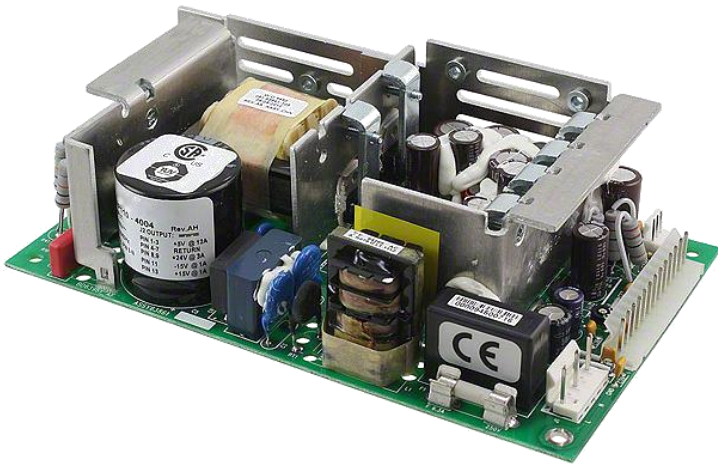


# MAP110 Series AC-DC Power Supplies



## Key Features & Benefits

- RoHS Lead-Solder-Exemption Compliant
- New 3.3 V and 5 V Output Models
- Universal Input 85-264 VAC
- Industry-Standard Footprint:  
7.0" x 4.3" x 1.97" (177.8 x 109.2 x 50.0 mm)
- Input Transient & ESD Compliance to EN61000-4-2/-3/-4
- Remote sense and overvoltage protection on single output units and main output of multiple output units
- Options include Overtemperature protection, Power Fail signal, Chassis & Cover
- Greater than 134,000 hours MTBF

Bel Power Solutions MAP110 Series of power supplies combines low cost and universal input in a board-only power solution to meet commercial and industrial requirements. Full international safety, EMI, and ESD compliance ensure worldwide acceptance. All units bear the CE Mark.

Wide dynamic output current and fixed-frequency operation simplifies system level operation. The MAP110 series is configured to an international standard footprint. Input and output connections are made via popular single-row Molex connectors.

Single output models feature wide-range output adjustability to meet a wide variety of standard and user-specific output voltage requirements.

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# MAP110 Series

## Single-Output Model Selection

| MODEL               | OUTPUT VOLTAGE | ADJUSTMENT RANGE | CONVECTION COOLED OUTPUT CURRENT | FORCED AIR OUTPUT CURRENT <sup>1</sup> | LINE REGULATION | LOAD REGULATION | RIPPLE & NOISE <sup>2</sup> | INITIAL SETTING ACCURACY |
|---------------------|----------------|------------------|----------------------------------|--|-----------------|-----------------|-----------------------------|--------------------------|
| <b>MAP110-1005*</b> | 5V             | 4.95V to 5.5V    | 16A                              | 22A                                    | 0.2%            | 1%              | 1%                          | 5.09V to 5.11V           |
| <b>MAP110-1012*</b> | 12V            | 11.25V to 12.75V | 7.5A                             | 10A                                    | 0.1%            | 0.5%            | 1%                          | 11.97V to 12.02V         |
| <b>MAP110-1024</b>  | 24V/28V        | 22.8V to 29.2V   | 3.8/3.2A <sup>3</sup>            | 5/4.3A <sup>3</sup>                    | 0.1%            | 0.5%            | 1%                          | 23.95V to 24.05V         |

## Multiple-Output Model Selection – 80 W Convection Cooled, 110 W Forced-Air Cooled (Minimum 200 LFM)

| MODEL               | OUTPUT VOLTAGE | ADJUSTMENT RANGE | CONVECTION COOLED OUTPUT CURRENT <sup>4</sup> | FORCED AIR OUTPUT CURRENT <sup>4</sup> | LINE REGULATION | LOAD REGULATION | RIPPLE & NOISE <sup>2</sup> | INITIAL SETTING ACCURACY |
|---------------------|----------------|------------------|---|--|-----------------|-----------------|-----------------------------|--------------------------|
| <b>MAP110-4000</b>  | +5V            | 4.75V to 5.25V   | 12A/20A PK                                    | 12A/20A PK                             | 0.2%            | 0.5%            | 1%                          | 5.09V to 5.11V           |
|                     | +12V           | Fixed            | 5A/9A PK                                      | 5A/9A PK                               | 0.2%            | 1%              | 1%                          | 11.97V to 12.03V         |
|                     | -12V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.2%            | 1%              | 1%                          | -11.4V to -12.6V         |
|                     | -5V            | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.2%            | 1.5%            | 1%                          | -4.75V to -5.25V         |
| <b>MAP110-4001*</b> | +5V            | 4.75V to 5.25V   | 12A/20A PK                                    | 12A/20A PK                             | 0.2%            | 0.5%            | 1%                          | 5.09V to 5.11V           |
|                     | +24V           | Fixed            | 3A/4.5A PK                                    | 3A/4.5A PK                             | 0.1%            | 1%              | 1%                          | 23.94V to 24.06V         |
|                     | -12V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | -11.4V to -12.6V         |
|                     | +12V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | 11.4V to 12.6V           |
| <b>MAP110-4002</b>  | +5V            | 4.75V to 5.25V   | 12A/20A PK                                    | 12A/20A PK                             | 0.2%            | 0.5%            | 1%                          | 5.09V to 5.11V           |
|                     | +12V           | Fixed            | 5A/9A PK                                      | 5A/9A PK                               | 0.1%            | 1%              | 1%                          | 11.97V to 12.03V         |
|                     | -12V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | -11.4V to -12.6V         |
|                     | +12V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | 11.4V to 12.6V           |
| <b>MAP110-4003*</b> | +5V            | 4.75V to 5.25V   | 12A/20A PK                                    | 12A/20A PK                             | 0.2%            | 0.5%            | 1%                          | 5.09V to 5.11V           |
|                     | +15V           | Fixed            | 5A/7.3A PK                                    | 5A/7.3A PK                             | 0.1%            | 1%              | 1%                          | 14.96V to 15.04V         |
|                     | -15V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | -14.3V to -15.7V         |
|                     | -5V            | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.2%            | 1.5%            | 1%                          | -4.75V to -5.25V         |
| <b>MAP110-4004</b>  | +5V            | 4.75V to 5.25V   | 12A/20A PK                                    | 12A/20A PK                             | 0.2%            | 0.5%            | 1%                          | 5.09V to 5.11V           |
|                     | +24V           | Fixed            | 3A/4.5A PK                                    | 3A/4.5A PK                             | 0.1%            | 1%              | 1%                          | 23.94V to 24.06V         |
|                     | -15V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | -14.3V to -15.7V         |
|                     | +15V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | 14.3V to 15.7V           |
| <b>MAP110-4010*</b> | +5V            | 4.75V to 5.25V   | 12A/20A PK                                    | 12A/20A PK                             | 0.2%            | 0.5%            | 1%                          | 5.09V to 5.11V           |
|                     | +12V           | Fixed            | 5A/9A PK                                      | 5A/9A PK                               | 0.1%            | 2%              | 1%                          | 11.97V to 12.03V         |
|                     | -5V            | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.2%            | 1.5%            | 1%                          | -4.75V to -5.25V         |
|                     | -12V           | Fixed            | 3A/4A PK                                      | 3A/4A PK                               | 0.3%            | 8%              | 1%                          | -11.5V to -12.5V         |
| <b>MAP110-4011</b>  | +5V            | 4.75V to 5.25V   | 12A/20A PK                                    | 12A/20A PK                             | 0.2%            | 0.5%            | 1%                          | 5.09V to 5.11V           |
|                     | +12V           | Fixed            | 5A/9A PK                                      | 5A/9A PK                               | 0.1%            | 1%              | 1%                          | 11.97V to 12.03V         |
|                     | -12V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | -11.4V to -12.6V         |
|                     | +24V           | Fixed            | 1A/1.5A PK                                    | 1A/1.5A PK                             | 0.1%            | 1%              | 1%                          | 23.2V to 24.8V           |

<sup>1</sup> With minimum 200LFM forced-air cooling.

<sup>2</sup> Maximum peak to peak noise expressed as a percentage of output voltage, 20 MHz bandwidth.

<sup>3</sup> MAP110-1024 output currents are expressed as 24V/28V operation.

<sup>4</sup> Peak loads up to 110 watts for 60 seconds or less are acceptable, (10% duty cycle max.). Peak power must not exceed 110 watts.

# MAP110 Series

|                                   |       |                  |            |            |      |      |      |                  |
|-----------------------------------|-------|------------------|------------|------------|------|------|------|------------------|
| <b>MAP110-4015*</b>               | +5V   | 4.75V to 5.25V   | 12A/20A PK | 12A/20A PK | 0.2% | 0.5% | 1%   | 5.09V to 5.11V   |
|                                   | +12V  | Fixed            | 5A/9A PK   | 5A/9A PK   | 0.1% | 1%   | 1%   | 11.97V to 12.03V |
|                                   | -15V  | Fixed            | 1A/1.5A PK | 1A/1.5A PK | 0.1% | 1%   | 1%   | -14.4V to -15.6V |
|                                   | +15V  | Fixed            | 1A/1.5A PK | 1A/1.5A PK | 0.1% | 1%   | 1%   | 14.4V to 15.6V   |
| <b>MAP110-4200</b>                | +12V  | 11.55V to 12.45V | 5A/9A PK   | 5A/9A PK   | 0.2% | 0.5% | 0.5% | 11.96V to 12.03V |
|                                   | +24V  | Fixed            | 4A/4.5A PK | 4A/4.5A PK | 0.2% | 1%   | 1%   | 23.94V to 24.06V |
|                                   | -12V  | Fixed            | 1A/1.5A PK | 1A/1.5A PK | 0.2% | 1%   | 1%   | -11.4V to -12.6V |
|                                   | +5V   | Fixed            | 2A/2.5A PK | 2A/2.5A PK | 0.2% | 1.5% | 1%   | 4.75V to 5.25V   |
| <b>MAP110-4300*<sup>5,6</sup></b> | +3.3V | 3.2V to 3.4V     | 12A/20A PK | 15A/20A PK | 0.3% | 0.7% | 1%   | 3.29V to 3.31V   |
|                                   | +5V   | Fixed            | 5A/12A PK  | 8A/12A PK  | 0.2% | 1%   | 1%   | 4.98V to 5.02V   |
|                                   | -12V  | Fixed            | 1A/1.5A PK | 1A/1.5A PK | 0.1% | 1%   | 1%   | -11.4V to -12.6V |
|                                   | +12V  | Fixed            | 1A/1.5A PK | 1A/1.5A PK | 0.1% | 1%   | 1%   | 11.4V to 12.6V   |
| <b>MAP110-4305*<sup>5,6</sup></b> | +3.3V | 3.2V to 3.4V     | 12A/15A PK | 15A/20A PK | 0.3% | 0.7% | 1%   | 3.29V to 3.31V   |
|                                   | +5V   | Fixed            | 5A/12A PK  | 8A/12A PK  | 0.2% | 1%   | 1%   | 4.98V to 5.02V   |
|                                   | -5V   | Fixed            | 1A/1.5A PK | 1A/1.5A PK | 0.1% | 1%   | 1%   | -4.75V to -5.25V |
|                                   | +12V  | Fixed            | 1A/1.5A PK | 1A/1.5A PK | 0.1% | 1%   | 1%   | 11.4V to 12.6V   |

## Maximum Output Rating

| MODEL/OUTPUT OPTION          | MULTIPLE OUTPUT BOARD ONLY | SINGLE OUTPUT BOARD ONLY | MULTIPLE OUTPUT 'L'-BRACKET | SINGLE OUTPUT 'L'-BRACKET | MULTIPLE OUTPUT 'C'-COVER | SINGLE OUTPUT 'C'-COVER |
|------------------------------|----------------------------|--------------------------|-----------------------------|---------------------------|---------------------------|-------------------------|
| CONVECTION CONTINUOUS / PEAK | 80W/110W                   | 90W/120W                 | 80W/110W                    | 90W/120W                  | 60W/110W                  | 65W/120W                |
| FORCED AIR 200 LMF           | 110W                       | 120W                     | 110W                        | 120W                      | 110W                      | 120W                    |

<sup>5</sup> Sum of the output currents of V1 + V2 may not exceed 15 A continuous, 22 A peak.

<sup>6</sup> Maximum operating ambient temperature of 40°C

Model numbers highlighted in yellow are not recommended for new designs.

\* Obsolete

# MAP110 Series

## Input Specifications

| PARAMETER            | CONDITIONS / DESCRIPTION   | MIN                                 | NOM | MAX        | UNITS            |
|----------------------|--|-------------------------------------|-----|------------|------------------|
| Input Voltage - AC   | Continuous input range   | 85                                  |     | 264        | VAC              |
| Input Frequency      | AC input   | 47                                  |     | 63         | Hz               |
| Brown Out Protection | Lowest AC input voltage when regulation is maintained with full rated loads. | 85                                  |     |            | VAC              |
| Hold-up Time         | Nominal AC input voltage (110 VAC)   | 50% load: 40<br>Full rated load: 20 |     |            | mS               |
| Input Current        | 85 VAC (110W load)<br>110VAC (110W load)                                     |                                     |     | 3.5<br>2.8 | A <sub>RMS</sub> |
| Input Protection     | Non-user serviceable internally located AC input line fuse.                  |                                     |     |            |                  |
| Inrush Surge Current | Internally limited by thermistor. $V_{in} = 264$ VAC (one cycle). 25 °C.     |                                     |     | 41         | A <sub>PK</sub>  |
| Operating Frequency  | Switching frequency of main transformer, (fixed frequency).                  | 20                                  |     | 25         | kHz              |

## Output Specifications

| PARAMETER              | CONDITIONS / DESCRIPTION  | MIN    | NOM                       | MAX       | UNITS |
|------------------------|---|--------|---------------------------|-----------|-------|
| Efficiency             | Full load @ 230 VAC (Varies with distribution of loads among outputs.)  |        | 70% typical               |           |       |
| Minimum Loads          | Single output models<br>Multiple output models, $V_1 + V_2$ <sup>7</sup>  | 0<br>1 |                           |           | Amps  |
| Ripple and Noise       | Full Load, 20 MHz Bandwidth.  |        | See Model Selection Chart |           |       |
| Output Power           | Multiple output units with convection cooling.<br>Multiple output units with 200 LFM forced air cooling.  | 5<br>5 |                           | 80<br>110 | Watts |
| Overshoot / Undershoot | Output voltage overshoot/undershoot at turn-on.   |        |                           | 1         | %     |
| Regulation             | Varies by output, regulation includes: line changes from 90-132 VAC or 175-264, changes in load starting at 20% load and changing to 100% load. |        | See Model Selection Chart |           |       |
| Transient Response     | Recovery time, to within 1% of initial set point due to a 50-100% load change, 4% max. deviation. (Main output only on multiple output units).  |        | 500                       |           | μS    |
| Turn-on Delay          | Time required for initial output voltage stabilization.   |        |                           | 1         | Sec   |
| Turn-on Rise Time      | Time required for output voltage to rise from 10% to 90%.   |        |                           | 20        | mS    |

## Interface Signals & Internal Protection

| PARAMETER                  | CONDITIONS / DESCRIPTION   | MIN              | NOM  | MAX | UNITS |   |
|----------------------------|--|------------------|------|-----|-------|---|
| Overvoltage Protection     | Provided on single output models and the main output of multiple output models.  | MAP110-1005      | 6.10 |     | 7.20  | V |
|                            |  | MAP110-1012      | 17.3 |     | 20.2  |   |
|                            |  | MAP110-1024      | 32.2 |     | 37.8  |   |
|                            |  | MAP110-4200      | 13.8 |     | 16.2  |   |
|                            |  | MAP110-4300      | 3.7  |     | 4.35  |   |
|                            |  | All other models | 5.75 |     | 6.75  |   |
| Overload Protection        | Fully protected against output overload and short circuit.<br>Automatic recovery upon removal of overload condition.   |                  | 150  | 200 | %     |   |
| Remote Sense               | Voltage drop compensated for at the load.  |                  |      | 250 | mV    |   |
| Input Power Fail Warning   | Option, TTL compatible logic signal. Time before regulation dropout due to loss of input power at 110 VAC. Active low. | 3                | 5    |     | mS    |   |
| Overtemperature Protection | Option, system shutdown due to excessive internal temperature.   |                  |      |     |       |   |

<sup>7</sup> Minimum load is required only to meet the regulation limits of V3 and V4. If V3 and V4 are unused, no minimum load is necessary.

# MAP110 Series

## Safety, Regulatory and EMI Specifications

| PARAMETER                               | CONDITIONS / DESCRIPTION   | MIN  | NOM         | MAX | UNITS |
|---|--|------|-------------|-----|-------|
| Agency Approvals                        | Approved to the latest edition of the following standards; UL/CSA60950-1 2nd, IEC60950-1 2nd and EN60950-1 2nd.                        |      |             |     |       |
| Dielectric Withstand Voltage            | Input to Chassis   | 2121 |             |     | VDC   |
|   | Input to Output (tested by manufacturer only)  | 4242 |             |     |       |
| Electromagnetic Interference, Conducted | FCC CFR title 47 Part 15 Sub-Part B - conducted & radiated<br>EN55022 / CISPR 22 conducted<br>EN55022 / CISPR 22 radiated <sup>8</sup> |      | B<br>B<br>A |     | Class |
| Input Transient Protection              | EN61000-4-5 Level 3  | 2    |             |     | kV    |
| Insulation Resistance                   | Input to output  | 10   |             |     | MΩ    |
| Leakage Current                         | Per EN60950, 264 VAC   |      |             | 750 | μA    |

## Environmental Specifications

| PARAMETER               | CONDITIONS / DESCRIPTION  | MIN    | NOM   | MAX      | UNITS   |
|-------------------------|---|--------|-------|----------|---------|
| Altitude                | Operating   |        |       | 10k      | ASL Ft. |
|                         | Non-operating   |        |       | 50k      |         |
| Operating Temperature   | Derate linearly above 50°C by 2.5% per °C to a max. temp. of 70°C |        |       |          |         |
|                         | At 100% load:<br>At 50% load:                                     | 0<br>0 |       | 50<br>70 | °C      |
| Storage Temperature     |   | -55    |       | 85       | °C      |
| Temperature Coefficient | 0°C to 70°C (after 15 minute warm-up)                             |        | ±0.03 | ±0.05    | %/°C    |
| Relative Humidity       | Non-condensing  |        |       | 95       | %RH     |

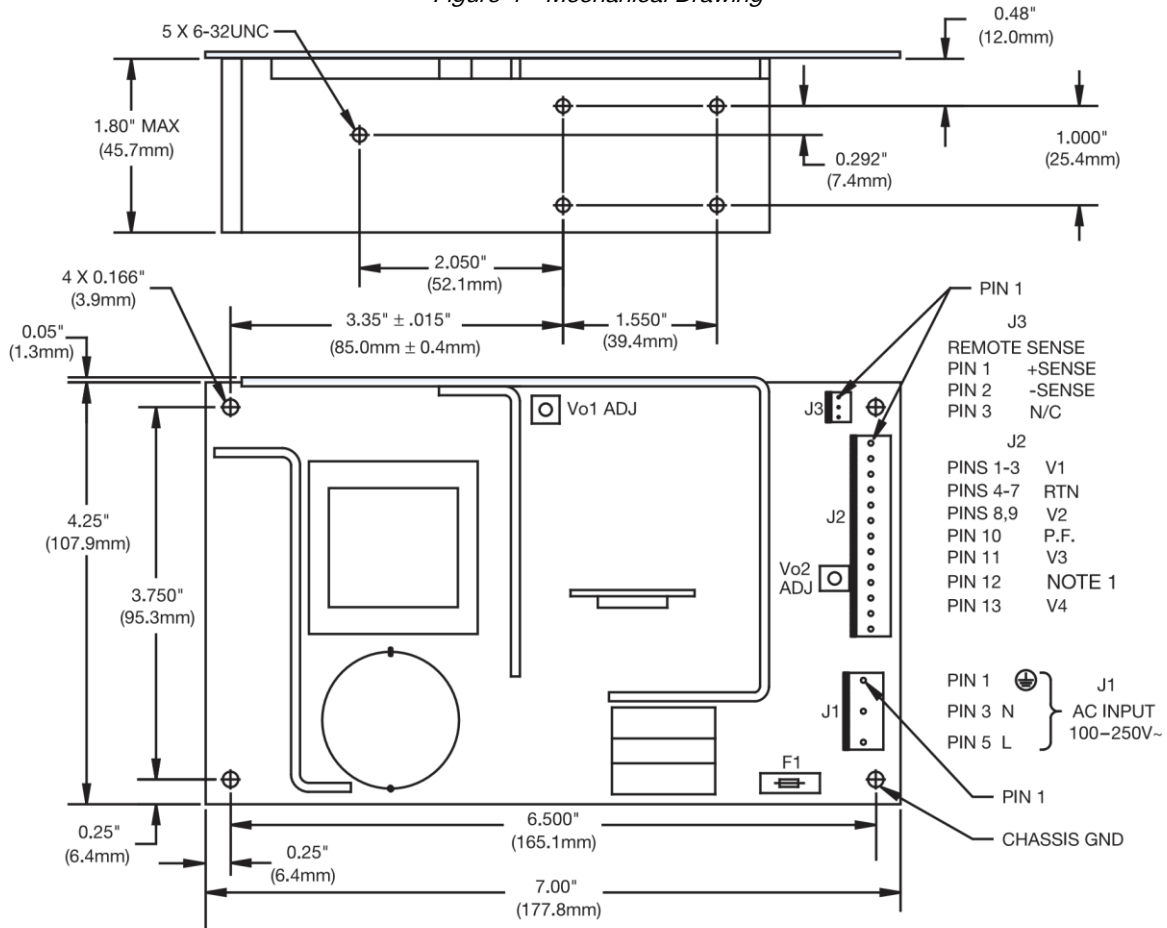
## Mechanical Specifications / Options

| PARAMETER         | CONDITIONS / DESCRIPTION  |
|-------------------|---|
| Dimensions        | 177.8 x 109.2 x 50.0 mm (7.00 x 4.30 x 1.97 inch)   |
| Weight            | 0.59 kg (1.3 lbs)   |
| L-Bracket         | Add 'L' suffix to model number. (Dimensions: 7.15" x 4.50" x 2.40" / 182 x 115 x 61 mm)   |
| Cover             | Add 'C' suffix to model number. Includes L-Bracket. (Dimensions: 7.20" x 4.50" x 2.40" / 183 x 115 x 61mm)                                      |
| Power Fail Signal | Add 'P' suffix to model number. Provides >5 mS typical warning time before main output drops 5%. Warning time increases at reduced load levels. |
| Thermal Shutdown  | Add 'T' suffix to model number. Initiates shut-down in the event of an overtemperature condition. Automatic recovery.                           |

<sup>8</sup> The following units meet Class B: MAP110-1005, MAP110-4000/4011/4015/4200/4300.

# MAP110 Series

Figure-1 - Mechanical Drawing



| MOLEX PCB PIN CONNECTOR INFORMATION |          |             |              |              |
|-------------------------------------|----------|-------------|--------------|--------------|
| REF DESIG                           | SERIES   | MOLEX P/N   | SPACING      | PINS, SQUARE |
| J1                                  | 41671 or | 26-48-1055* | 0.156 (3.96) | 0.045 (1.14) |
|                                     | 41791    | 26-60-4050* | 0.156 (3.96) | 0.045 (1.14) |
| J2                                  | 41671 or | 26-48-1135  | 0.156 (3.96) | 0.045 (1.14) |
|                                     | 41791    | 26-60-4130  | 0.156 (3.96) | 0.045 (1.14) |
| J3                                  | 6373     | 22-23-2031  | 0.100 (2.54) | 0.025 (0.64) |

\*With pins 2 & 4 removed for double spacing.

**NOTES:**

- 1.) When the V4 output is a positive (+) output, pin 12 on J2 is connected to RTN.  
When the V4 output is a negative (-) output, pin 12 on J2 is connected to V4.

Contact factory for dimensions for L-bracket and cover.

**For more information on these products consult: [tech.support@psbel.com](mailto:tech.support@psbel.com)**

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