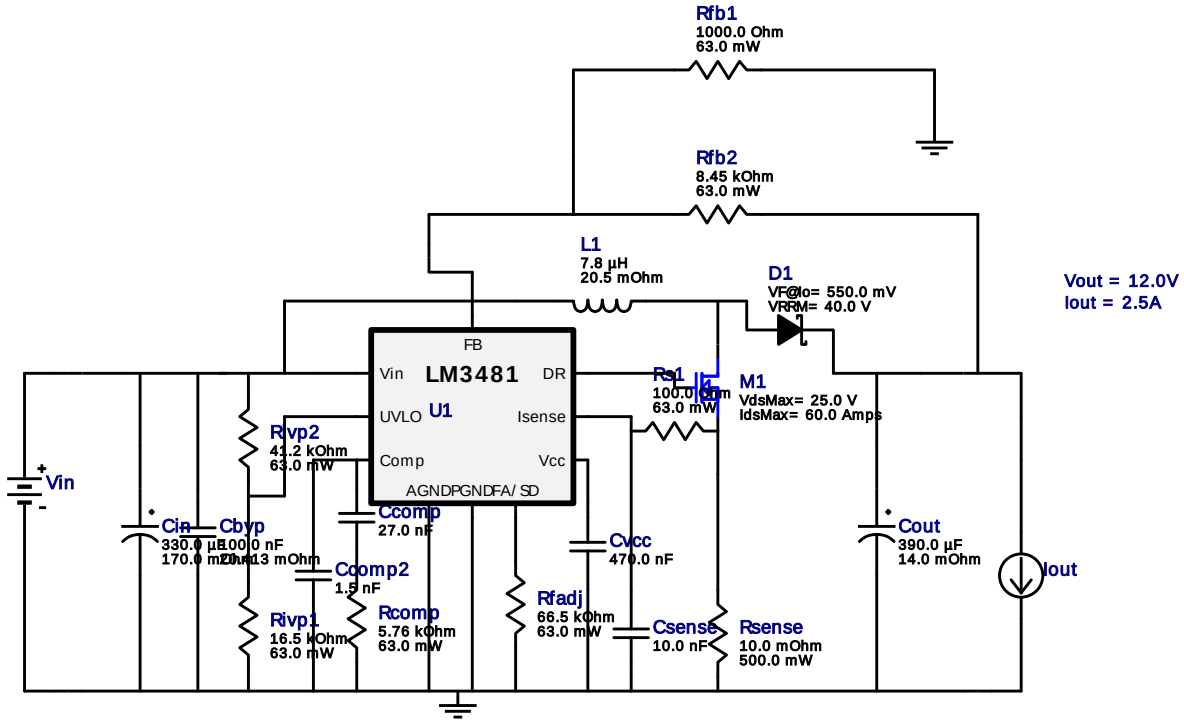
WEBENCH® Design Report

VinMin = 5.5V
VinMax = 8.5V
Vout = 12.0V
Iout = 2.5A

Device = LM3481MM/NOPB
Topology = Boost
Created = 7/21/14 8:20:27 AM
BOM Cost = $3.17
BOM Count = 19
Total Pd = 3.07W

Design : 1177446/89 LM3481MM/NOPB
LM3481MM/NOPB 5.5V-8.5V to 12.0V @ 2.5A

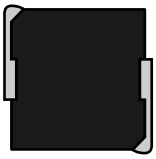


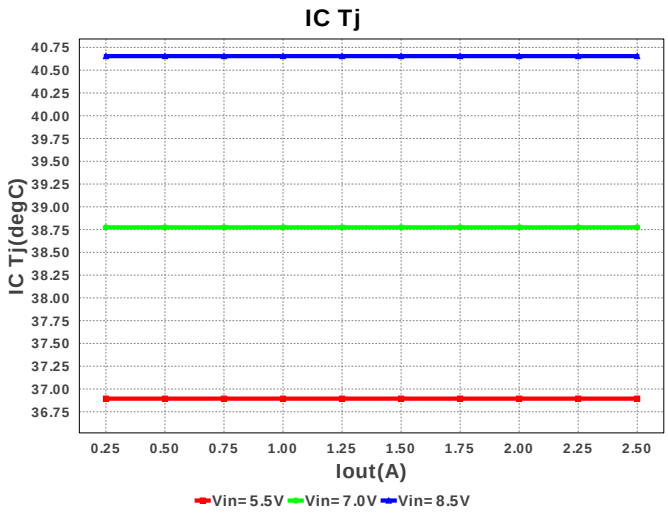
My Comments

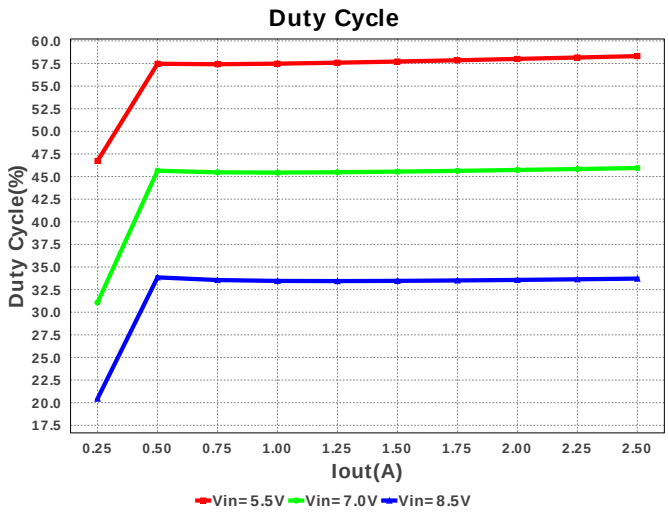
No comments

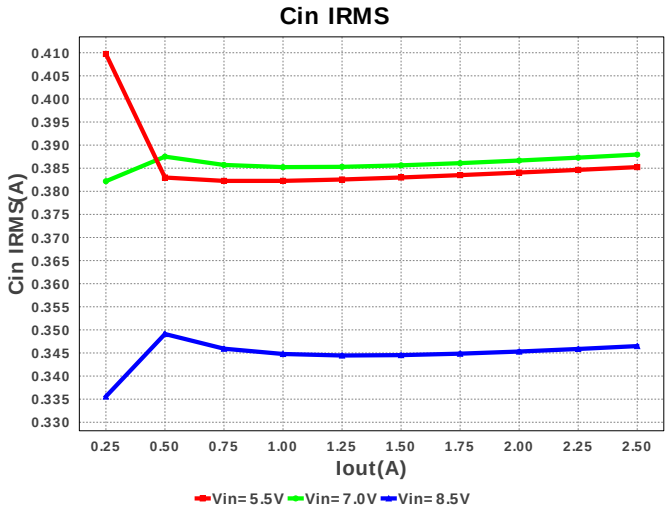
Electrical BOM

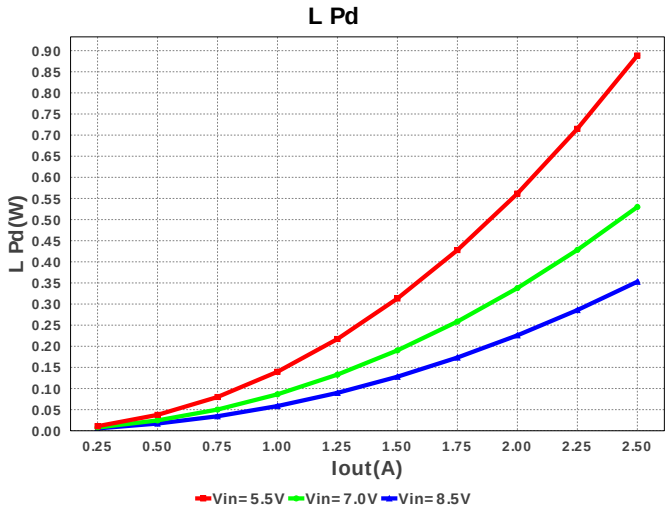
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	TDK	C1005X5R1A104K Series= 285	Cap= 100.0 nF ESR= 20.413 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB273 Series= X7R	Cap= 27.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB152 Series= X7R	Cap= 1.5 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	Nichicon	UUD1C331MNL1GS Series= uD	Cap= 330.0 uF ESR= 170.0 mOhm VDC= 16.0 V IRMS= 450.0 mA	1	$0.20	SM_RADIAL_8MM 113 mm²
5.	Cout	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
6.	Csense	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²

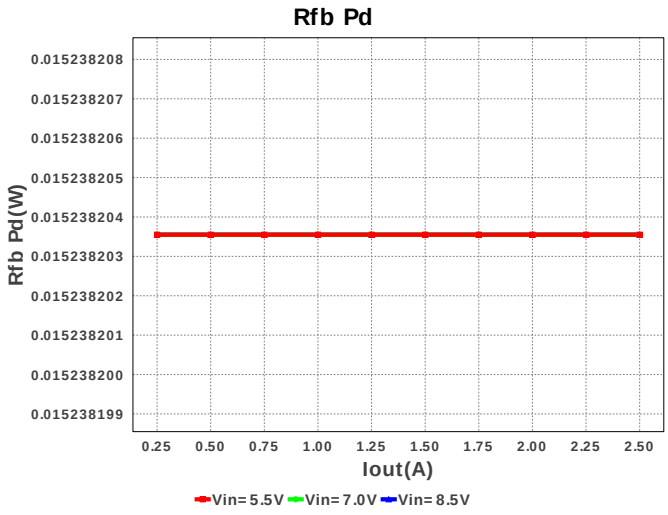
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Cvcc	MuRata	GRM155C80G474KE01D Series= 379	Cap= 470.0 nF VDC= 4.0 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
8.	D1	Comchip Technology	CDBC540-G	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.23	 SMC 83 mm²
9.	L1	Bourns	SRP1250-7R8M	L= 7.8 µH DCR= 20.5 mOhm	1	$0.64	 SRP1250 253 mm²
10.	M1	Texas Instruments	CSD16327Q3	VdsMax= 25.0 V IdsMax= 60.0 Amps	1	$0.44	 TRANS_NexFET_Q3 19 mm²
11.	Rcomp	Vishay-Dale	CRCW04025K76FKED Series= CRCW..e3	Res= 5.76 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	Rfadj	Vishay-Dale	CRCW040266K5FKED Series= CRCW..e3	Res= 66.5 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	CRCW040216K5FKED Series= CRCW..e3	Res= 16.5 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	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.11	 1206 11 mm²
19.	U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	$0.80	 MUB10A 24 mm²

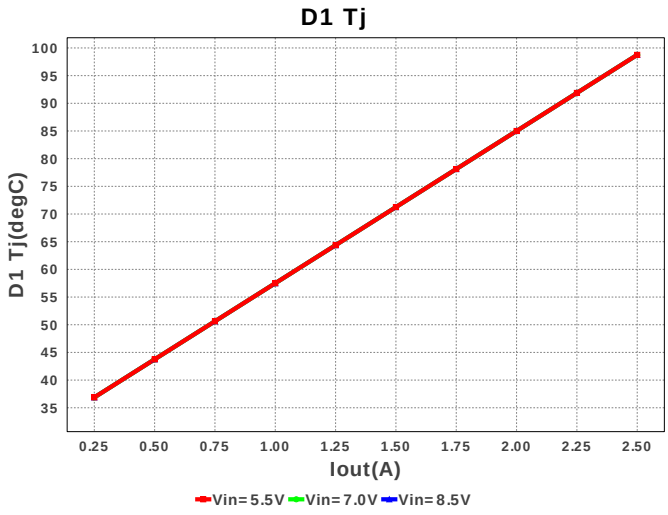




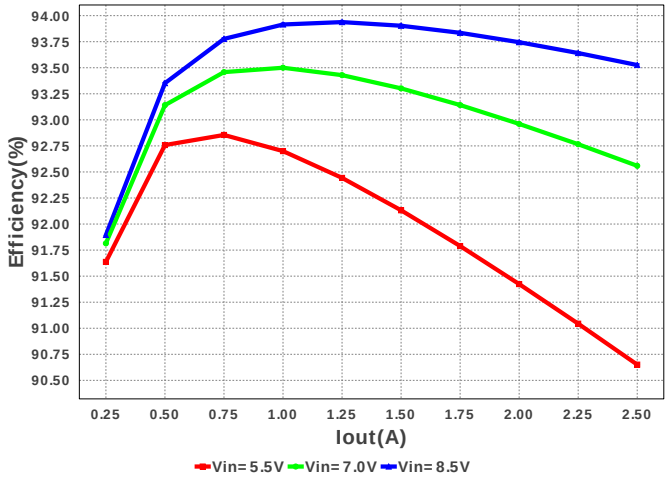




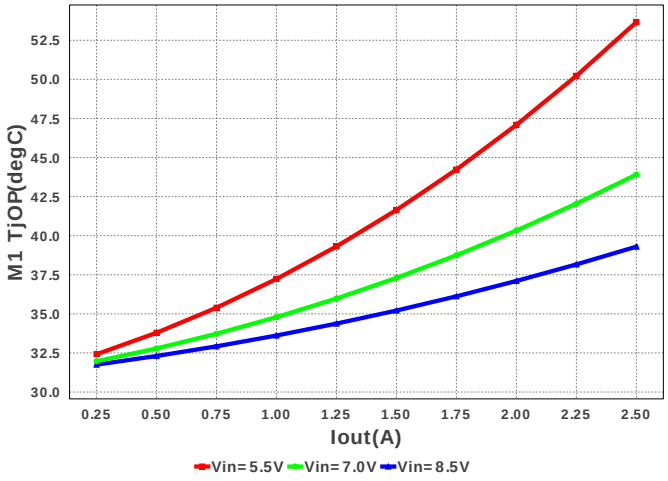




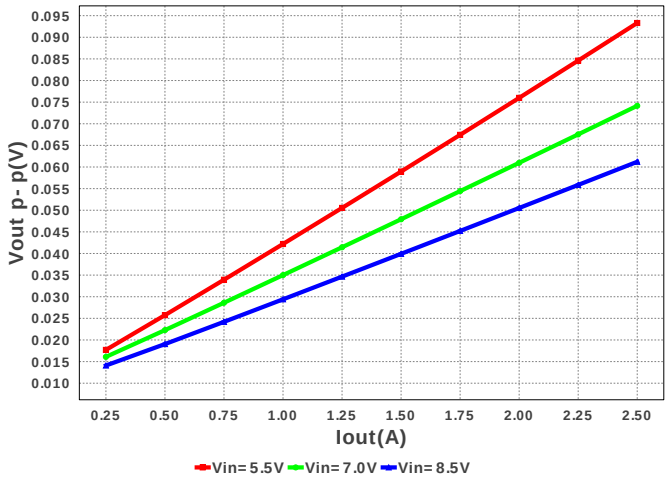
Efficiency



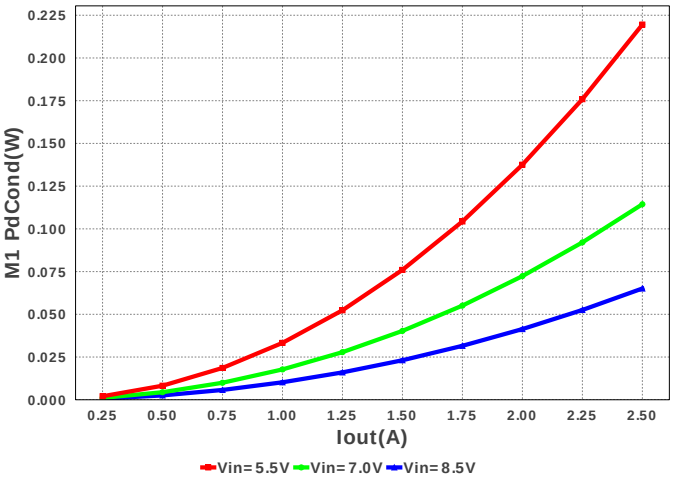
M1 TjOP



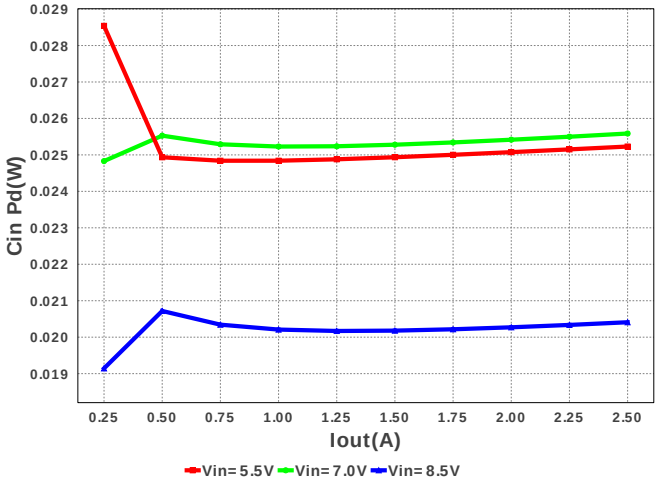
Vout p- p



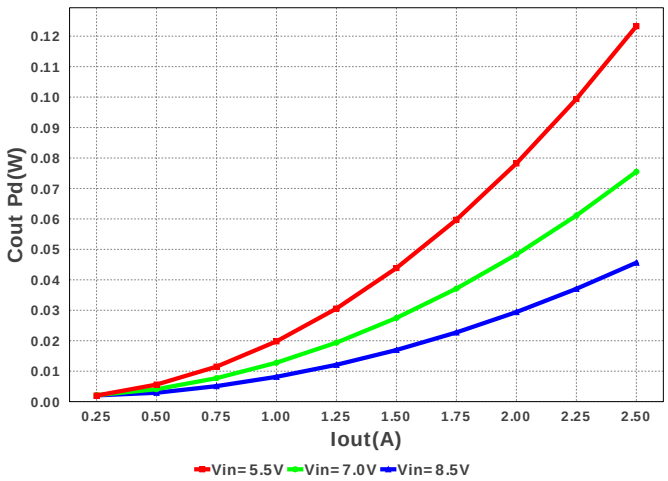
M1 PdCond

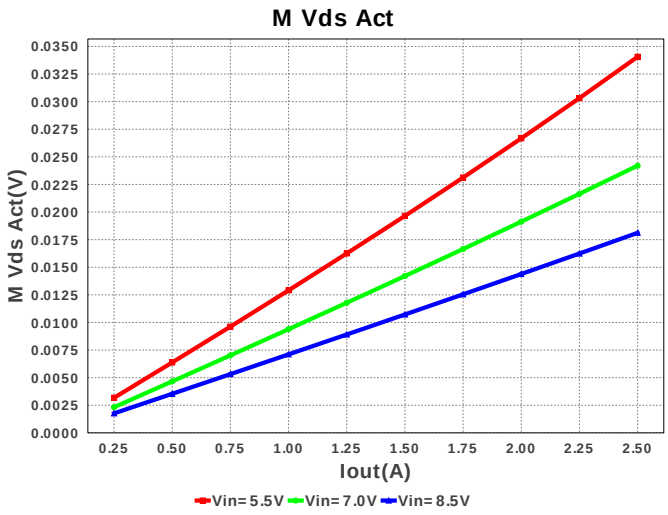


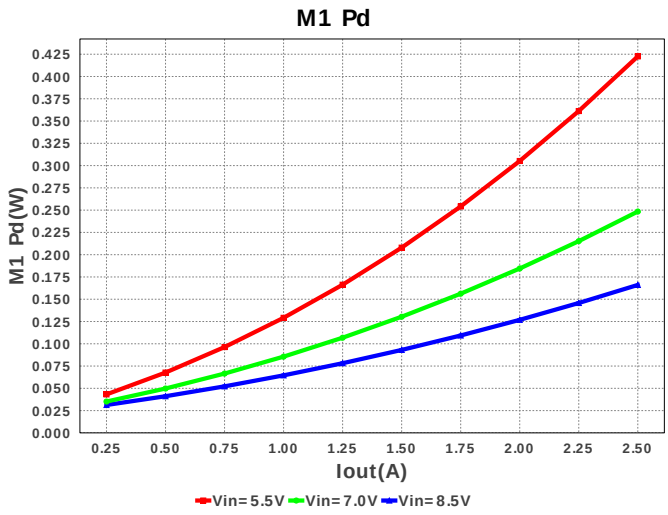
Cin Pd

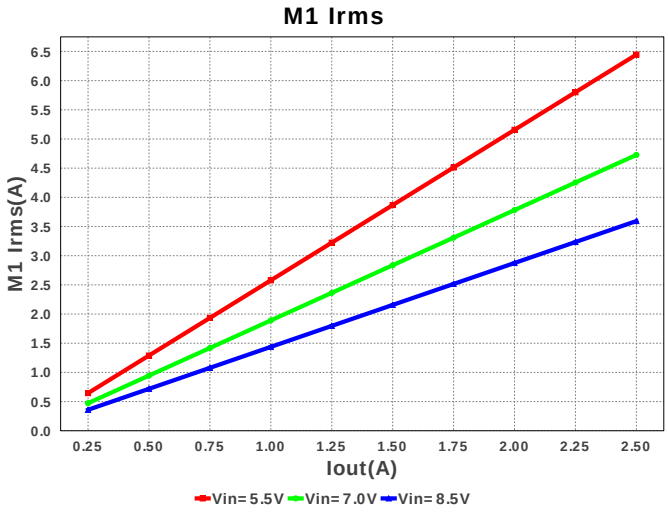


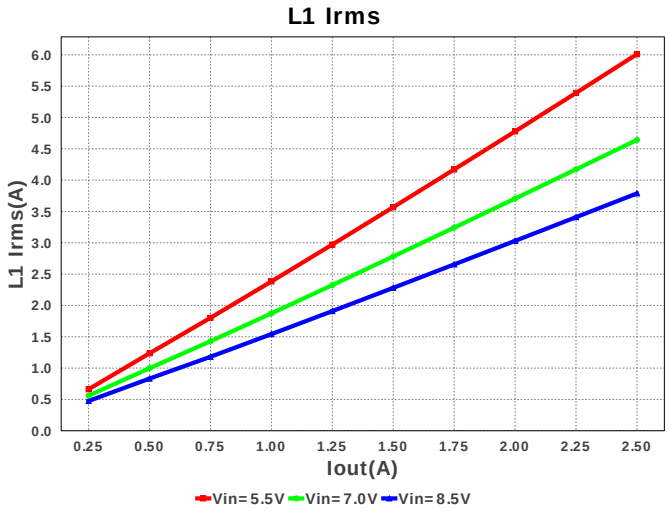
Cout Pd

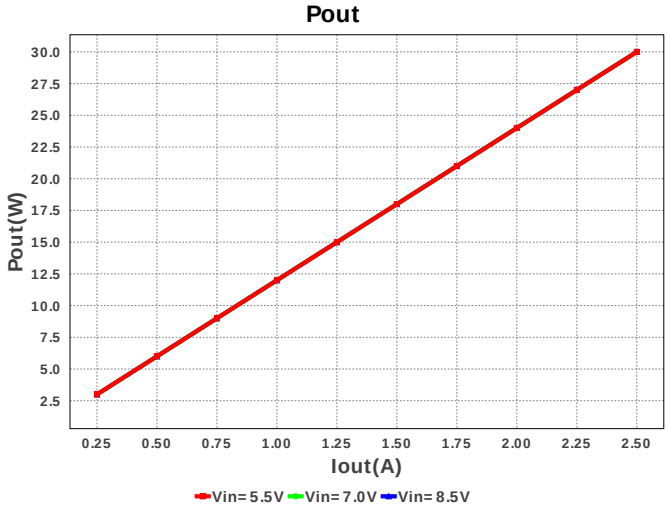


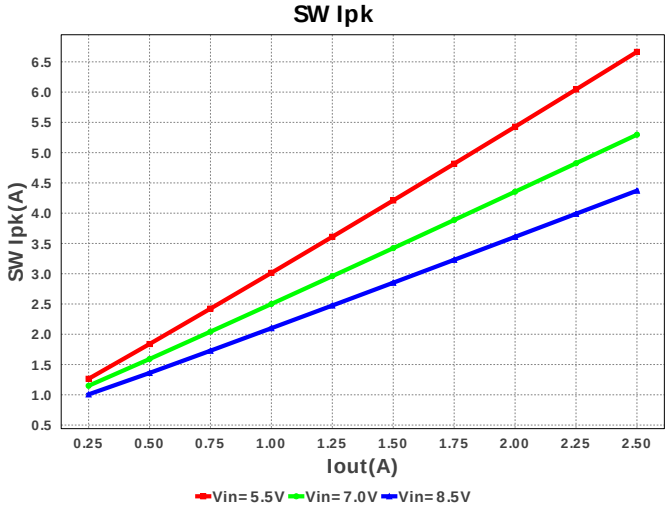


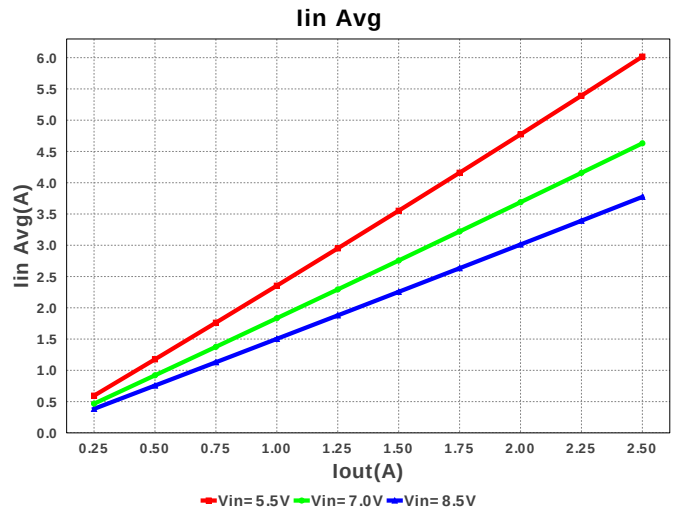


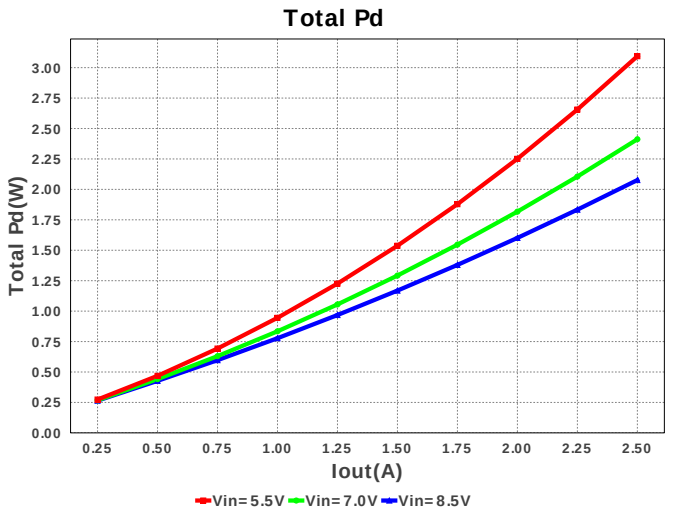


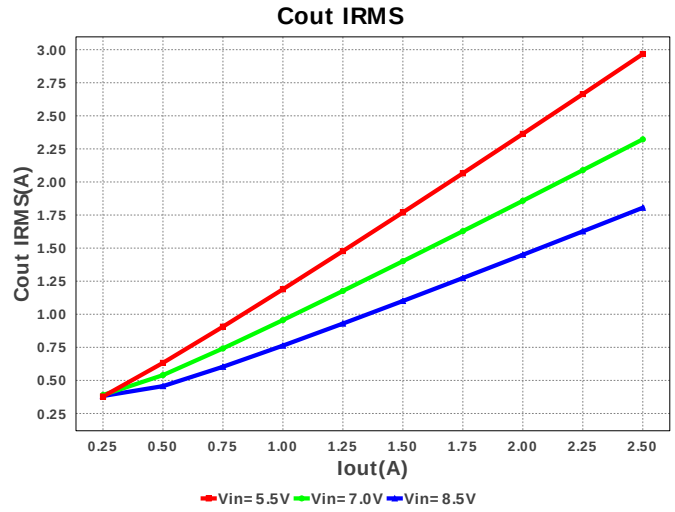


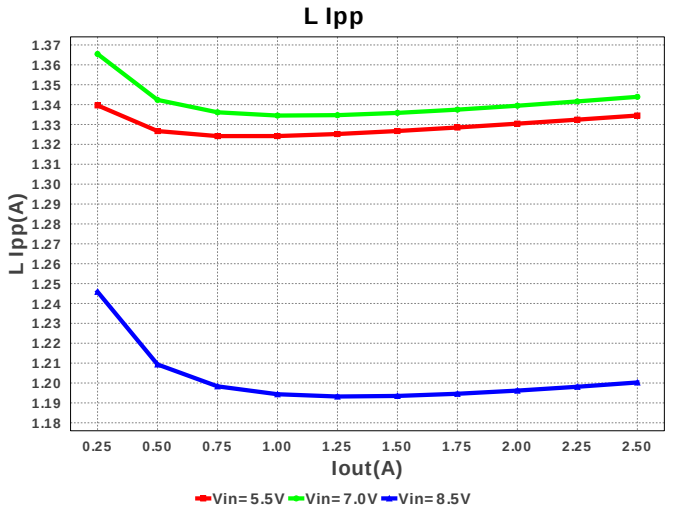


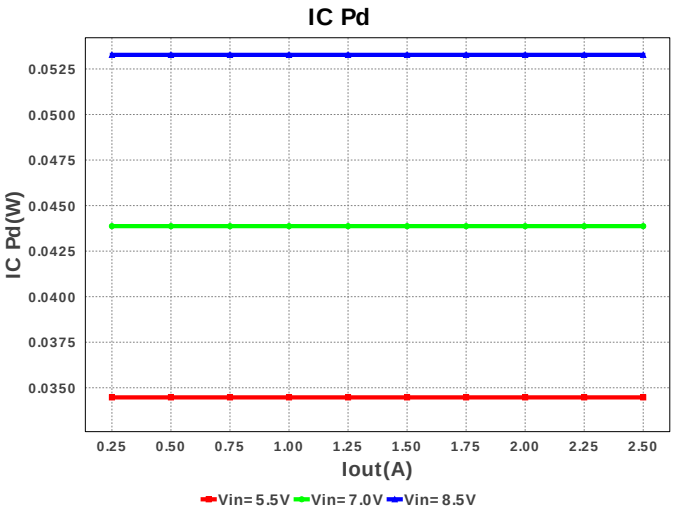


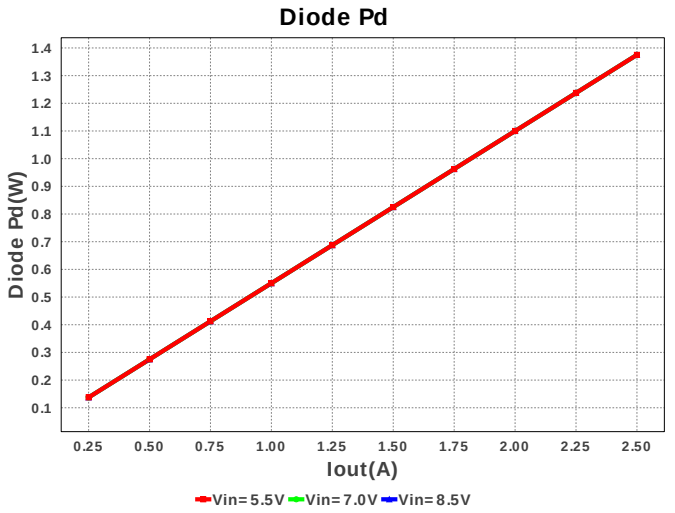


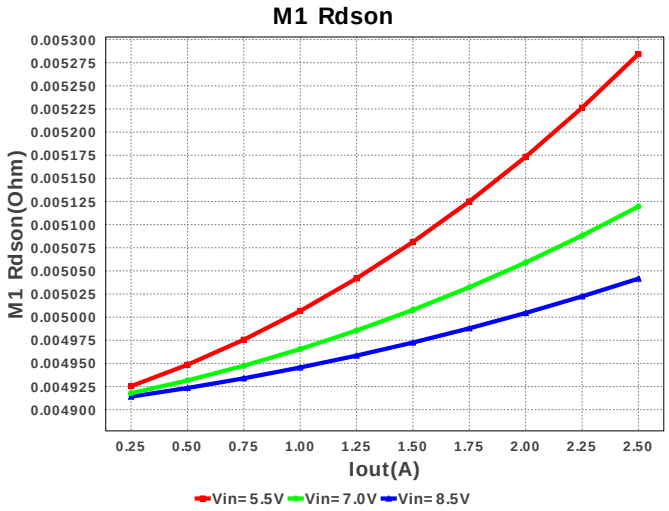


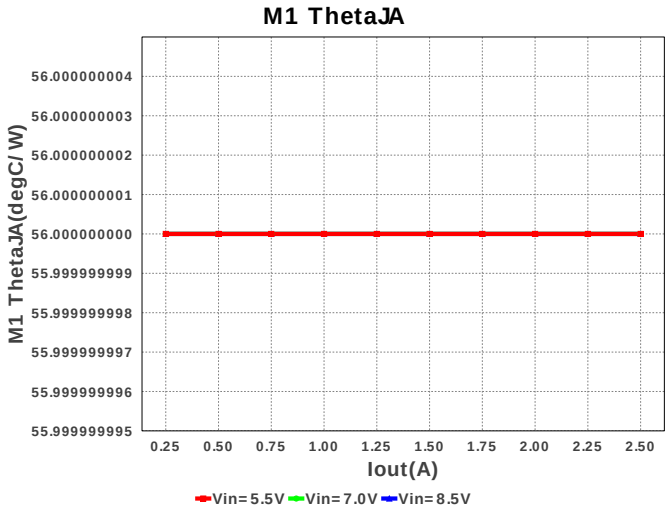


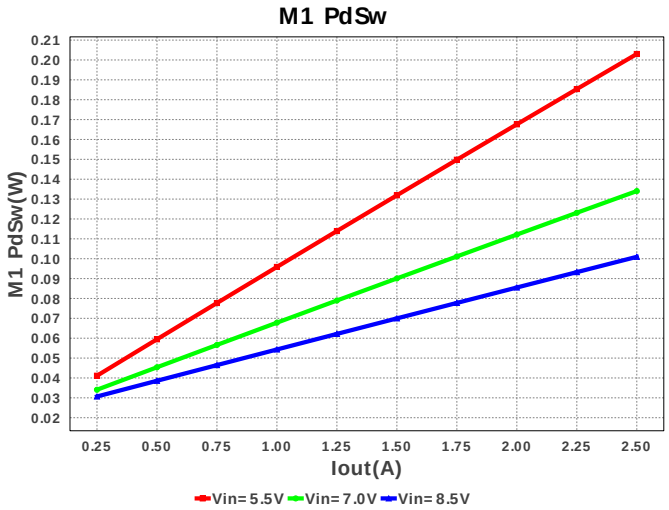


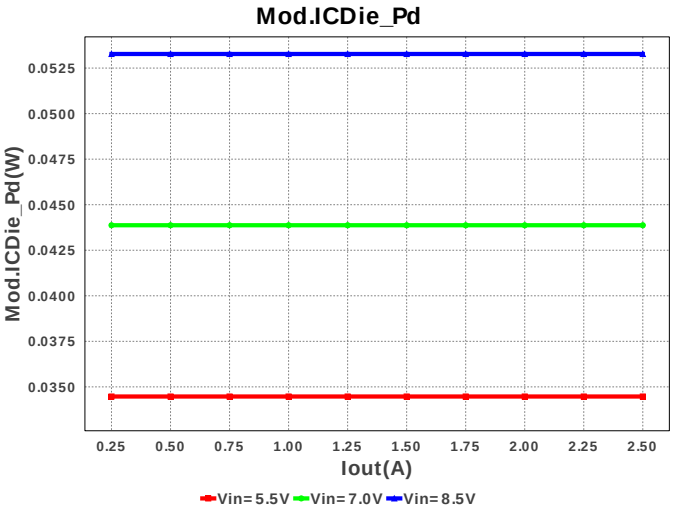












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	385.049 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	2.966 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	6.013 A	Current	Average input current
4.	L Ipp	1.334 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	6.006 A	Current	Inductor ripple current
6.	M1 Irms	6.432 A	Current	M1 MOSFET Irms
7.	SW Ipk	6.66 A	Current	Peak switch current
8.	BOM Count	19	General	Total Design BOM count
9.	FootPrint	657.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	304.768 kHz	General	Switching frequency
11.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	33.85 mV	General	M Vds
13.	M1 Rdson	5.263 mOhm	General	Drain-Source On-resistance
14.	M1 ThetaJA	56.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Mode	CCM	General	Conduction Mode
16.	Pout	30.0 W	General	Total output power
17.	Total BOM	$3.17	General	Total BOM Cost
18.	D1 Tj	98.75 degC	Op_Point	D1 junction temperature
19.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
20.	Cross Freq	2.278 kHz	Op_point	Bode plot crossover frequency
21.	Duty Cycle	58.286 %	Op_point	Duty cycle
22.	Efficiency	90.719 %	Op_point	Steady state efficiency
23.	IC Tj	36.912 degC	Op_point	IC junction temperature
24.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	2.5 A	Op_point	Iout operating point
26.	M1 TjOP	52.374 degC	Op_point	M1 MOSFET junction temperature
27.	Phase Marg	56.175 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	5.5 V	Op_point	Vin operating point
29.	Vout p-p	93.242 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	25.205 mW	Power	Input capacitor power dissipation
31.	Cout Pd	123.129 mW	Power	Output capacitor power dissipation

#	Name	Value	Category	Description
32.	Diode Pd	1.375 W	Power	Diode power dissipation
33.	IC Pd	34.56 mW	Power	IC power dissipation
34.	L Pd	887.253 mW	Power	Inductor power dissipation
35.	M1 Pd	399.527 mW	Power	M1 MOSFET total power dissipation
36.	M1 PdCond	217.738 mW	Power	M1 MOSFET conduction losses
37.	M1 PdSw	181.789 mW	Power	M1 MOSFET switching losses
38.	Rfb Pd	15.238 mW	Power	Rfb Power Dissipation
39.	Total Pd	3.069 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.5	Maximum Output Current
2.	Iout1	2.5	Output Current #1
3.	VinMax	8.5	Maximum input voltage
4.	VinMin	5.5	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.