



Medical  
electric  
equipment



Power  
Factor  
Correction



World wide



Low Profile



Safety  
Approvals



Inrush  
current  
limiting



Isolated



OCP



OVP

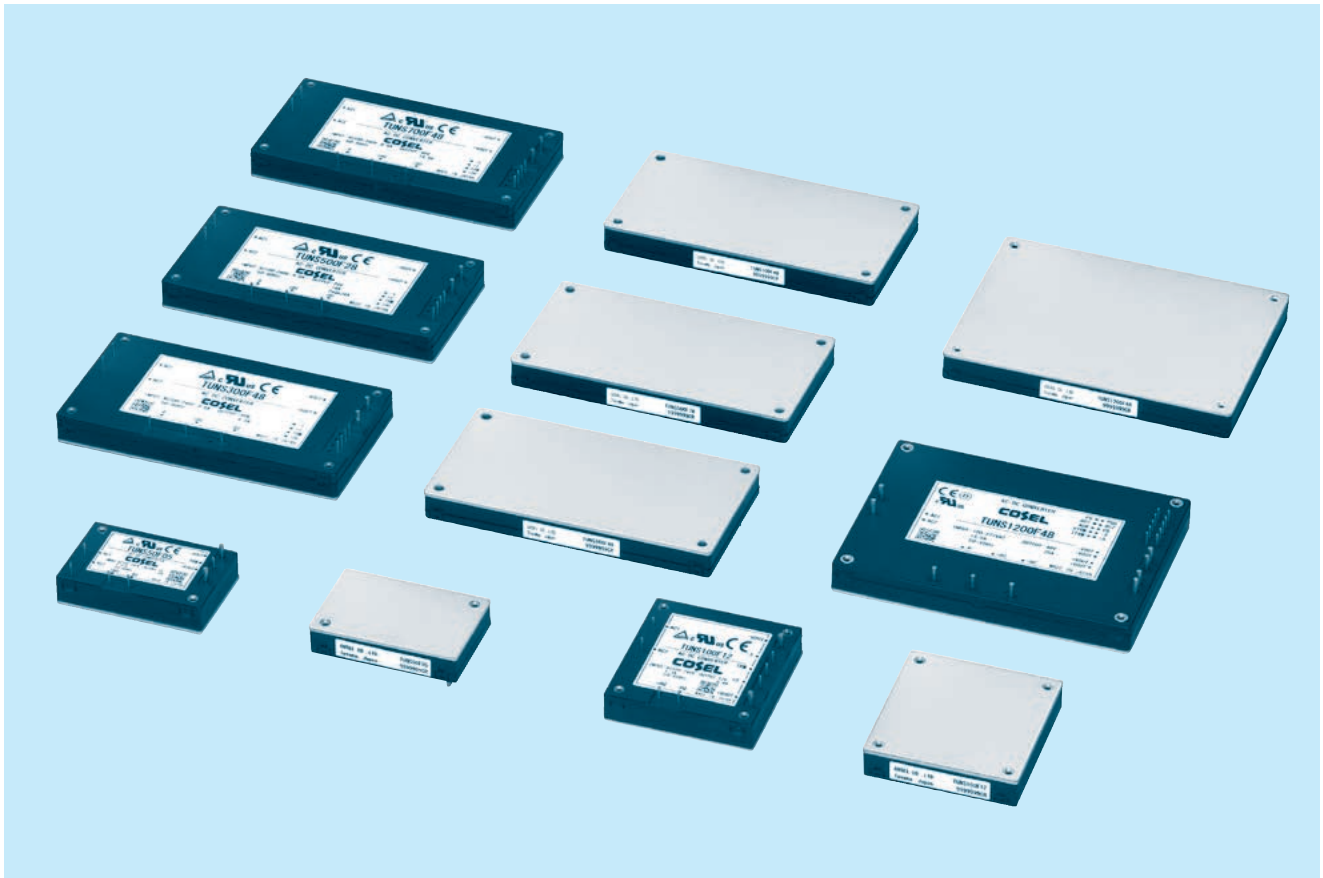


Remote  
ON/OFF



Parallel  
Operation

# TUNS-series



## Feature

AC-DC Power Module Type Converter  
Harmonic attenuator (Complies with IEC61000-3-2 class A)  
Thin and small size  
Built-in overcurrent, overvoltage and thermal protection circuits  
Mounting hole (M3 tapped)

<TUNS50F/100F/300F/500F/700F>

Universal input 85 - 264VAC

Peak current (TUNS500F)

<TUNS1200F>

Wide input 85 - 305VAC

For medical electric equipment

Constant current regulation

Output voltage can be varied to near 0V

Parallel operation possible

## CE marking

Low voltage directive

RoHS Directive

## UKCA marking

Electrical Equipment Safety Regulations

RoHS Regulations

## Safety Approval

UL60950-1, C-UL, EN62368-1

(TUNS50F/100F/300F/500F/700F)

UL62368-1, C-UL, EN62368-1 (TUNS1200F)

ANSI/AAMI ES60601-1, EN60601-1 3rd (TUNS1200F)

## 5-year warranty

## Optional parts

Heat sink

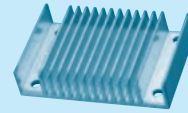
# TUNS50F

TUN S 50 F 05 -□

① ② ③ ④ ⑤ ⑥



\* Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal Input
- ⑤ Output voltage
- ⑥ Optional
- T : with Mounting hole (φ 3.4 thru)

\* Avoid short circuit between +BC and -BC. It may cause the failure of inside components.  
\* Keep TRM open, if output voltage adjustment is not necessary.

| MODEL                 | TUNS50F05 | TUNS50F12 | TUNS50F24 |
|-----------------------|-----------|-----------|-----------|
| MAX OUTPUT WATTAGE[W] | 50.0      | 50.4      | 50.4      |
| DC OUTPUT             | 5V 10A    | 12V 4.2A  | 24V 2.1A  |

## SPECIFICATIONS

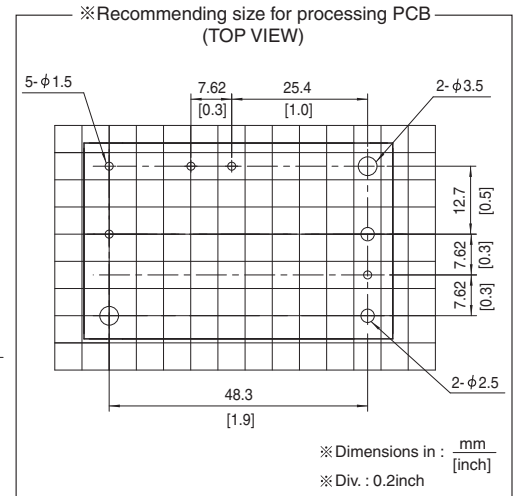
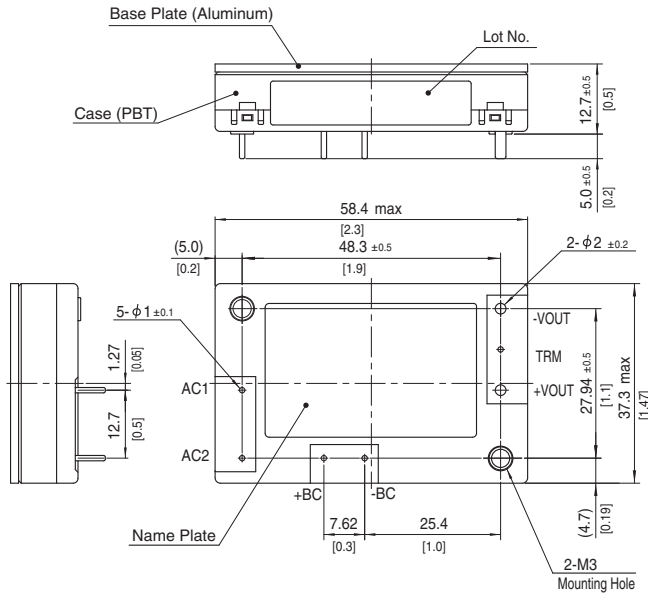
|                               | MODEL                              |                                                            | TUNS50F05                                                                                                          | TUNS50F12     | TUNS50F24     |
|-------------------------------|------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------|---------------|
| INPUT                         | VOLTAGE[V]                         |                                                            | AC85 - 264 1 φ (Refer to “Derating”)                                                                               |               |               |
|                               | CURRENT[A]                         | ACIN 100V                                                  | 0.67typ (Io=100%)                                                                                                  |               |               |
|                               |                                    | ACIN 200V                                                  | 0.35typ (Io=100%)                                                                                                  |               |               |
|                               | FREQUENCY[Hz]                      |                                                            | 50/60 (47 - 63)                                                                                                    |               |               |
|                               | EFFICIENCY[%]                      | ACIN 100V                                                  | 79typ                                                                                                              | 83typ         | 84typ         |
|                               |                                    | ACIN 200V                                                  | 81typ                                                                                                              | 84typ         | 86typ         |
|                               | POWER FACTOR (Io=100%)             | ACIN 100V                                                  | 0.95typ                                                                                                            |               |               |
|                               |                                    | ACIN 200V                                                  | 0.90typ                                                                                                            |               |               |
| INRUSH CURRENT                |                                    | Limited by external components (Thermistor)                |                                                                                                                    |               |               |
| LEAKAGE CURRENT[ma]           |                                    | 0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1) |                                                                                                                    |               |               |
| OUTPUT                        | VOLTAGE[V]                         |                                                            | 5                                                                                                                  | 12            | 24            |
|                               | CURRENT[A]                         |                                                            | 10                                                                                                                 | 4.2           | 2.1           |
|                               | LINE REGULATION[mV]                |                                                            | 10max                                                                                                              | 24max         | 48max         |
|                               | LOAD REGULATION[mV]                |                                                            | 10max                                                                                                              | 24max         | 48max         |
|                               | RIPPLE[mVp-p]                      | 0 to +100℃ *1                                              | 80max                                                                                                              | 120max        | 120max        |
|                               |                                    | -40 to 0℃ *1                                               | 120max                                                                                                             | 150max        | 150max        |
|                               |                                    | 0 to 15% Load *1                                           | 200max                                                                                                             | 280max        | 380max        |
|                               | RIPPLE NOISE[mVp-p]                | 0 to +100℃ *1                                              | 120max                                                                                                             | 150max        | 150max        |
|                               |                                    | -40 to 0℃ *1                                               | 200max                                                                                                             | 200max        | 250max        |
|                               |                                    | 0 to 15% Load *1                                           | 280max                                                                                                             | 360max        | 460max        |
|                               | TEMPERATURE REGULATION[mV]         | 0 to +65℃                                                  | 50max                                                                                                              | 120max        | 240max        |
|                               |                                    | -40 to +100℃                                               | 100max                                                                                                             | 240max        | 480max        |
|                               | DRIFT[mV]                          |                                                            | *2                                                                                                                 | 20max         | 90max         |
|                               | OUTPUT VOLTAGE ADJUSTMENT RANGE[V] |                                                            | Fixed (TRM pin open), adjustable by external resistor or external signal                                           |               |               |
|                               |                                    | 4.50 - 6.00                                                | 10.80 - 13.20                                                                                                      | 21.60 - 26.40 |               |
| OUTPUT VOLTAGE SETTING[V]     |                                    | 4.97 - 5.13                                                | 11.91 - 12.29                                                                                                      | 23.62 - 24.38 |               |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION             |                                                            | Works over 105% of rating and recovers automatically                                                               |               |               |
|                               | OVERVOLTAGE PROTECTION[V]          |                                                            | 6.30 - 7.00                                                                                                        | 13.90 - 16.35 | 27.60 - 32.40 |
|                               | REMOTE SENSING                     |                                                            | Not provided                                                                                                       |               |               |
|                               | REMOTE ON/OFF                      |                                                            | Not provided                                                                                                       |               |               |
| ISOLATION                     | INPUT-OUTPUT                       |                                                            | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃)                                                  |               |               |
|                               | INPUT-FG                           |                                                            | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃)                                                  |               |               |
|                               | OUTPUT-FG                          |                                                            | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15℃)                                                   |               |               |
| ENVIRONMENT                   | OPERATING TEMP.,HUMID.AND ALTITUDE |                                                            | -40 to +100℃ (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to “Derating”), 3,000m (10,000 feet) max |               |               |
|                               | STORAGE TEMP.,HUMID.AND ALTITUDE   |                                                            | -40 to +100℃, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max                                                |               |               |
|                               | VIBRATION                          |                                                            | 10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis                                    |               |               |
|                               | IMPACT                             |                                                            | 196.1m/s² (20G), 11ms, once each along X, Y and Z axis                                                             |               |               |
| SAFETY AND NOISE REGULATIONS  | AGENCY APPROVALS                   |                                                            | UL60950-1, C-UL (CSA60950-1), EN62368-1                                                                            |               |               |
|                               | HARMONIC ATTENUATOR                |                                                            | Complies with IEC61000-3-2 (Class A) *3                                                                            |               |               |
| OTHERS                        | CASE SIZE/WEIGHT                   |                                                            | 58.4 X 12.7 X 37.3mm [2.3 X 0.5 X 1.47 inches] (W X H X D) / 80g max                                               |               |               |
|                               | COOLING METHOD                     |                                                            | Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)                    |               |               |

\*1 Refer to instruction manual for measuring method of electric characteristics.

\*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 Please contact us about another class.

## External view



※ Tolerance : ±0.3 [±0.012]

※ Weight : 80g max

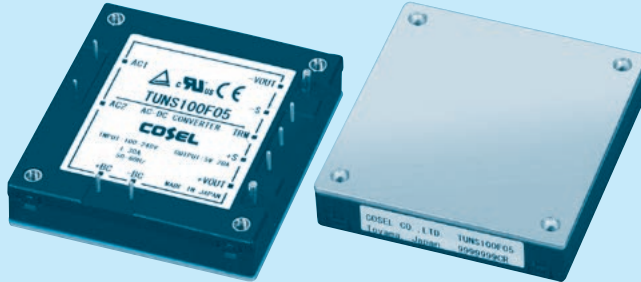
※ Dimensions in mm, [ ]=inches

※ Mounting hole screwing torque : 0.49N · m (5.0kgf · cm) max

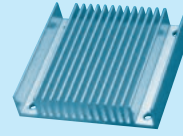
# TUNS100F

TUN S 100 F 05 -□

① ② ③ ④ ⑤ ⑥



\*Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal Input
- ⑤ Output voltage
- ⑥ Optional
- T : with Mounting hole (φ 3.4 thru)

\*Avoid short circuit between +BC and -BC. It may cause the failure of inside components.

\*Keep TRM open, if output voltage adjustment is not necessary.

\*If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

| MODEL                 | TUNS100F05 | TUNS100F12 | TUNS100F24 |
|-----------------------|------------|------------|------------|
| MAX OUTPUT WATTAGE[W] | 100.0      | 100.8      | 100.8      |
| DC OUTPUT             | 5V 20A     | 12V 8.4A   | 24V 4.2A   |

## SPECIFICATIONS

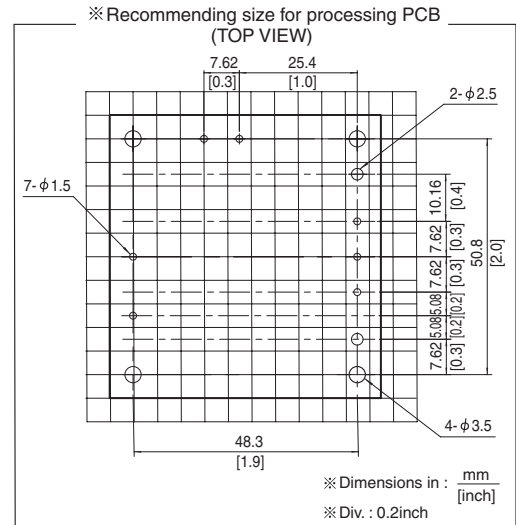
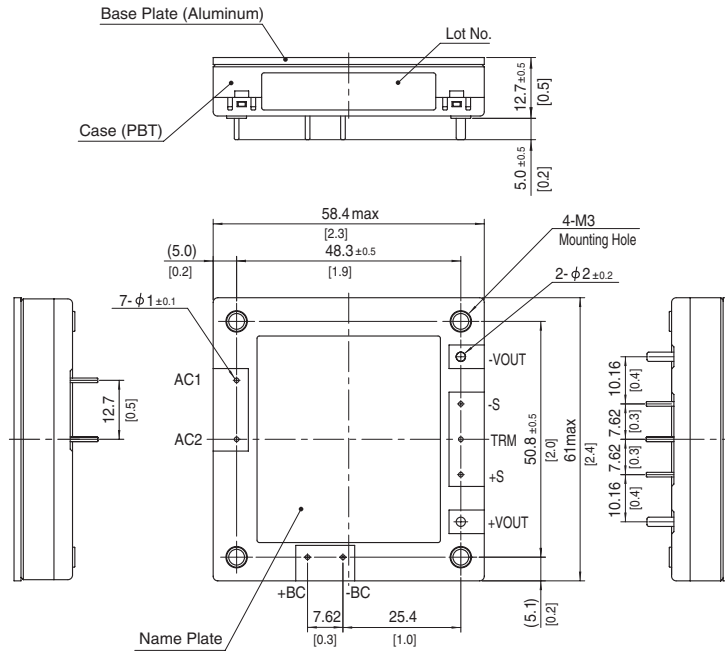
|                               | MODEL                                |                  | TUNS100F05                                                                                                         | TUNS100F12                                                               | TUNS100F24    |               |
|-------------------------------|--------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------|---------------|
| INPUT                         | VOLTAGE[V]                           |                  | AC85 - 264 1 φ (Refer to “Derating”)                                                                               |                                                                          |               |               |
|                               | CURRENT[A]                           | ACIN 100V        | 1.3typ (Io=100%)                                                                                                   |                                                                          |               |               |
|                               |                                      | ACIN 200V        | 0.7typ (Io=100%)                                                                                                   |                                                                          |               |               |
|                               | FREQUENCY[Hz]                        |                  | 50/60 (47 - 63)                                                                                                    |                                                                          |               |               |
|                               | EFFICIENCY[%]                        | ACIN 100V        | 82typ                                                                                                              | 83typ                                                                    | 84typ         |               |
|                               |                                      | ACIN 200V        | 85typ                                                                                                              | 85typ                                                                    | 86typ         |               |
|                               | POWER FACTOR (Io=100%)               | ACIN 100V        | 0.95typ                                                                                                            |                                                                          |               |               |
|                               |                                      | ACIN 200V        | 0.90typ                                                                                                            |                                                                          |               |               |
| INRUSH CURRENT                |                                      |                  | Limited by external components (Thermistor)                                                                        |                                                                          |               |               |
| LEAKAGE CURRENT[ma]           |                                      |                  | 0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1)                                                         |                                                                          |               |               |
| OUTPUT                        | VOLTAGE[V]                           |                  | 5                                                                                                                  | 12                                                                       | 24            |               |
|                               | CURRENT[A]                           |                  | 20                                                                                                                 | 8.4                                                                      | 4.2           |               |
|                               | LINE REGULATION[mV]                  |                  | 10max                                                                                                              | 24max                                                                    | 48max         |               |
|                               | LOAD REGULATION[mV]                  |                  | 10max                                                                                                              | 24max                                                                    | 48max         |               |
|                               | RIPPLE[mVp-p]                        | 0 to +100℃ *1    | 80max                                                                                                              | 120max                                                                   | 120max        |               |
|                               |                                      | -40 to 0℃ *1     | 120max                                                                                                             | 150max                                                                   | 150max        |               |
|                               |                                      | 0 to 15% Load *1 | 160max                                                                                                             | 240max                                                                   | 240max        |               |
|                               | RIPPLE NOISE[mVp-p]                  | 0 to +100℃ *1    | 120max                                                                                                             | 150max                                                                   | 150max        |               |
|                               |                                      | -40 to 0℃ *1     | 200max                                                                                                             | 200max                                                                   | 250max        |               |
|                               |                                      | 0 to 15% Load *1 | 240max                                                                                                             | 300max                                                                   | 300max        |               |
|                               | TEMPERATURE REGULATION[mV]           | 0 to +65℃        | 50max                                                                                                              | 120max                                                                   | 240max        |               |
|                               |                                      | -40 to +100℃     | 100max                                                                                                             | 240max                                                                   | 480max        |               |
|                               | DRIFT[mV]                            |                  | *2                                                                                                                 | 20max                                                                    | 40max         | 90max         |
|                               | OUTPUT VOLTAGE ADJUSTMENT RANGE[V]   |                  |                                                                                                                    | Fixed (TRM pin open), adjustable by external resistor or external signal |               |               |
|                               |                                      |                  |                                                                                                                    | 4.50 - 6.00                                                              | 10.80 - 13.20 | 21.60 - 26.40 |
| OUTPUT VOLTAGE SETTING[V]     |                                      |                  | 4.97 - 5.13                                                                                                        | 11.91 - 12.29                                                            | 23.62 - 24.38 |               |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION               |                  | Works over 105% of rating and recovers automatically                                                               |                                                                          |               |               |
|                               | OVERVOLTAGE PROTECTION[V]            |                  | 6.30 - 7.00                                                                                                        | 13.90 - 16.35                                                            | 27.60 - 32.40 |               |
|                               | REMOTE SENSING                       |                  | Provided                                                                                                           |                                                                          |               |               |
|                               | REMOTE ON/OFF                        |                  | Not provided                                                                                                       |                                                                          |               |               |
| ISOLATION                     | INPUT-OUTPUT                         |                  | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃)                                                  |                                                                          |               |               |
|                               | INPUT-FG                             |                  | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃)                                                  |                                                                          |               |               |
|                               | OUTPUT-FG                            |                  | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15℃)                                                   |                                                                          |               |               |
| ENVIRONMENT                   | OPERATING TEMP., HUMID. AND ALTITUDE |                  | -40 to +100℃ (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to “Derating”), 3,000m (10,000 feet) max |                                                                          |               |               |
|                               | STORAGE TEMP., HUMID. AND ALTITUDE   |                  | -40 to +100℃, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max                                                |                                                                          |               |               |
|                               | VIBRATION                            |                  | 10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis                                    |                                                                          |               |               |
|                               | IMPACT                               |                  | 196.1m/s² (20G), 11ms, once each along X, Y and Z axis                                                             |                                                                          |               |               |
| SAFETY AND NOISE REGULATIONS  | AGENCY APPROVALS                     |                  | UL60950-1, C-UL (CSA60950-1), EN62368-1                                                                            |                                                                          |               |               |
|                               | HARMONIC ATTENUATOR                  |                  | Complies with IEC61000-3-2 (Class A) *3                                                                            |                                                                          |               |               |
| OTHERS                        | CASE SIZE/WEIGHT                     |                  | 58.4 X 12.7 X 61.0mm [2.3 X 0.5 X 2.4 inches] (W X H X D) / 120g max                                               |                                                                          |               |               |
|                               | COOLING METHOD                       |                  | Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)                    |                                                                          |               |               |

\*1 Refer to instruction manual for measuring method of electric characteristics.

\*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 Please contact us about another class.

## External view



※ Tolerance :  $\pm 0.3$  [ $\pm 0.012$ ]

※ Weight : 120g max

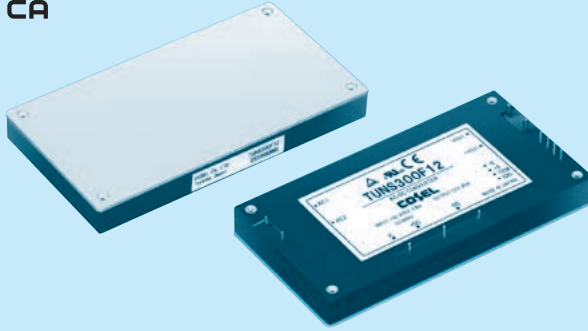
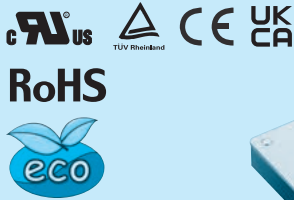
※ Dimensions in mm, [ ]=inches

※ Mounting hole screwing torque : 0.49N · m (5.0kgf · cm) max

# TUNS300F

TUN S 300 F 48 -□

① ② ③ ④ ⑤ ⑥



- ① Series name  
② Single output  
③ Output wattage  
④ Universal Input  
⑤ Output voltage  
⑥ Optional  
T : with Mounting hole  
( $\phi$  3.4 thru)  
Y1: Output voltage adjustment  
range  $\pm 20\%$  (Only 48V)  
R1: with Remote ON/OFF  
(Negative logic control)  
R2: with Remote ON/OFF  
(Negative logic and Low  
standby power)  
R3: with Remote ON/OFF  
(Positive logic control)  
N1: Auto restart from thermal  
protection

\* Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.  
\* Keep TRM open, if output voltage adjustment is not necessary.  
\* If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

| MODEL                 | TUNS300F12 | TUNS300F28 | TUNS300F48 |
|-----------------------|------------|------------|------------|
| MAX OUTPUT WATTAGE[W] | 300        | 308        | 312        |
| DC OUTPUT             | 12V 25A    | 28V 11A    | 48V 6.5A   |

## SPECIFICATIONS

|                                     | MODEL                              |                                                                   | TUNS300F12                                                                                                         | TUNS300F28                                                | TUNS300F48                               |
|-------------------------------------|------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------|
| INPUT                               | VOLTAGE[V]                         |                                                                   | AC85 - 264 1 φ                                                                                                     |                                                           |                                          |
|                                     | CURRENT[A]                         | ACIN 100V                                                         | 3.6typ (Io=100%)                                                                                                   |                                                           |                                          |
|                                     |                                    | ACIN 200V                                                         | 1.8typ (Io=100%)                                                                                                   |                                                           |                                          |
|                                     | FREQUENCY[Hz]                      |                                                                   | 50/60 (47 - 63)                                                                                                    |                                                           |                                          |
|                                     | EFFICIENCY[%]                      | ACIN 100V                                                         | 84typ                                                                                                              | 87typ                                                     |                                          |
|                                     |                                    | ACIN 200V                                                         | 86typ                                                                                                              | 89typ                                                     |                                          |
|                                     | POWER FACTOR (Io=100%)             | ACIN 100V                                                         | 0.96typ                                                                                                            | 90typ                                                     |                                          |
|                                     |                                    | ACIN 200V                                                         | 0.93typ                                                                                                            |                                                           |                                          |
| INRUSH CURRENT                      |                                    | Limited by external resistance                                    |                                                                                                                    |                                                           |                                          |
| LEAKAGE CURRENT[ma]                 |                                    | 0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1)        |                                                                                                                    |                                                           |                                          |
| OUTPUT                              | VOLTAGE[V]                         |                                                                   | 12                                                                                                                 | 28                                                        | 48                                       |
|                                     | CURRENT[A]                         |                                                                   | 25                                                                                                                 | 11                                                        | 6.5                                      |
|                                     | LINE REGULATION[mV]                |                                                                   | 24max                                                                                                              | 56max                                                     | 96max                                    |
|                                     | LOAD REGULATION[mV]                |                                                                   | 24max                                                                                                              | 56max                                                     | 96max                                    |
|                                     | RIPPLE[mVp-p]                      | 0 to +100℃ *1                                                     | 120max                                                                                                             | 180max                                                    | 250max                                   |
|                                     |                                    | -40 to 0℃ *1                                                      | 150max                                                                                                             | 200max                                                    | 300max                                   |
|                                     | RIPPLE NOISE[mVp-p]                | 0 to +100℃ *1                                                     | 150max                                                                                                             | 200max                                                    | 300max                                   |
|                                     |                                    | -40 to 0℃ *1                                                      | 200max                                                                                                             | 300max                                                    | 450max                                   |
|                                     | TEMPERATURE REGULATION[mV]         | 0 to +65℃                                                         | 120max                                                                                                             | 280max                                                    | 480max                                   |
|                                     |                                    | -40 to +100℃                                                      | 240max                                                                                                             | 560max                                                    | 960max                                   |
|                                     | DRIFT[mV] *2                       |                                                                   | 40max                                                                                                              | 90max                                                     | 180max                                   |
|                                     | OUTPUT VOLTAGE ADJUSTMENT RANGE[V] |                                                                   | Fixed (TRM pin open), adjustable by external resistor or external signal<br>9.60 - 14.40                           |                                                           |                                          |
| OUTPUT VOLTAGE SETTING[V]           |                                    | 11.91 - 12.29                                                     | 27.56 - 28.44                                                                                                      | 38.40 - 52.80 (-Y1 Option : 38.4 - 57.6)<br>47.24 - 48.76 |                                          |
| PROTECTION<br>CIRCUIT AND<br>OTHERS | OVERCURRENT PROTECTION             |                                                                   | Works over 105% of rating and recovers automatically                                                               |                                                           |                                          |
|                                     | OVERVOLTAGE PROTECTION[V]          |                                                                   | 15.00 - 16.80                                                                                                      | 35.00 - 39.20                                             | 55.20 - 64.80 (-Y1 Option : 60.0 - 67.2) |
|                                     | REMOTE SENSING                     |                                                                   | Provided                                                                                                           |                                                           |                                          |
|                                     | REMOTE ON/OFF                      |                                                                   | Optional (External power supply is required)                                                                       |                                                           |                                          |
| ISOLATION                           | INPUT-OUTPUT · RC *4               | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃) |                                                                                                                    |                                                           |                                          |
|                                     | INPUT-FG                           | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃) |                                                                                                                    |                                                           |                                          |
|                                     | OUTPUT · RC-FG *4                  | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15℃)  |                                                                                                                    |                                                           |                                          |
|                                     | OUTPUT-RC *4                       | AC100V 1minute, Cutoff current = 100mA, DC100V 10MΩ min (20±15℃)  |                                                                                                                    |                                                           |                                          |
| ENVIRONMENT                         | OPERATING TEMP.,HUMID.AND ALTITUDE |                                                                   | -40 to +100℃ (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to “Derating”), 3,000m (10,000 feet) max |                                                           |                                          |
|                                     | STORAGE TEMP.,HUMID.AND ALTITUDE   |                                                                   | -40 to +100℃, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max                                                |                                                           |                                          |
|                                     | VIBRATION                          |                                                                   | 10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis                                    |                                                           |                                          |
|                                     | IMPACT                             |                                                                   | 196.1m/s² (20G), 11ms, once each along X, Y and Z axis                                                             |                                                           |                                          |
| SAFETY AND<br>NOISE REGULATIONS     | AGENCY APPROVALS                   |                                                                   | UL60950-1, C-UL (CSA60950-1), EN62368-1                                                                            |                                                           |                                          |
|                                     | HARMONIC ATTENUATOR                |                                                                   | Complies with IEC61000-3-2 (Class A) *3                                                                            |                                                           |                                          |
| OTHERS                              | CASE SIZE/WEIGHT                   |                                                                   | 117.3×12.7×61.5mm [4.62×0.5×2.42 inches] (W×H×D) / 190g max                                                        |                                                           |                                          |
|                                     | COOLING METHOD                     |                                                                   | Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)                    |                                                           |                                          |

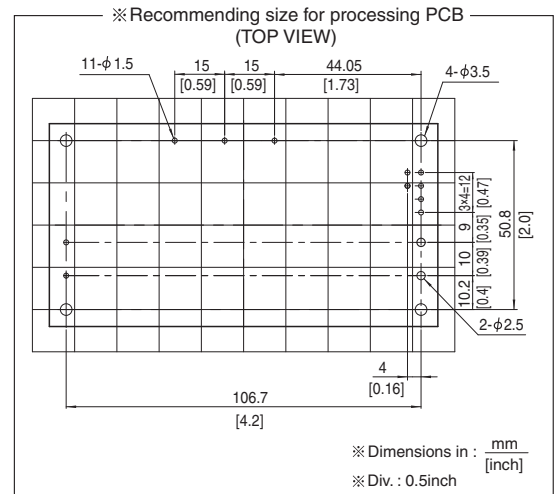
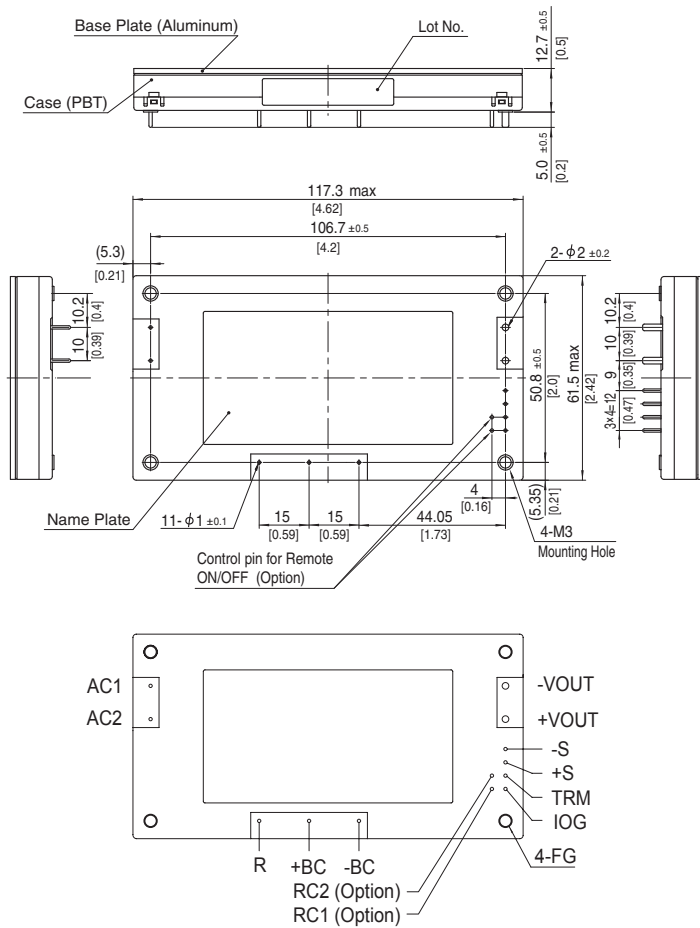
\*1 Refer to instruction manual for measuring method of electric characteristics.

\*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 Please contact us about another class.

\*4 "RC" is applicable when remote control (optional) is added.

## External view



※ Tolerance :  $\pm 0.3$  [ $\pm 0.012$ ]

※ Weight : 190g max

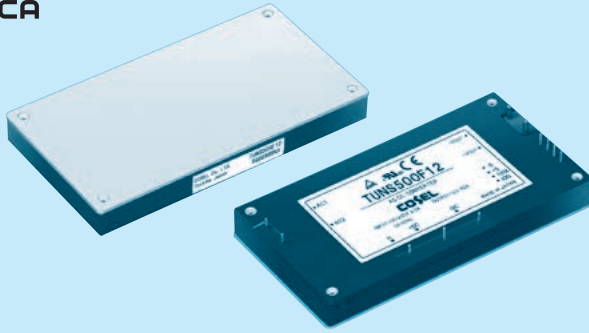
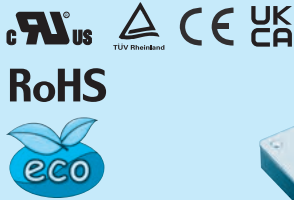
※ Dimensions in mm, [ ]=inches

※ Mounting hole screwing torque :  $0.49\text{N} \cdot \text{m}$  (5.0kgf  $\cdot$  cm) max

# TUNS500F

TUN S 500 F 48 -□

① ② ③ ④ ⑤ ⑥



- ① Series name  
② Single output  
③ Output wattage  
④ Universal Input  
⑤ Output voltage  
⑥ Optional  
T : with Mounting hole  
( $\phi$  3.4 thru)  
Y1: Output voltage adjustment  
range  $\pm 20\%$  (Only 48V)  
R1: with Remote ON/OFF  
(Negative logic control)  
R2: with Remote ON/OFF  
(Negative logic and Low  
standby power)  
R3: with Remote ON/OFF  
(Positive logic control)  
N1: Auto restart from thermal  
protection

\* Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.  
\* Keep TRM open, if output voltage adjustment is not necessary.  
\* If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

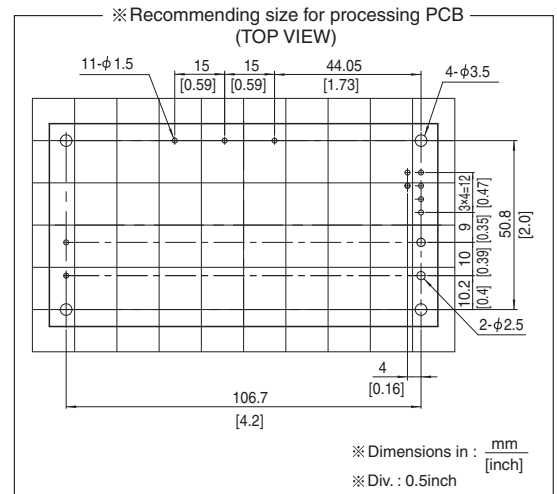
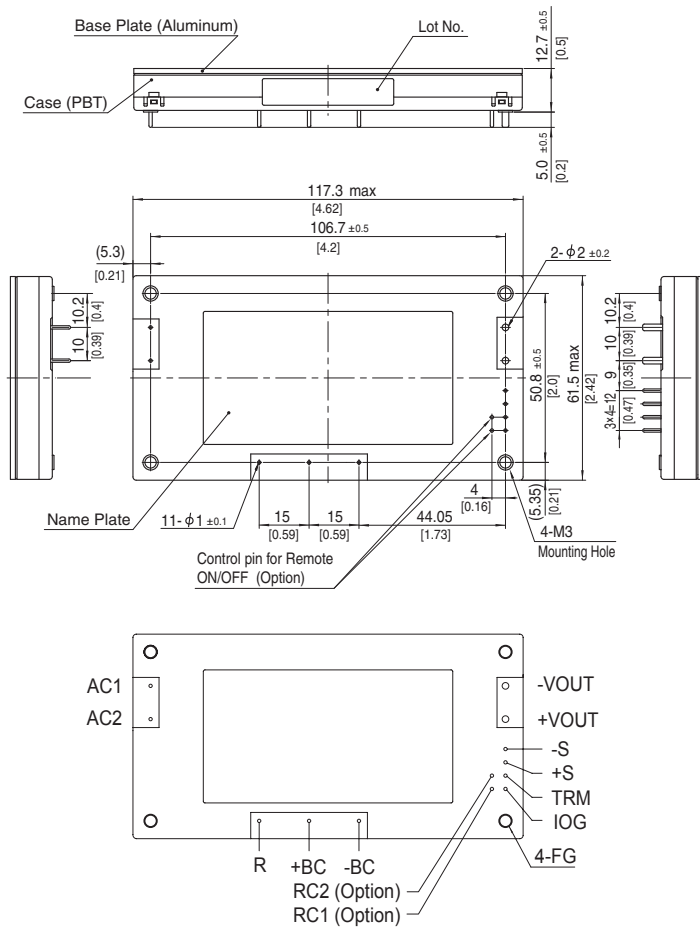
| MODEL                 | TUNS500F12         | TUNS500F28         | TUNS500F48           |
|-----------------------|--------------------|--------------------|----------------------|
| MAX OUTPUT WATTAGE[W] | 504                | 504                | 504                  |
| DC OUTPUT             | 12V 42A (Peak 55A) | 28V 18A (Peak 24A) | 48V 10.5A (Peak 14A) |

## SPECIFICATIONS

|                                     | MODEL                              |                                                                   | TUNS500F12                                                                                                         | TUNS500F28    | TUNS500F48                               |
|-------------------------------------|------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------|
| INPUT                               | VOLTAGE[V]                         |                                                                   | AC85 - 264 1 φ                                                                                                     |               |                                          |
|                                     | CURRENT[A]                         | ACIN 100V                                                         | 6.0typ (Io=100%)                                                                                                   |               |                                          |
|                                     |                                    | ACIN 200V                                                         | 3.0typ (Io=100%)                                                                                                   |               |                                          |
|                                     | FREQUENCY[Hz]                      |                                                                   | 50/60 (47 - 63)                                                                                                    |               |                                          |
|                                     | EFFICIENCY[%]                      | ACIN 100V                                                         | 84typ                                                                                                              | 87typ         | 88typ                                    |
|                                     |                                    | ACIN 200V                                                         | 86typ                                                                                                              | 90typ         | 90.5typ                                  |
|                                     | POWER FACTOR (Io=100%)             | ACIN 100V                                                         | 0.96typ                                                                                                            |               |                                          |
|                                     |                                    | ACIN 200V                                                         | 0.93typ                                                                                                            |               |                                          |
| INRUSH CURRENT                      |                                    | Limited by external resistance                                    |                                                                                                                    |               |                                          |
| LEAKAGE CURRENT[mA]                 |                                    | 0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1)        |                                                                                                                    |               |                                          |
| OUTPUT                              | VOLTAGE[V]                         |                                                                   | 12                                                                                                                 | 28            | 48                                       |
|                                     | CURRENT[A] *3                      |                                                                   | 42 (Peak 55)                                                                                                       | 18 (Peak 24)  | 10.5 (Peak 14)                           |
|                                     | LINE REGULATION[mV]                |                                                                   | 24max                                                                                                              | 56max         | 96max                                    |
|                                     | LOAD REGULATION[mV]                |                                                                   | 24max                                                                                                              | 56max         | 96max                                    |
|                                     | RIPPLE[mVp-p]                      | 0 to +100℃ *1                                                     | 120max                                                                                                             | 180max        | 250max                                   |
|                                     |                                    | -40 to 0℃ *1                                                      | 150max                                                                                                             | 200max        | 300max                                   |
|                                     | RIPPLE NOISE[mVp-p]                | 0 to +100℃ *1                                                     | 150max                                                                                                             | 200max        | 300max                                   |
|                                     |                                    | -40 to 0℃ *1                                                      | 200max                                                                                                             | 300max        | 450max                                   |
|                                     | TEMPERATURE REGULATION[mV]         | 0 to +65℃                                                         | 120max                                                                                                             | 280max        | 480max                                   |
|                                     |                                    | -40 to +100℃                                                      | 240max                                                                                                             | 560max        | 960max                                   |
|                                     | DRIFT[mV] *2                       |                                                                   | 40max                                                                                                              | 90max         | 180max                                   |
|                                     | OUTPUT VOLTAGE ADJUSTMENT RANGE[V] |                                                                   | Fixed (TRM pin open), adjustable by external resistor or external signal<br>9.60 - 14.40                           |               |                                          |
| OUTPUT VOLTAGE SETTING[V]           |                                    | 11.91 - 12.29                                                     | 27.56 - 28.44                                                                                                      | 47.24 - 48.76 |                                          |
| PROTECTION<br>CIRCUIT AND<br>OTHERS | OVERCURRENT PROTECTION             |                                                                   | Works over 101% of peak current and recovers automatically                                                         |               |                                          |
|                                     | OVERVOLTAGE PROTECTION[V]          |                                                                   | 15.00 - 16.80                                                                                                      | 35.00 - 39.20 | 55.20 - 64.80 (-Y1 Option : 38.4 - 57.6) |
|                                     | REMOTE SENSING                     |                                                                   | Provided                                                                                                           |               |                                          |
|                                     | REMOTE ON/OFF                      |                                                                   | Optional (External power supply is required)                                                                       |               |                                          |
| ISOLATION                           | INPUT-OUTPUT · RC *5               | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃) |                                                                                                                    |               |                                          |
|                                     | INPUT-FG                           | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃) |                                                                                                                    |               |                                          |
|                                     | OUTPUT · RC-FG *5                  | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15℃)  |                                                                                                                    |               |                                          |
|                                     | OUTPUT-RC *5                       | AC100V 1minute, Cutoff current = 100mA, DC100V 10MΩ min (20±15℃)  |                                                                                                                    |               |                                          |
| ENVIRONMENT                         | OPERATING TEMP.,HUMID.AND ALTITUDE |                                                                   | -40 to +100℃ (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to “Derating”), 3,000m (10,000 feet) max |               |                                          |
|                                     | STORAGE TEMP.,HUMID.AND ALTITUDE   |                                                                   | -40 to +100℃, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max                                                |               |                                          |
|                                     | VIBRATION                          |                                                                   | 10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis                                    |               |                                          |
|                                     | IMPACT                             |                                                                   | 196.1m/s² (20G), 11ms, once each along X, Y and Z axis                                                             |               |                                          |
| SAFETY AND<br>NOISE REGULATIONS     | AGENCY APPROVALS                   |                                                                   | UL60950-1, C-UL (CSA60950-1), EN62368-1                                                                            |               |                                          |
|                                     | HARMONIC ATTENUATOR                |                                                                   | Complies with IEC61000-3-2 (Class A) *4                                                                            |               |                                          |
| OTHERS                              | CASE SIZE/WEIGHT                   |                                                                   | 117.3×12.7×61.5mm [4.62×0.5×2.42 inches] (W×H×D) / 190g max                                                        |               |                                          |
|                                     | COOLING METHOD                     |                                                                   | Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)                    |               |                                          |

- \*1 Refer to instruction manual for measuring method of electric characteristics.  
\*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 ( ) means peak current. Avoid operating with peak current continuously. It may cause failure of the components inside the product.  
There are limitation of available condition of the peak current, such as peak time, duty etc. (Refer to the instruction manual in detail.)  
\*4 Please contact us about another class.  
\*5 "RC" is applicable when remote control (optional) is added.

## External view



※ Tolerance :  $\pm 0.3$  [ $\pm 0.012$ ]

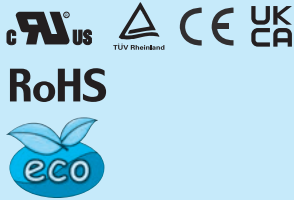
※ Weight : 190g max

※ Dimensions in mm, [ ]=inches

※ Mounting hole screwing torque :  $0.49\text{N} \cdot \text{m}$  (5.0kgf  $\cdot$  cm) max

# TUNS700F

TUN S 700 F 48 -□



- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal Input
- ⑤ Output voltage
- ⑥ Optional
- T : with Mounting hole (φ3.4 thru)
- Y1: Output voltage adjustment range ±20% (Only 48V)
- R1: with Remote ON/OFF (Negative logic control)
- R2: with Remote ON/OFF (Negative logic and Low standby power)
- R3: with Remote ON/OFF (Positive logic control)
- P : Parallel operation (Output voltage trimming disabled, Remote sensing disabled)

\* Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.  
 \* Keep TRM open, if output voltage adjustment is not necessary.  
 \* If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

| MODEL                 | TUNS700F12 | TUNS700F28 | TUNS700F48 |
|-----------------------|------------|------------|------------|
| MAX OUTPUT WATTAGE[W] | 700.8      | 700.0      | 700.8      |
| DC OUTPUT             | 12V 58.4A  | 28V 25A    | 48V 14.6A  |

## SPECIFICATIONS

| INPUT                               | MODEL                              |                                              | TUNS700F12                                                               | TUNS700F28                               | TUNS700F48                               |
|-------------------------------------|------------------------------------|----------------------------------------------|--------------------------------------------------------------------------|------------------------------------------|------------------------------------------|
|                                     | VOLTAGE[V]                         |                                              | AC85 - 264 1 φ                                                           |                                          |                                          |
|                                     | CURRENT[A]                         | ACIN 100V                                    | 8.6typ (Io=100%)                                                         |                                          |                                          |
|                                     |                                    | ACIN 200V                                    | 4.1typ (Io=100%)                                                         |                                          |                                          |
|                                     | FREQUENCY[Hz]                      |                                              | 50/60 (47 - 63)                                                          |                                          |                                          |
|                                     | EFFICIENCY[%]                      | ACIN 100V                                    | 83typ                                                                    | 86typ                                    | 87typ                                    |
|                                     |                                    | ACIN 200V                                    | 86typ                                                                    | 89typ                                    | 90typ                                    |
|                                     | POWER FACTOR<br>(Io=100%)          | ACIN 100V                                    | 0.96typ                                                                  |                                          |                                          |
|                                     |                                    | ACIN 200V                                    | 0.93typ                                                                  |                                          |                                          |
| INRUSH CURRENT                      |                                    |                                              | Limited by external resistance                                           |                                          |                                          |
| LEAKAGE CURRENT[ma]                 |                                    |                                              | 0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1)               |                                          |                                          |
| OUTPUT                              | VOLTAGE[V]                         |                                              | 12                                                                       | 28                                       | 48                                       |
|                                     | CURRENT[A]                         |                                              | 58.4                                                                     | 25                                       | 14.6                                     |
|                                     | LINE REGULATION[mV]                |                                              | 24max                                                                    | 56max                                    | 96max                                    |
|                                     | LOAD REGULATION[mV]                |                                              | 24max                                                                    | 56max                                    | 96max                                    |
|                                     | RIPPLE[mVp-p]                      | 0 to +100℃ *1                                | 120max                                                                   | 180max                                   | 250max                                   |
|                                     |                                    | -40 to 0℃ *1                                 | 150max                                                                   | 200max                                   | 300max                                   |
|                                     | RIPPLE NOISE[mVp-p]                | 0 to +100℃ *1                                | 150max                                                                   | 200max                                   | 300max                                   |
|                                     |                                    | -40 to 0℃ *1                                 | 200max                                                                   | 300max                                   | 450max                                   |
|                                     | TEMPERATURE REGULATION[mV]         | 0 to +65℃                                    | 120max                                                                   | 280max                                   | 480max                                   |
|                                     |                                    | -40 to +100℃                                 | 240max                                                                   | 560max                                   | 960max                                   |
|                                     | DRIFT[mV]                          | *2                                           | 40max                                                                    | 90max                                    | 180max                                   |
|                                     | OUTPUT VOLTAGE ADJUSTMENT RANGE[V] |                                              | Fixed (TRM pin open), adjustable by external resistor or external signal |                                          |                                          |
| OUTPUT VOLTAGE SETTING[V]           |                                    | 9.60 - 14.40                                 | 22.40 - 33.60                                                            | 38.40 - 52.80 (-Y1 Option : 38.4 - 57.6) |                                          |
| PROTECTION<br>CIRCUIT AND<br>OTHERS | OUTPUT VOLTAGE SETTING[V]          |                                              | 11.91 - 12.29                                                            | 27.56 - 28.44                            | 47.24 - 48.76                            |
|                                     | OVERCURRENT PROTECTION             |                                              | Works over 105% of rating and recovers automatically                     |                                          |                                          |
|                                     | OVERVOLTAGE PROTECTION[V]          |                                              | 15.00 - 16.80                                                            | 35.00 - 39.20                            | 55.20 - 64.80 (-Y1 Option : 60.0 - 67.2) |
|                                     | REMOTE SENSING                     |                                              | Provided                                                                 |                                          |                                          |
| REMOTE ON/OFF                       |                                    | Optional (External power supply is required) |                                                                          |                                          |                                          |

| MODEL                 | TUNS700F12-P | TUNS700F28-P | TUNS700F48-P |
|-----------------------|--------------|--------------|--------------|
| MAX OUTPUT WATTAGE[W] | 700.8        | 700.0        | 700.8        |
| DC OUTPUT             | 12V 58.4A    | 28V 25A      | 48V 14.6A    |

## SPECIFICATIONS

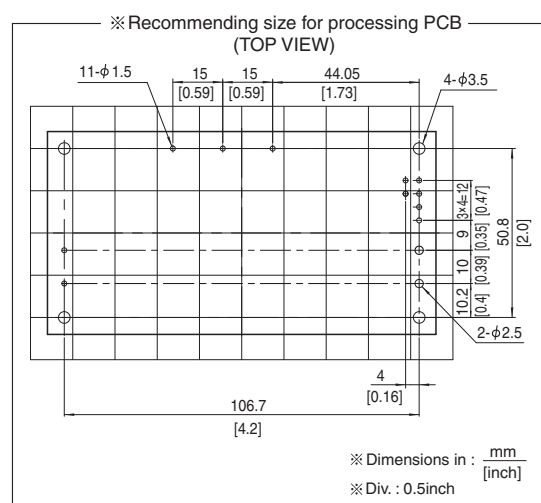
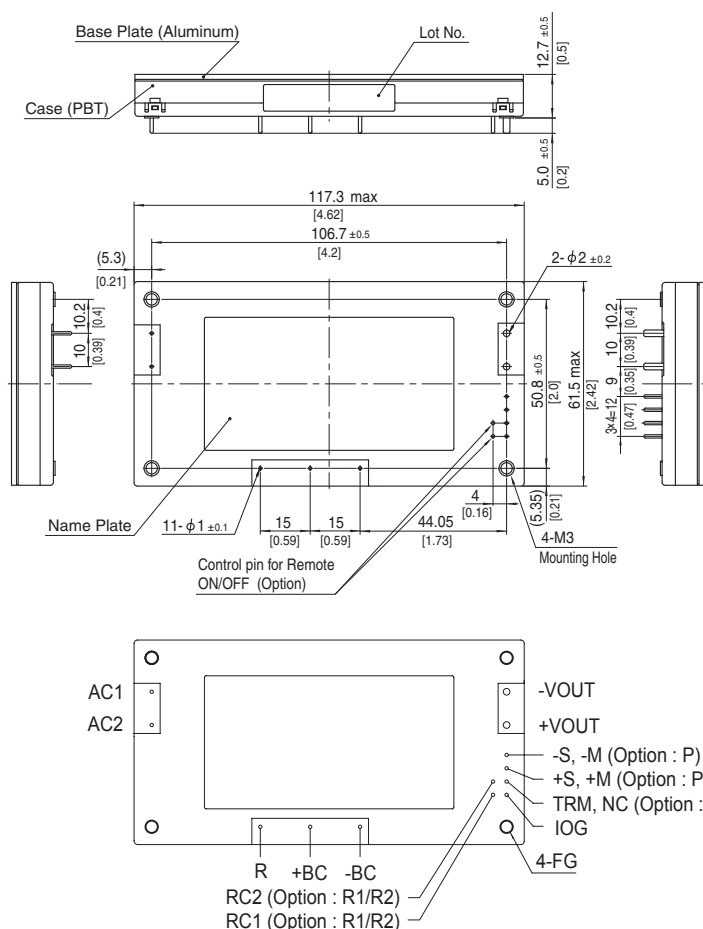
| INPUT                     | MODEL                               |                                                            | TUNS700F12-P     | TUNS700F28-P                                         | TUNS700F48-P |
|---------------------------|-------------------------------------|------------------------------------------------------------|------------------|------------------------------------------------------|--------------|
|                           | VOLTAGE[V]                          |                                                            | AC85 - 264 1 φ   |                                                      |              |
|                           | CURRENT[A]                          | ACIN 100V                                                  | 8.6typ (Io=100%) |                                                      |              |
|                           |                                     | ACIN 200V                                                  | 4.1typ (Io=100%) |                                                      |              |
|                           | FREQUENCY[Hz]                       |                                                            | 50/60 (47 - 63)  |                                                      |              |
|                           | EFFICIENCY[%]                       | ACIN 100V                                                  | 83typ            | 86typ                                                | 87typ        |
|                           |                                     | ACIN 200V                                                  | 86typ            | 89typ                                                | 90typ        |
|                           | POWER FACTOR<br>(Io=100%)           | ACIN 100V                                                  | 0.96typ          |                                                      |              |
|                           |                                     | ACIN 200V                                                  | 0.93typ          |                                                      |              |
| INRUSH CURRENT            |                                     | Limited by external resistance                             |                  |                                                      |              |
| LEAKAGE CURRENT[mA]       |                                     | 0.75max (ACIN 240V 60Hz, Io=100%, According to IEC62368-1) |                  |                                                      |              |
| OUTPUT                    | VOLTAGE[V]                          |                                                            | 12               | 28                                                   | 48           |
|                           | CURRENT[A]                          |                                                            | 58.4             | 25                                                   | 14.6         |
|                           | VOLTAGE ACCURACY[%]                 |                                                            | +5, -3           | +5, -3                                               | +5, -3       |
|                           | RIPPLE[mVp-p]                       | 0 to +100℃ *1                                              | 240max           | 360max                                               | 600max       |
|                           |                                     | -40 to 0℃ *1                                               | 300max           | 400max                                               | 700max       |
|                           |                                     | 0 to +30% Load *1                                          | 360max           | 540max                                               | 900max       |
|                           | RIPPLE NOISE[mVp-p]                 | 0 to +100℃ *1                                              | 300max           | 400max                                               | 700max       |
|                           |                                     | -40 to 0℃ *1                                               | 400max           | 600max                                               | 1000max      |
|                           |                                     | 0 to +30% Load *1                                          | 450max           | 600max                                               | 1000max      |
|                           | PROTECTION<br>CIRCUIT AND<br>OTHERS | OVERCURRENT PROTECTION                                     |                  | Works over 105% of rating and recovers automatically |              |
| OVERVOLTAGE PROTECTION[V] |                                     | 15.00 - 16.80                                              | 35.00 - 39.20    | 55.20 - 64.80                                        |              |
| REMOTE ON/OFF             |                                     | Optional (External power supply is required)               |                  |                                                      |              |

## GENERAL SPECIFICATIONS

|                              |                                    |                                                                                                                    |
|------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| ISOLATION                    | INPUT-OUTPUT · RC                  | *4 AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃)                                               |
|                              | INPUT-FG                           | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15℃)                                                  |
|                              | OUTPUT · RC-FG                     | *4 AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15℃)                                                |
|                              | OUTPUT-RC                          | *4 AC100V 1minute, Cutoff current = 100mA, DC100V 10MΩ min (20±15℃)                                                |
| ENVIRONMENT                  | OPERATING TEMP.,HUMID.AND ALTITUDE | -40 to +100℃ (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to “Derating”), 3,000m (10,000 feet) max |
|                              | STORAGE TEMP.,HUMID.AND ALTITUDE   | -40 to +100℃, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max                                                |
|                              | VIBRATION                          | 10 - 55Hz, 49.0m/s² (5G), 3minutes period, 60minutes each along X, Y and Z axis                                    |
|                              | IMPACT                             | 196.1m/s² (20G), 11ms, once each along X, Y and Z axis                                                             |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS                   | UL60950-1, C-UL (CSA60950-1), EN62368-1                                                                            |
|                              | HARMONIC ATTENUATOR                | Complies with IEC61000-3-2 (Class A) *3                                                                            |
| OTHERS                       | CASE SIZE/WEIGHT                   | 117.3 X 12.7 X 61.5mm [4.62 X 0.5 X 2.42 inches] (W X H X D) / 190g max                                            |
|                              | COOLING METHOD                     | Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)                    |

- \*1 Refer to instruction manual for measuring method of electric characteristics.
- \*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 Please contact us about another class.
- \*4 "RC" is applicable when remote control (optional) is added.

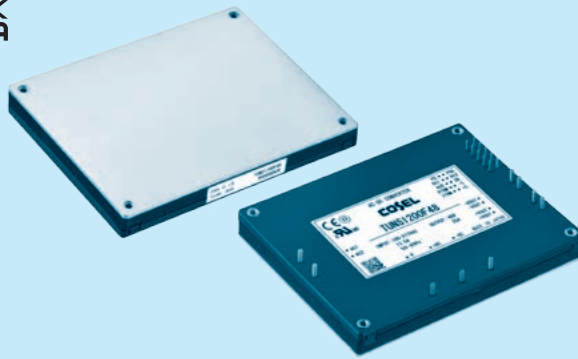
### External view



- ※ Tolerance :  $\pm 0.3$  [ $\pm 0.012$ ]
- ※ Weight : 190g max
- ※ Dimensions in mm, [ ] = inches
- ※ Mounting hole screwing torque : 0.49N · m (5.0kgf · cm) max

# TUNS1200F

TUN S 1200 F 48 -□



- ① Series name
- ② Single output
- ③ Output wattage
- ④ Universal Input
- ⑤ Output voltage
- ⑥ Optional
- T : with Mounting hole (φ 3.4 thru)
- Y1: Output voltage adjustment range ±20% (Only 48V)
- R3: with Remote ON/OFF (Positive logic control)
- N1: Auto restart from thermal protection

\* Avoid short circuit between +BC/R and -BC. It may cause the failure of inside components.  
 \* Keep VTRM open, if output voltage adjustment is not necessary.  
 \* Keep ITRM open, if output current adjustment is not necessary.  
 \* If remote sensing is not necessary, connect between +Vout & +S and between -Vout & -S.

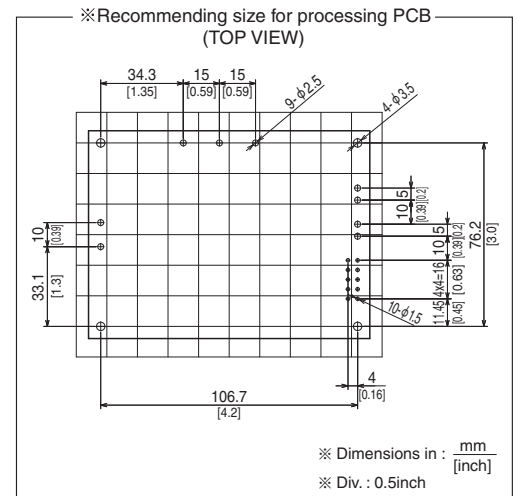
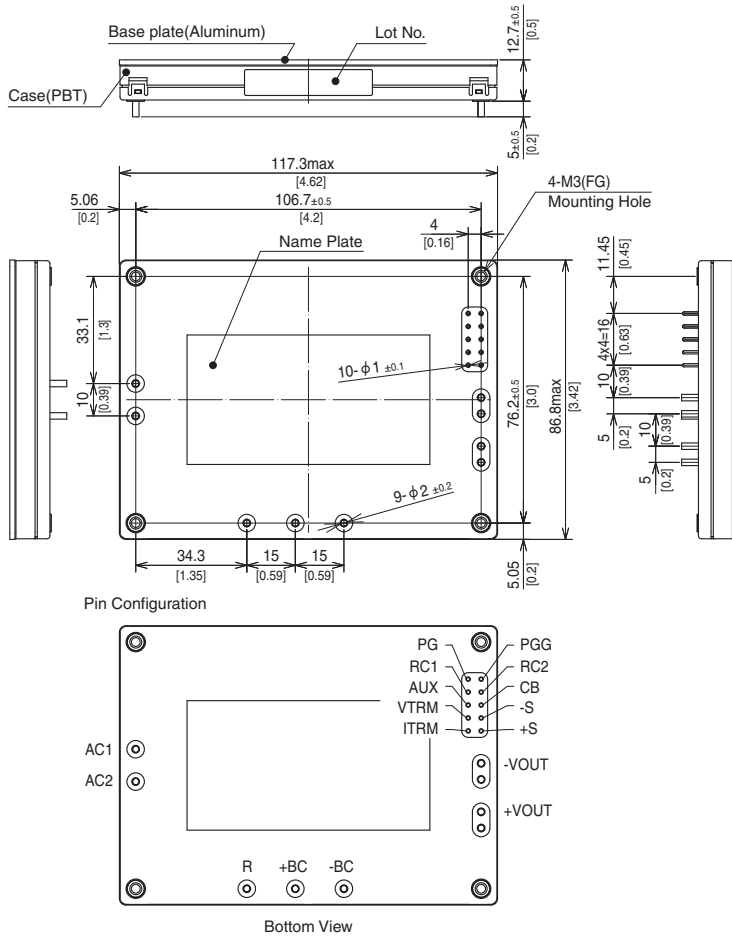
| MODEL                 | TUNS1200F12 | TUNS1200F28 | TUNS1200F48 | TUNS1200F65 |
|-----------------------|-------------|-------------|-------------|-------------|
| MAX OUTPUT WATTAGE[W] | 1008        | 1204        | 1200        | 1202.5      |
| DC OUTPUT             | 12V 84A     | 28V 43A     | 48V 25A     | 65V 18.5A   |

## SPECIFICATIONS

|                               | MODEL                                | TUNS1200F12                                                                                                                                                                            | TUNS1200F28   | TUNS1200F48                    | TUNS1200F65   |
|-------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------|---------------|
| INPUT                         | VOLTAGE[V]                           | AC85 - 305V 1 φ                                                                                                                                                                        |               |                                |               |
|                               | CURRENT[A]                           | ACIN 100V                                                                                                                                                                              | 12typ         | 14typ                          | 14typ         |
|                               |                                      | ACIN 200V                                                                                                                                                                              | 5.9typ        | 6.7typ                         | 6.7typ        |
|                               | FREQUENCY[Hz]                        | 50/60 (47 - 63)                                                                                                                                                                        |               |                                |               |
|                               | EFFICIENCY[%]                        | ACIN 100V                                                                                                                                                                              | 85typ         | 89typ                          | 90typ         |
|                               |                                      | ACIN 200V                                                                                                                                                                              | 87typ         | 91typ                          | 92typ         |
|                               | POWER FACTOR (Io=100%)               | ACIN 100V                                                                                                                                                                              | 0.98typ       |                                |               |
| OUTPUT                        |                                      | ACIN 200V                                                                                                                                                                              | 0.95typ       |                                |               |
|                               | INRUSH CURRENT                       | Limited by external resistance                                                                                                                                                         |               |                                |               |
|                               | LEAKAGE CURRENT[mA]                  | 0.5max (ACIN 240V 60Hz, Io=100%, According to IEC60601-1)                                                                                                                              |               |                                |               |
|                               | VOLTAGE[V]                           | 12                                                                                                                                                                                     | 28            | 48                             | 65            |
|                               | CURRENT[A]                           | 84                                                                                                                                                                                     | 43            | 25                             | 18.5          |
|                               | LINE REGULATION[mV]                  | 24max                                                                                                                                                                                  | 56max         | 96max                          | 130max        |
|                               | LOAD REGULATION[mV]                  | 24max                                                                                                                                                                                  | 56max         | 96max                          | 130max        |
|                               | RIPPLE[mVp-p]                        | 0 to +100°C *1                                                                                                                                                                         | 150max        | 180max                         | 250max        |
|                               |                                      | -40 to 0°C *1                                                                                                                                                                          | 180max        | 200max                         | 300max        |
|                               | RIPPLE NOISE[mVp-p]                  | 0 to +100°C *1                                                                                                                                                                         | 180max        | 200max                         | 300max        |
|                               |                                      | -40 to 0°C *1                                                                                                                                                                          | 200max        | 300max                         | 450max        |
|                               | TEMPERATURE REGULATION[mV]           | 0 to +80°C *1                                                                                                                                                                          | 120max        | 280max                         | 480max        |
|                               |                                      | -40 to +100°C *1                                                                                                                                                                       | 240max        | 560max                         | 960max        |
|                               | DRIFT[mV]                            | *2 40max                                                                                                                                                                               | 90max         | 180max                         | 240max        |
| PROTECTION CIRCUIT AND OTHERS | OUTPUT VOLTAGE ADJUSTMENT RANGE[V]   | Fixed (VTRM pin open), adjustable by external resistor or external signal                                                                                                              |               |                                |               |
|                               |                                      | 9.60 - 14.40                                                                                                                                                                           | 22.40 - 33.60 | 38.40 - 52.80 (Y1:38.4 - 57.6) | 52.00 - 78.00 |
|                               | OUTPUT VOLTAGE SETTING[V]            | 11.91 - 12.29                                                                                                                                                                          | 27.56 - 28.44 | 47.24 - 48.76                  | 63.96 - 66.04 |
|                               | OVERCURRENT PROTECTION               | Works over 105% of rating and recovers automatically                                                                                                                                   |               |                                |               |
|                               | OVERVOLTAGE PROTECTION[V]            | 15.00 - 16.80                                                                                                                                                                          | 35.00 - 39.20 | 55.20 - 60.00 (Y1:60.0 - 67.2) | 81.25 - 91.00 |
| ISOLATION                     | REMOTE SENSING                       | Provided                                                                                                                                                                               |               |                                |               |
|                               | REMOTE ON/OFF                        | Provided                                                                                                                                                                               |               |                                |               |
|                               | INPUT-OUTPUT                         | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C) 2MOOP                                                                                                               |               |                                |               |
|                               | INPUT-FG                             | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C) 1MOOP                                                                                                               |               |                                |               |
| ENVIRONMENT                   | OUTPUT-FG                            | TUNS1200F12/28/48 : AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)<br>TUNS1200F65 : AC1,200V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C) 1MOOP        |               |                                |               |
|                               | OUTPUT-RC, PG                        | AC100V 1minute, Cutoff current = 100mA, DC100V 10MΩ min (20±15°C)                                                                                                                      |               |                                |               |
|                               | OPERATING TEMP., HUMID. AND ALTITUDE | -40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to DERATING CURVE)                                                                                          |               |                                |               |
|                               | STORAGE TEMP., HUMID. AND ALTITUDE   | -40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max                                                                                                                   |               |                                |               |
| SAFETY AND NOISE REGULATIONS  | VIBRATION                            | 10 - 55Hz, 49.0m/s <sup>2</sup> (5G), 3minutes period, 60minutes each along X, Y and Z axis                                                                                            |               |                                |               |
|                               | IMPACT                               | 196.1m/s <sup>2</sup> (20G), 11ms, once each along X, Y and Z axis                                                                                                                     |               |                                |               |
|                               | AGENCY APPROVALS                     | UL62368-1, EN62368-1, C-UL (equivalent to CAN/CSA-C22.2 No.62368-1), ANSI/AAMI ES60601-1, EN60601-1 3rd, C-UL (equivalent to CAN/CSA-C22.2 No.60601-1), Complies with IEC60601-1-2 4th |               |                                |               |
| OTHERS                        | HARMONIC ATTENUATOR                  | Complies with IEC61000-3-2 (Class A) *3                                                                                                                                                |               |                                |               |
|                               | CASE SIZE/WEIGHT                     | 117.3 X 12.7 X 86.8mm [4.62 X 0.5 X 3.42 inches] (W X H X D) / 280g max                                                                                                                |               |                                |               |
|                               | COOLING METHOD                       | Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)                                                                                        |               |                                |               |

\*1 Refer to instruction manual for measuring method of electric characteristics.  
 \*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 Please contact us about another class.

## External view



※ Tolerance :  $\pm 0.3$  [ $\pm 0.012$ ]

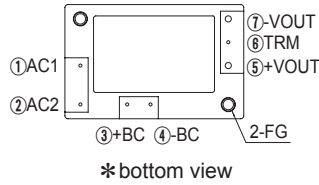
※ Weight : 280g max

※ Dimensions in mm, [ ]=inches

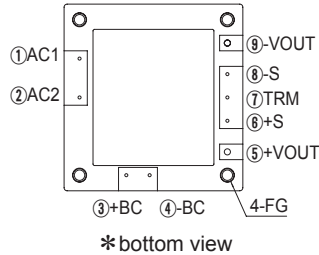
※ Mounting hole screwing torque : 0.49N · m (5.0kgf · cm) max

## Pin Configuration

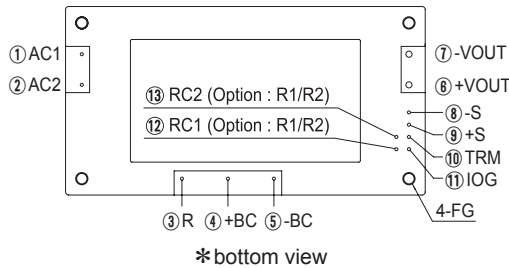
### ● TUNS50F



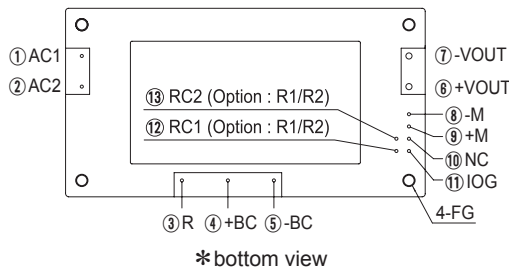
### ● TUNS100F



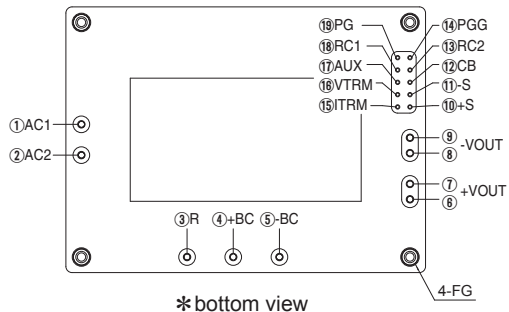
### ● TUNS300F/TUNS500F/TUNS700F



### ● TUNS700F□□-P (OPTION)



### ● TUNS1200F



| No.     | Pin Connection | Function |
|---------|----------------|----------|
| TUNS50F | TUNS100F       |          |
| ①       | ①              | AC1      |
| ②       | ②              | AC2      |
| ③       | ③              | +BC      |
| ④       | ④              | -BC      |
| ⑤       | ⑤              | +VOUT    |
| ⑦       | ⑧              | -VOUT    |
| -       | ⑧              | -S       |
| -       | ⑧              | +S       |
| ⑥       | ⑦              | TRM      |
| -       | -              | FG       |

| No. | Pin Connection | Function                                        |
|-----|----------------|-------------------------------------------------|
| ①   | AC1            | AC input                                        |
| ②   | AC2            | AC input                                        |
| ③   | R              | External resistor for inrush current protection |
| ④   | +BC            | +BC output                                      |
| ⑤   | -BC            | -BC output                                      |
| ⑥   | +VOUT          | +DC output                                      |
| ⑦   | -VOUT          | -DC output                                      |
| ⑧   | -S             | Remote sensing (-)                              |
| ⑨   | +S             | Remote sensing (+)                              |
| ⑩   | TRM            | Adjustment of output voltage                    |
| ⑪   | IOG            | Inverter operation monitor                      |
| ⑫   | RC1            | Remote ON/OFF (Option)                          |
| ⑬   | RC2            | Remote ON/OFF (Option)                          |
| -   | FG             | Mounting hole (FG)                              |

| No. | Pin Connection | Function                        |
|-----|----------------|---------------------------------|
| ⑧   | -M             | Output voltage monitor terminal |
| ⑨   | +M             | Output voltage monitor terminal |
| ⑩   | NC             | No connection                   |

Other than the above are the same as standard products.

| No. | Pin Connection | Function                                        |
|-----|----------------|-------------------------------------------------|
| ①   | AC1            | AC input                                        |
| ②   | AC2            | AC input                                        |
| ③   | R              | External resistor for inrush current protection |
| ④   | +BC            | +BC output                                      |
| ⑤   | -BC            | -BC output                                      |
| ⑥⑦  | +VOUT          | +DC output                                      |
| ⑧⑨  | -VOUT          | -DC output                                      |
| ⑩   | +S             | Remote sensing (+)                              |
| ⑪   | -S             | Remote sensing (-)                              |
| ⑫   | CB             | Current balance                                 |
| ⑬   | RC2            | Remote ON/OFF ground                            |
| ⑭   | PGG            | Power good output ground                        |
| ⑮   | ITRM           | Adjustment of output current                    |
| ⑯   | VTRM           | Adjustment of output voltage                    |
| ⑰   | AUX            | Auxiliary output                                |
| ⑱   | RC1            | Remote ON/OFF                                   |
| ⑲   | PG             | Power good output                               |
| -   | FG             | Mounting hole (FG)                              |

## Implementation • Mounting Method

## Mounting method

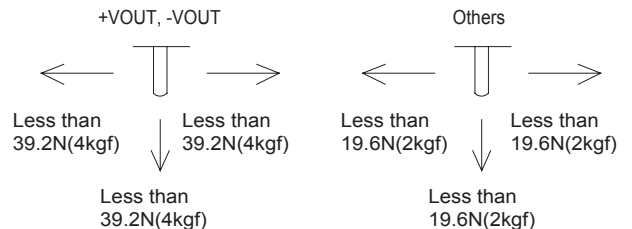
- Use with the conduction cooling (e.g. heat dissipation from the aluminum base plate to the attached heat sink).
- Use a heat sink that larger than the power supply and has a large thickness so that the aluminum base plate can be cooled uniformly.
- The unit can be mounted in any direction. When two or more power supplies are used side by side, position them with proper intervals to allow enough air ventilation. Aluminum base plate temperature of each power supply should not exceed the temperature range shown in “derating”.
- Avoid placing the AC input line pattern layout underneath the unit. It will increase the line conducted noise. Make sure to leave an ample distance between the line pattern layout and the unit. Also avoid placing the DC output line pattern underneath the unit because it may increase the output noise. Lay out the pattern away from the unit.
- Avoid placing the signal line pattern layout underneath the unit because the power supply might become unstable. Lay out the pattern away from the unit.
- High-frequency noise radiates directly from the unit to the atmosphere. Therefore, design the shield pattern on the printed circuit board and connect it to FG or -BC. The shield pattern prevents noise radiation.
- When a heat sink cannot be fixed on the base plate side, order the power module with “-T” option. A heat sink can be mounted by affixing a M3 tap on the heat sink. Please make sure a mounting hole will be connected to a grounding capacitor CY.

|               | Mounting hole |
|---------------|---------------|
| Standard      | M3 tapped     |
| Optional : -T | φ 3.4 thru    |

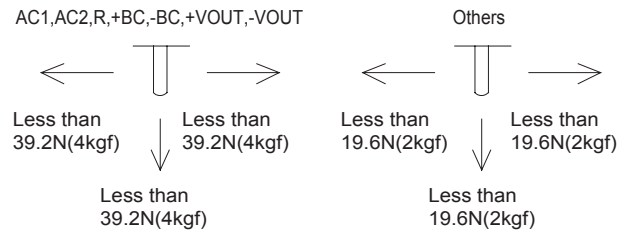
## Stress onto the pins

- When too much stress is applied to the pins may damage internal connections. Avoid applying stress in excess of that shown in right figure.
- The pins are soldered onto the internal PCB. Therefore, Do not bend or pull the leads with excessive force.
- Mounting hole diameter of PCB should be 3.5mm to reduce the stress to the pins.
- Fix the unit on PCB (fixing fittings) by screws to reduce the stress to the pins. Be sure to mount the unit first, then solder the unit.

## ● TUNS50F/100F/300F/500F/700F



## ● TUNS1200F



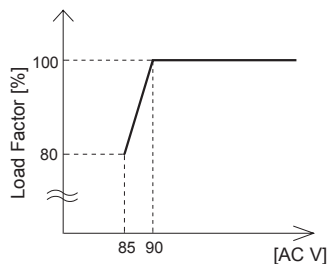
## Soldering temperature

- Flow soldering : 260°C for up to 15 seconds.
- Soldering iron (26W) : 450°C for up to 5 seconds.

## Derating

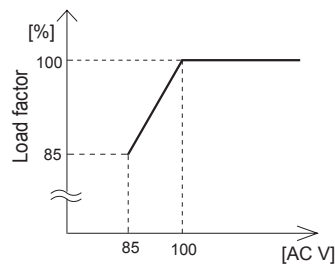
## Input voltage derating curve

## ● TUNS50F/100F



## ● TUNS700F/1200F

\*TUNS1200F12 has no input voltage derating.



## ● TUNS300F/500F

\*TUNS300F/500F has no input voltage derating.

## Derating

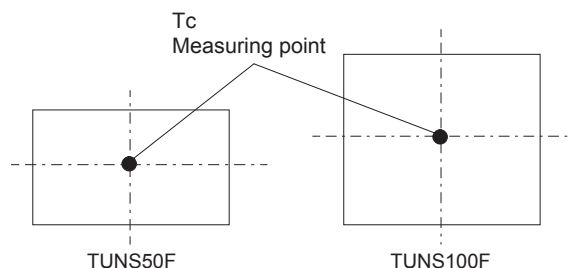
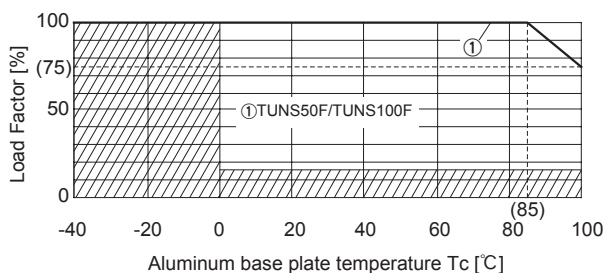
### Output voltage derating curve

■ Use the power modules with conduction cooling (e.g. heat dissipation from the aluminum base plate to the attached heat sink).

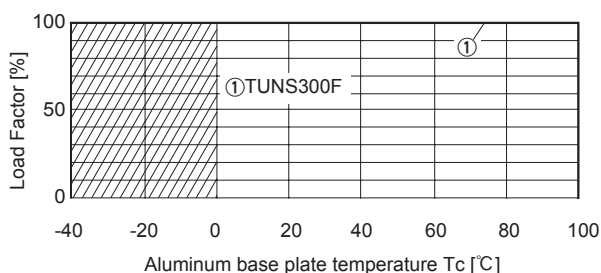
Below shows the derating curves with respect to the aluminum base plate temperature. Note that operation within the hatched areas will cause a significant level of ripple and ripple noise.

■ Please measure the temperature on the aluminum base plate edge side when you cannot measure the temperature of the center part of the aluminum base plate. In this case, please take 5deg temperature margin from the derating characteristics shown in below. Please reduce the temperature fluctuation range as much as possible when the up and down of the temperature are frequently generated. Contact us for more information on cooling methods.

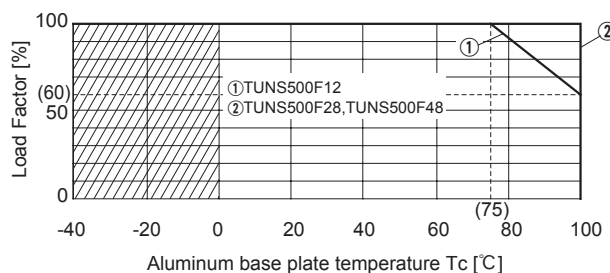
#### TUNS50F/100F



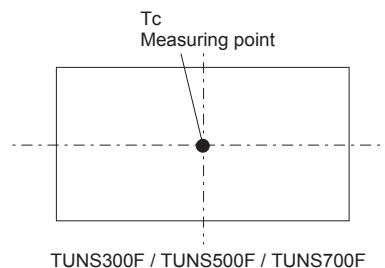
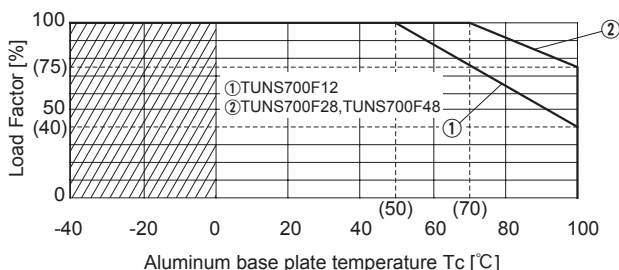
#### TUNS300F



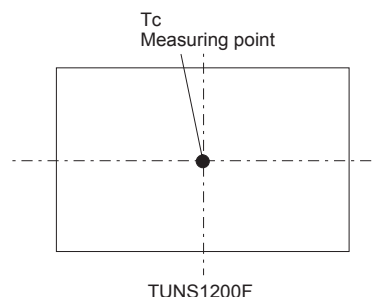
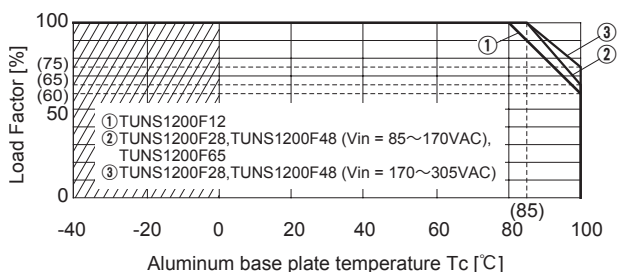
#### TUNS500F



#### TUNS700F



#### TUNS1200F



## Instruction Manual

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

Instruction Manual

<https://www.cosel.co.jp/redirect/catalog/en/TUNS/>

Before using our product

<https://en.cosel.co.jp/technical/caution/index.html>

TUNS



NOTICE



## Basic Characteristics Data

| Model     | Circuit method        | Switching frequency [kHz] | Input current [A] *1 | Inrush current protection circuit | PCB/Pattern |              |              | Series/Parallel operation availability |                    |
|-----------|-----------------------|---------------------------|----------------------|-----------------------------------|-------------|--------------|--------------|----------------------------------------|--------------------|
|           |                       |                           |                      |                                   | Material    | Single sided | Double sided | Series operation                       | Parallel operation |
| TUNS50F   | Active filter         | 80-600                    | 0.67                 | Thermistor                        | Aluminum    | Yes          |              | Yes                                    | *2                 |
|           | Flyback converter     | 100-300                   |                      |                                   |             |              |              |                                        |                    |
| TUNS100F  | Active filter         | 80-600                    | 1.3                  | Thermistor                        | Aluminum    | Yes          |              | Yes                                    | *2                 |
|           | Forward converter     | 300                       |                      |                                   |             |              |              |                                        |                    |
| TUNS300F  | Active filter         | 100                       | 3.6                  | SCR                               | Aluminum    | Yes          |              | Yes                                    | *2                 |
|           | Half-bridge converter | 400                       |                      |                                   |             |              |              |                                        |                    |
| TUNS500F  | Active filter         | 100                       | 6.0                  | SCR                               | Aluminum    | Yes          |              | Yes                                    | *2                 |
|           | Half-bridge converter | 400                       |                      |                                   |             |              |              |                                        |                    |
| TUNS700F  | Active filter         | 100                       | 8.6                  | SCR                               | Aluminum    | Yes          |              | Yes                                    | *2                 |
|           | Half-bridge converter | 400                       |                      |                                   |             |              |              |                                        |                    |
| TUNS1200F | Active filter         | 100                       | 14                   | SCR                               | Aluminum    | Yes          |              | Yes                                    | Yes                |
|           | Full-bridge converter | 400                       |                      |                                   |             |              |              |                                        |                    |

\*1 The value of input current is at ACIN 100V and rated load.

\*2 Refer to instruction manual.