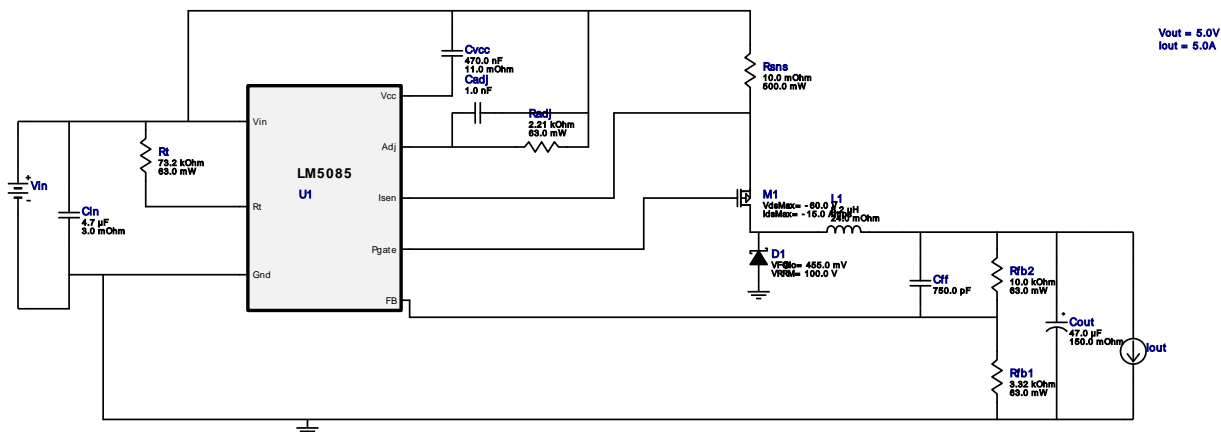













## WEBENCH® Design Report

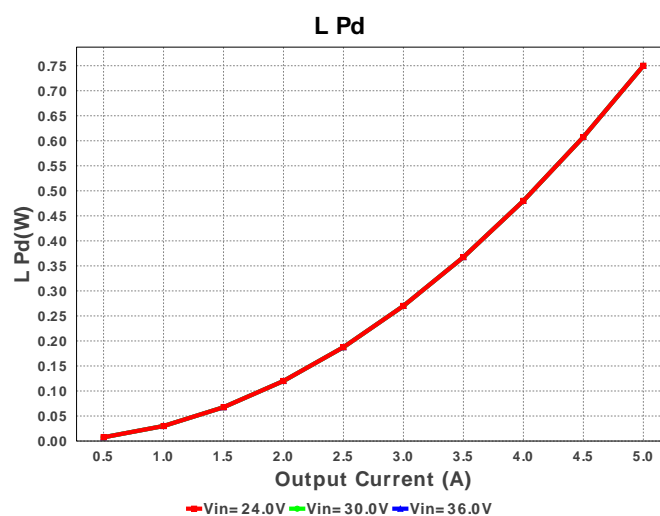
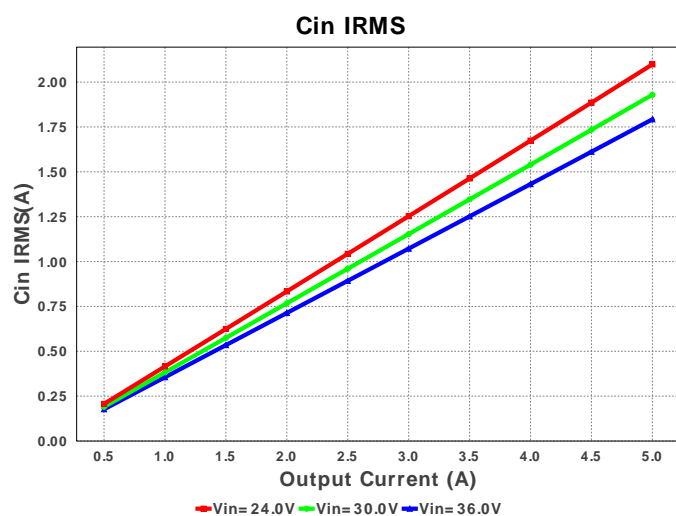
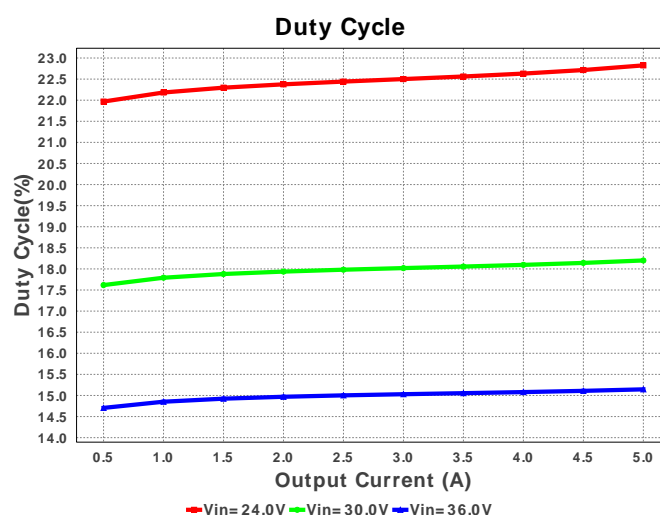
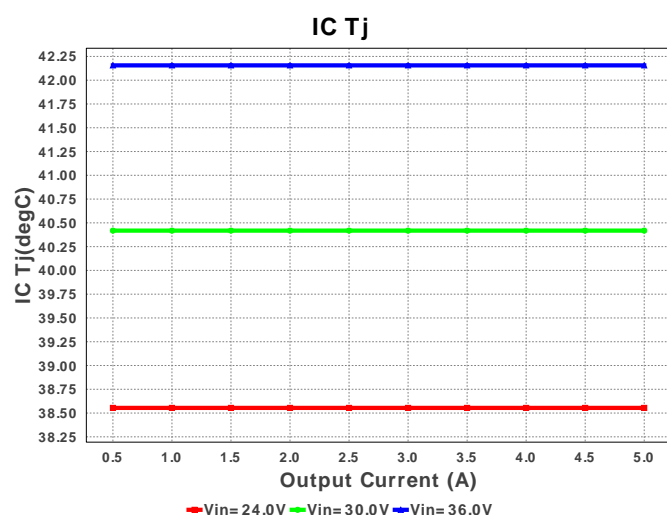
Design : 4466246/78 LM5085MY/NOPB  
LM5085MY/NOPB 24.0V-36.0V to 5.00V @ 5.0A

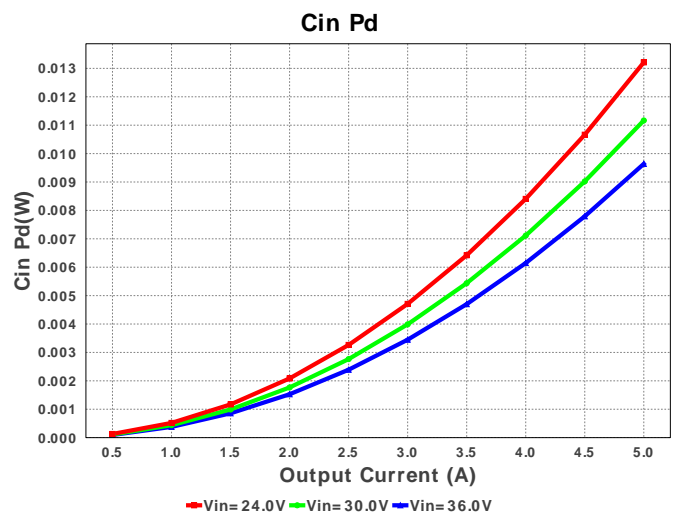
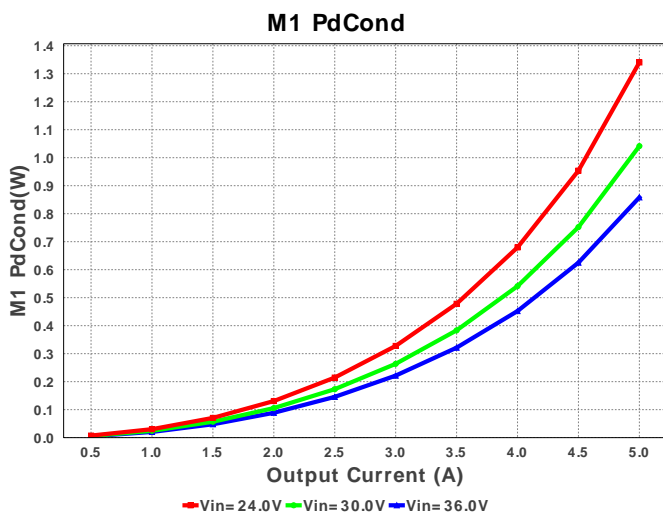
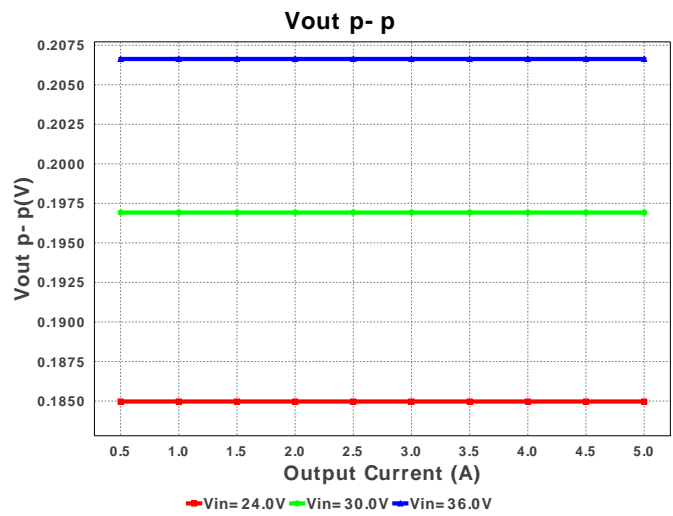
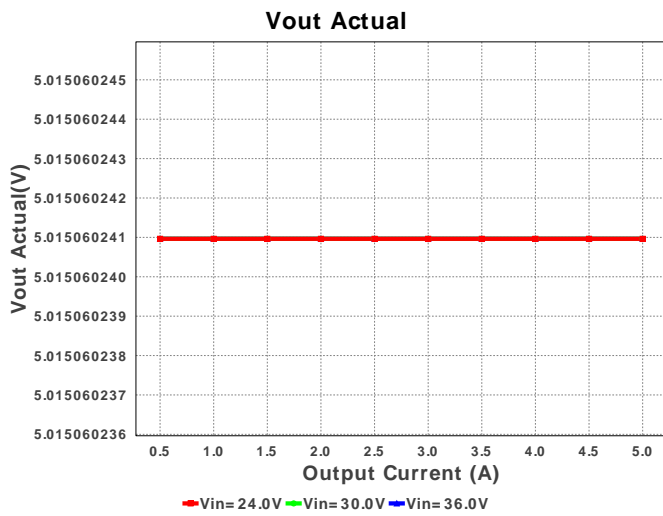
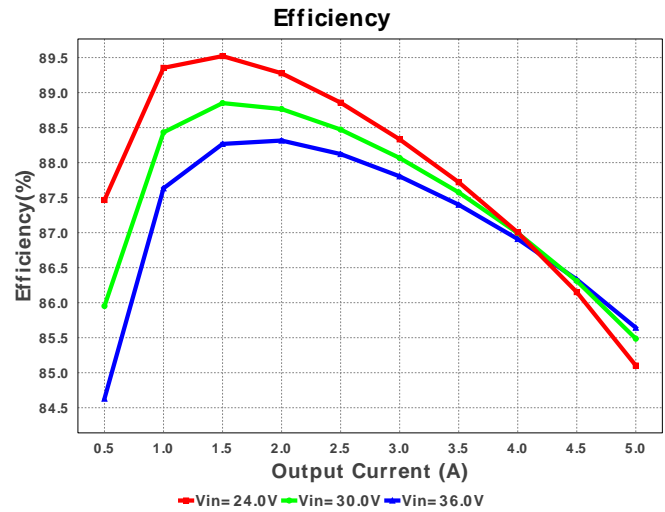
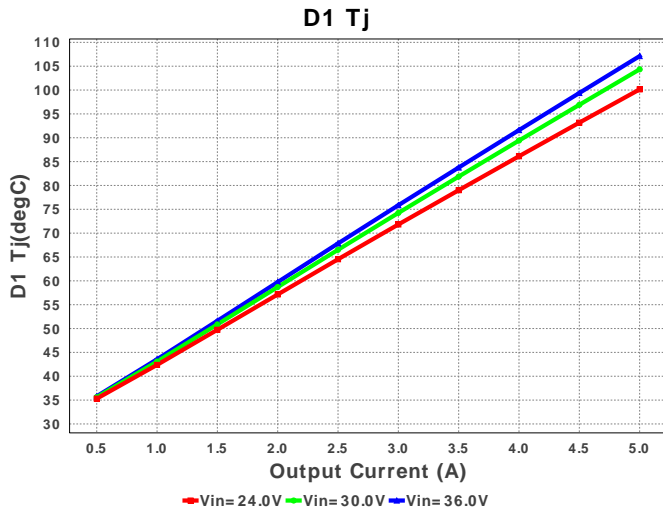


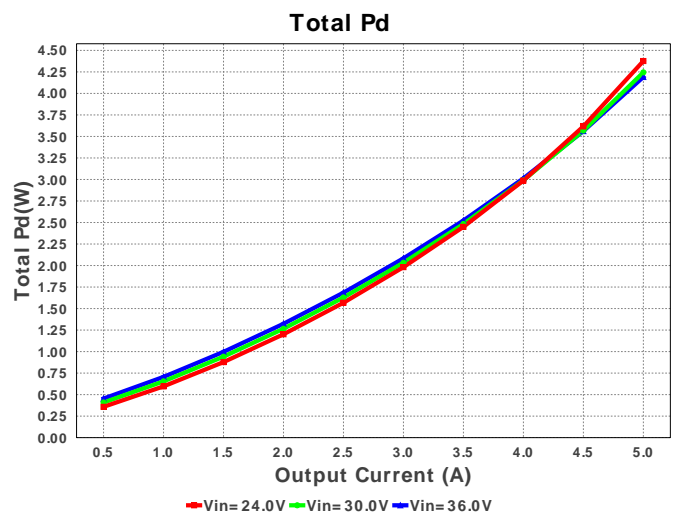
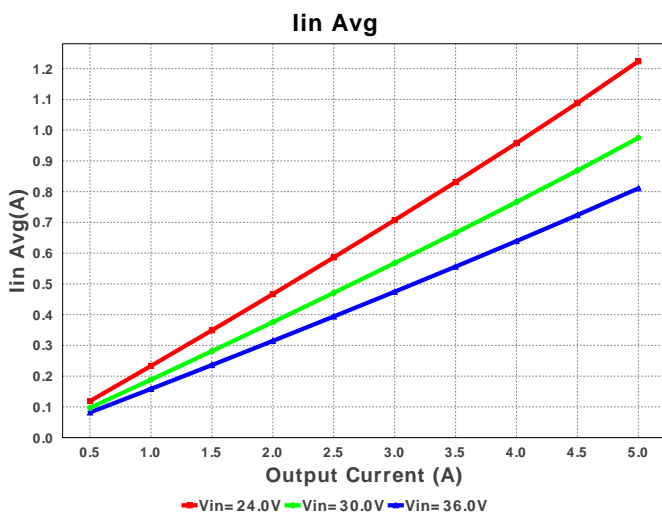
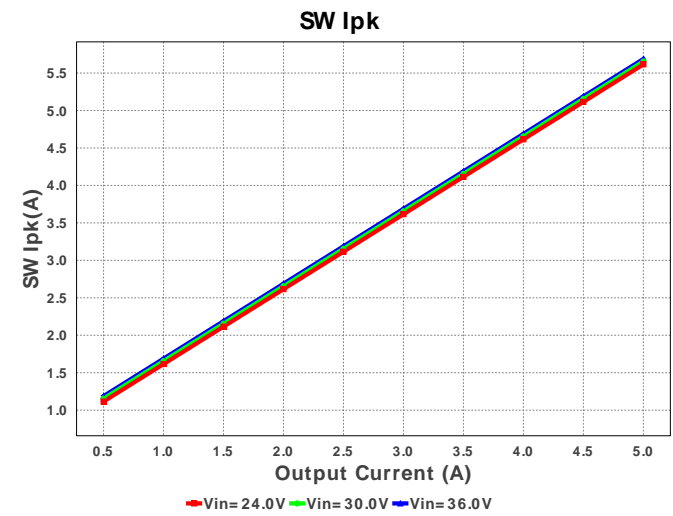
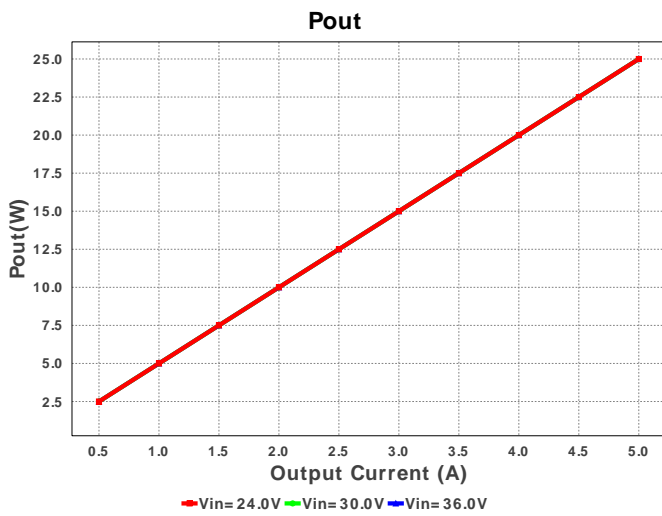
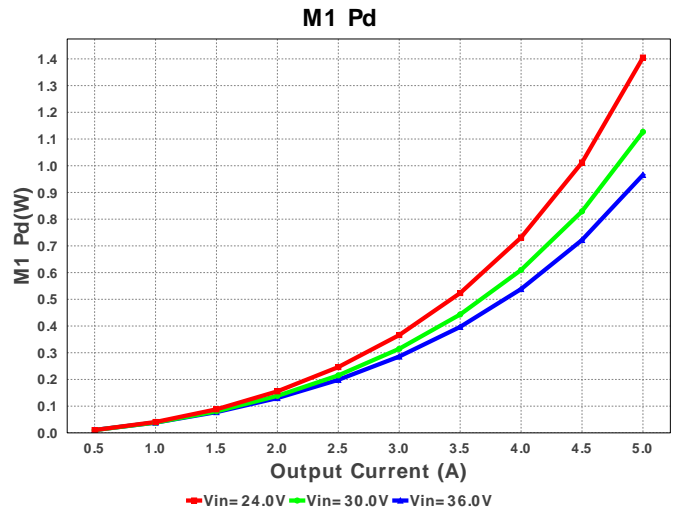
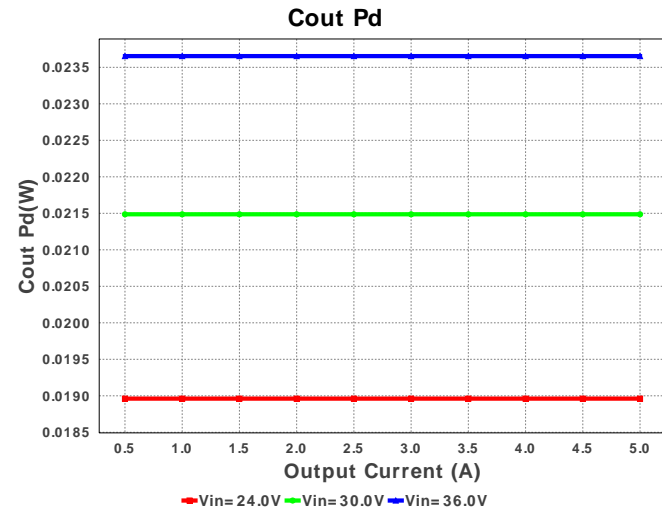
## Electrical BOM

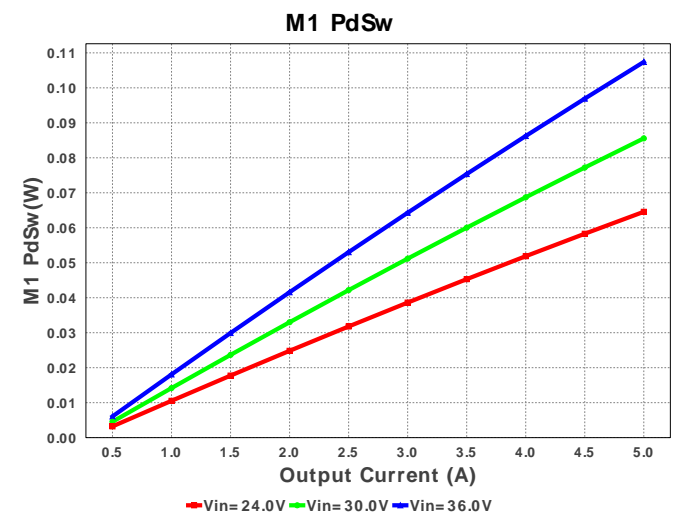
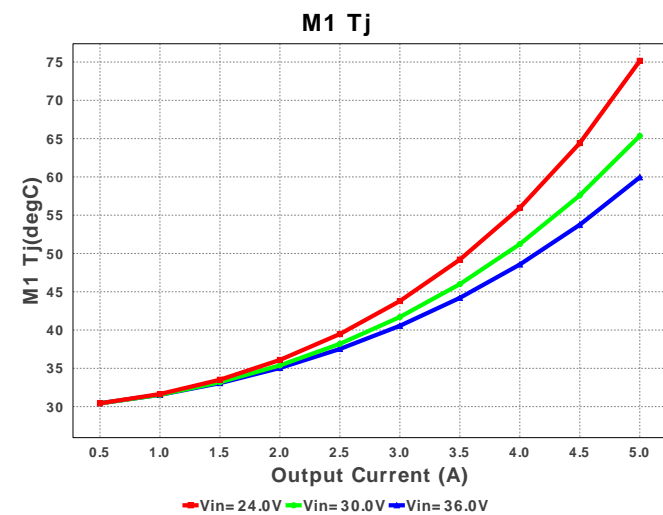
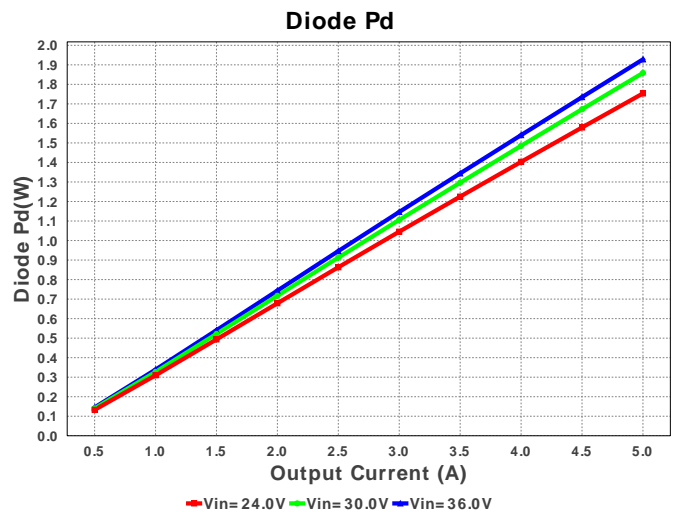
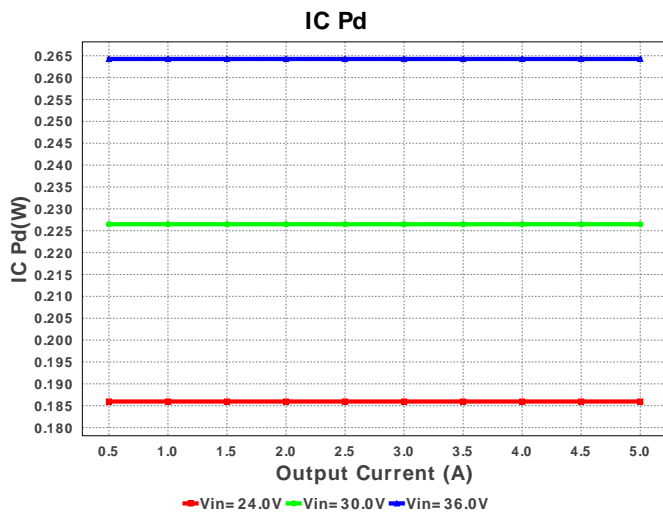
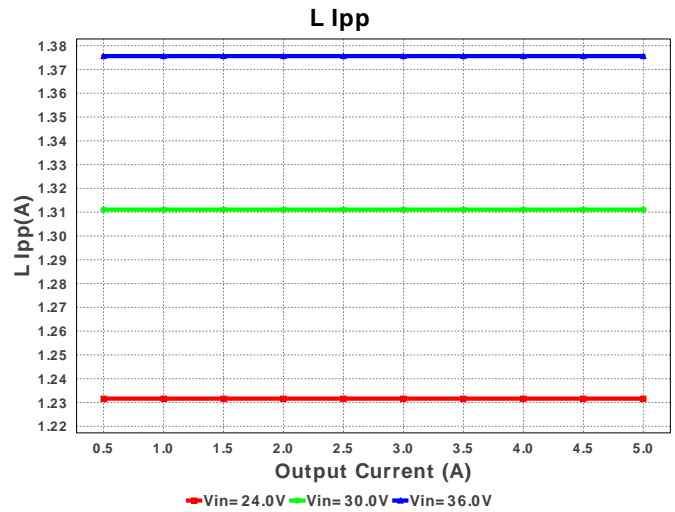
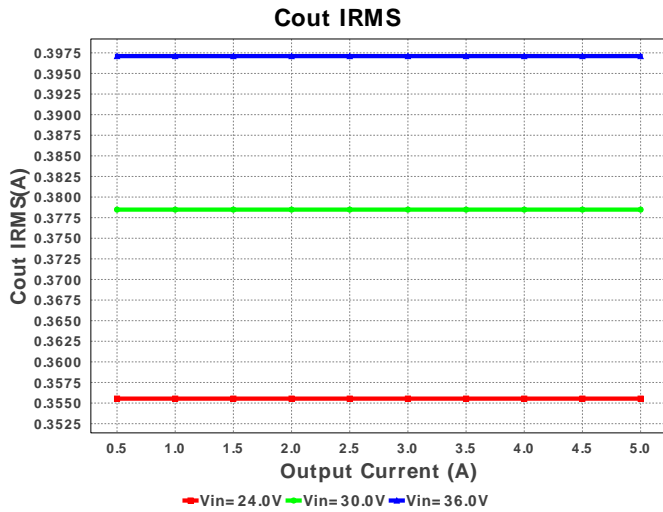
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm <sup>2</sup>
2.	Cff	MuRata	GRM1555C1H751GA01D Series= C0G/NP0	Cap= 750.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	 0402 3 mm <sup>2</sup>
3.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	\$0.07	 1206 11 mm <sup>2</sup>
4.	Cout	Panasonic	6TPU47MSI Series= ?	Cap= 47.0 uF ESR= 150.0 mOhm VDC= 6.3 V IRMS= 510.0 mA	1	\$0.46	 CAPSMT_6_S09 7 mm <sup>2</sup>
5.	Cvcc	AVX	0805YC474KAT2A Series= X7R	Cap= 470.0 nF ESR= 11.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm <sup>2</sup>
6.	D1	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm <sup>2</sup>
7.	L1	Coilcraft	XAL6060-822MEB	L= 8.2 µH DCR= 24.0 mOhm	1	\$0.82	 XAL6060 72 mm <sup>2</sup>
8.	M1	Fairchild Semiconductor	FDD5614P	VdsMax= -60.0 V IdsMax= -15.0 Amps	1	\$0.24	 DPAK 102 mm <sup>2</sup>
9.	Radj	Vishay-Dale	CRCW04022K21FKED Series= CRCW..e3	Res= 2.21 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfb1	Vishay-Dale	CRCW04023K32FKED Series= CRCW..e3	Res= 3.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
11.	Rfb2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
12.	Rsns	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.11	 1206 11 mm <sup>2</sup>
13.	Rt	Vishay-Dale	CRCW040273K2FKED Series= CRCW..e3	Res= 73.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
14.	U1	Texas Instruments	LM5085MY/NOPB	Switcher	1	\$0.85	 MUY08A 24 mm <sup>2</sup>









## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.792 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	397.105 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	810.77 mA	Current	Average input current
4.	L Ipp	1.376 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	5.688 A	Current	Peak switch current
6.	BOM Count	14	General	Total Design BOM count
7.	FootPrint	464.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
8.	Frequency	335.584 kHz	General	Switching frequency
9.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
10.	Pout	25.0 W	General	Total output power
11.	Total BOM	\$3.98	General	Total BOM Cost

#	Name	Value	Category	Description
12.	D1 Tj	107.118 degC	Op_Point	D1 junction temperature
13.	Vout Actual	5.015 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	15.144 %	Op_point	Duty cycle
16.	Efficiency	85.652 %	Op_point	Steady state efficiency
17.	IC Tj	42.156 degC	Op_point	IC junction temperature
18.	ICThetaJA	46.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	5.0 A	Op_point	Iout operating point
20.	M1 Tj	59.946 degC	Op_point	M1 MOSFET junction temperature
21.	VIN_OP	36.0 V	Op_point	Vin operating point
22.	Vout p-p	206.63 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	9.638 mW	Power	Input capacitor power dissipation
24.	Cout Pd	23.654 mW	Power	Output capacitor power dissipation
25.	Diode Pd	1.928 W	Power	Diode power dissipation
26.	IC Pd	264.259 mW	Power	IC power dissipation
27.	L Pd	750.0 mW	Power	Inductor power dissipation
28.	M1 Pd	962.284 mW	Power	M1 MOSFET total power dissipation
29.	M1 PdCond	854.887 mW	Power	M1 MOSFET conduction losses
30.	M1 PdSw	107.397 mW	Power	M1 MOSFET switching losses
31.	Total Pd	4.188 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.547 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

## Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	36.0	Maximum input voltage
3.	VinMin	24.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM5085	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

## Design Assistance

1. For a Constant On Time device to be stable, we need to provide a ripple at the feedback comparator. There are various methods to implement the ripple. Depending on the circuit complexity vs. the allowable ripple, we have three options to choose from. The simplest option, 'Low Complexity', would require only a high ESR cap at the output. This means that the BOM count will be small, but the output voltage ripple will be quite large. The 'optimal solution' would require a feed-forward cap in parallel with the upper feedback resistor to AC couple the ripple to the feedback node. This increases the BOM count slightly, but now we have more control over the output voltage ripple. If the output voltage requirement is very tight, then the best option is to go for the 'Low Output Ripple' solution. In this option we can go with very low ESR output caps and have very good control over the output voltage ripple

2. **LM5085 Product Folder** : <http://www.ti.com/product/LM5085> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

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