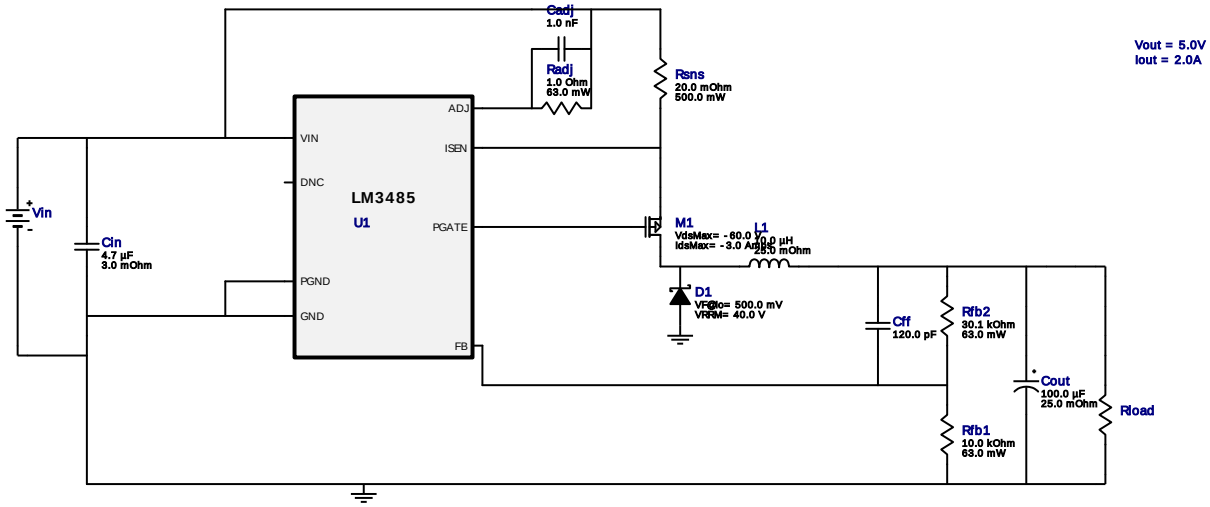
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 21.0V
Vout = 5.0V
Iout = 2.0A

Device = LM3485MM/NOPB
Topology = Buck
Created = 8/9/16 5:59:03 PM
BOM Cost = $1.69
BOM Count = 12
Total Pd = 1.07W

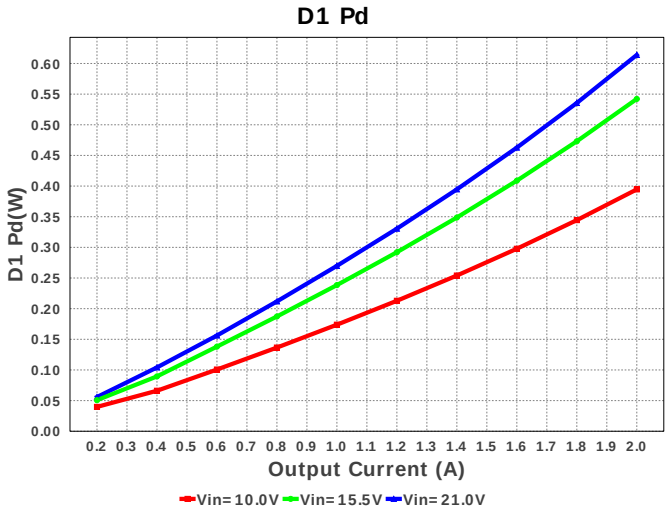
Design : 4750156/3 LM3485MM/NOPB
LM3485MM/NOPB 10.0V-21.0V to 5.00V @ 2.0A

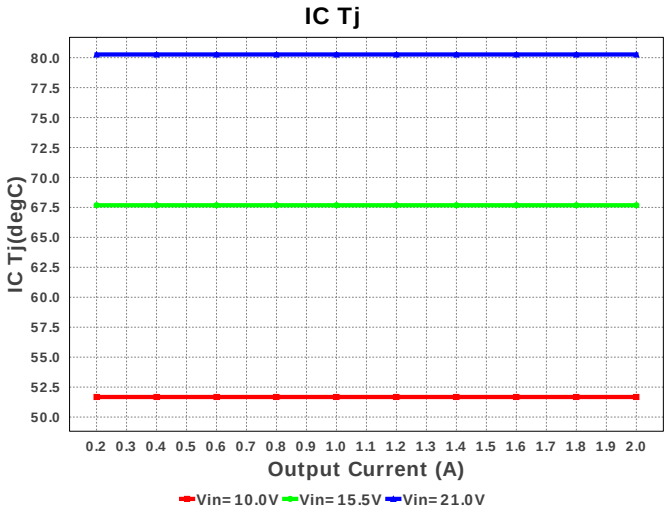


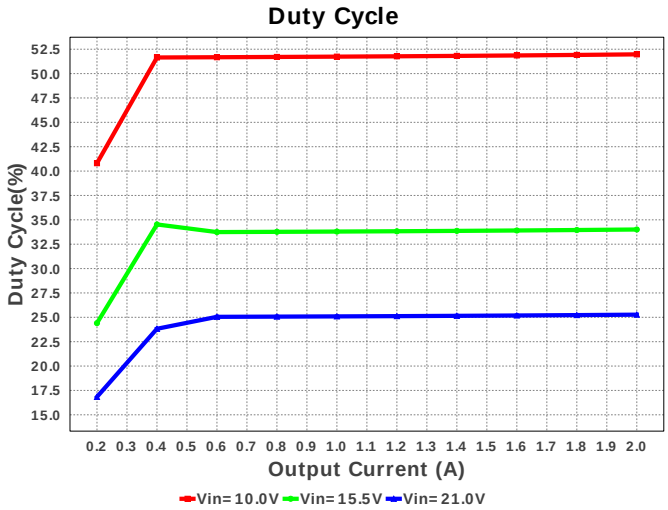
Electrical BOM

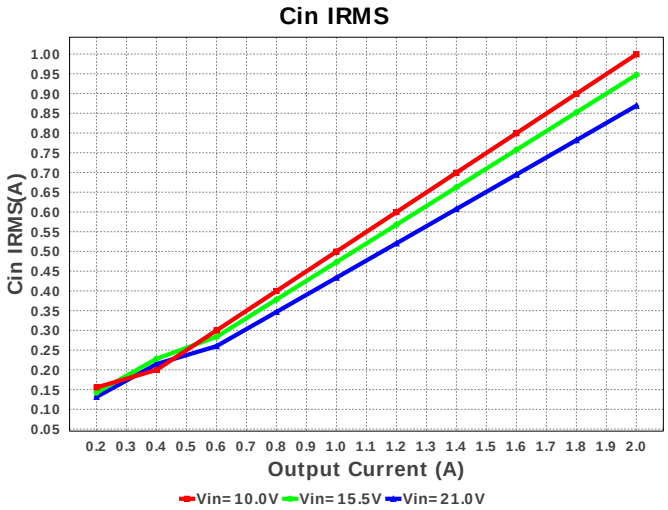
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cff	Samsung Electro-Mechanics	CL21C121JB61PNC Series= C0G/NP0	Cap= 120.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	$0.07	1206 11 mm²
4.	Cout	Panasonic	6SVPC100MY Series= SVPC	Cap= 100.0 uF ESR= 25.0 mOhm VDC= 6.3 V IRMS= 2.15 A	1	$0.28	SM_RADIAL_5MM 58 mm²
5.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	SMA 37 mm²
6.	L1	Bourns	SRU1038-100Y	L= 10.0 µH DCR= 25.0 mOhm	1	$0.33	SRU1038 144 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	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

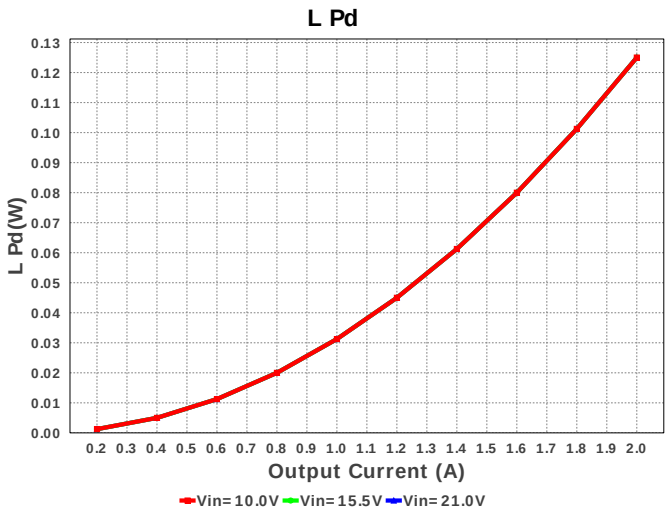
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfb2	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	Rsns	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	1206 11 mm^2
12.	U1	Texas Instruments	LM3485MM/NOPB	Switcher	1	$0.52	MUA08A 24 mm^2

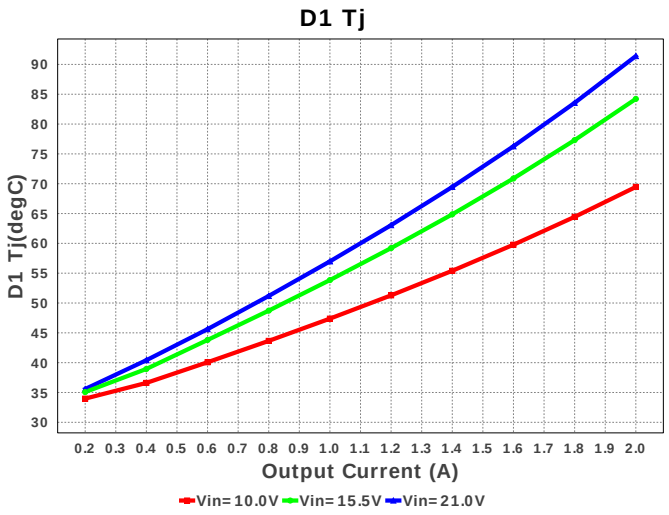


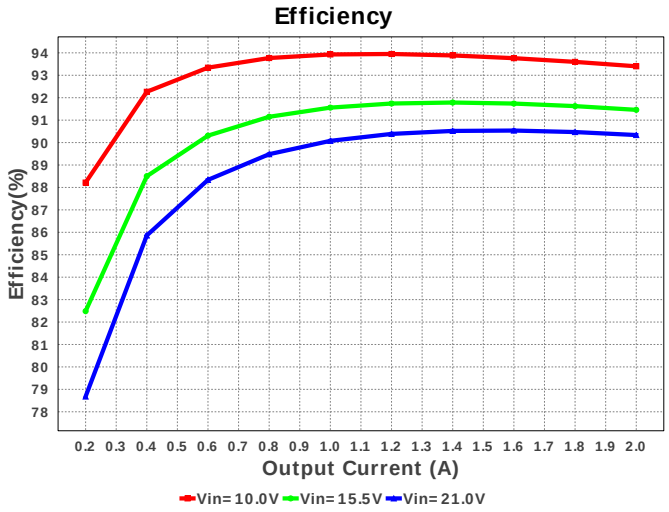


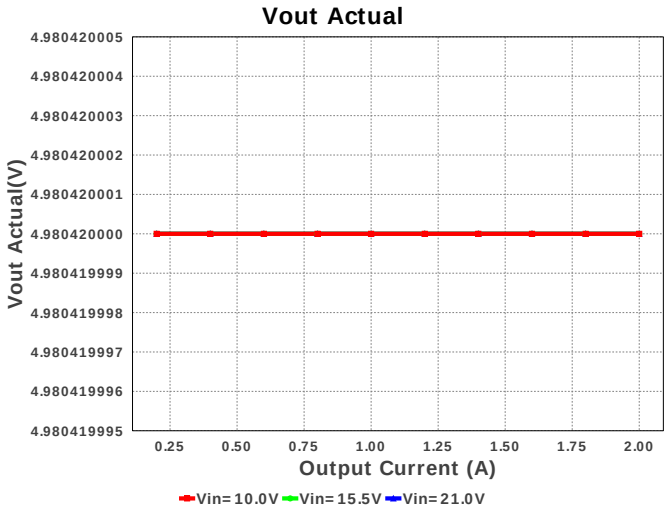


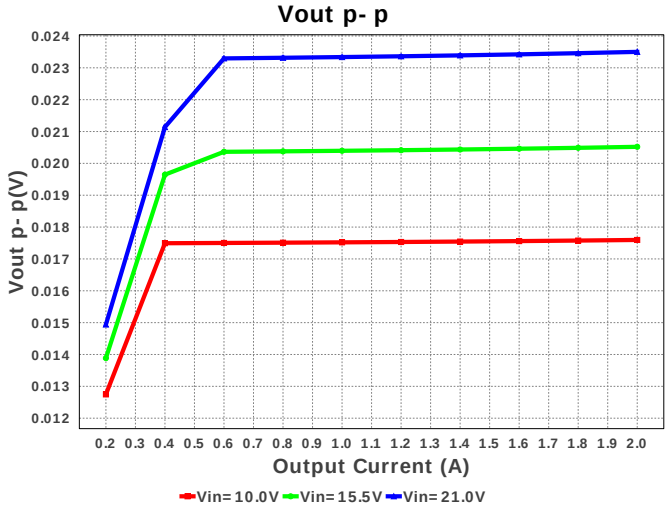


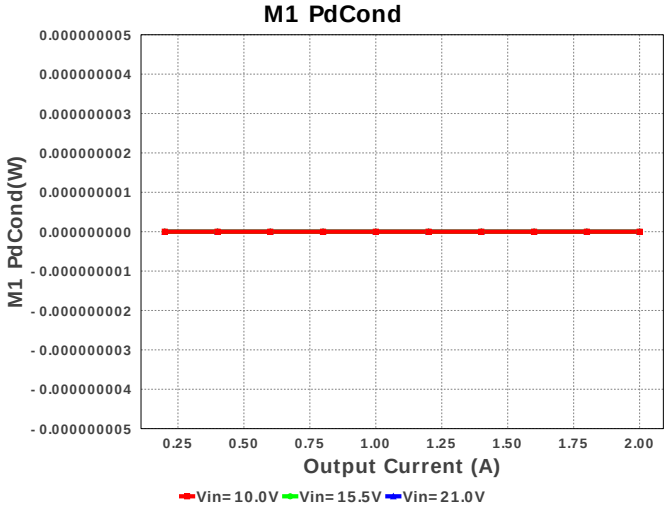


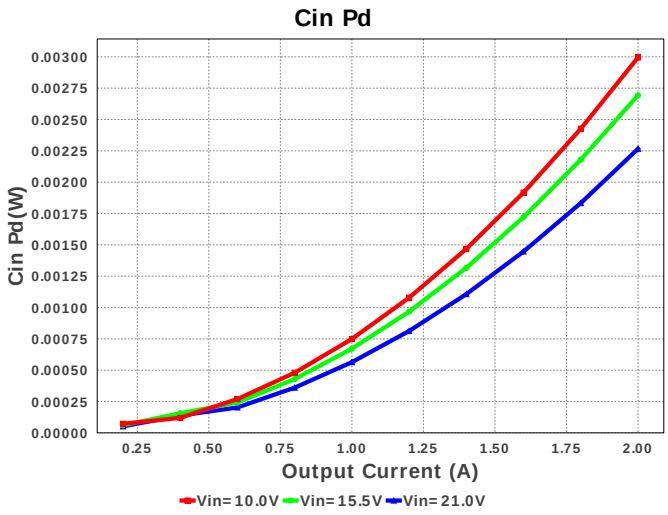


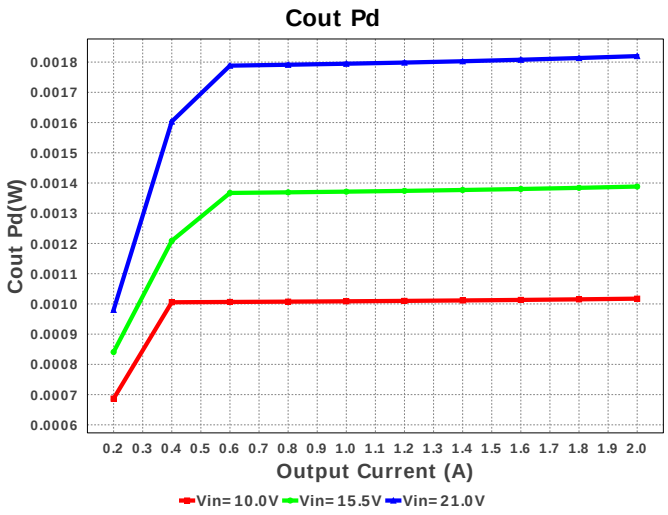


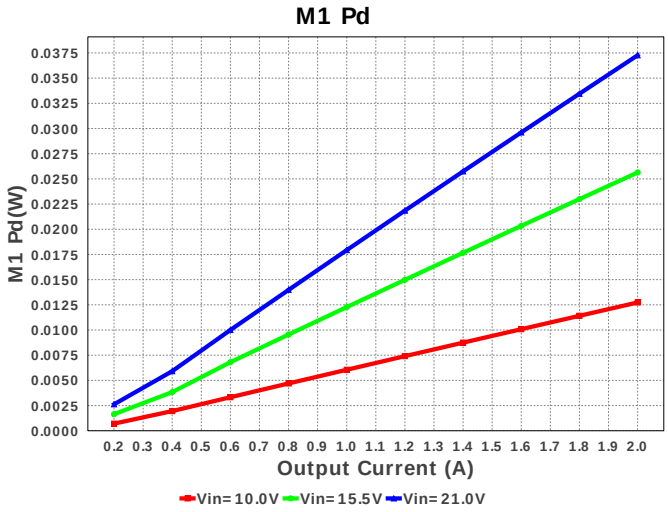


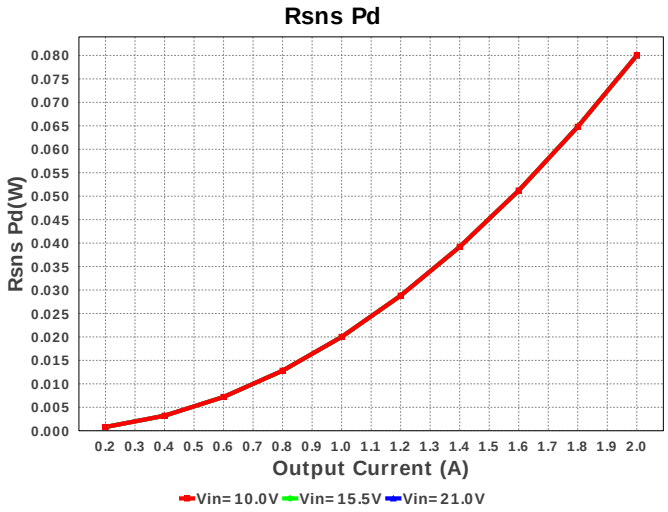


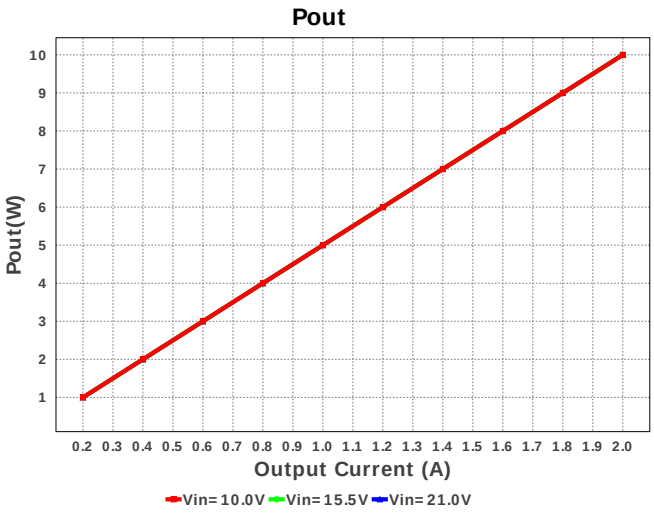


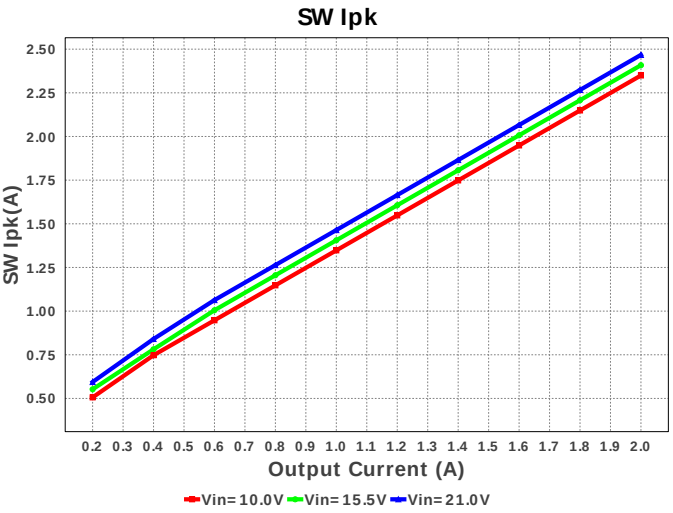


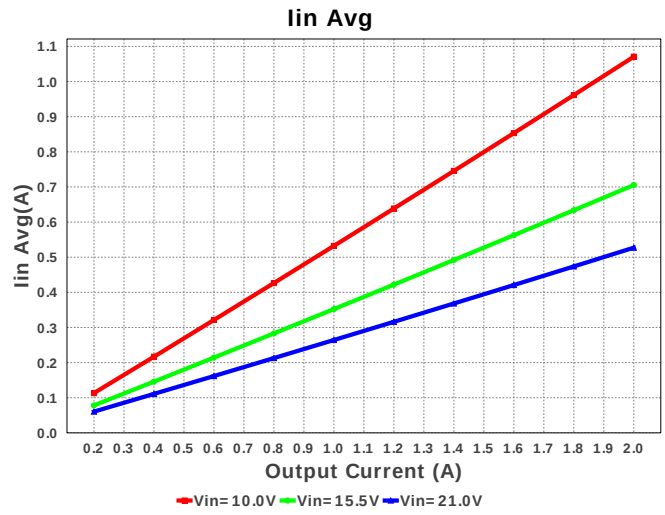


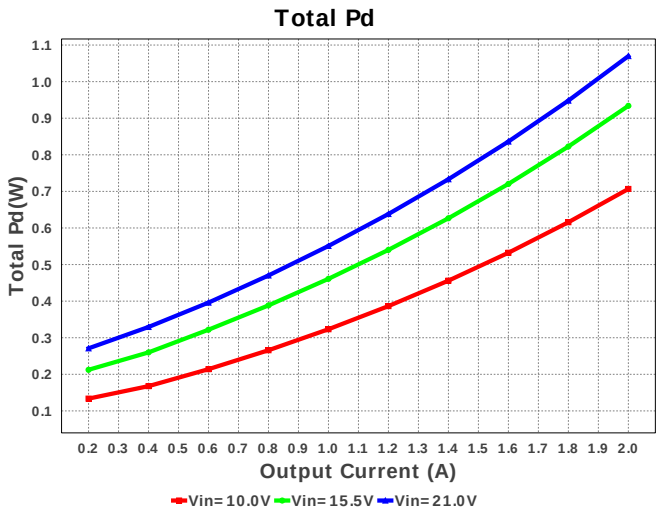


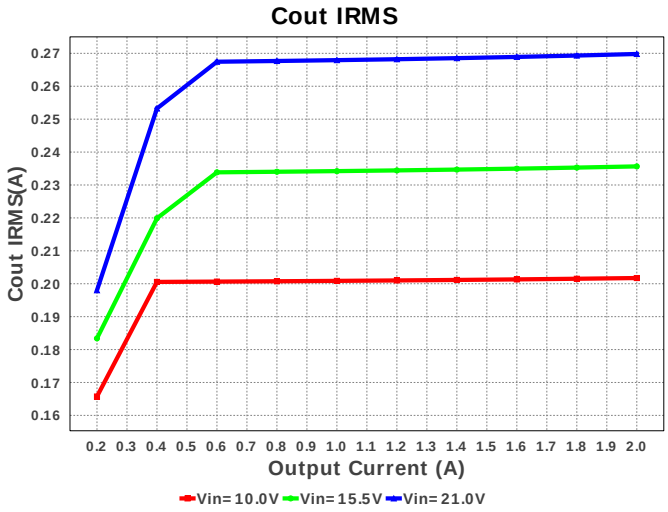


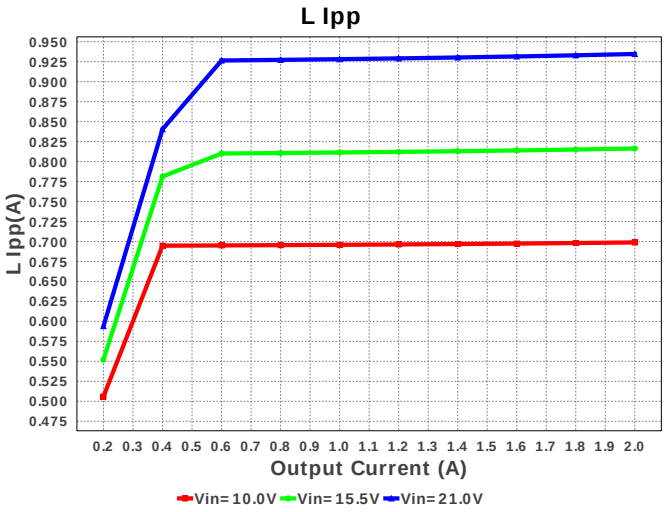


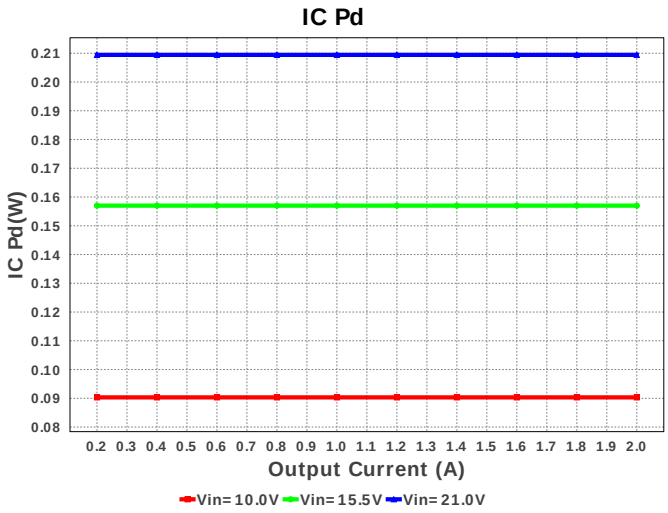


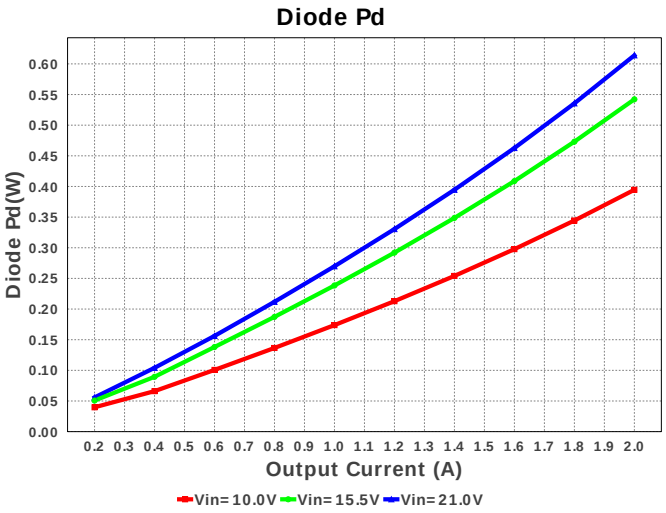


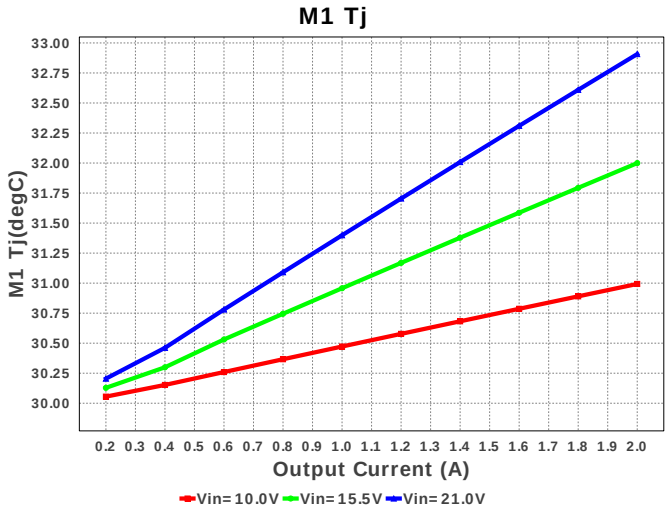


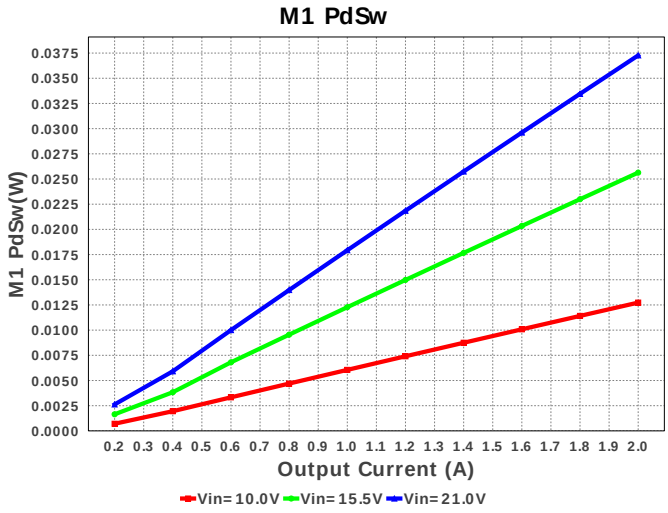












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	869.135 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	263.502 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	527.13 mA	Current	Average input current
4.	L Ipp	912.8 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	2.456 A	Current	Peak switch current
6.	BOM Count	12	General	Total Design BOM count
7.	FootPrint	323.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	464.576 kHz	General	Switching frequency
9.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
10.	Mode	CCM	General	Conduction Mode
11.	Pout	10.0 W	General	Total output power
12.	Total BOM	$1.69	General	Total BOM Cost
13.	D1 Tj	91.394 degC	Op_Point	D1 junction temperature
14.	Vout Actual	4.98 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	25.271 %	Op_point	Duty cycle
17.	Efficiency	90.337 %	Op_point	Steady state efficiency
18.	IC Tj	71.888 degC	Op_point	IC junction temperature
19.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	M1 Tj	32.907 degC	Op_point	M1 MOSFET junction temperature
22.	VIN_OP	21.0 V	Op_point	Vin operating point
23.	Vout p-p	22.952 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	2.266 mW	Power	Input capacitor power dissipation
25.	Cout Pd	1.736 mW	Power	Output capacitor power dissipation
26.	D1 Pd	613.935 mW	Power	Output Diode Power Dissipation
27.	Diode Pd	613.935 mW	Power	Diode power dissipation
28.	IC Pd	209.442 mW	Power	IC power dissipation
29.	L Pd	125.0 mW	Power	Inductor power dissipation
30.	M1 Pd	37.27 mW	Power	M1 MOSFET total power dissipation
31.	M1 PdCond	0.0 W	Power	M1 MOSFET conduction losses
32.	M1 PdSw	37.27 mW	Power	M1 MOSFET switching losses
33.	Rsns Pd	80.0 mW	Power	LED Current Rsns Power Dissipation
34.	Total Pd	1.07 W	Power	Total Power Dissipation
35.	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	21.0	Maximum input voltage
3.	VinMin	10.0	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.