



BD16 User Manual

Eurorack power distribution bus board

Installation, wiring, load planning and illustrative simulations for the Rogue Modular BD16. The board distributes external DC power to 16 module connections; it does not generate the supply voltages.

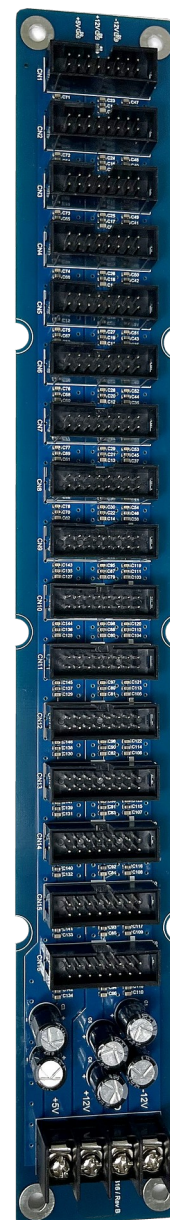
Specifications

Parameter	Specification
Module connections	16 shrouded 16-pin IDC headers
Power rails	+12 V, -12 V and +5 V, with ground
Maximum connector current	750 mA per rail at each connector
Maximum current per rail	2,000 mA total per rail across the board
Power input	Four-position screw terminal block
Rail indication	Dedicated LED for each of the three supply rails
Capacitors	Bulk reservoir capacitors and bypass capacitors at each header
Terminal wiring	Up to two 14 AWG wires with spade crimps; see page 3
Included hardware	Six mounting screws
Board dimensions	311.15 × 43.18 mm (12.250 × 1.700 in)

PCB copper: 1 oz (nominal 35 μ m), confirmed by the PCB fabricator. Each rail supports 750 mA per connector and 2,000 mA total, subject to supply and wiring capacity.

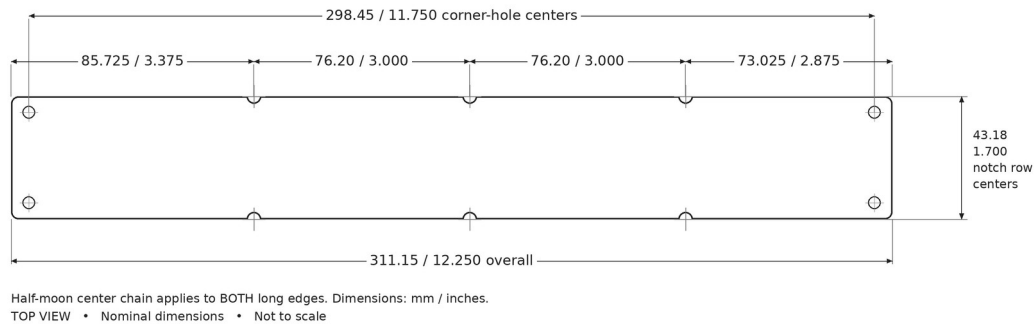
Connection notes

Use a regulated DC supply and verify polarity before powering on. Dimensions: page 2. Wiring and examples: pages 3–5. Supply selection: page 6. Startup: page 7. Engineering notes: page 8. Simulations: pages 9–11.



Mechanical dimensions

BD16 revision B board outline and mounting layout. Nominal dimensions are derived from B16_REV_B_DIM.DXF; millimeter values are converted from the drawing's inch dimensions.



Board and mounting specifications

Feature	Inches	Millimeters
Overall length × width	12.250 × 1.700	311.15 × 43.18
Corner-hole pattern center to center	11.750 × 1.250	298.45 × 31.75
Corner mounting holes 4 locations	Ø 0.177 nominal drill	Ø 4.496 nominal drill
Hole centers from short ends	0.250	6.350
Hole centers from long edges	0.225	5.715
Edge notches 3 on each long edge	R 0.100	R 2.540
Notch center positions from left board edge	3.375 / 6.375 / 9.375	85.725 / 161.925 / 238.125

Mounting reference

With the terminal block at the right, use the left and bottom edges as the origin. Corner-hole centers: X = 0.250 / 12.000 in; Y = 0.225 / 1.475 in. Half-moon screw centers: X = 3.375 / 6.375 / 9.375 in (85.725 / 161.925 / 238.125 mm); Y = 0 / 1.700 in (0 / 43.18 mm). Adjacent half-moon centers are 3.000 in (76.20 mm) apart.

Hole diameter is corroborated by the revision B fabrication drill file (T05). Finished plated-hole size, fabrication tolerances, PCB thickness and assembled height are not specified by this drawing. Allow clearance for components, wiring and the underside of the PCB.

Power supply wiring

Recommended DC feed wiring from the regulated power supply to one BD16 board. The board limit is 2,000 mA per rail, with 750 mA per rail at each module connector.

Wire gauge and length

Stranded copper wire	Recommended maximum one-way length	Calculated wire drop at 2 A
16 AWG (1.31 mm ²)	0.5 m (approximately 20 in)	26 mV
14 AWG (2.08 mm ²)	1.0 m (approximately 39 in)	35 mV

Use 16 AWG for short feeds or 14 AWG for longer feeds. Size ground for the combined return current, using the same gauge or larger. Route supply and return wires together.

These are conservative design recommendations, not tested absolute cable-length limits. Calculations assume equal-length supply and ground wires, 2 A in each conductor, and nominal wire resistance: 4.0 Ω /1,000 ft for 16 AWG and 2.7 Ω /1,000 ft for 14 AWG [1, 2]. Loop drop = 2 × current × one-way length × resistance per unit length. Connector, PCB and module-ribbon losses are additional; resistance rises with temperature. Check voltage at the board under full load.

Fork / spade crimp terminals

Recommended selection: M3 fork lugs with a 3.2 mm screw opening and a narrow 5.7 mm tongue. Confirm the screw size and that the lug seats flat within the barriers on the fitted terminal block before ordering in quantity; the examples below have not been fit-tested on the BD16.

Wire	Crimp barrel range	Example Phoenix Contact lug
16 AWG	0.5–1.5 mm ²	C-FCI 1,5/M3 · 3240032 [3]
14 AWG	1.5–2.5 mm ²	C-FCI 2,5/M3 · 3240037 [4]

Match the barrel to the conductor cross-section and use the lug manufacturer's specified crimp tool. Each terminal accepts up to two 14 AWG wires fitted with suitable spade crimps, allowing an incoming supply feed and an outgoing daisy-chain link. Seat both lugs securely within the terminal barriers. The assembly BOM identifies CN17 as WJ25C-B-7.62-4P (C8424), with a 14–22 AWG wire range.

For daisy chains, size feeds for all downstream loads. Recalculate voltage drop using actual rail and ground currents; the table assumes 2 A in each. Length guidance covers DC feeds, not module ribbon cables.

Reference data

- 1 · Belden 39116 — 16 AWG wire
- 2 · Belden 39114 — 14 AWG wire
- 3 · Phoenix Contact 3240032 — M3, 0.5–1.5 mm²
- 4 · Phoenix Contact 3240037 — M3, 1.5–2.5 mm²

Application notes

The following examples show DC power distribution between BD16 boards and installation in a Eurorack case. Use the terminal labels to identify each rail and refer to page 3 when selecting feed wires and crimps.

Example 1 Daisy chain between two boards

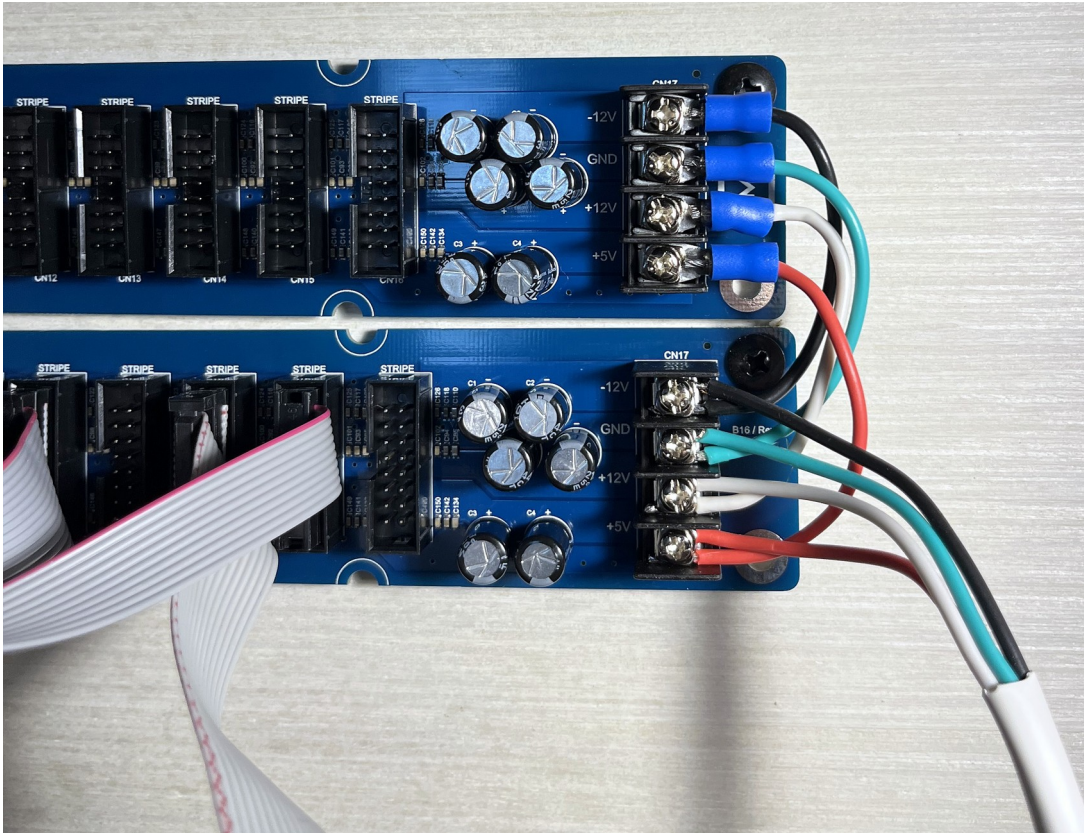


Figure 1. Incoming supply feed at the lower board with an outgoing link to the upper board.

Connect like-labeled terminals: -12 V to -12 V, GND to GND, +12 V to +12 V and +5 V to +5 V. In this example, the wires are black, green, white and red respectively. These colors identify this photographed assembly only; verify labels and polarity for your wiring.

Each terminal accepts up to two 14 AWG wires fitted with suitable spade crimps: one incoming feed and one outgoing link. Select lugs that seat securely within the terminal barriers.

The incoming feed carries the combined load of both boards; the link carries the downstream board's load. Account for both segments when checking voltage drop. Keep each rail on each board within 2,000 mA and each module connector within 750 mA per rail.

Application notes continued

Example 2 Installation in a Eurorack case

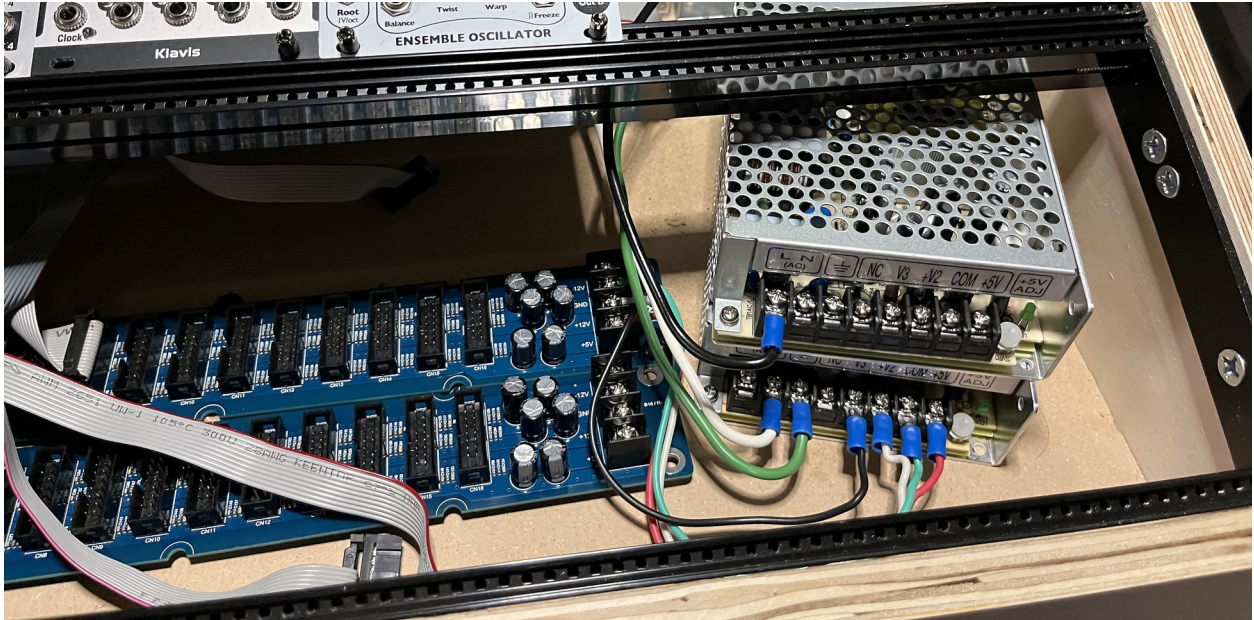


Figure 2. Case installation showing mounted BD16 boards, module ribbon cables and external power supply equipment. Additional equipment is shown for context and is not included with the BD16.

Supply and module connections

Feed the board from the corresponding regulated DC outputs of the power supply. Connect its DC common to GND and match each voltage rail to the marked BD16 terminal. The equipment shown is an installation example; use your power supply's documentation to identify its outputs.

Fit module ribbon cables with the correct polarity at both the board and module. Check the module's power requirements and connector orientation before applying power. Mount the board with clearance below the PCB and leave room for the terminal wiring and ribbon cables.

Load planning for a shared feed

For example, two boards each drawing 1 A from +12 V place 2 A on the shared +12 V feed. The +12 V link to the second board carries 1 A. Calculate voltage drop separately for each rail and its ground return using the actual downstream current; the 2 A wire-length table on page 3 does not establish a maximum for an entire chain.

Before connecting modules, verify the rail voltages and polarity at each board. Then check the voltages again under the intended load. Power off before changing connections. This section describes the DC distribution wiring; mains connections are outside its scope.

Power supply references

Mean Well triple-output supplies listed by Jameco. Select according to the rail loads and operating requirements below.

Mean Well model	Jameco part	Rated outputs	Rated power
RT-50B	323460	+5 V: 4 A +12 V: 2 A –12 V: 0.5 A	50 W
RT-65B	323540	+5 V: 5 A +12 V: 2.8 A –12 V: 0.5 A	64.6 W

Both supplies have a 0.5 A rated –12 V output. Higher current-range values remain subject to total-power and operating limits. Supply capacity does not increase the BD16 limits: 2,000 mA per rail on each board and 750 mA per rail at each module connector.

DC output connections

Connect +V1 to BD16 +5 V, +V2 to +12 V, V3 to –12 V, and COM to GND. This mapping applies to the B models listed above.

Verify the B model and terminal markings before wiring. Follow the manufacturer’s instructions for protective earth, enclosure, ventilation and AC installation. These supplies require installation inside equipment.

Sizing and operating checks

The supply only needs the rails required by all connected modules: +12 V only, +5 V only, or both if –12 V is not needed. Check every module’s requirements. Always connect DC common to GND; leave unused rail inputs unconnected.

Sum module currents for each rail across all boards. Allow for startup, board consumption and supply derating. Stay within supply and BD16 limits; spare capacity on one rail cannot compensate for another.

Verify voltage and ripple under the intended rail loads against each module’s requirements. Follow the applicable supply datasheet’s loading conditions, including lightly loaded rails; the three outputs must not be assumed to adjust independently.

Ordering and manufacturer documents

Jameco RT-50B · part 323460

Jameco RT-65B · part 323540

Mean Well RT-50 series datasheet

Mean Well RT-65 series datasheet

Product listings checked September 30, 2026. Check current stock and pricing with Jameco. Electrical references: Mean Well datasheets dated November 22, 2024.

First power up and troubleshooting

Perform installation and wiring with power disconnected. These instructions cover the low-voltage DC side. Follow the power-supply manufacturer's instructions for AC wiring, protective earth, enclosure and ventilation.

Installation sequence

1. List the required rails and maximum current for every module. Sum +5 V, +12 V and -12 V separately. Each connector is limited to 750 mA per rail; each board is limited to 2,000 mA total per rail. Also observe the external supply's limits.
2. Mount the board securely using the mechanical drawing. Keep the underside clear of conductive surfaces, loose hardware and wiring. Allow access to the terminal block and module headers.
3. Connect each required DC rail to its matching terminal and connect DC common to GND. Leave unused rail inputs unconnected. Check crimp seating, polarity and stray wire strands.
4. Before connecting modules, energize the supply and measure every required rail relative to GND. Confirm both voltage and sign. Check the supply's minimum-load recommendations; an unloaded test alone does not establish regulation under use.
5. Switch off and allow the supply to discharge. Connect the ribbon cables, checking both board and module orientation. Align the cable's -12 V conductors with the marked -12 V pins; do not rely only on the connector key or cable color.
6. Power up with the intended modules and recheck voltage at the board and at a loaded connector. If voltage is incorrect, a supply cycles, or a connection warms unexpectedly, power down and inspect the load budget and wiring before continuing.

Troubleshooting

Rail LED off: an intentionally unused rail can have its LED off. For a required rail, measure the supply output and terminal voltage, then inspect the feed and connections. An LED indicates rail presence; it is not a precision voltage or current-limit monitor.

Voltage low under load: check that rail's supply rating, shared-feed current, ground return, wire length and crimps. Compare supply-terminal and connector voltages to locate the drop.

Hum, noise or unstable operation: check supply loading conditions, ground routing and ribbon connections. Compare measured ripple with the module's requirements. The simulations on pages 9–11 are explanatory examples, not acceptance limits.

Copper and current assessment

The PCB fabricator confirmed 1 oz copper, nominally 35 μm thick. This takes precedence over the 2 oz stack-up setting found in the historical Altium design. The operating limits in this manual remain 750 mA per rail at each connector and 2,000 mA total per rail across the board.

Main bus copper screening

Representative main-bus widths were read from the revision B Gerbers. The table uses the IPC-2221 internal-conductor curve fit as a deliberately conservative screening baseline, with a 10°C conductor temperature rise. These are broad-section estimates, not whole-board maximum ratings or an optimized IPC-2152 analysis.

Rail	Bus width	1 oz estimate	2 oz comparison
+5 V	6.73 mm	4.8 A	7.9 A
+12 V	4.34 mm	3.5 A	5.7 A
–12 V	6.12 mm	4.4 A	7.4 A

The 2 oz column is a hypothetical comparison only. The manufactured board uses 1 oz. The equation is $I = 0.024 \times \Delta T^{0.44} \times A^{0.725}$, where A is copper cross-sectional area in square mils. It counts one copper layer; no doubled capacity from parallel layers is assumed.

The broad rail sections have calculated margin over 2 A. Pad constrictions, terminals, connector contacts, ground return and heating from adjacent loaded conductors must also be considered. This calculation is not measured thermal validation of the complete board.

Connector and load budgeting

The BOM identifies the module headers as C3406, 2.54 mm 2×8 shrouded headers. Standard Eurorack wiring uses two contacts per supply rail. At 750 mA per rail, ideal equal sharing gives 375 mA per contact. Actual sharing, mating sockets, ribbon conductors and termination quality affect performance. The stated operating limit is not an automatic current clamp.

For example, connector loads of 750 mA + 750 mA + 500 mA use the full 2,000 mA budget on one rail; allow for board consumption as well. A separate budget applies to each other rail. Do not multiply 750 mA by 16 to determine available board current.

0.5 A equals 500 mA. The RT-50B and RT-65B each have a rated –12 V output of 0.5 A, shared by all boards and modules supplied from that output. The board's higher distribution rating does not increase the supply's output capacity.

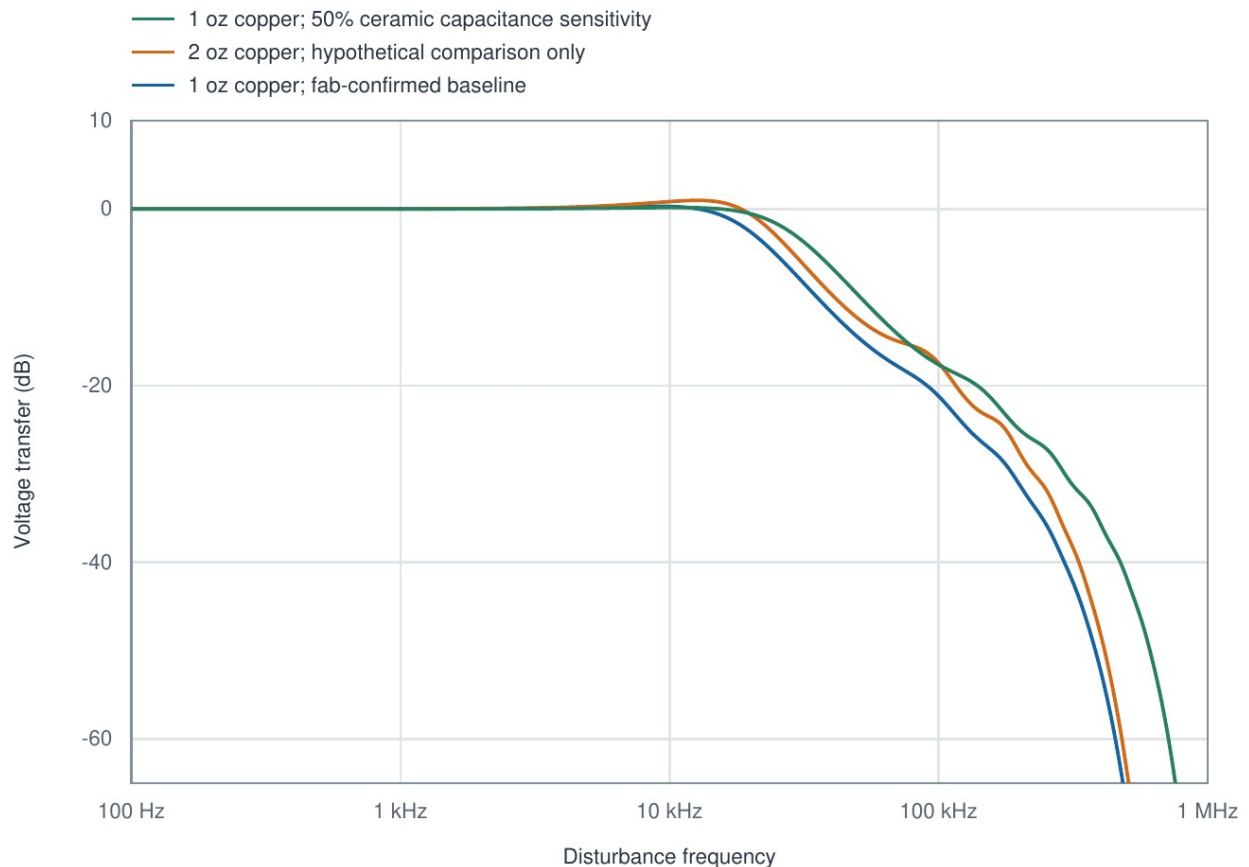
Engineering references

Qorvo IPC-2221 curve-fit equations: <https://www.qorvo.com/design-hub/design-tools/interactive/pcb-trace-power-handling-calculator>

IPC technical paper, The Value of IPC-2152, including the conservative chart and adjacent-conductor discussion: https://www.electronics.org/system/files/technical_resource/E7%26S22_03.pdf

Simulated ripple transfer

Reference only — not measured product performance. Actual results will differ in your installation due to wire inductance, cable length and routing, connection resistance, supply behavior and module loads. This graph models the +12 V rail.



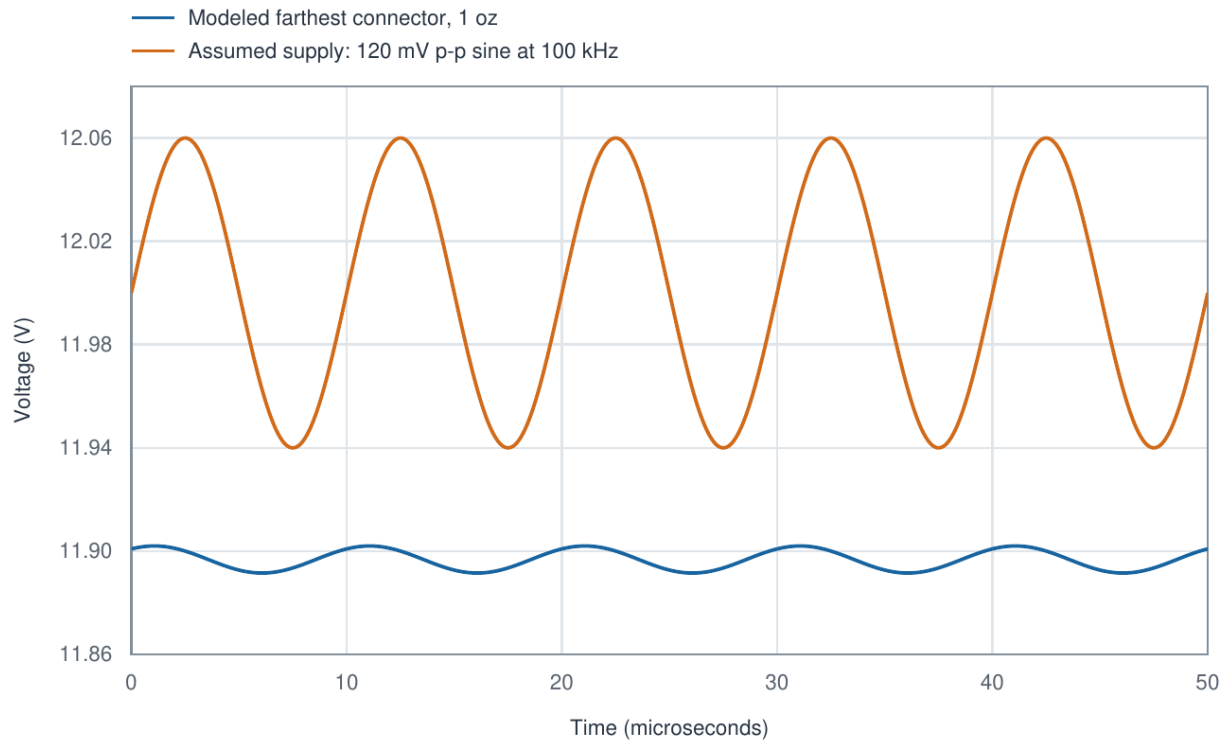
0 dB means no change; negative values mean reduced ripple; positive values indicate resonant amplification. The fab-confirmed 1 oz baseline gives approximately -21.2 dB at the illustrative 100 kHz test point. The 2 oz curve is hypothetical. The third curve halves ceramic capacitance to show sensitivity to effective capacitance.

Feed assumptions: 0.5 m one-way 16 AWG copper; 13.1 mΩ loop resistance and 0.30 μH loop inductance. Board assumptions: 16 equally spaced connector sections, with 56 mΩ total rail-plus-return resistance at 1 oz and 0.20 μH total loop inductance. These are approximate paths, not a full field extraction.

The RT-50B datasheet gives ripple limits but no switching frequency, ripple spectrum or output impedance. The model assumes a stiff supply-terminal boundary and ideal small-signal current loads. Supply regulation, cross-regulation and load-generated noise are excluded. No module ribbon cable is included. Do not extrapolate above 1 MHz.

Simulated connector ripple

Reference only — actual results will differ with wiring inductance, cable length and routing, connections, supply behavior and module loads. This simulated +12 V example uses 2 A total, including 750 mA at the farthest connector.



The other 15 connectors share 1.25 A uniformly. The 1 oz model predicts about 103.2 mV of DC feed-and-board drop and 10.47 mV peak-to-peak ripple for this specific input. The result stops at the connector pads; contact and module ribbon losses are excluded.

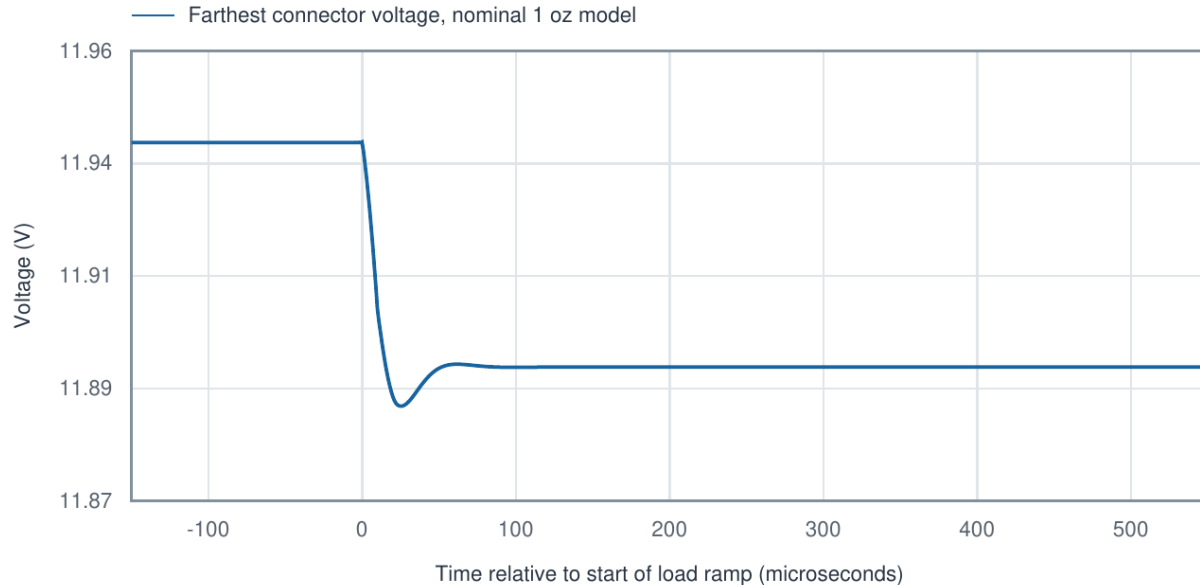
The input is a deliberately chosen 100 kHz sine with 120 mV peak-to-peak amplitude. 100 kHz is not a verified RT-50B switching frequency. The amplitude uses the +12 V ripple/noise limit as an example, not a measured sine amplitude. Actual noise contains multiple frequencies, so this does not establish actual residual ripple.

RT-50B rated outputs: +5 V at 4 A, +12 V at 2 A, -12 V at 0.5 A; 50 W total. Maximum ripple/noise: 80 mV peak-to-peak on +5 V and 120 mV peak-to-peak on each 12 V rail. The BD16 still limits +5 V to 2 A per board; -12 V capacity is limited by the supply.

Mean Well measures ripple/noise at 20 MHz bandwidth through a 12-inch twisted pair terminated with 0.1 μF + 47 μF . This differs from the modeled circuit. Its datasheet recommends CH1 (+5 V) loading above 10% for multi-output operation: more than 0.4 A for RT-50B. Observe total-power and temperature derating limits.

Simulated load step

Reference only — actual results will differ with wire inductance, cable length and routing, connections, supply behavior and module loads. This models only the board and feed; supply control-loop behavior and switching ripple are excluded.



The farthest connector's load rises from 100 mA to 750 mA over 10 μ s. Other connectors draw 1.25 A, so total rail current rises from 1.35 A to 2 A. With the supply terminal held at exactly 12 V, steady connector voltage changes from approximately 11.942 V to 11.897 V. Actual supply sag or recovery may add to this response.

BOM capacitance per rail: two 220 μ F bulk capacitors and one each of 10 μ F, 1 μ F and 100 nF at every connector. Assumed bulk ESR/ESL: 0.10 Ω / 10 nH per capacitor. Assumed ceramic ESR: 10 / 20 / 30 m Ω , respectively; ESL: 0.7 nH each. These parasitics are estimates, not fitted measurements. Ceramic capacitance depends on DC bias.

Each rail uses an independent equivalent return. Simultaneous shared-ground effects, actual connector spacing, pad necks, mutual inductance, temperature and component tolerances are not solved. Ringing depends on the assumed inductance and ESR. The baseline uses the fab-confirmed 1 oz copper.

Source: BD16 revision B BOM and Gerber review; Mean Well RT-50 datasheet dated 2024-11-22: <https://www.meanwell.com/Upload/PDF/RT-50/RT-50-SPEC.PDF>. The Python model and CSV data are retained with the project. Validate with differential or short-ground probing at the supply and connector under matching loads before treating these curves as measured performance.