

# KAMN40 SERIES

AC - DC POWER MODULE

28 ~ 40W UL / cUL / TUV / CE



## FEATURES

- AC/DC POWER MODULE
- UNIVERSAL INPUT 85 ~ 265 VAC
- HIGH EFFICIENCY UP TO 87%
- SHORT CIRCUIT PROTECTION
- INTERNAL INPUT FILTER
- 3 YEARS WARRANTY
- MEDICAL SAFETY APPROVED
- LOW LEAKAGE CURRENT



## MODEL LIST

| MODEL NO. | INPUT VOLTAGE | OUTPUT WATTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | EFF. (min.) | EFF. (typ.) | CAPACITOR LOAD (max.) |
|-----------|---------------|----------------|----------------|----------------|-------------|-------------|-----------------------|
|-----------|---------------|----------------|----------------|----------------|-------------|-------------|-----------------------|

### Single Output Models

|          |              |            |           |         |     |     |              |
|----------|--------------|------------|-----------|---------|-----|-----|--------------|
| KAMN4003 | 85 ~ 265 VAC | 28 WATTS   | + 3.3 VDC | 8500 mA | 76% | 78% | 7000 $\mu$ F |
| KAMN4005 | 85 ~ 265 VAC | 40 WATTS   | + 5 VDC   | 8000 mA | 80% | 82% | 7000 $\mu$ F |
| KAMN4012 | 85 ~ 265 VAC | 40.8 WATTS | + 12 VDC  | 3400 mA | 84% | 86% | 7000 $\mu$ F |
| KAMN4015 | 85 ~ 265 VAC | 40.5 WATTS | + 15 VDC  | 2700 mA | 85% | 87% | 7000 $\mu$ F |
| KAMN4024 | 85 ~ 265 VAC | 40.8 WATTS | + 24 VDC  | 1700 mA | 85% | 87% | 3500 $\mu$ F |

### Dual Output Models

|            |              |            |               |               |     |     |                    |
|------------|--------------|------------|---------------|---------------|-----|-----|--------------------|
| KAMN4012D  | 85 ~ 265 VAC | 40.8 WATTS | $\pm$ 12 VDC  | $\pm$ 1700 mA | 83% | 85% | $\pm$ 7000 $\mu$ F |
| KAMN4015D  | 85 ~ 265 VAC | 40.5 WATTS | $\pm$ 15 VDC  | $\pm$ 1350 mA | 84% | 86% | $\pm$ 7000 $\mu$ F |
| KAMN40512D | 85 ~ 265 VAC | 40 WATTS   | +5 / + 12 VDC | +5A / + 1.25A | 81% | 83% | 7000 $\mu$ F       |
| KAMN40524D | 85 ~ 265 VAC | 39 WATTS   | +5 / + 24 VDC | +3A / + 1A    | 81% | 83% | 7000 $\mu$ F       |

## SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

### GENERAL

| Characteristics         | Conditions                  | min.      | typ. | max.       | unit       |
|-------------------------|-----------------------------|-----------|------|------------|------------|
| Switching frequency     | Vi nom, Io nom              |           | 65   |            | KHz        |
| Isolation voltage       | Input - Output              | 4236/6000 |      |            | VAC/VDC    |
| Isolation resistance    | Input - Output, @ 500VDC    | 100       |      |            | M $\Omega$ |
| Ambient temperature (l) | Operating at Vi nom, Io nom | -40       |      | + 71       | °C         |
| Case temperature        | Operating at Vi nom, Io nom |           |      | + 85       | °C         |
| Derating                | Vi nom, +61 to + 71°C       |           |      | 2.5        | % / °C     |
| Storage temperature     | Non operational             | -40       |      | + 100      | °C         |
| Relative humidity       | Vi nom, Io nom              | 20        |      | 95         | % RH       |
| Temperature coefficient | Vi nom, Io min              |           |      | $\pm$ 0.03 | % / °C     |

NOTE1 : Pls refer to DERATING CURVE.

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ISO 9001 Certified

### SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

#### GENERAL

| Characteristics           | Conditions                                                 | min.              | typ.   | max. | unit  |
|---------------------------|------------------------------------------------------------|-------------------|--------|------|-------|
| MTBF                      | Bellcore issue 6 @40°C, GB<br>3.3V, 5V, 512D & 524D models |                   | 606000 |      | Hours |
|                           |                                                            |                   | 615000 |      | Hours |
|                           |                                                            |                   | 623000 |      | Hours |
| Altitude during operation | IEC 60068-2-13                                             |                   |        | 4850 | m     |
| Dimension                 |                                                            | L89 x W63.5 x H25 |        |      | mm    |
| Cooling                   | Free air convection                                        |                   |        |      |       |

#### INPUT SPECIFICATIONS

| Characteristics     | Conditions                   | min. | typ.        | max.      | unit |
|---------------------|------------------------------|------|-------------|-----------|------|
| Rated input voltage | Io nom                       | 100  |             | 240       | VAC  |
| Input voltage range | Ta min ... Ta max,<br>Io nom | 85   |             | 265       | VAC  |
|                     |                              | 120  |             | 375       | VDC  |
| Input current       | Vi : 115 / 230 VAC, Io nom   |      | 0.75 / 0.45 |           | A    |
| Rated input current | Vi : 100 ~ 240 VAC, Io nom   |      |             | 0.8 - 0.4 | A    |
| Line frequency      | Vi nom, Io nom               | 47   |             | 63        | Hz   |
| Inrush current      | Vi : 115 / 230 VAC, Io nom   |      |             | 20/40     | A    |
| Leakage current     | Normal condition             |      |             | 100       | μA   |
|                     | Single fault condition       |      |             | 300       | μA   |

#### OUTPUT SPECIFICATIONS

| Characteristics                                         | Conditions                      | min.                                               | typ. | max. | unit |
|---------------------------------------------------------|---------------------------------|----------------------------------------------------|------|------|------|
| Output voltage accuracy                                 | Vi nom, Io nom                  |                                                    |      | ± 1  | %    |
|                                                         | single output models            |                                                    |      | ± 2  | %    |
|                                                         | dual output models              |                                                    |      | ± 4  | %    |
| Minimum load                                            | Vi nom                          | 0                                                  |      |      | %    |
|                                                         | 524D model                      | 20                                                 |      |      | %    |
| Line regulation                                         | Io nom, Vi min ... Vi max       |                                                    |      | ± 1  | %    |
| Load regulation                                         | Vi nom, Io min ... Io nom       |                                                    |      | ± 1  | %    |
|                                                         | single output models            |                                                    |      | ± 2  | %    |
| Cross regulation (Dual model)                           | Asymmetrical load 20% / 100% FL |                                                    |      | ± 6  | %    |
| Hold up time                                            | Vi : 115 / 230 VAC, Io nom      | 20/100                                             |      |      | ms   |
| Turn on time                                            | Vi nom, Io nom                  |                                                    |      | 1000 | ms   |
| Rise time                                               | Vi nom, Io nom                  |                                                    |      | 150  | ms   |
| Fall time                                               | Vi nom, Io nom                  |                                                    |      | 150  | ms   |
| Transient recovery time                                 | Vi nom, I ~ 0.5 Io nom          |                                                    |      | 1    | ms   |
| Ripple & noise                                          | Vi nom, Io nom, BW = 20MHz      |                                                    |      | 50   | mV   |
| External trim ADJ. Range 2)<br>(for single output only) | Io = 5% ... 100%                | -10                                                |      | +10  | %    |
| Efficiency                                              | Vi nom, Io nom, Po / Pi         | Up to 87%, See model list and typ efficiency curve |      |      |      |

NOTE 2 : Pls refer to Fig 1 & Table 1 for connection and resistance recommended.

#### CONTROL AND PROTECTION

| Characteristics                   | Conditions                             | min.                  | typ. | max. | unit |
|-----------------------------------|----------------------------------------|-----------------------|------|------|------|
| Input fuse                        |                                        | T2A / 250VAC internal |      |      |      |
| Internal surge voltage protection | IEC 61000-4-5                          | Varistor              |      |      |      |
| Output short circuit              |                                        | Hiccup mode           |      |      |      |
| Rated over load protection        | Vi nom (see typ current limited curve) | 120                   |      | 160  | %    |

### SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

### APPROVALS AND STANDARDS

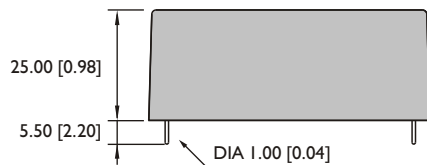
|                      |                                                                                                                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UL / cUL             | UL 60950-I, UL 60601-I Recognized                                                                                                                                                                                             |
| TUV                  | EN 60950-I, EN 60601-I                                                                                                                                                                                                        |
| CE                   | EN 60601-1-2, EN 55011, EN 61000-6-3, EN 55022 Class B, EN 61000-3-2, EN 61000-3-3<br>EN 61000-6-2, EN 55024, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5<br>EN 61000-4-6, EN 61000-4-8, EN 61000-4-11, EN 61204-3 |
| Vibration resistance | meet IEC 60068-2-6 (10-500 Hz, 2G, along X, Y, Z each Axis, 60 min for each Axis)                                                                                                                                             |
| Shock resistance     | meet IEC 60068-2-27 (15G, 11ms, 3 axes, 6 Faces, 3 times for each Face)                                                                                                                                                       |

### PHYSICAL CHARACTERISTICS

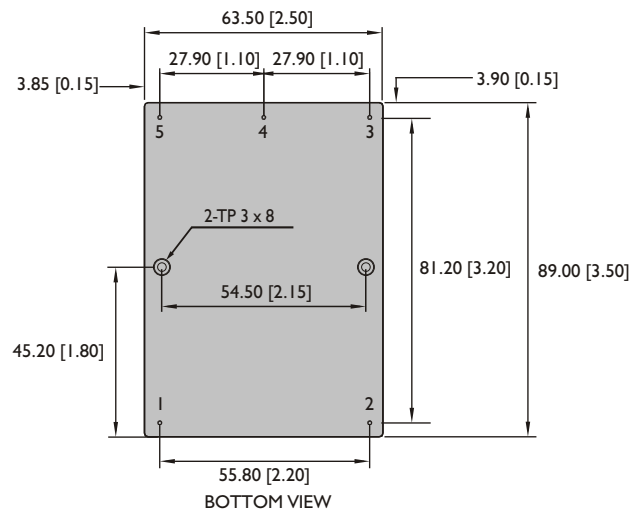
|                  |                                            |
|------------------|--------------------------------------------|
| Case size        | 89 x 63.5 x 25mm (3.5 x 2.5 x 0.98 inches) |
| Case material    | Plastic                                    |
| Weight           | 250g                                       |
| Potting material | Epoxy                                      |

### MECHANISM & PIN CONFIGURATION

mm [inch]



| GENERAL TOLERANCE          |             |
|----------------------------|-------------|
| 0.00[0.00] - 30.00[1.18]   | ±0.30[0.01] |
| 30.00[1.18] - 120.00[4.72] | ±0.50[0.02] |



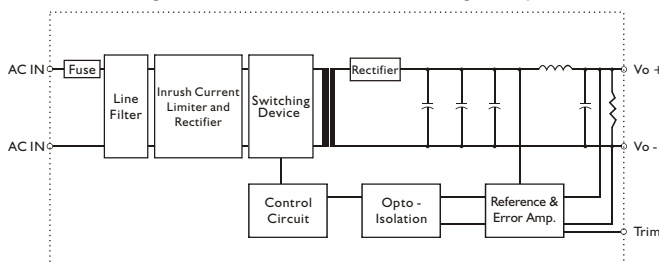
### PIN ASSIGNMENT

#### GENERAL

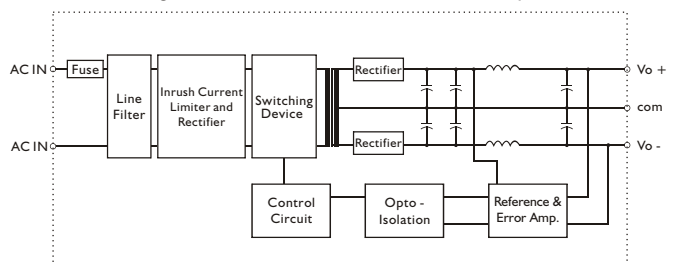
| PIN NO. | 1        | 2     | 3     | 4    | 5    |
|---------|----------|-------|-------|------|------|
| SINGLE  | AC IN    | AC IN | Vo +  | Vo - | Trim |
| DUAL    | 12D, 15D | AC IN | AC IN | com  | Vo - |
|         | 512D     | AC IN | AC IN | +5V  | +12V |
|         | 524D     | AC IN | AC IN | +5V  | +24V |

### CIRCUIT SCHEMATIC

• Block diagram for KAMN40 series with single output



• Block diagram for KAMN40 series with dual output

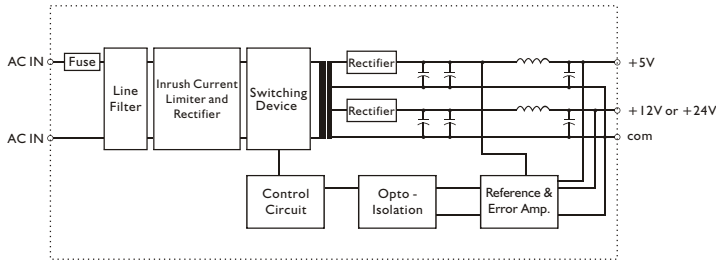


# KAMN40 SERIES

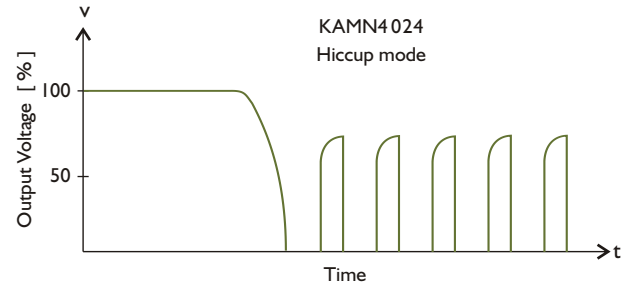
AC - DC POWER MODULE

## CIRCUIT SCHEMATIC

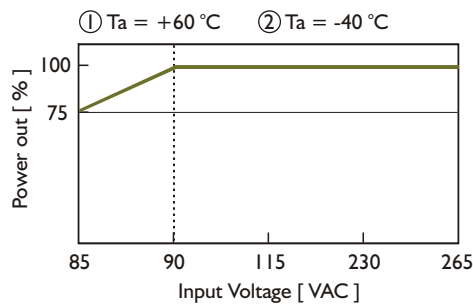
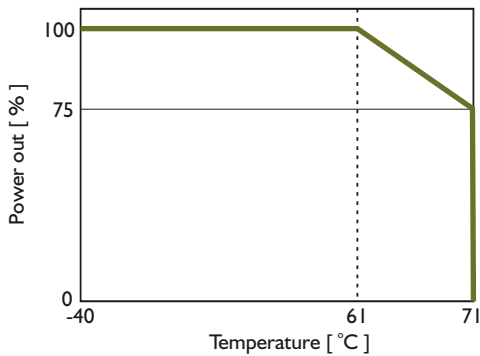
• Block diagram for KAMN40512D & KAMN40524D



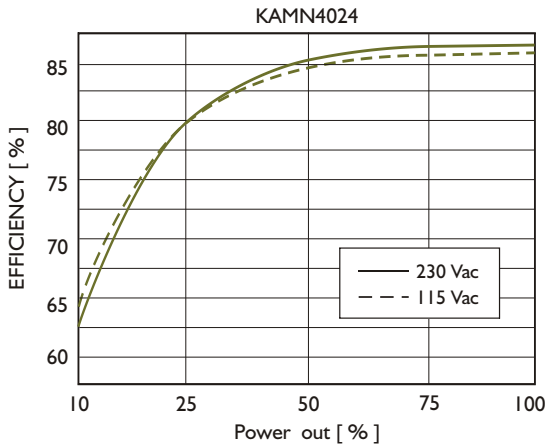
## TYP. CURRENT LIMITED CURVE



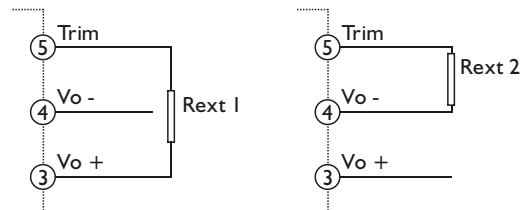
## DERATING CURVE



## TYP. EFFICIENCY CURVE



**Fig. 1 Trim connection**  
(For single output only)



**Table 1 Typical resistor values for various output voltage adjustment settings and max continuous power**

| Type     | Rext 1     |             | Rext 2     |             | Max continuous power |
|----------|------------|-------------|------------|-------------|----------------------|
|          | Vo nom -5% | Vo nom -10% | Vo nom +5% | Vo nom +10% |                      |
| KAMN4003 | 20KΩ       | 5.1KΩ       | 3KΩ        | 1KΩ         | 28 W                 |
| KAMN4005 | 5.1KΩ      | 1KΩ         | 6.8KΩ      | 2KΩ         | 40 W                 |
| KAMN4012 | 39KΩ       | 20KΩ        | 10KΩ       | 0Ω          | 40.8 W               |
| KAMN4015 | 180KΩ      | 56KΩ        | 30KΩ       | 5.1KΩ       | 40.5 W               |
| KAMN4024 | 150KΩ      | 51KΩ        | 8.2KΩ      | 0Ω          | 40.8 W               |