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ATTACHMENT: ASSY FIGURES

## 1.0 GENERAL DESCRIPTION AND SCOPE

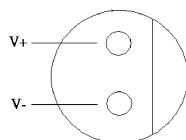
This is the specification of Model FSP065-DBKA1(F061); part no. 9NA0650601, Vehicle DC to DC Adapter switching power supply designed and manufactured by FSP GROUP, INC. located in Taiwan, Republic of China.

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	18.15V~19.85V	190mV	0A	3.42 A

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 cut-off 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: Input Line Voltage is 12V, and output at maximum load.

### 3.2 SHORT CIRCUIT PROTECTION

Output can be shorted without damage.

### 3.3 OVER-CURRENT PROTECTION

Output current limit 4.2A  $\pm$ 0.7A at 12.5Vdc Input Voltage.

### 3.4 TURN-ON DELAY TIME

The turn-on delay from application of DC input power to the establishment of rated DC power voltage should not exceed 200 mS under any conditions at 12Vdc.

### 3.5 HOLD UP TIME

0.3mS minimum. Tested 12Vdc input and max load at output.

### 3.6 DYNAMIC LOAD REGULATION

Output voltage within 18.15 – 19.85V, for load step 1.0A to 2.7A on the output. S/R=0.05A/uS, 100Hz & 1KHz 50% duty.

### 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.

Output Voltage	Upper trip limit	Remark
18.15Vdc ~ 19.85Vdc	20Vdc ~ 30Vdc	Only internal test

### 3.9 NO LOAD POWER CONSUMPTION

SPECIFICATION : Input power 1.2W(MAX).

CONDITION : At 14.5Vdc input voltage and no load .

## 4.0. INPUT ELECTRICAL SPECIFICATIONS

### 4.1 INPUT VOLTAGE RANGE

PARAMETER	MIN.	NOM.	MAX.	UNITS
V-in Range	10.5Vdc	12Vdc	14.5Vdc	Vdc

### 4.2 INPUT LINE CURRENT

10.5Vdc	7.5 Amps – rms maximum
14.5Vdc	5.6 Amps – rms maximum

### 4.3 OVER INPUT LINE VOLTAGE PROTECTION

If the Input voltage over 17.5V, this adapter will be shut down.

### 4.4 INRUSH CURRENT

At nominal line input, the inrush current will under 200 Amperes.

### 4.5 EFFICIENCY

12.5Vdc @Full Load	81% minimum
14.5Vdc @Full Load	82% minimum

## 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	-20 to +65deg.C

## 5.2 HUMIDITY

Operating	20 –80% RH, Non-condensing
Storage	10 –90% 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 of 50000 hours of continuous operation at 25°C, maximum-output load, and nominal input voltage.