

## PBA10F

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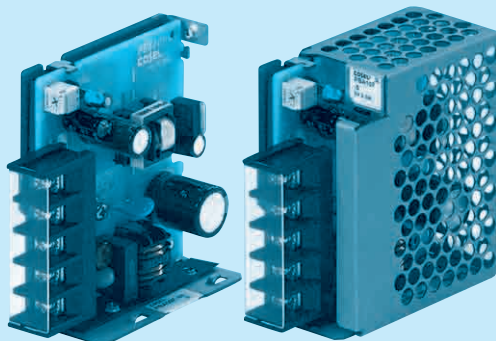
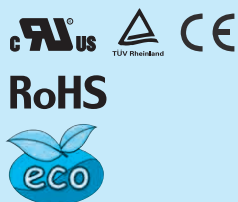
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Recommended EMI/EMC Filter  
NAC-06-472

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 Optional \*5  
C : with Coating  
G : Low leakage current  
E : Low leakage current  
and EMI class A  
T : Vertical terminal block  
J : Connector type  
N : with Cover  
(UL508 is acquired)  
NI : with DIN rail and Cover  
V : Output voltage setting  
potentiometer external-  
ly

Cover is optional

| MODEL                 | PBA10F-5 | PBA10F-12 | PBA10F-24 |
|-----------------------|----------|-----------|-----------|
| MAX OUTPUT WATTAGE[W] | 10       | 10.8      | 12        |
| DC OUTPUT             | 5V 2A    | 12V 0.9A  | 24V 0.5A  |

## SPECIFICATIONS

|                                     | MODEL                                | PBA10F-5                                                                                                                                  | PBA10F-12         | PBA10F-24     |
|-------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|
| INPUT                               | VOLTAGE[V]                           | AC85 - 264 1 $\phi$ or DC110 - 370 (AC50 or DC70 Please refer to the instruction manual 2.1 Input voltage *3)                             |                   |               |
|                                     | CURRENT[A]                           | ACIN 100V                                                                                                                                 | 0.30typ (Io=100%) |               |
|                                     |                                      | ACIN 200V                                                                                                                                 | 0.20typ (Io=100%) |               |
|                                     | FREQUENCY[Hz]                        | 50/60 (47 - 440) or DC                                                                                                                    |                   |               |
|                                     | EFFICIENCY[%]                        | ACIN 100V                                                                                                                                 | 74typ             | 77typ         |
|                                     |                                      | ACIN 200V                                                                                                                                 | 74typ             | 77typ         |
|                                     | INRUSH CURRENT[A]                    | ACIN 100V                                                                                                                                 | 15typ (Io=100%)   |               |
| OUTPUT                              |                                      | ACIN 200V                                                                                                                                 | 30typ (Io=100%)   |               |
|                                     | LEAKAGE CURRENT[ma]                  | 0.15/0.30max (ACIN 100V/240V 60Hz, Io=100%, According to IEC60950-1.DENAN)                                                                |                   |               |
|                                     | VOLTAGE[V]                           | 5                                                                                                                                         | 12                | 24            |
|                                     | CURRENT[A]                           | 2                                                                                                                                         | 0.9               | 0.5           |
|                                     | LINE REGULATION[mV] *6               | 20max                                                                                                                                     | 48max             | 96max         |
|                                     | LOAD REGULATION[mV] *6               | 40max                                                                                                                                     | 100max            | 150max        |
|                                     | RIPPLE[mVp-p]                        | 0 to +50°C *1                                                                                                                             | 80max             | 120max        |
|                                     |                                      | -10 - 0°C *1                                                                                                                              | 140max            | 160max        |
|                                     | RIPPLE NOISE[mVp-p]                  | 0 to +50°C *1                                                                                                                             | 120max            | 150max        |
|                                     |                                      | -10 - 0°C *1                                                                                                                              | 160max            | 180max        |
|                                     | TEMPERATURE REGULATION[mV]           | 0 to +50°C                                                                                                                                | 50max             | 120max        |
|                                     |                                      | -10 to +50°C                                                                                                                              | 60max             | 240max        |
|                                     | DRIFT[mV] *2                         | 20max                                                                                                                                     | 48max             | 96max         |
|                                     | START-UP TIME[ms]                    | 200typ(ACIN 100V, Io=100%) * Start-up time is 700ms typ for less than 1minute of applying input again from turning off the input voltage. |                   |               |
|                                     | HOLD-UP TIME[ms]                     | 20typ (ACIN 100V, Io=100%)                                                                                                                |                   |               |
|                                     | OUTPUT VOLTAGE ADJUSTMENT RANGE[V]   | 4.50 - 5.50                                                                                                                               | 10.0 - 13.2       | 19.2 - 27.0   |
|                                     | OUTPUT VOLTAGE SETTING[V]            | 5.00 - 5.15                                                                                                                               | 12.00 - 12.48     | 24.00 - 24.96 |
| PROTECTION<br>CIRCUIT AND<br>OTHERS | OVERCURRENT PROTECTION               | Works over 105% of rated current and recovers automatically                                                                               |                   |               |
|                                     | OVERVOLTAGE PROTECTION[V]            | 5.75 - 7.00                                                                                                                               | 15.0 - 18.0       | 30.0 - 37.0   |
|                                     | OPERATING INDICATION                 | LED (Green)                                                                                                                               |                   |               |
|                                     | REMOTE ON/OFF                        | None                                                                                                                                      |                   |               |
| ISOLATION                           | INPUT-OUTPUT                         | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (At Room Temperature)                                                    |                   |               |
|                                     | INPUT-FG                             | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (At Room Temperature)                                                    |                   |               |
|                                     | OUTPUT-FG                            | AC500V 1minute, Cutoff current = 25mA, DC500V 50M $\Omega$ min (At Room Temperature)                                                      |                   |               |
| ENVIRONMENT                         | OPERATING TEMP., HUMID. AND ALTITUDE | -10 to +71°C (Required Derating), 20 - 90%RH (Non condensing) 3,000m (10,000feet) max                                                     |                   |               |
|                                     | STORAGE TEMP., HUMID. AND ALTITUDE   | -20 to +75°C, 20 - 90%RH (Non condensing) 9,000m (30,000feet) max                                                                         |                   |               |
|                                     | VIBRATION                            | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60minutes each along X, Y and Z axis                                               |                   |               |
|                                     | IMPACT                               | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis                                                                              |                   |               |
| SAFETY AND<br>NOISE<br>REGULATIONS  | AGENCY APPROVALS (At only AC input)  | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178 Complies with DEN-AN                                                                      |                   |               |
|                                     | CONDUCTED NOISE                      | Complies with FCC Part15 classB, VCCI-B, CISPR22-B, EN55011-B, EN55022-B                                                                  |                   |               |
|                                     | HARMONIC ATTENUATOR                  | Complies with IEC61000-3-2 (Not built-in to active filter *4) *7                                                                          |                   |               |
| OTHERS                              | CASE SIZE/WEIGHT                     | 31×78×68mm [1.22×3.07×2.68 inches] (without terminal block) (W×H×D) / 150g max (with cover : 180g max)                                    |                   |               |
|                                     | COOLING METHOD                       | Convection                                                                                                                                |                   |               |

\*1 Measured by 20MHz oscilloscope or Ripple-Noise meter(equivalent to KEISOKU-GIKEN :RM101).

\*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C.

\*3 Derating is required.

\*4 When two or more units are used, they may not comply with the harmonic attenuator. Please contact us for details.

\*5 Please contact us about safety approvals for the model with option.

\*6 Please contact us about dynamic load and input response.

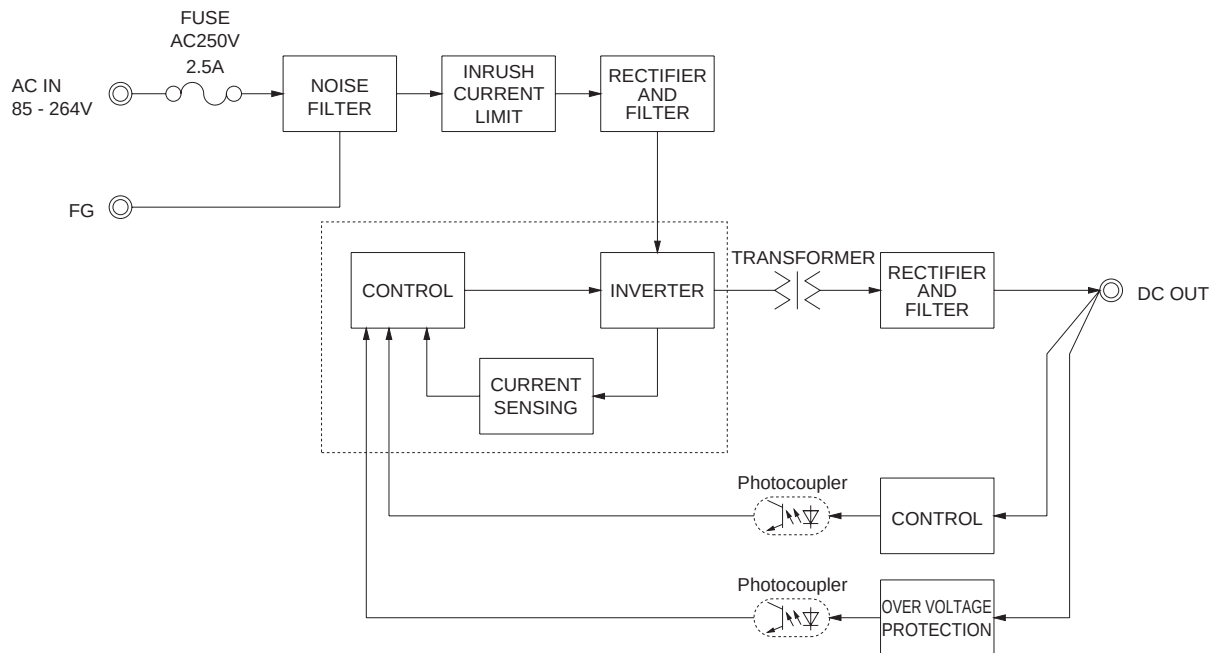
\*7 Please contact us about class C.

\* Parallel operation with other model is not possible.

\* Derating is required when operated with cover.

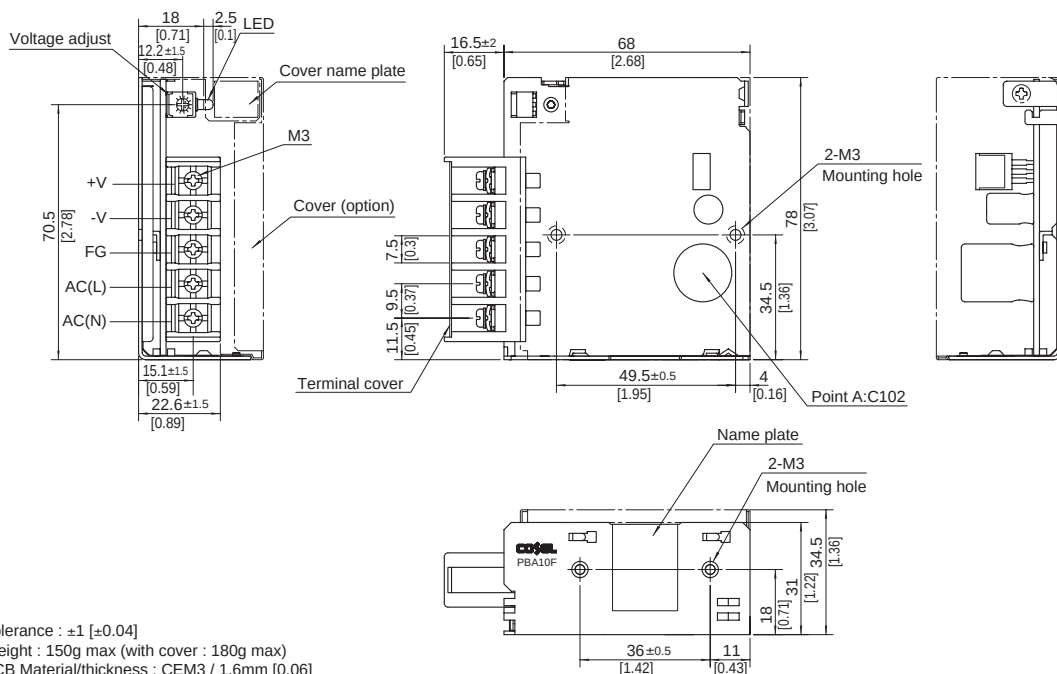
\* A sound may occur from power supply at peak loading.

## Block diagram



## External view

※ External size of option T,J,N,N1 and V is different from standard model and refer to 7 Option of instruction manual for details.



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 150g max (with cover : 180g max)
- ※ PCB Material/thickness : CEM3 / 1.6mm [0.06]
- ※ Chassis material : Electric galvanizing steel board
- ※ Dimensions in mm, [ ] = inches
- ※ Mounting torque :  $0.6\text{N} \cdot \text{m}$  (6.3kgf  $\cdot$  cm) max
- ※ Screw tightening torque : M3  $0.8\text{N} \cdot \text{m}$  (8.5kgf  $\cdot$  cm) max
- ※ Please connect safety ground to the unit in 2-M3 holes.

## PBA15F

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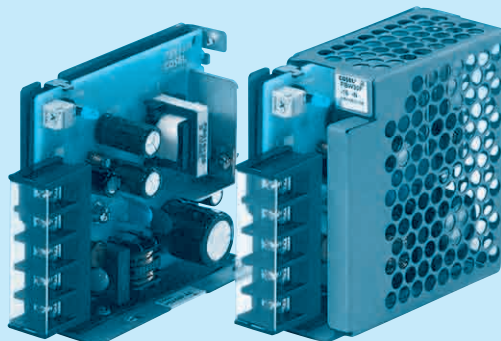
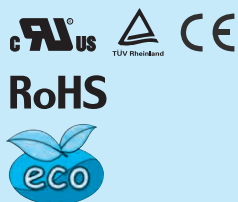
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\* The EMI/EMC Filter is recommended  
to connect with several devices.

- ① Series name  
② Single output  
③ Output wattage  
④ Universal input  
⑤ Output voltage  
⑥ Optional \*5  
C : with Coating  
G : Low leakage current  
E : Low leakage current  
and EMI class A  
T : Vertical terminal block  
J : Connector type  
N : with Cover  
(UL508 is acquired  
[5V, 12V, 24V])  
NI : with DIN rail and Cover  
V : Output voltage setting  
potentiometer external-  
ly

Cover is optional

| MODEL                 | PBA15F-3R3 | PBA15F-5 | PBA15F-9 | PBA15F-12 | PBA15F-15 | PBA15F-24 | PBA15F-48 |
|-----------------------|------------|----------|----------|-----------|-----------|-----------|-----------|
| MAX OUTPUT WATTAGE[W] | 9.9        | 15       | 15.3     | 15.6      | 15        | 16.8      | 16.8      |
| DC OUTPUT             | 3.3V 3A    | 5V 3A    | 9V 1.7A  | 12V 1.3A  | 15V 1A    | 24V 0.7A  | 48V 0.35A |

## SPECIFICATIONS

|                                     | MODEL                                | PBA15F-3R3                                                                                                                                 | PBA15F-5          | PBA15F-9         | PBA15F-12     | PBA15F-15     | PBA15F-24     | PBA15F-48     |
|-------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|---------------|---------------|---------------|---------------|
| INPUT                               | VOLTAGE[V]                           | AC85 - 264 1 $\phi$ or DC110 - 370 (AC50 or DC70 Please refer to the instruction manual 2.1 Input voltage *3)                              |                   |                  |               |               |               |               |
|                                     | CURRENT[A]                           | ACIN 100V                                                                                                                                  | 0.30typ (Io=100%) | 0.4typ (Io=100%) |               |               |               |               |
|                                     |                                      | ACIN 200V                                                                                                                                  | 0.15typ (Io=100%) | 0.2typ (Io=100%) |               |               |               |               |
|                                     | FREQUENCY[Hz]                        | 50/60 (47 - 440) or DC                                                                                                                     |                   |                  |               |               |               |               |
|                                     | EFFICIENCY[%]                        | ACIN 100V                                                                                                                                  | 68typ             | 74typ            | 75typ         | 77typ         | 75typ         | 75typ         |
|                                     |                                      | ACIN 200V                                                                                                                                  | 68typ             | 75typ            | 77typ         | 80typ         | 78typ         | 78typ         |
|                                     | INRUSH CURRENT[A]                    | ACIN 100V 15typ (Io=100%) (At cold start)<br>ACIN 200V 30typ (Io=100%) (At cold start)                                                     |                   |                  |               |               |               |               |
| OUTPUT                              | LEAKAGE CURRENT[ma]                  | 0.15/0.30max (ACIN 100V/240V 60Hz, Io=100%, According to IEC60950-1.DENAN)                                                                 |                   |                  |               |               |               |               |
|                                     | VOLTAGE[V]                           | 3.3                                                                                                                                        | 5                 | 9                | 12            | 15            | 24            | 48            |
|                                     | CURRENT[A]                           | 3                                                                                                                                          | 3                 | 1.7              | 1.3           | 1             | 0.7           | 0.35          |
|                                     | LINE REGULATION[mV] *6               | 20max                                                                                                                                      | 20max             | 36max            | 48max         | 60max         | 96max         | 192max        |
|                                     | LOAD REGULATION[mV] *6               | 40max                                                                                                                                      | 40max             | 100max           | 100max        | 120max        | 150max        | 240max        |
|                                     | RIPPLE[mVp-p]                        | 0 to +50°C *1                                                                                                                              | 80max             | 80max            | 120max        | 120max        | 120max        | 150max        |
|                                     |                                      | -10 - 0°C *1                                                                                                                               | 140max            | 140max           | 160max        | 160max        | 160max        | 200max        |
|                                     |                                      | 0 to +50°C *1                                                                                                                              | 120max            | 120max           | 150max        | 150max        | 150max        | 250max        |
|                                     | RIPPLE NOISE[mVp-p]                  | -10 - 0°C *1                                                                                                                               | 160max            | 160max           | 180max        | 180max        | 180max        | 300max        |
|                                     |                                      | 0 to +50°C                                                                                                                                 | 50max             | 50max            | 90max         | 120max        | 150max        | 480max        |
|                                     | TEMPERATURE REGULATION[mV]           | -10 to +50°C                                                                                                                               | 60max             | 60max            | 120max        | 150max        | 290max        | 600max        |
|                                     | DRIFT[mV] *2                         | 20max                                                                                                                                      | 20max             | 36max            | 48max         | 60max         | 96max         | 192max        |
|                                     | START-UP TIME[ms]                    | 200typ (ACIN 100V, Io=100%) * Start-up time is 700ms typ for less than 1minute of applying input again from turning off the input voltage. |                   |                  |               |               |               |               |
|                                     | HOLD-UP TIME[ms]                     | 20typ (ACIN 100V, Io=100%)                                                                                                                 |                   |                  |               |               |               |               |
| PROTECTION<br>CIRCUIT AND<br>OTHERS | OUTPUT VOLTAGE ADJUSTMENT RANGE[V]   | 2.85 - 3.60                                                                                                                                | 4.50 - 5.50       | 7.50 - 10.0      | 10.0 - 13.2   | 13.2 - 18.0   | 19.2 - 27.0   | 39.0 - 53.0   |
|                                     | OUTPUT VOLTAGE SETTING[V]            | 3.30 - 3.40                                                                                                                                | 5.00 - 5.15       | 9.00 - 9.36      | 12.00 - 12.48 | 15.00 - 15.60 | 24.00 - 24.96 | 48.00 - 49.92 |
|                                     | OVERCURRENT PROTECTION               | Works over 105% of rated current and recovers automatically                                                                                |                   |                  |               |               |               |               |
|                                     | OVERVOLTAGE PROTECTION[V]            | 4.00 - 5.25                                                                                                                                | 5.75 - 7.00       | 11.5 - 14.0      | 15.0 - 18.0   | 20.0 - 25.0   | 30.0 - 37.0   | 58.0 - 65.0   |
|                                     | OPERATING INDICATION                 | LED (Green)                                                                                                                                |                   |                  |               |               |               |               |
| ISOLATION                           | REMOTE ON/OFF                        | None                                                                                                                                       |                   |                  |               |               |               |               |
|                                     | INPUT-OUTPUT                         | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (At Room Temperature)                                                     |                   |                  |               |               |               |               |
|                                     | INPUT-FG                             | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50M $\Omega$ min (At Room Temperature)                                                     |                   |                  |               |               |               |               |
| ENVIRONMENT                         | OUTPUT-FG                            | AC500V 1minute, Cutoff current = 25mA, DC500V 50M $\Omega$ min (At Room Temperature)                                                       |                   |                  |               |               |               |               |
|                                     | OPERATING TEMP., HUMID. AND ALTITUDE | -10 to +71°C (Required Derating), 20 - 90%RH (Non condensing) 3,000m (10,000feet) max                                                      |                   |                  |               |               |               |               |
|                                     | STORAGE TEMP., HUMID. AND ALTITUDE   | -20 to +75°C, 20 - 90%RH (Non condensing) 9,000m (30,000feet) max                                                                          |                   |                  |               |               |               |               |
|                                     | VIBRATION                            | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60minutes each along X, Y and Z axis                                                |                   |                  |               |               |               |               |
| SAFETY AND<br>NOISE<br>REGULATIONS  | IMPACT                               | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis                                                                               |                   |                  |               |               |               |               |
|                                     | AGENCY APPROVALS (At only AC input)  | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178 Complies with DEN-AN                                                                       |                   |                  |               |               |               |               |
|                                     | CONDUCTED NOISE                      | Complies with FCC Part15 classB, VCCI-B, CISPR22-B, EN55011-B, EN55022-B                                                                   |                   |                  |               |               |               |               |
| OTHERS                              | HARMONIC ATTENUATOR                  | Complies with IEC61000-3-2 (Not built-in to active filter *4) *7                                                                           |                   |                  |               |               |               |               |
|                                     | CASE SIZE/WEIGHT                     | 31 x 78 x 85mm [1.22 x 3.07 x 3.35 inches] (without terminal block) (W x H x D) / 200g max (with cover : 235g max)                         |                   |                  |               |               |               |               |
|                                     | COOLING METHOD                       | Convection                                                                                                                                 |                   |                  |               |               |               |               |

\*1 Measured by 20MHz oscilloscope or Ripple-Noise meter (equivalent to KEISOKU-GIKEN : RM101).

\*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C.

\*3 Derating is required.

\*4 When two or more units are used, they may not comply with the harmonic attenuator. Please contact us for details.

\*5 Please contact us about safety approvals for the model with option.

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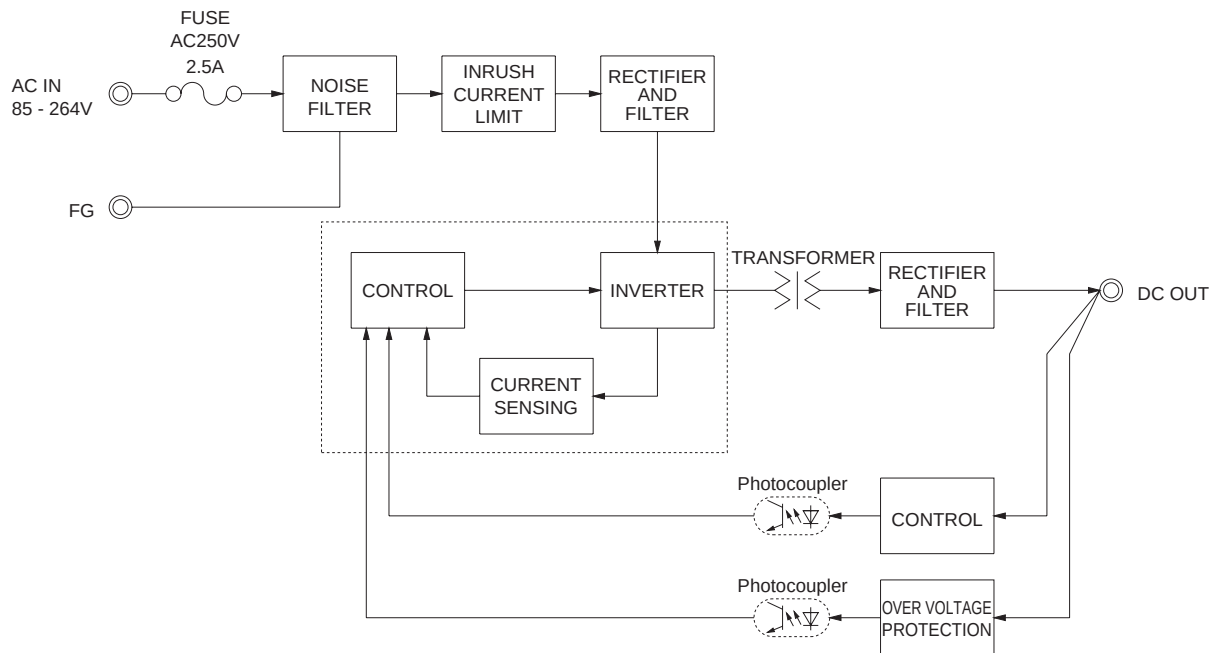
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\* Derating is required when operated with cover.

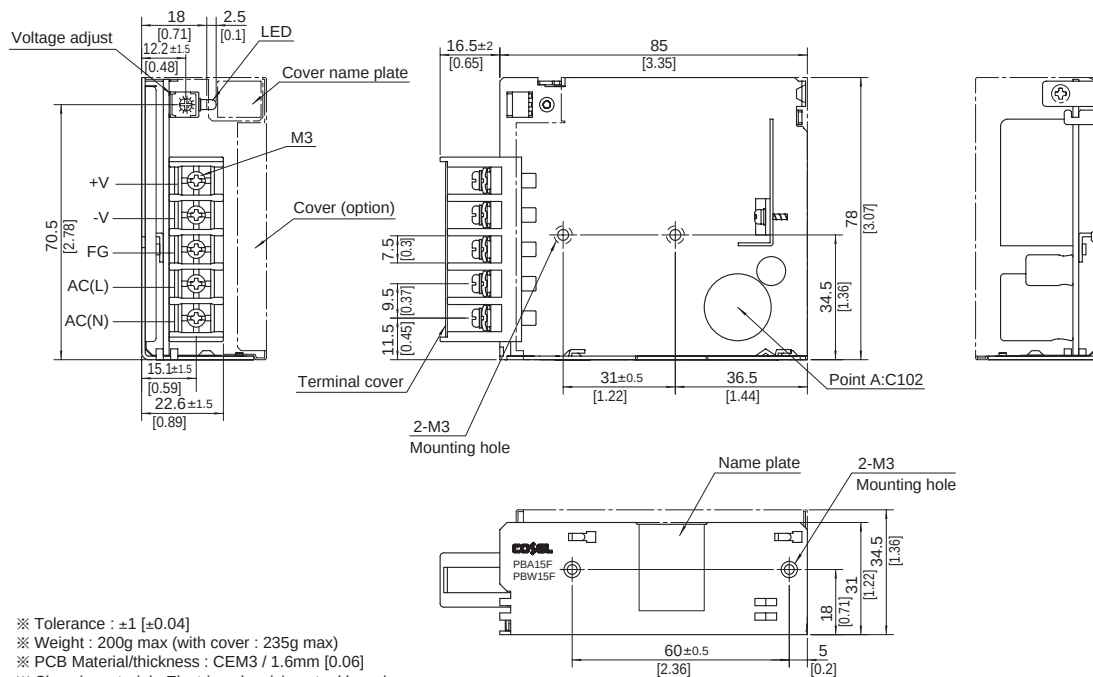
\* A sound may occur from power supply at peak loading.

## Block diagram



## External view

※ External size of option T,J,N,N1 and V is different from standard model and refer to 7 Option of instruction manual for details.



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 200g max (with cover : 235g max)
- ※ PCB Material/thickness : CEM3 / 1.6mm [0.06]
- ※ Chassis material : Electric galvanizing steel board
- ※ Dimensions in mm, [ ] = inches
- ※ Mounting torque : 0.6N • m (6.3kgf • cm) max
- ※ Screw tightening torque : M3 0.8N • m (8.5kgf • cm) max
- ※ Please connect safety ground to the unit in 2-M3 holes.

## PBA30F

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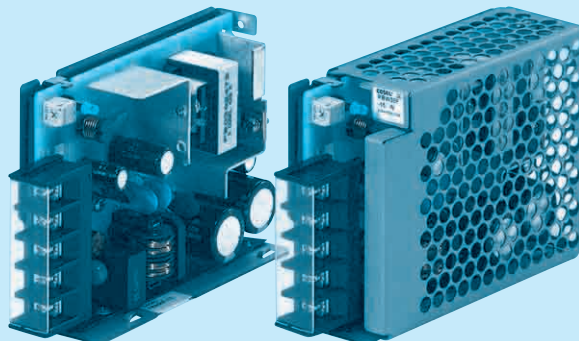
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NAC-06-472High voltage pulse noise type : NAP series  
Low leakage current type : NAM series  
\* The EMI/EMC Filter is recommended  
to connect with several devices.

- ① Series name  
② Single output  
③ Output wattage  
④ Universal input  
⑤ Output voltage  
⑥ Optional \*5  
C : with Coating  
G : Low leakage current  
E : Low leakage current  
and EMI class A  
T : Vertical terminal block  
J : Connector type  
N : with Cover  
(UL508 is acquired  
[5V, 12V, 24V])  
NI : with DIN rail and Cover  
V : Output voltage setting  
potentiometer external-  
ly

Cover is optional

| MODEL                 | PBA30F-3R3 | PBA30F-5 | PBA30F-9 | PBA30F-12 | PBA30F-15 | PBA30F-24 | PBA30F-48 |
|-----------------------|------------|----------|----------|-----------|-----------|-----------|-----------|
| MAX OUTPUT WATTAGE[W] | 19.8       | 30       | 30.6     | 30        | 30        | 31.2      | 31.2      |
| DC OUTPUT             | 3.3V 6A    | 5V 6A    | 9V 3.4A  | 12V 2.5A  | 15V 2A    | 24V 1.3A  | 48V 0.65A |

## SPECIFICATIONS

|                                     | MODEL                               |                                 | PBA30F-3R3                                                                                                                                | PBA30F-5    | PBA30F-9          | PBA30F-12     | PBA30F-15     | PBA30F-24     | PBA30F-48   |
|-------------------------------------|-------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------|---------------|---------------|---------------|-------------|
| INPUT                               | VOLTAGE[V]                          |                                 | AC85 - 264 1ϕ or DC110 - 370 (AC50 or DC70 Please refer to the instruction manual 2.1 Input voltage ※3)                                   |             |                   |               |               |               |             |
|                                     | CURRENT[A]                          | ACIN 100V                       | 0.50typ (Io=100%)                                                                                                                         |             | 0.70typ (Io=100%) |               |               |               |             |
|                                     |                                     | ACIN 200V                       | 0.30typ (Io=100%)                                                                                                                         |             | 0.40typ (Io=100%) |               |               |               |             |
|                                     | FREQUENCY[Hz]                       |                                 | 50/60 (47 - 440) or DC                                                                                                                    |             |                   |               |               |               |             |
|                                     | EFFICIENCY[%]                       | ACIN 100V                       | 68typ                                                                                                                                     | 74typ       | 75typ             | 76typ         | 78typ         | 79typ         |             |
|                                     |                                     | ACIN 200V                       | 69typ                                                                                                                                     | 77typ       | 77typ             | 78typ         | 81typ         | 81typ         |             |
|                                     | INRUSH CURRENT[A]                   | ACIN 100V                       | 15typ (Io=100%) (At cold start)                                                                                                           |             |                   |               |               |               |             |
|                                     | ACIN 200V                           | 30typ (Io=100%) (At cold start) |                                                                                                                                           |             |                   |               |               |               |             |
|                                     | LEAKAGE CURRENT[mA]                 |                                 | 0.30/0.65max (ACIN 100V/240V 60Hz, Io=100%, According to IEC60950-1.DENAN)                                                                |             |                   |               |               |               |             |
| OUTPUT                              | VOLTAGE[V]                          |                                 | 3.3                                                                                                                                       | 5           | 9                 | 12            | 15            | 24            | 48          |
|                                     | CURRENT[A]                          |                                 | 6                                                                                                                                         | 6           | 3.4               | 2.5           | 2             | 1.3           | 0.65        |
|                                     | LINE REGULATION[mV] ※6              |                                 | 20max                                                                                                                                     | 20max       | 36max             | 48max         | 60max         | 96max         | 192max      |
|                                     | LOAD REGULATION[mV] ※6              |                                 | 40max                                                                                                                                     | 40max       | 100max            | 100max        | 120max        | 150max        | 240max      |
|                                     | RIPPLE[mVp-p]                       | 0 to +50℃ ※1                    | 80max                                                                                                                                     | 80max       | 120max            | 120max        | 120max        | 120max        | 150max      |
|                                     |                                     | -10 - 0℃ ※1                     | 140max                                                                                                                                    | 140max      | 160max            | 160max        | 160max        | 160max        | 200max      |
|                                     | RIPPLE NOISE[mVp-p]                 | 0 to +50℃ ※1                    | 120max                                                                                                                                    | 120max      | 150max            | 150max        | 150max        | 150max        | 250max      |
|                                     |                                     | -10 - 0℃ ※1                     | 160max                                                                                                                                    | 160max      | 180max            | 180max        | 180max        | 180max        | 300max      |
|                                     | TEMPERATURE REGULATION[mV]          | 0 to +50℃                       | 50max                                                                                                                                     | 50max       | 90max             | 120max        | 150max        | 240max        | 480max      |
|                                     |                                     | -10 to +50℃                     | 60max                                                                                                                                     | 60max       | 120max            | 150max        | 180max        | 290max        | 600max      |
|                                     | DRIFT[mV] ※2                        |                                 | 20max                                                                                                                                     | 20max       | 36max             | 48max         | 60max         | 96max         | 192max      |
|                                     | START-UP TIME[ms]                   |                                 | 200typ(ACIN 100V, Io=100%) ※ Start-up time is 700ms typ for less than 1minute of applying input again from turning off the input voltage. |             |                   |               |               |               |             |
|                                     | HOLD-UP TIME[ms]                    |                                 | 20typ (ACIN 100V, Io=100%)                                                                                                                |             |                   |               |               |               |             |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V]  |                                     | 2.85 - 3.60                     | 4.50 - 5.50                                                                                                                               | 7.50 - 10.0 | 10.0 - 13.2       | 13.2 - 18.0   | 19.2 - 27.0   | 39.0 - 53.0   |             |
| OUTPUT VOLTAGE SETTING[V]           |                                     | 3.30 - 3.40                     | 5.00 - 5.15                                                                                                                               | 9.00 - 9.36 | 12.00 - 12.48     | 15.00 - 15.60 | 24.00 - 24.96 | 48.00 - 49.92 |             |
| PROTECTION<br>CIRCUIT AND<br>OTHERS | OVERCURRENT PROTECTION              |                                 | Works over 105% of rated current and recovers automatically                                                                               |             |                   |               |               |               |             |
|                                     | OVERVOLTAGE PROTECTION[V]           |                                 | 4.00 - 5.25                                                                                                                               | 5.75 - 7.00 | 11.5 - 14.0       | 15.0 - 18.0   | 20.0 - 25.0   | 30.0 - 37.0   | 58.0 - 65.0 |
|                                     | OPERATING INDICATION                |                                 | LED (Green)                                                                                                                               |             |                   |               |               |               |             |
|                                     | REMOTE ON/OFF                       |                                 | None                                                                                                                                      |             |                   |               |               |               |             |
| ISOLATION                           | INPUT-OUTPUT                        |                                 | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature)                                                             |             |                   |               |               |               |             |
|                                     | INPUT-FG                            |                                 | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature)                                                             |             |                   |               |               |               |             |
|                                     | OUTPUT-FG                           |                                 | AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩmin (At Room Temperature)                                                               |             |                   |               |               |               |             |
| ENVIRONMENT                         | OPERATING TEMP.,HUMID.AND ALTITUDE  |                                 | -10 to +71℃ (Required Derating), 20 - 90%RH (Non condensing) 3,000m (10,000feet) max                                                      |             |                   |               |               |               |             |
|                                     | STORAGE TEMP.,HUMID.AND ALTITUDE    |                                 | -20 to +75℃, 20 - 90%RH (Non condensing) 9,000m (30,000feet) max                                                                          |             |                   |               |               |               |             |
|                                     | VIBRATION                           |                                 | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60minutes each along X, Y and Z axis                                               |             |                   |               |               |               |             |
|                                     | IMPACT                              |                                 | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis                                                                              |             |                   |               |               |               |             |
| SAFETY AND<br>NOISE<br>REGULATIONS  | AGENCY APPROVALS (At only AC input) |                                 | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178 Complies with DEN-AN                                                                      |             |                   |               |               |               |             |
|                                     | CONDUCTED NOISE                     |                                 | Complies with FCC Part15 classB, VCCI-B, CISPR22-B, EN55011-B, EN55022-B                                                                  |             |                   |               |               |               |             |
|                                     | HARMONIC ATTENUATOR                 |                                 | Complies with IEC61000-3-2 (Not built-in to active filter ※4) ※7                                                                          |             |                   |               |               |               |             |
| OTHERS                              | CASE SIZE/WEIGHT                    |                                 | 31 x 78 x 103mm [1.22 x 3.07 x 4.06 inches] (without terminal block) (W x H x D) / 270g max (with cover : 310g max)                       |             |                   |               |               |               |             |
|                                     | COOLING METHOD                      |                                 | Convection                                                                                                                                |             |                   |               |               |               |             |

\*1 Measured by 20MHz oscilloscope or Ripple-Noise meter(equivalent to KEISOKU-GIKEN :RM101).

\*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25 $^{\circ}$ C.

\*3 Derating is required.

\*4 When two or more units are used, they may not comply with the harmonic attenuator. Please contact us for details.

\*5 Please contact us about safety approvals for the model with option.

\*6 Please contact us about dynamic load and input response.

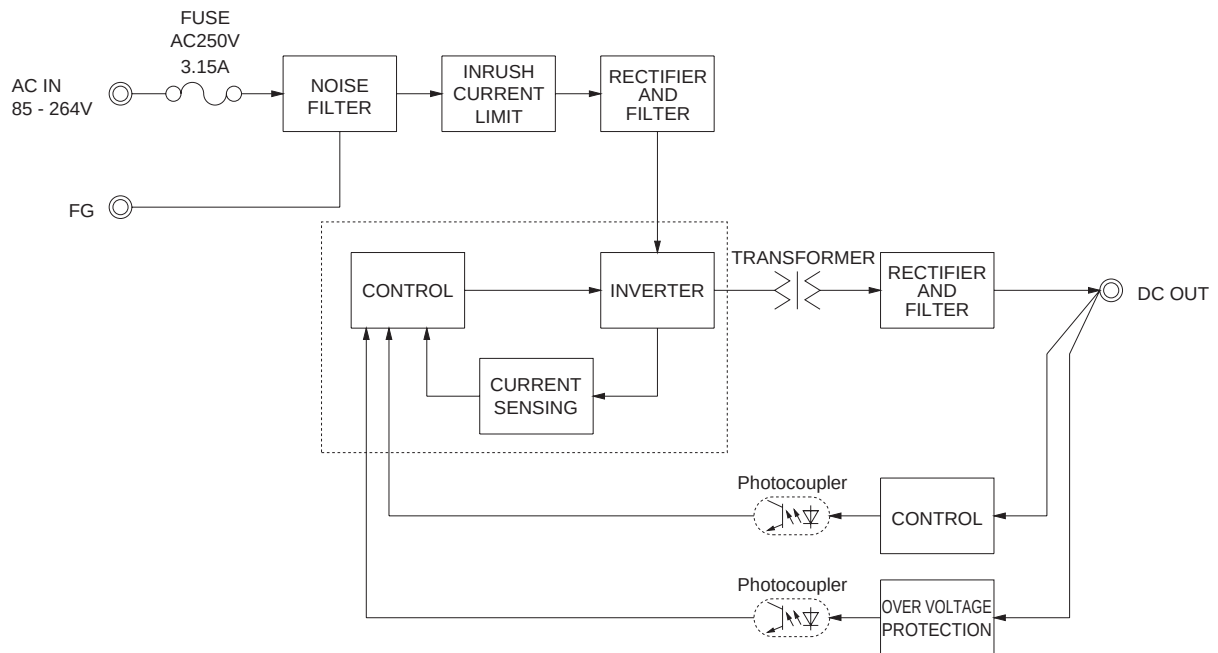
\*7 Please contact us about class C.

\* Parallel operation with other model is not possible.

\* Derating is required when operated with cover.

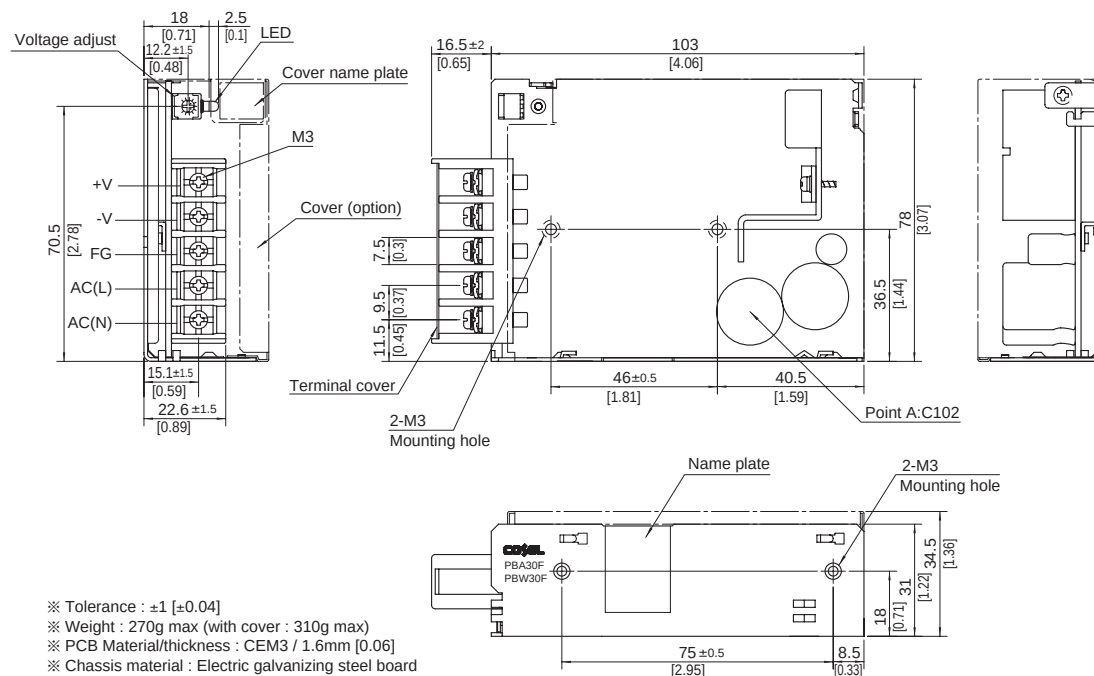
\* A sound may occur from power supply at peak loading.

## Block diagram



## External view

※ External size of option T,J,N,N1 and V is different from standard model and refer to 7 Option of instruction manual for details.



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 270g max (with cover : 310g max)
- ※ PCB Material/thickness : CEM3 / 1.6mm [0.06]
- ※ Chassis material : Electric galvanizing steel board
- ※ Dimensions in mm, [ ] = inches
- ※ Mounting torque : 0.6N • m (6.3kgf • cm) max
- ※ Screw tightening torque : M3 0.8N • m (8.5kgf • cm) max
- ※ Please connect safety ground to the unit in 2-M3 holes.

## PBA50F

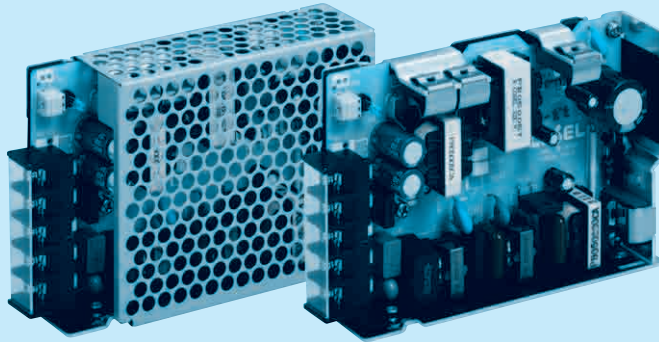
## Ordering information

PB A 50 F -5 -

① ② ③ ④ ⑤ ⑥



RoHS

Recommended EMI/EMC Filter  
NAC-06-472

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 Optional \*5  
C : with Coating  
G : Low leakage current (0.15mA max / ACIN 240V)  
E : Low leakage current and EMI class A (0.5mA max / ACIN 240V)  
T : Vertical terminal block  
J : Connector type  
R : with Remote ON/OFF  
N : with Cover (Only 24V UL508 is acquired)  
NL : with DIN rail and Cover  
V : Output voltage setting potentiometer external

Cover is optional

| MODEL                 | PBA50F-3R3 | PBA50F-5 | PBA50F-9 | PBA50F-12 | PBA50F-15 | PBA50F-24 | PBA50F-36 | PBA50F-48 |
|-----------------------|------------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| MAX OUTPUT WATTAGE[W] | 33         | 50       | 50.4     | 51.6      | 52.5      | 52.8      | 50.4      | 52.8      |
| DC OUTPUT             | 3.3V 10A   | 5V 10A   | 9V 5.6A  | 12V 4.3A  | 15V 3.5A  | 24V 2.2A  | 36V 1.4A  | 48V 1.1A  |

## SPECIFICATIONS

|                                     | MODEL                               |                            | PBA50F-3R3                                                                                               | PBA50F-5           | PBA50F-9       | PBA50F-12      | PBA50F-15      | PBA50F-24      | PBA50F-36      | PBA50F-48      |  |
|-------------------------------------|-------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|--|
| INPUT                               | VOLTAGE[V]                          |                            | AC85 - 264 1 ϕ or DC120 - 370 (AC50 or DC70 Please refer to the instruction manual 2.1 Input voltage *4) |                    |                |                |                |                |                |                |  |
|                                     | CURRENT[A]                          | ACIN 100V<br>ACIN 200V     | 0.5typ<br>0.3typ                                                                                         | 0.7typ<br>0.4typ   |                |                |                |                |                |                |  |
|                                     | FREQUENCY[Hz]                       |                            | 50/60 (47 - 63)                                                                                          |                    |                |                |                |                |                |                |  |
|                                     | EFFICIENCY[%]                       | ACIN 100V<br>ACIN 200V     | 75typ<br>76typ                                                                                           | 80typ<br>82typ     | 79typ<br>81typ | 80typ<br>82typ | 81typ<br>83typ | 82typ<br>84typ | 83typ<br>85typ | 83typ<br>85typ |  |
|                                     | POWER FACTOR(10=100%)               | ACIN 100V<br>ACIN 200V     | 0.98typ<br>0.87typ                                                                                       | 0.99typ<br>0.93typ |                |                |                |                |                |                |  |
|                                     | INRUSH CURRENT[A]                   | ACIN 100V<br>ACIN 200V     | 15typ (10=100%) (At cold start)<br>30typ (10=100%) (At cold start)                                       |                    |                |                |                |                |                |                |  |
|                                     | LEAKAGE CURRENT[mA]                 |                            | 0.4/0.75max (ACIN 100V/240V 60Hz, 10=100%, According to IEC60950-1.DENAN)                                |                    |                |                |                |                |                |                |  |
| OUTPUT                              | VOLTAGE[V]                          |                            | 3.3                                                                                                      | 5                  | 9              | 12             | 15             | 24             | 36             | 48             |  |
|                                     | CURRENT[A]                          |                            | 10                                                                                                       | 10                 | 5.6            | 4.3            | 3.5            | 2.2            | 1.4            | 1.1            |  |
|                                     | LINE REGULATION[mV]                 |                            | 20max                                                                                                    | 20max              | 36max          | 48max          | 60max          | 96max          | 144max         | 192max         |  |
|                                     | LOAD REGULATION[mV]                 |                            | 40max                                                                                                    | 40max              | 100max         | 100max         | 120max         | 150max         | 240max         | 240max         |  |
|                                     | RIPPLE[mVp-p]                       | 0 to +50℃ *1               | 80max                                                                                                    | 80max              | 120max         | 120max         | 120max         | 120max         | 150max         | 150max         |  |
|                                     |                                     | -10 - 0℃ *1                | 140max                                                                                                   | 140max             | 160max         | 160max         | 160max         | 160max         | 200max         | 200max         |  |
|                                     | RIPPLE NOISE[mVp-p]                 | 0 to +50℃ *1               | 120max                                                                                                   | 120max             | 150max         | 150max         | 150max         | 150max         | 250max         | 250max         |  |
|                                     |                                     | -10 - 0℃ *1                | 160max                                                                                                   | 160max             | 180max         | 180max         | 180max         | 180max         | 300max         | 300max         |  |
|                                     | TEMPERATURE REGULATION[mV]          | 0 to +50℃                  | 50max                                                                                                    | 50max              | 90max          | 120max         | 150max         | 240max         | 360max         | 480max         |  |
|                                     |                                     | -10 to +50℃                | 60max                                                                                                    | 60max              | 120max         | 150max         | 180max         | 290max         | 450max         | 600max         |  |
| DRIFT[mV]                           |                                     | *2                         | 20max                                                                                                    | 20max              | 36max          | 48max          | 60max          | 96max          | 144max         | 192max         |  |
| START-UP TIME[ms]                   |                                     | 350typ(ACIN 100V, 10=100%) |                                                                                                          |                    |                |                |                |                |                |                |  |
| HOLD-UP TIME[ms]                    |                                     | 20typ (ACIN 100V, 10=100%) |                                                                                                          |                    |                |                |                |                |                |                |  |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V]  |                                     | 2.85 - 3.63                | 4.00 - 5.50                                                                                              | 7.50 - 10.0        | 10.0 - 13.2    | 13.2 - 18.0    | 19.2 - 27.0    | 28.8 - 39.6    | 39.0 - 53.0    |                |  |
| OUTPUT VOLTAGE SETTING[V]           |                                     | 3.30 - 3.40                | 5.00 - 5.15                                                                                              | 9.00 - 9.36        | 12.00 - 12.48  | 15.00 - 15.60  | 24.00 - 24.96  | 35.00 - 37.44  | 48.00 - 49.92  |                |  |
| PROTECTION<br>CIRCUIT AND<br>OTHERS | OVERCURRENT PROTECTION              |                            | Works over 105% of rated current and recovers automatically                                              |                    |                |                |                |                |                |                |  |
|                                     | OVERVOLTAGE PROTECTION[V]           |                            | 4.00 - 5.25                                                                                              | 5.75 - 7.00        | 11.5 - 14.0    | 15.0 - 18.0    | 20.0 - 25.0    | 30.0 - 37.0    | 43.0 - 50.0    | 58.0 - 65.0    |  |
|                                     | OPERATING INDICATION                |                            | LED (Green)                                                                                              |                    |                |                |                |                |                |                |  |
|                                     | REMOTE ON/OFF                       |                            | Optional (Required external power source)                                                                |                    |                |                |                |                |                |                |  |
| ISOLATION                           | INPUT-OUTPUT · RC                   | *3                         | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature)                            |                    |                |                |                |                |                |                |  |
|                                     | INPUT-FG                            |                            | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature)                            |                    |                |                |                |                |                |                |  |
|                                     | OUTPUT · RC-FG                      | *3                         | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩmin (At Room Temperature)                             |                    |                |                |                |                |                |                |  |
| ENVIRONMENT                         | OPERATING TEMP.,HUMID.AND ALTITUDE  |                            | -10 to +71℃ (Required Derating), 20 - 90%RH (Non condensing) 3,000m (10,000feet) max                     |                    |                |                |                |                |                |                |  |
|                                     | STORAGE TEMP.,HUMID.AND ALTITUDE    |                            | -20 to +75℃, 20 - 90%RH (Non condensing) 9,000m (30,000feet) max                                         |                    |                |                |                |                |                |                |  |
|                                     | VIBRATION                           |                            | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60minutes each along X, Y and Z axis              |                    |                |                |                |                |                |                |  |
| SAFETY AND<br>NOISE<br>REGULATIONS  | IMPACT                              |                            | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis                                             |                    |                |                |                |                |                |                |  |
|                                     | AGENCY APPROVALS (At only AC input) |                            | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178 Complies with DEN-AN                                     |                    |                |                |                |                |                |                |  |
|                                     | CONDUCTED NOISE                     |                            | Complies with FCC Part15 classB, VCCI-B, CISPR22-B, EN55011-B, EN55022-B                                 |                    |                |                |                |                |                |                |  |
|                                     | HARMONIC ATTENUATOR                 |                            | Complies with IEC61000-3-2 *6                                                                            |                    |                |                |                |                |                |                |  |
| OTHERS                              | CASE SIZE/WEIGHT                    |                            | 31×82×120mm [1.22×3.23×4.72 inches] (without terminal block) (W×H×D) / 280g max (with cover : 325g max)  |                    |                |                |                |                |                |                |  |
|                                     | COOLING METHOD                      |                            | Convection                                                                                               |                    |                |                |                |                |                |                |  |

\*1 Measured by 20MHz oscilloscope or Ripple-Noise meter (equivalent to KEISOKU-GIKEN :RM101).

\*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25℃.

\*3 Applicable when Remote ON/OFF (optional) is added. RC is insulated with input, output and FG.

\*4 Derating is required.

\*5 Please contact us about safety approvals for the model with option.

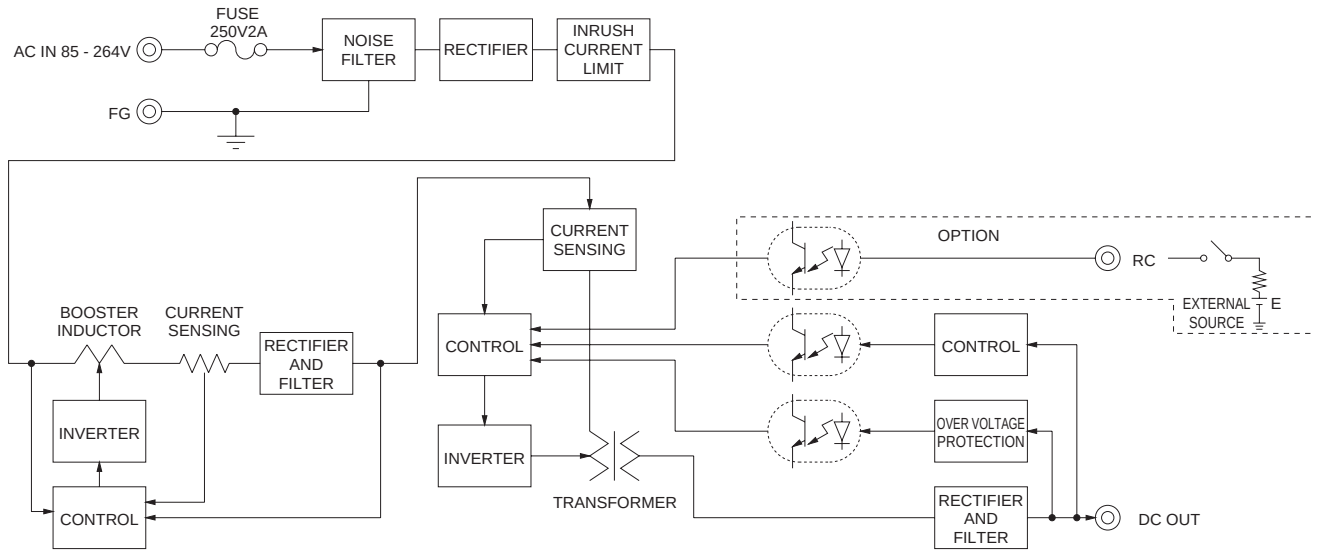
\*6 Please contact us about class C.

\* Parallel operation with other model is not possible.

\* Derating is required when operated with cover.

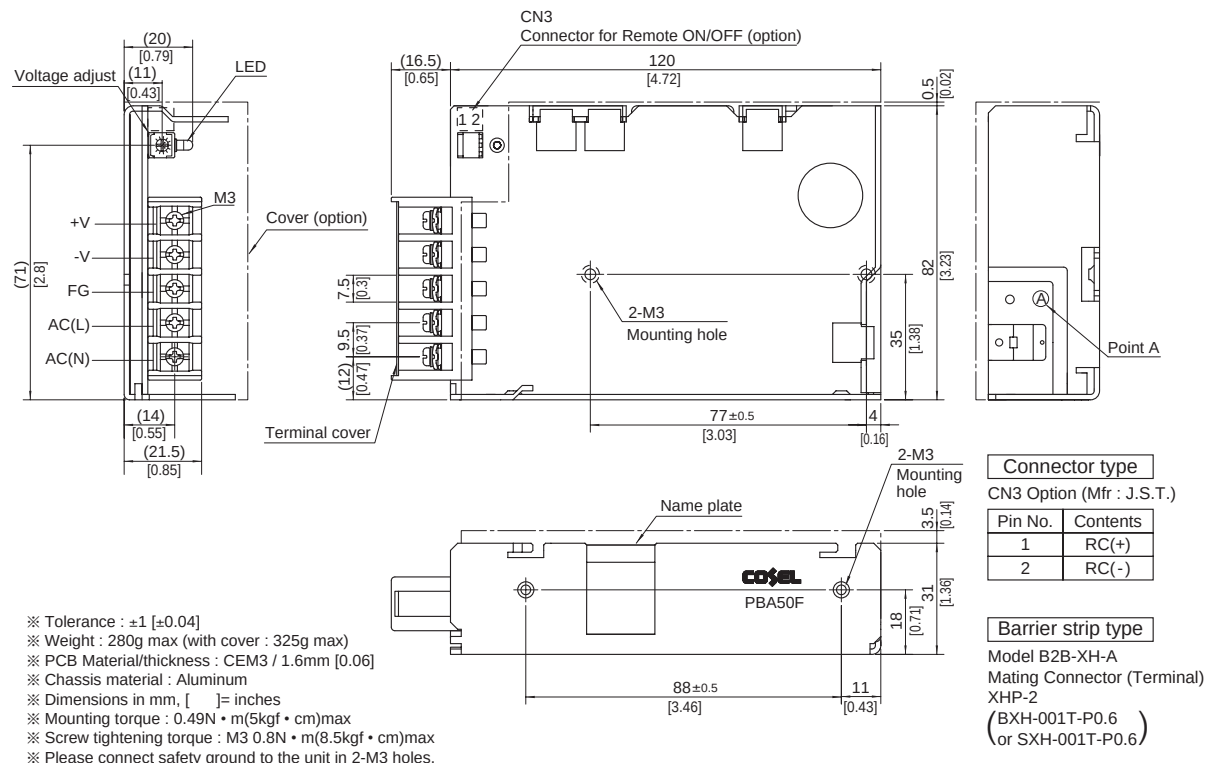
\* A sound may occur from power supply at peak loading.

## Block diagram



## External view

※ External size of option T,J,R,N,N1 and V is different from standard model and refer to 7 Option of instruction manual for details.



## PBA75F

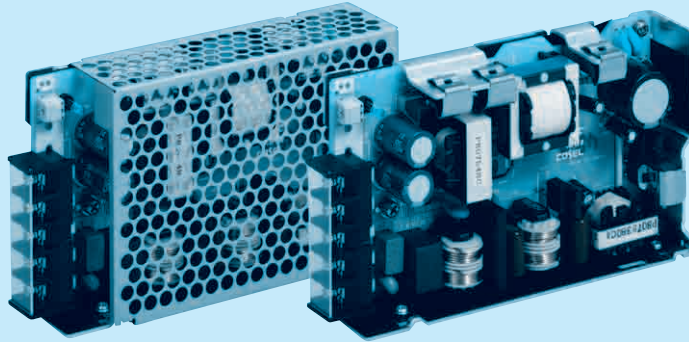
## Ordering information

PB A 75 F -5 -□

① ② ③ ④ ⑤ ⑥



RoHS

Recommended EMI/EMC Filter  
NAC-06-472

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 Optional \*5  
C : with Coating  
G : Low leakage current (0.15mA max / ACIN 240V)  
E : Low leakage current and EMI class A (0.5mA max / ACIN 240V)  
T : Vertical terminal block  
J : Connector type  
R : with Remote ON/OFF  
N : with Cover (Only 24V UL508 is acquired)  
NL : with DIN rail and Cover  
V : Output voltage setting potentiometer external

Cover is optional

| MODEL                 | PBA75F-3R3 | PBA75F-5 | PBA75F-9 | PBA75F-12 | PBA75F-15 | PBA75F-24 | PBA75F-36 | PBA75F-48 |
|-----------------------|------------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| MAX OUTPUT WATTAGE[W] | 49.5       | 75       | 75.6     | 75.6      | 75        | 76.8      | 75.6      | 76.8      |
| DC OUTPUT             | 3.3V 15A   | 5V 15A   | 9V 8.4A  | 12V 6.3A  | 15V 5A    | 24V 3.2A  | 36V 2.1A  | 48V 1.6A  |

## SPECIFICATIONS

|                                    | MODEL                               |                            | PBA75F-3R3                                                                                               | PBA75F-5    | PBA75F-9      | PBA75F-12     | PBA75F-15     | PBA75F-24     | PBA75F-36     | PBA75F-48   |        |
|------------------------------------|-------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------|-------------|---------------|---------------|---------------|---------------|---------------|-------------|--------|
| INPUT                              | VOLTAGE[V]                          |                            | AC85 - 264 1 ϕ or DC120 - 370 (AC50 or DC70 Please refer to the instruction manual 2.1 Input voltage *4) |             |               |               |               |               |               |             |        |
|                                    | CURRENT[A]                          | ACIN 100V                  | 0.7typ                                                                                                   | 1.0typ      |               |               |               |               |               |             |        |
|                                    |                                     | ACIN 200V                  | 0.4typ                                                                                                   | 0.5typ      |               |               |               |               |               |             |        |
|                                    | FREQUENCY[Hz]                       |                            | 50/60 (47 - 63)                                                                                          |             |               |               |               |               |               |             |        |
|                                    | EFFICIENCY[%]                       | ACIN 100V                  | 77typ                                                                                                    | 81typ       | 80typ         | 81typ         | 82typ         | 83typ         | 84typ         | 84typ       |        |
|                                    |                                     | ACIN 200V                  | 78typ                                                                                                    | 83typ       | 82typ         | 83typ         | 84typ         | 85typ         | 86typ         | 86typ       |        |
|                                    | POWER FACTOR(Io=100%)               | ACIN 100V                  | 0.98typ                                                                                                  | 0.99typ     |               |               |               |               |               |             |        |
|                                    |                                     | ACIN 200V                  | 0.87typ                                                                                                  | 0.93typ     |               |               |               |               |               |             |        |
|                                    | INRUSH CURRENT[A]                   | ACIN 100V                  | 15typ (Io=100%) (At cold start)                                                                          |             |               |               |               |               |               |             |        |
|                                    |                                     | ACIN 200V                  | 30typ (Io=100%) (At cold start)                                                                          |             |               |               |               |               |               |             |        |
|                                    | LEAKAGE CURRENT[ma]                 |                            | 0.4/0.75max (ACIN 100V/240V 60Hz, Io=100%, According to IEC60950-1.DENAN)                                |             |               |               |               |               |               |             |        |
| OUTPUT                             | VOLTAGE[V]                          |                            | 3.3                                                                                                      | 5           | 9             | 12            | 15            | 24            | 36            | 48          |        |
|                                    | CURRENT[A]                          |                            | 15                                                                                                       | 15          | 8.4           | 6.3           | 5             | 3.2           | 2.1           | 1.6         |        |
|                                    | LINE REGULATION[mV]                 |                            | 20max                                                                                                    | 20max       | 36max         | 48max         | 60max         | 96max         | 144max        | 192max      |        |
|                                    | LOAD REGULATION[mV]                 |                            | 40max                                                                                                    | 40max       | 100max        | 100max        | 120max        | 150max        | 240max        | 240max      |        |
|                                    | RIPPLE[mVp-p]                       | 0 to +50℃ *1               | 80max                                                                                                    | 80max       | 120max        | 120max        | 120max        | 120max        | 150max        | 150max      |        |
|                                    |                                     | -10 - 0℃ *1                | 140max                                                                                                   | 140max      | 160max        | 160max        | 160max        | 160max        | 200max        | 200max      |        |
|                                    | RIPPLE NOISE[mVp-p]                 | 0 to +50℃ *1               | 120max                                                                                                   | 120max      | 150max        | 150max        | 150max        | 150max        | 250max        | 250max      |        |
|                                    |                                     | -10 - 0℃ *1                | 160max                                                                                                   | 160max      | 180max        | 180max        | 180max        | 180max        | 300max        | 300max      |        |
|                                    | TEMPERATURE REGULATION[mV]          | 0 to +50℃                  | 50max                                                                                                    | 50max       | 90max         | 120max        | 150max        | 240max        | 360max        | 480max      |        |
|                                    |                                     | -10 to +50℃                | 60max                                                                                                    | 60max       | 120max        | 150max        | 180max        | 290max        | 450max        | 600max      |        |
|                                    | DRIFT[mV]                           |                            | *2                                                                                                       | 20max       | 20max         | 36max         | 48max         | 60max         | 96max         | 144max      | 192max |
|                                    | START-UP TIME[ms]                   |                            | 350typ(ACIN 100V, Io=100%)                                                                               |             |               |               |               |               |               |             |        |
| HOLD-UP TIME[ms]                   |                                     | 20typ (ACIN 100V, Io=100%) |                                                                                                          |             |               |               |               |               |               |             |        |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] |                                     | 2.85 - 3.63                | 4.00 - 5.50                                                                                              | 7.50 - 10.0 | 10.0 - 13.2   | 13.2 - 18.0   | 19.2 - 27.0   | 28.8 - 39.6   | 39.0 - 53.0   |             |        |
| OUTPUT VOLTAGE SETTING[V]          |                                     | 3.30 - 3.40                | 5.00 - 5.15                                                                                              | 9.00 - 9.36 | 12.00 - 12.48 | 15.00 - 15.60 | 24.00 - 24.96 | 36.00 - 37.44 | 48.00 - 49.92 |             |        |
| PROTECTION CIRCUIT AND OTHERS      | OVERCURRENT PROTECTION              |                            | Works over 105% of rated current and recovers automatically                                              |             |               |               |               |               |               |             |        |
|                                    | OVERVOLTAGE PROTECTION[V]           |                            | 4.00 - 5.25                                                                                              | 5.75 - 7.00 | 11.5 - 14.0   | 15.0 - 18.0   | 20.0 - 25.0   | 30.0 - 37.0   | 43.0 - 50.0   | 58.0 - 65.0 |        |
|                                    | OPERATING INDICATION                |                            | LED (Green)                                                                                              |             |               |               |               |               |               |             |        |
|                                    | REMOTE ON/OFF                       |                            | Optional (Required external power source)                                                                |             |               |               |               |               |               |             |        |
| ISOLATION                          | INPUT-OUTPUT · RC                   | *3                         | AC3.000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature)                            |             |               |               |               |               |               |             |        |
|                                    | INPUT-FG                            |                            | AC2.000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature)                            |             |               |               |               |               |               |             |        |
|                                    | OUTPUT · RC-FG                      | *3                         | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩmin (At Room Temperature)                             |             |               |               |               |               |               |             |        |
| ENVIRONMENT                        | OPERATING TEMP.,HUMID.AND ALTITUDE  |                            | -10 to +71℃ (Required Derating), 20 - 90%RH (Non condensing) 3,000m (10,000feet) max                     |             |               |               |               |               |               |             |        |
|                                    | STORAGE TEMP.,HUMID.AND ALTITUDE    |                            | -20 to +75℃, 20 - 90%RH (Non condensing) 9,000m (30,000feet) max                                         |             |               |               |               |               |               |             |        |
|                                    | VIBRATION                           |                            | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60minutes each along X, Y and Z axis              |             |               |               |               |               |               |             |        |
|                                    | IMPACT                              |                            | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis                                             |             |               |               |               |               |               |             |        |
| SAFETY AND NOISE REGULATIONS       | AGENCY APPROVALS (At only AC input) |                            | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178 Complies with DEN-AN                                     |             |               |               |               |               |               |             |        |
|                                    | CONDUCTED NOISE                     |                            | Complies with FCC Part15 classB, VCCI-B, CISPR22-B, EN55011-B, EN55022-B                                 |             |               |               |               |               |               |             |        |
|                                    | HARMONIC ATTENUATOR                 |                            | Complies with IEC61000-3-2 *6                                                                            |             |               |               |               |               |               |             |        |
| OTHERS                             | CASE SIZE/WEIGHT                    |                            | 32×82×135mm [1.26×3.23×5.31 inches] (without terminal block) (W×H×D) / 350g max (with cover : 400g max)  |             |               |               |               |               |               |             |        |
|                                    | COOLING METHOD                      |                            | Convection                                                                                               |             |               |               |               |               |               |             |        |

\*1 Measured by 20MHz oscilloscope or Ripple-Noise meter (equivalent to KEISOKU-GIKEN :RM101).

\*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25℃.

\*3 Applicable when Remote ON/OFF (optional) is added. RC is insulated with input, output and FG.

\*4 Derating is required.

\*5 Please contact us about safety approvals for the model with option.

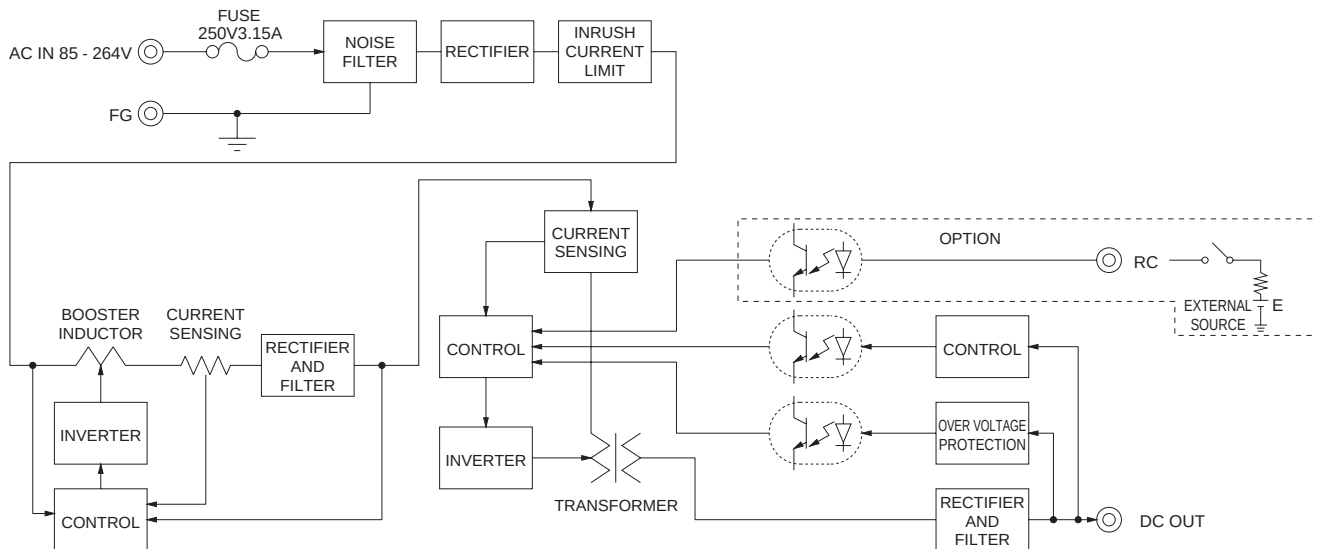
\*6 Please contact us about class C.

\* Parallel operation with other model is not possible.

\* Derating is required when operated with cover.

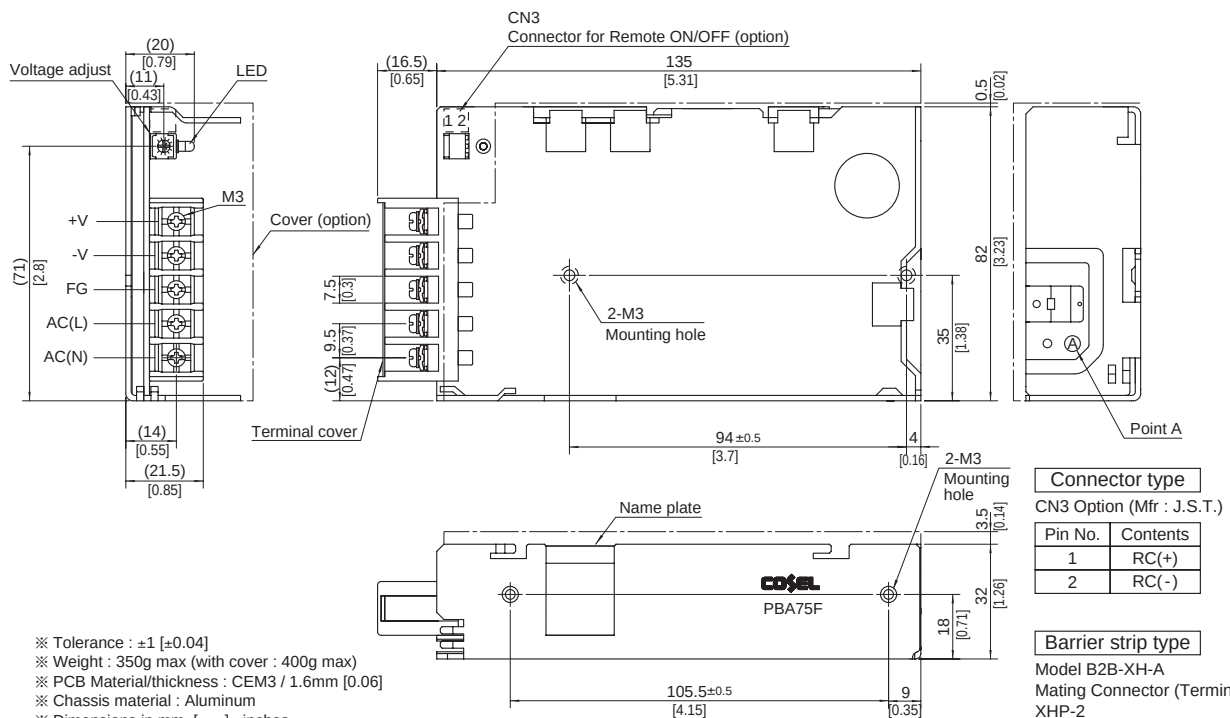
\* A sound may occur from power supply at peak loading.

## Block diagram

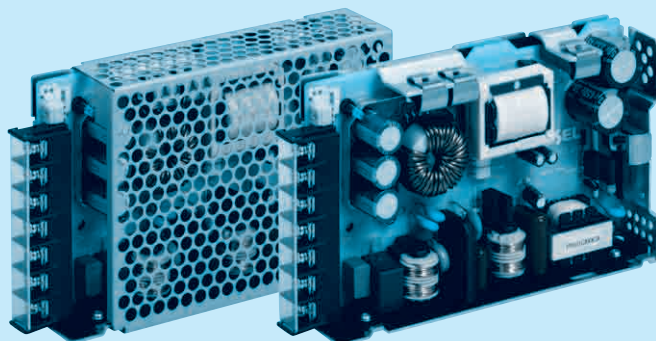


## External view

※ External size of option T,J,R,N,N1 and V is different from standard model and refer to 7 Option of instruction manual for details.



※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]  
 ※ Weight : 350g max (with cover : 400g max)  
 ※ PCB Material/thickness : CEM3 / 1.6mm [0.06]  
 ※ Chassis material : Aluminum  
 ※ Dimensions in mm, [ ] = inches  
 ※ Mounting torque : 0.49N • m (5kgf • cm) max  
 ※ Screw tightening torque : M3 0.8N • m (8.5kgf • cm) max  
 ※ Please connect safety ground to the unit in 2-M3 holes.



#### Recommended EMI/EMC Filter NAC-06-472



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 Optional \*5
- C : with Coating  
G : Low leakage current  
(0.15mA max / ACIN 240V)  
E : Low leakage current  
and EMI class A  
(0.5mA max / ACIN 240V)  
T : Vertical terminal block  
J : Connector type  
(Only -12, -15, -24, -36, -48)  
R : with Remote ON/OFF  
N : with Cover  
(Only 24V UL508 is acquired)  
NI : with DIN rail and Cover  
V : Output voltage setting  
potentiometer external-ly

Cover is optional

| MODEL                 | PBA100F-3R3 | PBA100F-5 | PBA100F-9 | PBA100F-12 | PBA100F-15 | PBA100F-24 | PBA100F-36 | PBA100F-48 |
|-----------------------|-------------|-----------|-----------|------------|------------|------------|------------|------------|
| MAX OUTPUT WATTAGE[W] | 66          | 100       | 94.5      | 102        | 105        | 108        | 100.8      | 100.8      |
| DC OUTPUT             | 3.3V 20A    | 5V 20A    | 9V 10.5A  | 12V 8.5A   | 15V 7A     | 24V 4.5A   | 36V 2.8A   | 48V 2.1A   |

## SPECIFICATIONS

|                                    | MODEL                               | PBA100F-3R3                                                                                             | PBA100F-5                                                                     | PBA100F-9   | PBA100F-12    | PBA100F-15    | PBA100F-24    | PBA100F-36    | PBA100F-48    |
|------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------|---------------|---------------|---------------|---------------|---------------|
| INPUT                              | VOLTAGE[V]                          | AC85 - 264 1ϕ or DC120 - 370 (AC50 or DC70 Please refer to the instruction manual 2.1 Input voltage *4) |                                                                               |             |               |               |               |               |               |
|                                    | CURRENT[A]                          | ACIN 100V                                                                                               | 0.9typ                                                                        | 1.3typ      |               |               |               |               |               |
|                                    |                                     | ACIN 200V                                                                                               | 0.5typ                                                                        | 0.7typ      |               |               |               |               |               |
|                                    | FREQUENCY[Hz]                       | 50/60 (47 - 63)                                                                                         |                                                                               |             |               |               |               |               |               |
|                                    | EFFICIENCY[%]                       | ACIN 100V                                                                                               | 77typ                                                                         | 82typ       | 80typ         | 81typ         | 83typ         | 84typ         | 84typ         |
|                                    |                                     | ACIN 200V                                                                                               | 79typ                                                                         | 84typ       | 82typ         | 83typ         | 86typ         | 86typ         | 86typ         |
|                                    | POWER FACTOR(lo=100%)               | ACIN 100V                                                                                               | 0.98typ                                                                       | 0.99typ     |               |               |               |               |               |
|                                    |                                     | ACIN 200V                                                                                               | 0.87typ                                                                       | 0.93typ     |               |               |               |               |               |
| INRUSH CURRENT[A]                  | ACIN 100V                           | 20typ (lo=100%) (At cold start)                                                                         |                                                                               |             |               |               |               |               |               |
|                                    | ACIN 200V                           | 40typ (lo=100%) (At cold start)                                                                         |                                                                               |             |               |               |               |               |               |
| LEAKAGE CURRENT[ma]                |                                     | 0.4/0.75max (ACIN 100V/240V 60Hz, lo=100%, According to IEC60950-1,DENAN)                               |                                                                               |             |               |               |               |               |               |
| OUTPUT                             | VOLTAGE[V]                          | 3.3                                                                                                     | 5                                                                             | 9           | 12            | 15            | 24            | 36            | 48            |
|                                    | CURRENT[A]                          | 20                                                                                                      | 20                                                                            | 10.5        | 8.5           | 7             | 4.5           | 2.8           | 2.1           |
|                                    | LINE REGULATION[mV]                 | 20max                                                                                                   | 20max                                                                         | 36max       | 48max         | 60max         | 96max         | 144max        | 192max        |
|                                    | LOAD REGULATION[mV]                 | 40max                                                                                                   | 40max                                                                         | 100max      | 100max        | 120max        | 150max        | 240max        | 240max        |
|                                    | RIPPLE[mVp-p]                       | 0 to +50℃ *1                                                                                            | 80max                                                                         | 80max       | 120max        | 120max        | 120max        | 150max        | 150max        |
|                                    |                                     | -10 - 0℃ *1                                                                                             | 140max                                                                        | 140max      | 160max        | 160max        | 160max        | 200max        | 200max        |
|                                    | RIPPLE NOISE[mVp-p]                 | 0 to +50℃ *1                                                                                            | 120max                                                                        | 120max      | 150max        | 150max        | 150max        | 250max        | 250max        |
|                                    |                                     | -10 - 0℃ *1                                                                                             | 160max                                                                        | 160max      | 180max        | 180max        | 180max        | 300max        | 300max        |
|                                    | TEMPERATURE REGULATION[mV]          | 0 to +50℃                                                                                               | 50max                                                                         | 50max       | 90max         | 120max        | 150max        | 240max        | 360max        |
|                                    |                                     | -10 to +50℃                                                                                             | 60max                                                                         | 60max       | 120max        | 150max        | 180max        | 290max        | 450max        |
|                                    | DRIFT[mV]                           | *2                                                                                                      | 20max                                                                         | 20max       | 36max         | 48max         | 60max         | 96max         | 144max        |
| START-UP TIME[ms]                  |                                     | 350typ(ACIN 100V, lo=100%)                                                                              |                                                                               |             |               |               |               |               |               |
| HOLD-UP TIME[ms]                   |                                     | 20typ (ACIN 100V, lo=100%)                                                                              |                                                                               |             |               |               |               |               |               |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] |                                     | 2.85 - 3.63                                                                                             | 4.00 - 5.50                                                                   | 7.50 - 10.0 | 10.0 - 13.2   | 13.2 - 18.0   | 19.2 - 27.0   | 28.8 - 39.6   | 39.0 - 53.0   |
| OUTPUT VOLTAGE SETTING[V]          |                                     | 3.20 - 3.40                                                                                             | 5.00 - 5.15                                                                   | 9.00 - 9.36 | 12.00 - 12.48 | 15.00 - 15.60 | 24.00 - 24.96 | 36.00 - 37.44 | 48.00 - 49.92 |
| PROTECTION CIRCUIT AND OTHERS      | OVERCURRENT PROTECTION              | Works over 105% of rated current and recovers automatically                                             |                                                                               |             |               |               |               |               |               |
|                                    | OVERVOLTAGE PROTECTION[V]           | 4.00 - 5.25                                                                                             | 5.75 - 7.00                                                                   | 11.5 - 14.0 | 15.0 - 18.0   | 20.0 - 25.0   | 30.0 - 37.0   | 43.0 - 50.0   | 58.0 - 65.0   |
|                                    | OPERATING INDICATION                | LED (Green)                                                                                             |                                                                               |             |               |               |               |               |               |
|                                    | REMOTE SENSING                      | Optional (Only -3R3, -5 Option -K)                                                                      |                                                                               |             |               |               |               |               |               |
| REMOTE ON/OFF                      |                                     | Optional (Required external power source)                                                               |                                                                               |             |               |               |               |               |               |
| ISOLATION                          | INPUT-OUTPUT · RC                   | *3                                                                                                      | AC3.000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature) |             |               |               |               |               |               |
|                                    | INPUT-FG                            |                                                                                                         | AC2.000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature) |             |               |               |               |               |               |
|                                    | OUTPUT · RC-FG                      | *3                                                                                                      | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩmin (At Room Temperature)  |             |               |               |               |               |               |
| ENVIRONMENT                        | OPERATING TEMP.,HUMID.AND ALTITUDE  | -10 to +71℃ (Required Derating), 20 - 90%RH (Non condensing) 3,000m (10,000feet) max                    |                                                                               |             |               |               |               |               |               |
|                                    | STORAGE TEMP.,HUMID.AND ALTITUDE    | -20 to +75℃, 20 - 90%RH (Non condensing) 9,000m (30,000feet) max                                        |                                                                               |             |               |               |               |               |               |
|                                    | VIBRATION                           | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60minutes each along X, Y and Z axis             |                                                                               |             |               |               |               |               |               |
|                                    | IMPACT                              | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis                                            |                                                                               |             |               |               |               |               |               |
| SAFETY AND NOISE REGULATIONS       | AGENCY APPROVALS (At only AC input) | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178 Complies with DEN-AN                                    |                                                                               |             |               |               |               |               |               |
|                                    | CONDUCTED NOISE                     | Complies with FCC Part15 classB, VCCI-B, CISPR22-B, EN55011-B, EN55022-B                                |                                                                               |             |               |               |               |               |               |
|                                    | HARMONIC ATTENUATOR                 | Complies with IEC61000-3-2 *6                                                                           |                                                                               |             |               |               |               |               |               |
| OTHERS                             | CASE SIZE/WEIGHT                    | 32×93×147mm [1.26×3.66×5.79 inches] (without terminal block) (W×H×D) / 440g max (with cover : 500g max) |                                                                               |             |               |               |               |               |               |
|                                    | COOLING METHOD                      | Convection                                                                                              |                                                                               |             |               |               |               |               |               |

\*1 Measured by 20MHz oscilloscope or Ripple-Noise meter(equivalent to KEISOKU-GIKEN :RM101).

\*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25℃.

\*3 Applicable when Remote ON/OFF(optional) is added. RC is insulated with input, output and FG.

\*4 Derating is required.

\*5 Please contact us about safety approvals for the model with option.

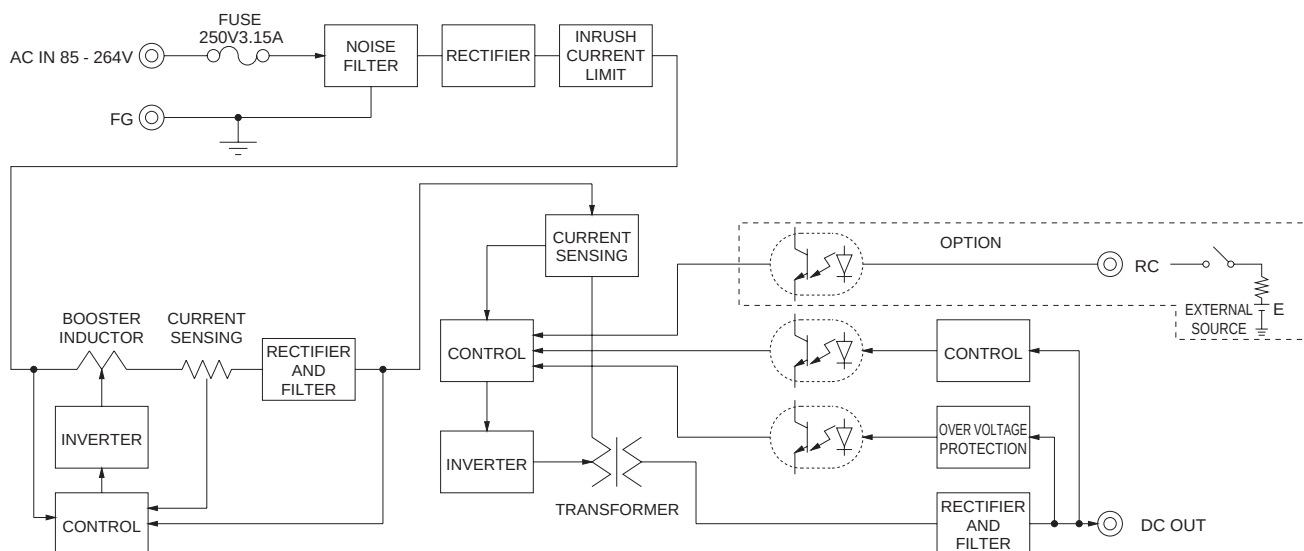
\*6 Please contact us about class C.

\* Parallel operation with other model is not possible.

\* Derating is required when operated with cover.

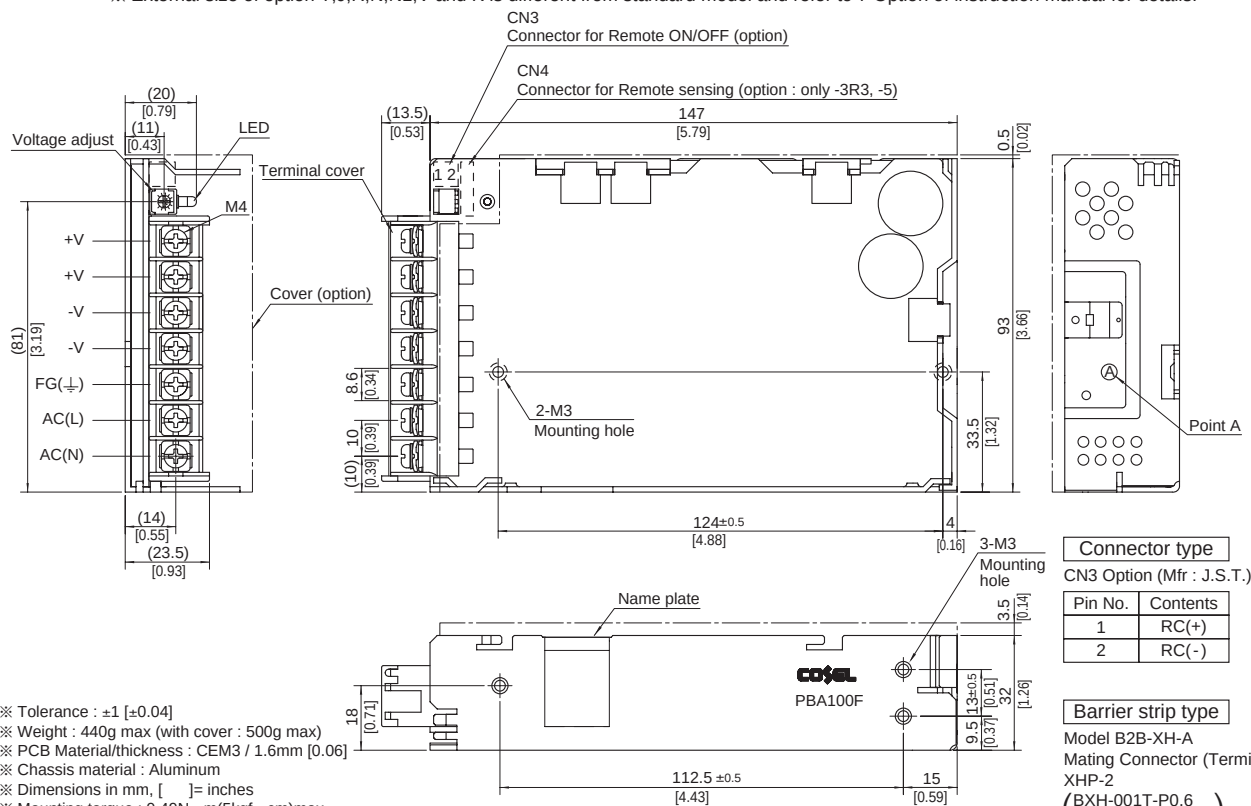
\* A sound may occur from power supply at peak loading.

## Block diagram



## External view

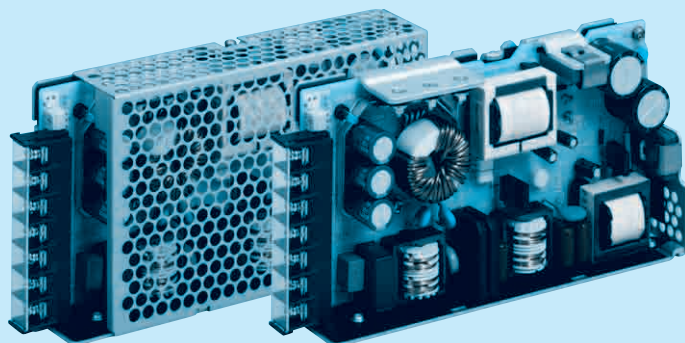
※ External size of option T,J,R,N,N1,V and K is different from standard model and refer to 7 Option of instruction manual for details.



- ※ Tolerance :  $\pm 1$  [ $\pm 0.04$ ]
- ※ Weight : 440g max (with cover : 500g max)
- ※ PCB Material/thickness : CEM3 / 1.6mm [ $0.06$ ]
- ※ Chassis material : Aluminum
- ※ Dimensions in mm, [ ] = inches
- ※ Mounting torque :  $0.49N \cdot m$  (5kgf  $\cdot$  cm)max
- ※ Mounting torque :  $M4:1.6N \cdot m$  (16.9kgf  $\cdot$  cm)max
- ※ Please connect safety ground to FG terminal on the unit.



RoHS

Recommended EMI/EMC Filter  
NAC-06-472High 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 Optional \*5  
C : with Coating  
G : Low leakage current  
(0.15mA max / ACIN 240V)  
E : Low leakage current  
and EMI class A  
(0.5mA max / ACIN 240V)  
T : Vertical terminal block  
J : Connector type  
(Only -12, -15, -24, -36, -48)  
R : with Remote ON/OFF  
N : with Cover  
(Only 24V UL508 is acquired)  
NI : with DIN rail and Cover  
V : Output voltage setting  
potentiometer external-ly

Cover is optional

| MODEL                 | PBA150F-3R3 | PBA150F-5 | PBA150F-9 | PBA150F-12 | PBA150F-15 | PBA150F-24 | PBA150F-36 | PBA150F-48 |
|-----------------------|-------------|-----------|-----------|------------|------------|------------|------------|------------|
| MAX OUTPUT WATTAGE[W] | 99          | 150       | 150.3     | 156        | 150        | 156        | 154.8      | 158.4      |
| DC OUTPUT             | 3.3V 30A    | 5V 30A    | 9V 16.7A  | 12V 13A    | 15V 10A    | 24V 6.5A   | 36V 4.3A   | 48V 3.3A   |

## SPECIFICATIONS

|                               | MODEL                               | PBA150F-3R3                                                                                              | PBA150F-5                                                                     | PBA150F-9                                                                     | PBA150F-12    | PBA150F-15    | PBA150F-24    | PBA150F-36    | PBA150F-48    |
|-------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|
| INPUT                         | VOLTAGE[V]                          | AC85 - 264 1 φ or DC120 - 370 (AC50 or DC70 Please refer to the instruction manual 2.1 Input voltage *4) |                                                                               |                                                                               |               |               |               |               |               |
|                               | CURRENT[A]                          | ACIN 100V                                                                                                | 1.3typ                                                                        | 2.0typ                                                                        |               |               |               |               |               |
|                               |                                     | ACIN 200V                                                                                                | 0.7typ                                                                        | 1.0typ                                                                        |               |               |               |               |               |
|                               | FREQUENCY[Hz]                       | 50/60 (47 - 63)                                                                                          |                                                                               |                                                                               |               |               |               |               |               |
|                               | EFFICIENCY[%]                       | ACIN 100V                                                                                                | 80typ                                                                         | 83typ                                                                         | 82typ         | 83typ         | 84typ         | 85typ         | 85typ         |
|                               |                                     | ACIN 200V                                                                                                | 82typ                                                                         | 86typ                                                                         | 85typ         | 86typ         | 87typ         | 88typ         | 88typ         |
|                               | POWER FACTOR(lo=100%)               | ACIN 100V                                                                                                | 0.98typ                                                                       | 0.99typ                                                                       |               |               |               |               |               |
|                               |                                     | ACIN 200V                                                                                                | 0.87typ                                                                       | 0.93typ                                                                       |               |               |               |               |               |
| INRUSH CURRENT[A]             | ACIN 100V                           | 20typ (lo=100%) (At cold start)                                                                          |                                                                               |                                                                               |               |               |               |               |               |
|                               | ACIN 200V                           | 40typ (lo=100%) (At cold start)                                                                          |                                                                               |                                                                               |               |               |               |               |               |
| LEAKAGE CURRENT[mA]           |                                     | 0.4/0.75max (ACIN 100V/240V 60Hz, lo=100%, According to IEC60950-1,DENAN)                                |                                                                               |                                                                               |               |               |               |               |               |
| OUTPUT                        | VOLTAGE[V]                          | 3.3                                                                                                      | 5                                                                             | 9                                                                             | 12            | 15            | 24            | 36            | 48            |
|                               | CURRENT[A]                          | 30                                                                                                       | 30                                                                            | 16.7                                                                          | 13            | 10            | 6.5           | 4.3           | 3.3           |
|                               | LINE REGULATION[mV]                 | 20max                                                                                                    | 20max                                                                         | 36max                                                                         | 48max         | 60max         | 96max         | 144max        | 192max        |
|                               | LOAD REGULATION[mV]                 | 40max                                                                                                    | 40max                                                                         | 100max                                                                        | 100max        | 120max        | 150max        | 240max        | 240max        |
|                               | RIPPLE[mVp-p]                       | 0 to +50℃ *1                                                                                             | 80max                                                                         | 80max                                                                         | 120max        | 120max        | 120max        | 150max        | 150max        |
|                               |                                     | -10 - 0℃ *1                                                                                              | 140max                                                                        | 140max                                                                        | 160max        | 160max        | 160max        | 200max        | 200max        |
|                               | RIPPLE NOISE[mVp-p]                 | 0 to +50℃ *1                                                                                             | 120max                                                                        | 120max                                                                        | 150max        | 150max        | 150max        | 250max        | 250max        |
|                               |                                     | -10 - 0℃ *1                                                                                              | 160max                                                                        | 160max                                                                        | 180max        | 180max        | 180max        | 300max        | 300max        |
|                               | TEMPERATURE REGULATION[mV]          | 0 to +50℃                                                                                                | 50max                                                                         | 50max                                                                         | 90max         | 120max        | 150max        | 240max        | 360max        |
|                               |                                     | -10 to +50℃                                                                                              | 60max                                                                         | 60max                                                                         | 120max        | 150max        | 180max        | 290max        | 450max        |
|                               | DRIFT[mV]                           | *2                                                                                                       | 20max                                                                         | 20max                                                                         | 36max         | 48max         | 60max         | 96max         | 144max        |
|                               | START-UP TIME[ms]                   |                                                                                                          | 350typ(ACIN 100V, lo=100%)                                                    |                                                                               |               |               |               |               |               |
| HOLD-UP TIME[ms]              |                                     | 20typ (ACIN 100V, lo=100%)                                                                               |                                                                               |                                                                               |               |               |               |               |               |
| PROTECTION CIRCUIT AND OTHERS | OUTPUT VOLTAGE ADJUSTMENT RANGE[V]  | 2.85 - 3.63                                                                                              | 4.00 - 5.50                                                                   | 7.50 - 10.0                                                                   | 10.0 - 13.2   | 13.2 - 18.0   | 19.2 - 27.0   | 28.8 - 39.6   | 39.0 - 53.0   |
|                               | OUTPUT VOLTAGE SETTING[V]           | 3.30 - 3.40                                                                                              | 5.00 - 5.15                                                                   | 9.00 - 9.36                                                                   | 12.00 - 12.48 | 15.00 - 15.60 | 24.00 - 24.96 | 36.00 - 37.44 | 48.00 - 49.92 |
|                               | OVERCURRENT PROTECTION              | Works over 105% of rated current and recovers automatically                                              |                                                                               |                                                                               |               |               |               |               |               |
|                               | OVERVOLTAGE PROTECTION[V]           | 4.00 - 5.25                                                                                              | 5.75 - 7.00                                                                   | 11.5 - 14.0                                                                   | 15.0 - 18.0   | 20.0 - 25.0   | 30.0 - 37.0   | 43.0 - 50.0   | 58.0 - 65.0   |
|                               | OPERATING INDICATION                | LED (Green)                                                                                              |                                                                               |                                                                               |               |               |               |               |               |
|                               | REMOTE SENSING                      | Optional (Only -3R3, -5 Option -K)                                                                       |                                                                               |                                                                               |               |               |               |               |               |
|                               | REMOTE ON/OFF                       | Optional (Required external power source)                                                                |                                                                               |                                                                               |               |               |               |               |               |
|                               | ISOLATION                           | INPUT-OUTPUT · RC                                                                                        | *3                                                                            | AC3.000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature) |               |               |               |               |               |
| ENVIRONMENT                   | INPUT-FG                            |                                                                                                          | AC2.000V 1minute, Cutoff current = 10mA, DC500V 50MΩmin (At Room Temperature) |                                                                               |               |               |               |               |               |
|                               | OUTPUT · RC-FG                      | *3                                                                                                       | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩmin (At Room Temperature)  |                                                                               |               |               |               |               |               |
|                               | OPERATING TEMP.,HUMID.AND ALTITUDE  | -10 to +71℃ (Required Derating), 20 - 90%RH (Non condensing) 3,000m (10,000feet) max                     |                                                                               |                                                                               |               |               |               |               |               |
| ENVIRONMENT                   | STORAGE TEMP.,HUMID.AND ALTITUDE    | -20 to +75℃, 20 - 90%RH (Non condensing) 9,000m (30,000feet) max                                         |                                                                               |                                                                               |               |               |               |               |               |
|                               | VIBRATION                           | 10 - 55Hz, 19.6m/s <sup>2</sup> (2G), 3minutes period, 60minutes each along X, Y and Z axis              |                                                                               |                                                                               |               |               |               |               |               |
|                               | IMPACT                              | 196.1m/s <sup>2</sup> (20G), 11ms, once each X, Y and Z axis                                             |                                                                               |                                                                               |               |               |               |               |               |
| SAFETY AND NOISE REGULATIONS  | AGENCY APPROVALS (At only AC input) | UL60950-1, C-UL(CSA60950-1), EN60950-1, EN50178 Complies with DEN-AN                                     |                                                                               |                                                                               |               |               |               |               |               |
|                               | CONDUCTED NOISE                     | Complies with FCC Part15 classB, VCCI-B, CISPR22-B, EN55011-B, EN55022-B                                 |                                                                               |                                                                               |               |               |               |               |               |
|                               | HARMONIC ATTENUATOR                 | Complies with IEC61000-3-2 *6                                                                            |                                                                               |                                                                               |               |               |               |               |               |
| OTHERS                        | CASE SIZE/WEIGHT                    | 34×93×168mm [1.34×3.66×6.61 inches] (without terminal block) (W×H×D) / 560g max (with cover : 630g max)  |                                                                               |                                                                               |               |               |               |               |               |
|                               | COOLING METHOD                      | Convection                                                                                               |                                                                               |                                                                               |               |               |               |               |               |

\*1 Measured by 20MHz oscilloscope or Ripple-Noise meter(equivalent to KEISOKU-GIKEN :RM101).

\*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25℃.

\*3 Applicable when Remote ON/OFF(optional) is added. RC is insulated with input, output and FG.

\*4 Derating is required.

\*5 Please contact us about safety approvals for the model with option.

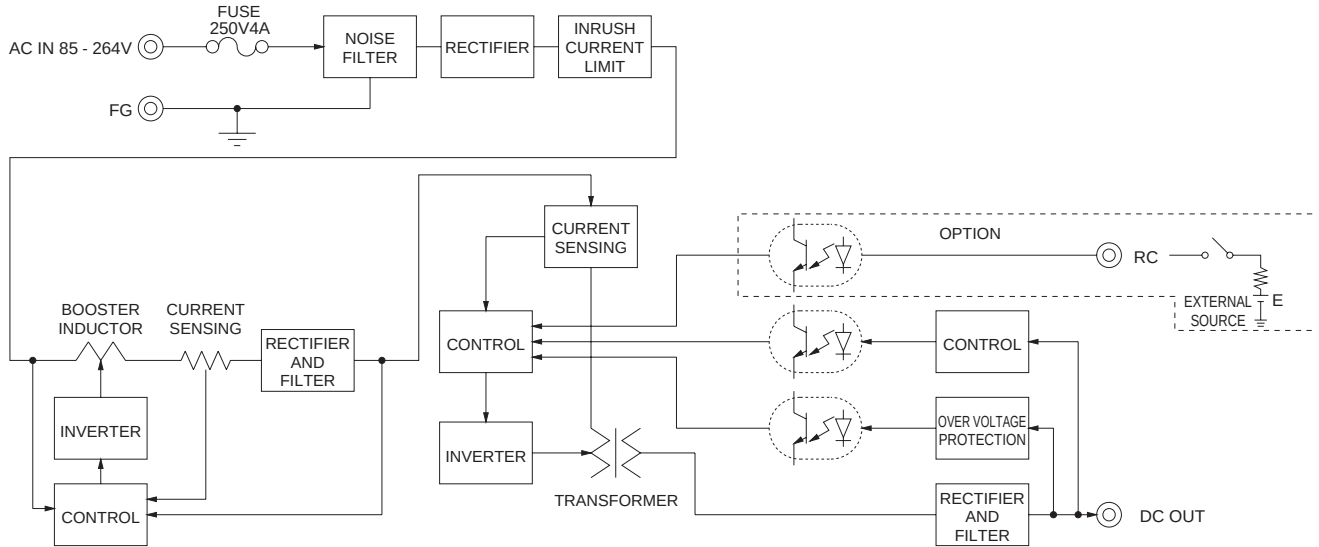
\*6 Please contact us about class C.

\* Parallel operation with other model is not possible.

\* Derating is required when operated with cover.

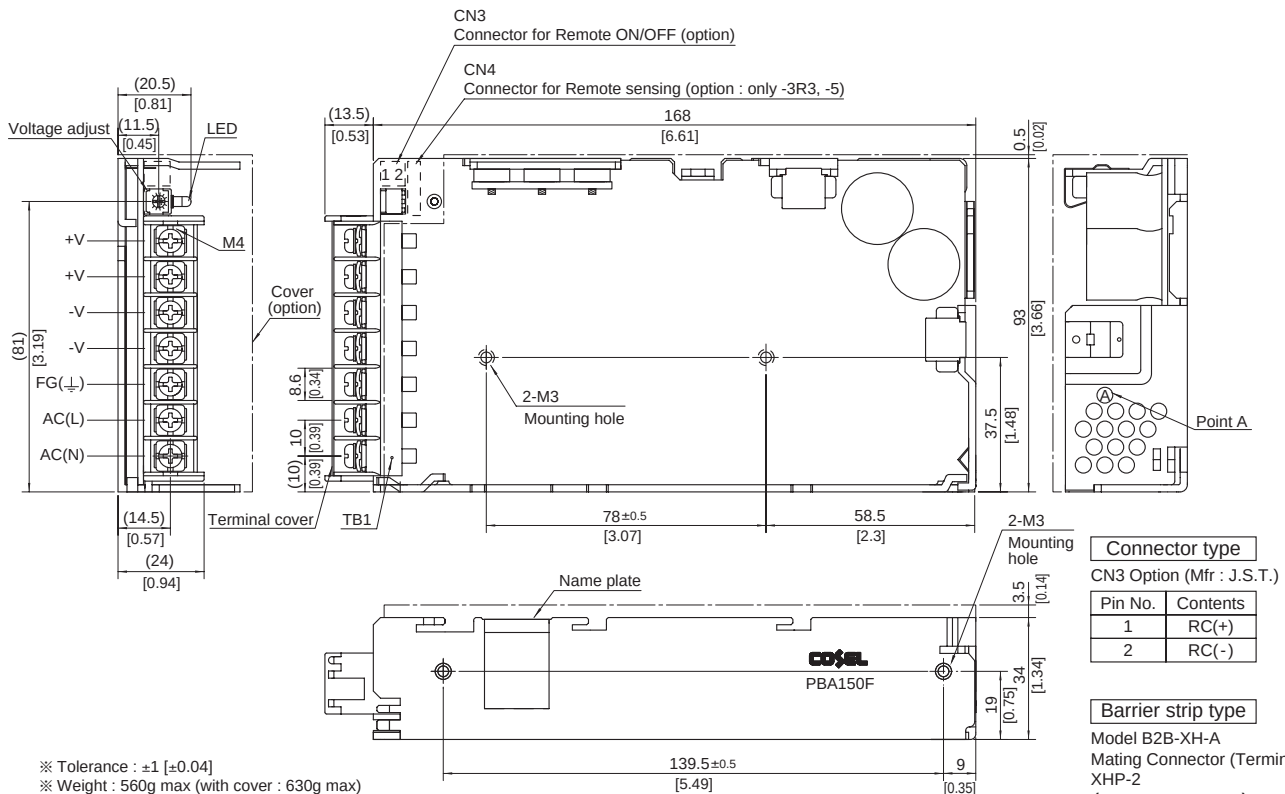
\* A sound may occur from power supply at peak loading.

## Block diagram



## External view

※ External size of option T,J,R,N,N1,V and K is different from standard model and refer to 7 Option of instruction manual for details.



※ Tolerance : ±1 [±0.04]  
 ※ Weight : 560g max (with cover : 630g max)  
 ※ PCB Material/thickness : CEM3 / 1.6mm [0.06]  
 ※ Chassis material : Aluminum  
 ※ Dimensions in mm, [ ] = inches  
 ※ Mounting torque : 0.49N • m (5kgf • cm) max  
 ※ Mounting torque : M4:1.6N • m (16.9kgf • cm) max  
 ※ Keep drawing current per pin below 20A for TB1.

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