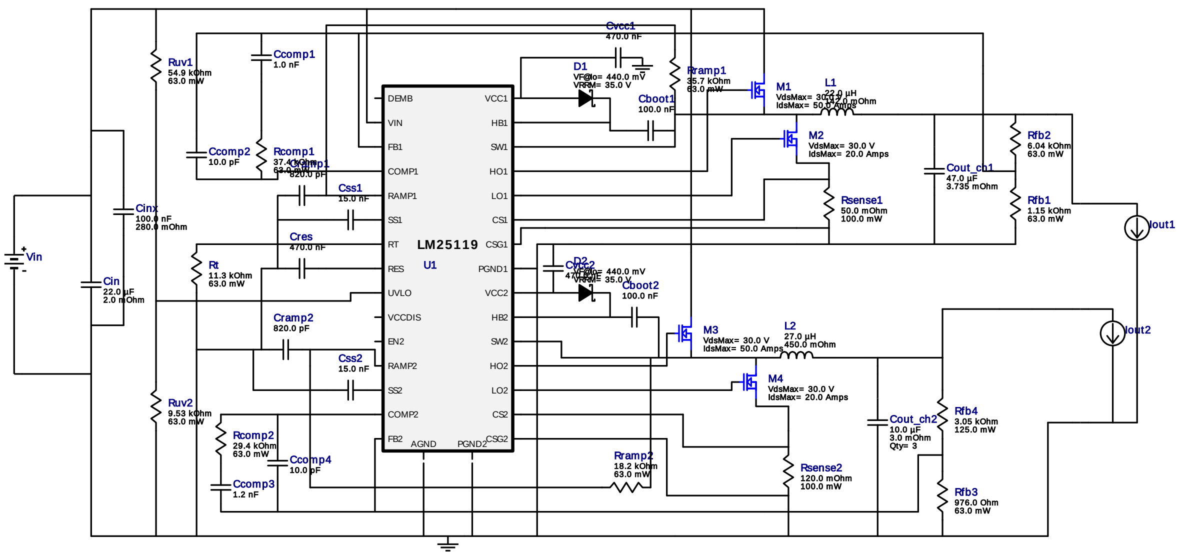
VinMin = 10.5V
VinMax = 13.0V
Vout = 5.0V
Iout = 1.0A

Device = LM25119PSQ/NOPB
Topology = Buck
Created = 8/23/16 6:07:51 AM
BOM Cost = $4.67
BOM Count = 41
Total Pd = 0.81W

WEBENCH ® Design Report

Design : 3496425/103 LM25119PSQ/NOPB
LM25119PSQ/NOPB 10.5V-13.0V to 3.30V @ 0.5A



1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.View WEBENCH(R) Disclaimer.

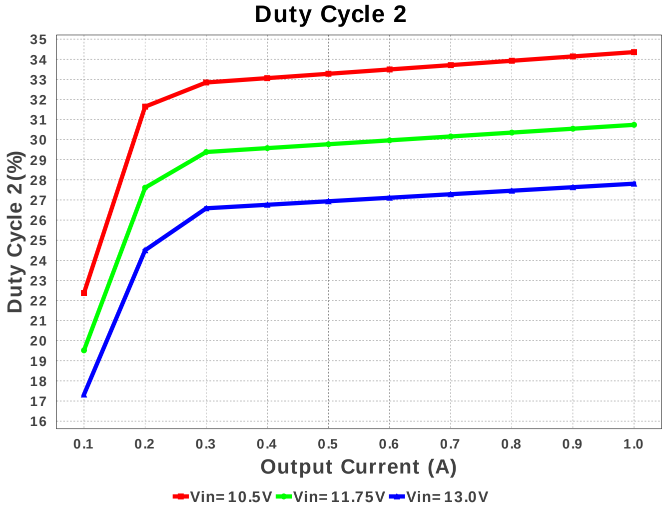
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot1	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
2.	Cboot2	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Ccomp1	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
4.	Ccomp2	Kemet	C0805C100K5GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
5.	Ccomp3	Samsung Electro-Mechanics	CL21C122JBFNNWE Series= C0G/NP0	Cap= 1.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
6.	Ccomp4	Kemet	C0805C100K5GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
7.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	$0.16	1210 15 mm^2
8.	Cinx	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2

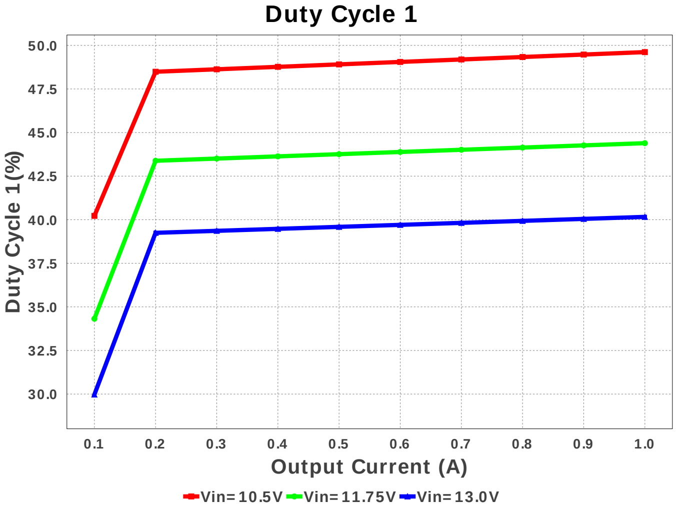
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cout_ch1	MuRata	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	1	$0.10	1206_190 11 mm^2
10.	Cout_ch2	MuRata	GRM188R60G106ME47D Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 4.0 V IRMS= 3.0 A	3	$0.02	0603 5 mm^2
11.	Cramp1	Yageo America	CC0805KRX7R9BB821 Series= X7R	Cap= 820.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
12.	Cramp2	Yageo America	CC0805KRX7R9BB821 Series= X7R	Cap= 820.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
13.	Cres	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
14.	Css1	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
15.	Css2	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
16.	Cvcc1	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
17.	Cvcc2	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
18.	D1	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm^2
19.	D2	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm^2
20.	L1	Bourns	SRN6045-220M	L= 22.0 µH DCR= 142.0 mOhm	1	$0.16	SRN6045 64 mm^2
21.	L2	NIC Components	NPI43C270MTRF	L= 27.0 µH DCR= 450.0 mOhm	1	$0.07	IND_NPI43C 31 mm^2
22.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 50.0 Amps	1	$0.28	DQG0008A 18 mm^2
23.	M2	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.19	DNH0008A 18 mm^2
24.	M3	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 50.0 Amps	1	$0.28	DQG0008A 18 mm^2
25.	M4	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.19	DNH0008A 18 mm^2
26.	Rcomp1	Vishay-Dale	CRCW040237K4FKED Series= CRCW..e3	Res= 37.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
27.	Rcomp2	Vishay-Dale	CRCW040229K4FKED Series= CRCW..e3	Res= 29.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
28.	Rfb1	Vishay-Dale	CRCW04021K15FKED Series= CRCW..e3	Res= 1.15 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

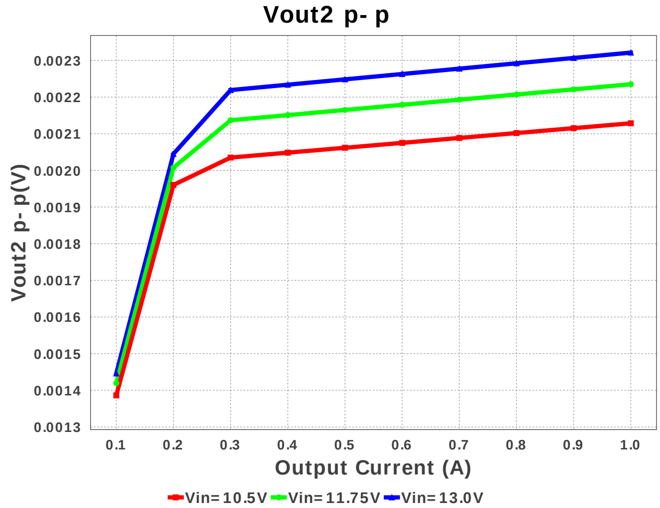
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
29.	Rfb2	Vishay-Dale	CRCW04026K04FKED Series= CRCW..e3	Res= 6.04 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
30.	Rfb3	Vishay-Dale	CRCW0402976RFKED Series= CRCW..e3	Res= 976.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
31.	Rfb4	Yageo America	RT0805BRD073K05L Series= ?	Res= 3.05 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.04	0805 7 mm^2
32.	Rramp1	Vishay-Dale	CRCW040235K7FKED Series= CRCW..e3	Res= 35.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
33.	Rramp2	Vishay-Dale	CRCW040218K2FKED Series= CRCW..e3	Res= 18.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
34.	Rsense1	Panasonic	ERJ-L03KF50MV Series= ERJ-L03	Res= 50.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.09	0603 5 mm^2
35.	Rsense2	Panasonic	ERJ-3RSFR12V Series= ERJ-3R	Res= 120.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.03	0603 5 mm^2
36.	Rt	Vishay-Dale	CRCW040211K3FKED Series= CRCW..e3	Res= 11.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
37.	Ruv1	Vishay-Dale	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
38.	Ruv2	Vishay-Dale	CRCW04029K53FKED Series= CRCW..e3	Res= 9.53 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
39.	U1	Texas Instruments	LM25119PSQ/NOPB	Switcher	1	$2.60	SQA32A 49 mm^2

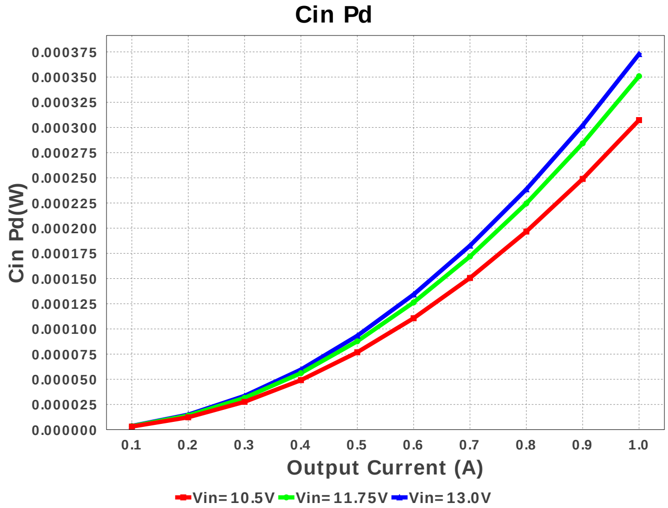
Duty Cycle 2

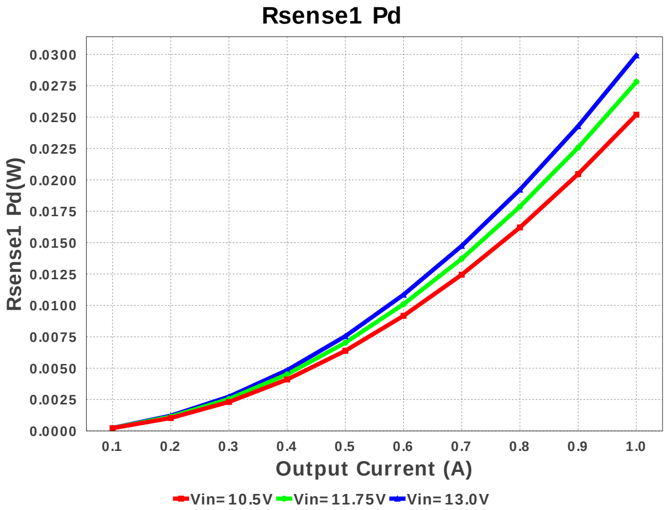


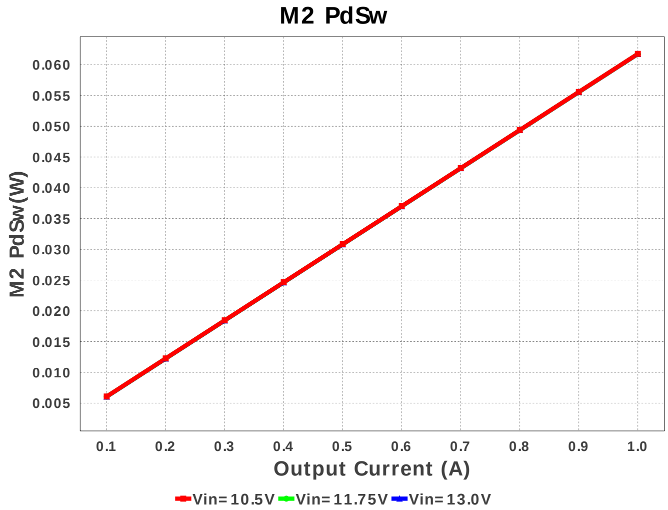
Duty Cycle 1

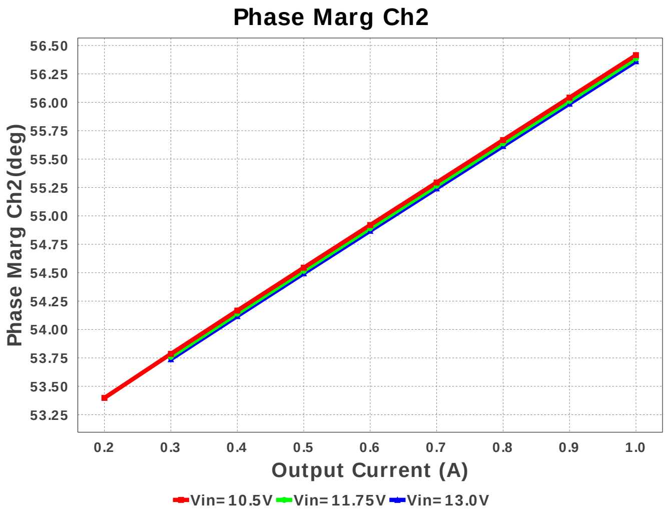


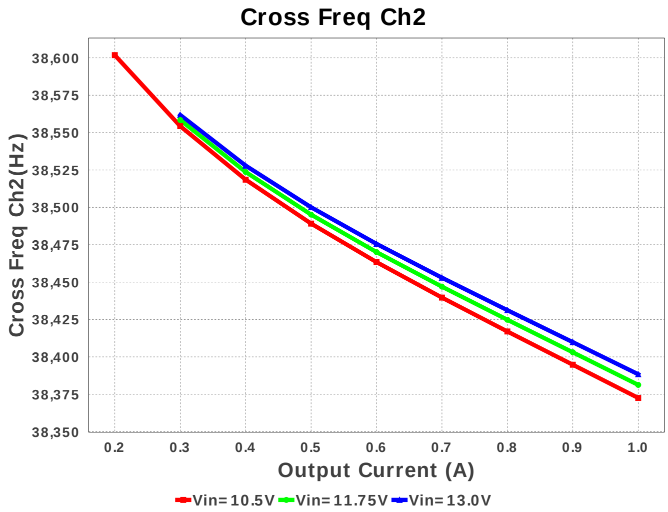

Vout2 p- p
Vout2 p- p(V)
0.0023
0.0022
0.0021
0.0020
0.0019
0.0018
0.0017
0.0016
0.0015
0.0014
0.0013
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

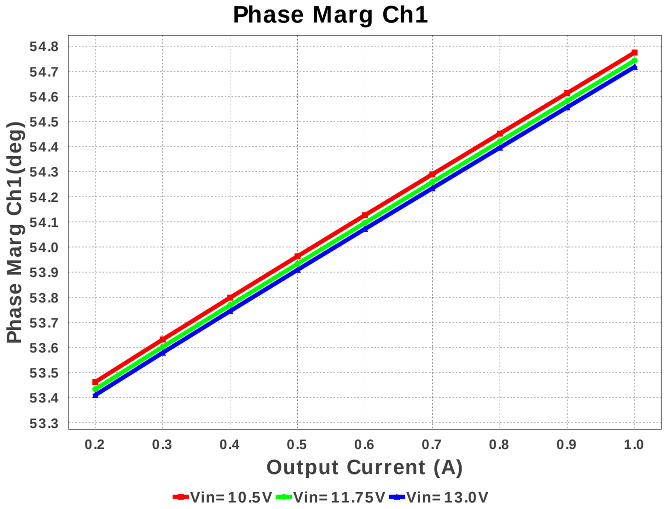

Cin Pd
Cin Pd(W)
0.000375
0.000350
0.000325
0.000300
0.000275
0.000250
0.000225
0.000200
0.000175
0.000150
0.000125
0.000100
0.000075
0.000050
0.000025
0.000000
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

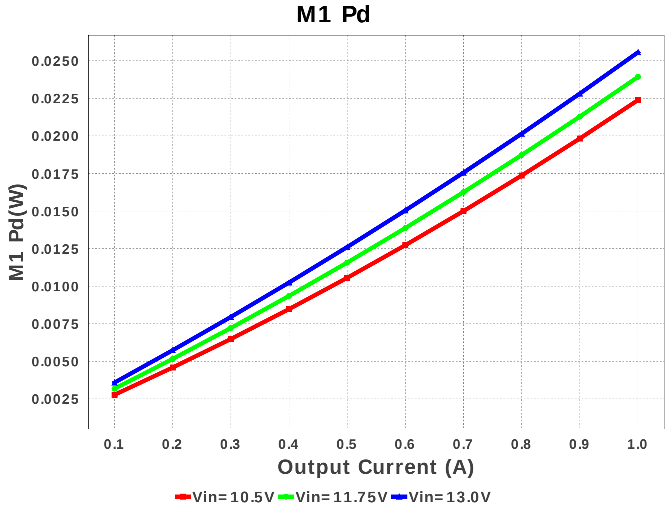

Rsense1 Pd
Rsense1 Pd(W)
0.0300
0.0275
0.0250
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

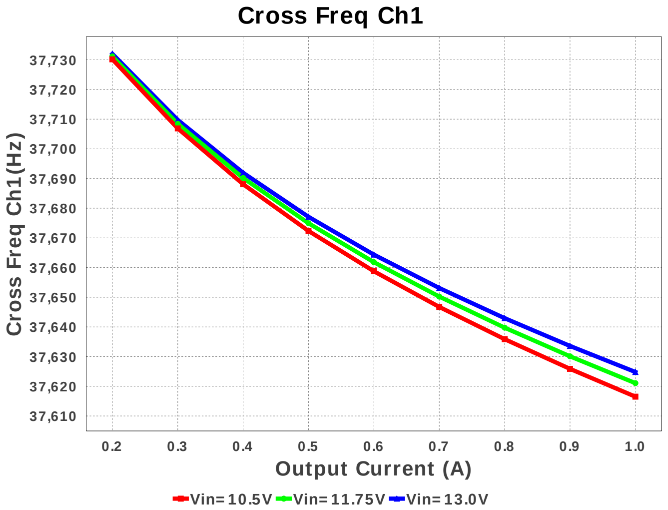

M2 PdSw
M2 PdSw(W)
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

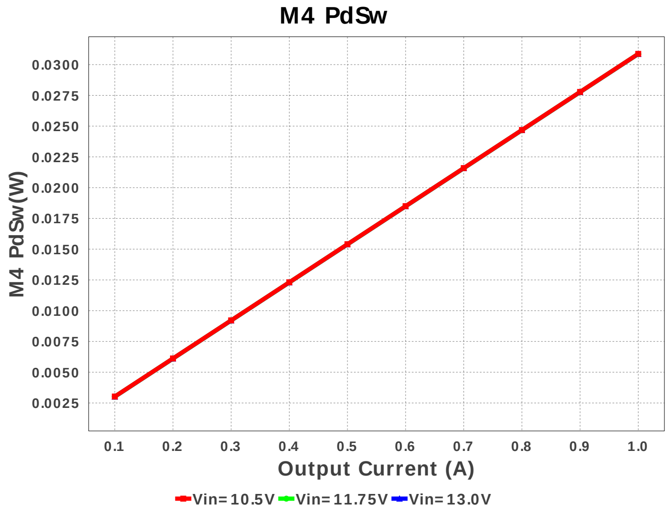

Phase Marg Ch2
Phase Marg Ch2(deg)
56.50
56.25
56.00
55.75
55.50
55.25
55.00
54.75
54.50
54.25
54.00
53.75
53.50
53.25
0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

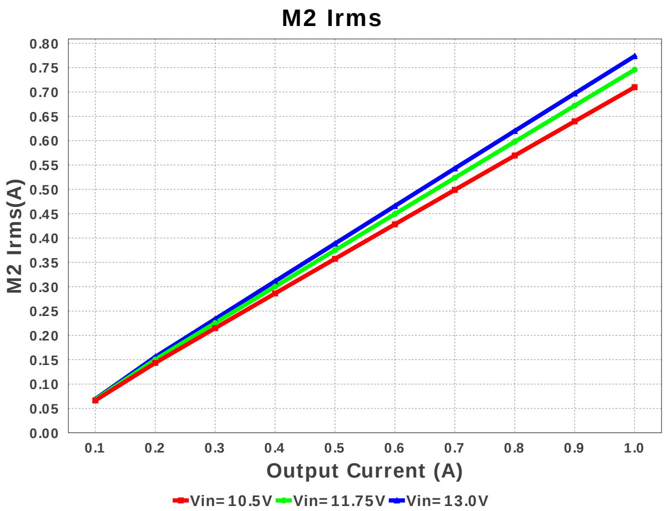

Cross Freq Ch2
Cross Freq Ch2(Hz)
38,600
38,575
38,550
38,525
38,500
38,475
38,450
38,425
38,400
38,375
38,350
0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

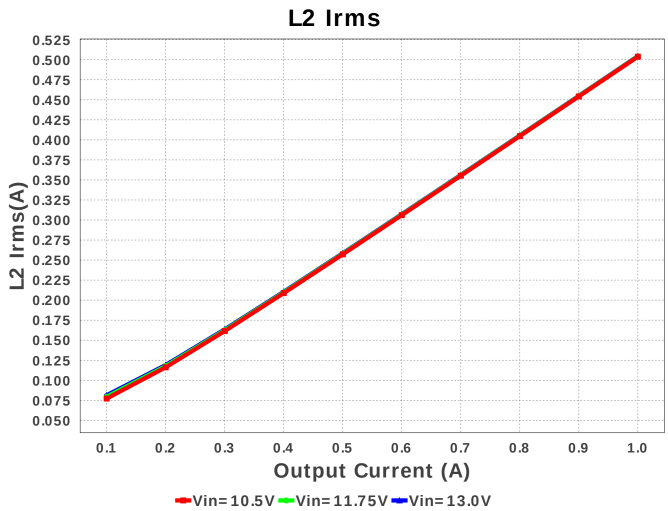

Phase Marg Ch1
Phase Marg Ch1(deg)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


M1 Pd
M1 Pd(W)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

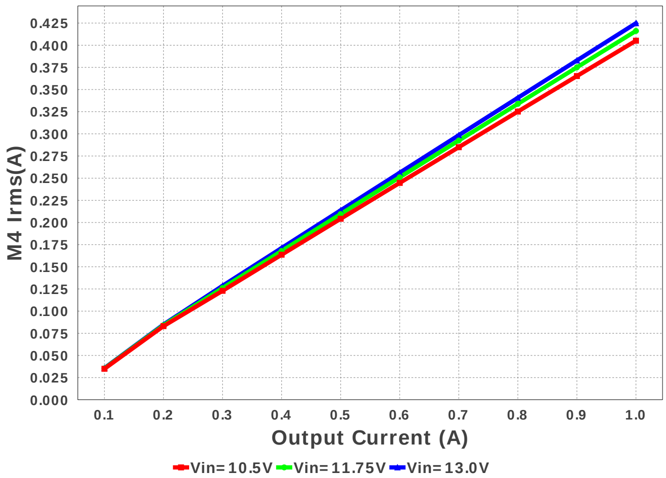

Cross Freq Ch1
Cross Freq Ch1(Hz)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


M4 PdSw
M4 PdSw(W)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

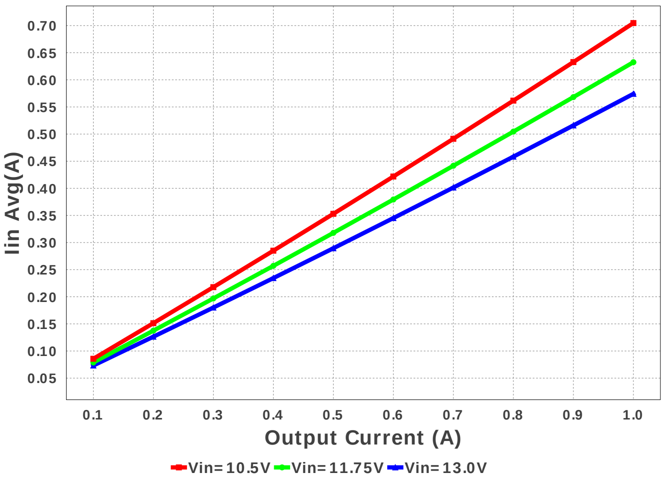

M2 Irms
M2 Irms(A)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


L2 Irms
L2 Irms(A)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

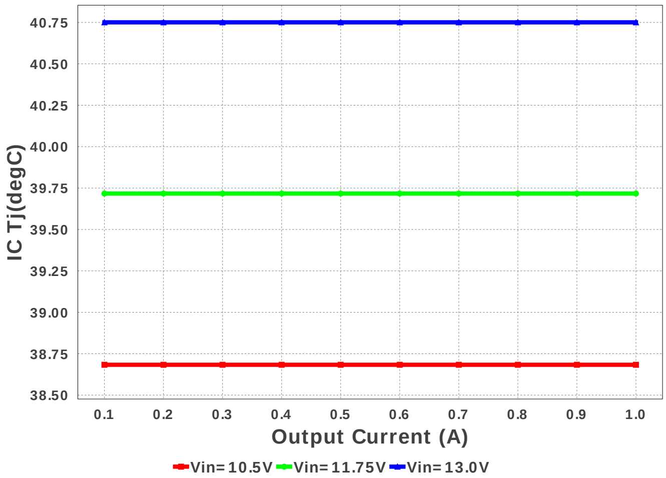
M4 Irms



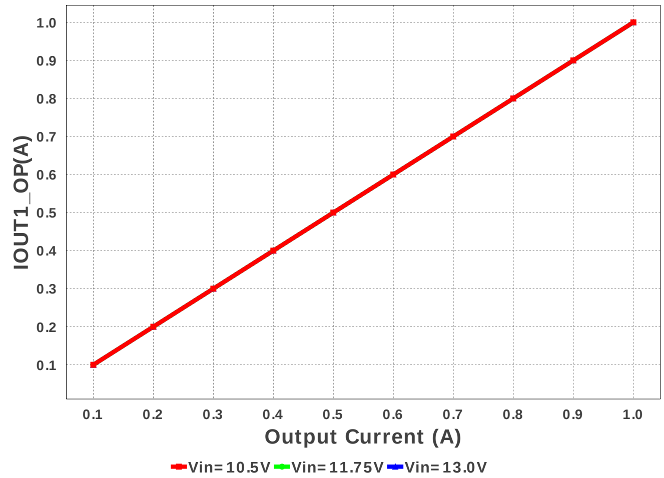
Iin Avg



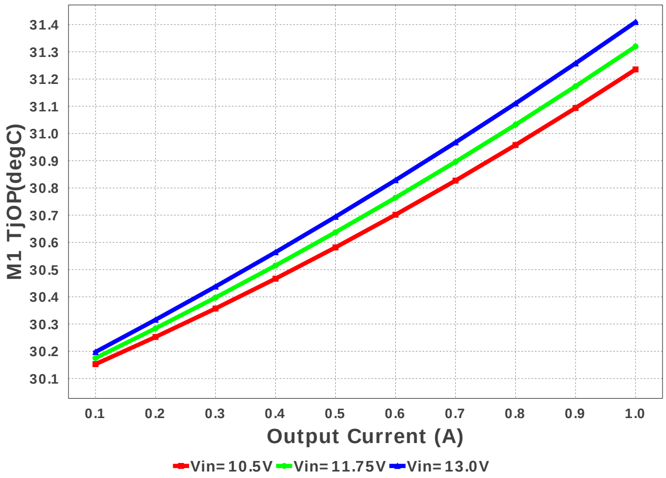
IC Tj



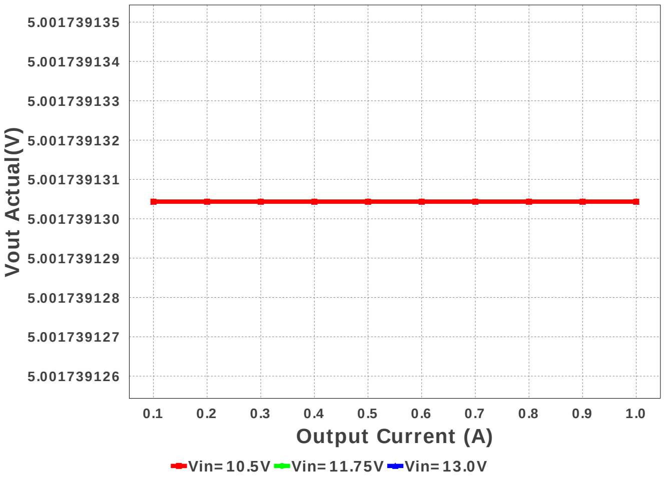
IOUT1_OP

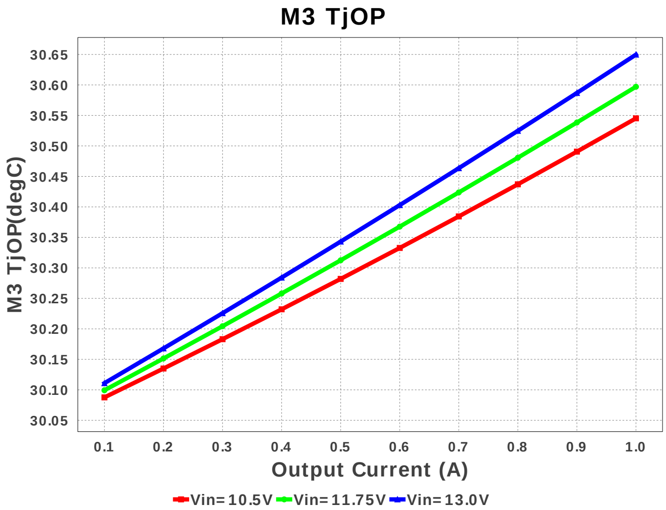


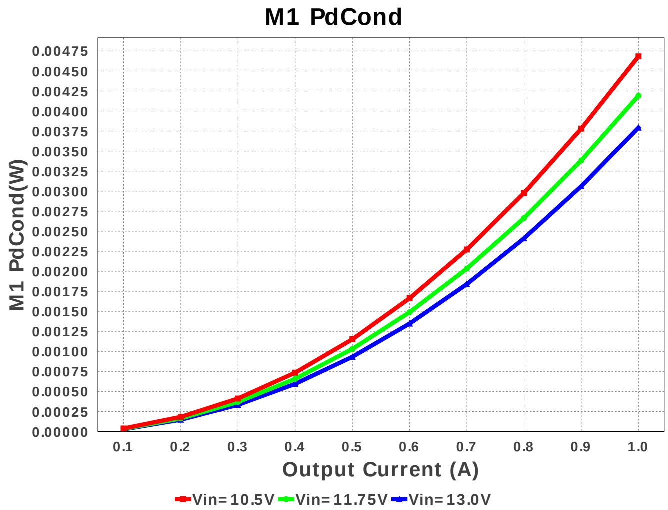
M1 TjOP

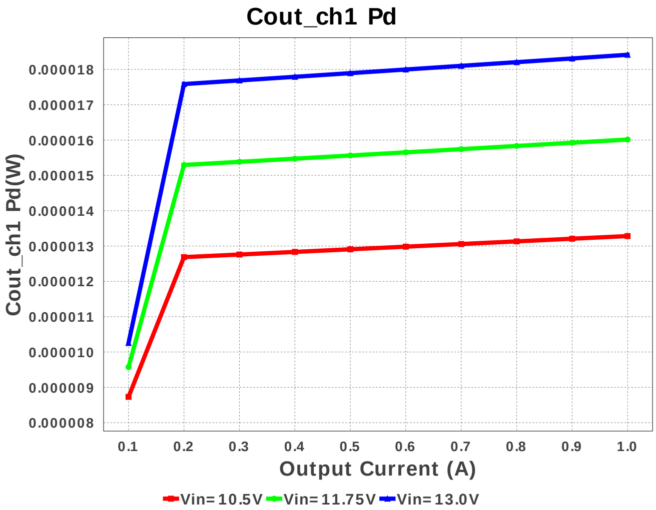


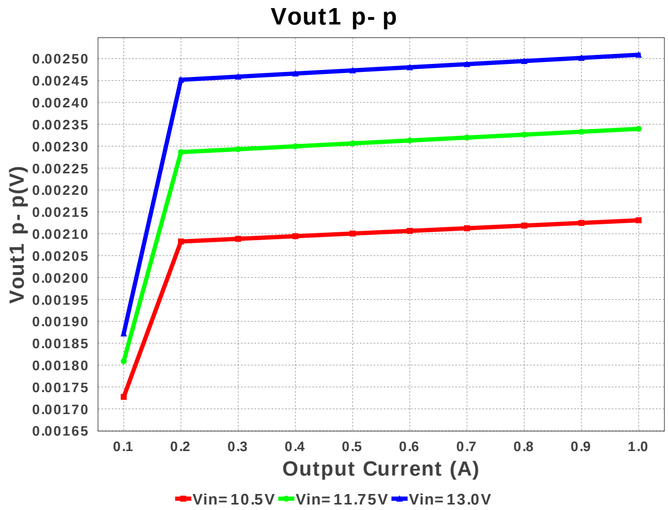
Vout Actual

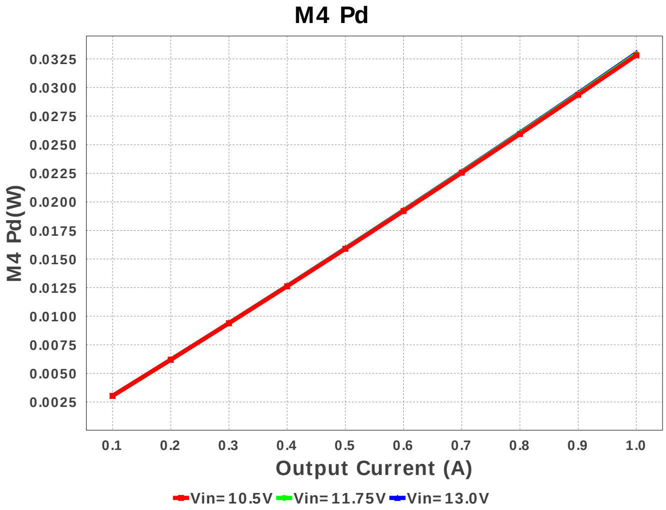


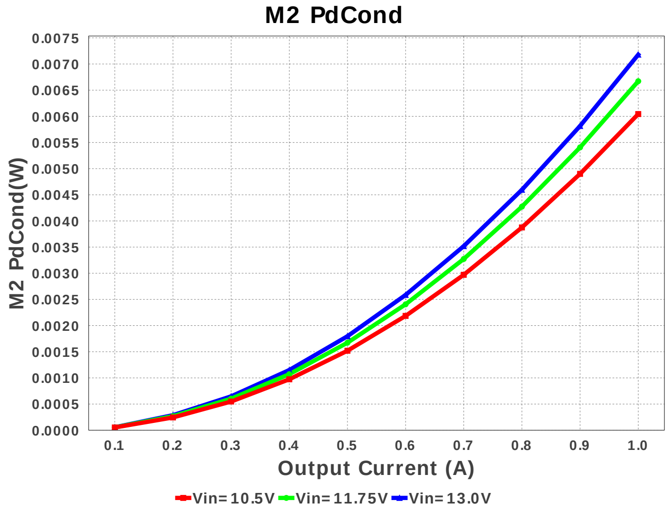

M3 TjOP
M3 TjOP(degC)
30.65 30.60 30.55 30.50 30.45 30.40 30.35 30.30 30.25 30.20 30.15 30.10 30.05
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

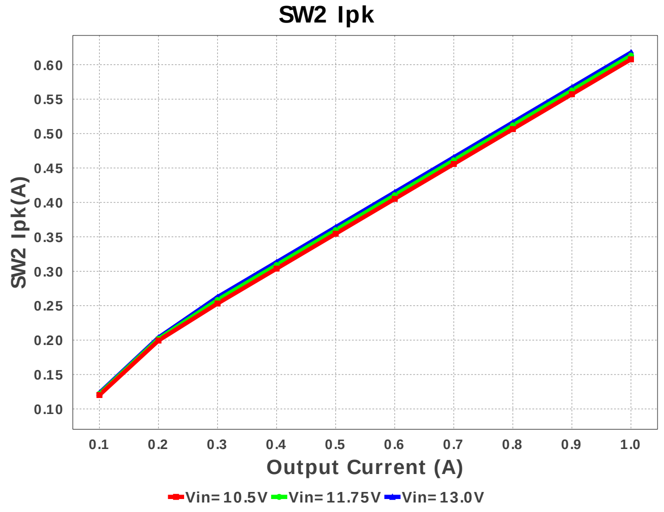

M1 PdCond
M1 PdCond(W)
0.00475 0.00450 0.00425 0.00400 0.00375 0.00350 0.00325 0.00300 0.00275 0.00250 0.00225 0.00200 0.00175 0.00150 0.00125 0.00100 0.00075 0.00050 0.00025 0.00000
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

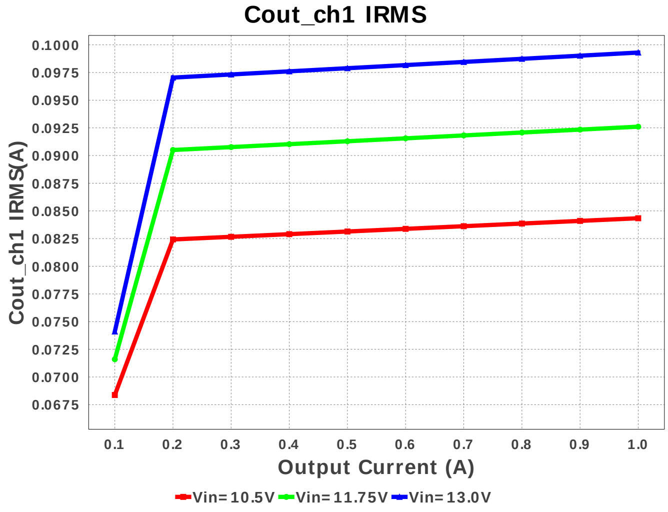

Cout_ch1 Pd
Cout_ch1 Pd(W)
0.000018 0.000017 0.000016 0.000015 0.000014 0.000013 0.000012 0.000011 0.000010 0.000009 0.000008
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

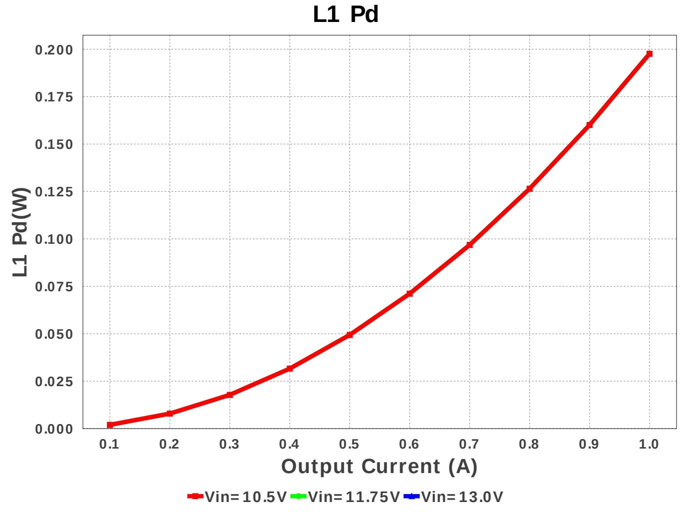

Vout1 p- p
Vout1 p- p(V)
0.00250 0.00245 0.00240 0.00235 0.00230 0.00225 0.00220 0.00215 0.00210 0.00205 0.00200 0.00195 0.00190 0.00185 0.00180 0.00175 0.00170 0.00165
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

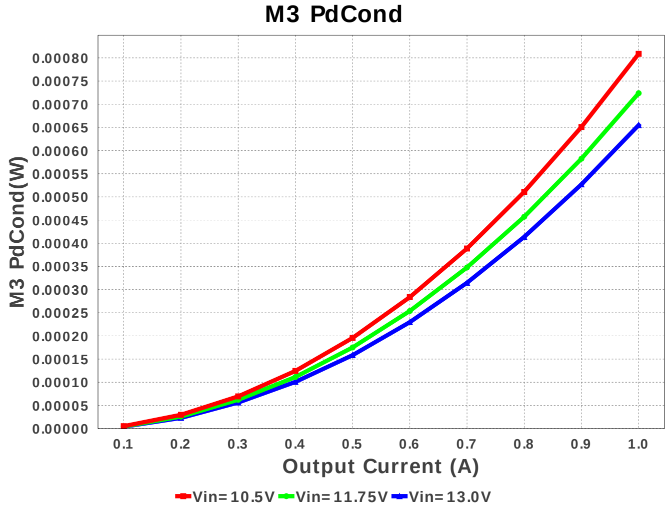

M4 Pd
M4 Pd(W)
0.0325 0.0300 0.0275 0.0250 0.0225 0.0200 0.0175 0.0150 0.0125 0.0100 0.0075 0.0050 0.0025
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

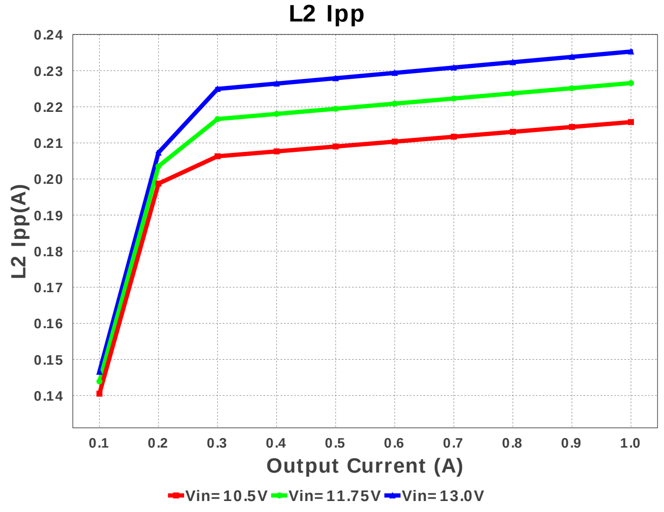

M2 PdCond
M2 PdCond(W)
0.0075 0.0070 0.0065 0.0060 0.0055 0.0050 0.0045 0.0040 0.0035 0.0030 0.0025 0.0020 0.0015 0.0010 0.0005 0.0000
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

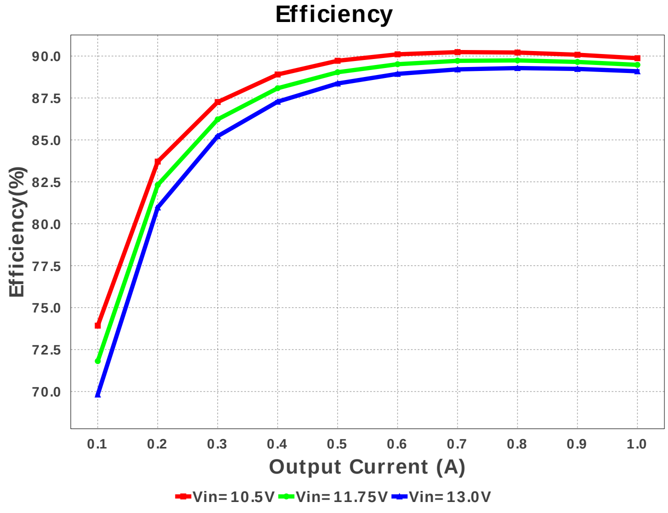

SW2 Ipk
SW2 Ipk(A)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


Cout_ch1 IRMS
Cout_ch1 IRMS(A)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

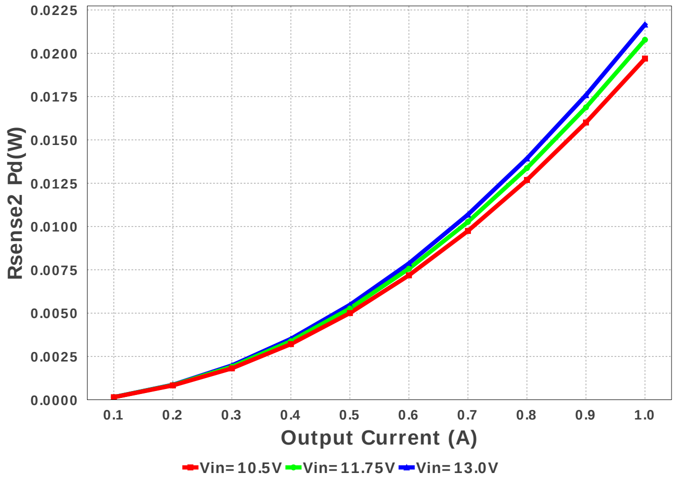

L1 Pd
L1 Pd(W)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


M3 PdCond
M3 PdCond(W)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

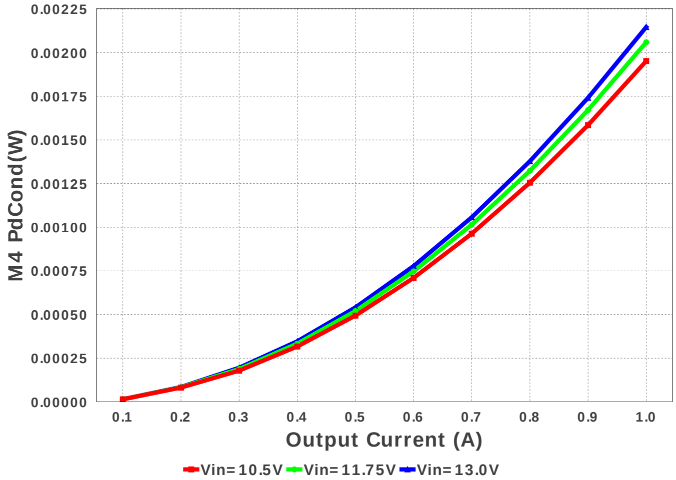

L2 Ipp
L2 Ipp(A)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


Efficiency
Efficiency(%)
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

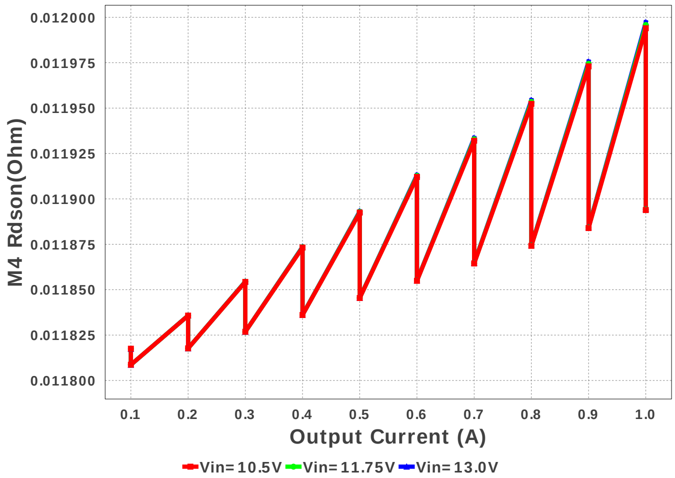
Rsense2 Pd



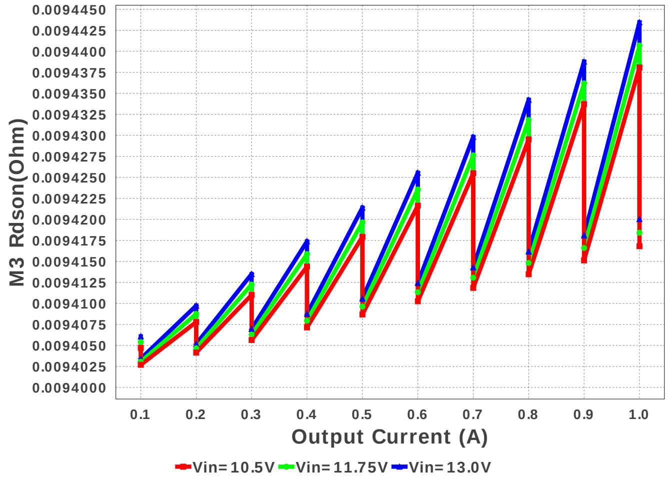
M4 PdCond



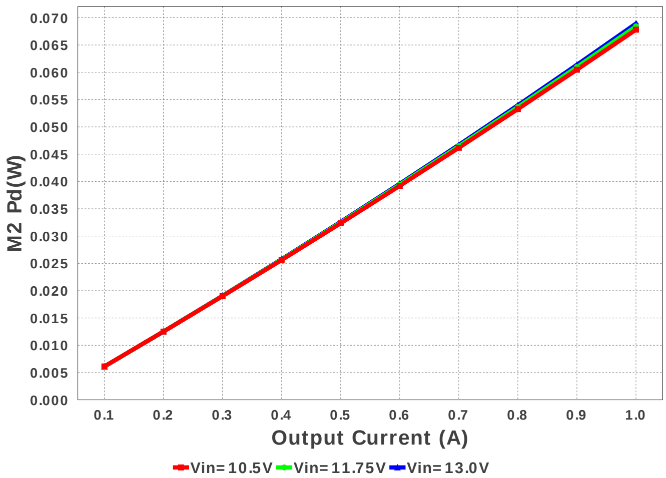
M4 Rdson



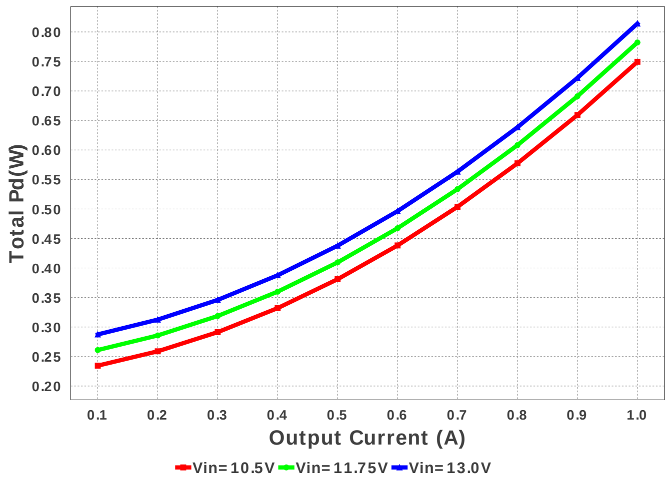
M3 Rdson

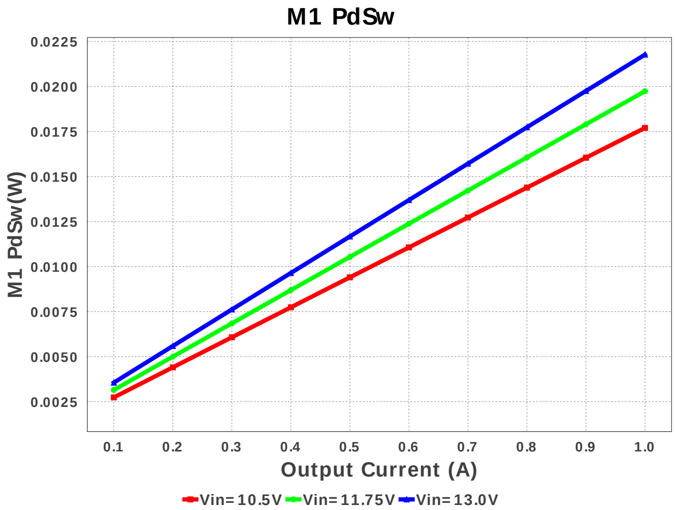


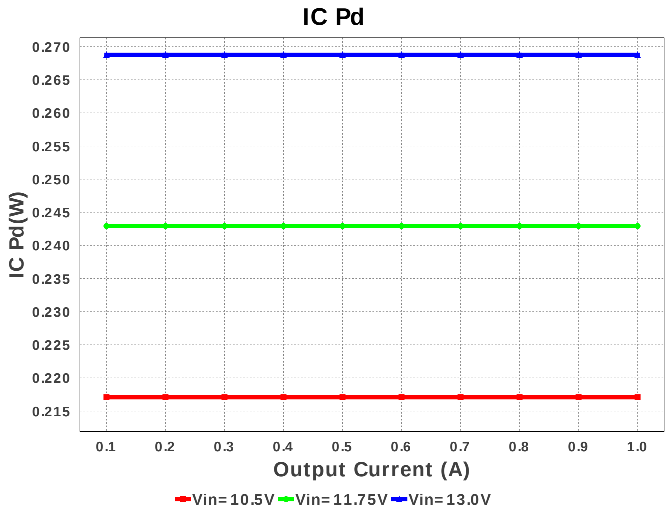
M2 Pd

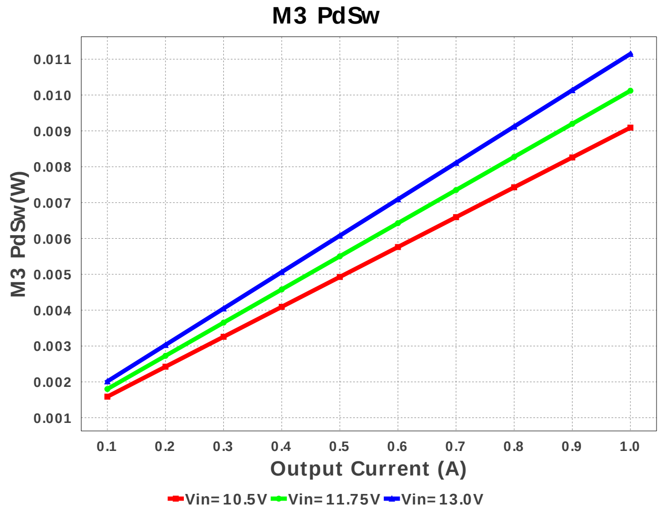


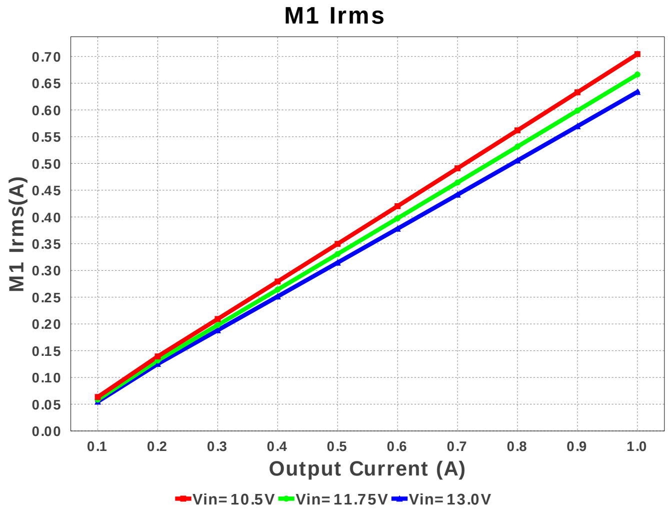
Total Pd

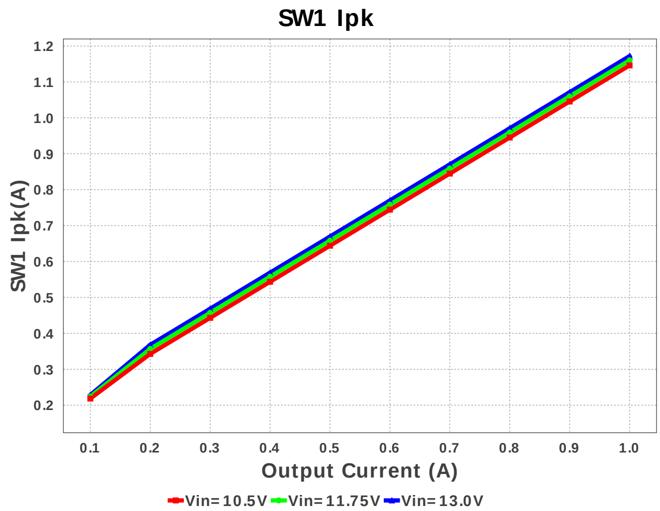


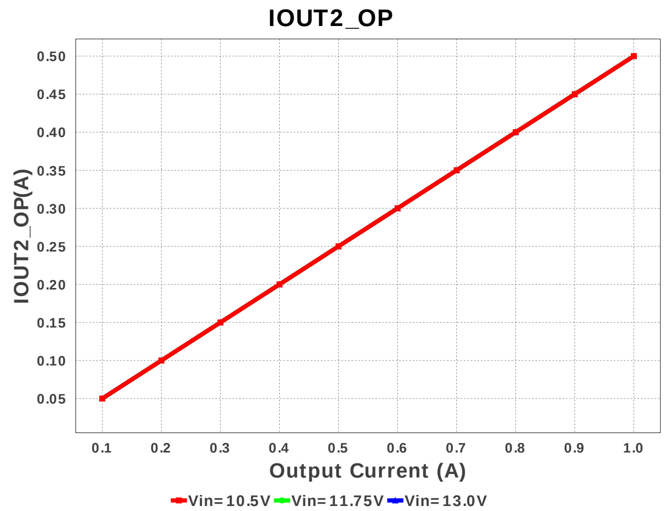

M1 PdSw
M1 PdSw(W)
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

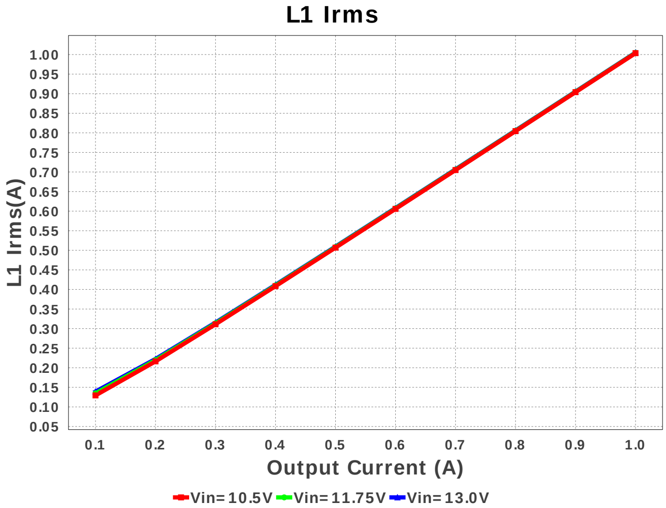

IC Pd
IC Pd(W)
0.270
0.265
0.260
0.255
0.250
0.245
0.240
0.235
0.230
0.225
0.220
0.215
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

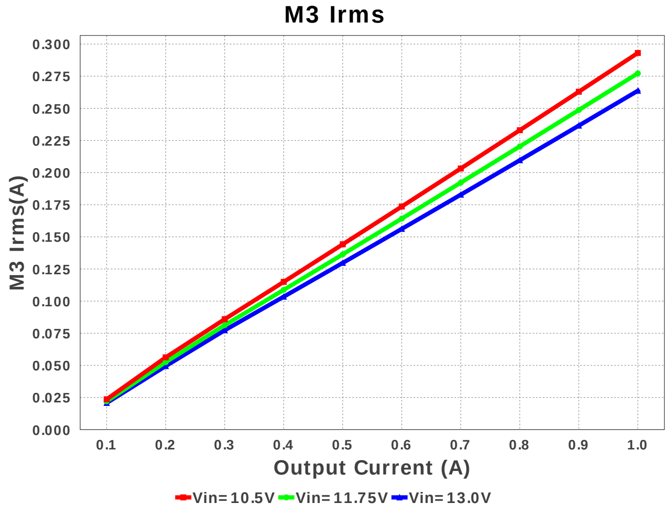

M3 PdSw
M3 PdSw(W)
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

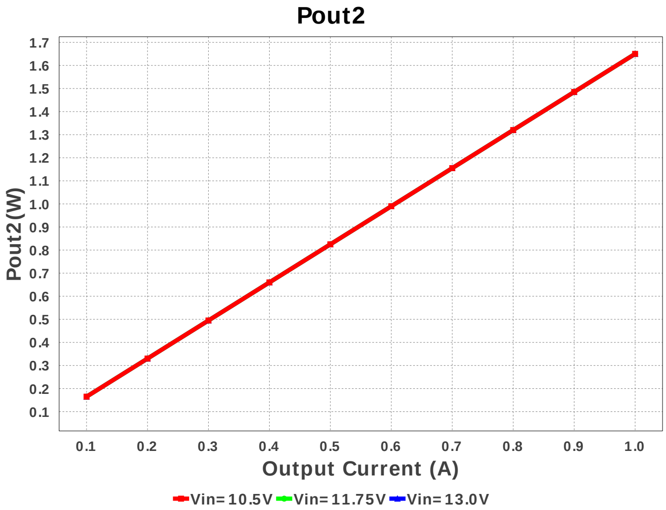

M1 Irms
M1 Irms(A)
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

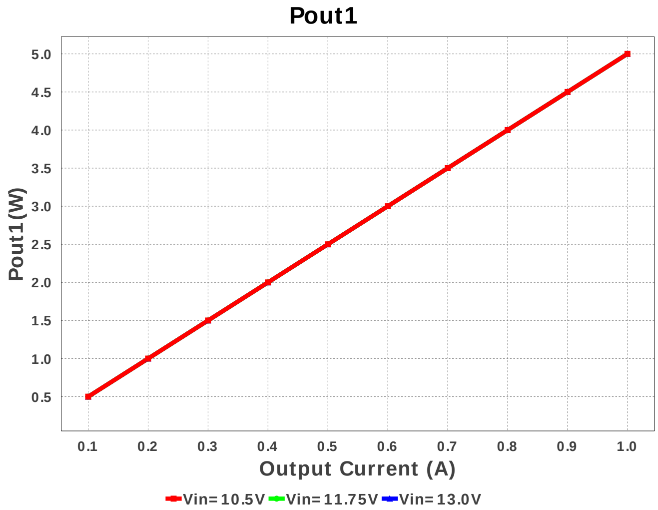

SW1 Ipk
SW1 Ipk(A)
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

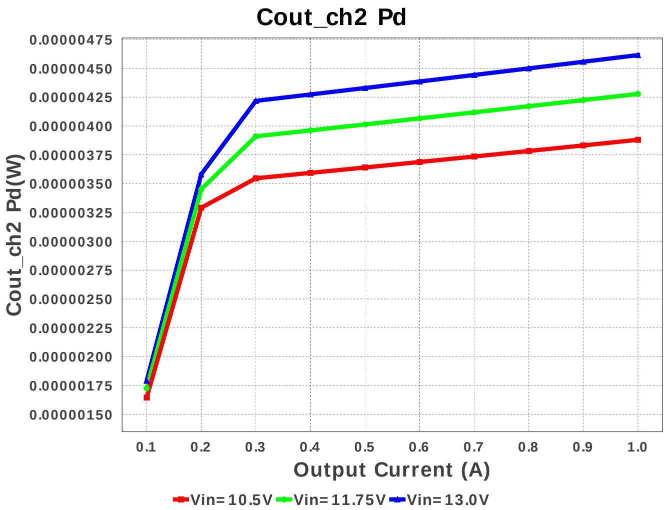

IOUT2_OP
IOUT2_OP(A)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

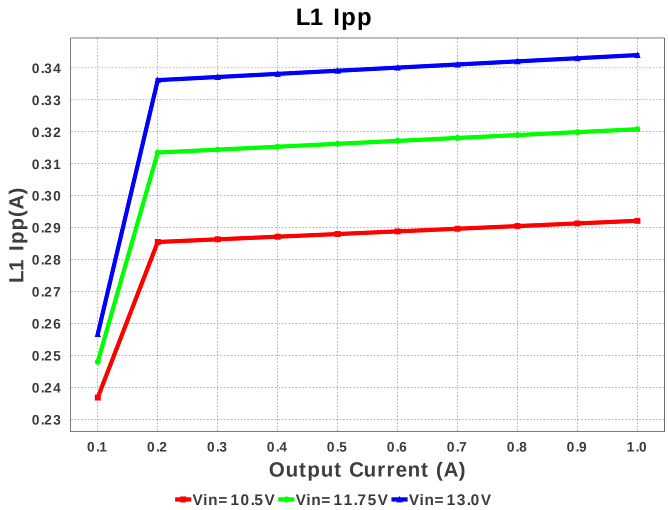

L1 Irms
L1 Irms(A)
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

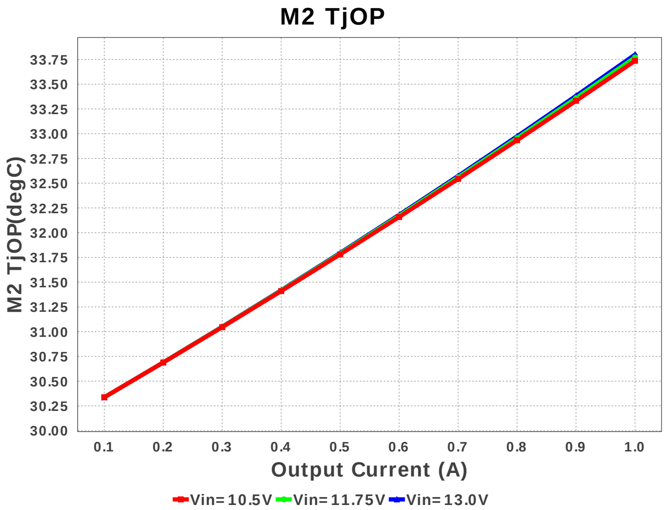

M3 Irms
M3 Irms(A)
0.300
0.275
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

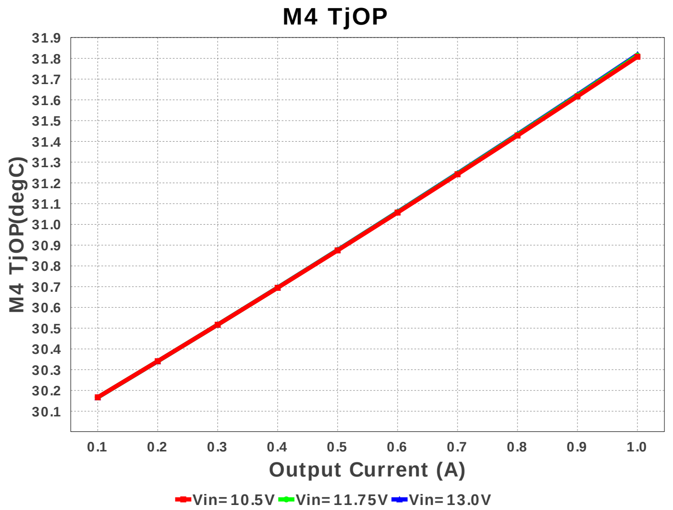

Pout2
Pout2(W)
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

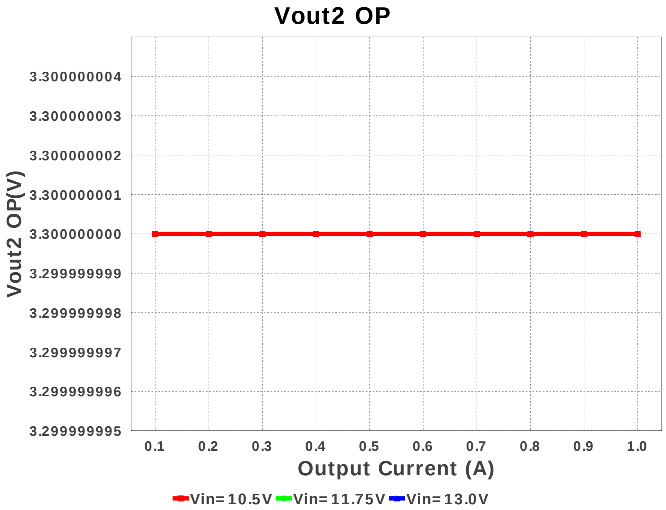

Pout1
Pout1(W)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

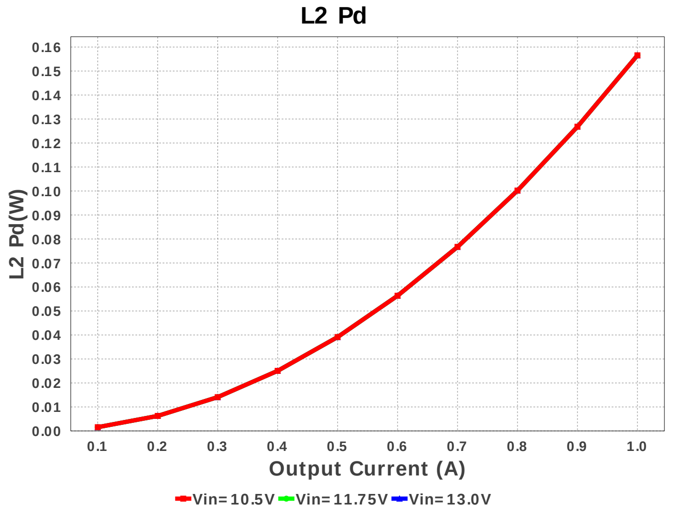

Cout_ch2 Pd
Cout_ch2 Pd(W)
0.00000475
0.00000450
0.00000425
0.00000400
0.00000375
0.00000350
0.00000325
0.00000300
0.00000275
0.00000250
0.00000225
0.00000200
0.00000175
0.00000150
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

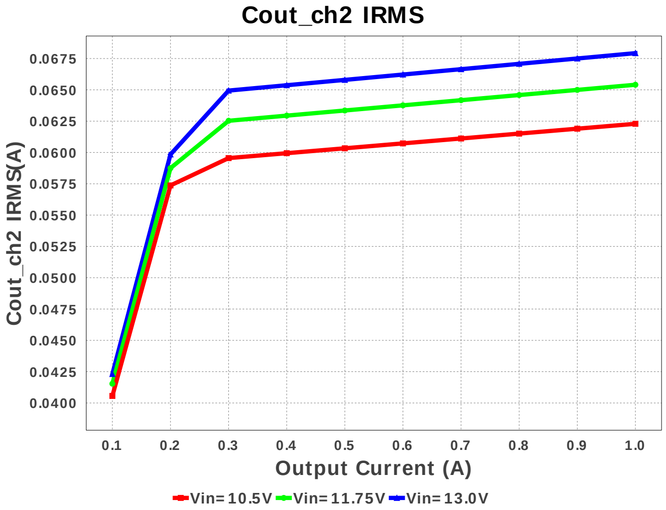

L1 Ipp
L1 Ipp(A)
0.34
0.33
0.32
0.31
0.30
0.29
0.28
0.27
0.26
0.25
0.24
0.23
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

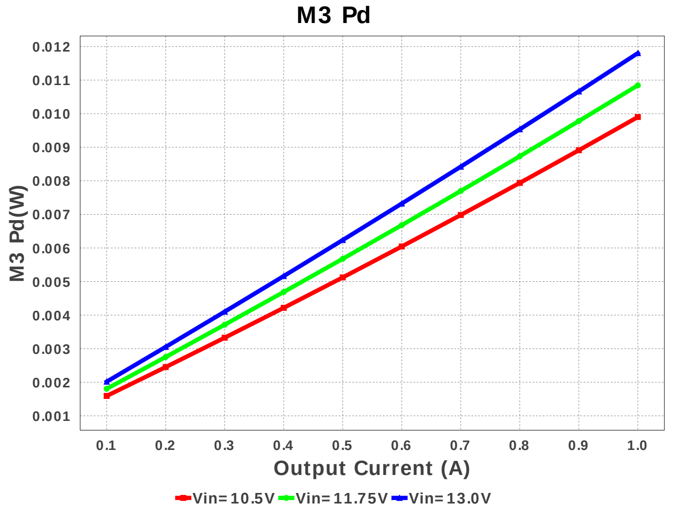

M2 TjOP
M2 TjOP(degC)
30.00 30.25 30.50 30.75 31.00 31.25 31.50 31.75 32.00 32.25 32.50 32.75 33.00 33.25 33.50 33.75
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V

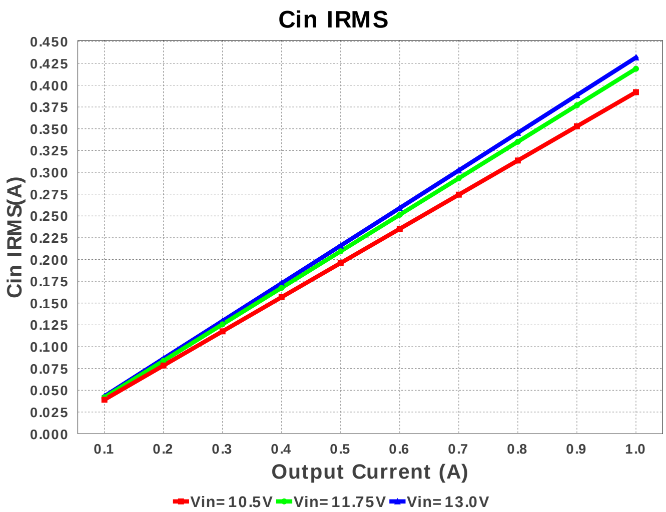

M4 TjOP
M4 TjOP(degC)
30.1 30.2 30.3 30.4 30.5 30.6 30.7 30.8 30.9 31.0 31.1 31.2 31.3 31.4 31.5 31.6 31.7 31.8 31.9
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


Vout2 OP
Vout2 OP(V)
3.299999995 3.299999996 3.299999997 3.299999998 3.299999999 3.300000000 3.300000001 3.300000002 3.300000003 3.300000004
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


L2 Pd
L2 Pd(W)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


Cout_ch2 IRMS
Cout_ch2 IRMS(A)
0.0400 0.0425 0.0450 0.0475 0.0500 0.0525 0.0550 0.0575 0.0600 0.0625 0.0650 0.0675
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V


M3 Pd
M3 Pd(W)
0.001 0.002 0.003 0.004 0.005 0.006 0.007 0.008 0.009 0.010 0.011 0.012
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=10.5V Vin=11.75V Vin=13.0V



Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	431.743 mA	Current	Input capacitor RMS ripple current
2.	Cout_ch1 IRMS	99.313 mA	Current	Output Channel 1 Capacitor RMS ripple current
3.	Cout_ch2 IRMS	67.93 mA	Current	Output Channel 2 Capacitor RMS ripple current
4.	Iin Avg	574.3 mA	Current	Average input current
5.	L1 Ipp	344.03 mA	Current	Peak-to-peak inductor ripple current
6.	L1 Irms	1.005 A	Current	Inductor ripple current
7.	L2Ipp	235.317 mA	Current	Channel 2 Inductor Peak to peak Current
8.	L2 Irms	504.593 mA	Current	Inductor ripple current
9.	M1 Irms	633.841 mA	Current	MOSFET RMS ripple current
10.	M2 Irms	773.463 mA	Current	MOSFET RMS ripple current
11.	M3 Irms	263.671 mA	Current	MOSFET RMS ripple current
12.	M4 Irms	424.827 mA	Current	MOSFET RMS ripple current
13.	SW1 Ipk	1.172 A	Current	Peak switch current
14.	SW2 Ipk	617.659 mA	Current	Peak switch current
15.	BOM Count	41	General	Total Design BOM count
16.	FootPrint	389.0 mm^2	General	Total Foot Print Area of BOM components
17.	Frequency	424.559 kHz	General	Switching frequency
18.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
19.	Pout1	5.002 W	General	Channel 1 output Power
20.	Pout2	1.65 W	General	Channel 2 output Power
21.	Total BOM	$4.67	General	Total BOM Cost
22.	Ch1 Mode	CCM	General	Conduction Mode
23.	Ch2 Mode	CCM	General	Conduction Mode
24.	M3 TjOP	30.65 degC	Op_Point	M3 MOSFET junction temperature
25.	M4 TjOP	31.818 degC	Op_Point	M4 MOSFET junction temperature
26.	Vout Actual	5.002 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
27.	Duty Cycle 1	40.175 %	Op_point	Duty cycle for Channel 1
28.	Duty Cycle 2	27.809 %	Op_point	Duty cycle for Channel 2
29.	Efficiency	89.095 %	Op_point	Steady state efficiency
30.	IC Tj	40.751 degC	Op_point	IC junction temperature
31.	IOUT1_OP	1.0 A	Op_point	Iout1 operating point
32.	IOUT2_OP	500.0 mA	Op_point	Iout2 operating point
33.	M1 TjOP	31.409 degC	Op_point	M1 MOSFET junction temperature
34.	M2 TjOP	33.799 degC	Op_point	M2 MOSFET junction temperature
35.	VIN_OP	13.0 V	Op_point	Vin operating point
36.	Vout1 OP	5.002 V	Op_point	Operational Voltage 1
37.	Vout1 p-p	2.509 mV	Op_point	Peak-to-peak output1 ripple voltage
38.	Vout2 OP	3.3 V	Op_point	Operational Voltage 2
39.	Vout2 p-p	2.321 mV	Op_point	Peak-to-peak output2 ripple voltage
40.	Cin Pd	372.804 µW	Power	Input capacitor power dissipation
41.	Cout_ch1 Pd	18.419 µW	Power	Ouput channel 1 capacitor power dissipation
42.	Cout_ch2 Pd	4.615 µW	Power	Ouput channel 2 capacitor power dissipation
43.	IC Pd	268.765 mW	Power	IC power dissipation
44.	L1 Pd	197.596 mW	Power	Inductor power dissipation
45.	L2 Pd	156.546 mW	Power	Inductor power dissipation
46.	M1 Pd	25.562 mW	Power	M1 MOSFET total power dissipation
47.	M1 PdCond	3.794 mW	Power	M1 MOSFET conduction losses
48.	M1 PdSw	21.768 mW	Power	M1 MOSFET switching losses
49.	M2 Pd	68.915 mW	Power	M2 MOSFET total power dissipation
50.	M2 PdCond	7.177 mW	Power	M2 MOSFET conduction losses
51.	M2 PdSw	61.737 mW	Power	M2 MOSFET switching losses
52.	M3 Pd	11.803 mW	Power	M3 MOSFET total power dissipation

#	Name	Value	Category	Description
53.	M3 PdCond	654.902 µW	Power	M3 MOSFET conduction losses
54.	M3 PdSw	11.148 mW	Power	M3 MOSFET switching losses
55.	M1 Rdson	9.443 mOhm	Power	Drain-Source On-resistance
56.	M3 Rdson	9.42 mOhm	Power	Drain-Source On-resistance
57.	M4 Pd	33.008 mW	Power	M4 MOSFET total power dissipation
58.	M4 PdCond	2.147 mW	Power	M4 MOSFET conduction losses
59.	M4 PdSw	30.862 mW	Power	M4 MOSFET switching losses
60.	M2 Rdson	11.997 mOhm	Power	Drain-Source On-resistance
61.	M4 Rdson	11.894 mOhm	Power	Drain-Source On-resistance
62.	Rsense1 Pd	29.912 mW	Power	Current Limit Sense Resistor Power Dissipation
63.	Rsense2 Pd	21.657 mW	Power	Current Limit Sense Resistor Power Dissipation
64.	Total Pd	814.16 mW	Power	Total Power Dissipation
65.	Cross Freq Ch1	37.625 kHz		Bode plot crossover frequency
66.	Cross Freq Ch2	38.39 kHz		Bode plot crossover frequency
67.	Phase Marg Ch1	54.713 deg		Bode Plot Phase Margin
68.	Phase Marg Ch2	56.355 deg		Bode Plot Phase Margin
69.	Vout Tolerance	3.222 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	Iout1	1.0	Output Current #1
3.	Iout2	500.0 m	Output Current #2
4.	VinMax	13.0	Maximum input voltage
5.	VinMin	10.5	Minimum input voltage
6.	Vout	5.0	Output Voltage
7.	Vout1	5.0	Output Voltage #1
8.	Vout2	3.3	Output Voltage #2
9.	base_pn	LM25119	Base Product Number
10.	source	DC	Input Source Type
11.	Ta	30.0	Ambient temperature

Design Assistance

1. Outline The LM5119 is a dual synchronous buck controller intended for step-down regulator applications from a high voltage or widely varying input supply. The control method is based upon current mode control utilizing an emulated current ramp. Current mode control provides inherent line feed-forward, cycle-by-cycle current limiting and ease of loop compensation. The use of an emulated control ramp reduces noise sensitivity of the pulse-width modulation circuit, allowing reliable control of very small duty cycles necessary in high input voltage applications. Sequencing the 2 outputs The LM(2)5119 contains an enable function allowing shutdown control of channel2, independent of channel1. If the EN2 pin is pulled below 2.0V, channel2 enters shutdown mode. If the EN2 input is greater than 2.5V, channel2 returns to normal operation. Diode Emulation A fully synchronous buck regulator implemented with a freewheel MOSFET rather than a diode has the capability to sink current from the output in certain conditions such as light load, over-voltage or pre-bias startup. The LM(2)5119 provides a diode emulation feature that can be enabled to prevent reverse (drain to source) current flow in the low side free-wheel MOSFET.

2. **LM25119** Product Folder : http://www.ti.com/product/LM25119 : contains the data sheet and other resources.