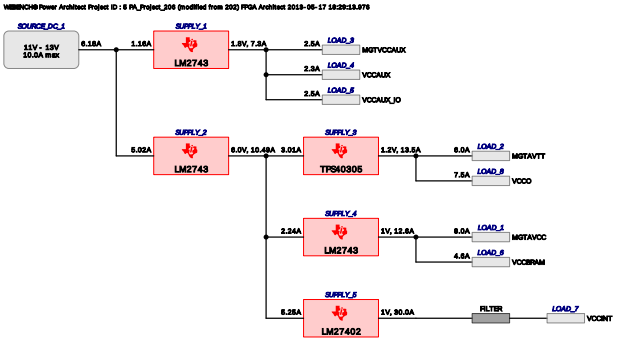
WEBENCH® Power Architect



项目报告

项目 : 3728439/5 : PA_Project_206 (modified from 202)
创建 : 2013-05-17 18:29:13.976
Optimize project optFactor=2

项目概览

1.	整体系统效率	81.683 %
2.	总系统 BOM 数量	132.0
3.	整体系统大小	3.014 kmm2
4.	总系统 BOM 成本	$20.26
5.	Total System Power Dissipation	16.132 W

--> 发布 WEBENCH Power Architect.

电源供应

#	名称	NSID	说明	Vout	Iout	效率	Foot-print	Cost	Design	页面
1.	SUPPLY_1	LM2743	Switcher : Operates with 3 to 6V Vcc	1.8 V	7.3 A	87%	370	$2.12	35	5
2.	SUPPLY_2	LM2743	Switcher : Operates with 3 to 6V Vcc	6.0 V	10.495 A	96.5%	502	$3.06	39	33
3.	SUPPLY_3	TPS40305	Switcher : Synchronous Buck Controller	1.2 V	13.5 A	81.7%	419	$3.40	36	12
4.	SUPPLY_4	LM2743	Switcher : Operates with 3 to 6V Vcc	1 V	12.6 A	85.1%	457	$3.43	37	19
5.	SUPPLY_5	LM27402	Switcher : High Current Synchronous Buck Controller	1 V	30.0 A	83.3%	1266	$8.25	38	26

电源负载

#	名称	VLoad	ILoad	说明
1.	MGTVCCAUX	1.8 V	2.5 A	VoutRipple=6%
2.	VCCAUX	1.8 V	2.3 A	VoutRipple=10%
3.	VCCAUX_IO	1.8 V	2.5 A	VoutRipple=10%
4.	MGTAVTT	1.2 V	6 A	VoutRipple=5%
5.	VCCO	1.2 V	7.5 A	VoutRipple=10%
6.	MGTAVCC	1 V	8 A	VoutRipple=6%
7.	VCCBRAM	1 V	4.6 A	VoutRipple=6%
8.	VCCINT	1 V	30 A	VoutRipple=6%, Filter required

FPGAs, Processors

#	制造商	Part Number	名称	系列	说明
1.	Xilinx	XC7VXH580T	FPGA_1	Virtex-7	FPGA Xilinx Virtex-7 XC7VXH580T

http://www.xilinx.com/support/documentation/data_sheets/ds183_Virtex_7_Data_Sheet.pdf

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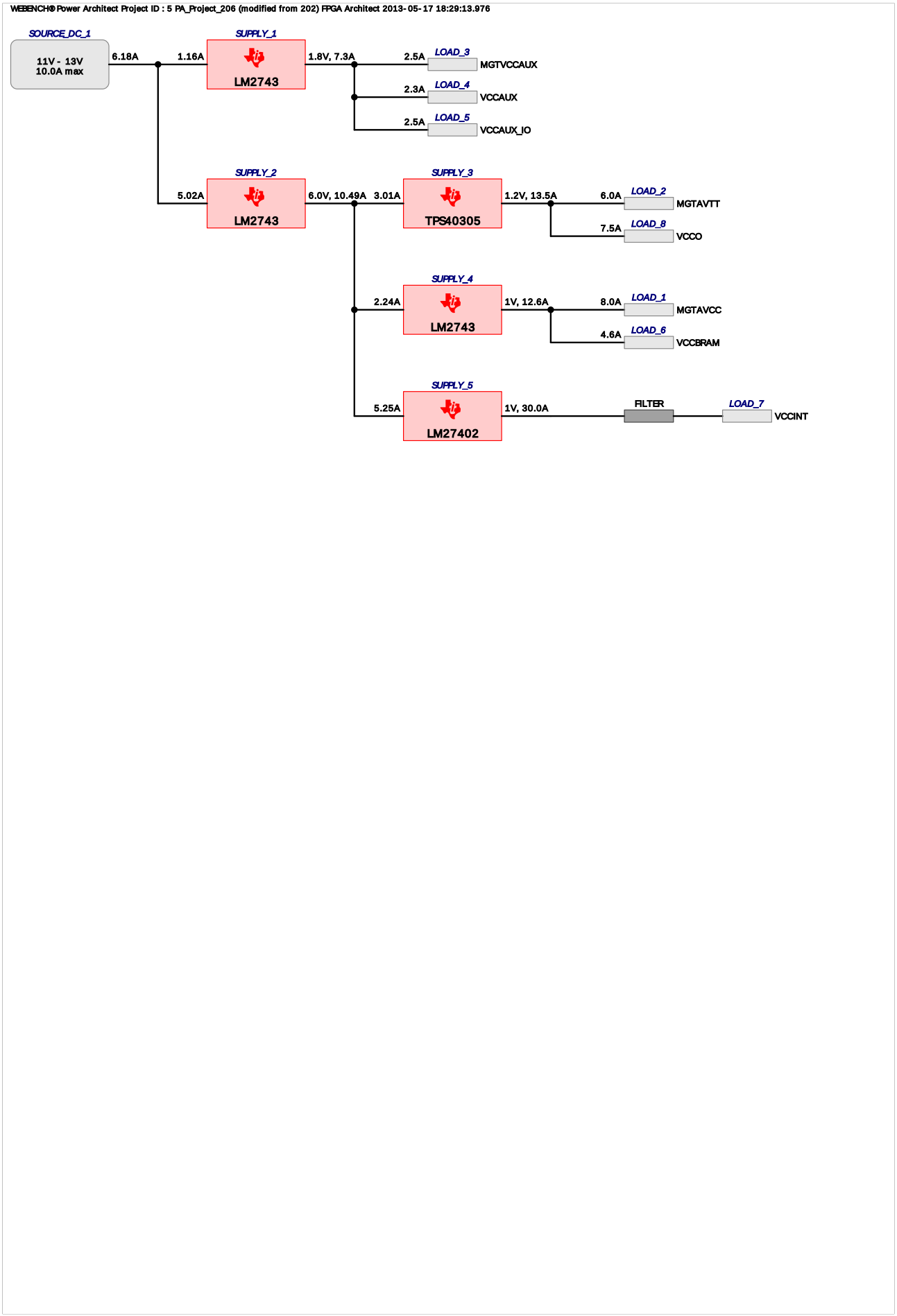
Project Diagram



电气采购BOM

制造商	零件编号	说明	数量	Budgetary Price	大小 (mm^2)
AVX	08053C104KAT2A	0805	2	$0.01	26
Vishay-Sprague	293D104X9035A2TE3	3216-18	1	$0.12	19
AOS	AON7514	TRANS_AOS_DFN3X3	4	$0.17	100
Kemet	C0805C106K8PACTU	0805	12	$0.05	52
Kemet	C0805C475K8PACTU	0805	1	$0.03	13
TDK	C3225X5R0J107M	1210	2	$0.38	23
TDK	C3225X5R1E106K	1210	2	$0.15	23
Yageo America	CC0805JRNP09BN180	0805	1	$0.01	13
Yageo America	CC0805JRNP09BN270	0805	1	$0.01	13
Yageo America	CC0805JRNP09BN560	0805	2	$0.01	26
Yageo America	CC0805JRNP09BN680	0805	1	$0.01	13
Yageo America	CC0805KRX7R9BB102	0805	3	$0.01	39
Yageo America	CC0805KRX7R9BB152	0805	1	$0.01	13
Yageo America	CC0805KRX7R9BB391	0805	1	$0.01	13
Yageo America	CC0805KRX7R9BB561	0805	2	$0.01	26
Yageo America	CC0805KRX7R9BB681	0805	1	$0.01	13
Vishay-Dale	CRCW0402100KFKED	0402	4	$0.01	30
Vishay-Dale	CRCW040210K0FKED	0402	2	$0.01	15
Vishay-Dale	CRCW040211K8FKED	0402	1	$0.01	8
Vishay-Dale	CRCW040216K2FKED	0402	1	$0.01	8
Vishay-Dale	CRCW040218K2FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04021K13FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04021K33FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04021K91FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04021R00FKED	0402	4	$0.01	30
Vishay-Dale	CRCW040223K7FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04022K10FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04022K87FKED	0402	1	$0.01	8
Vishay-Dale	CRCW040234K0FKED	0402	2	$0.01	15
Vishay-Dale	CRCW040237K4FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04023K48FKED	0402	1	$0.01	8
Vishay-Dale	CRCW0402464RFKED	0402	1	$0.01	8
Vishay-Dale	CRCW04024K64FKED	0402	1	$0.01	8
Vishay-Dale	CRCW040251K1FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04025K90FKED	0402	1	$0.01	8
Vishay-Dale	CRCW0402634RFKED	0402	1	$0.01	8
Vishay-Dale	CRCW0402698RFKED	0402	1	$0.01	8
Vishay-Dale	CRCW04026K81FKED	0402	1	$0.01	8
Vishay-Dale	CRCW040273K2FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04027K15FKED	0402	1	$0.01	8
Vishay-Dale	CRCW04027K68FKED	0402	1	$0.01	8
Vishay-Dale	CRCW0402806RFKED	0402	1	$0.01	8
Texas Instruments	CSD16322Q5	TRANS_NexFET_Q5	2	$0.46	110
Texas Instruments	CSD17306Q5A	TRANS_NexFET_Q5A	2	$0.50	110
Texas Instruments	CSD17312Q5	TRANS_NexFET_Q5	4	$1.07	110
Panasonic	EEE-FK1C681P	SM_RADIAL_G	3	$0.28	172
Coiltronics	FP1007R1-R22-R	IND_FP1007R1	1	$0.81	124
MuRata	GRM033R60J223KE01D	0201	3	$0.01	18
MuRata	GRM033R60J333KE01D	0201	1	$0.01	6
MuRata	GRM033R71A332KA01D	0201	1	$0.01	6
MuRata	GRM033R71C101KA01D	0201	1	$0.01	6
MuRata	GRM1555C1E621JA01D	0402	1	$0.01	8
MuRata	GRM155R61A105KE15D	0402	5	$0.01	38
MuRata	GRM155R61A124KE19D	0402	5	$0.01	38
MuRata	GRM155R61A224KE19D	0402	1	$0.01	8
MuRata	GRM188R61E105KA12D	0603	1	$0.02	10
MuRata	GRM216R71E122KA01D	0805	1	$0.01	13
MuRata	GRM21BR60J226ME39L	0805	6	$0.05	26
MuRata	GRM21BR61E475MA12L	0805	1	$0.06	13
MuRata	GRM31CR60J107ME39L	1206	3	$0.30	19
Texas Instruments	LM27402SQ/NOPB	MXA16A	1	$1.10	59
Texas Instruments	LM2743MTC/NOPB	MTC14	3	$0.80	176
ON Semiconductor	MBR0520LT1G	SOD-123	4	$0.06	87
Susumu Co Ltd	RR1220P-123-D	0805	2	$0.01	26
Susumu Co Ltd	RR1220P-183-D	0805	2	$0.01	26
Susumu Co Ltd	RR1220P-273-D	0805	1	$0.01	13
Diodes Inc.	SDM20U40-7-F	SOD-523	1	$0.06	11
Bourns	SRP7030-R22M	SRP7030	1	$0.49	88
Texas Instruments	TPS40305DRCR	DRC	1	$0.95	25
Coilcraft	XAL5030-122MEB	XAL5030	1	$0.56	54
Coilcraft	XAL5030-331MEB	XAL5030	1	$0.56	54
Coilcraft	XAL7070-161MEB	XAL7070	1	$0.68	87
Coilcraft	XAL7070-182MEB	XAL7070	1	$0.68	87

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Total	132	$20.27	2,309

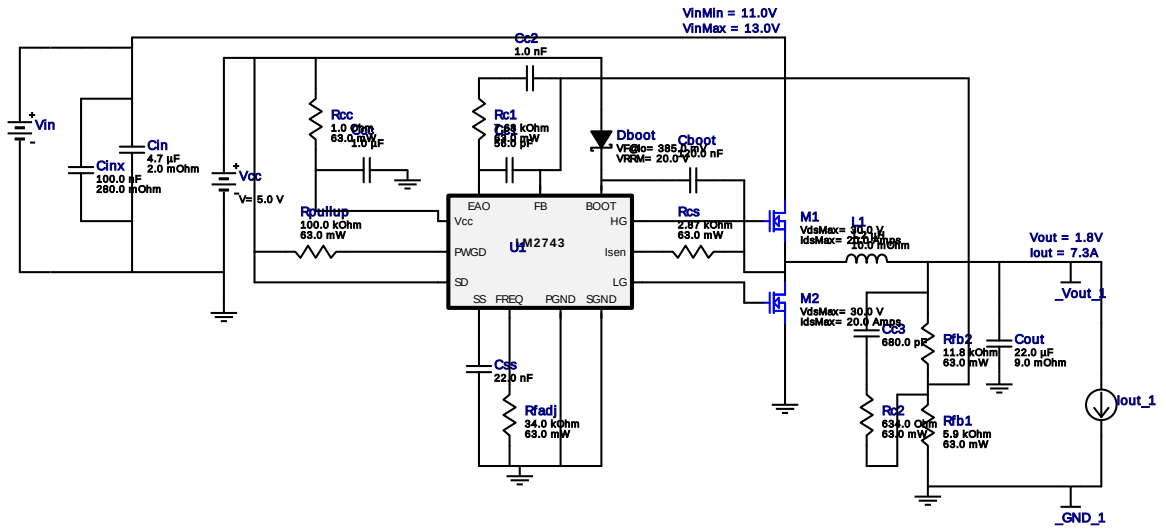
TEXAS INSTRUMENTS

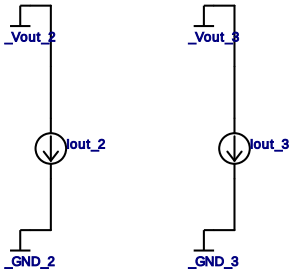
WEBENCH® 设计报告

VinMin = 11.0V
VinMax = 13.0V
Vout = 1.8V
Iout = 7.3A

Device = LM2743MTC/NOPB
Topology = Buck
创建 = 5/17/13 6:29:04 PM
BOM成本 = $2.12
Total Pd = 1.96W
大小 = 370.0mm2
BOM 数量 = 24

Design : 3728439/35 LM2743MTC/NOPB
LM2743MTC/NOPB 11.0V-13.0V to 1.8V @ 7.3A





电气材料清单

#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	Cboot	MuRata	GRM155R61A124KE19D Series= X5R	Cap= 120.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
2.	Cc1	Yageo America	CC0805JRNP09BN560 Series= C0G/NP0	Cap= 56.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
3.	Cc2	Yageo America	CC0805KRX7R9BB102 Series= X7R	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
4.	Cc3	Yageo America	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
5.	Ccc	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
6.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 µF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	$0.06	0805 13mm2

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#	名称	制造商	零件编号	属性	Qty	Price	大小
7.	Cinx	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
8.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 µF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	3	$0.05	0805 13mm2
9.	Css	MuRata	GRM033R60J223KE01D Series= X5R	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 6mm2
10.	Dboot	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 22mm2
11.	L1	Coilcraft	XAL5030-122MEB	L= 1.2 µH DCR= 10.0 mOhm	1	$0.56	XAL5030 54mm2
12.	M1	AOS	AON7514	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.17	TRANS_AOS_DFN3X3 25mm2
13.	M2	AOS	AON7514	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.17	TRANS_AOS_DFN3X3 25mm2
14.	Rc1	Vishay-Dale	CRCW04027K68FKED Series= CRCW..e3	Res= 7.68 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
15.	Rc2	Vishay-Dale	CRCW0402634RFKED Series= CRCW..e3	Res= 634.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
16.	Rcc	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
17.	Rcs	Vishay-Dale	CRCW04022K87FKED Series= CRCW..e3	Res= 2.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
18.	Rfadj	Vishay-Dale	CRCW040234K0FKED Series= CRCW..e3	Res= 34.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
19.	Rfb1	Vishay-Dale	CRCW04025K90FKED Series= CRCW..e3	Res= 5.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
20.	Rfb2	Vishay-Dale	CRCW040211K8FKED Series= CRCW..e3	Res= 11.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
21.	Rpullup	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
22.	U1	Texas Instruments	LM2743MTC/NOPB	Switcher	1	$0.80	MTC14 59mm2

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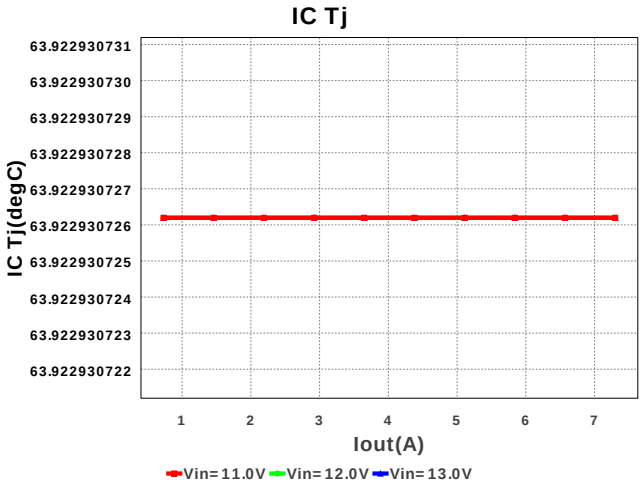

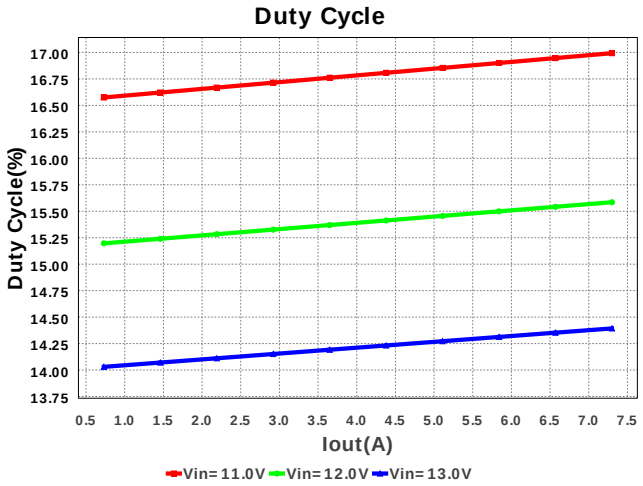

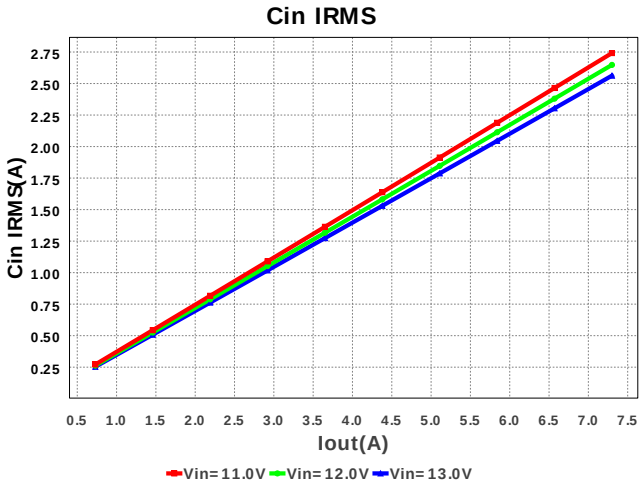

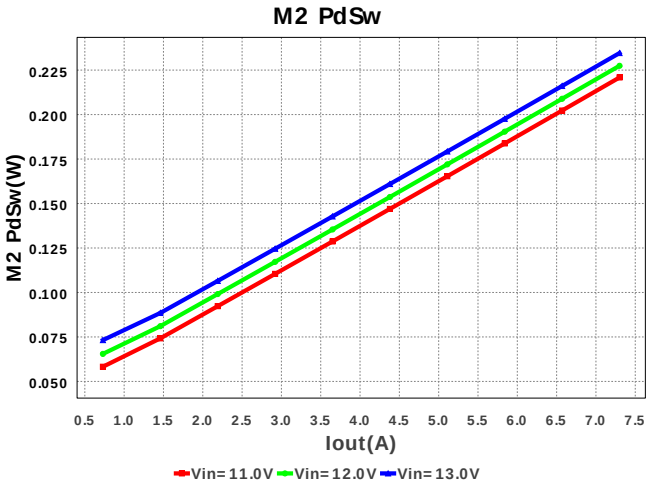

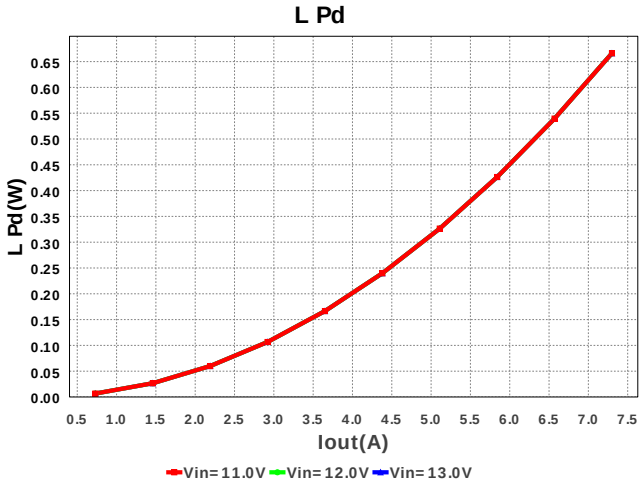

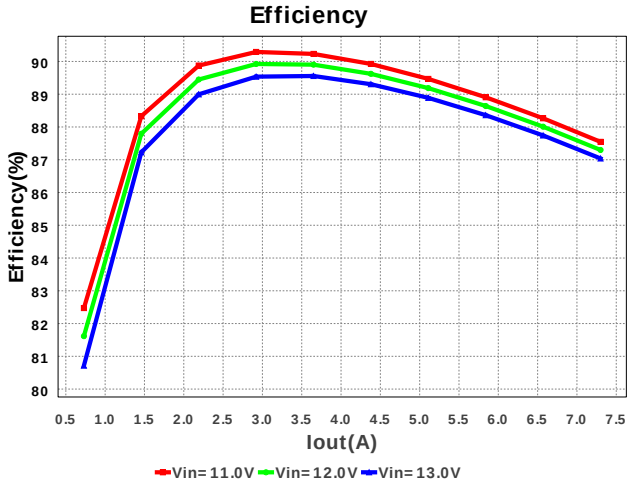

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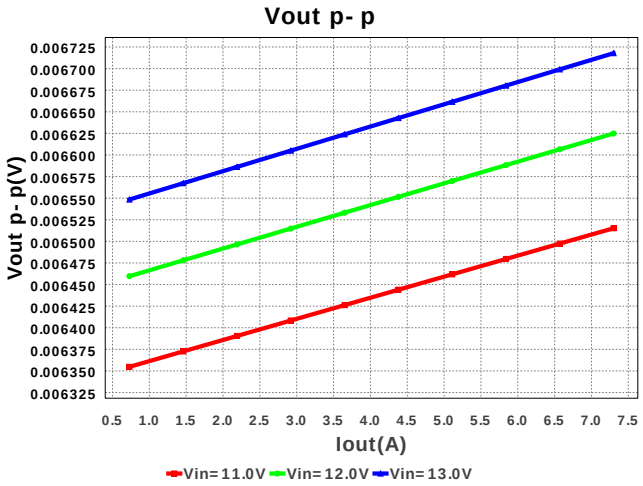

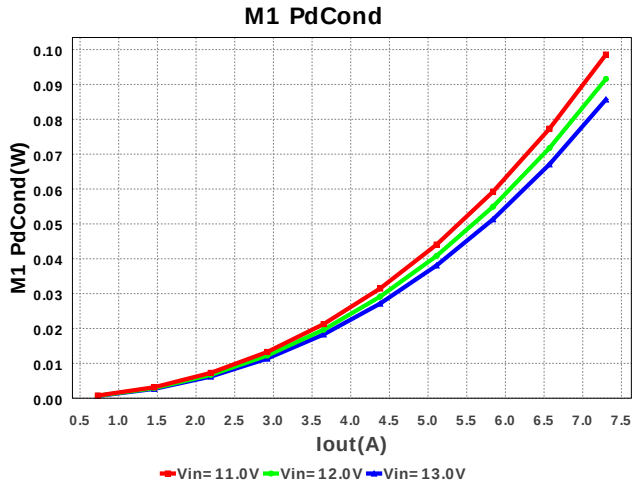

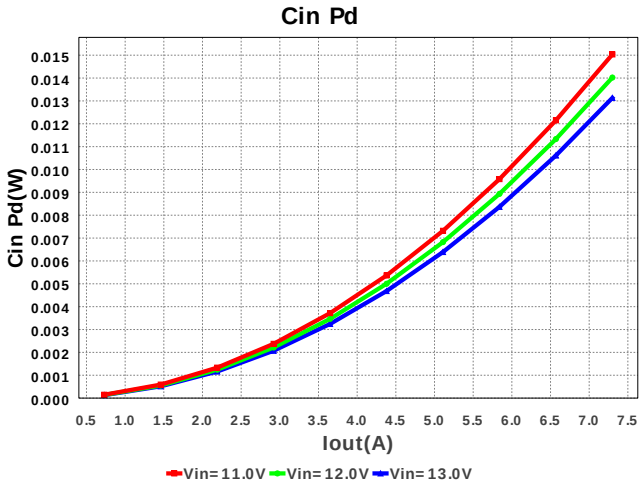

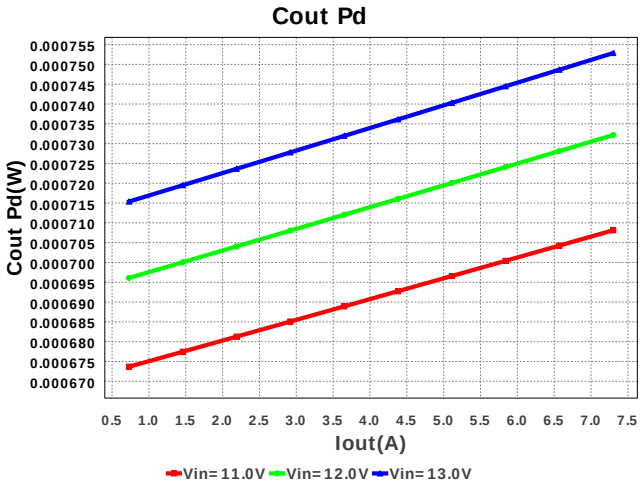

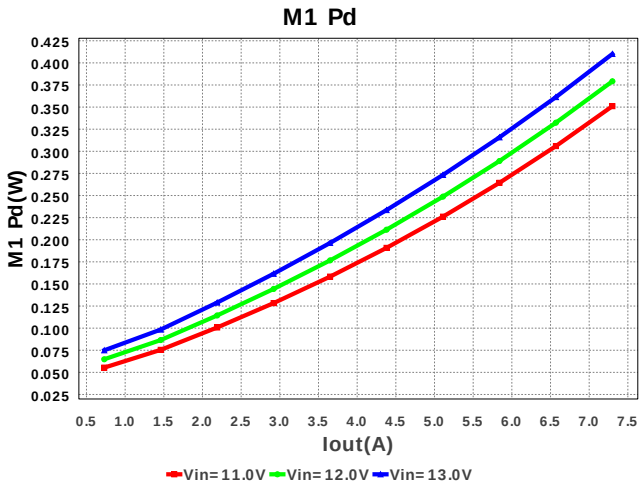

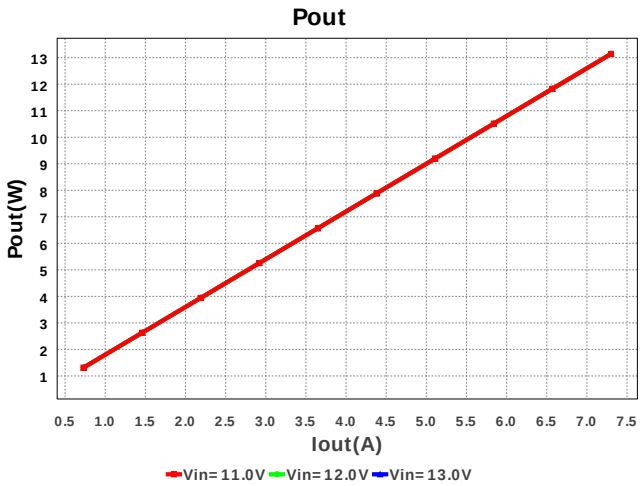

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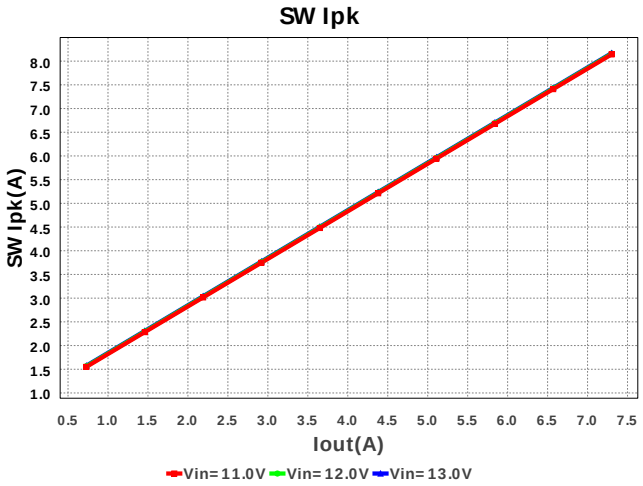

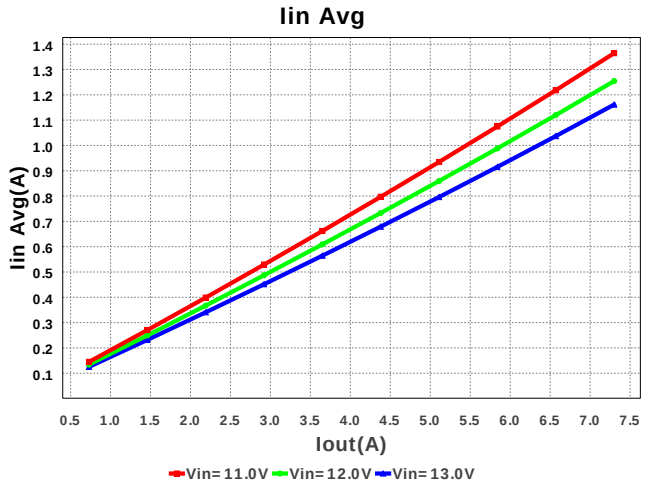

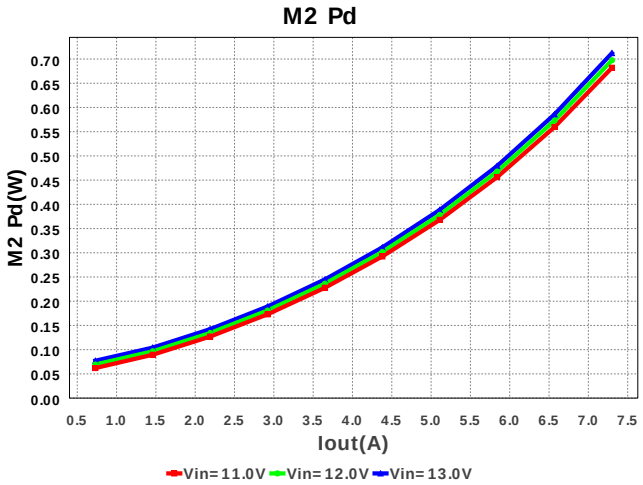

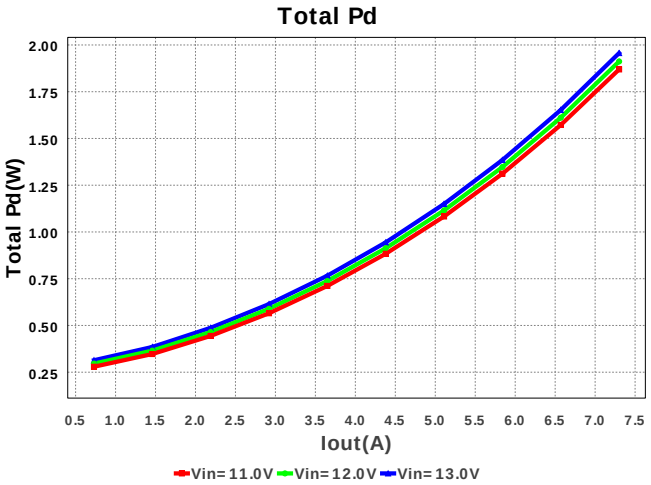

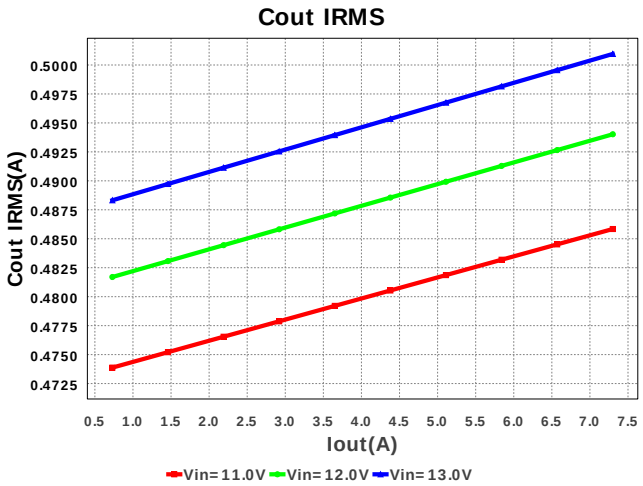

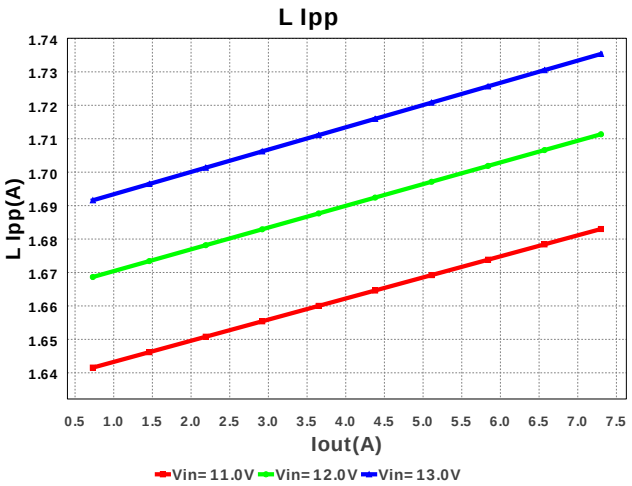

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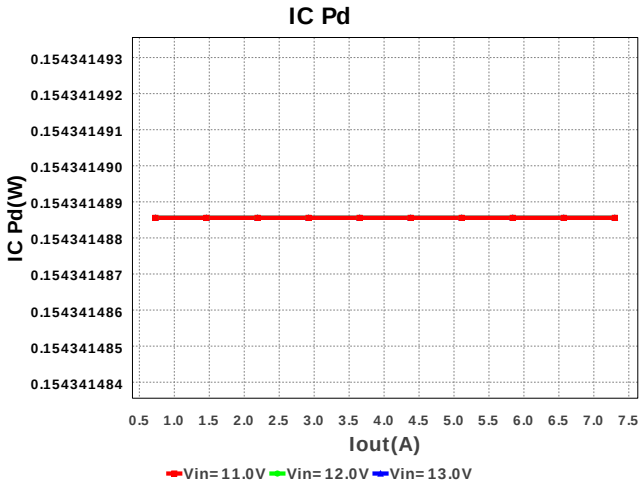

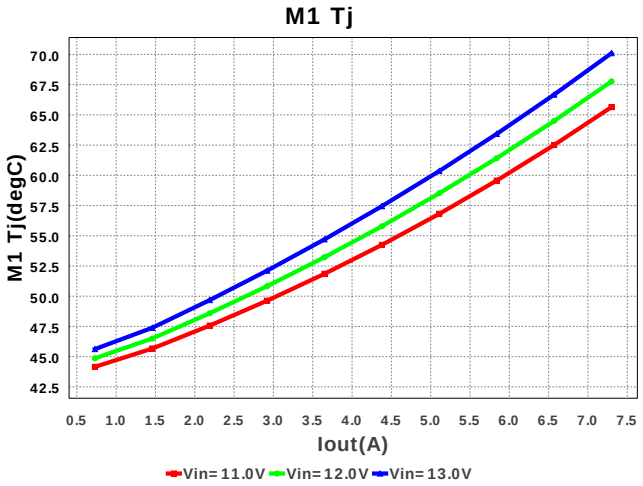

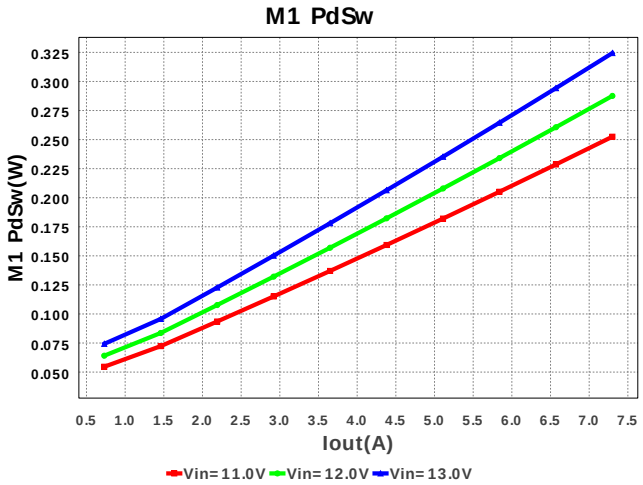

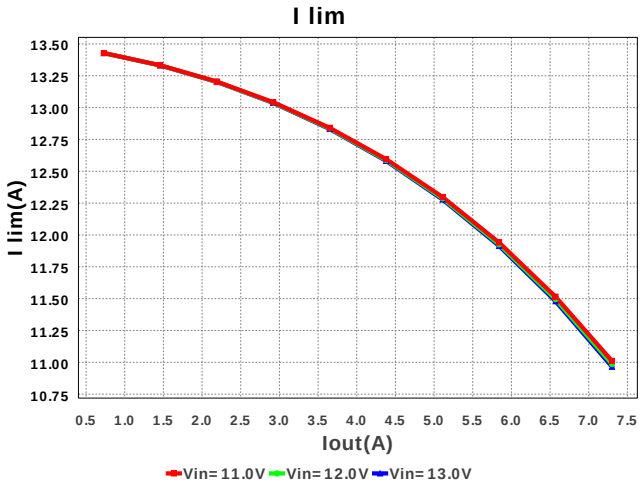

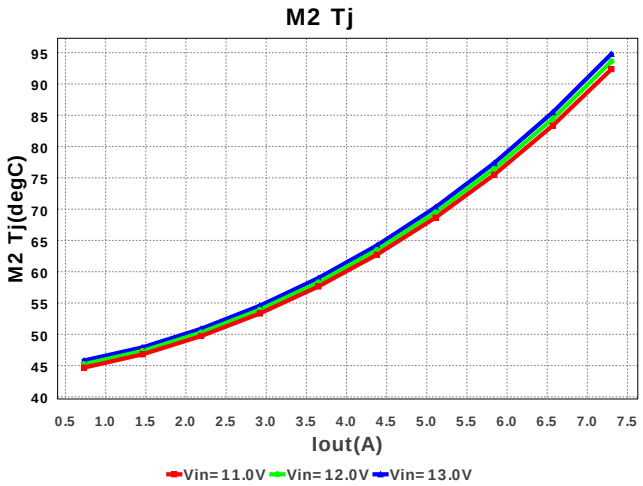

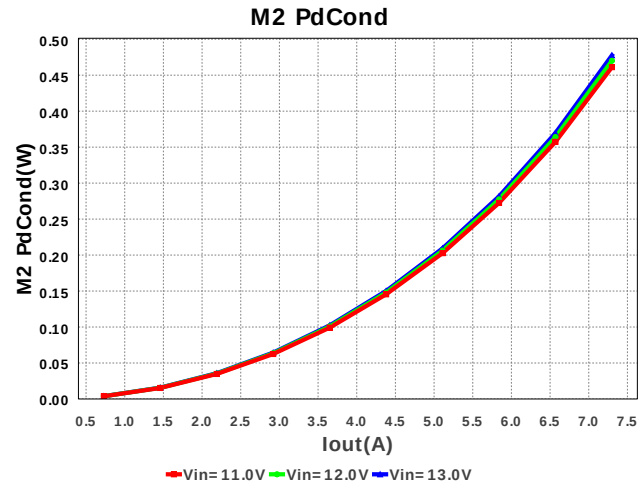

工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	2.562 A	Current	输入电容器均方根纹波电流
2.	Cout IRMS	500.954 mA	Current	输出电容器均方根纹波电流
3.	I lim	10.965 A	Current	电流限幅阈值
4.	Iin Avg	1.161 A	Current	平均输入电流
5.	L Ipp	1.735 A	Current	峰值到峰值电感器纹波电流
6.	SW Ipk	8.168 A	Current	峰值开关电流
7.	BOM 数量	24	General	Total Design BOM count
8.	大小	370.0 mm2	General	BOM组件的总所占面积
9.	频率	774.106 kHz	General	开关频率
10.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
11.	模式	CCM	General	传导模式

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#	名称	数值	类别	说明
12.	Pout	13.14 W	General	总输出功率
13.	总 BOM	$2.12	General	Total BOM Cost
14.	交叉频率	114.025 kHz	Op_point	波特图交叉频率
15.	占空比	14.393 %	Op_point	占空比
16.	效率	87.039 %	Op_point	稳态效率
17.	IC Tj	63.923 degC	Op_point	电路接点温度
18.	IOUT_OP	7.3 A	Op_point	Iout 操作点
19.	M1 Tj	70.103 degC	Op_point	M1 MOSFET 接点温度
20.	M2 Tj	94.795 degC	Op_point	M2 MOSFET 接点温度
21.	相位裕度	51.395 deg	Op_point	波特图相位裕度
22.	VIN_OP	13.0 V	Op_point	Vin操作点
23.	Vout p-p	6.718 mV	Op_point	峰值到峰值输出纹波电压
24.	Cin Pd	13.132 mW	Power	输入电容器功率耗散
25.	Cout Pd	752.864 µW	Power	输出电容器功率耗散
26.	IC Pd	154.341 mW	Power	电路功率耗散
27.	L Pd	666.125 mW	Power	电感器功率耗散
28.	M1 Pd	410.121 mW	Power	M1 MOSFET 总功率耗散
29.	M1 PdCond	85.699 mW	Power	M1 MOSFET 传导损耗
30.	M1 PdSw	324.422 mW	Power	M1 MOSFET 开关损耗
31.	M2 Pd	712.209 mW	Power	M2 MOSFET 总功率耗散
32.	M2 PdCond	477.635 mW	Power	M2 MOSFET 传导损耗
33.	M2 PdSw	234.574 mW	Power	M2 MOSFET 开关损耗
34.	整体 Pd	1.957 W	Power	总功率耗散

设计输入

#	名称	数值	说明
1.	输出电流	7.3 A	最大输出电流
2.	Iout1	7.3 Amps	Output Current #1
3.	Vin 最大	13.0 V	最高输入电压
4.	Vin 最小	11.0 V	最低输入电压
5.	输出电压:	1.8 V	输出电压
6.	Vout1	1.8 Volt	Output Voltage #1
7.	base_pn	LM2743	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

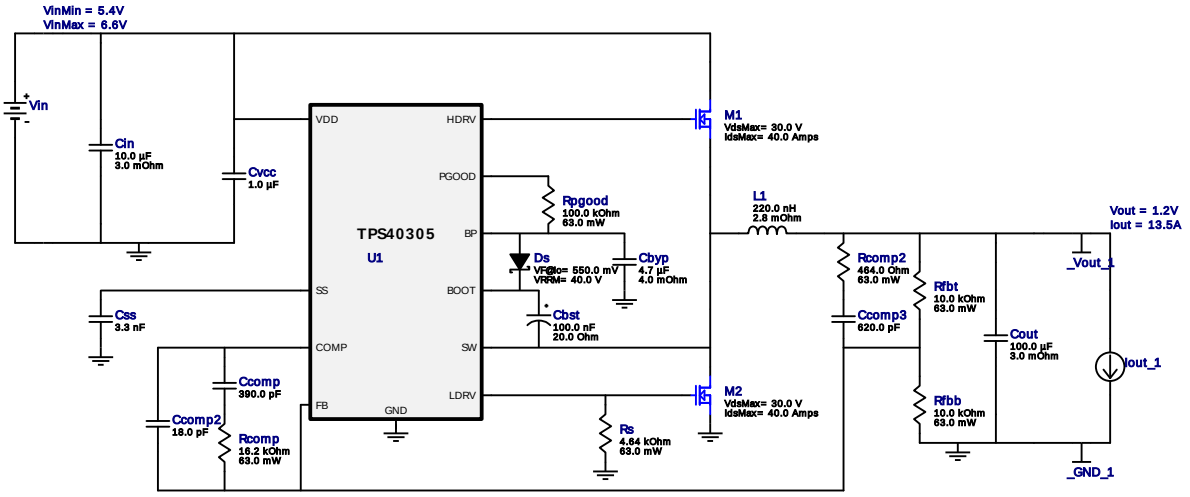
1. LM2743 Product Folder : http://www.ti.com/product/lm2743 : contains the data sheet and other resources.

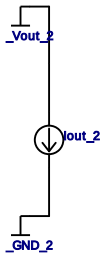
WEBENCH® 设计报告

VinMin = 5.4V
VinMax = 6.6V
Vout = 1.2V
Iout = 13.5A

Device = TPS40305DRCR
Topology = Buck
创建 = 5/17/13 6:29:07 PM
BOM成本 = $3.40
Total Pd = 3.64W
大小 = 419.0mm2
BOM 数量 = 24

Design : 3728439/36 TPS40305DRCR
TPS40305DRCR 5.4V-6.6V to 1.2V @ 13.5A





电气材料清单

#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	Cbst	Vishay-Sprague	293D104X9035A2TE3 Series= 293D	Cap= 100.0 nF ESR= 20.0 Ohm VDC= 35.0 V IRMS= 60.0 mA	1	$0.12	3216-18 19mm2
2.	Cbyp	Kemet	C0805C475K8PACTU Series= X5R	Cap= 4.7 µF ESR= 4.0 mOhm VDC= 10.0 V IRMS= 9.89 A	1	$0.03	0805 13mm2
3.	Ccomp	Yageo America	CC0805KRX7R9BB391 Series= X7R	Cap= 390.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
4.	Ccomp2	Yageo America	CC0805JRNP09BN180 Series= C0G/NP0	Cap= 18.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
5.	Ccomp3	MuRata	GRM1555C1E621JA01D Series= C0G/NP0	Cap= 620.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
6.	Cin	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 µF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	1	$0.05	0805 13mm2

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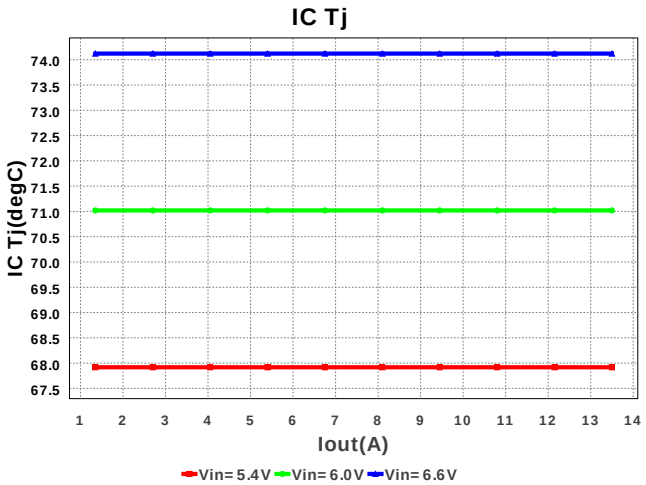
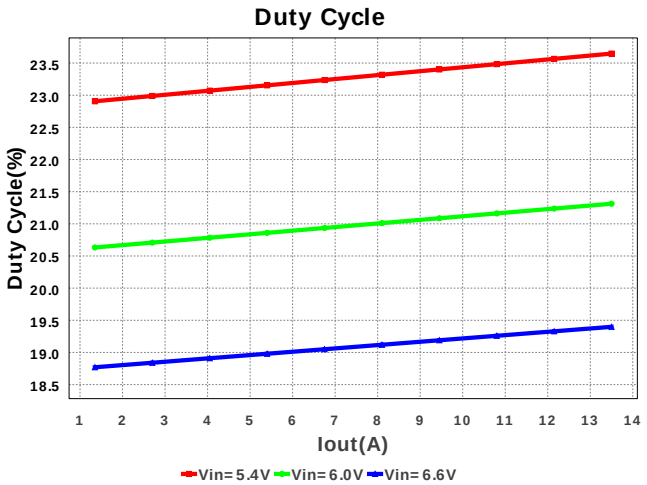
#	名称	制造商	零件编号	属性	Qty	Price	大小
7.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 µF ESR= 3.0 mOhm VDC= 6.3 V IRMS= 0.0 A	3	$0.30	1206 19mm2
8.	Css	MuRata	GRM033R71A332KA01D Series= X7R	Cap= 3.3 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 6mm2
9.	Cvcc	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 µF VDC= 25.0 V IRMS= 0.0 A	1	$0.02	0603 10mm2
10.	Ds	Diodes Inc.	SDM20U40-7-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.06	SOD-523 11mm2
11.	L1	Bourns	SRP7030-R22M	L= 220.0 nH DCR= 2.8 mOhm	1	$0.49	SRP7030 88mm2
12.	M1	AOS	AON7514	VdsMax= 30.0 V IdsMax= 40.0 Amps	2	$0.17	TRANS_AOS_DFN3X3 25mm2
13.	M2	AOS	AON7514	VdsMax= 30.0 V IdsMax= 40.0 Amps	2	$0.17	TRANS_AOS_DFN3X3 25mm2
14.	Rcomp	Vishay-Dale	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
15.	Rcomp2	Vishay-Dale	CRCW0402464RFKED Series= CRCW..e3	Res= 464.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
16.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
17.	Rfbt	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
18.	Rpgood	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
19.	Rs	Vishay-Dale	CRCW04024K64FKED Series= CRCW..e3	Res= 4.64 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
20.	U1	Texas Instruments	TPS40305DRCR	Switcher	1	$0.95	DRC 25mm2





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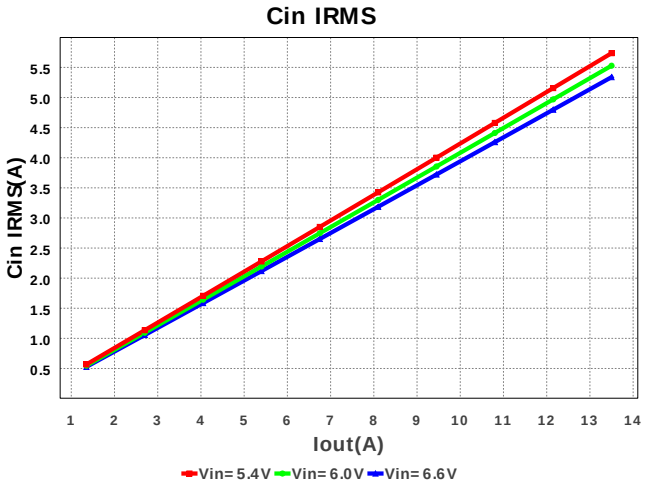
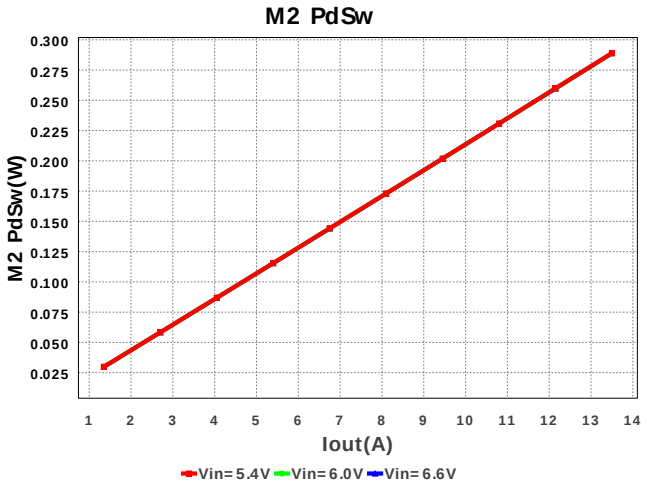
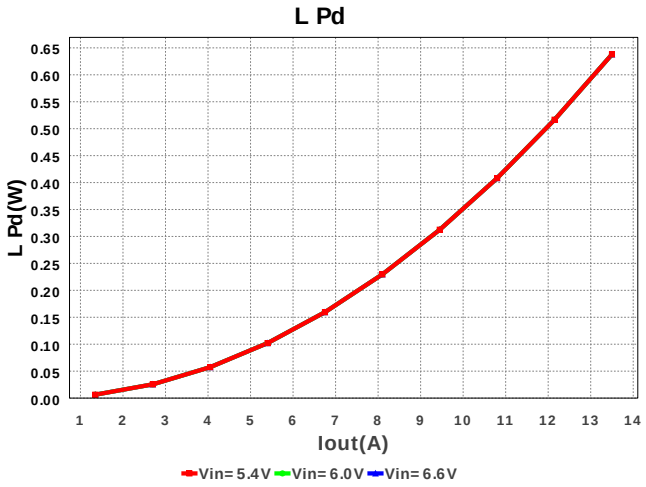
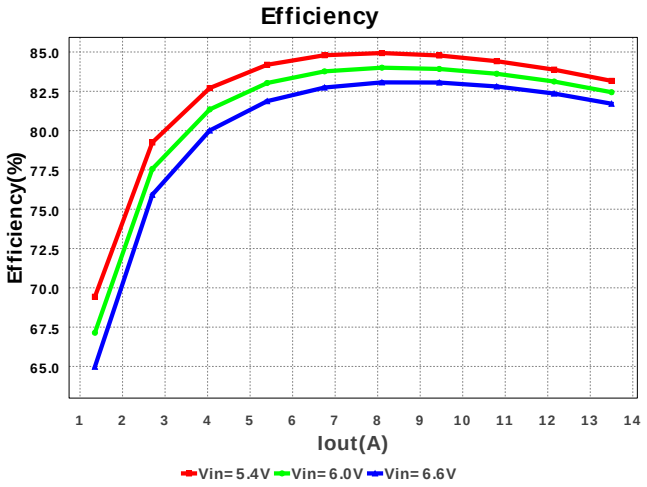
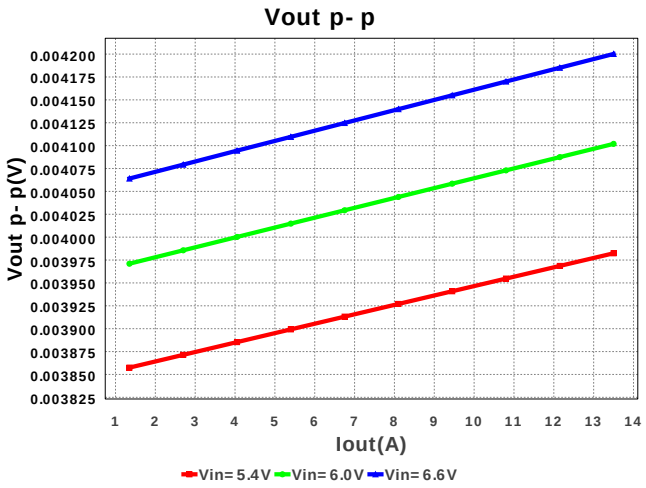
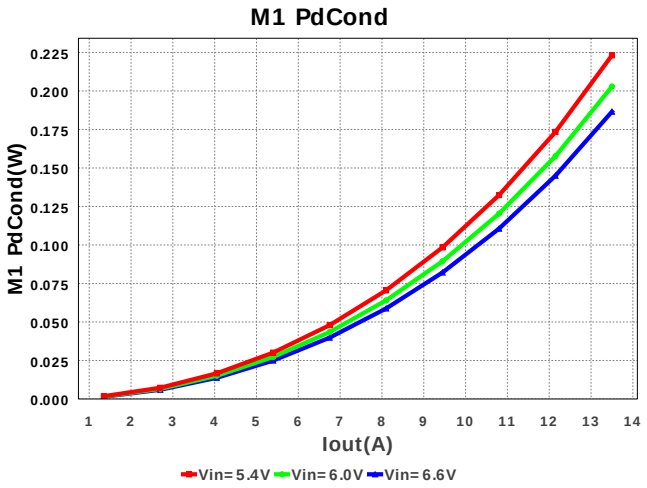

Cin IRMS
Cin IRMS(A)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

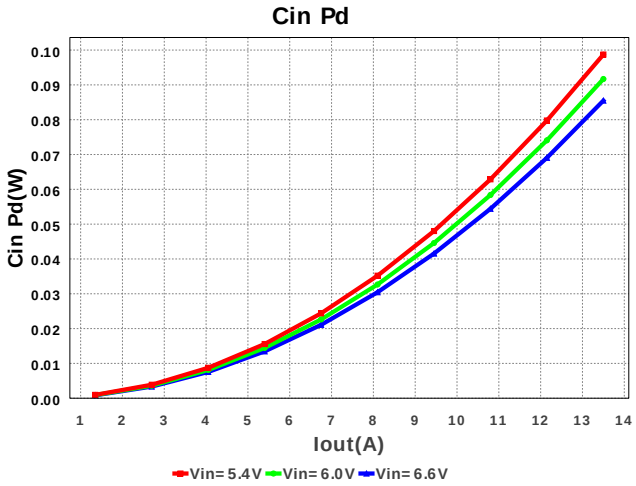

M2 PdSw
M2 PdSw(W)
0.300
0.275
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

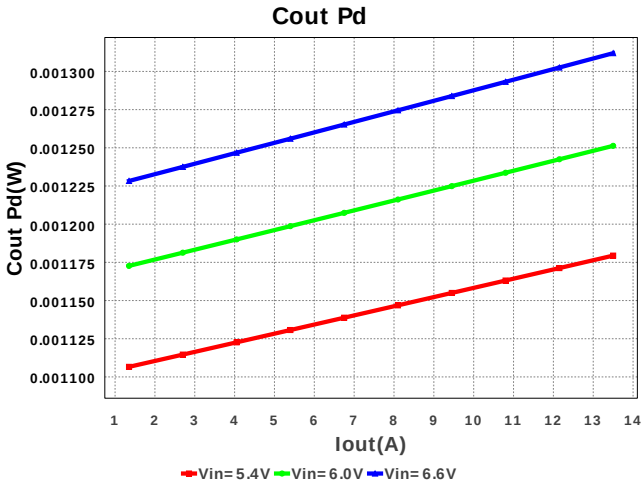

L Pd
L Pd(W)
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

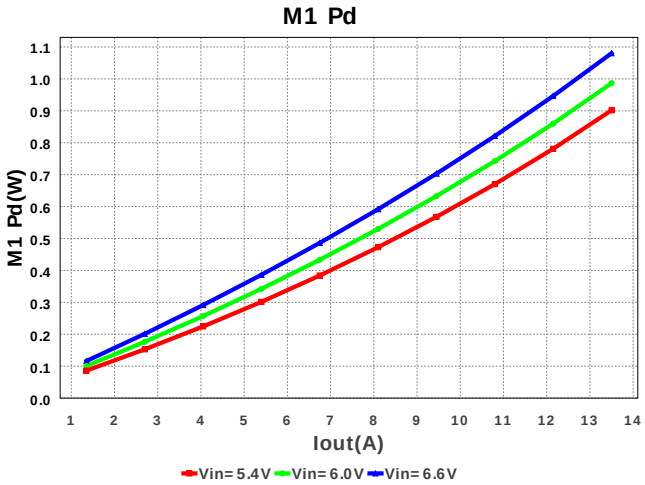

Efficiency
Efficiency(%)
85.0
82.5
80.0
77.5
75.0
72.5
70.0
67.5
65.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

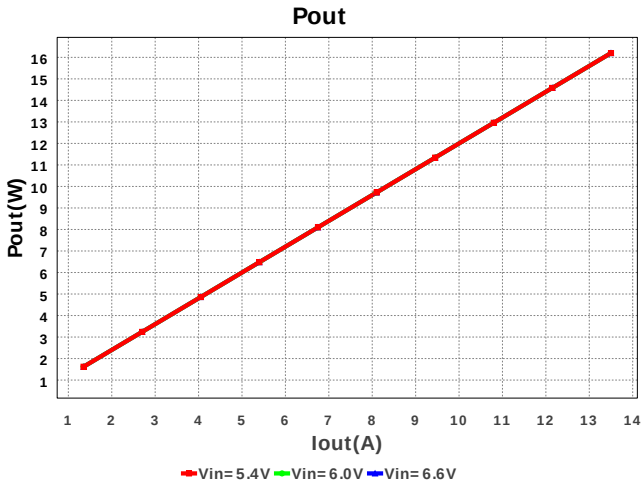

Vout p-p
Vout p-p(V)
0.004200
0.004175
0.004150
0.004125
0.004100
0.004075
0.004050
0.004025
0.004000
0.003975
0.003950
0.003925
0.003900
0.003875
0.003850
0.003825
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

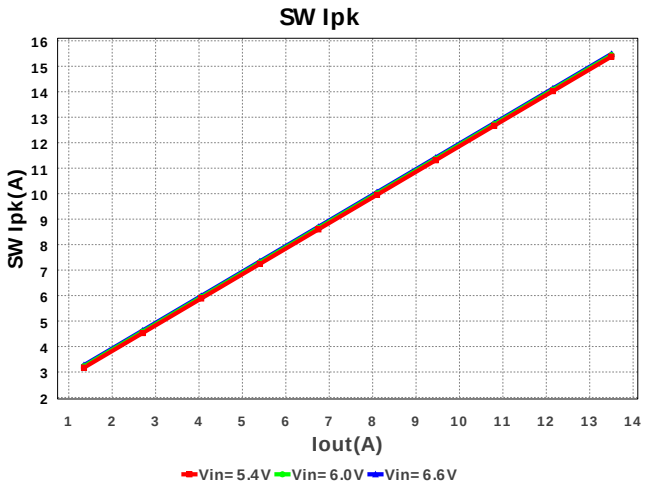

M1 PdCond
M1 PdCond(W)
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

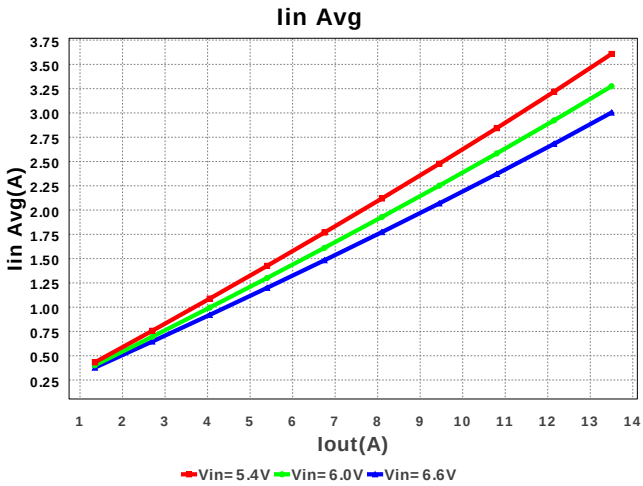

Cin Pd
Cin Pd(W)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

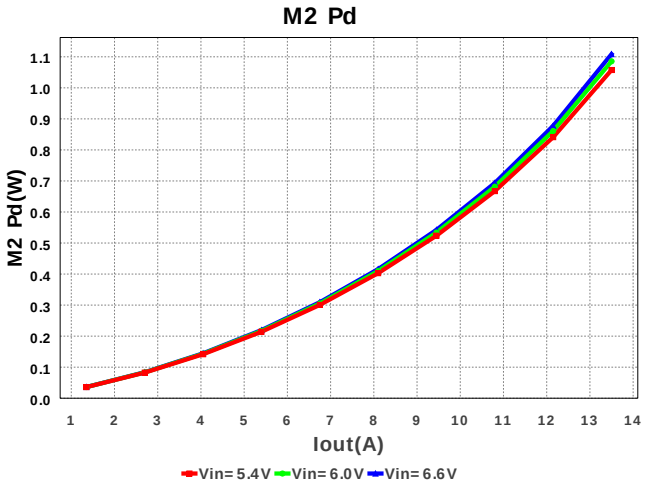

Cout Pd
Cout Pd(W)
0.001100
0.001125
0.001150
0.001175
0.001200
0.001225
0.001250
0.001275
0.001300
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

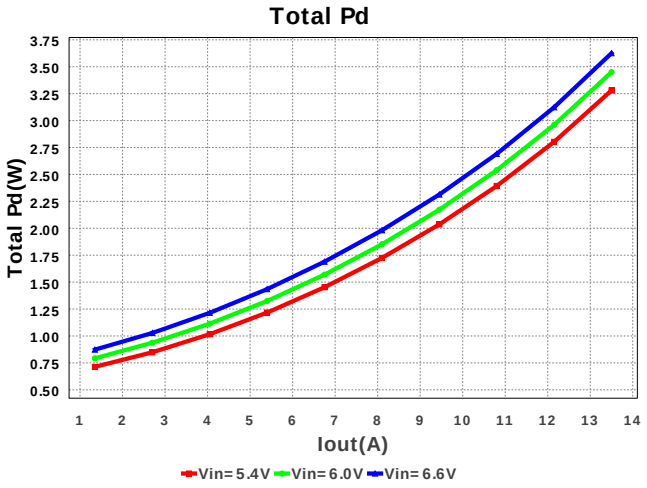

M1 Pd
M1 Pd(W)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

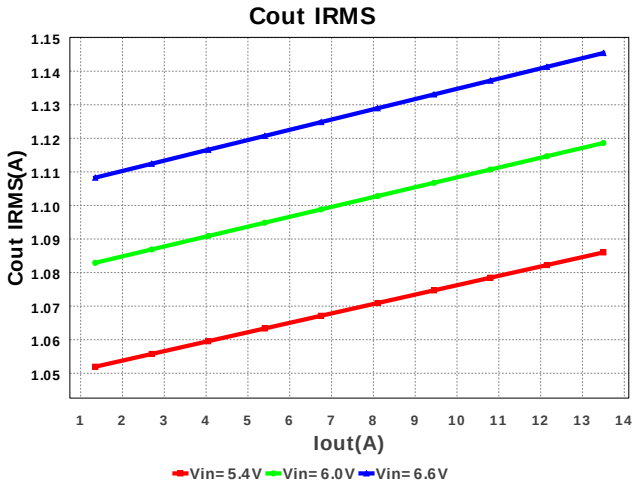

Pout
Pout(W)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

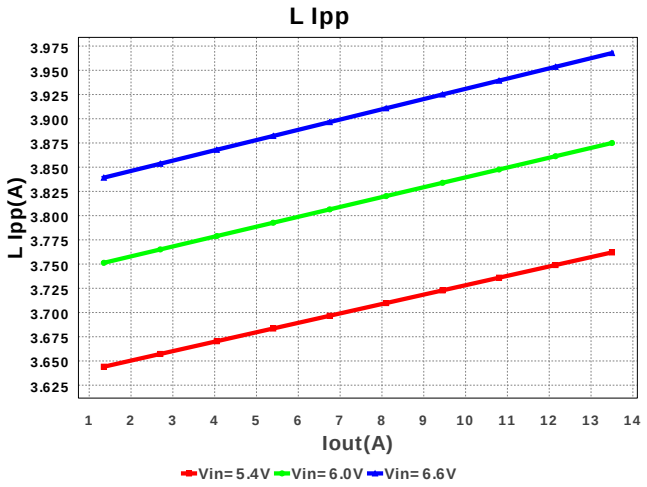

SW Ipk
SW Ipk(A)
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

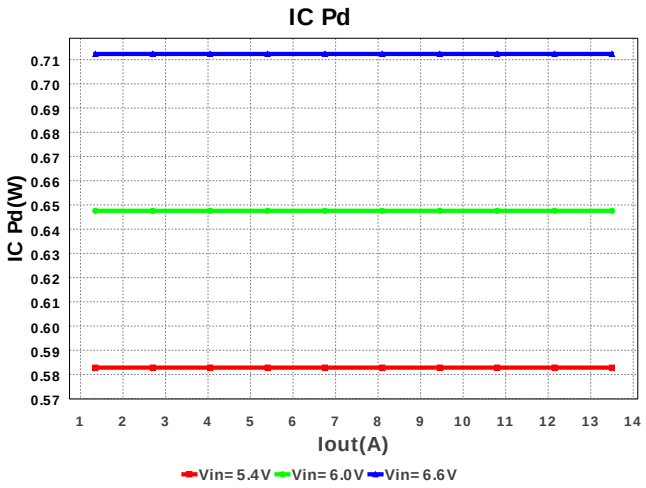

Iin Avg
Iin Avg(A)
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

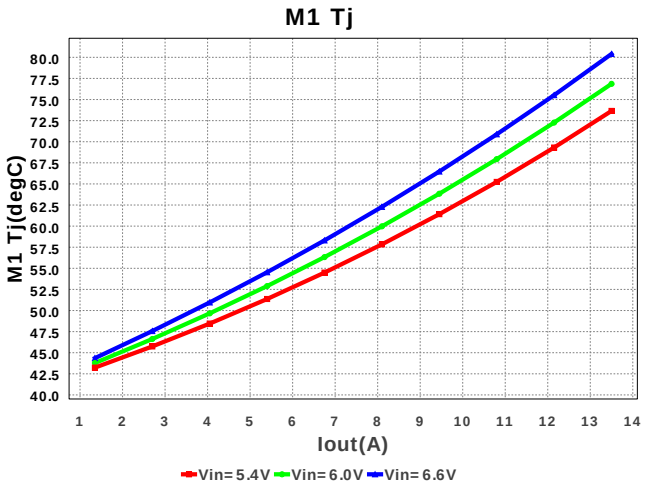

M2 Pd
M2 Pd(W)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

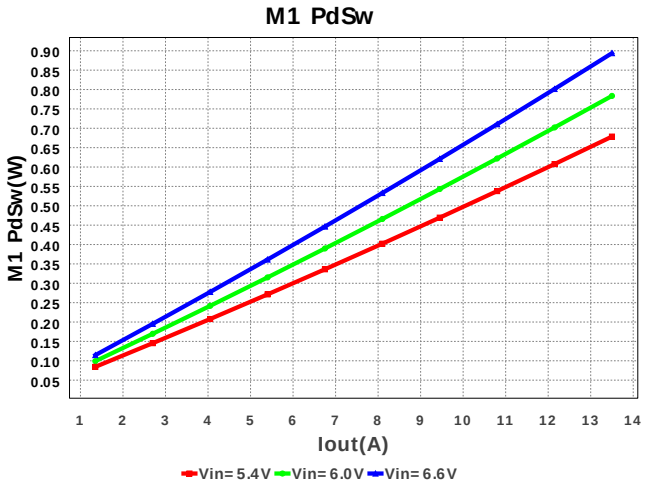

Total Pd
Total Pd(W)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

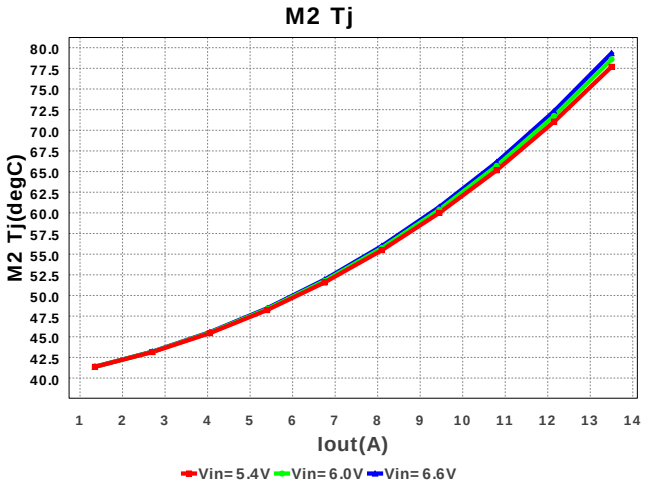

Cout IRMS
Cout IRMS(A)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

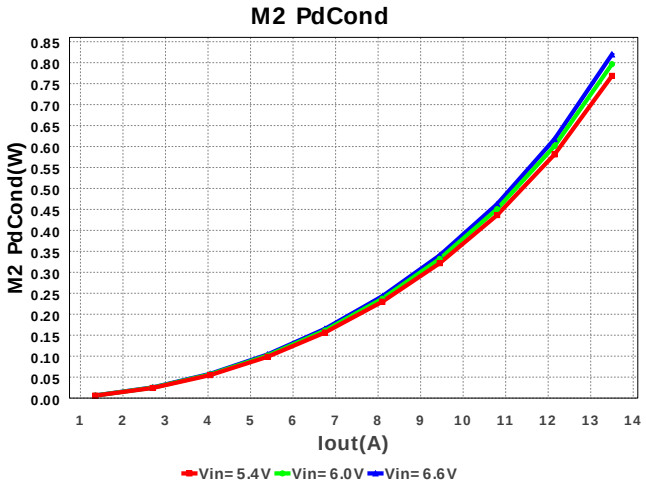

L Ipp
L Ipp(A)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V


IC Pd
IC Pd(W)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V


M1 Tj
M1 Tj(degC)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V







工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	5.338 A	Current	输入电容器均方根纹波电流
2.	Cout IRMS	1.145 A	Current	输出电容器均方根纹波电流
3.	Iin Avg	3.006 A	Current	平均输入电流
4.	L Ipp	3.968 A	Current	峰值到峰值电感器纹波电流
5.	SW Ipk	15.484 A	Current	峰值开关电流
6.	BOM 数量	24	General	Total Design BOM count
7.	大小	419.0 mm2	General	BOM组件的总所占面积
8.	频率	1.2 MHz	General	开关频率
9.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
10.	模式	CCM	General	传导模式
11.	Pout	16.2 W	General	总输出功率
12.	总 BOM	$3.4	General	Total BOM Cost
13.	交叉频率	122.721 kHz	Op_point	波特图交叉频率
14.	占空比	19.398 %	Op_point	占空比
15.	效率	81.669 %	Op_point	稳态效率
16.	IC Tj	74.122 degC	Op_point	电路接点温度
17.	IOUT_OP	13.5 A	Op_point	Iout 操作点
18.	M1 Tj	80.401 degC	Op_point	M1 MOSFET 接点温度
19.	M2 Tj	79.335 degC	Op_point	M2 MOSFET 接点温度
20.	相位裕度	65.252 deg	Op_point	波特图相位裕度
21.	VIN_OP	6.6 V	Op_point	Vin操作点
22.	Vout p-p	4.2 mV	Op_point	峰值到峰值输出纹波电压
23.	Cin Pd	85.486 mW	Power	输入电容器功率耗散
24.	Cout Pd	1.312 mW	Power	输出电容器功率耗散
25.	IC Pd	712.351 mW	Power	电路功率耗散
26.	L Pd	637.875 mW	Power	电感器功率耗散
27.	M1 Pd	1.082 W	Power	M1 MOSFET 总功率耗散
28.	M1 PdCond	188.257 mW	Power	M1 MOSFET 传导损耗
29.	M1 PdSw	893.809 mW	Power	M1 MOSFET 开关损耗
30.	M2 Pd	1.117 W	Power	M2 MOSFET 总功率耗散
31.	M2 PdCond	828.163 mW	Power	M2 MOSFET 传导损耗
32.	M2 PdSw	288.941 mW	Power	M2 MOSFET 开关损耗

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#	名称	数值	类别	说明
33.	整体 Pd	3.636 W	Power	总功率耗散

设计输入

#	名称	数值	说明
1.	输出电流	13.5 A	最大输出电流
2.	Iout1	13.5 Amps	Output Current #1
3.	Vin 最大	6.6 V	最高输入电压
4.	Vin 最小	5.4 V	最低输入电压
5.	输出电压:	1.2 V	输出电压
6.	Vout1	1.2 Volt	Output Voltage #1
7.	base_pn	TPS40305	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. TPS40305 Product Folder : http://www.ti.com/product/tps40305 : contains the data sheet and other resources.

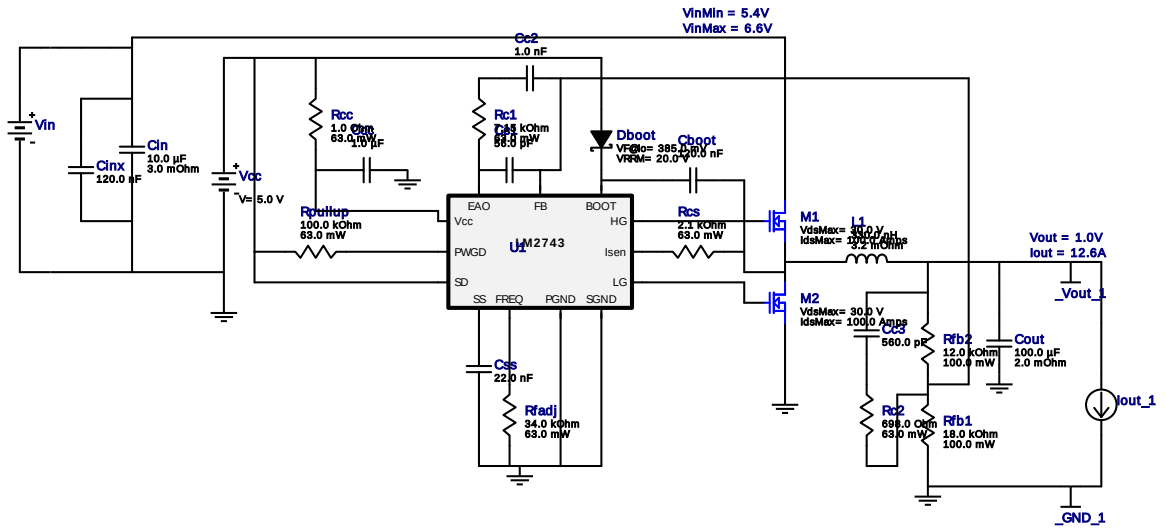
TEXAS INSTRUMENTS

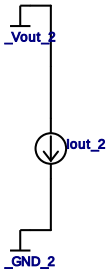
WEBENCH® 设计报告

VinMin = 5.4V
VinMax = 6.6V
Vout = 1.0V
Iout = 12.6A

Device = LM2743MTC/NOPB
Topology = Buck
创建 = 5/17/13 6:29:08 PM
BOM成本 = $3.43
Total Pd = 2.21W
大小 = 457.0mm2
BOM 数量 = 24

Design : 3728439/37 LM2743MTC/NOPB
LM2743MTC/NOPB 5.4V-6.6V to 1.0V @ 12.6A





电气材料清单

#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	Cboot	MuRata	GRM155R61A124KE19D Series= X5R	Cap= 120.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
2.	Cc1	Yageo America	CC0805JRNP09BN560 Series= C0G/NP0	Cap= 56.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
3.	Cc2	Yageo America	CC0805KRX7R9BB102 Series= X7R	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
4.	Cc3	Yageo America	CC0805KRX7R9BB561 Series= X7R	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
5.	Ccc	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
6.	Cin	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 µF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	2	$0.05	0805 13mm2
7.	Cinx	MuRata	GRM155R61A124KE19D Series= X5R	Cap= 120.0 nF VDC= 10.0 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.	Cout	TDK	C3225X5R0J107M Series= X5R	Cap= 100.0 µF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	$0.38	1210 23mm2
9.	Css	MuRata	GRM033R60J223KE01D Series= X5R	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 6mm2
10.	Dboot	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 22mm2
11.	L1	Coilcraft	XAL5030-331MEB	L= 330.0 nH DCR= 3.2 mOhm	1	$0.56	XAL5030 54mm2
12.	M1	Texas Instruments	CSD17306Q5A	VdsMax= 30.0 V IdsMax= 100.0 Amps	1	$0.50	TRANS_NexFET_Q5A 55mm2
13.	M2	Texas Instruments	CSD17306Q5A	VdsMax= 30.0 V IdsMax= 100.0 Amps	1	$0.50	TRANS_NexFET_Q5A 55mm2
14.	Rc1	Vishay-Dale	CRCW04027K15FKED Series= CRCW..e3	Res= 7.15 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
15.	Rc2	Vishay-Dale	CRCW0402698RFKED Series= CRCW..e3	Res= 698.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
16.	Rcc	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
17.	Rcs	Vishay-Dale	CRCW04022K10FKED Series= CRCW..e3	Res= 2.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
18.	Rfadj	Vishay-Dale	CRCW040234K0FKED Series= CRCW..e3	Res= 34.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
19.	Rfb1	Susumu Co Ltd	RR1220P-183-D Series= 264	Res= 18.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 13mm2
20.	Rfb2	Susumu Co Ltd	RR1220P-123-D Series= 264	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 13mm2
21.	Rpullup	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
22.	U1	Texas Instruments	LM2743MTC/NOPB	Switcher	1	$0.80	MTC14 59mm2

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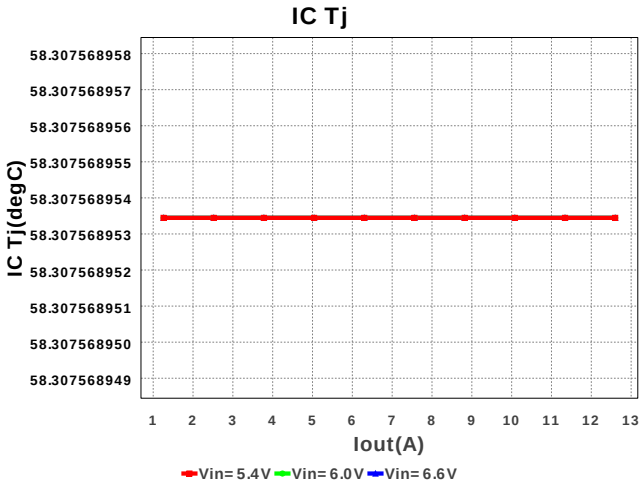
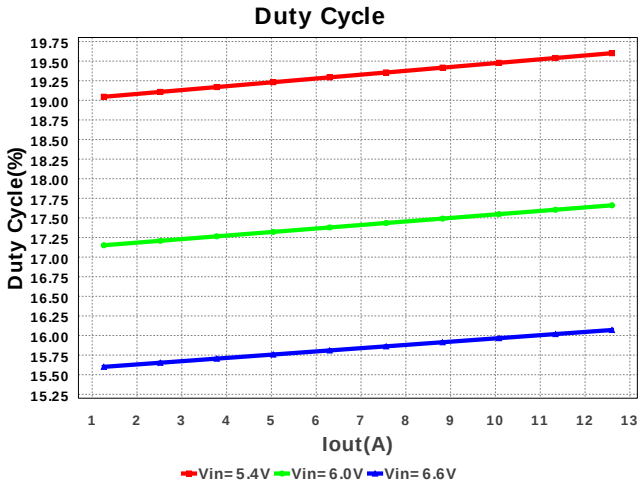
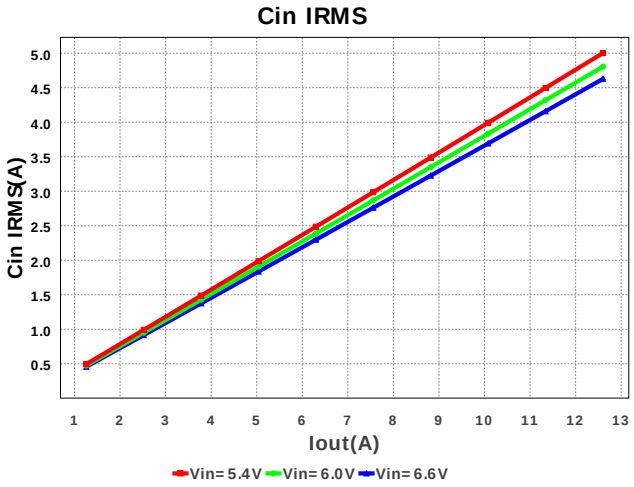
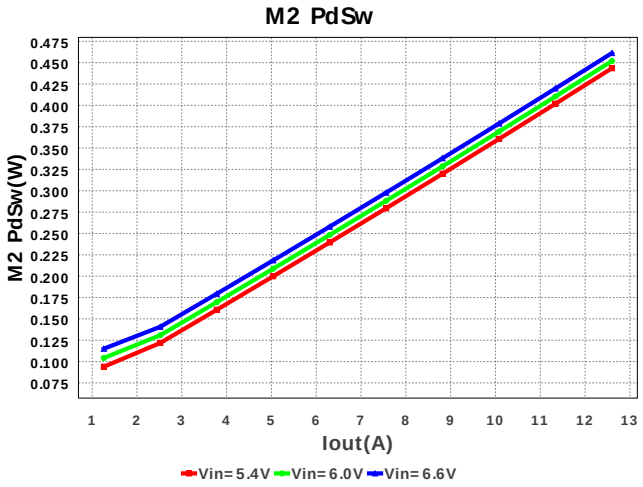
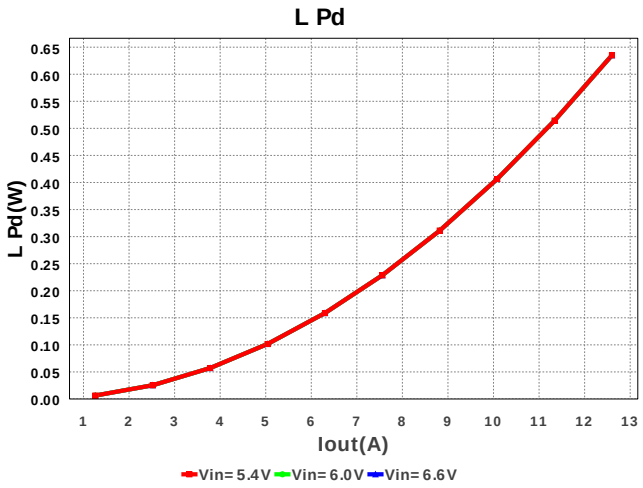
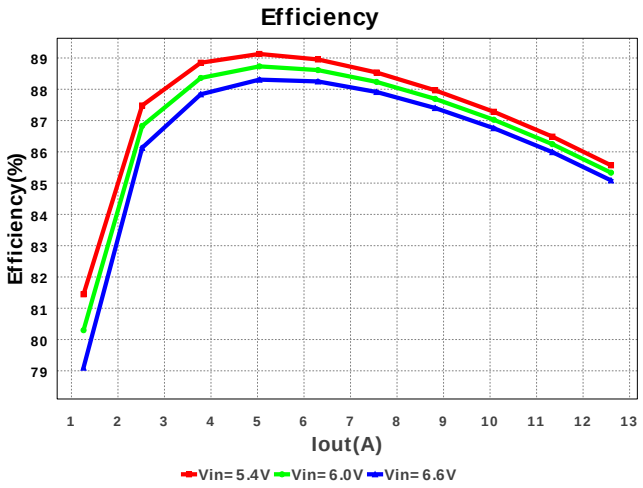

IC Tj
IC Tj(degC)
58.307568958
58.307568957
58.307568956
58.307568955
58.307568954
58.307568953
58.307568952
58.307568951
58.307568950
58.307568949
1 2 3 4 5 6 7 8 9 10 11 12 13
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

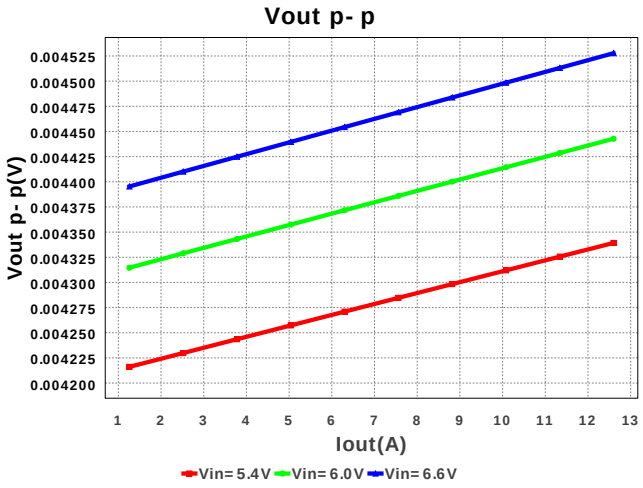

Duty Cycle
Duty Cycle(%)
19.75
19.50
19.25
19.00
18.75
18.50
18.25
18.00
17.75
17.50
17.25
17.00
16.75
16.50
16.25
16.00
15.75
15.50
15.25
1 2 3 4 5 6 7 8 9 10 11 12 13
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

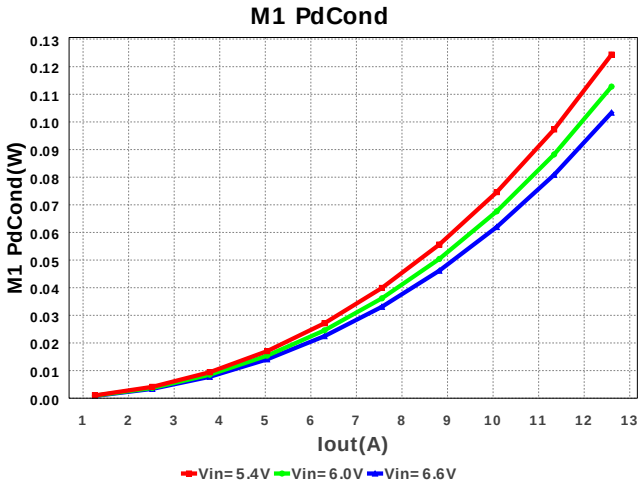

Cin IRMS
Cin IRMS(A)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
1 2 3 4 5 6 7 8 9 10 11 12 13
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

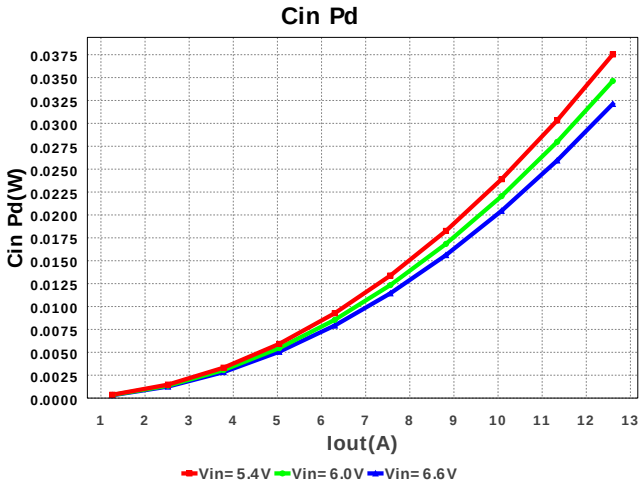

M2 PdSw
M2 PdSw(W)
0.475
0.450
0.425
0.400
0.375
0.350
0.325
0.300
0.275
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
1 2 3 4 5 6 7 8 9 10 11 12 13
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

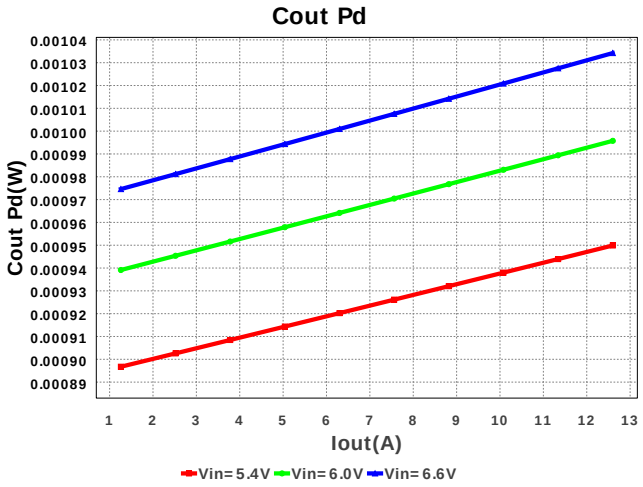

L Pd
L Pd(W)
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

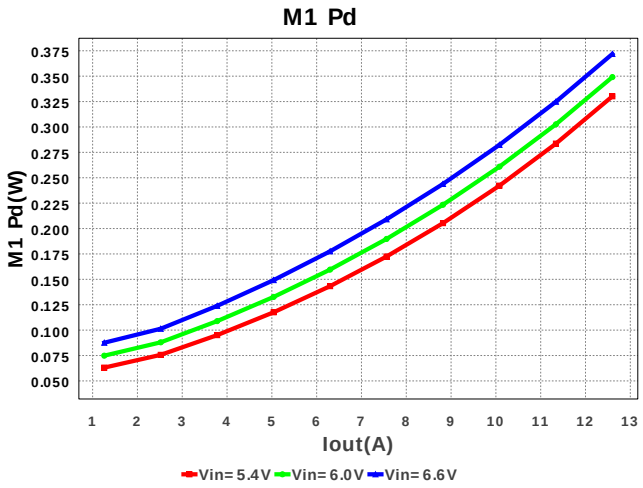

Efficiency
Efficiency(%)
89
88
87
86
85
84
83
82
81
80
79
1 2 3 4 5 6 7 8 9 10 11 12 13
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

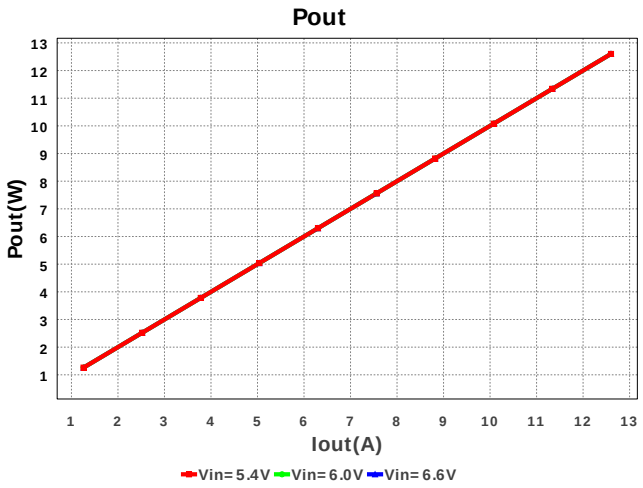












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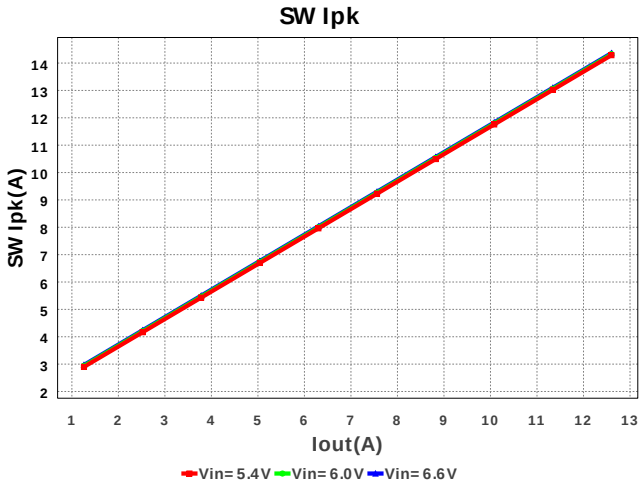
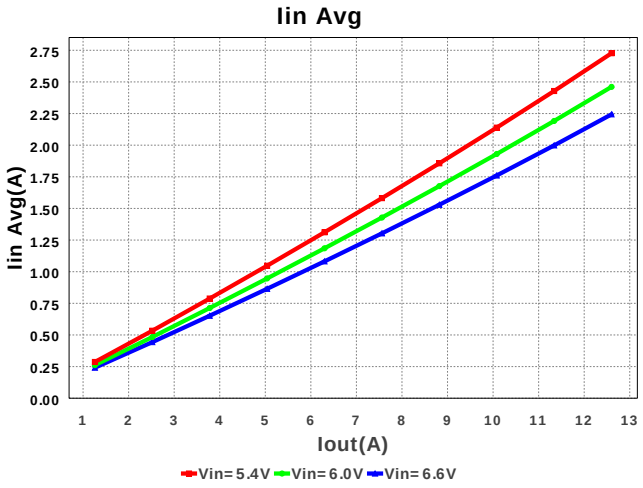
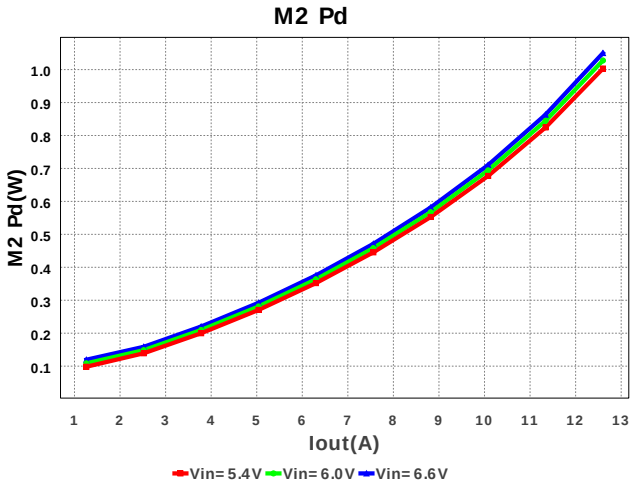
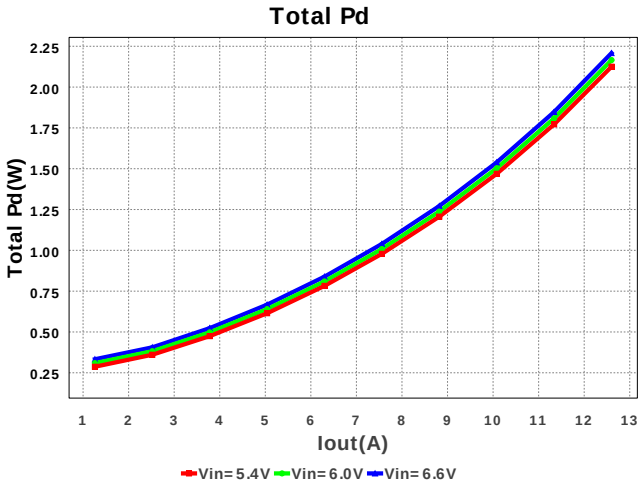
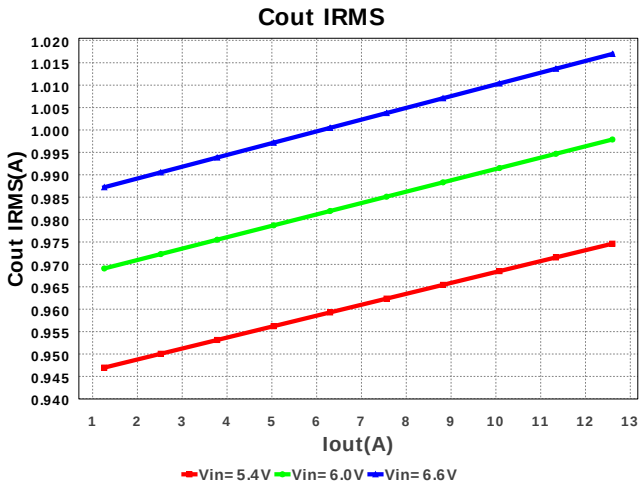
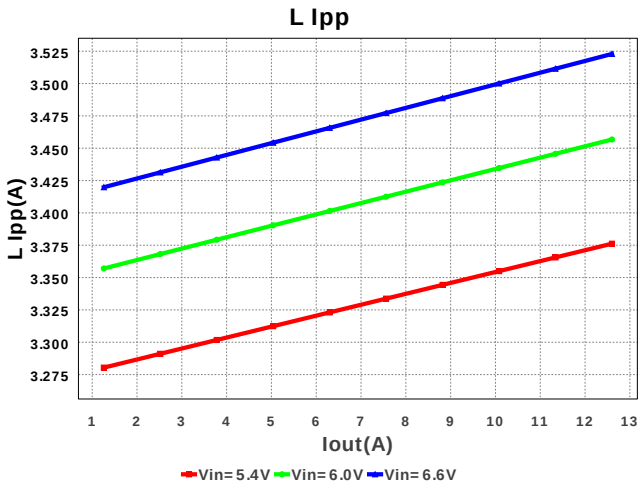

SW Ipk
SW Ipk(A)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

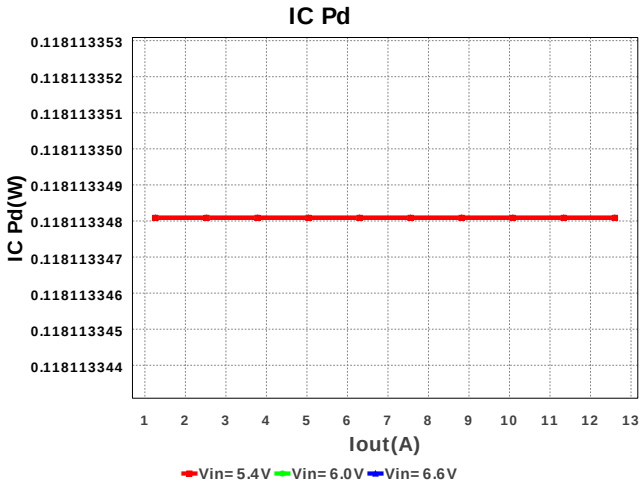

Iin Avg
Iin Avg(A)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

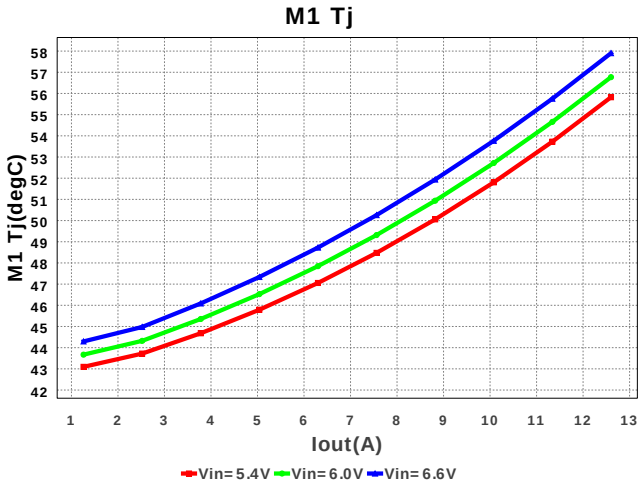

M2 Pd
M2 Pd(W)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

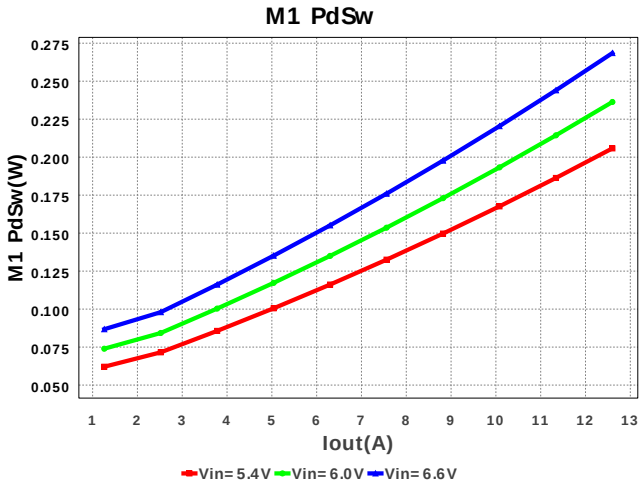

Total Pd
Total Pd(W)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

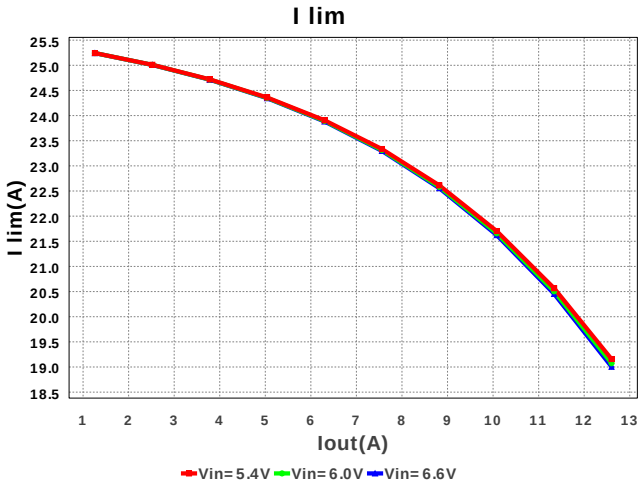

Cout IRMS
Cout IRMS(A)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

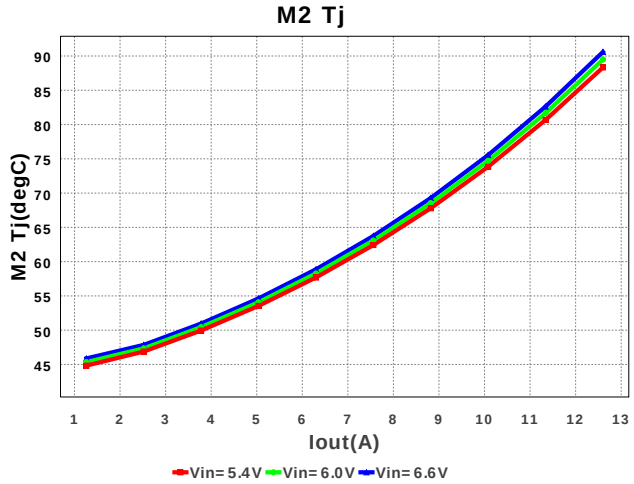

L Ipp
L Ipp(A)
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

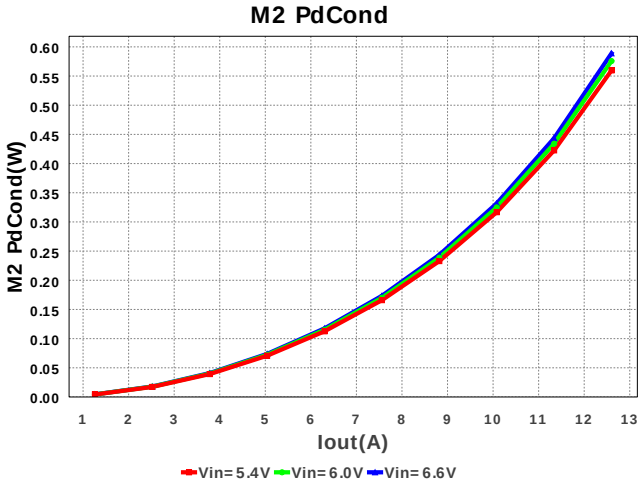












工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	4.627 A	Current	输入电容器均方根纹波电流
2.	Cout IRMS	1.017 A	Current	输出电容器均方根纹波电流
3.	I lim	19.004 A	Current	电流限幅阈值
4.	Iin Avg	2.244 A	Current	平均输入电流
5.	L Ipp	3.523 A	Current	峰值到峰值电感器纹波电流
6.	SW Ipk	14.361 A	Current	峰值开关电流
7.	BOM 数量	24	General	Total Design BOM count
8.	大小	457.0 mm2	General	BOM组件的总所占面积
9.	频率	774.106 kHz	General	开关频率
10.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
11.	模式	CCM	General	传导模式

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#	名称	数值	类别	说明
12.	Pout	12.6 W	General	总输出功率
13.	总 BOM	$3.43	General	Total BOM Cost
14.	交叉频率	64.926 kHz	Op_point	波特图交叉频率
15.	占空比	16.07 %	Op_point	占空比
16.	效率	85.087 %	Op_point	稳态效率
17.	IC Tj	58.308 degC	Op_point	电路接点温度
18.	IOUT_OP	12.6 A	Op_point	Iout 操作点
19.	M1 Tj	57.901 degC	Op_point	M1 MOSFET 接点温度
20.	M2 Tj	90.591 degC	Op_point	M2 MOSFET 接点温度
21.	相位裕度	51.85 deg	Op_point	波特图相位裕度
22.	VIN_OP	6.6 V	Op_point	Vin操作点
23.	Vout p-p	4.528 mV	Op_point	峰值到峰值输出纹波电压
24.	Cin Pd	32.12 mW	Power	输入电容器功率耗散
25.	Cout Pd	1.034 mW	Power	输出电容器功率耗散
26.	IC Pd	118.113 mW	Power	电路功率耗散
27.	L Pd	635.04 mW	Power	电感器功率耗散
28.	M1 Pd	371.888 mW	Power	M1 MOSFET 总功率耗散
29.	M1 PdCond	103.378 mW	Power	M1 MOSFET 传导损耗
30.	M1 PdSw	268.51 mW	Power	M1 MOSFET 开关损耗
31.	M2 Pd	1.05 W	Power	M2 MOSFET 总功率耗散
32.	M2 PdCond	588.973 mW	Power	M2 MOSFET 传导损耗
33.	M2 PdSw	461.243 mW	Power	M2 MOSFET 开关损耗
34.	整体 Pd	2.208 W	Power	总功率耗散

设计输入

#	名称	数值	说明
1.	输出电流	12.6 A	最大输出电流
2.	Iout1	12.6 Amps	Output Current #1
3.	Vin 最大	6.6 V	最高输入电压
4.	Vin 最小	5.4 V	最低输入电压
5.	输出电压:	1.0 V	输出电压
6.	Vout1	1.0 Volt	Output Voltage #1
7.	base_pn	LM2743	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. LM2743 Product Folder : http://www.ti.com/product/lm2743 : contains the data sheet and other resources.

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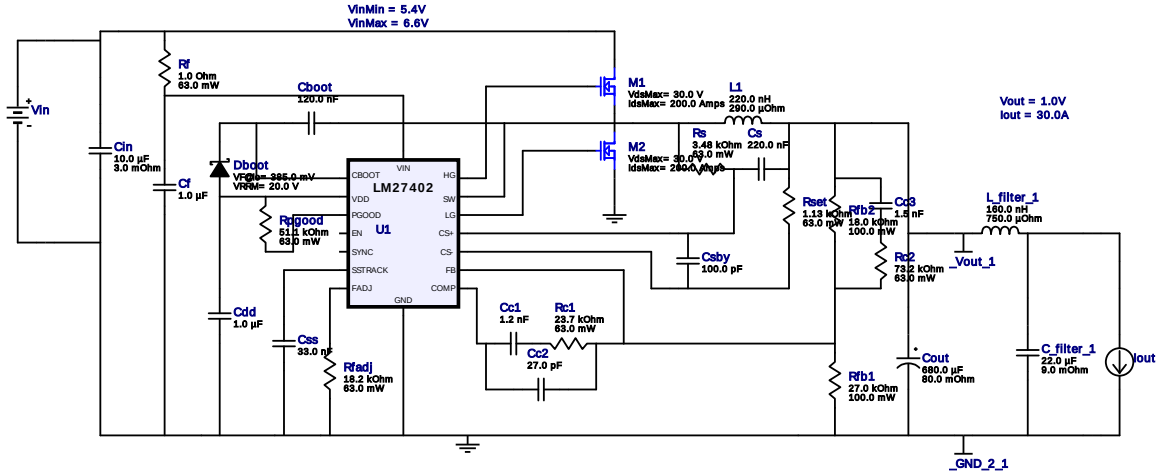
TEXAS INSTRUMENTS

WEBENCH® 设计报告

VinMin = 5.4V
VinMax = 6.6V
Vout = 1.0V
Iout = 30.0A

Device = LM27402SQ/NOPB
Topology = Buck
创建 = 5/17/13 6:29:10 PM
BOM成本 = $8.25
Total Pd = 6.02W
大小 = 1,266.0mm2
BOM 数量 = 35

Design : 3728439/38 LM27402SQ/NOPB
LM27402SQ/NOPB 5.4V-6.6V to 1.0V @ 30.0A



电气材料清单

#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	C_filter_1	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
2.	Cboot	MuRata	GRM155R61A124KE19D Series= X5R	Cap= 120.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
3.	Cc1	MuRata	GRM216R71E122KA01D Series= X7R	Cap= 1.2 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
4.	Cc2	Yageo America	CC0805JRNP09BN270 Series= C0G/NP0	Cap= 27.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
5.	Cc3	Yageo America	CC0805KRX7R9BB152 Series= X7R	Cap= 1.5 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
6.	Cdd	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
7.	Cf	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
8.	Cin	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 µF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	4	$0.05	0805 13mm2
9.	Cout	Panasonic	EEE-FK1C681P Series= FK	Cap= 680.0 µF ESR= 80.0 mOhm VDC= 16.0 V IRMS= 850.0 mA	3	$0.28	SM_RADIAL_G 172mm2
10.	Cs	MuRata	GRM155R61A224KE19D Series= X5R	Cap= 220.0 nF VDC= 10.0 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
11.	Csby	MuRata	GRM033R71C101KA01D Series= X7R	Cap= 100.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0201 6mm2
12.	Css	MuRata	GRM033R60J333KE01D Series= X5R	Cap= 33.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 6mm2
13.	Dboot	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 22mm2
14.	L1	Coiltronics	FP1007R1-R22-R	L= 220.0 nH DCR= 290.0 µOhm	1	$0.81	IND_FP1007R1 124mm2
15.	L_filter_1	Coilcraft	XAL7070-161MEB	L= 160.0 nH DCR= 750.0 µOhm	1	$0.68	XAL7070 87mm2
16.	M1	Texas Instruments	CSD17312Q5	VdsMax= 30.0 V IdsMax= 200.0 Amps	2	$1.07	TRANS_NexFET_Q5 55mm2
17.	M2	Texas Instruments	CSD17312Q5	VdsMax= 30.0 V IdsMax= 200.0 Amps	2	$1.07	TRANS_NexFET_Q5 55mm2
18.	Rc1	Vishay-Dale	CRCW040223K7FKED Series= CRCW..e3	Res= 23.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
19.	Rc2	Vishay-Dale	CRCW040273K2FKED Series= CRCW..e3	Res= 73.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
20.	Rf	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
21.	Rfadj	Vishay-Dale	CRCW040218K2FKED Series= CRCW..e3	Res= 18.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
22.	Rfb1	Susumu Co Ltd	RR1220P-273-D Series= 264	Res= 27.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 13mm2
23.	Rfb2	Susumu Co Ltd	RR1220P-183-D Series= 264	Res= 18.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 13mm2
24.	Rpgood	Vishay-Dale	CRCW040251K1FKED Series= CRCW..e3	Res= 51.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
25.	Rs	Vishay-Dale	CRCW04023K48FKED Series= CRCW..e3	Res= 3.48 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
26.	Rset	Vishay-Dale	CRCW04021K13FKED Series= CRCW..e3	Res= 1.13 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
27.	U1	Texas Instruments	LM27402SQ/NOPB	Switcher	1	$1.10	MXA16A 59mm2

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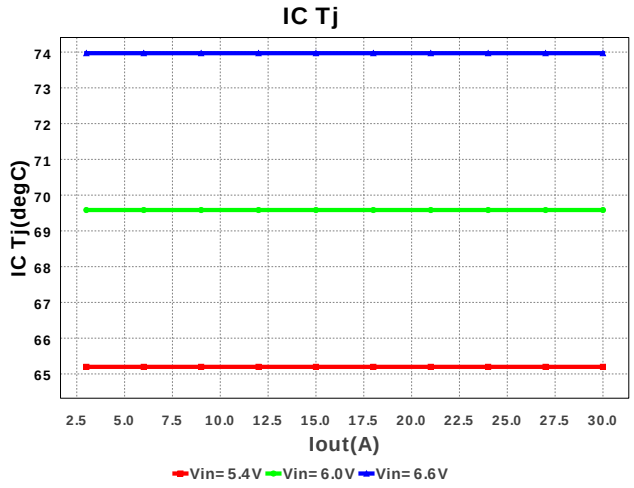

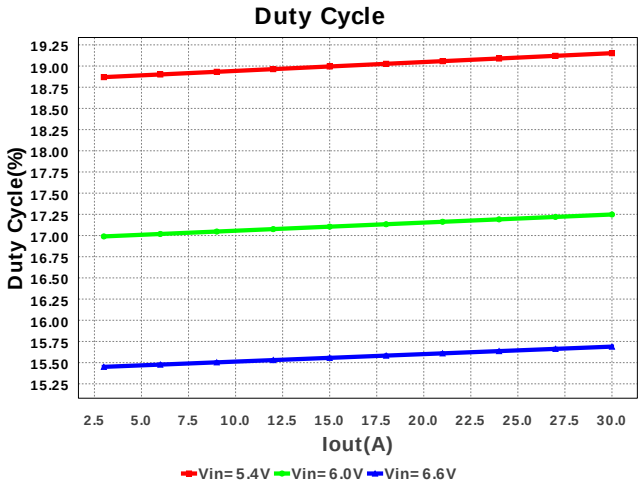

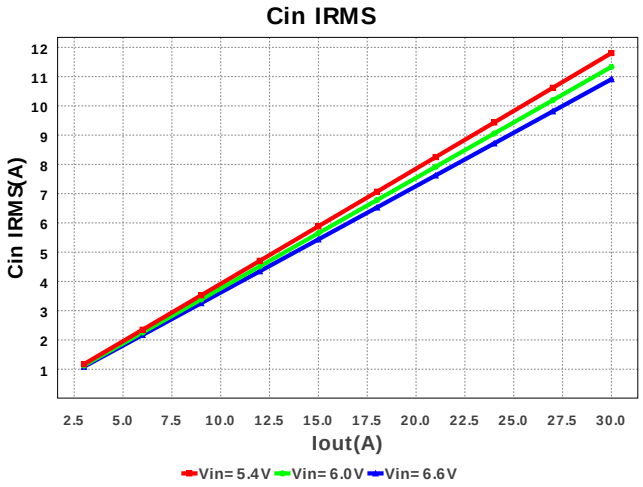

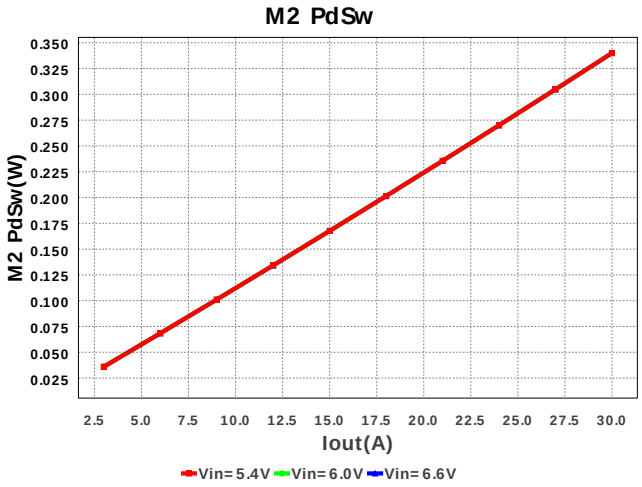

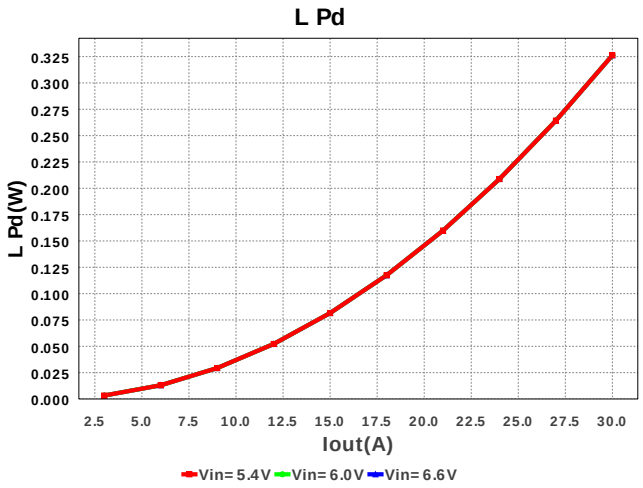

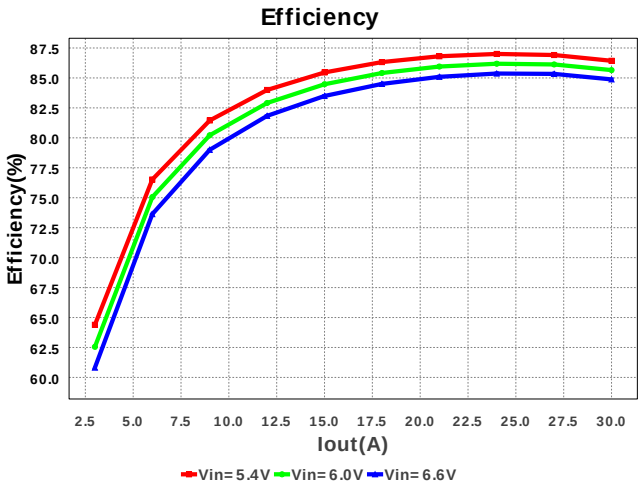

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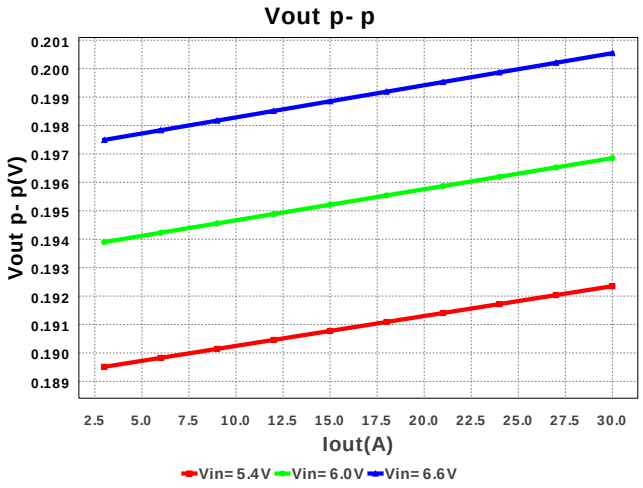
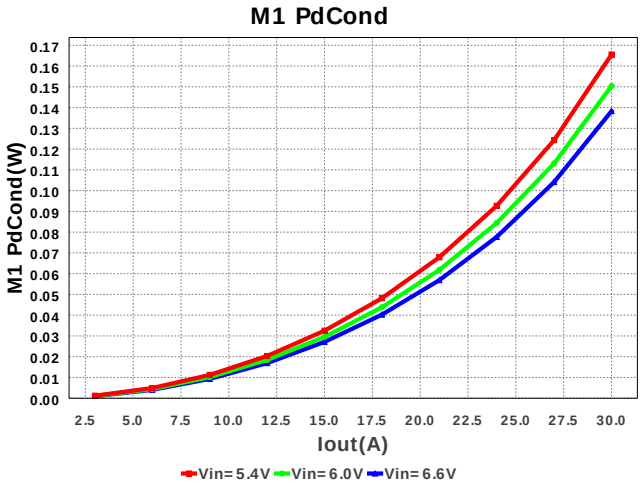
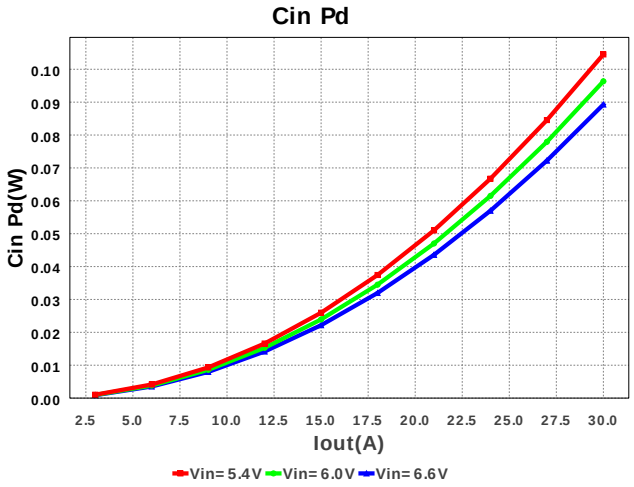
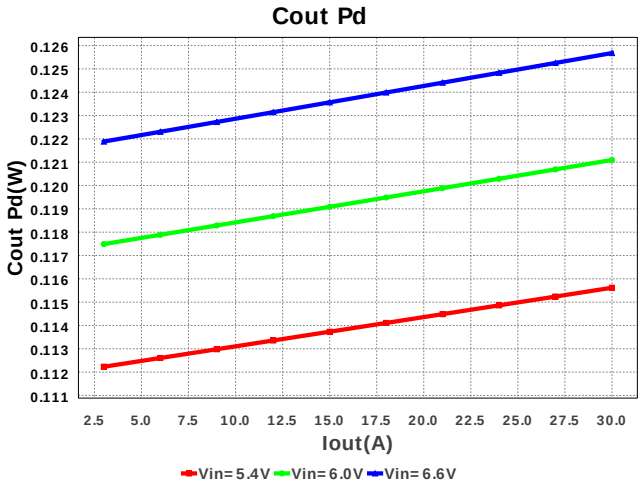
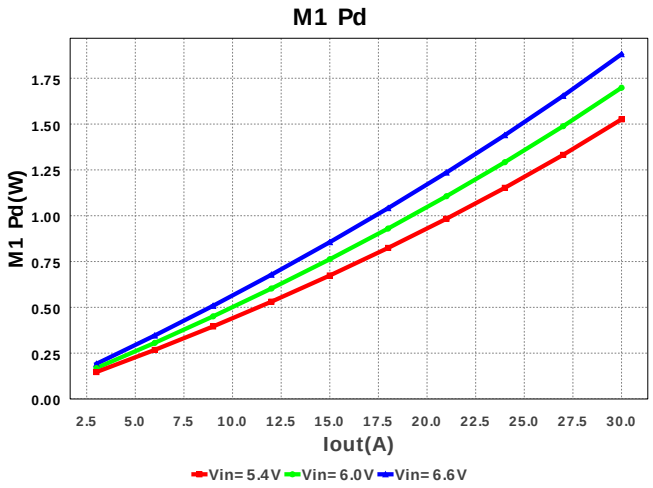
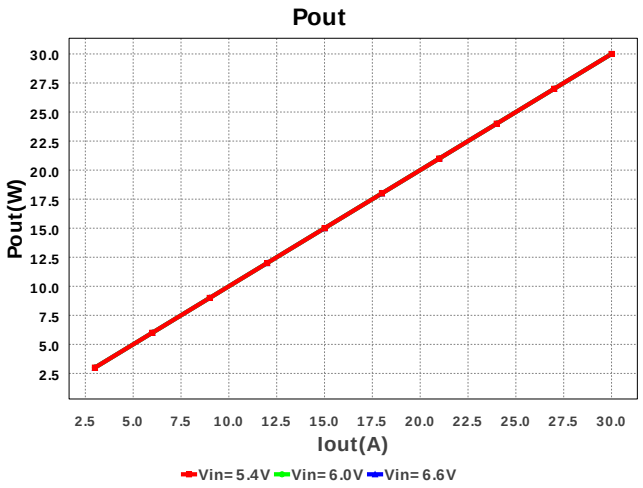

Vout p- p
Vout p- p(V)
0.201
0.200
0.199
0.198
0.197
0.196
0.195
0.194
0.193
0.192
0.191
0.190
0.189
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

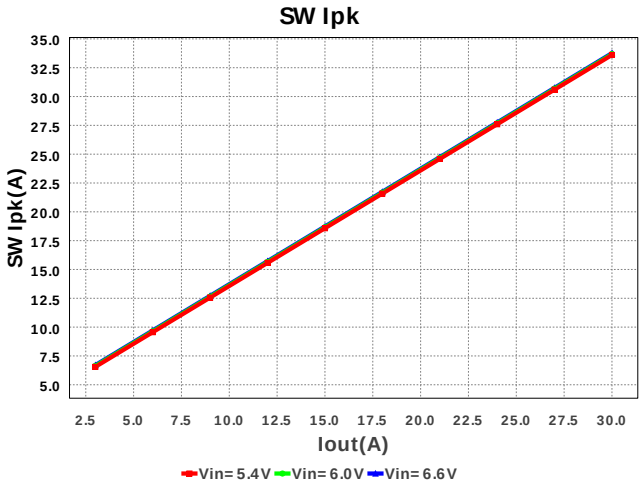

M1 PdCond
M1 PdCond(W)
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

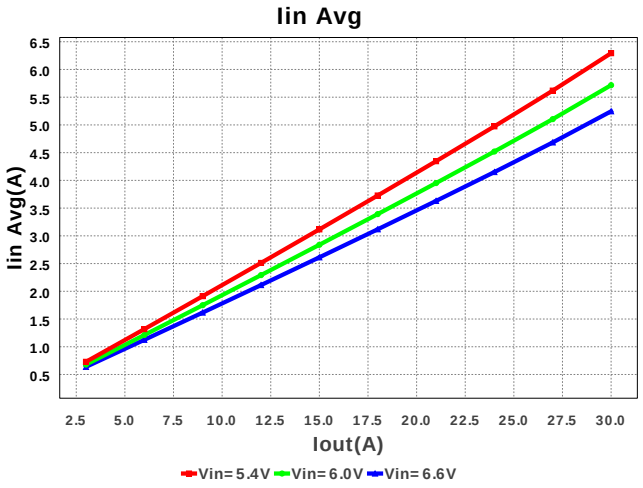

Cin Pd
Cin Pd(W)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

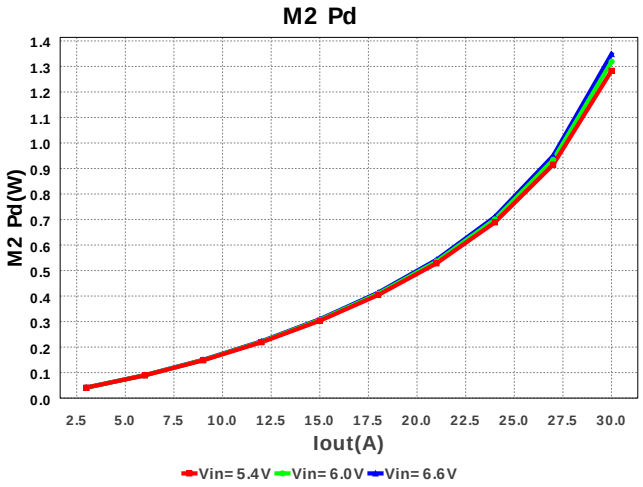

Cout Pd
Cout Pd(W)
0.126
0.125
0.124
0.123
0.122
0.121
0.120
0.119
0.118
0.117
0.116
0.115
0.114
0.113
0.112
0.111
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

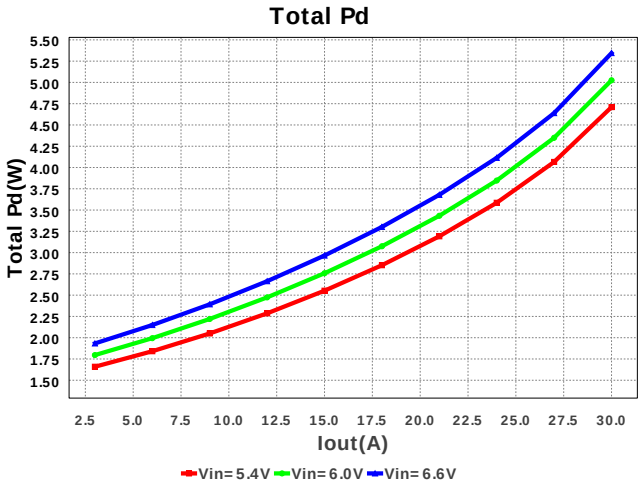

M1 Pd
M1 Pd(W)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

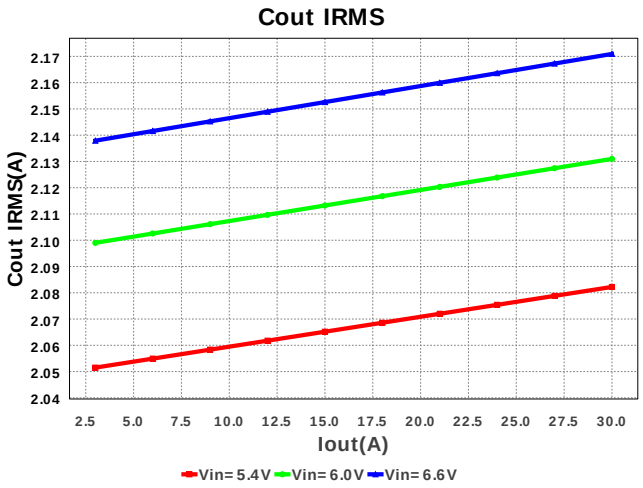

Pout
Pout(W)
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

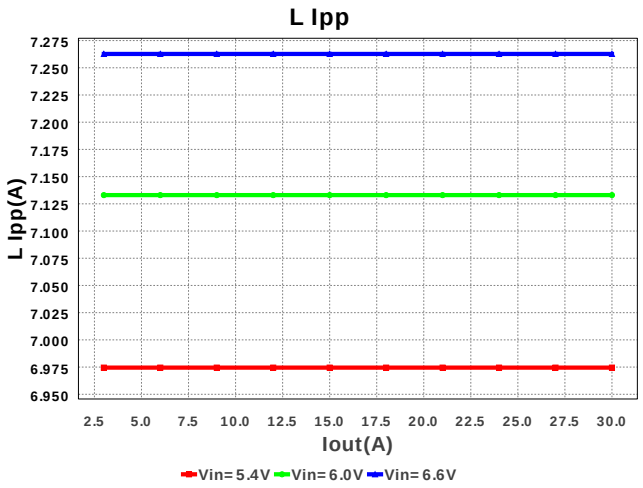

SW Ipk
SW Ipk(A)
35.0
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

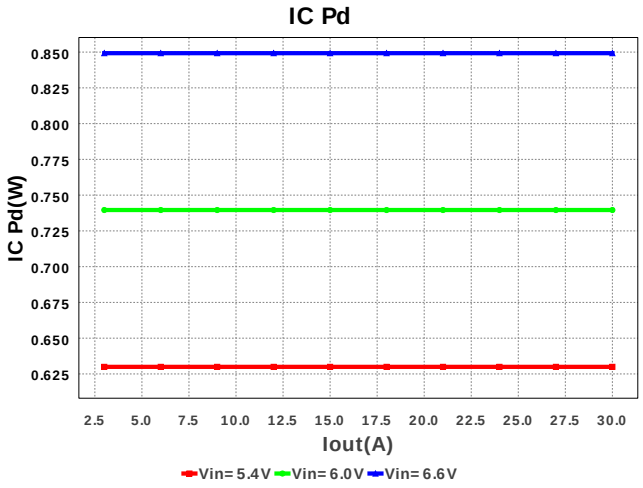

Iin Avg
Iin Avg(A)
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

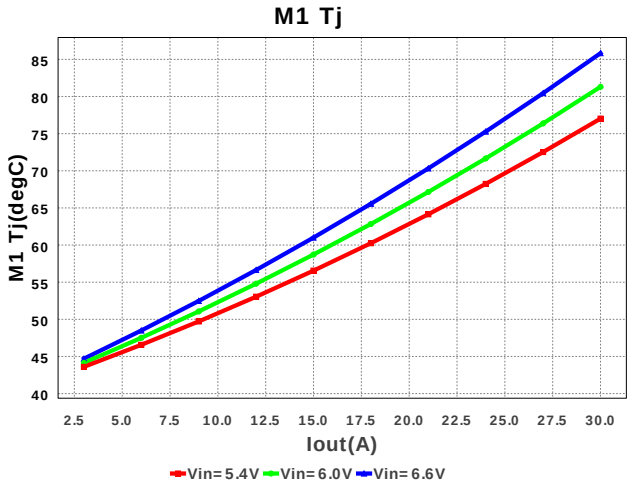

M2 Pd
M2 Pd(W)
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

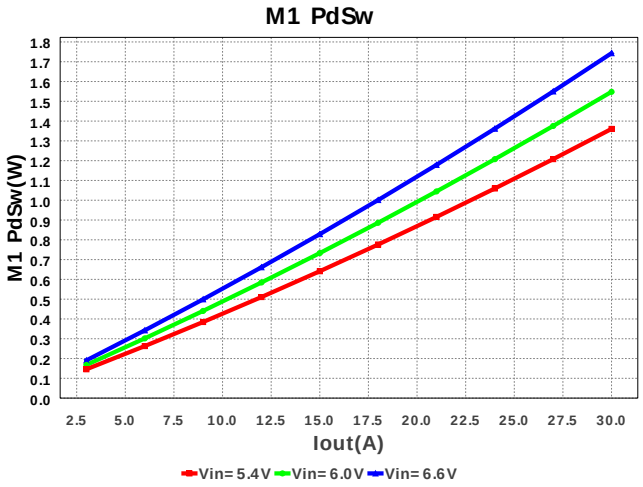

Total Pd
Total Pd(W)
5.50
5.25
5.00
4.75
4.50
4.25
4.00
3.75
3.50
3.25
3.00
2.75
2.50
2.25
2.00
1.75
1.50
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

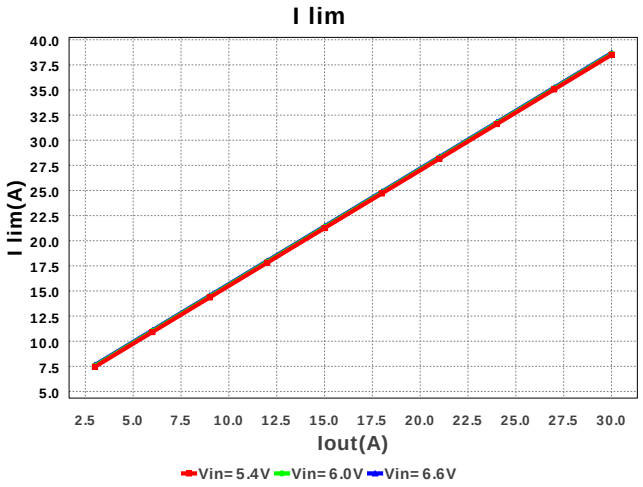

Cout IRMS
Cout IRMS(A)
2.17
2.16
2.15
2.14
2.13
2.12
2.11
2.10
2.09
2.08
2.07
2.06
2.05
2.04
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

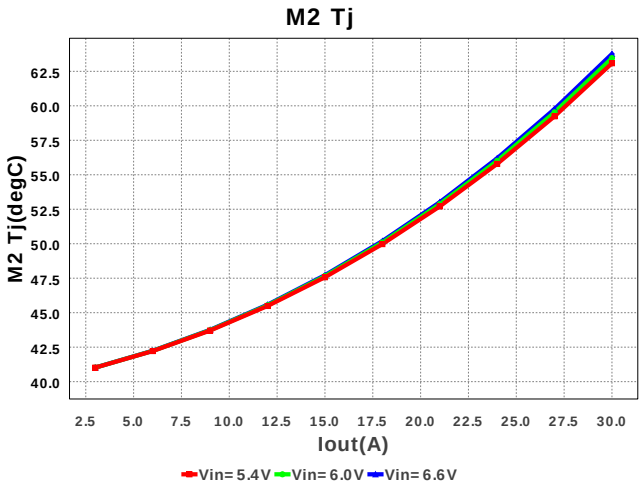

L Ipp
L Ipp(A)
7.275
7.250
7.225
7.200
7.175
7.150
7.125
7.100
7.075
7.050
7.025
7.000
6.975
6.950
2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Iout(A)
Vin=5.4V Vin=6.0V Vin=6.6V

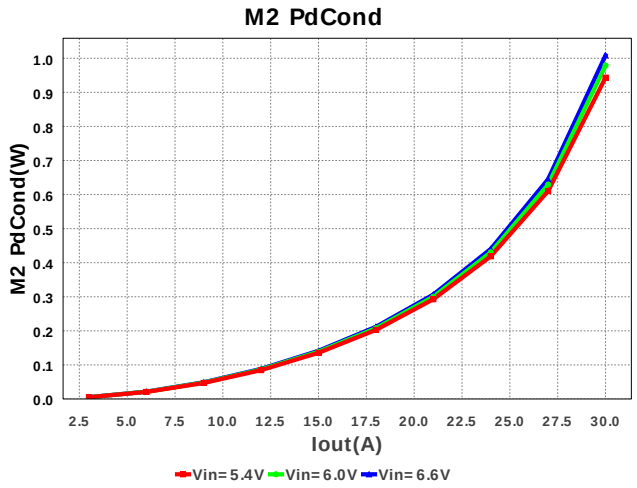












工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	10.911 A	Current	输入电容器均方根纹波电流
2.	Cout IRMS	2.171 A	Current	输出电容器均方根纹波电流
3.	I lim	38.676 A	Current	电流限幅阈值
4.	Iin Avg	5.246 A	Current	平均输入电流
5.	L Ipp	7.52 A	Current	峰值到峰值电感器纹波电流
6.	SW Ipk	33.76 A	Current	峰值开关电流
7.	filter_1 attenuation Factor	29.934 m	Filter	Attenuation factor
8.	filter_1 target Vpp	6.0 mV	Filter	Target voltage ripple through filter filter_1
9.	BOM 数量	35	General	Total Design BOM count
10.	大小	1.266 kmm2	General	BOM组件的总所占面积

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#	名称	数值	类别	说明
11.	频率	531.034 kHz	General	开关频率
12.	IC Tolerance	6.0 mV	General	IC Feedback Tolerance
13.	模式	CCM	General	传导模式
14.	Pout	30.0 W	General	总输出功率
15.	总 BOM	$8.25	General	Total BOM Cost
16.	filter_1 cut-off freq	59.984 kHz	Op_Point	Filter cut off frequency filter_1
17.	filter_1 voltage drop	22.5 mV	Op_Point	Voltage drop through filter filter_1
18.	交叉频率	107.469 kHz	Op_point	波特图交叉频率
19.	占空比	15.689 %	Op_point	占空比
20.	效率	83.289 %	Op_point	稳态效率
21.	IC Tj	73.97 degC	Op_point	电路接点温度
22.	IOUT_OP	30.0 A	Op_point	Iout 操作点
23.	M1 Tj	85.836 degC	Op_point	M1 MOSFET 接点温度
24.	M2 Tj	63.76 degC	Op_point	M2 MOSFET 接点温度
25.	相位裕度	69.48 deg	Op_point	波特图相位裕度
26.	VIN_OP	6.6 V	Op_point	Vin操作点
27.	Vout p-p	200.544 mV	Op_point	峰值到峰值输出纹波电压
28.	Cin Pd	89.286 mW	Power	输入电容器功率耗散
29.	Cout Pd	125.678 mW	Power	输出电容器功率耗散
30.	IC Pd	849.242 mW	Power	电路功率耗散
31.	L Pd	326.25 mW	Power	电感器功率耗散
32.	M1 Pd	1.882 W	Power	M1 MOSFET 总功率耗散
33.	M1 PdCond	138.563 mW	Power	M1 MOSFET 传导损耗
34.	M1 PdSw	1.743 W	Power	M1 MOSFET 开关损耗
35.	M2 Pd	1.349 W	Power	M2 MOSFET 总功率耗散
36.	M2 PdCond	1.009 W	Power	M2 MOSFET 传导损耗
37.	M2 PdSw	339.991 mW	Power	M2 MOSFET 开关损耗
38.	整体 Pd	6.019 W	Power	总功率耗散
39.	filter_1_Pd	724.336 mW	Power	Filter Power Loss filter_1

设计输入

#	名称	数值	说明
1.	输出电流	30.0 A	最大输出电流
2.	Iout1	30.0 Amps	Output Current #1
3.	Vin 最大	6.6 V	最高输入电压
4.	Vin 最小	5.4 V	最低输入电压
5.	输出电压:	1.0 V	输出电压
6.	Vout1	1.0 Volt	Output Voltage #1
7.	base_pn	LM27402	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. Tip: LM27402 High Current PCB Layout Design Guidance For higher current designs, please take care in designing the PCB layout. Consider good thermal management practices and proper routing of traces. Please see the following for more guidelines. Best Layout Practices for Switching Power Supplies http://sva.ti.com/assets/en/appnotes/national_power_designer114.pdf SIMPLE SWITCHER Layout Guidelines http://www.ti.com/lit/an/snva054c/snva054c.pdf Thermal Design by Insight, not Hindsight http://www.ti.com/lit/an/snva419c/snva419c.pdf

2. General Description: The LM27402 is a synchronous voltage mode buck controller with inductor DCR current sense capability. Sensing the inductor current eliminates the need to add resistive powertrain elements which increases overall efficiency and allows for accurate continuous current limit sensing. A 0.6V +/-1% voltage reference permits high accuracy and low voltage capability at the output. An operating voltage range of 3V to 20V makes the LM27402 suitable for a large variety of input rails. The LM27402 voltage mode control loop incorporates input voltage feed-forward to maintain stability throughout the entire input voltage range. The switching frequency is adjustable from 200 kHz to 1.2 MHz allowing a flexible design space. A power good indicator provides power rail sequencing capability and output fault detection. Programmable external softstart capability limits inrush current and provides monotonic output control at startup. Other features include external tracking of other power supplies, integrated LDO bias supply, and synchronization capability.

3. General Description: The LM27402 is offered in a 16 pin eTSSOP package and a 4mm x 4mm 16 pin exposed LLP.

4. LM27402 Product Folder : http://www.ti.com/product/lm27402 : contains the data sheet and other resources.

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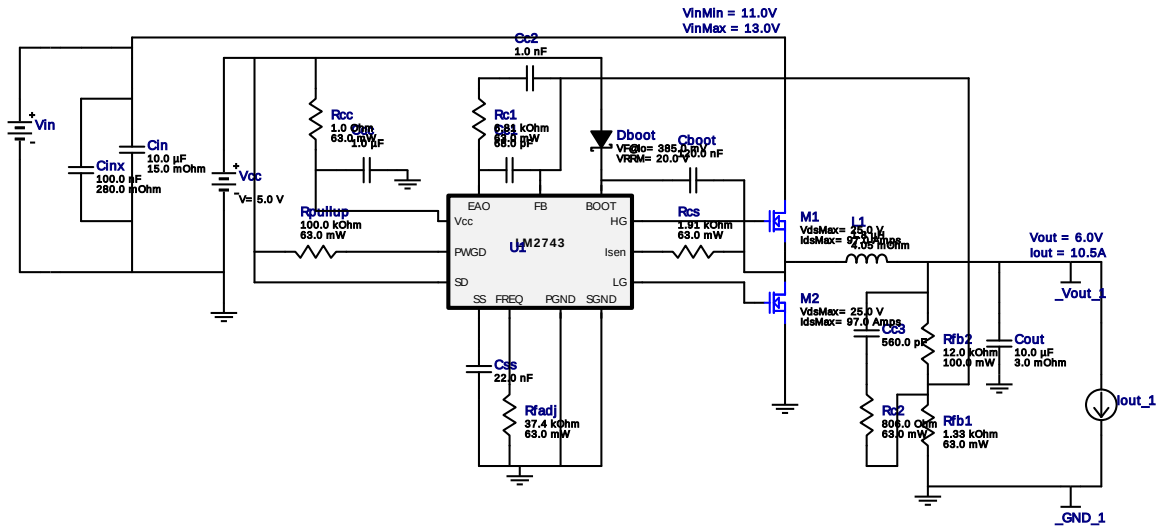
TEXAS INSTRUMENTS

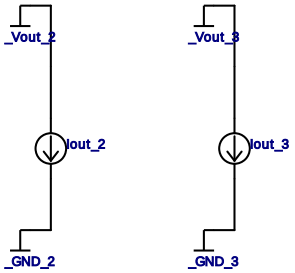
WEBENCH® 设计报告

VinMin = 11.0V
VinMax = 13.0V
Vout = 6.0V
Iout = 10.5A

Device = LM2743MTC/NOPB
Topology = Buck
创建 = 5/17/13 6:29:11 PM
BOM成本 = $3.06
Total Pd = 2.31W
大小 = 502.0mm2
BOM 数量 = 25

Design : 3728439/39 LM2743MTC/NOPB
LM2743MTC/NOPB 11.0V-13.0V to 6.0V @ 10.495A





电气材料清单

#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	Cboot	MuRata	GRM155R61A124KE19D Series= X5R	Cap= 120.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
2.	Cc1	Yageo America	CC0805JRNP09BN680 Series= C0G/NP0	Cap= 68.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
3.	Cc2	Yageo America	CC0805KRX7R9BB102 Series= X7R	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
4.	Cc3	Yageo America	CC0805KRX7R9BB561 Series= X7R	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
5.	Ccc	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 8mm2
6.	Cin	TDK	C3225X5R1E106K Series= X5R	Cap= 10.0 µF ESR= 15.0 mOhm VDC= 25.0 V IRMS= 3.0 A	2	$0.15	1210 23mm2

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#	名称	制造商	零件编号	属性	Qty	Price	大小
7.	Cinx	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
8.	Cout	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 µF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	3	$0.05	0805 13mm2
9.	Css	MuRata	GRM033R60J223KE01D Series= X5R	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 6mm2
10.	Dboot	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 22mm2
11.	L1	Coilcraft	XAL7070-182MEB	L= 1.8 µH DCR= 4.05 mOhm	1	$0.68	XAL7070 87mm2
12.	M1	Texas Instruments	CSD16322Q5	VdsMax= 25.0 V IdsMax= 97.0 Amps	1	$0.46	TRANS_NexFET_Q5 55mm2
13.	M2	Texas Instruments	CSD16322Q5	VdsMax= 25.0 V IdsMax= 97.0 Amps	1	$0.46	TRANS_NexFET_Q5 55mm2
14.	Rc1	Vishay-Dale	CRCW04026K81FKED Series= CRCW..e3	Res= 6.81 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
15.	Rc2	Vishay-Dale	CRCW0402806RFKED Series= CRCW..e3	Res= 806.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
16.	Rcc	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
17.	Rcs	Vishay-Dale	CRCW04021K91FKED Series= CRCW..e3	Res= 1.91 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
18.	Rfadj	Vishay-Dale	CRCW040237K4FKED Series= CRCW..e3	Res= 37.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
19.	Rfb1	Vishay-Dale	CRCW04021K33FKED Series= CRCW..e3	Res= 1.33 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
20.	Rfb2	Susumu Co Ltd	RR1220P-123-D Series= 264	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 13mm2
21.	Rpullup	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
22.	U1	Texas Instruments	LM2743MTC/NOPB	Switcher	1	$0.80	MTC14 59mm2

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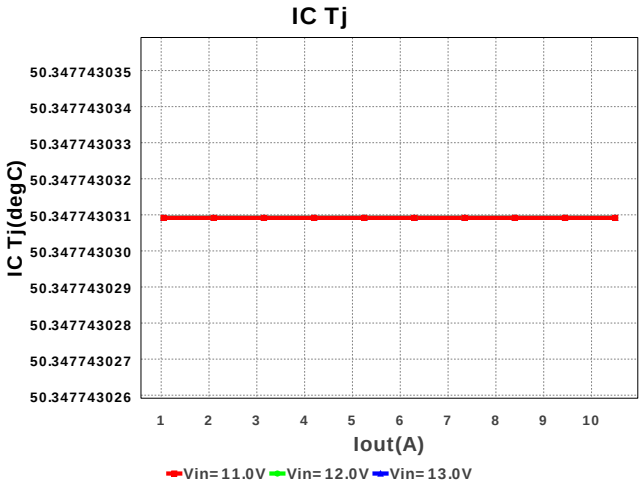

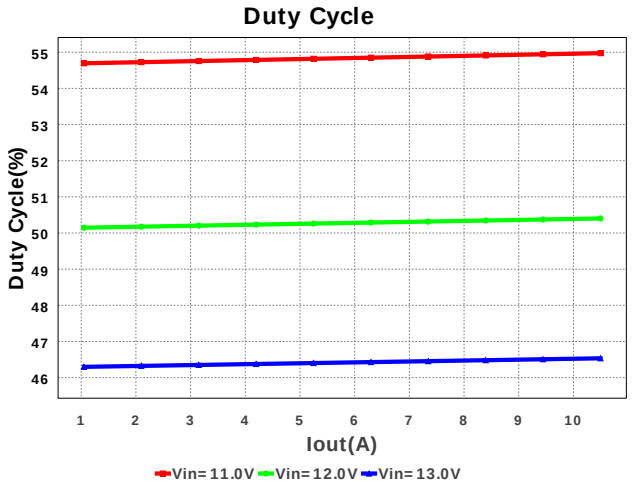

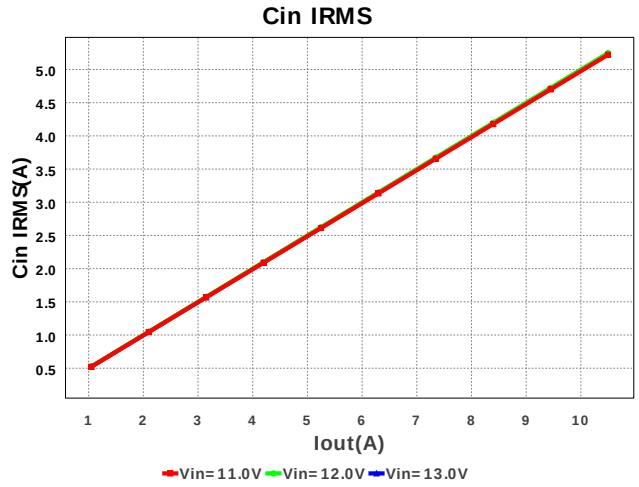

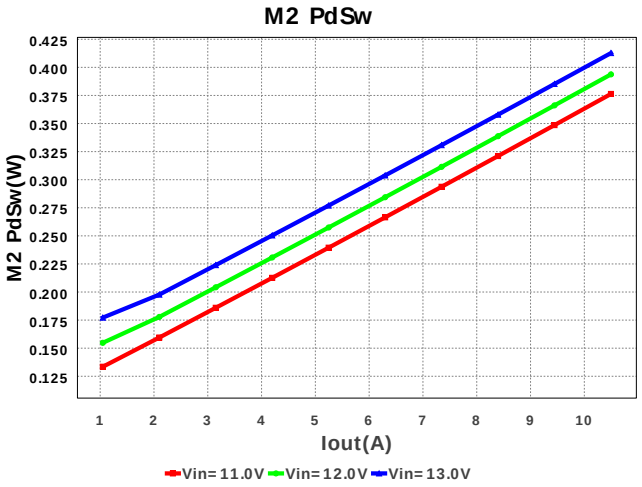

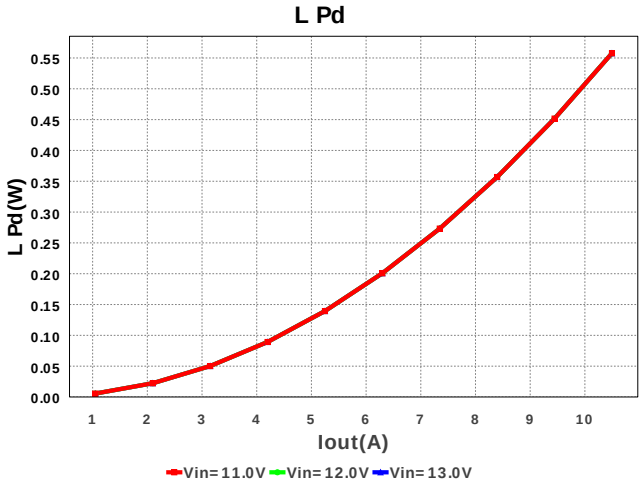

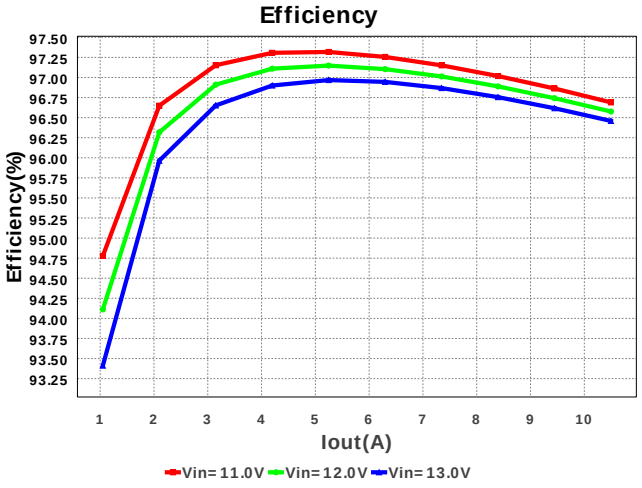

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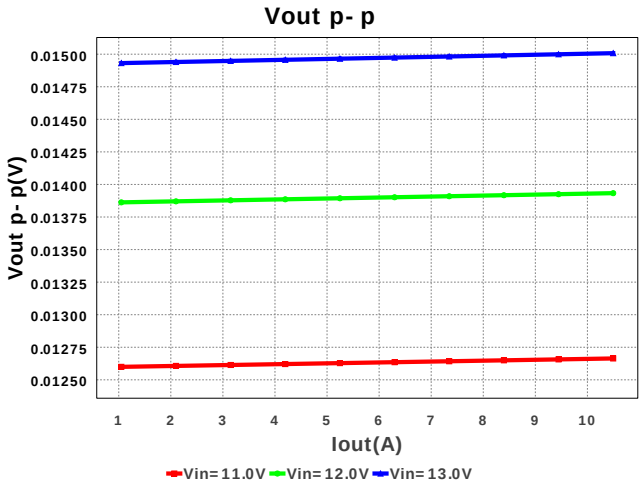

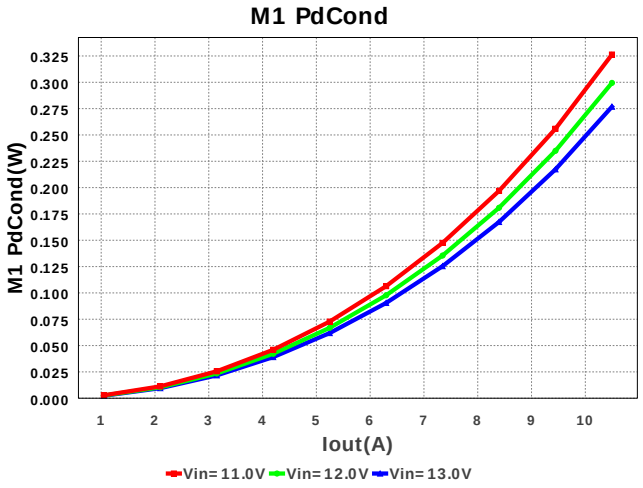

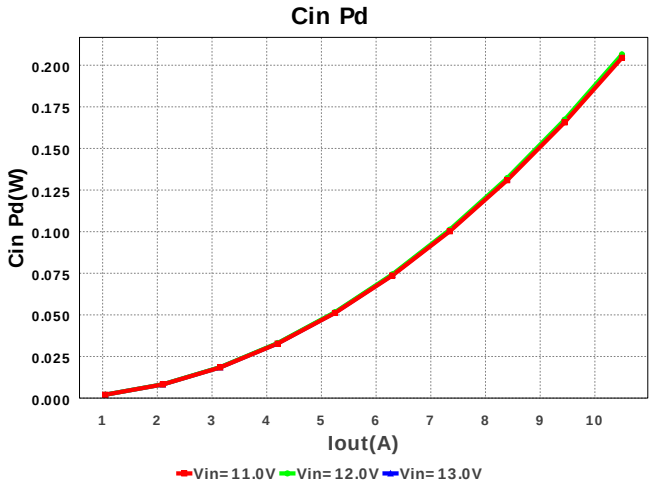

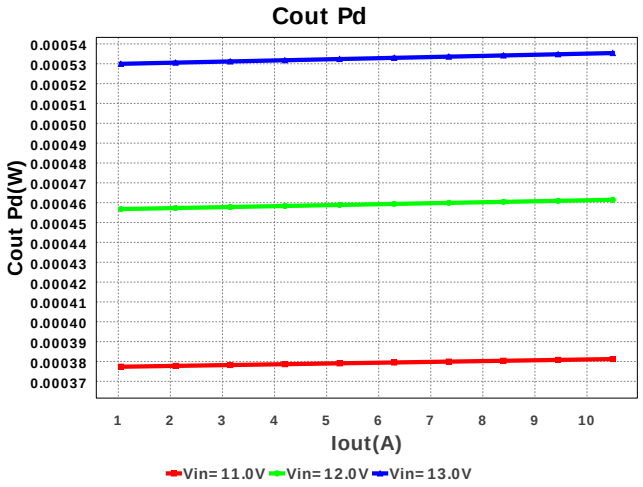

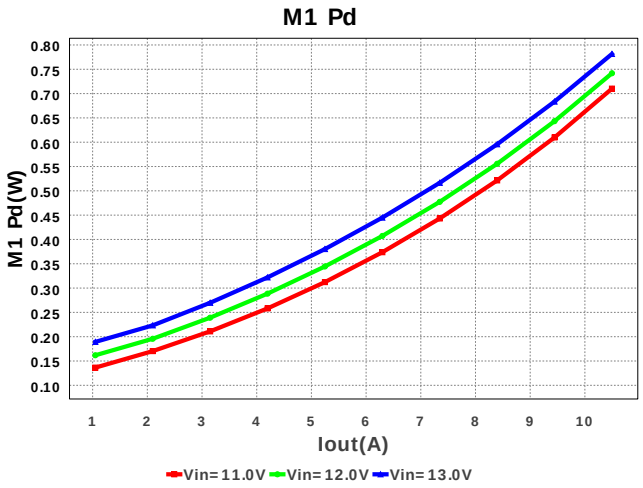

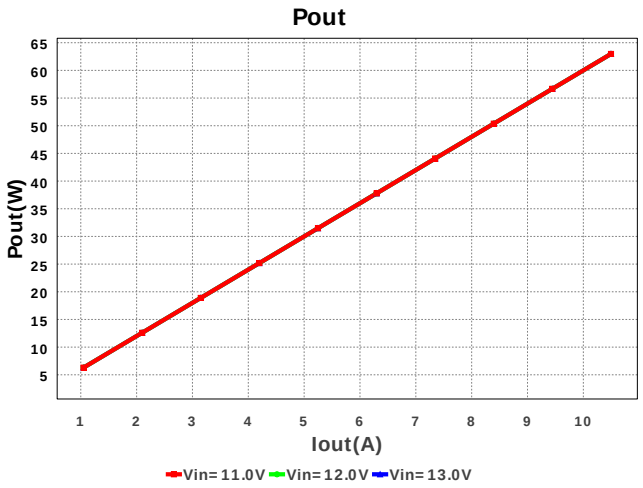

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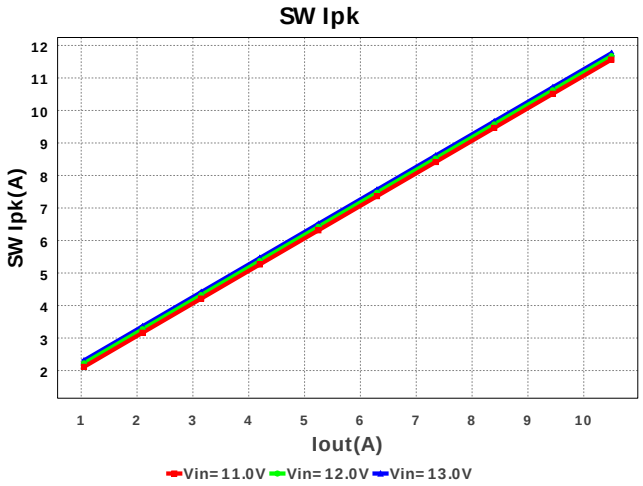

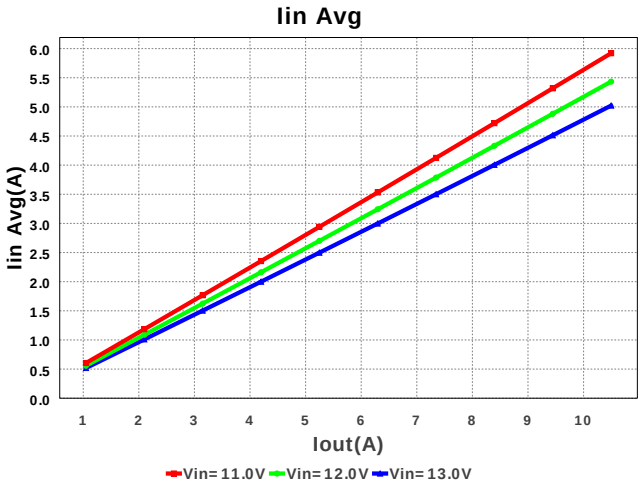

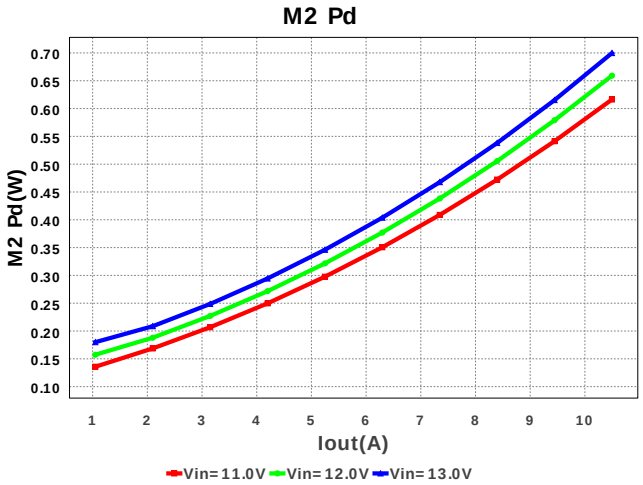

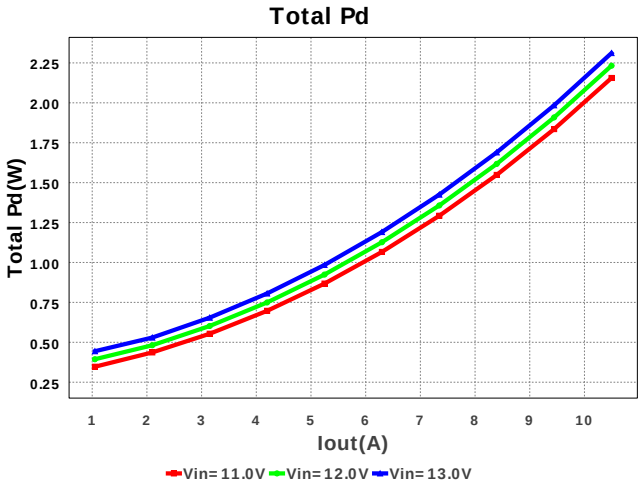

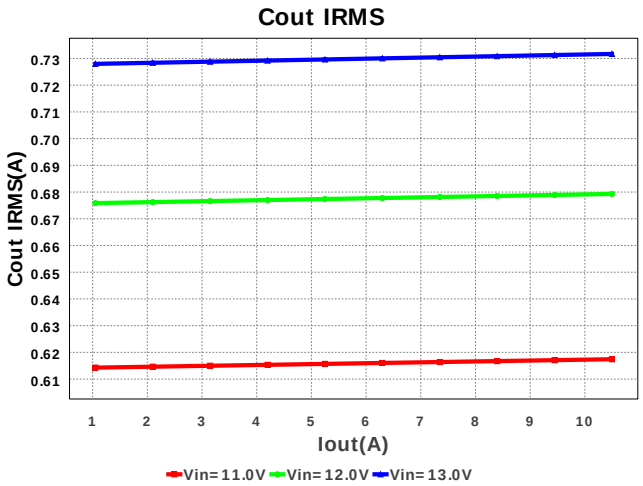

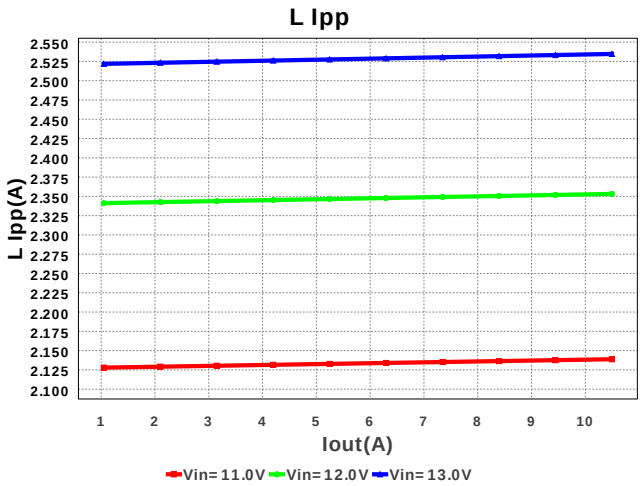

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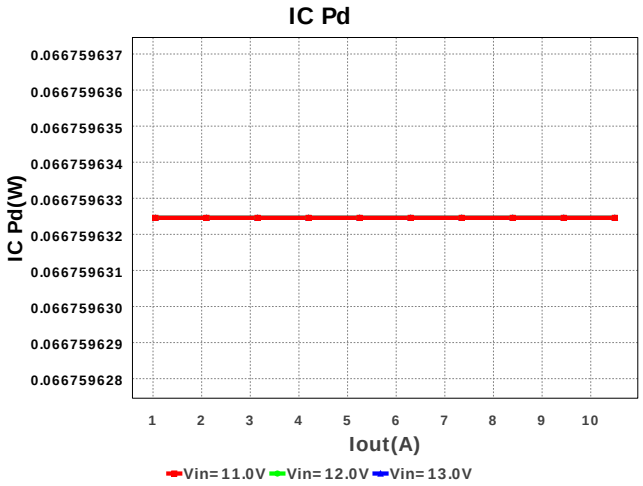

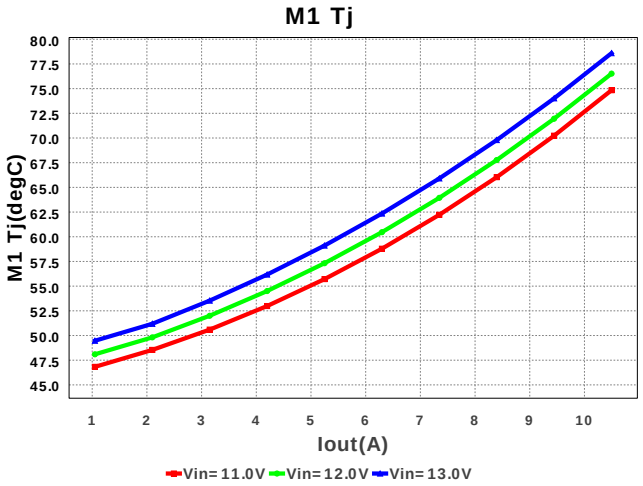

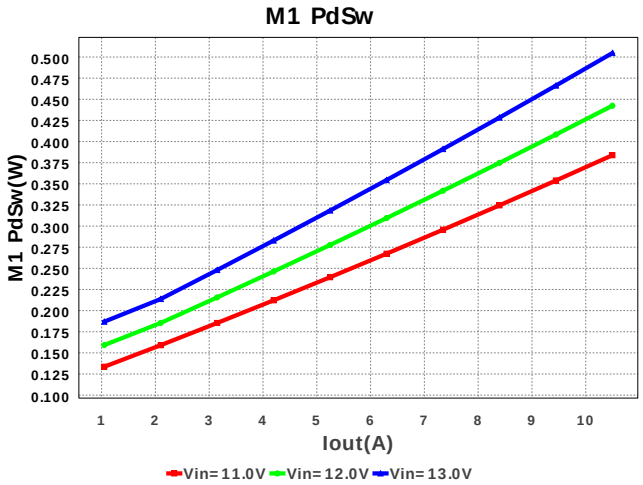

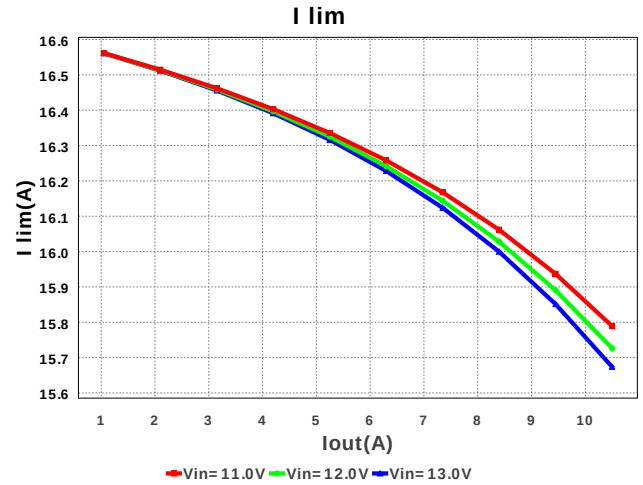

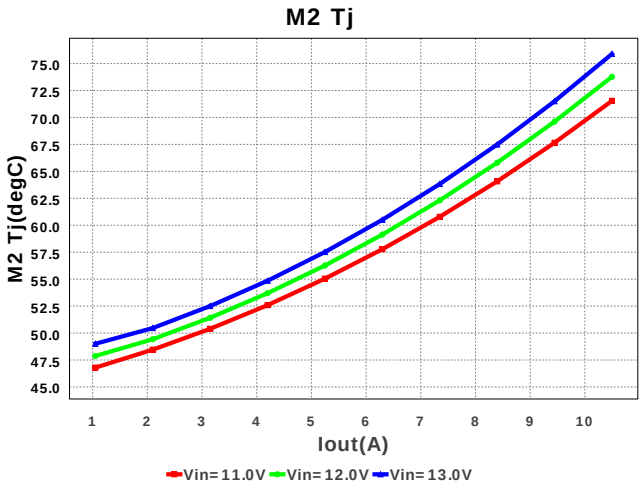

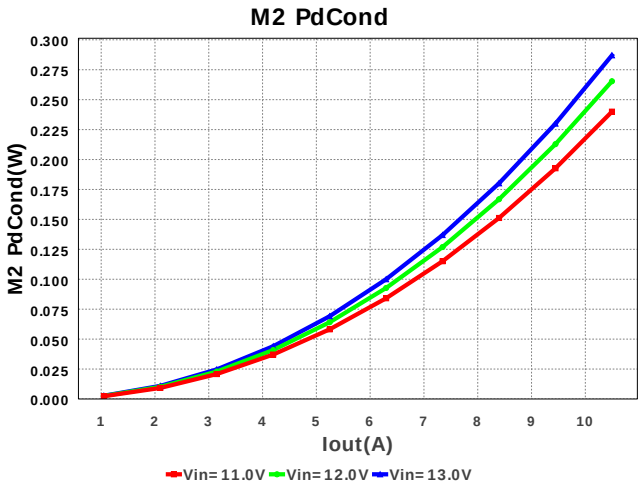

工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	5.235 A	Current	输入电容器均方根纹波电流
2.	Cout IRMS	731.697 mA	Current	输出电容器均方根纹波电流
3.	I lim	15.674 A	Current	电流限幅阈值
4.	Iin Avg	5.022 A	Current	平均输入电流
5.	L Ipp	2.535 A	Current	峰值到峰值电感器纹波电流
6.	SW Ipk	11.762 A	Current	峰值开关电流
7.	BOM 数量	25	General	Total Design BOM count
8.	大小	502.0 mm2	General	BOM组件的总所占面积
9.	频率	713.966 kHz	General	开关频率
10.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
11.	模式	CCM	General	传导模式

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#	名称	数值	类别	说明
12.	Pout	62.97 W	General	总输出功率
13.	总 BOM	$3.06	General	Total BOM Cost
14.	交叉频率	121.36 kHz	Op_point	波特图交叉频率
15.	占空比	46.534 %	Op_point	占空比
16.	效率	96.459 %	Op_point	稳态效率
17.	IC Tj	50.348 degC	Op_point	电路接点温度
18.	IOUT_OP	10.495 A	Op_point	Iout 操作点
19.	M1 Tj	78.59 degC	Op_point	M1 MOSFET 接点温度
20.	M2 Tj	75.891 degC	Op_point	M2 MOSFET 接点温度
21.	相位裕度	37.683 deg	Op_point	波特图相位裕度
22.	VIN_OP	13.0 V	Op_point	Vin操作点
23.	Vout p-p	15.008 mV	Op_point	峰值到峰值输出纹波电压
24.	Cin Pd	205.53 mW	Power	输入电容器功率耗散
25.	Cout Pd	535.38 µW	Power	输出电容器功率耗散
26.	IC Pd	66.76 mW	Power	电路功率耗散
27.	L Pd	557.609 mW	Power	电感器功率耗散
28.	M1 Pd	781.547 mW	Power	M1 MOSFET 总功率耗散
29.	M1 PdCond	276.858 mW	Power	M1 MOSFET 传导损耗
30.	M1 PdSw	504.689 mW	Power	M1 MOSFET 开关损耗
31.	M2 Pd	699.782 mW	Power	M2 MOSFET 总功率耗散
32.	M2 PdCond	287.054 mW	Power	M2 MOSFET 传导损耗
33.	M2 PdSw	412.729 mW	Power	M2 MOSFET 开关损耗
34.	整体 Pd	2.312 W	Power	总功率耗散

设计输入

#	名称	数值	说明
1.	输出电流	10.495 A	最大输出电流
2.	Iout1	10.495 Amps	Output Current #1
3.	Vin 最大	13.0 V	最高输入电压
4.	Vin 最小	11.0 V	最低输入电压
5.	输出电压:	6.0 V	输出电压
6.	Vout1	6.0 Volt	Output Voltage #1
7.	base_pn	LM2743	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. LM2743 Product Folder : http://www.ti.com/product/lm2743 : contains the data sheet and other resources.

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