



FEATURES

- 1600W output power
- 93% efficiency at half load
- 12V main output
- 12V standby output of 30W
- 1U height: 3.4" x 7.75" x 1.59"
- 38.6 Watts per cubic inch density
- N+1 redundancy, including hot plugging (up to 8 in parallel)
- Current sharing on 12V main output, ORing FET
- Overvoltage, overcurrent, overtemperature protection
- Internal cooling fan (variable speed)
- PMBus™ / I²C interface monitoring and control
- RoHS compliant

PRODUCT OVERVIEW

The D1U86P-D-1600-12-HxxDC series are highly efficient 1600 watt, DC input front end supplies with a 12V main output and a 12V (30W) standby. They have current sharing and up to 8 supplies may be operated in parallel. The supplies may be hot plugged, they recover from overtemperature faults, and have logic and PMBus monitoring and control. Their low profile 1U package and >38.6W/cubic inch power density make them ideal for delivering reliable, efficient power to servers, workstations, storage systems and other 12V distributed power systems.

ORDERING GUIDE

| Part Number | Power Output | Main Output | Standby Output ¹ | Airflow |
|------------------------|--------------|-------------|-----------------------------|---------------|
| D1U86P-D-1600-12-HB4DC | 1600W | 12Vdc | 12Vdc | Back to front |
| D1U86P-D-1600-12-HB3DC | | | | Front to back |

INPUT CHARACTERISTICS

| Parameter | Conditions | Min. | Nom. | Max. | Units |
|---------------------------------|---------------------------------|-------|-------|-------|-------|
| Input Voltage Operating Range | | -40 | -48 | -72 | Vdc |
| Turn-on Voltage | Ramp up | -43 | -43.5 | -44 | Vdc |
| Turn-off Voltage | Ramp down | -38.5 | -39 | -39.5 | |
| Maximum Current at Vin = -40Vdc | 1600W | | | 47 | Adc |
| DC Line Inrush Peak Current | Cold start between 0 to 200msec | 40 | | 50 | Apk |
| | | 72 | | 100 | |
| Efficiency (48V) | 20% load | | 92 | | % |
| | 50% load | | 93 | | |
| | 100% load | | 89 | | |

OUTPUT VOLTAGE CHARACTERISTICS

| Output Voltage | Parameter | Conditions | Min. | Typ. | Max. | Units |
|----------------|-------------------------------------|-----------------|-------|-------|-------|--------|
| 12V | Voltage Set Point | 50% load | 12.17 | 12.20 | 12.23 | Vdc |
| | Line and Load Regulation | | 11.4 | | 12.6 | |
| | Droop | | | 3.10 | | mV/A |
| | Ripple Voltage & Noise ¹ | 20MHz Bandwidth | | | 120 | mV p-p |
| | Output Current | | 0 | | 133.3 | A |
| | Load Capacitance | | 0 | | 10000 | μF |
| 12VSB | Voltage Set Point | 50% load | 11.97 | 12.0 | 12.03 | Vdc |
| | Line and Load Regulation | | 11.4 | | 12.6 | |
| | Droop | | | 120 | | mV/A |
| | Ripple Voltage & Noise ¹ | 20MHz Bandwidth | | | 120 | mV p-p |
| | Output Current | | 0 | | 2.5 | A |
| | Load Capacitance | | 0 | | 350 | μF |

¹ Ripple and noise are measured with 0.1 μF of ceramic capacitance and 10 μF of tantalum capacitance on each of the power supply outputs. A short coaxial cable with 50Ω scope termination is used.



Available now at
www.murata-ps.com/en/3d/acdc.html



| OUTPUT CHARACTERISTICS | | | | | |
|---|-------------------------------------|------|------|------|-------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Output Rise Monotonicity | No voltage excursion | | | | |
| Startup Time | DC ramp up | | 1.5 | 3 | s |
| Transient Response | 12V, 50% load step, 1.0A/μs di/dt | | 600 | | mV |
| | 12VSB, 50% load step, 1.0A/μs di/dt | | 600 | | |
| Current sharing accuracy (up to 8 in parallel) ² | At 100% load | | | ±5 | % |
| Hot Swap Transients | All outputs remain in regulation | | | 5 | % |
| Holdup Time | At full load (48V input) | 1 | | | ms |

| ENVIRONMENTAL CHARACTERISTICS | | | | | |
|-------------------------------------|---|------|------|------|-------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Storage Temperature Range | | -40 | | 85 | °C |
| Operating Temperature Range | | 0 | | 55 | |
| Operating Humidity | Noncondensing | 5 | | 90 | % |
| Storage Humidity | | 5 | | 95 | |
| Altitude (without derating at 45°C) | | 3000 | | | m |
| Shock | 30G non operating | | | | |
| Operational Vibration | 1G, 10-500Hz, 1.6G (non-operational) | | | | |
| MTBF | Per Telcordia SR-322 M1C1@ 40°C | 500K | | | hrs |
| Safety Approvals | CSA/UL 60950-1-07-2nd Ed. IEC 60950-1:2005 (2nd Edition) w Am. 1:2009 CE Marking per LVD DIRECTIVE 2006/95/EC | | | | |
| Input Fuse | Power Supply has internal 60A/170VDC fast blow fuse on the DC line input | | | | |
| Weight | 1.108kg (2.44lbs) | | | | |

² The load current of 100% refers to each power module max load connected in an N+1 configuration; therefore the total load will be "N" x 100% load of each module. The share accuracy of ±5% is a fixed percentage irrespective of the total loading and number of units connected in parallel.

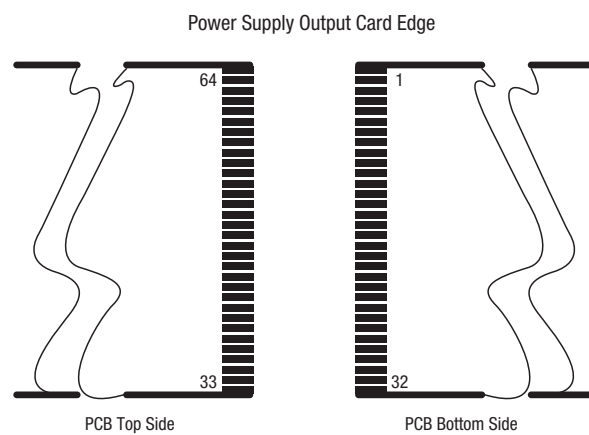
| PROTECTION CHARACTERISTICS | | | | | | |
|----------------------------|----------------------------|---|------|-------|------|-------|
| Output Voltage | Parameter | Conditions | Min. | Typ. | Max. | Units |
| | Overtemperature (intake) | An OTP warning will be issued via the PMBus interface when the air inlet exceeds 70°C; however the power module shall not shut down until critical internal hotspot temperatures are exceeded. | | 70 | | °C |
| | Overtemperature (hotspots) | The unit will shut down when internal hot spot exceed the derating guide lines and automatically recovers when the unit is cooled down. The unit will shut down due to hot spot at ambient temperature between 55°C-60°C with main 12V at full load. | | 55-60 | | |
| 12V | Overvoltage | Latching | 13.2 | | 14.4 | V |
| | Overcurrent | For overloads (slow) over current events a 147A nominal constant current will be sustained until the output voltage drops below 3VDC. At this point the unit shall shut down after a 1sec period and remain in that condition for 10secs. The cycle will then repeat. For severe (short circuit) over current events the unit shall shut down within 1ms and remain in this condition for 200ms before attempting a re-start. the unit shall attempt 10 shutdown/re-start cycles before permanently latching off. It will then be necessary to either recycle the DC input or toggle the PSON# input. | 137 | | 154 | |
| 12VSB | Overvoltage | Latching | 13.2 | | 14.4 | V |
| | Overcurrent | Autorecovery | 2.75 | TBD | 3.0 | A |

| ISOLATION CHARACTERISTICS | | | | | |
|---|--------------------------|------|------|------|-------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Insulation Safety Rating / Test Voltage | Input to Output - Basic | 1500 | | | Vdc |
| | Input to Chassis - Basic | 1500 | | | Vdc |
| Isolation | Output to Chassis | 500 | | | Vdc |

| EMISSIONS AND IMMUNITY | | |
|------------------------------------|-------------------------------------|---------------------|
| Characteristic | Standard | Compliance |
| Conducted Emissions | FCC 47 CFR Part 15/CISPR 22/EN55022 | Class A, 6dB margin |
| ESD Immunity | IEC/EN 61000-4-2 | Level 3 criteria A |
| Radiated Field Immunity | IEC/EN 61000-4-3 | Level 3 criteria B |
| Electrical Fast Transient Immunity | IEC/EN 61000-4-4 | Level 3 criteria A |
| Surge Immunity | IEC/EN 61000-4-5 | Level 2 criteria B |
| Radiated Field Conducted Immunity | IEC/EN 61000-4-6 | Level 3 criteria A |
| Magnetic Field Immunity | IEC/EN 61000-4-8 | 3 A/m criteria B |

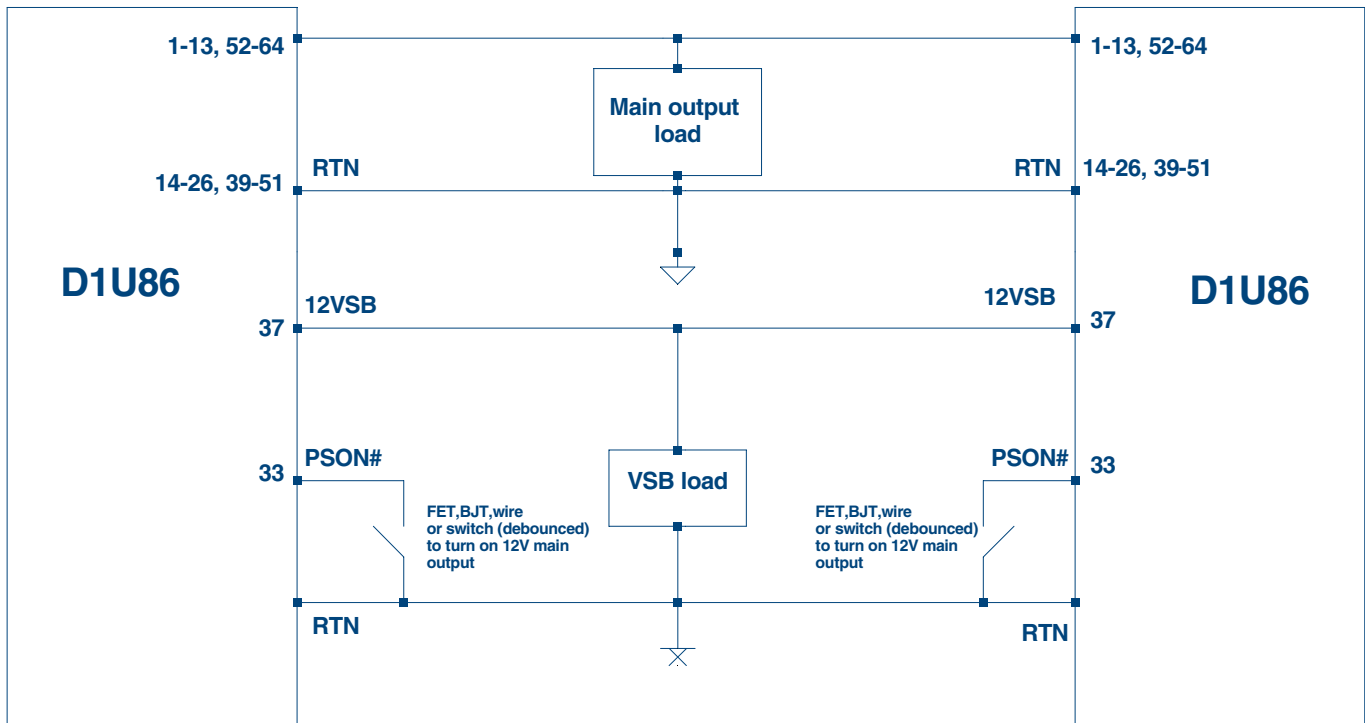
| STATUS INDICATORS AND CONTROL SIGNALS | | |
|---------------------------------------|--|---|
| Signal | Description | |
| PSON# | Low = main output on; PSON# can be permanently tied to GND within the host system. | |
| PRESENT# | Short pin pulled down on p/s; pulled up to either 3.3V or 12V (max) in the host system. For 3.3V use a 5.11KΩ resistor; for 12V use a 21KΩ resistor. | |
| PS INTERRUPT | Open drain PMBus signal; can be left open if not used. | |
| ADDR | PMBus Address; ADDR can be grounded or left open if not used. If grounded, the address will be 000, if it is open, the default address will be 111. | |
| ISHARE | Analog representation of main output current; can be left open if not used. | |
| PSOK ³ | Three level signal based on DC input and DC output status; can be left open if not used. | |
| I2C CLOCK | I ² C clock | |
| I2C DATA | I ² C data | |
| LED State | Mode | Operating Condition |
| 1. Off | Input Turn-off | DC Input is below minimum power-supply turn-on specification |
| 2. Green – blinking 1Hz | Standby | Power supply standby output is operating within normal parameters and main output is disabled |
| 3. Green – solid | Power-good | Power supply standby & main outputs are operating within normal parameters and delivering power |
| 4. Yellow – blinking 1Hz | Warning | Warning condition in power supply has been detected |
| 5. Yellow – solid | Fault | Fault condition in power supply has been detected. |

| OUTPUT CONNECTOR AND SIGNAL SPECIFICATION | | | |
|---|-------------------|---------------|---|
| Pin# | Function | Pin Type | Description |
| 14-26, 39-51 | RTN | Power Ground | Power and Standby Return |
| 1-13, 52-64 | 12V | Power | 12V Output |
| 37 | 12VSB | Power | 12V Standby Output |
| 38 | PSINTERRUPT | Output | Active low; interrupt line for power supply fault & warning detection as per PMBus spec |
| 36 | PRESENT# | Input | Power Supply Present Signal (shortest pin) |
| 35 | PSOK ³ | Analog output | Combination of three power supply output indicator signals: 1. DC input OK 2. Power Good 3. Power Supply Fault |
| 34 | ISHARE | Analog I/O | Analog representation of main output current. Typical analog voltage shall be 60.15mV/Amp of main output current. |
| 33 | PSON# | Input | Power Supply on/off control signal |
| 32 | SCL | Input | SMBus/PMBus Clock |
| 31 | SDA | I/O | SMBus/PMBus Data |
| 30 | GND | Analog I/O | Power Supply Signal Ground |
| 29 | N/A | N/A | Reserved; no User connection |
| 28 | N/A | N/A | Reserved; no User connection |
| 27 | ADDR | Analog input | PMBus Address |



| CONNECTOR AND SIGNAL SPECIFICATION ³ PSOK TRUTH TABLE VS. ANALOG OUTPUT | | | | | |
|--|------------|------------|------------|--------------|----------------|
| DC_OK_H | PWR_GOOD_H | PS_FAULT_L | PSOK | | OPERATION MODE |
| 0 | 0 | 1 | < 0.1Vdc | VDD = 3.3Vdc | No DC Input |
| 0 | 1 | 1 | (1/3) VDD | | Invalid |
| 1 | 0 | 1 | (2/3) VDD | | Standby |
| 1 | 1 | 1 | VDD | | Power Good |
| X | X | 0 | 0.2-0.4Vdc | | PS Fault |

WIRING DIAGRAM FOR OUTPUT

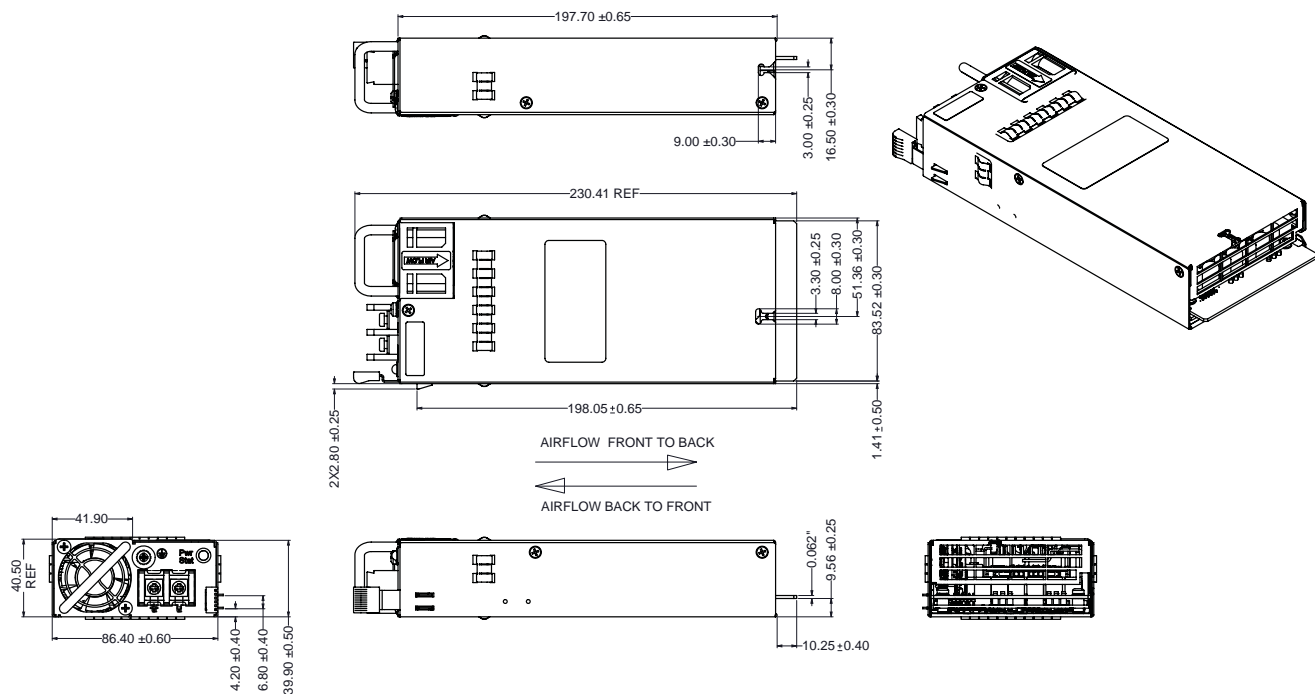


CURRENT SHARING NOTES

Main Output: Current share is achieved using the droop method. Nominal output voltage (12.20V) is achieved at 50% load and output voltage changes at a rate of 3.10mv per amp. Startup of parallel power supplies is not internally synchronized. If more than 1600W combined power is needed, start-up synchronization must be provided by using a common PS_ON signal. To account for $\pm 5\%$ full load current sharing accuracy and the reduction in full load output voltage due to droop, available output power must be derated by 10% when units are operated in parallel. Internal ORing FETs are provided.

Standby output can be tied together for redundancy but total combined output power must not exceed 30W; Internal MOSFET ORing devices are used.

MECHANICAL DIMENSIONS



DC input connector: Terminal Block, Dinkle Enterprise: Part No. DT-7C-B14W-02

Dimensions: 3.4" x 7.75" x 1.59" [86mm x 196.85mm x 39.9mm]

MATING CONNECTOR

| Part Number | Description |
|--------------------|-------------|
| FCI 10053363-200LF | Right Angle |
| FCI 10046971-008LF | Vertical |

OPTIONAL ACCESSORIES

| Description | Part Number |
|----------------------------------|----------------|
| 12V D1U86P Output Connector Card | D1U86P-12-CONC |

APPLICATION NOTES

| Document Number | Description |
|-----------------|-------------------------------|
| ACAN-50 | D1U86P Output Connector Card |
| ACAN-54 | D1U86P Communication Protocol |

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