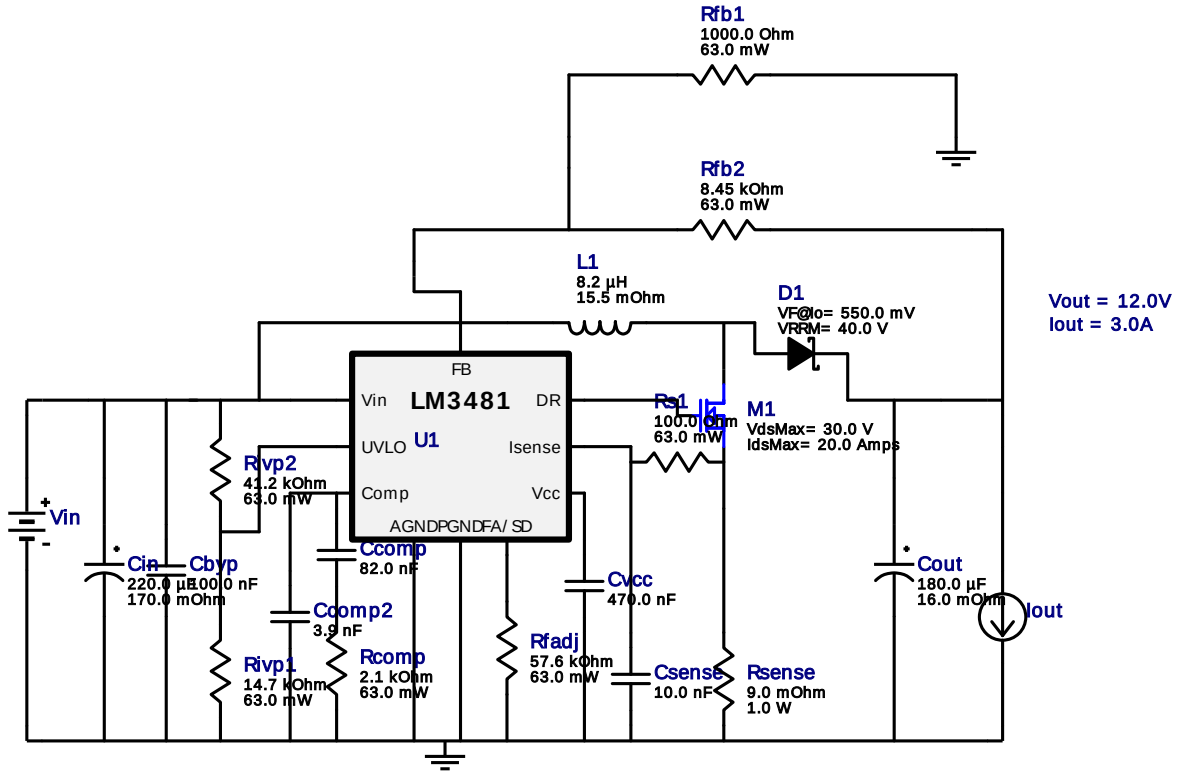
WEBENCH® Design Report

VinMin = 6.0V
VinMax = 11.0V
Vout = 12.0V
Iout = 3.0A

Device = LM3481MM/NOPB
Topology = Boost
Created = 11/13/16 12:00:52 PM
BOM Cost = $2.82
BOM Count = 19
Total Pd = 3.44W

Design : 4584502/34 LM3481MM/NOPB
LM3481MM/NOPB 6.0V-11.0V to 12.00V @ 3.0A

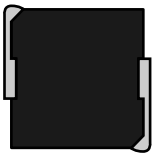


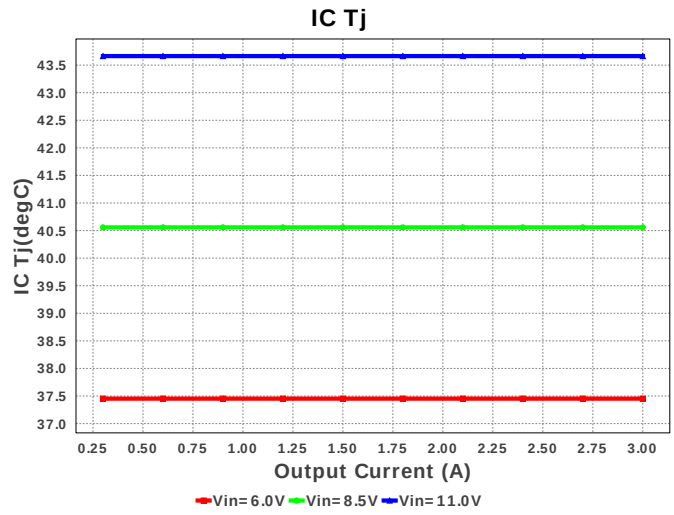
My Comments

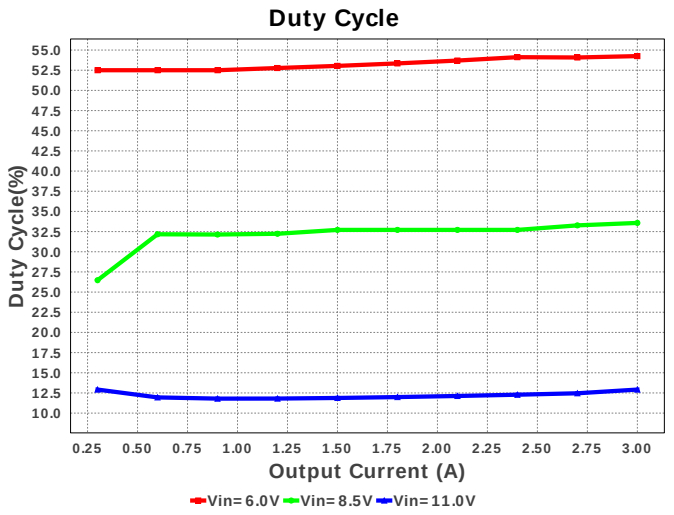
No comments

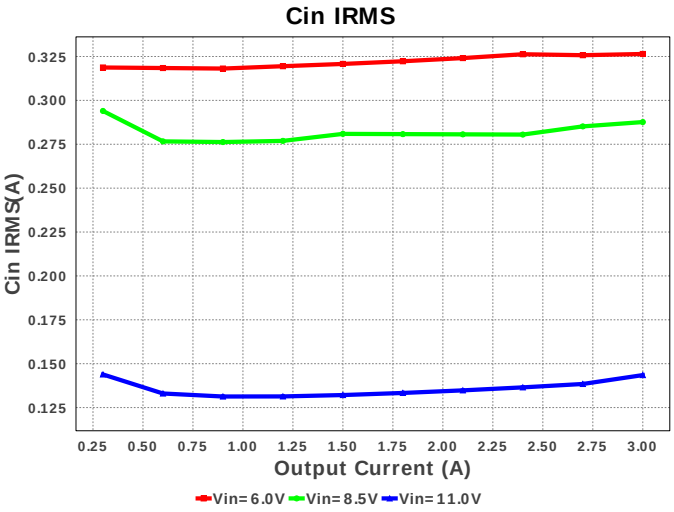
Electrical BOM

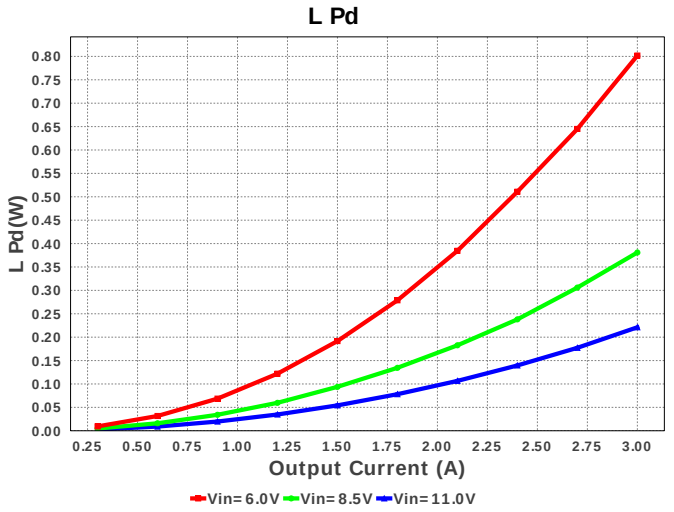
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	MuRata	GRM155R61A823KA01D Series= X5R	Cap= 82.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Ccomp2	MuRata	GRM033R71A392KA01D Series= X7R	Cap= 3.9 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
4.	Cin	Nichicon	UUD1E221MNL1GS Series= uD	Cap= 220.0 uF ESR= 170.0 mOhm VDC= 25.0 V IRMS= 450.0 mA	1	$0.16	SM_RADIAL_8MM 113 mm²
5.	Cout	Panasonic	25SVPF180M Series= ?	Cap= 180.0 uF ESR= 16.0 mOhm VDC= 25.0 V IRMS= 4.65 A	1	$0.61	CAPSMT_62_E12 106 mm²
6.	Csense	MuRata	GRM033R60J103KA01D Series= X5R	Cap= 10.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 2 mm²

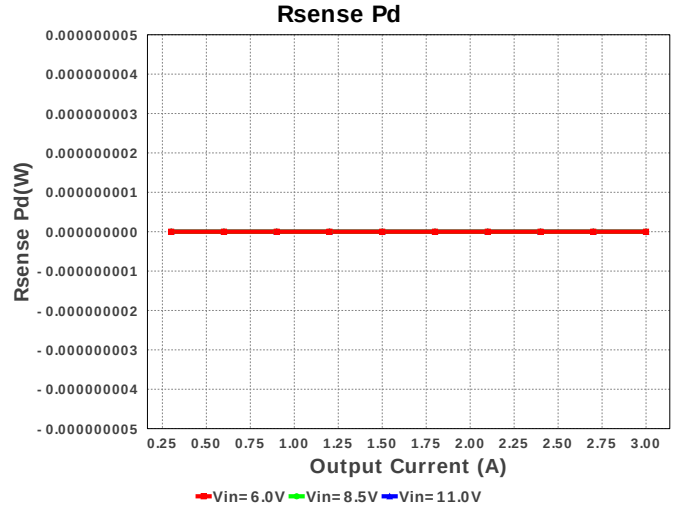
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Cvcc	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
8.	D1	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.17	 SMC 83 mm²
9.	L1	Bourns	SRP1270-8R2M	L= 8.2 µH DCR= 15.5 mOhm	1	$0.60	 SRP1270 246 mm²
10.	M1	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.17	 DNH0008A 18 mm²
11.	Rcomp	Vishay-Dale	CRCW04022K10FKED Series= CRCW..e3	Res= 2.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	Rfadj	Vishay-Dale	CRCW040257K6FKED Series= CRCW..e3	Res= 57.6 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	CRCW040214K7FKED Series= CRCW..e3	Res= 14.7 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	Susumu Co Ltd	PRL1632-R009-F-T1 Series= PRL1632	Res= 9.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	 0612 11 mm²
19.	U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	$0.80	 MUB10A 24 mm²

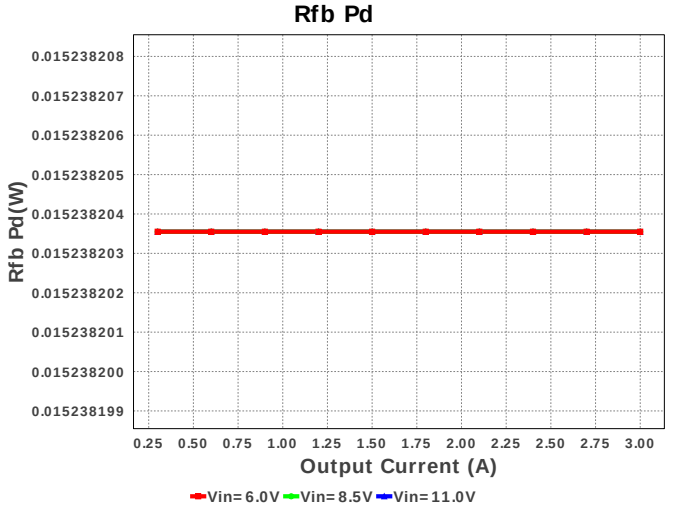


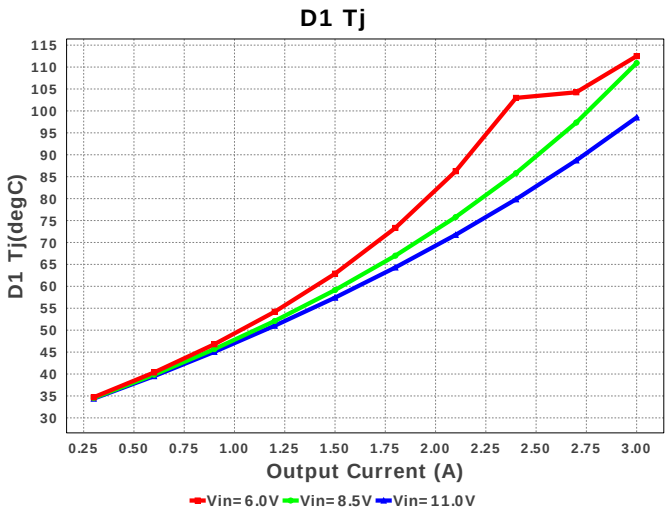


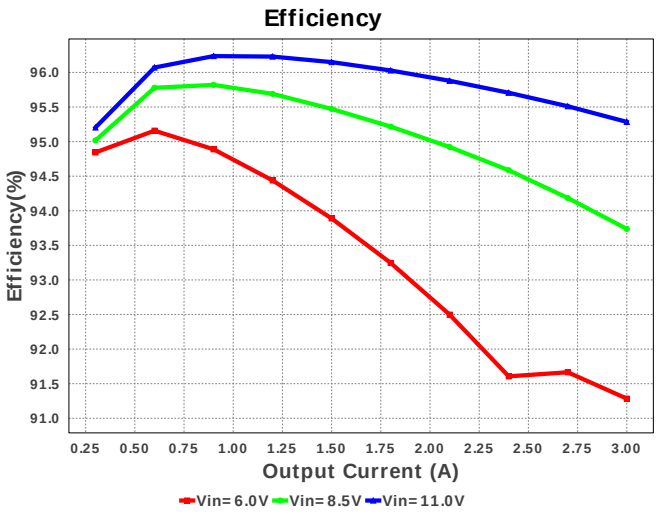


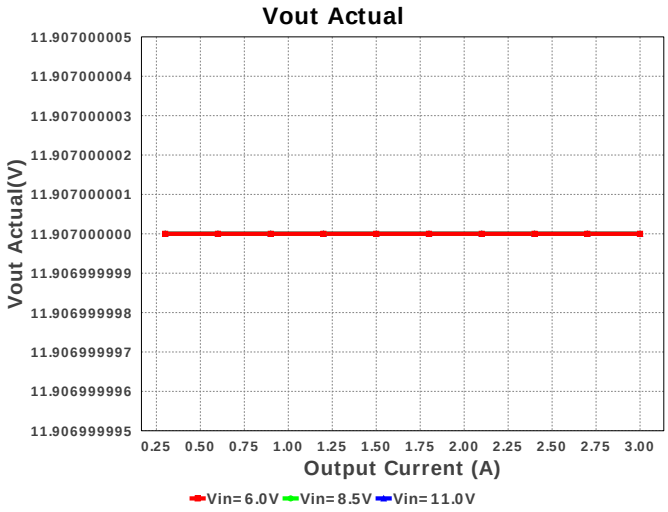


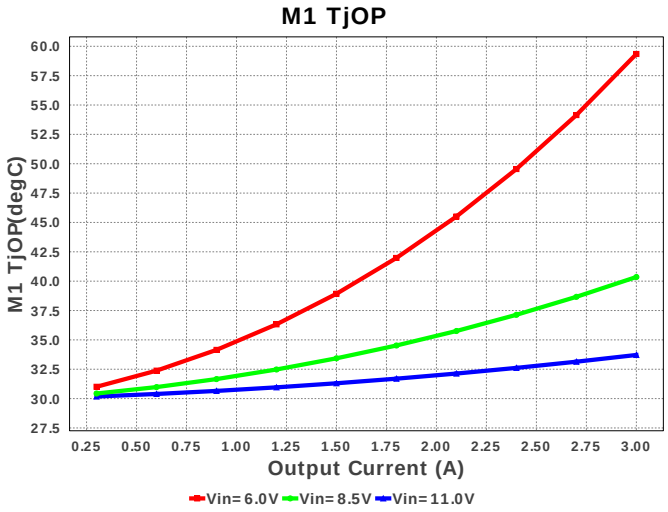


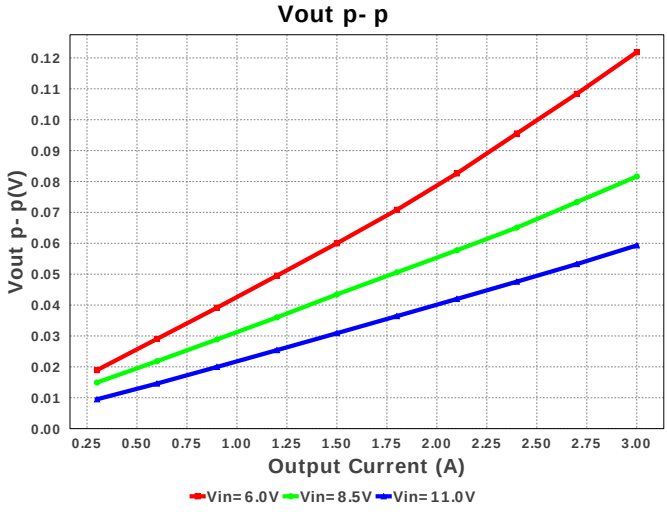


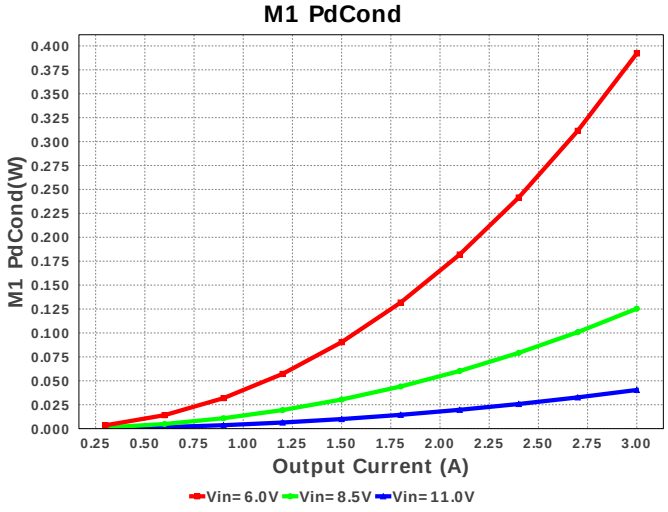


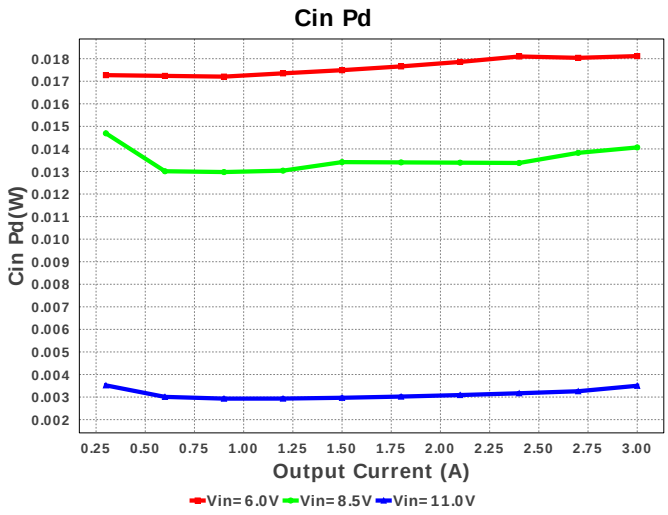


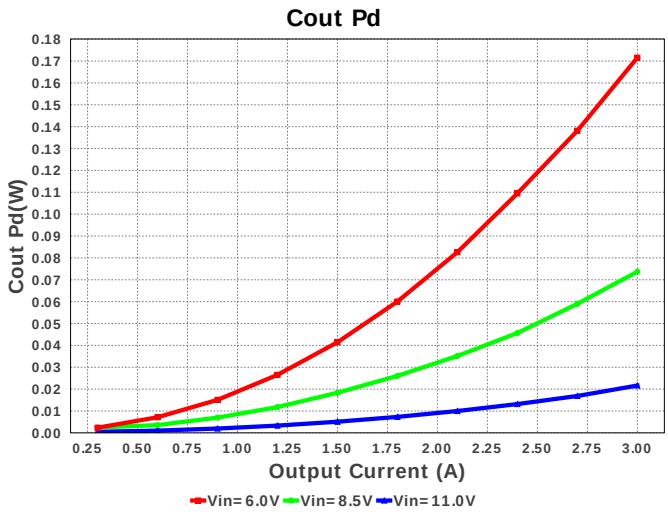


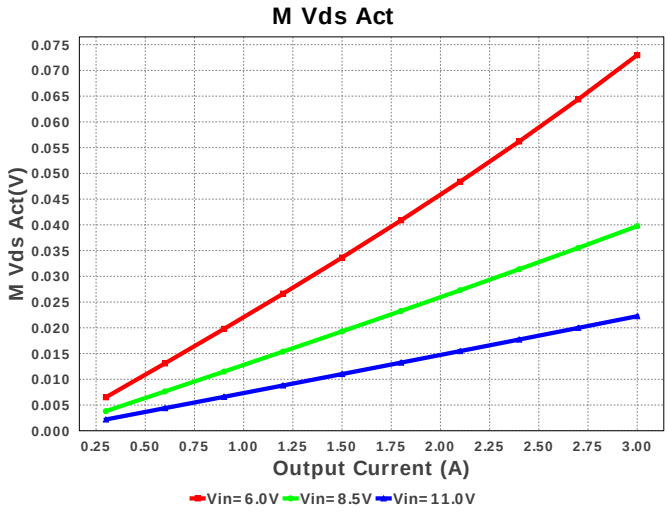


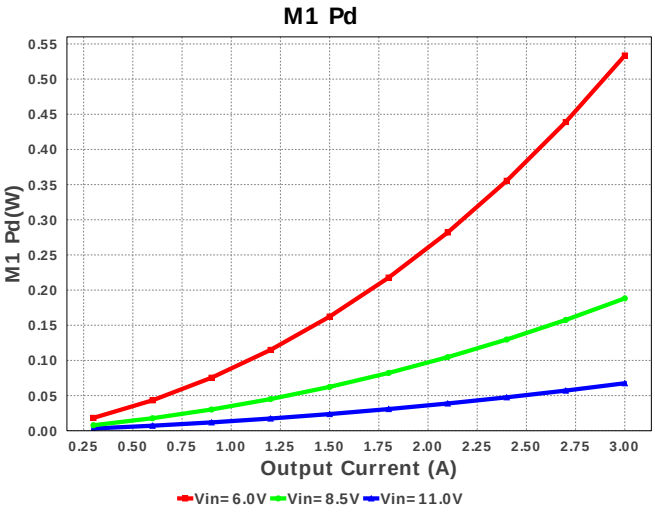


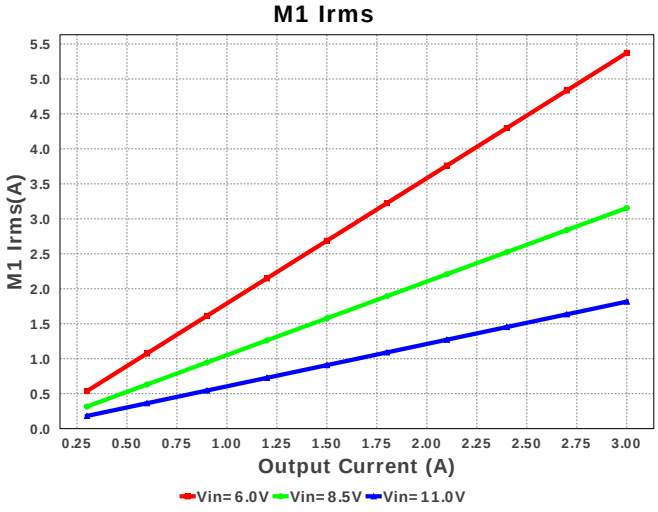


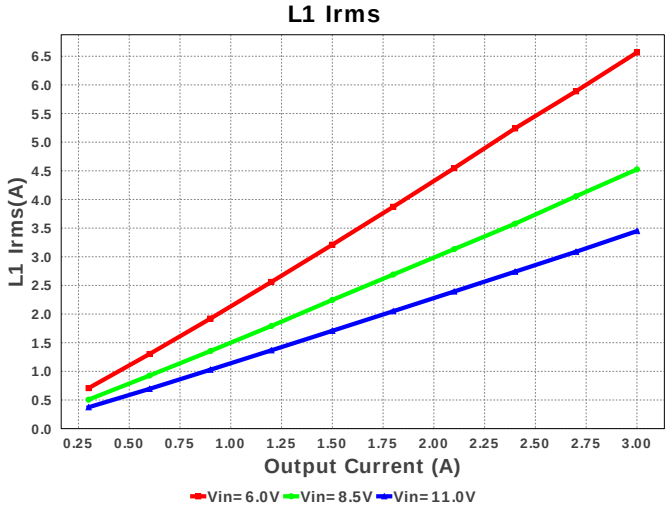


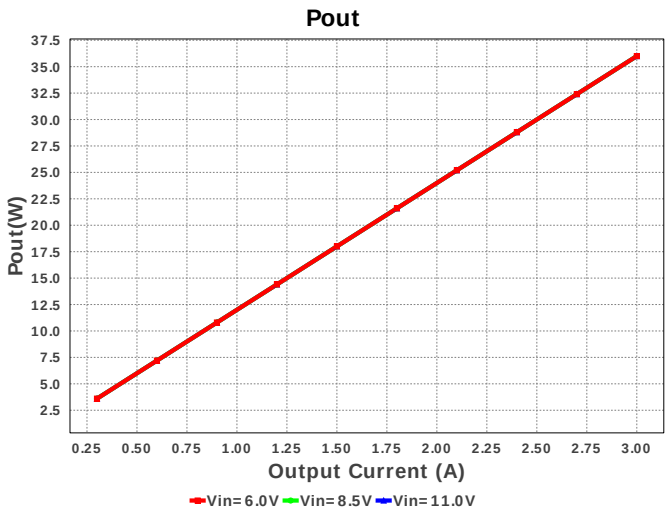


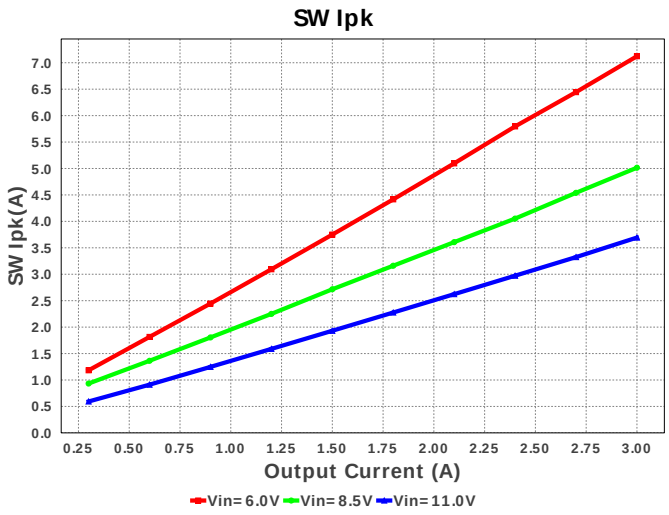


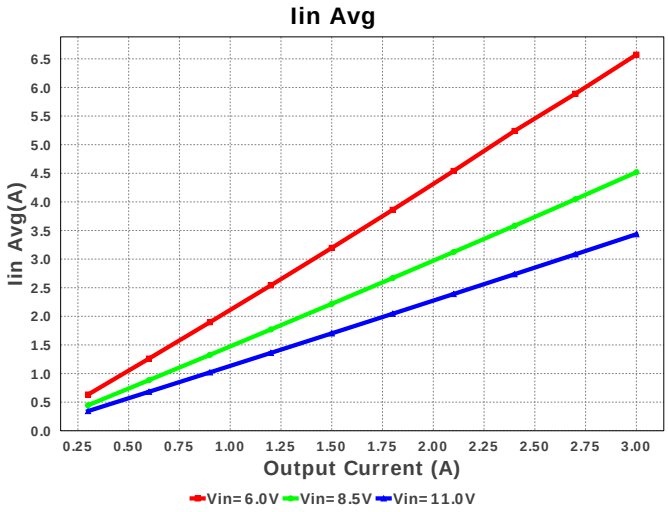


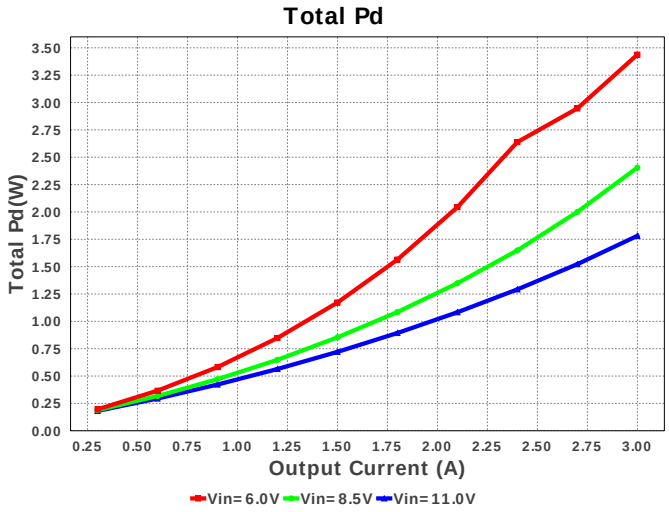


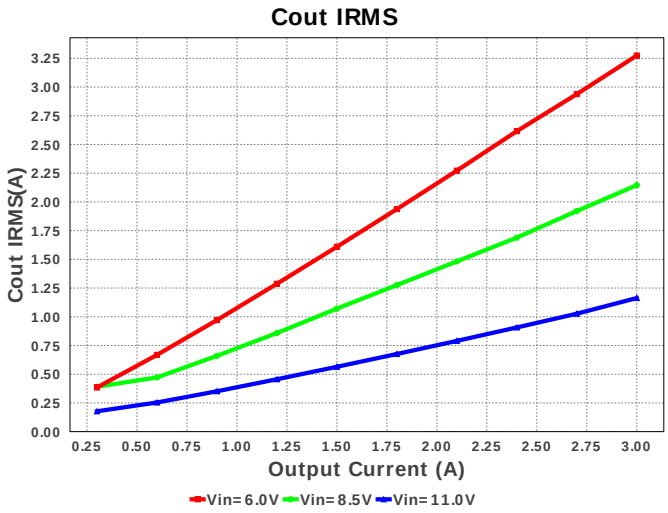


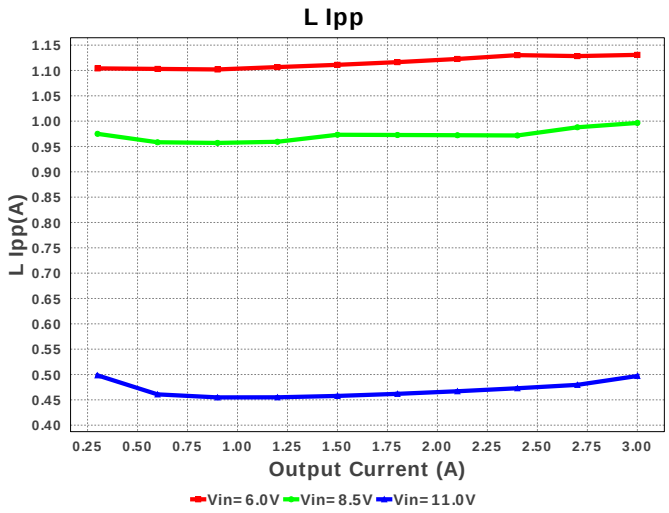


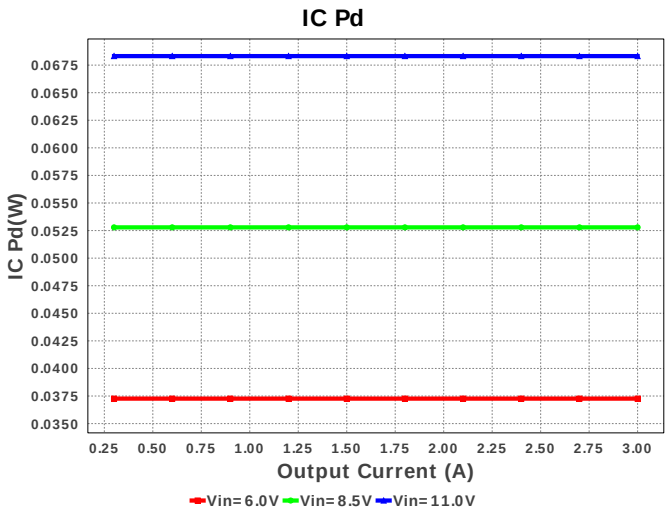


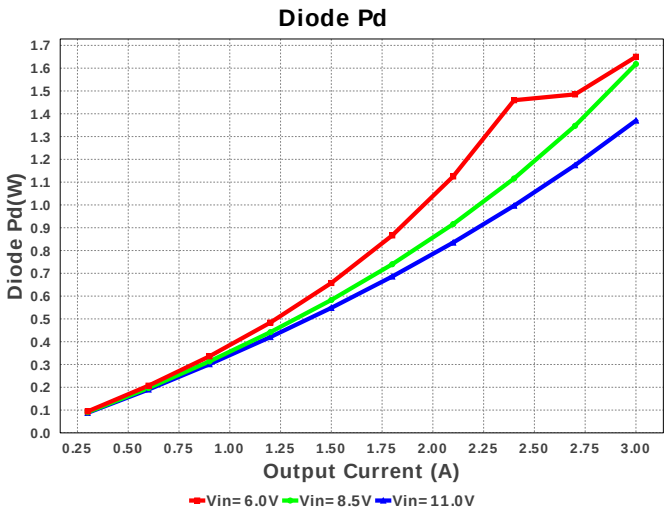


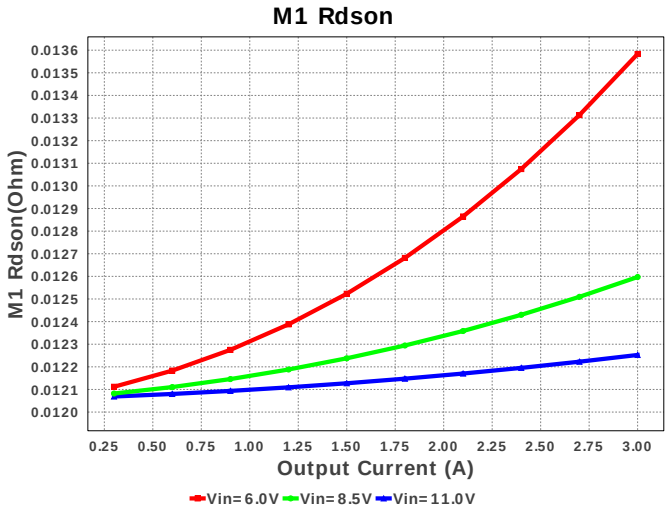


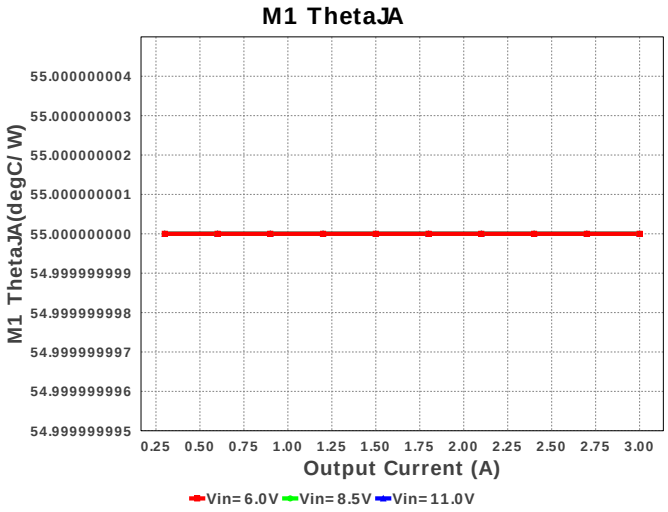


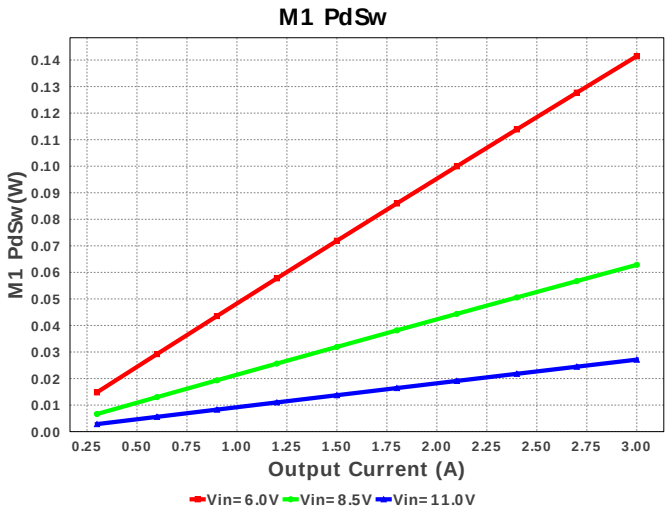


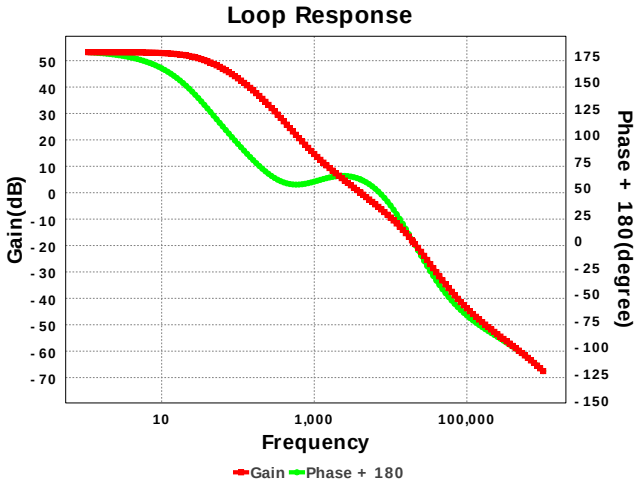












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	326.455 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	3.275 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	6.574 A	Current	Average input current
4.	L Ipp	1.131 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	6.566 A	Current	Inductor ripple current
6.	M1 Irms	5.362 A	Current	M1 MOSFET Irms
7.	SW Ipk	7.124 A	Current	Peak switch current
8.	BOM Count	19	General	Total Design BOM count
9.	FootPrint	636.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	347.592 kHz	General	Switching frequency
11.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance

#	Name	Value	Category	Description
12.	M Vds Act	72.875 mV	General	M Vds
13.	M1 Rdson	13.592 mOhm	General	Drain-Source On-resistance
14.	M1 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Mode	CCM	General	Conduction Mode
16.	Pout	36.0 W	General	Total output power
17.	Total BOM	$2.82	General	Total BOM Cost
18.	D1 Tj	112.5 degC	Op_Point	D1 junction temperature
19.	Low Freq Gain	47.606 dB	Op_Point	Gain at 10Hz
20.	Vout Actual	11.907 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	2.296 kHz	Op_point	Bode plot crossover frequency
23.	Duty Cycle	54.255 %	Op_point	Duty cycle
24.	Efficiency	91.276 %	Op_point	Steady state efficiency
25.	Gain Marg	-15.94 dB	Op_point	Bode Plot Gain Margin
26.	IC Tj	37.486 degC	Op_point	IC junction temperature
27.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
28.	IOUT_OP	3.0 A	Op_point	Iout operating point
29.	M1 TjOP	59.52 degC	Op_point	M1 MOSFET junction temperature
30.	Phase Marg	56.931 deg	Op_point	Bode Plot Phase Margin
31.	VIN_OP	6.0 V	Op_point	Vin operating point
32.	Vout p-p	121.897 mV	Op_point	Peak-to-peak output ripple voltage
33.	Cin Pd	18.117 mW	Power	Input capacitor power dissipation
34.	Cout Pd	171.568 mW	Power	Output capacitor power dissipation
35.	Diode Pd	1.65 W	Power	Diode power dissipation
36.	IC Pd	37.429 mW	Power	IC power dissipation
37.	L Pd	801.942 mW	Power	Inductor power dissipation
38.	M1 Pd	536.719 mW	Power	M1 MOSFET total power dissipation
39.	M1 PdCond	390.723 mW	Power	M1 MOSFET conduction losses
40.	M1 PdSw	145.996 mW	Power	M1 MOSFET switching losses
41.	Rfb Pd	15.238 mW	Power	Rfb Power Dissipation
42.	Rsense Pd	358.334 mW	Power	LED Current Rsns Power Dissipation
43.	Total Pd	3.441 W	Power	Total Power Dissipation
44.	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	3.0	Maximum Output Current
2.	VinMax	11.0	Maximum input voltage
3.	VinMin	6.0	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
8.	UserFsw	182.344 k	Customer Selected Frequency

Design Assistance

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