

EPAP-S860
Power Supply Product Specification


*An Etasis Power Supply Specification
For PS2 Power Supply*

SPECIFICATION

Model Name: EPAP-S860

Rev:	Description	Author / Editor	Date
0.1	Initial Engineering Specification	Gilbert	2009-10-21
0.2	Update Output Rating	Gilbert	2009-10-23
0.3	Add PMBus Command Summary	Rain	2010-01-27
0.4	Update PMBus Spec	Gilbert	2010-12-01
0.5	Cancel +5VSB Peak Load Function	Rain	2011-12-01

Design			Product Verification	
Mechanical	Electrical	Approval	Safety	Approval

 ETASIS ELECTRONICS	Model No.: EPAP-S860 PS2 Power Supply	Description: 產品規格 Product Specification
		Document No.:

1. Purpose

This specification defines the performance characteristics and functions of a 860 watts PS2 form factor of switch mode power supply with Active PFC (Power Factor Correction) and support external / internal PMBus Adapter card.

2. AC Input Requirements

2.1 Input Voltage and Frequency

Voltage (sinusoidal) : 100~240 VAC full range, with $\pm 10\%$ tolerance. Input frequency ranges from 47hz~63hz

2.2 AC Input Current and Inrush Current

AC line inrush current shall not damage any component nor cause the AC line fuse to blow under any DC conditions and with any specified AC line input voltage and frequency. Repetitive On/Off cycling of the AC input voltage shall not damage the power supply.

Table 1: AC Input Current and Inrush Current

Input Voltage	Input Current	Inrush Current
100~240Vac	12A~6A	50A (115V Input)

2.3 Input Power Factor Correction (Active PFC)

The power factor at 100% of rated load shall be ≥ 0.99 at 230VAC input voltage.

2.4 AC Line Fuse

The power supply shall have one line fused in the single line fuse on the line (Hot) wire of the AC input. The input fuse shall be a slow blow type; the line fusing shall be acceptable for all safety agency requirements.

2.5 AC Line Transient Specification

AC line transient conditions are characterized as “sag” and “surge” conditions. Sag conditions (also referred to as “brownout” conditions) will be defined as the AC line voltage dropping below nominal voltage. Surge conditions will be defined as the AC line voltage rising above nominal voltage. The power supply shall meet the regulation requirements under the following AC line sag and surge condition

Table 2: AC Line Sag Transient Performance

Duration	Sag	Operating AC Voltage	Line Frequency	Performance Criteria
Continuous	10%	Nominal AC Input ranges	50/60 Hz	No loss of function or performance
0-1 AC cycle	100%	Nominal AC Input ranges	50/60 Hz	No loss of function or performance
> 1 AC cycle	> 10%	Nominal AC Input ranges	50/60 Hz	Loss of function Acceptable,


 ETASIS ELECTRONICS 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.: EPAP-S860 PS2 Power Supply	Description: 產品規格 Product Specification
		Document No.:

Table 3: AC Line Surge Transient Performance

Duration	Surge	Operating AC Voltage	Line Frequency	Performance Criteria
Continuous	10%	Nominal AC Voltage	50/60 Hz	No loss of function or performance
0 - ½ AC cycle	30%	Mid-point of Nominal AC Voltage	50/60 Hz	No loss of function or performance

3. DC Output Specification

3.1 Output Power / Currents

The following table defines two sets of power and current ratings. The power supply shall meet both static and dynamic voltage regulation requirements for minimum load condition.

Table 4: Load Range

Voltage	Minimum Load	Maximum Load	Peak Load
+3.3V	0A	25A	
+5V	0A	25A	
+12V	0.8A	71A	75.5A
-12V	0A	0.8A	
+5VSB	0.1A	3.5A	

Notes:

- 1: The +3.3 & +5 Volt total outputs shall not exceed 40A.
- 2: Support 5 seconds Peak Load operation with other output rails at minimum load.
- 3: Support peak power up to 906W
- 4: Noise bandwidth is from DC to 20 MHz


3.2 Voltage Regulation, Ripple and Noise

Table 5: Regulation, ripple and noise

Output Voltage	+3.3V	+5V	+12V	-12V	+5VSB
Load Reg.	±5%	±5%	±5%	±5%	±5%
Line Reg.	±1%	±1%	±1%	±1%	±1%
Ripple & Noise	60mV	65mV	160mV	130mV	75mV

Ripple and noise shall be measured using the following methods:

- a) Measurements made differentially to eliminate common-mode noise
- b) Ground lead length of oscilloscope probe shall be ≤ 0.25 inch.
- c) Measurements made where the cable connectors attach to the load.
- d) Outputs bypassed at the point of measurement with a parallel combination of 10uF tantalum capacitor in parallel with 0.1uF ceramic capacitors.
- e) Oscilloscope bandwidth of 0 Hz to 20MHz.
- f) Measurements measured at locations where remote sense wires are connected.
- g) Regulation tolerance shall include temperature change, warm up drift and dynamic load

 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.:	Description: 產品規格
	EPAP-S860 PS2 Power Supply	Product Specification
		Document No.:

3.3 Capacitive Loading

The power supply shall be stable and meet all requirements in the following table, except dynamic loading requirements.

Table 6: Capacitive Loading Conditions

Output	MIN	MAX	Units
+3.3V	10	12,000	uF
+5V	10	12,000	uF
+12V	10	11,000	uF
-12V	1	350	uF
+5VSB	1	350	uF

3.4 Dynamic Loading

The output voltages shall remain within the limits specified in **Table-Regulation, ripple and noise** for the step loading and within the limits specified in **Table-Transient Load Requirement** for the capacitive loading. The load transient repetition rate shall be tested between **50Hz and 5kHz** at duty cycle ranging from 10%-90%. The load transient repetition rate is only a test specification. The Δ step load may occur anywhere within the MIN load to the MAX load shown in **Table-Load Range**.

Table 7: Transient Load Requirements

Output	Δ Step Load Size	Load Slew Rate	Capacitive Load
+5V	30% of Max. Load	0.5 A/uS	1000 uF
+3.3V	30% of Max. Load	0.5 A/uS	1000 uF
+12V	50% of Max. Load	0.5 A/uS	2200 uF
+5VSB	20% of Max. Load	0.5 A/uS	1 uF

3.5 Overshoot at Turn-on/Turn-off

Any output overshoot at turn on shall be less than 10% of the nominal output value. Any overshoot shall recover to be within regulation requirements in less than 10ms.

3.6 Timing Requirements

Table 8: Output Voltage Timing

Item	Description	MIN	MAX	Units
Tvout_rise	Output voltage rise time from each main output	1	20	mS
Tvout_on	All main output must be within regulation of each other within this time.		50	mS
Tvout_off	All main output must leave regulation within this time		400	mS


 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.:	Description: 產品規格
	EPAP-S860 PS2 Power Supply	Product Specification
		Document No.:

Figure 1: Output Voltage Timing

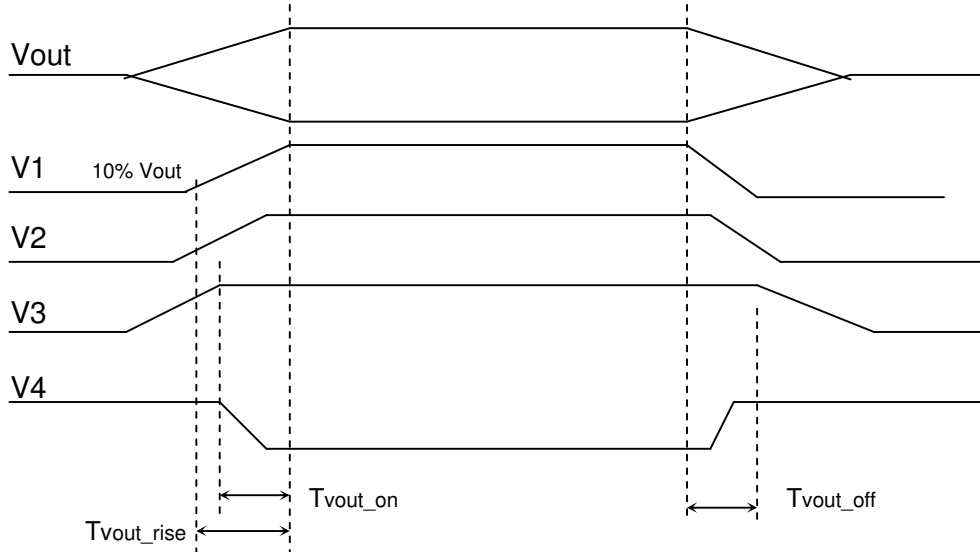


Table 9: Turn On/Off Timing

Item	Description	MIN	MAX	Units
Tsb_on-delay	Delay from AC being applied to +5VSB being within regulation.		1500	mS
Tac_on-delay	Delay from AC being applied to all output voltages being within regulation.		2500	mS
Tvout_holdup	Time all output voltage stay within regulation after loss of AC tested at 80% of maximum load.	18		mS
Tpwok_holdup	Delay from loss of AC deassertion of PWOK tested at 80% of maximum load.	17		mS
Tpson_on_delay	Delay from PSON# active to output voltage within regulation limits.	5	400	mS
Tpson_pwok	Delay from PSON# deactive to PWOK being deasserted.		50	mS
Tpwok_on	Delay from output voltage within regulation limits to PWOK asserted at turn on.	100	500	mS
Tpwok_off	Delay from PWOK deasserted to output voltages (+5V, +3.3V, +12V, -12V) dropping out of regulation limits. Tested at 80% of maximum load.	1		mS
Tpwok_low	Duration of PWOK being in the deasserted state during an off/on cycle using AC or the PSON# signal. .	100		mS
Tsb_vout	Delay from +5VSB being in regulation to O/Ps being in regulation at AC turn on.	50	1000	mS


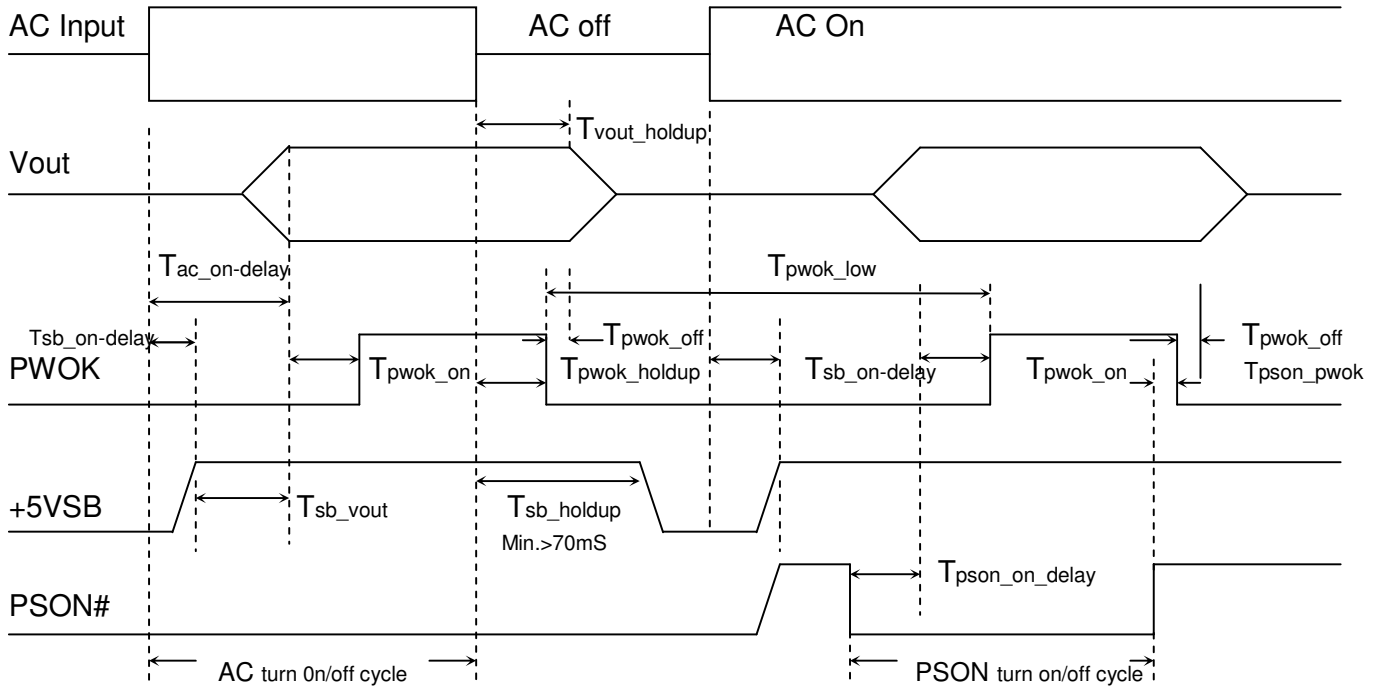
 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.: EPAP-S860 PS2 Power Supply	Description: 產品規格 Product Specification
		Document No.:

Figure 2: Turn On/Off Timing



3.8 Efficiency

This power efficiency shall be at least 82% at 115VAC Input.

3.3V and 5V combined power shall not exceed 20A while testing power efficiency.

4. Protection Circuits


Protection circuits inside the power supply shall cause only the power supply's main outputs to shutdown. If the power supply latches off due to a protection circuit tripping, an AC cycle OFF for 15 sec and a PSON# cycle HIGH for 1 sec must be able to restart the power supply.

4.1 Over Current Protection (OCP)

The power supply shall have current limit to prevent the +5V, +3.3V, and +12V outputs from exceeding the values shown in **Table-Over Current Protection**. The power supply shall latch off if the current exceeds the limit.

Table 10: Over Current Protection

Voltage	Minimum	Maximum	Shutdown Mode
+5V	27A	38A	Latch Off
+3.3V	27A	38A	Latch Off
+12V	76A	110A	Latch Off

 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.:	Description: 產品規格
	EPAP-S860 PS2 Power Supply	Product Specification
		Document No.:

4.2 Over Voltage Protection (OVP)

The power supply shall shut down and latch off after an over voltage conditions occurs.

Table 11: Over Voltage Protection

Voltage	Minimum	Maximum	Shutdown Mode
+5V	+5.7V	+6.5V	Latch Off
+3.3V	+3.9V	+4.5V	Latch Off
+12V	+13.3V	+14.5V	Latch Off

4.3 Short Circuit Protection

The power supply shall shut down in latch off mode when the output voltage is short circuit.

4.4 No Load Operation

No damage or hazardous condition should occur with all the DC output connectors disconnected from the load. The power supply may latch into the shutdown state.

4.5 Over Temperature Protection (OTP)

The power supply will latch off when an over temperature condition occurs. No damage shall be caused.

5. Environmental Requirements

5.1 Temperature

Operating Ambient, normal mode (inlet air): 0°C ~ 45°C (32°F~ 113°F)

Non-operating Ambient:: -40°C ~ 70°C (-40°F~ 158°F)

5.2 Humidity

Operating: 20% ~ 90%RH non-condensing

Non-Operating: 5% ~ 95%RH non-condensing

5.3 Altitude

Operating: Sea level to 10,000 ft


Non Operating: Sea level to 40,000 ft

5.4 Mechanical Shock

Non-Operating: 50 G Trapezoidal Wave, 11mS half sin wave. The shock is to be applied in each of the orthogonal axes.

5.5 Vibration (Non-Operating)

The power supply shall be subjected to a vibration test consisting of a 10 to 300 Hz sweep at a constant acceleration of 2.0g for duration of one (1) hour for each of the perpendicular axes X, Y and Z (0.1 octave/minute). The output voltages shall remain within specification.

 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.: EPAP-S860 PS2 Power Supply	Description: 產品規格 Product Specification
		Document No.:

5.6 Electromagnetic Compatibility

Table 12: EMC Requirements

Electromagnetic Interference	FCC CFR Title 47 Part 15 Sub Part B EN55022/EN55024	Conducted B Class Radiated B Class		
Harmonics	IEC61000-3-2 Class D			
Flicker	IEC61000-3-3			
ESD Susceptibility	EN-61000-4-2	±8KV by Air, ±4KV by Contact Performance Criteria B		
Radiated Susceptibility	EN61000-4-3	80MHz~1000MHz (3V/m(mns) Amplitude 80% AM 1KHz Criteria A		
EFT/Burst	EN61000-4-4	5KHz, AC: 1KV, DC: 0,5 KV, Performance Criteria B		
Surge Voltage	EN61000-4-5	Line-to-Line: 1KV Line-to-Ground: 2KV Performance Criteria B		
Conducted Susceptibility	EN61000-4-6	0.15MHz~80MHz 3V/m Amplitude 80% AM 1KHz Performance Criteria A		
RF Conducted	EN61000-4-8	50 Hz/3A(ms)/m Performance Criteria A		
Voltage Dips and Interruptions	EN61000-4-11	30%(Voltage Dips) 60%(Voltage Dips) >95%(Voltage Dips)	10 ms 100ms 500ms	Criteria B Criteria C Criteria C
Leakage Current	EN60950-1	3.5mA@240VAC		

5.7 Safety Agency Requirements

This power supply is design to meet the following safety

Table 13: Product Safety

Product Safety:	UL,cUL UL60950-1 CB IEC60950-1 TUV EN60950-1 BSMI CCC
------------------------	-------------------------------------------------------------------


5.8 Noise Performance

The noise shall be under 45dB, tested with 50% of rated load, 115VAC input and 25°C room ambient

6 Reliability

6.1 Mean Time Between Failures (MTBF)

The MTBF of the power supply shall be calculated utilizing the Part-Stress Analysis method of MIL217F.

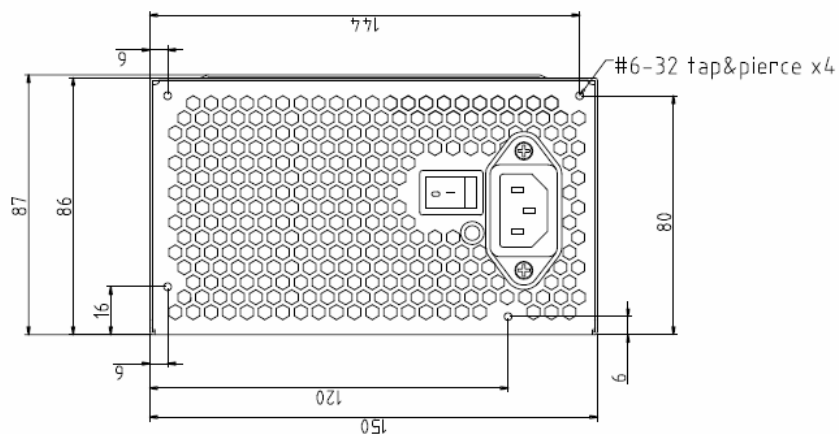
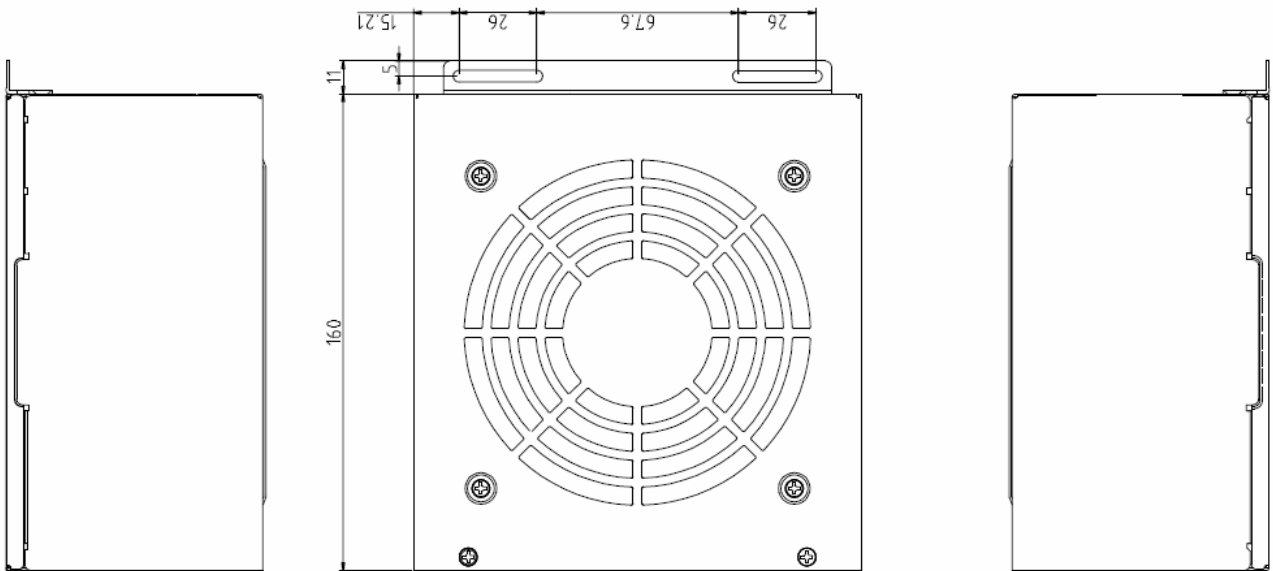
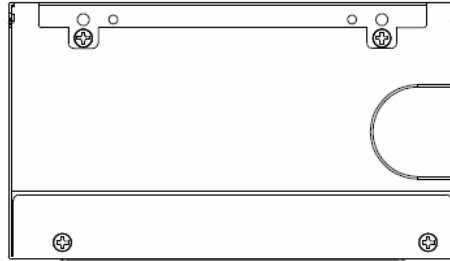
 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.:	Description: 產品規格
	EPAP-S860 PS2 Power Supply	Product Specification
		Document No.:


The calculated MTBF of the power supply shall be greater than 100,000 hours under the following conditions: Full rated load; 120V AC input; Ground Benign; 25°C

7. Mechanical Overview

Dimension: 150mm(W) x 86mm(H) x 160mm(D)

Notes: All dimensions are in mm.



	Model No.: EPAP-S860	Description: 產品規格 Product Specification
億泰興電子股份有限公司 ETASIS Electronics Corporation	PS2 Power Supply	Document No.:

Appendix: EPAP-S860 PMBUS Command Code Summary

Command Summary


Command Code	Command Name	SMBus Transaction Type	Length
19h	CAPABILITY	Read BYTE	1
88h	READ_VIN(Note1)	READ WORD	2
89h	READ_IIN	READ WORD	2
8Bh	READ_VOUT	READ WORD	2
8Ch	READ_IOUT	READ WORD	2
8Dh	READ_TEMPERATURE_1	READ WORD	2
90h	READ_FAN_SPEED_1	READ WORD	2
96h	READ_POUT	READ WORD	2
97h	READ_PIN	READ WORD	2
98h	PMBUS_REVISION	READ BYTE	1
99h	MFR_ID	R/W Block	Variable
9Ah	MFR_MODEL	R/W Block	Variable
9Bh	MFR_REVISION	R/W Block	Variable
9Eh	MFR_SERIAL	R/W Block	Variable
A0h	MFR_VIN_MIN	READ_WORD	2
A1h	MFR_VIN_MAX	READ_WORD	2
A7h	MFR_POUT_MAX	READ_WORD	2
B0h	USER_DATA_00	READ BYTE	1

Note1: If AC Input= 90V ~ 180V PMBus sent the value of 115V
 If AC Input= 181V ~ 264V PMBus sent the value of 220V

CAPABILITY Bit Contents (USER_DATA_19h)

Bits	Description	Value	Definition
7	Packet Error Checking	0	PEC is not supported
		1	PEC is supported
6:5	Maximum Bus Speed	00	100kHz
		01	400kHz
		10	Reserved
		11	Reserved
4	SMBALERT#	0	The device doesn't support SMBus Alert Response protocol
		1	The device does support SMBus Alert Response protocol
3:0	Reserved	0	Default=0

Note. Applying CAPABILITY command will retrieve 0x10h

 億泰興電子股份有限公司 ETASIS Electronics Corporation	Model No.:	Description: 產品規格
	EPAP-S860 PS2 Power Supply	Product Specification
		Document No.:

MFR Content


Command Code	Command Name	Content
99h	MFR_ID	ETASIS
9Ah	MFR_MODEL	EPAP-S860
9Bh	MFR_REVISION	A0 ~ Z9
9Eh	MFR_SERIAL	Length = 12
A0h	MFR_VIN_MIN	100VAC
A1h	MFR_VIN_MAX	240VAC
A7h	MFR_POUT_MAX	860W

USER_DATA_00 Bit Contents (Command Code B0h)

Bits	Status Bit Name	Definition
7:2	Reserved	Default=0
1	PS_ON Status	PS_OFF=0, PS_ON=1
0	AC Status	AC_OK=0

Device Addresses

PDB addresss A0/A1	0/0	0/1	1/0	1/1
PSU PMBUS Address	B0h	Reserved	Reserved	Reserved

 ETASIS ELECTRONICS	Model No.: EPAP-S860 PS2 Power Supply	Description: 產品規格 Product Specification
		Document No.:
億泰興電子股份有限公司 ETASIS Electronics Corporation		