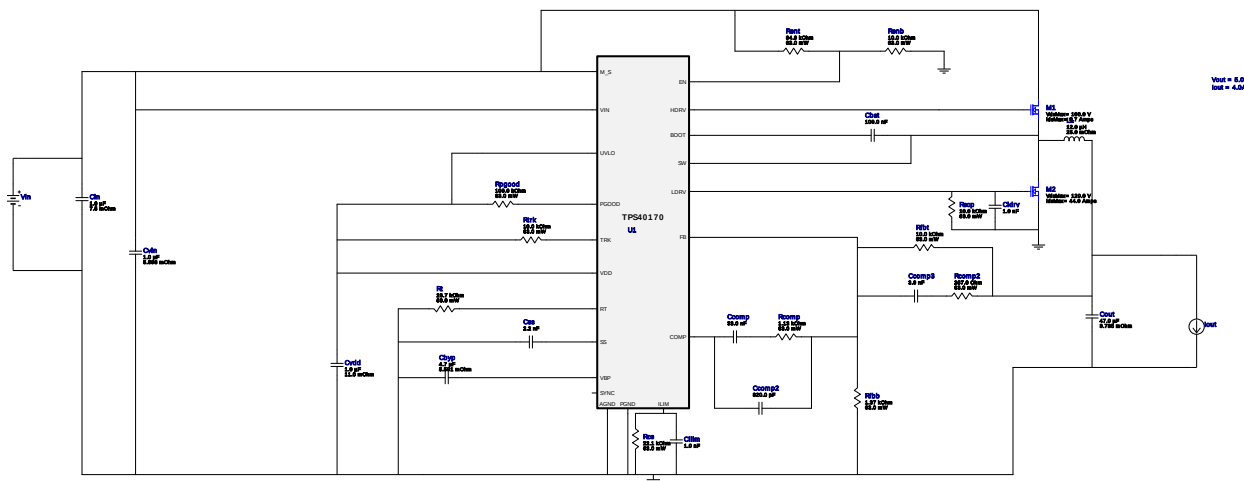


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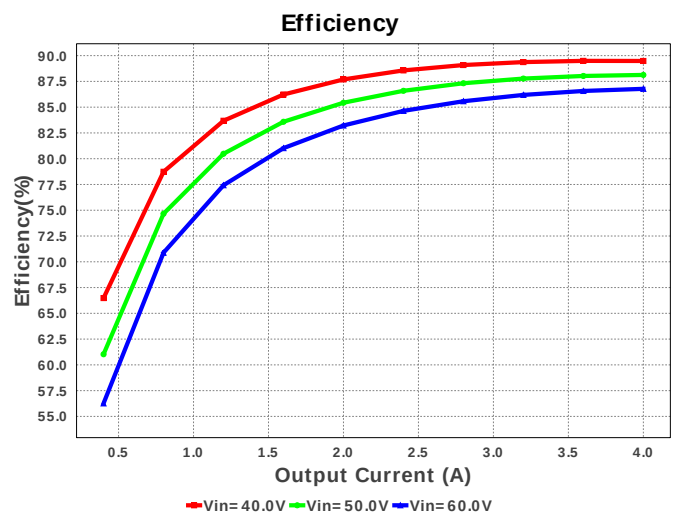
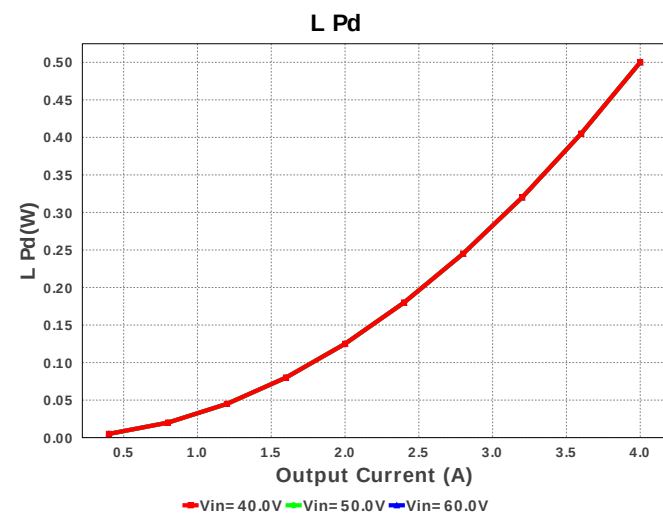
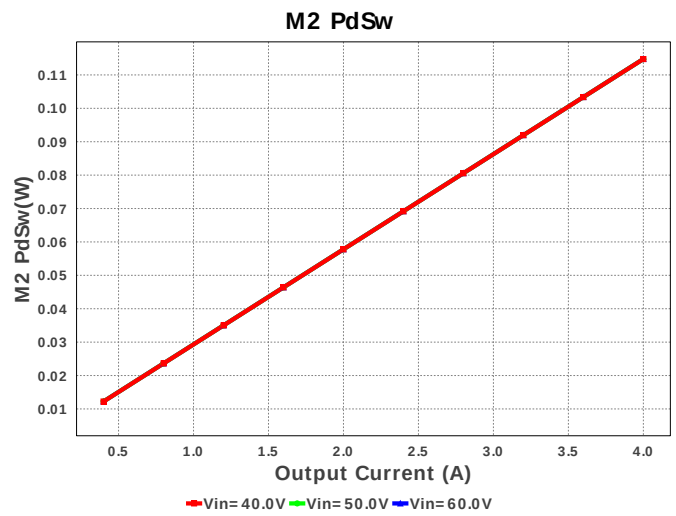
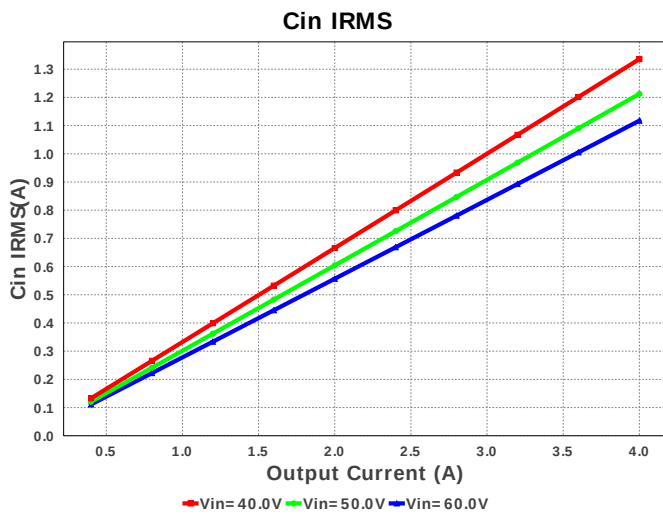
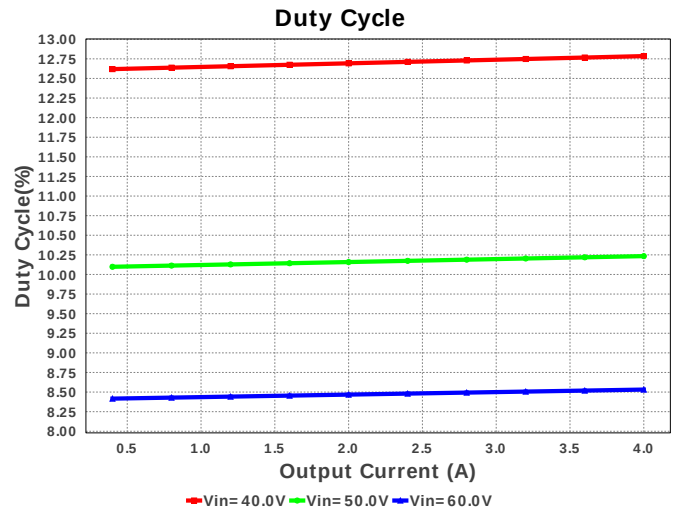
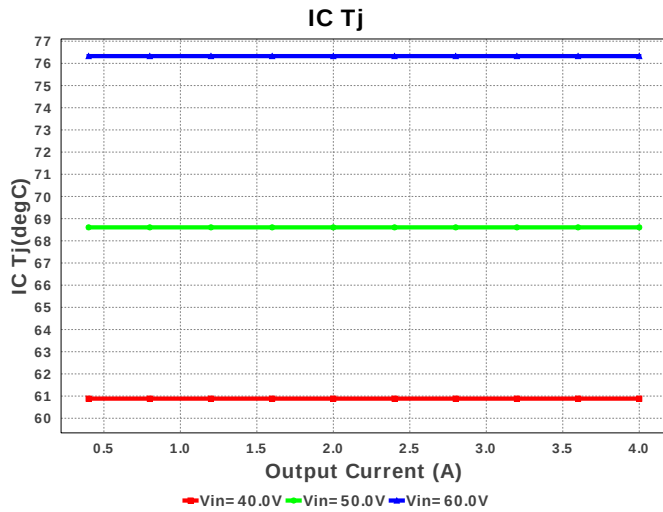
Design : 4161985/24 TPS40170RGYR
TPS40170RGYR 40.0V-60.0V to 5.00V @ 4.0A

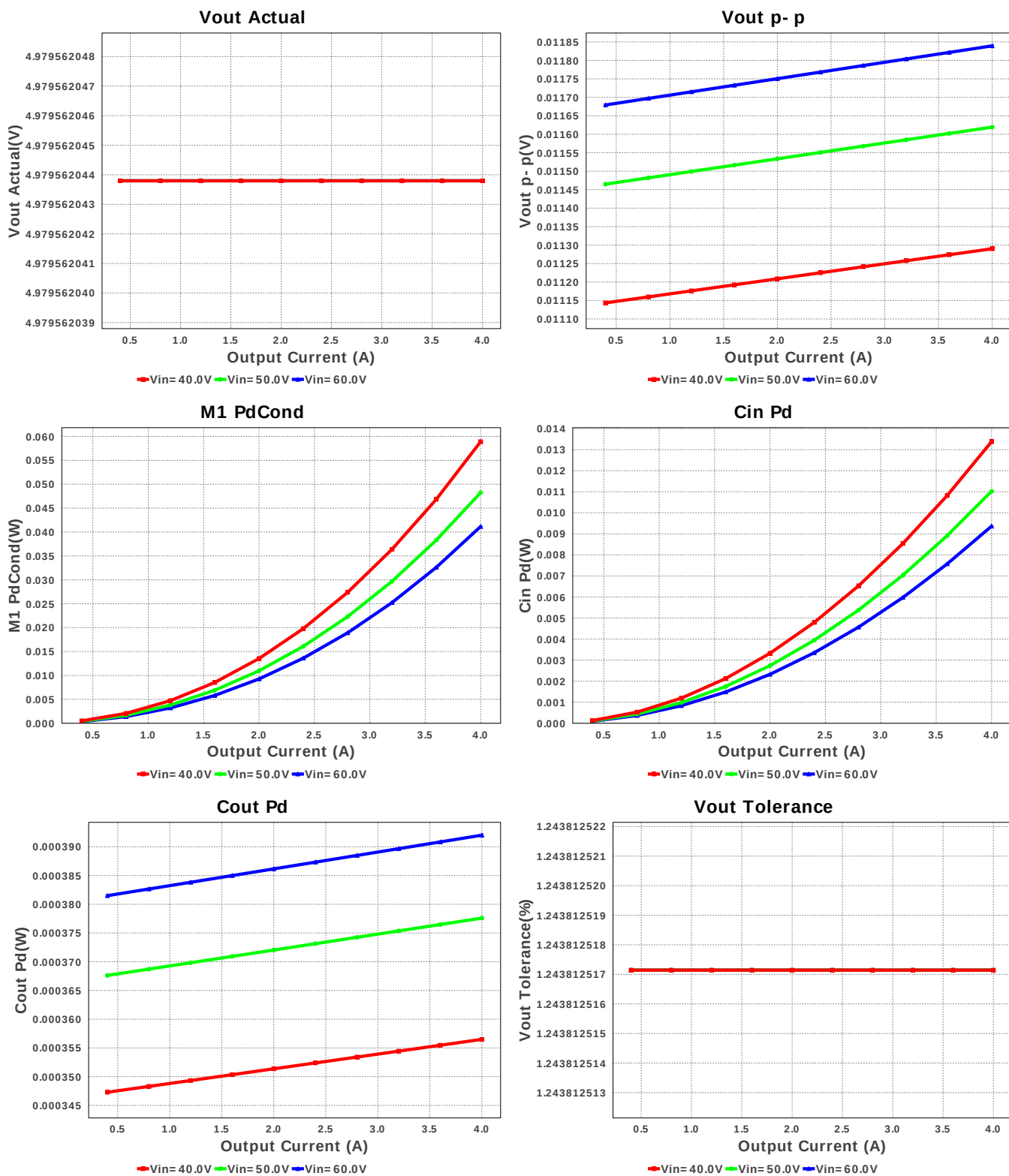


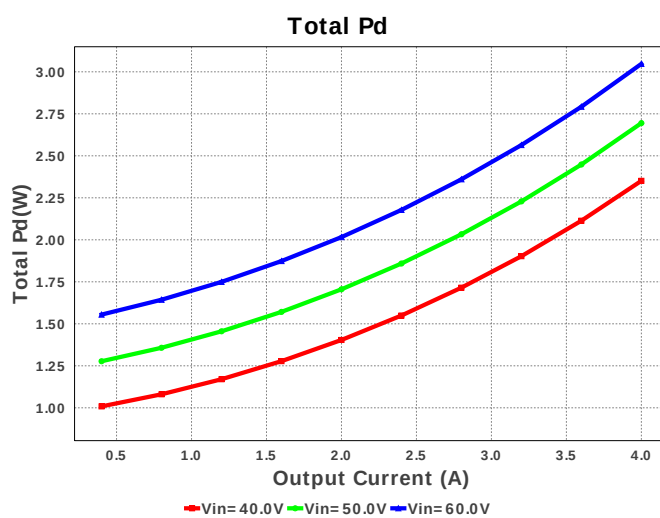
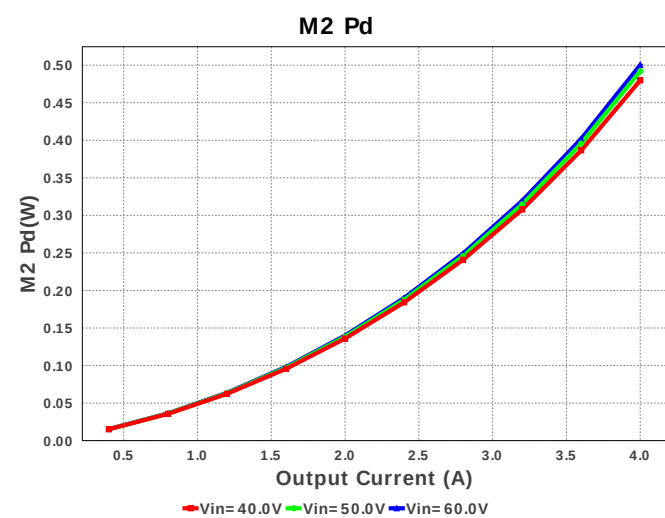
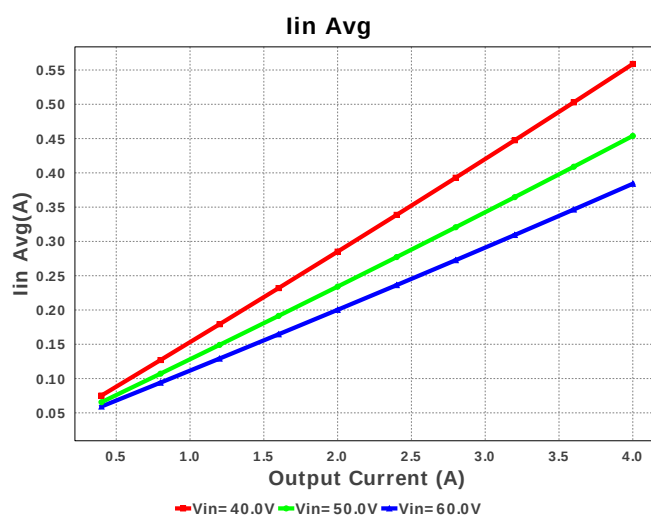
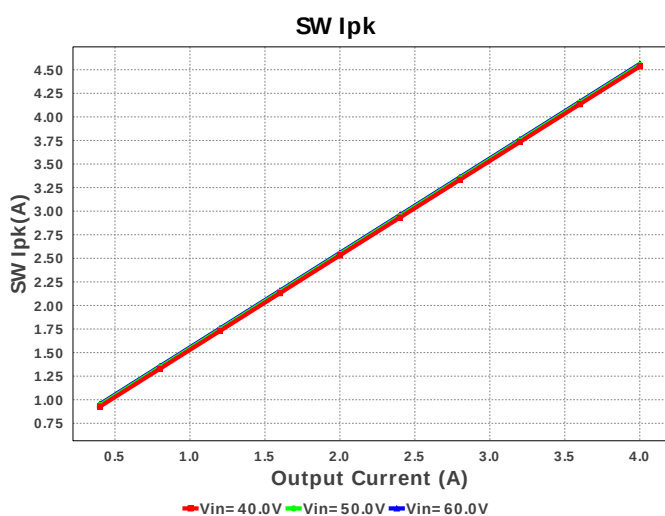
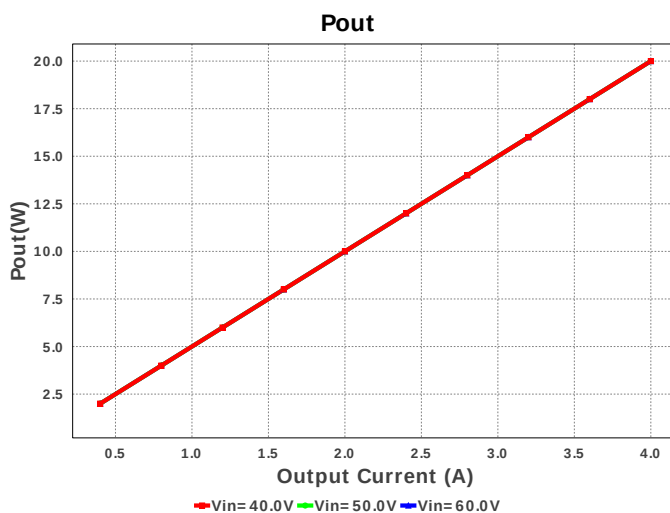
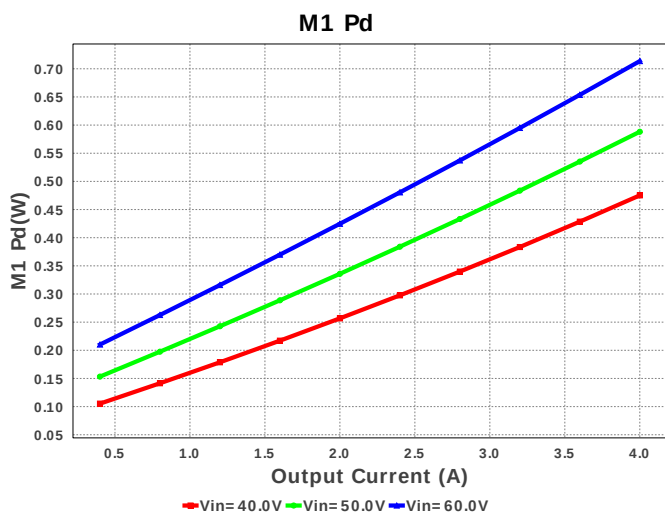
Electrical BOM

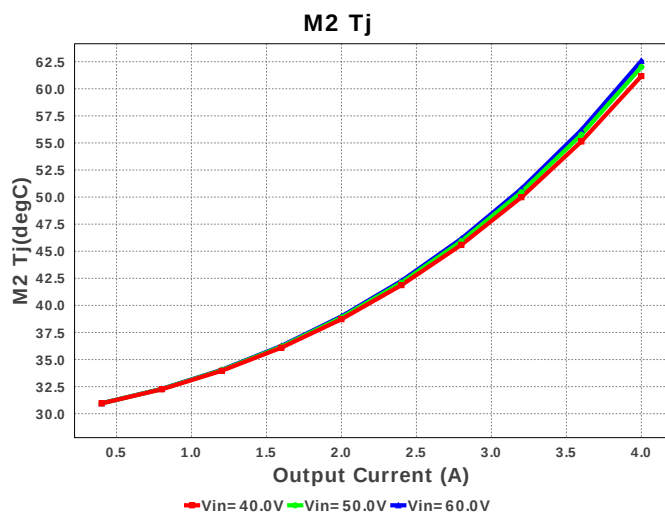
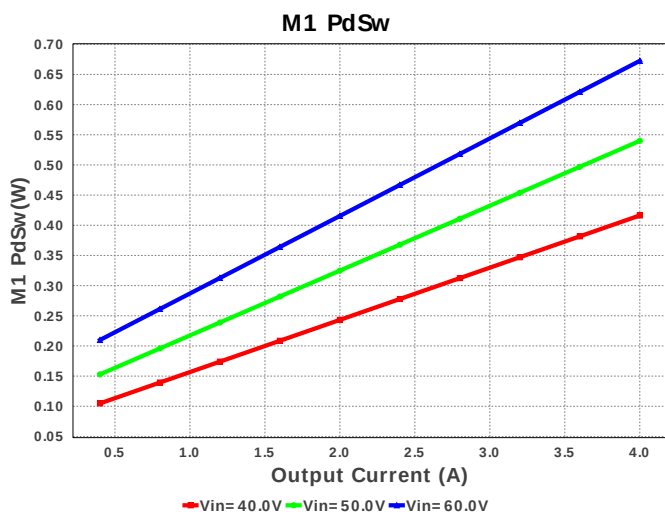
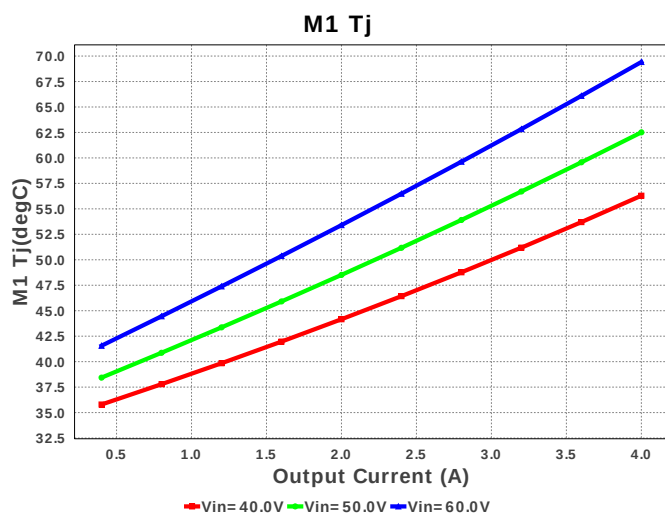
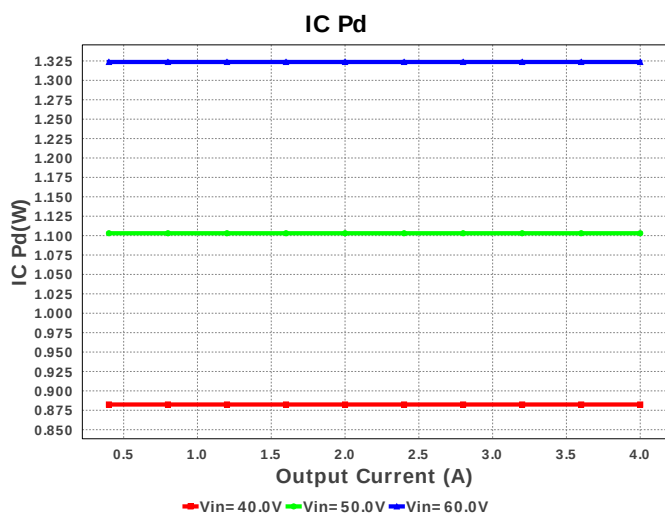
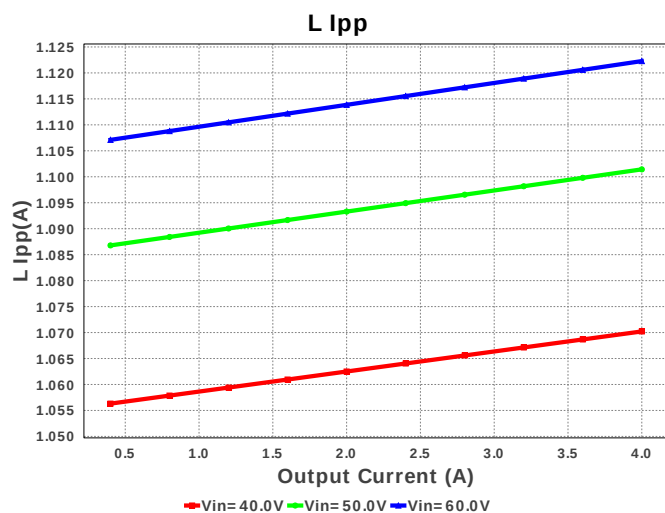
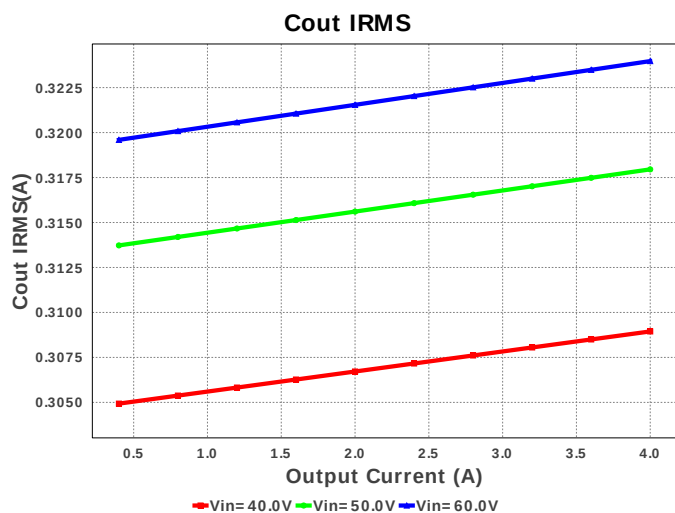
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Taiyo Yuden	HMK212B7104KG-T Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Cbyp	MuRata	GRM219R61C475KE15D Series= X5R	Cap= 4.7 uF ESR= 5.591 mOhm VDC= 16.0 V IRMS= 1.8634 A	1	\$0.03	0805 7 mm ²
3.	Ccomp	MuRata	GRM033R60J333KE01D Series= X5R	Cap= 33.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
4.	Ccomp2	Yageo America	CC0805KRX7R9BB821 Series= X7R	Cap= 820.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
5.	Ccomp3	Yageo America	CC0805KRX7R9BB392 Series= X7R	Cap= 3.9 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
6.	Cilim	MuRata	GRM216R71E102KA01D Series= X7R	Cap= 1.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
7.	Cin	TDK	C3216X7R2A105M160AA Series= X7R	Cap= 1.0 uF ESR= 7.5 mOhm VDC= 100.0 V IRMS= 5.9235 A	1	\$0.11	1206 11 mm ²
8.	Cldrv	MuRata	GRM216R71E102KA01D Series= X7R	Cap= 1.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
9.	Cout	MuRata	GRM31CR60J476ME19L Series= X5R	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.091 A	1	\$0.12	1206_190 11 mm ²
10.	Css	MuRata	GRM033R70J222KA01D Series= X7R	Cap= 2.2 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²

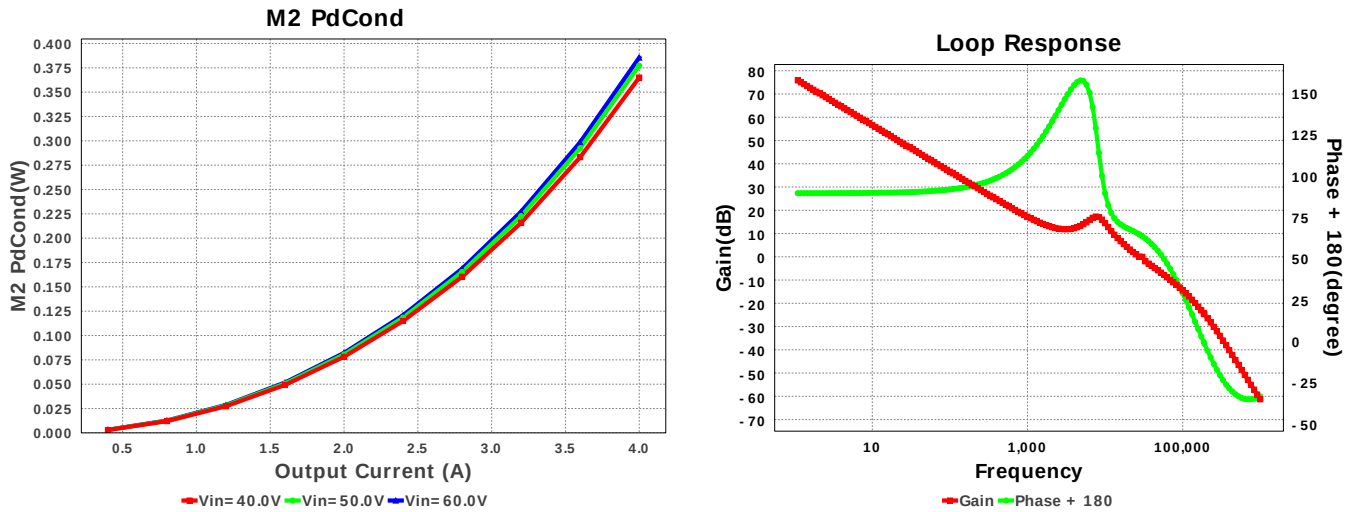
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Cvdd	MuRata	GRM188R71C105KA12D Series= X7R	Cap= 1.0 uF ESR= 11.0 mOhm VDC= 16.0 V IRMS= 2.72 A	1	\$0.01	 0603 5 mm ²
12.	Cvin	TDK	C3216X5R2A105K Series= X5R	Cap= 1.0 uF ESR= 5.698 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.07	 1206 11 mm ²
13.	L1	Bourns	SRR1208-120ML	L= 12.0 µH DCR= 25.0 mOhm	1	\$0.37	 SRR1208 216 mm ²
14.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 9.7 Amps	1	\$0.65	 TRANS_NexFET_Q3 18 mm ²
15.	M2	Infineon Technologies	BSC190N12NS3 G	VdsMax= 120.0 V IdsMax= 44.0 Amps	1	\$0.64	 PG-TDSON-8 55 mm ²
16.	Rcomp	Vishay-Dale	CRCW04021K13FKED Series= CRCW..e3	Res= 1.13 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rcomp2	Vishay-Dale	CRCW0402267RFKED Series= CRCW..e3	Res= 267.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rcs	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
19.	Renb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
20.	Rent	Vishay-Dale	CRCW040264K9FKED Series= CRCW..e3	Res= 64.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Rfbb	Vishay-Dale	CRCW04021K37FKED Series= CRCW..e3	Res= 1.37 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
22.	Rfbt	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
23.	Rpgood	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
24.	Rscp	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
25.	Rt	Vishay-Dale	CRCW040226K7FKED Series= CRCW..e3	Res= 26.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
26.	Rtrk	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
27.	U1	Texas Instruments	TPS40170RGYR	Switcher	1	\$2.10	 RGY0020A 25 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.117 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	323.973 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	384.17 mA	Current	Average input current
4.	L Ipp	1.122 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	4.561 A	Current	Peak switch current
6.	BOM Count	27	General	Total Design BOM count
7.	FootPrint	430.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	348.432 kHz	General	Switching frequency
9.	IC Tolerance	6.0 μ V	General	IC Feedback Tolerance
10.	Pout	20.0 W	General	Total output power
11.	Total BOM	\$4.3	General	Total BOM Cost
12.	Low Freq Gain	75.834 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	4.98 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Cross Freq	27.553 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	8.532 %	Op_point	Duty cycle
16.	Efficiency	86.768 %	Op_point	Steady state efficiency
17.	Gain Marg	-24.324 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	76.328 degC	Op_point	IC junction temperature
19.	IOUT_OP	4.0 A	Op_point	Iout operating point
20.	M1 Tj	69.418 degC	Op_point	M1 MOSFET junction temperature
21.	M2 Tj	62.578 degC	Op_point	M2 MOSFET junction temperature
22.	Phase Marg	65.129 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	60.0 V	Op_point	Vin operating point
24.	Vout p-p	11.839 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	9.365 mW	Power	Input capacitor power dissipation
26.	Cout Pd	392.02 μ W	Power	Output capacitor power dissipation
27.	IC Pd	1.324 W	Power	IC power dissipation
28.	L Pd	500.0 mW	Power	Inductor power dissipation
29.	M1 Pd	713.483 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	40.982 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	672.501 mW	Power	M1 MOSFET switching losses
32.	M2 Pd	503.017 mW	Power	M2 MOSFET total power dissipation
33.	M2 PdCond	388.244 mW	Power	M2 MOSFET conduction losses
34.	M2 PdSw	114.773 mW	Power	M2 MOSFET switching losses
35.	Total Pd	3.05 W	Power	Total Power Dissipation
36.	Vout Tolerance	1.244 %		Vout Tolerance based on IC Tolerance and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	4.0	Maximum Output Current
2.	VinMax	60.0	Maximum input voltage
3.	VinMin	40.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS40170	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TPS40170 Product Folder : <http://www.ti.com/product/TPS40170> : contains the data sheet and other resources.

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