

TECHNICAL SPECIFICATION

GPR3000-12A

Isolated AC-DC Rack-Mount Power Supply

Universal Input; Dual Outputs; 3000W@12V/246A and 5V/1A



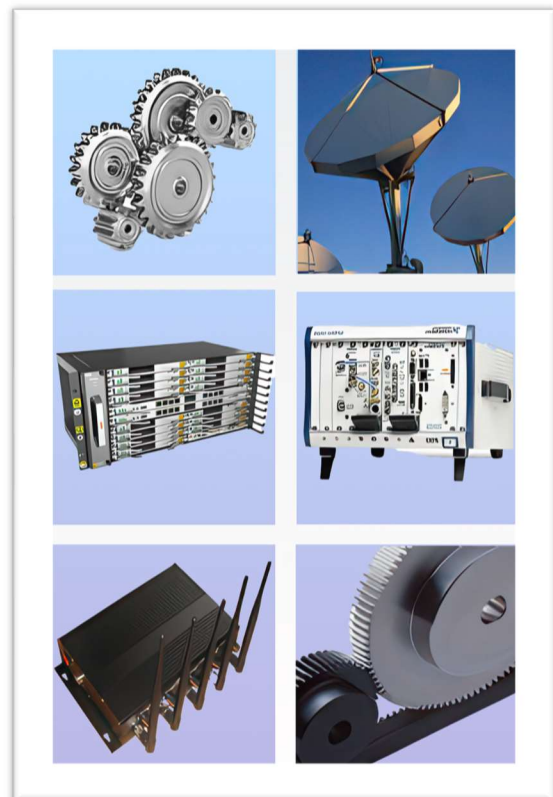
OVERVIEW

The GPR3000-12A is an isolated AC-DC converter for server and industrial applications. It is packaged in an industry standard mechanical configuration and delivers up to 12A of output current, or 3000 Watts of output power with a full load efficiency of typically 94% at V_{in} of 230Vac. This unit can operate over a universal AC input range, even up to 300Vac, and provides a precisely regulated single output voltage at 12V.

The GPR3000-12A features excellent electrical and thermal performance with creative circuit design, self-cooling internal fan, and optimized component placement. With two different LED status signals, I2C/PMbus™ control, and hot plug/parallel operation, the GPR3000-12A offers flexibility for various POE and telecom applications. The unit's design integrates protection circuits such as UVP, OVP, OCP, OTP, SCP to assure users highly reliable rack performance. The module complies with UL/EN/IEC62368 safety and additional EN61000 EMC requirements.

APPLICATIONS

- Telecom Equipment and POE Systems
- Industrial Automation
- Distributed Power Architectures
- Instruments and Test Equipment
- Amplifiers and Base Stations
- LAN/WAN Hardware Racks
- Enterprise Networking Racks



FEATURES

- Wide input voltage range: Universal AC input up to 300Vac/45-55Hz without damage
- Tightly regulated output voltage
- Hot pluggable with forced current sharing
- Highly efficient from 50% to 100% load
- Delivers up to 246Adc current or 3000W power with internal cooling fan
- Active PFC (typical:0.99@115Vin, 0.96@230Vin)
- Industry standard mechanical outline
 - 11.26”L x 5.12”W x 1.59”H
 - 286mm × 130mm ×40.5mm
- I2C Communication (PMbus™ compliant)
- Full protection for Input UVP, Output OVP, OCP, SCP, OTP
- 3000Vac/1Min for Pri to Sec and 1500Vac/1Min for Pri to Earth isolation voltage, 500Vdc/1Min for Sec to Earth isolation voltage
- Wide operating temperature range (-10° -70°C) with derating from 55°C. Powers up at -40° C
- ROHS Directive 2002/95/EC Compliant
- UL62368-1 international safety standard approved
- Meets EN61000-x international EMC standards



SCOPE

This document describes the specifications of GPR3000-12A isolated AC/DC power supply.

ABSOLUTE MAXIMUM RATINGS

Stresses that exceed the specified ratings stated in this datasheet can cause permanent damage to the unit. The ratings are absolute stress ratings; functional operation of the unit is not implied at conditions in excess of those given in the data sheet. Exposure to all absolute maximum ratings simultaneously for extended periods could adversely affect the unit's long term reliability.





ELECTRICAL SPECIFICATIONS @ 25°C

Parameter	Symbol	Min	Nominal	Max	Unit
Operating Input Voltage	V_{IN}	90	—	264	Vac
Operation Transient				300	
Non-operating continuous				315	
Operating Frequency		47	—	63	Hz
Max Input Current ($V_{IN}=100V$, $P_O=1110W$)	$I_{IN,max}$			16.0	A
Input No Load Power (V_{IN} =Nominal Input, $I_O=0$, Module enabled)		—	8	—	W
Input Standby Power (V_{IN} =Nominal Input, Module disabled)		—	4	—	W
Inrush Current with Cold Start	$230V_{IN}$	—	60	—	A
Power Factor (Nominal Input and Full Load)	λ	0.95	0.98	—	
Leakage Current				3.5	mA
Input Protection	Fuse in Line Input				

NOTE: Unless otherwise indicated, specifications apply to overall operating input voltages, resistive loads, and room temperature at 25°C.

DC OUTPUT SPECIFICATIONS

(Spec is required at +25°C if not specified)

Parameters	Condition & Description	Min	Nominal	Max	Unit
Output Voltage 1 (12Vout)	Half load condition, nominal output	12.18	12.22	12.36	V
Output Voltage 2 (5Vstb)		4.75	5.00	5.25	V
No trim requirement					
Output Load 1 (High Line – 220V)	12Vout	0		246	A
Output Load 2 (High Line – 110V)	5Vstb	0		1.0	A
Output Load 1 (Low Line – 110V)	12Vout	0		98.0	A
Output Load 2 (Low Line – 110V)	5Vstb	0		1.0	A





Parameters	Condition & Description	Min	Nominal	Max	Unit
Load Regulation (12Vout)	From Open to Full (Nominal Input)			±2% V _{OUT}	V
Load Regulation (5Vstb)				±3% V _{OUT}	V
Line Regulation	All Range (50% load)			±1% V _{OUT}	V
Thermal regulation				±0.03% V _{OUT} / °C	V
Min Load	No requirement				A
Ripple and Noise (12Vout)	115/230 in Full load (20k-20M bandwidth/10µf Tant-capacitor)			±1% V _{OUT}	V
Ripple and Noise (5Vstb)				±2% V _{OUT}	V
External Capacitive	Main Power, full load				
Load 1 (12Vout)				50000	µF
Load 2 (5Vstb)				1000	µF
Dynamic 1 (1A/us)	25% to 75% to 25% load			±4% V _{OUT}	V
Dynamic 2 (1A/S)	5-50% and 50%-100% load			±5% V _{OUT}	V
Recovery Time	Back to 1% V _{OUT}			500	µS
Turn On Overshoot				3%	V
Delay time	Nominal Input to 90% output			3	s
Rise time	10% output to 90% output, Monotonic. No external capacitor		20	50	mS
Output Indicator	LED and signal Indicator & PMbus				
Efficiency	230V input/50% load		94		%
Current Sharing	Forced current sharing@>50%load			5	%
Holdup Time	Nominal Input & Full Load & droop to 90% of output voltage		10/20	50	mS





PROTECTION CIRCUITS

Parameters	Condition & Description	Min	Nominal	Max	Unit
Input Under Voltage (UVP)	Auto-Recovery			85	Vac
Output Over Current (OCP)	Auto-Recovery	110% of load		130% of load	A
Output Over Voltage (OVP)	Latch Mode		120% of Vout	130% of Vout	V
Over Temperature (OTP)	Auto-Recovery		75		°C ambient
Short Circuit (SCP)	All conditions		No damage/smoke/fire		

ENVIRONMENTAL SPECIFICATIONS

Parameters	Condition & Description	Min	Nominal	Max	Unit
Operating Ambient Temperature		-10	+25	+70	°C
Working Temperature	For Full Load / input(<16,404ft)	-20	+25	+70	°C
Storage Temperature	Tstg	-55		105	°C
Hot Spot Temperature	See application note for hot spot location			115	°C
Airflow	Internal airflow direction from output to input				
Altitude				16404/5000	Ft/m
Humidity		+5%		95%	

NOTE: Derating from 50°C to 70°C by 3.5%/°C.





ISOLATION SPECIFICATIONS

Description	
Isolation Voltage from Input to Output	3000Vac@1Min
Isolation Voltage from Input to Earth-Chassis	1500Vac@1Min
Isolation Voltage from Output to Earth	500Vdc@1Min
Isolation Voltage from Signal to Earth	None

EMC SPECIFICATIONS

EMC Item	Requirement	Criteria	Reference
Conducted Emissions	Class A + system box		EN55022 QP/AV Method
Radiated Emissions	Class A + system box		EN55022/FCC Controlled by system
Conducted Immunity	Level 2		EN55024, EN61000-4-3
SURGE	DM: ± 2 KV CM: ± 4 KV	B	EN61000-4-5, EN 55024 ETSI EN 300 386 V1.3.2
EFT	± 2 KV (Level 2)	B	EN61000-4-4, EN 55024 ETSI EN 300 386 V1.3.2
ESD	Touch: ± 6 KV Air: ± 8 KV	B	EN61000-4-2, EN 55024 ETSI EN 300 386 V1.3.2
	Touch: ± 8 KV Air: ± 15 KV for Case	R	EN61000-4-2, EN 55024 ETSI EN 300 386 V1.3.2
Harmonic	Class A	NC	EN 61000-3-2 ETSI EN 300 386 V1.3.2
Flicker		NC	EN 61000-3-3 ETSI EN 300 386 V1.3.2
Radiated Susceptibility (RS)	80M~2GHz 10V/m,80% AM (level 3)	A	EN 61000-4-3, EN 55024 ETSI EN 300 386 V1.3.2
Conducted Susceptibility (CS)	150KHz~80MHZ 10V, 80% AM	A	EN 61000-4-6, EN 55024 ETSI EN 300 386 V1.3.2
Lightning AC Power Fault			GR-1089 Issue 4
Voltage Dips & Interruptions	See table below		EN 61000-4-11, EN 55024 ETSI EN 300 386 V1.3.2





Voltage Drop	Duration Time	Criteria
0% Ut	20 ms	B
70% Ut	500 ms	C
40% Ut	200 ms	C
0% Ut	5000 ms	C

LED AND STATUS INDICATORS

There is one LED located in the front panel to indicate input and PSU status.

Parameter	LED/Status	Min	Max	Unit
Status Signal Pin DC OK	ON/OFF Bi-color LED (Red & Green)	-0.3	30	Vdc
Standalone operation: No AC input: LED off N+1 parallel operation: No AC input (This power): LED red blinking With AC input: 1, Main output off, Standby output on: Led green blinking 2, Main output on, Standby output on: Led green 3, Power fail (No main output, OCP/OTP/Fan fail/OVP) Led red 4, standby output short: LED off 5, Warning: Green/Led Blinking				



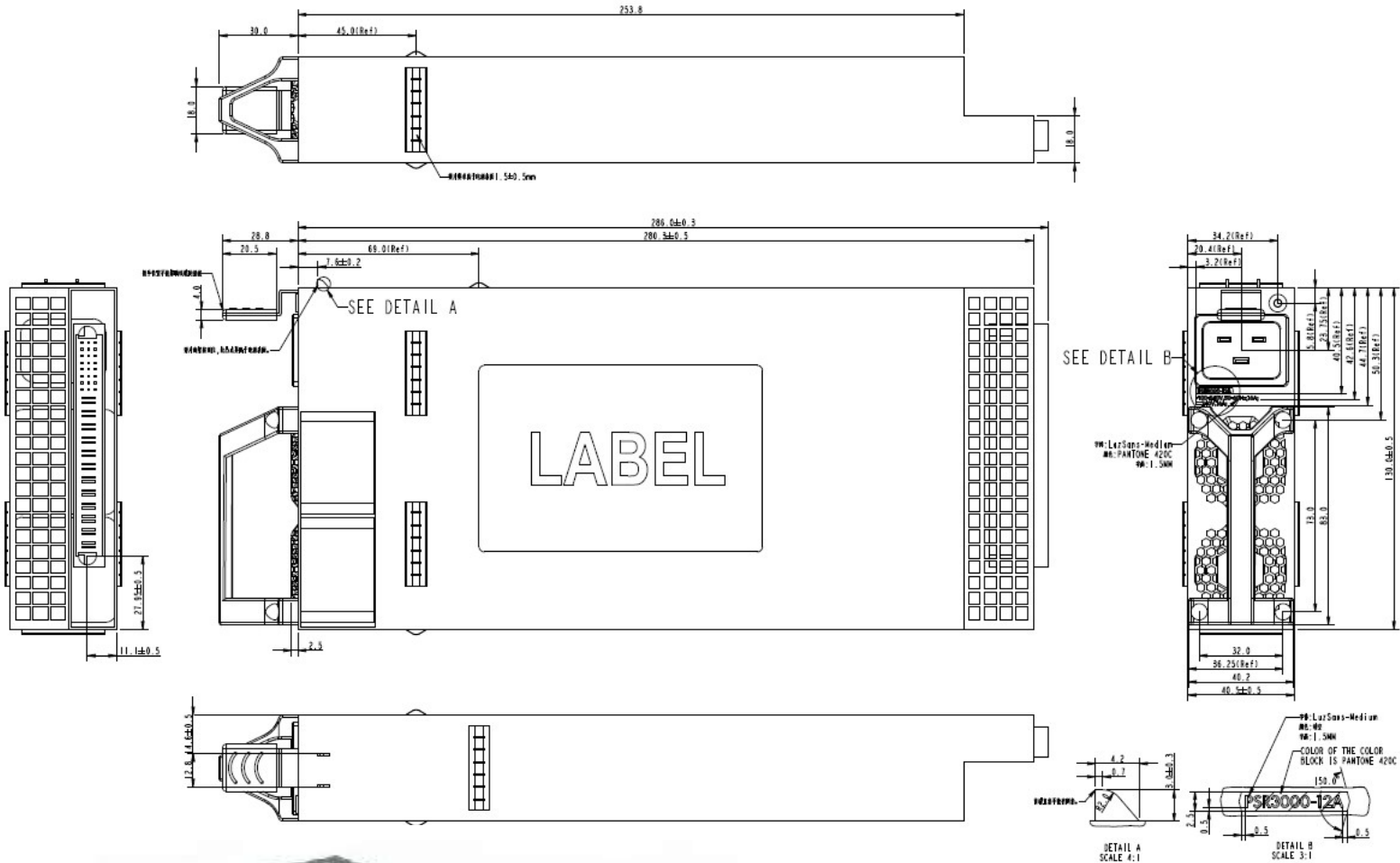
MECHANICAL PACKAGE

Description

Dimensions – L x W x H in/mm 8.7" x 1.99" x 1.58" / 221mm x 50.5mm x 40

Weight g / oz 1.06 / 30, typical

Vibration 0.75 mm, 10Hz-55Hz, 20 minutes





INPUT/OUTPUT CONNECTOR AND PIN ASSIGNMENT

Input connector: IEC320 – C20

OUTPUT PIN ASSIGNMENTS

PRODUCT NO.	ROWS	HIGH POWER												SIGNAL											
		E1	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	1	2	3	4	5	6	7	8	E2		
10127397-37H1400LF	C B A													G	G	L	L	L	L	L	L	L	L	L	

Power		Signal							
P1~P6	P7~P12	1	2	3	4	5	6	7	8
+12V	Return	5VSB Return	5VSB	Fault	PSKILL	PS PRESENT	SDA	SCL	C
		5VSB Return	5VSB	TBD	AC OK	SMBALERT	A0	A1	B
		Remote Sense(-)	Remote Sense(+)	ISHARE	Power Good	Signal Return	Remote ON/OFF	A2	A

	Power MFBL 4.50mm
	Signal Standard 3.56mm
	Signal MLBF 2.29mm





PIN DESCRIPTIONS

Items	Description	Explanation
Voltage Sense	Remote Sense(+) Remote Sense(-)	These two signal can compensate voltage drop of Vout. The maximum can compensate 0.25V for each pin
Current Sharing Signal	ISHARE	Connect together to guarantee output current within required tolerance at N+1 operation
Remote On/Off	Remote ON/OFF	To turn on or off the power supply by this signal Inside of power supply, this pin is connected to ground by 10K resistor, so floating for this pin is 0V. When logic low (<0.8V) for this pin, the PSU is on. When logic high (>2.5V), the power supply is off
Input status indicator	AC OK	OC output, this pin was connected to 3.3V by pull up resistor 4.7K Logic High for normal operation Logic Low (<0.4V, sink current <0.4mA) for abnormal operation
Output status indicator	Power Good	OC output, this pin was connected to 3.3V by pull up resistor 4.7K Logic High for normal operation Logic Low (<0.4V, sink current <0.4mA) for abnormal operation
PSU failure	Fault	Power fault include input abnormal, output abnormal, OTP, Fan failure, etc) OC output, this pin was connected to 3.3V by pull up resistor 4.7K Logic High for no fault Logic Low (<0.4V, sink current <0.4mA) for fault
PSU present to system box	PS PRESENT	Inside of PSU, the signal is connected to ground by 100ohm resistor
Control signal for hot plug	PSKILL	Suggest to connect the signal to ground in system side. When PSKILL was connected to ground, the power can have output. When PSKILL is pulled out, the power will shut down within 2mS
	Signal Return	
I2C address	A0,A1,A2	
I2C data	SDA	
I2C clock	SCL	
	SMBALERT	I2C interrupt signal, connect to 3.3V by pull up resistor 4.7k in PSU
5V standby output	5VSB 5VSB Return	

Note: Ripple and noise for these signals is less than 120 MV at 20Mhz bandwidth, less than 250mV at 250Mhz bandwidth.





PMBus™ AND EEPROM

The PSU has 8Kbytes of EEPROM and can communicate with a Host system controller via I2C using the PMBus1.1 standard.

The addresses for the internal MCU and EEPROM are:

Device	Address	Address Allocation (From high bit to low bit)							
MCU	0xBx	1	0	1	1	A2	A1	A0	R/W
EEPROM	0xAx	1	0	1	0	A2	A1	A0	R/W

Definition for EEPROM

Byte address (decimal)	Byte address (hex)	item	format	value
0000	0000h	Block signal		01
0001	0001h	Block signal		00
0002	0002h	Block signal		00
0003	0003h	Block signal		00
0004	0004h	Block signal		01
0005	0005h	Block signal		0B
0006	0006h			00
0007	0007h			F3
0008	0008h			01
0009	0009h			0A
0010	000Ah			19
0011	000Bh			C8
0012-0019	000Ch-0013h	MFG	Char*8	
0020	0014h			CA
0021-0044	0015h-002Ch	Product number	Char*24	GPR650B-12A1H(ASCII)
0045	002Dh			D2
0046-0063	002Eh-003Fh	SN	Char*18	
0064-2047	0040h-07FFh		Char*1984	Reserved





PMBUS COMMANDS FOR GPR3000-12A UNIT

CMD Code	Name	Type	Bytes	Conditions
03h	CLEAR_FAULTS	Send Byte	0	
19h	CAPABILITY	Read Byte	1	Value 00h
1Ah	QUERY	Block Write-Block Read Process Call	See PMBUS SPEC	
79h	STATUS_WORD	Read Word	2	
7Ah	STATUS_VOUT	Read Byte	1	
7Bh	STATUS_IOUT	Read Byte	1	
7Ch	STATUS_INPUT	Read Byte	1	
7Dh	STATUS_TEMPERATURE	Read Byte	1	
81h	STATUS_FANS_1_2	Read Byte	1	
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	Rpm value
91h	READ_FAN_SPEED_2	Read Word	2	Rpm value
94h	READ_DUTY_CYCLE	Read Word	2	
96h	READ_POUT	Read Word	2	
97h	READ_PIN*	Read Word	2	
98h	PMBUS_REVISION	Read Byte	1	Value 11h
99h	MFR_ID	Read Block	Variable	See MFR Data table
9Ah	MFR_MODEL	Read Block	Variable	See MFR Data table
9Bh	MFR_REVISION	Read Block	Variable	See MFR Data table
A0h	MFR_VIN_MIN	Read Word	2	See MFR Data table
A1h	MFR_VIN_MAX	Read Word	2	See MFR Data table
A2h	MFR_IIN_MAX	Read Word	2	See MFR Data table
A3h	MFR_PIN_MAX	Read Word	2	See MFR Data table
A4h	MFR_VOUT_MIN	Read Word	2	See MFR Data table
A5h	MFR_VOUT_MAX	Read Word	2	See MFR Data table
A6h	MFR_IOUT_MAX	Read Word	2	See MFR Data table
A7h	MFR_POUT_MAX	Read Word	2	See MFR Data table
A8h	MFR_TAMBIENT_MAX	Read Word	2	See MFR Data table
A9h	MFR_TAMBIENT_MIN	Read Word	2	See MFR Data table
AAh	MFR_EFFICIENCY_LL	Read Word	2	See MFR Data table
ABh	MFR_EFFICIENCY_HL	Read Word	2	See MFR Data table
ACH	MFR_FW_REVISION	Read Block	Variable	See MFR Data table
ADh	MFR_FW_ID	Read Block	Variable	See MFR Data table





MFR DATA TABLE

CMD Code	Name	Contact Applications Engineering for the most current values
99h	MFR_ID	
9Ah	MFR_MODEL	
9Bh	MFR_REVISION	
A0h	MFR_VIN_MIN	
A1h	MFR_VIN_MAX	
A2h	MFR_IIN_MAX	
A3h	MFR_PIN_MAX	
A4h	MFR_VOUT_MIN	
A5h	MFR_VOUT_MAX	
A6h	MFR_IOUT_MAX	
A7h	MFR_POUT_MAX	
A8h	MFR_TAMBIENT_MAX	
A9h	MFR_TAMBIENT_MIN	
AAh	MFR_EFFICIENCY_LL	
ABh	MFR_EFFICIENCY_HL	
ACh	MFR_FW_REVISION	
ADh	MFR_FW_ID	

ORDERING INFORMATION

Input Voltage	Output Voltage	Output Current	Aux Power Voltage	Aux Power Current	Model Number	Note
100VAC-240VAC	12V	246A	5V	1A	GPR3000-12A	Base Model

All specifications are typical at nominal input, full load, at 25°C ambient unless otherwise noted. Specifications are subject to change without notice. Please consult our Applications Engineering office at 858-275-6423 for additional technical data and support or email us at info@brightworks-usa.com.

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