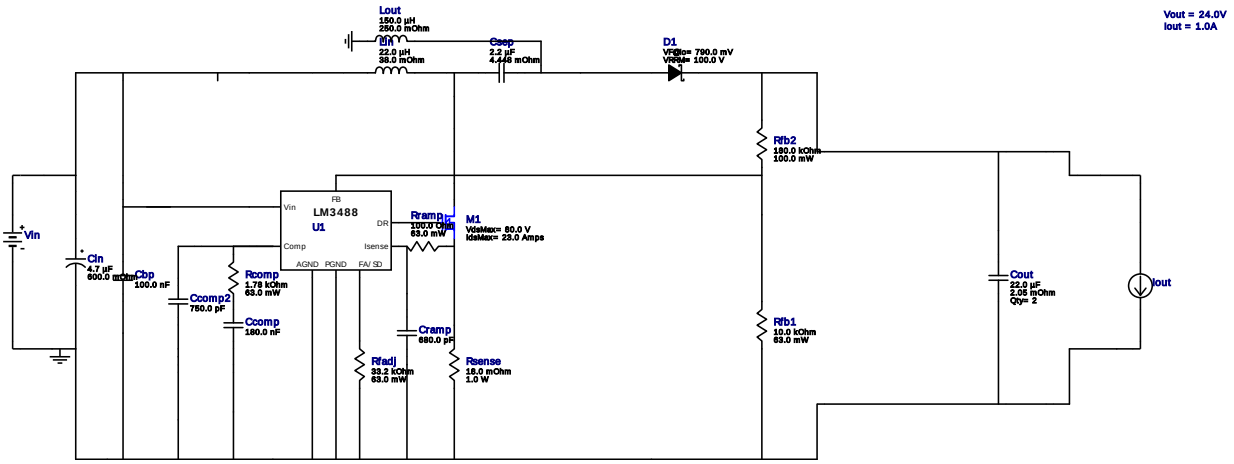
WEBENCH® Design Report

VinMin = 9.0V
VinMax = 30.0V
Vout = 24.0V
Iout = 1.0A

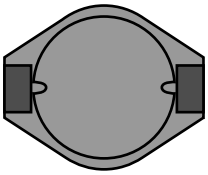
Device = LM3488MMX/NOPB
Topology = SEPIC
Created = 1/26/17 5:19:07 AM
BOM Cost = $3.41
BOM Count = 19
Total Pd = 2.55W

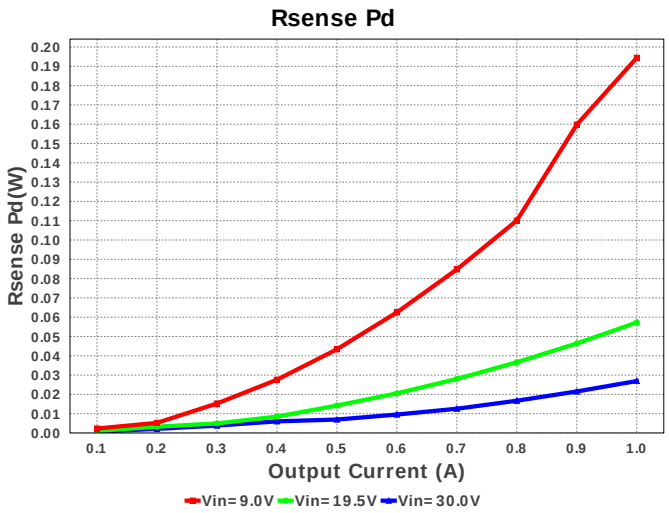
Design : 3445715/3 LM3488MMX/NOPB
LM3488MMX/NOPB 9.0V-30.0V to 24.00V @ 1.0A

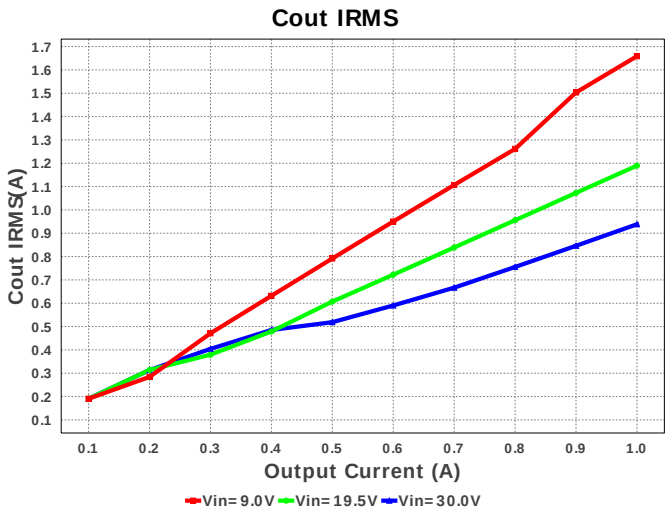


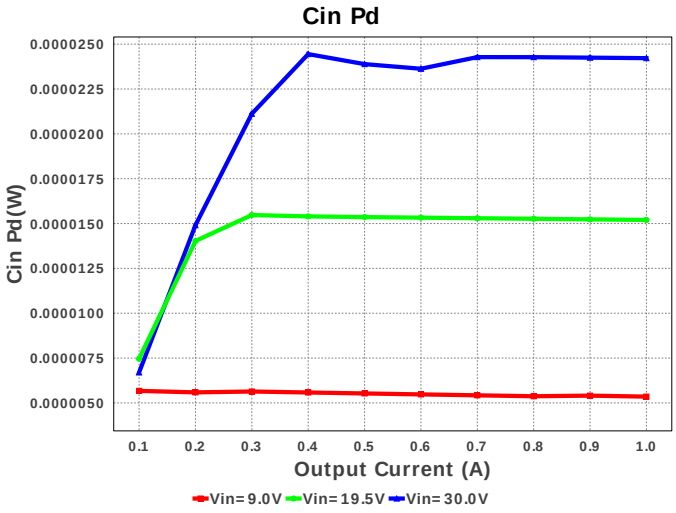
Electrical BOM

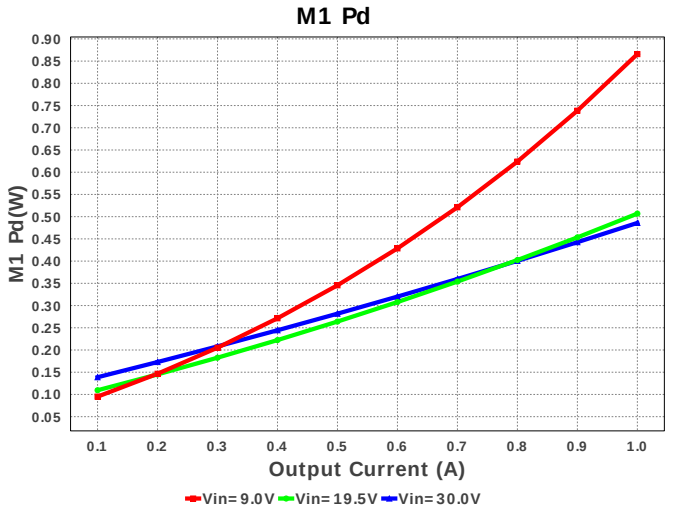
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbp	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0603 5 mm²
2.	Ccomp	MuRata	GRM155R60J184KE01D Series= X5R	Cap= 180.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C751JBCNNNC Series= C0G/NP0	Cap= 750.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.02	 0805 7 mm²
4.	Cin	Vishay-Sprague	593D475X9050D2TE3 Series= 593D	Cap= 4.7 uF ESR= 600.0 mOhm VDC= 50.0 V IRMS= 500.0 mA	1	$0.56	 7343-31 59 mm²
5.	Cout	TDK	C2012X5R1V226M125AC Series= X5R	Cap= 22.0 uF ESR= 2.05 mOhm VDC= 35.0 V IRMS= 4.5559 A	2	$0.30	 0805 7 mm²
6.	Cramp	Yageo America	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
7.	Csep	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	 1206_190 11 mm²
8.	D1	Diodes Inc.	B3100-13-F	VF@Io= 790.0 mV VRRM= 100.0 V	1	$0.22	 SMC 83 mm²
9.	Lin	Bourns	SRR1210-220M	L= 22.0 µH DCR= 38.0 mOhm	1	$0.44	 SRR1210 196 mm²

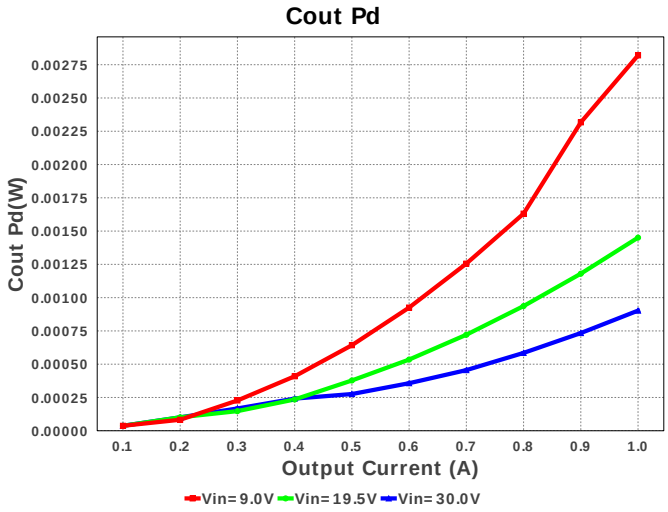
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Lout	NIC Components	NPI52W151MTRF	L= 150.0 µH DCR= 250.0 mOhm	1	$0.26	 IND_NPI52W 358 mm²
11.	M1	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	$0.19	 PG-TDSON-8 55 mm²
12.	Rcomp	Vishay-Dale	CRCW04021K78FKED Series= CRCW..e3	Res= 1.78 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
13.	Rfadj	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
14.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	Rfb2	Yageo America	RC0603FR-07180KL Series= ?	Res= 180.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm²
16.	Rramp	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	Rsense	Susumu Co Ltd	PRL1632-R018-F-T1 Series= PRL1632	Res= 18.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	 0612 11 mm²
18.	U1	Texas Instruments	LM3488MMX/NOPB	Switcher	1	$0.80	 MUA08A 24 mm²

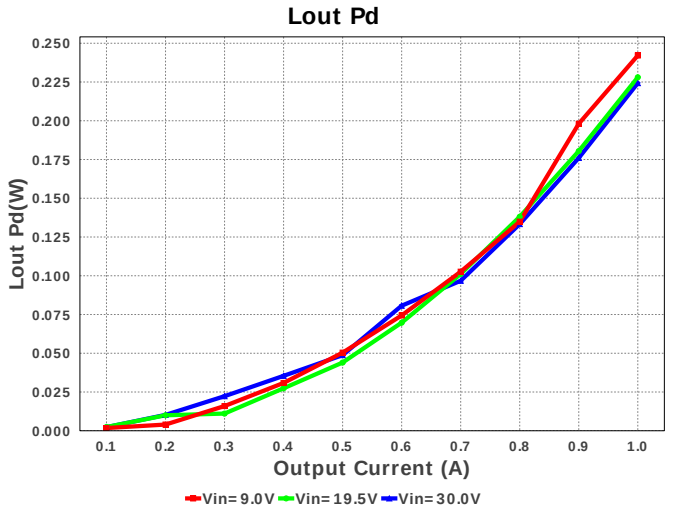


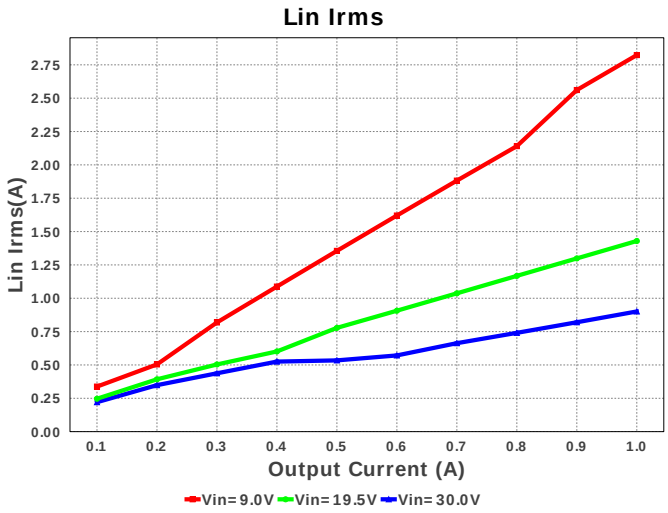


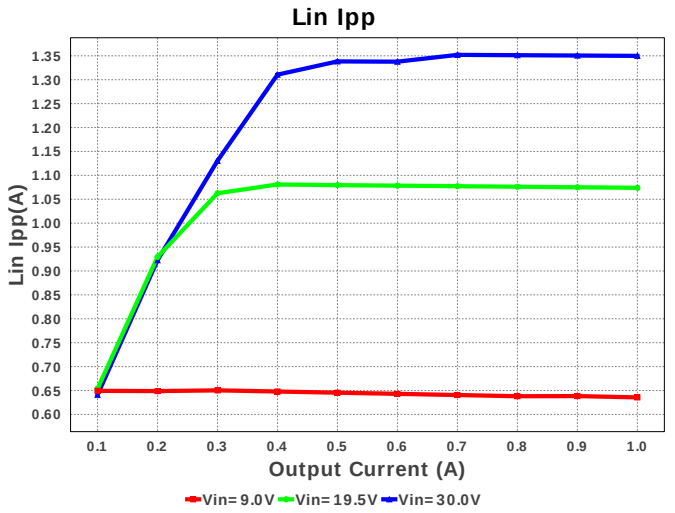


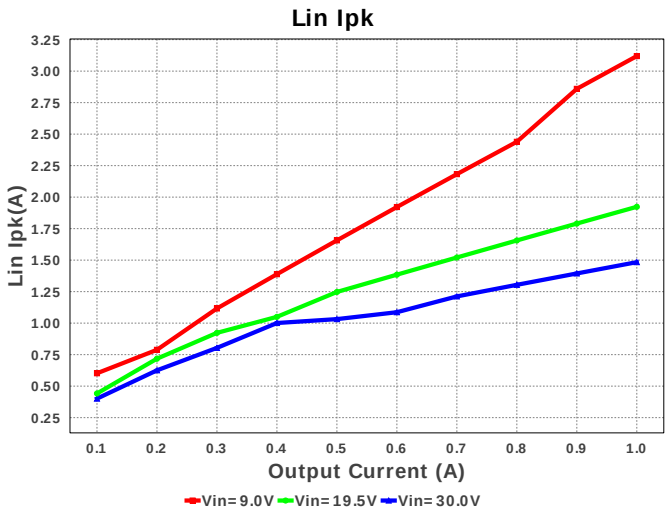


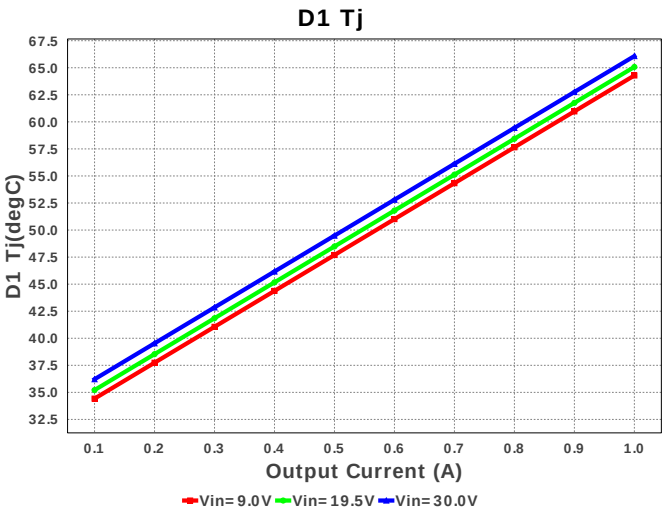


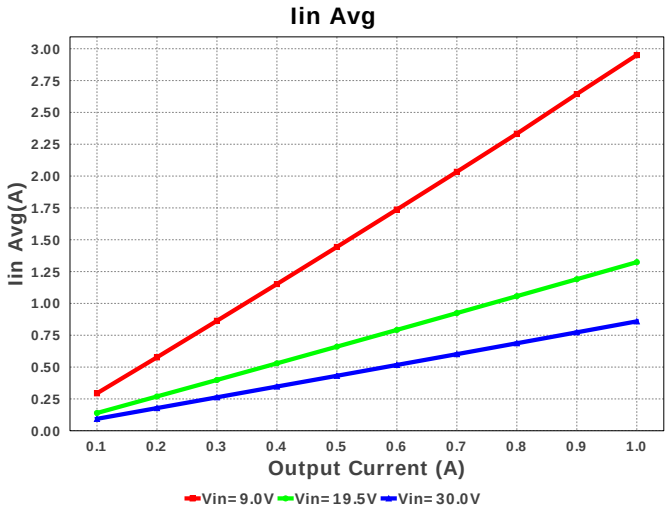


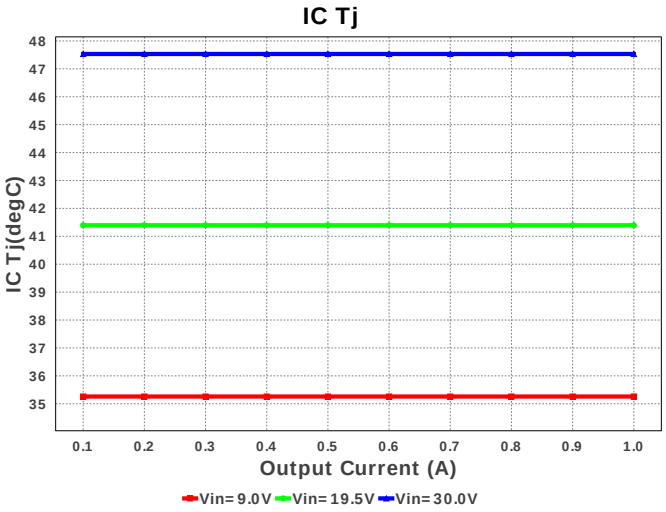


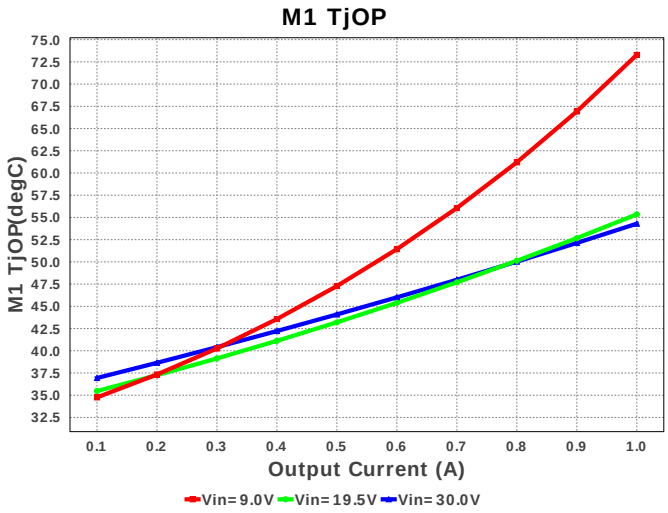


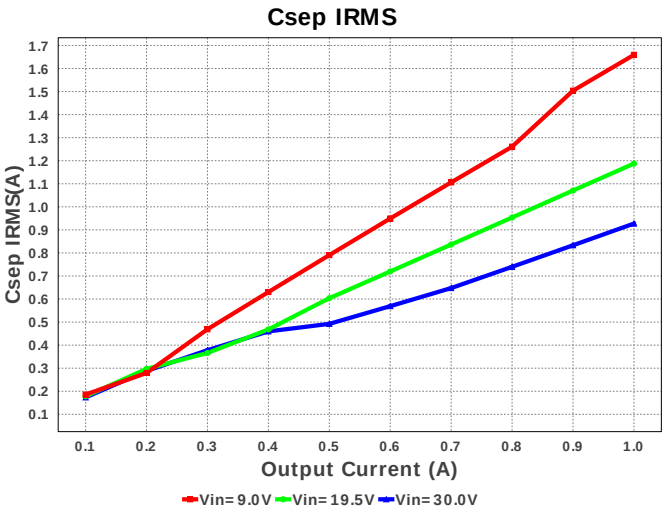


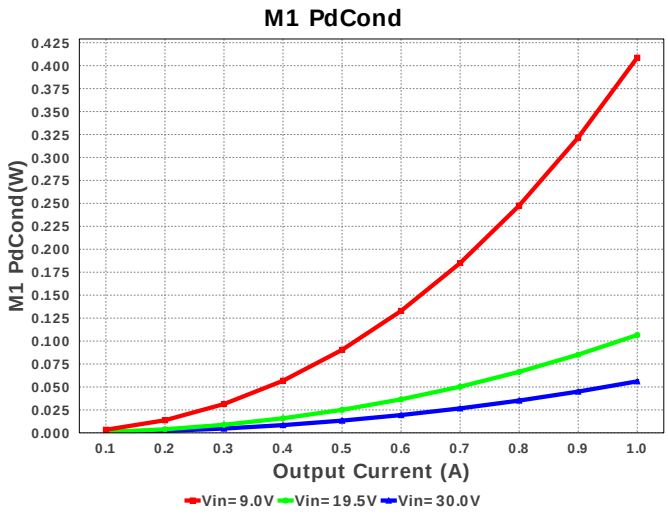


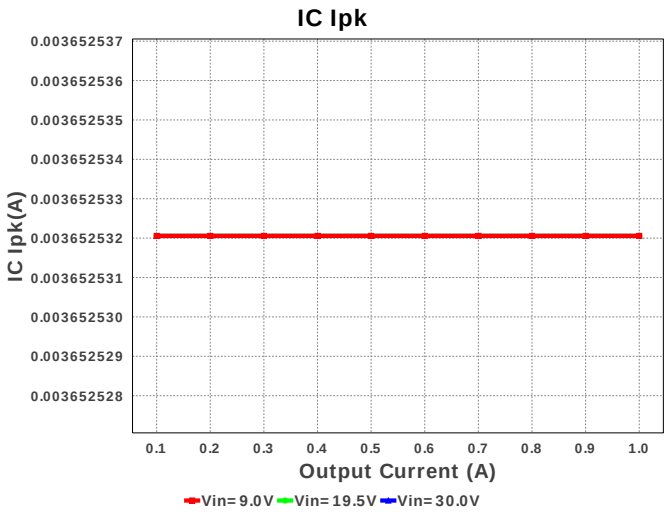


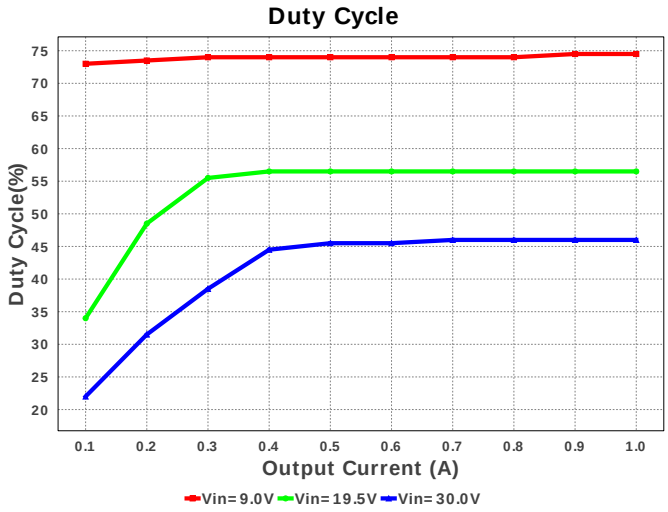


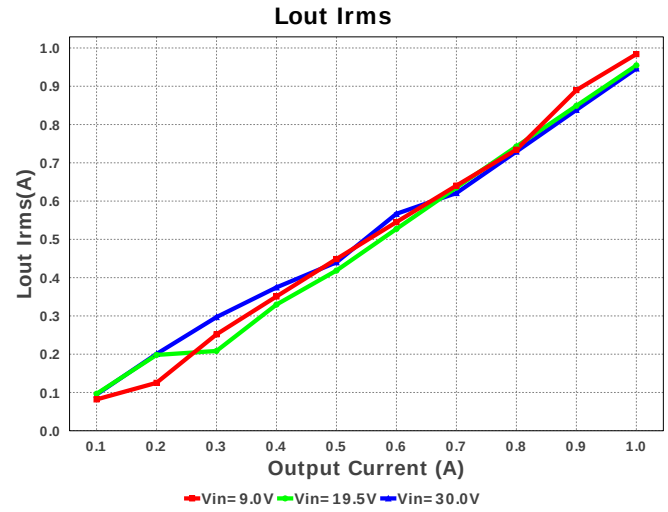


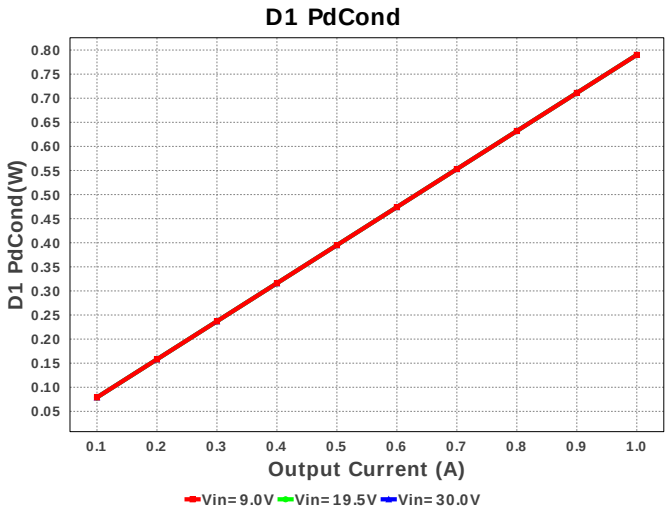


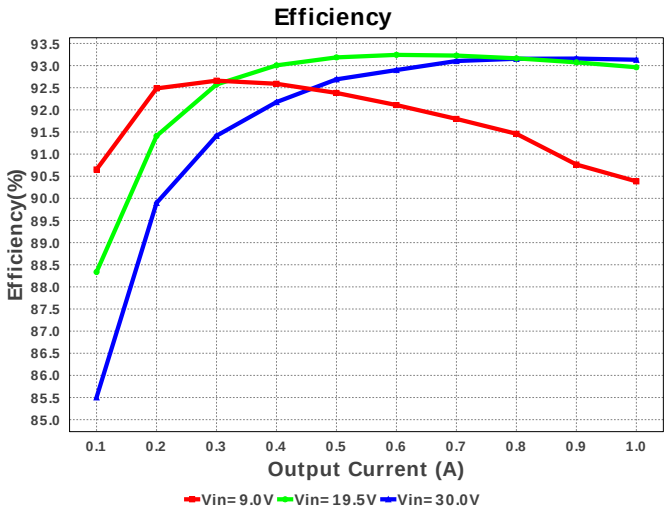


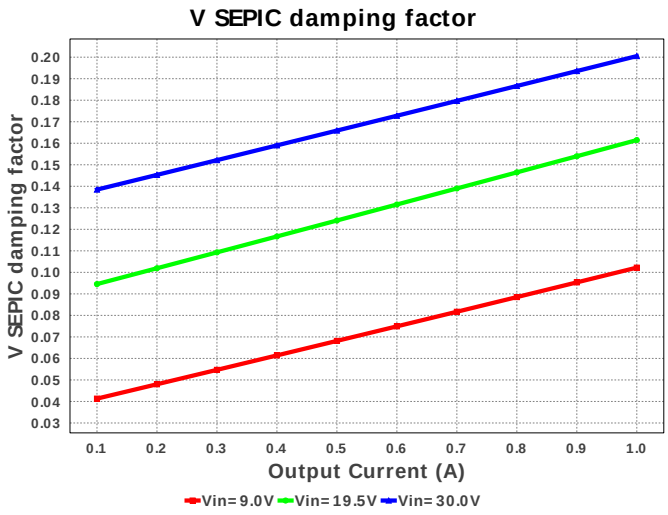


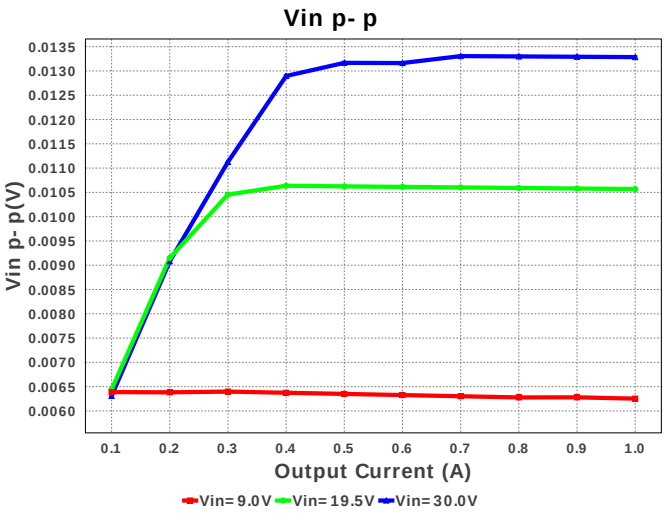


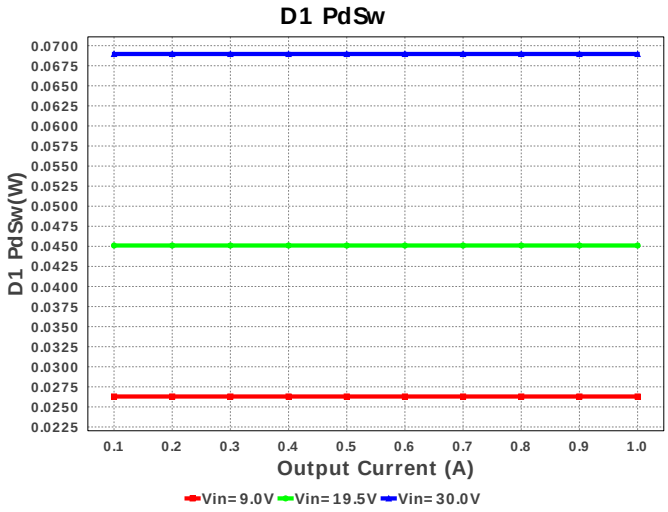


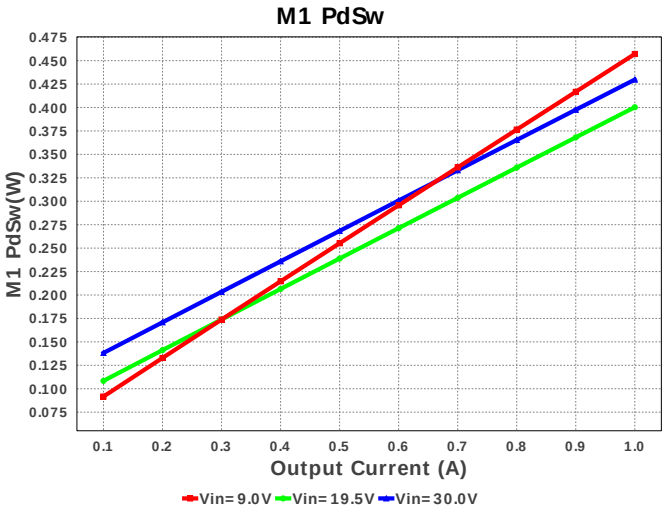


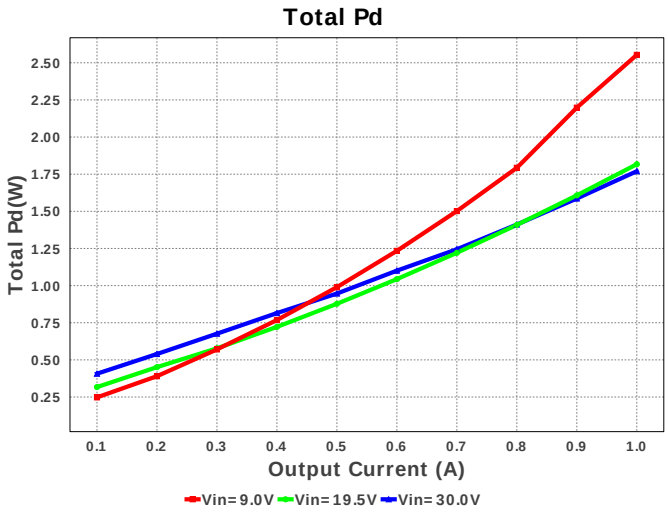


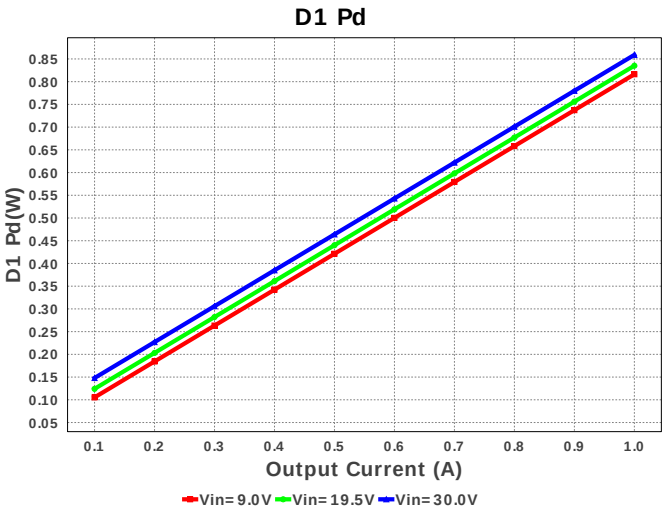


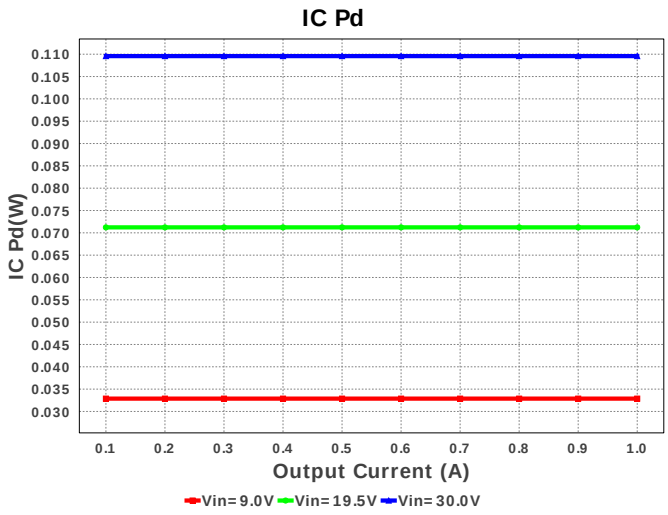


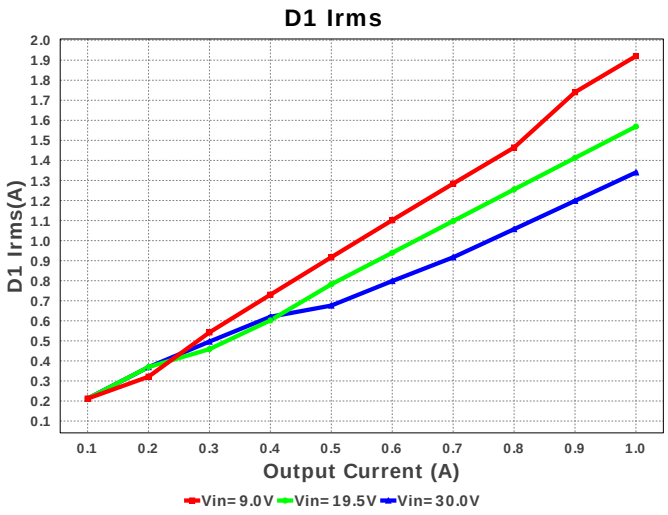


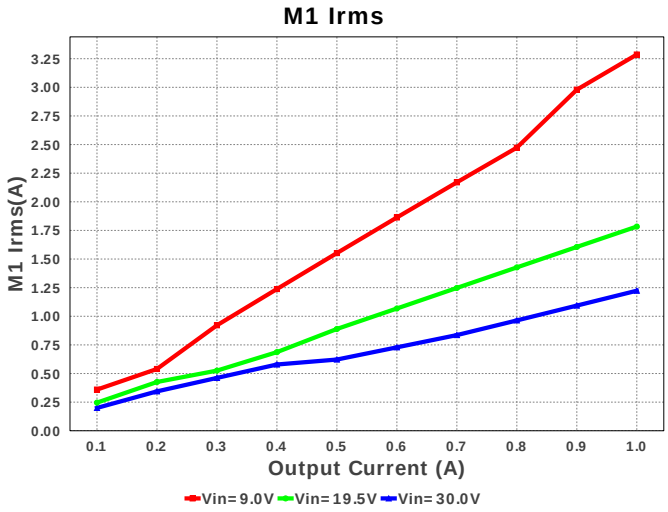


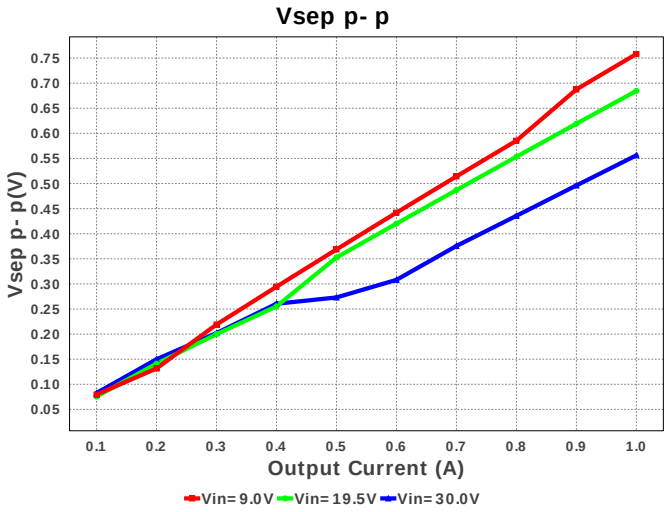


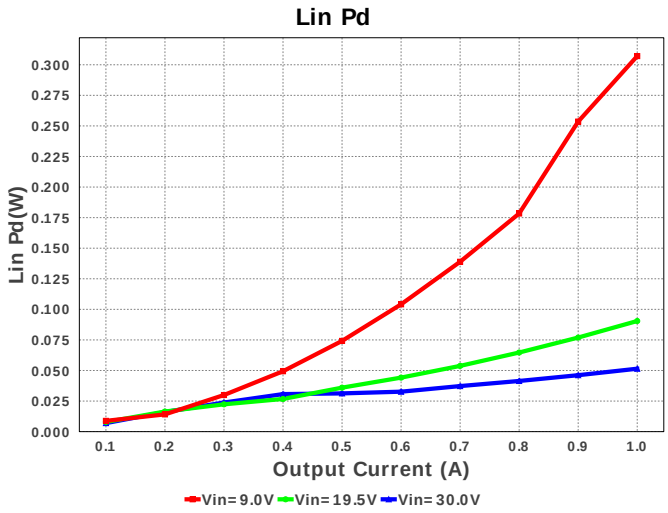


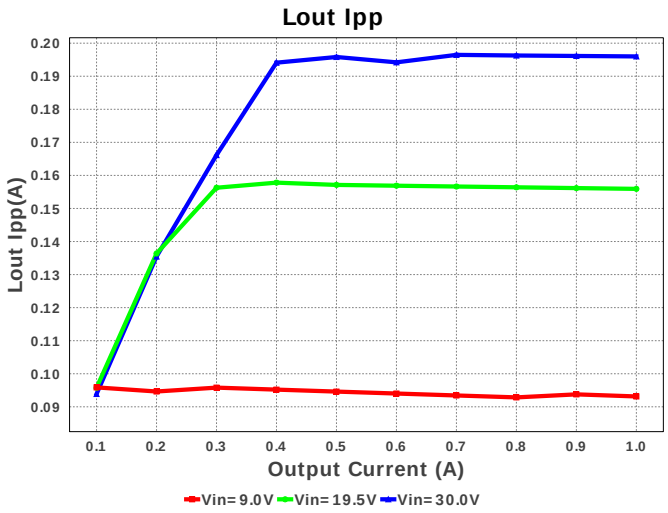




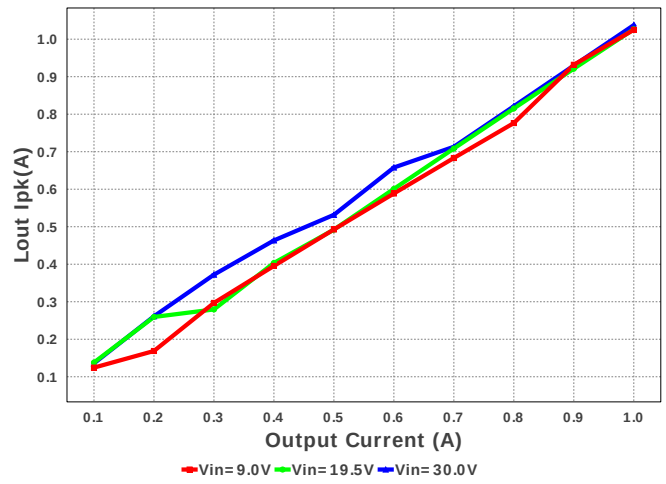




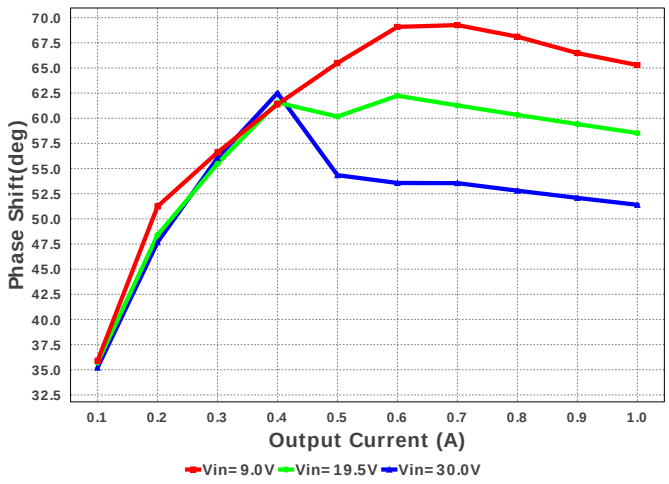




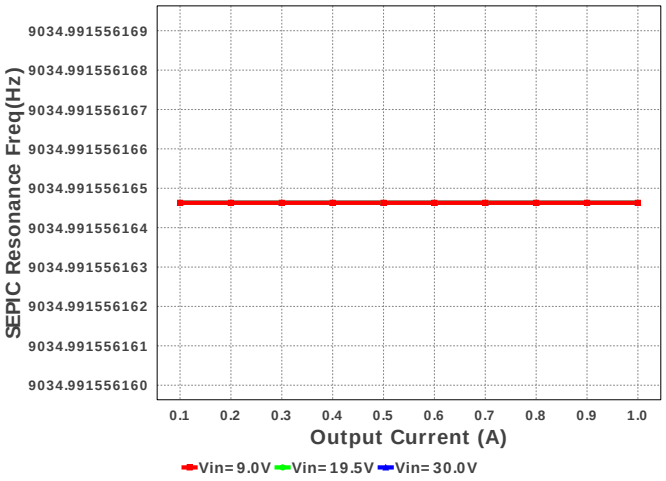
Lout Ipk



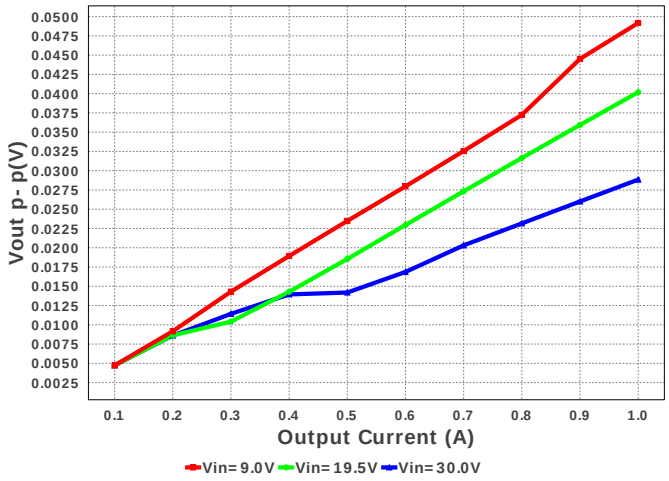
Phase Shift



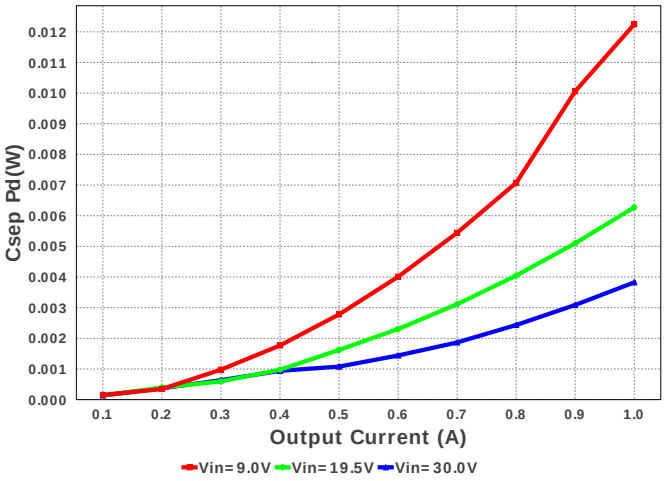
SEPIC Resonance Freq



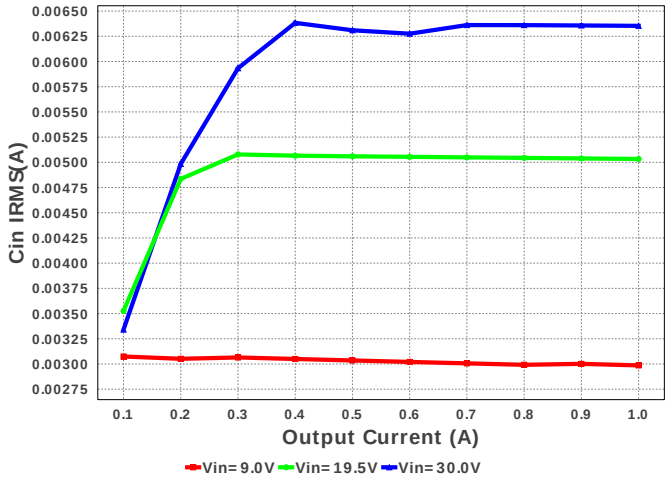
Vout p- p

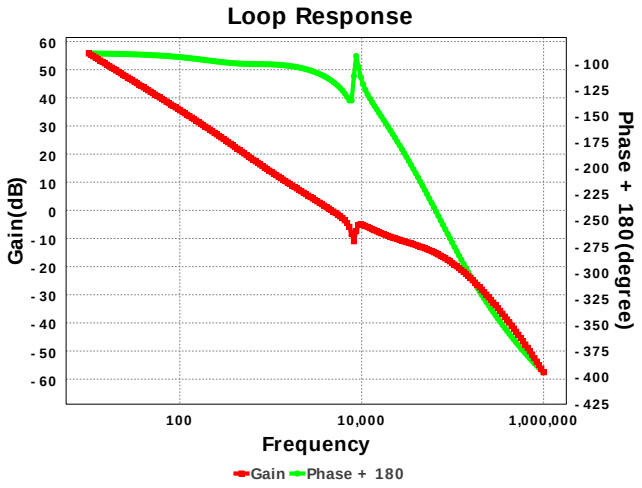


Csep Pd



Cin IRMS





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	3.002 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.66 A	Current	Output capacitor RMS ripple current
3.	Csep IRMS	1.661 A	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	1.922 A	Current	D1 Irms
5.	IC Ipk	3.647 mA	Current	Peak switch current in IC
6.	Iin Avg	2.95 A	Current	Average input current
7.	Lin Ipk	3.127 A	Current	Lin peak current
8.	Lin Ipp	639.259 mA	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	2.829 A	Current	Lin ripple current
10.	Lout Ipk	1.023 A	Current	Lout peak current
11.	Lout Ipp	93.662 mA	Current	Peak-to-peak output inductor ripple current
12.	Lout Irms	981.212 mA	Current	Lout ripple current
13.	M1 Irms	3.289 A	Current	M1 MOSFET Irms
14.	BOM Count	19	General	Total Design BOM count
15.	FootPrint	848.0 mm^2	General	Total Foot Print Area of BOM components
16.	Frequency	455.0 kHz	General	Switching frequency
17.	IC Tolerance	15.3 mV	General	IC Feedback Tolerance
18.	Mode	CCM	General	Conduction Mode
19.	Total BOM	$3.41	General	Total BOM Cost
20.	D1 Tj	64.278 degC	Op_Point	D1 junction temperature
21.	SEPIC Resonance Freq	9.035 kHz	Op_Point	SEPIC Resonance Frequency
22.	V SEPIC damping factor	102.22 m	Op_Point	V SEPIC damping factor
23.	Vin p-p	6.29 mV	Op_Point	Peak-to-peak input voltage
24.	Vsep p-p	763.982 mV	Op_Point	Peak-to-peak sepic voltage
25.	Cross Freq	4.606 kHz	Op_point	Bode plot crossover frequency
26.	Duty Cycle	74.5 %	Op_point	Duty cycle
27.	Efficiency	90.393 %	Op_point	Steady state efficiency
28.	Gain Marg	10.735 db	Op_point	Bode Plot Gain Margin
29.	IC Tj	47.503 degC	Op_point	IC junction temperature
30.	IOUT_OP	1.0 A	Op_point	Iout operating point
31.	M1 TjOP	73.143 degC	Op_point	M1 MOSFET junction temperature
32.	Phase Marg	63.852 deg	Op_point	Bode Plot Phase Margin
33.	Phase Shift	65.279 deg	Op_point	Bode Plot Phase Shift
34.	VIN_OP	9.0 V	Op_point	Vin operating point
35.	Vout p-p	49.487 mV	Op_point	Peak-to-peak output ripple voltage
36.	Cin Pd	5.408 µW	Power	Input capacitor power dissipation
37.	Cout Pd	2.825 mW	Power	Output capacitor power dissipation
38.	Csep Pd	12.265 mW	Power	SEPIC capacitor power dissipation
39.	D1 Pd	816.145 mW	Power	Diode power dissipation
40.	D1 PdCond	790.0 mW	Power	Diode conduction losses
41.	D1 PdSw	26.145 mW	Power	Diode switching losses
42.	IC Pd	109.395 mW	Power	IC power dissipation
43.	Lin Pd	308.368 mW	Power	Lin power dissipation
44.	Lout Pd	240.77 mW	Power	Lout power dissipation
45.	M1 Pd	862.849 mW	Power	M1 MOSFET total power dissipation
46.	M1 PdCond	408.382 mW	Power	M1 MOSFET conduction losses
47.	M1 PdSw	454.468 mW	Power	M1 MOSFET switching losses
48.	Rsense Pd	194.731 mW	Power	LED Current Rsns Power Dissipation
49.	Total Pd	2.551 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	9.0	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

Design Assistance

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