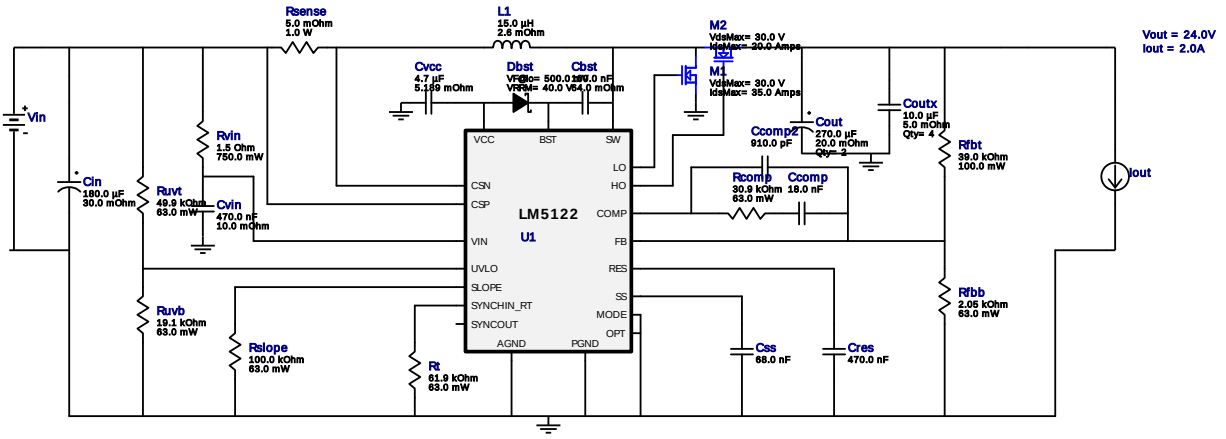
VinMin = 5.0V
VinMax = 5.0V
Vout = 24.0V
Iout = 2.0A

Device = LM5122MH/NOPB
Topology = Boost
Created = 8/11/16 8:07:46 AM
BOM Cost = $0.00
BOM Count = 28
Total Pd = 2.8W

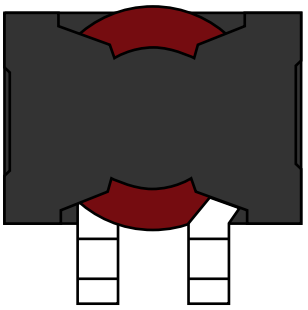
WEBENCH® Design Report

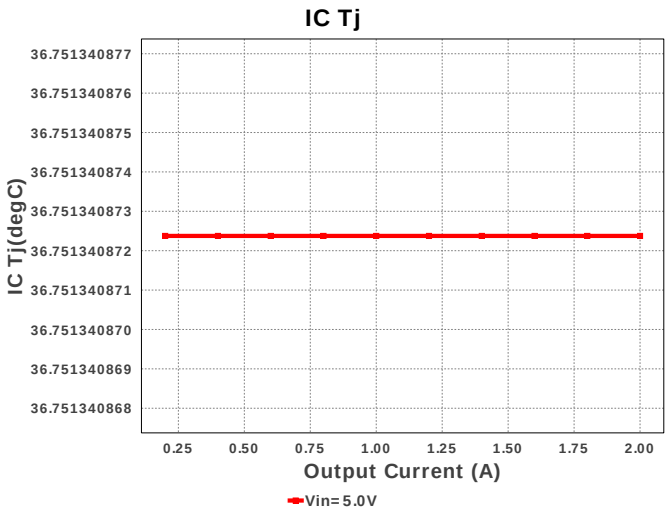
Design : 4085315/18 LM5122MH/NOPB
LM5122MH/NOPB 5.0V-5.0V to 24.03V @ 2.0A

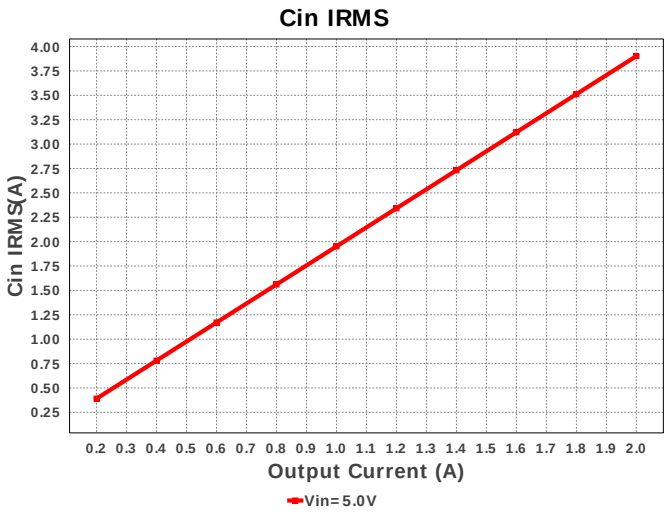


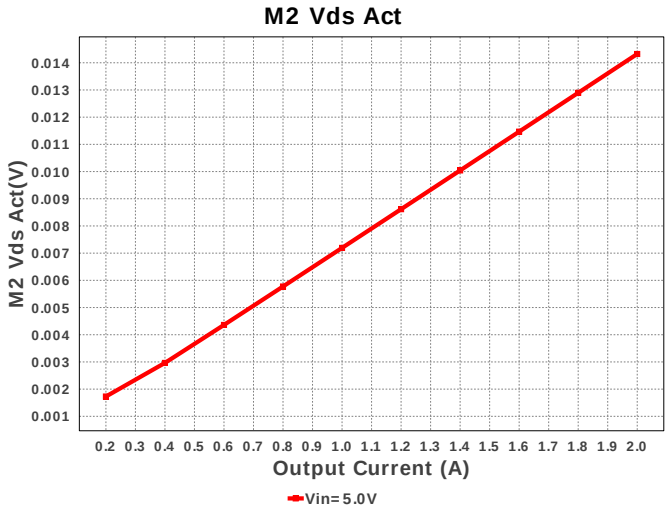
Electrical BOM

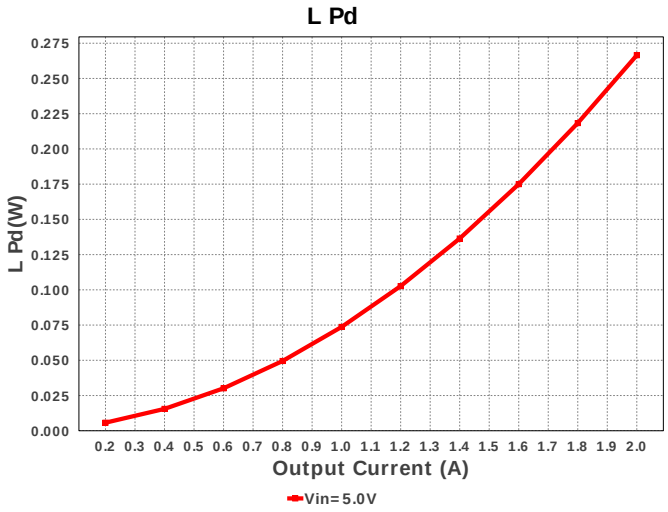
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB183 Series= X7R	Cap= 18.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C911JBCNNNC Series= C0G/NP0	Cap= 910.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
4.	Cin	Panasonic	16SVP180MX Series= SVP	Cap= 180.0 uF ESR= 30.0 mOhm VDC= 16.0 V IRMS= 3.02 A	1	$0.29	SM_RADIAL_10AMM 160 mm²
5.	Cout	Panasonic	EEHZA1V271P Series= ?	Cap= 270.0 uF ESR= 20.0 mOhm VDC= 35.0 V IRMS= 2.5 A	2	$1.02	SM_RADIAL_10BMM 160 mm²
6.	Coutx	TDK	C5750X7S2A106M230KB Series= X7S	Cap= 10.0 uF ESR= 5.0 mOhm VDC= 100.0 V IRMS= 6.45 A	4	NA	2220 54 mm²
7.	Cres	Taiyo Yuden	TMK212BJ474KD-T Series= X5R	Cap= 470.0 nF VDC= 20.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
8.	Css	MuRata	GRM155R61A683KA01D Series= X5R	Cap= 68.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
9.	Cvcc	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	$0.02	0805 7 mm²

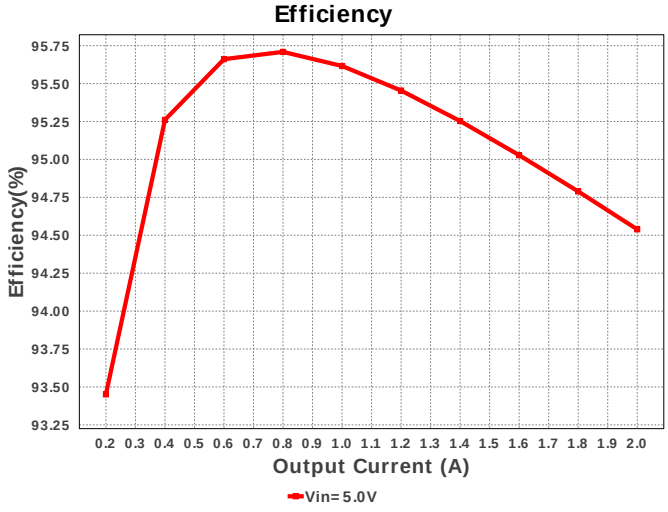
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Cvin	MuRata	GRM188R70J474KA01D Series= X7R	Cap= 470.0 nF ESR= 10.0 mOhm VDC= 6.3 V IRMS= 2.91 A	1	$0.02	 0603 5 mm²
11.	Dbst	Vishay-Semiconductor	SS14-E3/61T	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.08	 SMA 37 mm²
12.	L1	Coilcraft	SER2918H-153KL	L= 15.0 µH DCR= 2.6 mOhm	1	$2.65	 SER2918H 652 mm²
13.	M1	Texas Instruments	CSD17577Q3A	VdsMax= 30.0 V IdsMax= 35.0 Amps	1	$0.24	 TRANS_NexFET_Q3A 18 mm²
14.	M2	Texas Instruments	CSD17578Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.21	 TRANS_NexFET_Q3A 18 mm²
15.	Rcomp	Vishay-Dale	CRCW040230K9FKED Series= CRCW..e3	Res= 30.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	Rfbb	Vishay-Dale	CRCW04022K05FKED Series= CRCW..e3	Res= 2.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	Rfbt	Yageo America	RC0603FR-0739KL Series= ?	Res= 39.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm²
18.	Rsense	Susumu Co Ltd	PRL1632-R005-F-T1 Series= PRL1632	Res= 5.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	 0612 11 mm²
19.	Rslope	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	Rt	Vishay-Dale	CRCW040261K9FKED Series= CRCW..e3	Res= 61.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
21.	Ruvb	Vishay-Dale	CRCW040219K1FKED Series= CRCW..e3	Res= 19.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
22.	Ruvt	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
23.	Rvin	Stackpole Electronics Inc	RMCF2010FT1R50 Series= ?	Res= 1.5 Ohm Power= 750.0 mW Tolerance= 1.0%	1	$0.03	 2010 32 mm²
24.	U1	Texas Instruments	LM5122MH/NOPB	Switcher	1	$2.16	 MXA20A 71 mm²

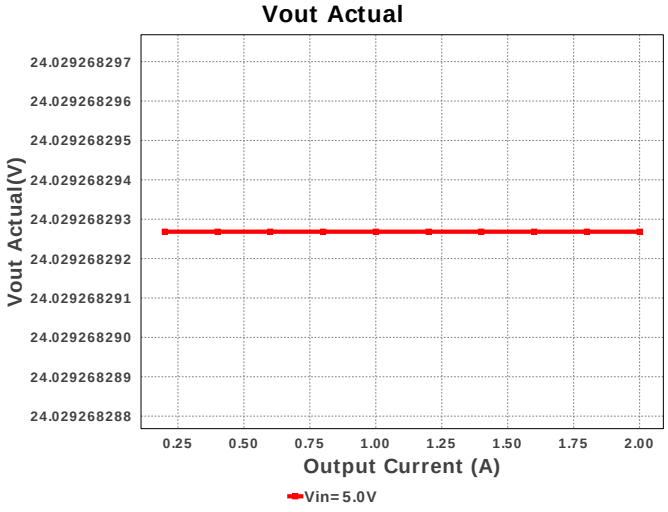


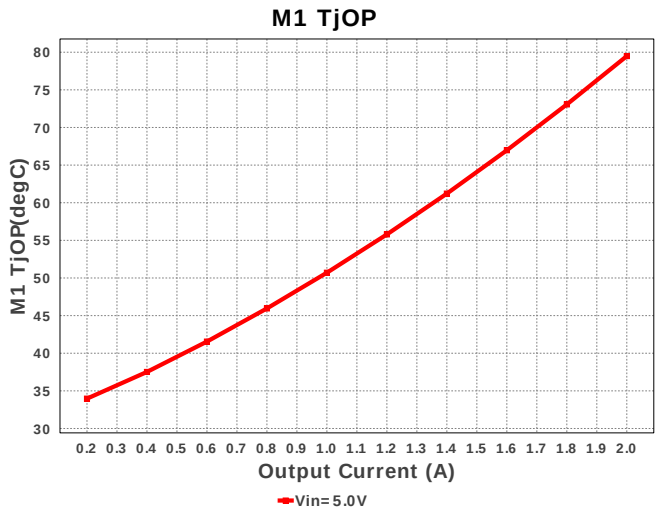


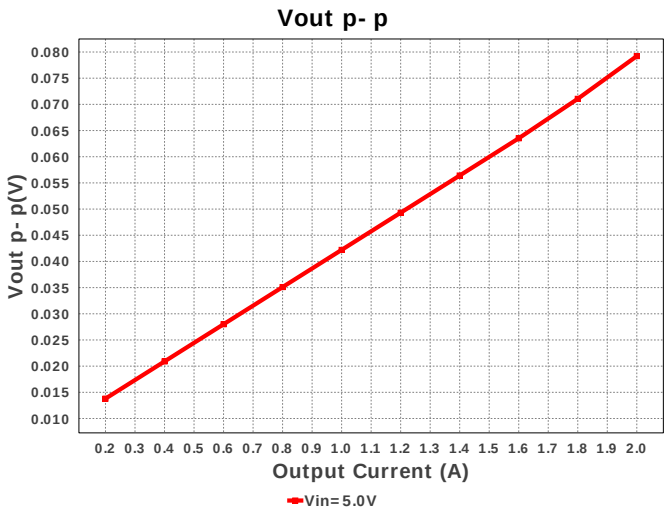


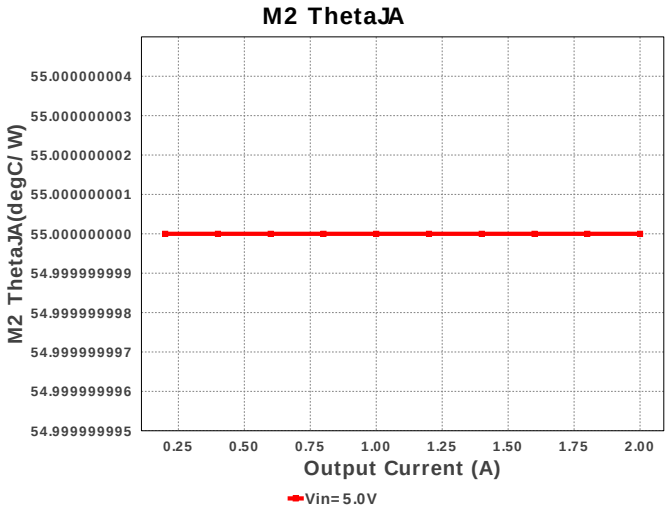


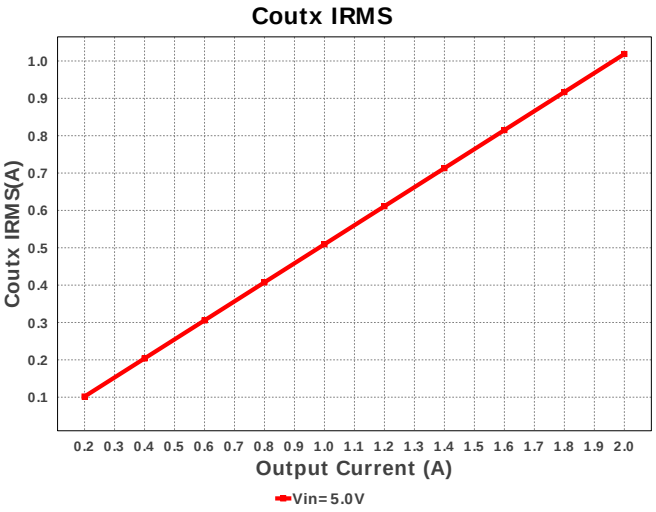


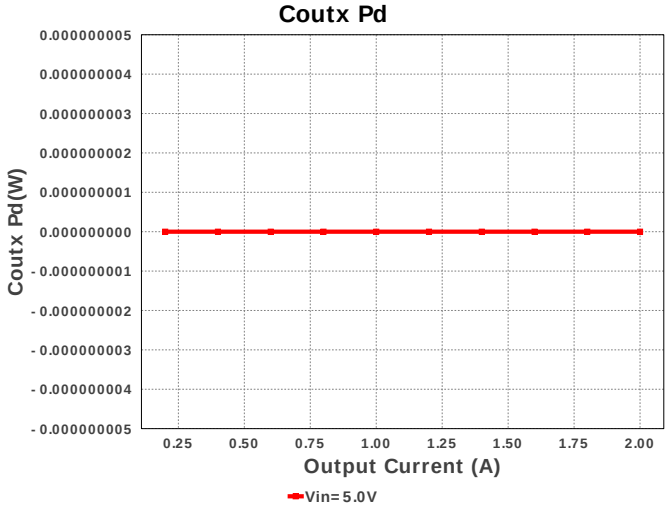


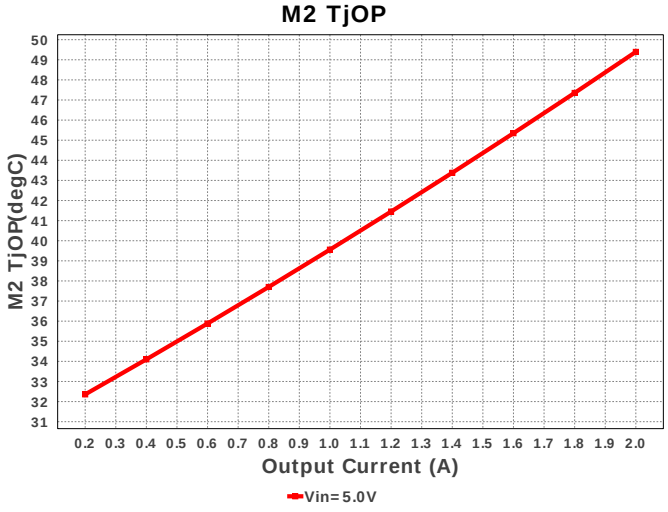


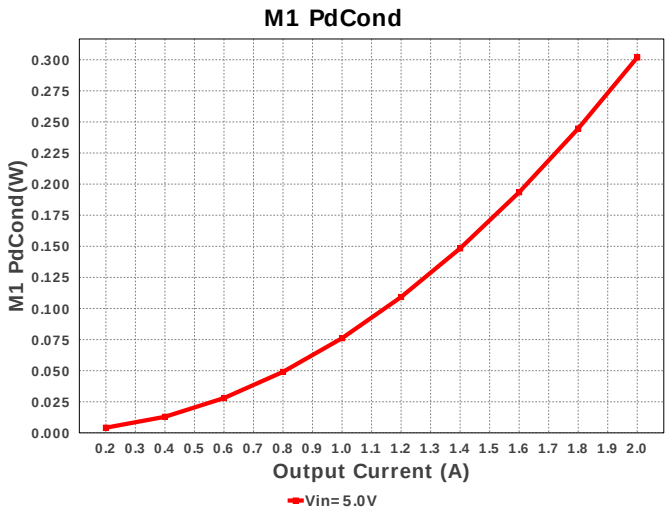


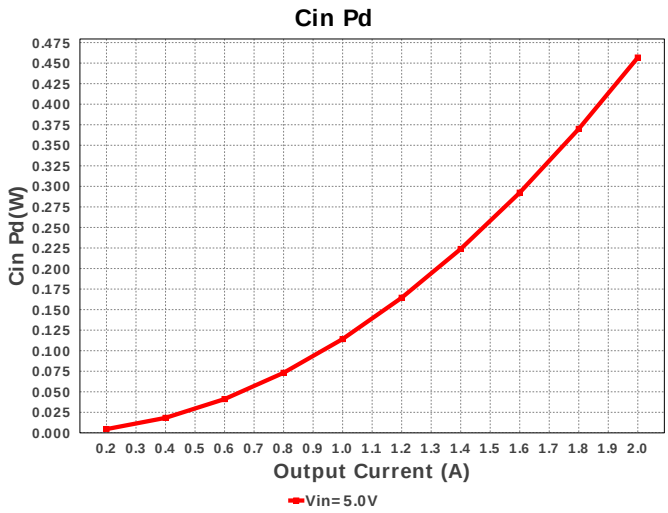


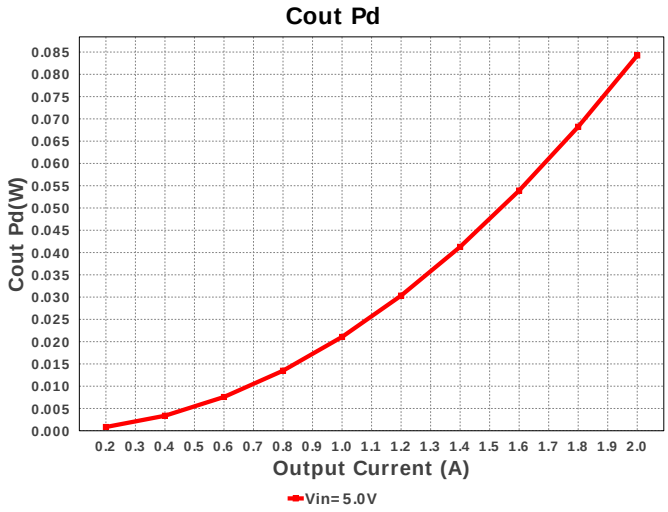


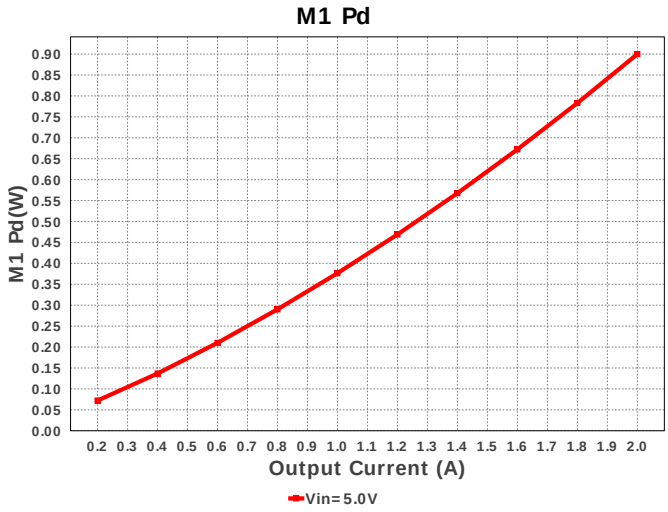


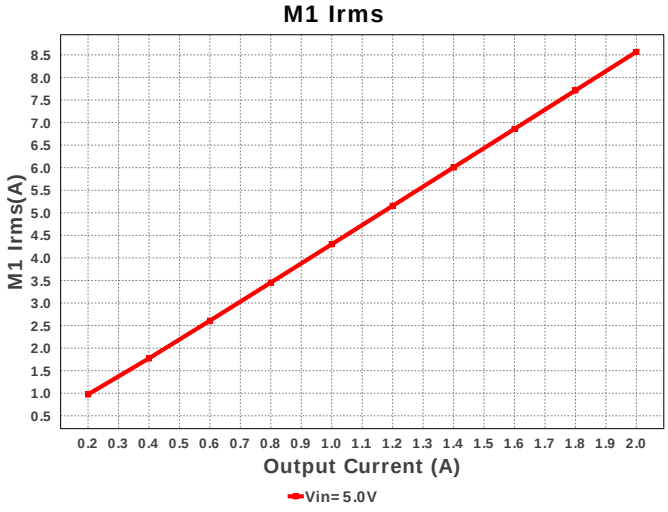


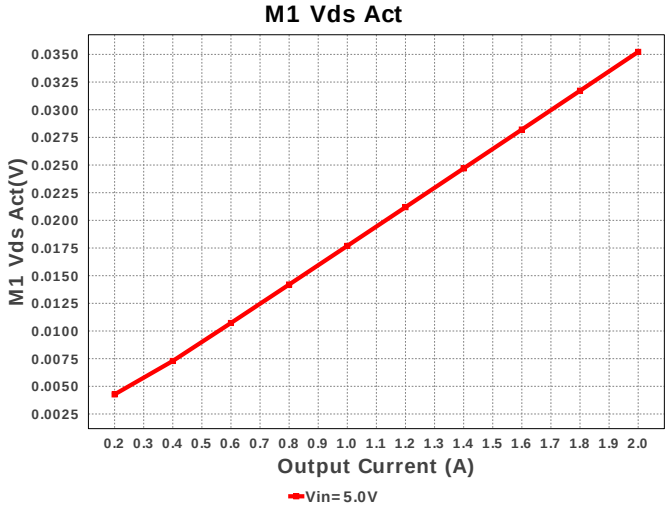


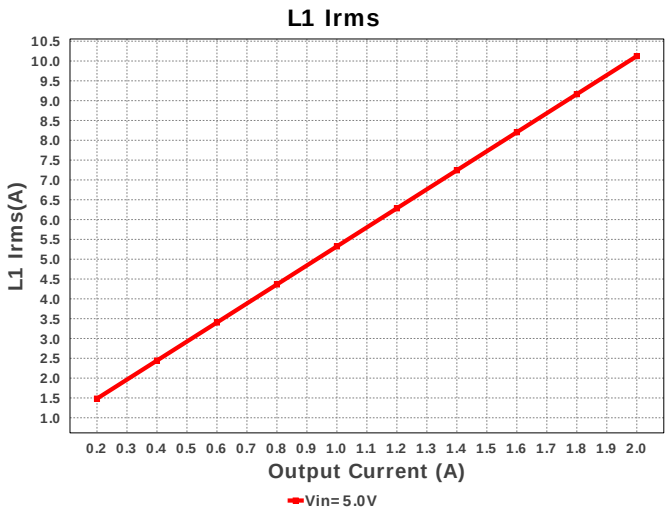


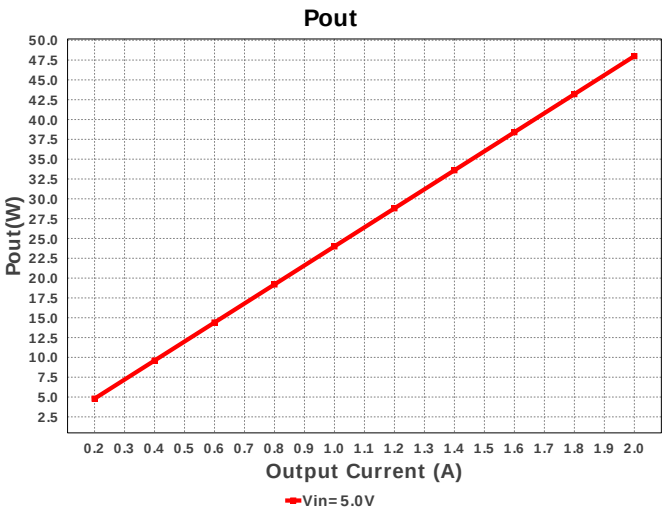


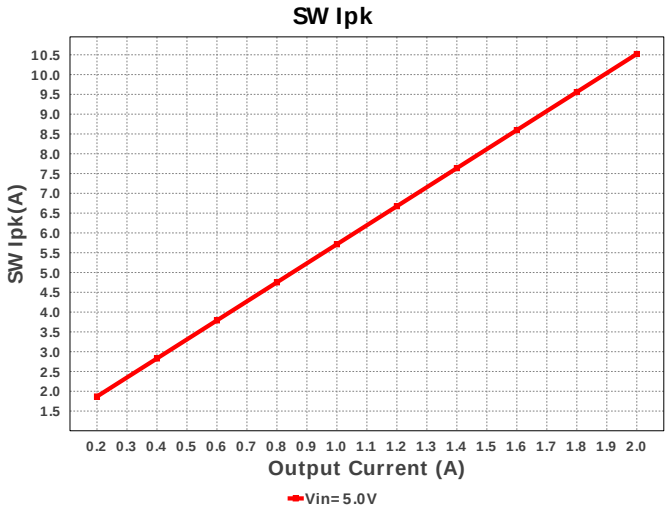


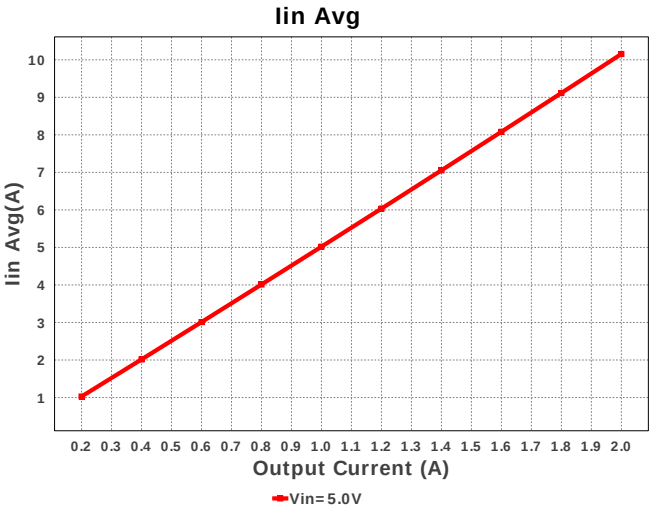


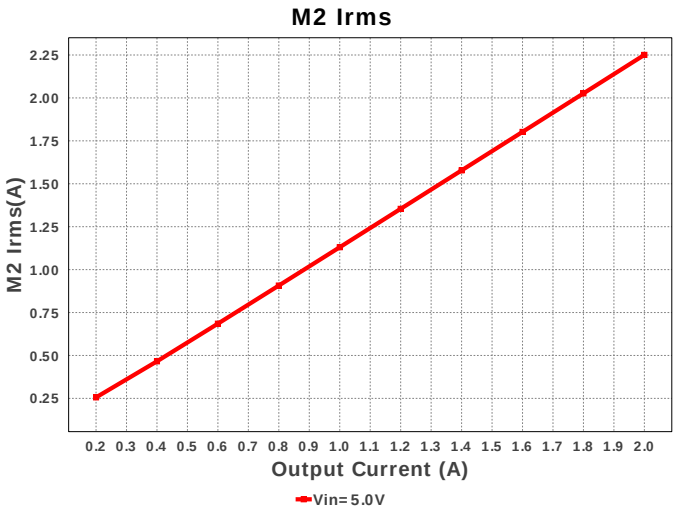


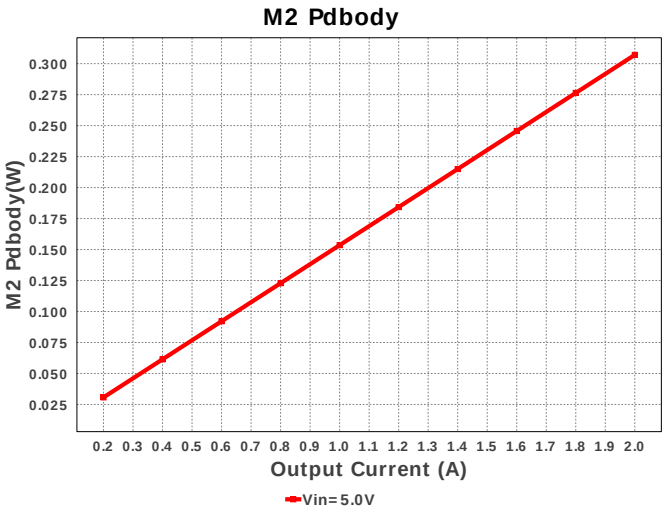


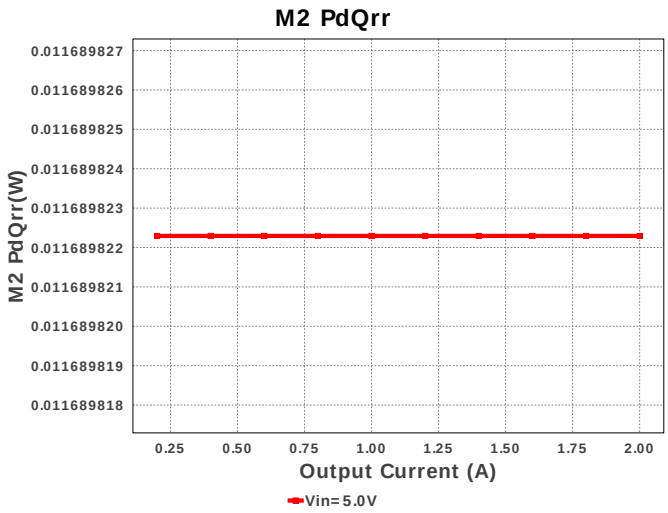


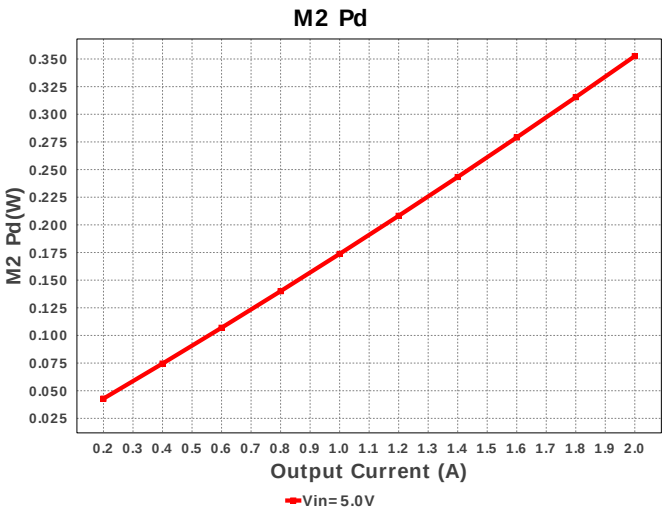


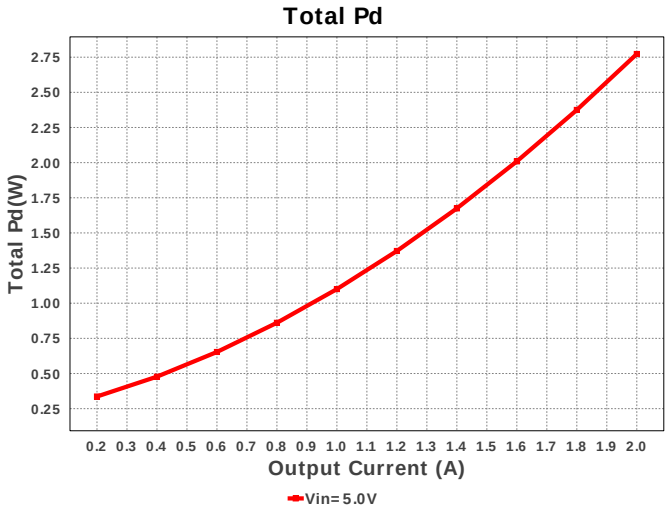


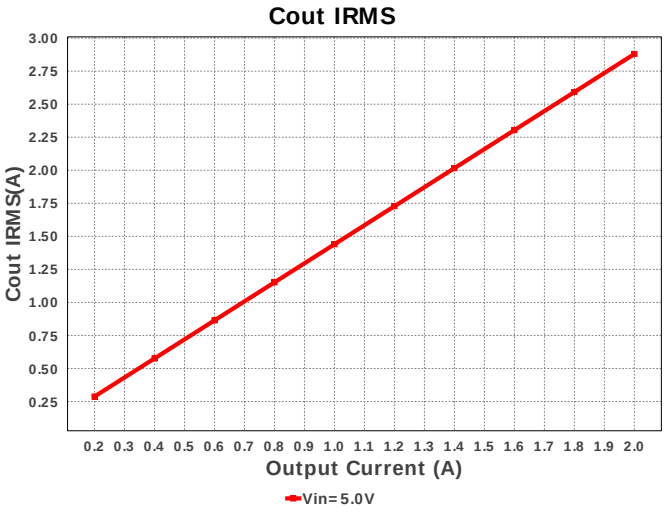


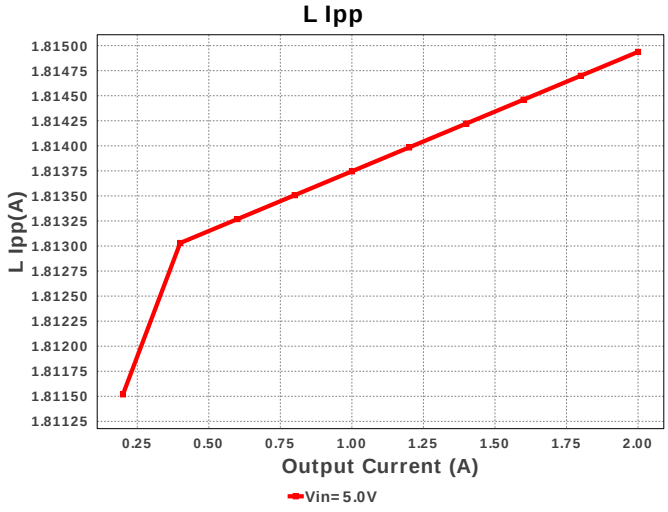


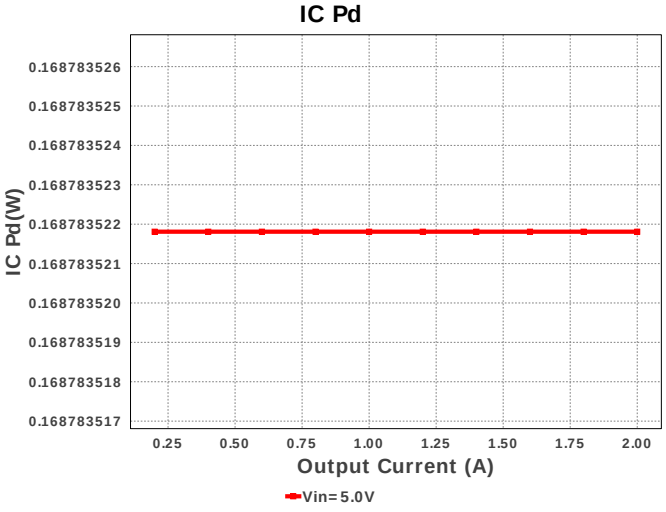


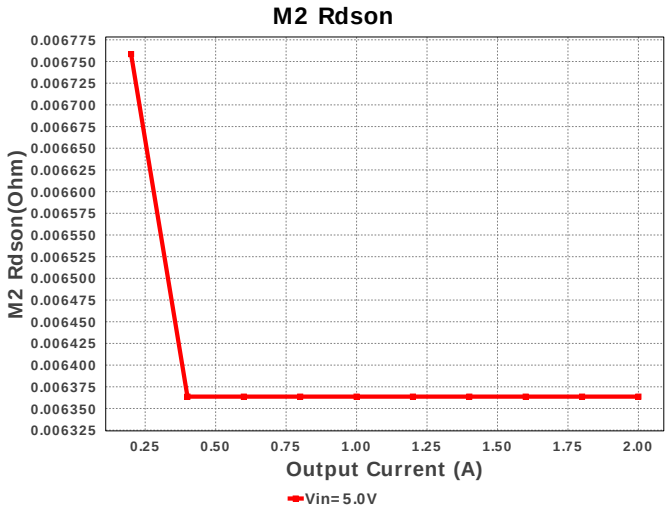


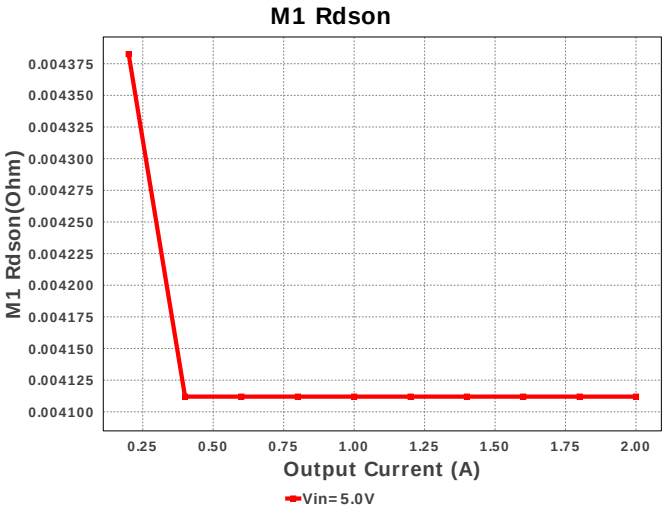


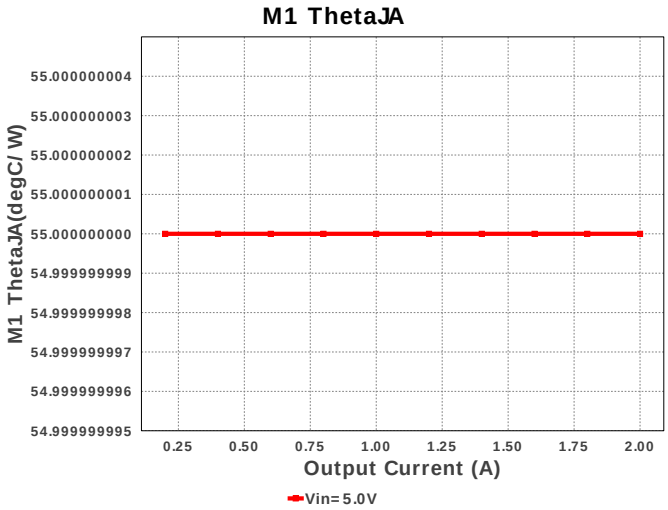


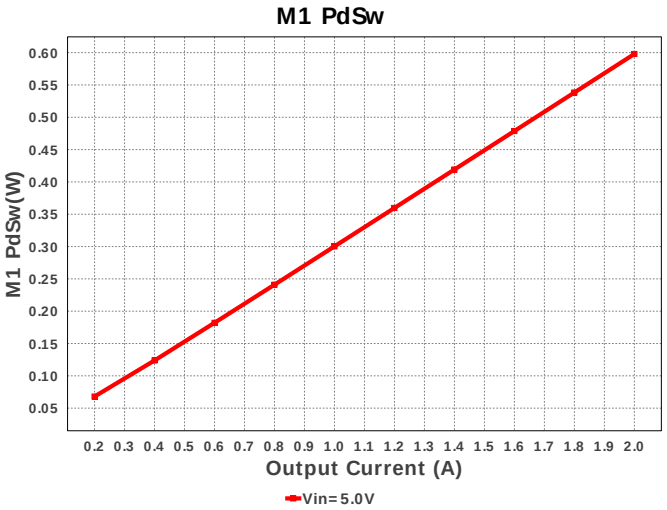


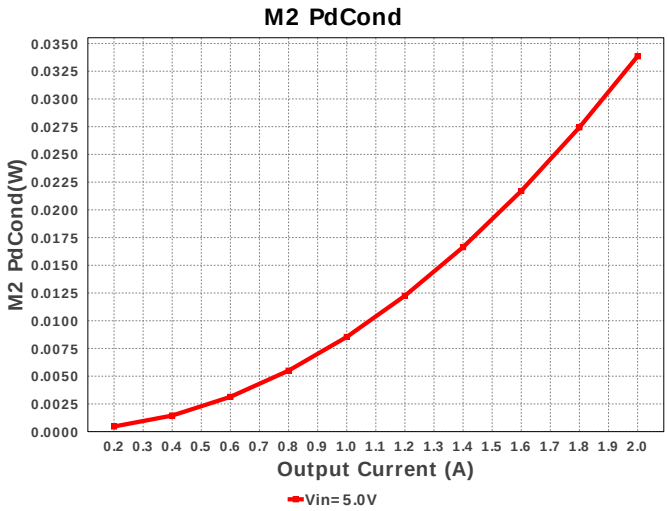


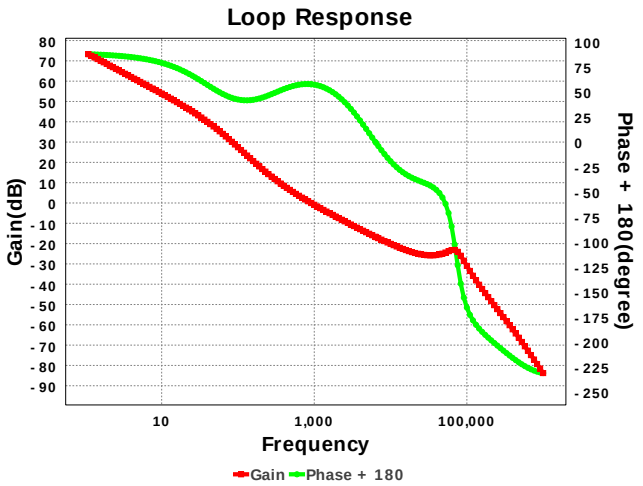












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	3.917 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	2.841 A	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	1.058 A	Current	Output capacitor_x RMS ripple current
4.	Iin Avg	10.16 A	Current	Average input current
5.	L Ipp	1.804 A	Current	Peak-to-peak inductor ripple current
6.	L1 Irms	10.121 A	Current	Inductor ripple current
7.	M1 Irms	8.626 A	Current	MOSFET RMS ripple current
8.	M2 Irms	2.249 A	Current	MOSFET RMS ripple current
9.	SW Ipk	10.573 A	Current	Peak switch current
10.	BOM Count	28	General	Total Design BOM count
11.	FootPrint	1.599 k mm^2	General	Total Foot Print Area of BOM components

#	Name	Value	Category	Description
12.	Frequency	145.396 kHz	General	Switching frequency
13.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
14.	M1 Rdson	4.112 mOhm	General	Drain-Source On-resistance
15.	M1 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
16.	M2 Rdson	6.364 mOhm	General	Drain-Source On-resistance
17.	M2 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
18.	M2 Vds Act	14.311 mV	General	M Vds
19.	Mode	CCM	General	Conduction Mode
20.	Pout	48.0 W	General	Total output power
21.	Total BOM	$0.0	General	Total BOM Cost
22.	Low Freq Gain	73.253 dB	Op_Point	Gain at 10Hz
23.	Vout Actual	24.029 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
24.	Vout OP	24.029 V	Op_Point	Operational Output Voltage
25.	Cross Freq	902.615 Hz	Op_point	Bode plot crossover frequency
26.	Efficiency	94.487 %	Op_point	Steady state efficiency
27.	Gain Marg	-16.775 dB	Op_point	Bode Plot Gain Margin
28.	IC Tj	37.515 degC	Op_point	IC junction temperature
29.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
30.	IOUT_OP	2.0 A	Op_point	Iout operating point
31.	M1 TjOP	79.935 degC	Op_point	M1 MOSFET junction temperature
32.	M2 TjOP	49.391 degC	Op_point	MOSFET junction temperature
33.	Phase Marg	58.747 deg	Op_point	Bode Plot Phase Margin
34.	VIN_OP	5.0 V	Op_point	Vin operating point
35.	Vout p-p	78.617 mV	Op_point	Peak-to-peak output ripple voltage
36.	Cin Pd	460.257 mW	Power	Input capacitor power dissipation
37.	Cout Pd	82.093 mW	Power	Output capacitor power dissipation
38.	Coutx Pd	0.0 W	Power	Output capacitor_x power loss
39.	IC Pd	187.88 mW	Power	IC power dissipation
40.	L Pd	266.319 mW	Power	Inductor power dissipation
41.	M1 Pd	907.914 mW	Power	MOSFET power dissipation
42.	M1 PdCond	305.935 mW	Power	M1 MOSFET conduction losses
43.	M1 PdSw	601.979 mW	Power	M1 MOSFET switching losses
44.	M2 Pd	352.559 mW	Power	MOSFET power dissipation
45.	M2 PdCond	33.794 mW	Power	M2 MOSFET conduction losses
46.	M2 PdQrr	11.69 mW	Power	Synchronous Boost High Side Reverse Recovery
47.	M2 Pdbody	307.076 mW	Power	Power dissipation through lower FET
48.	Total Pd	2.801 W	Power	Total Power Dissipation
49.	M1 Vds Act	35.468 mV		M Vds
50.	Vout Tolerance	3.448 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	5.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	LM5122	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. The LM5122 is a wide range boost controller which is operable in an ultra wide input range of 4.5 to 65V. A boost regulator can maintain regulation for input voltages lower than the output voltage.

2. **LM5122** Product Folder : http://www.ti.com/product/LM5122 : contains the data sheet and other resources.