



全漢企業股份有限公司  
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# SPECIFICATION



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FSP060-DAAN2 /9NA0605400

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**MODEL NO: FSP060-DAAN2**

**P/N : 9NA0605400**



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## Efficiency Testing Criteria

The Product Meet	Regulation	Output Power	Average Efficiency in Active Mode	Maximum Power in No Load	Total Harmonic Distortion
	ERP 2017	$\geq 50W$	$\geq 89\%$	$\leq 0.15W$	THD,V <2%
	DOE LEVEL VI	$\geq 50W$	$\geq 88\%$	$\leq 0.21W$	THD,V <2%
	ERP Lot 7	$\geq 50W$	$\geq 87\%$	$\leq 0.3W$	THD,V <2%

**Electrical Specification Revision History:**

Rev	<u>Description</u>	Date
1.0	SPEC ISSUE	APR,01,14”
2.0	CHANGE 5.2;5.4	MAY,29,14”
3.0	CHANGE 5.4 INPUT UNDER VOLTAGE PROTECTION	JUNE,17,14”
4.0	CHANGE 3.4;3.5	OCT,15,14”

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## ***1.0 GENERAL DESCRIPTION AND SCOPE***

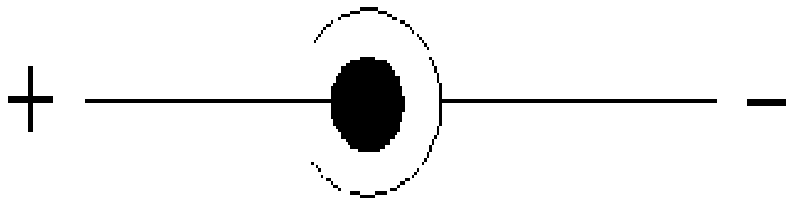
This is the specification of Model FSP060-DAAN2 part no. 9NA0605400-DC adapter switching power supply designed and manufactured by FSP GROUP, INC. located in Taiwan, Republic of China

The specification below is intended to describe as detailedly as possible the functions and performance of the subject power supply. Any comment or additional requirements to this specification from our customers will be highly appreciated and treated as a new target for us to approach

## ***2.0 CONNECTOR PIN DESIGNATIONS***

The pin designations and color codes are defined as follows:

### **OUTPUT POLARITY OF DC PLUG**



### 3.0 INPUT CHARACTERISTICS

#### 3.1 input voltage & frequency

The range of input voltage is from 90vac to 264vac with a single phase

	minimum	rating	maximum
Input voltage	90vac	100vac~240vac	264vac
Input frequency	47hz	60hz / 50hz	63hz

#### 3.2 input AC current

1.5A max @ 90vac input & full load

#### 3.3 Inrush current (cold start)

(cold start-25deg.C) DC full loading

No damage occur and the input fuse shall not blow up

#### 3.4 Average Efficiency

##### Energy Efficiency Regulations

ALL measurements to be taken after DUT has operated at 100% load for at least 30 minutes

Percentage of Nameplate Output Current	
Load Condition 1	100% +/-2%
Load Condition 2	75% +/-2%
Load Condition 3	50% +/-2%
Load Condition 4	25% +/-2%

115Vac @ 60Hz	Average Efficiency(for four Load): 88 minimum
230Vac @ 50Hz	Average Efficiency(for four Load): 88 minimum

#### 3.5 No load input power dissipation

SPECIFICATION : Input power 0.21W(MAX)

DITION : At 230Vac input voltage with no load .

## 4.0 OUTPUT CHARACTERISTICS

### 4.1 OUTPUT RATING

Output	Nominal	Regulation	Ripple/Noise	Min	Max
1	+24.0V	22.8V~25.2V	200mvp-p	0A	2.5A

**Ripple & noise: tested by a oscilloscope using 20mhz bandwidth and the output is paralleled a 0.1uf ceramic capacitor and a 10uf electrolysis capacitor (under the input voltage 100 ~ 240 VAC)**

### 4.2 LINE/ LOAD Regulation

output rating	Load condition		Line regulation	Load regulation	Remark
	Min load	Max load			
+24.0v	0A	2.5A	± 1 %	± 5 %	

### 4.3 Turn – on delay time

3s max @ 90vac input & full load

### 4.4 Hold time

8mS minimum. Tested 115 Vac input and max load at output

18mS minimum. Tested 230 Vac input and max load at output

### 4.5 RISE TIME

40ms max @ full load

### 4.6 OVERSHOOT

The output overshoot at turn-on shall not exceed 10% of normal voltage value with or without the load connected

### 4.7 DYNAMIC LOAD REGULATION

Output voltage within 22.8 – 25.2V, for load step 10% to 50% and 50% to 90% load on the output.

S/R=0.05A/uS, 100Hz & 1KHz 50% duty.



## 5.0 Protection Requirements

### 5.1 OVER-CURRENT PROTECTION

OCP point limited 200% of max load and Latch or Auto recovery

### 5.2 OVER-VOLTAGE PROTECTION

Output Voltage	Upper trip limit	Remark
22.8Vdc ~ 25.2Vdc	26Vdc ~ 40Vdc	Only internal test

### 5.3 SHORT CIRCUIT PROTECTION

Output can be shorted without damage, and auto recovery

### 5.4 INPUT UNDER VOLTAGE PROTECTION

UVP	70vac(below)
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## 6.0 . ENVIRONMENTAL REQUIREMENTS

The power supply will be compliant with each item in this specification for the following environmental conditions

### 6.1 TEMPERATURE RANGE

Operating	0 to + 40 deg.C
Storage	-20 to +70 deg.C

### 6.2 HUMIDITY

Operating	10 –90% RH, Non-condensing
Storage	10 –90% RH, Non-condensing

### 6.3 VIBRATION

The subject power supplies will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Vibration Operation, 0.01g<sup>2</sup>/Hz at 5 Hz sloping to 0.02g<sup>2</sup>/Hz at 20 Hz, and maintaining 0.02g<sup>2</sup>/Hz from 20 Hz to 500 Hz. The area under the PSD curve is 3.13gRMS. The duration shall be 20 minutes per axis for all three axes on all samples.

## **6.4 SHOCK**

The subject power supplies will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Storage All 6 sides;40G, 6 mSec. Half-sine wave pulse in both directions on three mutually perpendicular axes.

Operating All sides except top;10G, 6 mSec. Half-sine wave pulse in both directions on three mutually perpendicular axes.

## **6.5 PACKAGE DROP**

Turn off system.

Follow MIL-STD-810D, 0 - 9.1kg 1m, 9.2 - 18.2kg 90cm.

10 drops: 1 corner, 3 adjacent edges of corner, 6 faces.

At random, repeat the above process 1 more time.

Note: Check for mechanical damage and functional failures

## **7.0 RELIABILITY**

### **7.1 BURN-IN**

*THE POWER SUPPLY shall be burned-in at least 4 hours at  $35^{\circ}\text{C} \pm 5^{\circ}\text{C}$  under full load condition*

### **7.2 MTBF**

The subject adapter have a minimum predicted MTBF of 100000 hours of continuous operation at  $25^{\circ}\text{C}$ , maximum-output load, and nominal AC input voltage

## 8.0 EMI/EMS STANDARDS

### 8.1 EMI Standards

EN 55022 : 1998 + A1 : 2000 +A2 : 2003 CLASS B

CISPR22 : 2003 CLASS B

AS/NZS CISPR22 : 2004 CLASS B

EN61000-3-3 Voltage fluctuations& flicker

EN61000-4-2 ( ESD TEST)

After applied +/-4kv contact discharge and Adapter is no function error.

After applied +/-8kv air discharge Adapter is no function error.

EN61000-4-4 Electrical fast transient ( EFT )

Test Sequence	Peak Voltage	Frequency	Port	Coupling Mode Mains only	Number of Bursts
Class 2	1.0kV	5kHz	Mains or Clamp	L1, L2, and PE in sequence	200 (1 minute) per polarity and coupling mode

EN61000-4-5 EC1000-4-5 LEVEL 2 (SURGE stest) :

Differential mode : 1kv.

Common mode : 2kv.

### 8.2 LEAKAGE CURRENT

At 264 Vac 60Hz, 0.25mA max.

### 8.3 INSULATION RESISTANCE

20M $\Omega$  min @ primary to secondary add a 500vdc test voltage

### 8.4 Dielectric strength ( hi pot)

Primary to secondary : 2545vdc / 10mA / 60seconds (3seconds for production)

or

Primary to secondary : 1800vac / 10mA / 60seconds (3seconds for production)

### 8.5 ALTITUDE

The power supply must operate to a maximum altitude of 5000M above sea level