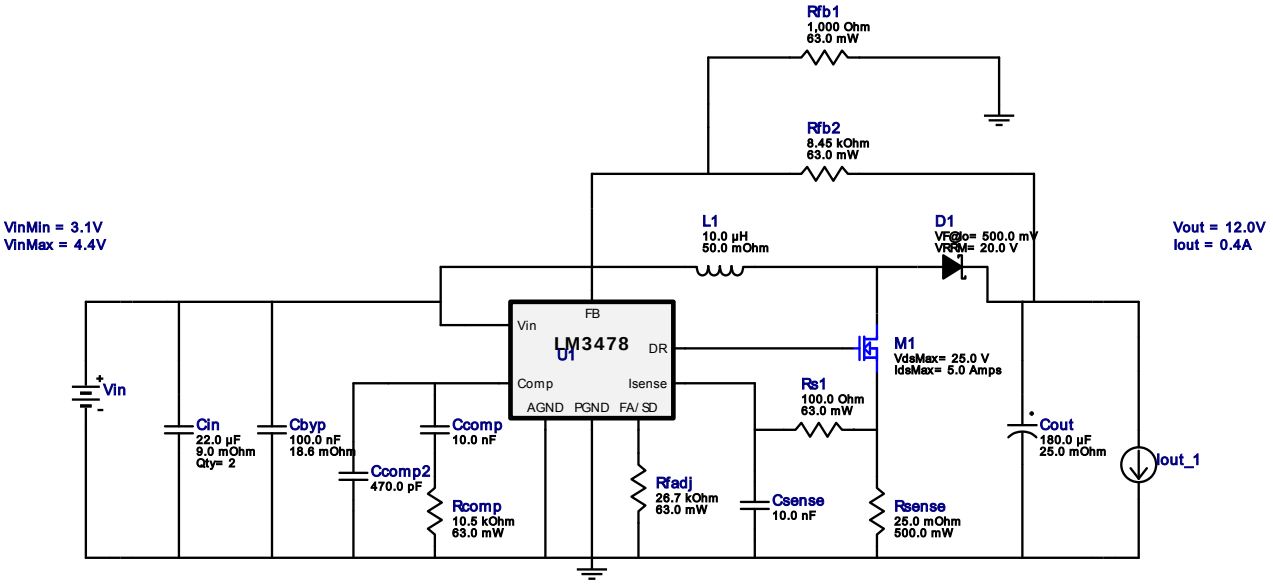
VinMin = 3.1V
VinMax = 4.4V
Vout = 12.0V
Iout = 0.4A

Device = LM3478MM/NOPB
Topology = Boost
Created = 4/24/14 6:09:47 AM
BOM Cost = $2.13
Footprint = 385.0mm2
BOM Count = 17
Total Pd = 0.69W

WEBENCH® Design Report

Design : LM3478MM/NOPB
LM3478MM/NOPB 3.1V-4.4V to 12.0V @ 0.4A

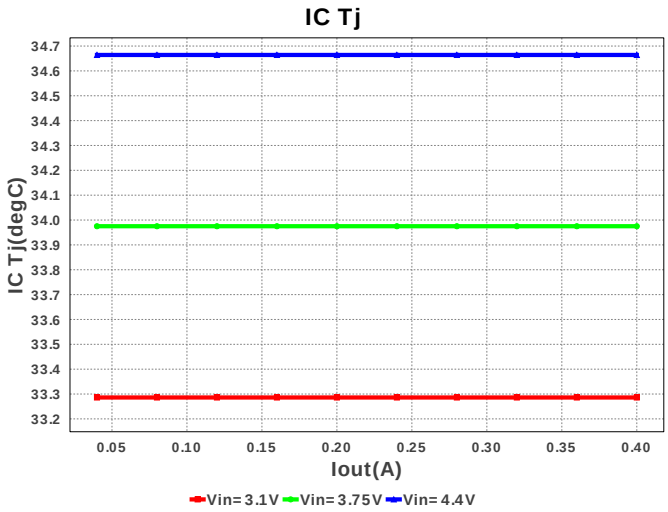


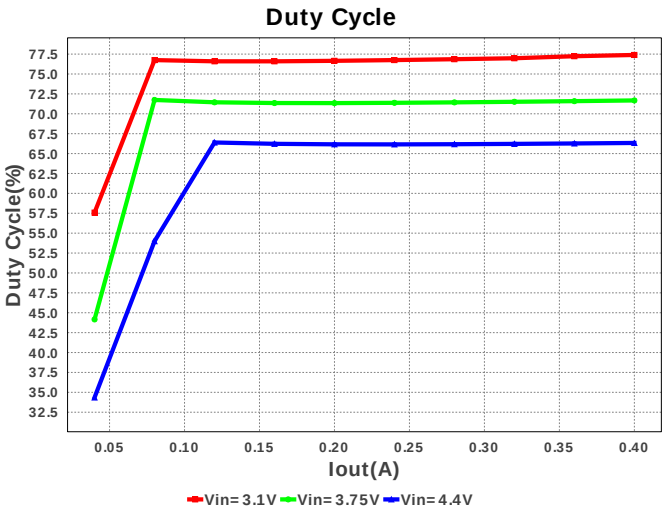
1. With the low turn of voltage of the LM34x8 your power supply may current limit before you reach your working input voltage. If this happens, or to preempt this from happening, you can include a low pass RC filter from input voltage to Vin on the IC. Make sure the rise time on the RC network is slower than your supply's rise time.

Electrical BOM

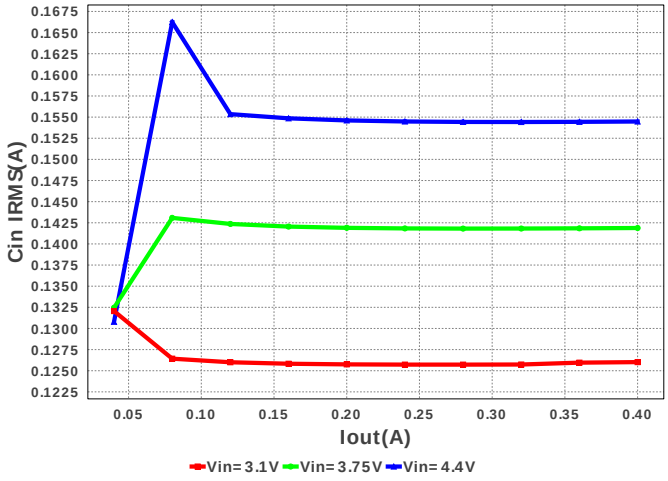
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	TDK	C1005X5R0J104K Series= X5R	Cap= 100.0 nF ESR= 18.6 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3mm2
2.	Ccomp	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
3.	Ccomp2	Yageo America	CC0805KRX7R9BB471 Series= X7R	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
4.	Cin	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 µF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	$0.05	0805 7mm2
5.	Cout	Sanyo	20SVPF180M Series= 1273	Cap= 180.0 µF ESR= 25.0 mOhm VDC= 20.0 V IRMS= 3.2 A	1	$0.50	CAPSMT_62_E7 106mm2
6.	Csense	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
7.	D1	Diodes Inc.	B320-13-F	VF@Io= 500.0 mV VRRM= 20.0 V	1	$0.16	SMC 83mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	L1	Bourns	SRN8040-100M	L= 10.0 µH DCR= 50.0 mOhm	1	$0.21	 SRN8040 100mm2
9.	M1	Texas Instruments	CSD16301Q2	VdsMax= 25.0 V IdsMax= 5.0 Amps	1	$0.17	 TRANS_NexFET_Q2 9mm2
10.	Rcomp	Vishay-Dale	CRCW040210K5FKED Series= CRCW..e3	Res= 10.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
11.	Rfadj	Vishay-Dale	CRCW040226K7FKED Series= CRCW..e3	Res= 26.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
12.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
13.	Rfb2	Vishay-Dale	CRCW04028K45FKED Series= CRCW..e3	Res= 8.45 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
14.	Rs1	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
15.	Rsense	Stackpole Electronics Inc	CSR1206FK25L0 Series= ?	Res= 25.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11mm2
16.	U1	Texas Instruments	LM3478MM/NOPB	Switcher	1	$0.80	 MUA08A 24mm2

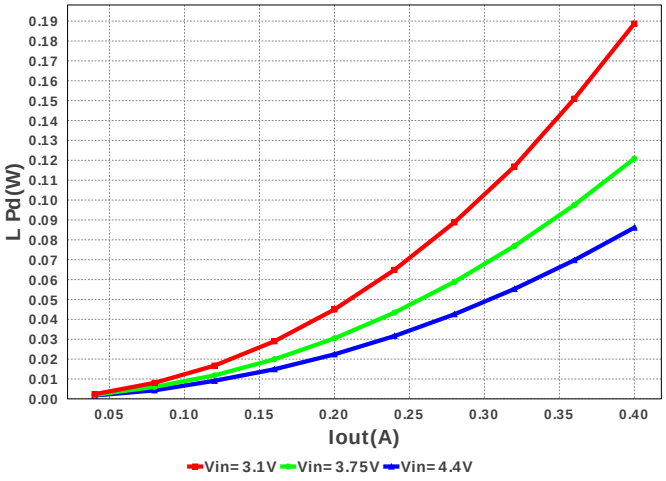




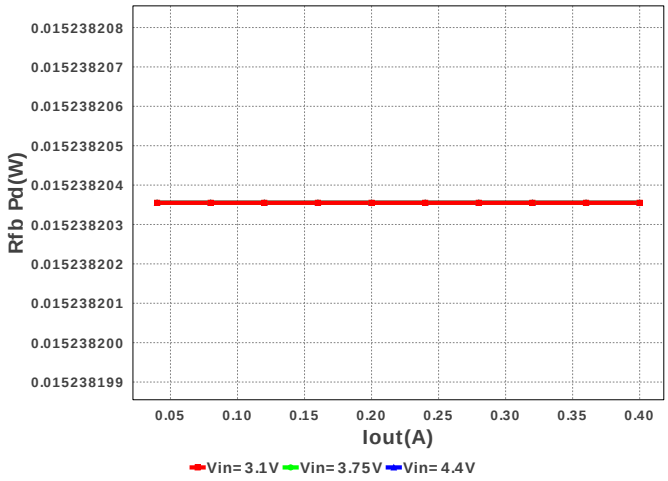
Cin IRMS



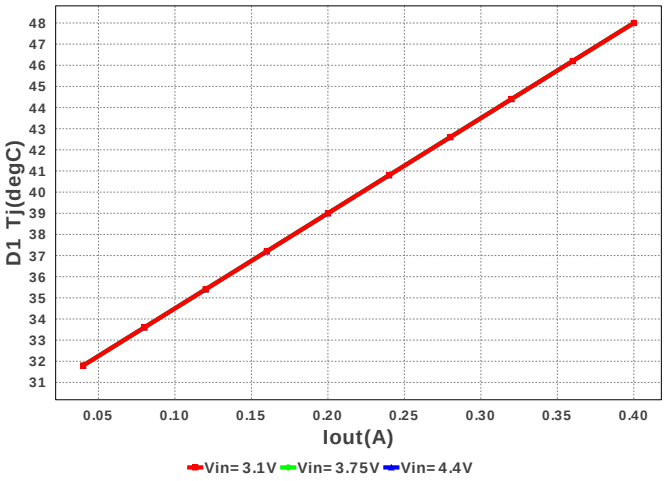
L Pd



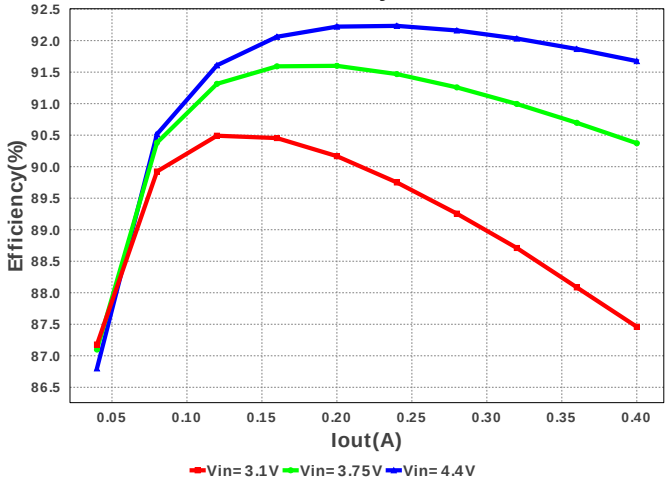
Rfb Pd



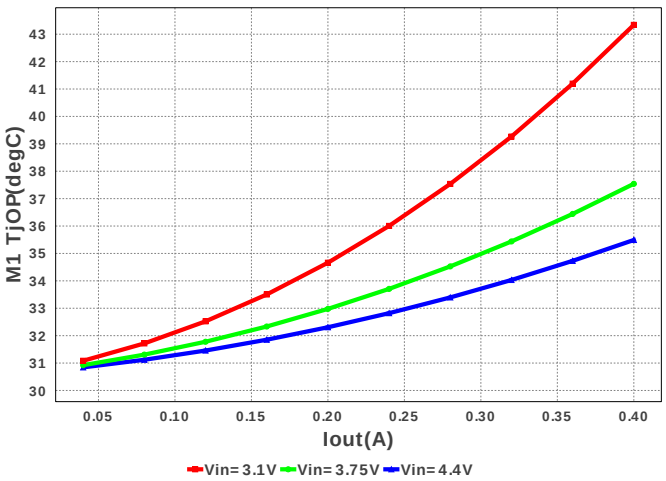
D1 Tj

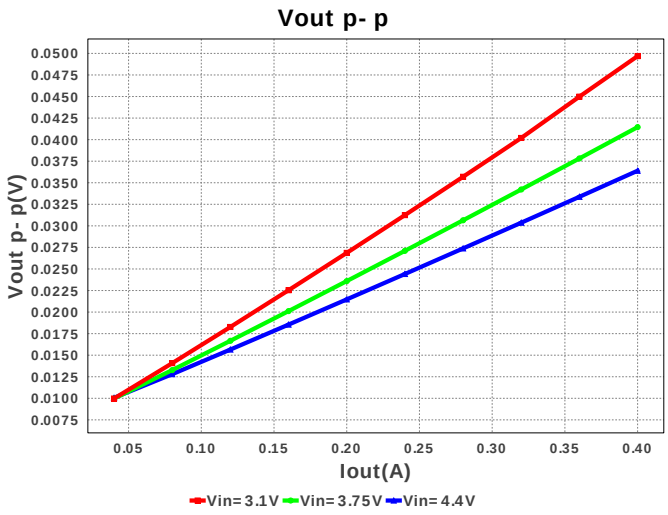


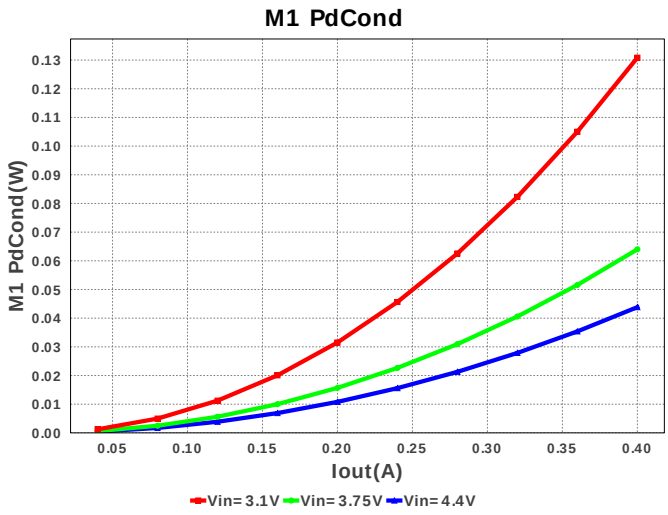
Efficiency

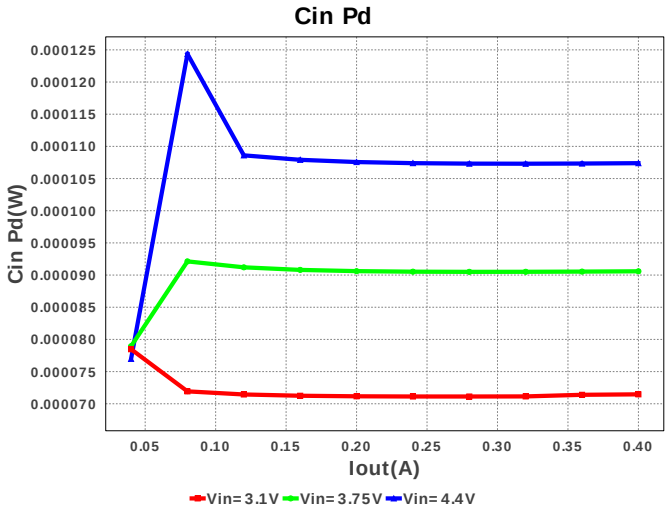


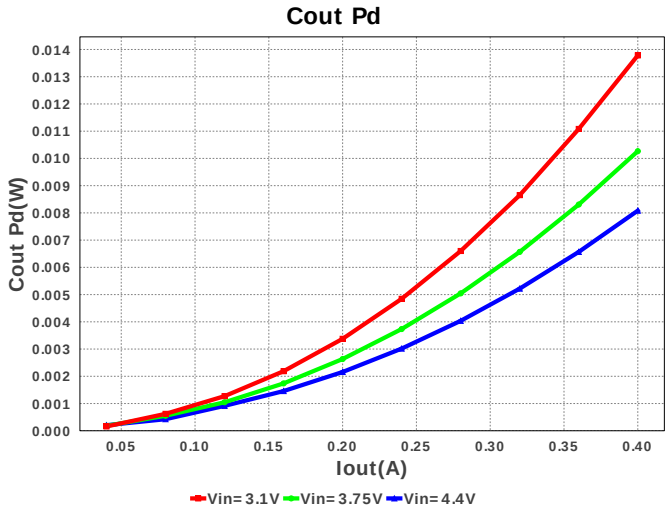
M1 TjOP

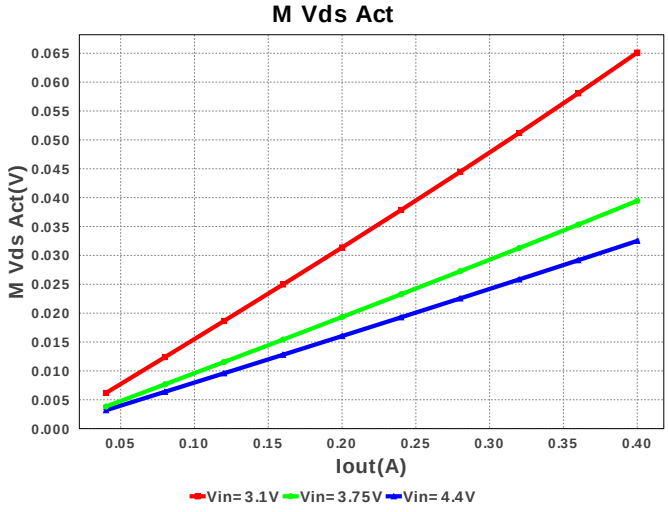


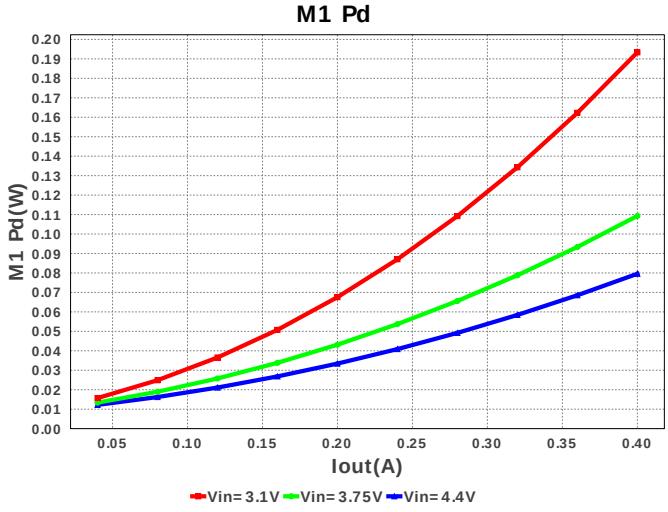


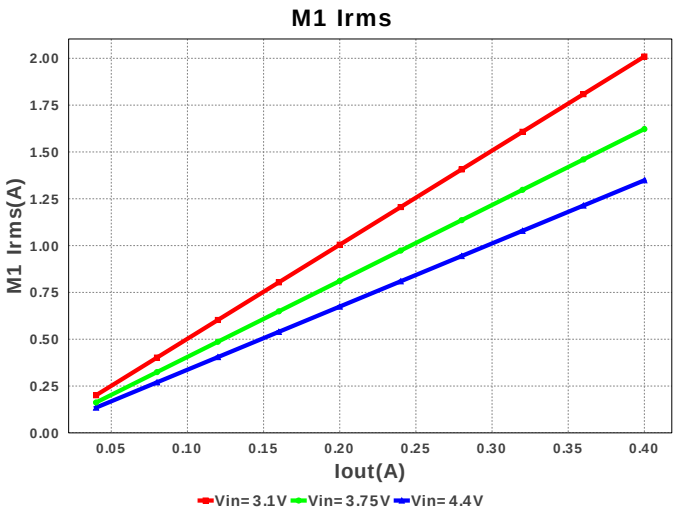


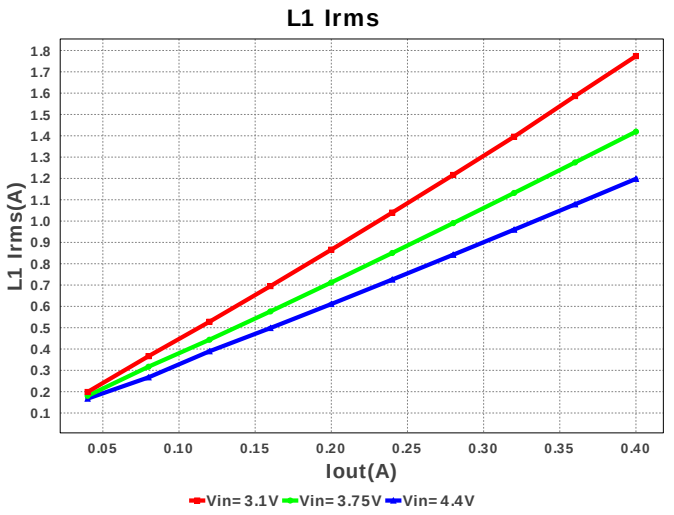


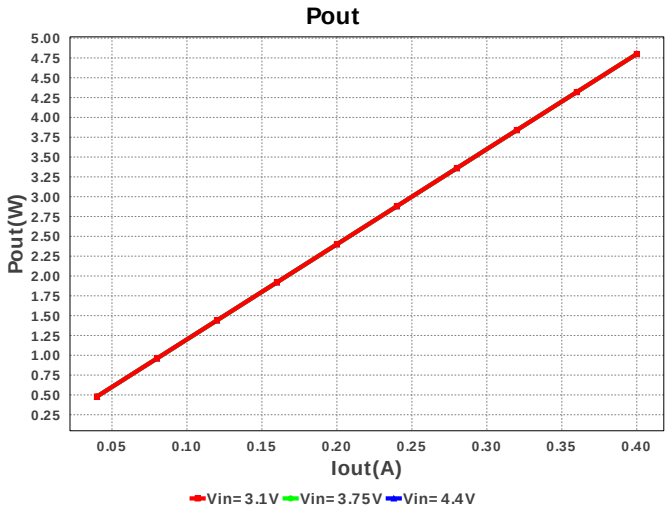


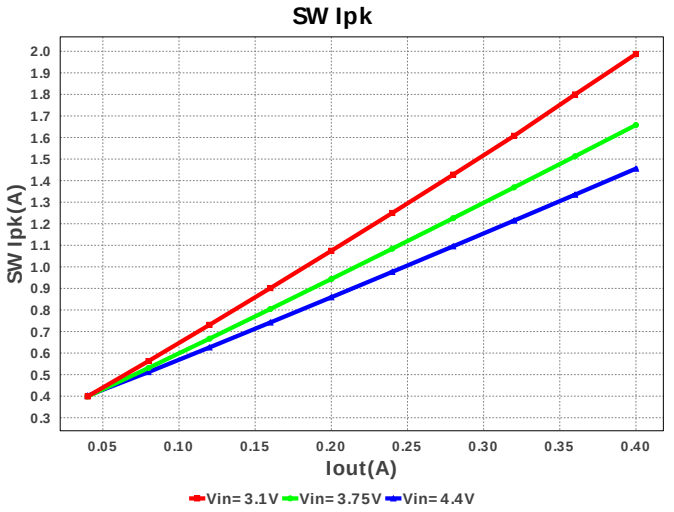


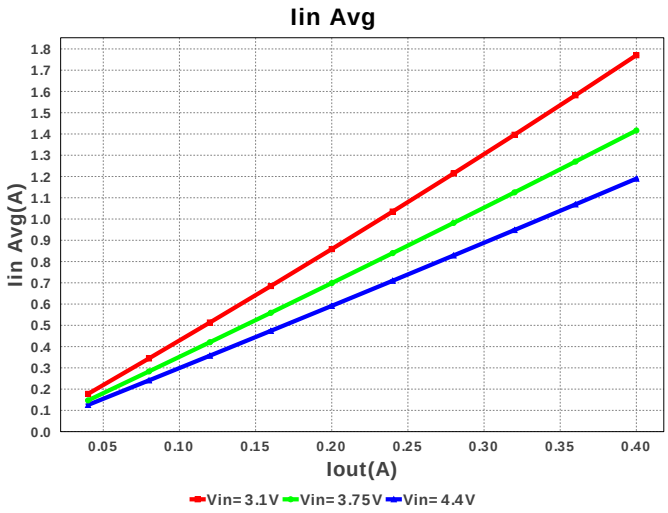


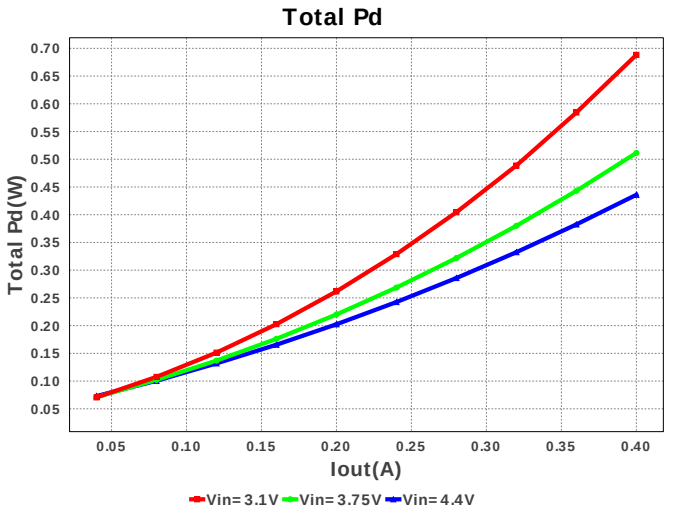


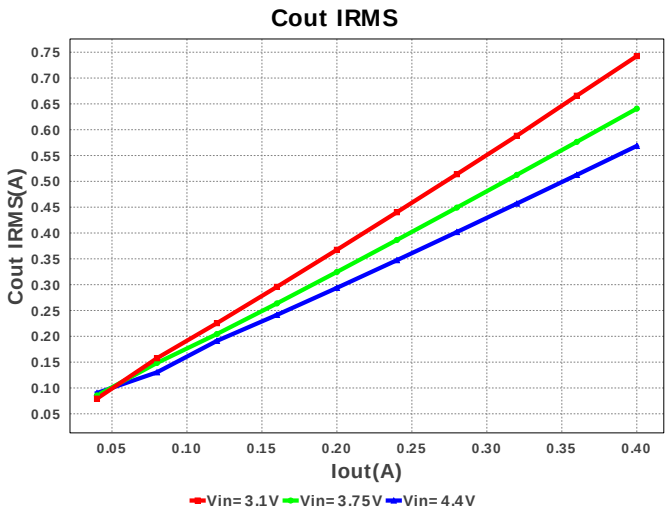


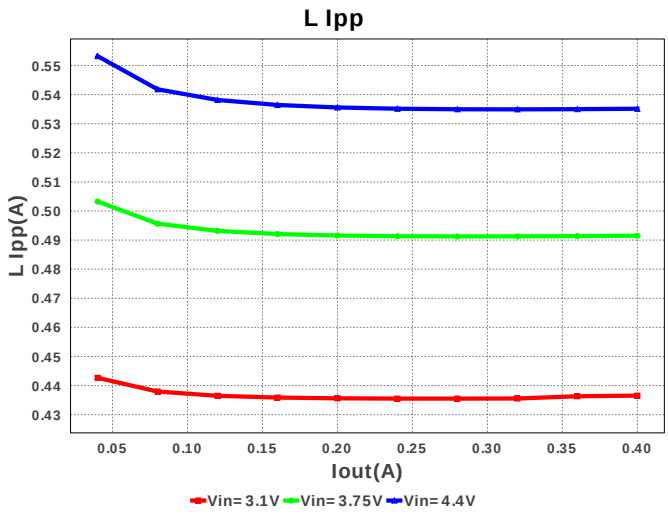


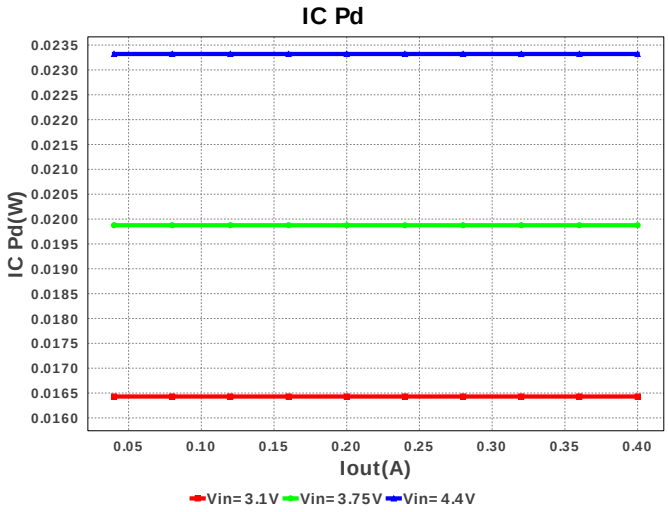


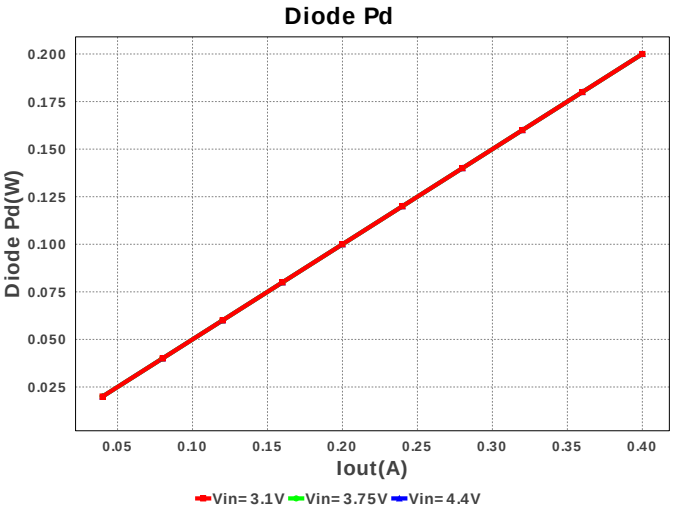


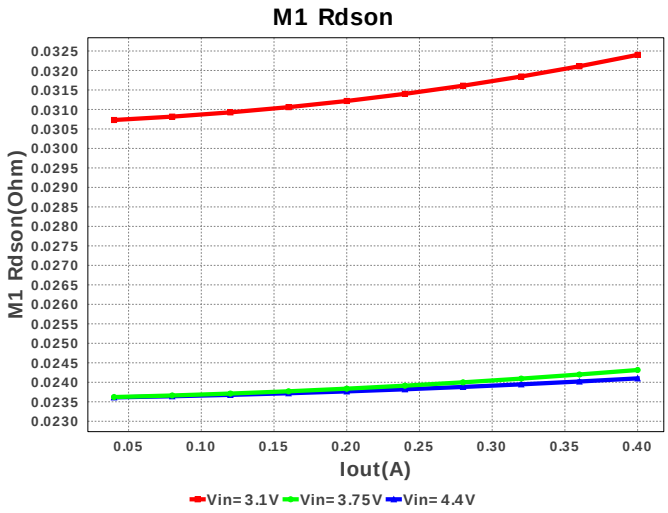


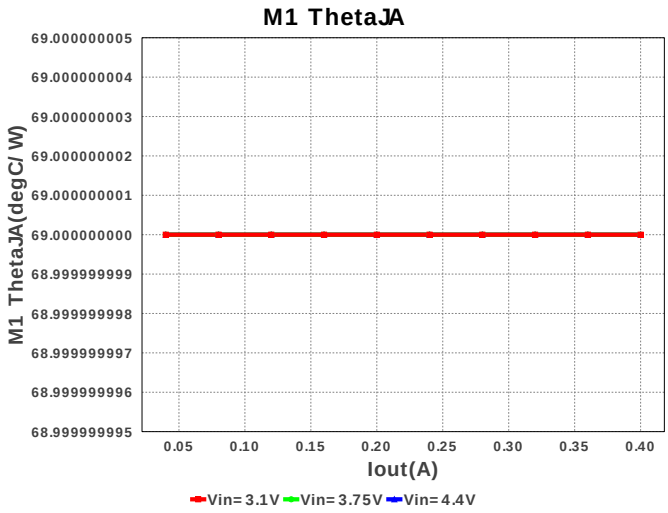


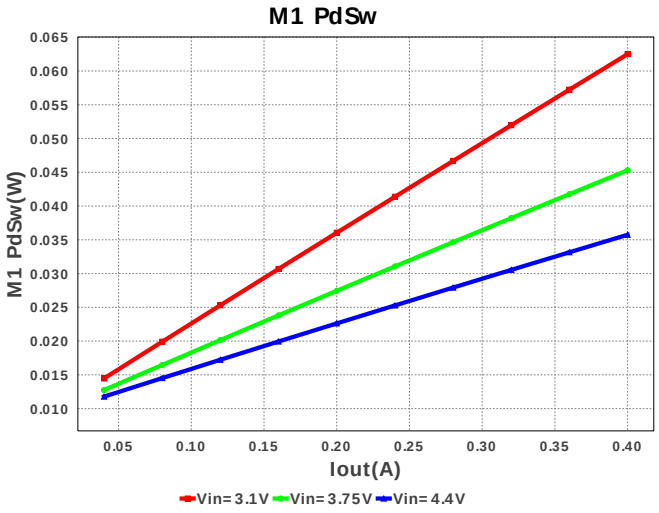












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	126.032 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	742.666 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.771 A	Current	Average input current
4.	L Ipp	436.589 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	1.774 A	Current	Inductor ripple current
6.	M1 Irms	2.005 A	Current	M1 MOSFET Irms
7.	SW Ipk	1.988 A	Current	Peak switch current
8.	BOM Count	17	General	Total Design BOM count
9.	FootPrint	385.0 mm2	General	Total Foot Print Area of BOM components
10.	Frequency	541.734 kHz	General	Switching frequency
11.	IC Tolerance	24.3 mV	General	IC Feedback Tolerance
12.	M Vds Act	65.009 mV	General	M Vds
13.	M1 Rdson	32.418 mOhm	General	Drain-Source On-resistance
14.	M1 ThetaJA	69.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Pout	4.8 W	General	Total output power
16.	Total BOM	$2.13	General	Total BOM Cost
17.	D1 Tj	48.0 degC	Op_Point	D1 junction temperature
18.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	3.233 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	77.4 %	Op_point	Duty cycle
21.	Efficiency	87.427 %	Op_point	Steady state efficiency
22.	IC Tj	33.298 degC	Op_point	IC junction temperature
23.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	400.0 mA	Op_point	Iout operating point
25.	M1 TjOP	43.467 degC	Op_point	M1 MOSFET junction temperature
26.	Phase Marg	59.47 deg	Op_point	Bode Plot Phase Margin
27.	VIN_OP	3.1 V	Op_point	Vin operating point
28.	Vout p-p	49.705 mV	Op_point	Peak-to-peak output ripple voltage
29.	Cin Pd	71.479 µW	Power	Input capacitor power dissipation
30.	Cout Pd	13.789 mW	Power	Output capacitor power dissipation
31.	Diode Pd	200.0 mW	Power	Diode power dissipation
32.	IC Pd	16.492 mW	Power	IC power dissipation
33.	L Pd	188.907 mW	Power	Inductor power dissipation
34.	M1 Pd	195.172 mW	Power	M1 MOSFET total power dissipation
35.	M1 PdCond	130.366 mW	Power	M1 MOSFET conduction losses
36.	M1 PdSw	64.806 mW	Power	M1 MOSFET switching losses
37.	Rfb Pd	15.238 mW	Power	Rfb Power Dissipation
38.	Total Pd	690.309 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	400.0 mA	Maximum Output Current
2.	Iout1	400.0 mAmps	Output Current #1
3.	VinMax	4.4 V	Maximum input voltage
4.	VinMin	3.1 V	Minimum input voltage
5.	Vout	12.0 V	Output Voltage
6.	Vout1	12.0 Volt	Output Voltage #1
7.	base_pn	LM3478	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **LM3478** Product Folder : http://www.ti.com/product/lm3478 : contains the data sheet and other resources.