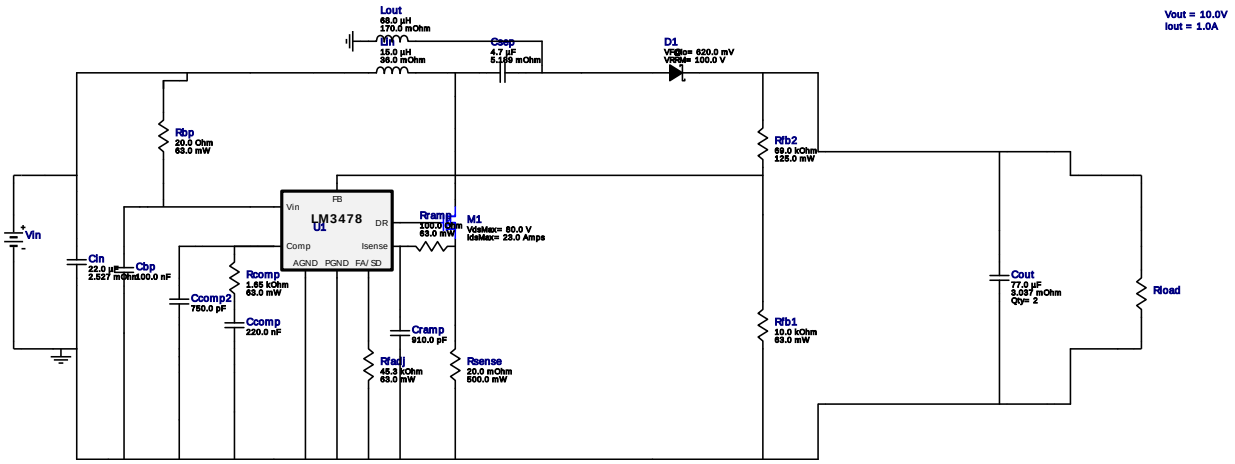
WEBENCH® Design Report

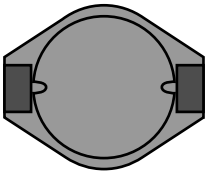
VinMin = 5.0V
VinMax = 17.0V
Vout = 10.0V
Iout = 1.0A

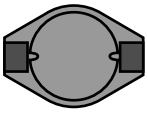
Device = LM3478MMX/NOPB
Topology = SEPIC
Created = 9/9/16 1:53:40 AM
BOM Cost = $2.65
BOM Count = 20
Total Pd = 1.62W

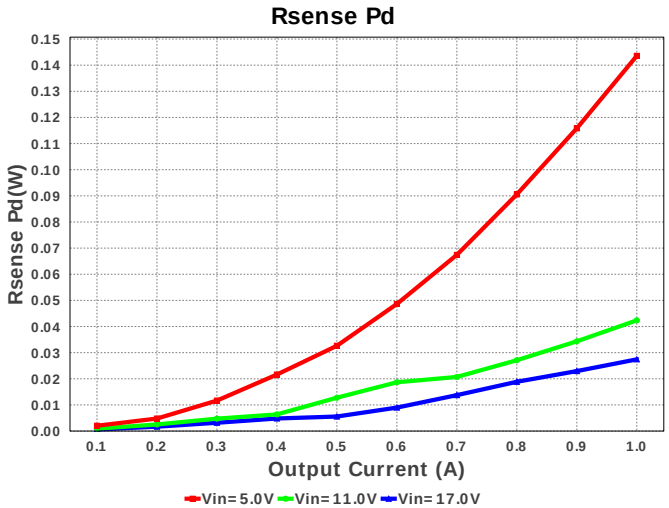
Design : 1542746/884 LM3478MMX/NOPB
LM3478MMX/NOPB 5.0V-17.0V to 10.00V @ 1.0A

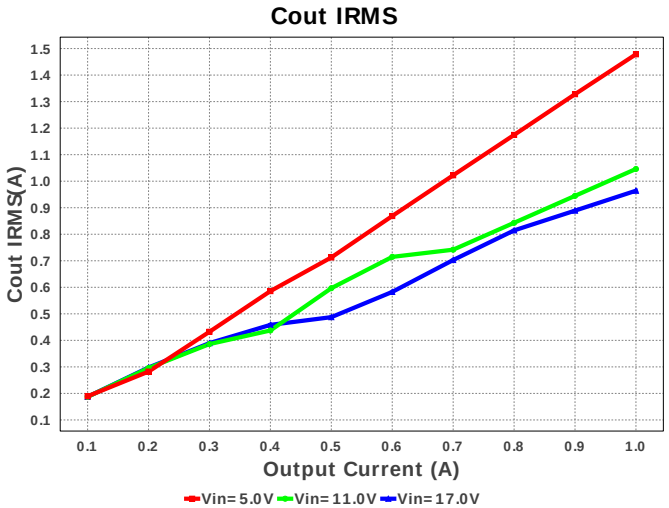


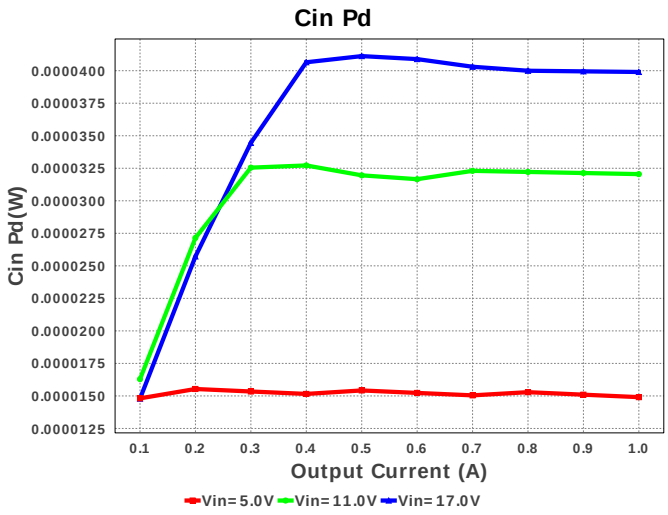
Electrical BOM

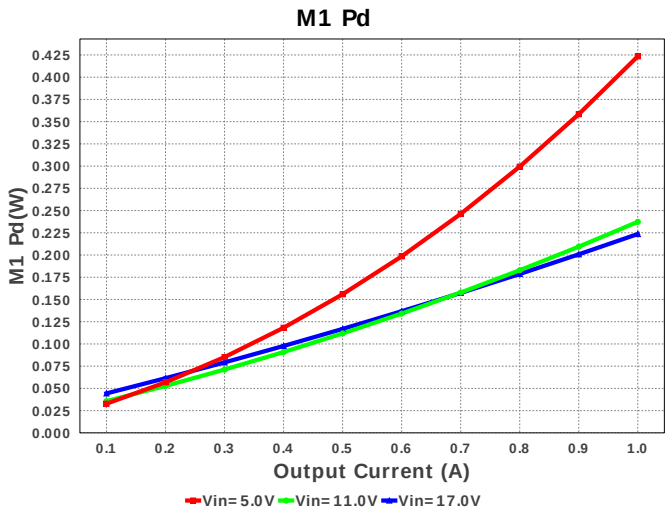
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbp	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
2.	Ccomp	MuRata	GRM155C80G224KE01D Series= X6S	Cap= 220.0 nF VDC= 4.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C751JBCNNNC Series= C0G/NP0	Cap= 750.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
4.	Cin	MuRata	GRM32EC81E226KE15L Series= X6S	Cap= 22.0 uF ESR= 2.527 mOhm VDC= 25.0 V IRMS= 4.2743 A	1	$0.23	1210_280 15 mm²
5.	Cout	MuRata	GRM32ER61C476ME15L Series= X5R	Cap= 77.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	2	$0.24	1210_280 15 mm²
6.	Cramp	Samsung Electro-Mechanics	CL21C911JBCNNNC Series= C0G/NP0	Cap= 910.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
7.	Csep	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	$0.02	0805 7 mm²
8.	D1	Vishay-Semiconductor	SS2PH10-M3	VF@Io= 620.0 mV VRRM= 100.0 V	1	$0.14	DO-220AA 14 mm²
9.	Lin	NIC Components	NPI52W150MTRF	L= 15.0 µH DCR= 36.0 mOhm	1	$0.26	 IND_NPI52W 358 mm²

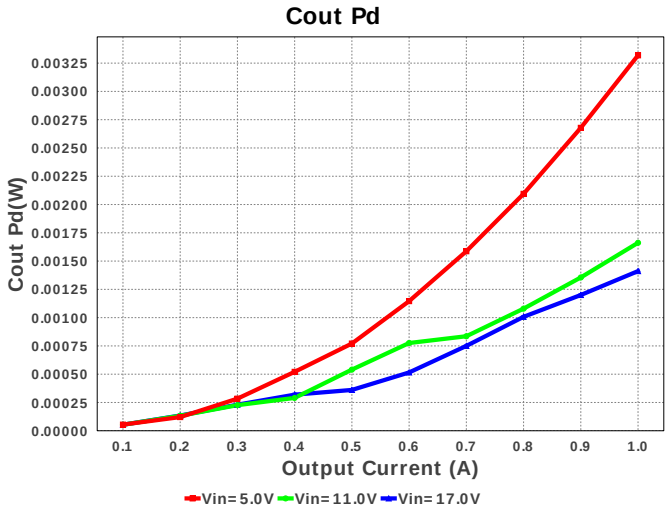
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Lout	NIC Components	NPI34W680MTRF	L= 68.0 µH DCR= 170.0 mOhm	1	$0.25	 IND_NPI34W 172 mm²
11.	M1	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	$0.19	 PG-TDSON-8 55 mm²
12.	Rbp	Vishay-Dale	CRCW040220R0FKED Series= CRCW..e3	Res= 20.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
13.	Rcomp	Vishay-Dale	CRCW04021K65FKED Series= CRCW..e3	Res= 1.65 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
14.	Rfadj	Vishay-Dale	CRCW040245K3FKED Series= CRCW..e3	Res= 45.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	Rfb2	Yageo America	RT0805BRD0769KL Series= RT0805	Res= 69.0 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.05	 0805 7 mm²
17.	Rramp	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	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11 mm²
19.	U1	Texas Instruments	LM3478MMX/NOPB	Switcher	1	$0.80	 MUA08A 24 mm²

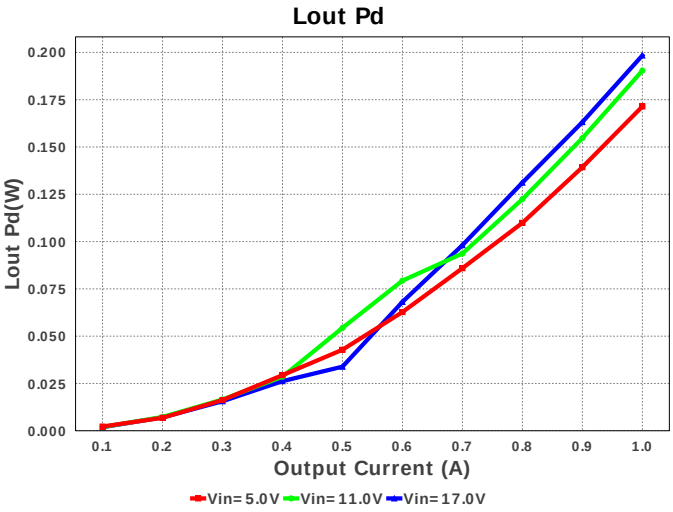


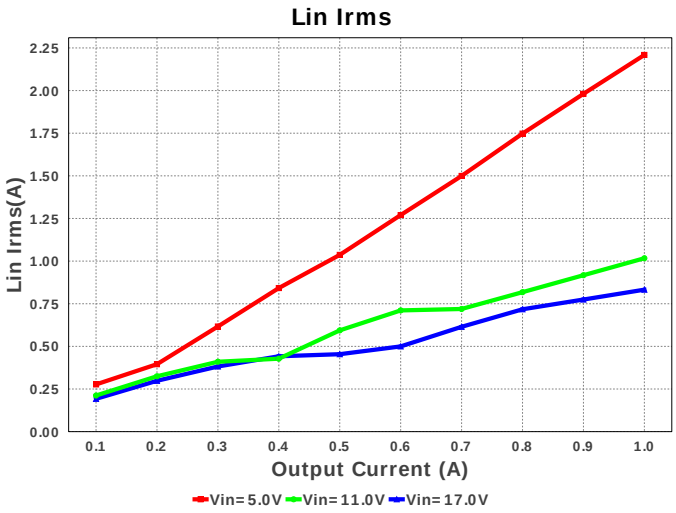


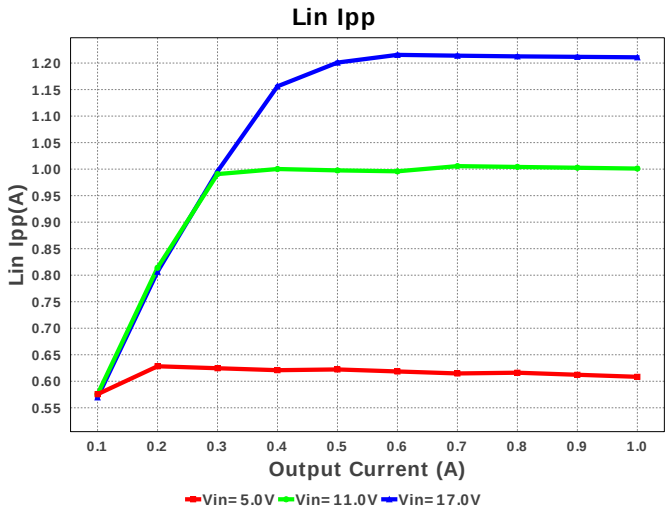


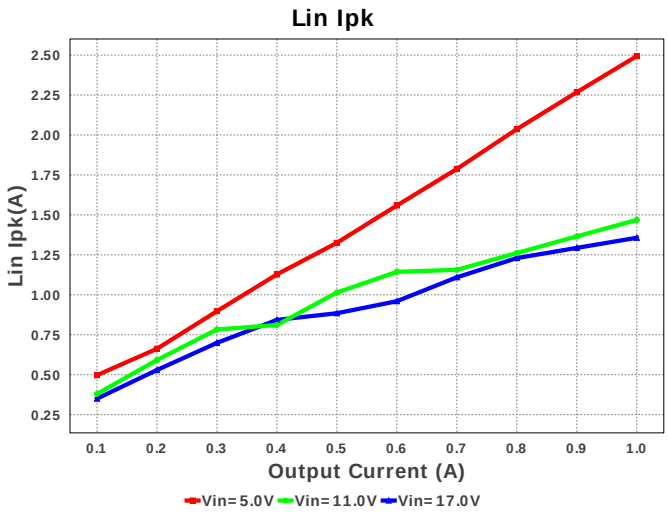


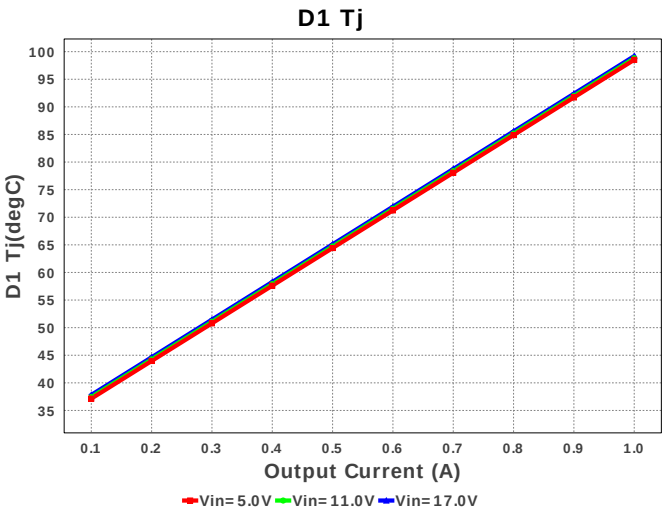


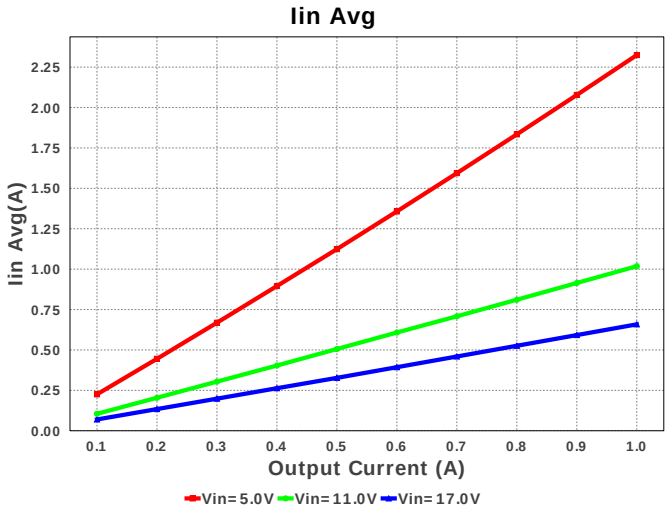


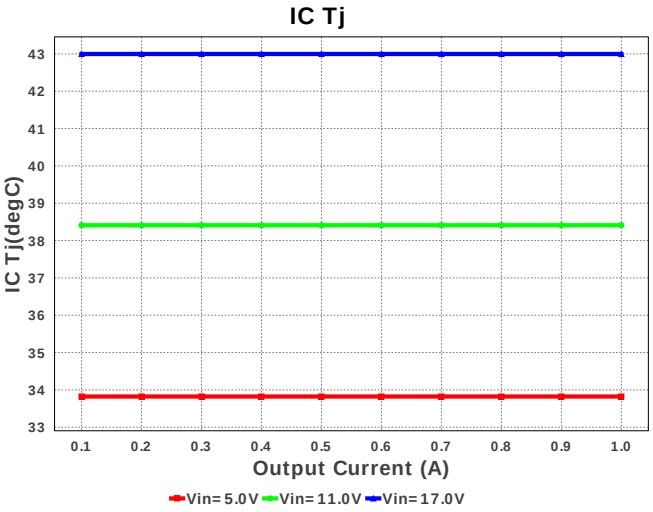


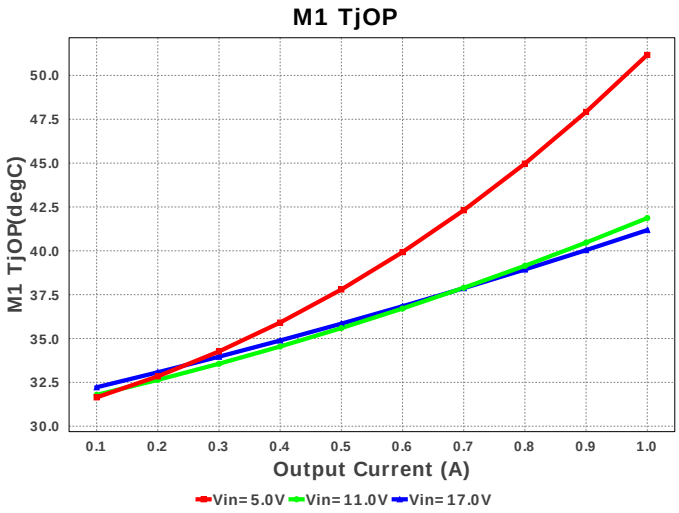


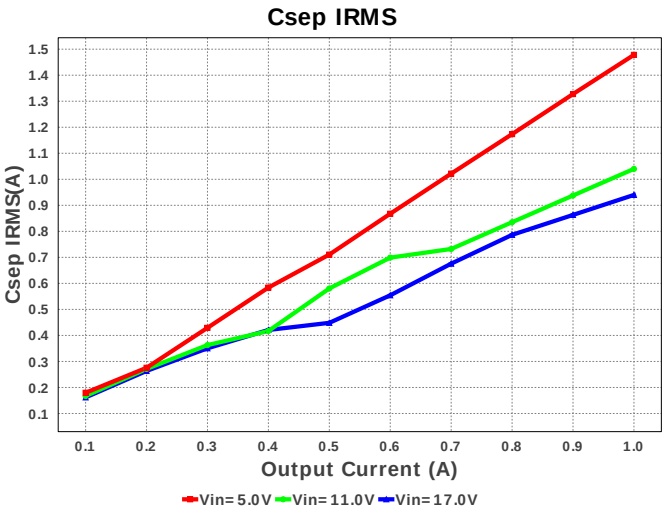


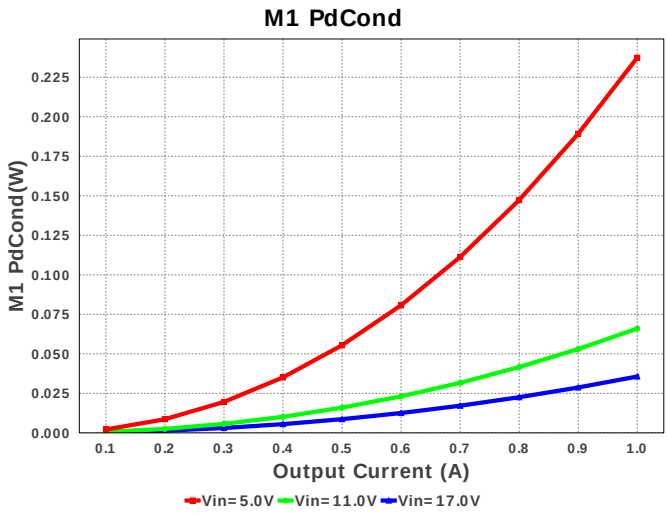


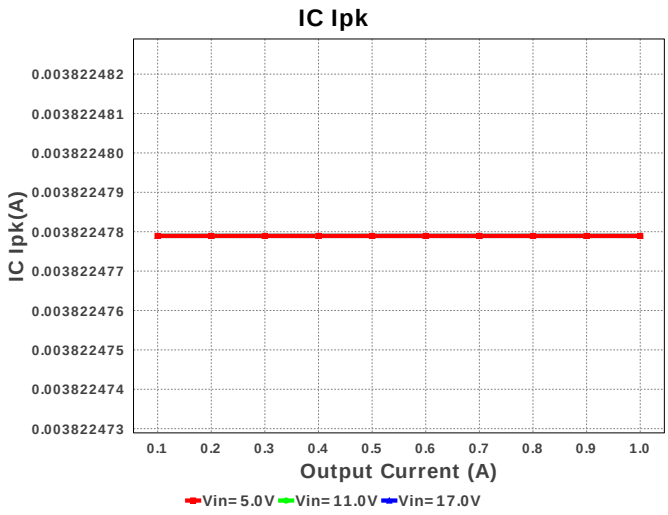


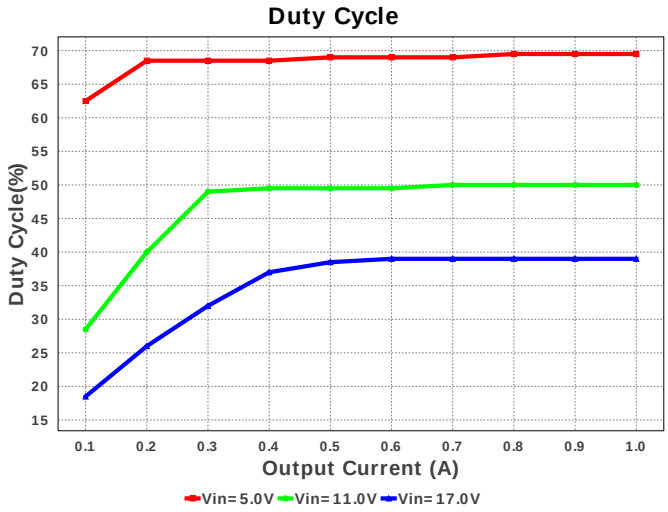


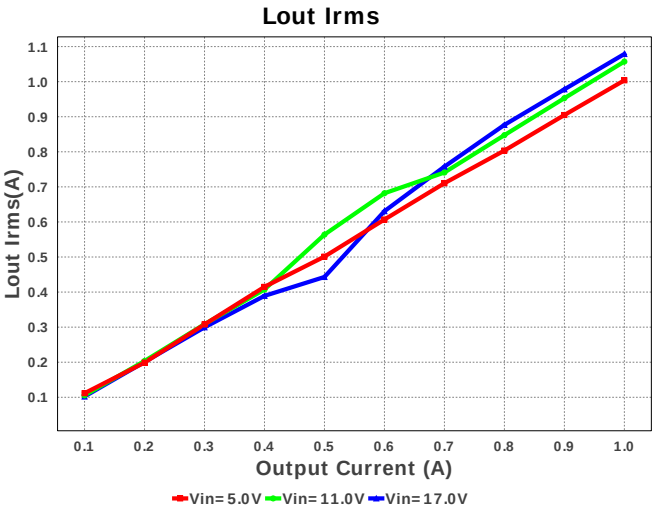


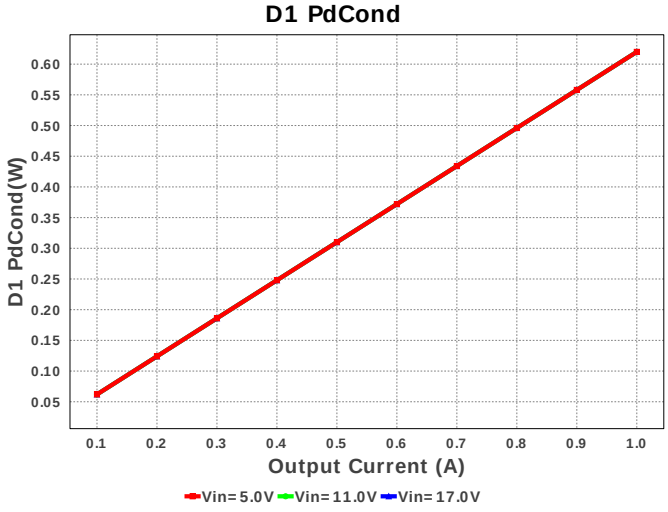


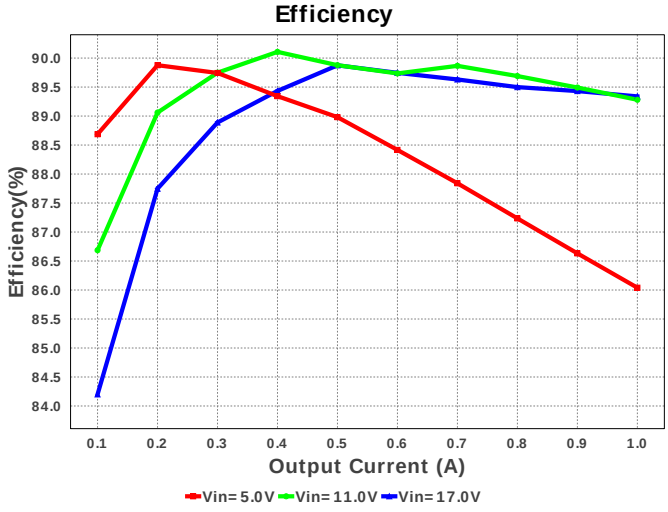


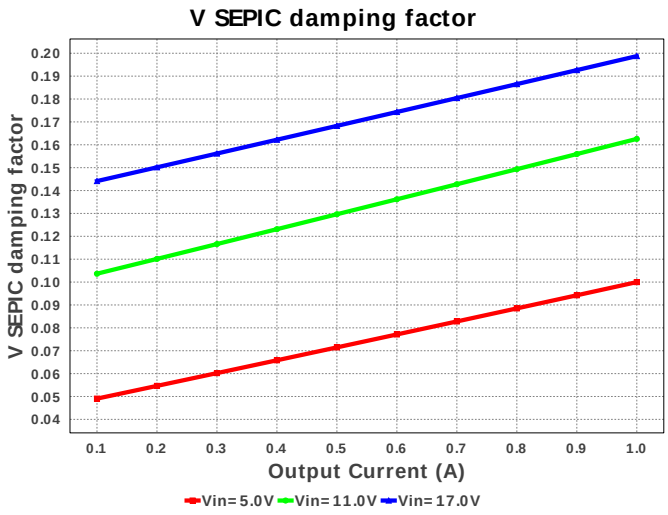


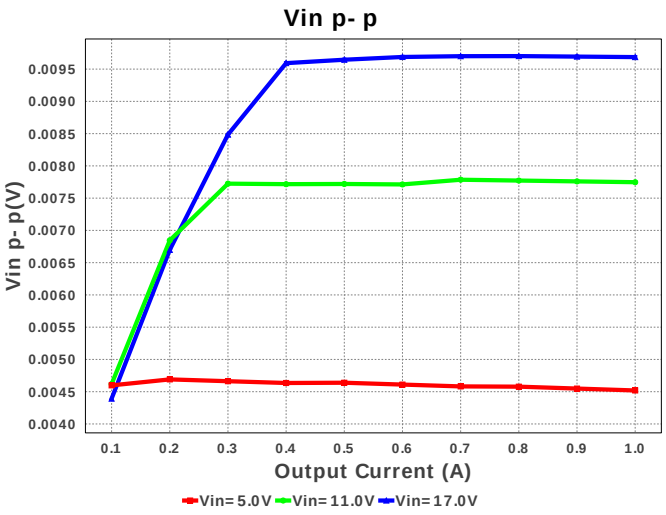


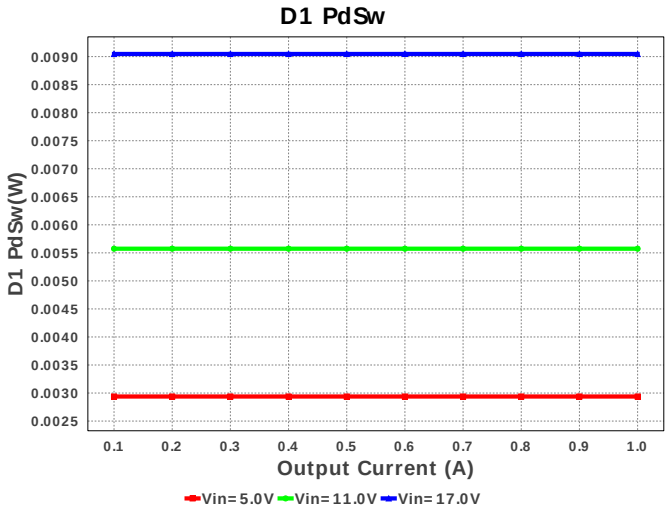


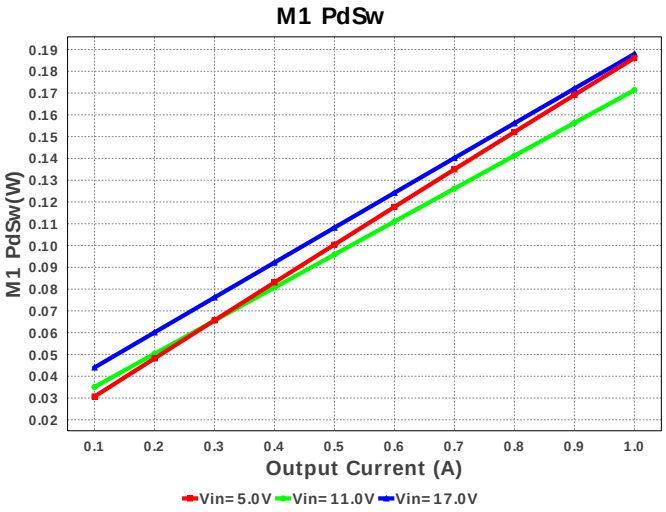


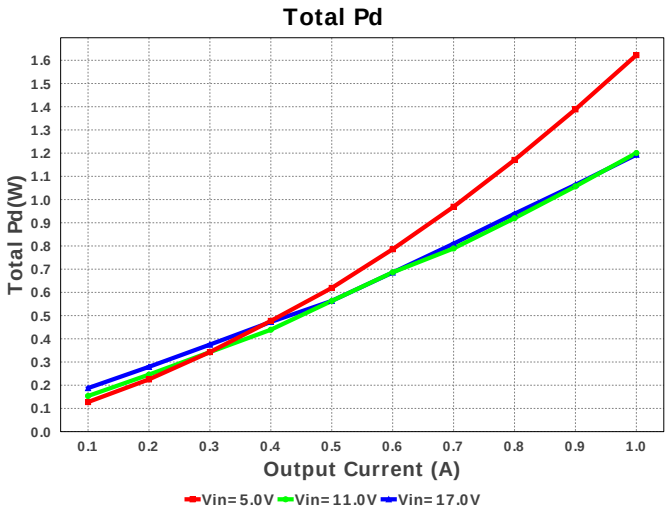


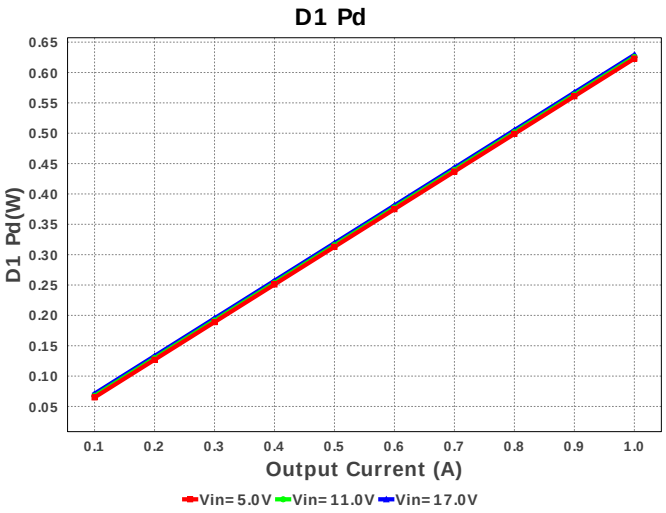


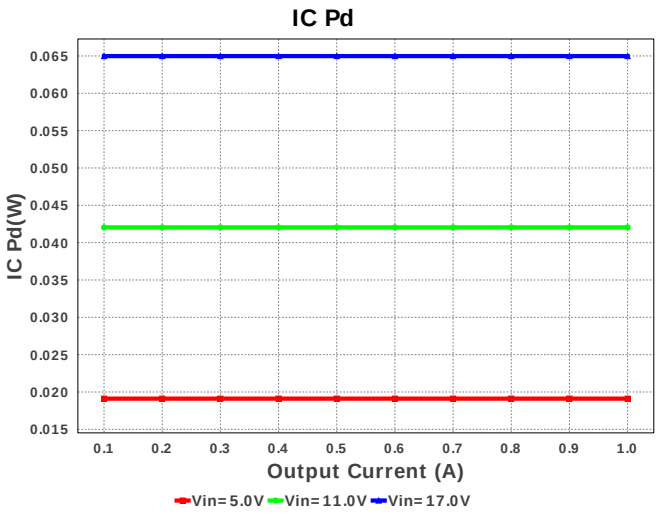


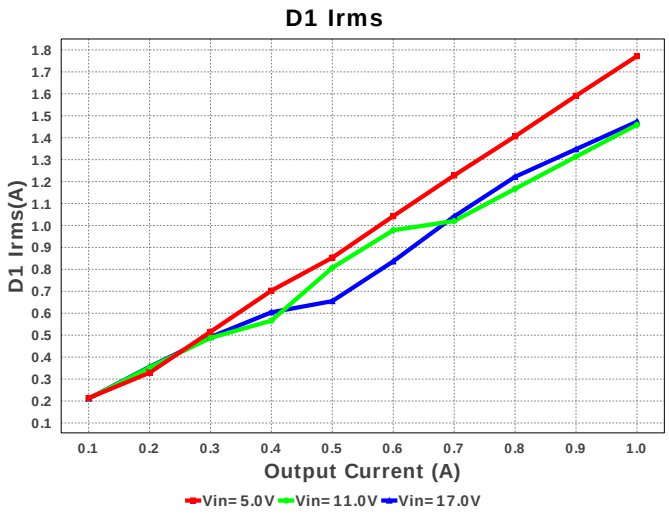


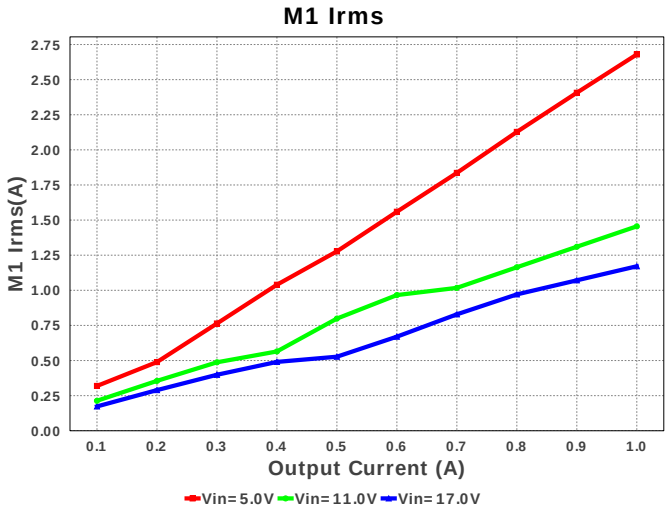


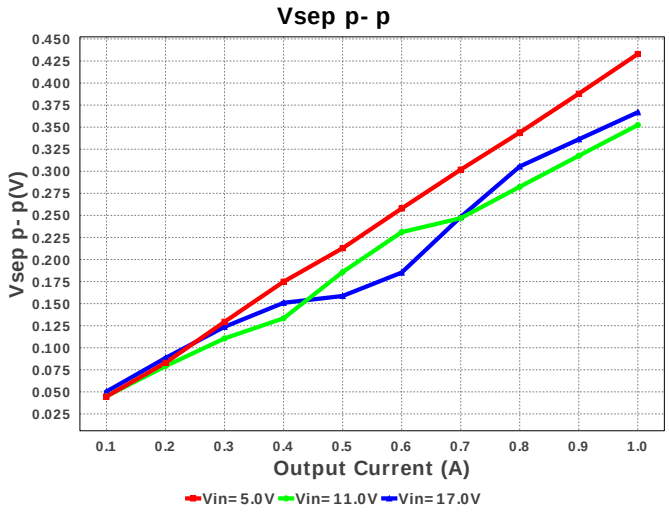


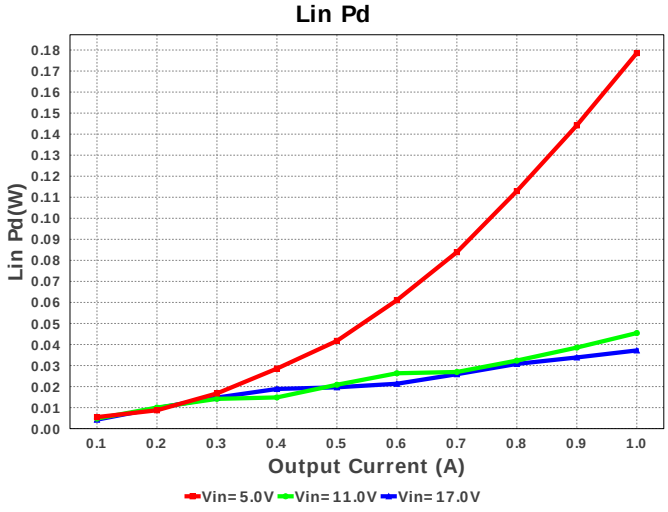


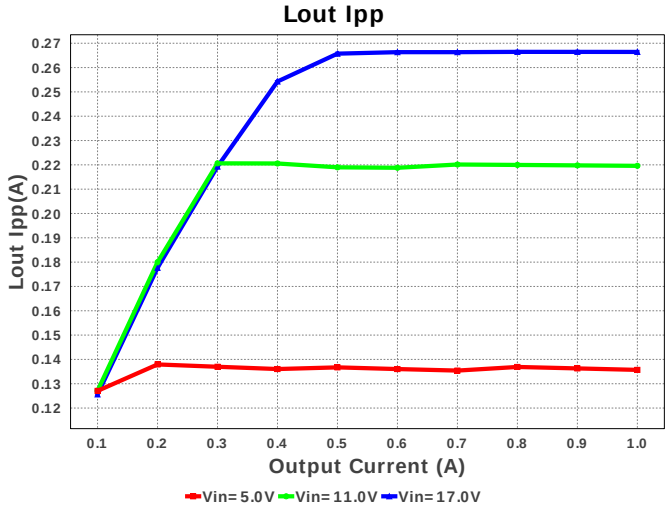


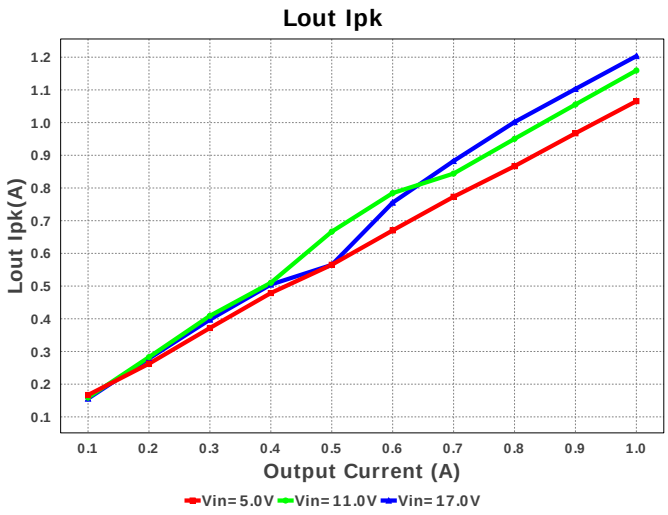


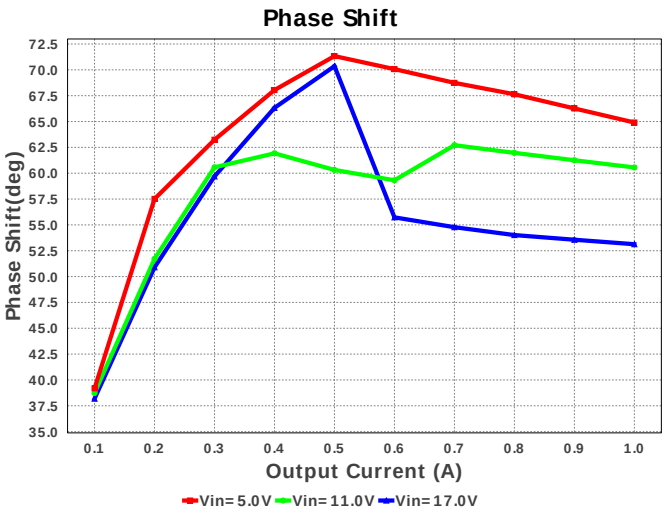


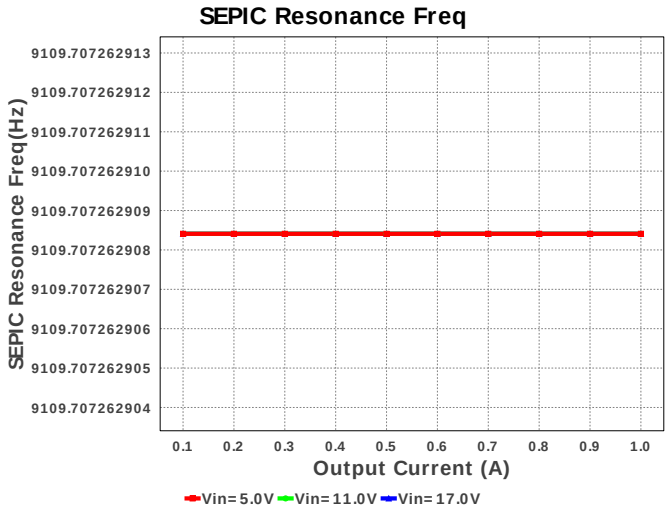


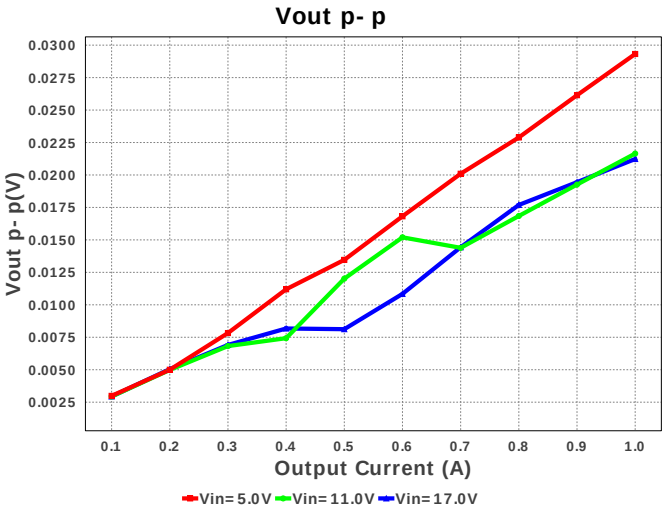


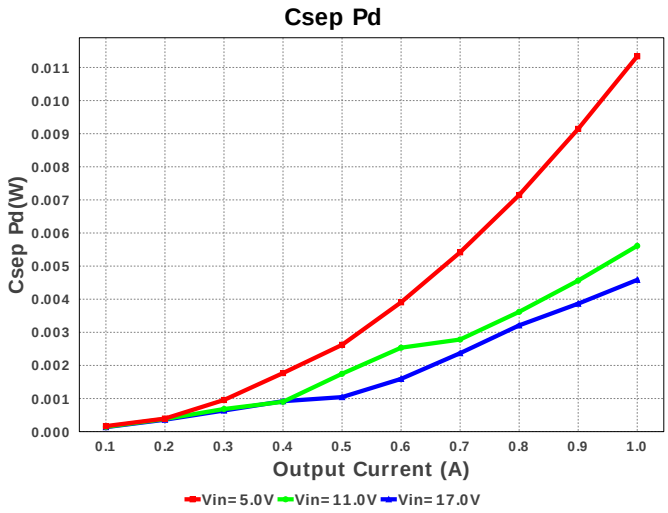


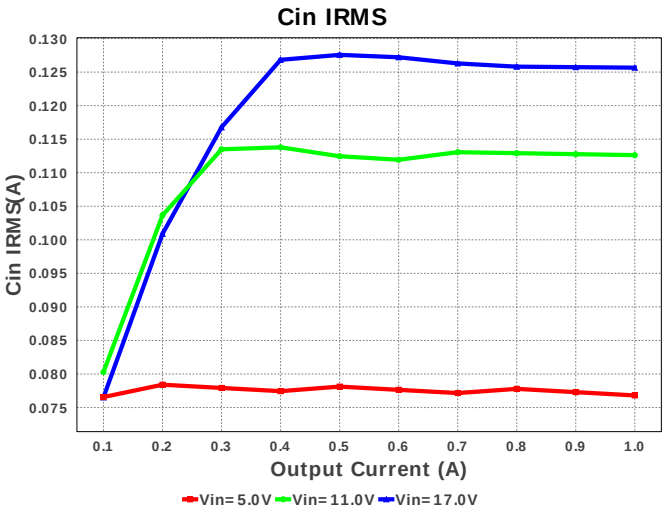


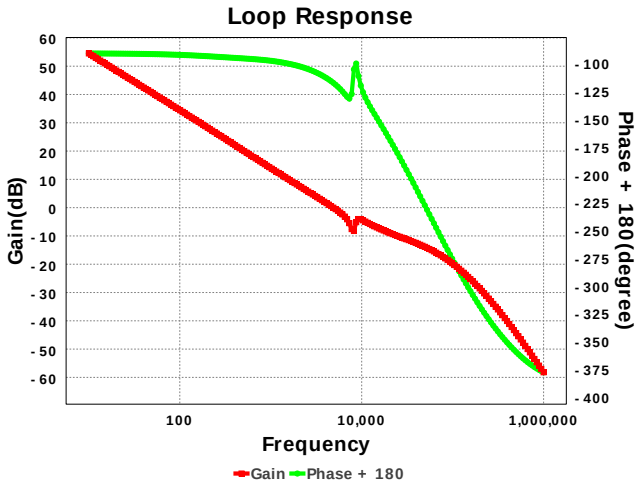












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	76.917 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.479 A	Current	Output capacitor RMS ripple current
3.	Csep IRMS	1.479 A	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	1.772 A	Current	D1 Irms
5.	IC Ipk	3.816 mA	Current	Peak switch current in IC
6.	Iin Avg	2.324 A	Current	Average input current
7.	Lin Ipk	2.494 A	Current	Lin peak current
8.	Lin Ipp	612.057 mA	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	2.207 A	Current	Lin ripple current
10.	Lout Ipk	1.068 A	Current	Lout peak current
11.	Lout Ipp	136.299 mA	Current	Peak-to-peak output inductor ripple current
12.	Lout Irms	1.006 A	Current	Lout ripple current
13.	M1 Irms	2.68 A	Current	M1 MOSFET Irms
14.	BOM Count	20	General	Total Design BOM count
15.	FootPrint	728.0 mm^2	General	Total Foot Print Area of BOM components
16.	Frequency	355.0 kHz	General	Switching frequency
17.	IC Tolerance	24.3 mV	General	IC Feedback Tolerance
18.	Mode	CCM	General	Conduction Mode
19.	Total BOM	$2.65	General	Total BOM Cost
20.	D1 Tj	98.521 degC	Op_Point	D1 junction temperature
21.	SEPIC Resonance Freq	9.11 kHz	Op_Point	SEPIC Resonance Frequency
22.	V SEPIC damping factor	100.015 m	Op_Point	V SEPIC damping factor
23.	Vin p-p	4.564 mV	Op_Point	Peak-to-peak input voltage
24.	Vsep p-p	435.751 mV	Op_Point	Peak-to-peak sepic voltage
25.	Cross Freq	4.88 kHz	Op_point	Bode plot crossover frequency
26.	Duty Cycle	69.5 %	Op_point	Duty cycle
27.	Efficiency	86.047 %	Op_point	Steady state efficiency
28.	Gain Marg	10.289 db	Op_point	Bode Plot Gain Margin
29.	IC Tj	42.976 degC	Op_point	IC junction temperature
30.	IOUT_OP	1.0 A	Op_point	Iout operating point
31.	M1 TjOP	51.101 degC	Op_point	M1 MOSFET junction temperature
32.	Phase Marg	63.349 deg	Op_point	Bode Plot Phase Margin
33.	Phase Shift	64.906 deg	Op_point	Bode Plot Phase Shift
34.	VIN_OP	5.0 V	Op_point	Vin operating point
35.	Vout p-p	29.512 mV	Op_point	Peak-to-peak output ripple voltage
36.	Cin Pd	14.95 µW	Power	Input capacitor power dissipation
37.	Cout Pd	3.321 mW	Power	Output capacitor power dissipation
38.	Csep Pd	11.347 mW	Power	SEPIC capacitor power dissipation
39.	D1 Pd	622.917 mW	Power	Diode power dissipation
40.	D1 PdCond	620.0 mW	Power	Diode conduction losses
41.	D1 PdSw	2.917 mW	Power	Diode switching losses
42.	IC Pd	64.881 mW	Power	IC power dissipation
43.	Lin Pd	178.31 mW	Power	Lin power dissipation
44.	Lout Pd	172.27 mW	Power	Lout power dissipation
45.	M1 Pd	422.014 mW	Power	M1 MOSFET total power dissipation
46.	M1 PdCond	237.28 mW	Power	M1 MOSFET conduction losses
47.	M1 PdSw	184.733 mW	Power	M1 MOSFET switching losses
48.	Rsense Pd	143.645 mW	Power	LED Current Rsns Power Dissipation
49.	Total Pd	1.622 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	17.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	10.0	Output Voltage
5.	base_pn	LM3478	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

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