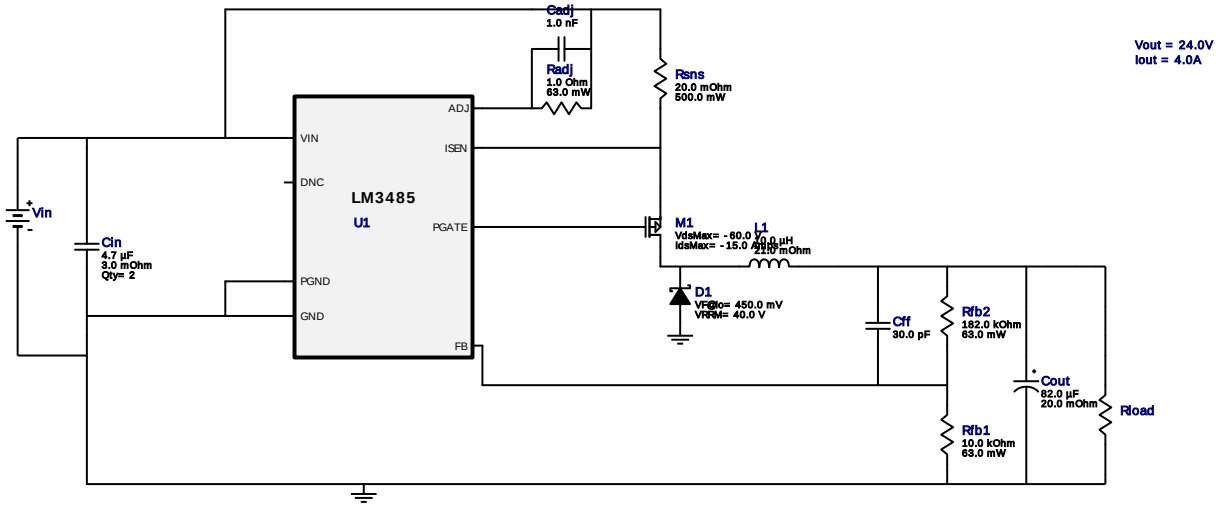
WEBENCH® Design Report

VinMin = 28.0V
VinMax = 28.0V
Vout = 24.0V
Iout = 4.0A

Device = LM3485MM/NOPB
Topology = Buck
Created = 8/2/16 6:19:52 AM
BOM Cost = $2.11
BOM Count = 13
Total Pd = 1.27W

Design : 4213487/7 LM3485MM/NOPB
LM3485MM/NOPB 28.0V-28.0V to 24.00V @ 4.0A



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 mm²
2.	Cff	Samsung Electro-Mechanics	CL21C300JBANNNC Series= C0G/NP0	Cap= 30.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	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 mm²
4.	Cout	Panasonic	35SVPF82M Series= ?	Cap= 82.0 uF ESR= 20.0 mOhm VDC= 35.0 V IRMS= 4.0 A	1	$0.61	CAPSMT_62_E12 106 mm²
5.	D1	Diodes Inc.	1N5819HW-7-F	VF@Io= 450.0 mV VRRM= 40.0 V	1	$0.08	SOD-123 13 mm²
6.	L1	Bourns	SRR1208-100ML	L= 10.0 µH DCR= 21.0 mOhm	1	$0.37	SRR1208 216 mm²
7.	M1	Fairchild Semiconductor	FDD5614P	VdsMax= -60.0 V IdsMax= -15.0 Amps	1	$0.24	DPAK 102 mm²
8.	Radj	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

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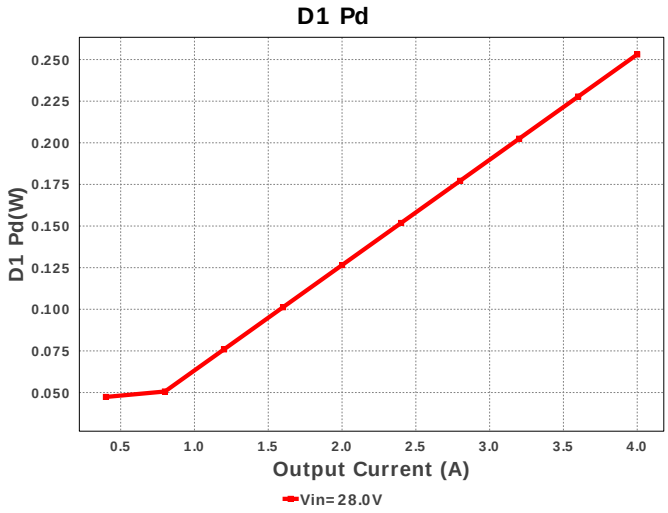
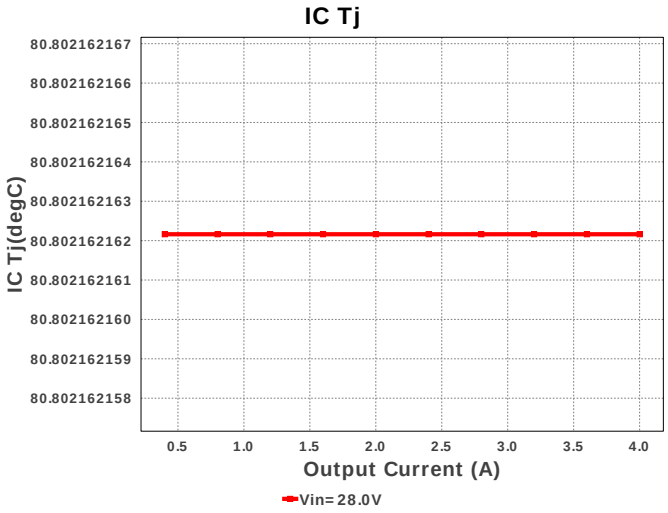
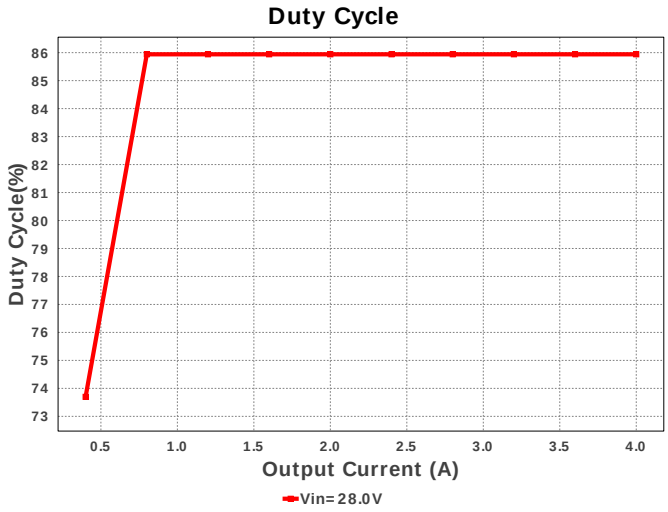
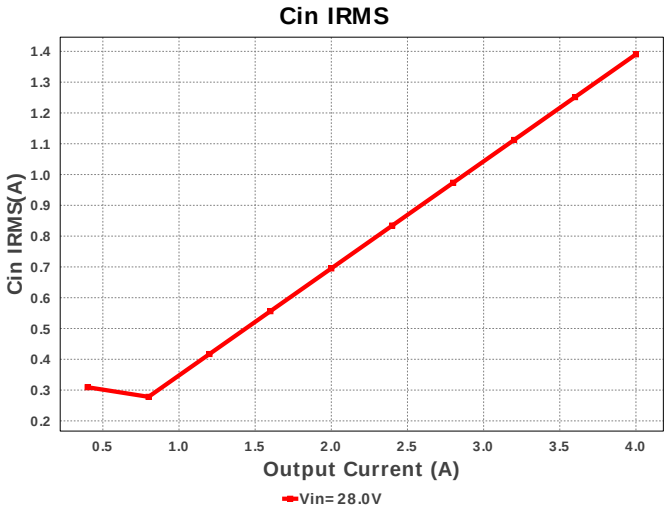
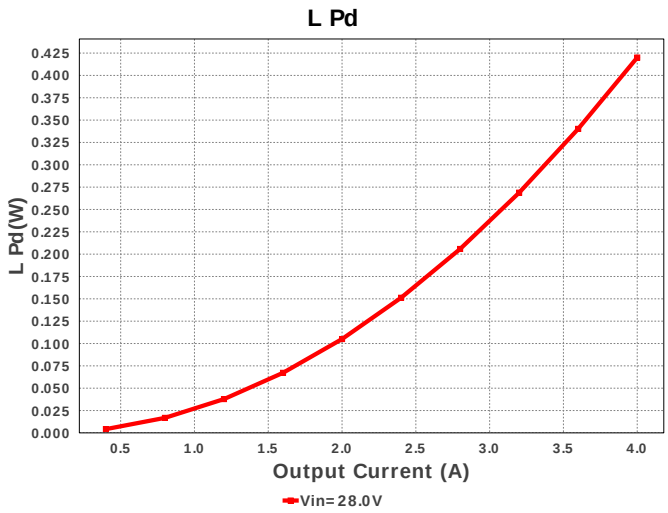
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
10.	Rfb2	Vishay-Dale	CRCW0402182KFKED Series= CRCW..e3	Res= 182.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	Rsns	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	1206 11 mm^2
12.	U1	Texas Instruments	LM3485MM/NOPB	Switcher	1	$0.52	MUA08A 24 mm^2

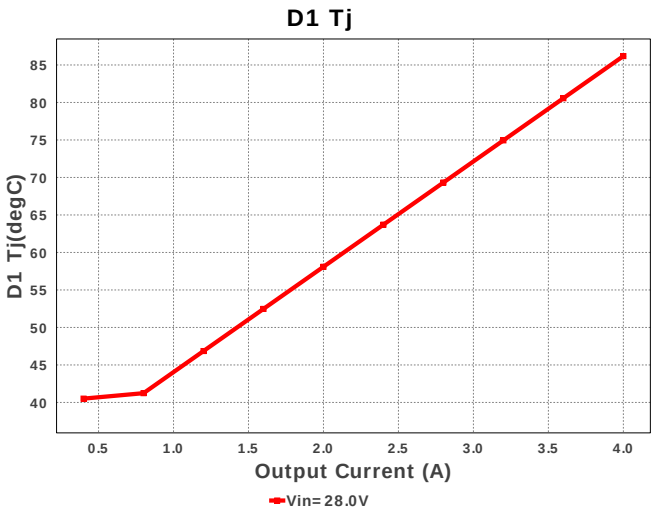


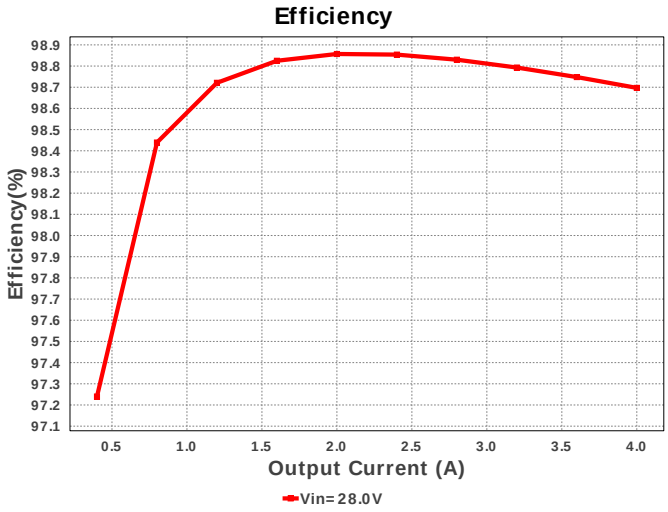


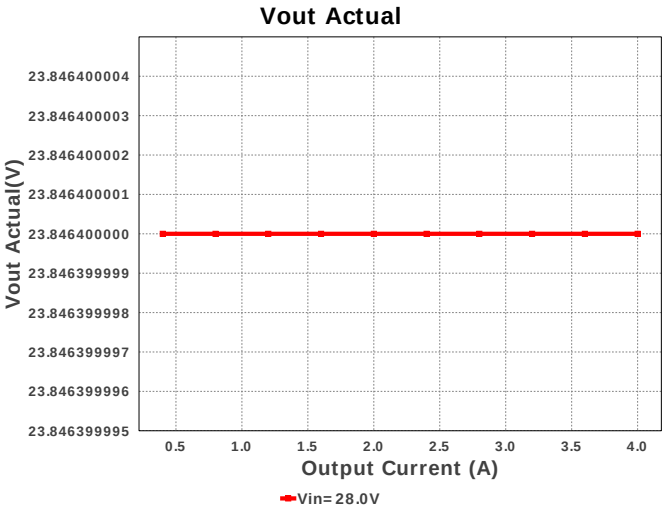


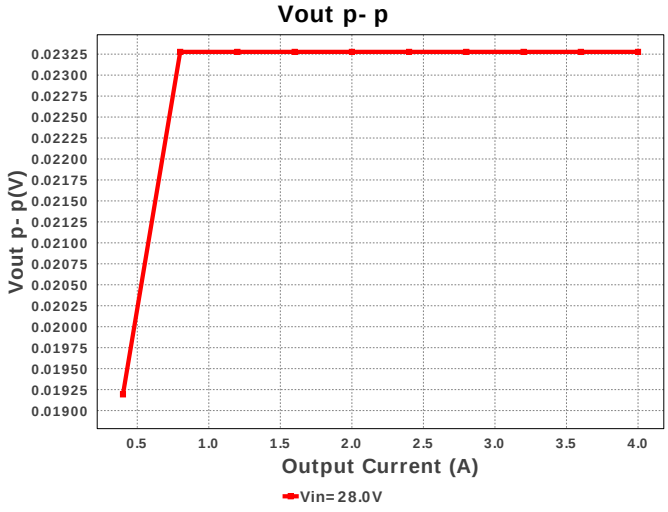


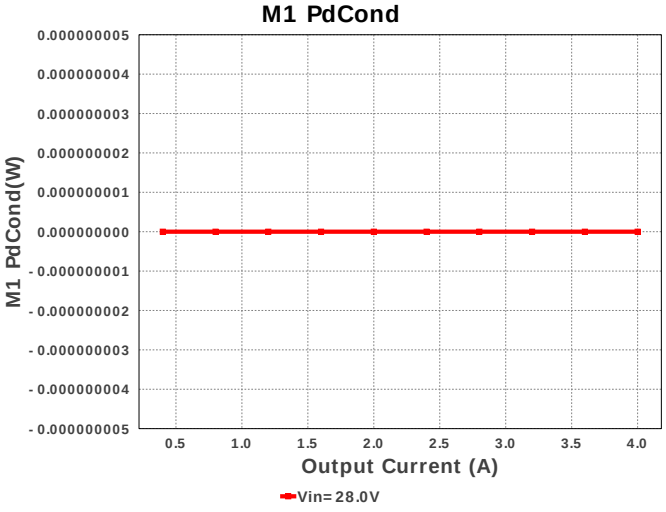












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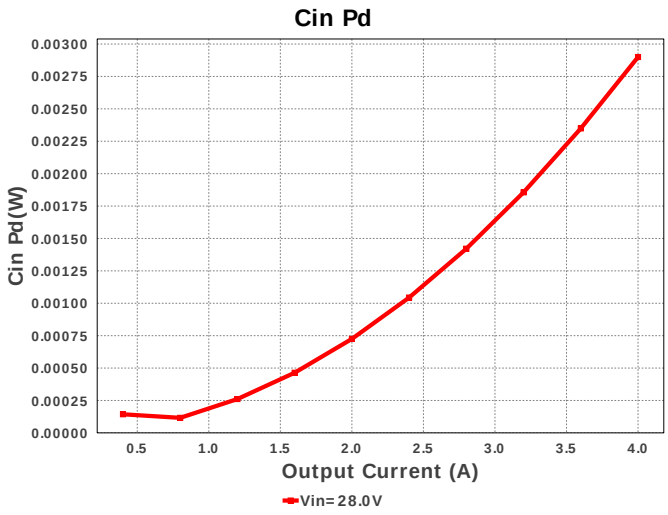

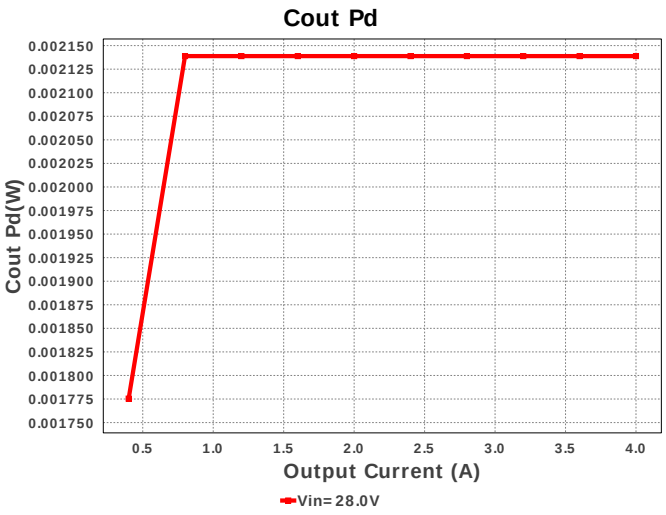

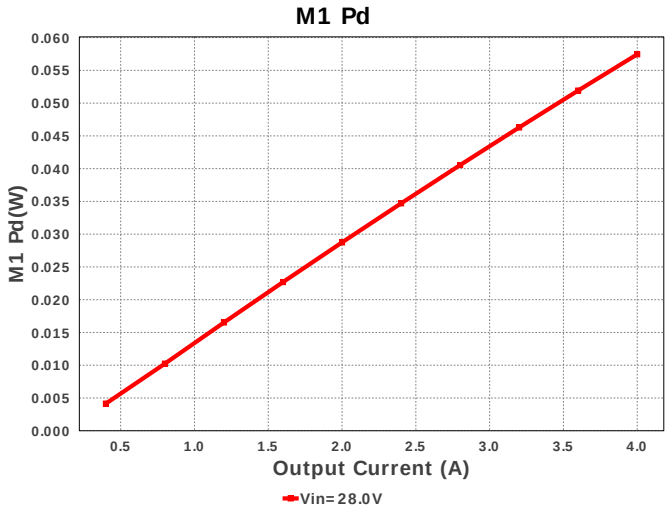

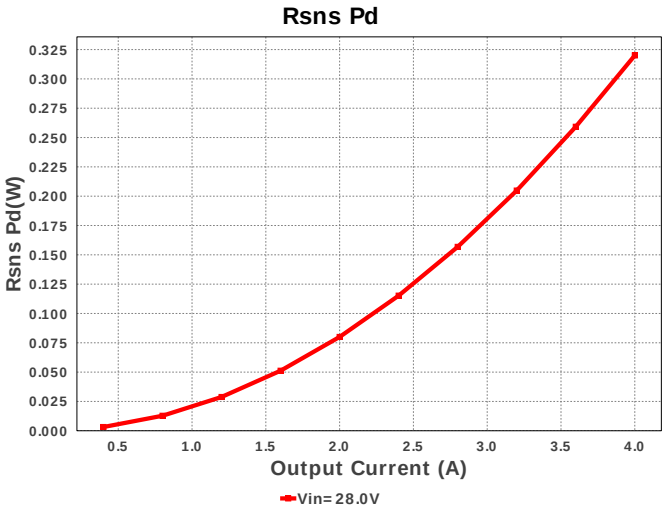

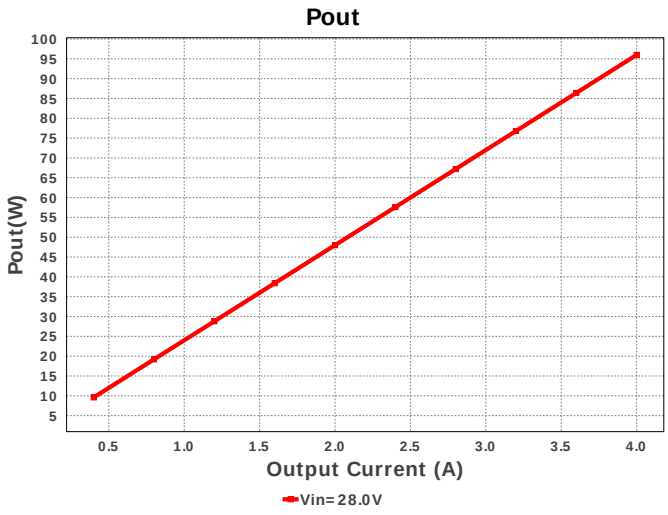

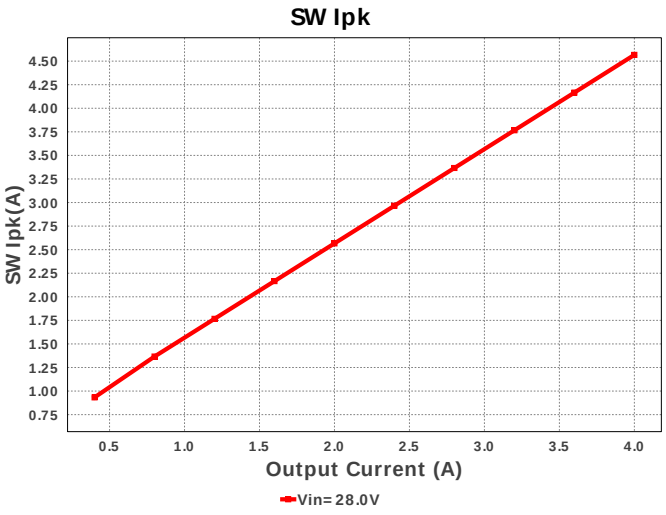

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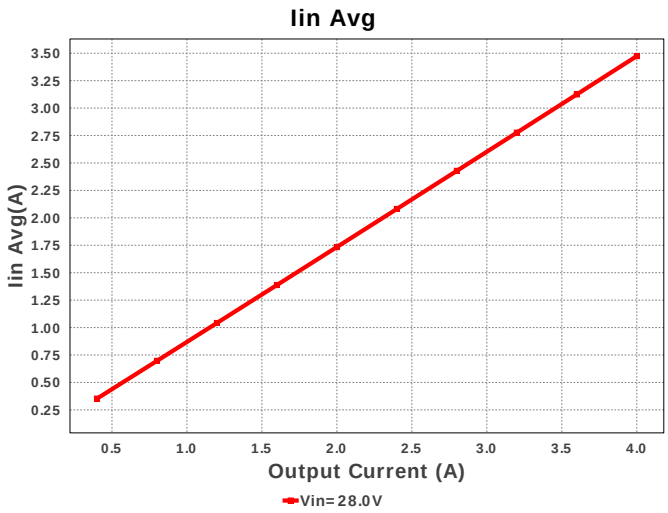

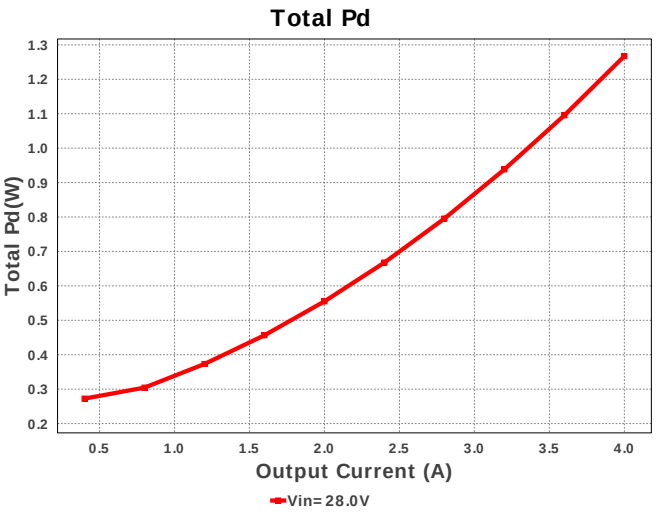

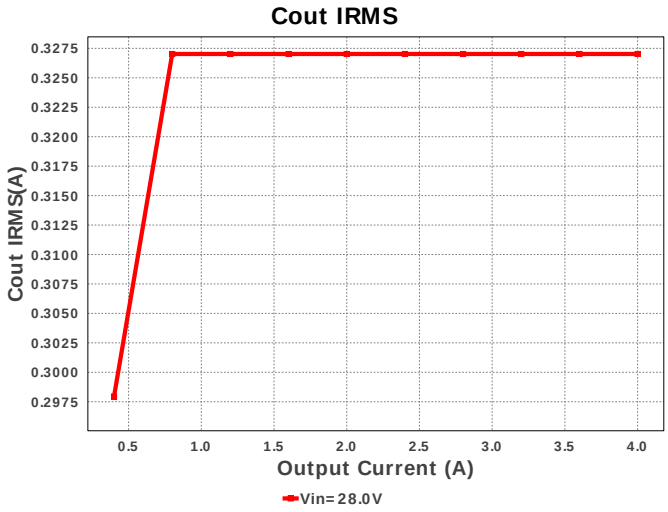

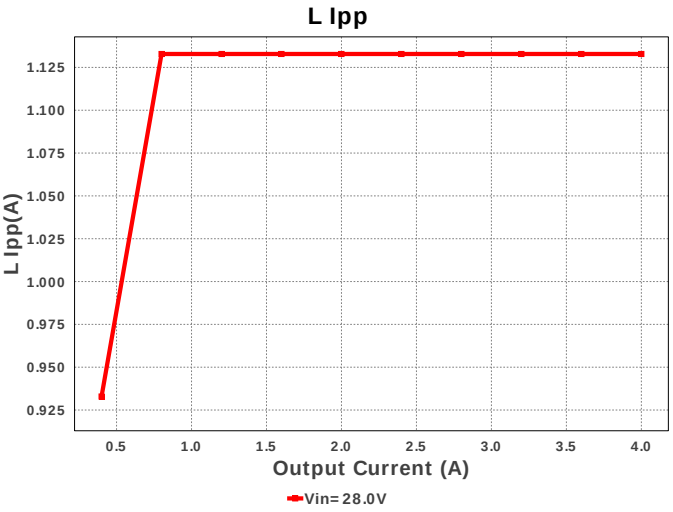

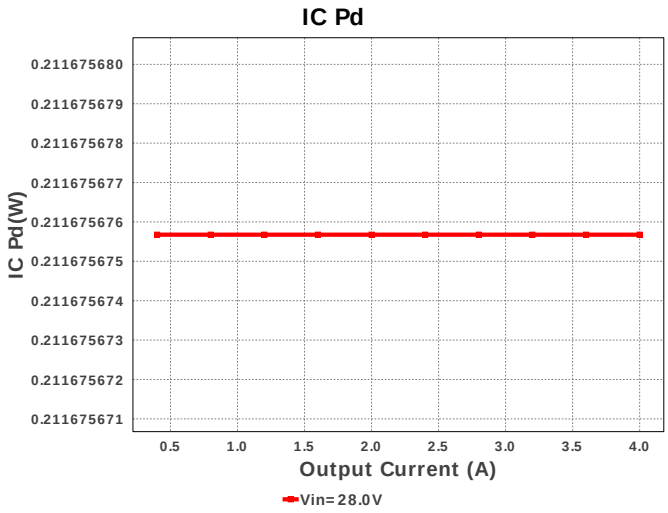

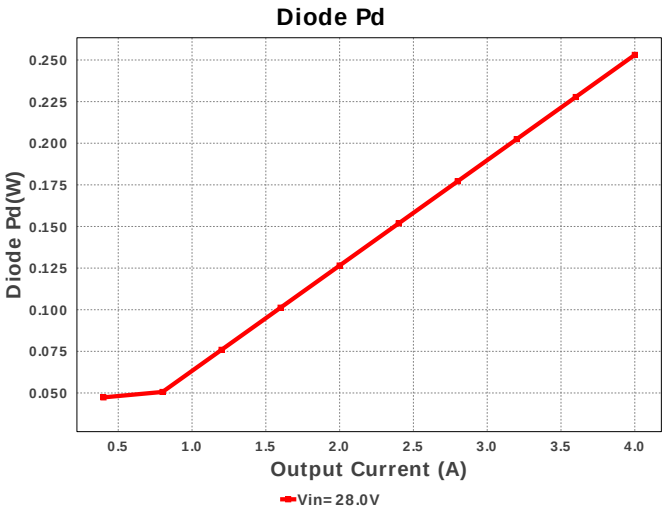

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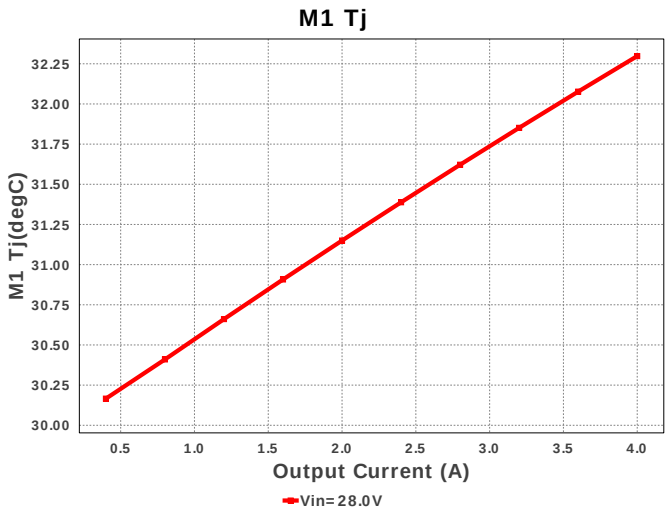

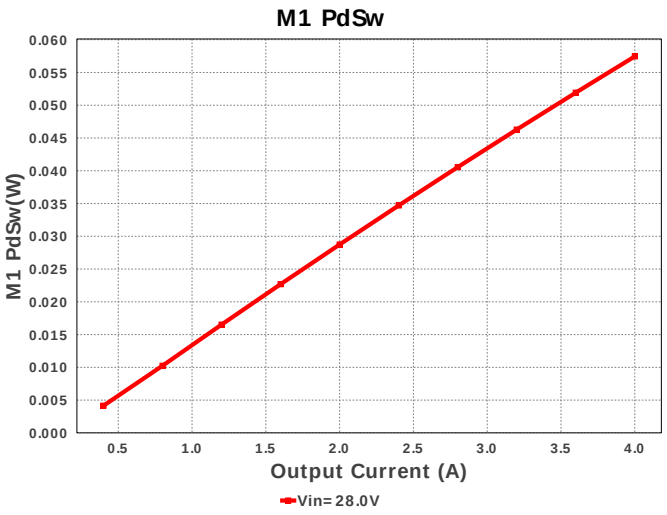

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.39 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	321.274 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	3.474 A	Current	Average input current
4.	L Ipp	1.113 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	4.556 A	Current	Peak switch current
6.	BOM Count	13	General	Total Design BOM count
7.	FootPrint	516.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	323.45 kHz	General	Switching frequency
9.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
10.	Pout	96.0 W	General	Total output power
11.	Total BOM	$2.11	General	Total BOM Cost
12.	D1 Tj	86.183 degC	Op_Point	D1 junction temperature
13.	Vout Actual	23.846 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	85.94 %	Op_point	Duty cycle
16.	Efficiency	98.697 %	Op_point	Steady state efficiency
17.	IC Tj	72.335 degC	Op_point	IC junction temperature
18.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	4.0 A	Op_point	Iout operating point
20.	M1 Tj	32.298 degC	Op_point	M1 MOSFET junction temperature
21.	VIN_OP	28.0 V	Op_point	Vin operating point
22.	Vout p-p	22.868 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	2.9 mW	Power	Input capacitor power dissipation
24.	Cout Pd	2.064 mW	Power	Output capacitor power dissipation
25.	D1 Pd	253.076 mW	Power	Output Diode Power Dissipation
26.	Diode Pd	253.076 mW	Power	Diode power dissipation
27.	IC Pd	211.676 mW	Power	IC power dissipation
28.	L Pd	420.0 mW	Power	Inductor power dissipation
29.	M1 Pd	57.446 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	0.0 W	Power	M1 MOSFET conduction losses
31.	M1 PdSw	57.446 mW	Power	M1 MOSFET switching losses
32.	Rsns Pd	320.0 mW	Power	LED Current Rsns Power Dissipation
33.	Total Pd	1.267 W	Power	Total Power Dissipation
34.	Vout Tolerance	1.915 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	4.0	Maximum Output Current
2.	VinMax	28.0	Maximum input voltage
3.	VinMin	28.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	LM3485	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

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1. Outline The LM3485 is a hysteretic PFET controller. The hysteretic control architecture provides for a stable design without the use of a control loop. The switching frequency depends on the inductance value, output capacitor ESR, and the input voltage. Therefore depending on the chosen BOM, the frequency at different input voltages would vary.

2. **LM3485** Product Folder : http://www.ti.com/product/LM3485 : contains the data sheet and other resources.

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