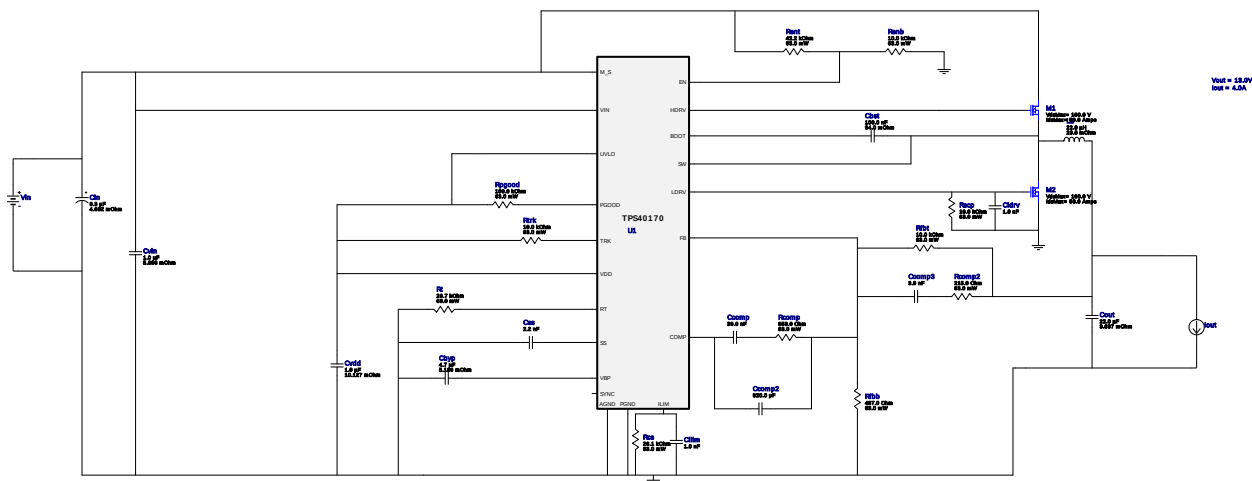


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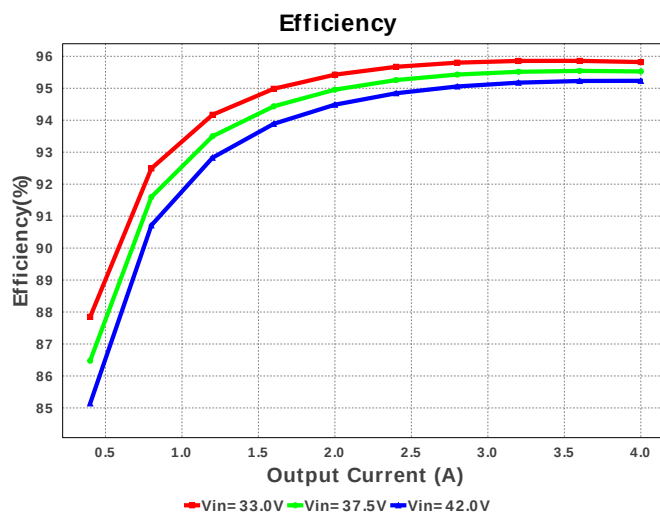
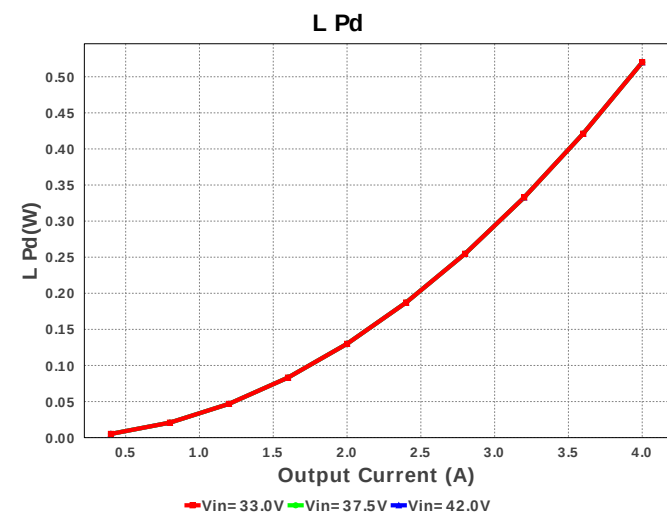
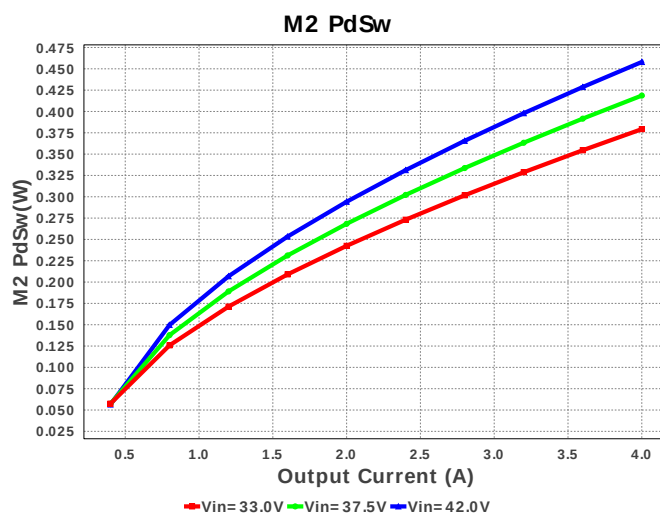
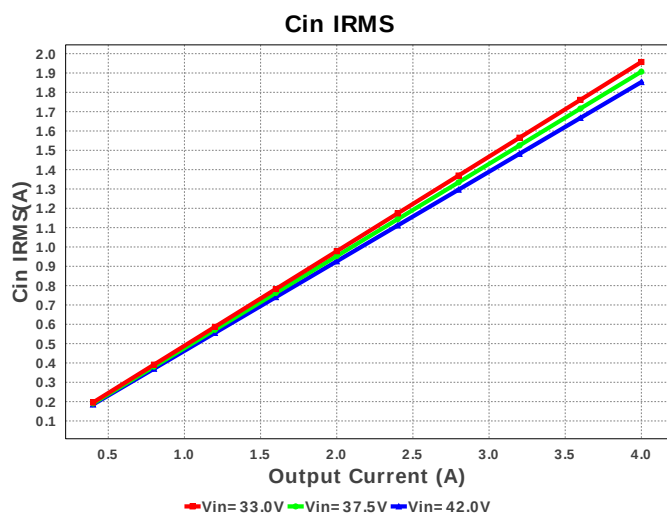
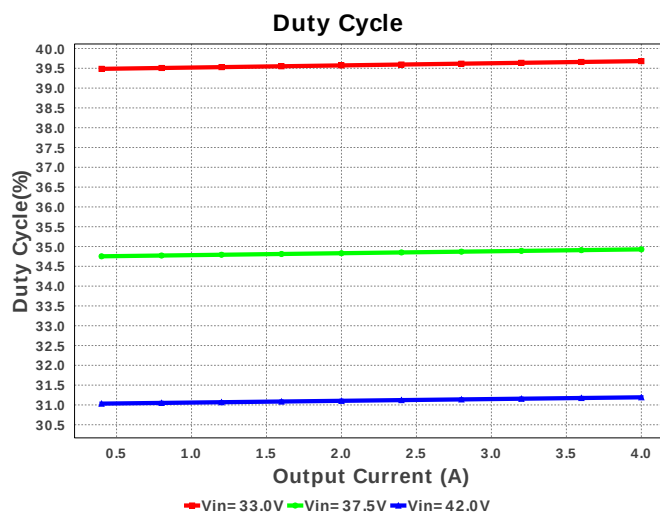
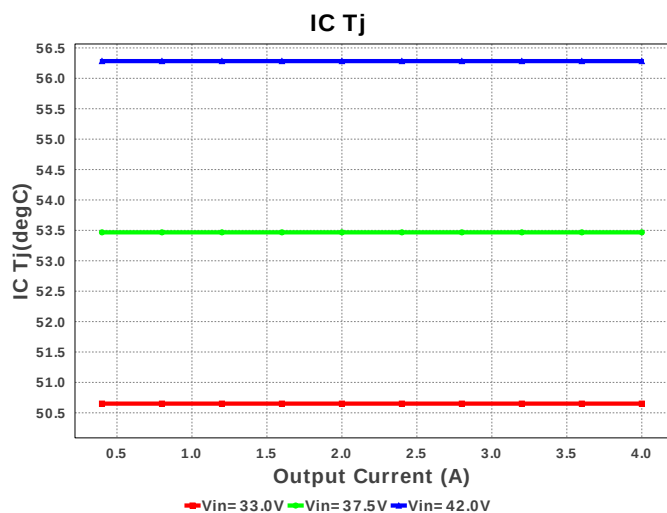
Design : 4806354/4 TPS40170RGYR
TPS40170RGYR 33.0V-42.0V to 13.00V @ 4.0A

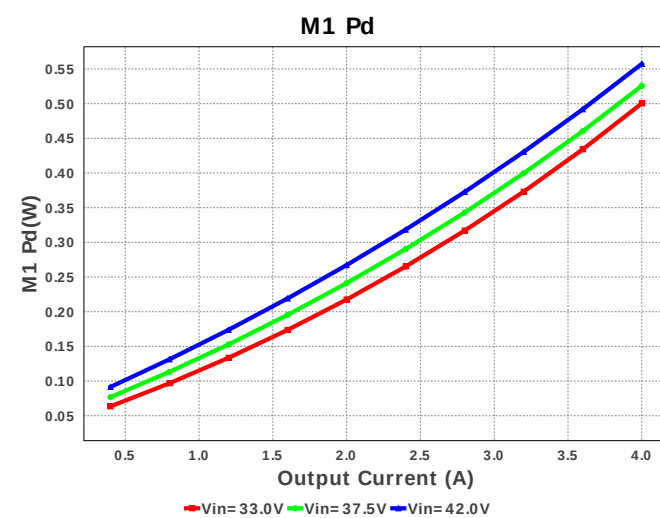
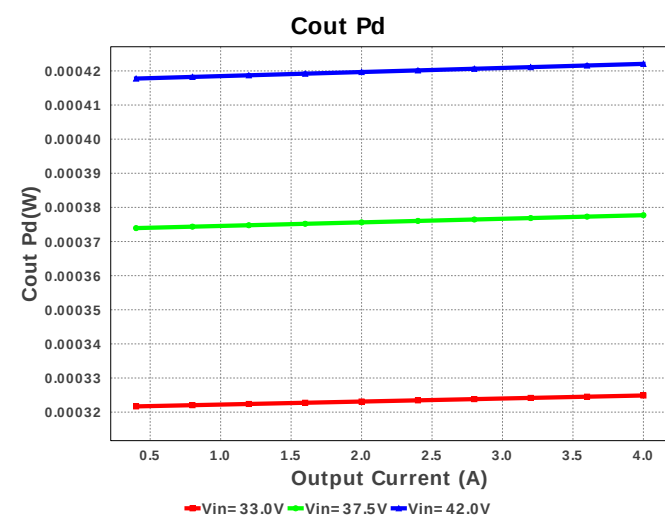
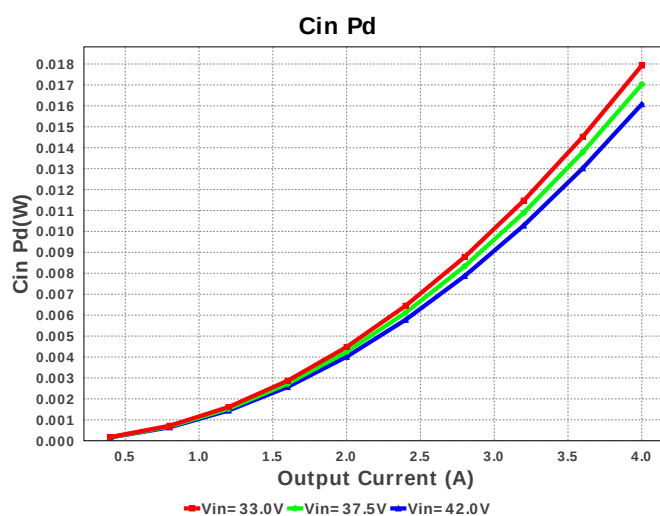
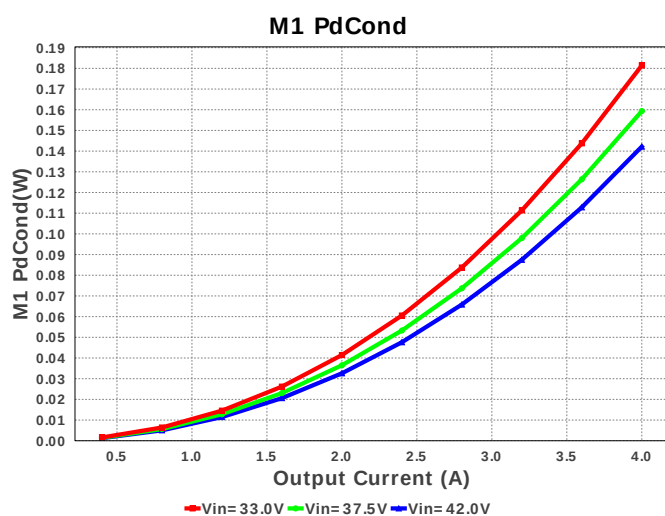
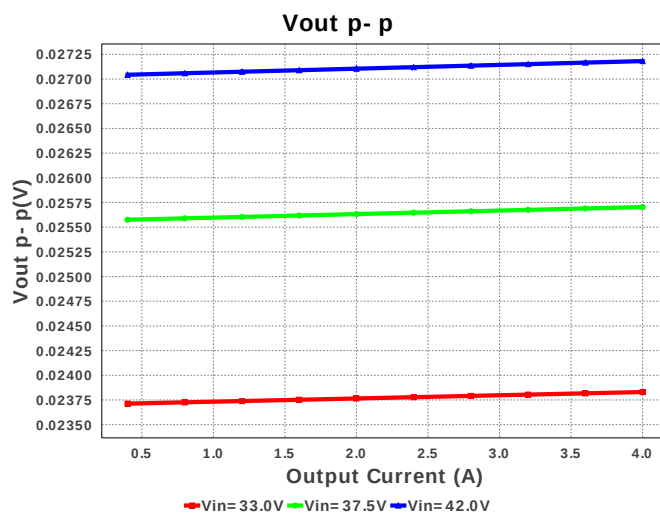
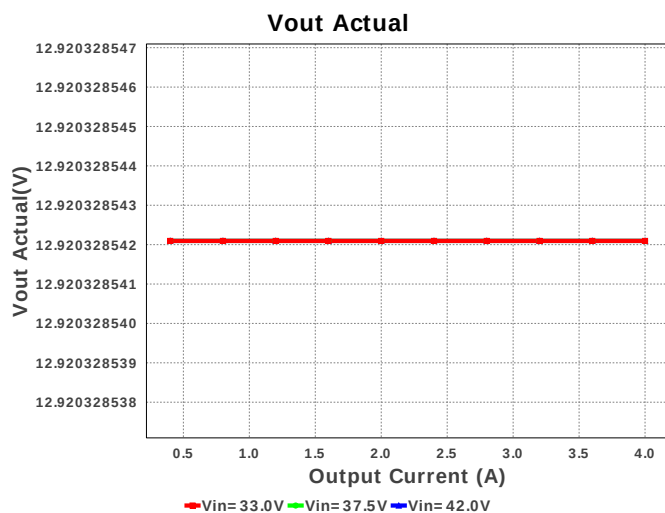


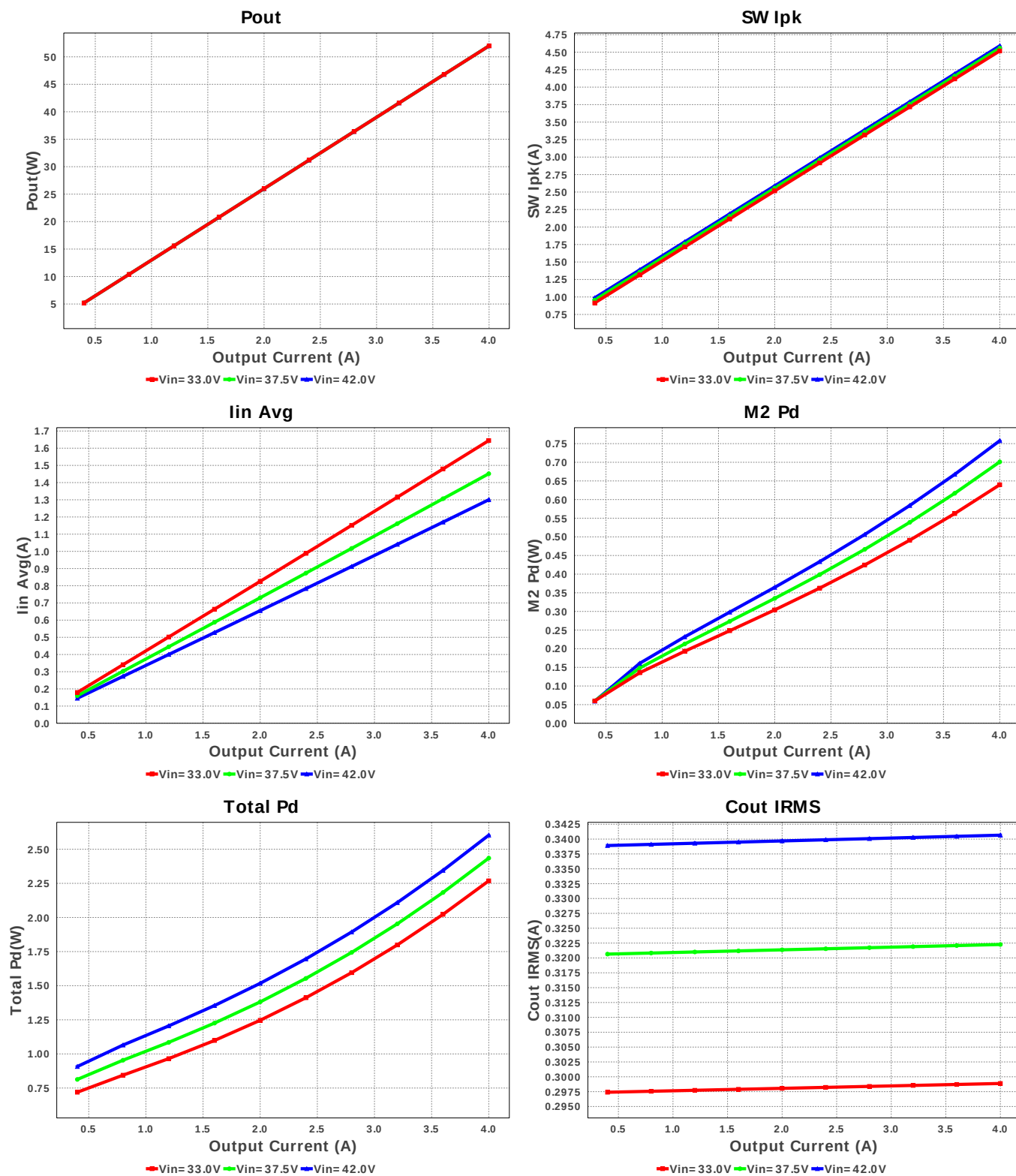
Electrical BOM

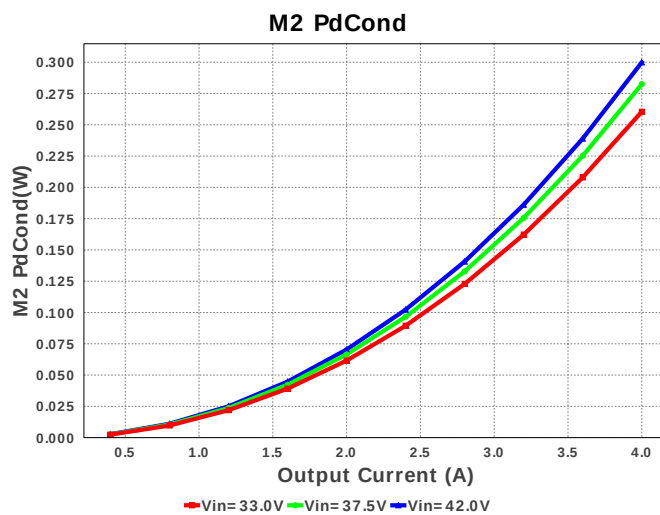
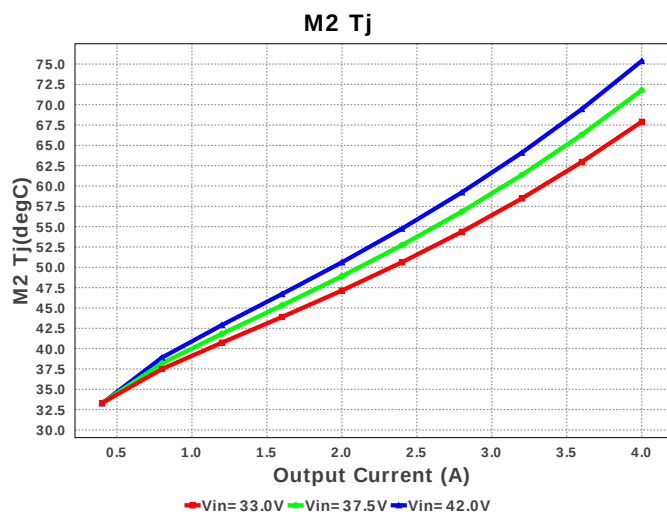
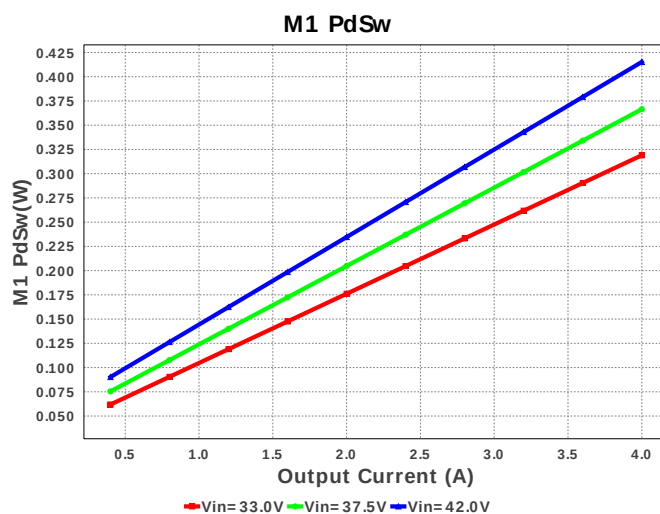
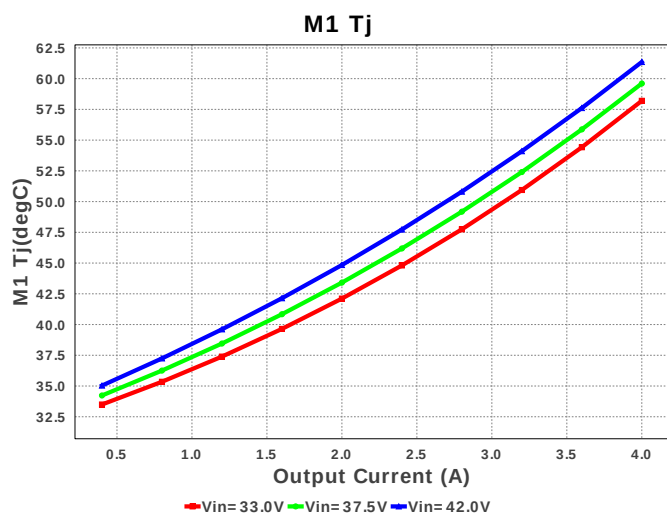
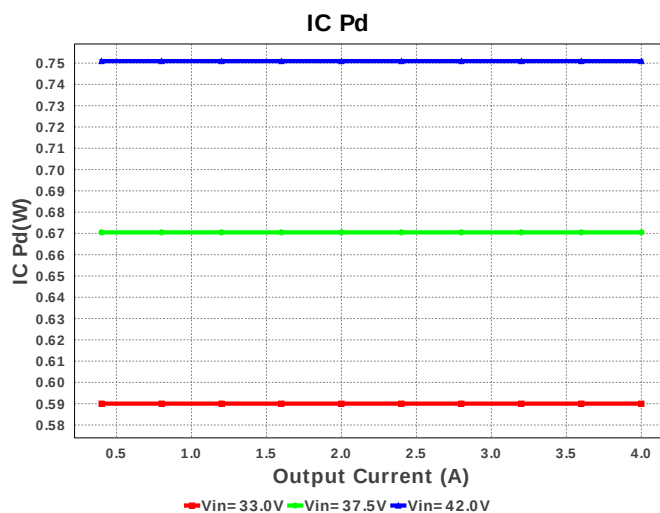
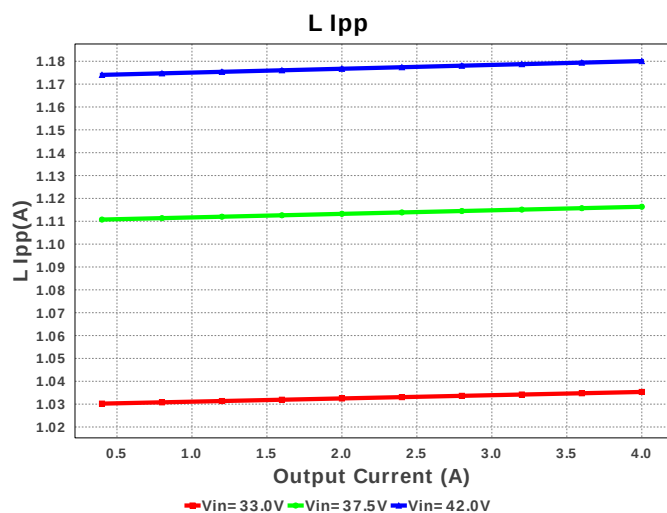
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	0805 7 mm ²
2.	Cbyp	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	0805 7 mm ²
3.	Ccomp	MuRata	GRM155R61A393KA01D Series= X5R	Cap= 39.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 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.	Clim	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	C3225X7S2A335K200AB Series= X7S	Cap= 3.3 uF ESR= 4.682 mOhm VDC= 100.0 V IRMS= 3.39944 A	1	\$0.24	1210 15 mm ²
8.	Cldr	MuRata	GRM033R71C102KA01D Series= X7R	Cap= 1.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
9.	Cout	MuRata	GRM31CR61C226ME15L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 16.0 V IRMS= 3.4771 A	1	\$0.13	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

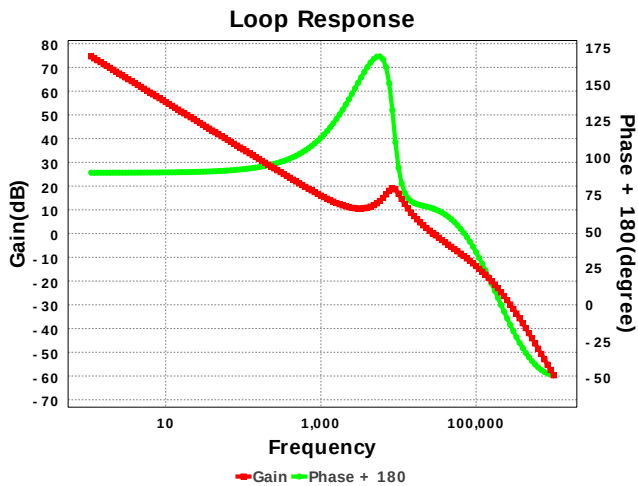
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11.	Cvdd	MuRata	GRM188R61C105KA93D Series= X5R	Cap= 1.0 uF ESR= 10.127 mOhm VDC= 16.0 V IRMS= 994.63 mA	1	\$0.01	 0603 5 mm ²
12.	Cvin	TDK	C3216X5R2A105K Series= X5R	Cap= 1.0 uF ESR= 5.698 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.07	 1206 11 mm ²
13.	L1	Coilcraft	MSS1210-223MEB	L= 22.0 µH DCR= 26.0 mOhm	1	\$0.81	 MSS1210 204 mm ²
14.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.50	 DQG0008A 18 mm ²
15.	M2	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.50	 DQG0008A 18 mm ²
16.	Rcomp	Vishay-Dale	CRCW0402953RFKED Series= CRCW..e3	Res= 953.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rcomp2	Vishay-Dale	CRCW0402215RFKED Series= CRCW..e3	Res= 215.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rcs	Vishay-Dale	CRCW040226K1FKED Series= CRCW..e3	Res= 26.1 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	CRCW040242K2FKED Series= CRCW..e3	Res= 42.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Rfbb	Vishay-Dale	CRCW0402487RFKED Series= CRCW..e3	Res= 487.0 Ohm 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	\$1.50	 RGY0020A 25 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.853 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	340.657 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.3 A	Current	Average input current
4.	L Ipp	1.18 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	4.59 A	Current	Peak switch current
6.	BOM Count	27	General	Total Design BOM count
7.	FootPrint	381.0 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.	Mode	CCM	General	Conduction Mode
11.	Pout	52.0 W	General	Total output power
12.	Total BOM	\$3.96	General	Total BOM Cost
13.	Low Freq Gain	74.621 dB	Op_Point	Gain at 10Hz
14.	Vout Actual	12.92 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Cross Freq	28.163 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	31.193 %	Op_point	Duty cycle
17.	Efficiency	95.255 %	Op_point	Steady state efficiency
18.	Gain Marg	-24.677 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	56.283 degC	Op_point	IC junction temperature
20.	IOUT_OP	4.0 A	Op_point	Iout operating point
21.	M1 Tj	61.355 degC	Op_point	M1 MOSFET junction temperature
22.	M2 Tj	74.619 degC	Op_point	M2 MOSFET junction temperature
23.	Phase Marg	65.545 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	42.0 V	Op_point	Vin operating point
25.	Vout p-p	27.182 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	16.078 mW	Power	Input capacitor power dissipation
27.	Cout Pd	422.064 μ W	Power	Output capacitor power dissipation
28.	IC Pd	750.951 mW	Power	IC power dissipation
29.	L Pd	520.0 mW	Power	Inductor power dissipation
30.	M1 Pd	557.405 mW	Power	M1 MOSFET total power dissipation
31.	M1 PdCond	142.207 mW	Power	M1 MOSFET conduction losses
32.	M1 PdSw	415.198 mW	Power	M1 MOSFET switching losses
33.	M2 Pd	745.246 mW	Power	M2 MOSFET total power dissipation
34.	M2 PdCond	299.898 mW	Power	M2 MOSFET conduction losses
35.	M2 PdSw	445.348 mW	Power	M2 MOSFET switching losses
36.	Total Pd	2.59 W	Power	Total Power Dissipation
37.	Vout Tolerance	1.927 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	4.0	Maximum Output Current
2.	VinMax	42.0	Maximum input voltage
3.	VinMin	33.0	Minimum input voltage
4.	Vout	13.0	Output Voltage
5.	base_pn	TPS40170	Base Product 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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