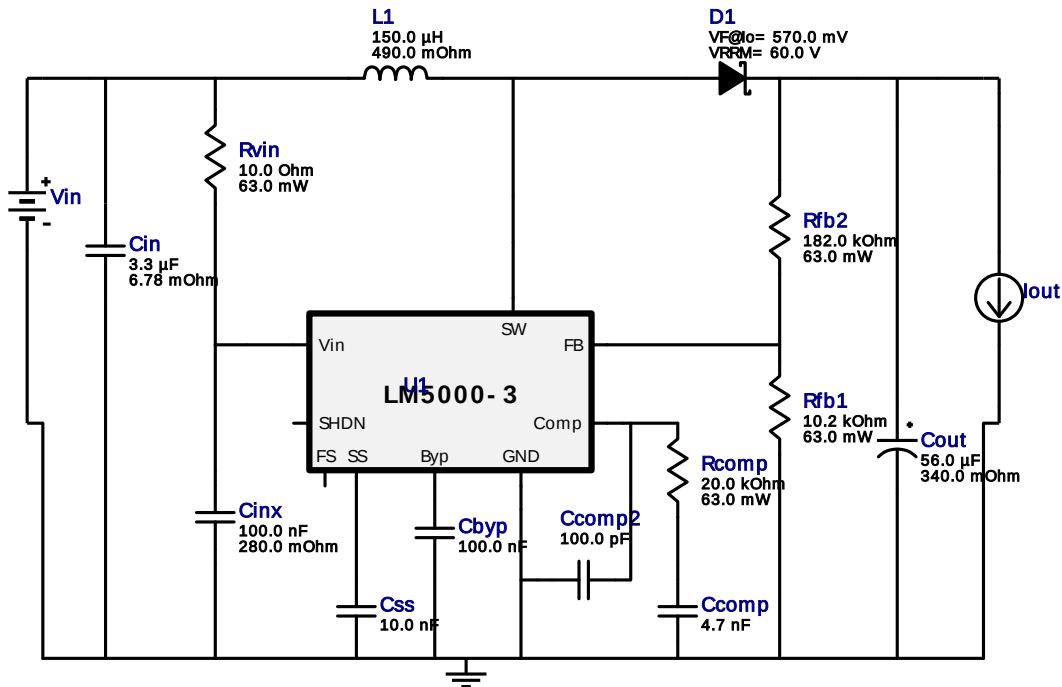


WEBENCH® Design Report

Design : 4742013/38 LM5000-3MTCX/NOPB
LM5000-3MTCX/NOPB 11.0V-13.0V to 24.00V @ 0.2A

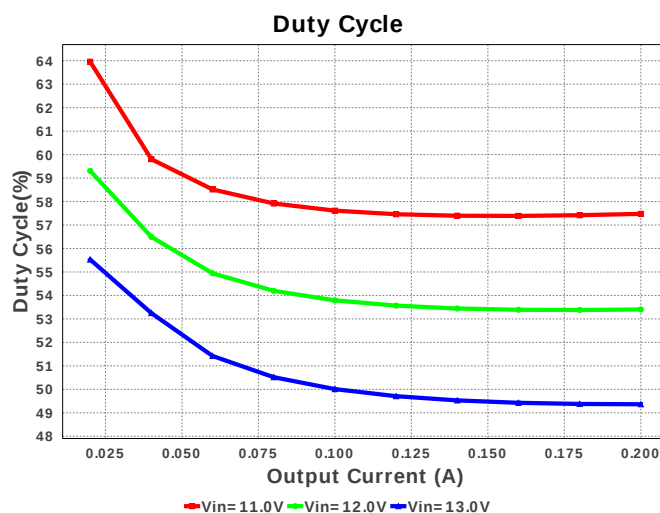
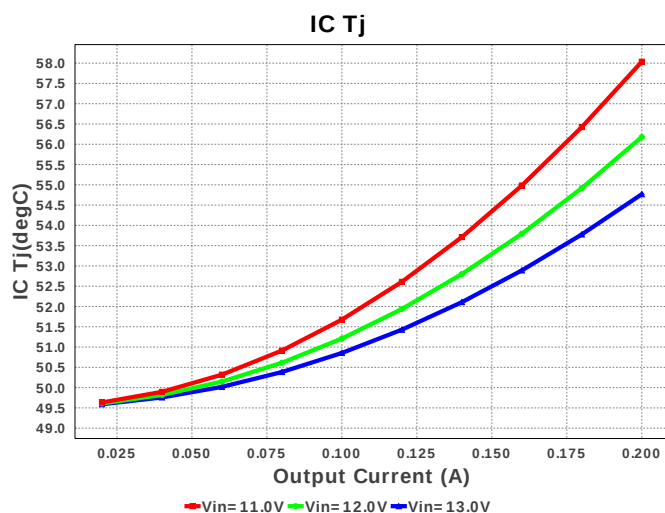
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Iout = 0.2A

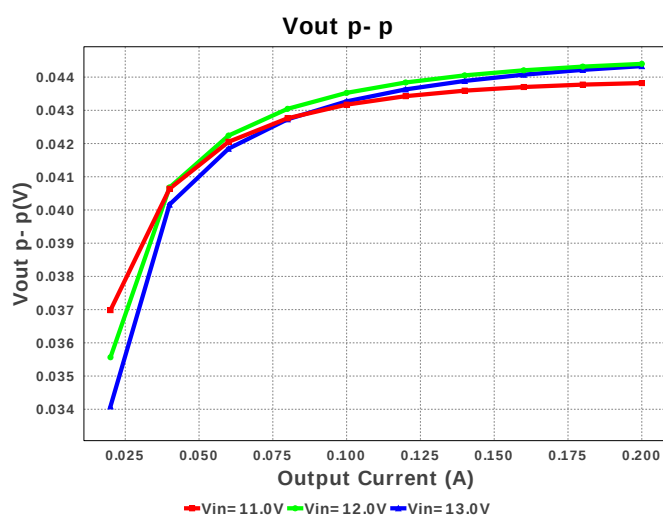
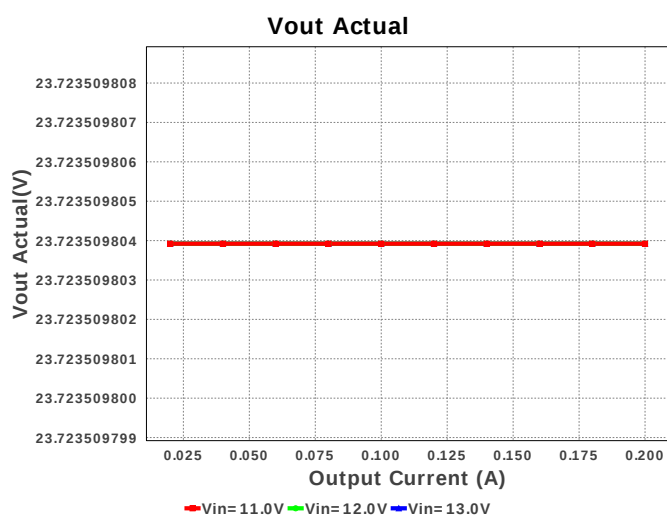
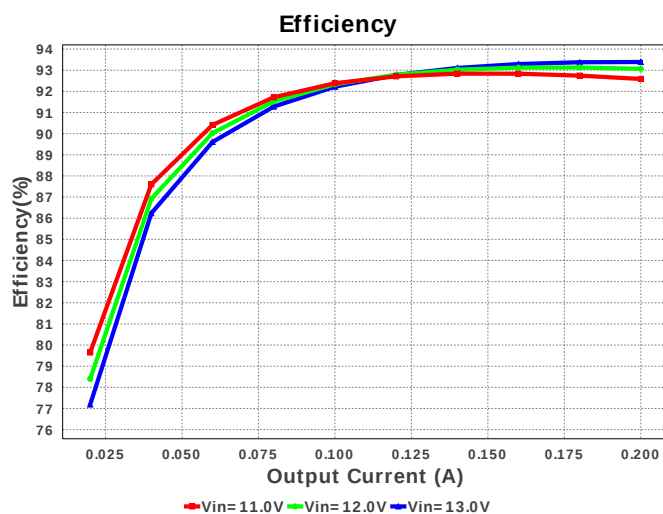
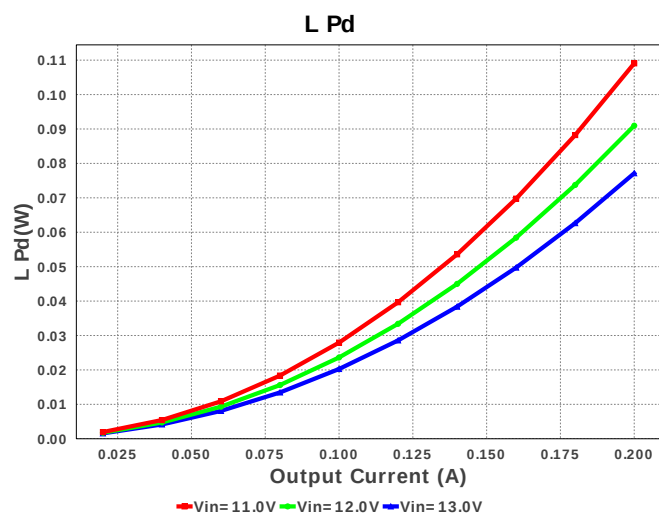
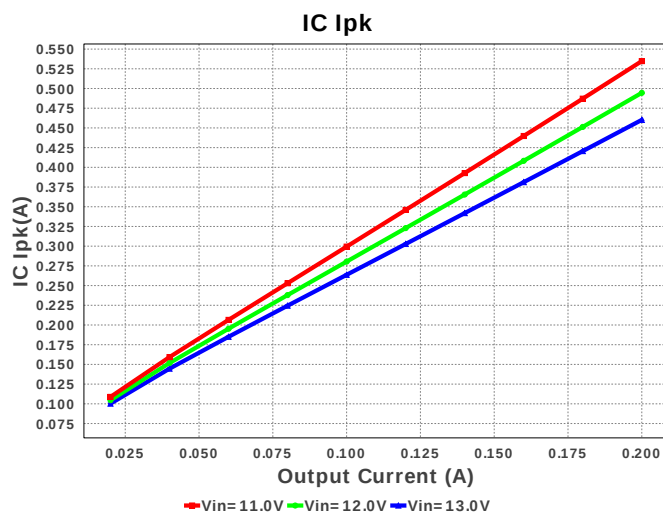
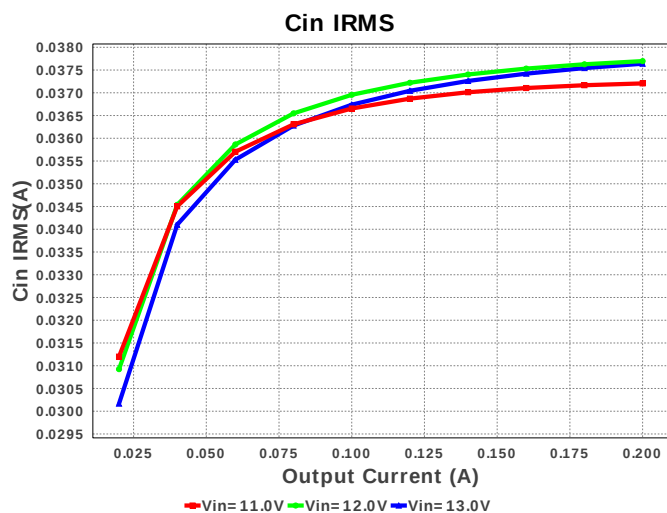


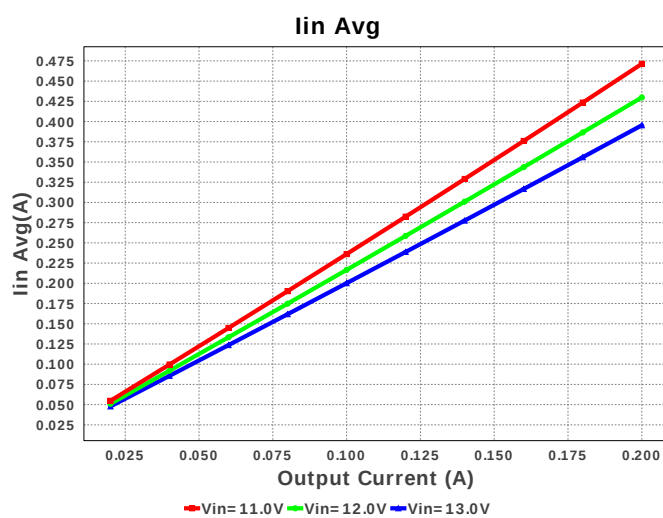
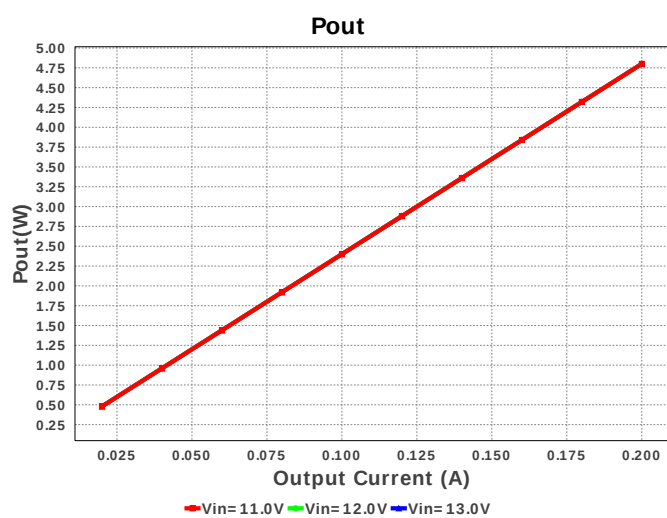
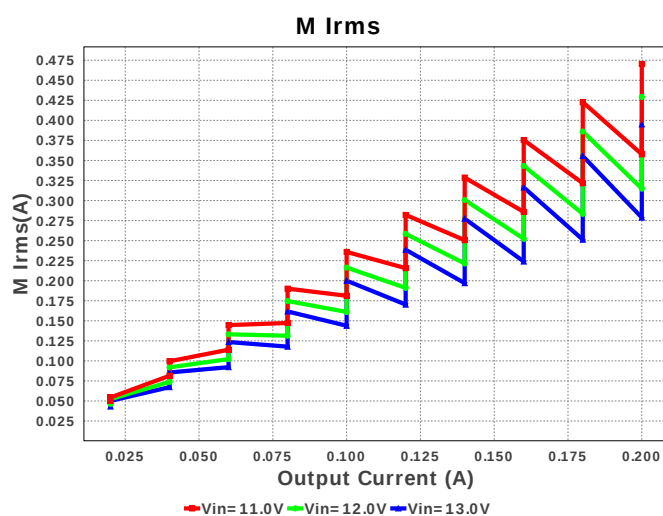
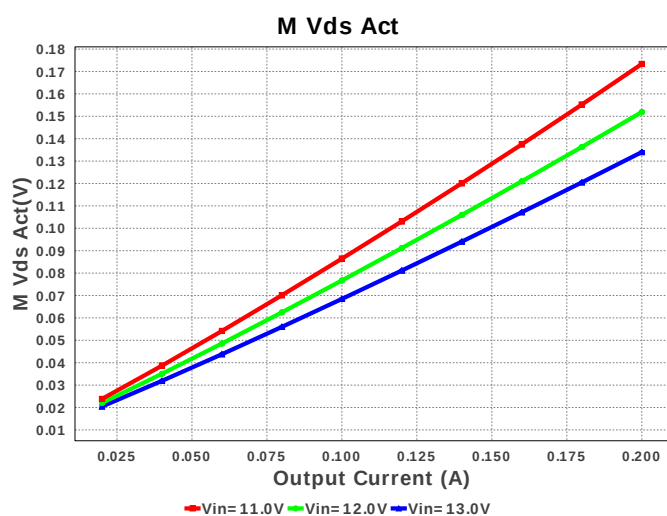
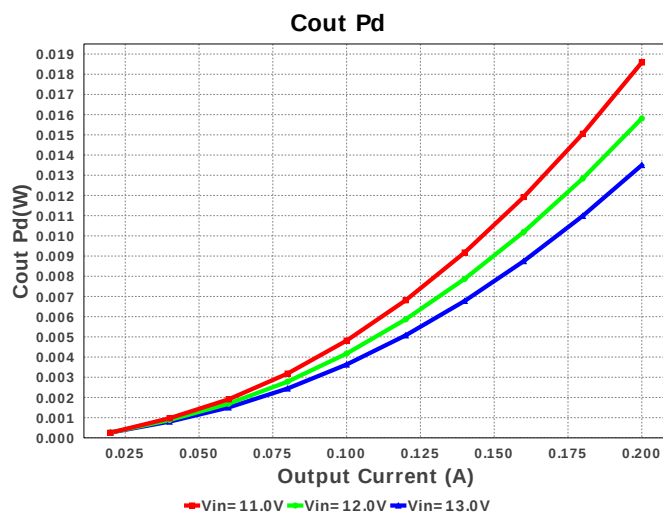
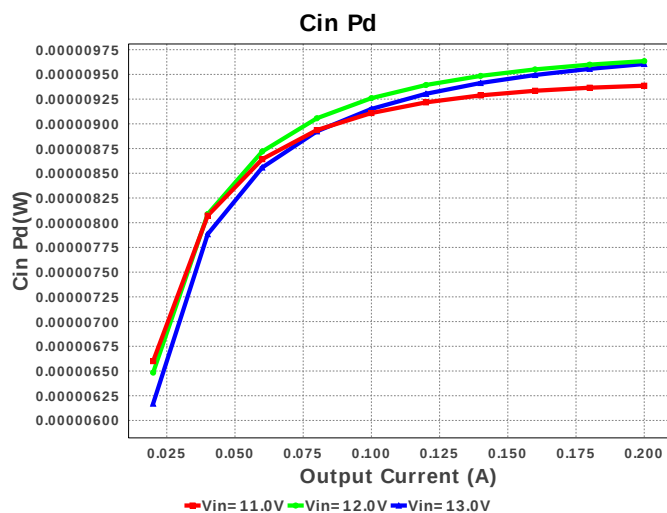
Electrical BOM

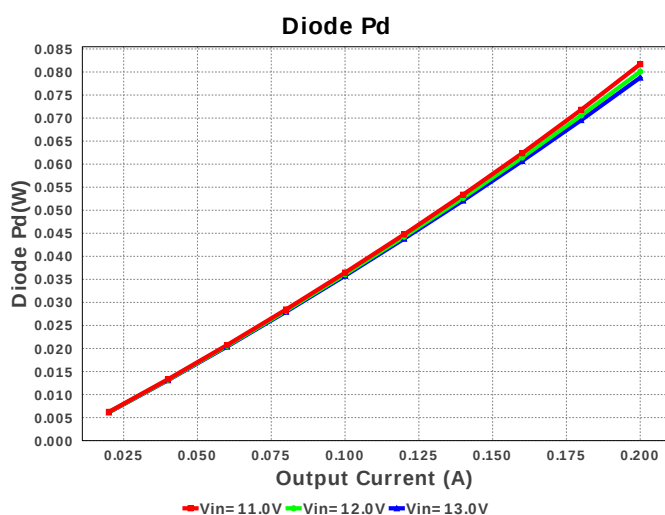
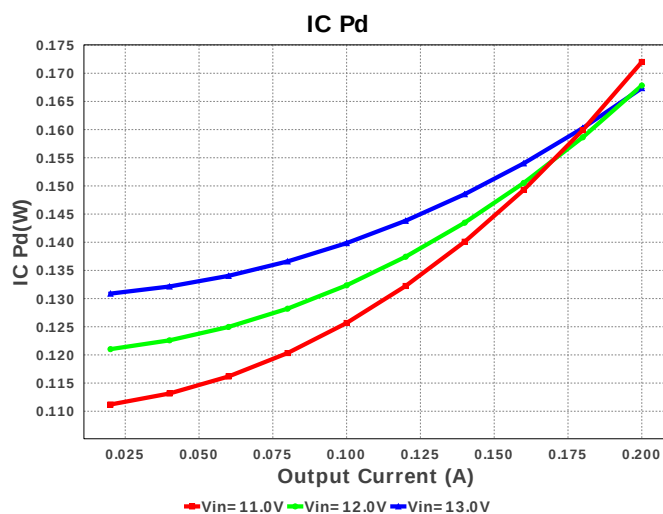
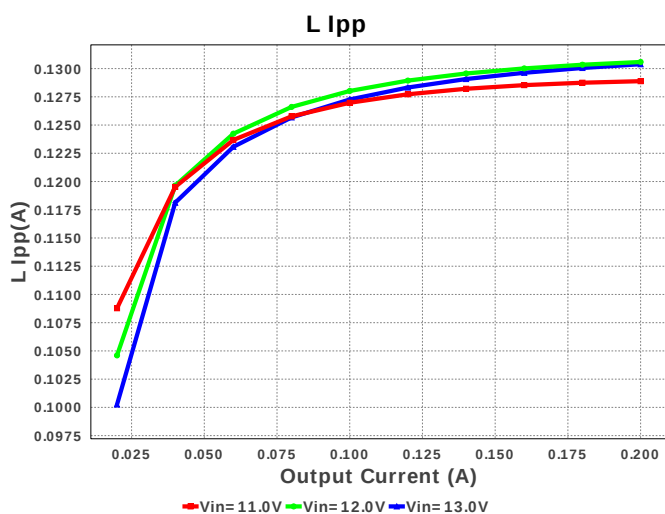
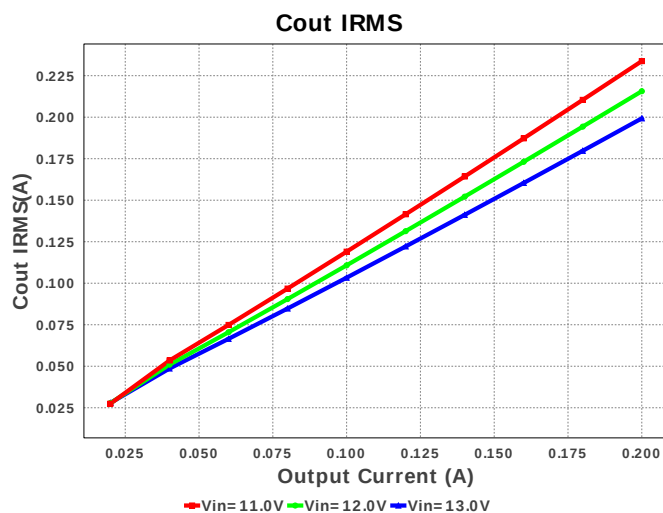
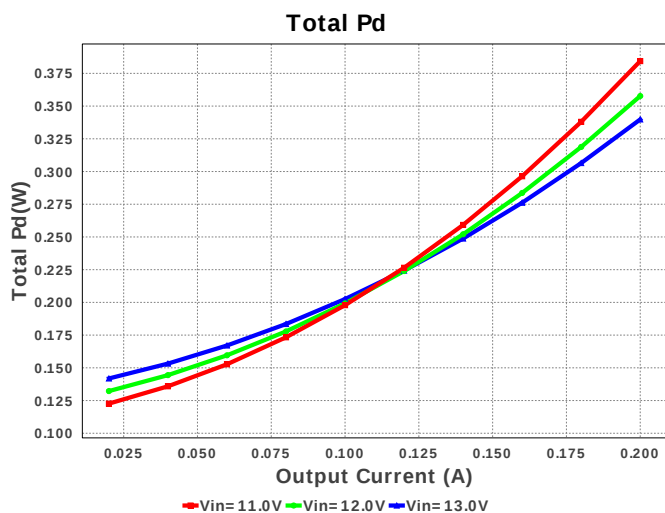
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Ccomp	Yageo America	CC0805KRX7R9BB472 Series= X7R	Cap= 4.7 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Ccomp2	MuRata	GRM033R71C101KA01D Series= X7R	Cap= 100.0 pF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
4.	Cin	MuRata	GRM21BR71E335KA73L Series= X7R	Cap= 3.3 uF ESR= 6.78 mOhm VDC= 25.0 V IRMS= 1.4 A	1	\$0.06	0805 7 mm ²
5.	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 7 mm ²
6.	Cout	Nichicon	UUD1V560MCL1GS Series= uD	Cap= 56.0 uF ESR= 340.0 mOhm VDC= 35.0 V IRMS= 280.0 mA	1	\$0.11	SM_RADIAL_6.3BMM 80 mm ²
7.	Css	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	\$0.04	 SOD-123F 12 mm ²
9.	L1	TDK	VLP8040T-151M	L= 150.0 µH DCR= 490.0 mOhm	1	\$0.22	 VLP8040 113 mm ²
10.	Rcomp	Vishay-Dale	CRCW040220K0FKED Series= CRCW..e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	Rfb1	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
12.	Rfb2	Vishay-Dale	CRCW0402182KFKED Series= CRCW..e3	Res= 182.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
13.	Rvin	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	U1	Texas Instruments	LM5000-3MTCX/NOPB	Switcher	1	\$1.80	 MTC16 59 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	37.16 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	233.504 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	534.043 mA	Current	Peak switch current in IC
4.	Iin Avg	470.61 mA	Current	Average input current
5.	L Ipp	128.72 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	357.011 mA	Current	Q lavg
7.	BOM Count	14	General	Total Design BOM count
8.	FootPrint	312.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	300.0 kHz	General	Switching frequency
10.	IC Tolerance	26.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	173.022 mV	General	

#	Name	Value	Category	Description
12.	Pout	4.8 W	General	Total output power
13.	Total BOM	\$2.32	General	Total BOM Cost
14.	Vout Actual	23.724 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Cross Freq	1.021 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	57.418 %	Op_point	Duty cycle
17.	Efficiency	92.722 %	Op_point	Steady state efficiency
18.	IC Tj	58.034 degC	Op_point	IC junction temperature
19.	ICThetaJA	150.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	200.0 mA	Op_point	Iout operating point
21.	Phase Marg	38.828 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	11.0 V	Op_point	Vin operating point
23.	Vout p-p	43.766 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	9.362 μ W	Power	Input capacitor power dissipation
25.	Cout Pd	18.538 mW	Power	Output capacitor power dissipation
26.	Diode Pd	74.652 mW	Power	Diode power dissipation
27.	IC Pd	171.771 mW	Power	IC power dissipation
28.	L Pd	108.771 mW	Power	Inductor power dissipation
29.	Total Pd	376.761 mW	Power	Total Power Dissipation
30.	Vout Tolerance	4.018 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	200.0 m	Maximum Output Current
2.	VinMax	13.0	Maximum input voltage
3.	VinMin	11.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	LM5000-3	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM5000-3 Product Folder** : <http://www.ti.com/product/LM5000> : contains the data sheet and other resources.

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