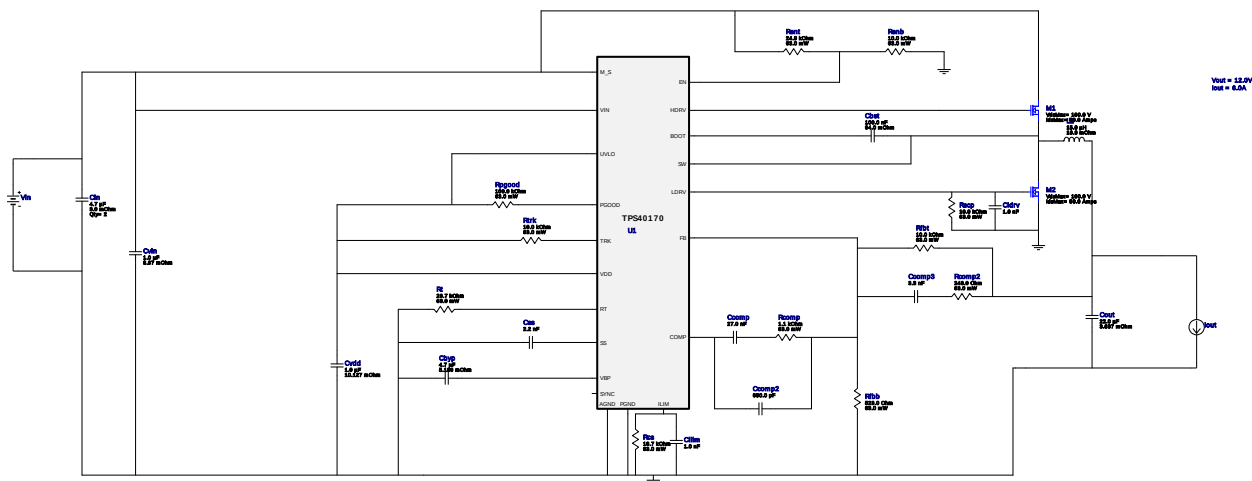


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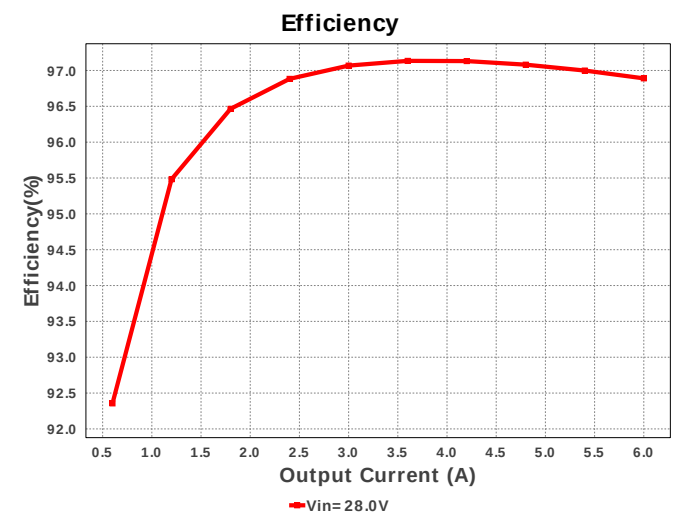
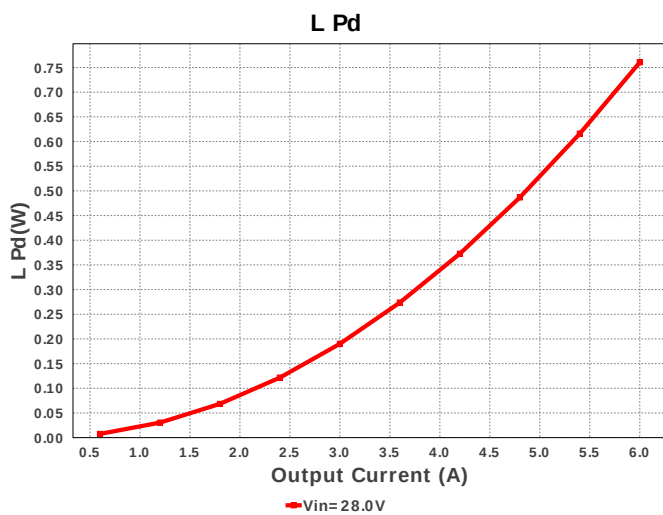
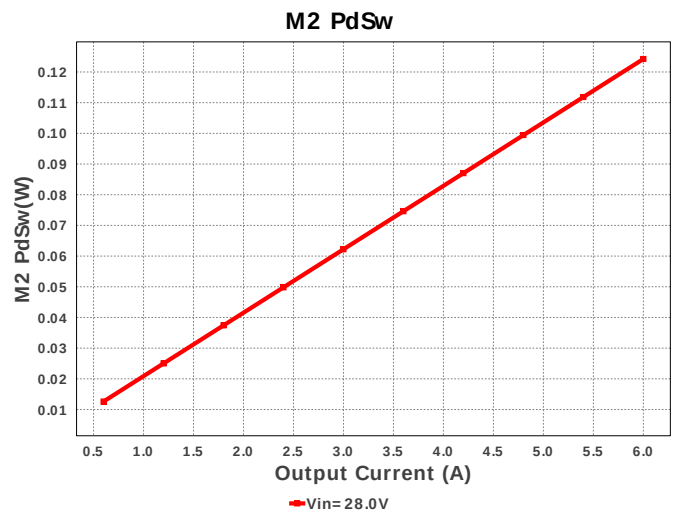
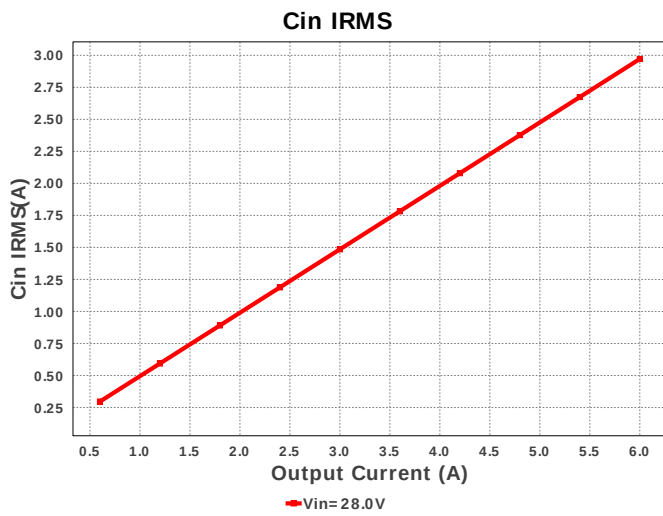
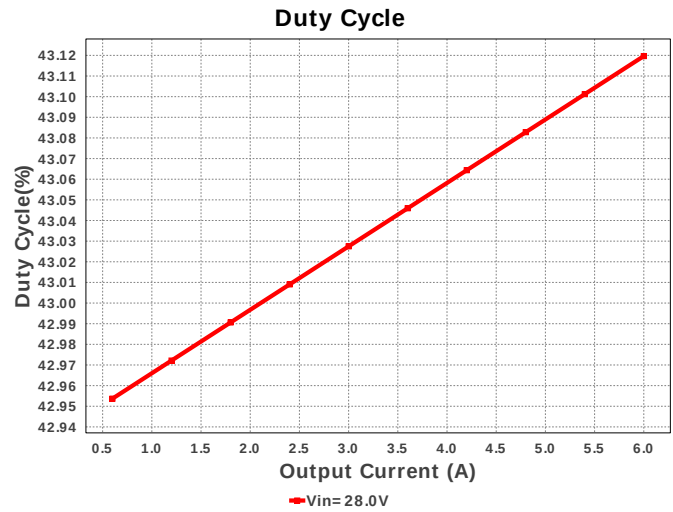
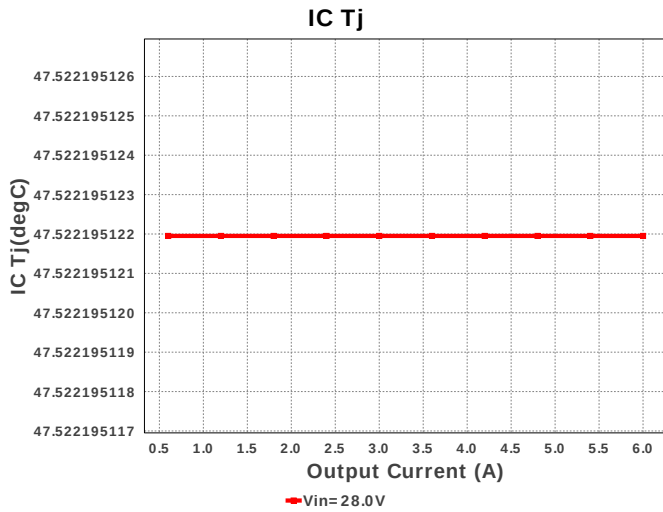
Design : 4213487/6 TPS40170RGYR
TPS40170RGYR 28.0V-28.0V to 12.00V @ 6.0A

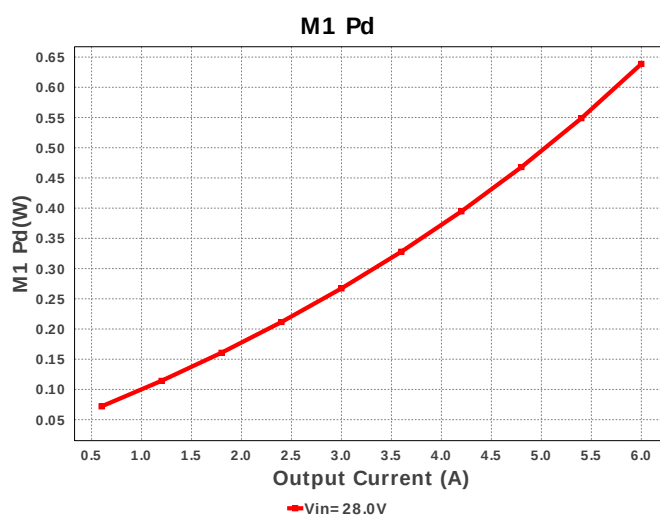
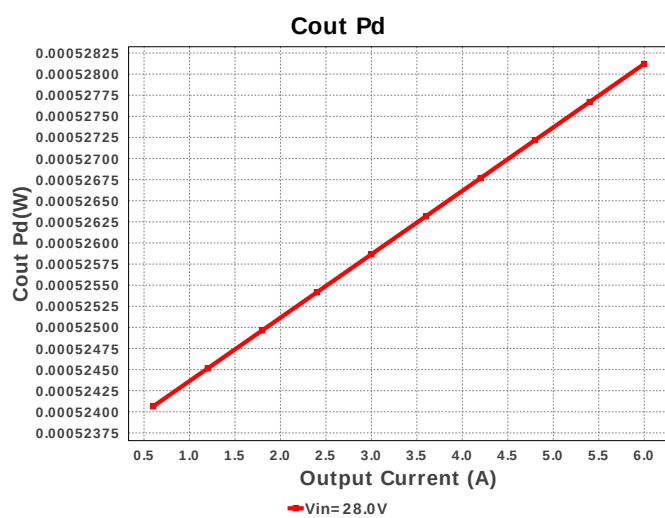
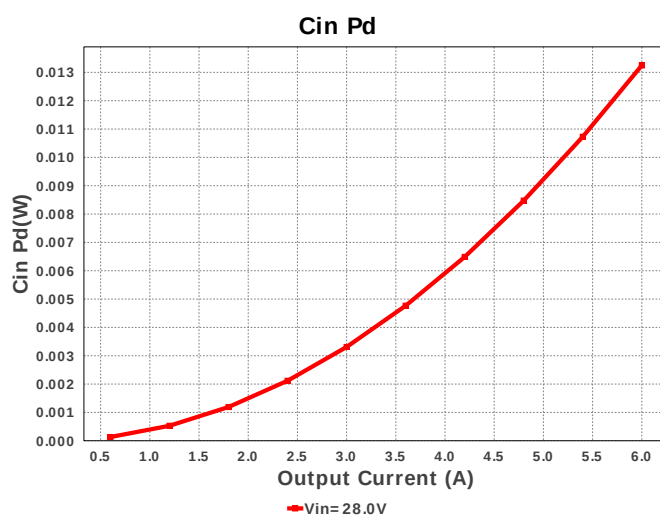
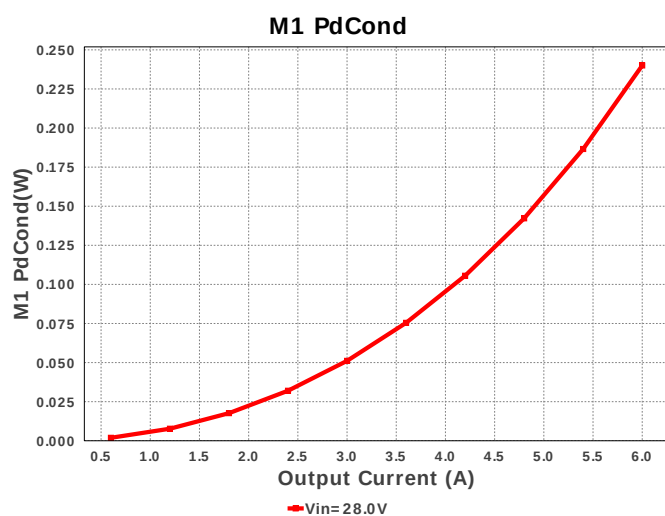
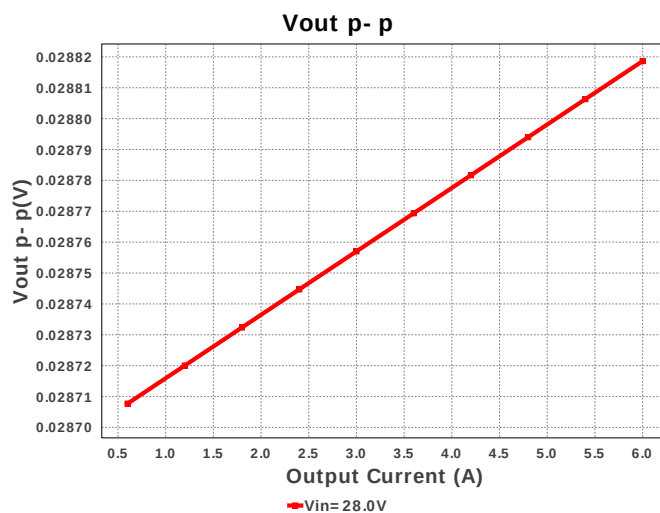
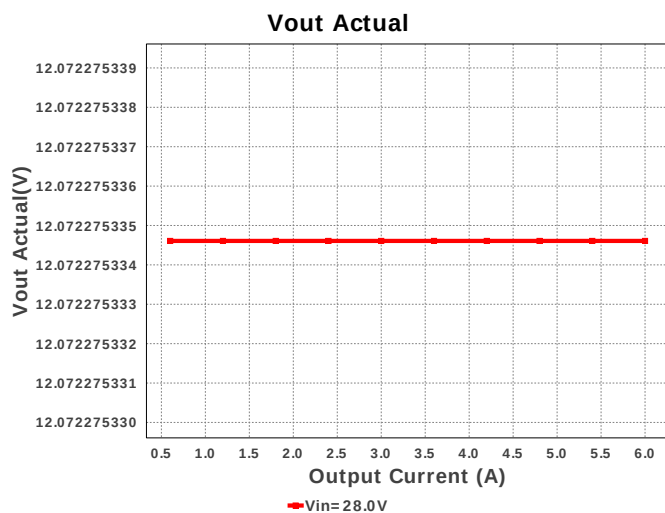


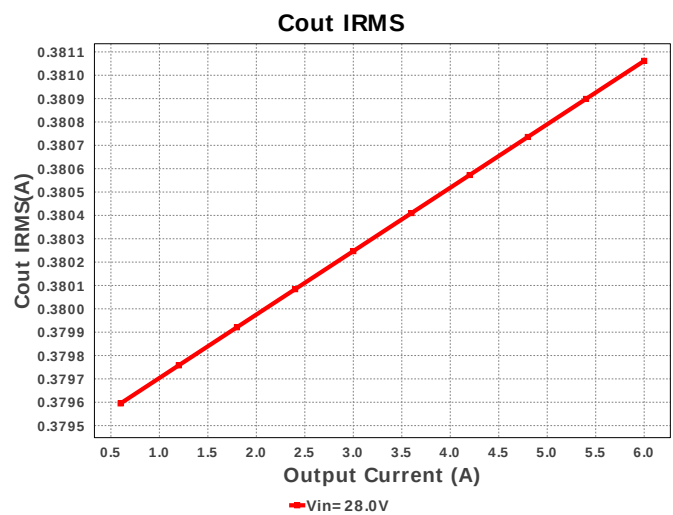
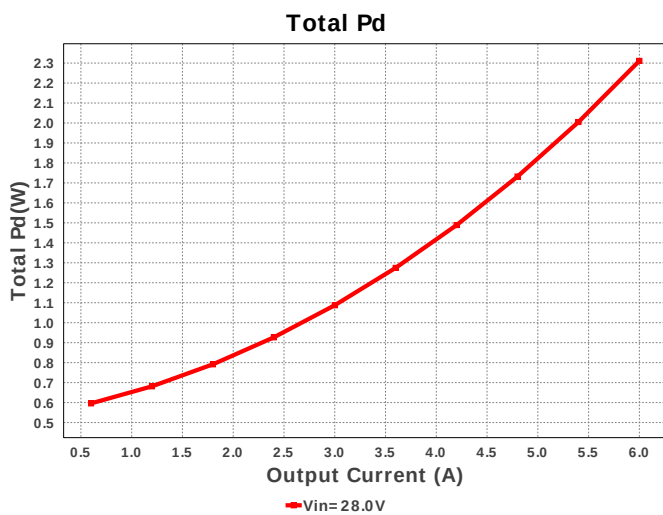
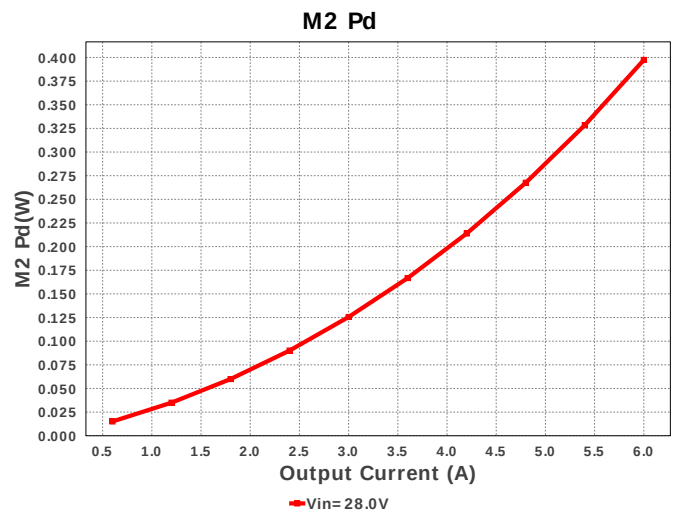
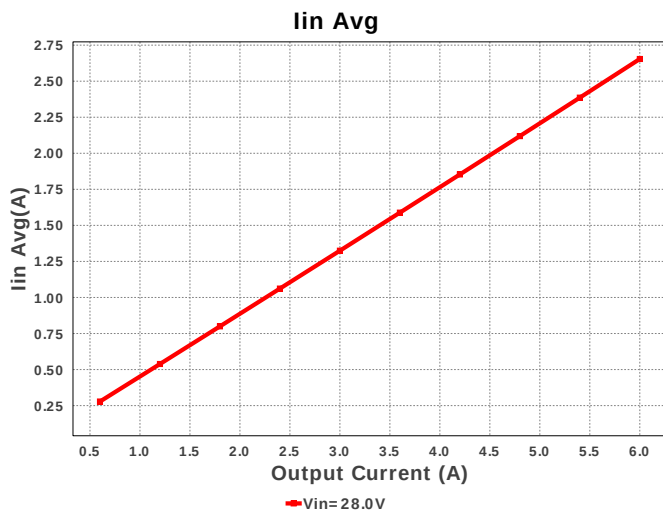
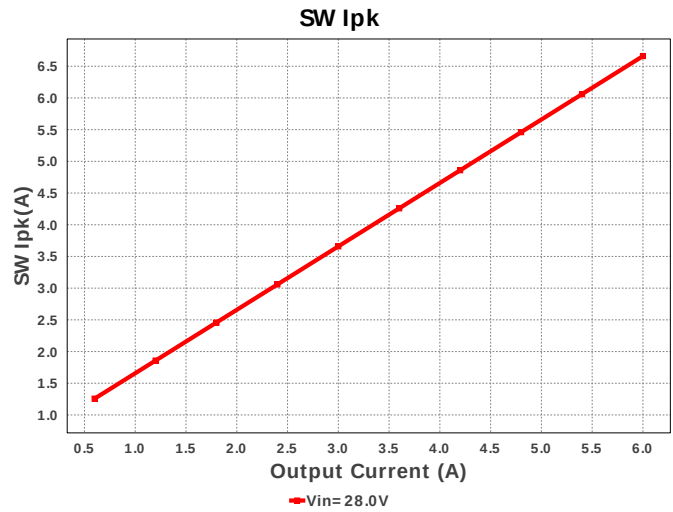
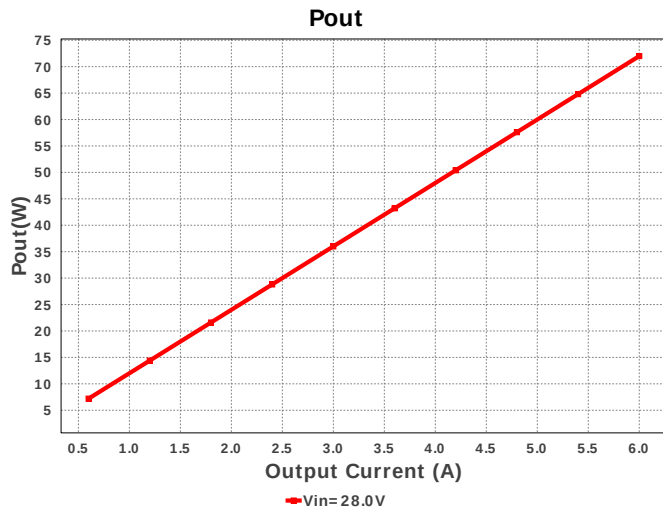
Electrical BOM

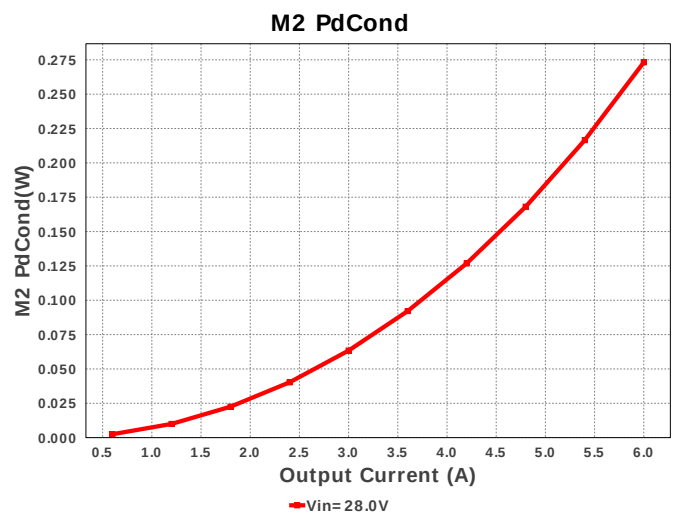
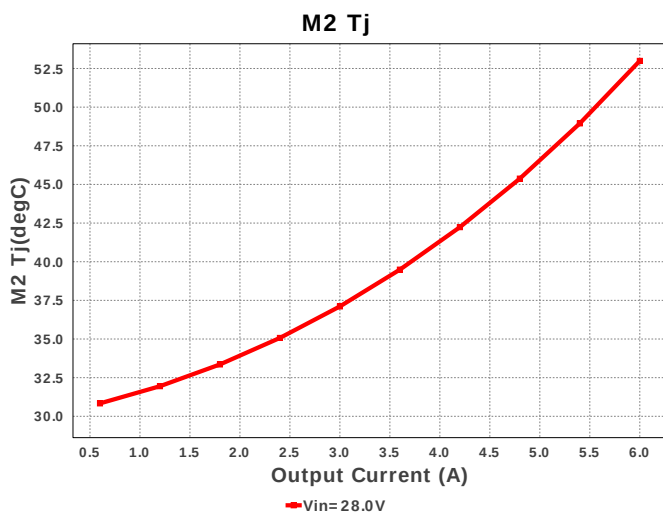
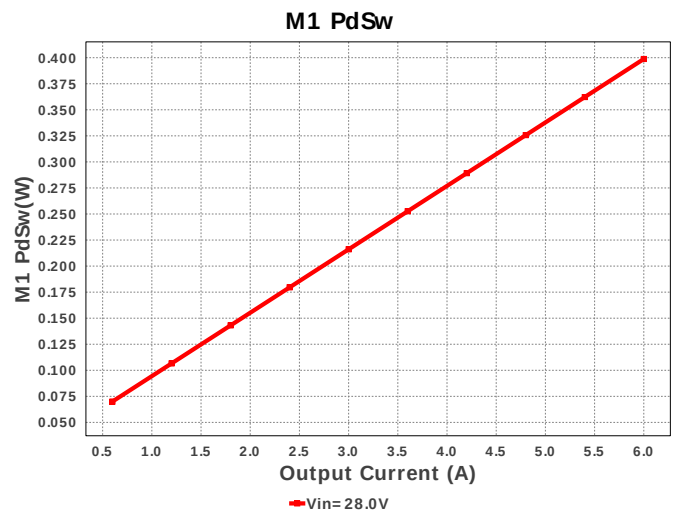
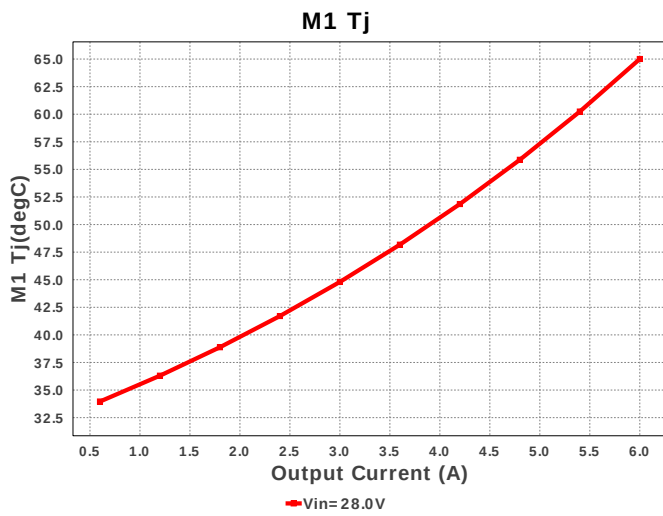
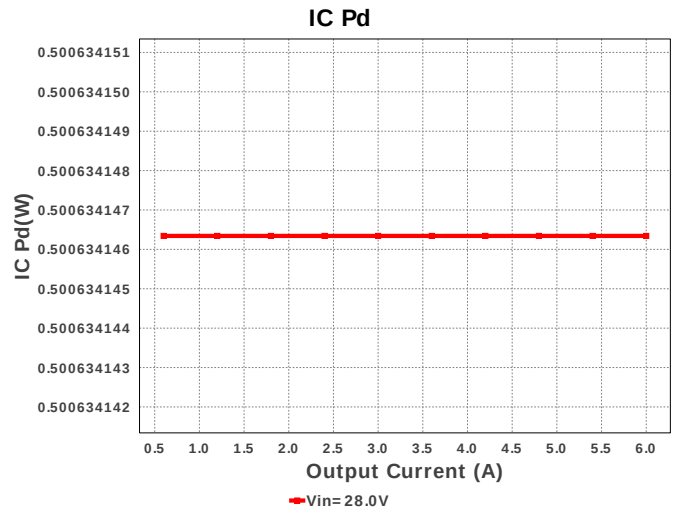
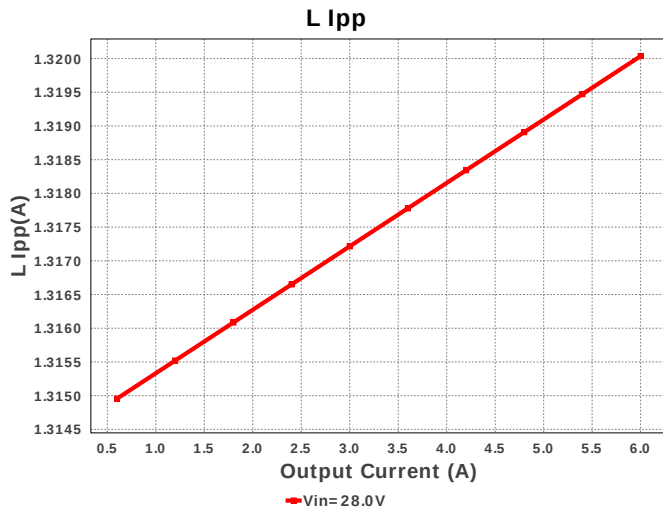
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	0805 7 mm ²
2.	Cbyp	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	0805 7 mm ²
3.	Ccomp	MuRata	GRM155R61A273KA01D Series= X5R	Cap= 27.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
4.	Ccomp2	Yageo America	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
5.	Ccomp3	MuRata	GRM216R71E332KA01D Series= X7R	Cap= 3.3 nF VDC= 25.0 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	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	2	\$0.07	1206 11 mm ²
8.	Cldrv	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

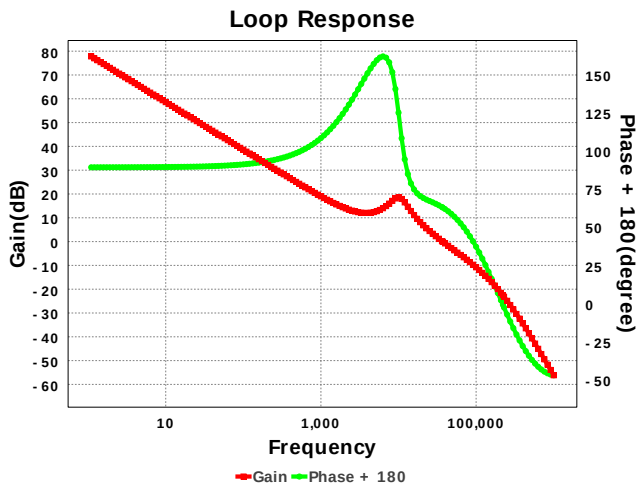
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11.	Cvdd	MuRata	GRM188R61C105KA93D Series= X5R	Cap= 1.0 uF ESR= 10.127 mOhm VDC= 16.0 V IRMS= 994.63 mA	1	\$0.01	 0603 5 mm ²
12.	Cvin	TDK	C3216X5R1H105K Series= X5R	Cap= 1.0 uF ESR= 8.97 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	 1206 11 mm ²
13.	L1	Coilcraft	XAL1010-153MEB	L= 15.0 µH DCR= 16.9 mOhm	1	\$1.71	 XAL1010 160 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	CRCW0402243RFKED Series= CRCW..e3	Res= 243.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rcs	Vishay-Dale	CRCW040218K7FKED Series= CRCW..e3	Res= 18.7 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	CRCW040224K9FKED Series= CRCW..e3	Res= 24.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Rfbb	Vishay-Dale	CRCW0402523RFKED Series= CRCW..e3	Res= 523.0 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	\$2.10	 RGY0020A 25 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.971 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	381.062 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	2.654 A	Current	Average input current
4.	L Ipp	1.32 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	6.66 A	Current	Peak switch current
6.	BOM Count	28	General	Total Design BOM count
7.	FootPrint	344.0 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	72.0 W	General	Total output power
11.	Total BOM	\$5.31	General	Total BOM Cost
12.	Low Freq Gain	77.79 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	12.072 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Cross Freq	37.068 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	43.12 %	Op_point	Duty cycle
16.	Efficiency	96.89 %	Op_point	Steady state efficiency
17.	Gain Marg	-22.541 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	47.522 degC	Op_point	IC junction temperature
19.	IOUT_OP	6.0 A	Op_point	Iout operating point
20.	M1 Tj	65.007 degC	Op_point	M1 MOSFET junction temperature
21.	M2 Tj	52.993 degC	Op_point	M2 MOSFET junction temperature
22.	Phase Marg	63.707 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	28.0 V	Op_point	Vin operating point
24.	Vout p-p	28.819 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	13.244 mW	Power	Input capacitor power dissipation
26.	Cout Pd	528.121 μ W	Power	Output capacitor power dissipation
27.	IC Pd	500.634 mW	Power	IC power dissipation
28.	L Pd	760.5 mW	Power	Inductor power dissipation
29.	M1 Pd	638.897 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	240.136 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	398.761 mW	Power	M1 MOSFET switching losses
32.	M2 Pd	397.405 mW	Power	M2 MOSFET total power dissipation
33.	M2 PdCond	273.171 mW	Power	M2 MOSFET conduction losses
34.	M2 PdSw	124.234 mW	Power	M2 MOSFET switching losses
35.	Total Pd	2.311 W	Power	Total Power Dissipation
36.	Vout Tolerance	1.921 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	6.0	Maximum Output Current
2.	VinMax	28.0	Maximum input voltage
3.	VinMin	28.0	Minimum input voltage
4.	Vout	12.0	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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