



Supplemental test data  
(参考資料)

Date of issue: Jul. 25, 2011

# Test Data

Model Number: OZ-060-12

Model Name: DC POWER SUPPLY

INPUT: 85V - 264V AC, 50 / 60 Hz

OUTPUT: 12 V 5.0A

Minimum load : 0W  
Rated load :60W

Approved by : Makoto Urasue (QA manager)

Designed by : A. Takeda (R&D engineer)

Tested by : Keiei Sawada (Evaluation test engineer)

**Nipron Co., Ltd.**

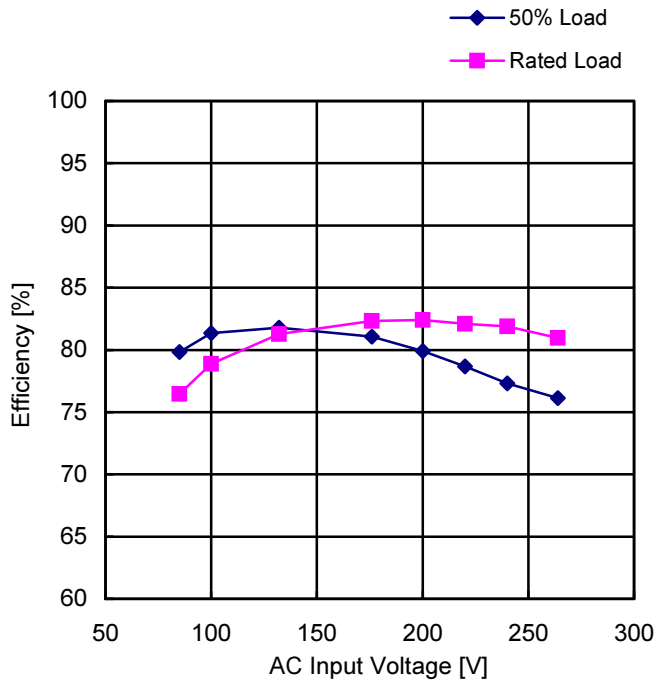
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Model	OZ-60-12	Temperature: 25°C																																					
Item	Input Current (by Load Power)																																						
		<table border="1"> <thead> <tr> <th rowspan="2">Load Power [W]</th> <th colspan="4">Input Current [A rms]</th> </tr> <tr> <th>Input Voltage 85V AC</th> <th>Input Voltage 100V AC</th> <th>Input Voltage 240V AC</th> <th>Input Voltage 264V AC</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>0.05</td> <td>0.05</td> <td>0.07</td> <td>0.08</td> </tr> <tr> <td>15.0</td> <td>0.39</td> <td>0.37</td> <td>0.24</td> <td>0.24</td> </tr> <tr> <td>30.0</td> <td>0.68</td> <td>0.64</td> <td>0.36</td> <td>0.34</td> </tr> <tr> <td>45.0</td> <td>0.99</td> <td>0.94</td> <td>0.48</td> <td>0.46</td> </tr> <tr> <td>60.0</td> <td>1.32</td> <td>1.26</td> <td>0.61</td> <td>0.58</td> </tr> </tbody> </table>				Load Power [W]	Input Current [A rms]				Input Voltage 85V AC	Input Voltage 100V AC	Input Voltage 240V AC	Input Voltage 264V AC	0.0	0.05	0.05	0.07	0.08	15.0	0.39	0.37	0.24	0.24	30.0	0.68	0.64	0.36	0.34	45.0	0.99	0.94	0.48	0.46	60.0	1.32	1.26	0.61	0.58
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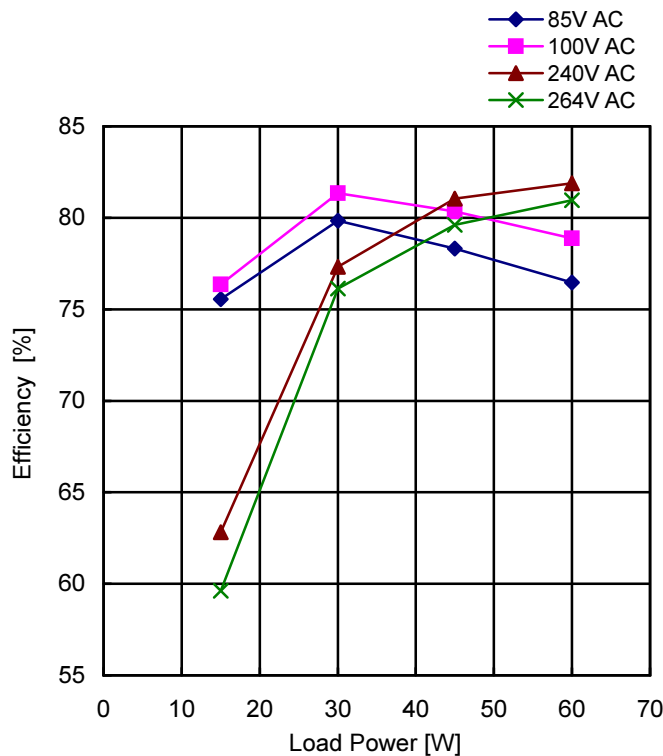
Model	OZ-60-12	Temperature: 25°C
Item	Efficiency	

■ Efficiency (by Input Voltage)



AC Input Voltage [V]	Efficiency [%]	
	50% Load	Rated Load
85	79.84	76.46
100	81.35	78.88
132	81.80	81.26
176	81.07	82.33
200	79.92	82.39
220	78.66	82.11
240	77.32	81.89
264	76.14	80.96

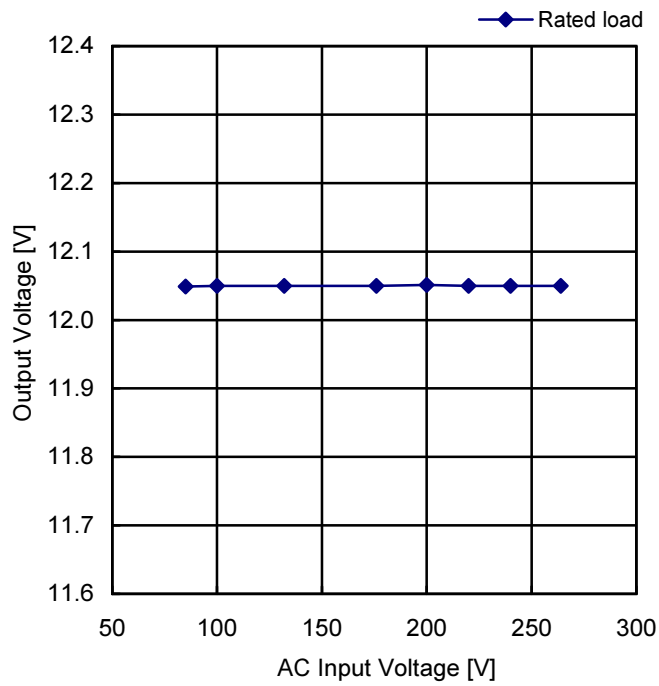
■ Efficiency (by Load Power)



Load Power [W]	Efficiency [%]			
	Input Voltage 85V AC	Input Voltage 100V AC	Input Voltage 240V AC	Input Voltage 264V AC
15.0	75.55	76.36	62.82	59.62
30.0	79.84	81.35	77.32	76.14
45.0	78.32	80.35	81.05	79.62
60.0	76.46	78.88	81.89	80.96

Model	OZ-60-12	Temperature: 25°C
Item	Line Regulation	

## 12V/5A



AC Input Voltage [V]	Output Voltage [V]
85	12.049
100	12.050
132	12.05
176	12.05
200	12.051
220	12.05
240	12.05
264	12.05

Model	OZ-60-12	Temperature: 25°C
Item	Load Regulation	

## 12V

Legend:

- ◆ 85V AC
- 100V AC
- ▲ 240V AC
- × 264V AC

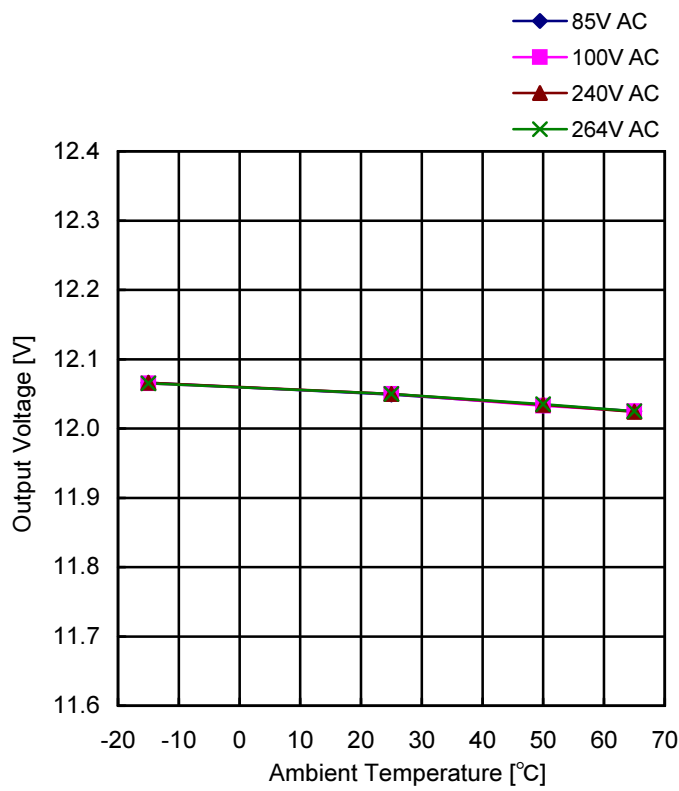
Load Power [W]	Output Voltage [V]			
	Input Voltage 85V AC	Input Voltage 100V AC	Input Voltage 240V AC	Input Voltage 264V AC
0.0	12.058	12.057	12.058	12.058
15.0	12.055	12.055	12.054	12.054
30.0	12.054	12.054	12.054	12.053
45.0	12.052	12.052	12.052	12.052
60.0	12.049	12.050	12.050	12.050
-	-	-	-	-

Load Condition	
Load Power [W]	Load Current [A]
	12V
0.0	0.00
15.0	1.25
30.0	2.50
45.0	3.75
60.0	5.00
-	-

Model	OZ-60-12
Item	Ambient Temperature Drift

## 12V



Ambient Temp. (°C)	Output Voltage [V]			
	Input Voltage 85V AC	Input Voltage 100V AC	Input Voltage 240V AC	Input Voltage 264V AC
-15	12.066	12.065	12.066	12.065
25	12.049	12.050	12.050	12.050
50	12.034	12.033	12.034	12.035
65	12.025	12.025	12.024	12.025

### Load Condition

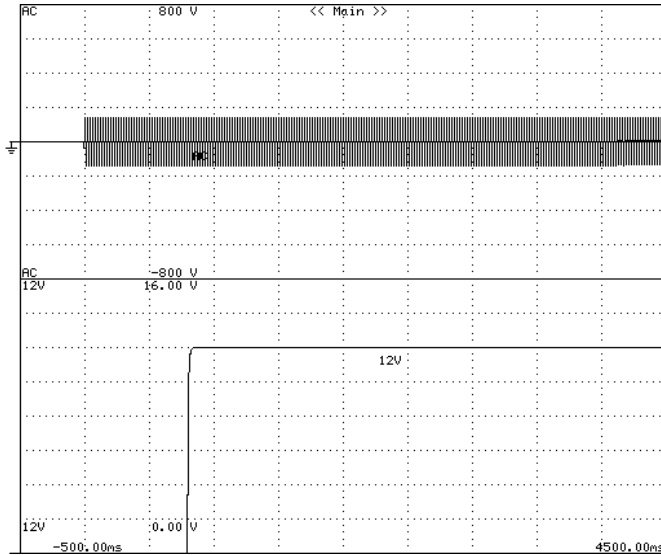
Ambient Temp. (°C)	Load Current [A]
	12V
-15	5.00
25	5.00
50	5.00
65	3.50

Model	OZ-060-12	Temperature: 25°C
Item	Output Rise Characteristics (at AC Power ON)	

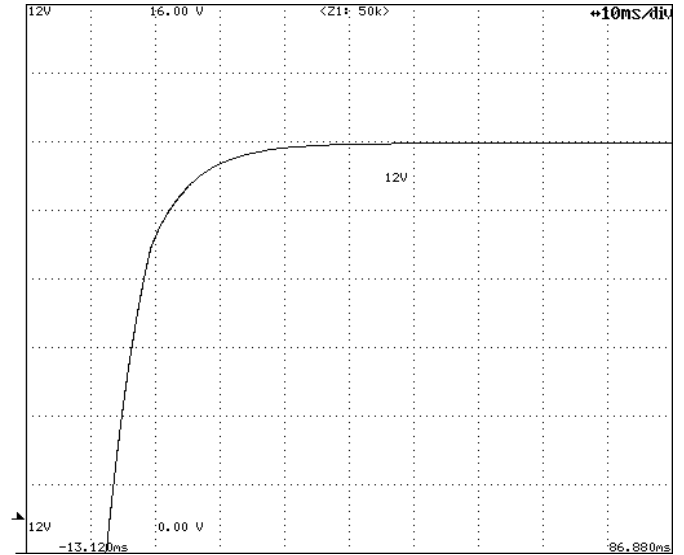
Input: 100V AC  
Load: Rated Load

Timebase Range: 500ms/div

Vertical Sensitivity: 2V/div  
Timebase Range: 10ms/div



All Output Start-up Sequence

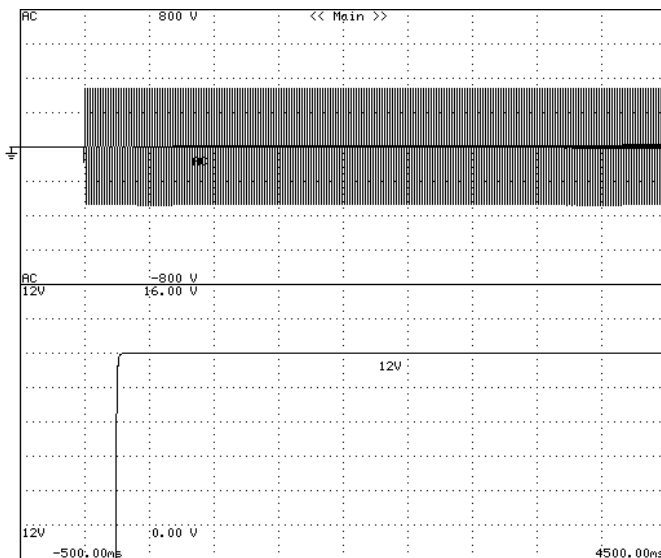


12V DC Output Rise Characteristics

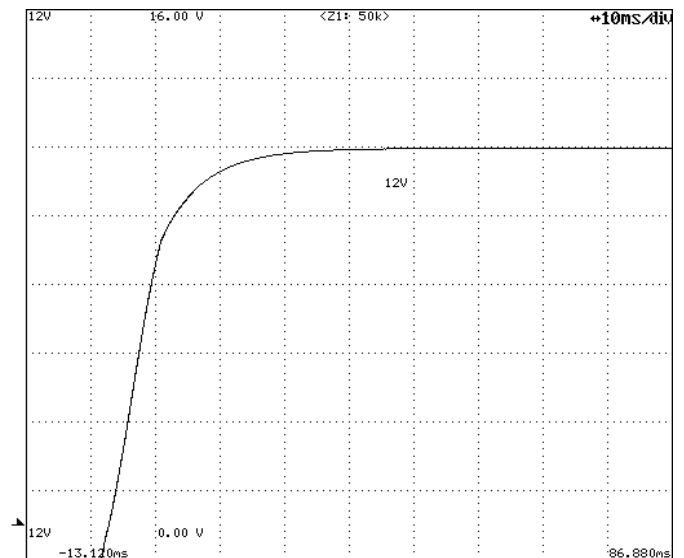
Input: 240V AC  
Load: Rated Load

Timebase Range: 500ms/div

Vertical Sensitivity: 2V/div  
Timebase Range: 10ms/div



All Output Start-up Sequence



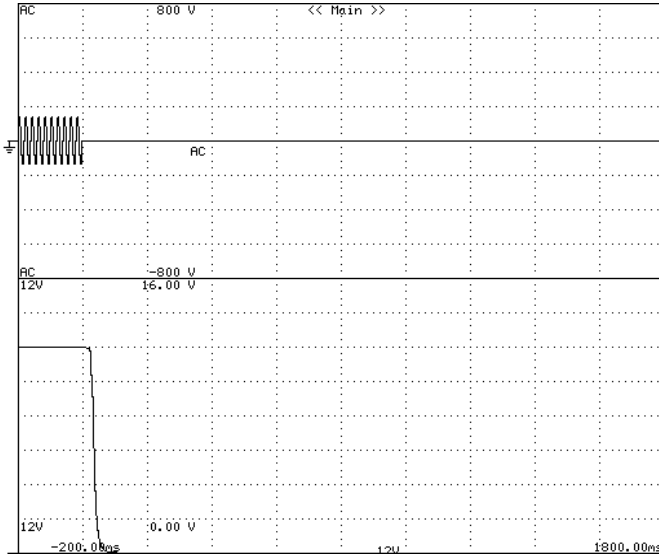
12V DC Output Rise Characteristics



Model	OZ-060-12	Temperature: 25°C
Item	Output Fall Characteristics (at AC Power OFF)	

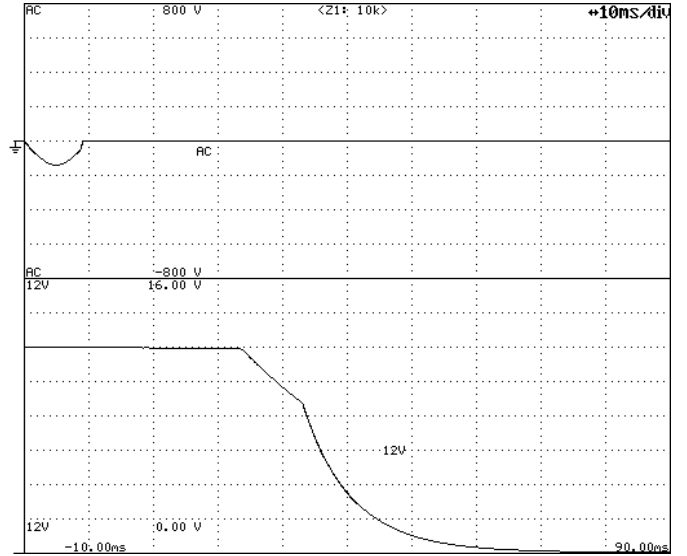
Input: 100V AC  
Load: Rated Load

**Timebase Range: 200ms/div**



Output Fall Characteristics

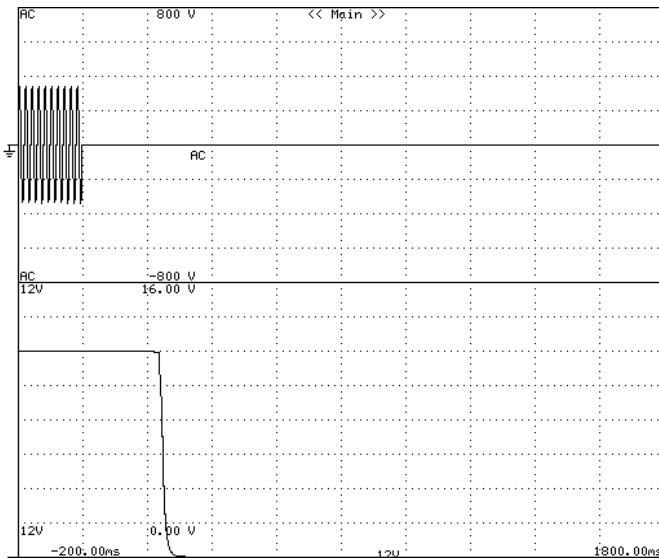
**Timebase Range: 10ms/div**



Output Fall Characteristics (magnification)

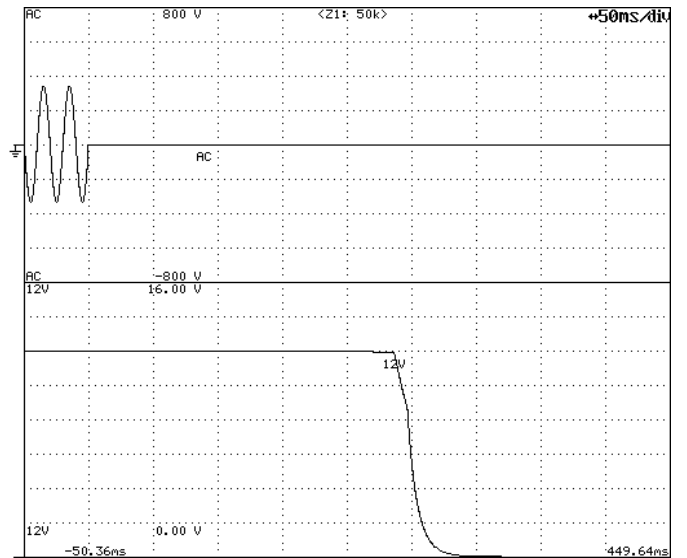
Input: 240V AC  
Load: Rated Load

**Timebase Range: 200ms/div**



Output Fall Characteristics

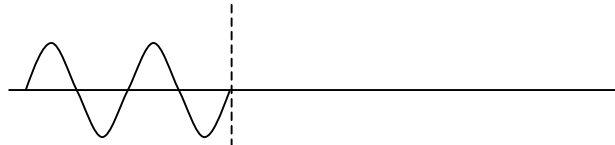
**Timebase Range: 50ms/div**



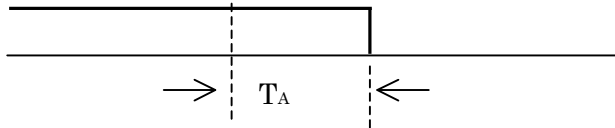
Output Fall Characteristics (magnification)

Model	OZ-060-12	Temperature: 25°C
Item	Instantaneous Interruption Compensation (by Load Power)	

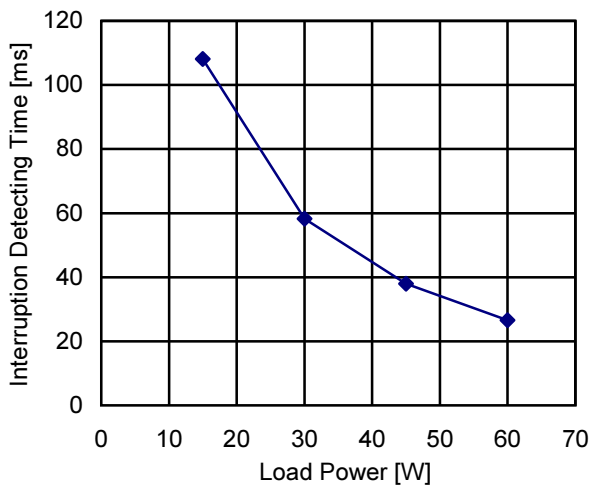
**Input Voltage**



**Output Voltage**

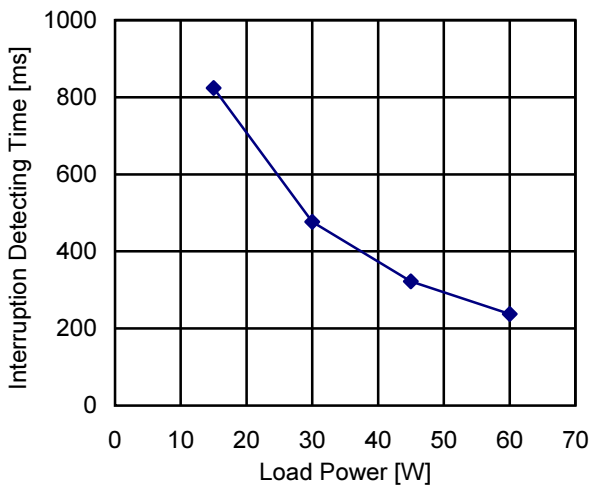


### Input Voltage: 100V AC



Load Power [W]	Interruption Detecting Time [ms]
	Output Voltage
	$T_A$
15.0	108.1
30.0	58.3
45.0	38.0
60.0	26.6

### Input Voltage: 240V AC

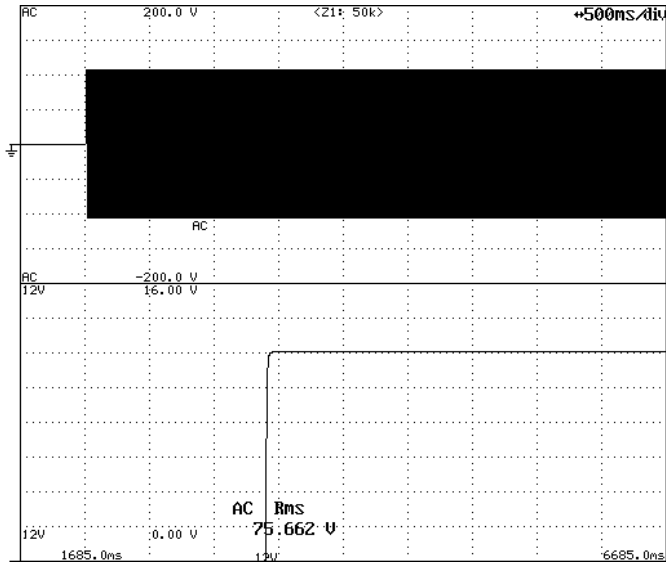


Load Power [W]	Interruption Detecting Time [ms]
	Output Voltage
	$T_A$
15.0	823.6
30.0	477.1
45.0	322.3
60.0	237.3

Model	OZ-060-12	Temperature: 25°C
Item	Start-Up Voltage	

**Timebase Range: 500ms/div  
Load: Rated Load**

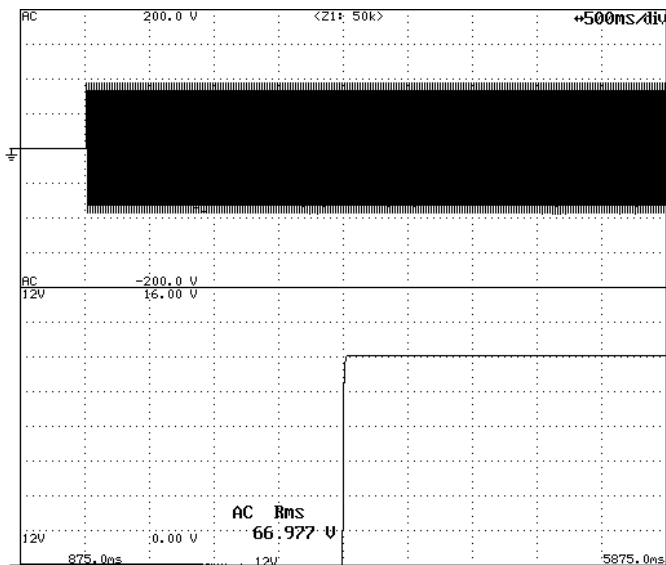
AC Input



**Start-up Voltage: 75.662V AC**

**Timebase Range: 500ms/div  
Load: Minimum Load**

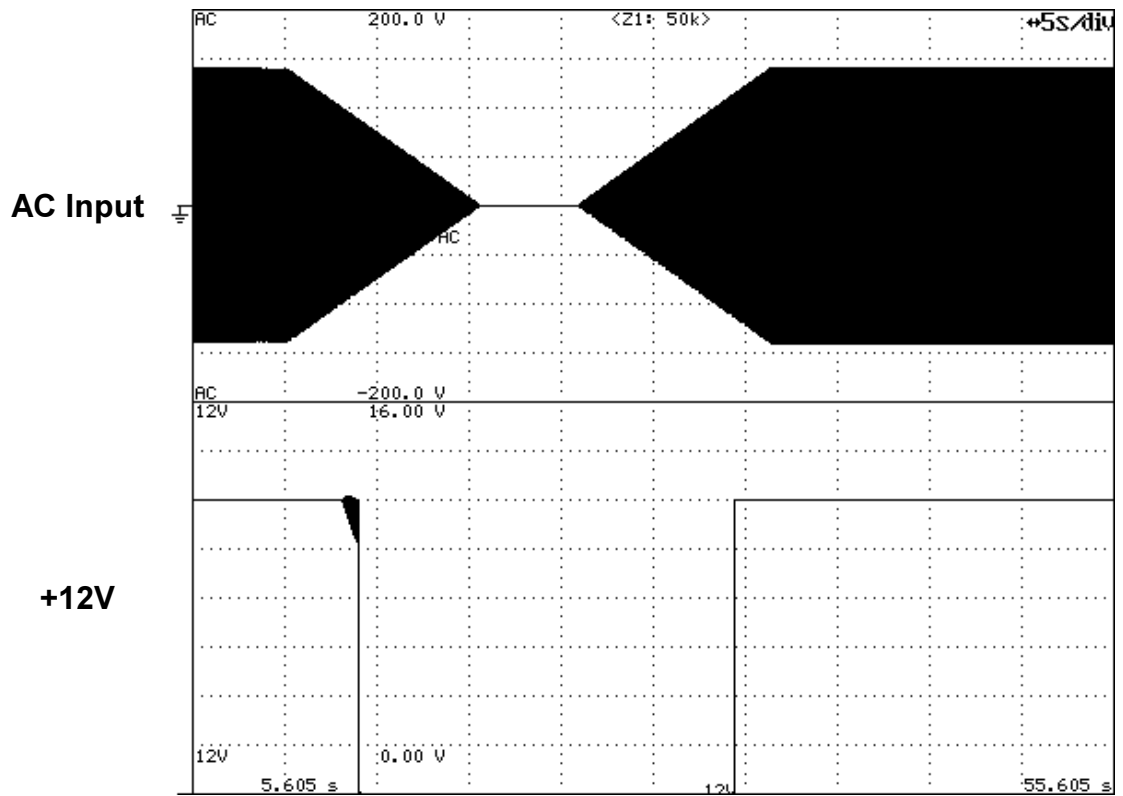
AC Input



**Start-up Voltage: 66.977V AC**

Model	OZ-060-12	Temperature: 25°C
Item	Input Voltage Sweep Up/Down	

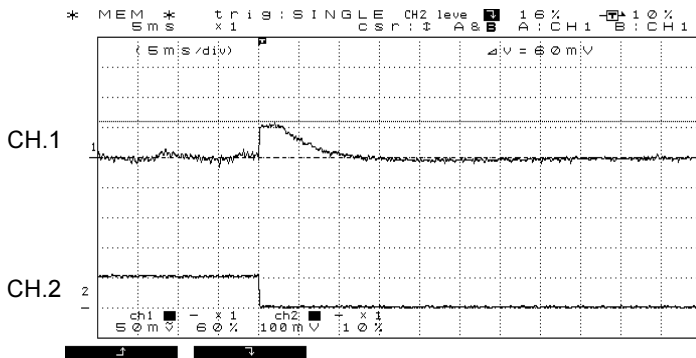
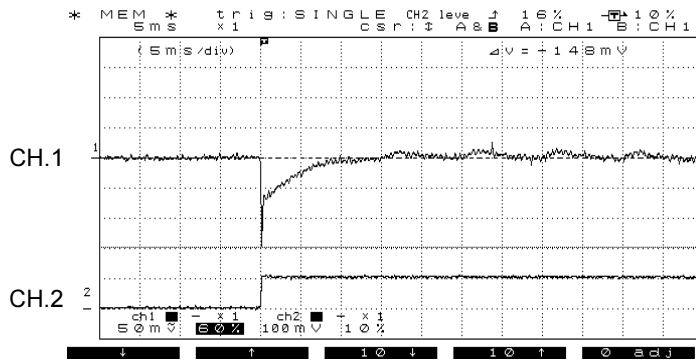
Timebase Range: 5s/div  
Load: Rated Load



Sweep Rate: 10Vave/sec

Model	OZ-060-12	Temperature: 25°C
Item	Dynamic Load Response	

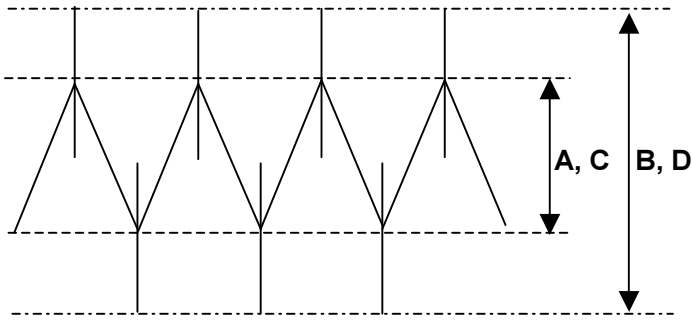
## +12V DC Output Transient Response Waveforms



### Waveform 1

CH1	Measuring Point: DC Output Voltage
	Vertical Sensitivity: 50mV/div
CH2	Measuring Point: DC Output Current
	Vertical Sensitivity: 5A/div
Timebase Range	5ms/div
Condition	Input: 100V AC
Note: Rated Load(5A) $\Rightarrow$ Minimum load(0A)	

Model	OZ-60-12	Load: Rated Load
Item	Ambient Temperature Drift	



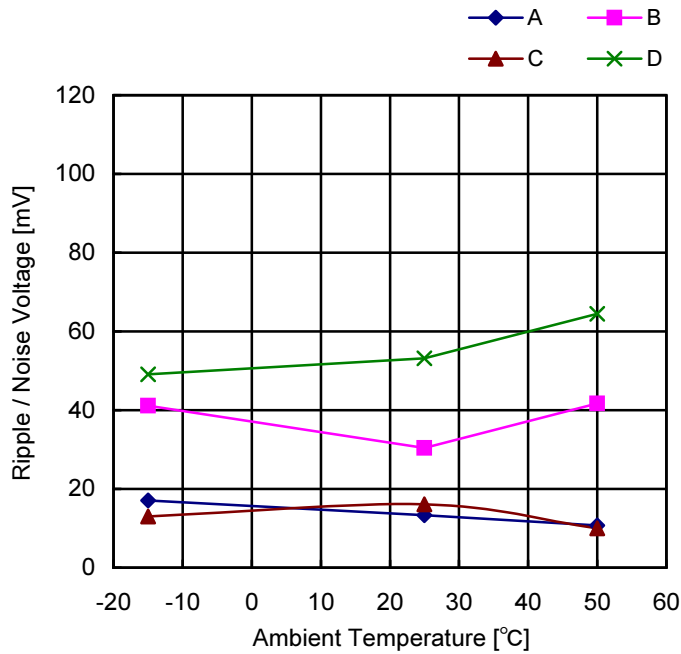
**at 100V AC**

A: Ripple Voltage (mV<sub>P-P</sub>)  
 B: Noise Voltage (mV<sub>P-P</sub>)

**at 240V AC**

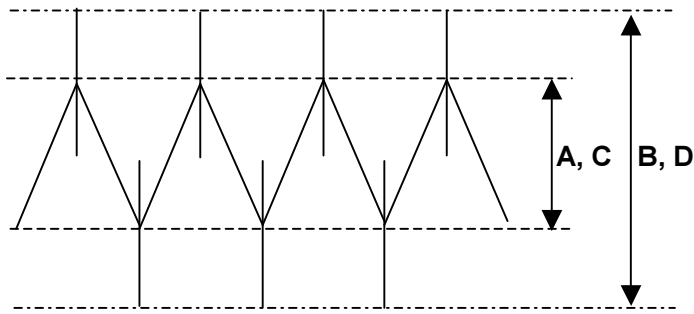
C: Ripple Voltage (mV<sub>P-P</sub>)  
 D: Noise Voltage (mV<sub>P-P</sub>)

## 12V



Ambient Temp. [°C]	Ripple / Noise Voltage [mV]			
	A	B	C	D
-15	17.1	41.1	13.0	49.1
25	13.3	30.4	16.1	53.2
50	10.7	41.7	10.0	64.5

Model	OZ-60-12	Temperature: 25°C
Item	Ambient Temperature Drift	



**at 100V AC**

A: Ripple Voltage (mV<sub>P-P</sub>)

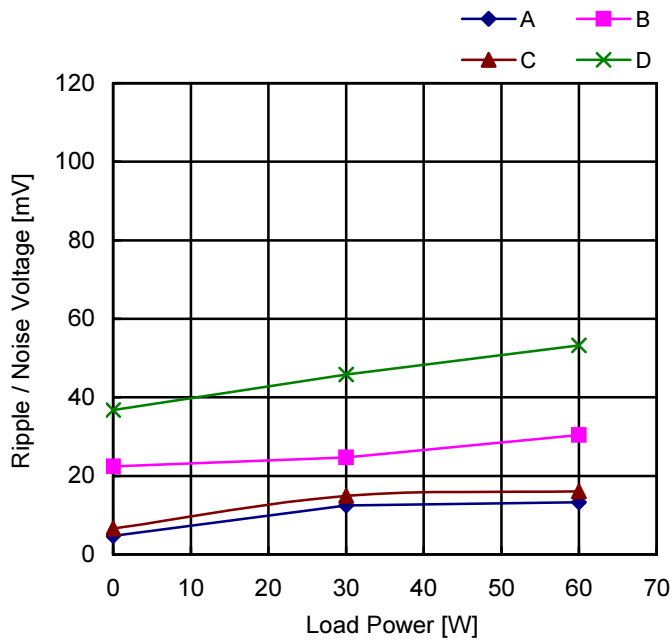
B: Noise Voltage (mV<sub>P-P</sub>)

**at 240V AC**

C: Ripple Voltage (mV<sub>P-P</sub>)

D: Noise Voltage (mV<sub>P-P</sub>)

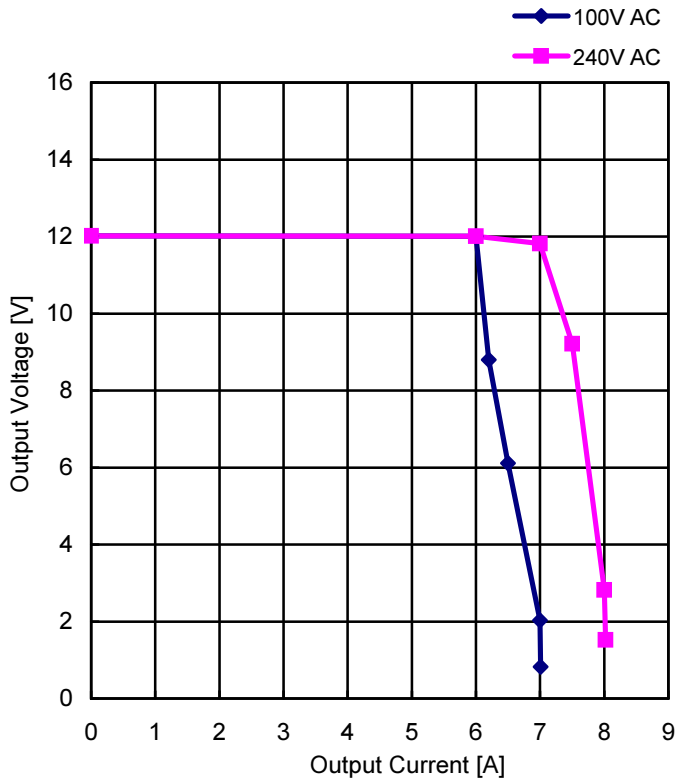
## 12V



Load Power [W]	Ripple / Noise Voltage [mV]			
	A	B	C	D
0	4.7	22.4	6.6	36.8
30	12.5	24.7	14.9	45.8
60	13.3	30.4	16.1	53.2

Model	OZ-60-12	Temperature: 25°C
Item	Over-Current Protection	

## V-I Characteristics of 12V O.C.P

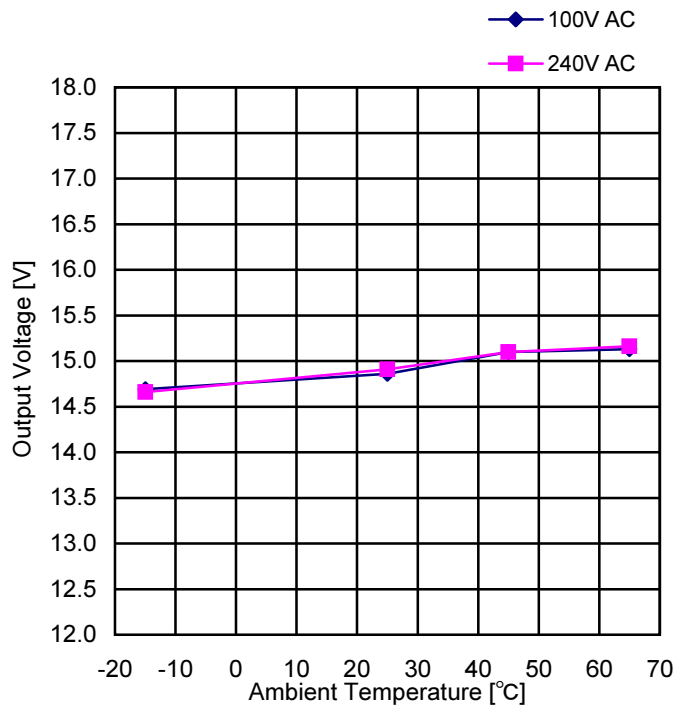


Input Voltage: 100V AC		Input Voltage: 240V AC	
Output Current [A]	Output Voltage [V]	Output Current [A]	Output Voltage [V]
0.00	12.02	0.00	12.02
6.00	12.01	6.00	12.01
6.20	8.80	7.00	11.82
6.50	6.11	7.50	9.21
7.00	2.03	8.00	2.82
7.01	0.82	8.02	1.52



Model	OZ-060-12	Load: Minimum Load
Item	Over-Voltage Protection	

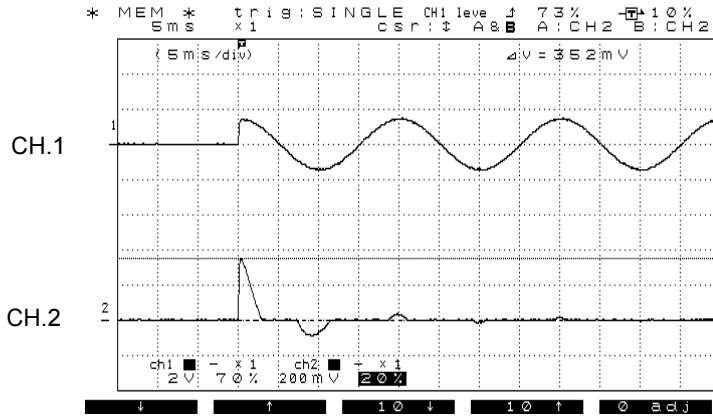
**+12V**



Ambient Temp. [°C]	Output Voltage	
	100V AC	240V AC
-15	14.69	14.66
25	14.86	14.91
45	15.10	15.10
65	15.13	15.16

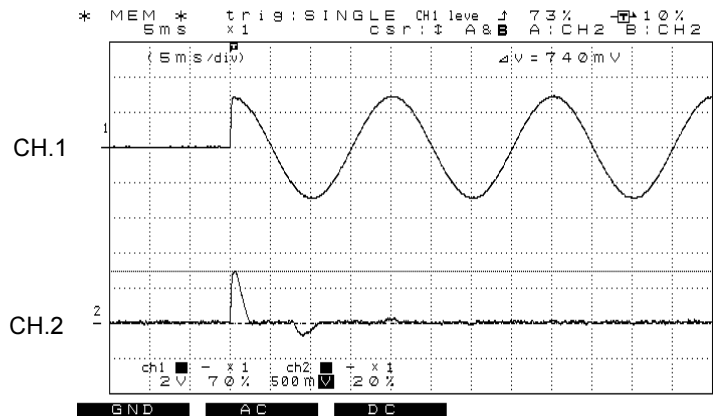
Model	OZ-060-12	Temperature: 25°C
Item	Inrush Current	Load: Rated Load

## Inrush Current Waveforms



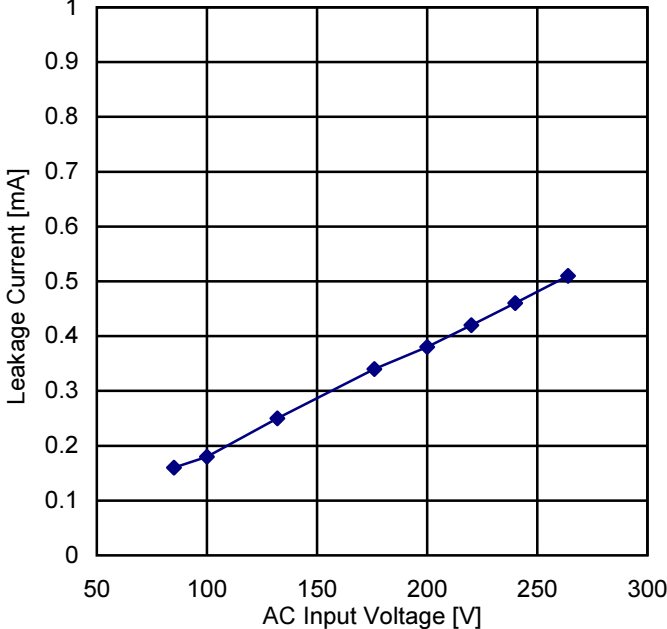
### Waveform 1

CH1	Measuring Point:	AC Input Voltage
	Range:	200V/div
CH2	Measuring Point:	AC Input Current
	Range:	10A/div
Timebase Range	5ms/div	
Conditions	Input: 100V AC Load: Rated Load	
Note: Inrush Current: 17.6A		



### Waveform 2

CH1	Measuring Point:	AC Input Voltage
	Range:	200V/div
CH2	Measuring Point:	AC Input Current
	Range:	25A/div
Timebase Range	5ms/div	
Conditions	Input: 200V AC Load: Rated Load	
Note: Inrush Current: 37.0A		

Model	OZ-060-12	Load: Rated Load																		
Item	Leakage Current																			
		<table border="1"> <thead> <tr> <th>AC Input Voltage [V]</th> <th>Leakage Current [mA]</th> </tr> </thead> <tbody> <tr> <td>85</td> <td>0.16</td> </tr> <tr> <td>100</td> <td>0.18</td> </tr> <tr> <td>132</td> <td>0.25</td> </tr> <tr> <td>176</td> <td>0.34</td> </tr> <tr> <td>200</td> <td>0.38</td> </tr> <tr> <td>220</td> <td>0.42</td> </tr> <tr> <td>240</td> <td>0.46</td> </tr> <tr> <td>264</td> <td>0.51</td> </tr> </tbody> </table>	AC Input Voltage [V]	Leakage Current [mA]	85	0.16	100	0.18	132	0.25	176	0.34	200	0.38	220	0.42	240	0.46	264	0.51
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