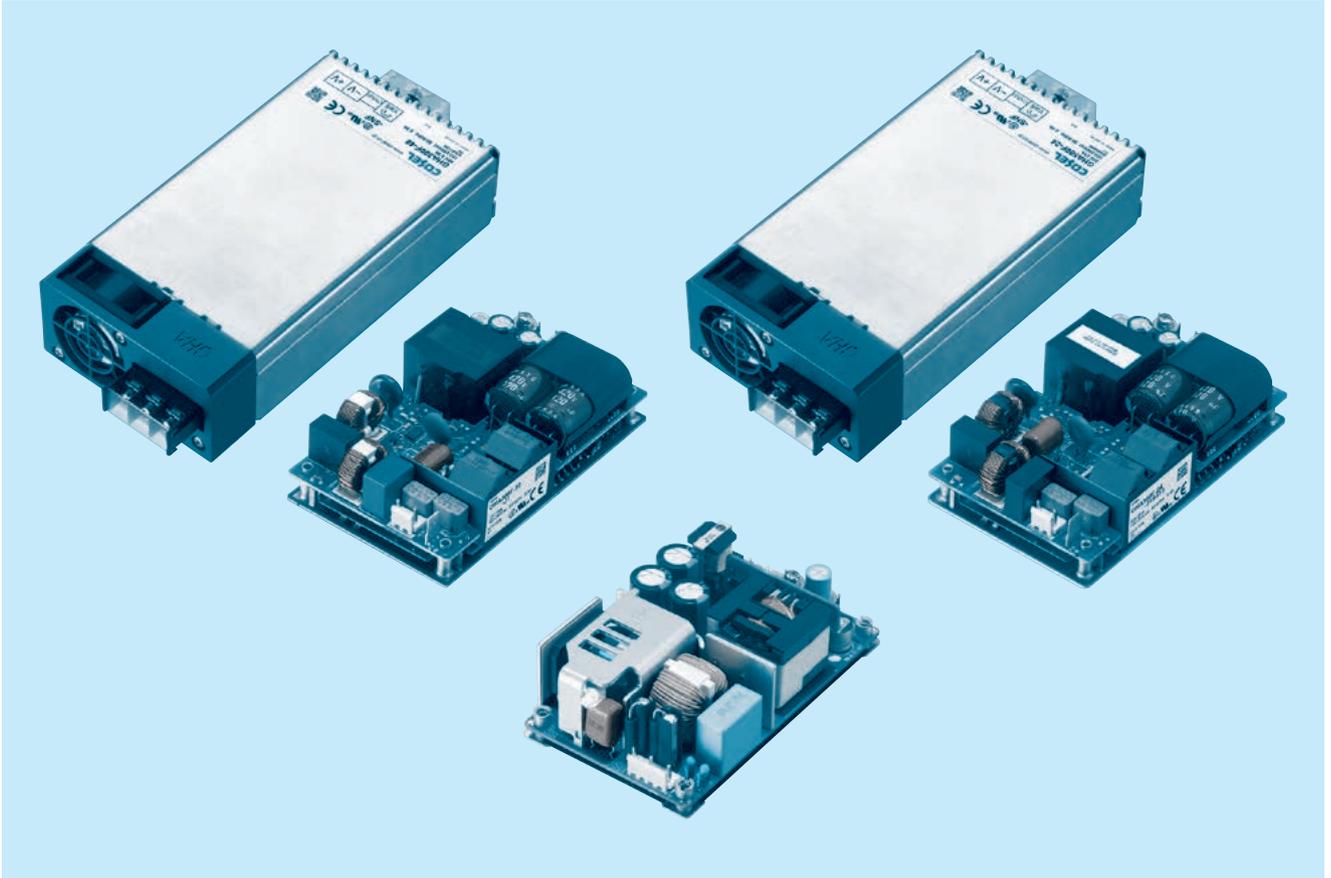




GHA-series



Feature

- Wattage 700Wmax
- Conduction cooling (GHA500F, GHA700F)
- 3" X 5" standard footprint
- Less than 1U high
- ITE and Medical safety approvals
- Low leakage current
- Suitable for BF application
- (Output-FG : 1MOFP, Input-Output :2MOFP) (GHA700F)
- With Remote (Option)
- With AUX1 (12V) (Optional Excluding GHA700F-12)
- With AUX2 (5V) (Optional)
- With FAN (GHA300F-SNF, GHA500F-SNF)

Safety agency approvals

- UL60950-1 (GHA300F, 500F), UL62368-1 (GHA700F)
- ANSI/AAMI ES60601-1, C-UL
- EN62368-1, EN60601-1 3rd
- Complies with IEC60601-1-2 4th
- DEN-AN
- EN61558-2-16 (GHA700F)

5-year warranty (Refer to Instruction Manual)

CE marking

- Low Voltage Directive
- RoHS Directive

UKCA marking

- Electrical Equipment Safety Regulations
- RoHS Regulations

EMI

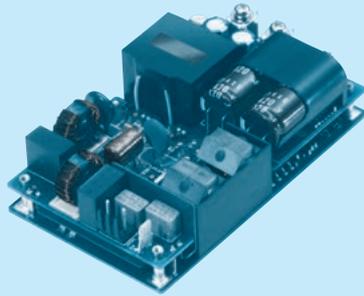
- Complies with FCC-B, CISPR11-B, CISPR32-B, EN55011-B
- EN55032-B, VCCI-B

EMS Compliance : EN61204-3, EN61000-6-2 IEC60601-1-2 (2014), EN60601-1-2 (2015)

- EN61000-4-2
- EN61000-4-3
- EN61000-4-4
- EN61000-4-5
- EN61000-4-6
- EN61000-4-8
- EN61000-4-11

GHA300F

GH A 300 F -□□ -□
 ① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
EAC-10-472



High voltage pulse noise type : EAP series
 Low leakage current type : EAM series
 * A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
 - ② Single output
 - ③ Output wattage
 - ④ Universal input
 - ⑤ Output voltage
 - ⑥ Optional *6
- T3 : mounting hole M3
 J1 : J.S.T.connector type
 J3 : Horizontal input connector J.S.T.connector type
 R3 : with Subfeatures (5VAUX,12VAUX,Remote, Power good)(Molex connector type)
 *with friction locks,J2R3

This power supply is manufactured by SMD technology. The stress to P.C.B like twisting or bending causes the defect of the unit, please handle the unit with care
 *Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

Specification is changed at option, refer to Instruction manual.

| MODEL | GHA300F-12 | | GHA300F-24 | | GHA300F-48 | |
|-----------------------|------------|---------|------------|-----------|------------|--|
| MAX OUTPUT WATTAGE[W] | 300 | | 300 | | 302.4 | |
| DC OUTPUT | Forced air | at 50°C | 12V 25A | 24V 12.5A | 48V 6.3A | |
| | | at 40°C | 12V 8.4A | 24V 4.2A | 48V 2.1A | |
| | Convection | at 50°C | 12V 4.5A | 24V 2.2A | 48V 1.1A | |

SPECIFICATIONS

| | MODEL | GHA300F-12 | | GHA300F-24 | | GHA300F-48 | | |
|------------------------------------|---|--|----------------|----------------|----------------|----------------|--------|--|
| INPUT | VOLTAGE[V] | AC90 - 264 1 φ (output derating is required at AC90V -115V *3) | | | | | | |
| | CURRENT[A] | ACIN 120V | 3.3typ | | 90typ | | 90typ | |
| | | ACIN 230V | 1.8typ | | 92typ | | 92typ | |
| | FREQUENCY[Hz] | 50 / 60 (47 - 63) | | | | | | |
| | EFFICIENCY[%] | ACIN 120V | 89typ | | 90typ | | 90typ | |
| | | ACIN 230V | 91typ | | 92typ | | 92typ | |
| | POWER FACTOR (Io=100%) | ACIN 120V | 0.95typ | | 90typ | | 90typ | |
| | | ACIN 230V | 0.90typ | | 92typ | | 92typ | |
| INRUSH CURRENT[A] | ACIN 120V | 20typ (Io=100%) (At cold start) (Ta=25°C) | | | | | | |
| | ACIN 230V | 40typ (Io=100%) (At cold start) (Ta=25°C) | | | | | | |
| LEAKAGE CURRENT[ma] | 0.125/0.250max (ACIN 120V/240V 60Hz,Io=100%, According to IEC60601-1) | | | | | | | |
| OUTPUT | VOLTAGE[V] | 12 | | 24 | | 48 | | |
| | CURRENT[A] | Forced air | 25.0 | | 12.5 | | 6.3 | |
| | | Convection | 4.5 | | 2.2 | | 1.1 | |
| | LINE REGULATION[mV] *4 | 48max | | 96max | | 192max | | |
| | LOAD REGULATION[mV] *4 | 100max | | 150max | | 240max | | |
| | RIPPLE[mVp-p] *1 | 0 to +50°C | 240max | | 240max | | 300max | |
| | | -20 to 0°C | 320max | | 320max | | 400max | |
| | RIPPLE NOISE[mVp-p]*1 | 0 to +50°C | 300max | | 300max | | 480max | |
| | | -20 to 0°C | 360max | | 360max | | 500max | |
| | TEMPERATURE REGULATION[mV] | 0 to +50°C | 120max | | 240max | | 480max | |
| | | -20 to +50°C | 150max | | 290max | | 600max | |
| | DRIFT[mV] *2 | 48max | | 96max | | 192max | | |
| | START-UP TIME[ms] | 500typ (ACIN 120V, Io=100%) | | | | | | |
| | HOLD-UP TIME[ms] | 16typ (ACIN 120V, Io=100%) | | | | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20 | | 21.60 to 26.40 | | 43.20 to 52.80 | | | |
| OUTPUT VOLTAGE SETTING[V] | 12.00 to 12.48 | | 24.00 to 24.96 | | 48.00 to 49.92 | | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating and recovers automatically | | | | | | |
| | OVERVOLTAGE PROTECTION[V] | 13.80 to 16.80 | | 27.60 to 33.60 | | 55.20 to 67.20 | | |
| | AUX1 (12V1A) | Optional | | | | | | |
| | AUX2 (5V1A) | Optional | | | | | | |
| | REMOTE ON/OFF | Optional | | | | | | |
| ISOLATION | PowerGood | Optional | | | | | | |
| | INPUT-OUTPUT · RC · AUX *7 | AC4,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 2MOPP | | | | | | |
| | INPUT-FG | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 1MOPP | | | | | | |
| | OUTPUT · RC · AUX-FG *7 | AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | | | | |
| ENVIRONMENT | OUTPUT-RC · AUX *7 | AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | | | | |
| | OPERATING TEMP.,HUMID.AND ALTIUDE | -20 to +70°C, 20 - 90%RH (Non condensing), 3,000m (10,000feet) max *3 | | | | | | |
| | STORAGE TEMP.,HUMID.AND ALTIUDE | -30 to +75°C, 20 - 90%RH (Non condensing), 9,000m (30,000feet) max | | | | | | |
| | VIBRATION | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60minutes each along X, Y and Z axis | | | | | | |
| SAFETY AND NOISE REGULATIONS | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis | | | | | | |
| | AGENCY APPROVALS | UL60950-1, ANSI/AAMI ES60601-1, C-UL(CSA60950-1, CAN/CSA60601-1), EN62368-1, EN60601-1 3rd, Complies with DEN-AN, IEC60601-1-2 4th Ed. | | | | | | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR11-B, CISPR22-B, EN55011-B, EN55022-B | | | | | | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (class A) *5 | | | | | | |
| OTHERS | CASE SIZE/WEIGHT | 76.2 X 35 X 127mm [3.0 X 1.4 X 5.0 inches] (W X H X D) / 400g max | | | | | | |
| | COOLING METHOD | Convection, Forced air (Require external fan) | | | | | | |

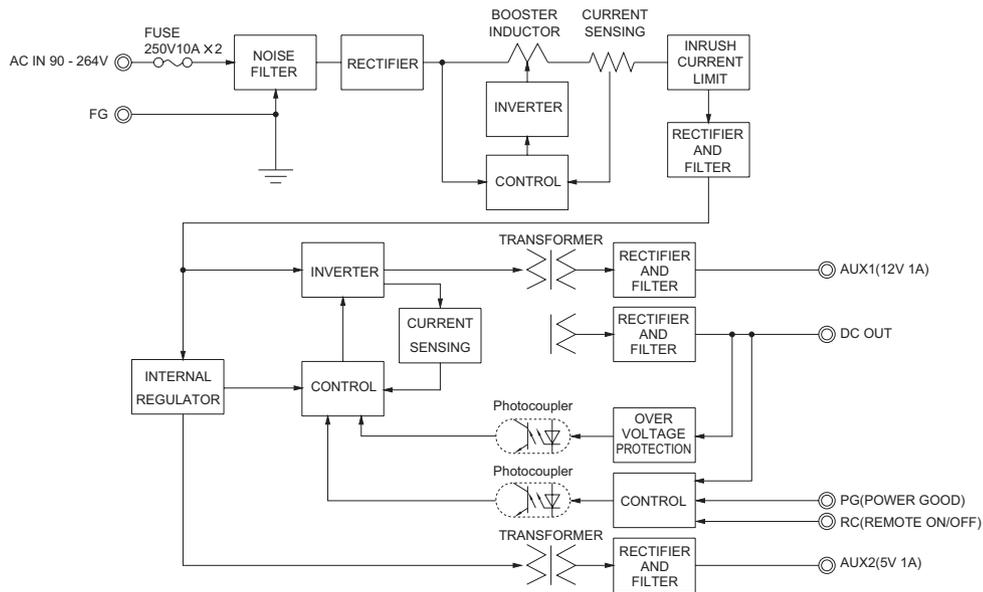
*1 This is the value that measured on measuring board with capacitor of 22 μF at 150mm from output terminal.
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103).
 *2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
 *3 Derating is required.
 *4 Please contact us about dynamic load and input response.
 *5 Please contact us about another class.

*6 Specification is changed at option, refer to Instruction Manual
 *7 Applicable when AUX and remote control (optional) is added.
 * To meet the specifications. Do not operate over-loaded condition.
 * Sound noise may be generated by power supply in case of pulse load.
 * Parallel operation is not possible.
 * Forced air cooling is required to output up to MAX OUTPUT WATTAGE.
 * Bottom layer P.C.B has electric potential which is required isolation from FG by clearance or creepage as the safety design issue.

Features

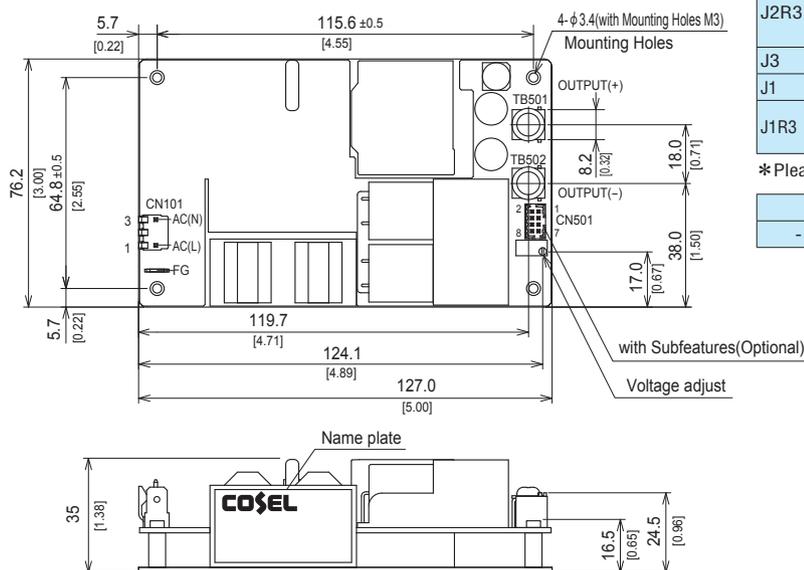
- High Power density: 14.3W/inch³
- 3" × 5" standard footprint
- Industrial and Medical safety approvals
- With Remote On/Off (Optional)
- No minimum load is required
- High efficiency 92% typ (Input Voltage 230V, Output Voltage 24V)
- Fits 1U applications
- Low leakage current
- With AUX1 (12V), AUX2 (5V) (Optional)

Block diagram



External view

*External size of option J3 is different from standard model and refer to 6 Option and Others of instruction manual for details.



- ※ Tolerance ± 1 [± 0.04]
- ※ Weight : 400g max
- ※ There is a total of four attachment holes.
- ※ This power supply requires mounting on metal standoffs 5mm in height. (Insulating sheet is required if you do not use a spacer).
- ※ Dimensions in mm, []=inches
- ※ Screw tightening torque : (TB501, 502) : 1.5N · m max
- ※ Mounting torque : 0.6N · m max
- ※ Avoid contact between TB501 and 502 wiring with mounting parts.
- ※ Option : -J1 : (J.S.T) connector type. Refer to Instruction Manual 6.

| | Connector | Mating connector | Terminal | Mfr | |
|----------|-----------|-------------------|------------|--------------------------|---------|
| Standard | CN101 | A-41671-A03A197-2 | 09-50-8031 | 08-50-0105 08-65-0114 | Molex * |
| | CN501 | 087831-0820 | 51110-0851 | 50394-8051 | |
| J2R3 | CN101 | A-41671-A03A197-2 | 09-50-8031 | 08-50-0105 08-65-0114 | |
| | CN501 | 087831-0841 | 51110-0860 | 50394-8051 | |
| J3 | CN101 | S2P3-VH | | | J.S.T. |
| J1 | CN101 | B2P3-VH | VHR-3N | SVH-21T-P1.1 | |
| J1R3 | CN501 | B8B-PHDSS | PHDR-08VS | SPHD-002T-P0.5 | |

*Please note the pin position No.1 is different from Molex.

| | FG | Mating connector | Terminal | Mfr |
|---|------------|------------------|----------|------------------|
| - | 250 Series | - | 170603-2 | Tyco Electronics |

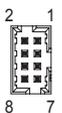
<Pin Assignments>

<CN101>

| Pin No. | Input |
|---------|-------|
| 1 | AC(L) |
| 2 | |
| 3 | AC(N) |

<CN501(Optional)>

| Pin No. | Function |
|---------|---------------------------|
| 1 | AUX1 : AUX1 (12V1A) |
| 2 | AUX1G: AUX1 (GND) |
| 3 | RC : REMOTE ON/OFF |
| 4 | RCG : REMOTE ON/OFF (GND) |
| 5 | PG : Power good |
| 6 | PGG : Power good (GND) |
| 7 | AUX2 : AUX2 (5V1A) |
| 8 | AUX2G: AUX2 (GND) |



CN501

GHA500F

GH A 500 F -□□ -□
 ① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
EAC-10-472



High voltage pulse noise type : EAP series
 Low leakage current type : EAM series
 * A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Optional *6
- T3 : mounting hole M3
- J1 : J.S.T.connector type
- J3 : Horizontal input connector J.S.T.connector type
- R3 : with Subfeatures (5VAUX, 12VAUX, Remote, Power good)(Molex connector type)
- *with friction locks, J2R3
- P : Parallel Operation

This power supply is manufactured by SMD technology. The stress to P.C.B like twisting or bending causes the defect of the unit, please handle the unit with care
 *Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

Specification is changed at option, refer to Instruction manual.

| MODEL | GHA500F-12 | GHA500F-15 | GHA500F-24 | GHA500F-30 | GHA500F-48 | GHA500F-56 | | |
|-----------------------|------------|------------|------------|------------|------------|------------|-----------|----------|
| MAX OUTPUT WATTAGE[W] | 500.4 | 501 | 504 | 501 | 504 | 504 | | |
| DC OUTPUT | Forced air | at 50°C | 12V 41.7A | 15V 33.4A | 24V 21.0A | 30V 16.7A | 48V 10.5A | 56V 9.0A |
| | | at 40°C | 12V 12.5A | 15V 10.0A | 24V 6.3A | 30V 5.0A | 48V 3.2A | 56V 2.7A |
| | Convection | at 50°C | 12V 9.2A | 15V 7.4A | 24V 4.6A | 30V 3.7A | 48V 2.3A | 56V 1.9A |
| | | at 0°C | 12V 30.0A | 15V 24.0A | 24V 15.0A | 30V 12.0A | 48V 7.5A | 56V 6.4A |
| conduction cooling | at 50°C | 12V 16.7A | 15V 13.4A | 24V 8.4A | 30V 6.7A | 48V 4.2A | 56V 3.6A | |

SPECIFICATIONS

| MODEL | GHA500F-12 | GHA500F-15 | GHA500F-24 | GHA500F-30 | GHA500F-48 | GHA500F-56 | | | |
|------------------------------------|--|--|---|----------------|----------------|----------------|----------------|--------|--------|
| INPUT | VOLTAGE[V] | AC90 - 264 1 φ (output derating is required at AC90V -115V *3) | | | | | | | |
| | CURRENT[A] | ACIN 120V | 5.4typ | | | | | | |
| | | ACIN 230V | 2.9typ | | | | | | |
| | FREQUENCY[Hz] | 50 / 60 (47 - 63) | | | | | | | |
| | EFFICIENCY[%] | ACIN 120V | 88typ | 90typ | 90typ | 90typ | 90typ | | |
| | | ACIN 230V | 90typ | 92typ | 92typ | 92typ | 92typ | | |
| | POWER FACTOR (lo=100%) | ACIN 120V | 0.95typ | | | | | | |
| | | ACIN 230V | 0.90typ | | | | | | |
| | INRUSH CURRENT[A] | ACIN 120V | 20typ (lo=100%) (At cold start) (Ta=25°C) | | | | | | |
| | | ACIN 230V | 40typ (lo=100%) (At cold start) (Ta=25°C) | | | | | | |
| LEAKAGE CURRENT[mA] | 0.125/0.250max (ACIN 120V/240V 60Hz, lo=100%, According to IEC60601-1) | | | | | | | | |
| OUTPUT | VOLTAGE[V] | 12 | 15 | 24 | 30 | 48 | 56 | | |
| | CURRENT[A] | Forced air | 41.7 | 33.4 | 21.0 | 16.7 | 10.5 | 9.0 | |
| | | Convection | 9.2 | 7.4 | 4.6 | 3.7 | 2.3 | 1.9 | |
| | | conduction cooling | 16.7 | 13.4 | 8.4 | 6.7 | 4.2 | 3.6 | |
| | LINE REGULATION[mV] | *4 | 48max | 60max | 96max | 120max | 192max | 192max | |
| | LOAD REGULATION[mV] | *4 | 100max | 120max | 150max | 180max | 240max | 240max | |
| | RIPPLE[mVp-p] | *1 | 0 to +50°C | 240max | 240max | 240max | 300max | 300max | 400max |
| | | -20 - 0°C | 320max | 320max | 320max | 400max | 400max | 500max | |
| | RIPPLE NOISE[mVp-p]*1 | 0 to +50°C | 300max | 300max | 300max | 480max | 480max | 500max | |
| | | -20 - 0°C | 360max | 360max | 360max | 500max | 500max | 580max | |
| TEMPERATURE REGULATION[mV] | 0 to +50°C | 120max | 150max | 240max | 300max | 480max | 480max | | |
| | -20 to +50°C | 150max | 180max | 290max | 360max | 600max | 600max | | |
| DRIFT[mV] | *2 | 48max | 60max | 96max | 120max | 192max | 192max | | |
| START-UP TIME[ms] | 500typ (ACIN 120V, lo=100%) | | | | | | | | |
| HOLD-UP TIME[ms] | 16typ (ACIN 120V, lo=100%) | | | | | | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20 | 13.50 to 16.50 | 21.60 to 26.40 | 27.00 to 31.50 | 43.20 to 52.80 | 52.00 to 56.00 | | | |
| OUTPUT VOLTAGE SETTING[V] | 12.00 to 12.48 | 15.00 to 15.30 | 24.00 to 24.96 | 30.00 to 31.20 | 48.00 to 49.92 | 55.00 to 56.00 | | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating and recovers automatically | | | | | | | |
| | OVERVOLTAGE PROTECTION[V] | 13.80 to 16.80 | 17.25 to 21.00 | 27.60 to 33.60 | 34.50 to 42.00 | 55.20 to 67.20 | 60.00 to 69.00 | | |
| | AUX1 (12V1A) | Optional | | | | | | | |
| | AUX2 (5V1A) | Optional | | | | | | | |
| | REMOTE ON/OFF | Optional | | | | | | | |
| PowerGood | Optional | | | | | | | | |
| ISOLATION | INPUT-OUTPUT · RC · AUX | *7 AC4,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 2MOPP | | | | | | | |
| | INPUT-FG | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 1MOPP | | | | | | | |
| | OUTPUT · RC · AUX-FG | *7 AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | | | | | |
| | OUTPUT-RC · AUX | *7 AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | | | | | |
| ENVIRONMENT | OPERATING TEMP., HUMID. AND ALTITUDE | -20 to +80°C, 20 - 90%RH (Non condensing), 3,000m (10,000feet) max | | | | | | | |
| | STORAGE TEMP., HUMID. AND ALTITUDE | -30 to +80°C, 20 - 90%RH (Non condensing), 9,000m (30,000feet) max | | | | | | | |
| | VIBRATION | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60minutes each along X, Y and Z axis | | | | | | | |
| | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis | | | | | | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | UL60950-1, ANSI/AAMI ES60601-1, C-UL(CSA60950-1, CAN/CSA60601-1), EN62368-1, EN60601-1 3rd, Complies with DEN-AN, IEC60601-1-2 4th Ed. | | | | | | | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR11-B, CISPR22-B, EN55011-B, EN55022-B | | | | | | | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (class A) *5 | | | | | | | |
| OTHERS | CASE SIZE/WEIGHT | 76.2 X 35 X 127mm [3.0 X 1.4 X 5.0 inches] (W X H X D) / 420g max | | | | | | | |
| | COOLING METHOD | Convection, Forced air (Require external fan), Conduction cooling | | | | | | | |

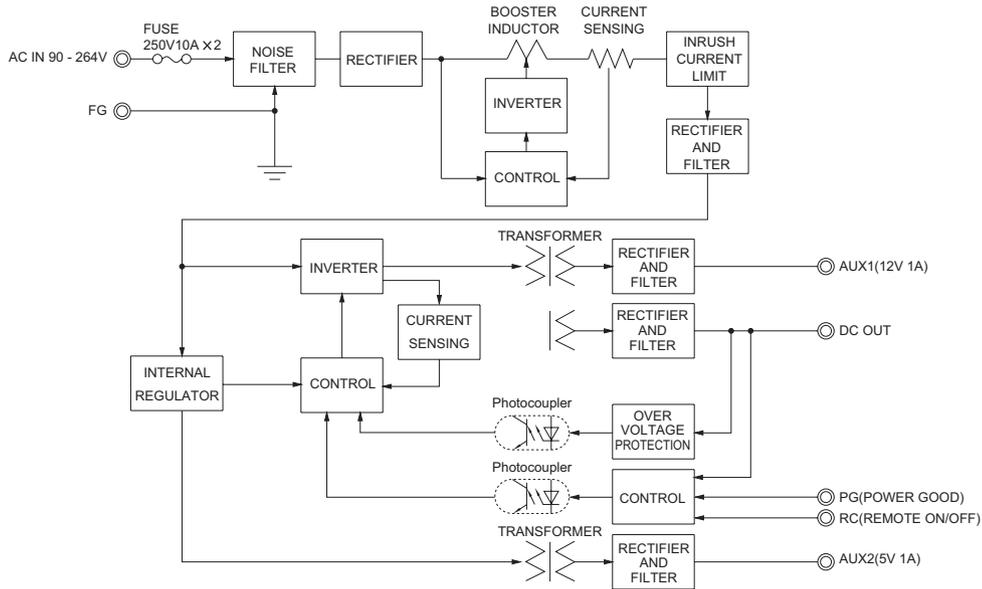
*1 This is the value that measured on measuring board with capacitor of 22 μF at 150mm from output terminal.
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103).
 *2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
 *3 Derating is required.
 *4 Please contact us about dynamic load and input response.

*5 Please contact us about another class.
 *6 Specification is changed at option, refer to Instruction Manual.
 *7 Applicable when AUX and remote control (optional) is added.
 * To meet the specifications. Do not operate over-loaded condition.
 * Sound noise may be generated by power supply in case of pulse load.
 * Parallel operation is available with -P option. Refer to 5.1 on the instruction manual.
 * Forced air cooling is required to output up to MAX OUTPUT WATTAGE.

Features

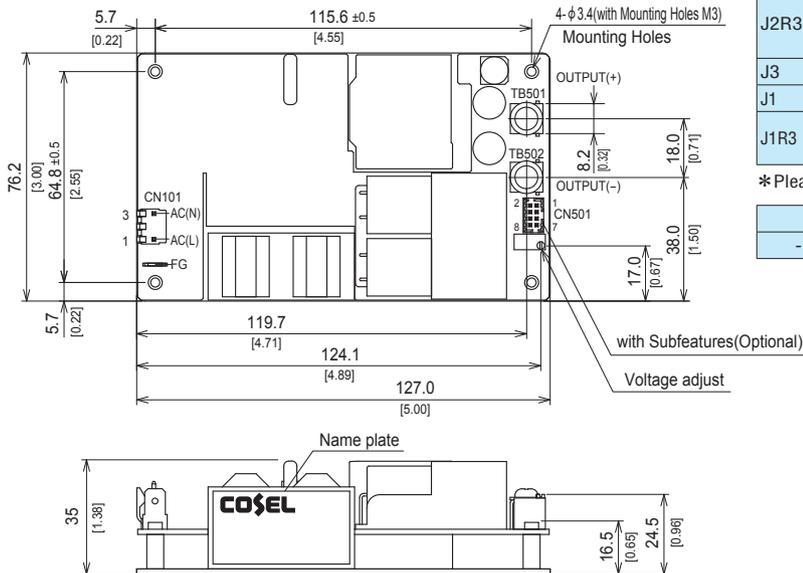
- **Wattage 500W max**
- **High efficiency 92% typ (Input Voltage 230V, Output Voltage 24V)**
- **Conduction cooling**
- **Fits 1U applications**
- **Low leakage current**
- **With AUX1 (12V), AUX2 (5V) (Optional)**
- **High Power density: 24.1W/inch³**
- **3" × 5" standard footprint**
- **Industrial and Medical safety approvals**
- **With Remote On/Off (Optional)**
- **No minimum load is required**

Block diagram



External view

* External size of option J3 is different from standard model and refer to 6 Option and Others of instruction manual for details.



- ※ Tolerance ±1 [±0.04]
- ※ Weight : 420g max
- ※ There is a total of four attachment holes.
- ※ Base Plate : Aluminum
- ※ Dimensions in mm, []=inches
- ※ Screw tightening torque : (TB501, 502) : 1.5N · m max
- ※ Mounting torque : 0.6N · m max
- ※ Avoid contact between TB501 and 502 wiring with mounting parts.
- ※ Option : J1 : (J.S.T) connector type. Refer to Instruction Manual 6.

| Connector | | Mating connector | Terminal | Mfr | |
|-----------|-------|-------------------|------------|--------------------------|---------|
| Standard | CN101 | A-41671-A03A197-2 | 09-50-8031 | 08-50-0105 08-65-0114 | Molex * |
| | CN501 | 087831-0820 | 51110-0851 | 50394-8051 | |
| J2R3 | CN101 | A-41671-A03A197-2 | 09-50-8031 | 08-50-0105 08-65-0114 | |
| | CN501 | 087831-0841 | 51110-0860 | 50394-8051 | |
| J3 | CN101 | S2P3-VH | | | J.S.T. |
| J1 | CN101 | B2P3-VH | VHR-3N | SVH-21T-P1.1 | |
| J1R3 | CN501 | B8B-PHDSS | PHDR-08VS | SPHD-002T-P0.5 | |

* Please note the pin position No.1 is different from Molex.

| FG | Mating connector | Terminal | Mfr |
|----|------------------|----------|---------------------------|
| - | 250 Series | - | 170603-2 Tyco Electronics |

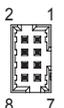
<Pin Assignments>

<CN101>

| Pin No. | Input |
|---------|-------|
| 1 | AC(L) |
| 2 | |
| 3 | AC(N) |

<CN501 (Optional)>

| Pin No. | Function |
|---------|---------------------------|
| 1 | AUX1 : AUX1 (12V1A) |
| 2 | AUX1G: AUX1 (GND) |
| 3 | RC : REMOTE ON/OFF |
| 4 | RCG : REMOTE ON/OFF (GND) |
| 5 | PG : Power good |
| 6 | PGG : Power good (GND) |
| 7 | AUX2 : AUX2 (5V1A) |
| 8 | AUX2G: AUX2 (GND) |



CN501

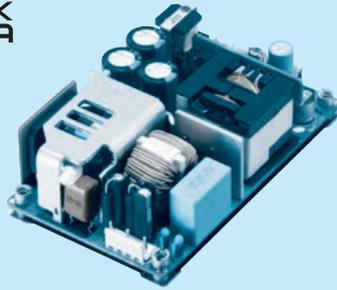
GHA700F

GH **A** **700** **F** -□□ -□

① ② ③ ④ ⑤ ⑥



RoHS
2MOPP



Example recommended EMI/EMC filter
EAC-16-472



High voltage pulse noise type : EAP series
Low leakage current type : EAM series
* A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

■ **BF**

- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Optional *1
- C : with Coating
- E : IEC Class II
- R3 : With Subfeatures (5VAUX, 12VAUX*, Remote, Power good)
- * Excluding GHA700F-12
- T3 : mounting hole M3
- U1 : can attach an external capacitor unit

This power supply is manufactured by SMD technology. The stress to P.C.B like twisting or bending causes the defect of the unit, please handle the unit with care
* Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

Specification is changed at option, refer to Instruction manual.

| MODEL | GHA700F-12-J1 | GHA700F-24-J1 | GHA700F-30-J1 | GHA700F-48-J1 | GHA700F-56-J1 | |
|-----------------------|---|---------------|---------------|---------------|---------------|-----------|
| MAX OUTPUT WATTAGE[W] | 650.4 | 700.8 | 699.0 | 700.8 | 700.0 | |
| DC OUTPUT | Forced air at 50°C Convection at 30°C at 50°C conduction cooling at 50°C | 12V 54.2A | 24V 29.2A | 30V 23.3A | 48V 14.6A | 56V 12.5A |
| | | 12V 33.4A | 24V 16.7A | 30V 13.4A | 48V 8.4A | 56V 7.2A |
| | | 12V 22.2A | 24V 11.1A | 30V 8.9A | 48V 5.6A | 56V 4.8A |
| | | 12V 33.4A | 24V 16.7A | 30V 13.4A | 48V 8.4A | 56V 7.2A |

SPECIFICATIONS

| MODEL | GHA700F-12-J1 | GHA700F-24-J1 | GHA700F-30-J1 | GHA700F-48-J1 | GHA700F-56-J1 | | |
|------------------------------------|--|---|-------------------|-------------------|-------------------|-------------------|--------|
| VOLTAGE[VAC] | 85 - 264 1 φ (Refer to "Derating" and Instruction Manual 1.1) | | | | | | |
| CURRENT[A] | ACIN 115V | 7.0typ | | | | | |
| | ACIN 230V | 3.5typ | | | | | |
| FREQUENCY[Hz] | 50 / 60 (45 - 66) | | | | | | |
| EFFICIENCY[%] | ACIN 115V ACIN 230V | 94.0typ (Po=400W) | 94.0typ (Po=400W) | 94.0typ (Po=400W) | 94.0typ (Po=400W) | 94.0typ (Po=400W) | |
| | | 92.5typ (Po=650W) | 93.0typ (Po=700W) | 93.0typ (Po=700W) | 93.0typ (Po=700W) | 93.0typ (Po=700W) | |
| | | 95.5typ (Po=400W) | 96.0typ (Po=400W) | 96.0typ (Po=400W) | 96.0typ (Po=400W) | 96.0typ (Po=400W) | |
| | | 94.5typ (Po=650W) | 95.5typ (Po=700W) | 95.5typ (Po=700W) | 95.5typ (Po=700W) | 95.5typ (Po=700W) | |
| POWER FACTOR (Po=700W) | ACIN 115V | 0.95typ | | | | | |
| | ACIN 230V | 0.90typ | | | | | |
| INRUSH CURRENT[A] | ACIN 115V | 20typ (At rated load) (At cold start) (Ta=25°C) | | | | | |
| | ACIN 230V | 40typ (At rated load) (At cold start) (Ta=25°C) | | | | | |
| EARTH LEAKAGE CURRENT[μA] | 100/200max (ACIN 100/264V 60Hz, At rated load, According to IEC60601-1) | | | | | | |
| TOUCH CURRENT[μA] | 100max (ACIN 264V 60Hz, At rated load, According to IEC60601-1) | | | | | | |
| INPUT | VOLTAGE[VAC] | 12 | 24 | 30 | 48 | 56 | |
| | CURRENT[A] | Forced air | 54.2 | 29.2 | 23.3 | 14.6 | 12.5 |
| | | Convection | 33.4 | 16.7 | 13.4 | 8.4 | 7.2 |
| | | conduction cooling | 33.4 | 16.7 | 13.4 | 8.4 | 7.2 |
| | LINE REGULATION[mV] | *3 | 48max | 96max | 120max | 192max | 192max |
| | LOAD REGULATION[mV] | *3 *8 | 100max | 150max | 180max | 240max | 240max |
| | RIPPLE[mVp-p] | 0 to +50°C | 240max | 300max | 350max | 550max | 600max |
| | | *4 *10 -20°C to +0°C | 320max | 400max | 500max | 700max | 750max |
| | RIPPLE NOISE[mVp-p] | 0 to +50°C | 300max | 400max | 450max | 650max | 700max |
| | | *4 *10 -20°C to +0°C | 360max | 500max | 600max | 800max | 850max |
| TEMPERATURE REGULATION[mV] | 0 to +50°C | 120max | 240max | 300max | 480max | 600max | |
| | -20°C to +50°C | 150max | 290max | 360max | 600max | 720max | |
| DRIFT[mV] | *5 | 48max | 96max | 120max | 192max | 192max | |
| START-UP TIME[ms] | 500typ (ACIN 115V, At rated load) | | | | | | |
| HOLD-UP TIME[ms] | 12typ (ACIN 115V, At rated load) | | | | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 11.40 to 13.20 22.80 to 26.40 28.50 to 33.00 45.60 to 52.80 53.20 to 61.60 | | | | | | |
| OUTPUT VOLTAGE SETTING[V] | 12.00 to 12.48 24.00 to 24.96 30.00 to 31.20 48.00 to 49.92 56.00 to 58.24 | | | | | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating and recovers automatically *6 | | | | | |
| | OVERVOLTAGE PROTECTION[V] | 13.80 to 16.80 | 27.60 to 33.60 | 34.50 to 42.00 | 55.20 to 67.20 | 64.40 to 78.40 | |
| | AUX1 (12V1A) | Optional (Refer to Instruction Manual 6.1) (Excluding GHA700F-12) | | | | | |
| | AUX2 (5V1A) | Optional (Refer to Instruction Manual 6.1) | | | | | |
| | REMOTE ON/OFF | Optional (Refer to Instruction Manual 6.1) | | | | | |
| | POWER GOOD | Optional (Refer to Instruction Manual 6.1) | | | | | |
| ISOLATION | INPUT-OUTPUT · RC · AUX | *7 AC4,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 2MOPP | | | | | |
| | INPUT-FG | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 1MOPP | | | | | |
| | OUTPUT · RC · AUX-FG | *7 AC1,500V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 1MOPP | | | | | |
| | OUTPUT-RC · AUX | *7 AC500V 1minute, Cutoff current=25mA, DC500V 50MΩ min (At Room Temperature) | | | | | |
| ENVIRONMENT | OPERATING TEMP., HUMID. AND ALTITUDE | -20 to +80°C, 20 - 90%RH (Non condensing), 3,000m (10,000feet) max | | | | | |
| | STORAGE TEMP., HUMID. AND ALTITUDE | -30 to +80°C, 20 - 90%RH (Non condensing), 9,000m (30,000feet) max | | | | | |
| | VIBRATION | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60minutes each along X, Y and Z axis | | | | | |
| | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis | | | | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | UL62368-1, ANSI/AAMI ES60601-1, C-UL (equivalent to CAN/CSA-C22.2 No.62368-1, CAN/CSA-C22.2 No.60601-1), EN62368-1, EN60601-1 3rd, Complies with IEC60601-1-2 4th Ed., EN61558-2-16 (OVC III), DEN-AN | | | | | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR32-B, EN55011-B, EN55032-B | | | | | |
| | HARMONIC ATTENUATOR | *8 Complies with IEC61000-3-2 (class A) | | | | | |
| OTHERS | CASE SIZE/WEIGHT | 76.2×38.1×127mm [3×1.5×5] (W×H×D) / 570g max | | | | | |
| | COOLING METHOD | Convection, Forced air (Require external fan), Conduction cooling | | | | | |

- *1 The listed options may affect the published standard specifications. Please contact us for detailed product specification.
- *2 The current of input surge to a built-in EMI/EMS Filter (0.2ms or less) is excluded.
- *3 In the case of dynamic fluctuations, the specifications may not be met.
- *4 This is the value measured on measuring board with capacitor of 22 μ F and 0.1 μ F within 150mm from output terminal. Measured by 20MHz Oscilloscope or Ripple-Noise meter (KEISOKU-GIKEN:RM-104).
- *5 Drift is the change in DC output for an eight hours period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- *6 The output is shut down when the overcurrent protection continues.

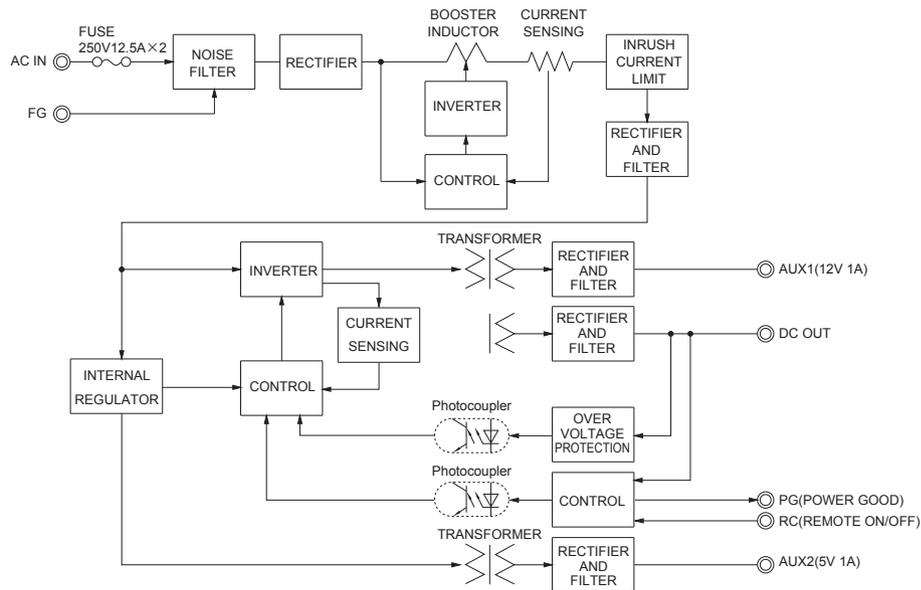
- *7 Applicable when AUX and remote control (optional) is added.
- *8 Please contact us about another class.
- *9 The value at Ta=20°C to +50°C.
- *10 The value at rated load.
- * To meet the specifications. Do not operate over-loaded condition.
- * Parallel operation is not possible.
- * Sound noise may be generated by power supply in case of pulse load.
- * Forced air cooling is required to output up to MAX OUTPUT WATTAGE.

Features

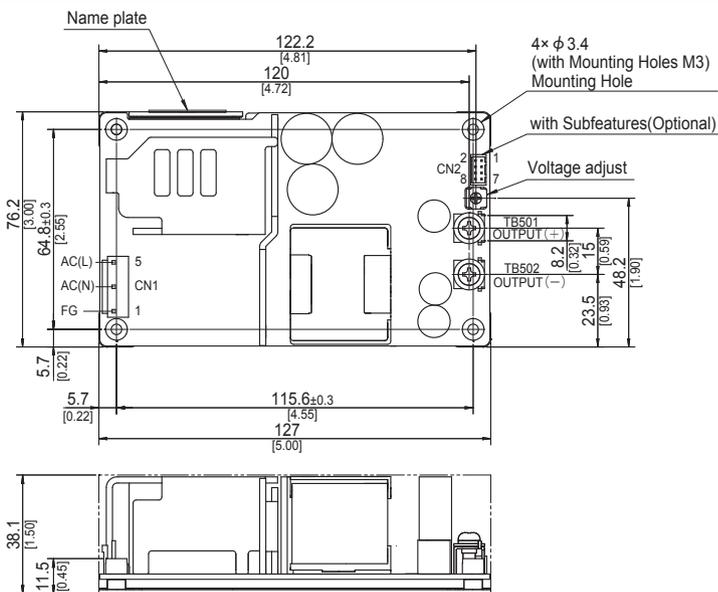
- **Wattage 700W max**
- **High efficiency 96% typ (Input Voltage 230V, Output Voltage 24V)**
- **3" X 5" standard footprint**
- **Industrial and Medical safety approvals (Suitable for BF application)**
- **With Remote On/Off (Optional)**
- **Isolated dual AUX (AUX1 12V 1A, AUX2 5V 1A) (Optional)**

- **High Power density: 31.1W/inch³**
- **Conduction cooling**
- **Fits 1U applications**
- **Low leakage current**
- **Complies with EN61558-2-16 (OVC III)**
- **Conformal coating (Optional)**

Block diagram



External view



- ※ Tolerance ± 1 [± 0.04]
- ※ Weight : 570g max
- ※ PCB Material / thickness : FR-4 / 1.7mm [0.07]
- ※ Chassis Material : Aluminum
- ※ Dimensions in mm, []=inches
- ※ Screw tightening torque : (TB501, 502) : M4 1.5N · m max
- ※ Mounting torque : M3 0.6N · m max
- ※ Avoid contact between TB501 and 502 wiring with mounting parts.
- ※ The locations of the output capacitor depend on the model.

| Connector | Mating connector | Terminal | Mfr |
|-----------|------------------|----------------------------------|--------|
| CN1 | B3P5-VH | SVH-21T-P1.1 SVH-41T-P1.1 | J.S.T. |
| CN2 * | B8B-PHDSS | SPHD-001T-P0.5 SPHD-002T-P0.5 | |

* Option: R3 or U1

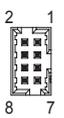
<CN1>

| Pin No. | Input |
|---------|-------|
| 1 | FG |
| 2 | |
| 3 | AC(N) |
| 4 | |
| 3 | AC(L) |

* Pin No.2 and 4 is NC at CN1.

<CN2 (Option: R3)>

| Pin No. | Function |
|---------|---------------------------|
| 1 | AUX1 : AUX1 (12V1A) *1 |
| 2 | AUX1G: AUX1 (GND) *1 |
| 3 | RC : REMOTE ON/OFF |
| 4 | RCG : REMOTE ON/OFF (GND) |
| 5 | PG : Power good |
| 6 | PGG : Power good (GND) |
| 7 | AUX2 : AUX2 (5V1A) |
| 8 | AUX2G: AUX2 (GND) |



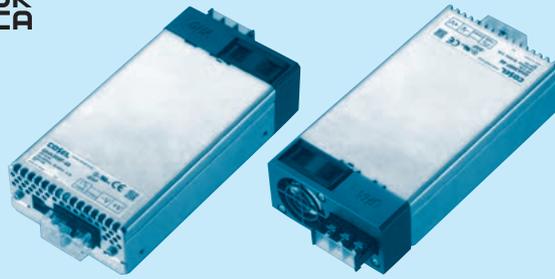
CN2

* Please refer to instruction manual for the pin assignments of the option U1.

* 1 In case of GHA700F-12, N.C.

GHA300F-SNF

GH A 300 F -□□ -SNF□
 ① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
EAC-10-472



High voltage pulse noise type : EAP series
 Low leakage current type : EAM series
 *A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
 - ② Single output
 - ③ Output wattage
 - ④ Universal input
 - ⑤ Output voltage
 - ⑥ Optional *6
 - J1 : CN501
PHconnector type(J.S.T.)
 - J2 : CN501
Friction locks connector type (Molex)
- Refer to the instruction manual 6.1.

*Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| MODEL | GHA300F-12-SNF | GHA300F-24-SNF | GHA300F-48-SNF |
|-----------------------|-------------------------------|----------------|----------------|
| MAX OUTPUT WATTAGE[W] | 300 | 300 | 302.4 |
| DC OUTPUT | Forced air +50°C 12V 25.0A | 24V 12.5A | 48V 6.3A |

SPECIFICATIONS

| | MODEL | GHA300F-12-SNF | GHA300F-24-SNF | GHA300F-48-SNF | |
|-------------------------------|---|--|----------------|----------------|--------|
| INPUT | VOLTAGE[V] | AC90 - 264 1 φ (output derating is required at AC90V -115V *3) | | | |
| | CURRENT[A] | ACIN 120V | 3.3typ | | |
| | | ACIN 230V | 1.8typ | | |
| | FREQUENCY[Hz] | 50 / 60 (47 - 63) | | | |
| | EFFICIENCY[%] | ACIN 120V | 88typ | 89typ | 89typ |
| | | ACIN 230V | 90typ | 91typ | 91typ |
| | POWER FACTOR (Io=100%) | ACIN 120V | 0.95typ | | |
| | | ACIN 230V | 0.90typ | | |
| INRUSH CURRENT[A] | ACIN 120V | 20typ (Io=100%) (At cold start) (Ta=25°C) | | | |
| | ACIN 230V | 40typ (Io=100%) (At cold start) (Ta=25°C) | | | |
| LEAKAGE CURRENT[mA] | 0.125/0.250max (ACIN 120V/240V 60Hz,Io=100%, According to IEC60601-1) | | | | |
| OUTPUT | VOLTAGE[V] | 12 | 24 | 48 | |
| | CURRENT[A] | Forced air 25.0 | 12.5 | 6.3 | |
| | LINE REGULATION[mV] | *4 48max | 96max | 192max | |
| | LOAD REGULATION[mV] | *4 100max | 150max | 240max | |
| | RIPPLE[mVp-p] *1 | 0 to +50°C | 240max | 240max | 300max |
| | | -20 - 0°C | 320max | 320max | 400max |
| | RIPPLE NOISE[mVp-p]*1 | 0 to +50°C | 300max | 300max | 480max |
| | | -20 - 0°C | 360max | 360max | 500max |
| | TEMPERATURE REGULATION[mV] | 0 to +50°C | 120max | 240max | 480max |
| | | -20 to +50°C | 150max | 290max | 600max |
| | DRIFT[mV] | *2 48max | 96max | 192max | |
| | START-UP TIME[ms] | 500typ (ACIN 120V, Io=100%) | | | |
| | HOLD-UP TIME[ms] | 16typ (ACIN 120V, Io=100%) | | | |
| | OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20 | 21.60 to 26.40 | 43.20 to 52.80 | |
| OUTPUT VOLTAGE SETTING[V] | 12.00 to 12.48 | 24.00 to 24.96 | 48.00 to 49.92 | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating and recovers automatically *7 | | | |
| | OVERVOLTAGE PROTECTION[V] | 13.80 to 16.80 | 27.60 to 33.60 | 55.20 to 67.20 | |
| | AUX1 | 10V 0.5A | | | |
| | AUX2 | 5V 1A | | | |
| | REMOTE ON/OFF | Possible, AUX2 is available | | | |
| | PowerGood | Open collector | | | |
| ISOLATION | INPUT-OUTPUT · RC · AUX | AC4,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 2MOPP | | | |
| | INPUT-FG | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 1MOPP | | | |
| | OUTPUT · RC · AUX-FG | AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | |
| | OUTPUT-RC · AUX | AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | |
| ENVIRONMENT | OPERATING TEMP.,HUMID.AND ALTITUDE | -20 to +70°C, 20 - 90%RH (Non condensing), 3,000m (10,000feet) max *3 | | | |
| | STORAGE TEMP.,HUMID.AND ALTITUDE | -30 to +75°C, 20 - 90%RH (Non condensing), 9,000m (30,000feet) max | | | |
| | VIBRATION | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60minutes each along X, Y and Z axis | | | |
| | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis | | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | UL60950-1, ANSI/AAMI ES60601-1, C-UL(CSA60950-1, CAN/CSA60601-1), EN62368-1, EN60601-1 3rd, Complies with DEN-AN, IEC60601-1-2 4th Ed. | | | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR11-B, CISPR22-B, EN55011-B, EN55022-B | | | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (class A) *5 | | | |
| OTHERS | CASE SIZE/WEIGHT | 85.2 X 41 X 165.3mm [3.35 X 1.61 X 6.5 inches] (W X H X D) / 620g max | | | |
| | COOLING METHOD | Forced air | | | |

*1 This is the value that measured on measuring board with capacitor of 22 μF at 150mm from output terminal.

Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103).

*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

*3 Refer to "Derating".

*4 Please contact us about dynamic load and input response.

*5 Please contact us about another class.

*6 Specification is changed at option, refer to Instruction Manual.

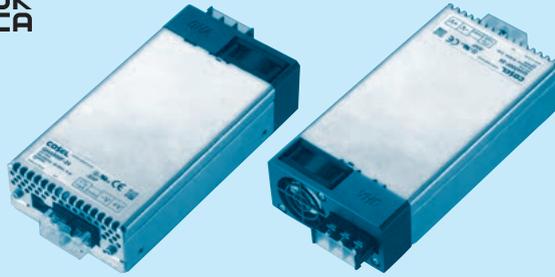
*7 When output current more than rated, output will shut down after 5 seconds or more. Recycle input after 3 minutes to reset the protection.

* To meet the specifications. Do not operate over-loaded condition.

* Sound noise may be generated by power supply in case of pulse load.

GHA500F-SNF

GH A 500 F -□□ -SNF□
 ① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
EAC-10-472



High voltage pulse noise type : EAP series
 Low leakage current type : EAM series
 * A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
 - ② Single output
 - ③ Output wattage
 - ④ Universal input
 - ⑤ Output voltage
 - ⑥ Optional *6
- J1 : CN501
 PHconnector type(J.S.T.)
 J2 : CN501
 Friction locks connector type (Molex)
 P : Parallel Operation
- Refer to the instruction manual 6.1.

*Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| MODEL | GHA500F-12-SNF | GHA500F-15-SNF | GHA500F-24-SNF | GHA500F-30-SNF | GHA500F-48-SNF | GHA500F-56-SNF | |
|-----------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------|
| MAX OUTPUT WATTAGE[W] | 450 | 501 | 504 | 501 | 504 | 504 | |
| DC OUTPUT | Forced air +50°C | 12V 37.5A | 15V 33.4A | 24V 21.0A | 30V 16.7A | 48V 10.5A | 56V 9.0A |

SPECIFICATIONS

| | MODEL | GHA500F-12-SNF | GHA500F-15-SNF | GHA500F-24-SNF | GHA500F-30-SNF | GHA500F-48-SNF | GHA500F-56-SNF | | | | | |
|------------------------------------|---|--|----------------|----------------|----------------|----------------|----------------|--------|----------------|--|----------------|--|
| INPUT | VOLTAGE[V] | AC90 - 264 1 φ (output derating is required at AC90V -115V *3) | | | | | | | | | | |
| | CURRENT[A] | ACIN 120V | 4.8typ | 5.4typ | | | | | | | | |
| | | ACIN 230V | 2.6typ | 2.9typ | | | | | | | | |
| | FREQUENCY[Hz] | 50 / 60 (47 - 63) | | | | | | | | | | |
| | EFFICIENCY[%] | ACIN 120V | 87typ | 89typ | 89typ | 89typ | 89typ | 89typ | | | | |
| | | ACIN 230V | 89typ | 91typ | 91typ | 91typ | 91typ | 91typ | | | | |
| | POWER FACTOR (Io=100%) | ACIN 120V | 0.95typ | | | | | | | | | |
| | | ACIN 230V | 0.90typ | | | | | | | | | |
| INRUSH CURRENT[A] | ACIN 120V | 20typ (Io=100%) (At cold start) (Ta=25°C) | | | | | | | | | | |
| | ACIN 230V | 40typ (Io=100%) (At cold start) (Ta=25°C) | | | | | | | | | | |
| LEAKAGE CURRENT[mA] | 0.125/0.250max (ACIN 120V/240V 60Hz,Io=100%, According to IEC60601-1) | | | | | | | | | | | |
| OUTPUT | VOLTAGE[V] | 12 | 15 | 24 | 30 | 48 | 56 | | | | | |
| | CURRENT[A] | Forced air | 37.5 | 33.4 | 21.0 | 16.7 | 10.5 | 9.0 | | | | |
| | LINE REGULATION[mV] | *4 | 48max | 60max | 96max | 120max | 192max | 192max | | | | |
| | LOAD REGULATION[mV] | *4 | 100max | 120max | 150max | 180max | 240max | 240max | | | | |
| | RIPPLE[mVp-p] *1 | 0 to +50°C | 240max | 240max | 240max | 300max | 300max | 400max | | | | |
| | | -20 - 0°C | 320max | 320max | 320max | 400max | 400max | 500max | | | | |
| | RIPPLE NOISE[mVp-p]*1 | 0 to +50°C | 300max | 300max | 300max | 480max | 480max | 500max | | | | |
| | | -20 - 0°C | 360max | 360max | 360max | 500max | 500max | 580max | | | | |
| | TEMPERATURE REGULATION[mV] | 0 to +50°C | 120max | 150max | 240max | 300max | 480max | 480max | | | | |
| | | -20 to +50°C | 150max | 180max | 290max | 360max | 600max | 600max | | | | |
| | DRIFT[mV] | *2 | 48max | 60max | 96max | 120max | 192max | 192max | | | | |
| | START-UP TIME[ms] | 500typ (ACIN 120V, Io=100%) | | | | | | | | | | |
| | HOLD-UP TIME[ms] | 16typ (ACIN 120V, Io=100%) | | | | | | | | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20 | | 13.50 to 16.50 | | 21.60 to 26.40 | | 27.00 to 31.50 | | 43.20 to 52.80 | | 52.00 to 56.00 | |
| OUTPUT VOLTAGE SETTING[V] | 12.00 to 12.48 | | 15.00 to 15.30 | | 24.00 to 24.96 | | 30.00 to 31.20 | | 48.00 to 49.92 | | 55.00 to 56.00 | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating and recovers automatically *7 | | | | | | | | | | |
| | OVERVOLTAGE PROTECTION[V] | 13.80 to 16.80 | 17.25 to 21.00 | 27.60 to 33.60 | 34.50 to 42.00 | 55.20 to 67.20 | 60.00 to 69.00 | | | | | |
| | AUX1 | 12V 0.5A | | | | | | | | | | |
| | AUX2 | 5V 1A | | | | | | | | | | |
| | REMOTE ON/OFF | Possible, AUX2 is available | | | | | | | | | | |
| | PowerGood | Open collector | | | | | | | | | | |
| ISOLATION | INPUT-OUTPUT · RC · AUX | AC4,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 2MOPP | | | | | | | | | | |
| | INPUT-FG | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) 1MOPP | | | | | | | | | | |
| | OUTPUT · RC · AUX-FG | AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | | | | | | | | |
| | OUTPUT-RC · AUX | AC500V 1minute, Cutoff current = 25mA, DC500V 50MΩ min (At Room Temperature) | | | | | | | | | | |
| ENVIRONMENT | OPERATING TEMP.,HUMID.AND ALTITUDE | -20 to +70°C, 20 - 90%RH (Non condensing), 3,000m (10,000feet) max *3 | | | | | | | | | | |
| | STORAGE TEMP.,HUMID.AND ALTITUDE | -30 to +80°C, 20 - 90%RH (Non condensing), 9,000m (30,000feet) max | | | | | | | | | | |
| | VIBRATION | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60minutes each along X, Y and Z axis | | | | | | | | | | |
| | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis | | | | | | | | | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | UL60950-1, ANSI/AAMI ES60601-1, C-UL(CSA60950-1, CAN/CSA60601-1), EN62368-1, EN60601-1 3rd, Complies with DEN-AN, IEC60601-1-2 4th Ed. | | | | | | | | | | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR11-B, CISPR22-B, EN55011-B, EN55022-B | | | | | | | | | | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (class A) *5 | | | | | | | | | | |
| OTHERS | CASE SIZE/WEIGHT | 85.2 X 41 X 165.3mm [3.35 X 1.61 X 6.5 inches] (W X H X D) / 660g max | | | | | | | | | | |
| | COOLING METHOD | Forced air | | | | | | | | | | |

*1 This is the value that measured on measuring board with capacitor of 22 μF at 150mm from output terminal.

Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103).

*2 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

*3 Refer to "Derating".

*4 Please contact us about dynamic load and input response.

*5 Please contact us about another class.

*6 Specification is changed at option, refer to Instruction Manual.

*7 When output current more than rated, output will shut down after 5 seconds or more. Recycle input after 3 minutes to reset the protection.

* To meet the specifications. Do not operate over-loaded condition.

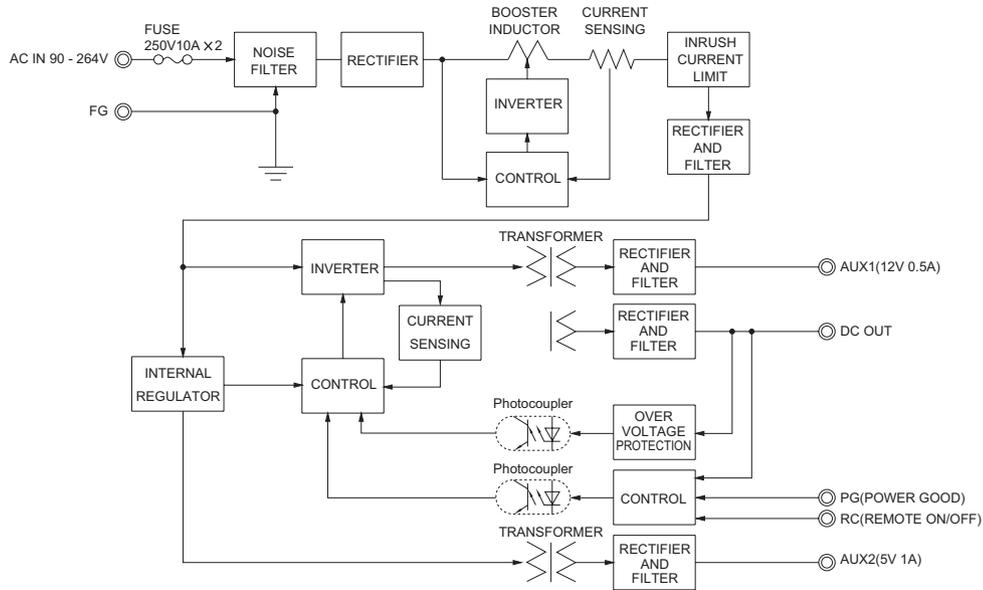
* Sound noise may be generated by power supply in case of pulse load.

* Parallel operation is available with -P option. Refer to 5.1on the instruction manual.

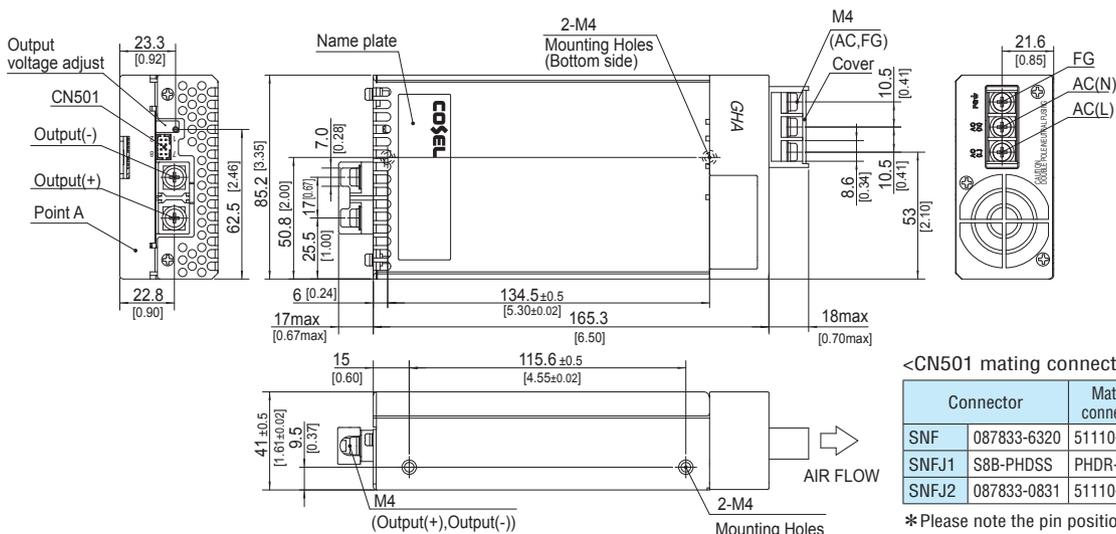
Features

- Full packaged design united with GHA's features, and additional robustness..
- High efficiency 91% typ (Input voltage 230V,Output voltage 24V)
- 50% minimized size compares with previous products.
- Optical for 1U applications
- Medical and Industrial safety approvals
- Low leakage current
- Conformal coating
- Single remote ON/OFF control for DC output, AUX1 and Fan.
- Isolated dual AUX (AUX1 12V 0.5A, AUX2 5V 1A)

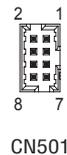
Block diagram



External view



- ※ Tolerance ± 1 [±0.04]
- ※ Weight : 660g max
- ※ Upper PCB Material/thickness : FR-4/1.6mm
- ※ Lower PCB Material/thickness : AL/1.5mm
- ※ Chassis Material/thickness : Aluminum/1.5mm
- ※ Cover Material/thickness : Aluminum/1.2mm
- ※ Fan cover Material : PBT
- ※ Mounting torque : 1.5N · m (14.7kgf · cm) max
- ※ Screw tightening torque M4 : 1.6N · m (16.9kgf · cm) max
- ※ Dimensions in mm, []=inches



<CN501 mating connector and terminal>

| Connector | Mating connector | Terminal | Mfr | |
|-----------|------------------|------------|----------------|---------|
| SNF | 087833-6320 | 51110-0851 | 50394-8051 | Molex * |
| SNFJ1 | S8B-PHDSS | PHDR-08VS | SPHD-002T-P0.5 | J.S.T. |
| SNFJ2 | 087833-0831 | 51110-0860 | 50394-8051 | Molex * |

* Please note the pin position No.1 is different from Molex.

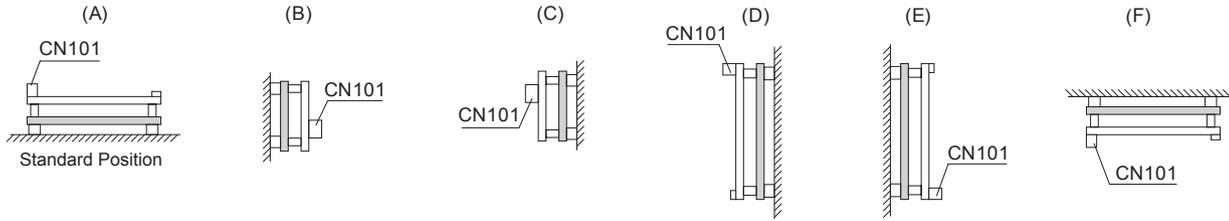
<CN501>

| Pin No. | Function |
|---------|---------------------------|
| 1 | AUX1 : AUX1 (12V0.5A) |
| 2 | AUX1G : AUX1 (GND) |
| 3 | RC : REMOTE ON/OFF |
| 4 | RCG : REMOTE ON/OFF (GND) |
| 5 | PG : Power good |
| 6 | PGG : Power good (GND) |
| 7 | AUX2 : AUX2 (5V1A) |
| 8 | AUX2G : AUX2 (GND) |

Assembling and Installation Method

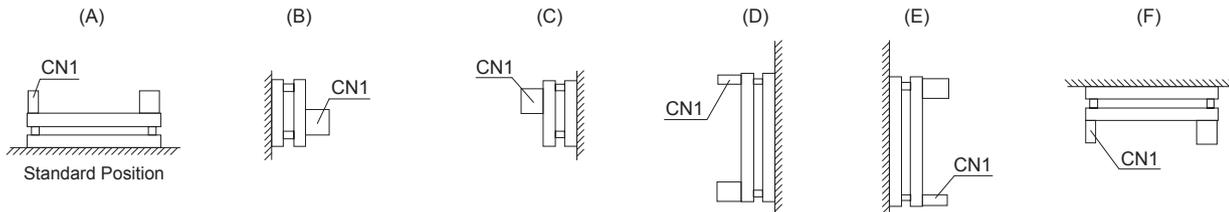
GHA300/500F

Mounting method



GHA700F

Mounting method



AC voltage exist on the primary side therefore. In order to prevent electric shock, or to meet the leakage current requirements of the safety standard, you need to ensure the proper insulation distance.

During use, keep the distance between d1 & d2 for to insulate between lead of component and metal chassis, use the spacer of 5mm or more between d2. If it is less than d1 & d2, insert the insulation sheet between power supply and metal chassis.

Conduction cooling, forced air and convection cooling are available (GHA500/700F).

When using conduction cooling, unless the baseplate and the heat sink are placed in close contact with each other, contact thermal resistance will increase until heat dissipation becomes insufficient.

Always use either thermal greaser or a thermal sheet.

If processing thermal grease, apply it thinly and evenly.

Also, when processing the thermal sheet, make a hole according to the position of the screw.

If the four corners are cut as shown in the figure below, stress may be applied to the edges of the base plate during fixing, which may damage the built-in parts, so avoid such processing.

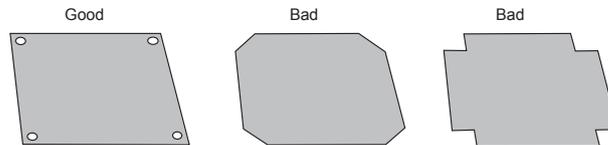
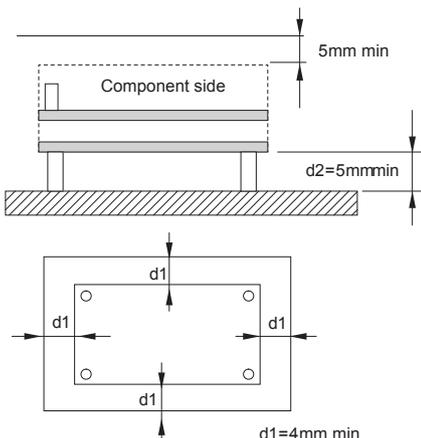
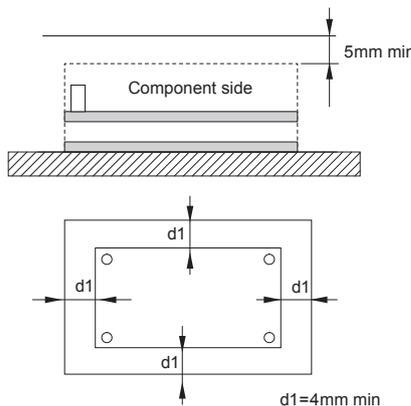


Image of using thermal sheet and precautions when processing

GHA300F

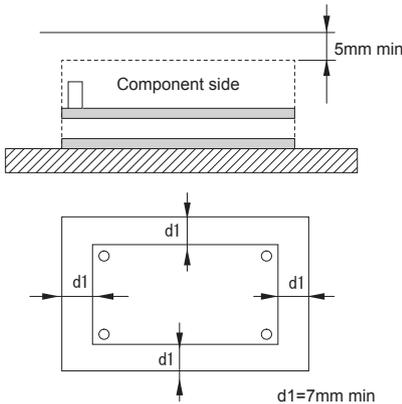


GHA500F



Assembling and Installation Method

GHA700F



Remarks:

There is a possibility that it is not possible to cool enough when the power supply is used by the sealing up space as showing in right figure.

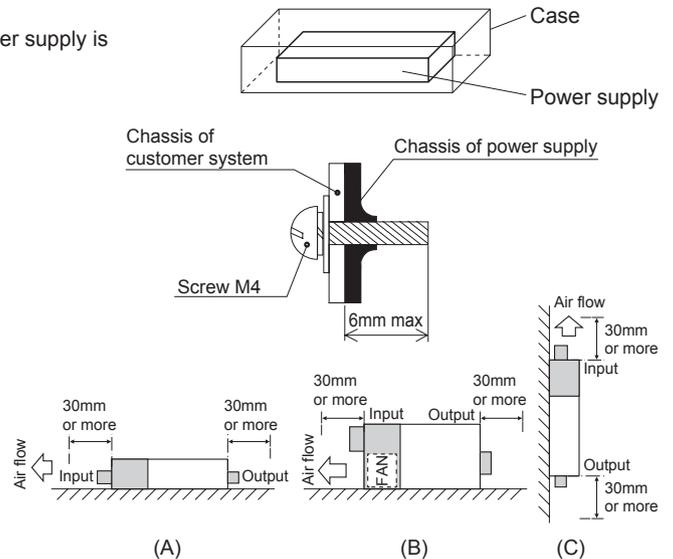
GHA300/500F-SNF

Mounting screw

Screw length into power supply should be shorter than 6mm due to keep safety isolation clearance from inside components in right figure. Please fix power supply surely by screws in consideration of the weight.

A cooling FAN is built-in. Please keep 30mm or more clearance both input and output side to make enough air ventilation. Do not block off cooling FAN's air flow for stable operation.

When power supply is used where dust exist, it may cause of FAN failure. It is recommended to install a air filter to the system air ventilation duct.



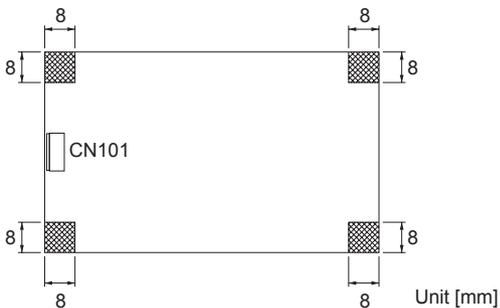
Mounting screw

The mounting screw should be M3. The hatched area shows the allowance of metal parts for mounting.

If metallic fittings are used on the component side of the board, ensure there is no contact with surface mounted components.

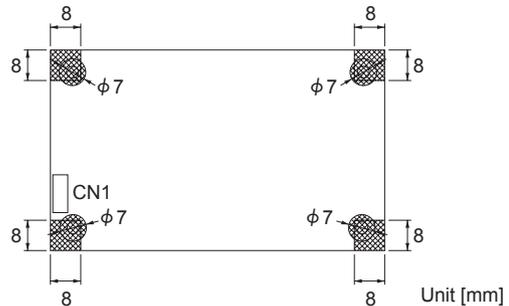
This product uses SMD technology. Please avoid the PCB installation method which includes the twisting stress or the bending stress.

GHA300/500F



GHA700F

*The center of $\phi 7$ mm is the same point as the center of the mounting hole.

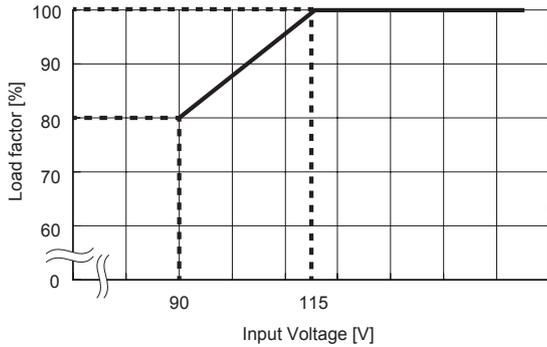


Derating

■ Cooling method

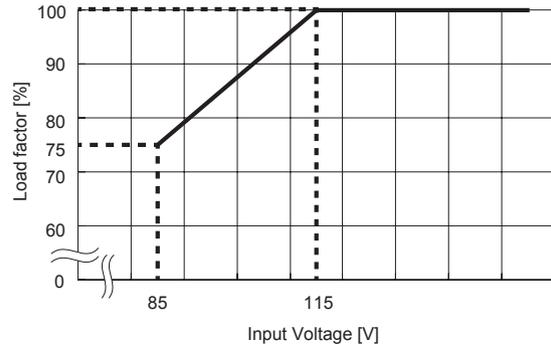
Conduction cooling, forced air and convection cooling are available for GHA500F and GHA700F. Both Forced air and convection cooling are available for GHA300F. Please see instruction manual 3 for details. Please make sure the maximum component temperature rise given in instruction manual 3 is not exceeded.

● GHA300/500F



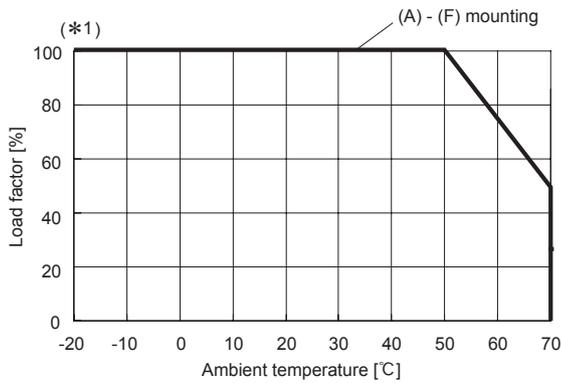
*For maximum power in each cooling method, please apply.

● GHA700F



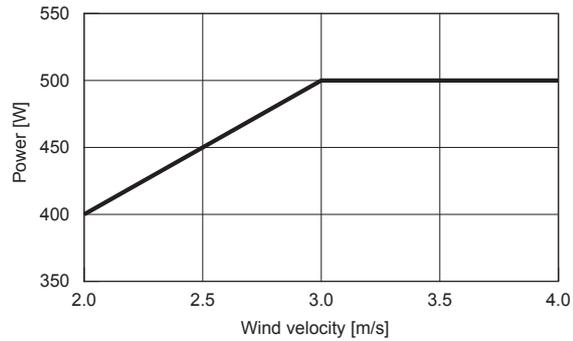
*For maximum power in each cooling method, please apply.

● GHA500F Ambient temperature derating curve at forced air (Reference value)

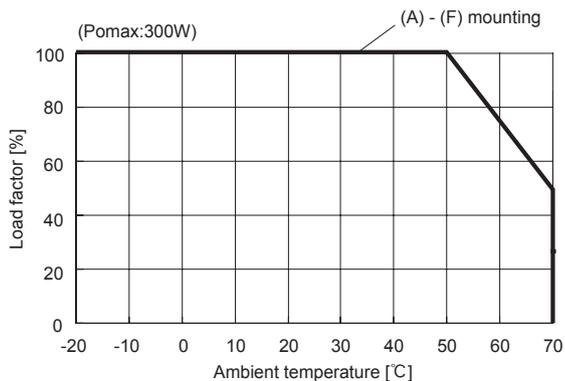


*For the derating curves of other heat dissipation methods, see instruction manual 3.

*1 The maximum output power by wind speed conditions (Reference value)

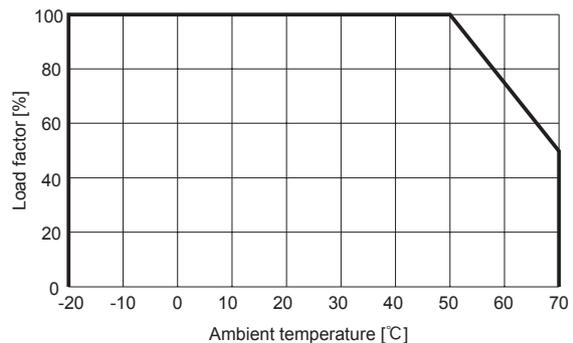


● GHA300F Ambient temperature derating curve at forced air (Reference value)



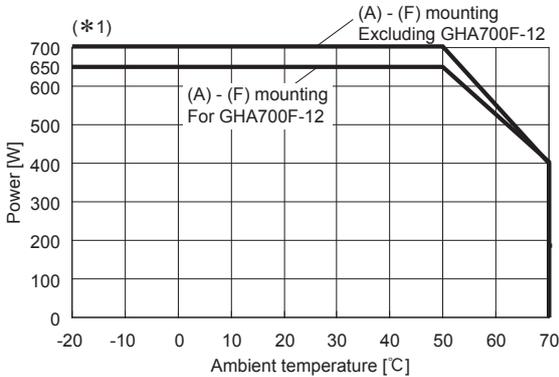
*For the derating curves of other heat dissipation methods, see instruction manual 3.

● GHA300/500F-SNF Ambient temperature derating curve (Reference value)

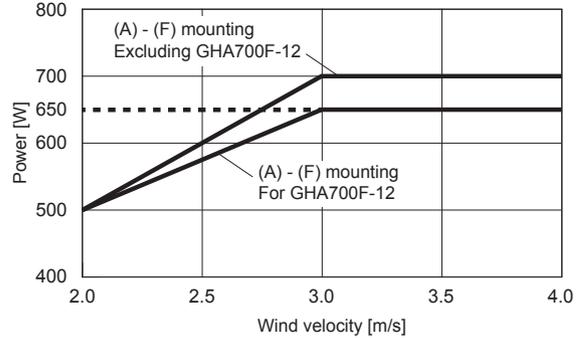


Derating

GHA700F Ambient temperature derating curve at forced air (Reference value)



* 1 The maximum output power by wind speed conditions (Reference value)



*For the derating curves of other heat dissipation methods, see instruction manual 3.

Instruction Manual

◆ It is necessary to read the "Instruction Manual" and "Before using our product" before you use our product.

Basic Characteristics Data

| Model | Circuit method | Switching frequency [kHz] | Input current * 1 [A] | Inrush current protection | PCB/Pattern | | | Series/Parallel operation availability | |
|-------------|-------------------------|---------------------------|-----------------------|---------------------------|---------------|--------------|--------------|--|--------------------|
| | | | | | Material | Single sided | Double sided | Series operation | Parallel operation |
| GHA300F | boost chopper | 60 - 220 | 3.3 | Thermistor | FR-4 | — | Yes | Yes | No |
| | LLC resonant converters | 90 - 180 | | | | | | | |
| GHA500F | boost chopper | 60 - 220 | 5.4 | Thermistor | Aluminum/FR-4 | Yes | Yes | Yes | * 2 |
| | LLC resonant converters | 90 - 180 | | | | | | | |
| GHA700F | boost chopper | 55 - 75 | 6.3 | Thermistor | FR-4 | — | Yes | Yes | No |
| | LLC resonant converters | 45 - 370 | | | | | | | |
| GHA300F-SNF | boost chopper | 60 - 220 | 3.3 | Thermistor | FR-4 | Yes | Yes | Yes | No |
| | LLC resonant converters | 90 - 180 | | | | | | | |
| GHA500F-SNF | boost chopper | 60 - 220 | 5.4 | Thermistor | Aluminum/FR-4 | Yes | Yes | Yes | * 2 |
| | LLC resonant converters | 90 - 180 | | | | | | | |

* 1 The value of input current is at ACIN 120V and rated load.

* 2 Parallel operation is available with -P option. Refer to 6.1 on the instruction manual.