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# SPECIFICATION



NB90

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ATTACHMENT: ASSY FIGURES

## 1.0 GENERAL DESCRIPTION AND SCOPE

This is the specification of Model NB90(F04001); part no. 9NA0900302, AC-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 OUTPUT ELECTRICAL REQUIREMENTS

### 3.1 OUTPUT RATING

Output	Nominal	Regulation	Ripple/Noise	Min	Max
1	+19.0V	18.05V~19.95V	190mV	0A	4.74A

The total output regulation shall be  $\pm 5\%$ , including the effects of line voltage variations, load current, ripple and noise, and the AC component of the load current. Ripple and noise measurements shall be made under all specified load conditions through a single Pole low pass filter with 20MHz cutoff frequency. Outputs shall bypass at the connector with a 0.1uF ceramic disk capacitor and a 47uF electrolytic capacitor to simulate system loading.

Ripple Noise test condition: At a static state input voltage ,Vin:90Vac ~ 264Vac,output at Max Current.

### 3.2 SHORT CIRCUIT PROTECTION

Output can be shorted without damage, and auto recovery.

**3.3 OVER-CURRENT PROTECTION**

Output current limit : 6.5A(Max) at C. C. Mode.

**3.4 TURN-ON DELAY TIME**

The turn-on delay from application of AC input power to the establishment of rated DC power voltage should not exceed 3.5 seconds under at 115Vac full load and C.C mode test.

**3.5 HOLD UP TIME**

15mS minimum. Tested 115Vac input and max load at output.

**3.6 DYNAMIC LOAD REGULATION**

Output Change between 10% and 50% or 50% and 90% of full load, slew rate is 0.5 ~ 1.0A/uS.  
High : 1.0mS, Low : 1.0mS, 18.05Vdc < Vout < 19.95Vdc.

**3.7 OVERSHOOT**

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

**3.8 OVER VOLTAGE PROTECTION**

The voltage will not exceed the upper trip limit. With latch up or auto-recovery function at full load

Output Voltage	Upper trip limit	Remark
18.05Vdc ~ 19.95Vdc	26Vdc	Only internal test(short U3's Pin 1-2).

**3.9 POWER FACTOR**

The Power Factor should be over 90% at Vin:115Vac & 230Vac and full load .

**3.10 NO LOAD POWER CONSUMPTION**

No Load Power Consumption:Input Power should be under 0.5W at Vin:115Vac & 230Vac .

**4.0. INPUT ELECTRICAL SPECIFICATIONS****4.1 INPUT VOLTAGE RANGE**

PARAMETER	MIN.	NOM.	MAX.	UNITS
V-in Range	90V	115/230	264V	V-rms

#### 4.2 INPUT FREQUENCY

47 - 63Hz

#### 4.3 INRUSH CURRENT

The cold inrush current must not cause the input fuse to open or cause damage to components.

#### 4.4 STEADY AC CURRENT

115Vac @Full Load	1.5A (Max)
230Vac @Full Load	0.8A (Max)

#### 4.5 EFFICIENCY

115Vac @Full Load	86% minimum
230Vac @Full Load	86% minimum

#### 4.6 POWER LINE HARMONIC REQUIREMENT

The input current harmonic requirement shall be met with EN-61000-3-2 at nominal line and full load.

#### 5.0. ENVIRONMENTAL REQUIREMENTS

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

#### 5.1 TEMPERATURE RANGE

Operating	0 to + 40 deg. C
Storage	-30 to +60deg.C

#### 5.2 HUMIDITY

Operating	8 – 80% RH, Non-condensing
Storage	8 – 80% RH, Non-condensing

### 5.3 VIBRATION

10 to 100Hz sweep at a constant acceleration of -0.5G for 10 min. for each of the perpendicular axes X, Y, Z.

### 5.4 SHOCK

Half-sine: 2ms

Storage All 6 sides; 50 to 90 in/sec in 10 in/sec increments.

Operating All sides except top; 40 to 70 in/sec in 10 in/sec increments.

No mechanical variations permitted. Electrically, the unit is capable of continuous normal operation after test completion.

### 5.5 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.

## 6.0. RELIABILITY

### 6.1. MTBF

The subject adapter have a minimum predicted MTBF(MIL-STD-217F) of 50000 hours of continuous operation at 25°C, maximum-output load, and nominal AC input voltage.

### 6.2 DIELECTRIC WITHSTAND VOLTAGE AND INSULATION RESISTANCE

Primary To Secondary : 4242 VDC 10mA for 2 second.

Insulation Resistance: 500Vdc / 1 Sec, 100 MΩ min. between primary and secondary.

### 6.3 LEAKAGE CURRENT

The measured reaing is less than 0.25 mA at 254Vac 50Hz.

## 6.4 EMC

The power supply have to meet EMC regulations as below.

Referring standards	Test specification	IEC standards
ESD	Contact 4KV	IEC61000-4-2
ESD	Air 8KV	IEC61000-4-2
RS	3V/M	IEC61000-4-3
CS	3V/M	IEC61000-4-6
FET	1KV on AC power line	IEC61000-4-4
SURGE	Differential mode:1KV(2ohm)	IEC61000-4-5
DIPS	0% 250Cycle , 40% 5Cycle 70% 0.5Cycle	IEC61000-4-11
CE	Class B	EN55022,EN55024
RE	Class B	EN55022,EN55024

## 6.5 CEC

The power supply have to meet ENERGY STAR V2.0 regulations as below.

Nameplate Output Power ( $P_{no}$ )	Minimum Average Efficiency in Active Mode (expressed as a decimal) <sup>2</sup>
0 to $\leq 1$ watt	$\geq 0.480 * P_{no} + 0.140$
$> 1$ to $\leq 49$ watts	$\geq [0.0626 * \ln(P_{no})] + 0.622$
$> 49$ watts	$\geq 0.870$

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%
Load Condition 5	0%

Note: All measurements to be taken after DUT has operated at 100% load for at least 30 minutes.