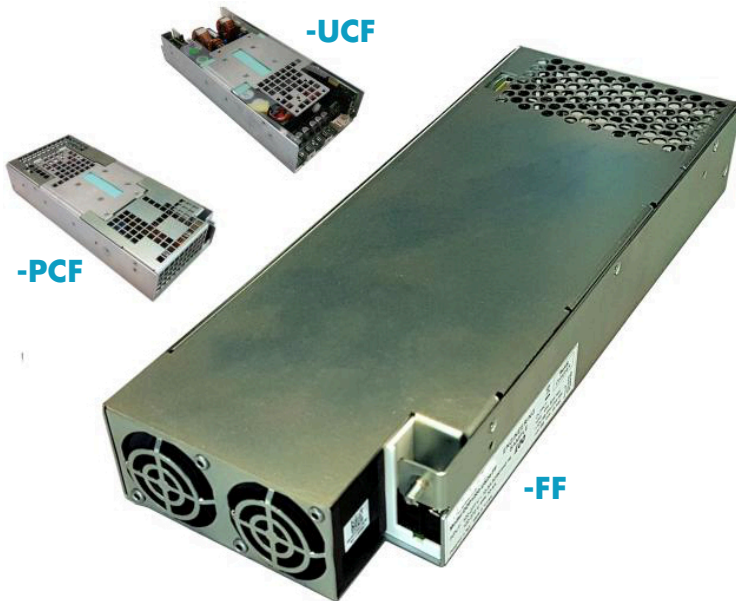


ITE AND SSL APPROVED, 1200 W AC-DC COMPACT, EFFICIENT, POWER SUPPLY

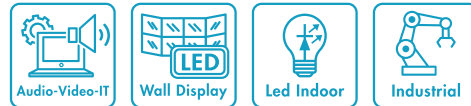
DDP1200 (FF, UCF, PCF) Series



Certifications



Applications



FEATURES

- » Universal input voltage range (85 – 305 V_{AC});
- » Input inrush current limiting;
- » 1200 W rated power;
- » High efficiency up to 94%;
- » Single 24 or 48 V_{DC} output voltage available;
- » Active PFC, EN61000-3-2 compliant (Class C, >25% load);
- » Low earth / touch leakage current;
- » Fan speed control function;
- » Over temperature, OV, OC and SC protections;
- » +12 V, 0.5 A; +5 V, 1 A Stand by outputs;
- » Built-in current sharing and OR-ing for parallel operation and N+1 redundancy;
- » Remote On / Off signal;
- » Power good and remote sense signals;
- » All packages fit 1U applications;
- » ITE safety approval to IEC 62368-1, IEC 60950; and LED lighting approval to UL 8750;
- » RoHS 3 compliant (Directive 2015/863/UE);
- » 5000 m altitude operation;
- » PMBus™ digital power-management protocol supported;

MARKET SEGMENTS AND APPLICATIONS

- » Video Wall Display, Entertainment Lighting;
- » LED Lighting Engine;
- » Industrial Control Systems;
- » Industrial Laser Applications;

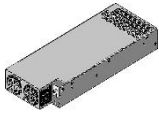
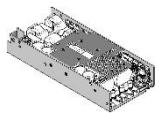
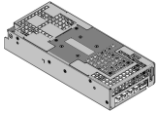
PRODUCT DESCRIPTION

Rated for IT / Industrial and LED lighting, the DDP1200 series of AC-DC power supplies offer increased embedded power in multiple 1U compatible packages, high energy efficiency and wide versatility. The series provides a steady 1200 W of regulated DC power through 180-305 V_{AC} and 1000 W through 85-137 V_{AC} input voltage ranges in a single output of 24 or 48 VDC. The DDP1200 series is available in three (3) compact 1U height compatible packages; one, enclosed with a built-in front mounted pair of fans and two (available only 24V variant), U-shaped chassis with or without protective cover, to facilitate system integration. By converting AC power at a 94% typical efficiency rate, the DDP1200 series generates very little heat allowing for optimal thermal management. The series offers a 12 V_{DC}, 0.5 A and a 5 V_{DC}, 1 A stand-by output and the full set of protection features including high breaking capacity fuses on both AC lines, input under voltage lockout (IUV), output over-current (OC), output short-circuit (SC), output over-voltage (OV) and over-temperature (OT). The DDP1200 series supports digital power management over the PMBus™ communications protocol enabling interoperability with and easy integration into a system. In addition, analogue control signals include Power Good (P_OK), Remote On / Off (+/-PS_Inhibit) and Sense terminals (RS+, RS-). Multiple DDP1200 units may be used in parallel mode for redundancy and / or higher power, made possible with the internal OR-ing and current sharing functions. The dual front-mounted fan version provides the full output rated power up to 60 °C. Its fan rotation speed is digitally controlled to guarantee the minimum required airflow, minimizing audible noise for quiet operation, and enhancing the power supply service life time. Rated power is also achieved in the U-chassis variants, with

or without protecting cover, when providing them with an 800 LFM airflow from top side up to 55 °C. All variants can be operated up to 70 °C de-rating the output power. The DDP1200 series complies with the latest IEC/EN/UL 62368-1, 60950-1 safety standards for Audio Video and Information Technologies and with the UL8750 safety standard for LED Lighting. The DDP1200 series meets the EN 55032 EMC

limits of Class B for conducted and radiated emissions, the EN 61000-3 for flicker and harmonics content and the EN 55024, EN 61000-6-2 for EM immunity.

Model Coding and Output Ratings

| Model Grade, Output Power | Output Voltages | Packages and Cooling | |
|-------------------------------------|------------------------------------|---|---|
| IT/Industrial Grade: DDP1200 | 24 V _{DC} : -US24- |  Front Mounted Fans: -FF |  U-Chassis External Forced Air Cooling: -UCF (only available for the 24V variant) |
| | 48 V _{DC} : -US48- | |  Perforated Cover External Forced Air Cooling: -PCF (only available for the 24V variant) |

| Output parameter | 24 V | | 48 V | |
|---|---|---|--|---|
| | 180-305 V _{AC} 163-300 V _{DC} | 85-137 V _{AC} 120-163 V _{DC} | 180-305 V _{AC} 163-300 V _{DC} | 85-137 V _{AC} 120-163 V _{DC} |
| V1 Nom Voltage | 24 V _{DC} | | 48 V _{DC} | |
| V1 Adjust Range | ±5% V _{NOM} | | | |
| V1 Rated Power | ±5% V _{NOM} | | | |
| V1 Rated Current | 1200 W | 1000 W | 1200 W | 1000 W |
| V1 Line Regulation | ±0.1% | | | |
| V1 Load Line Cross Regulation | ±2% | | | |
| V1 Ripple & Noise | 1% Peak-to-peak | | | |
| V1 Transient response | ±5%V1 to 25% load change at 1 A/μs | | | |
| V1 Over Current Protection | <75 A | | <75 A | |
| V1 Over Voltage protection | 116% V _{NOM} < V _{OUT} < 145% V _{NOM} | | | |
| V1 Max Out Capacitance | 16000 μF | | 16000 μF | |
| 12 _{V_{SB}} Nominal Voltage | 12 V _{DC} (stand-by output voltage is referred to the same V1 output voltage return) | | | |
| 12 _{V_{SB}} Rated Current | 0.5 A (maximum +12 V _{SB} and +5 V _{SB} combined output power is 6 W) | | | |
| 12 _{V_{SB}} Ripple & Noise | 120 mV Peak-to-peak | | | |
| 12 _{V_{SB}} Line Cross Regulation | ±5% | | | |
| 5 _{V_{SB}} Nominal Voltage | 5 V _{DC} (stand-by output voltage is referred to the same V1 output voltage return) | | | |
| 5 _{V_{SB}} Rated Current | 1 A (maximum +12 V _{SB} and +5 V _{SB} combined output power is 6 W) | | | |
| 5 _{V_{SB}} Ripple & Noise | 50 mV Peak-to-peak | | | |
| 5 _{V_{SB}} Load, line cross Regulation | ±5% | | | |

Input Specifications

| Specification | Test Conditions / Notes | Min. | Nominal | Max. | Units |
|---|--|------|---------|-------|------------------|
| AC Input Voltage | PS starts at 85 V _{AC} at all load conditions Operating input voltage range DDP1200 is designed to operate with a square or trapezoidal input voltage wave form (i.e. from UPS) | 85 | 100-277 | 305 | V _{RMS} |
| DC Input Voltage | Built in fuses has been safety certified up to 250 V _{DC} . Operating the DDP1200 above that limit up to 300 V _{DC} , does require an external fuse protection (*) | 120 | - | 300 | V _{DC} |
| Input Frequency | 400 Hz (max 440 Hz) operation over 85 – 137 V _{AC} input range | 47 | 50/60 | 63 | Hz |
| Input Current | At 180 V _{AC} , maximum load, 50 / 60 Hz | - | - | 8.0 | A _{RMS} |
| | At 85 V _{AC} , 1000 W load, 50 / 60 Hz | | | 14.5 | |
| | 163 V _{DC} , maximum load | | | 9.0 | A |
| | 120 V _{DC} , 1000 W | | | 10.0 | |
| Inrush Current | At power-on asserted Cold start, 25 °C ambient, full load Any point of the AC input sine | | | | |
| | 230 V _{AC} | - | - | 30 | A |
| | 277 V _{AC} | - | - | 50 | |
| Fusing | High breaking, 16 / 20 A, 277 V _{AC} (250 V _{DC}) on each AC lines. | - | - | 16/20 | A |
| Efficiency | 24, 48V variants: | | | | |
| | At 120 V _{AC} , 20% rated load | - | 88 | - | % |
| | At 120 V _{AC} , 50% rated load | - | 92 | - | |
| | At 120 V _{AC} , 100% rated load | - | 92 | - | |
| | At 230 V _{AC} , 20% rated load | - | 90 | - | |
| | At 230 V _{AC} , 50% rated load | - | 93 | - | |
| | At 230 V _{AC} , 100% rated load | - | 94 | - | |
| Input Power Consumption | At power on, no load, 100-277 V _{AC} range, FF | - | 7.0 | - | |
| At power on, no load, 100-277 V _{AC} range UCF/PCF | - | 6 | - | | |
| Stand by, no load, nominal 100-277 V _{AC} range | - | 4.0 | - | | |
| Power Factor | Any nominal input line voltage, 50/60 Hz, from 50 to 100% maximum load | 0.95 | - | - | - |
| THDi | From 50 to 100% rated load, 100-277 V _{AC} , 50/60 Hz. | - | - | 20 | % |
| Harmonic Current Fluctuations and Flicker | Complies with EN 61000-3-2 at 230 V _{AC} , 50/60 Hz, Class A, D. Complies with EN 61000-3-2 Class C at 230 V _{AC} , 50/60 Hz, >300 W load. Complies with EN 61000-3-3 at nominal voltages and full load. | | | | |
| Earth Leakage Current | Normal conditions | | | | |
| | 115 V _{RMS} , 60 Hz | - | 130 | - | µA |
| | 230 V _{RMS} , 50 Hz | - | 240 | - | |
| | 264 V _{RMS} , 60 Hz (worst case) | - | - | 400 | |
| | | | | | |
| Touch Leakage Current | 264 V_{RMS}, 60 Hz | | | | |
| | Normal Condition (NC) | - | - | 100 | µA |
| | Single Fault Condition (SFC) | - | - | 500 | |

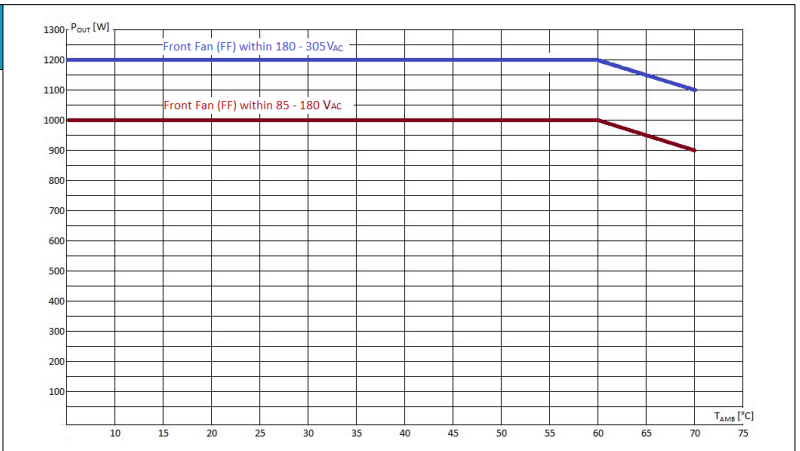
(*) Suggested fuse SIBA 5012434.16 and fuse holder SIBA 5105805.1

Output Specifications

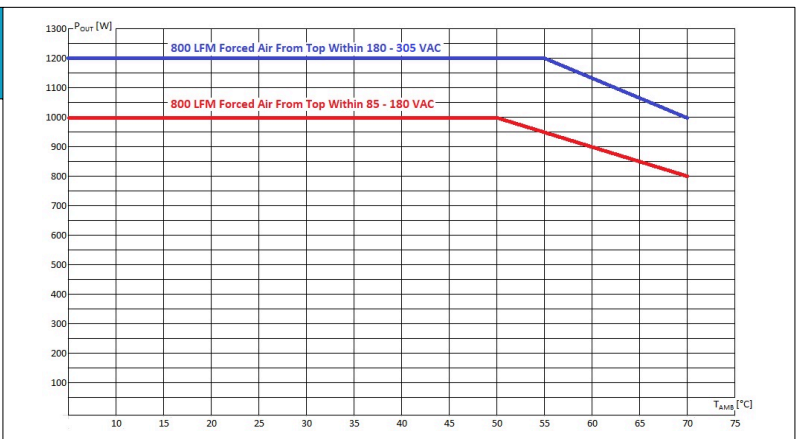
| Specification | Test Conditions / Notes | Min. | Nom. | Max. | Units |
|--|---|------|------|-------|------------------|
| V1 Output Voltages | ±0.5% set point accuracy | - | 24 | - | V |
| | RS+ closed on +V1, RS- closed on V1 RTN, at 6% load. | | 48 | | |
| | | | | | |
| V1 Output Power Rating | FF variant at 180 – 305 V _{AC} | | | 1200 | W |
| | UCF, PCF variants at 180-305 V _{AC} , 800 LFM | | | 1200 | |
| | FF variant at 85 – 137 V _{AC} | | | 1000 | |
| | UCF, PCF variants at 85 – 137 V _{AC} , 800 LFM | | | 1000 | |
| 12VSB Output Voltage | | - | 12 | - | V |
| 12VSB Output Current | FF, UCF and PCF packages up to 70 °C | - | - | 0.5 | A |
| 5VSB Output Voltage | | - | 5 | - | V |
| 5VSB Output Current | FF, UCF and PCF packages up to 70 °C | - | - | 1 | A |
| V1 Voltage Adjustment Range | Manually by push up and down buttons | - | - | ±5 | %V1 |
| V1 Load-Line-Cross Regulation | V _{AC} : 85 – 305 V _{RMS} ; I1: 0 – 100% | - | - | ±2 | %V1 |
| 5VSB, 12 V _{SB} | V _{AC} : 85 – 305 V _{RMS} ; I _{SB} : 0 – 100% | - | - | ±5 | %V _{SB} |
| Load-Line-Cross regulation | | | | | |
| V1 Line Regulation | V _{AC} : 85 – 305 V _{RMS} | - | - | ±0.1 | %V1 |
| Transient Response: | 25% load changes at 1 A/μs | - | - | ±5 | %V1 |
| V1, 12 V _{SB} , 5 V _{SB} | 24 V at 1000 μF load / I _{OUT} > 2.5 A | | | | %V _{SB} |
| Voltage Deviation | 48 V at 560 μF load / I _{OUT} > 1.25 A | | | | |
| | 12 V _{SB} , 5 V _{SB} at 0-2200 μF load | | | | |
| V1 | Rated load, Peak-to-peak, 20 MHz BW. | - | - | 1 | %V1 |
| Ripple and Noise | (100 nF ceramic, 10 μF tantalum at load) | | | | |
| V1 Start-up Rise Time | 85 < V _{IN} < 305, any load conditions. | 10 | - | 150 | ms |
| Start-up Delay | V1 in regulation after de-asserting PS_Inhibit | - | - | 1700 | ms |
| | V1 in regulation after AC is applied (worst case: 85 V _{AC}) | - | - | 2200 | |
| | 5V _{SB} in regulation after AC is applied | - | - | 500 | |
| | (worst case: 85 V _{AC}) | | | | |
| Turn-on Overshoot | | - | - | 10 | %V1 |
| | | - | - | 10 | %V _{SB} |
| V1 Hold-up Time | At nominal V _{IN} , full load | 10 | - | - | ms |
| | SEMI F47-0706 compliant at ≥208 V _{AC} | | | | |
| | 50% sag (104 V) | 200 | - | - | |
| | 30% sag (145 V) | 500 | - | - | |
| | 20% sag (166 V) | 1000 | - | - | |
| Minimum Load | V1, 12 V _{SB} , 5 V _{SB} | 0 | - | - | A |
| Maximum Load Capacitance | V1: 24 V _{DC} | - | - | 16000 | μF |
| | V1: 48 V _{DC} | - | - | 8000 | |
| V1 Current Sharing Accuracy | Parallel operation up to four units. | 40 | - | 60 | %I1 |
| | Two units in parallel at I1 rated load. | | | | |
| | I-Share signals connected together. | | | | |
| | RS+, RS- signals connected together and to the load. | | | | |
| | Max load at start up 1200 W, operating 2000 W, 180 ± 305 V _{AC} . | | | | |
| | Max load at start up 1000 W, operating 1667 W, 85 ± 137 V _{AC} . (referred to -FF, -PCF and -UCF) | | | | |
| V1 Remote Sense | RS+ and RS- power path voltage loss compensation | - | - | 0.12 | V |

Output Power De-Rating Curves

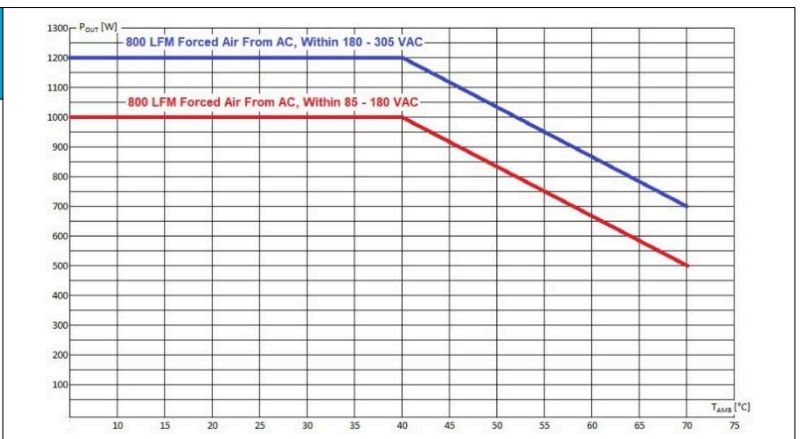
Front Fan (FF); 24, 48 V
Any orientation, V1 nominal



U-Chassis and Perforated Cover
Forced Air Cooling (UCF, PCF); 24 V
Air flow from top, V1 nominal



U-Chassis and Perforated Cover
Forced Air Cooling (UCF, PCF); 24 V
Air flow from AC side, V1 nominal



PMBus

The DDP1200 does support communication according to the PMBus 1.2 protocol via SDA, SCL and #SMBALERT signals as defined in the SMBus Specification version 2.0. The power supply shall not load the SMBus if it has no input power (SCL & SDA lines should go to High-Z).

The pull-up resistors (2.2 kΩ) for these signals shall be external to the power supply and referenced to an external +3.3V bus voltage. The DSP circuits inside the power supply are powered by the standby output. The PMBus is active whatever input power is applied to the power supply or a parallel redundant power supply in the system, provided that their 12VSB are connected in parallel. Maximum speed of SMBus is 100 kHz. The ADDR0 and ADDR1 signals, are inputs to the power supply that control the PMBus address assigned to the power supply.

On the system side, the ADDR0 and ADDR1 signals will either be connected to return through a 1 kΩ pull-down resistor or connected to +3.3V external bus voltage through a 1 kΩ pull-up resistor.

The address shall be derived from the logic of this pin as indicated on Outline Drawing and Connections section. The power supply is a slave only on SMBus device.

For a comprehensive description of DDP1200 PMBus management, do refer to the application note, "AN_MDP-DDP1200 PMBus Mgt_Rev00".

Examples of DDP1200 parameters available through communication bus are:

Input voltage status:

- » Output voltages +V1 measured value;

- » Output current on +V1 measured value;
- » Current sharing status;
- » Thermal health measured value;
- » Fan health status;
- » Power-On / Working hours;
- » Product information;
- » Status information;

Failures shall be reported by PMBus for all failure types:

- » Fan fault;
- » Protections failure (OV, OC, OT);
- » Voltages out of specification.

Base Signals / Controls

(Accessible From Signal Connector P204)

| Signal | Notes | Min | Typ. | Max | Unit |
|--|--|-----|------|------|------|
| +PS_Inhibit (Active High) | Input low voltage ($I_{IN} = 0 \mu A$) | 0 | - | 0.8 | V |
| | Input high voltage ($I_{IN} = 500 \mu A$ at 5.5 V) | 2.5 | - | 5.5 | |
| | V1 disabled when PS_Inhibit is pulled high | | | | |
| | V1 enabled when PS_Inhibit is floating or low | | | | |
| | 5 V _{SB} and 12 V _{SB} not affected by PS_Inhibit | | | | |
| -PS_Inhibit (Active Low) | Input low voltage ($I_{IN} = -800 \mu A$ at 0 V) | 0 | - | 0.8 | V |
| | Input high voltage ($I_{IN} = -200 \mu A$ at 2.5 V) | 2.5 | - | 5.5 | |
| | ($I_{IN} = 700 \mu A$ at 5.5 V) | | | | |
| | V1 disabled when -PS_Inhibit is pulled low | | | | |
| | V1 enabled when -PS_Inhibit is floating or high | | | | |
| | 5V _{SB} and 12V _{SB} not affected by -PS_Inhibit | | | | |
| Power_OK (*) (PS_OK) | Logic level low (<10 mA sinking) | - | - | 0.7 | V |
| | Logic level high (200 μA sourcing) | 2.4 | - | 3.45 | |
| | Low to high time after V1 in regulation | 150 | - | 350 | |
| | Power down warning time | 2 | - | - | ms |
| I_Share | The I_SHARE signals shall be daisy chained among power supplies operating in parallel. On a single power supply operating it provides current measurement on V1 output. On multiple power supplies operating in parallel, it provides current measurement on master V1 output. | | | | |
| SDA, SCL, #SMBALERT, ADDR0, ADDR1 | These are signals which support PMBus communication protocol as specified in the application note AN_MDP-DDP1200 PMBus Mgt_Rev00. | | | | |
| RSVD RX, RSVD TX | Mainly intended for internal Inission Power use, these RX and TX signals - available at the output signal connector P204 - may be used to access some DSP functions (monitoring, threshold settings, debug functions). These signals work as an UART Rx/Tx port and can also work as a RS-232 Rx/Tx port by building in the "RS-232 LINE DRIVERS/RECEIVERS" IC | | | | |
| 5V_{SB} Output (**) | Active and in regulation after an $85 < V_{AC} < 305$ is applied Not affected by PS_Inhibit. Available on P204, pin#4 | | | 500 | ms |
| 12V_{SB} Output (***) | Active and in regulation after an $85 < V_{AC} < 305$ is applied Not affected by PS_Inhibit. Available on P204, pin#16 | | | 500 | ms |

(*) When V1 is On, a P_OK low may indicates V1 under voltage condition. When two DDP1200 operate in parallel, P_OK low in one unit indicates that it is not sharing the expected amount of current (current sharing fault). A 3.3 k Ω internal pull up to a 3.3 V internal reference voltage is used; do not add any other external pull up.

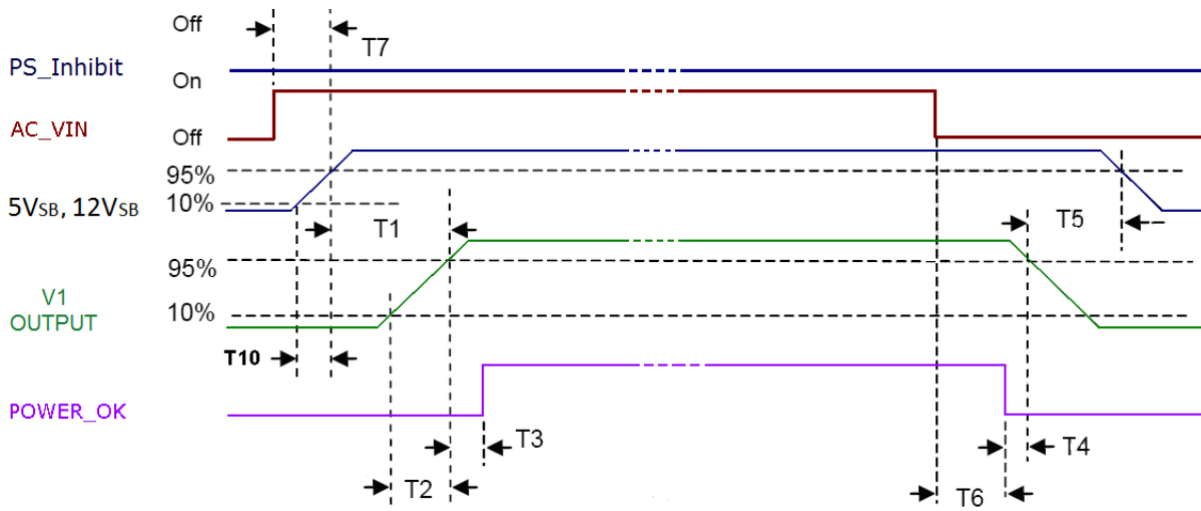
(**) The 5VSB outputs of two or more DDP1200s operating in parallel, cannot be connected in parallel in turn, since doing so results in power supplies

damage.

(***) The 12V_{SB} outputs of two or more DDP1200s operating in parallel can be connected in parallel in turn, taking into account that the maximum available power will not be higher of a single operating power supply one.

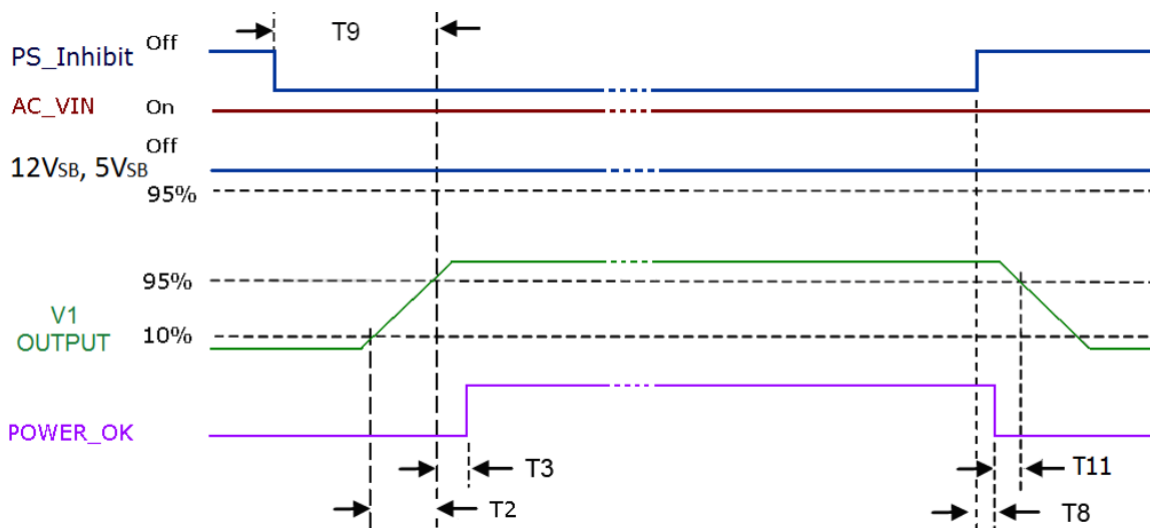
Base Signals / Controls Timing

AC/DC input Off-to-On and On-to-Off timings:



| | |
|------------------------------------|---|
| $12 V_{SB}/5 V_{SB}$ On to V1 On | $250 \text{ ms} \leq T1 \leq 1700 \text{ ms}$ |
| V1 rise time | $10 \text{ ms} \leq T2 \leq 150 \text{ ms}$ |
| $12 V_{SB}/5 V_{SB}$ rise time | $3 \text{ ms} \leq T10 \leq 150 \text{ ms}$ |
| V1 On – POWER_OK delay | $150 \text{ ms} \leq T3 \leq 350 \text{ ms}$ |
| Power down warning | $T4 \geq 2 \text{ ms}$ |
| V1 Off to $12 V_{SB}/5 V_{SB}$ Off | $T5 \geq 0.5 \text{ s}$ (V1 load > 25 W) |
| AC Off to POWER_OK low | $T6 \geq 8 \text{ ms}$ |
| AC_On to $12 V_{SB}/5 V_{SB}$ On | $T7 \leq 500 \text{ ms}$ |

AC/DC input Off-to-On and On-to-Off timings:



| | |
|---------------------------------|--|
| V1 On – POWER_OK delay | $150 \text{ ms} \leq T3 \leq 350 \text{ ms}$ |
| Turn-Off warning | $T11 \geq 1 \text{ ms}$ |
| PS_Inhibit – POWER_OK low delay | $T8 \leq 3 \text{ ms}$ |
| PS_Inhibit – V1 On delay | $T9 \leq 1700 \text{ ms}$ |

Protection Features

| Specification | Test Conditions / Notes | Min. | Nominal | Max. | Units |
|--------------------------------------|--|--------------|---------|--------|-------------------------------|
| Input Under Voltage | Auto-recovering, hiccup mode. | 58 | 75 | 82 | V_{AC} |
| Input Fuse | High breaking, 16 / 20 A, 277 V_{AC} (250 V_{DC}) on each AC lines. | - | - | 16/20 | A |
| Over Current | At nominal input voltages V1: Hiccup mode, auto-recovering 5 V_{SB} : Auto-recovering 12 V_{SB} : Hiccup mode, auto-recovering See Output Ratings Table section | - | - | 150 | %I _{Rated} A A |
| Short Circuit | At nominal input voltages V1: Hiccup mode or latch 5 V_{SB} : Auto-recovering 12 V_{SB} : Hiccup mode, auto-recovering. | - | - | - | |
| Over Voltage | V1, Power shut down, latch off. 12 V_{SB} : Hiccup mode, auto-recovering. | 116 | - | 145 | % V_{NOM} - 150 |
| Over Temperature (ambient) | Hiccup mode, auto-recovering. | 70 | - | - | °C |
| Over Temperature (on secondary side) | Hiccup mode, auto-recovering. | - | - | - | °C |
| Fan Fault Protection | Relevant to the "-FF" variant. The DSP monitors the signals (frequency generator) provided by both fans. If one fan fails, the DSP asserts maximum speed the other fan and provides an alarm indication through PMBus. If both fans fail, the DSP provides an alarm indication through LED and PMBus and after 20 s, does shut down V1. PS INHIBIT or AC/DC input have to be cycled to resume operations, after removed the fault. | | | | |
| Isolation: Primary-to-Secondary | Reinforced | 5660 4000 | - - | - - | V_{DC} V_{AC} |
| Isolation: Input-to-Earth | Basic Production tested at 2642 V_{DC} | 2642 1865 | - - | - - | V_{DC} V_{AC} |
| Isolation: Output-to-Earth | Basic | 1500 | - | - | V_{AC} |
| Equipment Protection Class | Class I | | | | |

Environmental Specifications

| Specification | Test Conditions / Notes | Min. | Nominal | Max. | Units |
|--------------------------------------|--|--------------|---------|--------|-------------------------------|
| Input Under Voltage | Auto-recovering, hiccup mode. | 58 | 75 | 82 | V_{AC} |
| Input Fuse | High breaking, 16 / 20 A, 277 V_{AC} (250 V_{DC}) on each AC lines. | - | - | 16/20 | A |
| Over Current | At nominal input voltages V1: Hiccup mode, auto-recovering 5 V_{SB} : Auto-recovering 12 V_{SB} : Hiccup mode, auto-recovering See Output Ratings Table section | - | - | 150 | %I _{Rated} A A |
| Short Circuit | At nominal input voltages V1: Hiccup mode or latch 5 V_{SB} : Auto-recovering 12 V_{SB} : Hiccup mode, auto-recovering. | - | - | - | |
| Over Voltage | V1, Power shut down, latch off. 12 V_{SB} : Hiccup mode, auto-recovering. | 116 | - | 145 | % V_{NOM} - 150 |
| Over Temperature (ambient) | Hiccup mode, auto-recovering. | 70 | - | - | °C |
| Over Temperature (on secondary side) | Hiccup mode, auto-recovering. | - | - | - | °C |
| Fan Fault Protection | Relevant to the "-FF" variant. The DSP monitors the signals (frequency generator) provided by both fans. If one fan fails, the DSP asserts maximum speed the other fan and provides an alarm indication through PMBus. If both fans fail, the DSP provides an alarm indication through LED and PMBus and after 20 s, does shut down V1. PS INHIBIT or AC/DC input have to be cycled to resume operations, after removed the fault. | | | | |
| Isolation: Primary-to-Secondary | Reinforced | 5660 4000 | - - | - - | V_{DC} V_{AC} |
| Isolation: Input-to-Earth | Basic Production tested at 2642 V_{DC} | 2642 1865 | - - | - - | V_{DC} V_{AC} |
| Isolation: Output-to-Earth | Basic | 1500 | - | - | V_{AC} |
| Equipment Protection Class | Class I | | | | |

Electromagnetic Compatibility (EMC) – Emissions

| Phenomenon | Conditions / Notes | Standard | Equipment/Performance Class |
|--------------------------------------|--|---|-----------------------------|
| Conducted | 115, 230, 277 V _{RMS} , Maximum load | EN 55032 EN 55011 (ISM) FCC Part 15 | B |
| Radiated | | EN 55032 EN 55011 (ISM) FCC Part 15 | B (*) |
| Line Voltage Fluctuation and Flicker | At 20%, 50% and 100% maximum load Nominal input voltages | EN 61000-3-3 | |
| Harmonic Current Emission | 230 V _{AC} input voltage, 50 / 60 Hz 230 V _{AC} 50 / 60 Hz, >300 W load | EN 61000-3-2 EN 61000-3-2 | A, D C |

Electromagnetic Compatibility (EMC) – Immunity

| Phenomenon | Conditions / Notes | Standard | Test Level | Criteria |
|-------------------------|--|--|------------|---|
| | Reference standard for ITE Reference standard for Industrial/IMS equipment | EN 55024 EN 61000-6-2 | | |
| ESD | 15 kV air discharge, 8 kV contact, at any point of the system. | EN 61000-4-2 | 4 | A |
| Radiated Field | 10 V/m, 20-2700 MHz, 1 KHz, 80% AM. | EN 61000-4-3 | 3 | A |
| Electric Fast Transient | ±2 kV on AC power port for 1 minute | EN 61000-4-4 | 3 | A |
| Surge | ±2 kV line to line; ± 4 kV line to earth on AC power port | EN 61000-4-5 | 4 | A |
| Conducted RF Immunity | 10 V _{RMS} , 0,15-80 MHz, 1 kHz, 80% AM | EN 61000-4-6 | 3 | A |
| Dips and Interruptions | 200 – 277 V _{AC} : Drop-out to 0% for 10 ms Dip to 40% for 5 cycles (100 ms) Dip to 70% for 25 cycles (500 ms) Drop-out to 0% for 5 s | EN61000-4-11 EN61000-4-11 EN61000-4-11 EN61000-4-11 | | A (**) A (de-rate to 900 W) A B |
| | 100 – 127 V _{AC} : Drop-out to 0% for 10 ms Dip to 40% for 5 cycles (100 ms) Dip to 70% for 25 cycles (500 ms) Drop-out to 0% for 5 s | EN 61000-4-11 EN 61000-4-11 EN 61000-4-11 EN 61000-4-11 | | A (**) A (de-rate to 400 W) A (de-rate to 700 W) B |

(**) Performance referred to +5V_{SB}, +12V_{SB} and V1 (PS_OK goes to low level after 8 ms as per timing described at page 8

Safety Agencies Approvals

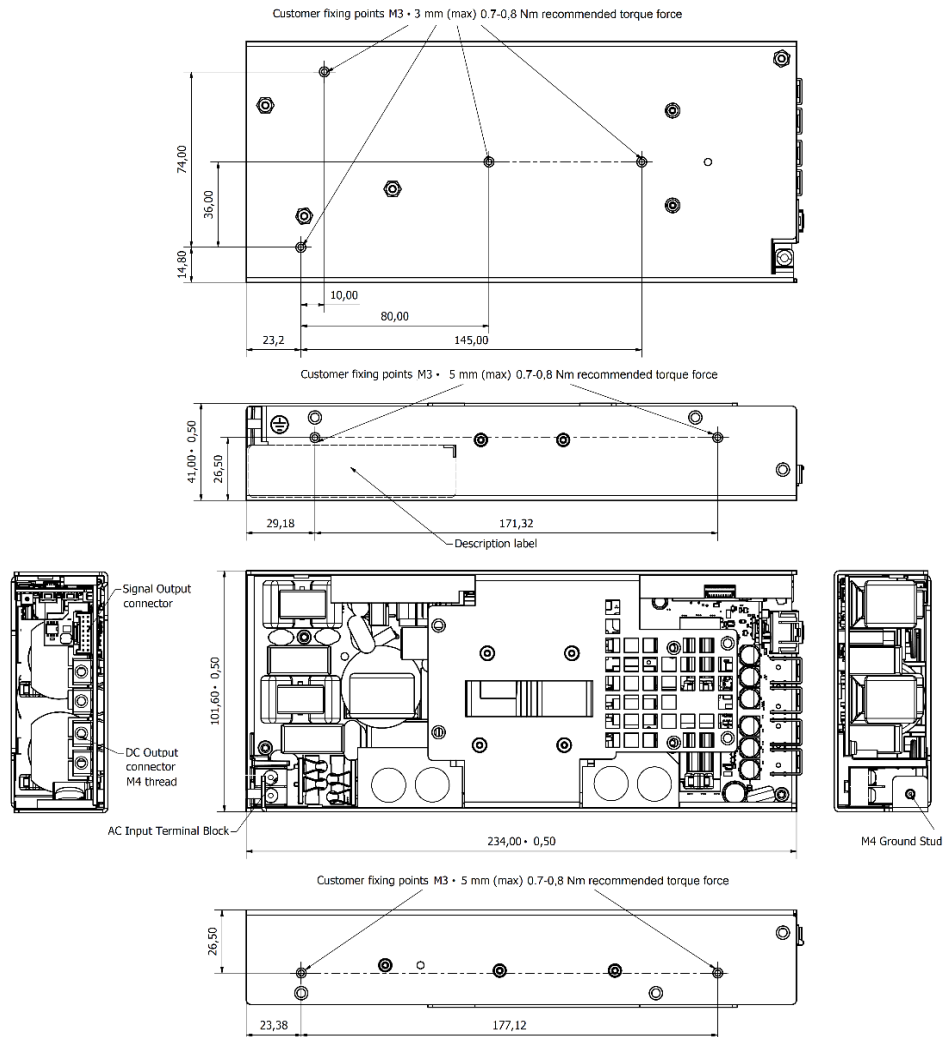
| Certification Body | Safety Standards | Category |
|--|---|--|
| CSA / UL | CSA C22.2 No. 60950-1, UL 60950-1, UL 62368-1; UL8750, CSA22.2 No. 250.13 | Audio Video and Information Technology Equipment LED Lighting |
| IEC IECCE CB Certification | IEC/EN 60950-1, IEC/EN 62368-1 | Audio Video and Information Technology Equipment |
| | Directive 2014/35/EU: Electrical Safety: Low Voltage electrical equipment (LVD) | Audio Video and Information Technology Equipment |
| CE | Directive 2014/30/EU: Electromagnetic Compatibility (EMC) | |
| | Directive 2015/863/EU: RoHS 3 | |
| Meets all essential requirements of the standard IEC/EN/UL/CSA 61010-1 2nd edition | | |

Outline Drawing and Connections

U-Chassis Forced Air Cooling (-UCF)

OVERALL DIMENSIONS: 101.6 x 234.0 x 41.0 mm (4.00 x 9.21 x 1.61 in)

WEIGHT: 1150 g (2.53 lb)



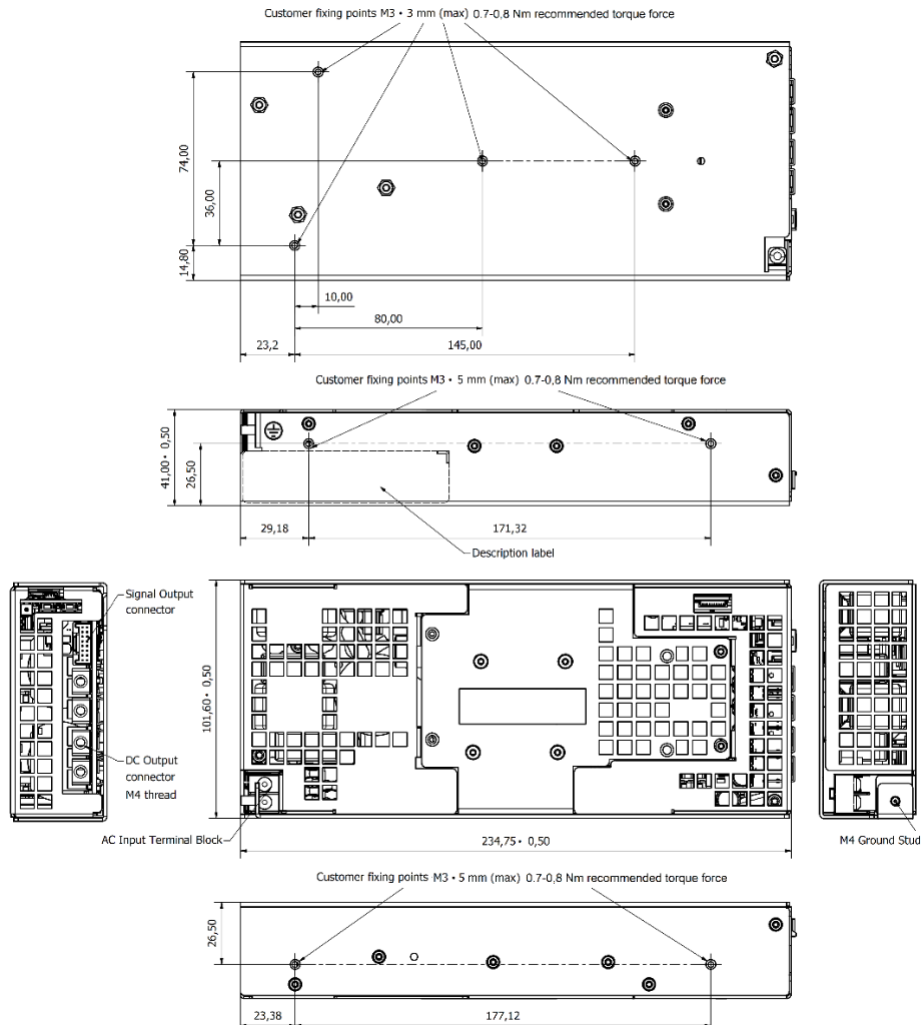
| AC INPUT CONNECTIONS | | DC OUTPUT CONNECTIONS | | SIGNAL CONNECTOR | | ADDITIONAL CONTROL FUNCTIONS | | |
|---|------------------|---|------------------|-------------------------|----------|------------------------------|------------------------|--|
| P1: AMTEK TB25C-802P-13-00A-L M4 GROUND STUD | | P200, P201, P202, P203: BRASS M4 THREADED TERMINAL (tight to 0.8-1Nm, max deep screws 7 mm) | | P204: MOLEX 501876-1640 | | SW600, SW601, DL600: | | |
| | | | | | | | | |
| Ref. | Function | Ref. | Function | Ref. | Function | Ref. | Function | |
| 1 | Line 1 | | 24 V Optional | 24 / 48 V | 1 | RMT (-) | SW600 | V1_ADJ (UP) |
| 2 | Line 2 | | | 2 | RMT (+) | SW601 | V1_ADJ (DOWN) | |
| 3 | Protection Earth | P200 | | | 3 | | I-SHARE | |
| | | P201 | - | | 4 | +5 V _{SB} | | |
| | | P202 | V1 RTN | V1 RTN | 5 | PS_INHIBIT | DL600 | Bi-colour LED |
| | | P203 | V1 RTN | - | 6 | PS_OK | Off | No AC/DC input power provided |
| | | | | | 7 | SCL | | |
| | | | | | 8 | SDA | Blinking Green | Input power good, standby active, V1 inhibited |
| | | | | | 9 | #SMBALERT | Steady Green | V1 Active |
| | | | | | 10 | ADDR0 | | |
| | | | | | 11 | -PS_INHIBIT | Steady or Blinking red | Power Supply Fault |
| | | | | | 12 | ADDR1 | | |
| | | | | | 13 | RSVD_RX (OUT) | | |
| | | | | | 14 | RSVD_TX (OUT) | | |
| | | | | | 15 | RTN | | |
| | | | | | 16 | 12 V _{SB} | | |

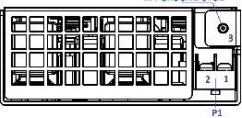
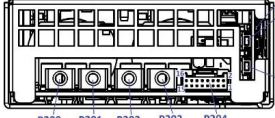
Outline Drawing and Connections

Perforated Cover Forced Air Cooled (-PCF)

OVERALL DIMENSIONS: 101.6 x 234.7 x 41.0 mm (4.00 x 9.24 x 1.61 in)

WEIGHT: 1250 g (2.75 lb)



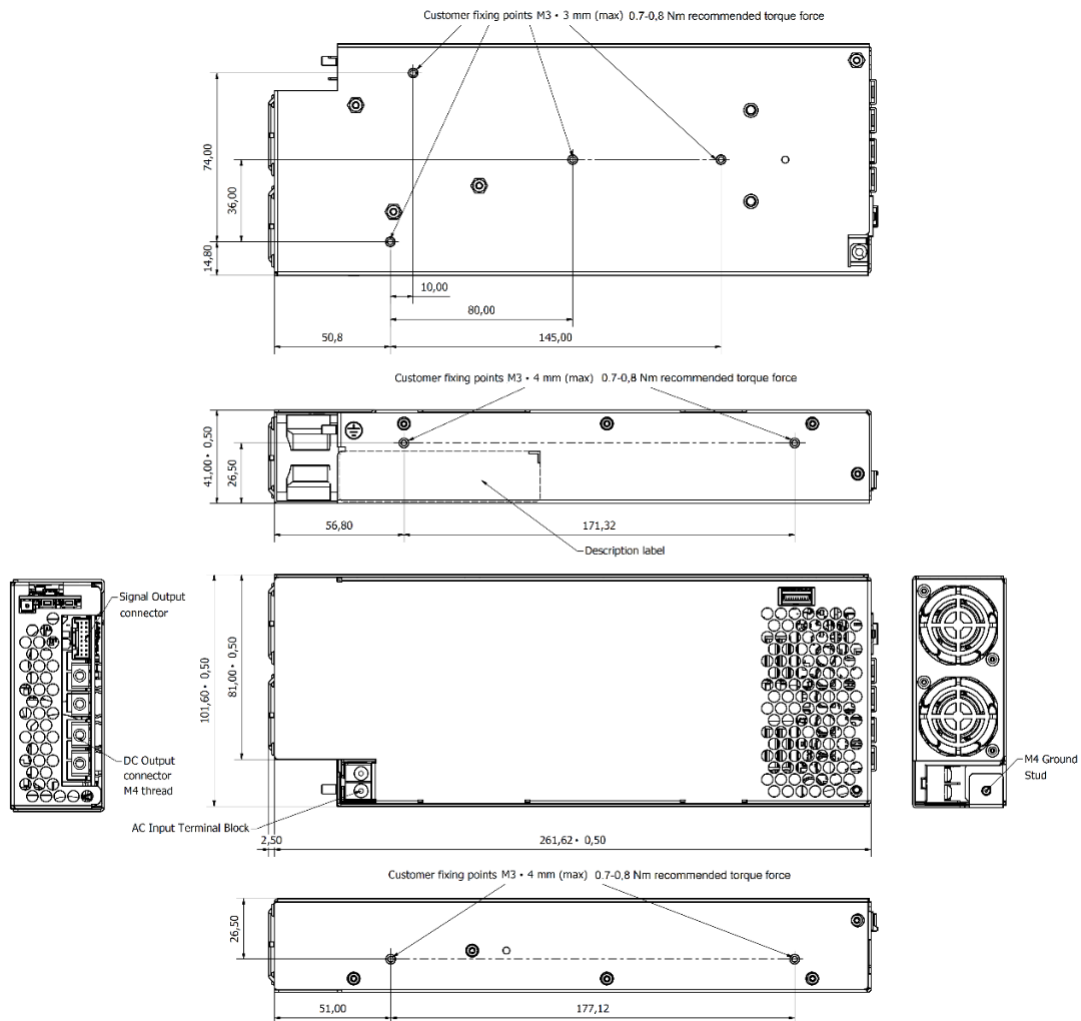
| AC INPUT CONNECTIONS | | DC OUTPUT CONNECTIONS | | SIGNAL CONNECTOR | | ADDITIONAL CONTROL FUNCTIONS | | |
|---|------------------|---|-----------------|-------------------------|----------|------------------------------|------------------------|--|
| P1: AMTEK TB25C-B02P-13-00A-L M4 GROUND STUD | | P200, P201, P202, P203: BRASS M4 THREADED TERMINAL (tight to 0.8-1Nm, max deep screws 7 mm) | | P204: MOLEX 501876-1640 | | SW600, SW601, DL600: | | |
|  | |  | | | | | | |
| Ref. | Function | Ref. | Function | Ref. | Function | Ref. | Function | |
| 1 | Line 1 | | 24V Optional | 24 / 48V | 1 | RMT (-) | SW600 | V1_ADJ (UP) |
| 2 | Line 2 | | | | 2 | RMT (+) | | |
| 3 | Protection Earth | P200 | | | 3 | I-SHARE | SW601 | V1_ADJ (DOWN) |
| | | P201 | | - | 4 | +5 V _{SB} | | |
| | | P202 | V1 RTN | V1 RTN | 5 | PS_INHIBIT | DL600 | Bi-colour LED |
| | | P203 | V1 RTN | - | 6 | PS_OK | Off | No AC/DC input power provided |
| | | | | | 7 | SCL | | |
| | | | | | 8 | SDA | Blinking Green | Input power good, standby active, V1 inhibited |
| | | | | | 9 | #SMBALERT | | |
| | | | | | 10 | ADDR0 | | |
| | | | | | 11 | -PS_INHIBIT | Steady Green | V1 Active |
| | | | | | 12 | ADDR1 | Steady or Blinking red | Power Supply Fault |
| | | | | | 13 | RSVD_RX (OUT) | | |
| | | | | | 14 | RSVD_TX (OUT) | | |
| | | | | | 15 | RTN | | |
| | | | | | 16 | 12 V _{SB} | | |

Outline Drawing and Connections

Front Mounted Fan (-FF)

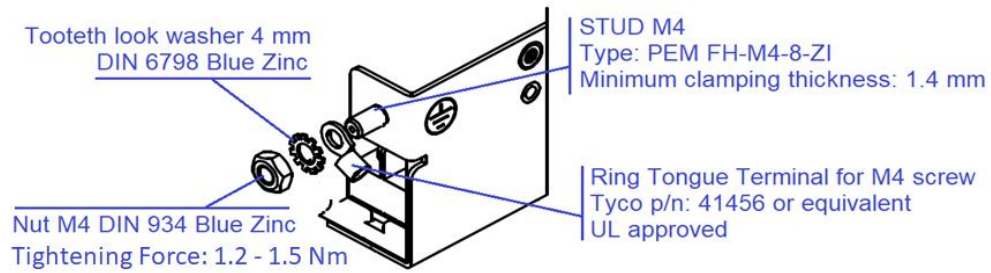
OVERALL DIMENSIONS: 101.6 x 264.12 x 41.0 mm (4.00 x 10.40 x 1.61 in)

WEIGHT: 1550 g (3.42 lb)



| AC INPUT CONNECTIONS | | DC OUTPUT CONNECTIONS | | SIGNAL CONNECTOR | | ADDITIONAL CONTROL FUNCTIONS | |
|---|------------------|---|----------|-------------------------|---------------------|------------------------------|--|
| P1: AMTEK TB25C-B02P-13-00A-L M4 GROUND STUD | | P200, P201, P202, P203: BRASS M4 THREADED TERMINAL (tight to 0.8-1Nm, max deep screws 7 mm) | | P204: MOLEX 501876-1640 | | SW600, SW601, DL600: | |
| | | | | | | | |
| Ref. | Function | Ref. | Function | Ref. | Function | Ref. | Function |
| 1 | Line 1 | 24V Optional | 24 / 48V | 1 | RMT (-) | SW600 | V1_ADJ (UP) |
| 2 | Line 2 | | | 2 | RMT (+) | SW601 | V1_ADJ (DOWN) |
| 3 | Protection Earth | | | 3 | I-SHARE | | |
| | | P200 | | 4 | +5 V _{SB} | DL600 | Bi-colour LED |
| | | P201 | - | 5 | PS_INHIBIT | Off | No AC/DC input power provided |
| | | P202 | V1 RTN | 6 | PS_OK | | |
| | | P203 | V1 RTN | 7 | SCL | Blinking Green | Input power good, standby active, V1 inhibited |
| | | | | 8 | SDA | | |
| | | | | 9 | #SMBALERT | | |
| | | | | 10 | ADDR0 | Steady Green | V1 Active |
| | | | | 11 | -PS_INHIBIT | | |
| | | | | 12 | ADDR1 | Steady or Blinking red | Power Supply Fault |
| | | | | 13 | RSVD_RX (OUT) | | |
| | | | | 14 | RSVD_TX (OUT) | | |
| | | | | 15 | RTN | | |
| | | | | 16 | +12 V _{SB} | | |

Protection Earth Connection Instructions



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