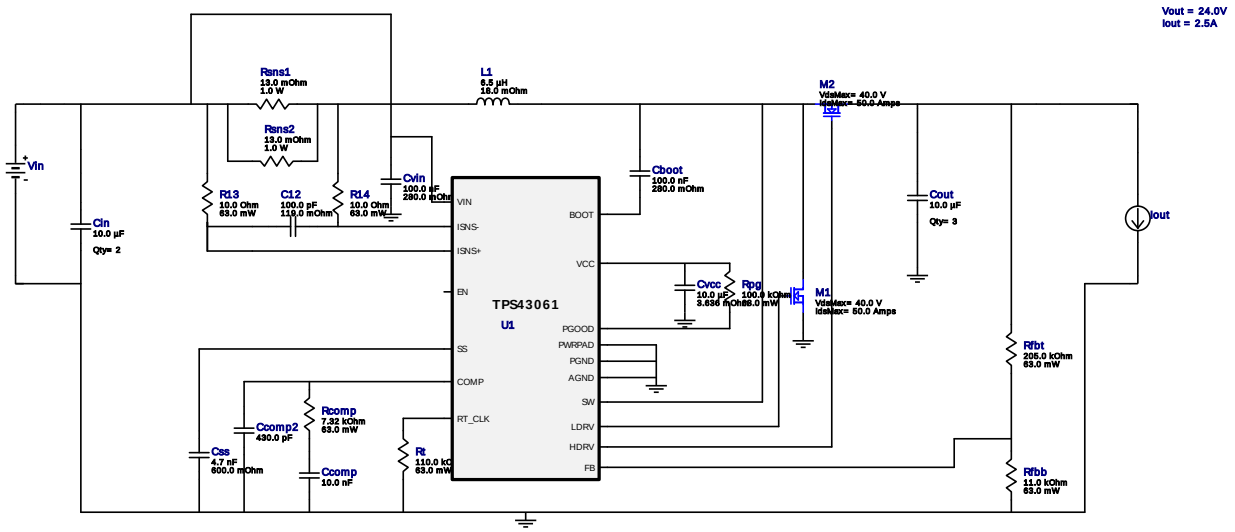
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 14.4V
Vout = 24.0V
Iout = 2.5A

Device = TPS43061RTER
Topology = Boost
Created = 7/11/16 4:25:39 AM
BOM Cost = $4.38
BOM Count = 25
Total Pd = 3.31W

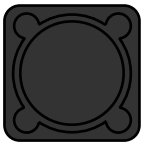
Design : 1641152/103 TPS43061RTER
TPS43061RTER 10.0V-14.4V to 24.00V @ 2.5A

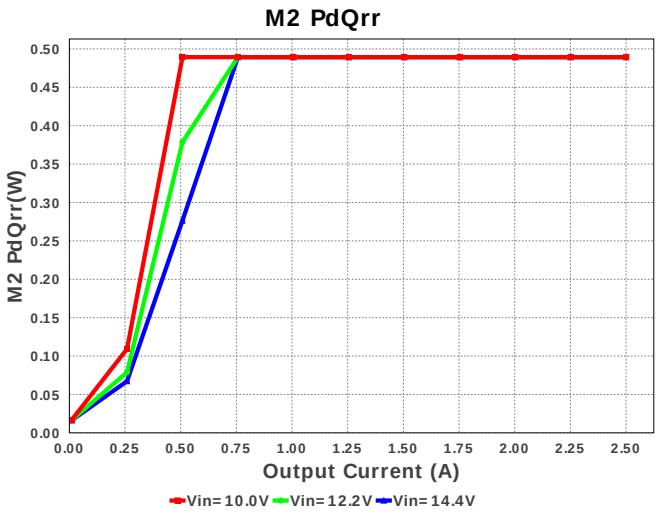


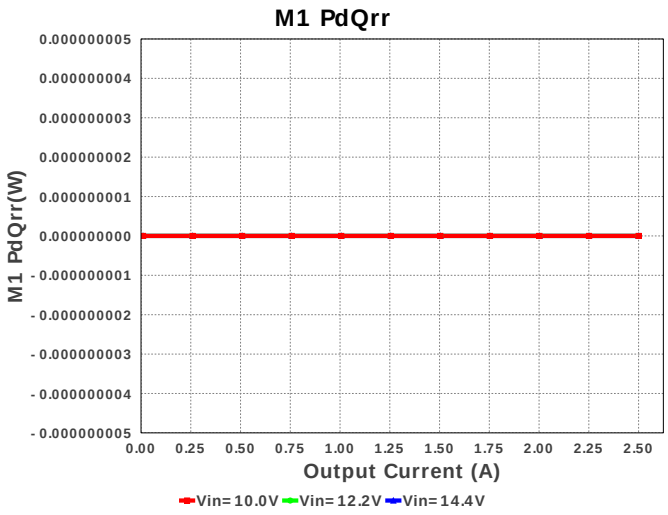
1. The pulse skip mode in the device has not been modeled. Efficiency and operational parameters of the model in pulse skip mode is not valid.

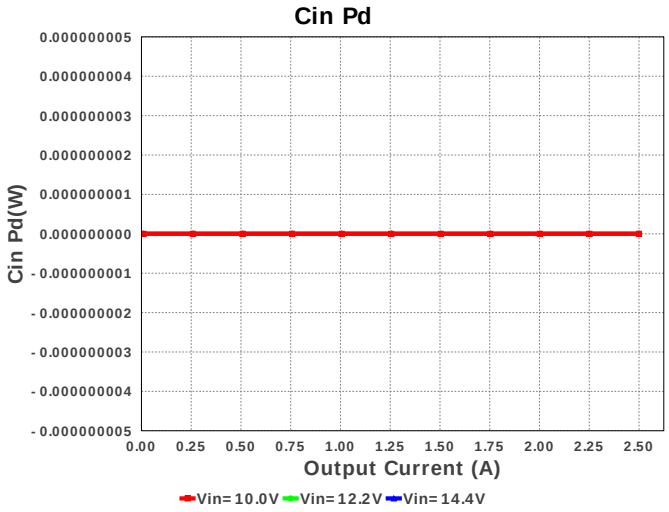
Electrical BOM

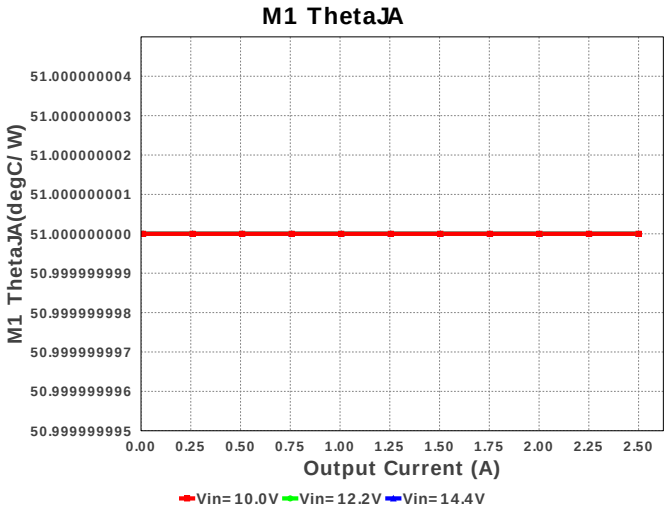
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	AVX	06035A101JAT2A Series= C0G/NP0	Cap= 100.0 pF ESR= 119.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
2.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
3.	Ccomp	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
4.	Ccomp2	MuRata	GRM1555C1E431JA01D Series= C0G/NP0	Cap= 430.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
5.	Cin	Taiyo Yuden	TMK316BJ106KL-T Series= X5R	Cap= 10.0 uF VDC= 25.0 V IRMS= 0.0 A	2	$0.05	1206 11 mm^2
6.	Cout	MuRata	GRM32ER71J106KA12L Series= X7R	Cap= 10.0 uF VDC= 63.0 V IRMS= 0.0 A	3	$0.27	1210_280 15 mm^2
7.	Css	MuRata	GRM188R71E472KA01D Series= X7R	Cap= 4.7 nF ESR= 600.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
8.	Cvcc	MuRata	GRM188R61C106MA73D Series= X5R	Cap= 10.0 uF ESR= 3.636 mOhm VDC= 16.0 V IRMS= 2.8889 A	1	$0.07	0603 5 mm^2
9.	Cvin	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

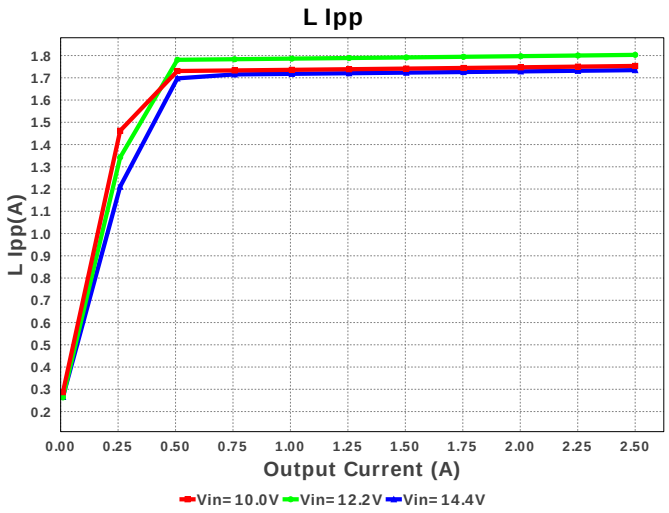
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	L1	Bourns	SRR1208-6R5ML	L= 6.5 µH DCR= 18.0 mOhm	1	$0.37	 SRR1208 216 mm^2
11.	M1	Texas Instruments	CSD18504Q5A	VdsMax= 40.0 V IdsMax= 50.0 Amps	1	$0.56	 TRANS_NexFET_Q5A 55 mm^2
12.	M2	Texas Instruments	CSD18504Q5A	VdsMax= 40.0 V IdsMax= 50.0 Amps	1	$0.56	 TRANS_NexFET_Q5A 55 mm^2
13.	R13	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.	R14	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
15.	Rcomp	Vishay-Dale	CRCW04027K32FKED Series= CRCW..e3	Res= 7.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
16.	Rfbb	Vishay-Dale	CRCW040211K0FKED Series= CRCW..e3	Res= 11.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
17.	Rfbt	Vishay-Dale	CRCW0402205KFKED Series= CRCW..e3	Res= 205.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
18.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
19.	Rsns1	Susumu Co Ltd	PRL1632-R013-F-T1 Series= PRL1632	Res= 13.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	 0612 11 mm^2
20.	Rsns2	Susumu Co Ltd	PRL1632-R013-F-T1 Series= PRL1632	Res= 13.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	 0612 11 mm^2
21.	Rt	Vishay-Dale	CRCW0402110KFKED Series= CRCW..e3	Res= 110.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
22.	U1	Texas Instruments	TPS43061RTER	Switcher	1	$1.40	 S-PVQFN-N16 17 mm^2

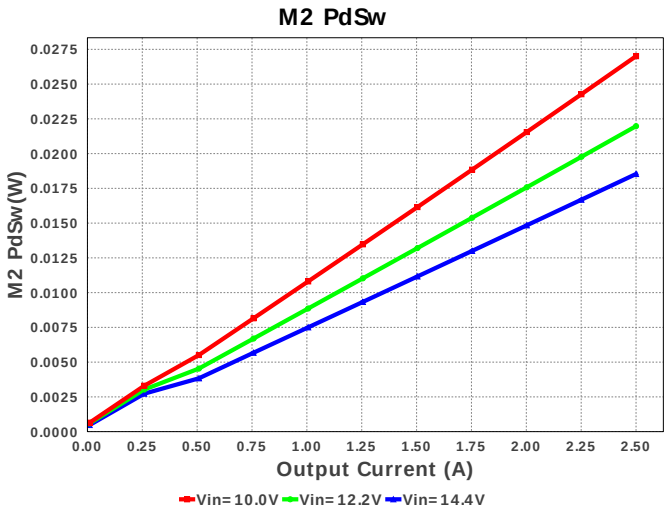


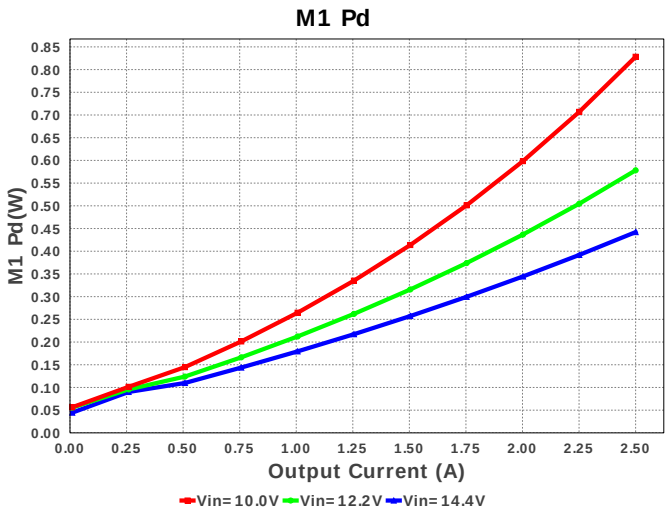


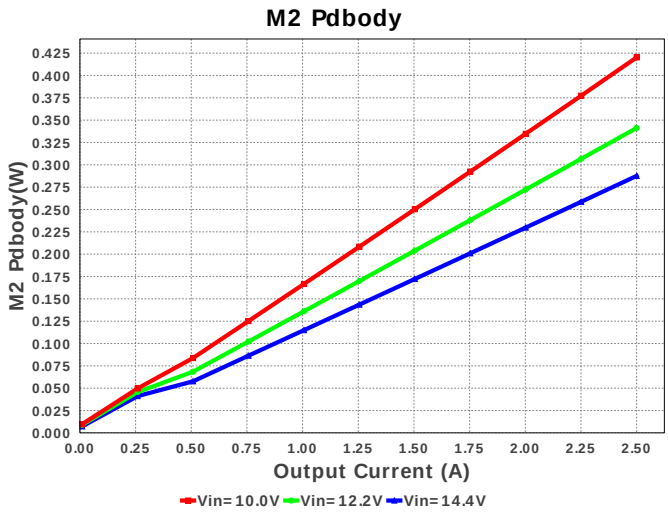


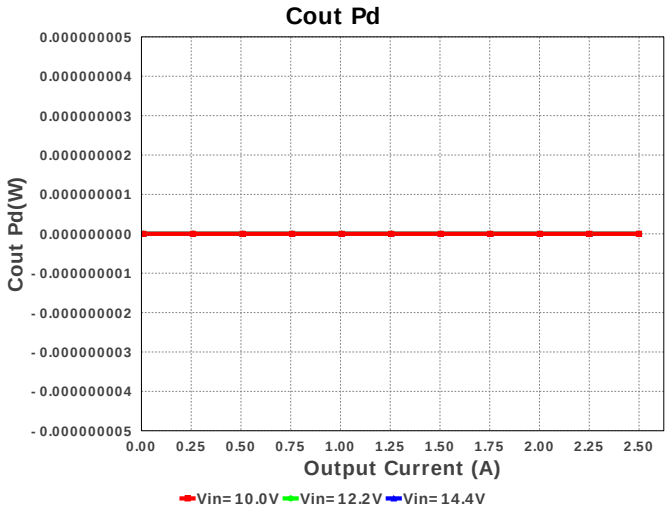


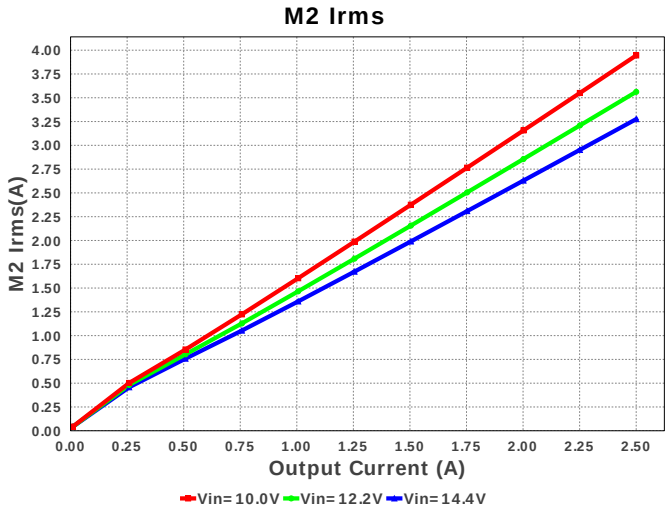


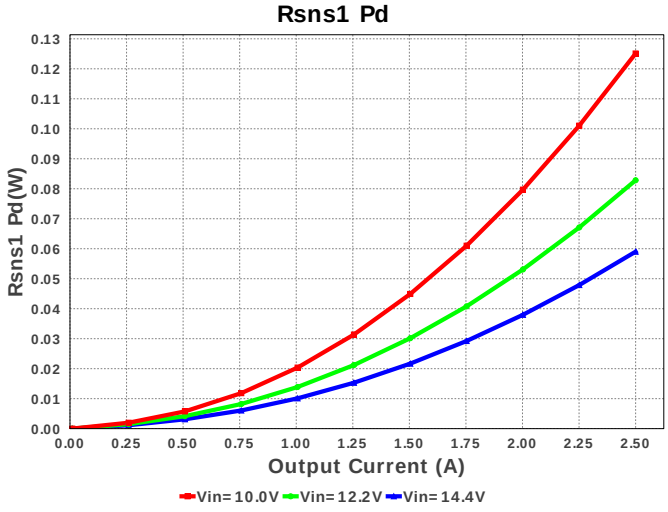


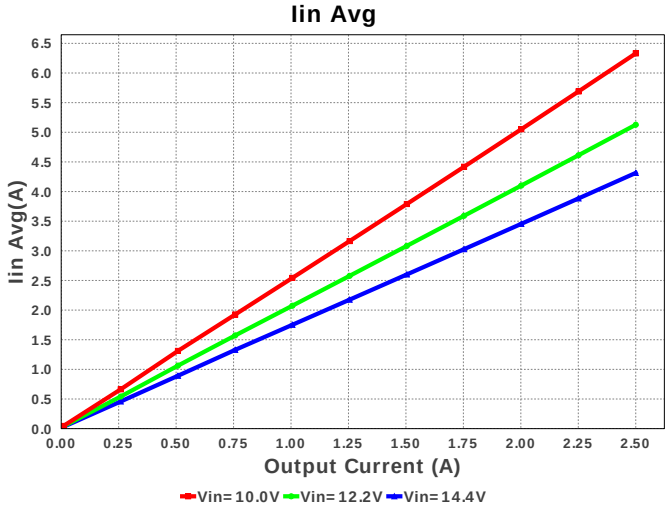




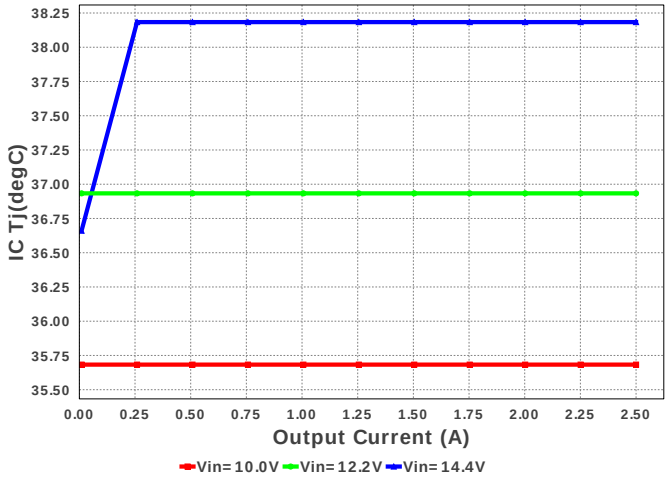




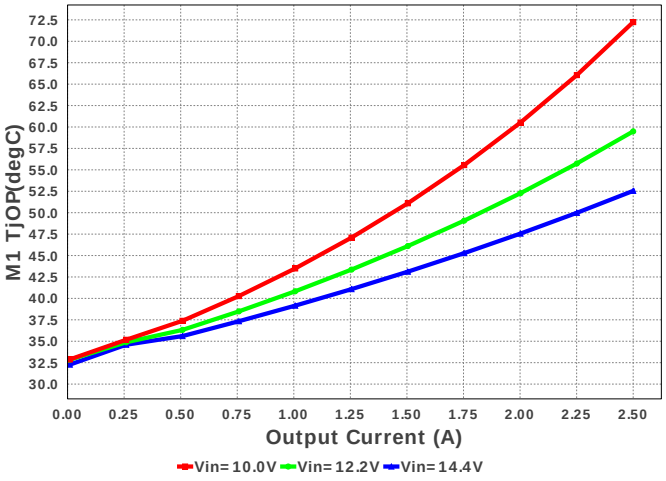




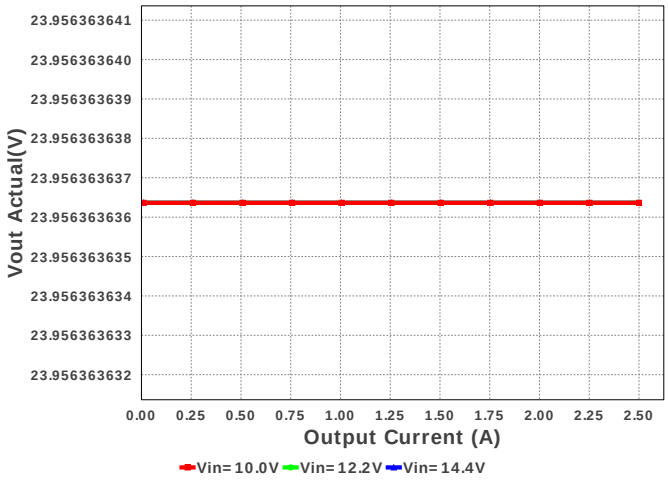
IC Tj



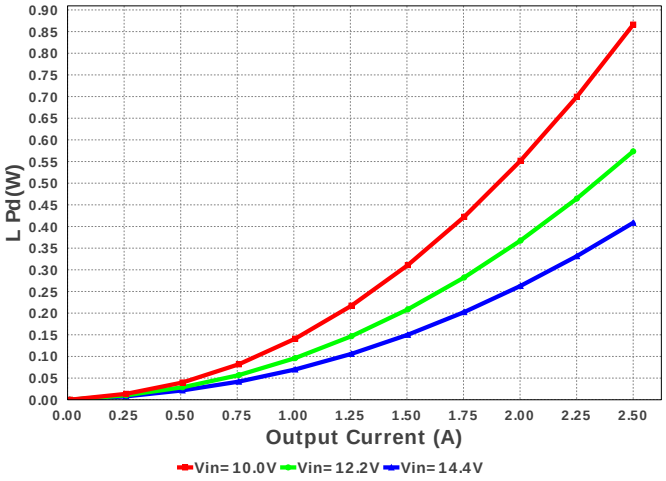
M1 TjOP



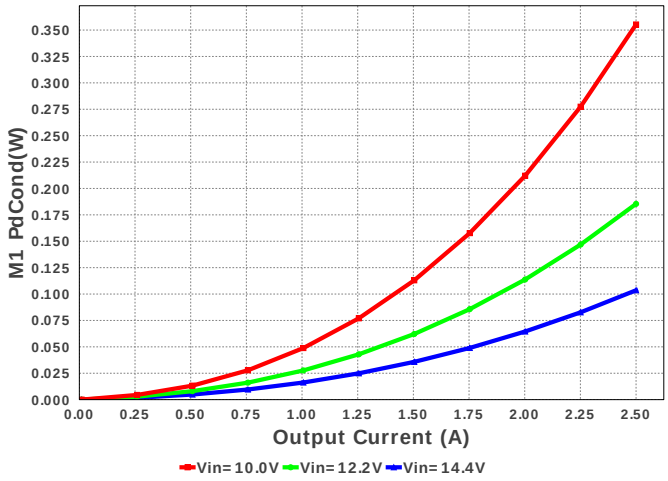
Vout Actual



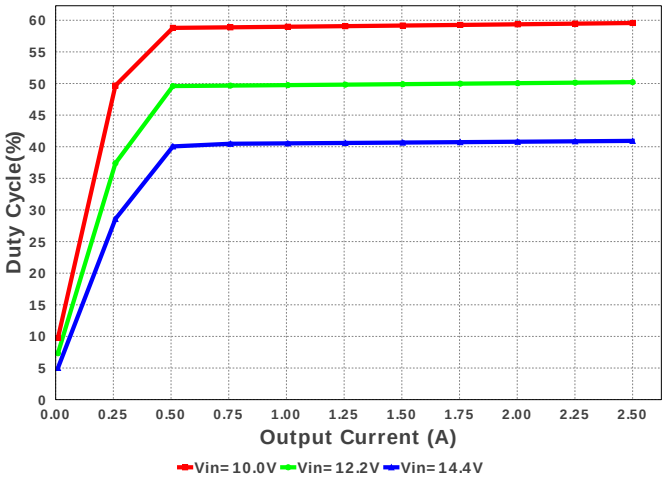
L Pd

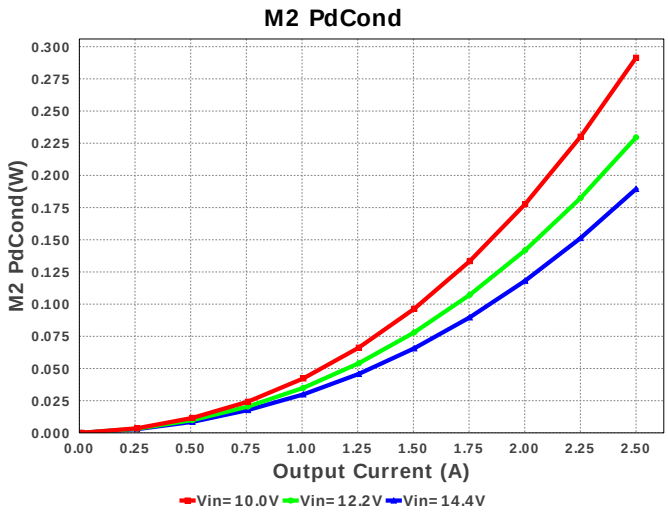


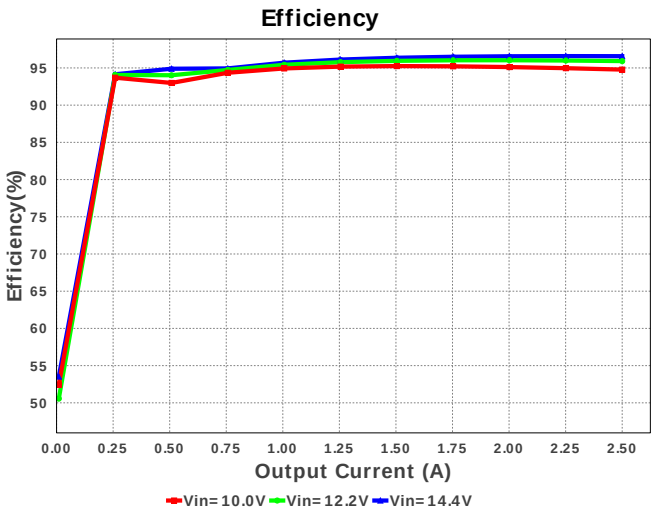
M1 PdCond

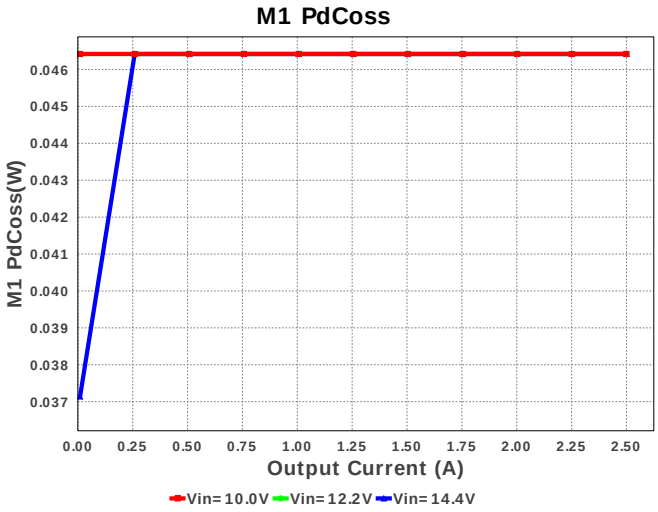


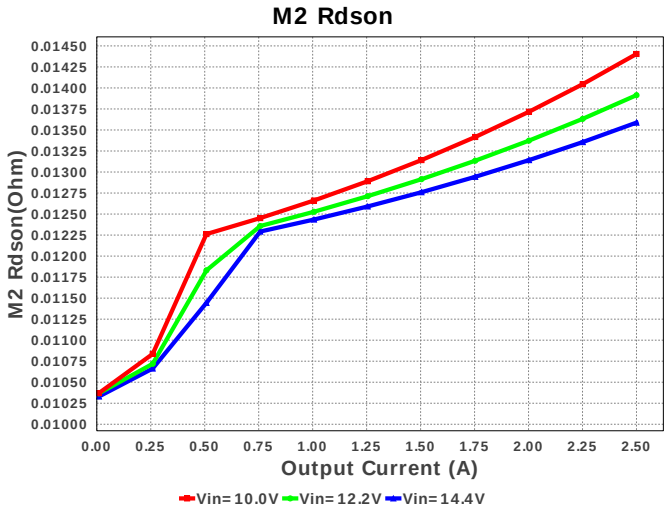
Duty Cycle

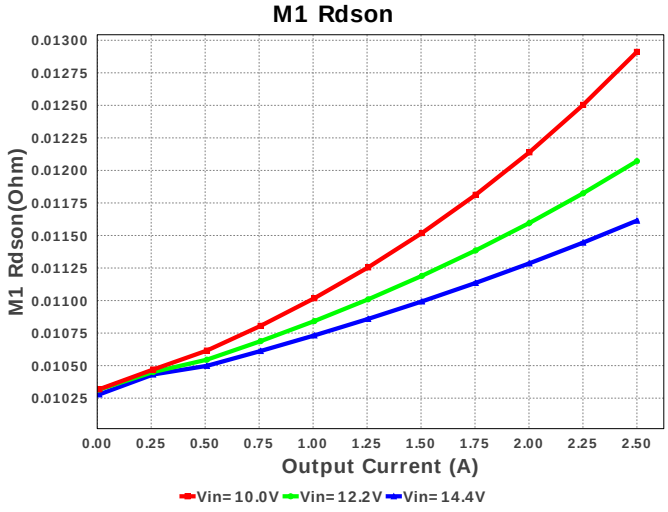


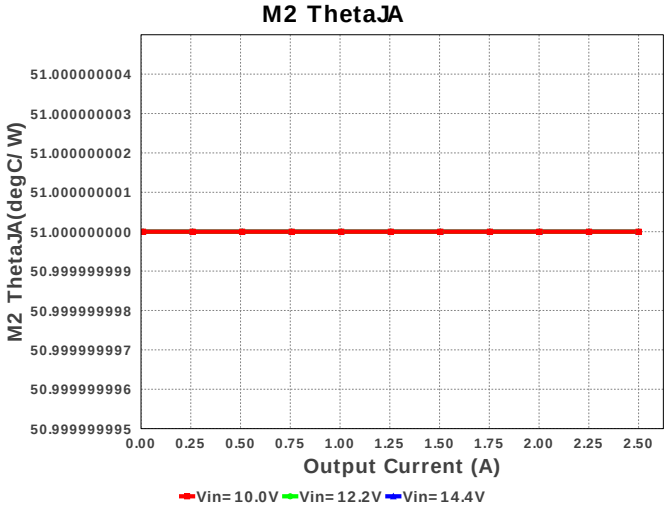


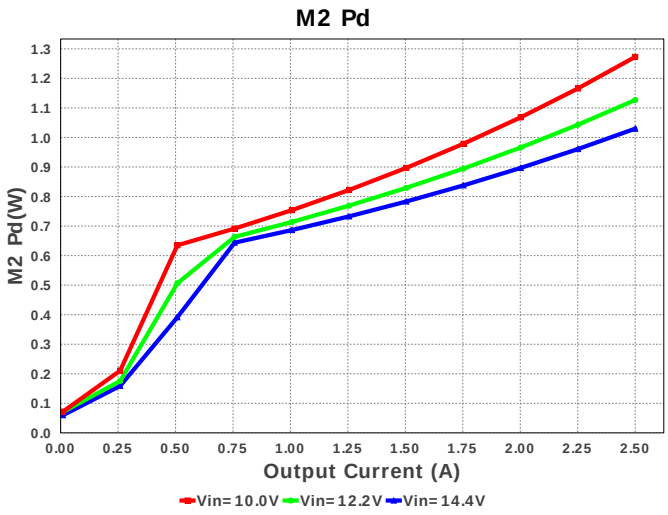


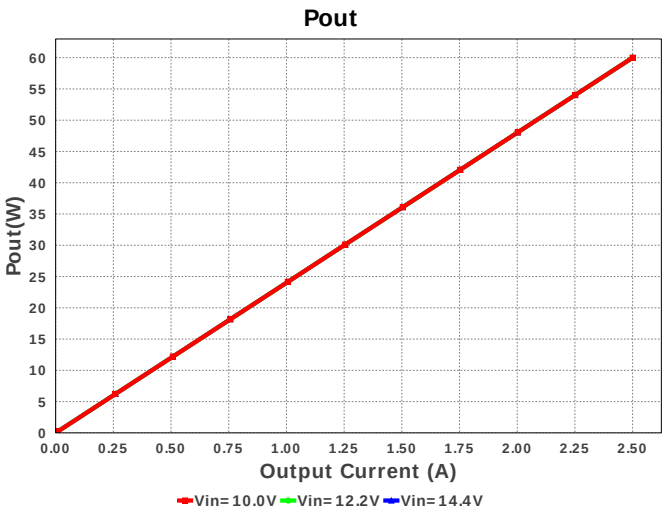


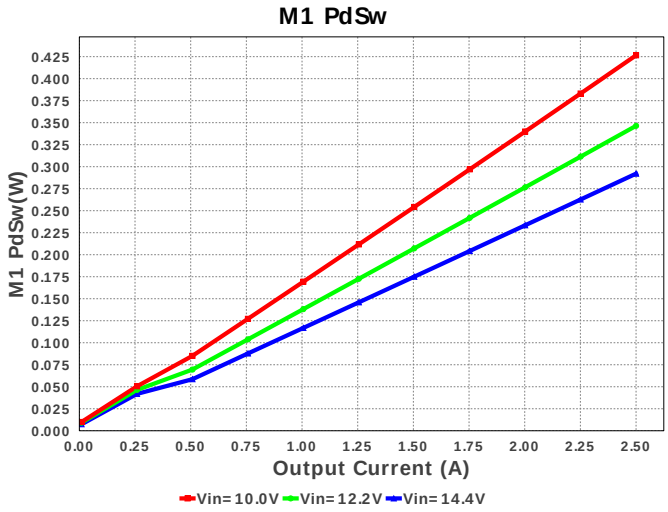


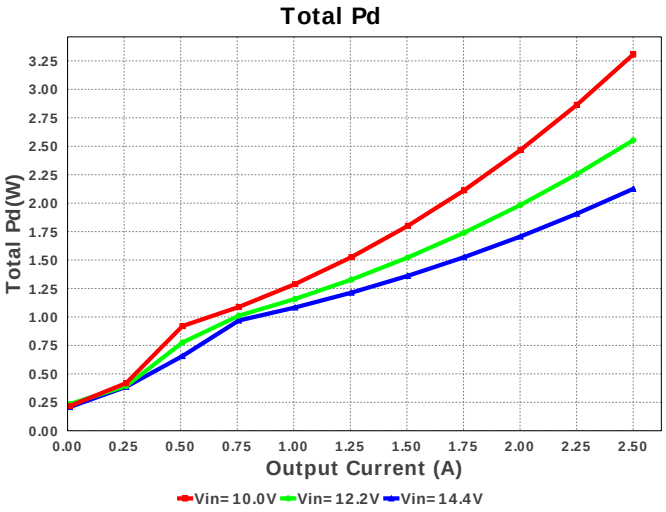


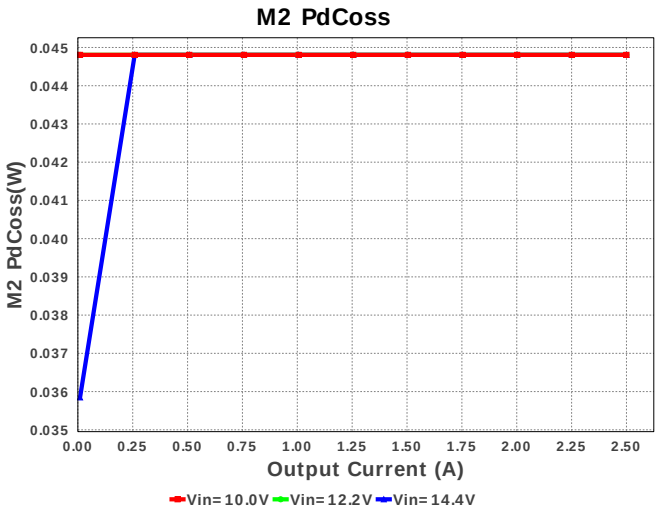


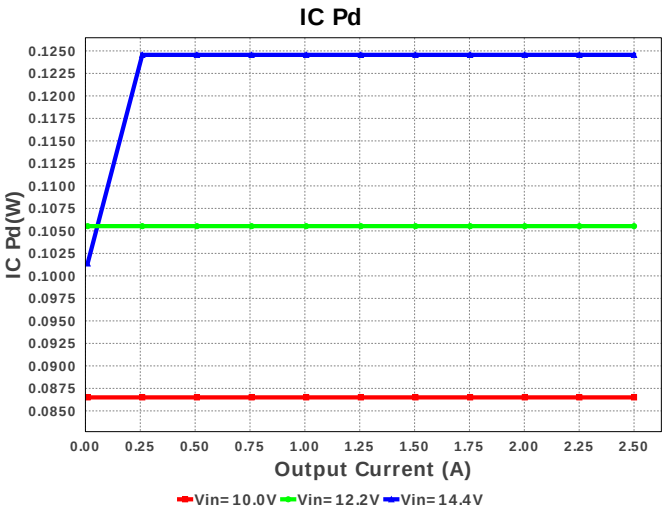




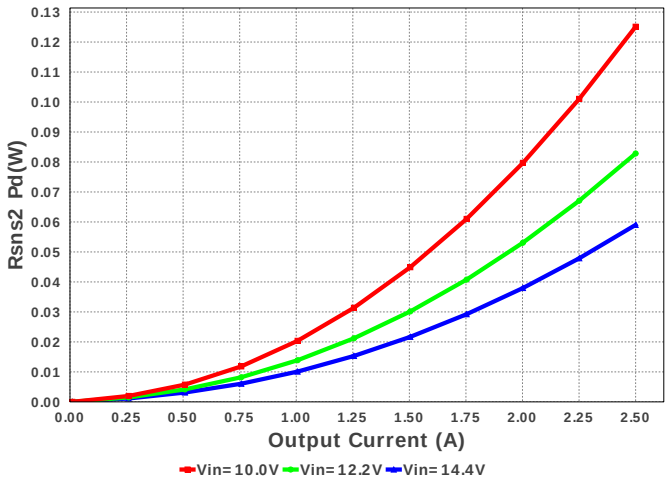




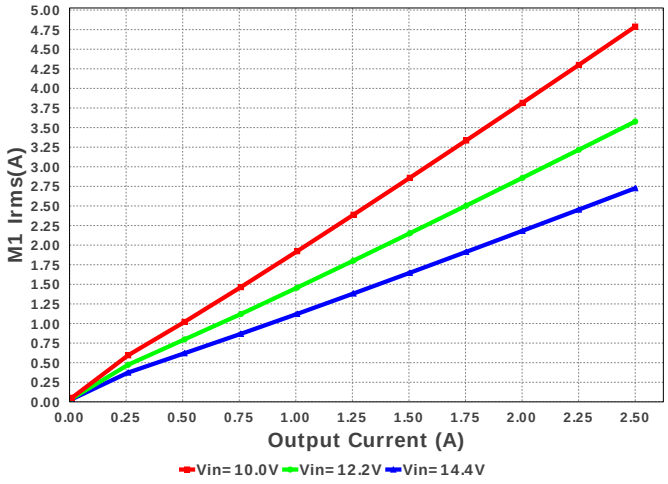




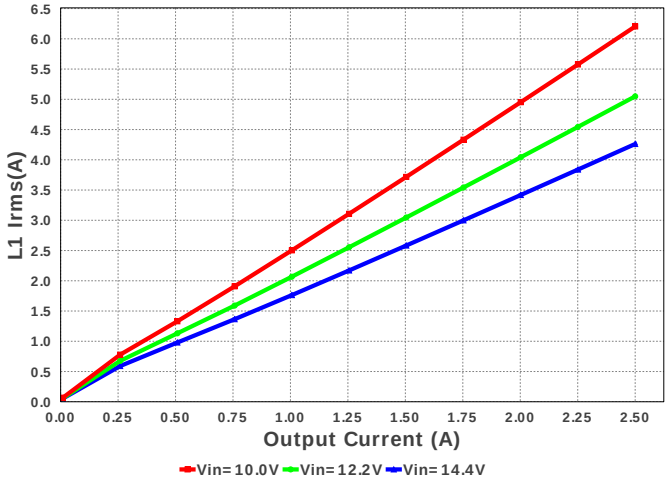
Rsns2 Pd



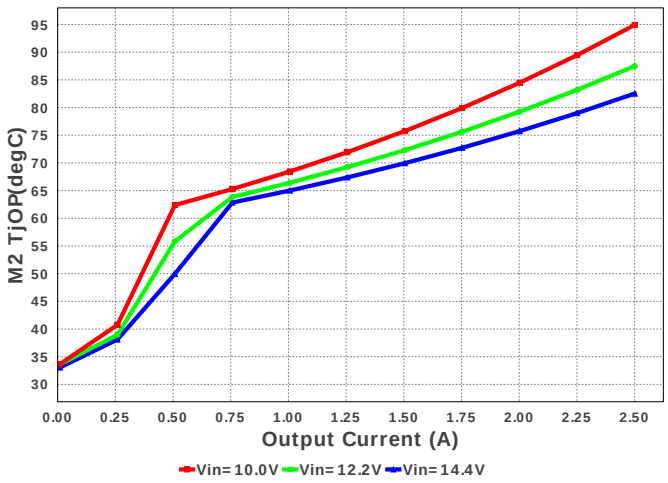
M1 Irms



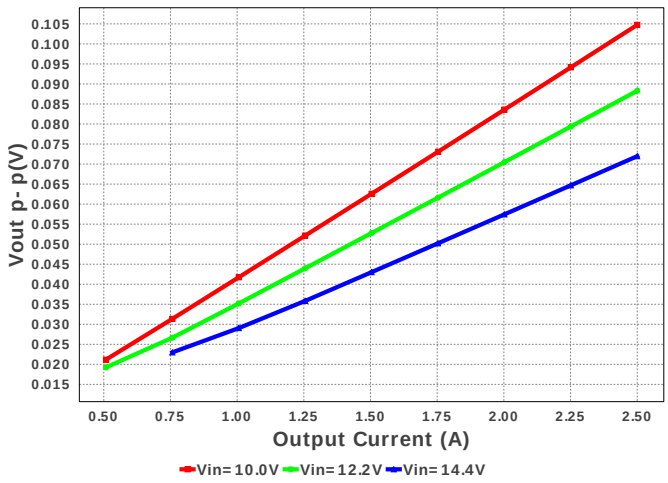
L1 Irms



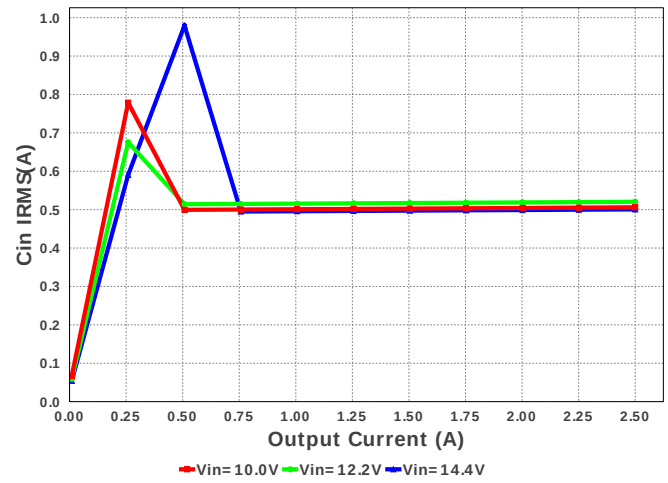
M2 TjOP

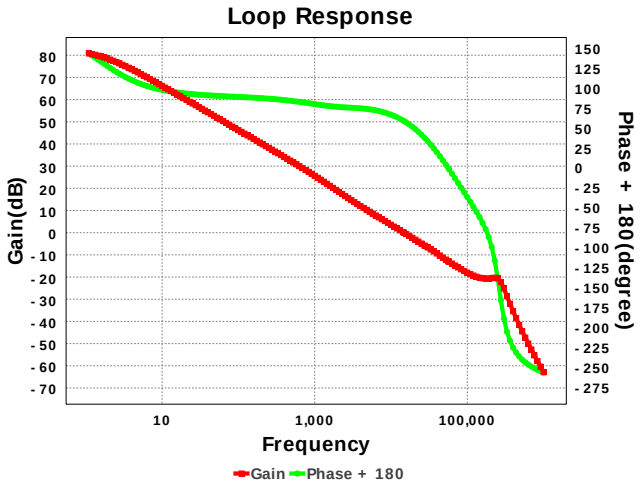


Vout p- p



Cin IRMS





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	506.121 mA	Current	Input capacitor RMS ripple current
2.	Iin Avg	6.331 A	Current	Average input current
3.	L Ipp	1.753 A	Current	Peak-to-peak inductor ripple current
4.	L1 Irms	6.204 A	Current	Inductor ripple current
5.	M1 Irms	4.789 A	Current	MOSFET RMS ripple current
6.	M2 Irms	3.945 A	Current	MOSFET RMS ripple current
7.	BOM Count	25	General	Total Design BOM count
8.	FootPrint	489.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	522.727 kHz	General	Switching frequency
10.	M1 Rdson	12.911 mOhm	General	Drain-Source On-resistance
11.	M1 ThetaJA	51.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
12.	M2 Rdson	14.412 mOhm	General	Drain-Source On-resistance
13.	M2 ThetaJA	51.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
14.	Pout	60.0 W	General	Total output power
15.	Total BOM	$4.38	General	Total BOM Cost
16.	Low Freq Gain	78.791 dB	Op_Point	Gain at 10Hz
17.	Vout Actual	23.956 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
18.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	10.432 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	59.571 %	Op_point	Duty cycle
21.	Efficiency	94.774 %	Op_point	Steady state efficiency
22.	Gain Marg	-10.758 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	35.683 degC	Op_point	IC junction temperature
24.	ICThetaJA	65.7 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	2.5 A	Op_point	Iout operating point
26.	M1 TjOP	72.239 degC	Op_point	M1 MOSFET junction temperature
27.	M2 TjOP	95.024 degC	Op_point	MOSFET junction temperature
28.	Phase Marg	57.847 deg	Op_point	Bode Plot Phase Margin
29.	VIN_OP	10.0 V	Op_point	Vin operating point
30.	Vout p-p	104.753 mV	Op_point	Peak-to-peak output ripple voltage
31.	Cin Pd	0.0 W	Power	Input capacitor power dissipation
32.	Cout Pd	0.0 W	Power	Output capacitor power dissipation
33.	IC Pd	86.5 mW	Power	IC power dissipation
34.	L Pd	866.107 mW	Power	Inductor power dissipation
35.	M1 Pd	828.22 mW	Power	MOSFET power dissipation
36.	M1 PdCond	355.273 mW	Power	M1 MOSFET conduction losses
37.	M1 PdCoss	46.421 mW	Power	M1 MOSFET Coss Losses
38.	M1 PdQrr	0.0 W	Power	M1 MOSFET switching losses
39.	M1 PdSw	426.526 mW	Power	M1 MOSFET switching losses
40.	M2 Pd	1.275 W	Power	MOSFET power dissipation
41.	M2 PdCond	291.566 mW	Power	M2 MOSFET conduction losses
42.	M2 PdCoss	44.807 mW	Power	M2 MOSFET Coss Losses
43.	M2 PdQrr	491.4 mW	Power	Synchronous Boost High Side Reverse Recovery
44.	M2 PdSw	27.008 mW	Power	M2 MOSFET switching losses
45.	M2 Pdbody	420.207 mW	Power	Power dissipation through lower FET
46.	Rsns1 Pd	125.104 mW	Power	Rsns1 Power Dissipation
47.	Rsns2 Pd	125.104 mW	Power	Rsns2 Power Dissipation
48.	Total Pd	3.309 W	Power	Total Power Dissipation
49.	Vout Tolerance	4.006 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.5	Maximum Output Current
2.	VinMax	14.4	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	TPS43061	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. Feature Highlights: Low Quiescent Current Boost Controller, Wide Vin Range 4.5V to 38V Vin, 58V Vout, 5.5V Gate Drive optimized for Low Qg NexFETs Thermal Shutdown

2. **TPS43061** Product Folder : http://www.ti.com/product/TPS43061 : contains the data sheet and other resources.