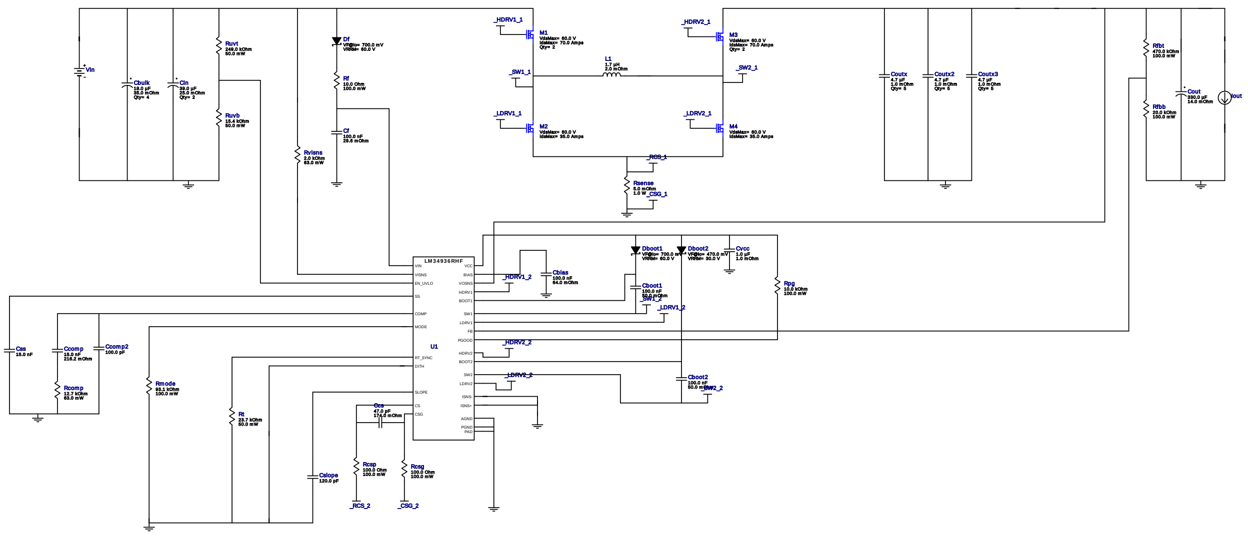
TEXAS INSTRUMENTS

WEBENCH ® Design Report

VinMin = 22.0V
VinMax = 30.0V
Vout = 19.5V
Iout = 14.0A

Device = LM34936RHFR
Topology = Buck_Boost
Created = 2024-05-21 14:06:57.405
BOM Cost = $14.63
BOM Count = 56
Total Pd = 5.37W

Design : 20 LM34936RHFR
LM34936RHFR 22V-30V to 19.50V @ 14A



Design Alerts

Component Selection Information

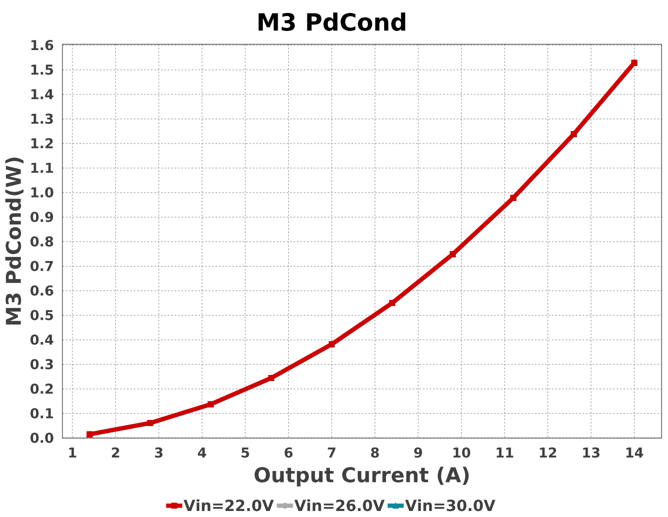
Please note that since parallel FETs have been chosen in this design, schematic and PCB export features will not work

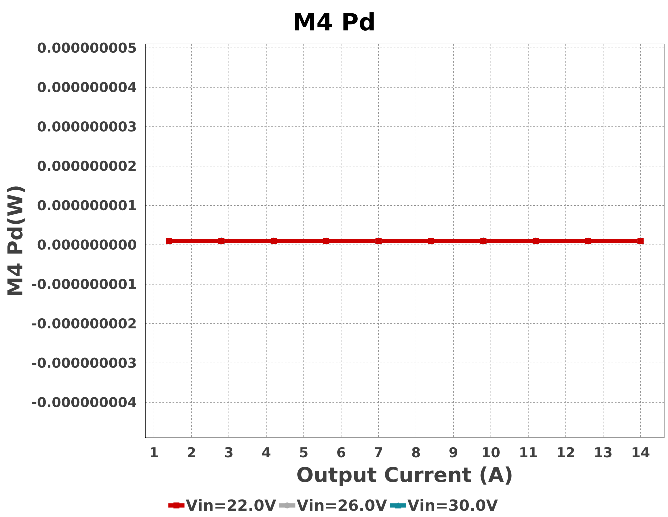
Electrical BOM

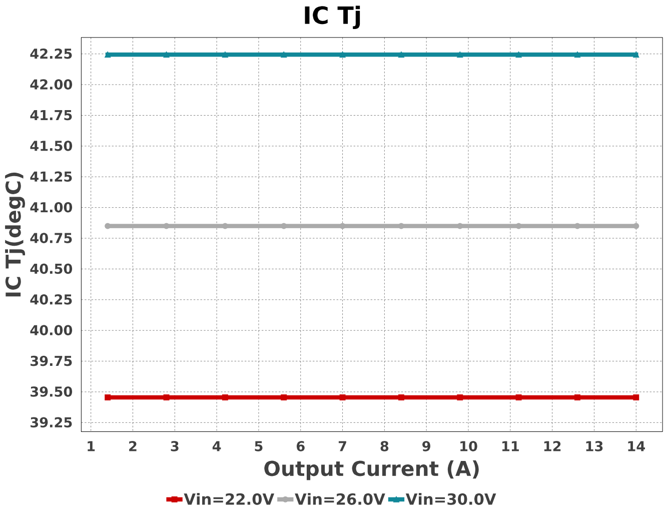
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cbias	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm^2
Cboot1	AVX	06033C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 50.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
Cboot2	AVX	06033C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 50.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
Cbulk	Panasonic	50SVPF18M Series= SVPF	Cap= 18.0 uF ESR= 35.0 mOhm VDC= 50.0 V IRMS= 2.7 A	4	$0.70	CAPSMT_62_E7 106 mm^2
Ccomp	TDK	CGA2B3X7R1H153K050BB Series= X7R	Cap= 15.0 nF ESR= 216.2 mOhm VDC= 50.0 V IRMS= 379.39 mA	1	$0.01	0402 3 mm^2
Ccomp2	Samsung Electro-Mechanics	CL21C101JBANNNC Series= C0G/NP0	Cap= 100.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
Ccs	AVX	06035A470JAT2A Series= C0G/NP0	Cap= 47.0 pF ESR= 174.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2

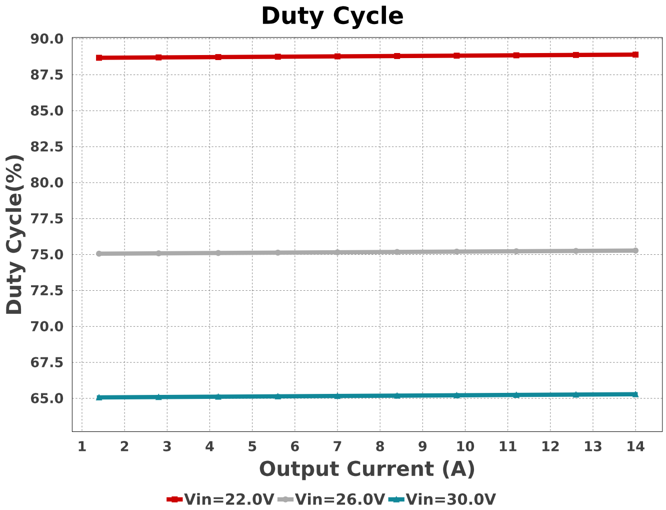
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cf	TDK	CGA3E2X7R1H104K080AA Series= X7R	Cap= 100.0 nF ESR= 29.6 mOhm VDC= 50.0 V IRMS= 971.99 mA	1	$0.01	0603 5 mm^2
Cin	Panasonic	50SVPF39M Series= SVPF	Cap= 39.0 uF ESR= 25.0 mOhm VDC= 50.0 V IRMS= 3.8 A	2	$1.15	CAPSMT_62_E12 106 mm^2
Cout	Panasonic	25SVPF330M Series= SVPF	Cap= 330.0 uF ESR= 14.0 mOhm VDC= 25.0 V IRMS= 5.0 A	1	$1.33	CAPSMT_62_F12 151 mm^2
Coutx	TDK	C2012X5R1H475K125AB Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 4.3 A	5	$0.12	0805 7 mm^2
Coutx2	TDK	C2012X5R1H475K125AB Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 4.3 A	5	$0.12	0805 7 mm^2
Coutx3	TDK	C2012X5R1H475K125AB Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 4.3 A	5	$0.12	0805 7 mm^2
Cslope	Samsung Electro-Mechanics	CL10C121JB8NNNC Series= C0G/NP0	Cap= 120.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
Css	Kemet	C0603C153J3GACTU Series= C0G/NP0	Cap= 15.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.09	0603 5 mm^2
Cvcc	Taiyo Yuden	EMK107B7105KA-T Series= X7R	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
Dboot1	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.10	SMA 37 mm^2
Dboot2	Torex USA Corporation	XBS053V15R-G	VF@Io= 470.0 mV VRRM= 30.0 V	1	$0.15	SOD-523 5 mm^2
Df	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.10	SMA 37 mm^2
L1	Coiltronics	HC1-1R7-R	L= 1.7 µH 2.0 mOhm	1	$1.87	HC1 225 mm^2
M1	Texas Instruments	CSD18543Q3A	VdsMax= 60.0 V IdsMax= 70.0 Amps	2	$0.21	DNH0008A 18 mm^2
M2	Texas Instruments	CSD18543Q3A	VdsMax= 60.0 V IdsMax= 35.0 Amps	1	$0.21	DNH0008A 18 mm^2
M3	Texas Instruments	CSD18543Q3A	VdsMax= 60.0 V IdsMax= 70.0 Amps	2	$0.21	DNH0008A 18 mm^2
M4	Texas Instruments	CSD18543Q3A	VdsMax= 60.0 V IdsMax= 35.0 Amps	1	$0.21	DNH0008A 18 mm^2

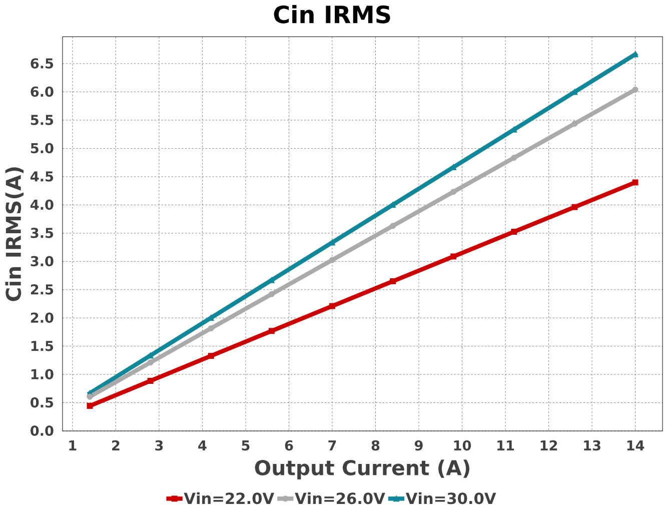
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rcomp	Vishay-Dale	CRCW040212K7FKED Series= CRCW..e3	Res= 12.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
Rcsg	Vishay-Dale	CRCW0603100RFKEA Series= CRCW..e3	Res= 100.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
Rcsp	Vishay-Dale	CRCW0603100RFKEA Series= CRCW..e3	Res= 100.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
Rf	Yageo	RC0603FR-0710RL Series= ?	Res= 10.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
Rfbb	Yageo	RC0603FR-0720KL Series= ?	Res= 20.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
Rfbt	Yageo	RC0603FR-07470KL Series= ?	Res= 470.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
Rmode	Yageo	RC0603FR-0793K1L Series= ?	Res= 93.1 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
Rpg	Yageo	RC0603FR-0710KL Series= ?	Res= 10.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
Rsense	Susumu Co Ltd	PRL1632-R005-F-T1 Series= PRL1632	Res= 5.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.20	0612 11 mm^2
Rt	Yageo	RC0201FR-0723K7L Series= ?	Res= 23.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm^2
Ruvb	Yageo	RC0201FR-0715K4L Series= ?	Res= 15.4 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm^2
Ruvt	Yageo	RC0201FR-07249KL Series= ?	Res= 249.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm^2
Rvisns	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
U1	Texas Instruments	LM34936RHFR	Switcher	1	$2.42	RHF0028A 42 mm^2

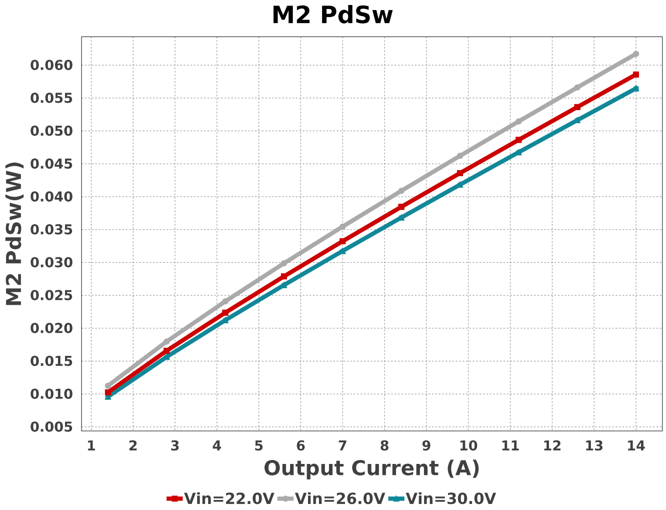


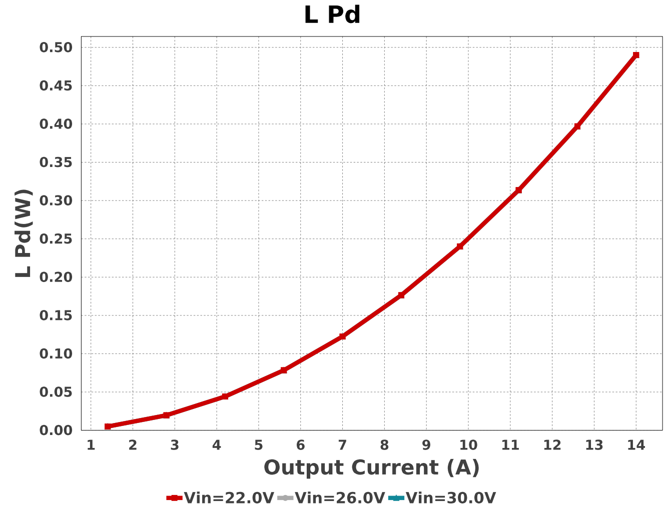


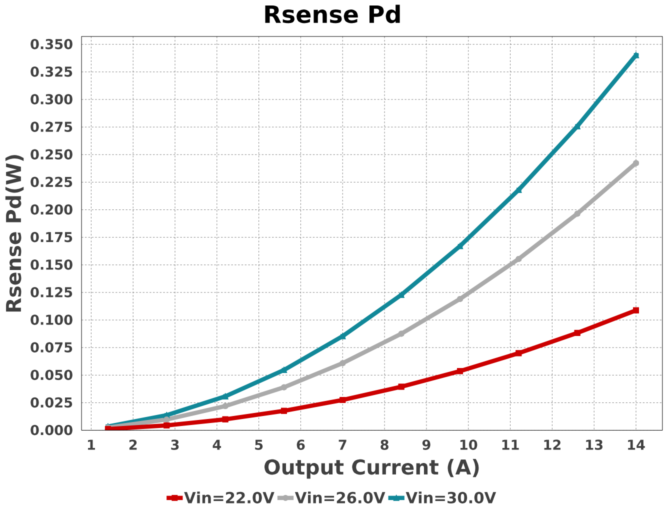

IC Tj
IC Tj(degC)
42.25
42.00
41.75
41.50
41.25
41.00
40.75
40.50
40.25
40.00
39.75
39.50
39.25
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V


Duty Cycle
Duty Cycle(%)
90.0
87.5
85.0
82.5
80.0
77.5
75.0
72.5
70.0
67.5
65.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

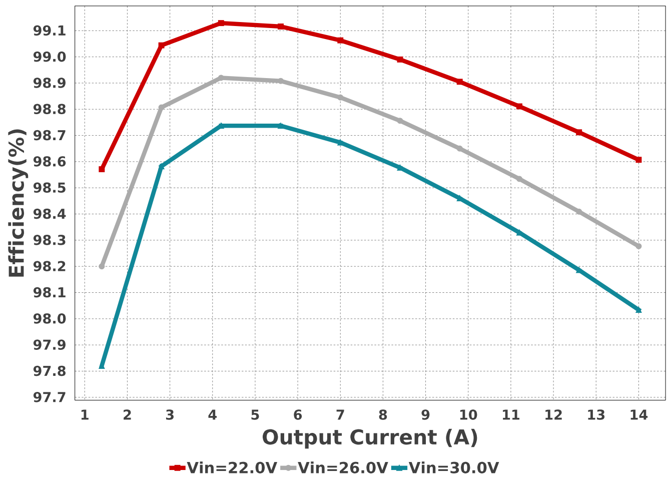

Cin IRMS
Cin IRMS(A)
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V


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
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

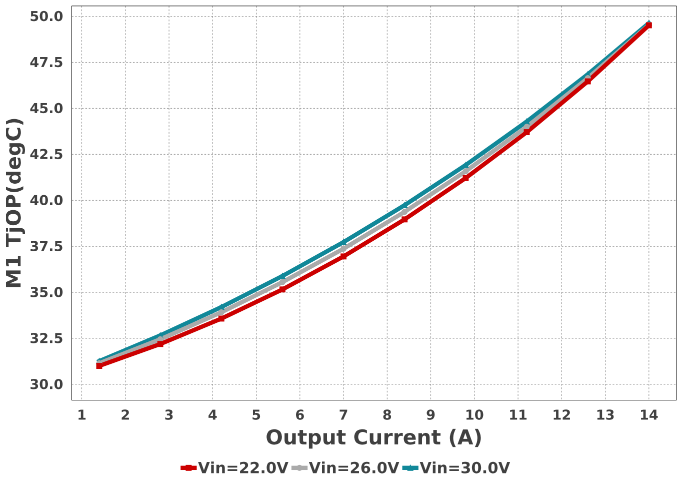

L Pd
L Pd(W)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V


Rsense Pd
Rsense Pd(W)
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
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

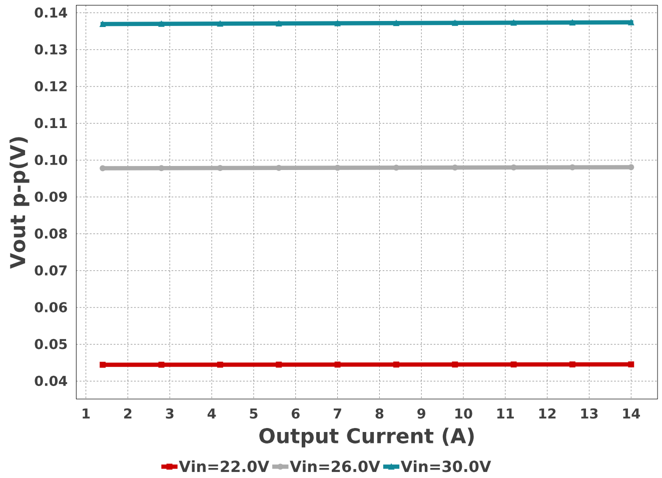
Efficiency



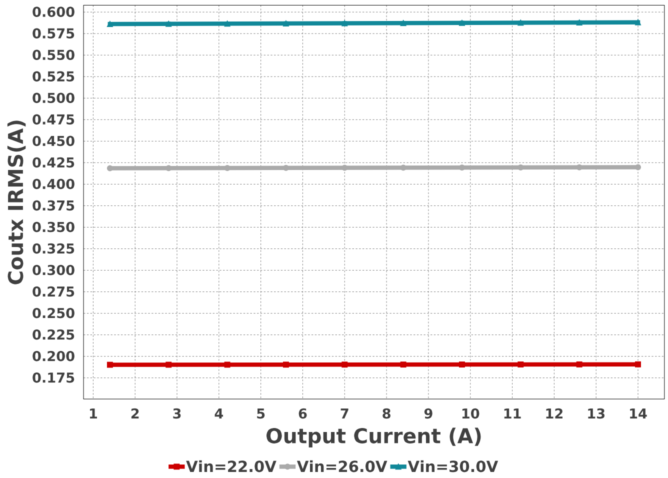
M1 TjOP



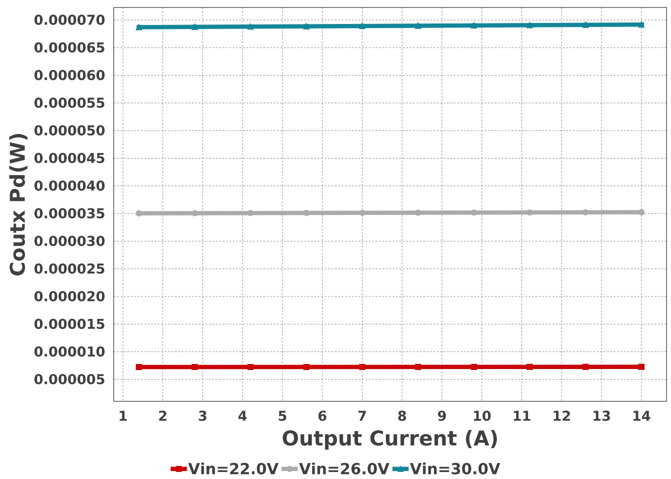
Vout p-p



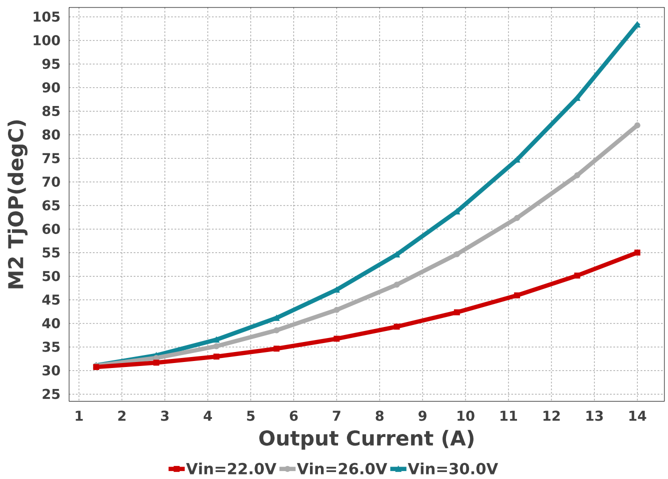
Coutx IRMS

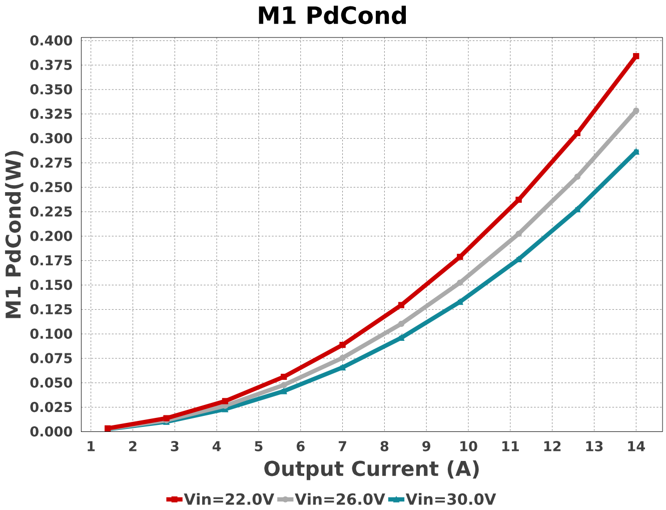


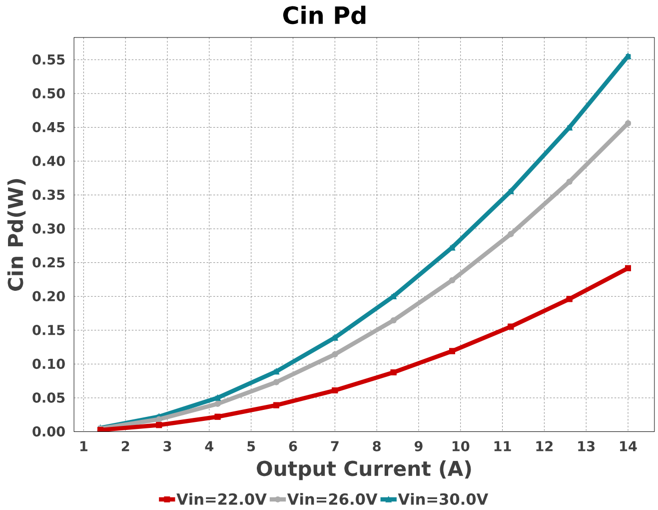
Coutx Pd

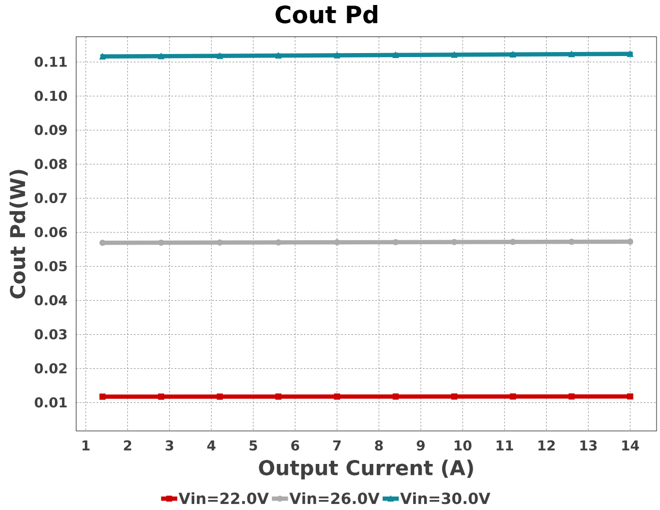


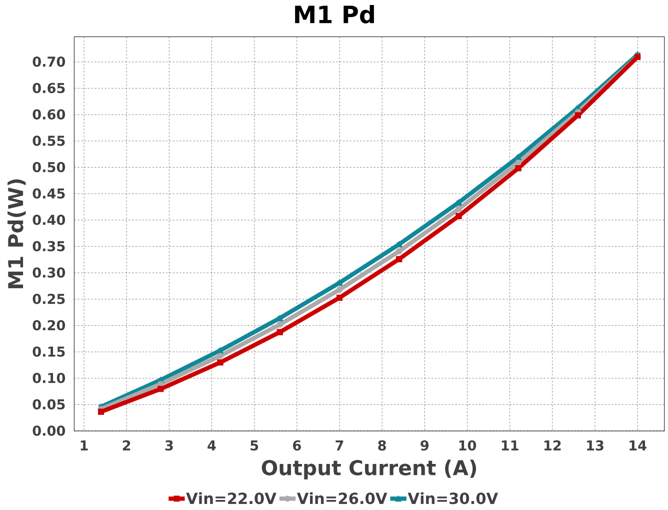
M2 TjOP

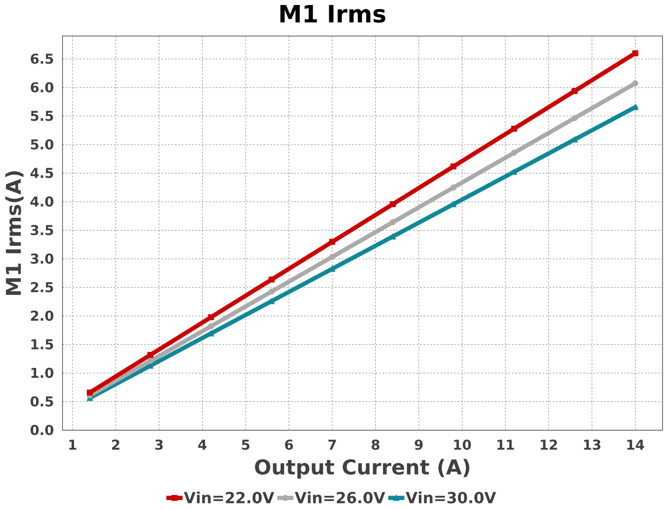


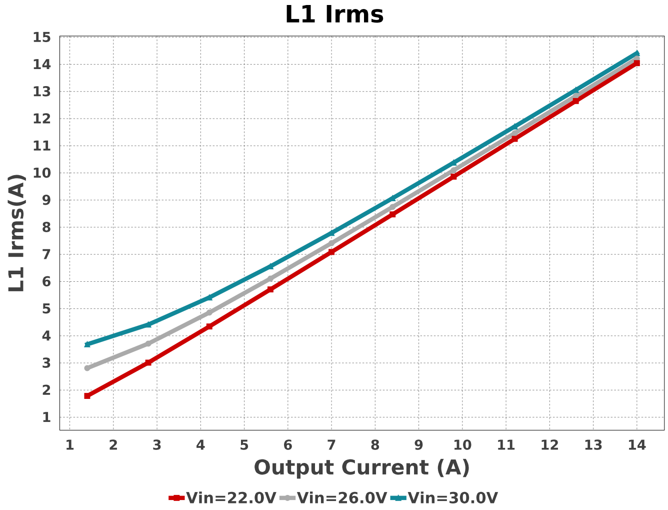

M1 PdCond
M1 PdCond(W)
0.400
0.375
0.350
0.325
0.300
0.275
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

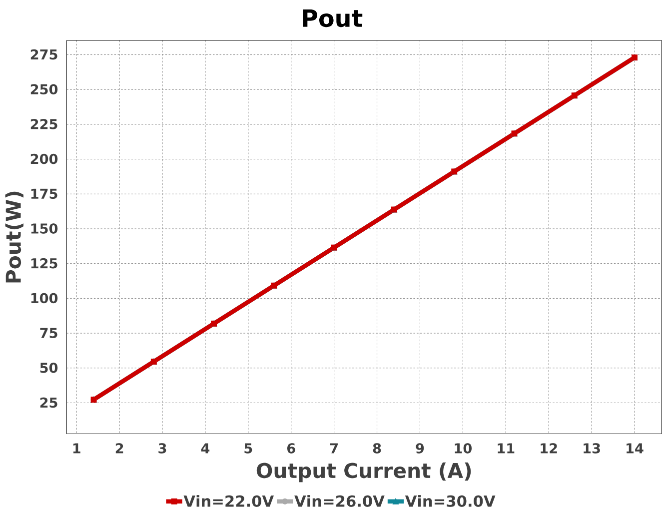

Cin Pd
Cin Pd(W)
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

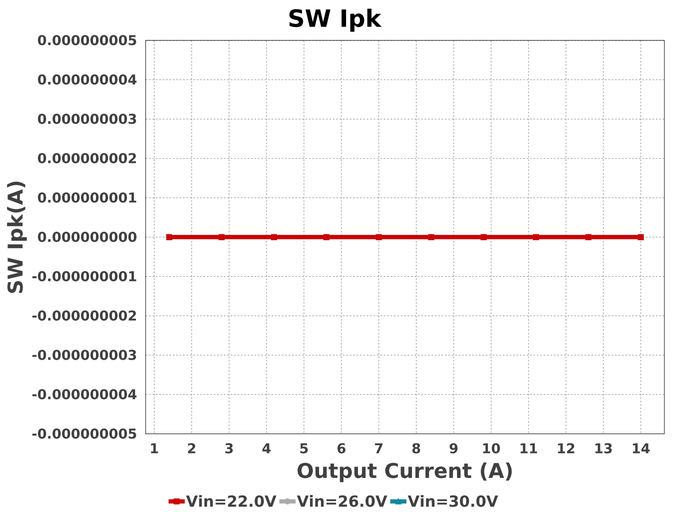

Cout Pd
Cout Pd(W)
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

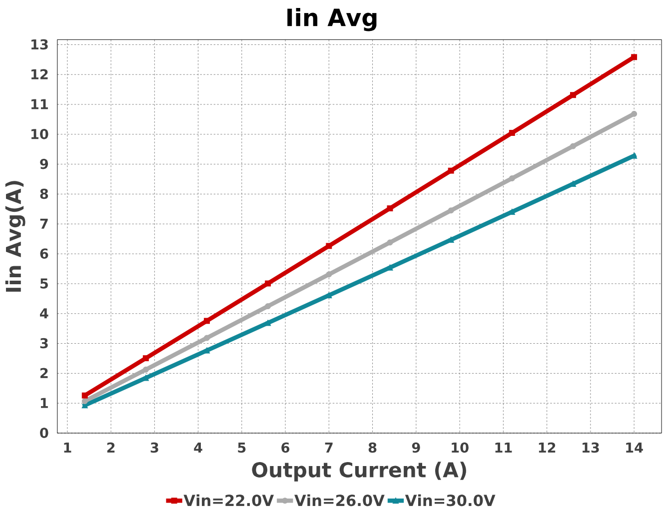

M1 Pd
M1 Pd(W)
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

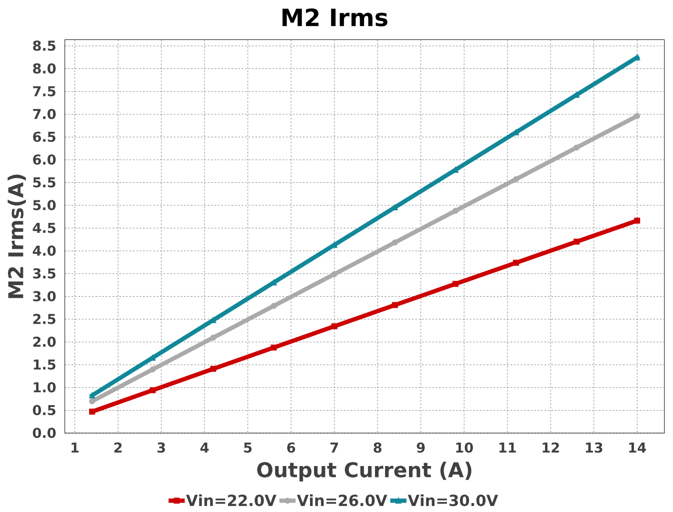

M1 Irms
M1 Irms(A)
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

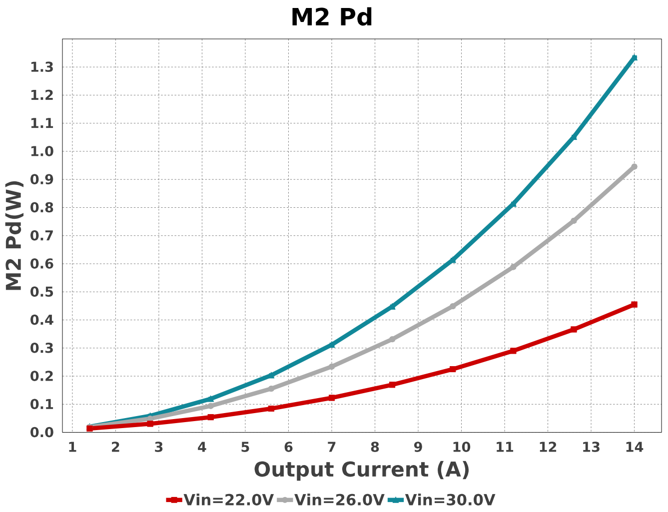

L1 Irms
L1 Irms(A)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

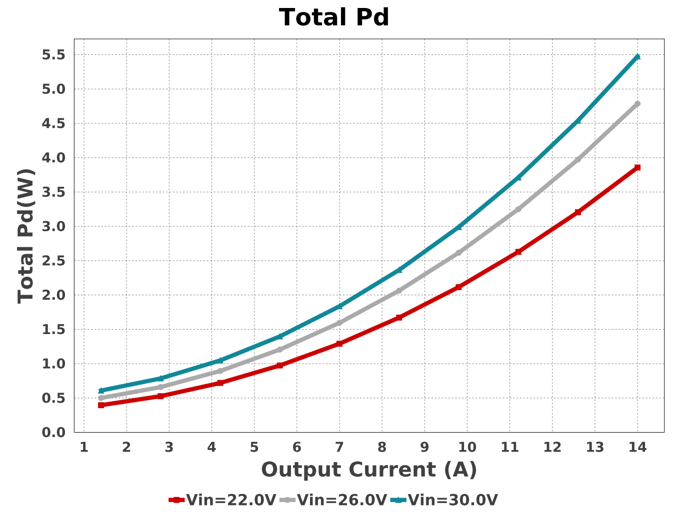

Pout
Pout(W)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

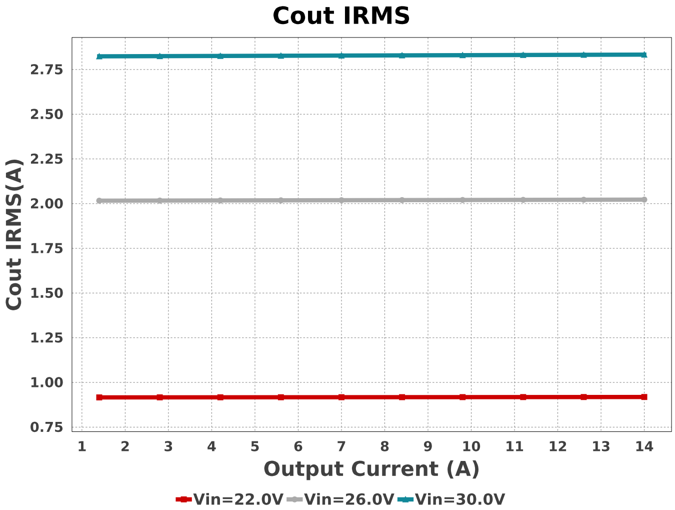

SW Ipk
SW Ipk(A)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

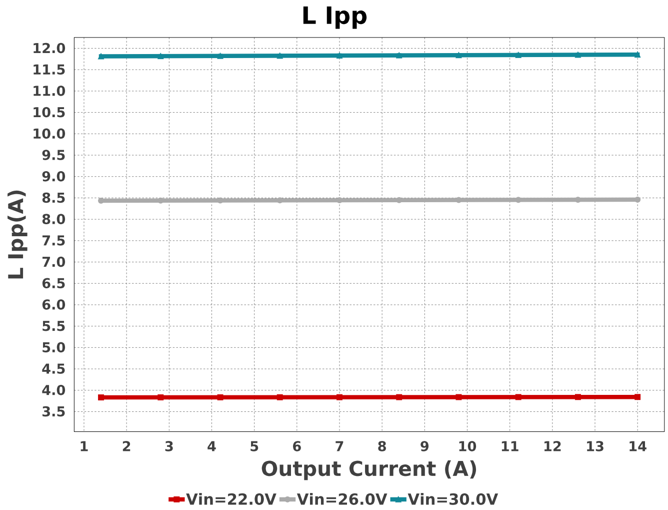

Iin Avg
Iin Avg(A)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

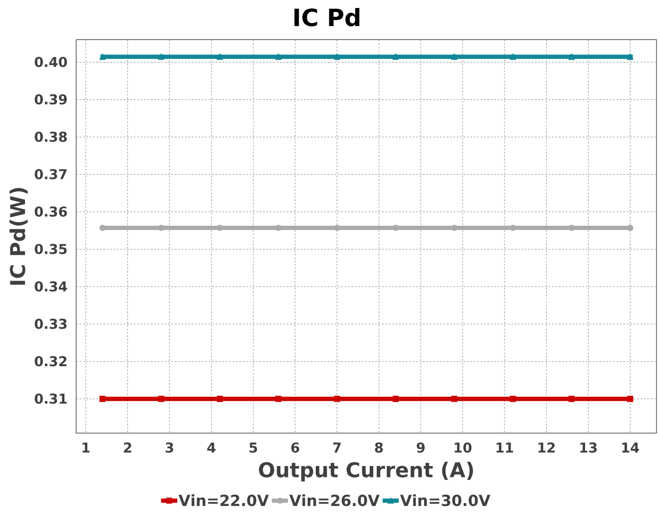

M2 Irms
M2 Irms(A)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

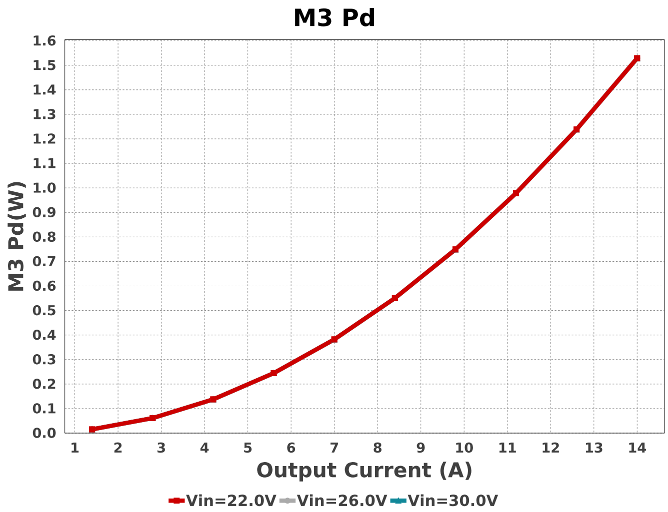

M2 Pd
M2 Pd(W)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

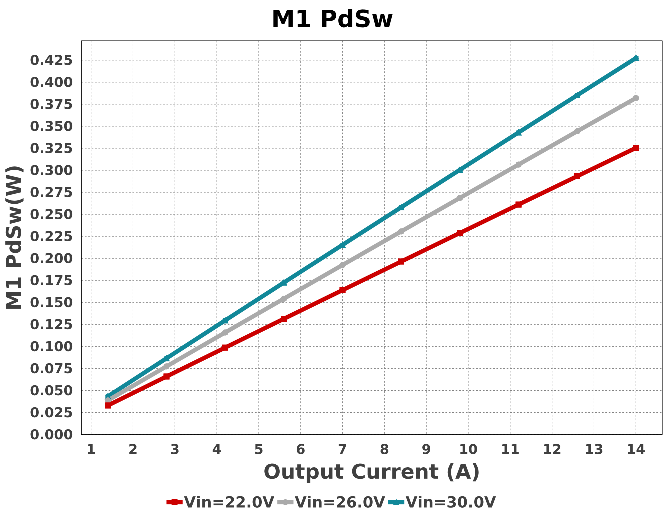

Total Pd
Total Pd(W)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

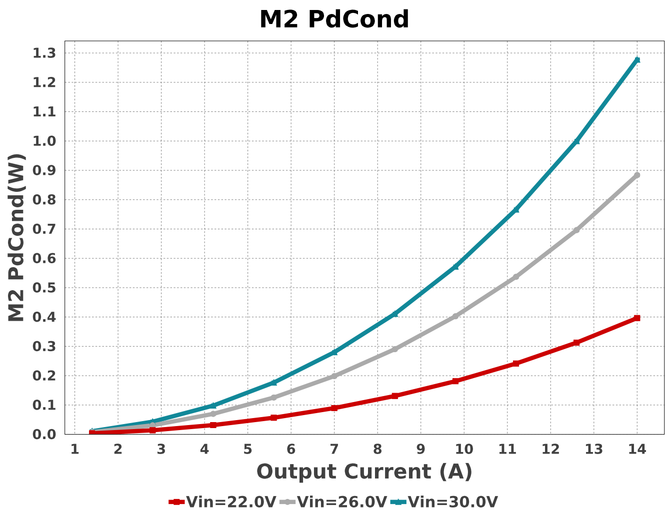

Cout IRMS
Cout IRMS(A)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V

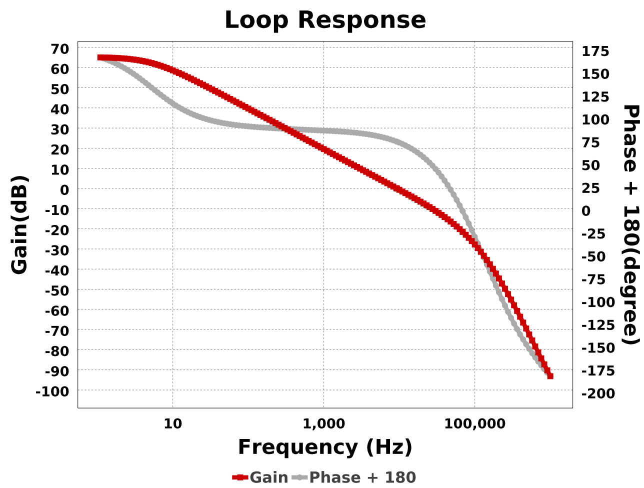

L Ipp
L Ipp(A)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V


IC Pd
IC Pd(W)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V


M3 Pd
M3 Pd(W)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V


M1 PdSw
M1 PdSw(W)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V


M2 PdCond
M2 PdCond(W)
Output Current (A)
Vin=22.0V Vin=26.0V Vin=30.0V



Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	6.665 A	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	555.24 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	2.837 A	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	112.67 mW	Capacitor	Output capacitor power dissipation
5.	Coutx IRMS	584.582 mA	Capacitor	Output capacitor_x RMS ripple current
6.	Coutx Pd	68.347 µW	Capacitor	Output capacitor_x power loss
7.	IC Pd	401.45 mW	IC	IC power dissipation
8.	IC Tj	42.244 degC	IC	IC junction temperature
9.	IC Tolerance	0.0 V	IC	IC Feedback Tolerance
10.	ICThetaJA	30.5 degC/W	IC	IC junction-to-ambient thermal resistance
11.	Iin Avg	9.279 A	IC	Average input current
12.	L Ipp	11.852 A	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	490.0 mW	Inductor	Inductor power dissipation
14.	L1 Irms	14.412 A	Inductor	Inductor ripple current
15.	M1 Irms	5.656 A	Mosfet	MOSFET RMS ripple current
16.	M1 Pd	607.07 mW	Mosfet	MOSFET power dissipation
17.	M1 PdCond	281.63 mW	Mosfet	M1 MOSFET conduction losses
18.	M1 PdSw	325.44 mW	Mosfet	M1 MOSFET switching losses
19.	M1 Rdson	7.8 mOhm	Mosfet	Drain-Source On-resistance
20.	M1 ThetaJA	27.5 degC/W	Mosfet	MOSFET junction-to-ambient thermal resistance
21.	M1 TjOP	46.694 degC	Mosfet	MOSFET junction temperature
22.	M2 Irms	8.248 A	Mosfet	MOSFET RMS ripple current
23.	M2 Pd	1.334 W	Mosfet	MOSFET power dissipation
24.	M2 PdCond	1.277 W	Mosfet	M2 MOSFET conduction losses
25.	M2 PdSw	56.469 mW	Mosfet	M2 MOSFET switching losses
26.	M2 Rdson	15.6 mOhm	Mosfet	Drain-Source On-resistance
27.	M2 ThetaJA	55.0 degC/W	Mosfet	MOSFET junction-to-ambient thermal resistance
28.	M2 TjOP	103.36 degC	Mosfet	MOSFET junction temperature
29.	M3 Pd	1.529 W	Mosfet	M3 MOSFET total power dissipation
30.	M3 PdCond	1.529 W	Mosfet	M3 MOSFET conduction losses
31.	M4 Pd	100.0 pW	Mosfet	M4 MOSFET total power dissipation
32.	Cin Pd	555.24 mW	Power	Input capacitor power dissipation
33.	Cout Pd	112.67 mW	Power	Output capacitor power dissipation
34.	Coutx Pd	68.347 µW	Power	Output capacitor_x power loss
35.	IC Pd	401.45 mW	Power	IC power dissipation
36.	L Pd	490.0 mW	Power	Inductor power dissipation
37.	M1 Pd	607.07 mW	Power	MOSFET power dissipation
38.	M1 PdCond	281.63 mW	Power	M1 MOSFET conduction losses
39.	M1 PdSw	325.44 mW	Power	M1 MOSFET switching losses
40.	M2 Pd	1.334 W	Power	MOSFET power dissipation
41.	M2 PdCond	1.277 W	Power	M2 MOSFET conduction losses
42.	M2 PdSw	56.469 mW	Power	M2 MOSFET switching losses
43.	M3 Pd	1.529 W	Power	M3 MOSFET total power dissipation
44.	M3 PdCond	1.529 W	Power	M3 MOSFET conduction losses
45.	M4 Pd	100.0 pW	Power	M4 MOSFET total power dissipation
46.	Rsense Pd	340.18 mW	Power	LED Current Rsns Power Dissipation
47.	Total Pd	5.37 W	Power	Total Power Dissipation
48.	Rsense Pd	340.18 mW	Resistor	LED Current Rsns Power Dissipation
49.	BOM Count	56	System Information	Total Design BOM count
50.	Cross Freq	9.303 kHz	System Information	Bode plot crossover frequency

#	Name	Value	Category	Description
51.	Duty Cycle	65.288 %	System Information	Duty cycle
52.	Efficiency	98.071 %	System Information	Steady state efficiency
53.	FootPrint	1.452 k mm^2	System Information	Total Foot Print Area of BOM components
54.	Frequency	340.229 kHz	System Information	Switching frequency
55.	Gain Marg	-21.473 dB	System Information	Bode Plot Gain Margin
56.	Iout	14.0 A	System Information	Iout operating point
57.	Low Freq Gain	65.064 dB	System Information	Gain at 1Hz
58.	Mode	CCM	System Information	Conduction Mode
59.	Operating Topology	Buck	System Information	The current operating topology of the device
60.	Phase Marg	75.932 deg	System Information	Bode Plot Phase Margin
61.	Pout	273.0 W	System Information	Total output power
62.	SW Ipk	0.0 A	System Information	Peak switch current
63.	Total BOM	$14.63	System Information	Total BOM Cost
64.	Vin	30.0 V	System Information	Vin operating point
65.	Vout	19.5 V	System Information	Operational Output Voltage
66.	Vout Actual	19.6 V	System Information	Vout Actual calculated based on selected voltage divider resistors
67.	Vout Tolerance	1.938 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
68.	Vout p-p	137.582 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	14.0	Maximum Output Current
VinMax	30.0	Maximum input voltage
VinMin	22.0	Minimum input voltage
Vout	19.5	Output Voltage
base_pn	LM34936	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

WEBENCH® Assembly

Component Testing

Some published data on components in datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will guarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of Cin and Cout, and the inductance and DC resistance of L1 before assembly of the board. Any large discrepancies in values should be electrically simulated in WEBENCH to check for instabilities and thermally simulated in WebTHERM to make sure critical temperatures are not exceeded.

Soldering Component to Board

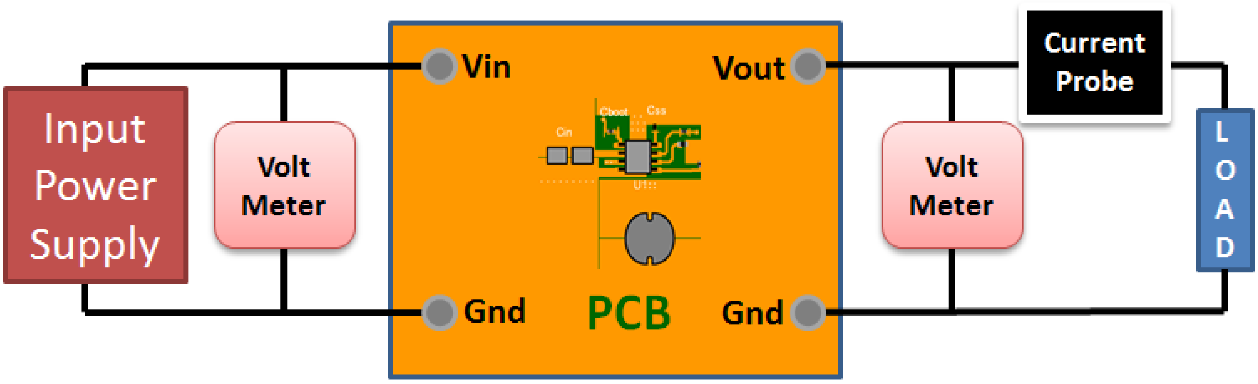
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab town to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with the PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

Initial Startup of Circuit

It is best to initially power up the board by setting the input supply voltage to the lowest operating input voltage 22.0V and set the input supply's current limit to zero. With the input supply off connect up the input supply to Vin and GND. Connect a digital volt meter and a load if needed to set the minimum Iout of the design from Vout and GND. Turn on the input supply and slowly turn up the current limit on the input supply.
If the voltage starts to rise on the input supply continue increasing the input supply current limit while watching the output voltage. If the current increases on the input supply, but the voltage remains near zero, then there may be a short or a component misplaced on the board. Power down the board and visually inspect for solder bridges and recheck the diode and capacitor polarities. Once the power supply circuit is operational then more extensive testing may include full load testing, transient load and line tests to compare with simulation results.

Load Testing

The setup is the same as the initial startup, except that an additional digital voltmeter is connected between Vin and GND, a load is connected between Vout and GND and a current meter is connected in series between Vout and the load. The load must be able to handle at least rated output power + 50% (7.5 watts for this design). Ideally the load is supplied in the form of a variable load test unit. It can also be done in the form of suitably large power resistors. When using an oscilloscope to measure waveforms on the prototype board, the ground leads of the oscilloscope probes should be as short as possible and the area of the loop formed by the ground lead should be kept to a minimum. This will help reduce ground lead inductance and eliminate EMI noise that is not actually present in the circuit.

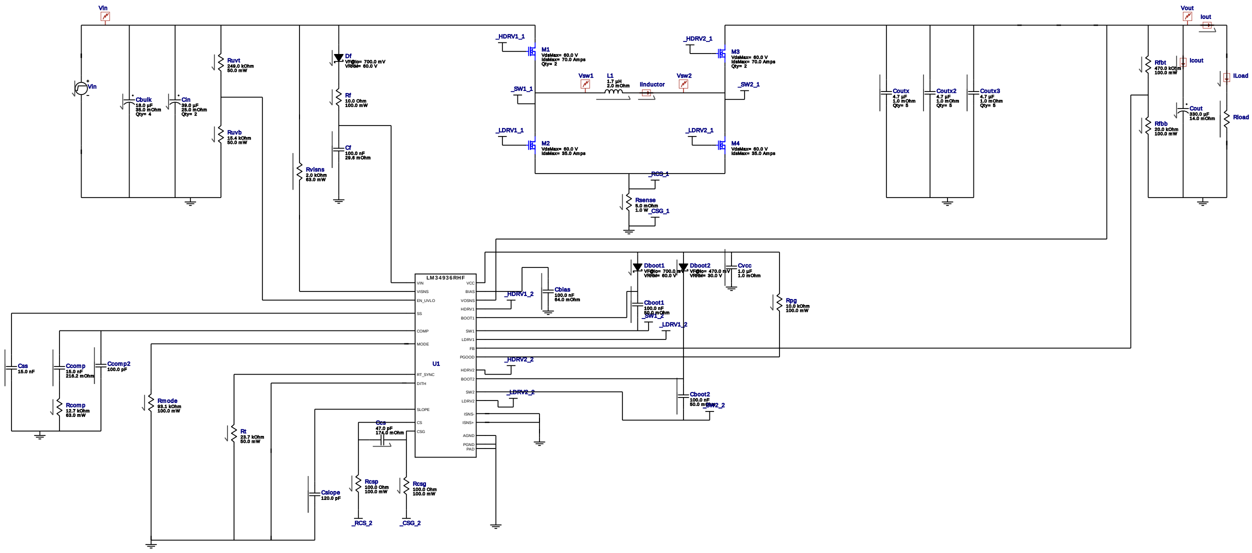


WEBENCH® Electrical Simulation Report

Design Id = 20

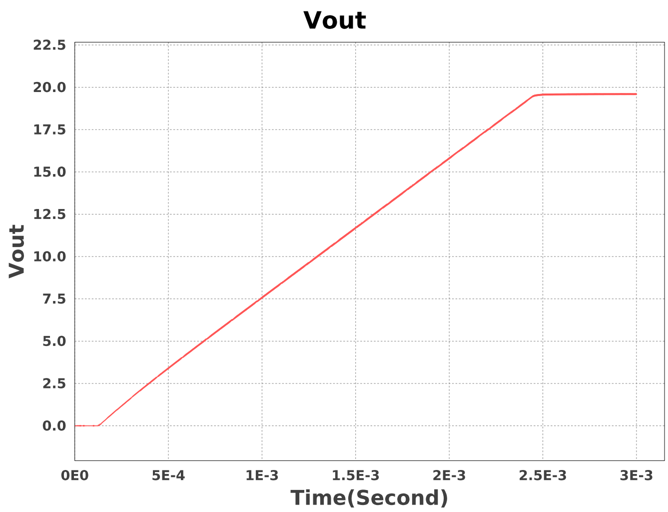
sim_id = 1

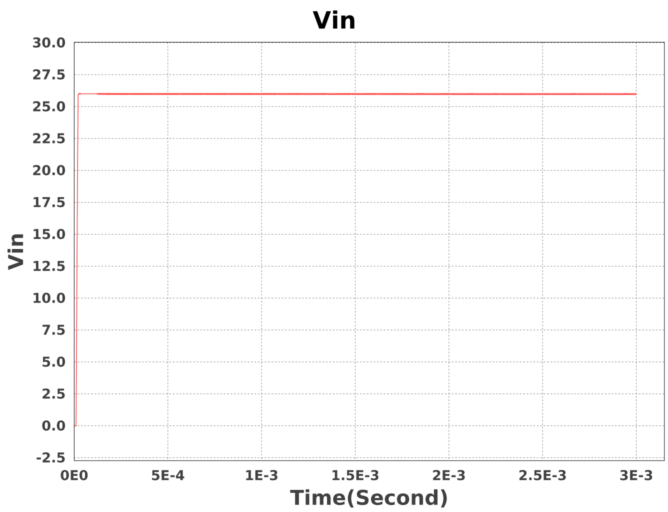
Simulation Type = Startup



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Rload	R	Load Resistance	1.3928571428571428 Ohm

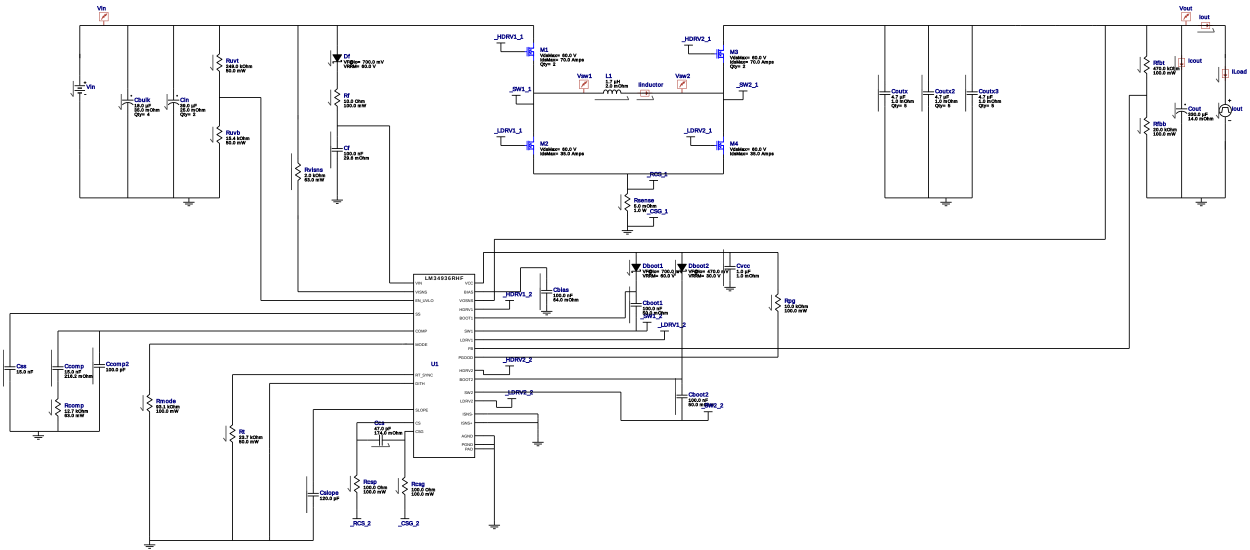




Design Id = 20

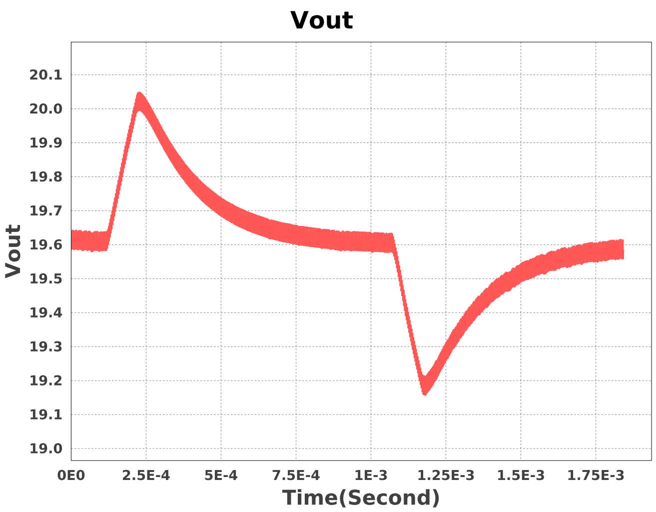
sim_id = 2

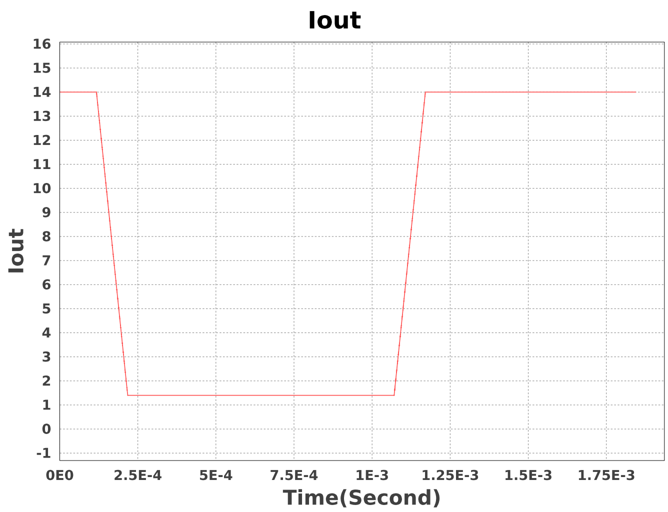
Simulation Type = Load Transient



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	L1	IC	Initial Current	-14.0
2.	Cout	IC	Initial condition	19.5
3.	Iout	signal_type	Signal Type	PULSE
		I1	Initial Load Current	14.0 A
		I2	Minimum Load Current	1.4 A
		Td	Initial Time Delay	1.17568E-4 s
		Tf	Fall Time	100u s
		Tr	Rise Time	100u s
		Pw	Pulse Width	8.530471772563863E-4 s

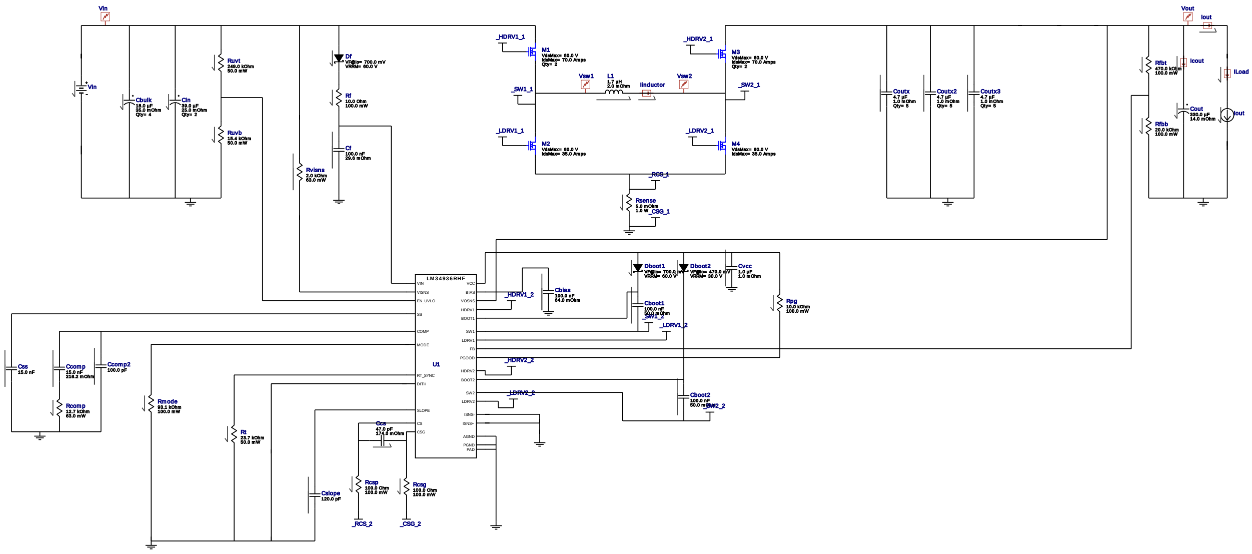




Design Id = 20

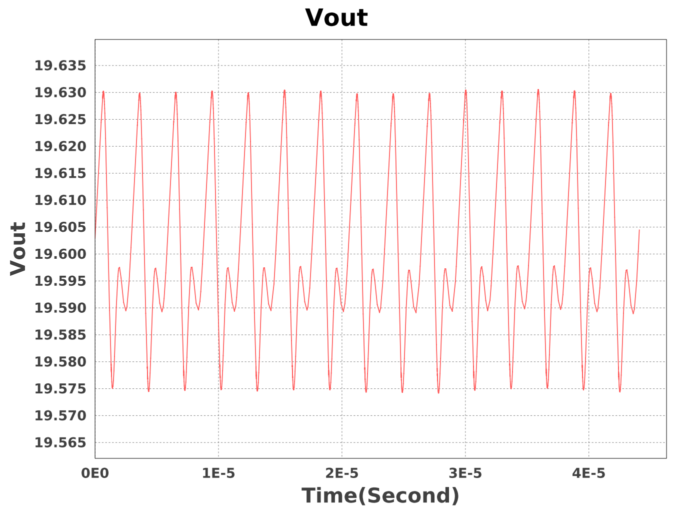
sim_id = 3

Simulation Type = Steady State



Simulation Parameters

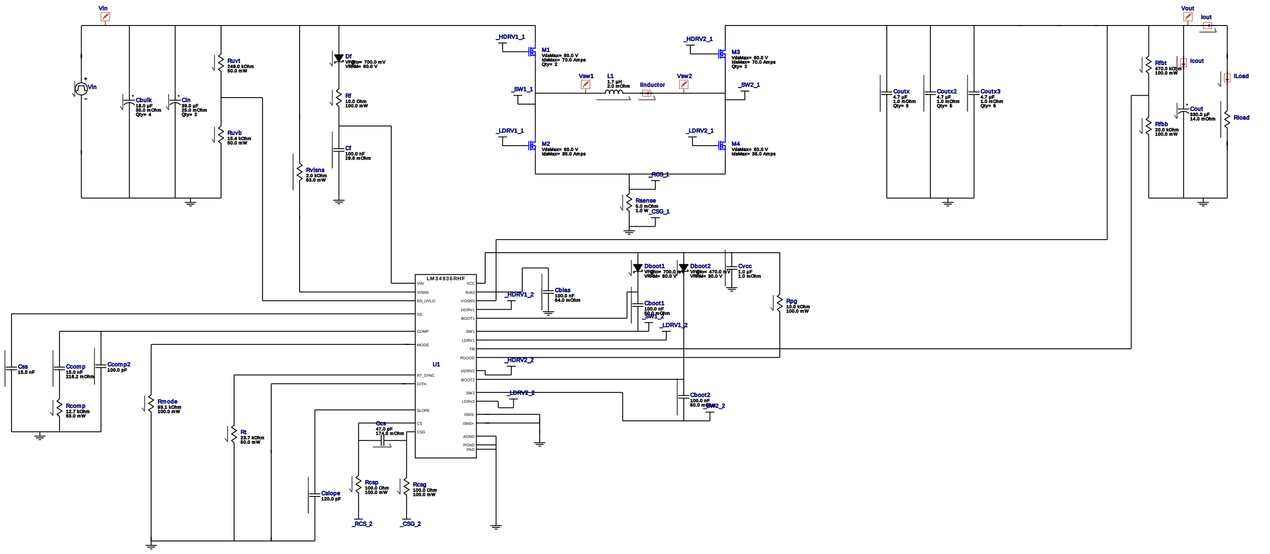
#	Name	Parameter Name	Description	Values
1.	L1	IC	Initial Current	-14.0
2.	Cout	IC	no description	19.5
3.	Iout	I	Load Current	14.0 A



Design Id = 20

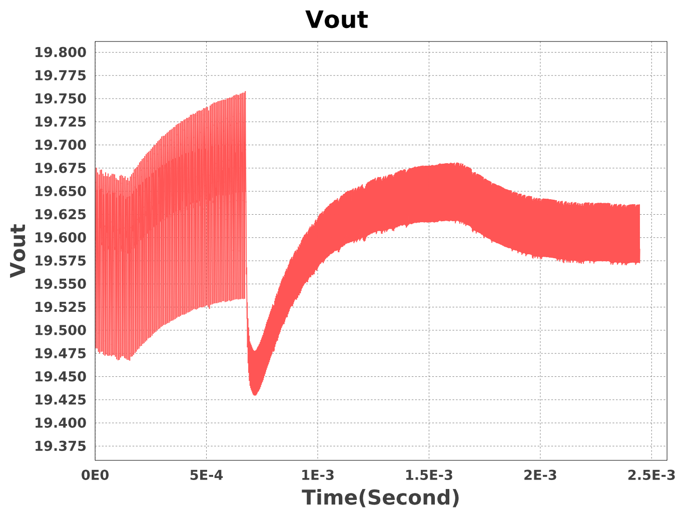
sim_id = 4

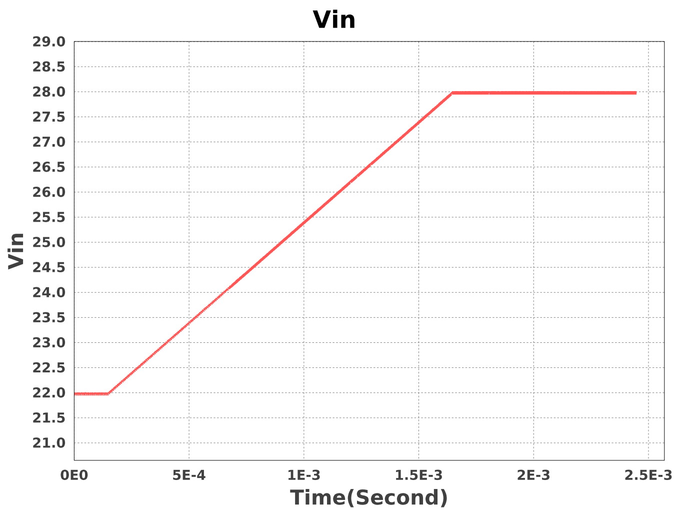
Simulation Type = Input Transient



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	L1	IC	Initial Current	-14.0
2.	Cout	IC	Initial Voltage	19.5
3.	Rload	R	Load Resistance	1.3928571428571428 Ohm





Design Assistance

1. Tip: Snubbers and/or gate resistors may be required to limit the SW1,2 node switching spikes below the IC and FET abs max ratings.
2. Tip: Slope Capacitor: smaller slope capacitors provide better transition region behavior.
3. Master key : 15162724C618322116DB1CB6C80B8C8A[v1]
4. **LM34936** Product Folder : http://www.ti.com/product/LM34936 : contains the data sheet and other resources.

