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NO.2-1, DAAN ROAD, SHULIN .DIST., NEW TAIPEI CITY 238, TAIWAN

# **SPECIFICATION**

**Model Name :**

***RB2 series***

**Description :**

**400W 、 460W 、 500W 、 550W 2U Redundant Power Supply**

**Version : A0**

**Issued Date : 20201202**



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## 1. General Description

This specification defines the characteristic of 1 + 1 redundant power supply with 2 Unit high. And **SURE STAR** model name is RB2-G400VP for 400W 、RB2-G460VP for 460W 、RB2-G500VP for 500W 、RB2-G550VP for 550W output.

## 2. Input Characteristic

### 2.1. Input connector

The input connector shall be an IEC60320 C14 inlet, rated for 15A/250Vac.

### 2.2. Input Voltage and Frequency

| Minimum | Nominal | Maximum | Measure |
|---------|---------|---------|---------|
| 90      | 100~240 | 264     | Vac     |
| 47      | 50~60   | 63      | Hz      |

### 2.3. Input Current and Inrush Current

| Input Voltage | Max. Input Current | Inrush Current |
|---------------|--------------------|----------------|
| 115Vac        | 8.5A               | 30A            |
| 230Vac        | 4A                 | 60A            |

### 2.4. Power Factor

The minimum power factor shall be 0.95 with full load and input 230Vac/50Hz.

## 3. Output Characteristic

### 3.1. DC Output Characteristic

| Output Voltage | Min. Current | Max. Current        | Regulation | Ripple & Noise |
|----------------|--------------|---------------------|------------|----------------|
| +3.3V          | 1A           | 24A/24A/25A/25A     | ±5%        | 50mV           |
| +5V            | 1A           | 24A/24A/25A/25A     | ±5%        | 50mV           |
| +12V           | 1A           | 33A/38A/41A/45A     | ±5%        | 120mV          |
| -12V           | 0A           | 0.8A                | ±5%        | 120mV          |
| +5VSB          | 0.1A         | 2.5A/2.5A/3.5A/3.5A | ±5%        | 50mV           |

Note :

1. The combined power from +3.3V and +5V shall not exceed 160W/160W/170W/170W.
2. The max total power shall not exceed 400W/460W/500W/550W.
3. Ripple and noise bandwidth is set to 20MHz.
4. Add a 0.1uF ceramic capacitor in parallel with a 10uF tantalum capacitor at output connector terminals for ripple and noise measurement.



### 3.2. Efficiency

The power efficiency shall meet 80plus GOLD.

### 3.3. Hold up Time

The output voltages stay in regulation at least 18ms with 100% load after loss of AC input.

### 3.4. Rise Time

The output voltages rise from 10% to 90% with full load shall be in 20ms maximum.

### 3.5. Dynamic Loading

The output voltages shall remain in regulation for the step loading, and in the limits for the capacitive loading specified below :

| <i>Output</i> | <i>Step Load Size</i> | <i>Load Slew Rate</i> | <i>Capacitive Load</i> |
|---------------|-----------------------|-----------------------|------------------------|
| +3.3V         | 30% of max load       | 0.5A / $\mu$ sec      | 1000uF                 |
| +5V           | 30% of max load       | 0.5A / $\mu$ sec      | 1000uF                 |
| +12V          | 65% of max load       | 0.5A / $\mu$ sec      | 2200uF                 |
| +5VSB         | 25% of max load       | 0.5A / $\mu$ sec      | 1uF                    |

### 3.6. PSON Remote on/off Control

The PSON signal is required to remotely turn on/off the power supply.

PSON is an active low TTL compatible signal that turns on the main power rails.

|             | <i>PSU On</i>   | <i>PSU Off</i> |
|-------------|-----------------|----------------|
| PSON Signal | LOW (0.8V max.) | HI (2V min.)   |

### 3.7. Power Good Signal

Power Good, also called PG or PWOK, is an active high TTL compatible signal.

PG signal is to indicate that all output voltages are in regulation and ready for use.

Below is for a representation of the timing characteristics of PG signal.

|                           |                |
|---------------------------|----------------|
| Power Good on delay time  | 100ms to 500ms |
| Power Good off delay time | 1ms (min.)     |



#### 4. Protection

##### 4.1. Over Current Protection

| <i>Output</i> | <i>Min.</i> | <i>Max.</i> | <i>Comment</i> |
|---------------|-------------|-------------|----------------|
| +3.3V         | 110%        | 170%        | PSU shutdown   |
| +5V           | 110%        | 170%        | PSU shutdown   |
| +12V          | 110%        | 170%        | PSU shutdown   |

##### 4.2. Over Voltage Protection

| <i>Output</i> | <i>Min.</i> | <i>Max.</i> | <i>Comment</i> |
|---------------|-------------|-------------|----------------|
| +3.3V         | 3.9V        | 4.5V        | PSU shutdown   |
| +5V           | 5.7V        | 6.5V        | PSU shutdown   |
| +12V          | 13.3V       | 14.5V       | PSU shutdown   |

##### 4.3. Short Circuit Protection

| <i>Output</i> | <i>Comment</i> |
|---------------|----------------|
| +3.3V         | PSU shutdown   |
| +5V           | PSU shutdown   |
| +12V          | PSU shutdown   |

##### 4.4. Over Temperature Protection

The power supply would be protected against over temperature condition by loss of cooling or excessive ambient temperature. The PSU will shutdown in an OTP condition.



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## 5. Power System Signal Status

### 5.1. Buzzer Status

| <i>Power Supply Condition</i>         | <i>Buzzer Status</i> |
|---------------------------------------|----------------------|
| No input power to PSU                 | OFF                  |
| Input present/ only standby output on | OFF                  |
| Power supply outputs ON and OK        | OFF                  |
| Power supply failure                  | Beeping              |

### 5.2. LED Indicator

| <i>Power Supply Condition</i>         | <i>Module LED</i> |
|---------------------------------------|-------------------|
| No input power to PSU                 | OFF               |
| Input present/ only standby output on | Amber             |
| Power supply outputs ON and OK        | Green             |
| Power supply failure                  | Red               |

### 5.3. TTL Signal

| <i>Power Supply Condition</i> | <i>Output Condition</i> |             |
|-------------------------------|-------------------------|-------------|
|                               | <i>Min.</i>             | <i>Max.</i> |
| Normal (Power Supply ON)      | 3V                      | 5.25V       |
| Failure (Power Supply OFF)    | 0V                      | 1V          |

## 6. Insulation

### 6.1. Dielectric Withstand Voltage

|                   |                             |
|-------------------|-----------------------------|
| Primary to Ground | 1500Vac (10mA) for 1 second |
|-------------------|-----------------------------|

### 6.2. Leakage Current

Leakage current is 3.5mA maximum at 240Vac/50Hz.

## 7. Safety

CB、CE、TUV、UL。

Please visit our website and get the latest safety certificate.



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## **8. EMC**

CE 、 FCC ◦ (Class B)

Please visit our website and get the latest EMC certificate.

## **9. Environmental Requirement**

### 9.1. Temperature

Operating : 0°C to +50°C.

Non Operating : -20°C to +70°C.

### 9.2. Humidity

Operating : 20% to 90% , non-condensing.

Non Operating : 5% to 95% , non-condensing.

### 9.3. Altitude

Operating : Up to 5000m.

### 9.4. Cooling Method

By DC fan.

## **10. Reliability**

### 10.1. MTBF

Using MIL - HDBK -217F the calculated MTBF > 100,000 hours at 25°C.



## 11. PMBus

### 11.1. PMBus communication

The PMBus serial bus communication devices for I2C data in the power supply shall be compatible with both SMBus 2.0 “high power” and I2C Vdd based power and drive.

This bus shall operate at 3.3V but tolerant of 5V signaling.

The SMBus pull-ups are located on the motherboard and may be connected to 3.3V or 5V.

Two pins are allocated on the power supply. One pin is the serial clock (SMBus\_SCL).

The second pin is used for serial data (SMBus\_SDA).

Both pins are bi-directional and are used to form a serial bus.

The device(s) in the power supply shall be located at an address(s) determined by addressing pins A0 and A1 on the power supply module.

The circuits inside the power supply shall derive their power from the 5VSB bus.

Device(s) shall be powered from the system side of the 5VSB device.

No pull-up resistors shall be on SCL or SDA inside the power supply.

There pull-up resistors should be located external to the power supply.

### 11.2. Power supply management interface

The device in the power supply shall derive its power off of the 5VSB output on the system side.

It shall be located at an address set by the A0 and A1 pins.

Refer to the PMBus specification posted on the [www.powerSIG.org](http://www.powerSIG.org) website for details on the power supply monitoring interface requirements.

I2C is a SMBus interface used to communicate power management information to the system.

### 11.3. Power supply management interface address

Device address locations

|                | <i>M1</i> | <i>M2</i> |
|----------------|-----------|-----------|
| Device Address | B0h       | B2h       |



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#### 11.4. PMBus command code summary

PMBus version 1.2 specification shall be used for the communication with system.

| <i>Command code</i> | <i>Command Name</i> | <i>SMBus Transaction Type</i> | <i>Number of Data Bytes</i> |
|---------------------|---------------------|-------------------------------|-----------------------------|
| 19H                 | CAPABILITY          | READ BYTE                     | 1                           |
| 1AH                 | QUERY               | READ BYTE                     | 1                           |
| 20H                 | VOUT_MODE           | READ BYTE                     | 1                           |
| 88H                 | READ_ACV_IN         | READ WORD                     | 2                           |
| 89H                 | READ_ACI_IN         | READ WORD                     | 2                           |
| 8BH                 | READ_VOUT           | READ WORD                     | 2                           |
| 8CH                 | READ_IOUT           | READ WORD                     | 2                           |
| 8DH                 | READ_TEMPERATURE_1  | READ WORD                     | 2                           |
| 90H                 | READ_FAN1_SPEED     | READ WORD                     | 2                           |
| 91H                 | READ_FAN2_SPEED     | READ WORD                     | 2                           |
| 96H                 | READ_POUT           | READ WORD                     | 2                           |
| 97H                 | READ_PIN            | READ WORD                     | 2                           |
| 98H                 | PMBus_VERSION       | READ BYTE                     | 1                           |

(Data Byte Type ASCII Code or HEX Code)



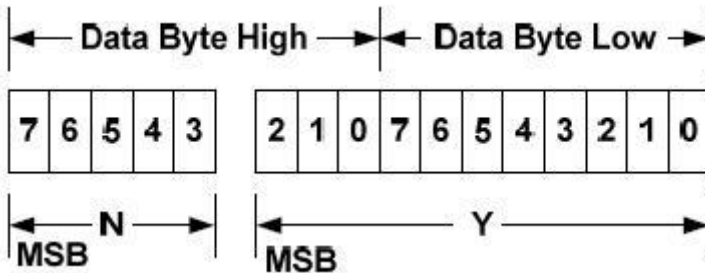


### 11.5. Data format

The Linear Data Format is a two byte value with:

An 11 bit, two's complement mantissa and A 5 bit, two's complement exponent (scaling factor).

The format of the two data bytes is shown below.



The relation between Y, N and the “real world” value is:

$$X = Y \cdot 2^N$$

Where, as described above:

X is the “real world” value;

Y is an 11 bit, two's complement integer; and

N is a 5 bit, two's complement integer.

Devices that use the Linear format must accept and be able to process any value of N.

### 11.6. VOUT\_MODE command

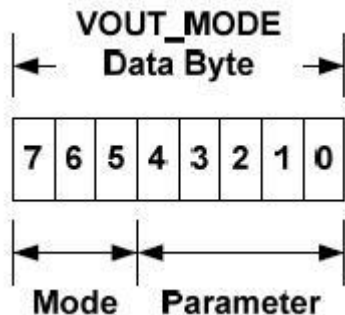
The data byte for the VOUT\_MODE command is one byte that consists of a three bit Mode and a five bit Parameter as shown below.

The three bit Mode sets whether the device uses the Linear, VID or Direct modes for output voltage related commands. The five bit Parameter provides more information about the selected mode, such as which manufacturer's VID codes are being used.

Sending the VOUT\_MODE command with the address set for writing sets the Mode and Parameter into the PMBus device, if it accepts changes to these values.

PMBus devices may have the Mode and Parameter set at the time of manufacture and may not permit the user to change these values.

In this case, if a host sends a VOUT\_MODE command for a write to a PMBus device, the device shall reject the VOUT\_MODE command, declare a communication fault for invalid data, and respond as described in PMBus Revision 1.2 specification part ii section 10.2.2.



If a device accepts the VOUT\_MODE command, the Mode and Parameter are retained until changed with another VOUT\_MODE command or until the bias power is removed.

Sending the VOUT\_MODE command using the SMBus Read Byte protocol returns one byte with the Mode and Parameter as shown in Figure 5.

The table below shows the permitted values and format of the VOUT\_MODE data byte.

More information on the VOUT\_MODE command is used with output voltage related commands is given below in Section 8.3.

| Mode   | Bits [7:5] | Bits [4:0] (Parameter)   |
|--------|------------|--|
| Linear | 000b       | Five bit two's complement exponent for the mantissa delivered as the data bytes for an output voltage related command. |

### 11.7. Data bytes for output voltage commands

There are several commands that either set or adjust the output voltage, or a related parameter, of a device that supports the PMBus protocol.

Examples VOUT\_COMMAND which causes the device to set its output voltage to the commanded value;

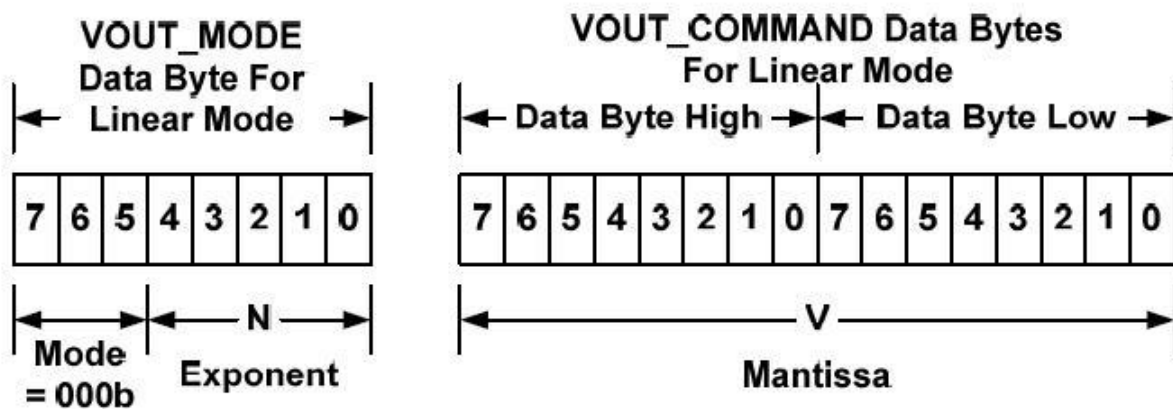
All output voltage related commands use two data bytes.

The contents of those data bytes depend on the voltage data format in use (set by the VOUT\_MODE command) and are described below.



Linear Mode:

The data bytes for the VOUT\_MODE and VOUT\_COMMAND when using the Linear voltage data format are shown in Figure 6. Note that the VOUT\_MODE command is sent separately from output voltage related commands and only when the output voltage format changes. VOUT\_MODE is not sent every time an output voltage command is sent.



The Mode bits are set to 000b.

The Voltage, in volts, is calculated from the equation:

Voltage=  $V \cdot 2^N$  Where, as described above:

Voltage is the parameter of interest;

V is a 16 bit unsigned binary integer; and

N is a 5 bit two's complement binary integer.



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### 11.8. Example Data

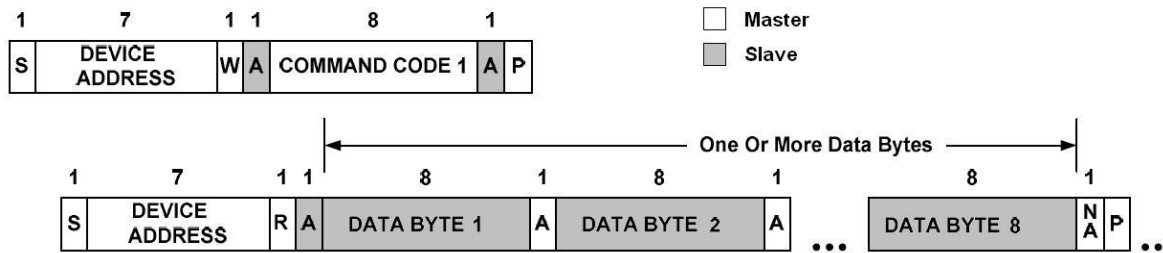
| <i>Command code</i> | <i>Command Name</i> | <i>Value Example</i> | <i>Meaning</i> |
|---------------------|---------------------|----------------------|----------------|
| 19H                 | CAPABILITY          | 20H                  |                |
| 1AH                 | QUERY               | B0H                  |                |
| 20H                 | VOUT_MODE           | 1CH                  | N= -4          |
| 88H                 | READ_ACV_IN         | 00H,DCH              | 220V           |
| 89H                 | READ_ACI_IN         | E0H,07H              | 0.4375 A       |
| 8BH                 | READ_VOUT           | 0CH,10H              | 12.06V         |
| 8CH                 | READ_IOUT           | DBH,02H              | 44.03A         |
| 8DH                 | READ_TEMPERATURE_1  | 00H,22H              | 34°C           |
| 90H                 | READ_FAN_SPEED_1    | 30H,FEH              | 16256 rpm      |
| 91H                 | READ_FAN_SPEED_2    | 00H,00H              | Reserved       |
| 96H                 | READ_POUT           | F8H,65H              | 537.25 W       |
| 97H                 | READ_PIN            | FCH,A8H              | 696.00 W       |
| 98H                 | PMBus_REVISION      | 22H                  | PMBus 1.2      |

Note 1: Data byte type ASCII Code or HEX Code.

Note 2: The reading accuracy is within  $\pm 5\%$ .



11.9. PMBus command protocol



**Command Protocol Without PEC**

Figure 8.2.3-1

PMBus command protocol for the two steps (Figure 8.2.3-1). The first step is master device sends Device Address and Command Code1 to slave device.

The Command Code 1 is set what kind data will receive on master device.

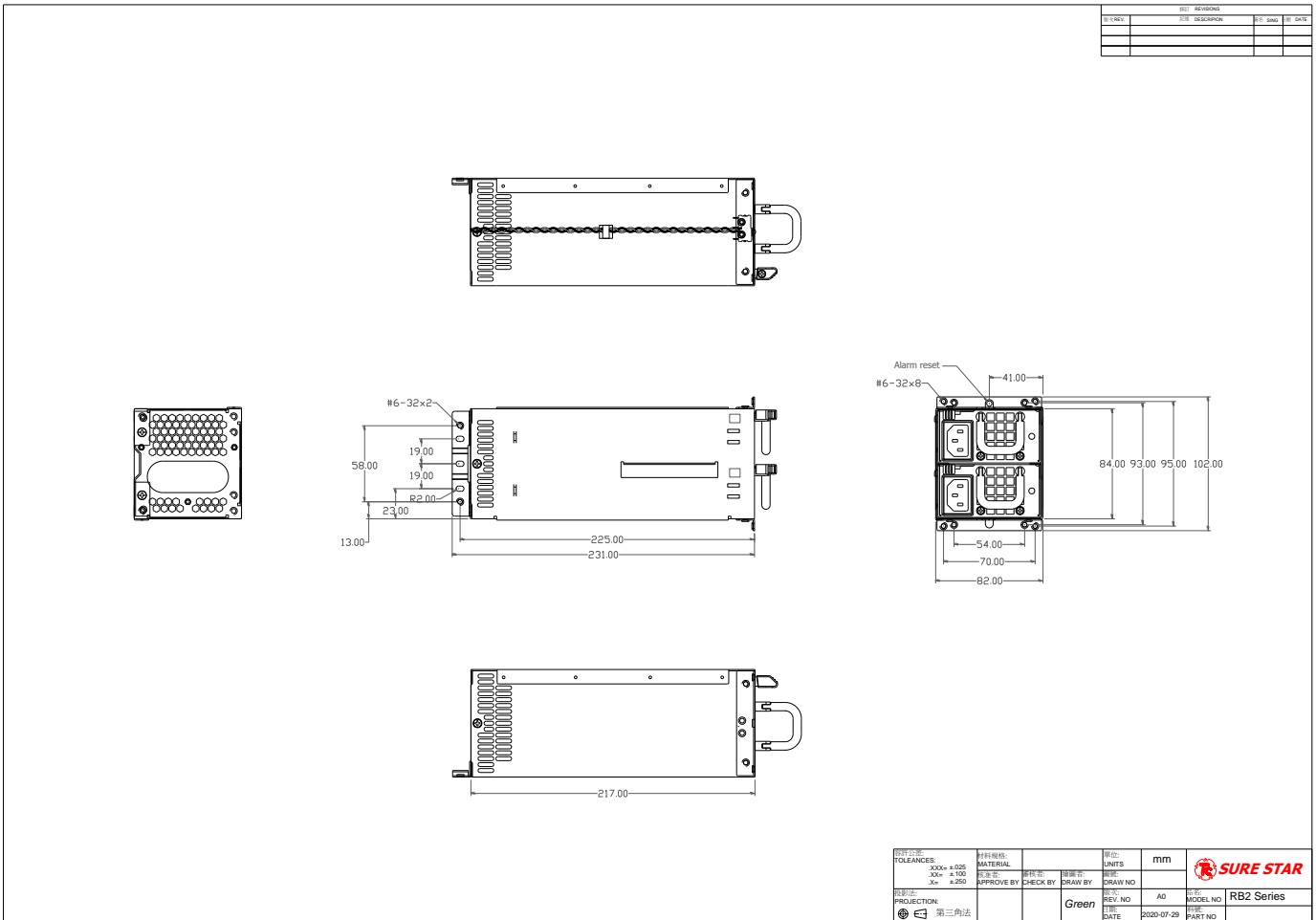
The second step is the master device will receive one or more DATA BYTE coming slave device.



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## 12. Mechanical Drawing and Output Wire

12.1. Outline (bracket optional) : W82 \* H84 \* D217mm.





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12.2. Output Wire (could be customization) :

**4Pins(HDC/CD-ROM/RW) P4H1-P4H3 P4H4-P4H7**  
 HOUSING : MOLEX 8981 series or equivalent  
 TERMINAL : MOLEX 8980 series or equivalent  
**4Pins(FLOPPY DISK) P4H4**  
 HOUSING : AMP 171822 series or equivalent  
 TERMINAL : AMP 171822 series or equivalent

| Housing No. | PIN No. | WIRE COLOR  | SIGNAL | WIRE SIZE | LENGTH      |
|-------------|---------|-------------|--------|-----------|-------------|
| P4H1        | 1       | YELLOW      | +12V   | 18AWG     | 500mm ±20mm |
|             | 2       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 3       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 4       | RED/RED     | +5V    | 18AWG     |             |
| P4H2        | 1       | YELLOW      | +12V   | 18AWG     | 150mm ±15mm |
|             | 2       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 3       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 4       | RED/RED     | +5V    | 18AWG     |             |
| P4H3        | 1       | YELLOW      | +12V   | 18AWG     | 150mm ±15mm |
|             | 2       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 3       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 4       | RED/RED     | +5V    | 18AWG     |             |
| P4H4        | 1       | YELLOW      | +12V   | 24AWG     | 150mm ±15mm |
|             | 2       | BLACK       | COM    | 24AWG     |             |
|             | 3       | BLACK       | COM    | 24AWG     |             |
|             | 4       | RED         | +5V    | 24AWG     |             |
| P4H5        | 1       | YELLOW      | +12V   | 18AWG     | 500mm ±20mm |
|             | 2       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 3       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 4       | RED/RED     | +5V    | 18AWG     |             |
| P4H6        | 1       | YELLOW      | +12V   | 18AWG     | 150mm ±15mm |
|             | 2       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 3       | BLACK/BLACK | COM    | 18AWG     |             |
|             | 4       | RED/RED     | +5V    | 18AWG     |             |
| P4H7        | 1       | YELLOW      | +12V   | 18AWG     | 150mm ±15mm |
|             | 2       | BLACK       | COM    | 18AWG     |             |
|             | 3       | BLACK       | COM    | 18AWG     |             |
|             | 4       | RED         | +5V    | 18AWG     |             |

**SATA HDD**  
 HOUSING : MOLEX 67582 series or equivalent  
 TERMINAL : MOLEX 67581 series or equivalent

| Housing No. | PIN No. | WIRE COLOR | SIGNAL | WIRE TYPE | LENGTH      |
|-------------|---------|------------|--------|-----------|-------------|
| S1          | 1       | ORANGE     | +3.3V  | 18AWG     | 500mm ±20mm |
|             | 2       | BLACK      | COM    | 18AWG     |             |
|             | 3       | RED/RED    | +5V    | 18AWG     |             |
|             | 4       | BLACK      | COM    | 18AWG     |             |
| S2          | 1       | ORANGE     | +3.3V  | 18AWG     | 150mm ±15mm |
|             | 2       | BLACK      | COM    | 18AWG     |             |
|             | 3       | RED/RED    | +5V    | 18AWG     |             |
|             | 4       | BLACK      | COM    | 18AWG     |             |
| S3          | 1       | ORANGE     | +3.3V  | 18AWG     | 150mm ±15mm |
|             | 2       | BLACK      | COM    | 18AWG     |             |
|             | 3       | RED        | +5V    | 18AWG     |             |
|             | 4       | BLACK      | COM    | 18AWG     |             |

**PMBUS**  
 HOUSING : MOLEX 70056 series of version G or equivalent

| Housing No. | PIN No. | COLOR  | WIRE TYPE | LENGTH      |
|-------------|---------|--------|-----------|-------------|
| PMBUS       | 1       | YELLOW | 24AWG     | ±50mm ±30mm |
|             | 2       | GREEN  | 24AWG     | ±50mm ±30mm |
|             | 3       | N/C    |           |             |
|             | 4       | BLACK  | 24AWG     | ±50mm ±30mm |
|             | 5       | ORANGE | 24AWG     | ±50mm ±30mm |

**20+4Pins(EP512V)**  
 HOUSING : MOLEX 5557 series or equivalent  
 TERMINAL : MOLEX 5556 series or equivalent

| Housing No. | PIN No. | WIRE COLOR   | SIGNAL | WIRE TYPE | LENGTH     |
|-------------|---------|--------------|--------|-----------|------------|
| P24         | 1       | BROWN/BLACK  | COM    | 18AWG     | 500mm±20mm |
|             | 2       | BROWN/BLACK  | COM    | 18AWG     |            |
|             | 3       | BLACK/BLACK  | COM    | 18AWG     |            |
|             | 4       | RED/BLACK    | COM    | 18AWG     |            |
|             | 5       | BLACK/BLACK  | COM    | 18AWG     |            |
|             | 6       | RED/BLACK    | COM    | 18AWG     |            |
|             | 7       | BLACK/BLACK  | COM    | 18AWG     |            |
|             | 8       | RED/BLACK    | COM    | 18AWG     |            |
|             | 9       | BROWN/BLACK  | COM    | 18AWG     |            |
|             | 10      | YELLOW/BLACK | COM    | 18AWG     |            |
|             | 11      | YELLOW/BLACK | COM    | 18AWG     |            |
|             | 12      | BLACK/BLACK  | COM    | 18AWG     |            |

**4Pins+3Pins(ATX12V FOR P4)**  
 HOUSING : MOLEX 5557 series or equivalent  
 TERMINAL : MOLEX 5556 series or equivalent

| Housing No. | PIN No. | WIRE COLOR  | SIGNAL | WIRE TYPE | LENGTH     |
|-------------|---------|-------------|--------|-----------|------------|
| P4A         | 1       | BLACK/BLACK | COM    | 18AWG     | 500mm±20mm |
|             | 2       | BLACK/BLACK | COM    | 18AWG     |            |
|             | 3       | BLACK/BLACK | COM    | 18AWG     |            |
|             | 4       | RED/BLACK   | +12V   | 18AWG     |            |
| P4B         | 1       | BLACK       | COM    | 20AWG     | 150mm±15mm |
|             | 2       | BLACK       | COM    | 20AWG     |            |
|             | 3       | YELLOW      | +12V   | 20AWG     |            |
|             | 4       | YELLOW      | +12V   | 20AWG     |            |

**8+2Pins(PQI Express)**  
 HOUSING : MOLEX 45559 series or equivalent  
 TERMINAL : MOLEX 5556 series or equivalent

| Housing No. | PIN No. | WIRE COLOR   | SIGNAL | WIRE TYPE | LENGTH     |
|-------------|---------|--------------|--------|-----------|------------|
| P6          | 1       | BLACK/BLACK  | COM    | 18AWG     | 500mm±20mm |
|             | 2       | YELLOW       | +12V   | 18AWG     |            |
|             | 3       | YELLOW       | +12V   | 18AWG     |            |
|             | 4       | BLACK/BLACK  | COM    | 18AWG     |            |
|             | 5       | YELLOW/BLACK | COM    | 18AWG     |            |
|             | 6       | BLACK/BLACK  | COM    | 18AWG     |            |
|             | 7       | BLACK/BLACK  | COM    | 18AWG     |            |

**TTL Signal Connector HOUSING : Molex 22-01-3027 or equivalent**

| Housing No. | PIN No. | WIRE COLOR | WIRE TYPE | LENGTH      |
|-------------|---------|------------|-----------|-------------|
| TTL         | 1       | BLACK      | 24AWG     | 750mm ±30mm |
|             | 2       | ORANGE     | 24AWG     | 750mm ±30mm |

**POWER Module Status Signal Connector HOUSING : Molex 22-01-3027 or equivalent**

| Housing No. | PIN No. | WIRE COLOR | WIRE TYPE | LENGTH      |
|-------------|---------|------------|-----------|-------------|
| PW1         | 1       | BLACK      | 24AWG     | 750mm ±30mm |
|             | 2       | BLUE       | 24AWG     | 750mm ±30mm |
| PW2         | 1       | BLACK      | 24AWG     | 750mm ±30mm |
|             | 2       | YELLOW     | 24AWG     | 750mm ±30mm |

**WAYON**  
 TOLERANCE: XXX%  
 MATERIAL: XXX  
 APPROVE BY: XXX  
 CHECK BY: XXX  
 DRAW BY: XXX  
 DATE: 2020/11/30  
 PART NO.: WireOut\_RA2+RB2  
 STD



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### **13. Customization Note**

Customization note shall be listed here.

**End of File**

NOTE : This data is subject to change without notice.