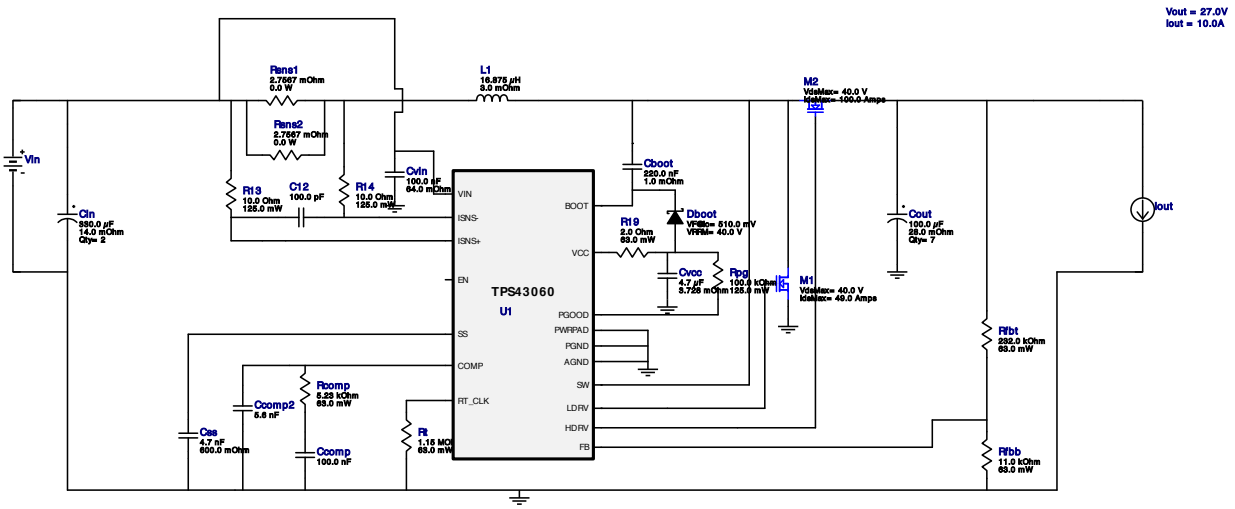
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 14.0V
Vout = 27.0V
Iout = 10.0A

Device = TPS43060RTER
Topology = Boost
Created = 2018-05-20 23:49:03.803
BOM Cost = $0.00
BOM Count = 31
Total Pd = 7.56W

Design : 2047837/188 TPS43060RTER
TPS43060RTER 10.0V-14.0V to 27.00V @ 10.0A

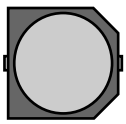
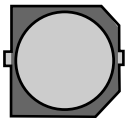


1. The pulse skip mode in the device has not been modeled. Efficiency and operational parameters of the model in pulse skip mode is not valid.

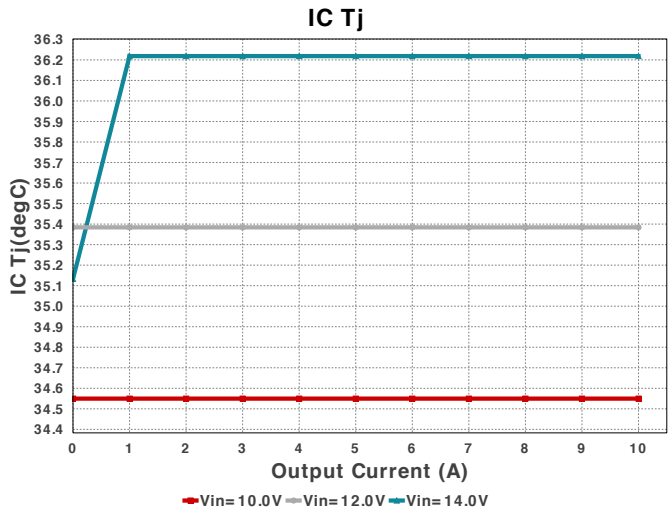
My Comments

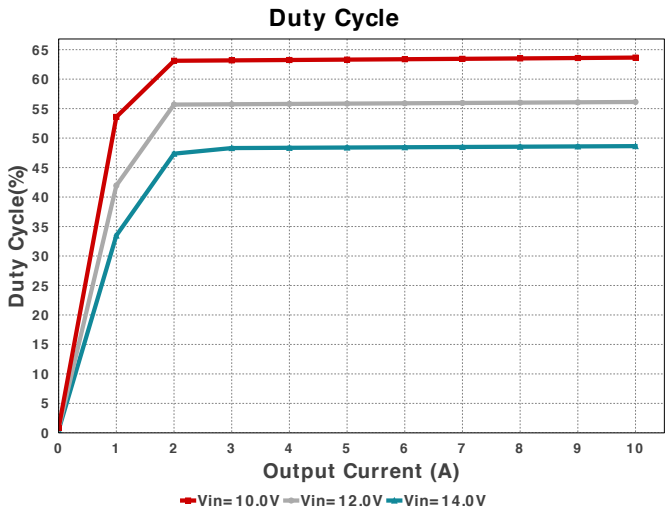
No comments

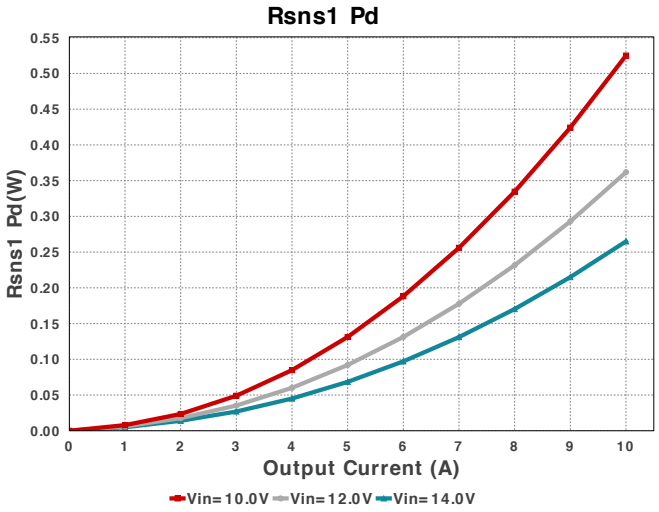
Electrical BOM

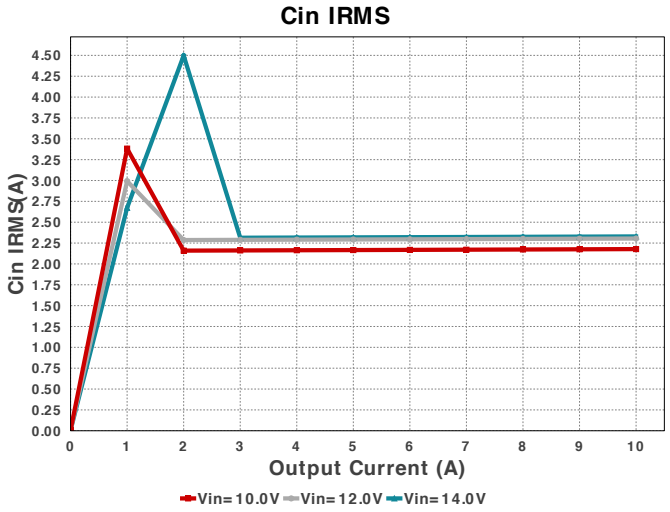
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	Samsung Electro-Mechanics	CL10C101JB8NNWC Series= C0G/NP0	Cap= 100.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
2.	Cboot	Kemet	C0603C224Z4VACTU Series= Y5V	Cap= 220.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
3.	Ccomp	AVX	08053C104JAZ2A Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.10	0805 7 mm²
4.	Ccomp2	TDK	CGA4C2C0G1H562J060AA Series= C0G/NP0	Cap= 5.6 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.06	0805 7 mm²
5.	Cin	Panasonic	25SVPF330M Series= SVPF	Cap= 330.0 uF ESR= 14.0 mOhm VDC= 25.0 V IRMS= 5.0 A	2	$0.74	 CAPSMT_62_F12 151 mm²
6.	Cout	Panasonic	EEHZA1H101P Series= ZA	Cap= 100.0 uF ESR= 28.0 mOhm VDC= 50.0 V IRMS= 2.0 A	7	$1.05	 SM_RADIAL_10BMM 160 mm²
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 mm²

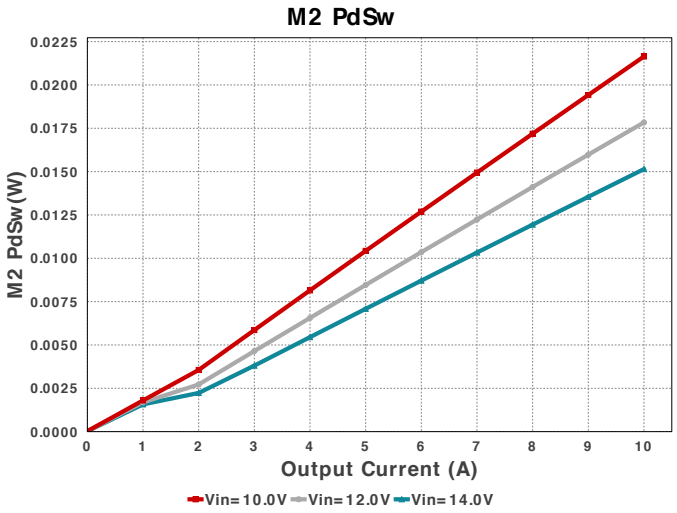
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Cvcc	TDK	C1608X6S1C475K080AC Series= X6S	Cap= 4.7 uF ESR= 3.728 mOhm VDC= 16.0 V IRMS= 2.69359 A	1	$0.10	 0603 5 mm²
9.	Cvin	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	 0805 7 mm²
10.	Dboot	Comchip Technology	CDBK0540	VF@Io= 510.0 mV VRRM= 40.0 V	1	$0.08	 SOD-123F 12 mm²
11.	L1	CUSTOM	CUSTOM	L= 16.875 µH DCR= 3.0 mOhm	1	NA	CUSTOM 0 mm²
12.	M1	Fairchild Semiconductor	FDMS8460	VdsMax= 40.0 V IdsMax= 49.0 Amps	1	$0.87	 TRANS_Fairchild_PQFN08A 56 mm²
13.	M2	Texas Instruments	CSD18512Q5B	VdsMax= 40.0 V IdsMax= 100.0 Amps	1	$0.64	 TRANS_NexFET_Q5B 58 mm²
14.	R13	Yageo America	RC0805FR-0710RL Series= ?	Res= 10.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
15.	R14	Yageo America	RC0805FR-0710RL Series= ?	Res= 10.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
16.	R19	Vishay-Dale	CRCW04022R00FKED Series= CRCW..e3	Res= 2.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	Rcomp	Vishay-Dale	CRCW04025K23FKED Series= CRCW..e3	Res= 5.23 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
18.	Rfbb	Vishay-Dale	CRCW040211K0FKED Series= CRCW..e3	Res= 11.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
19.	Rfbt	Vishay-Dale	CRCW0402232KFKED Series= CRCW..e3	Res= 232.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	Rpg	Panasonic	ERJ-6ENF1003V Series= ERJ-6E	Res= 100.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
21.	Rsns1	CUSTOM	CUSTOM Series= ?	Res= 2.7567 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
22.	Rsns2	CUSTOM	CUSTOM Series= ?	Res= 2.7567 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
23.	Rt	Vishay-Dale	CRCW04021M15FKED Series= CRCW..e3	Res= 1.15 MOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
24.	U1	Texas Instruments	TPS43060RTER	Switcher	1	$1.25	 S-PVQFN-N16 17 mm²

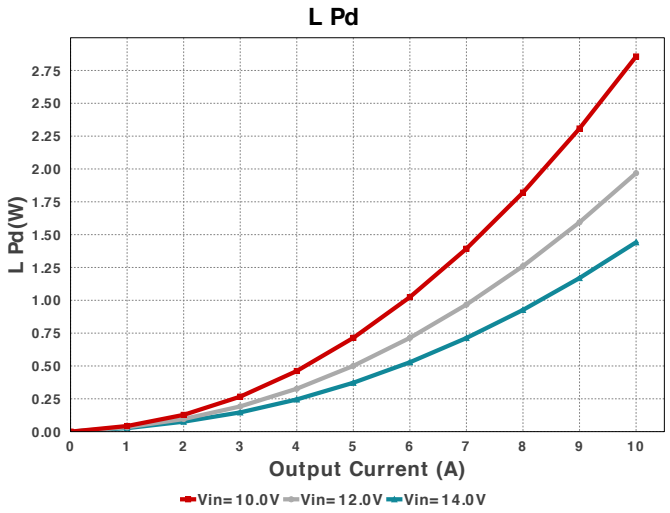




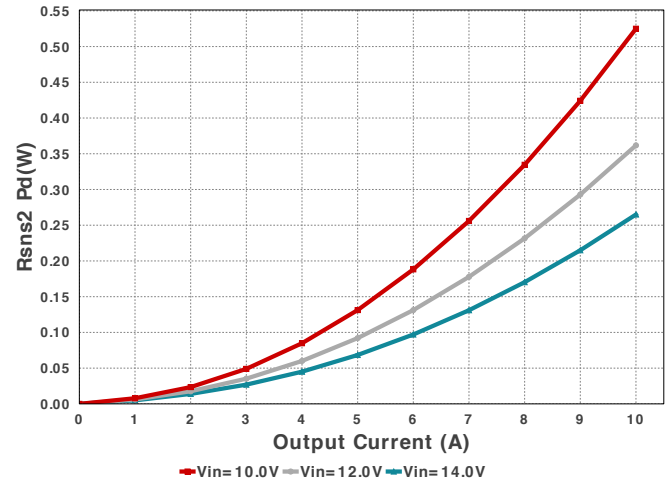




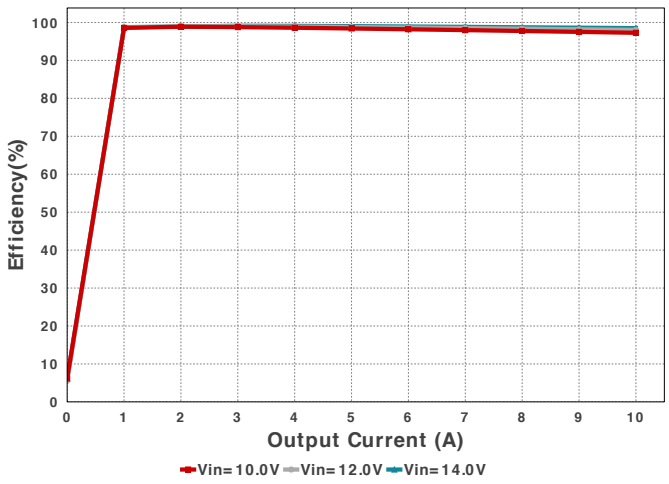




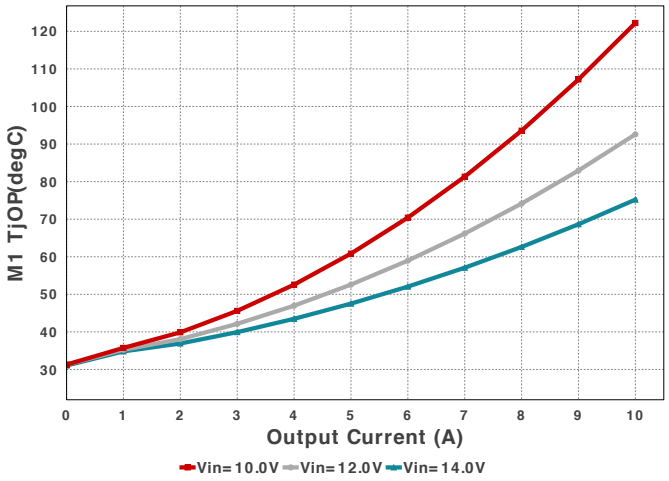
Rsns2 Pd



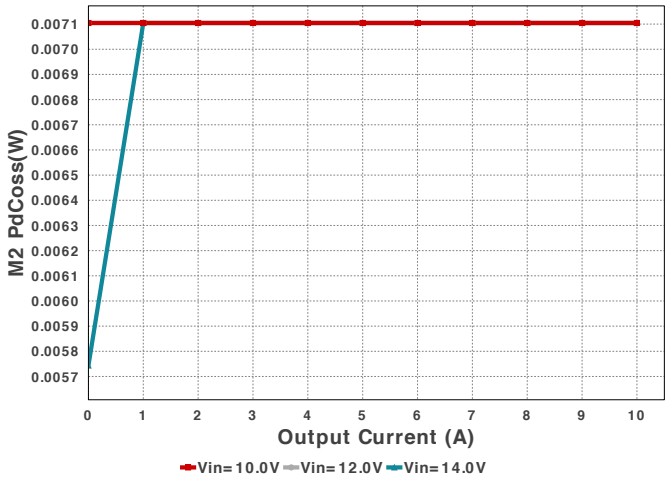
Efficiency



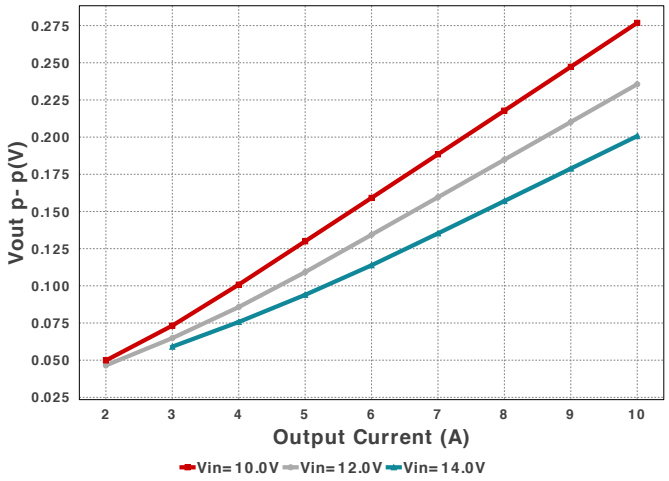
M1 TjOP



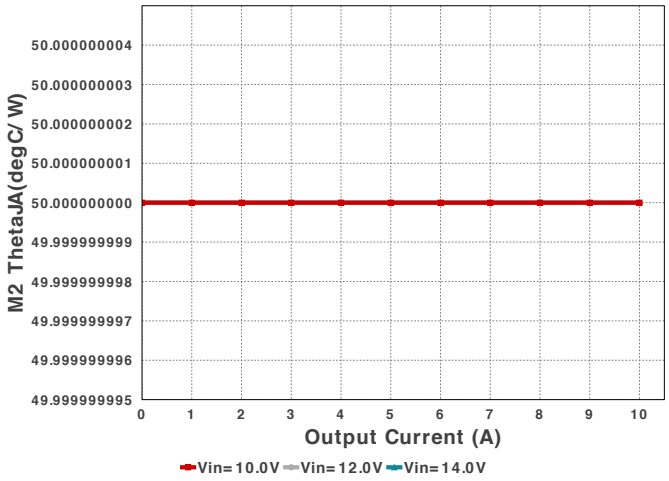
M2 PdCoss



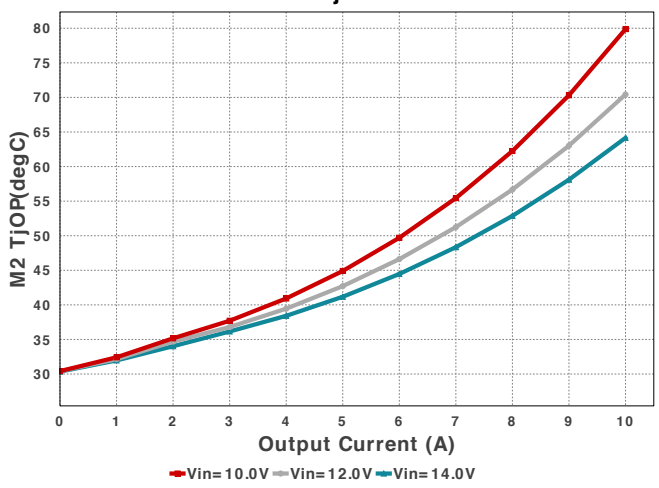
Vout p- p



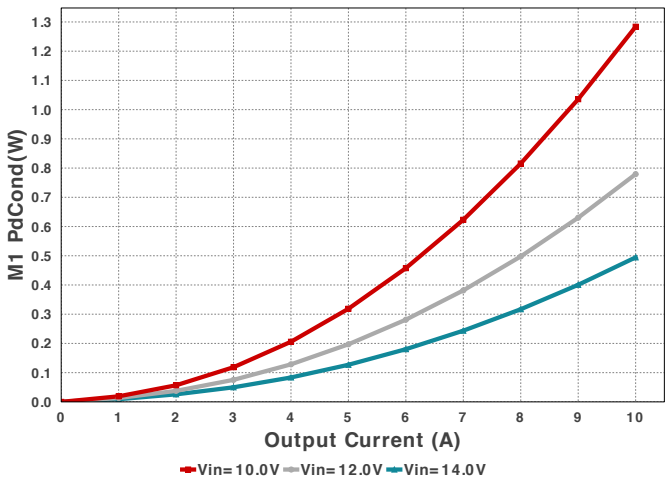
M2 ThetaJA



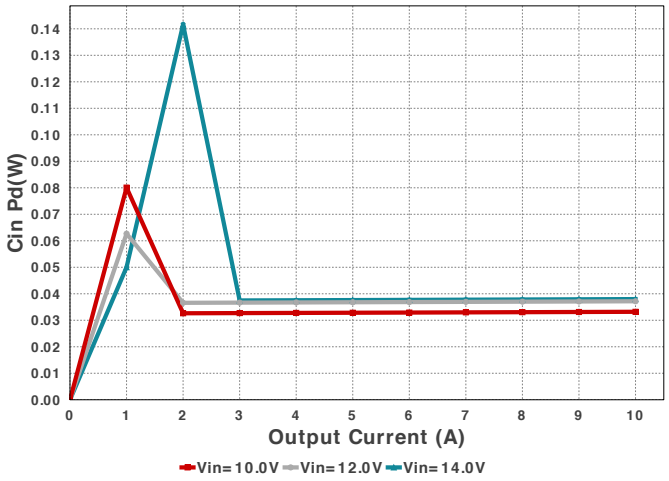
M2 TjOP



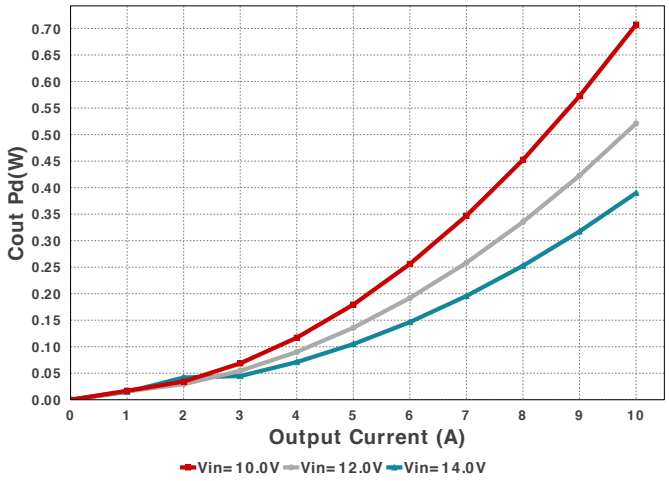
M1 PdCond



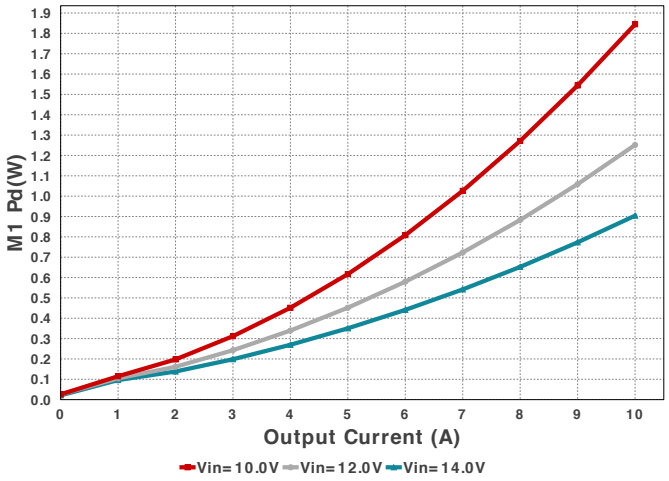
Cin Pd



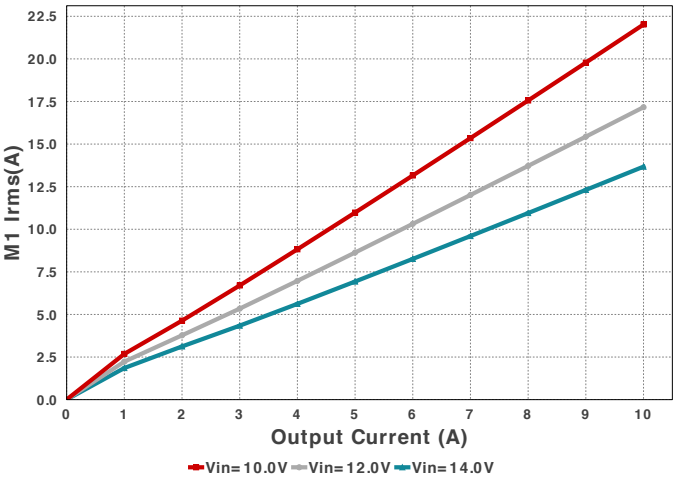
Cout Pd

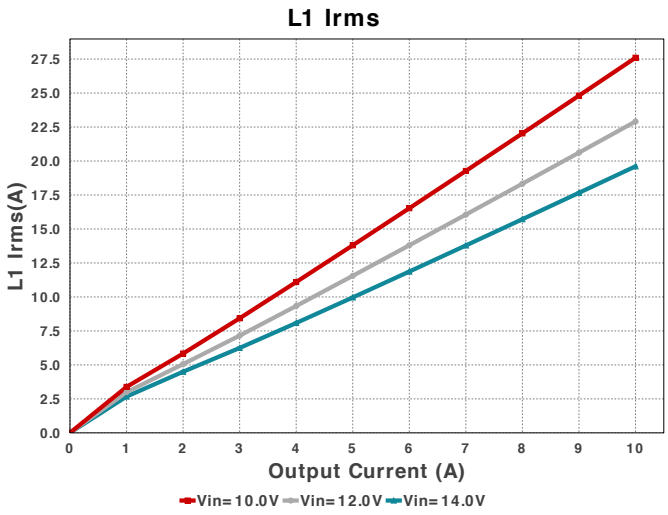


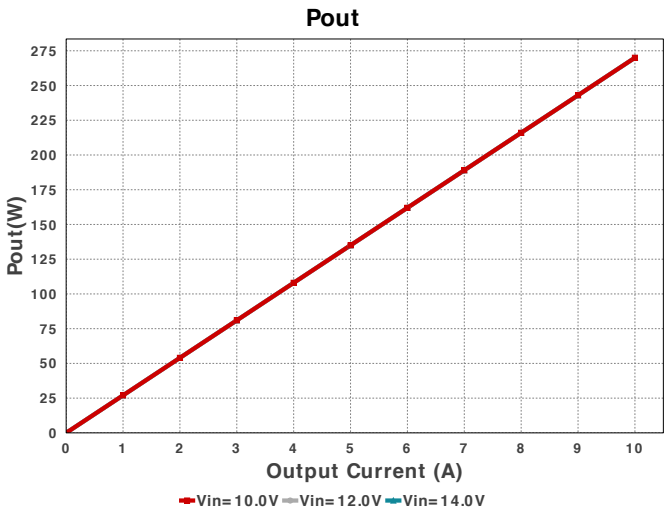
M1 Pd

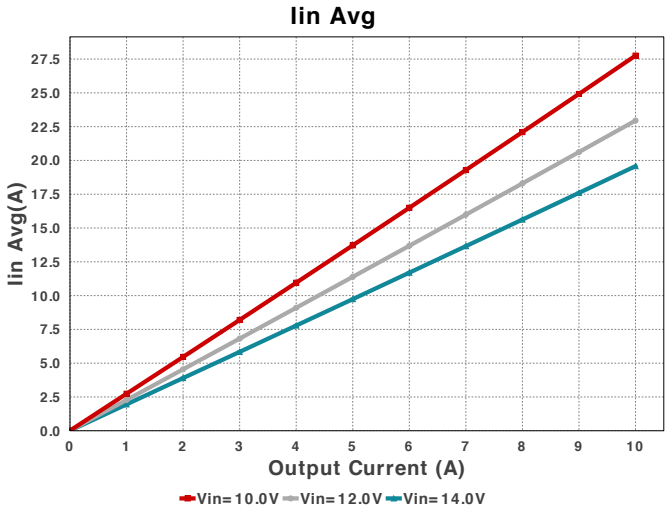


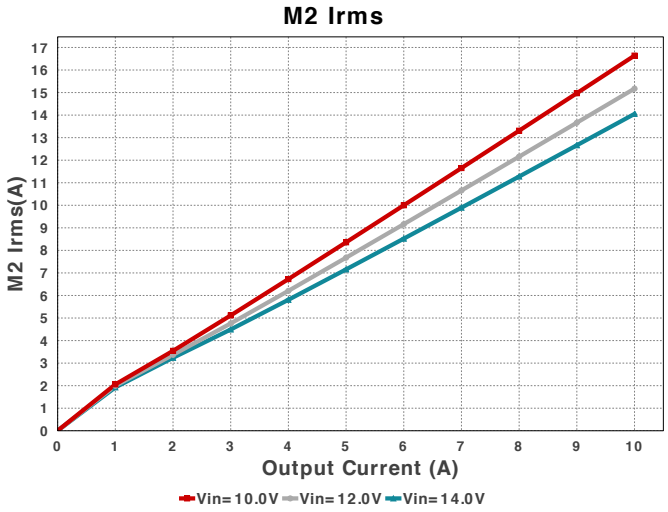
M1 Irms

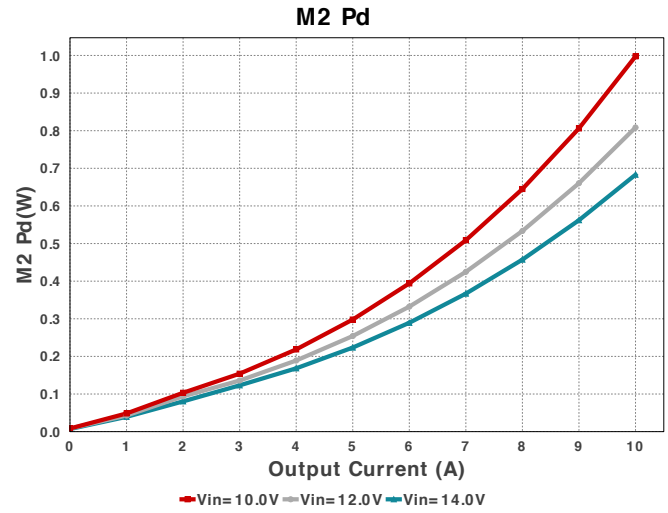


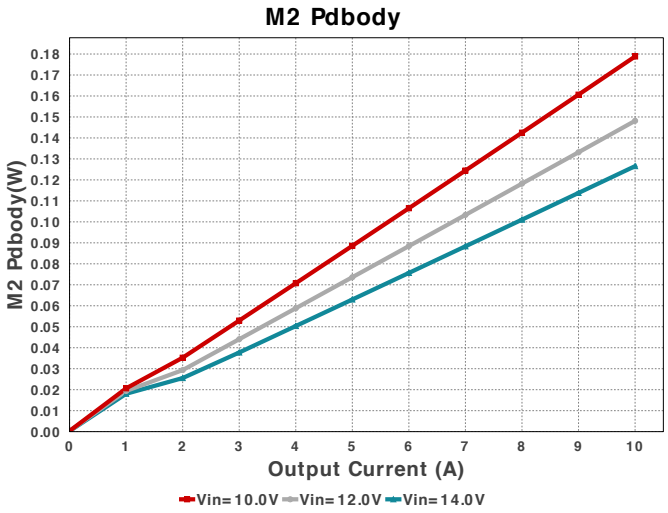


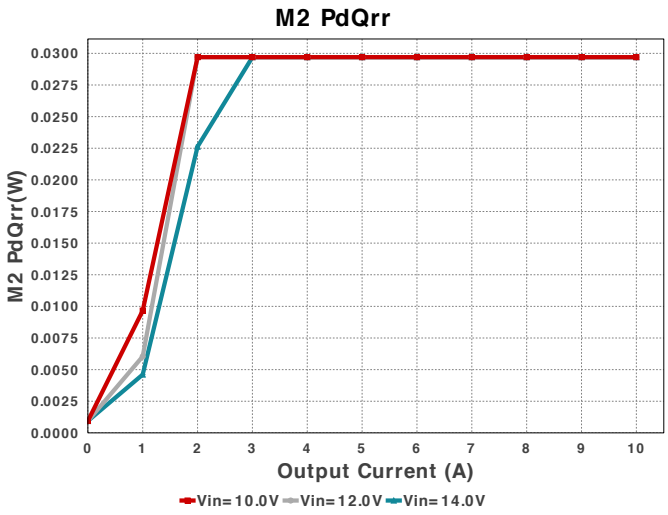


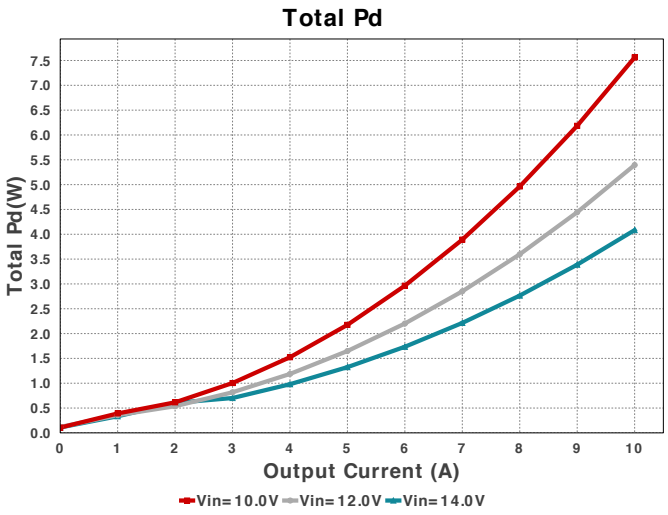


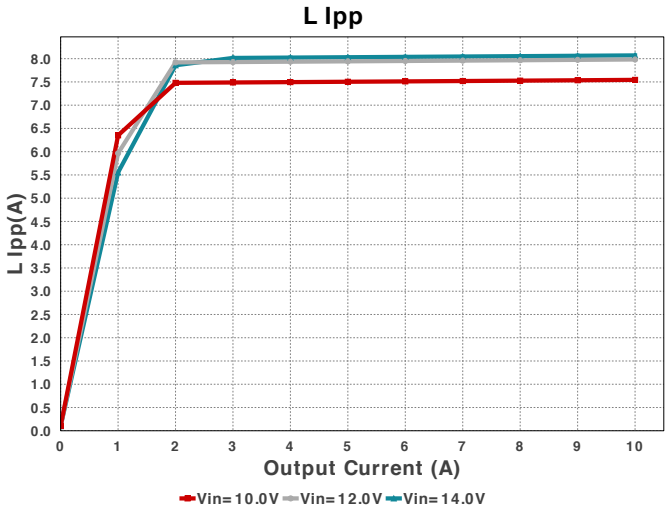


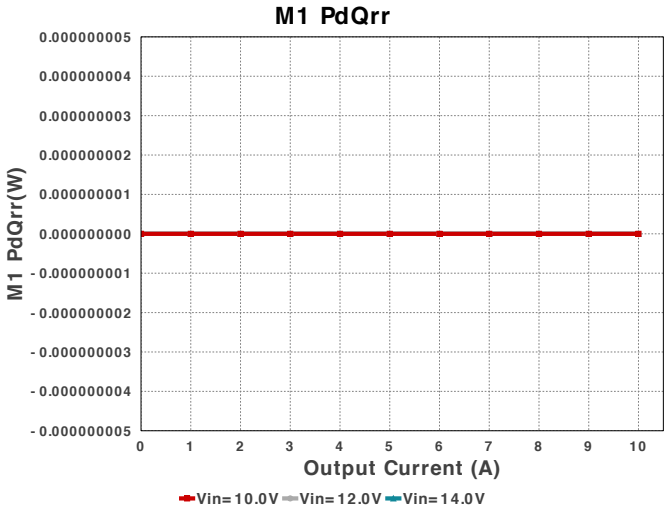


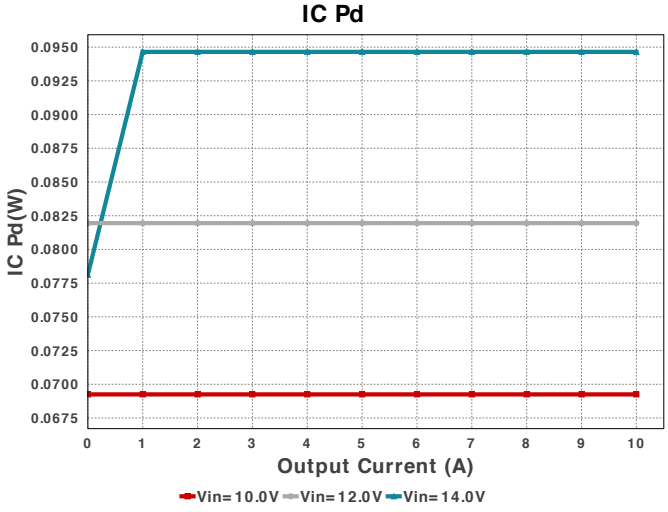


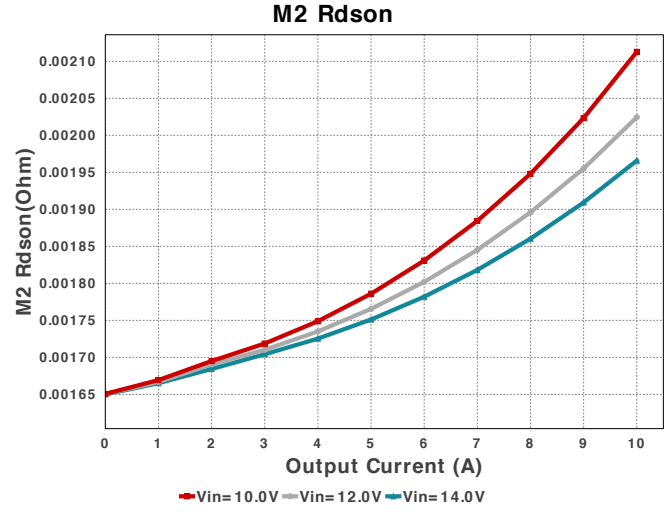


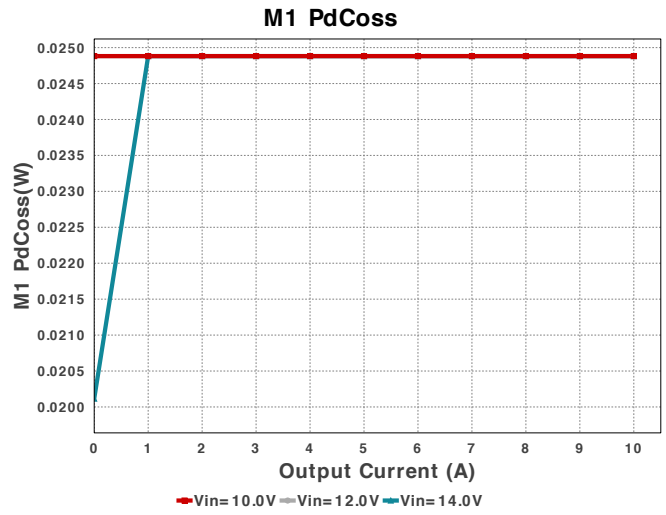


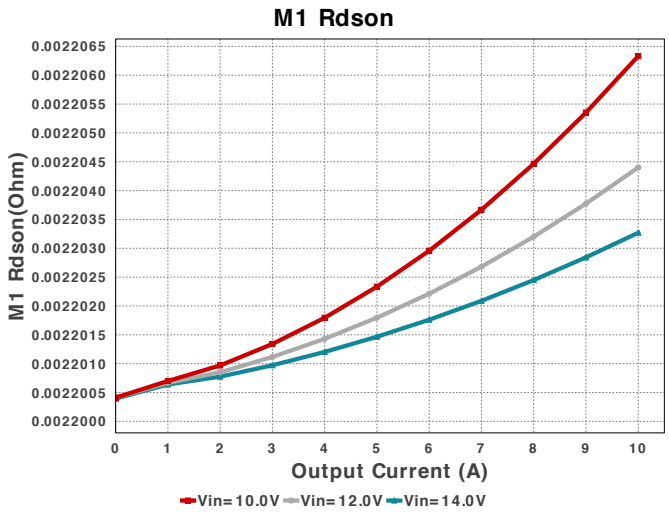


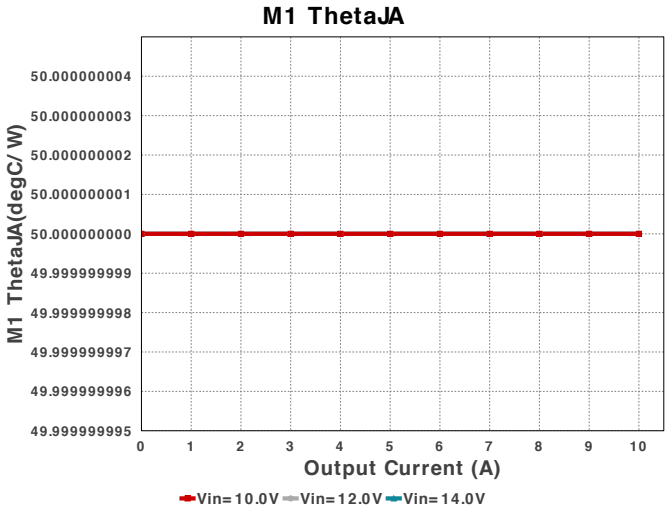


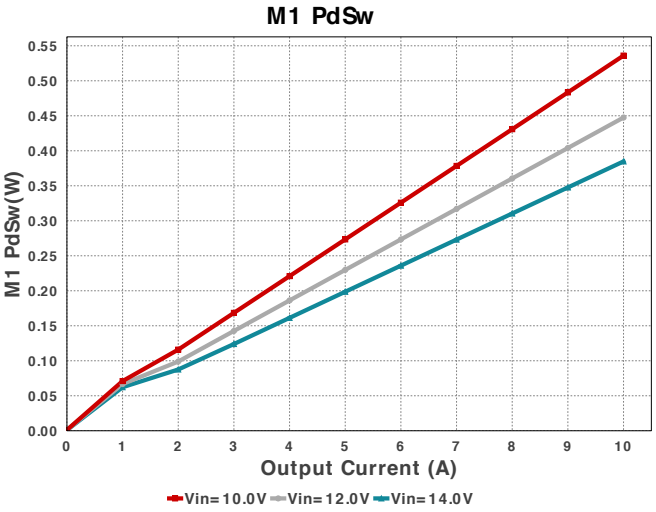


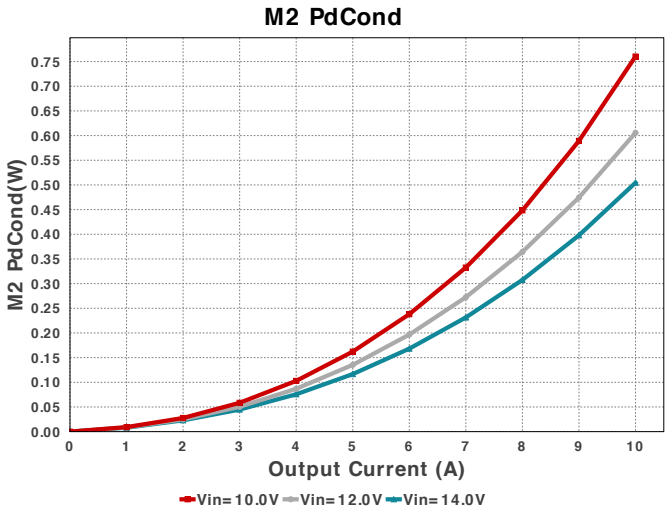


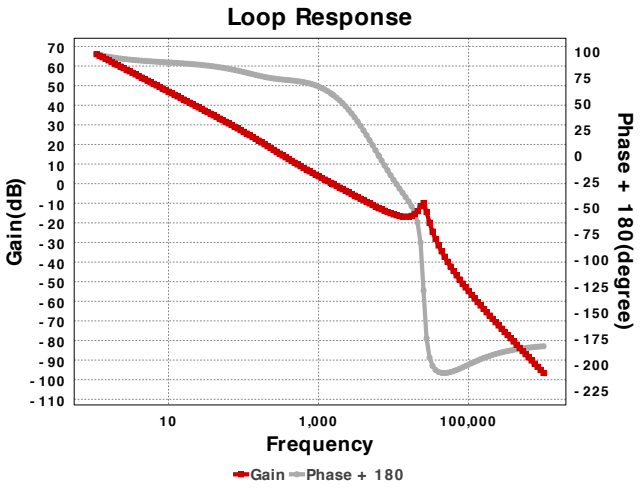












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.178 A	Current	Input capacitor RMS ripple current
2.	Iin Avg	27.756 A	Current	Average input current
3.	L Ipp	7.544 A	Current	Peak-to-peak inductor ripple current
4.	L1 Irms	27.599 A	Current	Inductor ripple current
5.	M1 Irms	22.019 A	Current	MOSFET RMS ripple current
6.	M2 Irms	16.639 A	Current	MOSFET RMS ripple current
7.	BOM Count	31	General	Total Design BOM count
8.	FootPrint	2.448 k mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	50.0 kHz	General	Switching frequency
10.	M1 Rdson	2.206 mOhm	General	Drain-Source On-resistance
11.	M1 ThetaJA	50.0 degC/W	General	MOSFET junction-to-ambient thermal resistance

#	Name	Value	Category	Description
12.	M2 Rdson	2.114 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	270.0 W	General	Total output power
16.	Total BOM	$0.0	General	Total BOM Cost
17.	Cross Freq	1.113 kHz	Op Point	Bode plot crossover frequency
18.	Duty Cycle	63.653 %	Op Point	Duty cycle
19.	Efficiency	97.275 %	Op Point	Steady state efficiency
20.	Gain Marg	-9.975 dB	Op Point	Bode Plot Gain Margin
21.	IC Tj	34.55 degC	Op Point	IC junction temperature
22.	ICThetaJA	65.7 degC/W	Op Point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	10.0 A	Op Point	Iout operating point
24.	Low Freq Gain	63.933 dB	Op Point	Gain at 1Hz
25.	M1 TjOP	122.23 degC	Op Point	M1 MOSFET junction temperature
26.	M2 TjOP	80.056 degC	Op Point	MOSFET junction temperature
27.	Phase Marg	55.331 deg	Op Point	Bode Plot Phase Margin
28.	VIN_OP	10.0 V	Op Point	Vin operating point
29.	Vout Actual	26.951 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
30.	Vout OP	27.0 V	Op Point	Operational Output Voltage
31.	Vout Tolerance	4.018 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
32.	Vout p-p	276.829 mV	Op Point	Peak-to-peak output ripple voltage
33.	Cin Pd	33.199 mW	Power	Input capacitor power dissipation
34.	Cout Pd	707.359 mW	Power	Output capacitor power dissipation
35.	IC Pd	69.25 mW	Power	IC power dissipation
36.	L Pd	2.856 W	Power	Inductor power dissipation
37.	M1 Pd	1.845 W	Power	MOSFET power dissipation
38.	M1 PdCond	1.284 W	Power	M1 MOSFET conduction losses
39.	M1 PdCoss	24.882 mW	Power	M1 MOSFET Coss Losses
40.	M1 PdQrr	0.0 W	Power	M1 MOSFET switching losses
41.	M1 PdSw	536.002 mW	Power	M1 MOSFET switching losses
42.	M2 Pd	1.001 W	Power	MOSFET power dissipation
43.	M2 PdCond	760.879 mW	Power	M2 MOSFET conduction losses
44.	M2 PdCoss	7.104 mW	Power	M2 MOSFET Coss Losses
45.	M2 PdQrr	32.67 mW	Power	Synchronous Boost High Side Reverse Recovery
46.	M2 PdSw	21.642 mW	Power	M2 MOSFET switching losses
47.	M2 Pdbody	178.833 mW	Power	Power dissipation through lower FET
48.	Rsns1 Pd	524.94 mW	Power	Rsns1 Power Dissipation
49.	Rsns2 Pd	524.94 mW	Power	Rsns2 Power Dissipation
50.	Total Pd	7.564 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	10.0	Maximum Output Current
2.	VinMax	14.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	27.0	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.