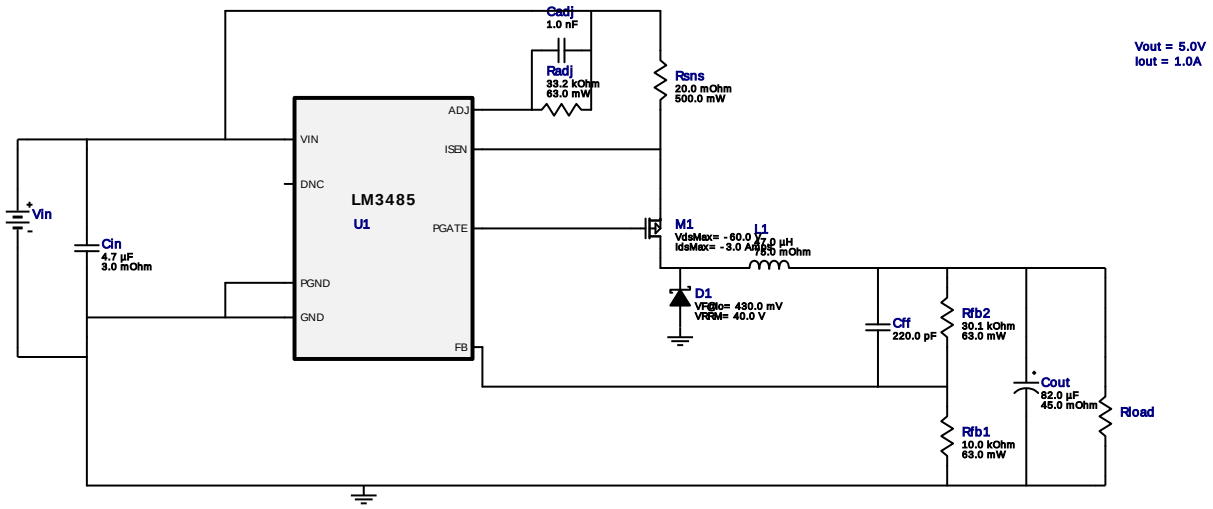
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 22.0V
Vout = 5.0V
Iout = 1.0A

Device = LM3485MM/NOPB
Topology = Buck
Created = 8/20/16 3:44:03 AM
BOM Cost = $2.12
BOM Count = 12
Total Pd = 0.55W

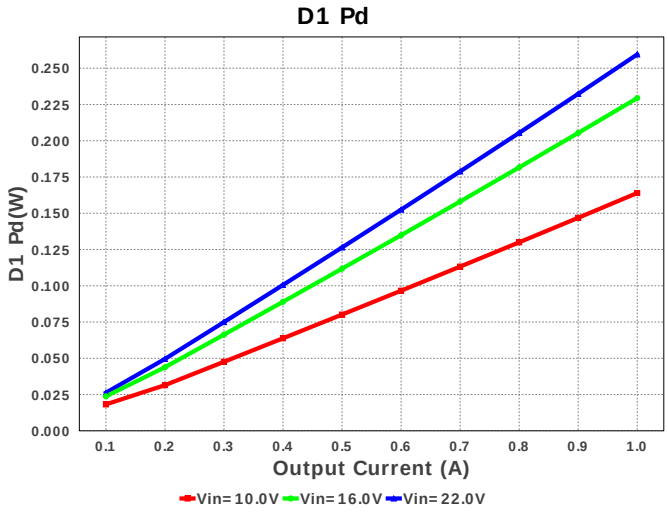
Design : 4772434/3 LM3485MM/NOPB
LM3485MM/NOPB 10.0V-22.0V to 5.00V @ 1.0A

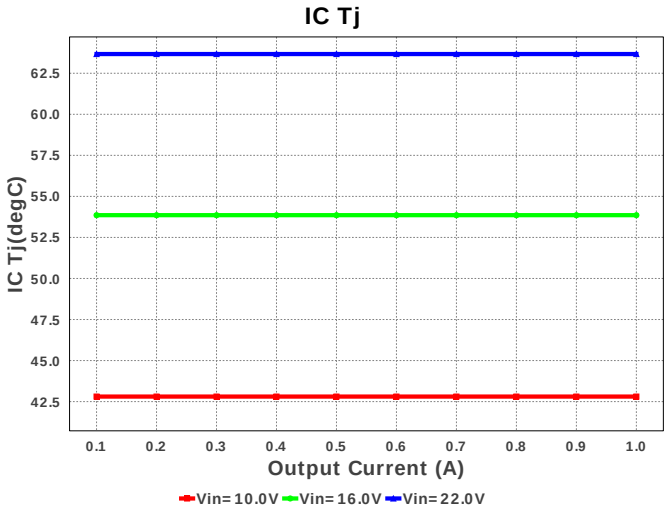


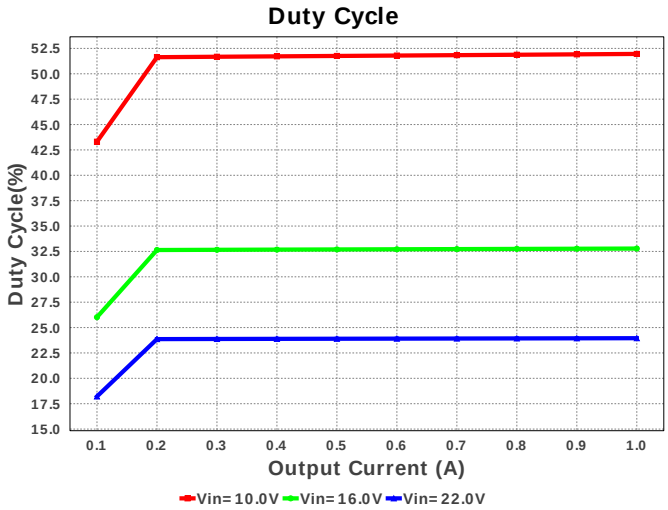
Electrical BOM

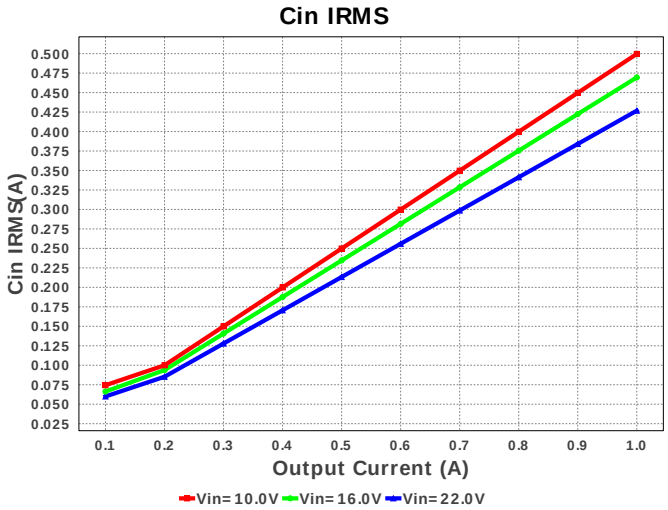
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cff	Yageo America	CC0805JRNPO9BN221 Series= C0G/NP0	Cap= 220.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	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	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	ON Semiconductor	MBRS2040LT3G	VF@Io= 430.0 mV VRRM= 40.0 V	1	$0.12	SMB 44 mm²
6.	L1	Sumida	CDRH125NP-470MC	L= 47.0 µH DCR= 75.0 mOhm	1	$0.61	CDRH125 204 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	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm 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

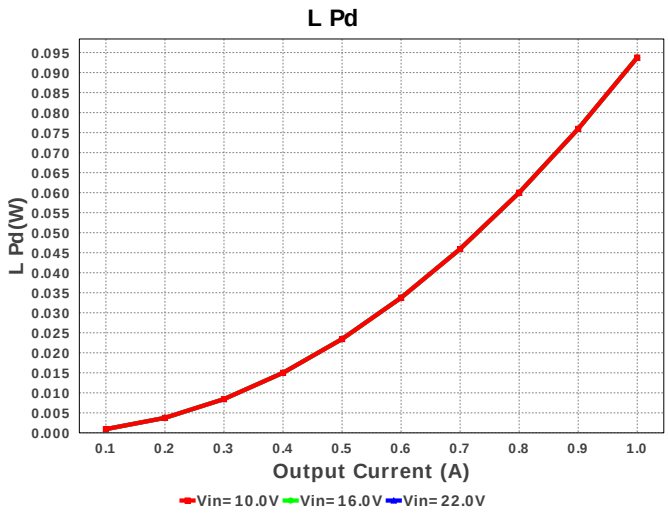
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfb2	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	Rsns	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	1206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

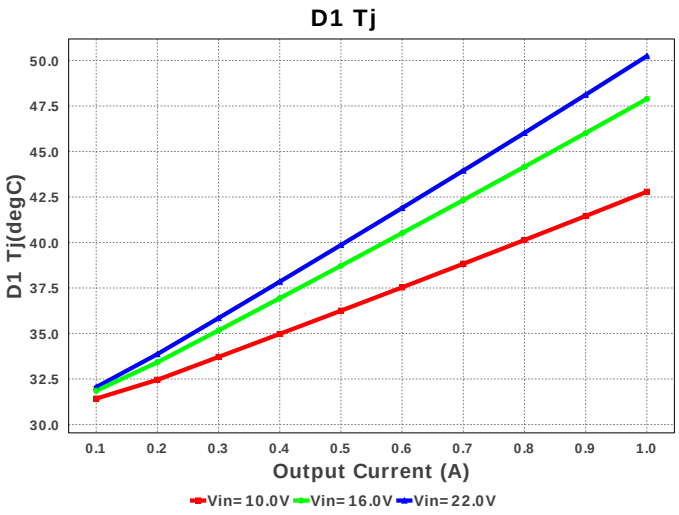


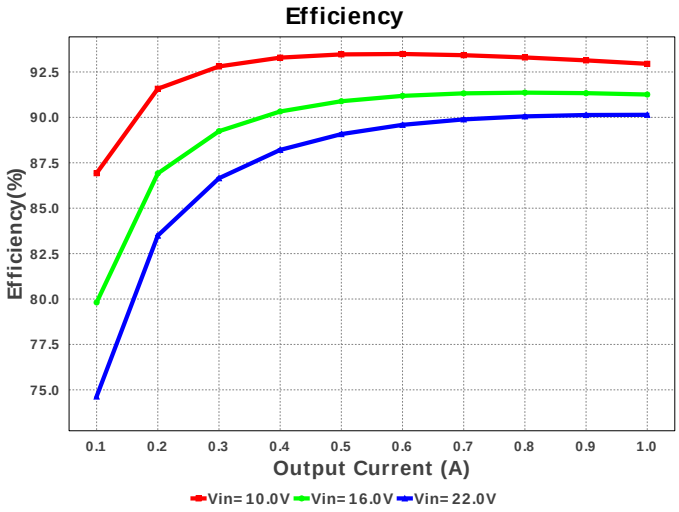


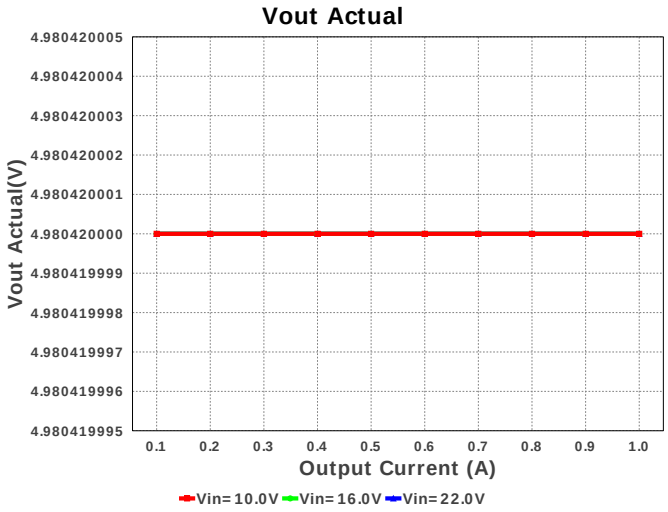


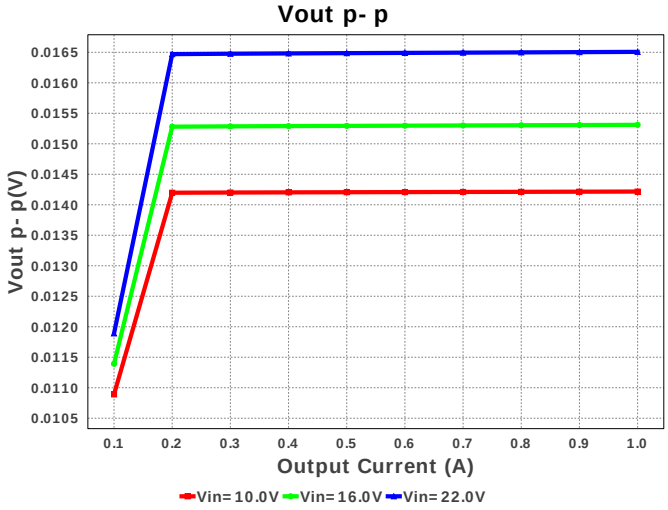


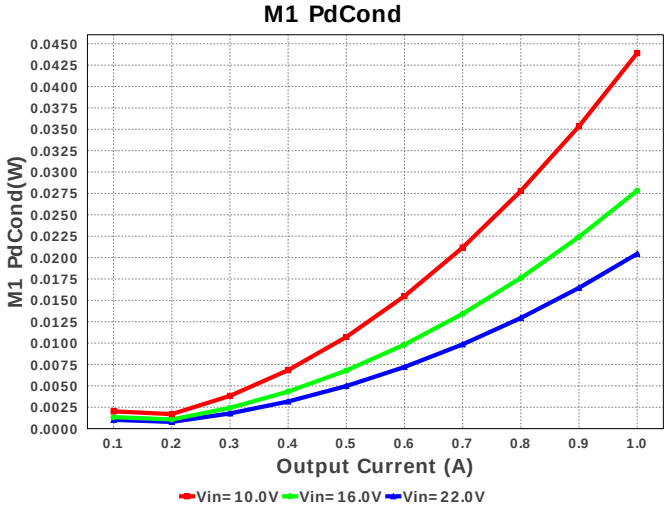


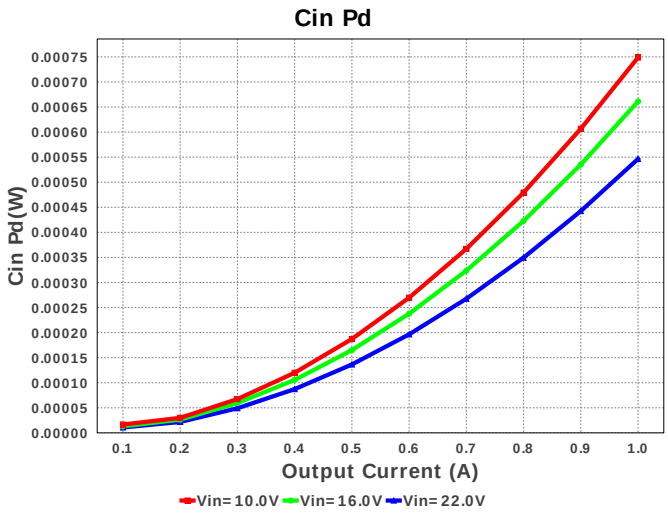


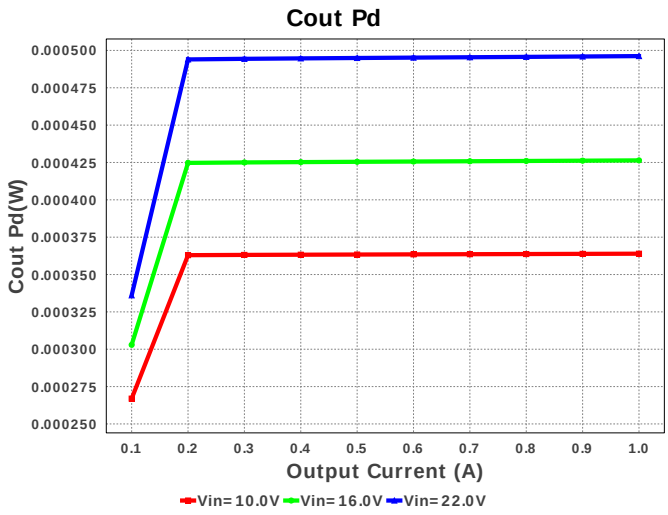


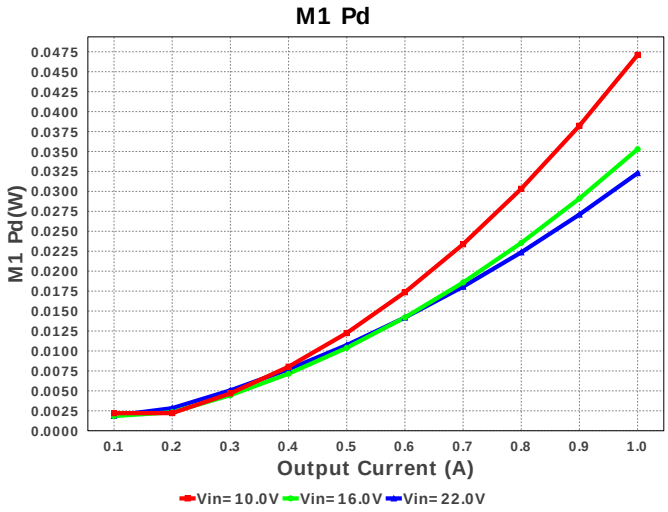


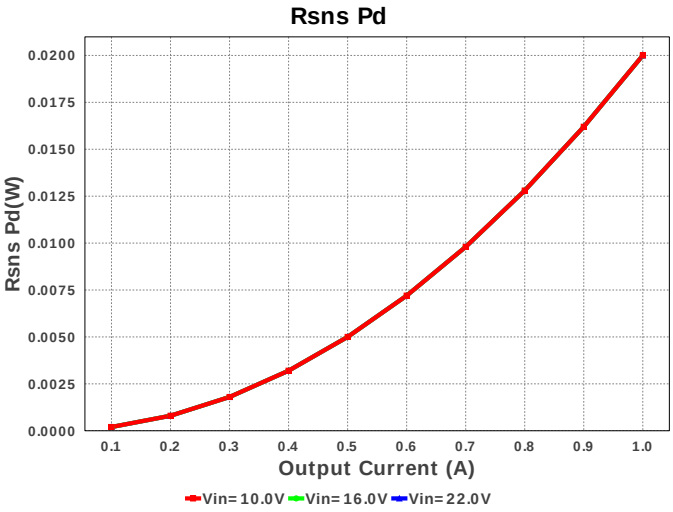


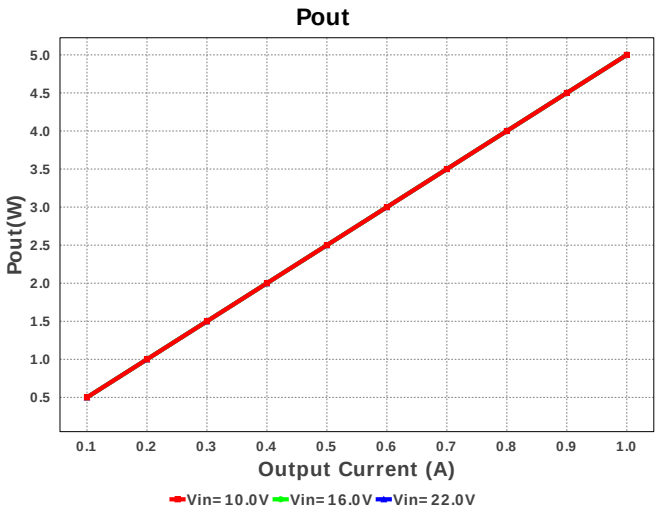


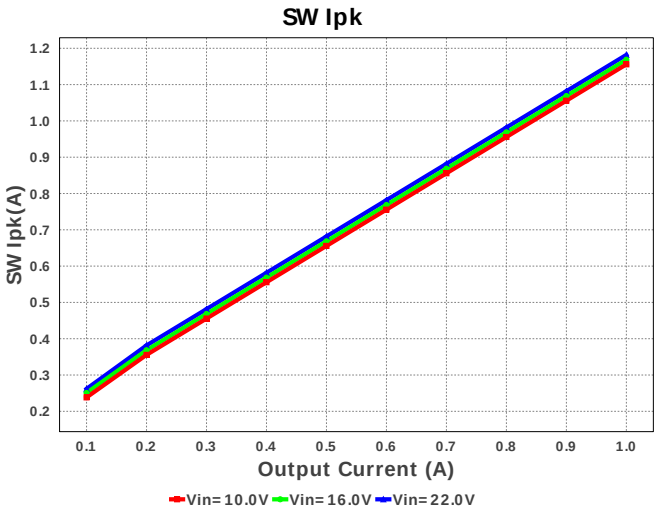


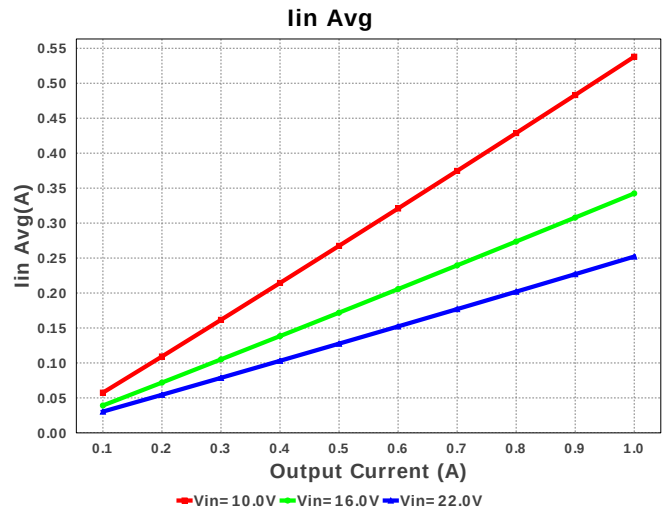


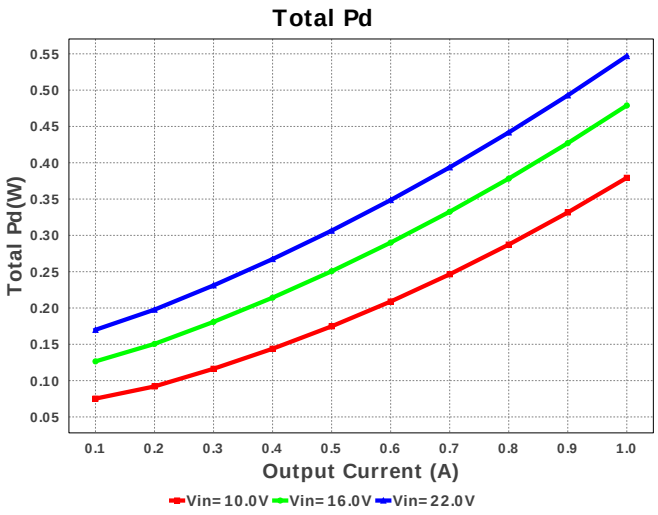


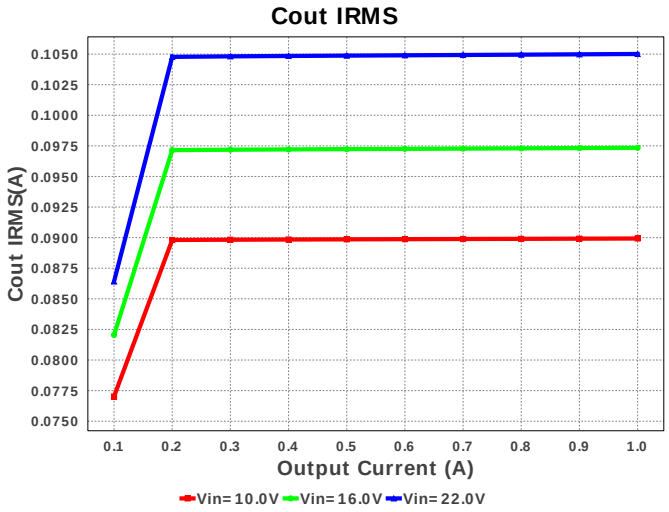


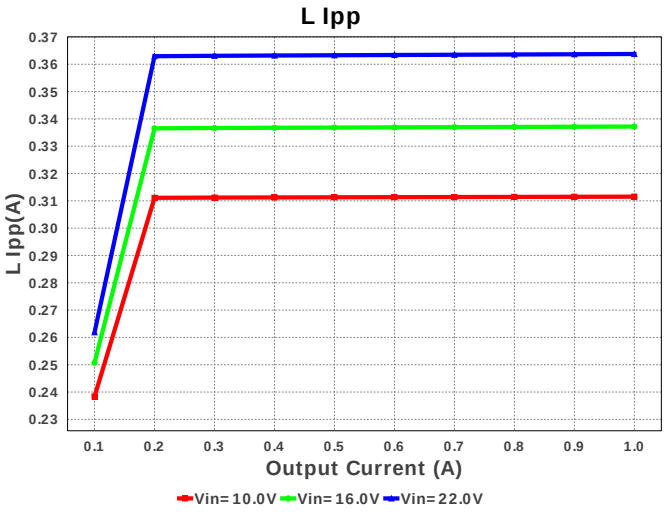


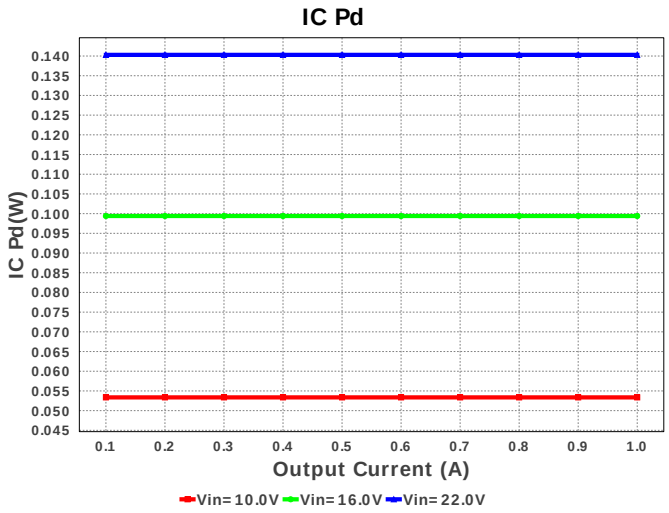


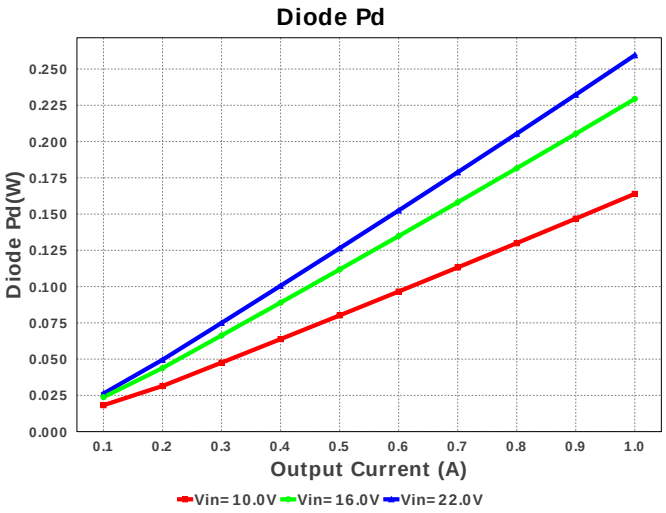


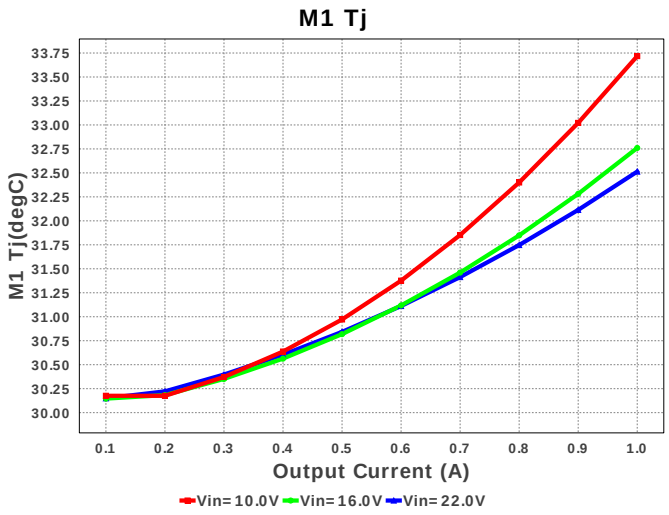


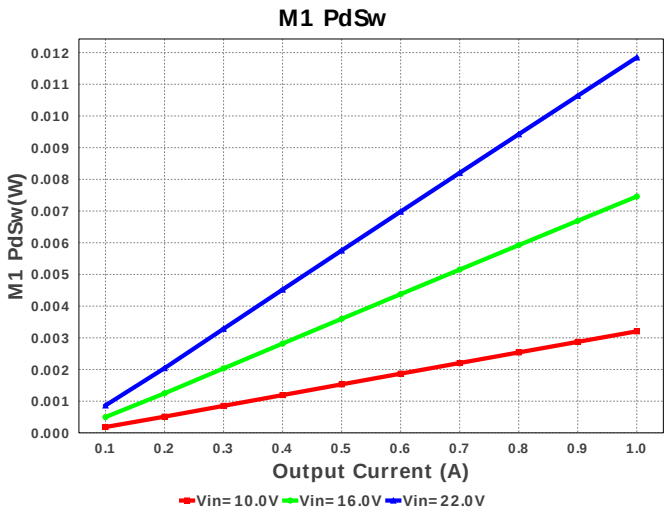












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	426.794 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	102.658 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	252.13 mA	Current	Average input current
4.	L Ipp	355.62 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	1.178 A	Current	Peak switch current
6.	BOM Count	12	General	Total Design BOM count
7.	FootPrint	411.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	260.275 kHz	General	Switching frequency
9.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
10.	Mode	CCM	General	Conduction Mode
11.	Pout	5.0 W	General	Total output power
12.	Total BOM	$2.12	General	Total BOM Cost
13.	D1 Tj	50.241 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	23.952 %	Op_point	Duty cycle
17.	Efficiency	90.14 %	Op_point	Steady state efficiency
18.	IC Tj	58.059 degC	Op_point	IC junction temperature
19.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	1.0 A	Op_point	Iout operating point
21.	M1 Tj	32.514 degC	Op_point	M1 MOSFET junction temperature
22.	VIN_OP	22.0 V	Op_point	Vin operating point
23.	Vout p-p	16.138 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	546.458 µW	Power	Input capacitor power dissipation
25.	Cout Pd	474.239 µW	Power	Output capacitor power dissipation
26.	D1 Pd	259.505 mW	Power	Output Diode Power Dissipation
27.	Diode Pd	259.505 mW	Power	Diode power dissipation
28.	IC Pd	140.294 mW	Power	IC power dissipation
29.	L Pd	93.75 mW	Power	Inductor power dissipation
30.	M1 Pd	32.37 mW	Power	M1 MOSFET total power dissipation
31.	M1 PdCond	20.524 mW	Power	M1 MOSFET conduction losses
32.	M1 PdSw	11.846 mW	Power	M1 MOSFET switching losses
33.	Rsns Pd	20.0 mW	Power	Rsense Power Dissipation
34.	Total Pd	546.92 mW	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	1.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM3485	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature
8.	userfsw	423.91 k	Customer Selected Frequency

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.