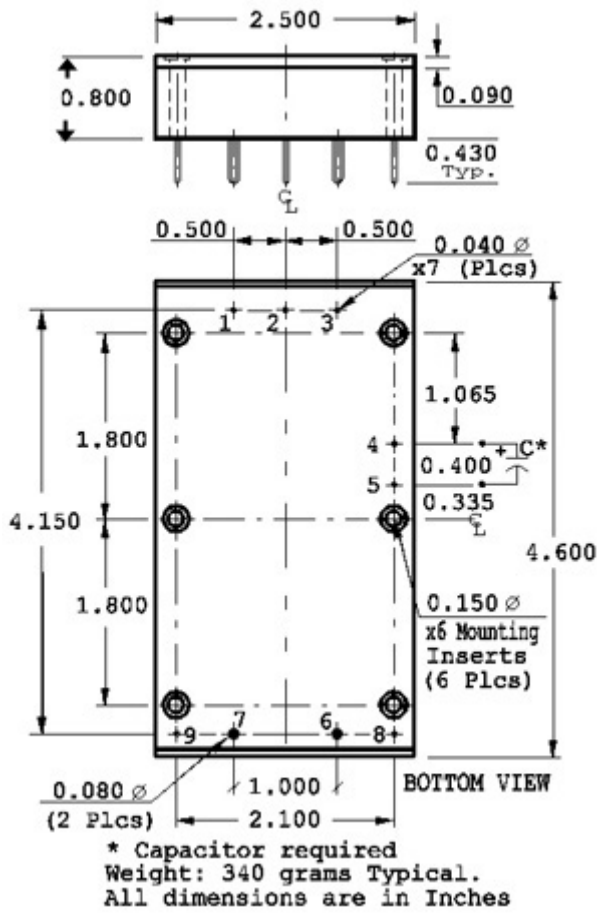
PICO Electronics

# Series AC1

**Power Factor Corrected**
**Universal AC Input: 85 - 265 VAC**
**47 - 440 Hz Input Frequency**
**Hi Reliability Isolated Regulated**
**Fixed Operating Frequency: 100Khz**
**AC-DC Converter to 300 Watts**

***360 to 800Hz Input Frequency***
***3 Phase Input Available***
***Consult Factory: 800-431-1064***




**Meets EN/IEC 61000-3-2 Requirements**
**Universal Input Voltage:** 85 to 265 VAC
**Power Factor Corrected,** 0.99 (50 - 100% Full Load)
**Space Saving Design:** One module replaces two
**Special Output Voltages Available**
**Regulated Output Voltage**
**Made in the USA, Fully Encapsulated**

**Typical Features/Electrical Characteristics**

**AC Line Input Voltage**: 85 to 265 VAC 47-440 Hz
**Output Power:** 150 to 300 watts, see chart
85 - 95 VAC Input, 200w maximum (5V, 150w max.)

**Output Voltage Ripple:** 75-480 mV, See chart

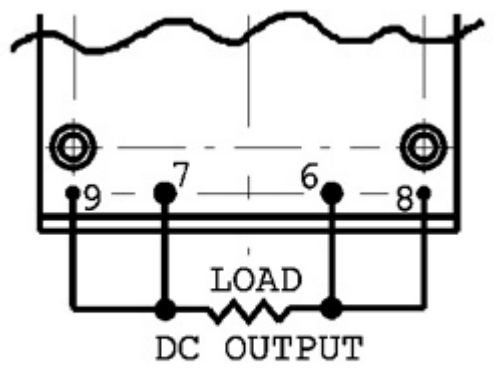
**Operating Temperature:** 0 to 85º C, case temperature. See application notes for proper thermal considerations. **Availabe with -20°C and -40°C operating temperature range** - Consult Factory
**Isolation**:

- From Input to DC Output: 4242 VDC
  From Input or DC output to Case: 2121 VDC
  From AC Input to Auxiliary 380 VDC Output: Non-Isolated

**Capacitor Requirement:** External at Auxiliary 380 VDC Pins: 220uf, 450 Volt Electrolytic
* MUST BE INSTALLED
**Current Limit Setpoint:** 130 % of full load rating (Typical)
**Operating Frequency:** 100Khz: Fixed

**NOTE: The torque for mounting screws must be 6 to 9 In-Lbs**

| PIN No. | FUNCTION |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | +3 |
| 5 | |
| 6 | |
| 7 | + |
| 8 | - |
| 9 | + SENSE |



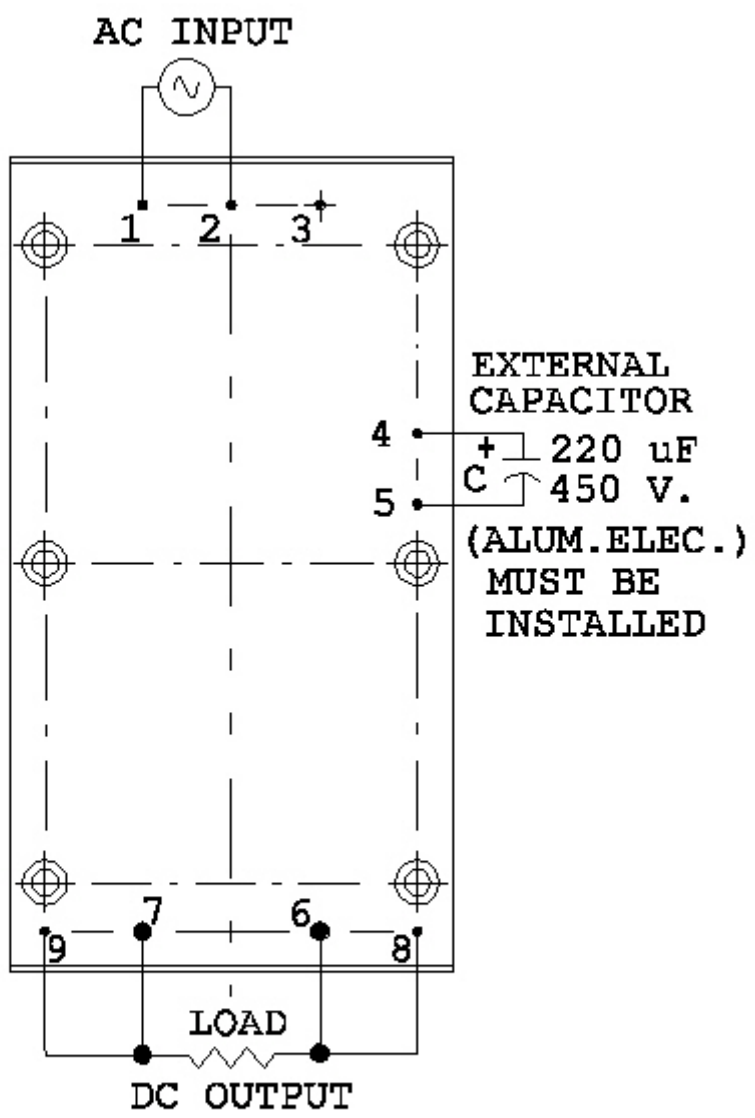

**Pins 8 and 9 for sense must be connected.**

| Pico Part No. | Output Voltage VDC | Max. Load Current (A) ** | Max. Output Power (watts) ** | EFF @ Full Load (%)* | Output Ripple Full Load 1-1 MHz BW mv p-p* | Out Volt Toler-ance (±%)* | V Ld. Reg 10-100% Load (±%)* | Line Regu-lation (±%)* | Price (US $) |
|---|---|---|---|---|---|---|---|---|---|
| AC1-5S | 5 | 30 | 150 | 76 | 100 | 1.0 | 1.5 | 0.2 | 337.75 |
| AC1-9S | 9 | 27.8 | 250 | 78 | 100 | 1.0 | 1.5 | 0.2 | 337.75 |
| AC1-12S | 12 | 25 | 300 | 80 | 150 | 0.5 | 1.5 | 0.2 | 337.75 |
| AC1-15S | 15 | 20 | 300 | 80 | 150 | 0.5 | 1.5 | 0.2 | 337.75 |
| AC1-24S | 24 | 12.5 | 300 | 81 | 250 | 0.5 | 1 | 0.2 | 337.75 |
| AC1-28S | 28 | 10.71 | 300 | 82 | 300 | 0.5 | 1 | 0.2 | 337.75 |
| AC1-48S | 48 | 6.25 | 300 | 82 | 500 | 0.5 | 1 | 0.2 | 372.09 |

**External Capacitor Required: 220µF, 450 V Aluminum Electrolytic Capacitor**

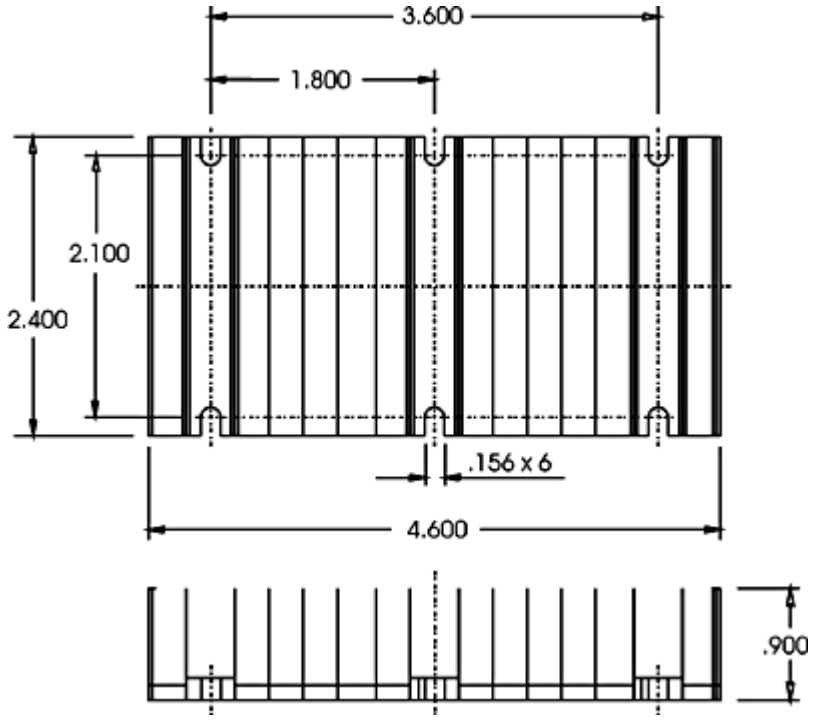
*All specifications are typical at nominal (115 VAC, 60 Hz) input, full load and 25° baseplate temperature unless otherwise stated.

** Using proper thermal considerations as outlined in the application notes.

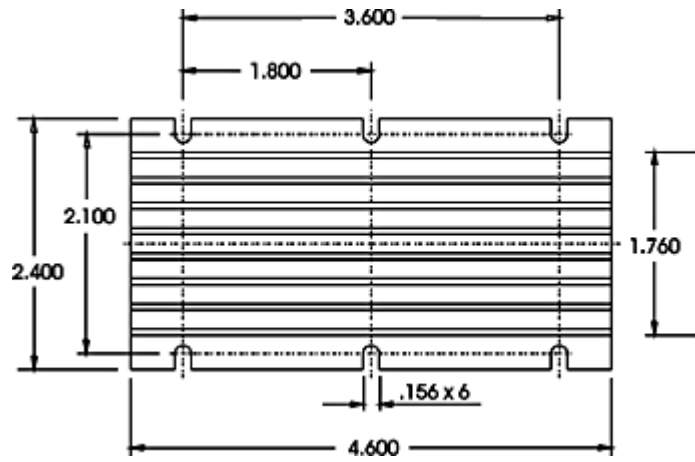



C=220uF,450V
Aluminum Electrolytic Capacitor

| CH HEATSINK | CV HEATSINK |
|---|---|




All dimensions are in inches ()=mm
Approx. weight = 145 grams

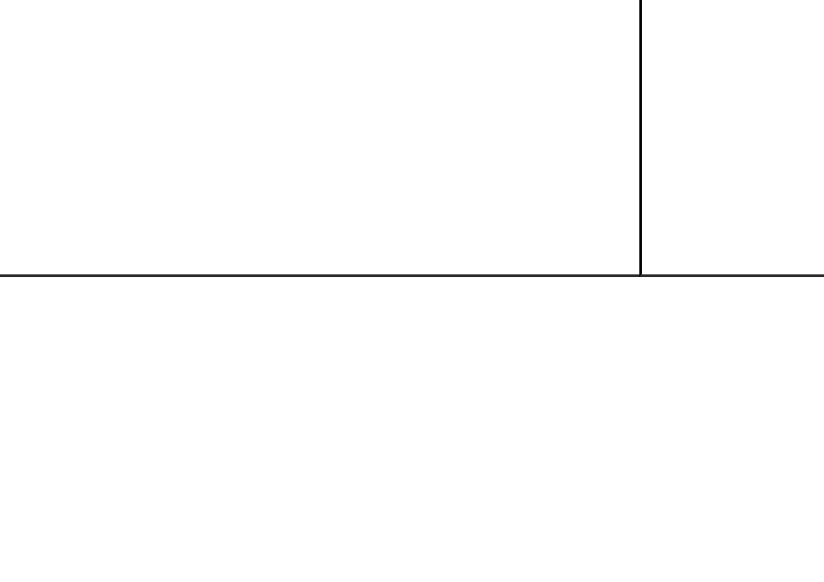



**NOTE:** Additional Heatsink options, consult fa
Approx. Weight = 145 grams

## THERMAL INTERFACE
## PART TI

Alloy Aluminum Substrate

Thermal Conductivity, (BTU-in/hr ft² ºF) ----1530
Coefficient of Thermal Expansion (25-100ºC, $10^{-6}$ in./in. ºF ---13.1
Hardness, Brinnell B ----23
Endurance Limit, psi. ----5000
Standard Thickness (inches) ---.002




## Thermal Considerations

| | AC1 Series | | |
|---|---|---|---|
| . | **Baseplate** | **Heatsink CV** | **Heatsink CH** |
| Free Air | 4.8 | 3.3 | 2.8 |

| | | | |
|---|---|---|---|
| 200 LFM | 2.6 | 1.6 | 0.9 |
| 400 LFM | 1.6 | 1.0 | 0.6 |
| 600 LFM | 1.3 | 0.7 | 0.5 |
| 800 LFM | 1.1 | 0.6 | 0.4 |
| 1000 LFM | 0.9 | 0.5 | 0.35 |

## EXAMPLE 1:

An AC1-24S module has an efficiency of 81%. What is themaximum ambient temperature if 100 Watts of power is needed?

A) In free air:
From Table 1: $T_{rca} = 4.8$
Using relation (2)

$$\Delta T = 4.8\,(100)\left[\frac{1}{.81} - 1\right] = 112.6^{\circ}C$$

$$T_a = 85 - 112.6 = -27^{\circ}C$$

B) In free air with heatsink (CV):
$T_{rca} = 3.3$

$$\Delta T = 3.3\,(100)\left[\frac{1}{.81} - 1\right] = 77.4^{\circ}C$$

$$T_a = 85 - 77.4 = 7.6^{\circ}C$$

C) With 400 LFM of air flow:
$T_{rca} = 1.6$

$$\Delta T = 1.6\,(100)\left[\frac{1}{.81} - 1\right] = 37.5^{\circ}C$$

$$T_a = 85 - 37.5 = 47.5^{\circ}C$$

## EXAMPLE 2:

What would be the maximum output power
for an AC1-24S module at an ambient temperature of 50°C with an efficiency of 81%?

A) If the module is used in free air.
From Table 1: $T_{rca} = 4.8$
Using Relation (2):

$$85 - 50 = 4.8\,P_{out}\left[\frac{1}{.81} - 1\right]$$

$$P_{out} = \frac{35}{4.8\,[.23]} = 31.1 \text{ Watts}$$

B) If the module is used in an area with forced air at 200 LFM with no heatsink.
$T_{rca} = 2.6$

$$P_{out} = \frac{35}{2.6\,[2.3]} = 58.5 \text{ Watts}$$

C) If the module with heatsink (CV) is used in free air.
$T_{rca} = 3.3$

$$P_{out} = \frac{35}{3.3\,[.23]} = 46.1 \text{ Watts}$$

## EXAMPLE 3:

At a maximum ambient temperature of
50°C and an efficiency of 81%, how could an AC1-24S module be used if 200 Watts of output power is required?

Using relation (2), we first find the maximum thermal resistance from case to air.

$$\Delta T = T_{rca}\,(200)\left[\frac{1}{.81} - 1\right]$$

$$85 - 50 = T_{rca}\,(46)$$

$T_{rca} = .76$

A) If no heatsink is used:
From Table 1, more than 1,000 LFM of airflow is required.

B) If a (CV) heatsink is used:
600 LFM of airflow is required.

C) If a (CH) heatsink is used:
400 LFM of airflow is required.

For immediate engineering assistance or to place an order:
**Call Toll Free: 800-431-1064**

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