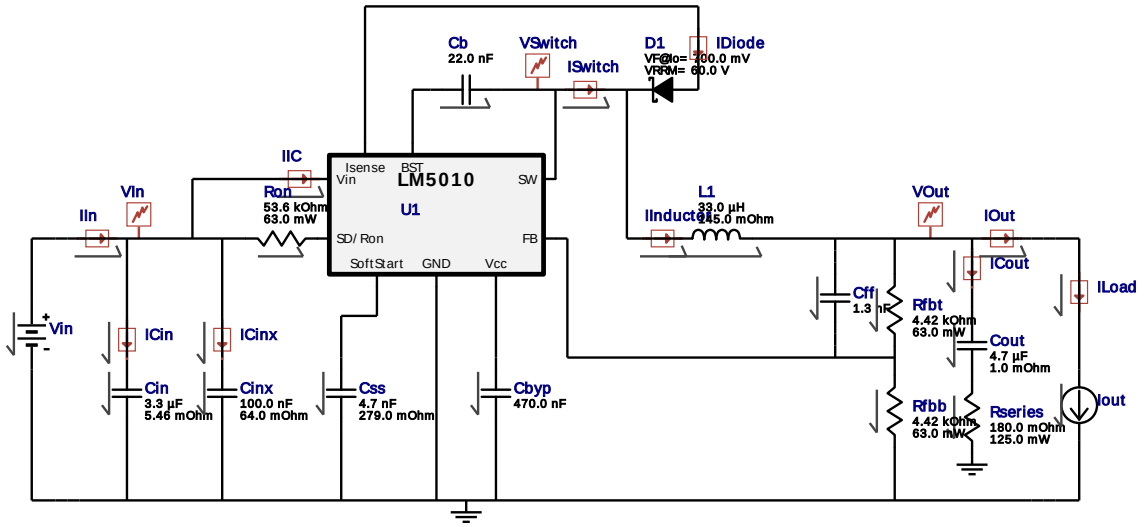
WEBENCH® Electrical Simulation Report

VinMin = 10.0V
VinMax = 40.0V
Vout = 5.0V
Iout = 1.0A

Device = LM5010SD/NOPB
Topology = Buck
创建 = 5/17/14 11:00:55 PM
User ID = 4009276
Design Id = 89
eSim Id = 1
仿真类型 = Steady State



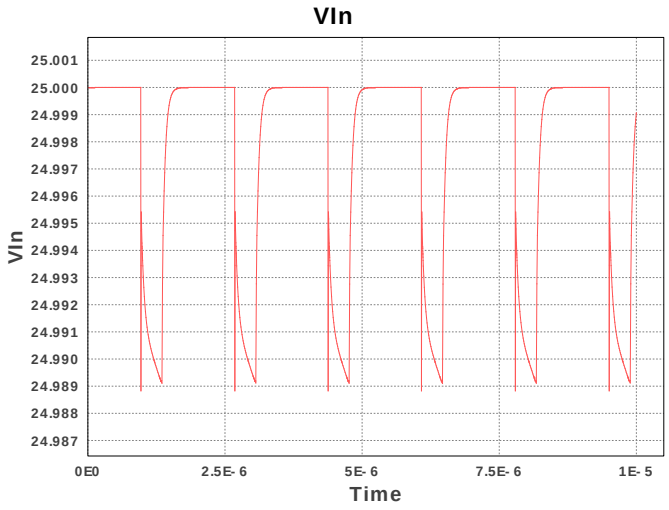
电气材料清单

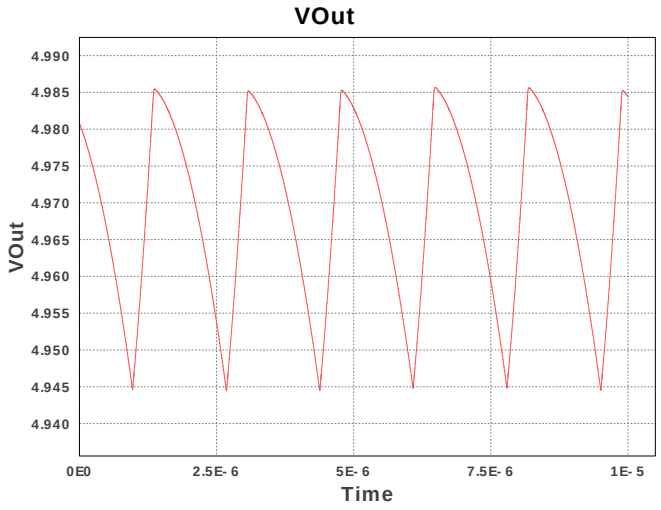
#	名称	制造商	零件编号	属性	Qty	Price	大小
1.	Cb	MuRata	GRM155R61C223KA01D Series= X5R	Cap= 22.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3mm2
2.	Cbyp	Taiyo Yuden	EMK212B7474KD-T Series= X7R	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7mm2
3.	Cff	AVX	0402YC132KAT2A Series= X7R	Cap= 1.3 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.05	0402 3mm2
4.	Cin	TDK	C3225X7S2A335K200AB Series= X7R	Cap= 3.3 µF ESR= 5.46 mOhm VDC= 100.0 V IRMS= 7.036 A	1	$0.24	1210 15mm2
5.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7mm2
6.	Cout	MuRata	GRM188R60J475ME19D Series= X5R	Cap= 4.7 µF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.02	0603 5mm2
7.	Css	Kemet	C0805C472K5RACTU Series= X7R	Cap= 4.7 nF ESR= 279.0 mOhm VDC= 50.0 V IRMS= 321.0 mA	1	$0.01	0805 7mm2
8.	D1	Diodes Inc.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.06	SMA 37mm2
9.	L1	Bourns	SRN8040-330M	L= 33.0 µH DCR= 145.0 mOhm	1	$0.21	SRN8040 100mm2
10.	Rfbb	Vishay-Dale	CRCW04024K42FKED Series= CRCW..e3	Res= 4.42 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2

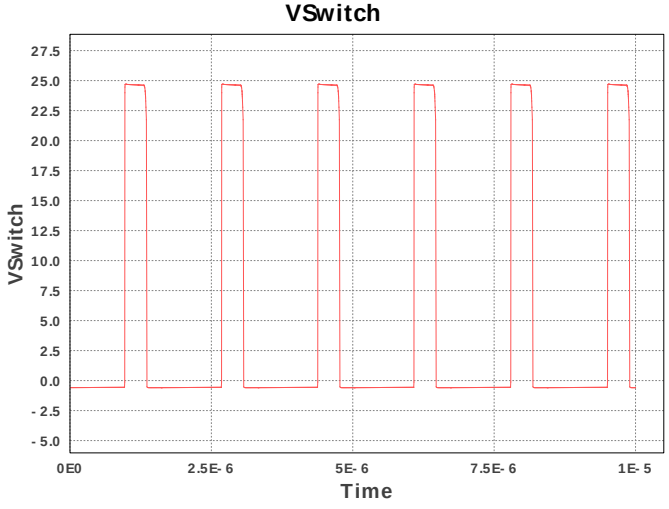
#	名称	制造商	零件编号	属性	Qty	Price	大小
11.	Rfbt	Vishay-Dale	CRCW04024K42FKED Series= CRCW..e3	Res= 4.42 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
12.	Ron	Vishay-Dale	CRCW040253K6FKED Series= CRCW..e3	Res= 53.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
13.	Rseries	Panasonic	ERJ-2BSFR18X Series= 226	Res= 180.0 mOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.06	0402 3mm2
14.	U1	Texas Instruments	LM5010SD/NOPB	Switcher	1	$1.43	MXA14A 59mm2

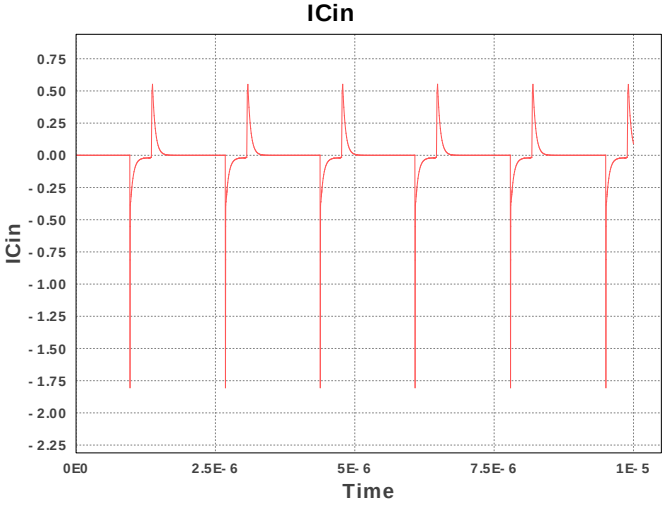
Simulation Parameters

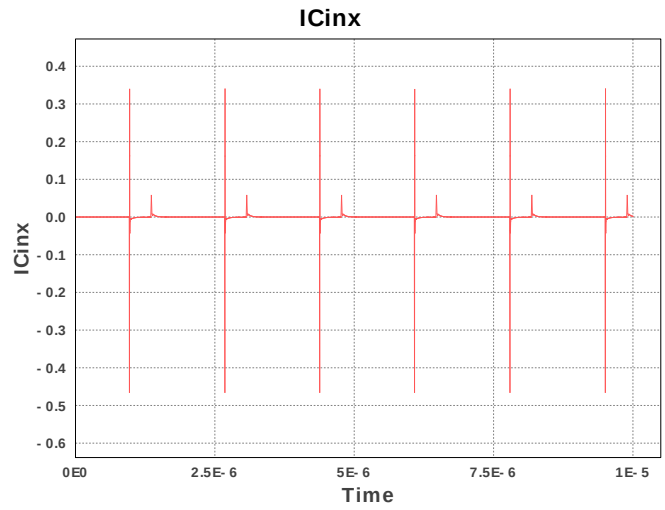
#	名称	Parameter Name	说明	Values
1.	Cbyp	IC	Initial Condition Across CByp (supports 7V internal rail)	7 V
2.	Cin	IC	Initial Condition Across Cin	25.0 V
3.	Css	IC	Initial Condition across the startup capacitor	2 V
4.	L1	IC	Initial Condition Through L1	0 A
5.	Iout	I	Load Current	1.0 A

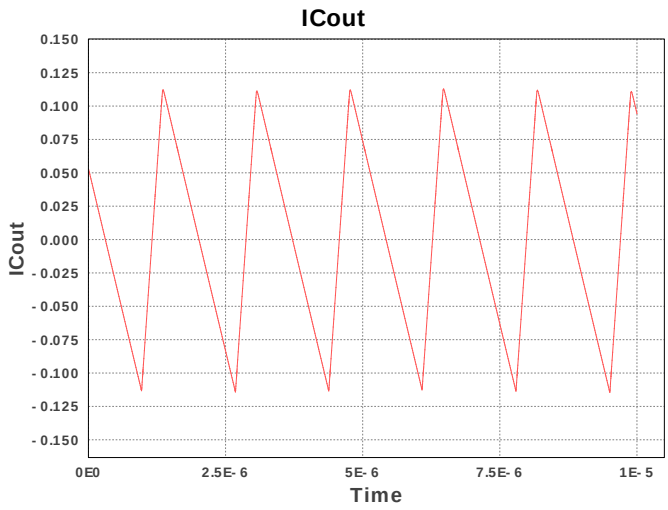


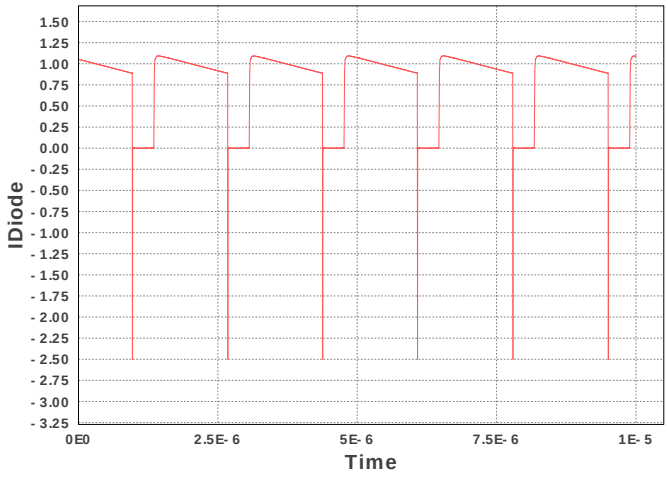


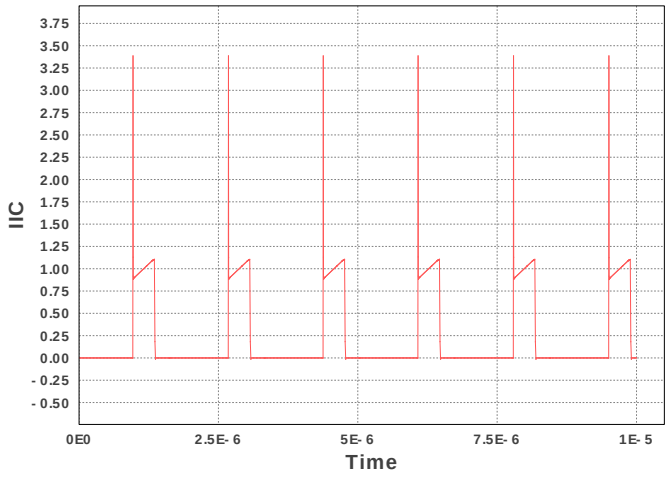


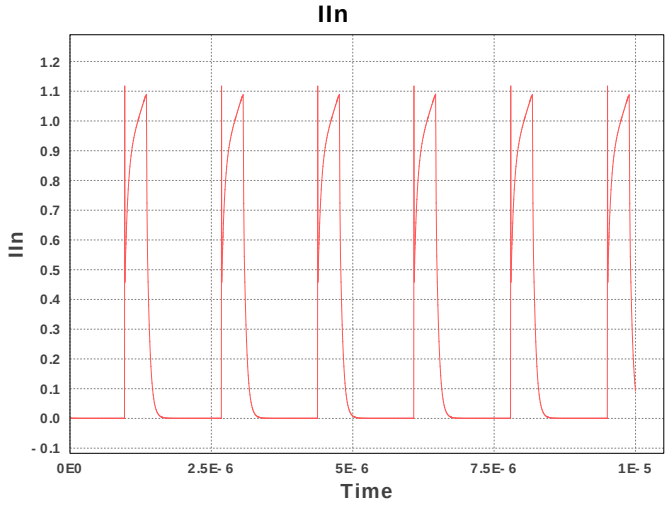


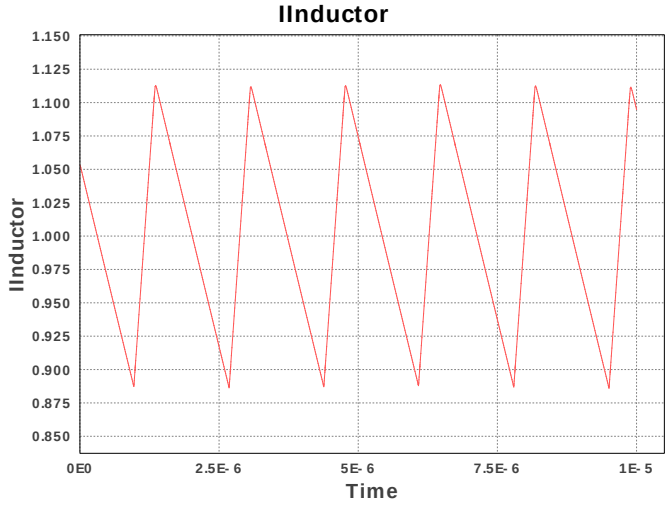


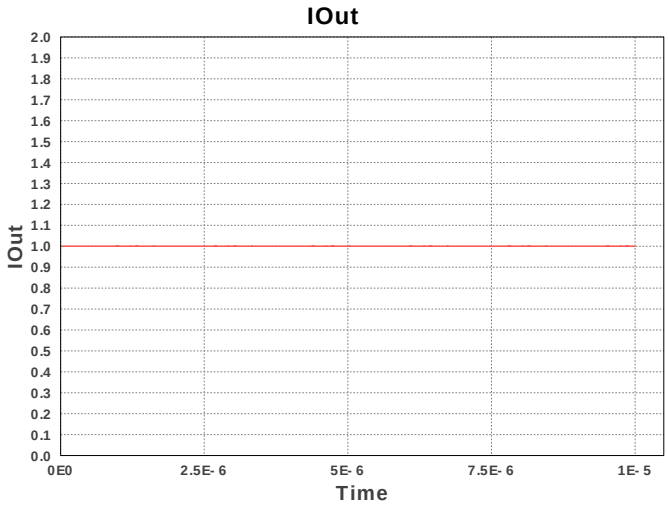


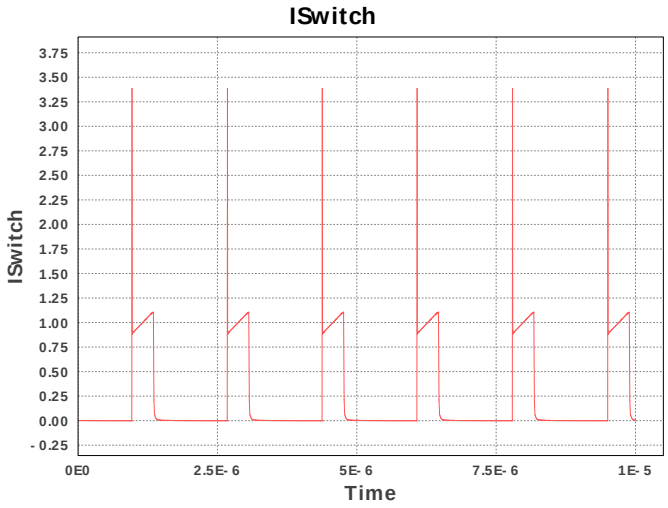


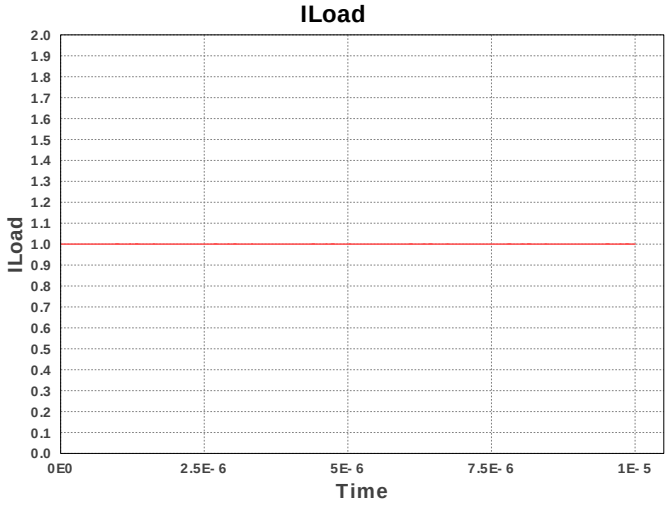












工作数值

#	名称	数值	类别	说明
1.	Cin IRMS	254.115 mA	Current	输入电容器均方根纹波电流
2.	Cout IRMS	81.993 mA	Current	输出电容器均方根纹波电流
3.	IC Ipk	1.142 A	Current	电路内的峰值开关电流
4.	Iin Avg	149.98 mA	Current	平均输入电流
5.	L Ipp	284.033 mA	Current	峰值到峰值电感器纹波电流
6.	M1 Irms	374.961 mA	Current	Q Iavg
7.	BOM 数量	14	General	Total Design BOM count
8.	大小	254.0 mm2	General	BOM组件的总所占面积
9.	频率	525.0 kHz	General	开关频率
10.	IC Tolerance	50.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	158.332 mV	General	Voltage drop across the MosFET
12.	模式	CCM	General	传导模式
13.	Pout	5.0 W	General	总输出功率
14.	总 BOM	$2.15	General	Total BOM Cost
15.	D1 Tj	137.683 degC	Op_Point	D1接点温度
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	占空比	14.06 %	Op_point	占空比
18.	效率	83.345 %	Op_point	稳态效率
19.	IC Tj	39.508 degC	Op_point	电路接点温度
20.	ICThetaJA	40.0 degC/W	Op_point	电路接点到环境热敏电阻
21.	IOUT_OP	1.0 A	Op_point	Iout 操作点
22.	VIN_OP	40.0 V	Op_point	Vin操作点
23.	Vout p-p	14.391 mV	Op_point	峰值到峰值输出纹波电压
24.	Cin Pd	352.575 µW	Power	输入电容器功率耗散
25.	Cout Pd	6.723 µW	Power	输出电容器功率耗散
26.	二极管 Pd	601.583 mW	Power	二极管功率耗散
27.	IC Pd	237.693 mW	Power	电路功率耗散
28.	L Pd	159.5 mW	Power	电感器功率耗散
29.	整体 Pd	999.167 mW	Power	总功率耗散

设计输入

#	名称	数值	说明
1.	输出电流	1.0 A	最大输出电流
2.	Iout1	1.0 Amps	Output Current #1
3.	Vin 最大	40.0 V	最高输入电压
4.	Vin 最小	10.0 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	LM5010	美国国家半导体的产品编号
8.	源	DC	输入源类别
9.	工作环境温度	30.0 degC	环境温度

设计协助

1. For a Constant On Time device to be stable, we need to provide a ripple at the feedback comparator. There are various methods to implement the ripple. Depending on the circuit complexity vs. the allowable ripple, we have three options to choose from. The simplest option, 'Low Complexity', would require only a high ESR cap at the output. This means that the BOM count will be small, but the output voltage ripple will be quite large. The 'Optimal Solution' would require a feed-forward cap in parallel with the upper feedback resistor to AC couple the ripple to the feedback node. This increases the BOM count slightly, but now we have more control over the output voltage ripple. If the output voltage requirement is very tight, then the best option is to go for the 'Low Output Ripple' solution. In this option we can go with very low ESR output caps and have very good control over the output voltage ripple.

2. LM5010 Product Folder : http://www.ti.com/product/lm5010 : contains the data sheet and other resources.