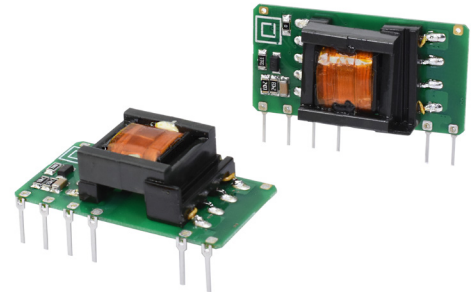


SERIES: PBO-15C | **DESCRIPTION:** INTERNAL AC-DC POWER SUPPLY

FEATURES

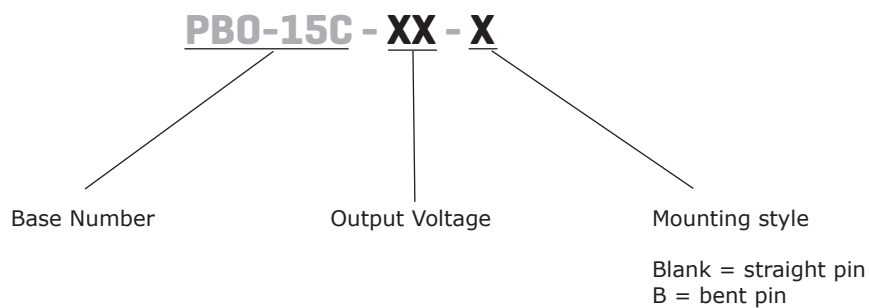
- wide input range (85~305 VAC or 100 – 430 VDC)
- available in straight-pin and bent-pin configurations
- wide operating temperature range (-40 to +85 C)
- over-voltage, over-current, short-circuit protection
- IEC/EN/UL 62368 certified
- designed to meet IEC/EN/UL 60335 requirements
- safety class II
- ideal for Industrial Control & Smart Home applications



| MODEL | output voltage | output current | output power | ripple and noise ¹ | efficiency ² |
|------------|----------------|----------------|--------------|-------------------------------|-------------------------|
| | (Vdc) | max (A) | max (W) | typ (mVp-p) | typ (%) |
| PBO-15C-3 | 3.3 | 3.0 | 9.9 | 150 | 75.0 |
| PBO-15C-5 | 5.0 | 2.8 | 14.0 | 150 | 77.0 |
| PBO-15C-9 | 9.0 | 1.67 | 15.0 | 150 | 82.0 |
| PBO-15C-12 | 12.0 | 1.25 | 15.0 | 150 | 82.0 |
| PBO-15C-15 | 15.0 | 1.0 | 15.0 | 150 | 84.0 |
| PBO-15C-24 | 24.0 | 0.625 | 15.0 | 150 | 85.0 |

Note: 1. At full load, nominal input, 20 MHz bandwidth oscilloscope, see Application Circuit.
2. At 230 Vac input.

PART NUMBER KEY



INPUT

| parameter | conditions/description | min | typ | max | units |
|---------------------------|------------------------|-----|-----|------|-------|
| voltage | AC input | 85 | | 305 | Vac |
| | DC input | 100 | | 430 | Vdc |
| frequency | | 47 | | 63 | Hz |
| current | at 115 Vac | | | 0.4 | A |
| | at 230 Vac | | | 0.25 | A |
| inrush current | at 115 Vac | | 18 | | A |
| | at 230 Vac | | 35 | | A |
| no load power consumption | at 230 Vac | | | 0.25 | W |

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|----------------------------|--------------------------------|-----|-------|--------|-------|
| capacitive load | 3.3 Vdc output models | | | 20,000 | μF |
| | 5 Vdc output models | | | 15,000 | μF |
| | 9 Vdc output models | | | 5,000 | μF |
| | 12 Vdc output models | | | 4,000 | μF |
| | 15 Vdc output models | | | 2,000 | μF |
| | 24 Vdc output models | | | 1,000 | μF |
| initial set point accuracy | 3.3 Vdc output | | ±3 | | % |
| | other outputs | | ±2 | | % |
| line regulation | at full load | | ±0.5 | | % |
| load regulation | 0% ~ 100% load, 3.3 Vdc output | | ±2 | | % |
| | 0% ~ 100% load, 5 Vdc output | | ±1.5 | | % |
| | 0% ~ 100% load, other outputs | | ±1 | | % |
| hold-up time | at 115 Vac | | 10 | | ms |
| | at 230 Vac | | 40 | | ms |
| switching frequency | | | 65 | | kHz |
| temperature coefficient | | | ±0.02 | | %/°C |

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|------|-------|
| over voltage protection | output voltage clamp | | | | |
| | 3.3 & 5 Vdc output models | | | 9.0 | Vdc |
| | 9 Vdc output models | | | 12.0 | Vdc |
| | 12 Vdc output models | | | 16.0 | Vdc |
| | 15 Vdc output models | | | 20.0 | Vdc |
| | 24 Vdc output models | | | 30.0 | Vdc |
| over current protection | auto recovery | 110 | | | % |
| short circuit protection | continuous, auto recovery | | | | |

SAFETY & COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|-------------------|--|-------|-----|-----|-------|
| isolation voltage | input to output for 1 minute, leakage current <5mA | 3,000 | | | Vac |
| safety approvals | certified to 62368: IEC, EN, UL | | | | |
| | designed to meet 60335: IEC, EN, UL | | | | |
| safety class | class II | | | | |
| EMI/EMC | CISPR32/EN55032 CLASS A (Recommended circuit 1, 4) | | | | |
| | CISPR32/EN55032 CLASS B (Recommended circuit 2, 3) | | | | |
| ESD | IEC/EN 61000-4-2 Contact ±6kV perf. criteria B | | | | |
| radiated immunity | IEC/EN61000-4-3 10V/m perf. criteria A | | | | |

SAFETY & COMPLIANCE (CONTINUED)

| parameter | conditions/description | min | typ | max | units |
|--------------------------------|---|-----------|-----|-----|-------|
| EFT/burst | IEC/EN61000-4-4 ±2KV (Recommended circuit 1, 2) perf. criteria B IEC/EN61000-4-4 ±4KV (Recommended circuit 3, 4) perf. criteria B | | | | |
| surge | IEC/EN61000-4-5 line to line ±1KV (Recommended circuit 1, 2) perf. criteria B IEC/EN61000-4-5 line to line±2KV (Recommended circuit 3, 4) perf. criteria B | | | | |
| conducted immunity | IEC/EN61000-4-6 10Vr.m.s perf. criteria A | | | | |
| voltage dips and interruptions | IEC/EN61000-4-11 0%, 70% perf. criteria B | | | | |
| MTBF | as per MIL-HDBK-217F at 25 °C | 1,000,000 | | | hours |
| RoHS | yes | | | | |

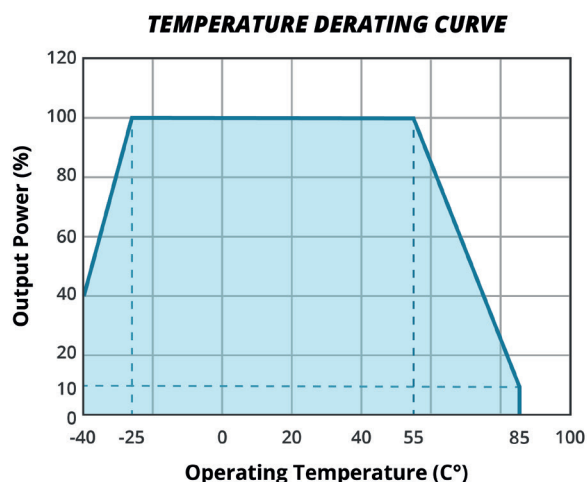
ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | | -40 | | 85 | °C |
| storage temperature | | -40 | | 105 | °C |
| storage humidity | | | | 95 | % |

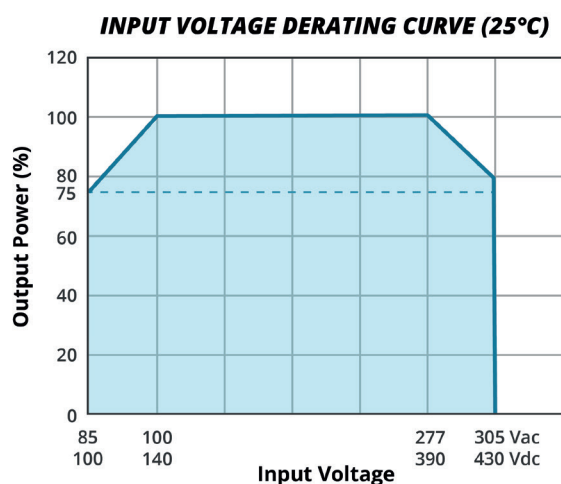
SOLDERABILITY

| parameter | conditions/description | min | typ | max | units |
|----------------|------------------------|-----|-----|-----|-------|
| wave soldering | for 5~10 seconds | 255 | 260 | 265 | °C |
| manual welding | for 3~5 seconds | 350 | 360 | 370 | °C |

DERATING CURVE



Key
 — Input voltage:
 85 - 305 Vac
 100 - 430 Vdc



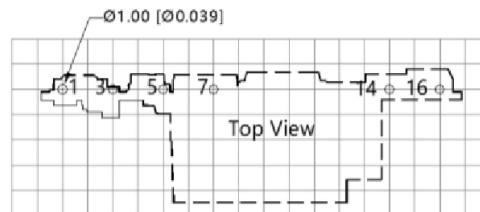
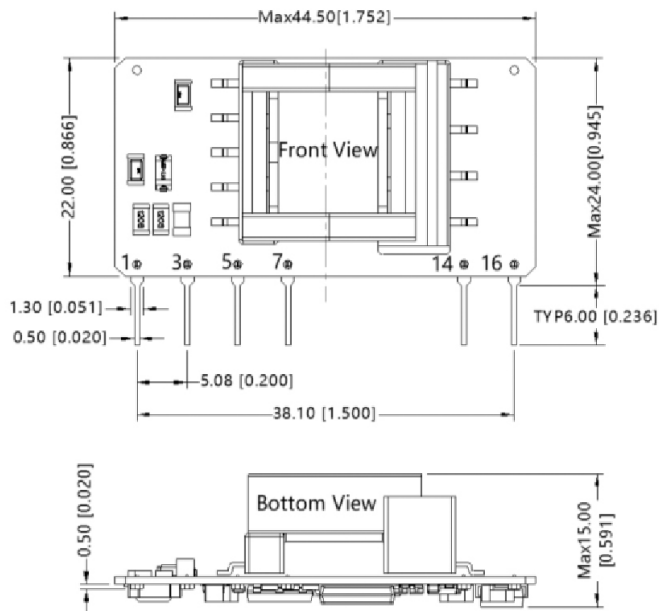
MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|------------|---|-----|-----|-----|-------|
| dimensions | 44.50 x 24.00 x 15.00 mm (1.751 x 0.944 x 0.590 inches) | | | | inch |
| weight | | | 11 | | g |
| cooling | free air convection | | | | |

MECHANICAL DRAWING

Straight-pin configuration

units: mm [inch]
 pin section tolerance: ± 0.10 [± 0.004]
 general tolerance: ± 0.50 [± 0.020]



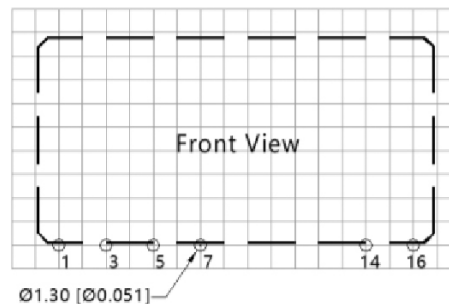
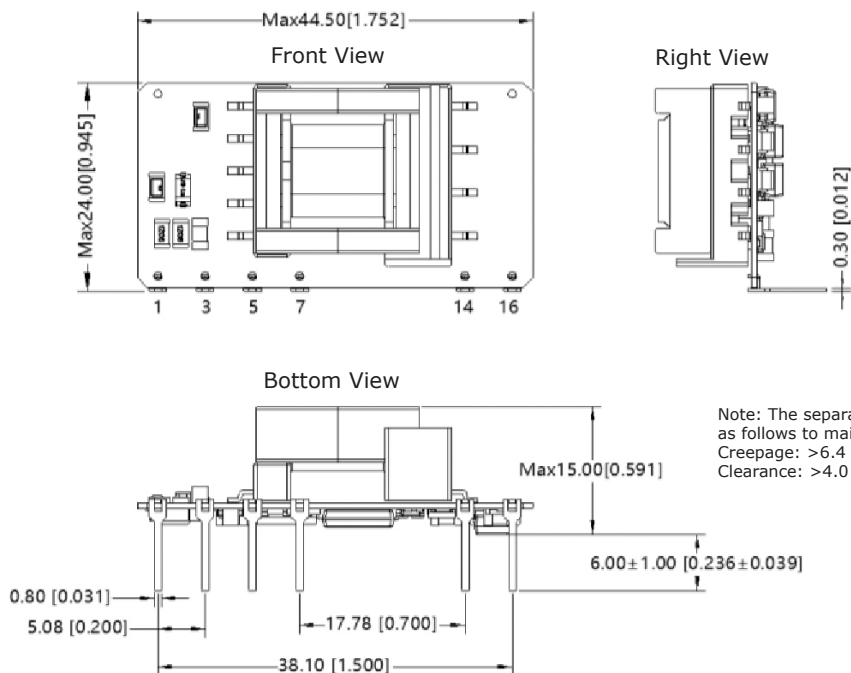
Note: Grid 2.54*2.54mm

Note: The separation between all primary and secondary circuits must be maintained as follows to maintain the safety requirements:
 Creepage: >6.4 mm
 Clearance: >4.0 mm

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | AC (N) |
| 3 | AC (L) |
| 5 | +V (cap) |
| 7 | -V (cap) |
| 14 | -Vo |
| 16 | +Vo |

Bent-pin configuration

units: mm [inch]
 pin section tolerance: ± 0.10 [± 0.004]
 general tolerance: ± 0.50 [± 0.020]

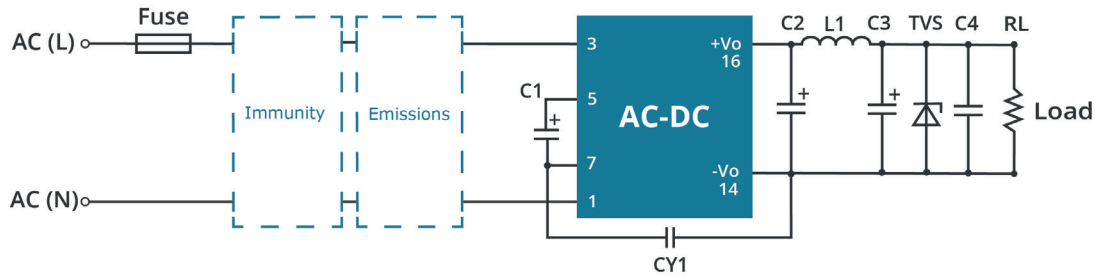


Note: Grid 2.54*2.54mm

Note: The separation between all primary and secondary circuits must be maintained as follows to maintain the safety requirements:
 Creepage: >6.4 mm
 Clearance: >4.0 mm

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | AC (N) |
| 3 | AC (L) |
| 5 | +V (cap) |
| 7 | -V (cap) |
| 14 | -Vo |
| 16 | +Vo |

APPLICATION DESIGN REFERENCE



Note: All applications must follow this minimum circuit implementation. Additional environmental and application-specific variations are listed in the following pages.

| PBO-15C Series additional component selection guide | | | | | | | | |
|---|-----------------|---------------|-----------------------------------|------------------|----------------------------|-----------|----------------|----------|
| Part no. | FUSE (required) | C1 (required) | C2 (required) | L1 (required) | C3 ¹ (required) | C4 | CY1 (required) | TVS |
| PBO-15C-3 | 1A/300V | 33µF/450V | 470µF/16V (solid-state capacitor) | 2.2µH (Max 22mΩ) | 220µF/16V | 0.1µF/50V | 2.2nF/400Vac | SMBJ7.0A |
| PBO-15C-5 | | | | | | | | SMBJ7.0A |
| PBO-15C-9 | | | | | | | | SMBJ12A |
| PBO-15C-12 | | | SMBJ20A | | | | | |
| PBO-15C-15 | | | SMBJ20A | | | | | |
| PBO-15C-24 | | | SMBJ30A | | | | | |

Note: 1. C3 is recommended to be a high frequency electrolytic capacitor with low ESR.

| PBO-15C Series Environmental and EMC selection guide | | | | | |
|--|--|---------------------|-------------------------|-----------|-----------|
| Recommended circuit | Typical application | Input voltage range | Environment temperature | Emissions | Immunity |
| 1 | General purpose | 85~305Vac | -40°C to 85°C | Class A | Class III |
| 2 | Smart home, home appliances, intelligent building, intelligent agriculture | | -25°C to 55°C | Class B | Class III |
| 3 | Indoor industrial | | -25°C to 55°C | Class B | Class IV |
| 4 | Outdoor, video monitoring, charging point, communications, security | | -40°C to 85°C | Class A | Class IV |

Circuit 1

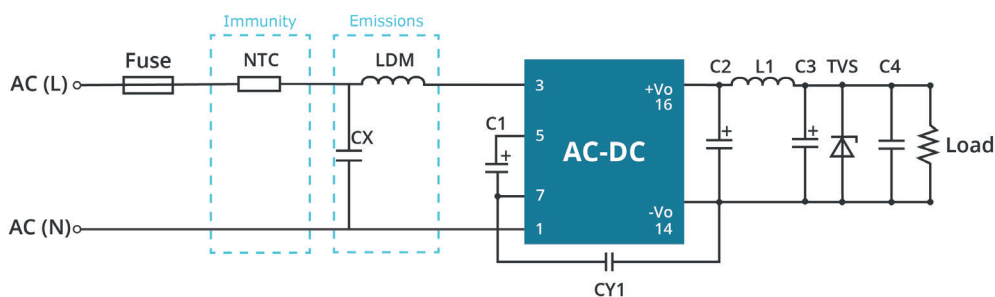


Table 1

| Ambient temperature range | Immunity Class | Emissions Class |
|---------------------------|----------------|-----------------|
| -40°C ~ 85°C | Class III | Class A |

| Component | Recommended value |
|-----------------|----------------------------|
| NTC | 10D - 10 |
| LDM | 1.2mH (min: 0.4A, max: 4Ω) |
| CX | 0.1μF/310Vac |
| FUSE (required) | 1A/300V, slow blow |

Circuit 2

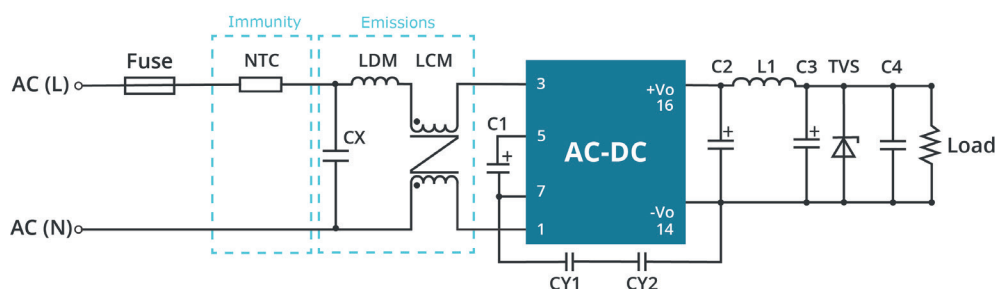


Table 2

| Ambient temperature range | Immunity Class | Emissions Class |
|---------------------------|----------------|-----------------|
| -25°C ~ 55°C | Class III | Class B |

| Component | Recommended value |
|-----------------|------------------------------|
| NTC | 10D - 10 |
| CY1 (CY2) | 2.2nF/400Vac |
| LCM | 10mH (min: 0.4A, max: 600mΩ) |
| LDM | 0.33mH (min: 0.4A, max: 1Ω) |
| CX | 0.22μF/310Vac |
| FUSE (required) | 1A/300V, slow blow |

Note: When designing applications for household use (e.g. Smart Home or Home Appliance application), two Y-Caps (CY1 & CY2 valued at 2.2nF/400Vac each) are required in series to satisfy 60335 household safety requirements. Non-household applications can use one Y-Cap (CY1 valued at 2.2 nF/400Vac).

APPLICATION DESIGN REFERENCE (CONTINUED)

Circuit 3

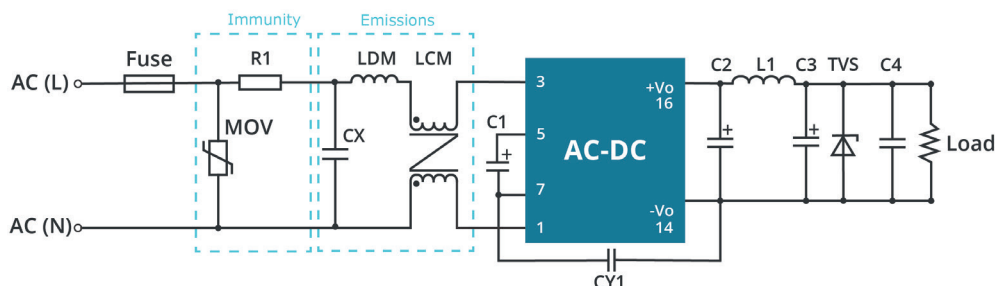


Table 3

| | | |
|---------------------------|----------------|-----------------|
| Ambient temperature range | Immunity Class | Emissions Class |
| -25°C ~ 55°C | Class IV | Class B |

| Component | Recommended value |
|-----------------|------------------------------|
| MOV | S14K350 |
| CY1 | 2.2nF/400Vac |
| CX | 0.22μF/310Vac |
| LCM | 10mH (min: 0.4A, max: 600mΩ) |
| LDM | 0.33mH (min: 0.4A, max: 1Ω) |
| R1 | 12Ω/3W |
| FUSE (required) | 2A/300V, slow blow |

Circuit 4

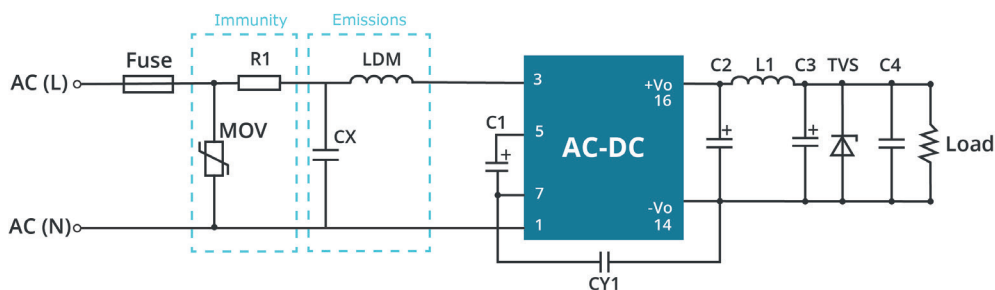


Table 4

| | | |
|---------------------------|----------------|-----------------|
| Ambient temperature range | Immunity Class | Emissions Class |
| -40°C ~ 85°C | Class IV | Class A |

| Component | Recommended value |
|-----------------|----------------------------|
| MOV | S14K350 |
| LDM | 1.2mH (min: 0.4A, max: 4Ω) |
| CX | 0.1μF/310Vac |
| R1 | 12Ω/3W |
| FUSE (required) | 2A/300V, slow blow |

REVISION HISTORY

| rev. | description | date |
|------|---|------------|
| 1.0 | initial release | 08/25/2020 |
| 1.01 | datasheet update | 12/14/2020 |
| 1.02 | derating curves and circuit figures updated | 01/24/2022 |

The revision history provided is for informational purposes only and is believed to be accurate.



Headquarters
20050 SW 112th Ave.
Tualatin, OR 97062
800.275.4899

Fax 503.612.2383
cui.com
techsupport@cui.com

CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

CUI reserves the right to make changes to the product at any time without notice. Information provided by CUI is believed to be accurate and reliable. However, no responsibility is assumed by CUI for its use, nor for any infringements of patents or other rights of third parties which may result from its use.

CUI products are not authorized or warranted for use as critical components in equipment that requires an extremely high level of reliability. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.