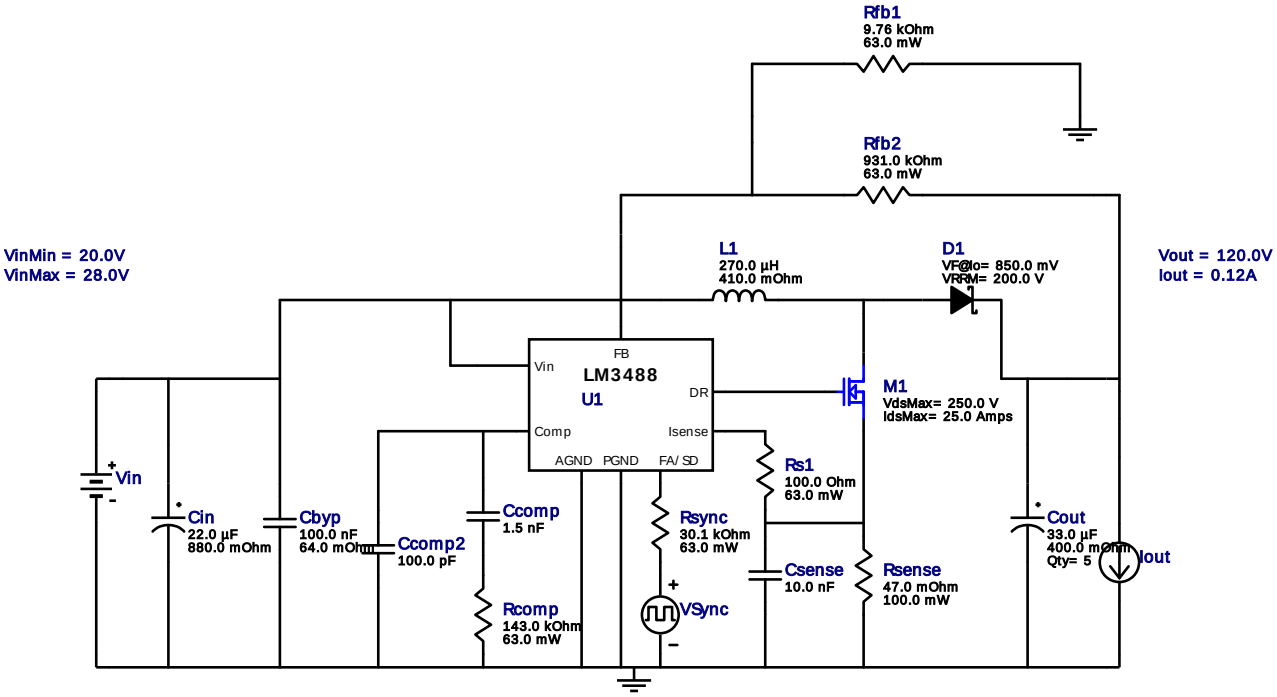
WEBENCH® Design Report

VinMin = 20.0V
VinMax = 28.0V
Vout = 120.0V
Iout = 0.12A

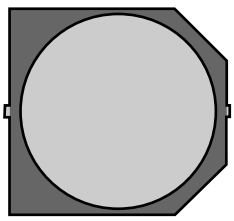
Device = LM3488MM/NOPB
Topology = Boost
Created = 5/14/15 5:34:26 AM
BOM Cost = $9.17
Footprint = 2,860.0 mm²
BOM Count = 20
Total Pd = 0.85W

Design : 1136045/83 LM3488MM/NOPB
LM3488MM/NOPB 20.0V-28.0V to 120.00V @ 0.12A

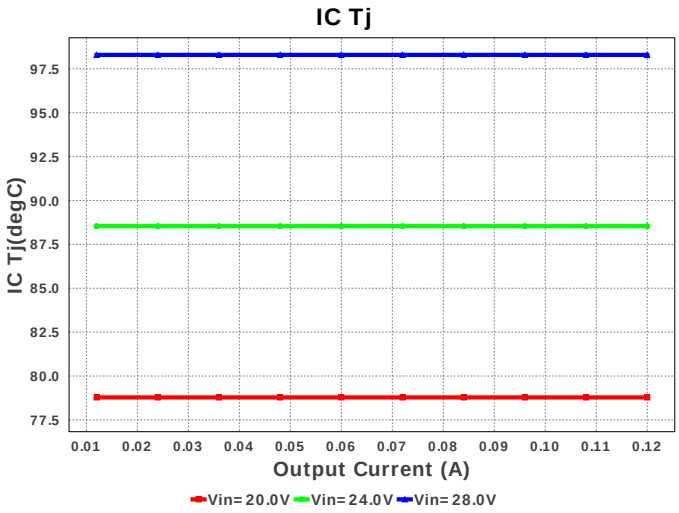


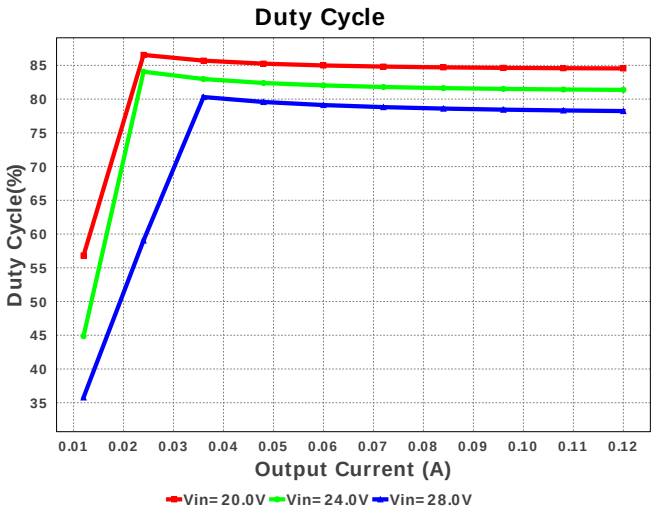
1. With the low turn of voltage of the LM34x8 your power supply may current limit before you reach your working input voltage. If this happens, or to preempt this from happening, you can include a low pass RC filter from input voltage to Vin on the IC. Make sure the rise time on the RC network is slower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

Electrical BOM

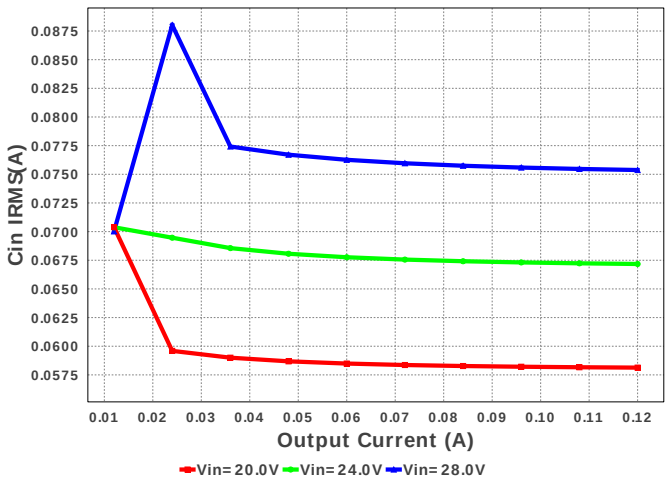
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	 0805 7 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB152 Series= X7R	Cap= 1.5 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
3.	Ccomp2	Yageo America	CC0805JRNPO9BN101 Series= C0G/NP0	Cap= 100.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
4.	Cin	Nichicon	UUD1H220MCL1GS Series= uD	Cap= 22.0 uF ESR= 880.0 mOhm VDC= 50.0 V IRMS= 165.0 mA	1	$0.11	 SM_RADIAL_6.3AMM 80 mm²
5.	Cout	Panasonic	EEV-EB2E330SM Series= ?	Cap= 33.0 uF ESR= 400.0 mOhm VDC= 250.0 V IRMS= 560.0 mA	5	$1.25	 EB_K16 483 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
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.	D1	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	$0.21	PowerDI123 13 mm²
8.	L1	Bourns	SDR1307-271KL	L= 270.0 µH DCR= 410.0 mOhm	1	$0.35	SDR1307 227 mm²
9.	M1	Infineon Technologies	BSC600N25NS3 G	VdsMax= 250.0 V IdsMax= 25.0 Amps	1	$1.27	PG-TDSON-8 55 mm²
10.	Rcomp	Vishay-Dale	CRCW0402143KFKED Series= CRCW..e3	Res= 143.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	Rfb1	Vishay-Dale	CRCW04029K76FKED Series= CRCW..e3	Res= 9.76 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
12.	Rfb2	Vishay-Dale	CRCW0402931KFKED Series= CRCW..e3	Res= 931.0 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	Panasonic	ERJ-L03KF47MV Series= 231	Res= 47.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.09	0603 5 mm²
15.	Rsync	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
16.	U1	Texas Instruments	LM3488MM/NOPB	Switcher	1	$0.80	MUA08A 24 mm²

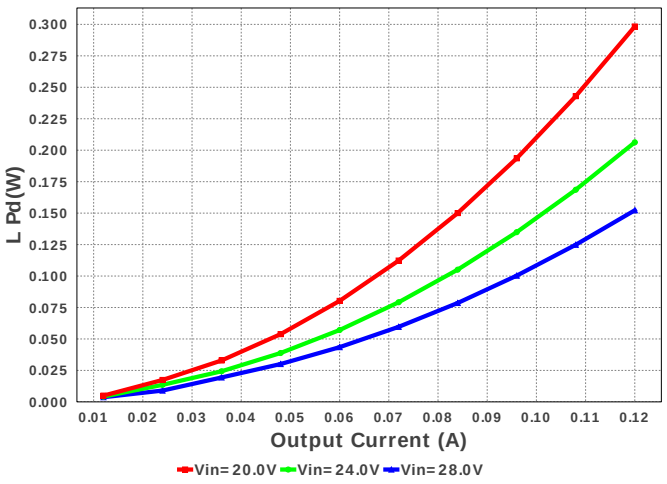




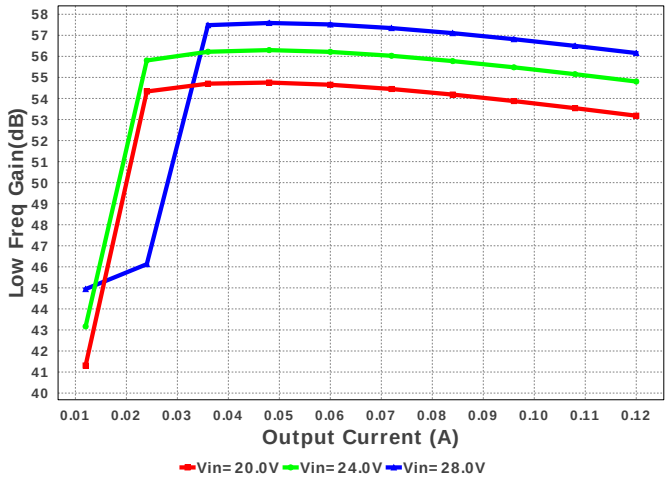
Cin IRMS



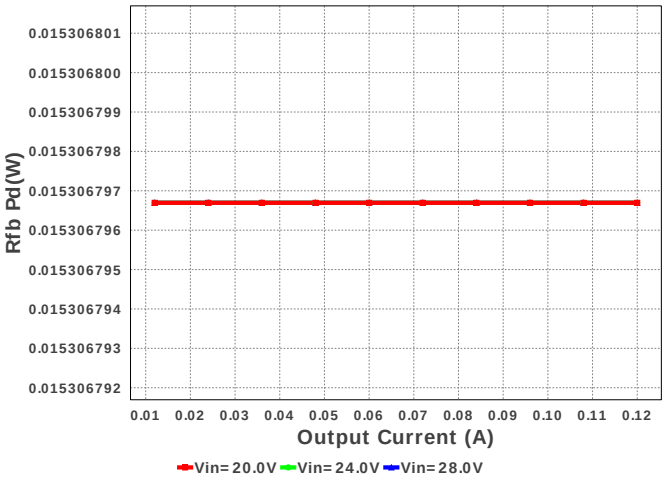
L Pd



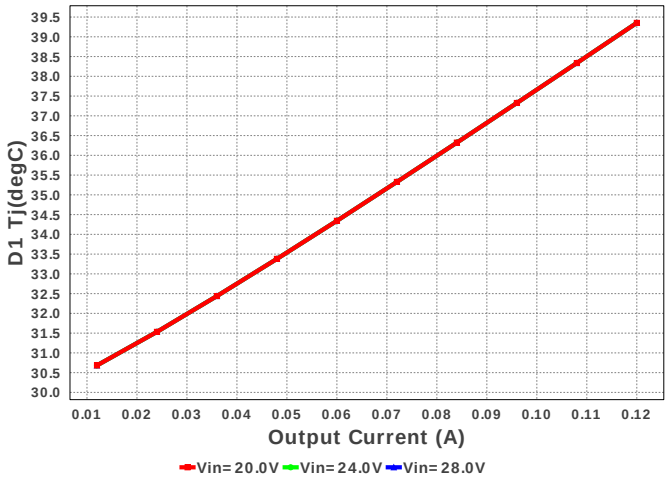
Low Freq Gain



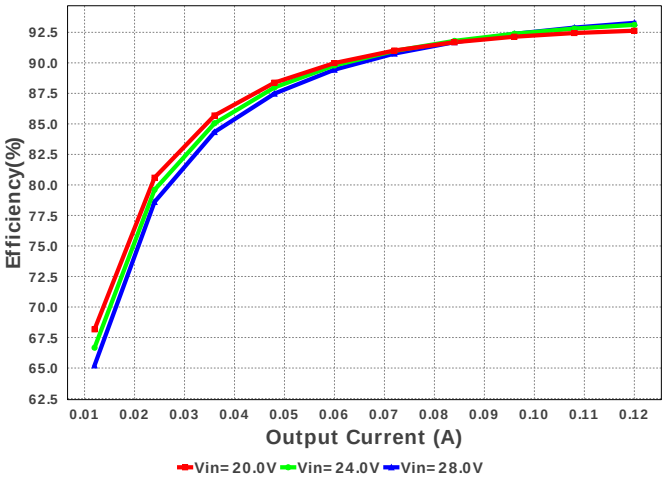
Rfb Pd

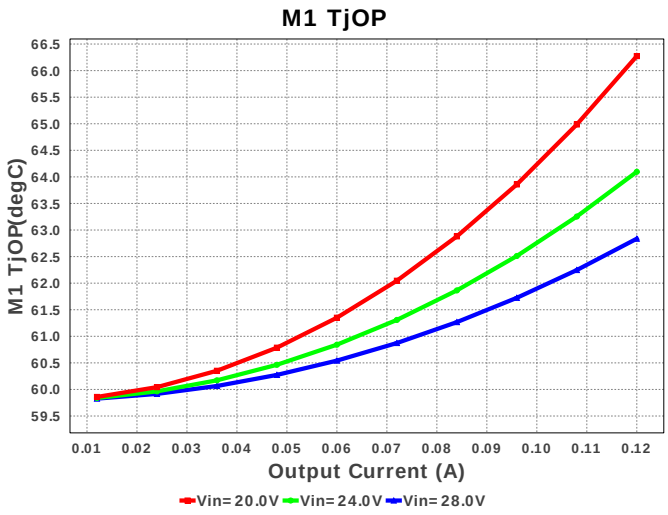


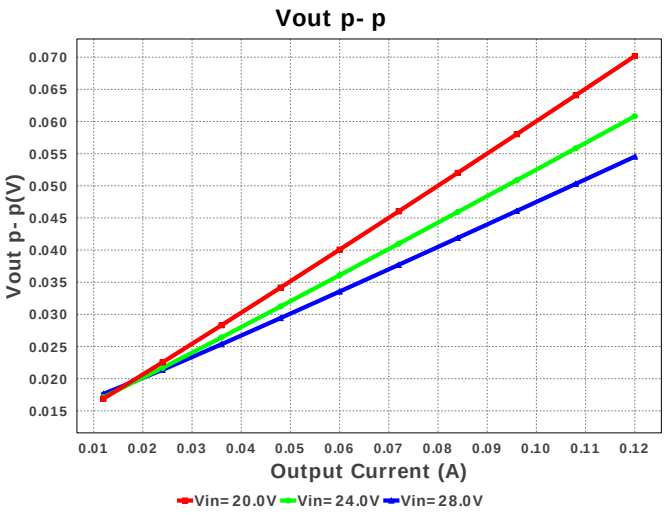
D1 Tj

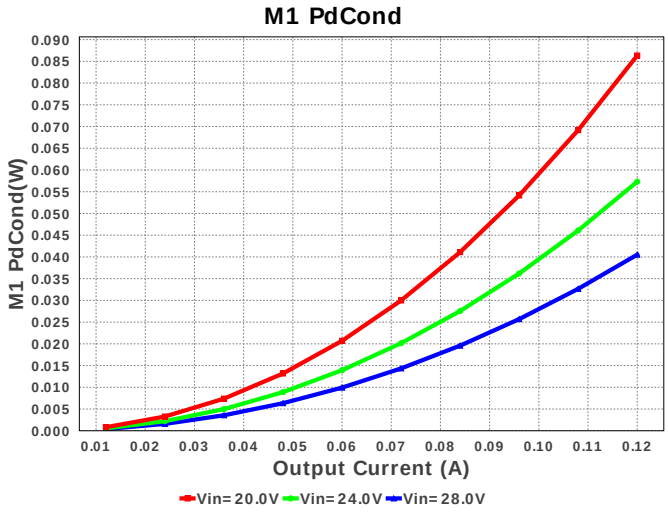


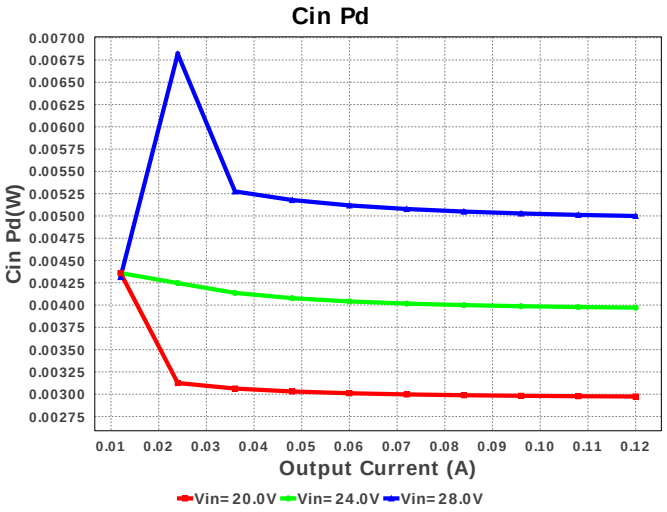
Efficiency

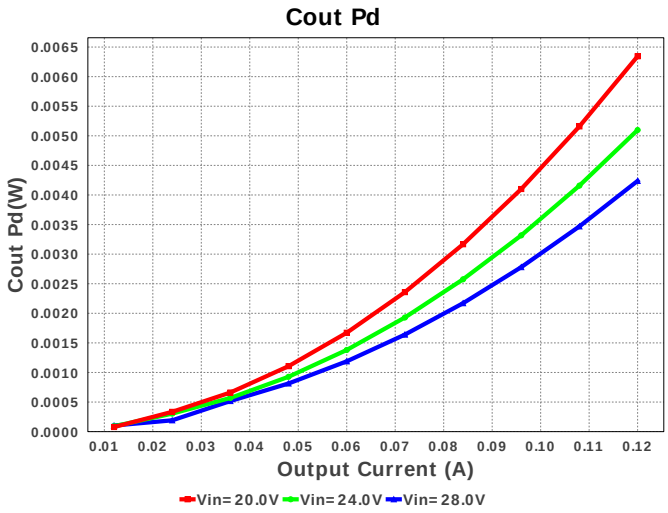


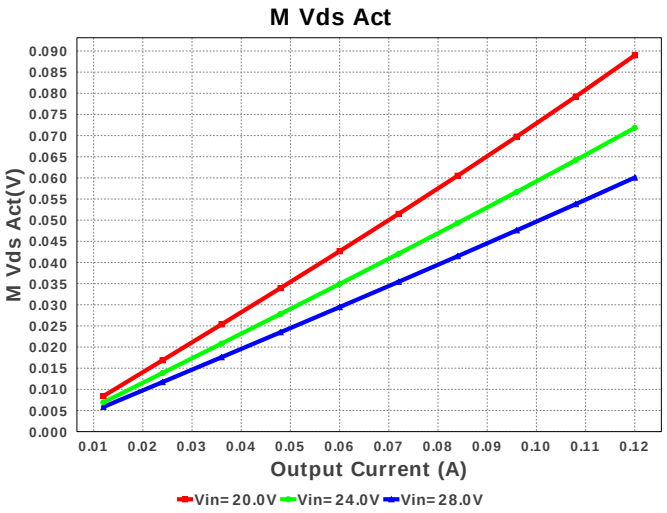


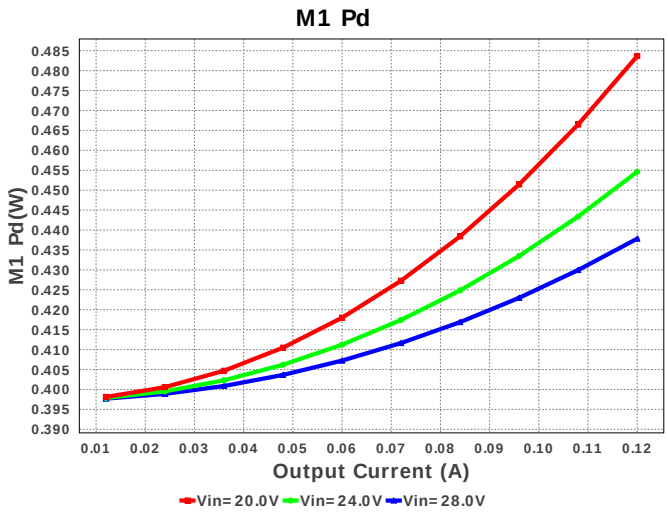


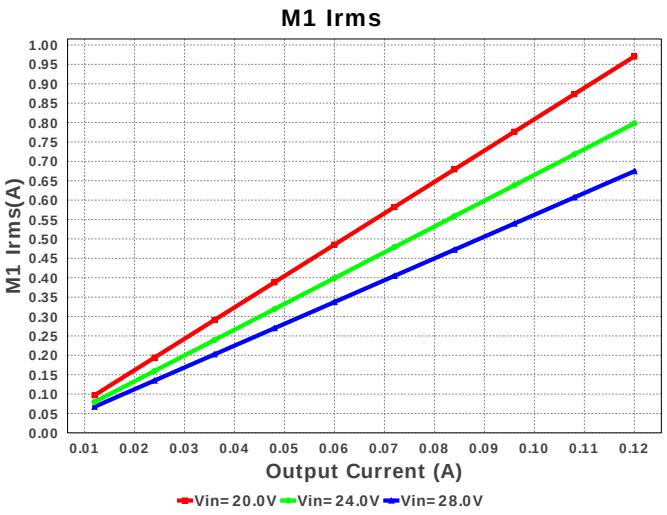


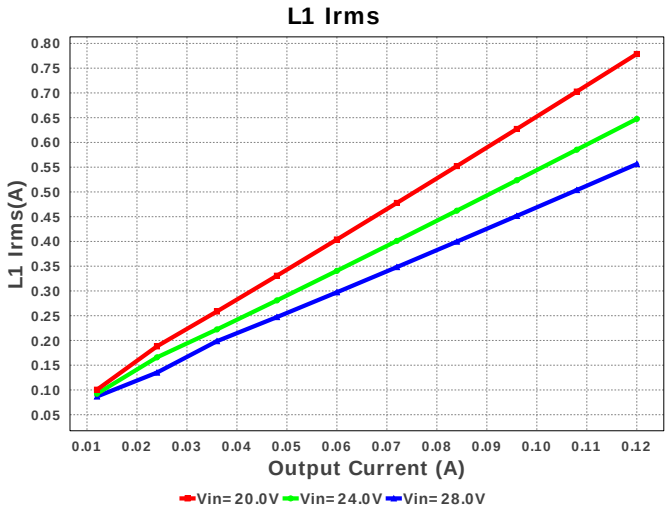


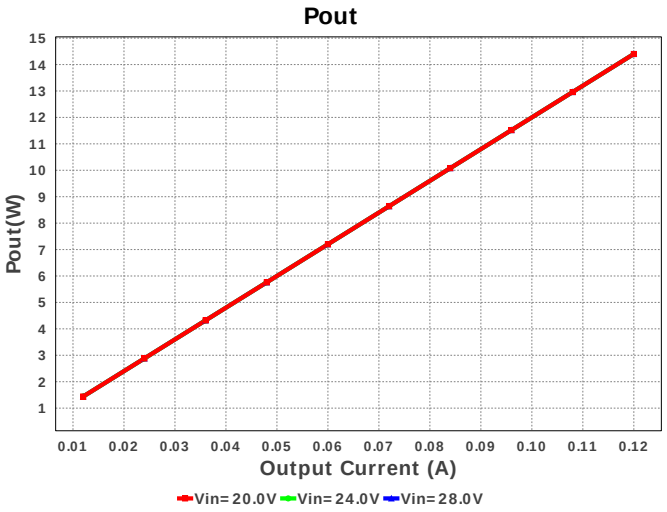


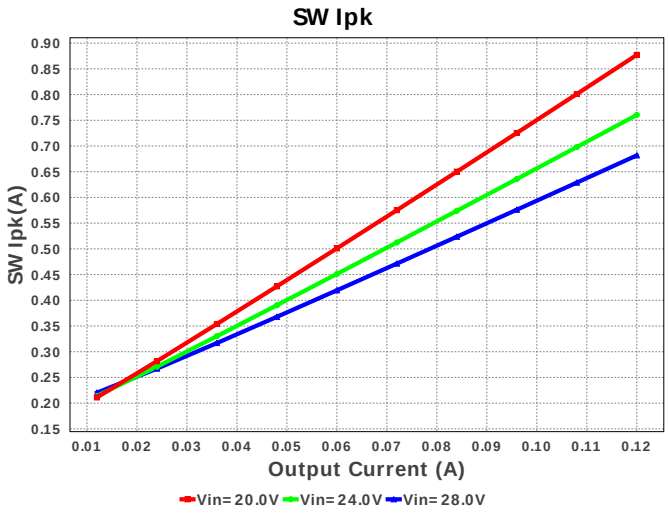


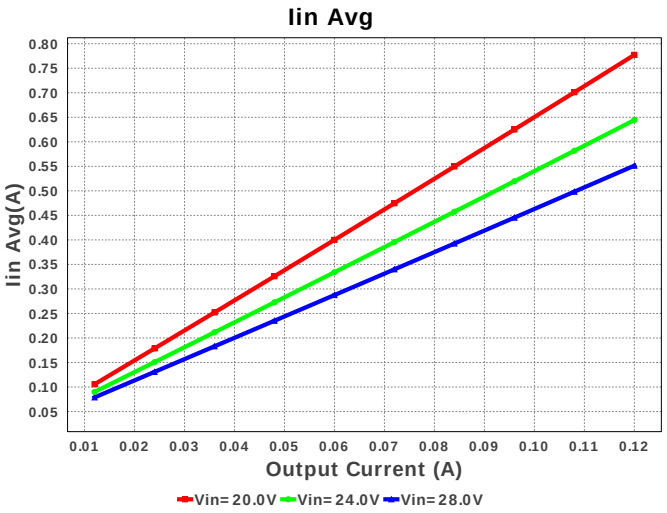


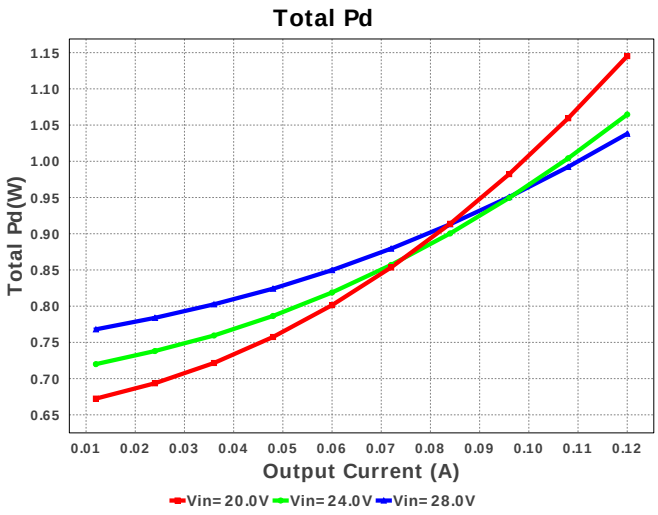


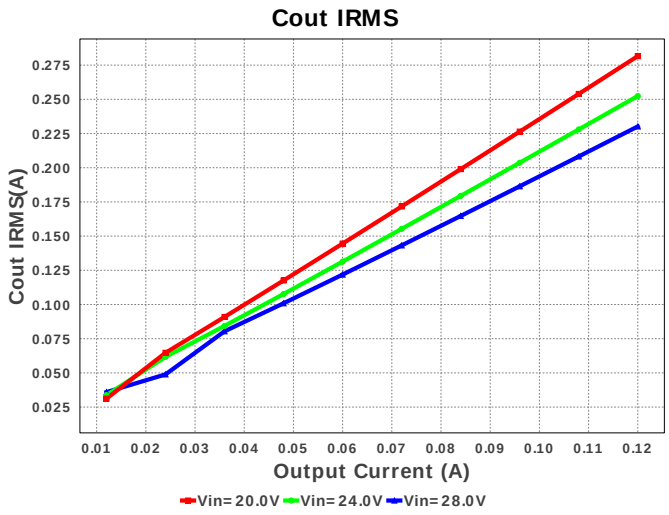


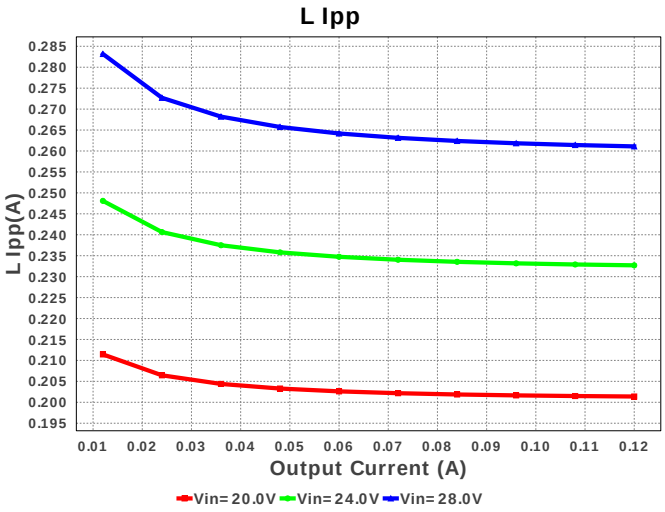


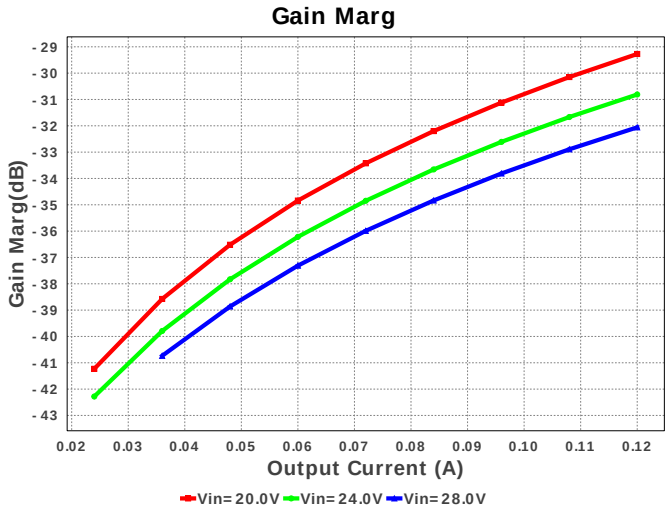


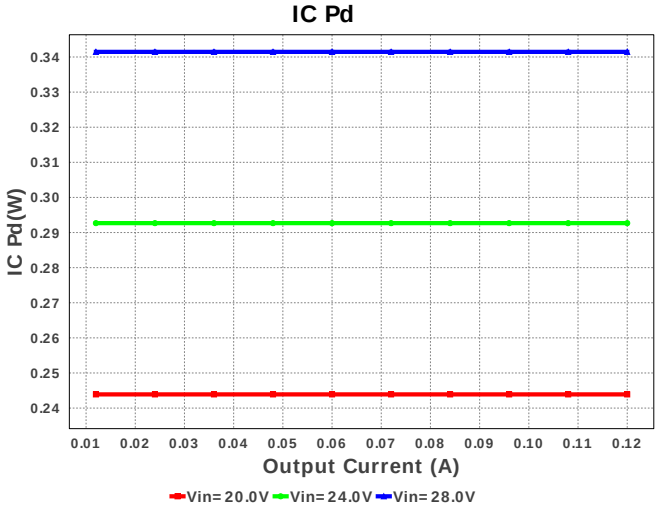


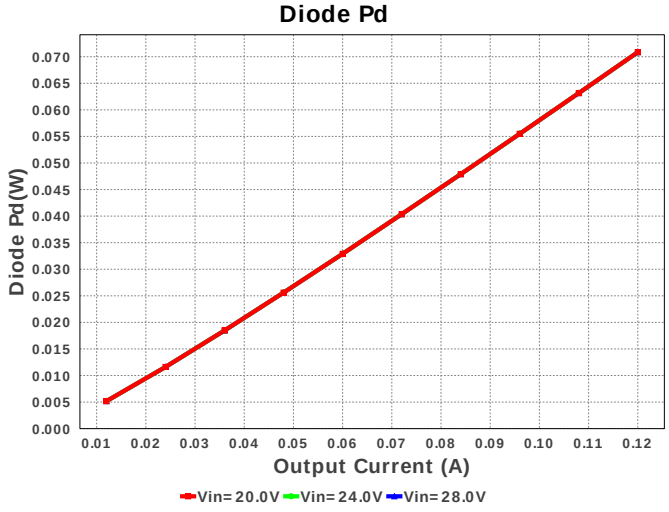


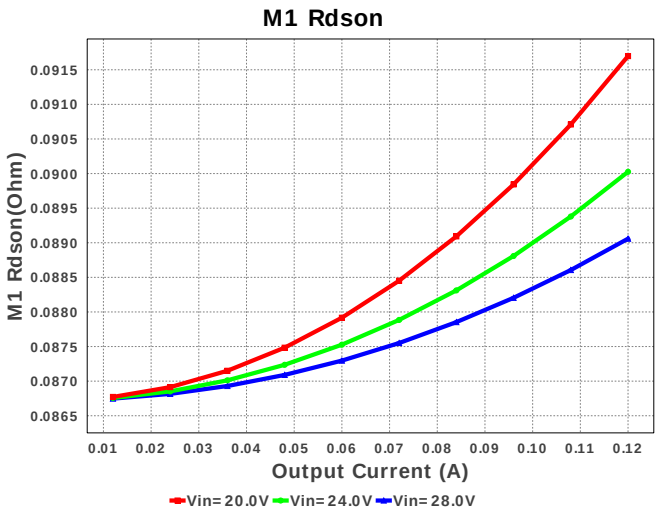


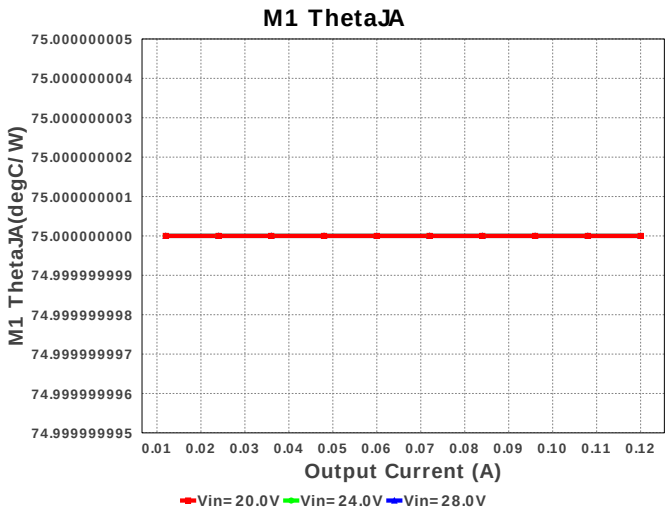


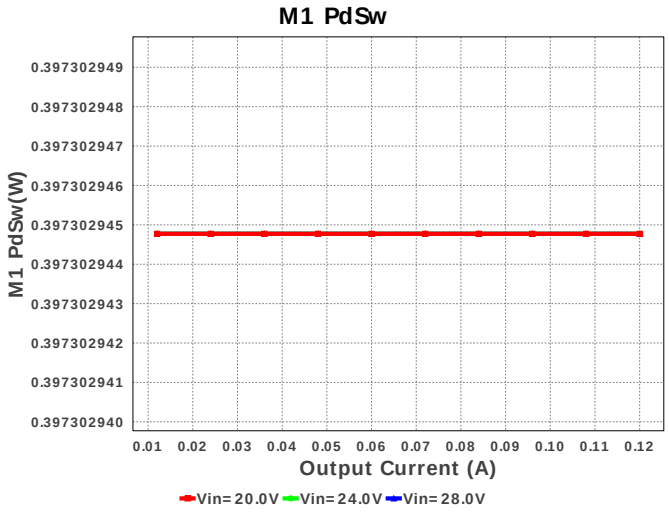


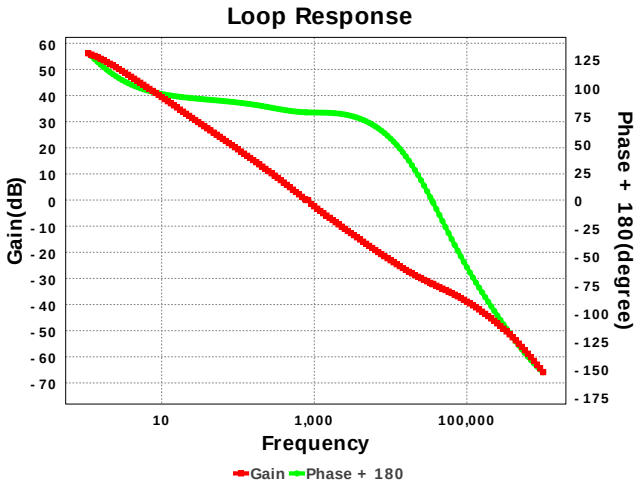












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	57.935 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	278.531 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	762.26 mA	Current	Average input current
4.	L Ipp	200.69 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	764.29 mA	Current	Inductor ripple current
6.	M1 Irms	968.321 mA	Current	M1 MOSFET Irms
7.	SW Ipk	862.438 mA	Current	Peak switch current
8.	BOM Count	20	General	Total Design BOM count
9.	FootPrint	2.86 k mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	310.417 kHz	General	Switching frequency
11.	IC Tolerance	15.3 mV	General	IC Feedback Tolerance
12.	M Vds Act	72.618 mV	General	M Vds
13.	M1 Rdson	74.994 mOhm	General	Drain-Source On-resistance
14.	M1 ThetaJA	75.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Pout	14.4 W	General	Total output power
16.	Total BOM	$9.17	General	Total BOM Cost
17.	D1 Tj	39.62 degC	Op_Point	D1 junction temperature
18.	Vout OP	120.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	591.733 Hz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	84.254 %	Op_point	Duty cycle
21.	Efficiency	94.455 %	Op_point	Steady state efficiency
22.	Gain Marg	-29.429 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	78.78 degC	Op_point	IC junction temperature
24.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	120.0 mA	Op_point	Iout operating point
26.	M1 TjOP	44.524 degC	Op_point	M1 MOSFET junction temperature
27.	Phase Marg	78.356 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	20.0 V	Op_point	Vin operating point
29.	Vout p-p	68.995 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	2.954 mW	Power	Input capacitor power dissipation
31.	Cout Pd	6.206 mW	Power	Output capacitor power dissipation

#	Name	Value	Category	Description
32.	Diode Pd	72.881 mW	Power	Diode power dissipation
33.	IC Pd	243.9 mW	Power	IC power dissipation
34.	L Pd	287.397 mW	Power	Inductor power dissipation
35.	M1 Pd	193.647 mW	Power	M1 MOSFET total power dissipation
36.	M1 PdCond	70.318 mW	Power	M1 MOSFET conduction losses
37.	M1 PdSw	123.329 mW	Power	M1 MOSFET switching losses
38.	Rfb Pd	15.307 mW	Power	Rfb Power Dissipation
39.	Total Pd	845.346 mW	Power	Total Power Dissipation
40.	Low Freq Gain	53.343 dB	Unknown	Gain at 10Hz

Design Inputs

#	Name	Value	Description
1.	Iout	120.0 m	Maximum Output Current
2.	Iout1	120.0 m	Output Current #1
3.	VinMax	28.0	Maximum input voltage
4.	VinMin	20.0	Minimum input voltage
5.	Vout	120.0	Output Voltage
6.	Vout1	120.0	Output Voltage #1
7.	base_pn	LM3488	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature
10.	UserFsw	310.417 k	Customer Selected Frequency

Design Assistance

1. **LM3488** Product Folder : http://www.ti.com/product/lm3488 : contains the data sheet and other resources.