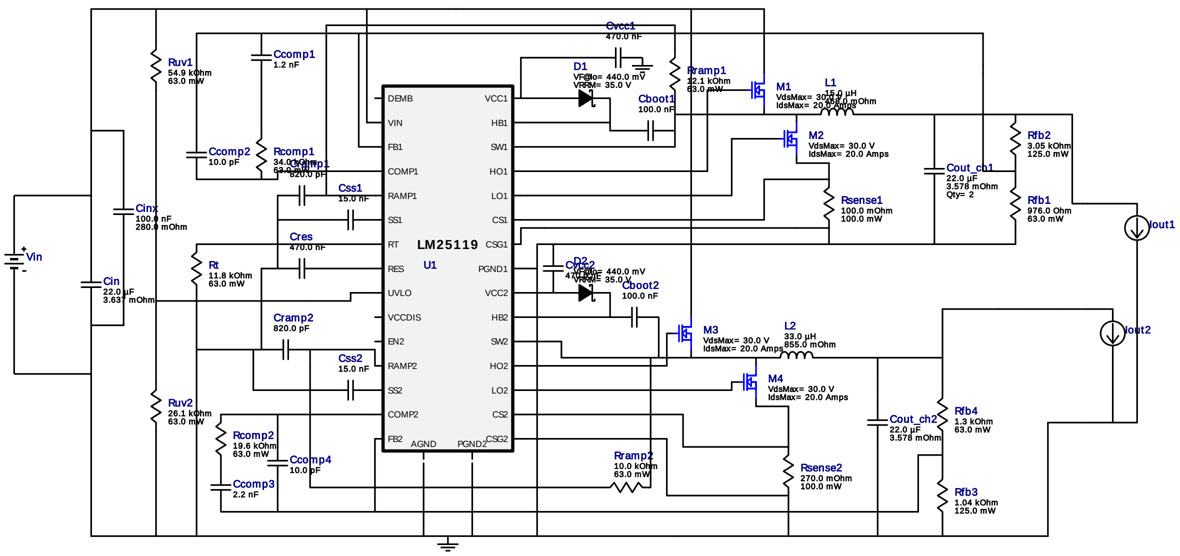
TEXAS INSTRUMENTS

WEBENCH ® Design Report

VinMin = 4.8V
VinMax = 5.2V
Vout = 3.3V
Iout = 0.5A

Device = LM25119PSQ/NOPB
Topology = Buck
Created = 8/25/16 4:53:22 AM
BOM Cost = $4.76
BOM Count = 40
Total Pd = 0.4W

Design : 3496425/108 LM25119PSQ/NOPB
LM25119PSQ/NOPB 4.8V-5.2V to 1.80V @ 0.2A



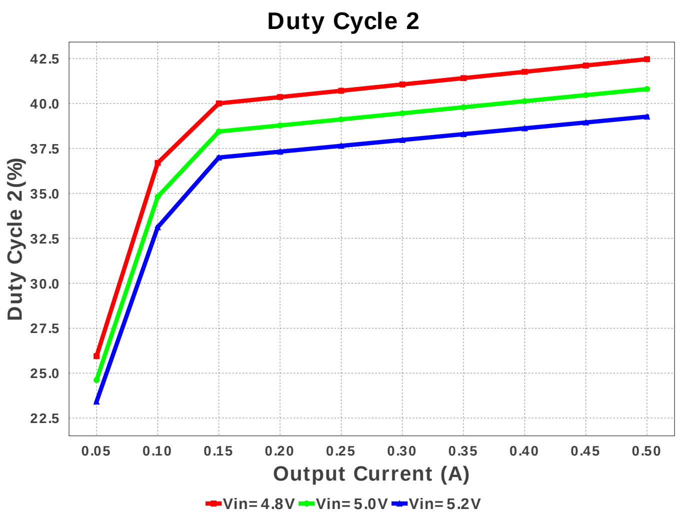
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

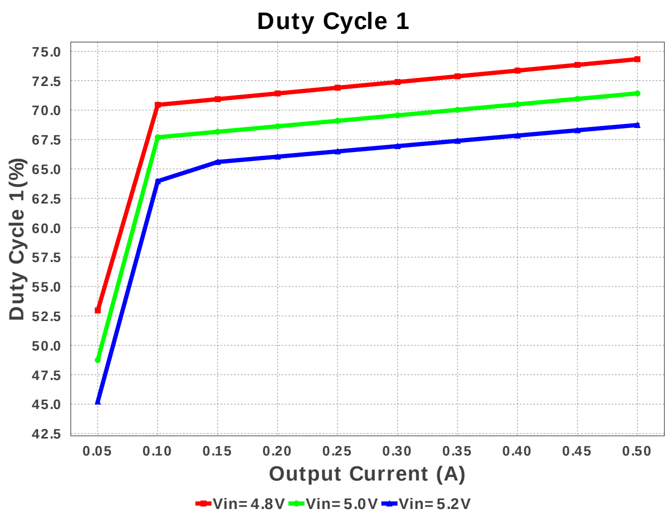
Electrical BOM

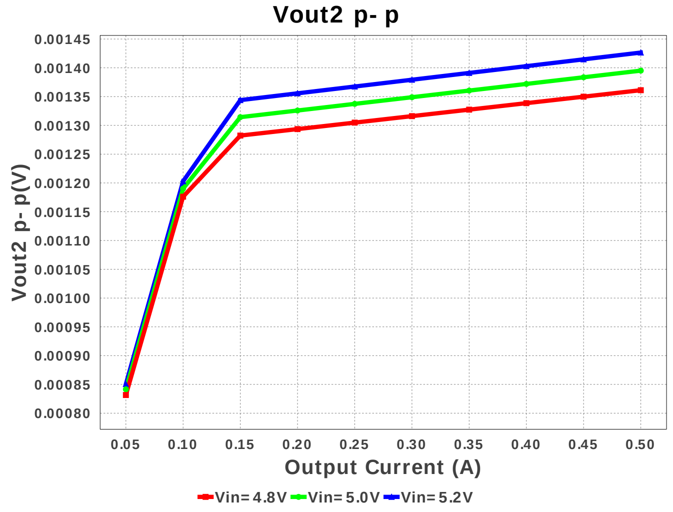
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot1	MuRata	GRM155R60J104KA01D Series= X5R	Cap= 100.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cboot2	MuRata	GRM155R60J104KA01D Series= X5R	Cap= 100.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Ccomp1	Samsung Electro-Mechanics	CL21C122JBFNNWE Series= C0G/NP0	Cap= 1.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Ccomp2	Kemet	C0805C100K5GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	Ccomp3	Yageo America	CC0805KRX7R9BB222 Series= X7R	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
6.	Ccomp4	Kemet	C0805C100K5GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
7.	Cin	MuRata	GRM31CR61A226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	1	$0.07	1206_190 11 mm²
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 mm²

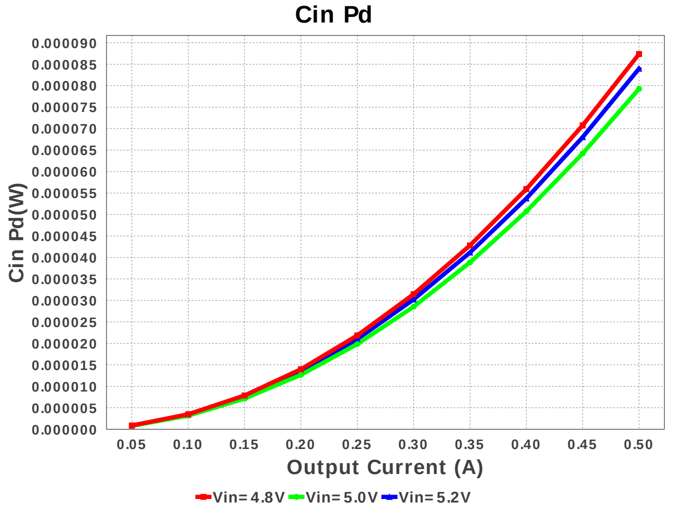
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cout_ch1	MuRata	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 uF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.29633 A	2	$0.04	0805 7 mm²
10.	Cout_ch2	MuRata	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 uF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.29633 A	1	$0.04	0805 7 mm²
11.	Cramp1	Yageo America	CC0805KRX7R9BB821 Series= X7R	Cap= 820.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
12.	Cramp2	Yageo America	CC0805KRX7R9BB821 Series= X7R	Cap= 820.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
13.	Cres	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
14.	Css1	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
15.	Css2	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
16.	Cvcc1	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
17.	Cvcc2	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
18.	D1	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm²
19.	D2	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm²
20.	L1	Coilcraft	ME3220-153KLB	L= 15.0 µH DCR= 468.0 mOhm	1	$0.23	ME3220 16 mm²
21.	L2	Coilcraft	XFL3012-333MEB	L= 33.0 µH DCR= 855.0 mOhm	1	$0.43	XFL3012 16 mm²
22.	M1	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.19	DNH0008A 18 mm²
23.	M2	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.19	DNH0008A 18 mm²
24.	M3	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.19	DNH0008A 18 mm²
25.	M4	Texas Instruments	CSD17579Q3A	VdsMax= 30.0 V IdsMax= 20.0 Amps	1	$0.19	DNH0008A 18 mm²
26.	Rcomp1	Vishay-Dale	CRCW040234K0FKED Series= CRCW..e3	Res= 34.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
27.	Rcomp2	Vishay-Dale	CRCW040219K6FKED Series= CRCW..e3	Res= 19.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
28.	Rfb1	Vishay-Dale	CRCW0402976RFKED Series= CRCW..e3	Res= 976.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
29.	Rfb2	Yageo America	RT0805BRD073K05L Series= ?	Res= 3.05 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.04	0805 7 mm²

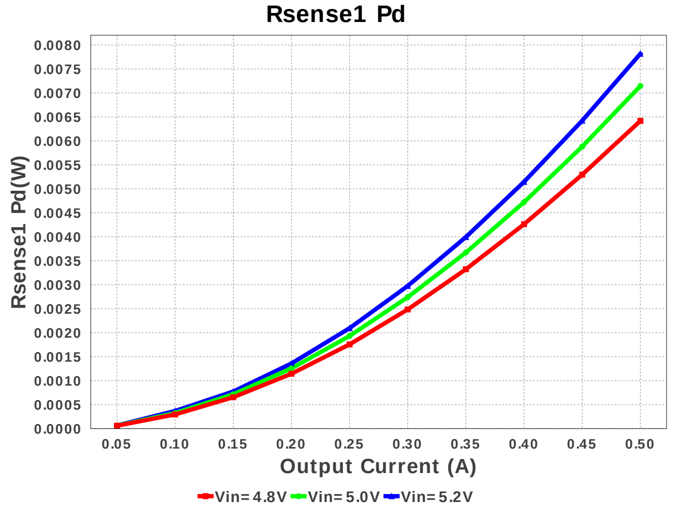
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
30.	Rfb3	Yageo America	RT0805BRD071K04L Series= RT0805	Res= 1.04 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.05	0805 7 mm²
31.	Rfb4	Vishay-Dale	CRCW04021K30FKED Series= CRCW..e3	Res= 1.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
32.	Rramp1	Vishay-Dale	CRCW040212K1FKED Series= CRCW..e3	Res= 12.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
33.	Rramp2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
34.	Rsense1	Panasonic	ERJ-3RSFR10V Series= ERJ-3R	Res= 100.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.03	0603 5 mm²
35.	Rsense2	Panasonic	ERJ-3RQFR27V Series= ERJ-3R	Res= 270.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.02	0603 5 mm²
36.	Rt	Vishay-Dale	CRCW040211K8FKED Series= CRCW..e3	Res= 11.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
37.	Ruv1	Vishay-Dale	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
38.	Ruv2	Vishay-Dale	CRCW040226K1FKED Series= CRCW..e3	Res= 26.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
39.	U1	Texas Instruments	LM25119PSQ/NOPB	Switcher	1	$2.60	SQA32A 49 mm²

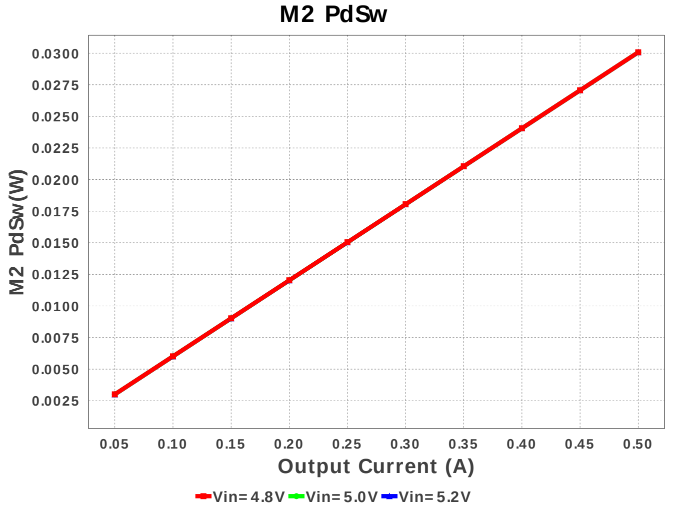


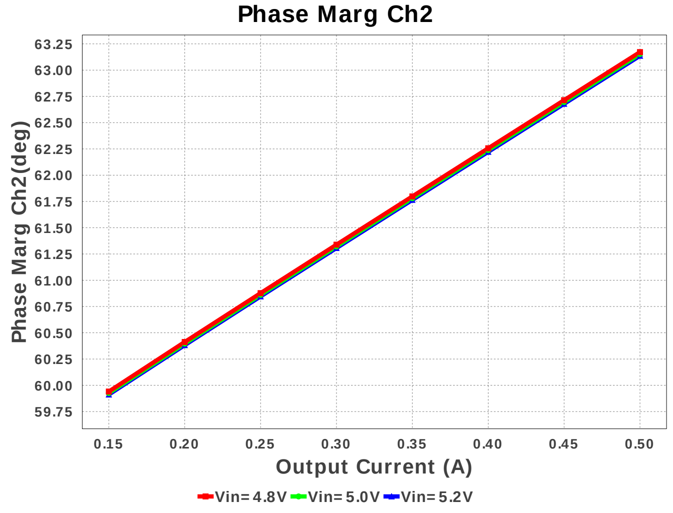


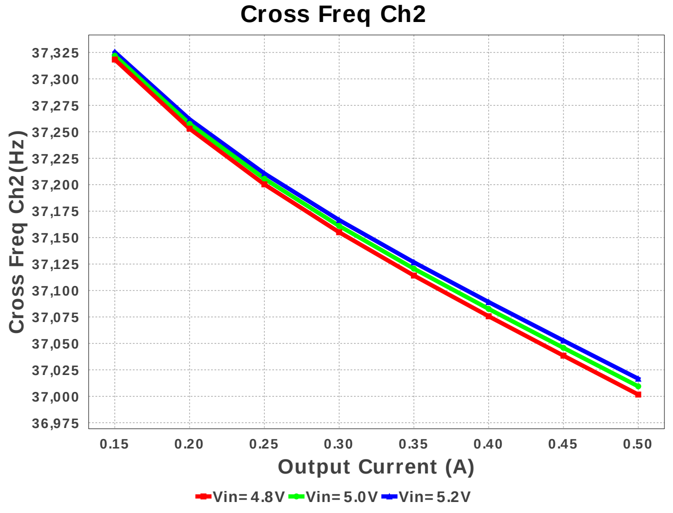

Vout2 p- p
Vout2 p- p(V)
0.00145
0.00140
0.00135
0.00130
0.00125
0.00120
0.00115
0.00110
0.00105
0.00100
0.00095
0.00090
0.00085
0.00080
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

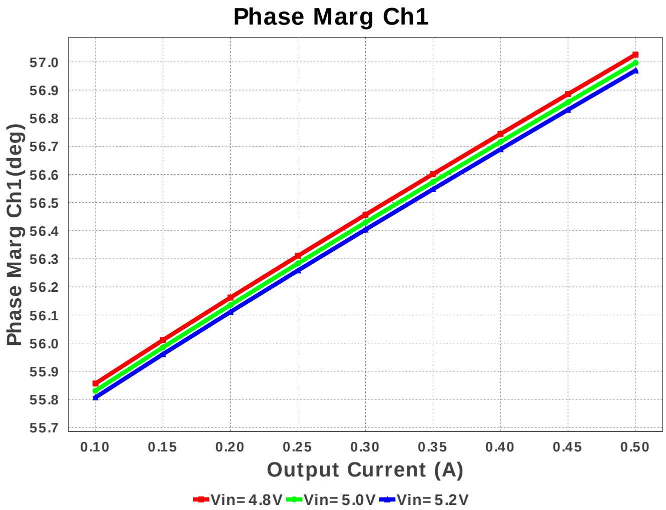

Cin Pd
Cin Pd(W)
0.000090
0.000085
0.000080
0.000075
0.000070
0.000065
0.000060
0.000055
0.000050
0.000045
0.000040
0.000035
0.000030
0.000025
0.000020
0.000015
0.000010
0.000005
0.000000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

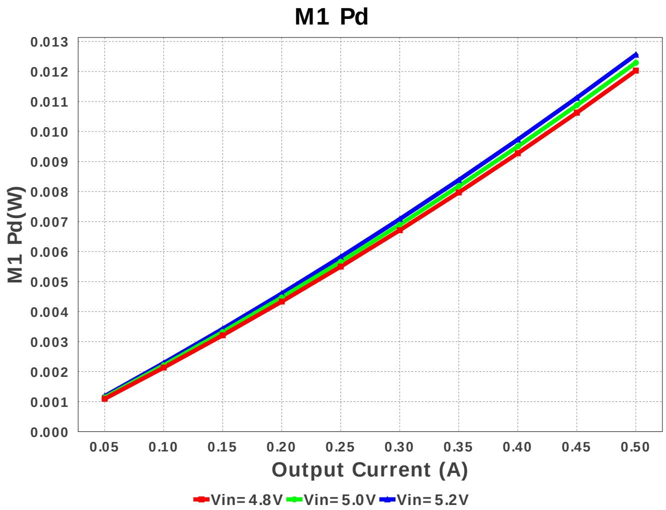

Rsense1 Pd
Rsense1 Pd(W)
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

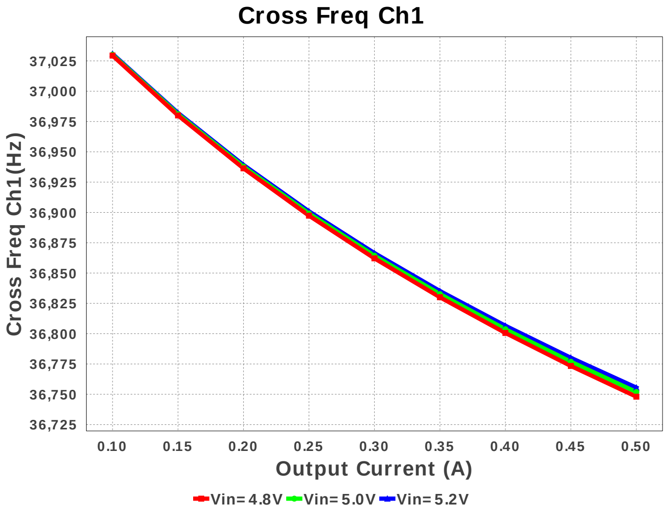

M2 PdSw
M2 PdSw(W)
0.0300
0.0275
0.0250
0.0225
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

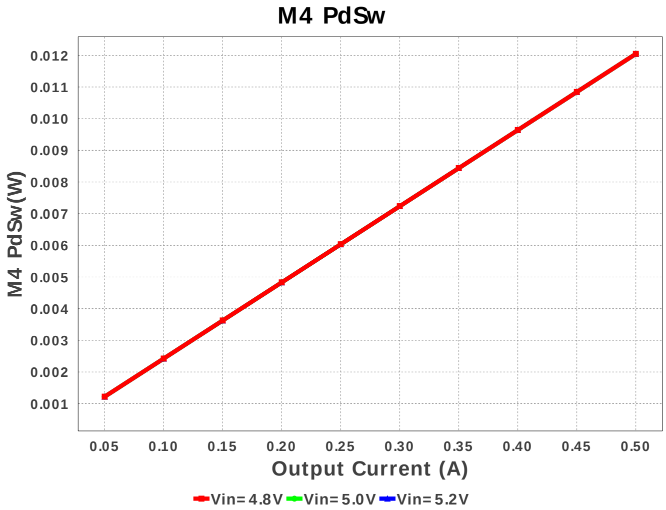

Phase Marg Ch2
Phase Marg Ch2(deg)
63.25
63.00
62.75
62.50
62.25
62.00
61.75
61.50
61.25
61.00
60.75
60.50
60.25
60.00
59.75
0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

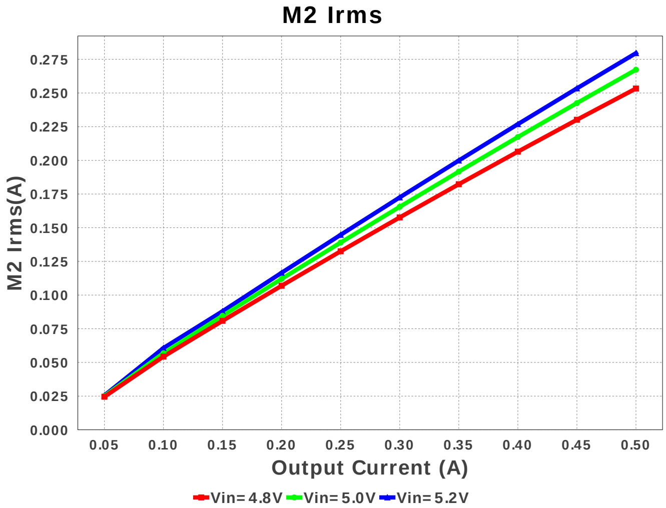

Cross Freq Ch2
Cross Freq Ch2(Hz)
37,325
37,300
37,275
37,250
37,225
37,200
37,175
37,150
37,125
37,100
37,075
37,050
37,025
37,000
36,975
0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

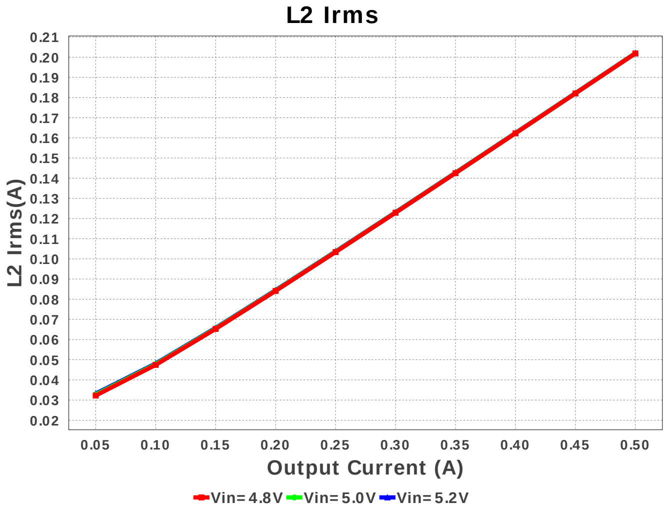

Phase Marg Ch1
Phase Marg Ch1(deg)
57.0 56.9 56.8 56.7 56.6 56.5 56.4 56.3 56.2 56.1 56.0 55.9 55.8 55.7
0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

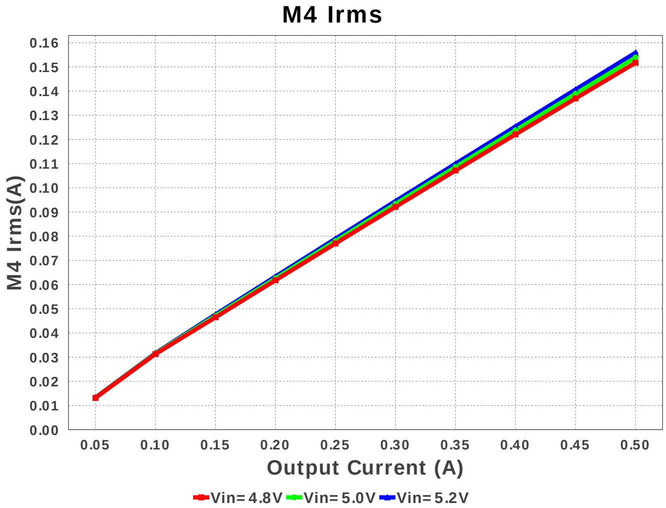

M1 Pd
M1 Pd(W)
0.013 0.012 0.011 0.010 0.009 0.008 0.007 0.006 0.005 0.004 0.003 0.002 0.001 0.000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

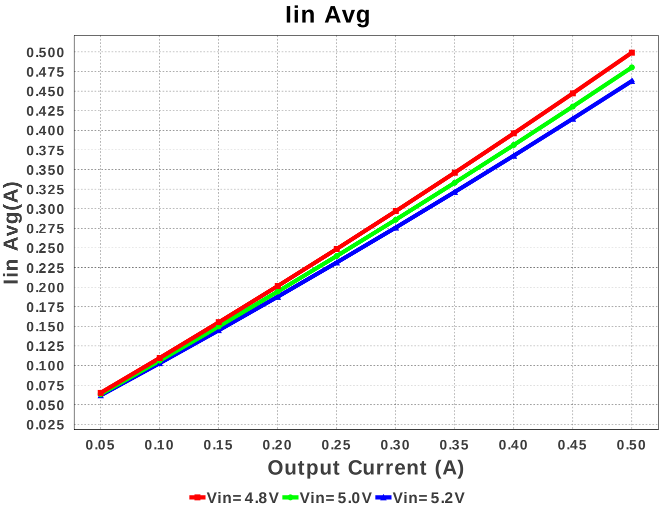

Cross Freq Ch1
Cross Freq Ch1(Hz)
37,025 37,000 36,975 36,950 36,925 36,900 36,875 36,850 36,825 36,800 36,775 36,750 36,725
0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

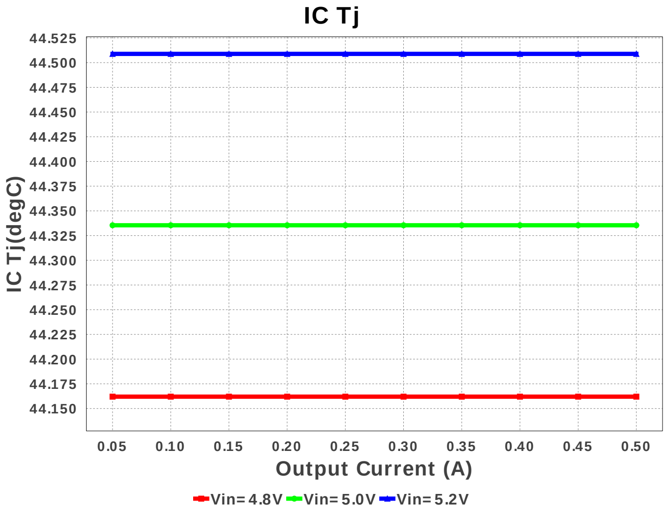

M4 PdSw
M4 PdSw(W)
0.012 0.011 0.010 0.009 0.008 0.007 0.006 0.005 0.004 0.003 0.002 0.001
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

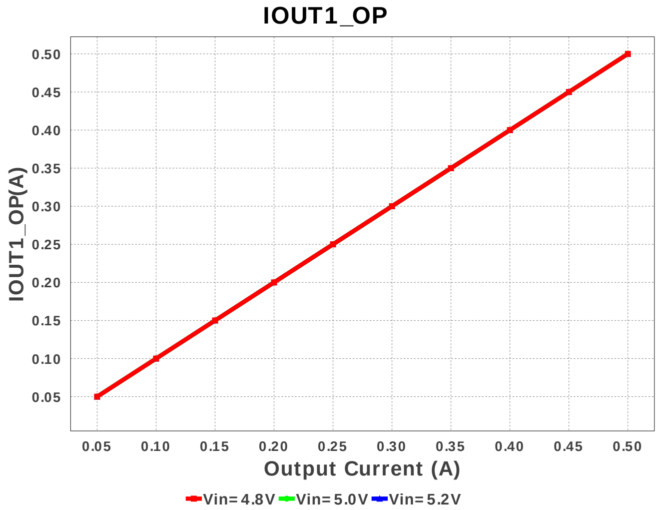

M2 Irms
M2 Irms(A)
0.275 0.250 0.225 0.200 0.175 0.150 0.125 0.100 0.075 0.050 0.025 0.000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

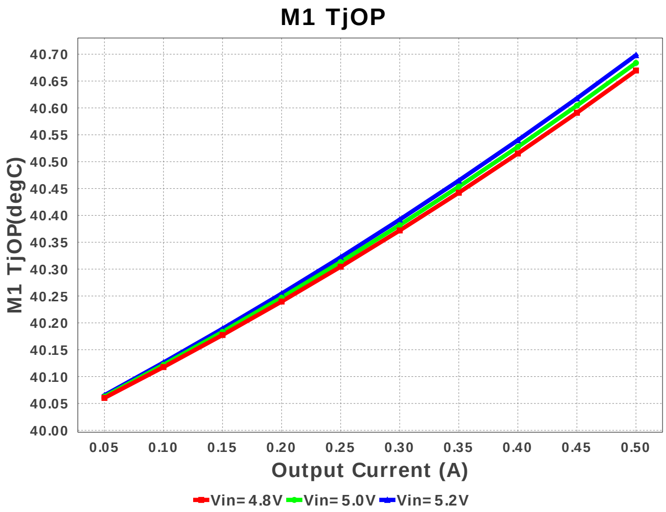

L2 Irms
L2 Irms(A)
0.21 0.20 0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.10 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

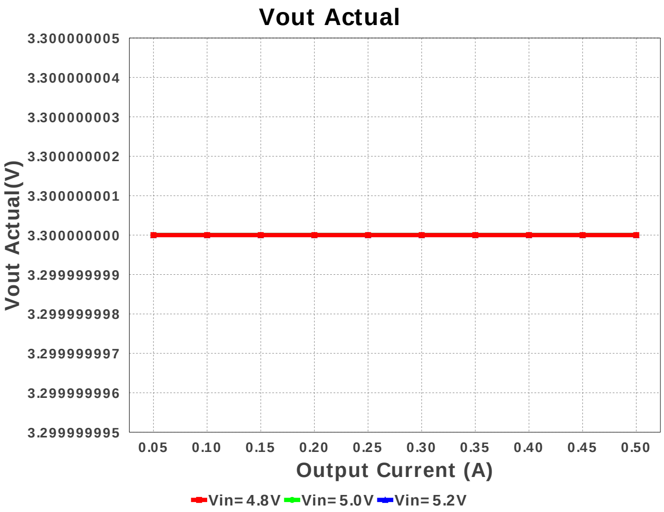

M4 Irms
M4 Irms(A)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

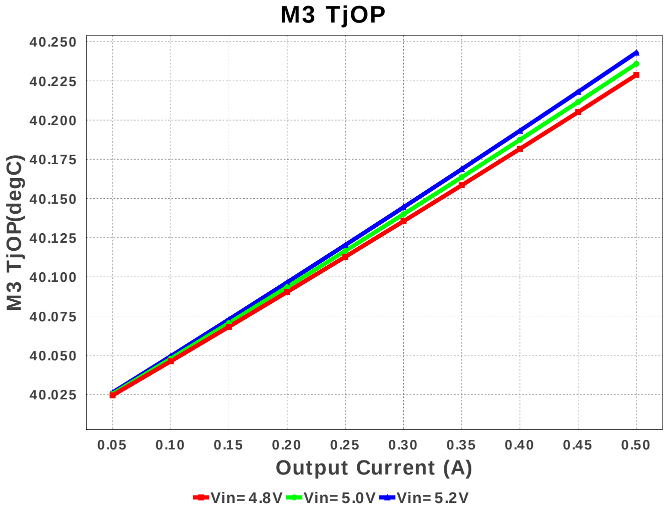

Iin Avg
Iin Avg(A)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

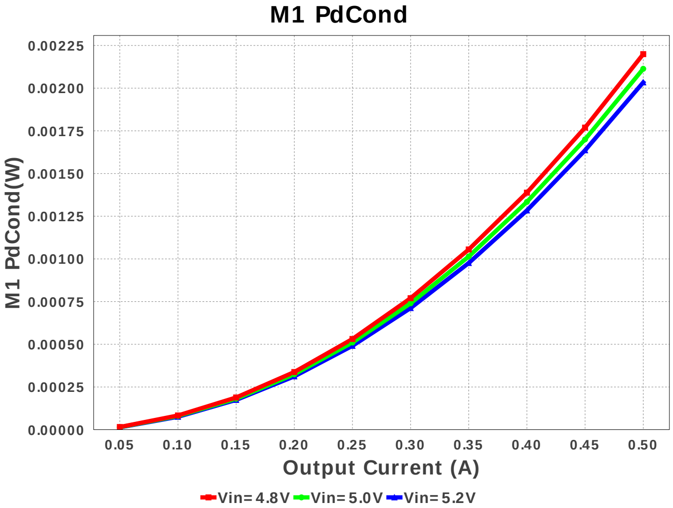

IC Tj
IC Tj(degC)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

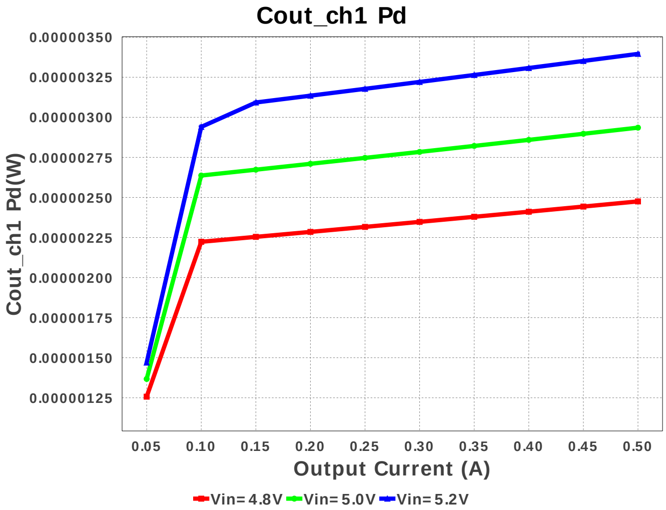

IOUT1_OP
IOUT1_OP(A)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

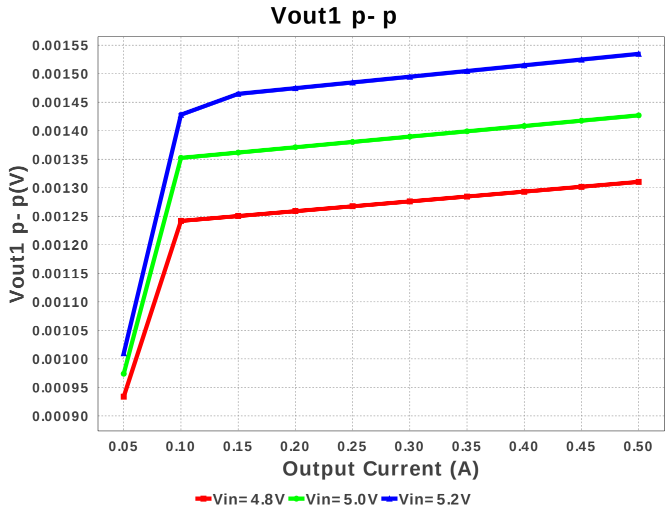

M1 TjOP
M1 TjOP(degC)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

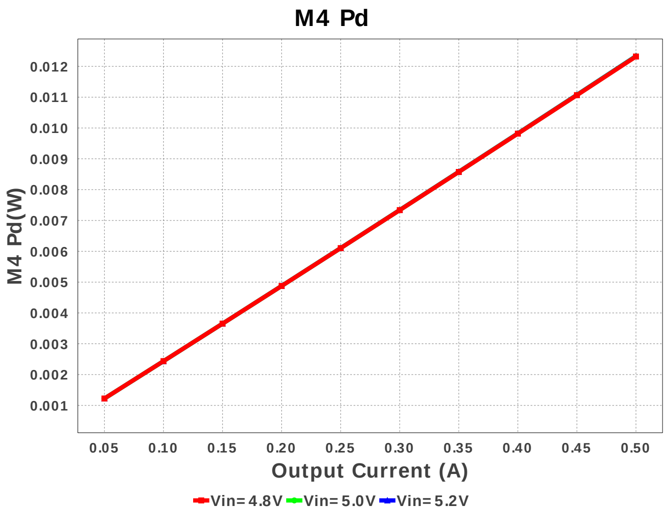

Vout Actual
Vout Actual(V)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

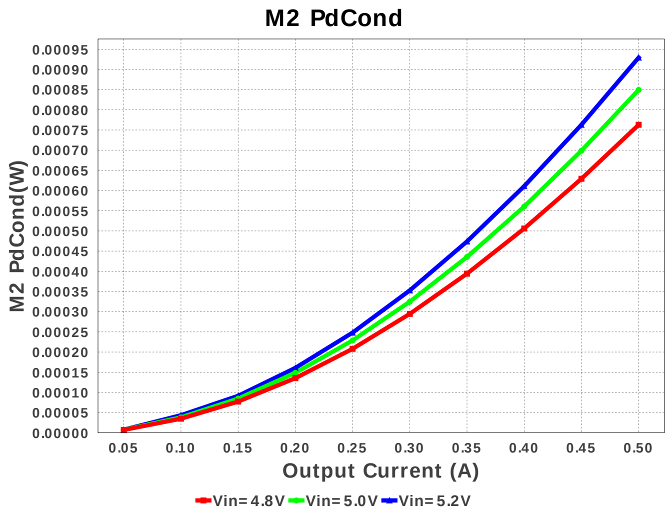

M3 TjOP
M3 TjOP(degC)
40.250
40.225
40.200
40.175
40.150
40.125
40.100
40.075
40.050
40.025
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

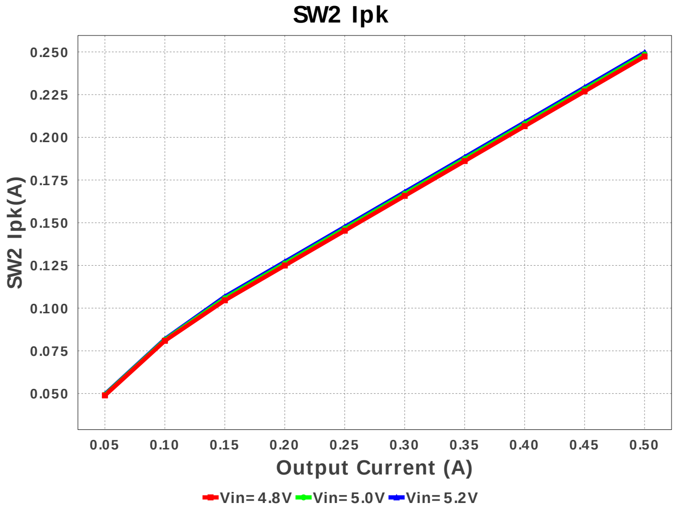

M1 PdCond
M1 PdCond(W)
0.00225
0.00200
0.00175
0.00150
0.00125
0.00100
0.00075
0.00050
0.00025
0.00000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

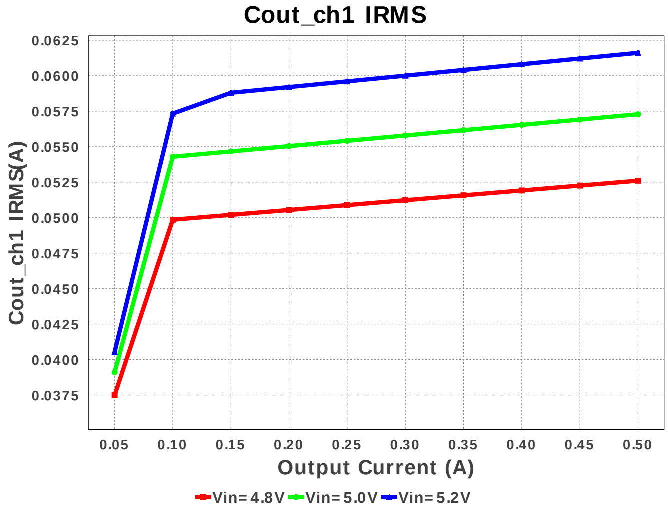

Cout_ch1 Pd
Cout_ch1 Pd(W)
0.00000350
0.00000325
0.00000300
0.00000275
0.00000250
0.00000225
0.00000200
0.00000175
0.00000150
0.00000125
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

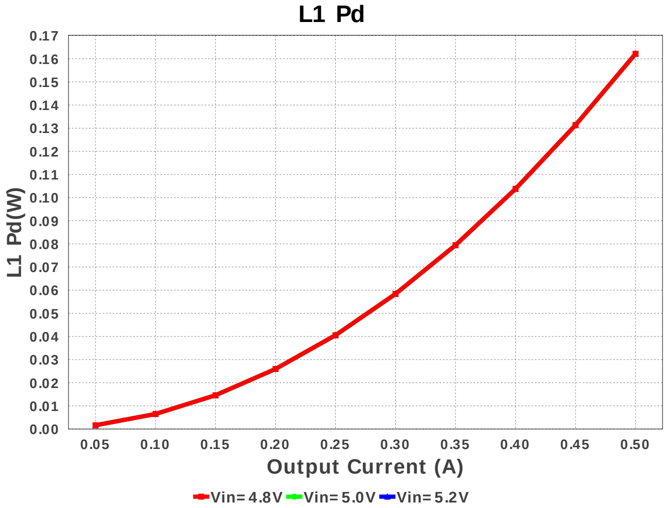

Vout1 p- p
Vout1 p- p(V)
0.00155
0.00150
0.00145
0.00140
0.00135
0.00130
0.00125
0.00120
0.00115
0.00110
0.00105
0.00100
0.00095
0.00090
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

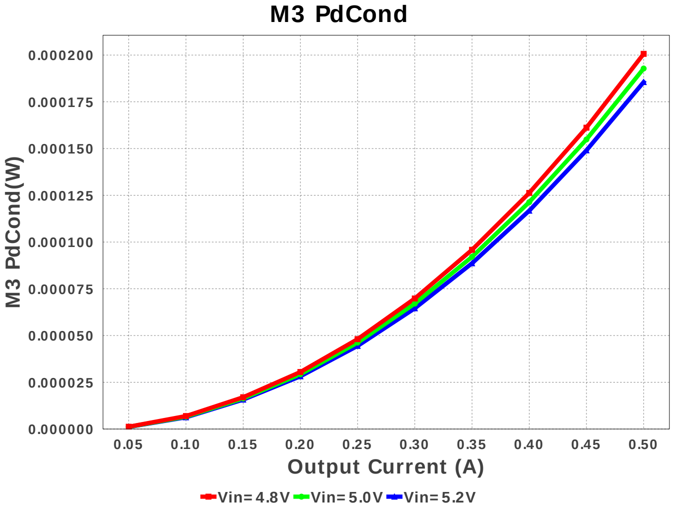

M4 Pd
M4 Pd(W)
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

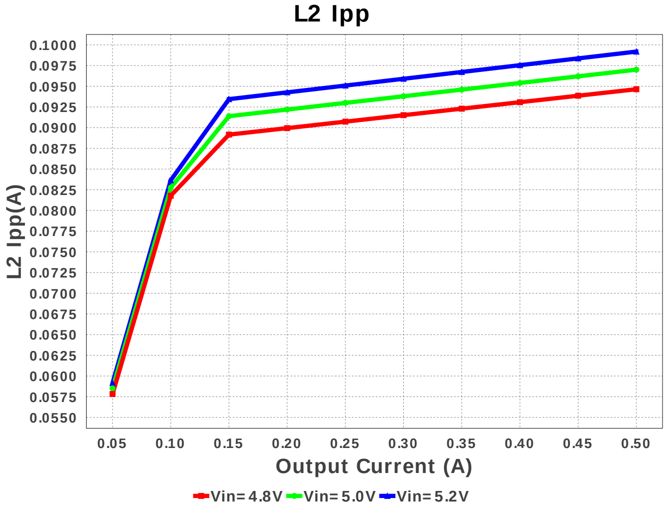

M2 PdCond
M2 PdCond(W)
0.00095
0.00090
0.00085
0.00080
0.00075
0.00070
0.00065
0.00060
0.00055
0.00050
0.00045
0.00040
0.00035
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

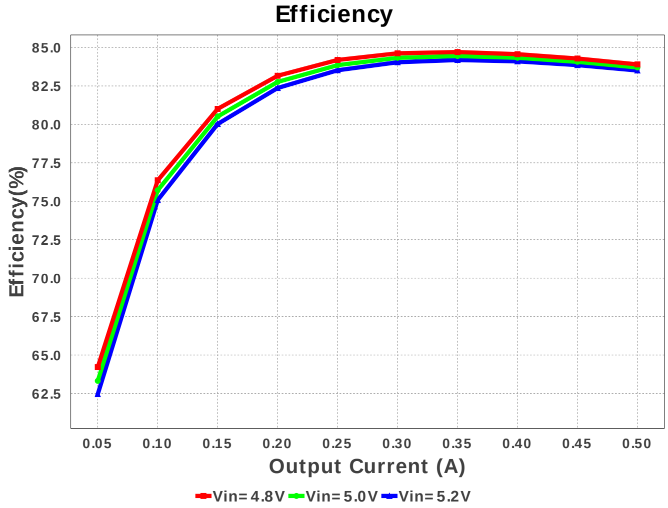

SW2 Ipk
SW2 Ipk(A)
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

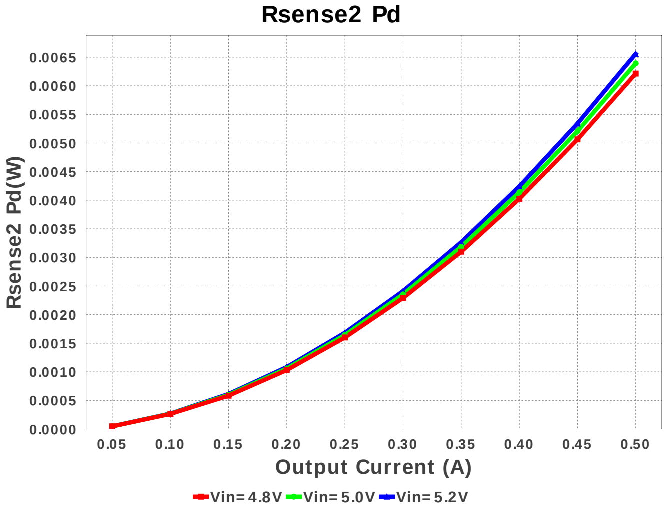

Cout_ch1 IRMS
Cout_ch1 IRMS(A)
0.0625
0.0600
0.0575
0.0550
0.0525
0.0500
0.0475
0.0450
0.0425
0.0400
0.0375
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

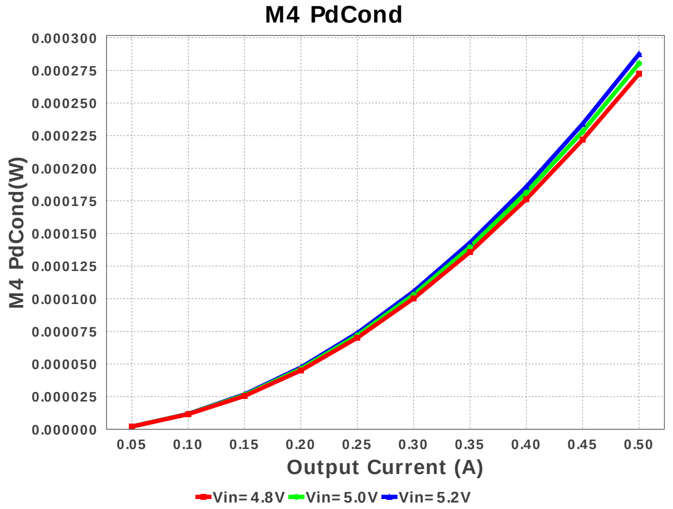

L1 Pd
L1 Pd(W)
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

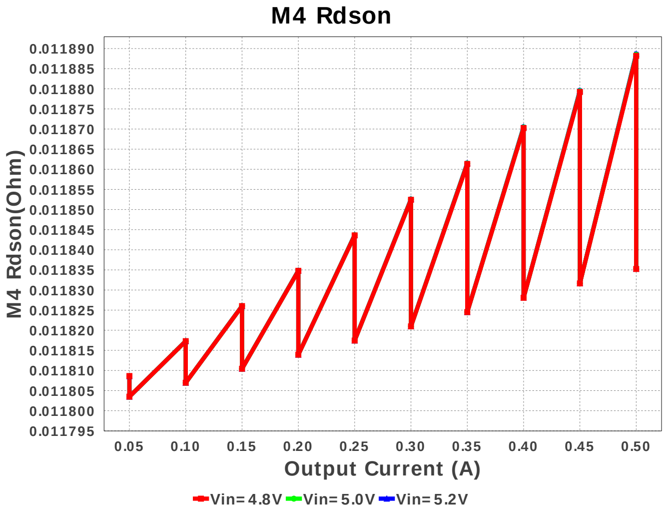

M3 PdCond
M3 PdCond(W)
0.000200
0.000175
0.000150
0.000125
0.000100
0.000075
0.000050
0.000025
0.000000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

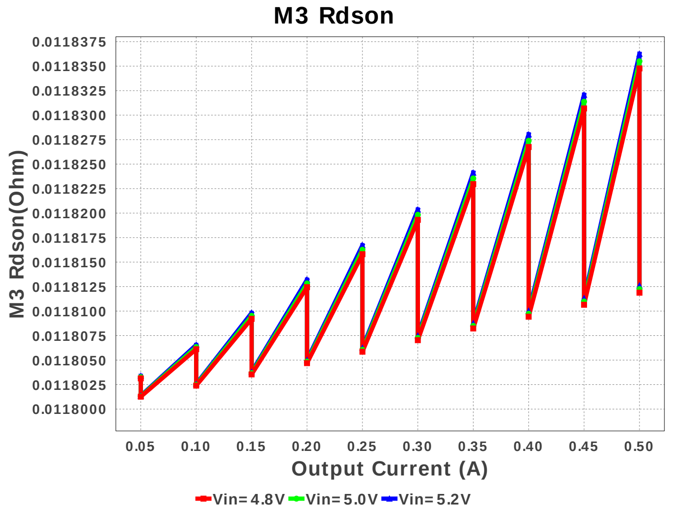

L2 Ipp
L2 Ipp(A)
0.1000
0.0975
0.0950
0.0925
0.0900
0.0875
0.0850
0.0825
0.0800
0.0775
0.0750
0.0725
0.0700
0.0675
0.0650
0.0625
0.0600
0.0575
0.0550
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

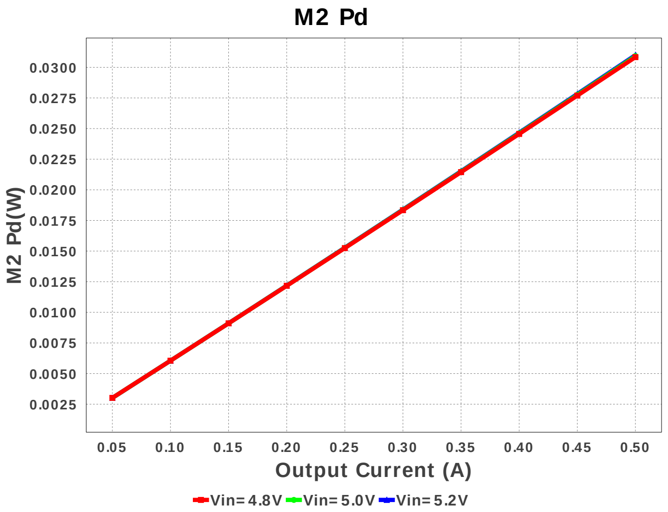

Efficiency
Efficiency(%)
85.0
82.5
80.0
77.5
75.0
72.5
70.0
67.5
65.0
62.5
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

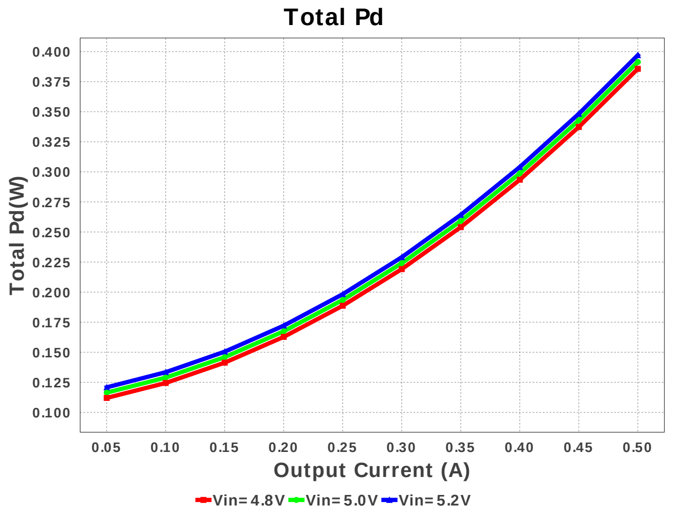

Rsense2 Pd
Rsense2 Pd(W)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

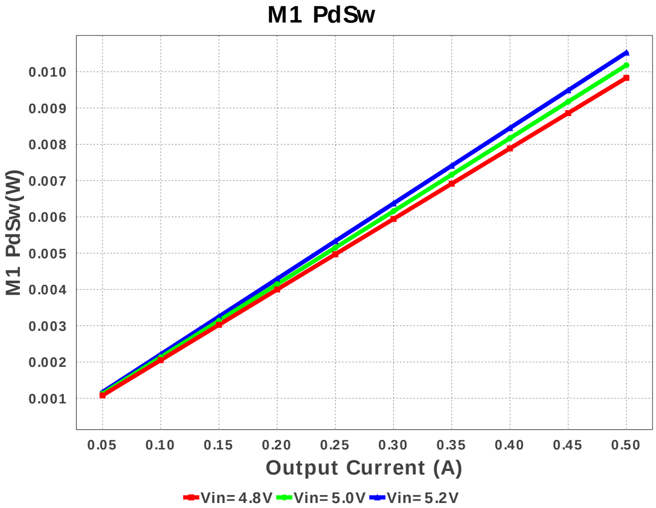

M4 PdCond
M4 PdCond(W)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

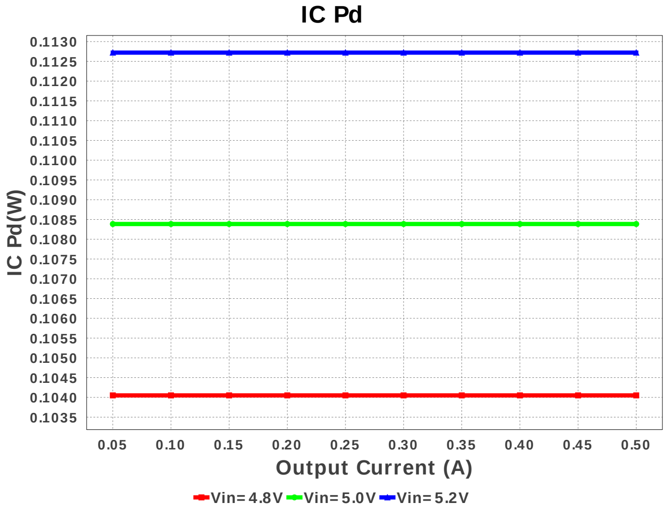

M4 Rdson
M4 Rdson(Ohm)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

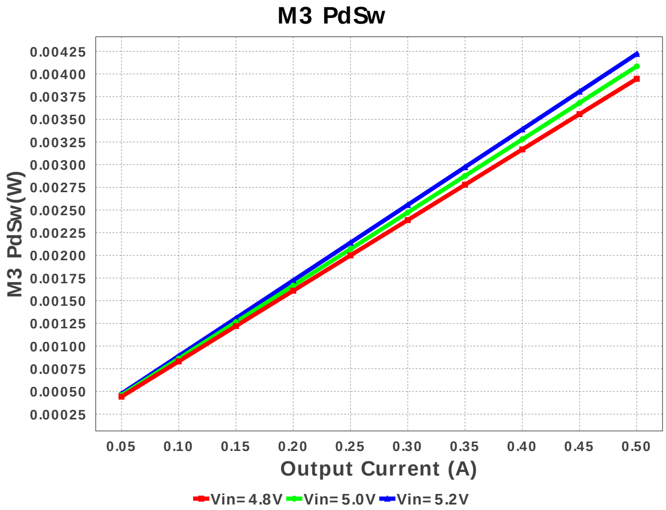

M3 Rdson
M3 Rdson(Ohm)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

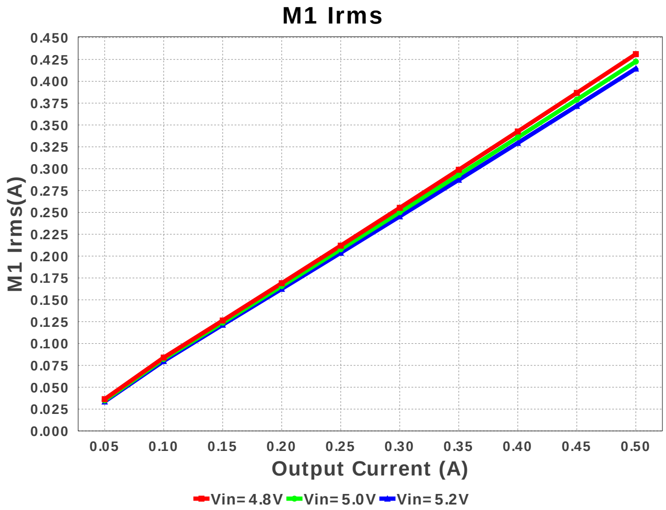

M2 Pd
M2 Pd(W)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

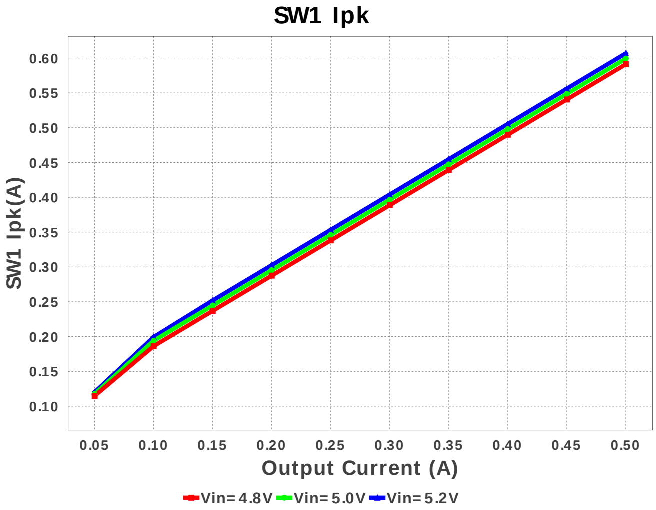

Total Pd
Total Pd(W)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

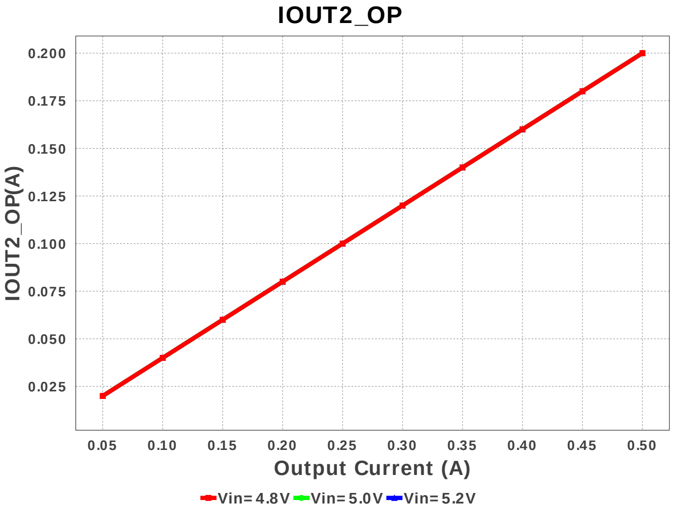

M1 PdSw
M1 PdSw(W)
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

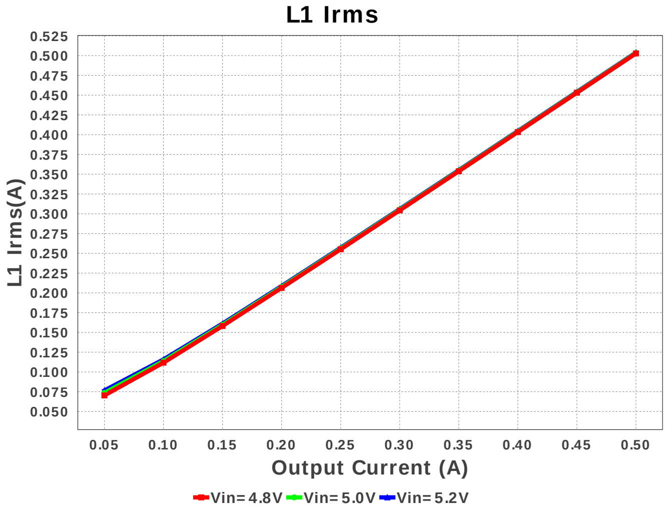

IC Pd
IC Pd(W)
0.1130
0.1125
0.1120
0.1115
0.1110
0.1105
0.1100
0.1095
0.1090
0.1085
0.1080
0.1075
0.1070
0.1065
0.1060
0.1055
0.1050
0.1045
0.1040
0.1035
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

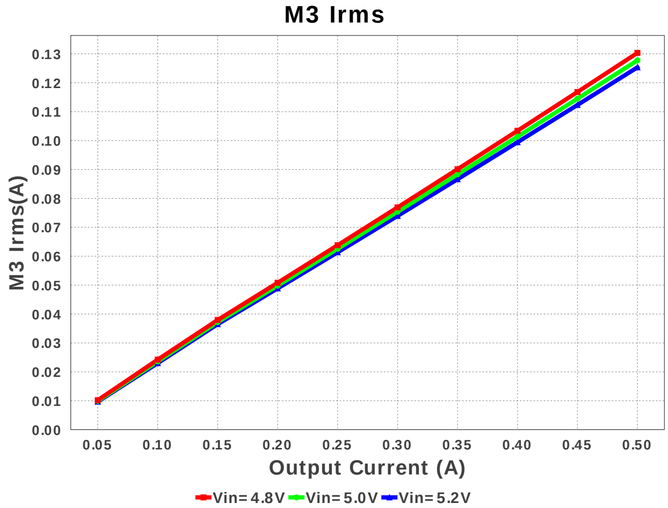

M3 PdSw
M3 PdSw(W)
0.00425
0.00400
0.00375
0.00350
0.00325
0.00300
0.00275
0.00250
0.00225
0.00200
0.00175
0.00150
0.00125
0.00100
0.00075
0.00050
0.00025
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

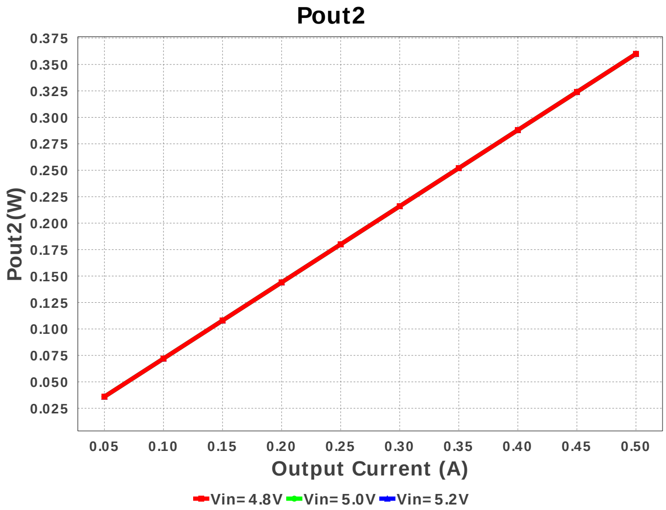

M1 Irms
M1 Irms(A)
0.450
0.425
0.400
0.375
0.350
0.325
0.300
0.275
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

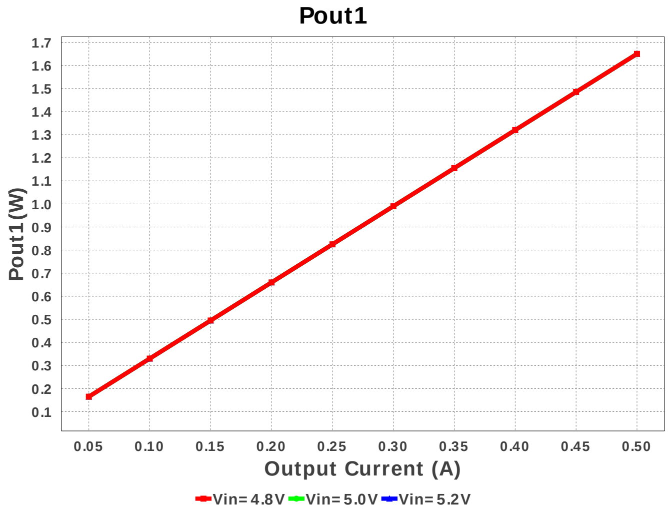

SW1 Ipk
SW1 Ipk(A)
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

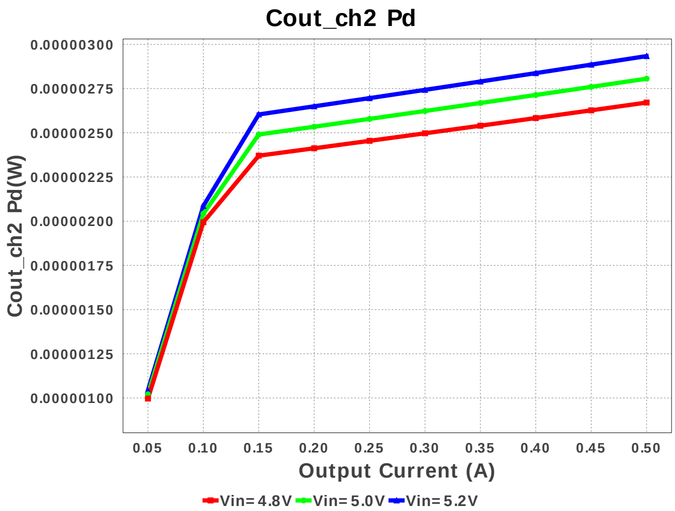

IOUT2_OP
IOUT2_OP(A)
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

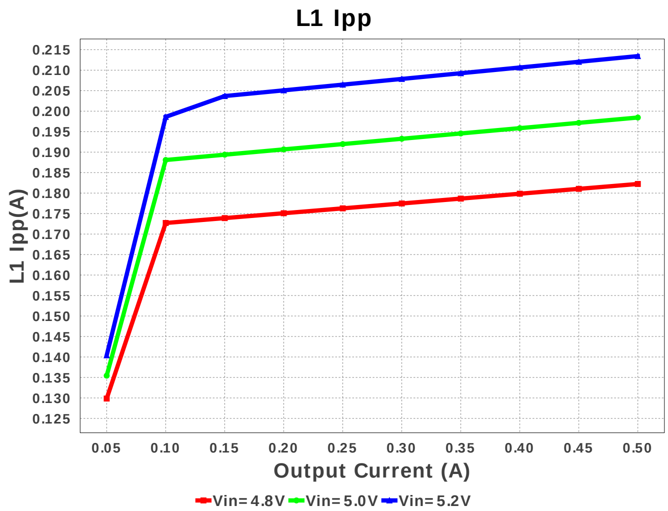

L1 Irms
L1 Irms(A)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

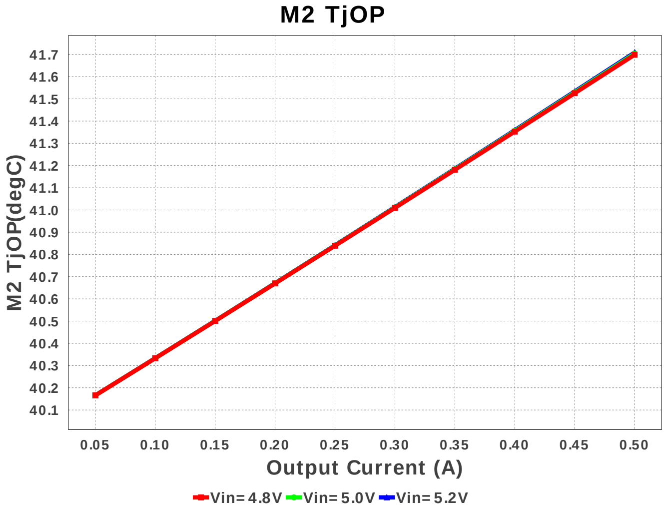

M3 Irms
M3 Irms(A)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

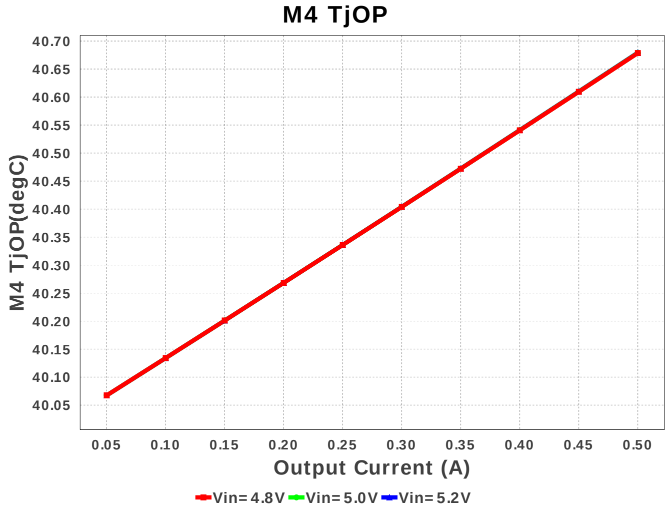

Pout2
Pout2(W)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

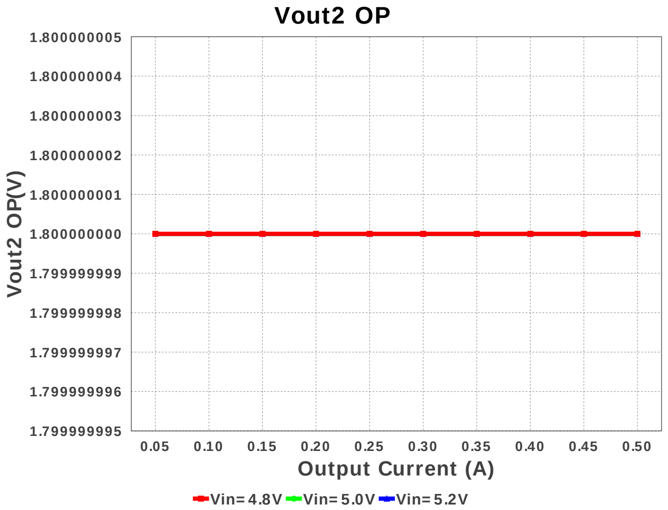

Pout1
Pout1(W)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

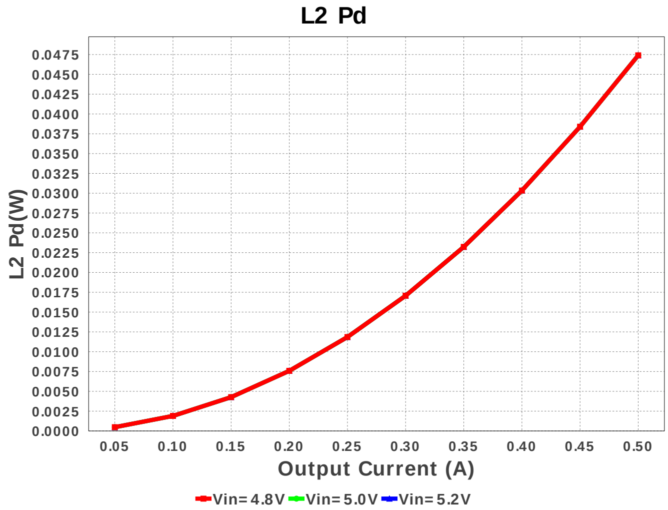

Cout_ch2 Pd
Cout_ch2 Pd(W)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

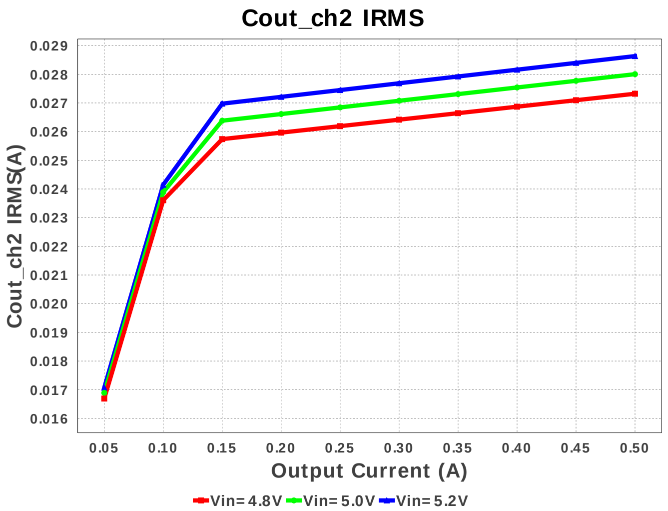

L1 Ipp
L1 Ipp(A)
Output Current (A)
Vin= 4.8V Vin= 5.0V Vin= 5.2V

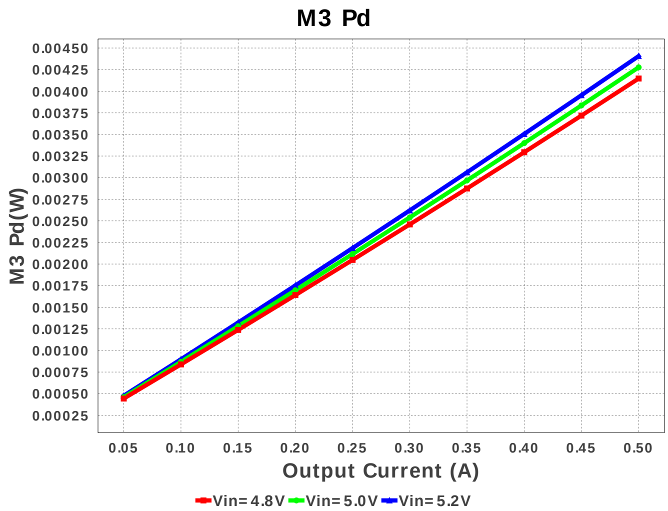

M2 TjOP
M2 TjOP(degC)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V

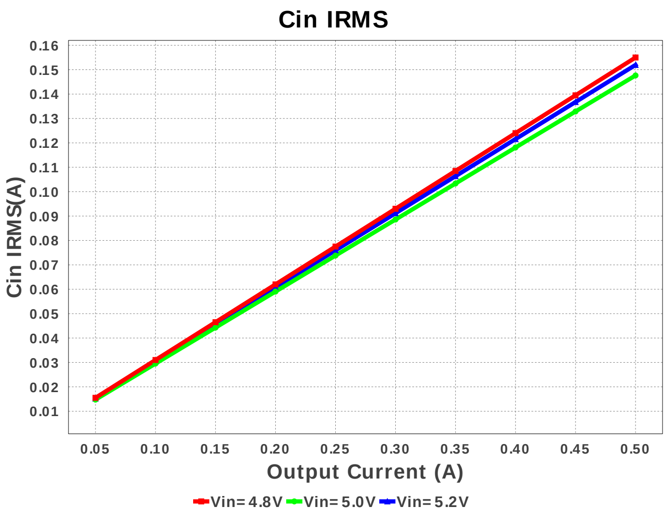

M4 TjOP
M4 TjOP(degC)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V


Vout2 OP
Vout2 OP(V)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V


L2 Pd
L2 Pd(W)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V


Cout_ch2 IRMS
Cout_ch2 IRMS(A)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V


M3 Pd
M3 Pd(W)
Output Current (A)
Vin=4.8V Vin=5.0V Vin=5.2V



Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	151.947 mA	Current	Input capacitor RMS ripple current
2.	Cout_ch1 IRMS	61.614 mA	Current	Output Channel 1 Capacitor RMS ripple current
3.	Cout_ch2 IRMS	28.634 mA	Current	Output Channel 2 Capacitor RMS ripple current
4.	Iin Avg	462.89 mA	Current	Average input current
5.	L1 Ipp	213.436 mA	Current	Peak-to-peak inductor ripple current
6.	L1 Irms	503.782 mA	Current	Inductor ripple current
7.	L2Ipp	99.19 mA	Current	Channel 2 Inductor Peak to peak Current
8.	L2 Irms	202.039 mA	Current	Inductor ripple current
9.	M1 Irms	414.527 mA	Current	MOSFET RMS ripple current
10.	M2 Irms	279.584 mA	Current	MOSFET RMS ripple current
11.	M3 Irms	125.332 mA	Current	MOSFET RMS ripple current
12.	M4 Irms	155.858 mA	Current	MOSFET RMS ripple current
13.	SW1 Ipk	606.718 mA	Current	Peak switch current
14.	SW2 Ipk	249.595 mA	Current	Peak switch current
15.	BOM Count	40	General	Total Design BOM count
16.	FootPrint	322.0 mm^2	General	Total Foot Print Area of BOM components
17.	Frequency	407.907 kHz	General	Switching frequency
18.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
19.	Pout1	1.65 W	General	Channel 1 output Power
20.	Pout2	360.0 mW	General	Channel 2 output Power
21.	Total BOM	$4.76	General	Total BOM Cost
22.	Ch1 Mode	CCM	General	Conduction Mode
23.	Ch2 Mode	CCM	General	Conduction Mode
24.	M3 TjOP	40.243 degC	Op_Point	M3 MOSFET junction temperature
25.	M4 TjOP	40.679 degC	Op_Point	M4 MOSFET junction temperature
26.	Vout Actual	3.3 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
27.	Duty Cycle 1	68.733 %	Op_point	Duty cycle for Channel 1
28.	Duty Cycle 2	39.27 %	Op_point	Duty cycle for Channel 2
29.	Efficiency	83.505 %	Op_point	Steady state efficiency
30.	IC Tj	44.509 degC	Op_point	IC junction temperature
31.	IOUT1_OP	500.0 mA	Op_point	Iout1 operating point
32.	IOUT2_OP	200.0 mA	Op_point	Iout2 operating point
33.	M1 TjOP	40.698 degC	Op_point	M1 MOSFET junction temperature
34.	M2 TjOP	41.708 degC	Op_point	M2 MOSFET junction temperature
35.	VIN_OP	5.2 V	Op_point	Vin operating point
36.	Vout1 OP	3.3 V	Op_point	Operational Voltage 1
37.	Vout1 p-p	1.535 mV	Op_point	Peak-to-peak output1 ripple voltage
38.	Vout2 OP	1.8 V	Op_point	Operational Voltage 2
39.	Vout2 p-p	1.426 mV	Op_point	Peak-to-peak output2 ripple voltage
40.	Cin Pd	83.971 µW	Power	Input capacitor power dissipation
41.	Cout_ch1 Pd	3.396 µW	Power	Ouput channel 1 capacitor power dissipation
42.	Cout_ch2 Pd	2.934 µW	Power	Ouput channel 2 capacitor power dissipation
43.	IC Pd	112.721 mW	Power	IC power dissipation
44.	L1 Pd	162.158 mW	Power	Inductor power dissipation
45.	L2 Pd	47.4 mW	Power	Inductor power dissipation
46.	M1 Pd	12.561 mW	Power	M1 MOSFET total power dissipation
47.	M1 PdCond	2.034 mW	Power	M1 MOSFET conduction losses
48.	M1 PdSw	10.527 mW	Power	M1 MOSFET switching losses
49.	M2 Pd	30.994 mW	Power	M2 MOSFET total power dissipation
50.	M2 PdCond	929.305 µW	Power	M2 MOSFET conduction losses
51.	M2 PdSw	30.065 mW	Power	M2 MOSFET switching losses
52.	M3 Pd	4.407 mW	Power	M3 MOSFET total power dissipation

#	Name	Value	Category	Description
53.	M3 PdCond	185.555 µW	Power	M3 MOSFET conduction losses
54.	M3 PdSw	4.221 mW	Power	M3 MOSFET switching losses
55.	M1 Rdson	11.836 mOhm	Power	Drain-Source On-resistance
56.	M3 Rdson	11.813 mOhm	Power	Drain-Source On-resistance
57.	M4 Pd	12.333 mW	Power	M4 MOSFET total power dissipation
58.	M4 PdCond	287.5 µW	Power	M4 MOSFET conduction losses
59.	M4 PdSw	12.045 mW	Power	M4 MOSFET switching losses
60.	M2 Rdson	11.889 mOhm	Power	Drain-Source On-resistance
61.	M4 Rdson	11.835 mOhm	Power	Drain-Source On-resistance
62.	Rsense1 Pd	7.817 mW	Power	Current Limit Sense Resistor Power Dissipation
63.	Rsense2 Pd	6.559 mW	Power	Current Limit Sense Resistor Power Dissipation
64.	Total Pd	397.04 mW	Power	Total Power Dissipation
65.	Cross Freq Ch1	36.757 kHz		Bode plot crossover frequency
66.	Cross Freq Ch2	37.023 kHz		Bode plot crossover frequency
67.	Phase Marg Ch1	56.962 deg		Bode Plot Phase Margin
68.	Phase Marg Ch2	63.12 deg		Bode Plot Phase Margin
69.	Vout Tolerance	2.354 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	Iout1	500.0 m	Output Current #1
3.	Iout2	200.0 m	Output Current #2
4.	VinMax	5.2	Maximum input voltage
5.	VinMin	4.8	Minimum input voltage
6.	Vout	3.3	Output Voltage
7.	Vout1	3.3	Output Voltage #1
8.	Vout2	1.8	Output Voltage #2
9.	base_pn	LM25119	Base Product Number
10.	source	DC	Input Source Type
11.	Ta	40.0	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.