



Supplemental test data  
(参考資料)

Date of issue: Jan. 12, 2012

## RELIABILITY Data

Model Number: HPCSF-400P-X2S

Model Name: DC POWER SUPPLY

INPUT: 85V – 264V AC, 50 / 60 Hz

OUTPUT:	3.3 V	8A	(20 A <sub>peak</sub> )
	5 V	8A	(20 A <sub>peak</sub> )
	12 V	19A	(30 A <sub>peak</sub> )
	-12 V	0.5A	(0.5 A <sub>peak</sub> )
	5VSB	2A	(3 A <sub>peak</sub> )

Minimum load : 0W

Rated load : 310.4W

Maximum continuous output power :310W

Peak output power :400W

Approved by : Makoto Wrasue (QA manager)

Designed by : Kazutoshi Arino (R&D engineer)

Tested by : Hitoyuki Wazanahe (Evaluation test engineer)

**Nipron Co., Ltd.**

## CONTENTS

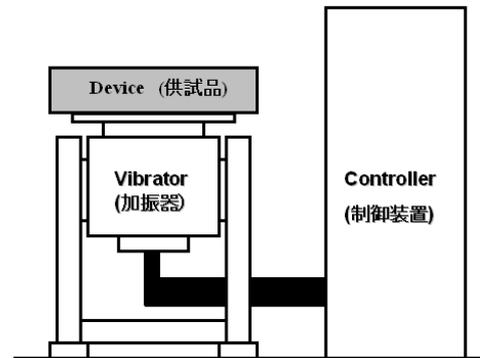
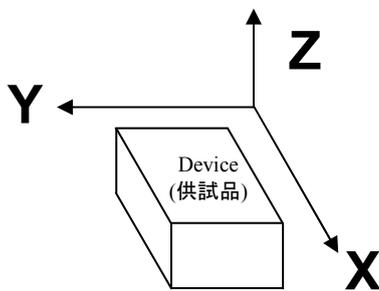
1. Vibration Test .....	1
振動試験	
2. Mechanical Shock Test .....	2
衝撃試験	
3. Output Short Circuit Test .....	3
出力短絡試験	
4. Output Short-Startup Test .....	4
出力短絡起動試験	
5. Isolation Resistance Test .....	5
絶縁抵抗試験	
6. Isolation Withstand Voltage Test(High-Pot Test) .....	6
絶縁耐電圧試験	
7. Line Noise Tolerance Test .....	7
ラインノイズ耐力試験	
8. Cooling FAN Stop Test .....	8
冷却 FAN 停止試験	
9. MTBF .....	9
平均故障間隔	

Model	HPCSF-400P-X2S	Judgment
Item	Vibration Test 振動試験	
		<b>PASS</b>

## 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 <sup>2</sup>	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

	3.3V	5V	12V	-12V	5VSB	Result (結果)
Before Test (試験前)	3.390V	5.062V	12.068V	-11.793V	5.113V	-
After Test (試験後)	3.386V	5.053V	12.066V	-11.801V	5.110V	<b>OK</b>

Model	HPCSF-400P-X2S	Judgment
Item	Mechanical Shock Test 衝撃試験	
		<b>PASS</b>

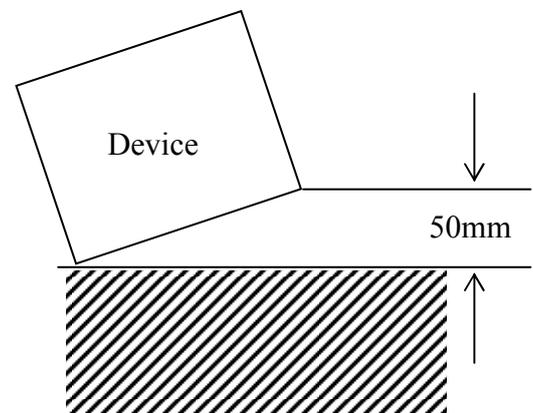
## 1. Test Conditions (試験条件)

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

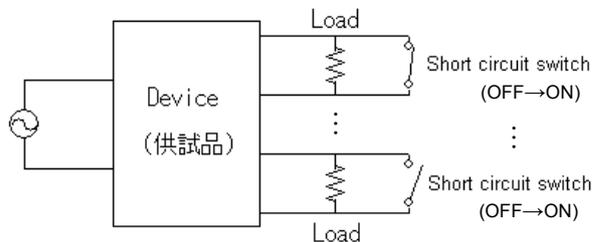
	3.3V	5V	12V	-12V	5VSB	Result (結果)
Before Test (試験前)	3.388V	5.066V	12.059V	-11.790V	5.109V	-
After Test (試験後)	3.379V	5.065V	12.064V	-11.787V	5.114V	<b>OK</b>

Model	HPCSF-400P-X2S	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: Refer to the load table  
(負荷)

## 2. Test Method (試験方法)



Load Table

3.3V	5V	12V	-12V	5VSB
8A→✓	8A	19A	0.5A	2A
8A	8A→✓	19A	0.5A	2A
8A	8A	19A→✓	0.5A	2A
8A	8A	19A	0.5A→✓	2A
8A	8A	19A	0.5A	2A→✓

✓: short circuit

## 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

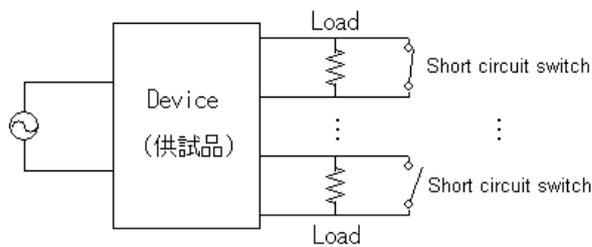
	3.3V	5V	12V	-12V	5VSB	Result (結果)
Before Test (試験前)	3.382V	5.065V	12.066V	-11.790V	5.109V	-
After Test (試験後)	3.379V	5.052V	12.059V	-11.789V	5.101V	<b>OK</b>

Model	HPCSF-400P-X2S	Judgment
Item	Output Short-Startup Test 出力短絡起動試験	

## 1. Test Conditions (試験条件)

Ambient Temperature: 25°C  
(周囲温度)  
Input Voltage: 100V AC  
(入力電圧)  
Load: Refer to the load table  
(負荷)

## 2. Test Method (試験方法)



Load Table

3.3V	5V	12V	-12V	5VSB
✓	8A	19A	0.5A	2A
8A	✓	19A	0.5A	2A
8A	8A	✓	0.5A	2A
8A	8A	19A	✓	2A
8A	8A	19A	0.5A	✓

✓: short circuit

## 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

	3.3V	5V	12V	-12V	5VSB	Result (結果)
Before Test (試験前)	3.375V	5.058V	12.070V	-11.788V	5.110V	-
After Test (試験後)	3.367V	5.055V	12.069V	-11.787V	5.103V	<b>OK</b>

Model	HPCSF-400P-X2S		Judgment
Item	Isolation Resistance Test 絶縁抵抗試験		<b>PASS</b>

## 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)

50MΩ(min) between AC input and DC outputs / FG.  
Note: measured with a 500 V DC megohm meter.

(AC 入力 対 DC 出力および FG 間で 50MΩ 以上であること)  
(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

	3.3V	5V	12V	-12V	5VSB	Result (結果)
Before Test (試験前)	3.378V	5.066V	12.060V	-11.789V	5.108V	-
After Test (試験後)	3.377V	5.060V	12.057V	-11.785V	5.106V	<b>OK</b>

Model	HPCSF-400P-X2S		Judgment
Item	Isolation Withstand Voltage Test (High-Pot Test) 絶縁耐電圧試験		<b>PASS</b>

## 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 DC outputs / FG.  
(AC 入力 対 DC 出力および FG 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

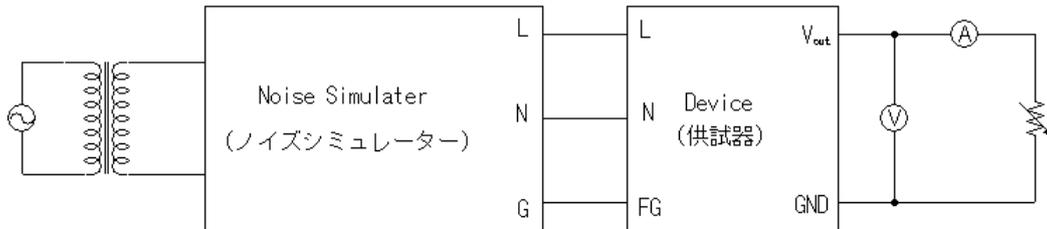
	3.3V	5V	12V	-12V	5VSB	Result (結果)
Before Test (試験前)	3.377V	5.066V	12.068V	-11.788V	5.109V	-
After Test (試験後)	3.377V	5.062V	12.067V	-11.780V	5.108V	<b>OK</b>

Model	HPCSF-400P-X2S	Judgment
Item	Line Noise Tolerance Test ラインノイズ耐力試験	
		<b>PASS</b>

## 1. Test Conditions (試験条件)

Ambient Temperature (周囲温度)	25°C	Noise Voltage (ノイズ電圧)	±2kV
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)	10 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	+	2kV	OK
		-		OK
Common	1000ns	+		OK
		-		OK

Model	HPCSF-400P-X2S		Judgment
Item	Cooling FAN Stop Test 冷却 FAN 停止試験		<b>PASS</b>

## 1.Test Conditions (試験条件)

Ambient Temperature: 25°C  
(周囲温度)  
Input Voltage: 100V AC  
(入力電圧)  
Load: Rated Load  
(負荷)

## 2.Test Method (試験方法)

At this test, status of the power supply is confirmed by stopping fan forcibly during operation with rated load.  
(この試験では、定格負荷運転中に電源冷却ファンを強制的に停止させ、電源の状態を確認する)

## 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)

After the power supply stopped for 494sec, It restarted normally  
(電源は 494 秒で停止した後、正常に起動した。)

Model	HPCSF-400P-X2S		Judgment
Item	MTBF 平均故障間隔		<b>PASS</b>

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。)

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

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

$\pi_Q$  : quality factor for congeneric parts at the line i  
( $\pi_i$  : 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<sub>F</sub> as a general condition in failure rate of parts  $\lambda_G$   
(部品故障率  $\lambda_G$  は、一般的条件として、地上・固定環境記号 G<sub>F</sub> を採用した。)

$$\begin{aligned} \text{MTBF(Hours)} &= (1 / \lambda_{EQUIP}) \times 10^6 \\ &= [1 / \sum_{i=1}^n N_i (\lambda_G)_i] \times 10^6 \\ &= 99014.058 \end{aligned}$$

MTBF : 99,014 hours  
(MTBF: 99,014 時間)