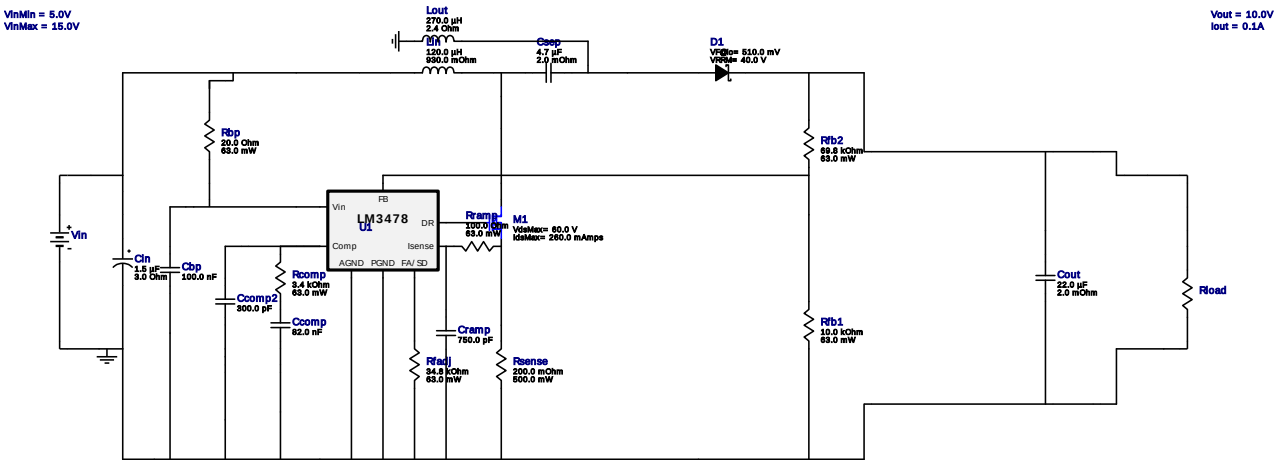
WEBENCH® Design Report

VinMin = 5.0V
VinMax = 15.0V
Vout = 10.0V
Iout = 0.1A

Device = LM3478MM/NOPB
Topology = SEPIC
Created = 6/2/15 5:28:41 AM
BOM Cost = $1.72
Footprint = 251.0 mm^2
BOM Count = 19
Total Pd = 0.39W

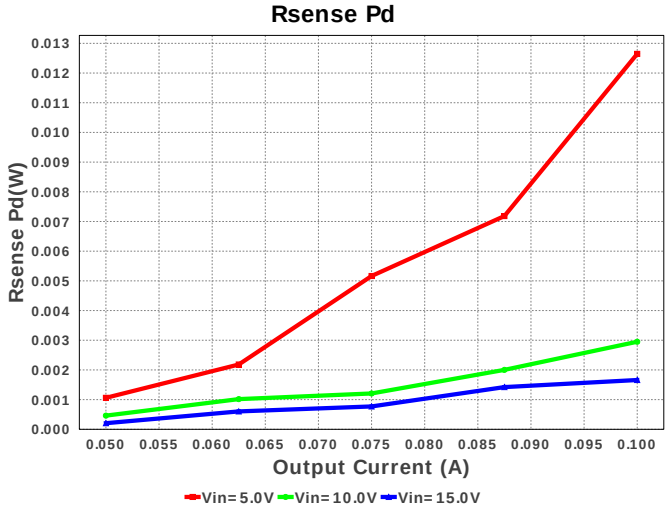
Design : 4387863/2 LM3478MM/NOPB
LM3478MM/NOPB 5.0V-15.0V to 10.00V @ 0.1A

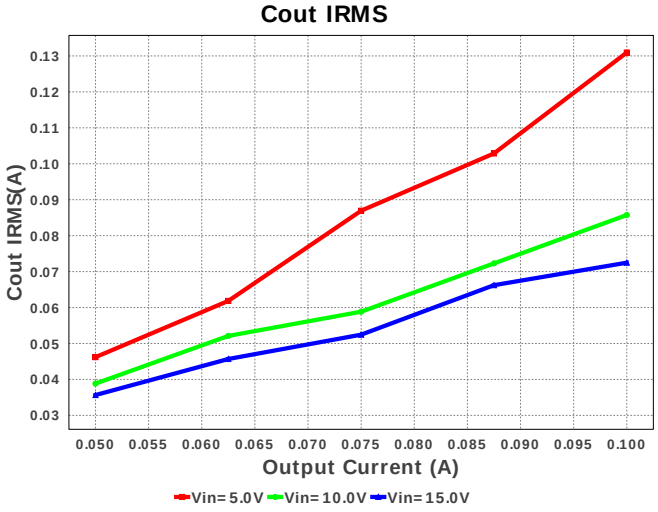


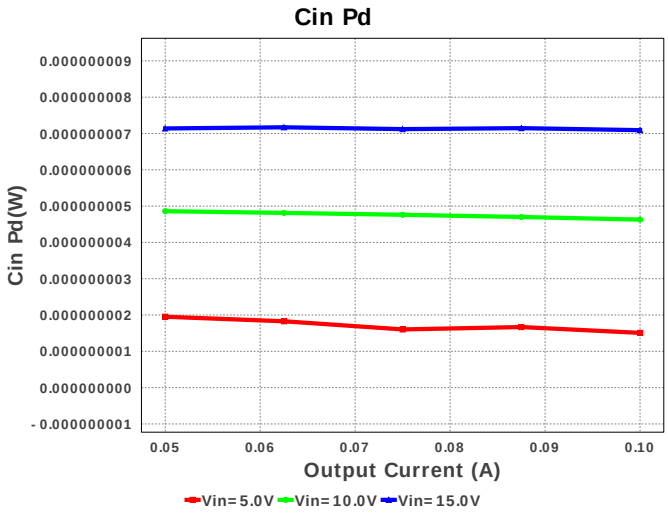
Electrical BOM

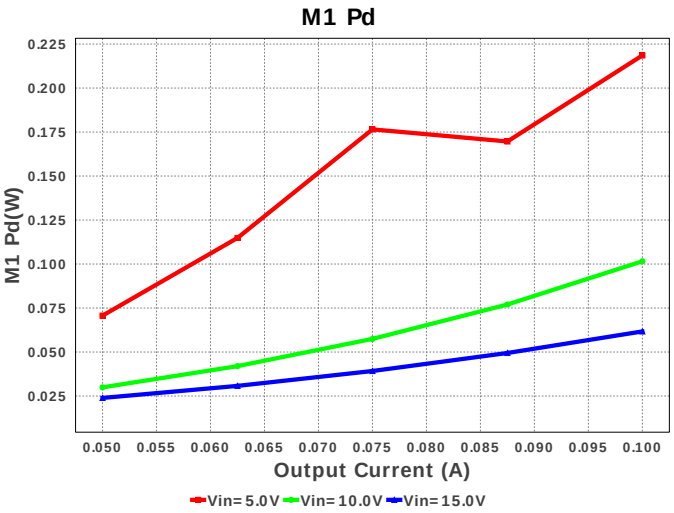
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbp	Kemet	C0603C104K3RACTU Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
2.	Ccomp	MuRata	GRM155R61A823KA01D Series= X5R	Cap= 82.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Ccomp2	MuRata	GRM1555C1E301JA01D Series= C0G/NP0	Cap= 300.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
4.	Cin	AVX	TPSA155K025R3000 Series= TPS	Cap= 1.5 uF ESR= 3.0 Ohm VDC= 25.0 V IRMS= 142.0 mA	1	$0.12	3216-18 11 mm^2
5.	Cout	MuRata	GRM32ER61C226KE20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	1	$0.16	1210 15 mm^2
6.	Cramp	MuRata	GRM1555C1E751JA01D Series= C0G/NP0	Cap= 750.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.02	0402 3 mm^2
7.	Csep	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	$0.06	0805 7 mm^2
8.	D1	ON Semiconductor	MBR0540T1G	VF@Io= 510.0 mV VRRM= 40.0 V	1	$0.06	SOD-123 13 mm^2
9.	Lin	Bourns	SDR0604-121KL	L= 120.0 µH DCR= 930.0 mOhm	1	$0.18	SDR0604 61 mm^2
10.	Lout	Bourns	SDR0603-271KL	L= 270.0 µH DCR= 2.4 Ohm	1	$0.18	SDR0603 61 mm^2

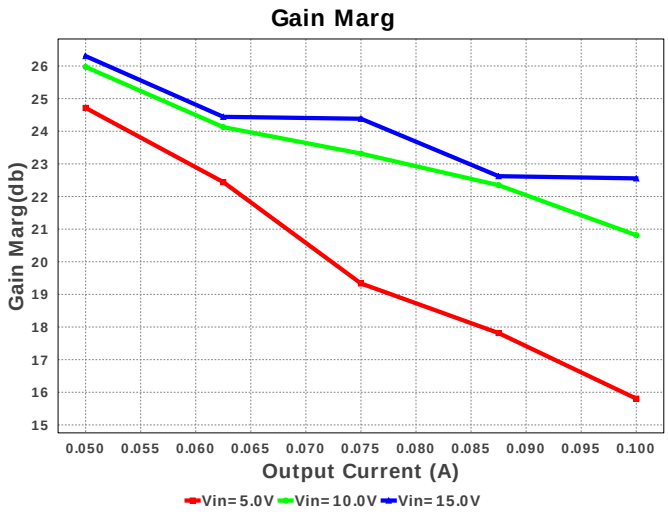
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	M1	ON Semiconductor	2N7002ET1G	VdsMax= 60.0 V IdsMax= 260.0 mAmps	1	$0.02	SOT-23 14 mm²
12.	Rbp	Vishay-Dale	CRCW040220R0FKED Series= CRCW..e3	Res= 20.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
13.	Rcomp	Vishay-Dale	CRCW04023K40FKED Series= CRCW..e3	Res= 3.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
14.	Rfadj	Vishay-Dale	CRCW040234K8FKED Series= CRCW..e3	Res= 34.8 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	Vishay-Dale	CRCW040269K8FKED Series= CRCW..e3	Res= 69.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 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	Rohm	MCR25JZHFLR200 Series= 298	Res= 200.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.03	1210 15 mm²
19.	U1	Texas Instruments	LM3478MM/NOPB	Switcher	1	$0.80	MUA08A 24 mm²

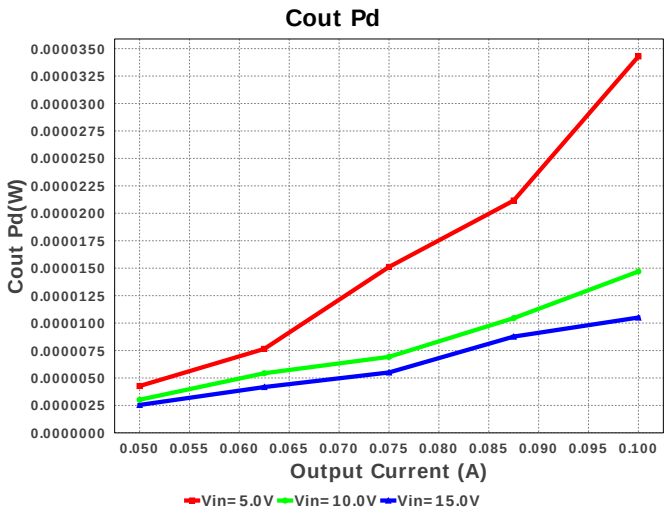


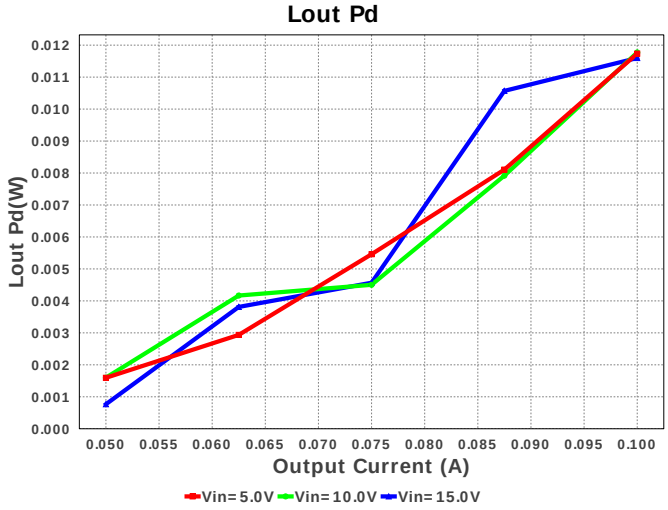


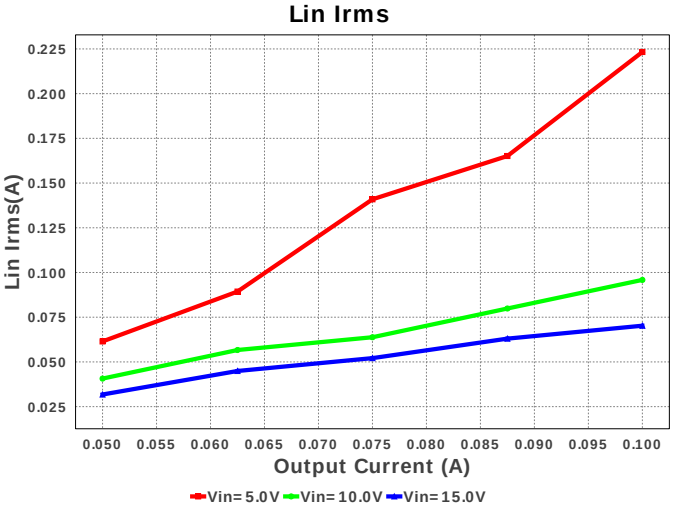


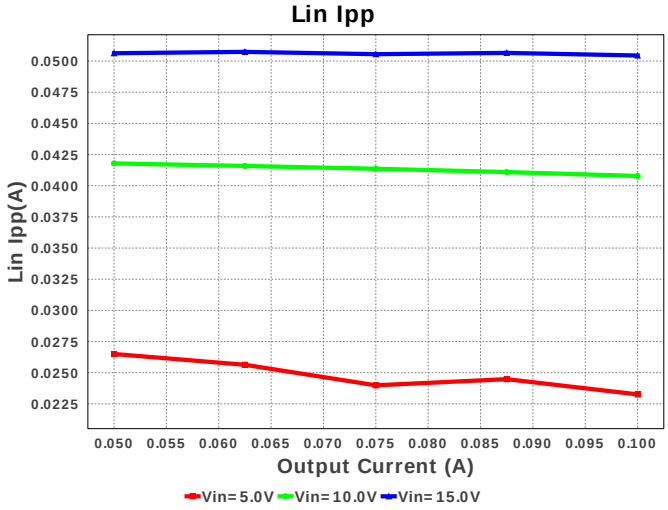


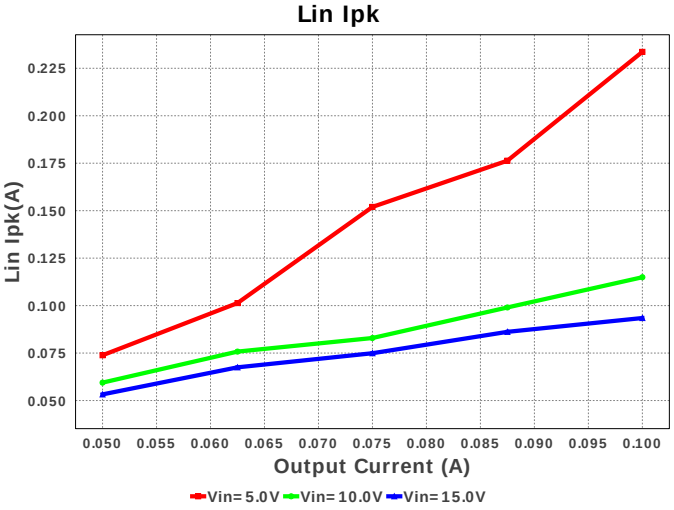


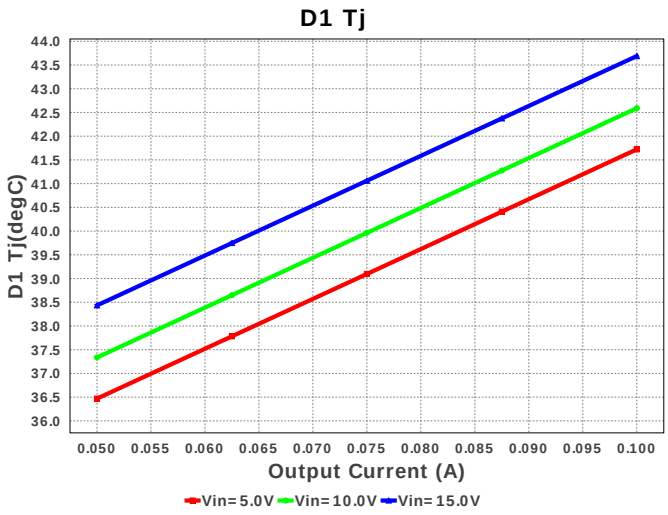


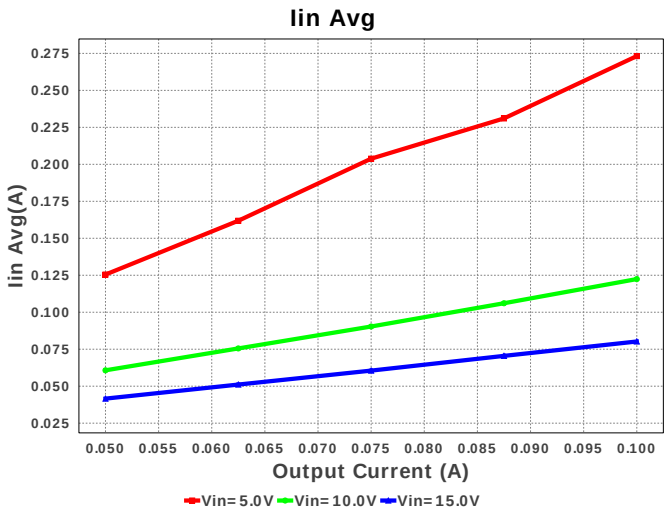


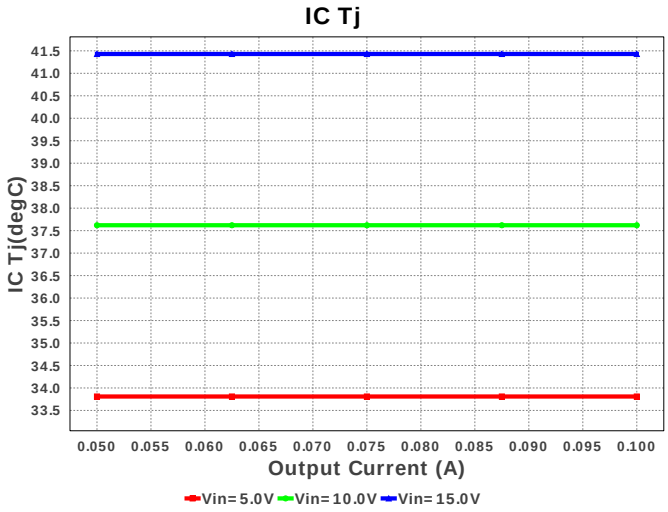


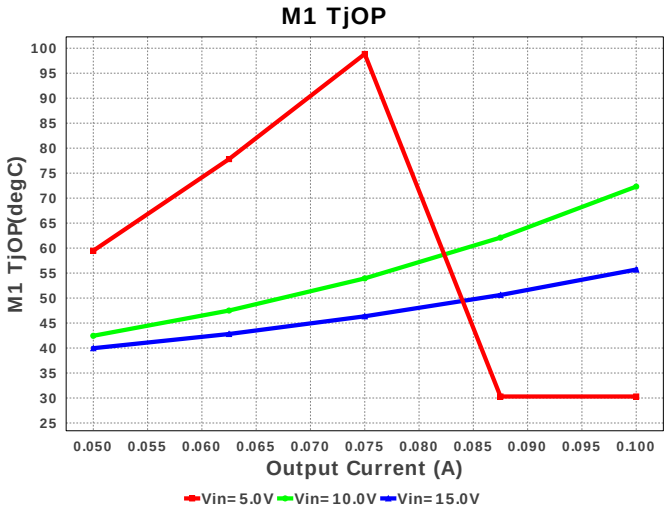


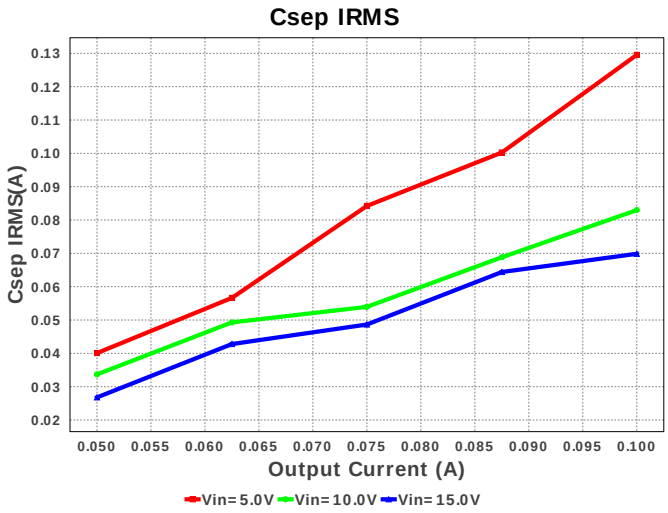


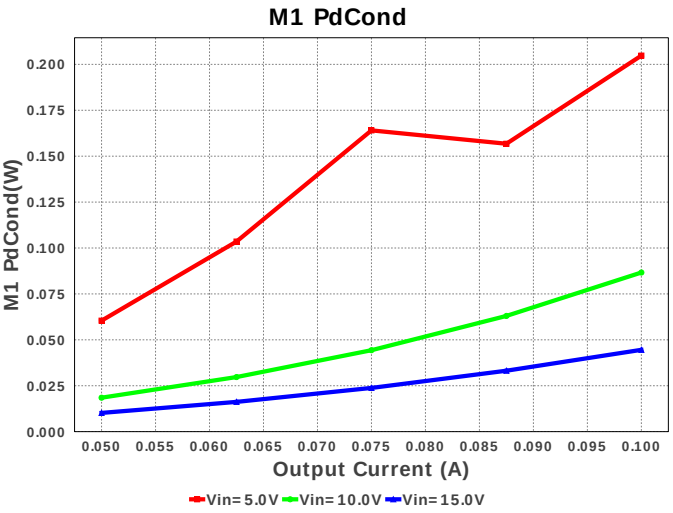


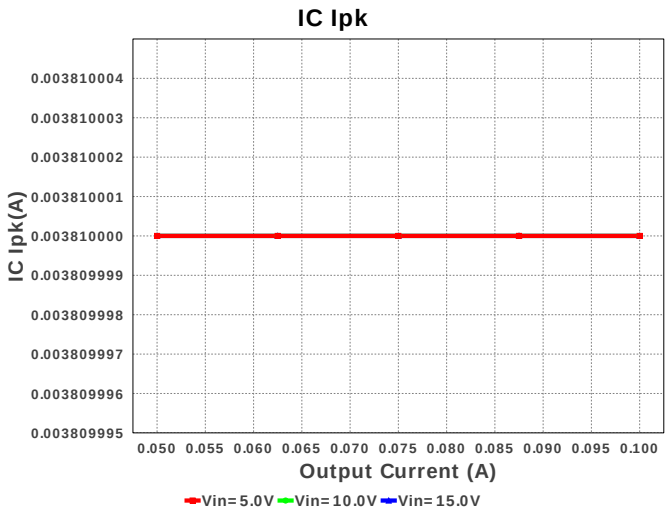


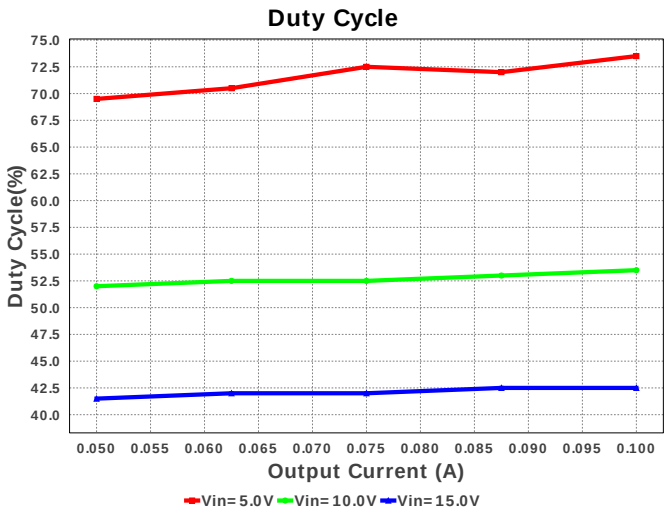


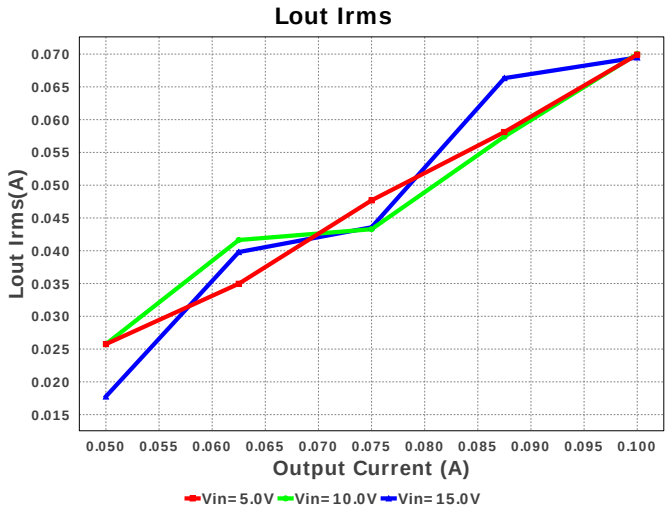


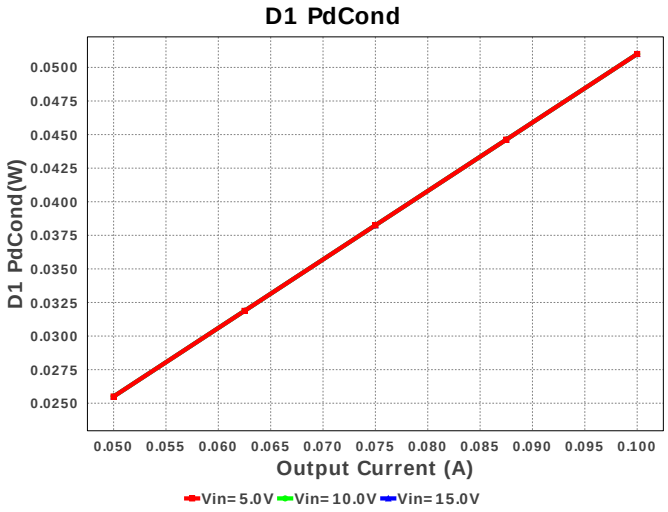


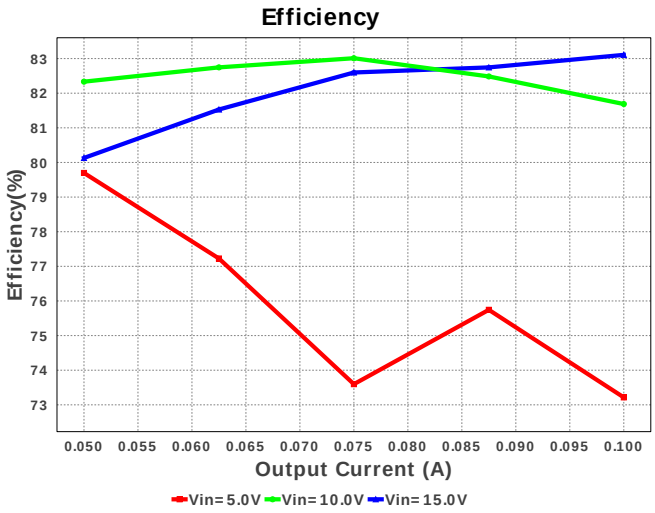


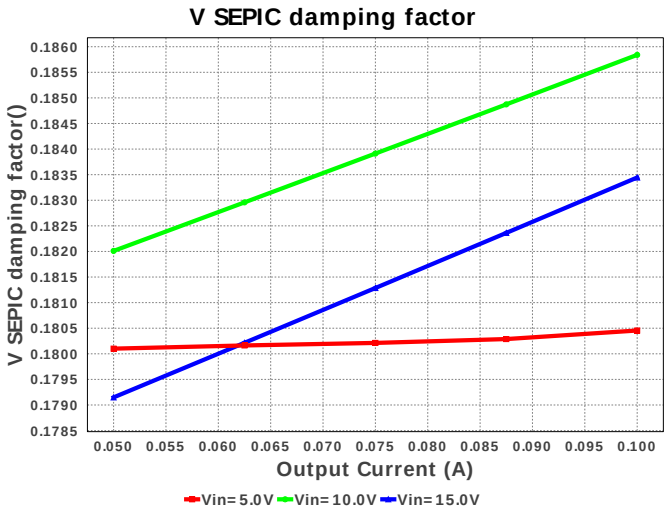


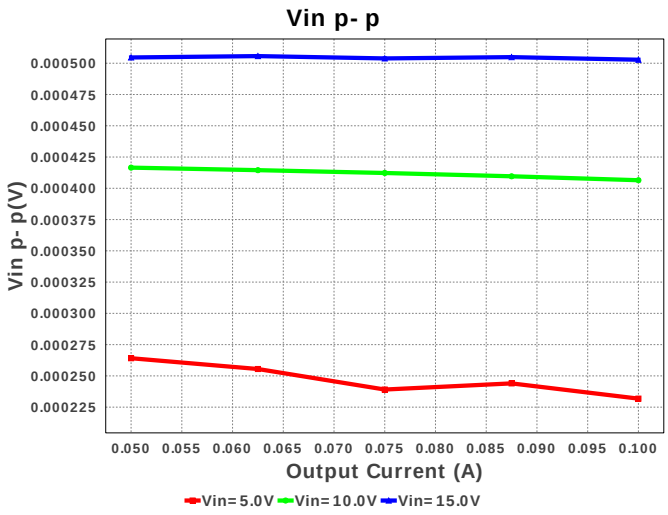


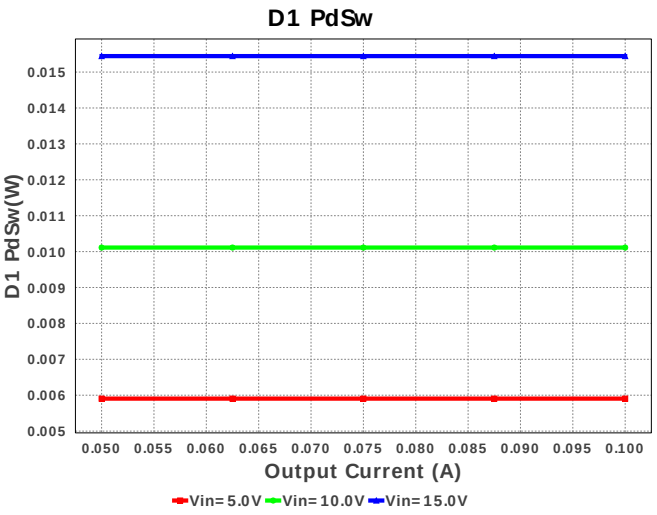


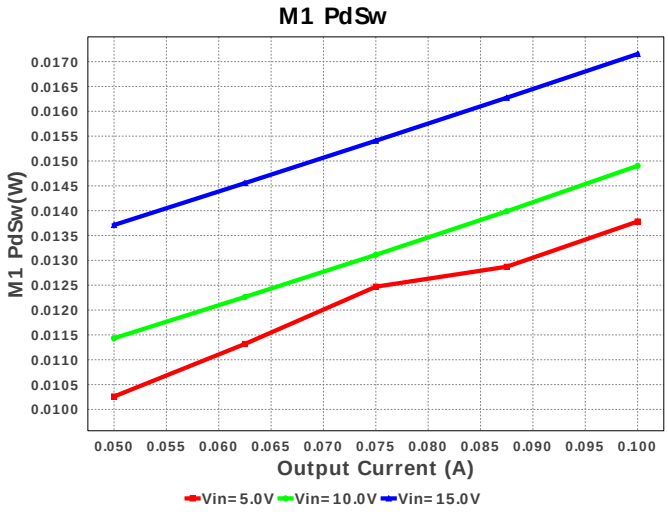


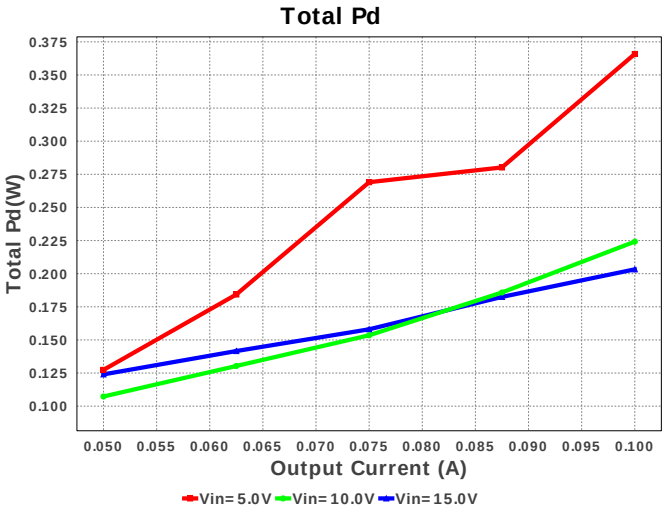


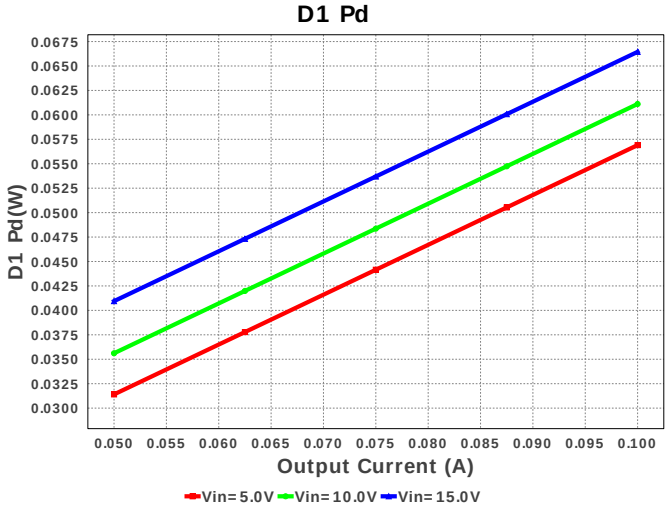


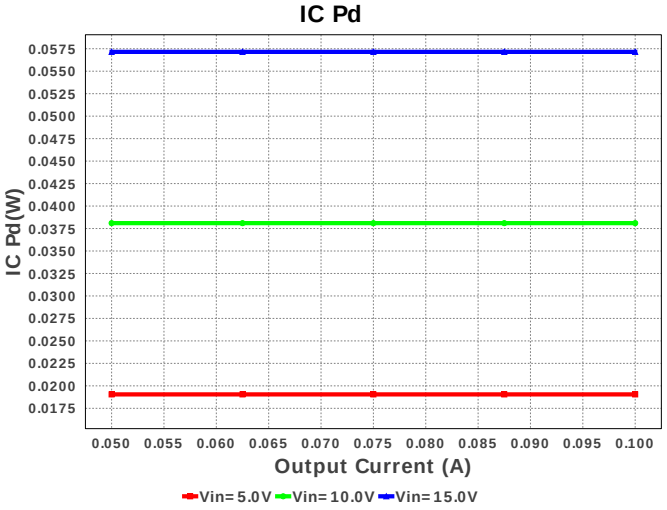


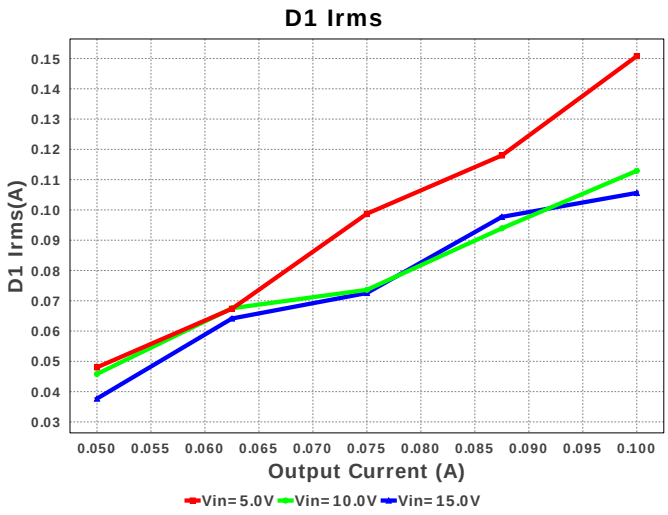


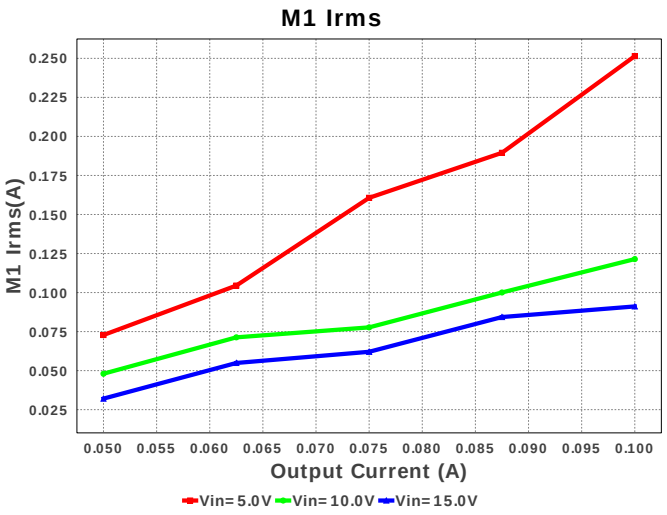


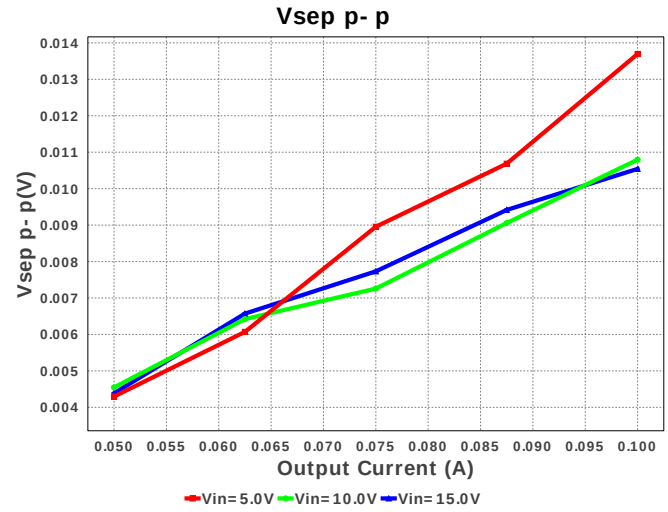


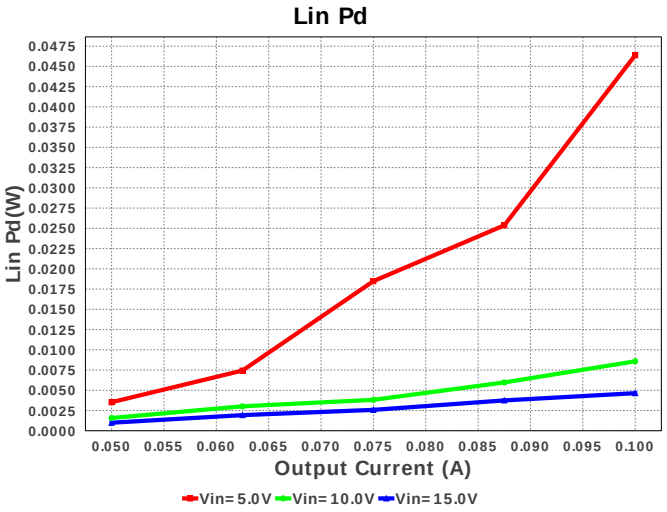


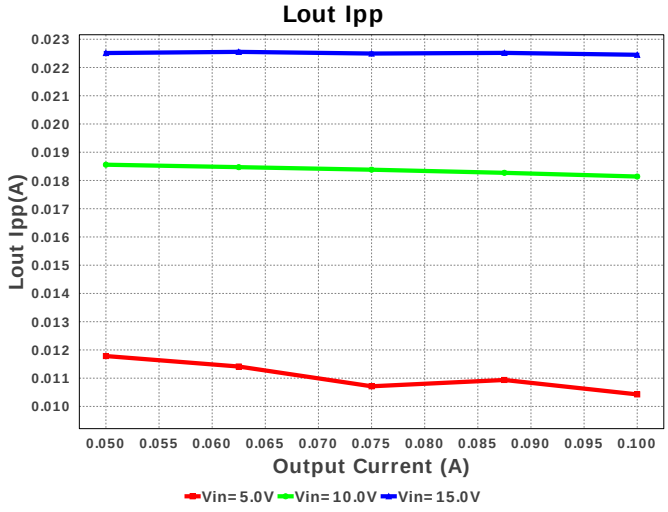


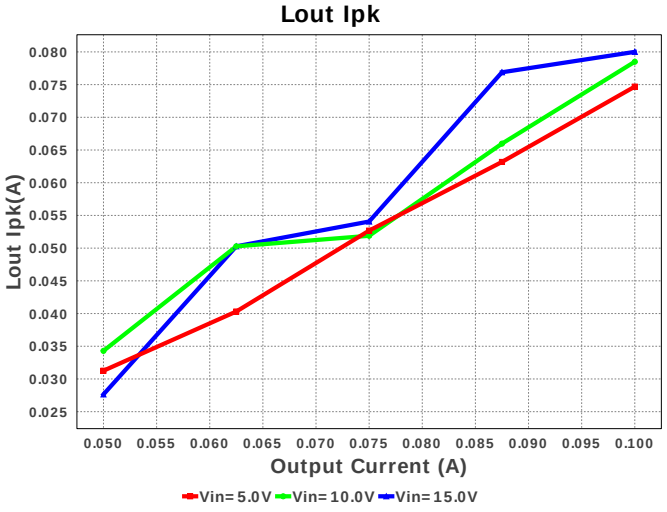


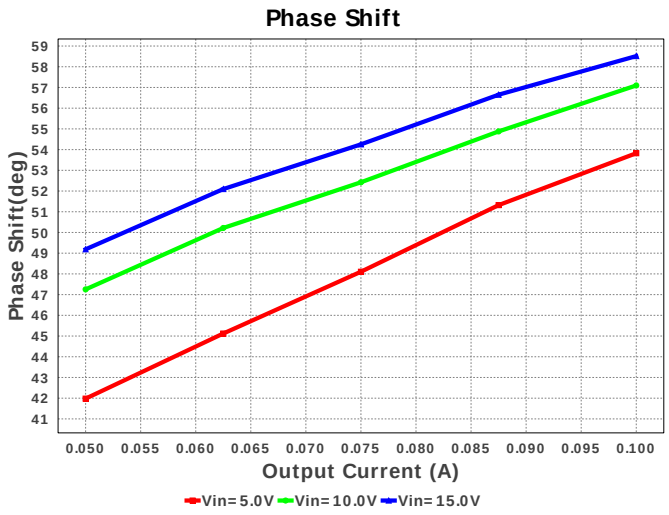


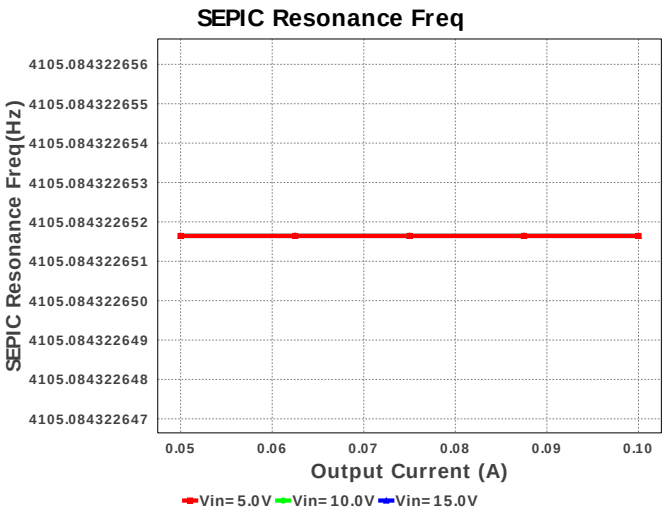


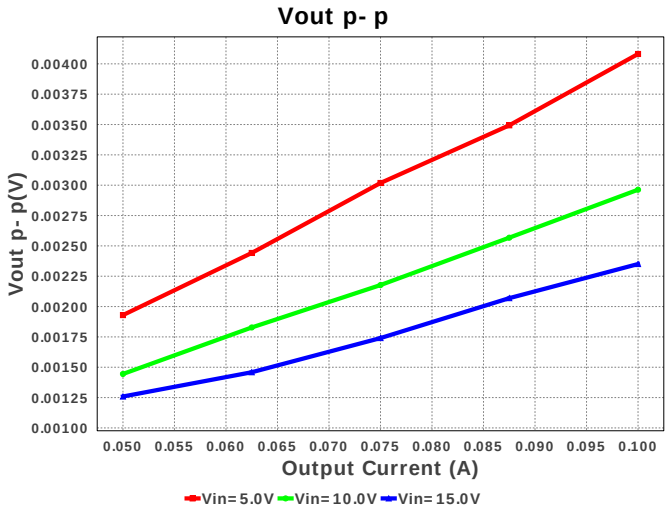


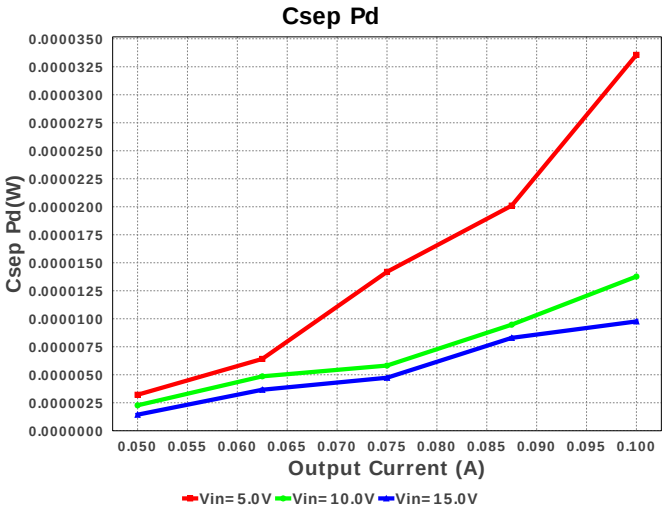


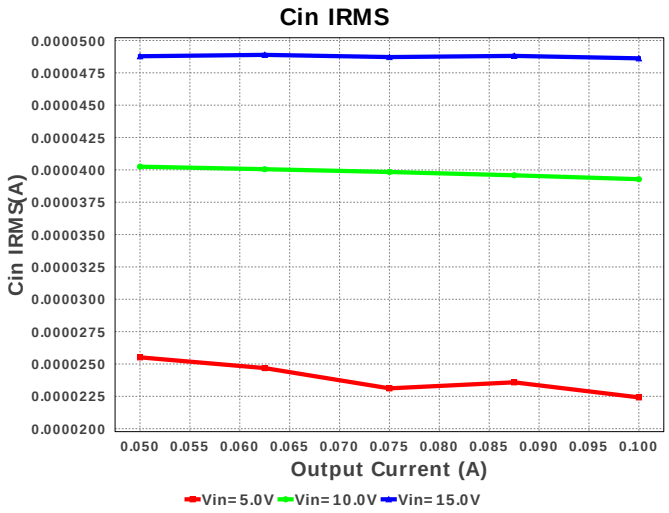


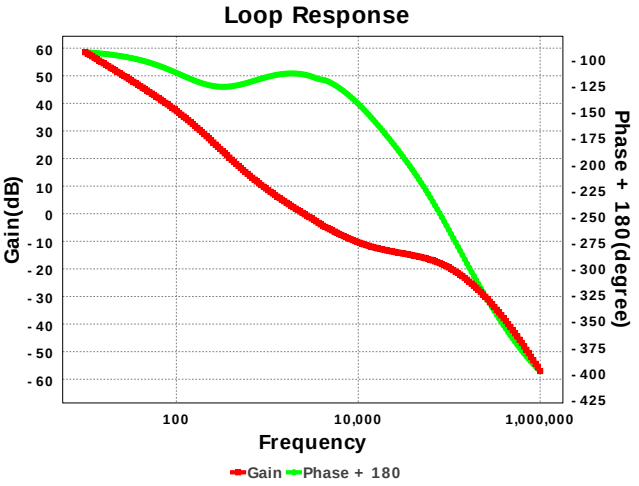












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	47.416 µA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	157.293 mA	Current	Output capacitor RMS ripple current
3.	Csep IRMS	157.261 mA	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	181.316 mA	Current	D1 Irms
5.	IC Ipk	3.36 mA	Current	Peak switch current in IC
6.	Iin Avg	278.19 mA	Current	Average input current
7.	Lin Ipk	294.639 mA	Current	Lin peak current
8.	Lin Ipp	49.477 mA	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	271.754 mA	Current	Lin ripple current
10.	Lout Ipk	102.026 mA	Current	Lout peak current
11.	Lout Ipp	21.948 mA	Current	Peak-to-peak output inductor ripple current

#	Name	Value	Category	Description
12.	Lout Irms	91.779 mA	Current	Lout ripple current
13.	M1 Irms	315.079 mA	Current	M1 MOSFET Irms
14.	BOM Count	19	General	Total Design BOM count
15.	FootPrint	251.0 mm^2	General	Total Foot Print Area of BOM components
16.	Frequency	445.0 kHz	General	Switching frequency
17.	IC Tolerance	24.3 mV	General	IC Feedback Tolerance
18.	Total BOM	$1.72	General	Total BOM Cost
19.	D1 Tj	41.047 degC	Op_Point	D1 junction temperature
20.	SEPIC Resonance Freq	4.105 kHz	Op_Point	SEPIC Resonance Frequency
21.	V SEPIC damping factor	180.073 m	Op_Point	V SEPIC damping factor
22.	Vin p-p	493.137 µV	Op_Point	Peak-to-peak input voltage
23.	Vsep p-p	34.549 mV	Op_Point	Peak-to-peak sepic voltage
24.	Cross Freq	2.437 kHz	Op_point	Bode plot crossover frequency
25.	Duty Cycle	75.0 %	Op_point	Duty cycle
26.	Efficiency	71.894 %	Op_point	Steady state efficiency
27.	Gain Marg	13.81 db	Op_point	Bode Plot Gain Margin
28.	IC Tj	40.081 degC	Op_point	IC junction temperature
29.	IOUT_OP	100.0 mA	Op_point	Iout operating point
30.	M1 TjOP	30.3 degC	Op_point	M1 MOSFET junction temperature
31.	Phase Marg	66.318 deg	Op_point	Bode Plot Phase Margin
32.	Phase Shift	54.326 deg	Op_point	Bode Plot Phase Shift
33.	VIN_OP	5.0 V	Op_point	Vin operating point
34.	Vout p-p	9.358 mV	Op_point	Peak-to-peak output ripple voltage
35.	Cin Pd	6.745 nW	Power	Input capacitor power dissipation
36.	Cout Pd	49.482 µW	Power	Output capacitor power dissipation
37.	Csep Pd	49.462 µW	Power	SEPIC capacitor power dissipation
38.	D1 Pd	53.628 mW	Power	Diode power dissipation
39.	D1 PdCond	51.0 mW	Power	Diode conduction losses
40.	D1 PdSw	2.628 mW	Power	Diode switching losses
41.	IC Pd	50.407 mW	Power	IC power dissipation
42.	Lin Pd	68.7 mW	Power	Lin power dissipation
43.	Lout Pd	20.22 mW	Power	Lout power dissipation
44.	M1 Pd	210.902 mW	Power	M1 MOSFET total power dissipation
45.	M1 PdCond	204.769 mW	Power	M1 MOSFET conduction losses
46.	M1 PdSw	6.133 mW	Power	M1 MOSFET switching losses
47.	Rsense Pd	19.855 mW	Power	LED Current Rsns Power Dissipation
48.	Total Pd	390.944 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	100.0 m	Maximum Output Current
2.	Iout1	100.0 m	Output Current #1
3.	VinMax	15.0	Maximum input voltage
4.	VinMin	5.0	Minimum input voltage
5.	Vout	10.0	Output Voltage
6.	Vout1	10.0	Output Voltage #1
7.	base_pn	LM3478	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

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