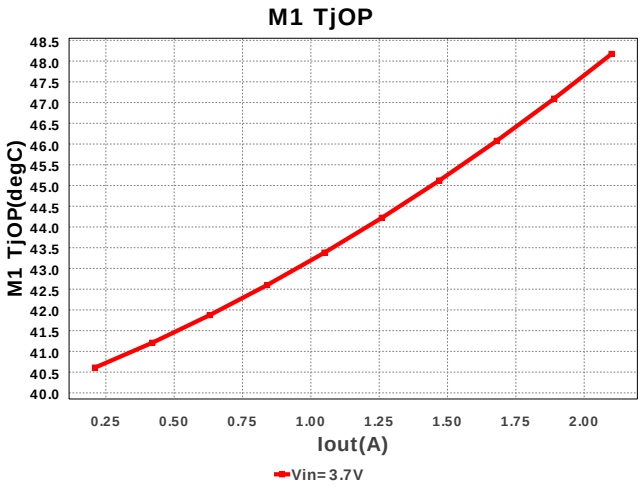

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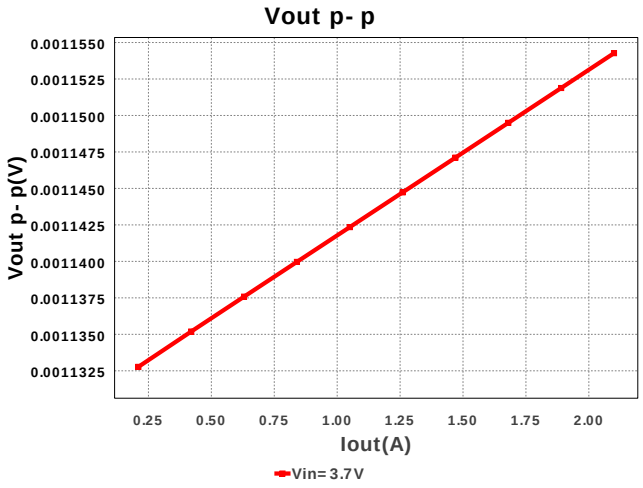

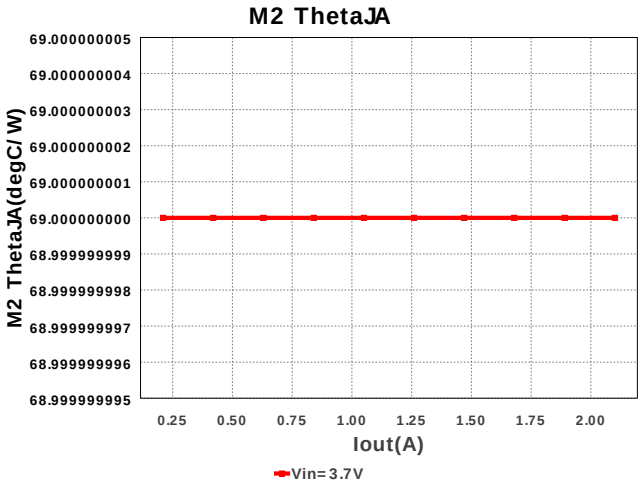

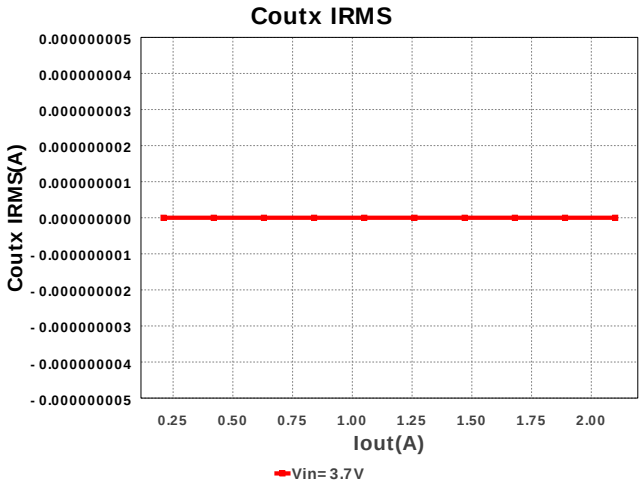

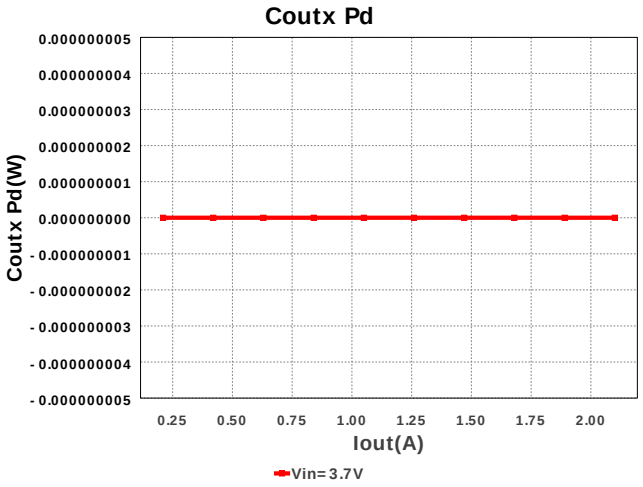

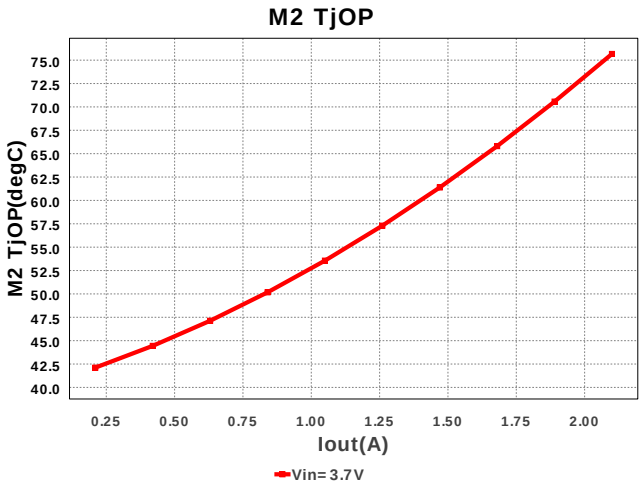

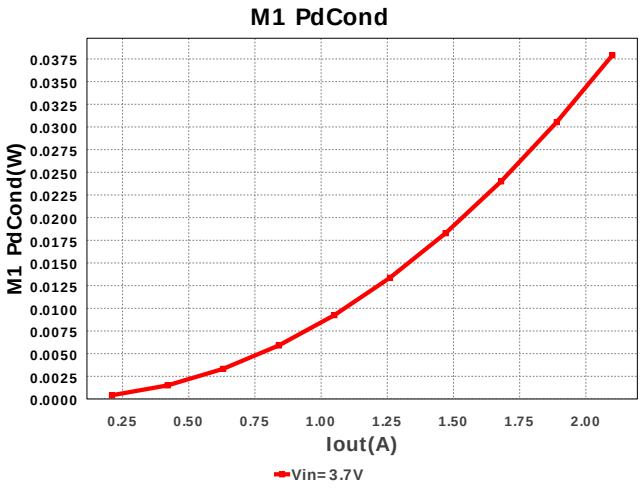

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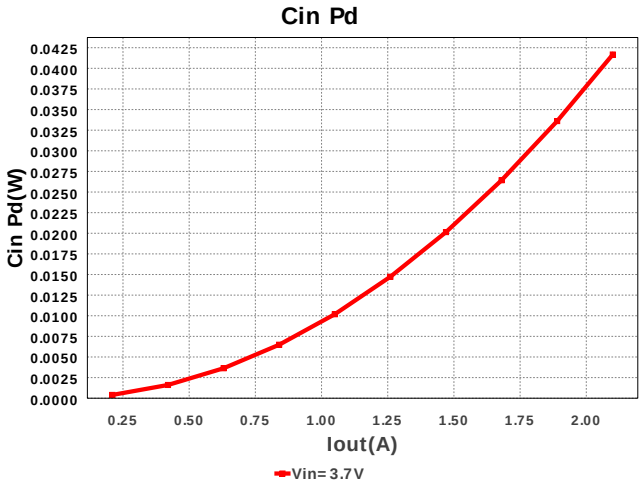
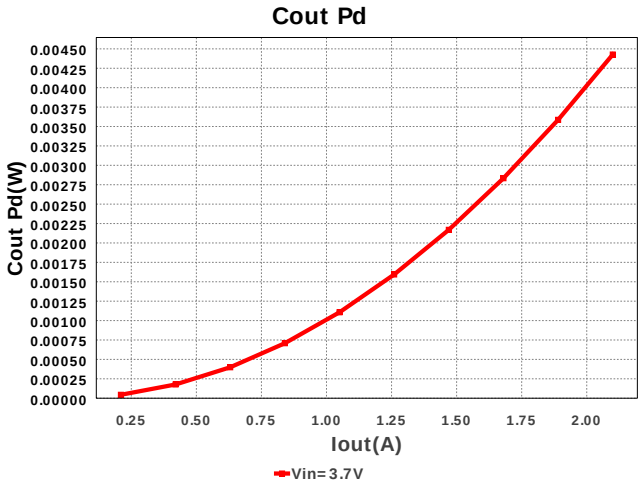
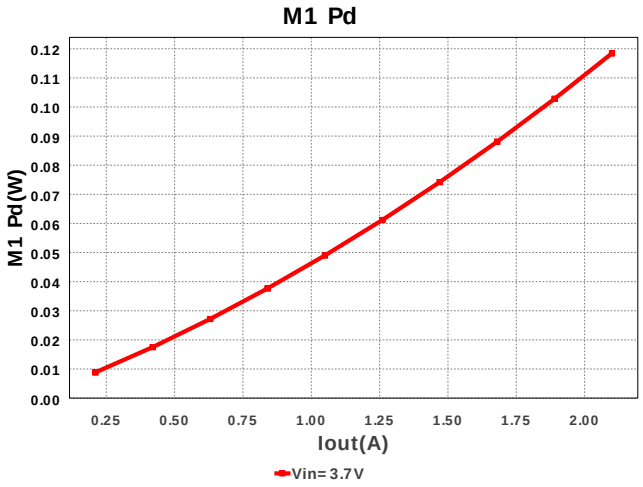
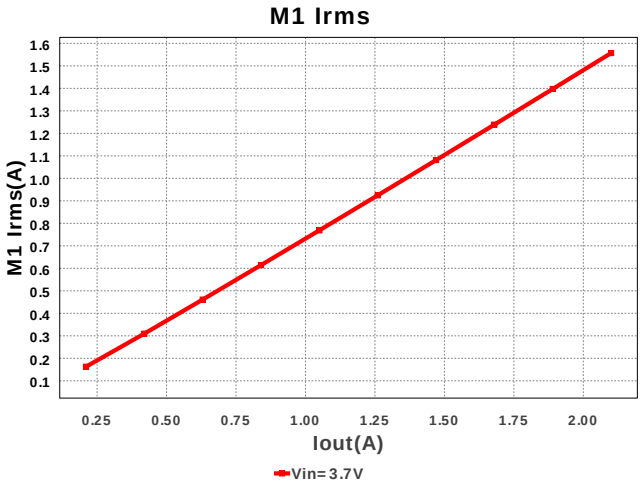
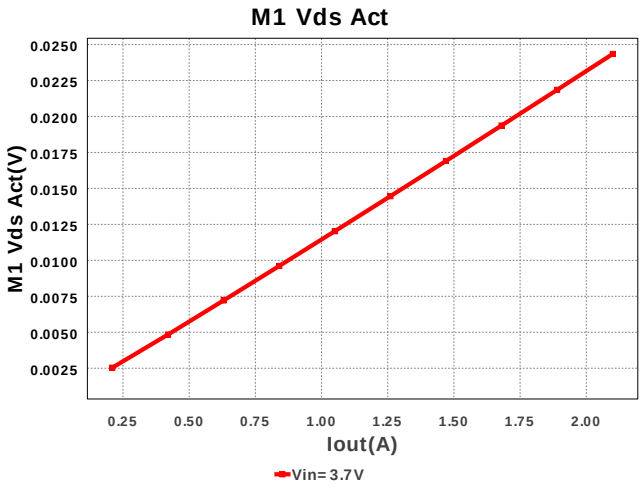
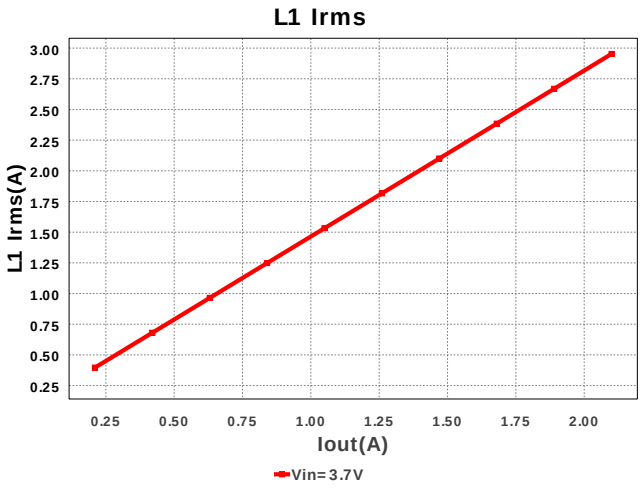

Cin Pd
Cin Pd(W)
0.0425
0.0400
0.0375
0.0350
0.0325
0.0300
0.0275
0.0250
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

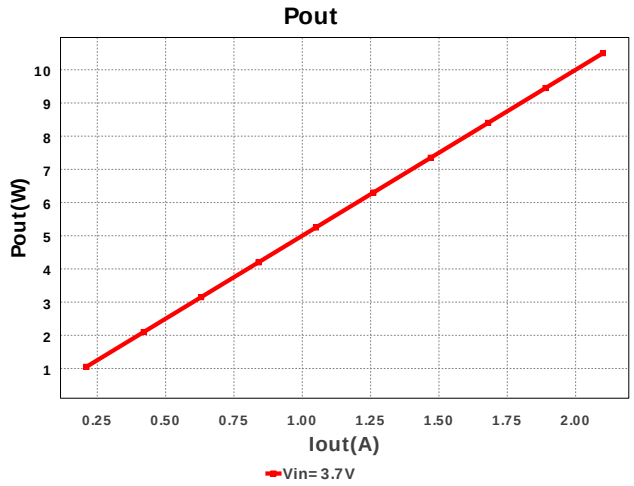

Cout Pd
Cout Pd(W)
0.00450
0.00425
0.00400
0.00375
0.00350
0.00325
0.00300
0.00275
0.00250
0.00225
0.00200
0.00175
0.00150
0.00125
0.00100
0.00075
0.00050
0.00025
0.00000
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

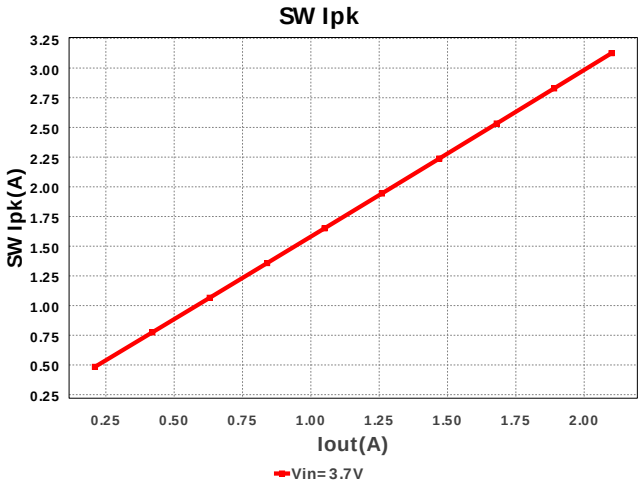

M1 Pd
M1 Pd(W)
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

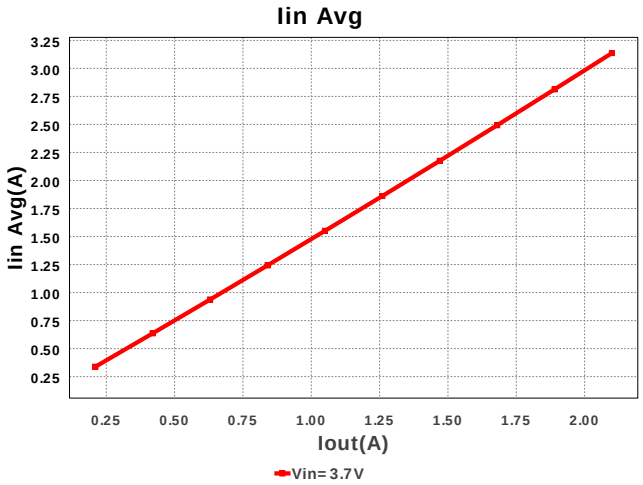

M1 Irms
M1 Irms(A)
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

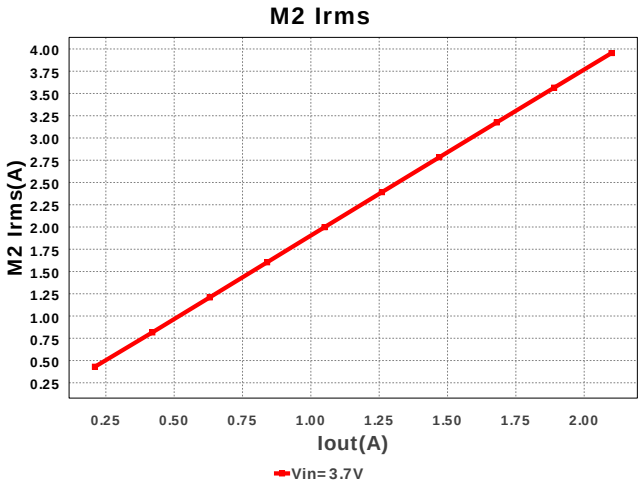

M1 Vds Act
M1 Vds Act(V)
0.0250
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

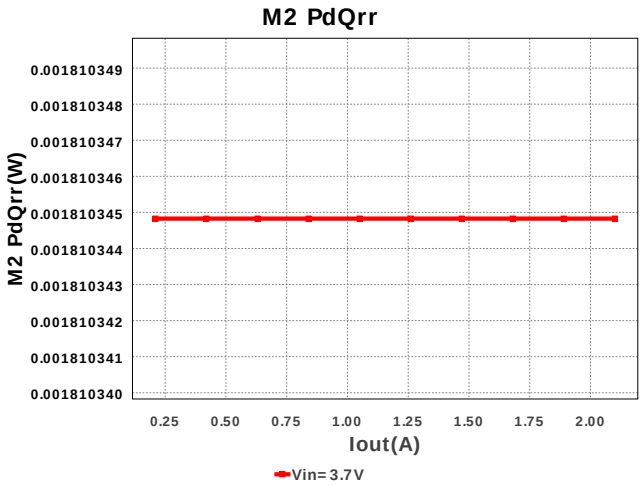

L1 Irms
L1 Irms(A)
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

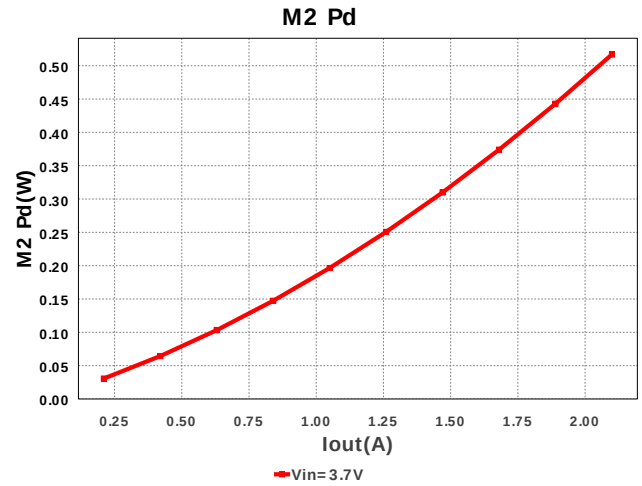

Pout
Pout(W)
10
9
8
7
6
5
4
3
2
1
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

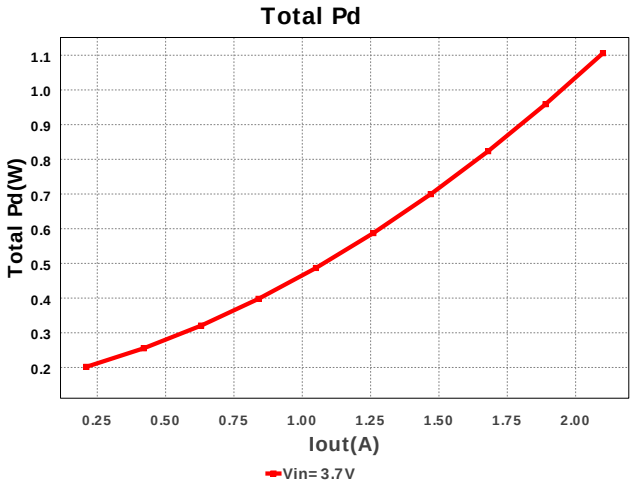

SW Ipk
SW Ipk(A)
3.25
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

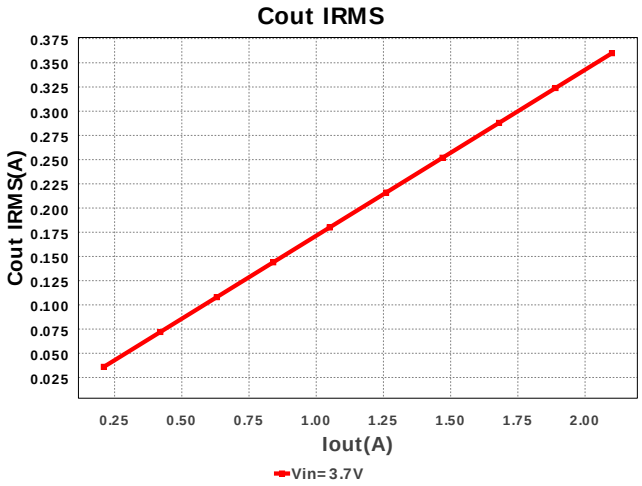

Iin Avg
Iin Avg(A)
3.25
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

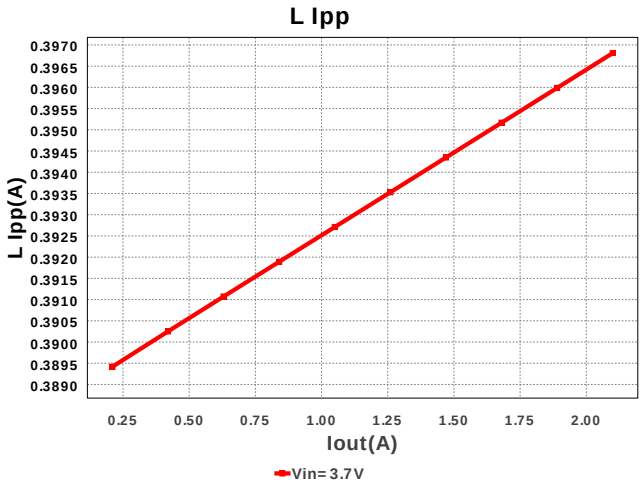

M2 Irms
M2 Irms(A)
4.00
3.75
3.50
3.25
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

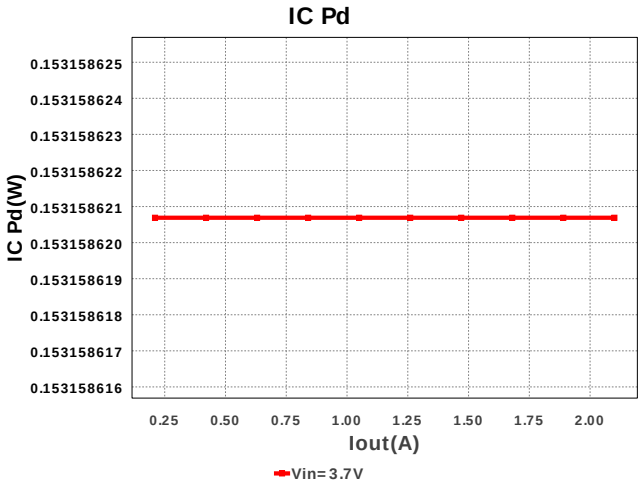

M2 PdQrr
M2 PdQrr(W)
0.001810349
0.001810348
0.001810347
0.001810346
0.001810345
0.001810344
0.001810343
0.001810342
0.001810341
0.001810340
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

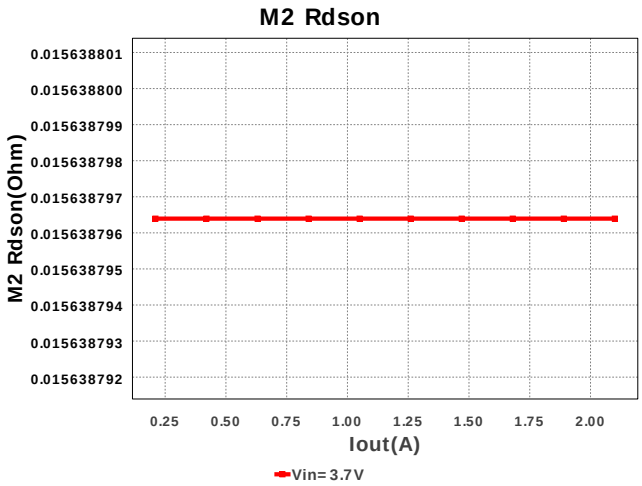

M2 Pd
M2 Pd(W)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
Iout(A)
Vin=3.7V

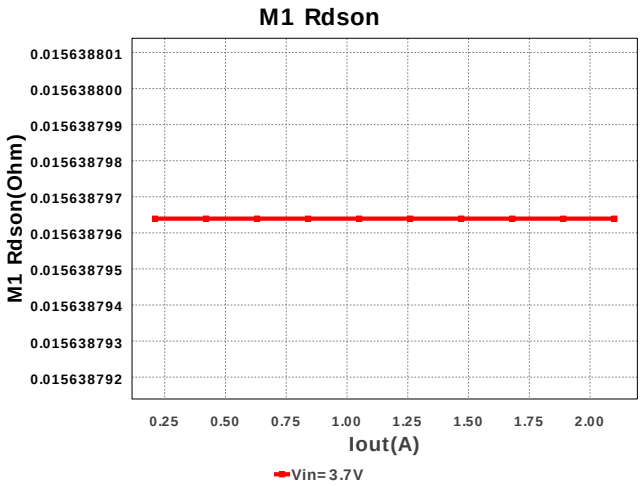












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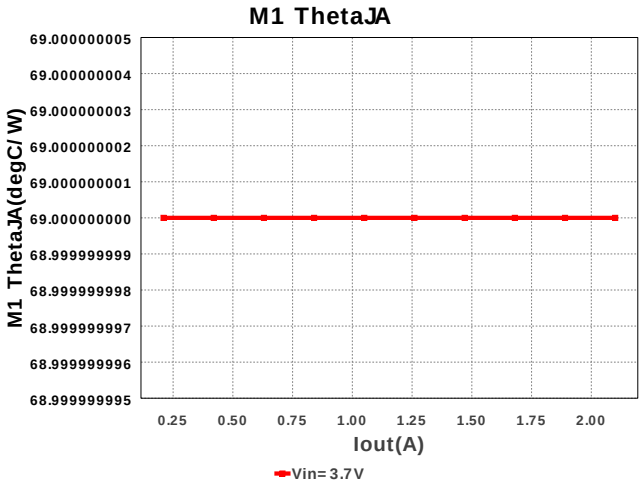

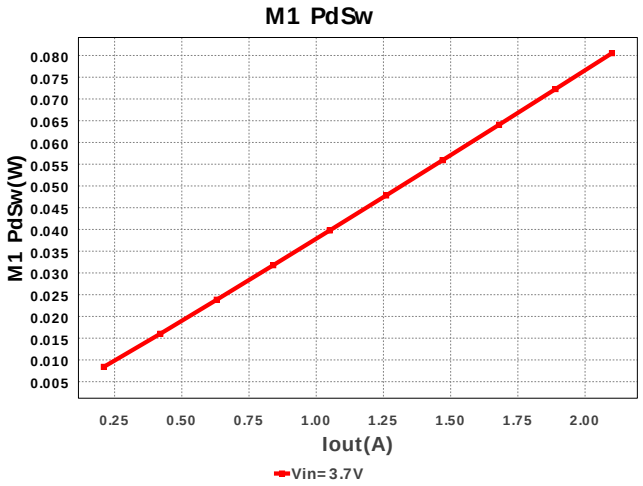

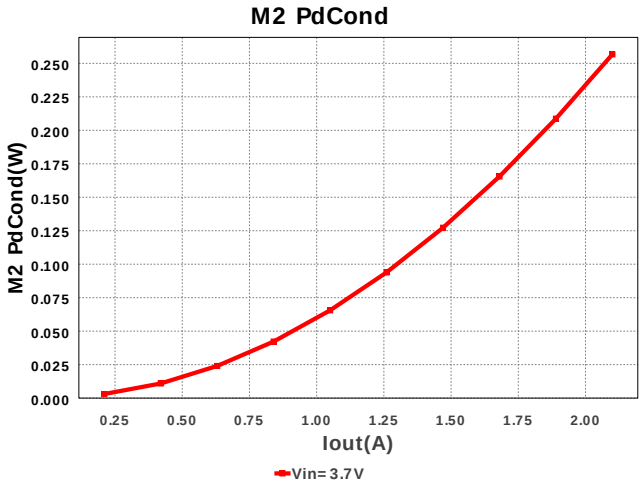

工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	1.318 A	Current	输入电容器均方根纹波电流
2.	Cout IRMS	580.242 mA	Current	输出电容器均方根纹波电流
3.	Iin Avg	3.142 A	Current	平均输入电流
4.	L Ipp	390.845 mA	Current	峰值到峰值电感器纹波电流
5.	L1 Irms	2.951 A	Current	电感器纹波电流
6.	M1 Irms	1.558 A	Current	MOSFET RMS 纹波电流
7.	M2 Irms	3.953 A	Current	MOSFET RMS 纹波电流
8.	SW Ipk	3.123 A	Current	峰值开关电流
9.	BOM 数量	25	General	Total Design BOM count
10.	大小	586.0 mm2	General	BOM组件的总所占面积
11.	频率	525.0 kHz	General	开关频率
12.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
13.	M1 Rdson	15.675 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.	M2 Rdson	15.675 mOhm	General	漏源导通电阻
16.	M2 ThetaJA	69.0 degC/W	General	MOSFET 接点到环境热敏电阻
17.	M2 Vds Act	61.956 mV	General	M Vds
18.	模式	CCM	General	传导模式
19.	Pout	10.5 W	General	总输出功率
20.	总 BOM	$3.83	General	Total BOM Cost
21.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
22.	占空比	33.169 %	Op_point	占空比
23.	效率	90.312 %	Op_point	稳态效率
24.	IC Tj	46.681 degC	Op_point	电路接点温度
25.	ICThetaJA	40.0 degC/W	Op_point	电路接点到环境热敏电阻
26.	IOUT_OP	2.1 A	Op_point	Iout 操作点
27.	M1 TjOP	48.268 degC	Op_point	M1 MOSFET 接点温度
28.	M2 TjOP	75.962 degC	Op_point	MOSFET 接点温度
29.	VIN_OP	3.7 V	Op_point	Vin操作点
30.	Vout p-p	1.833 mV	Op_point	峰值到峰值输出纹波电压
31.	Cin Pd	41.713 mW	Power	输入电容器功率耗散
32.	Cout Pd	5.354 mW	Power	输出电容器功率耗散

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#	名称	数值	类别	说明
33.	IC Pd	167.032 mW	Power	电路功率耗散
34.	L Pd	132.338 mW	Power	电感器功率耗散
35.	M1 Pd	119.821 mW	Power	MOSFET 功率耗散
36.	M1 Pd	119.821 mW	Power	MOSFET 功率耗散
37.	M1 PdCond	38.038 mW	Power	M1 MOSFET 传导损耗
38.	M1 PdSw	81.783 mW	Power	M1 MOSFET 开关损耗
39.	M2 Pd	521.182 mW	Power	MOSFET 功率耗散
40.	M2 PdCond	257.129 mW	Power	M2 MOSFET 传导损耗
41.	M2 PdQrr	1.838 mW	Power	Synchronous Boost High Side Reverse Recovery
42.	整体 Pd	1.126 W	Power	总功率耗散
43.	M1 Vds Act	24.418 mV	Unknown	M Vds
44.	M2 Pbody	262.216 mW	Unknown	较低功率FET的功率耗散

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	LM5122	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

设计协助

1. The LM5122 is a wide range boost controller which is operable in an ultra wide input range of 4.5 to 65V. A boost regulator can maintain regulation for input voltages lower than the output voltage.

2. LM5122 Product Folder : http://www.ti.com/product/lm5122 : contains the data sheet and other resources.

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