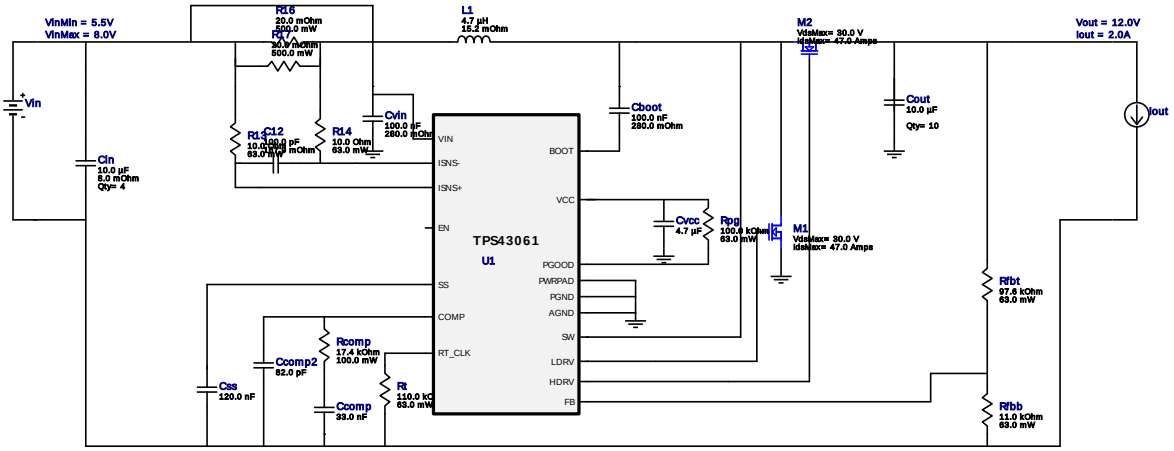
WEBENCH® Design Report

VinMin = 5.5V
VinMax = 8.0V
Vout = 12.0V
Iout = 2.0A

Device = TPS43061RTER
Topology = Boost
Created = 6/11/13 11:58:15 AM
BOM Cost = $3.20
Total Pd = 1.57W
Footprint = 585.0mm2
BOM Count = 34

Design : 3729827/4 TPS43061RTER
TPS43061RTER 5.5V-8.0V to 12.0V @ 2.0A

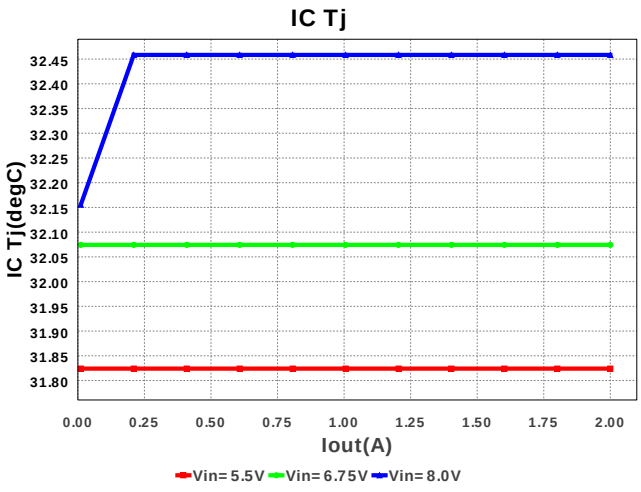


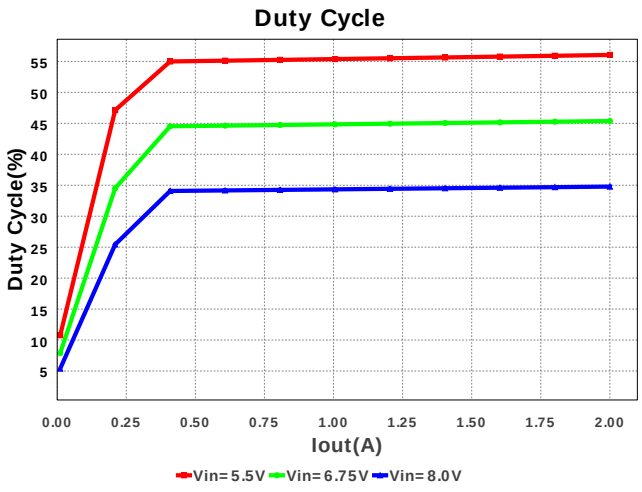
1. The pulse skip mode in the device has not been modeled. Efficiency and operational parameters of the model in pulse skip mode is not guaranteed.

Electrical BOM

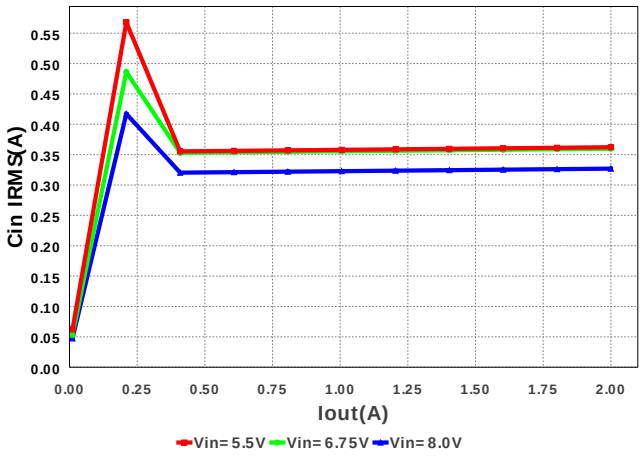
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	TDK	C1608C0G1H101J Series= C0G/NP0	Cap= 100.0 pF ESR= 167.9 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
2.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
3.	Ccomp	MuRata	GRM188R71C333KA01D Series= X7R	Cap= 33.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
4.	Ccomp2	Kemet	C0603C820J5GACTU Series= C0G/NP0	Cap= 82.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
5.	Cin	MuRata	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 µF ESR= 8.0 mOhm VDC= 16.0 V IRMS= 0.0 A	4	$0.05	0805 13mm2
6.	Cout	Nichicon	GRM219R61E106KA12 Series= ?	Cap= 10.0 µF VDC= 25.0 V IRMS= 0.0 A	10	$0.05	0805 13mm2
7.	Css	MuRata	GRM188R71C124KA01D Series= X7R	Cap= 120.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
8.	Cvcc	MuRata	GRM219R61C475KE15D Series= X5R	Cap= 4.7 µF VDC= 16.0 V IRMS= 0.0 A	1	$0.04	0805 13mm2
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 13mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	L1	TDK	SLF10165T-4R7N4R73PF	L= 4.7 µH DCR= 15.2 mOhm	1	$0.05	 SLF10165 146mm2
11.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 47.0 Amps	1	$0.34	 TRANS_NexFET_Q3 29mm2
12.	M2	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 47.0 Amps	1	$0.34	 TRANS_NexFET_Q3 29mm2
13.	R13	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 8mm2
14.	R14	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 8mm2
15.	R16	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 19mm2
16.	R17	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 19mm2
17.	Rcomp	Vishay-Dale	CRCW060317K4FKEA Series= CRCW..e3	Res= 17.4 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 10mm2
18.	Rfbb	Vishay-Dale	CRCW040211K0FKED Series= CRCW..e3	Res= 11.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 8mm2
19.	Rfbt	Vishay-Dale	CRCW040297K6FKED Series= CRCW..e3	Res= 97.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 8mm2
20.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 8mm2
21.	Rt	Vishay-Dale	CRCW0402110KFKED Series= CRCW..e3	Res= 110.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 8mm2
22.	U1	Texas Instruments	TPS43061RTER	Switcher	1	$1.40	 S-PWQFN-N16 27mm2

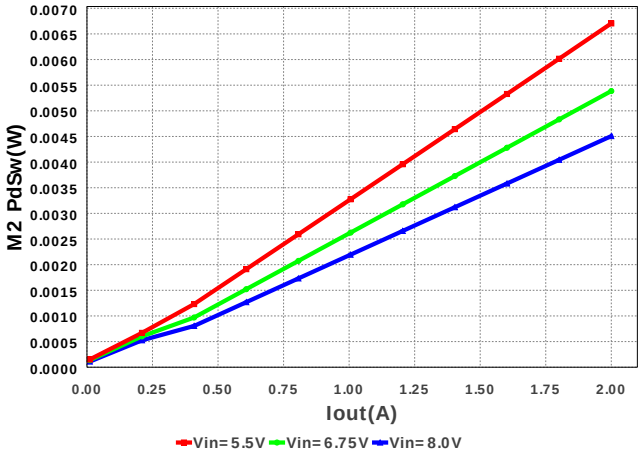




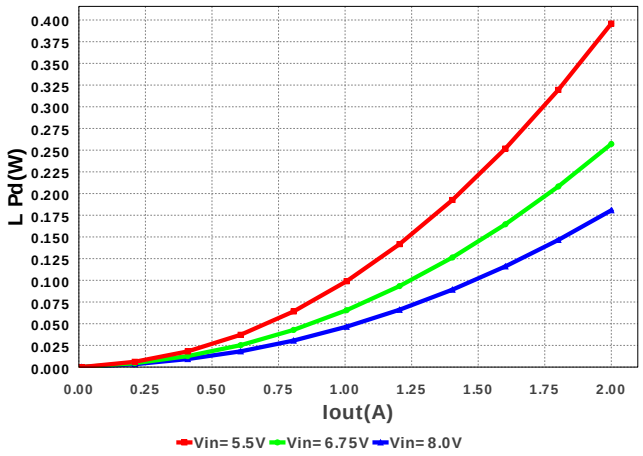
Cin IRMS



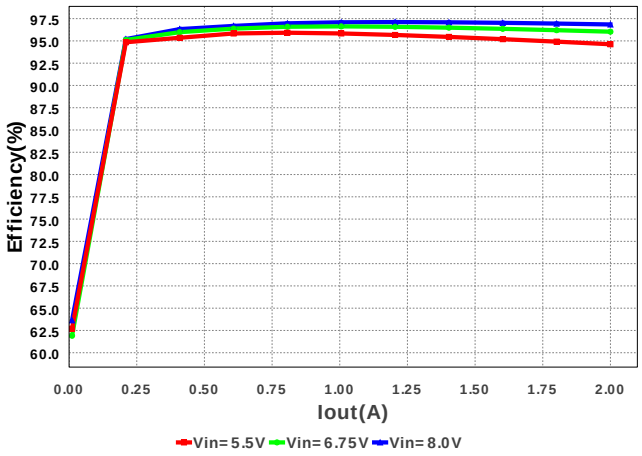
M2 PdSw



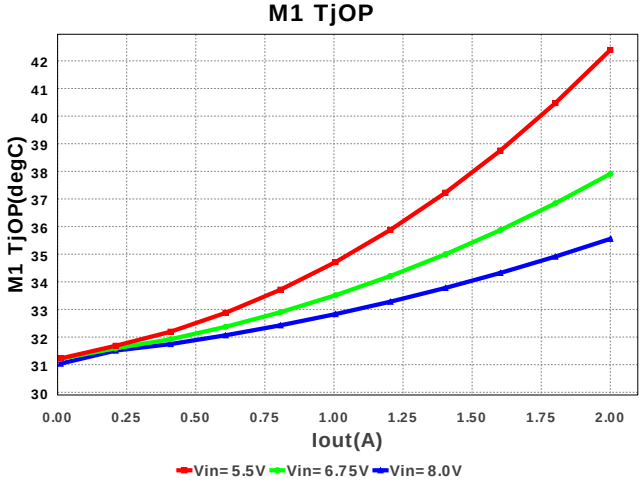
L Pd



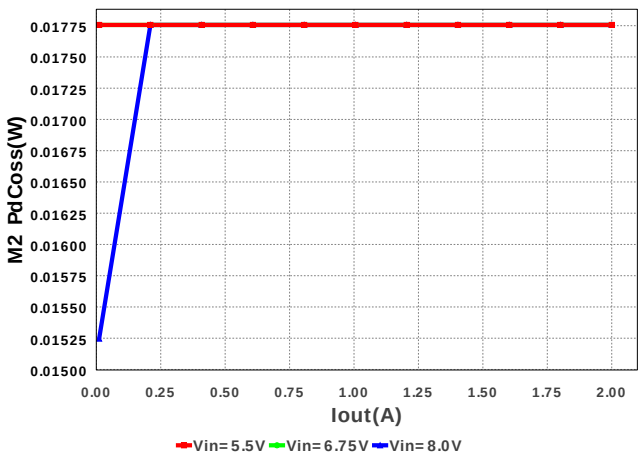
Efficiency



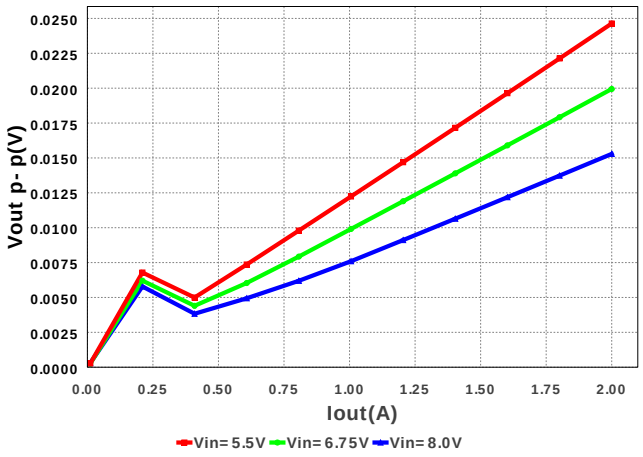
M1 TjOP



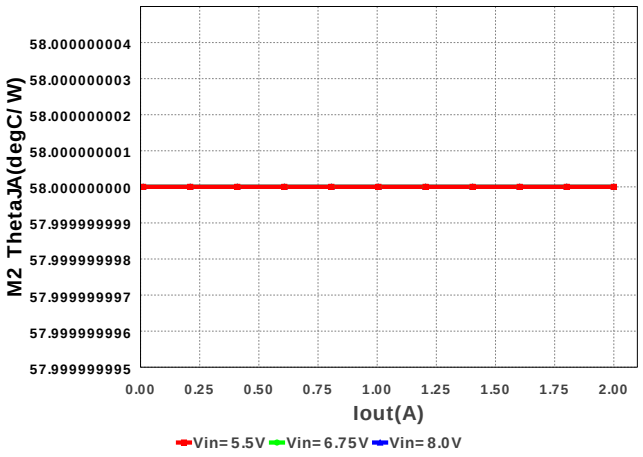
M2 PdCoss



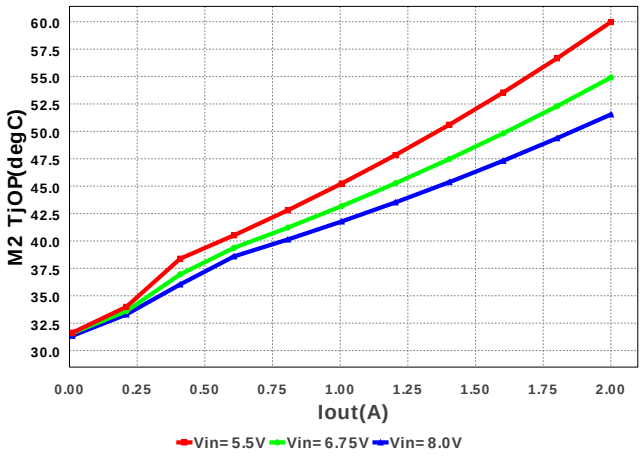
Vout p- p



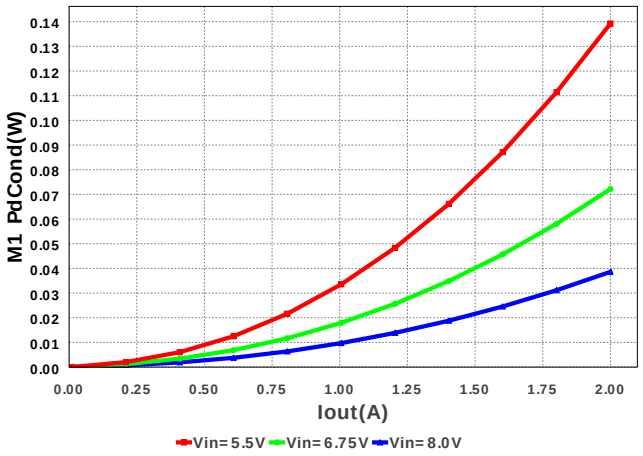
M2 ThetaJA



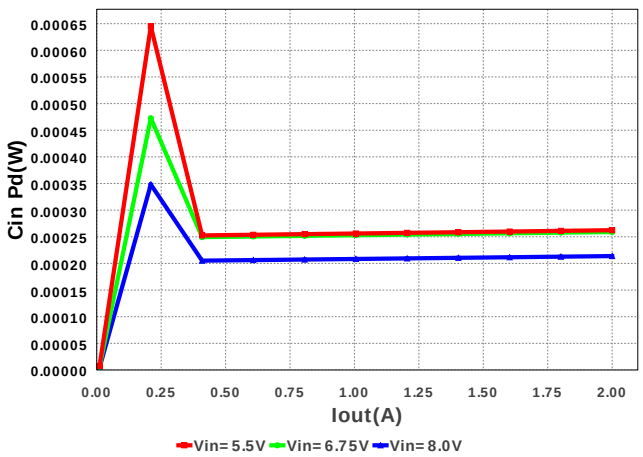
M2 TjOP



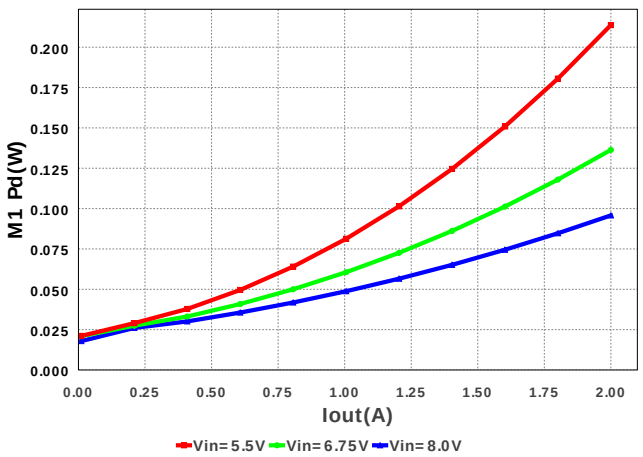
M1 PdCond

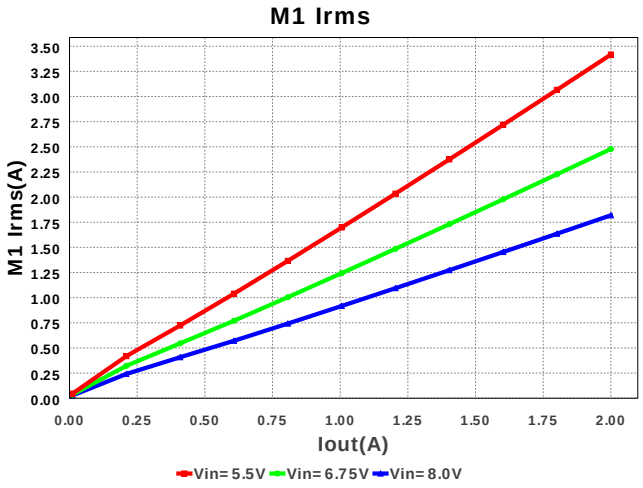


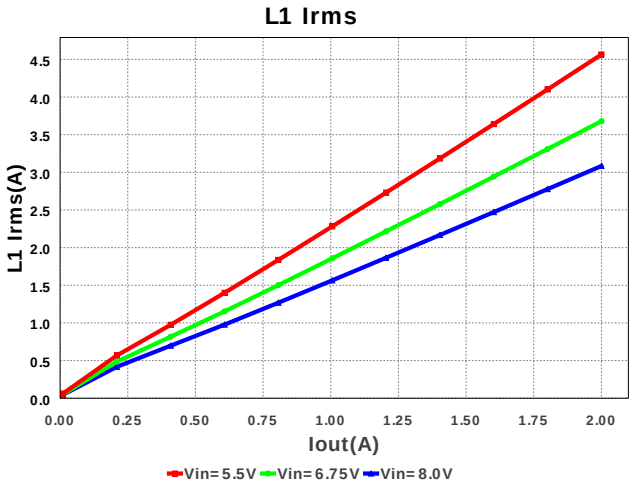
Cin Pd

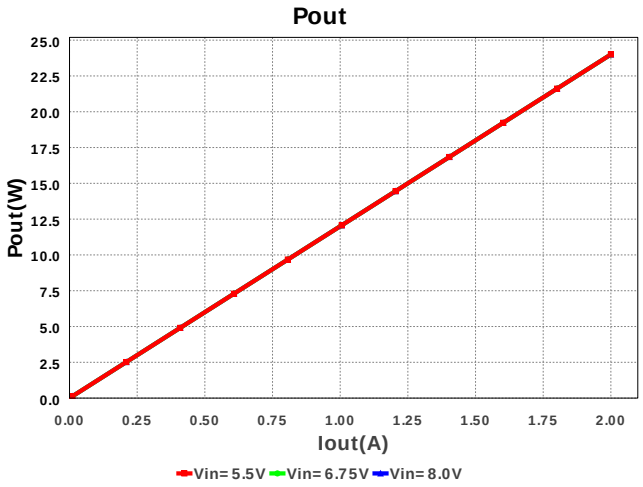


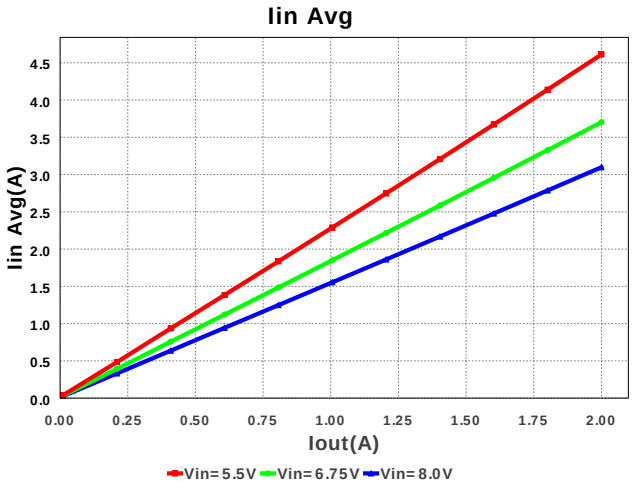
M1 Pd

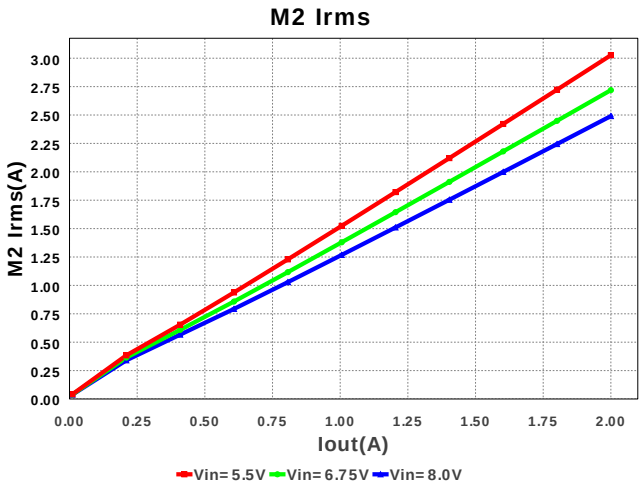


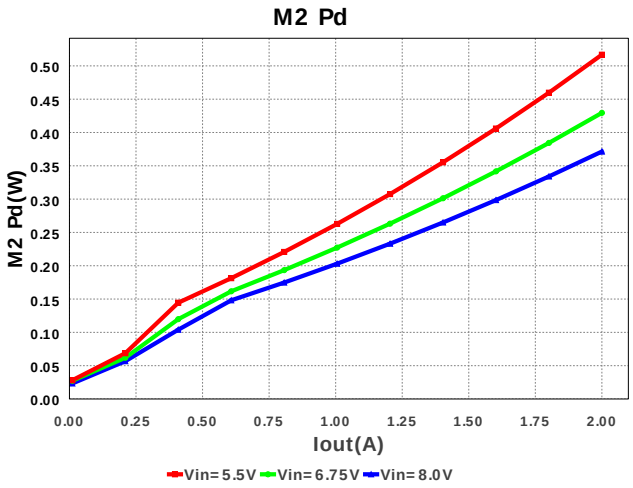


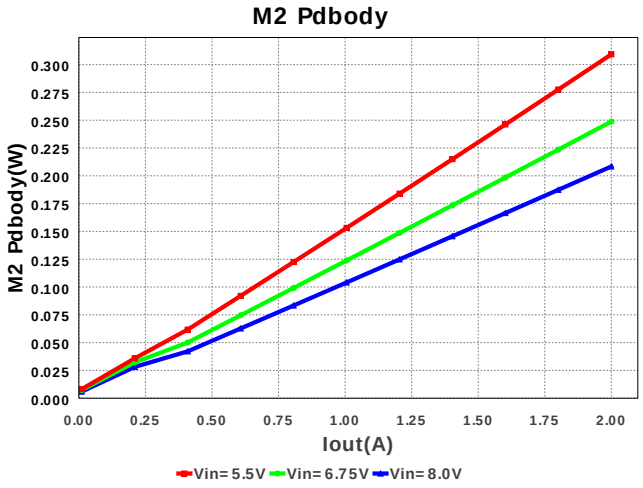


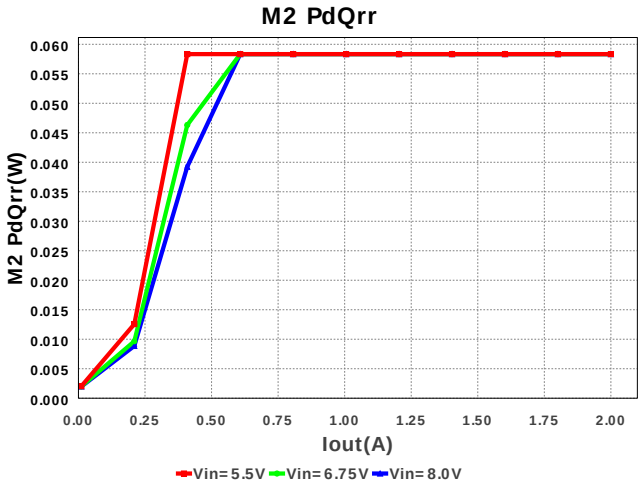


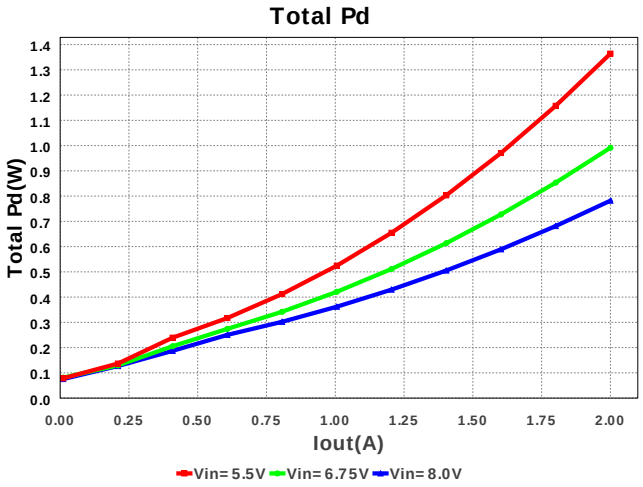


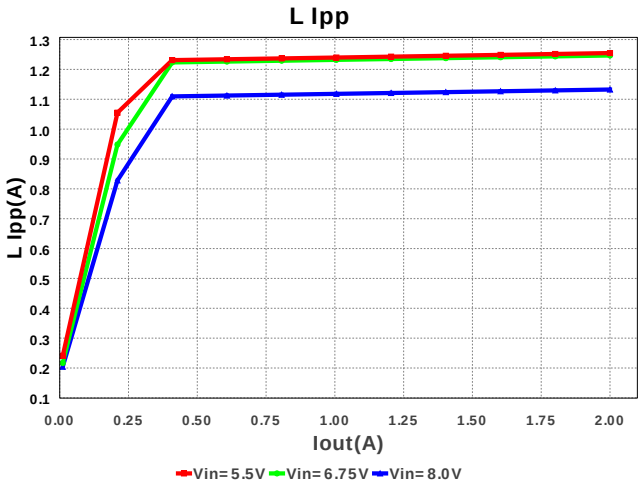


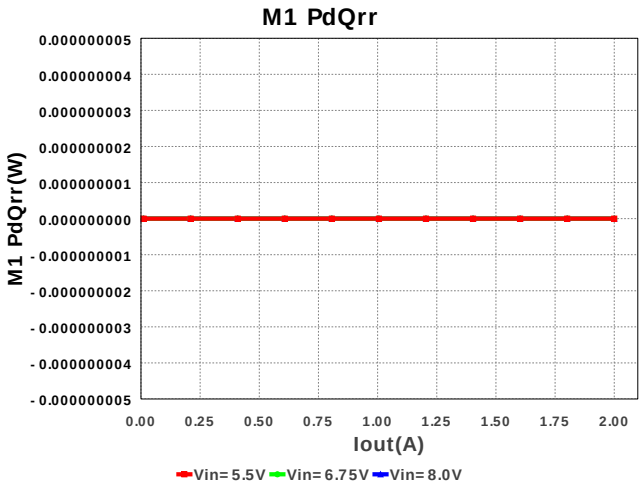


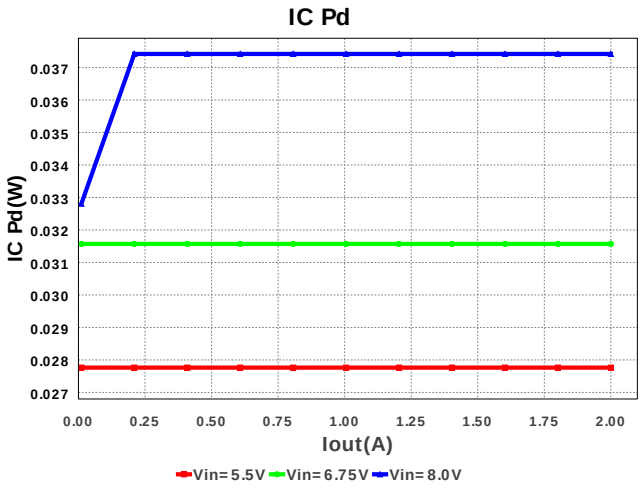




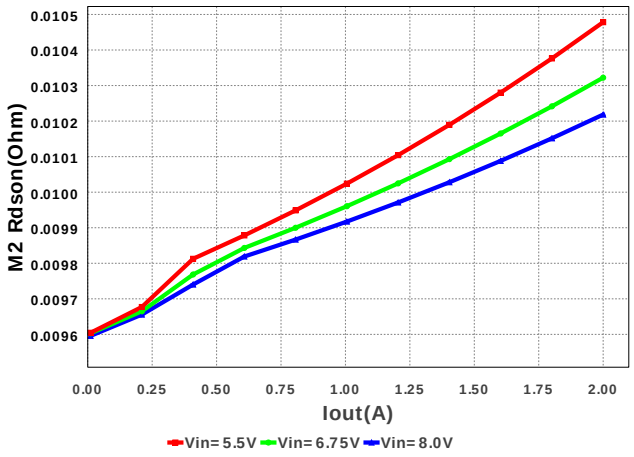




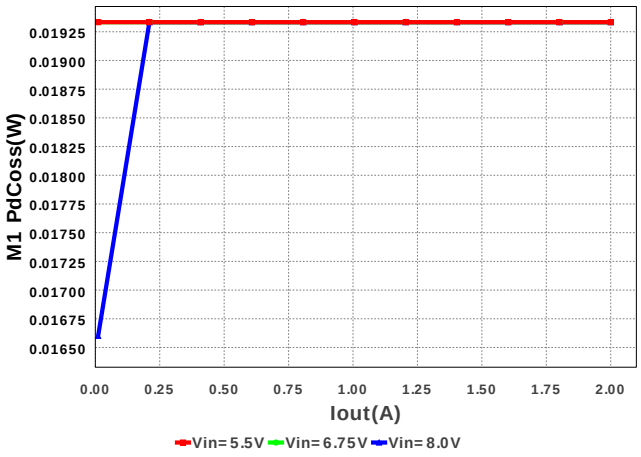




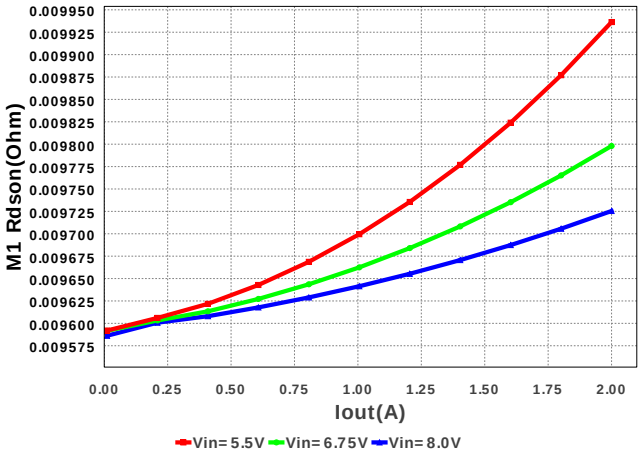
M2 Rdson



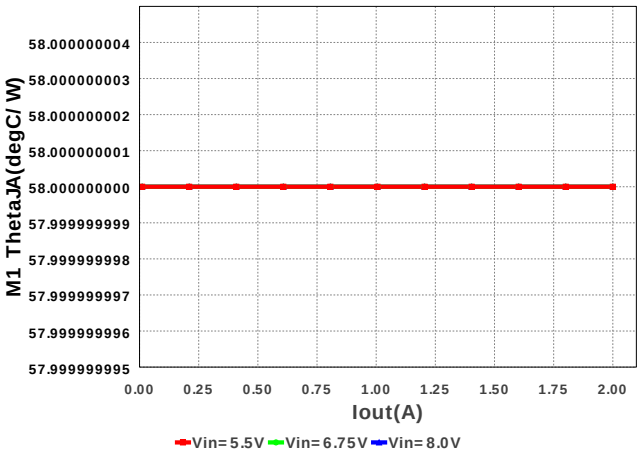
M1 PdCoss



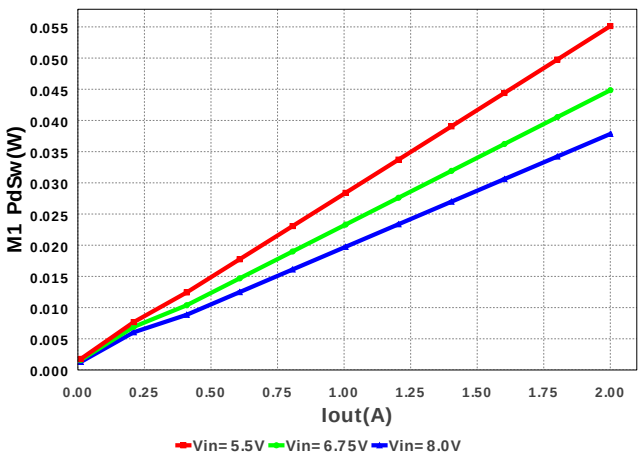
M1 Rdson



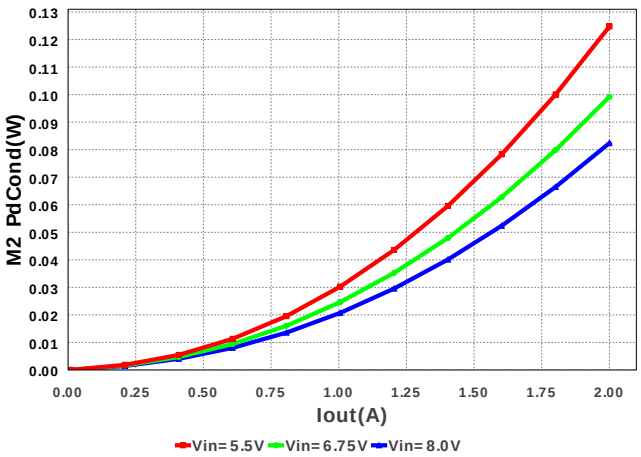
M1 ThetaJA

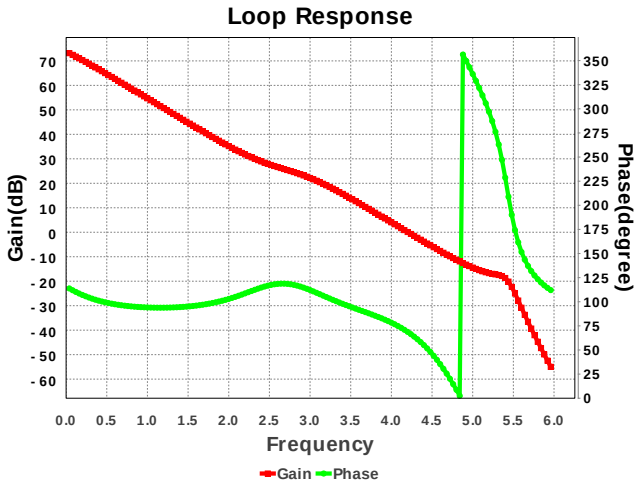


M1 PdSw



M2 PdCond





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	360.653 mA	Current	Input capacitor RMS ripple current
2.	Iin Avg	4.65 A	Current	Average input current
3.	L Ipp	1.249 A	Current	Peak-to-peak inductor ripple current
4.	L1 Irms	4.565 A	Current	Inductor ripple current
5.	M1 Irms	3.418 A	Current	MOSFET RMS ripple current
6.	M2 Irms	3.026 A	Current	MOSFET RMS ripple current
7.	BOM Count	34	General	Total Design BOM count
8.	FootPrint	585.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	525.0 kHz	General	Switching frequency
10.	M1 Rdson	9.937 mOhm	General	Drain-Source On-resistance
11.	M1 ThetaJA	58.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
12.	M2 Rdson	10.481 mOhm	General	Drain-Source On-resistance
13.	M2 ThetaJA	58.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
14.	Mode	CCM	General	Conduction Mode
15.	Pout	24.0 W	General	Total output power
16.	Total BOM	$3.2	General	Total BOM Cost
17.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	10.628 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	56.05 %	Op_point	Duty cycle
20.	Efficiency	93.843 %	Op_point	Steady state efficiency
21.	IC Tj	31.831 degC	Op_point	IC junction temperature
22.	ICThetaJA	65.7 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	2.0 A	Op_point	Iout operating point
24.	M1 TjOP	42.416 degC	Op_point	M1 MOSFET junction temperature
25.	M2 TjOP	60.075 degC	Op_point	MOSFET junction temperature
26.	Phase Marg	68.005 deg	Op_point	Bode Plot Phase Margin
27.	VIN_OP	5.5 V	Op_point	Vin operating point
28.	Vout p-p	24.531 mV	Op_point	Peak-to-peak output ripple voltage
29.	Cin Pd	260.141 µW	Power	Input capacitor power dissipation
30.	IC Pd	27.87 mW	Power	IC power dissipation
31.	L Pd	395.924 mW	Power	Inductor power dissipation
32.	M1 Pd	214.062 mW	Power	MOSFET power dissipation
33.	M1 PdCond	139.273 mW	Power	M1 MOSFET conduction losses
34.	M1 PdCoss	19.417 mW	Power	M1 MOSFET Coss Losses
35.	M1 PdQrr	0.0 W	Power	M1 MOSFET switching losses
36.	M1 PdSw	55.372 mW	Power	M1 MOSFET switching losses
37.	M2 Pd	518.527 mW	Power	MOSFET power dissipation
38.	M2 PdCond	124.791 mW	Power	M2 MOSFET conduction losses
39.	M2 PdCoss	17.833 mW	Power	M2 MOSFET Coss Losses
40.	M2 PdQrr	58.59 mW	Power	Synchronous Boost High Side Reverse Recovery
41.	M2 PdSw	6.735 mW	Power	M2 MOSFET switching losses
42.	M2 Pdbody	310.579 mW	Power	Power dissipation through lower FET
43.	Total Pd	1.575 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	8.0 V	Maximum input voltage
4.	VinMin	5.5 V	Minimum input voltage
5.	Vout	12.0 V	Output Voltage

#	Name	Value	Description
6.	Vout1	12.0 Volt	Output Voltage #1
7.	base_pn	TPS43061	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **TPS43061** Product Folder : http://www.ti.com/product/tps43061 : contains the data sheet and other resources.