ATE Shell

Automatic testing environment

Test results

25/05/2016

Power Management & Multimarket

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TEST RESULTS

Report date:
25/05/2016 08:28:57(UTC)

Rack name:
XMC Power test rack

DUT name:
XMC1300_APPs_v1.0

Notes:
AC Source Chroma 61505
Power Analyzer: WT500
Programmable load: 63202 and 63201
Oscilloscope: MSO-X4000
DC source: TTi QL355

1. Characterization items

T.C.Name	Test	P./F.	Comments	Link
Vac_100_0_50Load	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout_lin waveforms
				Vout_Vac waveforms
Vac_100_0_100Load	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout_lin waveforms
				Vout_Vac waveforms
Vac_200_0_50Load	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout_lin waveforms
				Vout_Vac waveforms
Vac_200_0_100Load	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout_lin waveforms
				Vout_Vac waveforms
Vac_100_68	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout waveform
Vac_200_130	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout waveform
Vac_100_75	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout waveform
Vac_200_150	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout waveform
Ithd_115V	try_Ithd_1.4			Ithd
				PF
Ithd_230V	try_Ithd_1.4			Ithd
				PF
Load_transient_5Hz	PFC_Load_transient_1.0			Vout_min_max_vs_Load
				Vout_lin waveforms
Load_transient_100Hz	PFC_Load_transient_1.0			Vout_min_max_vs_Load
				Vout_lin waveforms
Sw_analysis_CP	PFC_Sw_analysis_CP_1.0			Vac lin waveforms
				Vac SwFreq waveforms
				Vac Ton waveforms
Line_transient	PFC_Line_transient_1.0			Vout_min_max_vs_Load
				Vout_lin waveforms
				Vout_Vac waveforms
Dyn_StartUp_115	PFC_Dyn_StartUp_1.1			Vout_Iout
Dyn_StartUp_230	PFC_Dyn_StartUp_1.1			Vout_Iout

2. Characterization charts

2.1.Test case: Vac_100_0_50Load

Chart name: Vout_min_max_vs_Load

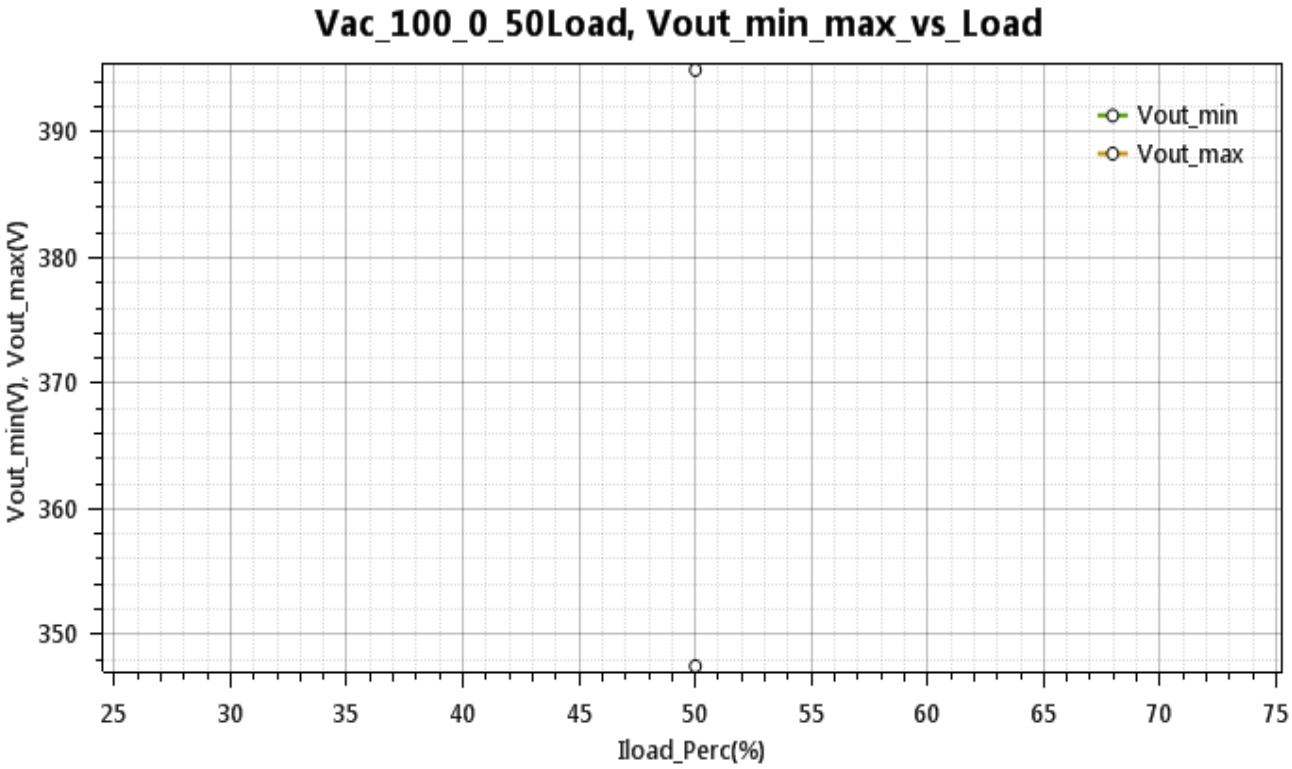


Chart name: Vout_Iin waveforms

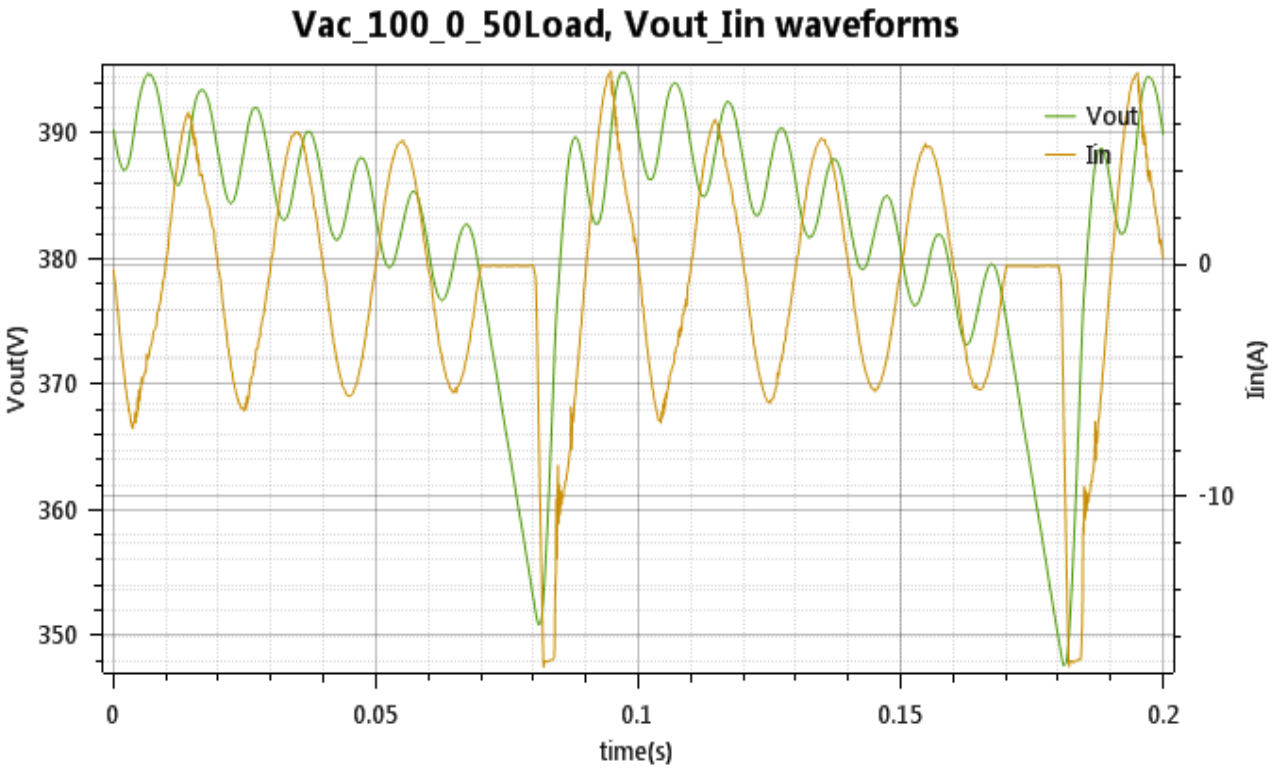
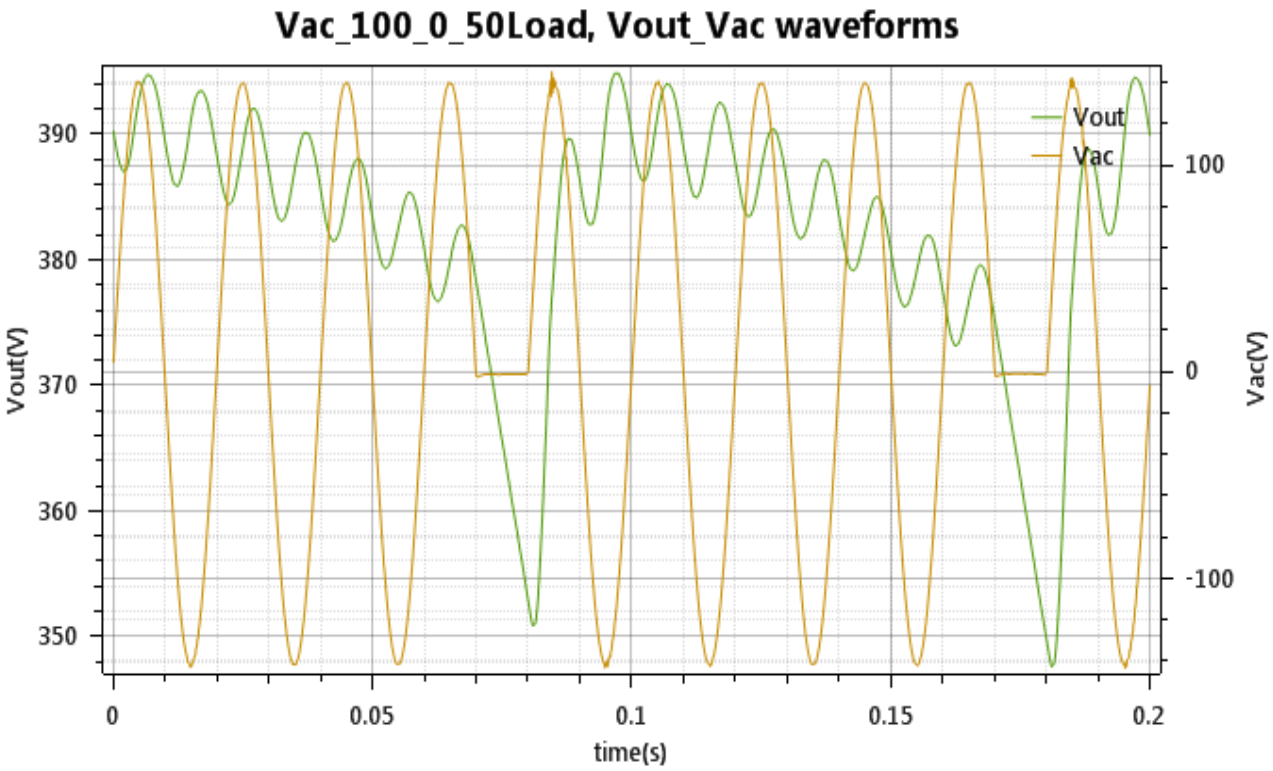


Chart name: Vout_Vac waveforms



2.2.Test case: Vac_100_0_100Load

Chart name: Vout_min_max_vs_Load

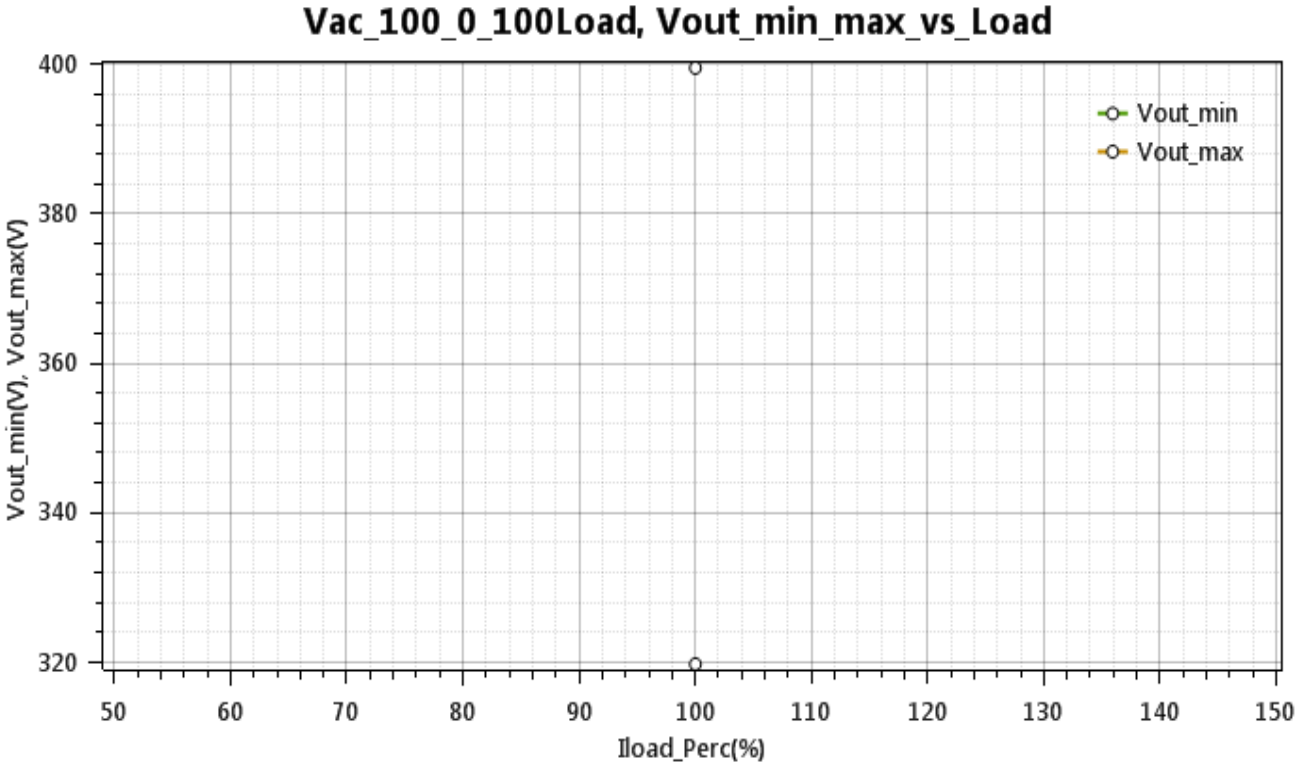


Chart name: Vout_Iin waveforms

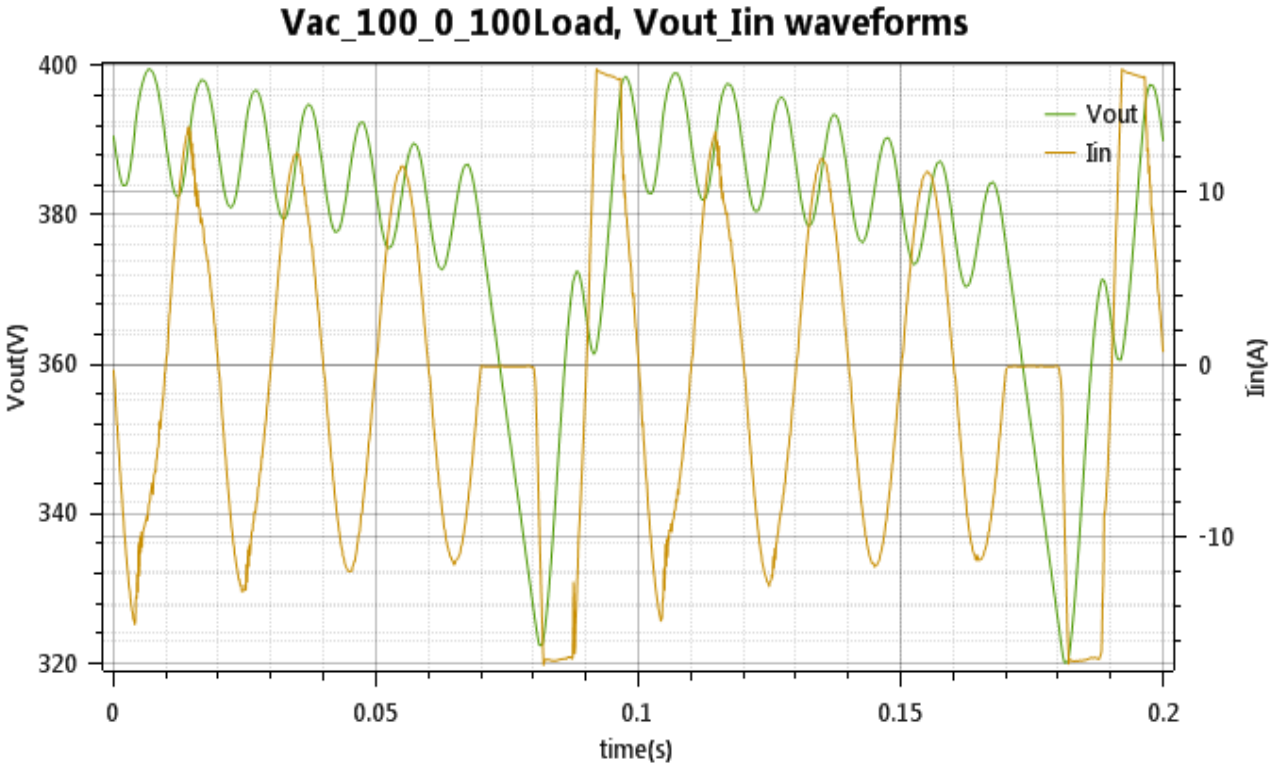
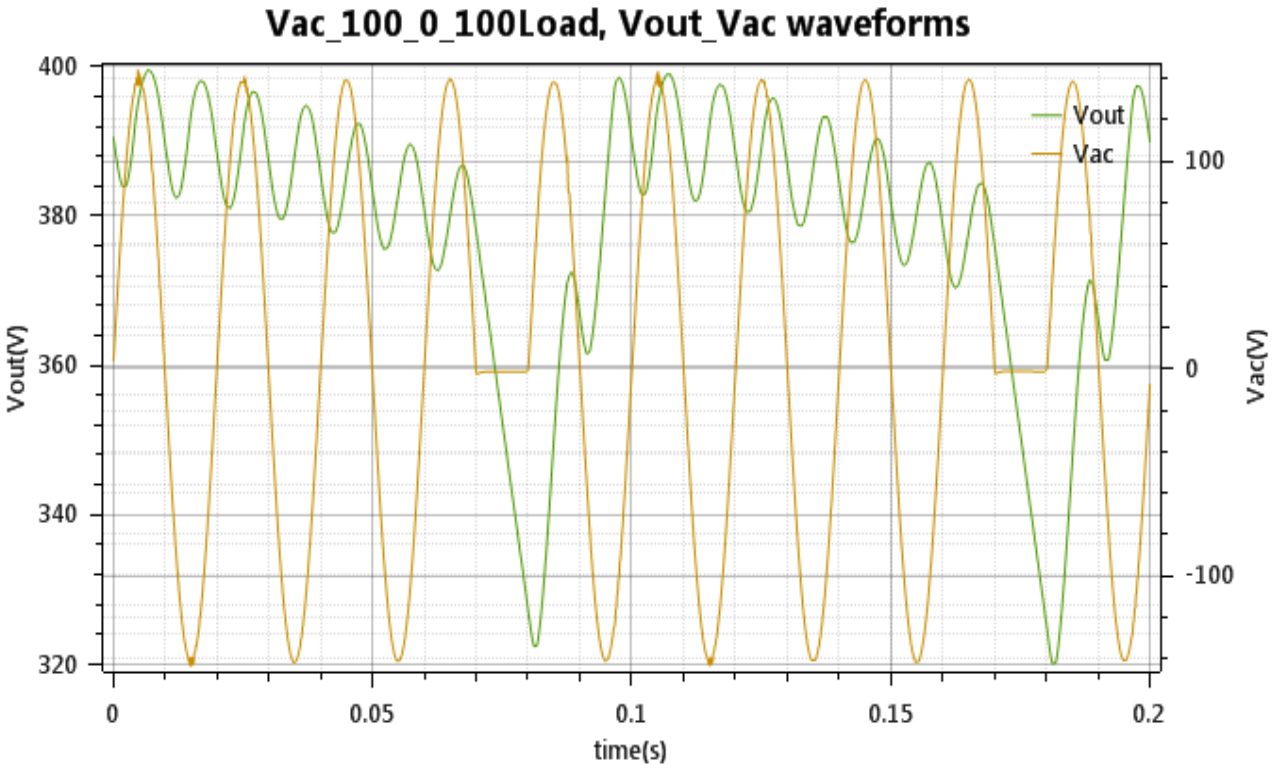


Chart name: Vout_Vac waveforms



2.3.Test case: Vac_200_0_50Load

Chart name: Vout_min_max_vs_Load

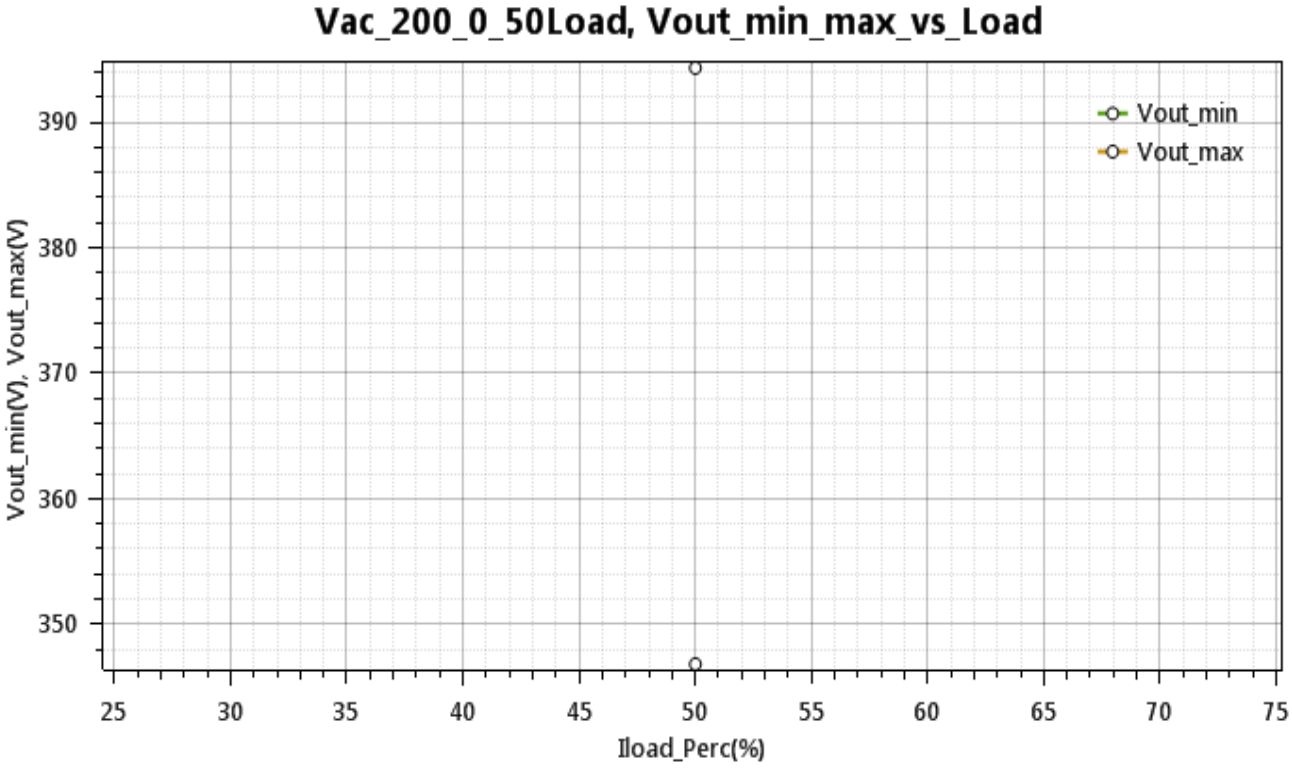


Chart name: Vout_Iin waveforms

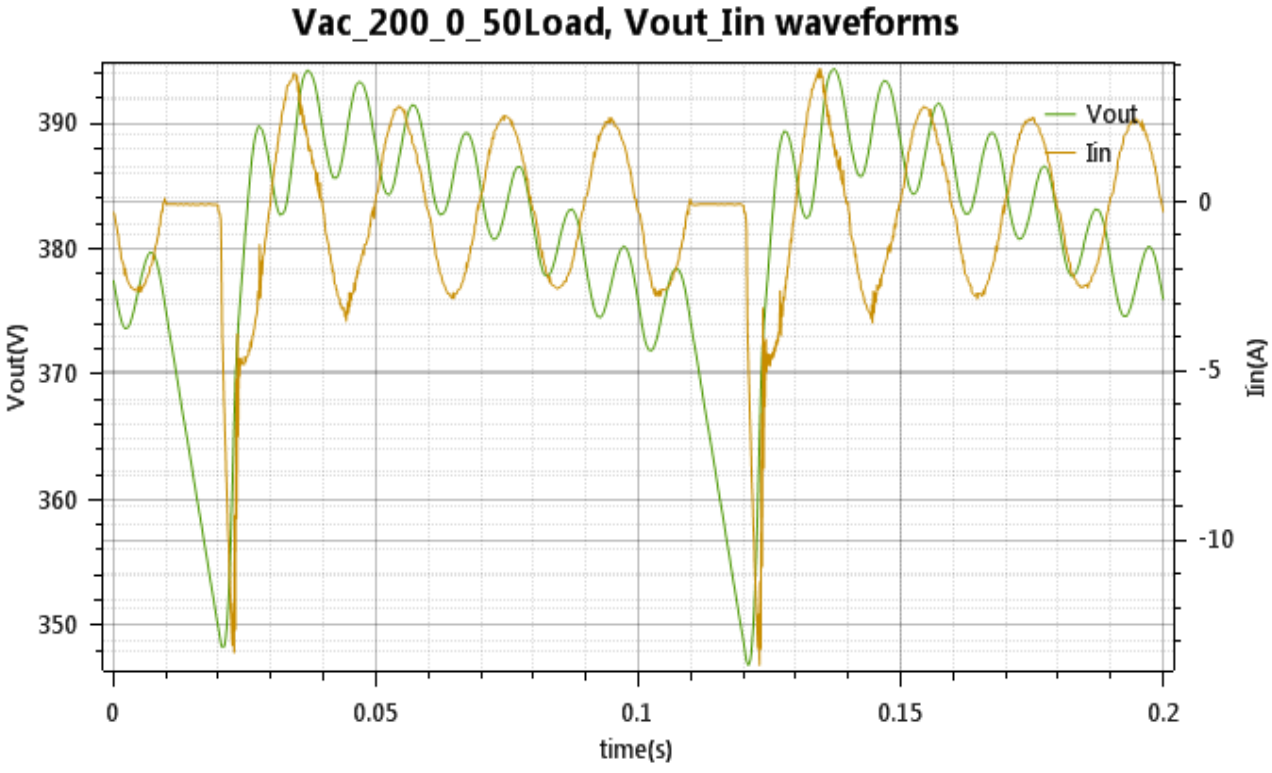
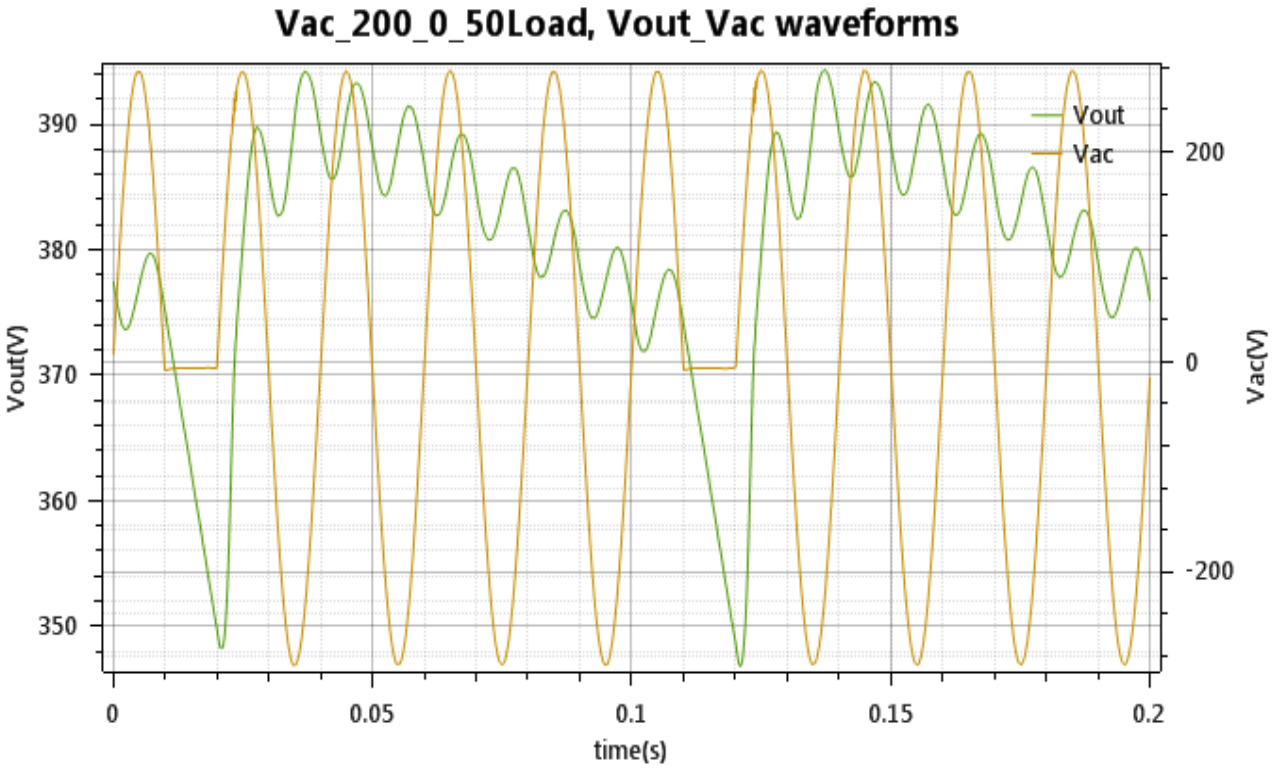


Chart name: Vout_Vac waveforms



2.4.Test case: Vac_200_0_100Load

Chart name: Vout_min_max_vs_Load

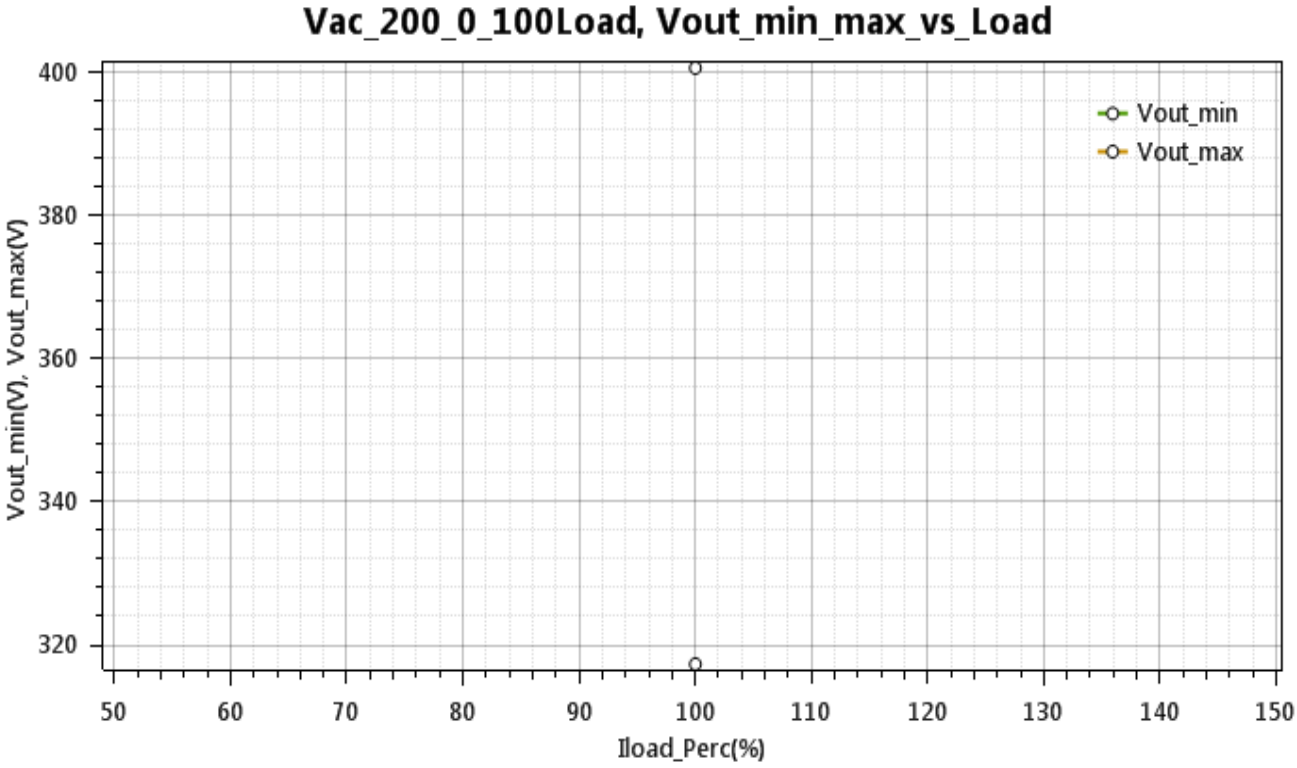


Chart name: Vout_Iin waveforms

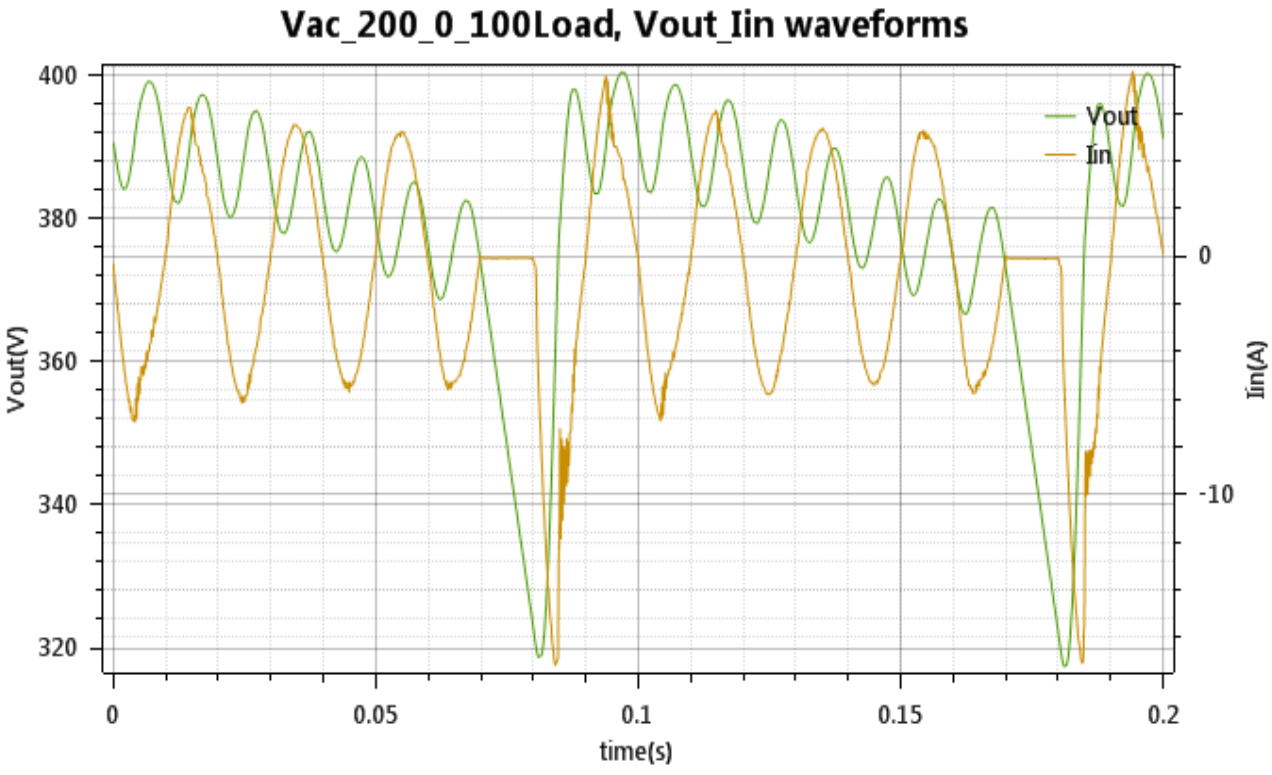
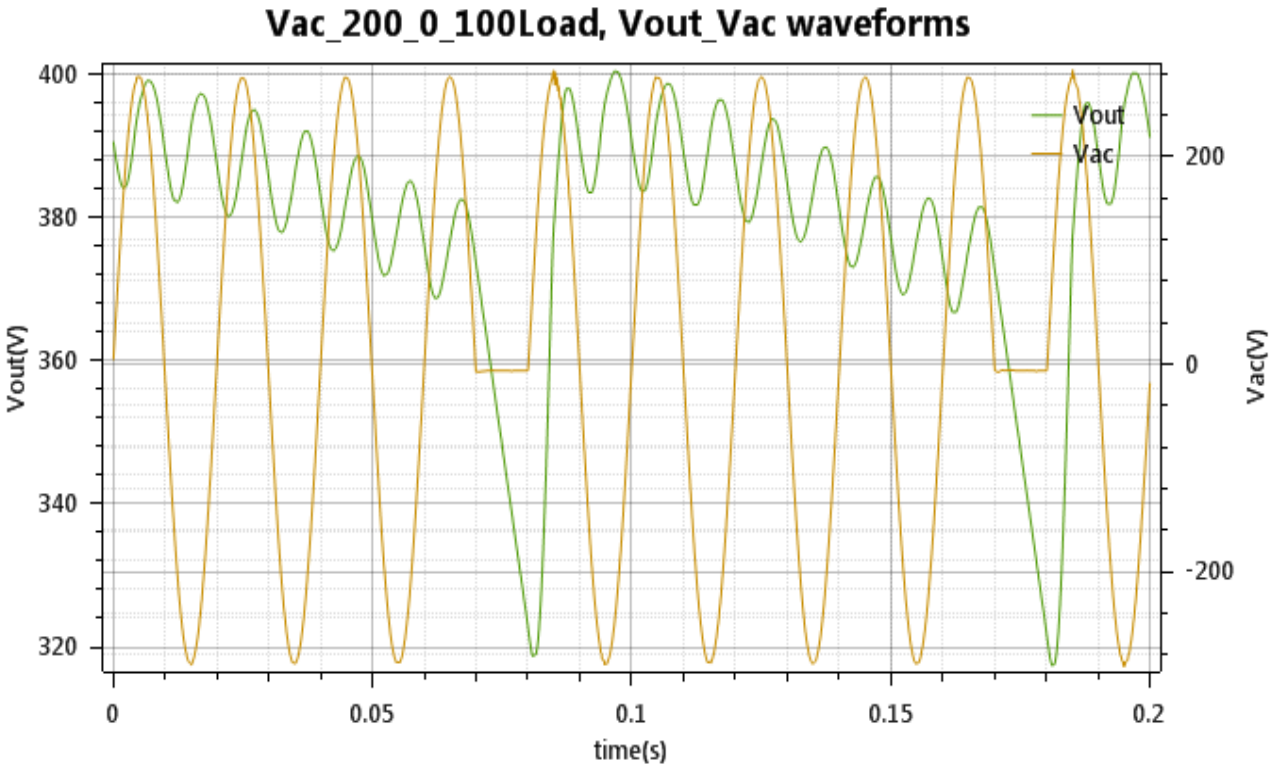


Chart name: Vout_Vac waveforms



2.5.Test case: Vac_100_68

Chart name: Vout_min_max_vs_Load

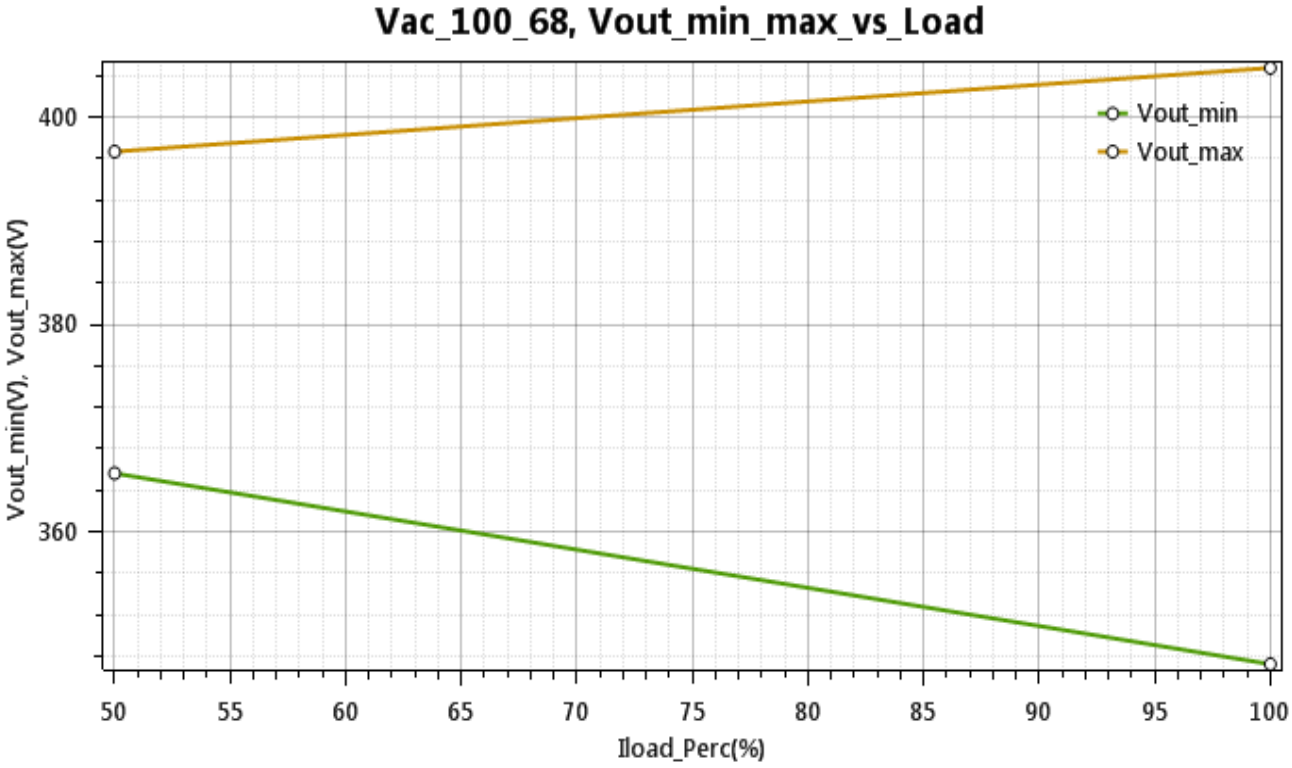
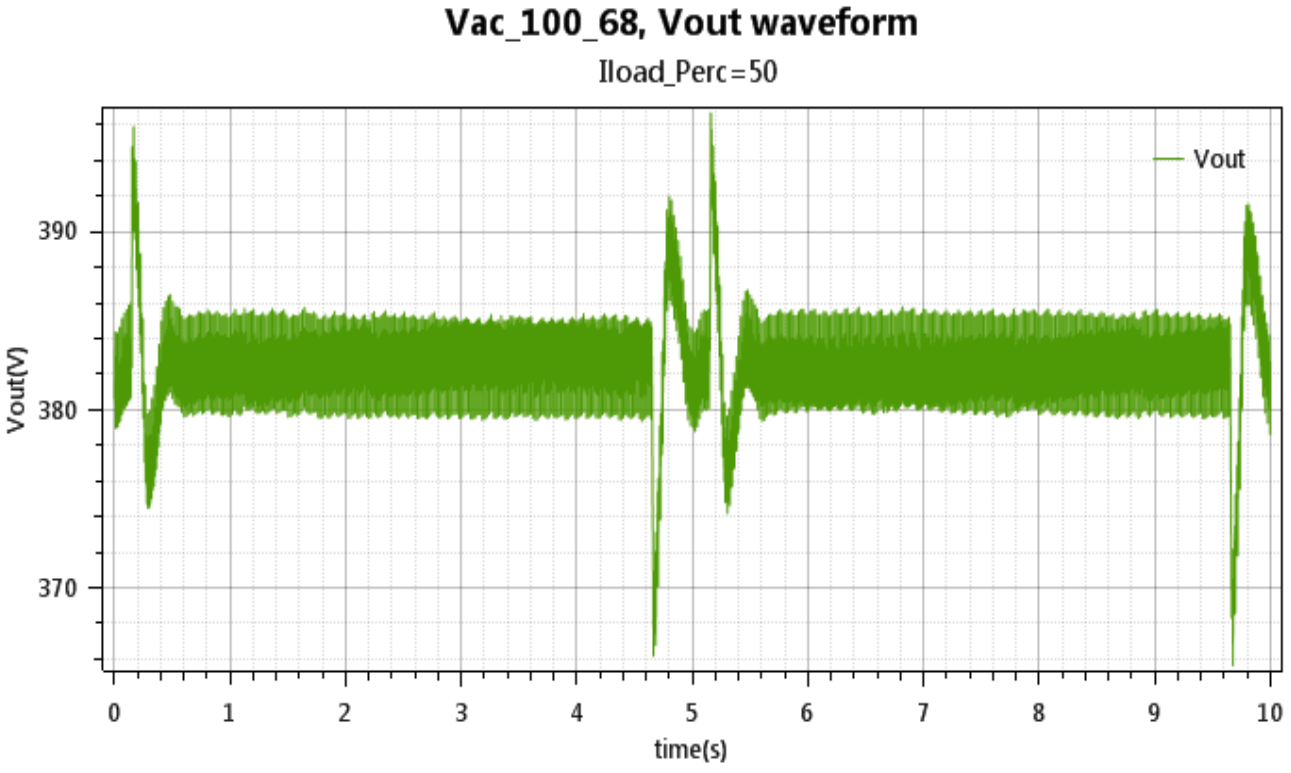
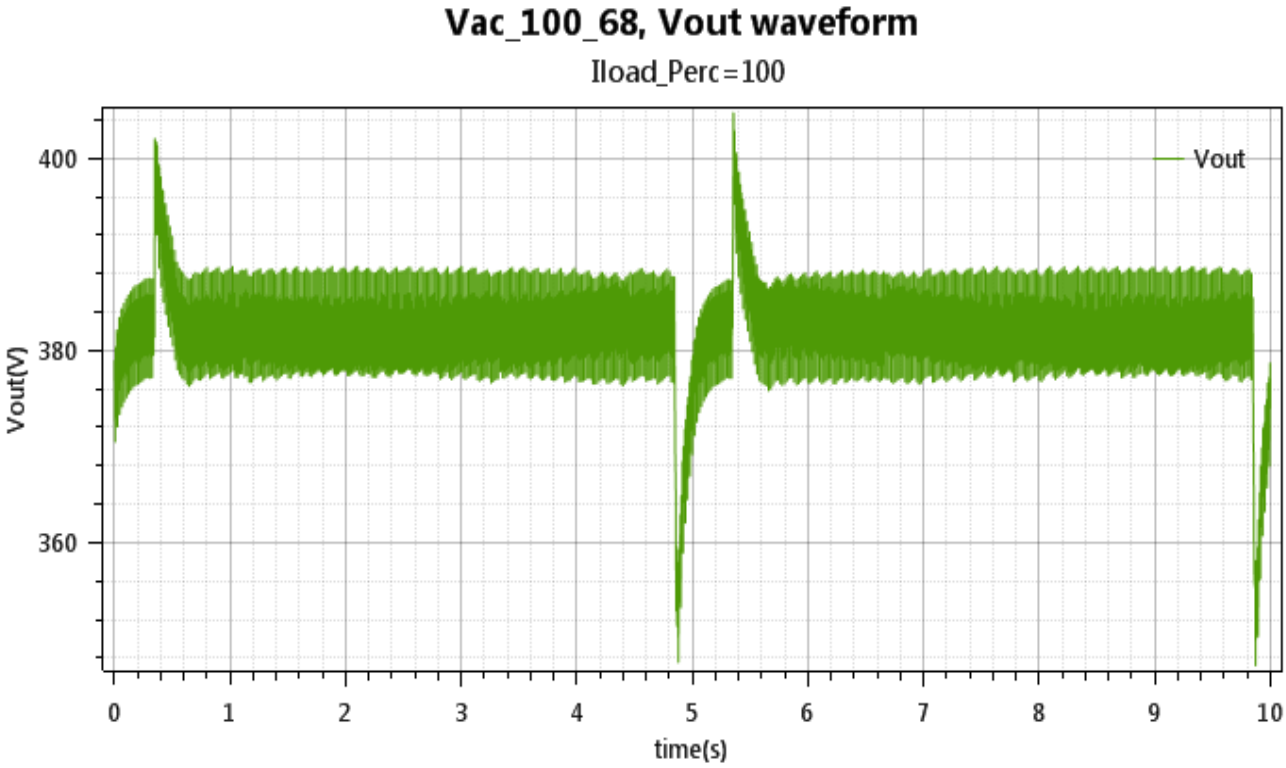


Chart name: Vout waveform




Vac_100_68, Vout waveform
Iload_Perc=100
Vout
400
380
360
Vout(V)
0
1
2
3
4
5
6
7
8
9
10
time(s)

2.6.Test case: Vac_200_130

Chart name: Vout_min_max_vs_Load

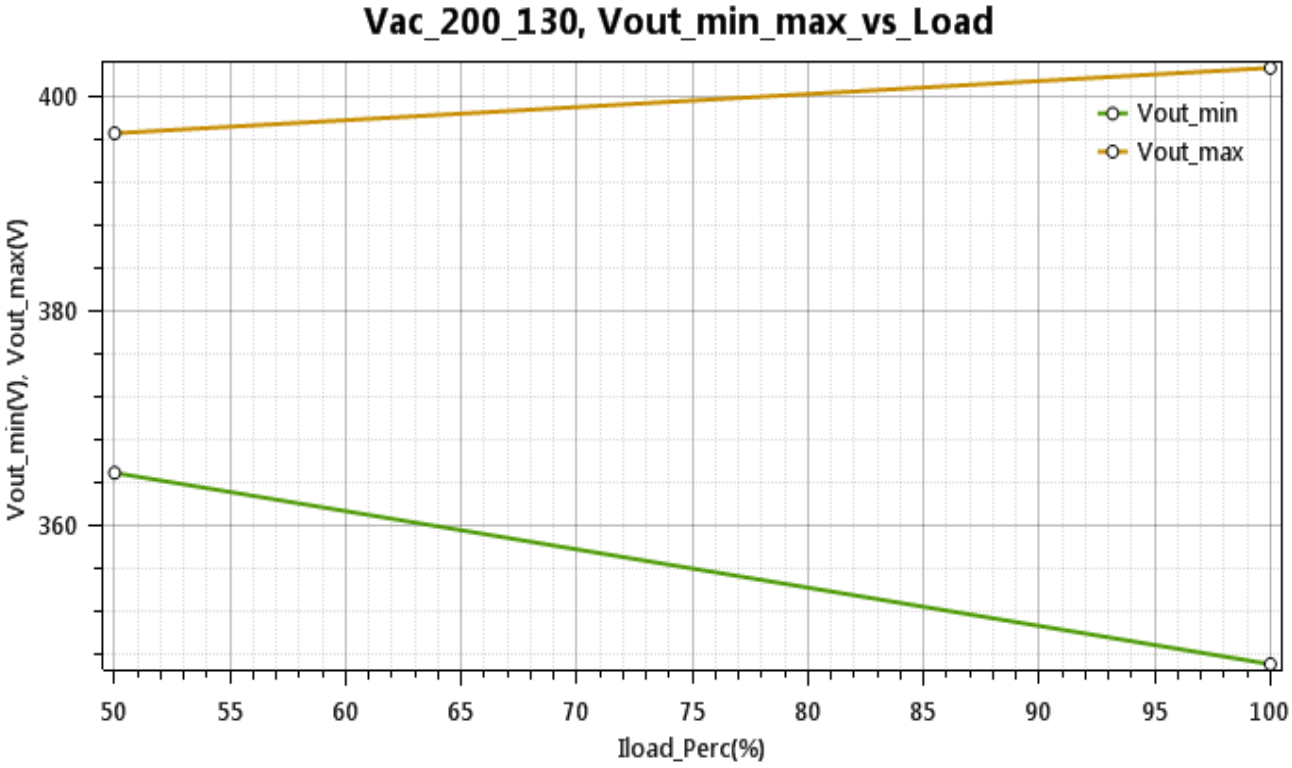
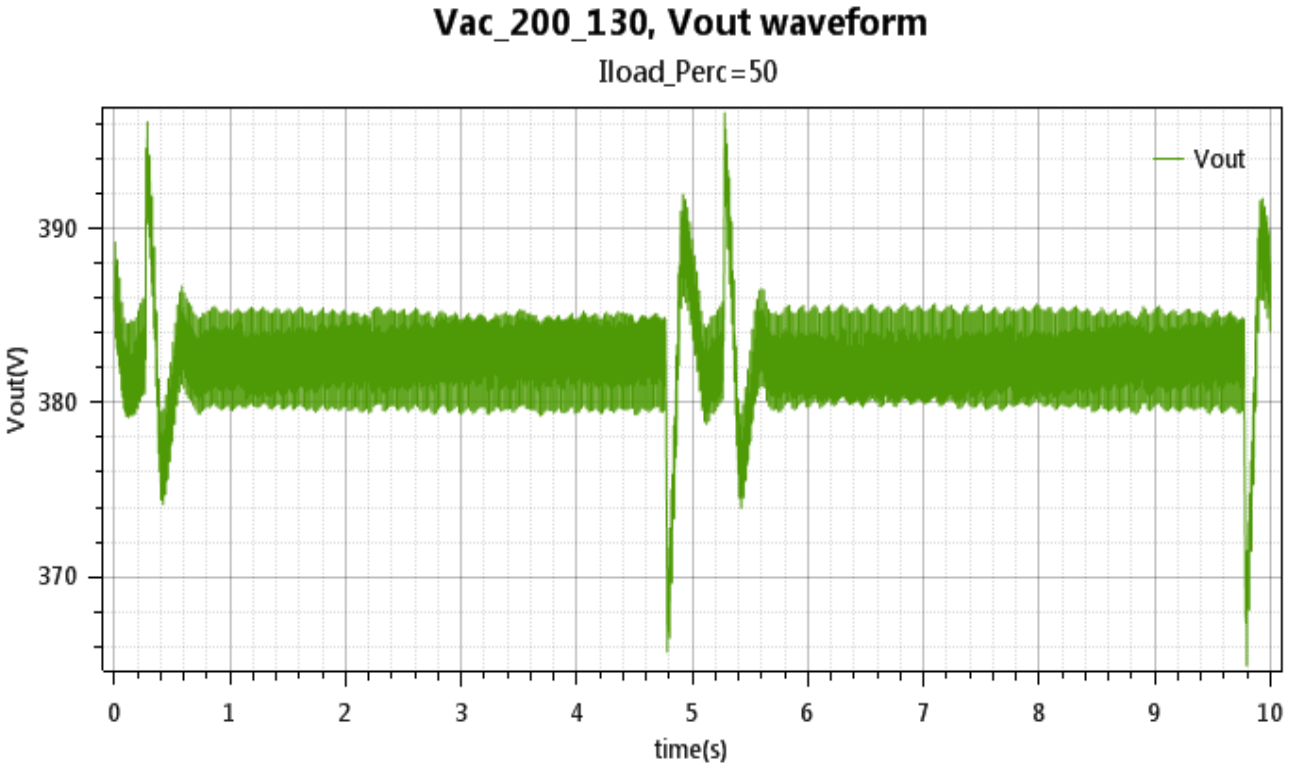
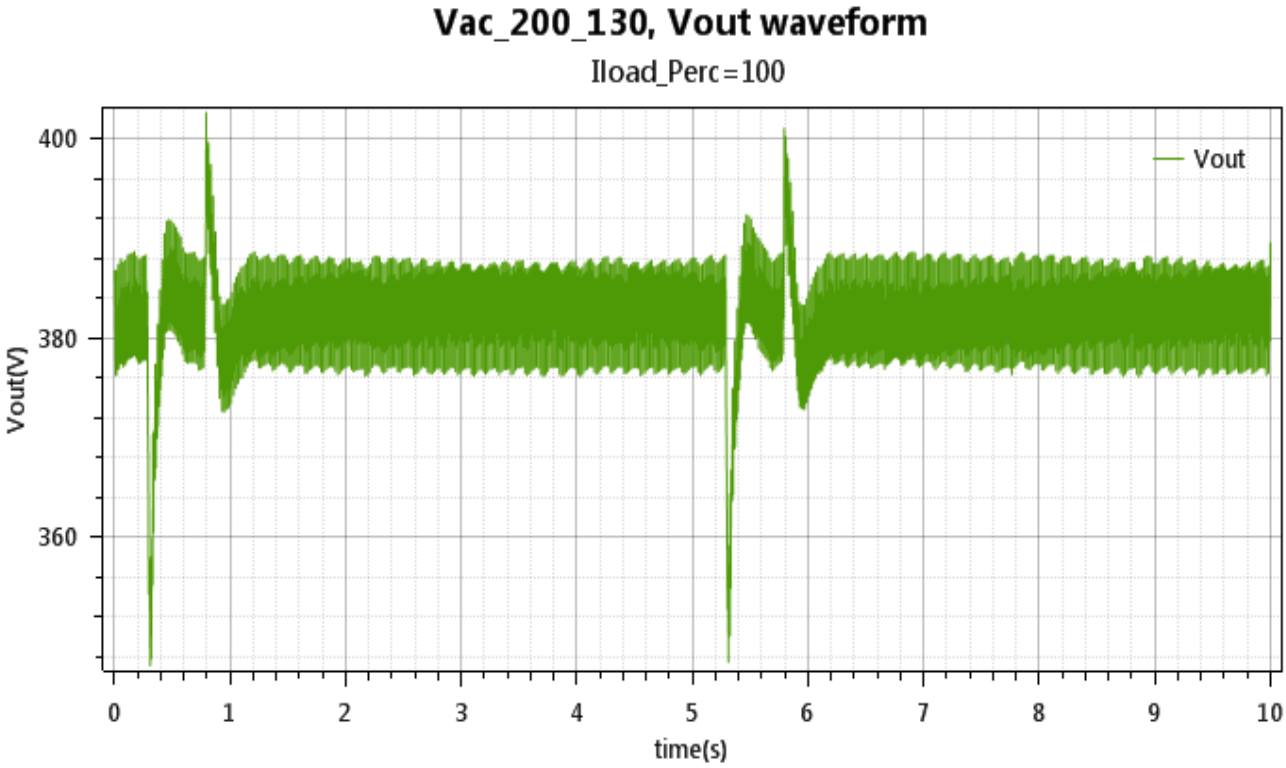


Chart name: Vout waveform




Vac_200_130, Vout waveform
Iload_Perc=100
Vout
400
380
360
Vout(V)
0
1
2
3
4
5
6
7
8
9
10
time(s)

2.7.Test case: Vac_100_75

Chart name: Vout_min_max_vs_Load

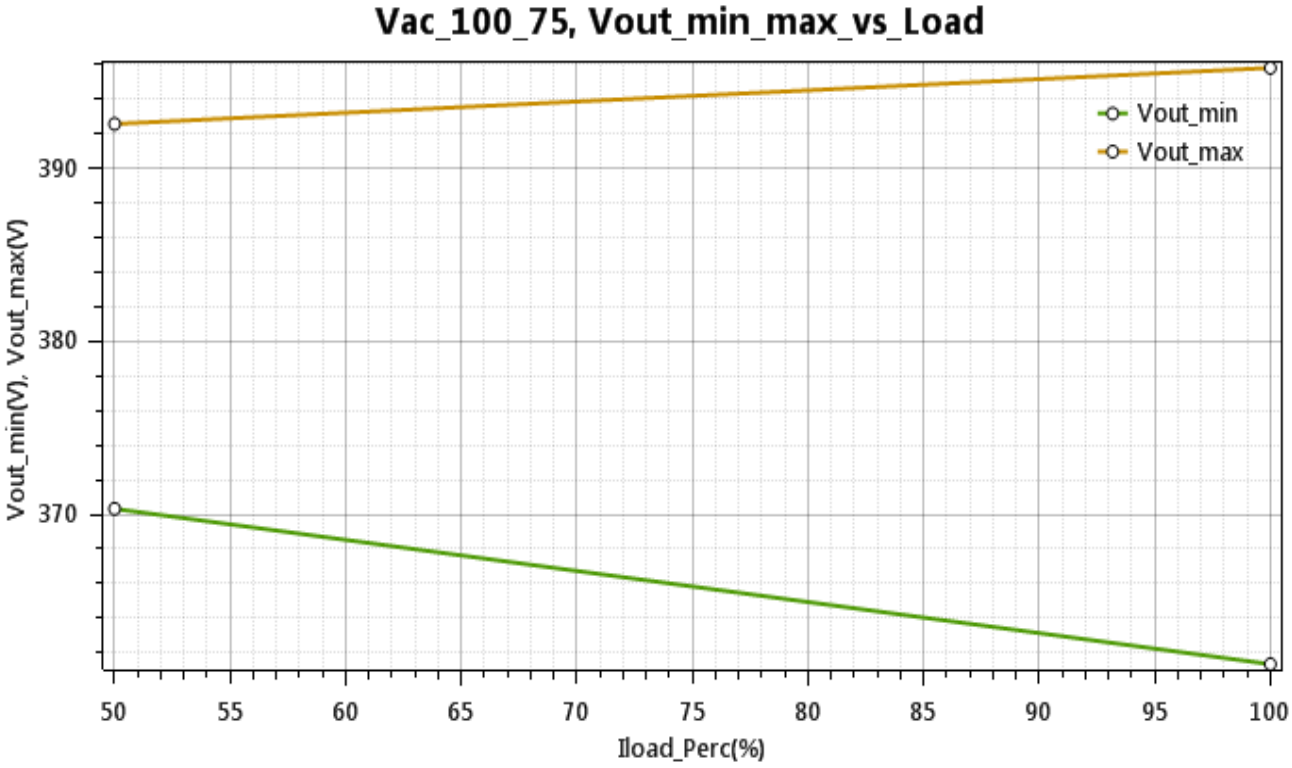
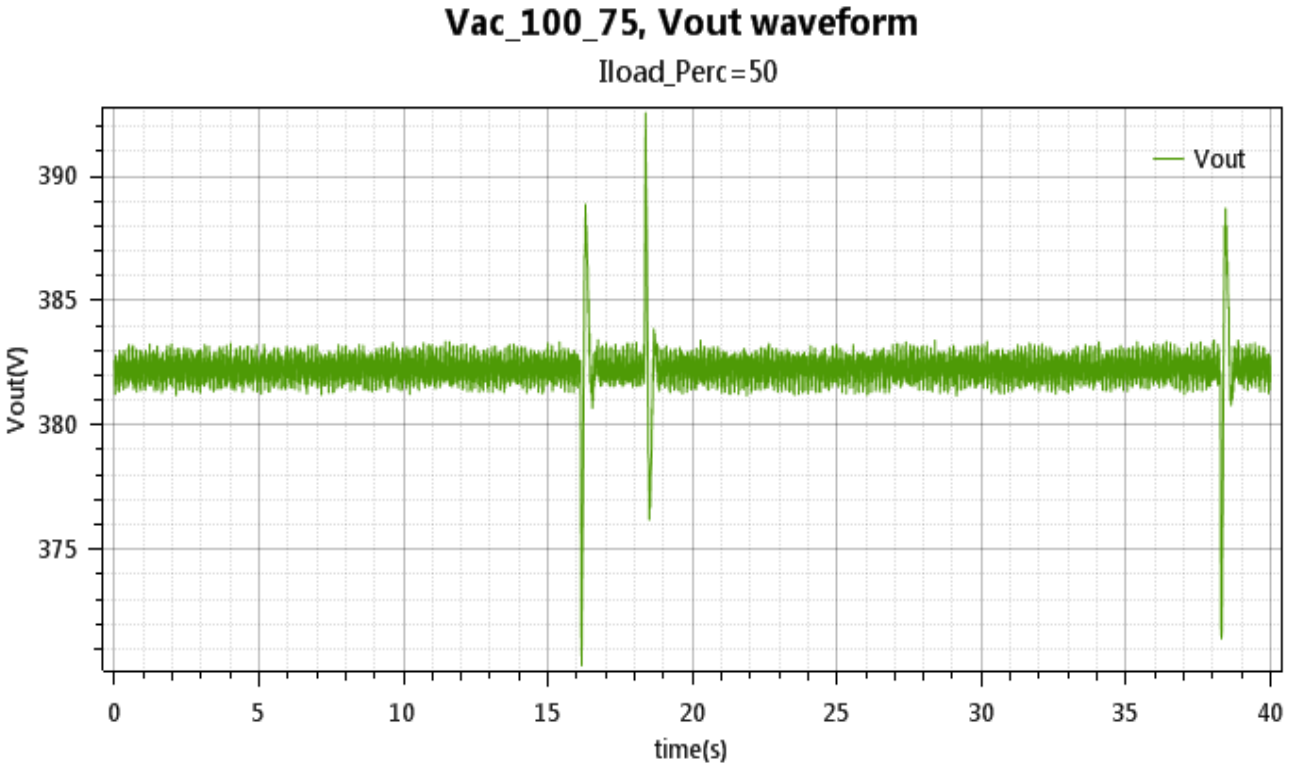
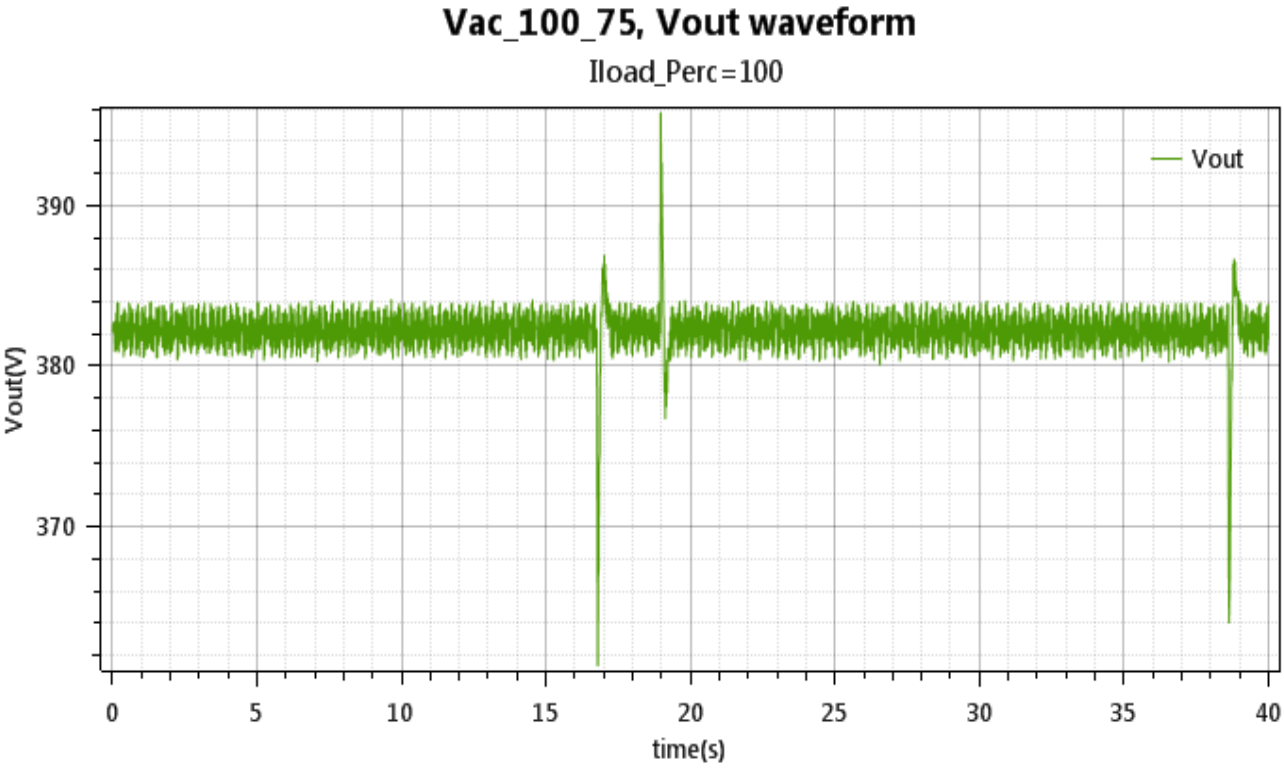


Chart name: Vout waveform




Vac_100_75, Vout waveform
Iload_Perc=100
Vout
390
380
370
Vout(V)
0
5
10
15
20
25
30
35
40
time(s)

2.8.Test case: Vac_200_150

Chart name: Vout_min_max_vs_Load

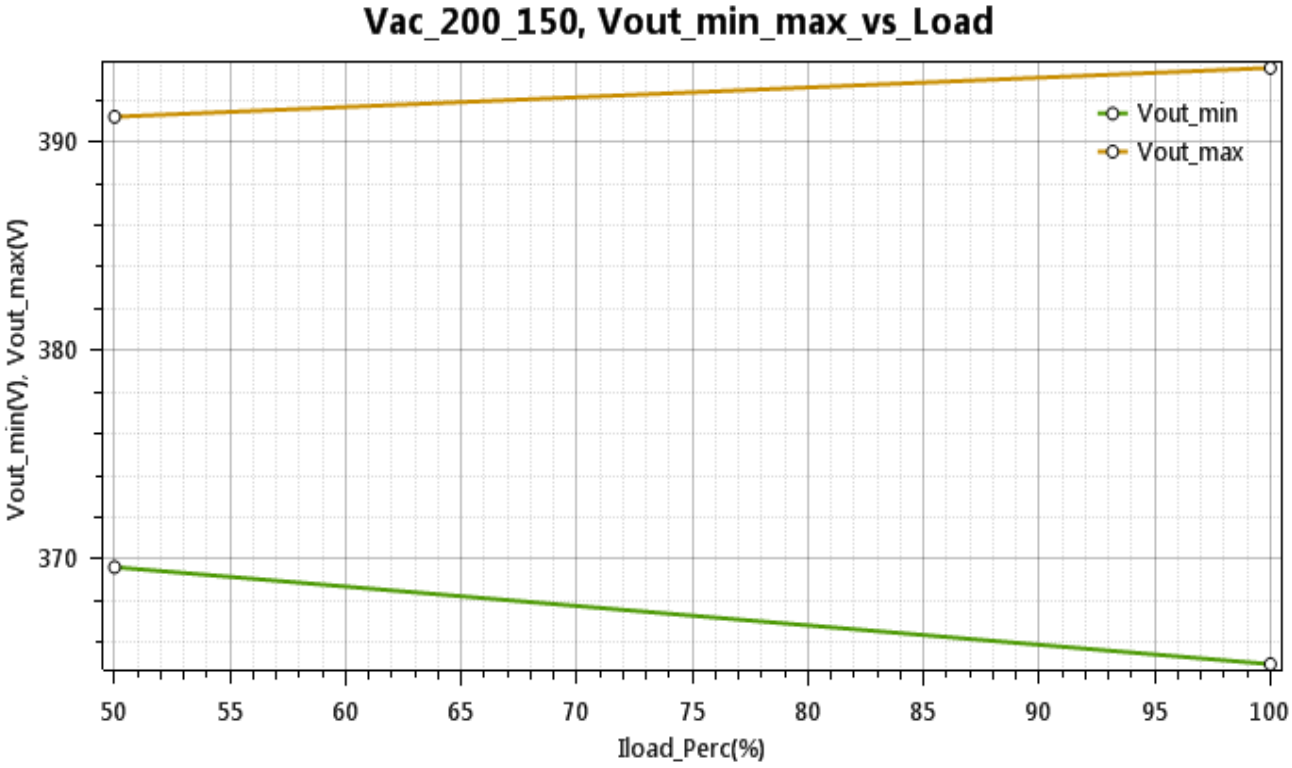
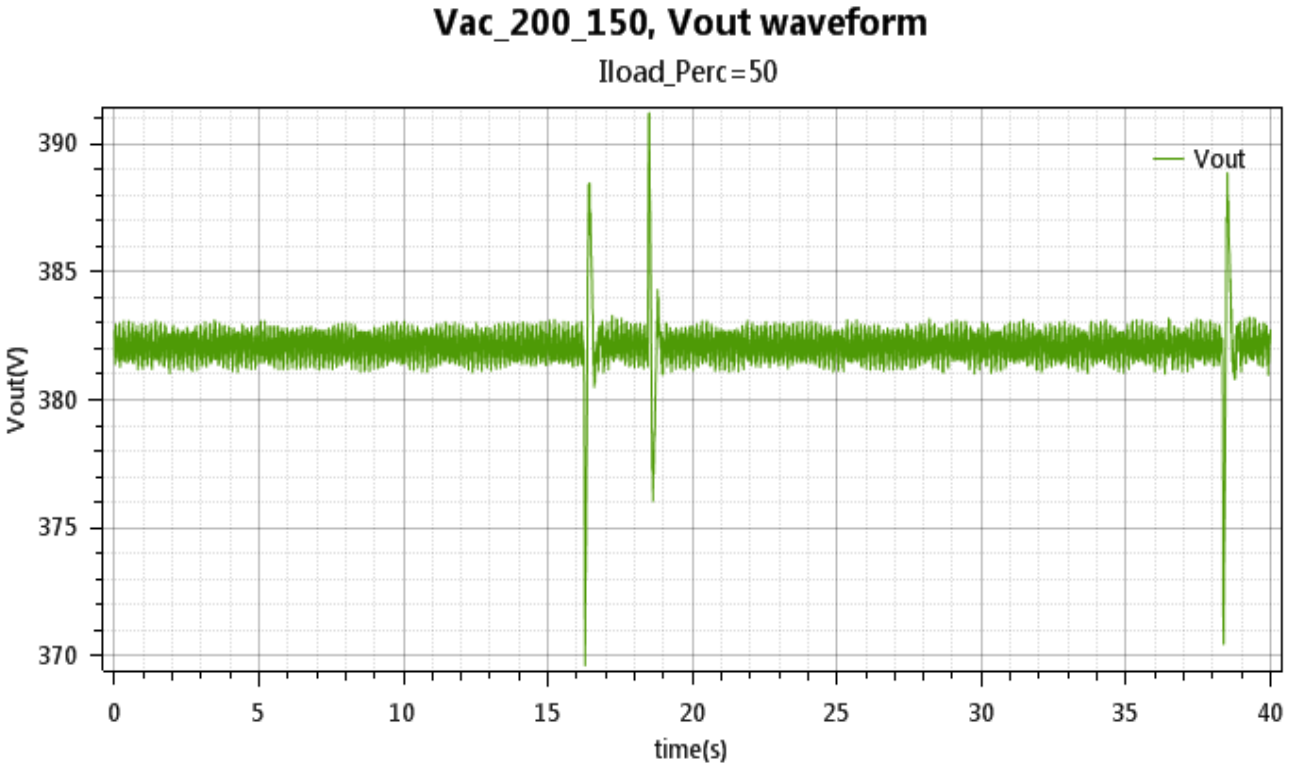
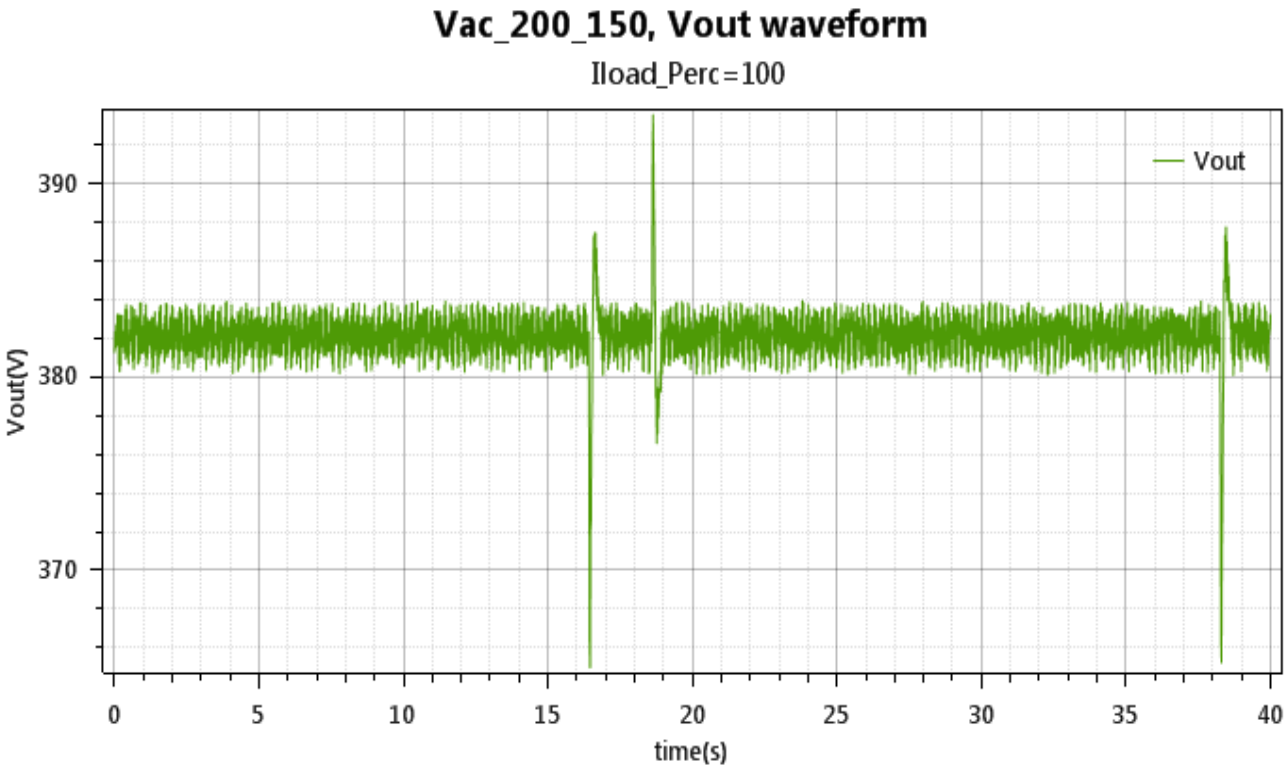


Chart name: Vout waveform




Vac_200_150, Vout waveform
Iload_Perc=100
Vout
390
380
370
Vout(V)
0
5
10
15
20
25
30
35
40
time(s)

2.9.Test case: Ithd_115V

Chart name: Ithd

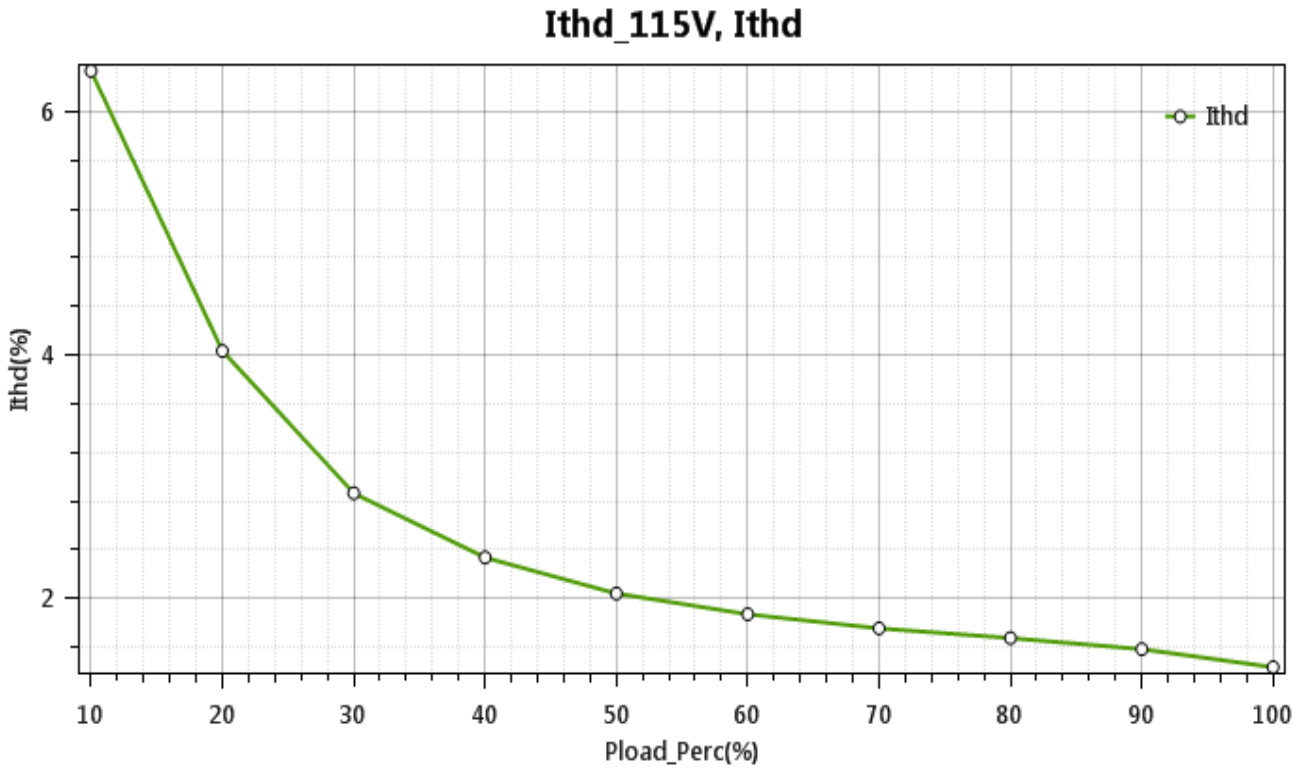
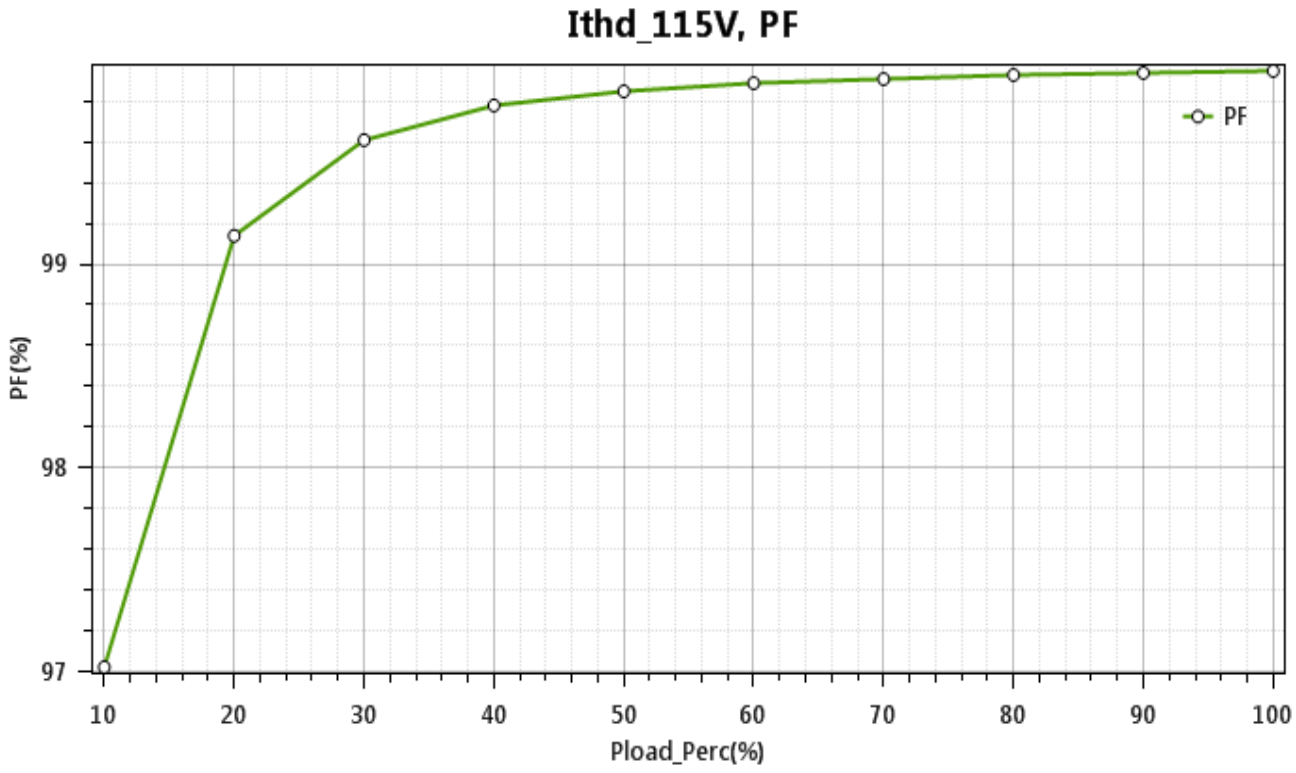


Chart name: PF



2.10.Test case: Ithd_230V

Chart name: Ithd

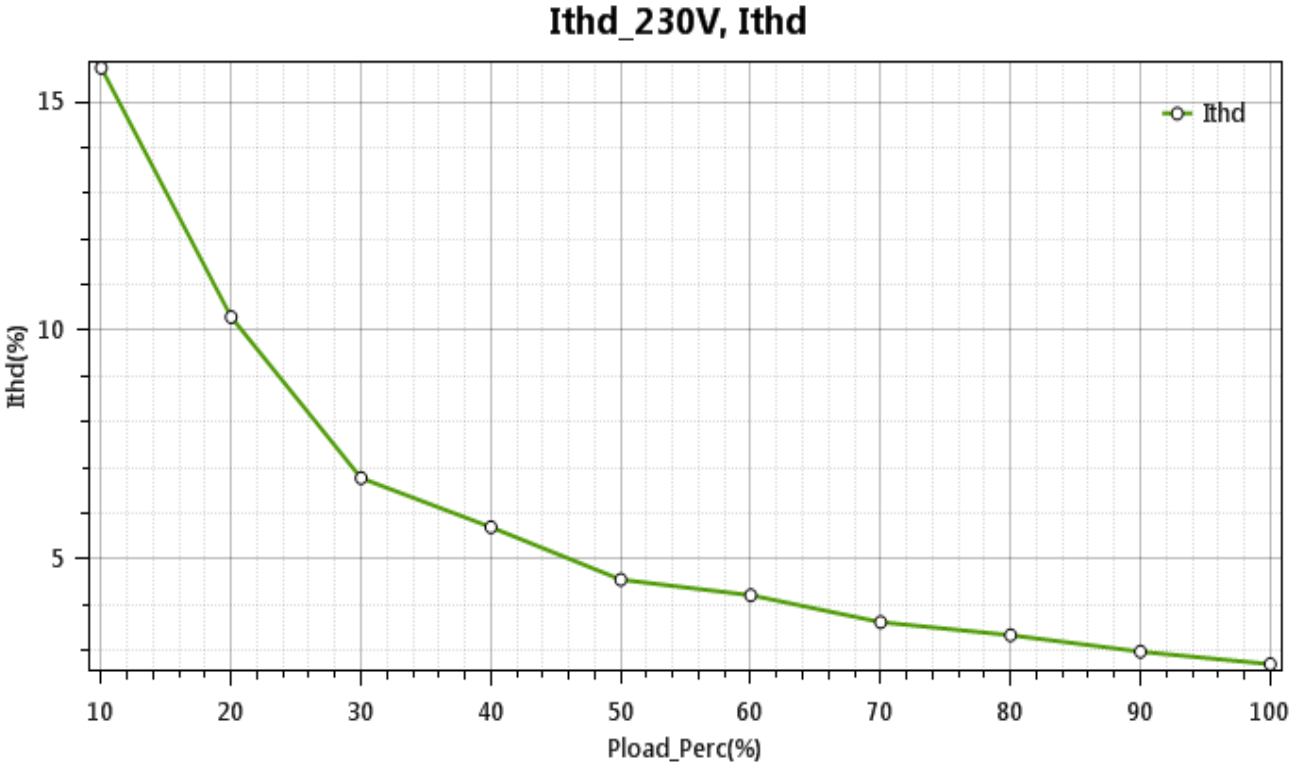
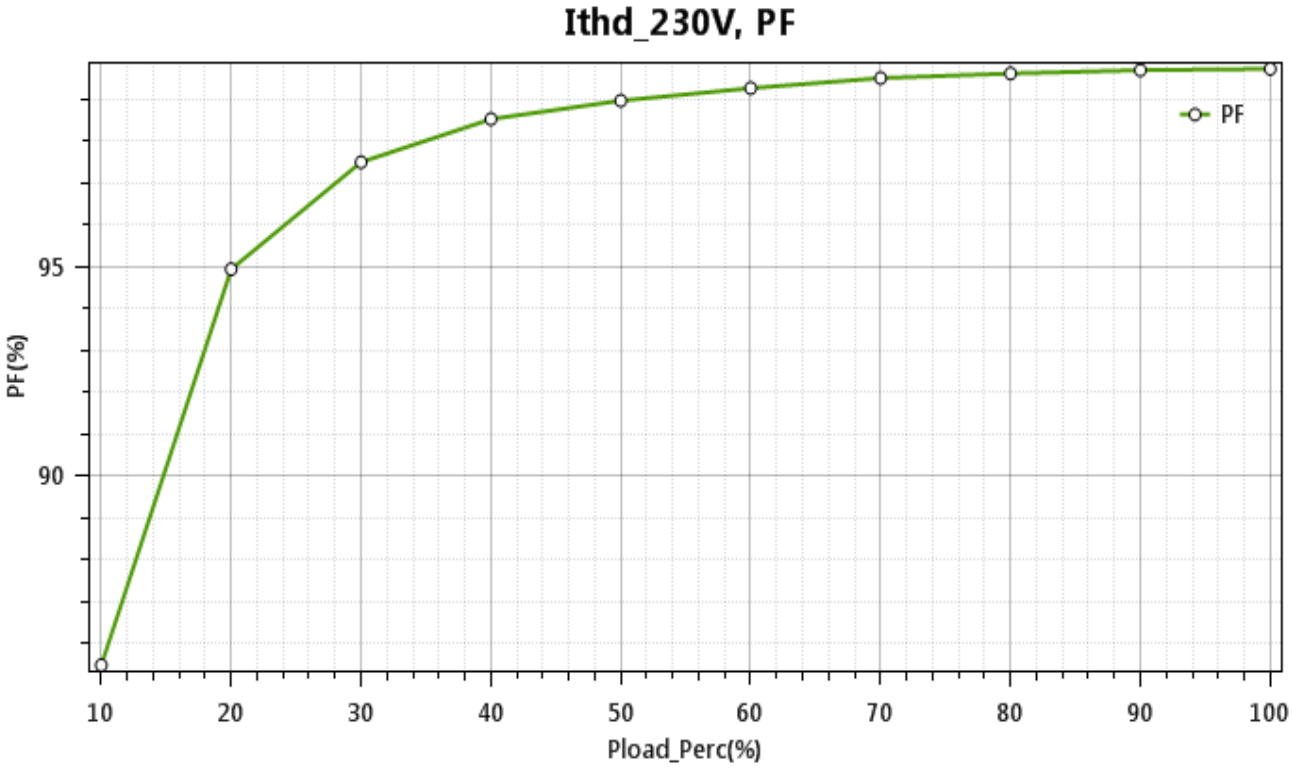


Chart name: PF



2.11.Test case: Load_transient_5Hz

Chart name: Vout_min_max_vs_Load

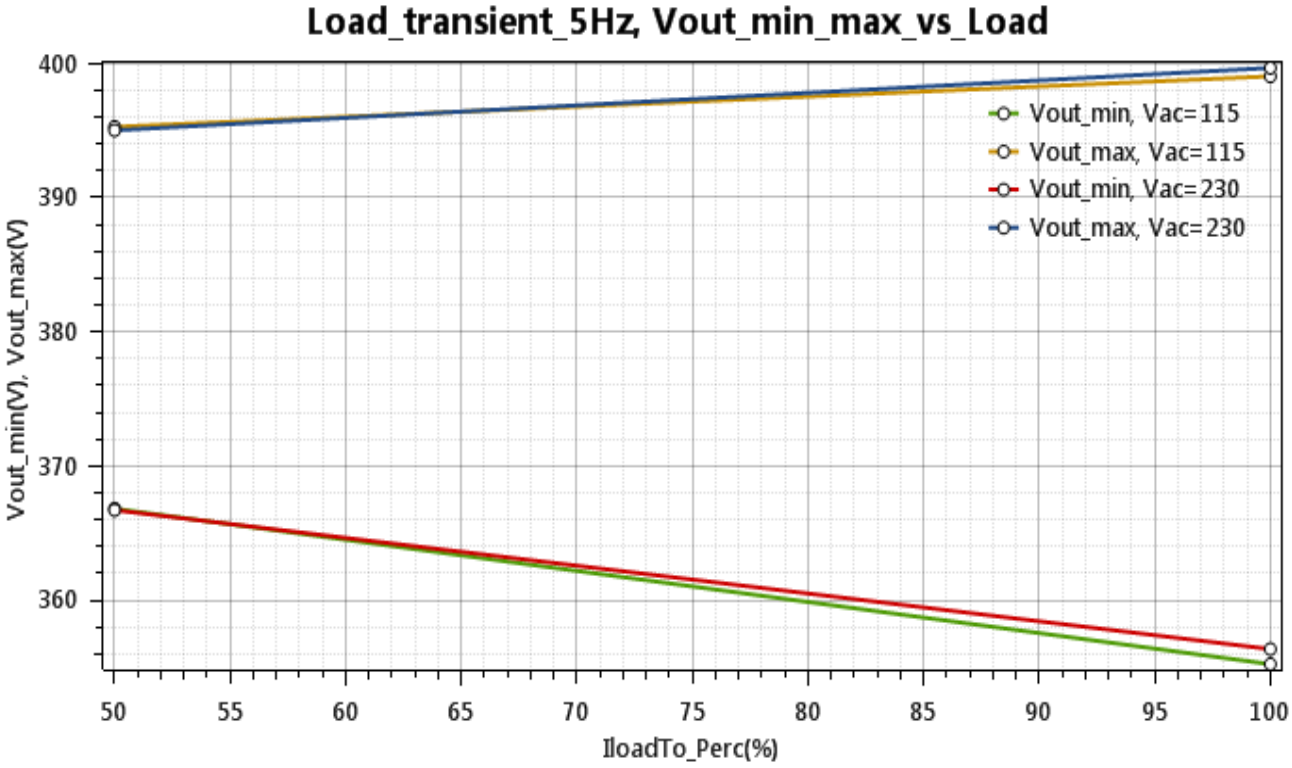
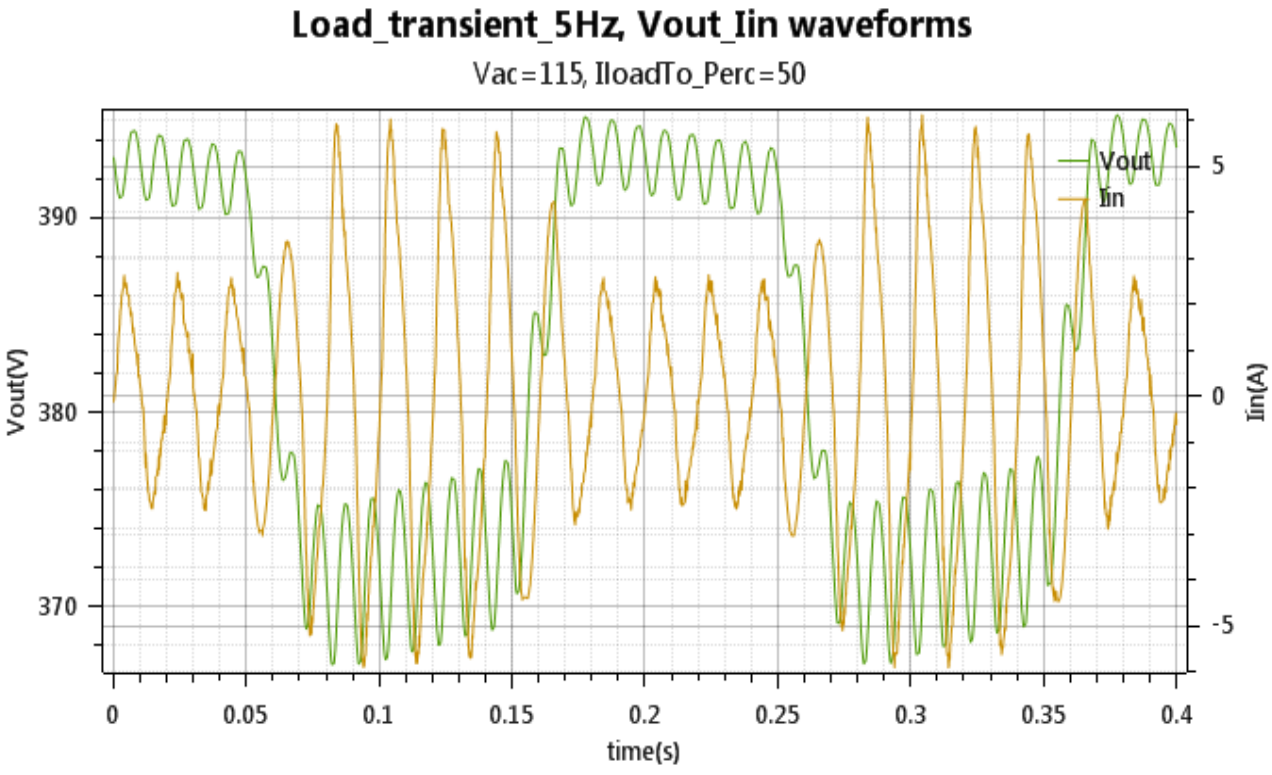
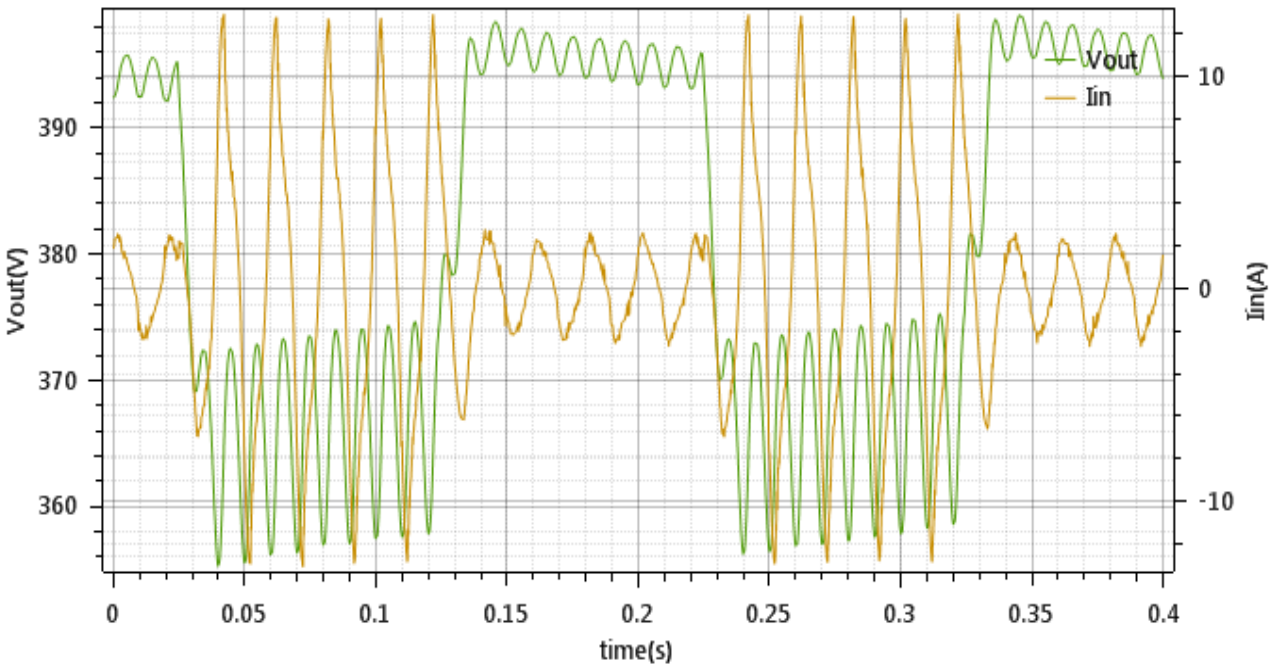


Chart name: Vout_Iin waveforms



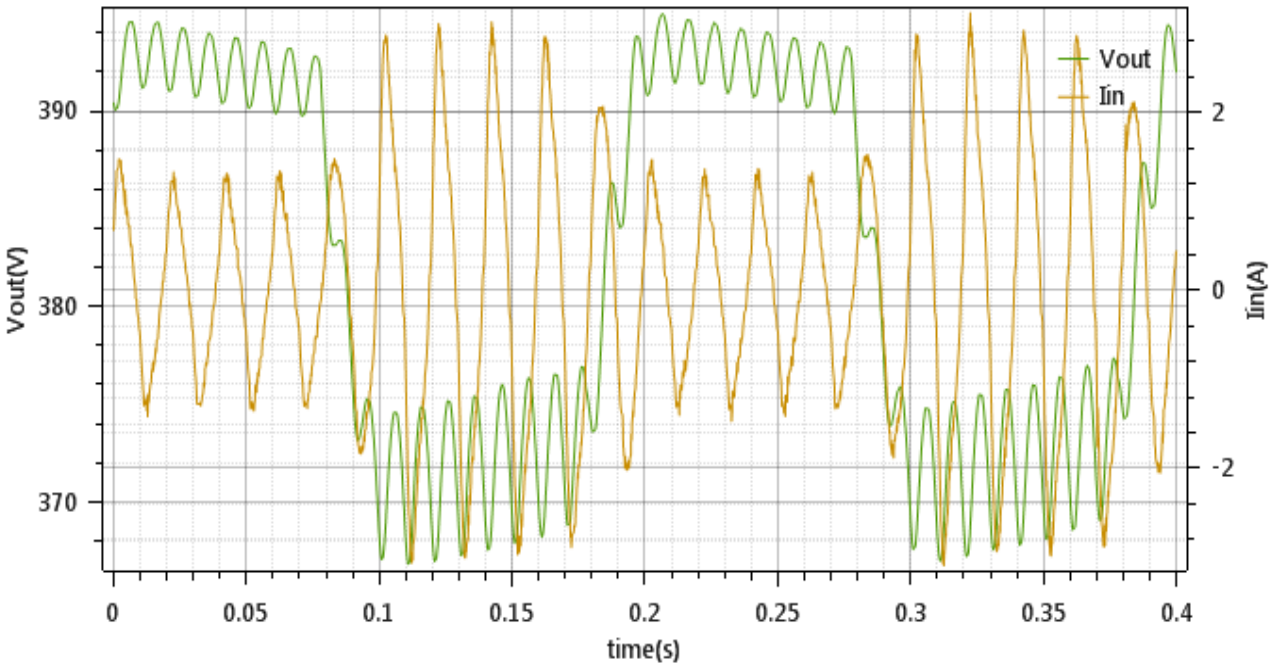
Load_transient_5Hz, Vout_Iin waveforms

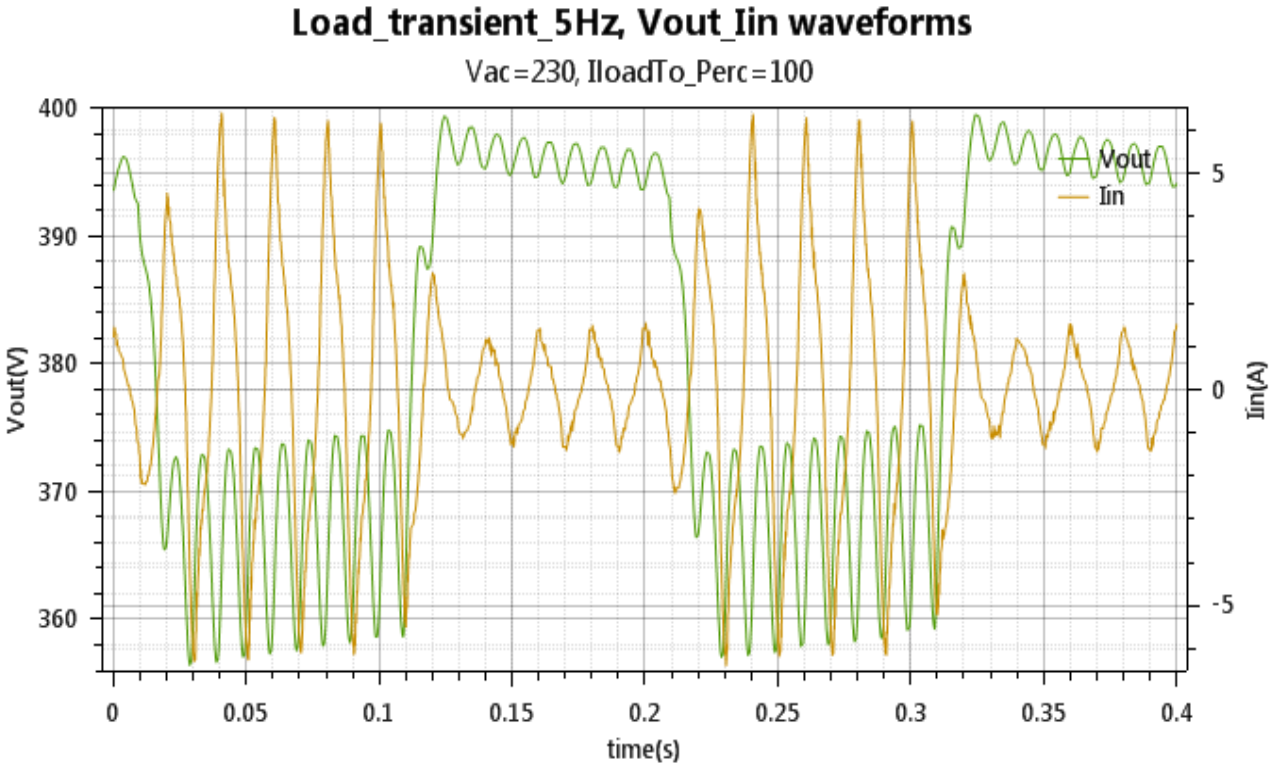
Vac=115, IloadTo_Perc=100



Load_transient_5Hz, Vout_Iin waveforms

Vac=230, IloadTo_Perc=50




Load_transient_5Hz, Vout_Iin waveforms
Vac=230, IloadTo_Perc=100
Vout
Iin
Vout(V)
Iin(A)
time(s)
400
390
380
370
360
5
0
-5
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4

2.12.Test case: Load_transient_100Hz

Chart name: Vout_min_max_vs_Load

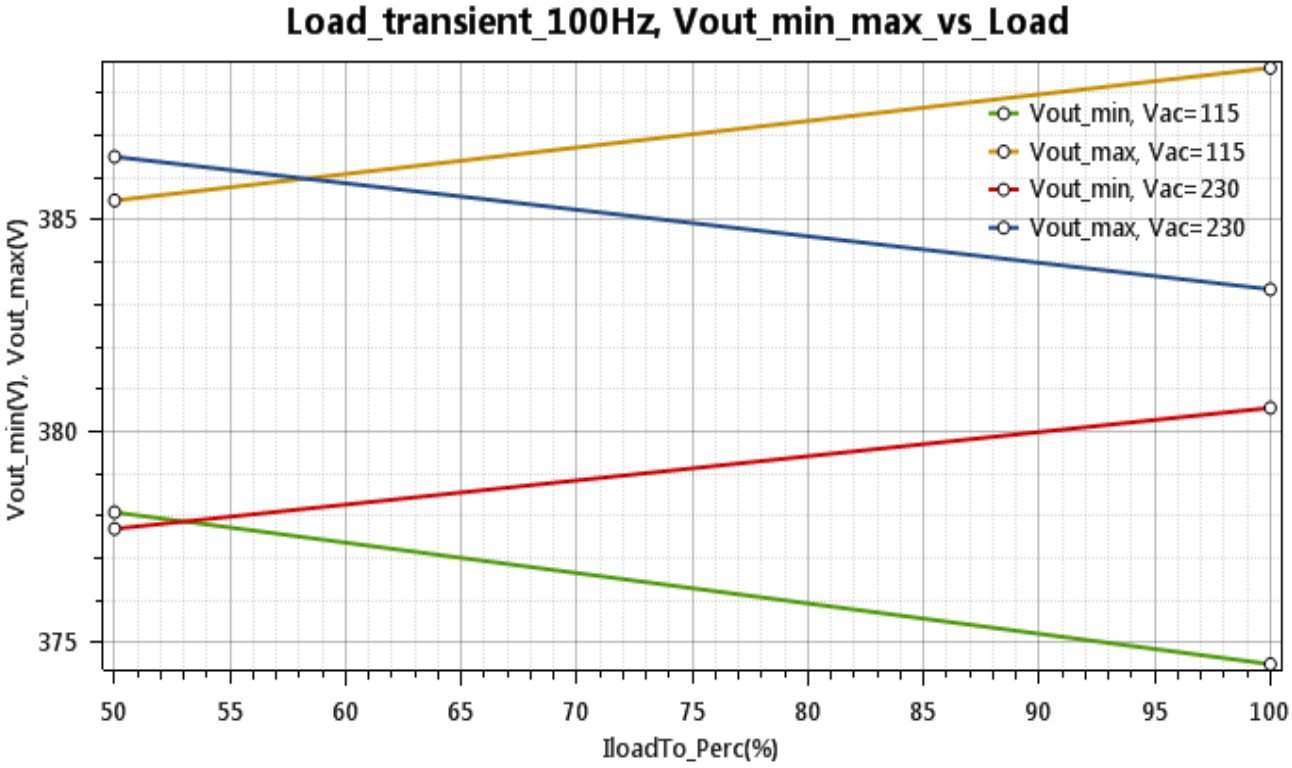
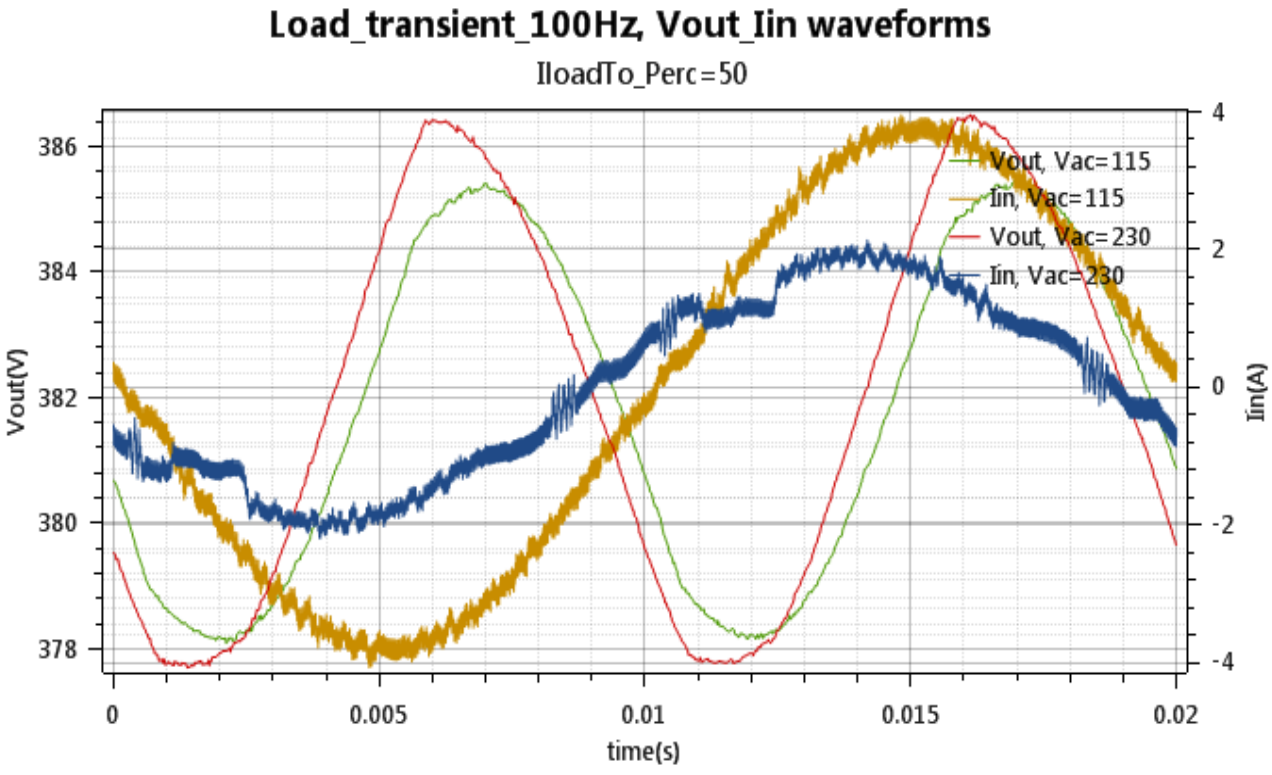
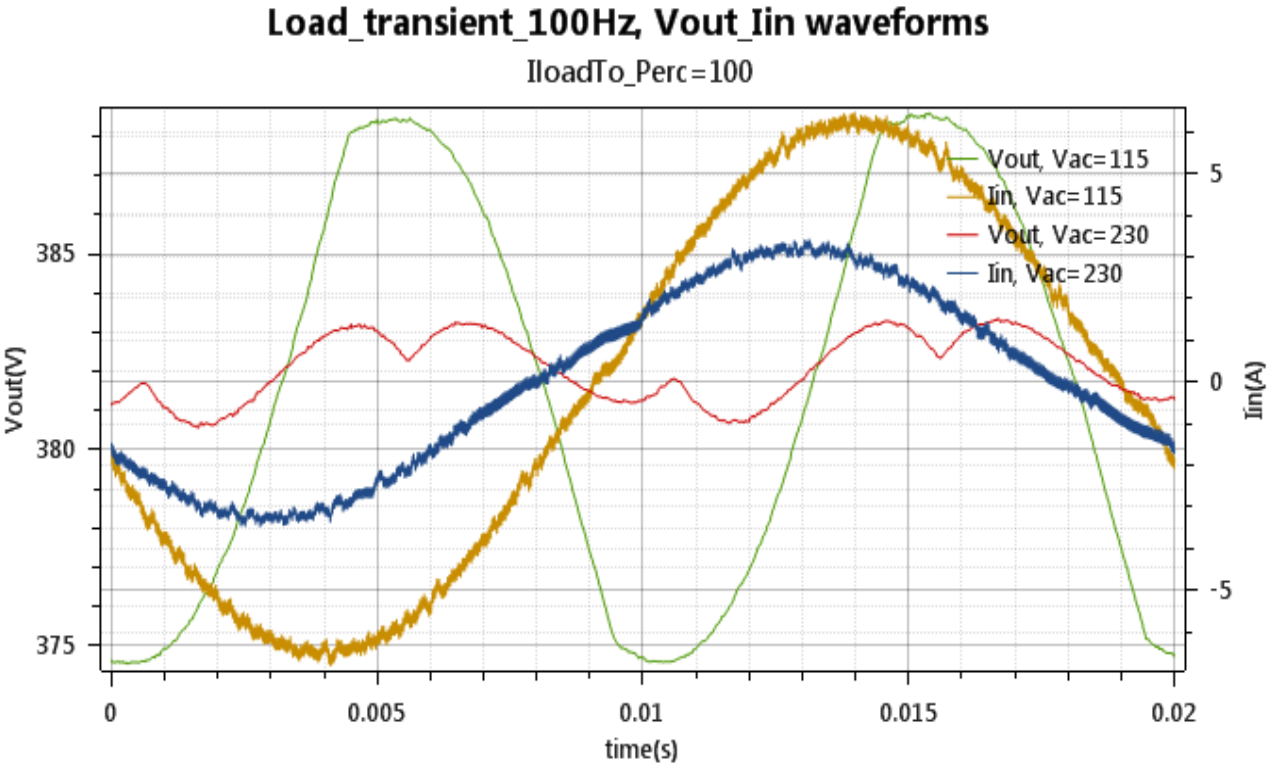


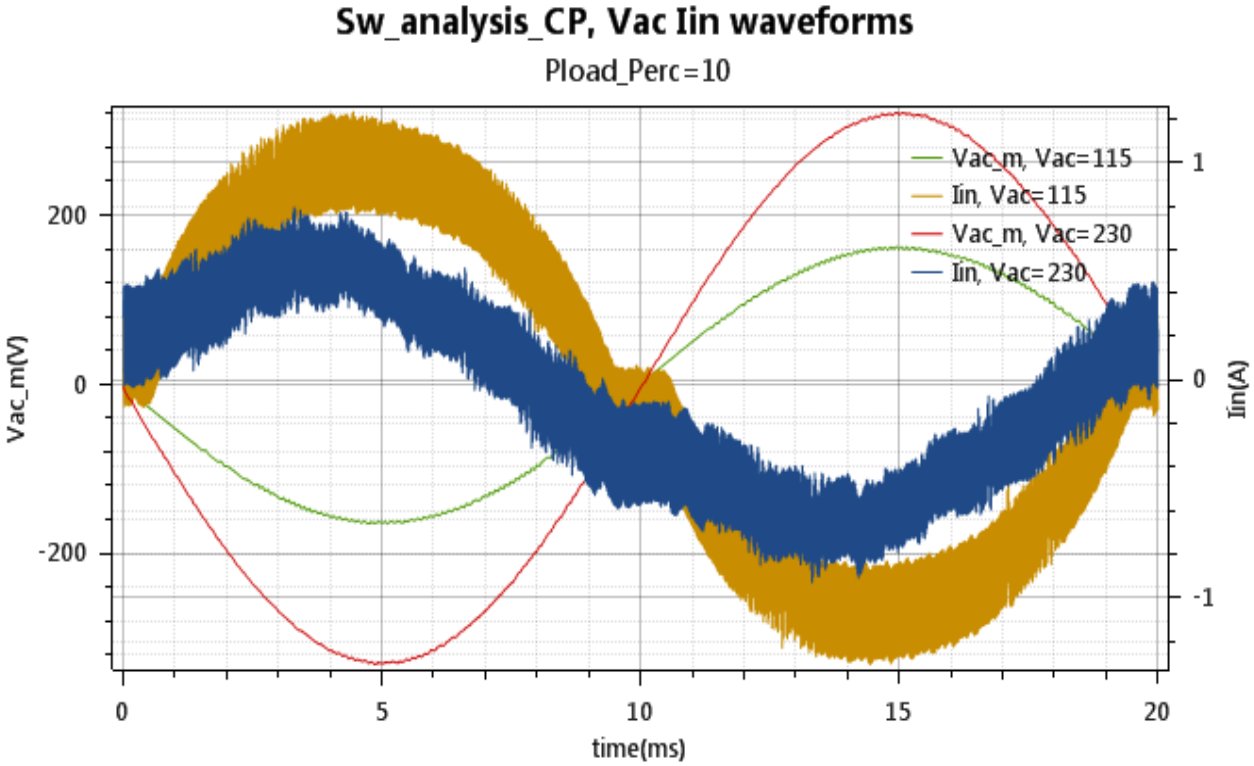
Chart name: Vout_Iin waveforms

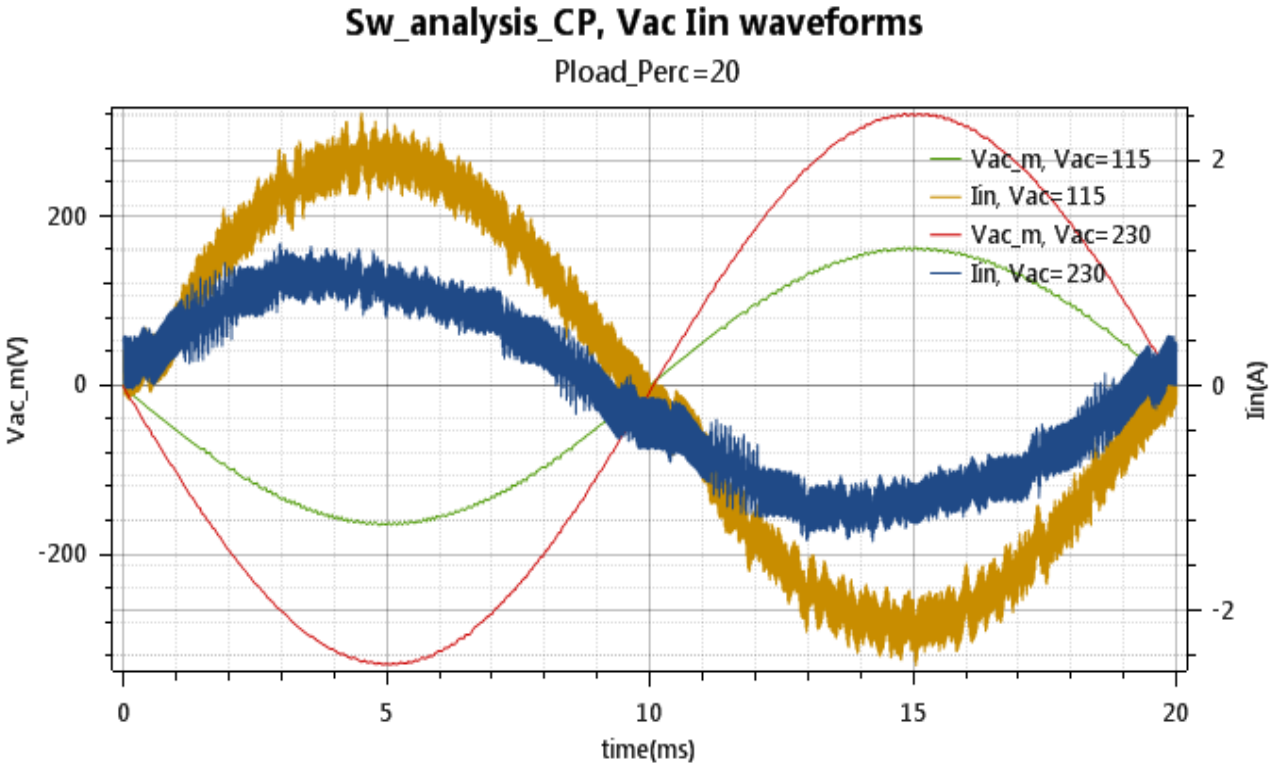


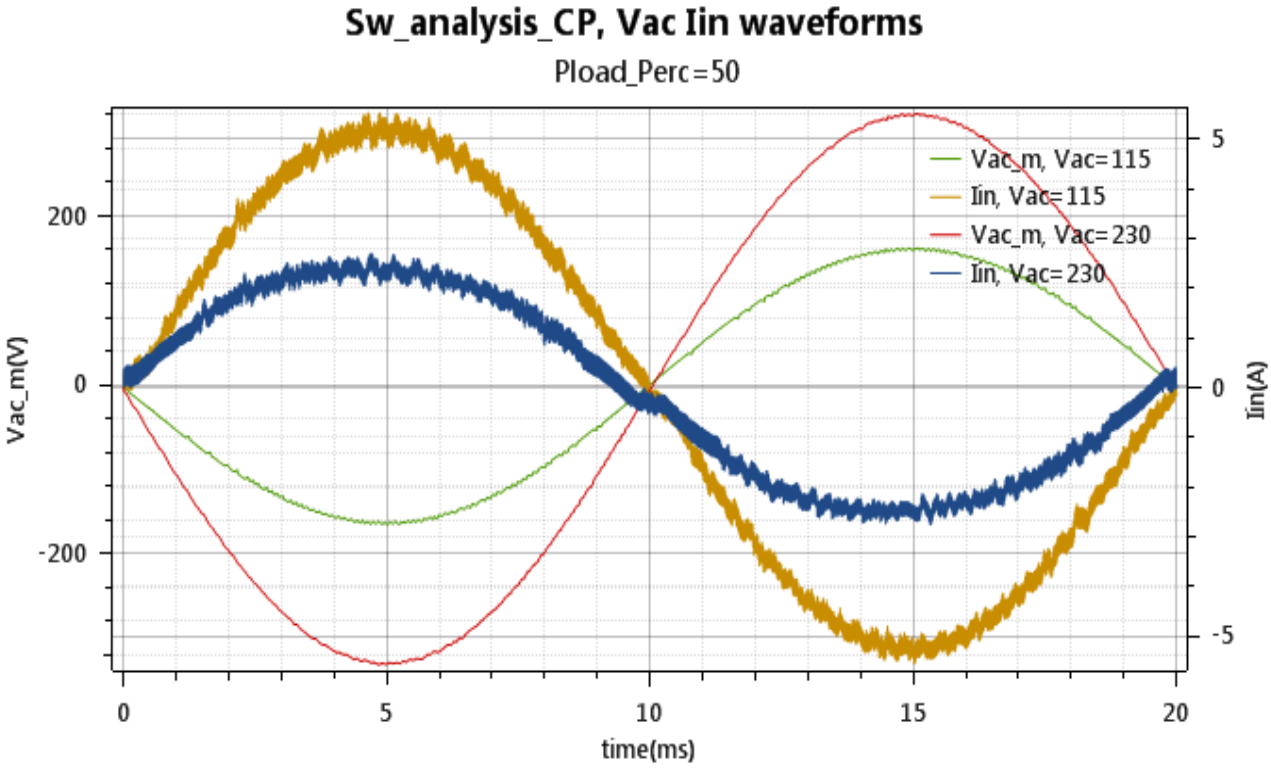

Load_transient_100Hz, Vout_Iin waveforms
IloadTo_Perc=100
Vout, Vac=115
Iin, Vac=115
Vout, Vac=230
Iin, Vac=230
Vout(V)
Iin(A)
385
380
375
5
0
-5
0
0.005
0.01
0.015
0.02
time(s)

2.13.Test case: Sw_analysis_CP

Chart name: Vac Iin waveforms






Sw_analysis_CP, Vac Iin waveforms
Pload_Perc=50
Vac_m, Vac=115
Iin, Vac=115
Vac_m, Vac=230
Iin, Vac=230
Vac_m(V)
Iin(A)
time(ms)
200
0
-200
5
0
-5
0
5
10
15
20

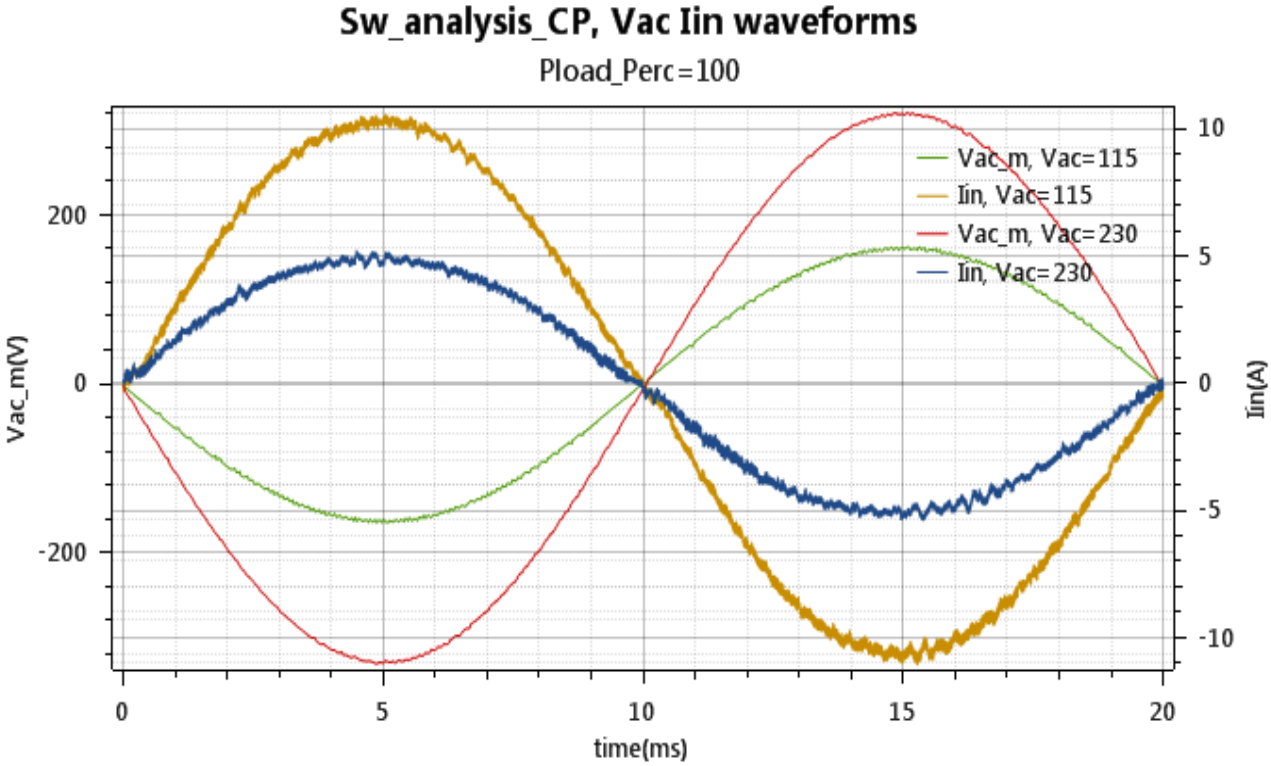
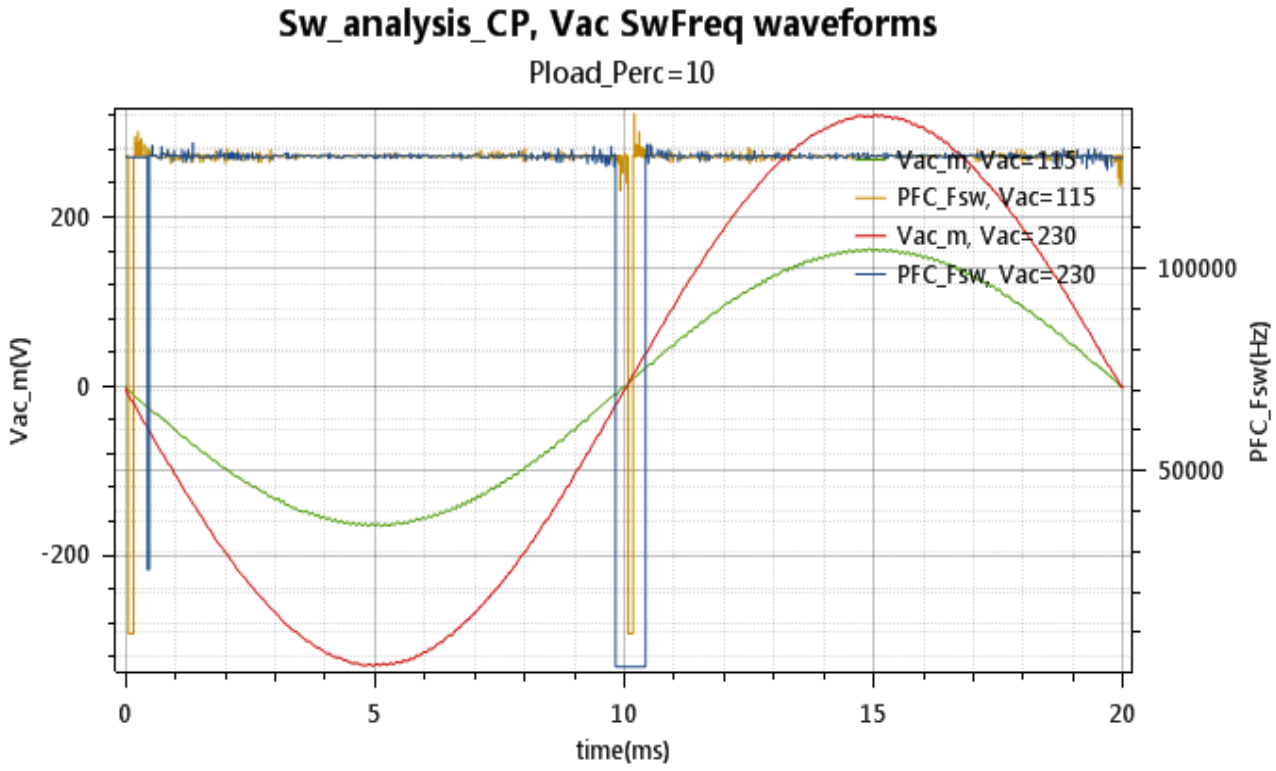
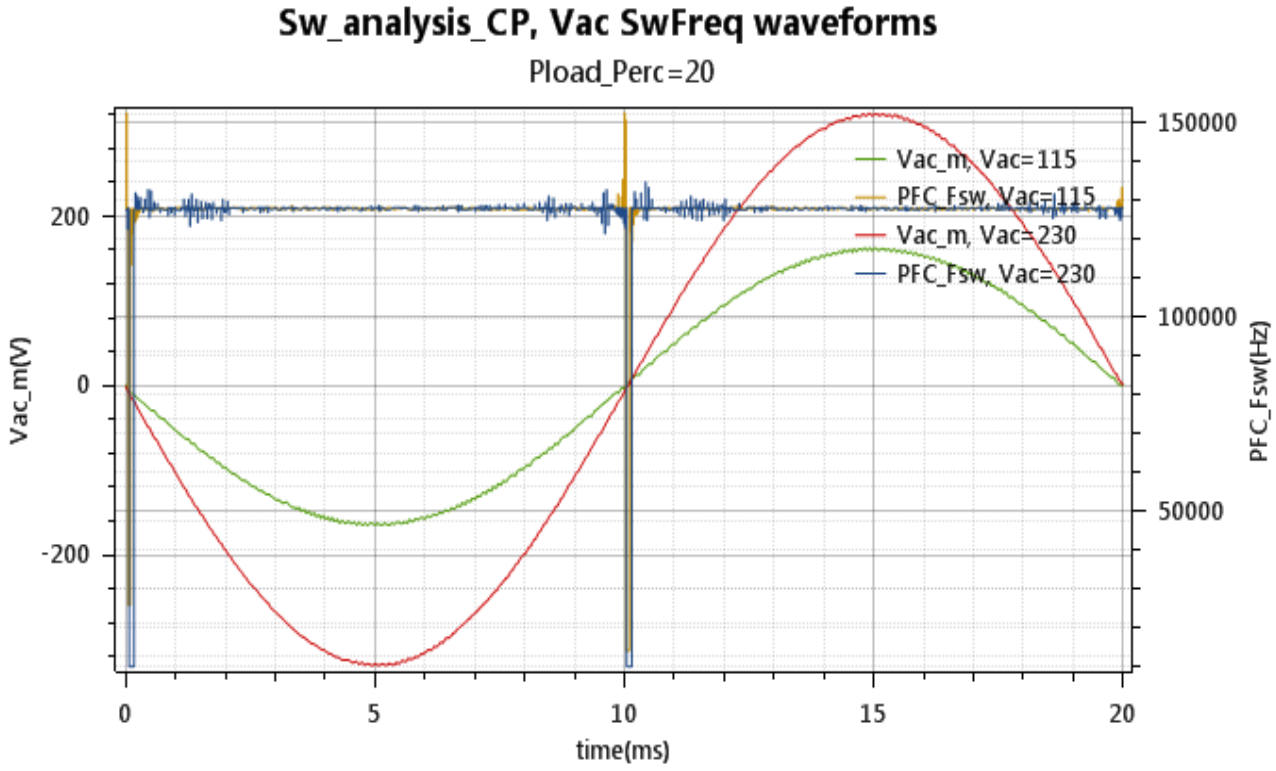
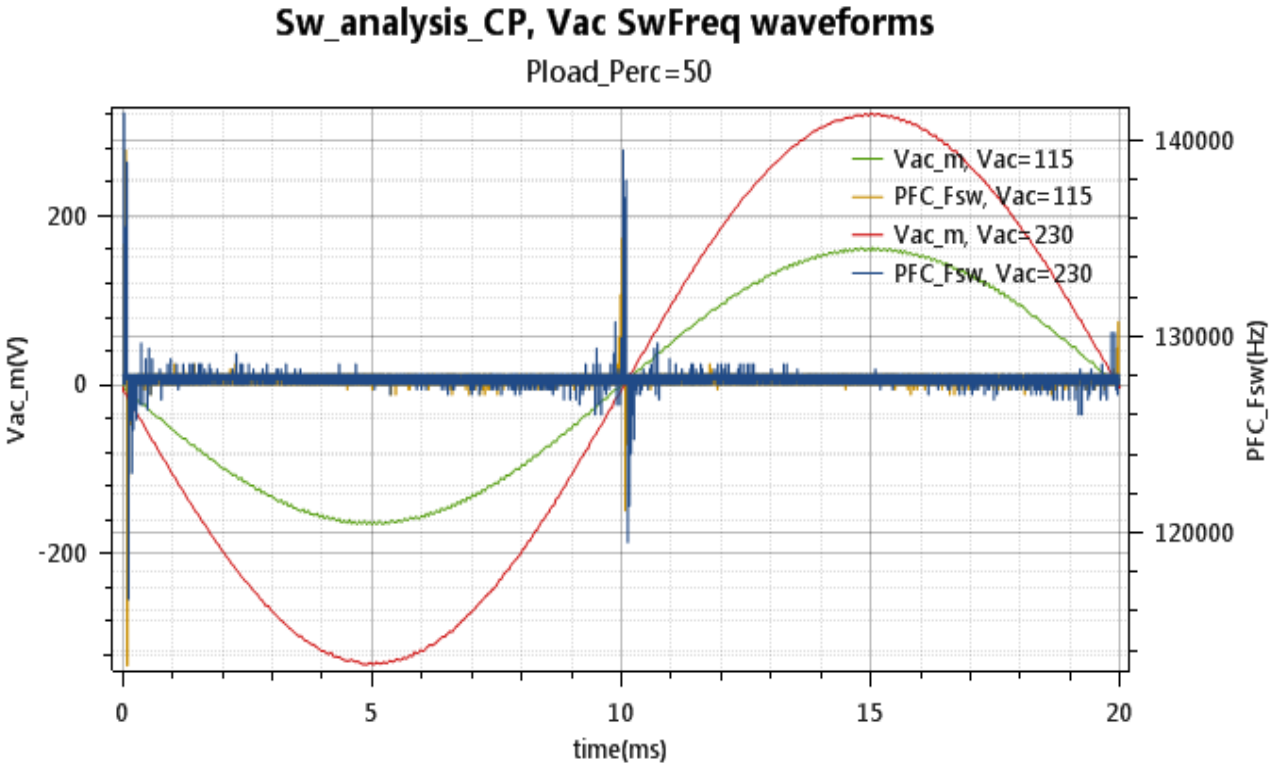

Sw_analysis_CP, Vac Iin waveforms
Pload_Perc=100
Vac_m, Vac=115
Iin, Vac=115
Vac_m, Vac=230
Iin, Vac=230
Vac_m(V)
Iin(A)
time(ms)
200
0
-200
10
5
0
-5
-10
0
5
10
15
20

Chart name: Vac SwFreq waveforms






Sw_analysis_CP, Vac SwFreq waveforms
Pload_Perc=50
Vac_m, Vac=115
PFC_Fsw, Vac=115
Vac_m, Vac=230
PFC_Fsw, Vac=230
Vac_m(V)
PFC_Fsw(Hz)
time(ms)
200
0
-200
140000
130000
120000
0
5
10
15
20

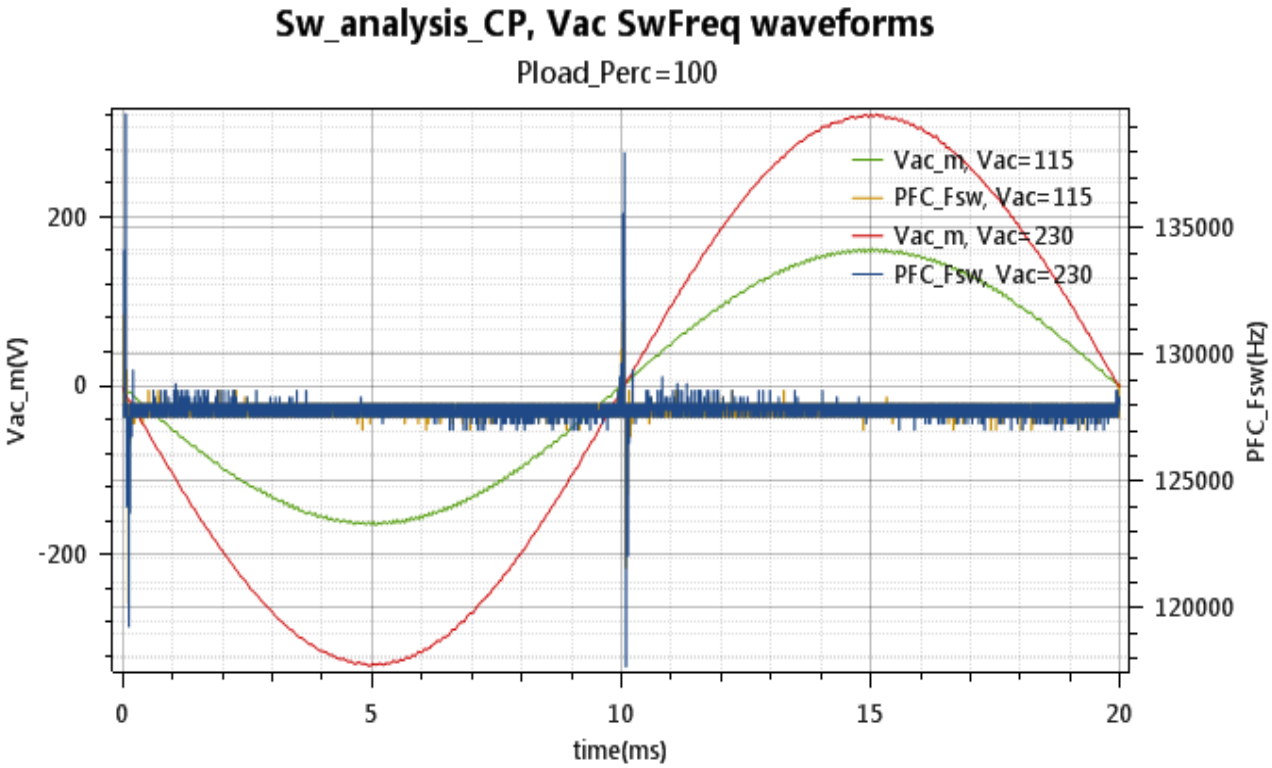
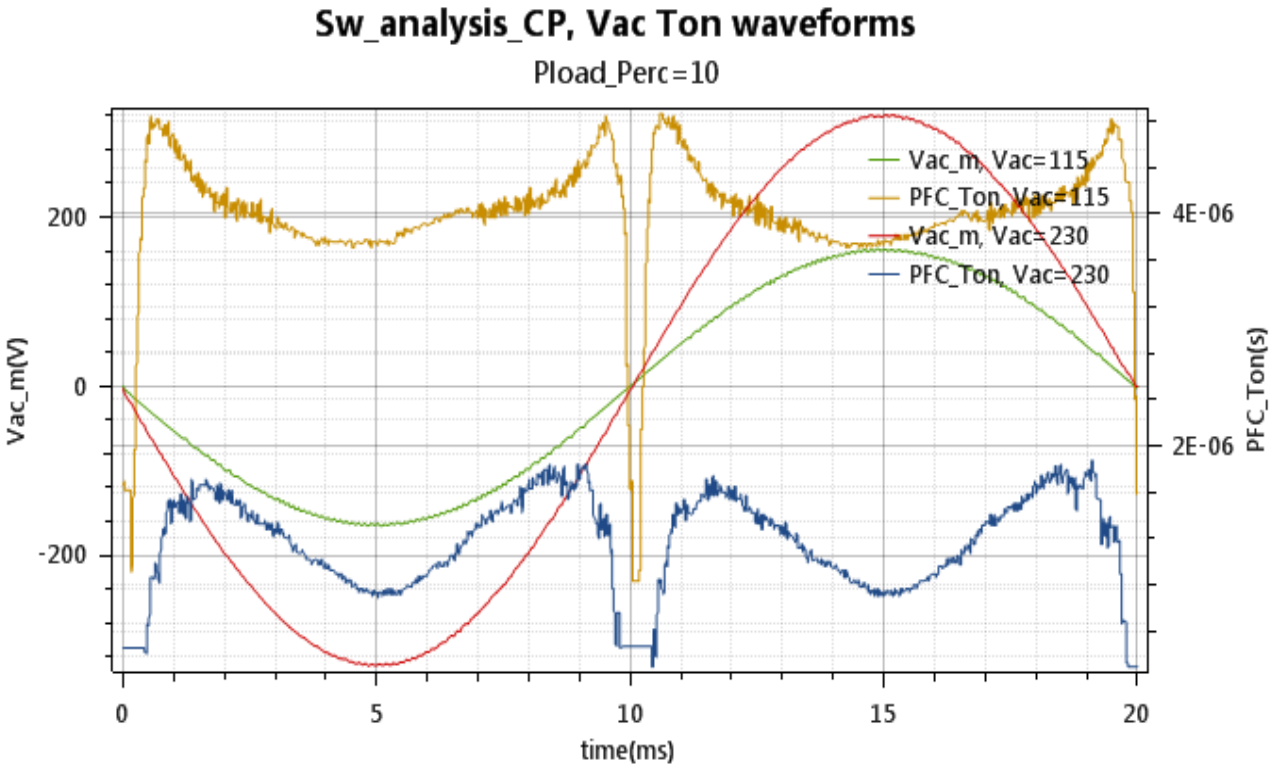
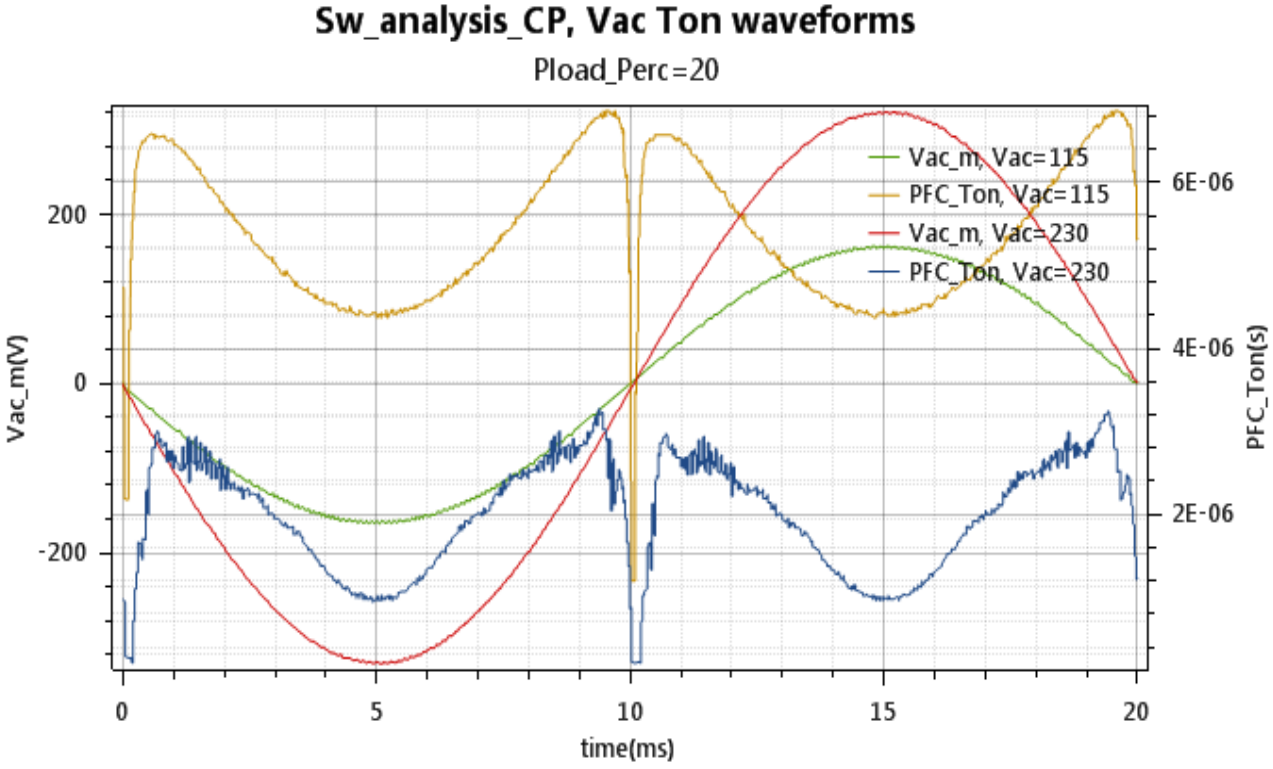
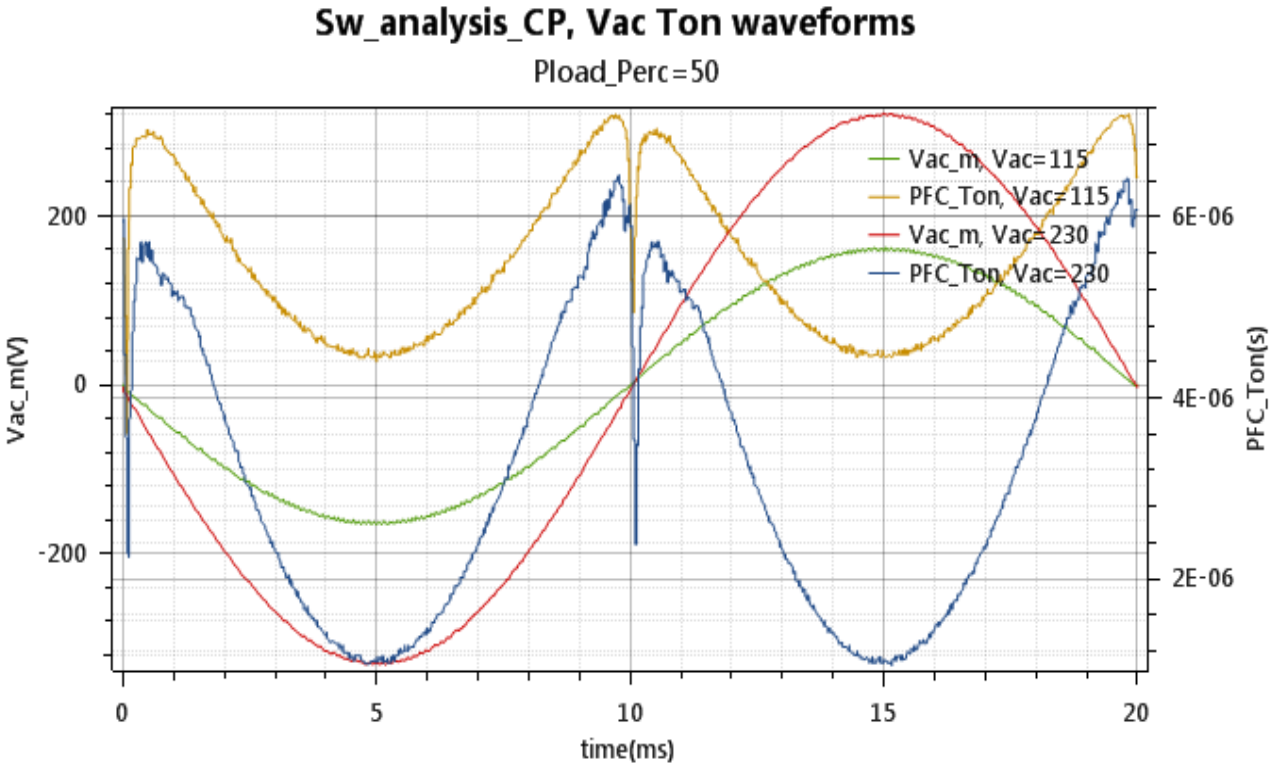
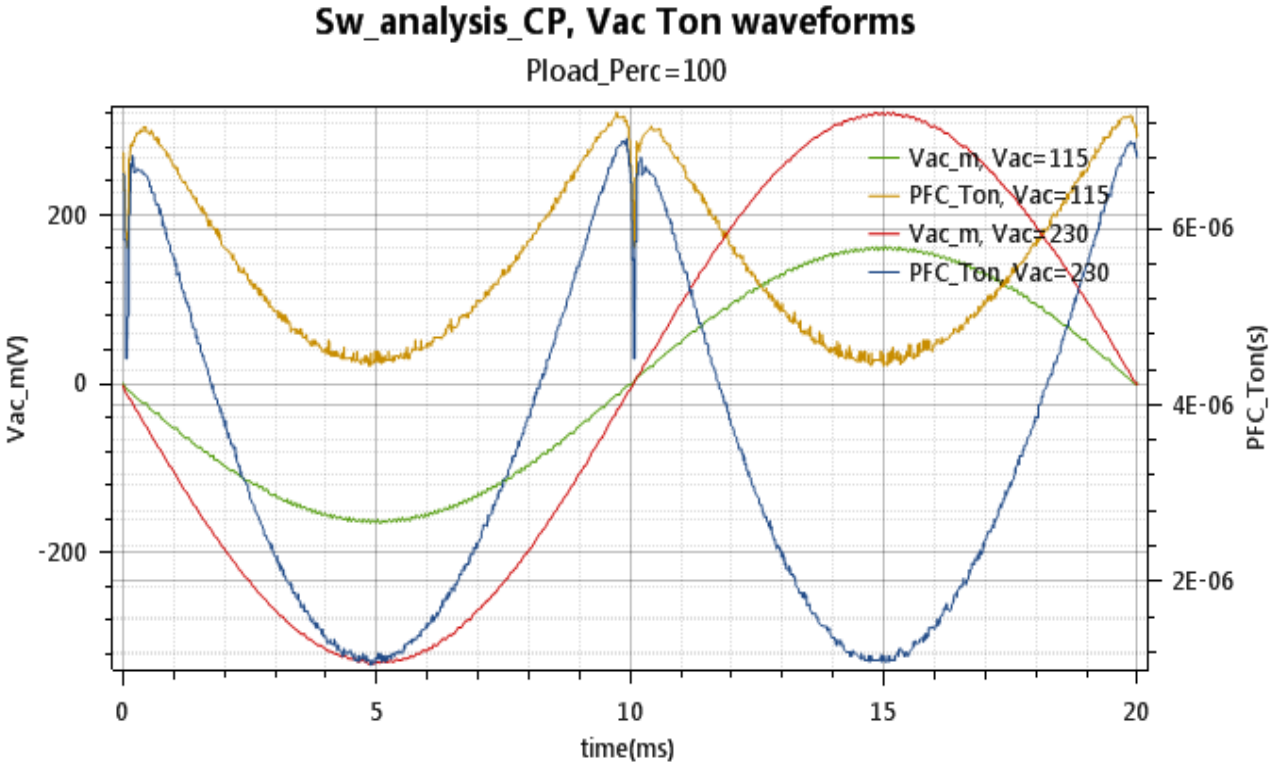

Sw_analysis_CP, Vac SwFreq waveforms
Pload_Perc=100
Vac_m, Vac=115
PFC_Fsw, Vac=115
Vac_m, Vac=230
PFC_Fsw, Vac=230
Vac_m(V)
PFC_Fsw(Hz)
time(ms)
200
0
-200
135000
130000
125000
120000
0
5
10
15
20

Chart name: Vac Ton waveforms






Sw_analysis_CP, Vac Ton waveforms
Pload_Perc=50
Vac_m, Vac=115
PFC_Ton, Vac=115
Vac_m, Vac=230
PFC_Ton, Vac=230
Vac_m(V)
PFC_Ton(s)
time(ms)
200
0
-200
6E-06
4E-06
2E-06
0
5
10
15
20


Sw_analysis_CP, Vac Ton waveforms
Pload_Perc=100
Vac_m, Vac=115
PFC_Ton, Vac=115
Vac_m, Vac=230
PFC_Ton, Vac=230
Vac_m(V)
PFC_Ton(s)
time(ms)
200
0
-200
6E-06
4E-06
2E-06
0
5
10
15
20

2.14.Test case: Line_transient

Chart name: Vout_min_max_vs_Load

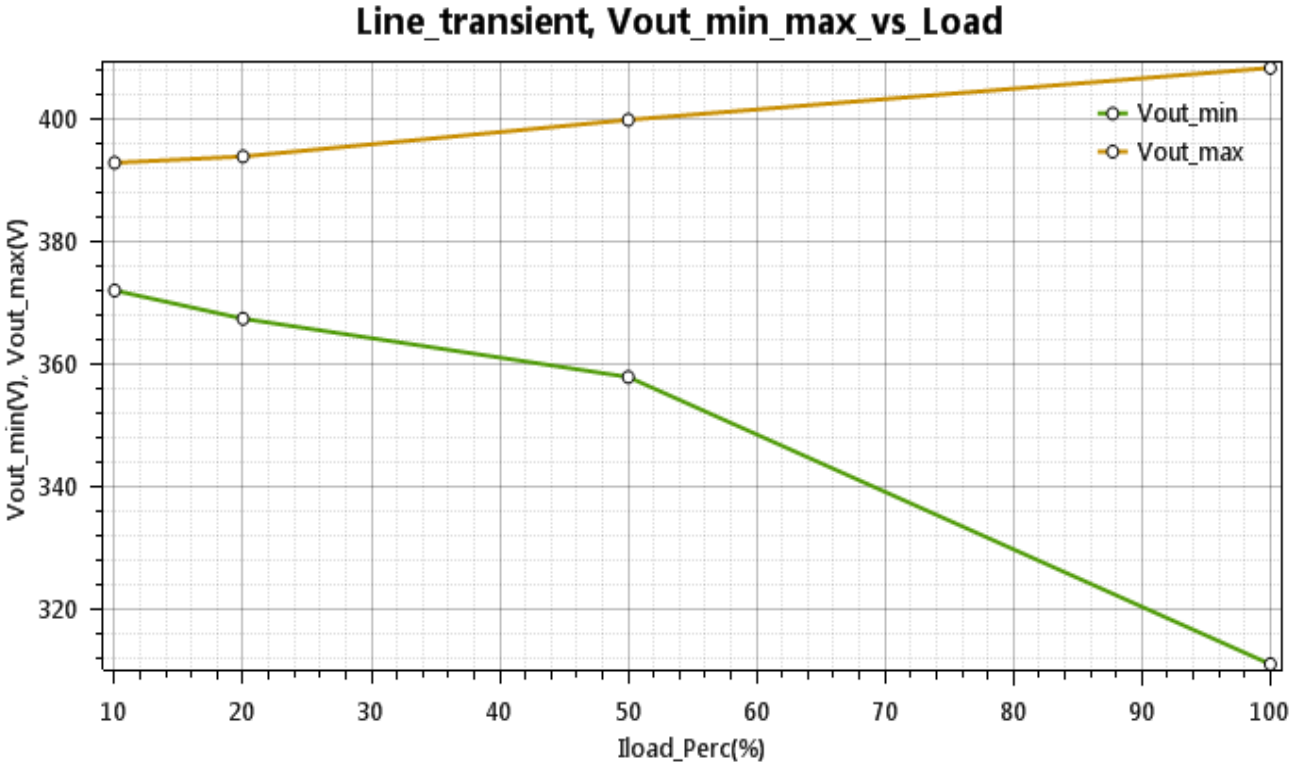
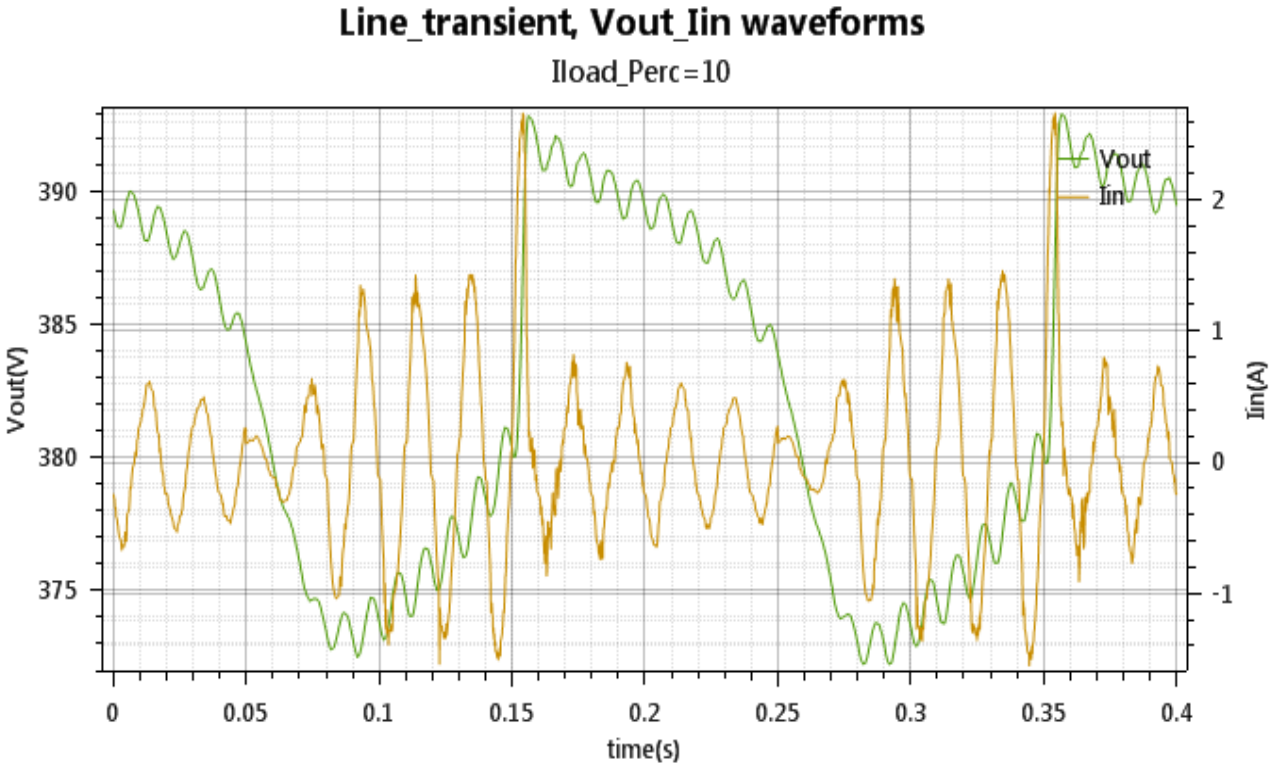
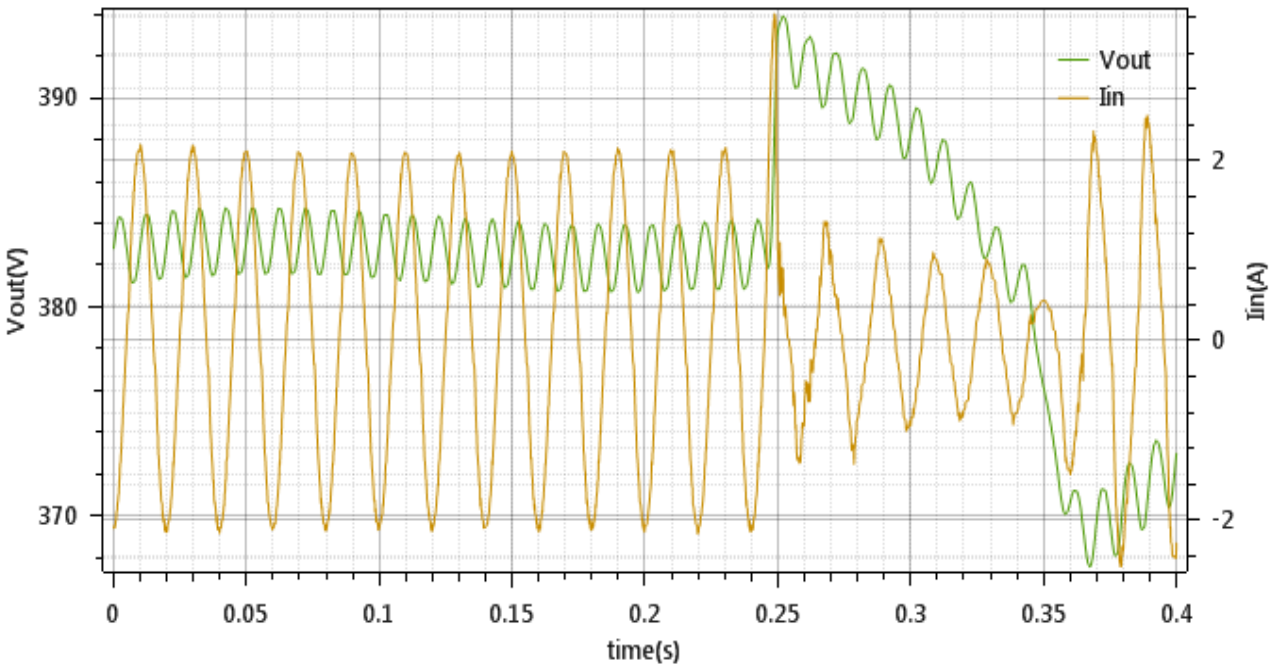


Chart name: Vout_Iin waveforms



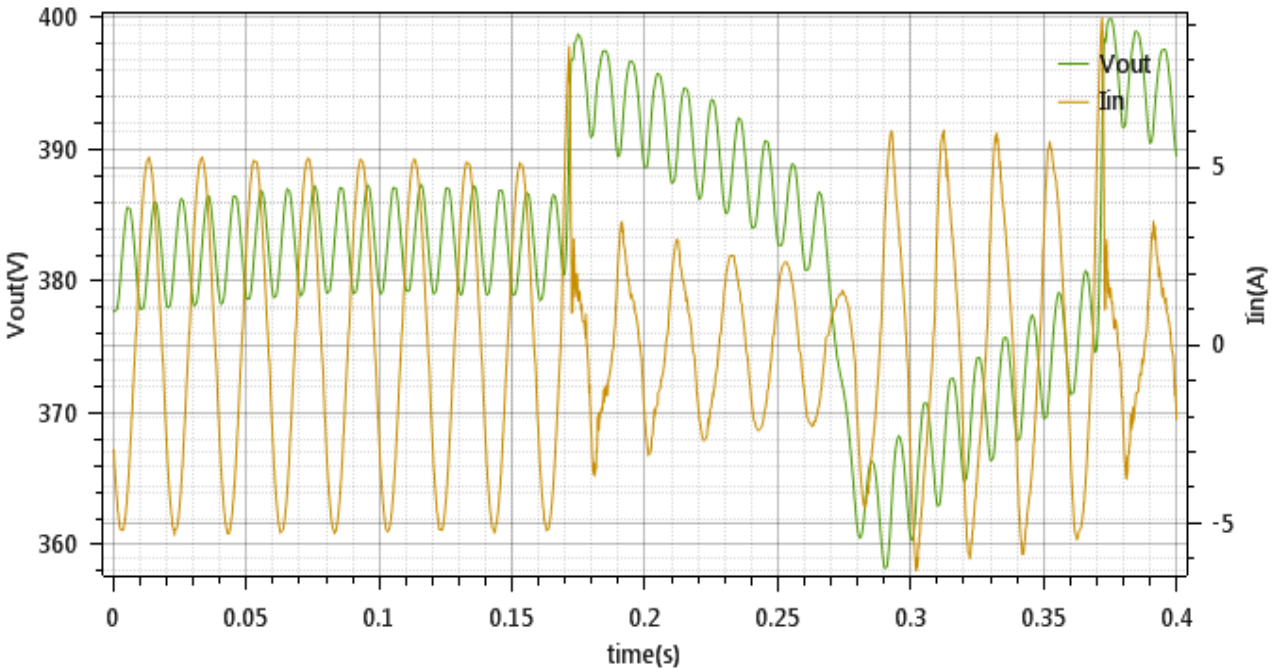
Line_transient, Vout_Iin waveforms

Iload_Perc=20



Line_transient, Vout_Iin waveforms

Iload_Perc=50



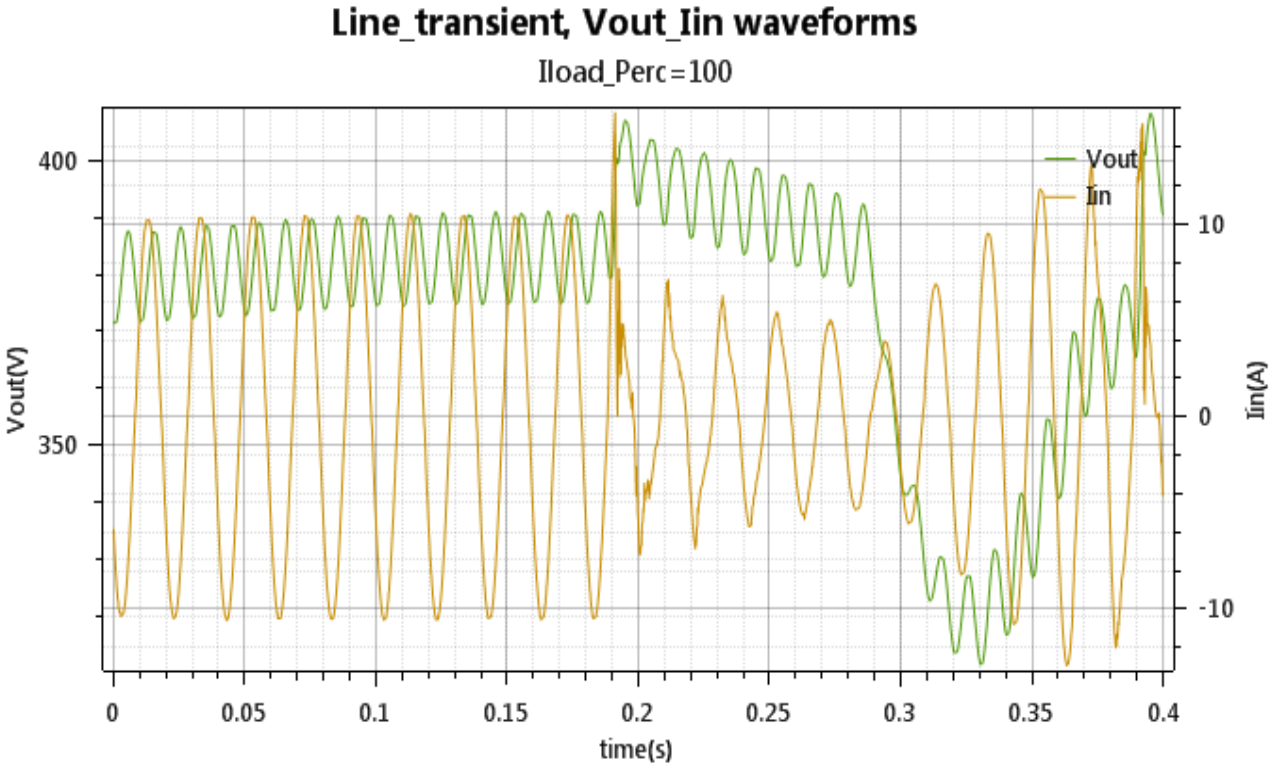
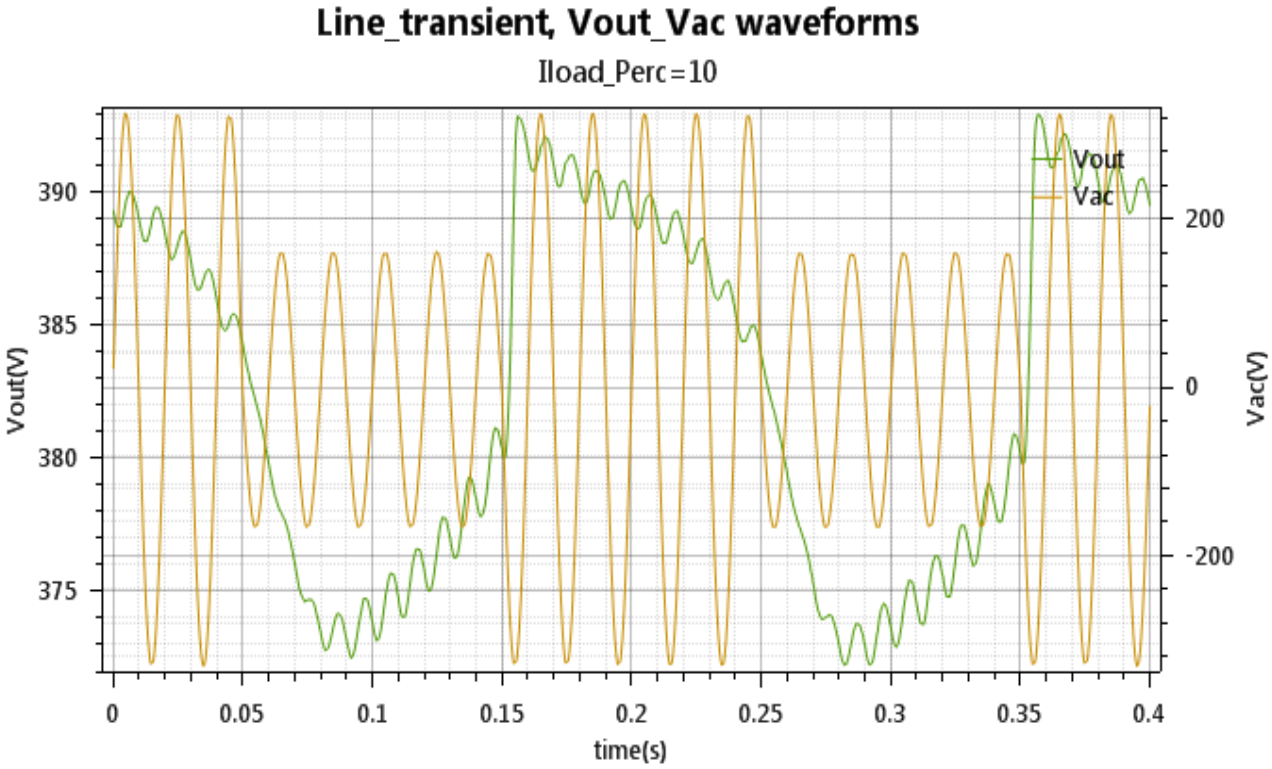
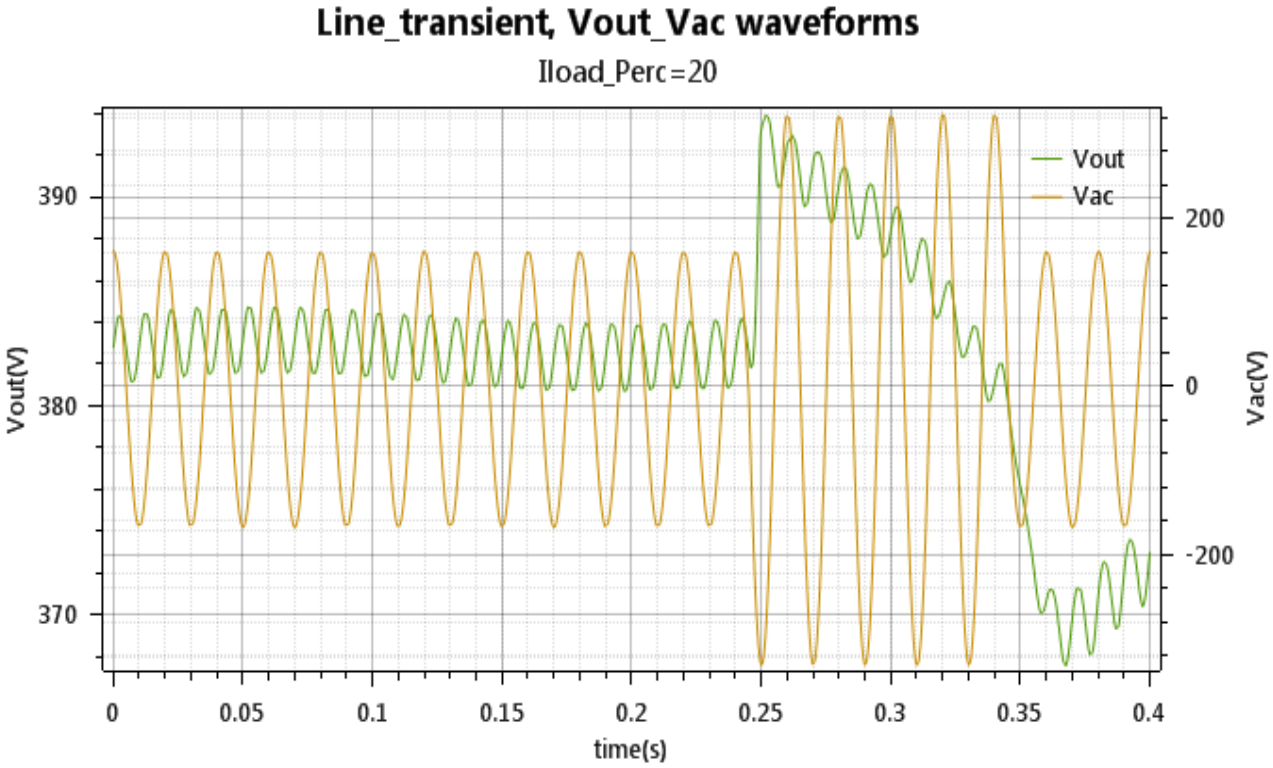
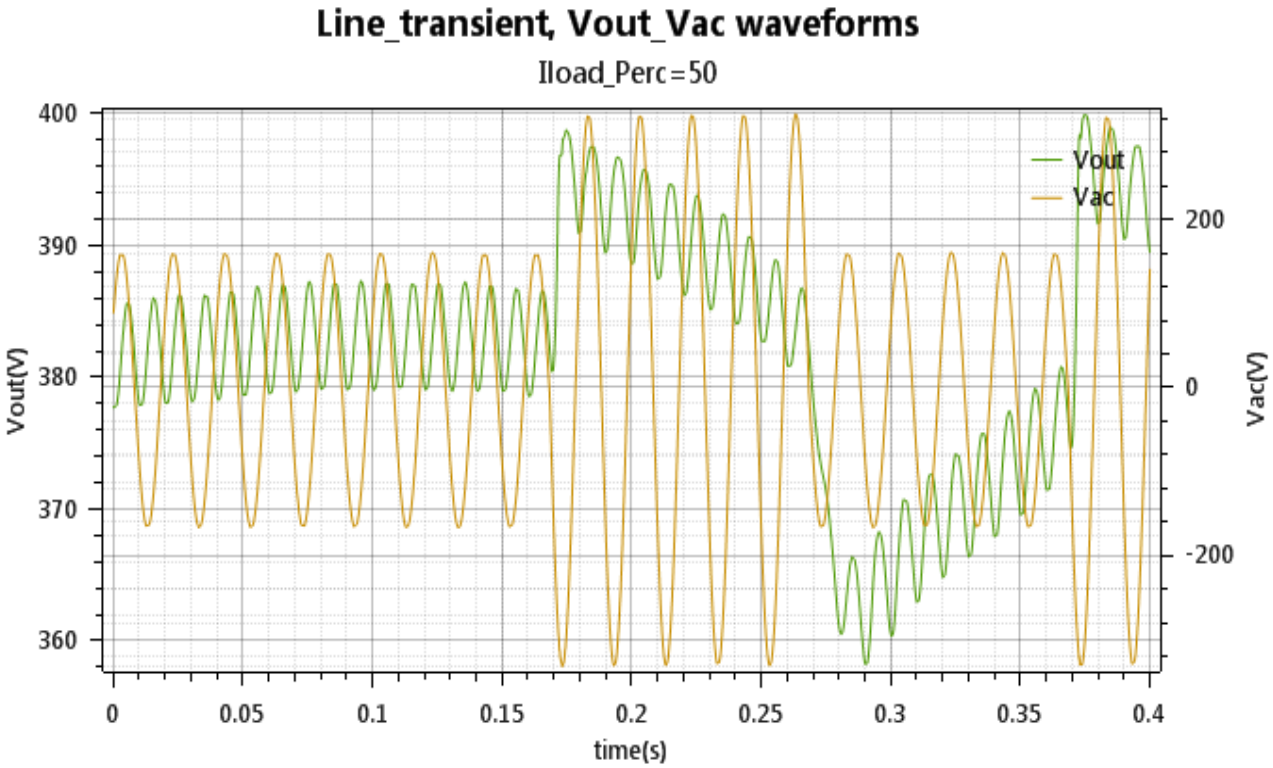
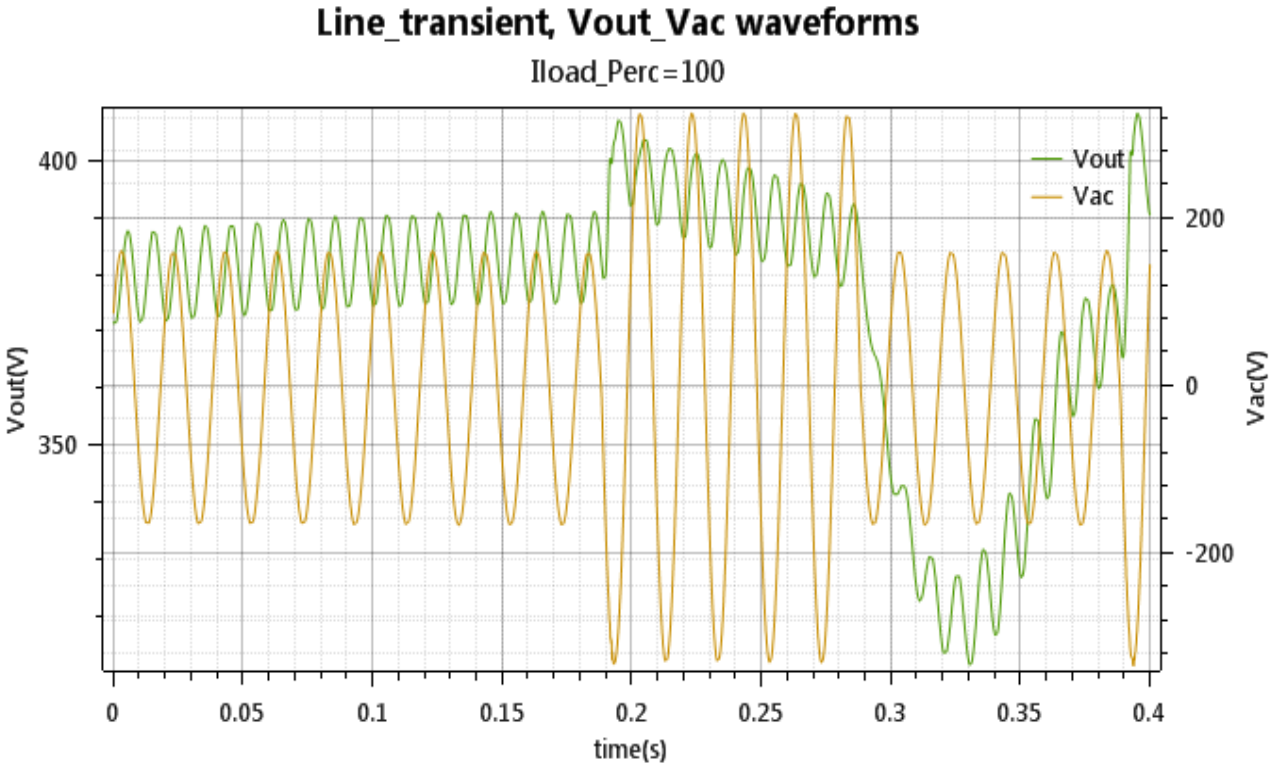


Chart name: Vout_Vac waveforms



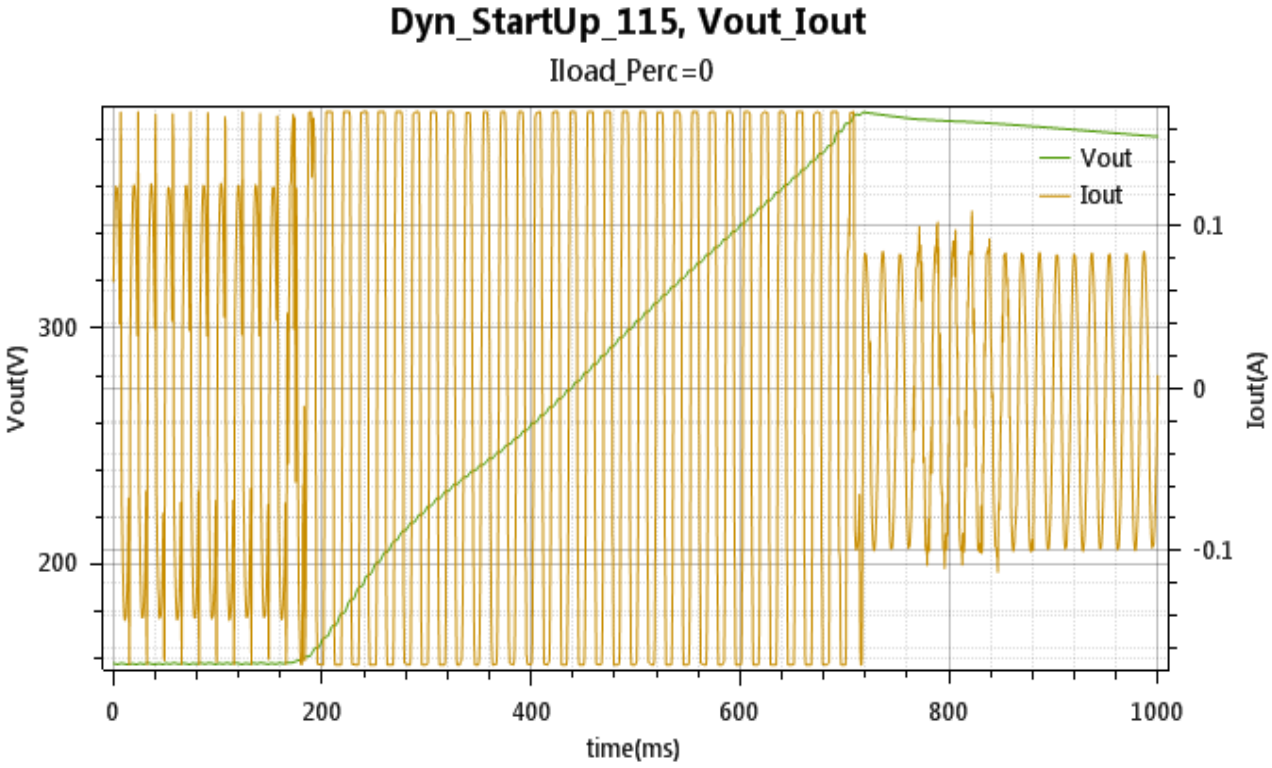

Line_transient, Vout_Vac waveforms
Iload_Perc=20
Vout
Vac
390
380
370
200
0
-200
Vout(V)
Vac(V)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
time(s)

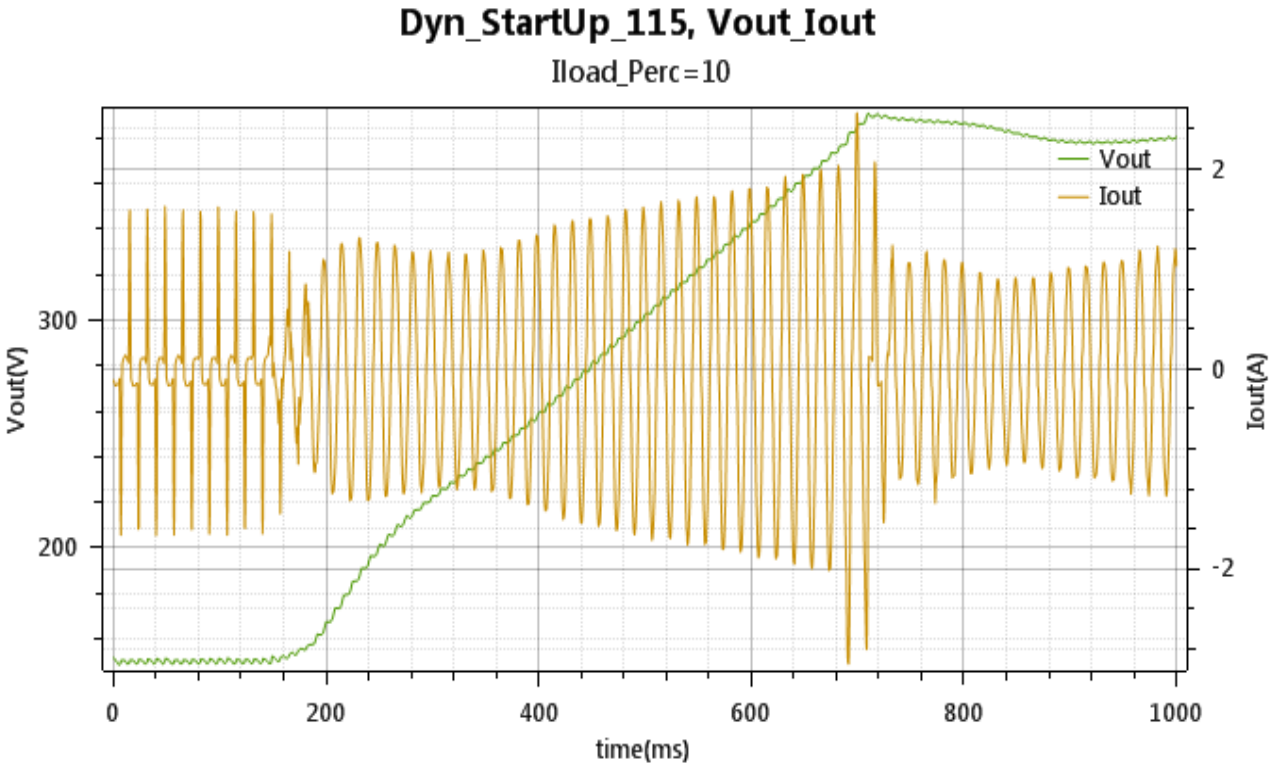

Line_transient, Vout_Vac waveforms
Iload_Perc=50
Vout
Vac
400
390
380
370
360
200
0
-200
Vout(V)
Vac(V)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
time(s)

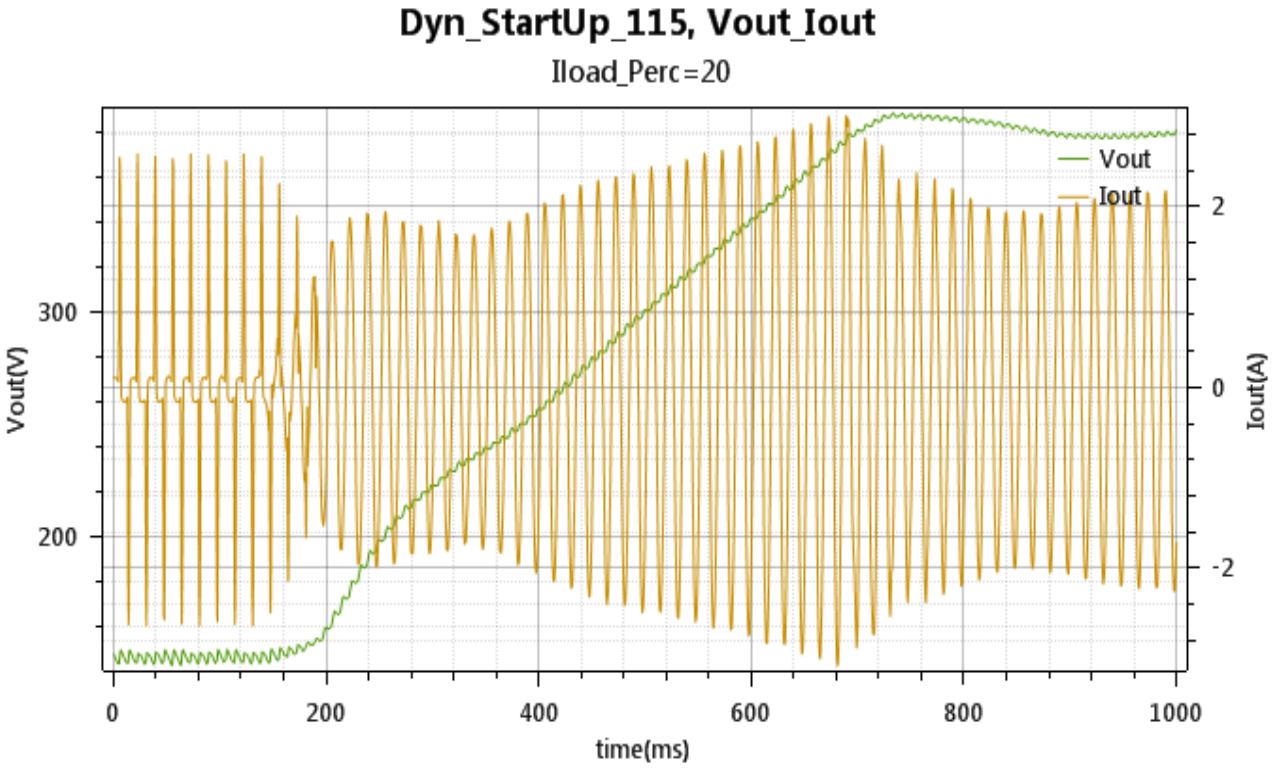

Line_transient, Vout_Vac waveforms
Iload_Perc=100
Vout
Vac
400
350
200
0
-200
Vout(V)
Vac(V)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
time(s)

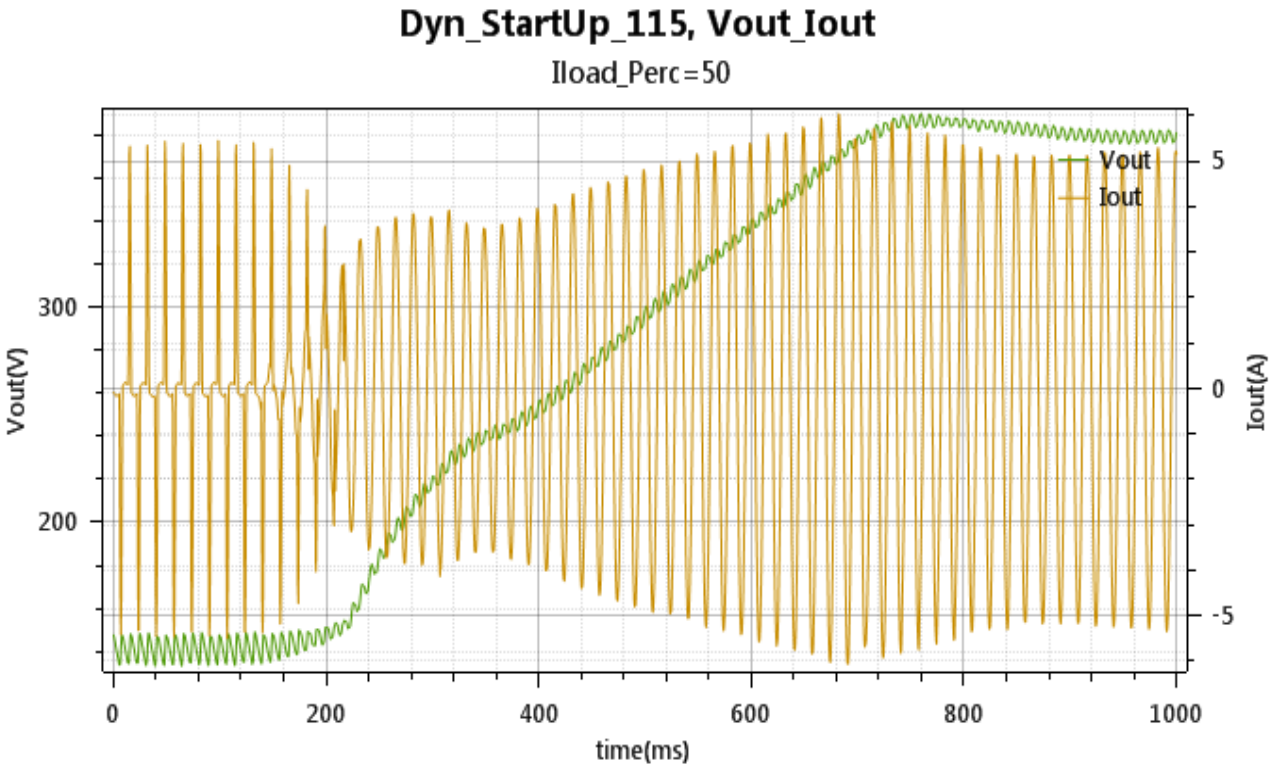
2.15.Test case: Dyn_StartUp_115

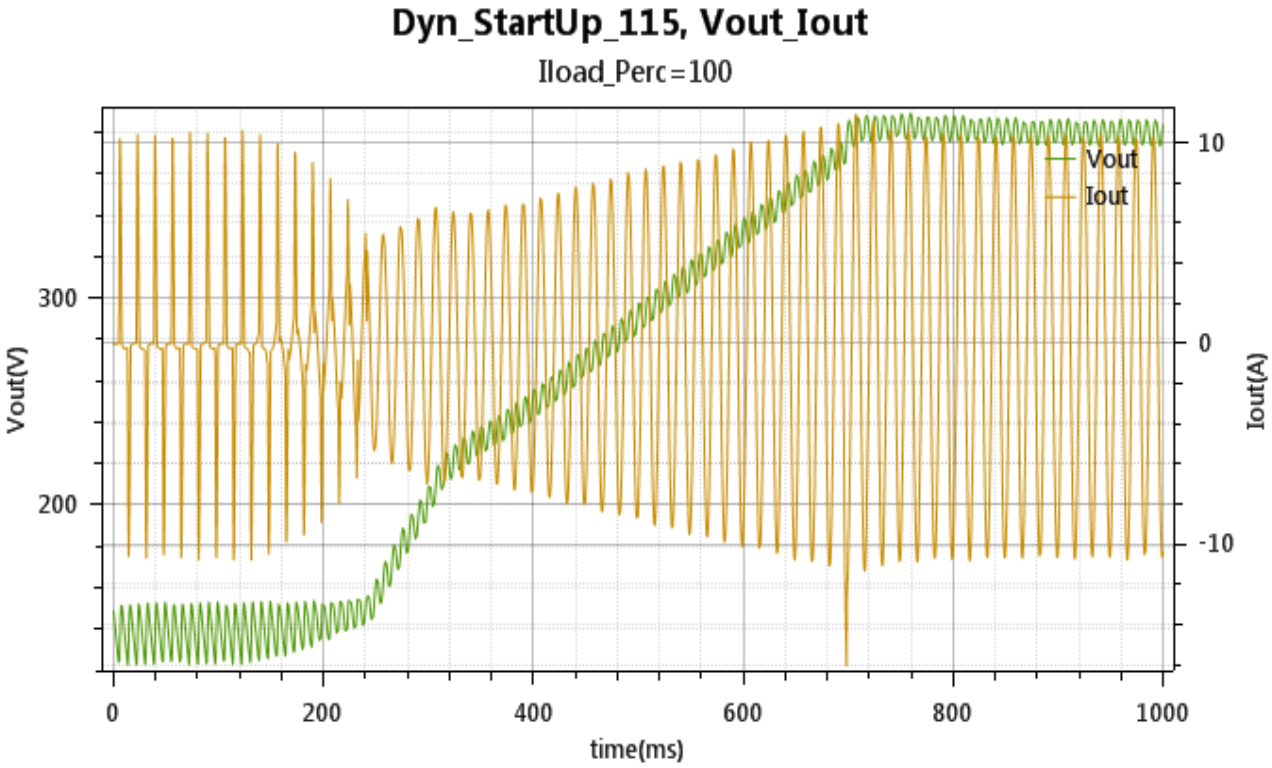
Chart name: Vout_Iout





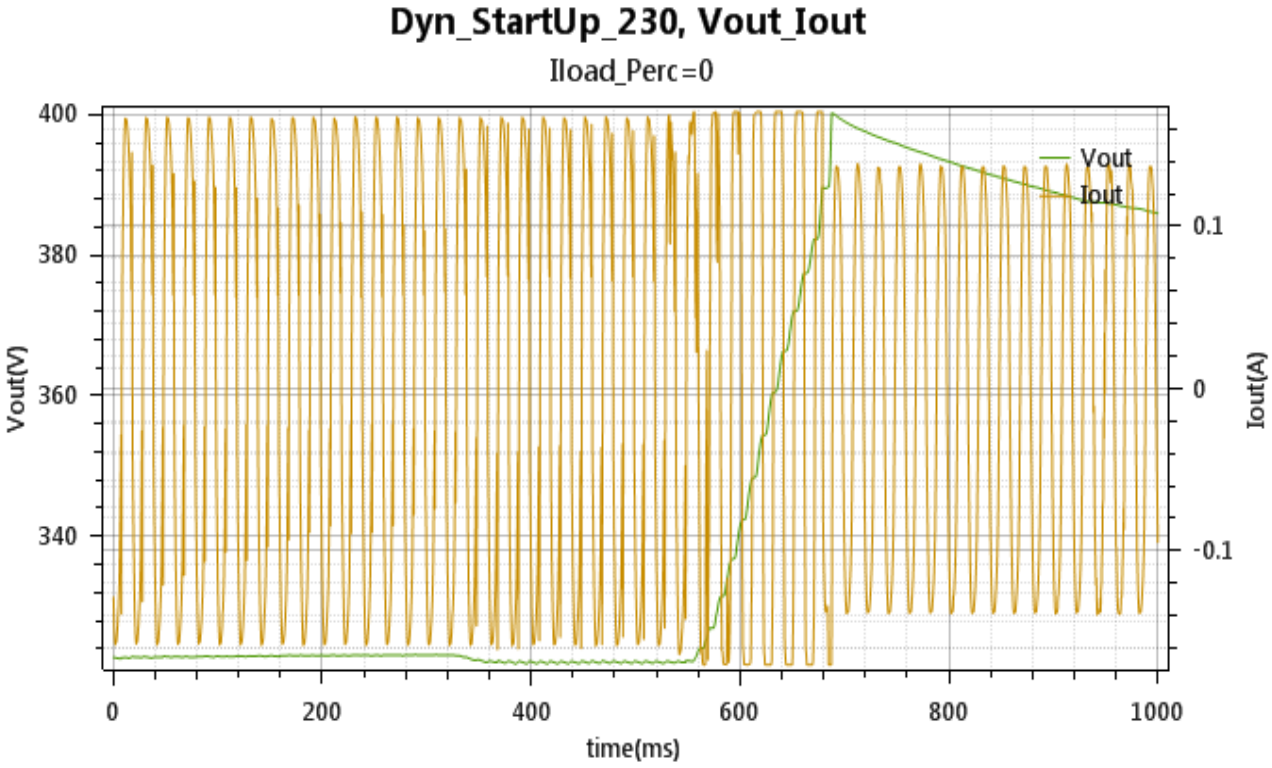

Dyn_StartUp_115, Vout_Iout
Iload_Perc=20
Vout
Iout
Vout(V)
Iout(A)
300
200
2
0
-2
0
200
400
600
800
1000
time(ms)

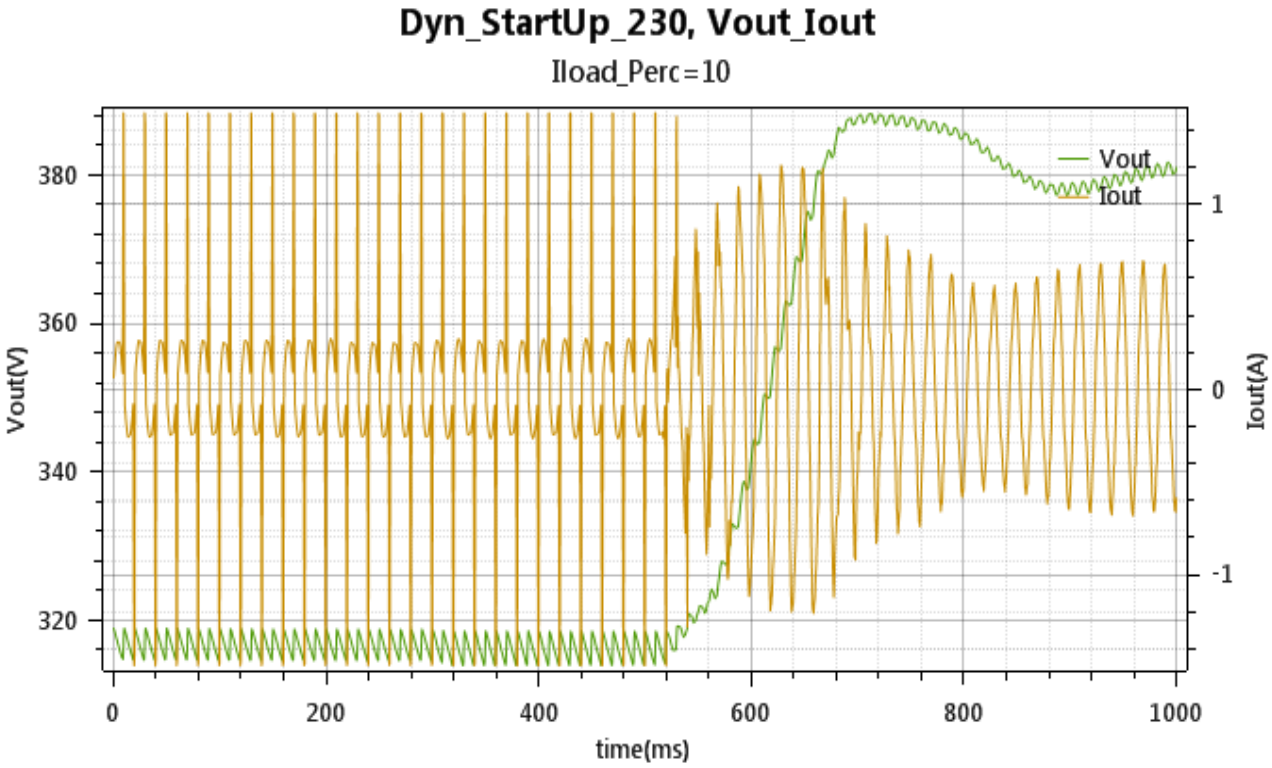

Dyn_StartUp_115, Vout_Iout
Iload_Perc=50
Vout
Iout
Vout(V)
Iout(A)
300
200
5
0
-5
0
200
400
600
800
1000
time(ms)

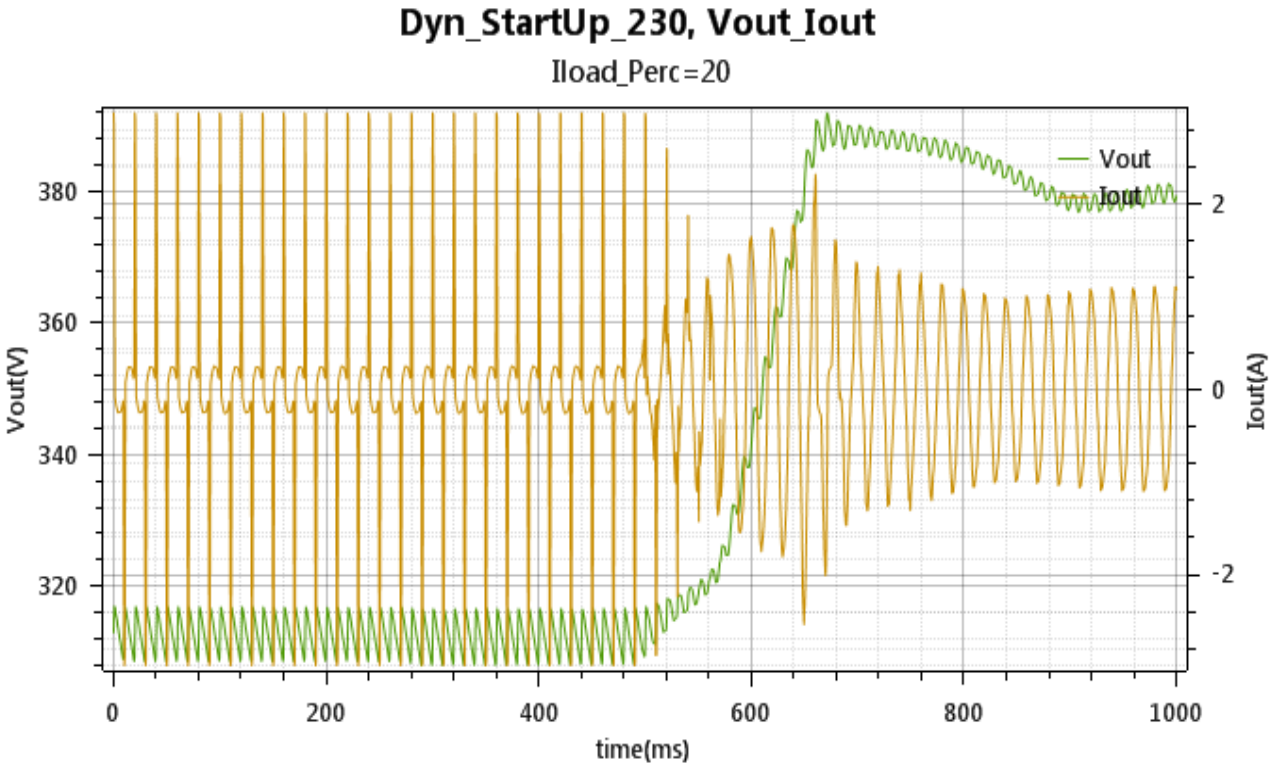

Dyn_StartUp_115, Vout_Iout
Iload_Perc=100
Vout
Iout
Vout(V)
Iout(A)
time(ms)
300
200
10
0
-10
0
200
400
600
800
1000

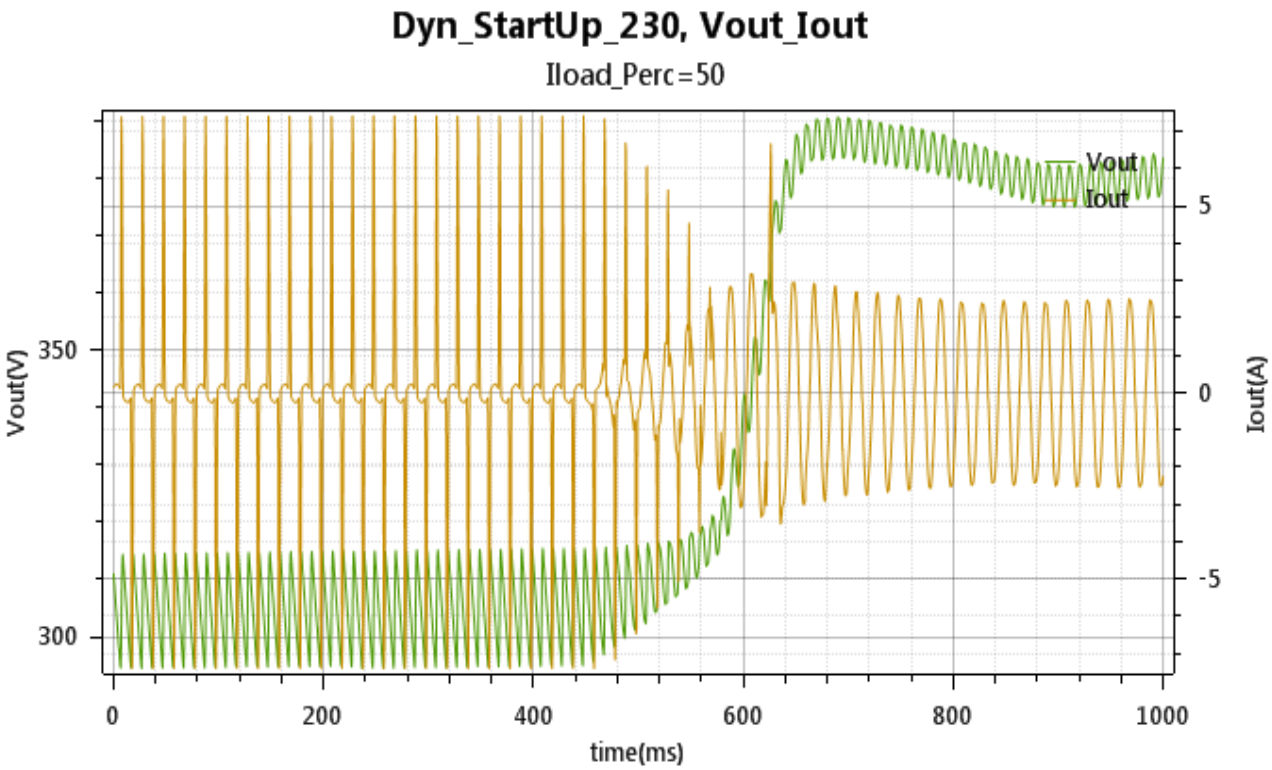
2.16.Test case: Dyn_StartUp_230

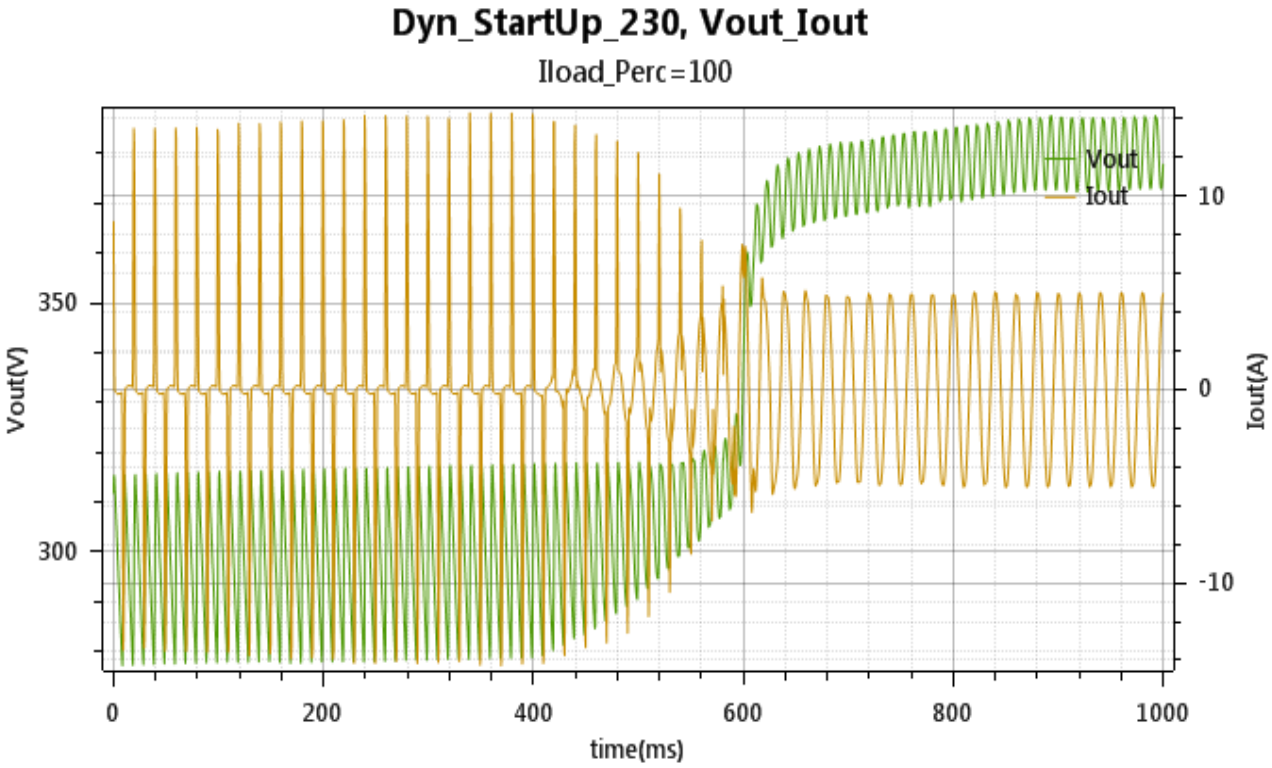
Chart name: Vout_Iout






Dyn_StartUp_230, Vout_Iout
Iload_Perc=20
Vout
Iout
380
360
340
320
Vout(V)
2
0
-2
Iout(A)
0
200
400
600
800
1000
time(ms)


Dyn_StartUp_230, Vout_Iout
Iload_Perc=50
Vout
Iout
350
300
Vout(V)
5
0
-5
Iout(A)
0
200
400
600
800
1000
time(ms)


Dyn_StartUp_230, Vout_Iout
Iload_Perc=100
Vout
Iout
Vout(V)
Iout(A)
350
300
10
0
-10
0
200
400
600
800
1000
time(ms)

3. Test case parameters

3.1 Vac_100_0_50Load

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 50
- Fjump(Hz): 10
- VacA(V): 100
- VacB(V): 0

3.2 Vac_100_0_100Load

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 100
- Fjump(Hz): 10
- VacA(V): 100
- VacB(V): 0

3.3 Vac_200_0_50Load

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 50
- Fjump(Hz): 10
- VacA(V): 200
- VacB(V): 0

3.4 Vac_200_0_100Load

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -

- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 100
- Fjump(Hz): 10
- VacA(V): 200
- VacB(V): 0

3.5 Vac_100_68

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 50, 100
- Fjump(Hz): 0.2
- VacA(V): 100
- VacB(V): 68

3.6 Vac_200_130

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 50, 100
- Fjump(Hz): 0.2
- VacA(V): 200
- VacB(V): 130

3.7 Vac_100_75

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 50, 100
- Fjump(Hz): 0.05
- VacA(V): 100
- VacB(V): 75

3.8 Vac_200_150

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 10
- Iload_Perc(%): 50, 100
- Fjump(Hz): 0.05
- VacA(V): 200
- VacB(V): 150

3.9 Ithd_115V

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Pload_nominal(w): 800
- Freq(Hz): 60
- Vac(V): 115
- Pload_Perc(%): 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
- V_load_on(V): 280
- Line_Filter_ON(Bool): 0

3.10 Ithd_230V

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Pload_nominal(w): 800
- Freq(Hz): 50
- Vac(V): 230
- Pload_Perc(%): 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
- V_load_on(V): 280
- Line_Filter_ON(Bool): 0

3.11 Load_transient_5Hz

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- Vac(V): 115, 230
- DcycleB(%): 50
- Fjump(Hz): 5
- ISlewRate(A_us): 0.5
- IloadFrom_Perc(%): 20
- IloadTo_Perc(%): 50, 100

3.12 Load_transient_100Hz

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- Vac(V): 115, 230
- DcycleB(%): 50
- Fjump(Hz): 100
- ISlewRate(A_us): 0.5
- IloadFrom_Perc(%): 20
- IloadTo_Perc(%): 50, 100

3.13 Sw_analysis_CP

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Vcc(V): 15
- time(ms): Lin1:0:20:10000
- Pload_nominal(A): 800
- Freq(Hz): 50
- Vac(V): 115, 230
- Pload_Perc(%): 10, 20, 50, 100

3.14 Line_transient

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Prog(-): -
- Nsamples(-): 2500
- Vcc(V): 15
- Iload_nominal(A): 2.1
- Freq(Hz): 50
- DcycleB(%): 50
- Iload_Perc(%): 10, 20, 50, 100
- Fjump(Hz): 5
- VacA(V): 115
- VacB(V): 230

3.15 Dyn_StartUp_115

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Nsamples(-): 2500
- Iload_nominal(A): 2.1
- time_window(ms): 1000
- Freq(Hz): 60
- Vac(V): 115

- Iload_Perc(%): 0, 10, 20, 50, 100

3.16 Dyn_StartUp_230

Inputs:

- DUT(-): XMC1300_APPs_v1.0
- Temp(C): NaN
- Nsamples(-): 2500
- Iload_nominal(A): 2.1
- time_window(ms): 1000
- Freq(Hz): 50
- Vac(V): 230
- Iload_Perc(%): 0, 10, 20, 50, 100

4. Test description

4.1 PFC_Line_transient_1.0

Version: 1.0
Author: Alfredo Medina
Description: Line transients test
This test measures the output voltage, input current, Vac and gate drive waveforms while jumps between 2 input voltages: VacA and VacB are carried out.

After first power up, 3 seconds will be allowed for the system to power up.
Oscilloscope conection:
- Och1 conected to Vout
- Och4 current probe to measure output current
- Och2 gate driver
- Och3 Input voltage

Revision history:
1.0 Original test

Inputs:

- DUT: Device Unter Test
- Temp: Ambient temperature in celsius degrees
- Prog: Path to the program to download (Not used, reseved)
- Nsamples: Number of samples of the waveforms
- Vcc: Vcc for IC supply (use LVPSch2)
- Iload_nominal: Nominal current load (100% load)
- Freq: AC Input voltage frequency
- DcycleB: Duty cycle of VacB
- Iload_Perc: Percentage of the nominal current load to be applied
- Fjump: Frequency of the input jump between VacA and VacB
- VacA: Input voltage set point A
- VacB: Input voltage set point B

Outputs:

- Vout: Output voltage waveform
- Iin: Input current waveform
- GD: Gate drive waveform
- time: Time reference for output waveforms
- Vout_min: Minimum value of Vout waveform
- Vout_max: Maximum value of Vout waveform
- Vac: Input voltage

4.2 try_Ithd_1.4

Version: 1.4
Author: Alfredo Medina
Description: DC test for voltage power supply:
This test performs DC measurements using the power analyzer, Measurements are averaged for a time of IntTime seconds.
RMS is used for AC values. Current load is applied before the system starts.
After first power up, 3 seconds will be allowed for the system to power up.

Oscilloscope conection:
- Och2 conected to Gate Drive

Revision history:
1.0 Original test

Inputs:

- DUT: Device Unter Test
- Temp: Ambient temperature in celsius degrees
- Pload_nominal:
- Freq: AC Input voltage frequency

- Vac: Vac input voltage (RMS)
- Pload_Perc:
- V_load_on:
- Line_Filter_ON:

Outputs:

- Vout: Average output voltage
- PF: Power factor
- Eff: Efficiency
- Pin: Input power
- Pout: Output power
- Ithd: Input current THD
- Iac: Input current (RMS)
- VoutPP: Output voltage peak to peak

4.3 PFC_Load_transient_1.0

Version: 1.0
Author: Alfredo Medina
Description: Voltage and current output waveform during load jumps between 2 constant current load values.
This test performs the acquisition of the output voltage and current during load jumps indicated by the input parameters:

After first power up, 3 seconds will be allowed for the system to power up.
Oscilloscope conection:
- Och1 conected to Vout
- Och4 current probe to measure output current
- Och2 gate driver

Revision history:
1.0 Original test

Inputs:

- DUT: Device Unter Test
- Temp: Ambient temperature in celsius degrees
- Prog: Path to the program to download (Not used, reseved)
- Nsamples: Number of samples of the waveforms
- Vcc: Vcc for IC supply (use LVPSch2)
- Iload_nominal: Nominal current load (100% load)
- Freq: AC Input voltage frequency
- Vac: Vac input voltage (RMS)
- DcycleB: Duty cycle of loadB
- Fjump: Frequency of the load jump
- ISlewRate: Current slew rate used to switch between load A to B
- IloadFrom_Perc: Percentage of the nominal current load point 1
- IloadTo_Perc: Percentage of the nominal current load point 2

Outputs:

- Vout: Output voltage waveform
- Iin: Input current waveform
- GD: Gate drive waveform
- time: Time reference for output waveforms
- Vout_min: Minimum value of Vout waveform
- Vout_max: Maximum value of Vout waveform

4.4 PFC_Sw_analysis_CP_1.0

Version: 1.0
Author: Alfredo Medina Garcia
Description: PFC Switching analysis
This test records the waveform of the input current and output voltage and analyze the PFC switching frequency and on time in over one AC cycle
A constant power load is applied

Oscilloscope connections:
Och1: Output voltage
Och2 : gate driver
Och3 : Vac
Och4 : Iin

Revision history:
1.0 Original version

Inputs:

- DUT: Device Unter Test
- Temp: Ambient temperature in celsius degrees
- Prog: Path to the program to download (Not used, reseved)
- Vcc: Vcc for IC supply (use LVPSch2)
- time: Time vector for the waveforms
- Pload_nominal: Nominal Power load (100% load)
- Freq: AC Input voltage frequency
- Vac: AC Input voltage (RMS)
- Pload_Perc: Percentage of the nominal power load to be applied

Outputs:

- Vac_m: Vac input voltage measued
- PFC_Fsw: PFC gate switching frequency
- Vout: Output voltage
- PFC_Ton: PFC gate on time
- Iin: Input current

4.5 PFC_Dyn_StartUp_1.1

Version: 1.1
Author: Alfredo Medina
Description: Start Up wavefrom for voltage power supply:
This test capture the waveform of Vout and Iout duirng start Up,
During the first run the test measure the target output voltage and set the scope trigger to 50% of such value and 30% on the horizontal scale.
The time scale is fix to 10ms per div, allowing a capture time of 100ms,
After every run the AC supply is switch off and output capacitor is discharged with a current of 2A for 3s.
This test expect the system to start within 3s after AC is applied.
Prog is the path to the program to download into the IC, if not used the value should be -

Oscilloscope conections:
- Vout conected to Och1
- GD connecte to Och2
- Vac conected to Och3
- Iout conected to Och4

Revision history:
1.0 Original version

Inputs:

- DUT: Device Unter Test
- Temp: Ambient temperature in celsius degrees
- Nsamples: Number of samples of the waveforms (use only 1 value)
- Iload_nominal: Nominal current load
- time_window: time to record waveforms
- Freq: AC Input voltage frequency
- Vac: AC Input voltage (RMS)
- Iload_Perc: Load as a percentage of the nominal load

Outputs:

- Vout: Output voltage waveform
- Iout: Output current waveform
- Vacwave: Vac input voltage
- Vgd: Gate driver voltage
- RiseTime: rise time (10% to 90%)

- time: time vector

5. Glossary

- L.L.: low limit value
- H.L.: high limit value
- L.R.: lowest result value reached by the parameter.
- H.R.: highest result value reached by the parameter.
- Ver.: generic test version.
- T.C.Name: test case name. Descriptive title for test instance.
- Test: generic test used for the test case instance.
- P./F.: pass or fail status of test case.

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