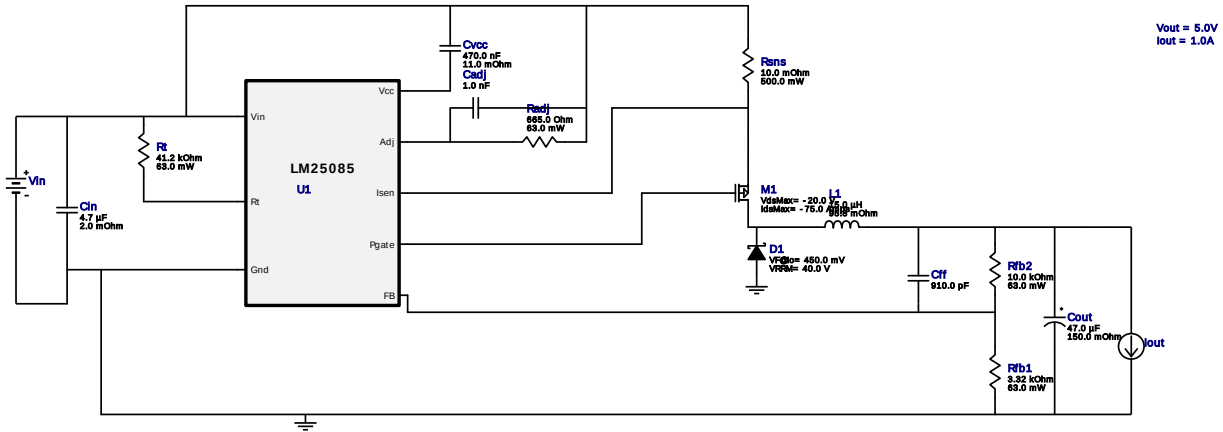


WEBENCH® Design Report

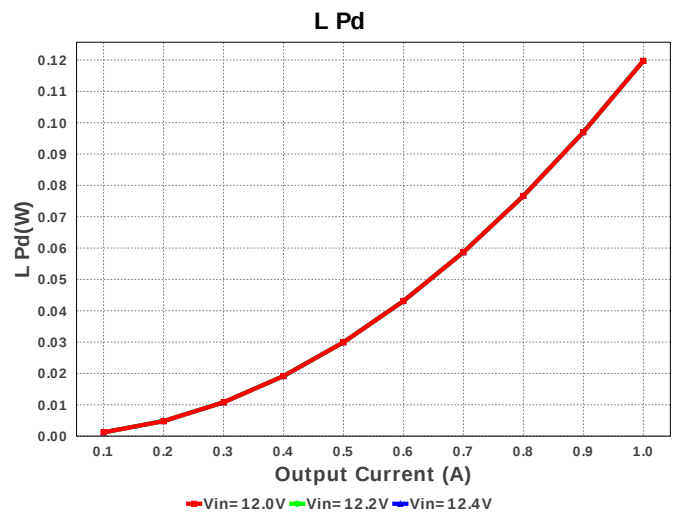
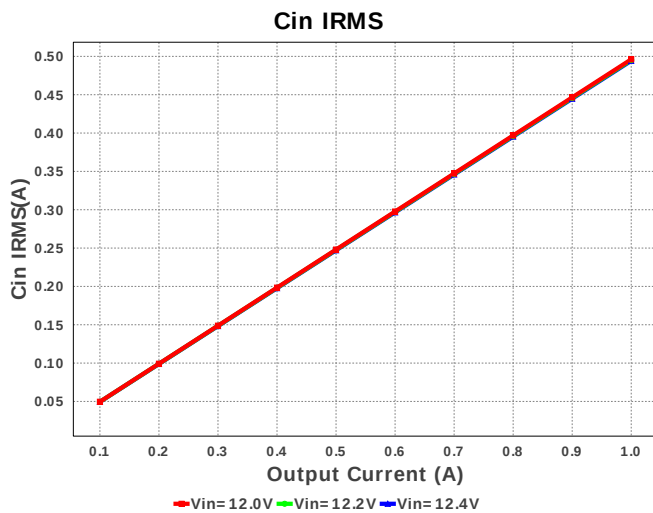
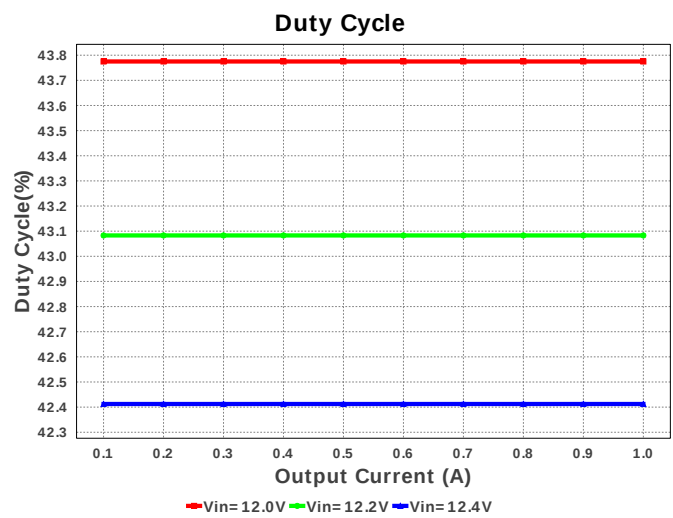
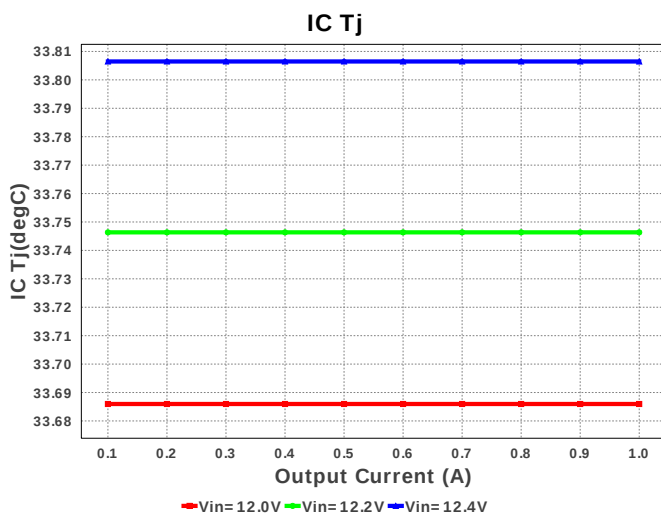
Design : 4738422/2 LM25085MY/NOPB
LM25085MY/NOPB 12.0V-12.4V to 5.00V @ 1.0A

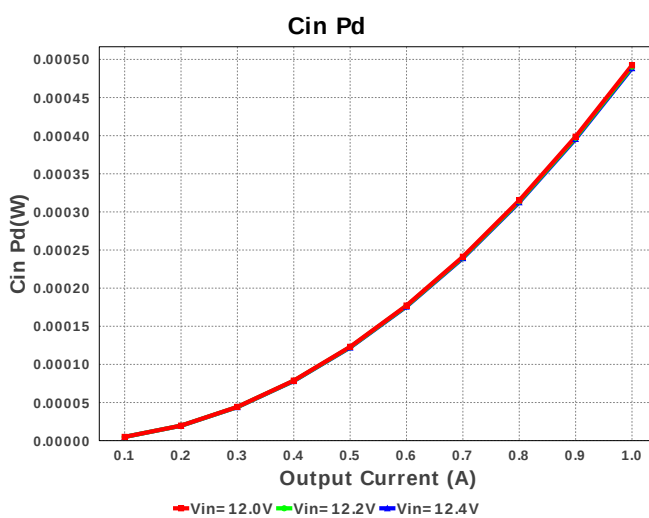
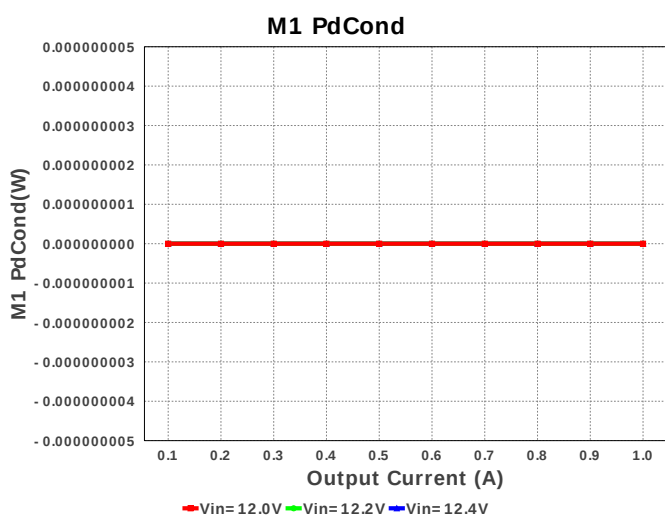
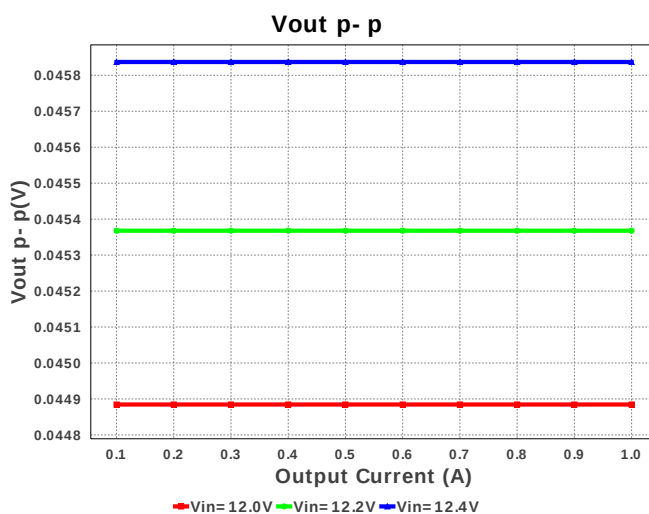
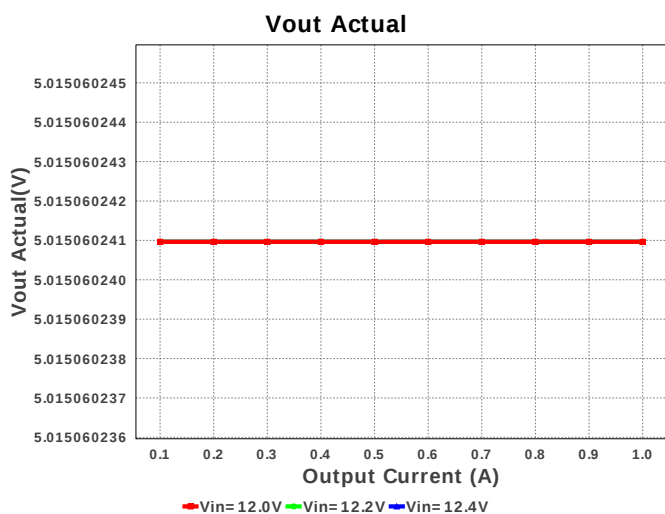
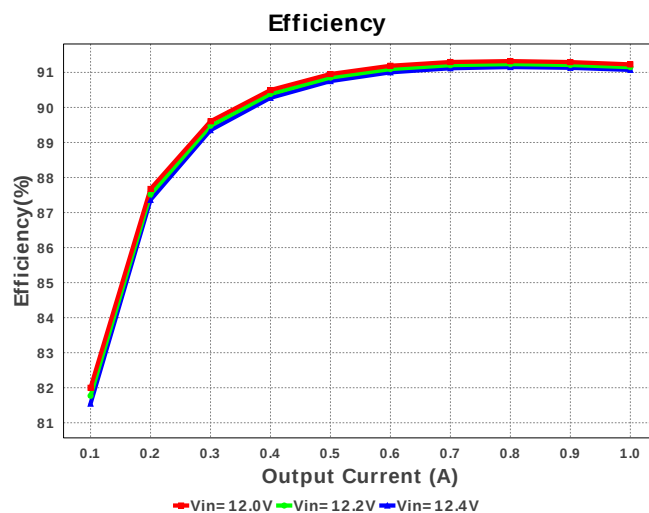
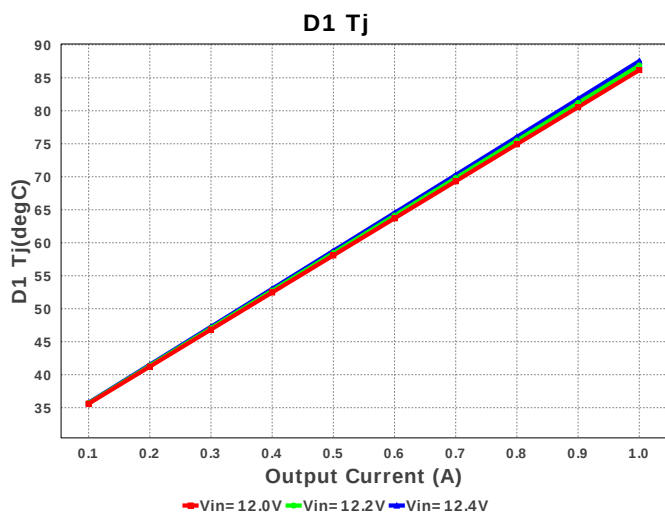


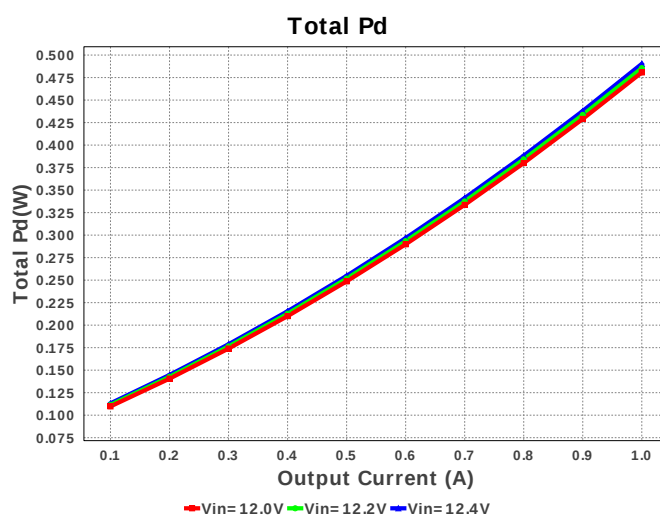
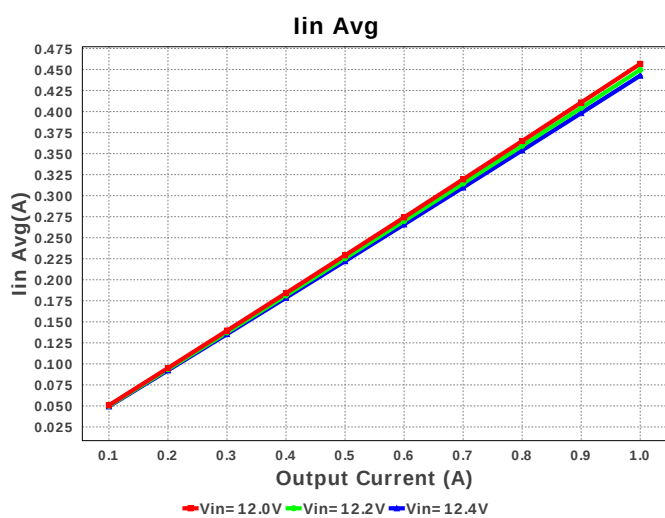
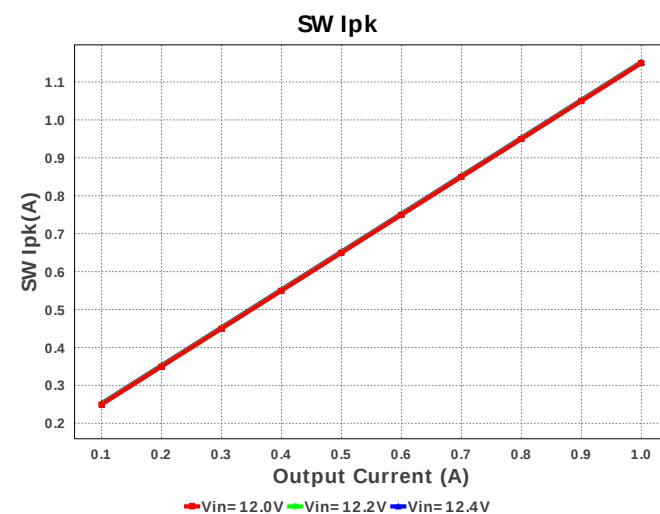
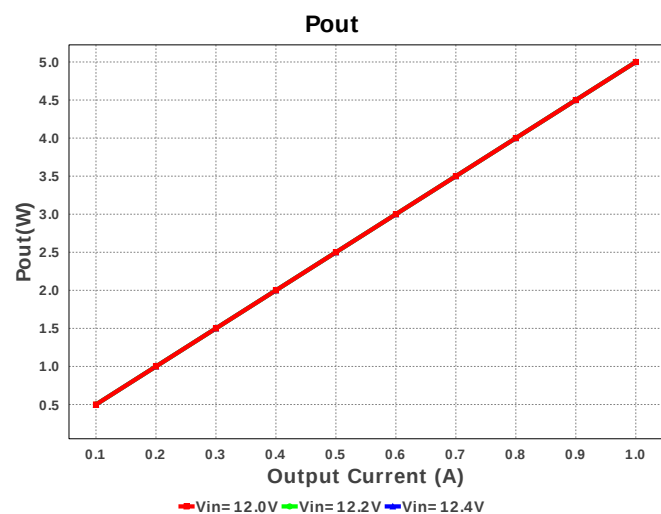
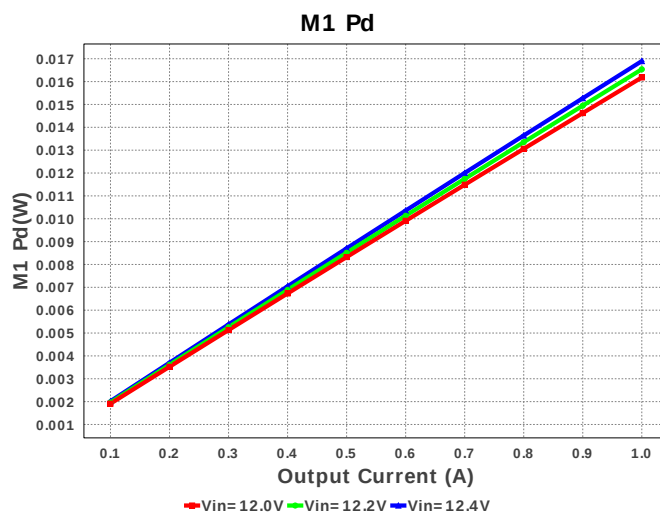
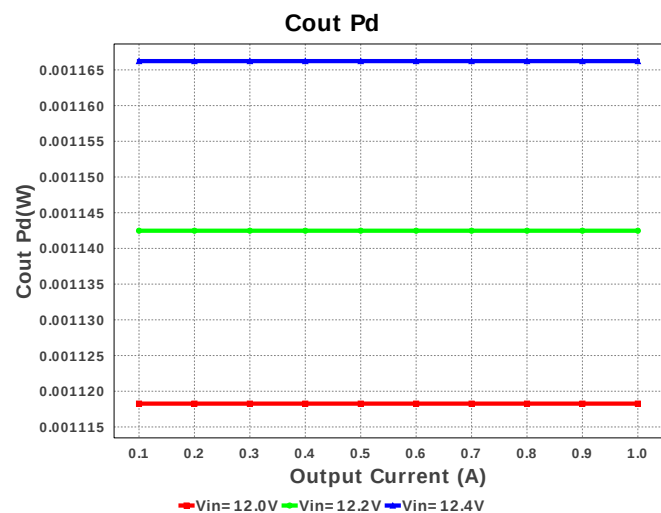
Electrical BOM

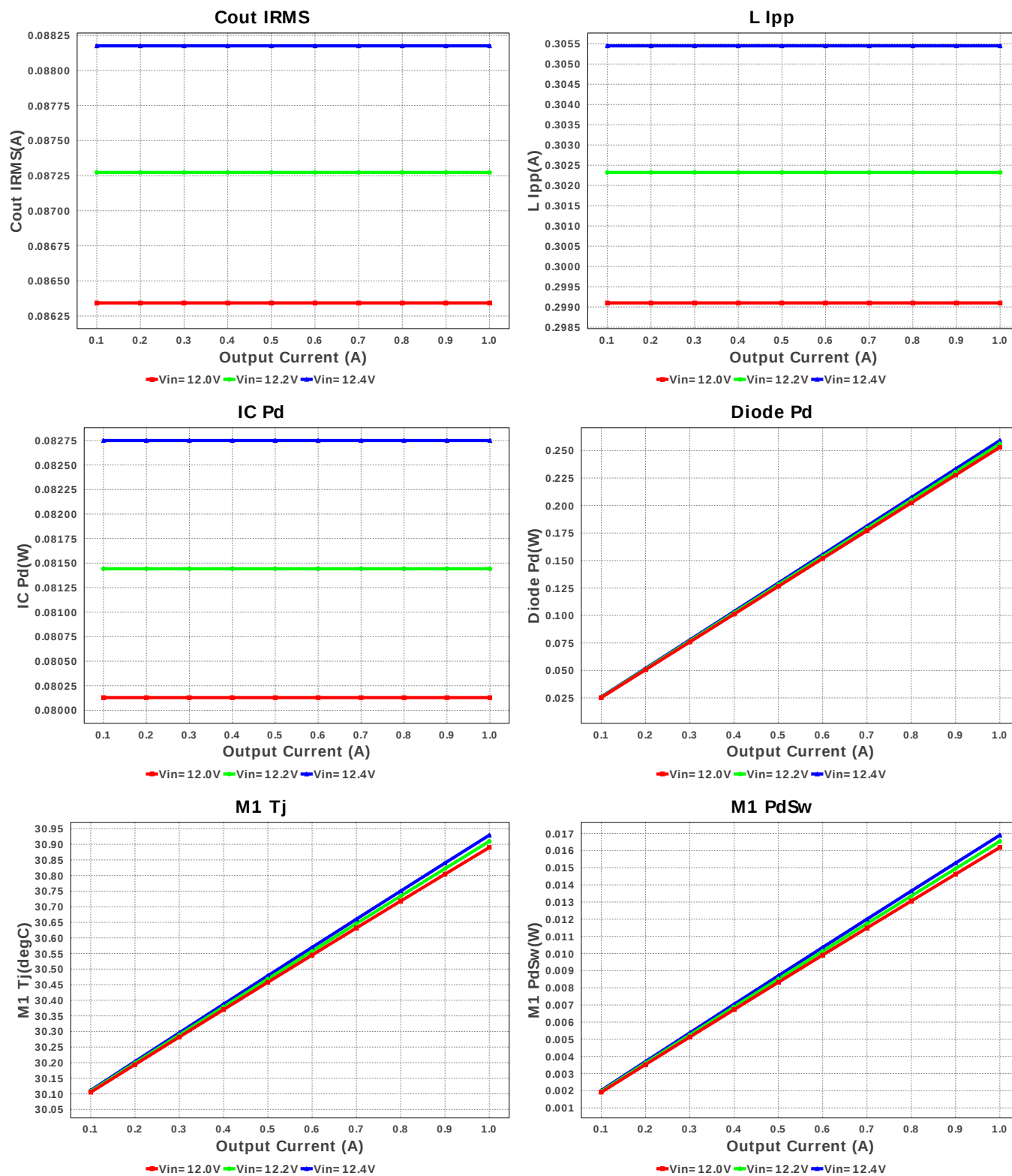
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Cff	TDK	C1608C0G1H911J Series= C0G/NP0	Cap= 910.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	0603 5 mm ²
3.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	\$0.02	0805 7 mm ²
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 ²
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 ²
6.	D1	Diodes Inc.	1N5819HW-7-F	VF@Io= 450.0 mV VRRM= 40.0 V	1	\$0.08	SOD-123 13 mm ²
7.	L1	Bourns	SRN6045-150M	L= 15.0 uH DCR= 95.8 mOhm	1	\$0.16	SRN6045 64 mm ²
8.	M1	Texas Instruments	CSD25402Q3A	VdsMax= -20.0 V IdsMax= -75.0 Amps	1	\$0.33	0 mm ²
9.	Radj	Vishay-Dale	CRCW0402665RFKED Series= CRCW..e3	Res= 665.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
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 ²
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 ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rsns	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.11	 1206 11 mm ²
13.	Rt	Vishay-Dale	CRCW040241K2FKED Series= CRCW..e3	Res= 41.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	U1	Texas Instruments	LM25085MY/NOPB	Switcher	1	\$0.70	 MUY08A 24 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	494.209 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	88.175 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	442.76 mA	Current	Average input current
4.	L Ipp	305.45 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	1.153 A	Current	Peak switch current
6.	BOM Count	14	General	Total Design BOM count
7.	FootPrint	255.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	602.593 kHz	General	Switching frequency
9.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
10.	Pout	5.0 W	General	Total output power
11.	Total BOM	\$1.95	General	Total BOM Cost

#	Name	Value	Category	Description
12.	D1 Tj	87.53 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	42.412 %	Op_point	Duty cycle
16.	Efficiency	91.071 %	Op_point	Steady state efficiency
17.	IC Tj	33.806 degC	Op_point	IC junction temperature
18.	ICThetaJA	46.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	1.0 A	Op_point	Iout operating point
20.	M1 Tj	30.929 degC	Op_point	M1 MOSFET junction temperature
21.	VIN_OP	12.4 V	Op_point	Vin operating point
22.	Vout p-p	45.837 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	488.486 μ W	Power	Input capacitor power dissipation
24.	Cout Pd	1.166 mW	Power	Output capacitor power dissipation
25.	Diode Pd	259.144 mW	Power	Diode power dissipation
26.	IC Pd	82.749 mW	Power	IC power dissipation
27.	L Pd	119.75 mW	Power	Inductor power dissipation
28.	M1 Pd	16.896 mW	Power	M1 MOSFET total power dissipation
29.	M1 PdCond	0.0 W	Power	M1 MOSFET conduction losses
30.	M1 PdSw	16.896 mW	Power	M1 MOSFET switching losses
31.	Total Pd	490.222 mW	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	1.0	Maximum Output Current
2.	VinMax	12.4	Maximum input voltage
3.	VinMin	12.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM25085	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. **LM25085 Product Folder** : <http://www.ti.com/product/LM25085> : 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.

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).