



# CPFE1000F-28


## EVALUATION DATA

Tested By: Carlos San Pedro / 	Date : 8/23/2011
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Name/Signature

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

Approved By: Greg Laufman / 	Date : 8/23/2011
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Name/Signature

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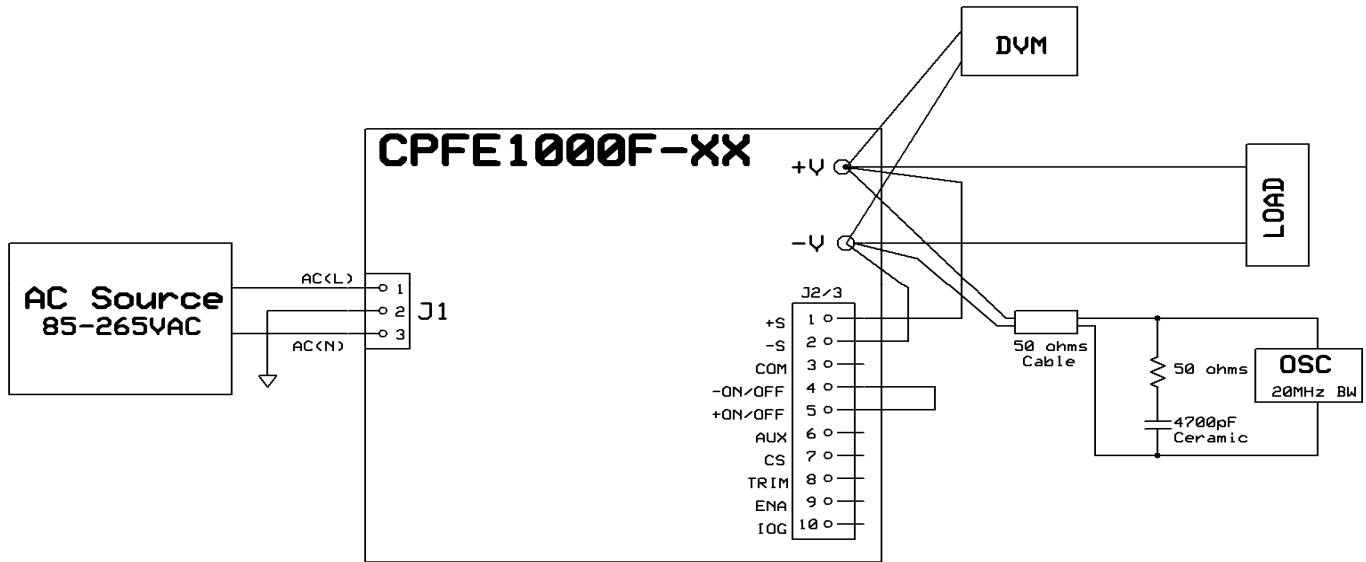
### Test Equipment used:

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	28.204	28.200	28.200	28.201	0.004	0.008%
25% Load	28.201	28.202	28.201	28.201	0.001	0.002%
50% Load	28.202	28.202	28.203	28.203	0.001	0.002%
75% Load	28.201	28.205	28.203	28.203	0.004	0.008%
100% Load	28.205	28.207	28.208	28.211	0.006	0.013%
Load Regulation	0.004	0.007	0.0078	0.01		
	0.008%	0.015%	0.016%	0.021%		

Vo measured across output studs using **remote sense** connections.

Io \ Vin	85 VAC	115 VAC	230 VAC	265 VAC	Line Regulation	
0% Load	28.051	28.051	28.051	28.051	0	0.000%
25% Load	28.052	28.053	28.055	28.056	0.004	0.008%
50% Load	28.057	28.058	28.059	28.060	0.003	0.006%
75% Load	28.058	28.059	28.060	28.061	0.003	0.006%
100% Load	28.056	28.059	28.065	28.066	0.01	0.021%
Load Regulation	0.007	0.008	0.014	0.015		
	0.015%	0.017%	0.029%	0.031%		

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

Condition Tbp = 25°C

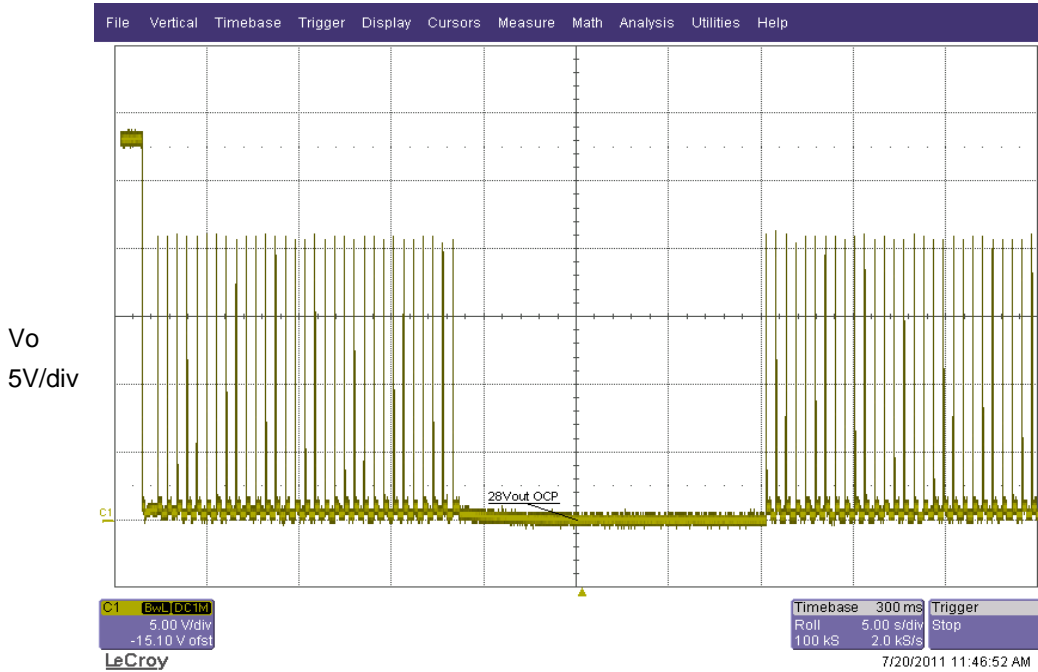
	0% Load	100%Load
Turn ON Voltage	77VAC	78VAC
Turn OFF Voltage	69VAC	74VAC

### 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	0.763	48.3	0.812	28.062	0	0	N/A	0%
115 VAC	0.803	47.1	0.546	28.062	0	0	N/A	
230 VAC	1.434	44.9	0.136	28.062	0	0	N/A	
265 VAC	1.668	43.6	0.099	28.062	0	0	N/A	
85 VAC	3.967	330.9	0.999	28.061	9.03	253.3908	76.58%	25%
115 VAC	3.006	324.4	0.989	28.063	9.03	253.4089	78.12%	
230 VAC	2.022	311.8	0.709	28.065	9.03	253.427	81.28%	
265 VAC	2.131	309.0	0.586	28.066	9.03	253.436	82.02%	
85 VAC	7.561	614.3	0.999	28.058	18.02	505.6052	82.31%	50%
115 VAC	5.423	606.8	0.998	28.067	18.02	505.7673	83.35%	
230 VAC	3.001	582.5	0.885	28.070	18.02	505.8214	86.84%	
265 VAC	2.937	577.1	0.798	28.071	18.03	506.1201	87.70%	
85 VAC	11.067	913.9	1.000	28.067	27.00	757.809	82.92%	75%
115 VAC	8.009	896.9	1.000	28.077	27.00	758.079	84.52%	
230 VAC	4.171	862.4	0.941	28.080	27.00	758.16	87.91%	
265 VAC	3.873	854.9	0.888	28.082	27.00	758.214	88.69%	
85 VAC	14.813	1234.0	1.000	28.068	36.06	1012.132	82.02%	100%
115 VAC	10.771	1209.0	0.999	28.082	36.06	1012.637	83.76%	
230 VAC	5.394	1152.5	0.962	28.087	36.06	1012.817	87.88%	
265 VAC	4.906	1143.4	0.927	28.091	36.06	1012.961	88.59%	

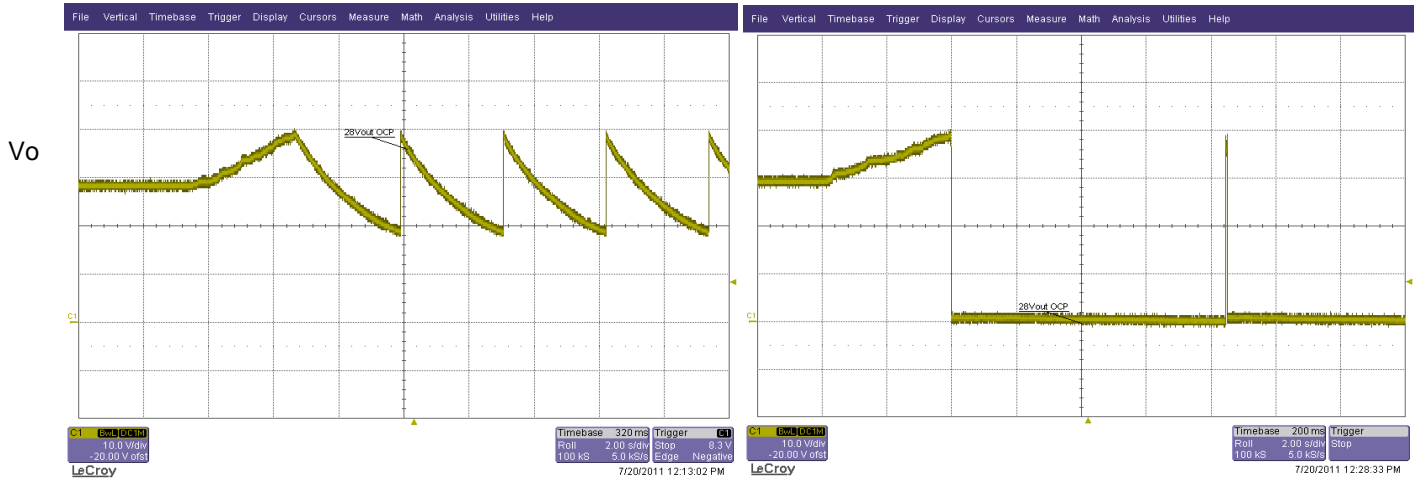
## 2.4 Over current protection (OCP) characteristics.



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

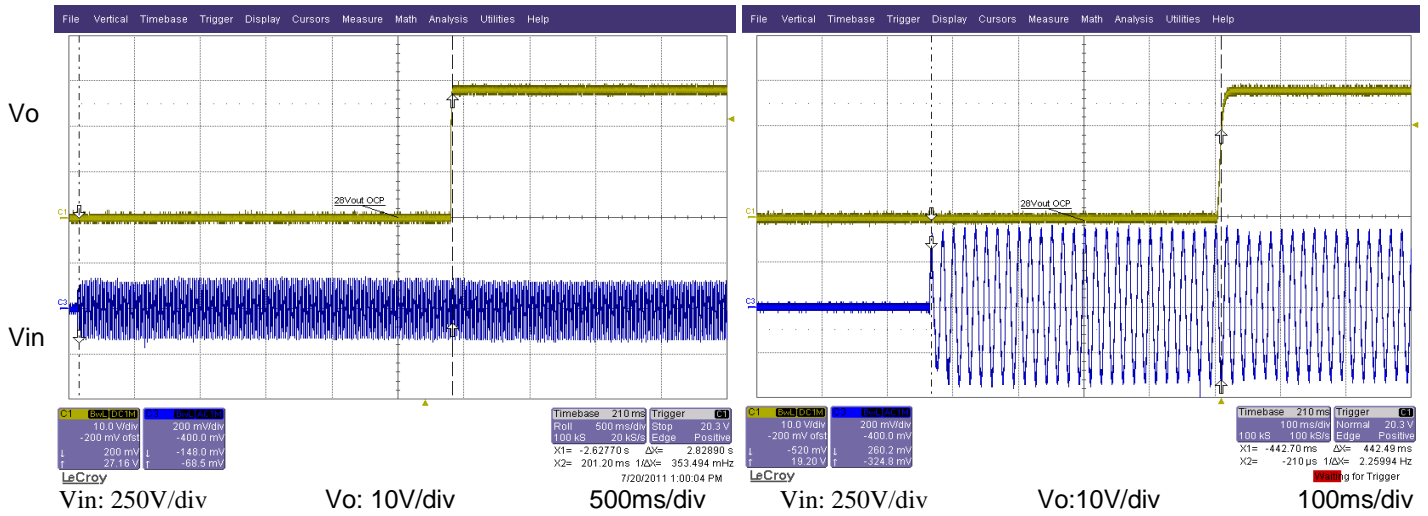
Vo: 10V/div

2s/div

Output Voltage during OVP mode (0% Load)

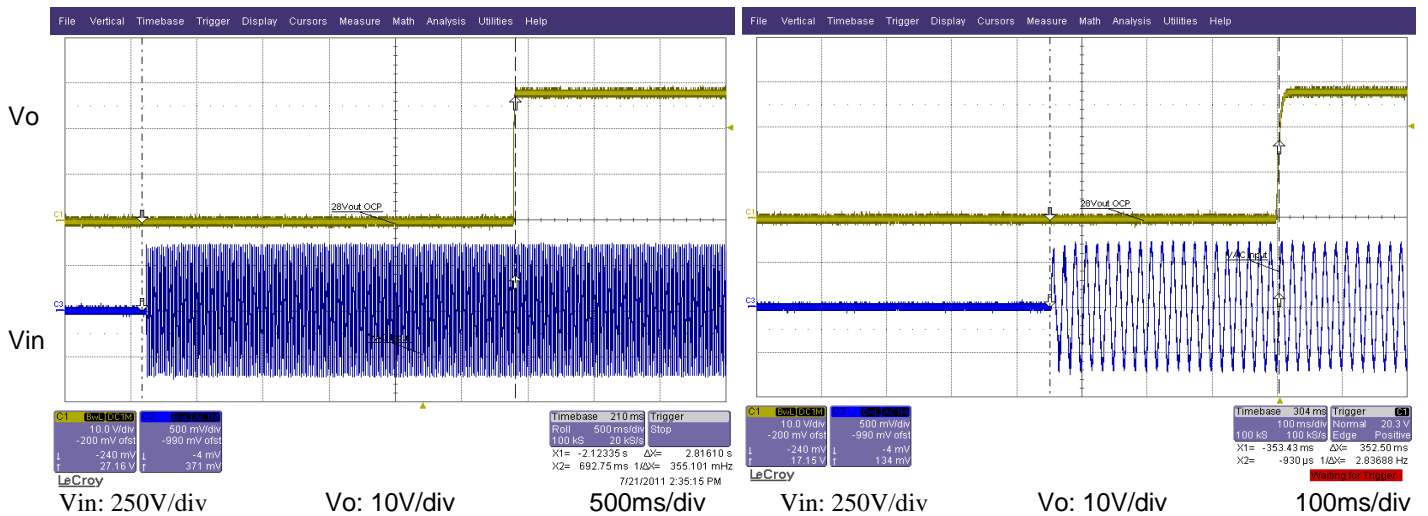
Output Voltage during OVP mode (100% Load)

## 2.6 Output rise and fall characteristics



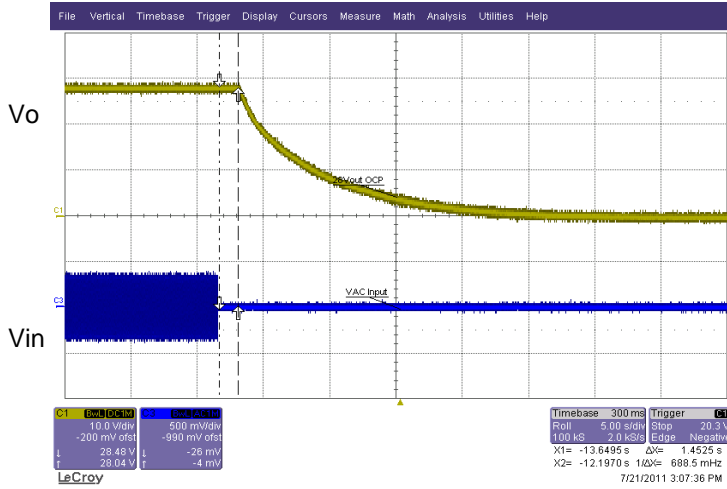
Output rise (0% Load, 115Vac input)

Output rise (100% Load, 115Vac input)



Output rise (0% Load, 230Vac input)

Output rise (100% Load, 230Vac input)

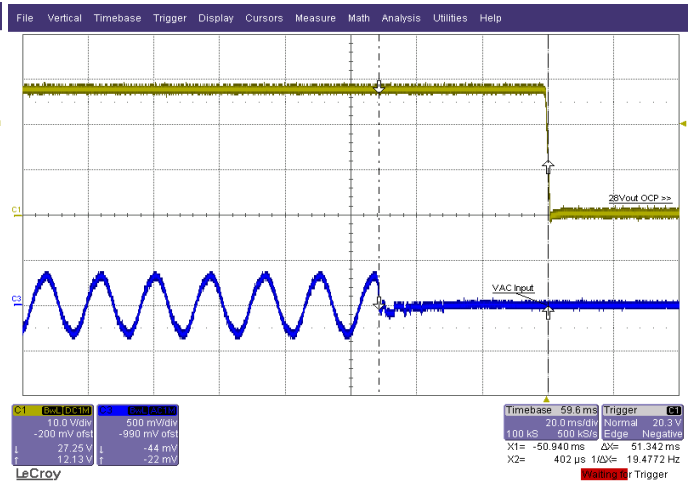


Vin: 250V/div

Vo:10V/div

5s/div

Output fall (0% load, 115Vac input)

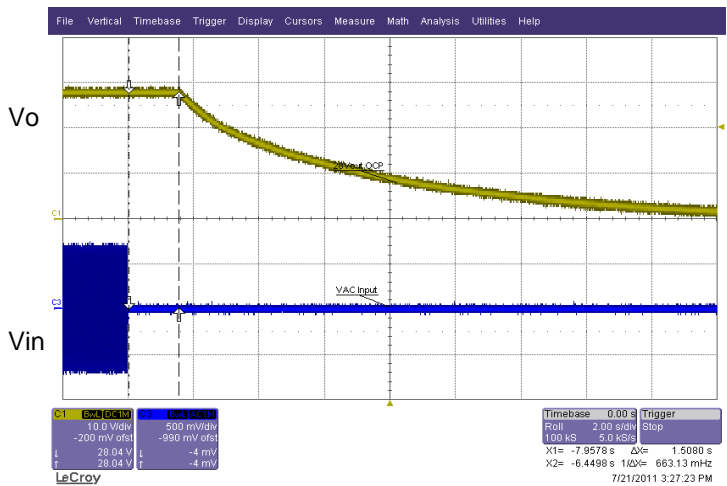


Vin: 250V/div

Vo: 10V/div

20ms/div

Output fall (100% load, 115Vac input)

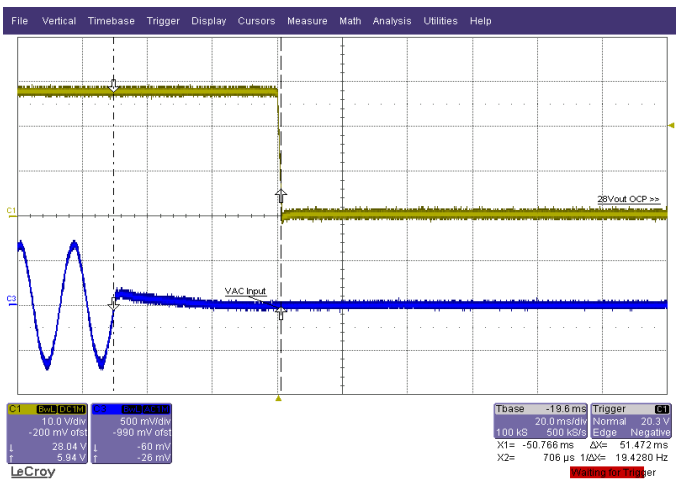


Vin: 250V/div

Vo: 10V/div

2s/div

Output fall (0% load, 230Vac input)



Vin: 250V/div

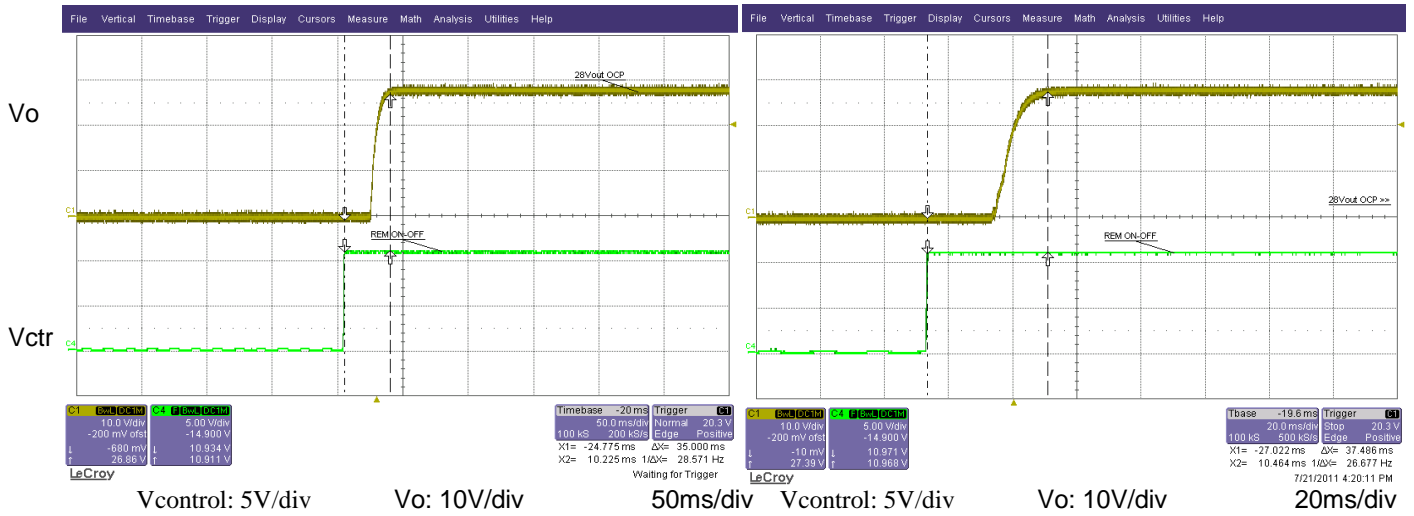
Vo: 10V/div

20ms/div

Output fall (100% load, 230Vac input)

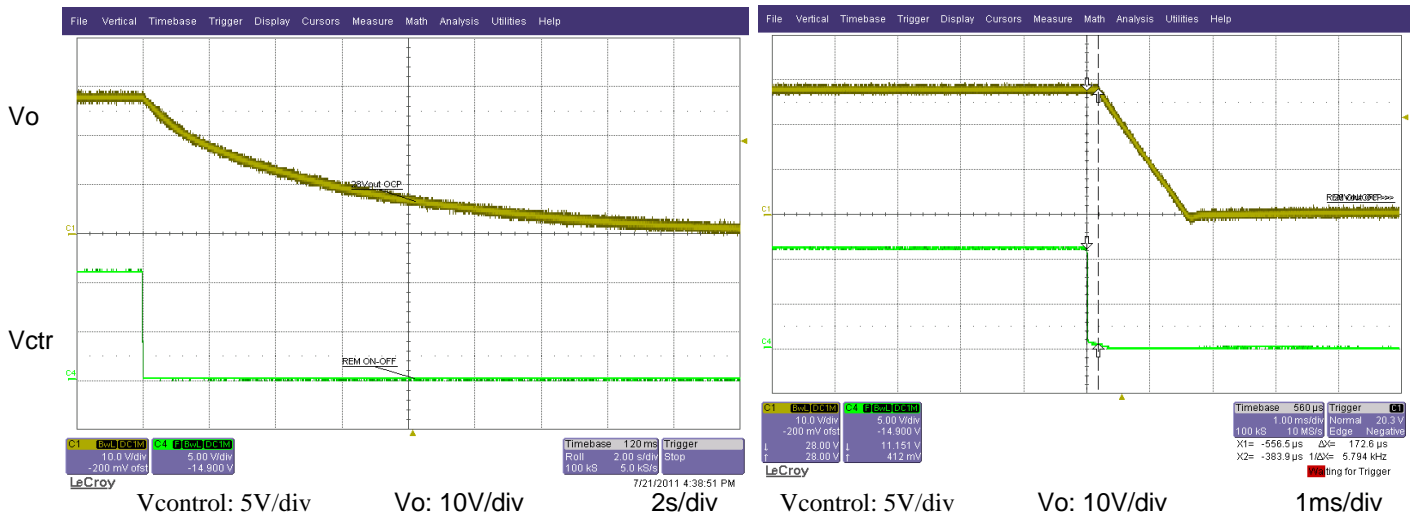


## 2.7 Output rise and fall characteristics with ON/OFF control.



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

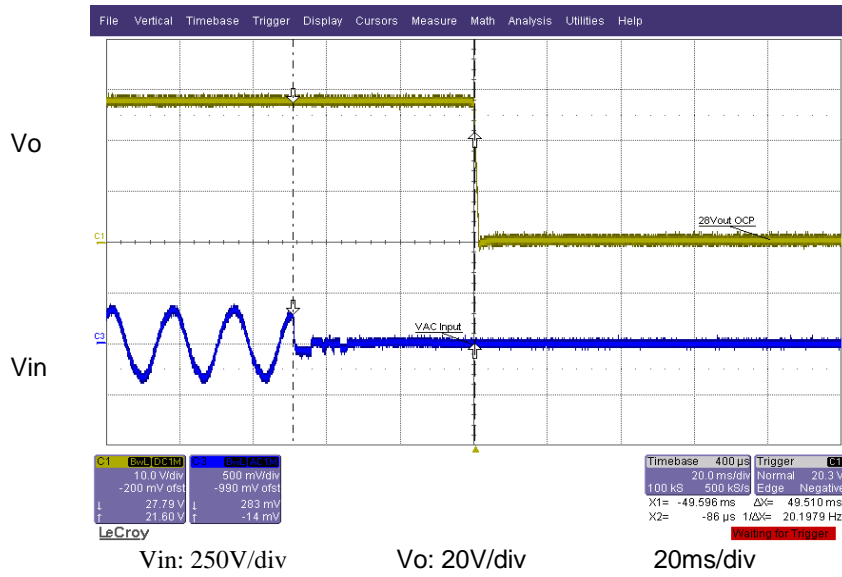
Output rise with ON/OFF control  
(100% load, 115Vac input)



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

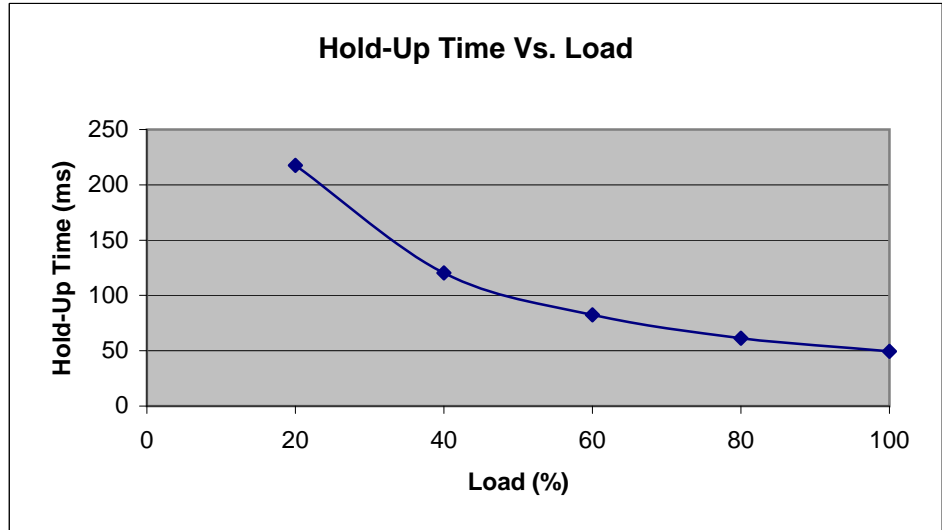
Output fall with ON/OFF control  
(100% load, 115Vac input)

## 2.8 Hold up time characteristics

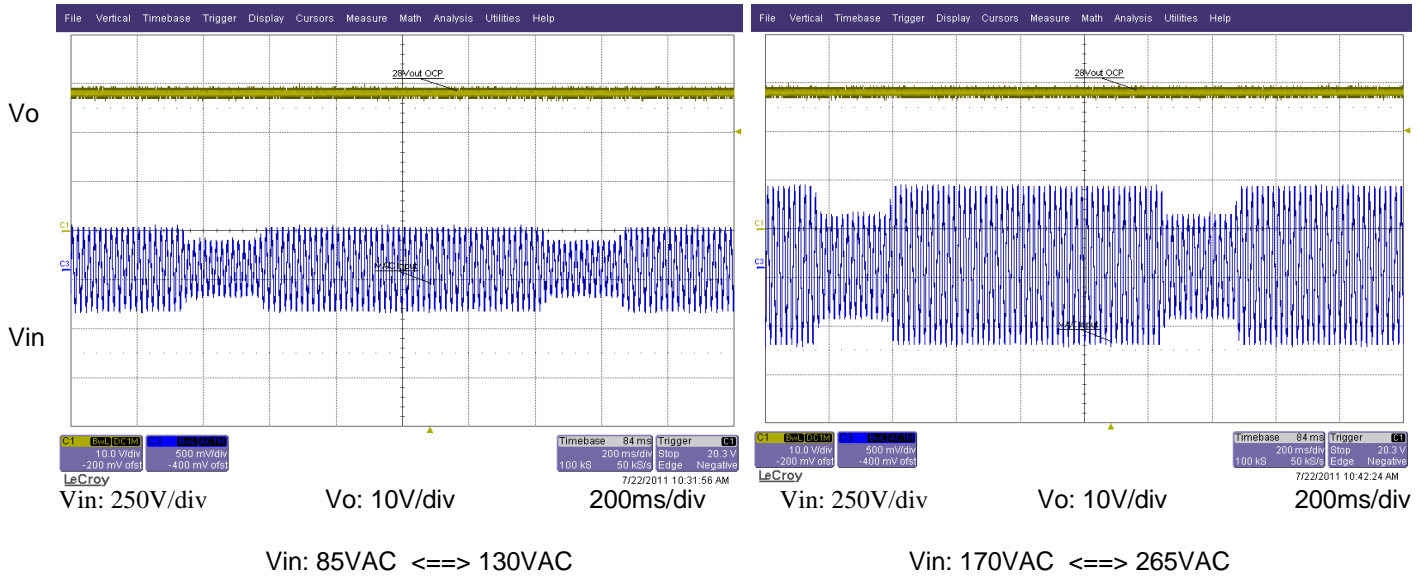


Hold up time (100% Load, 115VAC input)

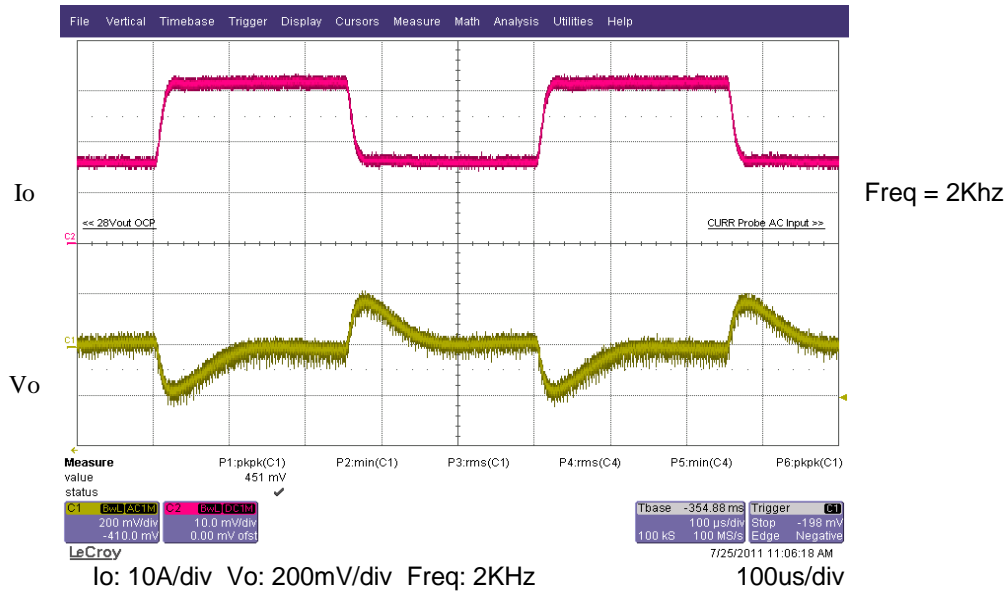
Load (%)	Hold up time (ms)
20	217.6
40	120.4
60	82.5
80	61.4
100	49.5



## 2.9 Dynamic line response characteristics

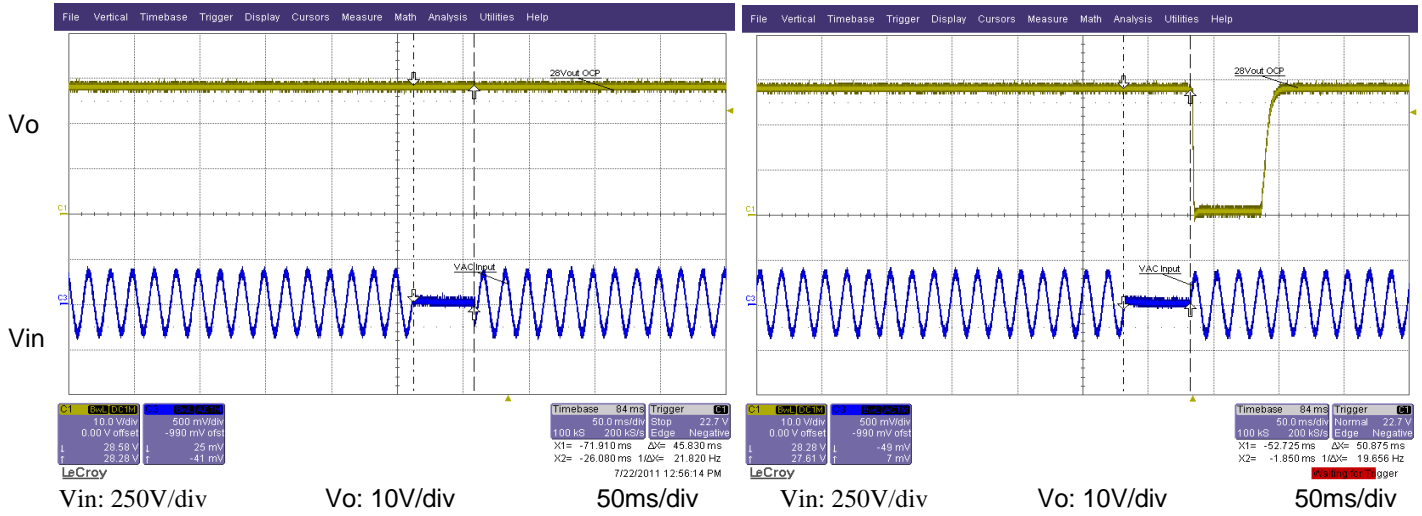


## 2.10 Dynamic load response characteristics



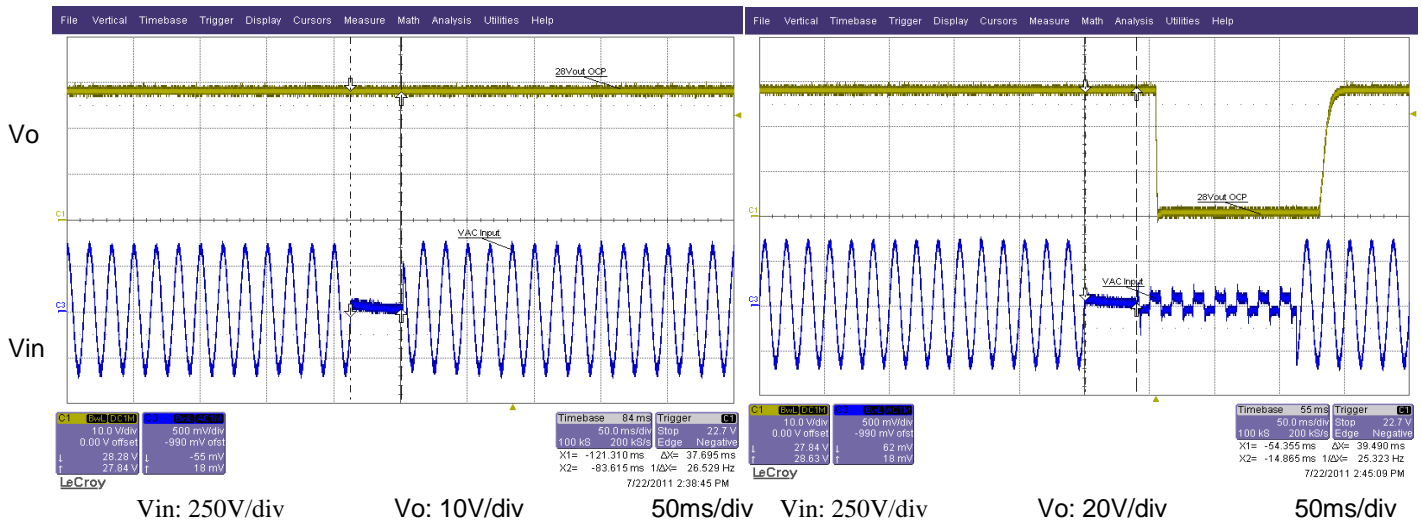
Dynamic Load Response (50% to 100% Load, 115Vac input)

## 2.11 Response to brownout characteristics



Vin: 115VAC - 45ms Dropout FL

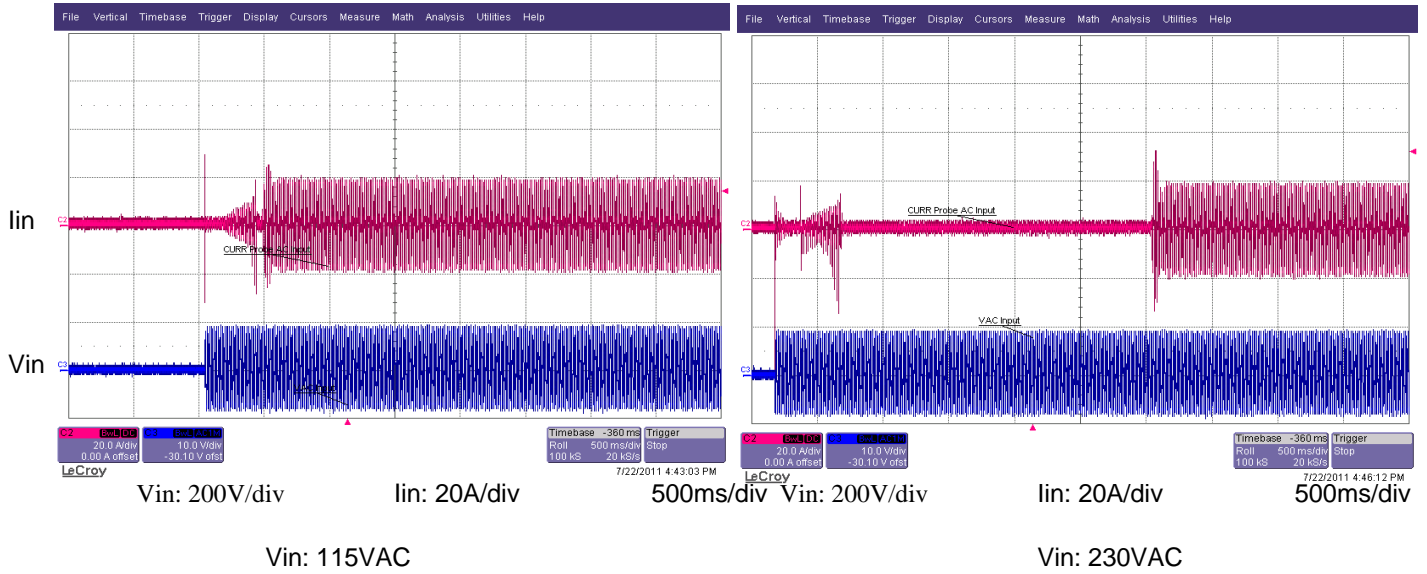
Vin: 115VAC - 47ms Dropout FL



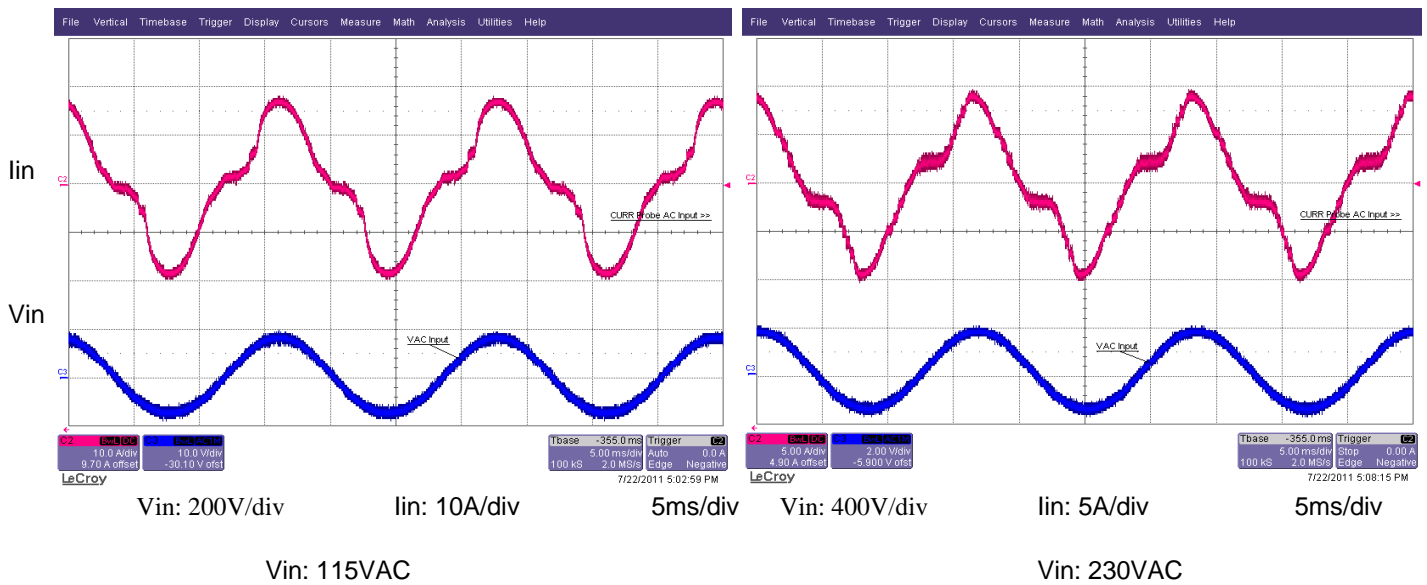
Vin: 230VAC - 37ms Dropout FL

Vin: 230VAC - 39ms Dropout FL

## 2.12 Inrush current characteristics

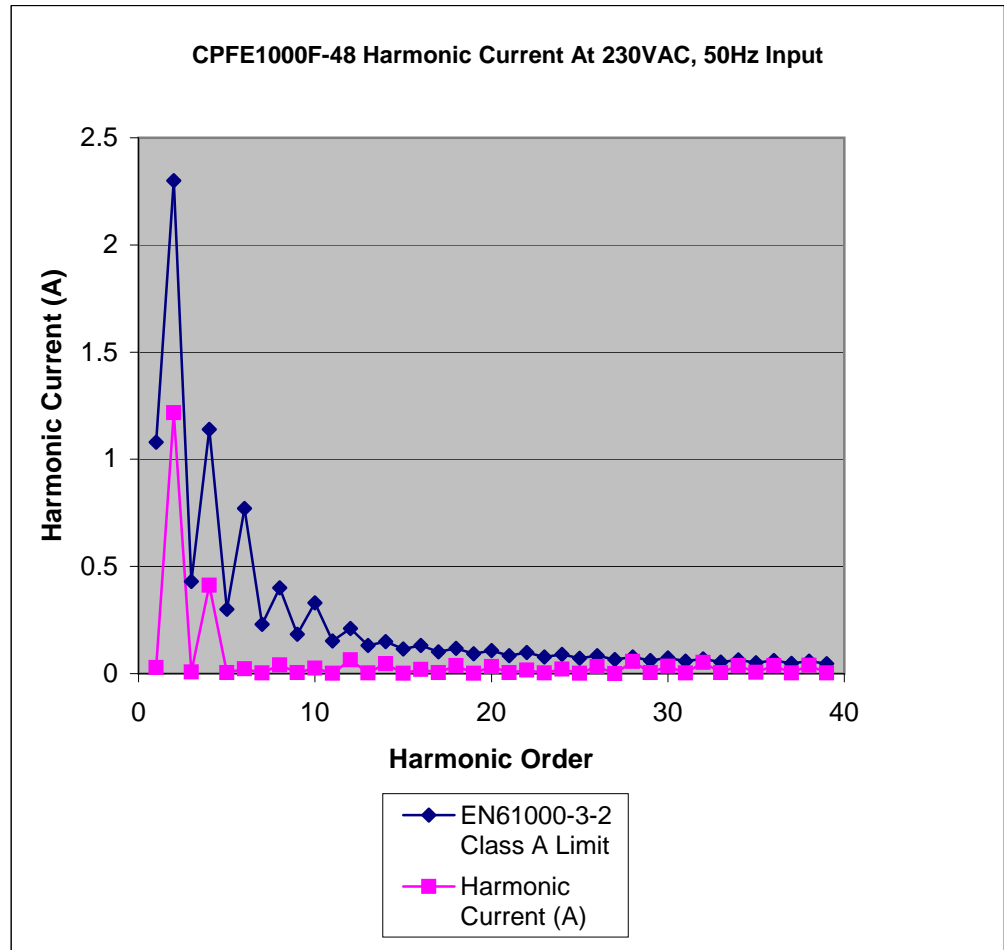


## 2.13 Input current waveforms

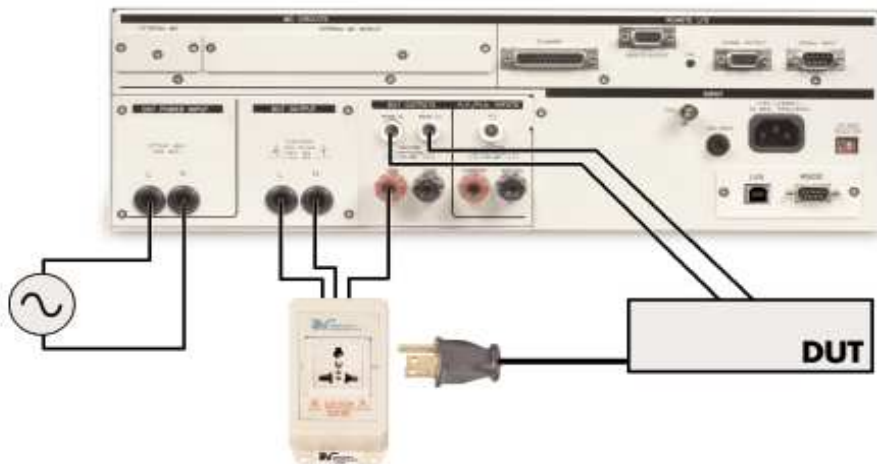
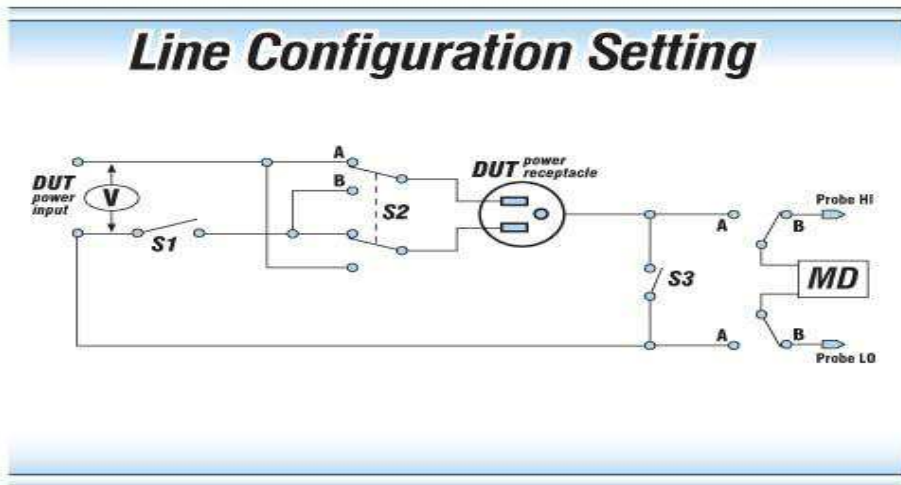


## 2.14 Input current harmonics

CPFE1000F-48		
Vin	230 VAC	
Freq	50 HZ	
Io	36 ADC	
Vo	28VDC	
Iin	5.298	
ATHD	26.56	
Harmonics	Limit (A)	A
2	1.08	0.031
3	2.3	1.281
4	0.43	0.008
5	1.14	0.422
6	0.3	0.004
7	0.77	0.029
8	0.23	0.002
9	0.4	0.034
10	0.184	0.003
11	0.33	0.024
12	0.153	0.003
13	0.21	0.067
14	0.131	0.004
15	0.15	0.05
16	0.115	0.001
17	0.132	0.023
18	0.102	0.006
19	0.118	0.039
20	0.092	0.001
21	0.107	0.04
22	0.084	0.007
23	0.098	0.019
24	0.077	0.005
25	0.09	0.028
26	0.071	0.003
27	0.083	0.034
28	0.066	0.002
29	0.078	0.055
30	0.061	0.004
31	0.073	0.037
32	0.058	0.005
33	0.068	0.045
34	0.054	0.004
35	0.064	0.043
36	0.051	0.007
37	0.061	0.032
38	0.048	0.003
39	0.058	0.05
40	0.046	0.003

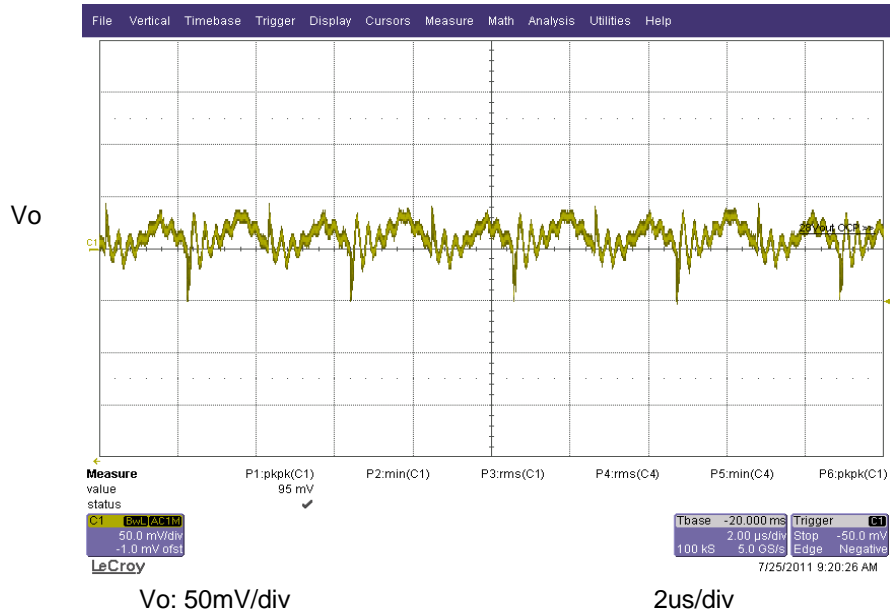


## 2.15 Leakage current characteristics



PS Vout	Time (s)	Freq (Hz)	Nom.1 115VAC	Nom.2 230VAC	Non.2HI 265VAC	Configuration		
						Neutral	Reverse	GND
48	10	60	0.4154	0.8979	1.0520	Closed	Off	Open
	10	60	0.0000	0.0001	0.0001	Closed	Off	Closed
	10	60	0.4151	0.8948	1.0460	Closed	On	Open
	10	60	0.0000	0.0001	0.0001	Closed	On	Closed
	10	50	0.3469	0.7506	0.8778	Closed	Off	Open
	10	50	0.0000	0.0001	0.0001	Closed	Off	Closed
	10	50	0.3467	0.7468	0.8735	Closed	On	Open
	10	50	0.0000	0.0001	0.0001	Closed	On	Closed

## 2.16 Output ripple and noise waveforms



Vin: 115VAC