

# CPFE1000F-48

## EVALUATION DATA

Tested By: Phong Ly / <i>Phong Ly</i>	Date : 8/23/2011
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Name/Signature

Checked By: Phong Ly / <i>Phong Ly</i>	Date : 8/23/2011
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Name/Signature

Approved By: Greg Laufman / <i>G. Laufman</i>	Date : 8/23/2011
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Name/Signature

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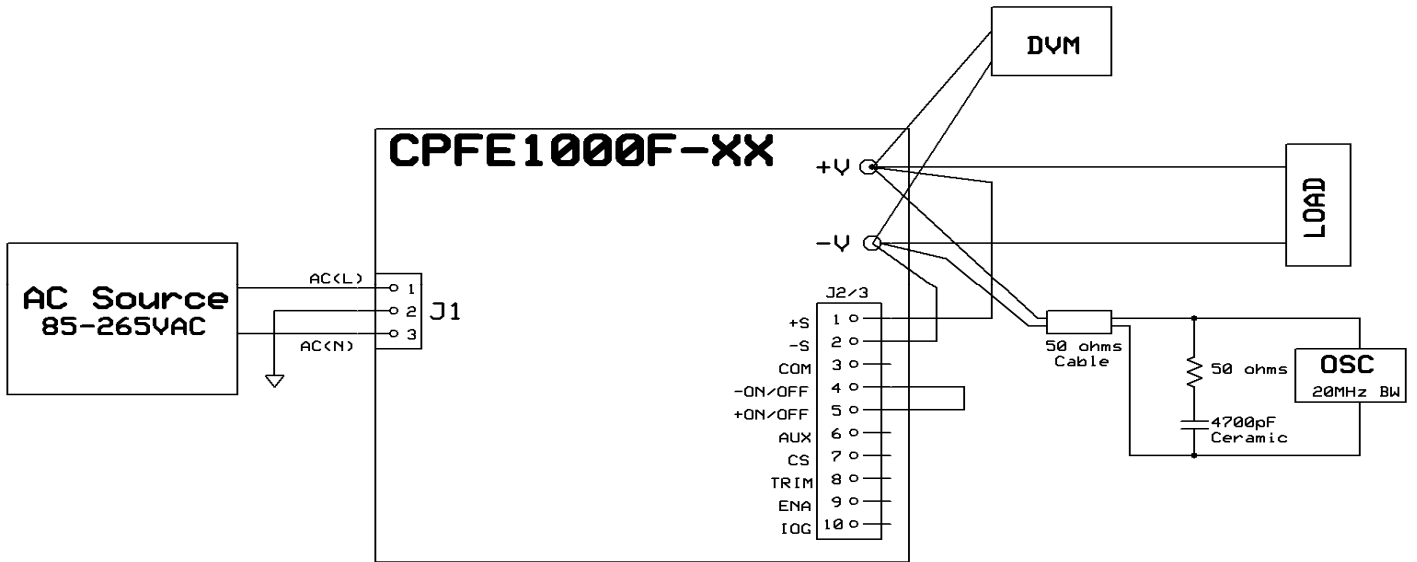
### Test Equipment used:

Digital Multi-Meter (DMM) - Model: Fluke 45  
Power Source - Model: Kikusui DCR4000L  
Electronic Load - Model: Chroma 63201  
Digital Power Meter - Model: Yokogawa WT1010  
Oscilloscope - Model: LeCroy Waverunner 6050  
Leakage Tester - Associate Research Model no. 620L

### Terminology used

$V_{in}$ .....	Input Voltage	$I_o$ .....	Output Current
$V_o$ .....	Output Voltage	$T_{bp}$ .....	Base Plate Temperature
$V_{cnt}$ .....	Control Voltage	$T_a$ .....	Ambient Temperature
$I_{in}$ .....	Input Current	$f$ .....	Frequency
$P_{in}$ .....	Input Power	Eff.....	Efficiency
$P_o$ .....	Output Power	PF.....	Power factor

# 1. Test set-ups



## 2. Characteristics

### 2.1 Line and Load Regulation:

Condition Tbp = 25°C

Vo measured across output studs using local sense connections.

Io \ Vin	85 VAC	115 VAC	230 VAC	265 VAC	Line Regulation	
0% Load	48.103	48.102	48.102	48.102	0.001	0.002%
25% Load	48.106	48.106	48.106	48.106	0	0.000%
50% Load	48.11	48.11	48.107	48.107	0.003	0.006%
75% Load	48.109	48.108	48.108	48.108	0.001	0.002%
100% Load	48.098	48.098	48.102	48.102	0.004	0.008%
Load Regulation	0.012	0.012	0.006	0.006		
	0.025%	0.025%	0.013%	0.013%		

Vo measured across output studs using remote sense connections.

Io \ Vin	85 VAC	115 VAC	230 VAC	265 VAC	Line Regulation	
0% Load	48.023	48.024	48.023	48.023	0.001	0.002%
25% Load	48.021	48.021	48.021	48.021	0	0.000%
50% Load	48.021	48.022	48.022	48.022	0.001	0.002%
75% Load	48.022	48.022	48.025	48.026	0.004	0.008%
100% Load	48.025	48.026	48.026	48.026	0.001	0.002%
Load Regulation	0.004	0.005	0.005	0.005		
	0.008%	0.010%	0.010%	0.010%		

### 2.2 Input turn ON/OFF voltage characteristics.

Condition Tbp = 25°C

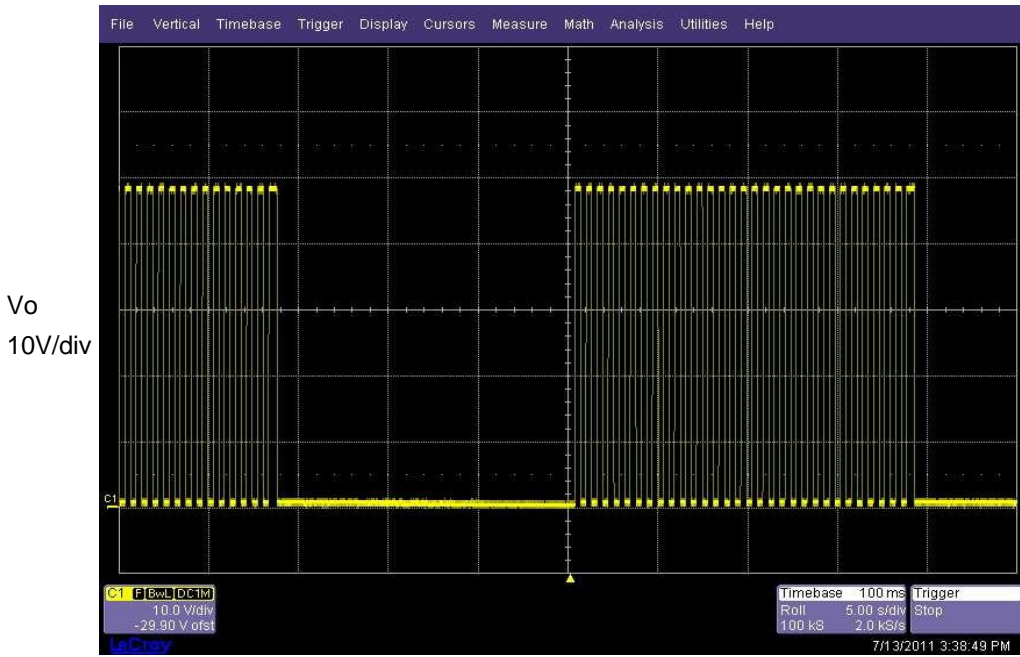
	0% Load	100%Load
Turn ON Voltage	69VAC	77VAC
Turn OFF Voltage	77VAC	78VAC

### 2.3 Efficiency and Power factor vs. Output power and Input Voltage, Standby Input Power

Condition Tbp = 25°C

Vin	Iin	Pin	PF	Vo	Io	Po	Eff	Load
85 VAC	0.736	44.5	0.7092	48.046	0	0	N/A	0%
115 VAC	0.767	43.9	0.4937	48.04	0	0	N/A	
230 VAC	1.426	41.2	0.125	48.036	0	0	N/A	
265 VAC	1.671	40.2	0.0903	48.03	0	0	N/A	
85 VAC	3.951	327.6	0.9719	48.002	5.25	252.0105	76.93%	25%
115 VAC	2.983	321	0.9342	47.998	5.25	251.9895	78.50%	
230 VAC	2.009	310.7	0.6676	47.993	5.25	251.9633	81.10%	
265 VAC	2.115	307.4	0.5474	47.988	5.25	251.937	81.96%	
85 VAC	7.408	612.3	0.9595	48.011	10.5	504.1155	82.33%	50%
115 VAC	5.44	605.5	0.9643	48.014	10.5	504.147	83.26%	
230 VAC	2.995	581.8	0.8409	48.018	10.5	504.189	86.66%	
265 VAC	2.918	576.8	0.743	48.02	10.5	504.21	87.42%	
85 VAC	10.929	910.3	0.968	48.031	15.75	756.4883	83.10%	75%
115 VAC	7.924	892.8	0.9681	48.03	15.75	756.4725	84.73%	
230 VAC	4.154	859.8	0.8988	48.025	15.75	756.3938	87.97%	
265 VAC	3.857	852.2	0.8325	48.022	15.75	756.3465	88.75%	
85 VAC	14.536	1231	0.9763	48.035	21	1008.735	81.94%	100%
115 VAC	10.614	1197.7	0.9684	48.039	21	1008.819	84.23%	
230 VAC	5.384	1150.1	0.9267	48.042	21	1008.882	87.72%	
265 VAC	4.88	1140.2	0.8817	48.045	21	1008.945	88.49%	

## 2.4 Over current protection (OCP) characteristics.



Output Voltage hiccups during OCP mode.  
(18s Hiccup & 16s turn off)

5s/div

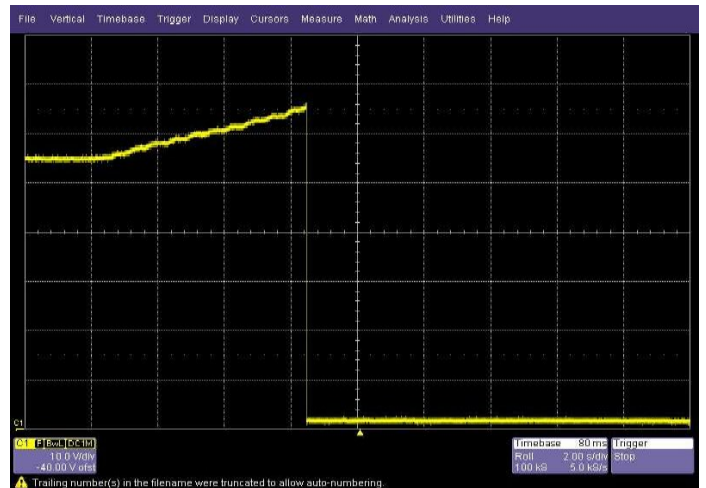
## 2.5 Over voltage protection (OVP) characteristics.



Vo: 10V/div

2s/div

Output Voltage during OVP mode (0% Load)

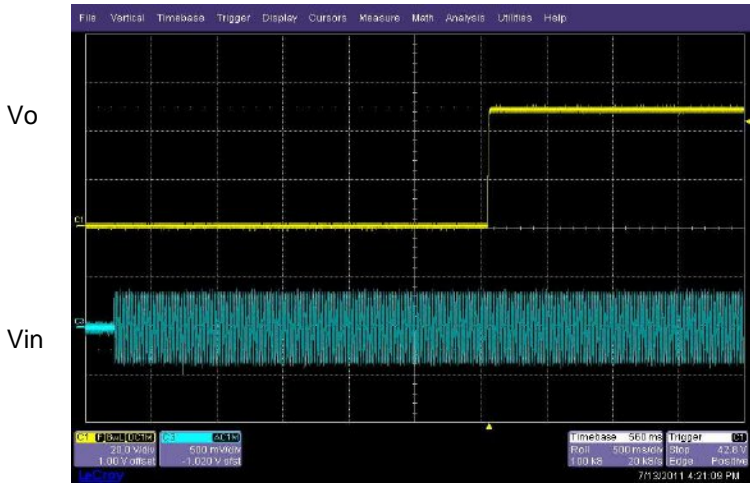


Vo: 10V/div

2s/div

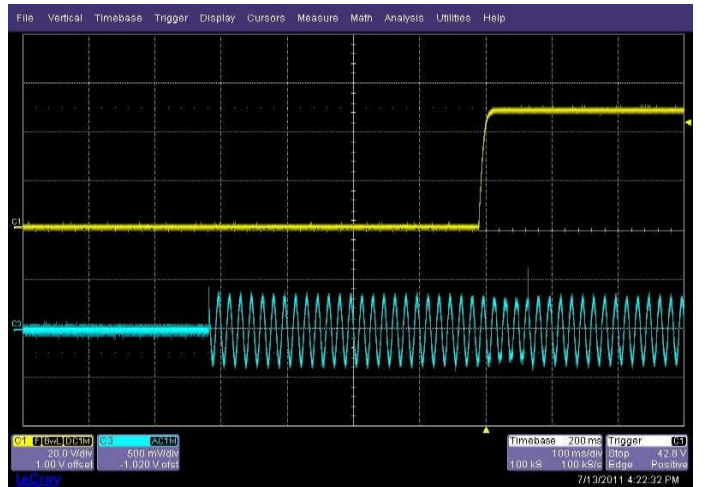
Output Voltage during OVP mode (100% Load)

## 2.6 Output rise and fall characteristics



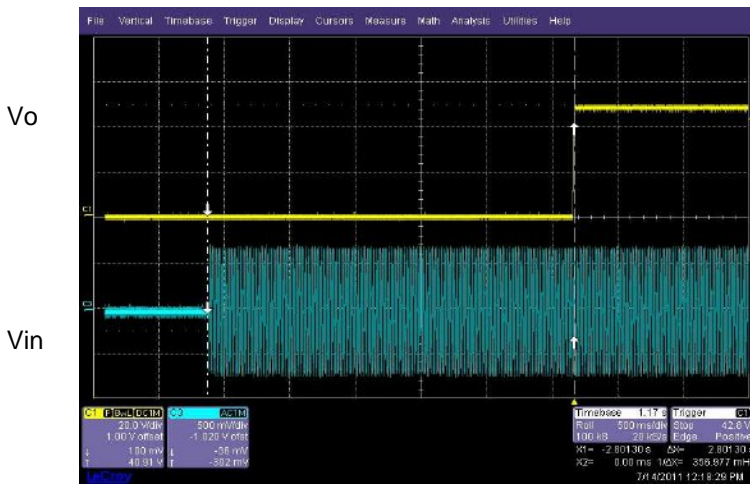
Vin: 250V/div      Vo: 20V/div      500ms/div

Output rise (0% Load, 115Vac input)



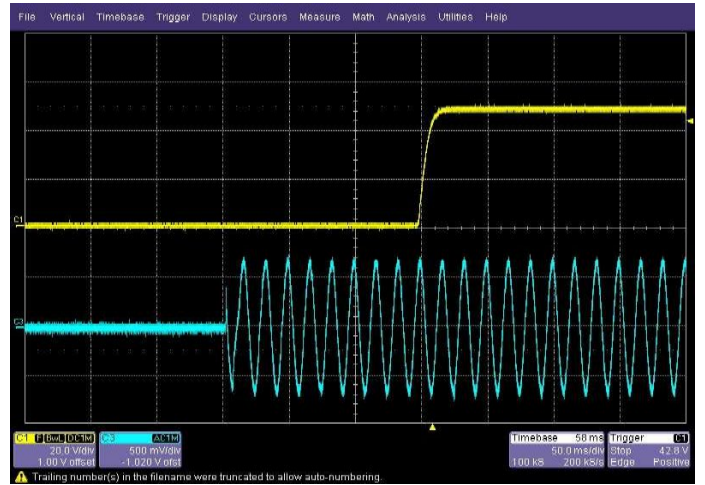
Vin: 250V/div      Vo: 20V/div      100ms/div

Output rise (100% Load, 115Vac input)



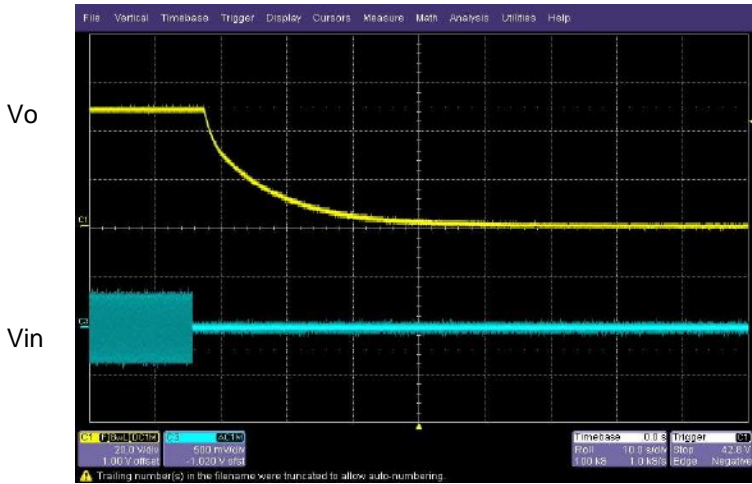
Vin: 250V/div      Vo: 20V/div      500ms/div

Output rise (0% Load, 230Vac input)



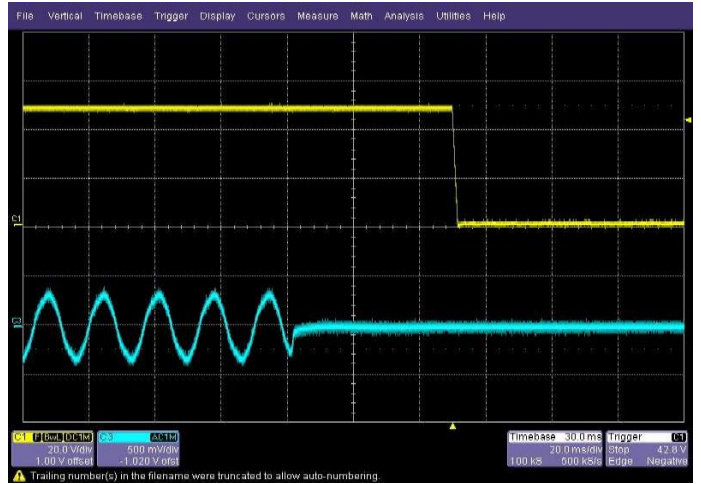
Vin: 250V/div      Vo: 20V/div      50ms/div

Output rise (100% Load, 230Vac input)



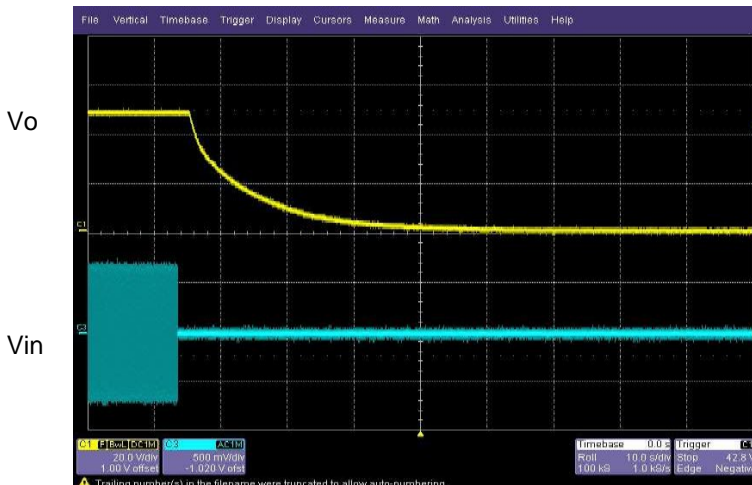
Vin: 250V/div      Vo: 20V/div      10s/div

Output fall (0% load, 115Vac input)



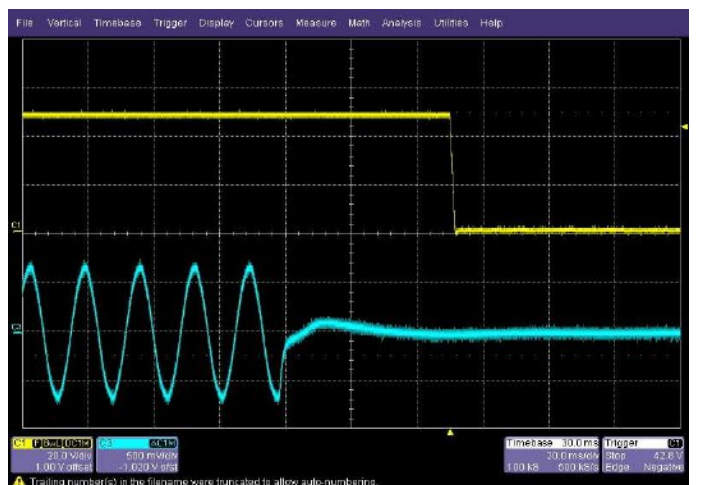
Vin: 250V/div      Vo: 20V/div      20ms/div

Output fall (100% load, 115Vac input)



Vin: 250V/div      Vo: 20V/div      10s/div

Output fall (0% load, 230Vac input)

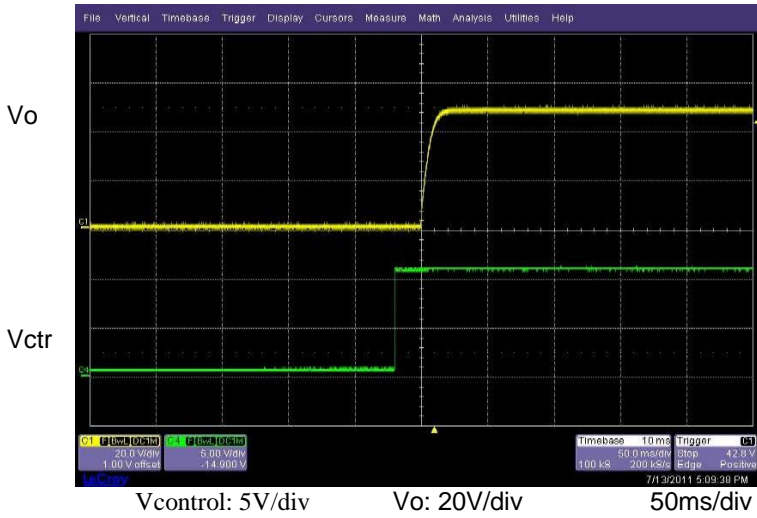


Vin: 250V/div      Vo: 20V/div      20ms/div

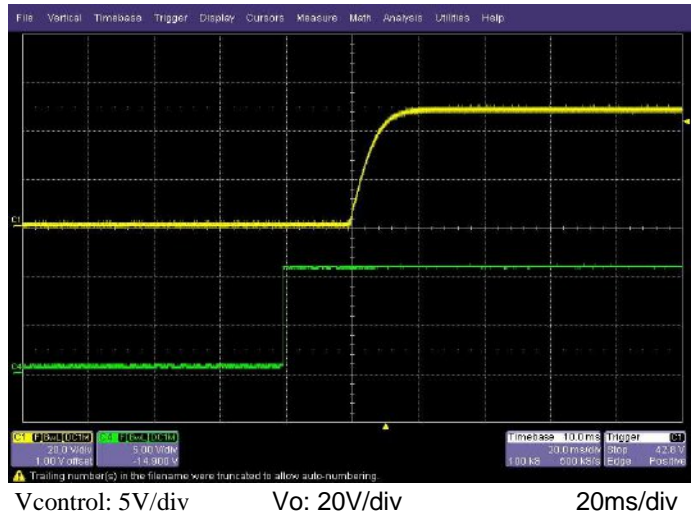
Output fall (100% load, 230Vac input)



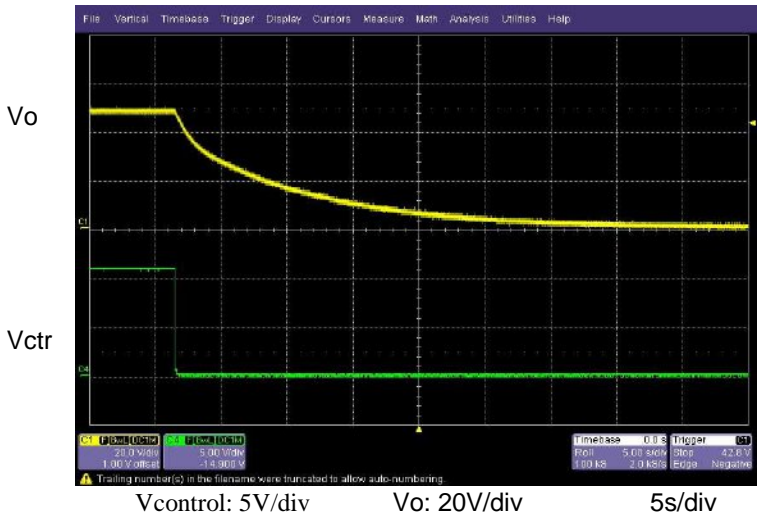
## 2.7 Output rise and fall characteristics with ON/OFF control.



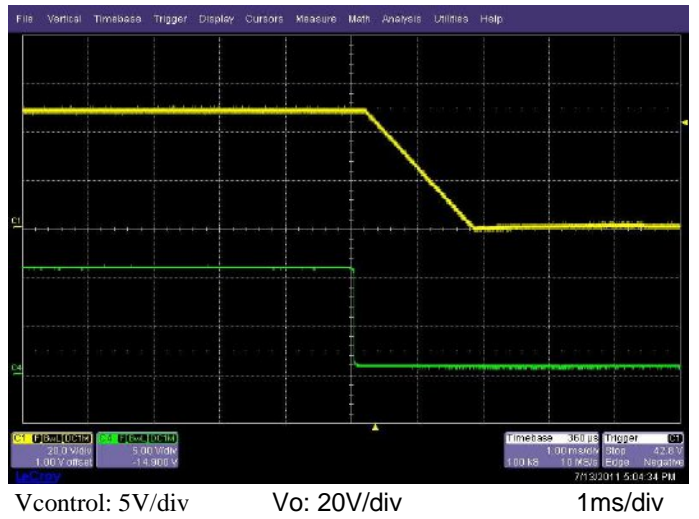
Output rise with ON/OFF control  
(0% load, 115Vac input)



Output rise with ON/OFF control  
(100% load, 115Vac input)

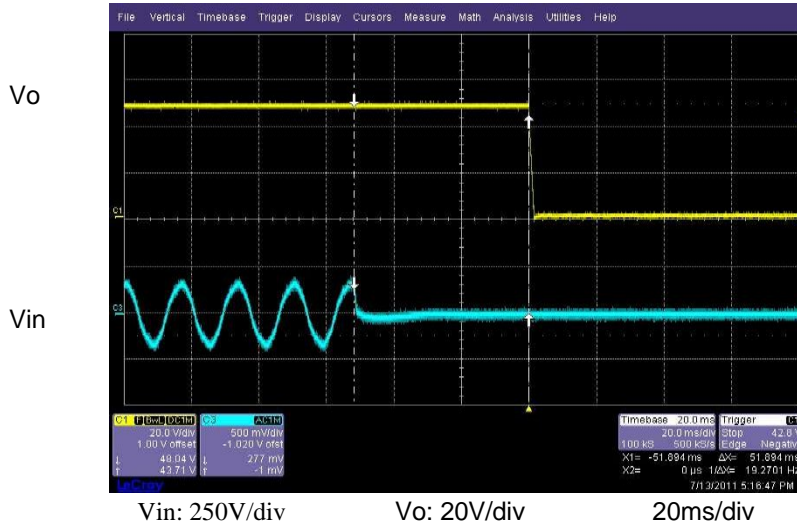


Output fall with ON/OFF control  
(0% load, 115Vac input)



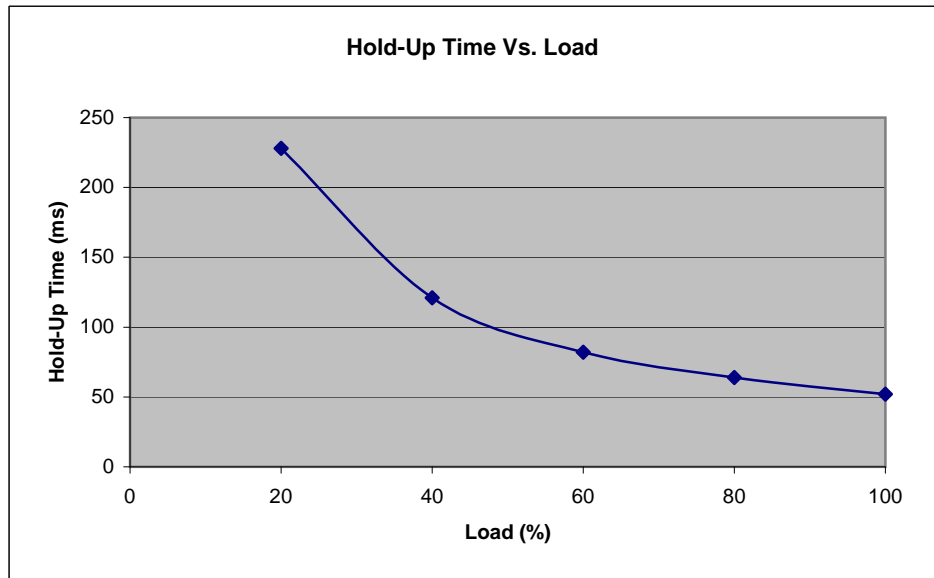
Output fall with ON/OFF control  
(100% load, 115Vac input)

## 2.8 Hold up time characteristics

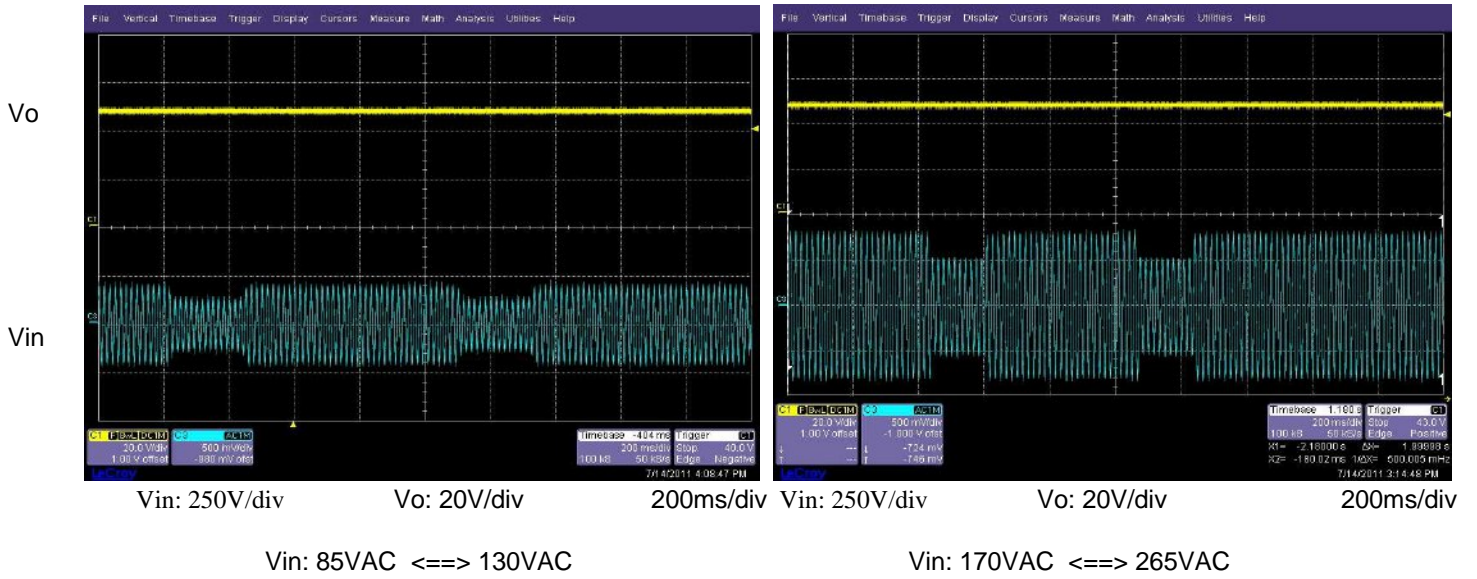


Hold up time (100% Load, 115Vac input)

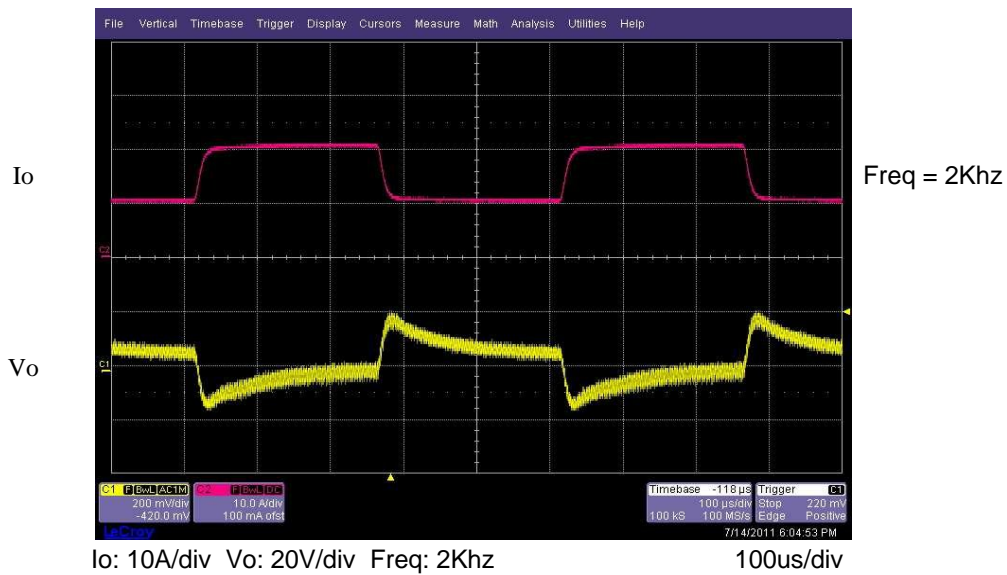
Load (%)	Hold up time (ms)
20	228
40	121
60	82
80	64
100	52



## 2.9 Dynamic line response characteristics

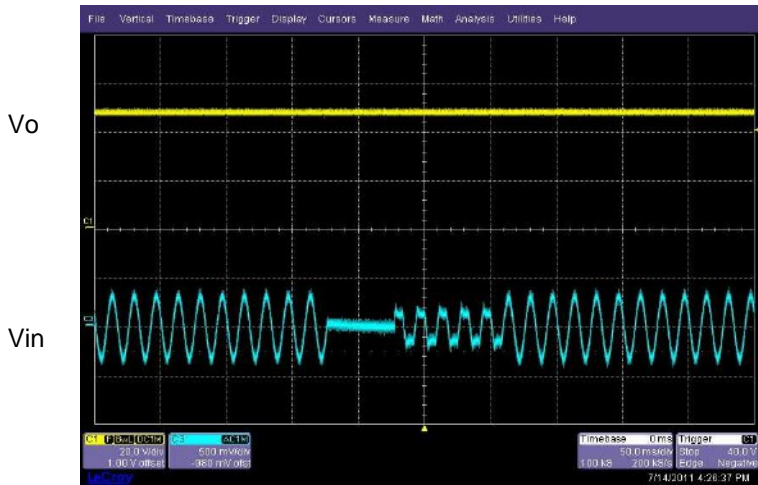


## 2.10 Dynamic load response characteristics



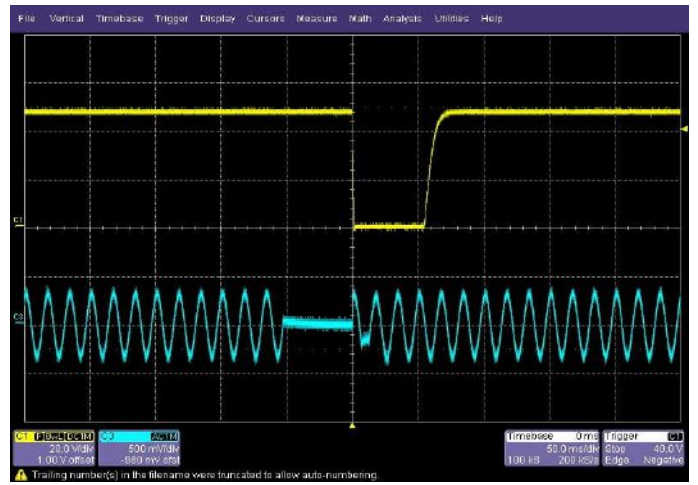
Dynamic Load Response (50% to 100% Load, 115Vac input)

## 2.11 Response to brownout characteristics



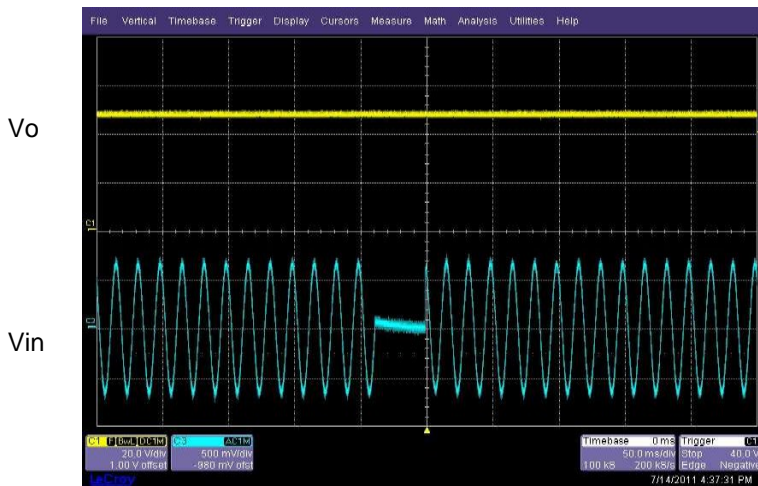
Vin: 250V/div Vo: 20V/div 50ms/div

Vin: 115VAC - 51mS Dropout



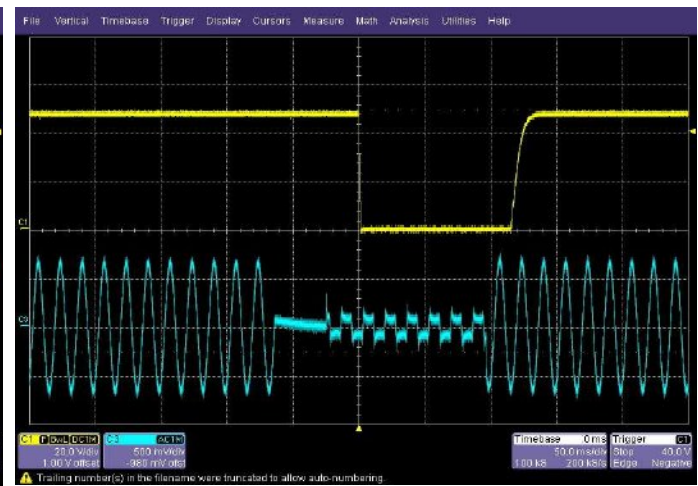
Vin: 250V/div Vo: 20V/div 50ms/div

Vin: 115VAC - 52mS Dropout



Vin: 250V/div Vo: 20V/div 50ms/div

Vin: 230VAC - 38mS Dropout

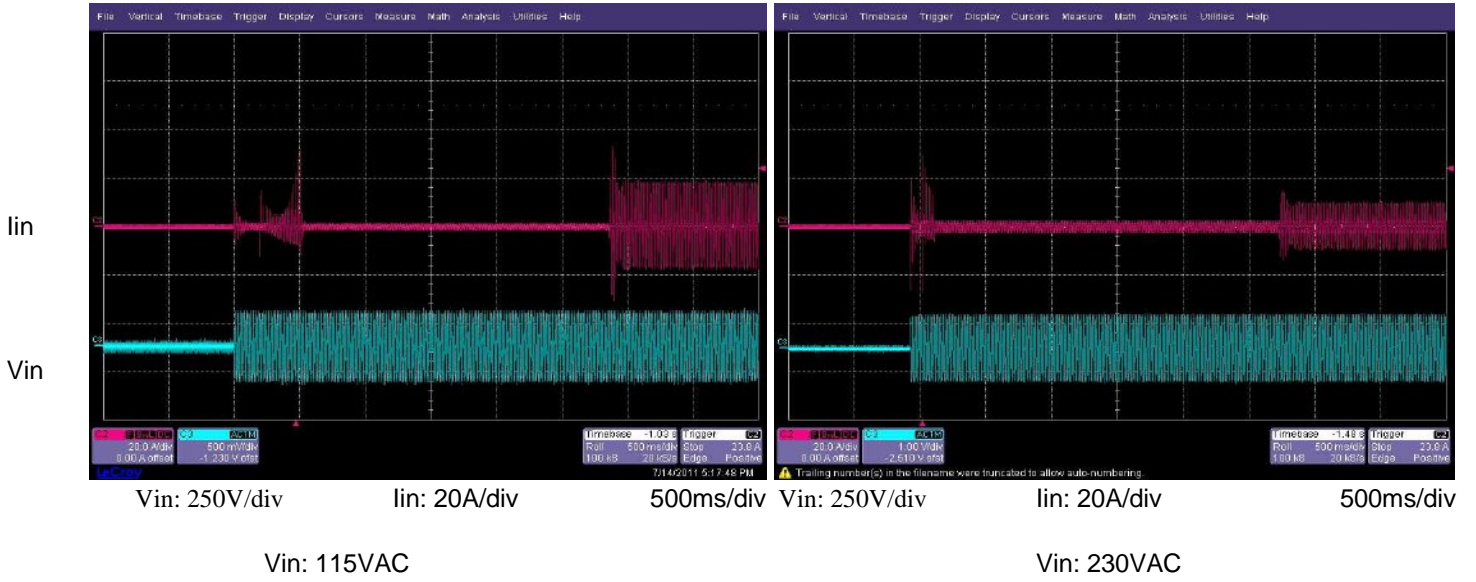


Vin: 250V/div Vo: 20V/div 50ms/div

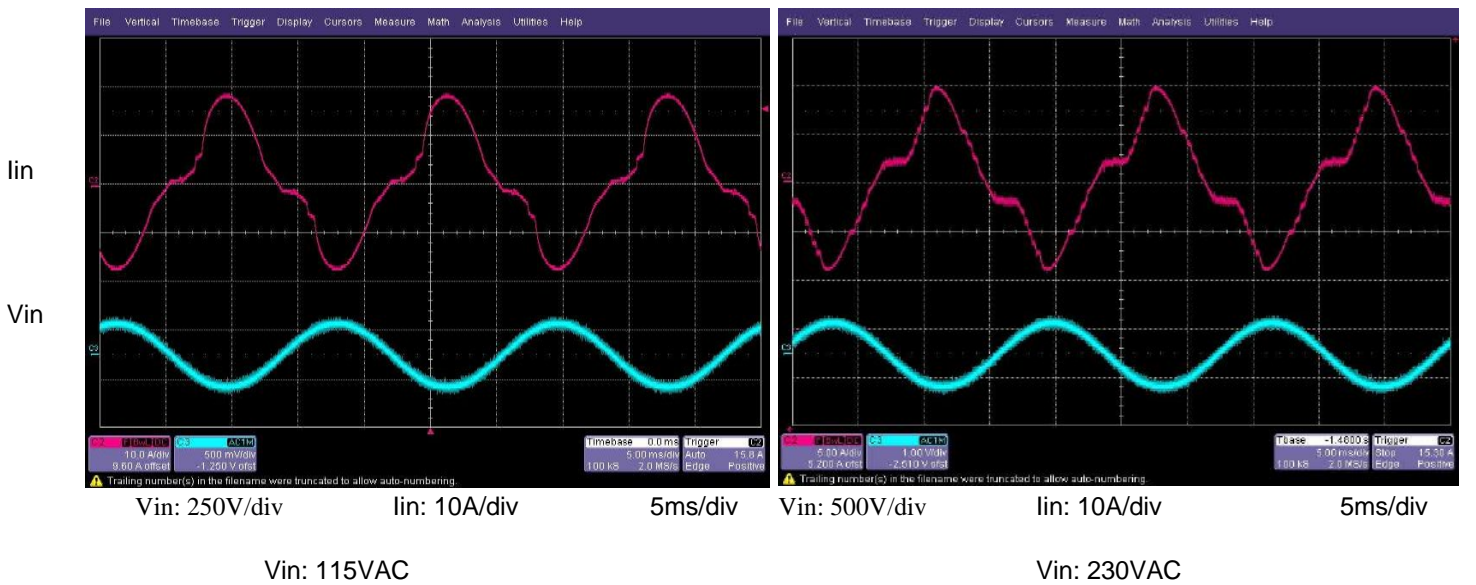
Vin: 230VAC - 39mS Dropout



## 2.12 Inrush current characteristics

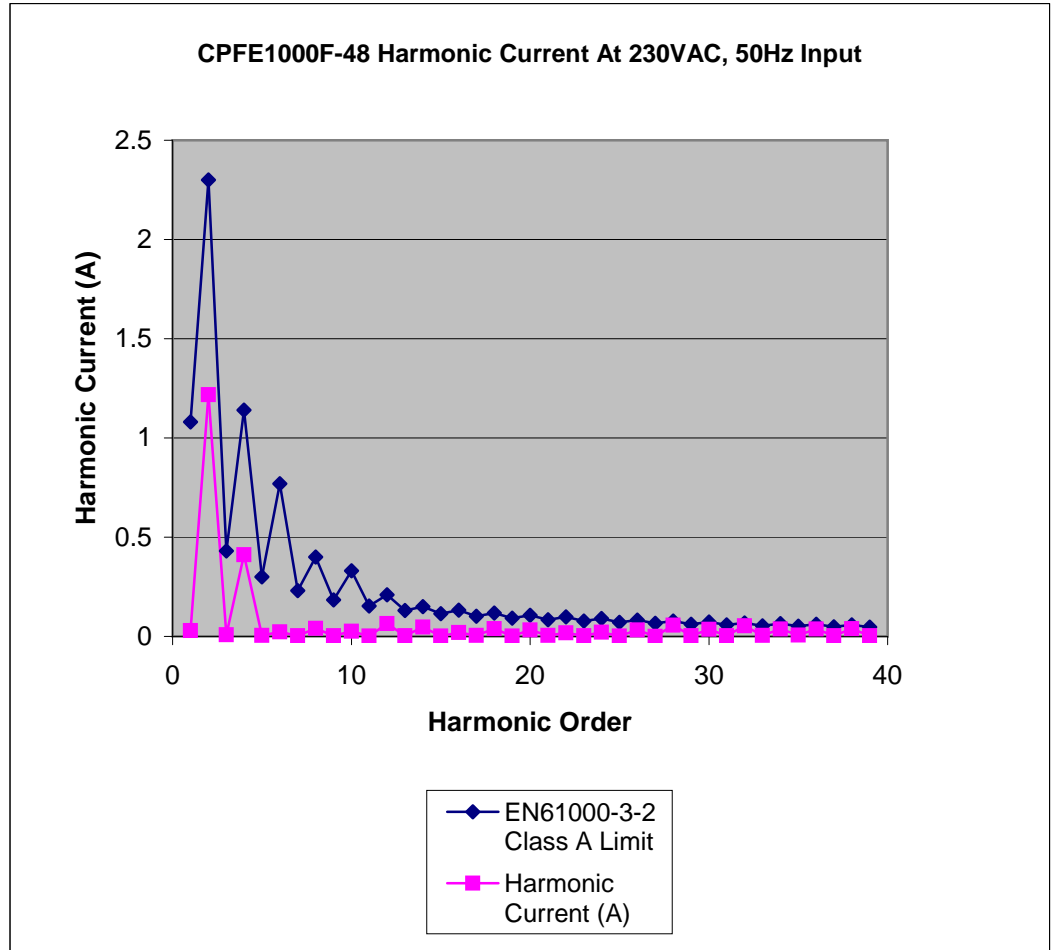


## 2.13 Input current waveforms



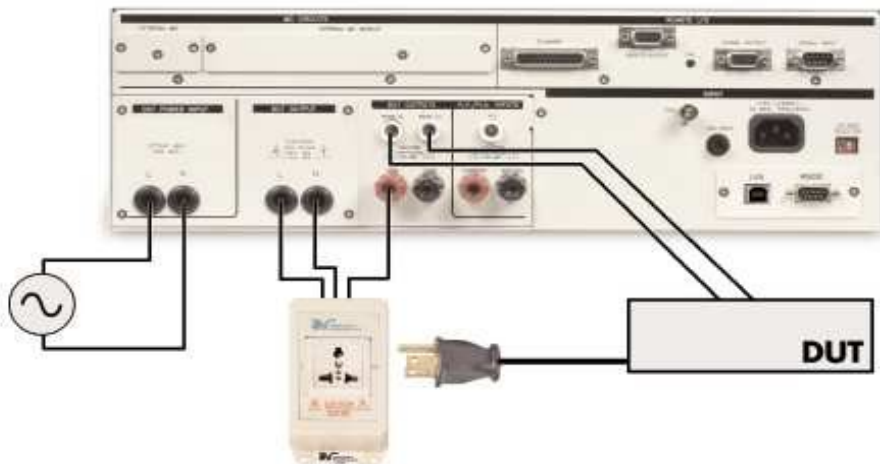
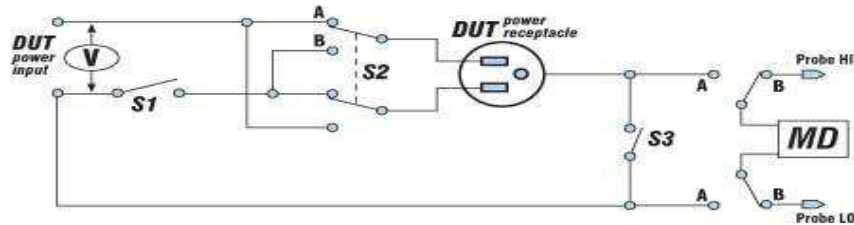
## 2.14 Input current harmonics

CPFE1000F-48		
Vin	230 VAC	
Freq	50 HZ	
Io	21 ADC	
Vo	48 VDC	
Iin	5.27	
ATHD	25.38	
Harmonics	Limit (A)	A
2	1.08	0.029
3	2.3	1.217
4	0.43	0.008
5	1.14	0.412
6	0.3	0.005
7	0.77	0.022
8	0.23	0.003
9	0.4	0.04
10	0.184	0.004
11	0.33	0.026
12	0.153	0.002
13	0.21	0.064
14	0.131	0.003
15	0.15	0.046
16	0.115	0.002
17	0.132	0.019
18	0.102	0.005
19	0.118	0.038
20	0.092	0.001
21	0.107	0.033
22	0.084	0.005
23	0.098	0.017
24	0.077	0.003
25	0.09	0.021
26	0.071	0.002
27	0.083	0.033
28	0.066	0
29	0.078	0.057
30	0.061	0.004
31	0.073	0.035
32	0.058	0.003
33	0.068	0.053
34	0.054	0.005
35	0.064	0.037
36	0.051	0.006
37	0.061	0.037
38	0.048	0.003
39	0.058	0.039
40	0.046	0.003



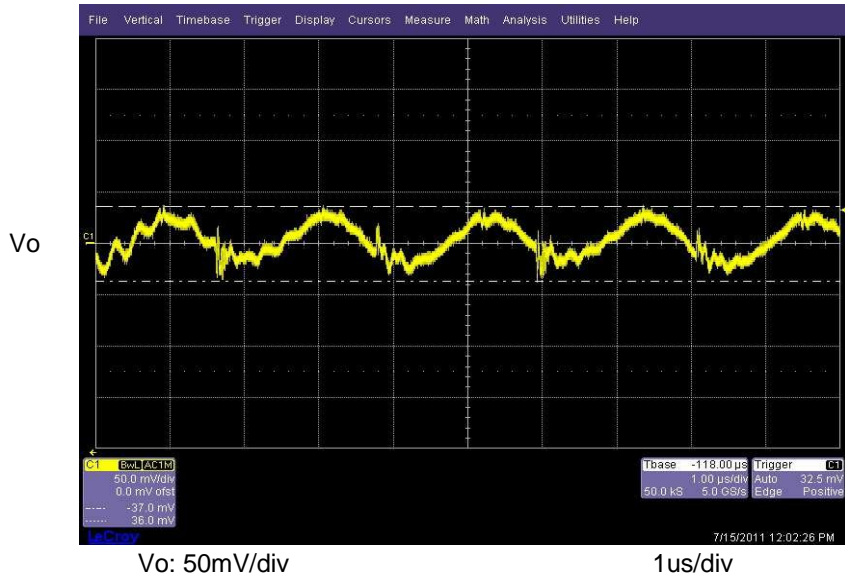
## 2.15 Leakage current characteristics

### Line Configuration Setting



PS Vout	Time (s)	Freq (Hz)	Nom.1 115VAC	Nom.2 230VAC	Non.2HI 265VAC	Configuration		
						Neutral	Reverse	GND
			<1.5mA	<1.5mA	<1.5mA	Neutral	Reverse	GND
48	10	60	0.4217	0.9155	1.0700	Closed	Off	Open
	10	60	0.0000	0.0001	0.0001	Closed	Off	Closed
	10	60	0.4196	0.9054	1.0570	Closed	On	Open
	10	60	0.0000	0.0001	0.0001	Closed	On	Closed
	10	50	0.3521	0.7643	0.8935	Closed	Off	Open
	10	50	0.0000	0.0001	0.0001	Closed	Off	Closed
	10	50	0.3503	0.7556	0.8822	Closed	On	Open
	10	50	0.0000	0.0001	0.0001	Closed	On	Closed

## 2.16 Output ripple and noise waveforms



Vin: 115VAC