



PRODUCT OVERVIEW

The D1U54-D-450-12-HxxC series power modules are very high efficiency, 450 watt DC input front end supplies, with a 12Vdc main output and a standby output. An active (digital) current share characteristic is provided to allow units to operate in parallel and share load current. The power supply may be hot plugged; recovers from overtemperature faults, and has status LEDs on the front panel in addition to hardware signal logic and PMBus™ status signals. The low profile 1U package and 14.8W/cubic inch power density make them ideal for delivering reliable, efficient power to networking equipment, workstations, storage systems and other 12Vdc distributed power architectures.

These models are intended to complement the appropriate D1U54P-W-450-12-HxxC AC input variant.

ORDERING GUIDE

| Part Number | Murata Internal Part Number | Power Output -48 to -60Vdc | Main Output | Standby Output | Airflow |
|---------------------|-----------------------------|----------------------------|-------------|----------------|---------------|
| D1U54-D-450-12-HA3C | M1920 | 450W | 12Vdc | 5Vdc | Front to Back |
| D1U54-D-450-12-HA4C | M1919 | | | 5Vdc | Back to front |

INPUT CHARACTERISTICS

| Parameter | Conditions | Min | Typ | Max | Units |
|----------------------------------|--|-------|-----|-------|-------|
| DC Input Voltage Operating Range | | -44 | -53 | -72 | |
| Turn-on Input Voltage | Ramp Up | -40.5 | -43 | -43.5 | Vdc |
| Turn-off Input Voltage | Ramp Down | -36.5 | -38 | -39.5 | |
| Input Current @ VIN = -53Vdc | 450W | | 9.5 | | Adc |
| DC Input Inrush Peak Current | Cold start (25°C) between 0 to 200ms | | | 25 | Apk |
| Efficiency (-54Vdc) | 20% FL | | 89 | | % |
| | 50% FL | | 93 | | |
| | 100% FL | | 90 | | |
| Reverse polarity protection | Reversed input cables; no internal/external fuse failure | +40 | | +72 | Vdc |

OUTPUT VOLTAGE CHARACTERISTICS

| Nominal Output Voltage | Parameter | Conditions | Min. | Typ. | Max. | Units |
|------------------------|---------------------------------------|---------------------------|-------|-------|-------|--------|
| Main 12Vdc | Output Set Point Accuracy | 50% load; Tamb = 25C | 11.96 | 12.00 | 12.04 | Vdc |
| | Line & Load Regulation | Combined regulation | -2.0% | | +2.0% | |
| | Ripple & Noise ^{1,2} | 20MHz Bandwidth | | | 120 | mV P-P |
| | Output Current | -40Vdc to -72Vdc DC input | 0 | | 37.5A | A |
| | Load Capacitance | | 500 | | 4000 | µF |
| 5VSB | Voltage Set Point | | | 5.0 | | Vdc |
| | Line & Load Regulation | | 4.76 | | 5.24 | |
| | Ripple Voltage & Noise ^{1,2} | 20MHz Bandwidth | | | 120 | mV P-P |
| | Output Current | | 0 | | 2 | A |
| | Load Capacitance | | 0 | | 3000 | µF |

¹ Ripple and noise are measured at the output connector, with 0.1 µF of ceramic capacitance and 10 µF of tantalum capacitance on each of the power supply outputs. A short coaxial cable to the measurement 'scope input, is used.

² Measurements assume the use of the minimum load capacitance as specified for the main 12Vdc output and a minimum load of 5%. Below 5% loading the overall voltage deviation shall be within ±2.5%.

FEATURES

- 450W output power
- 93% efficiency at 50% load
- 12Vdc main output
- 5Vdc standby output options
- <1U height:
54.5mm x 228.6mm x 40mm
(2.15" x 9.0" x 1.57")
- Card Edge DC Output and Signal I/O Connector
- DC Input Terminal Block
- 14.8 Watts per cubic inch power density
- N+1 redundancy capable, including hot plugging
- Active (digital) current sharing on 12Vdc main output; ORing FET are included for both standby and main outputs
- Overvoltage, Overcurrent, Overtemperature protection
- Internal cooling fan (variable speed)
- PMBus™/I2C interface with status indicators
- RoHS compliant
- Two Year Warranty



For full details go to
www.murata-ps.com/rohs



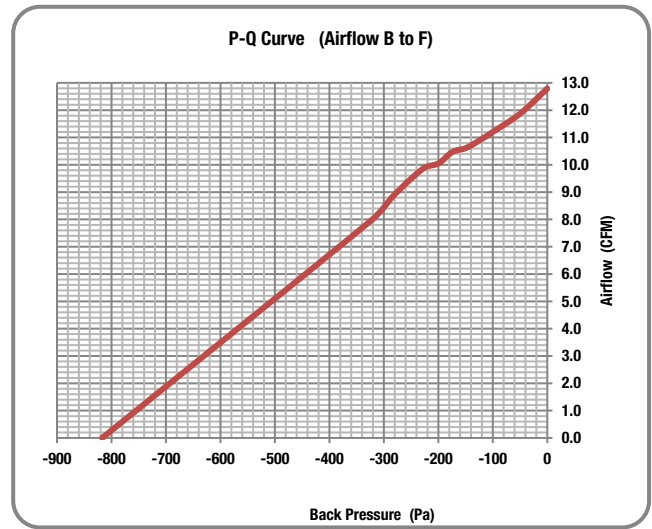
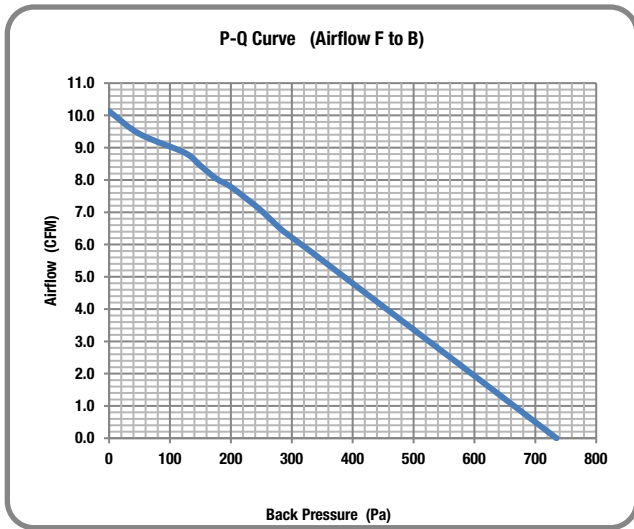
| OUTPUT CHARACTERISTICS | | | | | |
|--|--|------|------|-----------|---------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Startup Time | AC ramp up | | | 3 | s |
| Transient Response | Main 12V, 50% load step, 1A/ μ s di/dt | | | 5 | % |
| | Standby output, 50% load step, 1A/ μ s di/dt | | | 500 | μ s |
| Current sharing accuracy (Main 12Vdc output) | >10% load; (* percentage of full load) | | | $\pm 5^*$ | % |
| Hot Swap Transients | | | | ± 5 | % |
| Holdup Time (Total Effective Hold Up - See Timing Waveforms) | Full DC Input Source Range; 100% load | 2 | | - | ms |

| ENVIRONMENTAL CHARACTERISTICS | | | | | |
|---|--|------|------|------|-------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Storage Temperature Range | | -40 | | 70 | °C |
| Operating Temperature Range | -40 to -72Vdc, 450W | -5 | | 50 | |
| Operating Humidity | Noncondensing; +45°C | 5 | | 90 | % |
| Storage Humidity | | 5 | | 95 | |
| Altitude (without derating at 40°C) | | | | 3000 | m |
| Shock | 30G non-operating | | | | |
| Operational Vibration | Sine sweep; 5-200Hz, 2G; random vibration, 5-500Hz, 1.11G | | | | |
| MTBF (Target) | Per Telcordia SR-332 Issue 3 M1C3 at 40°C | | 620K | | hrs |
| Safety Approval Standards (Planned; Pending Submission) | CAN/CSA C22.2 No 60950-1:2007 + A2:2014 UL 60950-1:2014 IEC60950-1:2005 +A2:2013 EN 60950-1:2006+A2:2013 CCC: GB4943.1-2011; GB/T9254-2008; GB17625.1-2012 | | | | |
| Input Fuse | Power Supply has internal 25A/250V fast blow fuse on the DC input negative line | | | | |
| Weight | 1.51 lbs (0.684 kg) | | | | |

TYPICAL AIRFLOW; PRESSURE VS. FLOW (PQ) CURVES

D1U54-D-450-12-Hx3C

D1U54-D-450-12-Hx4C



- Notes:
1. The above curves represent provisional performance based upon a similar product using a 20mm thickness fan; these curves will be updated on later revisions of this datasheet.
 2. Curves recorded at room ambient (circa 25°C).
 3. Curves generated with internal fan running at 100% duty cycle while varying back pressure.

| PROTECTION CHARACTERISTICS | | | | | | |
|----------------------------|--------------------------|---|------|------|------|-------|
| Output | Parameter | Conditions | Min. | Typ. | Max. | Units |
| | Overtemperature (intake) | Autorestart with 4°C hysteresis for recovery (warning issued at 70°C) | | 75 | | °C |
| 12V | Overvoltage | Latching | 13.5 | | 14.5 | Vdc |
| | Overcurrent (target) | The output shall shutdown when an overcurrent condition is detected. It will auto restart after 1sec; however if the overcurrent condition is redetected the output will once again shutdown. The output will once again re-start, however if the overcurrent condition persists it will latch of after the fifth unsuccessful attempt. To reset the latch it will be necessary to toggle the PS_ON_L signal or recycle the incoming DC source. | 38 | | 47 | Adc |
| 5VSB | Overvoltage | Latching | 5.4 | | 6.0 | Vdc |
| | Overcurrent | The output shall shutdown when an overcurrent is detected. It will auto restart after 2sec; however if the overcurrent is re-detected the output will once again shutdown. This cycle will occur indefinitely while the overcurrent condition persists. | 2.2 | | 3.5 | Adc |

| ISOLATION CHARACTERISTICS | | | | | | |
|---------------------------------------|------------------------------|------|------|------|-------|--|
| Parameter | Conditions | Min. | Typ. | Max. | Units | |
| Insulation Safety Rating/Test Voltage | Input to Output - Reinforced | 1000 | | | Vdc | |
| Isolation | Output to Chassis | 500 | | | Vdc | |

| EMISSIONS AND IMMUNITY | | | |
|---|--|---|--|
| Characteristic | Standard | Compliance | |
| Input Current Harmonics | IEC/EN 61000-3-2 | Complies | |
| Voltage Fluctuation and Flicker | IEC/EN 61000-3-3 | Complies | |
| Conducted Emissions | FCC 47 CFR Part 15 CISPR 22/EN55022 | Class A with 6dB margin | |
| ESD Immunity | IEC/EN 61000-4-2 | Level 4 criteria A | |
| Radiated Field Immunity | IEC/EN 61000-4-3 | Level 3 criteria B | |
| Electrical Fast Transients/Burst Immunity | IEC/EN 61000-4-4 | Level 3 criteria A | |
| Surge Immunity | IEC/EN 61000-4-5 | Level 3, Criteria A (normal performance), common mode 2kV 12ohm, differential mode 1kV 2ohms | |
| RF Conducted Immunity | IEC/EN 61000-4-6 | Level 3 criteria A | |
| Magnetic Field Immunity | IEC/EN 61000-4-8 | 3 A/m criteria B | |
| Voltage Dips and Interruptions – Target (TBC) | ----- | -53VIn, 80% load, Dip 100% Duration 4ms; Performance Criteria A (normal performance maintained) | |

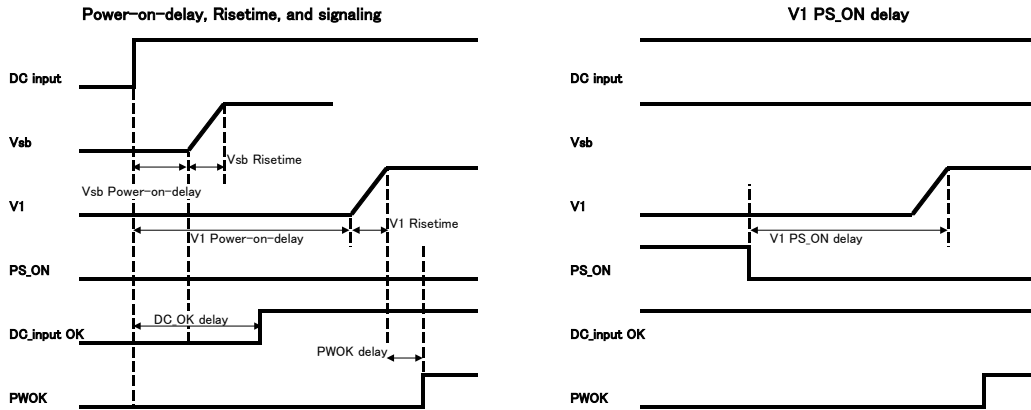
| STATUS INDICATORS AND CONTROL SIGNALS | |
|---|----------------|
| INPUT LED | |
| Condition | LED Status |
| Input Voltage Present | Solid Green |
| Input Voltage fault or warning | Blinking Green |
| Input off | Off |
| POWER LED | |
| Condition | LED Status |
| Output Fault indication concurrent PMBus Status_x registers | Solid Amber |
| Output Warning, indication, concurrent PMBus Status_x registers | Blinking Amber |
| Standby, 12Vdc Main output off, Vstby On | Blinking Green |
| Power Good 12Vdc Main output on, Vstby On | Solid Green |
| Power Off 12Vdc Main output off, Vstby Off | Off |

| STATUS AND CONTROL SIGNALS | | | |
|-------------------------------------|-------------------------------|--|---|
| Signal Name | I/O | Description | Interface Details |
| INPUT_OK (DC Source) | Output | The signal output is driven high when input source is available and within acceptable limits. The output is driven low to indicate loss of input power. There is a minimum of 1ms pre-warning time before the signal is driven low prior to the PWR_OK signal going low. The power supply must ensure that this interface signal provides accurate status when DC input power is lost. | Pulled up internally via 10K to VDD*. A logic high >2.0Vdc A logic low <0.8Vdc Driven low by internal CMOS buffer (open drain output). |
| PW_OK (Output OK) | Output | The signal is asserted, driven high, by the power supply to indicate that all outputs are valid. If any of the outputs fail then this output will be hi-Z or driven low. The output is driven low to indicate that the Main output is outside of lower limit of regulation. | Pulled up internally via 10K to VDD*. A logic high >2.0Vdc A logic low <0.8Vdc Driven low by internal CMOS buffer (open drain output). |
| SMB_ALERT (FAULT/WARNING) | Output | The signal output is driven low to indicate that the power supply has detected a warning or fault and is intended to alert the system. This output must be driven high when the power is operating correctly (within specified limits). The signal will revert to a high level when the warning/fault stimulus (that caused the alert) is removed. | Pulled up internally via 10K to VDD*. A logic high >2.0Vdc A logic low <0.8Vdc Driven low by internal CMOS buffer (open drain output). |
| PRESENT_L (Power Supply Absent) | Output | The signal is used to detect the presence (installation) of a PSU by the host system. The signal is connected to PSU logic +VSB_Return within the power module. | Passive connection to +VSB_Return. A logic low <0.8Vdc |
| PS_ON (Power Supply Enable/Disable) | Input | This signal is pulled up internally to the internal housekeeping supply (within the power supply). The power supply main 12Vdc output will be enabled when this signal is pulled low to +VSB_Return. In the low state the signal input shall not source more than 1mA of current. The 12Vdc output will be disabled when the input is driven higher than 2.4V, or open circuited. Cycling this signal shall clear latched fault conditions. | Pulled up internally via 10K to VDD*. A logic high >2.0Vdc A logic low <0.8Vdc Input is via CMOS Schmitt trigger buffer. |
| PS_KILL | Input | This signal is used during hot swap to disable the main output during hot swap extraction. The input is pulled up internally to VDD* (within the power supply). The signal is provided on a short (lagging pin) and should be connected to +VSB_Return. | Pulled up internally via 10K to VDD*. A logic high >2.0Vdc A logic low <0.8Vdc Input is via CMOS Schmitt trigger buffer. |
| ADDR (Address Select) | Input | An analog input that is used to set the address of the internal slave devices (EEPROM and microprocessor) used for digital communications. Connection of a suitable resistor to +VSB_Return, in conjunction with an internal resistor divider chain, will configure the required address (see ADDR Address Selection: #ADDRSelect) | DC voltage between the limits of 0 and +3.3Vdc. |
| SCL (Serial Clock) | Both | A serial clock line compatible with PMBus™ Power Systems Management Protocol Part 1 – General Requirements Rev 1.1. No additional internal capacitance is added that would affect the speed of the bus. The signal is provided with a series isolator device to disconnect the internal power supply bus in the event that the power module is unpowered, | V _L is 0.8V maximum V _{OL} is 0.4V maximum when sinking 3mA V _H is 2.1V minimum |
| SDA (Serial Data) | Both | A serial data line compatible with PMBus™ Power Systems Management Protocol Part 1 – General Requirements Rev 1.1. The signal is provided with a series isolator device to disconnect the internal power supply bus in the event that the power module is unpowered, | V _L is 0.8V maximum V _{OL} is 0.4V maximum when sinking 3mA V _H is 2.1V minimum |
| V1_SENSE V1SENSE_RTN | Input | Remote sense connections intended to be connected at and sense the voltage at the point of load. The voltage sense will interact with the internal module regulation loop to compensate for voltage drops due to connection resistance between the output connector and the load. If remote sense compensation is not required then the voltage can be configured for local sense by: 1. V1_SENSE directly connected to power gold fingers P9-P16 (inclusive) 2. V1_SENSE_RTN directly connected to gold fingers P1 to P8 (inclusive) | Compensation for a up to 0.12Vdc total connection drop (output and return connections). |
| ISHARE | Bi-Directional Digital Bus | The current sharing signal is connected between sharing units (forming an ISHARE bus). It is an input and/or an output (bi-directional analog bus) as the voltage on the line controls the current share between sharing units. A power supply will respond to a change in this voltage but a power supply can also change the voltage depending on the load drawn from it. On a single unit the voltage on the pin (and the common ISHARE bus would read 8VDC at 100% load (module capability). For two identical units sharing the same 100% load this would read 4VDC for perfect current sharing (i.e. 50% module load capability per unit). | Analogue voltage: +8V maximum; 10K to +12V_RTN |

*VDD is an internal voltage rail derived from VSB and an internal housekeeping rail ("diode ORed") and is compatible with the voltage tolerances of VSB).

TIMING SPECIFICATIONS

Turn-On Delay & Output Rise Time:

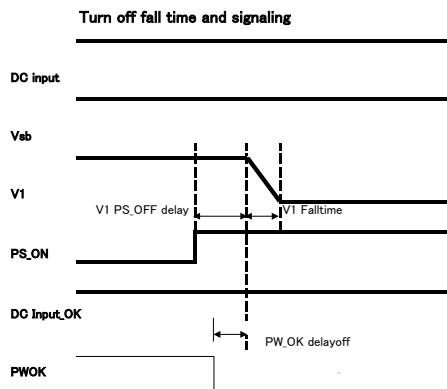


- The turn-on delay after application of DC input within the operating range shall as defined in the following tables.
- The output rise times shall be measured from 10% of the nominal output to the lower limit of the regulation band as defined in the following tables.

| Time | Min | Max |
|---------------------|-------|--------|
| Vsb Rise time | 2ms | 170ms |
| V1 Rise time | 10ms | 220ms |
| Vsb Power-on-delay | 300ms | 1600ms |
| V1 Power-on-delay | 400ms | 2000ms |
| V1 PS_ON delay | 100ms | 300ms |
| V1 PWOK delay | 300ms | 450ms |
| DCOK (Input) detect | 270ms | 1000ms |

TIMING SPECIFICATIONS

Turn-Off (Shutdown by PS_ON)

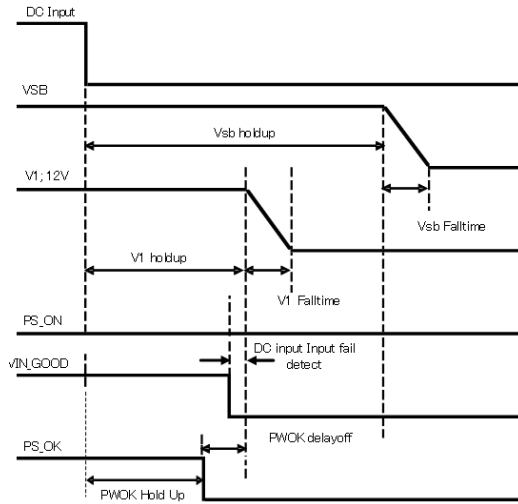


| Turn-Off Timing | Min | Max | Notes |
|-----------------|-------|-------|-------------------|
| V1 Fall time | - | - | Must be monotonic |
| V1 PS_OFF delay | 0ms | 6.0ms | |
| PW_OK delay off | 1.2ms | | |

- Note this characteristic is applicable for the main 12Vdc output shutdown from PS_ON pulled high.

TIMING SPECIFICATIONS

Power Removal Holdup

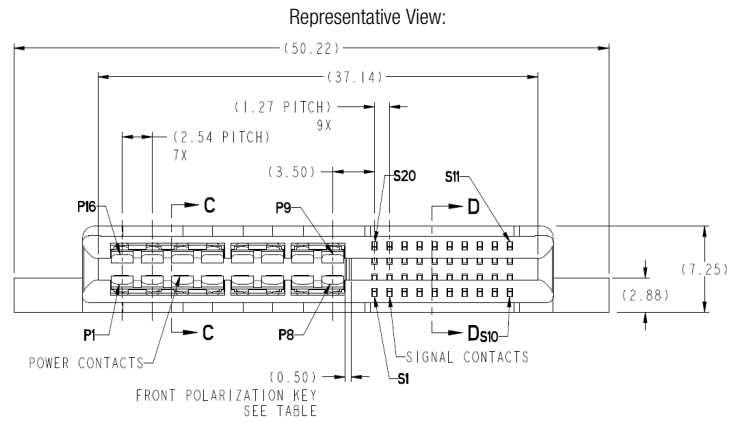
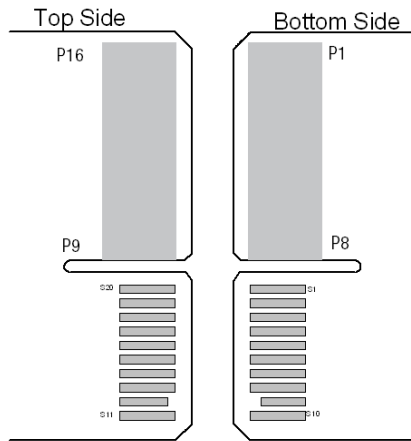


| Power Removal Timing | Min | Max | Notes |
|-----------------------------|-------|------|----------------|
| Vsb holdup | 17ms | 50ms | +VSB Full Load |
| V1 holdup (Total Effective) | 1.8ms | - | 100% load |
| DC (Input) fail detect | 400µs | 1ms | |
| PWOK delay off | 1.0ms | | 100% load |
| PWOK Hold Up | 0.8ms | | |

OUTPUT CONNECTOR & SIGNAL INTERFACE

Gold Finger Layout & Pin Assignment

Mating Connector: FCI 10126933080820xALF; "Straddle" Connector

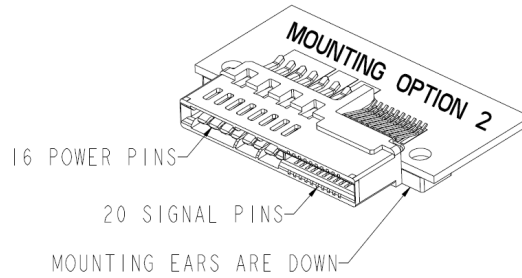


Note: Gold Fingers S9 (PS_KILL) and S12 (PS PRESENT/L) are "last to make; fist to break" short pins. Dimensions as follows:



FINGER PLATING SHALL BE AS PER IPC 2221, SECTION 4.4.4, TABLE 4.3, CLASS 2.

Host Board Mounting Proposed Orientation



OUTPUT CONNECTOR PIN ASSIGNMENTS - D1U54-D-450-12-HxxC

(Power Supply Gold Finger/Card)


| Pin# | Signal Name | Description/Comment |
|------------------|------------------------|---|
| P1-P8 inclusive | V1 (+12VOUT) | +12V Main Output |
| P9-P16 inclusive | V1 (+12VOUT) RTN/PGND) | +12V Main Output Return |
| S1 | +VSB (+5V) | Standby Output |
| S2 | +VSB (+5V) | Standby Output |
| S3 | Reserved | No User Connection |
| S4 | ISHARE | Active (Analogue) Current Share Bus |
| S5 | SDA | I ² C Serial Data Line |
| S6 | SCL | I ² C Serial Clock Line |
| S7 | SMB_ALERT | Alert signal to host system |
| S8 | PS_ON_L | Remote On/Off (Enable/Disable) |
| S9 | PS_KILL | Power Supply "kill"; short pin |
| S10 | DCOK/L | DC Input Source Present & "OK" |
| S11 | PW_OK | Power "OK" |
| S12 | PS PRESENT/L | Power Module Present; short pin |
| S13 | Reserved | No User Connection |
| S14 | Reserved | No User Connection |
| S15 | V1_SENSE_R | -VE Remote Sense Return |
| S16 | V1_SENSE | +VE Remote Sense |
| S17 | ADDR | Address Protocol Selection; (select address by use of the appropriate pull down resistor – see table below) |
| S18 | Reserved | No User Connection |
| S19 | +VSB (+5V) | Standby Output |
| S20 | +VSB (+5V) | Standby Output |

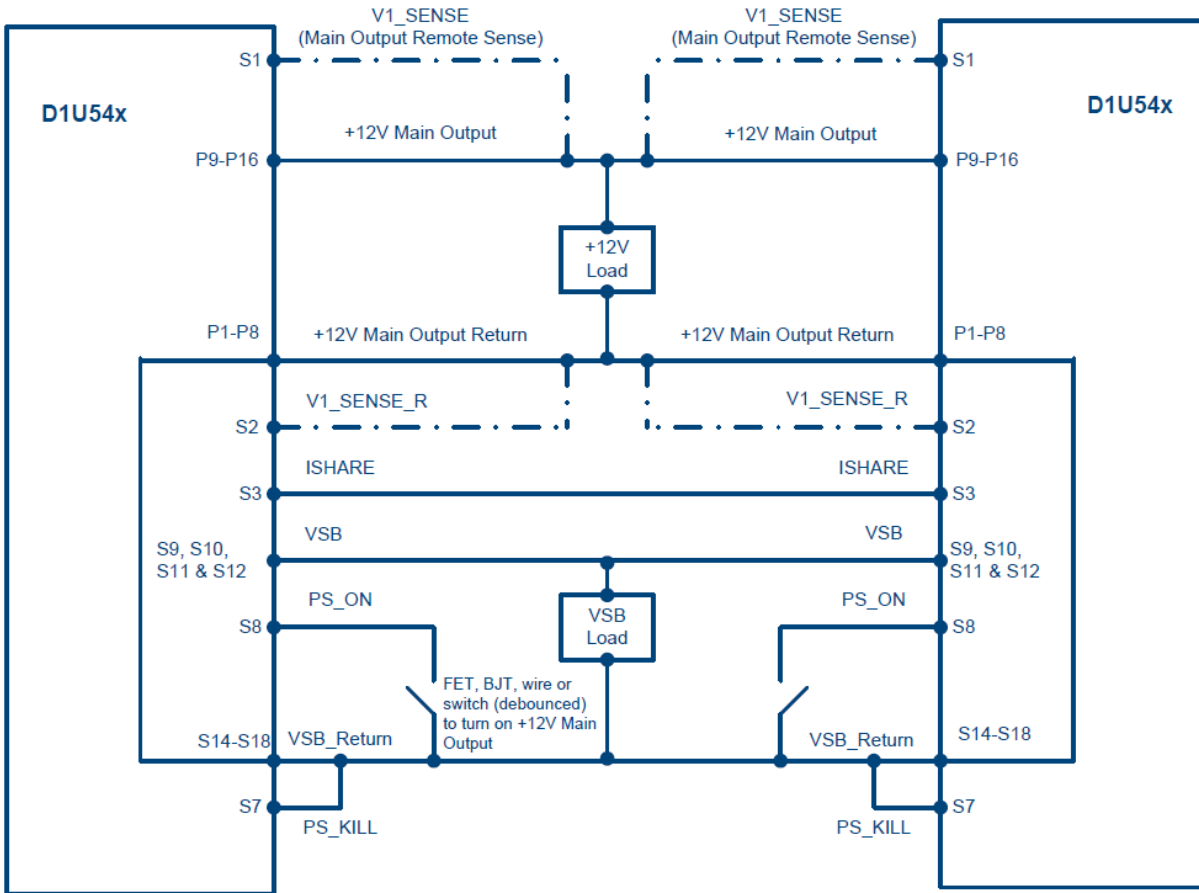
ADDR ADDRESS SELECTION

| ADDR pin (A3) resistor to GND (K-ohm)* | Power Supply Main Controller (Serial Communications Slave Address) | Power Supply External EEPROM (Serial Communications Slave Address) |
|--|--|--|
| 0.82 | 0xB0 | 0xA0 |
| 2.7 | 0xB2 | 0xA2 |
| 5.6 | 0xB4 | 0xA4 |
| 8.2 | 0xB6 | 0xA6 |
| 15 | 0xB8 | 0xA8 |
| 27 | 0xBA | 0xAA |
| 56 | 0xBC | 0xAC |
| 180 | 0xBE | 0xAE |

* The resistor shall be +/-5% tolerance
#BackToADDRSig

WIRING DIAGRAM FOR OUTPUT

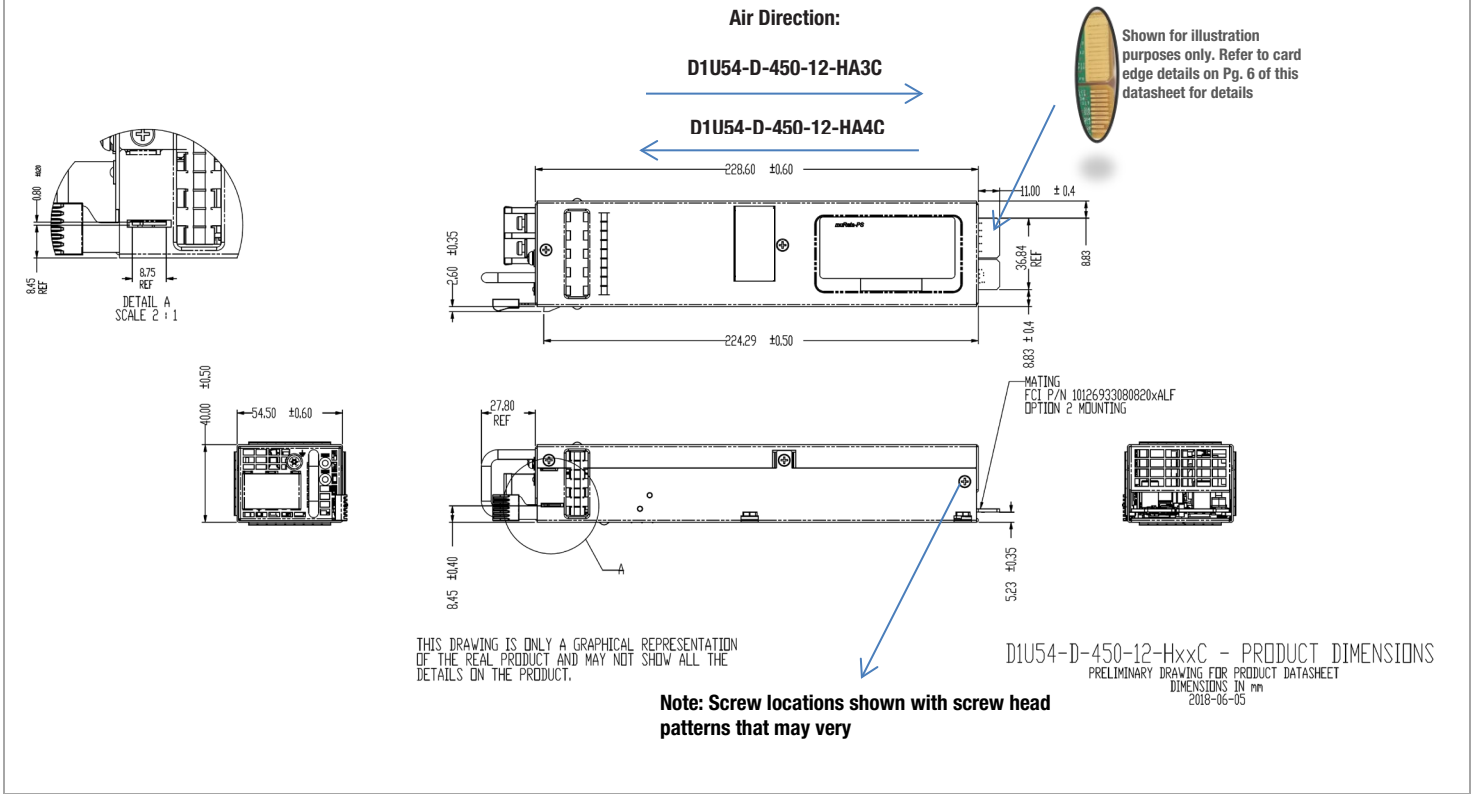
 Dotted lines show optional remote sense connections.
 Optional remote sense lines can be attached to a load that is a distance away from the power supply to improve regulation at the load.



CURRENT SHARE NOTES

1. Main Output: Current sharing is achieved using the active current share method details.)
2. Current sharing can be achieved with or without the remote (V_SENSE) connected to the common load.
3. +VSB Outputs can be tied together for redundancy but total combined output power must not exceed the rated standby power. The +VSB output has an internal ORing MOSFET for additional redundancy/internal short protection.
4. The current sharing pin B5 is connected between sharing units (forming an ISHARE bus). It is an input and/or an output (bi-directional analog bus) as the voltage on the line controls the current share between sharing units. A power supply will respond to a change in this voltage but a power supply can also change the voltage depending on the load drawn from it. On a single unit the voltage on the pin (and the common ISHARE bus would read 8VDC at 100% load. For two units sharing the same load this would read 4VDC for perfect current sharing (i.e. 50% load per unit).
5. The load for both the main 12Vdc and the VSB rails at initial startup shall not be allowed to exceed the capability of a single unit. The load can be increased after a delay of 3sec (minimum), to allow all sharing units to achieve steady state regulation.

MECHANICAL DIMENSIONS



- DC input Input Terminal Block is a Dinkle Enterprise DT-7C-B14W-02
- Dimensions: 2.15" x 9.0" x 1.57" (54.5mm x 228.6mm x 40.0mm)
- This drawing is a graphical representation of the product and may not show all fine details.
- Reference File: I:\Eng_wip\UserPDDwg\1919\D1U54-D-650-12-HBxC_DRAWING FOR PRODUCT DATASHEET

OPTIONAL ACCESSORIES

| Description | Part Number |
|----------------------------------|----------------|
| 12V D1U54P Output Connector Card | D1U54P-12-EDGE |

APPLICATION NOTES

| Document Number | Description | Link |
|-----------------|---|---------------------------------|
| ACAN-73 | D1U54P-54-CONC-EDGE Output Connector Card | Link to ACAN-73 |
| ACAN-74 | D1U54P-x Communication Protocol | Link to ACAN-74 |

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С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

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- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
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- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

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Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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