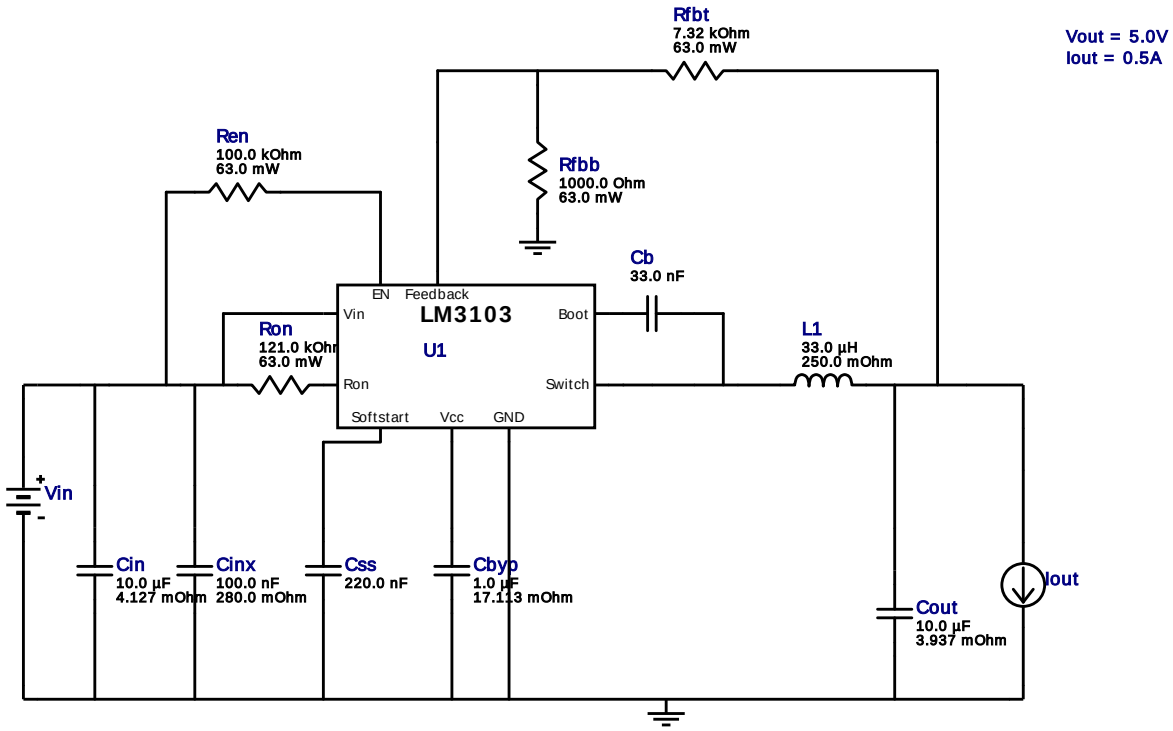
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 12.0V
Vout = 5.0V
Iout = 0.5A

Device = LM3103MHX/NOPB
Topology = Buck
Created = 7/24/16 5:34:16 PM
BOM Cost = $1.87
BOM Count = 12
Total Pd = 0.34W

Design : 4742013/263 LM3103MHX/NOPB
LM3103MHX/NOPB 10.0V-12.0V to 5.00V @ 0.5A

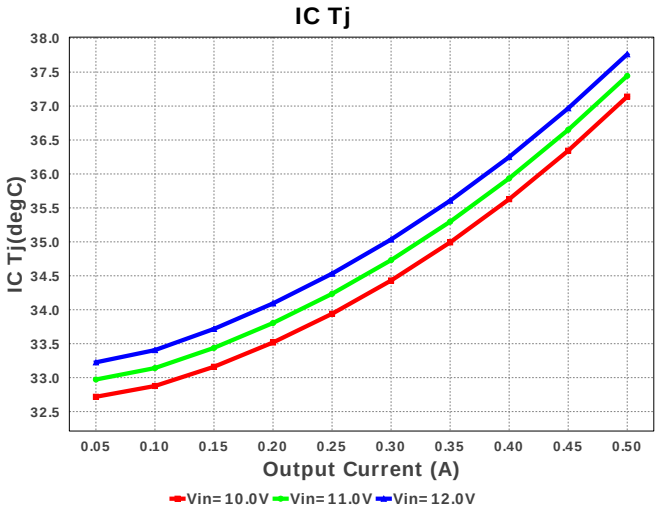


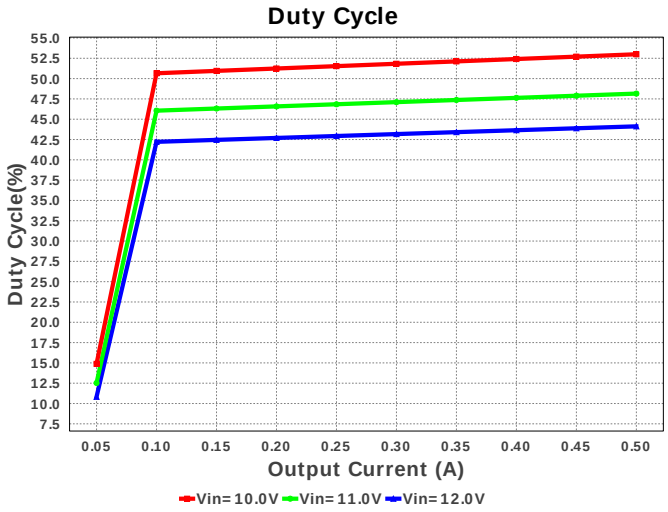
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.View WEBENCH(R) Disclaimer.

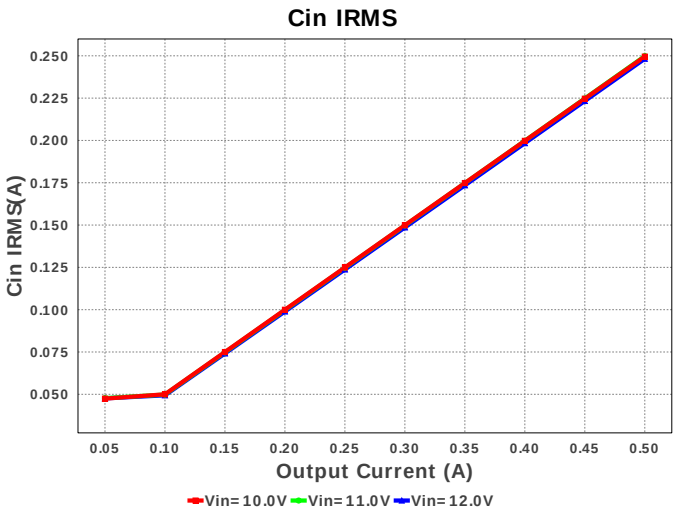
Electrical BOM

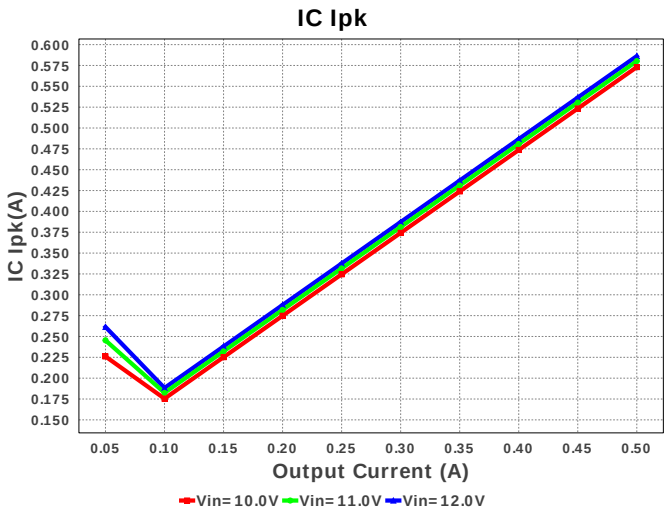
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM155R71E333KA88D Series= X7R	Cap= 33.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cbyp	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	$0.01	0603 5 mm²
3.	Cin	MuRata	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	1	$0.03	0805 7 mm²
4.	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 mm²
5.	Cout	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	1	$0.03	0805 7 mm²
6.	Css	MuRata	GRM155R71C224KA12D Series= X7R	Cap= 220.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²

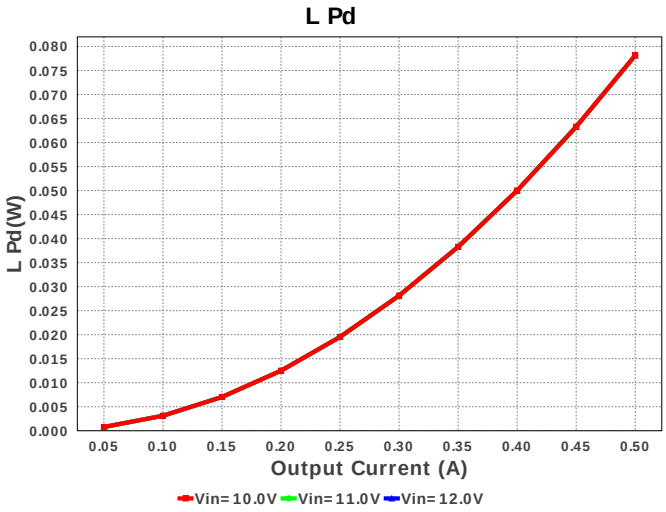
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	L1	Bourns	SDR0604-330KL	L= 33.0 µH DCR= 250.0 mOhm	1	$0.18	 SDR0604 61 mm²
8.	Ren	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
9.	Rfbb	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
10.	Rfbt	Vishay-Dale	CRCW04027K32FKED Series= CRCW..e3	Res= 7.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
11.	Ron	Vishay-Dale	CRCW0402121KFKED Series= CRCW..e3	Res= 121.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	U1	Texas Instruments	LM3103MHX/NOPB	Switcher	1	$1.55	 MXA16A 59 mm²

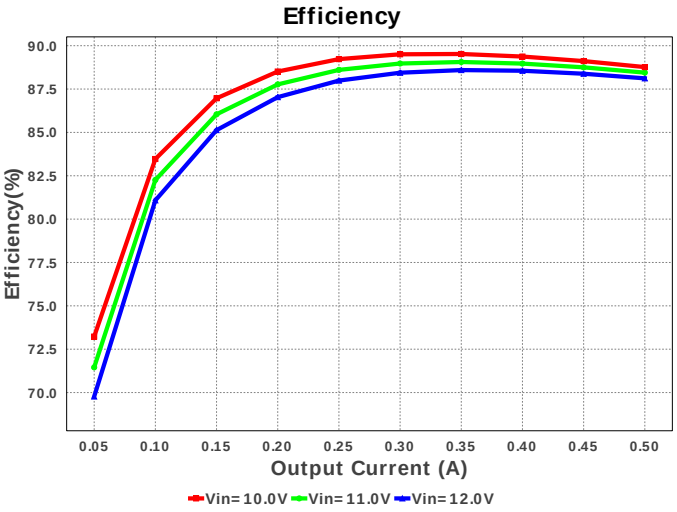


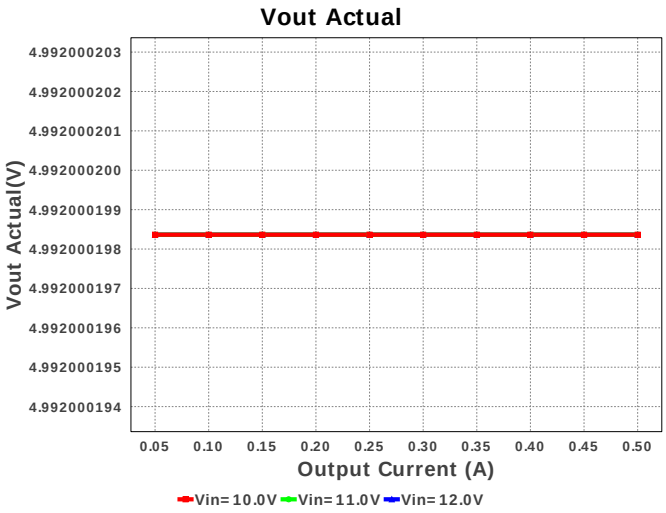


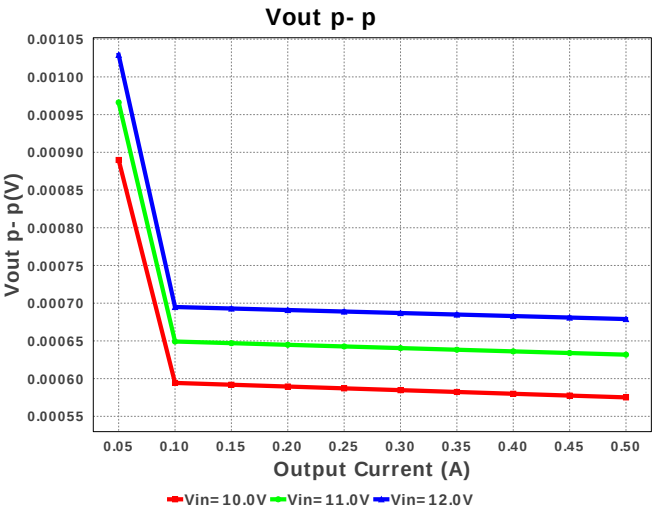


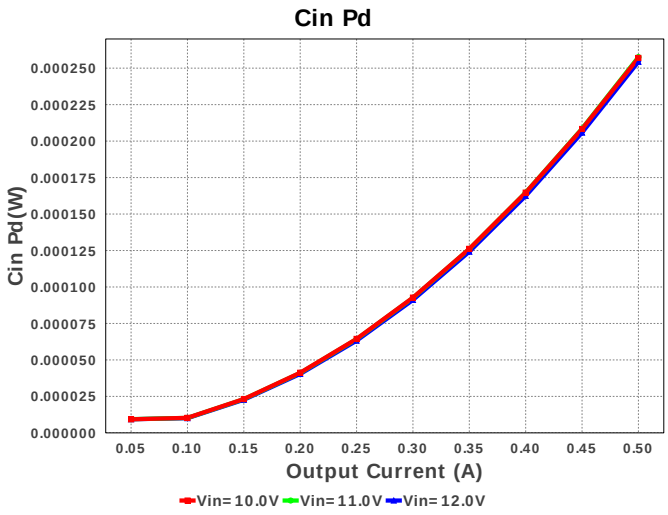


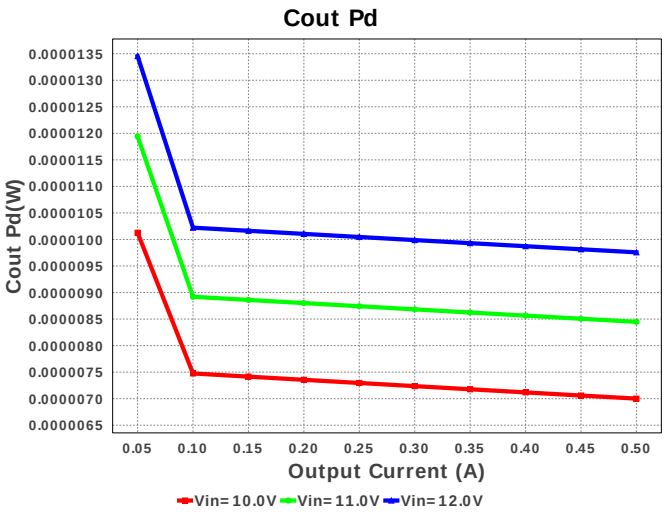


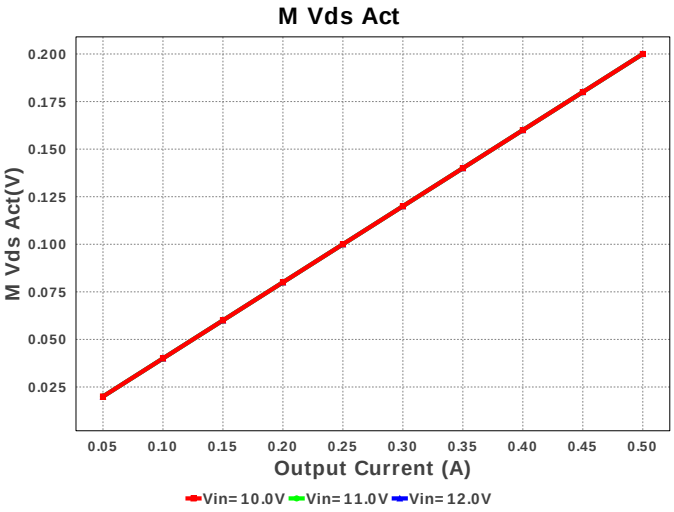


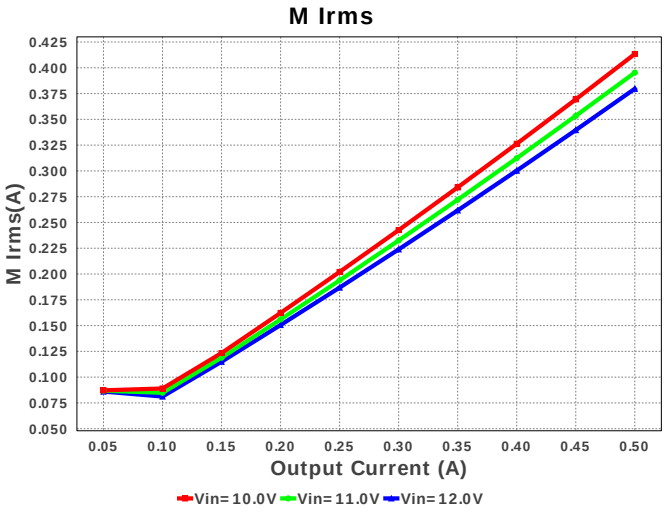


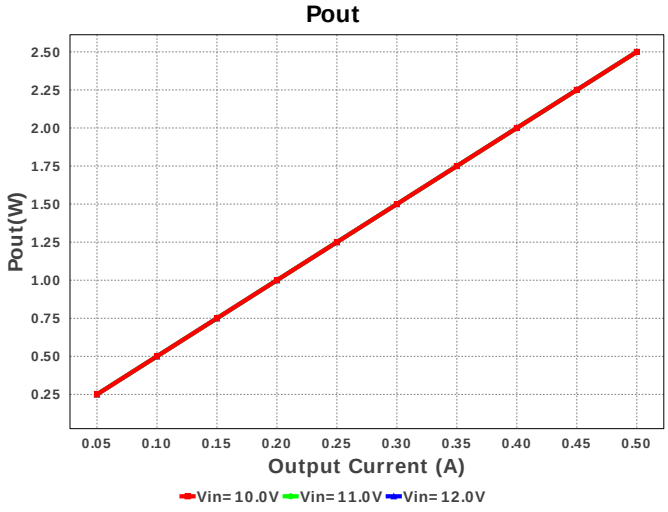


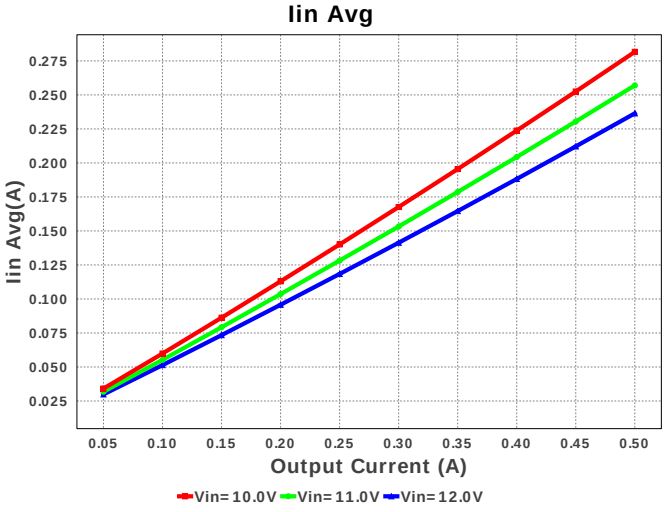


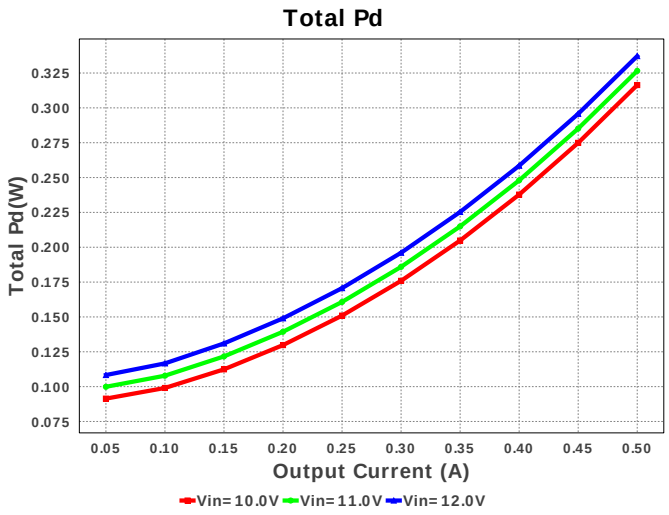


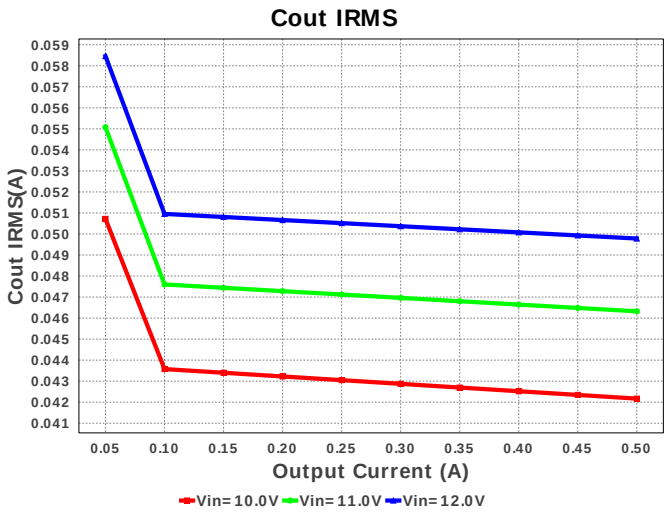


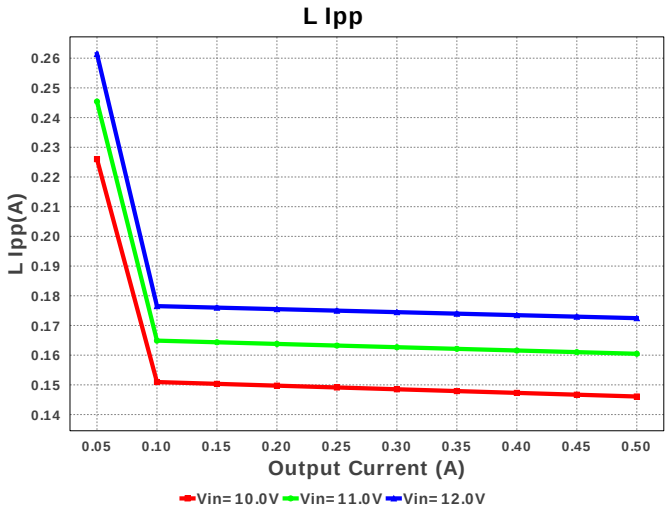


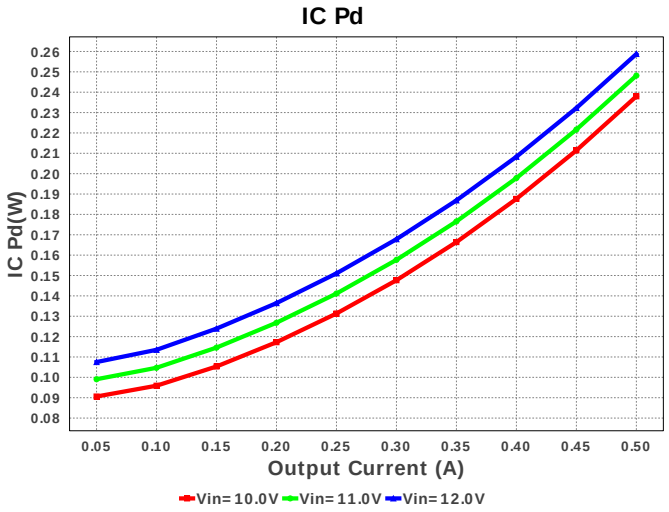












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	248.267 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	49.784 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	586.228 mA	Current	Peak switch current in IC
4.	Iin Avg	236.45 mA	Current	Average input current
5.	L Ipp	172.46 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	379.697 mA	Current	Q Iavg
7.	BOM Count	12	General	Total Design BOM count
8.	FootPrint	163.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	497.859 kHz	General	Switching frequency
10.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	200.0 mV	General	Voltage drop across the MosFET
12.	Pout	2.5 W	General	Total output power
13.	Total BOM	$1.87	General	Total BOM Cost
14.	Vout Actual	4.992 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	44.122 %	Op_point	Duty cycle
17.	Efficiency	88.109 %	Op_point	Steady state efficiency
18.	IC Tj	39.065 degC	Op_point	IC junction temperature
19.	ICThetaJA	35.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	500.0 mA	Op_point	Iout operating point
21.	VIN_OP	12.0 V	Op_point	Vin operating point
22.	Vout p-p	678.958 µV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	254.373 µW	Power	Input capacitor power dissipation
24.	Cout Pd	9.757 µW	Power	Output capacitor power dissipation
25.	IC Pd	259.012 mW	Power	IC power dissipation
26.	L Pd	78.125 mW	Power	Inductor power dissipation
27.	Total Pd	337.395 mW	Power	Total Power Dissipation
28.	Vout Tolerance	3.813 %		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	12.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM3103	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM3103** Product Folder : http://www.ti.com/product/LM3103 : contains the data sheet and other resources.