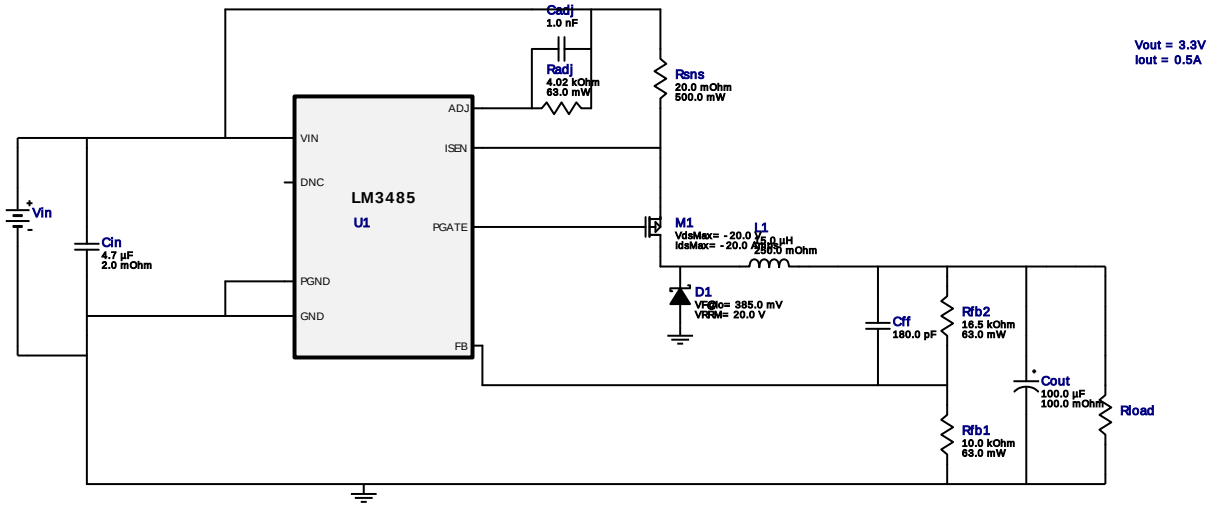
WEBENCH® Design Report

VinMin = 5.0V
VinMax = 6.0V
Vout = 3.3V
Iout = 0.5A

Device = LM3485MM/NOPB
Topology = Buck
Created = 8/1/16 12:42:35 AM
BOM Cost = $1.36
BOM Count = 12
Total Pd = 0.18W

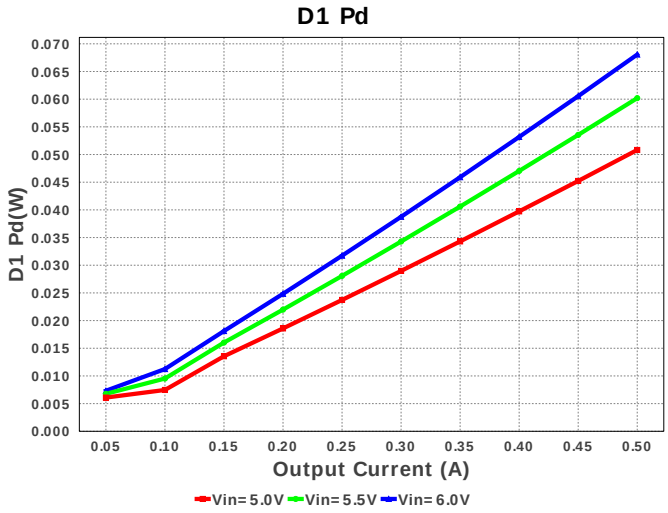
Design : 3837120/11 LM3485MM/NOPB
LM3485MM/NOPB 5.0V-6.0V to 3.30V @ 0.5A

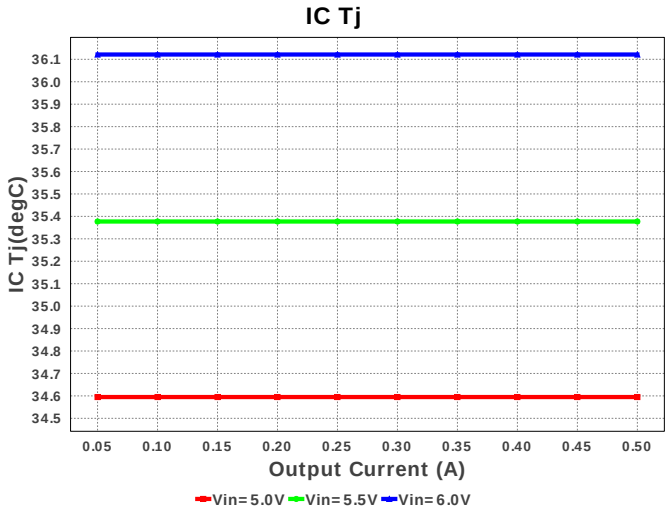


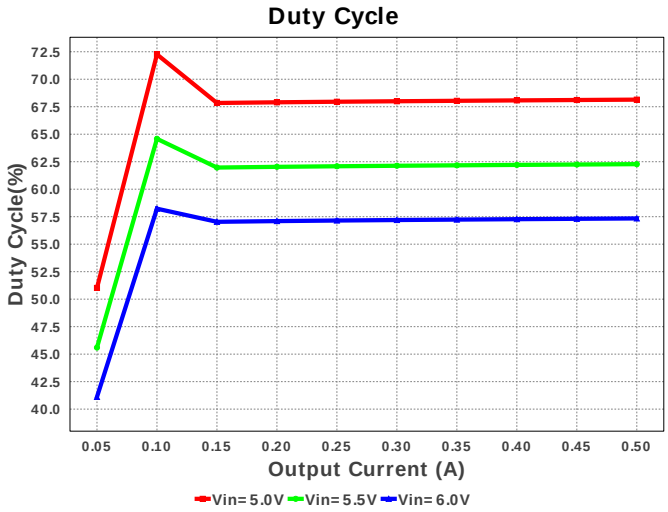
Electrical BOM

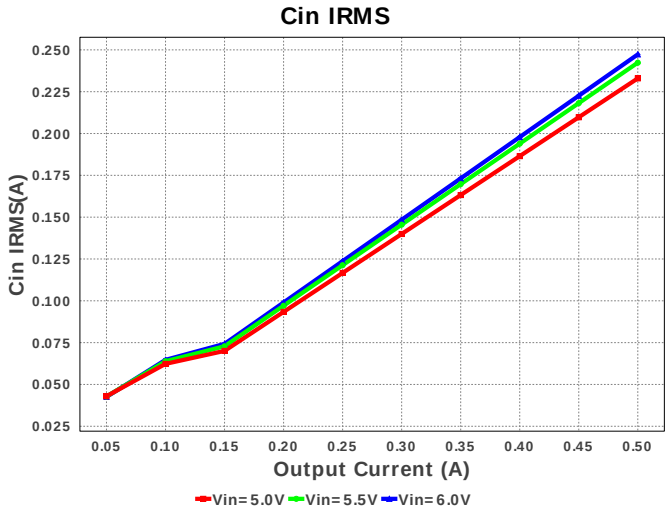
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cff	Kemet	C0805C181K5GACTU Series= C0G/NP0	Cap= 180.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	$0.02	0805 7 mm²
4.	Cout	Panasonic	6TPH100MAEA Series= ?	Cap= 100.0 uF ESR= 100.0 mOhm VDC= 6.3 V IRMS= 670.0 mA	1	$0.34	CAPSMT_6_A09 11 mm²
5.	D1	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 13 mm²
6.	L1	NIC Components	NPI43C150MTRF	L= 15.0 µH DCR= 250.0 mOhm	1	$0.07	IND_NPI43C 31 mm²
7.	M1	Texas Instruments	CSD25310Q2	VdsMax= -20.0 V IdsMax= -20.0 Amps	1	$0.20	TRANS_NexFET_Q3A 18 mm²
8.	Radj	Vishay-Dale	CRCW04024K02FKED Series= CRCW..e3	Res= 4.02 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
10.	Rfb2	Vishay-Dale	CRCW040216K5FKED Series= CRCW..e3	Res= 16.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
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

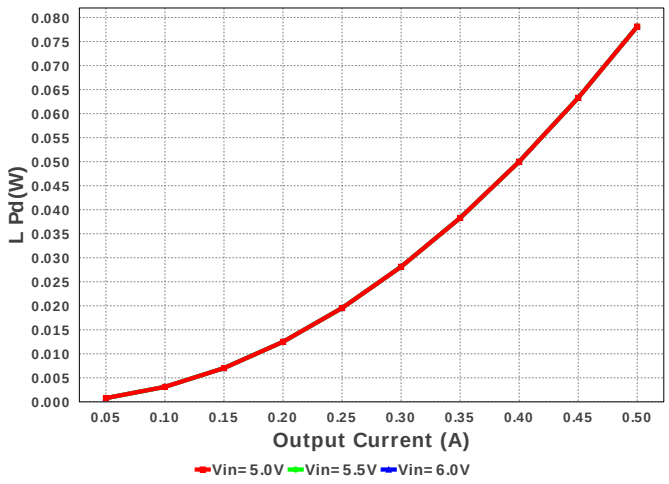




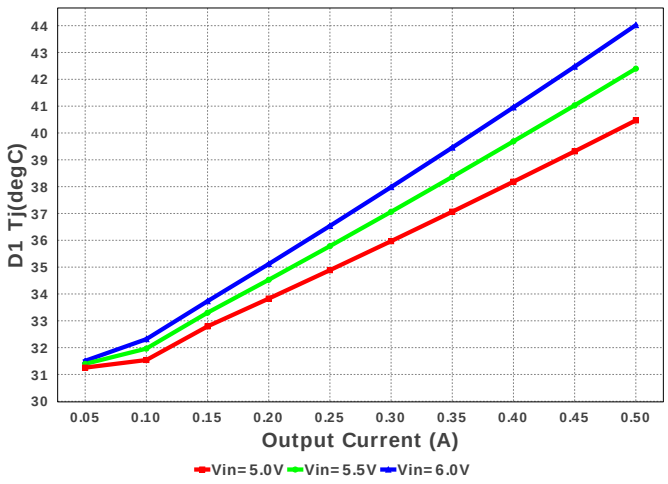




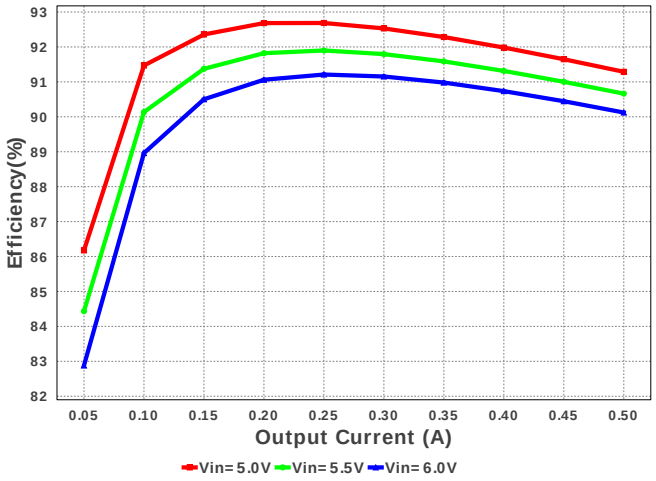
L Pd



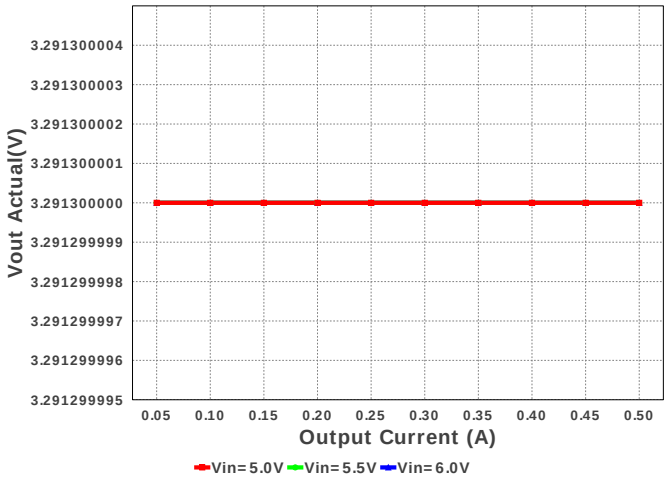
D1 Tj



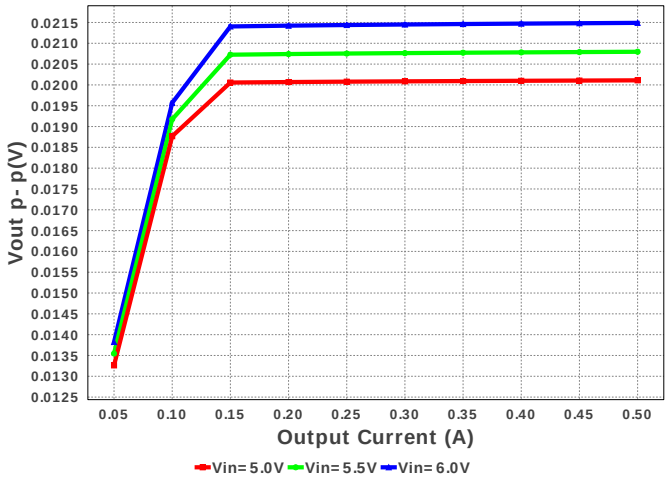
Efficiency



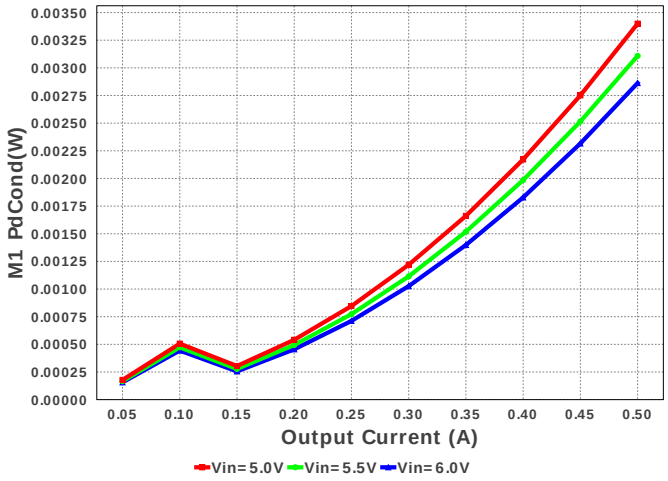
Vout Actual

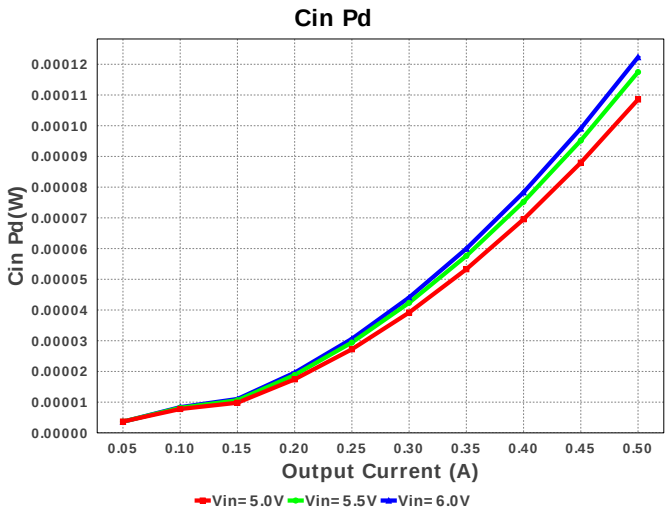


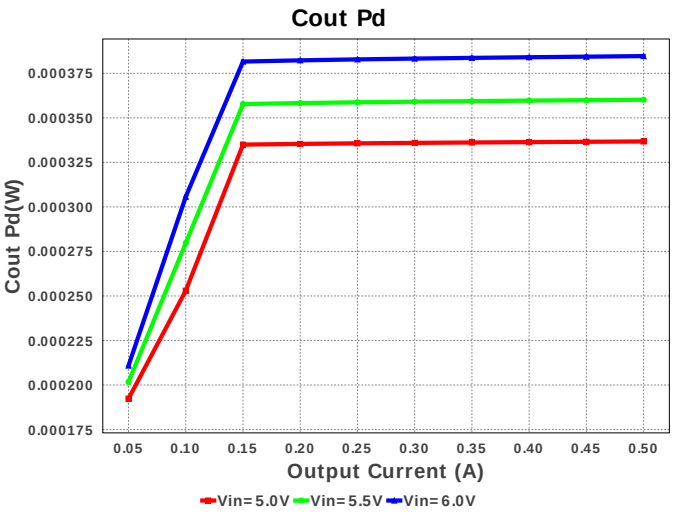
Vout p- p

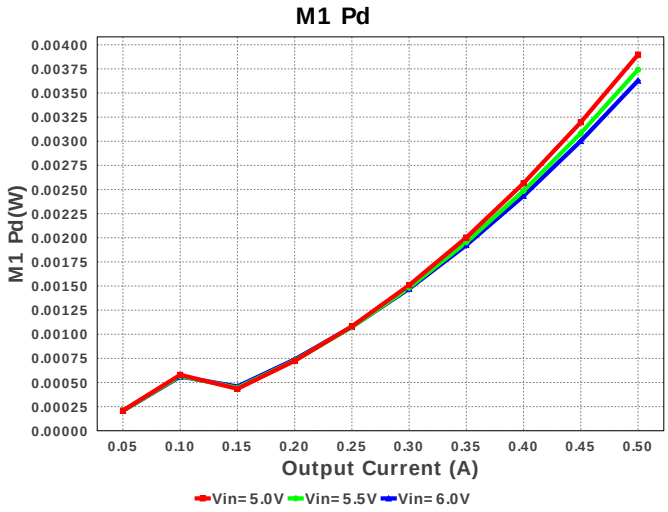


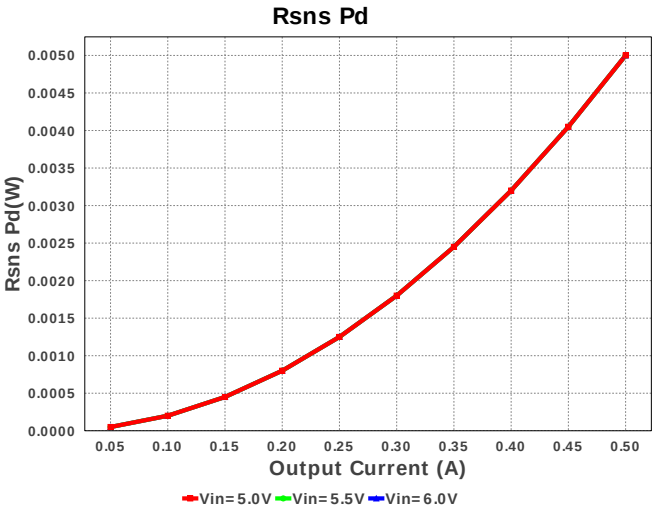
M1 PdCond

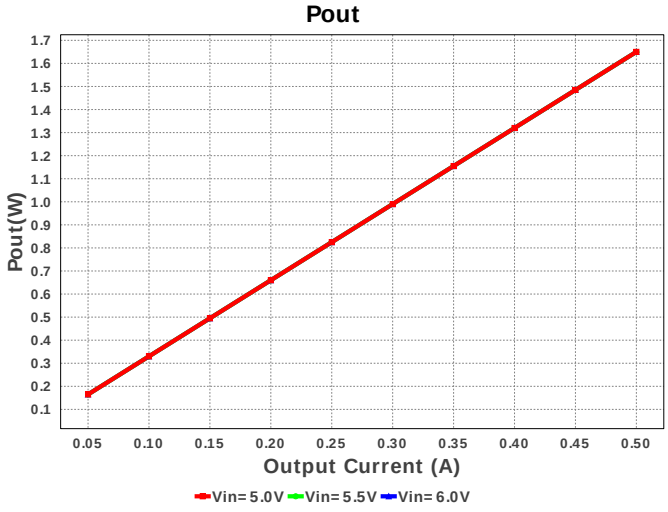


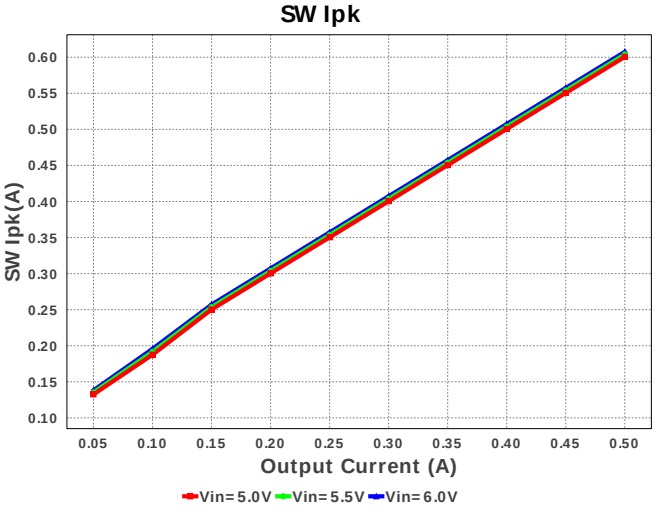


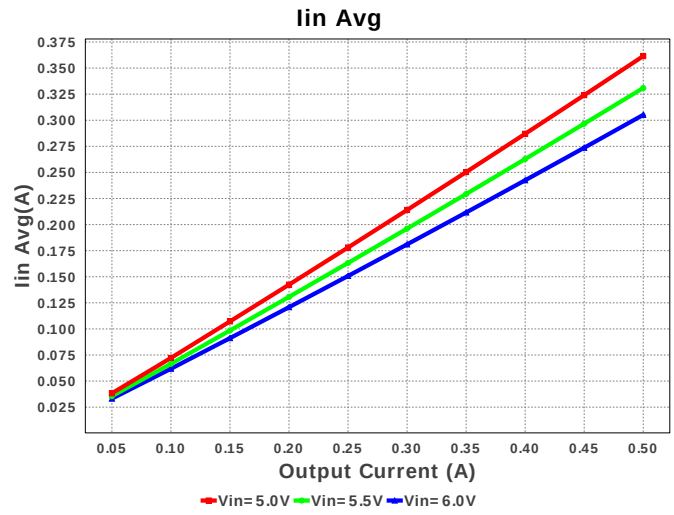


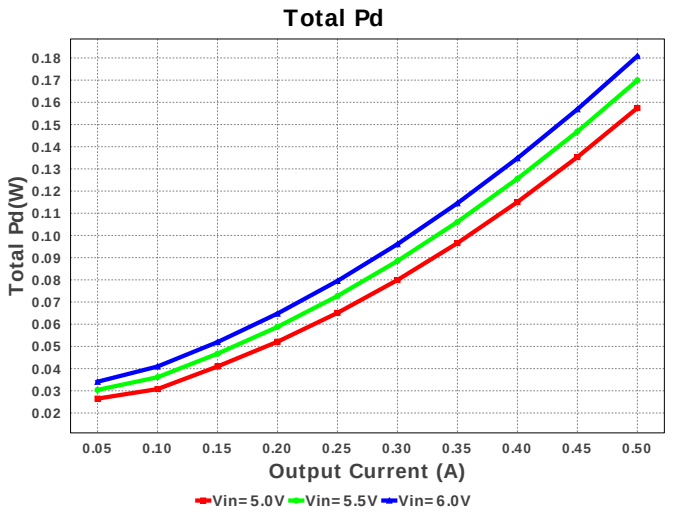


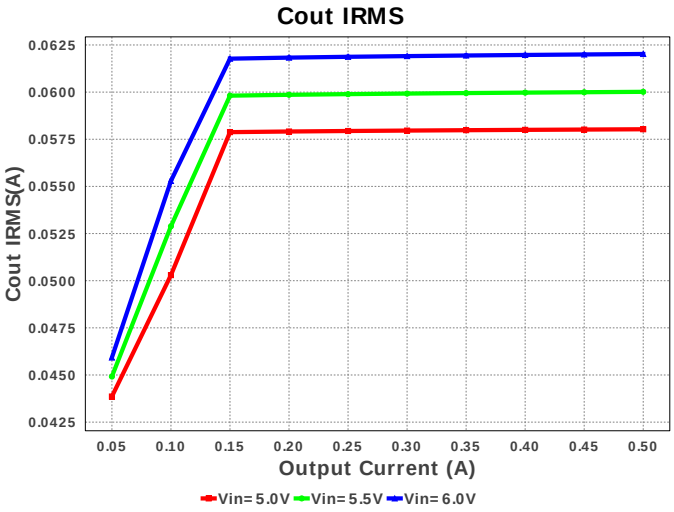


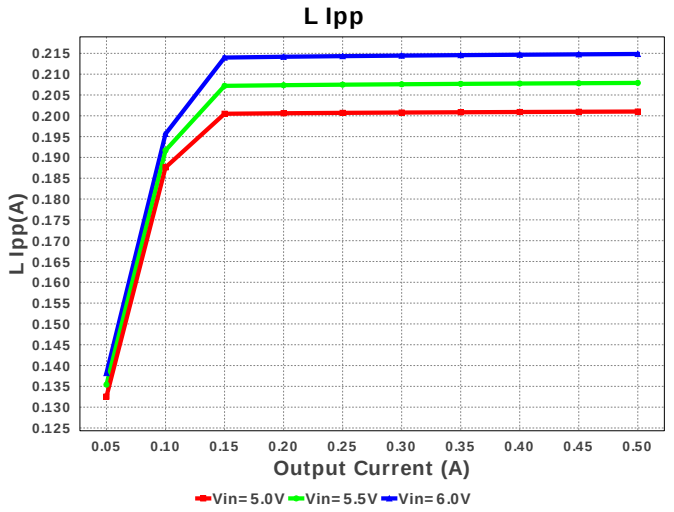


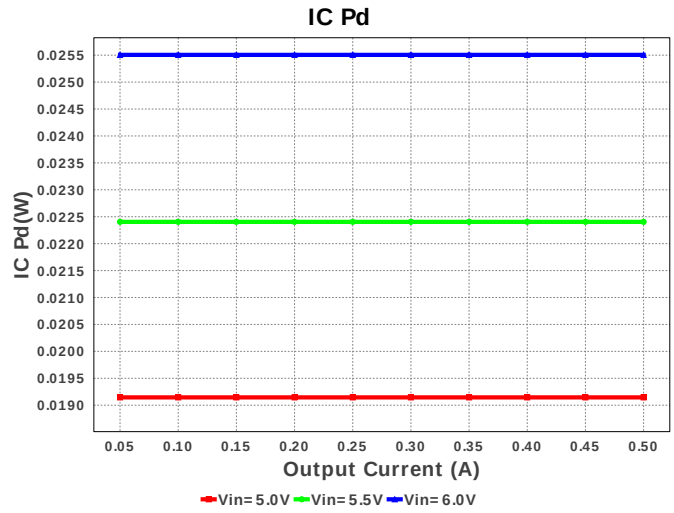


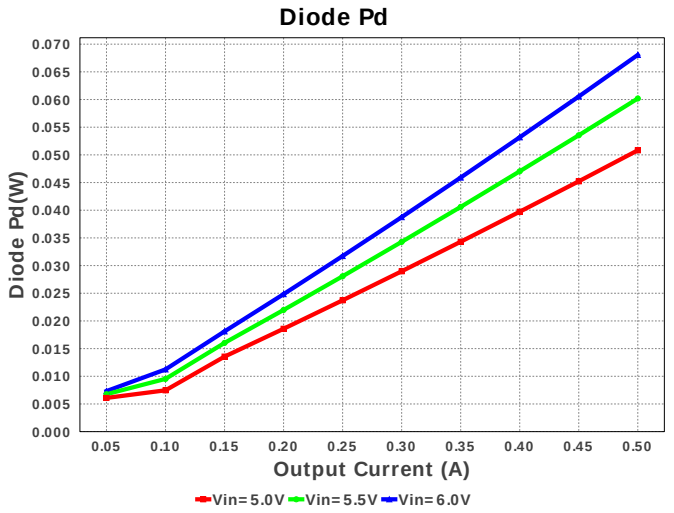


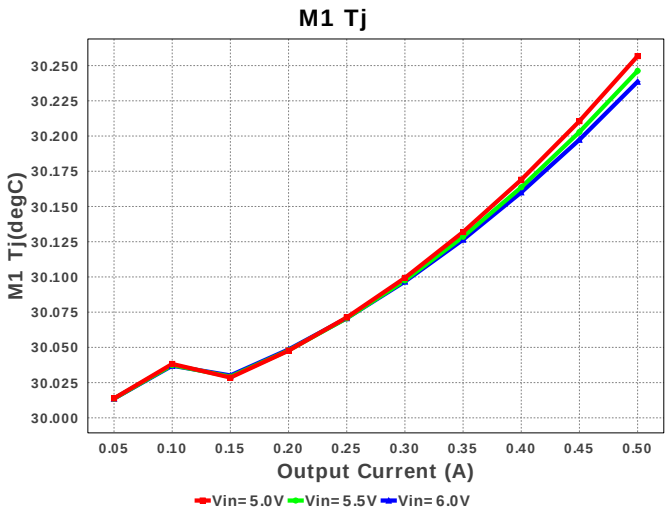


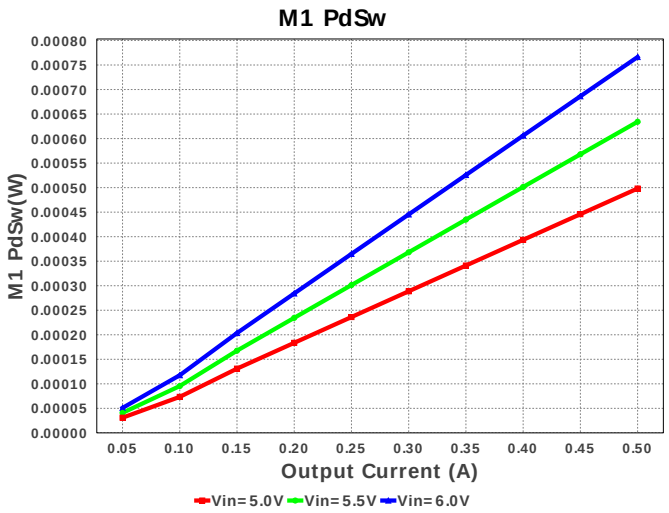












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	247.291 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	57.114 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	305.13 mA	Current	Average input current
4.	L Ipp	197.85 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	598.925 mA	Current	Peak switch current
6.	BOM Count	12	General	Total Design BOM count
7.	FootPrint	137.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	550.0 kHz	General	Switching frequency
9.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
10.	Pout	1.65 W	General	Total output power
11.	Total BOM	$1.36	General	Total BOM Cost
12.	D1 Tj	44.021 degC	Op_Point	D1 junction temperature
13.	Vout Actual	3.291 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	57.341 %	Op_point	Duty cycle
16.	Efficiency	90.126 %	Op_point	Steady state efficiency
17.	IC Tj	35.101 degC	Op_point	IC junction temperature
18.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	500.0 mA	Op_point	Iout operating point
20.	M1 Tj	30.239 degC	Op_point	M1 MOSFET junction temperature
21.	VIN_OP	6.0 V	Op_point	Vin operating point
22.	Vout p-p	19.79 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	122.305 µW	Power	Input capacitor power dissipation
24.	Cout Pd	326.205 µW	Power	Output capacitor power dissipation
25.	D1 Pd	68.062 mW	Power	Output Diode Power Dissipation
26.	Diode Pd	68.062 mW	Power	Diode power dissipation
27.	IC Pd	25.506 mW	Power	IC power dissipation
28.	L Pd	78.125 mW	Power	Inductor power dissipation
29.	M1 Pd	3.63 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	2.863 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	766.302 µW	Power	M1 MOSFET switching losses
32.	Rsns Pd	5.0 mW	Power	LED Current Rsns Power Dissipation
33.	Total Pd	180.771 mW	Power	Total Power Dissipation
34.	Vout Tolerance	1.258 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	6.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	3.3	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.