TECHNICAL SPECIFICATION

GPR600-54A

Isolated AC-DC Rack-Mount Power Supply
Universal Input; Single Output; 600W@54V/11A

BRIGHTWORKS
WE BUILD • WE POWER

OVERVIEW

The GPR600-54A is an isolated AC-DC converter for POE and Telecom applications. It is packaged in an industry standard mechanical configuration and delivers up to 11A of output current, or 616 Watts of output power with a full load efficiency of typically 94% at Vin 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 54V.

The GPR600-54A 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 GPR600-54A 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

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

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 11Adc current or 616W power with internal cooling fan
- Active PFC (typical:0.99@115Vin, 0.96@230Vin)
- Industry standard mechanical outline
  - 7.28"L x 2.89"W x 1.58"H
  - 185.0mm × 73.5mm ×40.1mm
- 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 GPR600-54A 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.

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com

ELECTRICAL SPECIFICATIONS @ 25°C

Parameter	Symbol	Min	Nominal	Max	Unit
Operating Input Voltage	V_{IN}	90	—	264	Vac
Operation Transient **Non-operating continuous**				300 315	
Operating Frequency		47	—	63	Hz
Max Input Current (V_{IN}=100V, P_O=1110W)	$I_{IN,max}$			9.0	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	5	W
Inrush Current with Cold Start	230V_{IN}	—	50	—	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 25ºC.

DC OUTPUT SPECIFICATIONS

(Spec is required at +25ºC if not specified)

Parameters	Condition & Description	Min	Nominal	Max	Unit
Output Voltage	Half load condition	55.44	56.00	56.56	V
	No trim requirement				
Output Load		0		11	A
Load Regulation	From Open to Full (Nominal Input)			±2% V_{OUT}	V
Line Regulation	All Range (50% load)			±1% V_{OUT}	V
Thermal regulation				±0.03% V_{OUT}/ ºC	V
Min Load	No requirement				A
Ripple and Noise	115/230 in Full load (20k-20M bandwidth/10μf Tant-capacitor)		±0.7%Vout	±1% V_{OUT}	V

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com

Parameters	Condition & Description	Min	Nominal	Max	Unit
External Capacitive load	Main Power, full load			2400	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				5%	V
Delay time	Nominal Input to 90% output			3	s
Rise time	10% output to 90% output, Monotonic. No external capacitor		50	100	mS
Output Indicator	LED and signal Indicator & PMbus				
Efficiency	230V input/50% load		92		%
Current Sharing	Forced current sharing@>50%load			5	%
Holdup Time	Nominal Input & Full Load & droop to 90% of output voltage		20		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		150% of load	A
Output Over Voltage (OVP)	Latch Mode			60	V
Over Temperature (OTP)	Auto-Recovery		65		℃ ambient
Short Circuit (SCP)	All conditions		No damage/smoke/fire		

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

ENVIRONMENTAL SPECIFICATIONS

Parameters	Condition & Description	Min	Nominal	Max	Unit
Operating Ambient Temperature		-10	+25	55	°C
Working Temperature	For Full Load / input	-20	+25	+70	°C
Storage Temperature	Tstg	-40		+70	°C
Hot Spot Temperature	See application note for hot spot location			110	ºC
Airflow	Internal airflow direction from output to input				
Altitude				16404/5000	Ft/m
Humidity		+5%		95%	

NOTE: Derating from 55°C to 70°C by 2.5%/°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	1500Vdc@1Min
Isolation Voltage from Signal to Earth	None

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

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: ±6KV CM: ±6KV	B	EN61000-4-5, EN 55024 ETSI EN 300 386 V1.3.2
EFT	±2KV (Level 2)	B	EN61000-4-4, EN 55024 ETSI EN 300 386 V1.3.2
ESD	Touch: ±6KV Air: ±8KV	B	EN61000-4-2, EN 55024 ETSI EN 300 386 V1.3.2
	Touch: ±8KV Air: ±15KV 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 note 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

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com

LED AND STATUS INDICATORS

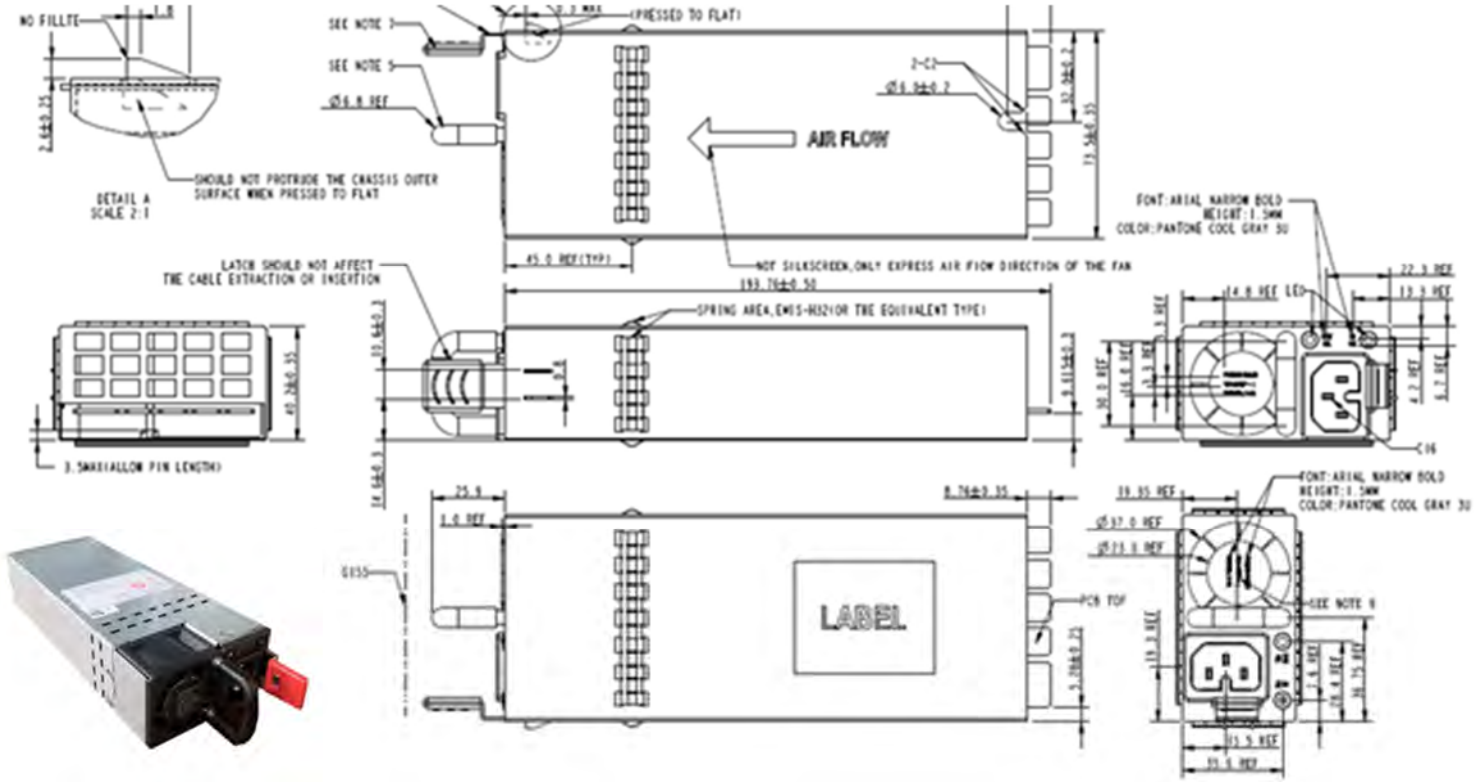
There are two LEDs located in the front panel to indicate input and PSU status. One is INPUT OK to indicate the input status, the other is DC OK to indicate PSU status.

Parameter	LED/Status	Min	Max	Unit
Status Signal Pin	ON/OFF	-0.3	30	Vdc

PSU Status	**LED Indicator**	
Different Cases	OUT OK	IN OK
Input normal/Output Normal	Green	Green
No input	Off	Off
No input but with external bias(Vsso)	Red	Off
Input out of range	1Sec red /green alternative	Red
Input UVP	Red	Red
Fault (output SCP/ocp/ovp/otp/fan failure or others	Red	Green
Early warning for OCP or OTP	1Sec red /green alternative	Green
PS ON(High) or PS-KILL(High) or Off by software	1Sec Green/off alternative	Green

MECHANICAL PACKAGE

Description	
Dimensions – L x W x H in/mm	1.93” x 0.94” x 0.91” / 49mm x 24mm x 23.2mm **Note**: Height measured from seating plane
Weight g / oz	30 / 1.06, typical
Vibration	0.75 mm, 10Hz-55Hz, 20 minutes



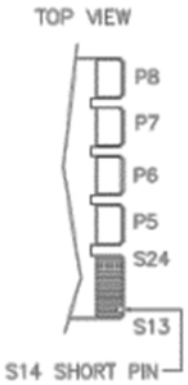
INPUT/OUTPUT CONNECTOR AND PIN ASSIGNMENT

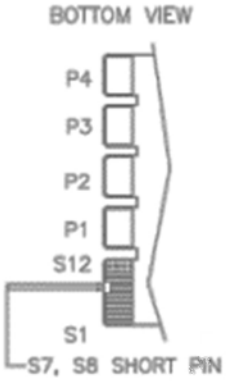
Input connector: IEC320-C16. Application must use safety-compliant input cords/cables. The cable AWG must be rated to match maximum rated input current.

Output connector: PCB Edge (gold finger). The system connector is C214F1-10843-Y from Alltop, or equivalent.

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

OUTPUT PIN ASSIGNMENTS





PIN	Assignment	PIN	Assignment
P1	SGND	P5	SGND
P2	NA	P6	NA
P3	56V GND	P7	56V GND
P4	56V	P8	56V
S1	NA	S13	NA
S2	ACOK	S14	PRESENT
S3	NA	S15	A0
S4	PS-ALERT	S16	NA
S5	SDA	S17	VSSO
S6	SCL	S18	EEPROM-WP
S7	PS-KILL	S19	NA
S8	PS ON	S20	SOC-L
S9	PWOK	S21	NA
S10	A1	S22	NA, Isolation pin
S11	NA, Isolation pin	S23	NA, Isolation pin
S12	NA, Isolation pin	S24	56VIBUS

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com

PIN DESCRIPTION – LOGIC DEFINITIONS

	Logic High		Logic Low		Unit
	Low limit	Up Limit	Low limit	Up Limit	
ACOK	3.0	3.4	0	0.4	V
PS-ALERT	3.0	3.4	0	0.4	V
SDA	3.0	3.4	0	0.8	V
SCL	3.0	3.4	0	0.8	V
PS-KILL	2.5	3.4	0	0.8	V
PS ON	2.5	3.4	0	0.4	V
PWOK	3.0	3.4	0	0.4	V
A1	2.8	3.4	0	0.66	V
PRESENT	3.0	3.4	0	0.4	V
A0	2.8	3.4	0	0.66	V
VSSO	11	12.6	/	/	V
EEPROM-WP	2.5	3.4	0	0.8	V
SOC-L	3.0	3.4	0	0.4	V

The signal pin voltage is refer to signal ground (except 56VIBUS) 56VIBUS is referred to 56V GND

PIN	Definition	Description	I/O type
P1、P5	SGND（Middle pin）	Signal Grounding （except 56VIBUS） Isolated with 56V GND by 1500Vac. Coonect to earth grounding	O
P3、P7	56V GND	Main Output 56V Negative	O
P4、P8	56V	Main Output 56V Positive	O
S2	ACOK	Logic high for input at defined range Logic low for input OVP or UVP	O
S4	PS-ALERT	Logic high for output OK Logic low for output abnormal to inform system to read PSU status by PMbus. Logic change by recycling input or PMBus command (03)	O
S5	SDA	I2C Data	I/O
S6	SCL	I2C Clock 100KHzMax	I/O
S7	PS-KILL（short pin）	Pull down resistor <100ohm (lower than 0.8V) in system to turn on PSU for hot swap	I
S8	PS ON（short pin）	Logic low (<0.4V) to turn on PSU Logic high (>2.5V) to turn off PSU	I
S9	PWOK	Logic high for PSU normal Logic low for PSU abnormal	O
S10	A1	I2C address A1	I

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

S11、S12、S22、S23		No connection	I
S14	PRESENT（short pin）	Logic low for good inserted	O
S15	A0	I2C address A0	I
S17	VSSO	External Bias (10-16Vdc) for PSU when No AC input or PSU fail, to detect EEPROM and PSU status	I
S18	EEPROM-WP	EEPROM write protection。WP=logic high, EEPROM is protected。WP= Logic low， EEPROM can be writen	I
S20	SOC-L	When load >106% rated load, SOC-L is logic low Early warning 150mS, then OCP When OCP back to normal, SOC-L back to logic high within 150mS	O
S24	56VIBUS	56V current sharing, refer to 56V GND	I/O

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

PMBUS™ AND EEPROM

The PSU has 8Kbytes of EEPROM and can communicate with a Host system controller via I2C using the PMBus1.2 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
00-01	00-01	Block signal	uint16	0XABAB
02	02	Block version	uint8	1
03	03	Block length	uint8	114
04-05	04-05	Block checksum	uint16	Checksum of block contents, excluding checksum word
06-07	06-07	Eeprom_size	uint16	40h (16Kbit)
08-09	08-09	Block_count	uint16	2
10-29	0A-1D	OEM_string	Char*20	GIP
30-49	1E-31	Product_number	Char*20	PSR360-56A
50-79	32-4F	Serial_number	Char*30	Manufacture Series Number
80-95	50-5F	Part_number	Char*16	0213XX
96-99	60-63	Part_version	Char*4	PSU version
100-119	64-77	Mfg_deviation	Char*20	Manufacture
120-121	78-79	Power_consumption	Int16	168h
122-125	7A-7D	Power_Type	Char*4	AC00
126-133	7E-85	Air_flow_direction	Char*8	OUT00000

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

COMMANDS FOR GPR600-54A UNIT

Data in linear format: x = y * 2^n
(For reference only)
*** The PMBus address is 0xB4 for power supply-1 and address 0xB6 for power supply-2.
*** All data is transmitted and received least significant byte (LSB) first.

CODE	COMMAND	R/W	TYPE	UNITS	SCALING	EXAMPLE	COMMENTS
03	CLEAR_FAULTS	W	N/A			use SendByte command	
20	VOUT_MODE	R	BYTE				
3A	FAN_CONFIG_1_2	R	BYTE				
3B	FAN_COMMAND_1	R/W	WORD	Percent	N=0	(100 = 100%)	data commanded in duty cycle (%)
46	IOUT_OC_FAULT_LIMIT	R	WORD	Amps	N=-4	(416 = 26.00A)	
4A	IOUT_OC_WARN_LIMIT	R	WORD	Amps	N=-4	(288 = 18.00A)	
4F	OT_FAULT_LIMIT	R	WORD	°C	N=0	(105 = 90 °C)	
51	OT_WARN_LIMIT	R	WORD	°C	N=0	(95 = 80 °C)	
58	VIN_UV_WARN_LIMIT	R	WORD	Volts	N=-1	(160 = 80V)	
59	VIN_UV_FALT_LIMIT	R	WORD	Volts	N=-1	(140 = 70V)	
5D	IIN_OC_WARN_LIMIT	R	WORD	Amps	N=-4	(160 = 5.00A)	
5E	POWER_GOOD_ON	R	WORD	Volts	N=-5	(768 = 24.00V)	
5F	POWER_GOOD_OFF	R	WORD	Volts	N=-5	(692 = 21.63V)	
68	POUT_OP_FAULT_LIMIT	R	WORD	Watts	N=0	(624 = 624W)	
6A	POUT_OP_WARN_LIMIT	R	WORD	Watts	N=1	(864 = 432W)	
6B	PIN_OP_WARN_LIMIT	R	WORD	Watts	N=1	(940 = 470W)	
79	STATUS_WORD	R	WORD				
7A	STATUS_VOUT	R	BYTE				
7B	STATUS_IOUT	R	BYTE				
7C	STATUS_INPUT	R	BYTE				
7D	STATUS_TEMPERATURE	R	BYTE				
7E	STATUS_CML	R	BYTE				
7F	STATUS_OTHER	R	BYTE				
80	STATUS_MFG_SPECIFIC	R	BYTE				
81	STATUS_FAN_1_2	R	BYTE				
88	READ_VIN	R	WORD	Volts	N=-1	(481 = 240.5V)	
89	READ_IIN	R	WORD	Amps	N=-4	(180 = 11.25A)	
8B	READ_VOUT	R	WORD	Volts	N=-4	(384 = 24.00V)	
8C	READ_IOUT	R	WORD	Amps	N=-4	(316 = 19.75A)	
8D	READ_TEMPERATURE1	R	WORD	°C	N=0	(105 = 105 °C)	inlet temperature
8F	READ_TEMPERATURE3	R	WORD	°C	N=0	(85 = 85 °C)	hot spot temperature
90	READ_FAN_SPEED_1	R	WORD	RPM	N=5	(225 = 7200 RPM)	
96	READ_POUT	R	WORD	Watts	N=1	(100 = 200W)	
97	READ_PIN	R	WORD	Watts	N=1	(200 = 400W)	
98	PMBUS_REVISION	R	BYTE				
EA	WRITE_PROTECT (EEPROM) 56h=Write Disabled, 9Ah=Write Enabled	R/W	BYTE				
EB	FIRMWARE REVISION	R	WORD			010Ch = Revision 1.12	
EC	SCRATCHPAD	R/W	WORD				

---[NOTES]---

SCALING N=-4: 2^-4 = 1/16 unit resolution
SCALING N=-1: 2^-1 = 1/2 unit resolution
SCALING N=0 : 2^0 = 1 unit resolution
SCALING N=1 : 2^1 = 2 unit resolution
SCALING N=5 : 2^5 = 32 unit resolution

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited

ORDERING INFORMATION

Input Voltage	Output Voltage	Output Current	Aux Power Voltage	Aux Power Current	Model Number	Note
100VAC-240VAC	54V	11A	No	No	GPR600-54A	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.

1 Civic Center Drive, Suite 210, San Marcos, CA 92069
858-275-6423 ext 104 • Fax: 858-225-6814
info@brightworks-usa.com
www.brightworks-usa.com
Brightworks Technology, Inc. is a Subsidiary of Group Intellect Power Technology, Limited