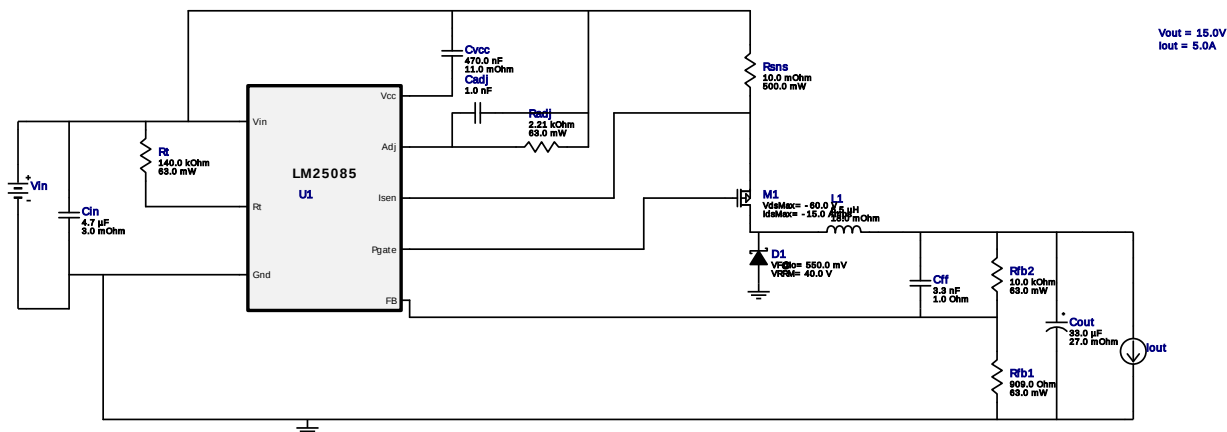


WEBENCH® Design Report

Design : 4213487/8 LM25085MY/NOPB
LM25085MY/NOPB 28.0V-28.0V to 15.00V @ 5.0A

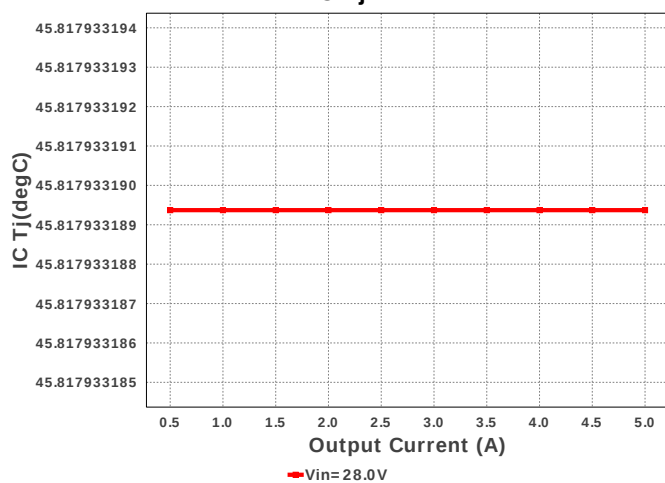


Electrical BOM

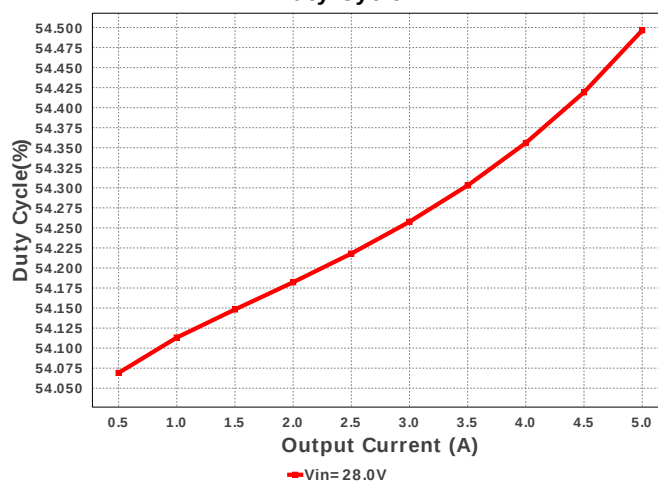
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
2.	Cff	MuRata	GRM188R71E332KA01D Series= X7R	Cap= 3.3 nF ESR= 1.0 Ohm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
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 ²
4.	Cout	Panasonic	20SVPG33M Series= ?	Cap= 33.0 uF ESR= 27.0 mOhm VDC= 20.0 V IRMS= 3.0 A	1	\$0.43	 CAPSMT_62_B45 53 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.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.17	 SMC 83 mm ²
7.	L1	Bourns	SRR1208-6R5ML	L= 6.5 µH DCR= 18.0 mOhm	1	\$0.37	 SRR1208 216 mm ²
8.	M1	Fairchild Semiconductor	FDD5614P	VdsMax= -60.0 V IdsMax= -15.0 Amps	1	\$0.24	 DPAK 102 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
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 ²
10.	Rfb1	Vishay-Dale	CRCW0402909RFKED Series= CRCW..e3	Res= 909.0 Ohm 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
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	CRCW0402140KFKED Series= CRCW..e3	Res= 140.0 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

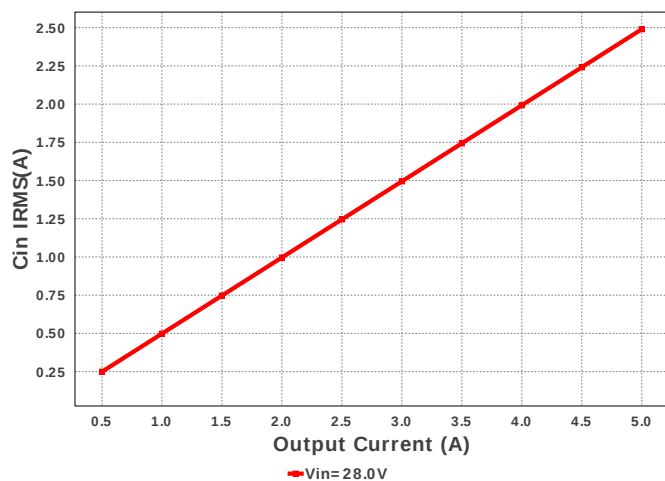
IC Tj



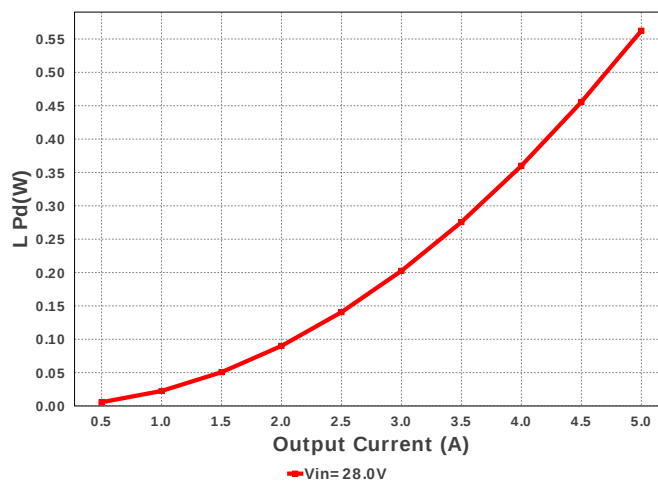
Duty Cycle

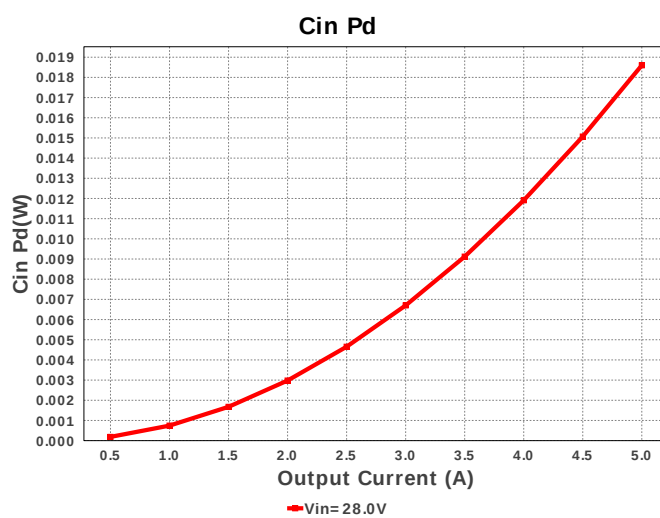
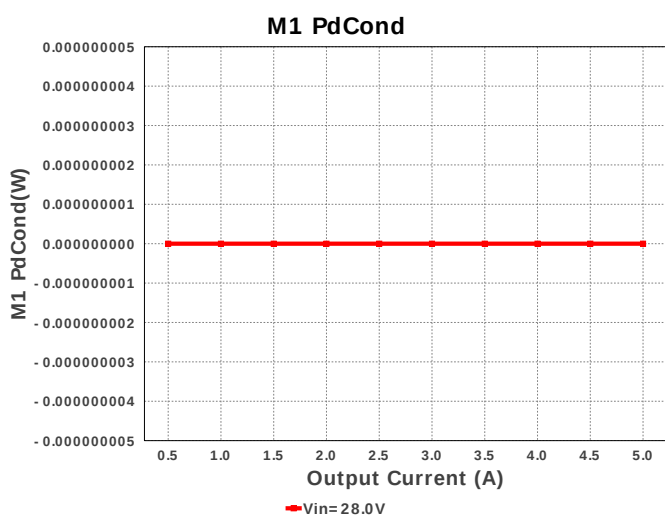
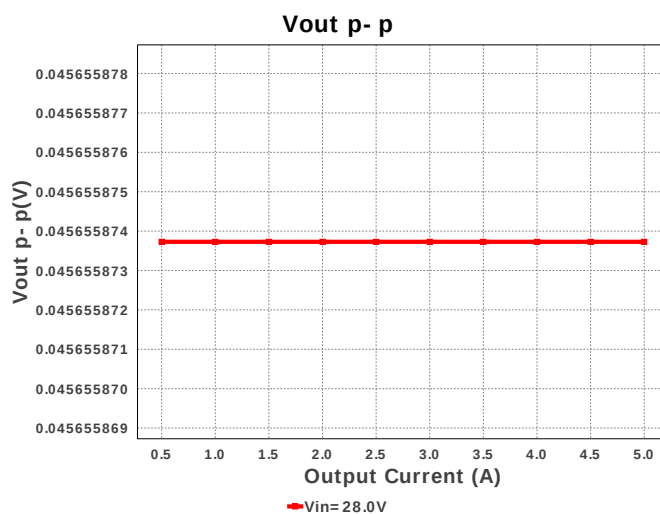
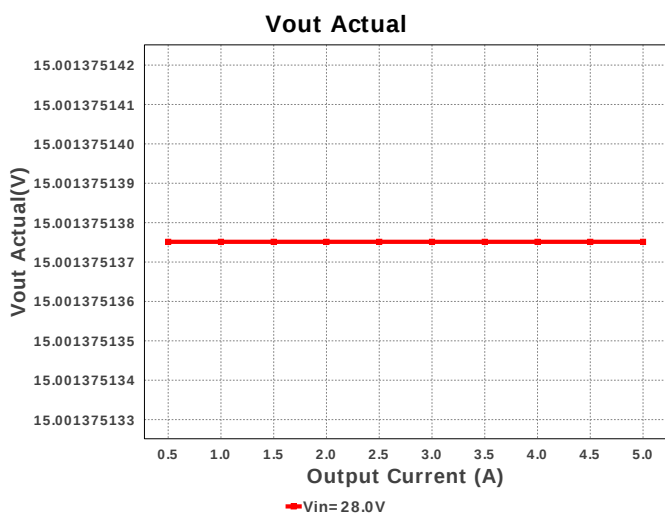
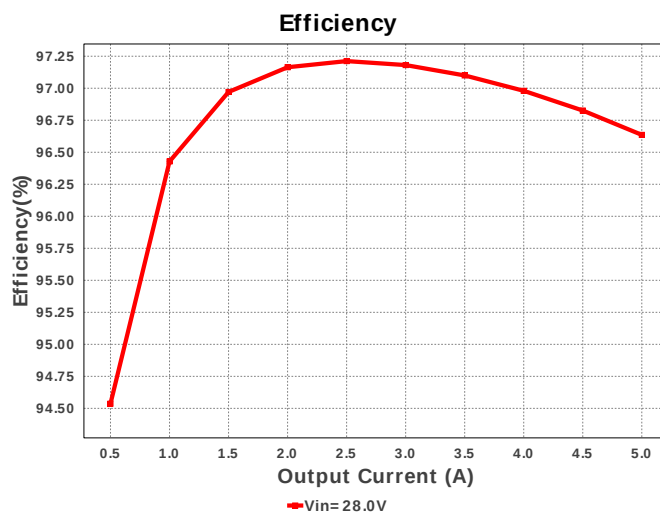
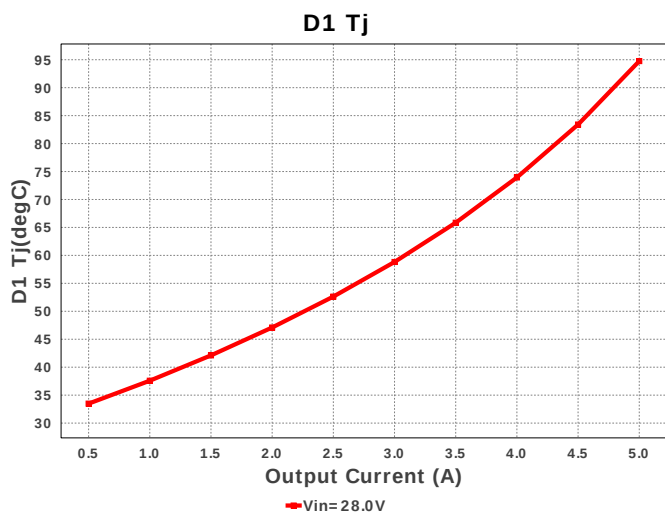


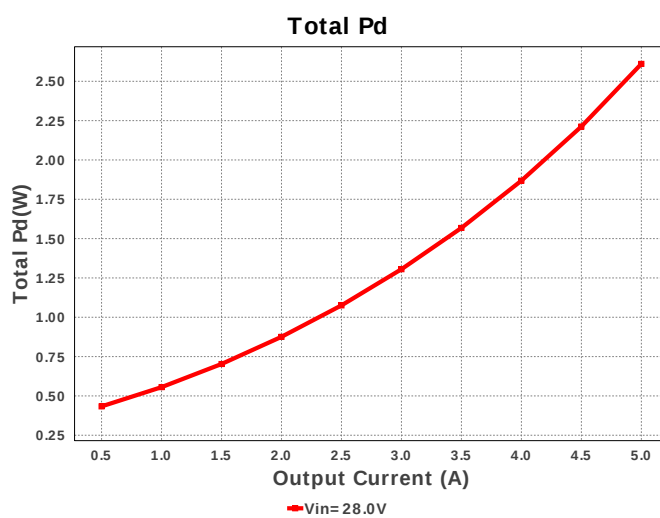
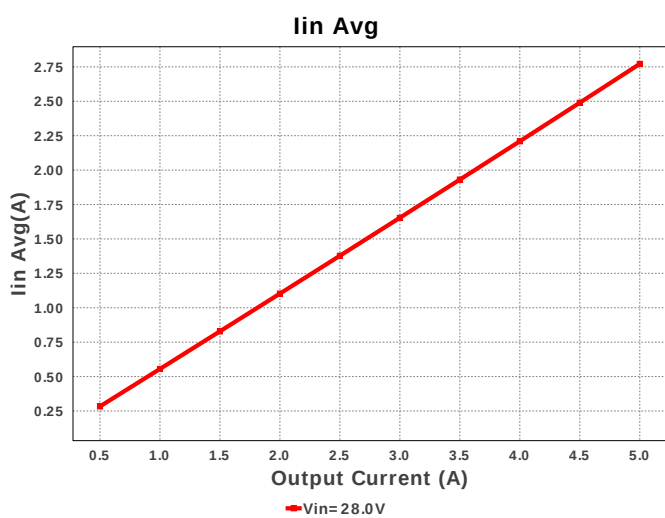
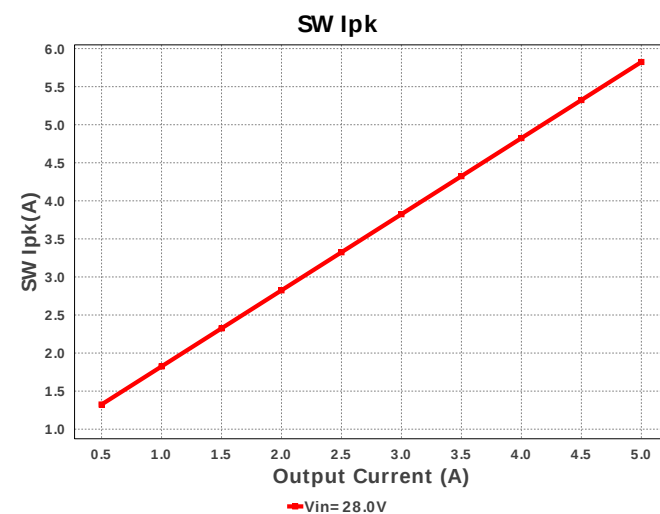
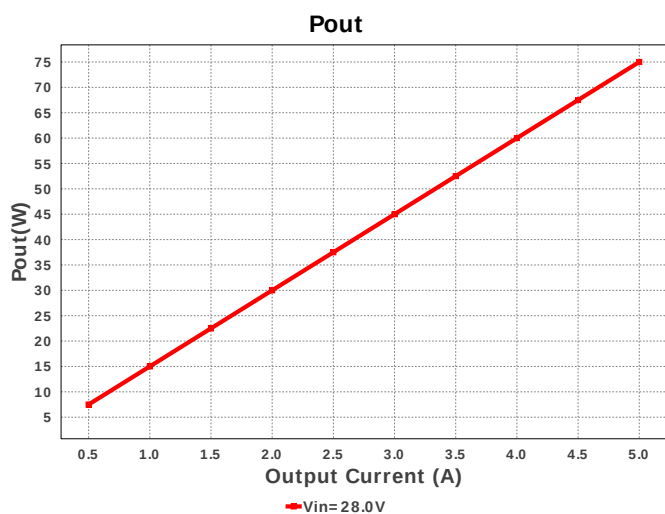
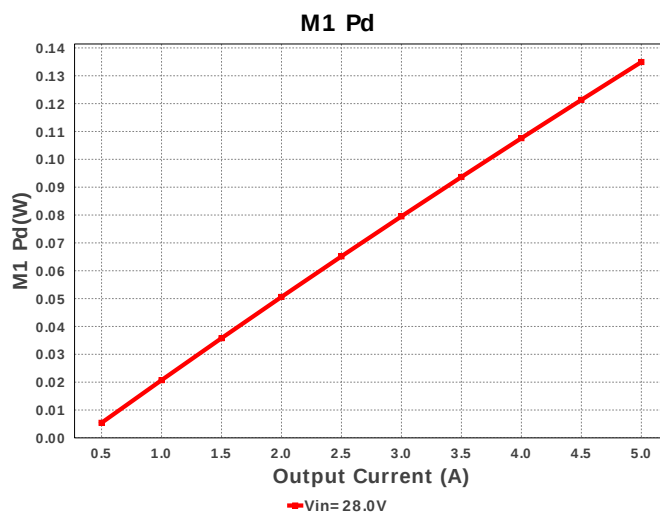
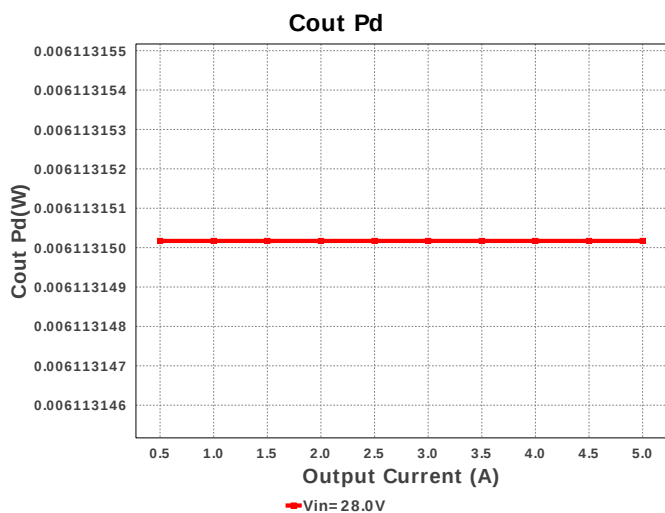
Cin IRMS

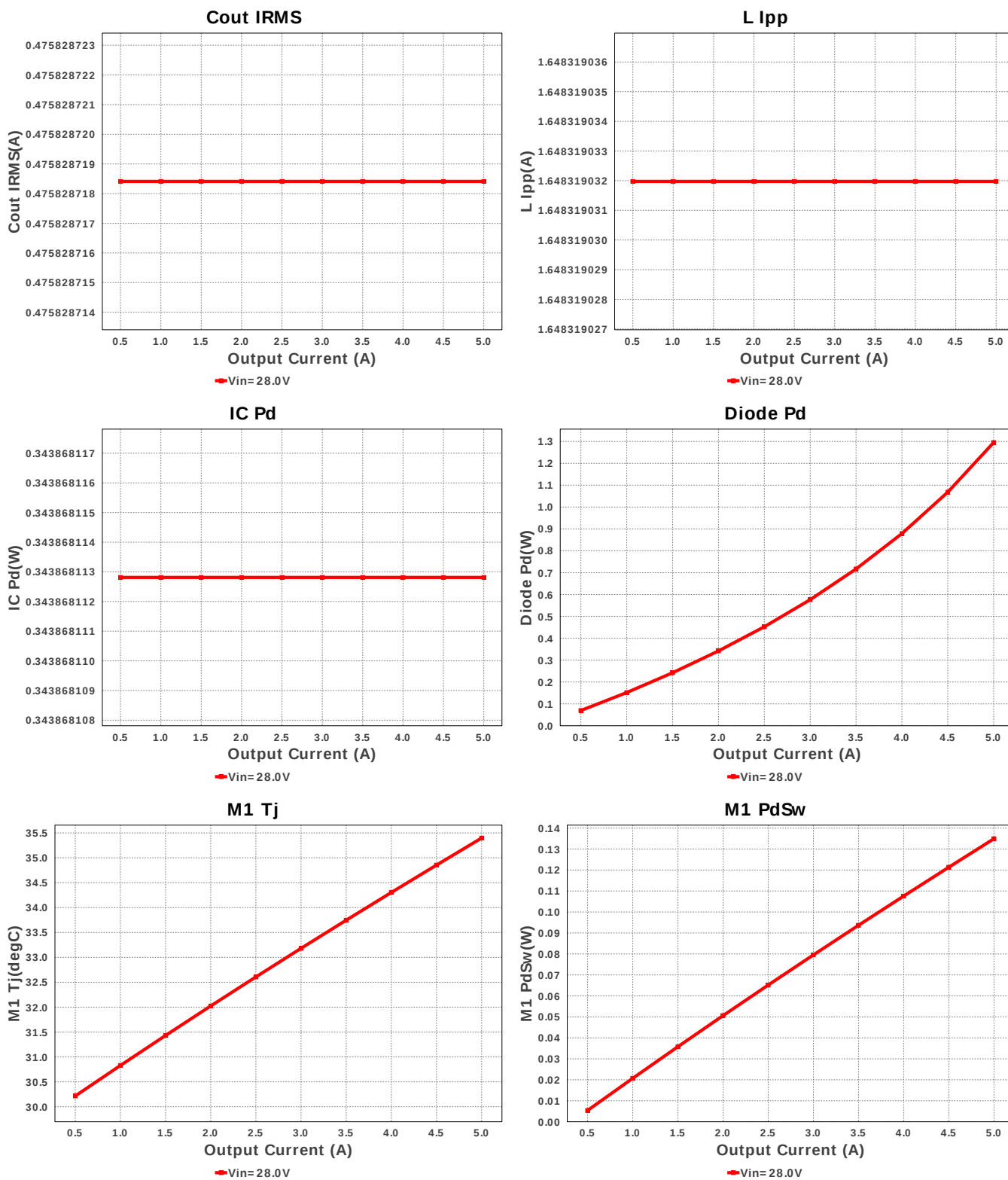


L Pd









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.49 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	475.829 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	2.772 A	Current	Average input current
4.	L Ipp	1.648 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	5.824 A	Current	Peak switch current
6.	BOM Count	14	General	Total Design BOM count
7.	FootPrint	530.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	612.834 kHz	General	Switching frequency
9.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
10.	Pout	75.0 W	General	Total output power
11.	Total BOM	\$2.17	General	Total BOM Cost

#	Name	Value	Category	Description
12.	D1 Tj	94.753 degC	Op_Point	D1 junction temperature
13.	Vout Actual	15.001 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	15.0 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	54.496 %	Op_point	Duty cycle
16.	Efficiency	96.636 %	Op_point	Steady state efficiency
17.	IC Tj	45.818 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	35.397 degC	Op_point	M1 MOSFET junction temperature
21.	VIN_OP	28.0 V	Op_point	Vin operating point
22.	Vout p-p	45.656 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	18.598 mW	Power	Input capacitor power dissipation
24.	Cout Pd	6.113 mW	Power	Output capacitor power dissipation
25.	Diode Pd	1.295 W	Power	Diode power dissipation
26.	IC Pd	343.868 mW	Power	IC power dissipation
27.	L Pd	562.5 mW	Power	Inductor power dissipation
28.	M1 Pd	134.937 mW	Power	M1 MOSFET total power dissipation
29.	M1 PdCond	0.0 W	Power	M1 MOSFET conduction losses
30.	M1 PdSw	134.937 mW	Power	M1 MOSFET switching losses
31.	Total Pd	2.611 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.889 %		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	28.0	Maximum input voltage
3.	VinMin	28.0	Minimum input voltage
4.	Vout	15.0	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.

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

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