

**JASPER ELECTRONICS**

1580 No. Kellogg Dr.  
 Anaheim, Ca., 92807  
 Ph: (714) 917-0749  
 Fax: (714) 917-0786  
 Email: R.Nishimoto@jasperelectronics.com  
 Web: www.jasperelectronics.com

General Product Specifications:

**Model TC2070-4A**

Jasper Electronics Internal Part Number: 03773-901-G  
**AC Input, 70 Watt 4 DC Outputs w/Standby.**

This document outlines the general specifications for Jasper Electronics (JE) model TC2070-4A component power supply module, fully compliant to the State of California Department of Transportation (CalTrans)

**Transportation Electrical Equipment Specification (TEES) March 12, 2009,  
 and designated Caltrans model 2070-4A.**

This document is currently preliminary only and may be incomplete in certain aspects. The features and specifications listed may be revised as a result of 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.



Front View



Rear View

Note: Model shown is an engineering prototype. Production units may vary slightly.

Specific design requirements are detailed in the TEES document. Generally, JE model TC2070-4A is a chassis mounted, open frame, 4-output with standby switching power supply capable delivering up to 75 Watts DC and intended specifically for use in Caltrans TEES 332L, 334L and 336L cabinets. Designed for non-redundant “cold pluggable” installation in the end product. AC input and PE is via a non-detachable power cord at the rear; DC output power and signal and control connections are through 10-circuit and 12-circuit connectors on the front of the supply. Adjacent on the front panel is a line-side operator accessible input fuse, and On/Off switch and output condition indicator LEDs. Convection cooled, with an extended operating temperature range. It is directly interchangeable with all other CalTrans approved 2070-4A modules.

**-INPUT-**

Voltage/Current  
 Label Rating ..... AC 90-135V, 60Hz±3Hz, 1.6A max. Single Phase.  
 Fusing ..... AC 3.0A, 250V delayed (slow-blow) action 3AG  
 (glass) 0.25"x1.25" cartridge type external line  
 fuse provided, operator accessible.  
 Inrush Current ..... Soft start (~25°C cold start) 25Apk @ AC 115V.

Efficiency ..... At AC 115V: >75% @ 1.0A;  
 >78% @ 5.0A;  
 >78% @ 10.0A.  
 Under Voltage  
 Protection ..... Auto DC output shutdown when AC input falls  
 below safe operating limits (≈ 50V AC).  
 Automatic recovery when input rises to within  
 normal operating range.

**-OUTPUTS-**

Model TC2070-4A  
 Voltage/Current (V/A) ... V1 +5.0V 0.0-10.0A  
                                   V2 +12.0V 0.0-0.5A (Serial)  
                                   V3 -12.0V 0.0-0.5A (Serial)  
                                   V4 +12.0V 0.0-1.0A (ISO)  
                                   V5 +5.0V 600µA (Standby)

Total loading on V1+V2+V3+V4 not to exceed 70 Watts at 74°C.  
 V5 is non-operating until AC input failure.

Output Voltage  
 Setpoint.....Factory preset within ±2.0% of nominal voltage.

Line Regulation .....±1.0% at the sense point over full AC input range and 0 – 100% output loading, with sense leads connected.

Load Regulation .....<±5.0% at the output connection over the full AC input range and 0 – 100% output loading.

Remote Sense.....V1 output compensates for up to 250mV total line drop in the load cables. Output is internally sensed if leads are opened.

Minimum Loading.....None required.

Output Turn-on Delay.....<1.0 second from AC turn-on.

Over/Under Shoot .....None at turn-on or turn-off.

Stability .....<±0.2% output drift after 20 minute warm-up.

Temp. Coefficient .....<±0.02%/°C, 0° - 50°C, after 20 minute warm-up.

Dynamic Response .....Output recovers to within 1% in less than 500µsec with a 50% load change at a slew rate of 1A/µsec. <±5.0% peak transient deviation.

Ripple and Noise (PARD).....50mV max peak-to-peak at the output terminal with a 20 MHz bandwidth limit. May be measured with a 0.1µF ceramic capacitor in parallel with a 22µF tantalum capacitor connected between the measured output and its return.

Hold-Up Time .....Outputs remain in regulation and capable of supplying 30 watts minimum for 550mSec following AC Fail going LOW. Holds output up for two (2) 500mSec power loss periods occurring within a 1.5 second period.

Over Voltage Protection (OVP) .....Non-crowbar type. Any output exceeding 130%±5% of nominal will cause all outputs to latch off. AC input recycle required to reset.

Over Temperature Protection.....Internal temperature sensing. Causes output to shut down. Automatic recovery.

Over Current/Short Circuit Protection .....Protected against overload and short-circuit faults. Automatic recovery when overload removed.

Standby Output .....Provides power at a minimum constant drain of 600µA from +5 to +2 VDC for 10 hours minimum. Monitor circuitry enables (ON) the +5 VDC Standby output immediately on Power Failure and isolates (OFF) at Power Up.

**-SIGNALS, INDICATORS and CONTROLS-**

AC On/Off Switch .....Line-side SPST toggle type, vertical throw, rated 5A@120VAC on the front panel. Panel silk-screened with function identification and On/Off positions adjacent. "Off" position is "down".

DC Power Indicator.....4 front panel mounted, single-color LEDs, one assigned to each output (V1-V4). Green indicates DC power ON and output is within ±5% of V-nom. Off indicates an output fault. Panel silk-screened with function and output identification adjacent.

AC Power Fail/Power Down .....AC Fail and Power Down output lines go LOW (ground true) immediately upon power failure. The lines transition to HIGH within 50ms after both power restoration and supply are fully recovered. Lines driven separately.

System Reset/Power Up.....Sysreset and Powerup output lines transition to LOW 525±25ms after AC Fail/Power Down transition to LOW. The Lines transition to HIGH 225±25ms after both Power Restoration and the supply are fully recovered. Lines driven separately.

Linesync .....60Hz Square Wave Linesync signal is generated by a crystal oscillator which synchronizes to the 60Hz VAC incoming power line at 120 and 300 degrees. A continuous square wave signal is +5 VDC amplitude, 8.333 ms halfcycle pulse duration, and 50±1% duty cycle. The output has a drive sink capability of 16 mA. A 2K Ohm pull-up resistor is connected between the output and +5 VDC. The monitor circuit compensates for missing pulses and line noise during normal operation. Signal disabled when Sysreset transitions LOW and enables when Sysreset transitions HIGH.

**-MECHANICAL-**

(Refer to JE Outline Configuration Dwg, P/N 03774-000.)

Weight.....1.59 Kg [3.50 lbs].

Retaining Fastener .....4 operator accessible M3x0.5 retractable thumb screw captive fasteners on the rear panel. TEES standard TSD No. 3.

Mounting Orientation .....Designed for horizontal insertion into a TEES specified Model 2070 Controller Unit.

**-OPERATING ENVIRONMENT-**

Operating Temperature ..-34.6° – +165.2°F (-37.0° – +74.0°C) ambient at full load.

Cooling .....Convection only.

Relative Humidity.....Up to 95% RH, non-condensing.

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.

Maintenance.....No routine maintenance is specified or required.

**-INTERCONNECT-**

AC Input ..... Non-detachable, 3x16 AWG conductor power cord exits the unit through a strain relief bushing from the rear panel. Minimum 40.0" length terminated with a NEMA 5-15P grounding type plug. 2 cord wrap brackets provided adjacent.

DC Output/Signal Connectors ..... **PS1:** 10-circuit (2x5) wire-to-board receptacle header with mating locking tab, user accessible through a front panel opening. Rated 9.5A per 0.99"[0.039mm] diameter contact pin, UL 94V-0 rated nylon 66/6 housing material. Tyco/AMP Mini-Universal Mate-N-Lok 2, p/n 1-770971-0. Mates with AMP plug p/n 770580-1 used with user selected AMP socket terminal appropriate for wire gauge and current capacity.

PS1 Pin#	Function
1	V1 (+5.0VDC) Output.
2	V2 (+12.0VDC) Serial Output.
3	V3 (-12.0VDC) Serial Output.
4	Return, V1,V2,V3 Output (Gnd).
5	V5 (+5.0VDC) Standby Output.
6	(+) V1 Sense.
7	(-) V1 Sense Return.
8	AC Input Power Fail Signal.
9	SYSRESET (System Reset).
10	No Connection.

**PS2:** 12-circuit (2x6) receptacle identical to PS1 above except: Tyco/AMP p/n 1-770972-0. Mates with AMP plug p/n 770581-1.

PS2 Pin#	Function
1	V1 (+5.0VDC) Output.
2	V2 (+12.0VDC) Serial Output.
3	V3 (-12.0VDC) Serial Output.
4	Return, V1,V2,V3 Output (Gnd).
5	V5 (+5.0VDC) Standby Output.
6	V4 (+12.0VDC) Isolated Output.
7	Return, V4 Output (Gnd).
8	POWERDOWN.
9	POWERUP.
10	EG (Equipment Ground).
11	LINESYNC.
12	No Connection.

**-SAFETY, REGULATORY and EMC-**

Designed to comply with the relevant industry standards of the authorities having jurisdiction, typically UL 60950-1, CSA 22.2 and IEC 60950.

EMI Filtering ..... Meets CISPR22B Level **TBD**, EN55022 Level **TBD**, and FCC Part 15, Level **TBD**, for conducted emissions.

Harmonics ..... Meets EN 61000-3 (harmonics and voltage fluctuations).

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.

**-MARKING and LABELING-**

A 2.00"x1.00" [50.8x25.4mm] adhesive label is applied to the front panel (ref. TEES 1.4.3). As a minimum, 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 possible but may require an enlarged or additional label. Consult the factory.

**-DOCUMENTATION-**

A Certificate of Conformance shall be issued with each lot shipped.

A Certificate of Test shall be issued with each lot shipped (the test data or results that may be required to appear on the certificate still **TBD** as of the publication date of this document).

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 TC2070-4A is fully compliant with the requirements of Directive 2002/95/EC Restrictions of Hazardous Substances (RoHS). 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-**

Every reasonable precaution is taken to ensure that the customer receives Jasper Electronics products in good condition. Each item was new when it left the factory and was packed in a container approved by the carrier.

JE makes shipments FOB from the Anaheim, CA, factory or other subsidiary facilities. When placed on board the carrier's vehicle, the equipment becomes the customer's property. The customer is responsible for examining each container when it arrives at the customer's facility, and for immediately reporting any damage to the delivering carrier. The customer shall make any and all subsequent claims for redress of in-transit damage directly to the carrier that delivered the shipment to the customer's facility and not to JE.

Unless otherwise requested, the model TC2070-4A assembly is typically boxed and shipped with up to five (5) units per container.

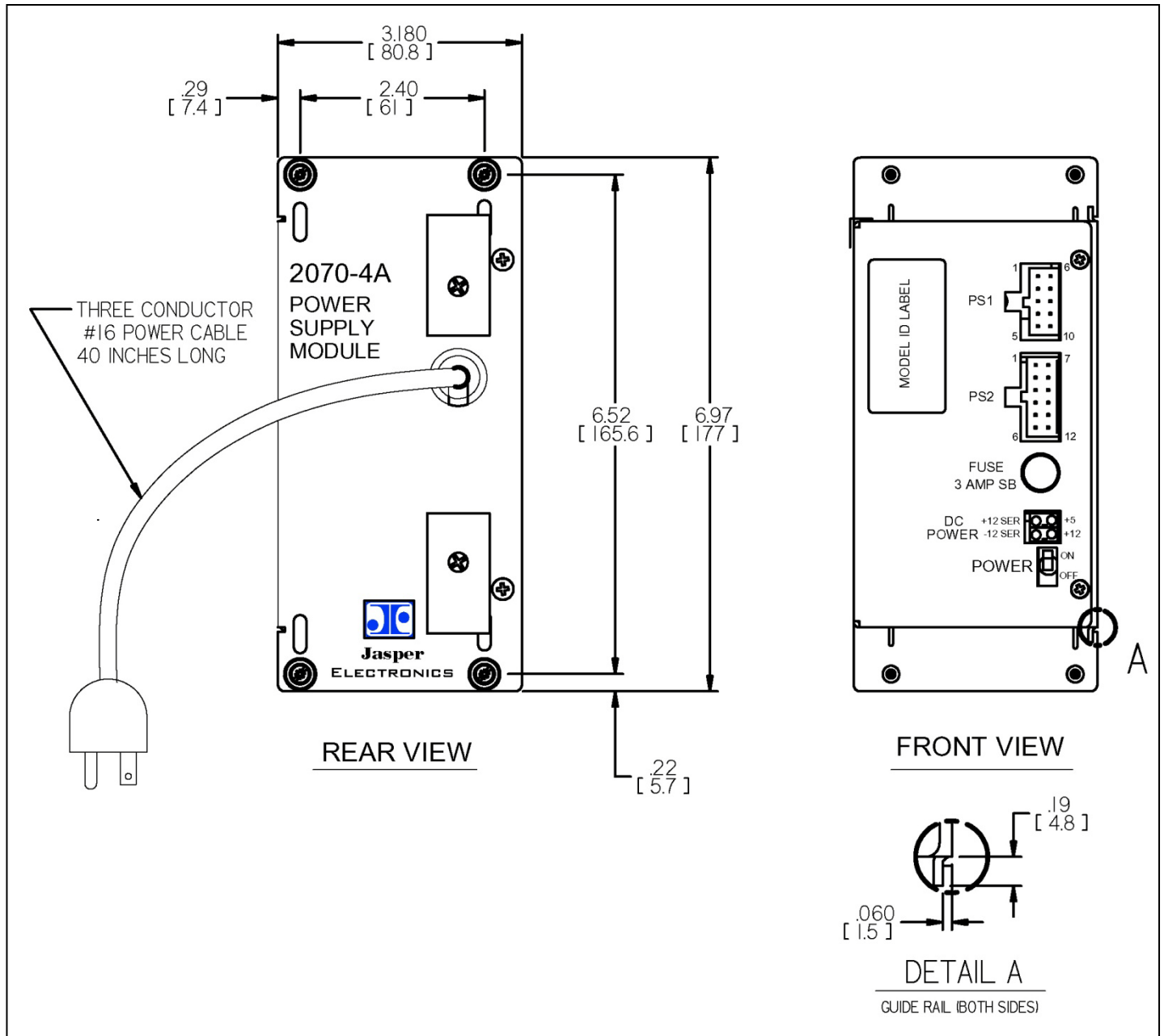
Shipping Weight ..... ~ 8.90g [~19.5 lbs], container with 5 assemblies.

**-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. This warranty applies only to defects that result in a failure to comply or perform to published specifications. 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.

Mechanical Outline

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



All statements and technical information contained herein are believed by JE to be reliable as of the publication date of this document, but the accuracy or completeness is not guaranteed, and JE reserves the right to change specifications without prior notification. However, every reasonable effort will be made by JE to inform users of JE products of changes to design form, fit or function that may affect the user's applications. JE manufactures a quality product, equal to any available in the marketplace; however, these products are intended to be used in accordance with the specifications described in these instructions. Any use or application that deviates from the stated operating specifications is not recommended and may be unsafe.

