SPECIFICATION

Model Name：

RB2 *series*

Description：

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

Version：A0

Issued Date : 20211101

1. General Description

This specification defines the characteristic of 1＋1 redundant power supply with 2 Unit high. And 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 0.9 with 50% 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 80% load after loss of AC input.

3.4. Rise Time

The output voltages rise from 10% to 90% with full load shall be in 5ms to 70ms.

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：

Output	*Step Load Size*	*Load Slew Rate*	*Capacitive Load*
+3.3V	30% of max load	0.5A / μ sec	1000uF
+5V	30% of max load	0.5A / μ sec	1000uF
+12V	65% of max load	0.5A / μ sec	2200uF
+5VSB	25% of max load	0.5A / μ 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.

	PSU On	*PSU Off*
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

Output	*Min.*	*Max.*	*Comment*
+3.3V	110%	150%	PSU shutdown
+5V	110%	150%	PSU shutdown
+12V	110%	150%	PSU shutdown

4.2. Over Voltage Protection

Output	*Min.*	*Max.*	*Comment*
+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

Output	*Comment*
+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.

5. Power System Signal Status

5.1. Buzzer Status

Power Supply Condition	*Buzzer Status*
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

Power Supply Condition	*Module LED*
No input power to PSU	OFF
Input present/ only standby output on	Red
Power supply outputs ON and OK	Green
Power supply failure	Red

5.3. TTL Signal

Power Supply Condition	*Output Condition*	
	Min.	*Max.*
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。

8. EMC

CE、FCC。(Class B)

9. Environmental Requirement

9.1. Temperature

Operating：0℃ to +50℃.

Non-Operating：-20℃ to +70℃.

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℃.

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 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

	M1	*M2*
Device Address	B0h	B2h

11.4. PMBus command code summary

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

Command code	*Command Name*	*SMBus Transaction Type*	*Number of Data Bytes*
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

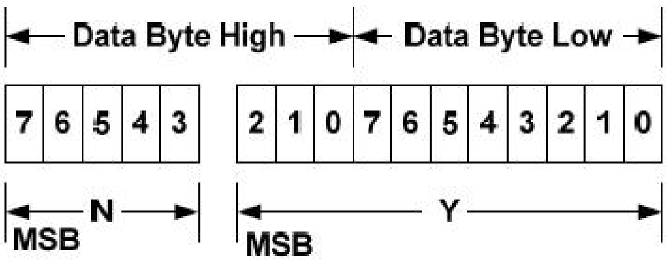
(Data Byte Type ASCII Code or HEX Code)

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

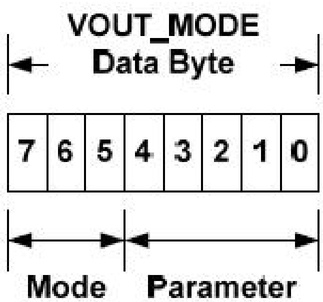
The data byte for the VOUT_MODE command is one byte that consists of a three bit Mode and a five bit Parameter as shown below.

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.

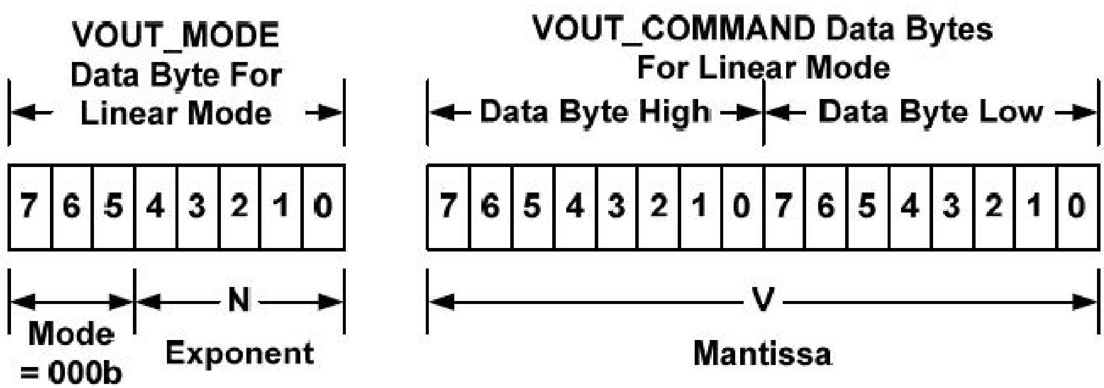
Mode	*Bits [7:5]*	*Bits [4:0] (Parameter)*
Linear	000b	Five bit two's complement exponent for the mantissa delivered as the data bytes for an output voltage related command.

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·2N 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.

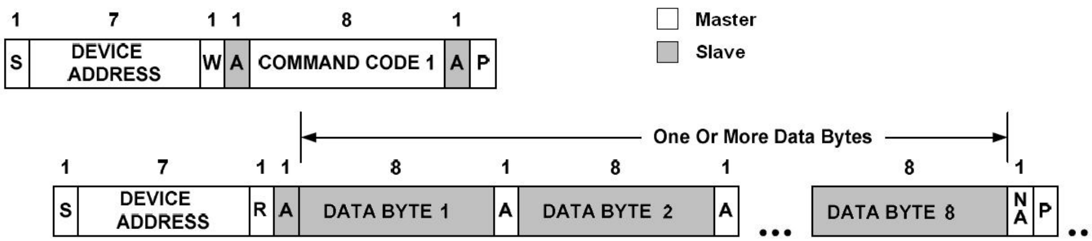
11.8. Example Data

Command code	*Command Name*	*Value Example*	*Meaning*
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℃
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 ±5%.

11.9. PMBus command protocol



Command Protocol Without PEC

Figure 8.2.3-1

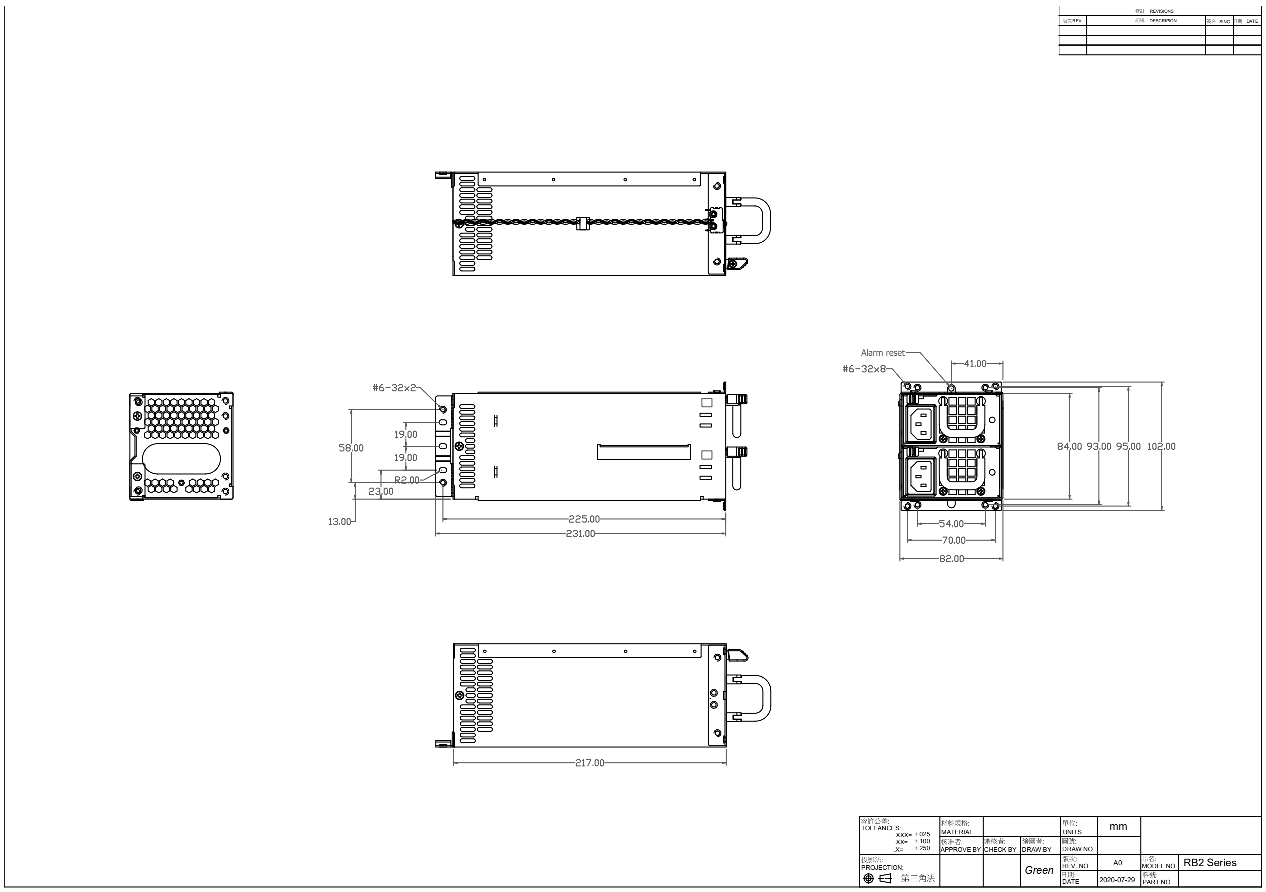
PMBus command protocol for the two steps (Figure 8.2.3-1). The first step is master device sends Device Address and Command Code1 to slave device.

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

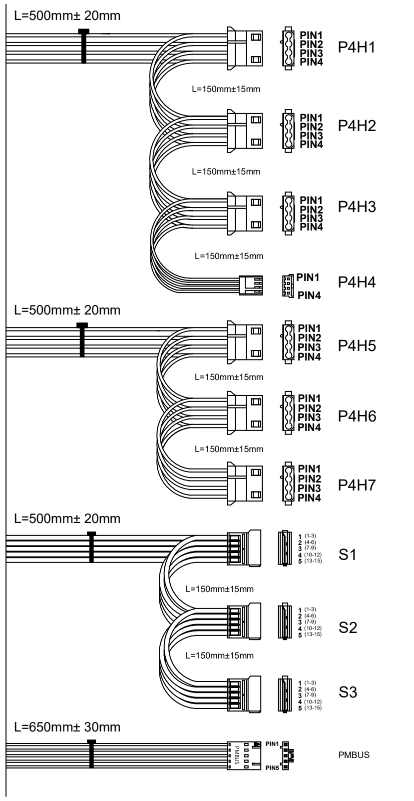
The second step is the master device will receive one or more DATA BYTE coming slave device.

12. Mechanical Drawing and Output Wire

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



12.2. Output Wire (could be customization)：



4Pins(HD/CD-ROM/RW):P4H1~P4H3 P4H5~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 170262 series or equivalent

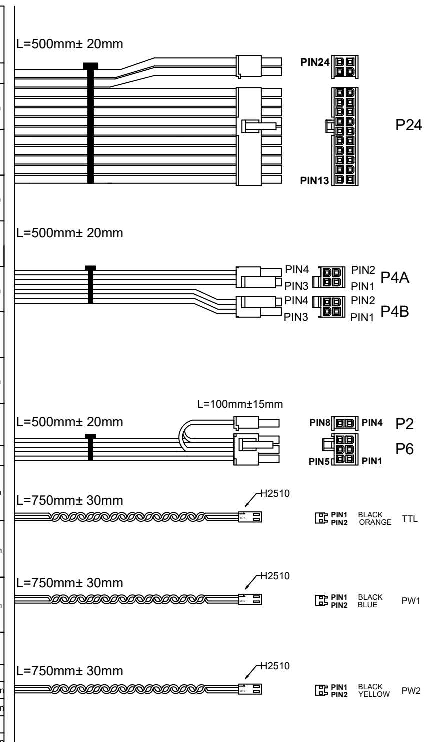
Housing	Pin No.	WIRE COLOR	SIGNAL	WIRE SIZE	LENGTH
P4H1	1	YELLOW/ YELLOW	+12V	18AWG	500mm ±20mm
	2	BLACK/BLACK	COM	18AWG	
	3	BLACK/BLACK	COM	18AWG	
	4	RED/RED	+5V	18AWG	
P4H2	1	YELLOW/ YELLOW	+12V	18AWG	150mm ±15mm
	2	BLACK/BLACK	COM	18AWG	
	3	BLACK/BLACK	COM	18AWG	
	4	RED/RED	+5V	18AWG	
P4H3	1	YELLOW/ 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/ YELLOW	+12V	18AWG	500mm ±20mm
	2	BLACK/BLACK	COM	18AWG	
	3	BLACK/BLACK	COM	18AWG	
	4	RED/RED	+5V	18AWG	
P4H6	1	YELLOW/ 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	Pin No.	WIRE COLOR	SIGNAL	WIRE TYPE	LENGTH
S1	1	ORANGE / ORANGE	+3.3V	18AWG	500mm ±20mm
	2	BLACK / BLACK	COM	18AWG	
	3	RED/RED	+5V	18AWG	
	4	BLACK / BLACK	COM	18AWG	
	5	YELLOW / YELLOW	+12V	18AWG	
S2	1	ORANGE / ORANGE	+3.3V	18AWG	150mm ±15mm
	2	BLACK / BLACK	COM	18AWG	
	3	RED/RED	+5V	18AWG	
	4	BLACK / BLACK	COM	18AWG	
	5	YELLOW / YELLOW	+12V	18AWG	
S3	1	ORANGE	+3.3V	18AWG	150mm ±15mm
	2	BLACK	COM	18AWG	
	3	RED	+5V	18AWG	
	4	BLACK	COM	18AWG	
	5	YELLOW	+12V	18AWG	

PMBUS
HOUSING : MOLEX 70066 series of version G or equivalent

Housing	PIN	COLOR	WIRE TYPE	LENGTH
PMBUS	1	YELLOW	24AWG	650mm ±30mm
	2	GREEN	24AWG	650mm ±30mm
	3	N/C		
	4	BLACK	24AWG	650mm ±30mm
	5	ORANGE	24AWG	650mm ±30mm



VERSIONS			
VER	DESCRIPTION	SIGN	DATE
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20+4Pins(EPS12V)
HOUSING : MOLEX 5557 series or equivalent
TERMINAL : MOLEX 5556 series or equivalent

Housing	Pin No.	WIRE COLOR	LENGTH	Pin No.	WIRE COLOR	LENGTH
P24	1	ORANGE(+3.3V)	500mm/18AWG	13	ORANGE(+3.3V) ORANGE(+3s)	500mm/18AWG 500mm/24AWG
	2	ORANGE(+3.3V)	500mm/18AWG	14	BLUE(-12V)	500mm/18AWG
	3	BLACK(GND)	500mm/18AWG	15	BLACK(GND)	500mm/18AWG
	4	RED(+5V)	500mm/18AWG	16	GREEN(PSON)	500mm/24AWG
	5	BLACK(GND)	500mm/18AWG	17	BLACK(GND)	500mm/18AWG
	6	RED(+5V)	500mm/18AWG	18	BLACK(GND)	500mm/18AWG
	7	BLACK(GND)	500mm/18AWG	19	BLACK(GND)	500mm/18AWG
	8	GRAY(PG)	500mm/24AWG	20	N/C	
	9	PURPLE(+5VSB)	500mm/18AWG	21	RED(+5V)	500mm/18AWG
	10	YELLOW(+12V) YELLOW(+12s)	500mm/18AWG 500mm/24AWG	22	RED(+5V) RED(+5s)	500mm/18AWG 500mm/24AWG
	11	YELLOW(+12V)	500mm/18AWG	23	RED(+5V)	500mm/18AWG
	12	ORANGE(+3.3V)	500mm/18AWG	24	BLACK(GND)	500mm/18AWG

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

Housing	Pin No.	WIRE COLOR	SIGNAL	WIRE TYPE	LENGTH
P4A	1	BLACK	COM	18AWG	500mm±20mm
	2	BLACK	COM	18AWG	
	3	YELLOW	+12V	18AWG	
	4	YELLOW	+12V	18AWG	
P4B	1	BLACK	COM	18AWG	
	2	BLACK	COM	18AWG	
	3	YELLOW	+12V	18AWG	
	4	YELLOW	+12V	18AWG	

6+2Pins(PCI Express)
HOUSING : MOLEX 45559 series or equivalent
TERMINAL: MOLEX 5556 series or equivalent

Housing	Pin No.	WIRE COLOR	SIGNAL	WIRE TYPE	LENGTH
P6	1	YELLOW	+12V	18AWG	500mm±20mm
	2	YELLOW	+12V	18AWG	
	3	YELLOW	+12V	18AWG	
	5	BLACK	COM	18AWG	
	6	BLACK/BLACK	COM	18AWG	
	7	BLACK/BLACK	COM	18AWG	
P2	4	BLACK	COM	20AWG	100mm±15mm
	8	BLACK	COM	20AWG	

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

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

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

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

容許公差 TOLERANCE .XXX= .XX= .X=	材料規格 MATERIAL			單位 UNIT	mm		
	核准者 APPROVE BY	審核者 CHECK BY	繪圖者 DRAW BY	圖號 DRAW NO.			
投影法 PROJECTION 第三角法			Waylon	版本 VERSION	A0	品名 MODEL NO.	WireOut_RA2+RB2
				日期 DATE	2021/11/01	料號 PART NO.	STD

13. Customization Note

Customization note shall be listed here.

<u>End of File</u>

NOTE：This data is subject to change without notice.