X SERIES

Single-Phase Rectifier Module

Overview

Eltek X-series single-phase rectifier modules provide industry-leading power density and efficiency in a 2 RU footprint. Versatility, scalability, and "hot swap" capability make for optimal system design and cost-effective deployment – from initial install to future upgrades.

X SERIES

SINGLE-PHASE RECTIFIER MODULE

Doc 2052570, Issue 2

THE ELTEK DIFFERENCE

Optimization

X-series rectifiers are optimized for the demanding power needs of wireless communications, enterprise and broadband access equipment.

Small size, big power

At only 2RU these compact rectifiers can provide up to 8400 Watts of power (X7500A models). The small size can free up space to reduce system size or incorporate additional electronics.

Efficiency

A 92% efficiency reduces the thermal load, thus improving overall system reliability and availability.

PRODUCT DESCRIPTION

X-series rectifiers are a family of rectifiers ranging from 100-150A, in either 24 or 48V. X-series rectifiers are designed for Eltek's Modular and Scalable DC Power Systems. They are scalable and can be operated either with a system controller or as stand-alone modules.

High reliability

- Hot pluggable
- Active load sharing
- Advanced internal monitoring

Wide operating range

- – 40° C to 50° C
- Nominal 208 V, 240 V 480/277 VAC

High power density

- Up to 30C/in^3

KEY FEATURES

- 2RU FOOTPRINT
- BOTH 24V AND 48V AVAILABLE
- TYPICAL EFFICIENCY 92%
- OPERATES FROM –40°C TO +65°C
- AC INPUT RANGE FROM 200V TO 240V ±10% (X7500A2 ACCEPTS UP TO 280V ±10%)
- POWER-FACTOR CORRECTION
- HOT-PLUGGABLE
- REDUNDANT PARALLEL OPERATION
- ACTIVE LOAD SHARING
- LED ALARM INDICATORS
- NEBS LEVEL 3
- UL/VDE 60950-1 CERTIFIED
- ADVANCED INTERNAL MONITORING
- CE MARK

X SERIES RECTIFIER MODULE

ADDITIONAL TECHNICAL SPECIFICATIONS

Ac Input

X SERIES	X5000A1	X7500A1	X7500A2	X3750B1	NOTES
Input Voltage (min)	180 Vac				
Input Voltage (max)	264 Vac		305 Vac	264 Vac	
Input Frequency (min)	47 Hz				
Input Frequency (max)	63 Hz				
Input Current (max)					
@ 180 Vac (amps)	36	52	52	27	
@ 208 Vac (amps)	32	45	45	23	
@ 240 Vac (amps)	27	39	39	20	
@ 277 Vac (amps)	–	–	34	–	
Inrush Current (max)	30 amps peak				Excludes X caps in the EMC input filter.
Power Factor	.99				Typical @ 230Vac, Full Load

DC Output

MAIN OUTPUT	X5000A1	X7500A1	X7500A2	X3750B1	NOTES
Vo Set Point (min/typ/max)	42/48/56V			21/24/28V	
Regulation (min/max)	±1%				Total regulation line, load, aging & temperature
Output Current (min/max amps)	0/100	0/150	0/150	0/150	
Output Power (watts max)	5600	8400	8400	4275	
Current Limit Setpoint (min/max amps)	110	155	155	155	Current limit set point is adjustable via I^2C or through Eltek Network Interface Card.
Short Circuit Current (peak amps)	800	1000	1000	1000	Excluding output capacitor discharge current.
Short Circuit Current (RMS amps)	35	50	50	50	
Output Noise*	○ 40 mV rms typical (10kHz to 20MHz) ○ 32 dBrnc (measured w/o external battery) ○ 250mV P-P (10 Khz to 20 Mhz)				
Output Rise Time* (min/max)	100/400 (msec)				Measured at 10 – 90% of final output level
Dynamic Response* (maximum)	3%				Change in output voltage within 10 msecs after a 10 to 100% load step change
Turn On Delay* (maximum)	3.5 sec				Measured from application of valid ac voltage to regulation set-point.
Adjustable Over-voltage Protection (min/max)	54/60 Vdc			27/30 Vdc	Software configurable
Backup Over-voltage Protection (max)	60 Vdc			30 Vdc	
Load Sharing (min/max)	±5 % of full load				
Reverse Output Current (max)	0.5 amps				Internal reverse protection is provided.
Efficiency	92% typical @ 230Vac			90% typical @ 230Vac	

*Compliant from –20°C to +65°C except for X7500A1 and X7500A2, which are compliant to –20°C to +50°C

Typical specifications, unless otherwise stated
Nominal line: 230 VAC
Nominal setpoint: 48 VDC
Nominal load: 100% of rated current
Specifications subject to change without notice

X SERIES RECTIFIER MODULE

Auxiliary Output

AUXILIARY OUTPUT	X5000A1	X7500A1	X7500A2	X3750B1	NOTES
Output 1					
Nominal Voltage	12V				
Vmin/max	10.5 / 14				
Source Current Rating (min/max)	0 / 200mA				
Sink Current (max)	100mA				Current required for internal controls when AC is not present

NOTE: Output 1 operates independent of main DC output and is referenced to Vout–

Physical Specifications

PARAMETER	DIMENSIONS	NOTES
Depth	404.8mm (15.94")	
Height	81.3mm (3.20")	
Width	131.5mm (5.18")	
Weight	6.8kg (15lbs)	

Environmental Specifications

PARAMETER	Minimum	Maximum	UNIT	NOTES
Storage Temperature	– 40	85	°C	
Operating Temperature	– 40	65	°C	No power derating except the X7500A1 and X7500A2 which derates 2%/°C above 50°C.
Humidity	5	95	%	Relative Humidity Non Condensing
Altitude	– 200	8000	Ft	For operation above 8000' , maximum temperature is derated 2°C per 1000' for temps above 65°C

General Requirements

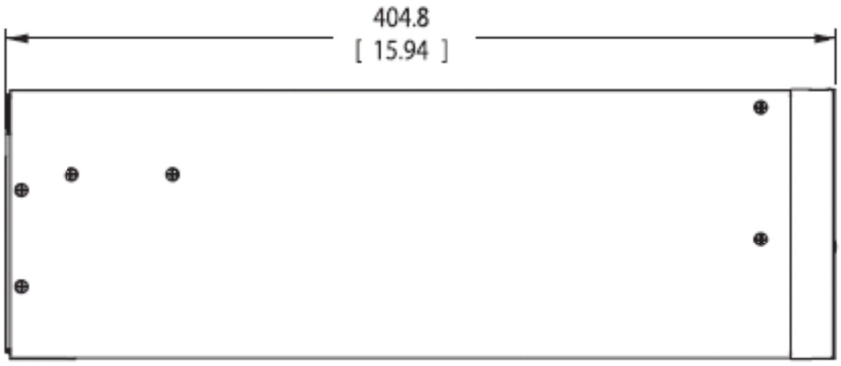
APPLICABLE STANDARDS			
Seismic Rating	Zone 4, per GR-63-CORE	EN61000-4-2	Electrostatic discharge immunity test, 15kV air, 8kV contact
Radiated Emissions	EN55022, Level A	EN61000-4-3	Radiated radio-frequency, electromagnetic field immunity test. Level 3: 10 V/m
Conductive Emissions	EN55022, Level A	EN61000-4-4	Electrical fast transient/burst immunity test. 1kV
NEBS Level 3	GR-1089-CORE& GR-63-CORE	EN61000-4-5	Surge immunity test 6kV: Line to line 6kV: Line to ground
		EN61000-4-6	Conducted Susceptibility, 3Vrms

Specifications are subject to change without notice

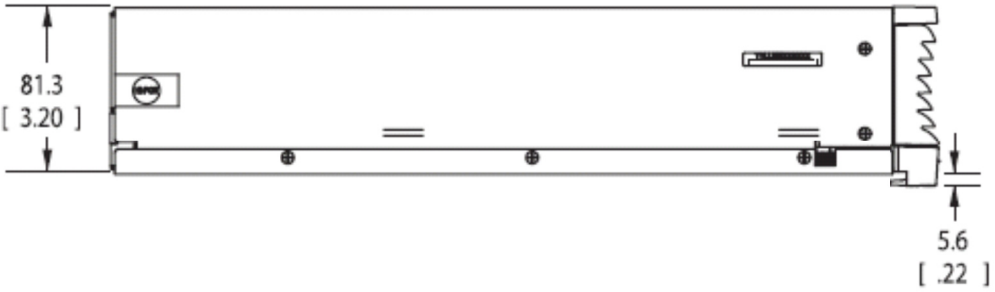
X SERIES RECTIFIER MODULE

DIMENSIONAL DRAWINGS

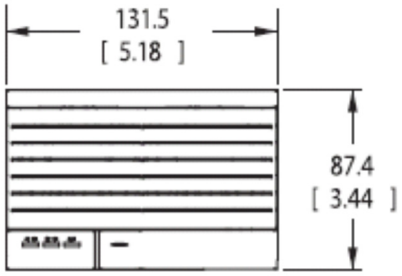
Top View



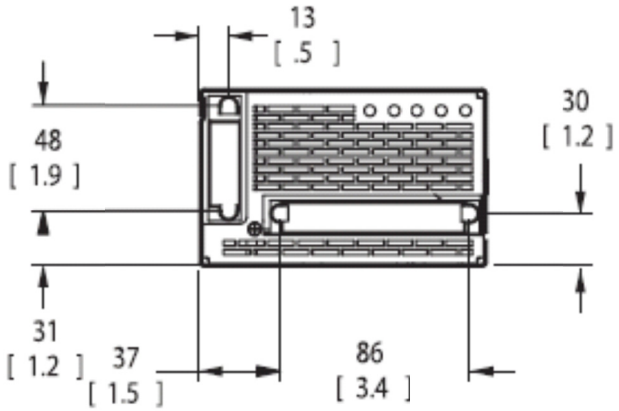
Side View



Front View



Rear View



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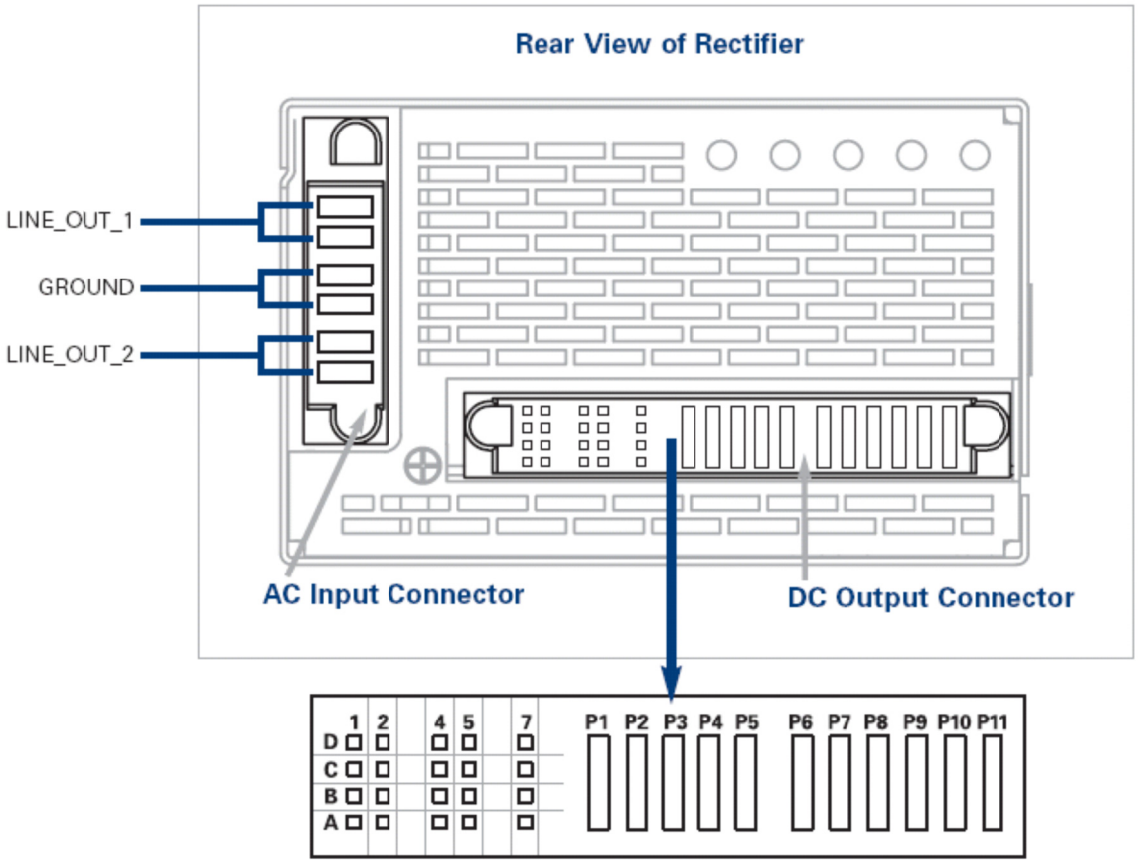
RECTIFIER CONNECTOR PIN-OUT REQUIREMENTS



Unit DC output
Connector p/n: 51939-052
Mating Connector p/n: 51940-027
Supplier: FCI/Berg

Unit AC input
Connector P/N: 51939-040
Supplier: FCI/BERG
Mating Connector P/N: CA126002275
Supplier: Eltek

FCI NUMBERING	1	2	4	5	7
D	TEMP_ALARM	SDA	LOC3	SHELF-BIAS	SHORT_PIN
C	MODULE_DISABLE	SCL	RESERVED	LOC2	REMOTE_SENSE-
B	AC_FAIL	MODULE_ALARM	ISHARE	LOC1	RESERVED
A	MODULE_PRESENT	LOGIC_GROUND	V_MARGIN	LOC0	REMOTE_SENSE+
P1	OUTPUT NEGATIVE				
P2					
P3					
P4					
P5					
P6	OUTPUT POSITIVE				
P7					
P8					
P9					
P10					
P11	RESERVED				

X SERIES RECTIFIER MODULE

NON-ISOLATED SIGNALS

OUTPUT+ and OUTPUT–

Power blades used for connecting positive and negative power connections.

REMOTE_SENSE+ and REMOTE_SENSE–

These signals are used to compensate for distribution drop across the output distribution. The maximum voltage drop from the rectifier module to the remote sense connection (the complete round trip) must be maintained to less than 1V. The remote sense leads may be left un-terminated in applications where remote voltage regulation is not required.

ISHARE

All rectifiers ISHARE pins are tied together on the system backplane to support load sharing. This connection may be terminated between rectifiers or left un-terminated in systems where load share is not required.

SHORT_PIN

The short pin is used to disable the rectifier if not fully seated in a system. It is required to be tied to OUTPUT– in the system backplane in order for the rectifier to provide proper output voltage. It may not be left un-terminated.

Address Pins (LOC0, LOC1, LOC2, LOC3)

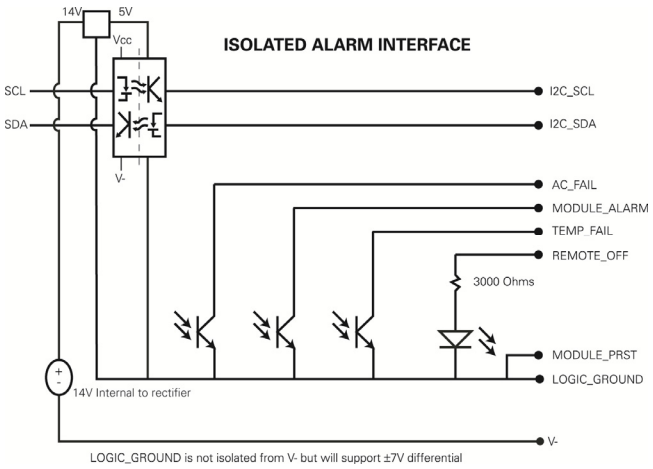
LOC0, LOC1, LOC2, and LOC3 are location pins used to set rectifier address in a system where the I²C bus is shared between rectifiers. They may be left un-terminated to generate logic 1 or connected to OUTPUT- to generate logic 0.

ISOLATED SIGNALS

I²C Communications Bus (SCL, SDA)

The I2C Communications Bus provides information about internal rectifier conditions as well as full control of output voltage and alarming setpoints. SCL and SDA are common data signals and can be wired directly to a system controller or on a common shared bus between the rectifiers in a system and the main system controller. The rectifiers communicate via the proprietary Eltek Communication Protocol. Contact your Eltek Power representative for technical assistance in interfacing to the rectifiers using this interface protocol. The I²C Bus signals are logic referenced to LOGIC_GROUND. The internal bias for the I²C isolation circuit will support a 10V common mode voltage differential to OUTPUT–.

ISOLATED SIGNALS (CONTD.)



MODULE_PRST (“Present”)

This signal is a connection to logic ground. It may be used to determine the presence of a rectifier module in a system location.

AC_FAIL

This signal is an opto-isolated open collector signal referenced to LOGIC_ GND within each rectifier. AC_FAIL is a normally closed signal which signifies the presence of an alarm with a high impedance. AC_FAIL indicates the presence of valid AC input voltage to the rectifier.

MODULE_ALARM

This signal is an opto-isolated open collector signal referenced to LOGIC_GND within each rectifier. MODULE_ALARM is a normally closed signal which signifies the presence of an alarm with a high impedance. MODULE_ALARM is designed to provide an power fail warning to indicate the pending loss of DC voltage during line drop conditions. MODULE_ALARM is asserted at least 5mSec prior to loss of DC output voltage during these conditions.

TEMP_FAIL

This signal is an opto-isolated open collector signal referenced to LOGIC_GND within each rectifier. TEMP_FAIL is a normally closed signal which signifies the presence of an alarm with high impedance. TEMP_FAIL indicates that the rectifier module has shut down due to an over-temperature condition.

REMOTE_OFF

This signal is a current limited input designed to accept a 3.3V to 5V input voltage. Applying a voltage between these pins will result in disabling the DC output voltage from the rectifier. This signal may be left un-terminated in systems where REMOTE_OFF is not required or is implemented via the I²C Interface.

OPTIONS

Optos

The isolated signals described and defined above are when the SEC_CONFIG_FEATURE byte is Enabled. Eltek standards for X Series rectifiers are:

Enabled
X7500A1-VV04
X5000A2-VV57

Disabled
X2500A1-VV
X2500B1-VV
X3750B1-VV
X5000A1-E4
X5000A1-VV
X7500A1-VV
X7500A2-VV

Truth Table for Disabled Alarm States

	Address Pin Condition			Alarm Output State		
I2C Address	LOC2	LOC1	LOC0	DC Alarm	AC Alarm	Temp Alarm
10	Low	Low	Low	1	1	1
12	Low	Low	High	1	1	0
14	Low	High	Low	1	0	1
1B	High	Low	Low	0	1	1
1A	High	Low	High	0	1	0
1C	High	High	Low	0	0	1
1E	High	High	High	0	0	0