BP040AC48ATEZ Global Platform High Efficiency Rectifier

Input: 100-120/200-240 V_{AC}; Default Output: ±54 V_{DC} @ 2000W

RoHS Compliant



The OmniOn Power™ BP040AC48ATEZ Rectifier used in the BPS power system provides significantly higher power density in the same form factor and efficiency improvements in the Compact Power Line of Rectifiers. The only difference between these rectifiers is output power limit. High-density front-to-back airflow is designed for minimal space utilization and is highly expandable for future growth. Wide-input enables the rectifier to be deployed internationally into a wide range of commercially available voltage sources. Configured with RS485 based communications busses, so that it could be positioned into a broad range of applications. Feature set flexibility makes this rectifier an excellent choice for applications requiring modular AC to -48V_{DC} intermediate voltages, such as in distributed power.

Applications

- 48V_{DC} distributed power architectures
- Routers/ VoIP/Soft and other Telecom Switches
- LAN/WAN/MAN applications
- File servers, Enterprise Networks, Indoor wireless
- SAN/NAS/iSCSI applications

Features

- Compact 1RU form factor with 42 W/in^3 density
- Constant power from 50-58V_{DC}
- 2000W from nominal 200-240V_{AC}
- Output voltage programmable from 42V-58V_{DC}
- ON/OFF control of the main output
- Comprehensive input, output and overtemperature protection
- RS485 communications
- Precision measurement reporting such as input/ output voltage & current
- Remote firmware upgrade capable
- Power factor correction (meets EN/IEC 61000-3-2 and EN 60555-2 requirements)
- Redundant, parallel operation with active load sharing
- Internally controlled Variable-speed fan
- Hot insertion/removal (hot plug)
- Three front panel LED indicators
- UL* Recognized, UR, CE, EN62368
- CE mark meets 2006/95/EC directive§
- CB report available
- RoHS Directive 2011/65/EU and amended Directive (EU) 2015/863

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BP040AC48ATEZ Technical Specifications

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Min	Max	Unit
Input Voltage: Continuous	V_{IN}	0	300	V_{AC}
Operating Ambient Temperature[1]	T_A	-40	75	°C
Storage Temperature	T_{stg}	-40	85	°C
I/O Isolation voltage to Frame (100% factory Hi-Pot tested)			1500	V_{AC}

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, V_o=54V_{DC}, resistive load, and temperature conditions.

INPUT					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Startup Voltage Low-line Operation High-line Operation	V_{IN}	80	85	90 185	V_{AC}
Operating Voltage Range Low-line Configuration High-line Configuration		90 185	100 – 120 200 – 240	140 264	
Voltage Swell (no damage)		305			
Turn OFF Voltage Hysteresis		75 5	80	85	
Frequency	F_{IN}	47		63	Hz
Source Impedance (NEC allows 2.5% of source voltage drop inside a building)			0.2		Ω
Operating Current; at 110V_{AC} at 240V_{AC}	I_{IN}		12.0 8.9		A_{AC}
Inrush Transient (264V_{RMS}, 25°C, excluding X-Capacitor charging)	I_{IN}		25	40	A_{PK}
Idle Power (at 230V_{AC}, 25°C) 54V OFF 54V ON @ I_o=0	P_{IN}		10 15	 20	W
Leakage Current (250V_{AC}, 60Hz)	I_{IN}		2.5	3.5	mA
Power Factor (50 – 100% load)	PF	0.97	0.995		
Efficiency[2], 230V_{AC} @ 25°C 10% of FL 20% of FL 50% of FL 100% of FL	η	 90 94 96 94			%
Holdup time / Ride Through time (Output voltage > 42V (Not in compliance with Telcordia requirements: in regulation at full load at 60Hz and 175Vac. GR-947-CORE, section 3.7.) (The Unit shall ride through a half cycle drop out at 50Hz.)	T	10			ms
Isolation (per EN60950)(consult factory for testing to this requirement) Input – Chassis/Signals Input – Output Output – Chassis/Signals	V	 1500 3000 500			 V_{AC} V_{AC} V_{DC}

[1]See the derating guidelines under the Environmental Specifications section.
[2]External DC source for FAN power supply.

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†CSA is a registered trademark of Canadian Standards Association.
‡VDE is a trademark of Verband Deutscher Elektrotechniker e.V.
§This product is intended for integration into end-user equipment. All CE marking procedures of end-user equipment should be followed. (The CE mark is placed on selected products.)
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BP040AC48ATEZ Technical Specifications (continued)

Electrical Specifications (Continued)

54V_{DC} MAIN OUTPUT					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Output Power @ low line input 100 – 120V_{AC} @ high line input 200 – 240V_{AC}	W	1200 2000			W_{DC}
Factory set default set point	V_{OUT}		54		V_{DC}
Overall regulation (load, temperature, aging) 0 – 45°C, LOAD > 1A > 45°C		-1 -2		+1 +2	%
Output Voltage Set Range Set by RS485		44		58	V_{DC}
Output Current - @ 1200W (100 – 120V_{AC}), 54V/50V @ 2000W (200 – 240V_{AC}), 54V/50V	I_{OUT}	1		22.2/24.0 37.0/40.0	A_{DC}
Current Share (> 50% FL)		-5		5	%FL
Output Ripple (20MHz bandwidth, load > 1A) RMS (5Hz to 20MHz) Peak-to-Peak (5Hz to 20MHz)	V_{OUT}			100 250[3]	mV_{rms} mV_{p-p}
External Bulk Load Capacitance	C_{OUT}	0uF to at least 10000uF			mF
Turn-On (monotonic turn-ON from 30 – 100% of Vnom above 5°C) Delay Rise Time – RS-485 mode[4] Output Overshoot	 T V_{OUT}		5 5	 2	 s s %
Load Step Response ($I_{O,START}$ > 2.5A) DI[5] DV Response Time	I_{OUT} V_{OUT} T	-5	2.0 2	50 5	%FL V_{DC} ms
Overload Power limit @ high line down to 50V_{DC} Power limit @ low line down to 50V_{DC} High line current limit if V_{out} > 39V_{DC} [2000W] Low line current limit Output shutdown (commences as voltage decays below this level)	 P_{OUT} P_{OUT} I_{OUT} I_{OUT} V_{OUT}	 2000 1200 40 24		 36	 W_{DC} W_{DC} A_{DC} A_{DC} V_{DC}
System power up	Upon insertion the rectifier will delay an overload shutdown for 20 seconds allowing for the insertion and startup of multiple rectifiers within a system.				
Overvoltage – 200ms delayed shutdown Immediate shutdown	V_{OUT}	> 65		< 60	V_{DC}
Latched shutdown	Three restart attempts are implemented within a 1 minute window prior to a latched shutdown.				
Over-temperature warning (prior to commencement of shutdown) Shutdown (below the max device rating being protected) Restart attempt Hysteresis (below shutdown level)	T		5 20 10		°C
Output remote sense capability				1[6]	V_{DC}
Output back-bias operating voltage	V_{OUT}	40	48	60	V_{DC}

[3] 500mVp-p max when the load <= 1A.
[4] Below -5°C, the rise time is approximately 5 minutes to protect the bulk capacitors. Rise time can be changed to 100ms, contact factory for details.
[5] di/dt (output current slew rate) 1A/µs.
[6] Max output voltage clamped to 58V, this function just for single unit application.

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BP040AC48ATEZ Technical Specifications (continued)

General Specifications

Parameter	Min	Typ	Max	Units	Notes
Reliability		450,000		Hours	Full load, 25°C; MTBF per SR232 Reliability protection for electronic equipment, issue 2, method I, case III
Service Life		10		Years	Full load, excluding fans
Unpacked Weight		1.2/2.64		Kgs/ Lbs	
Packed Weight		1.5/3.3		Kgs/ Lbs	
Heat Dissipation	70 Watts or 238 BTUs @80% load, 98 Watts or 334 BTUs @100% load				

Signal Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. Signals are referenced to LGND unless noted otherwise. The output of signal fault is open drain FET, which need to be pulled HI by external pull-up resistors to external VDD. Max sink current: 5mA

Parameter	Symbol	Min	Typ	Max	Unit
ON/OFF 54V output OFF 54V output ON (should be connected to LGND)	V_{OUT}	3.5V 0	—	5 0.5	V_{DC}
Interlock	[short pin shorted to V_{OUT}(-) on system side]				
Module Present	[short pin shorted to LGND internally]				
Remote sense +	Connector to Vout positive terminal with 20 ohm				
Remote sense -	Connector to Vout negative terminal with 20 ohm				
Fault# Logic HI (No fault is present) Logic LO (Fault is present)	V	VDD (VDD <= 12) 0	— —	 0.4	V_{DC}

Digital Interface Specifications

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Measurement System Characteristics						
Clock stretching		$T_{stretch}$			25	ms
I_{OUT} measurement range	Direct	I_{rng}	0		50	A_{DC}
I_{OUT} measurement accuracy 25°C		$I_{out(acc)}$	-2.5		+2.5	% of FL
V_{OUT} measurement range	Direct	$V_{out(rng)}$	0		70	V_{DC}
V_{OUT} measurement accuracy[7]		$V_{out(acc)}$	-1		+1	%
Temp measurement range	Direct	$Temp_{(rng)}$	0		150	°C
Temp measurement accuracy[8]		$Temp_{(acc)}$	-5		+5	°C
V_{IN} measurement range	Direct	$V_{in(rng)}$	0		320	V_{AC}
V_{IN} measurement accuracy @ 25°C		$V_{in(acc)}$	-2		2	%
I_{IN} measurement range	Direct	$I_{in(rng)}$	0		20	I_{AC}
I_{IN} measurement accuracy @ 25°C		$I_{in(acc)}$	-4		+4	% of FL
P_{IN} measurement range	Direct	$P_{in(rng)}$	0		2500	W_{in}
P_{IN} measurement accuracy@ 25°C	Direct	$P_{in(acc)}$	-3		+3	% FL
Fan Speed measurement range			0		28000	RPM
Fan Speed measurement accuracy			-10		10	%
Fan speed control range			0		100	%

[7]Above 2.5A of load current
[8]Within 30° of the default warning and fault levels.

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BP040AC48ATEZ Technical Specifications (continued)

Environmental Specifications

Parameter	Min	Typ	Max	Units	Notes
Ambient Temperature	-40[9]		75	°C	Air inlet from sea level to 4,000 meters.
Exhaust Air Temperature			15	°C	Maximum allowed internal temperature rise
Storage Temperature	-40		85	°C	
Operating Altitude			4000/13120	m / ft	
Non-operating Altitude			8200/27000	m / ft	
Power Derating with Altitude			2.0 4.0	%/305 m %/1000 ft	Above 2000/6560 m/ft; Above 4000m de-rate 4% per 305m (1000 ft)
Power Derating with Temperature			2.0	%/°C	55°C to 75°C
Acoustic noise		55		dbA	Full load, 25°C
Over Temperature Protection		125/110		°C	Shutdown / restart [internally measured points]
Humidity Operating Storage	 5 5		 95 95	 % %	Relative humidity, non-condensing
Shock and Vibration acceleration			2.4	Grms	IPC-9592B, Class II

[9]Designed to start and work at an ambient as low as -40°C, but may not meet operational limits until above -10°C.

Cold Climate Startup Behavior

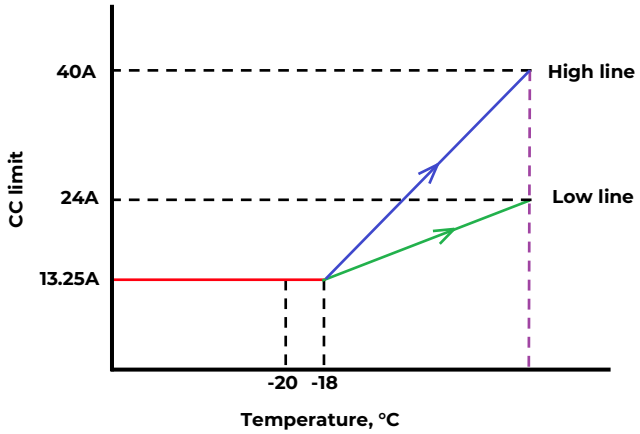


Figure 1. Warm - up sequence curve#

#Cold startup current will self-protect the unit as follows:
When internal startup temperature below -20°C is detected, The starting current will be limited to 13.25A until the internal temperature increases above -18°C at which time the rectifier will gradually increase output current to full current over a 5 minute period. After 5 minutes, the output current will be released to full current demand as governed by input voltage.

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BP040AC48ATEZ Technical Specifications (continued)

EMC

Parameter	Measurement	Standard	Level	Test
AC input[10]	Conducted emissions	EN55032, FCC Docket 20780 part 15, subpart J Meets EN 55032 Class B with a 6dB Margin Meets Telcordia GR1089-CORE by a 3dB margin	B	0.15 – 30MHz
	Radiated emissions	Class B with a 3dB Margin with shelf EN55032 to comply with system enclosure. Class B with 0dB Margin	B	30 – 10000MHz
	Line harmonics	EN61000-3-2 THD (230V, FL, 25°C)	Table 1 5%	
Parameter	**Measurement**	**Standard**	**Criteria[11]**	**Test**
AC Input Immunity	Line sags and interruptions	EN61000-4-11	B	-30%, 10ms, -60%, 100ms, -100%, 5sec
		Output will stay above 40V_{DC} @ 75% load Sag must be higher than 80Vrms.	A	25% line sag for 2 seconds 1 cycle interruption
	Lightning surge	EN61000-4-5, Level 4, 1.2/50µs – error free	A	4kV com, 2kV diff
		ANSI C62.41-2002 100kHz ring wave 1.2/50µs-8/20µs 550ns EFT burst	B, Table 2 B, Table 3 B, Table 7	6kV/0.5kA 6kV, 3kA 2kV, severity II
	Fast transients	EN61000-4-4, Level 3	B	5/50ns, 2kV (common mode)
Enclosure immunity	Conducted RF fields	EN61000-4-6, Level 3	A	130dBµV, 0.15-80MHz, 80% AM
	Radiated RF fields	EN61000-4-3, Level 3	A	10V/m, 80-1000MHz, 80% AM
		ENV 50140	A	
	ESD	EN61000-4-2, Level 4	B	8kV contact, 15kV air

[10]Emissions requirements can be verified using either the BPS system AC5 19in or 23in power shelf (ordering code 1600449176A or 1600470478A). Standalone the additional margin is not required.
[11]Criteria A: The product must maintain performance within specification limits. Criteria B: Temporary degradation which is self recoverable. Criteria C: Temporary degradation which requires operator intervention.

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BP040AC48ATEZ Technical Specifications (continued)

Characteristic Curves

The following figures provide typical characteristics for the BP040AC48ATEZ rectifier and 25°C.

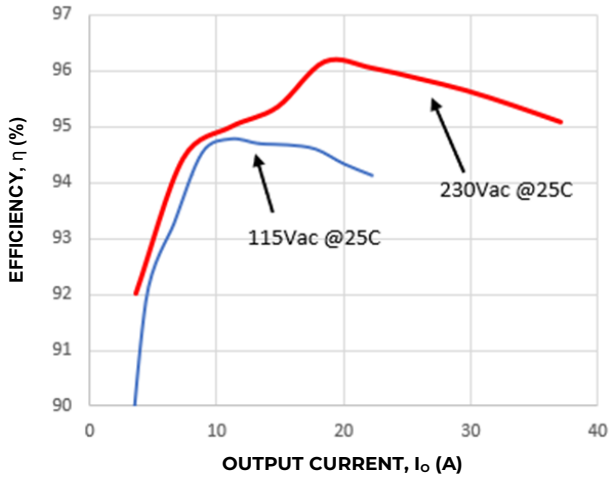


Figure 2. Rectifier Efficiency versus Output Current

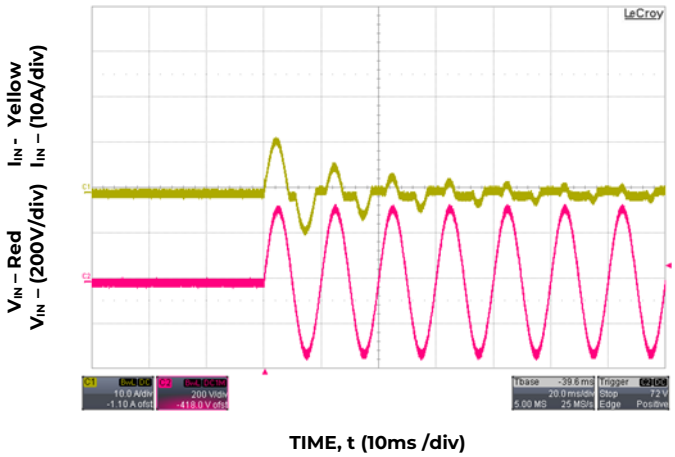


Figure 3. Inrush current V_{IN} = 230V_{AC}, 0°C phase angle

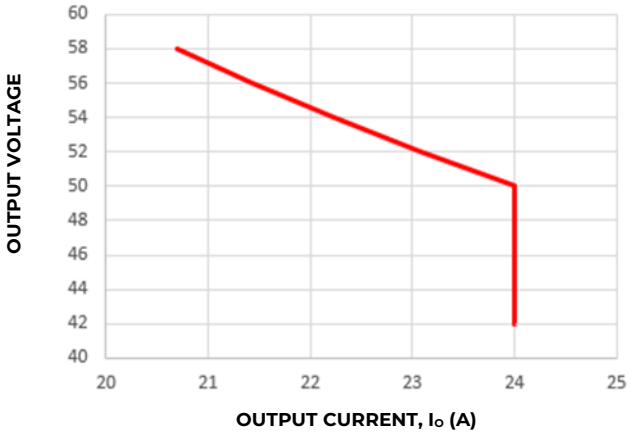


Figure 4. 54V_{DC} output: Power limit, Current limit and shutdown profile at V_{IN} = 90V_{AC}

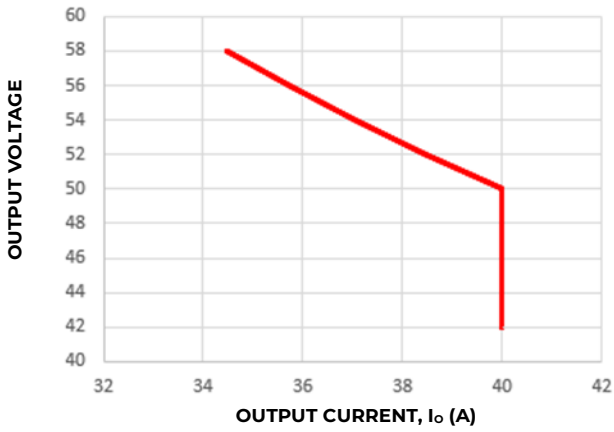


Figure 5. 54V_{DC} output: Power limit, Current limit and shutdown profile at V_{IN} = 185V_{AC}

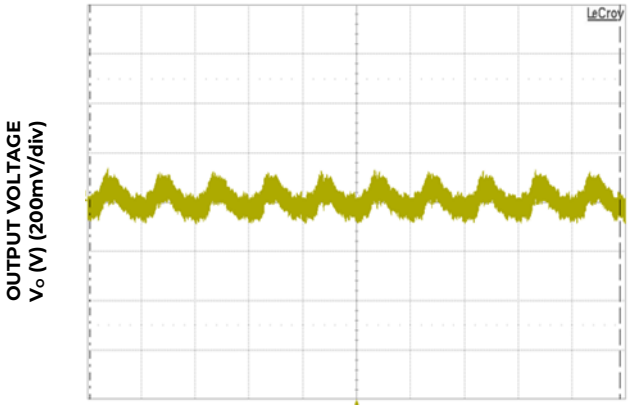


Figure 6. 54V_{DC} output ripple and noise, full load, V_{IN} = 185V_{AC}, 20MHz bandwidth

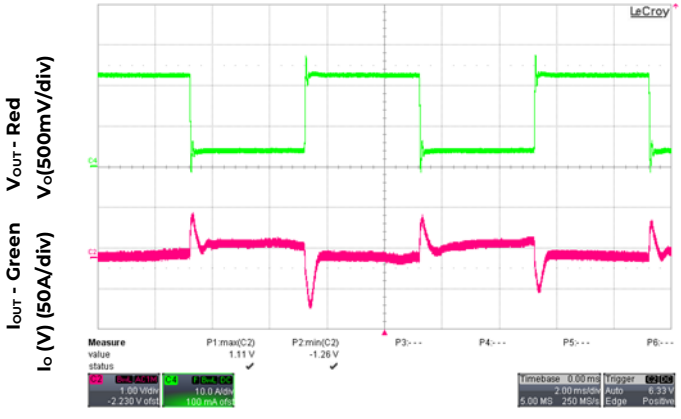


Figure 7. Transient response 54V_{DC} load step 10 – 60%, Slew rate: 1A/µs, V_{IN} = 230V_{AC}

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BP040AC48ATEZ Technical Specifications (continued)

Characteristic Curves (continued)

The following figures provide typical characteristics for the BP040AC48ATEZ rectifier and 25°C.

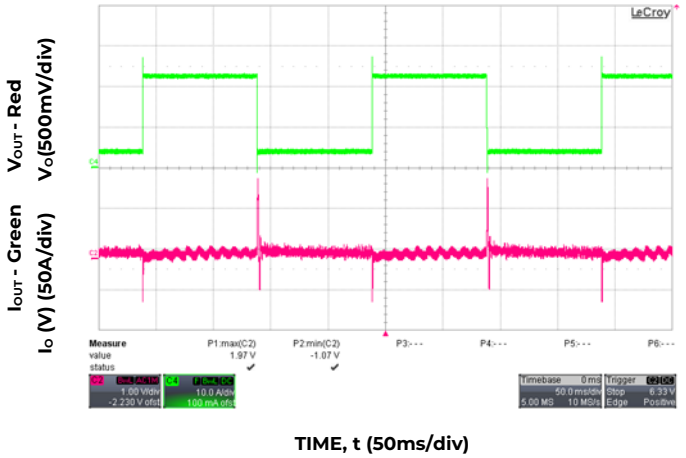


Figure 8. Transient response 54V_{DC} load step 10 – 60%, Slew rate: 1A/µs, V_{IN} = 230V_{AC}

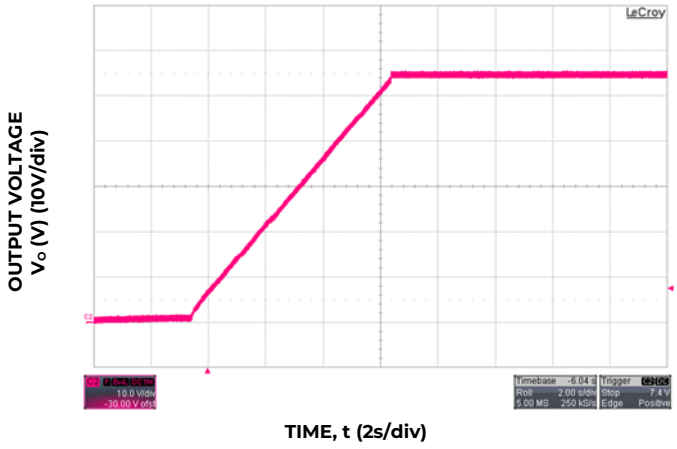


Figure 9. 54V_{DC} soft start, full load, V_{IN} = 230V_{AC} - RS485 mode with 10000µf external capacitance

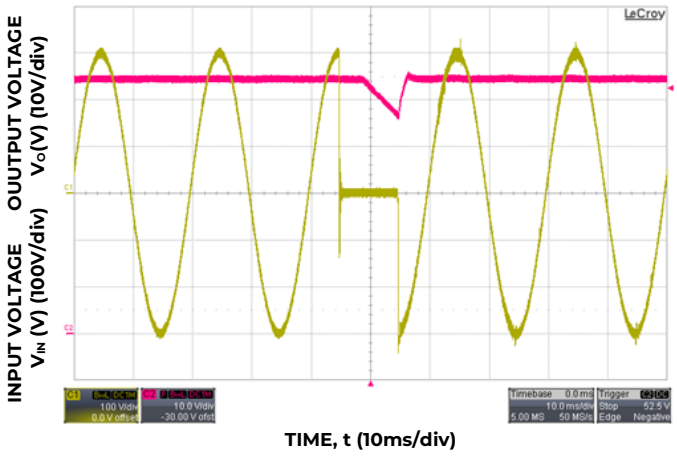


Figure 10. Ride through missing ½ cycle, full load, V_{IN} = 230V_{AC}

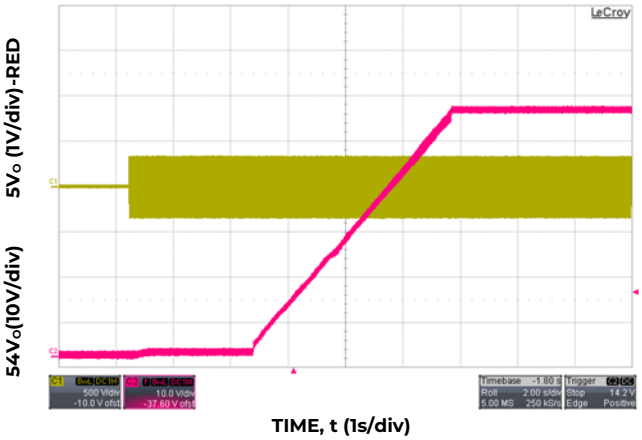


Figure 11. Turn-On at full load V_{IN} = 230V_{AC}

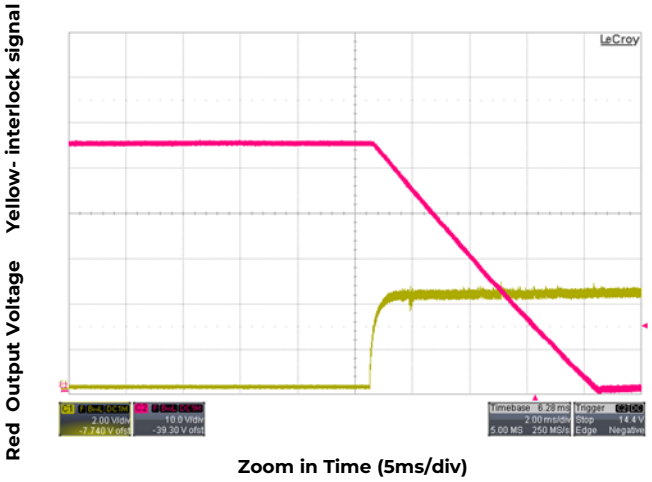


Figure 12. Time delay from interlock reverse and output shut down. Interlock signal can be used as quick turn off signal

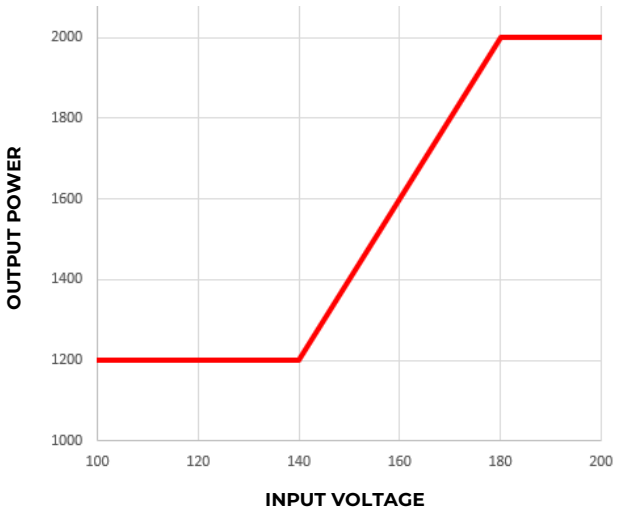


Figure 13. Output power derating below V_{IN} of 185V_{AC}

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BP040AC48ATEZ Technical Specifications (continued)

Control and Status

The Rectifier provides two means for monitor/control: analog & the OmniOn Power™ Galaxy-based RS485 protocol.

Details of analog control are provided in this data sheet. OmniOn Power™ will provide separate application notes on the Galaxy RS485 based protocol for users to interface to the rectifier. Contact your local OmniOn Power™ representative for details.

Global Broadcast: This is a powerful command because it instruct all rectifiers to respond simultaneously. A read instruction should never be accessed globally. The rectifier should issue an 'invalid command' state if a 'read' is attempted globally.

For example, changing the 'system' output voltage requires the global broadcast so that all paralleled rectifiers change their output simultaneously.

This command can also turn OFF the 'main' output or turn ON the 'main' output of all rectifiers simultaneously. Unfortunately, this command does have a side effect.

Only a single rectifier needs to pull down the ninth acknowledge bit. To be certain that each rectifier responded to the global instruction, a READ instruction should be executed to each rectifier to verify that the command properly executed. The GLOBAL BROADCAST command should only be executed for write instructions to slave devices.

Remote sense (RS+, RS-): The power supply has both positive and negative remote sense connections that can be connected to the positive and negative rails of the main output near the load. The compensation capability is 1V, if the power supply no need remote sense connections, keep it floating.

ON/OFF: Controls the main 54V_{DC} output when Interlock is connected to V_{OUT}(-). This pin must be pulled low to turn **ON** the rectifier unless RS485 communications are used. The rectifier will turn **OFF** if either the **ON/OFF** or the **Interlock** pin is released. This signal is referenced to LGND; it is ignored when RS485 communications are active.

Interlock: This is a shorter pin utilized for hot-plug applications to ensure that the rectifier turns **OFF** before the power pins are disengaged. It also ensures that the rectifier turns **ON** only after the power pins have been engaged. Must be connected to V_OUT (-) for the rectifier to be ON.

8V_INT: Single wire connection between rectifiers, Provides bias to the DSP of an unpowered rectifier.

Active current sharing among rectifiers operating in parallel is implemented by an external OmniOn controller using the Galaxy RS485 based protocol.

Status Signals

Module Present: This signal is tied to LGND inside the rectifier. It's intent is to provide a signal to the system that a rectifier is physically present in the slot.

Fault#: A TTL compatible status signal representing whether a Fault occurred. This signal needs to be pulled HI externally through a resistor. This signal goes LO for any failure that requires rectifier replacement. These faults may be due to:

- Fan failure
- Over-temperature shutdown
- Over-voltage shutdown
- Internal Rectifier Fault

General performance descriptions

Default state: Rectifiers are programmed in the default state to automatically restart after a shutdown has occurred. The default state can be reconfigured by changing non-volatile memory (Store_user_code).

Delayed overcurrent shutdown during startup: Rectifiers are programmed to stay in a constant current state for up to 20 seconds during power up. This delay has been introduced to permit the orderly application of input power to a subset of paralleled rectifiers during power up. If the overload persists beyond the 20 second delay, the rectifier will revert back into its programmed state of overload protection.

Unit in Power Limit or in Current Limit: When output voltage is > 36V_{DC} the Output LED will continue blinking.

When output voltage is < 36V_{DC}, if the unit is in the RESTART mode, it goes into hiccup. When the unit is ON the output LED is ON, when the unit is OFF the output LED is OFF.

When the unit is in latched shutdown the output LED is OFF.

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General performance descriptions (continued)

To restart after a latch off either of five restart mechanisms are available.

1. The hardware pin **ON/OFF** may be cycled OFF and then ON**.**
2. Remove and reinsert the unit.
3. Turn OFF and then turn ON AC power to the unit.
4. Changing firmware from **latch off** to **restart.**

Each of these commands must keep the rectifier in the OFF state for at least 2 seconds, with the exception of changing to **restart**.

A successful restart shall clear all alarm registers, set the **restarted successful** bit of the **Status_2** register.

A power system that is comprised of a number of rectifiers could have difficulty restarting after a shutdown event because of the non-synchronized behavior of the individual rectifiers. Implementing the latch-off mechanism permits a synchronized restart that guarantees the simultaneous restart of the entire system.

A synchronous restart can be implemented by;

1. Issuing a GLOBAL OFF and then ON command to all rectifiers,
2. Toggling Off and then ON the ON/OFF (ENABLE) signal
3. Removing and reapplying input commercial power to the entire system.

The rectifiers should be turned OFF for at least 20 – 30 seconds in order to discharge all internal bias supplies and reset the soft start circuitry of the individual rectifiers.

Hot plug procedures

Careful system control is recommended when hot plugging a rectifier into a live system. It takes about 15 seconds for a rectifier to configure its address on the bus based on the analog voltage levels present on the backplane. If communications are not stopped during this interval, multiple rectifiers may respond to specific instructions because the address of the hot plugged rectifier always defaults to xxxx000 (depending on which device is being addressed within the rectifier) until the rectifier configures its address.

The recommended procedure for hot plug is the following: The system controller should be told which rectifier is to be removed. Thus informing the installer that the identified rectifier can be removed from the system. The system controller should then poll the rectifier_present signal to verify when the rectifier is re-inserted. It should time out for 15 seconds after this signal is verified. At the end of the time out all communications can resume.

Failure Predictions

Alarm warnings that do not cause a shutdown are indicators of a potential future failure of the rectifier. For example, if a thermal sensor failed, a warning is issued but an immediate shutdown of the rectifier is not warranted.

Other potential predictive failure mechanisms can be derived from information such as fan speed when multiple fans are used in the same rectifier. If the speed of the fans varies by more than 20% from each other, this is an indication of an impending fan wear out.

The goal is to identify problems early before a protective shutdown would occur that would take the rectifier out of service.

Remote upgrade

This section describes at a high-level the recommended re-programming process for the three internal micro controllers inside the rectifier when the re-programming is implemented in live, running, systems.

The process has been implemented in visual basic by OmniOn Power™ Critical Power for controller based systems positioned primarily for the telecommunications industry. OmniOn Power™ Critical Power will share its development with customers who are interested to deploy the re-programming capability into their own controllers.

For some customers internal system re-programming is either not feasible or not desired. These customers may obtain a re-programming kit from OmniOn Power™ Critical Power. This kit contains a turn-key package with the re-program firmware.

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BP040AC48ATEZ Technical Specifications (continued)

The Upgrade Package: This package contains the following files;

- **Manifest.txt –** The manifest describes the contents of the upgrade package and any incidental information that may be useful, for example, what this upgrade contains or why is this upgrade necessary. This file contains the version number and the compatibility code of the upgraded program for each of the three processors
- **Program.bin –** The upgraded program contents are located here. Each processor to be upgraded will have its own file.
- Below is an example of an upgrade package
- Contents of the upgrade are in a zip file BP040ACM48TEZ.zip
- Unzipping the contents shows the following files BP040ACM48TEZ.pfc.bin

  BP040ACM48TEZ.sec.bin

  manifest.txt
- Opening manifest.txt shows the following
  # Upgrade manifest file
  # Targets: BP040AC48ATEZ PFC and SEC
  # Date: Tue 01/14/2014 14:25:09.37
  # Notes:
- Program contents

>p, CP3x00AC54TE _P01, CP3x00AC54TEZ _PFC.bin,1.18

>s, CP3x00AC54TE _S01, CP3x00AC54TEZ _SEC.bin,1.1

compatibility code new program revision number

Wink: 0.25 seconds ON, 0.75 seconds OFF

Fast Blink: 0.25 seconds ON. 0.25 seconds OFF

Upgrade Status Indication: The FAULT LED is utilized for indicating the status of the re-programming process.

Status	Fault LED	Description
Idle	OFF	Normal state
In boot block	Wink	Application is good
Upgrading	Fast blink	Application is erased or programming in progress
Fault	ON	Erase or re-program failed

Black box

Contents of the black box and more detailed information about the specifics of the feature are described in a separate document. The intent here is to provide a high level summary This feature includes the following;

1. A rolling event Recorder
2. Operational Use Statistics

The rolling event recorder

The purpose of the black box is to provide operational statistics as well as fault retention for diagnostics following either recoverable or non-recoverable fault events. Sufficient memory exists to store up to 5 time-stamped snapshot records (pages) that include the state of the status and alarm registers and numerous internal measurement points within the rectifier.

Each record is stored into nonvolatile memory at the time when a black box trigger event occurs. Once five records are stored, additional records over-write the oldest record. The memory locations will be cleared, when the product is shipped from the OmniOn Power™ factory.

Operational use statistics

This feature of the black box includes information on the repetition and duration of certain events in order to understand the long-term operational state of the rectifier. The events are placed into defined buckets for further analysis. For example; the rectifier records how long was the output current provided in certain load ranges.

Accessing the event records

The event records are accessed by uploading the entire contents of the black box of the rectifier into a folder assigned by the user. OmniOn Power™ provides a Graphical User Interface (GUI) that decodes the contents of the black box into a set of records that can be reviewed by the user.

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BP040AC48ATEZ Technical Specifications (continued)

Table 1: Alarm and LED state summary

	Rectifier LED State				Monitoring Signals	
Condition	**AC OK Green**	**DC OK Green**	**Fault Red**		**Fault**	**Module Present**
OK	1	1	0		HI	LO
Thermal Alarm (5°C before shutdown)	1	1	0		HI	LO
Thermal Shutdown	1	0	1		LO	LO
Defective Fan	1	0	1		LO	LO
AC Present but not within limits	Blinks	0	0		HI	LO
AC not present[1]	0	0	0		HI	LO
Boost Stage Failure	1	0	1		LO	LO
Over Voltage Latched Shutdown	1	0	1		LO	LO
Over Current	1	Blinks	0		HI	LO
Non-catastrophic Internal Failure[2]	1	1	1		LO	LO
Standby (remote)	1	0	0		HI	LO
Communications Fault (RS485 mode)	1	1	Blinks		HI	LO

[1] This signal is correct if the rectifier is back biased from other rectifiers in the shelf.
[2] Any detectable fault condition that does not cause a shutting down. For example, ORing FET failure, boost section out of regulation, etc.
[3] Signal transition from HI to LO is output load dependent.

Table 2: Signal Definitions

The hardware alarm signal (Fault#) is an open-drain FET which needs to be pulled HI to either 3.3V or 5V. Maximum sink current is 5mA. An active LO signal (PS-ON/OFF) must be pulled down to < 0.4V_{DC} to activate. All signals are referenced to LGND unless otherwise stated.

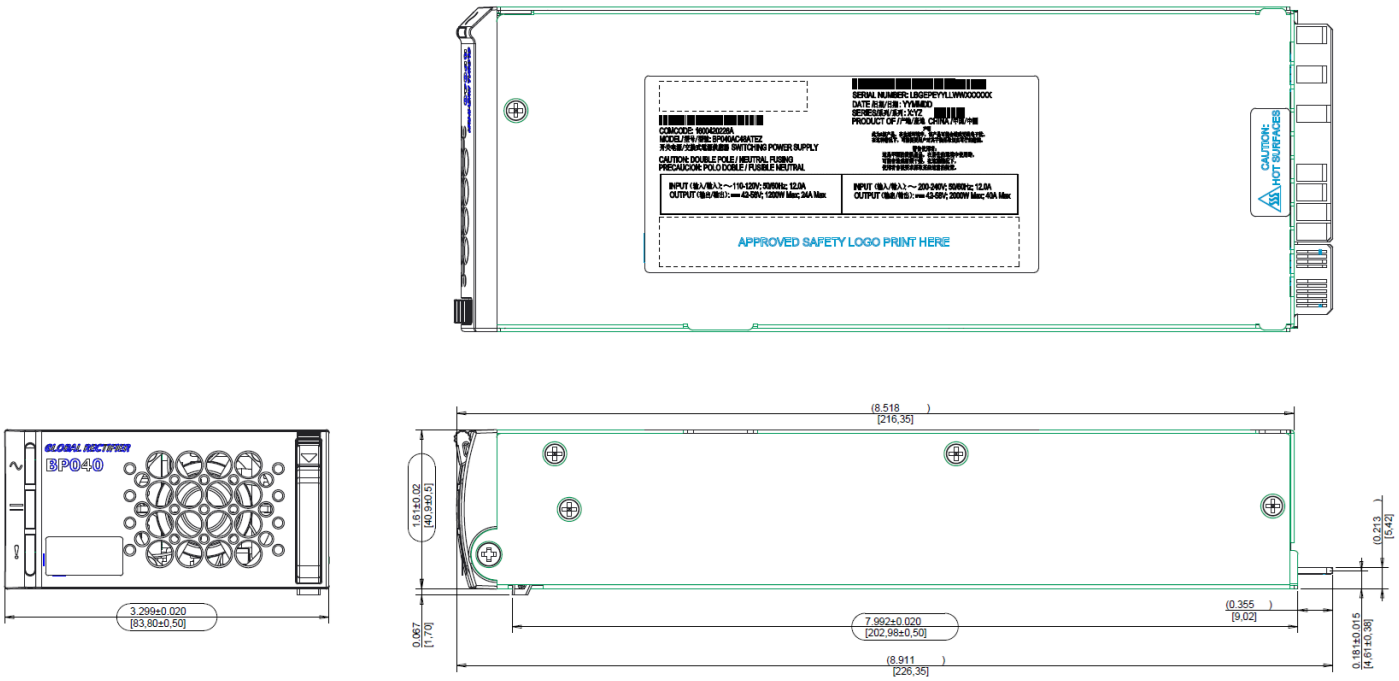
Function	Label	Description
Interlock	Interlock	Short pin, disables the main output unless connected to V_{OUT} (-).
Back bias	8V_INT	Used to back bias the DSP from operating Rectifiers. Ref: V_{OUT} (-).
Remote sense +	RS+	Connected to the load terminal, compensate the V_{drop} on load wire
Remote sense -	RS-	Connected to the load terminal, compensate the V_{drop} on load wire
RS485 line B	RS485B	Isolated RS485 line; voltage from RS485A to RS485B >0.2V is “high” (logic 1)
RS485 line A	RS485A	Isolated RS485 line; voltage from RS485A to RS485B >0.2V is “high” (logic 1)
Logic ground	LGND	Isolated ground for logic signals
Module ON/OFF	PS-ON/OFF	Module enable/disable signal, If shorted to LGND [& Interlock is shorted to V_{OUT}(-)] main output is ON.
Rectifier Fault	Fault#	Open drain FET; normally HI, changes to LO.
Module Present	MOD_PRES	Short pin, see Status and Control description for further information on this signal.
Unit address0	U0	Unit address0
Unit address1	U1	Unit address1
Unit address2	U2	Unit address2
Shelf0	S0	Shelf address0
Shelf1	S1	Shelf address1
Shelf2	S2	Shelf address2

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BP040AC48ATEZ Mechanical Specifications

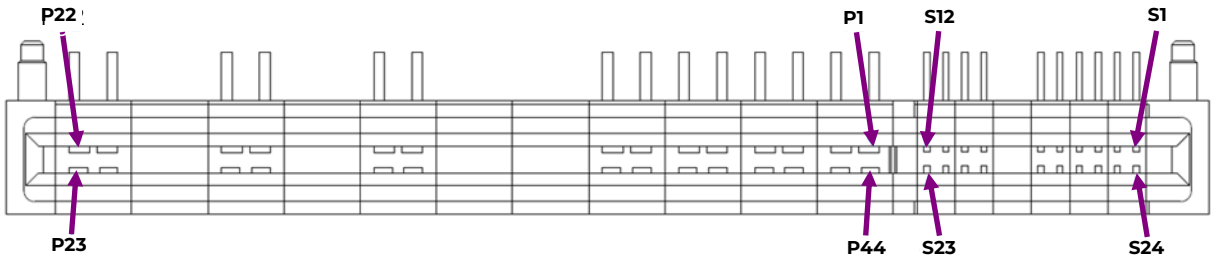
Mechanical Outline

Dimensions



Output mating Connector: right angle card edge, FCI 10163410-001LF

RS485 version:



INPUT POWER			OUTPUT POWER		SIGNAL											
P21,P22	P17,P18	P13,P14	P5-P8	P1-P4	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1
LINE-1 (HOT)	LINE-2 (Neutral)	EARTH (GND)	Vout +	Vout -	RS -	RS +			OMITTED		FAULT	U0	U1	U2	RS485B	RS485A
					NA	Interlock	8V_INT	NA	OMITTED		S0	S1	S2	LGND	MOD_PRES	PS-ON/OFF
P23,P24	P27,P28	P31,P32	P37-P40	P41-P44	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24

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BP040AC48ATEZ Ordering Information

Ordering Information

Please contact your OmniOn Power™ Sales Representative for pricing, availability and optional features.

Table 3: Device Codes

Device code	Input voltage	Output voltage	Output current	Ordering code
BP040AC48ATEZ	100-120 V_{AC} 200-240 V_{AC}	±54 V_{DC}	22.2/24.0 A_{DC} 37.0/40.0 A_{DC}	1600420226A

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Change History (excludes grammar & clarifications)

Revision	Date	Description of the Change
1.1	11/02/2022	Initial Release
1.2	03/23/2023	80plus, I²C and PMbus information removed, Cold climate start up behavior section added, Updated image of mechanical outline.
1.3	10/30/2023	Updated as per OmniOn template
1.4	09/17/2024	Updated Signal Definitions table
1.5	10/17/2024	Added TM & reference to BPS power system (p.1); corrected shelf reference (p.6)
1.6	12/18/2024	Update the description about the signal of PS_on/off and fault (p.4)
1.7	08/10/2026	Updated Table 2 and the Signal description of RS485, Deleted analog current-share signals; Clarified ON/OFF control; Updated Output mating connector Table.

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