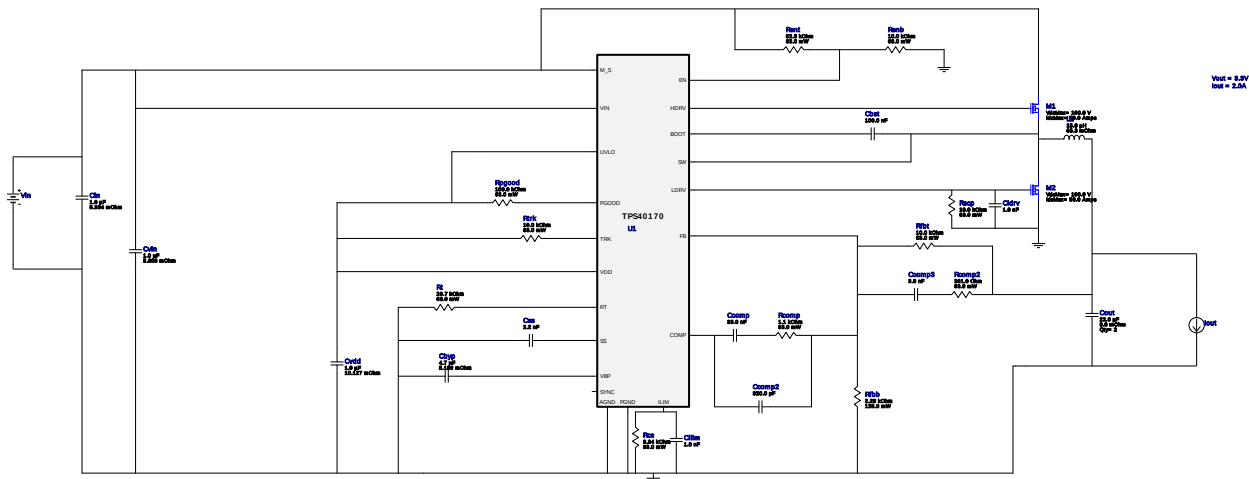


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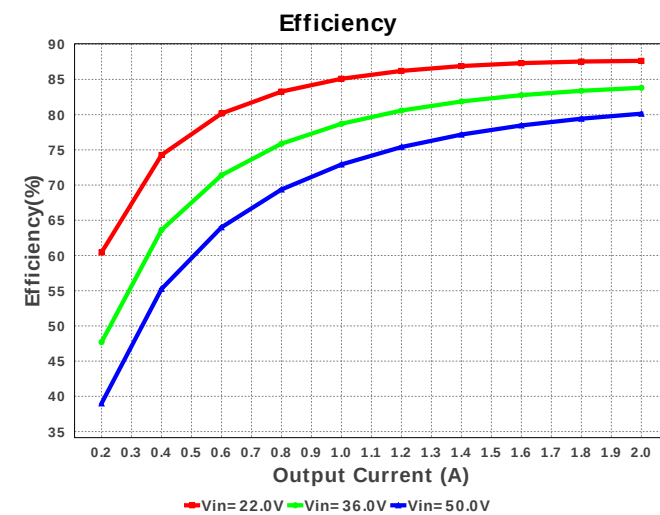
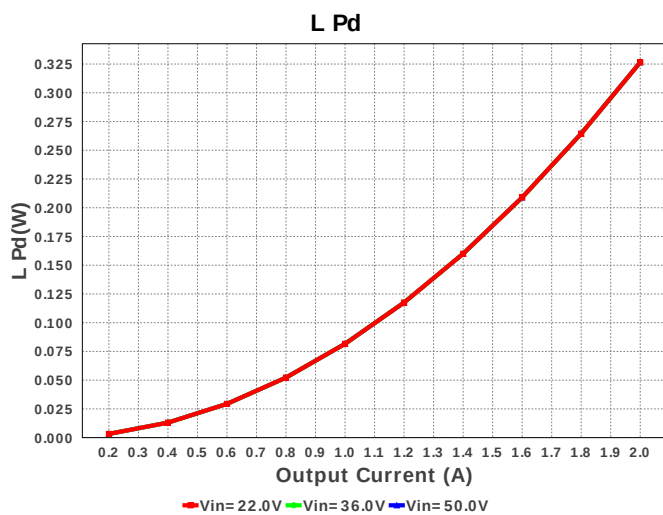
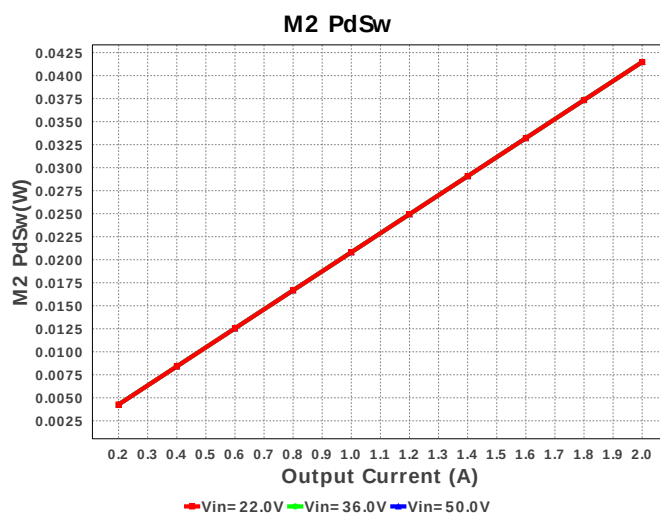
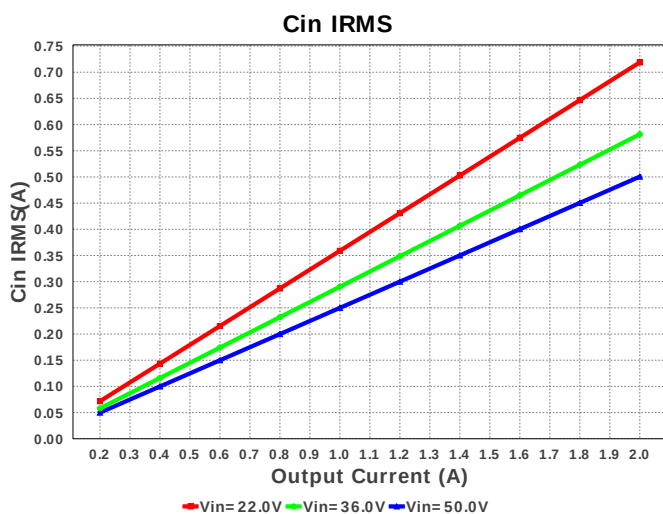
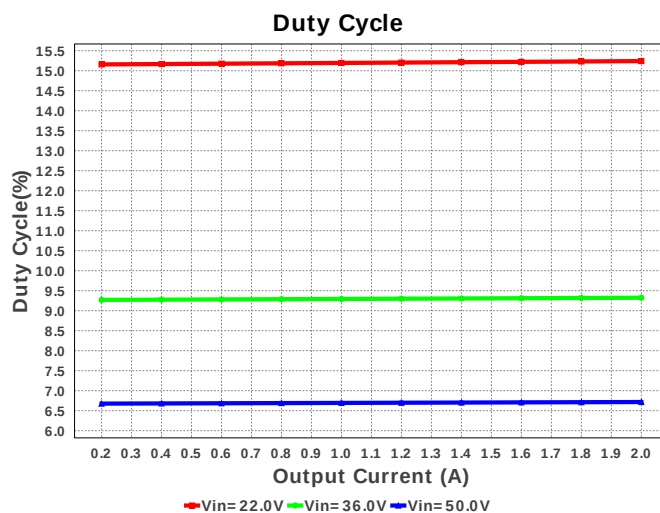
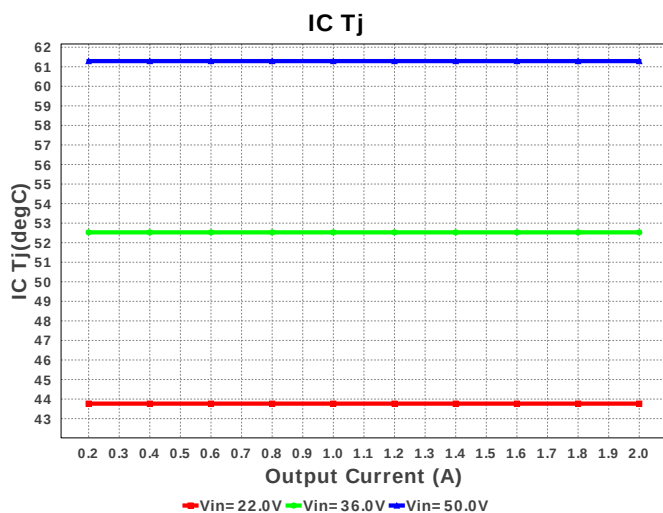
Design : 4766207/22 TPS40170RGYR
TPS40170RGYR 22.0V-50.0V to 3.30V @ 2.0A

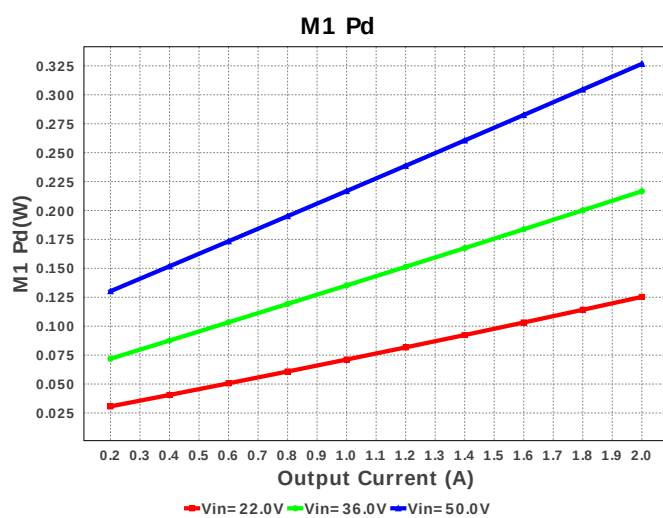
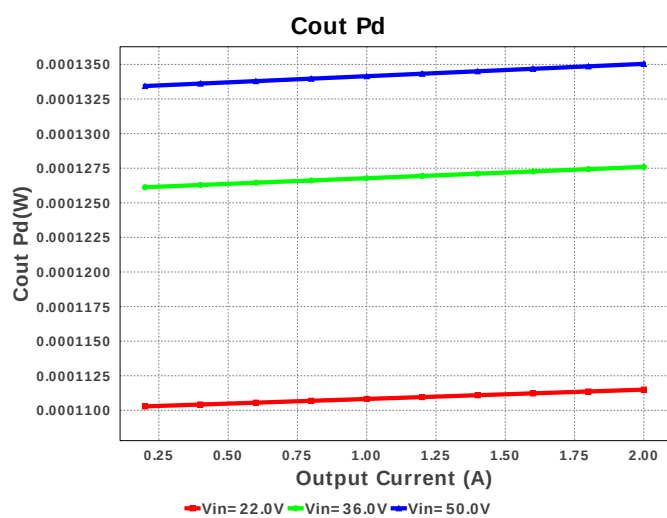
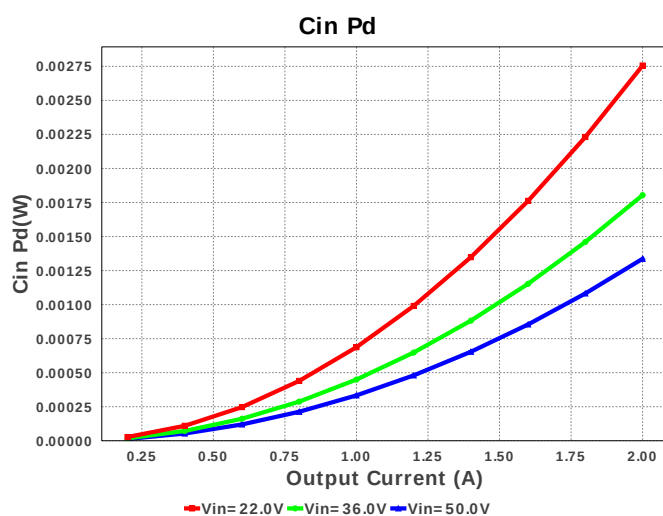
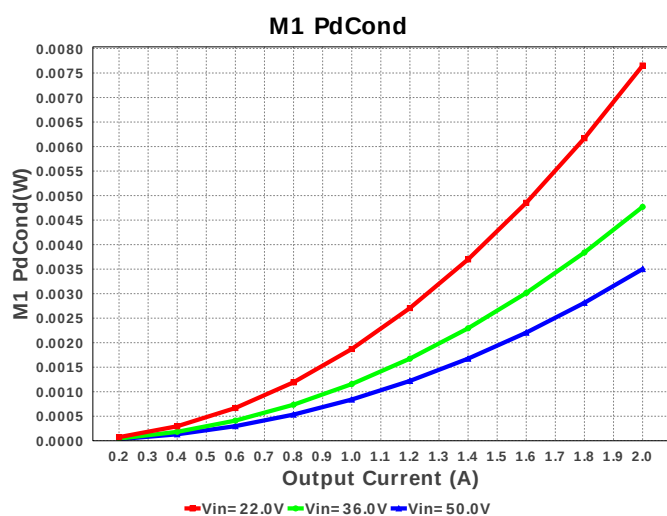
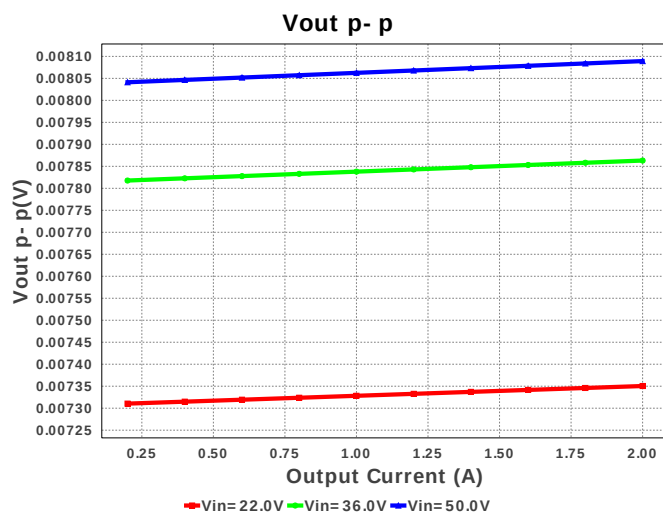
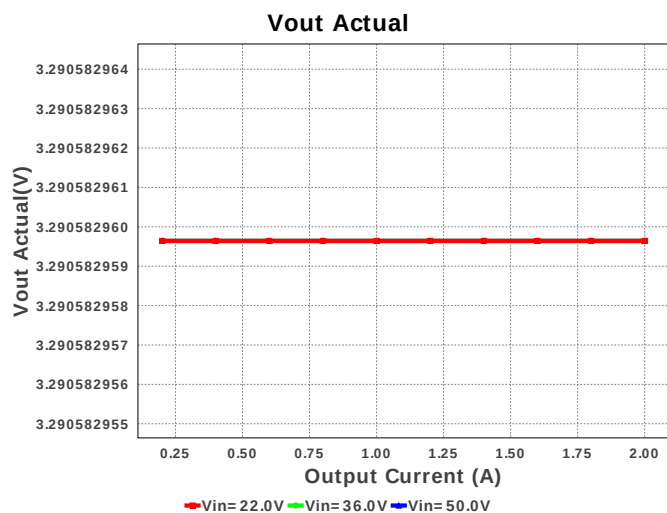


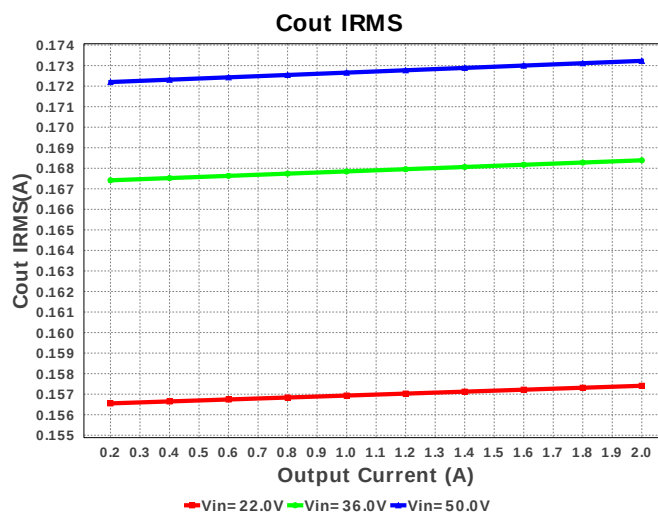
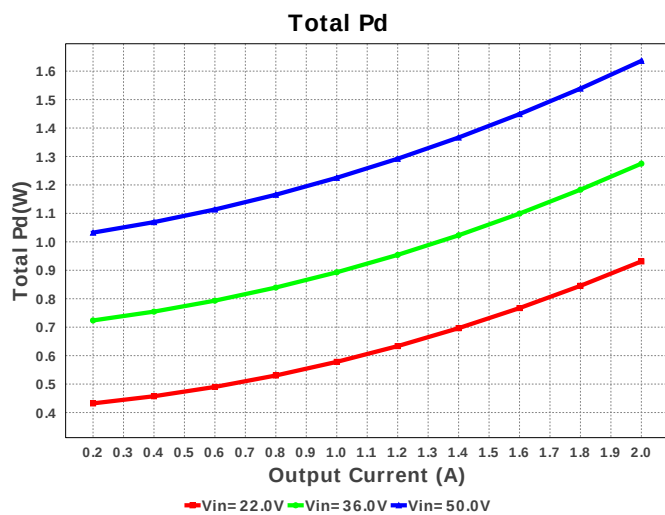
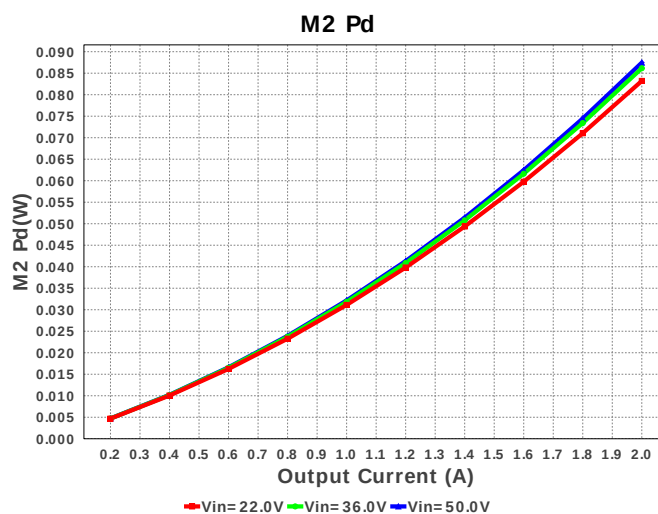
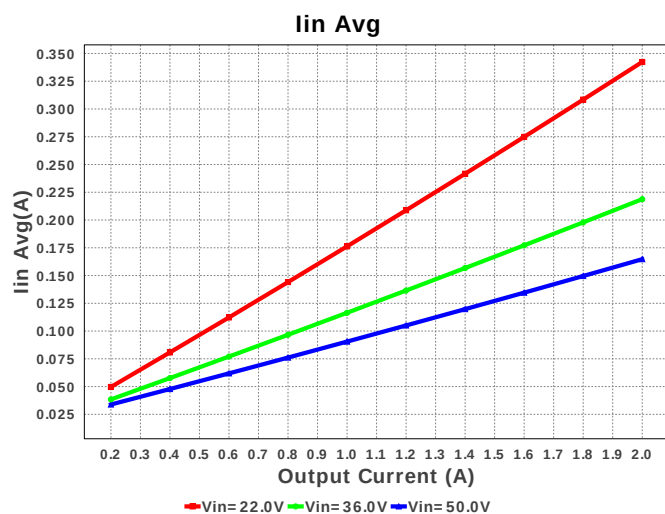
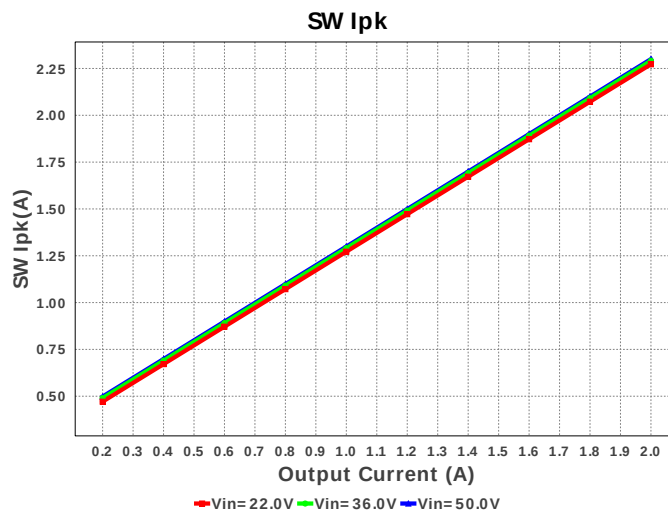
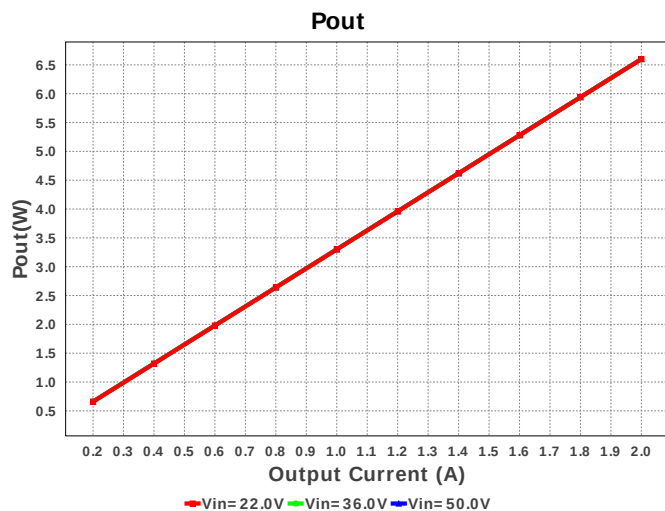
Electrical BOM

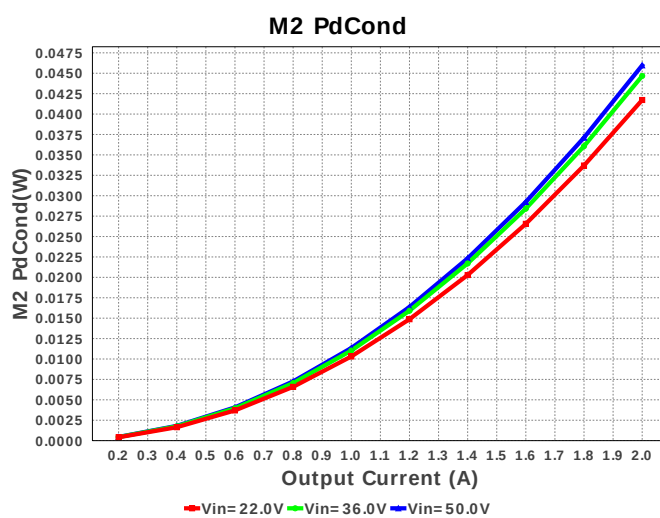
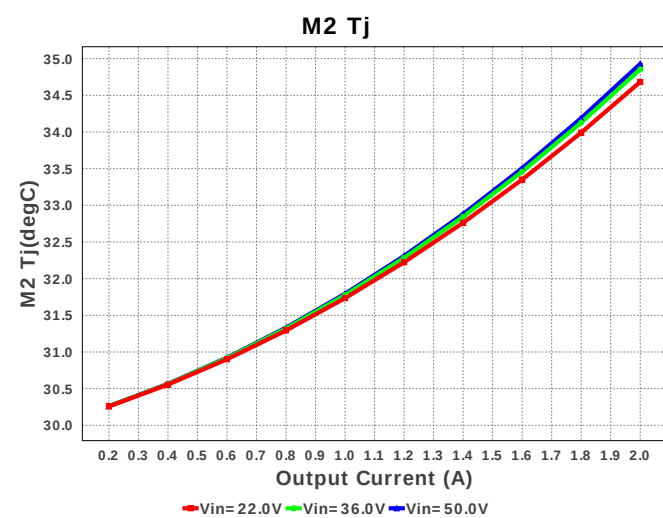
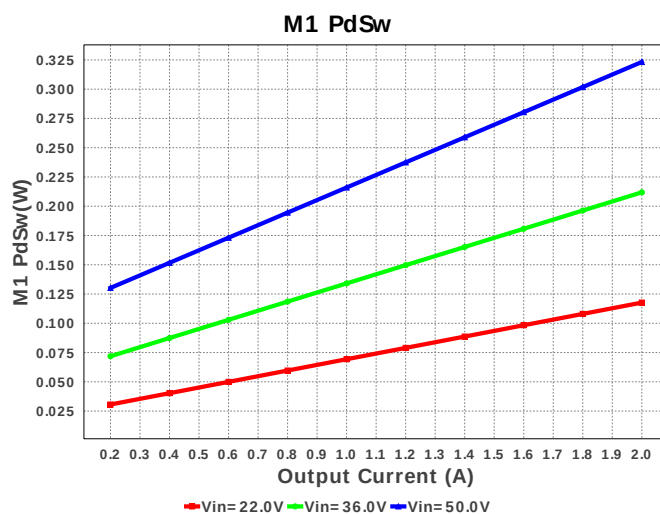
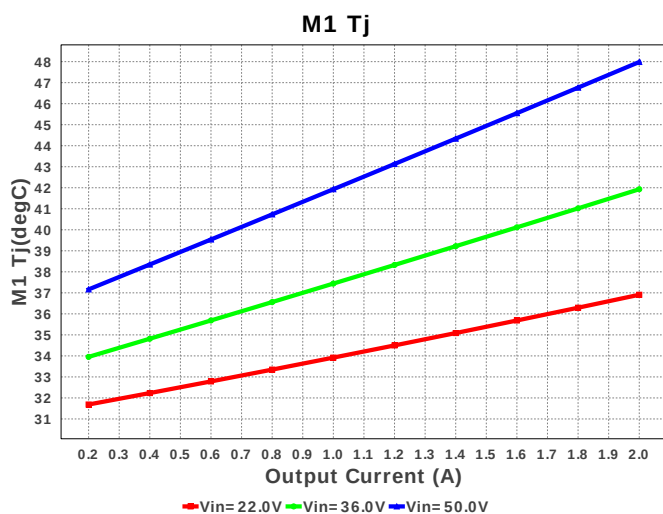
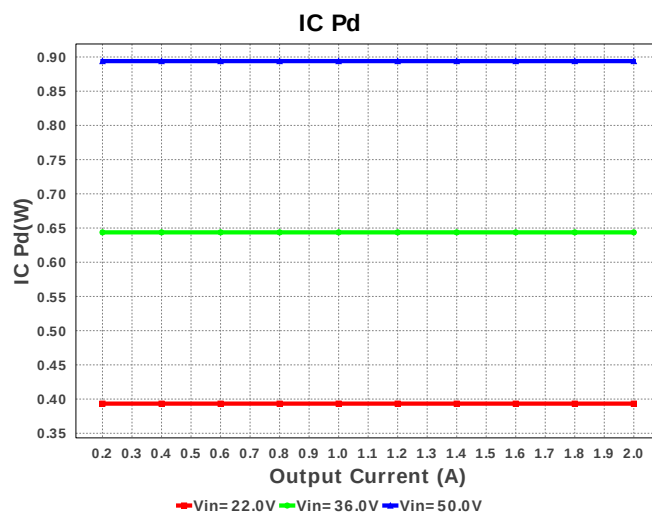
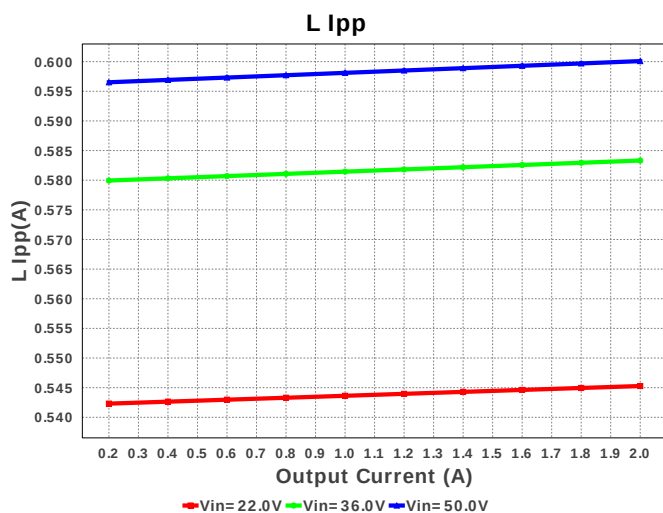
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Taiyo Yuden	HMK212B7104KG-T Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Cbyp	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	0805 7 mm ²
3.	Ccomp	MuRata	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	MuRata	GRM31CR72A105KA01L Series= X7R	Cap= 1.0 uF ESR= 5.334 mOhm VDC= 100.0 V IRMS= 1.55432 A	1	\$0.11	1206_190 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	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	\$0.04	0805 7 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

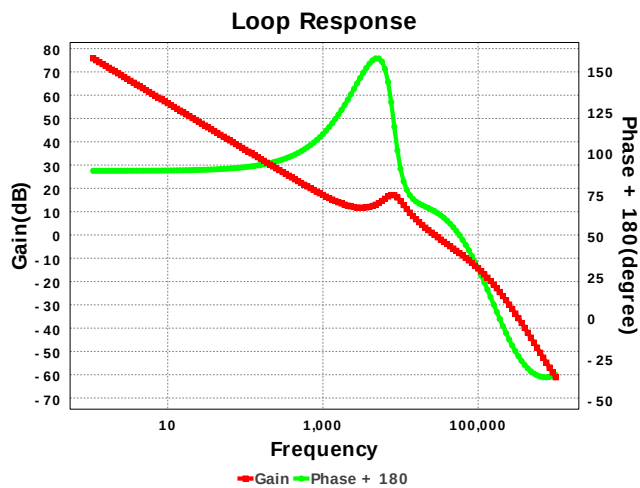
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11.	Cvdd	MuRata	GRM188R61C105KA93D Series= X5R	Cap= 1.0 uF ESR= 10.127 mOhm VDC= 16.0 V IRMS= 994.63 mA	1	\$0.01	 0603 5 mm ²
12.	Cvin	TDK	C3216X5R2A105K Series= X5R	Cap= 1.0 uF ESR= 5.698 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.07	 1206 11 mm ²
13.	L1	Vishay-Dale	IHLP3232DZER150M11	L= 15.0 µH DCR= 65.3 mOhm	1	\$0.75	 IHLP-3232DZ 112 mm ²
14.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.50	 TRANS_NexFET_Q3 18 mm ²
15.	M2	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.50	 TRANS_NexFET_Q3 18 mm ²
16.	Rcomp	Vishay-Dale	CRCW04021K10FKED Series= CRCW..e3	Res= 1.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rcomp2	Vishay-Dale	CRCW0402261RFKED Series= CRCW..e3	Res= 261.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rcs	Vishay-Dale	CRCW04026K34FKED Series= CRCW..e3	Res= 6.34 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	CRCW040252K3FKED Series= CRCW..e3	Res= 52.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Rfbb	Yageo America	RT0805BRD072K23L Series= RT0805	Res= 2.23 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	 0805 7 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	500.596 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	173.231 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	164.72 mA	Current	Average input current
4.	L Ipp	600.09 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	2.3 A	Current	Peak switch current
6.	BOM Count	28	General	Total Design BOM count
7.	FootPrint	295.0 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	6.6 W	General	Total output power
12.	Total BOM	\$3.78	General	Total BOM Cost
13.	Low Freq Gain	75.777 dB	Op_Point	Gain at 10Hz
14.	Vout Actual	3.291 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Cross Freq	27.533 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	6.716 %	Op_point	Duty cycle
17.	Efficiency	80.134 %	Op_point	Steady state efficiency
18.	Gain Marg	-24.473 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	61.29 degC	Op_point	IC junction temperature
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	M1 Tj	47.983 degC	Op_point	M1 MOSFET junction temperature
22.	M2 Tj	34.928 degC	Op_point	M2 MOSFET junction temperature
23.	Phase Marg	65.392 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	50.0 V	Op_point	Vin operating point
25.	Vout p-p	8.089 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	1.337 mW	Power	Input capacitor power dissipation
27.	Cout Pd	135.04 μ W	Power	Output capacitor power dissipation
28.	IC Pd	893.99 mW	Power	IC power dissipation
29.	L Pd	326.5 mW	Power	Inductor power dissipation
30.	M1 Pd	326.725 mW	Power	M1 MOSFET total power dissipation
31.	M1 PdCond	3.499 mW	Power	M1 MOSFET conduction losses
32.	M1 PdSw	323.226 mW	Power	M1 MOSFET switching losses
33.	M2 Pd	87.5 mW	Power	M2 MOSFET total power dissipation
34.	M2 PdCond	46.018 mW	Power	M2 MOSFET conduction losses
35.	M2 PdSw	41.482 mW	Power	M2 MOSFET switching losses
36.	Total Pd	1.636 W	Power	Total Power Dissipation
37.	Vout Tolerance	901.34 m%		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	50.0	Maximum input voltage
3.	VinMin	22.0	Minimum input voltage
4.	Vout	3.3	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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