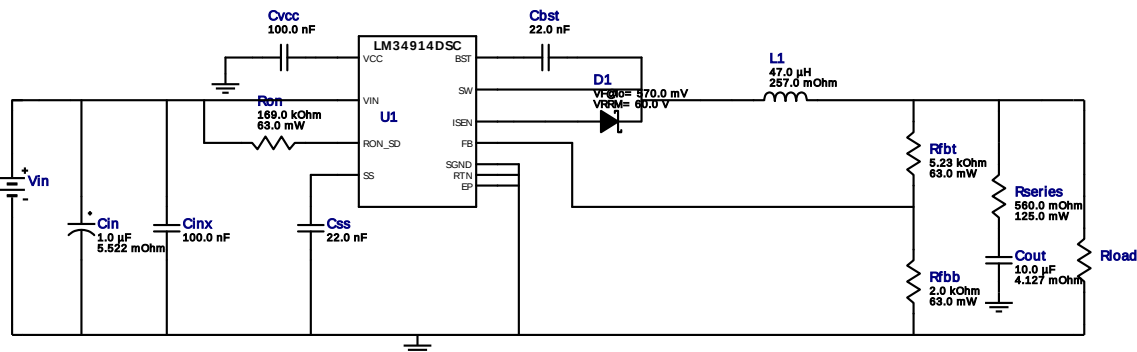


WEBENCH® Design Report

Design : 4743042/8 LM34914SD/NOPB
LM34914SD/NOPB 14.0V-22.0V to 9.00V @ 0.5A

Vout = 9.0V
Iout = 0.5A

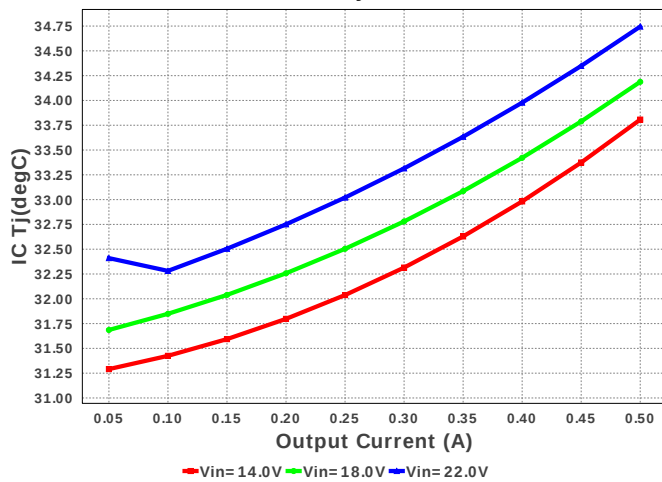


Electrical BOM

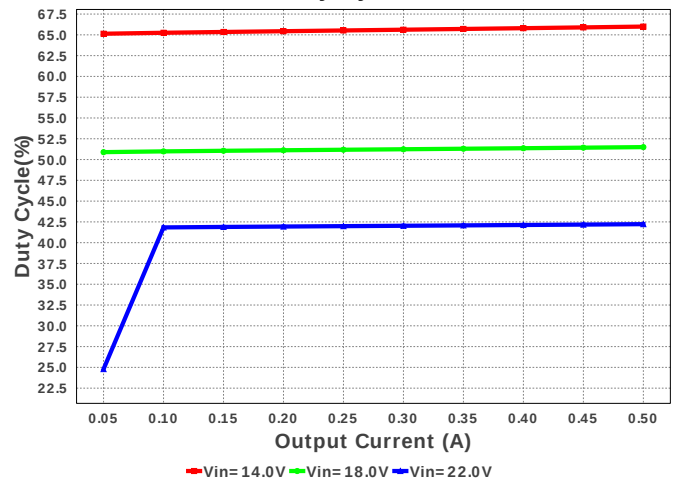
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	MuRata	GRM033C80J223KE01D Series= X6S	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
2.	Cin	TDK	C1608X7R1V105K080AC Series= X7R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 35.0 V IRMS= 2.2162 A	1	\$0.05	0603 5 mm ²
3.	Cinx	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Cout	MuRata	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	1	\$0.03	0805 7 mm ²
5.	Css	MuRata	GRM155R61C223KA01D Series= X5R	Cap= 22.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
6.	Cvcc	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
7.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	\$0.04	SOD-123F 12 mm ²
8.	L1	Bourns	SRN6045-470M	L= 47.0 uH DCR= 257.0 mOhm	1	\$0.16	SRN6045 64 mm ²
9.	Rfbb	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rfbb	Vishay-Dale	CRCW04025K23FKED Series= CRCW..e3	Res= 5.23 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
11.	Ron	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rseries	Panasonic	ERJ-2BQFR56X Series= ERJ-2B	Res= 560.0 mOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.06	 0402 3 mm ²
13.	U1	Texas Instruments	LM34914SD/NOPB	Switcher	1	\$1.35	 DSC0010B 16 mm ²

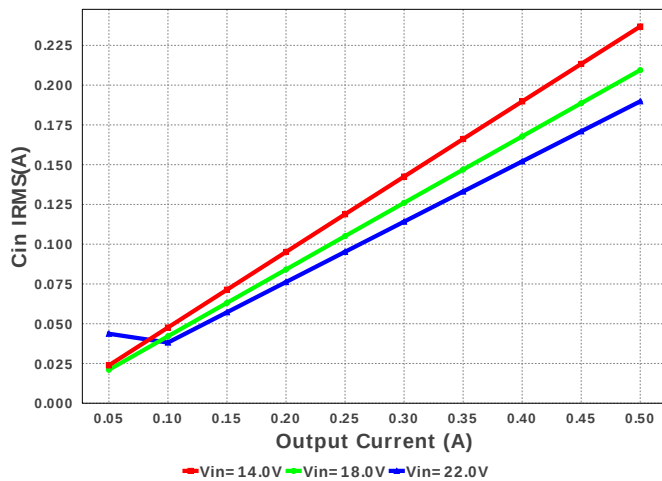
IC Tj



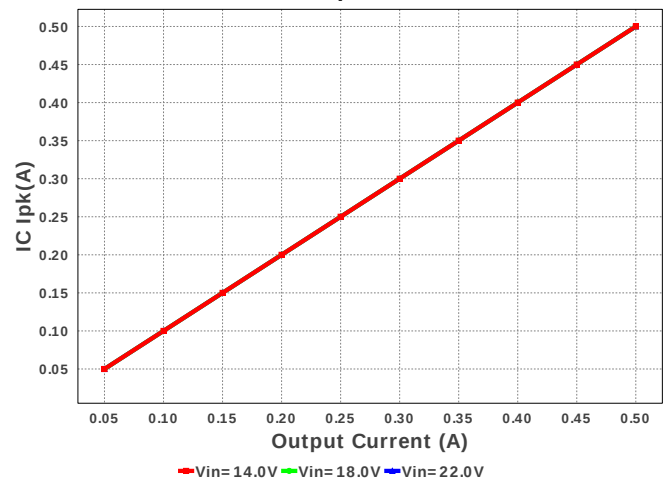
Duty Cycle

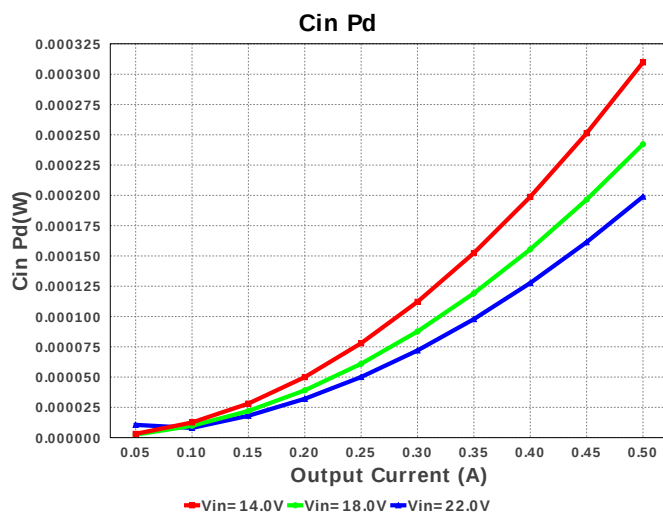
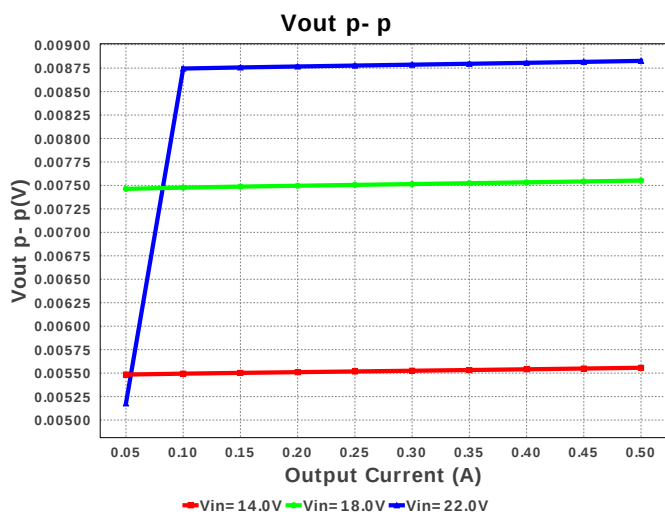
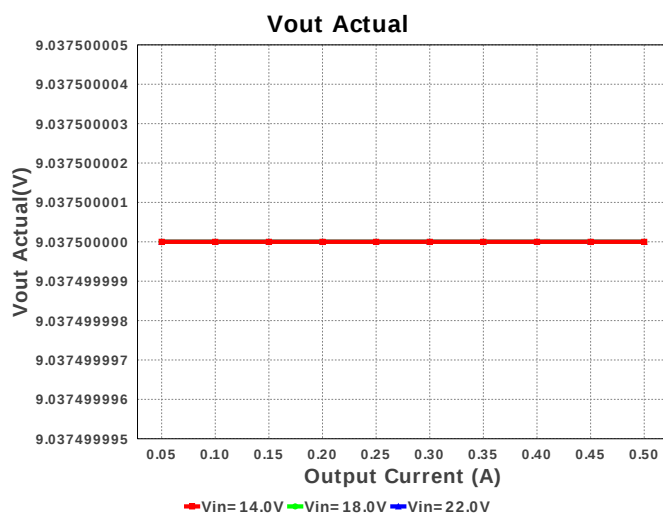
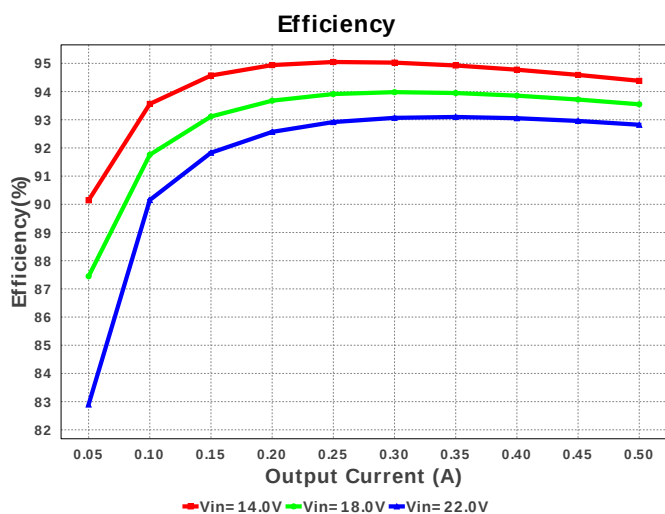
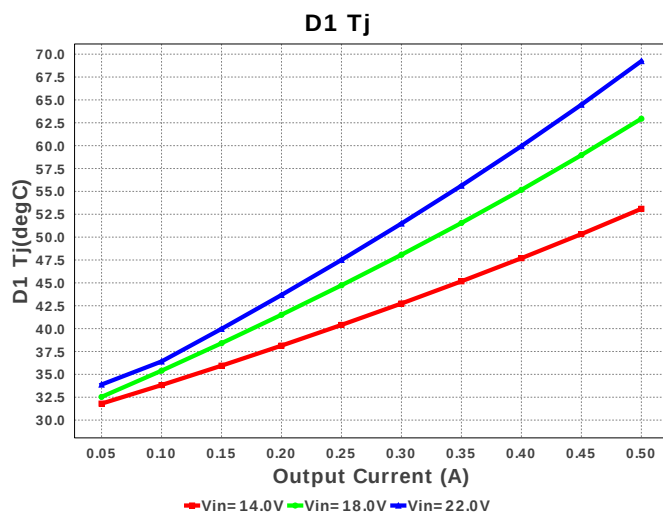
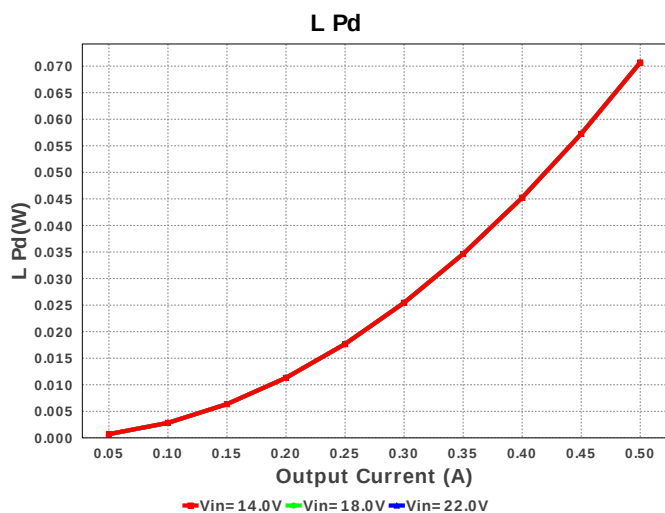


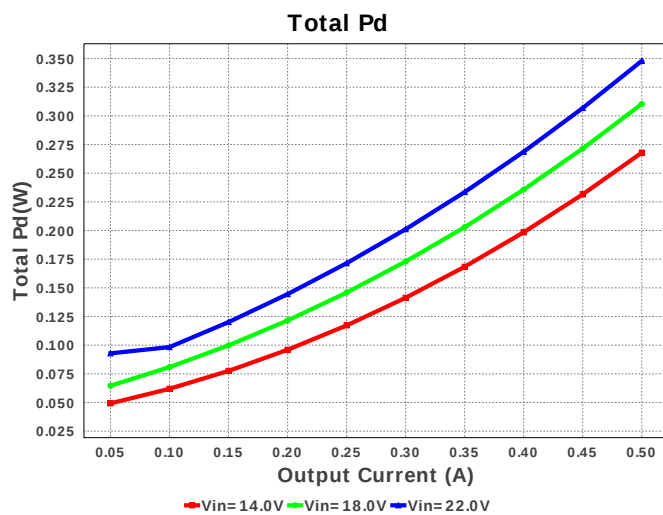
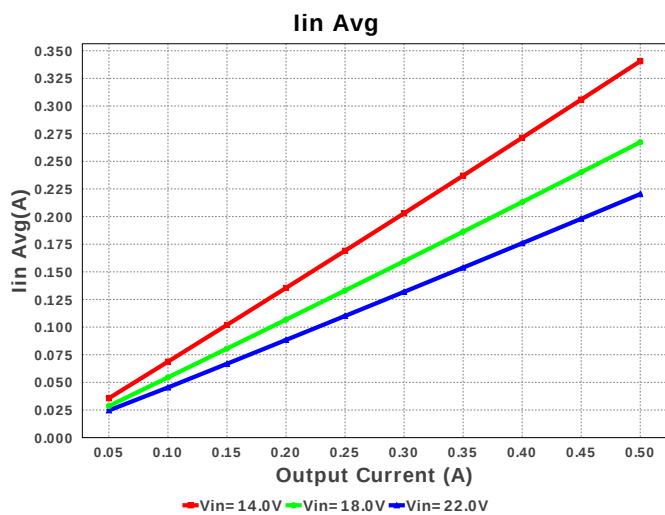
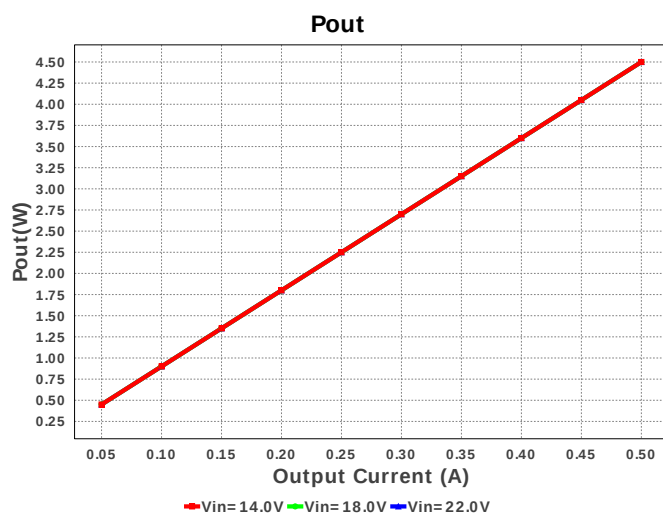
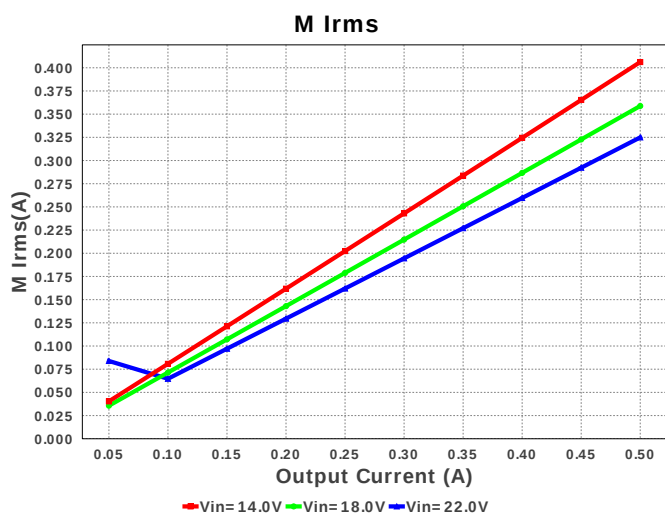
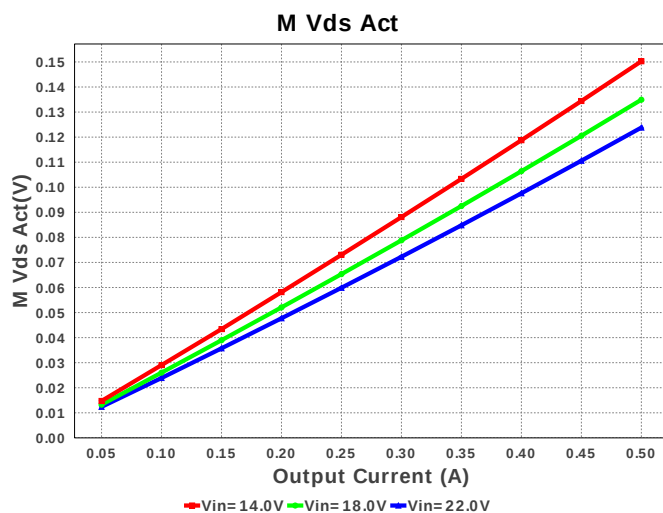
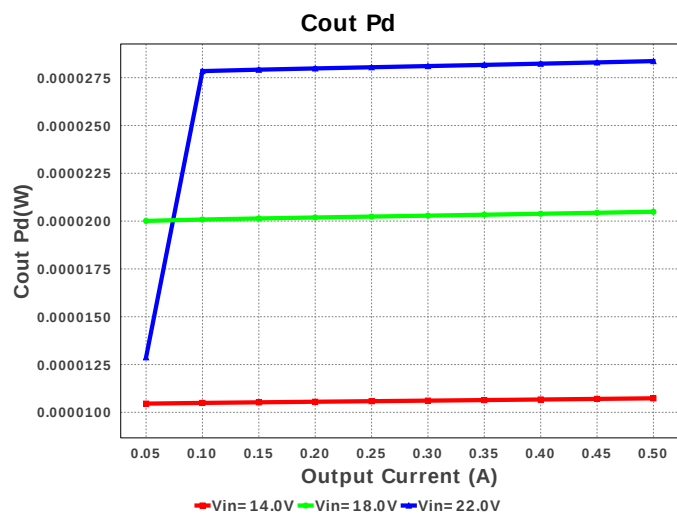
Cin IRMS

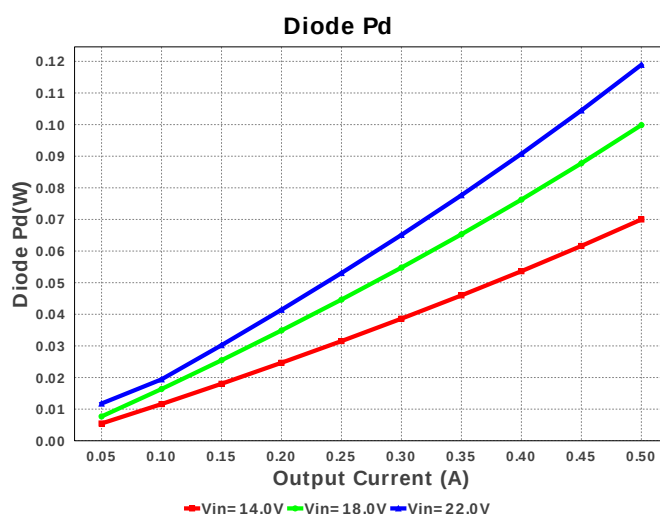
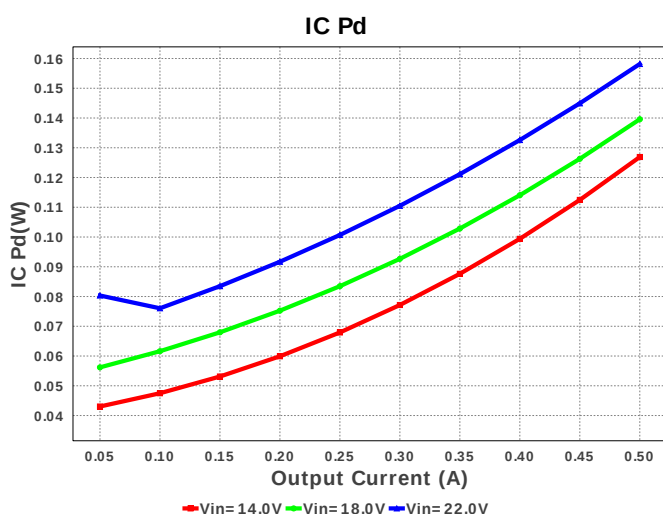
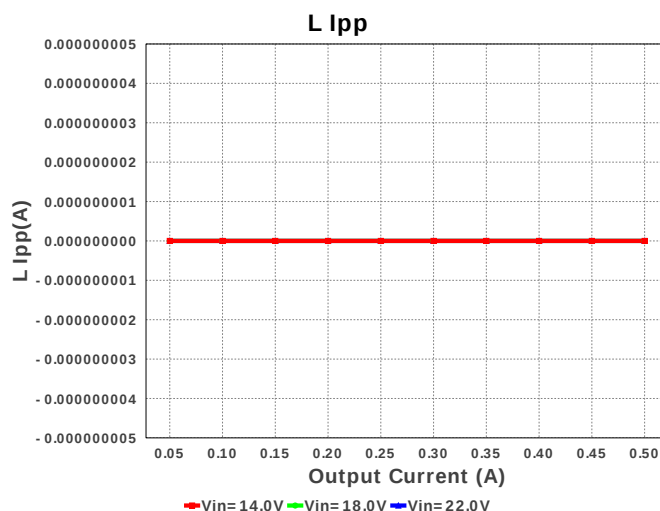
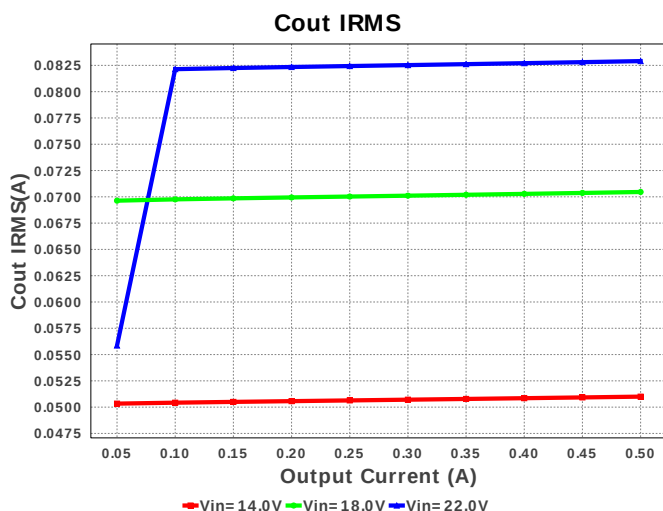


IC Ipk









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	189.813 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	82.907 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	636.651 mA	Current	Peak switch current in IC
4.	Iin Avg	220.36 mA	Current	Average input current
5.	L Ipp	273.3 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	324.915 mA	Current	Q lavg
7.	BOM Count	13	General	Total Design BOM count
8.	FootPrint	134.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	406.69 kHz	General	Switching frequency
10.	IC Tolerance	5.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	123.811 mV	General	Voltage drop across the MosFET
12.	Pout	4.5 W	General	Total output power
13.	Total BOM	\$1.76	General	Total BOM Cost
14.	D1 Tj	69.242 degC	Op_Point	D1 junction temperature
15.	Vout Actual	9.038 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	9.0 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	42.228 %	Op_point	Duty cycle
18.	Efficiency	92.822 %	Op_point	Steady state efficiency
19.	IC Tj	34.745 degC	Op_point	IC junction temperature
20.	ICThetaJA	30.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	500.0 mA	Op_point	Iout operating point
22.	VIN_OP	22.0 V	Op_point	Vin operating point
23.	Vout p-p	161.877 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	198.952 μ W	Power	Input capacitor power dissipation
25.	Cout Pd	28.367 μ W	Power	Output capacitor power dissipation
26.	Diode Pd	118.915 mW	Power	Diode power dissipation
27.	IC Pd	158.159 mW	Power	IC power dissipation
28.	L Pd	70.675 mW	Power	Inductor power dissipation
29.	Total Pd	347.984 mW	Power	Total Power Dissipation
30.	Vout Tolerance	1.664 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	9.0	Output Voltage
5.	base_pn	LM34914	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

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. **LM34914** Product Folder : <http://www.ti.com/product/LM34914> : contains the data sheet and other resources.

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You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

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