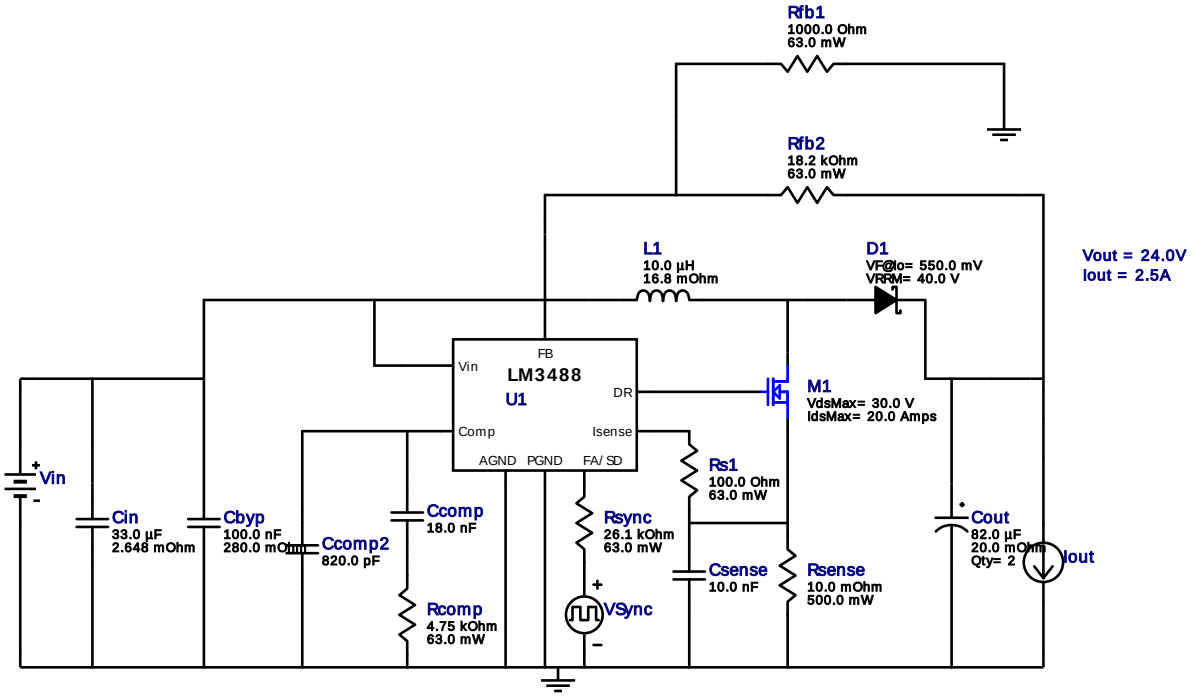
WEBENCH® Design Report

VinMin = 12.0V
VinMax = 14.0V
Vout = 24.0V
Iout = 2.5A

Device = LM3488MMX/NOPB
Topology = Boost
Created = 3/27/17 6:16:51 AM
BOM Cost = $3.54
BOM Count = 17
Total Pd = 2.89W

Design : 957852/97 LM3488MMX/NOPB
LM3488MMX/NOPB 12.0V-14.0V to 24.00V @ 2.5A



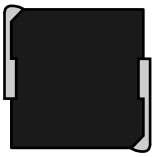
1. With the low turn of voltage of the LM34x8 your power supply may current limit before you reach your working input voltage. If this happens, or to preempt this from happening, you can include a low pass RC filter from input voltage to Vin on the IC. Make sure the rise time on the RC network is slower than your supply's rise time. If you are not using the syncronization feature of the part use the LM3478.

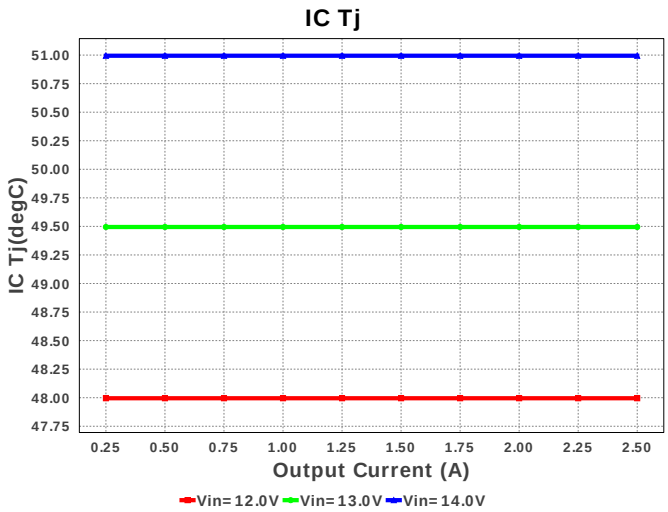
My Comments

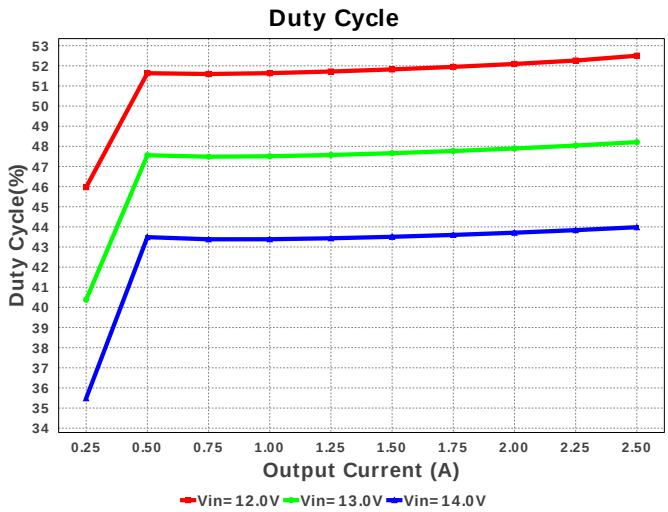
No comments

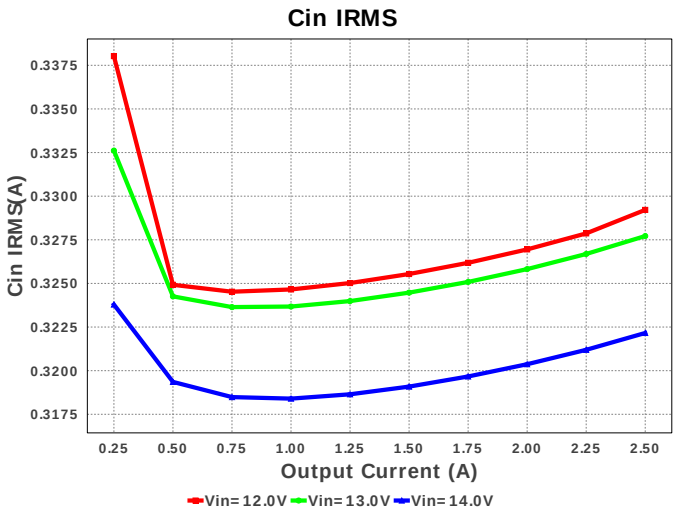
Electrical BOM

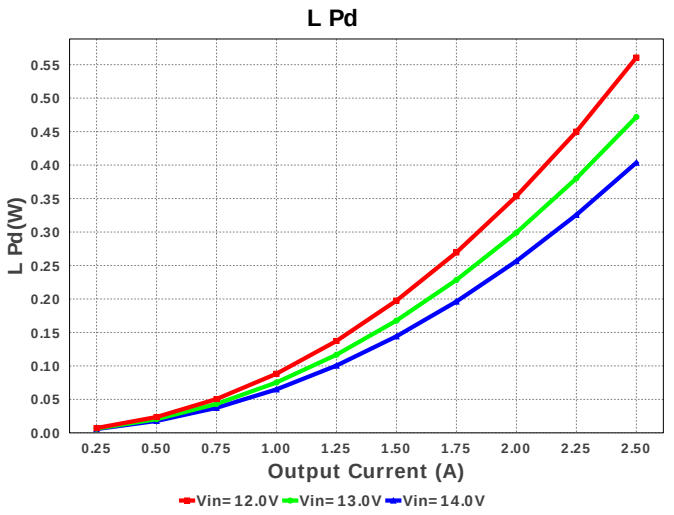
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB183 Series= X7R	Cap= 18.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB821 Series= X7R	Cap= 820.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	TDK	C3216X5R1E336M160AC Series= X5R	Cap= 33.0 uF ESR= 2.648 mOhm VDC= 25.0 V IRMS= 4.4586 A	1	$0.37	1206_180 11 mm²
5.	Cout	Panasonic	35SVPF82M Series= ?	Cap= 82.0 uF ESR= 20.0 mOhm VDC= 35.0 V IRMS= 4.0 A	2	$0.61	CAPSMT_62_E12 106 mm²
6.	Csense	Yageo America	CC0805KRX7R9BB103 Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²

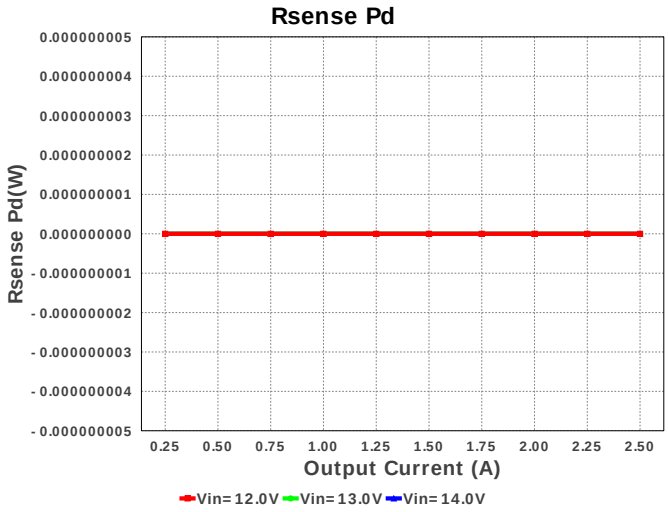
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	D1	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.18	 SMC 83 mm²
8.	L1	Bourns	SRP1270-100M	L= 10.0 µH DCR= 16.8 mOhm	1	$0.60	 SRP1270 246 mm²
9.	M1	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.17	 DNH0008A 18 mm²
10.	Rcomp	Vishay-Dale	CRCW04024K75FKED Series= CRCW..e3	Res= 4.75 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
11.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	Rfb2	Vishay-Dale	CRCW040218K2FKED Series= CRCW..e3	Res= 18.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
13.	Rs1	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
14.	Rsense	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.11	 1206 11 mm²
15.	Rsync	Vishay-Dale	CRCW040226K1FKED Series= CRCW..e3	Res= 26.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	U1	Texas Instruments	LM3488MMX/NOPB	Switcher	1	$0.80	 MUA08A 24 mm²

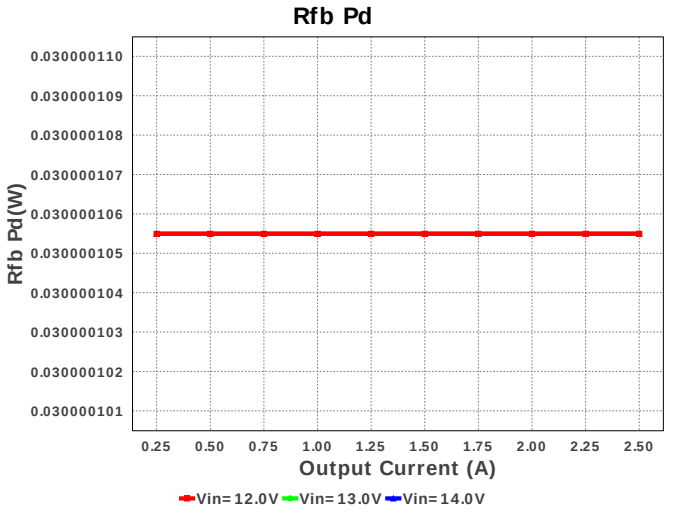


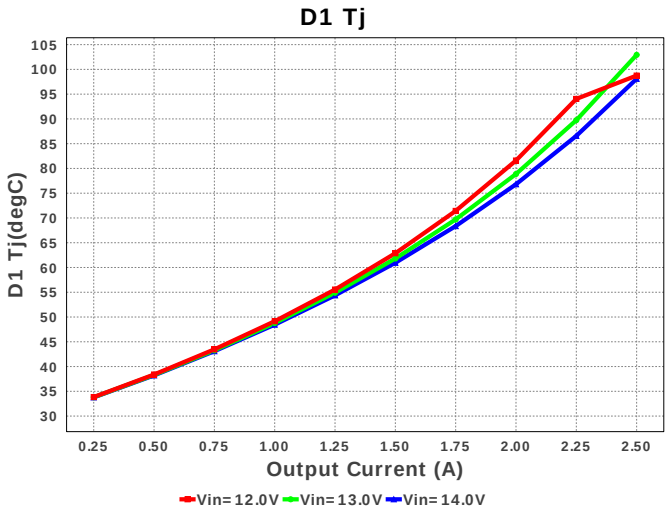


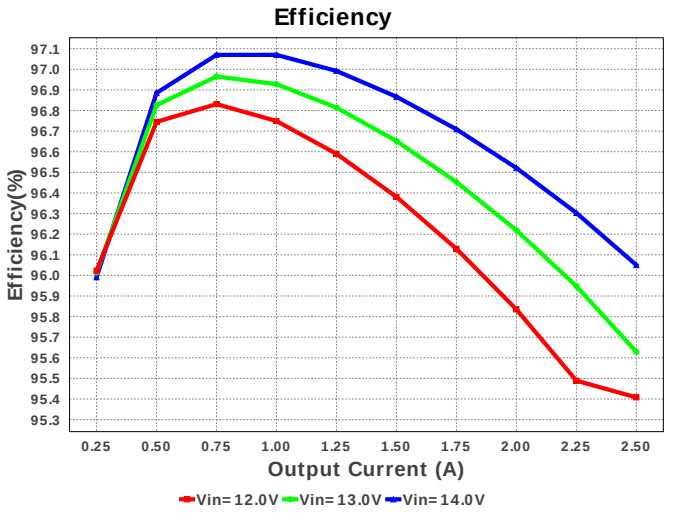


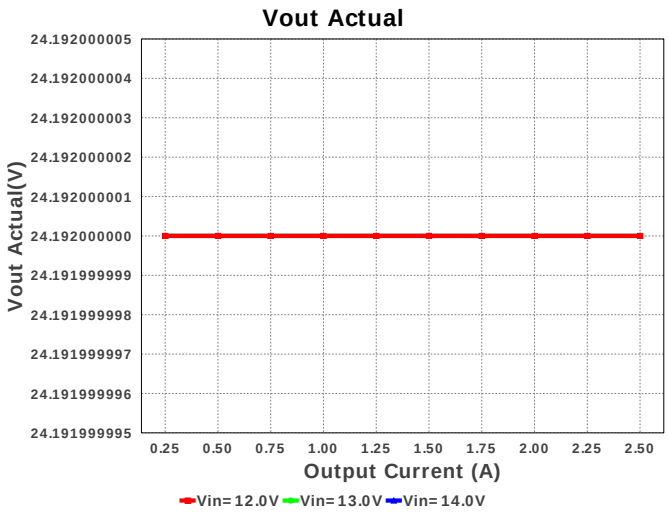


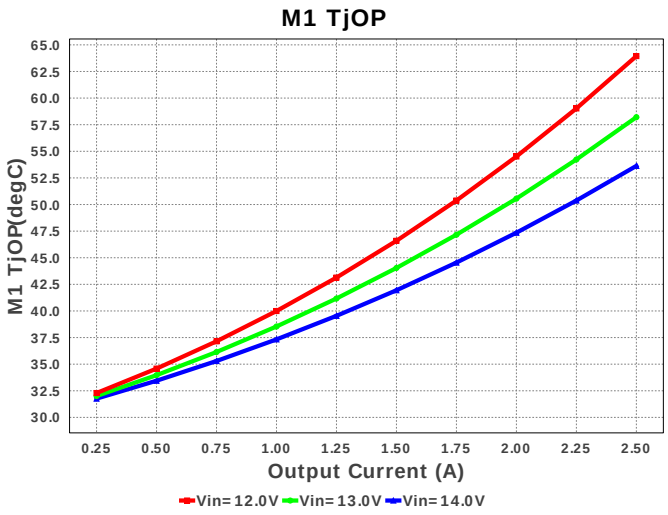


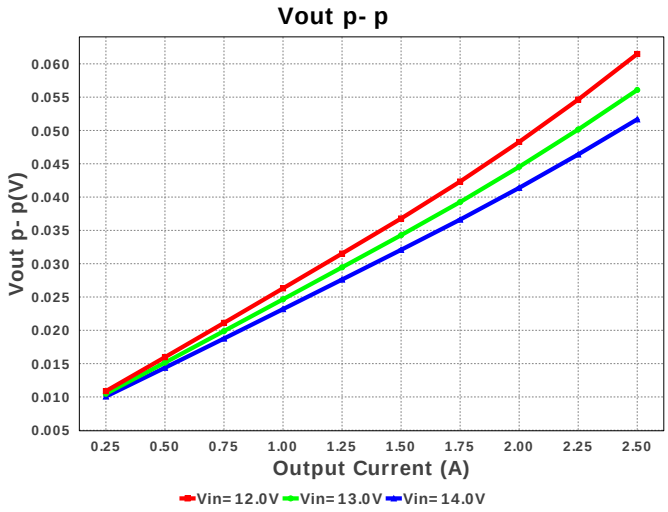


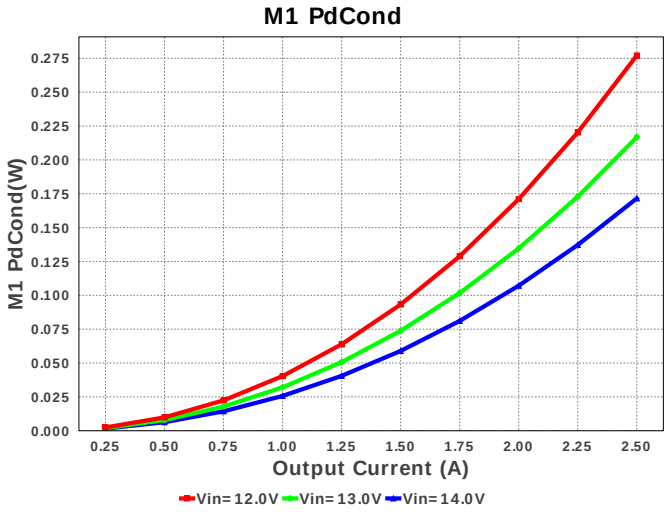


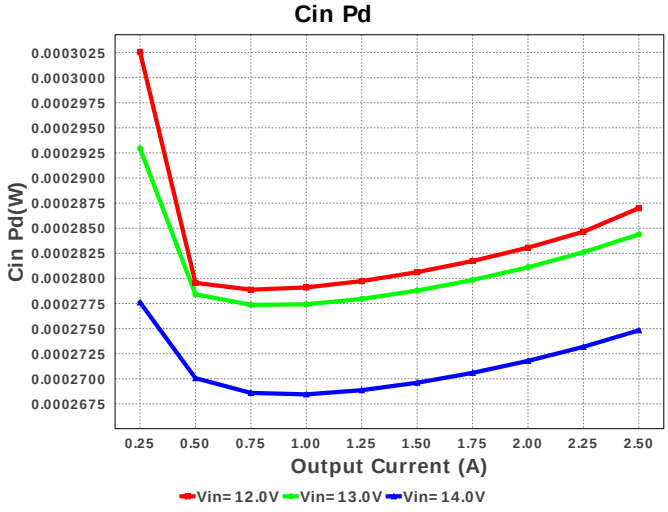


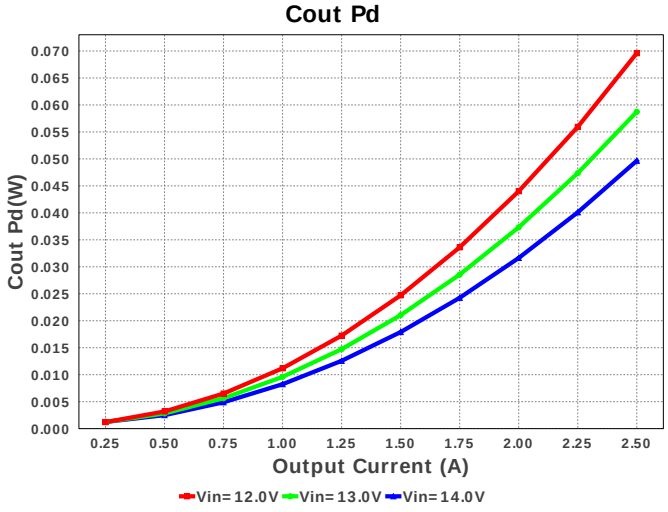


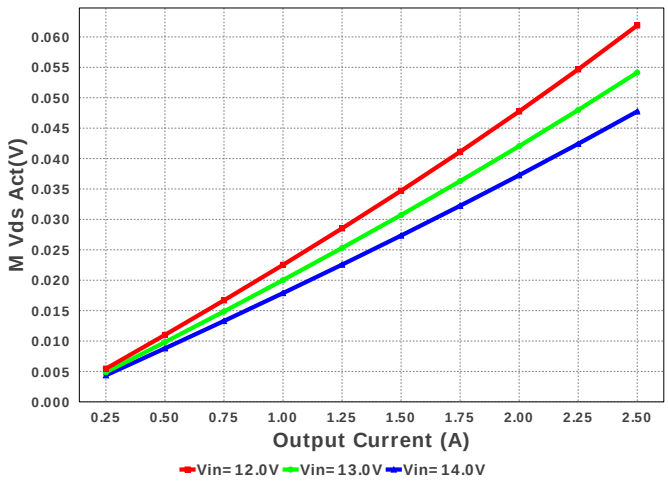


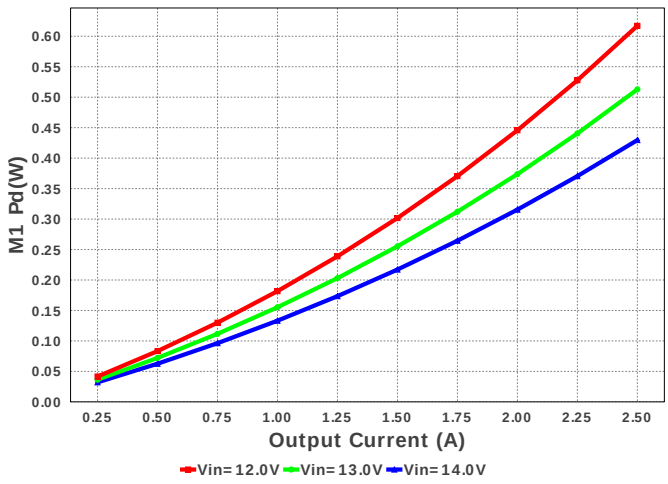


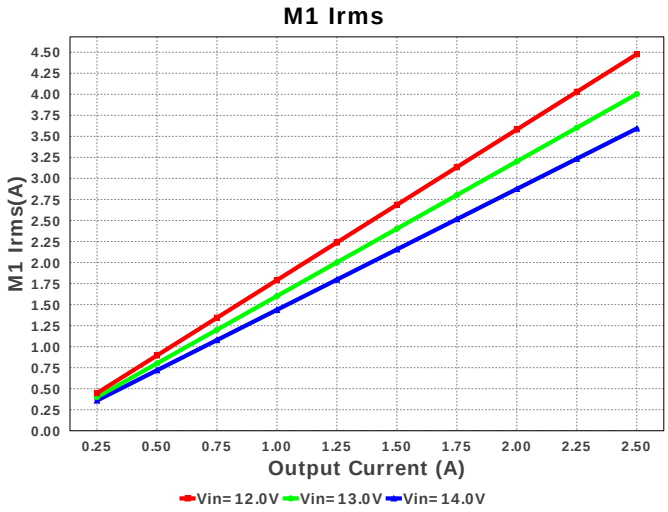


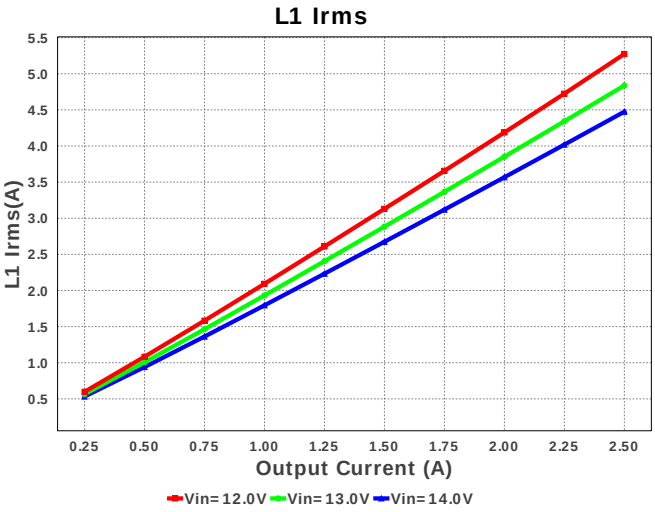


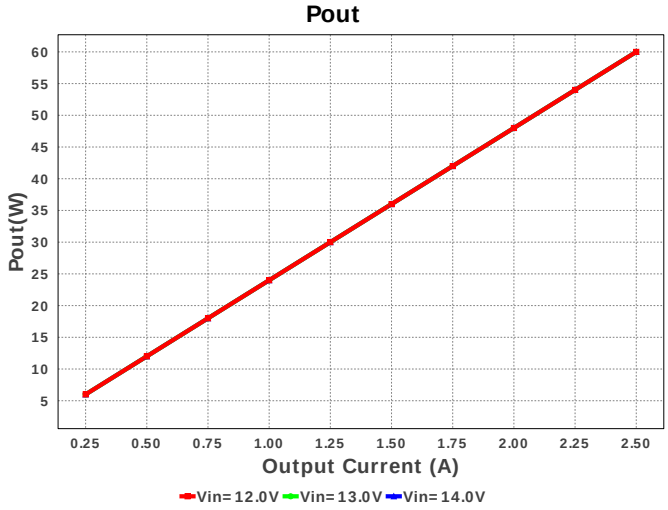


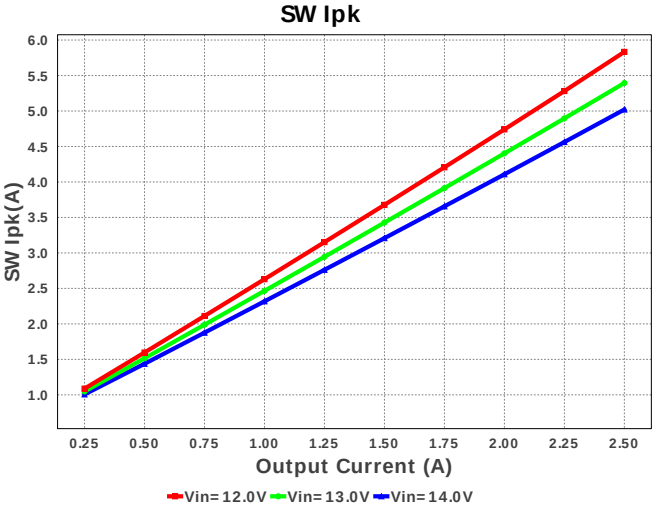


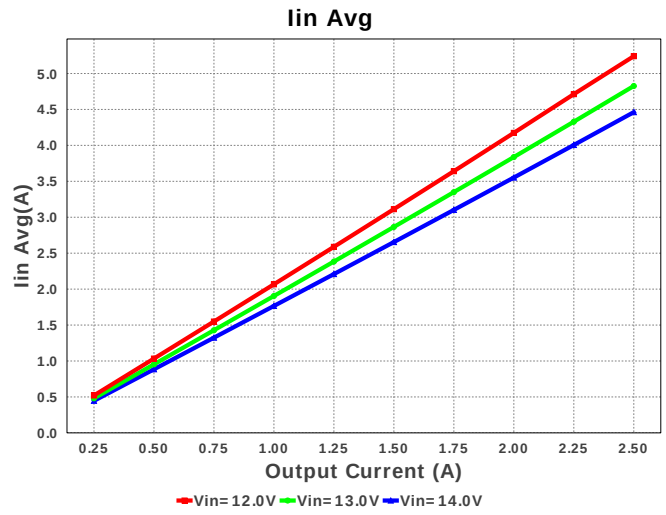


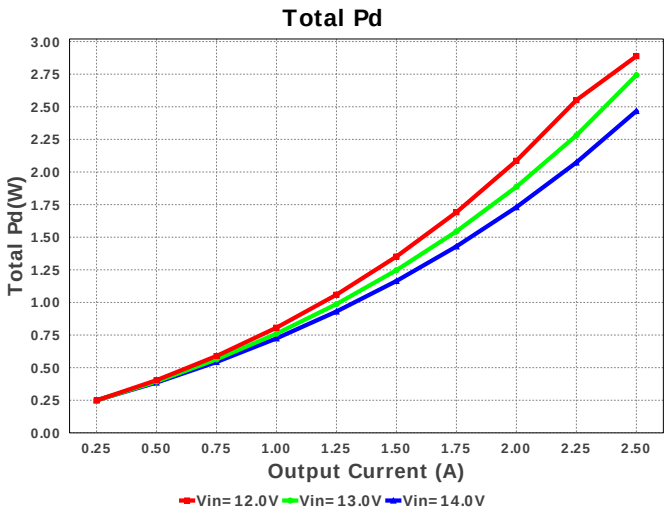


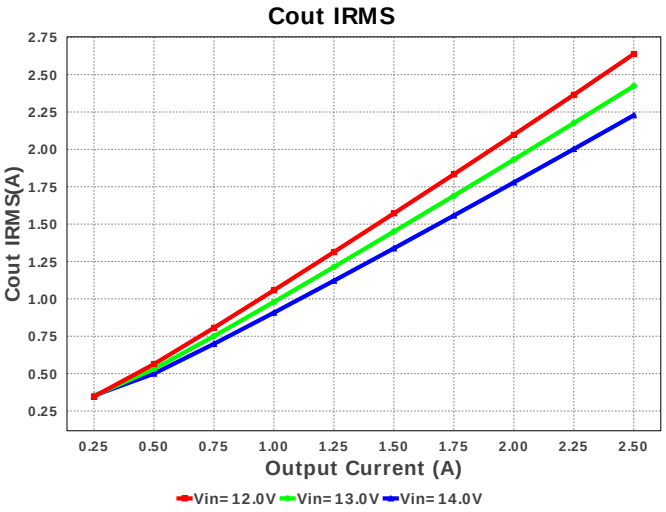


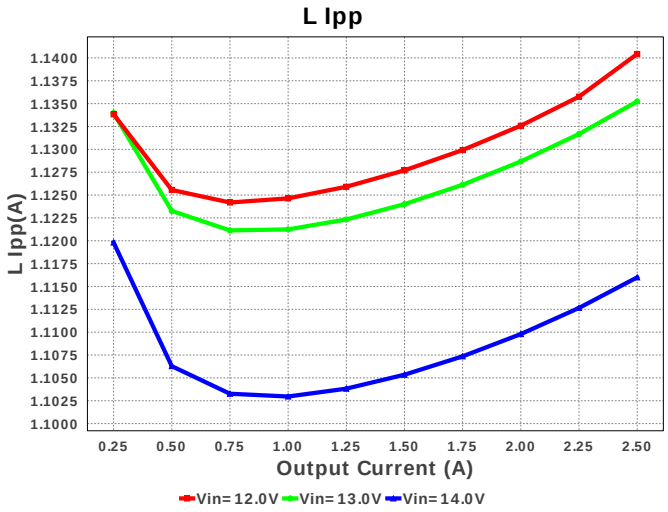


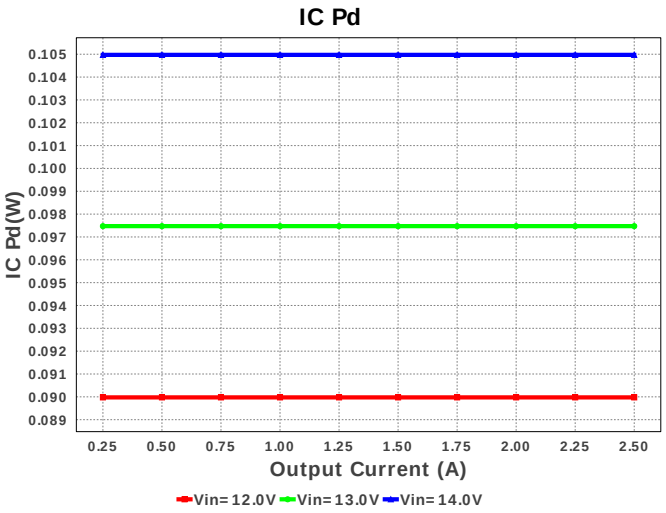


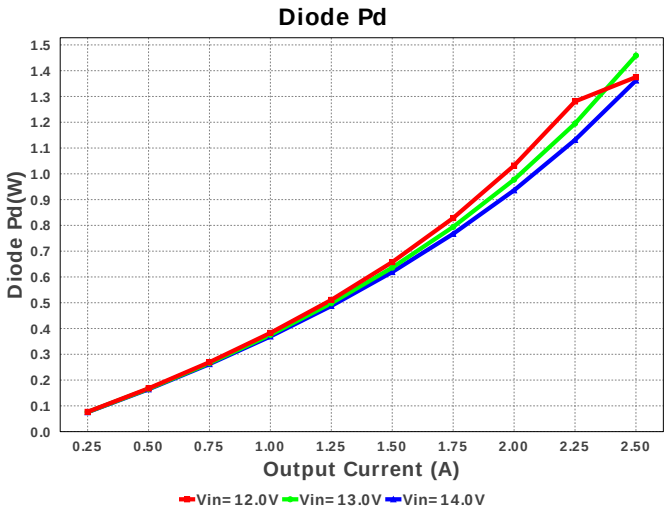


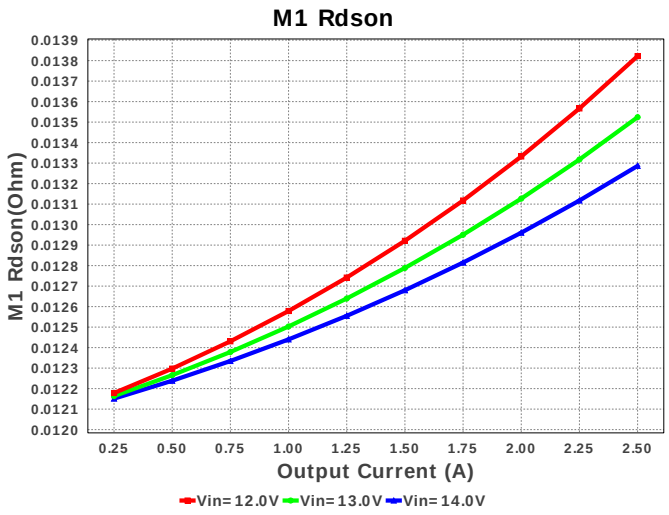


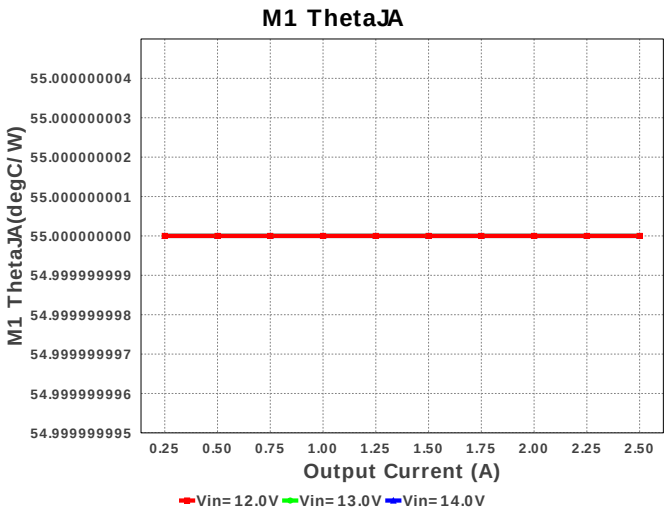


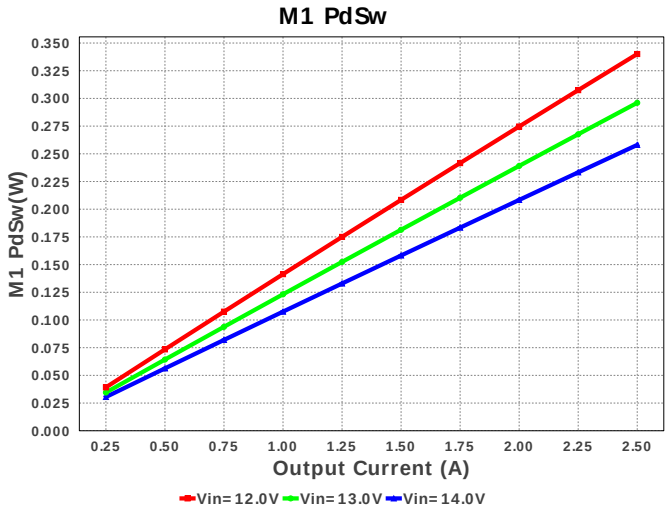


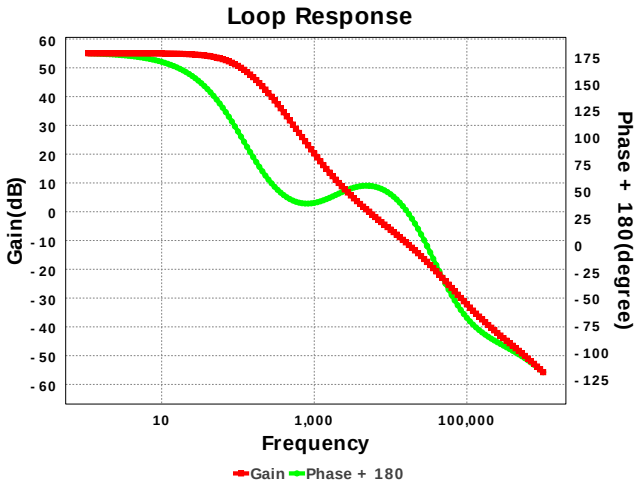












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	329.214 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	2.638 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	5.241 A	Current	Average input current
4.	L Ipp	1.14 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	5.273 A	Current	Inductor ripple current
6.	M1 Irms	4.468 A	Current	M1 MOSFET Irms
7.	SW Ipk	5.833 A	Current	Peak switch current
8.	BOM Count	17	General	Total Design BOM count
9.	FootPrint	648.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	550.0 kHz	General	Switching frequency
11.	IC Tolerance	15.3 mV	General	IC Feedback Tolerance
12.	M Vds Act	61.768 mV	General	M Vds
13.	M1 Rdson	13.825 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	60.0 W	General	Total output power
17.	Total BOM	$3.54	General	Total BOM Cost
18.	D1 Tj	98.75 degC	Op_Point	D1 junction temperature
19.	Low Freq Gain	53.602 dB	Op_Point	Gain at 10Hz
20.	Vout Actual	24.192 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
21.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
22.	Cross Freq	4.535 kHz	Op_point	Bode plot crossover frequency
23.	Duty Cycle	52.5 %	Op_point	Duty cycle
24.	Efficiency	95.406 %	Op_point	Steady state efficiency
25.	Gain Marg	-16.479 dB	Op_point	Bode Plot Gain Margin
26.	IC Tj	47.995 degC	Op_point	IC junction temperature
27.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
28.	IOUT_OP	2.5 A	Op_point	Iout operating point
29.	M1 TjOP	63.998 degC	Op_point	M1 MOSFET junction temperature
30.	Phase Marg	53.996 deg	Op_point	Bode Plot Phase Margin
31.	VIN_OP	12.0 V	Op_point	Vin operating point

#	Name	Value	Category	Description
32.	Vout p-p	61.48 mV	Op_point	Peak-to-peak output ripple voltage
33.	Cin Pd	286.995 µW	Power	Input capacitor power dissipation
34.	Cout Pd	69.594 mW	Power	Output capacitor power dissipation
35.	Diode Pd	1.375 W	Power	Diode power dissipation
36.	IC Pd	89.976 mW	Power	IC power dissipation
37.	L Pd	560.634 mW	Power	Inductor power dissipation
38.	M1 Pd	618.145 mW	Power	M1 MOSFET total power dissipation
39.	M1 PdCond	275.977 mW	Power	M1 MOSFET conduction losses
40.	M1 PdSw	342.168 mW	Power	M1 MOSFET switching losses
41.	Rfb Pd	30.0 mW	Power	Rfb Power Dissipation
42.	Rsense Pd	262.771 mW	Power	LED Current Rsns Power Dissipation
43.	Total Pd	2.889 W	Power	Total Power Dissipation
44.	Vout Tolerance	3.152 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.5	Maximum Output Current
2.	VinMax	14.0	Maximum input voltage
3.	VinMin	12.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	LM3488	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature
8.	UserFsw	550.0 k	Customer Selected Frequency

Design Assistance

1. **LM3488** Product Folder : http://www.ti.com/product/LM3488 : contains the data sheet and other resources.