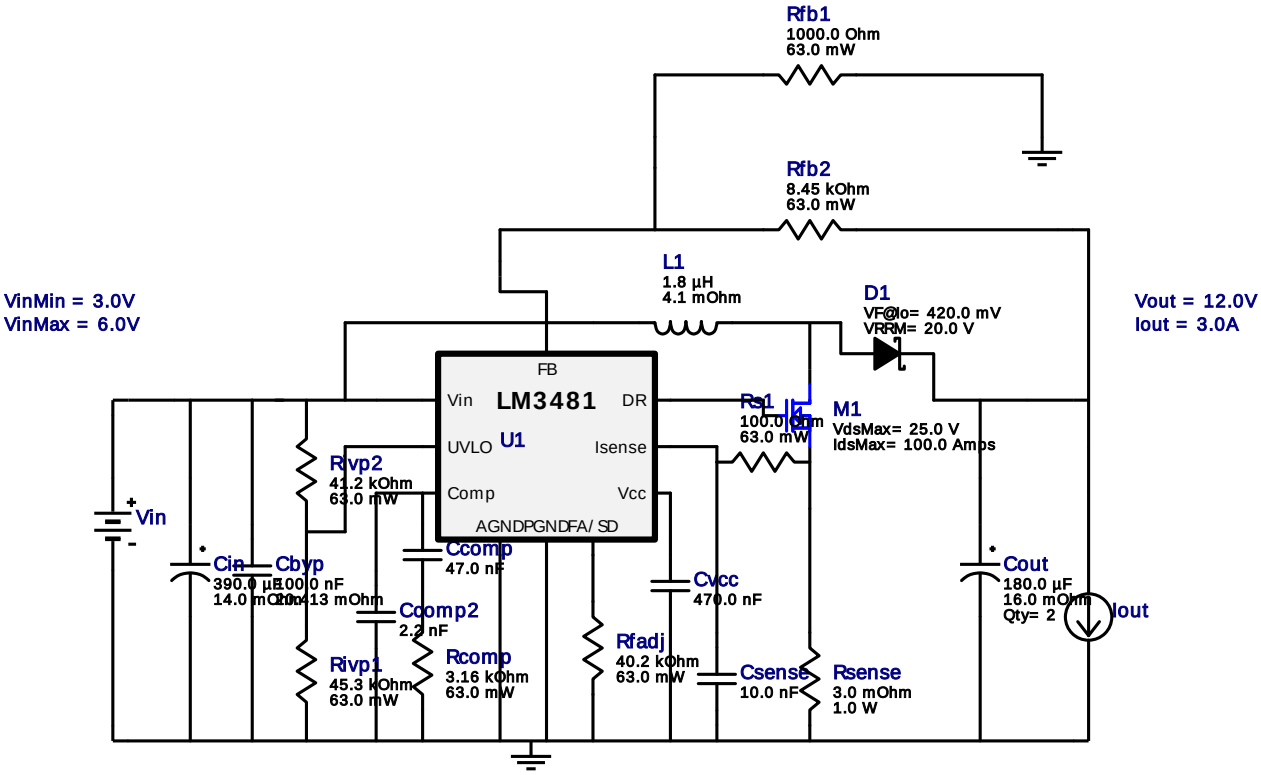
WEBENCH® Design Report

VinMin = 3.0V
VinMax = 6.0V
Vout = 12.0V
Iout = 3.0A

Device = LM3481MM/NOPB
Topology = Boost
Created = 3/15/15 10:03:59 PM
BOM Cost = $5.17
Footprint = 626.0 mm²
BOM Count = 20
Total Pd = 3.54W

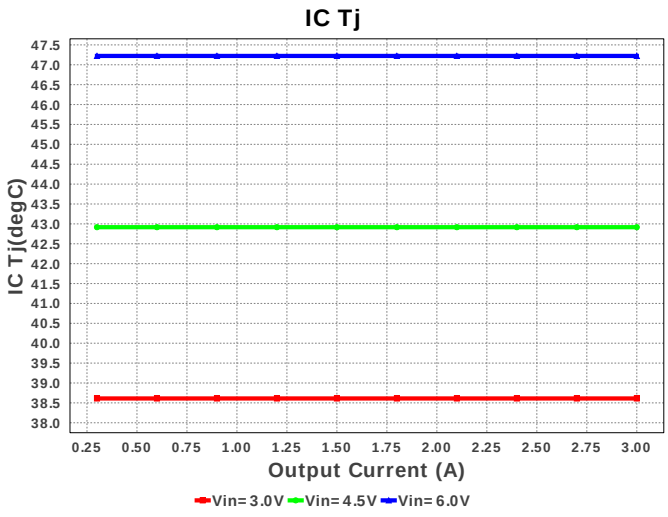
Design : 3789096/1 LM3481MM/NOPB
LM3481MM/NOPB 3.0V-6.0V to 12.00V @ 3.0A

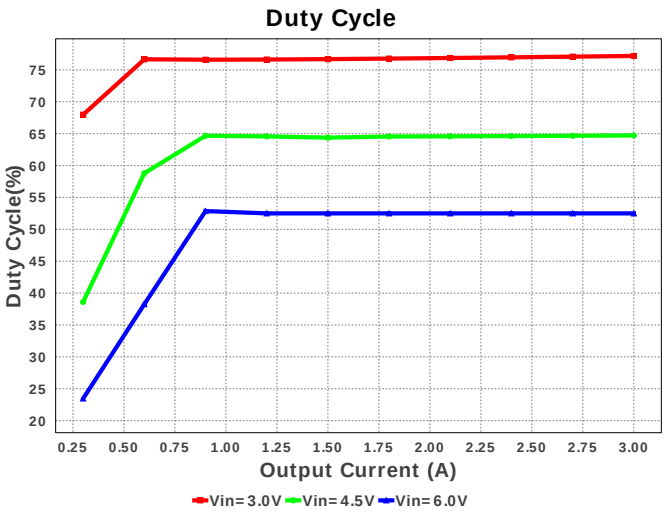


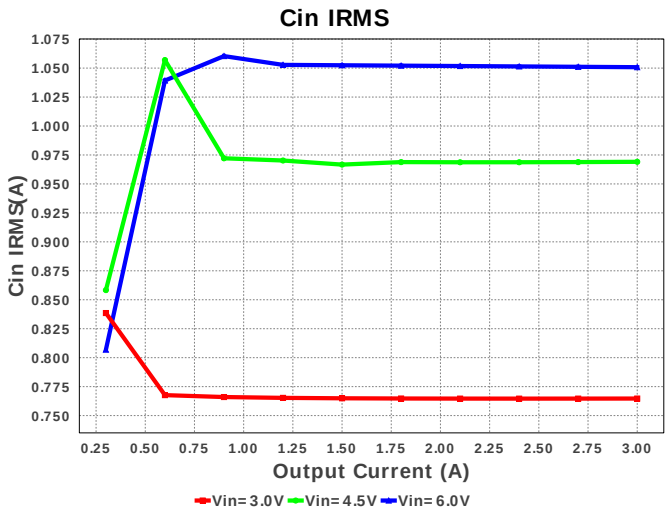
Electrical BOM

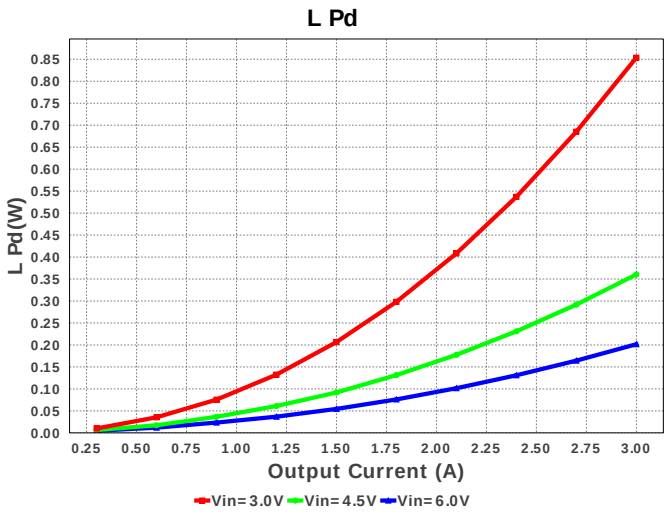
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	TDK	C1005X5R0J104K Series= X5R	Cap= 100.0 nF ESR= 20.413 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	1005 3 mm²
2.	Ccomp	Taiyo Yuden	TMK212B7473KD-T Series= X7R	Cap= 47.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB222 Series= X7R	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	Panasonic	20SVPF390M Series= 1273	Cap= 390.0 uF ESR= 14.0 mOhm VDC= 20.0 V IRMS= 4.95 A	1	$0.63	CAPSMT_62_E12 106 mm²
5.	Cout	Panasonic	25SVPF180M Series= 1273	Cap= 180.0 uF ESR= 16.0 mOhm VDC= 25.0 V IRMS= 4.65 A	2	$0.61	CAPSMT_62_E12 106 mm²
6.	Csense	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²

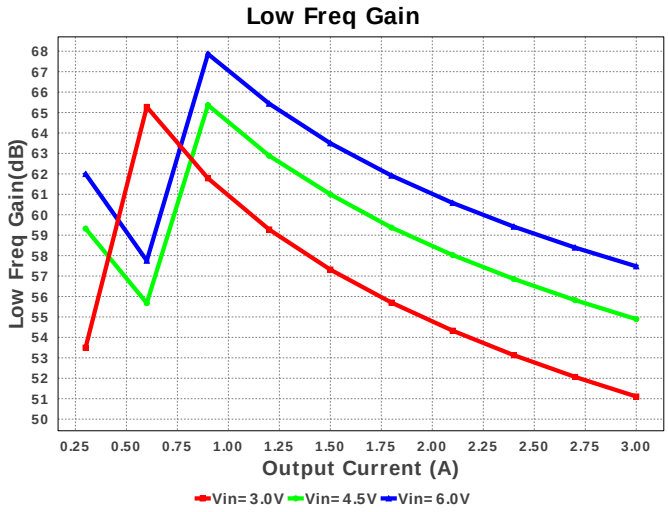
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Cvcc	MuRata	GRM155C80G474KE01D Series= 379	Cap= 470.0 nF VDC= 4.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
8.	D1	Vishay-Semiconductor	SL42-E3/57T	VF@Io= 420.0 mV VRRM= 20.0 V	1	$0.32	SMC 83 mm²
9.	L1	Coilcraft	XAL7070-182MEB	L= 1.8 µH DCR= 4.1 mOhm	1	$1.05	XAL7070 87 mm²
10.	M1	Texas Instruments	CSD16325Q5	VdsMax= 25.0 V IdsMax= 100.0 Amps	1	$0.84	TRANS_NexFET_Q5 55 mm²
11.	Rcomp	Vishay-Dale	CRCW04023K16FKED Series= CRCW..e3	Res= 3.16 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
12.	Rfadj	Vishay-Dale	CRCW040240K2FKED Series= CRCW..e3	Res= 40.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
13.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 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	CRCW040245K3FKED Series= CRCW..e3	Res= 45.3 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	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
18.	Rsense	Stackpole Electronics Inc	CSNL1206FT3L00 Series= 478	Res= 3.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	1206 11 mm²
19.	U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	$0.80	MUB10A 24 mm²

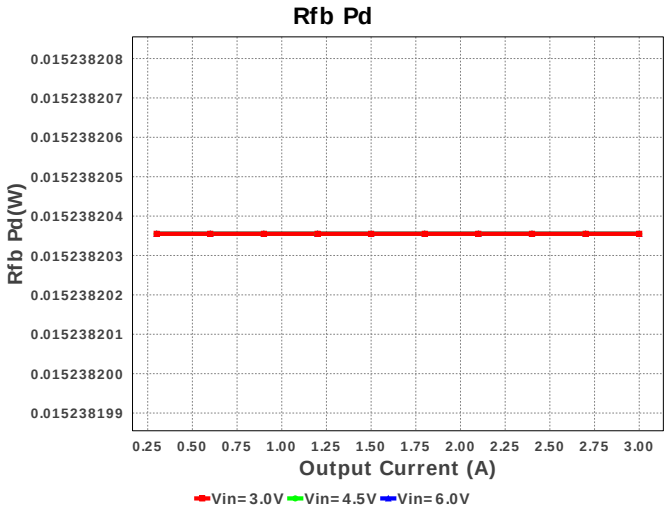


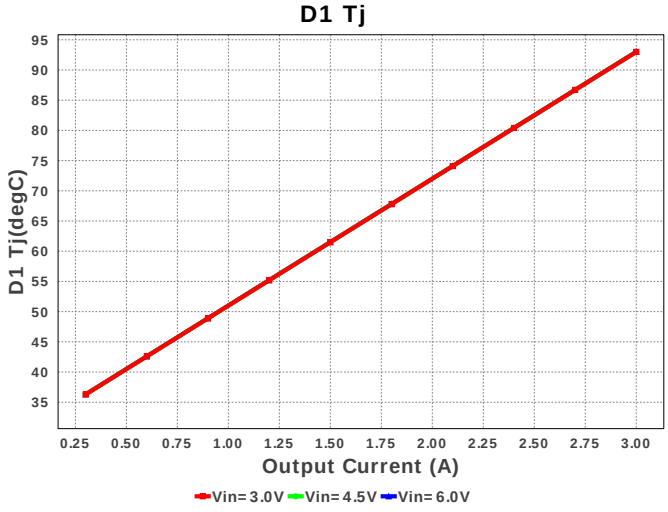


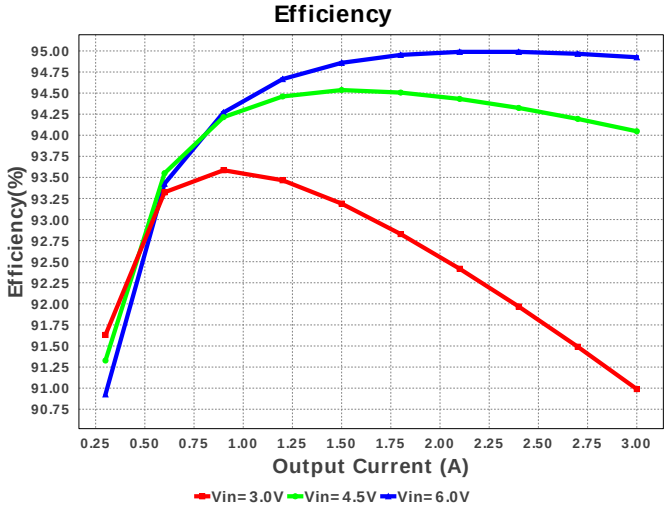


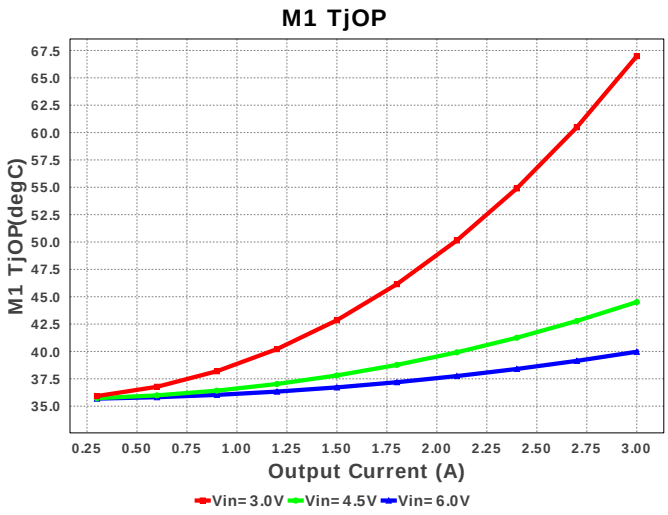


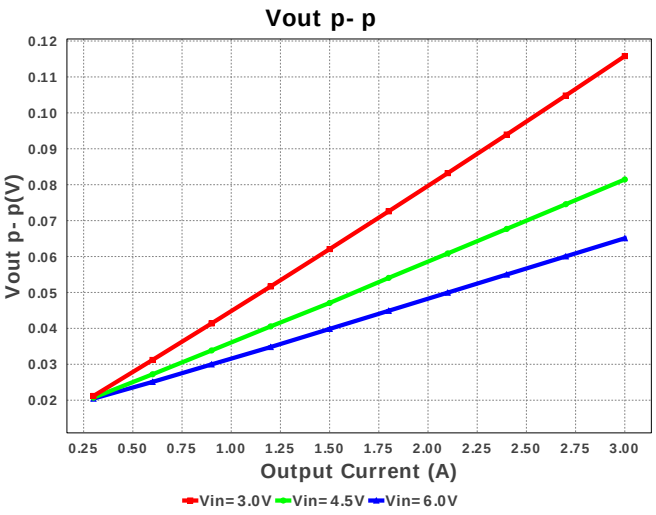


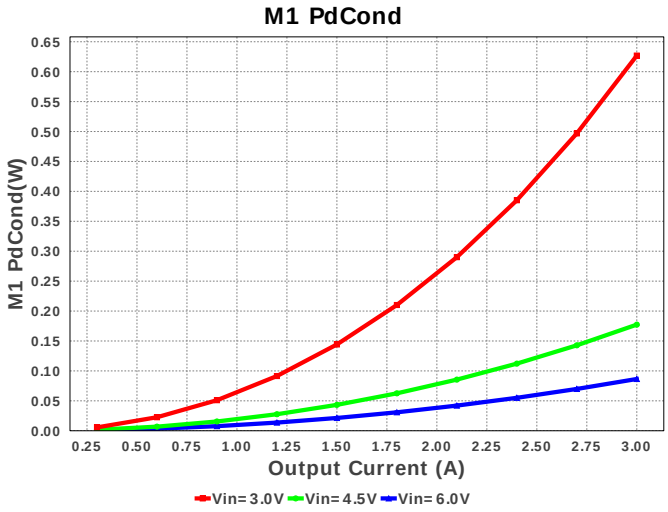


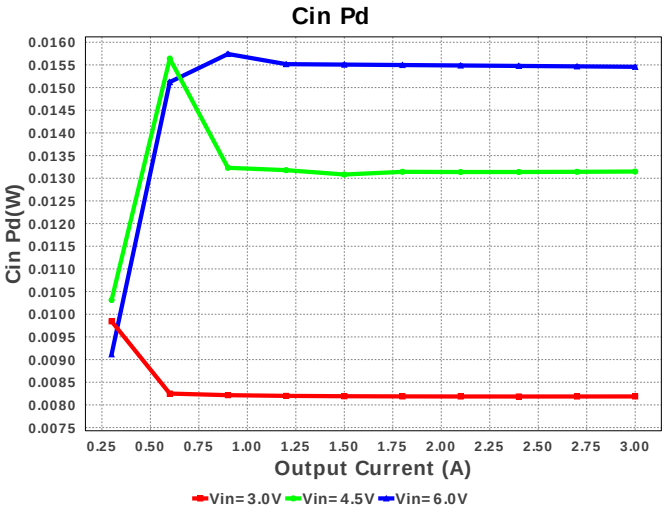


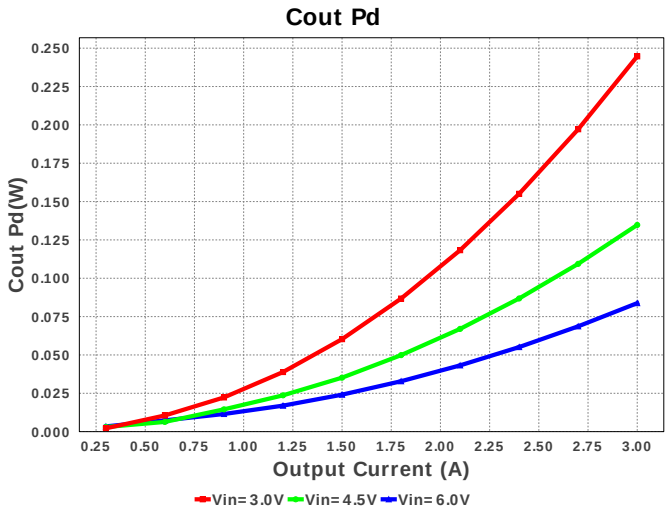


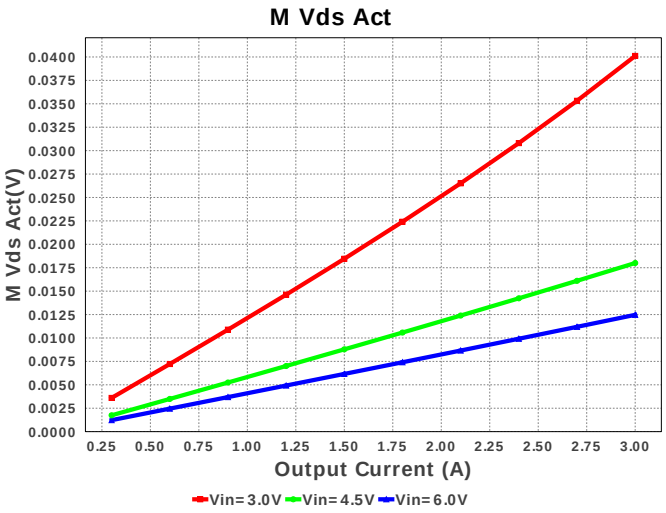


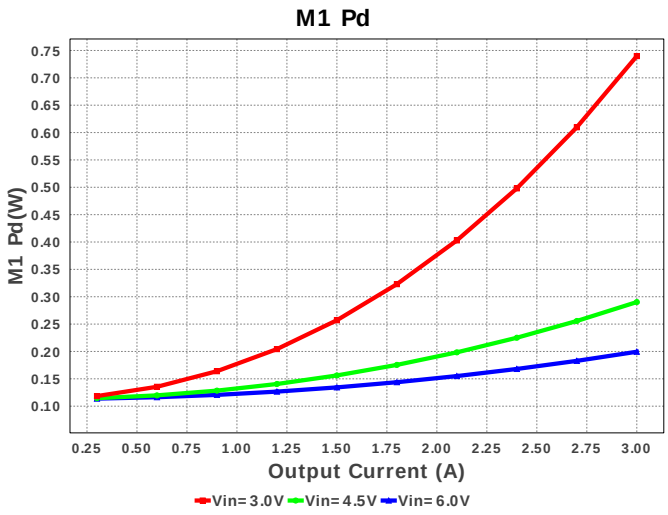


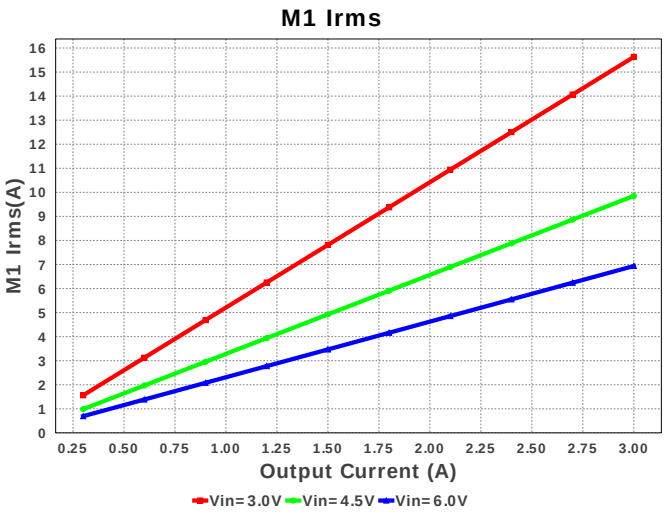


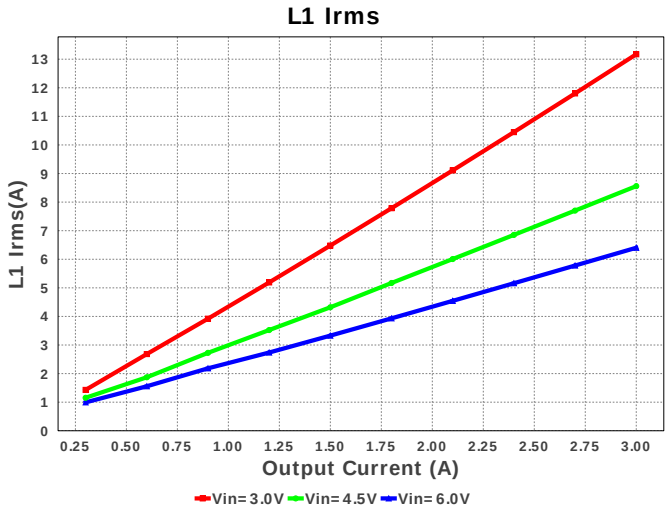


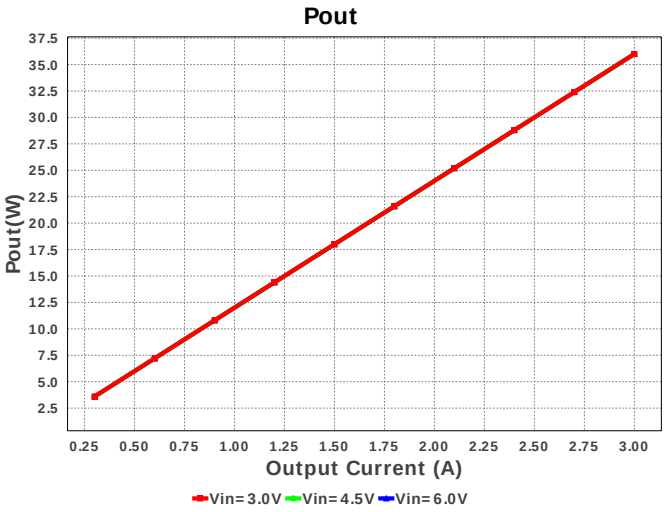


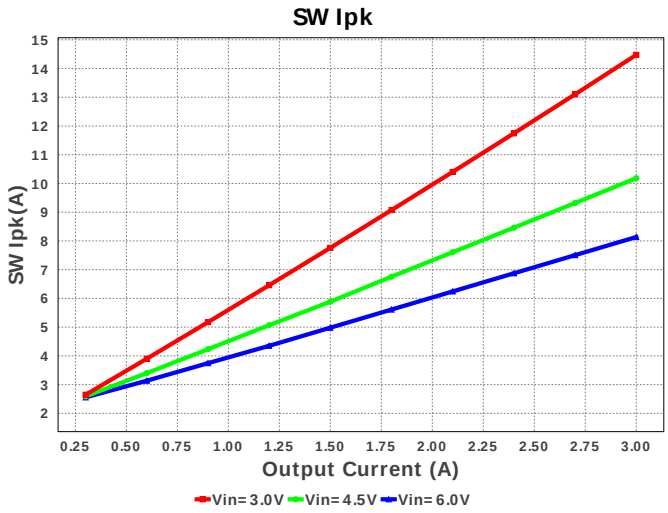


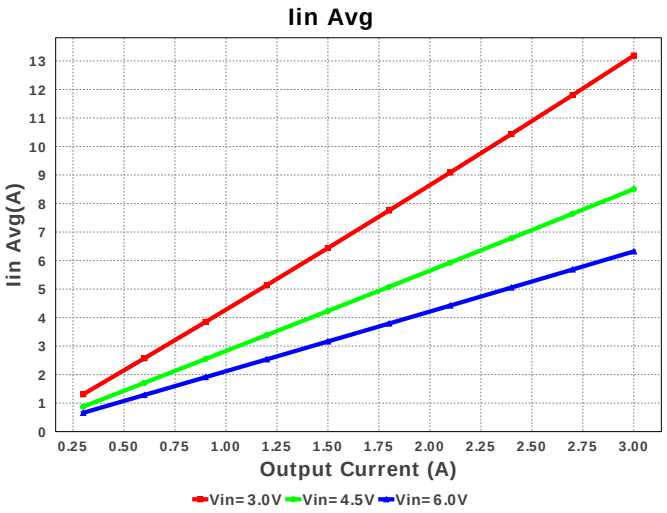


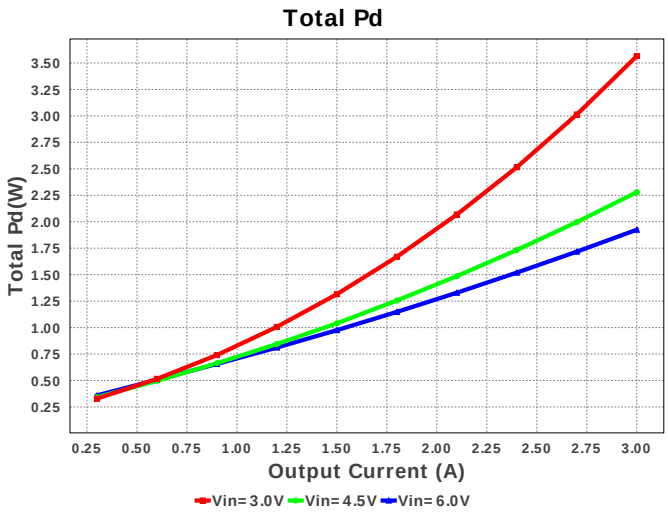


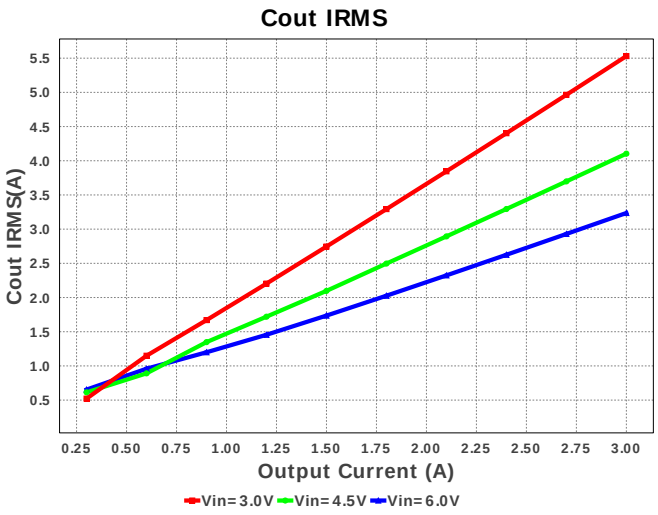


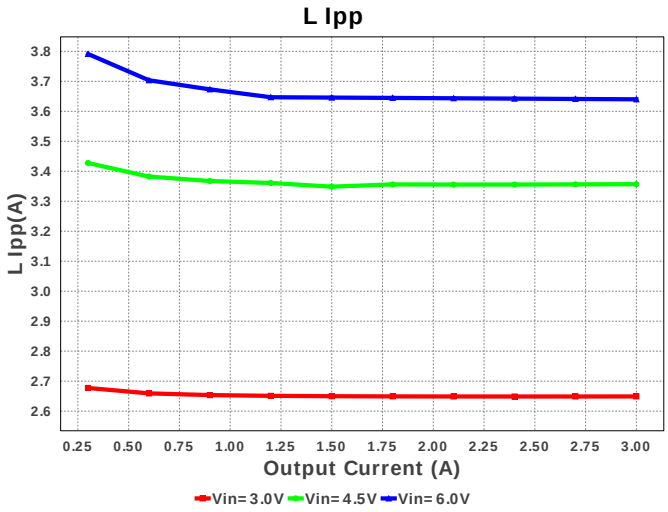


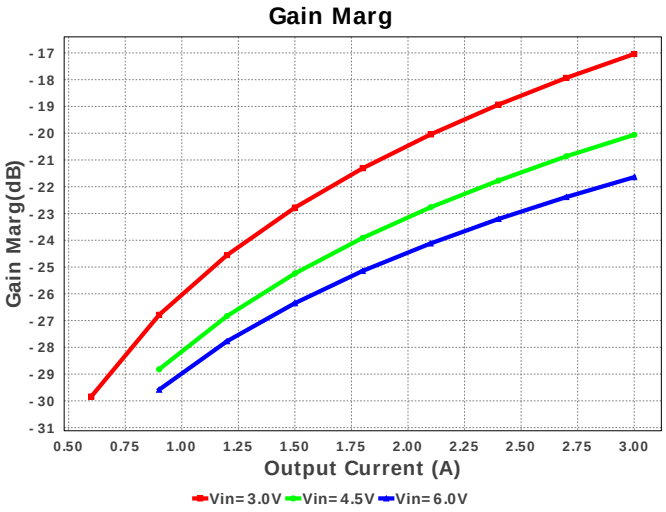


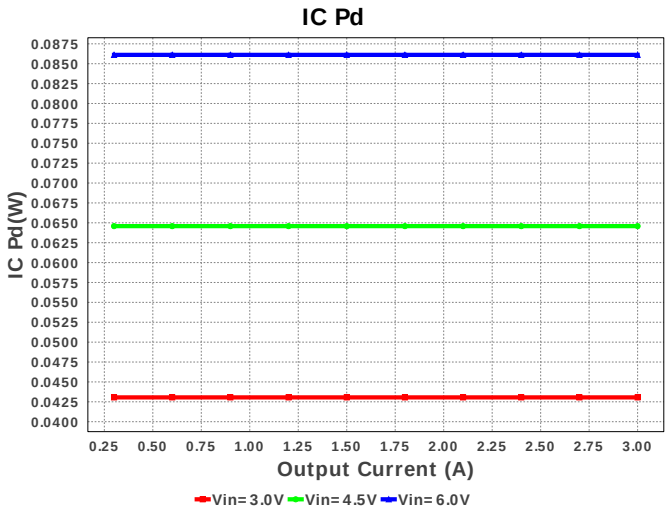


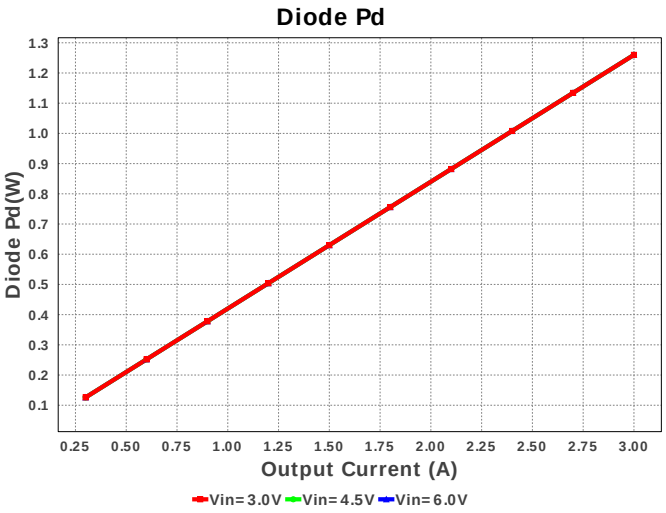


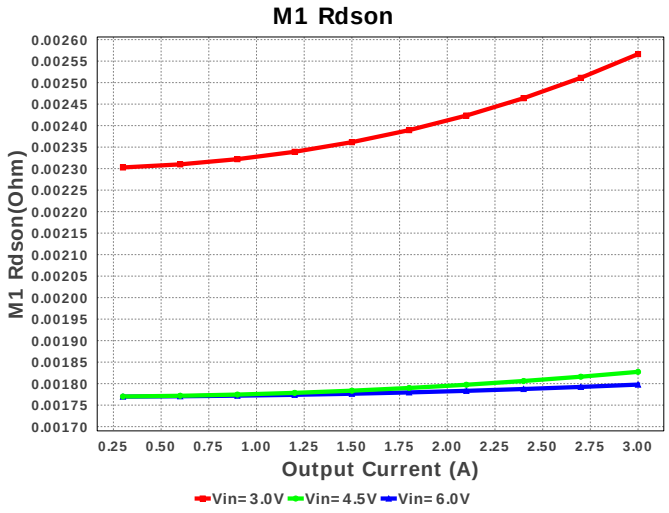


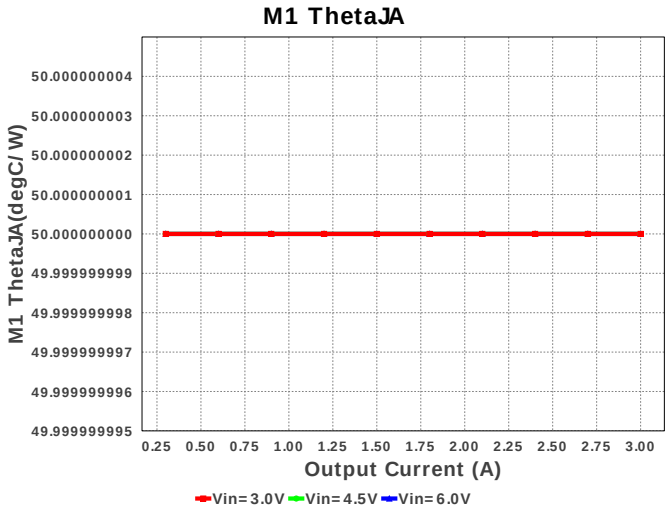


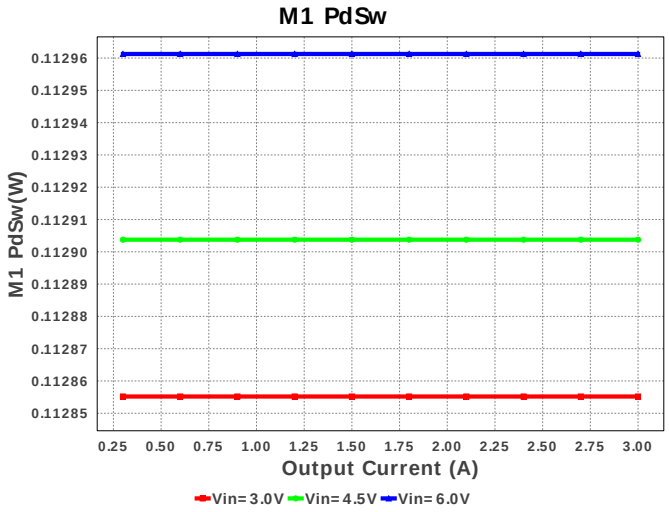


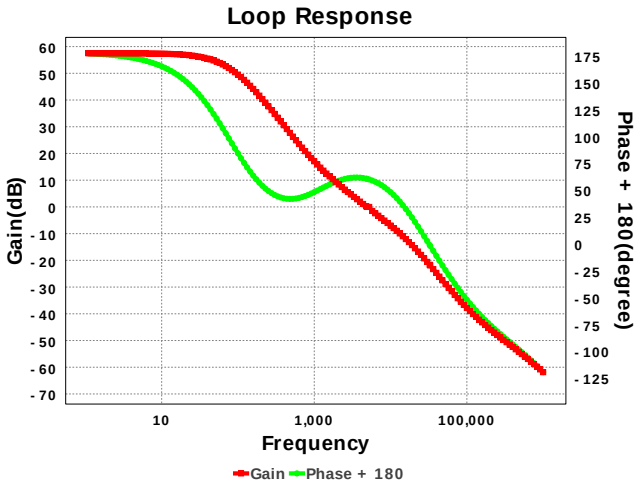












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	764.578 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	5.528 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	13.18 A	Current	Average input current
4.	L Ipp	2.649 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	13.165 A	Current	Inductor ripple current
6.	M1 Irms	15.597 A	Current	M1 MOSFET Irms
7.	SW Ipk	14.467 A	Current	Peak switch current
8.	BOM Count	20	General	Total Design BOM count
9.	FootPrint	626.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	479.249 kHz	General	Switching frequency
11.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	39.877 mV	General	M Vds
13.	M1 Rdson	2.557 mOhm	General	Drain-Source On-resistance
14.	M1 ThetaJA	50.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Pout	36.0 W	General	Total output power
16.	Total BOM	$5.17	General	Total BOM Cost
17.	D1 Tj	93.0 degC	Op_Point	D1 junction temperature
18.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	2.566 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	77.174 %	Op_point	Duty cycle
21.	Efficiency	91.045 %	Op_point	Steady state efficiency
22.	Gain Marg	-17.043 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	38.628 degC	Op_point	IC junction temperature
24.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	3.0 A	Op_point	Iout operating point
26.	M1 TjOP	65.861 degC	Op_point	M1 MOSFET junction temperature
27.	Phase Marg	56.206 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	3.0 V	Op_point	Vin operating point
29.	Vout p-p	115.737 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	8.184 mW	Power	Input capacitor power dissipation
31.	Cout Pd	244.497 mW	Power	Output capacitor power dissipation

#	Name	Value	Category	Description
32.	Diode Pd	1.26 W	Power	Diode power dissipation
33.	IC Pd	43.14 mW	Power	IC power dissipation
34.	L Pd	852.735 mW	Power	Inductor power dissipation
35.	M1 Pd	717.225 mW	Power	M1 MOSFET total power dissipation
36.	M1 PdCond	621.951 mW	Power	M1 MOSFET conduction losses
37.	M1 PdSw	95.274 mW	Power	M1 MOSFET switching losses
38.	Rfb Pd	15.238 mW	Power	Rfb Power Dissipation
39.	Total Pd	3.541 W	Power	Total Power Dissipation
40.	Low Freq Gain	51.113 dB	Unknown	Gain at 10Hz

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current
2.	Iout1	3.0	Output Current #1
3.	VinMax	6.0	Maximum input voltage
4.	VinMin	3.0	Minimum input voltage
5.	Vout	12.0	Output Voltage
6.	Vout1	12.0	Output Voltage #1
7.	base_pn	LM3481	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM3481** Product Folder : http://www.ti.com/product/lm3481 : contains the data sheet and other resources.