AC/DC 2400W CRPS SERVER POWER SUPPLY

LMS2400-P12B

MORNSUN®

CE Report EN62368-1 | CCC GB4943.1 | UKCA Report BS EN62368-1 | RoHS | 5 year Warranty

FEATURES

- Input voltage range: 90 - 264VAC and supports AC & HVDC wide voltage range input
- Operating ambient temperature range: -5℃ to +55℃
- Strong transient overpower capability to meet sudden computing demand scenarios
- 80 PLUS Platinum efficiency
- Supports N+M≤4 intelligent redundancy, cold backup efficiency optimization, and active current sharing
- PMBus / I2C communication function, Black box function
- Input over voltage/output under and over voltage, over-current alarm, over-current, short circuit/ over-temperature and fan failure multi-protection mechanisms
- 5 years warranty
- Safety according to UL/IEC62368

LMS2400-P12B product is the server power supply provided by for customers. It supports AC & HVDC wide voltage range input, hot-plug available and parallel using requirements. It features high efficiency, intelligent backup function, anti-backflow, remote compensation. With PMBus / I2C communication function, it can support online monitoring of input / output voltage / current / power, with fault warning, black box and other functions. The power supply is equipped with a fan for heat dissipation, with a suction heat dissipation mode,and the fan adopts an automatic speed regulation design. EMC and safety specifications meet the standards of UL/EN/IEC62368 and GB4943.

Selection Guide

Certification	Part No.*	Rated input voltage	Fan Operation Type	Output Power (W)*	nominal Output Voltage(VDC)		Main Load(A)		Auxiliary Load(A)	Max. Capacitive Load (μF)	
					Main Circuit	Auxiliary Circuit	Min.	Max.	Typ.	Main Circuit	Auxiliary Circuit
EN BS EN CCC	LMS2400-P12B	100-127VAC	Forward airflow, from DC to AC	1100	12.2	12.0	1	91	3.0	70000	3100
		200-240VAC 240VDC		2400			1	197	3.0		

Note: 1,*The maximum power of high-voltage input shall not exceed 2400W, and the maximum power of low-voltage input shall not exceed 1100W;
2,*The product picture is for reference only.For details, please refer to the actual product.

Input Specifications

Item	Operating Conditions			Min.	Typ.	Max.	Unit
Input Voltage Range	Low voltage ac input			90	115	140	VAC
	High voltage ac input			180	230	264	
	DC input			180	240	320	VDC
Input Voltage Frequency	AC input			47	--	63	Hz
AC Input Over-voltage	Protection point			300	--	320	VAC
	Restore Point			290	--	315	
DC Input Over-voltage	Protection point			336	--	350	VDC
	Restore Point			320	--	335	
Efficiency	TA=25℃, without Fan	Vin: 230VAC/50Hz	10% load	--	90	--	%
			20% load	--	94	--	
			50% load	--	94	--	
			100% load	--	91	--	
Input Current	V_{in}=100Vac/60Hz	P_{out}=1100W		--	--	14	A
	V_{in}=200Vac/50Hz	P_{out}=2400W		--	--	14	
	V_{in}=240Vdc	P_{out}=2400W		--	--	14	
Inrush Current	Vin=264Vac/50Hz	P_{out}=2400W	25℃ Cold start	--	--	35	
Leakage Current	Vin=264Vac/50Hz		Earth leakage	--	--	0.875	mA

	current				
Power Factor	Io=10%Imax @ Vin=230Vac/50Hz	0.90	--	--	--
	Io=20%Imax @ Vin=230Vac/50Hz	0.96	--	--	
	Io=50%Imax @ Vin=230Vac/50Hz	0.98	--	--	
	Io=100%Imax @ Vin=230Vac/50Hz	0.99	--	--	
ITHD	5%Imax<Io≤10%Imax @ Vin=230Vac/50Hz	--	--	20	%
	10%Imax<Io<20%Imax @ Vin=230Vac/50Hz	--	--	15	
	20%Imax≤Io<40%Imax @ Vin=230Vac/50Hz	--	--	10	
	40%Imax≤Io<50%Imax @ Vin=230Vac/50Hz	--	--	8	
	50%Imax≤Io≤100%Imax @ Vin=230Vac/50Hz	--	--	5	

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Rated Output Voltage	+12.2V	--	12.2	--	V
Steady State Output Voltage Range		11.6	12.2	12.8	
Dynamic Output Voltage Range		11.4	--	12.8	
Output Ripple & Noise*		--	--	120	mV
Output Current		1	--	197	A
Current Sharing Accuracy (@480W<Pout< 960W)		--	--	10	%
Current Sharing Accuracy (@960W≤Pout≤2400W)		--	--	5	
Hold-up Time		11	--	--	ms
60% load jump; 2.5A/us; Main load parallel 2200uF capacitor with 1A minimum load, auxiliary load parallel 1000uF capacitor		11.4	--	12.8	V
Rated Output Voltage	+12VSB	11.4	12	12.6	V
Steady State Output Voltage Range		11.4	12	12.6	
Dynamic Output Voltage Range		11.4	--	12.8	
Output Ripple & Noise*		--	--	120	mV
Output Current		0.05	--	3	A
Hold-up Time		80	--	--	ms
60% load jump; 0.5A/us; Main load parallel 2200uF capacitor with 1A minimum load, auxiliary load parallel 1000uF capacitor		11.4	--	12.8	V

Note: *Tip and barrel method" is used for ripple and noise test, output parallel 47uF electrolytic capacitor and 0.1uF ceramic capacitor, please refer to Server Power Test Specifications for specific information.

Protective Characteristics

	Item	Min.	Typ.	Max.	Unit	Note
+12V Output	Slow OCW (High voltage input)	207	--	217	A	Alarm
	Slow OCW (Low voltage input)	101	--	111		
	Slow OCP (High voltage input)	217	--	227		Blocked, +12VSB output is normal
	Slow OCP (Low voltage input)	111	--	121		
	Fast OCW (High voltage input)	269	--	279		Fast OCW, Blocked, +12VSB output is normal
	Fast OCW (Low voltage input)	163	--	173		
	OPP/Fast OCP (High voltage input)	279	--	289		Blocked, +12VSB output is normal
	OPP/Fast OCP (Low voltage input)	173	--	183		
	Short-circuit Protection	+12.2V output short circuit does not affect the normal operation of +12VSB; The short-circuit protection mode is latching, reset by PSON or AC power off and restart for recovery				

	Over-voltage Protection	13.5	--	15	V	Latching, +12VSB output is normal
	Under-voltage Protection	9.5	--	11		Self-recover,+12VSB output is normal
	Over Temperature Alarm Point	61	--	--	℃	Self-recover,+12VSB output is normal
	Over-temperature Protection Point	65	--	--		
	Over-temperature Protection Release	58	--	--		
	Clear- point of the over-temperature alarm	55	--	--		
	Fan-fault Protection	When the fan is faulty, the output is turned off. After the fault is rectified, the output automatically recovers				
+12VSB Output	Over-current Alarm	3.2	--	4	A	Alarm
	Over-current Protection	4	--	6		Self-recovery (main output will be protected/self-recovery together)
	Short-circuit Protection	Self-recovery (main output will be protected/self-recovery together)				
	Over-voltage Protection	13.5	--	15	V	Self-recovery (main output will be protected/self-recovery together)

LED Indicator Light

Power Status	Light Status
Power output normal	Green
All power supplies no AC input	Light off
When the fan is faulty, the output is turned off. After the fault is rectified, the AC input is automatically restored to normal. Only the slave machine with +12VSB output or in cold redundancy mode is asleep	The green light flashes at a frequency of 1Hz
One product no AC input, the other one with AC input	Orange
Product failure lead to output off, such as OVP, OCP, Fan Fault	Orange
Product in alarm status but with output on	The orange light flashes at a frequency of 1Hz
The module enters the firmware upgrade mode	The green light flashes at a frequency of 2Hz

Data Online Reading and Monitoring

Item	Accuracy Range		
Output Load	<10%	10%-30%	30%-100%
Input Voltage	±3%	±3%	±3%
Input Current	± 0.2A or ± 10%, When Iin < 0.2A, report 0.2A	±5% or±0.5A	±5% or±0.5A
Input Power	±10W or ±10%, When Pin<10W, report 10W	±5%or ±12W	±3%
Output Voltage	±5%	±3%	±3%
Output Current	±1A or ±10%, when Iout<1A, report 1A	±5%	±5%
Output Power	±10W or ±10%, When Pout<7W, report 7W	±5%	±5%

Timing Definition

Item	Description	Min.	Max.	Unit
Tvout_rise	Time for +12.2V output to rise from 0 to 10.8V	5	70	ms
	Time for +12VSB output to rise from 0 to 10.8V	1	25	
Tsb_on_delay	Time from AC power on to +12VSB output reaching at 10.8V	--	1500	
Tac_on_delay	Time from AC power on to +12.2V output reaching at 10.8V	--	3000	
Tvout_holdup	Time from AC power off to +12.2V output reaching at 10.8V@90%Load	11	--	
Tpwok_holdup	Time from AC power off to PWOK signal decreasing@90%Load	10	--	
Tpson_on_delay	Time from high to low of PSON# signal to +12.2V output reaching at 10.8V	5	400	
Tpson_pwok	Time from low to high of PSON# signal to PWOK signal becoming low-level	--	5	
Tpwok_on	Time from +12.2V output reaching at 10.8V to PWOK signal becoming high-level	100	500	
Tpwok_off	Time from PWOK signal becoming low-level to +12.2V output dropping to 10.8V@90%Load	1	--	

Tpwok_low	Time from PWOK signal becoming low-level to when the PWOK signal increases through the PSON switch or AC restart	100	--	
Tsb_vout	Time from +12VSB output reaching at 10.8V to +12.2V output reaching at 10.8V	50	1000	
T12VSB_holdup	Time from AC power off to +12VSB output voltage dropping to 10.8V	80	--	

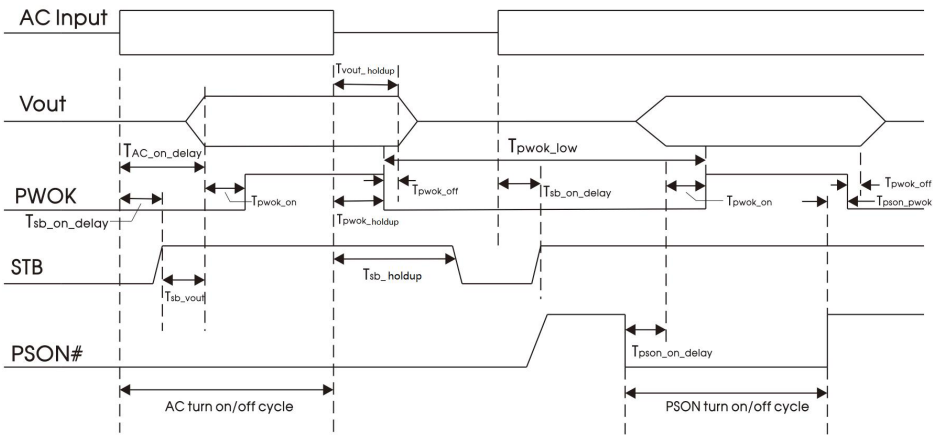
General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Test	Input - ⏚	Electric strength test for 1min., leakage current <5mA		1500	--	--	VAC
	Input - Output*	Electric strength test for 1min., leakage current <10mA		3000	--	--	
Insulation Resistance	Input - ⏚	Ambient temperature: 25 ± 5℃ Relative humidity: < 95%RH, no condensation Test voltage: 500VDC		50	--	--	MΩ
	Input - Output						
Operating Temperature				-5	--	55	℃
Storage Temperature				-40	--	70	
Operating Humidity		Non-condensing		--	--	90	%RH
Storage Humidity				--	--	95	
Operating Altitude		⩾2000m, the room temperature derating of 1℃/300m		--	--	5000	m
Storage Ambient Height				--	--	15200	
Hot-plug		1. 0.5m/s⩽speed⩽1m/s, the backplane voltage cannot exceed the dynamic specification of the power module during hot-plug process. 2. Add 1000uF capacitive load at the output.	+12.2V	11.4	--	12.8	V
			+12VSB	11.4	--	12.8	
MTBF		Rated input, 100% load @ 25℃ Evaluated by Telcordia SR-332		>500,000 h			
Safety Standards				GB4943.1, safety approved & EN62368-1, BS EN62368-1(Report) Design refer to UL/IEC62368-1			
Communication Method		PMBus / I2C					
Warranty		5 years					
Note: * Input-Output isolation voltage refer to PCBA only.							

Mechanical Specifications

Case Material	Metal (SGCC)
Dimensions*	73.50mm x 185.00mm x 40.00/39.00mm (W x D x H)
Weight	990g (Typ.)
Cooling Method	Forced-air cooling
Note: *Product shell height 39mm, fan height 40mm.	

Timing Diagram



Electromagnetic Compatibility (EMC)

Emissions (EMI)	CE	CISPR32/EN55032 CLASS A	
	RE	CISPR32/EN55032 CLASS A	
	Harmonic current	IEC/EN61000-3-2 CLASS A	
Immunity (EMS)	ESD	IEC/EN61000-4-2 Contact ±8KV/Air ±15KV	perf. Criteria A
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 Input port: ±2KV	perf. Criteria A
	Surge	IEC/EN61000-4-5 line to line ±2KV 2Ω /line to ground ±2KV 12Ω	perf. Criteria A
	CS	IEC/EN61000-4-6 3Vrms	perf. Criteria A
	Voltage dips, interruption	IEC/EN61000-4-11 >95% dip 8ms @ 90% load	perf. Criteria A

Functional Requirements Of Black Box

General requirements of black box	1. It is necessary to record the alarm when the output is turned off and the input power is down, the alarm status and the time of the fault occur are stored, and the important physical quantities at the fault site are saved and queried, including not limited to input voltage, output voltage, output current, temperature, fan speed, etc. Use the circular storage method (the black box information is written on the current index number +1 in case of failure, and when the index number is "record 9", the next line is written to "record 0"). 2. Support the host to query fault records one by one. Support the host to query the latest input power failure time. 3. Support host timing. The host needs to send the system time (time according to the Unix standard) to the power module, and the send it again every 10 minutes for the time synchronization of the power module. If the host is not timed, the time in the power supply is equivalent to the entire cumulative time of power supply work.
Storage and reading mechanism of black box records	Described from the time dimension, it is divided into the following stages: 1. Power-up initialization stage After powering on, read the historical fault of the EEPROM record into the cache, and the time is initialized to the last fault record plus 3 seconds. 2. Fault site storage stage The upper computer timings the power time (10min/time), when the output is turned off, the enabling fault record mark writes all the fault scene data to the EEPROM to generate a fault record. 3. Fault data reporting stage When the upper computer queries the alarm log, each time a single query is made, the lower computer takes the corresponding data from the EEPROM storage area and uploads it all to the upper computer.

Black box reading protocol

Command	Name of the command	Data reading type	Data bytes	Description of the order
DCh	MFR_READ_BLACK_BOX	Block Read	237	Power supply black box query, Reading: multi-byte (fault record information, you need to write the fault index before reading, 0-4, 0 is the latest record. 4 is the earliest record)
DFh	MFR_BLACKBOX_CONFIG	Read/Write Byte	1	0:disable black box function 1:enable black box function

System timing mechanism in the black box	The power module needs to be time synchronized through host: 1) Product: -- Synchronization -- Time to send the power module every 10 minutes -- The time to send is in seconds 2) Power supply: -- Time synchronization of accepting products -- Interrupt timing, every 1second, the counter is increased by 1, and the time unit is seconds The timing time (time according to the Unix standard) is the number of seconds relative to the base time. The delivery time under the host will be sent to the power supply from the number of seconds from the base time to the current time. The time read in the alarm log is the number of seconds from the base time of the alarm. If the host is not given time, the running time of the power supply will increase by seconds, and the power drop needs to be saved.
Black box data content	The black box records the real-time physical quantity and state data of the scene. The storage content is divided into two parts: the head and the data department. Each record contains 38 bytes of data.

Gold-finger Definition

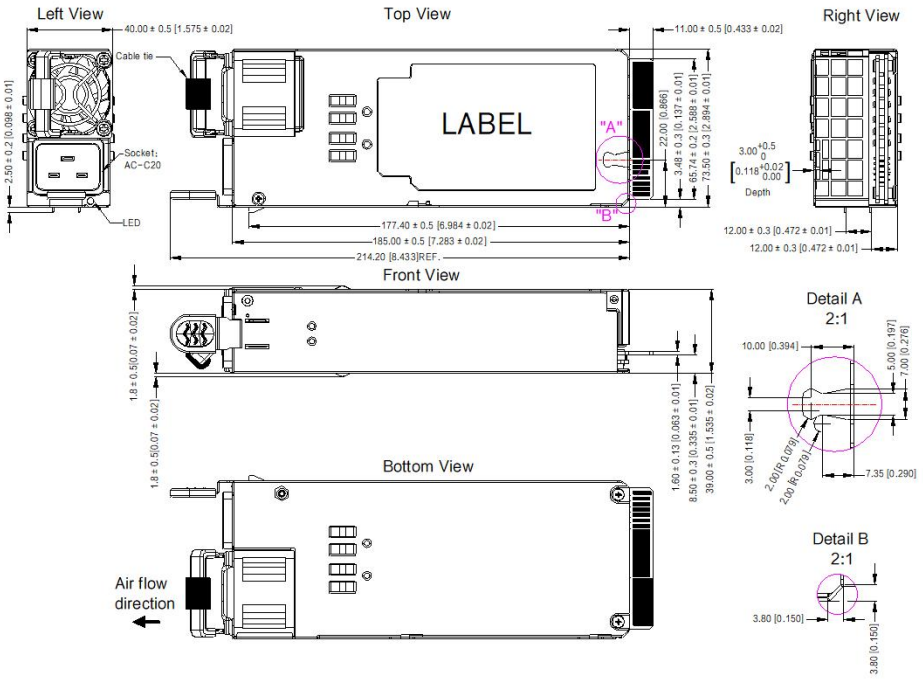
Output Terminal	Definition	Output Terminal	Definition
A1-A9	SGND	B1-B9	SGND
A10-A18	+12.2V	B10-B18	+12.2V
A19	PMBus_SDA	B19	A0

A20	PMBus_SCL	B20	A1
A21	PSON#	B21	+12VSB
A22	SMBAlert#	B22	SMART_ON
A23	+12V_Return sense	B23	+12V_Sharebus#
A24	+12V_Remote sense	B24	PRESENT#
A25	PWOK	B25	VIN_GOOD

Note: The product is equipped with a built-in cooling fan, Keep the air intake clear of Debris, If the environment cannot meet this requirement, a fanless model is recommended.

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



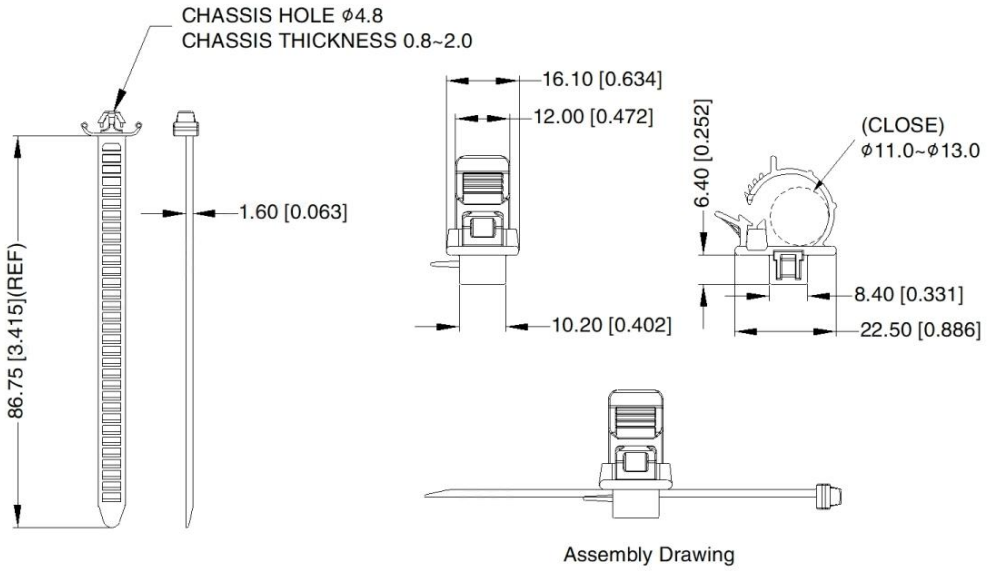
AC-C20 Pin-Out		Picture
Pin	Mark	
1	AC(L)	
2	⏚	
3	AC(N)	

Goldfinger Pin-Out(Top)		Picture
Pin	Mark	
A1~9	SGND	
A10~18	+12.2V	
A19	PMBus_SDA	
A20	PMBus_SCL	
A21	PSON	
A22	SMBAlert#	
A23	+12V_Return sense	
A24	+12V_Remote sense	
A25	PWOK	

Goldfinger Pin-Out(Bottom)		Picture
Pin	Mark	
B1~9	SGND	
B10~18	+12.2V	
B19	A0	
B20	A1	
B21	+12VSB	
B22	SMART_ON	
B23	+12V_Sharebus#	
B24	PRESENT#	
B25	VIN_GOOD	

Note:
Unit: mm[inch]
General tolerances: ± 2[± 0.078]

Recommended Tie Type



Assembly Drawing

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220663;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity <75%RH with nominal input voltage and rated output load;
3. The room temperature derating of 1℃/1000m is needed for operating altitude greater than 2000m;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. In order to improve the efficiency at high input voltage, there will be audible noise generated, but it does not affect product performance and reliability;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. The out case needs to be connected to PE (⏚)of system when the terminal equipment in operating;
9. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
10. The power supply is considered a component which will be installed into a terminal equipment. All EMC tests should be confirmed with the final equipment. Please consult our FAE for EMC test operation instructions.

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