



CFM400S SERIES 400 WATT AC-DC POWER SUPPLY WITH PFC

Features

- Universal Input Range 80~264V_{ac}
- High Efficiency up to 94%
- 3"x 5" Compact Size
- Class I
- No Load Power Consumption<0.5W (PS-Off)
- Approval IEC/EN/UL 62368-1
- Approval EN 55032, 47 CFR FCC Part 15
- Active PFC Meets EN 61000-3-2
- Meets IEC/EN 60335-1
- High Power Density up to 17.3W/Inch³
- 370W Natural, 400W Conduction Convection
- Over Temperature Protection
- PS On/Off Remote Control
- Power Good & Power Fail Signal
- +5V Stand-by, 12V Fan Output
- Low Inrush Current



| MODEL NUMBER | OUTPUT VOLTAGE | OUTPUT CURRENT | | | VOLTAGE ACCURACY | RIPPLE & NOISE | VOLTAGE ADJ. RANGE | LINE REGULATION | LOAD REGULATION | %EFF. (Typ.) |
|--------------------------------|----------------|----------------|-------------|---------|------------------|----------------|--------------------|-----------------|-----------------|--------------|
| | | NOTE1 | | NOTE2 | | | | | | |
| | | With FAN | Without FAN | | | | | | | |
| | | | COVER | OPEN | | NOTE3 | NOTE4 | NOTE5 | | |
| CFM400S120 | 12 V | 33.33 A | 26.67 A | 23.33 A | ±1% | 120 mV | 11.4~12.6 V | ±0.5% | ±1% | 92% |
| CFM400S180 | 18 V | 22.22 A | 17.78 A | 15.56 A | ±1% | 150 mV | 17.1~18.9 V | ±0.5% | ±1% | 93% |
| CFM400S240 | 24 V | 16.67 A | 13.33 A | 11.67 A | ±1% | 150 mV | 22.8~25.2 V | ±0.5% | ±1% | 94% |
| CFM400S360 | 36 V | 11.11 A | 8.89 A | 7.78 A | ±1% | 200 mV | 34.2~37.8 V | ±0.5% | ±1% | 94% |
| CFM400S480 | 48 V | 8.33 A | 6.67 A | 5.83 A | ±1% | 250 mV | 45.6~50.4 V | ±0.5% | ±1% | 94% |
| CFM400S540 | 54 V | 7.40 A | 5.93 A | 5.19 A | ±1% | 300 mV | 51.3~56.7 V | ±0.5% | ±1% | 94% |
| Stand-by Output Voltage | | | | | | | | | | |
| All | +5 V | 1A (Note 7) | | | ±3% | 100 mV | --- | ±1% | ±5% | --- |
| Fan Output Voltage | | | | | | | | | | |
| All | +12 V | 0.5A (Note 6) | | | --- | --- | --- | --- | --- | --- |

Note:

1. V_{in}=230V_{ac}, Forced air convection with 21.9CFM fan.
2. Voltage accuracy is set at 100% full load and 25°C Ta.
3. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measuring @20MHz BW.
4. Line regulation is measured from high line to low line with 100% full load.
5. Load regulation is measured from 10% to 100% full load.
6. Fan output can only operate normal when the stand-by output is above 0.5A.
7. When PS-OFF, at -40°C, stand-by output voltage with CC load 1A requires input voltage above 100V_{ac}.

PART NUMBER

| Series | Number of Outputs | Nominal Output Voltage | Type | Output Terminal |
|--------|-------------------|--|---|-----------------------------------|
| CFM400 | X | XXX | X (Option) | -X(Option) |
| CFM400 | S : Single | 120 : 12V 180 : 18V 240 : 24V 360 : 36V 480 : 48V 540 : 54V | None : With Baseplate C : With Cover | None : Vertical R : Horizontal |

Part Number Example:

CFM400S120: With Baseplate, 400W, 12Vdc Output, Vertical Type Terminal

CFM400S120C-R: With Cover, 400W, 12Vdc Output, Horizontal Type Terminal



CFM400S Series

TECHNICAL SPECIFICATIONS

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

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|-----------------------|------------------------------------|--------|------|------|------|-----------------|
| Input Voltage | Safety only 90~264 V _{ac} | All | 80 | | 264 | V _{ac} |
| Operating Temperature | See Derating Curve | All | -40 | | 85 | °C |
| Storage Temperature | | All | -40 | | 85 | °C |
| Operating Altitude | | All | | | 5000 | m |

INPUT CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|-------------------------|--|--------|------|------|------------|-----------------|
| Operating Voltage Range | | All | 100 | | 240 | V _{ac} |
| Input Frequency Range | Safety 50-60HZ | All | 47 | | 63 | Hz |
| Maximum Input Current | 100% Full load, V _{in} =100V _{ac} | All | | | 6 | A |
| Power Factor | V _{in} =230V _{ac} Full load | All | | 0.95 | | |
| Leakage Current | Contact leakage current Earth leakage current | All | | | 0.1 0.3 | mA |
| Inrush Current | V _{in} =240V _{ac} , Cold start at 25°C | All | | 30 | | A |

OUTPUT CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|--------------------------------|--|------------|-------|------|-------|-----------------|
| Output Voltage Set Point | V _{in} =Nominal V _{in} , I _o =I _o max., T _c =25°C | CFM400S120 | 11.88 | 12 | 12.12 | V _{dc} |
| | | CFM400S180 | 17.82 | 18 | 18.18 | |
| | | CFM400S240 | 23.76 | 24 | 24.24 | |
| | | CFM400S360 | 35.64 | 36 | 36.36 | |
| | | CFM400S480 | 47.52 | 48 | 48.48 | |
| Operating Output Current Range | V _{in} =80V _{ac} ~264V _{ac} , See Derating Curve | CFM400S120 | | | 33.33 | A |
| | | CFM400S180 | | | 22.22 | |
| | | CFM400S240 | | | 16.67 | |
| | | CFM400S360 | | | 11.11 | |
| | | CFM400S480 | | | 8.33 | |
| CFM400S540 | | | 7.40 | | | |
| Holdup Time | V _{in} =115V _{ac} | All | | 10 | | ms |
| Output Voltage Regulation | | | | | | |
| Load Regulation | 10% to 100% full load | All | | | ±1.0 | % |
| Line Regulation | V _{in} =High line to low line | All | | | ±0.5 | % |
| Over Voltage Protection | Latch off (AC recycle to reset) | CFM400S120 | | | 16 | V _{dc} |
| | | CFM400S180 | | | 30 | |
| | | CFM400S240 | | | 35 | |
| | | CFM400S360 | | | 50 | |
| | | CFM400S480 | | | 63 | |
| CFM400S540 | | | 63 | | | |
| Over Current Protection | Auto recovery | All | 110 | | 190 | % |
| Short Circuit Protection | Auto recovery | All | | | | |
| Over Temperature Protection | Auto recovery | All | | | | |



CFM400S Series

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|-------------------------|--|------------|------|------|-------|----------|
| Output Ripple and Noise | 1. Add a 0.1uF ceramic capacitor and a 10uF aluminum electrolytic capacitor to output 2. Oscilloscope is 20MHz bandwidth 3. Ambient temperature=25°C | CFM400S120 | | | 120 | mV |
| | | CFM400S180 | | | 150 | |
| | | CFM400S240 | | | 150 | |
| | | CFM400S360 | | | 200 | |
| | | CFM400S480 | | | 250 | |
| | | CFM400S540 | | | 300 | |
| Load Capacitance | 1. $V_{in}=115V_{ac}$ and $230V_{ac}$ 2. Output is 100% full load 3. Ambient temperature=25°C | CFM400S120 | | | 33330 | uF |
| | | CFM400S180 | | | 22220 | |
| | | CFM400S240 | | | 16670 | |
| | | CFM400S360 | | | 11110 | |
| | | CFM400S480 | | | 8330 | |
| | | CFM400S540 | | | 7400 | |
| Efficiency | 1. $V_{in}=230V_{ac}$ 2. Output is 100% full load 3. Ambient temperature=25°C | CFM400S120 | | 92.0 | | % |
| | | CFM400S180 | | 93.0 | | |
| | | CFM400S240 | | 94.0 | | |
| | | CFM400S360 | | 94.0 | | |
| | | CFM400S480 | | 94.0 | | |
| | | CFM400S540 | | 94.0 | | |
| PS-On Signal | Power on | All | 0 | | 2 | V_{dc} |
| | Power off (PS-ON and GND open) | | | 4 | | mA |
| | Power on (PS-ON and GND short) | | | 10 | | |
| | Power-off (PS-ON and GND open) | | | 0 | | |
| Power Good (PG) | 1. $V_{in}=80V_{ac}\sim 264V_{ac}$ 2. Output is 100% full load 3. The TTL goes high after power set up | All | 100 | | 500 | ms |
| Power Fail (PF) | 1. $V_{in}=80V_{ac}\sim 264V_{ac}$ 2. Output is 100% full load 3. The TTL goes low before V_o below 90% rated value | All | 1 | 10 | | ms |

ISOLATION CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|----------------------|----------------------|--------|------|------|------|----------|
| Input to Output | 1 minute | All | 3000 | | 4000 | V_{ac} |
| Isolation Resistance | Input to output | All | 100 | | | MΩ |

FEATURE CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|---------------------------|-----------------------------------|--------|------|------|------|-------|
| Switching Frequency | $P_{out}=\text{max. rated power}$ | All | | 65 | | kHz |
| Output Voltage adjustment | | All | -5 | | +5 | % |

GENERAL SPECIFICATIONS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|-----------|--|--------|------|------|------|---------|
| MTBF | $I_o=100\%$; $T_a=25^\circ\text{C}$ per MIL-HDBK-217F | All | | 300 | | 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 ($\pm X$ 、 $\pm Y$ 、 $\pm Z$ 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 |



CFM400S Series

GENERAL SPECIFICATIONS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|--|--|--------|--|------------|------|-------------|
| Weight | Baseplate versions Covered versions | All | | 470 550 | | g |
| Dimensions | With baseplate C (with cover) | All | 5.000x3.000x1.540 Inches (127.00x76.20x39.10 mm) 5.354x3.425x1.673 Inches (136.00x87.00x42.50 mm) | | | |
| Safety | Class I, EN/IEC/UL 62368-1 | | | | | Ed3.0 |
| EMC Emission | EN 55032:2015+A11:2020, EN 61000-6-3 2007+A1: 2011+AC: 2012, Class B EN IEC 61000-6-4:2019, 47 CFR FCC Part 15 Subpart B (Class B) EN IEC 61204-3:2018, EN IEC 61000-3-2:2019, EN 61000-3-3:2013+A1:2019 | | | | | |
| Conducted Disturbance | EN 55032:2015+A11:2020, EN 61000-6-3 2007+A1: 2011+AC: 2012, Class B EN IEC 61000-6-4:2019, 47 CFR FCC Part 15 Subpart B (Class B), EN IEC 61204-3:2018 | | | | | Class B |
| Radiated Disturbance | EN 55032:2015+A11:2020, EN 61000-6-3 2007+A1: 2011+AC: 2012, Class B EN IEC 61000-6-4:2019, 47 CFR FCC Part 15 Subpart B (Class B), EN IEC 61204-3:2018 | | | | | Class B |
| Harmonic Current Emissions | EN IEC 61000-3-2:2019 | | | | | Class A, C |
| Voltage Fluctuations & Flicker | EN 61000-3-3:2013+A1:2019 | | | | | |
| EMC Immunity | EN 55035:2017+A11:2020, EN IEC 61000-6-1:2019, EN IEC 61000-6-2:2019 EN IEC 61204-3:2018, IEC 61000-4-2, 3, 4, 5, 6, 8, 11 | | | | | |
| Electrostatic Discharge (ESD) | IEC 61000-4-2:2008, Air Discharge: ± 8 kV, Contact Discharge: ± 4 kV | | | | | Criterion A |
| Radio-Frequency, Continuous Radiated Disturbance | IEC 61000-4-3:2020 | | | | | Criterion A |
| Electrical Fast Transient (EFT) | IEC 61000-4-4:2012, ± 1 kV, ± 2 kV | | | | | Criterion A |
| Surge | IEC 61000-4-5:2014+A1:2017, L-N: ± 0.5 kV, ± 1 kV, L-E(Ground): ± 0.5 kV, ± 1 kV, ± 2 kV | | | | | Criterion A |
| Conducted Disturbances, Induced by RF Fields | IEC 61000-4-6:2013+COR1:2015 | | | | | Criterion A |
| Power Frequency Magnetic Field | IEC 61000-4-8:2009 | | | | | Criterion A |
| 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 | CFM400S Series App Notes | | | | | |

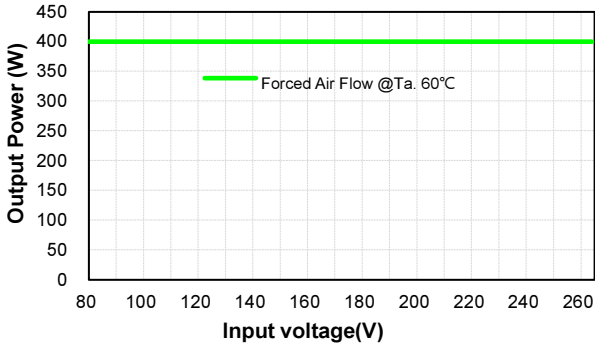


CHARACTERISTIC CURVE

Power Derating Curve

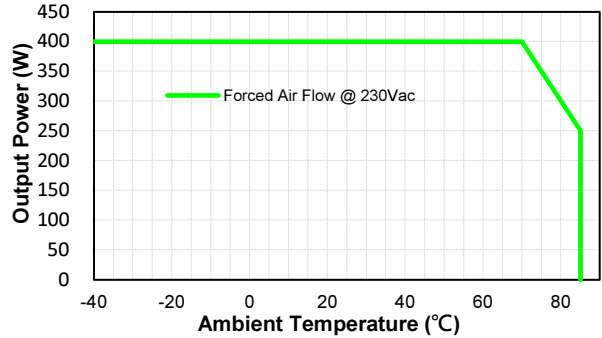
Forced Air Flow

Output power & Input voltage



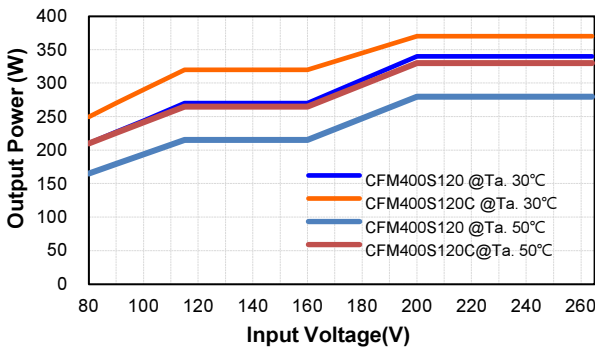
Forced Air Flow

Output power vs Ambient Temperature



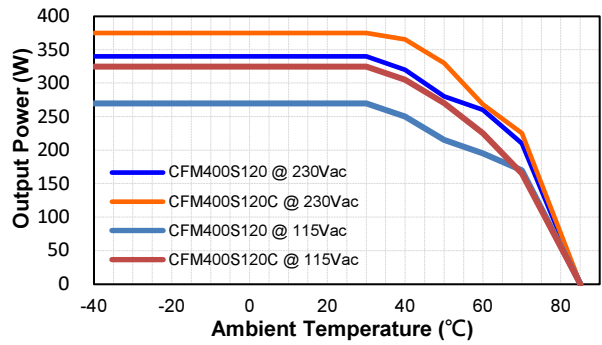
Natural Convection

Output power & Input Voltage

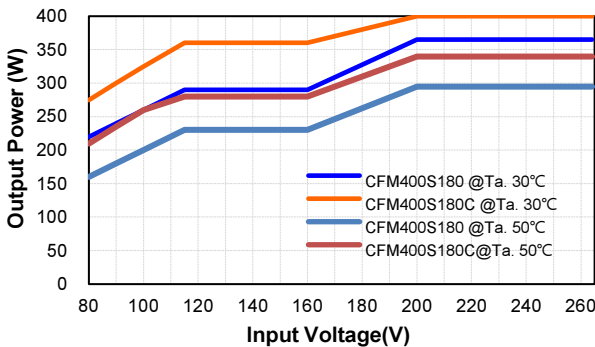


Natural Convection

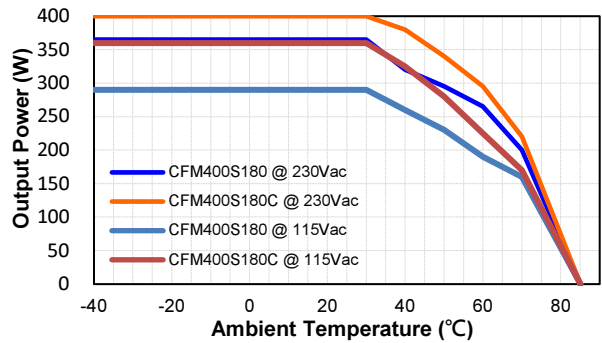
Output power vs Ambient Temperature



Output power & Input Voltage



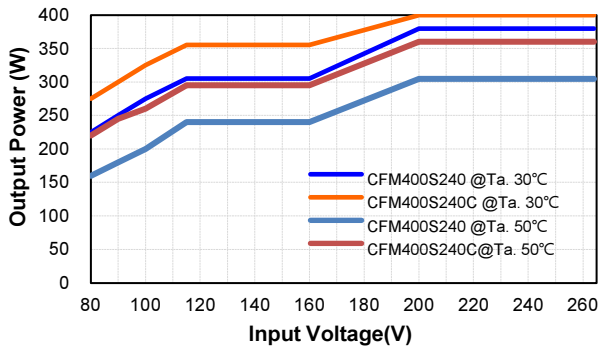
Output power vs Ambient Temperature



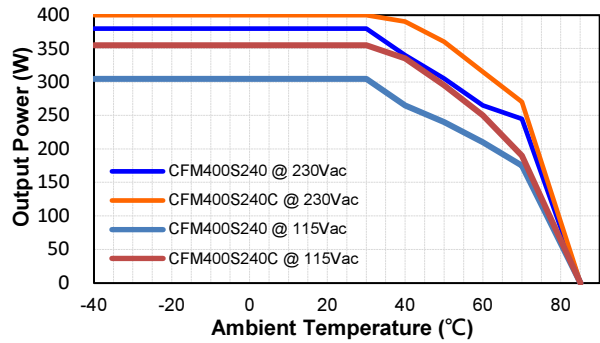


CFM400S Series

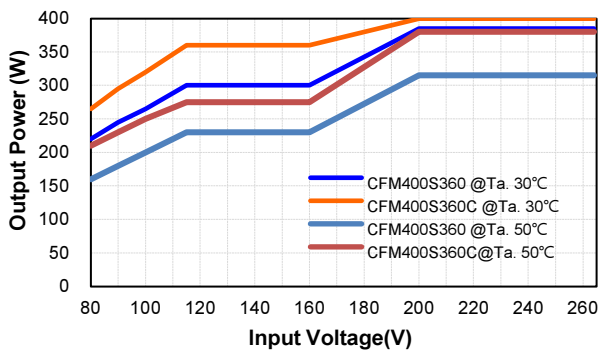
Output power & Input Voltage



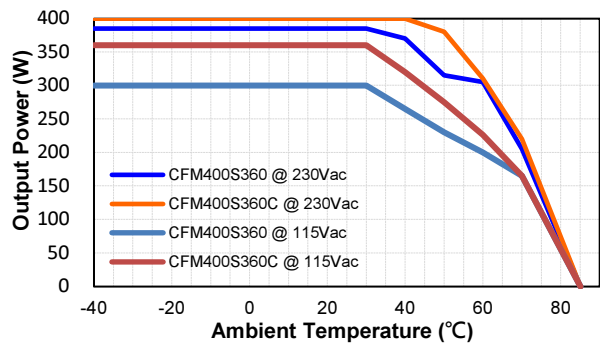
Output power vs Ambient Temperature



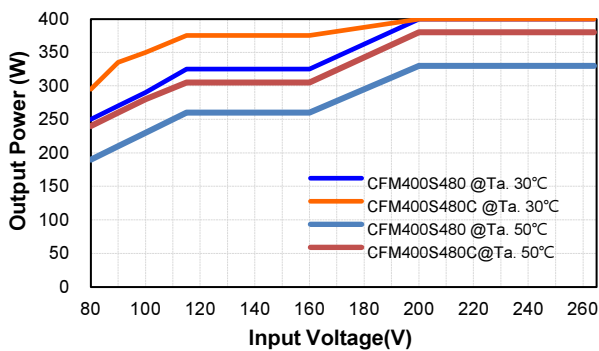
Output power & Input Voltage



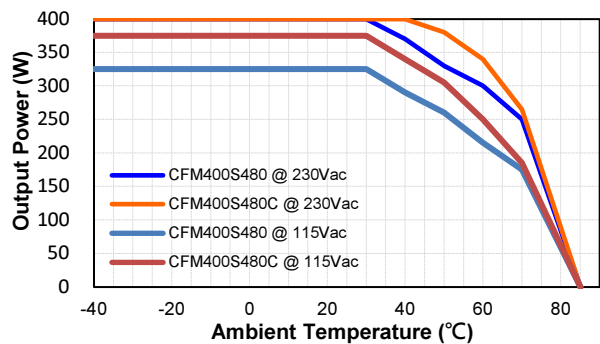
Output power vs Ambient Temperature



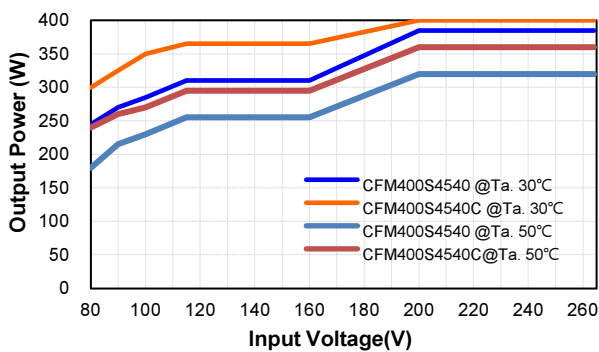
Output power & Input Voltage



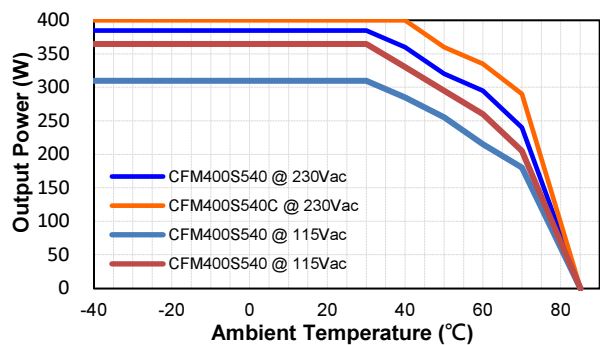
Output power vs Ambient Temperature



Output power & Input Voltage



Output power vs Ambient Temperature



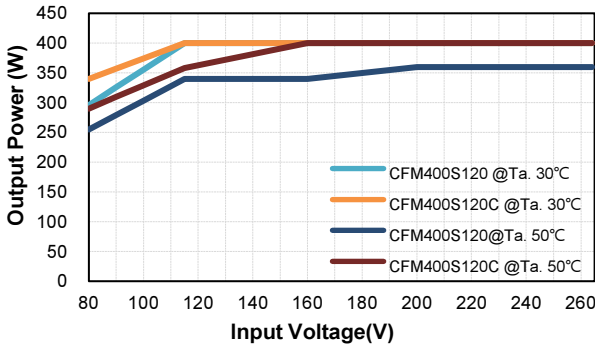


**Conduction Convection with External Baseplate
(48x24.8x0.12cm)**

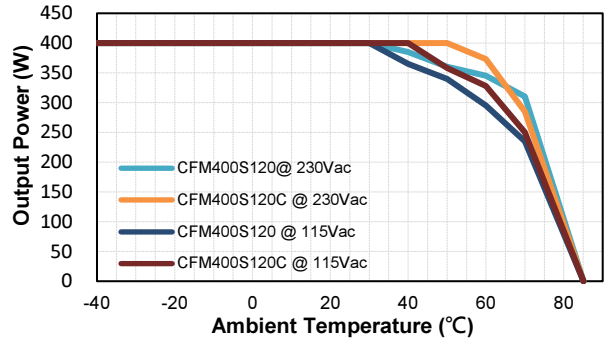
CFM400S Series

**Conduction Convection with External Baseplate
(48x24.8x0.12cm)**

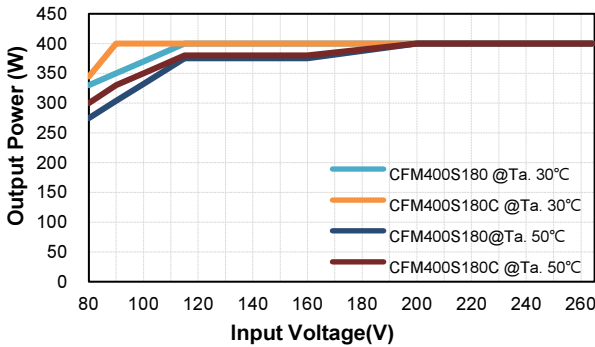
Output power & Input Voltage



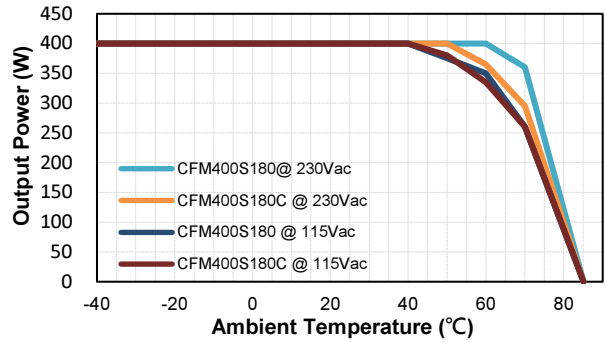
Output power vs Ambient Temperature



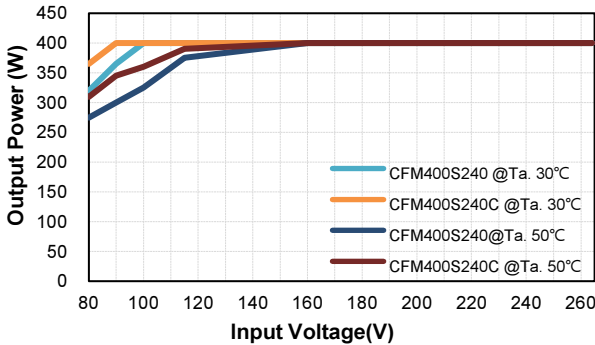
Output power & Input Voltage



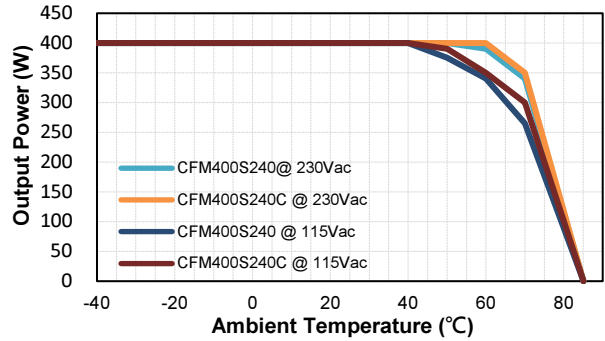
Output power vs Ambient Temperature



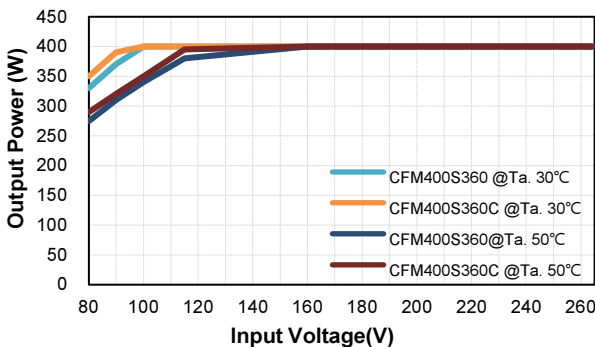
Output power & Input Voltage



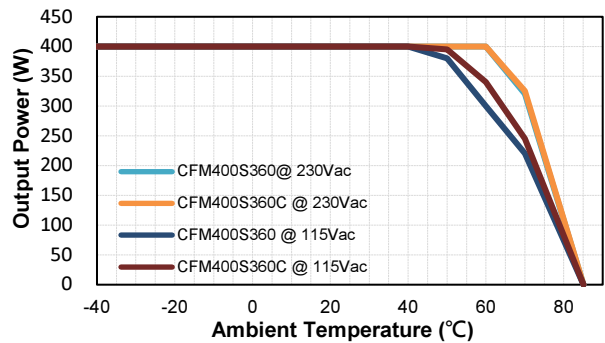
Output power vs Ambient Temperature



Output power & Input Voltage



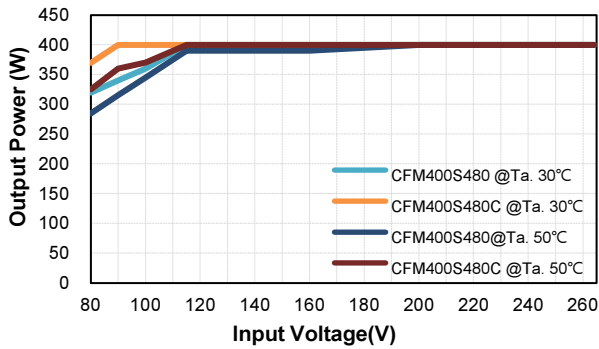
Output power vs Ambient Temperature



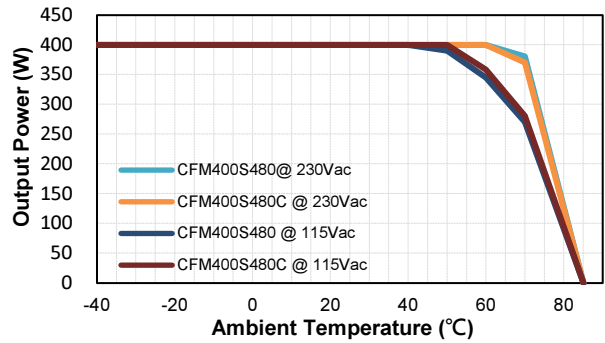


CFM400S Series

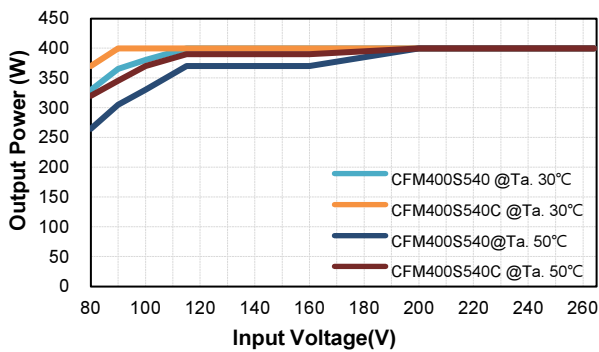
Output power & Input Voltage



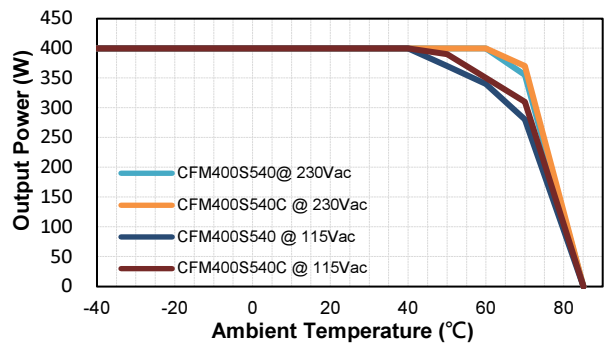
Output power vs Ambient Temperature



Output power & Input Voltage

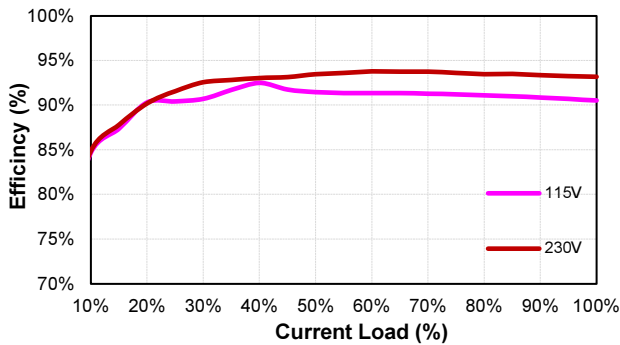


Output power vs Ambient Temperature

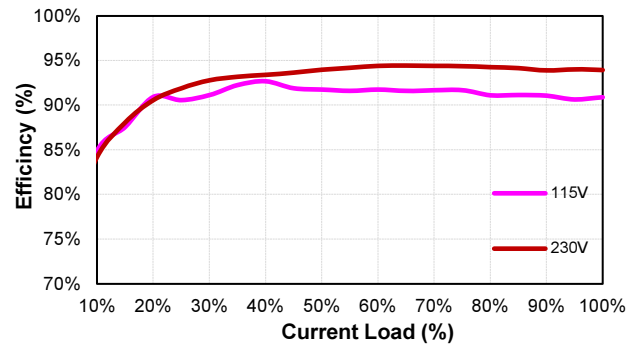


Performance Data

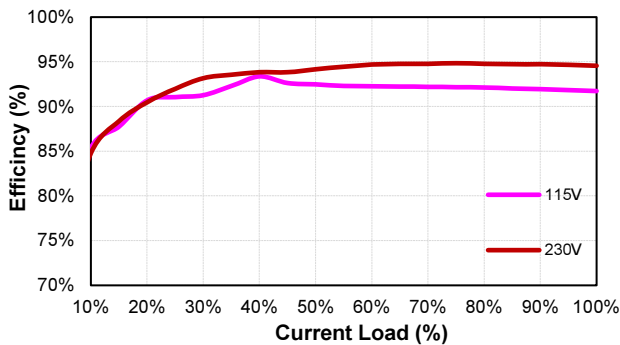
CFM400S120 (Eff Vs Io)



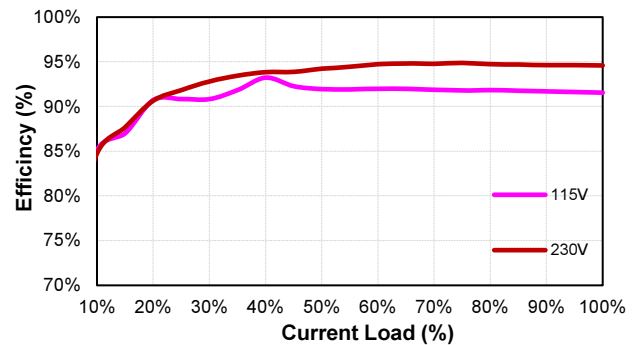
CFM400S180 (Eff Vs Io)



CFM400S240 (Eff Vs Io)



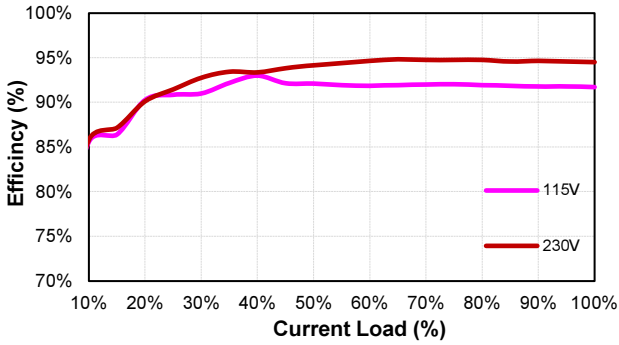
CFM400S360 (Eff Vs Io)



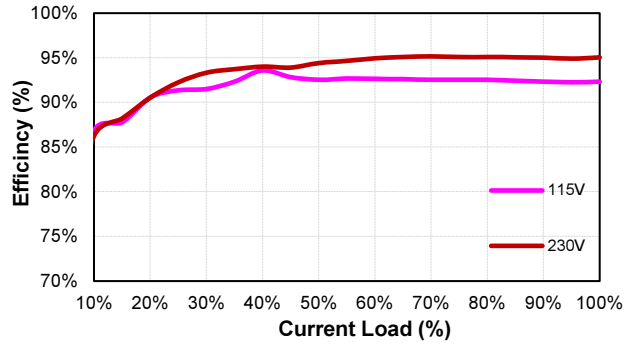


CFM400S Series

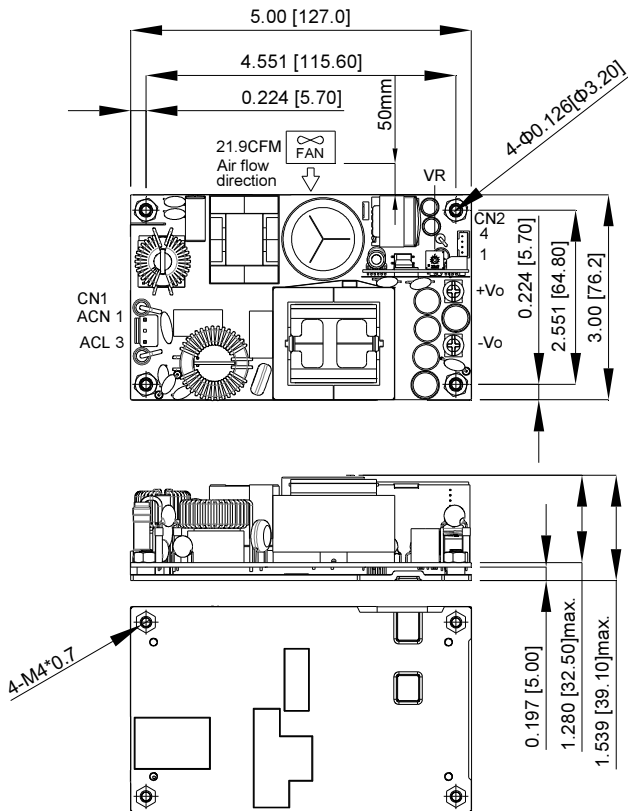
CFM400S480 (Eff Vs Io)



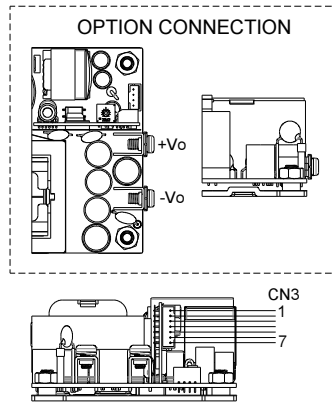
CFM400S540 (Eff Vs Io)



MECHANICAL SPECIFICATION



CFM400SXXX



| PIN CONNECTION | | |
|----------------|----------|-------|
| PIN | Function | Wafer |
| 1 | ACN | CN1 |
| 2 | - | |
| 3 | ACL | CN2 |
| 1 | GND | |
| 2 | +5VSB | |
| 3 | GND | CN3 |
| 4 | +12V-FAN | |
| 1 | GND | |
| 2 | PF | |
| 3 | FAN-EN | |
| 4 | PS-ON | |
| 5 | -Sense | |
| 6 | +Sense | |
| 7 | OPTION | |

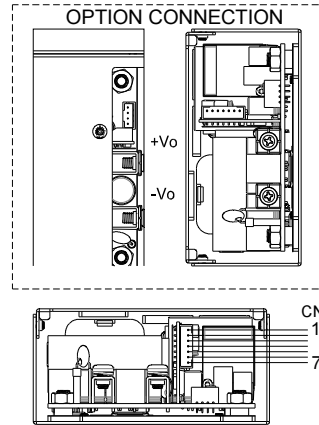
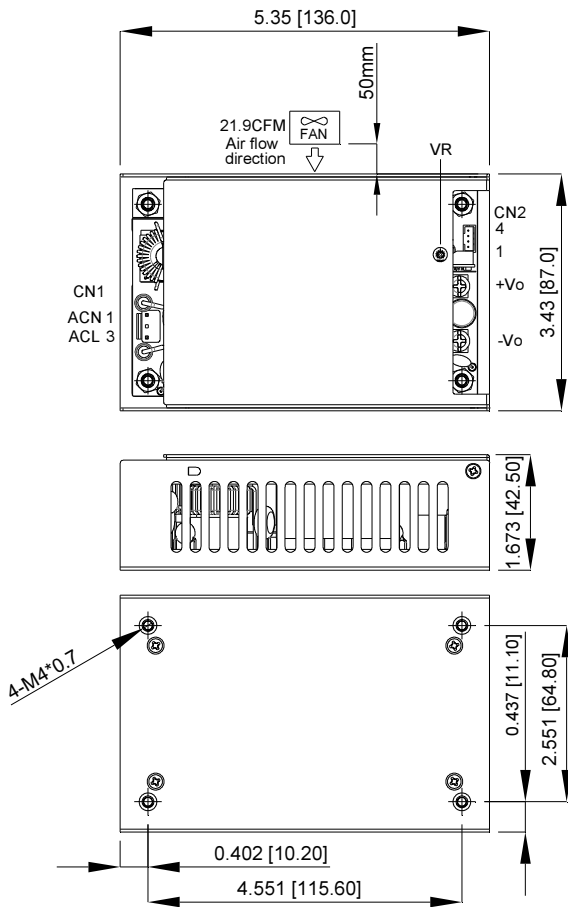
All Dimensions In Inches[mm]
 Tolerance Inches: x.xx = ± 0.03, x.xxx = ± 0.02
 Millimeters: x.x = ± 0.7, x.xx = ± 0.5



CFM400S Series

MECHANICAL SPECIFICATION

CFM400SXXXC



| PIN CONNECTION | | |
|----------------|----------|-------|
| PIN | Function | Wafer |
| 1 | ACN | CN1 |
| 2 | - | |
| 3 | ACL | CN2 |
| 1 | GND | |
| 2 | +5VSB | |
| 3 | GND | |
| 4 | +12V-FAN | CN3 |
| 1 | GND | |
| 2 | PF | |
| 3 | FAN-EN | |
| 4 | PS-ON | |
| 5 | -Sense | |
| 6 | +Sense | |
| 7 | OPTION | |

All Dimensions In Inches[mm]
 Tolerance Inches: x.xx = ± 0.03, x.xxx = ± 0.02
 Millimeters: x.x = ± 0.7, x.xx = ± 0.5

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