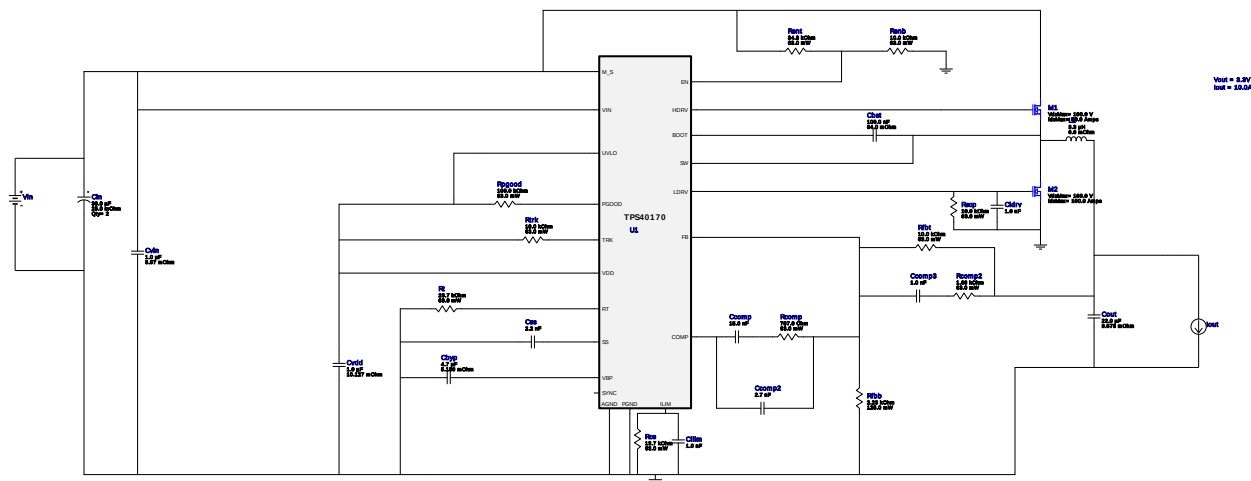


WEBENCH® Design Report

Design : 4085315/7 TPS40170RGYR
TPS40170RGYR 6.0V-36.0V to 3.30V @ 10.0A

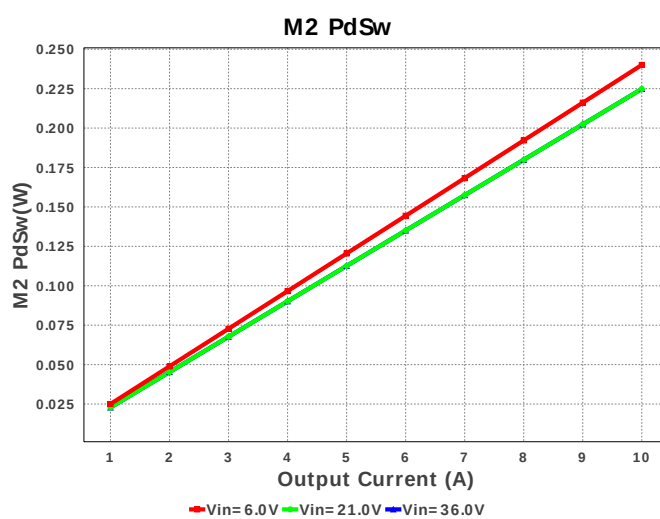
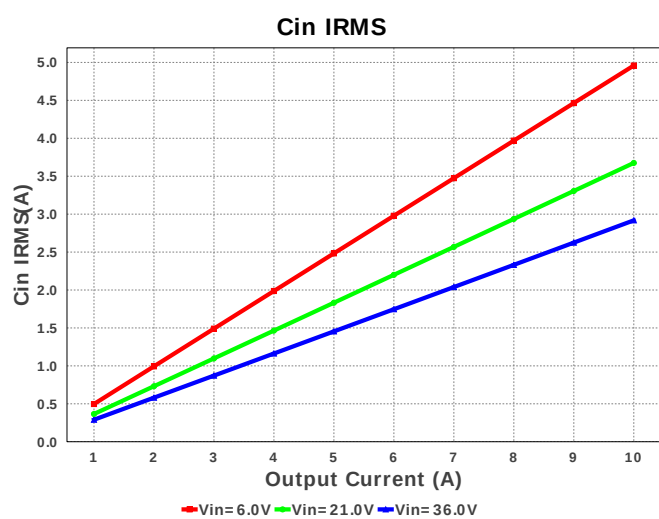
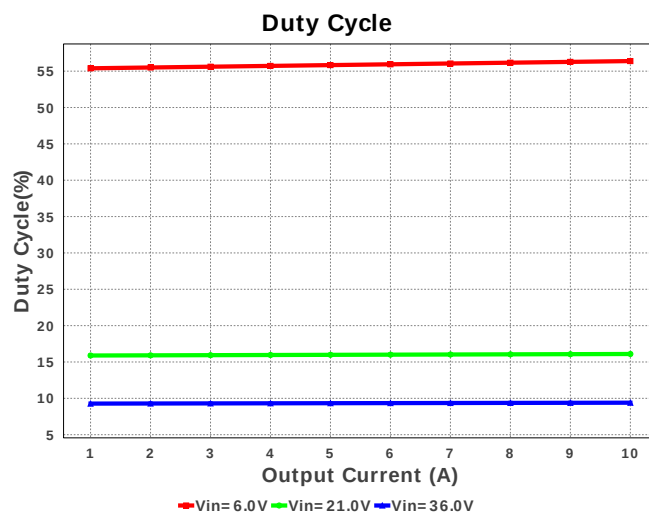
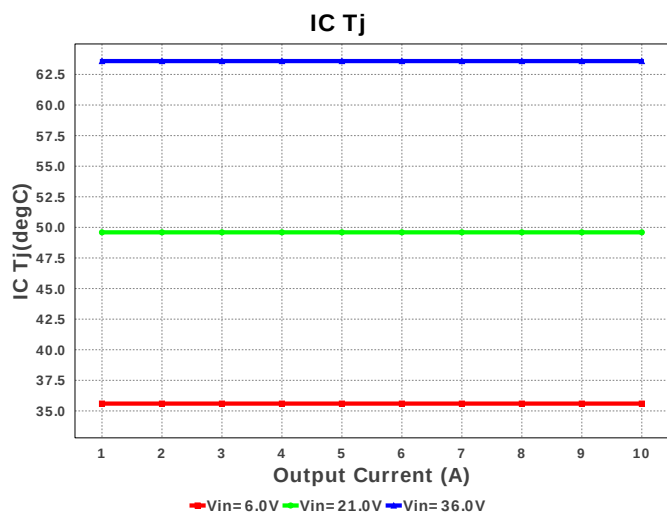


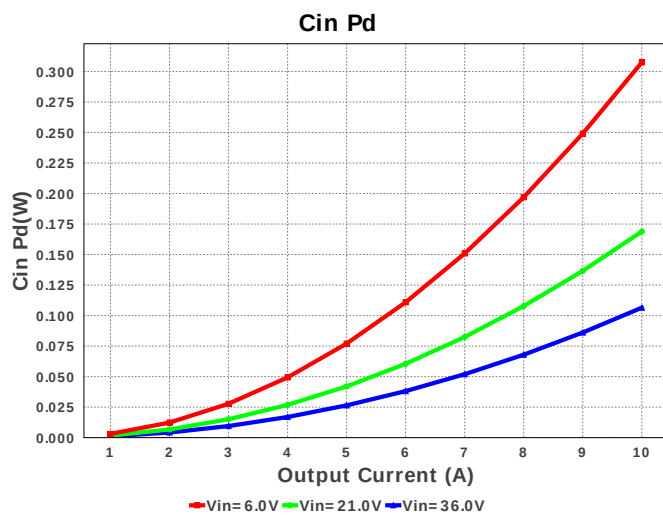
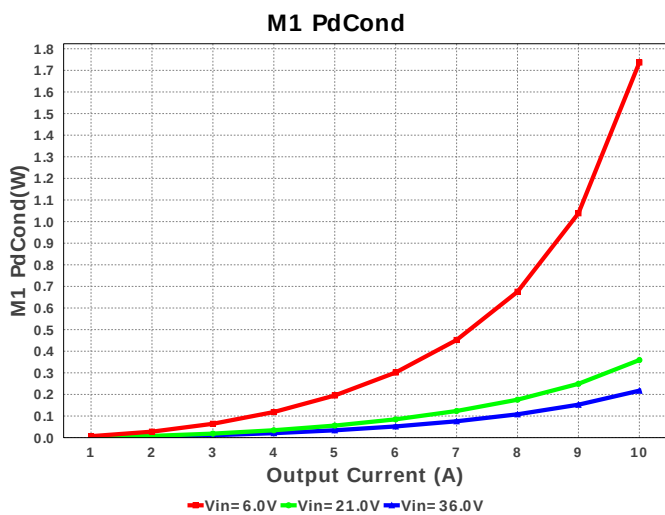
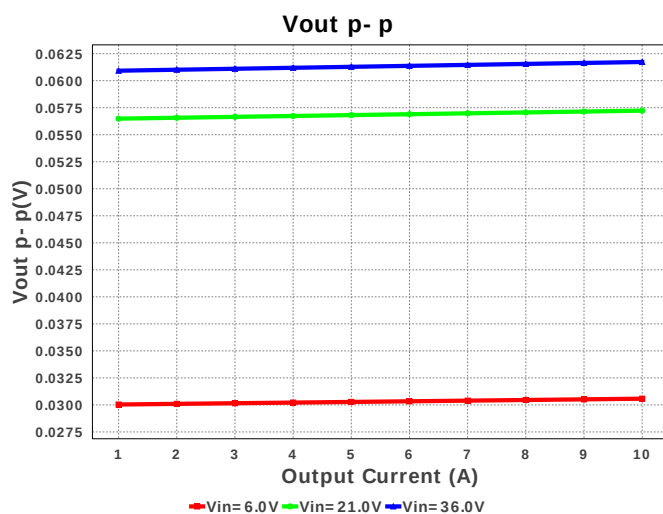
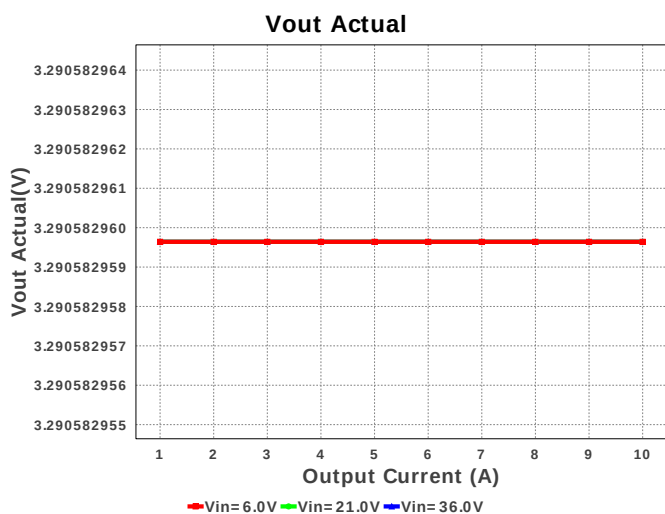
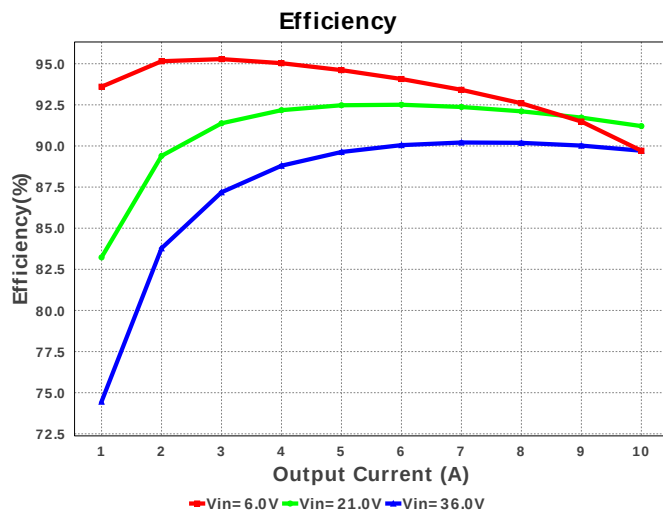
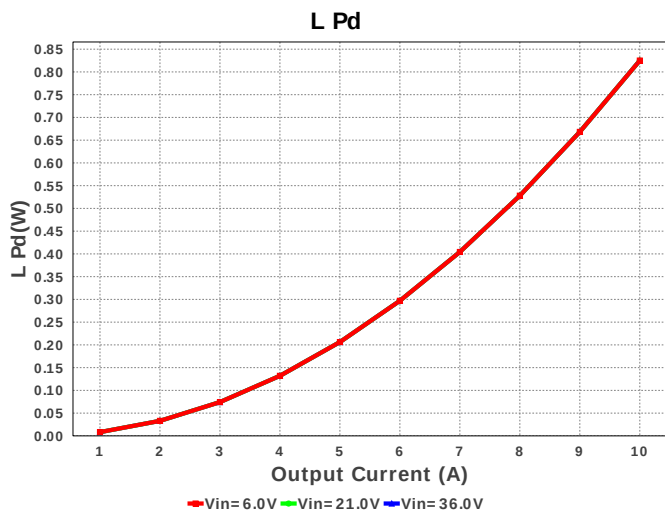
Electrical BOM

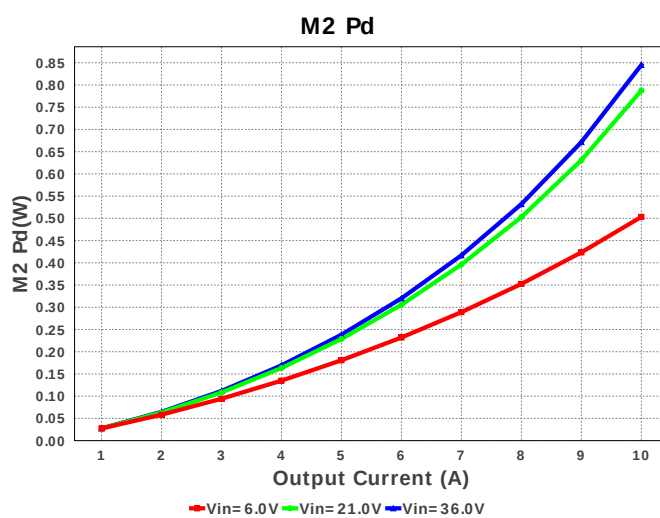
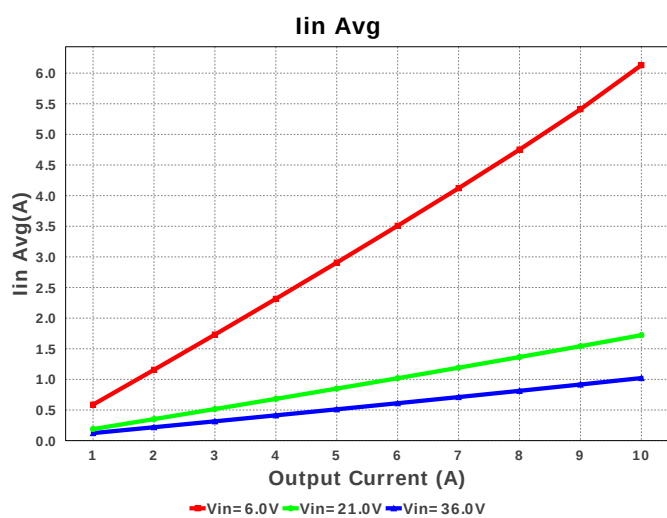
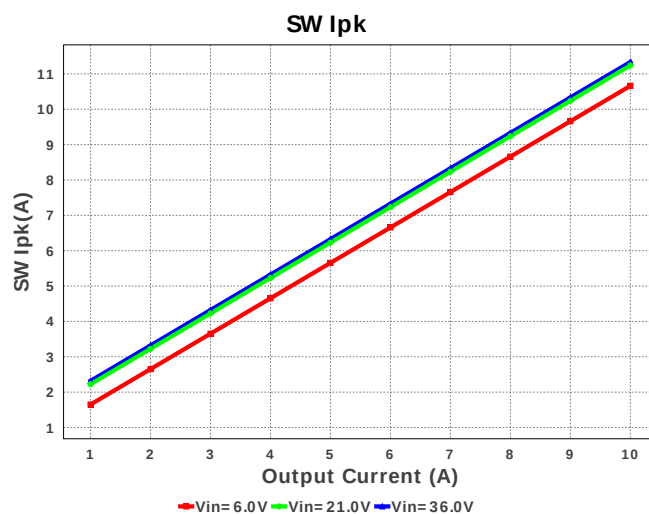
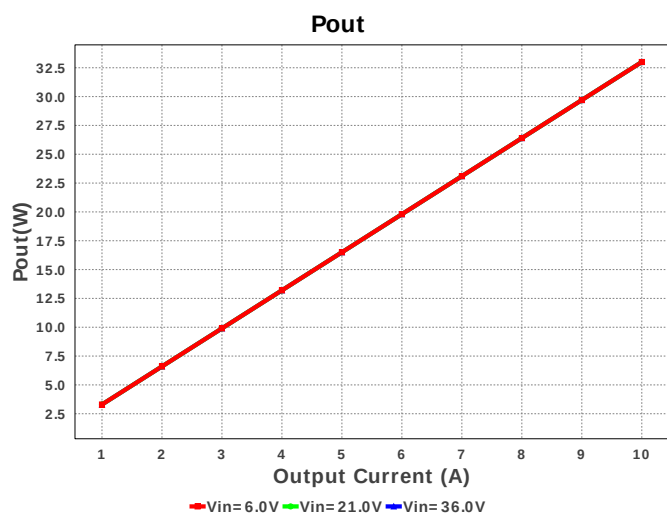
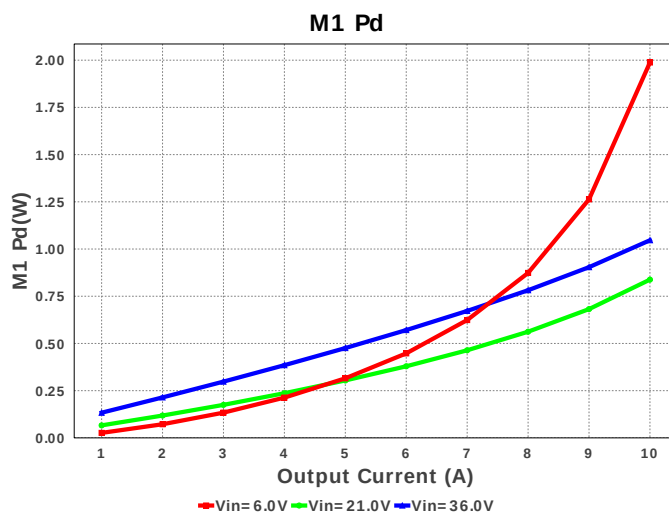
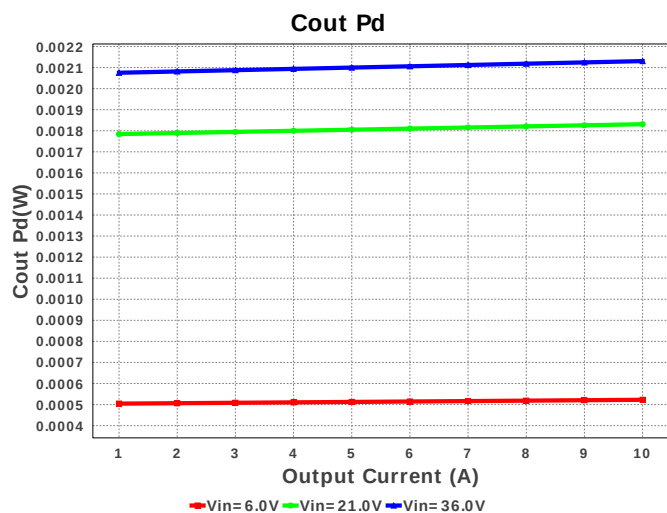
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	0805 7 mm ²
2.	Cbyp	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	0805 7 mm ²
3.	Ccomp	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Ccomp2	Yageo America	CC0805KRX7R9BB272 Series= X7R	Cap= 2.7 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
5.	Ccomp3	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 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	Panasonic	50SVPF39M Series= ?	Cap= 39.0 uF ESR= 25.0 mOhm VDC= 50.0 V IRMS= 3.8 A	2	\$0.72	 CAPSMT_62_E12 106 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	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 uF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.29633 A	1	\$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

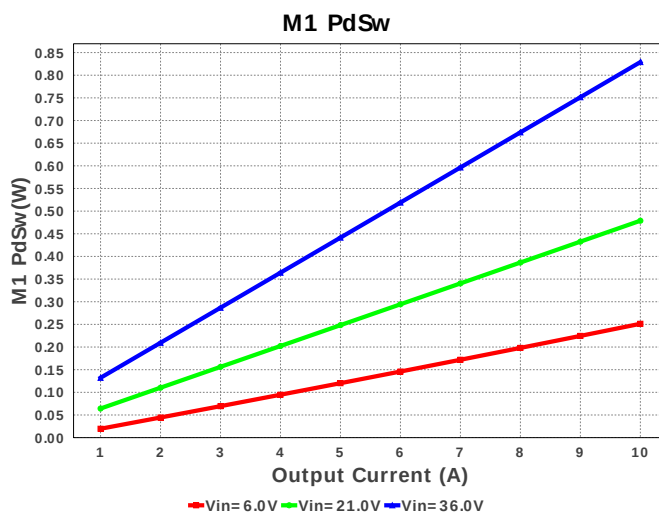
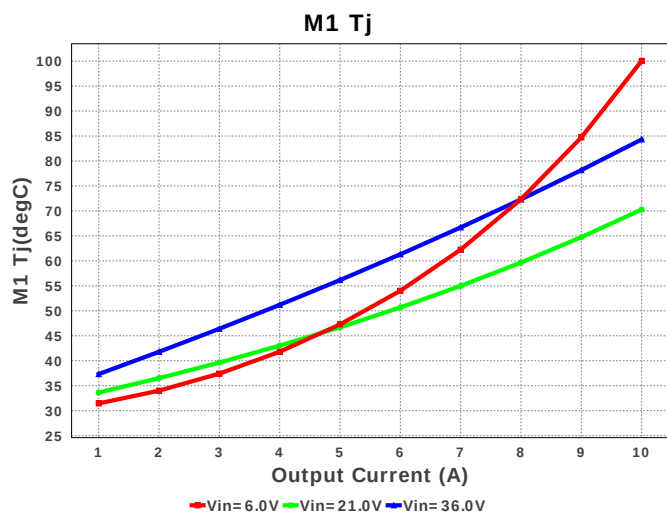
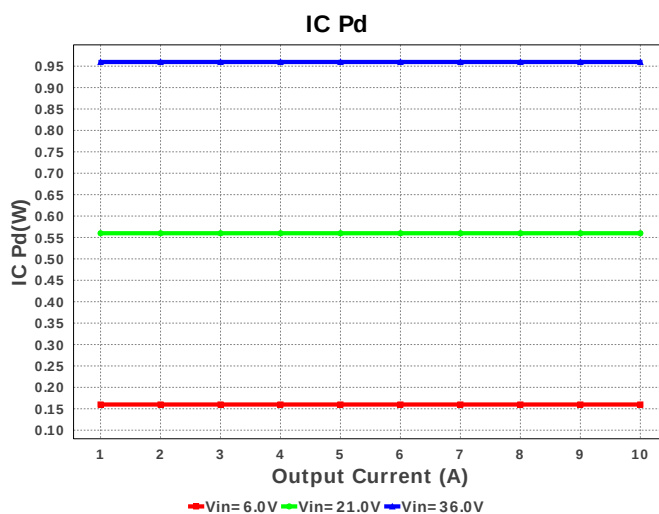
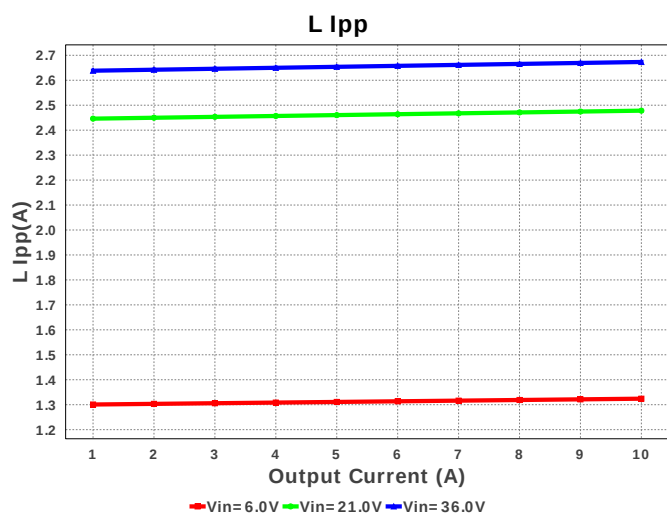
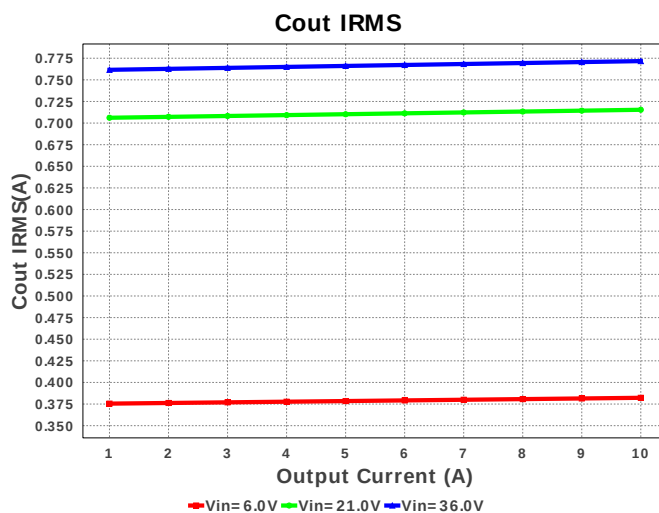
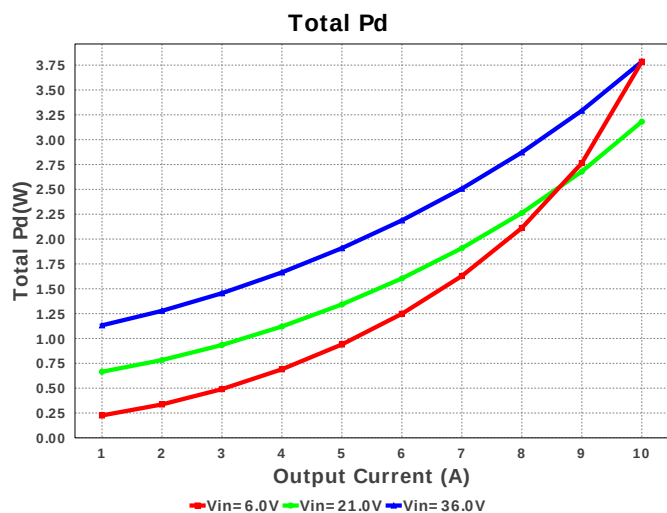
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Cvdd	MuRata	GRM188R61C105KA93D Series= X5R	Cap= 1.0 uF ESR= 10.127 mOhm VDC= 16.0 V IRMS= 994.63 mA	1	\$0.01	 0603 5 mm ²
12.	Cvin	TDK	C3216X5R1H105K Series= X5R	Cap= 1.0 uF ESR= 8.97 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	 1206 11 mm ²
13.	L1	Bourns	SRP1270-3R3M	L= 3.3 uH DCR= 6.6 mOhm	1	\$0.60	 SRP1270 246 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	CSD19531Q5A	VdsMax= 100.0 V IdsMax= 100.0 Amps	1	\$0.67	 TRANS_NexFET_Q5A 55 mm ²
16.	Rcomp	Vishay-Dale	CRCW0402787RFKED Series= CRCW..e3	Res= 787.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rcomp2	Vishay-Dale	CRCW04021K69FKED Series= CRCW..e3	Res= 1.69 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rcs	Vishay-Dale	CRCW040213K7FKED Series= CRCW..e3	Res= 13.7 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	CRCW040234K8FKED Series= CRCW..e3	Res= 34.8 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

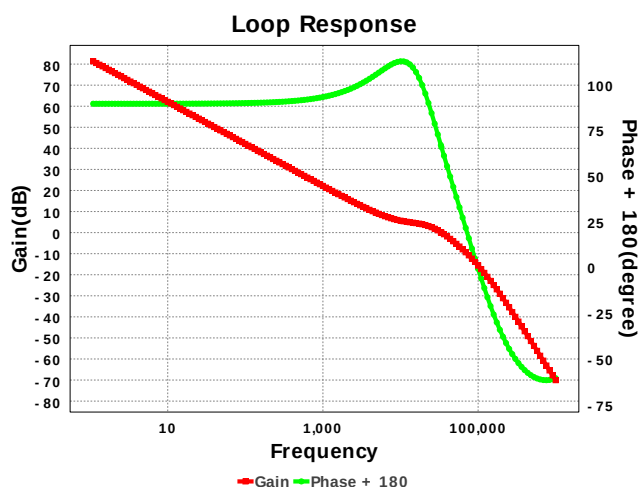
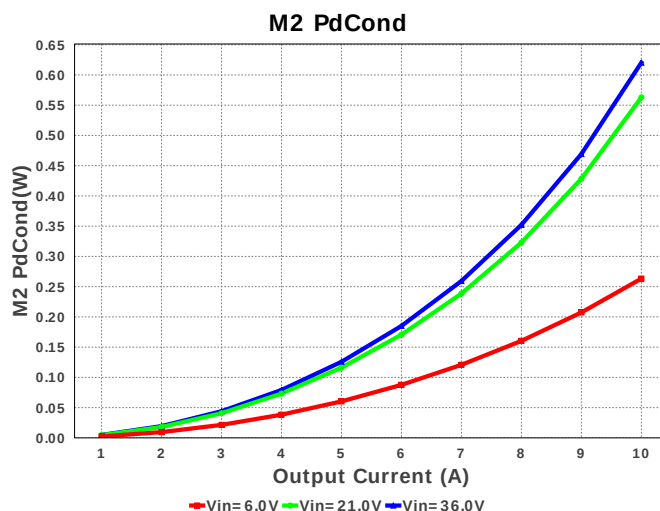
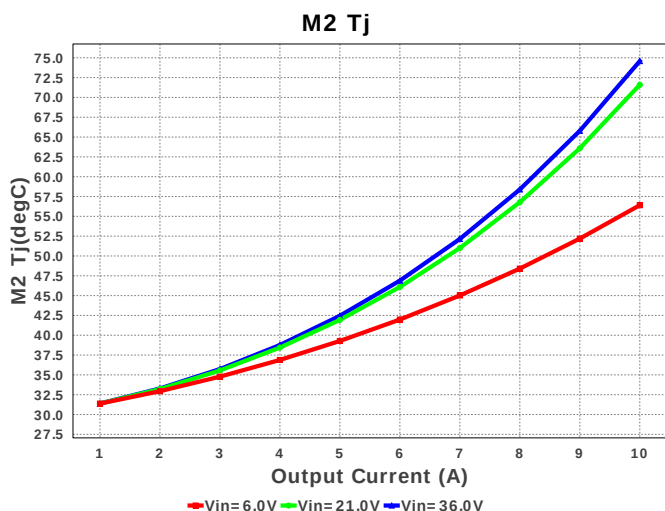
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
27. U1		Texas Instruments	TPS40170RGYR	Switcher	1	\$1.50	 RGY0020A 25 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.918 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	771.689 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.023 A	Current	Average input current
4.	L Ipp	2.673 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	11.337 A	Current	Peak switch current
6.	BOM Count	28	General	Total Design BOM count
7.	FootPrint	666.0 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	33.0 W	General	Total output power
12.	Total BOM	\$5.02	General	Total BOM Cost
13.	Low Freq Gain	81.32 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	33.699 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	9.4 %	Op_point	Duty cycle
17.	Efficiency	89.597 %	Op_point	Steady state efficiency
18.	Gain Marg	-15.547 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	63.592 degC	Op_point	IC junction temperature
20.	IOUT_OP	10.0 A	Op_point	Iout operating point
21.	M1 Tj	84.315 degC	Op_point	M1 MOSFET junction temperature
22.	M2 Tj	74.581 degC	Op_point	M2 MOSFET junction temperature
23.	Phase Marg	66.281 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	36.0 V	Op_point	Vin operating point
25.	Vout p-p	61.73 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	106.453 mW	Power	Input capacitor power dissipation
27.	Cout Pd	2.131 mW	Power	Output capacitor power dissipation
28.	IC Pd	959.77 mW	Power	IC power dissipation
29.	L Pd	825.0 mW	Power	Inductor power dissipation
30.	M1 Pd	988.859 mW	Power	M1 MOSFET total power dissipation
31.	M1 PdCond	159.844 mW	Power	M1 MOSFET conduction losses

#	Name	Value	Category	Description
32.	M1 PdSw	829.015 mW	Power	M1 MOSFET switching losses
33.	M2 Pd	949.437 mW	Power	M2 MOSFET total power dissipation
34.	M2 PdCond	724.646 mW	Power	M2 MOSFET conduction losses
35.	M2 PdSw	224.791 mW	Power	M2 MOSFET switching losses
36.	Total Pd	3.832 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	10.0	Maximum Output Current
2.	VinMax	36.0	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage
4.	Vout	3.3	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) : <http://www.ti.com/product/TPS40170> : contains the data sheet and other resources.

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