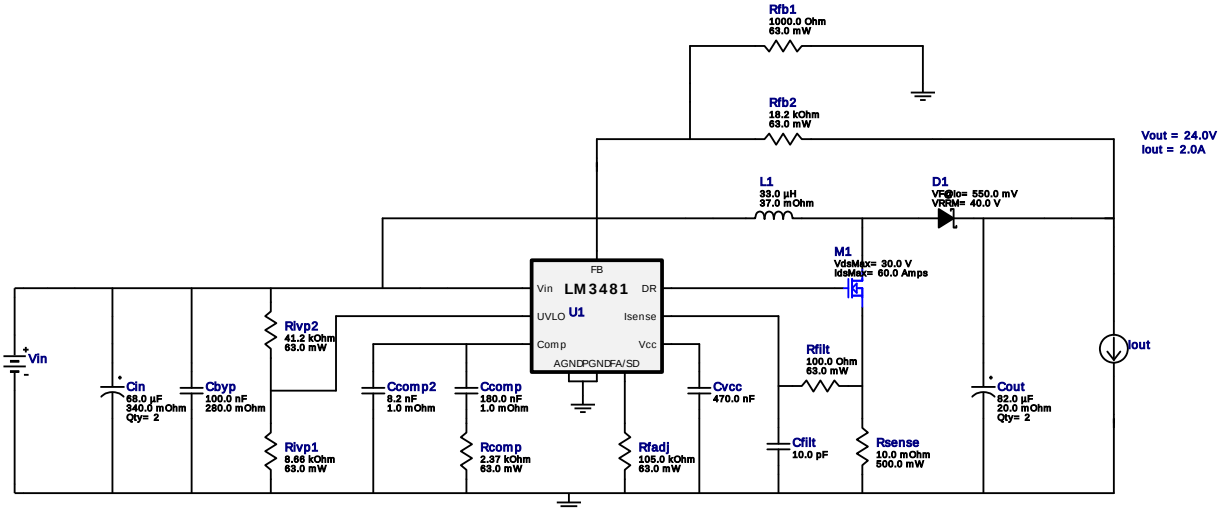


WEBENCH® Design Report

Design : 15203 LM3481MM/NOPB
LM3481MM/NOPB 9V-16V to 24.00V @ 2A

VinMin = 9.0V
VinMax = 16.0V
Vout = 24.0V
Iout = 2.0A

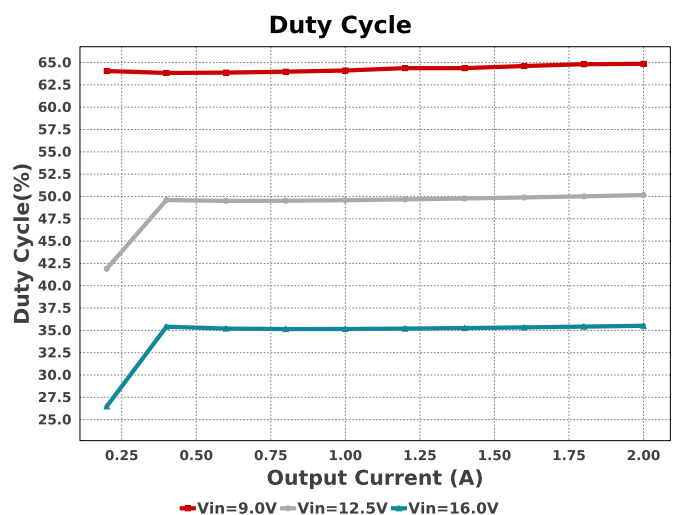
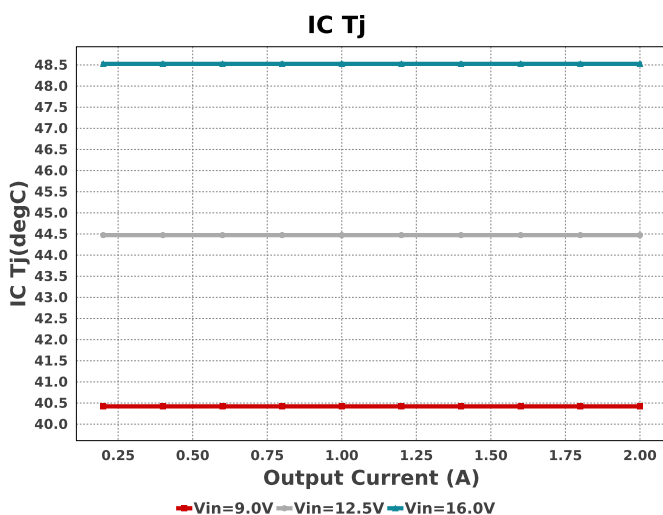
Device = LM3481MM/NOPB
Topology = Boost
Created = 2023-07-25 05:27:45.323
BOM Cost = \$6.62
BOM Count = 21
Total Pd = 2.89W



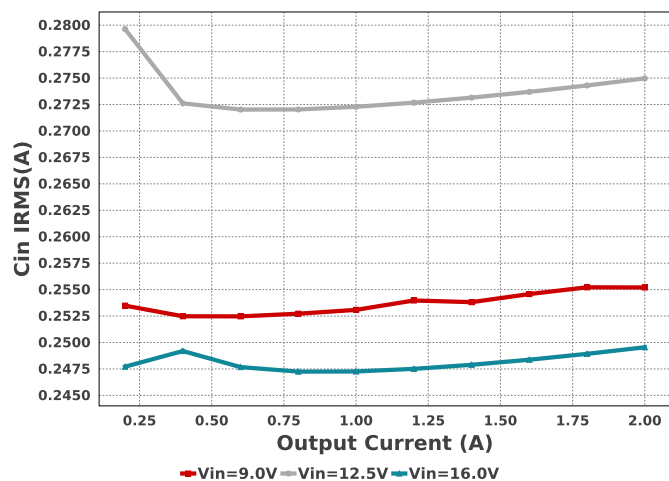
Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cbyp	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
Ccomp	MuRata	GRM188R71C184KA01D Series= X7R	Cap= 180.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0603 5 mm ²
Ccomp2	MuRata	GRM155R71H822KA88D Series= X7R	Cap= 8.2 nF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
Cfilt	Yageo	CC0805JRNPO9BN100 Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
Cin	Nichicon	UUD1V680MCL1GS Series= uD	Cap= 68.0 uF ESR= 340.0 mOhm VDC= 35.0 V IRMS= 280.0 mA	2	\$0.10	SM_RADIAL_6.3BMM 80 mm ²
Cout	Panasonic	35SVPF82M Series= SVPF	Cap= 82.0 uF ESR= 20.0 mOhm VDC= 35.0 V IRMS= 4.0 A	2	\$1.17	CAPSMT_62_E12 106 mm ²
Cvcc	Panasonic	ECPU1C474MA5 Series= ECPU(A)	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.27	1206 11 mm ²
D1	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.19	SMC 83 mm ²

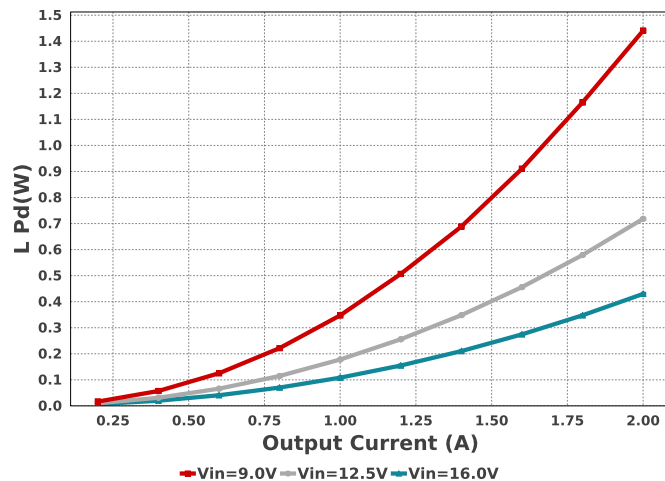
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
L1	Vishay-Dale	IHLP6767DZER330M11	L= 33.0 μ H 37.0 mOhm	1	\$1.98	 IHLP-6767DZ 369 mm ²
M1	Texas Instruments	CSD17309Q3	VdsMax= 30.0 V IdsMax= 60.0 Amps	1	\$0.33	 DQG0008A 18 mm ²
Rcomp	Vishay-Dale	CRCW04022K37FKED Series= CRCW..e3	Res= 2.37 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rfadj	Yageo	AC0402FR-07105KL Series= ?	Res= 105.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rfb2	Vishay-Dale	CRCW040218K2FKED Series= CRCW..e3	Res= 18.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rfilt	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rivp1	Vishay-Dale	CRCW04028K66FKED Series= CRCW..e3	Res= 8.66 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rivp2	Vishay-Dale	CRCW040241K2FKED Series= CRCW..e3	Res= 41.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rsense	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.11	 1206 11 mm ²
U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	\$1.08	DGS0010A_N 24 mm ²



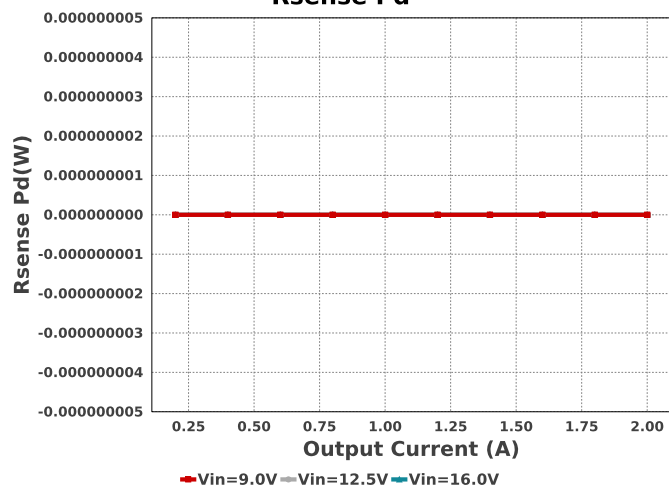
Cin IRMS



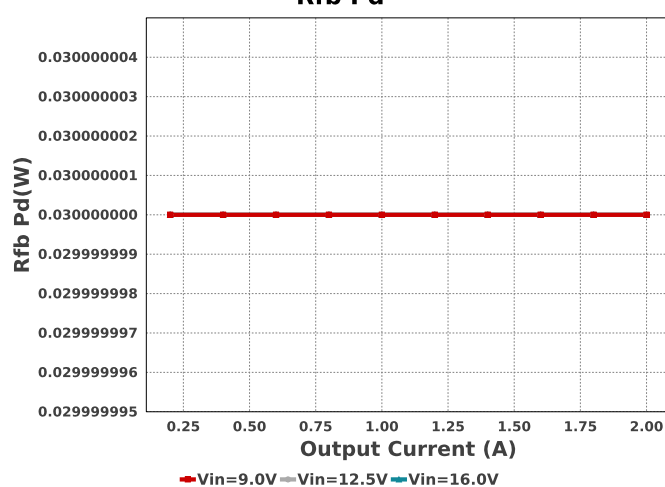
L Pd



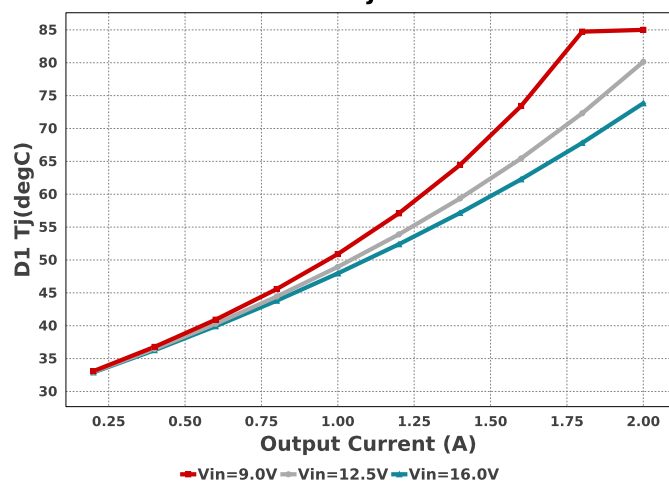
Rsense Pd



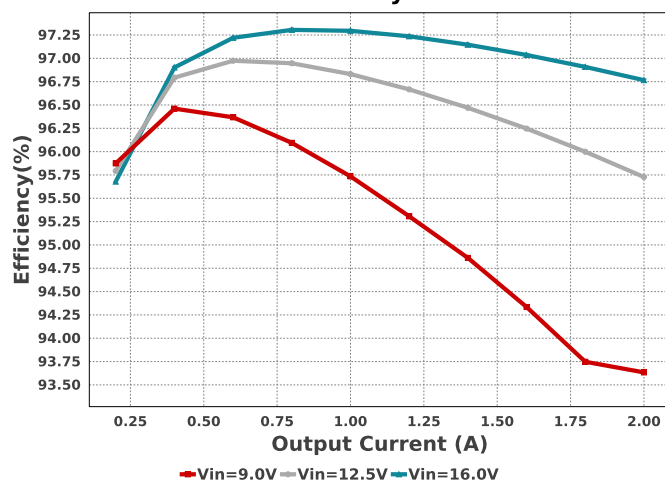
Rfb Pd

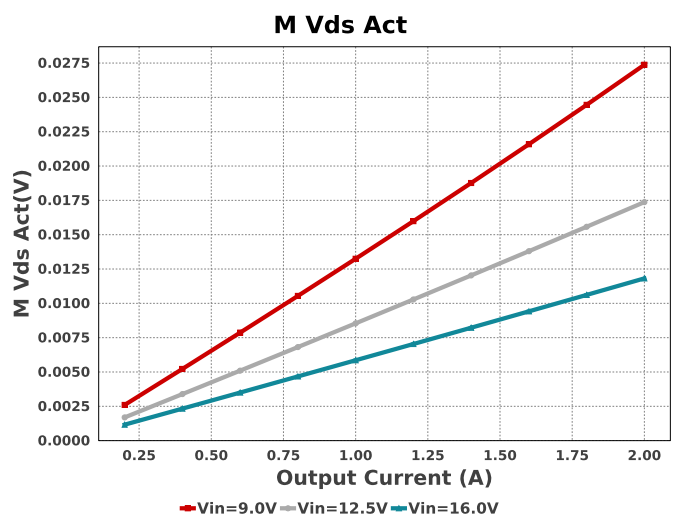
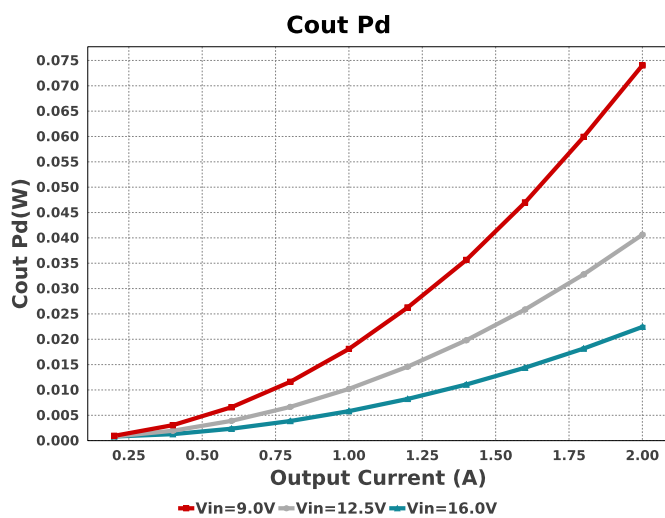
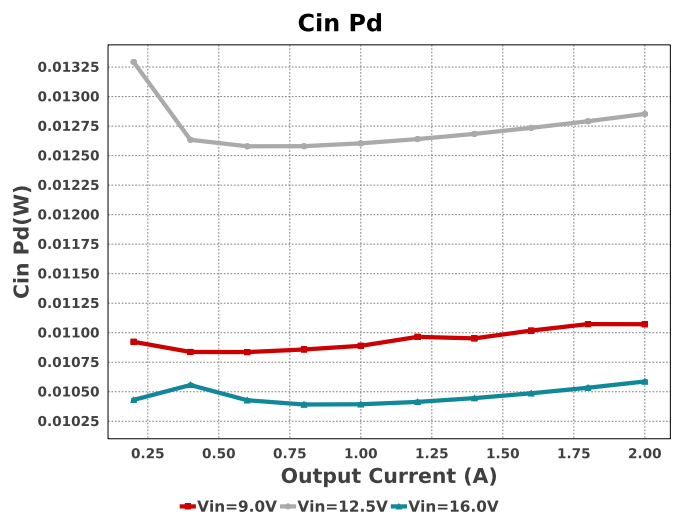
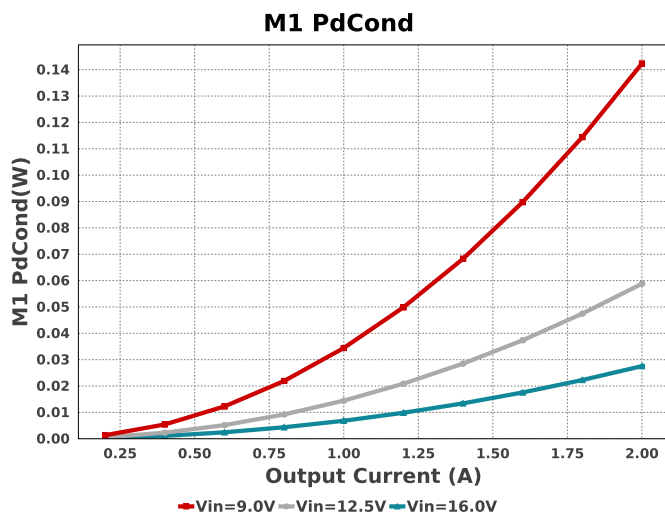
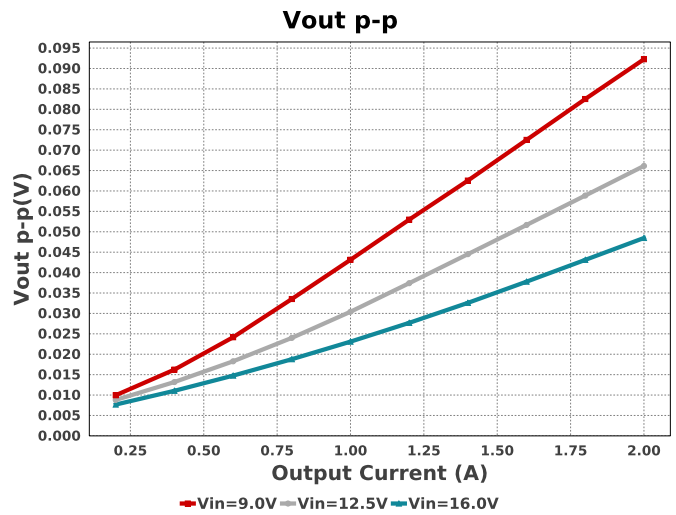
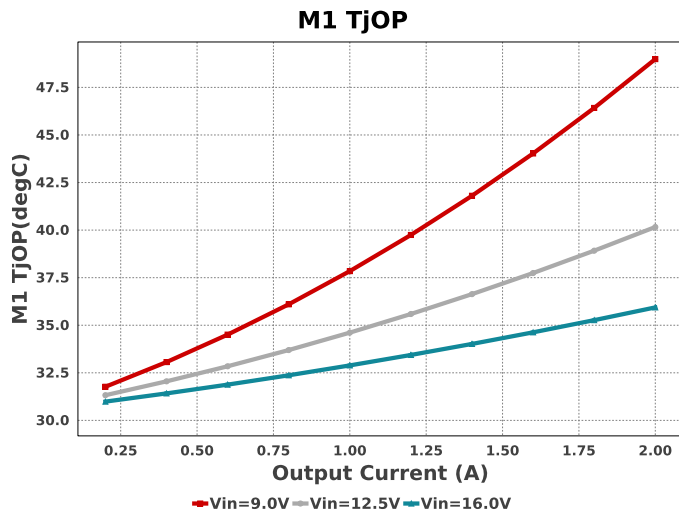


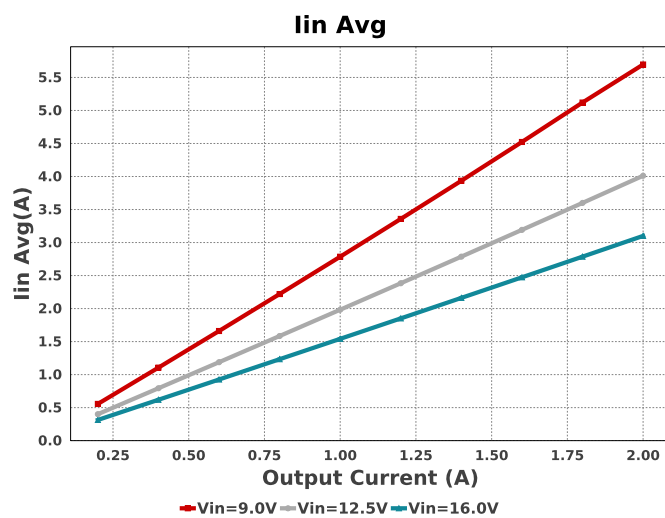
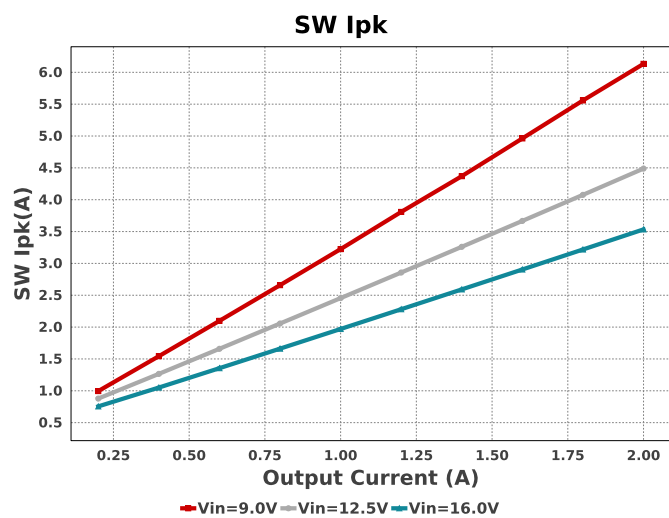
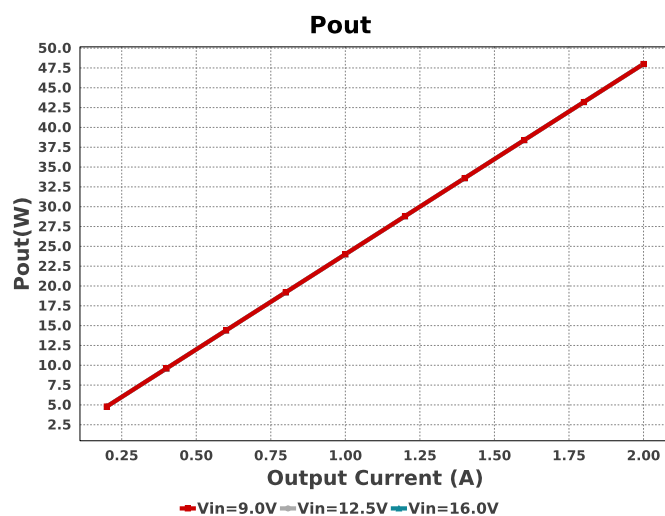
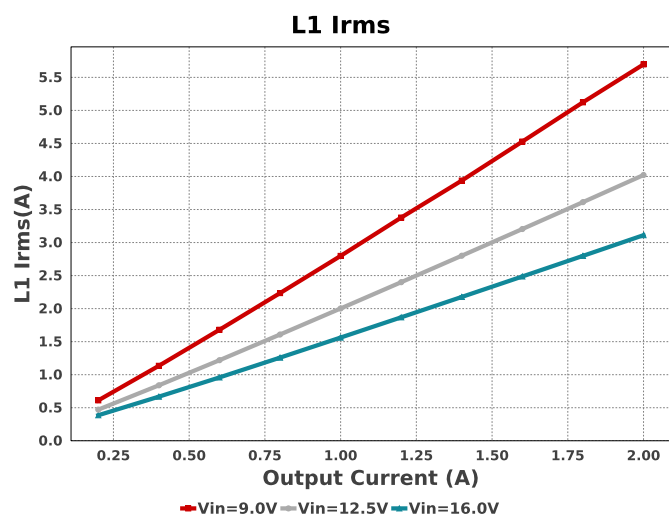
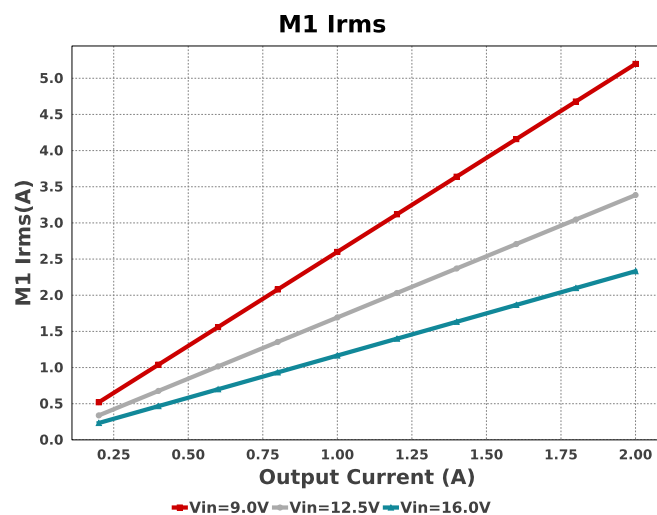
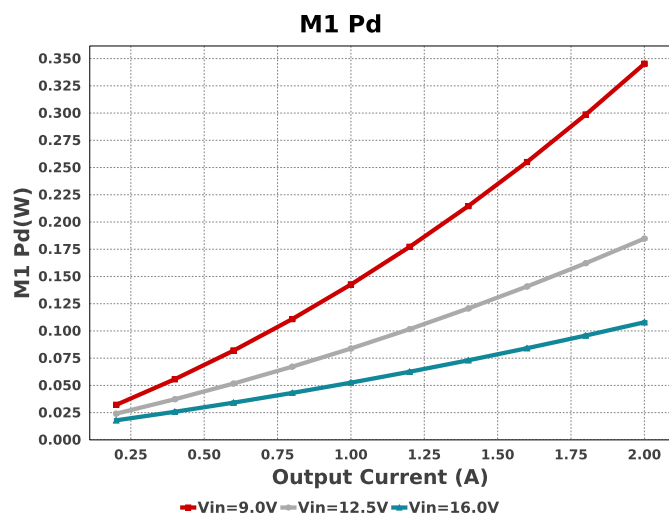
D1 Tj

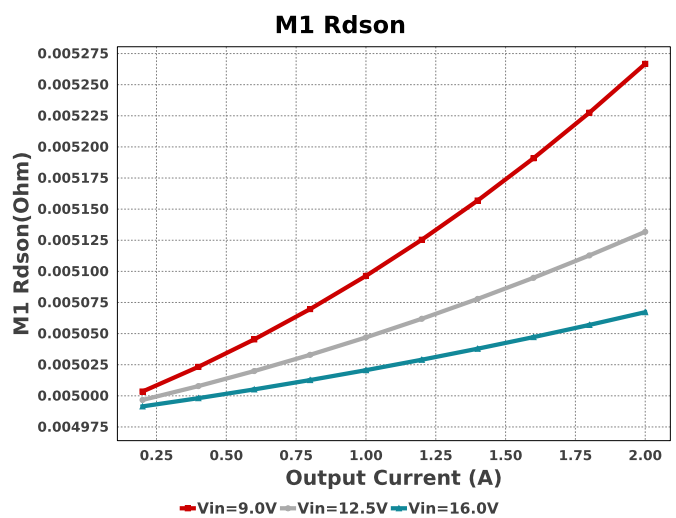
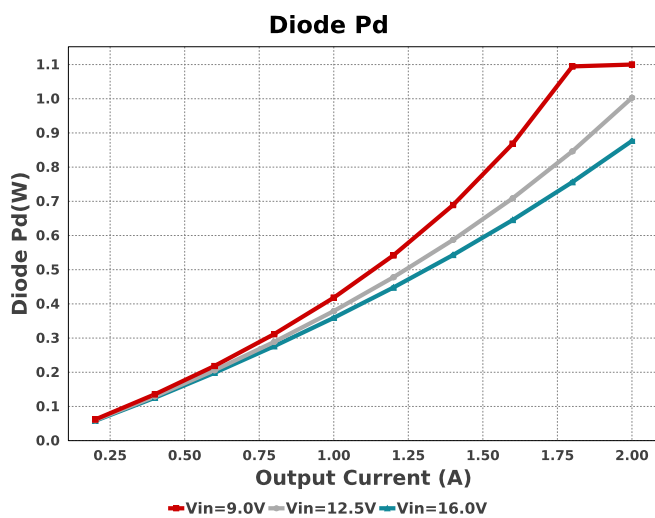
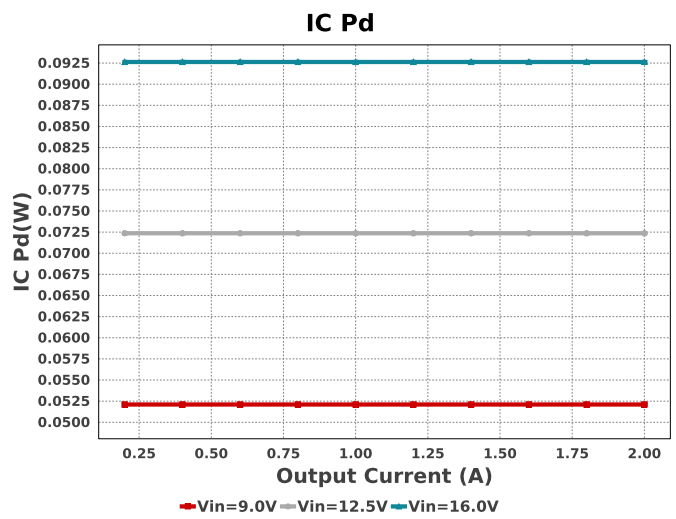
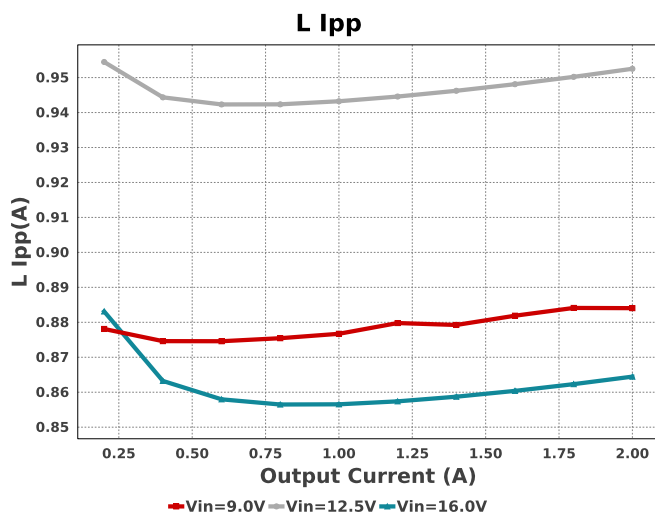
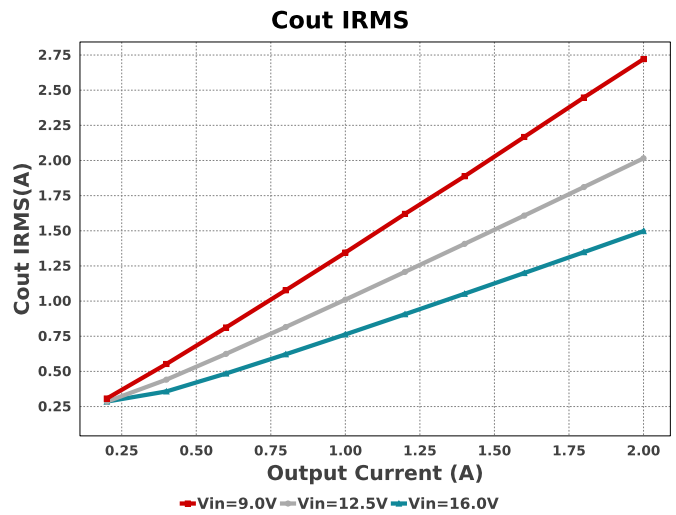
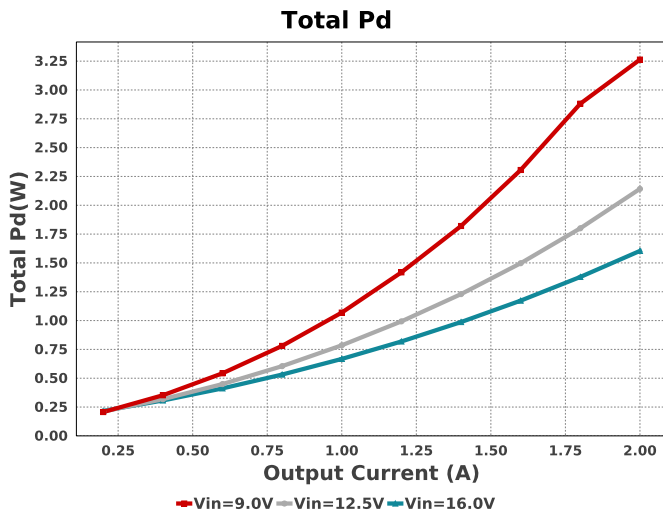


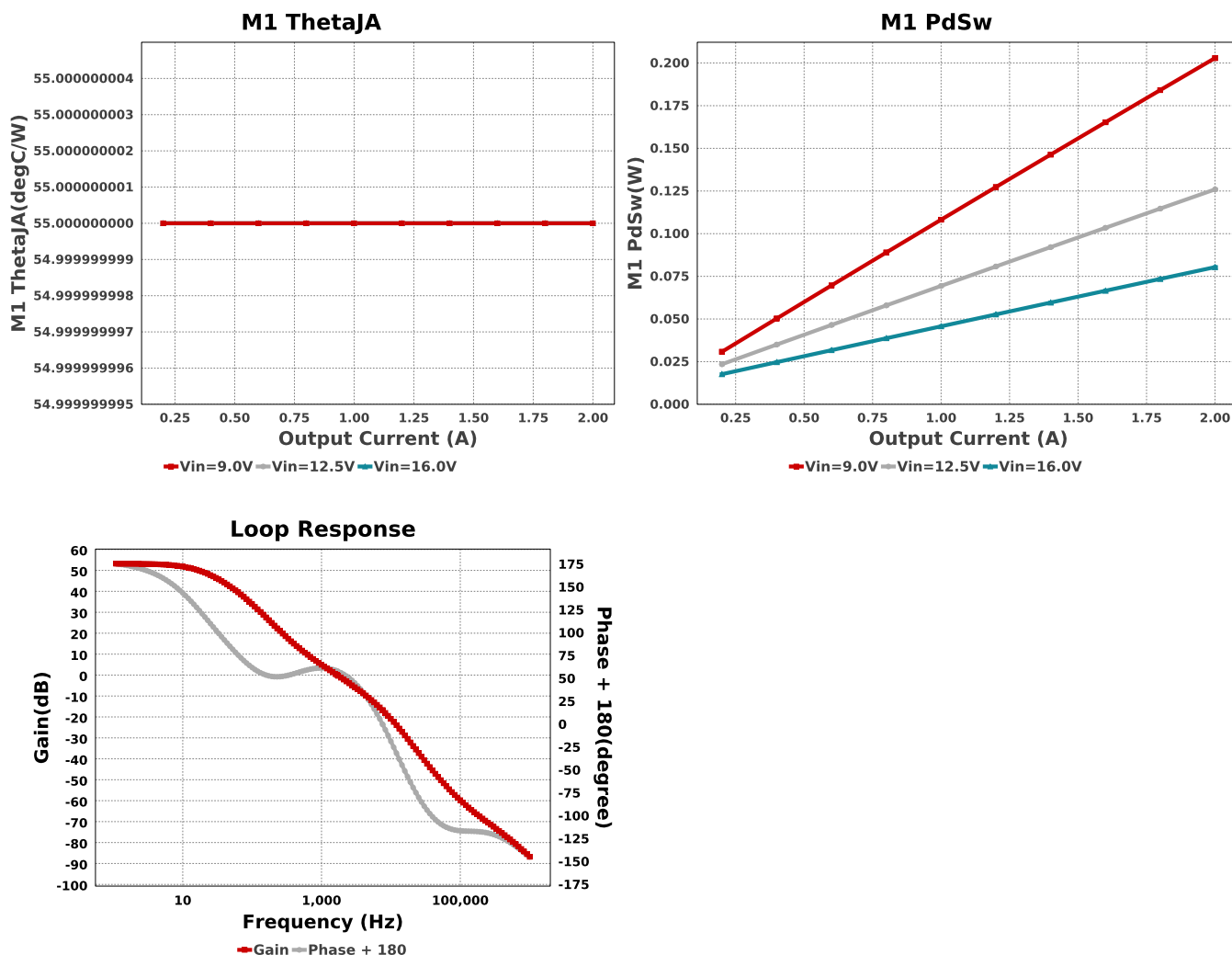
Efficiency











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	254.275 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	10.991 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	2.707 A	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	73.275 mW	Capacitor	Output capacitor power dissipation
5.	D1 Tj	85.0 degC	Diode	D1 junction temperature
6.	Diode Pd	1.1 W	Diode	Diode power dissipation
7.	IC Pd	52.2 mW	IC	IC power dissipation
8.	IC Tj	40.44 degC	IC	IC junction temperature
9.	IC Tolerance	19.0 mV	IC	IC Feedback Tolerance
10.	ICThetaJA	200.0 degC/W	IC	IC junction-to-ambient thermal resistance
11.	Iin Avg	5.655 A	IC	Average input current
12.	L Ipp	880.83 mA	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	1.421 W	Inductor	Inductor power dissipation
14.	L1 Irms	5.658 A	Inductor	Inductor ripple current
15.	M Vds Act	27.383 mV	Mosfet	M Vds
16.	M1 Irms	5.198 A	Mosfet	M1 MOSFET Irms
17.	M1 Pd	346.46 mW	Mosfet	M1 MOSFET total power dissipation
18.	M1 PdCond	142.34 mW	Mosfet	M1 MOSFET conduction losses
19.	M1 PdSw	204.12 mW	Mosfet	M1 MOSFET switching losses
20.	M1 Rdson	5.268 mOhm	Mosfet	Drain-Source On-resistance
21.	M1 ThetaJA	55.0 degC/W	Mosfet	MOSFET junction-to-ambient thermal resistance
22.	M1 TjOP	49.055 degC	Mosfet	M1 MOSFET junction temperature
23.	Cin Pd	10.991 mW	Power	Input capacitor power dissipation
24.	Cout Pd	73.275 mW	Power	Output capacitor power dissipation
25.	Diode Pd	1.1 W	Power	Diode power dissipation
26.	IC Pd	52.2 mW	Power	IC power dissipation
27.	L Pd	1.421 W	Power	Inductor power dissipation
28.	M1 Pd	346.46 mW	Power	M1 MOSFET total power dissipation
29.	M1 PdCond	142.34 mW	Power	M1 MOSFET conduction losses
30.	M1 PdSw	204.12 mW	Power	M1 MOSFET switching losses
31.	Rfb Pd	30.0 mW	Power	Rfb Power Dissipation
32.	Rsense Pd	284.44 mW	Power	LED Current Rsns Power Dissipation

#	Name	Value	Category	Description
33.	Total Pd	2.894 W	Power	Total Power Dissipation
34.	Rfb Pd	30.0 mW	Resistor	Rfb Power Dissipation
35.	Rsense Pd	284.44 mW	Resistor	LED Current Rsns Power Dissipation
36.	BOM Count	21	System Information	Total Design BOM count
37.	Cross Freq	979.394 Hz	System Information	Bode plot crossover frequency
38.	Duty Cycle	64.616 %	System Information	Duty cycle
39.	Efficiency	94.313 %	System Information	Steady state efficiency
40.	FootPrint	931.0 mm ²	System Information	Total Foot Print Area of BOM components
41.	Frequency	198.811 kHz	System Information	Switching frequency
42.	Gain Marg	-15.48 dB	System Information	Bode Plot Gain Margin
43.	Iout	2.0 A	System Information	Iout operating point
44.	Low Freq Gain	47.967 dB	System Information	Gain at 1Hz
45.	Mode	CCM	System Information	Conduction Mode
46.	Phase Marg	56.972 deg	System Information	Bode Plot Phase Margin
47.	Pout	48.0 W	System Information	Total output power
48.	SW Ipk	6.093 A	System Information	Peak switch current
49.	Total BOM	\$6.62	System Information	Total BOM Cost
50.	Vin	9.0 V	System Information	Vin operating point
51.	Vout	24.0 V	System Information	Operational Output Voltage
52.	Vout Actual	24.192 V	System Information	Vout Actual calculated based on selected voltage divider resistors
53.	Vout Tolerance	3.452 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
54.	Vout p-p	91.755 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	2.0	Maximum Output Current
VinMax	16.0	Maximum input voltage
VinMin	9.0	Minimum input voltage
Vout	24.0	Output Voltage
base_pn	LM3481	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature
UserFsw	200.0 k	Customer Selected Frequency

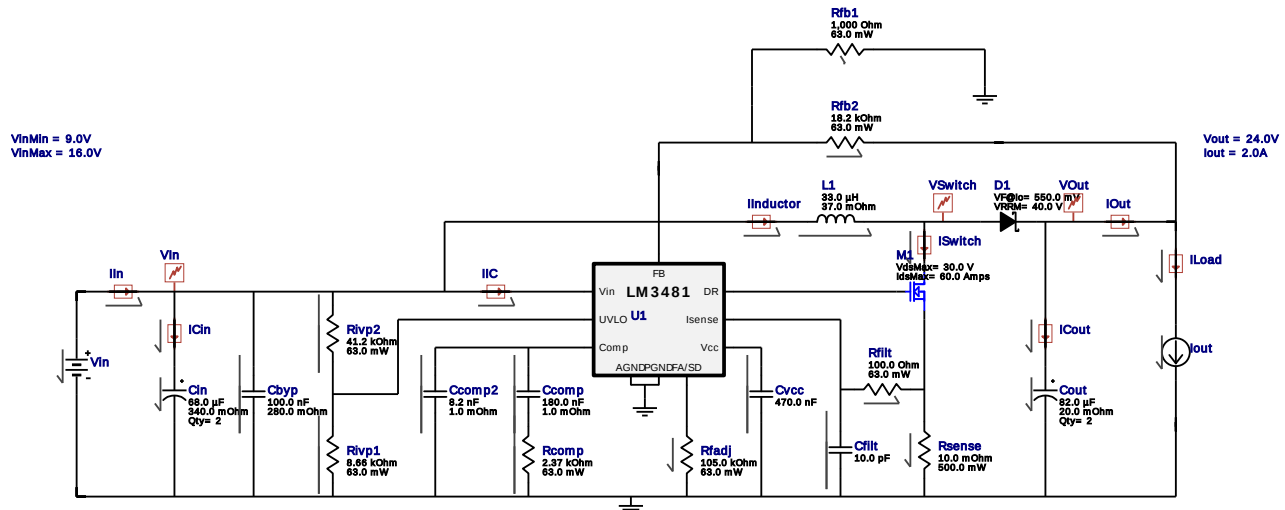
WEBENCH® Assembly

WEBENCH® Electrical Simulation Report

Design Id = 15203

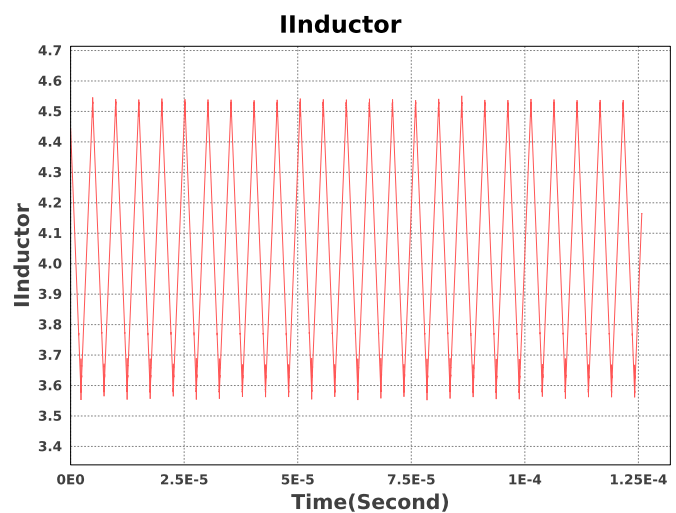
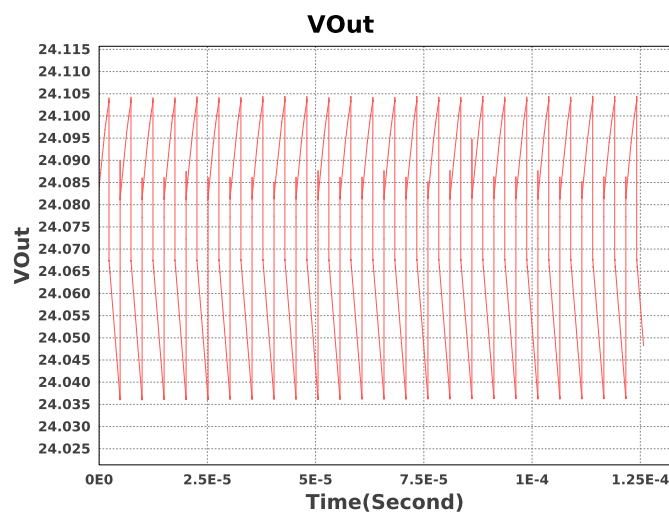
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Simulation Type = Steady State



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Iout	I	Load Current	2.0 A



Design Assistance

- Master key : 1B0CCE6EBD53FA1F[v1]
- LM3481** Product Folder : <http://www.ti.com/product/LM3481> : contains the data sheet and other resources.

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