## 2 x 4” 250W AC-DC Power Supplies

https://product.tdk.com/en/power/cus-m
www.emea.lambda.tdk.com/cus250m



Medical | Industrial | Test | LED | Broadcast | COMM

The compact CUS250M is packaged in the industry standard 2x4” footprint. The series can deliver 250 W with forced-air or conduction cooling at ambient temperatures of up to 45°C. With Medical & ITE certifications, the unit can be used in both Class I & Class II (no ground wire) applications, and meets Class B Conducted and Radiated EMI with generous margins. Input voltage range includes operation down to 80Vac (see instruction manual for ratings). Other options include a 5V standby voltage, remote on/off, DC_OK and AC_Fail signals, with a U channel, cover or top fan mechanical construction.

| Features | Benefits |
|---|---|
| • Up to 250W Utilizing Convection and Conduction Cooling | • Quiet Operation |
| • Operation in Ambient Temperatures of up to 85ºC | • Suitable for High Ambient Temperature Environments |
| • Medical Certifications (2 x MOPP) | • Suitable for B and BF Type Medical Equipment |
| • Class B Conducted and Radiated EMI with Significant Margins | • Easier System EMC Compliance |
| • Certified for Class I and Class II installations | • Flexible Utilisation |
| • Compact 2 x 4 x 1.56” / 50.8 x 101.6 x 39.5mm Size | • Space Saving in End Equipment |
| • Enclosure & Cooling Options | • Versatile Application |
| • EN60335-1 Compliant | • Suitable for Household and Similar Electrical Appliances |

## Model Selector

| Model | Nominal Output Voltage (V) | Output Adjustment (1) (V) | Fan Supply (V) | Maximum Current Forced Air (A) | Maximum Power Forced Air (W) |
|---|---|---|---|---|---|
| CUS250M-12 | 12 | 12 - 13.2 | 11.4 | 20.83 | 250 |
| CUS250M-15 | 15 | 15 - 16.5 | 11.4 | 16.66 | 250 |
| CUS250M-18 | 18 | 18 - 19.8 | 11.4 | 13.88 | 250 |
| CUS250M-24 | 24 | 24 - 26.4 | 11.4 | 10.41 | 250 |
| CUS250M-28 | 28 | 28 - 30.8 | 11.4 | 8.92 | 250 |
| CUS250M-36 | 36 | 36 - 39.6 | 11.4 | 6.94 | 250 |
| CUS250M-48 | 48 | 48 - 52.8 | 11.4 | 5.2 | 250 |

**CUS250M- | 12 | / | U | M | - | J**

**12** — Output voltage 12, 15, 18, 24, 28, 36, 48

**U**

| | |
|---|---|
| blank | Open frame (with integral baseplate) |
| U | U channel |
| A | U channel with cover |
| F | U channel, cover and top mounted fan |
| C | M3 inserts for underside mounting |

**M**

| | |
|---|---|
| blank | JST connectors |
| M (2) | Molex type input connectors |

**-**

| | |
|---|---|
| blank | Dual fuses |
| E (2) | Single input fuse in line |

**J**

| | |
|---|---|
| blank | No options |
| G | 5V 0.1A standby supply, remote on/off (enable), DC_OK, AC_Fail |
| J | 5V 0.1A standby supply, remote on/off (inhibit), DC_OK, AC_Fail |

Notes:
See website for detailed specifications, test methods and installation manual.
Specification parameters apply at 25ºC ambient temperature unless otherwise stated.
(1) Output voltage is user adjustable or can be factory set.
Non-standard output versions may be subject to minimum order quantities and variations to specification.
For all non-standard output voltage settings please consult Sales.
(2) Subject to Minimum Order Quantities. Please contact Sales

Preferred models

## Specifications

| Model | | CUS250M |
|---|---|---|
| **Input** | | |
| Input Voltage Range (Operating) | Vac | 80 - 264 (3) |
| Nominal Input Voltage Range | Vac | 100 - 240 (Note: Safety certified for 80-264Vac) |
| Input Frequency | Hz | 47 - 63 (4) |
| Input Current (100Vac) | A | 3.1 |
| Inrush Current at 230Vac (Cold Start) | A | <75. Note: the inrush $I^2t$ is significantly below the rating of the internal 5A fast acting fuse, or an external circuit breaker |
| Leakage Current | uA | <150 at 264Vac 63Hz |
| Touch Current (Enclosure Leakage) | uA | Class I: <10, Class II: <70, at 264Vac 63Hz |
| Power Factor (115/230Vac) | - | >0.9 / >0.7 (>20% load) |
| Harmonic Compliance | - | Meets IEC61000-3-2 Class A |
| No Load Power Consumption | W | <0.5 (230Vac) when output is inhibited |
| Hold Up Time | ms | >14 |
| Efficiency | % | Up to 94 |
| Average Efficiency | % | >91 Measured at 25%, 50%, 75% and 100% load conditions |
| Conducted & Radiated EMI | - | EN55032 / EN55011-B (See application notes for conditions) |
| Immunity | - | Designed to meet IEC60601-1-2 Ed.4.1, see immunity table |
| Insulation Class | - | Construction suitable for Class I or Class II installation |
| Safety Certifications and Markings | - | IEC/ES/EN 60601-1 and IEC/UL/EN 62368-1; IEC/EN 61010-1 (5). Compliant with IEC/EN 60335-1 (6), CE Mark and UKCA Mark |

Notes:
(3) Derate output power linearly by 1%/Vac to 225W load from 100 to 90Vac input. Output power is reduced by 2%/Vac between 90Vac and 80Vac (180W at 80Vac)
(4) For operation at 440Hz please consult Technical Sales.
(5) For product labelled on or after 20th December 2024
(6) For 15V, 18V, 28V, 36V & 48V output product labelled on or after 15th January 2025. (12V and 24V models have been compliant since August 2022

## Immunity

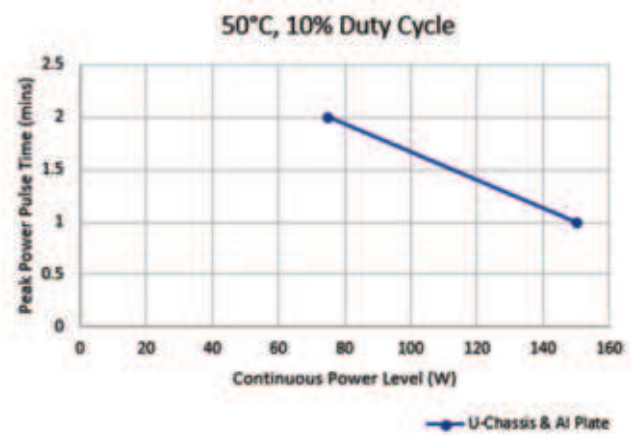
| Test | Test | UOM | Level & Criteria |
|---|---|---|---|
| IEC61000-4-2 (ESD) | Enclosure Port | Lvl | Level 4, Criteria A |
| | AC Port | Lvl | Level 4, Criteria A |
| | CH1 and Standby | Lvl | Level 3, Criteria A |
| | Signal I/O Port (Remote On/Off, AC_FAIL, DC_OK) | Lvl | Level 3, Criteria A |
| IEC61000-4-3 (Radiated Immunity) | 80 MHz to 2.7 GHz | V/m | 10 (Level 3, Criteria A) |
| | 2.7 GHz to 6 GHz | V/m | 10 (Level 3, Criteria A) |
| EN 60601-1-2:2015 (Radiated Immunity) | Immunity to RF Wireless Communications Equipment (Table 9) | - | All Criteria, Criteria A |
| CISPR 35 | 1.8 GHz to 5 GHz | V/m | 3 (Table 1, condition 1.3 requirements, Criteria A) |
| IEC 61204-3: 2000 | 900 MHz (Keyed Carrier) | V/m | 3 (Criteria A) |
| IEC61000-4-4 | AC Port | kV | 4 (Level 4, Criteria A) |
| (Electrical Fast Transient Burst) | CH1 | kV | 2 (Level 4, Criteria A) |
| | Fan Out, Standby | kV | N/A |
| | Signal I/O Port (Remote On/Off, AC_FAIL, DC_OK) | kV | 2 (Level 4, Criteria A) |
| IEC61000-4-5 (Surge) | (AC input common mode) | kV | 2 (Level 3, Criteria A) |
| | (AC input normal mode) | kV | 1 (Level 3, Criteria A) |
| IEC61000-4-6 (Conducted Susceptibility) | (AC input common mode) | V | 10 (Level 3, Criteria A) |
| | (DC output common mode) | V | 10 (Level 3, Criteria A) |
| | (Fan Out, Standby common mode) | V | N/A |
| | (Signal I/O common mode) | V | N/A |
| IEC61000-4-8 (Power Frequency Mag. Field) | | A/m | (Level 4, Criteria A) |
| IEC61000-4-11 (Voltage dips / Interruption) | When leaving the factory (bulk-capacitor life degradation not considered) | - | Class 3 |
| | 0% for 0.5 cycle | Criteria | A |
| | 0% for 1 cycle | Criteria | A ≤175W, B >175W |
| | 40% for 10/12 cycles | Criteria | 100Vac: A≤50W, B>50W; 220Vac: A |
| | 70% for 25/30 cycles | Criteria | 100Vac: A≤150W, B>150W; 220Vac: A |
| | 80% for 250/300 cycles | Criteria | 100Vac: A≤200W, B>200W; 220Vac: A |
| IEC60601-1-2 (Voltage dips / Interruption) | 0% for 250/300 cycles | Criteria | B |
| | When leaving the factory (bulk-capacitor life degradation not considered) | - | - |
| | 0% for 0.5 cycle | Criteria | A |
| | 0% for 1 cycle | Criteria | A ≤175W, B >175W |
| | 70% for 25/30 cycles | Criteria | 100Vac: A≤150W, B>150W; 220Vac: A |
| IEC61000-6-2 (Voltage dips / Interruption) | 0% for 250/300 cycles | Criteria | B |
| | 0% for 1 cycle | Criteria | B |
| | 40% for 10/12 cycles | Criteria | C |
| | 70% for 25/30 cycles | Criteria | C |
| IEC61204-3 (Voltage dips / Interruption) | 0% for 250/300 cycles | Criteria | C |
| | 30% for 10 ms | Criteria | B |
| | 60% for 100 ms | Criteria | 100Vac: A≤70W, B>70W; 220Vac: A |
| SEMI F47 | 95% for 5000 ms | Criteria | C |
| | 50% for 0.2 s | Criteria | 170Vac: A≤240W, B>240W; 220Vac: A |
| | 70% for 0.5 s | Criteria | A |
| | 80% for 1s | Criteria | A |
| IEC61000-4-12 (Ringwave Test) | | - | (Level 3, Criteria A) |
| EN61000-4-14 (Voltage Fluctuations) | | - | Class 3, Criteria A |

## Specifications

| Model | | CUS250M |
|---|---|---|
| **Output** | | |
| Switching Frequency | kHz | Variable frequency from 25 to 300 (excluding burst mode) for the PFC, DC-DC and flyback converters. Frequencies vary with input voltage, output voltage and output load. |
| Line Regulation | % | <0.5 (85 - 264Vac) |
| Load Regulation | % | <1 (0 - 100% load) |
| External Load Capacitance | uF | 12V: 20,830, 15V: 16,660, 18V: 9,440, 24V: 2,290, 28V: 4,460, 36V: 3,470, 48V: 1,300 |
| Ripple & Noise | % | <1 of nominal output for operating temperatures above 0°C<br>12V model: <2, other voltages: <1.5 at -20°C. <2 in burst mode when the load is <10% of the rated current<br>External load capacitance will reduce the amplitude. |
| Temperature Coefficient | %/°C | ±0.02 |
| Minimum Load | - | No minimum load required |
| Overcurrent Protection | % | 110 to 170. Hiccup mode, automatic recovery |
| Overvoltage Protection | - | 115-140% of standard output voltage<br>Latching (unit shutdown), cycle AC input or use remote on/off to reset |
| Overtemperature Protection | - | Latching, cycle AC or use remote on/off to reset |
| Remote Sense | - | None |
| Remote On/Off (Optional) | - | Opto-isolated. Inhibit: High = OFF, Low = ON, Enable: High = ON, Low = OFF |
| Standby Voltage (Optional) | - | 5V 0.1A |
| Fan Supply (Standard) | - | 11.4V 0.5A |
| DC_OK Signal (Optional) | - | Opto-isolated signal, transistor is on when main output is good |
| AC_Fail signal (Optional) | - | Opto-isolated signal, transistor is on when AC input is good |
| Parallel Operation | - | Not possible |
| Series Operation | - | Not possible |
| **Environmental** | | |
| Operating Temperature (-40°C start-up) | °C | -20 to +85 with system forced air cooling (70 maximum for fan version /F), see derating curves below |
| Storage Temperature | °C | -40 to +85 (70 maximum for fan version /F) |
| Operating Humidity (non-condensing) | %RH | 5 - 95 (15 - 90 for /F fan version) |
| Pollution Degree | - | PD2 Material group IIIb |
| Cooling | - | Convection, conduction or forced air cooling. See derating curves below |
| Altitude | m | 5,000 |
| Withstand Voltage (For 1 minute) | Vac | Input to Ground 1,500 (1xMOPP), Input to Output 4,000 (2xMOPP), Output to Ground 1,500 (1xMOPP) |
| Isolation Resistance | MΩ | >100 at 25°C, 70%RH & 500VDC |
| Vibration (non-operating) | - | 2G, 10-500Hz for 1 hour |
| Shock (non-operating) | - | 30G, 11ms half sine |
| **Other** | | |
| Weight | g | Open frame: 275, /A: 320, /C: 275, /F: 345, /U: 305 |
| Size (WxLxH) | mm | Open frame : 50.8 x 101.6 x 39.5<br>U channel : 64 x 119.2 x 39.5<br>Cover (/A) : 64 x 119.2 x 43<br>Fan (/F) : 64 x 119.2 x 60.6 |
| Size (WxLxH) | Inches | Open frame: 2 x 4 x 1.56<br>U channel : 2.52 x 4.69 x 1.56<br>Cover (/A) : 2.52 x 4.69 x 1.69<br>Fan (/F) : 2.52 x 4.69 x 2.39 |
| Connectors | - | Input: JST B2P3-VH, Output: M3 screw, Fan: Molex 22-05-7025, Signals: Molex 87833-0833 |
| Warranty | yrs | 5 |

## Peak Power Rating Curves

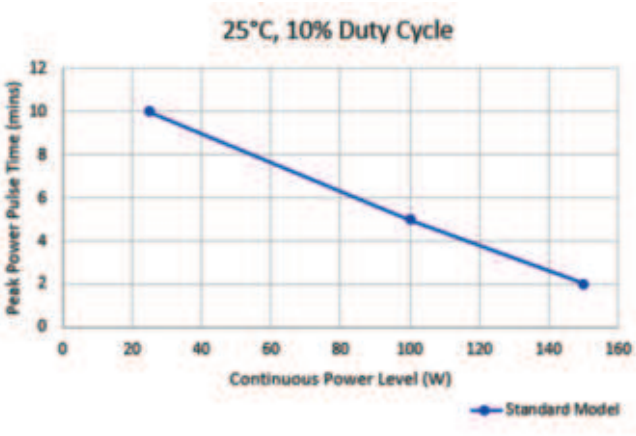
### U chassis configuration, convection cooled on metal baseplate




Examples:
150W continuous - 250W peak - 1 min pulse time - 10% duty cycle
75W continuous - 250W peak - 2 mins pulse time - 10% duty cycle

## Peak Power Rating Curves

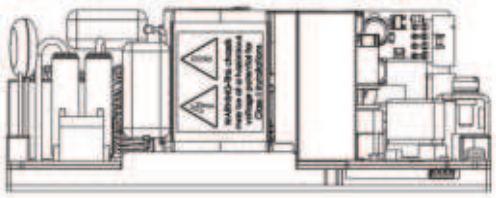
### Open frame configuration, convection cooled (no metal baseplate)



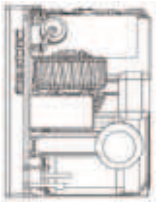

Examples:
150W continuous - 250W peak - 2 mins pulse time - 10% duty cycle
100W continuous - 250W peak - 5 mins pulse time - 10% duty cycle
25W continuous - 250W peak - 10 mins pulse time - 10% duty cycle

## Orientation

### Horizontal Orientation A



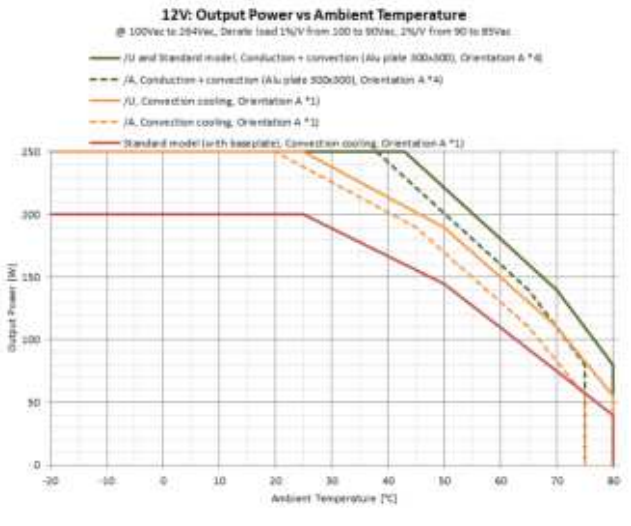
### Vertical Orientation B



Notes:
See website for detailed specifications, test methods and installation manual.
Specification parameters apply at 25°C ambient temperature unless otherwise stated.

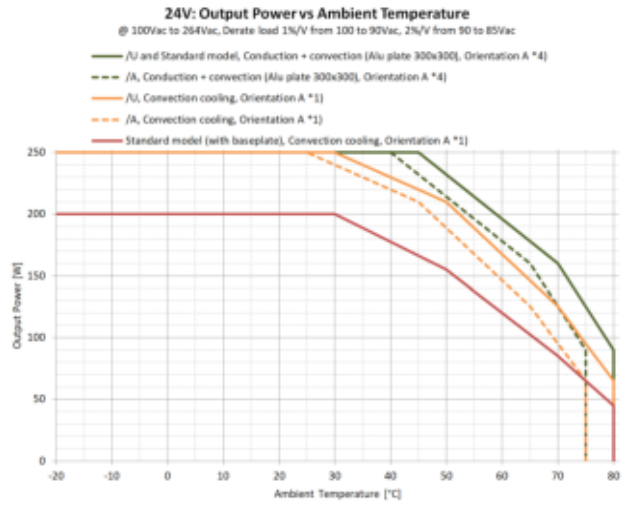
## Output Power vs Ambient Temperature

### Conduction/convection cooled CUS250M-12

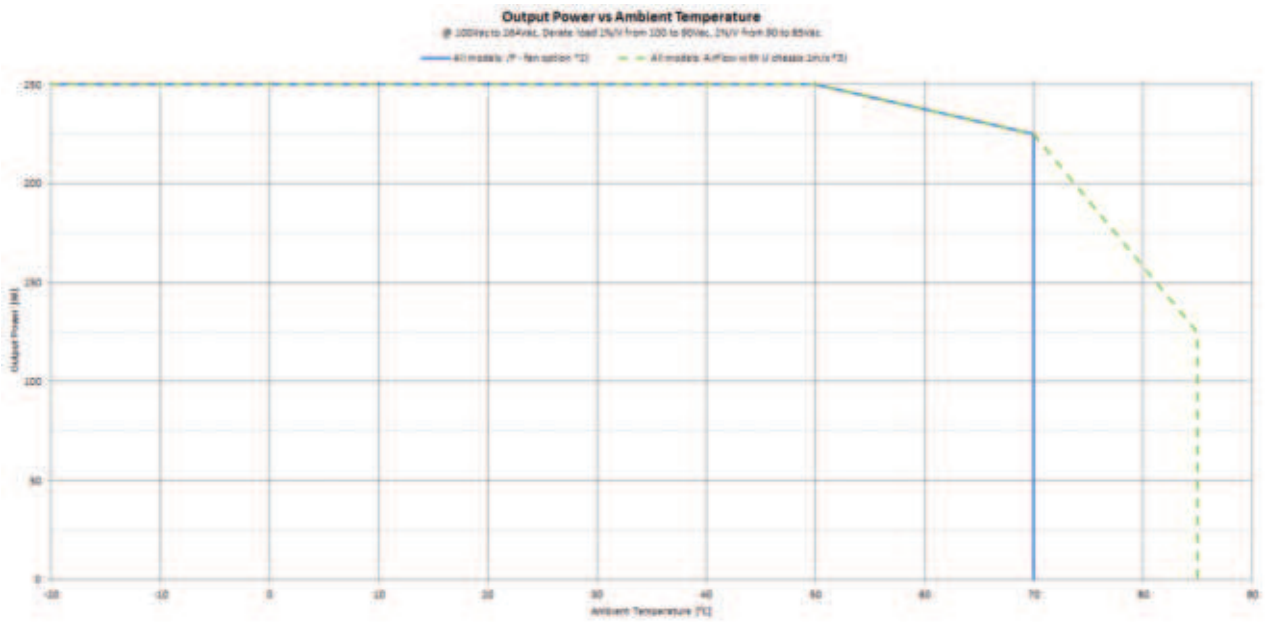



## Output Power vs Ambient Temperature

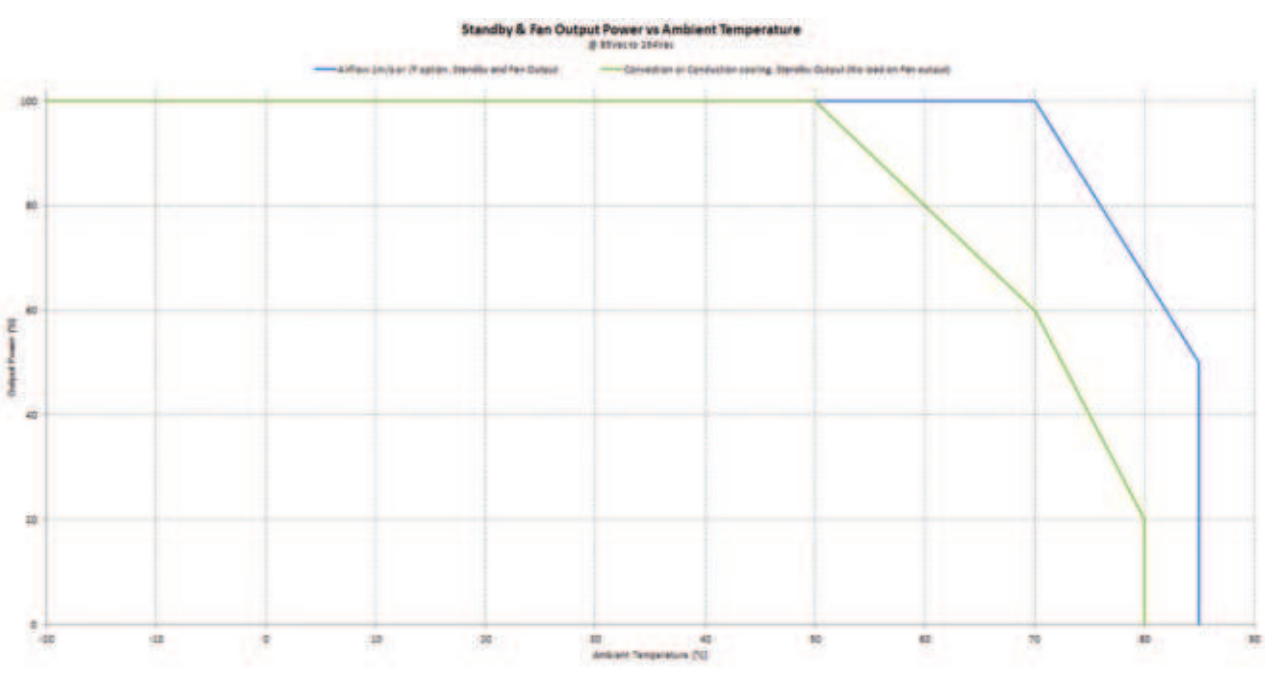
### Conduction/convection cooled CUS250M-24



## Output Power vs Ambient Temperature (forced air cooled) all CUS250M voltages




## Standby and Fan Output Power vs Ambient Temperature




Notes

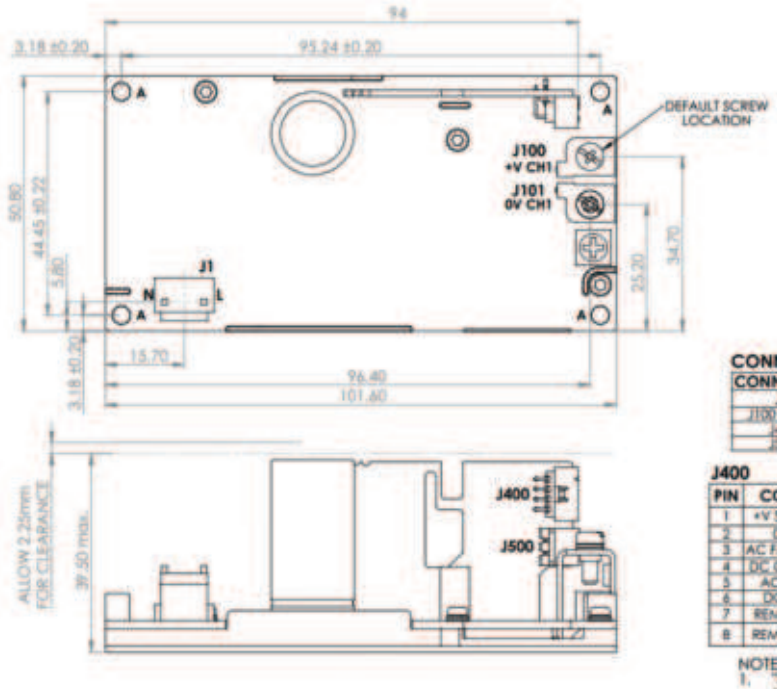
1: Orientation A (see Application Note), 50mm above surface.
Standby output is loaded (see derating curves for Standby output), no load on Fan output

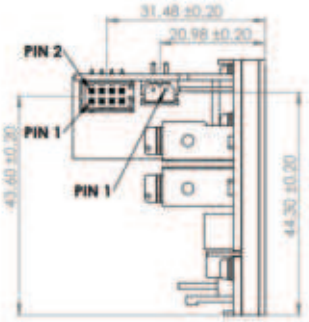
2: 50mm above surface. Limited by fan specification to 70°C maximum

3: Tested with U chassis with airflow direction 1 (see Application Note).
The customer must ensure that the airflow rate and direction keep component temperatures below the specified limits.
Standby and Fan output load according to derating curves.
Measured in wind tunnel with 5mm space on side of U chassis.

4: Mounted on natural aluminium plate, 300x300x1mm lifted 50mm above other surfaces
Orientation A (see Application Note)
Standby output is loaded (see derating curves for Standby output), no load on Fan output

## Outline Drawing CUS250M Open Frame Unit (Integral baseplate)




**CONNECTORS**

| CONNECTOR | MANUFACTURER | HOUSING | CRIMP |
|---|---|---|---|
| J1 | JST | VAR-2 | SVA-411-P1.1 |
| J100 & J101 | - | - | M3 TAG |
| J400 | MOLEX | 51110-0851 | 50394 |
| J500 | MOLEX | 50-37-5023 | 08-70-1039 |

**J400**

| PIN | CONNECTION |
|---|---|
| 1 | +V STANDBY (+5V) |
| 2 | 0V STANDBY |
| 3 | AC FAIL COLLECTOR |
| 4 | DC OK COLLECTOR |
| 5 | AC FAIL EMITTER |
| 6 | DC OK EMITTER |
| 7 | REMOTE ON/OFF - |
| 8 | REMOTE ON/OFF + |

**J1**

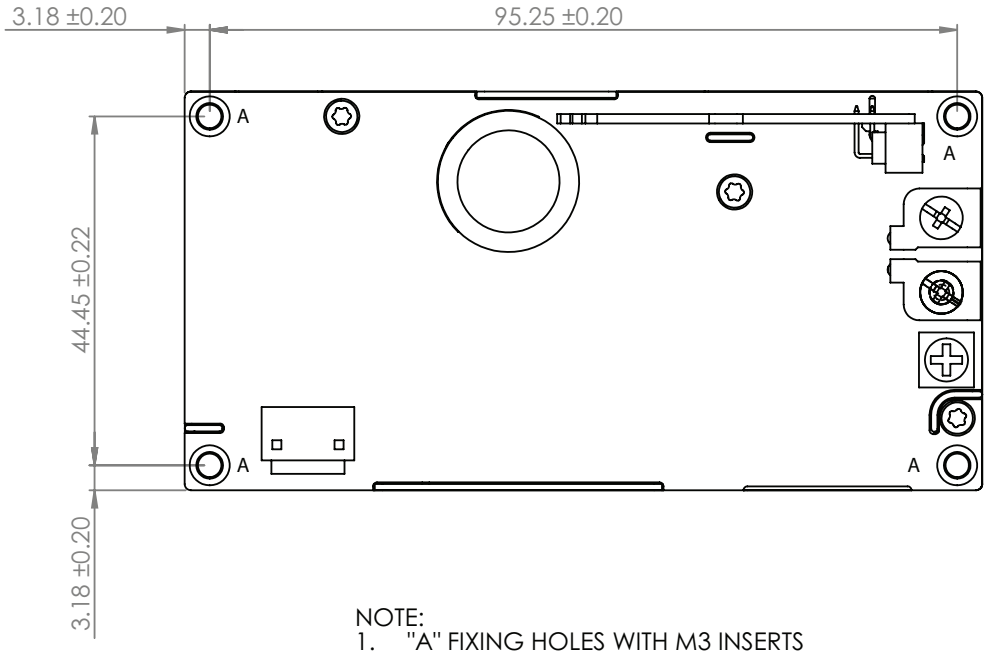
| PIN | CONNECTION | |
|---|---|---|
| | MOLEX | JST |
| 1 | NEUTRAL | LIVE |
| 2 | NOT CONNECTED | NOT CONNECTED |
| 3 | LIVE | NEUTRAL |

**J500**

| PIN | CONNECTION |
|---|---|
| 1 | +V FAN |
| 2 | 0V FAN |

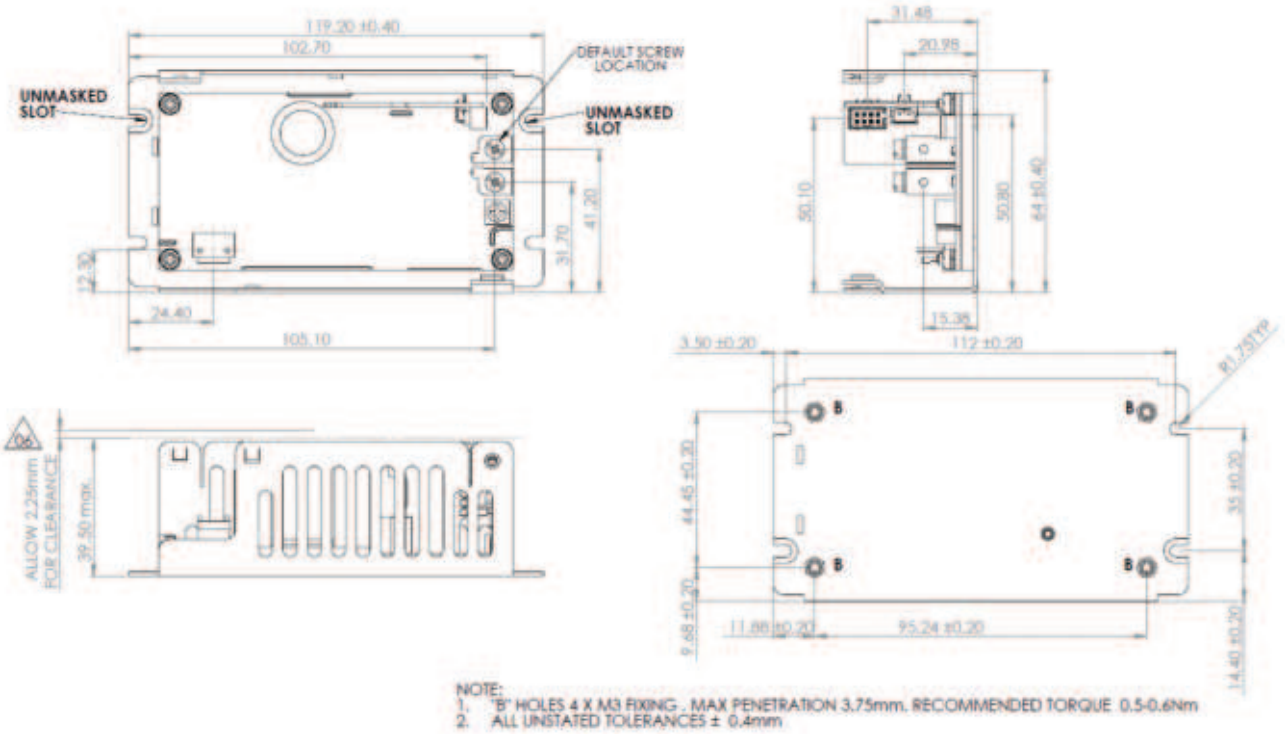
NOTE:
1. "A" FIXING HOLES ø3.5 TO ACCOMMODATE M3 SCREW. MAXIMUM TOP SIDE WASHER DIAMETER - 6mm
2. ALL UNSTATED TOLERANCES ± 0.4mm

## Outline Drawing CUS250M/C Open Frame Unit with inserts (Integral baseplate)

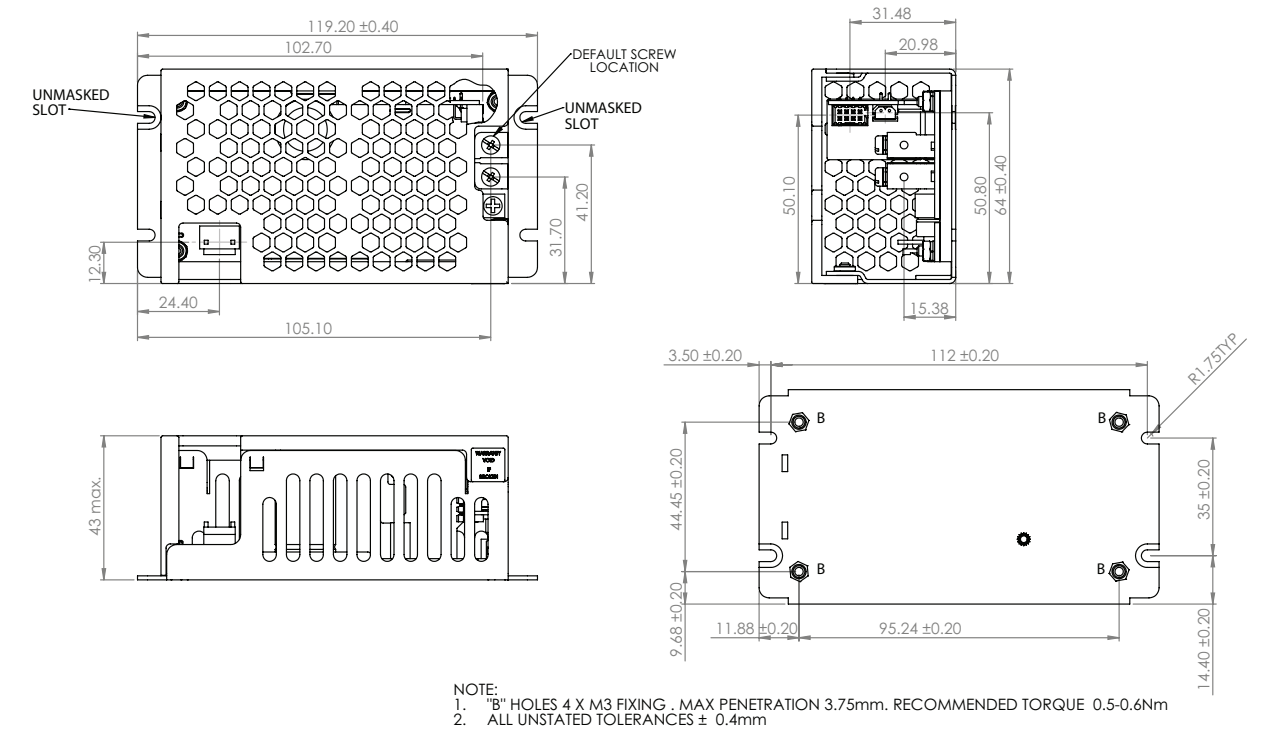



NOTE:
1. "A" FIXING HOLES WITH M3 INSERTS
2. ALL UNSTATED TOLERANCES ± 0.4mm

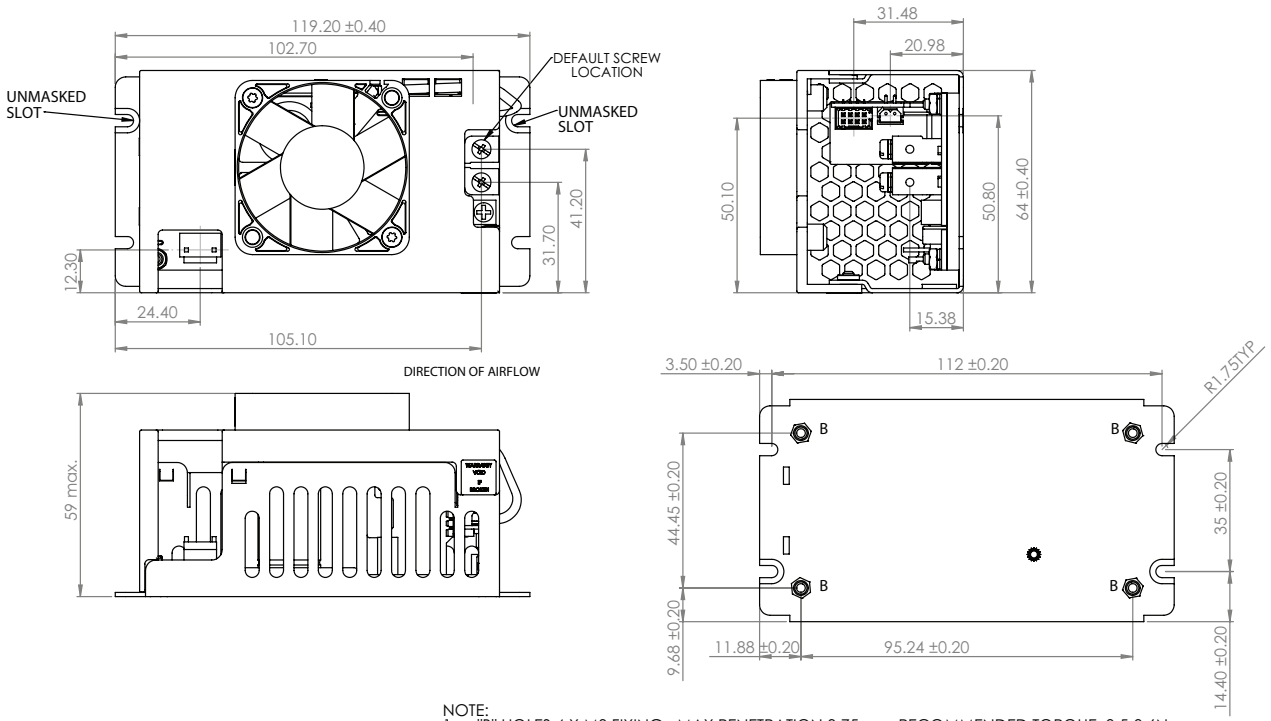
## Outline Drawing CUS250M/U (U Channel) Option




## Outline Drawing CUS250M/A (U Channel with Cover) Option



## Outline Drawing CUS250M/F (U Channel with Cover & Top Mounted Fan) Option




NOTE:
1. "B" HOLES 4 X M3 FIXING . MAX PENETRATION 3.75mm. RECOMMENDED TORQUE 0.5-0.6Nm
2. ALL UNSTATED TOLERANCES ± 0.4mm

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For additional information, please visit
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