

**JASPER
ELECTRONICS**



POPULAR OPTIONS

- Additional Labeling
- Custom Silkscreening
- Bar Codes



CONTACT

1580 No. Kellogg Dr.
Anaheim, California, 92807

(714) 917-0749

www.jasperelectronics.com
sales@jasperelectronics.com

Model TC2216-24 (HV)

AC Input / 175 Watt 24 & 48 VDC Output w/ PFC



TC2216 FRONT VIEW



TC2216 REAR VIEW

GENERAL OVERVIEW

Jasper Electronics Model TC2216-24(HV) component power supply module is **fully compliant** to the **Advanced Transportation Controller (ATC) Cabinet Standard 5301**, v02.02, March 18, 2019, and designated as ATC 5301 Model 2216-24-HV. The features and specifications listed here may be revised as a result of ongoing development testing or additional user requested changes, but as of the user acceptance date of the first article production sample model (Revision code A), changes affecting the form, fit, function or other features outlined in this document shall not be permitted without prior notification to and written approval from the user. Specific design requirements are detailed in the ATC 5301 document.

Generally, Model TC2216-24 is a 19.0" rack mounted, fully enclosed 2-output switching power supply capable delivering up to 175 Watts DC and intended specifically for use in ATC High Voltage (HV) Cabinets. These are designed for non-redundant "cold pluggable" installation in the end product. AC input and PE is via a detachable power cord inlet, and DC output power connections are through a 6-circuit connector, both on the rear of the supply as shown. User accessible line-side input and individual output fuses, as well as condition indicator LEDs, are all visible on the front panel. Front panel test points allow the user to verify output voltage set points. Model TC2216-24 is convection cooled, with an extended operating temperature range. It is designed to be directly interchangeable with 2216-24 modules from other vendors.

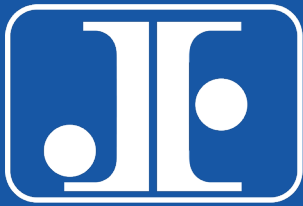
TECHNICAL SPECIFICATIONS

| INPUT | |
|--|---|
| Voltage/ Current Rating | AC 80-270V, 2.6Arms max, 45-65Hz, 10 Phase |
| Fusing | AC 3.00A, 250V delayed action (slow-blow) 3AG 0.25"x1 .25" cartridge type external line fuse provided, operator accessible on the front panel |
| Inrush Current | Soft start (~25°C cold start) 20Apk@ AC 115V |
| Power Factor | >0.95 line PFC typical at 115VAC, full load |
| Efficiency | At AC 115V: >80% |
| Under Voltage Protection | Auto DC output shutdown when AC input falls below safe operating limits. Automatic recovery when input rises to within normal operating range |
| OUTPUT | |
| Model TC2070-4 | |
| Voltage/Current (V/A) | V1 =+48.0VDC 0.0-1.0A V2 = +24.0V DC 0.0-5.0A Total loading on V1 +V2 not to exceed 175 Watts at 74°C DC outputs are electrically isolated from AC Mains, Earth Ground and each other |
| Output Voltage Setpoint | Factory preset within $\pm 2.0\%$ of nominal voltage |
| Line Regulation | $\pm 1.0\%$ at the output connection over full AC input range |
| Load Regulation | $< \pm 2.0V$ at the output connection over the full AC input range and 0 -100% output loading |
| Output Sense | Outputs internally sensed |
| Minimum Loading | None required |
| Output Turn-on Delay | <1.00 Sec from AC turn-on @110V AC |
| Over/ Under Shoot | <5% at turn-on or turn-off |
| Stability | $< \pm 0.2\%$ output drift after 20 minute warm-up |
| Temperature Coefficient | $< \pm 0.02\%/^{\circ}C$, 0° - 50°C, after 20 minute warm-up |
| Dynamic Response | Output recovers to within 1 % in less than 500 μ sec with a 50% load change at a slew rate of 1N μ sec. $< \pm 5.0\%$ peak transient deviation |
| Ripple and Noise (PARD) | 300mV max peak-to-peak at the output terminal with a 20 MHz bandwidth limit. May be measured with a 0.1 μ F ceramic capacitor in parallel with a 22 μ F tantalum capacitor connected between the measured output and its return |
| Over Voltage Protection (OVP) | Non-crowbar type. Any output exceeding 130% $\pm 5\%$ of nominal will cause all outputs to latch off. AC input recycle required to reset |
| Over Current/ Short Circuit Protection | Outputs fuse protected against overload and short-circuit faults |
| Output Fusing | AC 250V delayed action (slow-blow) 3AG 0.25"x1 .25" cartridge type external fuses provided in the(+) output, operator accessible on the front panel V1, 48V DC: 2.0A. V2, 24V DC: 8.0A. |
| Hold-Up Time | Outputs remain in regulation for 50mSec minimum following loss of input power at low line, full load |
| Output Transient Protection | Minimum 1500W voltage transient suppressor |
| SIGNALS, INDICATORS AND CONTROLS | |
| AC Power Indicator | Front panel mounted, single-color LED. Green indicates AC power ON. Off indicates an input or fuse fault |
| DC Power Indicator | Front panel mounted, single-color LED, 1 per output. Green indicates DC power ON. Off indicates an output or fuse fault |
| Output Test Points | Two "banana jack" type test sockets provided on the front panel, color coded red and black. Allows operator to verify output voltage. Mates with 0.175"x0.590" [4.5mmx15.0mm] plugs |

*Specifications subject to change without notice.

| MECHANICAL | | | | | | | | | | | | | | | |
|--|---|---------|----------|---|------------------|---|---------------------------------|---|------------------|---|----------|---|---------------|---|------------------------|
| (Refer to JE Outline Configuration Dwg, P/N 04166-000-G.) | | | | | | | | | | | | | | | |
| Mounting Orientation | 1 U x 19.00" EIA rack chassis designed for horizontal insertion into a dedicated space within an ATC 5301 cabinet | | | | | | | | | | | | | | |
| Weight | 1.59 Kg [3.50 lbs] | | | | | | | | | | | | | | |
| Retaining Fastener | 0.450"x0.250" radiusd slots at each corner of the front panel allow for user provided retaining hardware | | | | | | | | | | | | | | |
| SAFETY, REGULATORY AND EMC | | | | | | | | | | | | | | | |
| Designed to comply with the relevant industry standards of the authorities having jurisdiction | | | | | | | | | | | | | | | |
| Touch Current | 1.2mA max @ 50/60Hz, 115V AC per UL 60950 test procedures (Sec. 5.0) | | | | | | | | | | | | | | |
| Routine Factory Tests | Di-electric strength (hi-pot) to 2121V DC input-to-chassis and input-to-outputs; MegOhm to 500V output-to-chassis | | | | | | | | | | | | | | |
| OPERATING ENVIRONMENT | | | | | | | | | | | | | | | |
| Operating Temperature | -34.6° -+165.2°F [-37 .0° -+ 7 4.0°C] ambient at full load | | | | | | | | | | | | | | |
| Cooling | Convection only | | | | | | | | | | | | | | |
| Relative Humidity | Up to 95% RH, non-condensing | | | | | | | | | | | | | | |
| Conformal Coating | All printed circuit board surfaces are fully conformal coated with a UL94V-0 rated material to eliminate moisture absorption that includes a UV tracer | | | | | | | | | | | | | | |
| Operational Vibration | 0.75G peak, 5 -500Hz along three orthogonal axis | | | | | | | | | | | | | | |
| Storage Temperature | -40° to +185°F (-40° to +85°C) | | | | | | | | | | | | | | |
| Altitude | Operating to 10,000 ft. Storage to 30,000 ft. | | | | | | | | | | | | | | |
| MTBF | Designed for 150,000 hrs at 25°C | | | | | | | | | | | | | | |
| Service Life | 7 years, typical, before replacement should be considered | | | | | | | | | | | | | | |
| Calibration | Modules will maintain the output voltage and load capacity over the life of the equipment. Annual re-calibration or routine maintenance service is not specified or required | | | | | | | | | | | | | | |
| INTERCONNECT | | | | | | | | | | | | | | | |
| J1 AC Input | Recessed 3-circuit, IEC 320/C14 type. User accessible on the front panel. Requires user provided detachable NEMA 5-15 power cord | | | | | | | | | | | | | | |
| J2 DC Output Connector | <p>6-circuit (1x6) pcb feed-thru receptacle header, user accessible through a rear panel opening. UL rated 12.0A 250V per contact. UL94V-0 rated PA type insulation material. Phoenix Contact Stecksystem Classic Combicon, pin 1825161. Mates with PC pin 1823422 or user verified alternate plug header</p> <p>CAUTION: In accordance with IEC 61984, COMBICON connectors have no switching power (COC). During designated use, they must not be plugged in or disconnected when carrying voltage or under load</p> <table> <tr> <th>J1 Pin#</th><th>Function</th></tr> <tr> <td>1</td><td>+48.0 VDC Output</td></tr> <tr> <td>2</td><td>48.0 VDC Ground (Mains Neutral)</td></tr> <tr> <td>3</td><td>+24.0 VDC Output</td></tr> <tr> <td>4</td><td>Not Used</td></tr> <tr> <td>5</td><td>24 VDC Ground</td></tr> <tr> <td>6</td><td>Chassis (Earth) Ground</td></tr> </table> | J1 Pin# | Function | 1 | +48.0 VDC Output | 2 | 48.0 VDC Ground (Mains Neutral) | 3 | +24.0 VDC Output | 4 | Not Used | 5 | 24 VDC Ground | 6 | Chassis (Earth) Ground |
| J1 Pin# | Function | | | | | | | | | | | | | | |
| 1 | +48.0 VDC Output | | | | | | | | | | | | | | |
| 2 | 48.0 VDC Ground (Mains Neutral) | | | | | | | | | | | | | | |
| 3 | +24.0 VDC Output | | | | | | | | | | | | | | |
| 4 | Not Used | | | | | | | | | | | | | | |
| 5 | 24 VDC Ground | | | | | | | | | | | | | | |
| 6 | Chassis (Earth) Ground | | | | | | | | | | | | | | |

*Specifications subject to change without notice.



**JASPER
ELECTRONICS**



POPULAR OPTIONS

- Additional Labeling
- Custom Silkscreening
- Bar Codes



CONTACT

1580 No. Kellogg Dr.
Anaheim, California, 92807
(714) 917-0749

www.jasperelectronics.com
sales@jasperelectronics.com

STANDARD MARKING AND LABELING

A 2"x1" [50.8x25.4mm] adhesive label is applied to the front panel (ref. TEES 1.4.3). As a minimum, this label is imprinted with JE model identification data including JE name, JE model designation, JE part number, the input/output ratings, a 4-digit (week/year) manufacturing date code, and manufacturing facility identification code. Application of any future authorized product safety certification marks, user specified part number or model description, or user required markings such as bar codes, revision codes, name, or logo is optional, but may require an enlarged or additional label. Please consult the factory for details.

CUSTOM CONFIGURATION CODE

-MXXXX: Indicates a Modified model, where XXXX is a factory assigned 4-digit number to identify a unique, user specified configuration. Such models may include special or non-standard features and/or options, or be in a configuration differing sufficiently from the design of the approved similar standard model to require reevaluation of all or part of the design to ensure continuing compliance with all safety requirements. Please consult the factory for details.

STANDARD DOCUMENTATION

A Certificate of Conformance and a Test Certificate shall be included with each lot shipped. Unit serial numbers within the lot shall be listed on the certificates.

Following user acceptance of the production released configuration (Revision A), changes that affect the final (end) assembly revision shall not be incorporated unless and until the user has been notified and has submitted written approval for the change to JE engineering. This requirement applies to both JE and user requested design changes

ENVIRONMENTAL CONSIDERATIONS

The model TC2216-24 is fully compliant with the requirements of EC Directive 2015/863/EU Restrictions of Hazardous Substances (RoHS-10). RoHS compliant models are identified with the letter code "G" suffix added to the JE internal part number on the unit labels and related documents (sales orders, etc). All materials, processes and packaging used in the assembly and shipping of RoHS versions comply.

A Certificate of Compliance is available on request. Contact the factory.

PACKAGING AND SHIPPING

JE ships FOB Origin from the Anaheim, CA factory or our other subsidiary facilities.

LIMITED WARRANTY POLICY

All Jasper Electronics (JE) standard model power supplies and products are guaranteed to be free of defects in workmanship and materials for a minimum of two (2) years from the date of original shipment, when operated within specification. Non-standard (custom) power supplies and products may be warranted on an individual basis. The unused portion of this warranty is fully transferable with the original equipment in which the power supply is installed. Please see our website for full warranty statement.

NEMA TEST REPORT

SPECIFICATIONS USED FOR TEST: ATC5301 SEC 11 REV V02.02

ATC 5301 SEC 11 tests referred to herein were performed at A2Z Test Labs Company. Tests included:

- High Temperature with low and high input voltage applied
- Low Temperature with low and high input voltage applied
- Power interruption tests of 500 and 1000 milliseconds applied
- Various transients and non-destruct transients were applied
- Vibration survey and endurance vibration were performed in all three axes
- Mechanical shock tests were applied in all three axes

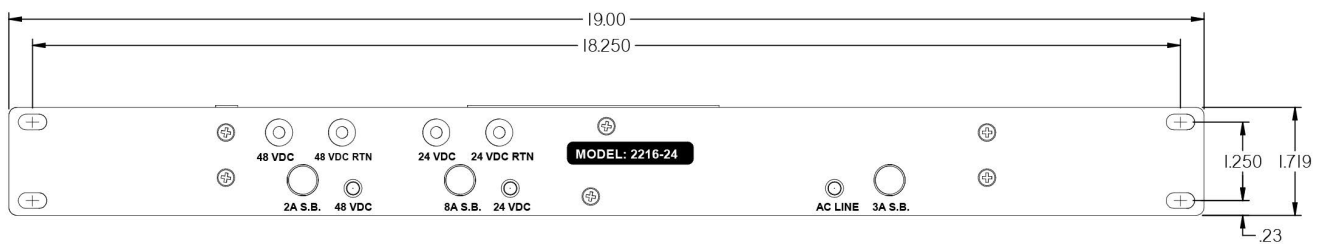
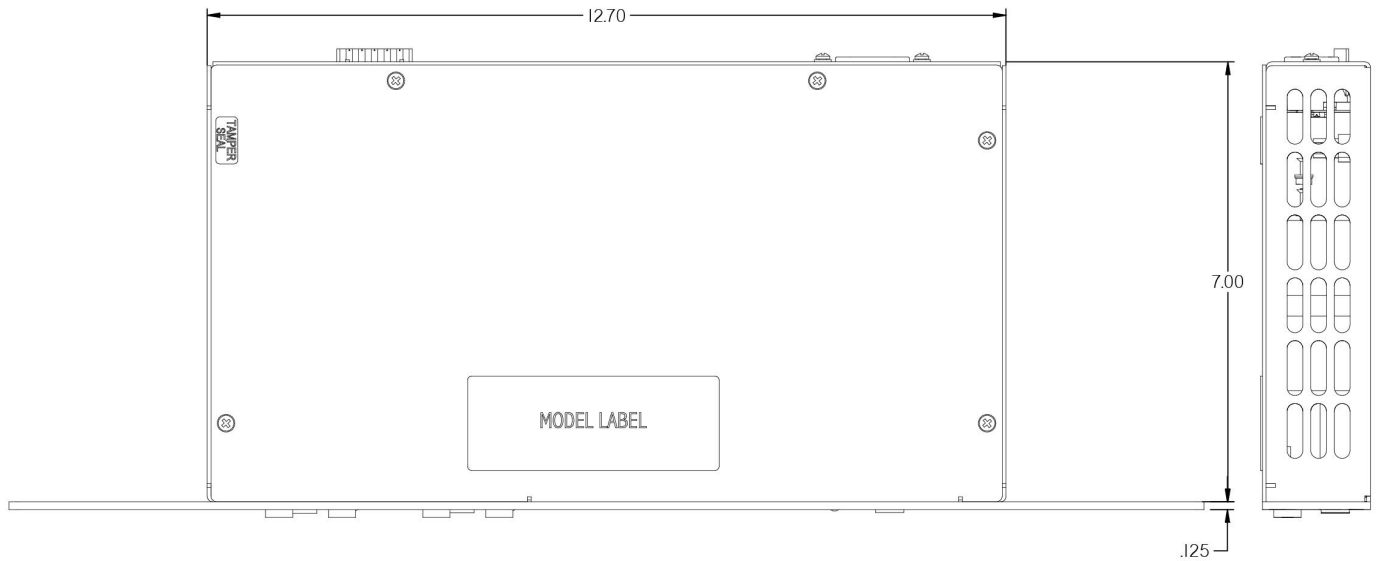
The units performed with no failures when subjected to the tests called out in ATC 5301 V02.02 SEC11. Jasper Electronics is not associated with A2Z Test Labs Company in any way.



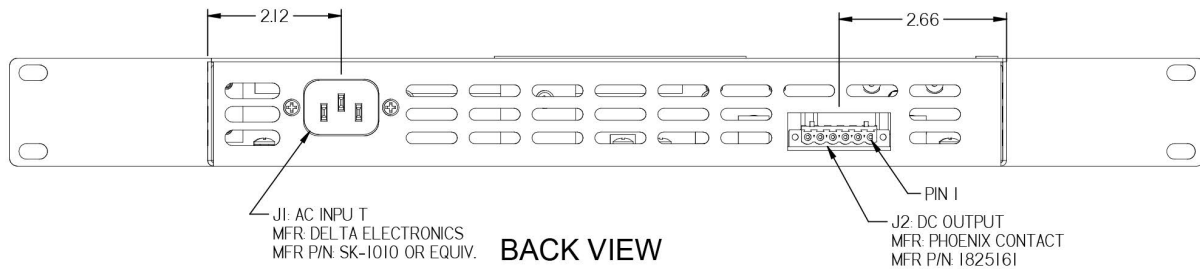
TC2216 OUTLINE DRAWING

Mechanical Outline

(Dimensions in inches[millimeters]. Not to scale.)



FRONT VIEW



BACK VIEW

All sheet metal exterior surfaces protected with black matte powder coating.
Front panel silkscreen lettering in very light gray.

INNOVATIVE SPECIALTY DC POWER SYSTEMS

Standard and Custom Power Supplies from 5W to 10KW

TRAFFIC CONTROL POWER SUPPLIES



- 70-400+ Watts / 120 and 220 VAC Models Available
- CALTRANS TEES, NYSDOT, CDOT, GDOT Compliant for 332, 334, 336, 342, 344, and 346 Series cabinets
- RoHS and NEMA Compliant
- Custom labeling and barcoding available
- Ruggedization against shock / vibration / humidity available

CUSTOM POWER DISTRIBUTION ASSEMBLIES (PDAs)



- Compliant with TEES 2020
- 1U smaller than the PDA2-LX and PDA3-LX
- User accessible slots as specified
- Custom labeling and barcoding available
- Ruggedization against shock / vibration / humidity available

COMPACT PCI



- AC or DC input, 175W - 500W DC output, active PFC
- 3U x 8HP, 6U x 8HP sizes
- PICMG 2.11 compliant, UL/CSA, NEMKO/TUV/CE certified, ROHS compliant
- Ruggedization against shock/ vibration/ humidity optional

Primary Applications: Industrial Computing, Military, Satellite Comm, Test, Transportation, Telecom, Aerospace

SPECIALTY HOT-SWAPPABLE POWER SUPPLIES



- 200-1500W, Universal Input, 5-54VDC Output
- Hot Swap. N+1, 90+% Efficiency
- 1U Form Factors
- 30+ Variations for Various Applications Including Nuclear
- Ruggedization against shock/ vibration/ humidity optional

Primary Applications: Medical Equipment, Military, Test, Automotive, Computing, Audio, Sensitive Electronics

RACK POWER SYSTEMS



- 200W-1500W, 2-8 slots, single or mixed output voltages, up to 10KW total
- Single, dual, or individual unit AC or DC input
- Internally or externally redundant DC outputs
- Standard 19" and 23" size or user-specified configurations also available
- Ruggedization against shock/ vibration/ humidity optional

Primary Applications: Medical Equipment, Military, Test, Automotive, Computing, Audio, Sensitive Electronics

CUSTOMS & MODIFIED STANDARDS



- 75W-2KW
- Single to 7 outputs
- Designed and built to custom or semi-custom specifications
- Ruggedization against shock/ vibration/ humidity optional
- Custom electrical specs, chassis, paint, labeling, connectors, interface all available

Primary Applications: Medical Equipment, Military, Test, Automotive, Computing, Audio, Sensitive Electronics

LOW NOISE CONVECTION / CONDUCTION COOLED POWER SUPPLIES



- 200W-500W, 90—264VAC full range input with 12-54 VDC Output
- Wide operating temperature range / high efficiency
- Small form factors
- Ruggedization against shock/ vibration/ humidity optional

Primary Applications: Medical Equipment, Military, IT, Sensitive Electronics

MEDICAL ADAPTERS



- 6W-250W, Efficiency levels V & VI
- Desktop, Wall-mount, and Interchangeable AC plug types
- Large selection of output connectors – additional cable lengths available
- UL60601 (medical) approved adapters available
- Ruggedization against shock/ vibration/ humidity optional

