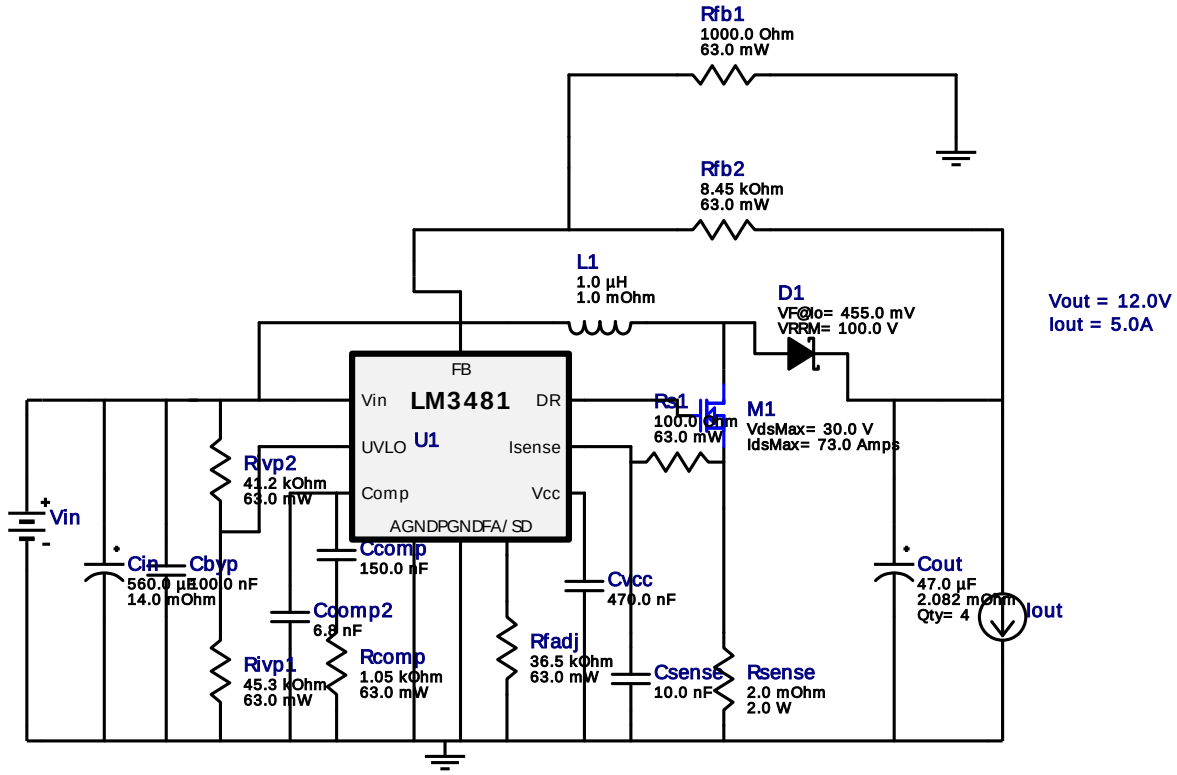
WEBENCH® Design Report

VinMin = 3.0V
VinMax = 9.0V
Vout = 12.0V
Iout = 5.0A

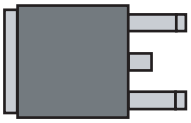
Device = LM3481MM/NOPB
Topology = Boost
Created = 8/5/16 4:54:18 AM
BOM Cost = $6.59
BOM Count = 22
Total Pd = 5.45W

Design : 4761085/7 LM3481MM/NOPB
LM3481MM/NOPB 3.0V-9.0V to 12.00V @ 5.0A

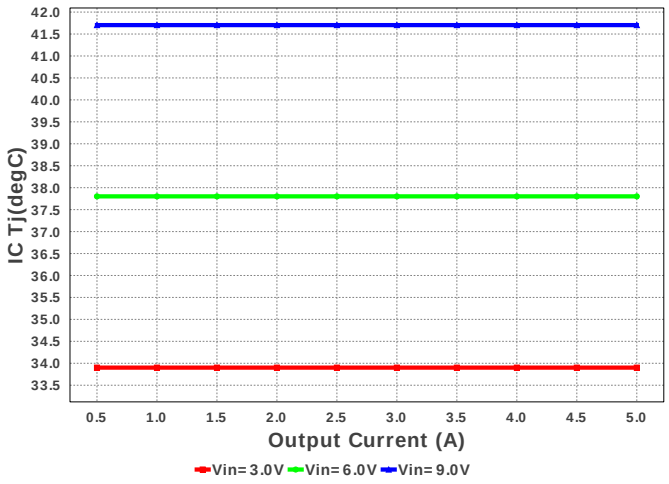


Electrical BOM

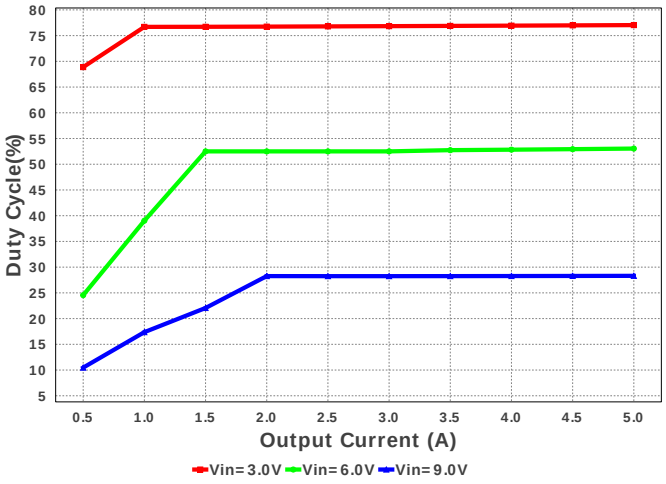
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	MuRata	GRM155R60J154KE01D Series= X5R	Cap= 150.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	Panasonic	16SVPF560M Series= ?	Cap= 560.0 uF ESR= 14.0 mOhm VDC= 16.0 V IRMS= 4.95 A	1	$0.61	CAPSMT_62_E12 106 mm²
5.	Cout	TDK	C3216X5R1E476M160AC Series= X5R	Cap= 47.0 uF ESR= 2.082 mOhm VDC= 25.0 V IRMS= 5.0279 A	4	$0.35	1206 11 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
7.	Cvcc	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	D1	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	$1.33	 DDPAK 210 mm^2
9.	L1	Coilcraft	XAL1010-102MEB	L= 1.0 µH DCR= 1.0 mOhm	1	$1.71	 XAL1010 160 mm^2
10.	M1	Texas Instruments	CSD17307Q5A	VdsMax= 30.0 V IdsMax= 73.0 Amps	1	$0.25	 TRANS_NexFET_Q5A 55 mm^2
11.	Rcomp	Vishay-Dale	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
12.	Rfadj	Vishay-Dale	CRCW040236K5FKED Series= CRCW..e3	Res= 36.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
13.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
14.	Rfb2	Vishay-Dale	CRCW04028K45FKED Series= CRCW..e3	Res= 8.45 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
15.	Rivp1	Vishay-Dale	CRCW040245K3FKED Series= CRCW..e3	Res= 45.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
16.	Rivp2	Vishay-Dale	CRCW040241K2FKED Series= CRCW..e3	Res= 41.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
17.	Rs1	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
18.	Rsense	Ohmite	FCSL64R002GER Series= FCSL	Res= 2.0 mOhm Power= 2.0 W Tolerance= 2.0%	1	$0.37	2512_WIDE 43 mm^2
19.	U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	$0.80	 MUB10A 24 mm^2

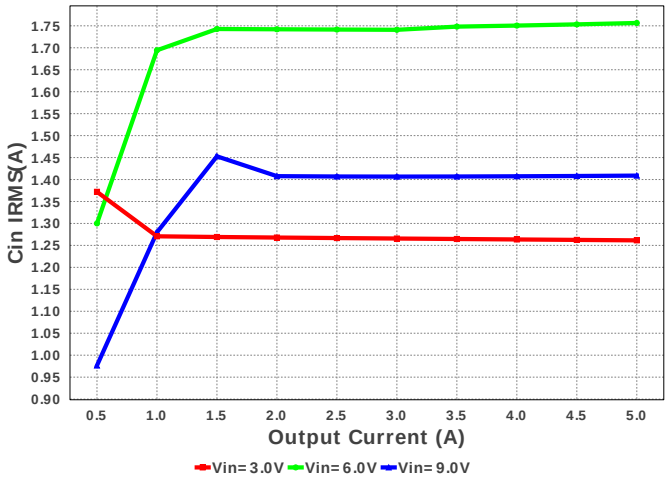
IC Tj



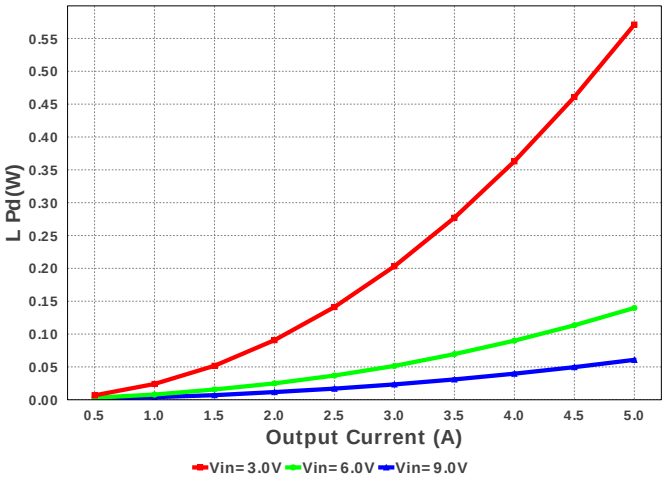
Duty Cycle



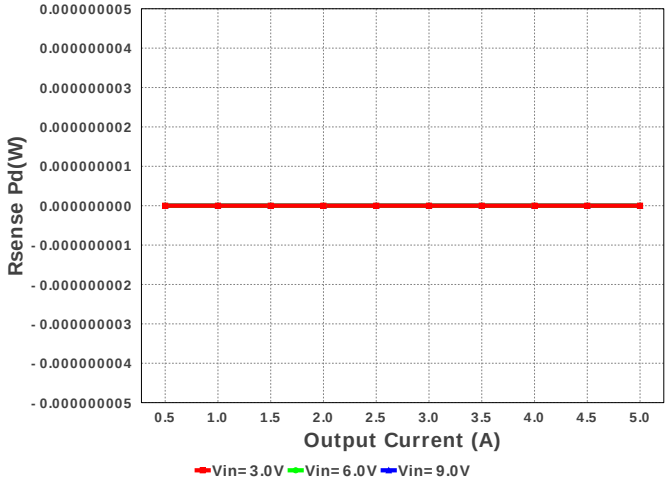
Cin IRMS



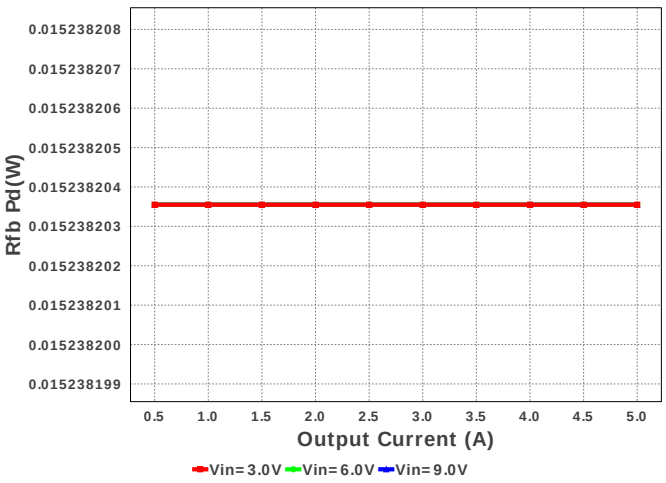
L Pd

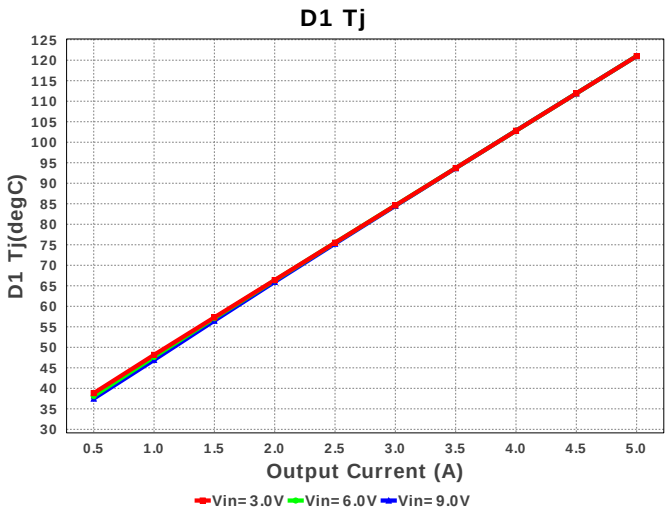


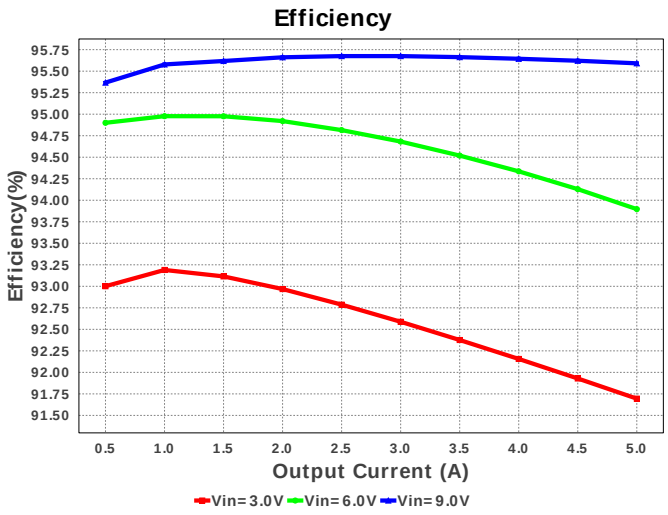
Rsense Pd

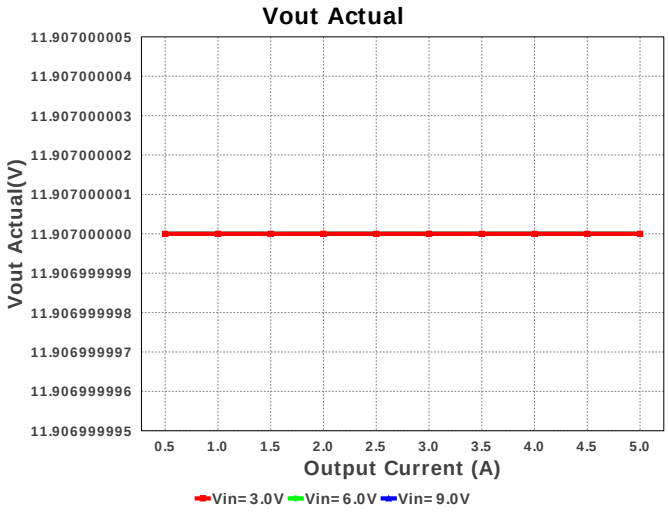


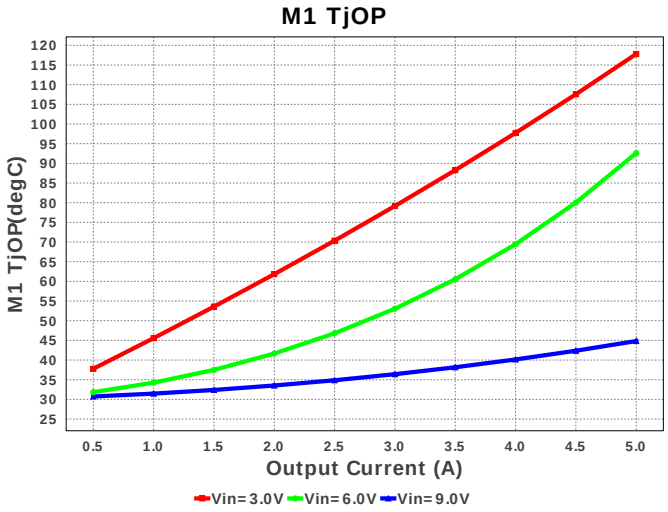
Rfb Pd

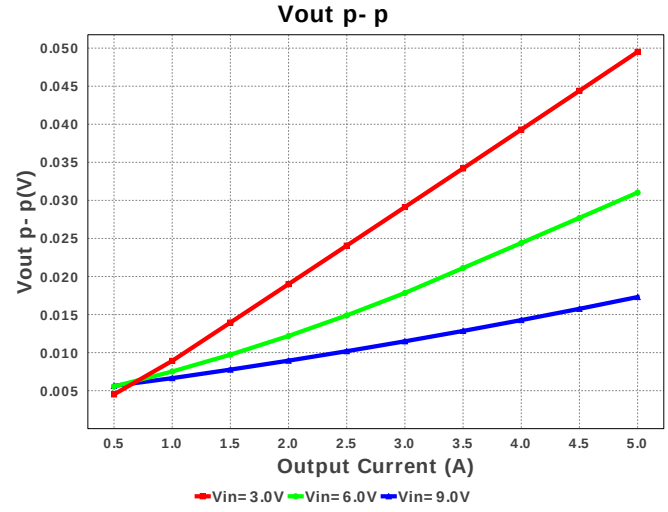


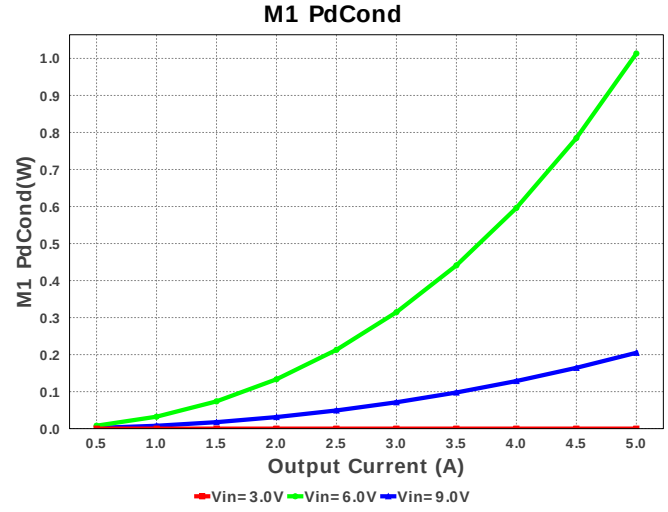


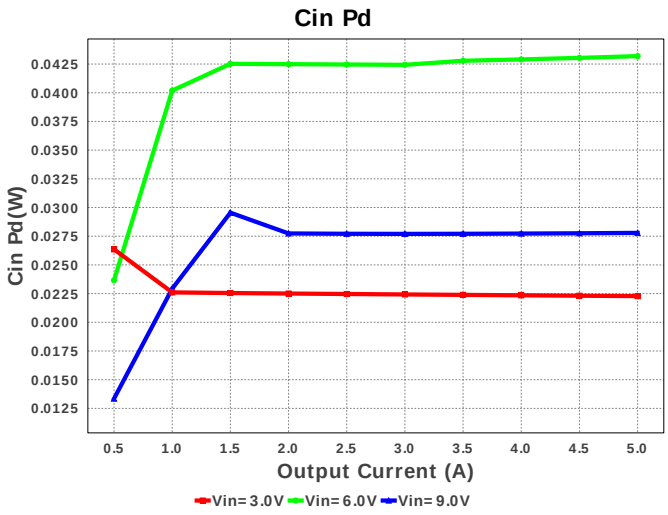


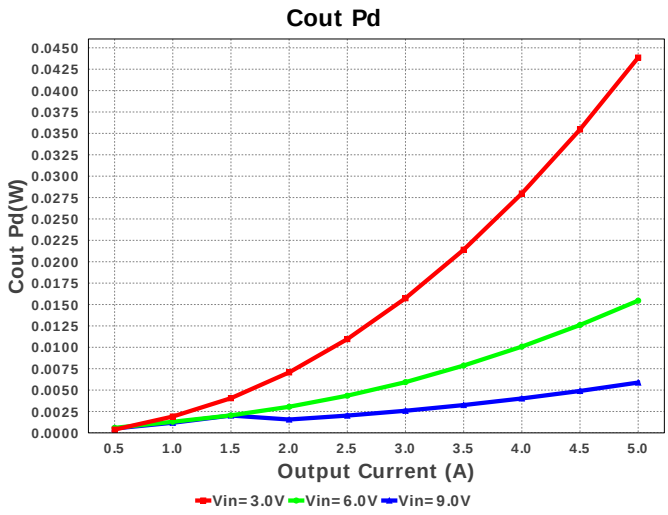


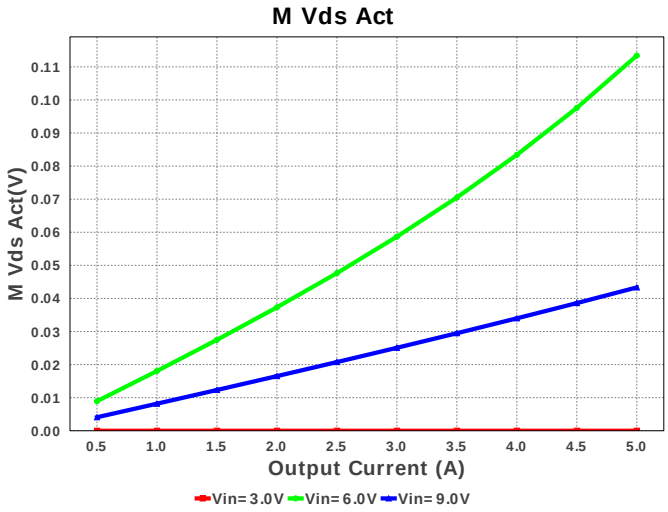


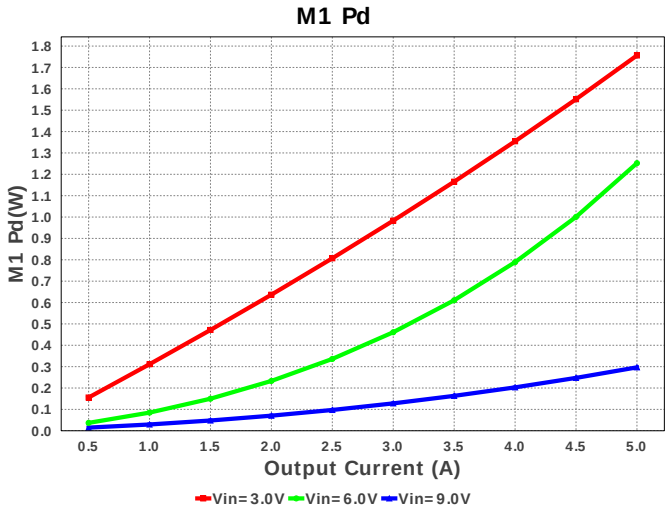


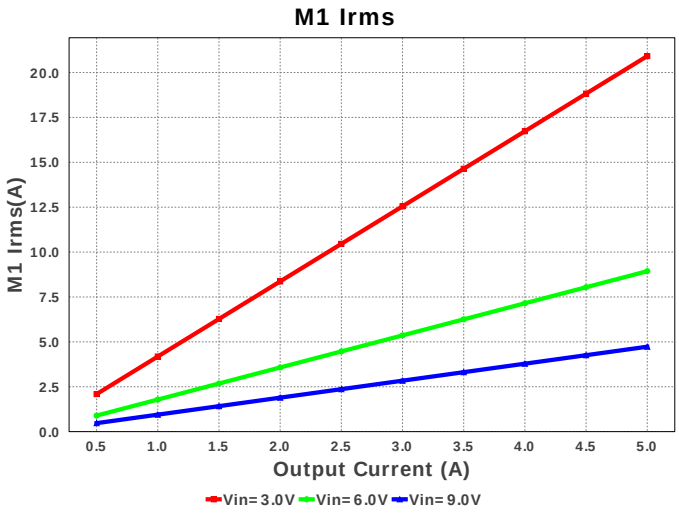


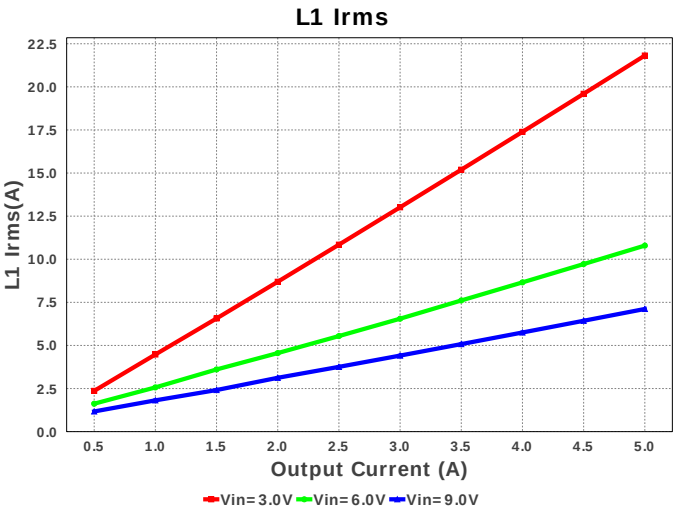


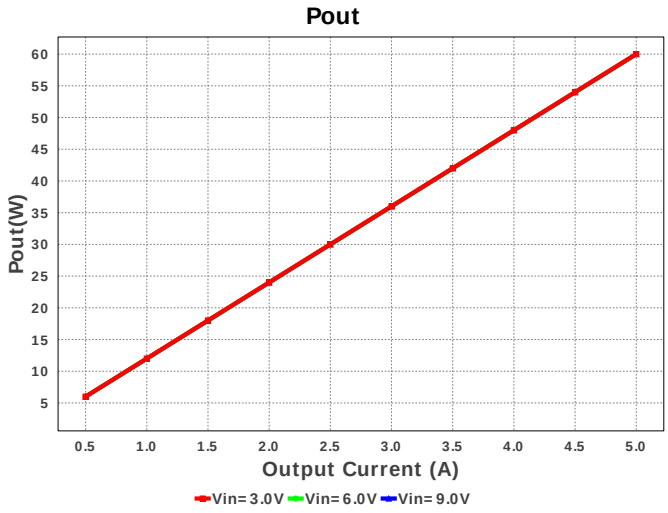


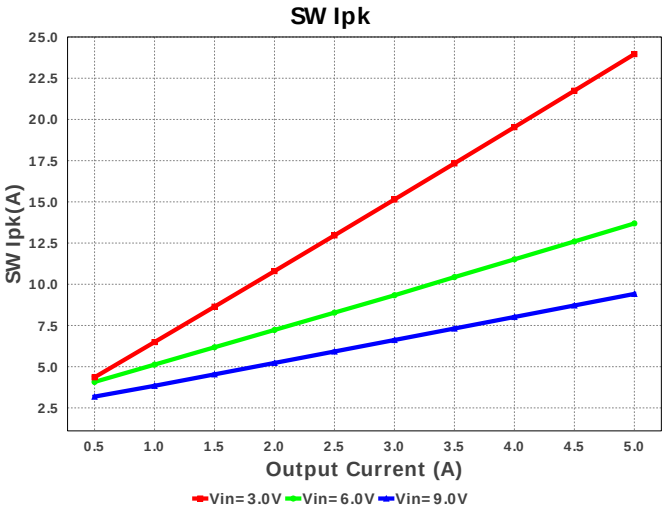


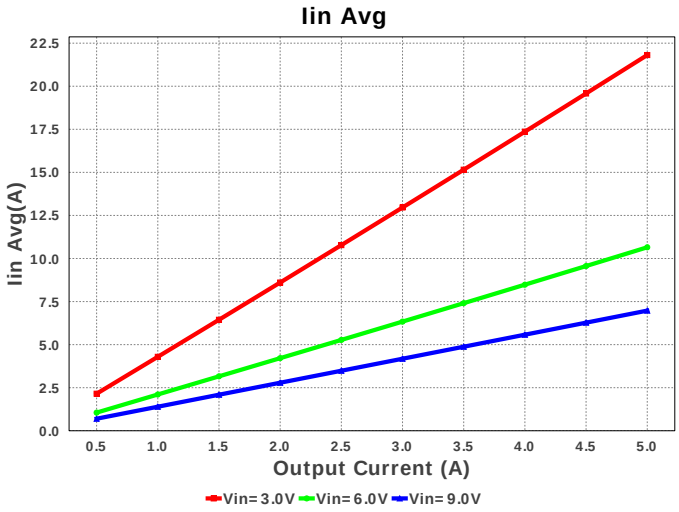


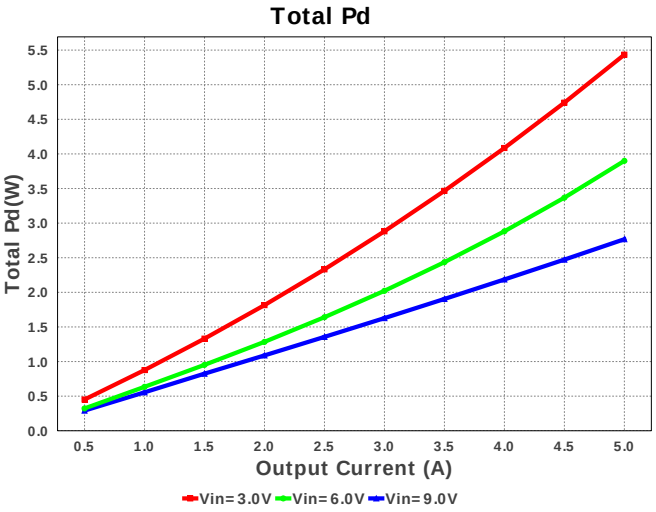


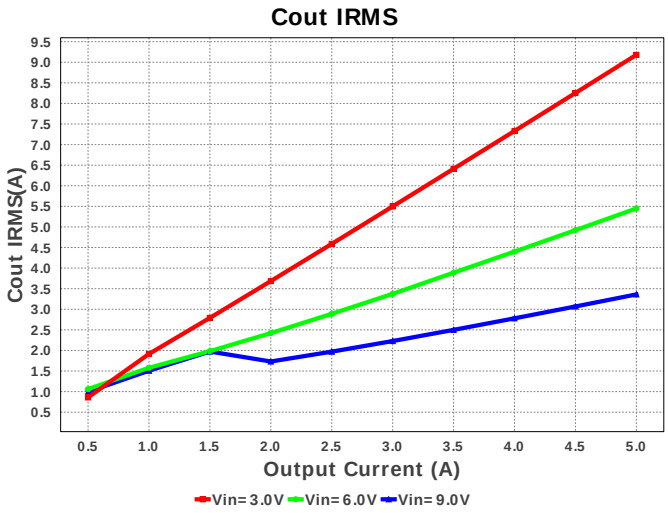


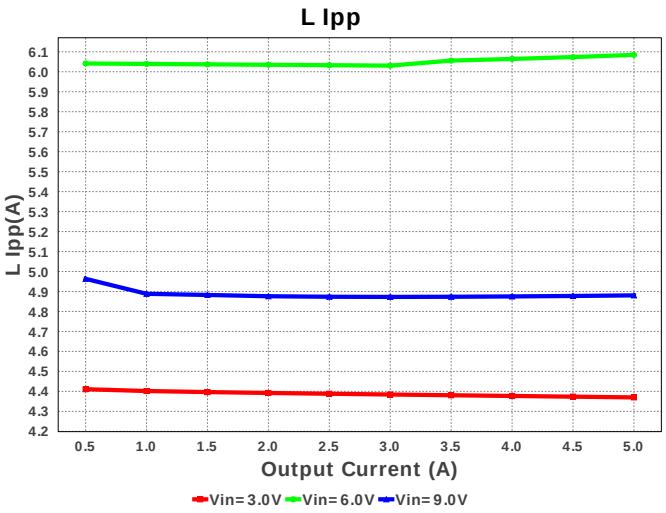


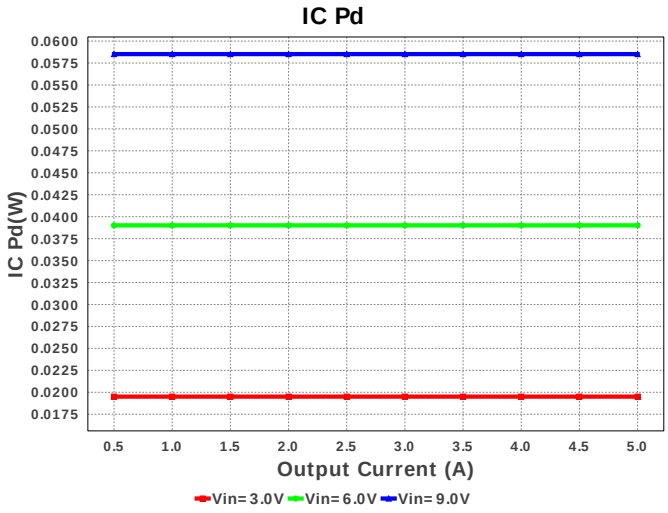


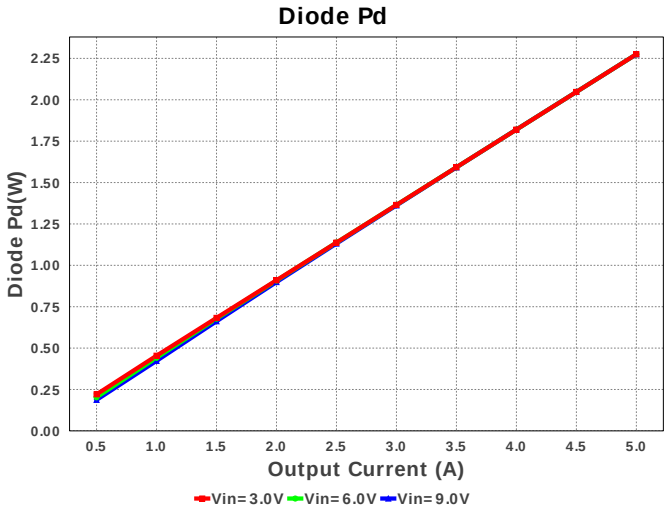


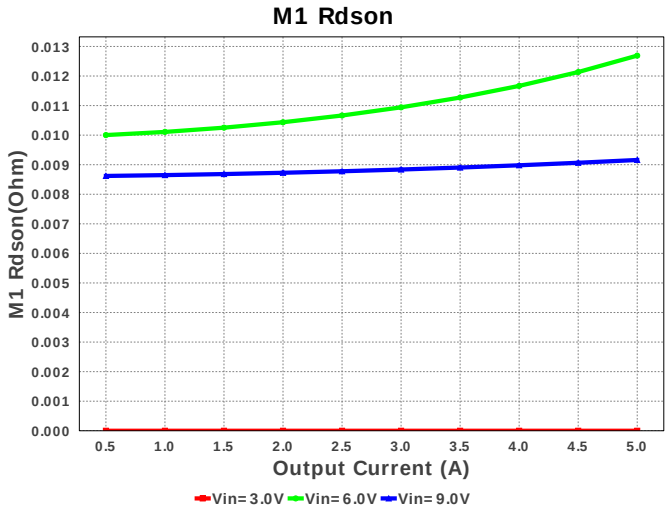


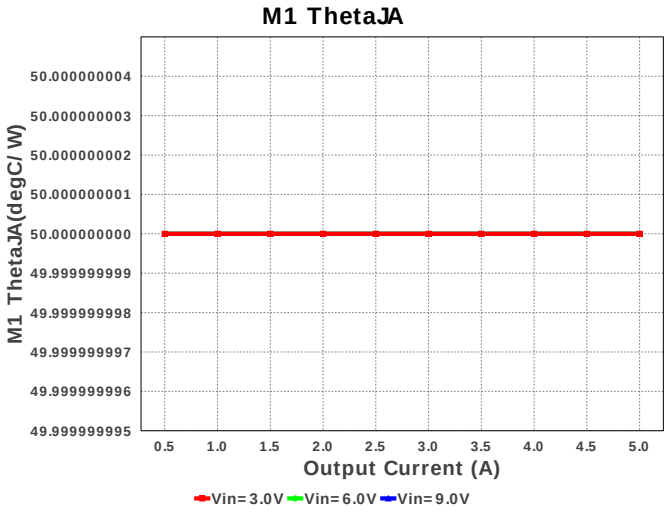


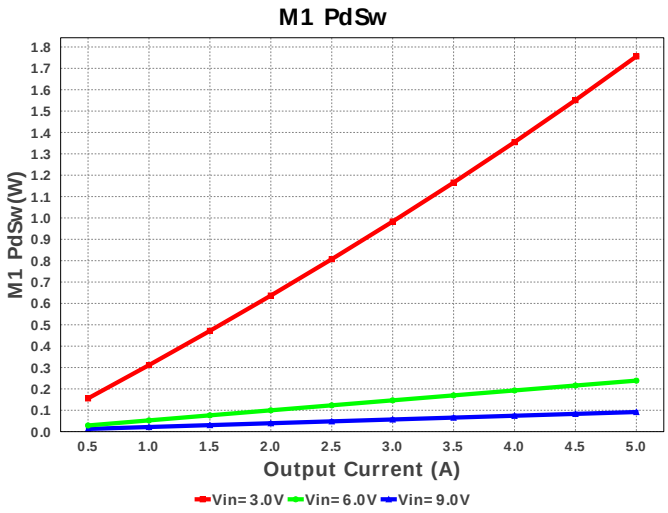


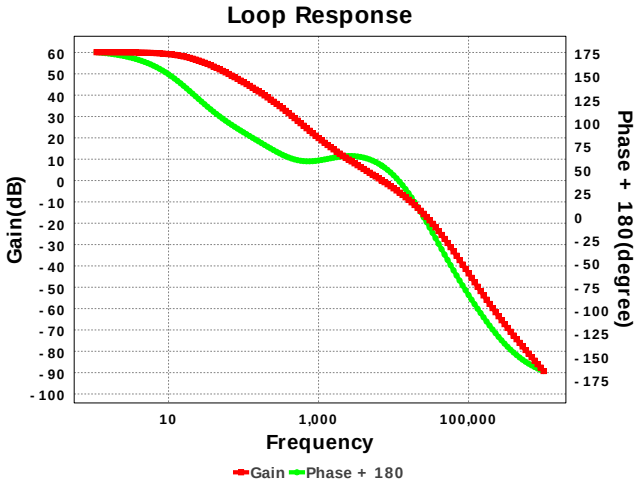












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.262 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	9.181 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	21.815 A	Current	Average input current
4.	L Ipp	4.37 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	21.82 A	Current	Inductor ripple current
6.	M1 Irms	20.915 A	Current	M1 MOSFET Irms
7.	SW Ipk	23.968 A	Current	Peak switch current
8.	BOM Count	22	General	Total Design BOM count
9.	FootPrint	685.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	521.23 kHz	General	Switching frequency
11.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance

#	Name	Value	Category	Description
12.	M Vds Act	0.0 V	General	M Vds
13.	M1 Rdson	0.0 Ohm	General	Drain-Source On-resistance
14.	M1 ThetaJA	50.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Pout	60.0 W	General	Total output power
16.	Total BOM	$6.59	General	Total BOM Cost
17.	D1 Tj	121.0 degC	Op_Point	D1 junction temperature
18.	Low Freq Gain	50.235 dB	Op_Point	Gain at 10Hz
19.	Vout Actual	11.907 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
20.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
21.	Cross Freq	2.853 kHz	Op_point	Bode plot crossover frequency
22.	Duty Cycle	77.047 %	Op_point	Duty cycle
23.	Efficiency	91.68 %	Op_point	Steady state efficiency
24.	Gain Marg	-15.089 dB	Op_point	Bode Plot Gain Margin
25.	IC Tj	33.91 degC	Op_point	IC junction temperature
26.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
27.	IOUT_OP	5.0 A	Op_point	Iout operating point
28.	M1 TjOP	118.331 degC	Op_point	M1 MOSFET junction temperature
29.	Phase Marg	60.643 deg	Op_point	Bode Plot Phase Margin
30.	VIN_OP	3.0 V	Op_point	Vin operating point
31.	Vout p-p	55.366 mV	Op_point	Peak-to-peak output ripple voltage
32.	Cin Pd	22.281 mW	Power	Input capacitor power dissipation
33.	Cout Pd	43.869 mW	Power	Output capacitor power dissipation
34.	Diode Pd	2.275 W	Power	Diode power dissipation
35.	IC Pd	19.551 mW	Power	IC power dissipation
36.	L Pd	571.324 mW	Power	Inductor power dissipation
37.	M1 Pd	1.767 W	Power	M1 MOSFET total power dissipation
38.	M1 PdCond	0.0 W	Power	M1 MOSFET conduction losses
39.	M1 PdSw	1.767 W	Power	M1 MOSFET switching losses
40.	Rfb Pd	15.238 mW	Power	Rfb Power Dissipation
41.	Rsense Pd	861.817 mW	Power	LED Current Rsns Power Dissipation
42.	Total Pd	5.445 W	Power	Total Power Dissipation
43.	Vout Tolerance	3.342 %		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	9.0	Maximum input voltage
3.	VinMin	3.0	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.