



Supplemental test data
(参考資料)

Date of issue: Jul. 23, 2011

RELIABILITY Data

Model Number: OZ-060-12

Model Name: DC POWER SUPPLY

INPUT: 85V – 264V AC, 50 / 60 Hz

OUTPUT: 12 V 5.0 A

Minimum load : 0W
Rated load : 60W

Approved by : Makoto Urasue (QA manager)

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

Tested by : Hiroyuki Watanabe (Evaluation test engineer)

Nipron Co., Ltd.

CONTENTS

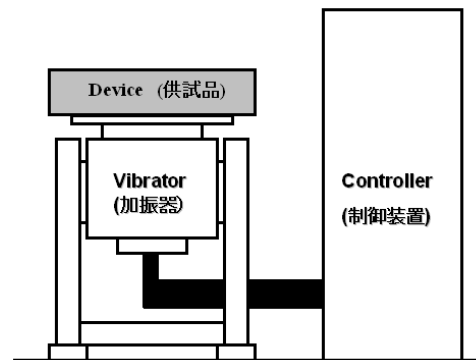
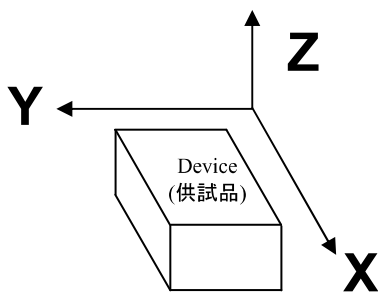
1. Vibration Test	1
振動試験	
2. Mechanical Shock Test	2
衝撃試験	
3. Output Short Circuit Test	3
出力短絡試験	
4. Output Short-Startup Test	4
出力短絡起動試験	
5. Isolation Resistance Test	5
絶縁抵抗試験	
6. Isolation Withstand Voltage Test(High-Pot Test)	6
絶縁耐電圧試験	
7. Line Noise Tolerance Test	7
ラインノイズ耐力試験	
8. MTBF	8
平均故障間隔	

Model	OZ-060-12	Judgment
Item	Vibration Test 振動試験	
		PASS

1. Test Conditions (試験条件)

Ambient Temperature (周囲温度)	25°C	Vibration Direction (振動方向)	X, Y, Z
Acceleration (加速度)	19.6m/s ²	Vibration Time (振動時間)	45 minutes each
Vibration Frequency (振動周波数)	10 - 55Hz	Sweep Cycle (掃引サイクル)	10 cycles

2. Test Method (試験方法)



EQUIPMENT USED

MANUFACTURER	Controller (制御部)		Vibrator (加振部)	
EMIC CORPORATION	MODEL	F-200-BM-E04	MODEL	903-FN

3. Criteria (判定基準)

1. There shall be no smoke, no fire or no breakdown.
(発煙、発火、破損なきこと)
2. No output voltage drop with control circuit failure.
(制御回路の異常による出力電圧の異常なきこと)

4. Test Results (試験結果)

Input: 100V AC
Load: Rated Load

	12V	-	Result (結果)
Before Test (試験前)	11.989V	-	-
After Test (試験後)	11.984 V	-	OK

Model	OZ-060-12	Judgment
Item	Mechanical Shock Test 衝撃試験	
		PASS

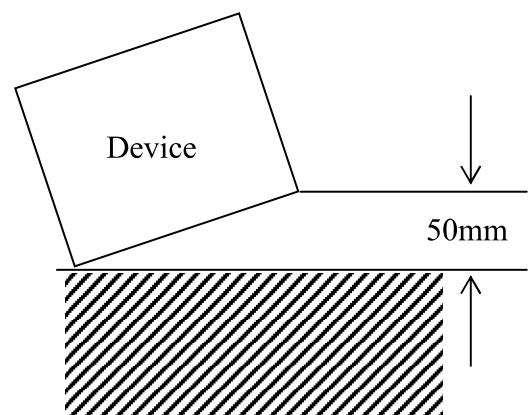
1. Test Conditions (試験条件)

Ambient Temperature: 25°C
(周囲温度)
Standard: JIS C 60068-2-31
(規格)
Height: 50mm
(高さ)

2. Test Method (試験方法)

No failure should be detected by the test that one side of bottom is lifted up (to slant the unit) and, for each of 4 sides, let it fall down 3 times from the position of 50 mm high.

(底部の片側を持ち上げ(ユニットを傾けること)、4面それぞれに対して、高さ50mmの位置から3回落とし異常がないこと。)



3. Criteria (判定基準)

1. There shall be no smoke, no fire or no breakdown.
(発煙、発火、破損なきこと)
2. No output voltage drop with control circuit failure.
(制御回路の異常による出力電圧の異常なきこと)

4. Test Results (試験結果)

Input: 100V AC
Load: Rated Load

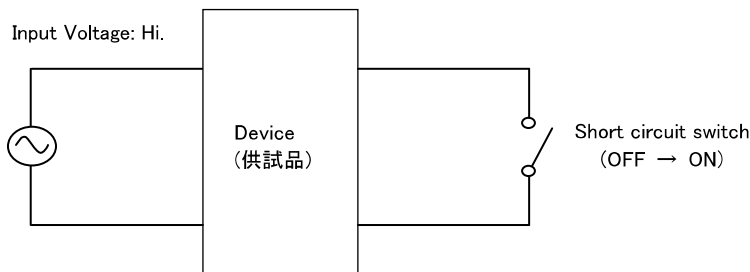
	12V	-	Result (結果)
Before Test (試験前)	11.987 V	-	-
After Test (試験後)	11.985 V	-	OK

Model	OZ-060-12	Judgment
Item	Output Short Circuit Test 出力短絡試験	

1. Test Conditions (試験条件)

Ambient Temperature: 25°C
(周囲温度)
Input Voltage: 100V AC
(入力電圧)
Load: Not applied
(負荷)

2. Test Method (試験方法)



3. Criteria (判定基準)

There shall be no smoke, no fire or no breakdown.
(発煙、発火、破損なきこと)

4. Test Results (試験結果)

Input: 100V AC
Load: Rated Load

	12V	-	Result (結果)
Before Test (試験前)	11.986 V	-	-
After Test (試験後)	11.984 V	-	OK

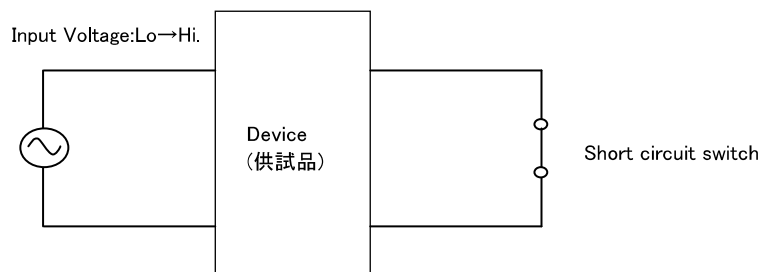
Model	OZ-060-12	Judgment
Item	Output Short-Startup Test 出力短絡起動試験	

PASS

1. Test Conditions (試験条件)

Ambient Temperature: 25°C
(周囲温度)
Input Voltage: 100V AC
(入力電圧)
Load: Not applied
(負荷)

2. Test Method (試験方法)



3. Criteria (判定基準)

There shall be no smoke, no fire or no breakdown.
(発煙、発火、破損なきこと)

4. Test Results (試験結果)

Input: 100V AC
Load: Rated Load

	12V	-	Result (結果)
Before Test (試験前)	11.984 V	-	-
After Test (試験後)	11.983 V	-	OK

Model	OZ-060-12		Judgment
Item	Isolation Resistance Test 絶縁抵抗試験		PASS

1.Test Conditions (試験条件)

Ambient Temperature: 25°C
(周囲温度)
Input Voltage: Not applied
(入力電圧)
Load: Not applied
(負荷)

2.Test Method (試験方法)

1. 50MΩ(min) between AC input and FG / DC outputs .
(AC 入力 対 FG および DC 出力間で 50MΩ 以上であること)
2. 50MΩ(min) between DC outputs and FG.
(DC 出力 対 FG 間で 50MΩ 以上であること)

Note: measured with a 500 V DC megohm meter.
(但し、DC500V のメガオームメーターでの測定)

3.Criteria (判定基準)

1. There shall be no smoke, no fire or no breakdown.
(発煙、発火、破損なきこと)
2. No output voltage drop with control circuit failure.
(制御回路の異常による出力電圧の異常なきこと)

4.Test Results (試験結果)

Input: 100V AC
Load: Rated Load

	12V	-	Result (結果)
Before Test (試験前)	12.989 V	-	-
After Test (試験後)	12.985 V	-	OK

Model	OZ-060-12		Judgment
Item	Isolation Withstand Voltage Test (High-Pot Test) 絶縁耐電圧試験		PASS

1.Test Conditions (試験条件)

Ambient Temperature: 25°C
(周囲温度)
Input Voltage: Not applied
(入力電圧)
Load: Not applied
(負荷)

2.Test Method (試験方法)

1 minutes at 1.5kV AC between AC input and interconnected FG / DC outputs.
(AC 入力 対 FG および DC 出力間で AC1.5kV を 1 分間印加すること)

3.Criteria (判定基準)

1. There shall be no smoke, no fire or no breakdown.
(発煙、発火、破損なきこと)
2. No output voltage drop with control circuit failure.
(制御回路の異常による出力電圧の異常なきこと)

4.Test Results (試験結果)

Input: 100V AC
Load: Rated Load

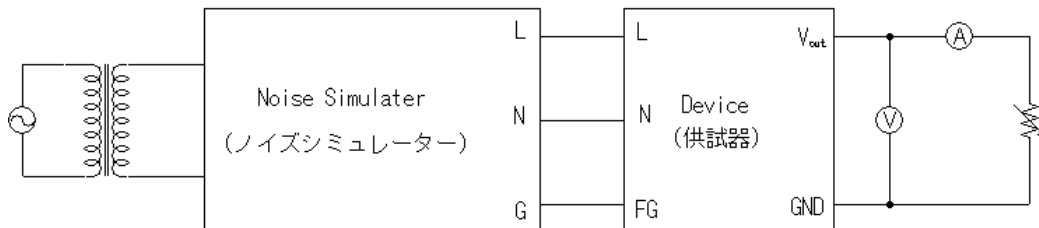
	12V	-	Result (結果)
Before Test (試験前)	11.985 V	-	-
After Test (試験後)	11.980 V	-	OK

Model	OZ-060-12	Judgment
Item	Line Noise Tolerance Test ラインノイズ耐力試験	
		PASS

1. Test Conditions (試験条件)

Ambient Temperature (周囲温度)	25°C	Noise Voltage (ノイズ電圧)	±1kV
Input Voltage (入力電圧)	100V AC	Pulse Width (パルス幅)	100, 1000ns
Load (負荷)	Rated Load	Phase (位相)	0° - 360°
Test Mode (テストモード)	Normal and Common	Test Time (試験時間)	1 minute each

2. Test Method (試験方法)



EQUIPMENT USED

MANUFACTURER	Simulator (シミュレーター)	
NOISE LABORATORY CO., LTD (ノイズ研究所)	MODEL	INS-420

3. Criteria (判定基準)

1. There shall be no smoke, no fire or no breakdown.
(発煙、発火、破損なきこと)
2. No output voltage drop with control circuit failure.
(制御回路の異常による出力電圧の異常なきこと)

4. Test Results (試験結果)

Test Mode	Pulse Width	Polarity	Voltage	Result
Normal	100ns	+	1kV	OK
		-		OK
Common	1000ns	+		OK
		-		OK

Model	OZ-060-12		Judgment
Item	MTBF 平均故障間隔		PASS

EIAJ RCR-9102 calculate the number by the MTBF EIAJ calculation criteria of stabilized direct current power supply.
(EIAJ RCR-9102 直流安定化電源の MTBF EIAJ 推奨算出基準に基づき計算する。)

λ_{EQUIP} : failure rate of all the device[number of failure units/ 10^6 hours]
(λ_{EQUIP} : 全機器故障率[故障数/ 10^6 時間])

λ_G : congeneric failure rate for the congeneric parts of at the line of i
[number of failure units/ 10^6 hours]
(λ_G : i 番目の同属部品に対する同属故障率[故障数/ 10^6 時間])

π_Q : quality factor for congeneric parts at the line i
(π_i : i 番目の同属部品に対する品質ファクタ)

N_i : number of units of congeneric parts at the line i
(N_i : i 番目の同属部品の個数)

n : number of categories in different congeneric parts in the device
(n : 機器内の異なった同属部品のカテゴリの数)

It is adapted ground and fixation and the environment signs G_f as a general condition in failure rate of parts λ_G
(部品故障率 λ_G は、一般的条件として、地上・固定環境記号 G_f を採用した。)

$$\begin{aligned} \text{MTBF(Hours)} &= (1 / \lambda_{EQUIP}) \times 10^6 \\ &= [1 / \sum_{i=1}^n N_i (\lambda_G)_i] \times 10^6 \\ &= 387293.67 \end{aligned}$$

MTBF : 387,293 hours
(MTBF: 387,293 時間)