



# CFM12S SERIES 12 WATT OPEN FRAME AC-DC MODULES

## Features

- Universal Input Range 90~264Vac
- High Efficiency up to 87%
- 1.5"x 1" Open Frame Compact Size
- Class II
- No Load Input Power < 75mW
- Approval IEC/EN/UL 62368-1 Ed 3.0
- Approval IEC/EN 60335-1
- Approval EN 55032 Class B and CISPR/FCC Class B
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Over Voltage Protection
- Over Voltage Category OVC II & OVC III



| MODEL NUMBER | OUTPUT VOLTAGE | OUTPUT CURRENT | VOLTAGE ACCURACY NOTE1 | RIPPLE& NOISE NOTE2 | LINE REGULATION NOTE3 | LOAD REGULATION NOTE4 | %EFF. (Typ.) NOTE5 |
|--------------|----------------|----------------|------------------------|---------------------|-----------------------|-----------------------|--------------------|
| CFM12S050    | 5 V            | 2 A            | ±2%                    | 100mV               | ±1%                   | ±1%                   | 80%                |
| CFM12S090    | 9 V            | 1.34 A         | ±2%                    | 100mV               | ±1%                   | ±1%                   | 85%                |
| CFM12S120    | 12 V           | 1.0 A          | ±2%                    | 120mV               | ±1%                   | ±1%                   | 85%                |
| CFM12S150    | 15 V           | 0.8 A          | ±2%                    | 150mV               | ±1%                   | ±1%                   | 85%                |
| CFM12S240    | 24 V           | 0.5 A          | ±2%                    | 240mV               | ±1%                   | ±1%                   | 87%                |

Note:

1. Voltage accuracy is set at 100% full load.
2. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measurement @20MHz BW.
3. Line regulation is measured from 90Vac to 264Vac with 100% full load.
4. Load regulation is measured from 10% to 100% full load.
5. Typical efficiency at 230 Vac and 100% full load at 25°C.
6. T Version wafer with JST B3B-XH/B4B-XH and mate with JST housing XH series or equivalent.

## PART NUMBER

| Series | Number of Outputs | Nominal Output Voltage                                      | Type                                               |
|--------|-------------------|-------------------------------------------------------------|----------------------------------------------------|
| CFM12  | X                 | XXX                                                         | -XX                                                |
| CFM12  | S : Single        | 050 : 5V<br>090 : 9V<br>120 : 12V<br>150 : 15V<br>240 : 24V | Blank : PCB Mount<br>E : Encapsulated<br>T : Wafer |

Part Number Example:

**CFM12S120-T**: Open Frame, 12W, Single 12Vdc Output, Wafer



# CFM12S Series

## TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, 100% full load at 25°C unless otherwise noted.)

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER             | NOTES and CONDITIONS                  | Device | Min. | Typ. | Max. | Units           |
|-----------------------|---------------------------------------|--------|------|------|------|-----------------|
| Input Voltage         | Safety approvals only to the AC input | All    | 90   |      | 264  | V <sub>ac</sub> |
|                       |                                       |        | 120  |      | 370  | V <sub>dc</sub> |
| Operating Temperature | See Derating Curve                    | All    | -40  |      | 75   | °C              |
| Storage Temperature   |                                       | All    | -40  |      | 85   | °C              |
| Operating Altitude    | IEC/EN/UL 62368-1 OVC II              | All    |      |      | 5000 | m               |
|                       | IEC 62368-1 OVC III                   |        |      |      | 2000 |                 |
|                       | IEC/EN 60335-1 OVC II                 |        |      |      | 5000 |                 |

### INPUT CHARACTERISTICS

| PARAMETER               | NOTES and CONDITIONS                                     | Device | Min. | Typ. | Max. | Units           |
|-------------------------|----------------------------------------------------------|--------|------|------|------|-----------------|
| Operating Voltage Range |                                                          | All    | 100  |      | 240  | V <sub>ac</sub> |
| Input Frequency Range   |                                                          | All    | 50   |      | 60   | Hz              |
| Maximum Input Current   | 100% Full load, V <sub>in</sub> =100V <sub>ac</sub>      | All    |      |      | 0.4  | A               |
| Leakage Current         |                                                          | All    |      |      | 0.25 | mA              |
| Inrush Current          | V <sub>in</sub> =240V <sub>ac</sub> , Cold start at 25°C | All    |      |      | 50   | A               |

### OUTPUT CHARACTERISTICS

| PARAMETER                      | NOTES and CONDITIONS                                                                                                                                        | Device    | Min.  | Typ. | Max.  | Units           |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|------|-------|-----------------|
| Output Voltage Set Point       | V <sub>in</sub> =Nominal V <sub>in</sub> , I <sub>o</sub> =I <sub>o</sub> max., T <sub>c</sub> =25°C                                                        | CFM12S050 | 4.90  | 5    | 5.10  | V <sub>dc</sub> |
|                                |                                                                                                                                                             | CFM12S090 | 8.82  | 9    | 9.18  |                 |
|                                |                                                                                                                                                             | CFM12S120 | 11.76 | 12   | 12.24 |                 |
|                                |                                                                                                                                                             | CFM12S150 | 14.70 | 15   | 15.30 |                 |
|                                |                                                                                                                                                             | CFM12S240 | 23.52 | 24   | 24.48 |                 |
| Operating Output Current Range | V <sub>in</sub> =90V <sub>ac</sub> ~264V <sub>ac</sub> , <b>See Derating Curve</b>                                                                          | CFM12S050 |       |      | 2.0   | A               |
|                                |                                                                                                                                                             | CFM12S090 |       |      | 1.34  |                 |
|                                |                                                                                                                                                             | CFM12S120 |       |      | 1.0   |                 |
|                                |                                                                                                                                                             | CFM12S150 |       |      | 0.8   |                 |
|                                |                                                                                                                                                             | CFM12S240 |       |      | 0.5   |                 |
| Holdup Time                    | V <sub>in</sub> =115V <sub>ac</sub>                                                                                                                         | All       |       | 10   |       | ms              |
| Output Voltage Regulation      |                                                                                                                                                             |           |       |      |       |                 |
| Load Regulation                | 10% to 100% full load                                                                                                                                       | All       |       |      | ±1.0  | %               |
| Line Regulation                | V <sub>in</sub> =High line to low line                                                                                                                      | All       |       |      | ±1.0  | %               |
| Over Voltage Protection        | Hiccup mode (Auto recovery)                                                                                                                                 | CFM12S050 |       |      | 6.3   | V <sub>dc</sub> |
|                                |                                                                                                                                                             | CFM12S090 |       |      | 12.6  |                 |
|                                |                                                                                                                                                             | CFM12S120 |       |      | 15.8  |                 |
|                                |                                                                                                                                                             | CFM12S150 |       |      | 18.9  |                 |
|                                |                                                                                                                                                             | CFM12S240 |       |      | 31.5  |                 |
| Output Ripple and Noise        | 1. Add a 0.1uF ceramic capacitor and a 10uF aluminum electrolytic capacitor to output<br>2. Oscilloscope is 20MHz band width<br>3. Ambient temperature=25°C | CFM12S050 |       |      | 100   | mV              |
|                                |                                                                                                                                                             | CFM12S090 |       |      | 100   |                 |
|                                |                                                                                                                                                             | CFM12S120 |       |      | 120   |                 |
|                                |                                                                                                                                                             | CFM12S150 |       |      | 150   |                 |
|                                |                                                                                                                                                             | CFM12S240 |       |      | 240   |                 |



## CFM12S Series

| PARAMETER        | NOTES and CONDITIONS                                                                                          | Device    | Min. | Typ. | Max. | Units   |
|------------------|---------------------------------------------------------------------------------------------------------------|-----------|------|------|------|---------|
| Load Capacitance | 1. $V_{in}=115V_{ac}$ and $230V_{ac}$<br>2. Output is 100% full load<br>3. Ambient temperature= $25^{\circ}C$ | CFM12S050 |      |      | 2000 | $\mu F$ |
|                  |                                                                                                               | CFM12S090 |      |      | 1340 |         |
|                  |                                                                                                               | CFM12S120 |      |      | 1000 |         |
|                  |                                                                                                               | CFM12S150 |      |      | 800  |         |
|                  |                                                                                                               | CFM12S240 |      |      | 500  |         |
| Efficiency       | 1. Input voltage is $230V_{ac}$<br>2. Output is 100% full load<br>3. Ambient temperature= $25^{\circ}C$       | CFM12S050 |      | 80   |      | %       |
|                  |                                                                                                               | CFM12S090 |      | 85   |      |         |
|                  |                                                                                                               | CFM12S120 |      | 85   |      |         |
|                  |                                                                                                               | CFM12S150 |      | 85   |      |         |
|                  |                                                                                                               | CFM12S240 |      | 87   |      |         |

### ISOLATION CHARACTERISTICS

| PARAMETER            | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units     |
|----------------------|----------------------|--------|------|------|------|-----------|
| Input to Output      | 1 Minute             | All    |      |      | 4300 | $V_{ac}$  |
| Isolation Resistance | Input to output      | All    | 100  |      |      | $M\Omega$ |

### FEATURE CHARACTERISTICS

| PARAMETER           | NOTES and CONDITIONS              | Device | Min. | Typ. | Max. | Units |
|---------------------|-----------------------------------|--------|------|------|------|-------|
| Switching Frequency | $P_{out}=\text{max. rated power}$ | All    |      | 65   |      | kHz   |

### GENERAL SPECIFICATIONS

| PARAMETER                                        | NOTES and CONDITIONS                                                                                                                                                    | Device   | Min.                                            | Typ. | Max. | Units       |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------------------|------|------|-------------|
| MTBF                                             | I <sub>o</sub> =100%; T <sub>a</sub> =25°C per MIL-HDBK-217F                                                                                                            | All      | 580                                             |      |      | k hours     |
| Humidity                                         | Non-condensing                                                                                                                                                          | All      |                                                 |      | 93   | % RH        |
| Shock                                            | Meet MIL-STD-810F Table 516.5, Table 516.5-I 10ms, each axis 3 times(±X 、 ±Y 、 ±Z axis)                                                                                 | All      |                                                 | 75   |      | g           |
| Vibration                                        | Meet MIL-STD-810F Table 514.5C-VIII, 15~2000Hz, X 、 Y 、 Z axis, 1 hour (each axis),. Total 3 hrs.                                                                       | All      |                                                 | 4    |      | g           |
| Weight                                           | Blank (PCB mount)                                                                                                                                                       | CFM12S   |                                                 | 16   |      | grams       |
|                                                  | E (Encapsulated)                                                                                                                                                        | CFM12S-E |                                                 | 40   |      |             |
|                                                  | T (Wafer)                                                                                                                                                               | CFM12S-T |                                                 | 17   |      |             |
| Dimensions                                       | Blank (PCB mount)                                                                                                                                                       | All      | 1.500x1.000x0.776 Inches (38.10x25.40x19.70 mm) |      |      |             |
|                                                  | E (Encapsulated)                                                                                                                                                        |          | 1.600x1.100x0.772 Inches (40.64x27.94x19.60mm)  |      |      |             |
|                                                  | T (Wafer)                                                                                                                                                               |          | 2.150x1.000x0.709 Inches (54.61x25.40x18.00mm)  |      |      |             |
| Safety                                           | Class II, IEC/EN/UL 62368-1 (Ed 3.0), IEC/EN 60335-1                                                                                                                    |          |                                                 |      |      |             |
| EMC Emission                                     | EN 55032:2015+A1:2020, 47 CFR FCC Part 15 Subpart B, EN 55032:2015+A11:2020, EN 61000-6-3:2021, EN 61000-6-4:2019, EN 61000-3-2:2019+A1:2021, EN 61000-3-3:2013+A2:2021 |          |                                                 |      |      | Class B     |
| Conducted Disturbance                            | EN 55032:2015+A1:2020, 47 CFR FCC Part 15 Subpart B, EN 55032:2015+A11:2020, EN 61000-6-3:2021, EN 61000-6-4:2019                                                       |          |                                                 |      |      | Class B     |
| Radiated Disturbance                             | EN 55032:2015+A1:2020, 47 CFR FCC Part 15 Subpart B, EN 55032:2015+A11:2020, EN 61000-6-3:2021, EN 61000-6-4:2019                                                       |          |                                                 |      |      | Class B     |
| Harmonic Current Emissions                       | EN 61000-3-2:2019+A1:2021                                                                                                                                               |          |                                                 |      |      |             |
| Voltage Fluctuations & Flicker                   | EN 61000-3-3:2013+A2:2021                                                                                                                                               |          |                                                 |      |      |             |
| EMC Immunity                                     | EN 55035:2017+A11:2020, EN 61000-6-1:2019, EN 61000-6-2:2019, IEC 61000-4-2,3,4,5,6,11                                                                                  |          |                                                 |      |      |             |
| Electrostatic Discharge (ESD)                    | IEC 61000-4-2:2008, Air Discharge: ±8kV, Contact Discharge: ±4kV                                                                                                        |          |                                                 |      |      | Criterion A |
| Radio-Frequency, Continuous Radiated Disturbance | IEC 61000-4-3:2020                                                                                                                                                      |          |                                                 |      |      | Criterion A |
| Electrical Fast Transient (EFT)                  | IEC 61000-4-4:2012, ±1kV, ±2kV                                                                                                                                          |          |                                                 |      |      | Criterion A |
| Surge                                            | IEC 61000-4-5:2014+A1:2017, L-N: ±1kV                                                                                                                                   |          |                                                 |      |      | Criterion A |
| Conducted Disturbances, Induced by RF Fields     | IEC 61000-4-6:2013+COR1:2015                                                                                                                                            |          |                                                 |      |      | Criterion A |



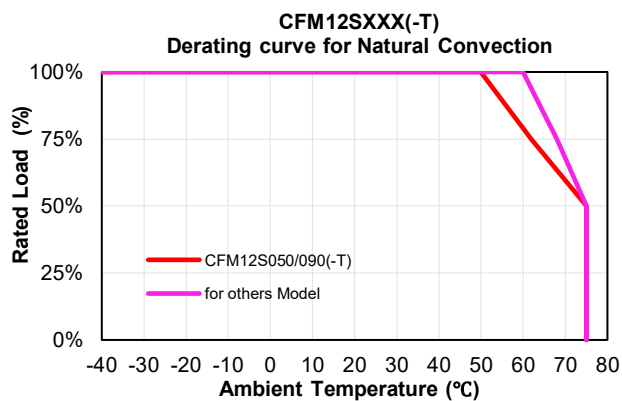
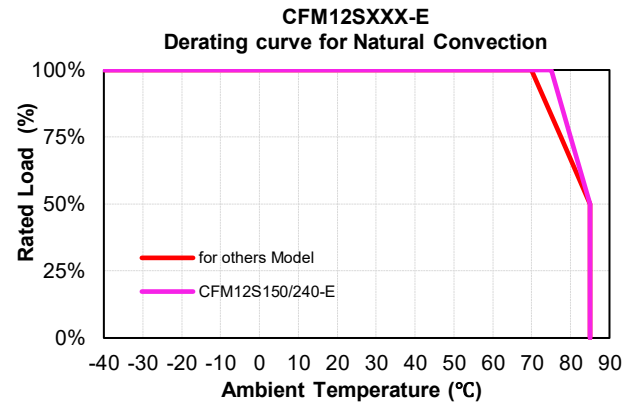
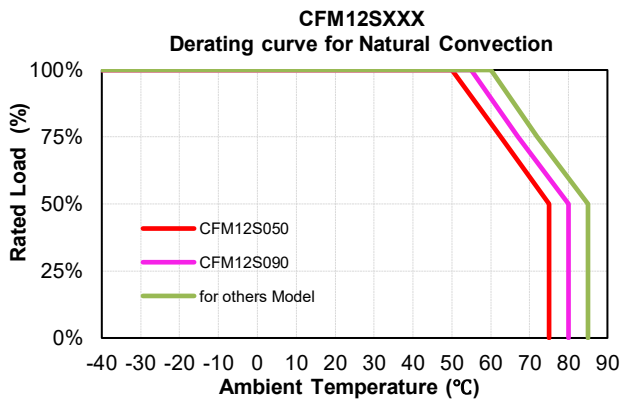
# CFM12S Series

## GENERAL SPECIFICATIONS

|                       |                                                             |                                         |
|-----------------------|-------------------------------------------------------------|-----------------------------------------|
| Voltage Dips          | IEC 61000-4-11:2020, Dip: 30% Reduction, Dip >95% Reduction | Criterion A                             |
| Voltage Interruptions | IEC 61000-4-11:2020, >95% Reduction                         | Criterion B                             |
| Application Note Link |                                                             | <a href="#">CFM12S Series App Notes</a> |

## CHARACTERISTIC CURVE

### Power Derating Curve

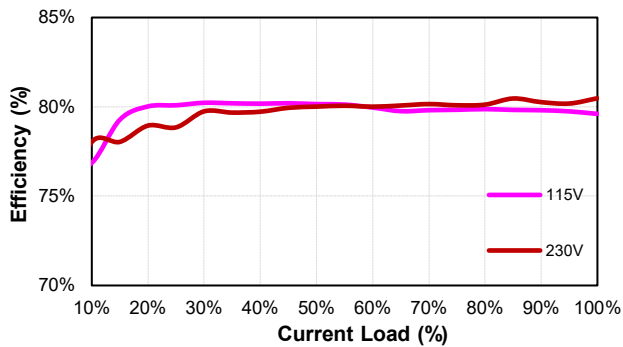




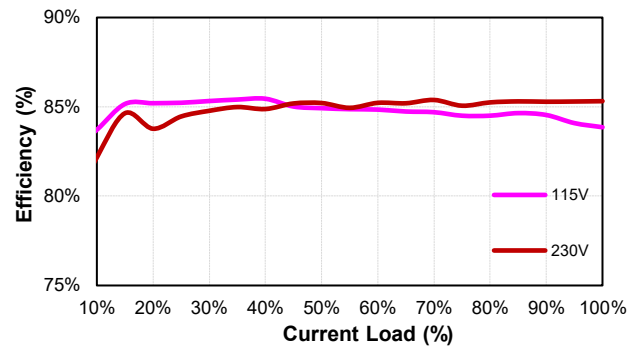
# CFM12S Series

## Performance Data

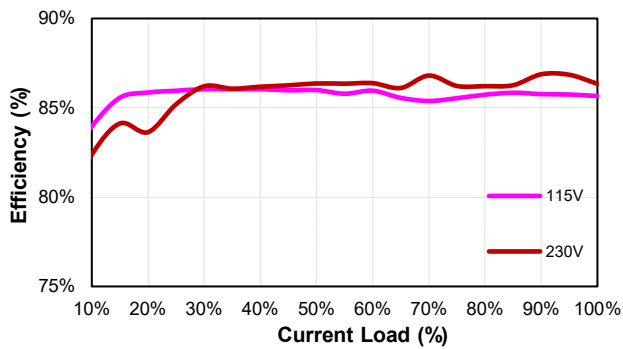
CFM12S050 (Eff Vs Io)



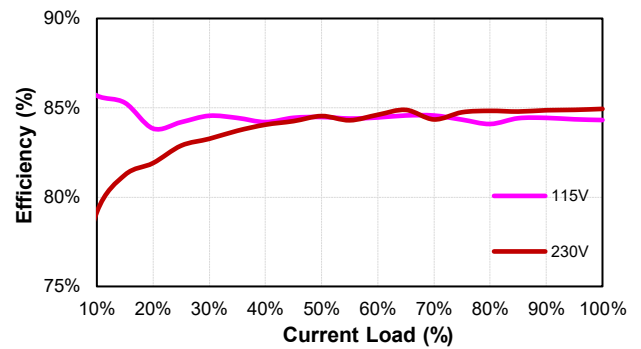
CFM12S090 (Eff Vs Io)



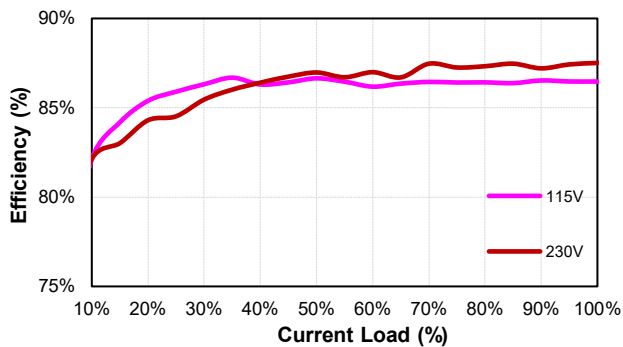
CFM12S120 (Eff Vs Io)



CFM12S150 (Eff Vs Io)



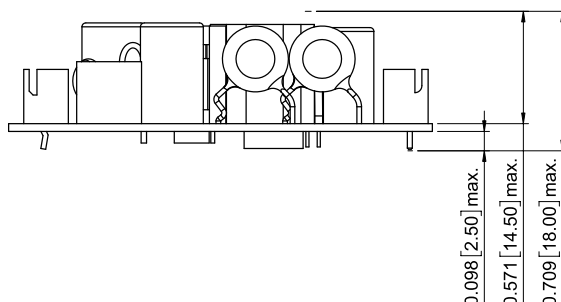
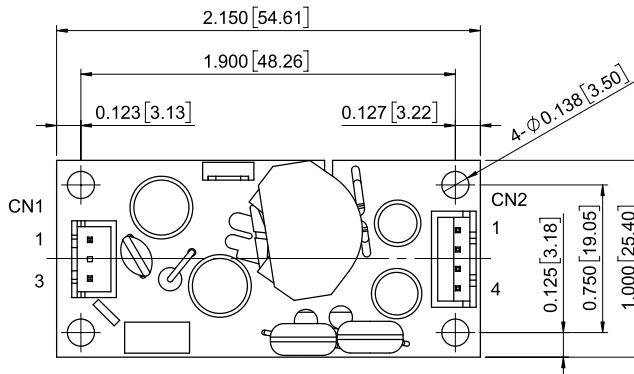
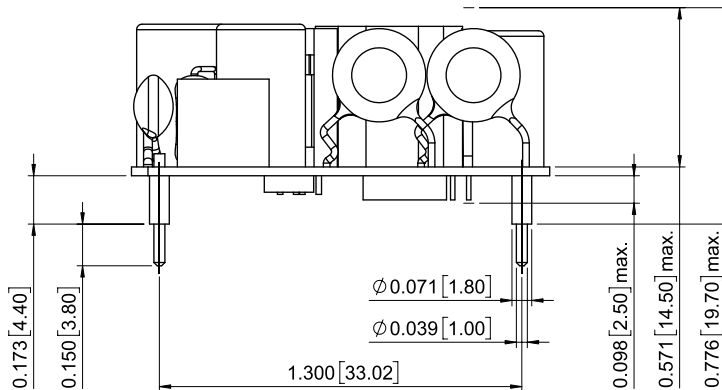
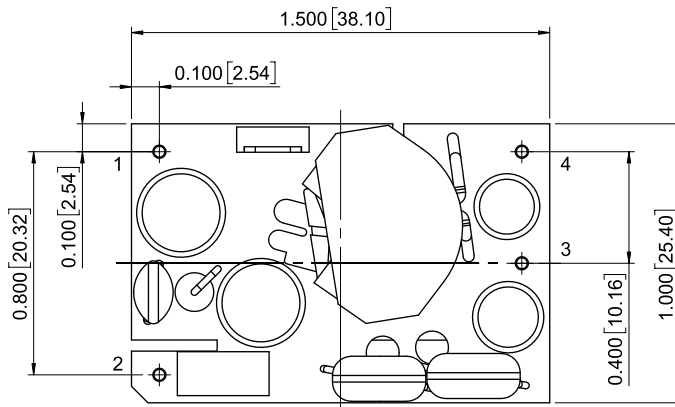
CFM12S240 (Eff Vs Io)





# CFM12S Series

## MECHANICAL SPECIFICATION



### CFM12SXXX

All Dimensions in Inches[mm]  
Tolerance Inches: x.xxx=±0.020  
Millimeters: x.xx=±0.50

| Pin Connection |          |
|----------------|----------|
| Pin            | Function |
| 1              | ACN      |
| 2              | ACL      |
| 3              | -Vout    |
| 4              | +Vout    |

### CFM12SXXX-E

All Dimensions in Inches[mm]  
Tolerance Inches: x.xxx=±0.020  
Millimeters: x.xx=±0.50

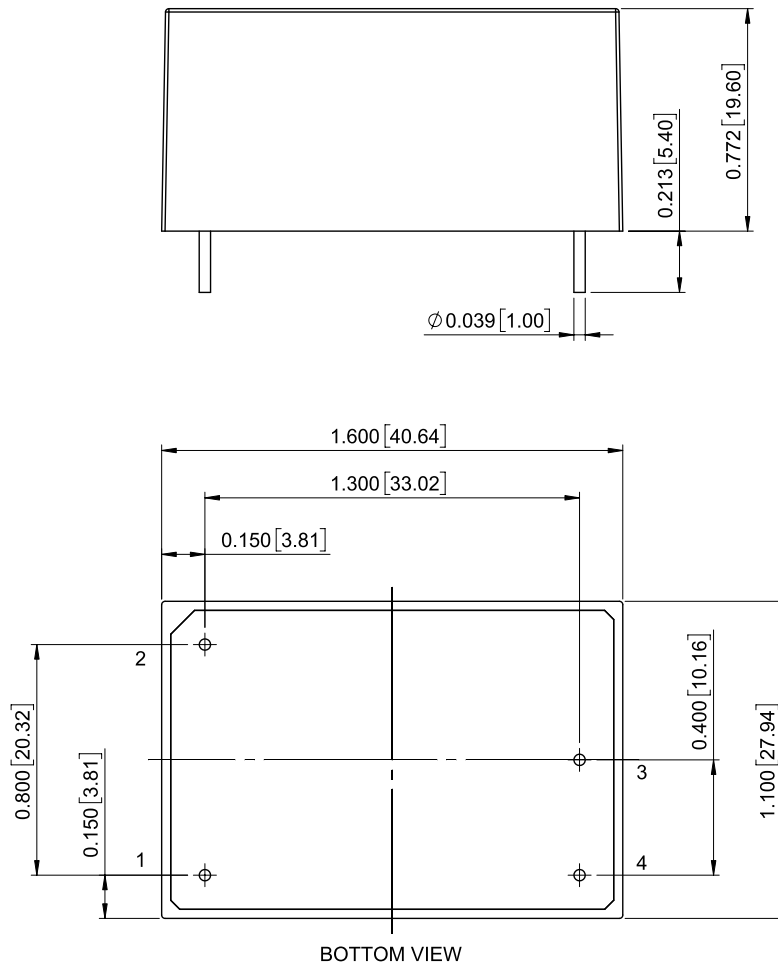
AC Input Connector(CN1):JST B3B-XH-A(LF)(SN)(2N) or equivalent

| Pin | Function | Mating Housing             | Terminal                               |
|-----|----------|----------------------------|----------------------------------------|
| 1   | ACN      | JST XHP-3<br>or equivalent | JST<br>SXH-001T-P0.6N<br>or equivalent |
| 2   | -        |                            |                                        |
| 3   | ACL      |                            |                                        |

DC Output Connector(CN2):JST B4B-XH-A(LF)(SN) or equivalent

| Pin | Function | Mating Housing             | Terminal                               |
|-----|----------|----------------------------|----------------------------------------|
| 1   | +Vout    | JST XHP-4<br>or equivalent | JST<br>SXH-001T-P0.6N<br>or equivalent |
| 2   | +Vout    |                            |                                        |
| 3   | -Vout    |                            |                                        |
| 4   | -Vout    |                            |                                        |

## MECHANICAL SPECIFICATION



## CFM12SXXX-E

All Dimensions in Inches[mm]

Tolerance      Inches: x.xxx=±0.020

Millimeters: x.xx=±0.50

| Pin Connection |          |
|----------------|----------|
| Pin            | Function |
| 1              | ACN      |
| 2              | ACL      |
| 3              | -Vout    |
| 4              | +Vout    |