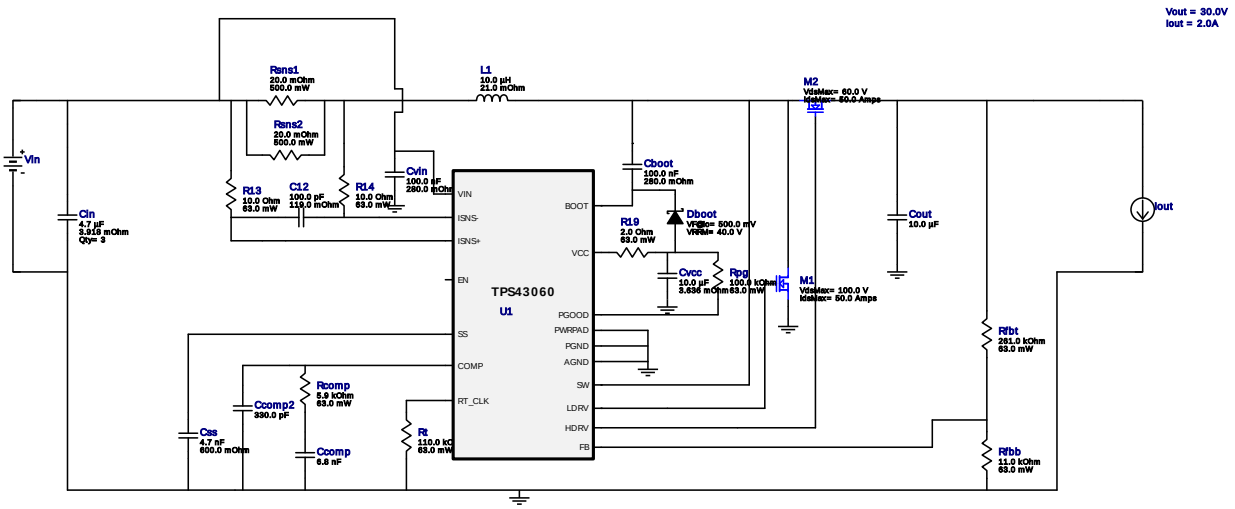
WEBENCH® Design Report

VinMin = 14.0V
VinMax = 17.0V
Vout = 30.0V
Iout = 2.0A

Device = TPS43060RTER
Topology = Boost
Created = 9/23/16 8:29:42 PM
BOM Cost = $3.58
BOM Count = 26
Total Pd = 2.97W

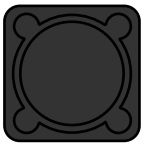
Design : 4802695/5 TPS43060RTER
TPS43060RTER 14.0V-17.0V to 30.00V @ 2.0A

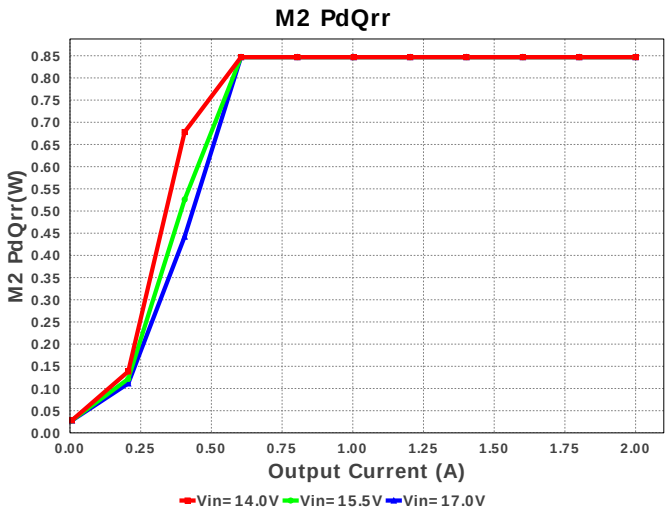


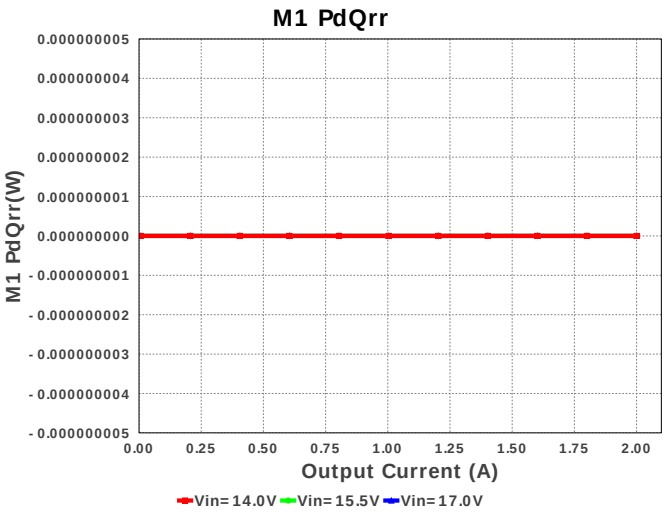
1. The pulse skip mode in the device has not been modeled. Efficiency and operational parameters of the model in pulse skip mode is not valid.

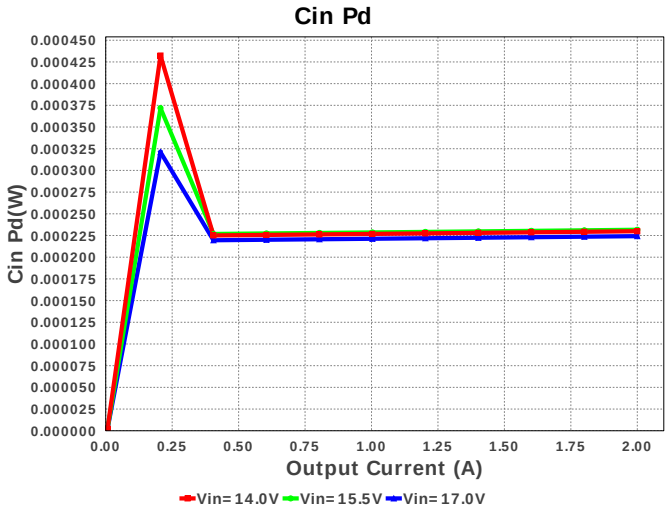
Electrical BOM

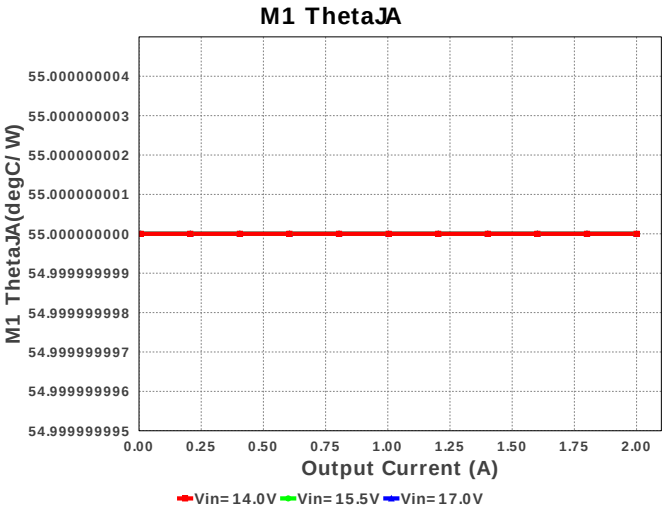
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	AVX	06035A101JAT2A Series= C0G/NP0	Cap= 100.0 pF ESR= 119.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
2.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
3.	Ccomp	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
4.	Ccomp2	Samsung Electro-Mechanics	CL21C331JBANFNC Series= C0G/NP0	Cap= 330.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
5.	Cin	TDK	C3216JB1V475K Series= JB	Cap= 4.7 uF ESR= 3.918 mOhm VDC= 35.0 V IRMS= 0.0 A	3	$0.13	1206 11 mm^2
6.	Cout	MuRata	GRM32ER71J106KA12L Series= X7R	Cap= 10.0 uF VDC= 63.0 V IRMS= 0.0 A	1	$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

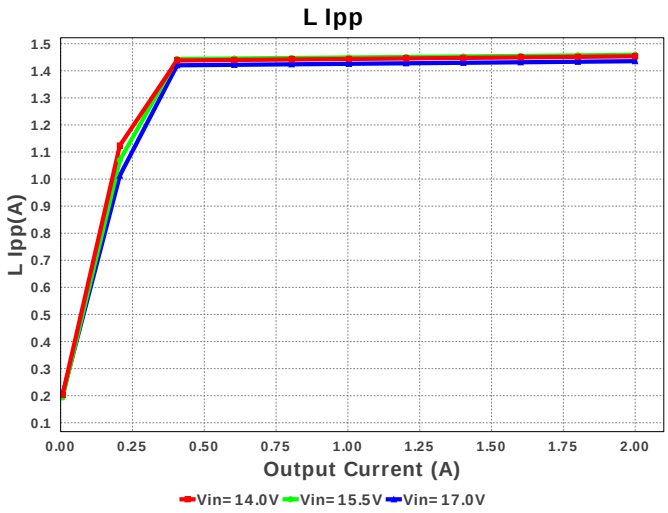
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Dboot	Vishay-Semiconductor	SS14-E3/61T	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.08	 SMA 37 mm^2
11.	L1	Bourns	SRR1208-100ML	L= 10.0 µH DCR= 21.0 mOhm	1	$0.37	 SRR1208 216 mm^2
12.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	$0.50	 DQG0008A 18 mm^2
13.	M2	Texas Instruments	CSD18537NQ5A	VdsMax= 60.0 V IdsMax= 50.0 Amps	1	$0.31	 TRANS_NexFET_Q5A 55 mm^2
14.	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
15.	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
16.	R19	Vishay-Dale	CRCW04022R00FKED Series= CRCW..e3	Res= 2.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
17.	Rcomp	Vishay-Dale	CRCW04025K90FKED Series= CRCW..e3	Res= 5.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
18.	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
19.	Rfbt	Vishay-Dale	CRCW0402261KFKED Series= CRCW..e3	Res= 261.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
20.	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
21.	Rsns1	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11 mm^2
22.	Rsns2	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11 mm^2
23.	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
24.	U1	Texas Instruments	TPS43060RTER	Switcher	1	$1.25	 S-PVQFN-N16 17 mm^2

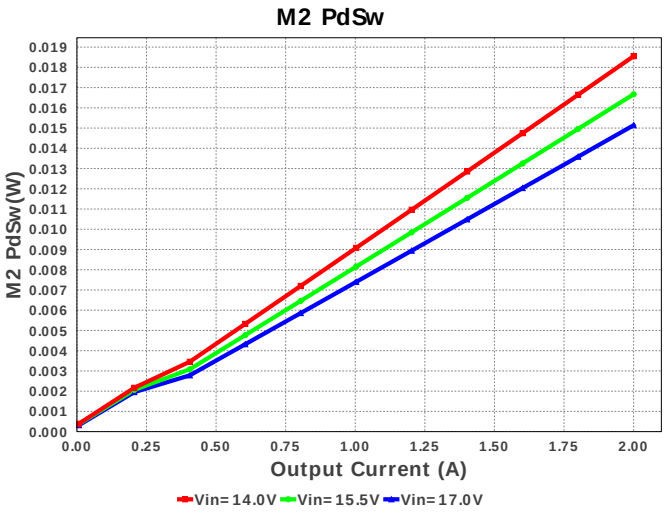


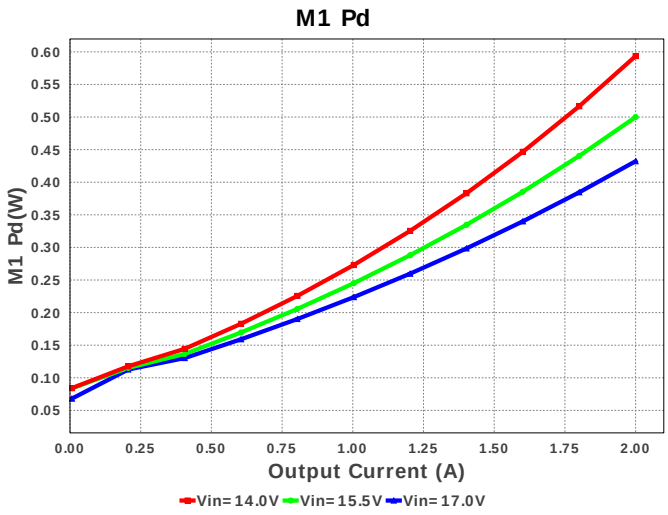


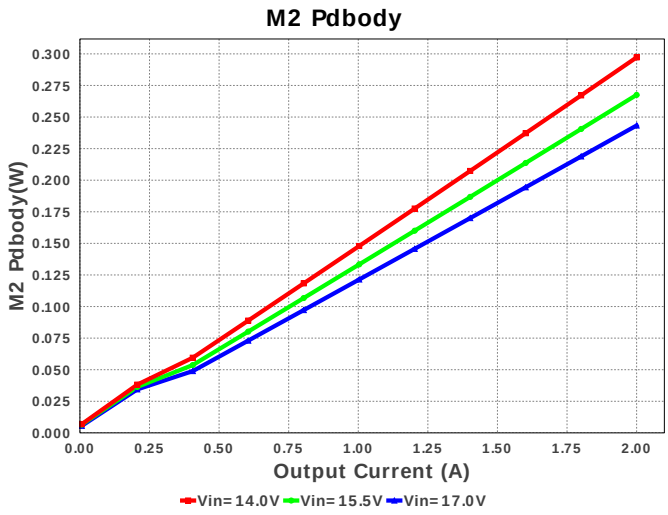


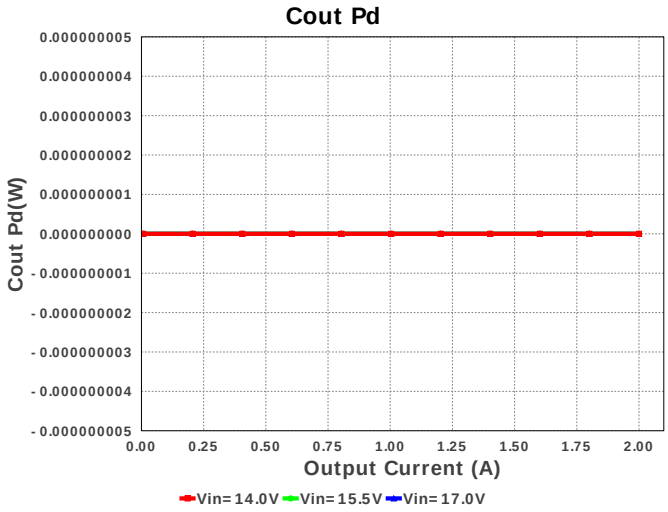


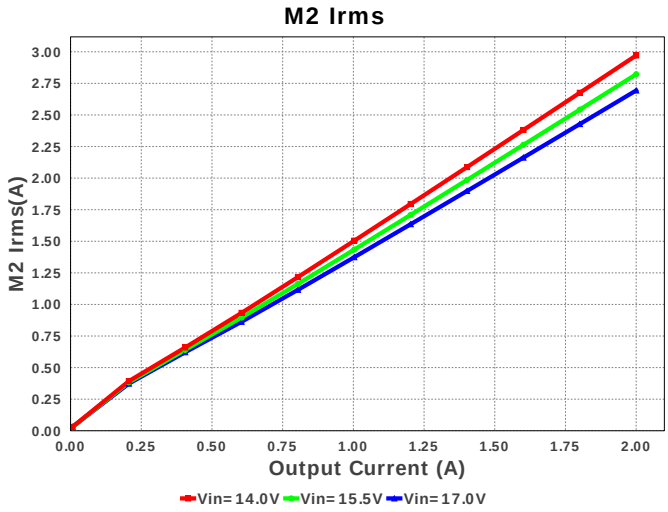


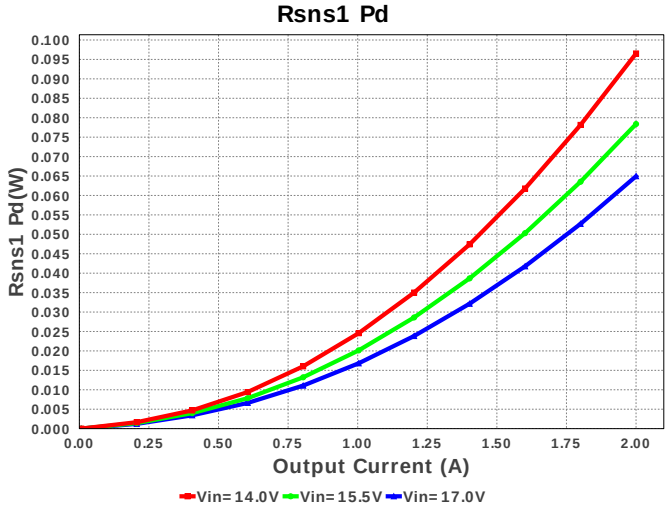


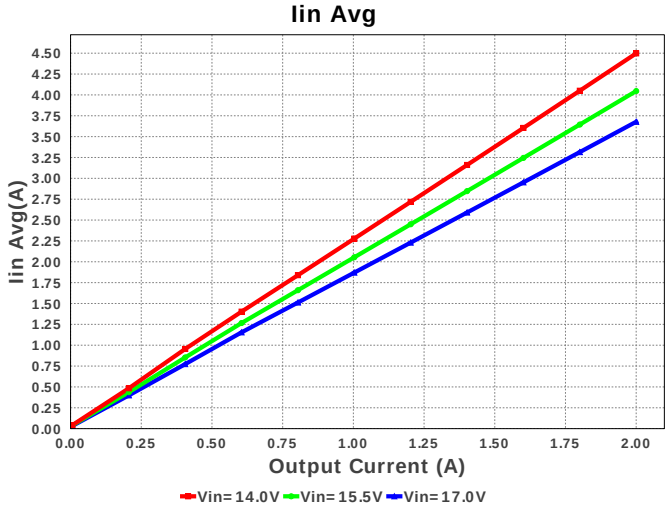


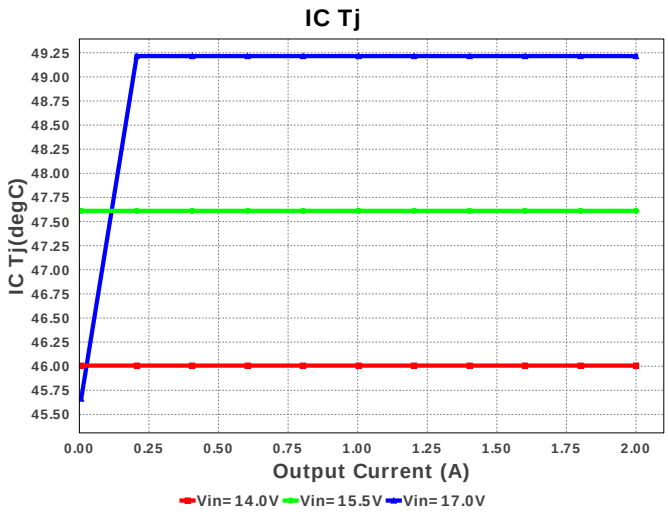


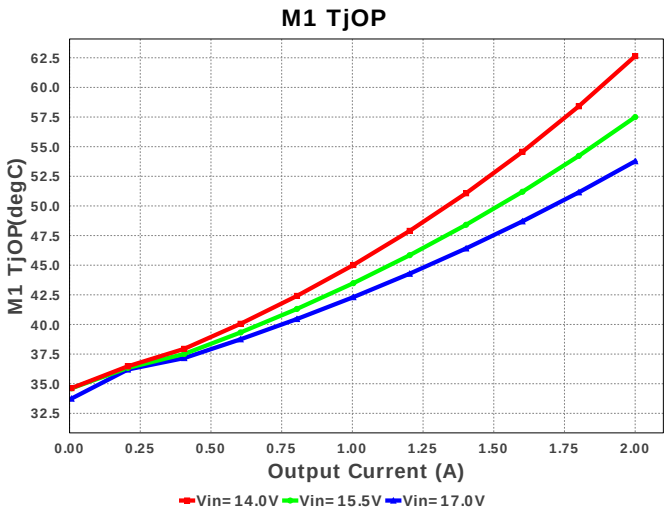


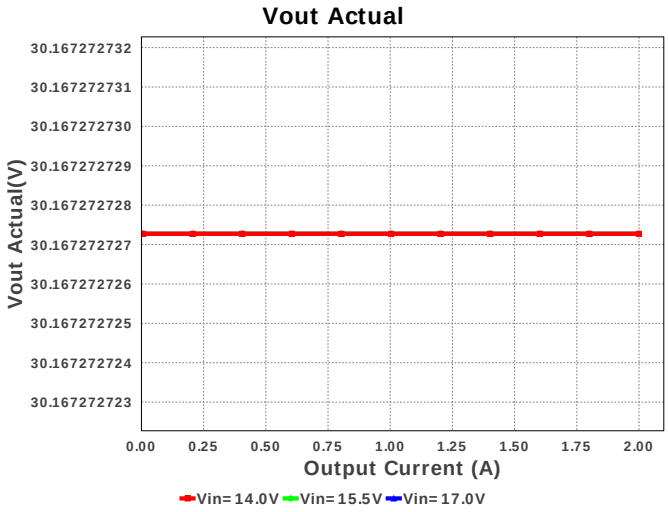


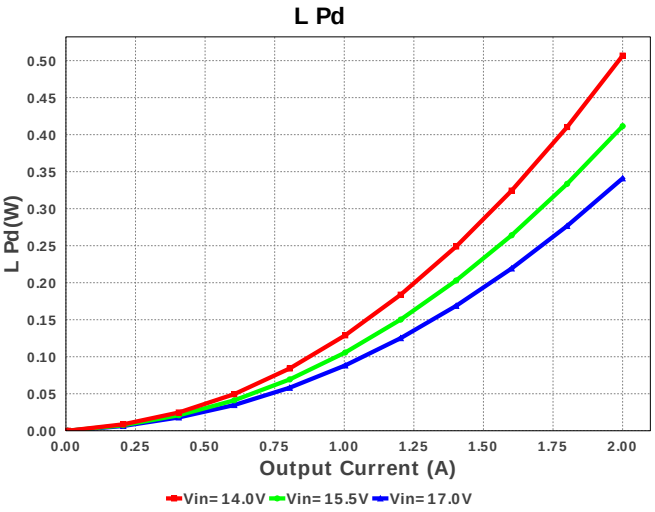


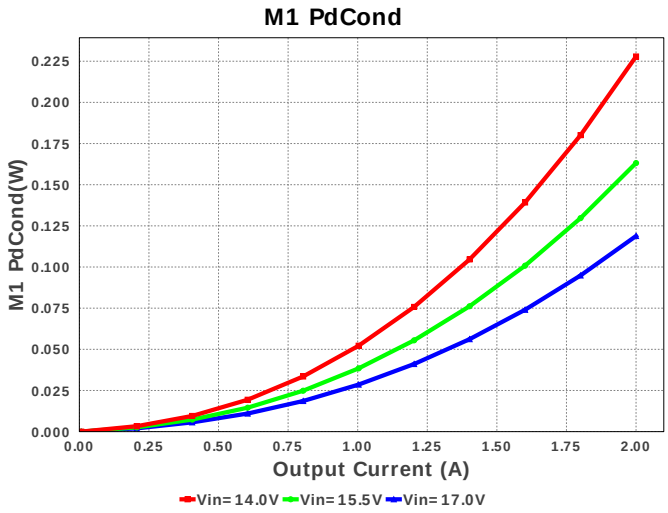


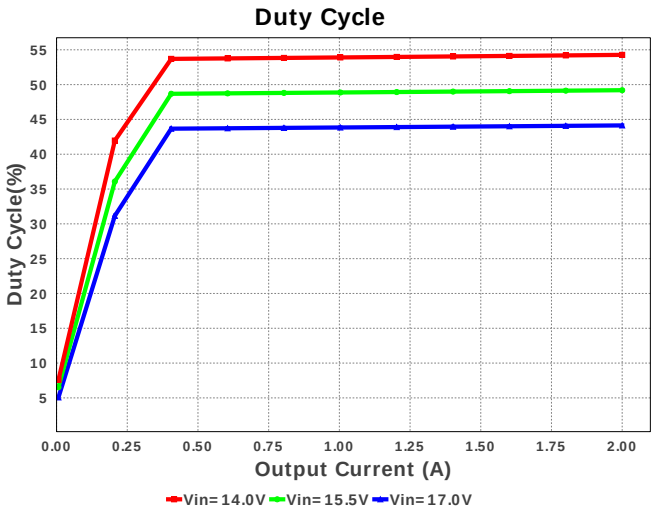


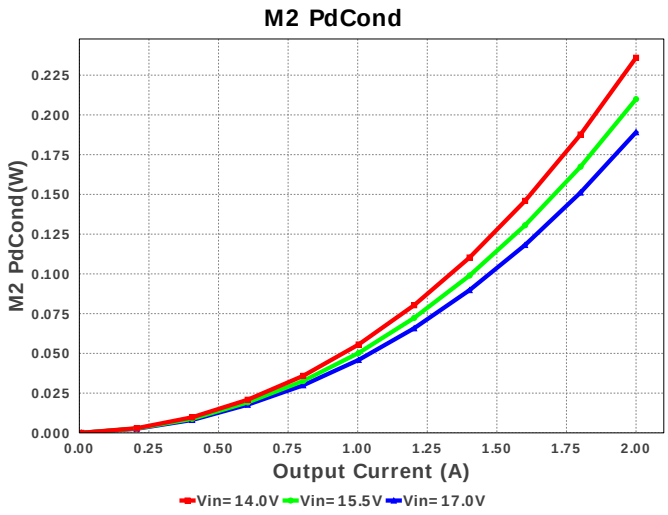


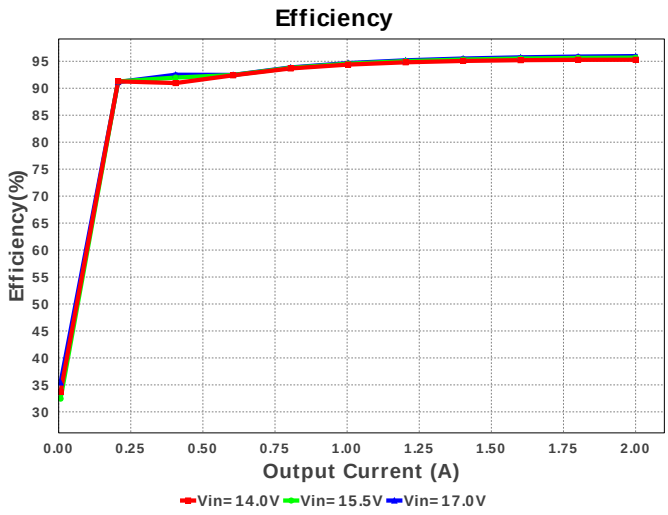


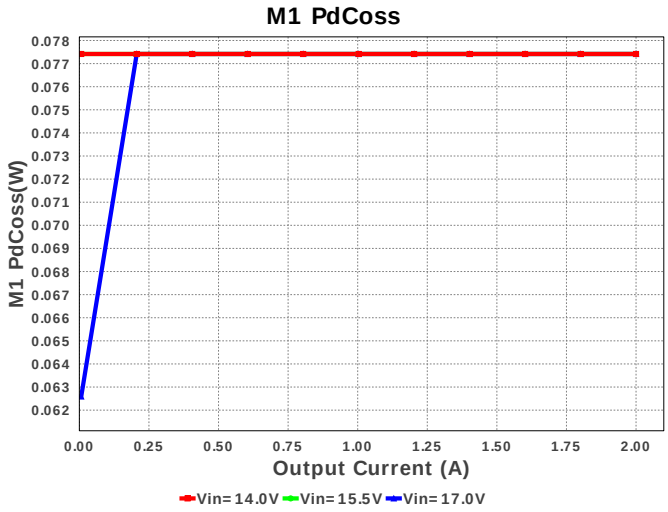


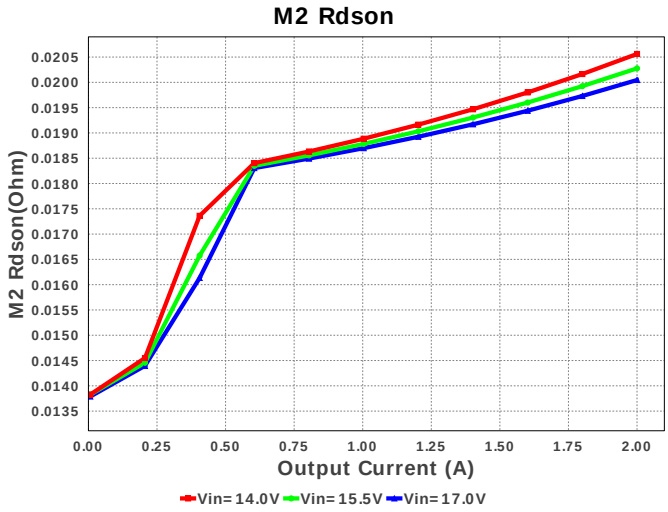


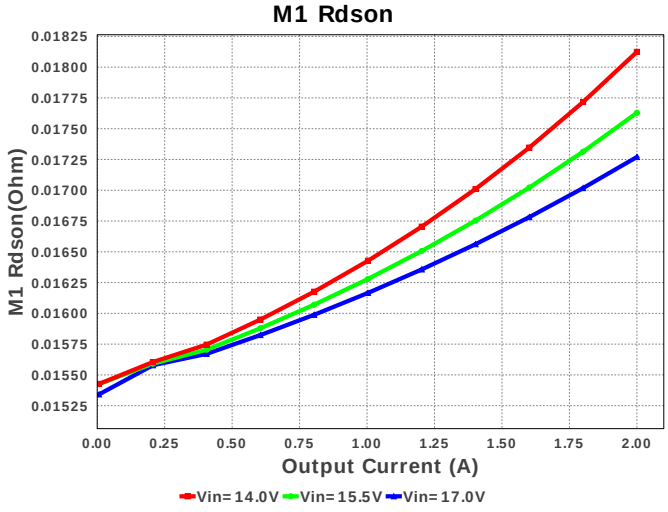


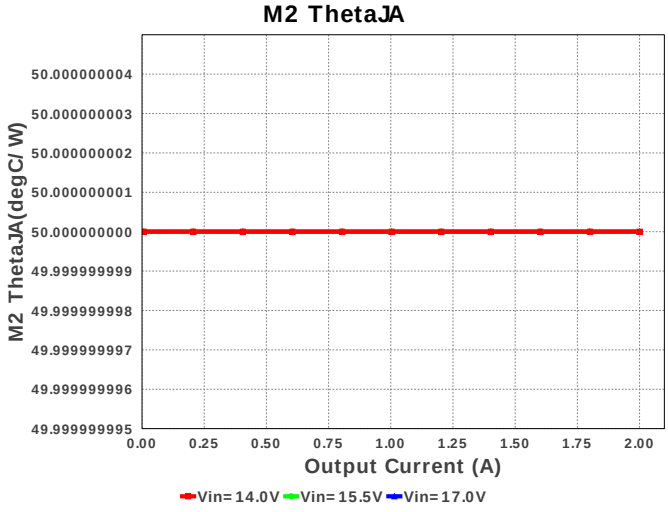


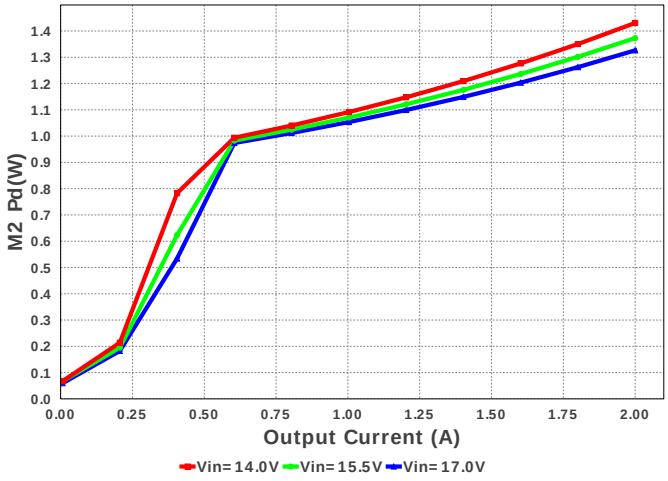


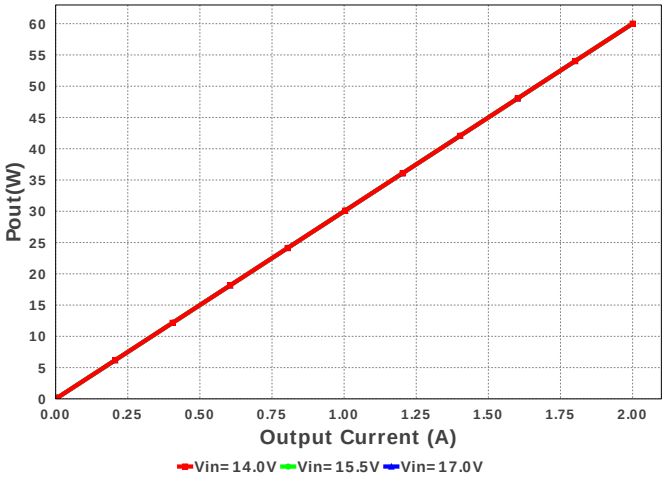


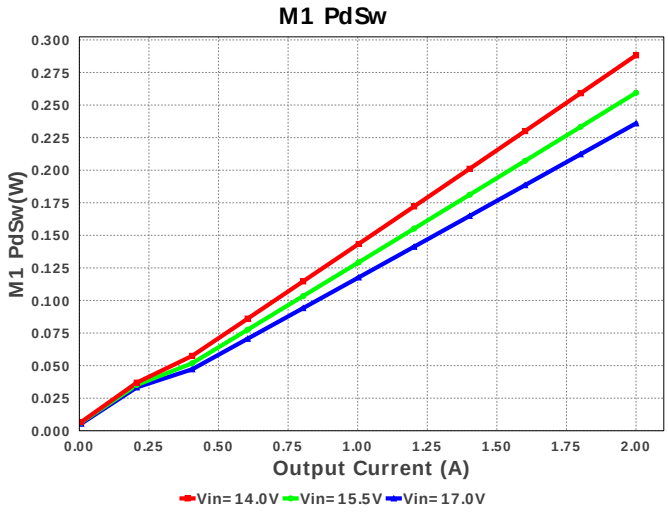


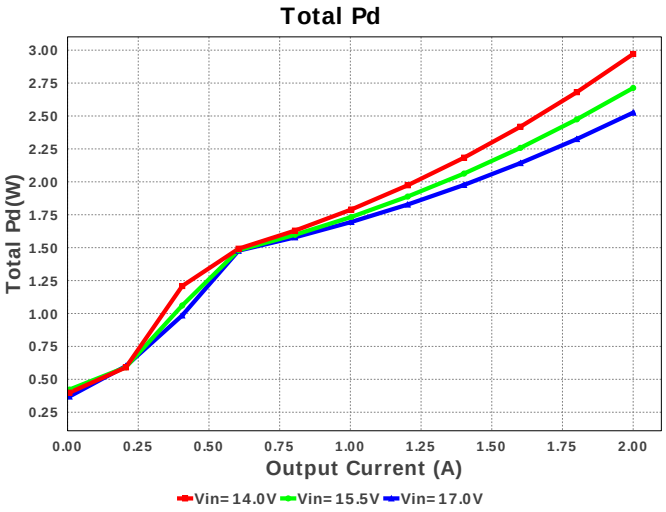


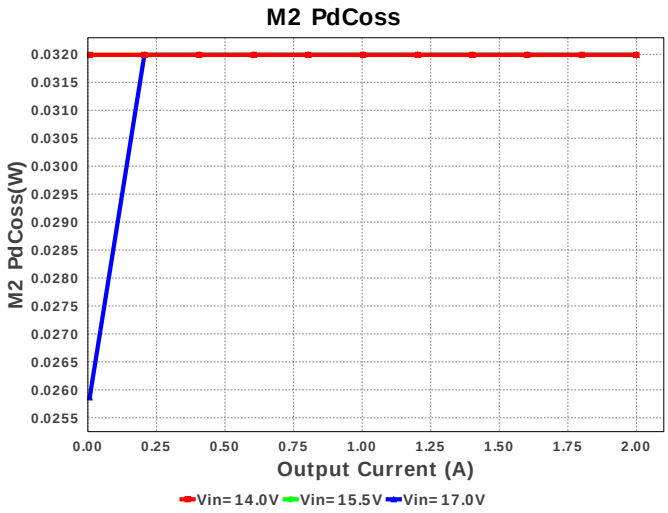


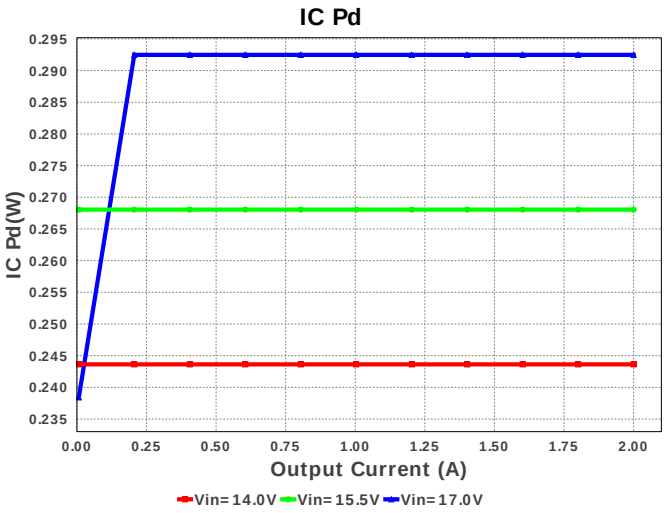


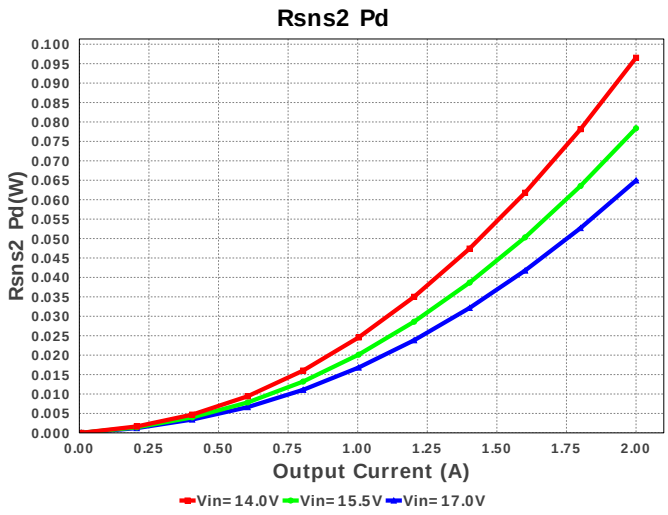


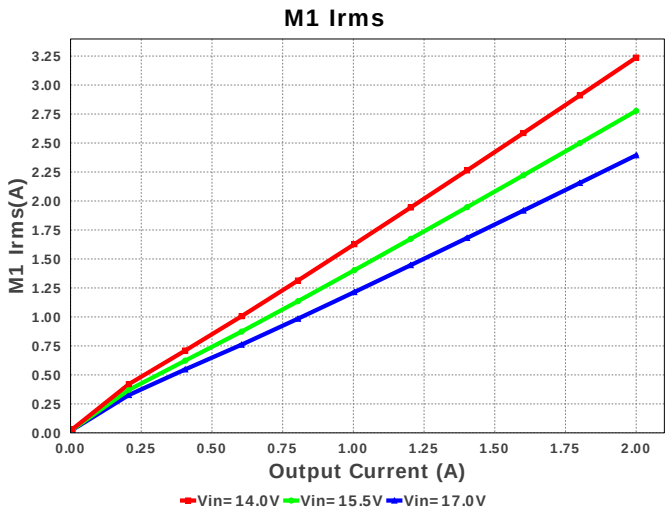


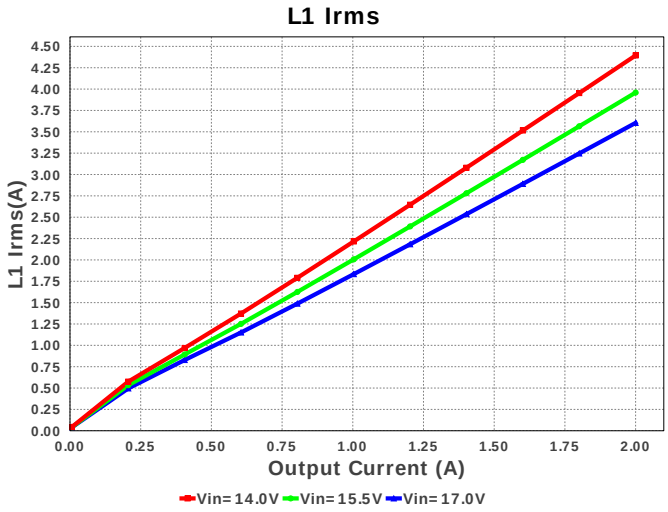


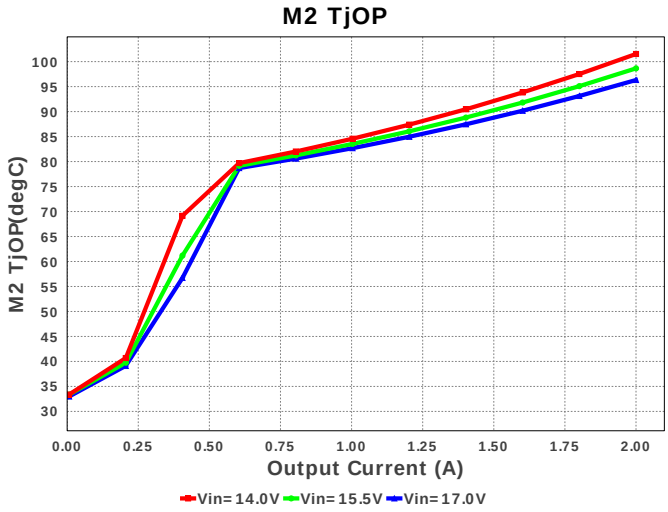


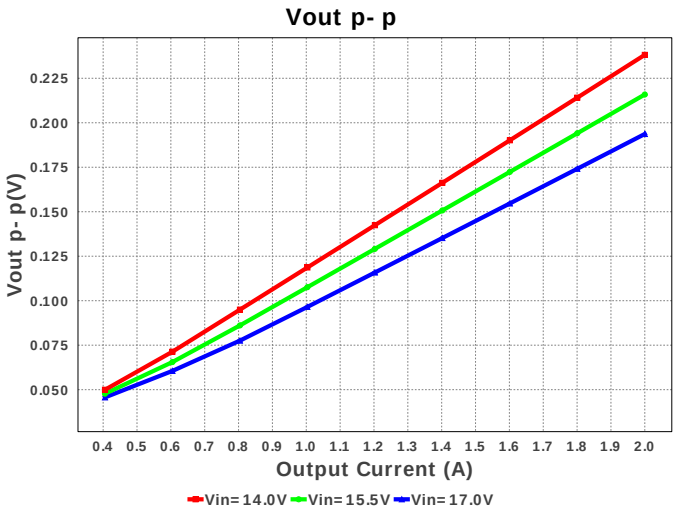


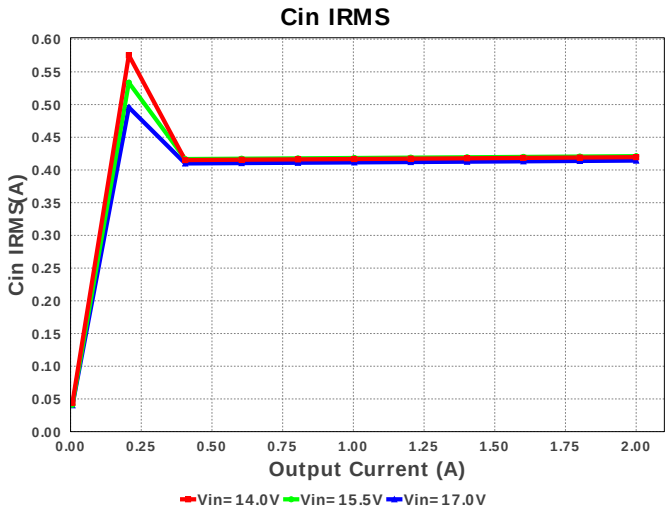


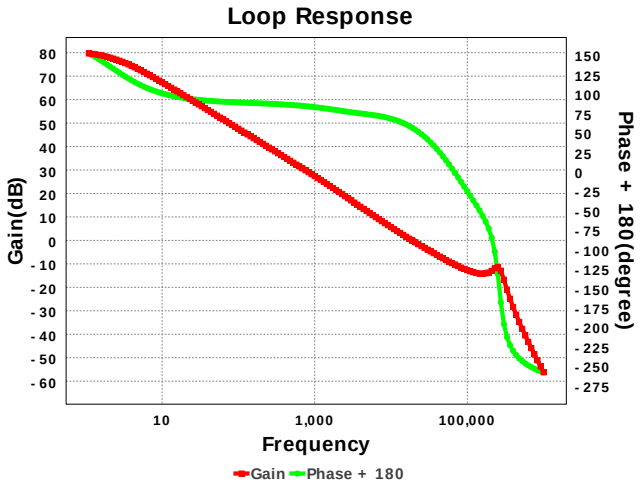












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	419.603 mA	Current	Input capacitor RMS ripple current
2.	Iin Avg	4.498 A	Current	Average input current
3.	L Ipp	1.454 A	Current	Peak-to-peak inductor ripple current
4.	L1 Irms	4.394 A	Current	Inductor ripple current
5.	M1 Irms	3.237 A	Current	MOSFET RMS ripple current
6.	M2 Irms	2.971 A	Current	MOSFET RMS ripple current
7.	BOM Count	26	General	Total Design BOM count
8.	FootPrint	478.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	522.727 kHz	General	Switching frequency
10.	M1 Rdson	18.124 mOhm	General	Drain-Source On-resistance
11.	M1 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
12.	M2 Rdson	20.58 mOhm	General	Drain-Source On-resistance
13.	M2 ThetaJA	50.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
14.	Mode	CCM	General	Conduction Mode
15.	Pout	60.0 W	General	Total output power
16.	Total BOM	$3.58	General	Total BOM Cost
17.	Low Freq Gain	78.688 dB	Op_Point	Gain at 10Hz
18.	Vout Actual	30.167 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Vout OP	30.0 V	Op_Point	Operational Output Voltage
20.	Cross Freq	15.834 kHz	Op_point	Bode plot crossover frequency
21.	Duty Cycle	54.272 %	Op_point	Duty cycle
22.	Efficiency	95.276 %	Op_point	Steady state efficiency
23.	Gain Marg	-9.35 dB	Op_point	Bode Plot Gain Margin
24.	IC Tj	46.006 degC	Op_point	IC junction temperature
25.	ICThetaJA	65.7 degC/W	Op_point	IC junction-to-ambient thermal resistance
26.	IOUT_OP	2.0 A	Op_point	Iout operating point
27.	M1 TjOP	62.642 degC	Op_point	M1 MOSFET junction temperature
28.	M2 TjOP	101.722 degC	Op_point	MOSFET junction temperature
29.	Phase Marg	56.366 deg	Op_point	Bode Plot Phase Margin
30.	VIN_OP	14.0 V	Op_point	Vin operating point
31.	Vout p-p	238.156 mV	Op_point	Peak-to-peak output ripple voltage
32.	Cin Pd	229.943 µW	Power	Input capacitor power dissipation
33.	Cout Pd	0.0 W	Power	Output capacitor power dissipation
34.	IC Pd	243.627 mW	Power	IC power dissipation
35.	L Pd	506.762 mW	Power	Inductor power dissipation
36.	M1 Pd	593.489 mW	Power	MOSFET power dissipation
37.	M1 PdCond	227.871 mW	Power	M1 MOSFET conduction losses
38.	M1 PdCoss	77.416 mW	Power	M1 MOSFET Coss Losses
39.	M1 PdQrr	0.0 W	Power	M1 MOSFET switching losses
40.	M1 PdSw	288.202 mW	Power	M1 MOSFET switching losses
41.	M2 Pd	1.434 W	Power	MOSFET power dissipation
42.	M2 PdCond	236.183 mW	Power	M2 MOSFET conduction losses
43.	M2 PdCoss	31.991 mW	Power	M2 MOSFET Coss Losses
44.	M2 PdQrr	850.5 mW	Power	Synchronous Boost High Side Reverse Recovery
45.	M2 PdSw	18.551 mW	Power	M2 MOSFET switching losses
46.	M2 Pdbody	297.212 mW	Power	Power dissipation through lower FET
47.	Rsns1 Pd	96.526 mW	Power	Rsns1 Power Dissipation
48.	Rsns2 Pd	96.526 mW	Power	Rsns2 Power Dissipation
49.	Total Pd	2.975 W	Power	Total Power Dissipation
50.	Vout Tolerance	4.027 %		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	17.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	30.0	Output Voltage
5.	base_pn	TPS43060	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, 7.5V Gate Drive optimized for standard MOSFET Thresholds Thermal Shutdown

2. **TPS43060** Product Folder : http://www.ti.com/product/TPS43060 : contains the data sheet and other resources.