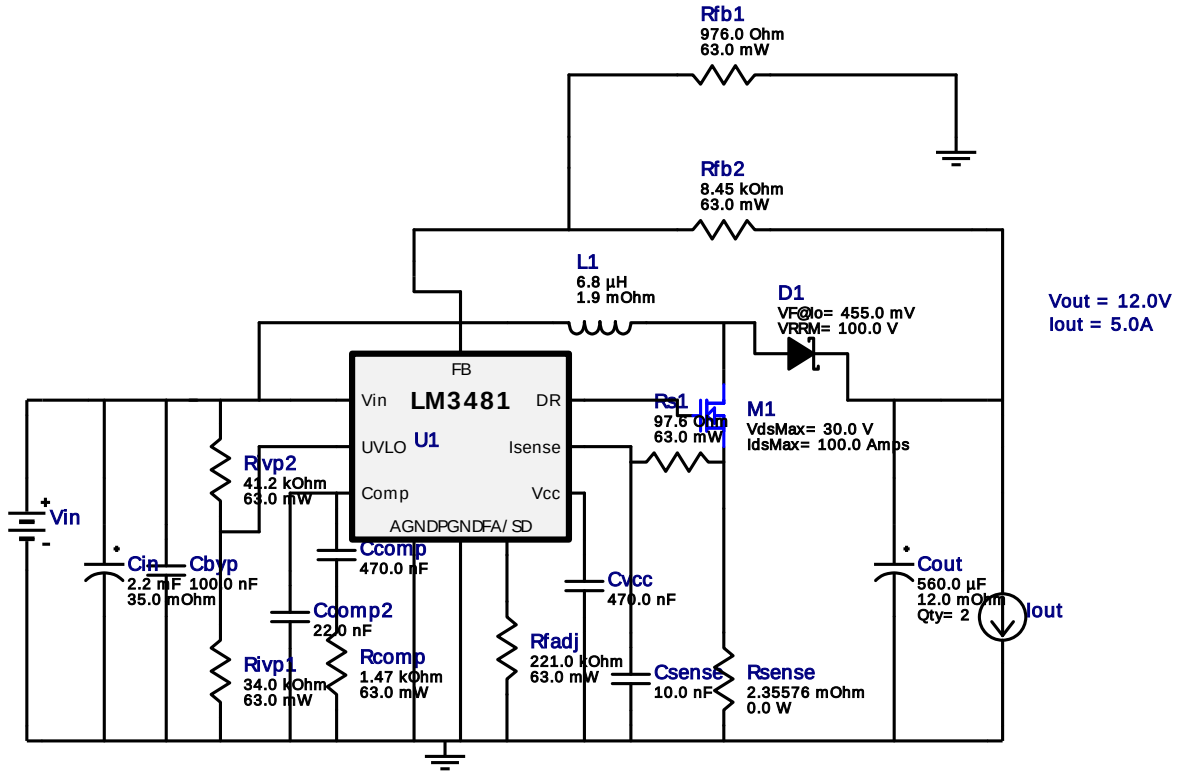
WEBENCH® Design Report

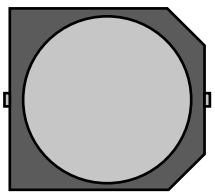
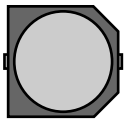
VinMin = 3.5V
VinMax = 6.0V
Vout = 12.0V
Iout = 5.0A

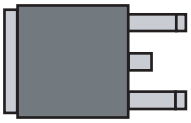
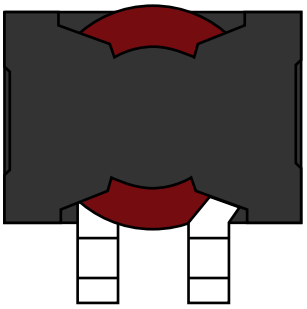
Device = LM3481MM/NOPB
Topology = Boost
Created = 2017-09-07 03:26:04.623
BOM Cost = $0.00
BOM Count = 20
Total Pd = 5.73W

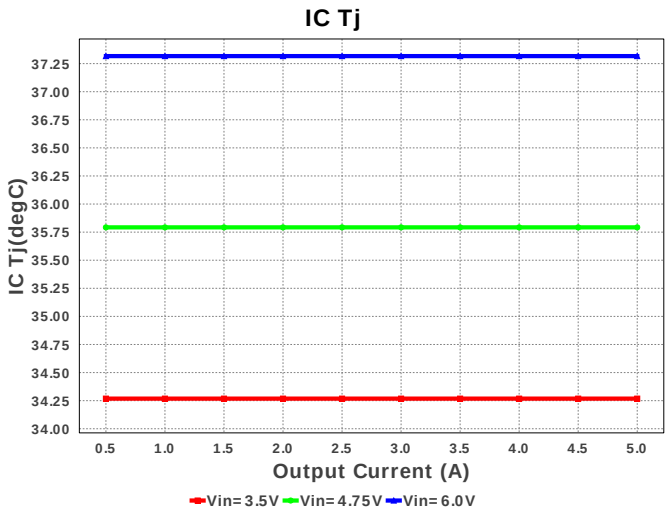
Design : 1584118/20 LM3481MM/NOPB
LM3481MM/NOPB 3.5V-6.0V to 12.00V @ 5.0A

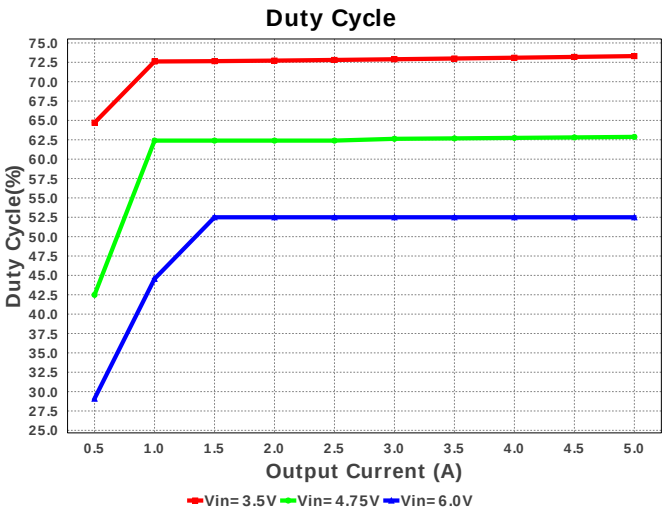


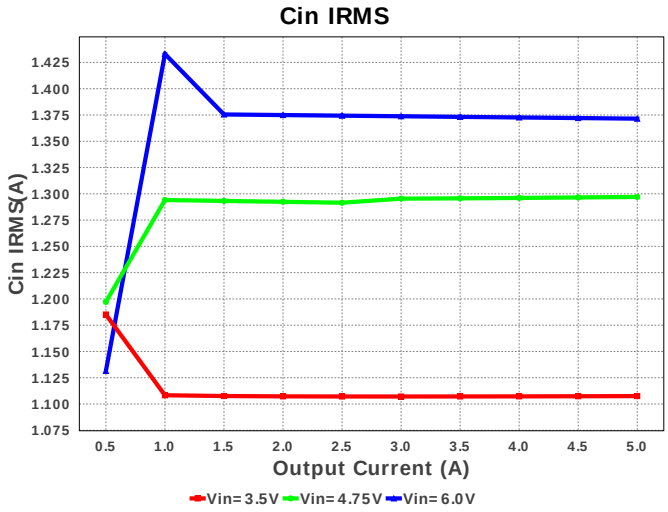
Electrical BOM

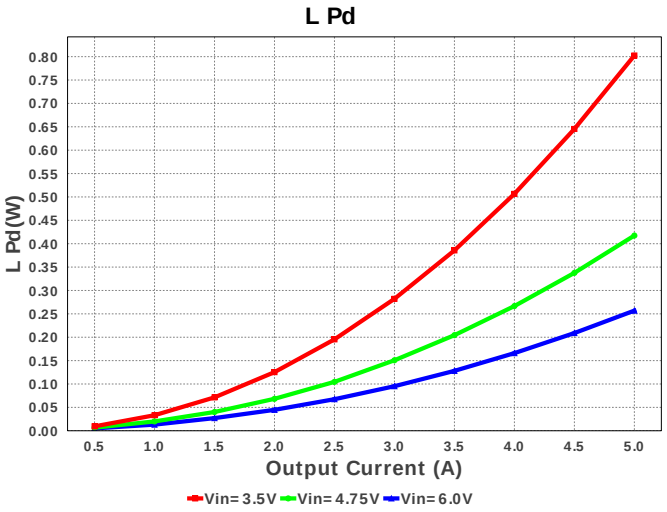
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	MuRata	GRM155R60J104KA01D Series= X5R	Cap= 100.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	MuRata	GRM155R60J474KE19D Series= X5R	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB223 Series= X7R	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	Panasonic	EEV-FK1E222M Series= FK	Cap= 2.2 mF ESR= 35.0 mOhm VDC= 25.0 V IRMS= 1.8 A	1	$0.74	 SM_RADIAL_J16 399 mm²
5.	Cout	Panasonic	20SVPF560M Series= SVPF	Cap= 560.0 uF ESR= 12.0 mOhm VDC= 20.0 V IRMS= 5.4 A	2	$0.74	 CAPSMT_62_F12 151 mm²

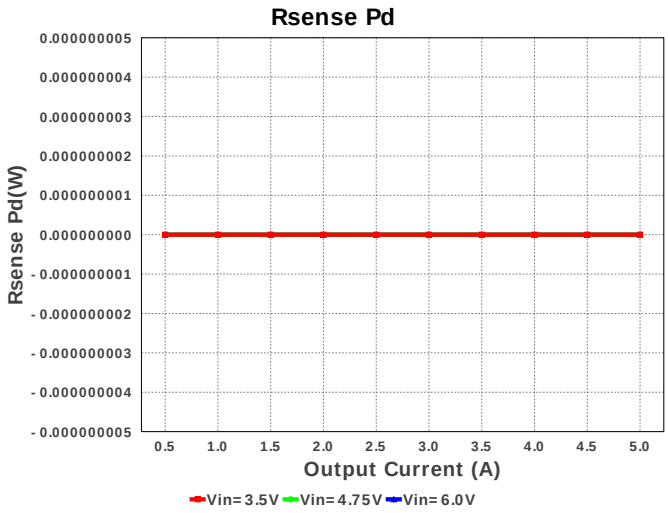
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
6.	Csense	Yageo America	CC0805KRX7R9BB103 Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
7.	Cvcc	MuRata	GRM155R60J474KE19D Series= X5R	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
8.	D1	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	$1.39	 DDPAK 210 mm²
9.	L1	Coilcraft	SER2915H-682KL	L= 6.8 µH DCR= 1.9 mOhm	1	$1.95	 SER2915H 652 mm²
10.	M1	Texas Instruments	CSD17303Q5	VdsMax= 30.0 V IdsMax= 100.0 Amps	1	$0.64	 TRANS_NexFET_Q5 55 mm²
11.	Rcomp	Vishay-Dale	CRCW04021K47FKED Series= CRCW..e3	Res= 1.47 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	Rfadj	Vishay-Dale	CRCW0402221KFKED Series= CRCW..e3	Res= 221.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
13.	Rfb1	Vishay-Dale	CRCW0402976RFKED Series= CRCW..e3	Res= 976.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
14.	Rfb2	Vishay-Dale	CRCW04028K45FKED Series= CRCW..e3	Res= 8.45 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	Rivp1	Vishay-Dale	CRCW040234K0FKED Series= CRCW..e3	Res= 34.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	Rivp2	Vishay-Dale	CRCW040241K2FKED Series= CRCW..e3	Res= 41.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	Rs1	Vishay-Dale	CRCW040297R6FKED Series= CRCW..e3	Res= 97.6 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
18.	Rsense	CUSTOM	CUSTOM Series= ?	Res= 2.35576 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
19.	U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	$0.80	 MUB10A 24 mm²

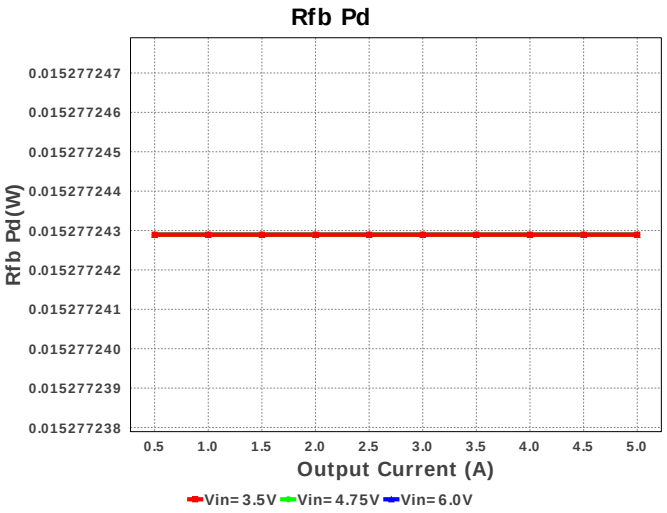


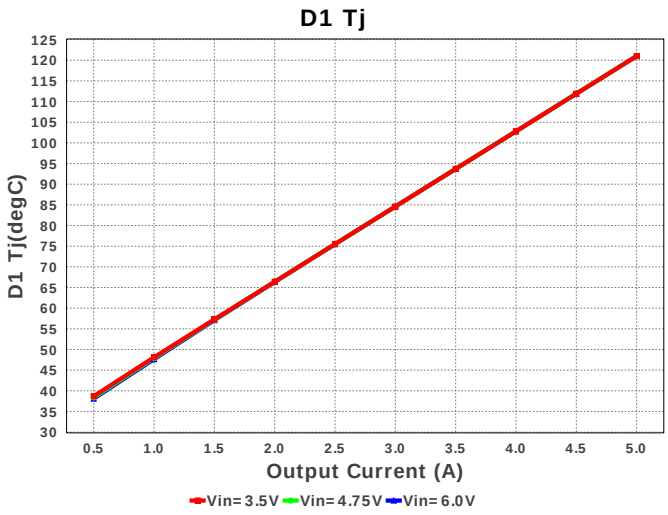


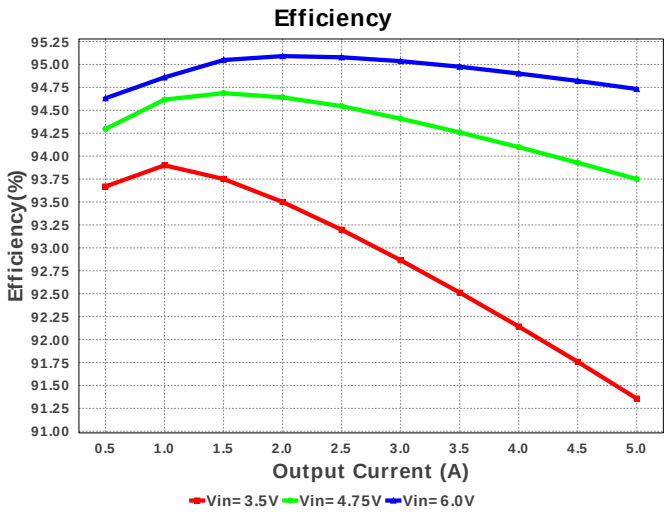


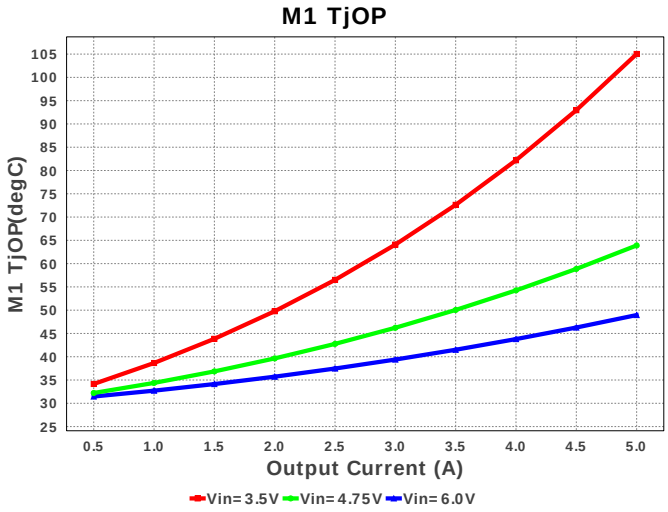


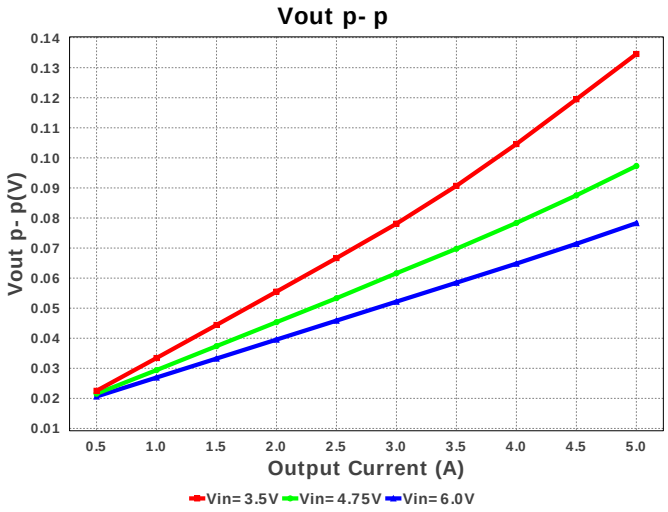


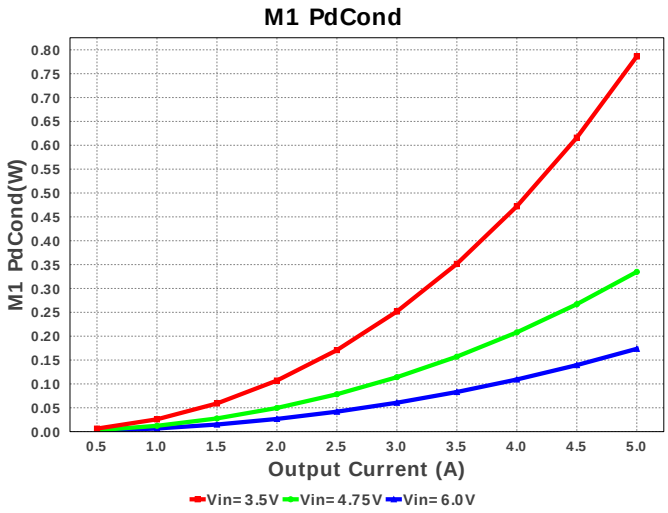


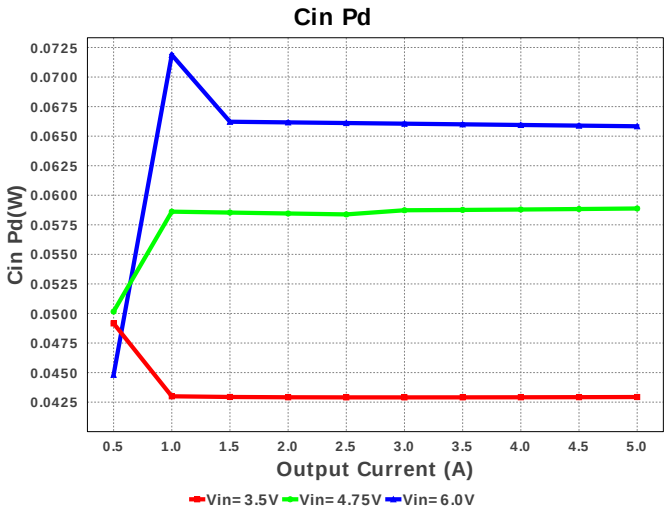


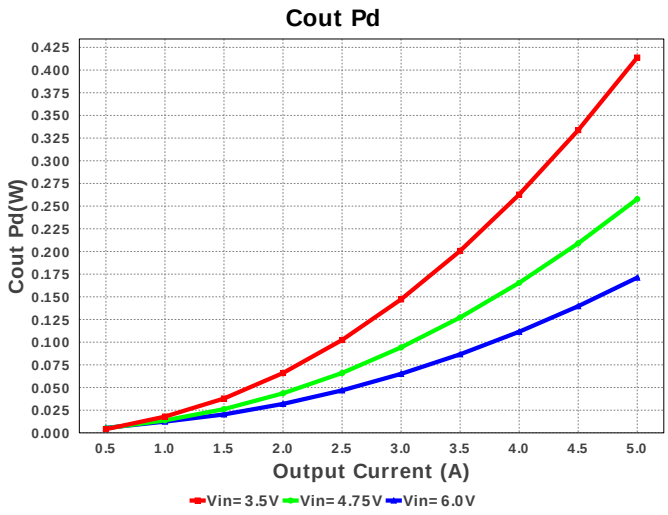


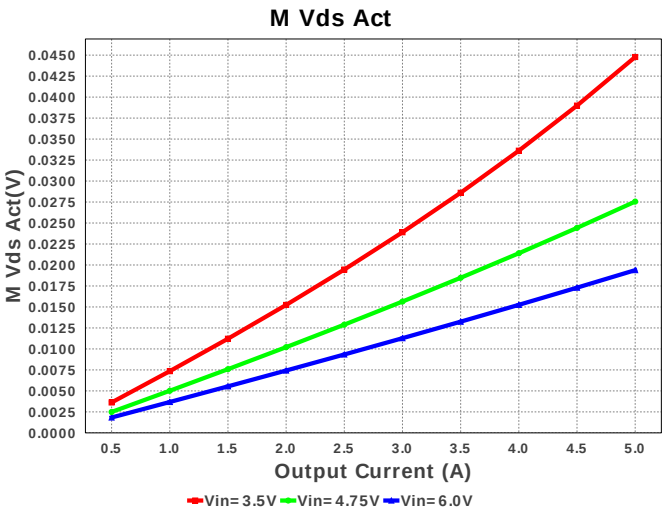


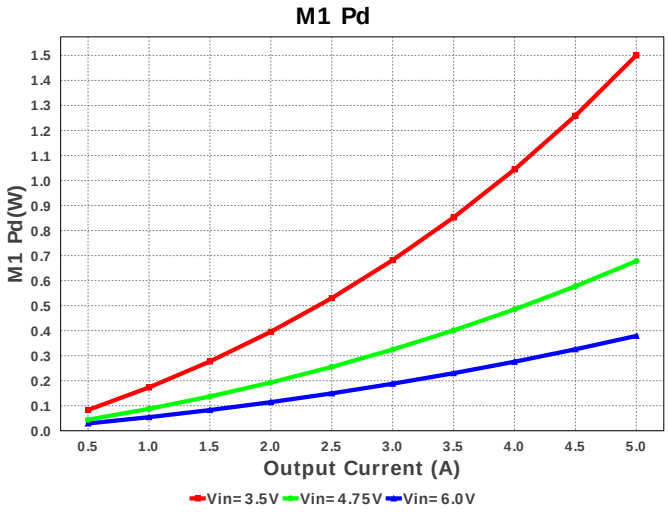


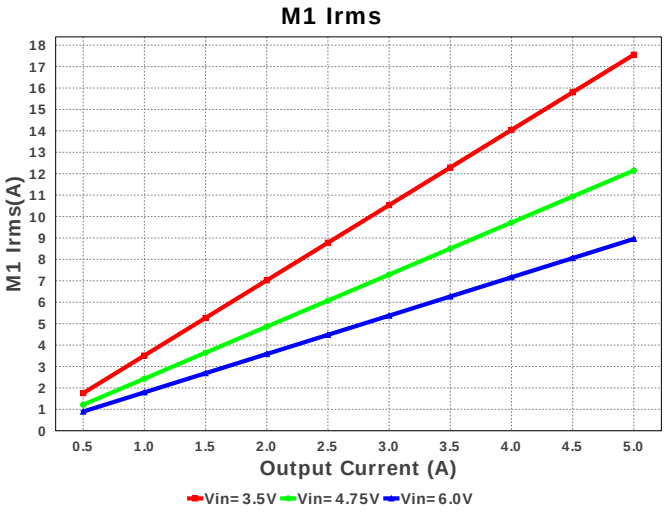


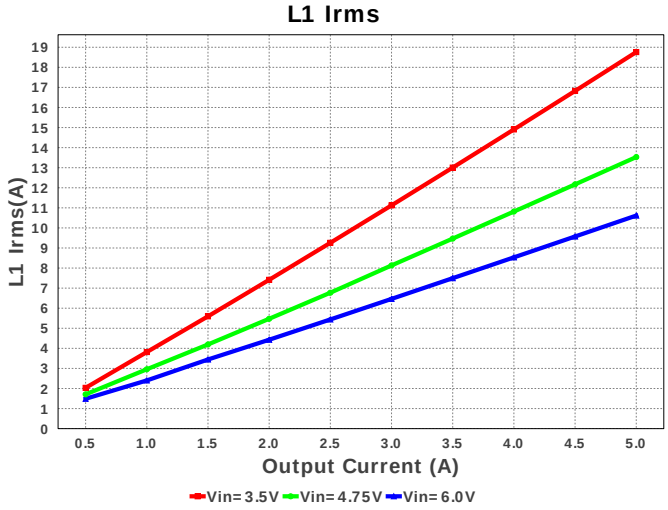


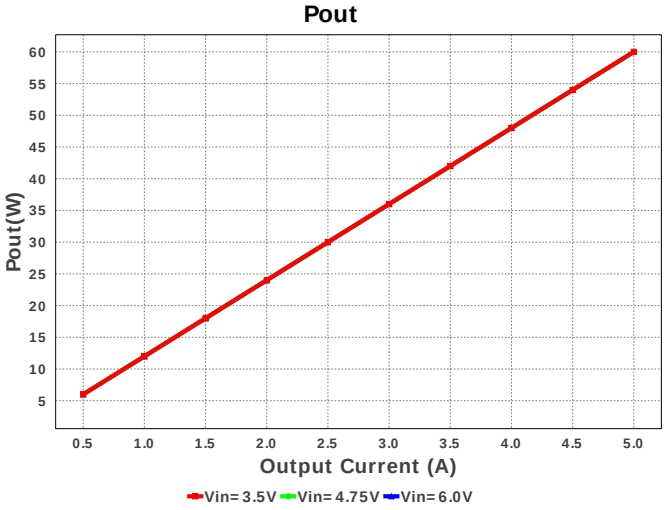


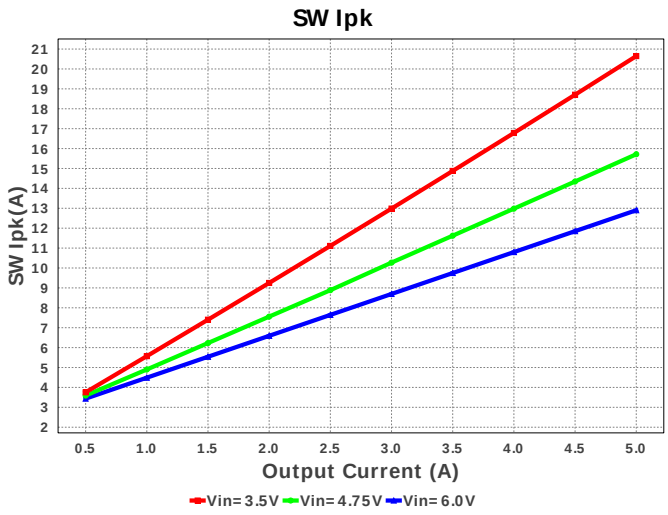


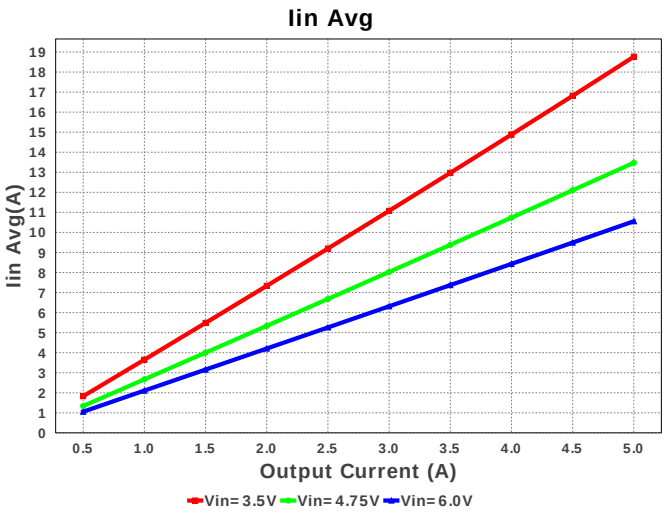


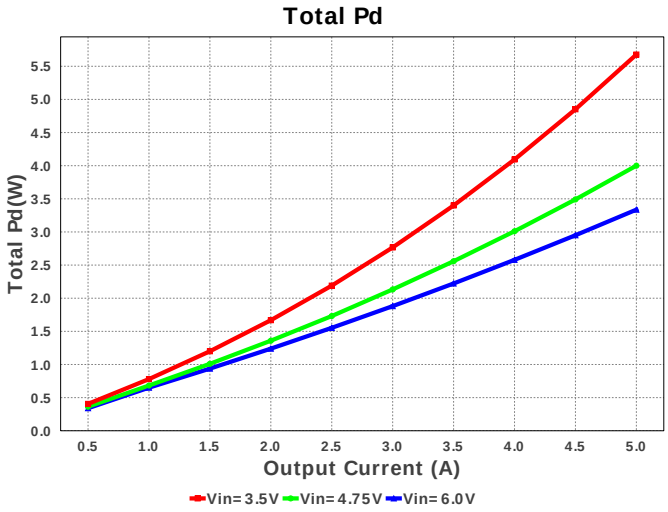


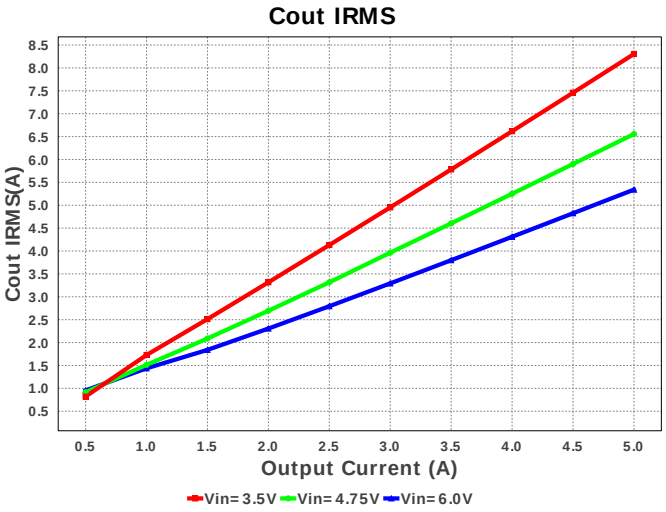


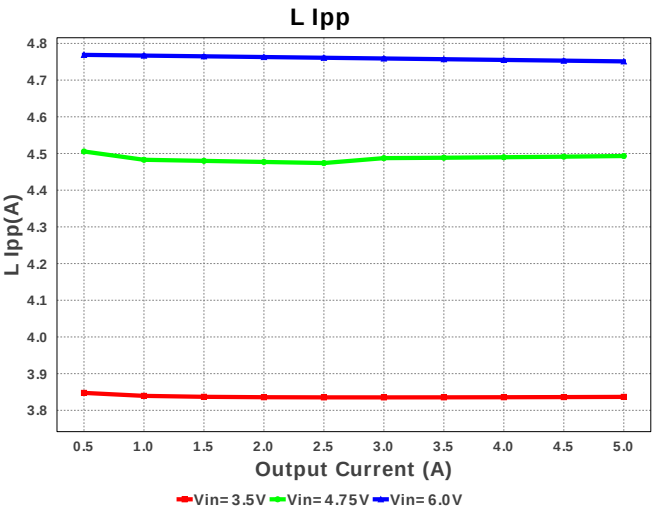


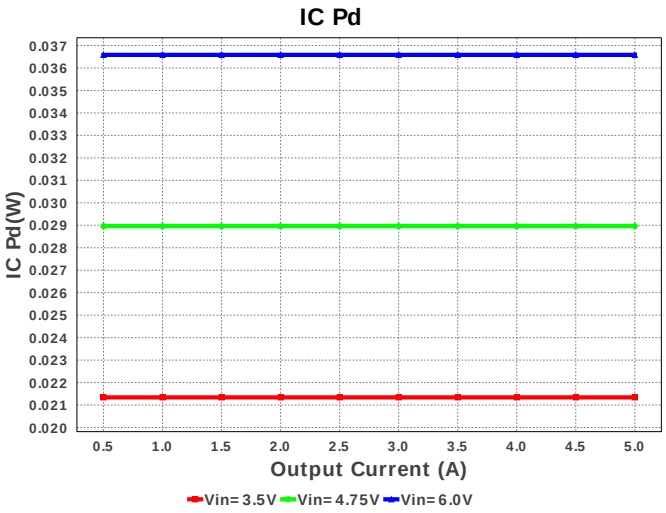


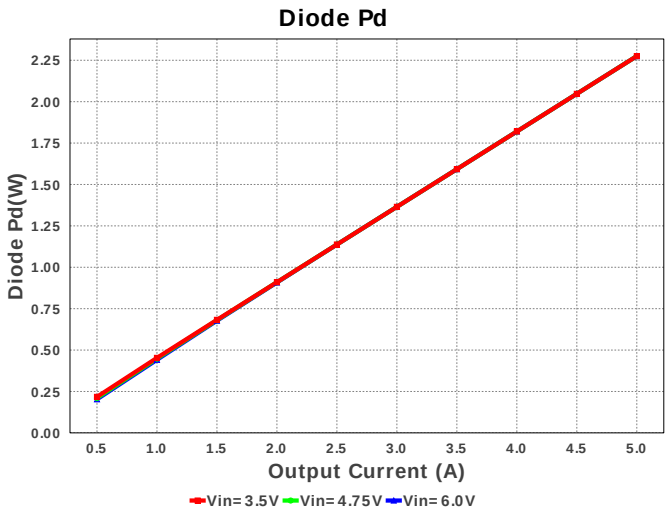


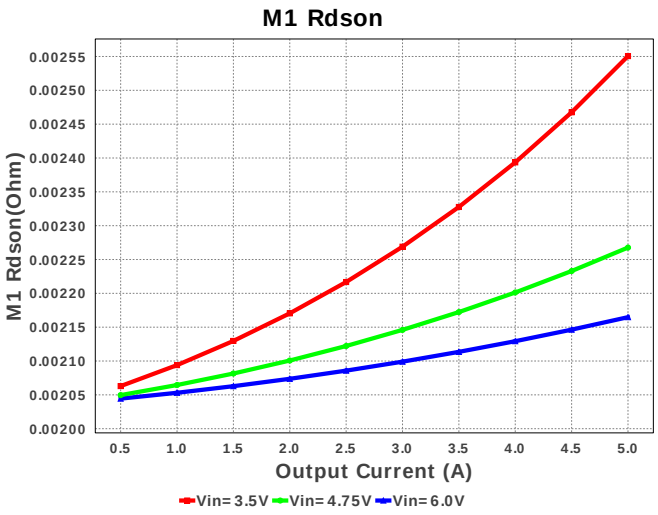


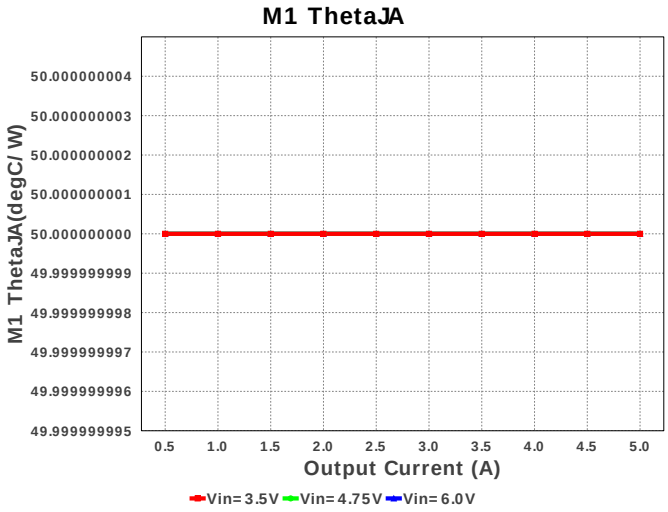


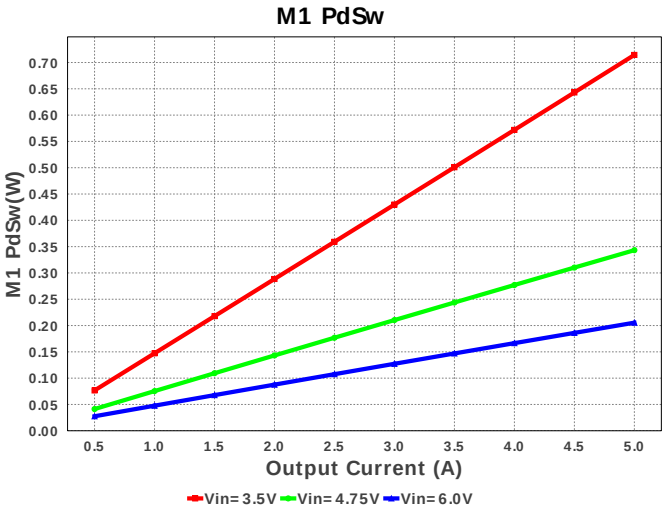


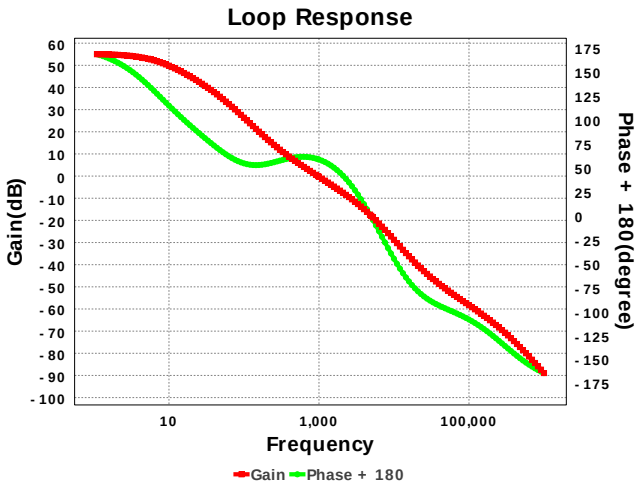












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.108 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	8.309 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	18.781 A	Current	Average input current
4.	L Ipp	3.838 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	18.776 A	Current	Inductor ripple current
6.	M1 Irms	17.519 A	Current	M1 MOSFET Irms
7.	SW Ipk	20.662 A	Current	Peak switch current
8.	BOM Count	20	General	Total Design BOM count
9.	FootPrint	1.69 k mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	97.099 kHz	General	Switching frequency
11.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance

#	Name	Value	Category	Description
12.	M Vds Act	45.008 mV	General	M Vds
13.	M1 Rdson	2.569 mOhm	General	Drain-Source On-resistance
14.	M1 ThetaJA	50.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Mode	CCM	General	Conduction Mode
16.	Pout	60.0 W	General	Total output power
17.	Total BOM	$0.0	General	Total BOM Cost
18.	D1 Tj	121.0 degC	Op_Point	D1 junction temperature
19.	Low Freq Gain	50.011 dB	Op_Point	Gain at 1Hz
20.	Vout Actual	12.169 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
21.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
22.	Cross Freq	582.24 Hz	Op_point	Bode plot crossover frequency
23.	Duty Cycle	73.324 %	Op_point	Duty cycle
24.	Efficiency	91.277 %	Op_point	Steady state efficiency
25.	Gain Marg	-15.635 dB	Op_point	Bode Plot Gain Margin
26.	IC Tj	34.312 degC	Op_point	IC junction temperature
27.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
28.	IOUT_OP	5.0 A	Op_point	Iout operating point
29.	M1 TjOP	107.71 degC	Op_point	M1 MOSFET junction temperature
30.	Phase Marg	57.508 deg	Op_point	Bode Plot Phase Margin
31.	VIN_OP	3.5 V	Op_point	Vin operating point
32.	Vout p-p	134.657 mV	Op_point	Peak-to-peak output ripple voltage
33.	Cin Pd	42.957 mW	Power	Input capacitor power dissipation
34.	Cout Pd	414.257 mW	Power	Output capacitor power dissipation
35.	Diode Pd	2.275 W	Power	Diode power dissipation
36.	IC Pd	21.56 mW	Power	IC power dissipation
37.	L Pd	803.77 mW	Power	Inductor power dissipation
38.	M1 Pd	1.554 W	Power	M1 MOSFET total power dissipation
39.	M1 PdCond	788.512 mW	Power	M1 MOSFET conduction losses
40.	M1 PdSw	765.633 mW	Power	M1 MOSFET switching losses
41.	Rfb Pd	15.277 mW	Power	Rfb Power Dissipation
42.	Rsense Pd	756.684 mW	Power	LED Current Rsns Power Dissipation
43.	Total Pd	5.734 W	Power	Total Power Dissipation
44.	Vout Tolerance	3.346 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	6.0	Maximum input voltage
3.	VinMin	3.5	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	LM3481	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM3481** Product Folder : http://www.ti.com/product/LM3481 : contains the data sheet and other resources.