

# KHEA/KHNA30F

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Recommended EMI/EMC Filter  
NAC-04-472-D



High voltage pulse noise type : NAP series  
Low leakage current type : NAM series  
\*The EMI/EMC Filter is recommended to connect with several devices.

- ① Series name  
KHE : Euro style I/O terminals  
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option  
C : with Coating

| MODEL                 | KHEA/KHNA30F-5 | KHEA/KHNA30F-12 | KHEA/KHNA30F-24 |
|-----------------------|----------------|-----------------|-----------------|
| MAX OUTPUT WATTAGE[W] | 25             | 27.6            | 31.2            |
| DC OUTPUT             | 5V 5A          | 12V 2.3A        | 24V 1.3A        |

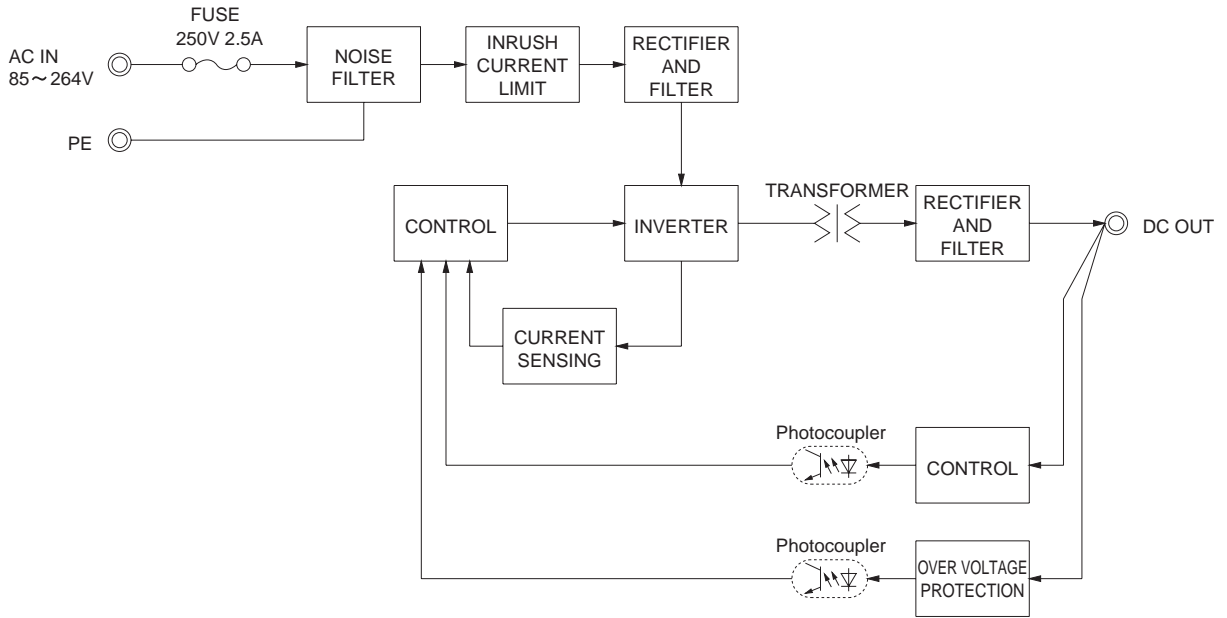
## SPECIFICATIONS

|                                    | MODEL   | KHEA/KHNA30F-5  | KHEA/KHNA30F-12 | KHEA/KHNA30F-24 |           |
|------------------------------------|---|---|-----------------|-----------------|-----------|
| INPUT                              | VOLTAGE[V]  | AC85 - 264 1 φ (Output derating is required) or DC120 - 370   |                 |                 |           |
|                                    | CURRENT[A]  | ACIN 115V   | 0.45typ         | 0.50typ         | 0.55typ   |
|                                    |   | ACIN 230V   | 0.30typ         | 0.30typ         | 0.35typ   |
|                                    | FREQUENCY[Hz]   | 50 / 60 (47 - 440) or DC  |                 |                 |           |
|                                    | EFFICIENCY[%]   | ACIN 115V   | 84.0typ         | 87.0typ         | 88.5typ   |
|                                    |   | ACIN 230V   | 85.5typ         | 88.5typ         | 89.5typ   |
| INRUSH CURRENT[A]                  | ACIN 115V   | 18typ (Io=100%) (at cold start Ta=25°C)   |                 |                 |           |
|                                    | *1 ACIN 230V  | 35typ (Io=100%) (at cold start Ta=25°C)   |                 |                 |           |
| LEAKAGE CURRENT[ma]                | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) |   |                 |                 |           |
| OUTPUT                             | VOLTAGE[V]  | 5   | 12              | 24              |           |
|                                    | CURRENT[A]  | 5.0   | 2.3             | 1.3             |           |
|                                    | PEAK CURRENT[A]   | -   | -               | -               |           |
|                                    | LINE REGULATION[mV] *2  | 20max   | 48max           | 96max           |           |
|                                    | LOAD REGULATION[mV] *2  | 80max   | 100max          | 150max          |           |
|                                    | RIPPLE[mVp-p] *3  | 0 to +70°C  | 150max          | 150max          | 150max    |
|                                    |   | -20 - 0°C   | 300max          | 300max          | 300max    |
|                                    |   | Io=0 - 30%  | 300max *4       | 300max *4       | 300max *4 |
|                                    | RIPPLE NOISE[mVp-p] *3  | 0 to +70°C  | 180max          | 180max          | 180max    |
|                                    |   | -20 - 0°C   | 360max          | 360max          | 360max    |
|                                    |   | Io=0 - 30%  | 360max *4       | 360max *4       | 360max *4 |
|                                    | TEMPERATURE REGULATION[mV]  | 0 to +70°C  | 50max           | 120max          | 240max    |
|                                    |   | -20 to +70°C  | 60max           | 150max          | 290max    |
|                                    | DRIFT[mV] *5  | 20max   | 48max           | 96max           |           |
| START-UP TIME[ms]                  | 200typ (ACIN 115V, Io=100%)   |   |                 |                 |           |
| HOLD-UP TIME[ms]                   | 20typ (ACIN 115V, Io=100%)  |   |                 |                 |           |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 4.50 to 5.50  | 10.80 to 13.20  | 22.50 to 28.50  |                 |           |
| OUTPUT VOLTAGE SETTING[V]          | 5.00 to 5.15  | 12.00 to 12.48  | 24.00 to 24.96  |                 |           |
| PROTECTION CIRCUIT AND OTHERS      | OVERCURRENT PROTECTION  | Works over 105% of rating and recovers automatically *10  |                 |                 |           |
|                                    | OVERVOLTAGE PROTECTION[V]   | 6.30 to 7.60  | 13.80 to 16.80  | 30.00 to 36.00  |           |
|                                    | DC_OK LAMP  | LED (Green)   |                 |                 |           |
| ISOLATION                          | INPUT-OUTPUT  | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)  |                 |                 |           |
|                                    | INPUT-PE  | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)  |                 |                 |           |
|                                    | OUTPUT-PE   | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature)   |                 |                 |           |
| ENVIRONMENT                        | OPERATING TEMP., HUMID. AND ALTITUDE  | -20 to +70°C (Required to Derating), 20 - 90%RH (Non condensing)  |                 |                 |           |
|                                    | STORAGE TEMP., HUMID. AND ALTITUDE  | -30 to +85°C, 20 - 90%RH (Non condensing)   |                 |                 |           |
|                                    | VIBRATION *8  | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail)   |                 |                 |           |
|                                    | IMPACT  | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis (Packing state)  |                 |                 |           |
| SAFETY AND NOISE REGULATIONS       | AGENCY APPROVALS (At only AC input)   | UL60950-1, C-UL(CSA60950-1), UL508 (NEC Class2 per UL1310), ANSI/ISA12.12.01, EN60950-1, EN50178 Complies with DEN-AN |                 |                 |           |
|                                    | CONDUCTED NOISE   | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B  |                 |                 |           |
|                                    | HARMONIC ATTENUATOR   | Complies with IEC61000-3-2 (Class A) *6 (Not built-in to active filter) *9  |                 |                 |           |
| OTHERS                             | CASE SIZE *7  | 22.5 × 75 × 90mm (W × H × D) [0.89 × 2.95 × 3.54 inches]  |                 |                 |           |
|                                    | WEIGHT  | 165g max  |                 |                 |           |
|                                    | COOLING METHOD  | Convection / Forced air   |                 |                 |           |

\*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less)is excluded.  
 \*2 Please contact us about dynamic load and input response.  
 \*3 This is the value that measured on measuring board with capacitor of 22μF and 0.1μF at 150mm from output terminal.  
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.  
 Ripple and ripple noise spec is change at Io=0 to 30% by burst operation.  
 \*4 In case of operating under 0°C ambient temperature, the value is two times of specification at 0 to 30% load factor.  
 \*5 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

\*6 Please contact us about another class.  
 \*7 Case size contains neither the umbo.  
 \*8 Only as standard mounting orientation (A). Refer to the instruction manual 5.1.  
 If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.  
 \*9 When two or more units are operating it may not comply with the IEC61000-3-2.  
 \*10 If the overcurrent protection circuit operates continuously, the output voltage shut down. Refer to the instruction manual 2.3.  
 \* To meet the specifications. Do not operate over-loaded condition.  
 \* A sound may occur from power supply at light or peak loading.

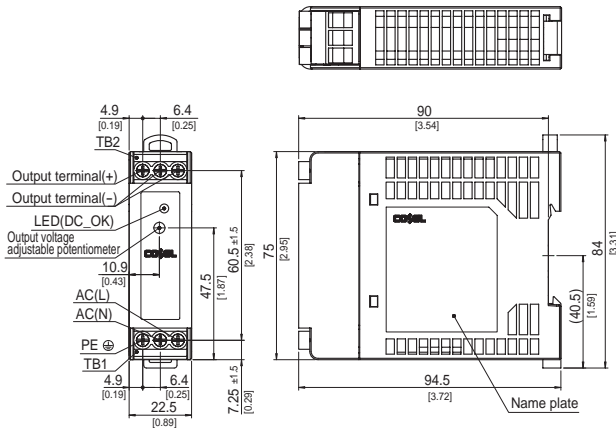
## Block diagram



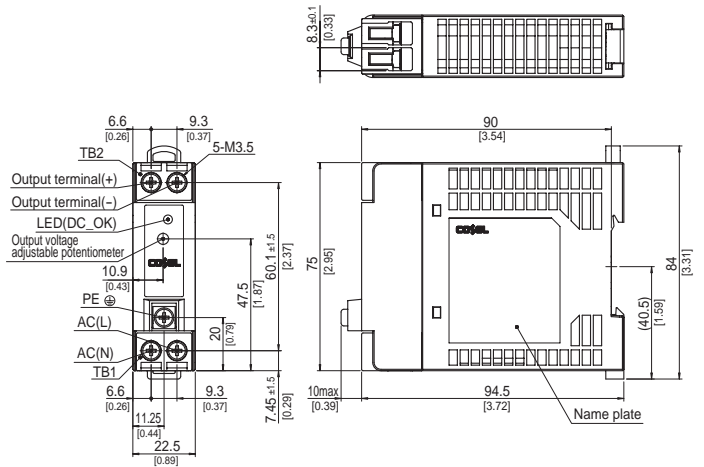
## External view

<KHEA30F(Euro Style I/O Terminals)>

<KHNA30F(Barrier Blocks Style I/O Terminals)>



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 165g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 165g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max

# KHEA/KHNA60F

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Recommended EMI/EMC Filter  
NAC-04-472-D



High voltage pulse noise type : NAP series  
Low leakage current type : NAM series  
\*The EMI/EMC Filter is recommended to connect with several devices.

- ① Series name  
KHE : Euro style I/O terminals  
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option  
C : with Coating

|                       |                 |                 |
|-----------------------|-----------------|-----------------|
| MODEL                 | KHEA/KHNA60F-12 | KHEA/KHNA60F-24 |
| MAX OUTPUT WATTAGE[W] | 54              | 60              |
| DC OUTPUT             | 12V 4.5A        | 24V 2.5A        |

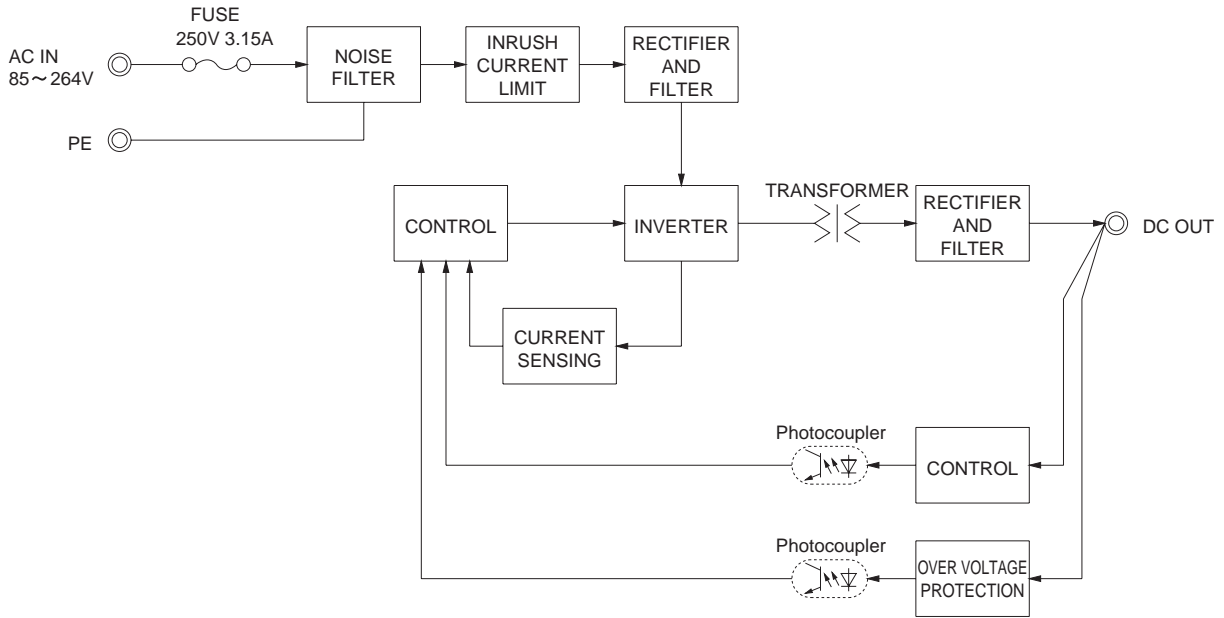
## SPECIFICATIONS

|                                    | MODEL   | KHEA/KHNA60F-12   | KHEA/KHNA60F-24 |           |
|------------------------------------|---|---|-----------------|-----------|
| INPUT                              | VOLTAGE[V]  | AC85 - 264 1 φ (Output derating is required) or DC120 - 370   |                 |           |
|                                    | CURRENT[A]  | ACIN 115V   | 1.00typ         | 1.10typ   |
|                                    |   | ACIN 230V   | 0.60typ         | 0.70typ   |
|                                    | FREQUENCY[Hz]   | 50 / 60 (47 - 440) or DC  |                 |           |
|                                    | EFFICIENCY[%]   | ACIN 115V   | 87.0typ         | 89.0typ   |
|                                    |   | ACIN 230V   | 88.0typ         | 91.0typ   |
| INRUSH CURRENT[A]                  | ACIN 115V   | 18typ (Io=100%) (at cold start Ta=25°C)   |                 |           |
|                                    | *1 ACIN 230V  | 35typ (Io=100%) (at cold start Ta=25°C)   |                 |           |
| LEAKAGE CURRENT[ma]                | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) |   |                 |           |
| OUTPUT                             | VOLTAGE[V]  | 12  | 24              |           |
|                                    | CURRENT[A]  | 4.5   | 2.5             |           |
|                                    | PEAK CURRENT[A]   | -   | -               |           |
|                                    | LINE REGULATION[mV] *2  | 48max   | 96max           |           |
|                                    | LOAD REGULATION[mV] *2  | 100max  | 150max          |           |
|                                    | RIPPLE[mVp-p] *3  | 0 to +70°C  | 200max          | 200max    |
|                                    |   | -20 - 0°C   | 300max          | 300max    |
|                                    |   | Io=0 - 30%  | 300max *4       | 300max *4 |
|                                    | RIPPLE NOISE[mVp-p] *3  | 0 to +70°C  | 260max          | 260max    |
|                                    |   | -20 - 0°C   | 360max          | 360max    |
|                                    |   | Io=0 - 30%  | 360max *4       | 360max *4 |
|                                    | TEMPERATURE REGULATION[mV]  | 0 to +70°C  | 120max          | 240max    |
|                                    |   | -20 to +70°C  | 150max          | 290max    |
|                                    | DRIFT[mV] *5  | 48max   | 96max           |           |
| START-UP TIME[ms]                  | 200typ (ACIN 115V, Io=100%)   |   |                 |           |
| HOLD-UP TIME[ms]                   | 20typ (ACIN 115V, Io=100%)  |   |                 |           |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20  | 22.50 to 28.50  |                 |           |
| OUTPUT VOLTAGE SETTING[V]          | 12.00 to 12.48  | 24.00 to 24.96  |                 |           |
| PROTECTION CIRCUIT AND OTHERS      | OVERCURRENT PROTECTION  | Works over 105% of rating and recovers automatically *10  |                 |           |
|                                    | OVERVOLTAGE PROTECTION[V]   | 13.80 to 16.80  | 30.00 to 36.00  |           |
|                                    | DC_OK LAMP  | LED (Green)   |                 |           |
| ISOLATION                          | INPUT-OUTPUT  | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)  |                 |           |
|                                    | INPUT-PE  | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)  |                 |           |
|                                    | OUTPUT-PE   | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature)   |                 |           |
| ENVIRONMENT                        | OPERATING TEMP., HUMID. AND ALTITUDE  | -20 to +70°C (Required to Derating), 20 - 90%RH (Non condensing)  |                 |           |
|                                    | STORAGE TEMP., HUMID. AND ALTITUDE  | -30 to +85°C, 20 - 90%RH (Non condensing)   |                 |           |
|                                    | VIBRATION *8  | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail)   |                 |           |
|                                    | IMPACT  | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis (Packing state)  |                 |           |
| SAFETY AND NOISE REGULATIONS       | AGENCY APPROVALS (At only AC input)   | UL60950-1, C-UL(CSA60950-1), UL508 (NEC Class2 per UL1310), ANSI/ISA12.12.01, EN60950-1, EN50178 Complies with DEN-AN |                 |           |
|                                    | CONDUCTED NOISE   | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B  |                 |           |
|                                    | HARMONIC ATTENUATOR   | Complies with IEC61000-3-2 (Class A) *6 (Not built-in to active filter) *9  |                 |           |
| OTHERS                             | CASE SIZE *7  | 32×90×90mm (W×H×D) [1.26×3.54×3.54 inches]  |                 |           |
|                                    | WEIGHT  | 270g max  |                 |           |
|                                    | COOLING METHOD  | Convection / Forced air   |                 |           |

\*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less) is excluded.  
 \*2 Please contact us about dynamic load and input response.  
 \*3 This is the value that measured on measuring board with capacitor of 22μF and 0.1μF at 150mm from output terminal.  
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.  
 Ripple and ripple noise spec is change at Io=0 to 30% by burst operation.  
 \*4 In case of operating under 0°C ambient temperature, the value is two times of specification at 0 to 30% load factor.  
 \*5 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

\*6 Please contact us about another class.  
 \*7 Case size contains neither the umbo.  
 \*8 Only as standard mounting orientation (A). Refer to the instruction manual 5.1.  
 If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.  
 \*9 When two or more units are operating it may not comply with the IEC61000-3-2.  
 \*10 If the overcurrent protection circuit operates continuously, the output voltage shut down. Refer to the instruction manual 2.3.  
 \* To meet the specifications. Do not operate over-loaded condition.  
 \* A sound may occur from power supply at light or peak loading.

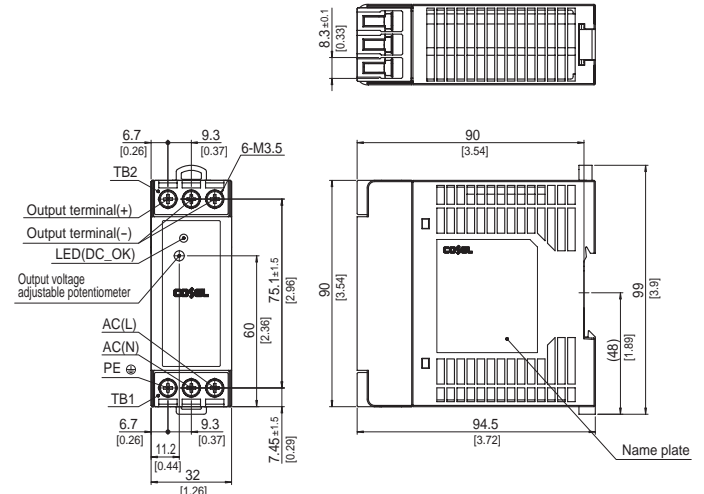
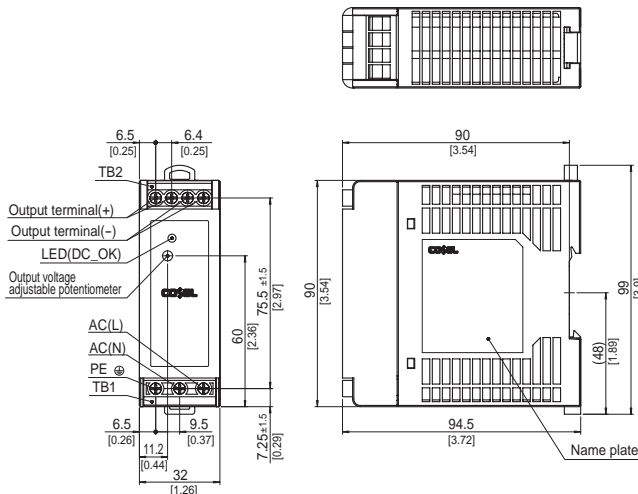
Block diagram



External view

<KHEA60F(Euro Style I/O Terminals)>

<KHNA60F(Barrier Blocks Style I/O Terminals)>



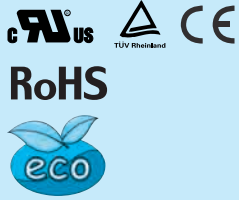
- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 270g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis - Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max

- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 270g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis - Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max

# KHEA/KHNA90F

KH  A 90 F -   -

① ② ③ ④ ⑤ ⑥



Recommended EMI/EMC Filter  
NAC-04-472-D



High voltage pulse noise type : NAP series  
Low leakage current type : NAM series  
\*The EMI/EMC Filter is recommended to connect with several devices.

- ① Series name  
KHE : Euro style I/O terminals  
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
- C : with Coating
- E : NEC Class2 (24V)

|                       |                 |                 |
|-----------------------|-----------------|-----------------|
| MODEL                 | KHEA/KHNA90F-12 | KHEA/KHNA90F-24 |
| MAX OUTPUT WATTAGE[W] | 81.6            | 91.2            |
| DC OUTPUT             | 12V 6.8A        | 24V 3.8A        |

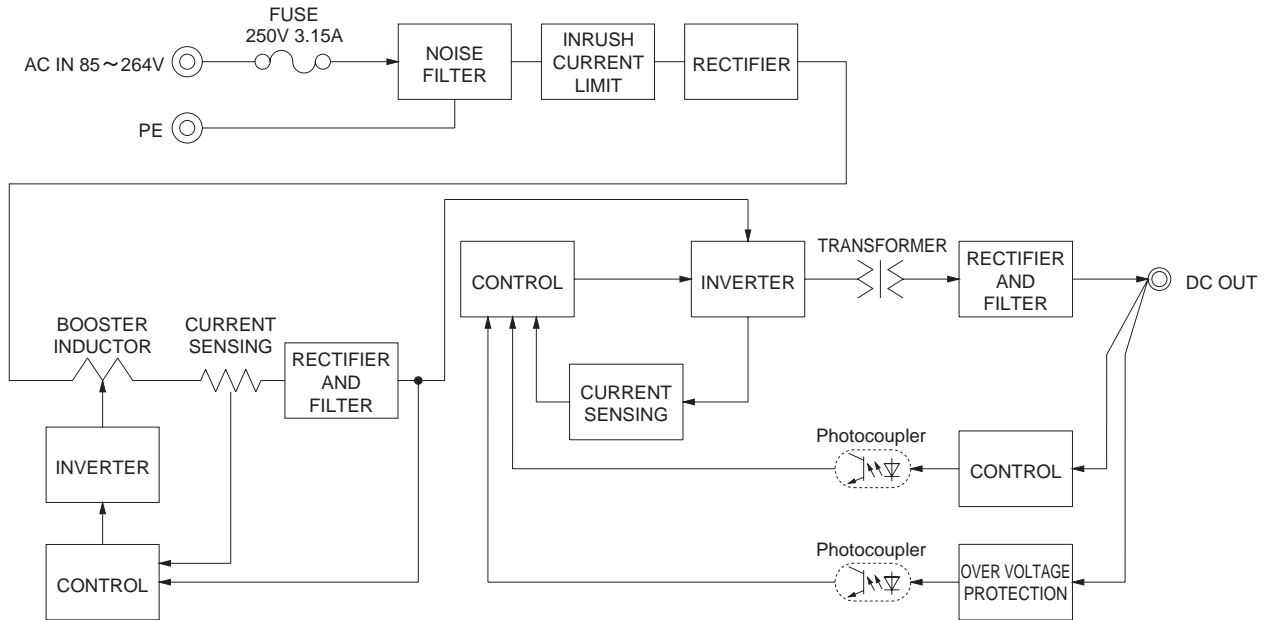
## SPECIFICATIONS

|                                    | MODEL   | KHEA/KHNA90F-12   | KHEA/KHNA90F-24                               |                                 |
|------------------------------------|---|---|---|---------------------------------|
| INPUT                              | VOLTAGE[V]  | AC85 - 264 1 φ (Output derating is required) *10  |   |                                 |
|                                    | CURRENT[A]  | ACIN 115V   | 0.85typ                                       | 0.95typ                         |
|                                    |   | ACIN 230V   | 0.45typ                                       | 0.55typ                         |
|                                    | FREQUENCY[Hz]   | 50 / 60 (47 - 63)   |   |                                 |
|                                    | EFFICIENCY[%]   | ACIN 115V   | 87.0typ                                       | 89.0typ (88.0typ for option -E) |
|                                    |   | ACIN 230V   | 88.0typ                                       | 91.0typ (89.5typ for option -E) |
|                                    | POWER FACTOR (Io=100%)  | ACIN 115V   | 0.98typ                                       |                                 |
|                                    | ACIN 230V   | 0.86typ   |   |                                 |
| INRUSH CURRENT[A]                  | ACIN 115V   | 18typ (Io=100%) (at cold start Ta=25°C)   |   |                                 |
|                                    | ACIN 230V   | 35typ (Io=100%) (at cold start Ta=25°C)   |   |                                 |
| LEAKAGE CURRENT[ma]                | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) |   |   |                                 |
| OUTPUT                             | VOLTAGE[V]  | 12  | 24  |                                 |
|                                    | CURRENT[A]  | 6.8   | 3.8   |                                 |
|                                    | PEAK CURRENT[A]   | -   |   |                                 |
|                                    | LINE REGULATION[mV] *2  | 48max   | 96max   |                                 |
|                                    | LOAD REGULATION[mV] *2  | 100max  | 150max  |                                 |
|                                    | RIPPLE[mVp-p] *3  | 0 to +70°C  | 200max  | 200max                          |
|                                    |   | -20 - 0°C   | 300max  | 300max                          |
|                                    |   | Io=0 - 30%  | 300max *4                                     | 300max *4                       |
|                                    | RIPPLE NOISE[mVp-p] *3  | 0 to +70°C  | 260max  | 260max                          |
|                                    |   | -20 - 0°C   | 360max  | 360max                          |
|                                    |   | Io=0 - 30%  | 360max *4                                     | 360max *4                       |
|                                    | TEMPERATURE REGULATION[mV]  | 0 to +70°C  | 120max  | 240max                          |
|                                    |   | -20 to +70°C  | 150max  | 290max                          |
|                                    | DRIFT[mV] *5  | 48max   |   |                                 |
| START-UP TIME[ms]                  | 500typ (ACIN 115V, Io=100%)   |   |   |                                 |
| HOLD-UP TIME[ms]                   | 20typ (ACIN 115V, Io=100%)  |   |   |                                 |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20  | 22.50 to 28.50 (Fixed for option -E)  |   |                                 |
| OUTPUT VOLTAGE SETTING[V]          | 12.00 to 12.48  | 24.00 to 24.96 (24.00 to 24.50 for option -E)   |   |                                 |
| PROTECTION CIRCUIT AND OTHERS      | OVERCURRENT PROTECTION  | Works over 105% of rating (101% for option -E), recovers automatically *9   |   |                                 |
|                                    | OVERVOLTAGE PROTECTION[V]   | 13.80 to 16.80  | 30.00 to 36.00 (26.40 to 33.60 for option -E) |                                 |
|                                    | DC_OK LAMP  | LED (Green)   |   |                                 |
| ISOLATION                          | INPUT-OUTPUT  | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)  |   |                                 |
|                                    | INPUT-PE  | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)  |   |                                 |
|                                    | OUTPUT-PE   | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature)   |   |                                 |
| ENVIRONMENT                        | OPERATING TEMP., HUMID. AND ALTITUDE  | -20 to +70°C (Required to Derating), 20 - 90%RH (Non condensing)  |   |                                 |
|                                    | STORAGE TEMP., HUMID. AND ALTITUDE  | -30 to +85°C, 20 - 90%RH (Non condensing)   |   |                                 |
|                                    | VIBRATION *8  | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail)                   |   |                                 |
|                                    | IMPACT  | 196.1m/s <sup>2</sup> (20G), 11ms, X, Y and Z axis (Packing state)  |   |                                 |
| SAFETY AND NOISE REGULATIONS       | AGENCY APPROVALS (At only AC input)   | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178, UL508, NEC Class2 (24V output only option -E), ANSI/ISA12.12.01 Complies with DEN-AN |   |                                 |
|                                    | CONDUCTED NOISE   | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B  |   |                                 |
|                                    | HARMONIC ATTENUATOR   | Complies with IEC61000-3-2 (Class A) *6   |   |                                 |
| OTHERS                             | CASE SIZE *7  | 50×90×90mm (W×H×D) [1.97×3.54×3.54 inches]  |   |                                 |
|                                    | WEIGHT  | 405g max  |   |                                 |
|                                    | COOLING METHOD  | Convection / Forced air   |   |                                 |

\*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less) is excluded.  
 \*2 Please contact us about dynamic load and input response.  
 \*3 This is the value that measured on measuring board with capacitor of 22μF and 0.1μF at 150mm from output terminal.  
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.  
 Ripple and ripple noise spec is change at Io=0 to 30% by burst operation.  
 \*4 In case of operating under 0°C ambient temperature, the value is two times of specification at 0 to 30% load factor.  
 \*5 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

\*6 Please contact us about another class.  
 \*7 Case size contains neither the umbo.  
 \*8 Only as standard mounting orientation (A). Refer to the instruction manual 5.1.  
 If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.  
 \*9 If the overcurrent protection circuit operates continuously, the output voltage shut down. Refer to the instruction manual 2.3.  
 \*10 Please contact us about DC input voltage.  
 \* To meet the specifications. Do not operate over-loaded condition.  
 \* A sound may occur from power supply at light or peak loading.

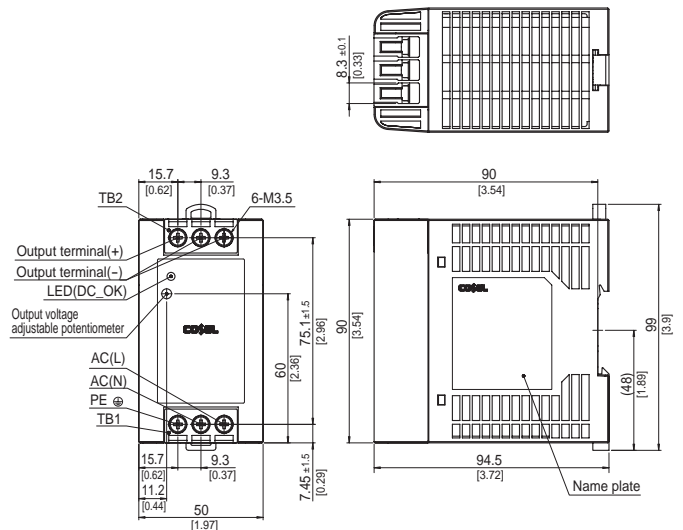
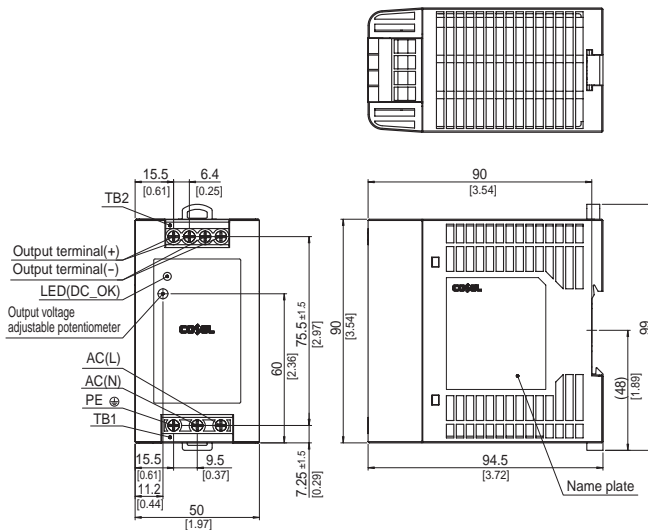
## Block diagram



## External view

<KHEA90F(Euro Style I/O Terminals)>

<KHNA90F(Barrier Blocks Style I/O Terminals)>



- ※ Tolerance : ±1 [±0.04]
- ※ Weight : 405g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max

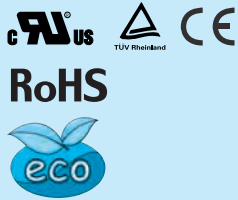
- ※ Tolerance : ±1 [±0.04]
- ※ Weight : 405g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max



# KHEA series

KHE A  F -24 -

① ② ③ ④ ⑤ ⑥



Recommended EMI/EMC Filter  
 KHEA120F NAC-04-472-D  
 KHEA240F NAC-06-472-D  
 KHEA480F NAC-10-472-D



High voltage pulse noise type : NAP series  
 Low leakage current type : NAM series  
 \*The EMI/EMC Filter is recommended to connect with several devices.

- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
- C : with Coating
- N2: Screw mounting

| MODEL                 | KHEA120F-24        | KHEA240F-24        | KHEA480F-24        |
|-----------------------|--------------------|--------------------|--------------------|
| MAX OUTPUT WATTAGE[W] | 120                | 240                | 480                |
| DC OUTPUT             | 24V 5A (Peak 7.5A) | 24V 10A (Peak 15A) | 24V 20A (Peak 30A) |

## SPECIFICATIONS

|                                    | MODEL  | KHEA120F-24  | KHEA240F-24                                     | KHEA480F-24                                     |         |
|------------------------------------|--|--|---|---|---------|
| INPUT                              | VOLTAGE[V]   | AC85 - 264 1 φ or DC120 - 370  |   | AC85 - 264 1 φ *11 *12                          |         |
|                                    | CURRENT[A]   | ACIN 115V  | 1.2typ  | 2.3typ  | 4.6typ  |
|                                    |  | ACIN 230V  | 0.6typ  | 1.2typ  | 2.3typ  |
|                                    | FREQUENCY[Hz]  | 50 / 60 (47 - 63) or DC  |   | 50 / 60 (47 - 63)                               |         |
|                                    | EFFICIENCY[%]  | ACIN 115V  | 90typ   | 92typ   | 92typ   |
|                                    |  | ACIN 230V  | 92typ   | 94typ   | 94typ   |
|                                    | POWER FACTOR   | ACIN 115V  | 0.98typ   | 0.98typ   | 0.98typ |
|                                    |  | ACIN 230V  | 0.93typ   | 0.93typ   | 0.93typ |
| INRUSH CURRENT[A]                  | ACIN 115V  | 15typ (at cold start Ta=25°C)  | 20typ (more than 3 sec. to re-start)            |   |         |
|                                    | *1 ACIN 230V   | 30typ (at cold start Ta=25°C)  | 40typ (more than 3 sec. to re-start)            |   |         |
| LEAKAGE CURRENT[ma]                | 0.45 / 0.75max   |  | 0.75 / 1.5max                                   |   |         |
|                                    | (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) |  |   |   |         |
| OUTPUT                             | VOLTAGE[V]   | 24   | 24  | 24  |         |
|                                    | CURRENT[A]   | 5  | 10  | 20  |         |
|                                    | PEAK CURRENT[A]  | *2 7.5   | 15  | 30  |         |
|                                    | LINE REGULATION[mV]  | *3 96max   |   | 96max (Io=30-100%) *10                          |         |
|                                    | LOAD REGULATION[mV]  | *3 150max *4   |   | 150max (Io=30-100%) *10                         |         |
|                                    | RIPPLE[mVp-p]  | 0 to +70°C   | 120max  |   | 120max  |
|                                    |  | -25 - 0°C  | 240max  |   | 240max  |
|                                    |  | Io=0 - 30%   | 240max *4                                       |   | 500max  |
|                                    | RIPPLE NOISE[mVp-p]  | 0 to +70°C   | 150max  |   | 150max  |
|                                    |  | -25 - 0°C  | 300max  |   | 300max  |
|                                    |  | Io=0 - 30%   | 300max *4                                       |   | 600max  |
|                                    | TEMPERATURE REGULATION[mV]   | 0 to +70°C   | 240max *4                                       |   | 240max  |
|                                    |  | -25 to +70°C   | 360max *4                                       |   | 360max  |
|                                    | DRIFT[mV]  | *6 96max   |   | 96max   |         |
|                                    | START-UP TIME[ms]  | 750max (ACIN 115V, Io=100%)  |   | 750max (ACIN 115V, Io=100%)                     |         |
| HOLD-UP TIME[ms]                   | 20typ (ACIN 115V, Io=100%)   |  | 20typ (ACIN 115V, Io=100%)                      |   |         |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 22.5 to 28.5   |  | 22.5 to 26.4                                    |   |         |
| OUTPUT VOLTAGE SETTING[V]          | 24.0±1.0%  |  | 24.0±1.0%                                       |   |         |
| PROTECTION CIRCUIT AND OTHERS      | OVERCURRENT PROTECTION   | Works over 101% of peak current and recovers automatically   |   |   |         |
|                                    | OVERVOLTAGE PROTECTION[V]  | 30.0 to 36.0   |   |   |         |
|                                    | DC_OK LAMP   | LED (Green)  |   |   |         |
|                                    | ALARM LAMP   | LED (Red)  |   |   |         |
| ISOLATION                          | DC_OK CONTACT  | Relay contact 30VDC 1A max, 30VAC 0.5A max (resistive load)  |   |   |         |
|                                    | INPUT-OUTPUT   | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)   |   |   |         |
|                                    | INPUT-PE   | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)   |   |   |         |
|                                    | OUTPUT-PE  | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature)  |   |   |         |
| ENVIRONMENT                        | OUTPUT-RC, DC_OK   | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature)  |   |   |         |
|                                    | OPERATING TEMP., HUMID. AND ALTITUDE                                 | -25 to +70°C (Required to Derating), 20 - 90%RH (Non condensing)   |   |   |         |
|                                    | STORAGE TEMP., HUMID. AND ALTITUDE                                   | -40 to +85°C, 20 - 90%RH (Non condensing)  |   |   |         |
|                                    | VIBRATION  | *9 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) |   |   |         |
| SAFETY AND NOISE REGULATIONS       | IMPACT   | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis (Packing state)   |   |   |         |
|                                    | AGENCY APPROVALS (At only AC input)                                  | UL60950-1, C-UL (CSA60950-1), EN60950-1, EN50178, UL508, ANSI / ISA12.12.01 Complies with DEN-AN                       |   |   |         |
|                                    | CONDUCTED NOISE  | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B   |   |   |         |
| OTHERS                             | HARMONIC ATTENUATOR  | Complies with IEC61000-3-2 (Class A) *7  |   |   |         |
|                                    | CASE SIZE  | *8 37×124×117mm (W×H×D)<br>[1.46×4.88×4.61 inches]   | 50×124×117mm (W×H×D)<br>[1.97×4.88×4.61 inches] | 70×124×117mm (W×H×D)<br>[2.76×4.88×4.61 inches] |         |
|                                    | WEIGHT   | 580g max   | 900g max  | 1,200g max                                      |         |
|                                    | COOLING METHOD   | Convection / Forced air  |   |   |         |

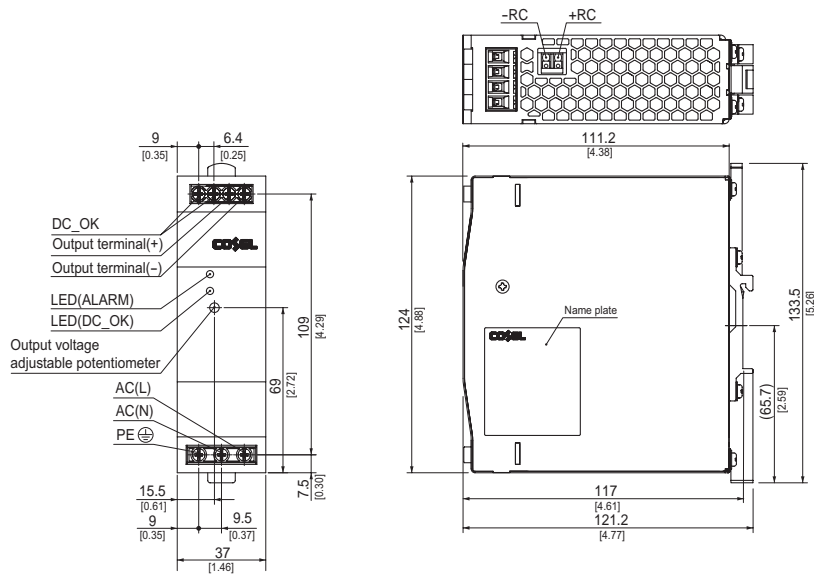
\*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter (0.2ms or less) is excluded.  
 \*2 Refer to 3. instruction manual.  
 \*3 Please contact us about dynamic load and input response.  
 \*4 The output voltage is below 23.5V, the value is equal to three times of the specification.  
 \*5 This is the value that measured on measuring board with capacitor of 22 μF and 0.1 μF at 150mm from output terminal.

Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103).  
 Please refer to the instruction manual 2.7.  
 \*6 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.  
 \*7 Please contact us about another class.  
 \*8 Case size contains neither the umbo.

\*9 Only as standard mounting orientation (A). Refer to the instruction manual 5.1. If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.  
 \*10 Burst operation at 30% load or less.  
 \*11 Output derating is required. Please refer to the instruction manual 5.2.  
 \*12 Please contact us about DC input voltage.  
 \* To meet the specifications. Do not operate over-loaded condition.  
 \* A sound may occur from power supply at light or peak loading.

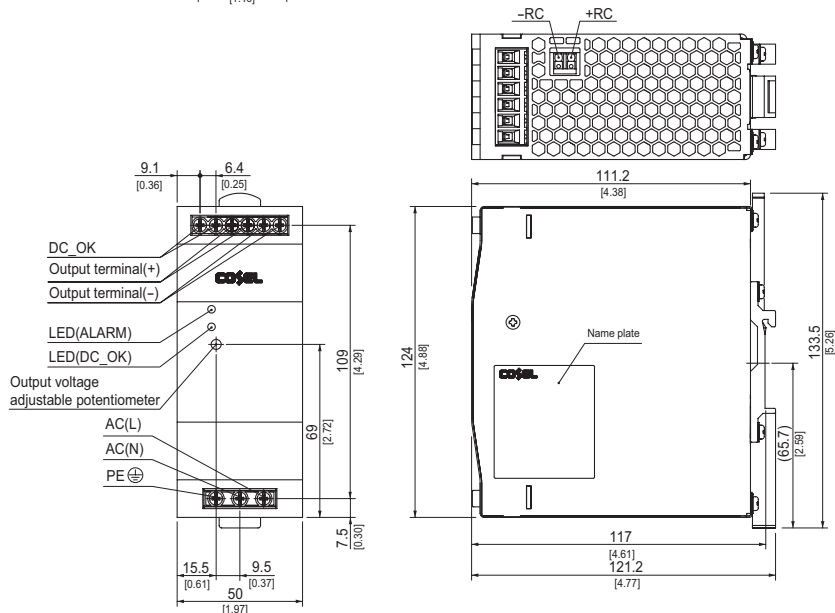
## External view

### ■KHEA120F



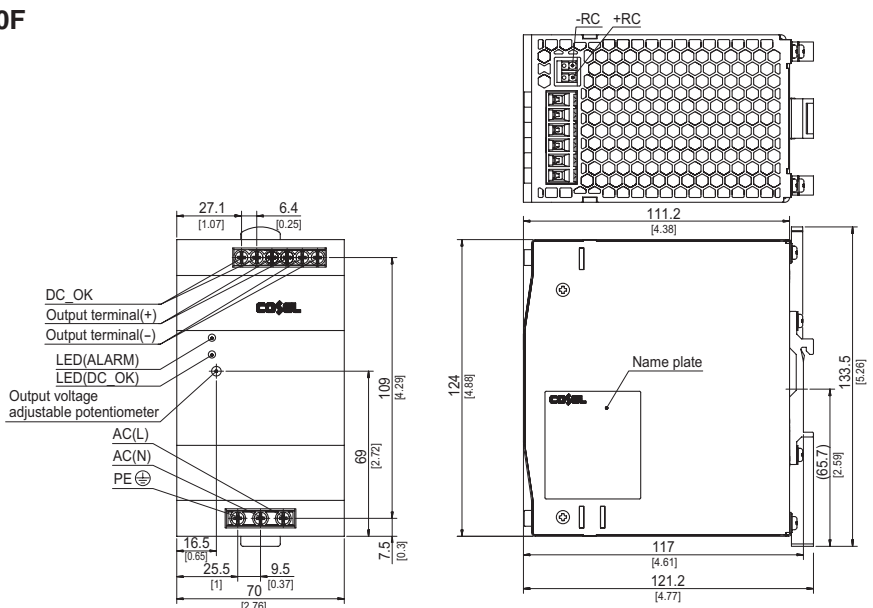
- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 580g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Nylon
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max

### ■KHEA240F



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 900g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Nylon
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max

### ■KHEA480F



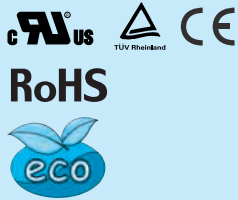
- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 1,200g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Nylon
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1N · m max



# KHNA series

KHN A    F -24 -

① ② ③ ④ ⑤ ⑥



Recommended EMI/EMC Filter  
 KHNA120F NAC-04-472-D  
 KHNA240F NAC-06-472-D  
 KHNA480F NAC-10-472-D



High voltage pulse noise type : NAP series  
 Low leakage current type : NAM series  
 \*The EMI/EMC Filter is recommended to connect with several devices.

- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
- C : with Coating
- N2: Screw mounting

| MODEL                 | KHNA120F-24        | KHNA240F-24        | KHNA480F-24        |
|-----------------------|--------------------|--------------------|--------------------|
| MAX OUTPUT WATTAGE[W] | 120                | 240                | 480                |
| DC OUTPUT             | 24V 5A (Peak 7.5A) | 24V 10A (Peak 15A) | 24V 20A (Peak 30A) |

## SPECIFICATIONS

|                                    | MODEL                                | KHNA120F-24  | KHNA240F-24                                     | KHNA480F-24                                     |         |
|------------------------------------|--------------------------------------|--|---|---|---------|
| INPUT                              | VOLTAGE[V]                           | AC85 - 264 1 φ or DC120 - 370  |   | AC85 - 264 1 φ *11 *12                          |         |
|                                    | CURRENT[A]                           | ACIN 115V  | 1.2typ  | 2.3typ  | 4.6typ  |
|                                    |                                      | ACIN 230V  | 0.6typ  | 1.2typ  | 2.3typ  |
|                                    | FREQUENCY[Hz]                        | 50 / 60 (47 - 63) or DC  |   | 50 / 60 (47 - 63)                               |         |
|                                    | EFFICIENCY[%]                        | ACIN 115V  | 90typ   | 92typ   | 92typ   |
|                                    |                                      | ACIN 230V  | 92typ   | 94typ   | 94typ   |
|                                    | POWER FACTOR                         | ACIN 115V  | 0.98typ   | 0.98typ   | 0.98typ |
|                                    |                                      | ACIN 230V  | 0.93typ   | 0.93typ   | 0.93typ |
| INRUSH CURRENT[A]                  | ACIN 115V                            | 15typ (at cold start Ta=25°C)  | 20typ (more than 3 sec. to re-start)            |   |         |
|                                    | *1 ACIN 230V                         | 30typ (at cold start Ta=25°C)  | 40typ (more than 3 sec. to re-start)            |   |         |
| LEAKAGE CURRENT[ma]                |                                      | 0.45 / 0.75max   |   | 0.75 / 1.5max                                   |         |
|                                    |                                      | (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN)   |   |   |         |
| OUTPUT                             | VOLTAGE[V]                           | 24   | 24  | 24  |         |
|                                    | CURRENT[A]                           | 5  | 10  | 20  |         |
|                                    | PEAK CURRENT[A]                      | *2 7.5   | 15  | 30  |         |
|                                    | LINE REGULATION[mV]                  | *3 96max   |   | 96max (Io=30-100%) *10                          |         |
|                                    | LOAD REGULATION[mV]                  | *3 150max *4   |   | 150max (Io=30-100%) *10                         |         |
|                                    | RIPPLE[mVp-p]                        | 0 to +70°C   | 120max  |   | 120max  |
|                                    |                                      | -25 - 0°C  | 240max  |   | 240max  |
|                                    |                                      | Io=0 - 30%   | 240max *4                                       |   | 500max  |
|                                    | RIPPLE NOISE[mVp-p]                  | 0 to +70°C   | 150max  |   | 150max  |
|                                    |                                      | -25 - 0°C  | 300max  |   | 300max  |
|                                    |                                      | Io=0 - 30%   | 300max *4                                       |   | 600max  |
|                                    | TEMPERATURE REGULATION[mV]           | 0 to +70°C   | 240max *4                                       |   | 240max  |
|                                    |                                      | -25 to +70°C   | 360max *4                                       |   | 360max  |
|                                    | DRIFT[mV]                            | *6 96max   |   | 96max   |         |
|                                    | START-UP TIME[ms]                    | 750max (ACIN 115V, Io=100%)  |   | 750max (ACIN 115V, Io=100%)                     |         |
| HOLD-UP TIME[ms]                   | 20typ (ACIN 115V, Io=100%)           |  | 20typ (ACIN 115V, Io=100%)                      |   |         |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 22.5 to 28.5                         |  | 22.5 to 26.4                                    |   |         |
| OUTPUT VOLTAGE SETTING[V]          | 24.0±1.0%                            |  | 24.0±1.0%                                       |   |         |
| PROTECTION CIRCUIT AND OTHERS      | OVERCURRENT PROTECTION               | Works over 101% of peak current and recovers automatically   |   |   |         |
|                                    | OVERVOLTAGE PROTECTION[V]            | 30.0 to 36.0   |   |   |         |
|                                    | DC_OK LAMP                           | LED (Green)  |   |   |         |
|                                    | ALARM LAMP                           | LED (Red)  |   |   |         |
|                                    | DC_OK CONTACT                        | -  |   |   |         |
| ISOLATION                          | INPUT-OUTPUT                         | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)   |   |   |         |
|                                    | INPUT-PE                             | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature)   |   |   |         |
|                                    | OUTPUT-PE                            | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature)  |   |   |         |
|                                    | OUTPUT-RC                            | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature)  |   |   |         |
| ENVIRONMENT                        | OPERATING TEMP., HUMID. AND ALTITUDE | -25 to +70°C (Required to Derating), 20 - 90%RH (Non condensing)   |   |   |         |
|                                    | STORAGE TEMP., HUMID. AND ALTITUDE   | -40 to +85°C, 20 - 90%RH (Non condensing)  |   |   |         |
|                                    | VIBRATION                            | *9 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) |   |   |         |
|                                    | IMPACT                               | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis (Packing state)   |   |   |         |
| SAFETY AND NOISE REGULATIONS       | AGENCY APPROVALS (At only AC input)  | UL60950-1, C-UL (CSA60950-1), EN60950-1, EN50178, UL508, ANSI / ISA12.12.01 Complies with DEN-AN                       |   |   |         |
|                                    | CONDUCTED NOISE                      | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B   |   |   |         |
|                                    | HARMONIC ATTENUATOR                  | Complies with IEC61000-3-2 (Class A) *7  |   |   |         |
| OTHERS                             | CASE SIZE                            | *8 37×124×117mm (W×H×D)<br>[1.46×4.88×4.61 inches]   | 50×124×117mm (W×H×D)<br>[1.97×4.88×4.61 inches] | 70×124×117mm (W×H×D)<br>[2.76×4.88×4.61 inches] |         |
|                                    | WEIGHT                               | 580g max   | 900g max  | 1,200g max                                      |         |
|                                    | COOLING METHOD                       | Convection / Forced air  |   |   |         |

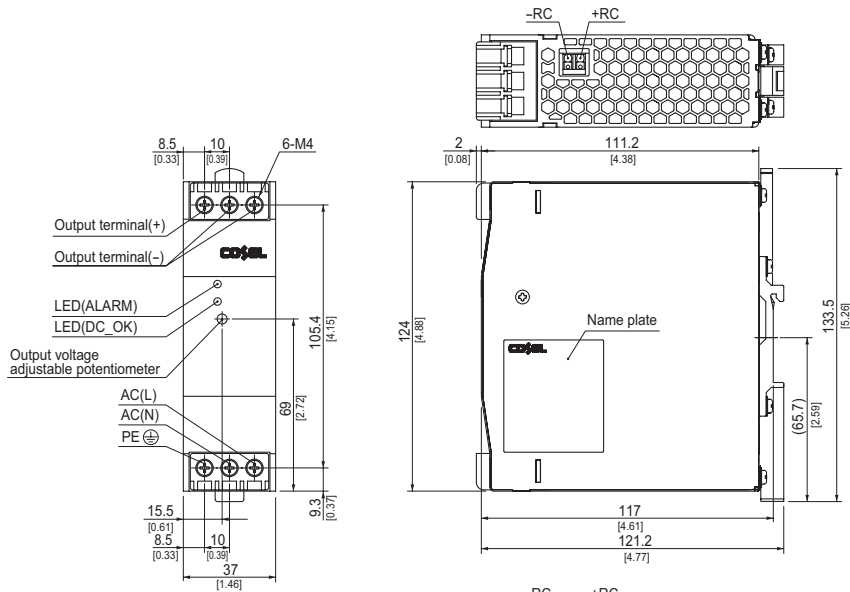
\*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter (0.2ms or less) is excluded.  
 \*2 Refer to 3. instruction manual.  
 \*3 Please contact us about dynamic load and input response.  
 \*4 The output voltage is below 23.5V, the value is equal to three times of the specification.  
 \*5 This is the value that measured on measuring board with capacitor of 22 μF and 0.1 μF at 150mm from output terminal.

Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.  
 \*6 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.  
 \*7 Please contact us about another class.  
 \*8 Case size contains neither the umbo.

\*9 Only as standard mounting orientation (A). Refer to the instruction manual 5.1. If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.  
 \*10 Burst operation at 30% load or less.  
 \*11 Output derating is required. Please refer to the instruction manual 5.2.  
 \*12 Please contact us about DC input voltage.  
 \* To meet the specifications. Do not operate over-loaded condition.  
 \* A sound may occur from power supply at light or peak loading.

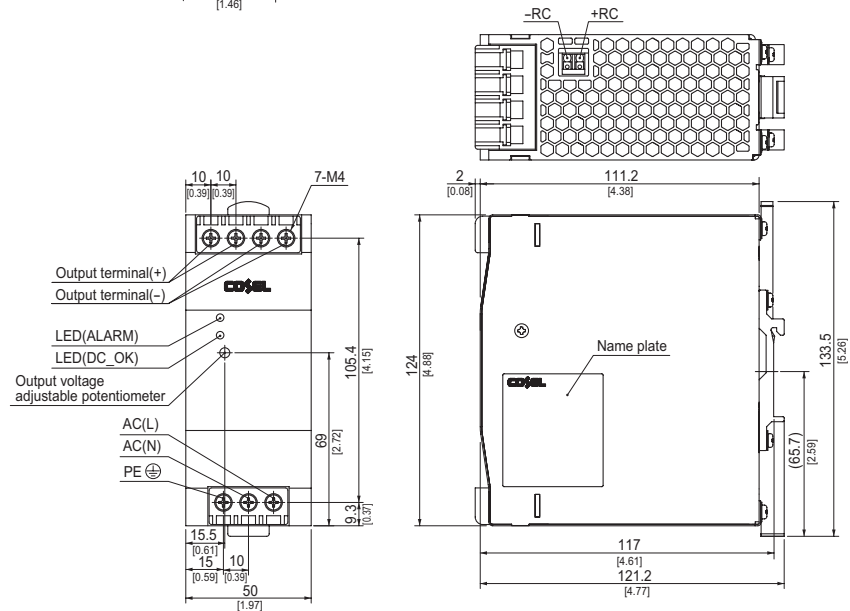
## External view

### ■ KHNA120F



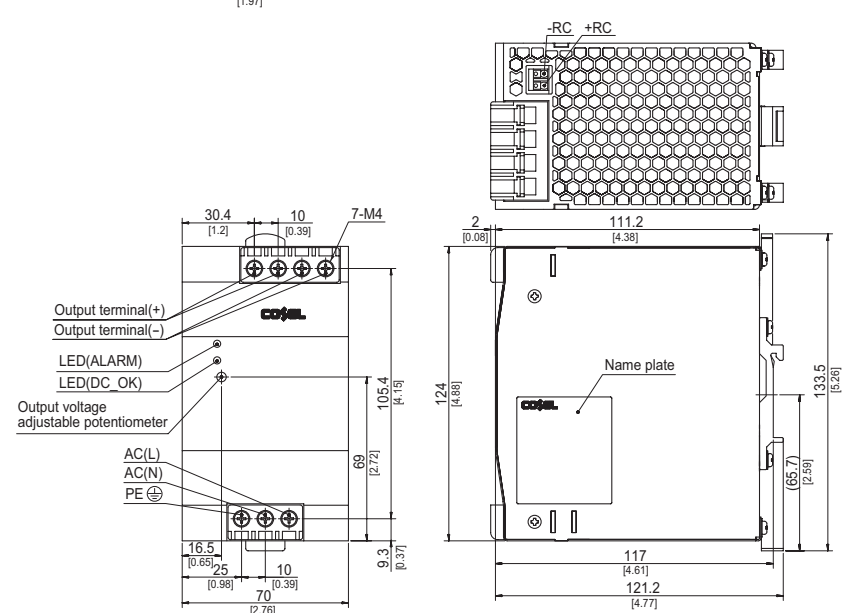
- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 580g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Nylon
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1.6N · m max

### ■ KHNA240F



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 900g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Nylon
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1.6N · m max

### ■ KHNA480F



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 1,200g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Nylon
- ※ Dimensions in mm, [ ] = inches
- ※ Screw tightening torque : 1.6N · m max

# Mouser Electronics

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[KHEA60F-12](#) [KHEA90F-12](#)



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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