

LPR12-30/-60

LPR48-30/-60

Line Power Modules

Technical Guide: 0120040-J0

Effective: 12/2018

LPR12-30, LPR12-60, LPR48-30, LPR48-60

 **NOTE:**

Photographs contained in this manual are for illustrative purposes only. These photographs may not match your installation.

 **NOTE:**

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, contact Alpha Technologies or your nearest Alpha representative.

 **NOTE:**

Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries, or other hardware if used or operated in any manner or subject to any condition inconsistent with its intended purpose, or if installed or operated in an unapproved manner, or improperly maintained.

For technical support, contact Alpha Technologies:

Canada and USA: **1-888-462-7487**

International: **+1-604-436-5547**

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1. Safety

SAVE THESE INSTRUCTIONS: This manual contains important safety instructions that must be followed during the installation, servicing, and maintenance of the product. Keep it in a safe place. Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies or the nearest Alpha representative.

1.1 Safety Symbols

To reduce the risk of injury or death, and to ensure the continued safe operation of this product, the following symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

The use of **ATTENTION** indicates specific regulatory/code requirements that may affect the placement of equipment and /or installation procedures.



NOTE:

A NOTE provides additional information to help complete a specific task or procedure. Notes are designated with a checkmark, the word NOTE, and a rule beneath which the information appears



CAUTION!

CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment. Cautions are designated with a yellow warning triangle, the word CAUTION, and a rule beneath which the information appears.



WARNING!

WARNING presents safety information to PREVENT INJURY OR DEATH to personnel. Warnings are indicated by a shock hazard icon, the word WARNING, and a rule beneath which the information appears.



HOT!

The use of HOT presents safety information to PREVENT BURNS to the technician or user.

1.2 General Safety



WARNING!

This system is designed to be installed in a restricted access location that is inaccessible to the general public.

1.3 Mechanical Safety

- Power supplies can reach extreme temperatures under load.
- Use caution around sheet metal components and sharp edges.

1.4 Electrical Safety

WARNING!

Hazardous voltages are present at the input of power systems. The DC output from rectifiers and batteries, though not dangerous in voltage, has a high short-circuit current capacity that may cause severe burns and electrical arcing.

Before working with any live battery or power system, follow these precautions:

- a. Remove all metallic jewelry, such as watches, rings, metal rimmed glasses, or necklaces.
- b. Wear safety glasses with side shields at all times during the installation.
- c. Use OSHA approved insulated hand tools. Do not rest tools on top of batteries.

WARNING!

Lethal voltages are present within the power system. Always assume that an electrical connection or conductor is energized. Check the circuit with a voltmeter with respect to the grounded portion of the enclosure (both AC and DC) before performing any installation or removal procedure.

- » Do not work alone under hazardous conditions.
- » A licensed electrician is required to install permanently wired equipment. Hazardous voltages are present at the input of power systems. Ensure that the utility power is disconnected and locked out before performing any installation or removal procedure.
- » Ensure that no liquids or wet clothes come into contact with internal components.
- » Hazardous electrically live parts inside this unit are energized from the batteries even when the AC input power is disconnected.
- » The enclosure which contains the DC or AC power system along with customer installed radios must remain locked at all times, except when authorized service personnel are present.
- » Always assume electrical connections or conductors are live. Turn off all circuit breakers and double-check with a voltmeter before performing installation or maintenance.
- » Place a warning label on the utility panel to warn emergency personnel that a reserve battery source is present which will power the loads in a power outage condition or if the AC disconnect breaker is turned off.
- » At high ambient temperature conditions, the internal temperature can be hot so use caution when touching the equipment.

2. Product Overview

The LPR12/LPR48 down converter modules employ a high frequency switched mode conversion technique to provide a bulk regulated nominal 12 or -48Vdc output from a single isolated ± 190 Vdc input. This is directly compatible with Alpha's LPS36 48Vdc to ± 190 Vdc up converters for use in network powering applications.

Line powering (also known as, Express, Simplex, Remote, Centralized) is a method of distributing energy over an existing copper network. Copper twisted-pairs are used to distribute 100VA limited power sources at ± 190 Vdc. The individual, isolated inputs are terminated at a remote end and converted back to an isolated nominal 12 or 48Vdc supply.

See the Specifications section of this manual, which details the electrical ratings for each module.



Figure 1 — LPR module

2.1 Product Features

- +/-190V to 12V or 48V DC-DC down converter for remote/line powering FTTH, FTTP or municipal Wi-Fi networks
- High efficiency 88-90% for reduced OPEX costs and carbon footprint
- Utilizes existing copper-pair network for distributing power
- Reduces truck rolls and operating expenses with no batteries at remote sites
- Compact, self-enclosed design, ideal for mounting on the side of houses, or aerial strands

2.2 Product Part Numbers

Description	Part Number/List Option
LPR-12-30	0120040-001
LPR-12-60	0120041-001
LPR-48-30	0120042-001
LPR-48-60	0120043-001

3. Specifications

Electrical	
Input Voltage	+/-100 to +/-190Vdc
Output Voltage	LPR12-30: 12.0-12.5Vdc LPR12-60: 12.5-13.5Vdc LPR48-30 47-50Vdc LPR48-60: 54-56 Vdc
Power	30W (LPR-12-30/48-30) 60W (LPR-12-60/48-60)
Efficiency	>88% (12V models); 90% (48V models)
Mechanical	
Dimensions	inches: 7.9H x 5.4W x 2.0D (mm: 202H x 138W x 52D) without the secure screw
Weight	.78 kg (1.7 .lb)
Environmental	
Temperature	-40 to 65°C (-40 to 149°F)
Humidity	5 to 95% RH non-condensing
Enclosure Type	NEMA 3R
Performance/Features	
LED	Presence of line power provided, output voltage, fault diagnostic
Connections	8-pin molex connectors
Wall Mounting	Four #8 (fastening hardware)
Agency Compliance	
Safety	CSA/UL 60950-1 CSA/UL 60905-21 (RFT-V circuit compatible) CAN/CSA C22.2 No. 60950-22-07 UL 60950-22 CSA C22.2 No. 94.2-07 UL 50E Low Voltage Directive 2006/95/EC
EMC	CFR47 (FCC) Part 15, Class A EN 300 386 v1.6.1

4. Site Evaluation and Pre-installation

4.1 Pre-installation Requirements

4.1.1 Effective Capacitance

At the time of installation, carry out a system assessment to ensure that the effective capacitance of the total system, including the capacitance from the output of the up-converter (front-end), does not exceed 11 μF (Line to Earth) and 40 μF (Line to Line).

4.1.2 RFT-V Circuits

At the time of installation, ensure that the voltage rating of the wiring of the telecommunication network is adequate for the normal RFT circuit voltage (+/-200Vdc), together with superimposed transients.

Ensure that the circuits to be connected together are all RFT-V circuits.

4.1.3 Primary Protection

The LPR Series has built-in surge protection across the input terminals in compliance with the GR-1089-CORE requirement. External primary protection is recommended for outdoor aerial installation.

4.1.4 Installation Locations

Allowable installation locations for the LPR converters include the following: outdoors, direct sunlight, and inside or outside a cabinet.



WARNING!

Do not submerge unit under water.

4.2 Packing Materials

All Alpha products are shipped in rugged, single walled boxes and suspended via solid inserts to minimize shock that may occur during transportation. Packaging assemblies and methods are tested to International Safe Transit Association standards.

4.2.1 Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure that the product is packed with at least three inches of shock-absorbing material to prevent shipping damage.

Alpha Technologies is not responsible for damage caused by improper packaging of returned products.

4.3 Check for Damage

Before unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior for damage. If any damage is observed, contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage, inform the carrier and contact Alpha Technologies for advice on the impact of any damage.

4.4 General Receipt of Shipment

The inventory included with your shipment is dependent upon the options you have ordered. The options are clearly marked on the shipping container labels and bill of materials.

Call Alpha Technologies if you have any questions before you proceed: 1 888 462 7487.

5. Installation

This chapter is provided for qualified personnel to install an LPR system.

5.1 General Instructions

This chapter provides cabling details and notes on cable sizing for DC applications. Connections to the converter system must comply with all the local codes and ordinances.

5.2 Safety Precautions



WARNING!

The DC input is a potentially dangerous voltage. Do not touch the input connections when under power. Per GR1089-ClassA2, qualified technicians can work on the unit when energized.

The DC output to the modules (and the converter system) - though not dangerous in voltage - has a high short circuit current capacity that may cause severe burns and electrical arcing.

The LPR unit shall be continuously energized to prevent condensation within the enclosure.

Before working with any live battery or power system, follow these precautions:

- a. Remove all metallic jewelry, such as watches, rings, metal rimmed glasses, or necklaces.
- b. Wear safety glasses with side shields at all times during the installation.
- c. Use OSHA approved INSULATED hand tools.

The installers should follow all applicable local rules and regulations for electrical and batter installations, eg., CSA, UL, CEC, NEC, OSHA, and local fire codes.

5.3 Tools Required

Various insulated tools are essential for product installation. The following list is a guide.

- Phillips head screwdriver, #2 (tip size, 3/16")
- Slot head screwdriver (blade size 1/8")
- Digital voltmeter equipped with test leads
- Cutters, crimpers, and wire strippers 0.25 to 10mm²

5.4 Mounting

The following figure shows the recommended mounting orientation.

Recommended hardware:

- 4x #8 screws
- 4x #8 flat narrow washers
- 4x #8 sealing washers for watertight mount

The LPR can be mounted to surfaces with #8 fastening hardware in four locations. Alpha recommends using flat washers for improved fastening.

6. Mounting Orientation

Mount the LPR in the orientation as shown in the following image.



Figure 2 — LPR mounting orientation

6.1 LPR Wiring Connections

Safety Precautions

WARNING!

For safety reasons, ensure the shelf is properly bonded to the enclosure's ground grid.

Input voltage shall meet UL60950-21 RFT-V requirements.

DO NOT CONNECT TO RFT-C CIRCUITS.

Chassis must be permanently grounded.

Telecom cable carrying $\pm 190V$, shall be #26 AWG minimum (rated 200V minimum).

Primary over voltage protection must be provided on all input pairs.

Insulation of the outside plant conductors should be rated $>90^{\circ}C$ ($194^{\circ}F$).

Insulation of the wiring inside the enclosed equipment cabinets should be rated $105^{\circ}C$ ($221^{\circ}F$) minimum. Cables must be dressed to avoid damage to the conductors.

The designed capacitance between $+190V$ and $-190V$ RFT-V conductors is $7\mu F$ and the measured capacitance between $\pm 190V$ conductors and earth is $<1\mu F$.



CAUTION!

CAUTION: The equipment shall be energized continuously to prevent condensation within the outdoor enclosure.

This equipment is intended to be used in outdoor environments.

Load connections should be made in close proximity to the power output.

Refer to the Installation chapter for additional safety precautions.

6.2 Input and Output Wiring

Input Cable (24AWG, 3 conductors)

Input	Wire Color	Circuit Designation
VIN (+)	Red	+190V_ChA
VIN (-)	White	-190V_ChA
GND	Green	Chassis Ground

Output Cable 48V Model (20AWG, 3 conductors)

Input	Wire Color	Circuit Designation
VOUT (+)	Black	48V_RTN
VOUT (-)	Red	-48V
GND	Green	Chassis Ground

Output Cable 12V Model (20AWG, 3 conductors)

Input	Wire Color	Circuit Designation
VOUT (+)	Black	+12V
VOUT (-)	White	12V_RTN
GND	Green	Chassis Ground

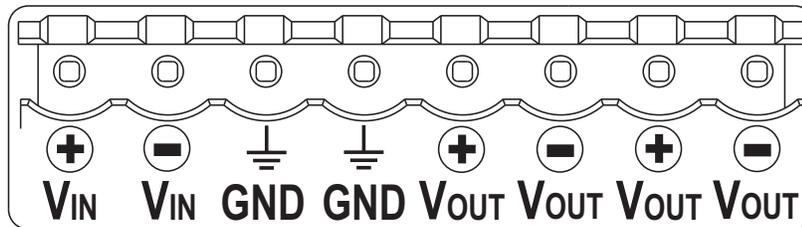


Figure 3 — Input and output terminals

6.3 Normal Mode of Operation

Normal operation of the converter system will be indicated by the illumination of the green LED indicators.

6.4 Reverse Polarity Protection

The converter will not be damaged and will operate if an input connection is made in reverse.

7. Warranty Statement and Service Information

7.1 Technical Support

In Canada and the USA, call toll free 1-888-462-7487.

Customers outside Canada and the USA, call +1-604-436-5547.

7.2 Warranty Statement

For full information details review Alpha's online Warranty Statement at www.alpha.ca/support.

7.3 Product Warranty

Alpha warrants that for a period of two (2) years from the date of shipment its products shall be free from defects under normal authorized use consistent with the product specifications and Alpha's instructions, the terms of the manual will take precedence.

The warranty provides for repairing, replacing or issuing credit (at Alpha's discretion) for any equipment manufactured by it and returned by the customer to the factory or other authorized location during the warranty period.

There are limitations to this warranty coverage. The warranty does not provide to the customer or other parties any remedies other than the above. It does not provide coverage for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. No other obligations are expressed or implied. Warranty also does not cover damage or equipment failure due to cause(s) external to the unit including, but not limited to, environmental conditions, water damage, power surges or any other external influence.

The customer is responsible for all shipping and handling charges. Where products are covered under warranty Alpha will pay the cost of shipping the repaired or replacement unit back to the customer.

7.4 Battery Warranty

Note that battery warranty terms and conditions vary by battery and by intended use. Contact your Alpha sales representative or the Technical Support team at the above number to understand your entitlements under Battery Warranty.

7.5 Warranty Claims

Any claim under this Limited Warranty must be made in writing to Alpha BEFORE sending material back. Alpha will provide Product return instructions upon approval of return request. A Service Repair Order (SRO) and / or Return Authorization (RA) number will be issued ensuring that your service needs are handled promptly and efficiently.

Claims must be made online at: www.alpha.ca.

7.6 Service Information

For a list of international service centers, refer to the Alpha website: www.alpha.ca

8. Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
AWG	American Wire Gauge
BTU	British thermal unit
CAN	Controller area network
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
CX	Cordex™ series; e.g., CXC for Cordex System Controller
DC	Direct current
DHCP	Dynamic Host Configuration Protocol
EIA	Electronic Industries Alliance
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ERM	Electromagnetic Compatibility and Radio Spectrum Matters
ESD	Electrostatic Discharge
FCC	Federal Communications Commission (for the USA)
GSM	Group Speciale Mobile (global system for mobile communications)
HVSD	High voltage shutdown
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
LED	Light emitting diode
LVD	Low voltage disconnect
MIL	One thousandth of an inch; used in expressing wire cross sectional area
MOV	Metal oxide varistor
MTBF	Mean time between failures
NC	Normally closed
NEC	National Electrical Code (for the USA)
NO	Normally open
OSHA	Occupational Safety & Health Administration
OVP	Over voltage protection
RAM	Random access memory
RU	Rack unit (1.75")
TCP/IP	Transmission Control Protocol / Internet Protocol
THD	Total harmonic distortion
UL	Underwriters Laboratories
VRLA	Valve regulated lead acid

9. Certification

About CSA and NRTL

CSA (Canadian Standards Association also known as CSA International) was established in 1919 as an independent testing laboratory in Canada. CSA received its recognition as an NRTL (Nationally Recognized Testing Laboratory) in 1992 from OSHA (Occupational Safety and Health Administration) in the United States of America (Docket No. NRTL-2-92). This was expanded and renewed in 1997, 1999, and 2001. The specific notifications were posted on OSHA's official website as follows:

- Federal Register #: 59:40602 - 40609 [08/09/1994]
- Federal Register #: 64:60240 - 60241 [11/04/1999]
- Federal Register #: 66:35271 - 35278 [07/03/2001]

When these marks appear with the indicator “C and US” or “NRTL/C” it means that the product is certified for both the US and Canadian markets, to the applicable US and Canadian standards. (1)

Alpha rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 60950-01 and UL 60950-01. Alpha UPS products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 107.3 and UL 1778.

As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)

Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)



NRTLs capabilities

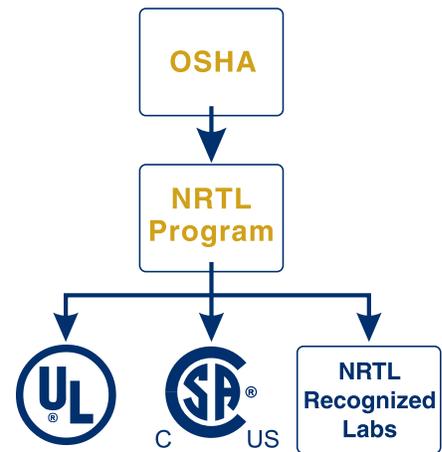
NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program.

The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4)

The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)

Governance of NRTL

The NRTL Program is both national and international in scope with foreign labs permitted.

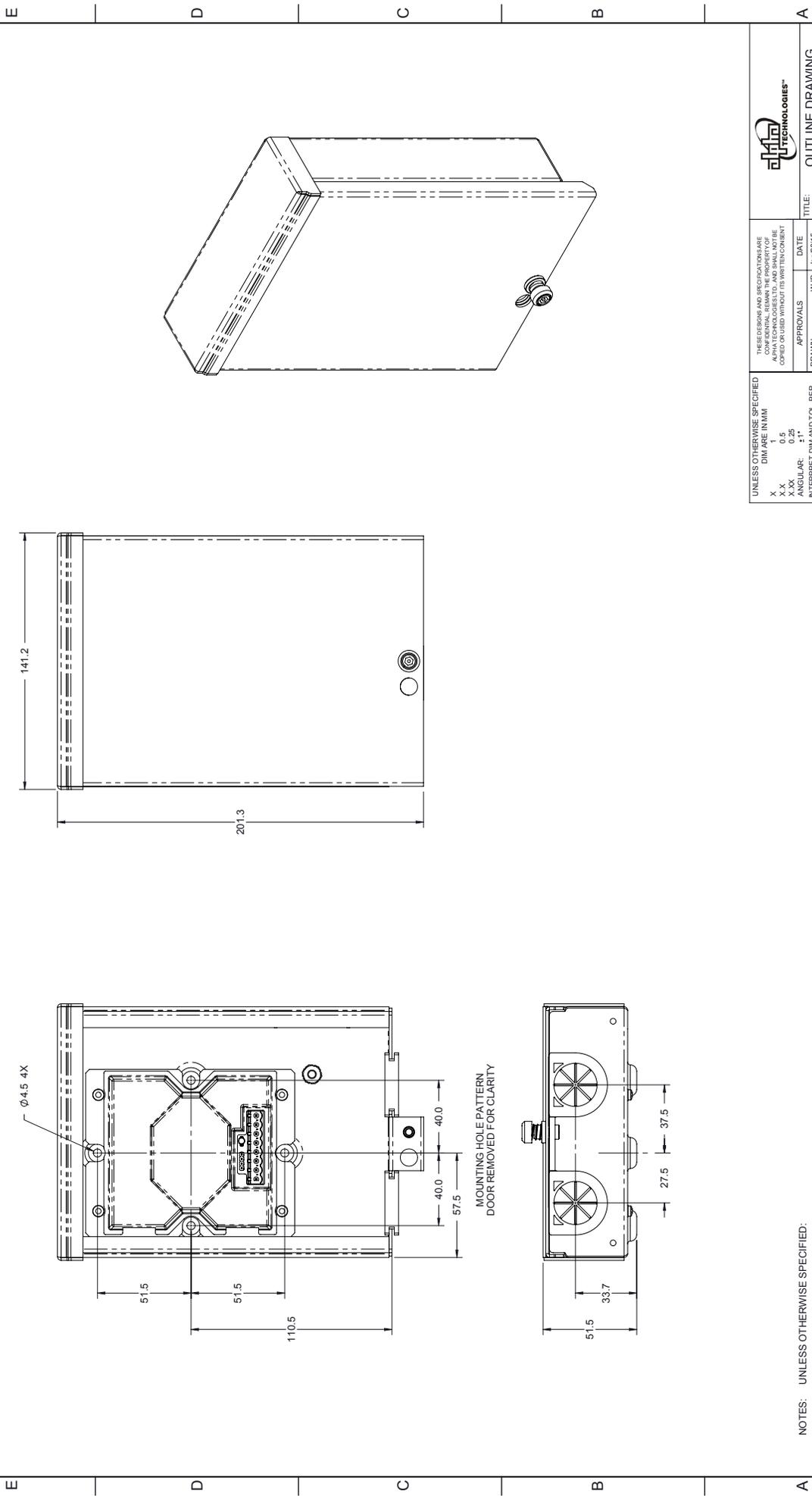


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NOTES: UNLESS OTHERWISE SPECIFIED:
1. PRODUCT TO BE FABRICATED ACCORDING TO ATL PRODUCTION STANDARD 0700001

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