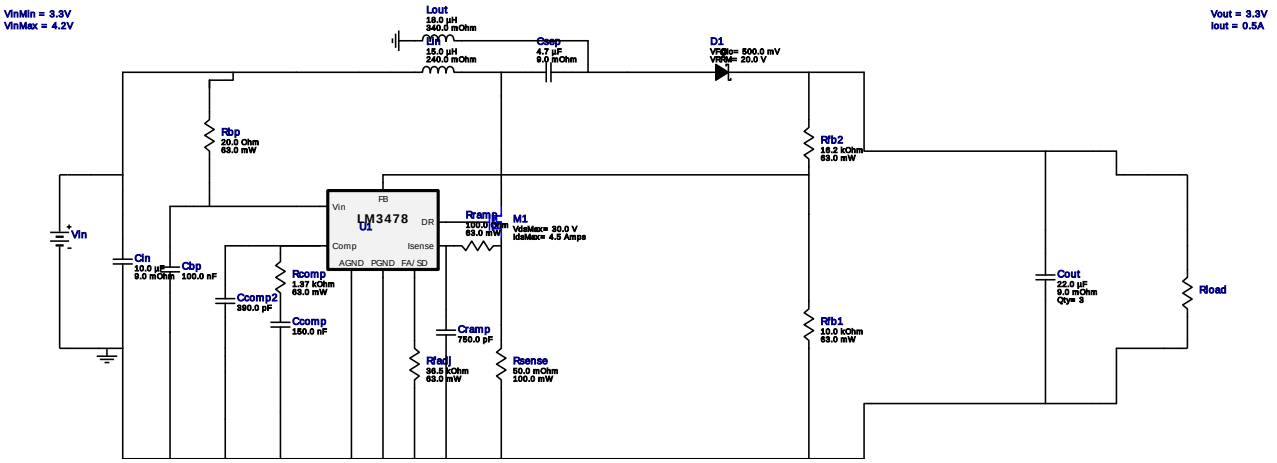
WEBENCH® Design Report

VinMin = 3.3V
VinMax = 4.2V
Vout = 3.3V
Iout = 0.5A

Device = LM3478MM/NOPB
Topology = SEPIC
Created = 6/5/15 11:47:39 PM
BOM Cost = $1.86
Footprint = 203.0 mm^2
BOM Count = 21
Total Pd = 0.63W

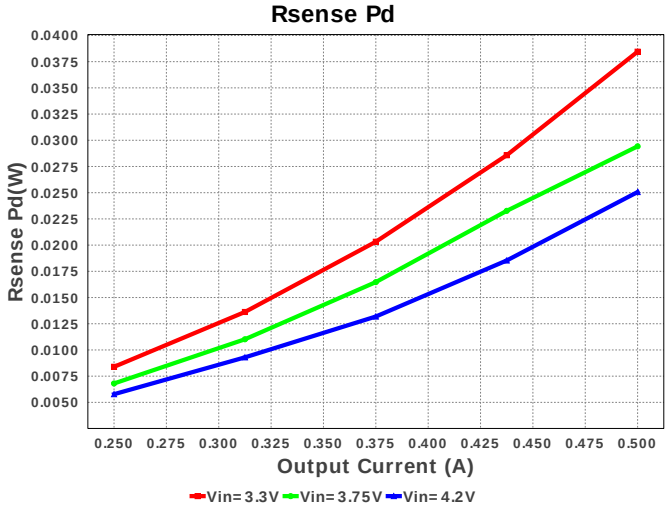
Design : 3810512/2 LM3478MM/NOPB
LM3478MM/NOPB 3.3V-4.2V to 3.30V @ 0.5A

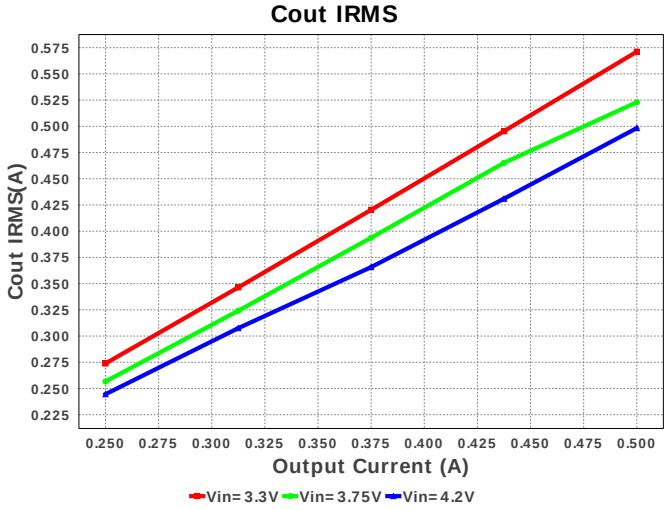


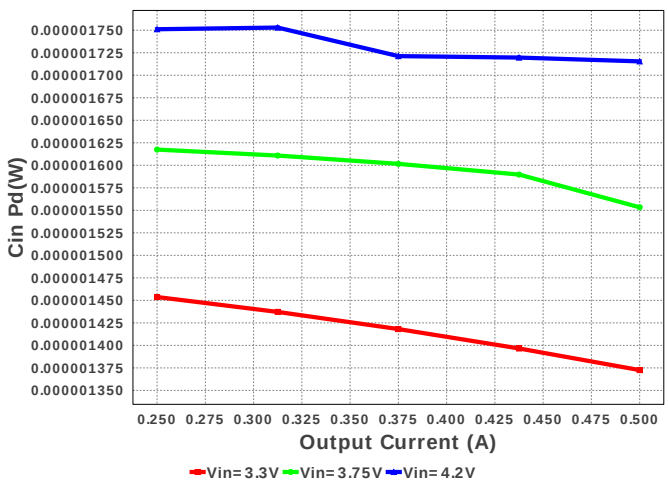
Electrical BOM

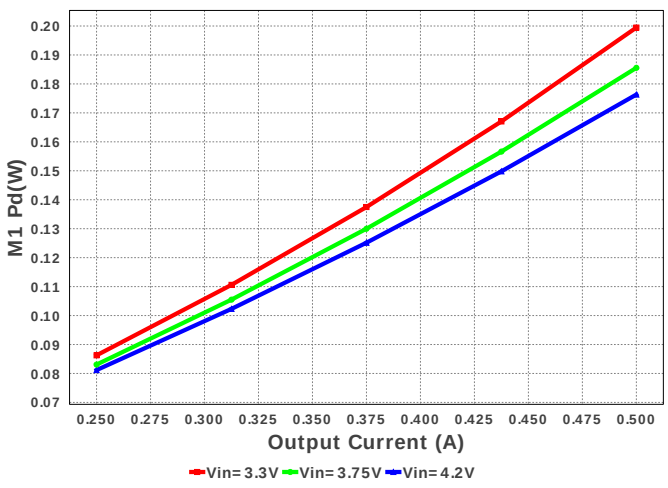
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbp	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
2.	Ccomp	MuRata	GRM155R61A154KE19D Series= X5R	Cap= 150.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Ccomp2	Yageo America	CC0805KRX7R9BB391 Series= X7R	Cap= 390.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
4.	Cin	MuRata	GRM188R60J106ME47D Series= X5R	Cap= 10.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 2.74 A	1	$0.03	0603 5 mm^2
5.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	3	$0.05	0805 7 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	GRM155R60J475ME87D Series= X5R	Cap= 4.7 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 1.22 A	1	$0.02	0402 3 mm^2
8.	D1	Diodes Inc.	B220-13-F	VF@Io= 500.0 mV VRRM= 20.0 V	1	$0.08	SMB 44 mm^2
9.	Lin	Bourns	SDR0403-150ML	L= 15.0 µH DCR= 240.0 mOhm	1	$0.18	SDR0403 28 mm^2
10.	Lout	Bourns	SDR0403-180ML	L= 18.0 µH DCR= 340.0 mOhm	1	$0.18	SDR0403 28 mm^2

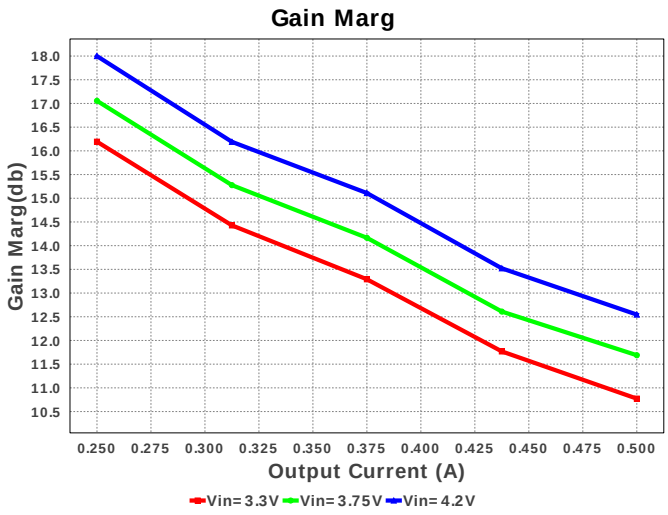
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	M1	Vishay-Siliconix	SI2316BDS-T1-E3	VdsMax= 30.0 V IdsMax= 4.5 Amps	1	$0.22	SOT-23 14 mm²
12.	Rbp	Vishay-Dale	CRCW040220R0FKED Series= CRCW..e3	Res= 20.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
13.	Rcomp	Vishay-Dale	CRCW04021K37FKED Series= CRCW..e3	Res= 1.37 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
14.	Rfadj	Vishay-Dale	CRCW040236K5FKED Series= CRCW..e3	Res= 36.5 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	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 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	Panasonic	ERJ-L03KF50MV Series= 231	Res= 50.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.09	0603 5 mm²
19.	U1	Texas Instruments	LM3478MM/NOPB	Switcher	1	$0.80	MUA08A 24 mm²

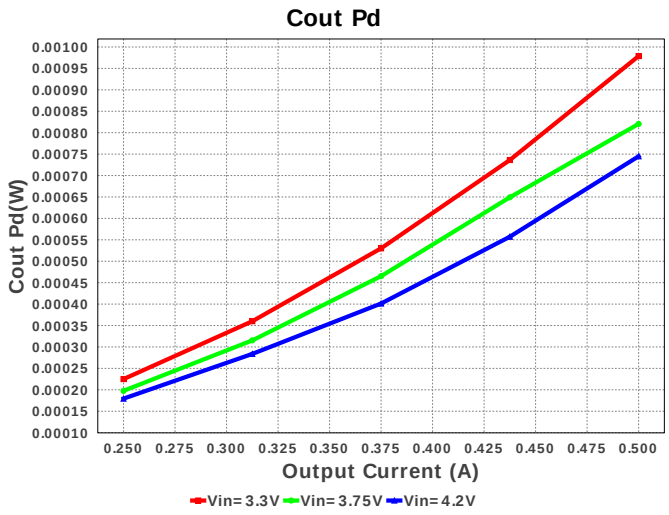


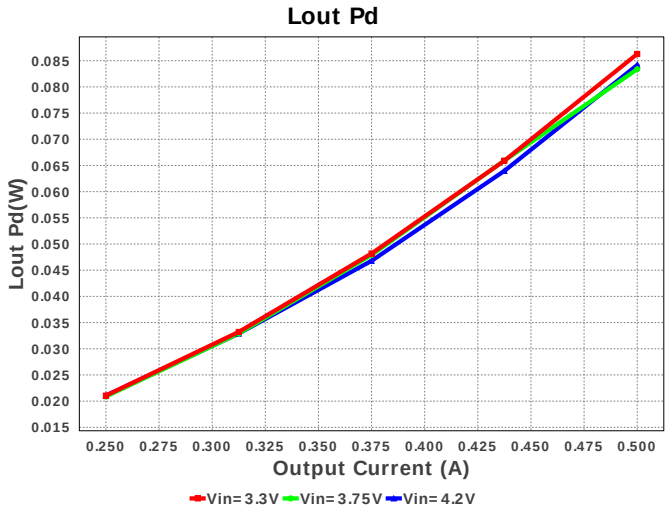


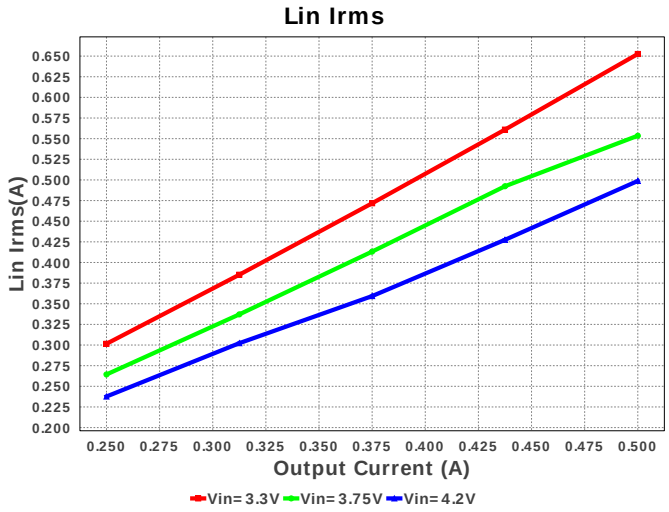


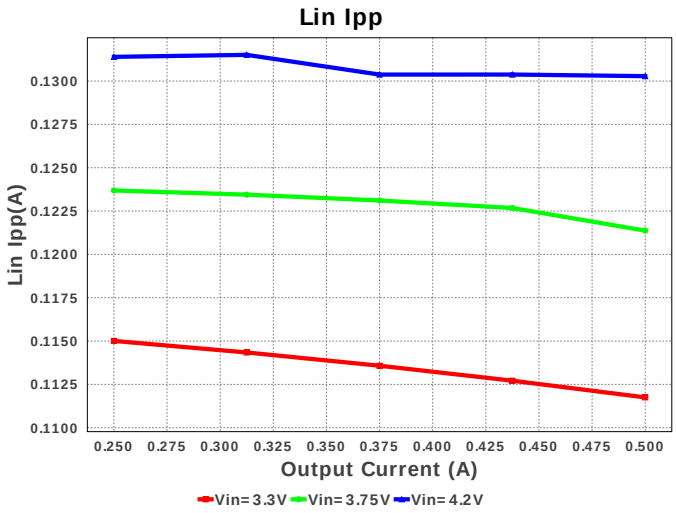


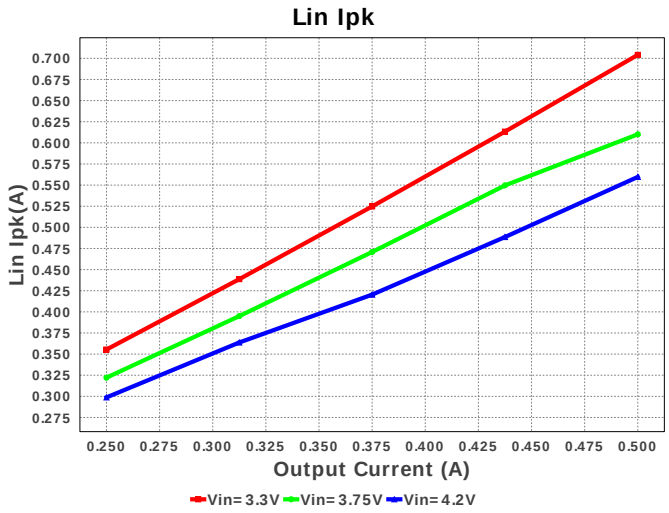


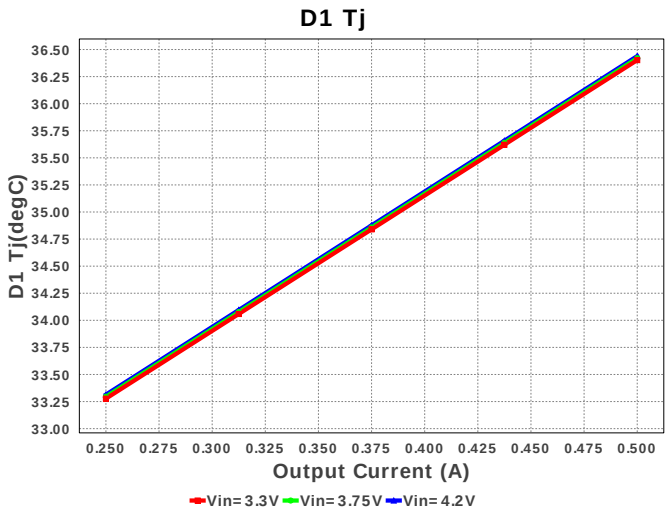


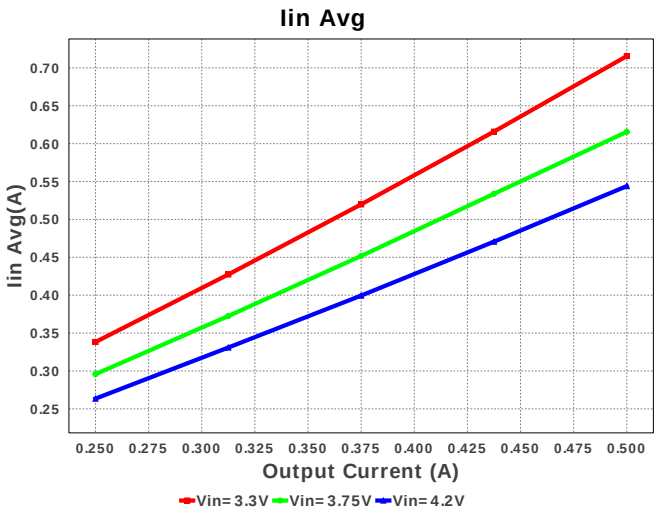


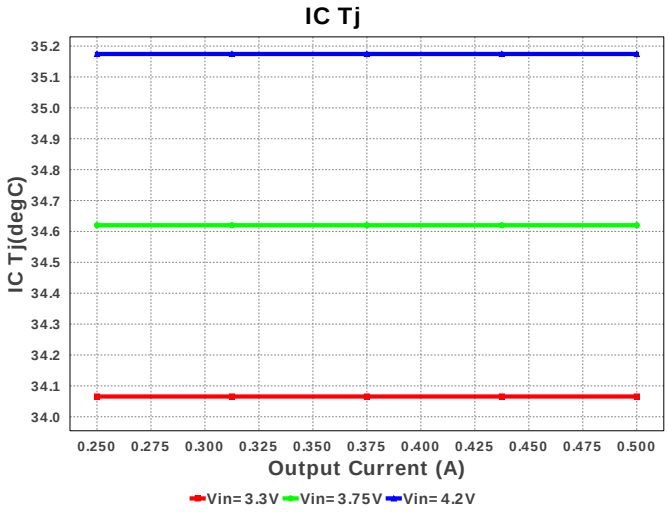


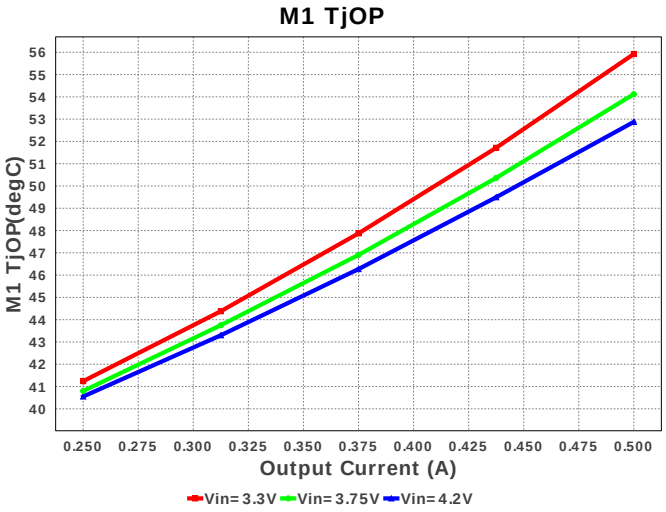


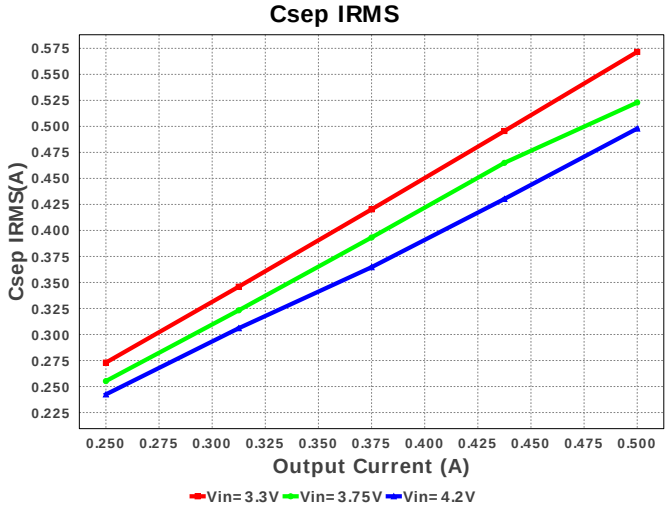


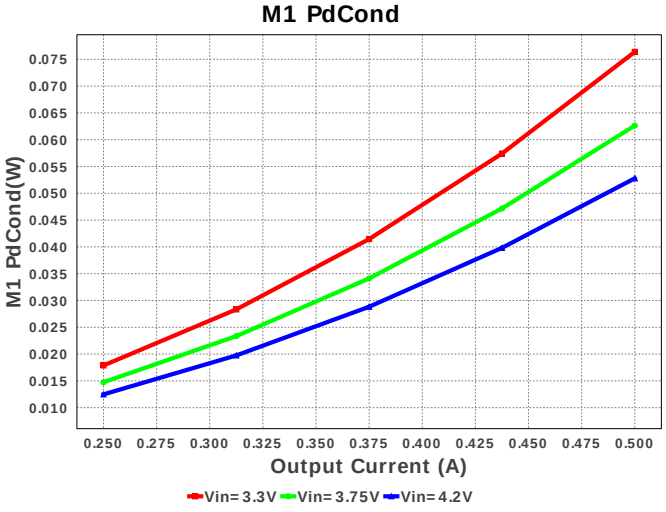


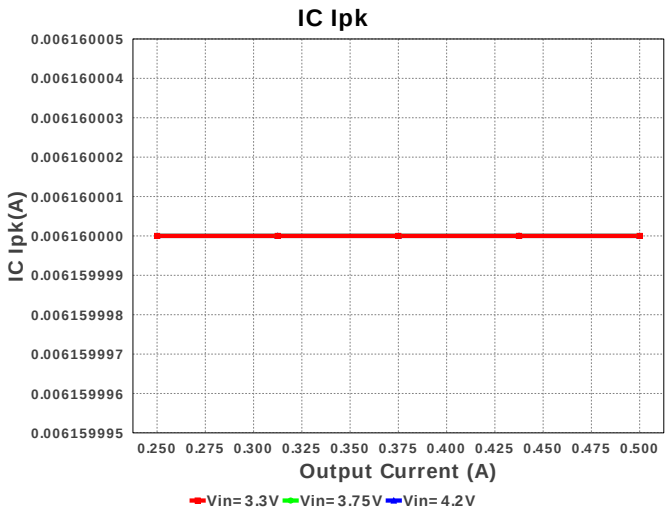


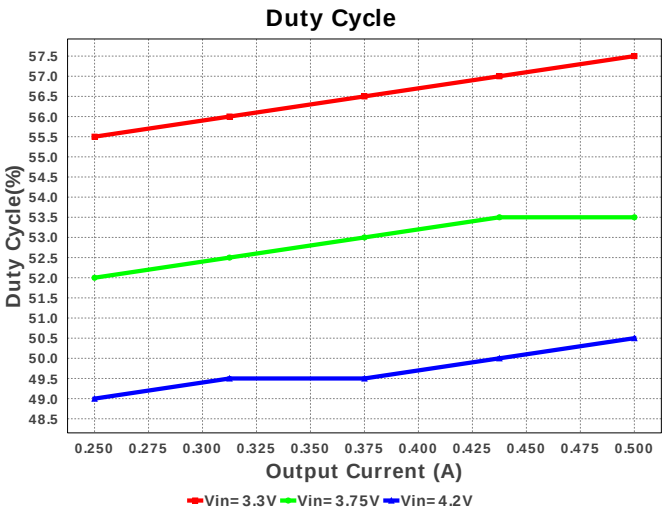


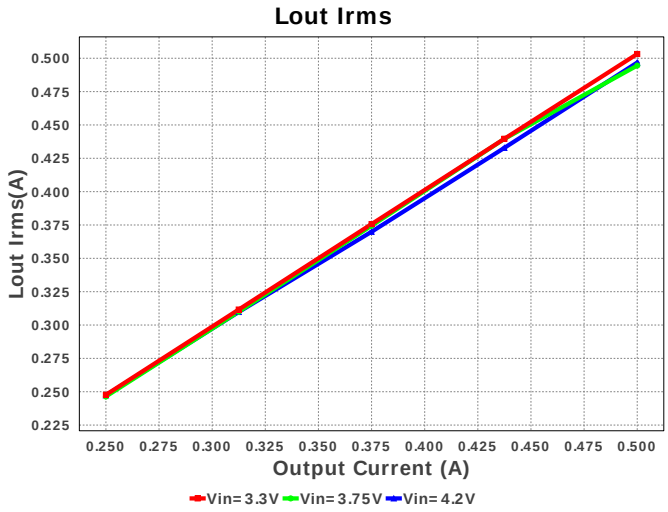


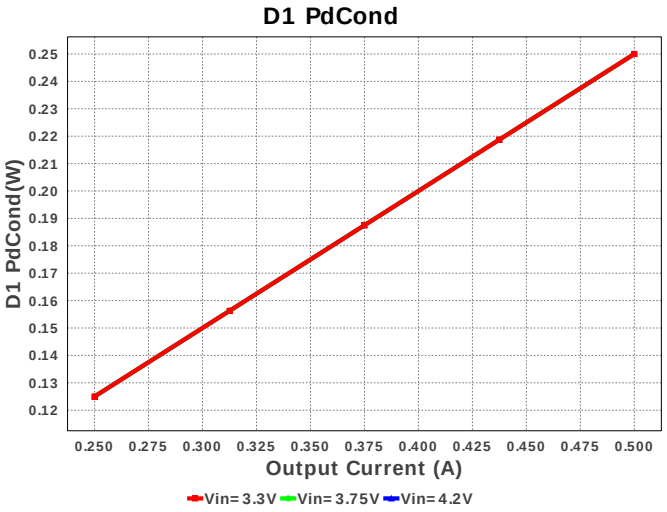


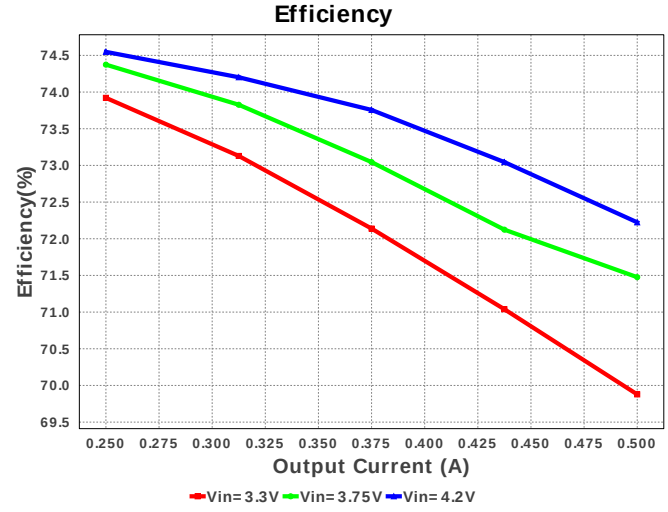


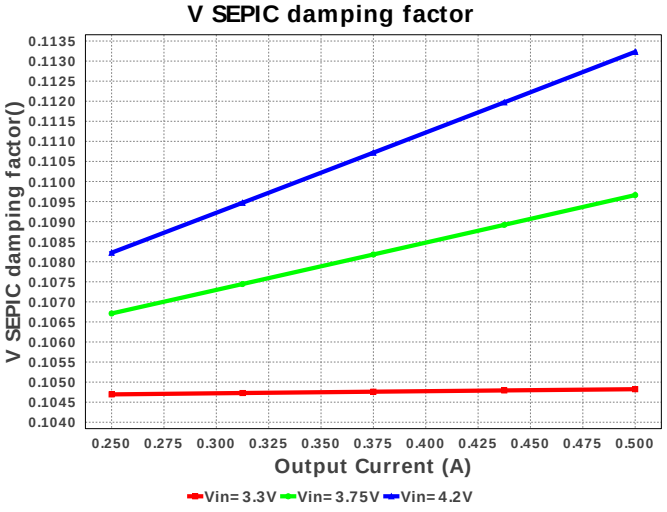


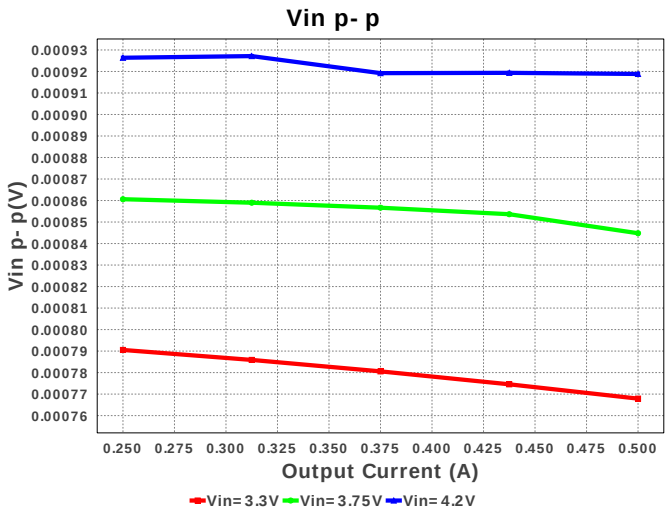


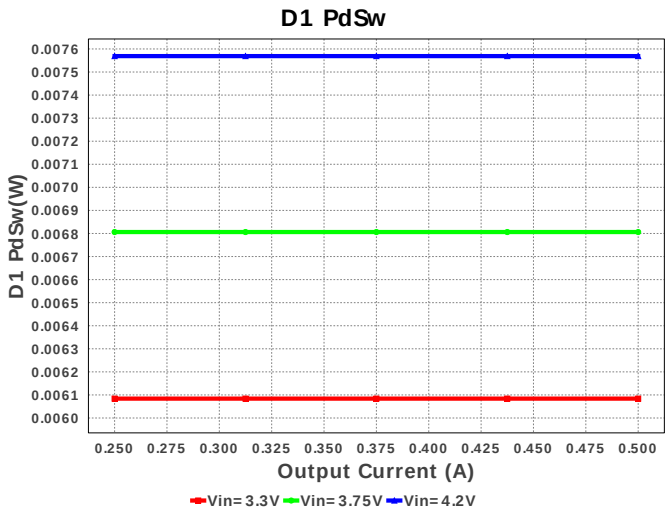


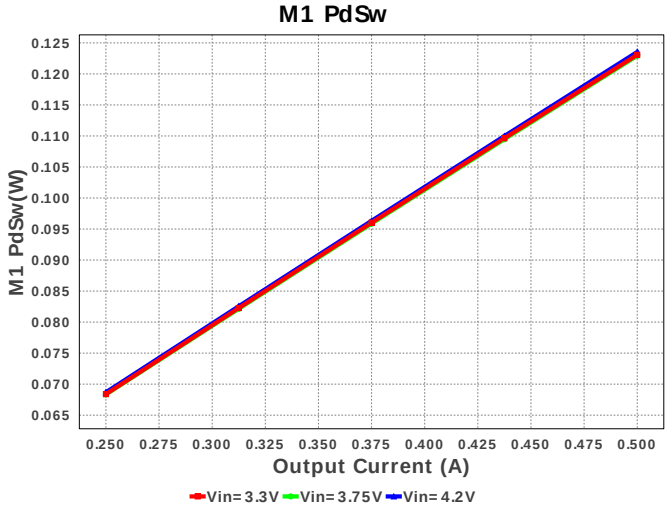


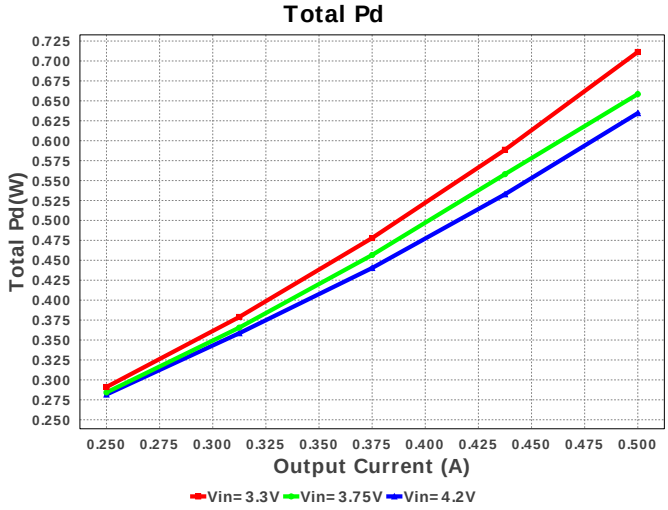


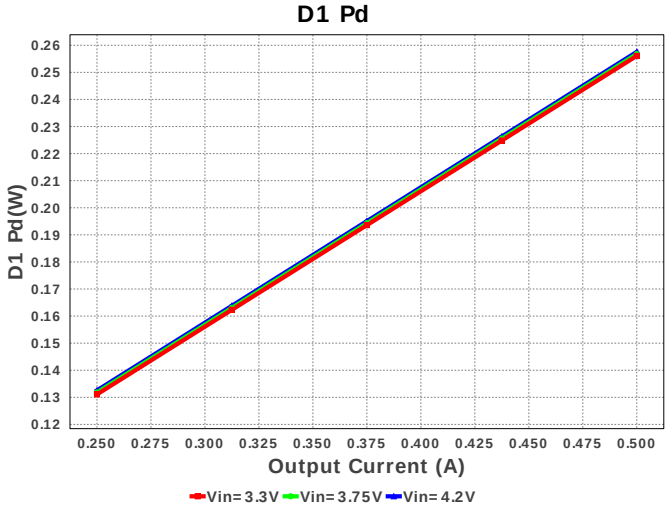


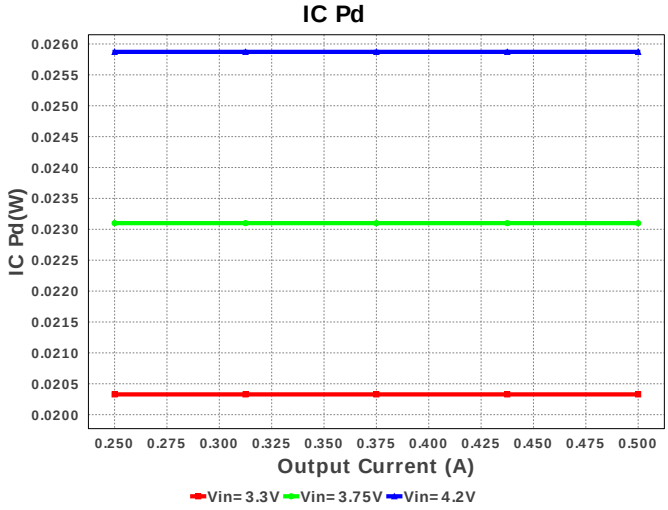


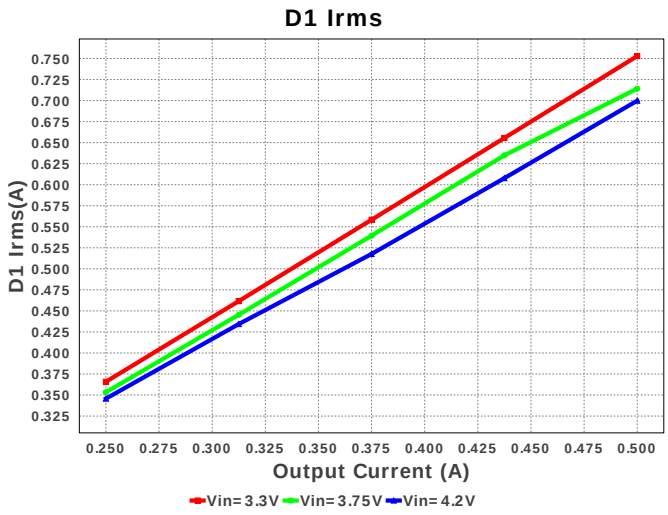


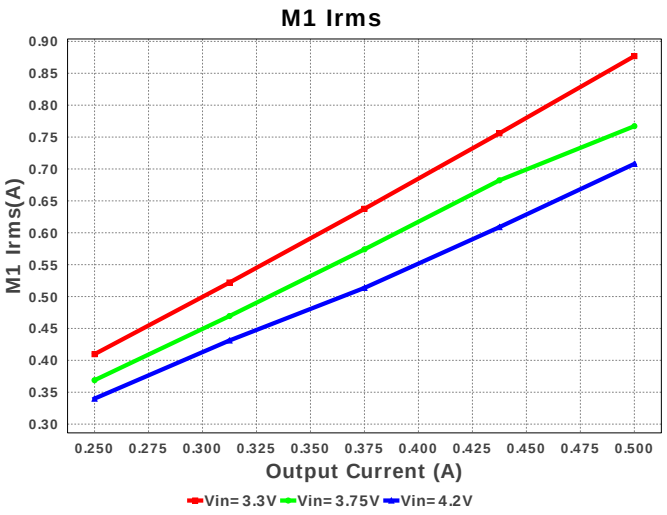


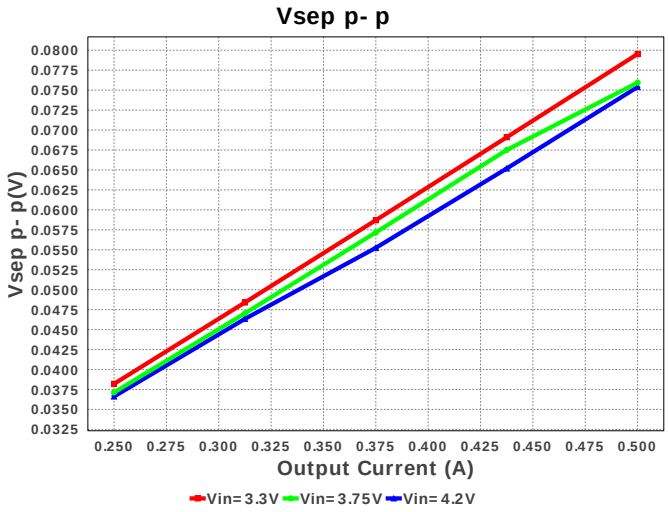


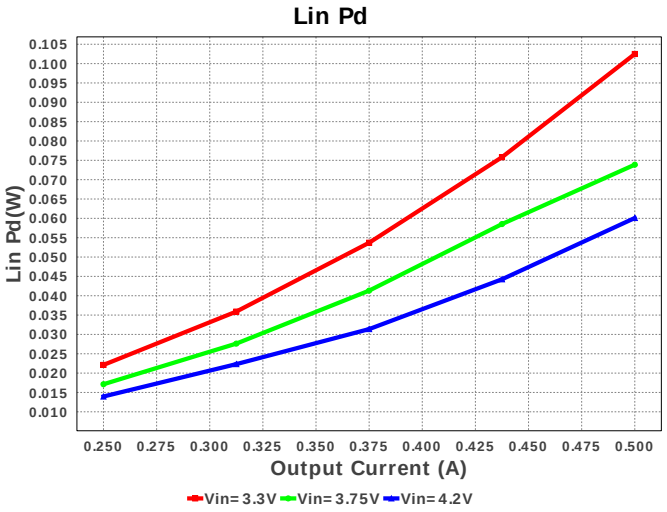


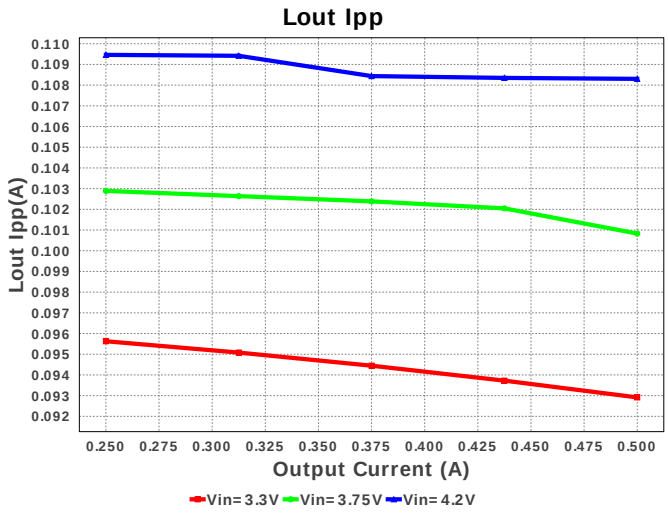


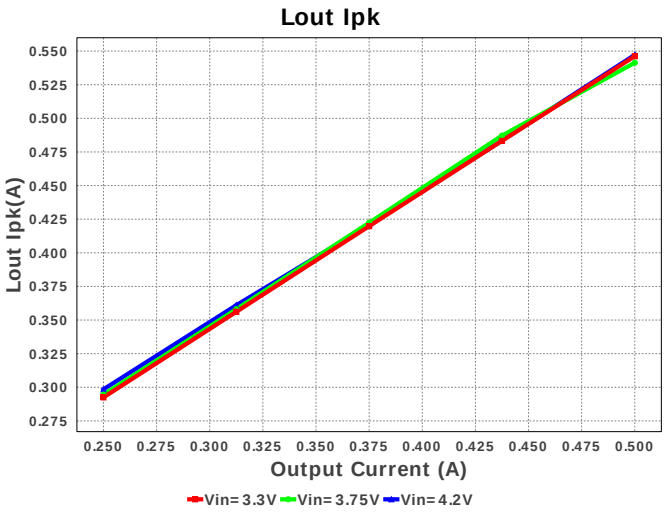


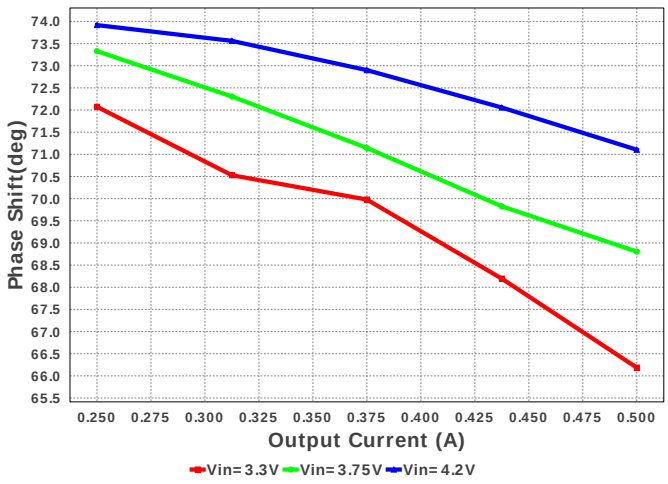


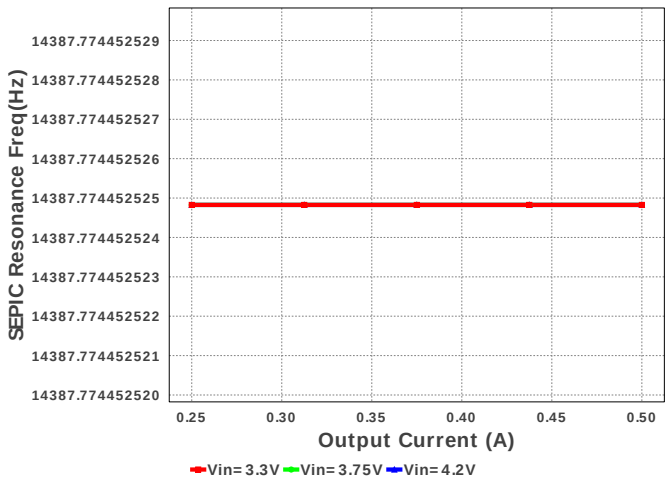


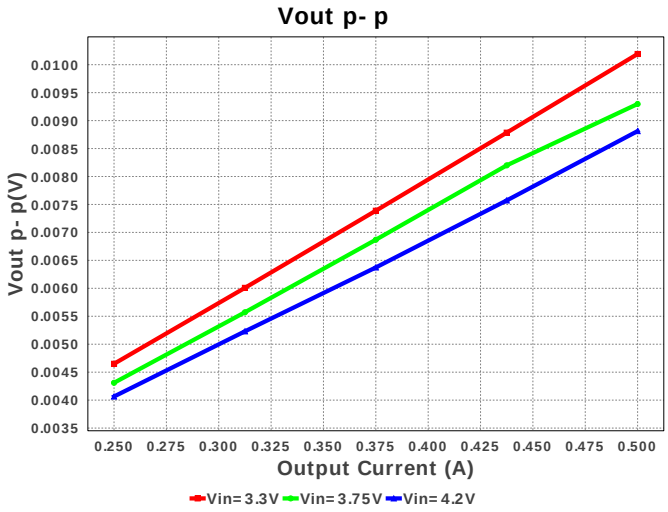


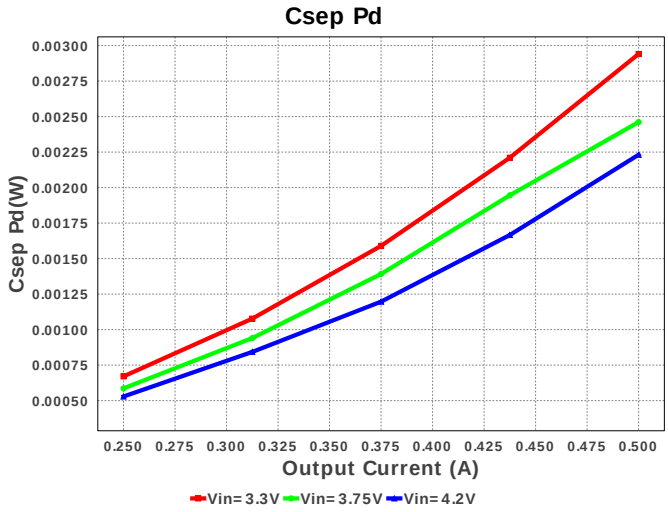


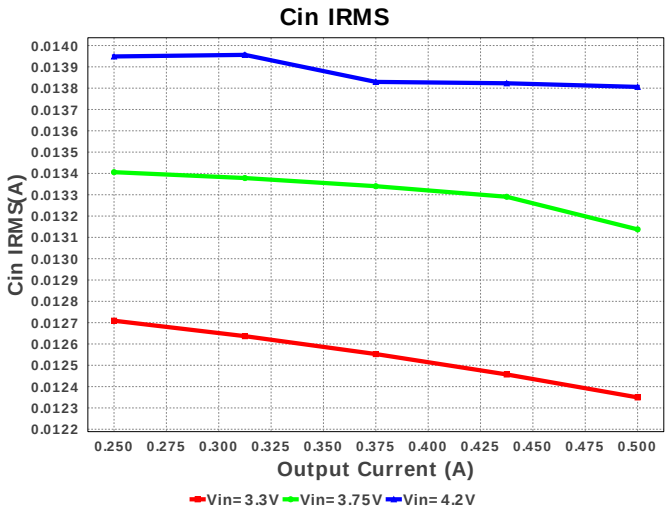


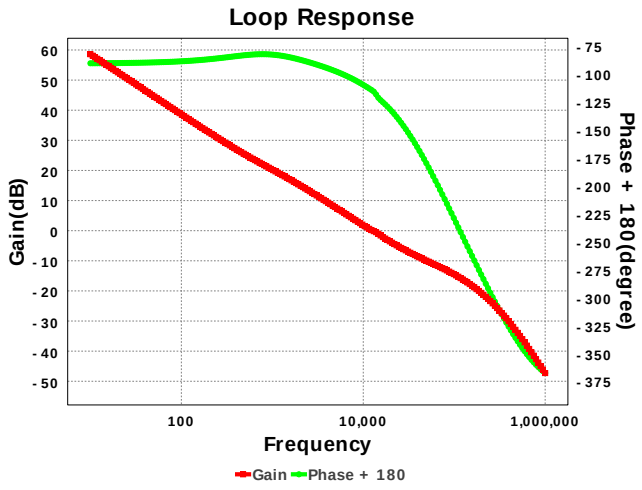












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	16.647 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	578.096 mA	Current	Output capacitor RMS ripple current
3.	Csep IRMS	577.112 mA	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	758.505 mA	Current	D1 Irms
5.	IC Ipk	4.311 mA	Current	Peak switch current in IC
6.	Iin Avg	691.62 mA	Current	Average input current
7.	Lin Ipk	791.781 mA	Current	Lin peak current
8.	Lin Ipp	269.542 mA	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	665.581 mA	Current	Lin ripple current
10.	Lout Ipk	606.205 mA	Current	Lout peak current
11.	Lout Ipp	224.345 mA	Current	Peak-to-peak output inductor ripple current

#	Name	Value	Category	Description
12.	Lout Irms	501.306 mA	Current	Lout ripple current
13.	M1 Irms	886.704 mA	Current	M1 MOSFET Irms
14.	BOM Count	21	General	Total Design BOM count
15.	FootPrint	203.0 mm^2	General	Total Foot Print Area of BOM components
16.	Frequency	415.0 kHz	General	Switching frequency
17.	IC Tolerance	24.3 mV	General	IC Feedback Tolerance
18.	Total BOM	$1.86	General	Total BOM Cost
19.	D1 Tj	36.313 degC	Op_Point	D1 junction temperature
20.	SEPIC Resonance Freq	14.388 kHz	Op_Point	SEPIC Resonance Frequency
21.	V SEPIC damping factor	103.185 m	Op_Point	V SEPIC damping factor
22.	Vin p-p	2.315 mV	Op_Point	Peak-to-peak input voltage
23.	Vsep p-p	179.603 mV	Op_Point	Peak-to-peak sepic voltage
24.	Cross Freq	12.316 kHz	Op_point	Bode plot crossover frequency
25.	Duty Cycle	57.5 %	Op_point	Duty cycle
26.	Efficiency	72.294 %	Op_point	Steady state efficiency
27.	Gain Marg	10.297 db	Op_point	Bode Plot Gain Margin
28.	IC Tj	33.622 degC	Op_point	IC junction temperature
29.	IOUT_OP	500.0 mA	Op_point	Iout operating point
30.	M1 TjOP	46.24 degC	Op_point	M1 MOSFET junction temperature
31.	Phase Marg	66.387 deg	Op_point	Bode Plot Phase Margin
32.	Phase Shift	67.673 deg	Op_point	Bode Plot Phase Shift
33.	VIN_OP	3.3 V	Op_point	Vin operating point
34.	Vout p-p	19.769 mV	Op_point	Peak-to-peak output ripple voltage
35.	Cin Pd	2.494 µW	Power	Input capacitor power dissipation
36.	Cout Pd	1.003 mW	Power	Output capacitor power dissipation
37.	Csep Pd	2.998 mW	Power	SEPIC capacitor power dissipation
38.	D1 Pd	252.525 mW	Power	Diode power dissipation
39.	D1 PdCond	250.0 mW	Power	Diode conduction losses
40.	D1 PdSw	2.525 mW	Power	Diode switching losses
41.	IC Pd	18.108 mW	Power	IC power dissipation
42.	Lin Pd	106.945 mW	Power	Lin power dissipation
43.	Lout Pd	85.87 mW	Power	Lout power dissipation
44.	M1 Pd	125.036 mW	Power	M1 MOSFET total power dissipation
45.	M1 PdCond	73.159 mW	Power	M1 MOSFET conduction losses
46.	M1 PdSw	51.877 mW	Power	M1 MOSFET switching losses
47.	Rsense Pd	39.312 mW	Power	LED Current Rsns Power Dissipation
48.	Total Pd	632.342 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	Iout1	500.0 m	Output Current #1
3.	VinMax	4.2	Maximum input voltage
4.	VinMin	3.3	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	Vout1	3.3	Output Voltage #1
7.	base_pn	LM3478	Texas Instruments Base Part 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.