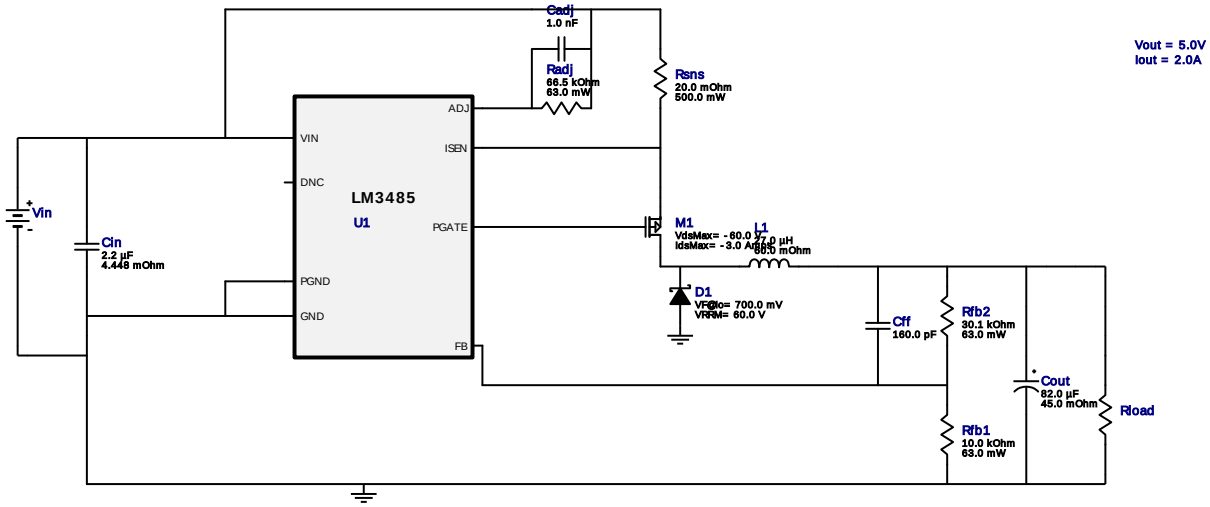
WEBENCH® Design Report

VinMin = 20.0V
VinMax = 30.0V
Vout = 5.0V
Iout = 2.0A

Device = LM3485MM/NOPB
Topology = Buck
Created = 7/12/16 11:07:35 PM
BOM Cost = $1.84
BOM Count = 12
Total Pd = 1.43W

Design : 3893481/5 LM3485MM/NOPB
LM3485MM/NOPB 20.0V-30.0V to 5.00V @ 2.0A



My Comments

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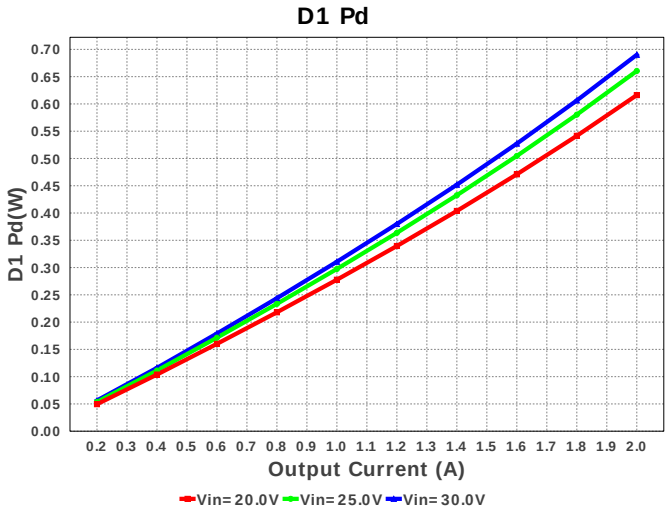
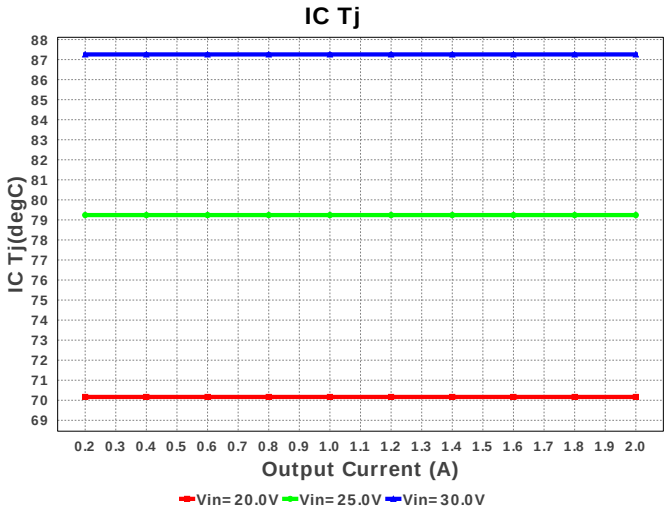
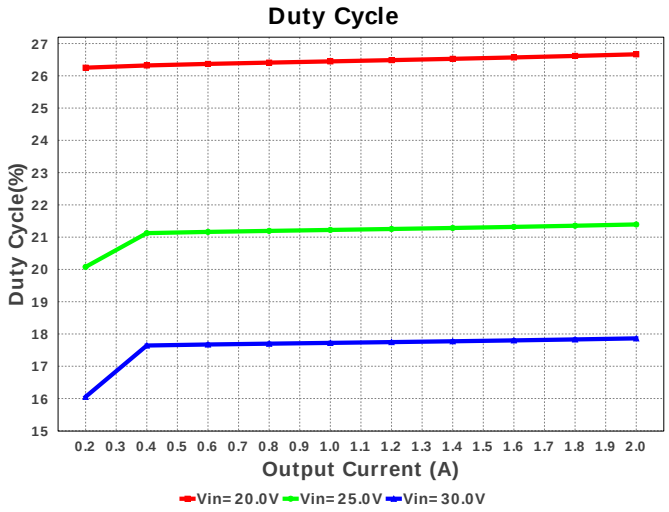
Electrical BOM

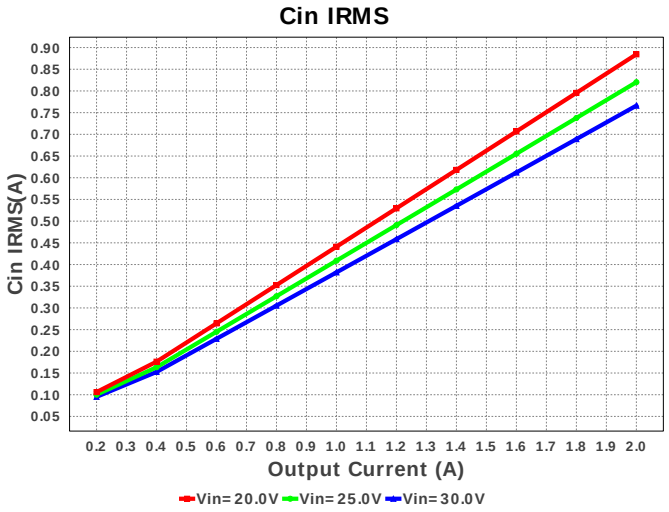
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cff	Samsung Electro-Mechanics	CL21C161JBANNNC Series= C0G/NP0	Cap= 160.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
4.	Cout	Panasonic	6SVP82M Series= SVP	Cap= 82.0 uF ESR= 45.0 mOhm VDC= 6.3 V IRMS= 1.7 A	1	$0.42	SM_RADIAL_6.3AMM 80 mm²
5.	D1	Diodes Inc.	B360A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.12	SMA 37 mm²
6.	L1	Bourns	SDR1307-270ML	L= 27.0 µH DCR= 60.0 mOhm	1	$0.35	SDR1307 227 mm²
7.	M1	Fairchild Semiconductor	FDC5614P	VdsMax= -60.0 V IdsMax= -3.0 Amps	1	$0.23	SOT-23-6 15 mm²
8.	Radj	Vishay-Dale	CRCW040266K5FKED Series= CRCW..e3	Res= 66.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

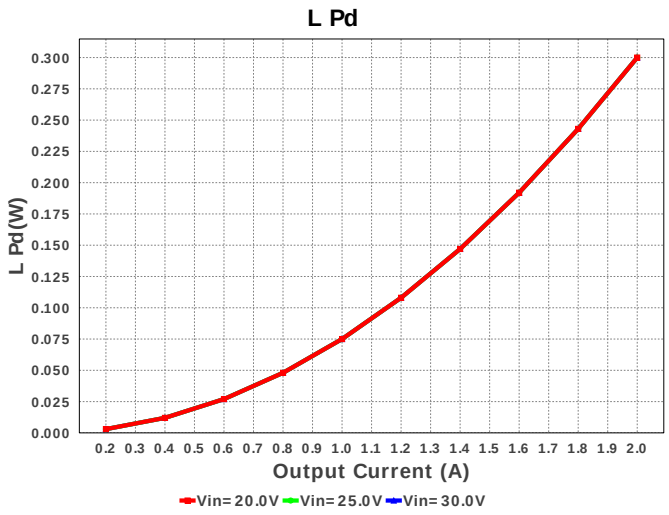
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
10.	Rfb2	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
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

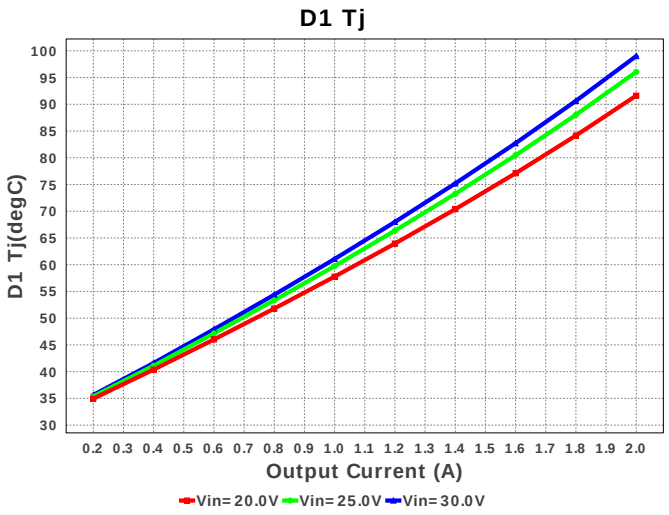


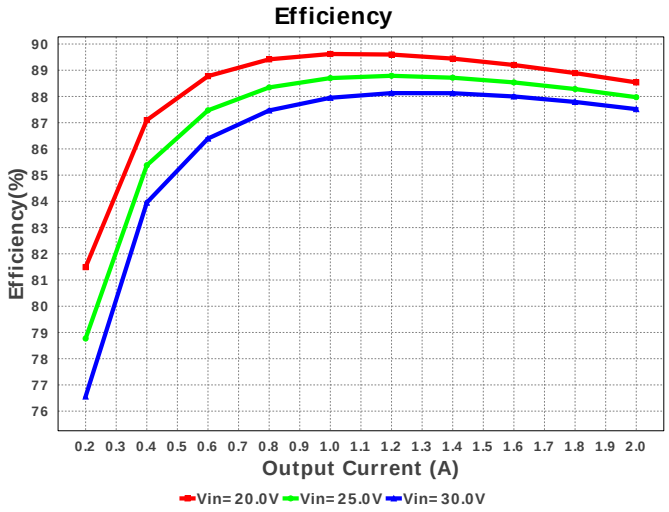


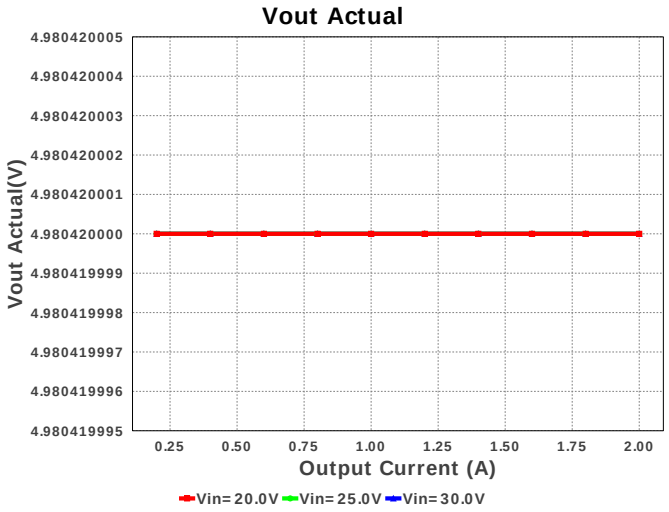


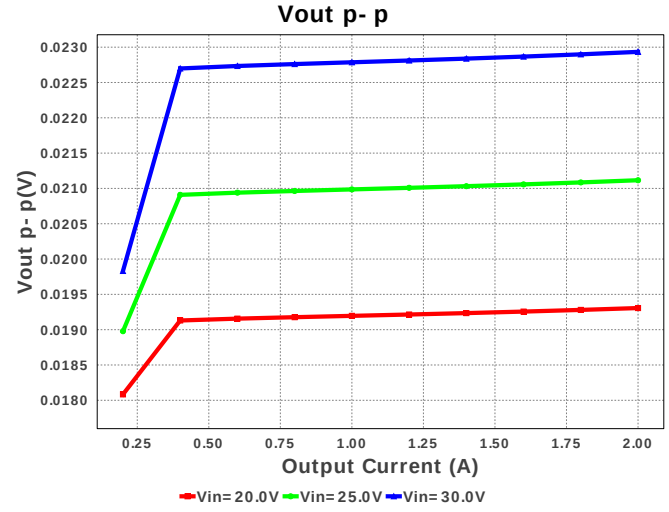


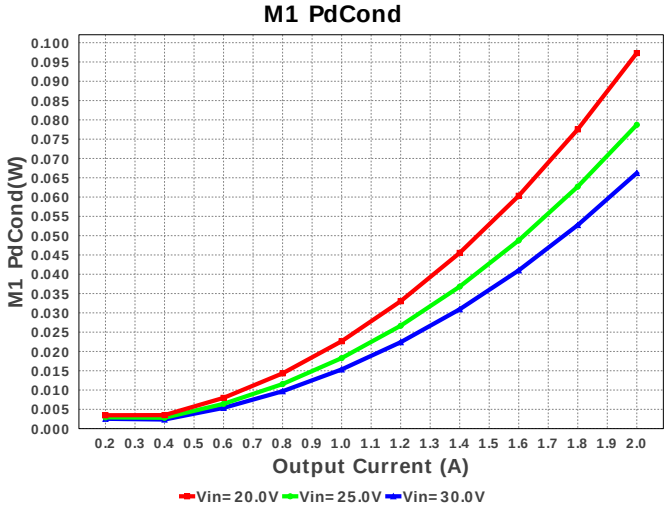


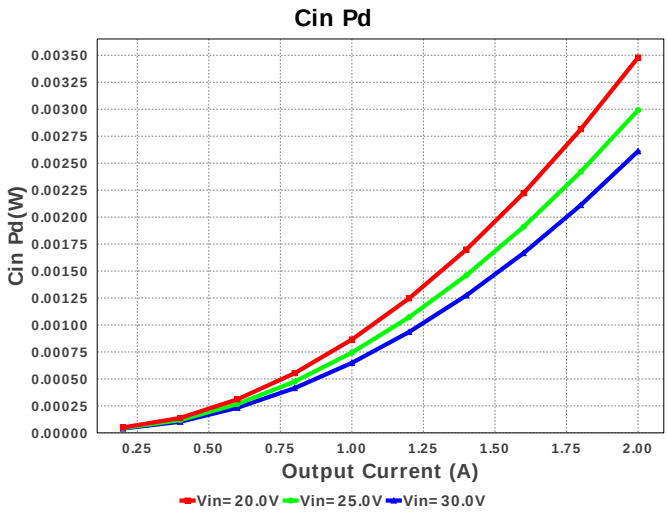


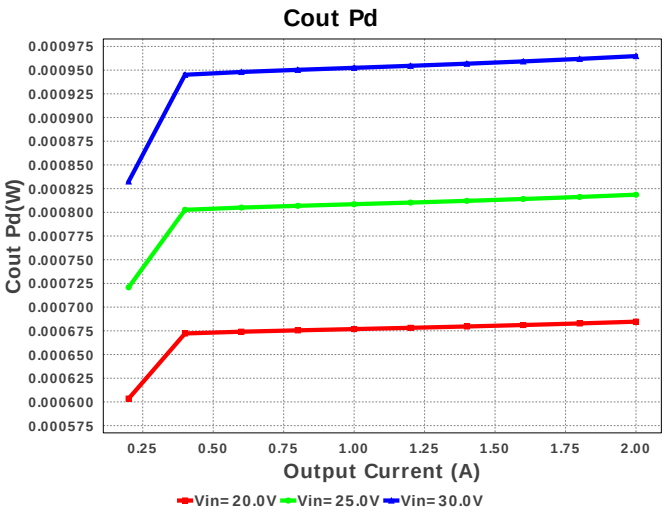


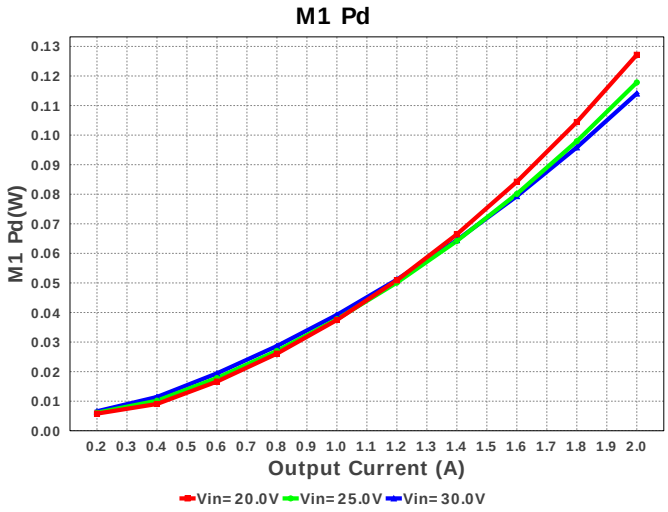


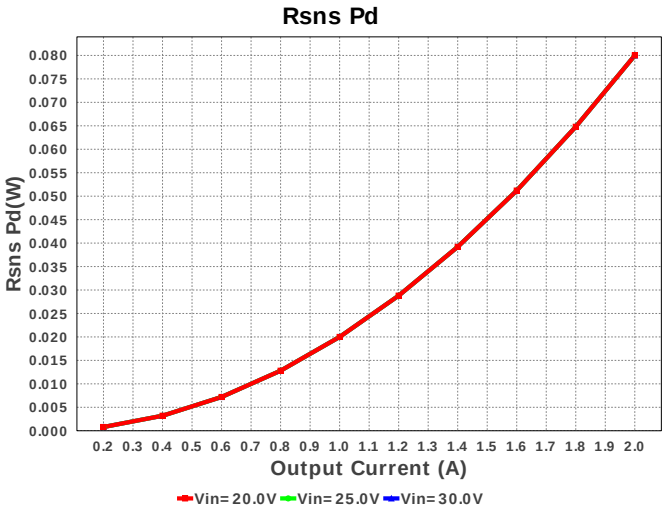


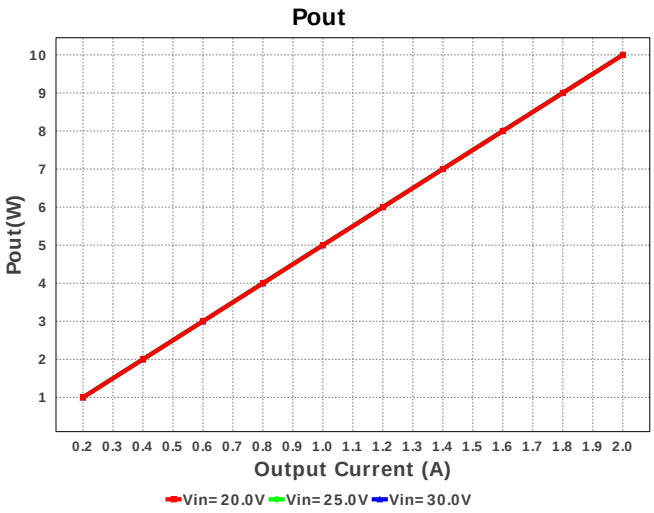


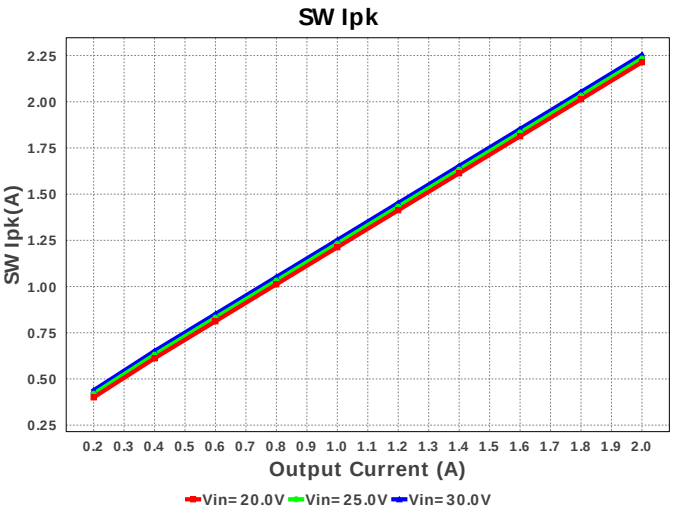


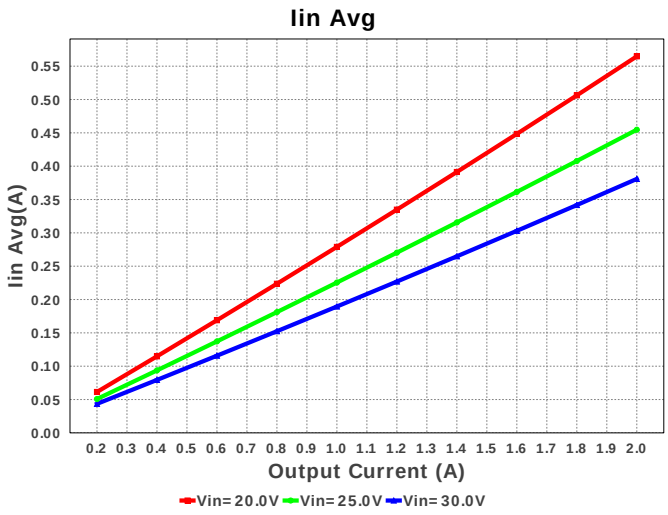


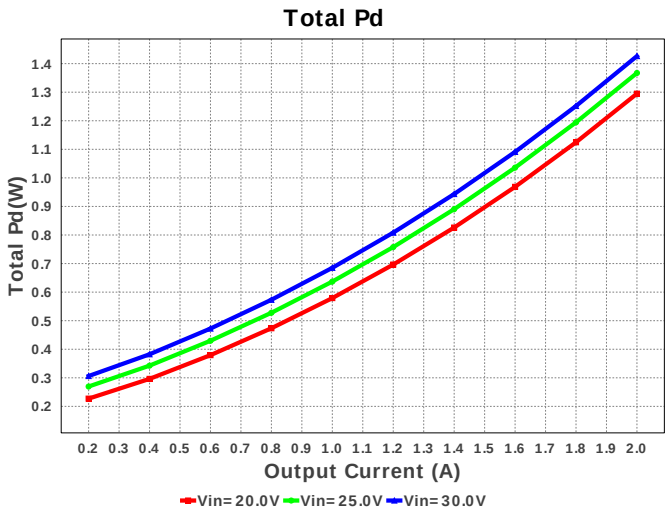


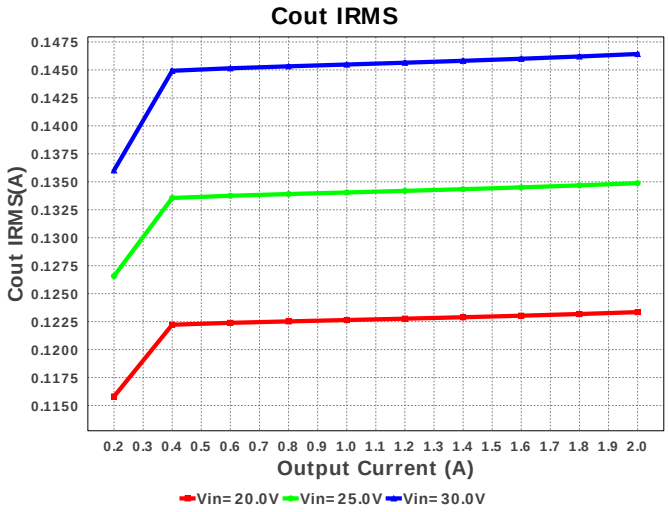


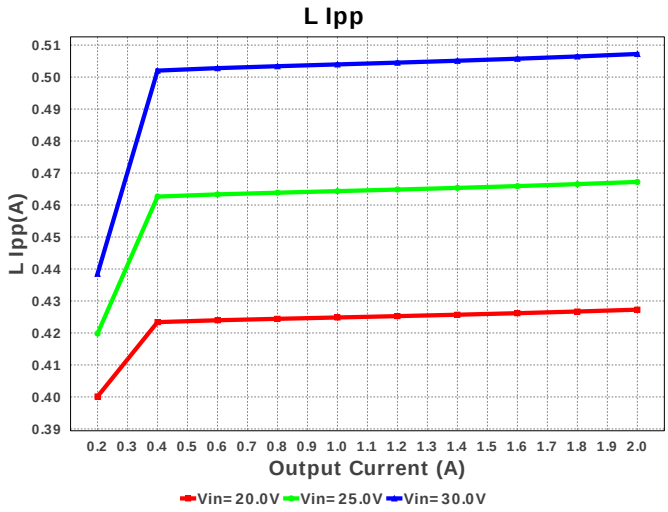


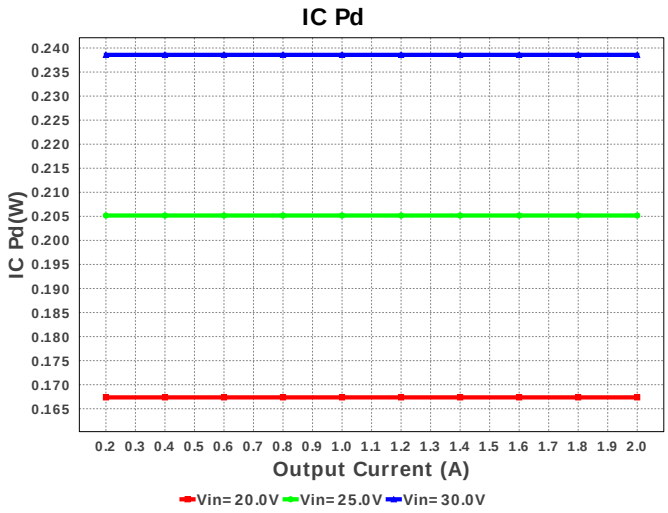


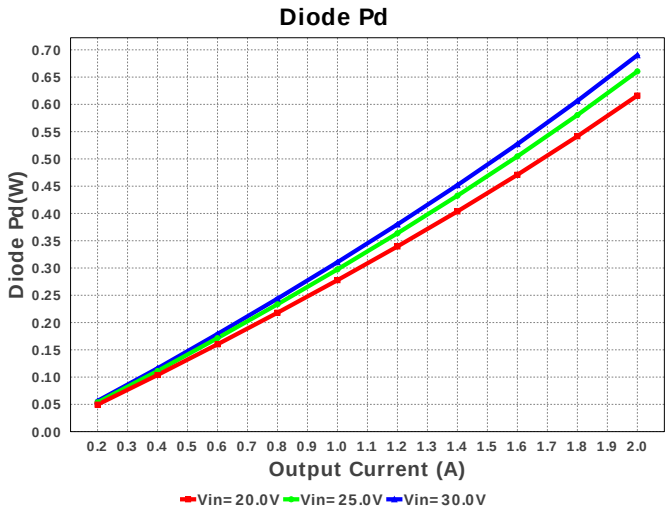


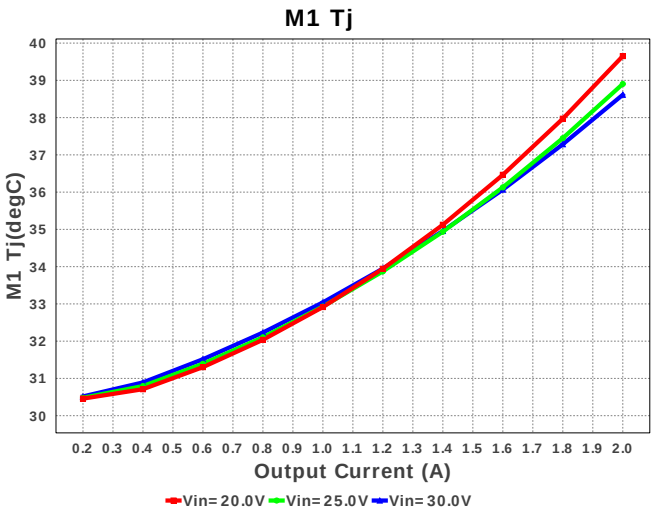


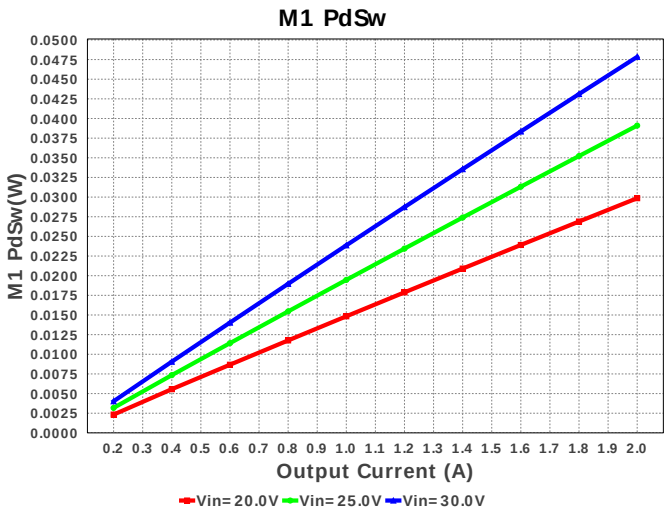












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	766.103 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	144.017 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	380.9 mA	Current	Average input current
4.	L Ipp	498.89 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	2.249 A	Current	Peak switch current
6.	BOM Count	12	General	Total Design BOM count
7.	FootPrint	427.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	347.222 kHz	General	Switching frequency
9.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
10.	Pout	10.0 W	General	Total output power
11.	Total BOM	$1.84	General	Total BOM Cost
12.	D1 Tj	99.012 degC	Op_Point	D1 junction temperature
13.	Vout Actual	4.98 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	17.864 %	Op_point	Duty cycle
16.	Efficiency	87.511 %	Op_point	Steady state efficiency
17.	IC Tj	77.714 degC	Op_point	IC junction temperature
18.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	2.0 A	Op_point	Iout operating point
20.	M1 Tj	38.613 degC	Op_point	M1 MOSFET junction temperature
21.	VIN_OP	30.0 V	Op_point	Vin operating point
22.	Vout p-p	22.557 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	2.611 mW	Power	Input capacitor power dissipation
24.	Cout Pd	933.344 µW	Power	Output capacitor power dissipation
25.	D1 Pd	690.117 mW	Power	Output Diode Power Dissipation
26.	Diode Pd	690.117 mW	Power	Diode power dissipation
27.	IC Pd	238.571 mW	Power	IC power dissipation
28.	L Pd	300.0 mW	Power	Inductor power dissipation
29.	M1 Pd	114.891 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	67.048 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	47.843 mW	Power	M1 MOSFET switching losses
32.	Rsns Pd	80.0 mW	Power	LED Current Rsns Power Dissipation
33.	Total Pd	1.427 W	Power	Total Power Dissipation
34.	Vout Tolerance	1.516 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	20.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM3485	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

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.